

August 20, 2021

Louis Casolo, P.E.  
City Engineer, City of Stamford  
Engineering Department  
Stamford Government Center  
888 Washington Boulevard, 7<sup>th</sup> Floor  
Stamford, Connecticut 06901-2024

Re: 2021 In-Depth Inspection and Evaluation of Structure No. 02212  
West Main Street over Rippowam River (Pedestrian Bridge)  
Summary of Inspection Findings, Conclusions, and Repair Recommendations

Dear Mr. Casolo,

### **Introduction**

Structure No. 02212 was originally constructed in 1883 as a two-span lenticular truss-floorbeam-stringer bridge, supported by two (2) abutments and one (1) main pier to carry two directions of vehicular traffic. In 1922, eight (8) supplemental concrete piers were added under the center of each floorbeam to help support trolley traffic down the middle of the deck and essentially converted the bridge into a ten (10) mini-span structure. In 2002, due to the rapid deterioration of the superstructure and substructure, the bridge was immediately closed to vehicular traffic and was downgraded to carry pedestrians only. Between 2003 and 2019, conditions continued to worsen with the large failures of the West Abutment and Main Pier along with the severe section loss to the floorbeams, and the serviceable deck was consequently restricted to its center 10' width.

Per our recent agreement with the City of Stamford, CT, Greenman-Pedersen, Inc. (GPI) conducted an in-depth inspection and evaluation of the above-referenced bridge and its approaches on July 20, 2021. All visible portions of the deck, superstructure, and substructure were assessed for condition; and all substructure units were probed for evidence of scour. Specifically, special attention was paid to the significant deterioration of the floorbeams, the failing dry stacked stone West Abutment, and the failing stone masonry Pier 5 (original lone / center pier). The inspection also included an assessment of the pedestrian protection features along the center of the bridge, and acquisition of streambed profile measurements surrounding all nine (9) piers due to the observed presence of scour and substructure undermining.

The following generally summarizes the conditions observed during the inspection, including any changes and/or new developments noted since the similar inspections conducted in 2002 and 2011:

### **Deck** (Condition Rating = 2 (Critical))

1. Both gangways (bridging the original center pier and bridging the West Abutment) are in good condition and appeared to be stable and secure at the time of inspection. There is a missing bolt on the chain link fence hold-down plate on the west end gangway. **See Photo 10.**

2. The chain link fence installed at both ends and across the full length of the bridge to guide pedestrian traffic toward the gangways and prevent their access to the deteriorated portions of the bridge exhibits breaches at the following locations: **See Photos 11 and 12, and Refer to Appendix C.**
  - a. West end of the bridge allowing pedestrian access into the closed-off south side of the deck.
  - b. West approach allowing pedestrian access into the closed-off south side of the deck.
  - c. West approach allowing pedestrian access into the closed-off north side of the deck.
  - d. East end of the bridge allowing pedestrian access into the closed-off original south pedestrian walkway.
  - e. East end of the bridge allowing pedestrian access into the closed-off north side of the deck.
3. The bituminous asphalt pavement exhibits widespread longitudinal cracking, mapcracking, depressions, and uneven patchwork. **See Photos 4 and 6.**
4. In general, the deck concrete exhibits widespread scaling with exposed aggregate throughout the underside and there is one 12'± long failed area with exposed and loose or missing original brick pavers and underside of the asphalt pavement in the north fascia bay in Span 2 (outside the limits of the gangways). **See Photos 13 and 14, and Refer to Appendix B.**

