

# Riverside Greenway

## Conceptual Design Study

Prepared for the  
Riverside Greenway Working Group  
April 2019



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<b>To:</b> Ted Chapman, Chair Riverside Greenway Working Group	<b>Date:</b> April 15, 2019
<b>From:</b> William Paille, PE	<b>Proj. No.</b> 28376.00
<b>Re:</b> Riverside Greenway Conceptual Design Study	

## Project Background

BSC Group was retained by the Lawrence Solomon Foundation (Solomon Foundation) in March 2018 to provide survey, preliminary design, and cost estimating services as part of the preparation of a conceptual design study for a portion of the Riverside Greenway that will connect Clearwater Rd/Deforest Rd in the Village of Lower Falls to the MBTA Riverside Train Station in the City of Newton, Massachusetts. We have prepared this Project Memorandum for the Solomon Foundation and Riverside Greenway Working Group (RGWG) to document existing issues, public engagement and the process that was undertaken to develop various conceptual design alternatives and elements along with associated order-of-magnitude construction costs anticipated to complete this vital connection over I-95 and the I-90 Connector/Access Road.

### Existing Conditions (Refer to Appendices for plans)

#### Clearwater Road & Deforest Road

Clearwater Road is classified as a local road and generally runs in a northeasterly-southwesterly direction with a portion of the road extending approximately 100 feet from the intersection with Deforest Road toward I-95 where it terminates. This section of Clearwater Road is a private way and is primarily used as a driveway access to #110 Clearwater Road and #8 Deforest Road, as well as access to a gas main owned by Columbia Gas. Clearwater Road and Deforest Road consists of one lane in each direction.

Adjacent land along Clearwater Road and Deforest Road is residential. There are existing sidewalks along either side of Clearwater Road and Deforest Road to the intersection of the private way portion of Clearwater Road. There are no sidewalks along either side of Clearwater Road where it becomes private way. There are no parking restrictions along the public way portion of Clearwater Road and Deforest Road. However, parking by the public is not allowed along the private way portion of Clearwater Road without permission by the two property owners.



Algonquin Gas

The existing gas line consists of a 24-inch service main, located below ground that runs within a parcel of land owned by the City of Newton beginning at the intersection of Clearwater Road and said parcel northerly to the abandoned railroad bed. The gas line runs approximately 270 feet from the end of Clearwater Road to the abandoned railroad bed and continues another 300 feet along said parcel before turning to the east to cross under I-95.

BSC contacted and spoke with Algonquin Gas in the spring of 2018 to discuss the project and determine if there are any concerns with constructing a multi-use trail adjacent to or over their gas line. No reservations or concerns were expressed on the part of the Algonquin Gas representative.



Bridge No. N-12-062 (892) RR CSX/MBTA over I-95/ST128

The bridge is a two-span railroad through girder structure with the west span over I-95 Southbound and the east span over I-95 Northbound and was constructed between 1962 and 1964. A site visit was performed by BSC on April 26, 2018 at which time a visual assessment of the bridge was performed only (Refer to Appendices for existing plan and Memorandum, dated November 23, 2018, prepared by BSC). Based on a review of existing plans and the site visit, it was determined the bridge was constructed as designed. However, at some point the railroad tracks were removed and the stone ballast retained. During the site visit several deficiencies were observed that are noted in the attached memorandum.



Bridge No. N-12-061 (891) RR CSX/MBTA over I-90 Connector/Access Road

The bridge is a two-span railroad through girder structure with the west span over the I-95 NB off-ramp and the east span over the service road. A site visit was performed by BSC on April 26, 2018 at which time a visual assessment of the bridge was performed only (Refer to Appendices for existing plan and Memorandum, dated November 23, 2018, prepared by BSC). Based on a review of existing plans and the site visit it was determined the bridge was constructed as designed with one exception – the brick protective courses were constructed differently from the existing plan. In addition, at some point the railroad tracks were removed and the stone ballast retained. During the site visit several deficiencies were observed that are noted in the attached memorandum.



**Key Milestones (Kickoff, Site Visits, Survey & Public Engagement)**

The following is a summary of meetings with project stakeholders and submissions:

- March 15, 2018. Kickoff with Riverside Greenway Working Group members and City of Newton staff. BSC presented project via PowerPoint followed by a discussion of trail options, bridge railing and surface alternatives, and schedule.  
Location: Newton City Hall – Mayor Mann Conference Room
- March 28, 2018. Internal coordination with BSC Survey and Transportation to discuss scope of field work and schedule.  
Location: BSC Boston Office
- April 4, 2018. Site visit by BSC Transportation to walk project, document existing conditions, prepare for ground survey completed in April.
- April 26, 2018. Site visit by BSC Structural engineer to visually inspect the bridge over I-95 and Connector Road.
- June 1, 2018. Site walk with Riverside Greenway Working Group Chair, committee members, Solomon Foundation, Mark Development and Jacobs Engineering.
- June 19, 2018. Progress meeting with the Riverside Greenway Working Group Chair, committee members, Solomon Foundation, Mayor Fuller and staff.  
Location: Newton City Hall – Mayor Mann Conference Room
- August 7, 2018. Coordination meeting with MassDOT, Solomon Foundation and Riverside Greenway Working Group Chair (via phone).  
Location: Boston Impact Hub – 50 Milk Street, Boston
- September 10, 2018. Progress meeting with Riverside Greenway Working Group Chair, committee members.  
Location: 91 Cornell Street, Newton
- September 17, 2018. Public workshop to present project and solicit feedback from community.  
Location: Auburndale Community Library
- November 4, 2018. Presentation to Lower Falls Improvement Committee to present project, alternatives, rail/surface options, and answer questions from the committee.  
Location: Hamilton Community Center (Lower Falls)
- December 22, 2018. Submission of draft Riverside Greenway Conceptual Design Study report to the committee chair with follow up construction cost breakdown to Solomon Foundation early January 2019.

**Trail Alternatives**

Several alternatives were developed and presented to the RGWG, MassDOT and the public through a series of progress meetings, workshops and presentations beginning in June through November 2018. The following is a summary of the various alternatives that were developed:

Alternative No. 1 – West Connection (Refer to Appendices for Conceptual Sketch)

This option begins at the intersection of Clearwater Road and Deforest Road as a shared-use for approximately 100 feet to the entrance to the multi-use path. It is recommended the existing edge of Clearwater Road be better defined using vertical granite curb and the driveway entrances to the existing two residential properties reconfigured and parking along this section of Clearwater Road by the general public be discouraged or prevented either by posting new signs or implementing a new parking restriction as it is currently designated as a private way. It is also recommended the surface of Clearwater Road along this section remain as hot mix asphalt pavement.

This alternative also includes the section of abandoned railbed from Pine Grove Avenue to the point where it intersects with the existing natural gas line along land owned by the City of Newton positioned between the golf course property and several private properties. Although ideal for an off-road trail, the proximity of a bike path so close to several homes may result in public opposition. As a result, this segment has been broken out separately.

It is recommended the multi-use path be 12 feet wide with a hot mix asphalt surface beginning at the end of Clearwater Road, traverse along property owned by the City of Newton and over an existing natural gas line owned and maintained by Algonquin Gas to the existing abandoned railroad bed within property owned by Boston & Albany Railroad. The alignment or configuration of this section of the path shown is still conceptual but it is recommended the path maintain a maximum grade of 5% to comply with the latest ADA/AAB guidelines. Initial assessment of existing conditions reveals 3:1 maximum fill slopes are possible and retaining walls will not be required along this section. As there is an existing chain link fence along the easterly side of the City-owned parcel to delineate State Highway Layout (SHLO) for I-95 southbound, there is no need for new railing or fence along this side. However, it is anticipated separation and/or privacy screening may be required along the westerly side of the path as there are two residential properties abutting this portion. In addition, at a LFIC meeting, one of the owners voiced concern of possible future lighting of the trail and users being in proximity to their backyard.

The path provides connection opportunities at the point where it meets with the existing abandoned railroad bed. As this is the highest elevation of the path and provides an excellent view in all directions, it is recommended this area be designed to provide safe and easy access to Clearwater Road and over I-95 while allowing future connections as the trail system expands including but not limited to the existing lower walking trail to the northwest via a paved path or stairway or to the golf course via a paved path via land owned by Boston & Albany Railroad and the Commonwealth of Massachusetts.

**Estimated Construction Costs (Refer to Appendices):**

Based on the conceptual layout described herein, limited topographical survey performed, latest available GIS data and estimated quantities, order-of-magnitude costs (i.e. major items of work) were developed using the latest MassDOT nomenclature and weighted average bid prices. Estimated quantities were increased by 10% to account for any topography discrepancy, limit of work adjustment or material changes and includes a 20% contingency to account for miscellaneous items of work, transportation, labor adjustments, etc. Finally, these costs are for construction and do not include topographic survey, permitting, engineering, property takings/easements, bidding/advertisement or construction administration.

