U.S. Department of Transportation

BETTER UTILIZING INVESTMENTS TO LEVERAGE DEVELOPMENT
BUILD FY 2020 GRANT APPLICATION

Project Name:	**Bridging the Economy of Rural Maine Project**
Project Type:	Primary-Road/Secondary-Bridge Repair/Replacement
Project Location:	Rural, Maine 1st and 2nd Congressional District
Funds Requested:	$23,616,000 - (80%)
Funds Matched:	$ 5,904,000 - (20%)
Total Project Cost:	$29,520,000
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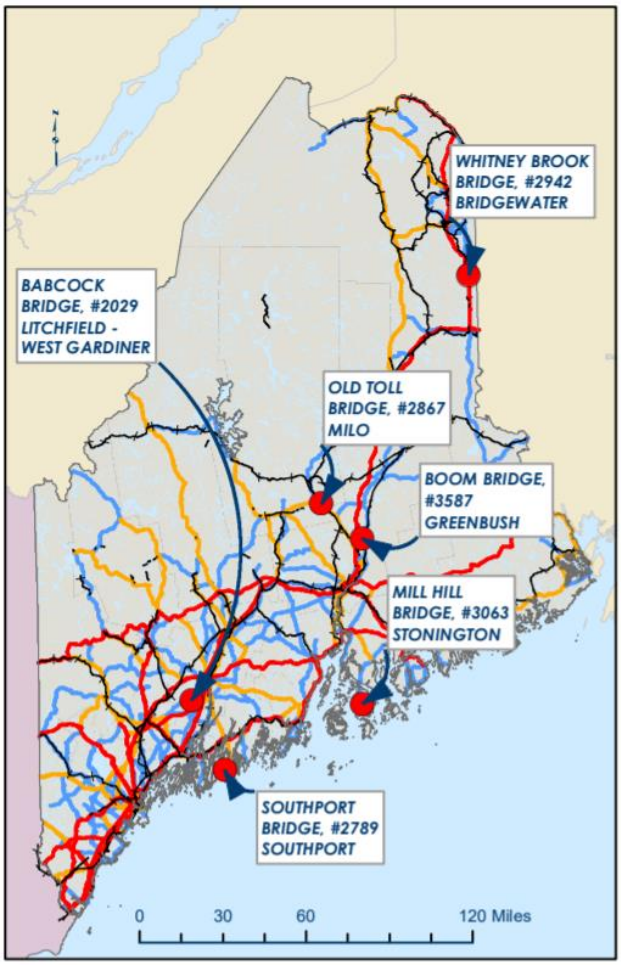

Project Summary

Maine Department of Transportation (MaineDOT) is seeking $23,616,000 from a U.S. Department of Transportation (USDOT) Better Utilizing Investment to Leverage Development (BUILD) FY 2020 grant. The total cost of the project is $29,520,000, 20 percent ($5,904,000) of which will be matched by MaineDOT and core federal funding.

The *Bridging the Economy of Rural Maine Project* will:

a) Replace five and rehabilitate a sixth key highway bridges located throughout rural Maine, each built prior to 1940, currently rated in poor condition and reaching the end of their useful lives.
b) Maintain access to basic life services at existing travel distances and times where alternatives are in some cases limited and costly and put lives at greater risk.
c) Allow for uninterrupted supply chains for commerce in Maine's rural regions.
d) Ensure that many of the distinct and varied elements of Maine's unique economy, from agriculture to forest products to lobstering, remain competitive in today's global economy.
e) Continue uninterrupted access to Maine's tourism economy, including the outdoor recreational resources of its vast coastline, trails and lakes for residents and tourists throughout the state.

The *Bridging the Economy of Rural Maine Project* (the "Project") will fully replace five challenged bridges and rehabilitate one other at key locations throughout the state. An analytical approach has been taken to identify rural Maine bridges most in need of significant investment; these six bridges top the list but are also emblematic of the larger critical need for bridge replacement in Maine. While these candidate bridges are geographically spread out, they are connected by their importance to an economically distressed region and each serves one or more connected parts of the state's vast economy. Also, in common, each bridge was built prior to 1940 and each has at least one aspect that is rated in poor condition. Some have more than one. Each needs to be replaced (one repaired) or they will incur significant maintenance work at the end of their serviceable life and risk potential closure. These bridges lack many of the modern safety protections that have been developed and are now standard since these bridges were put in service more than 80 years ago. The impact of their failure or closure on residents, tourists, and businesses is great. Most of these bridges have little reasonable alternative routing that could handle the same traffic weight and density. And because there are few alternative routes, *one-way* detours in the event of a bridge closure range from 13 to more than 100 miles. This would add significant expense to already economically challenged individuals, businesses and tourists and could put lives at risk from less efficient emergency services and inflict substantial inconvenience at best. Replacing the bridges now, prior to load restrictions, failure or forced closure allows for their planned, orderly and cost-efficient replacement and an overall more efficient use of scarce funds. The Project maintains existing access to schools and basic services for residents in the state, allows businesses in Maine to use these state roads as capillaries to the artery of Interstate 95 and allows recreational enthusiasts continued access to Maine's many outdoor activities that drive the state's $9 billion tourism industry. It greatly improves the safety of motor vehicle operation over the bridges. Maine and MaineDOT have been investing

consistently in bridge improvements and replacements but additional funding sources are needed to continue to keep the state's 2,461 bridges in a state of good repair.[1]

MaineDOT is an accomplished, experienced and responsible recipient of past TIGER, FASTLANE, INFRA and BUILD grants and can be relied upon to fully fund and commence the project in advance of the 2022 obligation date, and to complete the project by the 2027 requirement without risk. Replacing these five bridges and rehabilitating one other will ensure this region maintains continuous access without inflicting undue burdens that this state with its vast rural areas, simply cannot afford.

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Standard Form 424, Application for Federal Assistance

Project Narrative

I. Project Description

According to TRIP, a national transportation research nonprofit, "Good transportation is essential in rural areas to provide access to jobs, to facilitate the movement of goods and people, to access opportunities for health care and educational skills, and to provide links to other social services. Transportation supports businesses and is a critical factor in a company's decision to locate new business operations. For communities that rely on tourism and natural amenities to help support their economy, transportation is the key link between visitors and destinations."[2] Many parts of Maine are economically distressed. The bridges in the Project provide residents of many small rural towns access to schools and shopping, healthcare and emergency services and basic life necessities. Some provide access for the Maine forest industry to get logging trucks from the many private roads that connect the forests to Maine state roads and ultimately to Interstate 95. Many provide the state's rural agriculture economy with a means to get produce to market. They also provide access for residents and visitors to Maine to enjoy the state's outdoor recreational activities. If access over those bridges was discontinued, the additional costs in travel time and distance would place a great burden on this challenged region. Detours over comparable roadways would stretch from 13 miles to 100 miles. That would impact residents, business and industry both within the region and traversing *through* the region as well as the tourism industry *within* the region. On an average daily basis, 18,140 vehicles traverse these bridges presently, of which 2,119 are heavy trucks.

[1] USDOT FHWA National Bridge Inventory, https://www.fhwa.dot.gov/bridge/nbi/no10/county19a.cfm#me
[2] https://tripnet.org/wp-content/uploads/2019/08/Rural_Roads_TRIP_Report_May_2019.pdf page 2

Maine's freight network is the lifeblood of the state. It provides critical access by which goods flow into and out of the state, and also offers local access to goods, services and employment, thereby bolstering Maine's economy. Maine's highways are used to transport the majority of freight, capturing more than 80% of all freight tonnage moved within the state.[3]

Given the importance of the transportation system to the state, Maine's bridges present a daunting challenge. Of all the states in the U.S., Maine has the highest proportion of its residents living in rural areas, some 61.3% according to Census Bureau definition.[4] The rural nature of the state is exhibited by the fact that 89% of the total land in Maine is forestland,[5] and 8.7% of Maine's *overall* ADT operates over bridges in poor condition. Only five states have a higher percentage. That is 220% higher than the overall U.S. number. Nine percent of Maine's overall ADT across bridges is in *rural areas*. Only four states have a higher percentage. That is 250% higher than the overall U.S. number. 4.6% of Maine's overall ADT travels on *poor bridges in rural areas*. For the U.S. that number is <1.0%. Only two of 53 states and U.S. territories fare worse.[6] If you were to place Maine's bridges rated in poor condition end-to-end, they would stretch for more than six miles. The state has identified needed repairs to 360 bridges at an estimated cost of $1.05 billion. The need in Maine is vast and resources are limited. With so many poor bridges spread across such a vast rural state, MaineDOT prioritizes which bridges have the most critical need, despite the possibility of critical bridges being spread far apart. That's why the Project bridges are in six different counties: Aroostook, Hancock, Kennebec, Lincoln, Penobscot, and Piscataquis.

There are 2,461 bridges over 20 feet in length in the National Bridge Inventory in Maine. Of these, 314 have been determined to be in poor condition, and thus have a significant defect. In 2019, Maine ranked 7th nationally in terms of percentage of total bridges that are in poor condition, some 13%. All of the bridges that make up the Project have at least one component that is in poor condition, and many have more than one.

