

TIGER II DISCRETIONARY GRANTS

MEMORIAL BRIDGE REPLACEMENT PROJECT PORTSMOUTH, NH – KITTERY, MAINE



Memorial Bridge
US Route 1 over the Piscataqua River
(looking east toward the Portsmouth Naval Shipyard in Kittery, Maine)

Prepared August 23, 2010

Memorial Bridge Replacement Project - Portsmouth, NH – Kittery, Maine

PROJECT PARTIES:

PRIMARY PROPOSED PROJECT STATE

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TYPE OF PROJECT:

BRIDGE

LOCATION OF PROJECT:

Congressional District;

Portsmouth, Rockingham County, NH, 1st

Kittery, York County, ME, 1st Congressional District

URBAN OR RURAL AREA:

Urban

AMOUNT OF DOLLARS OF GRANT FUNDS REQUESTED: *\$20 million*

DUNS NUMBER (WWW.DNB.COM):

*NEW HAMPSHIRE 80-859-1697
MAINE 80-904-5966*

PRE-APPLICATION ID:

N10MPP-0884

Link To NHDOT Web Page For Application

<http://www.nh.gov/dot/projects/portsmouthkittery/index.htm>

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OVERVIEW AND INTRODUCTION

The New Hampshire Department of Transportation (NHDOT) submits this application requesting \$20 million through the TIGER II Discretionary Grant Program (TIGER II). This grant application addresses the critical condition of the Memorial Bridge that carries US Route 1 over the Piscataqua River between New Hampshire and Maine. The Memorial Bridge is the NHDOT's # 1 bridge priority. It is structurally deficient, functionally obsolete, has a Federal Sufficiency Rating of 6 (of 100), and currently has a weight limit restriction of only 3-Tons.

The purpose of this project is to restore this crossing of the Piscataqua River to a “State of Good Repair” so that it is once again able to fully serve the multimodal transportation needs of the seacoast communities of Portsmouth, New Hampshire, and Kittery, Maine. Carrying 12,000 vehicles, and nearly 1,000 pedestrians and bicyclists, each day, the Memorial Bridge is in critical condition with severe and extensive corrosion and deterioration throughout its entire superstructure. Further, it is a vertical lift steel through truss movable bridge, and opens to serve the needs of river and ocean-going vessels traveling in and out of this busy seacoast port. Its mechanical and electrical operating systems are outdated and require significant commitments of resources to ensure its maintenance and continued operation. Immediate closures have often been required to perform emergency repairs to its structural, mechanical, and/or electrical systems. The deterioration has necessitated the 3-Ton (Passenger Cars Only) posting, severely limiting its ability to adequately function as a connection between these communities.

Due to these issues, it is no longer economical nor viable to rehabilitate the Memorial Bridge. The safe and dependable operation of this complex structure is critical to the efficient movement of marine traffic to and from the ports and moorings along the river, while also providing connectivity for the regional transportation system between the two states and the seacoast communities of Portsmouth, NH, and Kittery, Maine. Due to the age and deteriorated condition of this large and extremely complex structure, collectively New Hampshire and Maine are not able to fund the overall needed improvements within their respective transportation programs and funds.

Complete superstructure replacement of the Memorial Bridge is required to address the severe deterioration of this structure and to provide dependable service for vehicular, bicycle, pedestrian, and marine traffic in this region both now and well into the future. The Memorial Bridge is located at the closest and most viable place for a river crossing in support of vehicular, pedestrian, and bicycle traffic, and it is essential to retain this community connection at its current site.

Replacement of the Memorial Bridge will:

- *Address significant deficiencies in the regional transportation system by replacing the structurally and functionally deficient vertical lift bridge over a crucial transportation waterway.*
- *Serve the long-term mobility needs for pedestrians, bicyclists, vehicles, trucks, and river vessels (private and commercial) in the Portsmouth-Kittery region by providing safe and dependable bridge operation for all users and modes of travel.*
- *Ensure continued economic and cultural vitality of the New Hampshire and Maine seacoast region by addressing a deficient bridge located within tourist oriented businesses and downtown areas.*
- *Provide/create jobs in this region for the entire duration of construction activities (3 to 4 years).*
- *Enhance the livability of these two communities through a direct pedestrian, bicycle, and vehicular connection.*

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Maine and New Hampshire believe this application meets the criteria for the TIGER II Grant Program and further, that it represents the type of project envisioned. It is a unique and truly multimodal application, addressing the transportation needs served by the Memorial Bridge (vehicular, pedestrian, and bicycle traffic). Receipt of TIGER II Grant funds will also allow both states to focus near-term future funding (2013) toward addressing the needs of the nearby Sarah Mildred Long Bridge, a structurally deficient vertical lift bridge serving vehicular, rail, and river/marine traffic, that would otherwise not be possible.

DESCRIPTION OF THE MEMORIAL BRIDGE

The Memorial Bridge is eligible for listing in the National Register of Historic Places. At its opening in 1923, this vertical lift movable bridge was dedicated as the official state memorial to World War I servicemen. At that time, it served as the only local connection between the downtown areas of Portsmouth, NH, and Kittery, Maine. It is now structurally deficient and in November 2009, after completion of an emergency repair project that closed the Memorial Bridge for two months, its load capacity was reduced to 3-Tons.

