FINAL DESIGN REPORT

Rehabilitation of the approach spans for Bridge No. 00524
“Arrigoni Bridge”
Route 66 over Providence and Worcester Railroad and the Connecticut River

In the Town of
Middletown & Portland, Connecticut

ConnDOT Project No. 82-312
Federal Aid Project No. 0066(112)
Construction District 1
STV Project No. 40-13855-0082

90% Review Submission
January 11, 2019

Prepared for:
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1. Project Description

The Arrigoni Bridge carries Route 66 over Route 9, the Connecticut River, P & W Railroad and Local Roads in Middletown and Portland, Connecticut. The structure carries two lanes of traffic and a sidewalk in each direction. The 3,420 foot long, 30-span bridge consists of twenty-eight girder/floorbeam/stringer approach spans with a 7-1/2” reinforced concrete deck flanking two tied through arch spans with a concrete filled grid deck. The structure was completed in 1938.

This project proposes to incorporate the following work items:

- Replace concrete deck, barrier, and sidewalk of the Middletown and Portland approach span viaducts.
- Strengthen primary structural members with legal load Rating Factor less than 1.0.
- Strengthen Portland approach bent columns exhibiting section loss greater than 25% of cross section area.
- Install suspender rope separators
- Repair Light Standards on approach spans
- Replace HPS luminaires with LED luminaires.
- Replace navigation lights with solar powered lights
- Replace airway lights with solar powered lights
- Repair approach span sidewalk brackets
- Repair approach span Pedestrian Rail
- Localized paint removal and spot painting
- Clean and repair drainage scuppers and connecting drains
- Repair substructure concrete.
- Add a 2” RMC for 36 fiber optic cable for IMS
- Replace approach guiderail and barrier curb to the bridge.
- Replace curbing in the shoulder and median on the Middletown approach roadway.
- Mill and pave Middletown and Portland approach roadways.

This project will utilize stationing based off the original construction plans from 1938. Project Limits begin at STA. 95+93.48 and end at 141+50 for a total of 4,556.52 feet. The deck & bituminous overlay of the main arch spans 10 & 11 of the bridge installed in 2012 will be left untouched in this project.

Rehabilitation of the Route 66 Middletown and Portland approach roadways is proposed under this project. This work will include replacement of existing barrier curb at each approach with cast-in-place concrete barrier curb to match the existing. The concrete sidewalks along the length of the barrier will be replaced. The approach roadways in the vicinity of the barriers and abutments are underlain with concrete pavement which will remain in place.

The failing bituminous concrete surface on the Middletown approach will be subject to 4 inches of milling, or exposure of the concrete slab, and repaved. The median island will be treated with bituminous concrete lip curbing and AASHTO MASH compliant guiderail, placed and anchored in accordance with CTDOT standard drawings. Guiderail at the outside edge of the roadway is proposed to replace the existing rail length, from cast-in-place barrier attachment to new end anchor installations. The concrete curbing at the edge of road is badly damaged and will require
full depth pavement reconstruction to facilitate proper concrete curb installation. Full depth construction will be limited by an offset distance of two feet from the existing edge of road to minimize cost and impact to the travelling public.

The Portland approach roadway is in good condition but will be milled to eradicate remnant temporary markings utilized during construction and overlaid to provide a fresh surface to apply final pavement markings. MASH compliant guiderails will be installed to replace the existing system, attached to the proposed cast-in-place barrier and will terminate at new end anchors. Existing granite curbing at the Portland approach is in good condition and will be reset as needed, eliminating the need for full depth pavement construction.

The access ramps to Lower Main St at the Portland approach will be reconfigured for larger turning vehicles such as WB-62 & WB-67. Presently the existing guide rail is severely damaged from truck turning movements. This improvement will be included in the following submission.

This project will not include drainage improvements however, any existing catch basins or manhole structures within milling areas will be reset. This will ensure the final roadway surface will maintain proper drainage.