Bridge	Town	Route	Waterway	County	Congressional District	Year Built
Babcock	Litchfield/West Gardiner	RTE 126	Cobbossecontee Lake	Kennebec	2nd	1931
Mill Hill	Stonington	Route 15	Mill Pond Outlet	Hancock	2nd	1939
Boom	Greenbush	Route U.S. 2	Beach Bridge Brook	Penobscot	2nd	1938
Southport	Southport	Route 27	Townsend Gut/Atlantic Ocean	Lincoln	1st	1939
Old Toll	Milo	Routes 6, 11, 16	Piscataquis River	Piscataquis	2nd	1926
Whitney Brook	Bridgewater	U.S. 1	Whitney Brook	Aroostook	2nd	1923

[3] Maine Integrated Freight Strategy, November 2017, https://www.maine.gov/mdot/ofbs/docs/FreightStrat.pdf, page ES-3
[4] https://www.quora.com/Which-U-S-state-has-the-most-rural-land-out-of-all-the-other-states
[5] http://maineforest.org/wp-content/uploads/2016/09/Maines-Forest-Economy-10-12-2016.pdf, page 2 of pdf
[6] https://www.fhwa.dot.gov/bridge/fc.cfm

Overall, Maine is a very good steward of transportation spending resources. In the Reason Foundation's *24th Annual Highway Report*, Maine is ranked 4th among all other states in overall cost effectiveness and condition, ranking 1st in rural interstate pavement condition and 7th in rural arterial pavement condition. Where Maine must improve and where its rankings are lowest is for bridge conditions. According to the same report, Maine's worst rankings are in structurally deficient bridges, ranking 41st. For states with the most structurally deficient bridges as a percent of their total bridge inventory, Maine ranks 7th worst.[7] To improve in the rankings, Maine needs to reduce its percentage of structurally deficient bridges. Maine is in the bottom 10 of states with structurally deficient bridges in the country.[8] In order to begin to catch and place Maine's transportation system on an equal footing with states that do not have nearly as many miles per-capita (the result of low population density and a large land mass), Maine needs infusions such as BUILD grants to allow its rural residents and the many diverse businesses to compete.

The FHWA defines "poor condition" as a classification given to a bridge which has any component: deck, superstructure, substructure, or culvert in poor or worse condition, a code of 4 or less.[9] FHWA defines a bridge with a fracture critical member (FCM) as one which has a steel member in tension, or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse.[10] The Project bridges are all prioritized for replacement by MaineDOT but presently there is not enough funding to complete replacements for all bridges where it is needed. For rural major and minor collector bridges, which each of these bridges is classified as, only 5 states have a higher percentage of these type of bridges in worse condition than Maine. In 2014, MaineDOT updated a 2007 study to determine the necessary funding for Maine bridges "to maintain a safe bridge network and extend bridge life as needed" and that figure is $140 million.[11] Maine has done an excellent job selecting the highest priority bridges for BOTH safety and return on investment as the state prioritizes the number of bridges requiring investment. MaineDOT completed 76 bridge projects in 2019, spending $130.8 million, but the need is far in excess of that amount.[12]

These bridges are crucial to the diverse Maine economy. They provide access to rural forestlands which are vital to the forest industry, an industry which is still a great driver of the Maine economy. The industry provides for 33,538 total jobs (both direct and indirect) and an $8.5 billion total economic impact to a state with $60 billion in GDP.[13] In addition to providing connectivity for local rural residents, the roads over these bridges connect on one end with the timber regions and on the other end with Interstate 95. Both feedstocks for the mills and finished products flow by truck across the Project bridges to chip mills, sawmills and wood burning biomass power plants.

The tourism industry in Maine is also vital to the economy. These bridges play critical connective roles taking tourists in vehicles to recreation regions; the bridges are the gateways.

[7] https://www.artba.org/2020/04/12/230000-u-s-bridges-need-repair-new-analysis-of-federal-data-finds/
[8] https://reason.org/wp-content/uploads/24th-annual-highway-report-2019-state-by-state-summaries.pdf, page 37
[9] https://www.fhwa.dot.gov/bridge/britab.cfm
[10] https://www.fhwa.dot.gov/bridge/nbis/
[11] http://www.maine.gov/mdot/pdf/kobs2014.pdf, page 1
[12] https://www.maine.gov/mdot/projects/workplan/docs/2020/WorkPlan2020_2021_2022%20Jan_14_2020.pdf, page xii
[13] Supra note 3, Maine Forest Economy, page 2 of pdf

The Project bridges in the central part of the state connect tourists to lakes and trails popular for fishing and hiking in summer and snowmobiling and skiing in the winter. Those in the south connect tourists to Maine's vast coastline which offers unique inns, a wide array of seafood, and Maine's flagship lighthouses. There are 65 lighthouses along Maine's 3,478 miles of coast. Many are open to the public and some even offer an inside look of the tower and the keeper's quarters. A good number have adjacent museums. These industries along with lobstering, agriculture and recreation are important drivers of Maine GDP and can all be positively impacted by the investment of the Project.

Because of the size of this rural region and the scarcity of bridges, each one is of great importance. When access to a bridge is closed in these rural areas, there is usually no simple nearby alternative within a reasonable distance.

Quantitative Facts[14]

Project Name: Bridging the Economy of Rural Maine Project

- The $29,520,000 in roadway infrastructure investment will yield $642 million in economic output for this region.
- This project will replace five rural highway bridges (all built between the years of 1923 through 1939) with modern bridges with 100-year lives and upgrade a sixth for the next 30 years. All will have modern safety features preventing the safety and economic impact of their outages.
- The Project has a total Net Present Value (NPV) benefit of at least $642 million and a benefit-cost ratio of at least 26.14 to 1.
- The Project is regional in scope and is located in a rural region of the country.
- The bridges in the Project are located in six counties: Aroostook, Hancock, Kennebec, Lincoln, Penobscot, and Piscataquis.
- The Project is located in Maine's Congressional District 1 (Representative Chellie Pingree) and Congressional District 2 (Representative Jared Golden). The state is represented by U.S. Senators Susan Collins and Angus King.[15]
- Total amount of BUILD FY 2020 funds requested: $23,616,000 (80 percent of the total cost of the project). A match has been committed by the Maine Department of Transportation in the amount of $5,904,000 (20 percent) which includes Maine's core federal funding.[16]
- Previously incurred expenses for all six bridges are $715,670 as of May 5, 2020.
- The Project's geospatial data can be found in the tables describing each bridge.
- The BCA analysis conservatively estimates that these bridges will last another 10 years before they must be replaced or shut down, and the project BCA accrues no benefits before that time.
- Total Cost of the Project: $29,520,000.

[14] See *Appendix A*, Benefit-Cost Analysis, for an explanation of the statistics cited below.
[15] See *Appendix E*, Support Letters.
[16] See *Appendix F*, Match Letter.

Built in the 1920s, 30s and 40s, these bridges are at the end of their useful lives despite undergoing life-extending improvements in the past. Each bridge presently has at least one condition that is rated poor, most have more than one. Each of these conditions will be fully remedied with a replacement bridge, and in the case of Southport, a rehabilitation. In each case, access across comparable to the bridges during construction will be maintained to avoid the reroute hardships that the Project aims to prevent. If the Project is not completed, there is the real risk of an eventual shutdown which would force reroutes. It is important to note that detour length is determined from the detour being on a route of the same or better roadway functional classification, where available. It is not necessarily the shortest route. Traffic detoured from a bridge on the interstate or a bridge on a state route can only be detoured onto another interstate or state route. A factor to consider when determining if a detour is available is the potential for moving vehicles, including heavy trucks, around the structure. Therefore, town roads are typically avoided for detour routes as they are less capable of accommodating heavy truck traffic. The coding of detour length of 99.9 or 100 indicates a detour length greater than 99.9 miles, a bridge with no available detour, or a detour which requires entry into Canada.

The following are details on the current bridges as well as the plan for replacement bridges:

1. **Babcock Bridge (#2029) – Route 126 over the Cobbossecontee Stream in Litchfield/West Gardiner**

Bridge Coordinates	Year Built	Bridge Length (Feet)	Bridge Type	Functional Classification	2020 AADT
Lat: 44.202999 Lon: -69.899239	1931	53	Cast-in-place Concrete T-Beam	Rural-Minor Arterial	2,000

a) Current State

The **89-year-old** Babcock Bridge carries State Route 9/126 over the Cobbossecontee Stream. The stream is the dividing line between Litchfield and West Gardiner. The route is one of many of the rural network of roads in Maine, and it helps connect the state's capital of Augusta with the 2nd largest metropolitan area, Lewiston/Auburn. The bridge is used by residents going between those areas and by trucks carrying goods to and from warehouse and industrial sites within the two regions. There is a Walmart Distribution Center in Lewiston. This route, off the Maine Turnpike, is also used extensively by tourists, in particular as they access Lake Cobbossecontee. The existing bridge is a single-span bridge with five cast-in-place concrete T-beams on concrete abutments and wingwalls placed on concrete footings. The bridge is considered functionally obsolete and in *poor condition*. The deck is in *poor condition*,

Pavement failing and slipping due to erosion behind the wingwalls.

with scattered cracking, rust staining and efflorescence. Bridge drains have minor surface rust. The superstructure is in overall satisfactory condition. The exterior western beam has a large spall with multiple exposed rebar on the bottom and inside face near midspan. The exposed rebar has minor section loss. The abutments are in overall fair condition. There are large vertical cracks at the steps of most of the beam seats with some 1/4" to 3/8" wide. There is significant scaling below the waterline. The wingwalls have severe scaling with significant section loss below the waterline. There is moderate erosion behind the northwest wingwall. There is also erosion along the side-slopes which is causing the pavement to fail. The stream channel is in fair condition. There is a mild gradient in the stream and fair alignment. The opening is restricted at the bridge based on the width of the channel upstream and downstream of the bridge. The road alignment at this bridge is in *poor condition*. A crash study was performed on Lewiston Road (Route 126), where the bridge is located, from the Dennis Hill Road intersection to Spear Corner Road Intersection. This crash study was from the beginning of 2016 to the end of 2018. Eighteen crashes were reported in this study. Also, in July of 2019, a vehicle went through the guardrail on the southwest side, where there is a very sharp curve, careened through the tree clearing and into Cobbossecontee Stream. If this bridge is not replaced and requires closure, the detour around Babcock Bridge is ***34 miles***.

b) <u>Description of Replacement Bridge</u>

Sparse rip-rap and wingwall deterioration.

