U.S. Department of Transportation

TRANSPORTATION INVESTMENT GENERATING ECONOMIC RECOVERY
TIGER FY 2017 GRANT APPLICATION

Project Name:	Penquis Region Rural Bridges Project
Project Type:	Road-Bridge Repair/Replacement
Project Location:	Rural, Maine 2nd Congressional District
Funds Requested:	$10,836,220 - (50%)
Funds Matched:	$10,836,220 - (50%)
Total Project Cost:	$21,672,440
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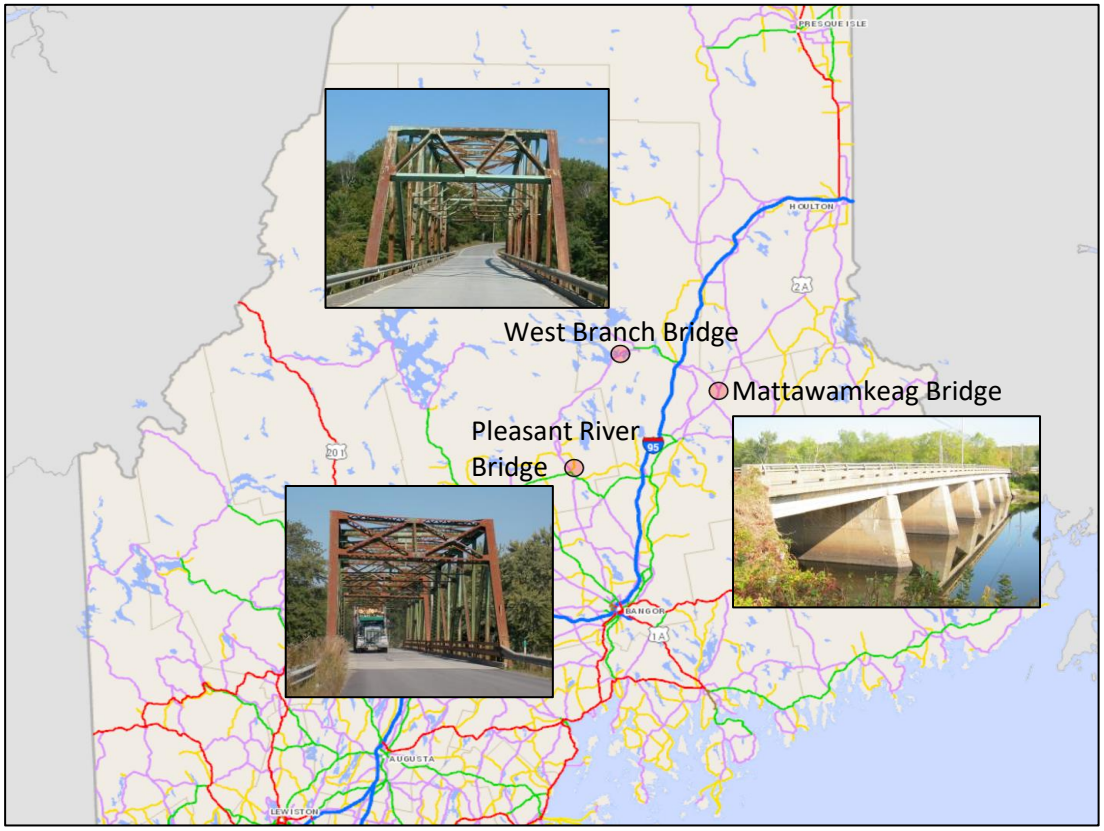
DUNS #:	80-904-5966

Penquis Region Rural Bridges Project



Project Summary

Maine Department of Transportation (MaineDOT) is seeking $10,836,220 from a U.S. Department of Transportation (USDOT) Transportation Investment Generating Economic Recovery (TIGER) FY 2017 grant. The total cost of the project is $21,672,440, 50 percent ($10,836,220) of which will be matched by MaineDOT.

The *Penquis Region Rural Bridges Project* will:

a) Repair a network of three key highway bridges in rural Maine that require near-term replacement, as they are all structurally deficient or fracture critical, and will be made safer for the long term.
b) Maintain access to basic life services at existing travel distances and times where alternatives are limited and costly, and put lives at risk.
c) Allow for uninterrupted supply chains for business in the region, principally the Maine forest economy, which while long suffering in terms of plant closures, still plays a critical role for employment, GDP and exports.
d) Continue and improve access to Maine's outdoor recreational resources of trails and lakes for residents and the tourism economy of the region.

The *Penquis Region Rural Bridges Project* ("Project") will fully replace three challenged highway bridges in a small area in the center of the Penquis Region in rural Piscataquis and Penobscot Counties. Each of these bridges is either structurally deficient, in a fracture critical state or both, and need to be replaced or incur significant maintenance and risk potential closure. The impact of their failure or closure on the residents in the region as well as those traveling through the region for business, or to enjoy Maine's many outdoor recreation opportunities, is great. These bridges are clustered in a region with little reasonable alternative routing. Because there are few alternative routes, the *one-way* detours in the event of a bridge closure range from 12 to 98 miles. This would add significant expense to individuals and businesses, could put lives at risk for emergency services and inflict substantial inconvenience at best. Replacing the bridges now, prior to load posting, failure or forced closure, will allow for their orderly and cost-efficient replacement. The Project maintains existing access to schools and basic emergency services for residents in this rural region, 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 tourism industry in the state. Maine and MaineDOT have been investing consistently on bridge improvements and replacements but additional funding sources are needed to continue to keep the 2,450 state bridges, 80% of which are in rural areas, in a state of good repair.[1] MaineDOT is an accomplished and responsible recipient of past TIGER and FASTLANE grants and can be relied upon to fully fund and commence the project in advance of the 2020 obligation date, and to complete the project by the 2025 requirement. Replacing these three bridges will ensure this region maintains continuous access without inflicting undue burdens that this rural area simply cannot afford.

[1] USDOT FHWA National Bridge Inventory, https://www.fhwa.dot.gov/bridge/nbi/no10/fccount16.cfm

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I. Project Description

a) PROJECT DETAILS AND BACKGROUND

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.[2] In fact, 89% of the total land in Maine is forestland.[3] The three bridges that together make up the Project are all within rural Maine in Penobscot and adjacent Piscataquis Counties. "Rural residents tend to be more heavily reliant on their limited transportation network - primarily rural roads and highways - than their counterparts in more urban areas. Residents of rural areas often must travel longer distances to access education, employment, retail locations, social opportunities and health services."[4] The bridges in the Project provide the residents of Milo, Millinocket, Mattawamkeag and many other small rural towns access to schools and shopping, health and emergency services and basic life necessities. They 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. They provide access for residents and visitors to Maine to enjoy state parks, lakes, the new national monument and even snowmobile trails that drive the tourism industry which had over 22 million visitors in 2016 who generated nearly $6 billion in spending.[5] "With an economy based largely on manufacturing, agriculture, tourism and fishing, the quality of Maine's transportation system plays a vital role in the state's economic growth and quality of life."[6] If access over those bridges were discontinued, the additional costs in travel time and distance would place a great burden on this challenged region. Detours over comparable roadways would be from 12 miles to 98 miles. It would impact residents, business and industry both within the region and traversing through the region as well as the tourism industry in the region. On an average daily basis, 4,260

[2] https://www.quora.com/Which-U-S-state-has-the-most-rural-land-out-of-all-the-other-states
[3] http://maineforest.org/wp-content/uploads/2016/09/Maines-Forest-Economy-10-12-2016.pdf, page 2 of pdf
[4] http://www.tripnet.org/docs/Rural_Roads_TRIP_Report_2017.pdf, page 2
[5] https://visitmaine.com/assets/downloads/2016-MOT-Annual-Report.pdf, page 18 and 19
[6] http://www.tripnet.org/docs/ME_Transportation_by_the_Numbers_TRIP_Report_October_2016.pdf, page 2

vehicles traverse these bridges presently, of which 443 are heavy trucks principally serving the forest industry.