As this alternative does not include any bridges the costs developed for this alternative were limited to the connection at Clearwater Road, the path along the gas line to the abandoned railbed and connections to the lower area via a stairway and golf course via a path. Accordingly, the estimated construction cost for this alternative are broken down as follows:

Deforest Road Link:	\$177,500
Pine Grove Path:	\$266,000

Alternative No. 2 – Bridge over I-95 & Median (Refer to Appendices)

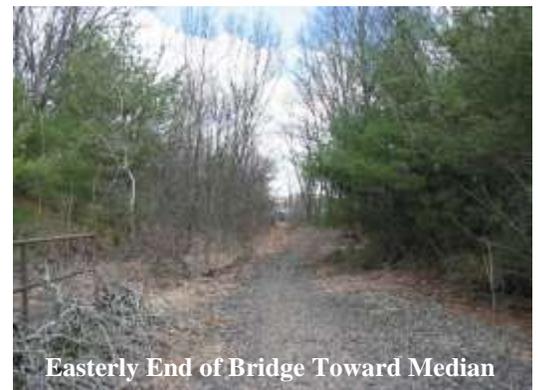
This option begins at the westerly approach to the existing bridge over I-95 and utilizes the existing bridge structure to traverse over the southbound and northbound travel lanes of I-95 and across the existing wooded median between the bridge structure over I-95 and bridge structure over the I-90 Connector/Access Road, all of which is located entirely within property owned by the Boston & Albany Railroad and SHLO. It is recommended the section of path from the westerly connection to the bridge be a minimum 10 feet wide with a hot mix asphalt surface to match the existing inside width of the existing structure.



As the surface over the existing structure consists of track ballast and is not compliant with current ADA/AAB standards, it will have to be replaced.

As described in more detail herein, there are several options available that will meet current ADA/AAB standards including hot mix asphalt, pressure treated wood decking, prefabricated aluminum or steel decking.

The existing bridge structure was not designed or constructed with a rail system and as such it is unlikely the MassDOT will approve a new rail system that would require attachment to the top of the existing steel truss, an independent rail system will likely be required.



The section of path between the bridge over I-95 and the bridge over the I-90 Connector/Access Road provides an excellent opportunity to enhance the trail and provide an enjoyable experience for users. The area is buffered from I-95 and the I-90 Connector/Access Road both visually and from traffic noise. It is recommended the section of the path from the easterly approach to the existing bridge over I-95 to the westerly approach to the bridge over the I-90 Connector/Access Road be 12 feet

wide with a hot mix asphalt surface. As this area is located between the I-95 NB/SB travel lanes and the I-90 Connector/Access (i.e. median) and entirely within SHLO, access within and along this area will be subject to MassDOT jurisdiction. As such it is likely MassDOT will require separation or a barrier (i.e. 8' high chain link fence) along both sides of the path to prevent users from traversing northerly or southerly along the median.

Estimated Construction Costs (Refer to Appendices):

Based on the conceptual layout described herein, limited topographical survey performed, latest available GIS data and estimated quantities, order-of-magnitude costs (i.e. major items of work) were developed using the latest MassDOT nomenclature and weighted average bid prices. As this option includes the existing bridge over I-95, the estimate includes costs related to four possible bridge deck surface options including hot mix asphalt (HMA), pressure-treated (PT) lumber with independent rail system, prefabricated aluminum panel with independent rail system and open steel grate with independent rail system. In addition, the estimate includes costs related to two possible bridge rail options including steel/aluminum and steel with chain link fence backing. Again, estimated quantities were increased by 10% to account for any topography discrepancy, limit of work adjustment or material changes and a 20% contingency to account for miscellaneous items of work, transportation, labor adjustments, etc. As previously stated, these costs are for construction and do not include topographic survey, permitting, engineering, property takings/easements, bidding/advertisement or construction administration.

The estimated construction cost for this alternative are summarized as follows:

	<u>Path</u>	<u>w/Steel/Alum Rail</u>	<u>w/Steel &amp; CLF</u>
Path with HMA Bridge Deck	\$208,500	\$340,000	\$358,000
Path with PT Bridge Deck	\$206,500	\$338,000	\$356,000
Path with Aluminum Panel Deck	\$229,000	\$365,000	\$383,000
Path with Open Steel Grate Deck	\$369,000	\$533,000	\$551,000

Alternative No. 3 – East Connection including Pony Truss (Alt. 3A) & Riverside (Alt. 3B) (Refer to Appendices)

This option begins at the westerly approach to the existing bridge over the I-90 Connector/Access Road and utilizes the existing structure to traverse over the I-90 Connector/Access Road to connect to points north (i.e. Pony Truss Trail) and/or south (i.e. Riverside Station). This option is located entirely within property owned by the Boston & Albany Railroad and SHLO. It is recommended the width of the path from the median transition from 12 feet to 9.5 feet to match the existing inside width of the existing structure.

As the surface over the existing structure consists of track ballast and is not compliant with current ADA/AAB standards, it will have to be replaced. As previously mentioned and presented herein, there are several options available that will meet current ADA/AAB standards including hot mix asphalt, pressure treated wood decking, prefabricated aluminum or steel decking.

As the existing bridge structure was designed and constructed with a rail system attached to the top of the existing steel truss, it is likely MassDOT will allow the existing rail to be replaced and/or upgraded to meet current ADA/AAB standards.



One of the goals established by the RGWG was to investigate possible connections to the existing Pony Truss Trail and Recreation Park to the northeast and the future Riverside Development Project to the southeast. Although several options were developed, based on meetings and discussions with the RGWG, Mark Development, City of Newton, MassDOT, and MBTA, the preferred alternative included a connection from south side of the bridge to the I-90 Connector/Access Road within SHLO that will eventually link to the future Riverside Development, and a stair connection from the north side of the bridge to the existing I-90 Connector/Access Road within SHLO to allow access to Recreation Park and the Pony Truss Trail.

Estimated Construction Costs (Refer to Appendices):

Based on the conceptual layout described herein, limited topographical survey performed, latest available GIS data and estimated quantities, order-of-magnitude costs (i.e. major items of work) were developed using the latest MassDOT nomenclature and weighted average bid prices. As this option includes the existing bridge over the I-90 Connector/Access Road, the estimate includes costs related to four possible bridge deck surface options including hot mix asphalt, pressure-treated lumber with independent rail system, prefabricated aluminum panel with independent rail system and open steel grate with independent rail system. In addition, the estimate includes costs related to two possible bridge rail options including steel/aluminum and steel with chain link fence backing. Again, estimated quantities were increased by 10% to account for any topography discrepancy, limit of work adjustment or material changes and a 20% contingency to account for miscellaneous items of work, transportation, labor adjustments, etc. As previously stated, these costs are for construction and do not include topographic survey, permitting, engineering, property takings/easements, bidding/advertisement or construction administration.

The estimated construction cost for the I-90 Connector/Access Road bridge structure is summarized as follows:

	<u>Path</u>	<u>w/Steel or Alum Rail</u>	<u>w/Steel &amp; CLF</u>
Path with HMA Bridge Deck	\$60,000	\$198,000	\$223,500
Path with PT Bridge Deck	\$58,000	\$195,000	\$220,500
Path with Aluminum Panel Deck	\$87,000	\$230,500	\$256,000
Path with Open Steel Grate Deck	\$274,000	\$455,000	\$480,000

The estimated construction cost for the Pony Truss Trail and Riverside connection is summarized as follows:

	<u>Pony Truss</u>	<u>Riverside</u>
Path, Landing, Ramp	\$141,500	\$363,000

**Conclusions & Recommendations**

Several alternatives were developed with the goal of linking Clearwater Road to various points along both sides of I-95 including the Leo J. Martin Memorial Golf Course, the Pony Truss Trail, Recreation Park and the Riverside Greenline Station. Each alternative was presented and discussed with several project stakeholders including the Working Group, the Solomon Foundation, Mark Development and MassDOT, then narrowed to specific schematics that are described herein. In addition, several options were developed related to bridge rail, bridge deck and path surface along with associated linear foot and square foot cost that are also summarized herein.

Alternatives

Discussion of the west connection:

Based on available information there appears to be two primary access points to the path from the west:

The first is at or near the intersection of Pine Grove Avenue and the abandoned railbed, northeasterly along the abandoned railbed for approximately 800 feet behind seventeen residential properties before intersecting with property owned by the City of Newton. This option presents several challenges including the restricted width where the abandoned railbed intersects with Pine Grove Ave and the need for a land taking and/or easement from either the Leo J Martin property or 81 Pine Grove Ave property; and known opposition from several property owners abutting the abandoned railbed. In addition, the abandoned railbed property is currently owned by the Boston & Albany Railroad and will require either a land taking or long-term lease (i.e. typically 99 years) to utilize this corridor for a multi-use path.

The second is the end of Clearwater Road that is currently a private way beginning at the intersection with Deforest Road to a point approximately 100 feet toward the SHLO. This connection presents several advantages including the fact it is paved and already providing access for Algonquin Gas to maintain their 24-inch gas line despite the fact it is a private way and supports two residential driveways; it also provides safe access to the adjacent neighborhood via several low volume, low speed roads that connect to Clearwater Road; only impacts two residential properties as opposed to seventeen along the abandoned railbed; and it is already being used as the primary access over I-95 and the I-90 Connector/Access Road by bicyclists and pedestrians.

The section along the property owned by the City of Newton that contains the existing gas main maintains a minimum clear width of approximately 20-feet with topography that could support a multi-use path with relatively minor upgrades including some type of privacy screening along the residential properties to the west.