The proposed bridge replacement will be a one-span steel multi-girder bridge with a composite concrete deck and integral concrete wearing surface. The alignment on the western side will be moved north about 3 feet in order to reduce the sharp curve at the bridge. The bridge width will be increased to 33'4" which will accommodate two 11-foot lanes and two 4-foot shoulders as well as 1'8" wide curbs on each side. The bridge will be lengthened to a 90-foot span to increase the channel width at the bridge. To improve the service life of the proposed bridge, corrosion-resistant materials will be used for the superstructure elements where there is increased exposure due to road deicing salts. The substructure will consist of two cast-in-place concrete integral abutments on steel piles on bedrock. Slopes in front of the abutments will be armored with riprap. Slopes around the bridge will also be armored with riprap. The roadway

approaches will be reconstructed to improve driver safety and comfort. One improvement will be reducing the curve on the western side of the bridge. Safer guardrails will be replaced along the project limits. Slopes approaching the bridge will be improved to reduce erosion.

2. Mill Hill Bridge (#3063) – Route 15 over the Mill Pond Outlet in Stonington

Bridge Coordinates	Year Built	Bridge Length (Feet)	Bridge Type	Functional Classification	2020 AADT
Lat: 44.188522 Lon: -68.66021	1939	43	Concrete T-Beam, 2-lane roadway with concrete deck	Rural Major Collector	2,450

a) Current State

Mill Hill Bridge is located on Deer Isle, one of Maine's numerous coastal islands. It has been in service for **81 years**. These island chains are critical to the global lobster supply, which is critical to Maine's economy. Lobster boats dot the island and lobsters are packaged and shipped from the island. There are also a number of summer homes and inns on the island that add to the economy of the region. While Route 15 is not the only road on the island, closure of the bridge would create burden for travelers. If the Project is not completed and there is a closure, the detour is ***13 miles*** and would force trucks to utilize a narrow road of lower functional class on the more residential side of the island. Both the deck condition and the superstructure of this bridge are presently rated in *poor condition*. The bridge crosses over the outlet of Holts/Mill Pond which is a tidal stream flowing to Penobscot Bay. MaineDOT recently received a letter from the Maine Historic Preservation Commission stating that they have determined that there are no historical or archaeological resources will be impacted by this project eliminating a potential risk during the NEPA process.

Deterioration of the concrete T-Beam superstructure.

Deterioration and patching or the concrete bridge deck.

b) Description of Replacement Bridge

The replacement bridge will be three feet wider than the current bridge by increasing the shoulder widths on each side. Increased shoulder width will provide additional room for pedestrians and bicyclists increasing the safety for each. The project will include replacement of cross-pipes and driveway culverts to improve road drainage to reduce road icing events noted during a preliminary public meeting. The new bridge rail and approach guard rail will be compliant with modern safety standards. There is no through waterway and no navigability under the bridge; at low tide the area is a mudflat. The proposed bridge will provide more than two feet of clearance for the 10-year upland flow coupled with the mean high-water level plus four feet of sea level rise. The proposed bridge also provides more than 2 feet of clearance above the current 50- and 100-year storm tides.

3. Boom Bridge (#3587) – Route U.S. 2 over Beach Bridge Brook in Greenbush

Bridge Coordinates	Year Built	Bridge Length (Feet)	Bridge Type	Functional Classification	2020 AADT
Lat: 45.052673 Lon: -68.656425	1938	101	Concrete slab, 2-lane roadway with concrete deck	Rural Minor Arterial	2,130

a) Current State

This **82-year-old** bridge is at the east edge of the Penobscot River along U.S. Route 2, which parallels I-95 located west of the river. This bridge is in a very rural part of central Maine north of Bangor. The bridge spans small stream that flows into the Penobscot. This bridge is utilized by trucks carrying raw materials and finished product to and from the Nine Dragons Paper Mill in Old Town which was recently reopened in August 2019 after being closed for nearly four years. The mill receives logs from Maine's vast forestland and ships pulp out

Accumulation of debris caused by the bridge piers located in the channel and the deficient bridge rail.

Deterioration of the concrete superstructure.

globally, employing 130 Maine residents.[17] This bridge was last rehabilitated more than 40 years ago (1979) and both the deck and superstructure of the Boom Bridge are presently rated in *poor condition*. If the Project is not completed and there is a closure, the detour is up to ***52 miles***.

b) Description of Replacement Bridge

The replacement bridge will be a modern, wider and safer version of the current bridge. The width of the bridge will be 36' curb-to-curb with 12-foot travel lanes and 6-foot shoulders. The length of the bridge will be 125 feet, similar to the current bridge. The superstructure will consist of galvanized plate girders with a concrete deck and a bituminous wearing surface. The substructure will have integral abutments supported on steel H-piles to bedrock. The new bridge will be shifted approximately 9' to the east to accommodate staged construction. The finished grade will be increased between 2 feet and 3 feet at the bridge.

4. Southport Bridge (#2789) – Route 27 over the Townsend Gut & Atlantic Ocean in Southport

Bridge Coordinates	Year Built	Bridge Length (Feet)	Bridge Type	Functional Classification	2020 AADT
Lat: 43.842583 Lon: -69.654091	1939	374	Movable steel through-truss, steel multi-girder approach spans, 2-lane roadway, open grating and concrete filled deck	Rural Major Collector	3,410

a) Current State

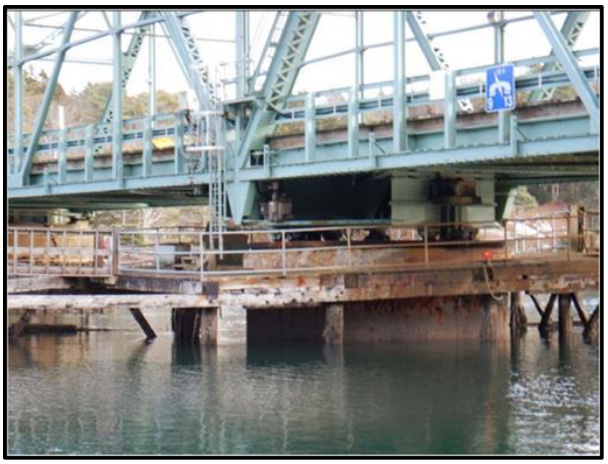
This **81-year-old** bridge is a two-lane steel through-truss swing bridge with a sidewalk along north side. This state route is the only roadway to the island. The bridge leads to the island of year-round residents, summer homes and inns, and is a very popular tourist destination and contributor to the Maine economy that is focused on Boothbay Harbor in this region. Southport is home to one of Maine's venerable lighthouses and is a popular stop on Maine lighthouse tours. Without strengthening and repairs, the bridge will be structurally unable to carry modern loads. The bridge is not currently under a weight restriction, but does not meet Maine's legal load rating requirements. Active steel corrosion will continue to threaten the primary structural members of the bridge if protective coatings are not maintained. There is concrete deterioration of the supports of the bridge turning machinery. The bridge is turned periodically to allow boat traffic

[17] https://www.prnewswire.com/news-releases/nd-paper-celebrates-reopening-of-old-town-maine-pulp-mill-300901442.html

through the bridge area. If not repaired, this would threaten the structural support of the bridge and machinery. The mechanical and electrical operation of the bridge is in a state of disrepair and rated in *poor condition*. The bridge opening and closing mechanism remains operational only due to the work arounds that the bridge operators have put in place to bypass broken or obsolete systems. The structure Operator's House, which is perched in the superstructure of the swing span, has reached the end of its useful service life. Portions of the timber floor have soft spots with patch repairs over the worst areas. The equipment in the Operator's House is maintained in various states of disrepair. Without repair, the opening and closing mechanisms of the bridge will likely remain functional for only five to ten more years to the degree required by law for the proper passage of marine vessel traffic (the BCA conservatively assumes the full 10 years). If the Project is not completed and there is a closure, there is no practical detour as the only way on and off the island would be with the establishment of ferry service.

Significant spalling under center gear support of the swing span.

Corrosion of the truss floor beams.



Sagging and settlement of equipment access platform and fender system.

b) Description of Upgraded Bridge

This bridge is unique within the Project, as it affords sole access to an island and MaineDOT has assessed that a bridge rehabilitation is the most efficient upgrade rather than a full replacement. Bridge upgrades are planned in order to give the bridge an additional 30 years of useful life. Mechanical upgrades planned for this bridge include proper swing mechanism brake type and size. The mechanical system upgrades will increase the reliability of the systems, including automatic stop features of the swing mechanism. Electrical upgrades will include automatic shutoffs and other automatic safety systems to help prevent against operator error or other issues. No automatic system limits are currently in place. Potential emergency services impact or delays will be reduced. Traffic barriers, warning barriers, and advanced warning lights will be replaced

on each approach span to meet current standards. Environmentally, in-water work will include pile-driving for the new fender system, however piles will be driven with noise mitigation measures and techniques. The Townsend Gut is a tidal waterway and does not present any flood risks. The structural alterations to the bridge will not increase the superstructure depth to be closer to the high-water line. The proposed structural change will improve the hydraulic capacity of the waterway.

