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MAINE TRAILS

Memorable Bridge

Reconstructing Maine-New Hampshire's Memorial Bridge

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MICHAEL LONG

MCFARLAND JOHNSON, INC.
53 REGIONAL DR STE 202
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Construction workers prepare to bolt a steel support in place. It is estimated the bridge will cost \$90 million to complete. Bill Moore photo

Memorable Bridge

After nearly 20 years, Kittery and Portsmouth have a new lift bridge to replace historic Memorial Bridge. By Kathryn Buxton

IT'S THE way we like to see things work. In this case two states, their departments of transportation, a celebrated engineer and designer and a contracting firm building a brand-new lift bridge.

And on August 8, officials and citizens celebrated the opening of the multi-modal Memorial Bridge that crosses the Piscataqua River between Portsmouth, New Hampshire and Kittery, Maine following the path of its



MaineDOT Commissioner David Bernhardt with U.S. Senator Susan Collins. Collins was instrumental in helping Maine and New Hampshire secure a \$20 million TIGER grant for the bridge replacement project. MaineDOT photo.

predecessor built in 1923. Budgeted at \$81.4 million, the actual cost for the bridge may be closer to \$90 million when all is said and done.

Still, good feelings flowed as freely as the first vehicles across the bridge following the opening ceremonies.

"This is a great example of teamwork," New Hampshire Transportation Commissioner Chris Clement said at the opening festivities. "It speaks to what you can do when you put your mind to it. Once it was started, there was no stopping it."

"This bridge is a model for all the other states when they're looking for an example of innovation and cooperation," said MaineDOT Commissioner David Bernhardt, speaking on behalf

of Maine Governor Paul LePage.

"That cooperation between our states underscores just how important the Memorial Bridge is," said New Hampshire Governor Maggie Hassan. By way of illustration she (as did others) singled out U.S. Senators Jeanne Shaheen, (D-New Hampshire) and Susan Collins (R-Maine) who together secured the \$20 million federal TIGER grant that enabled the project to go forward.

What the two senators were able to accomplish was noteworthy, said Federal Highway Administrator Victor Mendez. He said that in four TIGER grant rounds, only 218 grants have been awarded out of 4,000 applications. The \$20 million grant for the Memorial Bridge is also one of the largest grants given during the history of the award.

"So clearly, they did something right," Mendez told the assembled.

Collins and Shaheen also talked about how proud they were to have worked together on the bridge.

"Our one and only U.S. neighbor is New Hampshire," said Senator Collins, "but we share much more than just the border. We share a history rooted in independence and a culture built on hard work and self-reliance," she said. "We are here today because we also share an economy and a commitment to the future."

FROM RED LIST TO RENEWAL

The original Memorial Bridge was a steel truss design completed in 1923, and the story of its demise is a nail biter. The bridge is one of three spans crossing the Piscataqua River between Kittery and Portsmouth.



Crews at work on the lift span, MaineDOT photo.



Eileen Foley, 95, cut the ribbon on the new bridge. In 1923, when she was just five years old, Foley cut the ribbon opening the old Memorial bridge. Bill Moore photo.

As local lore has it, the bridge was built in the heart of Portsmouth to accommodate workers at the Portsmouth Naval Shipyard who wanted to get to and from work as quickly as possible.

As early as 1994, when the bridge showed up on New Hampshire's Red List of Bridges and Maine's tally of deficient bridges, officials in the two states began the scramble to secure funding for the project. Heavy vehicles were banned from using the bridge since the early 2000s when inspectors determined the bridge's steel structure was deteriorating.

The two states began to seriously debate the future of the Memorial Bridge in 2007. Originally, the plan was to rehabilitate the bridge. But by 2009 it was beginning to be clear that the bridge was in serious condition and officials posted the bridge with a 10-ton weight limit. By 2010, the bridge had deteriorated so badly, the two states considered closing the bridge altogether and shifting traffic to two nearby spans - the Sarah Mildred Long Bridge and the I-95 bridge. The prospect that the bridge, which had the only bicycle and pedestrian access connecting the two communities would permanently close, sparked a local movement - Save Our Bridges

- to preserve all three bridges.

