WEST EASTON BOROUGH
NORTHAMPTON COUNTY

IN-DEPTH BRIDGE INSPECTION AND ALTERNATIVES DISCUSSION REPORT

TRESTLE BRIDGE
OVER SR 2026 (IRON STREET)
AND
TRESTLE BRIDGE
OVER SPRING STREET

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1/31/19
Date

Prepared By:

benesch
engineers · scientists · planners

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TRESTLE BRIDGE OVER SR 2026 (IRON STREET)
AND
TRESTLE BRIDGE OVER SPRING STREET

INTRODUCTION

This in-depth bridge inspection and alternatives discussion report for the trestle bridge over SR 2026 (Iron Street) and trestle bridge over Spring Street (see Location Map on the next page) is presented in accordance with our August 24, 2018 proposal. The in-depth bridge inspection focused on the condition of the bridges to determine defects which will either affect the ability of the structures to be repurposed for trail use or require repair. The in-depth bridge inspection was a close-up, hands-on inspection that included the use of access equipment (ladders), access vehicles (articulated boom lift) and sounding the timber members with a hammer to determine areas of internal decay. When hammer sounding, the timber members with areas of internal decay sound hollow. The location of significant splits in the timber members were also noted, as these are an indication of failure due to load. An in-depth inspection was not completed on the superstructure's timber ties since it was previously determined and anticipated that these members will not remain if the bridges are repurposed. A summary of the in-depth bridge inspections (including photographs) and alternatives discussion are provided, based on the inspection of the structures on October 5, 10, 16, and 18 and November 19 and 20 of 2018.

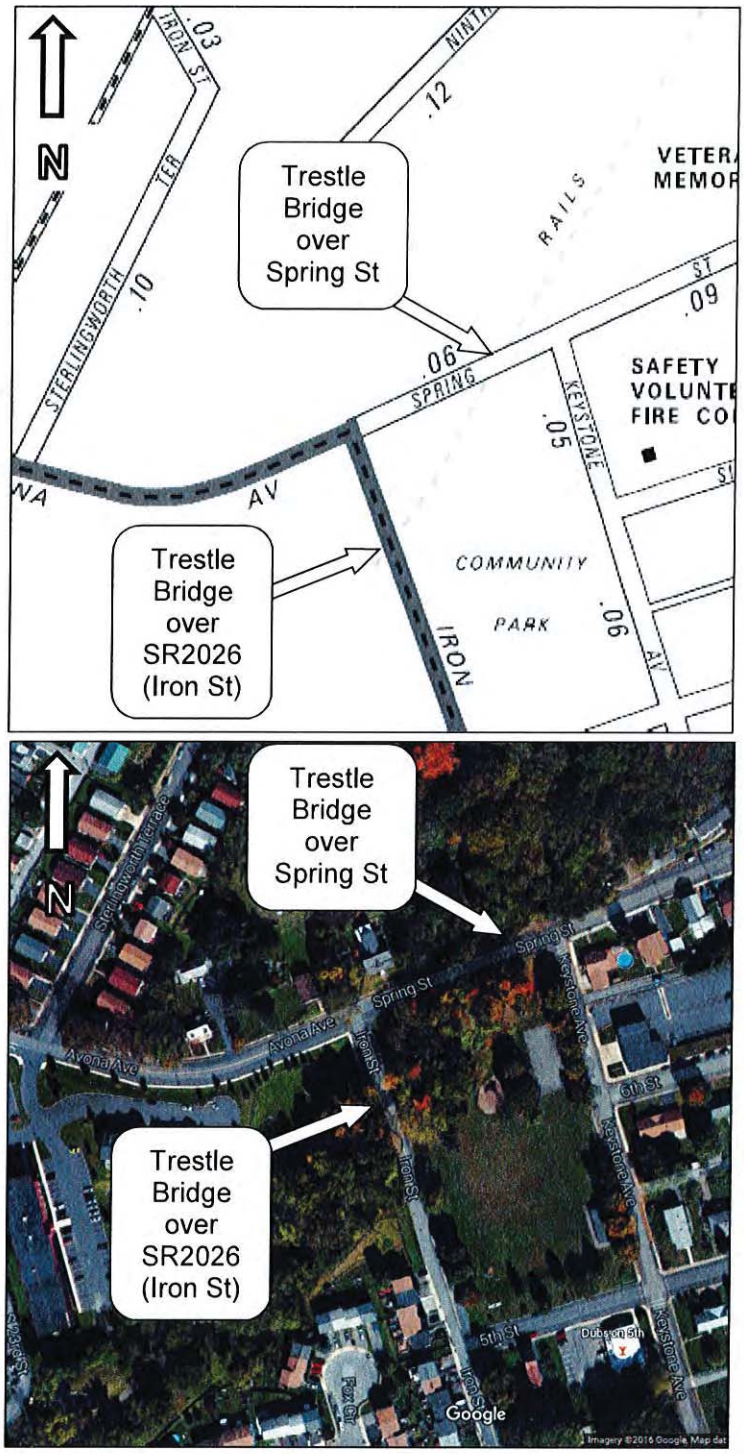

Figure 1: Location Map, West Easton Borough (PennDOT Type 5 and Google Maps)

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PROJECT LOCATION MAP: (BY OTHERS FROM LTAP REPORT)		
IRON STREET AND SPRING STREET TRESTLES		
WEST EASTON BOROUGH, NORTHAMPTON COUNTY, PENNSYLVANIA		
DATE: DEC 26, 2018	PROJECT NO. 60212.00	PREPARED BY: DSH

TRESTLE BRIDGE OVER SR 2026 (IRON STREET)
BRIDGE SKETCHES

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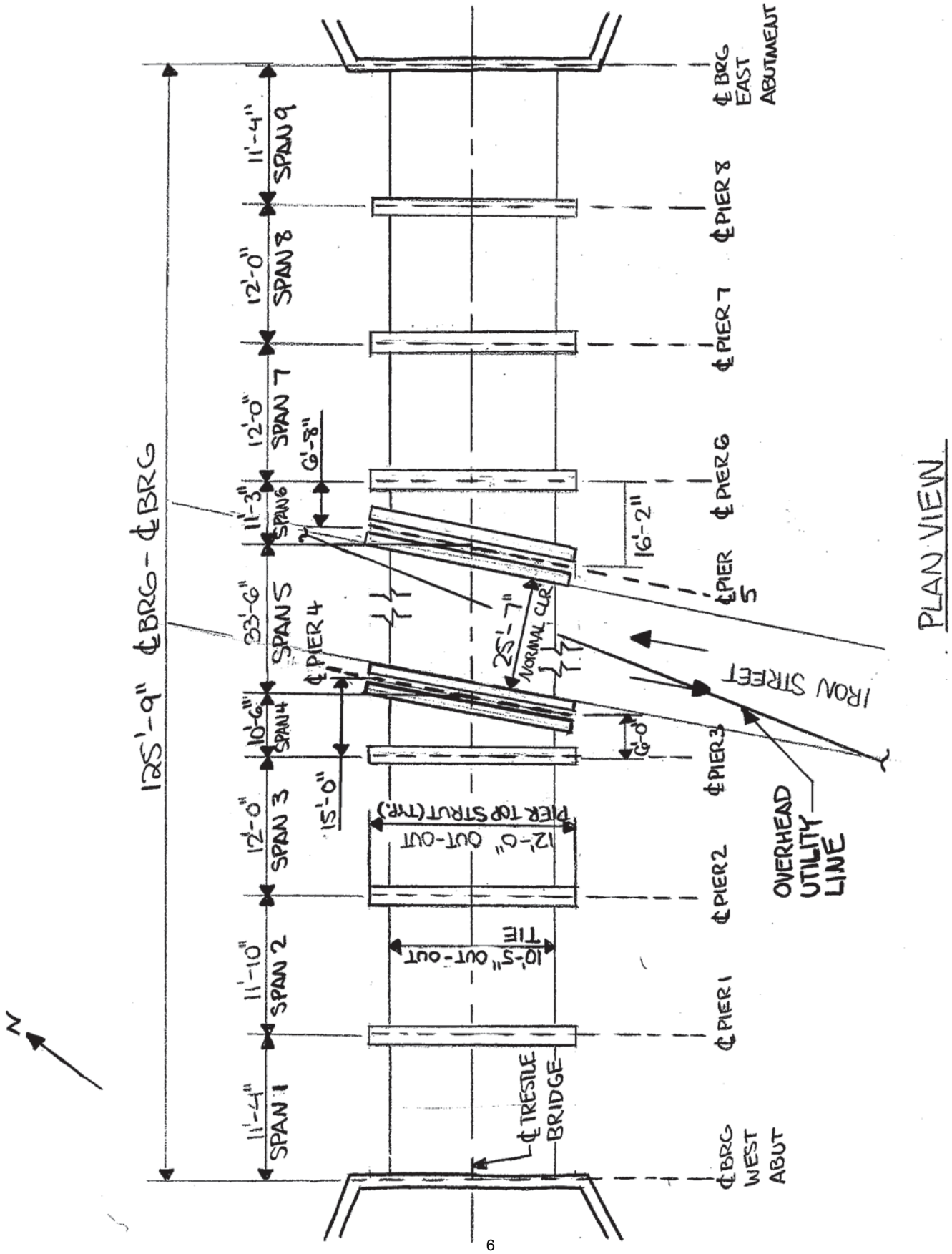
Chkd. by: BKB Date: 12/28/18 Job No. 60212.00

Project: WEST EASTON BRIDGES

Element: TRESTLE BRIDGE OVER IRON STREET



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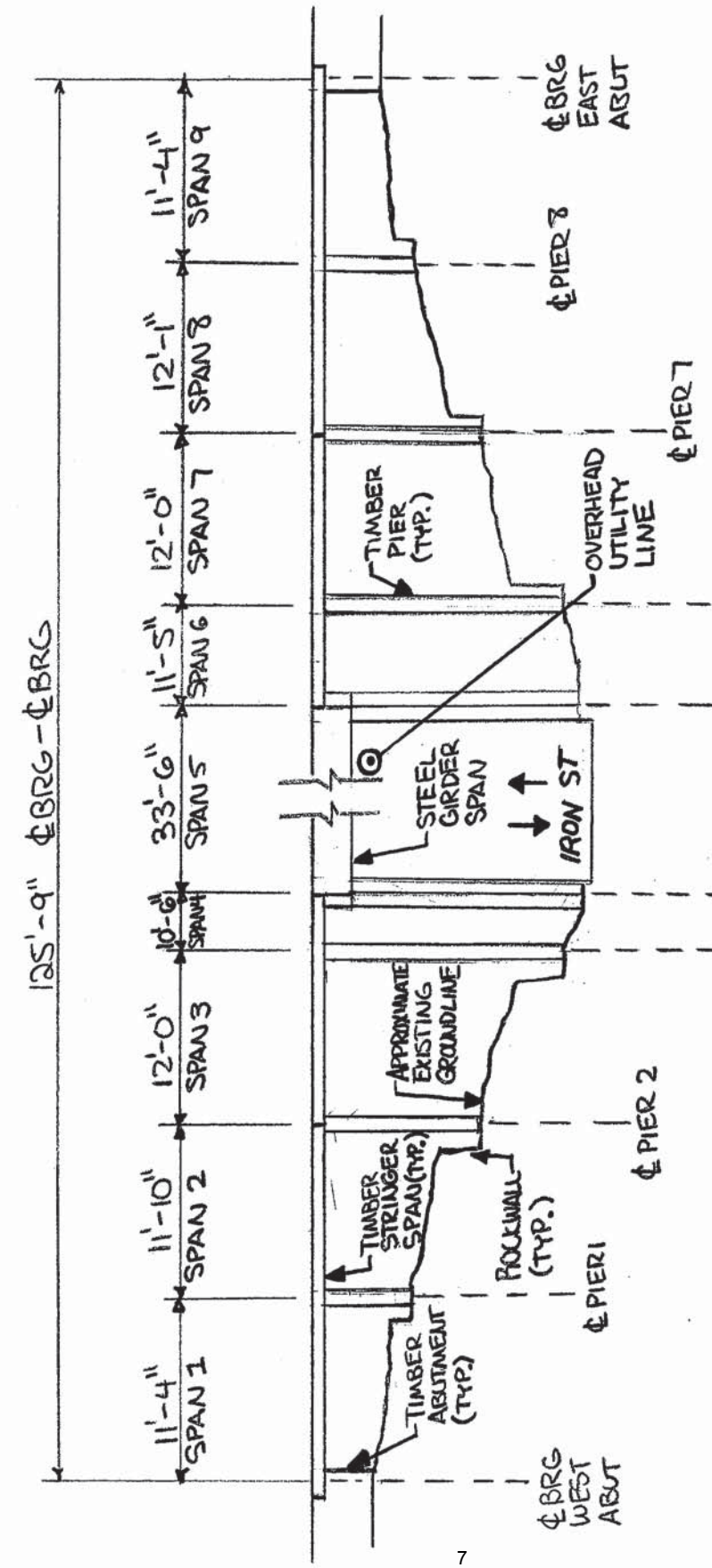
Comp. by: DSH Date: 10/11/18 Sheet ____ of ____

Chkd. by: BLB Date: 12/20/18 Job No. 60212.00

Project: WEST EASTON BRIDGES

Element: TRESTLE BRIDGE OVER IRON STREET



ELEVATION VIEW
(LOOKING NORTH)

NOTES:
1) ROCKWALLS LOCATED BEHIND PIERS 1,2,3 AND 4,5,6.
2) ELEVATION VIEW SHOWN AT ℄ TRESTLE BRIDGE.

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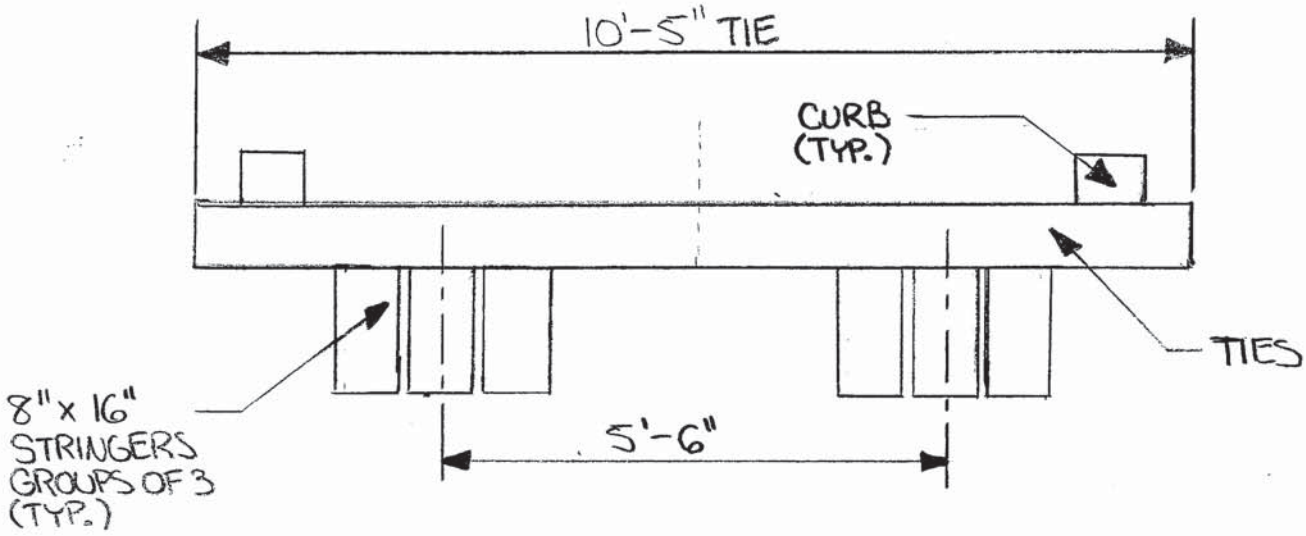
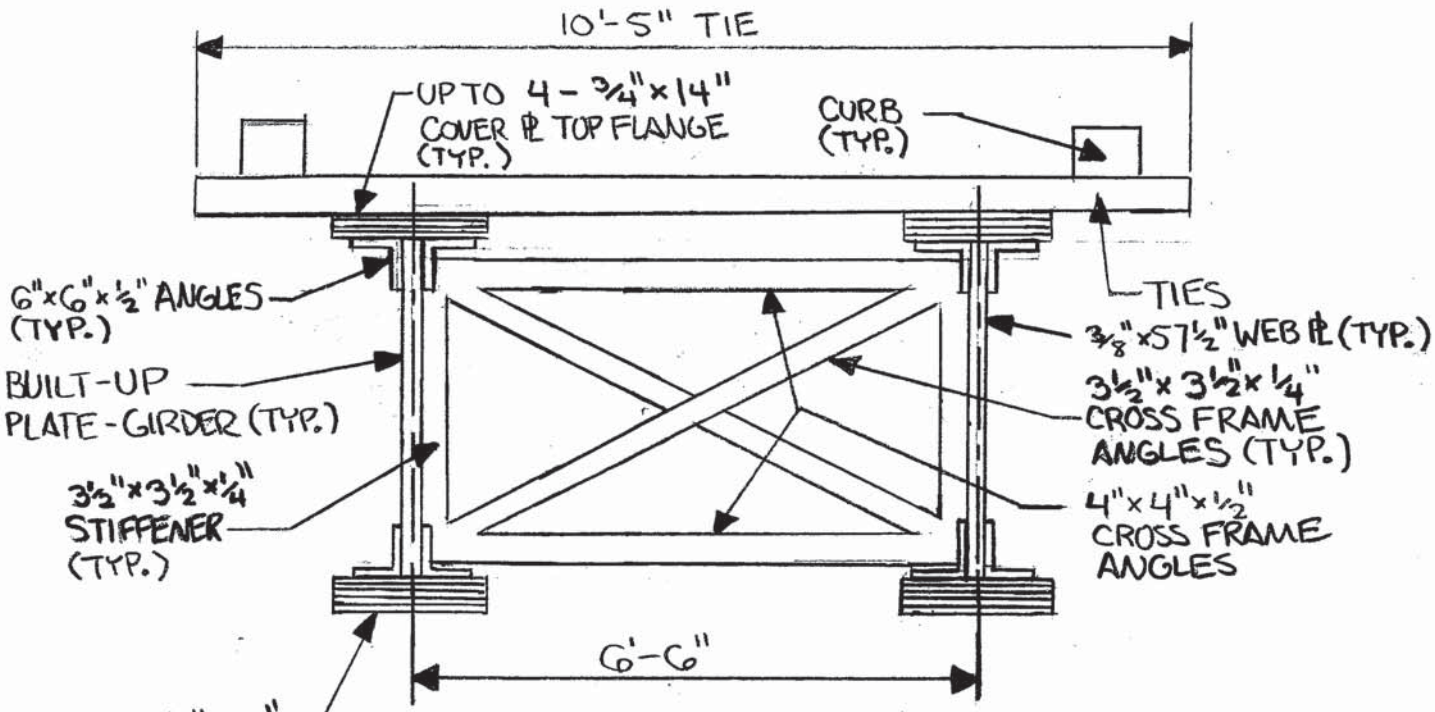
Element: TRESTLE BRIDGE OVER IRON STREET