According to the latest detailed bridge inspection, conducted in the summer of 2009 (see Appendix B for more information), the Memorial Bridge will soon (estimated between 1 to 3 years) have to be closed. Due to the severely corroded and deteriorated condition of the bottom chord members, and concerns with the mechanical systems, it is no longer an economical nor viable candidate for rehabilitation. Environmental documentation is well underway and the NHDOT intends to proceed with a Design / Build contract for the replacement effort. Input from concerned local groups, other stakeholders, and the public, will be solicited on the overall shape and appearance of the replacement structure.



*Aerial view of Memorial Bridge
(looking east with Portsmouth Naval Shipyard in background)*

The Memorial Bridge was the first major "vertical lift" bridge in the eastern United States, and for more than 86 years, it has been a constant and dramatic landmark for these seacoast communities. Spanning the Piscataqua River, a tidal transportation waterway for ocean going and river vessels, it connects the historic coastal regions involving the City of Portsmouth, New

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Hampshire, and the Town of Kittery, Maine. For generations, the bridge has carried automobiles, trucks, and emergency vehicles along coastal US Route 1, and its wood-floored walkways still provide the only pedestrian and cycling link between two communities steeped in history. The bridge walkways provide an opportunity to observe the working waterfront of both NH and Maine, and activities involving lobster boats, barges delivering road salt at the Marine Terminal, submarines at the Portsmouth Naval Shipyard, restaurants, historic Prescott Park, recreational and commercial watercraft, and guided tour boats. Many local residents also use this crossing to commute, by bicycle, private vehicle, or on foot, to the Portsmouth Naval Shipyard, located in Kittery, Maine.

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The Memorial Bridge is one of the oldest operational lift bridges in the United States and its continued safe operation is at risk. The bridge consists of three steel through-truss spans, which total 900 feet in length, including the main channel vertical lift span.



The lift span consists of a steel through-truss span and two steel truss towers that extend 200 feet above the river channel. The bridge operator's house, located on the lift span, rises with the bridge and contains most of the operating machinery and equipment. The gate tenders' booths are adjacent to either end of the lift span on the west side of the roadway. The curb-to-curb width on the bridge is 28 feet, with one 14-foot travel lane in each direction, and 6-foot sidewalks cantilevered on both sides of the bridge.

The existing open steel grating that provides the deck surface for the vertical lift span requires cyclists to walk their bicycles over the bridge on the sidewalks, for safety reasons.

Vessels access Portsmouth harbor under the Memorial Bridge

The superstructure of the Memorial Bridge is currently in Serious Condition, as defined in the FHWA condition rating guidelines, due to severe corrosion and loss of steel section in the floor system and trusses. The floor system has sustained significant section loss at downspout locations, at areas adjacent to floorbeam end connections, and where the sidewalk cantilever supports are connected to the floor system. Bottom chord gusset plates on all spans, lift tower gusset plates on both lift towers, and the bottom chord members of the lift span have all sustained severe section loss. (See Appendix B for more bridge inspection photos from latest 6-month structural inspection.)

The Memorial Bridge provides a timber sidewalk for pedestrian use, a steel grid deck for vehicular traffic on the lift span, and reinforced concrete decks for vehicular traffic on the fixed approach truss spans. The concrete decks are in generally poor condition and need complete replacement. The steel grid deck on the roadway portion of the lift span has cracked welds in some locations and also needs complete replacement.

The pier elements of the substructure are currently in Satisfactory Condition and will be retained/rehabilitated as part of this project. Timber cribbing around the piers is in poor condition and will need to be replaced. The abutment elements of the substructure are currently in Poor Condition and will also be replaced as part of this project.

Although this bridge carries 12,100 vehicles per day, the Memorial Bridge still remains as the only river crossing for pedestrians and bicyclists in this region. The East Coast Greenway, a bicycle trail extending from Florida to Maine, utilizes the Memorial Bridge to connect New Hampshire and Maine. Closure or removal of the Memorial Bridge would break the continuity of the East Coast Greenway and US Route 1, and would require them to be re-designated along

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other existing roadways and bridges. The other two bridges connecting Portsmouth and Kittery (I-95 and US Route 1 Bypass) do not allow, nor do they have safe accommodations for, bicycles or pedestrians. Bicycle groups from both states (NH Seacoast Greenway and Maine Eastern Trail Management District) have strongly supported the retention of a multi-modal bridge at the existing Memorial Bridge location, which would provide improved vehicular, bicycle, and pedestrian accommodations.

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Between 2005 and 2008, the DOTs of Maine and New Hampshire, with much public input, jointly developed contract plans and documents for a major rehabilitation of the Memorial Bridge. This process ultimately resulted in the decision to completely replace the lift span and all mechanical and electrical components associated with its operation, in addition to the extensive rehabilitation of the fixed approach truss spans and the lift towers. The project also included replacement of the Scott Avenue Bridge, a Portsmouth city-owned structure that provides the southern approach to the bridge, and work on the Kittery northern approach bridge.



Severe deterioration w/holes in lift span bottom chord

Upon completion of the required federal environmental documents, construction plans and specifications, and the development of a Memorandum of Agreement between the two states, the project was advertised for construction bids on July 29, 2008. Project bids were more than \$15 million over the construction estimate of \$44 million, with the “A” Bidder at \$59 million and the “B” Bidder at \$70 million. Due to the financial constraints of the two DOTs, the contract was not awarded. After the bids were rejected, both States signed a Cooperative Agreement to complete a Connections Study to further evaluate the transportation needs and connections between Portsmouth and Kittery.



As part of the cooperative agreement and in support of the ME-NH Connections Study, inspection of the Memorial Bridge was completed during the summer of 2009 to determine the current load capacity of the bridge for vehicular traffic and whether the plans developed for the previously advertised project (based on 2003 inspection data) were still valid. Continued deterioration of the structural steel members was identified, requiring emergency repairs to be performed during a two-month bridge closure, and resulting in a weight limit

reduction from 10-Tons to 3-Tons (Passenger Cars Only).