The location where the existing abandoned railbed intersects the Newton property is an ideal location for a common 'hub' that could support several connections including the segment from Clearwater Road and along the Newton property, the segment over the two bridges to the east, the segment to the west providing a connection to the Leo J. Martin golf course, and the segment to the north providing a connection to an existing walking path.

Based on existing conditions, several site visits and discussions with project stakeholders including the RGWG, the following is recommended:

- The path be accessed from the end of Clearwater Road, along property owned by the City of Newton and currently being leased to Algonquin Gas as a hot mix asphalt surface (12 feet wide) to a point where it intersects the abandoned railbed from the west via a possible future paved path, connect to the existing trail system via a stairway to a lower landing and to the east via a hot mix asphalt surface to the existing bridge over I-95;
- The City coordinate with the property owner of 110 Clearwater Road and 8 Deforest Road to implement specific roadway upgrades including but not limited to the installation of new granite curb, reconstructing existing driveways, pavement milling and overlay, installation of new signs, loam and seed and other miscellaneous items of work to provide a safe and attractive gateway to the path;
- The City study the need for new parking restrictions along Deforest Road, the public portion of Clearwater Road as well as the private portion of Clearwater Road;
- The City investigate the need for street lights along the private way portion of Clearwater Road and if deemed necessary the type of lighting that will be acceptable by the two resident property owners located at 110 Clearwater Road and 8 Deforest Road respectively;
- It is not recommended the path be lighted at this time but access to the trail be restricted from dusk to dawn.

#### Discussion of the bridge over I-95 & median:

As BSC was only contracted to perform a visual inspection of the existing bridge structure over I-95, it is recommended a complete inspection of the bridge structure be performed and a rating report prepared for this structure prior to any final designs for improvements to the existing structure are developed or implemented. It is recommended the path access the bridge from the west as a hot mix asphalt surface (10 feet wide) to the western abutment of the existing bridge over I-95. In addition, it is recommended the existing stone ballast be removed and a new independent deck/rail system be designed based on a bridge rating assessment that is compliant with current ADA/AAB standards and approved by MassDOT.

It is recommended the path continue from the east abutment of the existing bridge structure over I-95 to the west abutment of the existing bridge structure over the I-90 Connector/Access Road as a hot mix asphalt surface (12 feet wide). It is also recommended an 8-foot high chain link fence be installed along either side of this portion of the path at an offset approved by MassDOT that will prevent user access northerly/southerly along the median yet not detract from the aesthetic appearance of the path.

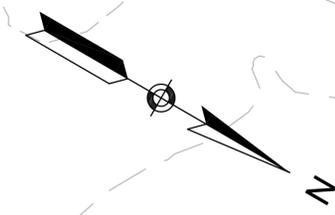
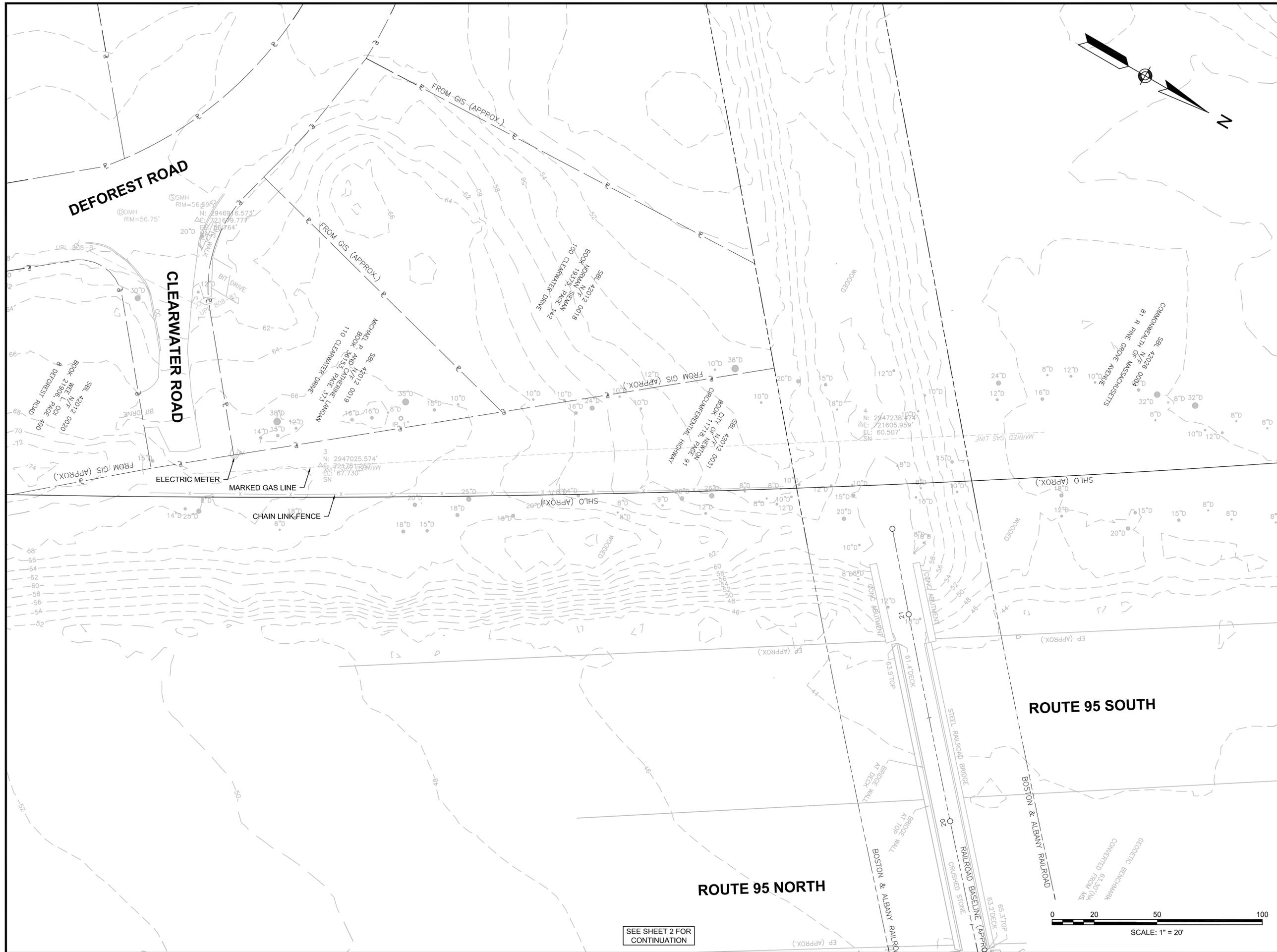
#### Discussion of the bridge over I-90 Connector/Access Road, Pony Truss Trail & future Riverside Development:

As BSC was only contracted to perform a visual inspection of the existing bridge structure over the I-90 Connector/Access Road, it is recommended a complete inspection of the bridge structure be performed and a rating report prepared for this structure prior to any final designs for improvements to the existing structure are developed or implemented. However, it is recommended the existing stone ballast be removed and a new independent deck system be designed based on a bridge rating assessment and the existing steel railing be replaced with a new rail that is compliant with current ADA/AAB standards and approved by MassDOT.

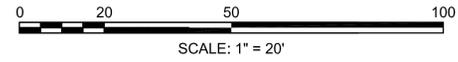
It is recommended a new hot mix asphalt path connect the east end of the bridge structure to the Pony Truss Trail to the north and a new stairway provide a connection to the Service Road. The path will require a retaining wall at the west end to support the trail and stairway but utilize the existing topography as much as possible before connecting to the Pony Truss Trail. Similarly, it is recommended a new hot mix asphalt path connect the east end of the bridge to the existing Service Road and eventually the Riverside Development Project currently being planned and permitted. This connection will require a retaining wall, need to comply with the latest ADA/AAB standards and approval by MassDOT.

