

# Contractors take Longfellow Bridge to the past

Bridge restorers faithful to bygone ways



DAVID L. RYAN/GLOBE STAFF

**Outside contractors working on the Longfellow Bridge are getting an education in 19th-century engineering.**

By **Martine Powers** | GLOBE STAFF MAY 21, 2014

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It turns out that they just don't make bridges the way they used to.

One year after the launch of the sweeping Longfellow Bridge reconstruction project, contractors are getting an education on the construction practices of yore, poring over century-old bridge building manuals, reviving obsolete metalworking techniques, and scouring the region for building materials that have long disappeared from the market.

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Rockport granite, with its inimitable grain? That stuff stopped being excavated during the Great Depression.

And the art of riveting metal? Its heyday — which calls to mind black-and-white photos of fighter planes and posters of a bandanna-wearing woman named “Rosie” — has long faded into the past.

“People really haven’t been riveting for quite a while,” said Mary Grieco, metals control engineer for the Massachusetts Department of Transportation. “It’s a learning curve for everybody. There are no specifications anymore that tell you how to rivet, so we make the best engineering judgment on how to do it.”



Wendy Maeda/Globe Staff

Biz Reed of Olde New England Granite looked over slabs of rescued Rockport granite that will be used in the project.

The primary purpose of the Longfellow project is to strengthen the bridge, which has long been considered structurally deficient. And though construction crews usually rely on modern practices for bridge repair projects, the Longfellow Bridge's status in Boston history led MassDOT officials and historic preservation commissions to require that all the construction techniques be true to the bridge's early-20th century origins — down to the smallest pieces of metal.

The estimated \$255 million cost of the bridge overhaul, which is scheduled to be completed in September 2016, includes the expenses of hewing to historical accuracy. Contractors who signed on to the project were given advance notice that they would be expected to go to extraordinary lengths to uphold the structure's antique character. To ensure that construction would not be delayed, for example, contractors began ordering and stockpiling rivets early on.

“Obviously, it's an iconic bridge, and is literally unique in many of its aspects,” said Charles Sullivan, executive director of the Cambridge Historical Commission, one of the groups advising the Longfellow contractors on historical preservation. “When it comes to design and the method of construction, we thought it was important to replicate those aspects.”

The rivets will largely be used to piece together the vertical steel columns underneath the bridge, which shoot up from the steel arches and support the deck above them. In places out of public sight, construction workers will use modern bolts that are welded to have the smooth look of rivets.

The art of riveting went out of fashion a half-century ago. The practice involves heating rivets, cylindrical metal shafts with round heads, up to 2,000 degrees, until they glow bright red, then quickly jamming them into a hole before they have a chance to cool. It's slow, costly, and dangerous. That's why construction largely switched to nuts and bolts that can more easily be screwed into place.

“The technology never totally went away,” Sullivan said. “But you no longer see pictures of people standing on the frame of the Empire State Building throwing rivets through the air.”

As the MassDOT prepared to award contracts for the Longfellow Bridge project, they had a stipulation: The contractors had to promise to learn how to perform a variety of archaic building techniques.

Some of the contractors attended a seminar on riveting in Michigan. Others looked to 1930s-era manuals on rivet techniques — their best guide on the subject.

“Most people are very excited because it’s something they’ve never done before,” Grieco continued, “and maybe will never have a chance to do again.”

Grieco said contractors ordered custom-made rivets early enough, and in large enough quantity, that they’re not worried about running out. Much of the riveting work is being performed by Cianbro Fabrication and Coating Corp., which is welding larger pieces of the bridge in Georgetown. Robert Small, project manager for the company’s work on the Longfellow Bridge, said it’s the company’s first major project that relies on rivets. “We use rivets very, very rarely,” Small said.

They’ve sought insight from the most seasoned members of the staff.

“There are a few people left around here that used to do it,” Small said.

But rivets aren’t the only challenge of this project. Finding the right replacement granite has proved elusive. The particular granite hails from quarries in Rockport that began to close just after the Wall Street crash of 1929.

Concrete was cheap and easy to make, and became a more popular option for construction.

Now, Rockport granite is impossible to find freshly cut from the earth: Anything now on the market has been reclaimed, stripped from an existing structure. And most pieces available are thin slabs — not the great big blocks necessary for the work on the Longfellow.

As part of a new design for the bridge deck, contractors had already planned to strip the existing granite curb between the vehicle lanes and the T tracks. They had hoped to repurpose that granite to construct new stone stairs and barriers on the side of the bridge.

“We thought we had our answer on the bridge, and we had hopes of being able to use that for the replacement,” said Steve Roper, historic resources supervisor at MassDOT.

But the stone alongside the train tracks is known as Deer Isle granite, which has a lavender hue — not the black-white-and-gray speckled look of Rockport granite.

“People who know stone said, ‘Oh, it’s Deer Isle, that’s not going to work,’ ” Roper said. “They’re different grains, and they will not look good if you put them side by side.”

Thus commenced a years-long hunt by contractors for the right kind of granite, which they knew would probably have been cut at least 80 years ago.

They also needed blocks that were large enough to create huge stone steps, another complicating factor.

“We looked all over New England trying to find matching granite,” Roper said.

What they didn’t know: Biz Reed, co-owner and executive vice president of Wakefield-based Olde New England Granite, had exactly what they needed. In 2010, on a whim, Reed’s company had purchased 3,000 tons of historic Rockport granite that had been stripped from the Hines Memorial Bridge in Amesbury during a reconstruction project.

He had no idea what the company would do with such a large amount of such a particular form of stone, but they couldn’t pass it up.

“Little did we know it would be the right match for the Longfellow,” Reed said. “We just happened to be in the right place at the right time.”

When Reed got word that a team of MassDOT officials, historical preservationists, and construction contractors were all on the hunt for the Rockport stone, he gave them a call.

“I was in seventh heaven,” Reed said. “I told them that we have the granite here. There’s no need to look anywhere else.”

Roper, too, was relieved. “It was tremendous,” he said.

So far, the contractor that is fabricating the stone parapets has spent more than \$100,000 for about 250 tons of Rockport granite.

Reed’s company is still in the process of shipping the 5-ton, century-old blocks of stone to the fabricator. The hunks of rock sit piled up in the company’s storage yard in Wakefield, with each slab labeled to indicate the spot on the bridge for which it’s destined.

“It’s classic, that salt-and-pepper grain,” Reed said, patting the stone lovingly — a perfect fit, he added, for a structure nicknamed the “salt and pepper bridge.”

There is one historical technique that MassDOT officials decided to forgo: the perfect blend of paint for the bridge’s iron fencing. Originally, workers used a complex, multistage process to create the look of weathered bronze. The operation is painstaking, and involves four different colors of paint applied by hand in quick succession.

“We decided it was overkill,” Roper said. “Especially for the maintenance guys in the future who will need to patch up the scratches.” In this case, Roper said, a regular coat of paint will have to do.

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