TYPICAL TIMBER STRINGER SPAN SECTION



TYPICAL STEEL GIRDER SECTION
(SPAN 5 ONLY)

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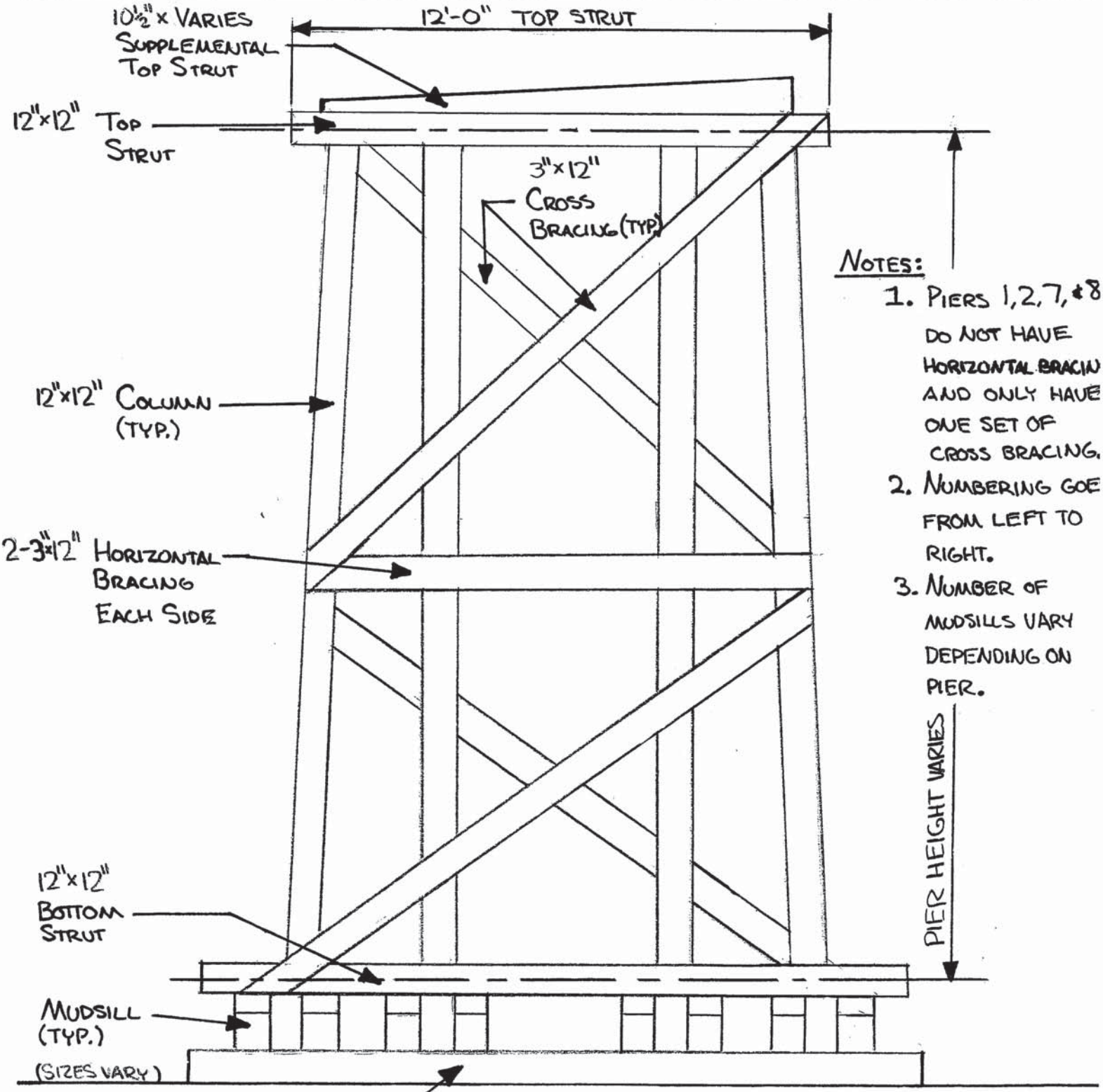
Element: TRESTLE BRIDGE OVER IRON STREET



NOTES:

1. PIERS 1, 2, 7, & 8 DO NOT HAVE HORIZONTAL BRACING AND ONLY HAVE ONE SET OF CROSS BRACING.
2. NUMBERING GOE FROM LEFT TO RIGHT.
3. NUMBER OF MUDSILLS VARY DEPENDING ON PIER.

TYPICAL APPROACH SPAN TIMBER PIER

ELEVATION VIEW

(LOOKING EAST)

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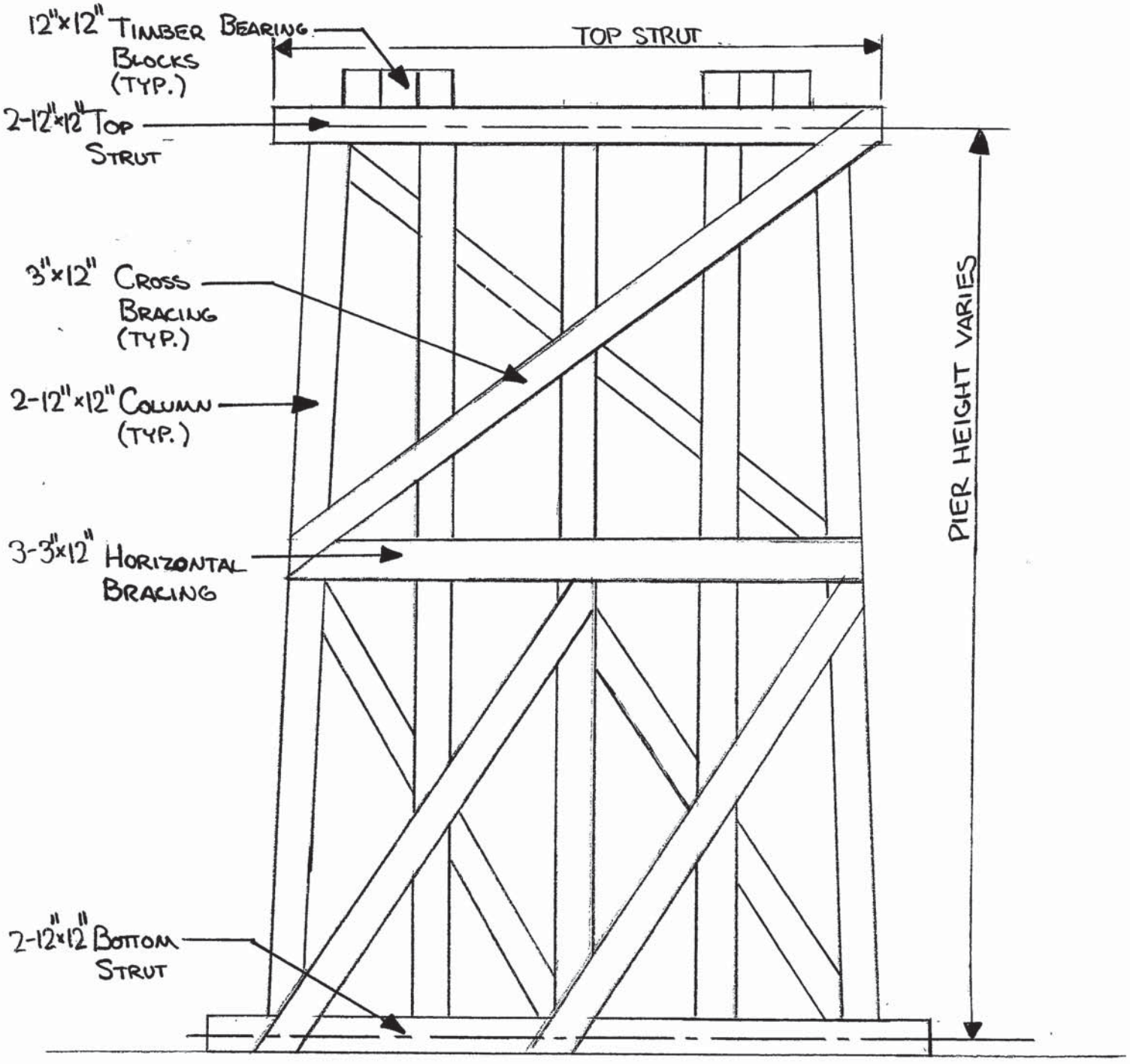
Chkd. by:	BKB	Date:	12/28/18	Job No.	60212.00
Project:	WEST EASTON BRIDGES				
Element:	TRESTLE BRIDGE OVER IRON STREET				



NOTES:
1. NUMBERING GOES FROM LEFT TO RIGHT.

TYPICAL MAIN SPAN TIMBER PIER
ELEVATION VIEW
(LOOKING EAST)

TRESTLE BRIDGE OVER SR 2026 (IRON STREET)

BRIDGE DESCRIPTION

The trestle bridge over SR 2026 (Iron Street) is a nine (9) span, 125'-9" bridge with a 10'-5" out-to-out width. The superstructure is comprised of eight (8) approach spans consisting of six (6) timber stringers and a main span (Span 5) consisting of two (2) steel built-up plate girders. The superstructure is supported by timber substructure units consisting of two (2) stub abutments with U-wings and eight (8) piers. Piers 1 thru 3 and 6 thru 8 are comprised of a timber top strut, four (4) columns, bottom strut, mudsills, and footing. Piers 4 and 5 are comprised of two (2) adjacent piers each containing bearing blocks, a top strut, five (5) columns, and bottom strut. See Photographs 1 thru 10 for General Photographs.

IN-DEPTH BRIDGE INSPECTION SUMMARY

The bridge was observed to be in an overall "imminent" failure condition. The "imminent" failure condition rating indicates that there is major deterioration or section loss present in critical structural components. The bridge overall condition was controlled by the condition of both the superstructure (timber stringers in the approach spans) and substructure (abutments).

SUPERSTRUCTURE: The superstructure was observed to be in an overall "imminent" failure condition. The overall superstructure condition was controlled by the condition of the timber stringers in the approach spans. A detailed summary of the superstructure defects observed is provided below.

Timber Ties: As previously mentioned, an in-depth inspection was not completed on the superstructure's timber ties since it was previously determined and anticipated that these members will not remain if the bridge is repurposed. However, the following general visual observations were made:

- Significant vegetation is growing along the ties. See Photographs 11 and 12.
- The ties exhibit many obvious areas with decay.
- Steel bolts are embedded/hanging from the ties.

Note that none of the steel bolts were currently observed to be in danger of falling from the structure into the roadway. However, this is a future concern with the continued decay of the ties if the structure continues to be left in place.

Timber Stringers: The timber stringers are in an overall "imminent" failure condition. The stringer defects included decay, splits and fire/fungus damage. There were numerous areas in which decay was visible and numerous areas where internal decay was present based on hammer sounding. Throughout the bridge, a minimum of two (2) up to a maximum of all six (6) stringers in a given span exhibited areas of decay. Many stringers exhibited areas of decay in multiple locations (typically adjacent to a substructure unit) within a given span and eight (8) stringers exhibited areas of decay for the full span length. There were splits in seven (7) stringer locations with five (5) of them extending the full span length. There was an isolated location in which three (3) stringers in Span 4 and four (4) stringers in Span 3 were affected by fire/fungus damage. See the Stringer Defect Summary Table for a detailed summary of the stringer defects and Photographs 13 thru 21 for representative stringer defect photographs.

Steel Superstructure: The steel superstructure is in overall fair condition (all primary structural elements are sound but have minor section loss). There were areas with open bolt/rivet holes in the built-up plate girder webs and stiffeners. There were areas with pack rust and associated bending of cover plates between the built-up plate girder top and bottom flange cover plates (most notably

along the bottom flange of Girder 2). There were areas of minor section loss to the horizontal gusset plate at top flange connection in isolated locations. See Photographs 22 thru 24.

SUBSTRUCTURE: The substructure was observed to be in an overall "imminent" failure condition. The overall substructure condition was controlled by the condition of the abutments. A detailed summary of the substructure defects observed is provided below.

Timber Abutments: The timber abutments are in an overall "imminent" failure condition. The timber transverse and longitudinal abutment members exhibited significant decay in over half of the members. These included areas of decay up to full height x full width x 4'-0" long in the transverse and longitudinal members. See Photographs 25 thru 29. Similarly, the timber transverse and longitudinal wing members exhibited significant decay in over half the members. These included areas where members were completely missing as a result of decay. See Photographs 30 thru 32.

Timber Piers: The timber piers are in an overall critical condition (advanced deterioration of primary structural elements). The timber top strut defects included decay, splits and fire/fungus damage. There were numerous areas in which decay was visible and isolated areas where internal decay was present, based on hammer sounding. Six (6) of the eight (8) top struts exhibited visible decay at the member end. Two (2) of the eight (8) top struts exhibited internal decay, based on hammer sounding. Two (2) of the eight (8) top struts exhibited splits. There was an isolated location in which one (1) top strut had been affected by fire/fungus damage. Areas of decay were observed in the supplemental top struts at Pier 1 (right end 3" high x 3" wide x 3'-2" long) and Pier 2 (left end full height x full width x 1'-0" long as well as the right end 7" high x 9" wide x 3'-0" long). See the Top Strut Defect Summary Table for a detailed summary of the top strut defects and Photographs 33 thru 40 for representative top strut defect photographs.

The timber column defects included isolated locations with decay, splits and fire/fungus damage with defects noted in five (5) out of forty four (44) columns. See the Column Defect Summary Table for a detailed summary of the column defects and Photographs 41 and 42 for representative column defect photographs.

The timber bottom strut defects included decay and splits. There were numerous areas in which decay was visible and isolated areas where internal decay was present, based on hammer sounding. Five (5) of the eight (8) bottom struts exhibited visible decay at the member end. Two (2) of the eight (8) bottom struts exhibited internal decay, based on hammer sounding, and one (1) bottom strut exhibited full length splits. See the Bottom Strut Defect Summary Table for a detailed summary of the bottom strut defects and Photographs 43 thru 46 for representative bottom strut defect photographs.

The timber mudsills exhibited significant decay in over 75% of the members. These included areas of decay up to full height x full width x 3'-0" long in the mudsills. See Photographs 47 thru 50.

The timber footings were not visible in most locations. Where the footings were visible, the top surfaces were typically soft. In addition, one area of decay was observed at the right end of the footing at Pier 1 (4" vertical x 4" wide x 6'-0" long).

The timber transverse substructure bracing defects included a split in one (1) location. The longitudinal substructure bracing defects included weathering/decay noted in three (3) locations. See Photographs 51 and 52.

MISCELLANEOUS: The fencing at each end of bridge is in generally in satisfactory condition, however it does not prohibit access onto the topside of the bridge. There were "NO TRESPASSING" signs posted on

the fencing and structure in various locations. However, it did appear that some of these signs were missing, including on the fence at the near approach.

During the bridge inspection, hornets/wasps were observed nesting in the following areas within the timber members, limiting the in-depth bridge inspection of these members:

- Within the top strut of Pier 5 above Column 4 (Far pier of the double)
- In the joint between the supplemental top strut and top strut of Pier 8. Located at midspan between Columns 2 and 3.

Overhead utility lines are located under Span 5, as shown on the bridge plan view sketch. The in-depth bridge inspection of portions of the bridge located adjacent to utilities was limited, to maintain the required clearances to utilities.

TRESTLE BRIDGE OVER SR 2026 (IRON STREET)
DEFECT SUMMARY TABLES

SR 2026 (Iron Street) Stringer Defect Summary Table

Span	Stringer	Location Along Span	Defect	Additional Location Information/Defect Description	Photograph
1	All	Bearing Areas	Decay	Bottom, Full Width x 1'-0" Long	-
1	3	Adjacent to West Abutment	Decay	Top, 1.5" Vertical x Full Width x 4'-0" Long	13
1	6	Adjacent to West Abutment	Decay	Top, 1.5" Vertical x Full Width x 4'-0" Long	13
2	All	Bearing Areas	Decay	Bottom, Full Width x 1'-0" Long	-
2	1	Adjacent to Pier 2	Split	Midheight, 4'-0 Long	-
2	3	Full Length	Decay	Bottom, 3" Vertical x Full Width x Full Length	14
2	6	Adjacent to Pier 2	Decay	Top, 2" Vertical x 5" Wide x 2'-0" Long	-
3	1	Full Length	Split	Midheight, Full Length	-
3	1	Adjacent to Pier 2	Decay	Full Height x Full Width x 3'-0" Long	15
3	1	Adjacent to Pier 3	Decay	Full Height x Full Width x 1'-0" Long	-
3	3	Adjacent to Pier 3	Decay	Full Height x Full Width x 1'-0" Long	-
3	3	Adjacent to Pier 3	Fire/Fungus Damage	Right (South) Face Over 2'-0" Length	-
3	4	Adjacent to Pier 3	Decay	Full Height x Full Width x 1'-0" Long	-
3	4	Half of Span (Far)	Split	Midheight, Half of Span	-
3	4	Adjacent to Pier 3	Fire/Fungus Damage	Bottom Over 2'-0" Length	16
3	5	Adjacent to Pier 3	Fire/Fungus Damage	Bottom Over 2'-0" Length	16
3	6	Adjacent to Pier 3	Fire/Fungus Damage	Bottom Over 2'-0" Length	16
4	1	Adjacent to Pier 4	Decay	Full Height x Full Width x 1'-0" Long	-
4	1	Full Length	Split	Midheight, Full Length	-
4	2	Adjacent to Pier 4	Decay	Bottom, Full Width x 1'-0" Long	-
4	3	Adjacent to Pier 4	Decay	Full Height x Full Width x 1'-0" Long	-
4	4	Adjacent to Pier 3	Fire/Fungus Damage	Bottom Over 2'-0" Length	17
4	4	Full Length	Split	Midheight, Full Length	18
4	5	Adjacent to Pier 3	Fire/Fungus Damage	Bottom Over 2'-0" Length	17
4	5	Adjacent to Pier 4	Decay	Bottom, Full Width x 1'-0" Long	-
4	6	Adjacent to Pier 3	Fire/Fungus Damage	Bottom Over 2'-0" Length	17
6	1	Adjacent to Pier 5	Decay	Full Height x Full Width x 1'-0" Long	-
6	3	Full Length	Decay	Top, 3" Vertical x Full Width x Full Length	-
6	3	Full Length	Decay	Bottom, 3" Vertical x Full Width x Full Length	-
6	6	Full Length	Split	Midheight, Full Length	19
7	3	Full Length	Decay	Top, 3" Vertical x Full Width x Full Length	-
7	3	Full Length	Decay	Bottom, 3" Vertical x Full Width x Full Length	-
7	4	Full Length	Decay	Top, 2" Vertical x Full Width x Full Length	-
7	5	Adjacent to Pier 7	Decay	Bottom, Full Width x 3'-0" Long	-
7	6	Full Length	Split	Midheight, Full Length	-
8	1	Adjacent to Pier 8	Decay	Bottom, Full Width x 4'-0" Long	-
8	2	Adjacent to Pier 7	Decay	Bottom, Full Width x 1'-6" Long	-
8	3	Full Length	Decay	Top, 4" Vertical x Full Width x Full Length	-
8	4	Midspan	Decay	Top, 2" Vertical x Full Width x 3'-0" Long	-
8	4	Adjacent to Pier 8	Decay	Top, 2" Vertical x Full Width x 2'-0" Long	-
8	4	Adjacent to Pier 8	Decay	Bottom, Full Width x 2'-0" Long	-
8	5	Adjacent to Pier 7	Decay	Bottom, Full Width x 3'-0" Long	20
9	1	Adjacent to Pier 8	Decay	Full Height x Full Width x 3'-0" Long	-
9	3	Adjacent to Pier 8	Decay	Full Height x Full Width x 1'-0" Long	-
9	3	Full Length	Decay	Top, 2" Vertical x Full Width x Full Length	-
9	3	Adjacent to East Abutment	Decay	Bottom, Full Width x 4'-0" Long	-
9	4	Full Length	Decay	Full Height x Full Width x Full Length	-
9	6	Full Length	Decay	Top, 4" Vertical x Full Width x Full Length	21

