TIGER 3 APPLICATION

RICHMOND – DRESDEN

MAINE KENNEBEC BRIDGE

Bridge Number 2506
Federal Project AC-BH-1267(400)X
Work ID Number 012674.00
TIGER 3 Pre-Application ID "DScott76093842"

Maine Department of Transportation
October 26, 2011

PROJECT OVERVIEW

Project Name:

Richmond-Dresden, Maine Kennebec Bridge

Loaded trucks must center on bridge deck to miss portal bracing, creating essentially a one lane bridge.

General Description:

Constructed in 1931, the Maine Kennebec Bridge (MKB) carries State Route 197 over the Kennebec River between the communities of Richmond and Dresden. MKB is 1,239 feet long. It has one moveable section, consisting of a swing span that pivots open, allowing larger vessels to pass in the navigable portion of the River. MKB is classified as Structurally Deficient by the Federal Highway Administration (FHWA); five of its spans are Fracture Critical, meaning that failure of certain steel tension members could result in failure. MKB and its approaches have numerous deficiencies and do not meet current design criteria, including width, vertical clearance, load capacity, sight distances, stopping distances, super-elevation and curve radii. The cost of replacement together with approach work is estimated at $24.9 million.

A feasibility study, completed in 2006, compared several options and found that replacement in approximately 10 years would be the lowest cost solution on a life cycle basis. Now, five years after that study, complete replacement with a higher structure remains the least cost alternative. In accordance with these findings, the proposed project is replacement with a high level, fixed span bridge. This application requests $10.81 million in TIGER funds to supplement $1.64 million in existing Federal funds to pay for 50% of the project.

Key Threshold Requirements:

- Eligible Project: ***YES****, Bridge Project eligible under Title 23, USC.*
- NEPA complete or underway: ***YES***.
- Included in relevant planning documents: ***YES***.
- Ready to obligate all TIGER funds by June 30, 2013: ***YES*****,** *scheduled for April 2013 delivery.*
- Local match provided: ***50%*** *of the total project cost will be borne by the State of Maine.*

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Project Website: http://www.maine.gov/mdot/tiger3/kbr.htm

Project Benefits:

(i) State of Good Repair
- replacement of an 80 year old bridge at the end of its service life.
- included in all applicable State planning documents and the Federal STIP.
- is the lowest life cycle cost solution.
- helps bring Maine's percentage of Structurally Deficient bridges closer to New England and National averages (Maine - 15.4%; New England - 12.4%, U.S. - 11.5%).

(ii) Economic Competitiveness:
- provides reliable access and regional mobility for highway and marine traffic.
- is the only viable detour route for Sagadahoc Bridge, ensuring redundant access to Bath Iron Works (a major defense contractor and one of Maine's largest employers).
- is adjacent to Economically Distressed Areas likely to benefit from its short and long term economic activity.

(iii) Livability:
- will provide enhanced safety for bicycle and pedestrian traffic.
- will support Richmond's downtown revitalization efforts.
- will improve access for non-drivers and persons with disabilities.

(iv) Environmental Sustainability:
- will minimize adverse environmental impacts and utilize emerging techniques to protect salmon and sturgeon resources.
- will promote access to Swan Island and the *Steve Powell Wildlife Refuge*.

(v) Safety:
- will improve load capacity and geometrics to reduce accidents and injuries.
- will remove the potential risks associated with a failing, lead-based paint system.

(vi) Innovation:
- will provide for the use of "bubble curtains" to minimize the in-water noise associated with pile driving.
- will utilize a very compressed construction schedule which will require Contractor innovation.

(vii) Partnership:
- 50% Federal share for a project typically eligible for 80% Federal.
- completes an overall funding package.
- has documented support from elected officials and local government.

(viii) Benefit / Cost (3% Discount Rate)
- total Benefits of $361.7 million.
- total Costs of $25.2 million.
- Benefit / Cost Ratio of 14.3.

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MKB Conceptual Plans http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/KMBConceptualPlans.pdf
MKB Conceptual Schedule http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/KMBConceptualSchedule.pdf
MKB Detailed Cost Estimate http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBPreliminaryEstimate.pdf
MKB Economically Distressed Area Map
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MKB Life Cycle Cost Analysis – 3% Discount
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBLifeCycleCostAnalysis.pdf
MKB Life Cycle Cost Analysis – 7 % Discount
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBLifeCycleCostAnalysis7percentDiscount.pdf

1. INTRODUCTION

The Maine Kennebec Bridge is located between Richmond and Dresden on State Route 197 over the Kennebec River. State Route 197 extends generally east and west over the Kennebec River which flows southward under the bridge. The existing bridge was built in 1931 and is 1,239 feet long with ten spans. Five spans are multi-stringer, four spans are through Parker trusses, and one span is a center bearing swing span with a Warren through truss. The deck is an open steel grid.

