

SCOPE FOR REHABILITATION
BRIDGE NO. 03312
I-84 EB OVER ROUTE 72, ROUTE 372, RAILROAD, AND QUINNIPIAC RIVER
TOWN OF PLAINVILLE
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Bridge No. 03312 is an eight 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 1990, carries I-84 Eastbound over Route 72, 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 steel girder cap beams with fixed hinge girder connections. The structure has various span lengths with a maximum span length of 108 feet and an overall length of 853 feet. The curb-to-curb width is 51 feet, which is consistent with the approach roadway width, and the overall deck width is 55.5 feet. The 2012 Average Daily Traffic (ADT) on the bridge is 37,350 vehicles. The 2012 ADT on Route 72 and Route 372 is 51,500 and 9,700 vehicles, respectively.

The reinforced concrete deck is in satisfactory condition (Overall Rating = 6). The bituminous concrete overlay has minor potholes and patches with up to ½” deep settlement. The underside of the deck has hairline cracking, random efflorescence, honeycomb areas and random shallow rebar. There are random hollow areas over the travelway and spalls up to 2.5” deep with isolated exposed rebar in the girder haunches, end diaphragm haunches, and joint undersides. The maximum underside deck deterioration was found to be 7.4% in span 2 and the overall deck deterioration was found to be 5%. The parapets exhibit isolated scrapes and spalled areas up to 3’ x 1’ and up to 2.5” deep. The steel two pipe railing contains areas of heavy rust and an isolated 2” x 1” rusted through hole in a pipe. Random rails and post webs are bent due to impact damage. Compression seal joints at the abutments and piers are sunken up to 1.5” deep. Concrete headers in the travel lanes have spalls up to 1 square foot x 2” deep with exposed rebar. The abutments joints do not extend fully to the south parapet, and the bituminous concrete is cracked and filled with sand in these areas.

The superstructure is in poor condition (Overall Rating = 4). The flanges of the north fascia girder (girder 1) exhibit areas of heavy to laminated rust throughout with up to 5/16” deep section loss, resulting in up to 11% total losses in the flanges. Steel plates have been added to the webs and stiffeners at the supports at locations of previous rusted through holes, areas of heavy losses and locations with buckled webs and stiffeners. Girder webs have up to 1/8” deep losses adjacent to the hinge plates at pier 2, resulting in up to 14% web loss. The girder pot bearings exhibit heavy to laminated rust and Teflon shavings at random pistons. The fixed and sliding bearings for the steel pier cap girder have tilted anchor bolts, up to 3/16” impacted rust between components, minor rotational misalignment of plates, and backed off or missing nuts. At pier 2 (labeled west to east) there is impacted rust and gaps between the hinge plates and the web girders as well as between the pin nuts and the hinge plates. 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 diaphragms have a total of 44 deteriorated welds, primarily the welds between the diaphragm lower struts and the connection plates. Welds at numerous locations were previously repaired or otherwise retrofitted.

The reinforced concrete substructure is in fair condition (Overall Rating = 5). The abutments and backwalls have silt staining, isolated minor spalling and cracking with random rust and efflorescence. The abutment and backwall joints are open up to 5/8” wide and vary slightly along their heights. The post tensioned concrete pier caps exhibit heavy silt stains, popouts, and shallow tie wires. The concrete at the

end faces in and around the grout pockets exhibit cracking with efflorescence, hollow areas and spalls up to 2' x 9" x 1.5" deep. Away from the cap ends, there are hollow areas and spalled areas up to 3' x 2' x 5" deep with exposed rebar. Pier 3 cap has hollow concrete over a travelway. The steel girder pier cap webs have areas of active rust with up to 1/16" deep section loss. Random stiffeners have as much as 3/16" deep section loss at their bases, typically away from the bearings. The girder bottom flanges exhibit areas of active rust with up to 3/16" deep section losses. The inside faces of the cap have peeling paint with active rust. The footing at pier 5 is exposed up to 1.5' high and has riprap around it. The footing is founded on piles and should not be exposed, but appears to be as-built.

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
- Mill full depth at joints and along parapets and place new bituminous concrete
- Clean and paint beam ends and bearing devices
- Remove haunches over travelways
- Repair superstructure steel as necessary
- Repair substructure as necessary
- Modify bridge parapets to safety shape
- Modify west approach end block and update guiderail attachment
- Cover exposed pier footing

The proposed rehabilitation will be performed utilizing temporary lane shifts and lane closures of I-84 EB. 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 and Route 372 traffic are anticipated to perform superstructure repairs and substructure repairs to piers 2, 3 and 4. 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 piers 5 and 6 and the superstructure spanning across the tracks.

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.