SR 2026 (Iron Street) Top Strut Defect Summary Table				
Pier	**Location along Strut**	**Defect**	**Additional Location Information/Defect Description**	**Photograph**
1	Right (South) End	Decay	10" Vertical x 10" Wide x 3'-2" Long	33 and 34
2	Right (South) End	Decay	10" Vertical x 10" Wide x 1'-6" Long	35 and 36
3	Right (South) End	Fire/Fungus Damage	Over 4'-0" Length	-
4	Left (North) End	Decay	Far Strut, 10" Vertical x 6" Wide x 9" Long	37
4	Left (North) End	Splits	Near and Far Strut, Top, Extends Under Bearing Areas	37
4	Between Columns 2 and 4	Decay	Far Strut, Full Height x Full Width x 6'-0" Long	-
5	Left (North) End	Decay	Near Strut, 8" Vertical x 6'-0" Long	38
5	Adjacent to Column 3	Splits	Near and Far Strut, Top and Bottom, 3'-0" Long	-
5	Right (South) End	Decay	Far Strut, Full Height x Full Width x 6'-0" Long (Hornets Nest Observed)	39 and 40
6	Left (North) End	Decay	10" Vertical x 10" Wide x 4'-0" Long	-
6	Right (South) End	Decay	10" Vertical x 10" Wide x 1'-6" Long	-
7	Left (North) End	Decay	10" Vertical x 8" Wide x 1'-6" Long	-
8	Between Columns 2 and 3	Decay	No Measurements (Hornets Nest Observed)	-

SR 2026 (Iron Street) Column Defect Summary Table					
Pier	**Column**	**Location along Column**	**Defect**	**Additional Location Information/Defect Description**	**Photograph**
3	4	Top	Fire/Fungus Damage	Left (North) Face Over 2'-0" Length	-
4	1	Top	Decay	Far Column, 4'-0" Long	-
5	2	Top	Split	Near Column, 5'-0" Long	41
5	2	Top	Decay	Near Column, 5'-0" Long	-
5	5	Full Height	Split	Near Column, Right (South) Face, Full Height	42
5	5	Top	Decay	Near Column, 3'-0" Long	-
6	4	Full Height	Split	Far (East) Face, Full Height	-

SR 2026 (Iron Street) Bottom Strut Defect Summary Table				
Pier	**Location along Strut**	**Defect**	**Additional Location Information/Defect Description**	**Photograph**
1	Left (North) End	Decay	1'-0" Vertical x 9" Wide x 4" Long	-
1	Right (South) End	Decay	10" Vertical x 9" Wide x 1'-2" Long	-
2	Left (North) End	Decay	1'-0" Vertical x 9" Wide x 3'-9" Long	-
3	Full Length	Split	Top, Full Length	-
4	Left (North) End	Decay	Full Height x Full Width x 6'-0" Long	43 and 44
4	Between Columns 4 and 5	Decay	Top, Full Width x 3'-0" Long	-
5	Full Length	Decay	Near and Far Strut, Top, 8" Vertical x Full Width x Full Length	45 and 46
8	Left (North) End	Decay	6" Vertical x 6" Wide x 3'-0" Long	-

TRESTLE BRIDGE OVER SR 2026 (IRON STREET) PHOTOGRAPHS

1. View Over Structure From Near (West) End

2. View Over Structure From Far (East) End

3. View of Near (West) Approach Looking West

4. View of Far (East) Approach Looking East

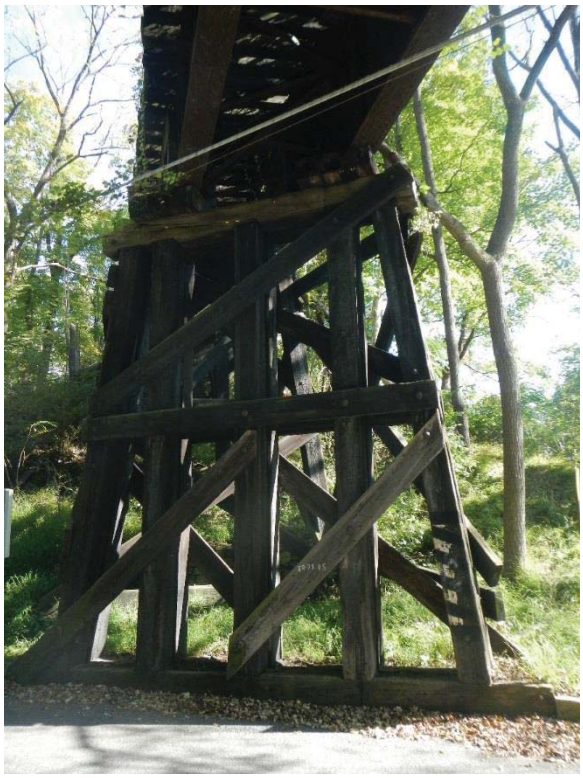
5. Partial Left (North) Elevation View

6. Partial Right (South) Elevation View

7. Span 2 Superstructure (Typical Approach Span Superstructure)

8. Span 5 Superstructure (Main Span Superstructure)

9. Pier 8 Near (West) Elevation (Typical Approach Span Pier)



10. Pier 5 Near (West) Elevation (Typical Main Span Pier)

11. Significant Vegetation Growth Along Ties at Near (West) End

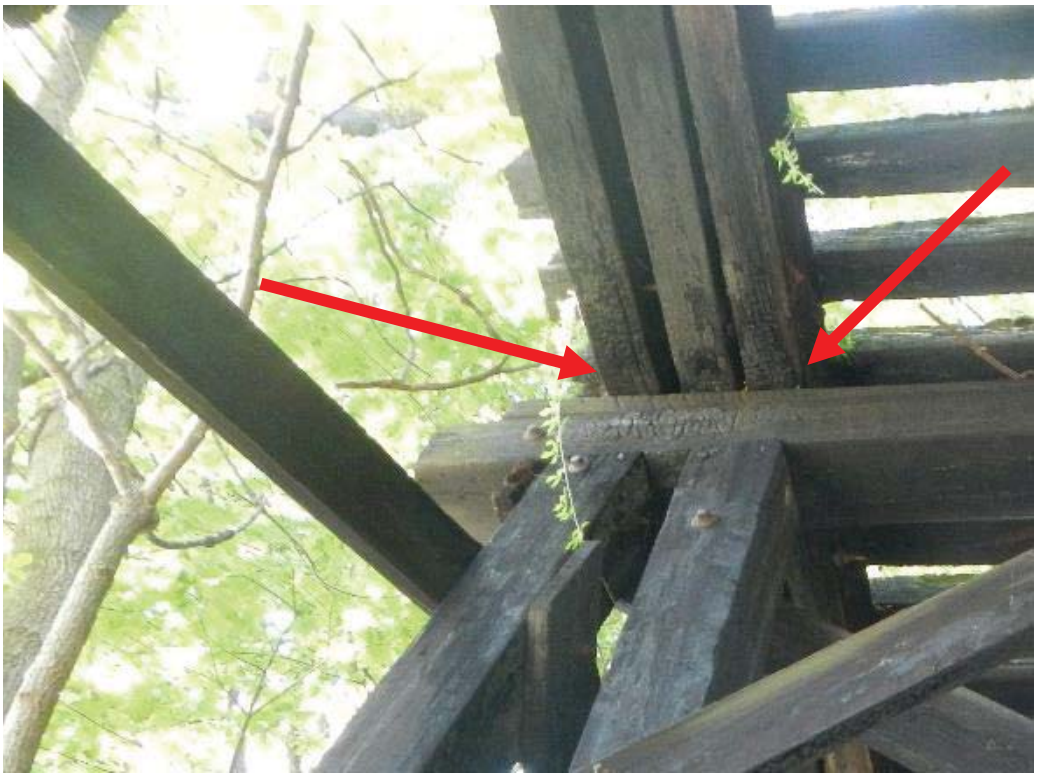
12. Significant Vegetation Growth Along Ties at Far (East) End

13. Span 1 Stringers Decay to Top of Stringers Adjacent to Near (West) Abutment

14. Span 2 Stringer 3 Decay Along Bottom of Stringer

15. Span 3 Stringer 1 Decay at Bot of Stringer Adj to Pier 2 (Hammer Penetration up to 6”) (Decay Extends Full Height)

16. Span 3 Stringers 4 Thru 6 Fire/Fungus Damage Along Bottom of Stringers Adjacent to Pier 3



17. Span 4 Stringers 4 Thru 6 Fire/Fungus Damage Along Bottom of Stringers Adjacent to Pier 3

18. Span 4 Stringer 4 Horizontal Split in Stringer Adjacent to Pier 4 (Split is Full Length)

19. Span 6 Stringer 6 Horizontal Split in Stringer Adjacent to Pier 6 (Split is Full Length)

20. Span 8 Stringer 5 Decay to Bottom of Stringer Adjacent to Pier 7

21. Span 9 Stringer 6 Decay to Top Portion of Stringer Along Entire Span

22. General View of Steel Superstructure in Span 5 (Main Span) in Fair Condition

23. Open Bolt Holes in Girder 1 Web Near Pier 4

24. Pack Rust Between Girder 2 Cover Plates and Bent Cover Plate Near Pier 4

25. Near (West) Abutment Stem Longitudinal Member Decay (3’ of Penetration with 4’ Rod, Typical Condition)

26. Near (West) Abutment Stem Transverse Member Decay (3’ of Penetration with 4’ Rod)

27. General View of Far (East) Abutment Stem Longitudinal Member Decay

28. Far (East) Abutment Stem Longitudinal Member Decay (3’-6” of Penetration with 4’ Rod, Typical Condition)

29. Near (West) Abutment Right (South) End Backwall Member Decay (4’ of Penetration with 4’ Rod)

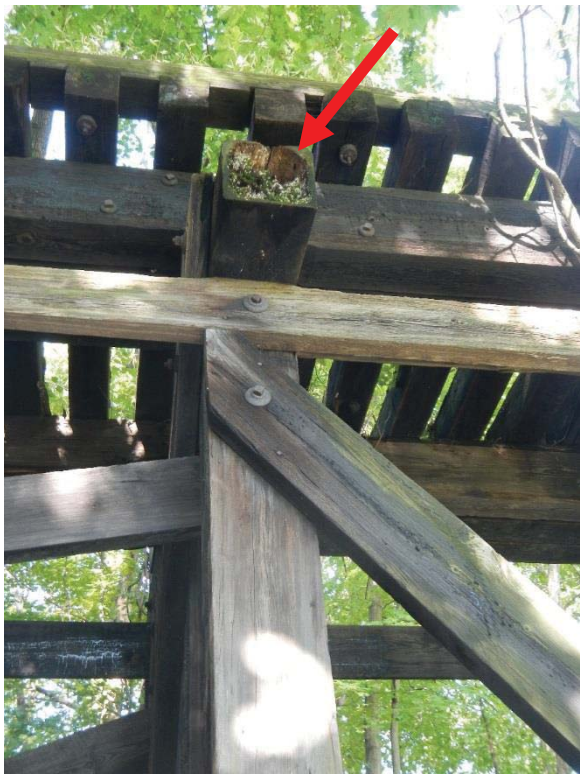
30. Near (West) Abutment Left (North) Wing Decay

31. Far (East) Abutment Left (North) Wing Decay

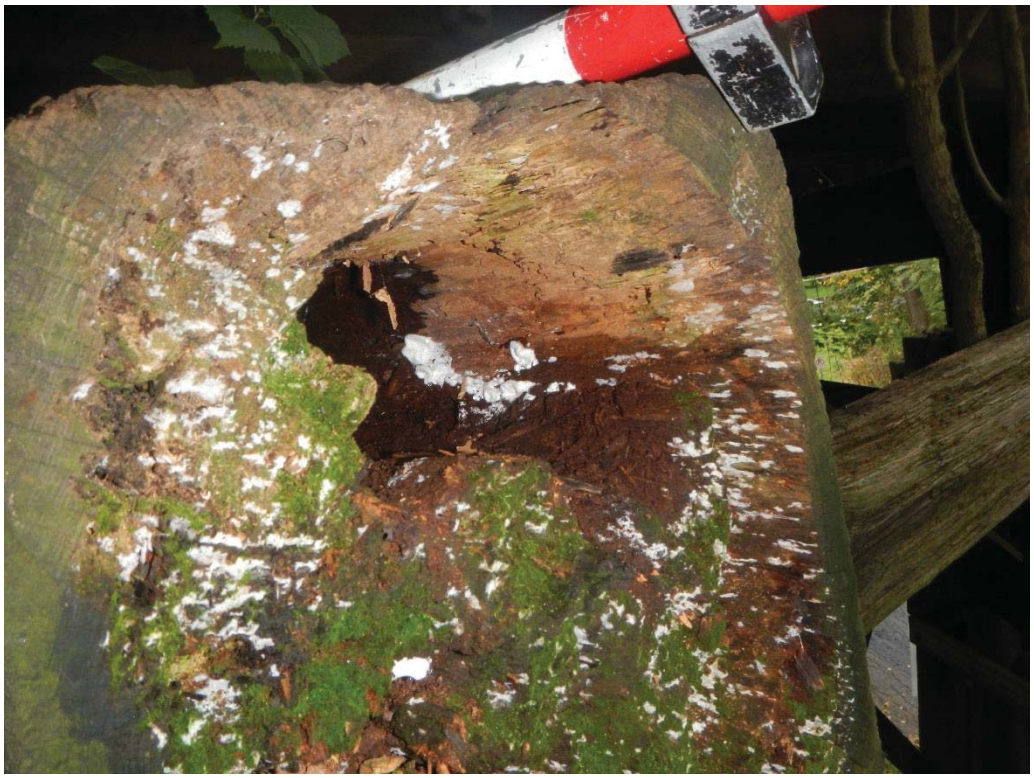
32. Far (East) Abutment Left (North) Wing Decay