### **Trusses** (Condition Rating = 2 (Critical))

1. Typical Truss Conditions:
  - Pack rust (up to 3/4") between all faying surfaces resulting in deformed cover plates and minor section loss to the hanger plates at all upper and lower panel points. **See Photo 15.**
  - Various rivets throughout all upper panel points are broken due to pack rust forces - some were previously replaced but many are still missing. **See Photo 15.**
  - The pin covers / eyebar spacers within the panel points are broken at scattered locations. **See Photo 16.**
  - The end verticals on all four (4) trusses exhibit severe laminar corrosion with up to 100% section loss throughout the lower 12". Several locations were previously repaired with welded steel plates; however, those repairs are deteriorating. The verticals also exhibit numerous torch flame gouges within the lower 3', and there is ±3" thick dirt and debris accumulation at the base of them. **See Photo 17.**
2. Defects on Southwest Truss:
  - L0-U0: Lower 3' of the vertical has a welded south wall repair plate and a welded west wall repair plate for the lower 2'. The end finial has a broken connection. Several lacing bars have been replaced and are welded together.
  - L3-U3: Vertical exhibits severe collision damage with torn angle legs, is shifted west 2-1/2" at PPL3, is shifted outward (south) 2-1/2", and is bowed west 3" (minimum) approximately 1' from PPL3. The lacing bars are bowed west 1-1/2". **See Photo 18.**
  - U3-L4: Diagonal is shifted inward (north) 2-1/4" and is slightly bowed.
  - L5-U5: Lower 3' of the vertical has a welded east wall repair plate.

3. Defects on Southeast Truss:

- L0-U0: Lower 3' of the vertical has a welded west wall repair plate.
- U1-L2: Diagonal is bowed outward (south) up to 3/4" near PPL2.
- L2-U2: Vertical exhibits minor collision damage.
- U2-L3: Diagonal is bowed upward up to 1-1/4" and outward (south) up to 3/4".
- L3-U3: Vertical exhibits moderate collision damage and is bowed east up to 1".
- U3-L4: Diagonal is bowed outward (south) up to 3/4" near PPL4.

4. Defects on Northwest Truss:

- L0-U0: Vertical exhibits significant collision damage - all components are severely deformed, broken, and/or detached, and the entire member is bent outward (north) by up to 3". Lower 3' of the vertical has a welded south wall repair plate. Additionally, there is a large tree growing around the vertical which is beginning to push it eastward. **See Photo 19.**
- U0-U1: Diagonal is shifted outward (north) up to 3" at U0.
- L1-U1: Lower hanger is bowed inward (south) up to 1".
- L2-U2: Vertical was previously repaired (mostly replaced) for its full height where the originally riveted components were removed in their entirety and replaced with welded components arranged to match the geometry and style of the existing. **See Photo 20.**
- L2-U3: Diagonal is bowed outward (north) up to 5". **See Photo 21.**
- U2-L3: Diagonal is bowed outward (north) up to 1".
- U4-U5: Upper Chord exhibits a 4" long tear and upward deflection in lower angle leg of south face at PPU4.
- L5-U5: Lower 3' of the vertical has a welded east wall repair plate.

5. Defects on Northeast Truss:

- L0-U0: Lower 3' of the vertical has a welded west wall repair plate.

6. The floorbeam hanger rods exhibit severe laminar corrosion with significant section losses at every location. At the worst occurrences, the 1-1/4" thick square bar is reduced to 3/4" remaining thickness metal (RTM) where it passes through the floorbeam upper flange and 1/2" RTM where it passes through the floorbeam lower flange. Additionally, the rods exhibit 5/8" min. (est.) section losses around the pin at numerous locations. **See Table 1** below for the tabulated section loss per floorbeam. **See Photo 22.**

Table 1 - Defects and Section Losses on Floorbeam Hanger Rods		
Location	South Hanger	North Hanger
FB1	<ul style="list-style-type: none"> <li>• 1" RTM at upper flange and lower flange.</li> <li>• Rod bent 1/2" south.</li> </ul>	<ul style="list-style-type: none"> <li>• 1/2" section loss at upper flange and 1/2" RTM at lower flange.</li> <li>• Rod bent up to 1-1/2" north.</li> </ul>
FB2	<ul style="list-style-type: none"> <li>• 1" RTM at upper flange and lower flange.</li> <li>• Rod bent 1/2" south.</li> </ul>	<ul style="list-style-type: none"> <li>• 1/2" section loss at upper flange and 1/2" RTM at lower flange.</li> </ul>