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Typical Corrosion of Steel Members

The Maine and New Hampshire DOTs thoroughly reviewed the 2009 detailed inspection results. This data was compared to the plans and details developed for the previous rehabilitation project advertised in July 2008, that was not awarded. This comparison confirmed that deterioration of the bridge, especially the floor system and bottom chord members, has progressed significantly to the extent that rehabilitation of the Memorial Bridge is no longer considered a prudent and viable option.

Based on this information, and the results of the ME-NH Connections Study, it was determined that complete replacement of the superstructure with a new vertical lift bridge having a similar appearance and operational capacity for marine traffic, is required to truly serve the multi-modal transportation needs of members of these communities that utilize the Memorial Bridge crossing.

CURRENT TRAFFIC

There are three bridges that span the Piscataqua River in the Portsmouth-Kittery area and accommodate vehicular traffic: the Memorial Bridge for US Route 1; the Sarah Mildred Long Bridge for the US Route 1 Bypass; and; the I-95 High-Level Bridge for the Interstate highway system.

Currently, the average summer weekday daily traffic volume on the Memorial Bridge is approximately 12,100 vehicles per day, with passenger cars accounting for all vehicles due to the 3 Ton weight limit. Approximately 6% of the people crossing the Memorial Bridge on



a weekday are pedestrians or cyclists.¹ The Memorial Bridge “opened” 4,023 times in calendar year 2008. Of these,

4% (161 lifts) were for maintenance,

Memorial

Bridge open for Marine Traffic

testing, or training purposes, and 77% (3,098 lifts) were required to provide a vertical clearance of 50 feet or less, i.e., a partial lift of the movable span. The remaining lifts were required to accommodate large ocean-going delivery vessels. The time required for completing a lift and reopening the bridge to traffic averaged 8.9 minutes.

Non-vehicular traffic on the Memorial Bridge on a recent summer weekday, July 17, 2009, between 6:00 am and 8:00 pm, involved approximately 635 pedestrians and 335 bicyclists. The ME-NH Connections Study conducted an origin and destination study, which determined that 37 percent of pedestrians and bicyclists who use the bridge on a weekday are commuting to and from work. If this bridge were closed, it is likely that these users would drive to and from work, since alternative routes for crossing the Piscataqua River (i.e., I-95 and Sarah Mildred Long bridges) are not available for non-vehicular traffic, as noted above.

¹ ME-NH Connection Study Traffic Volumes Summary Bullets

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If this crossing was not available for pedestrians and bicyclists, the closest alternate route is more than 22 miles in length (assuming bicycle and pedestrian facilities are not added to the 2,798 foot long Sarah Mildred Long Bridge). Even if either of the other two crossings (Sarah Mildred Long Bridge or the I-95 High-Level Bridge) were outfitted with sidewalks, pedestrian traffic would be all but eliminated due to the additional distance (2.4 miles) pedestrians would need to traverse using either of these other two bridges. The ME-NH Connections Study completed a bike/pedestrian origin and destination survey, and counted over 600 pedestrians and 300 bicyclists using this crossing on a recent/typical summer weekday (July 17, 2009, 6:00 am to 8:00 pm). Summer weekend counts can be were 65% higher than the summer weekday volumes. This crossing also sees a high wintertime activity with 220 pedestrians and 25 bicyclists from 6:00 am to 6:00 pm on February 8, 2010, further emphasizing its importance as a local connection.

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GRANT FUNDS AND ADDITIONAL PROJECT FUNDS

This project addresses the deficiencies of the Memorial Bridge to provide long-term viability and reliability for the local transportation system. Although the critical need for TIGER II funds cannot be over-stated, it is important to note the significant amount of funds already committed to this effort by both New Hampshire and Maine. Upon completion of the ME-NH Connections Study, NHDOT and MaineDOT together will have invested more than \$11 million in engineering services (including emergency repairs) to keep this structure open and in operation, and to determine the most prudent and feasible solution for addressing the deficiencies of the Memorial Bridge and the current and future transportation needs of these two communities.

COST ESTIMATE AND APPLICATION FUNDING

The Memorial Bridge replacement, NHDOT's highest priority bridge project, is estimated to cost \$90 million. Of this total, \$20 million is funded through the TIGER II Grant, \$45 million is funded by New Hampshire state funds (through the issuance of legislatively approved GARVEE bonds), and \$25 million is funded by State of New Hampshire federal bridge funds.

Table 1 – Application Funding by Source and Category in Millions of Dollars

	<i>TIGER II Funds</i>	<i>FHWA Funds</i>	<i>State of NH (GARVEE bonds)</i>	<i>Contingencies (reserved)</i>	<i>TOTAL</i>
<i>Memorial Bridge</i>	<i>\$20</i>	<i>\$25</i>	<i>\$45</i>	<i>\$10</i>	<i>\$100</i>

Replacing the Memorial Bridge, including the New Hampshire and Maine approach spans, is estimated at \$90 million. Table 1 (above) includes an additional \$10 million dollars in NHDOT state and federal program funds reserved to address contingencies during this complex construction project. This totals \$100 million in funding available if any unanticipated issues arise during bidding or construction efforts.