Light standards and electrical components that exhibit signs of deterioration will be refurbished in this project and the existing HPS lighting fixtures will be retrofitted with LED luminaries.

An incident management system serving Route 9 and Route 66 is present in the project area and includes an aerial 36 fiber cable fastened to the existing illumination conduit under the northern sidewalk of the Arrigoni Bridge. This trunk line IMS fiber cable will be relocated inside a new conduit mounted under the bridge sidewalk and parallel to the existing illumination conduit.

**Maintenance and Protection of Traffic:** The MPT plans have been developed to maintain traffic through the project limits with minimal disturbance while providing the contractor with adequate space to efficiently complete the construction. The proposed stages of construction have been detailed on the Maintenance and Protection of Traffic plan sheets. Below is a summary:

Presently the bridge carries two lanes of traffic in each direction. Traffic will be reduced to one lane in each direction during staged construction.

**Stage Construction Sequence:**

Stage 1: Shift and merge eastbound Route 17/66 (Main Street) traffic to the north side of the bridge and merge westbound Route 17/66 traffic to allow for placement of Temporary Precast Concrete Barrier Curb (TPCBC) to establish the work area on the south side of the bridge. Temporary illumination units will be placed on the TPCBC to maintain adequate roadway light levels during construction.

Stage 2: Merge eastbound Route 17/66 (Main Street) traffic to the south side of the bridge and merge westbound Route 17/66 traffic to the north side of the bridge to allow for placement of Temporary Precast Concrete Barrier Curb (TPCBC) to establish the center work area on the
bridge. Roadway illumination will be provided by the new luminaires installed on the south side of the bridge during Stage 1 and the existing luminaires on the north side of the bridge.

Stage 3: Shift and merge westbound Route 17/66 (Main Street) traffic to the south side of the bridge and merge eastbound Route 17/66 traffic to allow for placement of Temporary Precast Concrete Barrier Curb (TPCBC) to establish the work area on the north side of the bridge. Temporary illumination units will be placed on the TPCBC to maintain adequate roadway light levels during construction.
2. Exceptions to minimum design standards:

DESIGN FEATURES:

Functional Classification: Multi-Lane Principal Urban Arterial
Type of Roadside Development: Intermediate
Federal-Aid System: NHS
Roadway Configuration: Four 11 ft. lanes, no shoulder
Proposed Improvement Type: 3R Project
Traffic Volume: 33,700 ADT (2013)
Pavement Type: 2-1/2” HMA wearing surface over 7-1/2” reinforced concrete deck

Access Control: Partial Control

LRFD Bridge Design Specifications (2012)
### Design Report

#### Design Element

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Existing</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Highway</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Speed</td>
<td>40 mph</td>
<td>40 mph</td>
<td>40 mph</td>
</tr>
<tr>
<td>Travel Lane Width</td>
<td>11-12 ft.</td>
<td>11 ft.</td>
<td>11 ft.</td>
</tr>
<tr>
<td>Shoulder Width (Right)</td>
<td>2-8 ft.</td>
<td>0 ft.*</td>
<td>0 ft.*</td>
</tr>
<tr>
<td>Shoulder Width (Left)</td>
<td>2-4 ft.</td>
<td>0 ft.*</td>
<td>0 ft.*</td>
</tr>
<tr>
<td>Cross Slope Travel Lane</td>
<td>1.5-2 %</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Cross Slope Shoulder</td>
<td>Same as travel lane</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Sidewalk Width</td>
<td>5’</td>
<td>5’ min</td>
<td>5’ min</td>
</tr>
<tr>
<td>Stopping Sight Distance</td>
<td>320 ft.</td>
<td>550 ft.</td>
<td>550 ft.</td>
</tr>
<tr>
<td>Minimum Radius</td>
<td>490 ft.</td>
<td>1350 ft.</td>
<td>1350 ft.</td>
</tr>
<tr>
<td>Superelevation Rate ($e_{max}$)</td>
<td>4%</td>
<td>1.9%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Maximum Grade</td>
<td>9%</td>
<td>+4.5%</td>
<td>+4.5%</td>
</tr>
<tr>
<td>Minimum Grade</td>
<td>0.5%</td>
<td>-2.0%</td>
<td>-2.0%</td>
</tr>
<tr>
<td><strong>Bridge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridge Width (Curb to Curb)</td>
<td>48 ft.**</td>
<td>44 ft.*</td>
<td>44 ft.*</td>
</tr>
</tbody>
</table>