"There's beginning to be an awareness now of how the community feels about the bridges. And when I say 'community,' I mean Kittery and Portsmouth, because we really are one community separated by a bridge," Ben Porter of Save Our Bridges told the *Portsmouth Herald* in 2009. "We place enormous value on these bridges."

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Two separate reports – the New Hampshire-Maine Connections Study and the Bi-State Funding Task Force formed by Maine Governor John Baldacci and New Hampshire Governor John Lynch – looked at the economic impact of the bridges on communities in both states, as well as the funding outlook for replacement and ongoing maintenance for all three bridges spanning the Piscataqua River. Despite the enormous price tag of maintaining all three crossings, more than \$506 million over 30 years, the two states agreed to go ahead with the replacement of the Memorial Bridge and to plan for the future of the Sarah Mildred Long and I-95 bridges.

It is important to note the task force was able to identify only \$381.5 million in available funding from the two states, leaving a shortfall of nearly \$125 million.

ON FAST-FORWARD

The 1923 Memorial Bridge reached the end of the road in July 2011 when it was closed to all vehicle traffic. Considering the complex nature of the project and the tight construction schedule, preparation and timing were essential for each phase of the project. The location of the bridge – part of a major north-south corridor linking the two states – influenced the decision to fast-track the project. For Keith Cota of NHDOT who served as chief project engineer for the project, there were several tense moments. He said if the bridge had been approached as a typical design-bid-build project, it would have taken up to four years to complete, compared with the 18-month project timeline established for the design-build project.

“The shape and condition of the old bridge and the importance of this bridge to the communities and economies of both states, played a major role in deciding to go with design-build,” said Cota. In November 2011, after New Hampshire and Maine officials evaluated designs submitted by three firms, the project was awarded to the design-build team of Archer Western Contractors and bridge designer HNTB. While the Archer Western bid was the highest of the four firms competing, they received the highest score at the completion of the best value award determination process with a schedule approximately five months shorter than the other three teams. NHDOT estimated that every additional day without a third bridge would cost the two states \$25,000.

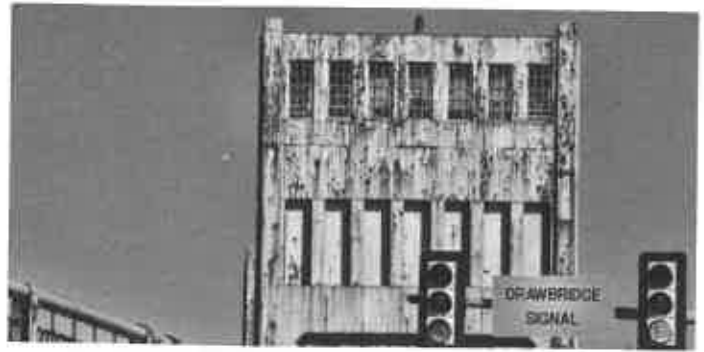
Archer Western started working on the replacement project in December 2011, and planned for the new bridge to open in summer 2013. Demolition of the old bridge began in January 2012.

For the bridge designers at HNTB, one of the initial challenges was meeting the public's high expectations for the project. Consequently, they decided to make the new bridge a “skyline replica” of the original.

“The new bridge had to look like an old truss bridge, but be a modified truss without the corrosion prone details,” said James Fisher of HNTB, who served as design manager on the project. The final design by HNTB's Theodore Zoli mimics the old design with a three-span through truss configuration with flanking span supported towers and a modified plate girder construction.

To the untrained eye, the bridge does look as if it has been around for decades, but there are many innovations in the details. Fisher noted one major innovation came when the team decided to strengthen and “recycle” the old bridge's four piers, greatly reducing the environmental impact of the construction. Crews used the old granite facing on the piers as coffer dams, drilling down into the piers and placing more than a dozen 500-ton capacity battered micropiles in each pier. The reinforced piers form the primary support for the new steel bridge structure.

The completed bridge features two 11-foot travel lanes, two five-foot bicycle lanes and is flanked by two six-foot sidewalks. Over the decades, the bridge had become something of a tourism hot spot, so the design team added pedestrian overlooks outside of the trusses that offer unobstructed views of the Piscataqua River, Kittery and Portsmouth.