<b>Table 1 - Defects and Section Losses on Floorbeam Hanger Rods (cont.)</b>		
<b>Location</b>	<b>South Hanger</b>	<b>North Hanger</b>
FB3	<ul style="list-style-type: none"> <li>1" RTM at upper flange and lower flange.</li> <li>Rod around pin exhibits severe laminar corrosion with greater than 5/8" section loss.</li> </ul>	<ul style="list-style-type: none"> <li>1/2" section loss at upper flange and lower flange.</li> </ul>
FB4	<ul style="list-style-type: none"> <li>1" RTM at upper flange and 1/2" RTM at lower flange.</li> </ul>	<ul style="list-style-type: none"> <li>No Significant Defects Noted.</li> </ul>
FB5	<ul style="list-style-type: none"> <li>No floorbeam appears to exist at Pier 5; however, a phantom number was assigned to maintain the pattern of the floorbeam designation matching the pier designation at all locations.</li> </ul>	
FB6	<ul style="list-style-type: none"> <li>1" section loss at upper flange and 1" RTM at lower flange.</li> </ul>	<ul style="list-style-type: none"> <li>1/2" section loss at lower flange.</li> </ul>
FB7	<ul style="list-style-type: none"> <li>1/2" RTM at upper flange and lower flange.</li> <li>Rod around pin exhibits severe laminar corrosion with greater than 5/8" section loss.</li> </ul>	<ul style="list-style-type: none"> <li>3/4" section loss at upper flange and 1" RTM at lower flange.</li> <li>Rod around pin exhibits severe laminar corrosion with greater than 5/8" section loss.</li> </ul>
FB8	<ul style="list-style-type: none"> <li>1/2" section loss at upper flange and 3/4" section loss at lower flange.</li> </ul>	<ul style="list-style-type: none"> <li>1/2" section loss at upper flange and lower flange.</li> </ul>
FB9	<ul style="list-style-type: none"> <li>1/2" section loss at upper flange and lower flange.</li> </ul>	<ul style="list-style-type: none"> <li>3/4" RTM at lower flange and 1" RTM at upper flange.</li> </ul>

**Superstructure** (Condition Rating = 2 (Critical))

1. The West Abutment end of Stringers 14 thru 25 (north trolley stringer to south fascia) are unsupported due to the previously failed dry stacked stone abutment wall and appear to be displaced downward several inches. **See Photo 26.**
2. The stringers are embedded in the deck concrete and only their lower flanges are exposed. Those flanges exhibit widespread severe corrosion with areas of 100% section loss. Additionally, the fascia stringers are pulled away from the deck concrete at several locations. **See Photo 13.**
3. All floorbeams are severely deteriorated from Stringer 11 to the north fascia and from Stringer 21 to the south fascia with widespread areas of 100% section loss to the web, including the previously installed repairs at various floorbeams, and up to 75% loss on the flanges. Floorbeams 6 and 7 are holed-thru at their south pier interface, and Floorbeam 8 is holed-thru at both of its pier interfaces for Full Height x up to 2"W. **See Photos 9, 22, and 23.**
4. The cross-bracing is completely detached and missing in Span 2 and is broken / drooping in Spans 4 and 10. **See Photo 29.**