PROJECT SCHEDULE

With approval of this application, the project schedule is planned as follows:

MEMORIAL BRIDGE – CONTRACT SCHEDULE

- January 2011 – Receive notification of approval of TIGER II Grant Program funds*
- January 2011 – RFQ for Design-Build of Memorial Bridge replacement*
- April 2011 – RFP for Design Build of Memorial Bridge replacement*
- September 2011 – Award Contract to Design Build team*
- September 2012 – Memorial Bridge closes and demolition/construction begins*
- October 2014 – Project complete, Memorial Bridge re-opened*

LONG TERM OUTCOMES

A strong multimodal transportation system promotes economic vitality and viability, and ultimately results in more livable communities utilizing that system. Transportation projects have the dual benefit of directly supporting jobs during construction, in addition to supporting the regional and local economics through improved movement of goods, services, and people. Deficient links in transportation system infrastructure restrict travel and can significantly impact a region's economic growth and safety. Ensuring that transportation infrastructure remains in a state of good repair is a critical element in providing opportunities for economic competitiveness and viable economic growth. The proposed replacement of the Memorial Bridge helps restore the ability of these communities to remain competitive and promotes sustainable economic growth for the region.

STATE OF GOOD REPAIR

Current Condition

As previously stated, the Memorial Bridge is in desperate need of replacement. The bridge is structurally deficient and functionally obsolete, has reached the end of its effective service life,

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and currently has a weight restriction of 3-Tons, due to its severely deteriorated condition. The bridge is so severely deteriorated that a rehabilitation option is no longer considered viable, however, the cost associated with the needed superstructure replacement is beyond the current financial resources available to Maine and New Hampshire through standard transportation funding programs. Replacement is needed to restore this crossing to a “state of good repair” to be in serviceable condition to meet all multimodal transportation demands of the area.

Operating and Maintenance Costs

The Memorial Bridge will need to be closed in the near future (1 to 4 years; 2012 estimated and used for analysis). If the bridge is closed, and the lift span placed in the raised position, then the US Coast Guard will, at some point, require that the lift span be removed as a safety measure for marine shipping. This, obviously, has a detrimental effect on all local traffic, be it pedestrians, bicyclists, passenger vehicles, trucks, or emergency response vehicles. If the bridge is replaced as proposed, annual operating and maintenance costs are estimated to be \$0.7 million (2010 dollars), versus the current \$0.9 million presently required for annual operation and maintenance, given the new technology available for moveable bridge operations. This estimate is derived from past and present operating and maintenance costs for the Memorial Bridge, with a significant portion of these costs associated with labor expenses required to keep the bridge operational and reliable. This significant decrease is mostly due to lower operational costs from reduced staffing needs for the replacement bridge, as compared to previous annual maintenance and operating costs that frequently exceeded \$1 million.

ECONOMIC COMPETITIVENESS

The Memorial Bridge connects the commercial centers of Portsmouth, NH, and Kittery, ME. In addition to numerous commercial and retail establishments, historic Strawberry Banke, and Prescott Park, many other historic and cultural attractions in both states are located in close proximity to the bridge, which attract tourists and local residents alike. Closing the Memorial Bridge will negatively impact both residents and visitors in the area who are now able to walk between Portsmouth and Kittery, and who support the merchants and attractions in both states. Studies show that heritage tourism and other cultural attractions create a \$38.2 million industry in the Portsmouth seacoast area, one that supports 1,161 full-time jobs and generates \$4.4 million in local and state government revenue.

http://www.art-speak.org/uploads/PortsmouthSeacoastArea_PamphletInsert.pdf

According to the ME-NH Connections Study, 37% of pedestrians and bicyclists crossing the Memorial Bridge on a weekday are commuting to or from work. Again, closure of the Memorial Bridge would have a substantial impact to these bridge users, forcing them to drive to work over much longer distances and at greater cost. This decrease in mobility and transportation options significantly reduces the economic competitiveness of these two communities.

LIVABILITY

Portsmouth and Kittery Connectivity

Livability and community cohesion go hand in hand. The quality of relationships among people in a community, as indicated by the frequency of positive interactions, the number of neighborhood friends and acquaintances, and one’s sense of community connection, is a significant indicator of a region’s livability. The City of Portsmouth and the Town of Kittery both have vibrant downtown areas and well-established neighborhoods. The Memorial Bridge connects these communities and contributes to their overall livability by linking the downtown areas, businesses, organizations, civic groups, and individuals. In addition to numerous restaurants and retail establishments, considerable historic character is present within these communities. Strawberry Banke, Prescott Park, and many other historical sites, are all located in close proximity to the bridge. These cultural elements, of which the Memorial Bridge is a part, all combine to form the historic fabric of these seacoast communities. Should the Memorial Bridge be permanently closed, residents and visitors in the area who are now able to walk, bike, or drive between Portsmouth and Kittery will be severely impacted, and ultimately the

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livability and the economies of these two communities and the region will be diminished dramatically.

Community Health and Safety

Memorial Bridge is the only crossing of the Piscataqua River that accommodates pedestrians and bicyclists, whether traveling for work, recreation, or entertainment. Both New Hampshire and Maine designate the Memorial Bridge as part of their State Bicycle Routes, and it is the Maine-New Hampshire link in the 2,500 mile East Coast Greenway. Permanent closure of the Memorial Bridge due to its continued deterioration would result in a 22-mile detour for bicyclists trying to cross between Maine and New Hampshire. Furthermore, according to the ME-NH Connections Study, 37% of pedestrians and bicyclists who use Memorial Bridge during the week do so to get to work. Closure of the bridge would eliminate the opportunity to walk or bike, instead of drive, thereby reducing the transportation options available to the residents and businesses in the Portsmouth-Kittery area.