Rust on one of the lift towers of the Sarah Mildred Long Bridge. Bill Moore photo

UP NEXT: SARAH MILDRED LONG

With the completion and opening of the new \$88 million Memorial Bridge in August, Maine and New Hampshire have sharpened focus on the upcoming replacement of the Sarah Mildred Long Bridge that carries the U.S. Route 1 Bypass over the Piscataqua River between Portsmouth and Kittery.

The Sarah Mildred Long Bridge is one of three major bridges crossing the river at Maine's southern border and is a critical back-up route in case of disruption on the I-95 Bridge. Sarah Mildred Long, a lift bridge, carries crucial commercial traffic along the US Route 1 Bypass including movement of people and goods to the Navy Shipyard in Kittery that employs 4,200 workers.

Built in 1940, the bridge is one of 23 bridges in New Hampshire and 58 in Maine that have been classified as both “structurally deficient” and “fracture critical,” according to the Federal Highway Administration.

The Sarah Mildred Long Bridge Replacement Project is a joint venture between the Maine and New Hampshire Departments of Transportation, with MaineDOT serving as the lead. In 2011 the two states came up with a “Three-Bridge Agreement” to do something about the condition of the jointly owned Piscataqua River bridges. Initially, the plan was to rehabilitate what is known as “the second bridge.” Since then, the two states have agreed to replace the bridge. Cost of a new bridge is significantly higher than rehabilitation. Later this year, Maine and New Hampshire revived the Interstate Bridge Authority and charged it with addressing the funding issue.

The two departments are to share replacement costs, estimated to be \$170 million, equally. The two states had jointly applied for a TIGER grant from the U.S. DOT (TIGER stands for “transportation investment generating economic recovery”) to help cover the cost of reconstructing the rail line that runs across the river. That bid was rejected and has caused the states to scramble for funding to cover that cost. One sticking point has been that law prohibits the use of federal highway money for rail construction.

As of press time, MaineDOT has said it intends to use funding from a \$50 million GARVEE bond approved by the Maine Legislature this spring to cover its costs. New Hampshire is still hunting for funds: *Foster's Daily Democrat* reported in September that New Hampshire state leaders were still working on finding ways to generate revenues for the aging Sarah Mildred Long Bridge (among other transportation improvements).

The design process got under way in 2013 and not a moment too soon: it is estimated there are less than four years left in the remaining life of the bridge.

According to the *Portsmouth Herald*, the design of the new 2,804 foot bridge is beginning to take shape. It is being described as “sleek,” “open” and significantly taller than the current bridge, with four “graceful” towers at each corner of the center lift span — although the exact look of the towers remains a work in progress.

Jay Rohleder, FIGG vice president of project development, says four towers were called for, as the towers will not only raise the center span for maritime traffic, but also will power a rail line.

As planned, the center span portion of the rail line will be at the traffic deck level, while the rest of the line will be below the deck. When a train uses the line, the center span section will drop down to accommodate it.

Construction is expected to begin on the new bridge by fall 2014. ■

Fisher noted that while the new bridge design visually pays homage to John Alexander Low Waddell's 1920s steel truss design, the modern bridge addresses one of the major shortcomings of traditional steel truss designs – the use of gusset plate connections that are susceptible to corrosion and difficult to replace. Instead, the bridge features modified plate girders and incorporates cold bent steel flanges. The steel was dipped in zinc during the fabrication process to deter corrosion.

POWER OF INFRASTRUCTURE

The power of public infrastructure to unite and strengthen communities was apparent at the opening ceremonies where residents of Kittery and Portsmouth came out in force to be among the first to walk, bike and drive across the new bridge.

In the end, it is the fact that people can experience the bridge and

the river outside of their automobiles that makes the new Memorial Bridge so memorable.

Kittery-based writer-photographer Bill Moore credits the bridge's appeal to the tangible presence it has in the lives of local residents. Many citizens don't just drive across it, they walk and ride bikes across the bridge on a daily basis.

"It takes us smack into the heart of Portsmouth," said Moore, who wrote about and photographed the project extensively during construction. "It's big and important, and you can walk across and bike across."

Moore already is looking forward to work beginning on the Sarah Mildred Long Bridge, and plans to cover its construction in words and photos for the *Portsmouth Herald's* Bridge Watch column. ■

FMI: For info on the Sarah Mildred Long Bridge project, visit www.maine.gov/mdot/sml/.

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