

SCOPE FOR REHABILITATION
BRIDGE NO. 03311
I-84 WB OVER ROUTE 72 NB, ROUTE 372, RAILROAD, AND QUINNIPIAC RIVER
TOWN OF PLAINVILLE
Issued June 2014
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Bridge No. 03311 is a six span bridge consisting of a steel multi-girder superstructure with a reinforced concrete deck on a pile supported substructure. This structure, built in 1969 and rehabilitated in 1989, carries I-84 Westbound over Route 72 Northbound, Route 372, B&M Railroad, and the Quinnipiac River in Plainville, Connecticut. The substructure consists of reinforced concrete abutments, hammerhead piers with post-tensioned caps, and an isolated pier bent with a steel girder cap with fixed hinge girder connections. The structure has various span lengths with a maximum of 108.92 feet and an overall length of 663 feet. The curb-to-curb width is 51.9 feet, the overall deck width is 55.45 feet, and the approach roadway curb-to-curb width is 50.85 feet. The 2012 Average Daily Traffic (ADT) on the bridge is 37,350 vehicles. The 2012 ADT on Route 72 NB and Route 372 is 25,750 and 9,700 vehicles, respectively.

The reinforced concrete deck is in satisfactory condition (Overall Rating = 6). The bituminous concrete overlay exhibits ½ inch deep raveling and paving seams that are open up to 1 inch wide. The underside of the deck has hairline cracking with random efflorescence throughout, along with random spalls, open cracks, and hollow area, some of which are over travel ways. Haunches also exhibit random spalls. The deterioration shown on the underside of the deck is estimated to be a maximum of 20.9% in span 5 and 13.2% overall. Some of the junction box covers in the parapets have only one screw holding them in place. The asphaltic plug joints have adhesion cracks up to 2.5 inches wide that are more severe in the shoulders. The joints exhibit up to ¾ inch of settlement or wheel line rutting and display active leakage.

The superstructure is in poor condition (Overall Rating = 4). The girders exhibit areas of heavy rusting with section loss, particularly the north fascia girder, and random stiffeners have rusted through holes. The fixed pin plates at pier 3 exhibit 11% section loss at span 3, girder 2 and 25% section loss at span 4, girder 1. Random areas that were previously painted have started to rust through. The expansion guided pot bearings have areas of heavy laminated rust. Impacted rust fills the gap between the underside of the curved sole plate and the top of the masonry plate of the fixed bearing at the steel pier cap girder end. The sliding bearing at the steel pier cap girder end has up to 1/8 inch of impacted rust between the plates, and gaps up to ¼ inch high below the masonry plate causing up to 16% loss of bearing contact. The fixed hinges at this pier have up to ¾ inch of impacted rust between the hinge plates and webs. Hinge plates have areas of up to 3/16 inch deep section loss. As part of State Project No. 109-127, the 6-inch diameter pins were replaced with 8-inch diameter stainless steel pins (photos and drawings attached).

The reinforced concrete abutments and piers are in fair condition (Overall Rating = 5). Both abutment backwalls have hairline cracks with efflorescence. The west abutment backwall has areas of shallow rebar and a 3' x 3' x 3" deep spall with exposed rebar, while the east abutment backwall has a 2.5' x 2.5' hollow area and approximately 2 square feet of spalling, up to 2 inches deep. Erosion has exposed the north face of the west abutment footing, approximately 7.5' long x 23" high, and there is a full height x ¼" wide crack in the footing below the wingwall/abutment junction. The northwest wingwall footing is exposed up to full height x 30' long and is undermined approximately 3' long x 9" high x 6.5' deep, exposing the piles. The post tensioned concrete pier caps exhibit cracking with random efflorescence, adjacent spalling/scaling, and cracking. There are random spalls that are typically not more than 1 square foot and up to 1" deep with random exposed rebar. There are isolated corner spalls up to 2" deep, and there are random hollow areas in the caps including two areas over Route 72 and Route 372. The steel

girder pier cap flanges have 1/16" deep section losses in critical areas and the web bases have up to 3/16" section loss. There are areas of heavy concrete and pigeon debris along the pier caps.

RECOMMENDED REHABILITATION

Based on field inspection of the existing structure the following rehabilitation measures are recommended:

- Replace joints over abutments and piers
- Repair deck ends at each joint
- Mill deck, full and partial depth deck patch
- Place new membrane waterproofing and bituminous concrete across entire deck
- Clean and paint beam ends and bearing devices
- Remove haunches over travelway
- Repair substructure as necessary
- Replace impacted guiderail at I-84 WB approaches
- Fill in undermined NW wingwall and replace material over exposed abutment footings
- Repair superstructure steel as necessary

The proposed rehabilitation will be performed utilizing temporary lane shifts and lane closures of I-84 WB. Two lanes of traffic will be maintained for each stage of construction. Each stage will consist of milling the existing bituminous and membrane waterproofing, full and partial depth deck patching, repairing the deck ends, placing new membrane and bituminous concrete and installing the new asphaltic plug joints, half the bridge at a time. Temporary precast concrete barrier curb will be used to provide positive protection between the work area and travel lanes.

Cleaning and painting of the beam ends and bearing devices and certain superstructure and substructure repairs can be performed with no interruptions to I-84 WB traffic. Interruptions to Route 72 traffic are anticipated to perform superstructure repairs and substructure repairs to the western two piers; one lane of traffic will be maintained during substructure repairs. The hammerhead pier cap end repairs will require temporary support and shoulder closures due to the proximity of the post tensioning end load plates. Coordination with the railroad will be required for work on the beam ends and the steel girder pier cap. Route 372 may require lane shifts for substructure repair work.

The Quinnipiac River, which runs under the structure between the railroad and Route 72, will not be impacted as a result of this project. This section of the river is located outside a FEMA delineated floodway; therefore, it is anticipated that there will be no environmental permits needed for this project.