## APPENDICES

## EXISTING CONDITIONS



SEE SHEET 2 FOR CONTINUATION



WILLIAM PAILE  
PROFESSIONAL ENGINEER

DATE

**TWO BRIDGES  
RIVERSIDE TRAIL  
FEASIBILITY STUDY**

IN  
NEWTON  
MASSACHUSETTS  
MIDDLESEX COUNTY

EXISTING  
CONDITIONS

MAY, 2018

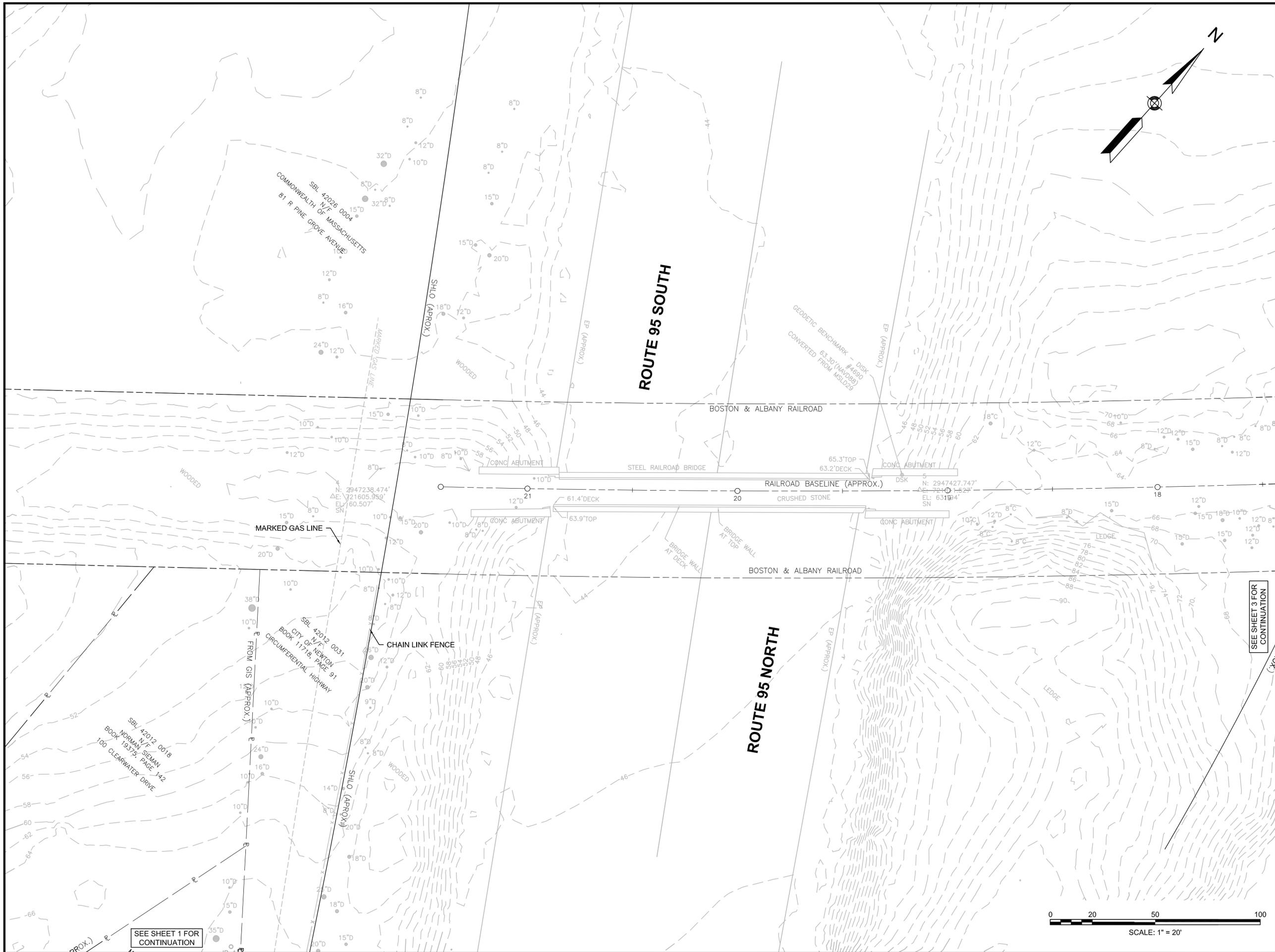
REVISIONS:

NO.	DATE	DESC.

PREPARED FOR:  
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**BSC GROUP**  
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617 896 4300

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SCALE: SEE PLAN



WILLIAM PAILLE  
PROFESSIONAL ENGINEER

DATE

**TWO BRIDGES  
RIVERSIDE TRAIL  
FEASIBILITY STUDY**

IN  
NEWTON  
MASSACHUSETTS  
MIDDLESEX COUNTY

**EXISTING  
CONDITIONS**

MAY, 2018

REVISIONS:

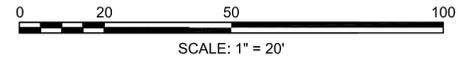
NO.	DATE	DESC.

PREPARED FOR:  
A GREENER GREATER BOSTON, INC.  
10 LAUREL AVE, SUITE 200  
WELLESLEY, MA 02481

**BSC GROUP**  
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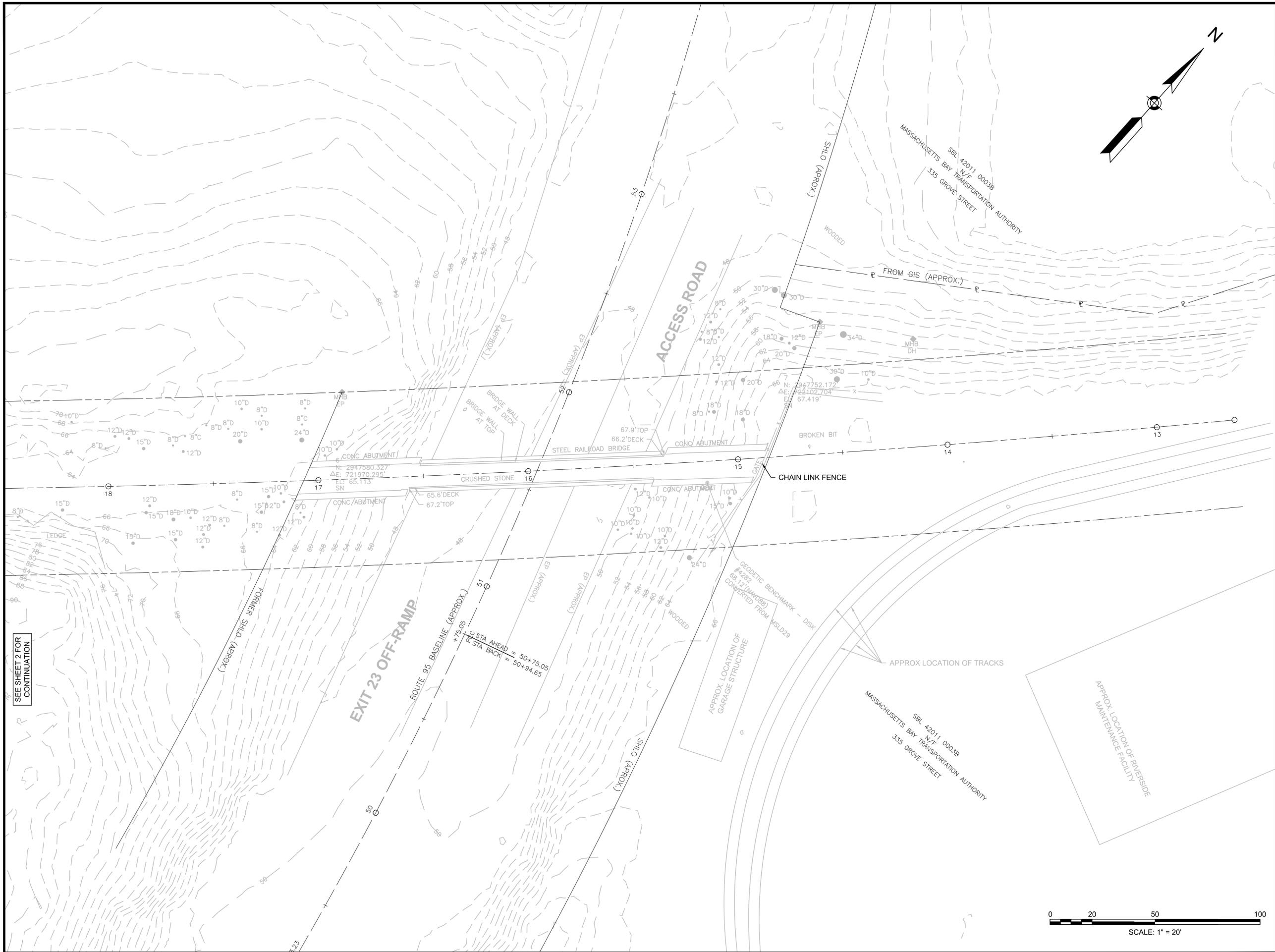
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JOB. NO: 28376.00



SEE SHEET 1 FOR  
CONTINUATION

SEE SHEET 3 FOR  
CONTINUATION



SEE SHEET 2 FOR CONTINUATION

WILLIAM PAILLE  
PROFESSIONAL ENGINEER

DATE

**TWO BRIDGES  
RIVERSIDE TRAIL  
FEASIBILITY STUDY**

IN  
NEWTON  
MASSACHUSETTS  
MIDDLESEX COUNTY

EXISTING  
CONDITIONS

MAY, 2018

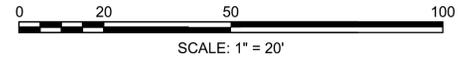
REVISIONS:

NO.	DATE	DESC.

PREPARED FOR:  
A GREENER GREATER BOSTON, INC.  
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SCALE: SEE PLAN



## TWO BRIDGES STRUCTURAL ASSESSMENT

**To:** Bill Paille **Date:** November 23, 2018  
**From:** Shih-Yung Chen **Project. No.** 28376.00  
**Re:** Two Bridges Feasibility Study – Two Bridges Site Walk

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**General Remarks:**

Two existing railroad bridges, Bridge No. N-12-061 (891) RR CSX/MBTA over Service Road and Bridge No. N-12-062 (892) RR CSX/MBTA over I 95/ST128, were visited by me on April 26, 2018. There were existing plans available for both bridges. The railroad is abandoned with railroad tracks removed and ballast remaining on topside of the bridge. The purpose of this site walk was to observe the condition of the bridges from a safe vantage point (i.e. standing on top of the bridge). No hand-on or in-depth inspection or measurements of the bottom of the structures, the abutments and the center piers were performed during this visit.