Figure 1: Project Location Map

This project proposes replacing the existing bridge with a new structure located no more than 125 feet upstream from the existing bridge centerline in order to minimize potential impacts on private properties in the vicinity. This location also allows the swing span to remain operable during construction. An alternate horizontal alignment was considered on the downstream side. It was determined, however, that the proximity to existing houses near both the Richmond and Dresden abutments would result in unacceptable impacts. Consequently, the downstream location was eliminated from further consideration.

The highway approaches to the structure will require significant fill material to accommodate the raise in vertical alignment. At the Richmond (west side) approach, proposed finish grade will be raised approximately 30 feet above existing and transition to the west to match existing at the intersection of Front Street (State Route 197) and Old Ferry Road. An existing house located in the northwest quadrant of the project will likely require protection from the proposed embankment with a permanent retaining wall system or complete acquisition. MaineDOT maintains a service road to the southwest of the Richmond abutment that would be utilized to redirect traffic onto the existing bridge during construction.

At the Dresden (east side) approach, proposed finish grade will be raised approximately 46 feet above existing and transition to match the existing roadway approximately 915 feet east of the proposed end abutment. To maintain access to existing houses north of the structure, Lincoln Road will be spanned by the proposed structure and a permanent access road connecting Lincoln Road and Densmore Lane to Front Street (State Route 197) will be constructed. This access road will also be used to facilitate maintenance and protection of traffic during construction. An existing private residence and wastewater disposal field is located at the east limit of the survey mapping (approximately 330 feet east of the proposed end abutment). The proposed embankment toe of slope will likely impact this property, requiring a permanent retaining wall system or land acquisition. http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/KMBConceptualPlans.pdf

2. EXISTING CONDITIONS

2.1 Existing Geometric Features

The existing bridge over the Kennebec River provides a clear roadway width of 20 feet resulting in two 10-foot wide travel lanes. The first two spans at the west end of the bridge are multi-stringer spans constructed on a down-gradient from west to east. The next five spans are through trusses with the State Route 197 profile essentially level. The middle through-truss is a center bearing swing span to allow passage of boats on the Kennebec River, including U.S. Coast Guard icebreakers to maintain marine access. The eastern remaining three spans of the bridge are multi-stringer spans constructed on a down-gradient from west to east.

Center Bearing Swing Truss Span with Two Fixed Truss Spans on Each Side

State Route 197 is a two lane roadway comprised of two 11-foot wide travel lanes with 3 to 4-foot wide shoulders. Horizontal and vertical curves exist on both the east and west roadway approaches to the bridge.

West Bridge Approach (Richmond Side)

East Bridge Approach (Dresden Side)

On the west approach, there is a warning sign with two flashing beacons to provide motorists with an indication that the bridge is temporarily closed and the swing span has been opened for boats. Table 1 provides a summary of the existing geometric features.

2.2 Design Standards

State Route 197 is a Non-NHS roadway and is classified as an urban major collector. The appropriate design standards for this classification of roadway are based on a design speed of 40 mph. Table 1 shows the design elements and deficiencies due to existing conditions.

Table 1: Existing Condition vs. Design Criteria

Design Element	Existing Condition	Design Criteria	
Design Speed	35-45 mph	40 mph	
Level of Service	C	C	
On-Street Parking	Not Provided	Not Provided	
Approach Lane Width	11′	11′ min.	
Approach Shoulder Width	3′- 4′	6′ min.	8′ desirable
Approach Cross Slope	1.5% - 3%	2% travel lane	4% shoulder
Bridge Width	20′	30′ min.	34′-38′ desirable
Structural Capacity	H21 (21 Tons)	HL93 mod (45 Tons)	
Minimum Stopping Sight Distance	133′	305′	
Passing Sight Distance	133′ & 238′	1470′	
Decision Sight Distance	230′ & 133′	825′	
Max. Degree of Curve/Min. Curve Radius	14°-01″ / 409′	11°-30″ / 500′	
Superelevation	e_{max} = 10%	e_{max} = 4%	
Horizontal Sight Distance	198′	305′	