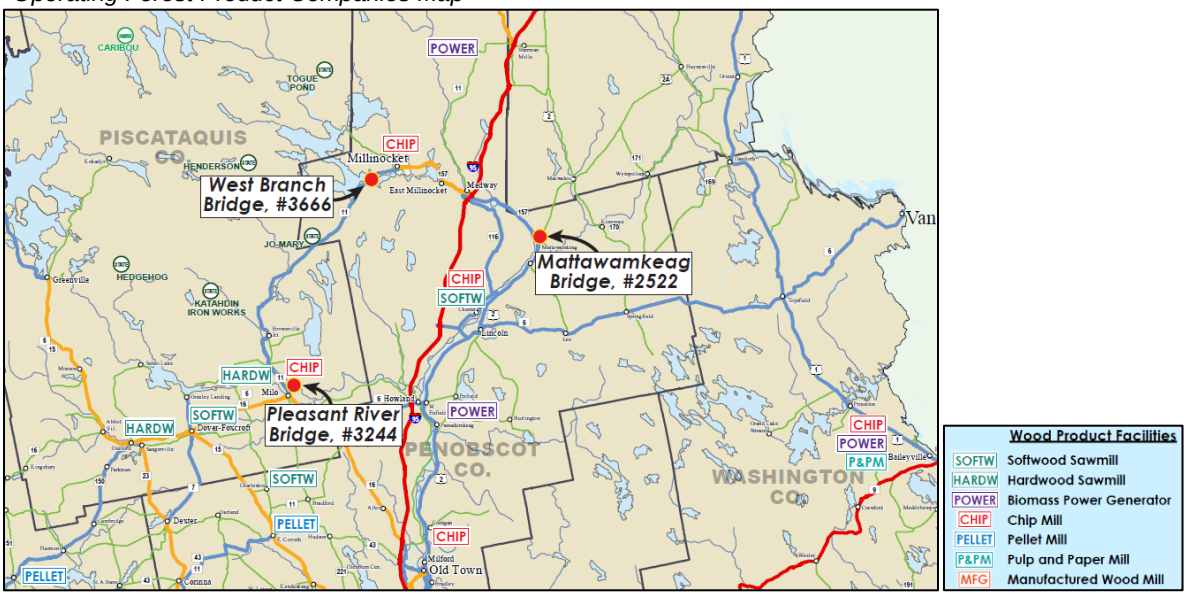
There are 2,450 bridges over 20 feet in length in the National Bridge Inventory in Maine. Of these, 352 have been determined to be structurally deficient, and thus have a significant defect. In 2016, Maine ranked 9th nationally in terms of percentage of total bridges that are structurally deficient, some 15%.[7] Two of the three key bridges that make up the Project are each structurally deficient. They are the Mattawamkeag Bridge on State Route 2 over the Mattawamkeag River ("Mattawamkeag") in Mattawamkeag and the Pleasant River Bridge on Pleasant Street over the Pleasant River ("Pleasant River") in Milo. The third bridge of the cluster in this region that comprises the Project is the West Branch Bridge on State Route 11 over the West Branch of the Penobscot River ("West Branch") in T3 Indian Purchase Township. That bridge, while not deemed structurally deficient is identified as "fracture critical." 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.[8] In addition to being structurally deficient, the Pleasant River Bridge is also fracture critical. These 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 classified bridges, which each of these bridges is, only 5 states have a higher percentage of those that are structurally deficient than Maine. In each classification, the percentage exceeds the national average by five and six points respectively.[9] MaineDOT completed 21 bridge replacement projects in 2016 spending $50 million but the need is far in excess of that amount.[10] 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] Currently through FAST Act funding only 50% is covered so Maine must find other sources or risk falling further behind on bridge infrastructure needs.

These bridges provide access to rural forestlands in Maine which are vital to the forest industry, an industry which while in decline 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.[12] A large percentage of Maine roads are private and in forestland. 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 (all identified on the map below). The cluster of bridges of the Project sits at the center of these flows to and from the Interstate which becomes the main artery for travel beyond Maine. To continue to remain competitive in a global economy, the industry cannot afford increases to basic cost components such as transportation. Bridge closures, which would increase both the miles traveled and the time the equipment is in

[7] Supra note 1, USDOT FHWA National Bridge Inventory
[8] https://www.fhwa.dot.gov/bridge/nbis/
[9] Supra note 1, USDOT FHWA National Bridge Inventory
[10] http://www.maine.gov/mdot/docs/2017/mainedot-annualreport2016-web.pdf, page 19
[11] http://www.maine.gov/mdot/pdf/kobs2014.pdf, page 1
[12] Supra note 3, Maine Forest Economy, page 2 of pdf

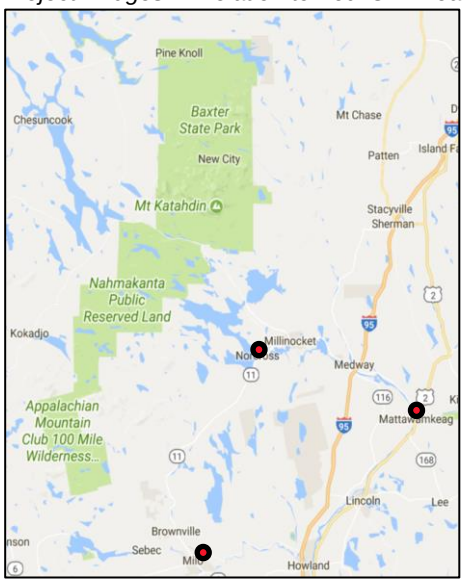
use for the same load, would increase those costs. That would in turn force the mills to seek a costlier source of raw materials than they would otherwise have chosen. Bridge outages are rarely resolved quickly, so these costs increases would become all but permanent forcing mills to either raise prices and risk losing the business, or reduce their profitability, making it harder to maintain employment and further invest in their business. The Project would eliminate this risk.

Operating Forest Product Companies Map



Similarly, the tourism industry in Maine is vital to the economy. These bridges play critical connective roles taking tourists in vehicles and on snowmobiles to recreation regions and the bridges are the gateways. (See map to the right) Baxter State Park is home to the highest peak in Maine, Mt. Katahdin, and is the northernmost point on the famed Appalachian Trail. The area east of the park, including Katahdin Woods and Waters National Monument, attracts tourists as well due to scenic natural surroundings. Additionally, there is a large tourist region featuring recreational lakes very close to the area which utilizes these bridges for access and where there is little alternative access. *(These items are discussed further in the Economic Competitiveness and Quality of Life Merit Criteria sections of the narrative.)*

Project Bridges in Relation to Tourism Areas



Because of the size of the region and the scarcity of bridges, each one is of great importance. There are only 360 bridges in all of Piscataquis and Penobscot Counties which cover land area of 7,358 square miles. For comparison, that size is within a few miles of the size of the state of New Jersey, and in that same land area New Jersey has some 6,700 bridges, nearly 20 times the number of these rural Maine counties. When access to a bridge is closed in these rural areas,

there simply is no nearby alternative within a reasonable distance. For the bridges in the Project, the calculated comparable road detours in the event of an outage are 12 one-way miles for Pleasant River, 48 one-way miles for Mattawamkeag and 98 one-way miles for West Branch.

Quantitative Facts[13]

Project Name: Penquis Region Rural Bridges Project

- The $21,672,440 in roadway infrastructure investment will yield $65 million in economic output for this region.
- This project will replace three rural highway bridges (built in 1928, 1936 and 1948) with modern bridges with 100-year lives and current safety features preventing the safety and economic impact of their outages.
- The Project has a total Net Present Value (NPV) benefit of at least $96 million and a benefit-cost ratio of at least 6.09 to 1. For the purposes of this TIGER grant application, the Benefit Cost Analysis is conservative, as it assumes no growth after 2036.
- The Project is regional in scope and is located in a rural region of the country.
- The bridges in the Project are located in two counties; Penobscot and Piscataquis.
- The Project is located in Maine Congressional District 2 (Representative Bruce Poliquin). The state is represented by U.S. Senators Susan Collins and Angus King.[14]
- Total Cost of the Project: $21,672,440
- Total amount of TIGER FY 2017 funds requested: $10,836,220 (50 percent of the total cost of the project). A match has been committed by the Maine Department of Transportation in the amount of $10,836,220 (50 percent).[15]
- The Project's geospatial data can be found in a table in Project Location.
- The BCA analysis conservatively estimates that a no build scenario will lead to some manner of shut down for an average of two weeks per year assumes and that the detour miles occur during that time.

b) Current and Future Conditions of the bridges

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. They are presently structurally deficient or functionally obsolete. Additionally, two of the structures are also fracture critical, and all are too narrow to provide proper usage for pedestrians and recreational vehicles. Each of these conditions will be fully remedied with a replacement bridge. In each case, access across the bridges during construction will be maintained to avoid the reroute pain that the Project will be preventing. If the Project is not completed, there is the real risk of an eventual outage which would force the reroutes described below.

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

Details on the current bridges, the replacement bridges and the impact of a detour if the bridges were closed for each bridge in the Project follow:

1. West Branch Bridge – Route 11 over the West Branch of the Penobscot River

Bridge	Year Built	Remaining Service Life (Yrs)	Bridge Length (Feet)	Bridge Type	Challenge
West Branch	1948	5-10	369	One-Span Riveted Thru-Truss with Rolled Beam Approach Spans	Fracture Critical

a) Current State

The West Branch Bridge is a center span, 240' steel thru-truss bridge with steel girder 62' approach spans on each end with a concrete bridge deck. The wearing surface and deck joints over the piers were replaced in 1985 and the deck was repaired in 2006 including new drains and pier joint rehabilitation. Both piers and both abutments are founded on spread footings and all four are located outside of the main channel of the river. The bridge has substandard width that is only 24-feet between curbs (narrowness evident in the photo) and the bridge rail is substandard and does not protect the truss members.