5. Old Toll Bridge (#2867) – Route 6, 11, 16 over the Piscataquis River in Milo

Bridge Coordinates	Year Built	Bridge Length (Feet)	Bridge Type	Functional Classification	2020 AADT
Lat: 45.23362 Lon: -68.958473	1926	247	Concrete T-Beam multi-span, 2-lane roadway, concrete deck	Rural Minor Arterial	3,450

a) Current State

This bridge, at **94 years old**, is along a two-lane state route just south of the town of Milo. This bridge connects Pleasant River Lumber Company in Dover-Foxcroft to shipping routes. This bridge is important to lumber commerce and is a tourist route leading to Baxter State Park, home to one end of the famous Appalachian Trail. This bridge is part of the alternative to Interstate 95, a rural gateway to the North Maine Woods, as well as Baxter State Park and the Woods and Water National Monument, all areas of vast outdoor tourism. The bridge was built 1926 and widened in 1990. The bridge length is 247.2' with 5 spans and the curb-to-curb width on bridge 28'. The superstructure is reinforced concrete T-beams with concrete deck and the abutments are spill

Deterioration of the bridge piers.

Deterioration and patching of the T-Beam stems over the piers.

through type on spread footings. While the deck condition is fair, the superstructure and the substructure are both rated in *poor condition*. The project has been surveyed and preliminary design has commenced. If the Project is not completed and there is a closure, the detour would be ***49 miles***.

b) Description of Replacement Bridge

The proposed bridge has a width of 34 feet curb-to-curb with 11-foot travel lanes and 6-foot shoulders. The length will be 275 feet. It will be a two-span bridge with a pier in the middle of the river. The bridge will have only one mid pier so that less debris will be caught by piers, thus decreasing maintenance costs. The superstructure will be haunched and galvanized steel welded plate girders with a concrete deck and bituminous wearing surface. There will be a 3-bar steel rail on both sides. Integral abutments will be supported on steel H-piles to the bedrock. A wall-type pier will be supported on steel H-piles. The right-of-way will be shifted to the east to allow for construction of the entire bridge. The finished grade of the bridge will be raised up to create a crested vertical curve over the bridge.

6. Whitney Brook Bridge (#2942) – U.S. Route 1 over the Whitney Brook in Bridgewater

Bridge Coordinates	Year Built	Bridge Length (Feet)	Bridge Type	Functional Classification	2020 AADT
Lat: 46.420509 Lon: -67.843445	1923	33	Concrete T-Beam, 2-lane roadway with concrete deck	Principal Arterial - on NHS	4,650

a) Current State

This **87-year-old** bridge is a small north-south aligned bridge along two-lane U.S. Route 1 through the very rural part of northeastern Maine. The bridge can be detoured using local town roads, but that detour is inadequate for the vast number of trucks using the route and there are minimal alternatives to its use. The truck detour consists of using state highways, including Route 11, which would be more than a ***100-mile detour***. This is a truck route for goods to and from Twin Rivers Paper Mill in Madawaska. It is a link to the northern part of Interstate 95. This region is home to Maine's significant agricultural region. Crops include broccoli, cauliflower, potatoes, grains and barley. Potatoes grown in this part of Maine are processed into French-fries. The bridge was built in 1923 and widened in 1944 and again in 1989. The latest widening moved the sidewalk to the downstream side and increased the curb to curb width to 44 feet. The 30-foot-long bridge is 97 years old. On this bridge, the deck and superstructure are both in *poor condition* while the substructure is in

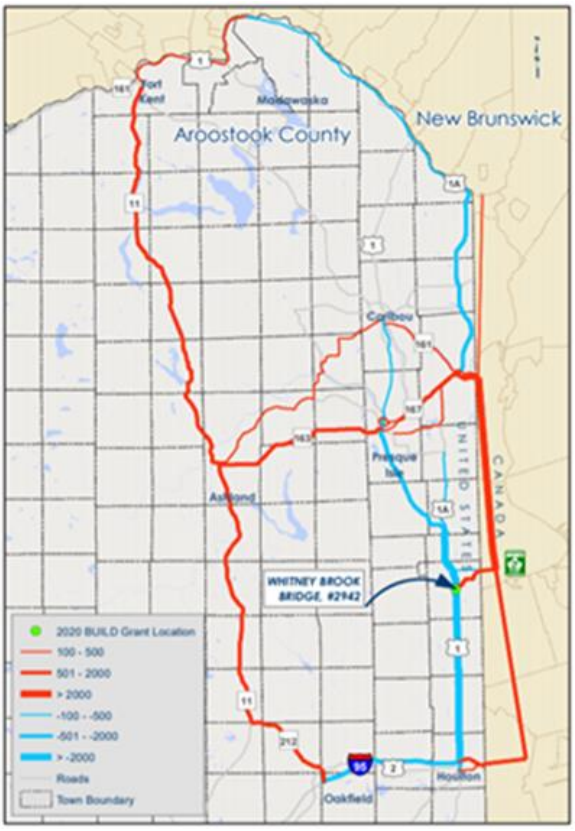
Channel restriction caused by the existing bridge.

Deterioration of the concrete T-Beam stem at the abutment.

satisfactory condition. A single 5-foot-wide sidewalk is located on the east side of the bridge. The superstructure has reinforced concrete T-beams with a concrete deck and concrete wearing surface. The abutments are full-height cantilever abutments on spread footings.

b) Description of Replacement Bridge

The replacement bridge will have a width of 36 feet curb-to-curb with 12-foot travel lanes and 6-foot shoulders with a 5-foot sidewalk. The bridge length will be 60 feet. This will be a single-span bridge. The superstructure will be beams with a cast-in-place deck membrane and bituminous wearing surface. There will be integral abutments supported on steel H-piles to bedrock. Rock socketed piles are a possibility depending upon the results of a future geotechnical investigation. Both the horizontal and vertical clearances will be similar to what exists today. If the Project is not completed and there is a bridge closure, the detours would be ***more than 100 miles,*** including one that would extend into Canada.



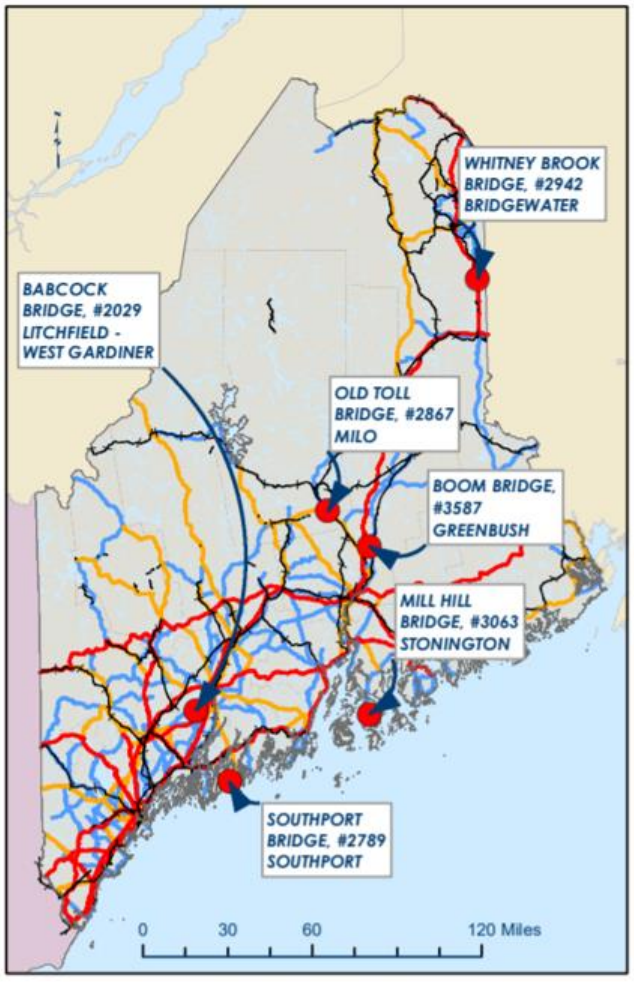
To help estimate the benefits of bridges to highway users, MaineDOT uses travel demand modeling software to estimate the change in driver route patterns in the event of a bridge closure/outage. It does not assume that drivers would simply proceed towards the bridge and suffer the full detour around it. MaineDOT takes into consideration rather, that drivers would adjust their route preference with the knowledge that the bridge is out and take the most efficient route for the entire trip given the outage. In some cases, even the most efficient reroute could

extend more than 100 miles, depending upon the trip origin, destination and sufficient alternatives. The BCA conservatively utilizes the efficient rerouting determined through the results of the software. An example of the software's reroute algorithm is noted on the map on the previous page, which is the reroute map for the Whitney Brook Bridge in Bridgewater. The red lines show increases in average daily traffic volume due to closure of the bridge and the aqua blue line shows decreases.