**Bridge Description:**

## 1. Bridge No. N-12-061 (891) RR CSX/MBTA over Service Road

The bridge is a two-span railroad through girder structure. East Span is over I-95 ramp and West Span is over service road. Refer to photos 1 & 2 and sketches 1 & 3 respectively for views, bridge framing plan and typical cross section.

## 2. Bridge No. N-12-062 (892) RR CSX/MBTA over I 95/ST128

The bridge is a two-span railroad through girder structure. East Span is over north bound of I-95 and West Span is over south bound of I-95. Refer to photos 3 & 4 and sketches 2 & 4 respectively for bridge framing plan and typical cross section.

**Photos and Observations:**

Refer to photos 1 thru 12 for bridge features and deficiencies observed.

It appears that both bridges were constructed according to the existing plans with the following exceptions:

1. The railroad tracks were removed with ballast remaining on topside of bridge structure (Refer to sketches 3 & 4).
2. The brick protective courses for bridge no. N-12-061 (891) were constructed differently from the existing plan (Refer to photo 6 and sketch 3).

cc: File



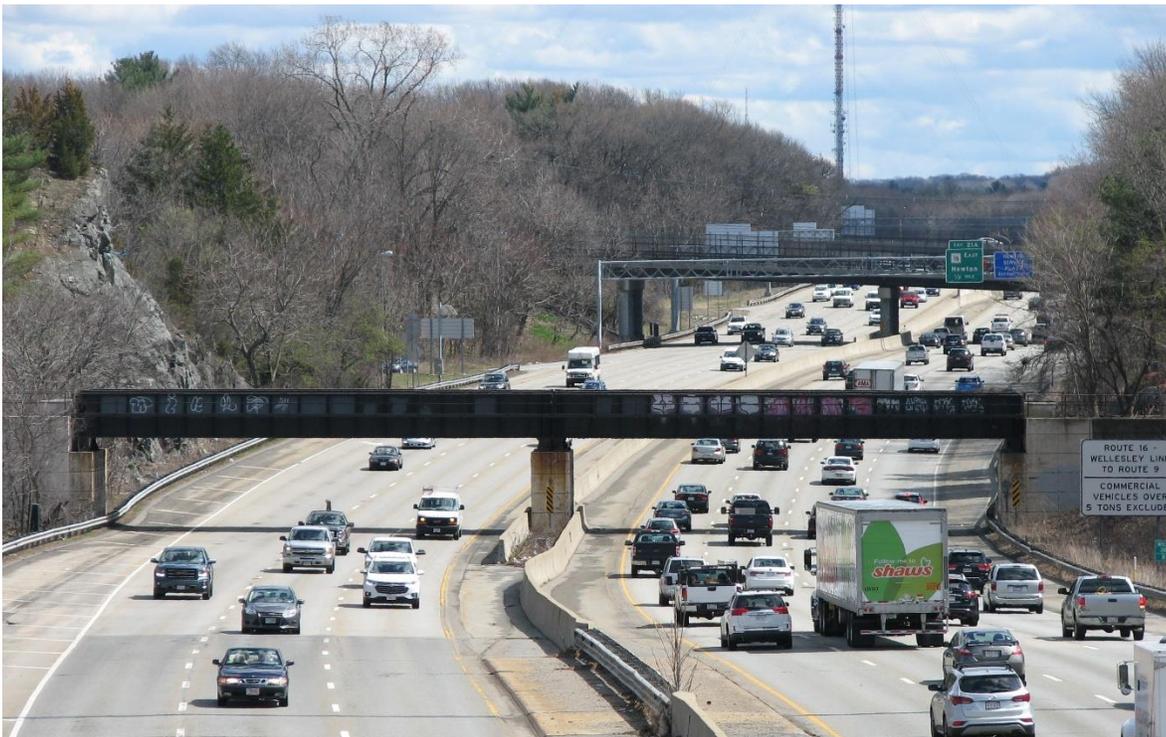
**Photo 1 – Bridge No. N-12-061 (891) South Elevation**



**Photo 2 – Bridge No. N-12-061 (891) North Elevation**



**Photo 3 – Bridge No. N-12-062 (892) South Elevation**



**Photo 4 – Bridge No. N-12-062 (892) North Elevation**



**Photo 5– Bridge No. N-12-061 (891) – Top of Bridge, Looking East  
Trees and Vegetation Overgrown at West Wingwalls**



**Photo 6 – Bridge No. N-12-061 (891) – Typical Top of Bridge, Looking East**



**Photo 7 – Bridge No. N-12-061 (891) – Several Bridge Rail Posts Show Section Loss**



**Photo 8 – Bridge No. N-12-061 (891) – Numerous Cracks at South Side of Brick Protective Course**



**Photo 9 – Bridge No. N-12-062 (892) – Top of Bridge, Looking East  
Trees and Vegetation Overgrown at West Wingwalls**



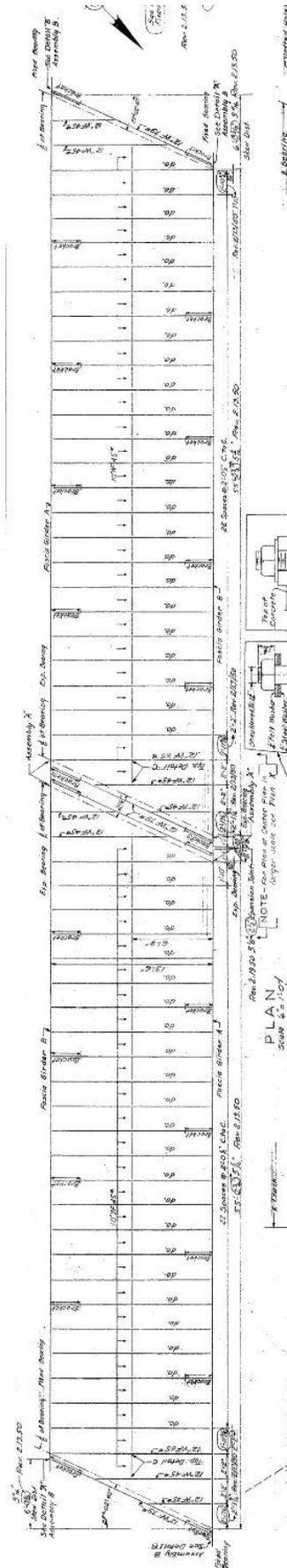
**Photo 10 – Bridge No. N-12-062 (892) – Typical Top of Bridge, Looking East**



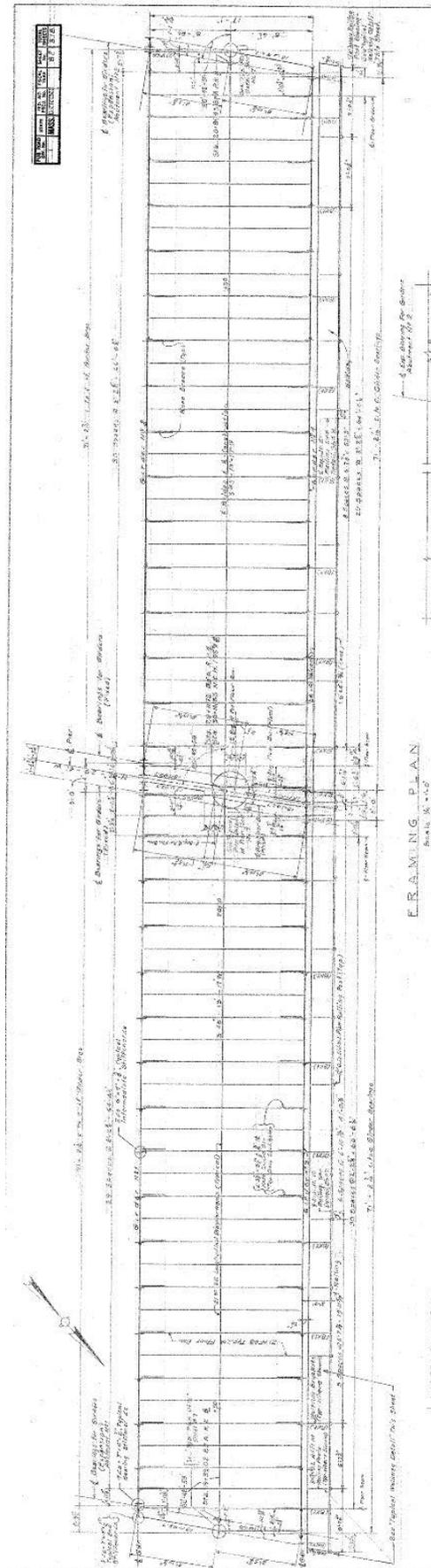
**Photo 11 – Bridge No. N-12-062 (892) – Typical Peeling Paint, Surface Rust and Graffiti at Random Locations**