Overhead members of the steel superstructure have experienced collisions with the resulting deformation of steel members evident. The bridge has a weight restriction and is posted for one truck on the bridge at any time. The paint system on the steel thru-truss structure is generally in poor condition. Future maintenance items include painting the structural steel, replacing a cracked bottom chord brace stitch plate, repairing overhead cross member collision damage and resetting the south bearings for the main span. The center thru-truss span is a fracture critical bridge, meaning that the failure of any one of many smaller components (gusset plates for instance) can compromise the load-carrying capacity of the entire structure. Periodic inspections of fracture critical structures are expensive and time-consuming. Periodic painting of the large surface area of thru-truss bridges is also prohibitively expensive. This bridge has been identified for replacement due to the narrowness of the bridge relative to the importance of the corridor and the 55-mph speed limit. Its marginal structural capacity and high maintenance cost are also significant motivators.

b) Description of Replacement Bridge

The new bridge will have three spans to avoid reducing the hydraulic capacity of the river channel, but unlike the existing bridge, it will likely have piers in the river channel, near the banks. Outside spans will be about 80 percent of the length of the center span for structural efficiency. Support for abutments and piers will either be spread footings on soil or bedrock or

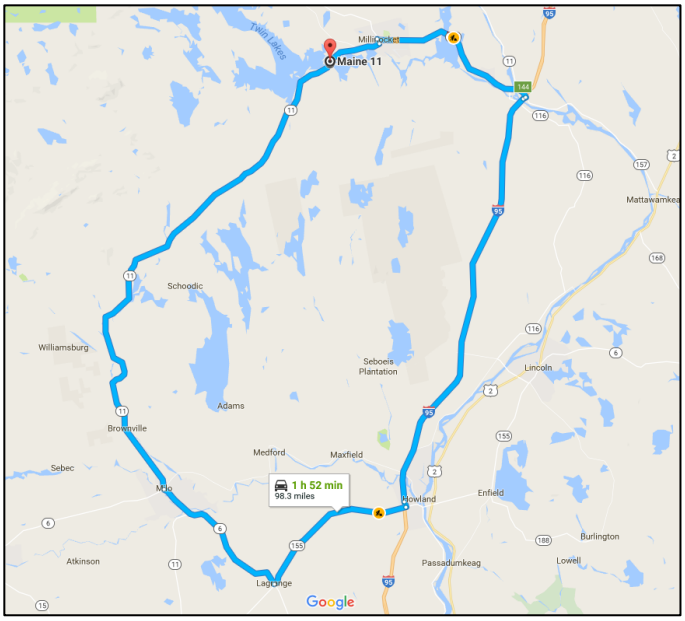
steel piles bearing on bedrock or dense soil strata. The width of the bridge will include two 11-foot-wide travel lanes and six-foot shoulders to provide two-way passage for snowmobiles and ATV traffic on the bridge deck adjacent to vehicular travel lanes. Relocating the bridge easterly of its current location also increases the distance to adjacent bridge structures to the west.

Corrosion-resistant materials will be utilized for superstructure elements and for substructure elements with increased exposure to corrosion. The proposed bridge type will likely be a steel girder bridge with a concrete deck and three-bar steel bridge rail. A steel girder bridge, properly detailed with corrosion-resistant materials will have a long service life with low maintenance costs.

c) Impact of Closure Detour – 98 one-way miles

Bridge	Functional Classification	AADT	Heavy Truck AADT
West Branch	Rural - Major Collector	1,240	161

AADT - Annual Average Daily Traffic[16]



If the Project is not completed and there is a closure, the detour for crossing the West Branch Bridge is **98** one-way miles for 1,240 vehicles on an average day. Because of the lack of alternatives, vehicles would be forced to take a very circuitous route that despite the use of Interstate 95 would still take **nearly two hours** each way. This is the shortest route not employing local roads. The route has a daily user cost of $27,879.[17]

2. Mattawamkeag Bridge – Route 2 over the Mattawamkeag River

Bridge	Year Built	Remaining Service Life (Yrs)	Bridge Length (Feet)	Bridge Type	Challenge
Mattawamkeag	1928	5-10	357	Seven-Span Concrete Girder	Structurally Deficient

[16] Traffic data for all bridges can be found at **http://www.mainedot.gov/grants/tiger/**

[17] User cost details for all bridges can be found at **http://www.mainedot.gov/grants/tiger/**

a) Current State

The Mattawamkeag Bridge is a seven-span structure with reinforced concrete T-beams and concrete deck. Each span is 47-foot clear. The curb-to-curb width is 30 feet with a single five-foot sidewalk. The superstructure has a concrete wearing surface with 10% delaminated areas. Several areas of the sidewalk and joint headers have been patched. The concrete deck has 30% delamination with scattered spalling and full-depth patch areas. The bridge rail does not meet an acceptable standard. The deck is in poor condition and the superstructure in fair condition.

The abutments are full height cantilever on spread footings that encase the old granite abutments. The north abutment has a full height vertical crack that is being monitored. The northeast wingwall has separation at the construction joint. The piers are mass wall type piers on spread footings and all the pier noses have a varying degree of moderate to heavy scaling areas. The damage to the pier noses are due in part to ice action. A diagonal shear crack is located at the upstream end of north pier. The south abutment east side has heavy scaling that has exposed girder bearing area. The substructure overall is in fair condition.

Footings are exposed on piers 2, 4, 5 and 6. Grout bags surround the four center piers only extending out six-foot to 16-foot beyond the pier. The south abutment footing is exposed.

Rehabilitation of the existing bridge is neither prudent nor feasible given the age of the bridge (89 years) which far exceeds the design life (75 years). Additionally, there is concern about scour vulnerability. The current bridge relies on scour protection consisting of grout bags around most of the piers. Grout bags are not a long-term solution. The grout bags have some minor undermining. The older section of substructure is in poor condition. Any rehabilitation work would require extensive cofferdams and work trestles. Substructure rehabilitation would be very expensive and only add 10 to 20 years of life to the structure.

b) Description of Replacement Bridge

The new bridge will be a multiple-span, continuous girder bridge approximately 360 feet long. MaineDOT anticipates the preferred span arrangement is a three-span bridge (110’-140’-110’=360’). This three-span option will use weathering steel plate girders or New England Bulb Tee’s. To minimize changes in the profile weathering, steel plate girders will likely be used. Steel girders are generally less deep than precast concrete girders. Steel girders also weigh less and are easier to erect than precast girders.

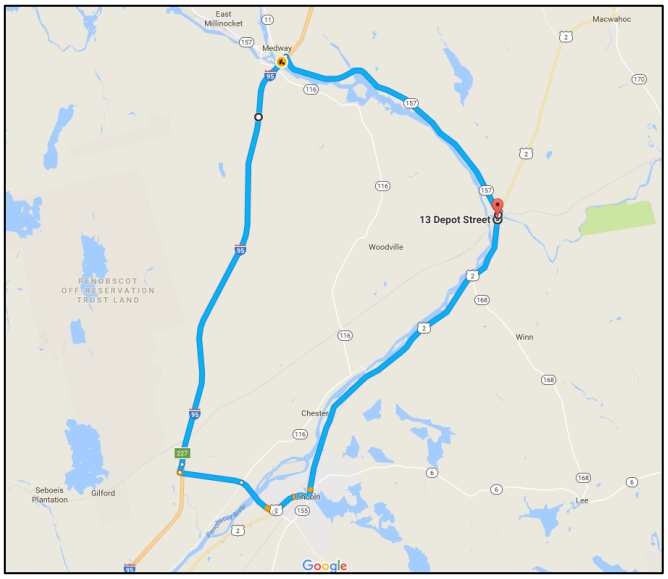
The bridge will be widened to safely accommodate the increasing recreational traffic of snowmobiles and ATVs in the area by putting in wider shoulders and expanding the sidewalk, resulting in a bridge width of approximately 43 feet. The bridge will have 12-foot travel lanes with two five-foot shoulders and a single eight-foot wide sidewalk. The resulting curb-to-curb width is 34-foot.