Maximum Profile Grades	-6.6%	9.5%	
Minimum Profile Grades	0%	0% min.	0.25% desirable
Min. Vertical Clearance over River	12′±	To be determined by USCG	
Min. Vertical Clearance on Truss Bridge	15′-3″ (center) 11′-0″ (sides)	14′-6″	

A review of the design criteria compared to the existing roadway and bridge geometry, show that there are several non-standard features associated with the existing conditions. The list of deficiencies is long, however, the most serious are mentioned here. The bridge width does not meet the 30-foot minimum required width and the narrowness of the bridge impacts the travel speed of vehicles. The shoulder widths on both approaches to the bridge do not meet the 6 feet minimum required for this classification of roadway. The roadway does not accommodate a consistent design speed. The radius of the horizontal curve on the west approach to the bridge accommodates a speed of 35 mph and the radius of the horizontal curve on the east approach to the bridge accommodates a speed of approximately 45 mph. The pavement cross slope does not satisfy the design criteria in all locations within the project limits.

The 21 ton inventory rating is less than Maine's current design loading of 45 tons; the bridge, however, does not currently require load posting. Since the paint system is now ineffective throughout the bridge, additional section loss could require load posting in the near future.

Stopping Sight Distances (SSD) are also lacking. Two of the three vertical curves on the approaches do not provide the minimum SSD of 305 feet. On the west approach there is a sag vertical curve followed by a crest vertical curve with a short tangent section between the two curves, allowing only headlight sight distance (HSD) of 605 feet; the crest vertical curve provides a SSD of 232 feet. MaineDOT's Highway Design Guide specifies that minimum HSD should equal the SSD. The east approach to the bridge also has a sag vertical curve providing a SSD of 133 feet.

Passing Sight Distances provided by the horizontal curves on the west and east bridge approaches are 268 feet and 238 feet, respectively, both of which are significantly lower than the minimum required. On the curved approaches, minimum required passing sight distance is not provided. The Decision Sight Distances provided by the horizontal curves on the west and east bridge approaches are both are significantly lower than the minimum required. In summary, deficiencies exist in maximum degree of curve and minimum curve radius, superelevation, and horizontal sight distance.

2.3 Traffic Capacity

The 2010 Average Annual Daily Traffic (AADT) for State Route 197 is 3,340 vehicles per day. The design hourly volume (DHV) is 12% of the AADT, with heavy trucks comprising 6% of the DHV.

The Estimated Time of Completion (ETC) for this project is assumed to be the year 2015. The years 2035 and 2065 were subsequently assumed to be ETC+20 and ETC+50, respectively. Table 3 provides the 2005 traffic volumes as well as those calculated for ETC (2015), ETC+20 (2035), and ETC+50 (2065) using a growth factor of 2% per year. The projected traffic volumes were used in the modeling that forms the basis for the Benefit Cost Analysis discussed later in this application.

Table 2: Existing and Projected Traffic Volumes

Volume	YEAR			
	2005	ETC (2015)	ETC+20 (2035)	ETC+50 (2065)
AADT (vpd)	3110	3732	4976	6842
DHV (vpd)	373	448	597	821

The existing highway approaches generally provide a 28 feet wide section, consisting of two 11′ wide travel lanes with 3 foot shoulders compared to the bridge width of 20 feet. The narrowness of the bridge results in the structure operating as a single lane structure when being traversed by large trucks. A high volume of truck traffic uses this roadway including large logging trucks that encroach on the adjacent oncoming travel lane, causing oncoming traffic to stop and wait until the trucks clear the bridge. This alternating one-way traffic flow causes delays to motorists as the total bridge length is 1,239 feet long. Normally, two-way passenger vehicle traffic can be accommodated on the bridge, although the travel speed may be lower than 40 mph due to the narrow lanes and a reduced driver comfort level in crossing it. Some motorists are unwilling to negotiate two-way travel across the structure when it is being traversed by a large truck.