33. Pier 1 Right (South) End Top Strut Decay

34. Pier 1 Right (South) End Top Strut Decay Close Up (3’-2” of Penetration with 4’ Rod)



35. Pier 2 Right (South) End Top Strut Decay and Algae/Fungus Growth

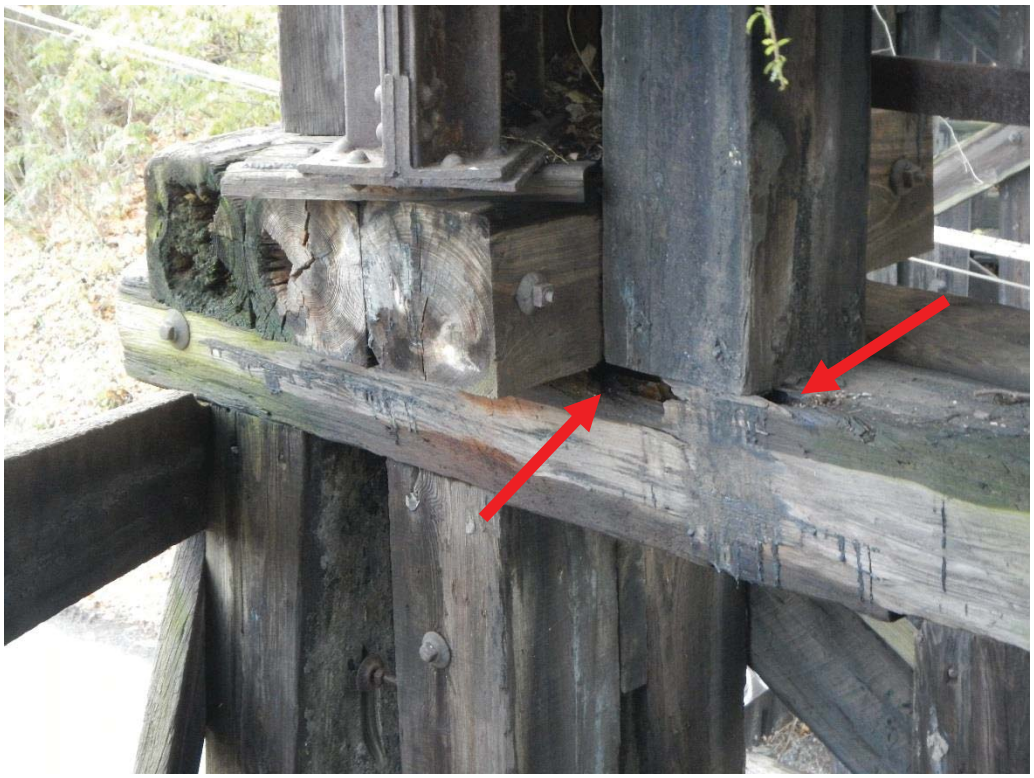


36. Pier 2 Right (South) End Top Strut Decay and Algae/Fungus Growth Close Up

37. Pier 4 Left (North) End Top Strut Decay and Splits

38. Pier 5 Near (West) Side Top Strut Decay Over Column 2 (Decay Extends to Left (North) End)

39. Pier 5 Right (South) End Top Strut Decay



40. Pier 5 Far (West) Side Top Strut Decay Over Column 4 (Decay Extends to Right (South) End)

41. Pier 5 Column 2 Split Near (West) Face

42. Pier 5 Column 5 Split Right (South) Face

43. Pier 4 Left (North) End Bottom Strut Decay

44. Pier 4 Left (North) End Bottom Strut Decay Close Up (5’ of Penetration with 6’ Rod)

45. Pier 5 Bottom Strut Split/Decay Between Columns (Typical Condition)

46. Pier 5 Bottom Strut Split/Decay Between Columns 1 and 2 Close Up

47. Pier 1 Mudsills 1 thru 3 Decay (Typical Condition)

48. Pier 1 Mudsill 1 Decay Close Up (3’ of Penetration with 4’ Rod, Typical Condition)

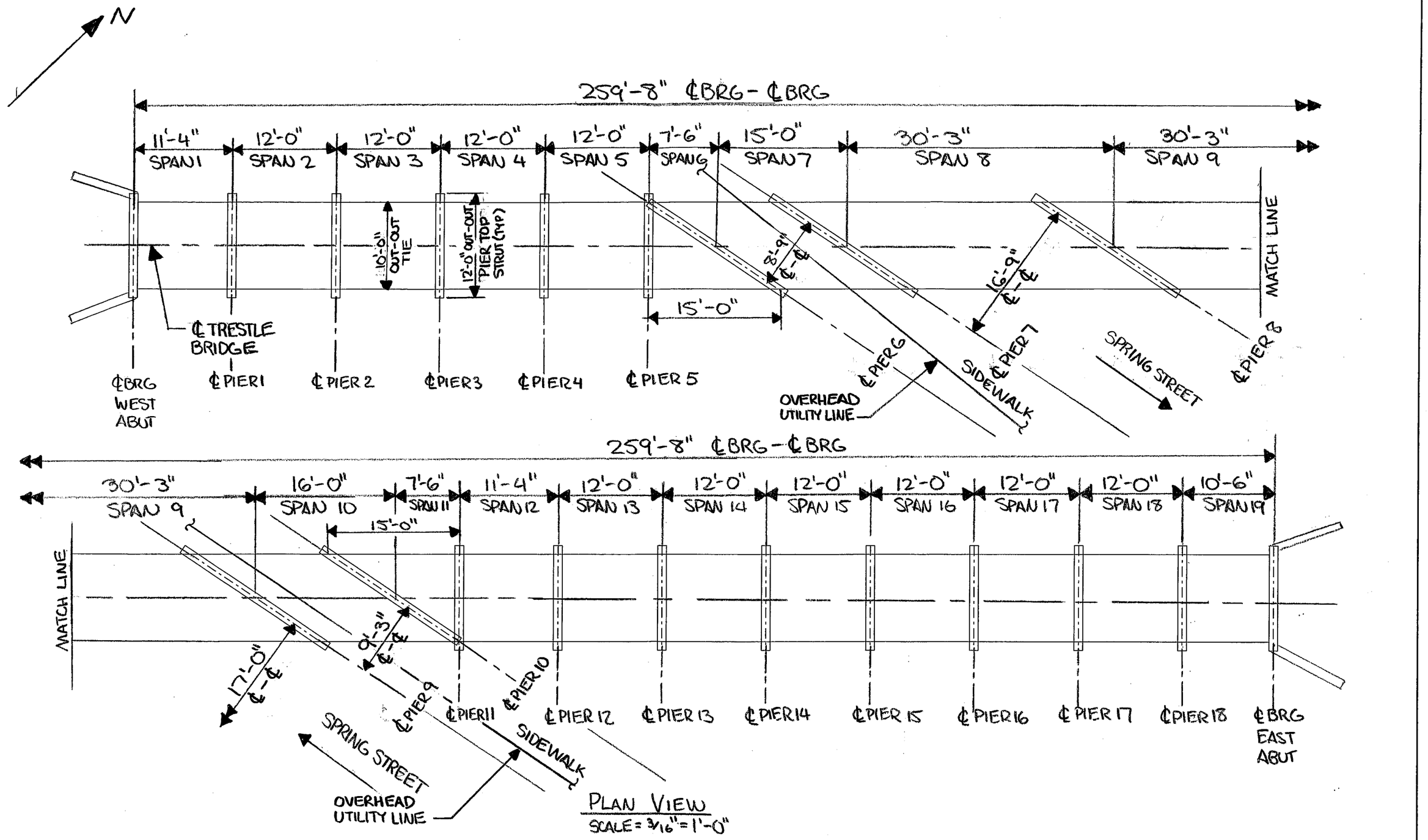
49. Pier 2 Mudsills 5 thru 8 Decay (Typical Condition)

50. Pier 2 Mudsill 8 Decay Close Up (3’ of Penetration with 4’ Rod, Typical Condition)

51. Spans 2 & 3 Top Right (South) Longitudinal Bracing Weathering/Decay

52. Span 3 Bottom Left (North) Longitudinal Bracing Weathering/Decay

TRESTLE BRIDGE OVER SPRING STREET
BRIDGE SKETCHES



PLAN VIEW
SCALE = 3/16" = 1'-0"

Rev	Date	By	Chk'd	Description

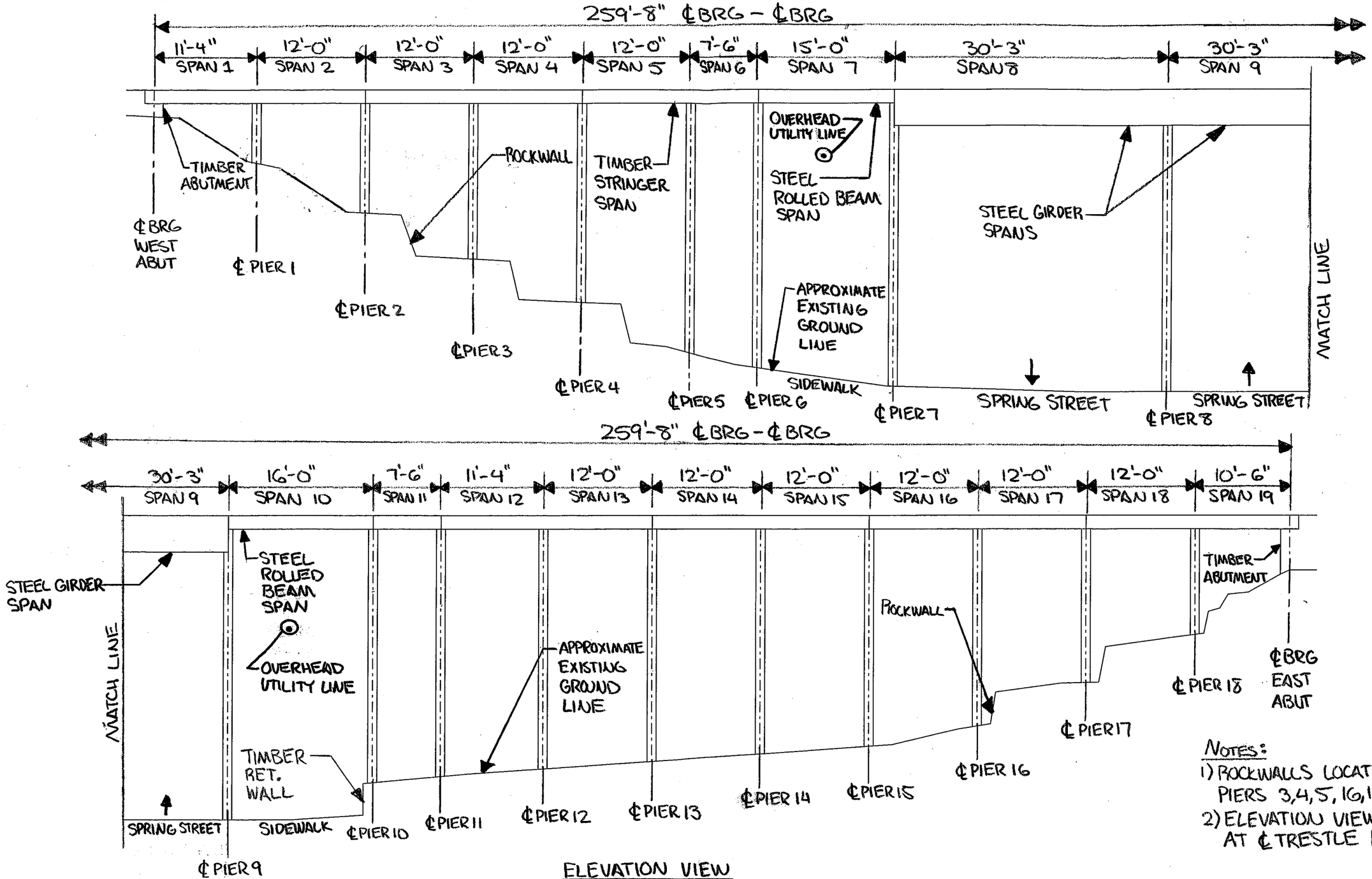
benesch
Alfred Benesch & Company
840 Hamilton Street, Suite 400
Allentown, Pennsylvania 18101
610-439-7066

WEST EASTON BRIDGES
TRESTLE BRIDGE OVER SPRING STREET

WEST EASTON BOROUGH, NORTHAMPTON COUNTY, PENNSYLVANIA

Drawn:	Designed:	Checked:	Scale:	Date:	Project No.:	Sheet No.:
DJH	DJH	BLB	AS NOTED	10/22/18	60212.00	

60200.00 dhendricks 10\22\2018 11:38:22 Y:\Lehigh\60200S\60212.00\Eng_Docs\Work_files\Trestle Contours.dgn (Default)



ELEVATION VIEW
SCALE: 3/16" = 1'-0"
(LOOKING NORTH)

NOTES:
1) ROCKWALLS LOCATED BEHIND PIERS 3,4,5,16,17,18.
2) ELEVATION VIEW SHOWN AT ℄ TRESTLE BRIDGE.

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WEST EASTON BRIDGES
TRESTLE BRIDGE OVER SPRING STREET
WEST EASTON BOROUGH, NORTHAMPTON COUNTY, PENNSYLVANIA

Drawn: DSH	Designed: DSH	Checked: BKB	Scale: AS NOTED	Date: 10/22/18	Project No.: 60212.00	Sheet No.:

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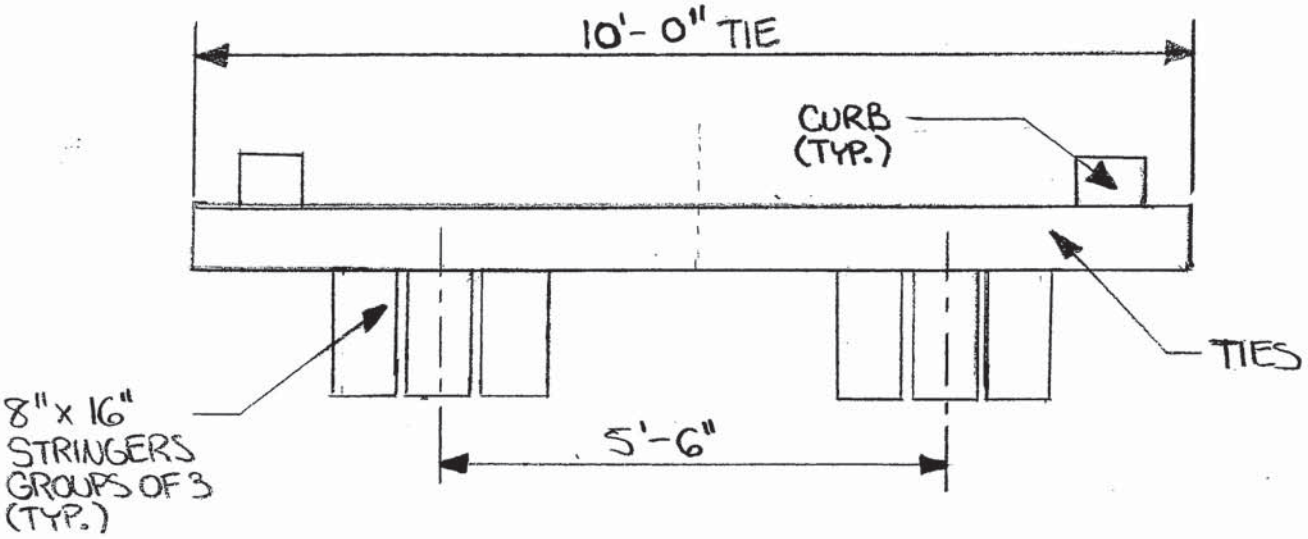
benesch

Comp. by: DSH Date: 10/11/18 Sheet ____ of ____

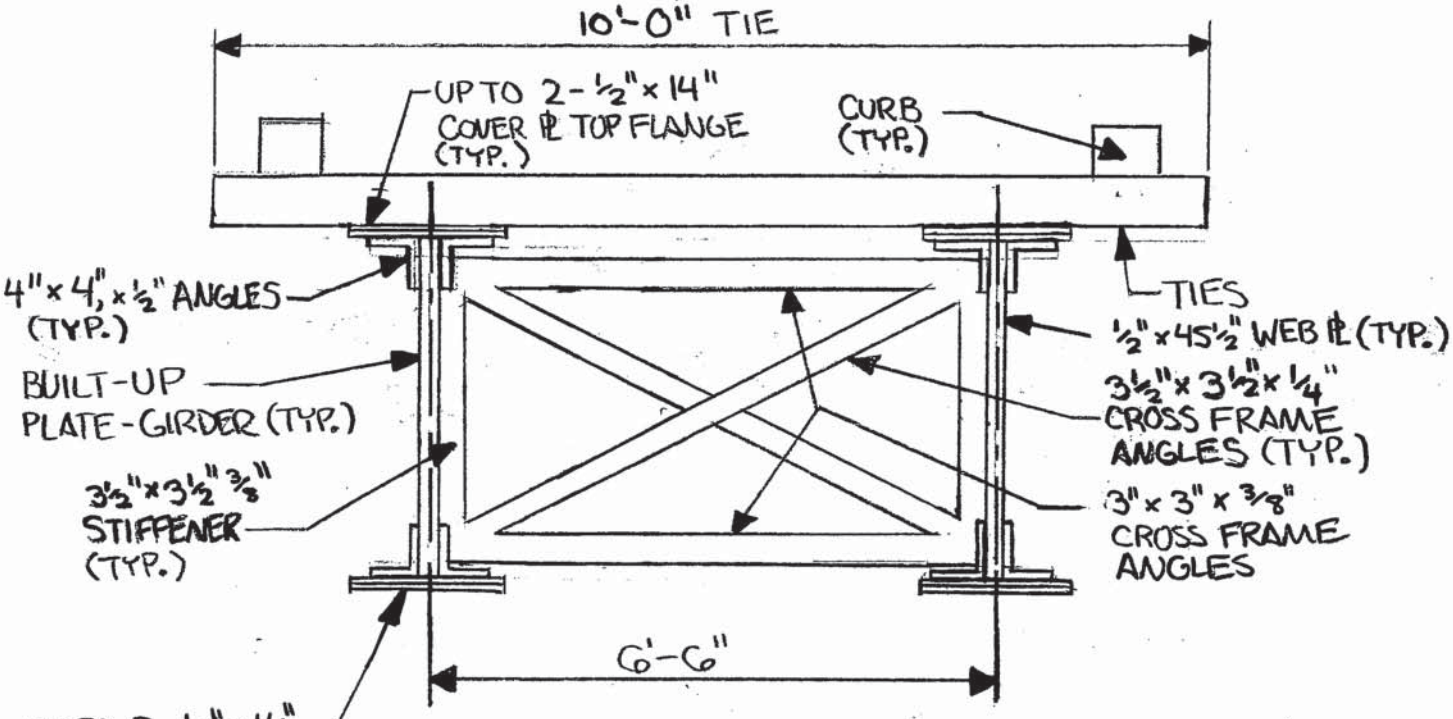
Chkd. by: BKB Date: 12/28/18 Job No. 60212.00

Project: WEST EASTON BRIDGES

Element: TRESTLE BRIDGE OVER SPRING STREET



TYPICAL TIMBER STRINGER SPAN SECTION



TYPICAL STEEL GIRDER SECTION
(SPANS 8 AND 9)

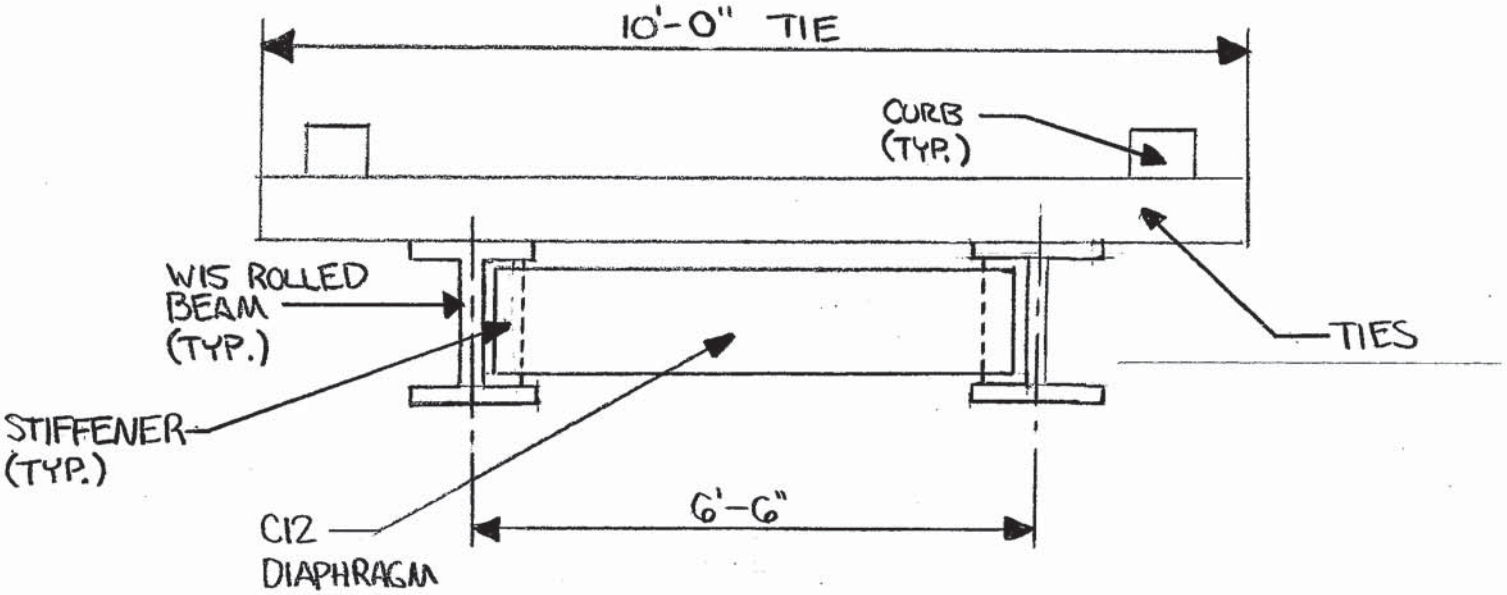
benesch

Comp. by: DSH Date: 10/19/18 Sheet ____ of ____

Chkd. by: BKB Date: 12/28/18 Job No. 60212.00

Project: WEST EASTON BRIDGES

Element: TRESTLE BRIDGE OVER SPRING STREET



TYPICAL STEEL ROLLED BEAM SECTION
(SPANS 7 AND 10)