Responses regarding the importance of the Memorial Bridge as a transportation connection were obtained through the Public Outreach efforts of the Connections Study. Local recreational groups, such as the Seacoast Area Bicycle Riders (SABR), as well as many other bicycle enthusiasts, vociferously objected to any Study alternative that closed or removed the Memorial Bridge. Clearly, this response demonstrates the importance to residents and visitors alike, of retaining this connection for non-motorized travel.

The proposed bridge replacement project will maintain the current level of pedestrian and bicycle traffic, and likely increase it with improvements to the pathways for bicyclists and pedestrians on the bridge. Currently, bicyclists are required to walk their bikes on the sidewalk, due to the open steel grate bridge deck, instead of riding across the lift span. Some bicyclists do not heed this warning, which increases danger to themselves and the motorists with whom they share the roadway. One proposed safety improvement to the Memorial Bridge replacement is constructing a solid deck on the lift span and increasing the shoulder width from 3 feet to 5 feet on each side of the travel way, both of which will enhance bicyclist and motorist safety whenever they share the bridge.

Travel Time

Easy access to work, recreational activities, and local businesses contributes to the livability of a community. While travel time for vehicle drivers is likely to increase temporarily while the bridge is being replaced, it will be reduced after construction of the Memorial Bridge is complete.

SUSTAINABILITY

Promoting a more environmentally sustainable transportation system is an important goal in any infrastructure improvement program. Investment in replacing the Memorial Bridge, as opposed to potentially/permanently closing the bridge, will provide measurable reductions in vehicle emissions, improve energy efficiency, and provide other environmental benefits to the Portsmouth-Kittery region.

Vehicle Traffic Congestion

The Memorial Bridge and Sarah Mildred Long Bridge provide alternatives to I-95 for those individuals traveling more locally between Portsmouth and Kittery. Closure of either bridge would significantly increase vehicular traffic on the I-95 High Level Bridge, a transportation corridor that serves nearly 90,000 vehicles per day and is already congested.

Due to the recently imposed weight restrictions on the Memorial and Sarah Mildred Long Bridges, truck traffic is already being detoured onto I-95. Improvement to either or both of these two structures for capacity to carry full legal loads and to eliminate the weight restrictions, would restore a more balanced flow of traffic, thereby helping to reduce travel time, emissions,

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and overall congestion in the region. Obviously, closure of either or both of these bridges would result in substantial increases in vehicle congestion within the region.

Pedestrian and Bicycle Traffic

The Memorial Bridge offers a healthy alternative to vehicle travel by providing pedestrians and bicyclists a local crossing of the Piscataqua River between Portsmouth and Kittery. In the absence of this alternative through closure of the Memorial Bridge, those travelers would likely have to drive, as alternative routes are significantly longer (as previously mentioned). Some bicyclists and pedestrians would no longer use those modes of travel to cross the river. Not providing for the needs of pedestrian and bicycle traffic would not be in keeping with the USDOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations.

SAFETY AND SECURITY

Portsmouth Naval Shipyard

One of four remaining shipyards in the United States, the Portsmouth Naval Shipyard occupies the 297 acres of federally owned Seavey Island, located in Kittery, ME. This Naval Shipyard performs overhaul, repair, and modernization of LOS ANGELES Class nuclear submarines for the US Navy and is the future repair site of the new VIRGINIA Class submarine. The Memorial Bridge replacement would provide pedestrian, bicycle, and vehicular access, including transport of materials, between the Shipyard in Kittery, the City of Portsmouth, and the regional transportation network.

Evacuation and Emergency Routes

The Memorial Bridge enhances the delivery of important safety services to the region. US Route 1 over the Memorial Bridge is a key element of planned evacuation routes for the State of Maine Emergency Management Administration and for the Seabrook Nuclear Power Plant, located in Seabrook, NH. Additionally, Emergency Response Services for Kittery and Portsmouth would then be able to utilize this bridge when responding to emergency situations. The current weight restrictions mean that the Memorial Bridge is no longer an option for responding emergency vehicles. This makes the many historic buildings in the downtowns of each community more vulnerable to potential fires, given the additional distance to be traveled by mutual aid and emergency responders during any fire related incident.

Bridge Safety

The current Memorial Bridge lift span has an open steel grid deck as the roadway surface. This type of deck surface is an older design that is no longer specified for new construction due to safety hazards for both bicycle and vehicular traffic, and presents significant maintenance concerns. Currently, due to the open grate bridge deck, cyclists are required to walk their bicycles across the Memorial Bridge on the pedestrian sidewalk. The proposed replacement would provide a new solid riding surface and increased shoulder widths from 3 feet to 5 feet, thereby improving overall safety for bicyclists and the motorists with which they travel.

The benefit-cost analysis conducted for the application estimates that the bridge replacement will generate accident reduction savings totaling \$47.3 million.

In addition, the Memorial Bridge is both structurally deficient and functionally obsolete and has severe weight restrictions at 3-Tons, due to the significant structural deterioration that has occurred. This obviously creates a safety concern regarding its ability to provide continued service to bridge users while the deterioration continues. Without timely action to address all deficiencies, the Memorial Bridge will likely be closed to all traffic - vehicular, bicycle, and pedestrian - in the very near future, and eventually the lift span will need to be removed so that it does not obstruct navigation along the river.