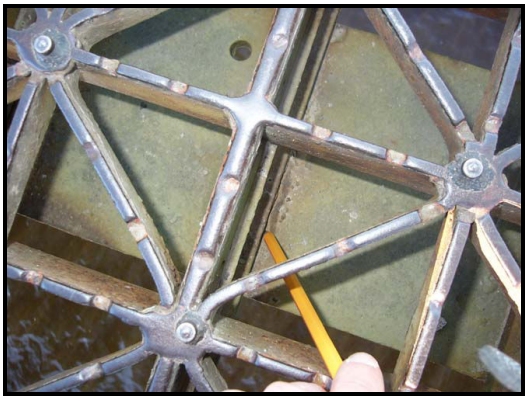
2.4 Structural Conditions

The bridge, originally constructed in 1931, underwent significant repair/partial replacement after the flood of 1936. In 1959, the timber floor system was removed and replaced with an open grate steel grid deck system. The swing span under went select repairs in 1986. Most notable was the removal of the timber fender system and installation of “dolphins” consisting of steel pipe legs and concrete deck placed just upstream and downstream of Pier 5. MaineDOT and its Consultant performed a cursory bridge inspection from November 14 thru 17, 2005. MaineDOT conducted a public information meeting the evening of November 15, 2005.

The following photographs represent the general condition of this bridge.

Paint System Failure and Resulting Steel Corrosion

General Condition - Truss Spans



General Deck Condition

The open grate steel deck has many locations were the tack welds connecting the grating to the stringers have broken.

Severed Portal Brace

The end portal framing of the trusses has been impacted and severed in multiple locations.

Span 7 - Bottom Chord

The upstream bottom chord of Span 7 is bowed by approximately four inches. It appears that the bow was caused by a vessel collision with the truss.

Span 7 - Member L5U6, Downstream Side

Truss diagonal on downstream side of Span 7 has been bent and twisted due to vehicular impact transmitted via the bridge railing connection.

Substructure Deterioration.

Note crack at anchor bolt.

Pier 3 – Downstream End Condition

Railing Condition

The bridge railing has been impacted in multiple locations.

2.5 Mechanical Condition of Swing Bridge

The swing span generally operates as intended, but requires constant attention by the maintenance crew. Three times in the last 10 years a fire truck from nearby Richmond village has been used to close the swing span because it was stuck open, using the fire truck's winch and steel cable. The swing span also expands during hot weather causing it to bind against the fixed spans. When this happens, a welding torch must be used to cut the deck in order to widen the gap and allow the bridge to close. The picture shows this procedure.

2.6 Navigation Clearances

The existing swing bridge span provides unrestricted vertical navigation clearance when it is in the open position. The vertical clearance (navigational height) provided under the swing span

when it is closed is approximately 16′-0″ at high water levels. The horizontal clearances provided when the swing span is opened are: 71′-7″ between the swing span and Pier 4, and 67′-5″ between the swing span and Pier 6.

Navigability on this section of the Kennebec River is extremely important, especially for U.S. Coast Guard vessels. The U.S. Coast Guard operates two vessels for ice breaking and aids to navigation. These vessels are utilized during most winters to prevent ice jams that can cause flooding in many upstream areas if the ice jams are not broken up. The CGC Thunder Bay requires a masthead clearance of 76 feet and a horizontal clearance of 38 feet. The CGC Marcus Hanna requires a masthead clearance of 58 feet and a horizontal clearance of 36 feet. Both vessels are accommodated by the swing span of the existing bridge.

3. PROJECT DETAILS

The proposed project would replace the existing bridge with a high level, fixed bridge – eliminating the need for a moveable span.

Based on the Feasibility Study, the replacement structure would likely be a nine span steel plate girder with tall concrete piers supported on piles bearing on ledge. A concrete alternate might be considered as well. The steel structure would include a center section superstructure of five spans, framed by an expansion joint and a two span continuous structure on both sides. The first three spans from the Richmond (west side) abutment will be curved to match the proposed horizontal alignment. The center spans would provide at least 76 feet of vertical clearance and 150 feet plus of horizontal clearance, which would accommodate all marine traffic that can clear the downstream bridge (Sagadahoc Bridge). Approach grades on the adjacent spans are limited to ±6%.