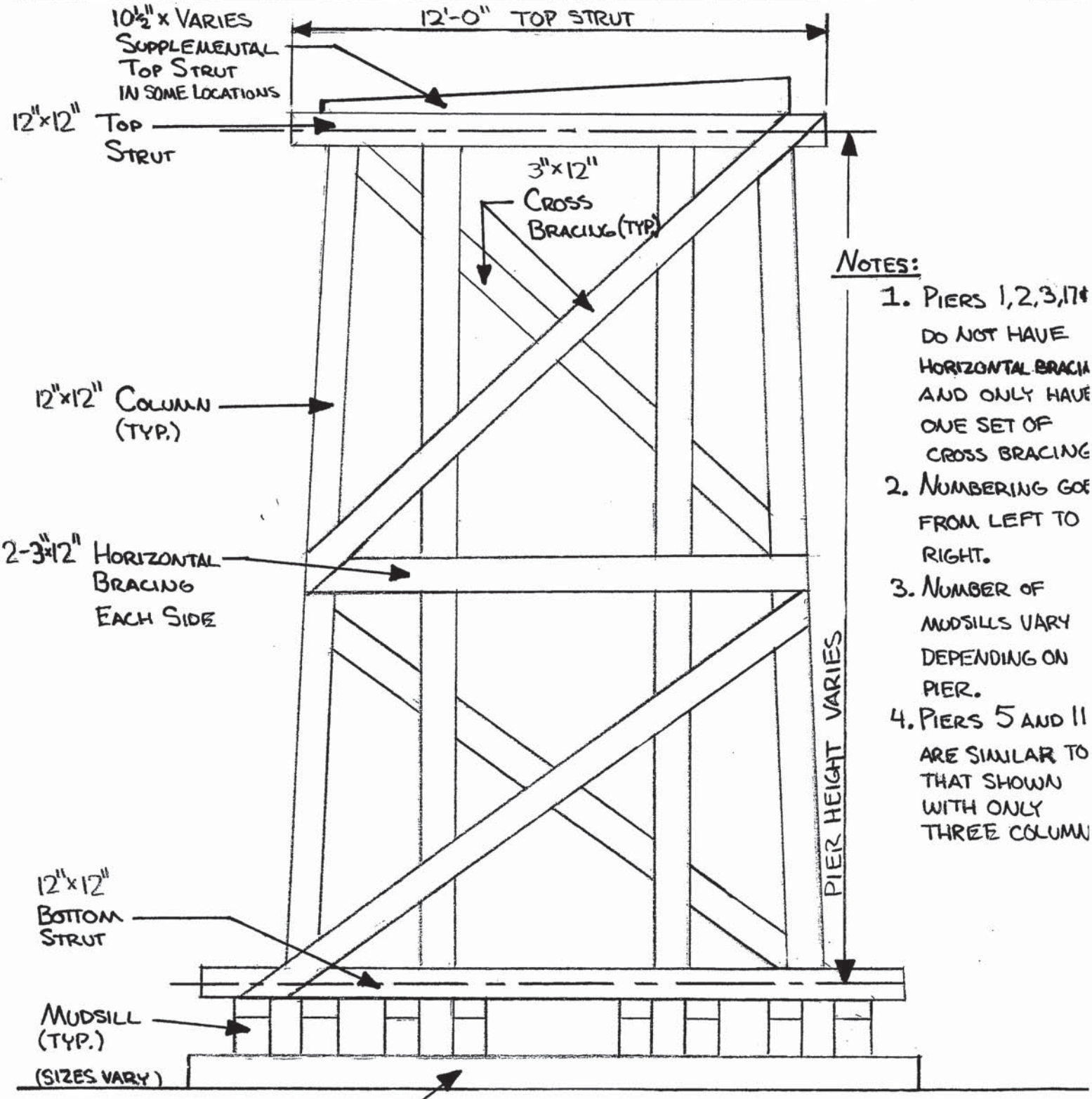
benesch

Comp. by: DSH Date: 10/28/18 Sheet ____ of ____

Chkd. by: BKB Date: 12/28/18 Job No. 60212.00

Project: WEST EASTON BRIDGES

Element: TRESTLE BRIDGE OVER SPRING STREET



NOTES:

1. PIERS 1,2,3,17& DO NOT HAVE HORIZONTAL BRACIN AND ONLY HAVE ONE SET OF CROSS BRACING
2. NUMBERING GOE FROM LEFT TO RIGHT.
3. NUMBER OF MUDSILLS VARY DEPENDING ON PIER.
4. PIERS 5 AND 11 ARE SIMILAR TO THAT SHOWN WITH ONLY THREE COLUMN

TIMBER PIER 1 THRU 5 AND 11 THRU 18

ELEVATION VIEW

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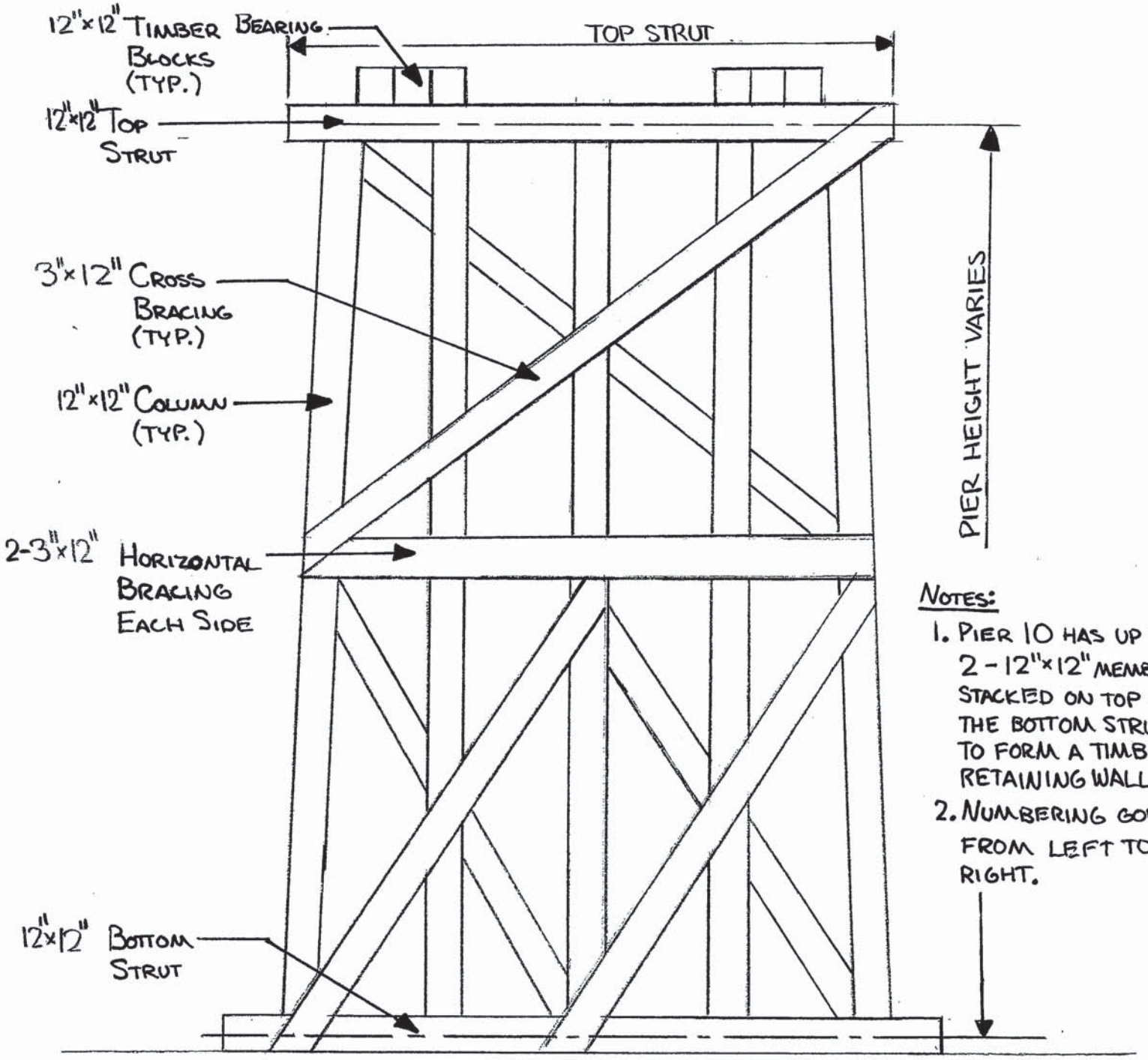
Comp. by: DSH Date: 10/28/18 Sheet ____ of ____

Chkd. by: BKB Date: 12/28/18 Job No. 60212.00

Project: WEST EASTON BRIDGES

Element: TRESTLE BRIDGE OVER SPRING STREET



TIMBER PIER 6 AND 10
ELEVATION VIEW
(LOOKING EAST)

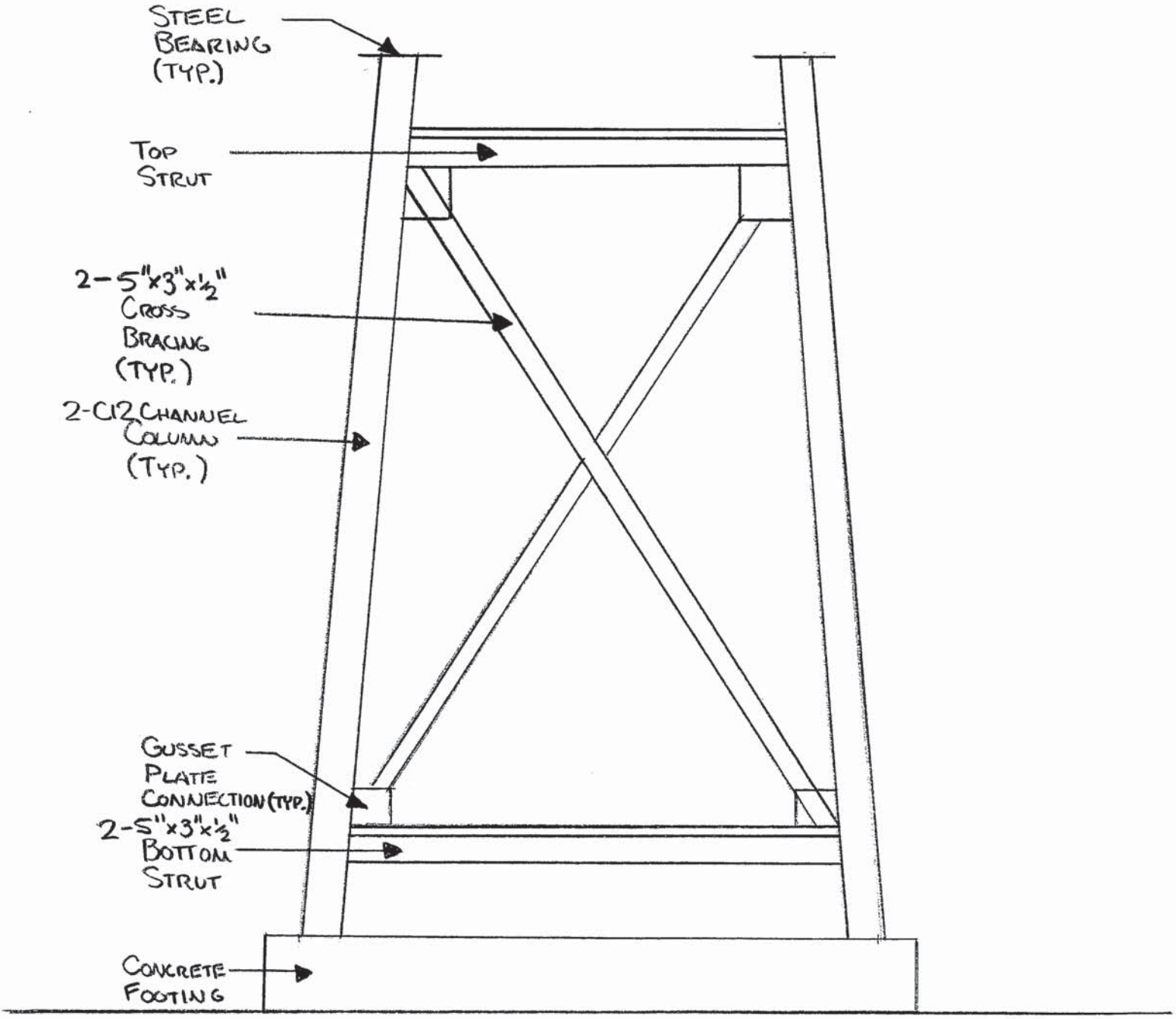
benesch

Comp. by: DSH Date: 10/28/18 Sheet ____ of ____

Chkd. by: BKB Date: 12/28/18 Job No. 60212.00

Project: WEST EASTON BRIDGES

Element: TRESTLE BRIDGE OVER SPRING STREET



STEEL PIER 7, 8, AND 9

ELEVATION VIEW

(LOOKING EAST)

TRESTLE BRIDGE OVER SPRING STREET

BRIDGE DESCRIPTION

The trestle bridge over Spring Street is a nineteen (19) span, 259'-8" bridge with a 10'-0" out-to-out width. The superstructure is comprised of fifteen (15) approach spans consisting of six (6) timber stringers, two (2) approach spans (Spans 7 and 10) consisting of two (2) steel rolled beams, and two (2) main spans (Spans 8 and 9) consisting of two (2) steel built-up plate girders. The superstructure is supported by timber and steel substructure units consisting of two (2) timber stub abutments with U-wings and eighteen (18) piers. Timber Piers 1 thru 5 and 11 thru 18 are comprised of a top strut, four (4) columns, bottom strut, mudsills, and footings (Piers 12 and 13 have concrete footings.) Timber Piers 6 and 10 are comprised of bearing blocks, top strut, five (5) columns, and lower strut. Steel Piers 7 thru 9 are comprised of a top strut, two (2) columns, lower strut, and concrete footings. See Photographs 1 thru 12 for General Photographs.

IN-DEPTH BRIDGE INSPECTION SUMMARY

The bridge was observed to be in an overall "imminent" failure condition. The "imminent" failure condition rating indicates that there is major deterioration or section loss present in critical structural components. The bridge overall condition was controlled by the condition of both the superstructure (timber stringers in the approach spans) and substructure (timber piers).

SUPERSTRUCTURE: The superstructure was observed to be in an overall "imminent" failure condition. The overall superstructure condition was controlled by the condition of the timber stringers in the approach spans. A detailed summary of the superstructure defects observed is provided below.

Timber Ties: As previously mentioned, an in-depth inspection was not completed on the superstructure's timber ties since it was previously determined and anticipated that these members will not remain if the bridge is repurposed. However, the following general visual observations were made:

- Significant vegetation is growing along the ties. See Photographs 13 and 14.
- The ties exhibit many obvious areas with decay.
- Steel bolts are embedded/hanging from the ties.

Note that none of the steel bolts were currently observed to be in danger of falling from the structure into the roadway. However, this is a future concern with the continued decay of the ties if the structure continues to be left in place.

Timber Stringers: The timber stringers are in an overall "imminent" failure condition. The stringer defects included decay and splits. There were numerous areas in which decay was visible and numerous areas where internal decay was present, based on hammer sounding. At least half the stringers in eight (8) spans of the bridge exhibited decay. Many stringers exhibited areas of decay in multiple locations (typically adjacent to a substructure unit) within a given span and six (6) stringers exhibited areas of decay for the full span length. There were numerous stringer locations with splits with many of them extending the full span length. See the Stringer Defect Summary Table for a detailed summary of the stringer defects and Photographs 15 thru 27 for representative stringer defect photographs.

Steel Superstructure: The steel superstructure is in overall fair condition (all primary structural elements are sound but have minor section loss). There were areas with pack rust and associated bending of plates/angles between the built-up plate girder top and bottom flange cover plates,

horizontal gusset plates at the top and bottom flanges, and stringer connection angles and plates. There were locations with up to 100% section loss in the horizontal gusset plates connected to the top and bottom flanges of the built up plate girder, stringer connection angles and plates, and the bottom of stiffener angles. See Photographs 28 thru 36.

SUBSTRUCTURE: The substructure was observed to be in an overall "imminent" failure condition. The overall substructure condition was controlled by the condition of the timber piers. A detailed summary of the substructure defects observed is provided below.

Timber Abutments: The timber abutments are in an overall critical condition (advanced deterioration of primary structural elements). The timber transverse and longitudinal abutment members exhibited significant decay in approximately 25% of the members. These included areas of decay up to 6" high x 6" wide x 3'-0" long in the transverse and longitudinal members. See Photographs 37 and 38. The timber transverse and longitudinal wing members exhibited significant decay in over half the members. These included areas where members were completely missing as a result of decay. See Photographs 39 thru 41.

Timber Piers: The timber piers are in an overall "imminent" failure condition. The timber top strut defects included decay and splits. There were numerous areas in which decay was visible and isolated areas where internal decay was present, based on hammer sounding. Ten (10) of the fifteen (15) top struts exhibited visible decay at the member end. One (1) top strut exhibited internal decay, based on hammer sounding. Six (6) of the fifteen (15) top struts exhibited splits. No defects were noted in the supplemental top struts of this bridge. See the Top Strut Defect Summary Table for a detailed summary of the top strut defects and Photographs 42 thru 47 for representative top strut defect photographs.

The timber column defects included numerous locations with decay and splits with defects noted in twenty six (26) out of sixty (60) columns. Twelve (12) of the columns exhibited decay, with most of these locations adjacent to a column splice. Twenty five (25) columns exhibited splits, with many splits extending full height. See the Column Defect Summary Table for a detailed summary of the column defects and Photographs 48 thru 56 for representative column defect photographs.

The timber bottom strut defects included decay and splits. There were numerous areas in which decay was visible and some areas where internal decay was present, based on hammer sounding. Nine (9) of the fifteen (15) bottom struts exhibited visible decay at the member end. Five (5) of the fifteen (15) bottom struts exhibited internal decay, based on hammer sounding. Seven (7) of the fifteen (15) bottom struts exhibited splits. See the Bottom Strut Defect Summary Table for a detailed summary of the bottom strut defects and Photographs 57 thru 59 for representative bottom strut defect photographs.

The timber mudsills exhibited significant decay in over 75% of the members. These included areas where members were completely missing as a result of decay. See Photographs 60 thru 62.

The timber footings were not visible in most locations. Areas of decay were observed at the footing ends of footings at Pier 2, 14, 15, 17 and 18. See Photographs 63 and 64.