**Substructure** (Condition Rating = 2 (Critical))

1. Significant scour was noted at the upstream end of the original lone / center pier (Pier 5) and most of the supplemental piers where footing exposure was documented as follows:
  - **Pier 1** - No footing exposure; however, the timber formwork plank at the wall base is exposed up to 9" high around the upstream nose. Per the exposed footing details at other piers, that plank is embedded in the top of footing concrete; therefore, the top of the Pier 1 footing is assumed to be just below the riverbed. *Note - the 2002, 2007, and 2011 CTDOT Biennial Inspection Reports documented no footing exposure at this location. See Photo 24.*
  - **Pier 2** - No footing exposure; however, the timber formwork plank at the wall base is exposed up to 9" high around the upstream nose. Per the exposed footing details at other piers, that plank is embedded in the top of footing concrete; therefore, the top of the Pier 2 footing is assumed to be just below the riverbed. No undermining was detected. *Note - the 2002, 2007, and 2011 CTDOT Biennial Inspection Reports documented no footing exposure at this location.*
  - **Pier 3** - Footing is exposed up to 1'-5" vertically at the upstream nose and extending down the west face for approximately 3'. No undermining was detected. *Note - the 2002, 2007, and 2011 CTDOT Biennial Inspection Reports documented no footing exposure at this location.*
  - **Pier 4** - Footing is exposed up to 1'-7" vertically at the upstream nose and extending down the west face for approximately 5'. No undermining was detected. *Note - the 2002, 2007, and 2011 CTDOT Biennial Inspection Reports documented no footing exposure at this location. See Photo 25.*
  - **Pier 5 (original lone / center pier)** - Footing is exposed throughout the upstream reconstructed portion (concrete) up to 3'-6" vertically at the northeast corner. No undermining was detected. *Note - the 2002 CTDOT Biennial Inspection Report documented up to 2'-0" of vertical footing exposure at this location while the 2011 CTDOT Biennial Inspection Report documented up to 1'-3" of vertical footing exposure. Based on these differences, it is evident that the scour is dynamic (as expected), and the 2021 findings reveal an increase of 2'-3" since 2011. See Photo 25.*
  - **Pier 6** - No footing exposure; however, the top of the timber formwork plank at the wall base was detected via probing through the riverbed. *Note - the 2002, 2007, and 2011 CTDOT Biennial Inspection Reports documented no footing exposure at this location.*
  - **Pier 7** - Footing is exposed up to 3" vertically along the downstream half of the west face. No undermining was detected. *Note - the 2002, 2007, and 2011 CTDOT Biennial Inspection Reports documented no footing exposure at this location.*
  - **Pier 8** - Footing is exposed up to 6" vertically along the entire west face with plank exposure around the upstream nose and along the full length of the west face. No undermining was detected. *Note - the 2002 and 2007 CTDOT Biennial Inspection Reports documented up to 9" of vertical footing exposure at this location; that measurement was subsequently confirmed in 2007. However, in 2011, documentation of no footing exposure was provided.*
  - **Pier 9** - No footing exposure; however, the top of the timber formwork plank at the wall base was detected via probing through the riverbed. *Note - the 2002, 2007, and 2011 CTDOT Biennial Inspection Reports documented no footing exposure at this location.*

Refer to the Appendix A: "Scour Sketches" at the end of this letter for detailed depictions of the channel soundings at every pier. Based on the age of construction and the fact that the supplemental piers were constructed in the early 1920's and subsequent to the bridge's original build date of 1883, it should be assumed that they are founded on spread footings with no piles present (conservative approach). Additionally, per the 2018 soil borings acquired adjacent to both abutments, competent rock exists at a depth of 27' to 30' but no information on the foundations for the abutments and piers was provided as part of those efforts or within WMC's associated Bridge Rehabilitation Plans. Those findings and our assumptions are further supported by the information and data presented in CTDOT's *Initial Evaluation Summary / Revised Initial Evaluation Summary / Non-Destructive Testing Results* report dated October 2001 (CTDOT Project No. 170-1788/1789).

2. All supplemental piers exhibit concrete abrasion up to 6"D at their base, light rust staining, and random vertical and horizontal cracks scattered throughout. **See Photos 24 and 25.**
3. The extent of the previously failed portion of the dry stacked stone West Abutment appears to have increased in length on both sides of the collapse. Currently, the abutment exhibits a 22'W x Full Height x 9'D void with loose blocks extending several feet from each end. The loosened blocks are not yet laying in the river, but they are displaced outward and are likely on their way. Scattered deep voids are present throughout. **See Photo 26.**
4. The failed portion on the west face of the stone masonry center pier (Pier 5) also appears to have worsened since 2018. While the length and height are generally the same, the depth extends up to 4'-6" max., leaving only about 1'-6" remaining thickness - basically the (east) fascia course of blocks are all that's left in parts. Furthermore, the east end of the south truss in Span 5 has limited support due to this failure and the adjacent south nose of the pier which exhibits loosened and displaced blocks up to 9" outward. *Note - based on the exposed interior, construction of the 6' thick wall appears to be masonry throughout (not just stacked / placed rock between the fascia courses).* **See Photos 27 and 28.**
5. The dry stacked stone East Abutment exhibits deep voids (1.5 SF areas x 5'+D), but the wall is uniform and generally stable. There is a 3'L x 2'H x Full Depth "punch-through" for the utility pipe near the south end with surrounding loose stones. **See Photo 29.**