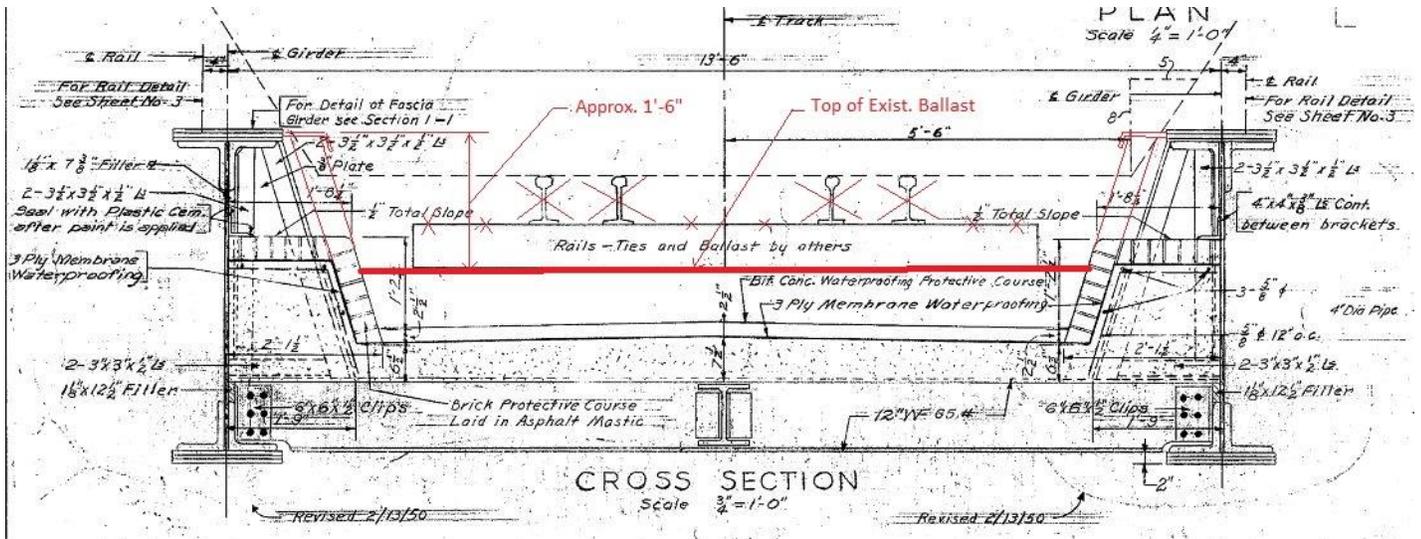
**Photo 12 – Bridge No. N-12-062 (892) – Typical Surface Rust at Girder and Floorbeam Connection**



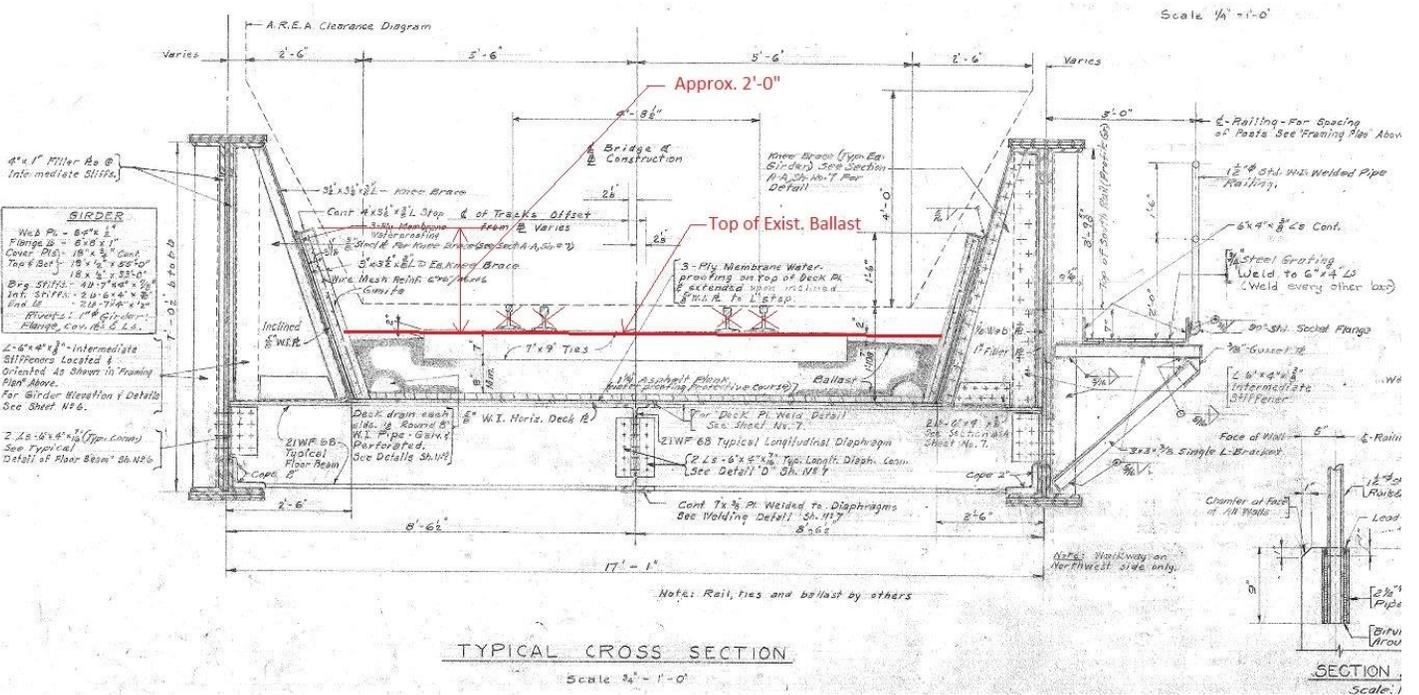
**Sketch 1-Bridge No. N-12-061 (891) Framing Plan**



**Sketch 2—Bridge No. N-12-062 (892) Framing Plan**



**Sketch 3 – Bridge No. N-12-061 (891) Typical Cross Section**



**Sketch 4 – Bridge No. N-12-062 (892) Typical Cross Section**

## ALTERNATIVES



WEST

WILLIAM PAILLE  
PROFESSIONAL ENGINEER

DATE

**TWO BRIDGES  
RIVERSIDE TRAIL  
FEASIBILITY STUDY**

IN  
NEWTON  
MASSACHUSETTS  
MIDDLESEX COUNTY

DECEMBER 2018

REVISIONS:

NO.	DATE	DESC.

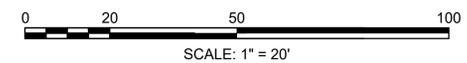
PREPARED FOR:  
A GREENER GREATER BOSTON, INC.  
10 LAUREL AVE, SUITE 200  
WELLESLEY, MA 02481

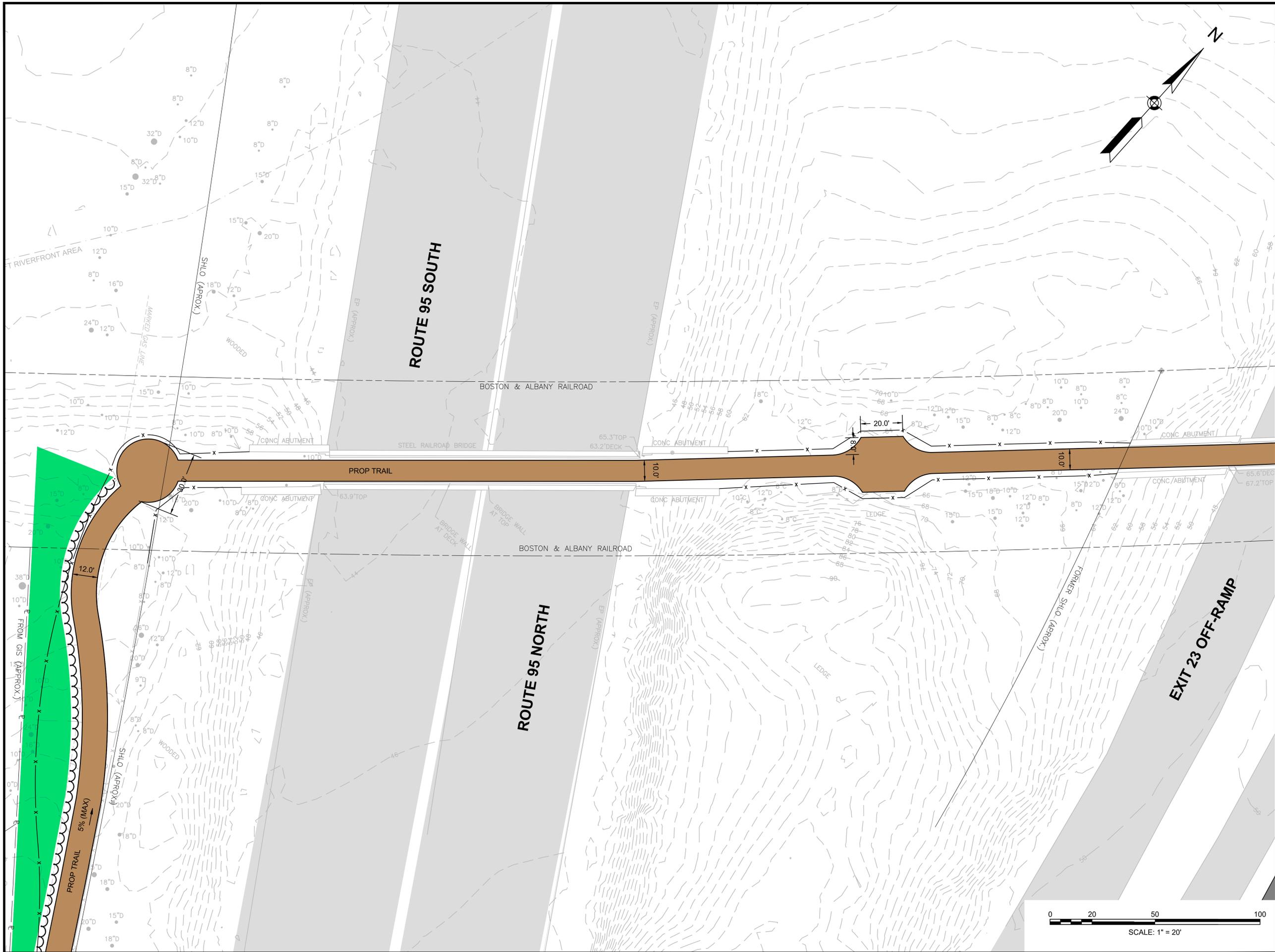


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02127  
617 896 4300

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DWG.:  
JOB. NO: 28376.00 SHEET OF 3