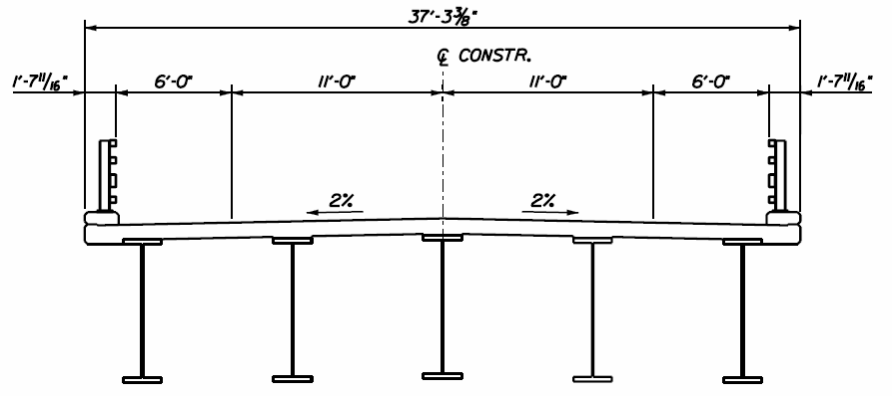


Figure 2: Proposed Bridge Section

The proposed bridge section meets the design requirements and will provide sufficient width to accommodate two-way truck traffic, bicycles and pedestrians. The structure carries two 11-foot lanes, 6-foot shoulders and MaineDOT's standard steel 4-bar traffic/bicycle railing.

4. PROJECT PARTNERS

MaineDOT will continue to consult with stakeholders during the development of this project. Documentation of stakeholder support and/or involvement to date is included as web links under the applicable Selection Criteria subsections.

Advisory Council on Historic Preservation
Army Corps of Engineers
Federal Highway Administration – Maine Division
Maine Department of Environmental Protection
Maine Department of Inland Fisheries & Wildlife
Maine Historic Preservation Office
National Oceanic and Atmospheric Administration
Swans Island Preserve
Town of Dresden
Town of Richmond
U.S. Coast Guard
U.S. Department of the Interior
U.S. Environmental Protection Agency
U.S. Fish & Wildlife Service

5. GRANT FUNDS AND USE OF PROJECT FUNDS

Table 3: Proposed Funding	
	50% Federal / 50% State (Millions)
Preliminary Engineering	$1.3
Right-of-Way	$0.5
Construction	$21.4
Construction Engineering	$1.7
TOTAL	**$24.9**

This breakdown assumes that $10.81 million in a TIGER III Grant will be awarded to complete the required funding for this project, as follows:

STATE OF MAINE (50%)		$12.45
FEDERAL (50%)	BR / BH	$1.64
	TIGER III	$10.81
FEDERAL TOTAL		$12.45
TOTAL PROJECT COST		**$24.90**

6. SELECTION CRITERIA (PRIMARY)

6.1 Long Term Outcomes

6.1.1 State of Good Repair

According to data from the National Bridge Inspection database, 15.4% of Maine's Federally-eligible bridges are Structurally Deficient (SD). Advancing this project will remove a major bridge from the SD list and free up scarce financial resources for other statewide bridge needs, which total approximately $125 million per year. In order to maintain good repair and operation the existing bridge requires over $100,000 annually, which will be eliminated by the new bridge.

In 2007, *Keeping our Bridges Safe* noted the risks associated with fracture-critical bridges and poor connections; the proposed project eliminates those concerns since the replacement structure will be highly redundant and have fewer connections.

http://www.maine.gov/mdot/pdf/Keeping%20Our%20Bridges%20Safe.1107.pdf

6.1.2 Economic Competitiveness

The Maine Kennebec Bridge is an important crossing on the Kennebec River. The nearest alternative crossings are bridges at Bath, Gardiner, and Augusta, which are 16.4 miles, 9.3 miles and 17.3 miles away respectively. The average annual daily traffic is on the Bridge is 3,340 vehicles, with approximately six percent being trucks. If the Bridge were closed and taken out of service, travelers would be forced to use these alternate crossings and traffic would shift to accommodate the loss.

As mentioned previously, bridge traffic is reduced to one-lane operation when larger trucks are crossing the bridge. Operating costs, delay, and travel time would be reduced by bridge replacement, enhancing economic competitiveness in the region served by the project.

MKB connects Sagadahoc and Lincoln counties. The Kennebec River divides these two counties. The area is considered part of the Brunswick Micro Labor Market Area (LMA) as defined by Maine Department of Labor. State Route 197 is a major collector and serves as an important commuter roadway, especially for the Brunswick Micro LMA. Among the major employers in the LMA are Bath Iron Works and Bowdoin College. This LMA has a labor force of 34,653 with an unemployment rate of 6.9%.