The timber transverse substructure bracing exhibited significant decay in approximately 25% of the members. The longitudinal substructure bracing exhibited significant decay or was missing in over 50% of the members. See Photographs 65 thru 69.

Steel Piers: The steel piers are in overall fair condition. There were typically areas with pack rust and associated bending of plates between the vertical gusset plates and bracing at the base of columns.

There were typically areas with up to 100% section loss to the column connection angles at the base of columns. There were isolated locations of up to 100% section loss to the end of bracing angles at the base of columns. See Photographs 70 thru 74.

MISCELLANEOUS: The fencing at each end of bridge is in generally in satisfactory condition, however it does not prohibit access onto the topside of the bridge. There were "NO TRESPASSING" signs posted on the fencing and structure in various locations. However, it did appear that some of these signs were missing, including on the fence at the far approach.

The diagonal stripes of the object markers on the concrete blocks at the south side of Pier 8 point down away from traffic. These diagonal stripes should be corrected to point down towards the traffic. Object markers should also be placed on the roadsides of the fixed hazards such as the footings on Piers 7 and 9.

During the bridge inspection, hornets/wasps were observed nesting in the following areas within the timber members, limiting the in-depth bridge inspection of the area around these members:

- Between Stringers 1, thru 3 directly above the bearing on Pier 11
- At the location of the splice on Column 1 of Pier 15

Overhead utility lines are located under Spans 6 and 9 as shown on the bridge plan view sketch. The in-depth bridge inspection of portions of the bridge located adjacent to utilities was limited, to maintain the required clearances to utilities.

TRESTLE BRIDGE OVER SPRING STREET
DEFECT SUMMARY TABLES

Spring Street Stringer Defect Summary Table					
Span	**Stringer**	**Location along Span**	**Defect**	**Additional Location Information/Defect Description**	**Photograph**
1	1	Full Length	Split	Midheight, Full Length	-
1	1	Full Length	Decay	Top, 1" Vertical x Full Width x Full Length	-
1	1	Adjacent to West Abutment	Decay	Full Height x Full Width x 2'-0" Long	-
1	1	Adjacent to Pier 1	Decay	Full Height x Full Width x 2'-6" Long	-
1	3	Adjacent to West Abutment	Decay	Full Height x Full Width x 2'-0" Long	-
1	3	Full Length	Split	4" From Top, Full Length	15
1	3	Bearing Areas	Decay	Bottom, Full Width x 1'-0" Long	-
1	4	Full Length	Split	Midheight, Full Length	-
1	4	Adjacent to West Abutment	Decay	Full Height x Full Width x 2'-0" Long	-
2	1	Adjacent to Pier 1	Decay	Full Height x Full Width x 2'-6" Long	-
2	3	Adjacent to Pier 1	Decay	Top Half x Full Width x 2'-0" Long	-
2	3	Adjacent to Pier 2	Decay	Full Height x Full Width x 3'-0" Long	-
3	1	Adjacent to Pier 2	Decay	Bottom, Full Width x 1'-0" Long	-
3	2	Adjacent to Pier 2	Decay	Bottom, Full Width x 2'-0" Long	-
3	3	Midspan	Split	Midheight, 6'-0" Long	-
3	3	Adjacent to Pier 2	Decay	Full Height x Full Width x 6'-0" Long	-
3	3	Adjacent to Pier 3	Decay	Full Height x Full Width x 3'-0" Long	-
3	4	Adjacent to Pier 2	Decay	Bottom, Full Width x 1'-0" Long	-
3	4	Adjacent to Pier 3	Decay	Bottom, Full Width x 4'-0" Long	-
3	5	Adjacent to Pier 2	Decay	Bottom, Full Width x 1'-0" Long	16
4	1	Adjacent to Pier 4	Decay	Bottom, Full Width x 1'-0" Long	-
4	2	Adjacent to Pier 4	Decay	Bottom, Full Width x 2'-0" Long	-
4	3	Adjacent to Pier 3	Decay	Full Height x Full Width x 1'-0" Long	-
4	3	Adjacent to Pier 4	Decay	Bottom, Full Width x 3'-0" Long	-
4	4	Adjacent to Pier 4	Decay	Full Height x Full Width x 1'-0" Long	-
4	5	Full Length	Decay	Bottom, Full Width x Full Length	17 and 18
5	3	Full Length	Split	Midheight, Full Length	19
5	5	Full Length	Decay	Bottom, Full Width x Full Length	-
6	5	Adjacent to Pier 5	Decay	Bottom, Full Width x 2'-0" Long	-
12	1	Full Length	Split	Midheight, Full Length	-
13	1	Adjacent to Pier 12	Decay	Full Height x Full Width x 3'-0" Long	-
13	1	Full Length	Split	Midheight, Full Length	20
13	1	Adjacent to Pier 13	Decay	Full Height x Full Width x 3'-0" Long	-
13	3	Full Length	Split	Midheight, Full Length	-
13	4	Adjacent to Pier 12	Split	Bottom , 6'-0" Long	-
13	4	Adjacent to Pier 12	Decay	Bottom, Full Width x 1'-0" Long	-
13	5	Adjacent to Pier 12	Decay	Bottom, Full Width x 2'-0" Long	-
13	5	Adjacent to Pier 12	Split	Bottom, 6'-0" Long	-
13	5	Adjacent to Pier 13	Decay	Bottom, Full Width x 1'-6" Long	-
13	6	Full Length	Split	Midheight, Full Length	-
14	1	Adjacent to Pier 13	Decay	Bottom, Full Width x 3'-0" Long	-
14	1	Adjacent to Pier 14	Decay	Full Height x Full Width x 3'-0" Long	-
14	3	Adjacent to Pier 13	Decay	Bottom, Full Width x 3'-0" Long	-
14	4	Adjacent to Pier 14	Decay	Bottom, Full Width x 1'-0" Long	-
14	5	Full Length	Split	Bottom, Full Length	-
14	5	Adjacent to Pier 14	Decay	Bottom, Full Width x 1'-0" Long	-
14	6	Full Length	Split	Bottom, Full Length	-
14	6	Adjacent to Pier 14	Decay	Full Height x Full Width x 4'-0" Long	21
14	6	Full Length	Split	Midheight, Full Length	-
15	1	Adjacent to Pier 14	Decay	Bottom, Full Width x 1'-6" Long	-
15	2	Adjacent to Pier 14	Decay	Bottom, Full Width x 1'-6" Long	-
15	3	Full Length	Split	Midheight, Full Length	-
15	5	Adjacent to Pier 14	Decay	Bottom, Full Width x 3'-0" Long	-
15	5	Adjacent to Pier 15	Decay	Bottom, Full Width x 2'-0" Long	-
15	6	Full Length	Decay	Full Height x Full Width x Full Length	22 and 23
15	6	Full Length	Split	Midheight, Full Length	-
16	1	Full Length	Decay	Full Height x Full Width x Full Length	24 and 25
16	2	Adjacent to Pier 16	Decay	Bottom, Full Width x 2'-0" Long	-
16	3	Full Length	Split	Midheight, Full Length	-
16	3	Adjacent to Pier 16	Decay	Full Height x Full Width x 3'-0" Long	-
16	5	Adjacent to Pier 15	Decay	Bottom, Full Width x 3'-0" Long	-
16	6	Full Length	Split	Midheight, Full Length	-
17	1	Full Length	Decay	Full Height x Full Width x Full Length	-
17	3	Full Length	Split	Midheight, Full Length	26

Spring Street Stringer Defect Summary Table (Continued)					
Span	**Stringer**	**Location along Span**	**Defect**	**Additional Location Information/Defect Description**	**Photograph**
17	6	Full Length	Split	Midheight, Full Length	-
19	1	Adjacent to Pier 18	Decay	Full Height x Full Width x 2'-0" Long	27
19	1	Full Length	Split	Midheight, Full Length	-
19	1	Adjacent to East Abutment	Decay	Full Height x Full Width x 1'-0" Long	-
19	2	Adjacent to Pier 18	Decay	Bottom, Full Width x 1'-0" Long	-
19	2	Adjacent to East Abutment	Decay	Bottom, Full Width x 1'-0" Long	-
19	3	Full Length	Split	Midheight, Full Length	-
19	3	Adjacent to East Abutment	Decay	Bottom, Full Width x 1'-0" Long	-
19	4	Full Length	Split	Midheight, Full Length	-
19	5	Adjacent to Pier 18	Decay	Bottom, Full Width x 1'-0" Long	-
19	6	Adjacent to Pier 18	Decay	Full Height x Full Width x 2'-0" Long	-
19	6	Full Length	Split	Midheight, Full Length	-
19	6	Adjacent to East Abutment	Decay	Full Height x Full Width x 1'-0" Long	-

Spring Street Top Strut Defect Summary Table				
Pier	**Location along Strut**	**Defect**	**Additional Location Information/Defect Description**	**Photograph**
1	Full Length	Split	Near (West) Face, Midheight, Full Length	42
1	Left (North) End	Decay	6" Vertical x 6" Wide x 2'-4" Long	43
2	Between Columns 2 and 3	Split	Midheight, 2'-6" Long	-
2	Left (North) End	Decay	6" Vertical x 6" Wide x 1'-0" Long	-
3	Right (South) End	Decay	10" Vertical x 10" Wide x 1'-6" Long	44
4	Left (North) End	Decay	Full Height x Full Width x 4'-0" Long	-
11	Left (North) End	Decay	6" Vertical x 6" Wide x 1'-0" Long	-
12	Adjacent to Column 3	Split	Far (East) Face, Extending From Column 3, 2'-0" Long	-
13	Between Columns 2 and 3	Split	Near (West) and Far (East) Face, Midheight, 5'-0" Long	45
13	Btw Left (North) End and Col 2	Decay	Full Height x Full Width x 5'-0" Long	46
13	Between Columns 2 and 3	Split	Top and Bottom, 5'-0" Long	47
13	Btw Col 3 and Right (South) End	Decay	Full Height x Full Width x 5'-0" Long	-
14	Left (North) End	Decay	Full Height x Full Width x 2'-0" Long	-
15	Btw Col 3 and Right (South) End	Split	Far (East) Face, Midheight, 6'-0" Long	-
15	Between Columns 2 and 3	Split	Near (West) Face, 5'-0" Long	-
16	Above Column 3	Split	Near (West) Face, 2'-0" Long	-
16	Right (South) End	Decay	Full Height x Full Width x 6" Long	-
17	Left (North) End	Decay	Full Height x Full Width x 3'-0" Long	-
18	Left (North) End	Decay	6" Vertical x 6" Wide x 3" Long	-

Spring Street Column Defect Summary Table					
Pier	**Column**	**Location along Column**	**Defect**	**Additional Location Information/Defect Description**	**Photograph**
1	1	Full Height	Split	Far (East) Face, Full Height	48
1	2	Full Height	Split	Far (East) Face, Full Height	48
1	3	Full Height	Split	Far (East) Face, Full Height	-
5	3	Full Height	Split	Far (East) Face, Full Height	-
6	2	Above Splice	Split	Near (West) and Far (East) Face, 15'-0" Long	-
6	2	Below Splice	Split	Near (West) Face, 6'-0" Long	-
6	3	Bottom Half	Split	Near (West) Face, 15'-0" Long	-
6	3	Bottom Half	Decay	Near (West) Right (South) Corner, 3" x 3" Section x 15'-0" Long	-
6	3	Bottom	Decay	2'-0" Long	-
6	4	Full Height	Split	Near (West) Face, Full Height	-
6	4	At Bottom Cross Bracing	Decay	Far (East) Face, 1'-0" Vertical x 1"-0" Wide x 2" Deep	-
6	5	Above Splice	Split	Near (West) Face, Full Height Above Splice	-
6	5	Full Height	Decay	Full Height	49
10	1	Above Splice	Split	Near (West) Face, Full Height Above Splice	-
10	2 thru 5	Full Height	Split	Near (West) Face, Full Height	
10	1	Full Height	Split	Right (South) Face, Full Height	-
10	1	Above Splice	Decay	2'-0" Long	50
10	1	Below Splice	Decay	2'-0" Long	-
10	2	At Bottom Cross Bracing	Decay	3'-0" Long	-
10	3	Full Height	Split	Left (North) Face, Full Height	-
10	3	Full Height	Split	Far (East) Face, Full Height	-
10	3	At Top Cross Bracing	Decay	3'-0" Long	-
10	4	Above Horizontal Brace	Split	Left (North) Face, 15'-0" Long	-
10	5	Above Splice	Decay	Full Height Above Splice	-
10	5	Below Splice	Decay	3'-0" Long	51
11	2	Full Height	Split	Left (North) Face, Full Height	-
11	3	Above Horizontal Brace	Split	Right (South) Face, 10'-0" Long	-
12	2	Full Height	Split	Right (South) Face, Full Height	-
12	3	Bottom Half	Split	Right (South) Face, 15'-0" Long	-
12	4	Full Height	Split	Far (East) Face, Full Height	52
13	1	Below Top Strut	Split	Near (West) Face, 6'-0" Long	-
13	1	Full Height	Split	Far (East) Face, Full Height	-
13	1	Below Top Strut	Decay	3'-0" Long	-
14	1	Below Top Strut	Decay	5'-0" Long	-
14	1	At Longitudinal Brace	Decay	3'-0" Long	53
14	1	Full Height	Split	Near (West) Face, Full Height	-
14	2	Full Height	Split	Near (West) Face, Full Height	-
14	3	Full Height	Split	Near (West) Face, Full Height	-
14	3	Above Splice	Split	Far (East) Face, Full Height Above Splice	-
14	4	Above Splice	Decay	1'-0" Long	-
14	4	Below Splice	Decay	2'-0" Long	54
14	4	Full Height	Split	Near (West) Face, Full Height	-
14	4	Below Splice	Split	All Faces, 6'-0" Long	-
15	1	At Splice	Decay	Location of Hornets Nest, Not Measured	-
15	4	Above Splice	Split	Right (South) Face, Splice to Top Strut	-
15	4	Above Splice	Decay	1'-10" Long	55 and 56
18	4	Full Height	Split	Near (West) Face, Full Height	-
18	4	Full Height	Split	Right (South) Face, Full Height	-

Spring Street Bottom Strut Defect Summary Table				
Pier	**Location along Strut**	**Defect**	**Additional Location Information/Defect Description**	**Photograph**
1	Between Columns 2 and 3	Split	Midheight, 4'-0" Long	-
1	Left (North) End	Decay	10" Vertical x 10" Wide x 2'-0" Long	57
2	Between Columns 2 and 3	Split	Top, 3'-0" Long	-
2	Between Columns 2 and 3	Decay	Top, 6" Vertical x 6" Wide x 3'-0" Long	-
4	Right (South) End	Decay	8" Vertical x 8" Wide x 2'-6" Long	-
6	Left of Column 3	Decay	1'-0" Long	-
10	Left (North) End	Decay	6'-0" Long	-
11	Btw Left (North) End and Col 2	Split	Top, 6'-0" Long	-
11	Left (North) End	Decay	6" Vertical x 6" Wide x 1'-0" Long	-
11	Between Columns 1 and 2	Decay	6" Vertical x Full Width x 3'-0" Long	-
12	Btw Col 2 and Right (South) End	Split	Top, 8'-0" Long	-
12	Right (South) End	Decay	Full Height x Full Width x 1'-6" Long	-
13	Left (North) End	Split	Top, 1'-6" Long	-
13	Right (South) End	Split	Top, 1'-6" Long	-
14	Btw Col 2 and Right (South) End	Decay	Top, 8" Vertical x Full Width x 8'-0" Long	58
14	Btw Col 2 and Right (South) End	Split	Top, 8'-0" Long	58
15	Full Length	Decay	Full Height x Full Width x Full Length	59
16	Btw Col 2 and Right (South) End	Split	Top, 10'-0" Long	-
16	Btw Col 2 and Right (South) End	Decay	10'-0" Long	-
17	Left (North) End	Decay	10" Vertical x 8" Wide x 1'-6" Long	-
17	Right (South) End	Decay	10" Vertical x 10" Wide x 1'-0" Long	-
18	Left (North) End	Decay	10" Vertical x 8" Wide x 1'-3" Long	-
18	Right (South) End	Decay	8" Vertical x 6" Wide x 1'-0" Long	-

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

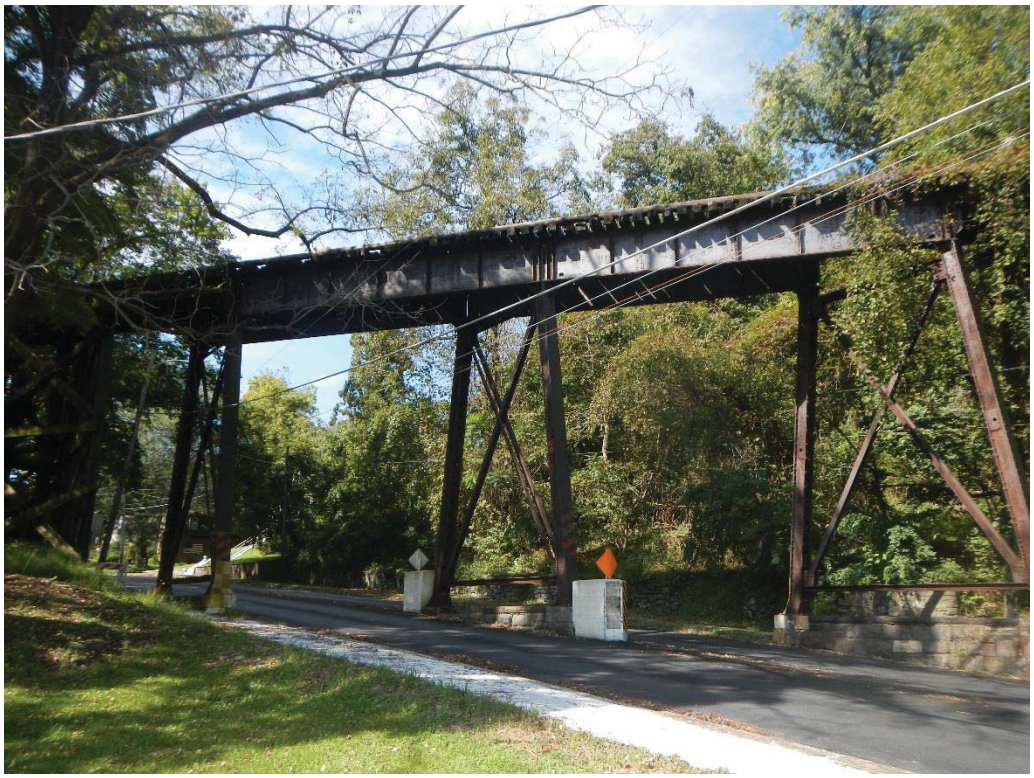
1. View Over Structure From Near (West) End