II. Project Location

The bridges in the Project are in Aroostook, Hancock, Kennebec, Lincoln, Penobscot, and Piscataquis Counties in Maine's 1st and 2nd Congressional Districts. (*All GPS coordinates are noted above within the initial charts for individual bridge.*)

These bridges were selected as one Project for this BUILD grant application due to their status, age, condition, and poor rating in a region struggling to overcome economic hardship. MaineDOT has a proven track record of selecting bridges most in need. Furthermore, Maine has been forced to stretch their investment dollar even further due to certain circumstances. Maine's Three-Year Work Plan cited "Due to cost increases arising from workforce challenges, work constraints, and other factors, making the old projects whole has required an extraordinary amount of funding. Therefore, even though total estimated funding will increase (largely due to increased levels of federal competitive grant funds), higher unit costs will yield substantially lower levels of capital project production in terms of miles of paving, numbers of bridges, etc. Accordingly, this Work Plan largely consists of spreading what used to be two years of capital projects over three years to stay within funding and cost constraints."[18] The bridges are a vital connection to the region's employment, emergency services, access to healthcare, tourism and recreation. With public transportation in rural parts of the state virtually non-existent, residents rely on personal vehicles and local roadways and bridges to get to and from work. The national average of the percentage of the U.S. population living below the poverty line is 13.4%. Three of the six Project bridges are located in counties that exceed the national average. Since 2010, the



[18] https://www.maine.gov/mdot/projects/workplan/docs/2020/WorkPlan2020_2021_2022%20Jan_14_2020.pdf

population of the U.S. has grown 6%. Maine's population, however, has grown by less than 1% during this same time period, ranking 43rd of all states. For the counties where the Project bridges are located, populations have been shrinking. Only Hancock County (Stonington) has grown in population since 2010 and by only a meager 0.7%. Maine ranks 33rd in U.S. median household income. All but one of the counties where the Project bridges are located are below the median household income average for the state of Maine. With the shrinking population, the unemployment rate for the state of Maine is at historic lows, dropping below 3%. However, for four of the six counties where the Project bridges are located, the unemployment rate exceeded the state average (in 2018). Regarding education, 30% of Maine residents complete college, very similar to the national average. However, in four of the six counties where Project bridges are located, that number is below that mark.[19]

Geographic Area Name	Median Household Income	% of Maine	% of US	Per Capita Income	% of Maine	% of US
Bridgewater, Aroostook County	$47,596	85%	78%	$24,269	78%	74%
Stonington, Hancock County	$47,125	84%	77%	$26,464	85%	81%
Litchfield/West Gardiner, Kennebec County	$69,464	124%	113%	$34,329	110%	105%
Southport, Lincoln County	$52,197	93%	85%	$41,878	134%	128%
Greenbush, Penobscot County	$41,492	74%	68%	$22,200	71%	68%
Milo, Piscataquis County	$33,142	59%	54%	$17,121	55%	52%

With few options for employment and transportation and a shrinking population base to fund repairs, the region simply cannot afford the financial impact and personal inconvenience if any of these bridges were taken out of service, and residents and businesses were forced to incur the costs of detours over any period of time.

III. Grant Funds, Sources and Uses of all Project Funding

The Cost Estimate of the Project by bridge and broad category is as follows:

Bridge	Preliminary Engineering (PE)	Right of Way (ROW)	Construction	Construction Engineering (CE)	Total
Babcock	$285,000	$15,000	$2,810,000	$290,000	$3,400,000
Mill Hill	$265,000	$25,000	$1,860,000	$170,000	$2,320,000
Boom	$430,000	$15,000	$2,610,000	$345,000	$3,400,000
Southport	$1,030,000	$0	$8,540,000	$1,030,000	$10,600,000
Old Toll	$975,000	$25,000	$5,290,000	$710,000	$7,000,000
Whitney Brook	$325,000	$20,000	$2,130,000	$325,000	$2,800,000
Project Total	$3,310,000	$100,000	$23,240,000	$2,870,000	$29,520,000

[19] https://data.ers.usda.gov/reports.aspx?ID=17829, et.al.

Table showing sources and uses of project funds and percentage:

Cost Category	MaineDOT	Other Federal	BUILD	TOTAL
Preliminary Engineering	$874,000	$2,436,000		$3,310,000
ROW Acquisition	$40,000	$60,000		$100,000
Construction	$1,920,000		$21,320,000	$23,240,000
Con Engineering	$574,000		$2,296,000	$2,870,000
TOTAL	$3,408,000	$2,496,000	$23,616,000	$29,520,000
	11.5%	8.5%		
	20.0%		80.0%	

All BUILD grant funding for the Project will be spent on construction engineering and actual construction costs. It will not be used for preliminary engineering-related costs or any right-of-way acquisition. Previously incurred expenses associated with the Project are $715,670 as of May 5, 2020.

Detailed budget information for each of the bridges in the Project can be found in Appendix C.

State Matching Funds

MaineDOT is well equipped to manage and administer this grant, having received and managed numerous USDOT grants for highway, railroad and transit programs including previous TIGER, FASTLANE, INFRA, and BUILD awards. "Competitive USDOT discretionary grant programs have become a critical component of the fiscal foundation that supports basic transportation needs in Maine. These programs include BUILD, INFRA, TIGER, FASTLANE, AID Demonstration, and CHBP grants. This Work Plan is built upon $155 million of awarded grants…over the years, grant projects have shifted from extraordinary onetime projects like the Madawaska International Bridge replacement project to basic system needs like bundles of traffic signals and smaller bridges. Relying on discretionary, non-guaranteed competitive grant programs for basic needs is admittedly less certain, but until bipartisan funding solutions materialize, it is a calculated risk worth taking. Key awarded grants that support the work in this Work Plan are as follows:"[20]

- $10.8-million TIGER grant for the Penquis Region Rural Bridges Project;
- $5.3-million FASTLANE grant for Maine Railroad Bridge Capacity projects and harbor improvements;
- $25-million INFRA grant for the I-395/Route 9 Connector, providing a quarter of the estimated total project cost;
- $36-million INFRA grant for the replacement of the Madawaska International Bridge;
- $26.6-million for three BUILD grants for traffic mobility improvements around the state, downtown improvements in three western Maine communities, and for infrastructure improvements in downtown Waterville (a City of Waterville project).

[20] MaineDOT Three-Year Work Plan, https://www.maine.gov/mdot/projects/workplan/docs/2020/WorkPlan2020_2021_2022%20Jan_14_2020.pdf, page iv, v

The Maine Department of Transportation (MaineDOT) is a cabinet-level state agency with primary responsibility for statewide transportation by all modes of travel. MaineDOT employs approximately 1,800 people and expends or disburses more than $600 million per year, including federal, state and local funds. The primary source of transportation funding in Maine is gas tax revenue, which by statute, can be used for highways and bridges only. In Maine, this source of funding has decreased as more fuel-efficient vehicles and a declining population base lead to a decrease in the amount of gasoline purchased. MaineDOT's match funding source for the Project will be State General Obligation Bonds. In Maine that comes from state bonds approved by the legislature and taxpayers in 2022 and 2023. Due to its significant economic and transportation impact on the entire state and region, this Project has been prioritized by MaineDOT. "In November 2019, 76% of Maine voters approved the latest $105-million General Fund General Obligation (G.O.) transportation bond. This bond provides $85 million for highway and bridge projects and $15 million for multimodal projects. Additionally, based upon widespread support in recent years, Maine's work plan is based upon the assumption that the Governor, the Legislature, and the voters will approve two additional $100 million General Fund G.O. bonds in November 2020 and November 2021. Without annual bonds of this amount or other funding sources to replace it, substantial cuts will be necessary from the capital programs."[21] The balance of the Project funding comes from Maine's Core Federal Formula funds like Surface Transportation Program (STP), National Highway Performance Program (NHPP), etc.

This BUILD grant is needed to supplement the additional funding MaineDOT has been spending and is committed to spend on bridges as part of its 8,800-mile state-jurisdiction highway network. MaineDOT commissioned an important bridge report in 2007 *Keeping Our Bridges Safe (KOBS)*. The 2007 Report was written to meet an Executive Order issued after the August 1, 2007 bridge collapse in Minneapolis, Minnesota. Maine reacted responsibly to the results of the report and increased funding for bridges in the state through a bond program that increased funding from $70 million annually to $110 million during the 4-year period ending in 2013.[22] Former MaineDOT Commissioner David Bernhardt then directed this report to be reviewed in 2014 to determine progress towards achieving the goals. The 2014 update recommended spending $140 million per year to put Maine's bridges into a state of good repair and extend bridge life as needed.[23] Funding challenges for bridges in this rural state remain. The 2020-2022 MaineDOT Work Plan expects to complete 148 bridge projects and spend some $546 million, some 63% higher than the 2017-2019 similar plan.[24] Rural Maine needs the impact of BUILD grants to help maintain highway access through rural Maine and to *bridge the gap* in funding availability. Upon completion, MaineDOT is committed to allocating funds to maintain the new bridges to the appropriate standards throughout their lives, having demonstrated that ability for decades.

A match commitment letter from the MaineDOT Commissioner is attached as Appendix F.