The number of piers in the river will be reduced, increasing the opening area and improving the flow characteristics through the bridge. Fewer piers reduces the potential for ice jam and trapping debris.

c) Impact of Closure Detour – 48 one-way miles

Bridge	Functional Classification	AADT	Heavy Truck AADT
Mattawamkeag	Rural - Major Collector	2,030	203

AADT - Annual Average Daily Traffic



If the Project is not completed and there is a closure, the detour for crossing the Mattawamkeag Bridge is **48** one-way miles for 2,030 vehicles on an average day. (There is an alternative route but a bridge on that route is scour critical and is limited to one truck at a time. That was not considered the practical alternative route, especially given the 200+ daily trucks that utilize the Mattawamkeag bridge that would be impacted by the detour. Those additional trucks and vehicle traffic would shift the problem to another bridge.) Because of the lack of alternatives, vehicles would be forced to take a very circuitous route, that despite the use of Interstate 95, would still take nearly 57 minutes each way. This is the shortest route that utilizes state roads in its entirety. This route has a daily user cost of $23,628.

3. Pleasant River Bridge – Pleasant Street over Pleasant River

Bridge	Year Built	Remaining Service Life (Yrs)	Bridge Length (Feet)	Bridge Type	Challenge
Pleasant River	1936	5-10	309	Two-Span Riveted Thru-Truss	Structurally Deficient **&** Fracture Critical

a) Current State

The Pleasant River Bridge is a two-span, painted, riveted steel thru-truss bridge built in 1936. The truss structure is fracture critical. The bridge has a concrete deck and concrete wearing surface. The curb-to-curb width is only 22 feet (narrowness evident in the photo). The superstructure is in poor condition due to collision damage to portals and sway frames. Some overhead steel members have collision damage. The paint system has failed over a large area of the bridge. The bridge rails consist of steel C-section bolted directly to the side of truss members. The bridge rail is substandard and does not provide protection for the truss members. Early signs of wear can be seen in the concrete wearing surface due to the picks on snowmobile tracks.

The abutments are full-height, cantilever type supported on timber piles. Both concrete abutments have map cracking with heavy efflorescence of the breastwall and a few cracks. The north abutment has spalling of the bridge seat. The single pier is a wall-type pier support on timber piles. A post-tensioned, reinforced-concrete collar was added around the top of the pier. The condition of the substructure is fair.

Rehabilitation of the existing bridge, which has previously undergone several life-extending repairs, is neither prudent nor feasible, given the age of the bridge (89 years) which far exceeds the design life (75 years). The existing bridge is too narrow, and the only practical way to address this is through replacement.

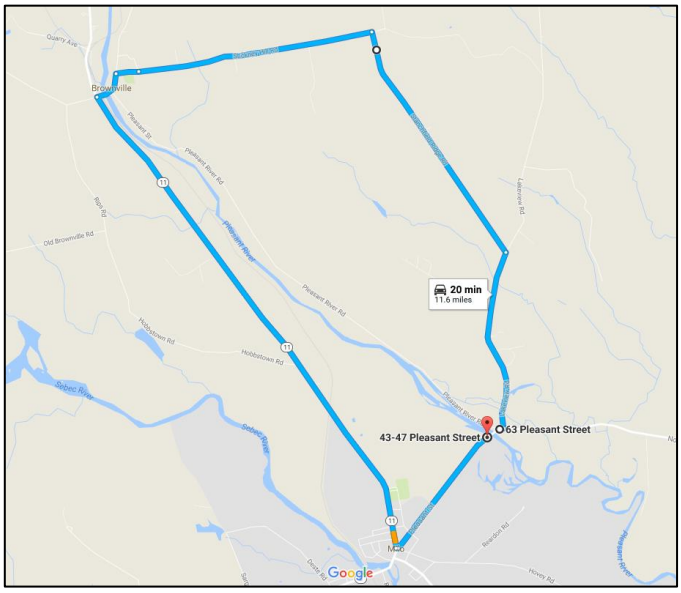
b) Description of Replacement Bridge

The new bridge is a multiple-span, continuous girder bridge that will likely have two spans and a pier in the middle of the river. This span arrangement will minimize any additional in-water impacts in an area known to have spawning habitat for endangered Atlantic Salmon. The bridge is in a floodplain and will need extensive hydraulic modeling, but based on the performance of the existing bridge, that is not expected to significantly affect the size of the bridge. The superstructure will consist of welded weathering-steel plate girders, with a concrete deck. The wearing surface on the deck will be either integral concrete or bituminous asphalt and membrane waterproofing. The bridge is currently narrow and will be widened by adding shoulders to safely accommodate the increasing recreational traffic of snowmobiles and ATVs in the area, resulting in a bridge width of approximately 38 feet. The travel lanes will be 11 feet wide with six-foot shoulders. The resulting curb-to-curb width is 34 feet.

c) Impact of Closure Detour – 12 one-way miles

Bridge	Functional Classification	AADT	Heavy Truck AADT
Pleasant River	Rural - Minor Collector	990	79

AADT - Annual Average Daily Traffic



If the Project is not completed and there is a closure, the detour for crossing the Pleasant River Bridge is **12** miles and expected to take 20 minutes for 990 vehicles on an average day. Vehicles would take the next closest comparable bridge and road in Brownville, which crosses the Pleasant River and then proceed east and south. This is the shortest route not employing local roads. This route has a daily user cost of $3,103. This route employs mostly State Aid Highways but they are acceptable even with the additional traffic volumes. While this bridge has the smallest detour distance and reroute cost, the bridge is both structurally deficient and fracture critical, making it very important for inclusion in the Project.

II. Project Location

a) Location - Maps, geo-spatial information[18]

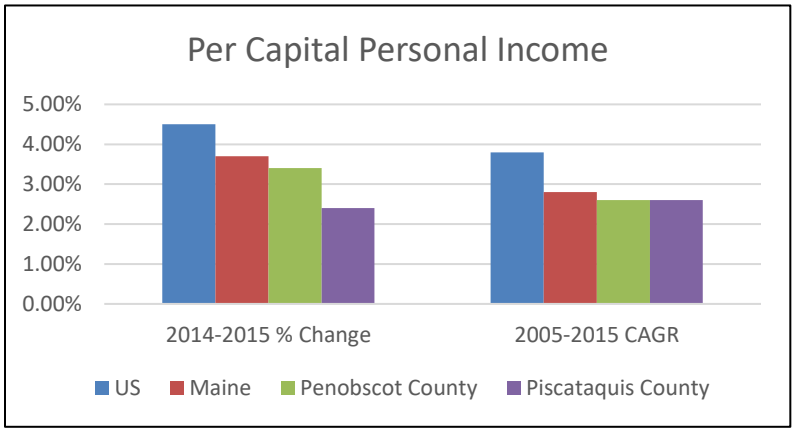
The bridges in the Project are in Penobscot and Piscataquis Counties in Maine's 2nd Congressional District. They are located in the towns of T3 Indian-Purchase Township (West Branch), Mattawamkeag and Milo (Pleasant River).

Bridge	Longitude	Latitude	County
West Branch	-68.76967	45.636874	Penobscot
Mattawamkeag	-68.35357	45.518778	Penobscot
Pleasant River	-68.97047	45.266815	Piscataquis

The percentage of structurally deficient bridges in the U.S. fell from 2001 to 2013 while Maine's percentage of bridges in that category remained the same.[19] Maine had 362 structurally deficient bridges in 2016 and ranked 9th in the nation in this category. Of the total number of bridges statewide, 14.8 percent of them were classified as structurally deficient.[20] Penobscot County, home to two of these bridges, ranks 2nd in the state for total number of structurally deficient bridges. Piscataquis County, site of the Pleasant River bridge, ranks 2nd in the state for percentage of total bridges that are structurally deficient. These bridges were selected as one Project for this TIGER grant application due to their close proximity to one another, their access

[18] *See* Appendix B, Maps with Project Locations
[19] http://maine.gov/mdot/pdf/kobs2014.pdf, page 11
[20] American Road & Transportation Builders Association 2016 Annual Bridge Report, Source: U.S. Department of Transportation Federal Highway Administration National Highway Bridge Inventory, 2015 data

to the region and their poor ranking in a region struggling to overcome economic hardship. The bridges are within a 16-mile radius of one another, making them a concentrated safety concern for the two-county area that has 17 percent (Penobscot County) and 19 percent (Piscataquis County) of the county population living in poverty.[21] The bridges are a vital connection to the region's employment, emergency services, access to healthcare, tourism and recreation. With public transportation in this rural part of the Penquis Region virtually non-existent, residents rely on personal vehicles and local roadways and bridges to get to and from work. In Piscataquis County, 88 percent of the population relies on a personal vehicle to commute to work. In Penobscot County, which includes Bangor with a metropolitan-area population of 153,746 and its public transportation system, that number is actually higher, at 90 percent.[22] The region is among the most rural in the country. Overall, Piscataquis County is the 4th least densely populated county east of the Mississippi River, with only 4.4 people per square mile.[23] Penobscot County, if not for Bangor (some 40 miles away from the closest bridge in the Project), would be equally sparse.