**Channel / Waterway** (Condition Rating = 4 (Poor))

1. On average, the depth of the river beneath the bridge is a few feet greater than upstream and downstream indicating the presence of contraction scour. Additionally, local scour exists at all nine (9) piers as documented above.
2. While no heavy drift and debris accumulations were noted at the piers, GPI was advised that the channel had been cleaned-out just prior to our visit. We did observe various small fallen trees, limbs, and/or branches caught at each pier at the time of our inspection - there were heavy thunderstorms that passed through Stamford subsequent to the cleanout; therefore, it is assumed that this drift was a result of those flows. **See Photos 9 and 30.**
3. Also, the failed blocks from the south end of Pier 5 are laying in the river and extend across to adjacent Pier 4 and block the Span 5 channel for a 3'± height, causing additional flow restriction. **See Photo 27.**

## Conclusions and Repair Recommendations

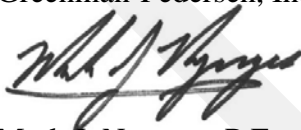
The bridge remains in overall critical condition due to the advanced deterioration of the deck, superstructure, and substructure. However, both gangways located in the middle of the deck (one bridging the original lone / center pier (Pier 5) and the other bridging the West Abutment) are in good condition and appeared to be stable and secure at the time of inspection. Although scour was noted at all nine (9) piers and footing exposure is present at many of them, no undermining was detected and none of them exhibited signs of distress and/or instability. Furthermore, the deck, floorbeams, and stringers beneath and in the immediate vicinity of the gangway points of support also did not exhibit signs of distress and/or instability; therefore, it is GPI's opinion that the gangways can remain open for pedestrian use at this time.

As a result of our latest findings, however, we do recommend that the following priority repairs be made to maintain the remaining integrity of the bridge and to ensure continued safety for the pedestrian traffic:

1. Restore the breached areas of protective / guide fencing across the bridge. **See Photos 11 and 12, and Refer to Appendix C.**
2. Remove the tree growing around the west end vertical (L0-U0) of the Northwest Truss to prevent further displacement of the structure. **See Photo 19.**
3. Routinely remove the drift and debris accumulations from beneath the bridge. At a minimum, the channel should be visually checked monthly and following all significant storm events for the development of such accumulations. **See Photos 9 and 30.**
4. Routinely monitor the exposed pier footings for an increase in extent and the development of undermining. At a minimum, all nine (9) piers should be probed every three (3) months and following all significant storm events. **See Photos 24 and 25.**
5. Routinely monitor the failed portions of the dry stacked stone West Abutment and stone masonry Pier 5 for an increase in extent. At a minimum, the walls should be visually checked every three (3) months and following all significant storm events. **See Photos 26 thru 28.**

Please do not hesitate to contact me should you have any questions or need additional information.

Sincerely,  
Greenman-Pedersen, Inc.



Mark J. Nyerges, P.E.  
Project Manager

Attachments

*Professional Certification: I hereby certify that this Report, including all of its contents, has been approved by me and that I am a duly licensed Professional Engineer under the laws of the State of Connecticut.*

CT License No.: PEN.0030659

Date: 8/20/2021



**PHOTOGRAPHS**





**Photo 1:** South Elevation of Structure.



**Photo 2:** North Elevation of Structure.



**Photo 2:** Waterway looking downstream (south).



**Photo 3:** Waterway looking upstream (north).



**Photo 4:** General view of East Approach looking east. Note the longitudinal wide cracks and uneven patchwork throughout the asphalt pavement.