[21] Ibid, page vi
[22] Keeping Our Bridges Safe, https://www.maine.gov/mdot/pdf/Keeping%20Our%20Bridges%20Safe.1107.pdf, page 1
[23] Ibid, page 1
[24] https://www.maine.gov/mdot/projects/workplan/docs/2020/WorkPlan2020_2021_2022%20Jan_14_2020.pdf, page xii

IV. Selection Criteria

The Project is important because it addresses all of the merit criteria, both primary and secondary. MaineDOT has a strategy of project prioritization and explains how these particular bridges rose to the top at the following link: https://www.maine.gov/mdot/publications/docs/plansreports/MaineDOT-Transportation-Asset-Management-Plan-final.pdf. Each bridge is in poor condition, functionally obsolete or fracture critical or all three, which combined with the potential for increased emergency response time and additional road transit time in the event of an outage, is an important *safety* issue. The bridges were built between 1923 and 1939 and all show more than visible signs of that age. The Project would put all into a *state of good repair*. With most having few alternative routes, and few of those being reasonable and practical, an outage of each bridge would impact the *economy* of the region, the ability to *compete* on a level playing field and the *financial wellness* of residents. Outdoor recreation and the environment play a vital role to Maine and the tourist industry. As such, the Project will be constructed in an *environmentally sustainable* way reflective of the unique and recent agreements MaineDOT has with FHWA for NEPA. Any bridge outage would greatly decrease the *quality of life* in the region causing wasteful additional time and resources versus current routes. Construction of the Project will use *innovative* processes and materials for completion. The Project has a broad base of support from numerous stakeholders, enabling MaineDOT to once again be a great *partner* with USDOT for a significant federal grant.

1. Primary Selection Criteria

    a) Safety

All of the bridges are in poor condition, as indicated by their most recent National Bridge Inventory rating. The Southport Bridge is the only bridge of the six in which MaineDOT is not calling for a complete replacement. For each the safety and well-being of area residents would be jeopardized in the event of bridge failure. Emergency response time would increase as would time and distance of travel for first responders.

Replacing the six bridges in this grant application will address safety issues on the rural highway system. Any increase in mileage will increase the likelihood of negative safety events. These bridges are critical to the area because of the rural nature of the region. If a bridge fails or needs to be closed due to sudden major repairs, the maximum detour mileage will range from 13 to more than 100 miles. Using the more conservative computer modeling methodology to determine the most efficient reroutes taken in the event of bridge closure and conservatively estimating that a no-build scenario will lead to a shutdown in year 10, the Project will result in an overall safety savings in avoided crashes of **$73 million** over the course of 30 years on a 7 percent NPV basis.

New Safety Features Added to the Project Bridges

New Safety Feature	Babcock	Mill Hill	Boom	Southport	Old Toll	Whitney Brook
Crash-tested bridge rail	✓	✓	✓	✓	✓	✓
Improved visibility due to wider shoulders	✓	✓	✓		✓	
Improved bridge lighting				✓		
Improved hydraulic capacity		✓		✓		
Wider sidewalks						✓
Wider shoulders	✓	✓	✓		✓	✓
Improved drainage	✓	✓	✓		✓	✓

b) State of Good Repair

As previously mentioned, the bridges in the Project each have at least one aspect that is in poor condition, and some have more than one. They were built and rehabilitated prior to today's modern advancements. The proposed design of the new bridges will eliminate vulnerabilities in the features of the current bridges, which were completed prior to the adoption of better, safer and more efficient bridge design elements. While the bridges have held up well considering their age, Maine's harsh climate has been taking a toll on the bridges for years. All of the new bridges are designed for a 100-year lifespan. The rural residents in the region need new and reliable bridges to maintain the connection of their communities to commerce, recreation and the tourist economy. The new bridges will be safer, more accommodating to users and employ innovative features in their construction *(see Safety and Innovation Merit Criteria)*. If the Project is not completed, the eventual detours that would be encountered in the event of a bridge failure would create additional safety and financial hardships for these rural residents. Those costs would be abundant. If not replaced, the remaining service life of the six bridges is no more than 10 years and their maintenance costs are high (included in the BCA) and a poor investment of scarce resources. Maintenance savings are a critical component of any highway infrastructure project. Maintenance costs are constant and make it difficult for the state to budget for large capital projects. The Project avoids future maintenance less the costs to maintain the new bridges saving Maine and the region **$4 million** of NPV discounted at 7% over the 30-year analysis period. Bridge maintenance dollars could be spent where they realize more long-term value.

c) Economic Competitiveness

The bridges are an example of rural infrastructure that supports commerce and economic growth in a region that is economically challenged. Most of this area is rural and with no alternate means of transportation, therefore existing roads are key to the economic and social livelihood of the area. A network of paved and unpaved rural local roads provides the foundation for residents and raw materials to connect to the economy. They afford the movement of goods in the region, including **forest products, lobsters**, and **agriculture**, all vital elements of Maine's rural economy and connect them to global economy. But they also connect residents and tourists to

Maine's **tourism** and **recreation** economy and everything that Maine's vast outdoors has to offer.

As the **forest products** industry, a once huge portion of the Maine economy, works to re-invent itself, it can only be done with efficient and reliable infrastructure. The economic impact of the industry was estimated at $8.5 billion in 2016. There are 16,500 direct jobs and 38,900 indirect jobs statewide resulting from the forest products industry, but it is an industry that has faced recent challenges competing in a global environment. Soft demand and low energy prices are the biggest factors in recent forest product mill closures in Maine. The industry is having to change its focus. The hope is that by increasing the variety of wood products produced both large (e.g., OSB) and small (e.g., golf tees) that will, in turn, make each remaining company more stable in the state and enhance investment in sustaining forest resources for generations, but the cost of transportation is a key factor in keeping the forest economy competitive. Replacing these bridges would provide the worry-free structural integrity required to handle raw timber materials and finished lumber and paper goods. Eliminating the bridges due to structural failure or even increasing weight restrictions that block efficient forest product movement would necessitate rerouting these raw materials and finished goods. Rerouting, in turn, drives up transportation costs which then drives up the cost of goods as manufacturers attempt to compete in that global marketplace. The Project bridges that are key to Maine's forest economy are the **Old Toll Bridge in Milo** and the **Boom Bridge in Greenbush**.

Maine's iconic **lobster** industry, as well as other seafood, is probably the most visible and economically important asset in the state. The cold-water lobster industry brings fisherman as well as tourists to the coastal region. The wholesale lobster distribution supply chain contributed an estimated $967.7 million to the Maine economy and supported more than to 5,500 jobs in 2016.[25] Given their proximity to the Maine coastal region, the **Southport Bridge in Southport** and the **Mill Hill Bridge in Stonington** play a vital role in connecting this important industry to vast seafood markets.

The abundant rural rolling hills in northeast Maine are home to the state's most significant **agricultural** crops. These crops include broccoli, cauliflower, potatoes, grains and barley. The potatoes grown in this part of Maine are frequently processed into French-fries and delivered throughout the country. Given these perishable commodities, a dependable transportation network is critical not only for getting these goods to market, but also for regional farmers to obtain supplies, goods and a pathway to their own retail and commercial needs. The U.S. Department of Agriculture reports that the market value of farm products sold in Maine in 2017 was $667 million.[26] The **Whitney Brook in Bridgewater** is in the heart of Maine's northeast farmland and connects the region to the main transportation artery – Interstate 95.

Travel and **tourism**, important to any state rich in natural beauty and outdoor recreational opportunities, is a key driver of the broader service economy in Maine, and that mission requires solid roads and bridges that make getting there safe, convenient and affordable. In 2018 total direct expenditures for tourism in Maine was $6.2 billion. The overall economic impact of

[25] http://www.colby.edu/economics/lobsters/Lobsters2DollarsFinalReport.pdf, page 3
[26] https://www.pressherald.com/2019/10/21/maine-voices-forest-product-industry-has-much-to-celebrate/#

tourism was $9.16 billion,[27] out of a total GDP of $64.9 billion, some 14%.[28] Maine is home to abundant snowmobile recreation activity that alone pumps more than $350 million annually into the state's economy. Tourism supports nearly 110,000 jobs, about 16% of employment in the state. The **Southport Bridge in Southport**, the **Mill Hill Bridge in Stonington**, and the **Babcock Bridge in Litchfield/West Gardiner** all play vital roles for tourists.

Outdoor **recreation** in Maine makes up a larger percentage of the state's economy than in almost any other state – ranking third only behind Hawaii and Montana. It accounts for 4.8% of Maine's economy – more than double the national average. Outdoor recreation supports more than 40-thousand jobs in Maine, 6.4% of employment.[29] **All of the bridges** have an impact on recreation in the state.

Costs to operate vehicles according to the BUILD BCA guidance includes costs such as fuel prices, maintenance, tires and depreciation. The elimination of travel miles for both trucks and vehicles from the highway also decreases travel time for the average highway user, thus improving mobility and maintaining economic competitiveness for drivers of the Maine economy. Using the BCA Guidance suggested values, this project will result in operating costs savings due to fewer vehicle and truck miles traveled along with additional travel time avoided of **$534 million** over the course of 30 years. These costs savings are significant, particularly for the rural region of Maine and a strong return on investment for the Project. This challenged region simply cannot afford the incremental costs associated with bridge outage detours.