Incomes in these counties are challenged, and have been over time as the adjacent chart shows. In a recent year and over the last decade, these counties trail both the state of Maine and the nation in Per Capital Personal Income by substantial margins.[24] Similarly, for the number of people living in poverty, both counties exceeded the national average of 15.5 percent by wide margins. Piscataquis was 20.9 percent and Penobscot was 17.9 percent. For seniors in Piscataquis, the number was nearly double the nation.[25] With few options for employment and transportation, the region simply cannot afford the financial and inconvenience impact 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. Project Parties

MaineDOT – Funding $10,836,220

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 1,900 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

[21] United States Census Bureau, QuickFacts, Piscataquis County and Penobscot County, Maine, 2011-2015
[22] http://Statsamerica.org/distress/distress.aspx, 2015 data, Indiana Business Research Center, Indiana University, 2017
[23] Determined from data in https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk
[24] Supra note 21, Census Factfinder
[25] Supra note 21, Census Factfinder

revenue, which by statute, can be used for highways and bridges only. The 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 2015 and 2016. Due to its significant economic and transportation impact on the entire state and region, the Project has been prioritized by MaineDOT.

IV. Grant Fund Sources/Uses

a) Table showing sources and uses of project funds and percentage:

	MaineDOT	TIGER	TOTAL
Preliminary Engineering	$1,332,240	$0	$1,387,439
Right of Way	$55,199		
Construction	$7,503,781	$10,836,220	$20,285,001
Construction Engineering (CE)	$1,945,000	$0	
TOTAL	$10,836,220	$10,836,220	$21,672,440
% of TOTAL Project	**50%**	**50%**	**100%**

All TIGER grant funding for the Project will be spent on actual construction costs. It will not be used for engineering-related costs or any right of way acquisition.

b) State Matching Funds

Funding for MaineDOT's portion of the project will come from the State's General Obligation Bond proceeds. 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 and FASTLANE awards. Those awards include two prior bridge projects which utilized MaineDOT matching funds. Preliminary engineering and minimal right of way acquisition for the Project, with an estimated of $627,560, will be incurred by MaineDOT prior to the contracting of the Project with FHWA. It is not included in the cost of the Project and is separate and apart from MaineDOT's matching dollars. A match commitment letter from the MaineDOT Commissioner is attached as Appendix F.

V. Merit Criteria

a) Introduction

The Project is important because it meets all of the merit criteria, both primary and secondary. The bridges are each structurally deficient, 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 range in age from 69 to 89 years since they were originally built, and all show visible signs of that age. The Project would put all into a *state of good repair*. With few alternative routes, and none which are reasonable and practical, an outage of each of the bridges would impact the *economy* of the region, the ability to *compete* on a level playing field and the economic fortunes of the 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

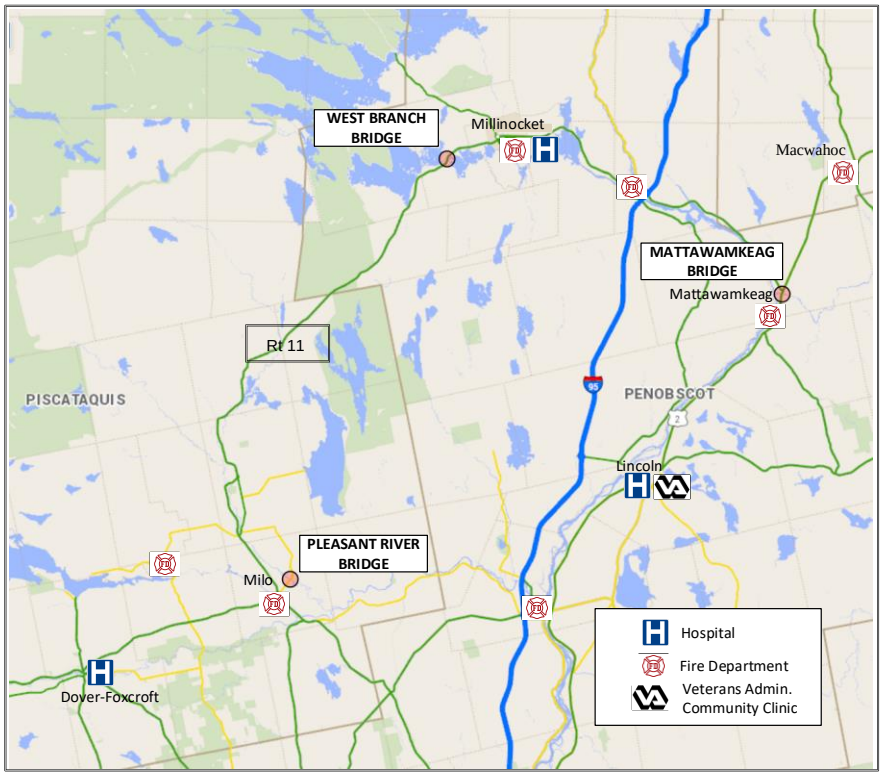
unique and recent agreement MaineDOT has with FHWA for NEPA. Any outage would greatly lessen *quality of life* in the region causing wasteful time and resources versus current routes. Construction of the Project will use *innovative* processes and materials for completion. The Project has a broad base of support from numerous stakeholders, enabling MaineDOT to once again be a great *partner* with USDOT for a significant federal grant.

b) Primary Selection Criteria

1) Safety

The Pleasant River and Mattawamkeag bridges are both structurally deficient, as indicated by their most recent evaluation scoring. The West Branch and Pleasant River bridges are both fracture critical from their latest evaluation. The safety and well-being of area residents could be jeopardized in the event of bridge failure. Emergency response time would increase to some parts of the region as time and distance of travel for emergency responders would rise. The region is served by three hospitals and a Veteran's Administration clinic: Millinocket Regional Hospital, Penobscot Valley Hospital, Mayo Regional Hospital in Dover-Foxcroft, and a regional V.A. clinic in Lincoln. Those living opposite the bridges from fire stations and hospitals would see response times increase, especially those living southwest of the West Branch bridge. Residents living in eastern Piscataquis County would face longer emergency response times without the West Branch Bridge. For example, those living along Route 11 southwest of the West Branch Bridge would be served by the fire station in Milo instead of Millinocket as they are today. In the event of an emergency with patient-to-hospital transport required and no West Branch Bridge, access to their closest hospital, a mere five miles away (in Millinocket), would be cut off. Therefore, responders at the next closest station, in Milo, would answer the call. Milo responders would need to drive north to the emergency, then back southwest to the hospital in Dover-Foxcroft. This would turn a 10-mile response today (Millinocket fire station to accident to Millinocket hospital) into a 60-mile journey (Milo fire station to accident to Dover-Foxcroft hospital.) In another example, residents living east of the Pleasant River bridge would still be served by the Milo fire station, as they are today. But

Fire Departments and Hospitals Map



without the bridge itself they would be subjected to a seven mile or longer response, including dirt road transit, versus a one mile or longer response, via paved roads. Similarly, without the Mattawamkeag bridge some residents would also face a seven mile or longer emergency response. Residents living northeast of that bridge are currently served by the station in Mattawamkeag, but without the bridge, some residents would be served from Macwahoc, creating a seven mile longer emergency response. *(Macwahoc fire station is shown on the upper-right edge of the Fire Departments and Hospitals Map.)*

Replacing the three 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 detour mileage will range from 12 miles to 98 miles. Using these detour miles and conservatively estimating that a no-build scenario will lead to some manner of shutdown for an average of two weeks per year and with these mileages and time frames, the Project will result in an overall safety savings of $6,201,332 over the course of 30 years on a 7 percent NPV basis.

In Maine, the number of fatal crashes per 100 million vehicle miles traveled is 1.07. Using this data, the dollar value of lives saved by project Year 6 is expected to be more than $565,214. Looking at each bridge independently, this project will result in a cost savings of $302,907 for West Branch; $236,151 for Mattawamkeag; and $26,156 for Pleasant River. An FMCSA study stated that in 2008 the number of large trucks involved in crashes that resulted in injuries per 100 million vehicle miles traveled was 29.1. To be conservative, this application assumes that all the injuries would be minor (i.e. Maximum Abbreviated Injury Scale Level 1). The value of preventing injuries is $34,866 by Year 6.[26] Looking at each bridge independently, this project will result in a cost savings of $18,685 for West Branch; $14,567 for Mattawamkeag; and $1,614 Pleasant River. This is a conservative figure, since there would also be accidents involving large trucks with minor injuries sustained. The economic impact of these crashes is $4,252 per accident, which also assumes that all the crashes are classified as a MAIS Level 1 accident. The benefit of eliminating these crash impacts by Year 6 has a value of $5,067. Looking at each bridge independently, this project will result in a cost savings of $2,716 for West Branch; $2,117 for Mattawamkeag; and $231 for Pleasant River.