**Photo 5:** General view of West Approach looking west.



**Photo 6:** General view of Top of Deck looking west from Span 2. Note the widespread longitudinal cracking, mapcracking, and depressions throughout the asphalt pavement.



**Photo 7:** General view of the South Truss and closed-off original south pedestrian walkway looking east from the west end. Note the walkway exhibits numerous areas of rotted, loose, and/or broken timber planks and is not suitable for usage.



**Photo 8:** General view of the North Truss and closed-off original north pedestrian walkway looking west from the east end. Note the walkway exhibits numerous areas of rotted, loose, and/or broken timber planks and is not suitable for usage.



**Photo 9:** General view of the underside of deck, superstructure, and substructure looking southeast toward Spans 6 thru 10. Note the severely deteriorated floorbeams with holed-thru webs. Also note the typical drift and debris accumulation at the piers.



**Photo 10:** General view of the West Gangway (bridges the West Abutment), looking east. Note the gangway is in good condition but is missing one (1) bolt for the hold-down plate at the west end (circled).



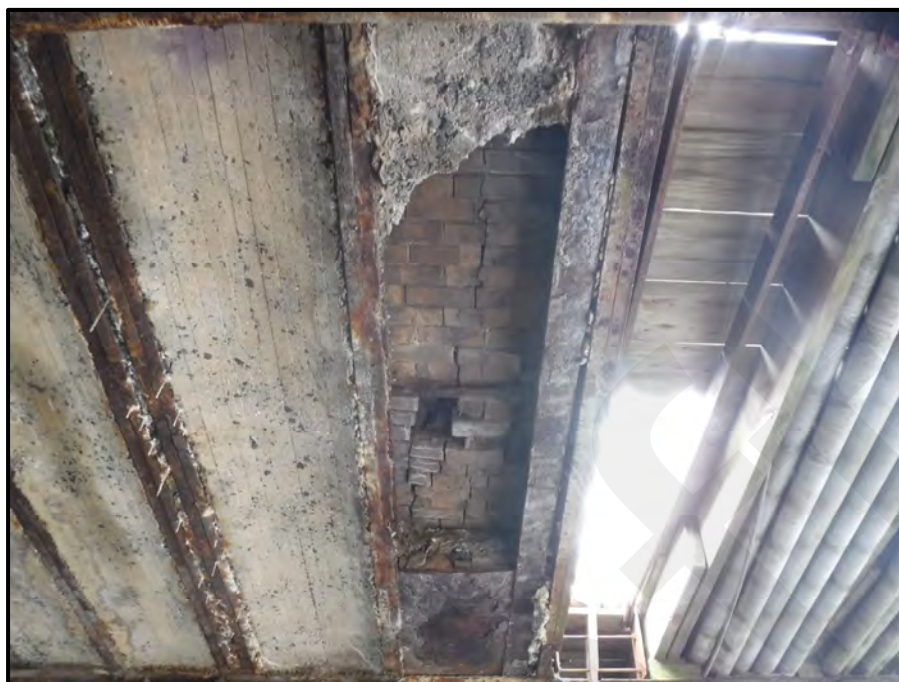
**Photo 11:** Breach in the protective fencing at the west end of the bridge allowing pedestrian access into the closed-off south side of the deck, looking south. Similar breaches are present at several locations throughout the bridge (refer to Appendix C).



**Photo 12:** Breach in the protective fencing at the east end of the bridge allowing pedestrian access into the closed-off original south pedestrian walkway, looking west.



**Photo 13:** Typical widespread scaling with exposed aggregate throughout the underside of the deck in Span 9, looking up, facing east. Note the stringers embedded within the deck exhibit severe deterioration of the exposed flanges.



**Photo 14:** 12'± long x 2'± wide area of failed concrete deck with exposed and loose or missing original brick pavers and underside of the asphalt pavement in the north fascia bay in Span 2, looking up, facing west. This condition is outside the limits of the gangways (refer to Appendix B).