# OVER ROUTE 95

WILLIAM PAILLE  
PROFESSIONAL ENGINEER DATE

## TWO BRIDGES RIVERSIDE TRAIL FEASIBILITY STUDY

IN  
NEWTON  
MASSACHUSETTS  
MIDDLESEX COUNTY

DECEMBER 2018

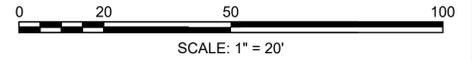
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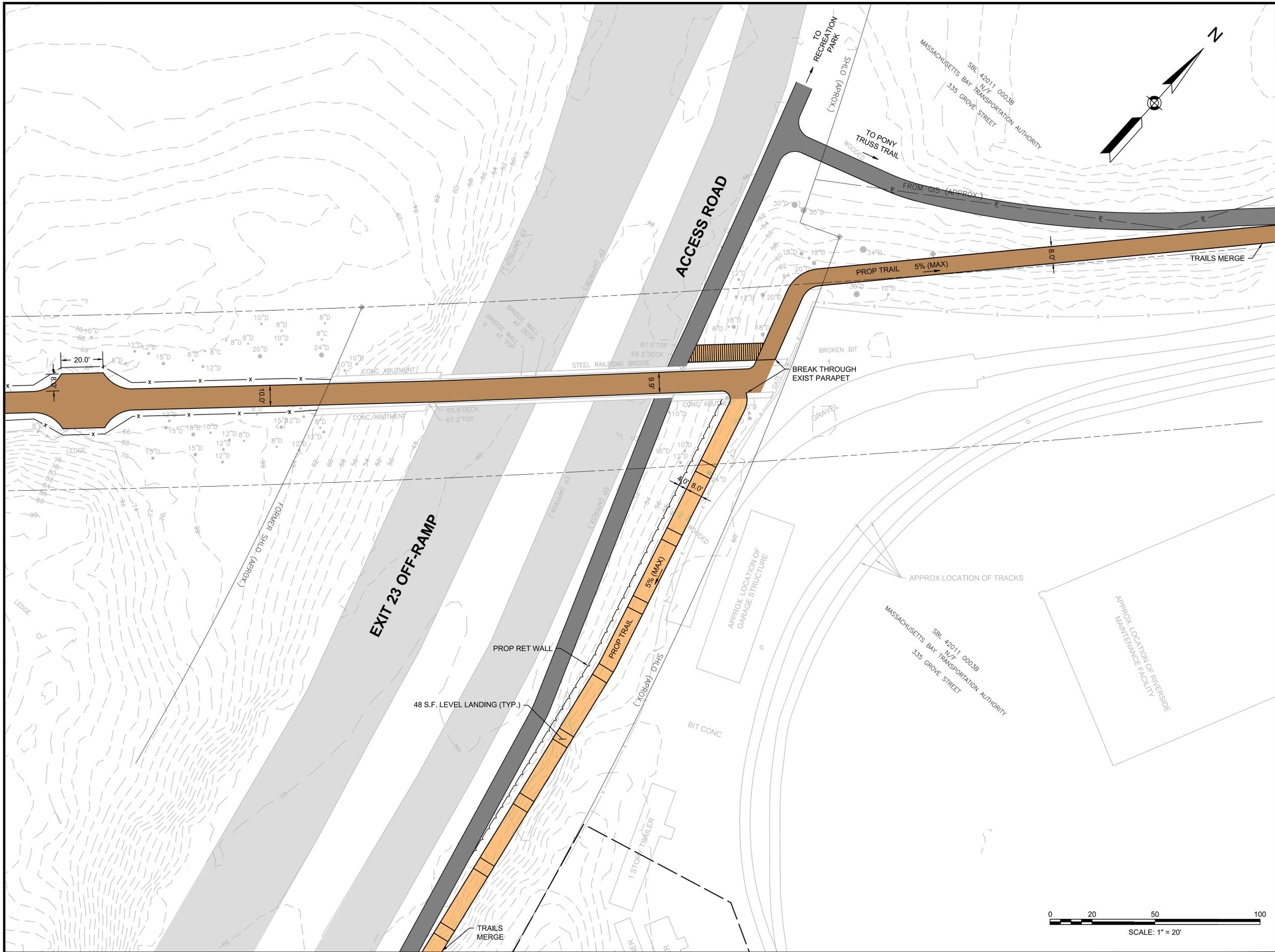
NO.	DATE	DESC.

PREPARED FOR:  
A GREENER GREATER BOSTON, INC.  
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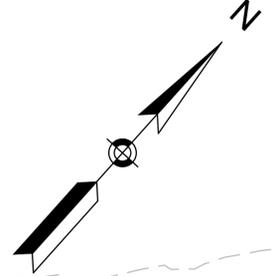
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EAST



WILLIAM PAILLE  
PROFESSIONAL ENGINEER

DATE

**TWO BRIDGES  
RIVERSIDE TRAIL  
FEASIBILITY STUDY**

IN  
NEWTON  
MASSACHUSETTS  
MIDDLESEX COUNTY

DECEMBER 2018

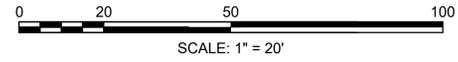
REVISIONS:

NO.	DATE	DESC.

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**MATERIAL COMPARISON MATRIX  
& RAIL/SURFACE OPTIONS**

## MATERIAL COMPARISON MATRIX

Rail Options				
Option	Unit Cost	Typical Application	Remarks	Sample Image
Timber Rail Fence	\$5/Lnft	Along multi-use, non-motorized trails with slopes steeper than 3:1	Timber rail fence is recommended at bridge approaches and along both sides of trail between bridge structure over I-95 & I-90 Connector	
Steel/Aluminum Rail*	\$250/Lnft	Along top of retaining walls or bridge deck used for multi-use, non-motorized trails where there is proper separation (as required) between vehicles and trail users	As the existing bridge over I-95 does not currently have a rail system, MassDOT may not allow a new rail system to be attached to the existing structure. As the existing bridge over the I-90 Connector road currently has a rail system, MassDOT is likely to approve a similar type system	

\* Indicates rail mounted on top of existing truss to achieve minimum 54 inch height above deck

## Rail Options

Option	Unit Cost	Typical Application	Remarks	Sample Image
Steel Rail with Optional CLF*	\$300/Lnft	Along top of retaining walls or bridge deck used for multi-use, non-motorized trails where there is proper separation (as required) between vehicles and trail users	As the existing bridge over I-95 does not currently have a rail system, MassDOT may not allow a new rail system to be attached to the existing structure. As the existing bridge over the I-90 Connector road currently has a rail system, MassDOT is likely to approve a similar type system	
Pressure Treated Wood	\$1.50/Sqft	On structures over rivers or inactive roads or with a drainage system that can redirect surface runoff off the structure	A complete inspection of both bridges is recommended to determine if a pressure treated wood deck system is appropriate	

\* Indicates rail mounted on top of existing truss to achieve minimum 54 inch height above deck

## Rail Options

Rail Options				
Option	Unit Cost	Typical Application	Remarks	Sample Image
Hot Mix Asphalt	\$2.5/Sqft	On structures over existing active roads where surface runoff needs to be directed off the structure	Although not preferred or recommended, a complete inspection of both bridges is recommended to determine if a hot mix asphalt surface is required	
Prefabricated Aluminum Panel	\$15/Sqft	Alternative on structures over existing active roads where surface runoff needs to be directed off the structure and when lightweight material is desired. Also can include a rail system and facilitate/expedite construction	A complete inspection of both bridges is recommended to determine if a prefabricated aluminum panel system is appropriate.	