New Safety Features Added to the Project Bridges

New Safety Feature	West Branch	Mattawamkeag	Pleasant River
Crash tested bridge rail	✓	✓	✓
Improved visibility due to wider shoulders	✓	✓	✓
Improved bridge lighting		✓	
Improved hydraulic capacity	✓	✓	✓
Wider sidewalk (8’ vs 5’)		✓	
Wider shoulders (6’ vs 0’)	✓		✓
Improved drainage	✓	✓	✓
Elimination of height restriction	✓		✓

[26] The fraction of the Value of a Statistical Life used for a MAIS Level 1 accident is .003, per the TIGER/INFRA BCA guidance.

2) State of Good Repair

As previously mentioned, the bridges in the Project are each structurally deficient, fracture critical or both. The proposed design of the new bridges will eliminate vulnerabilities in the features of the current bridges, which were completed in the 1920s – 1940s, prior to the adoption of better, safer and more efficient bridge design elements. The new bridges are designed for a 100-year lifespan. Meanwhile, if not replaced, the remaining service life of the three bridges, as well as the cost to maintain the bridges during that timeframe, follows:

	Mattawamkeag	**Pleasant River**	**West Branch**
Remaining Service Life (Yrs)	**5-10**	**5-10**	**5-10**
Curb & Fascia Rehab	$400,000	-	-
Steel/Bearing/Rivet Repair	-	$200,000	-
Scour Mitigation	$100,000	-	-
Spot Paint	-	$300,000	-
Substructure Rehab	$400,000	$300,000	$200,000
ONE-TIME TOTAL:	**$900,000**	**$800,000**	**$200,000**
Annual:			
Deck Patching	$5,000	-	$10,000
Fracture Critical Inspections	$2,000	$25,000	$25,000
Steel/Bearing/Rivet Repair	-	-	$10,000

Concrete deterioration, spalling and collision damage shown in the following photos will be eliminated with the replacement of new modern bridges.

Mattawamkeag Bridge - Heavy concrete deterioration

Mattawamkeag Bridge - Spall at abutment bridge seat

Pleasant River Bridge – Spalling of bridge seat

Pleasant River Bridge - Collision damage

West Branch Bridge - Damage to lateral sway bracing

West Branch Bridge - Collision damage to diagonal truss member

The new bridges will be safer, more accommodating to users and employ innovative features in their construction *(see Safety and Innovation Merit Criteria).*

3) Economic Competitiveness

a. THE GOODS ECONOMY

The bridges are an example of rural infrastructure supporting commerce and economic growth in a region that is economically challenged. In this rural area with no alternate means of transportation, 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 outside their area. They afford the initial movement of the raw timber and forest products that feed the pulp and paper industry. These roads also provide a

quiet, meaningful quality of life for those living along them. Rural local roads feed into rural minor collector roads. The Pleasant River Bridge roadway is classified in this category. These roads feed and work in concert with the rural major collector roads to provide a vital link between rural areas and larger road arteries. Both the Mattawamkeag and the West Branch Bridges encompass rural major collectors. These feed into rural minor arterial roadways which then feed into higher volume rural principal arterial – other roadways. Traffic gathered at these points can then access the largest rural artery of all, the rural principal arterial – interstate highways. Interstate 95 acts as the primary artery through Maine.

The economic impact of Maine's forest products industry was estimated at $8.5 billion in 2016. There are 16,500 direct jobs and 38,900 indirect jobs statewide resulting from the 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 wood mill closures in Maine.[27] 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 that will enhance investment in sustaining forest resources for generations, but the cost of transportation is a key factor in keeping the mills competitive. Replacing these bridges would provide the worry-free structural integrity required to handle raw timber materials, and finished lumber and paper goods, thus eliminating the threat of applying inadequate weight restrictions to materials traveling over the bridges. On the other hand, eliminating the bridges due to structural failure or even increasing weight restrictions that eliminate forest products movements 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 the global marketplace. International trade,

Forest Industry Flows and Key Industry Plants Map

[27] http://tradepartnership.com/wp-content/uploads/2015/01/ME_TRADE_2013.pdf, p.13

including imports and exports, supports 177,519 Maine jobs, more than one in five. While total employment declined from 2004 - 2013, trade-related jobs grew by 24 percent, with large and small companies, farms and factories participating in global trade in the past decade.[28] Canada is Maine's largest trading partner and receives 47.5% of the state's exports. Meanwhile, 51% of Maine's imports originate from Canada. To the south, Maine is a one-day drive from the international shipping lanes that link U.S. goods via the ports of New York and New Jersey. Getting these wood products to the global market in order to compete begins by having them travel on rural roads.

The *Forest Industry Flows and Key Plants Map* (on the previous page) illustrates how potential reroutes would further increase costs for an industry already suffering from global competition. Looking forward to potential redevelopment of defunct mill sites, the need to maintain infrastructure cannot be overemphasized. These sites are ideally located at the confluence of private and public road networks and rail lines. With continuing research and development by the University of Maine and private sector corporations, new uses and product lines are being developed regularly. The now abandoned sites are being repositioned to receive the new technologies and processes. Situated in critical locations in the supply chain, these mills will likely see new investments and future job growth.

For workers in the Penquis Region, a rerouted drive to their place of employment would mean increased travel costs: fuel cost, time spent on the drive, added wear-and-tear to a vehicle, and added traffic on alternate-route roads and bridges. This would be financially burdensome to an area with a per capita personal income (PCPI) well below the national average. According to 2015 U.S. Census Bureau data, Piscataquis County's PCPI was $34,634, only 72 percent of the national average while that number in Penobscot County was $37,032, just 77 percent.[29] With PCPI in the mid $30,000s, simply the fuel cost that residents would incur if the bridges were closed and their daily commutes were extended, ranging from $622 to over $5,000 annually, would certainly eliminate any disposable income. The total additional costs to operate their vehicles for extended distances simply could not be afforded by the average resident.

Bridge	One-way Reroute Distance (Miles)	Annual Fuel Cost Impact*	Annual Total Vehicle Cost Impact**
Pleasant River	98	**$5,078**	**$13,108**
Mattawamkeag	48	**$2,487**	**$6,420**
West Branch	12	**$622**	**$1,605**

** Based on average US Fuel Economy and average Maine price per gallon on 9/26/17*
*** Based on 250 annual commutes and IRS expense for standard mileage rates used to calculate the deductible costs of operating an automobile for business*

[28] Supra note 25, Maine Trade, page 14
[29] http://www.statsamerica.org/distress/distress.aspx, US Commerce Department's Economic Development Administration

b. THE SERVICE ECONOMY

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, but that mission requires solid roads and bridges that make getting there safe, convenient and affordable. The three bridges in the Project are positioned between Interstate 95 and the interior recreational areas key to a growing economy in the state. In 2016, visitors to Maine spent nearly $6 billion, or about 10 percent of state GDP, a six percent increase from the prior year.[30] Baxter State Park and the 87,500 acres west of it is known for its outstanding opportunities to hike, canoe, hunt, fish, snowmobile, snowshoe and cross-country ski. Also in this area, north and west of the three bridges lies, Maine's tallest mountain and largest lake. Mount Katahdin and Moosehead Lake, one of the largest freshwater lakes in the U.S.[31], is home to a variety of recreational and vacation activities that entice tourists from inside and outside of the state. Tourists participate in hiking, fishing, whitewater rafting, scenic floatplane flights, ATV adventures and much more. A large collection of lake cottages and a wide range of hotels mean that tourists in this area need these bridges to access this region and to flourish.

Maine is home to snowmobile recreation activity that pumps over $350 million annually into the state's economy. 14,500 miles of snowmobile trails make up the state's Interconnected Trail System (ITS). This activity provides 2,300 full-time jobs in the state.[32] The Pleasant River Bridge carries one of only two routes connecting the eastern and western halves of the ITS network.[33] The Mattawamkeag Bridge is part of the ITS main thoroughfare trail system. (The West Branch Bridge meanwhile, has a separate snowmobile bridge adjacent to it.) Maintaining the connectivity of this network of trails is also important to the ancillary businesses that benefit from this recreational/tourism activity, including restaurants along the trails, fuel stops, lodging and resorts, and snowmobile rental, maintenance, and sales facilities.

c. OPERATING COST SAVINGS

Costs to operate vehicles according to the TIGER BCA guidance includes costs such as fuel prices, maintenance, tires and depreciation. Using the BCA Guidance suggested values, this project will result in operating costs savings of $1.8 million over the course of 30 years. Looking at each bridge independently, this project will result in a cost savings of $963,065 for West Branch; $683,048 for Mattawamkeag; and $159,783 for Pleasant River. These costs savings are significant, particularly for this rural region of Maine.

A key goal of the Trump Administration is to reduce America's dependence on foreign oil, which will serve 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 98 miles each way.