* Does not meet standard

** Based on “Bridge to Remain in Place” criteria in HDM Section 2-7.02.02

#### Exceptions to Design Standards:

The left and right shoulder widths and bridge width do not meet design standards. The bridge sub-standard elements cannot be met based on “Bridge to Remain in Place” criteria in HDM section 2-7.02.02. The request for design exceptions was submitted before the committee on August 22, 2017.
3. Public Utilities Affected by the project:

There are multiple utilities affected by the project. Identified utilities include Eversource, Comcast, Crown Castle, Frontier, and P&W Railroad. Multiple field coordination meetings were held in the fall of 2018, which are identified below. A general coordination meeting was held at CTDOT Headquarters on November 20, 2018.

Providence and Worcester Railroad (P&W) were informed of possible affect by the project on August 24, 2018. A coordination meeting took place on September 6, 2018. P&W’s tracks are present beneath span 4 and 6. Deck replacement work is planned above the tracks in addition to minor substructure concrete repair to Piers 3, 4, 5, & 6.

Comcast was informed of possible affect by the project on August 29, 2018. Field coordination meetings took place on October 16, 2018 and December 13, 2018. Their utility (3) fiber optic interdicts will be temporarily relocated from the southerly bridge sidewalk brackets prior to the start of Stage 1 Construction. Following the completion of Stage 1, the utility may be relocated back to it’s original location.

Crown Castle was informed of possible affect by the project on August 29, 2018. A field coordination meeting took place on October 25, 2018. It was determined that the utility will remain in place during construction, however it will be temporarily shifted to accommodate the southerly sidewalk bracket and strut replacement.

Eversource was informed of possible affect by the project on August 29, 2018. Field coordination meetings took place on October 16, 2018 for general coordination and on November 9, 2018 to review the service connection for the Illumination Cabinet near Pier 15.

4. Environmental Documentation:

In accordance with 23 CFR 771 and the Programmatic Agreement between the Federal Highway Administration (FHWA) and the Connecticut Department of Transportation (CTDOT) for Processing of Categorical Exclusions dated September 2015, the Department completed a Categorical Exclusion Determination Checklist, dated August 4, 2017 which concluded that this project qualifies as an Automatic Categorical Exclusion.

The 100 – Year Flood plain EL. 24.1 ft within the project limits encompasses Piers 7-16. Work activities within the flood plain include concrete substructure repair to columns of piers 7 & 8, the base of steel columns 12-16. Work will also take place to investigate and potentially repair bridge drainage at the base of Pier 8. This work will take place on the substructure above the 100 year flood grade. Access with construction equipment such as man lifts and bucket trucks will operate in the floodplain.

It was determined and confirmed at the Inter-agency Coordination Meeting on October 18, 2018 that the permits required based on the proposed work activities are a FM General and to Coordinate with the Coast Guard.
5. **Environmental Permits:**

The following Permits have been acquired:

- U.S. Coast guard Coordination
- F.M. General

6. **Rights – of - Way:**

Rights of way process is underway to obtain rights for several trees located on private property which have encroached on the bridge.

7. **Hazardous / Contaminated Materials:**

The Department’s Environmental Compliance Section conducted a Contaminated Materials Screening Evaluation and has determined (on August 24, 2015) that additional tasks (Task 710) are required.