A key goal of the Trump Administration is to reduce America's dependence on foreign oil, which serves the purpose of increasing the country's energy security. The project moves the United States closer to seeing a real reduction in the nation's dependency on foreign oil by reducing unnecessary fuel use due to having to detour up to 100 miles each way.

d) Environmental Sustainability

MaineDOT recognizes that assuring sustainability of habitats and ecosystems as well as transportation infrastructure can occur in concert rather than in conflict. Toward that end, MaineDOT endeavors to exercise reasonable stewardship over both natural resources and transportation infrastructure through its commitment to addressing aquatic organisms, wildlife habitat and fish passage in cooperation with natural resource agencies, while weighing all aspects of a proposed project. An agreement between the Federal Highway Administration, Maine Division and the Maine Department of Transportation authorizes MaineDOT to determine on behalf of the FHWA whether a project qualifies for a NEPA Categorical Exclusion (CE) if the project does not have a significant effect on the human environment.[30] MaineDOT and various other state and federal departments have executed agreements to expeditiously but thoroughly review environmental impacts from projects *(and they are listed in Project Readiness.)*

[27] https://motpartners.com/wp-content/uploads/2019/04/2018_MAINE_GovConf_HighlightSheet.pdf
[28] https://fred.stlouisfed.org/series/MENGSP
[29] https://maineoutdoorbrands.com/maine-outdoor-brands-news/outdoor-recreations-economic-impact/
[30] Programmatic Agreement between the FHWA, Maine Division and the MaineDOT Regarding the Processing of Actions Classified as Categorical Exclusions for Federal-Aid Highway Project

Pollutants of Concern

Completion of the Project and avoidance of billions of future highway mileages saves miles for passenger vehicles as well as trucks. Most heavy trucks are powered by diesel engines, which are major sources of emissions of nitrogen oxides (NO_x), sulfur dioxide, volatile organic compounds and particulate matter (PM). NO_x reacts with volatile organic compounds to form ground-level ozone, commonly known as smog. Diesel exhaust is of specific concern because it is likely to be carcinogenic to humans by inhalation and may additionally cause non-cancer respiratory effects.[31] The avoided net costs of emissions of NO_x, sulfur dioxide, PM and volatile organic compounds over the 30-year life of the project are projected to be more than **$10 million** (vehicle plus ferry). This Project is favorable to the environment which has the additional benefit of driving the economy from Maine's beauty and outdoor recreation opportunities. It is a virtuous cycle.

e) Quality of Life

A region's quality of life is enhanced when residents have mobility and ease of passage. Mobility is a critical lifeline, especially in rural areas of Maine that simply have few transport options. Access to schools, shopping and the area's robust outdoor recreation activities requires dependable roads and bridges, especially during the region's harsh winters. A rural school bus network must work in concert with the educational system. Access to schools via direct bus routes over the six bridges prevents delay.

Less time spent commuting daily adds to one's quality of life. For residents in rural Maine, reroutes in the event the bridges are closed become more costly in areas where there are fewer route choices. Those reroute alternatives, which range from up to 13 to more than 100 miles each way, would add millions of hours to drive time, greatly diminishing quality of life.

Also impacting quality of life is the prevention of noise pollution that would result to the region from the additional traffic miles that come from detours in the event of bridge closures. The noise pollution from cars and heavy trucks and tractor-trailers can be considerable, particularly in rural areas. While this benefit is surely realized by the Project, conservatively it has not been included in the BCA.

2. Secondary Selection Criteria

a) Innovation

The Project replacement bridges will be designed for 100-year lives. To achieve that, MaineDOT will utilize a variety of innovative techniques in construction for all of the bridges:

[31] See *U.S. DEP'T. OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION, CHAPTER 2: NATIONAL FREIGHT TRANSPORTATION TRENDS AND EMISSIONS*, http://www.fhwa.dot.gov/environment/air_quality/publications/effects_of_freight_movement/chapter02.cfm

i. Use of corrosion resistant bridge materials – Stainless steel and Glass Fiber Reinforced Polymer (GFRP) reinforcement will be used in the concrete bridge elements exposed to deicing chemicals or salt water. FRP bridge drains will be used to extend the life of the bridge decks and prevent deicing chemicals from corroding the superstructure as often happens when steel drains corrode. Steel girders will be made of weathering steel where appropriate, or galvanized or metalized in harsher locations, to extend bridge life and avoid future preservation costs.
ii. Use of high-performance concrete – Low permeability air-entrained concrete will be used in the bridges through performance-based specifications. MaineDOT has used performance-based specifications for concrete since the late 1990s.
iii. Use of 2D modeling for the hydraulic analysis of the bridges.
iv. Use of good detailing practices including:
    1. Use of integral abutments or semi-integral abutments to eliminate the use of bridge joints.
    2. Using the minimum number of deck drains possible.
    3. Providing adequate concrete cover over reinforcing to prevent corrosion.

In addition, and unique to individual bridges within the Project:

i. Mill Hill - Fabricated in a controlled environment off-site, the superstructure will consist of precast concrete beams which may include integral concrete deck. With the precast beams delivered to the site when needed, the contractor can rapidly set the superstructure and reduce the length of the traffic detour. Eliminating the need for traditional cast-in-place concrete construction methods will improve site safety, product quality, and schedule.
ii. Mill Hill - Stainless-steel reinforcing will be used in concrete elements where applicable to better protect in the marine environment.
iii. Southport - Using FRP Composite Pipe Piles instead of Timber to increase the durability of the fender system.

b) Partnership

The project has wide support from a variety of stakeholders. They stand ready to assist in completing approvals rapidly and constructing the six bridges with as little disruption as possible to traffic and adjoining communities. Appendix E contains numerous letters confirming stakeholder collaboration and project support. The stakeholders understand the importance of these bridges to residents, workers, tourists, emergency responders and area schools. MaineDOT project managers have already begun public stakeholder meetings. They are coordinating with local fishing communities and industry as well as the USACE and USCG.

There will be another unique partnership at play in the Project. MaineDOT and FHWA have established several programmatic agreements to expedite the NEPA process handling state and federal reviews concurrently. These agreements cover Categorical Exclusions, programmatic wetlands findings, state and national historic preservation and the Federal Endangered Species Act. Signatories to these agreements also include the U.S. Army Corps of Engineers (USACE), US Fish & Wildlife Service (USFWS), Advisory Council on Historic Preservation and Maine

State Historic Preservation Officer, NOAA's National Marine Fisheries Service and the Maine Turnpike Authority. These partnerships greatly expedite construction projects such as the bridge replacements in the Project.

V. Environmental Risk Review

a) Project Schedule Key Events[32]

	Whitney Brook	Old Toll	Mill Hill	Babcock	Southport	Boom
Task Name	**Completion Dates**					
Project Kickoff	5/1/2020	12/27/2013	4/2/2017	6/1/2019	4/1/2016	4/14/2016
Initial Team meeting	9/5/2020	3/21/2014	3/21/2019	2/3/2020	8/27/2018	5/3/2017
Preliminary Public Meeting	10/16/2020	7/23/2014	6/19/2019	4/6/2020	5/1/2019	5/3/2017
Preliminary Design Report/Preliminary Plan Complete	3/18/2021	9/25/2020	6/30/2020	1/29/2021	7/10/2020	10/2/2020
Formal Public Meeting	4/22/2021	10/30/2020	9/21/2020	2/18/2021	9/4/2020	11/6/2020
NEPA Complete	9/9/2021	4/16/2021	6/8/2021	7/8/2021	7/8/2021	7/2/2021
Plan Impacts Complete	8/5/2021	3/10/2021	12/8/2020	3/18/2021	10/2/2020	4/23/2021
Utilities Certified	9/30/2021	1/5/2022	1/5/2022	9/17/2021	11/27/2020	3/25/2022
Environmental Approvals Complete	9/9/2021	4/16/2021	1/5/2022	7/8/2021	4/14/2022	7/2/2021
Right-of-Way Certified	6/17/2022	1/5/2022	1/5/2022	2/1/2022	2/1/2022	3/25/2022
P,S&E Submission	6/17/2022	6/13/2022	1/27/2022	2/1/2022	6/23/2022	6/3/2022
Advertise	7/13/2022	7/13/2022	2/17/2022	2/22/2022	7/21/2022	6/22/2022
Award	8/17/2022	8/17/2022	3/24/2022	3/29/2022	8/25/2022	8/10/2022
Begin Construction	6/28/2023	4/26/2023	6/1/2022	4/26/2022	9/22/2022	9/8/2022
Construction Complete	10/31/2024	10/23/2025	6/23/2023	6/2/2023	11/16/2023	11/1/2024

The Project Plan for each bridge anticipates both obligation of funding and completion of the Project well within the September 30, 2022, and 2027 deadlines, respectfully, with the latest bridge to go in service in the fall of 2025.

1. Environmental Permits and Review

All bridges in the Project will be processed under NEPA as Programmatic Categorical Exclusions. They will all need Army Corps permits under the Clean Water Act (Section 10 and/or Section 404), and will need a permit or will meet the exemption for existing crossings under the Maine Natural Resources Protection Act. These processes are under way and pose minimal risk to on-schedule project completion.

[32] See *Appendix D* for full Gantt Charts for each Project Bridge.