JOB CREATION AND ECONOMIC STIMULUS

Investment in the bridge’s infrastructure improvements is anticipated to produce significant near-term economic stimulus and job creation benefits in the Portsmouth-Kittery region. The construction activity will provide a variety of construction, manufacturing, and other job opportunities supporting industry and labor income with most, if not all, project expenditures supplied domestically. Replacing the Memorial Bridge, including the New Hampshire and Maine approach spans, is estimated at \$90 million.

JOB CREATION

The Council of Economic Advisors provides an estimate of one job created or saved per \$92,136 of government spending from ARRA. Using the CEA method and assuming an overall project expenditure of \$90 million, it is estimated that 977 jobs will be created, directly or indirectly, by the construction investment in the Memorial Bridge replacement project.

Direct on-site labor associated with the Memorial Bridge is projected to total 198 employees. The following table breaks down these labor requirements by construction element. Most of these employees are directly related to the construction work of the bridge or are involved in the engineering services. Additional direct off-site jobs to subcontractors and suppliers of steel, concrete, and electrical and mechanical equipment for the lift bridge, are estimated to add another 61 jobs over the course of the project with significant potential for indirect and induced multiplier effects.

<i>Memorial Bridge</i>	<i>Direct Jobs</i>
<i>Scott Avenue Bridge</i>	<i>7</i>
<i>Fixed Truss Deck Replacement</i>	<i>7</i>
<i>Kittery Approach Spans</i>	<i>7</i>
<i>Fixed Span Structural Replacement</i>	<i>16</i>
<i>Control and Plaques</i>	<i>16</i>
<i>Float-Out Prep and Float-Out</i>	<i>16</i>
<i>Removal of Fixed Approach Spans</i>	<i>??</i>
<i>Removal/Replacement of Existing Abutments</i>	<i>??</i>
<i>Lift Span Mechanical Work</i>	<i>16</i>
<i>Tower Replacement</i>	<i>16</i>
<i>Fabricate and Assemble Lift Span Offsite</i>	<i>20</i>
<i>Paint Fixed Spans</i>	<i>9</i>
<i>Paint Towers</i>	<i>9</i>
<i>Float-In New Lift Span</i>	<i>16</i>
<i>Electrical Work</i>	<i>6</i>
<i>Roadway Approach Work</i>	<i>37</i>
<i>Total</i>	<i>198</i>

Most of the jobs directly associated with this project will be in construction-related industries. Higher paying jobs are often more desirable for communities as they generate a greater amount of additional taxes and consumption of local goods and services. At the same time, lower paying wages may be beneficial for communities with a greater proportion of unemployed or non-professional workers. Construction employment may benefit many individuals in these more economically disadvantaged populations, with secondary benefits to the local businesses and communities.

ECONOMIC DISTRESS AND OPPORTUNITIES

The study region has been reshaped considerably in the past few decades. It has transitioned from a region with a strong military presence to a more civilian-oriented area. In 1990, when Pease Air Force Base closed, nearly 20 percent of the local population lived on the base and its closure resulted in their transfer. In addition, the Portsmouth Naval Shipyard employed 25,000 civilian men and women during World War II at the height of its operation. Since then, employment at the Shipyard has continued to decrease to the current level of 4,200 people. The changes in local employment opportunities were difficult for Portsmouth and Kittery to absorb. The existence of a strong transportation infrastructure linking communities, states, local businesses, and the world in general, has helped facilitate this transformation.

The federal Economically Distressed Area designation criteria are not met at the county-level for the Portsmouth, New Hampshire-Kittery, Maine, region. The area, however, has been undergoing a significant economic transition in the past few decades as noted above. Below are some indicators of local economic distress:

- *The City of Portsmouth experienced slower employment growth from 1998 to 2008 than the United States. The U.S. employment growth rate for that period was 10.6%. For Portsmouth, employment growth was 4.6%, half the national rate.*
- *Portsmouth's population has decreased 1.8% over the past eight years. During this same period, the U.S. population has grown nearly 8% (see Figure 1).*

EVALUATION OF EXPECTED PROJECT COSTS AND BENEFITS

HDR Engineering and HLB Decision Economics, using methods and parameters consistent with US Department of Transportation guidelines, conducted the benefit/cost analysis. All benefits and costs in the analysis are estimated in 2010 dollars. The valuation of benefits uses a number of assumptions that are required to produce monetized values for non-pecuniary benefits. The different components of time, for instance, are monetized by using a "value of time" that is assumed to be equivalent to the user's willingness to pay for "time savings" in transit. These, as with all other values used in the analysis, are taken from the United States Department of Transportation (USDOT) guidance on the preparation of TIGER II applications. Where USDOT has not provided valuation guidance or a reference to guidance, standard industry practice has been applied. (See Appendix D for complete summary and backup information.)

Benefit/Cost Results

Project Benefits: Six categories of benefits were measured for this analysis: 1) accident reductions; 2) emission reductions; 3) vehicle operating cost savings; 4) travel time savings; 5) pavement maintenance benefits; and; 6) walking/biking health benefits.

Project Costs: Costs include the initial capital construction costs as well as the operating and maintenance (O&M) costs for the Memorial Bridge.

The following principles guided the estimation of benefits and costs:

- *Only incremental benefits and costs are measured.*
 - *Users include pedestrians, bicyclists, motorcyclists, automobile drivers, and truck drivers. In addition, the health benefits to those individuals who choose to walk or bike, instead of drive, were incorporated.*
 - *The incremental costs of implementation of the project include initial and recurring costs. Initial costs refer to the capital costs incurred for design and construction of the bridge work. Recurring costs include annual operating costs in addition to incremental maintenance expenses. Only additions in costs to the current operations and planned investments are considered in this analysis.*
- *Benefits and costs are valued at their opportunity costs.*

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- *The benefits stemming from the implementation of the transportation improvement are those above and beyond the benefits that could be obtained from the best transportation alternative.*

Annual costs and benefits are computed over a long-run planning horizon and summarized through a lifecycle cost analysis. The bridge projects have a minimum useful life of 50 years.