Although the unemployment rates and median incomes for Sagadahoc and Lincoln County are not below the National average, the economic challenges in the area are significant. Due to the proximity of the Maine coast, many Maine counties have disparities in wealth, income, and job opportunities, with pockets of above average opportunity that skew the county aggregate. The disparity in income among Maine's coastal communities is apparent in the Census data. In fact, based on the last Census, the per capita income in the area is significantly below the National average.

6.1.3 Livability

One of Richmond's unique characteristics is as a historic river port town which thrived as a steamboat landing during the shipbuilding era. The Kennebec River and the bridge played an important role in its development. Richmond has been successful at working extensively over the last few years creating an attractive downtown and village area within walking and bicycling distance of the bridge. The town and bridge also border a large, publicly owned nature preserve on an island in the Kennebec River, located less than a mile downstream from the bridge. Swan Island is visible from the bridge and is notable in that the entire island is a wildlife preserve.

The bridge allows residents to be connected to the towns on either side of the river, much quicker travel to area destinations and, of course, being able to go over the bridge as part of their daily lives is an important aspect of citizen's livability in general. It brings the river into the daily lives of area residents, helping to attract economic development and improved quality of life.

The current bridge is not conducive to bicycling and pedestrians. It is narrow, without shoulders, and nearly impassable for someone in a wheelchair. This bridge is within a half-mile of an extensive pedestrian sidewalk system, a walkable downtown and neighborhoods in Richmond. In 2011, the town received extensive coverage on television news for the success it has had on becoming more walkable and livable resulting in attracting extensive business development. The bridge is a very scenic attribute to the downtown waterfront area. It spans the beautiful Kennebec River, a major draw for fisherman, boaters, kayakers and tourists. The bridge over the Kennebec is an important part of what makes Richmond and Dresden, and the entire area livable. One could drive, walk or bike across the scenic river just a short distance from the downtown area. Maine is ranked #2 in the nation for bicycling by the League of American Bicyclists, and bridges like these are an important draw for bicyclists. Having the bridge nearby to Richmond has a profound effect on area economic vibrancy, livability and quality of life.

Replacement of the bridge is necessary to improve access for bicyclists and pedestrians. The addition of a six foot shoulder on each side is vital for bicyclists and pedestrians and will create a much safer facility. The bridge is very close to one of Maine's Official Bike Routes as listed in Explore Maine by Bike, 33 Loop Bicycle Tours. The bridge is near Tour 33 "Merrymeeting Bay and Beaches". A new bridge could be a destination for bicyclists on the Route, and create the possibility for a bike route over the bridge and down the West side of the Kennebec River. The following is a link to the Route and map showing the Route.

http://www.exploremaine.org/bike/midcoast/merrymeetingbay.shtml

If the bridge was to be posted or closed, the area livability would be drastically reduced. The bridge allows residents to be connected to the towns on either side of the river and travel to area destinations without a lengthy detour. Just being able to go over the bridge as part of their daily lives is an important aspect of citizen livability in general. It brings the river into the daily lives of area residents, attracting economic development and improved quality of live.

6.1.4 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 endeav-

ors to exercise reasonable stewardship over both natural resources and transportation infrastructure through its commitment to addressing aquatic organism and wildlife habitat and passage in cooperation with natural resource agencies, while weighing all aspects of a proposed project. A relatively new measure may be explored in the construction of the foundations to mitigate noise impacts to aquatic wildlife, including salmon and sturgeon. The use of "bubble curtains", a relatively recent innovation, will be implemented during pile driving to attenuate conduction of sound vibrations through the water column.

6.1.5 Safety

An analysis of the recent crash history for the bridge and its approaches shows that there were three crashes in the 2008 - 2010 period. The cumulative critical rate factor was 0.95 and the percent of personal injury was 66.7. There were two non-incapacitating injury crashes and one property damage only crash. All three crashes occurred on the west approach segment located approximately 400 feet west of the bridge to the swing span. This segment is characterized by non-standard horizontal and vertical curves, non-standard superelevation, and inadequate sight distance on the western bridge approach, in addition to the narrowness of the bridge.

Additional crash history is available from the analysis contained in 2006 Feasibility Study. At that time crashes were examined for 2002 through 2004. Both analyses are consistent in the magnitude of injuries. A total of seven crashes occurred during that period. Of those crashes 71% occurred on the west approach segment. One occurred on the east approach segment. One crash occurred at the swing span section. The replacement bridge will correct these geometric deficiencies.