[30] https://visitmaine.com/assets/downloads/2016-MOT-Annual-Report.pdf
[31] www.themainehighlands.com/story/moosehead-lake
[32] http://www.pressherald.com/2013/02/09/snowmobiling-puts-cold-cash-into-maines-economy_2013-02-10/
[33] Maine Snowmobile Association, http://www.mesnow.com/Map.html, 2017

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. It is estimated that each truck removed from the highway saves $.01 per truck ton-mile of highway maintenance costs per see TIGER FY 2017 BCA Guidance. This project will save Maine $290,931 over the course of 30 years on an NPV basis. Looking at each bridge independently, this project will result in a cost savings of $188,540 for West Branch; $91,123 for Mattawamkeag; and $11,268 for Pleasant River.

The elimination of truck-miles from the highway decreases travel time for the average highway user thus improving mobility. The travel time that is critical to this proejct is avoiding the detour time of up to 1.5 hours each way for passenger and truck users of the bridges. Overall, the project will save $21.6 million in travel time costs over the course of 30 years. Passenger travel time savings in Year 6 amounts to $1.267 million; truck driver travel time savings amounts to $449,557. Looking at each bridge independently, this project will result in a cost savings of $452,551 for West Branch; $754,572 for Mattawamkeag; and $60,063 for Pleasant River.

4) Environmental Sustainability

MaineDOT recognizes that assuring sustainability of habitats, ecosystems and 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.[34] 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.)*

Pollutants of Concern

Most heavy trucks are powered by diesel engines, which are major sources of emissions of nitrogen oxides (NO_x), sulfur dioxide 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.[35] The avoided net costs of emissions of sulfur oxide and volatile organic compounds over the 30-year life of the project are projected to be approximately $6.8 million. Sulfur oxide is emitting at a rate of 0.097 g/mile has a social cost of

[34] Programmatic Agreement between the FHWA, Maine Division and the MaineDOT Regarding the Processing of Actions Classified as Categorical Exclusions for Federal-Aid Highway Project

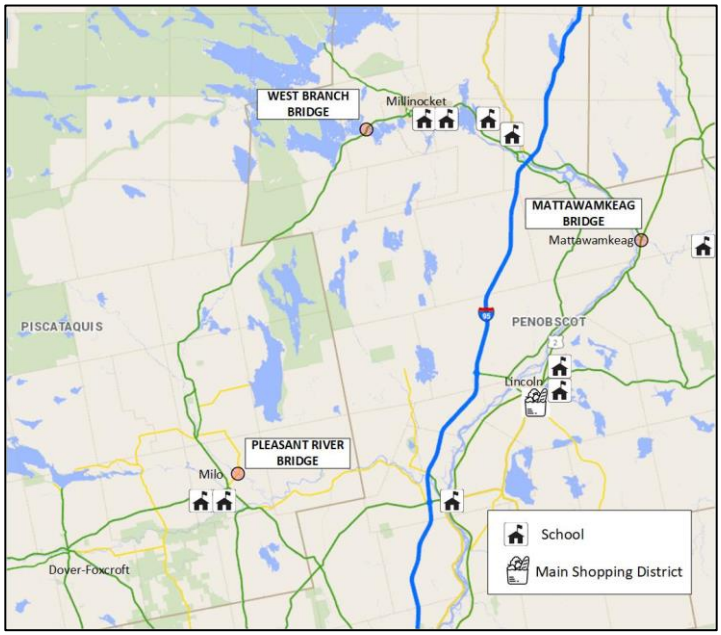
[35] *See* U.S. DEP'T. OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION, CHAPTER 2: NATIONAL FREIGHT TRANSPORTATION TRENDS AND EMISSIONS, http://www.fhwa.dot.gov/environment/air_quality/publications/effects_of_freight_movement/chapter02.cfm (last visited Oct. 7, 2017).

$43,600 per mile attached to it. Volatile organic compounds emit at a rate of 0.445 g/mile with a corresponding value of $1,872 per mile. Likewise, the avoided costs of emissions of nitrogen oxide (NOx) over the course of the 30-year life of the project are projected to be approximately $90 million. Trucks produce approximately 9.191 g/mile of NOx which has an assigned social cost of $7,377 per mile. And the avoided costs of particulate matter (PM) emissions are valued at approximatley $97 million. Particulate Matter is emitting at a rate of 0.215 g/mile has a social cost of $337,459 per mile attached to it. The overall net cost associated with these emissions over the 30-year project period is over $194 million.

5) 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 like the Penquis Region 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 three bridges prevents delay. As shown on the next map, students living southwest of the West Branch Bridge would face a significant reroute to reach their Millinocket-area schools. Meanwhile east of Interstate 95, the Mattawamkeag Bridge is the key link for Lincoln-area students.

Project Region Schools and Shopping



While the small towns in this area offer minor opportunities for shopping and eating at restaurants, the town of Lincoln is the region's main center of shops, restaurants, pharmaceutical needs, other essentials and quality of life needs. The Mattawamkeag Bridge, 14 miles north of Lincoln, provides access for residents north and east of there who may not have the resources to travel an additional 55 miles to Bangor. As discussed earlier, residents' quality of life is enhanced when they have access to the many outdoor recreational activities that the Penquis Region of Maine offers. The numerous lake houses in the Katahdin region require access not only to and from the rural major and rural principal roadways, but also to and from adjacent towns on rural local, rural minor and rural major roadways. These adjacent towns offer way-of-life resources for residents, such as groceries and hardware supplies, without the need to drive to larger cities.

Less time spent commuting daily adds to one's quality of life. For residents in the region, reroutes in the event the bridges are closed become costly. The reroute alternatives, which range

from 12 to 98 miles each way, could add nearly two hours to drive time greatly diminishing quality of life.

Also impacting quality of life is the 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. The Project will see a reduction in noise pollution by year 6 of $2,769. Looking at each bridge independently, this project will result in a cost savings of $1,276 for West Branch; $11,151 for Mattawamkeag; and $332 for Pleasant River.

c) Secondary Selection Criteria

1) Innovation

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

i. Use of corrosion resistant reinforcing steel for bridge components – Stainless steel concrete reinforcing will be used for all superstructure elements, including abutment backwalls, and will be considered for substructure elements, especially piers. Consideration will be given to the use of large diameter stainless steel welded bar grids to accelerate the process of placing concrete reinforcing for deck construction, potentially saving several weeks of construction time.

ii. Use of high performance concrete – Low permeability concrete will be used in the bridge through performance-based specifications. MaineDOT has used performance-based specifications for concrete since the late 1990s.

iii. Use of good detailing practices including:
   1. Use of integral abutments or semi-integral abutments to eliminate the use of joints.
   2. Using the minimum number of deck drains possible.
   3. Using fiberglass reinforced polymer drains

2) Partnership

The project has wide support from a variety of stakeholders. They stand ready to assist in completing approvals rapidly and constructing the three 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.

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 US Army Corps of Engineers (ASACE), 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 (*and will be discussed further in Project Readiness*) in the Project.

VI. Project Readiness

A. Technical Feasibility

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 replaced 18 multi-span bridges over water, with expenditures more than $160 million. Those past structures have averaged 494 feet in length, far longer than any bridge in the Project. During that same time, the team has tackled well over 100 bridge projects and has secured permitting for all of them. While no bridge project is without some level of challenge, the bridges in the Project are all well within the capability of the team and none have complicated engineering design challenges, neither civil nor mechanical.

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
Mattawamkeag	$396,145	$24,000	$5,310,000	$580,000	$6,310,145
Pleasant River	$318,746	$23,199	$4,620,000	$475,000	$5,436,945
West Branch	$617,349	$8,000	$8,410,000	$890,000	$9,925,349
Project Total	$1,332,240	$55,199	$18,340,000	$1,945,000	$21,672,440

B. Project Schedule/Gantt Chart

Project Schedule Key Events[36]