2. View Over Structure From Far (East) End

3. View of Near (West) Approach Looking West

4. View of Far (East) Approach Looking East

5. Partial Left (North) Elevation View



6. Partial Right (South) Elevation View

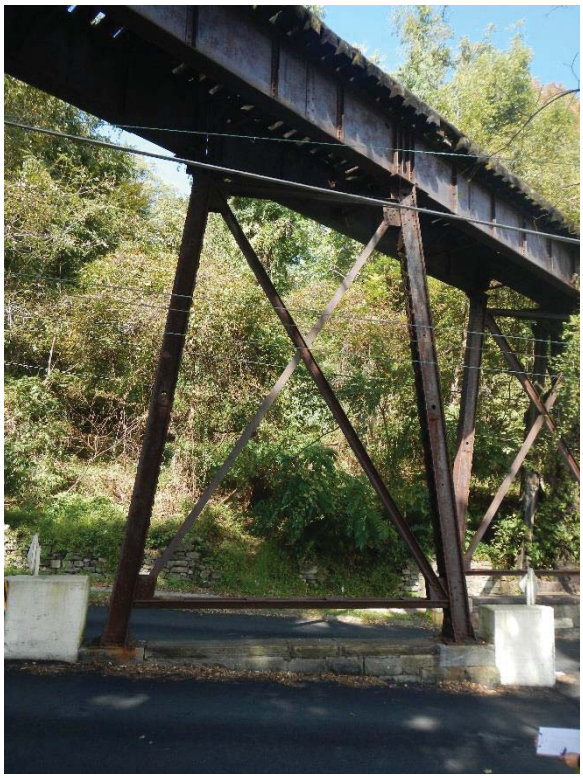
7. Span 2 Superstructure (Typical Timber Approach Span Superstructure)

8. Span 7 Superstructure (Typical Steel Approach Span Superstructure)

9. Span 9 Superstructure (Typical Main Span Superstructure)

10. Pier 18 Near (West) Elevation (Typical Approach Span Piers)

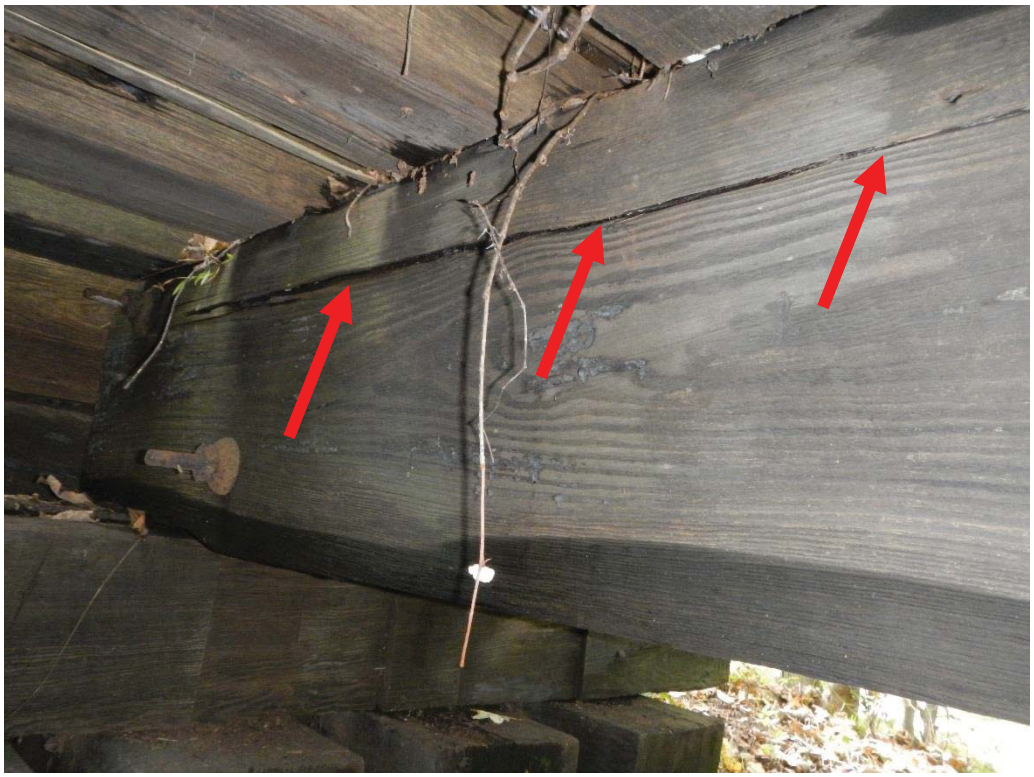
11. Pier 6 Far (East) Elevation (Approach Span Pier 10 Similar)



12. Pier 8 Near (West) Elevation (Typical Main Span Piers)

13. Significant Vegetation Growth Along Ties at Near (West) End

14. Significant Vegetation Growth Along Ties at Far (East) End

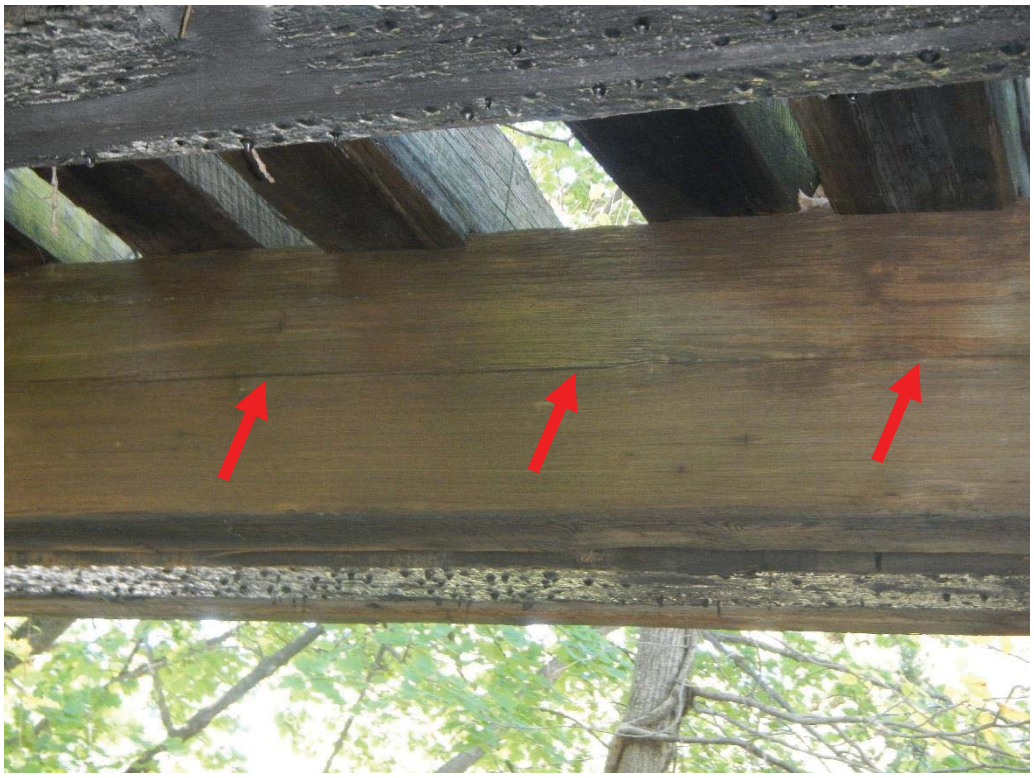


15. Span 1 Stringer 3 Horizontal Split in Stringer Adjacent to Near (West) Abutment (Split is Full Length)

16. Span 3 Stringer 5 Decay at Bottom of Stringer Adj to Pier 2 (Hammer Penetration up to 4”) (Decay Extends Full Height)

17. Span 4 Stringer 5 Decay Along Bottom of Stringer Adjacent to Pier 3 (Decay Extends Full Length)

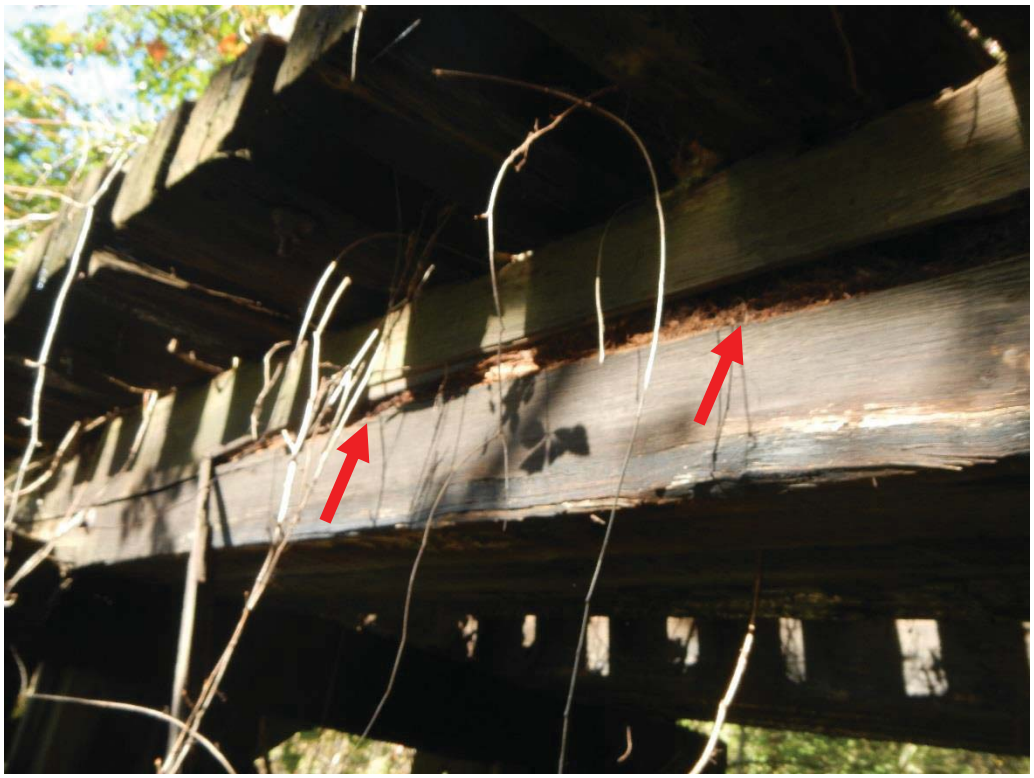
18. Span 4 Stringer 5 Decay Along Bottom of Stringer Adjacent to Pier 3 (Decay Extends Full Length) Close Up



19. Span 5 Stringer 3 Horizontal Split in Stringer

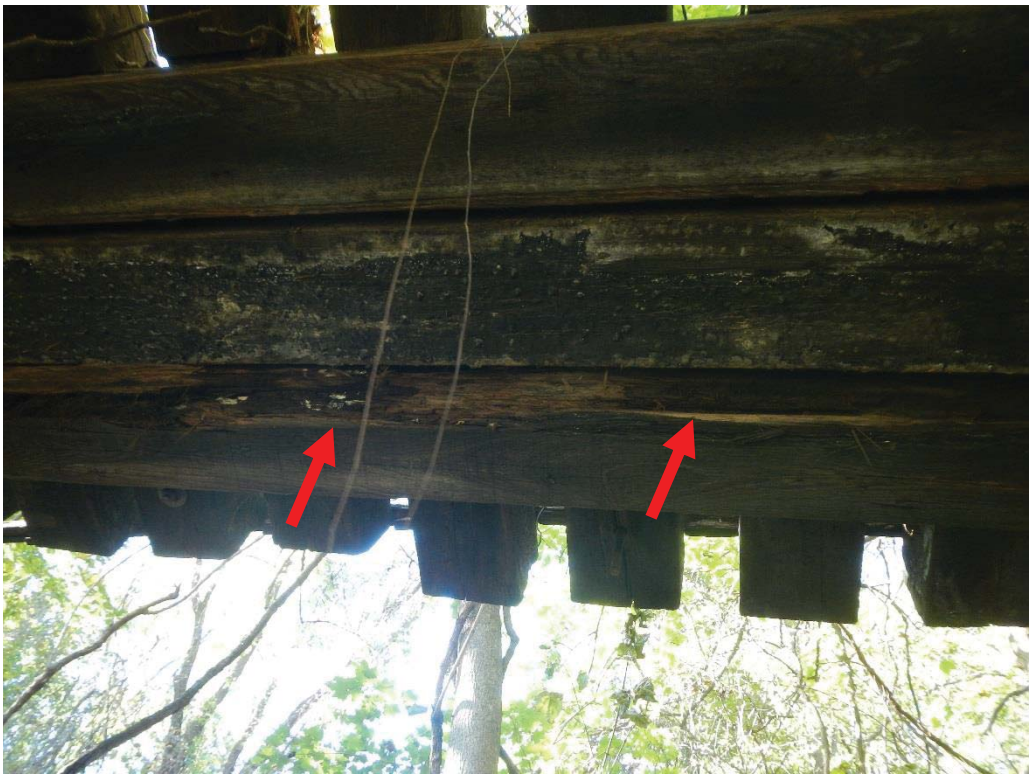
20. Span 13 Stringer 1 Horizontal Split in Stringer

21. Span 14 Stringer 6 Decay to Bottom of Stringer Adj to Pier 14 (Hammer Penetration up to 6”) (Decay Extends Full Height)



22. Span 15 Stringer 6 Decay to Stringer Along Entire Span

23. Span 15 Stringer 6 Decay to Stringer Along Entire Span Close Up



24. Span 16 Stringer 1 Decay to Bottom of Stringer

25. Span 16 Stringer 1 Decay to Top Portion of Stringer

26. Span 17 Stringer 3 Horizontal Splits in Stringer

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

27. Span 19 Stringer 1 Decay to Bottom of Stringer Adj to Pier 18 (1’ of Penetration with Rod) (Decay Extends Full Height)

28. Span 7 Stringer 1 100% Section Loss to Connection Angle Adjacent to Pier 7

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

29. Span 8 Girder 1 100% Section Loss to Stiffener Adjacent to Pier 7

30. Span 8 Girder 1 Bottom Flange Steel Rust Residue on Horizontal Gusset Plate (Typical)

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

31. Span 8 Girder 2 Bottom Flange 100% Section Loss to Horizontal Gusset Plate at Diaphragm 3

32. Span 8 Girder 2 Section Loss to Exterior Stiffeners Adjacent to Pier 8

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

33. Span 8 Girder 2 Section Loss to Exterior Stiffeners Adjacent to Pier 8 Close Up

34. Span 9 Girder 1 Top Flange Horizontal Gusset Plate Bent with Section Loss between Diaphragm 2 and 3

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

35. Span 9 Girder 2 Pack Rust Between Bottom Flange and Cover Plate (Typical)

36. Span 10 Stringer 2 Bent Connection Angle with Section Loss Adjacent to Pier 9

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

37. Near (West) Abutment Stem Longitudinal Member Decay (3’ of Penetration with 4’ Rod)

38. Far (East) Abutment Stem Longitudinal Member Decay (2’-6” of Penetration with 4’ Rod)

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

39. Near (West) Abutment Left (North) Wing Decay

40. Far (East) Abutment Left (North) Wing Decay

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

41. Far (East) Abutment Right (South) Wing Decay

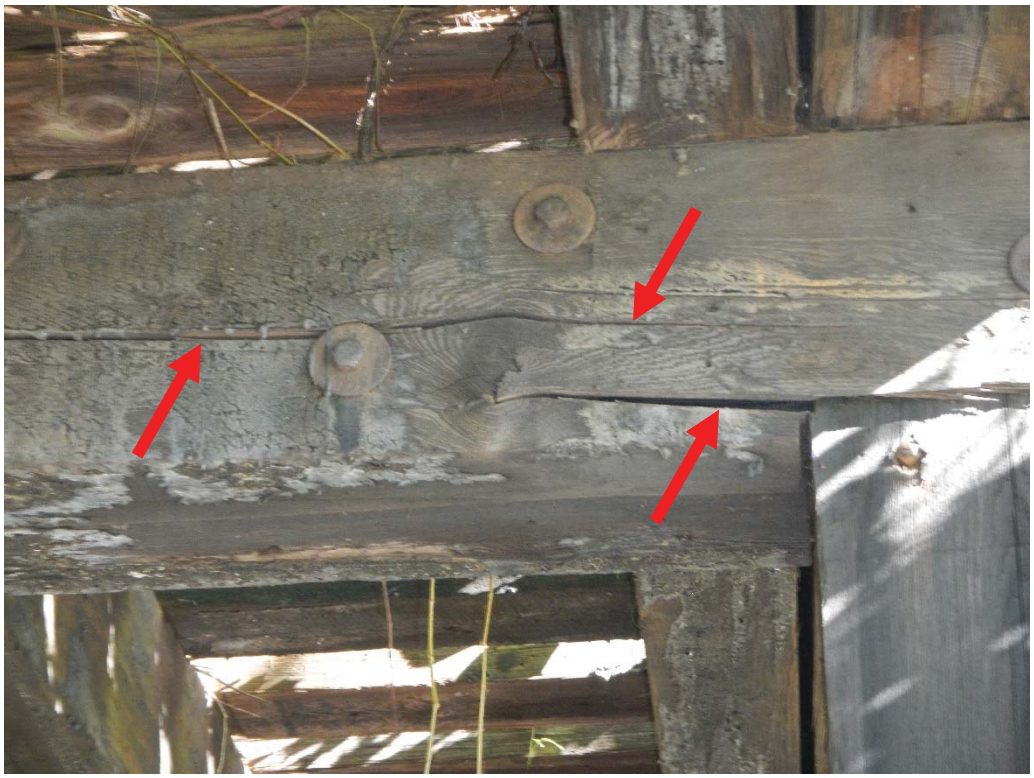
42. Pier 1 Right (South) End Top Strut Split (Split is Full Length)