**Photo 15:** Southwest Truss, Panel Point U4 exhibits pack rust (up to 3/4") underneath the upper cover plates, looking southwest. Note the replaced broken rivet. Conditions are typical at all upper panel points.





**Photo 16:** Southwest Truss, Panel Point L4 exhibits a broken pin cover / eyebar spacer, looking down, facing west. Condition is typical at numerous eyebars.



**Photo 17:** Southeast Truss West End Vertical (L0-U0) exhibits severe laminar corrosion with up to 100% section loss throughout the lower 12", looking down, facing east. Note the deteriorating welded repair plate and the debris accumulation at the bottom. Conditions are typical at all end verticals.

**Photo 18:** Southwest Truss Vertical L3-U3 is severely collision damaged with deformed and broken components, looking northeast. The entire member is shifted west 2-1/2" and outward 2-1/2". The member is also bowed west 3" (min.) approximately 1' from PPL3, and the lacing bars are also bowed west 1-1/2".



**Photo 19:** Northwest Truss West End Vertical (L0-U0) is severely collision damaged with deformed, broken, and/or detached components, looking southwest. The entire member is bent outward (north) by up to 3", and the upper chord (U0-U1) is also shifted outward up to 3". Note the large tree growing around the vertical which is beginning to push it eastward.

**Photo 20:** Northwest Truss Vertical L2-U2 was previously replaced in its entirety with welded components matching the style and geometry of the existing, looking west.



**Photo 21:** Northwest Truss Diagonal L2-U3 is bowed outward (north) up to 5", looking east. Condition is typical at numerous diagonals.



**Photo 22:** The hanger rod at the south end of Floorbeam 7 exhibits severe laminar corrosion with 1/2" remaining thickness metal (RTM) locally where it passes through the floorbeam's upper and lower flanges (original thickness is 1-1/4"), looking east. Note the rod exhibits 50% min. (est.) section losses around the pin. Also note the severely holed-thru floorbeam web and the severe laminar corrosion on the flanges. All conditions are typical at nearly every location.



**Photo 23:** The Floorbeam 8 web is holed-thru for its full height x 2"W at the interface with the south face of Pier 8, looking west.



**Photo 24:** Inspector is standing on top of the exposed footing (up to 9" vertically) at the upstream (north) nose of Pier 1, looking south. No undermining was detected, and similar conditions exist at Piers 2, 6, 8, and 9. Note the concrete abrasion up to 6" deep throughout the base of the pier, typical throughout all piers.



**Photo 25:** The footing at the upstream (north) nose of Pier 4 is exposed up to 1'-7" vertically, looking south (no undermining was detected). Note the random cracks and light rust staining scattered throughout the pier, typical throughout all piers. Additionally, note the inspector standing on top of the exposed footing / scour protection wall along the concrete reconstructed north end of Pier 5 (original lone / center pier) (left).



**Photo 26:** General view of the previously failed portion of the dry stacked stone West Abutment, looking west. The extent of the loosened blocks bookending the collapse appears to have worsened since the 2018 inspection. Also note the ends of Stringers 14 thru 25 (north trolley stringer to south fascia) are unsupported as a result and appear to be displaced downward several inches.



**Photo 27:** General view of the previously failed portion of the stone masonry Pier 5 (original / lone center pier), looking northeast. While the length and height of the collapse are generally the same, the depth extends up to 4'-6" max., leaving only about 1'-6" remaining thickness and resulting in limited support for the east end of the south truss and Stringers 16 thru 25. Note the failed masonry blocks are laying in the river and block the Span 5 channel for a 3'± height.



**Photo 28:** General view of the south nose of Pier 5 which exhibits loosened and displaced blocks up to 9" outward on the west face (left), looking north.



