I. INTRODUCTION

The purpose of this study is to determine the feasibility of constructing a pedestrian bridge on the piers of the existing bridge carrying I-195 over the Providence River. Building the pedestrian bridge is a proposed alternative to removing the entire existing structure, including the piers. The intent is to determine if a new pedestrian bridge can be constructed at a cost equal to or less than the costs associated with removing the existing piers from the river.

As part of the relocation of I-195 in Providence, the existing interstate bridge over the Providence River will be taken out of service. The terms of the current US Coast Guard Permit for the new I-195 Bridge call for the existing bridge to be removed. This includes removing the five-143 foot long river piers down to or below elevation -11, approximately five feet below the existing mudline.

Four alternative pedestrian bridge types, placed on three alignments as described in section V are evaluated in this study. Investigating multiple bridge types and alignments provide a range of options and costs associated with a new pedestrian bridge. The estimates, discussed in section VII, will be used to compare the cost of constructing a new pedestrian bridge versus the cost of the pier removal.

II. EXISTING CONDITIONS

The existing I-195 bridge over the Providence River is a 1191 foot, eighteen span viaduct ranging from the east side of South Main Street to the west side of Dyer Street. Six spans (458 feet) of the structure are over the Providence River. Eleven spans (733 feet) are over city streets and parking lots. The structure is a typical steel girder interstate bridge with a concrete deck, concrete piers and pile caps. The typical horizontal clearance between piers, perpendicular to the navigation channel, is 54 feet. The typical span length, parallel to the bridge and skewed to the river is 76 feet. A section of the existing bridge across the river is illustrated in figure 1.

![Figure 1: Existing Partial Longitudinal Section](image)

The bridge piers in the river are approximately 143 feet long. The piers are supported by steel piles embedded in twelve foot wide concrete pile caps. The top of the pile cap is at elevation -11. The six foot wide concrete pier bases, clad with granite veneer, support eight circular reinforced concrete columns. The tops of the pier bases (bottom of the
columns) are at elevation 3.5. The columns support concrete caps which in turn support the steel superstructure.

**Figure 2: Existing River Pier Section**

The pier caps and columns are in deplorable condition. Supplemental shoring has been installed on the piers at most of the girders. The bridge deck is also in poor condition with timber underdeck shoring installed across virtually the entire area of exposed concrete. The bridge deck, pier caps and columns are part of the structure that will be removed and would not be part of a future pedestrian bridge.

The bridge pier bases that would be used to support the proposed pedestrian bridge were visually inspected as part of this study. The piers associated with the pedestrian bridge are labeled B2 to B8 on the original construction drawings (circa 1955). Piers B2 and B8 would serve as the abutments for the new bridge. These two piers are located on the east and west shore of the Providence River. As such the concrete caps are below grade and do not have granite cladding. Piers B3 to B7 are located within the Providence River and are clad with granite as shown above. The inspection found the existing river pier bases to be in good condition. Overall the granite appears to be in very good condition with some minor cracking, caulking loss and staining noted throughout. As part of the I-195 interim shoring contract Aetna Bridge Company drilled and grouted anchor bolts through the granite into the concrete to connect the temporary girder shoring posts. The contractor encountered both solid granite and concrete during his drilling operations indicating good material strength. Photographs representing the typical conditions of the existing pier caps are located in the appendix of this report.

**III. PIER REMOVAL**

The existing bridge will be removed after it is taken out of service. The current USCG Bridge permit for the new I-195 Providence River Bridge calls for the existing bridge to be removed within 90 days after it is closed. The permit requires the bridge to be removed down to the top of the pile cap (elevation -11).
OPTION 1 - 3 SPAN CONTINUOUS STEEL TRUSS ARCH

OPTION 2 - 3 SPAN CONTINUOUS HAUCHED STEEL GIRDER

OPTION 3 - SIMPLY SUPPORTED PRECAST BUTTED BOX BEAMS

OPTION 4 - SIMPLY SUPPORTED GLU-LAM TIMBER STRINGERS
(3) Span Continuous Steel Truss Arch

Option 1

- HSS 16x12x3/8
- OR HSS 16x8x1/2
- Tapered Steel Rail (TYP.)
- 7" Cast in Place Deck & Floor Framing
- W4x22

20'-0" HSS 10x6x3/8

(3) Span Continuous Steel Haunched Girder

Option 2

- Pedestrian Rail (TYP.)
- Steel Girder (TYP.)
- 7" Cast in Place Conc. Deck
- Steel Diaphragm

2'-0" B'-O" B'-O" 2'-0"

20'-0"

Simple Span Precast Butted Box Beams

Option 3

- Pedestrian Rail (TYP.)
- EI-46 (TYP.) Box Beam
- 4" Concrete Topping
- 5 Beams @ 4'-0" = 20'-0"

Simple Span Glulam Timber Girder

Option 4

- Pedestrian Rail (TYP.)
- Glulam Timber Beam, TYP.
- 4"x6" Glulam Timber Decking
- 6'-4 5/8" Tapered Steel Rail (TYP.)

20'-0" 6'-4 5/8" 6'-4 5/8"
Ramp and Stair Landing Plan Alternatives:

**FIGURE 8**

In order to be viable the bridge must be equal to or less in cost than the removal of the piers and make logical connections on both sides of the river. To this end Figure 9 shows the 3-span continuous truss arch design and offset alignment configuration with landing plan L-3.
PROVIDENCE RIVER SHARED USE PATH/BRIDGE
(PEDESTRIANS & BICYCLES)
CLIENTS
R.I. DEPARTMENT OF TRANSPORTATION
PROVIDENCE PARKS DEPARTMENT

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