6.2 Job Creation and Near-Term Economic Activity

This project is expected to quickly create construction jobs and preserve local business employment. Utilizing the TIGER 3 FAQ's at the USDOT Application Resources website which states "After discussions with and various references from the White House Council of Economic Advisers, the USDOT estimates that there are 13,000 job-years created per $1 billion dollars of government investment (or $76,900 per job-year). Previous guidance had stated that every $92,000 of investment is equivalent to one job year." http://www.dot.gov/tiger/application-resources.html#FAQ

For this project, it is therefore assumed that every $76,900 of project construction value will create one (1) job-year. In accordance with the above guidance, this project will create 278 construction job-years ($21,400,000 / $76,900). If only the TIGER 3 portion of the proposed funding package is counted, then 140 job-years could be the calculated number. However, since Maine does not have an identified funding source to complete the project without this TIGER Grant, 278 job-years seems a better measure of the effect of a grant award.

6.3 Evaluation of Expected Project Costs and Benefits

The Benefit/Cost Analysis looks at the project from the standpoint of society as a whole, and accounts for the net benefits and net costs based on the criteria described in the TIGER Grant

NOFA. The analysis seeks to answer the question, "Is society better off with the project or without the project?" The analysis addresses travel time savings, vehicle operating costs, crash reduction, emission reduction, and livability enhancement.

The life cycle cost analysis indicates that the lowest cost alternative is the high profile replacement. Therefore, the benefit cost analysis focuses on that option, and compares the replacement to the "no build' scenario, which is the base case assumption. This assumes that the existing bridge would be closed to traffic. Existing and future traffic would be diverted to alternate routes, thereby increasing travel time and mileage. The benefits and crash reduction factors due to alignment and improved geometrics of the replacement bridge would be forgone. Replacing the bridge avoids these future costs. The benefits that accrue to society from the Maine Kennebec River Bridge can be estimated by the avoided costs that would occur without the proposed replacement. The life cycle cost analysis includes only bridge construction costs as compare to the alternatives. The benefit cost analysis, on the other hand, includes all costs including construction, preliminary engineering, construction engineering, and right-of-way, for a total of $24.9 million.

Summary of Benefits and Costs

The annual benefits and costs values were discounted at 3% and 7% over a 50 year time horizon. Three percent is the more appropriate rate for the analysis because the new bridge will have a very long life, and in addition, the alternate use of funds would be a public expenditure as opposed to a private investment. The full analysis can be found in the spreadsheet supplement to this application.[1] A summary of the results of this analysis (3% discount rate) are as follows.

- Total Benefits of $ 361.7 million
- Total Costs of $ 25.2 million
- Benefit-Cost ratio of 14.3

When discounted at 7%, the benefits and costs are as follows.

- Total Benefits of $ 193.7 million
- Total Costs of $ 25.0 million
- Benefit-Cost ratio of 7.7

It is estimated that travel cost savings alone due to avoided VMT amount to $280.5 million. On an annual basis these costs savings represent over ¾ of the total annual benefits. These user costs savings are the key driver of the benefit-cost ratio. Even if all other benefits were ignored the

[1] Benefit Cost Analysis
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBBenefitCostAnalysis.pdf
Benefit Cost Analysis Narrative
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBBenefitCostAnalysisNarrative.pdf
Benefit Cost Analysis – 3% Discount
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBLifeCycleCostAnalysis3percentDiscount.pdf
Benefit Cost Analysis – 7% Discount
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBLifeCycleCostAnalysis7percentDiscount.pdf

benefit cost ratio would be a minimum of 6.0 at the larger, 7% discount rate. It must be noted that the assumptions on the other key criteria have a small influence on these results.

6.4 Project Schedule

The project milestone dates are as follows:

Table 4: Project Milestones	
NEPA	September 2012
Design Complete	March 2013
Right-of-Way	March 2013
Obligate Funding	May 2013
Construction Complete	December 2015

The complete Critical Path Method schedule is provided here.
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/KMBConceptualSchedule.pdf

6.5 Environmental Approvals

The most sensitive wetlands are freshwater inter-tidal emergent wetlands (PEM) associated with the Kennebec River. These wetlands are dominated by wild rice and other mud plants. All resources to the tidal river outside of the emergent marsh are considered Riverine Unconsolidated Substrate (RUS) impacts. Additionally, there are forested wetlands (PFO) located easterly of Lincoln Road and Densmore Lane in Dresden. The only species that the area mapped as Essential Fishery Habitat under the Magnusson – Stevens Sustainable Fisheries Act is the Atlantic salmon.