## Rail Options

Option	Unit Cost	Typical Application	Remarks	Sample Image
Open Steel Grate	\$100/Sqft	Alternative on structures with a drainage system that can redirect surface runoff off the structure, and with an alternative rail system and debris catchment system	A complete inspection of both bridges is recommended to determine if an open steel grate system is appropriate.	
Hot Mix Asphalt	\$3/Sqft	Multi-use, non-motorized trails accommodating that need to comply with ADA/AAB	As the proposed trail will serve all non-motorized modes and need to comply with ADA/AAB standards the use of hot mix asphalt is recommended except over the bridges	

## Rail Options

Option	Unit Cost	Typical Application	Remarks	Sample Image
Porous Hot Mix Asphalt	\$12/Sqft	Multi-use, non-motorized trails open during winter months or along environmental resource areas	Although the use of porous hot mix asphalt is desired, it will be the decision of the State (i.e. MassDOT and/or DCR)	
Compacted Gravel	\$30/Sqft	Multi-use, non-motorized trails that do not need to comply with ADA/AAB	As the proposed trail will serve all non-motorized modes and need to comply with ADA/AAB standards the use of compacted gravel is not recommended	

## PRELIMINARY COST ESTIMATE

**Item List and Cost Estimate  
Riverside Greenway Conceptual Design Study**

Item	Unit	Description	Unit Price	Estimated Total Cost															
				Alternative No. 1 West Connection				Alternative No. 2 Bridge over I-95 & Median				Alternative No. 3 East Connector				Alternative No. 3A		Alternative No. 3B	
				Deforest Rd. Link		Pine Grove Path		Bridge over I-90 Connector/Access Road		Pony Truss Connection		Riverside Connection							
		Quantity	Est. Cost	Quantity	Est. Cost	Quantity	Est. Cost	w/Rail Option 1	w/Rail Option 2	Quantity	Est. Cost	w/Rail Option 1	w/Rail Option 2	Quantity	Est. Total*	Quantity	Est. Total*		
102.52	FT	TEMPORARY TREE PROTECTION FENCE	\$10.00	0	\$0.00	1,700	\$17,000.00	20	\$200.00			0	\$0.00			20	\$200.00	0	\$0.00
103.	EA	TREE REMOVED - DIAMETER UNDER 24 INCHES	\$1,100.00	0	\$0.00	50	\$55,000.00	10	\$11,000.00			0	\$0.00			5	\$5,500.00	0	\$0.00
120.1	CY	UNCLASSIFIED EXCAVATION	\$30.00	125	\$3,750.00	790	\$23,700.00	250	\$7,500.00			50	\$1,500.00			150	\$4,500.00	150	\$4,500.00
129.	SY	PAVEMENT MILLING	\$6.00	300	\$1,800.00	0	\$0.00	0	\$0.00			0	\$0.00			0	\$0.00	0	\$0.00
141.1	CY	TEST PIT FOR EXPLORATION	\$85.00	450	\$38,250.00	0	\$0.00	0	\$0.00			0	\$0.00			0	\$0.00	0	\$0.00
150.	CY	ORDINARY BORROW	\$30.00	50	\$1,500.00	300	\$9,000.00	0	\$0.00			0	\$0.00			0	\$0.00	950	\$28,500.00
170.	SY	FINE GRADING AND COMPACTING - SUBGRADE AREA	\$5.00	270	\$1,350.00	1,730	\$8,650.00	750	\$3,750.00			0	\$0.00			375	\$1,875.00	375	\$1,875.00
402.	CY	DENSE GRADED CRUSHED STONE FOR SUB-BASE	\$70.00	60	\$4,200.00	390	\$27,300.00	165	\$11,550.00			0	\$0.00			80	\$5,600.00	85	\$5,950.00
460.	TON	HOT MIX ASPHALT	\$110.00	10	\$1,100.00	65	\$7,150.00	135	\$14,850.00			0	\$0.00			80	\$8,800.00	85	\$9,350.00
472.	TON	HOT MIX ASPHALT FOR MISCELLANEOUS WORK	\$200.00	10	\$2,000.00	0	\$0.00	0	\$0.00			0	\$0.00			0	\$0.00	10	\$2,000.00
482.3	FT	SAWCUTTING ASPHALT PAVEMENT	\$2.00	50	\$100.00	0	\$0.00	0	\$0.00			0	\$0.00			0	\$0.00	0	\$0.00
504.	FT	GRANITE CURB TYPE VA4 - STRAIGHT	\$42.00	200	\$8,400.00	0	\$0.00	0	\$0.00			0	\$0.00			0	\$0.00	0	\$0.00
504.1	FT	GRANITE CURB TYPE VA4 - CURVED	\$50.00	50	\$2,500.00	0	\$0.00	0	\$0.00			0	\$0.00			0	\$0.00	0	\$0.00
645.096	FT	96 INCH CHAIN LINK FENCE (PIPE TOP RAIL) (LINE POST OPTION)	\$63.00	100	\$6,300.00	0	\$0.00	800	\$50,400.00			0	\$0.00			0	\$0.00	0	\$0.00
654.096	FT	96 INCH CHAIN LINK FENCE FABRIC	\$30.00	100	\$3,000.00	0	\$0.00	800	\$24,000.00			0	\$0.00			0	\$0.00	0	\$0.00
656.	FT	TIMBER RAIL FENCE	\$50.00	0	\$0.00	150	\$7,500.00	800	\$40,000.00			0	\$0.00			300	\$15,000.00		\$0.00
685.	CY	STONE MASONRY WALL IN CEMENT MORTAR	\$685.00	0	\$0.00	0	\$0.00	0	\$0.00			0	\$0.00			100	\$68,500.00	350	\$239,750.00
707.8	EA	STEEL BOLLARD	\$1,300.00	2	\$2,600.00	2	\$2,600.00	0	\$0.00			2	\$2,600.00			2	\$2,600.00	2	\$2,600.00
748.	LS	MOBILIZATION	\$25,000.00	1	\$25,000.00	1	\$25,000.00	1	\$25,000.00			1	\$25,000.00			0	\$0.00	0	\$0.00
751.	CY	LOAM BORROW (PLANTING SOIL)	\$50.00	95	\$4,750.00	605	\$30,250.00	85	\$4,250.00			0	\$0.00			0	\$0.00	40	\$2,000.00
765.	SY	SEEDING	\$2.00	535	\$1,070.00	3,465	\$6,930.00	500	\$1,000.00			0	\$0.00			0	\$0.00	250	\$500.00
867.104	FT	4 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)	\$1.00	200	\$200.00	1,300	\$1,300.00	400	\$400.00			0	\$0.00			250	\$250.00	350	\$350.00
<b>SUBTOTAL</b>					\$107,870.00		\$221,380.00		\$193,900.00				\$29,100.00				\$112,825.00		\$297,375.00
Stairway System (Concrete footings with PT Lumber):					\$25,000.00		\$0.00		\$0.00				\$25,000.00				\$0.00		\$0.00
Landscaping (Screening):					\$15,000.00		\$0.00		\$10,000.00				\$0.00				\$5,000.00		\$5,000.00
Alternative Subtotal:					\$147,870.00		\$221,380.00		\$203,900.00				\$54,100.00			<b>Add</b>	<b>\$141,390.00</b>	<b>And/Or</b>	<b>\$362,850.00</b>
<u>Bridge Deck Options:</u>																			
		HMA (\$110/Ton)	<b>Add</b>	N/A	\$0.00	N/A	\$0.00	4' x 10' x 150'	\$4,500.00			4' x 9.5' x 210'	\$6,010.00						
		Pressure Treated (\$1.50/SF)	<b>Or</b>	N/A	\$0.00	N/A	\$0.00	10' x 150'	\$2,500.00			9.5' x 210'	\$3,500.00						
		Prefabricated Aluminum Panel (\$15/SF)	<b>Or</b>	N/A	\$0.00	N/A	\$0.00	10' x 150'	\$25,000.00			9.5' x 210'	\$33,000.00						
		Open Steel Grate (\$100/SF)	<b>Or</b>	N/A	\$0.00	N/A	\$0.00	10' x 150'	\$165,000.00			9.5' x 210'	\$220,000.00						
<u>Bridge Rail Options:</u>																			
		Option 1: Steel/Aluminum (\$250/Lnft)	<b>Add</b>	N/A	\$0.00	N/A	\$0.00	150' x 2 sides		\$75,000.00		210' x 2 sides		\$105,000.00					
		Option 2: Steel with CLF (\$300/Lnft)	<b>Or</b>	N/A	\$0.00	N/A	\$0.00	150' x 2 sides			\$90,000.00	210' x 2 sides		\$126,000.00					
<b>Bridge Option Cost Summary</b>					<b>Est. Total*</b>		<b>Est. Total*</b>		<b>Subtotal</b>	<b>Est. Total*</b>	<b>Est. Total*</b>		<b>Subtotal</b>	<b>Est. Total*</b>	<b>Est. Total*</b>				
Path with HMA Bridge Deck					\$177,444.00		\$265,656.00		\$208,400.00	\$340,080.00	\$358,080.00		\$60,110.00	\$198,132.00	\$223,332.00				
Path with PT Bridge Deck					\$177,444.00		\$265,656.00		\$206,400.00	\$337,680.00	\$355,680.00		\$57,600.00	\$195,120.00	\$220,320.00				
Path with Aluminum Panel Deck					\$177,444.00		\$265,656.00		\$228,900.00	\$364,680.00	\$382,680.00		\$87,100.00	\$230,520.00	\$255,720.00				
Path with Open Steel Grate Deck					\$177,444.00		\$265,656.00		\$368,900.00	\$532,680.00	\$550,680.00		\$274,100.00	\$454,920.00	\$480,120.00				

Includes 20% Contingency

Notes:

- Costs are order-of-magnitude for construction and include major items of work only based on conceptual design and estimated quantities.
- Costs do not reflect survey, permitting, engineering, property takings/easements, bidding/advertisement or construction administration