The opportunity cost associated with the delayed consumption of benefits and the alternative uses of the capital for the implementation of the project is measured by the discount rate. All benefits and costs are discounted to reflect the opportunity costs of committing resources to the project. Calculated real discount rates are applied to all future costs and benefits as a representation of how the public sector evaluates investments. A 7% real discount rate is used in the analysis, with a sensitivity test at 3%.

Using the discount rate recommended in the TIGER II Grant program guidance (7%), replacement of the Memorial Bridge, will result in:

- *Total benefits of \$67.5 million in present value terms*
- *Total costs of \$89.2 million in present value terms*
- *Total net present value of (\$21.8) million, with a benefit-cost ratio of 0.8.*

For comparison purposes, the BCR was also calculated at a 3% discount rate, resulting in a BCR of 1.6 versus the 7% discount rate of 0.8. An analysis of internal rate of return discovered that a discount rate of 5.4% or lower would yield positive benefits.

CAPITAL AND OPERATING COSTS

Capital construction costs for replacement of the Memorial Bridge, estimated at \$90 million, will be encumbered in FFY 2012, FFY 2013, and FFY 2014. Construction will be completed by October 2014, and the bridge reopened that fall. If this project is unable to move forward due to the unavailability of sufficient funds, it is assumed, for the cost analysis that the Memorial Bridge will close permanently in 2012 due to continued and increased structural deterioration. If this were to occur, the Bridge Operators/Gate Operators for the Memorial Bridge would be unemployed, resulting in the loss of 12 full time jobs.

Current operating and maintenance costs for the bridge were compiled and then compared to the expected costs associated with operating and maintaining the bridge after construction. Standard maintenance, such as painting, steel repair, minor rehabilitation of electrical and mechanical work, and deck replacement, as well as annual maintenance costs, were incorporated into the benefit cost analysis.

EVALUATION OF PROJECT PERFORMANCE

Bridge Inspections

Once investments are complete, inspection of the Memorial Bridge will be performed on a bi-annual basis as required for compliance with the National Bridge Inspection Standards. Bridge inspection reports will be evaluated to gauge project longevity and will be used to coordinate future maintenance and preservation efforts as needed. The success of the investment will be evaluated as part of this inspection process. In addition, maintenance personnel engaged in day-to-day operations of this lift bridge will also provide input to this process. Their constant operation of and contact with this structure will provide keen insight to the success and performance of the bridge improvement.

Reporting

The New Hampshire Department of Transportation has successfully implemented significant American Recovery and Reinvestment Act (ARRA) programs since this legislation was approved in February of 2009. Monthly reporting of individual ARRA projects, that detail project status and employment data, including payroll, number of employees on each project, and hours

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worked, are currently being collected and posted on New Hampshire's ARRA web pages. Similar information would be collected and reported for this project to document and evaluate economic and job creation performance that result from this economic investment.

Labor Compliance Tracking

Labor compliance personnel are currently employed to communicate and prescribe practices and procedures required to effectuate the Equal Employment Opportunity (EEO) provisions for all federally funded contracts, in accordance with the Federal Highway Administration's Contractor Compliance requirements outlined in 23 CFR 230, Appendix A of Subpart C, Part I.

PARTNERSHIP

One of the most telling signs of the importance of this project to the Portsmouth-Kittery region is the partnership that has been developed to enable the Memorial Bridge replacement alternative to move forward. Public and private organizations have committed their support to this project, as noted below.

First, the States of Maine and New Hampshire are both committing significant funding towards this effort, with the Federal Highway Fund providing \$25 million of the project cost. Second, the State of NH is providing \$45 million in state funds through GARVEE bonds. And third, other independent non-governmental organizations have been created with the sole purpose of supporting the project and ensuring that it goes forward. To date, both states together have invested more than \$11 million in design and inspection work for these bridges.

This application enjoys widespread support from many stakeholders in these communities and among a great number of elected officials at all levels of state and local government. (See Appendix A for a complete list of support letters.) The Context Sensitive Solutions process was utilized when developing and considering alternatives for this river crossing. Many diverse groups representing numerous municipalities, agencies, organizations, and the general public provided extensive input on the various alternatives that were considered for the Memorial Bridge. The result was a virtually unanimous consensus that a multi-modal bridge accommodating vehicular, pedestrian, and bicycle traffic be retained at this location. These parties, oftentimes representing conflicting interests, collectively recognized the extensive negative impacts to: local and regional businesses, loss of an emergency response and evacuation route, the overall quality of life, and the disconnecting/severing of ties between these two downtown areas, should the Memorial Bridge be closed or removed. They have repeatedly and vociferously indicated that maintaining/improving the multi-modal transportation options available at the Memorial Bridge is an essential part of the quality of life for these two communities and the region as a whole, and that eliminating this local connection would be unacceptable.

As has already been described, this bridge is critical to the region's economy, to maintaining an efficient transportation network between the two states, and to ensuring that the connectivity of the region is not diminished. Like many states in the country, the recent economic downturn has forced Maine and New Hampshire to significantly tighten their financial belts, and to make very difficult financial decisions. For this reason, these Federal Discretionary TIGER II funds are vital to perform the necessary work on the Memorial Bridge.