	Babcock, Litchfield/West Gardiner	**Mill Hill, Stonington**	**Boom, Greenbush**	**Old Toll, Milo**	**Southport, Southport**	**Whitney Brook, Bridgewater**
Section 106:Historic & Cultural Resources-Architectural	Bridge is not National Register Eligible and not in an Historic District.	Mill Hill Bridge is not National Register Eligible and is not in an historic district.	No Architectural properties eligible for listing on the National Register within the project area.	No Architectural properties eligible for listing on the National Register within the project area.	The Bridge is eligible for listing on the National Historic Register of Historic Places, being one of the only remaining swing ridges remaining in the State. Design will avoid and minimize impacts to character defining features	Bridge is not National Register Eligible and not in an Historic District.
Section 106:Historic & Cultural Resources-Archaeological	Archaeological field check planned Summer 2020.	MaineDOT recieved a letter from the Maine Historic Preservation Commission stating that they have determined that there are no historical or archaeological resources will be impacted by this project.	No Archaeological resources	Two National Register listed archeological sites within the project area. Phase II Archaeological testing completed. Data recovery will be required if sites can not be avoided.	To be determined.	To be determined.
Section 4(f) Resources			No Section 4(f) Resources			Town Park adjacent to bridge.
U.S. Coast Guard Permit	Not applicable	A Coast Guard Exemption will be requested through Federal Highway.	Not applicable	A Coast Guard Exemption will be requested through Federal Highway.	A Coast Guard permit will be required. Deviations from CFR XX will be required during construction.	Not applicable
Mitigation	Not anticipated	Potential impacts to salt marsh and eelgrass will require in-lieu fees for mitigation.		Phase III Archaeology Data Recovery anticipated.	In-water work is anticipated and noise mitigation measures will likely be required.	Not anticipated
Federally Endangered Species	In Atlantic salmon DPS but not critical habitat; No Effect	Atlantic salmon are not present, and there is a low likelihood that sturgeon would be present at the bridge site.	Atlantic salmon Critical Habitat present. Expect in-water work restrictions between October 1-July 14.	Atlantic salmon present. Expect in-water work restrictions including time of year restrictions on in-water work in October, November, April, May, and June	In Atlantic salmon DPS and Critical Habitat; In Atlantic and shortnose sturgeon DPS. In-water work restrictions expected between March 15 and September 30.	No Endangered Fish Species, but high value coldwater fishery (trout).

MaineDOT and various other state and federal departments have executed agreements to expeditiously but thoroughly review environmental impacts from projects. MaineDOT will take advantage of the following agreements where applicable to streamline the environmental review and approval process:

a. Programmatic Agreement between the Federal Highway Administration, Maine Division and the Maine Department of Transportation Regarding the Processing of Actions Classified as Categorical Exclusions for Federal-Aid Highway Projects
b. Cooperative Agreement between U.S. Department of the Interior Fish and Wildlife

Service (USFWS), FHWA and the MaineDOT State Transportation Reviews by the USFWS in Maine 2015-2020

c. Cooperative Agreement between USFWS, FHWA and the MaineDOT State Transportation Reviews by the USFWS in Maine 2016-2021
d. Maine Atlantic Salmon Programmatic Consultation finalized January 23, 2017
e. Programmatic Agreement for the State of Maine concerning identification of listed and proposed species and designation of non-federal representative under the Federal Endangered Species Act between FHWA, Maine Division USACE, MaineDOT
f. USFWS, NOAA's National Marine Fisheries Service Programmatic Agreement for the State of Maine Between MaineDOT, FHWA Maine Division, USFWS Regarding Endangered Species Act Section 7 Consultation for Canada Lynx
g. Memorandum of Agreement for Stormwater Management Between the MaineDOT, MTA and Maine Department of Environmental Protection
h. Nationwide Programmatic Section 4(f) Evaluation for use of Historic Bridges

MaineDOT and the Bridge Program Division have years of experience completing bridge replacement projects on time and within budget. The Project will meet all statutory deadlines required for this BUILD grant.

2. Assessment of Risks & Mitigation Strategies

The bridges in the Project will be designed by and construction will be led by the Bridge Program team at MaineDOT. Over the last decade, that team has performed major construction or replacement of 266 bridges with expenditures of more than $923 million. While no bridge project is without some level of challenge, MaineDOT has carefully considered the risks and the bridges in the Project are all well within the capability of the team; none have complicated engineering design challenges, neither civil nor mechanical.

Risks & Mitigations

Bridge	Project Risks	Mitigations
Whitney Brook in Bridgewater	• Concerns with town-owned park at the northwest corner of the bridge. • Children visiting the construction site unsupervised. Many kids make use of the town-owned park at the northwest corner of the bridge.	• Minimize impacts to the park. Anticipate a de minimis determination on the town-owned park property. • Mitigation: Install temporary security fencing between the construction are and the town park.
Old Toll in Milo	• Archeological resources identified in the vicinity of the bridge. • Environmental restrictions due to the presence of endangered Atlantic Salmon	• Close coordination the Maine Historic Preservation Commission (MHPC). The selected alignment is based on feedback from MHPC. • Minimize permanent in-water structures, plan construction to avoid sensitive times for salmon life stages. Begin early coordination with U.S. Fish and Wildlife and Maine Department of Marine Resources to obtain best available information on species.
Babcock Bridge in Litchfield/West Gardiner	• Variable leaf milfoil present in the area of the project.	• All underwater equipment will need to be thoroughly cleaned prior to leaving the site.

	• Boaters in the area need access to the river	• Access to a private boat launch within the project limits may need to be provided during construction
Mill Hill in Stonington	• Concerns of historical interests noted.	• Already resolved by letter from MHPC.
Boom Bridge in Greenbush	• Risks: Environmental restrictions due to the presence of endangered Atlantic Salmon	• Minimize permanent in-water structures, plan construction to avoid sensitive times for salmon life stages. Begin early coordination with U.S. Fish and Wildlife and Maine Department of Marine Resources to obtain best available information on species.
Southport Bridge in Southport	• Bridge eligible for listing on the National Historic Register of Historic Places; one of Maine's only remaining swing bridges.	• The rehabilitation will be done in accordance with the Secretary of the Interior's Standards for Rehabilitation to minimize impacts to character-defining features.
	• Environmental restrictions due to the potential presence of endangered Atlantic salmon, Atlantic sturgeon, and Shortnose sturgeon	• Proposed design minimizes in-water work. Consult with the National Marine Fisheries Service (NMFS/NOAA). Contract documents will clearly identify all environmental limitations.
	• Maintaining navigation during construction	• Close coordination with the US Coast Guard and local Harbor Master to determine allowable channel impacts.

VI. Benefit Cost Analysis

7% NPV Summary over 30 Years			
	Costs	Benefits	
CAPEX	$24,547,898		
Maintenance Costs		$3,951,814	
Vehicle Travel Time & Ops Costs Savings		$534,139,965	
Vehicle Safety		$73,236,905	
Vehicle Emissions		$8,747,877	
Avoided Ferry Travel Time & Ops Costs Savings (including Ferry CapEx Costs)		$19,398,933	
Ferry Emissions		$1,297,508	
Residual Value of the Project		$1,012,792	
TOTAL	$ 24,547,898	$641,785,794	
Benefit-Cost Ratio			26.14

The Project BCA is compelling. Relatively low costs to replace the six bridges are overwhelmed by the large benefits generated by avoiding significant reroutes and the resultant operating costs, time savings and public safety. It is a project of great leverage versus the alternative. Replacing the Whitney Brook Bridge in Bridgewater is the most significant example as the new bridge is estimated to cost $2.85 million but because of the significant avoided reroutes due to minimal alternatives in the face of an outage yields tremendous avoided costs of more than $323 million. That is driven primarily by reasonably high AADT (nearly 5,000 by 2030) a high percentage of use by heavy trucks (20%) and a lengthy average reroute of 21 miles and 26 minutes for all users. If that bridge is not replaced, the economic impact to the region would be enormous. (See

individual BCAs in Appendix A) As described, benefits for the Project do not begin to accrue until the bridges are presumed out of service ten years from now when their collective average age would be 97 years and last until the bridges have been in service for 30 years. Despite that delay in benefits, the NPV of the Project benefits is $642 million and it sports a benefit-cost ratio of 26.14 based primarily on the avoided impact in operating costs and drive time due to reroutes. For the Southport bridge which is the sole access to an island, if the Project is not completed, the BCA presumes the establishment of a ferry service to the island including the procurement of the boat and staffing as there is no other practical option to reach the island.

Importantly for independent utility, each of the bridges has a benefit-cost ratio of at least 3.25.

	Costs	Benefits	Ratio
Babcock - Litchfield/West Gardiner	$ 2,899,894	$ 9,430,750	3.25
Mill Hill - Stonington	$ 1,986,525	$ 42,373,534	21.33
Boom - Greenbush	$ 2,832,364	$ 74,545,454	26.32
Southport - Southport	$ 9,049,476	$ 58,842,216	6.50
Old Toll - Milo	$ 5,490,438	$ 132,728,195	24.17
Whitney Brook - Bridgewater	$ 2,289,202	$ 323,865,645	141.48
TOTAL	$ 24,547,898	$ 641,785,794	26.14

See *Appendix A* for a detailed BCA for each individual bridge, descriptions of assumptions and utilized rates.

Grant Request Supporters*

MaineDOT's grant request for BUILD FY 2020 funds is supported by a diverse group of elected officials, shippers and stakeholders due to the significant impact the Project will have on the region. This list of supporters includes:

Members of Congress *(letters being sent directly to the Secretary)*

U.S. Senator Susan Collins
U.S. Senator Angus King
U.S. Congresswoman Chellie Pingree
U.S. Congressman Jared Golden

State Elected Officials/Offices

Governor Janet Mills
State Senator Michael E. Carpenter
State Senator Paul T. Davis
State Senator Dana L. Dow
State Senator Louis J. Luchini
State Senator Jeffrey Timberlake
State Representative Norman E. Higgins
State Representative Genevieve McDonald

Town of Litchfield, Maine *(letter submitted separately)*
Town of Southport, Maine
Town of Stonington, Maine

State and Local Organizations

Kennebec Valley Council of Governments (KVCOG)
Lincoln County Regional Planning Commission (LCRPC)
Northern Maine Development Commission

Shippers

ND Paper *(letter submitted separately)*

Please visit http://www.mainedot.gov/grants/build/

* Due to the impact of Covid-19, numerous letters are not yet available but will be delivered to USDOT. MaineDOT will post all received on our website noted above.

APPENDIX