Avoidance and minimization will occur throughout the design process. Restoration from removal of existing bridge piers is estimated to be approximately 2,000 sf. Compensatory mitigation in the form of in-lieu fee is anticipated for 20,000 sf of PFO, 1,300 sf of PEM, and 3,700 sf of RUS/EUS. Compensatory mitigation is anticipated for impacts to wetlands and waterbodies. Total in-lieu fee costs are anticipated to be approximately $125,000.

Permit levels for ACOE and DEP have been determined based on eight new in-water piers, rip rap scour protection and temporary impacts. For eight piers, it is expected that two would be within the PEM, and six within the RUS. Total PEM impacts are estimated to be 1,300 sf and RUS impacts are estimated to be 3,700 sf. Approach work for a new bridge is estimated to impact approximately 20,000 sf of PFO wetlands. DEP and ACOE permits are needed. The level of permitting is anticipated to be a DEP Permit by Rule and a CAT II for the ACOE

A U.S. Coast Guard Permit will be needed for construction over navigable water. Approval is anticipated by December 1, 2012.

6.6 Legislative Approvals

The proposed project is partially funded in MaineDOT's 2012-2013 Capital Work Plan which has been approved by the Maine Legislature.

6.7 State and Local Planning

The proposed project is contained in MaineDOT's Capital Work Plan, the Six Year Plan, and the Strategic Transportation Improvement Plan.

6.8 Technical Feasibility

The 2006 Feasibility Study originally demonstrated the technical feasibility of this project.
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/KMBFeasibilityStudy.pdf

The details of the cost estimate are provided here.
http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/MKBPreliminaryEstimate.pdf

MaineDOT has replaced several large bridges recently, among them the award winning Penobscot Narrows Bridge and the Norridgewock Covered Bridge. These two projects alone total over $100 million and demonstrate the capability of the Department in project management and delivery. It is also noteworthy that Maine was the first state in the Nation to fully obligate all ARRA Funding.

6.9 Financial Feasibility

MaineDOT has 50% of the total project cost ($12.45 million) in hand to partner with the Federal government on this project.

7. SELECTION CRITERIA (SECONDARY)

7.1 Innovations

During construction, innovative noise attenuation methods for protection of the aquatic species will be evaluated. MaineDOT plans to specify "bubble curtails" to dampen shock vibrations in the water column. http://en.wikipedia.org/wiki/Bubble_curtain

7.2 Partnership

The project website contains numerous letters confirming stakeholder collaboration and project support. http://www.maine.gov/mdot/tiger3/kbr.htm

8. PROJECT READINESS AND NEPA

This project will be a Categorical Exclusion in accordance with 771.117(d)(3). The Federal Highway Administration will be the lead on NEPA. NEPA approval is anticipated by September 1, 2012. The bridge is eligible for the National Register of Historic Places along with one property at the corner of River Road and Old Ferry. National Register eligibility within the Area of Potential Effect has been concurred by the State Historic Preservation Officer. Archaeology sites also exist within the APE that would require mitigation consisting of recordation of the bridge and phase III archaeology recovery survey. Concurrence and signed MOA are anticipated to be completed by February 1, 2012. Native American tribes have been consulted with and there are no concerns. The project is in DPS and critical habitat for Atlantic salmon and within the known range of Shortnose Sturgeon and Atlantic Sturgeon. Shortnose Sturgeon could be over-wintering in the project area. No Critical Habitat has been designated for either sturgeon so none will be affected by the project

9. FEDERAL WAGE RATE CERTIFICATION

As with all Federal projects, MaineDOT complies with all required Federal provisions, including the Davis-Bacon Act. http://www.maine.gov/mdot/tiger3/documents/pdf/mkb/davisbacon.pdf

10. ENVIRONMENTAL FEDERAL, STATE AND LOCAL ACTIONS

The project has been presented to federal and state resource and regulatory agencies at the Maine DOT Interagency Meeting on October 11, 2011 for permit and approval levels. No local permits are required.

11. CHANGES TO THE PRE-APPLICATION FORM

Minimal changes to schedule milestones, but all TIGER III Funds would still be obligated by April/May of 2013. Project completion will be December 2015.