It is for this reason the application enjoys such a broad array of support within the communities. They understand that the investment in this infrastructure is critically necessary and that neither state can afford to move forward with these projects without Federal assistance. Maine and New Hampshire believe this application meets the criteria for the TIGER grant program and that it also represents the kind of application that was envisioned, regarding jobs creation and

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economic stimulus, when ARRA was passed by the U.S. Congress and signed into law by the President.

PROJECT READINESS AND NEPA

On June 26, 2008, the Federal Highway Administration classified the original Memorial Bridge project as a “modified-replacement in-kind” construction project for the Memorial Bridge as Class II (Categorical Exclusion), pursuant to the National Environmental Policy Act (NEPA) of 1969. On July 18, 2008, the Advisory Council on Historic Preservation determined, with a fully executed Memorandum of Agreement among all parties, that the Section 106 process was completed. On July 31, 2008, the Federal Highway Administration approved the Section 4(f) evaluation and determined the project to be legally sufficient, pursuant to the US Department of Transportation Act of 1966, 49 USC 303(c), and Section 18(a) of the Federal-Aid Highway Act of 1968, 23 USC 138 (as amended by the Federal-Aid Highway Act of 1983).

The project was fully permitted through the NH Department of Environmental Services-Wetlands Bureau on July 7, 2008. In addition, the proposed work qualified for a Maine Natural Resources Protection Act Permit by Rule for bridges, which due to time restrictions of the permit-by-rule process had not been requested. As there are no impacts to either the Piscataqua River or to jurisdictional wetlands, the Army Corps of Engineers determined on May 16, 2007 that the project would not need an ACOE permit, pursuant to Section 404 of the Clean Water Act. The US Coast Guard determined that a bridge permit pursuant to the Rivers and Harbors Act of 1899 would not be required, but construction approvals would be necessary.

Based on the August 2009 and April 2010 detailed structural inspections of the Memorial Bridge, it was determined that the deterioration had progressed too far to rehabilitate the structure without removing/floating the entire fixed truss spans and towers to a dry dock for a piece-by-piece inspection, cleaning, refurbishing, and/or replacement. This effort was in addition to complete removal and replacement of the original lift span, including the control house and all electrical and mechanical elements. This determination, i.e., rehabilitation no longer being feasible, changed the scope of the project to a complete replacement of the superstructure.

Now that the project proposes a complete replacement of the Memorial Bridge superstructure, rather than the “modified-replacement in-kind” construction originally envisioned, NHDOT is in the process of finalizing documentation to request a Class II (Categorical Exclusion), pursuant to the National Environmental Policy Act (NEPA) of 1969 for this effort.

ME-NH Connections Study

Based on a bi-state agreement (See Appendix C for copy), signed in December 2008, the Maine-NH “Connections Study” (<http://www.mainenhconnections.org/index.php>) has been tasked with identifying the long-term multimodal transportation needs of the area and evaluating the transportation alternatives that best address those needs for crossing between Portsmouth, New Hampshire, and Kittery, Maine. The “Connections Study” is evaluating transportation issues pertaining to the three existing bridges (Memorial Bridge/US Route 1; Sarah Mildred Long Bridge/US Route 1 Bypass; and the I-95 High-Level Bridge) over the Piscataqua River. The Connection Study is currently being finalized and submittal of the Study results is expected by the fall of 2010.

STATE AND LOCAL PLANNING

A project to address the Memorial Bridge is included in the New Hampshire Department of Transportation’s (NHDOT) current “Ten Year Transportation Improvement Plan.” Further, a separate project has also been included to address the Sarah Mildred Long Bridge, another vertical lift movable bridge that needs extensive rehabilitation or replacement in the near future. The Sarah Long Bridge is also considered structurally deficient due to its significant corrosion and deterioration, and currently has a weight restriction of 20-Tons. This second large and very complex bridge project places a substantial financial burden on transportation budgets that are already insufficient to meet current needs.

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The Ten Year Plan places strong emphasis on addressing Red List (structurally deficient) bridges and the Memorial Bridge and Sarah Mildred Long Bridge are two of NH's highest priority bridges. The Ten Year Plan is revised every two years based on input from the Regional Planning Commissions, numerous public meetings throughout the State, and approval by the State Legislature. NH Governor Lynch signed the current Ten Year Plan into law on June 28, 2010. Both bridges are also included in NHDOT's current "Statewide Transportation Improvement Program" (STIP).

Maine's portion of the Memorial Bridge rehabilitation project was included in their 2008-2009 biennial Capital Work Plan. When the bids for the original rehabilitation project were rejected in late 2008, funds were reallocated to the ME-NH Connections Study and other high-priority bridgework in Maine.

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NHDOT Web site <http://www.nh.gov/dot/projects/portsmouthkittery/index.htm>

Project:	Portsmouth-Kittery, Memorial Bridge Replacement
Scope of Work:	TIGER II Discretionary Grant Application for Memorial Bridge Replacement
Contact:	Robert Landry, P.E. Telephone: (603) 271-3921
TIGER Discretionary Grant Application	Cover Letter Commissioner Campbell Application Appendix A - Letters of Support Appendix B - Memorial Bridge Inspection and Rating Reports Interim Inspection Report, May 2010 Volume 1 Volume 2 Appendix A Appendix B Appendix C Appendix C - Bi-State Agreement Appendix D - Benefit Cost Analysis Backup Data Appendix E - Comparison, TIGER I vs TIGER II Appendix F - Federal Wage Rates
Regulations:	US Coast Guard Regulations of Lifts for Memorial Bridge