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

43. Pier 1 Left (North) End Top Strut Decay (2’-4” Penetration with 4’ Rod)

44. Pier 3 Right (South) End Top Strut Decay

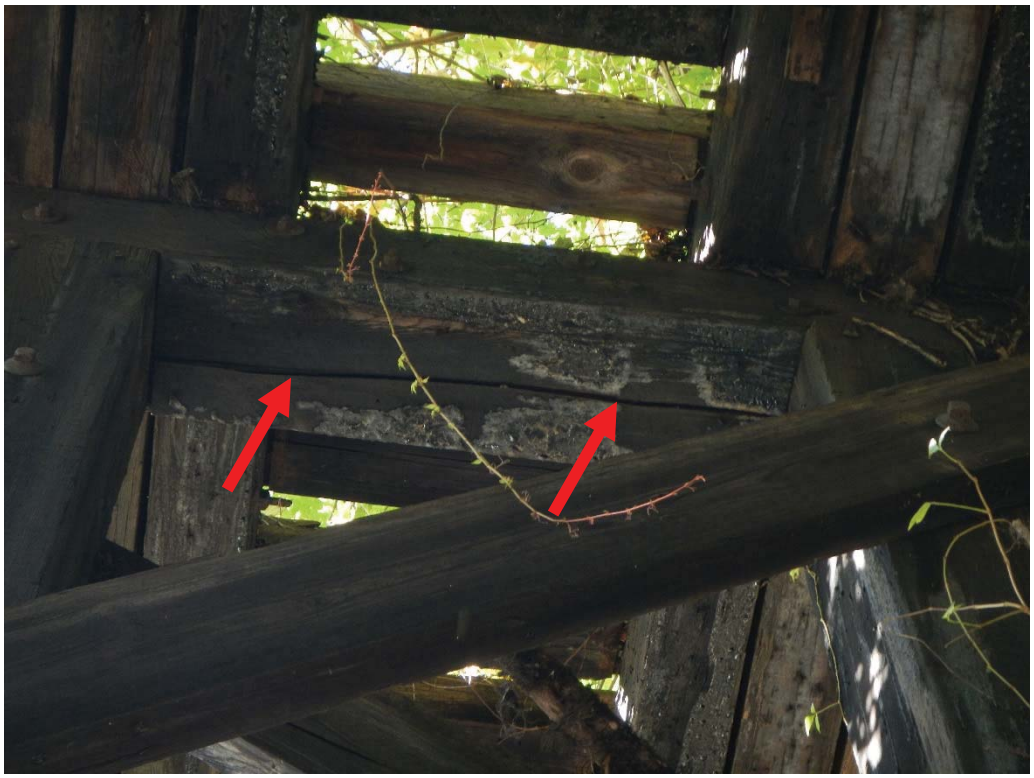
TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS



45. Pier 13 Near (West) Face Top Strut Splits

46. Pier 13 Near (West) Side Top Strut Decay Btw Cols 1 and 2 (Hammer Penetration up to 6”) (Decay Extends Full Height)

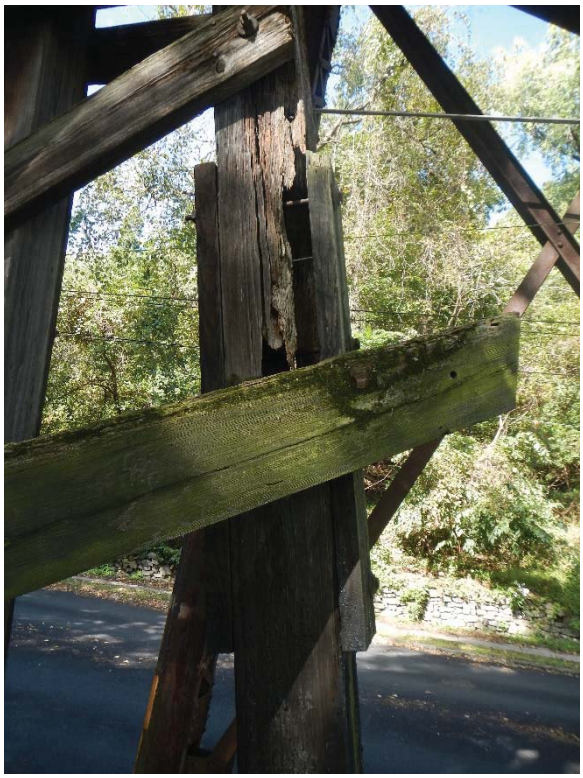
TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS



47. Pier 13 Top Strut Split at Underside Between Columns 2 and 3

48. Pier 1 Columns 1 and 2 Splits Far (East) Face

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS



49. Pier 6 Column 5 Decay Around Column Splice (Decay Extends Full Height)

50. Pier 10 Column 1 Decay Around Column Splice

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

51. Pier 10 Column 5 Decay Around Column Splice

52. Pier 12 Column 4 Split Far (East) Face

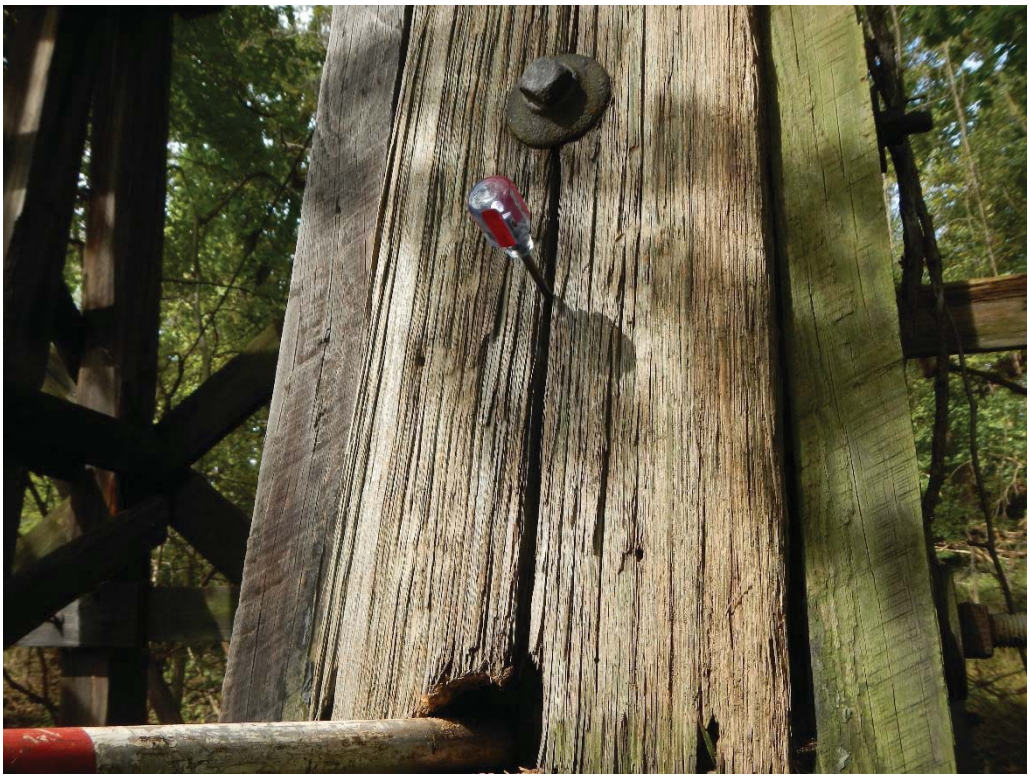
TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

53. Pier 14 Column 1 Decay Adjacent to Longitudinal Bracing at Left (North) Face

54. Pier 14 Column 4 Decay Around Column Splice (1'-4" of Penetration with 4' Rod)

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

55. Pier 15 Column 4 Decay Around Column Splice



56. Pier 15 Column 4 Decay Around Column Splice Close Up

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

57. Pier 1 Left (North) End Bottom Strut Decay (2’ of Penetration with 4’ Rod)

58. Pier 14 Bottom Strut Split/Decay

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

59. Pier 15 Bottom Strut Decay Between Columns 2 and 3 (Decay Extends Full Length)

60. Pier 14 Mudsills 5 thru 8 Decay (Typical Condition)

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

61. Pier 15 Mudsills 5 thru 8 Decay (Typical Condition)

62. Pier 15 Mudsills 5 and 6 Decay Close Up

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

63. Pier 15 Far (East) Right (South) End Footing Decay (3’-6” Penetration with 4’ Rod)

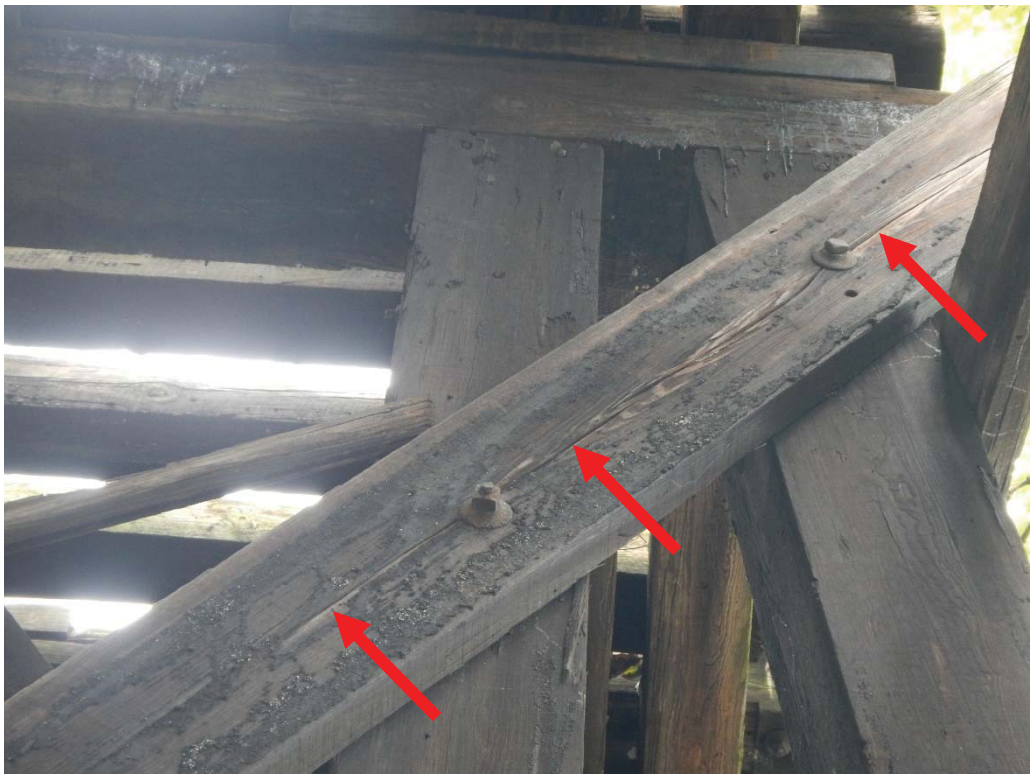
64. Pier 17 Right (South) End Footing Decay (4’ of Penetration with 4’ Rod)

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

65. Span 5 Right (South) Longitudinal Bracing Missing at Pier 5

66. Span 6 Right (South) Longitudinal Bracing Decay

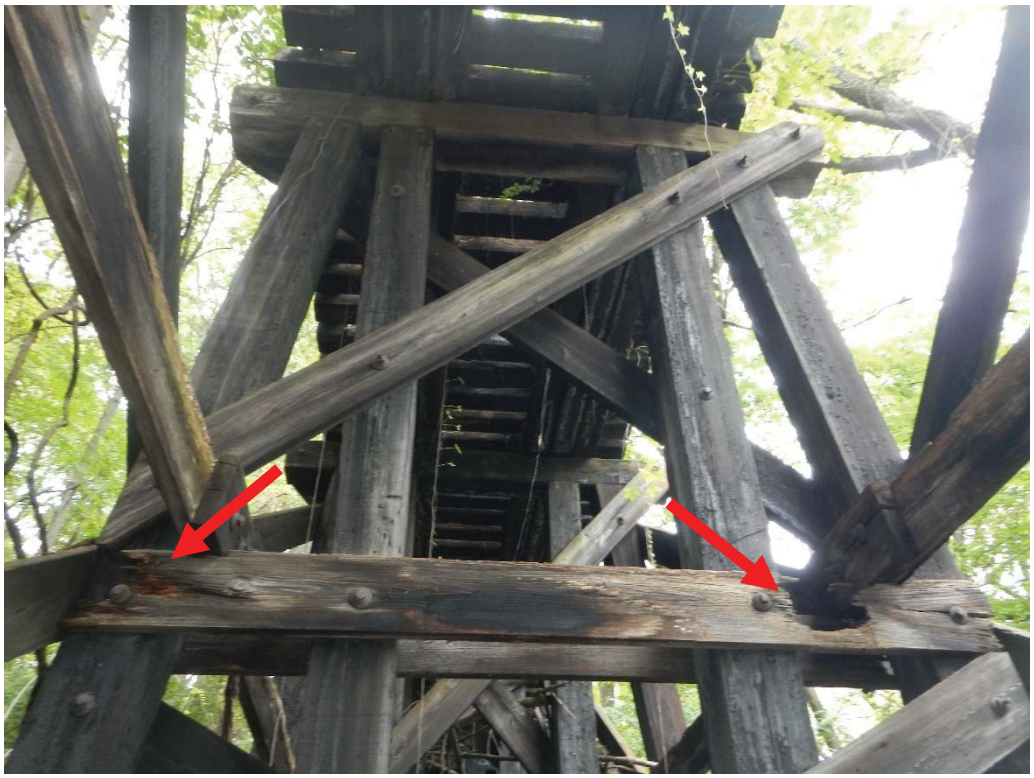
TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS



67. Pier 5 Near (West) Top Diagonal Transverse Brace Split

68. Pier 14 Far (East) Top Diagonal Transverse Brace Decay

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS



69. Pier 16 Near (West) Horizontal Transverse Brace Decay

70. Pier 7 Column 1 Bracing Vertical Gusset Plates Bent with Pack Rust

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

71. Pier 7 Column 1 Connection Angle 100% Section Loss

72. Pier 7 Column 2 Near (West) Bracing 100% Section Loss

TRESTLE BRIDGE OVER SPRING STREET PHOTOGRAPHS

73. Pier 8 Column 1 Connection Angle Section Loss

74. Pier 9 Column 1 Bracing Vertical Gusset Plates Bent with Pack Rust

ALTERNATIVES DISCUSSION

ALTERNATIVES DISCUSSION

Three alternatives that allow for a future trail crossing at SR 2026 (Iron Street) and Spring Street were evaluated. The alternatives discussed in detail below include:

- Bridge Removal with at Grade Trail
- Bridge Removal and Replacement for Trail Use
- Bridge Rehabilitation for Trail Use

All square foot costs utilized to determine estimated removal and replacement costs for the alternatives discussed below are based upon historical data.

BRIDGE REMOVAL WITH AT GRADE TRAIL ALTERNATIVE (RECOMMENDED)

The removal of the existing bridges with construction of an at grade trail crossing would be the most cost effective of the three alternatives. The cost associated with this alternative would primarily be the cost to remove the existing bridge, as the costs associated with rehabilitation of the existing structure or a new bridge are not applicable to this alternative.

Advantages:

- Removes the existing bridges that are in "imminent" failure condition
- No future maintenance of existing or new structures
- Least cost alternative

Disadvantages:

- A bridge crossing may be preferred by the public (aesthetics, views)
- A bridge crossing is safer to trail users in regards to crossing SR 2026 (Iron Street) and Spring Street

Utilizing a removal cost of $45/sf the cost associated with the removal of the bridges is estimated at $60,000 and $120,000 for the trestle bridge over SR 2026 (Iron Street) and the trestle bridge over Spring Street, respectively. These costs do not include costs associated with construction of an at grade trail.

BRIDGE REMOVAL AND REPLACEMENT FOR TRAIL USE ALTERNATIVE

The removal of the existing bridges and replacement with new bridges would be another trail crossing alternative. Regrading the embankment under the far (east) side of the trestle bridge over Spring Street would allow for some reduction in this structure's length. However, the length of the bridges would still be significant at approximately 125' for the SR 2026 crossing and 205' (a 55' structure length reduction) for the Spring Street crossing.

Advantages:

- Removes the existing bridges that are in "imminent" failure condition
- A bridge crossing may be preferred by the public (aesthetics, views)
- A bridge crossing is safer to trail users in regards to crossing SR 2026 (Iron Street) and Spring Street

Disadvantages:

- Future maintenance of new structures required
- Highest cost alternative

Utilizing a removal cost of approximately $45/sf the cost associated with the removal of the bridges is estimated at $60,000 and $120,000 for the trestle bridge over SR 2026 (Iron Street) and the trestle bridge over Spring Street, respectively. Utilizing a construction cost of approximately $350/sf the cost

associated with the construction of new bridges is estimated at $450,000 and $725,000 for the new bridge over SR 2026 (Iron Street) and the new bridge over Spring Street, respectively. Therefore, the total cost of this alternative is estimated at $510,000 and $845,000 for SR 2026 (Iron Street) and Spring Street, respectively.

BRIDGE REHABILITATION FOR TRAIL USE ALTERNATIVE

The steel superstructure portions of the trestle bridge over SR 2026 (Iron Street), the steel main span (Span 5) consisting of two (2) steel built-up plate girders, determined to be in fair condition could be rehabilitated and repurposed for trail use. Similarly, the steel superstructure portions of the trestle bridge over Spring Street, the steel spans consisting of two (2) approach spans (Spans 7 and 10) with two (2) steel rolled beams and two (2) main spans (Spans 8 and 9) with two (2) steel built-up plate girders, could be rehabilitated and repurposed for trail use. In addition, the steel substructure portions of the trestle bridge over Spring Street, Piers 7 thru 9, could be rehabilitated and repurposed for trail use.

However, the condition of timber portions of both structures resulting in an overall "imminent" failure condition rating indicates that there is major deterioration or section loss present in critical structural components. These elements will require rehabilitation or replacement. The number of timber members requiring rehabilitation and replacement to repurpose the structure for trail use is significant.

Also note that additional defects currently not visible will become apparent with the removal of timber members to be replaced. For example, when timber ties are removed, additional defects along the top of stringers will become apparent where the timber ties are currently connected to the stringers. Similarly in locations where timber stringers require replacement, additional defects of the supplemental top strut will become apparent where the stringer is currently connected to the supplemental top strut. Also note that additional portions of the structure that are not visible such as most timber footings which were buried were not inspected. Based on the condition of the other timber members and the visible portions of the timber footings, the condition of the timber footings that were not visible may also be an issue.

For the trestle bridge over SR 2026 (Iron Street), rehabilitation would require at a minimum the rehabilitation/replacement of the following timber members:

- Replacement of all stringers.
- Replacement of both abutments and wings.
- Replacement of all supplemental top struts.
- Rehabilitation/Replacement of the majority of top struts.
- Rehabilitation/Replacement of isolated columns.
- Rehabilitation/Replacement of some of the bottom struts.
- Replacement of all mudsills.
- Rehabilitation/Replacement of isolated footings.

For the trestle bridge over Spring Street, the rehabilitation requirements would be more extensive than the trestle bridge over SR 2026 (Iron Street) including increased column rehabilitation/replacement locations (some locations rather than isolated locations) and the addition of rehabilitation/replacement of some bracing members. See the In-Depth Bridge Inspection Summary and Defect Summary Tables for a detailed summary of the defects.

Given the general condition of the timber portion of the structures, the number of members that require rehabilitation/replacement, and the age of the structure (over 100 years old), it is not recommended to utilize the existing bridges for trail use. Therefore, no costs relative to this alternative are presented.

CONCLUSION

Given the three alternatives discussed, the recommended alternative for a future trail crossing is the bridge removal with at grade trail alternative. This recommendation is based on the cost of this alternative compared to the bridge removal and replacement for trail use alternative, the general condition of the timber portion of the existing structures, and the number of members that require rehabilitation/replacement for the bridge rehabilitation for trail use alternative.