Task Name	Duration	Start	Finish
Project Kickoff	0 days	Mon 9/18/17	Mon 9/18/17
Gather existing project data	3 wks	Mon 9/18/17	Fri 10/6/17
Initial Team meeting	0 days	Fri 10/6/17	Fri 10/6/17
Preliminary Public Meeting	0 days	Fri 11/17/17	Fri 11/17/17
Survey completed	6 wks	Mon 9/25/17	Fri 11/3/17
Hydraulic Analysis completed	6 wks	Mon 11/6/17	Fri 12/15/17
Preliminary Geotechnical work	11 wks	Mon 11/6/17	Fri 1/19/18
Preliminary Design Completed	39 wks	Wed 11/29/17	Tue 8/28/18
Draft PDR completed	0 days	Tue 8/28/18	Tue 8/28/18
PDR reviewed, amended &	12 wks	Wed 8/29/18	Tue 11/20/18
Preliminary Design Report	0 days	Tue 11/20/18	Tue 11/20/18
Formal Public meeting	0 days	Tue 1/1/19	Tue 1/1/19
Utility Coordination	12 wks	Wed 1/2/19	Tue 3/26/19
Approach plans completed	14 wks	Wed 1/2/19	Tue 4/9/19
Plan Impacts Complete	0 days	Tue 4/9/19	Tue 4/9/19
Final Environmental Coordination	41 wks	Wed 4/10/19	Tue 1/21/20
Structural Design Completed	74 wks	Wed 2/27/19	Tue 7/28/20
Utilities Certified	8 wks	Wed 4/10/19	Tue 6/4/19
ROW coordination	62 wks	Wed 4/10/19	Tue 6/16/20
NEPA complete	0 days	Tue 1/21/20	Tue 1/21/20
Environmental Approvals Complete	22 wks	Wed 1/22/20	Tue 6/23/20
PS&E package complete	0 days	Tue 7/28/20	Tue 7/28/20
Advertise	0 days	Wed 8/26/20	Wed 8/26/20
Bid Opening	0 days	Wed 9/16/20	Wed 9/16/20
Award	0 days	Wed 10/7/20	Wed 10/7/20
Begin Construction	0 days	Wed 10/28/20	Wed 10/28/20
Construction	159 wks	Wed 10/28/20	Wed 11/15/23
End Construction	0 days	Wed 11/15/23	Wed 11/15/23

The project plan for each bridge anticipates both obligation of funding and completion of the Project well within the September 30, 2020, and 2025 deadlines, respectfully.

C. Required Approvals
Environmental Approvals

Communication with environmental agencies and interested parties has been initiated. Baseline data collection is underway to identify natural and cultural resources potentially affected.

[36] *See* Appendix D for full Gantt Chart.

Alternatives will be evaluated under state and federal laws. The NEPA process will be completed prior to the final design of the preferred alternatives.

a) National Environmental Policy Act (NEPA)

The (NEPA) process will inform and be incorporated into preliminary design efforts. The project is anticipated to be classified as a Categorical Exclusion in accordance with 23 CFR 771.117(d) (13). The FHWA Maine Division will be the lead agency for NEPA review. NEPA is underway. Should any issues arise, MaineDOT will work directly with the respective agencies to quickly resolve them. The NEPA process is expected be completed by January 21, 2020. In the event of any issues forthcoming, there will be ample time to address them prior to the required TIGER Discretionary Grant obligation date.

b) U.S. Coast Guard Permit

The Pleasant River is navigable at the Pleasant River Bridge location. However, it is expected that a U.S. Coast Guard permit exemption can easily be obtained as it was for a recent project upriver. As the waterways associated with the other two bridges are not navigable, a U.S. Coast Guard permit will not be required to remove the existing structures to construct the new bridges.

c) Other Federal and State Environmental Permits

A U.S. Army Corps of Engineers permit will be required for work being conducted within waters of the United States. A Maine Department of Environmental Protection permit will also be required. All permit approvals are expected to be received by June 23, 2020.

d) Historic and Archeological

The Section 106 process has begun, including identification of historic resources.

e) Section 4(f) of the Department of Transportation Act

Identification of 4(f) resources is complete. If the proposed design requires use of an identified resource, MaineDOT will work with FHWA to obtain approval under Section 4(f).

f) Endangered Species Act (ESA) and Essential Fisheries Habitat (EFH) MaineDOT has identified the Federal Endangered Species and EFH within the project areas. MaineDOT and FHWA will coordinate with federal agencies during project design to avoid and/or minimize effects to ESA/EFH. MaineDOT and FHWA will complete the required consultations prior to June 23, 2020.

State and Local Approvals and Federal Transportation Requirements Affecting State and Local Planning

MaineDOT has broad public support for the Project (see Letters of Support) and will include the Project in the 2018-2019-2020-2021 State Transportation Improvement Program (STIP).

D. Risks & Mitigations

Project Risks	Mitigations
Environmental permitting/Restriction • Due to the presence of Atlantic Salmon, environmental permits will limit in stream work time and limit noise generated during construction	Minimize in water work • Collaborative agreements with MaineDOT, USFWS, USACE, FHWA and MTA under the Endangered Species Act through a process that expedites endangered species consultations and aims to meet both wildlife and project goals[37] • Choose a final design that minimizes in water work. • Constructability reviews will be completed during preliminary design to insure the selected alternative is buildable given the various environmental restrictions
Cost control • While the preliminary design phase has begun for the bridges, the final recommended improvements at these bridges could lead to scope and cost increases if additional required work is identified.	Thorough preliminary evaluation • Multiple alternatives will be evaluated during preliminary design with many scenarios of how to maintain traffic being considered • Constructability reviews will be a key focus during preliminary design with a focus on ***most constructible*** and cost effective. Design Build Process may be employed • Will result in higher probability to achieve cost estimates • Better constructability issue resolution
ROW acquisition • There is limited right of way acquisition for each of the bridges in the Project	State of Maine law for required takings[38] • Statutes in the State of Maine allow for this process to be completed expeditiously and according to an existing process that MaineDOT executes often. • Follows a 5-step process 1. Mapping 2. Appraisal 3. Negotiation 4. Offer 5. Condemnation • The process cannot be stalled at any phase including condemnations as there is a separate appeals process that allows the project to proceed with no delay • The entire Right of Way process is allotted up to a year in the project schedule • There are no local statutes or challenges that can impact the process

Further mitigating any project delay are numerous programmatic agreements MaineDOT has with reviewing agencies. MaineDOT will take advantage of the following agreements to streamline the environmental review and approval process:

i. Cooperative Agreement between US Department of the Interior Fish and Wildlife Service (USFWS), FHWA and the MaineDOT State Transportation Reviews by the USFWS in Maine 2015-2020

[37] http://www.maine.gov/mdot/maspc/
[38] See MaineDOT's The Land Owner's Guide to the Acquisition Process *Revised 12/2014,* http://www.maine.gov/mdot/publications/docs/brochures/landownersguideoct2014.pdf

ii. Cooperative Agreement between USFWS, FHWA and the MaineDOT State Transportation Reviews by the USFWS in Maine 2016-2021
iii. Maine Atlantic Salmon Programmatic Consultation between the USFWS, MaineDOT, U.S. Army Corps of Engineers (USACE), and the Maine Turnpike Authority (MTAnalized on January 23, 2017, which covers activities that involve work in streams to construct, preserve and maintain the state transportation system
iv. 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, USFWS, NOAA's National Marine Fisheries Service
v. Programmatic Agreement between the FHWA, Maine Division and the MaineDOT Regarding the Processing of Actions Classified as Categorical Exclusions for Federal-Aid Highway Project
vi. Programmatic Agreement for the State of Maine Between MaineDOT, FHWA Maine division, USFWS Regarding Endangered Species Act Section 7 Consultation for Canada Lynx
vii. Section 106 Tribal 106 Programmatic Agreement
viii. Memorandum of Agreement for Stormwater Management Between the MaineDOT, MTA and Maine Department of Environmental Protection

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

VII. Results of Benefit Cost Analysis

7% NPV Summary		
	COSTS	BENEFITS
CAPEX	$18,929,548	
TRAVEL TIME SAVINGS		$21,622,312
SAFETY		$6,201,332
EMISSIONS		$64,932,193
OPERATING COSTS		$22,489,333
TOTAL	$18,929,548	$115,245,170
BENEFIT COST RATIO		6.09

See Appendix A for detailed BCA

VIII. Cost Share

This TIGER 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.[39] 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.[40] Funding challenges for bridges in this rural state remain. The 2017-2019 MaineDOT Work Plan expects to complete 278 bridge projects and spend some $334 million which while ambitious still lags the 2014 KOBS report by nearly $90 million.[41] Rural Maine needs the impact of a TIGER grant to help maintain highway access through the Penquis Region. Once the Project is completed, MaineDOT is committed to allocating funds to maintain the new bridges to the appropriate standards over their lives.

IX. Federal Wage Rate Certification

See Appendix G.

[39] Supra Note 11, Keeping our Bridges Safe, page 1
[40] Supra Note 11, Keeping our Bridges Safe, page 1
[41] http://www.maine.gov/mdot/projects/workplan/docs/2017/MaineDOTWorkPlan2017_2018_2019.pdf, page ii

Grant Request Supporters

MaineDOT's grant request for TIGER FY 2017 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

U.S. Senator Susan Collins
U.S. Senator Angus King
U.S. Congressman Bruce Poliquin

State Elected Officials/Offices

Governor Paul LePage
Penobscot County – Court of County Commissioners
Piscataquis County Commissioners
Town of Mattawamkeag, ME – Chairman Board of Selectmen

State and Local Organizations

Maine Forest Products Council – Executive Director
New England Outdoor Center

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

****** As additional letters of support are submitted, MaineDOT will place them on the website noted above.

APPENDIX