

The NH-ME Metallized Memorial Bridge

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ABSTRACT

This is the story of the largest movable bridge replacement in NH's history, a compelling account of new ideas to match and exceed an historically significant 90-year old lift bridge in design, style, and innovation with today's unique high-performance features designed to last a century. These bridge features include a first-in-the-world structural design, and the first use of thermal spray zinc coating in New Hampshire and Maine, whose pewter-colored finish blends with the naval and marine river setting, and whose success has encouraged the growth of metallizing in shops and on bridges in New England over the past decade.

Key words: bridge, metallizing, thermal spray coating, zinc

INTRODUCTION

Metallizing in NH was a coating used only sparingly in the past at critical locations on two major bridges. Its greater use was severely limited by the lack of qualified applicators, absence from bridge fabricator operations, and overall excessive cost. This picture changed dramatically with the impetus of the new metallized Memorial Bridge project and the massive investment in metallizing equipment at a large local bridge fabricator that made metallizing possible for this bridge. The successful use and ten-year performance of the thermal spray coating (TSC), i.e. metallizing, on this bridge has had a significant impact on metallized New England bridges to follow.

ORIGINAL BRIDGE

The original Memorial Bridge (see photo), carrying US 1 from Portsmouth, NH to Kittery, ME over the Piscataqua River, was in horrible shape in 2011. The 1923 truss was badly rusted and severely deteriorated from a grid deck that let road salts fall through onto the floor system and lower truss members below. The historic truss was ranked number one on NHDOT's red list of bridges in greatest need of repair and on July 27, 2011 the bridge was closed completely to all vehicles.



The Memorial Bridge had been a city icon and was beloved by citizens for nine decades. When the bridge was opened in 1923 it was a momentous occasion celebrated and captured in headlines across the country. The strategic bridge was the first lift bridge on the US east coast, the longest lift span in the world, and completed the last gap in the US 1 coastal highway from Florida to Maine at a time after World War I when the country was transitioning from rail travel to automobile.

Built in memory of the soldiers and sailors from NH and ME who died in that war, and designed by the premier movable bridge designer of that day, J.A. Waddell called the ‘Father of Movable Bridges’, this bridge truly was a signature bridge of great importance. Waddell’s patented design was used for other lift bridges around the world and the companies he founded designed, many years later, two of the signature bridges over this Portsmouth river.

NEW BRIDGE FEATURES

The urgent need to replace the Memorial Bridge quickly led NHDOT to adopt a new contract mechanism, the Design-Build contract. The selected design-build team were HNTB ⁽¹⁾ designer and Archer Western ⁽²⁾ builder. Under the leadership of one of today’s foremost bridge designers, Ted Zoli, the new bridge design followed the required silhouette of the original truss and at the same time incorporated a number of new innovative mechanical and structural features. Mechanical innovations to the bridge included relocating the control house off the lift span to a fixed span, made the truss shallower, reduced the height of the towers, and moved the machinery rooms to the underside of both ends of the lift span.

(1) HNTB Corporation, Empire State Building, 57th Floor, 350 5th Ave, New York, NY

(2) Archer Western Construction LLC, 929 W Adams St, Chicago, IL