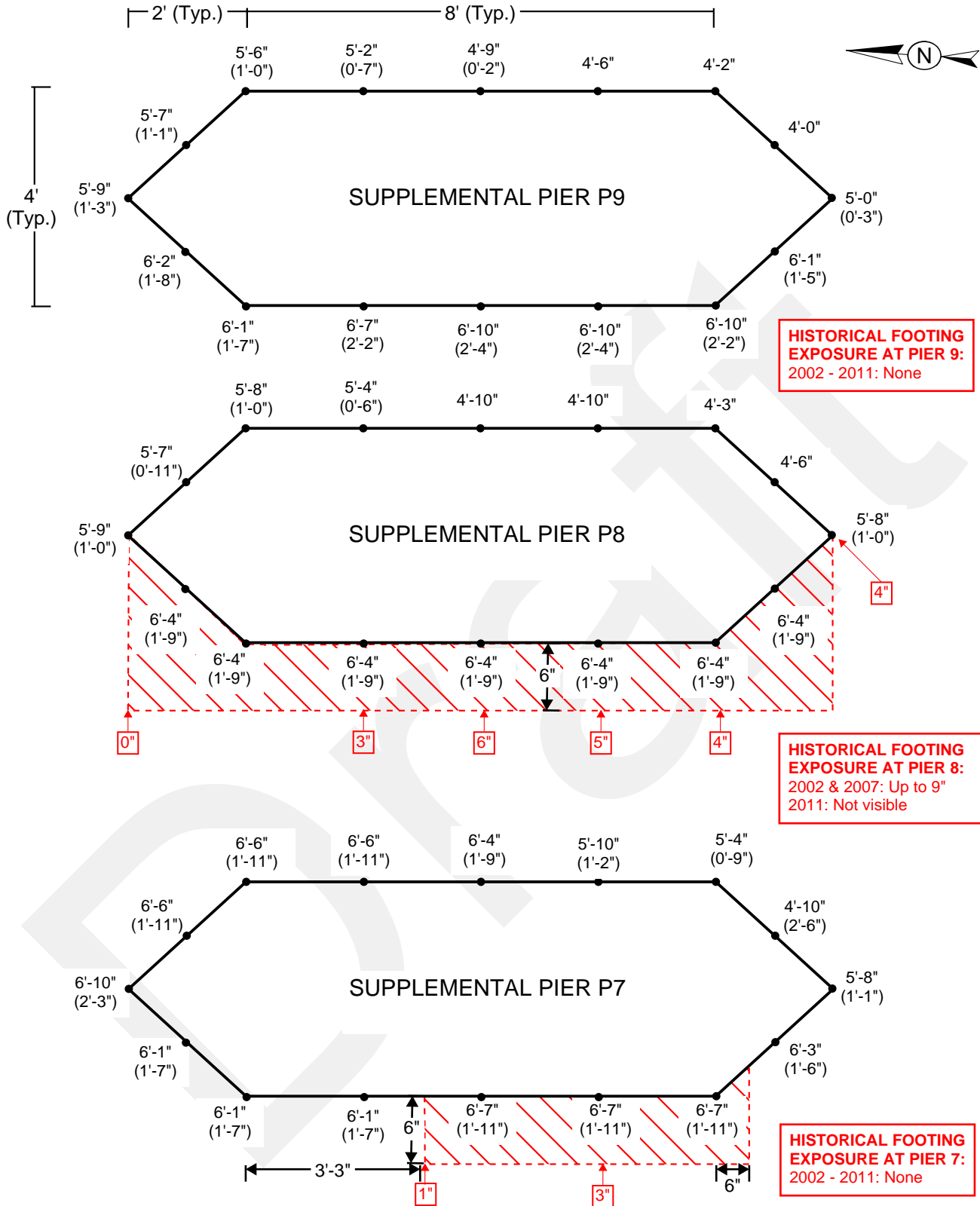
**Photo 29:** General view of dry-stacked East Abutment which exhibits deep voids (1.5 SF x 5'+D) throughout and loose stone surrounding the “punch-through” for the utility pipe, looking southeast. Note the broken superstructure cross-bracing in Span 10.



**Photo 30:** Drift and debris accumulation at the upstream (north) nose of Pier 8, looking south. Condition is typical to varying degrees at all nine (9) piers.



**APPENDIX A**  
**SCOUR SKETCHES**

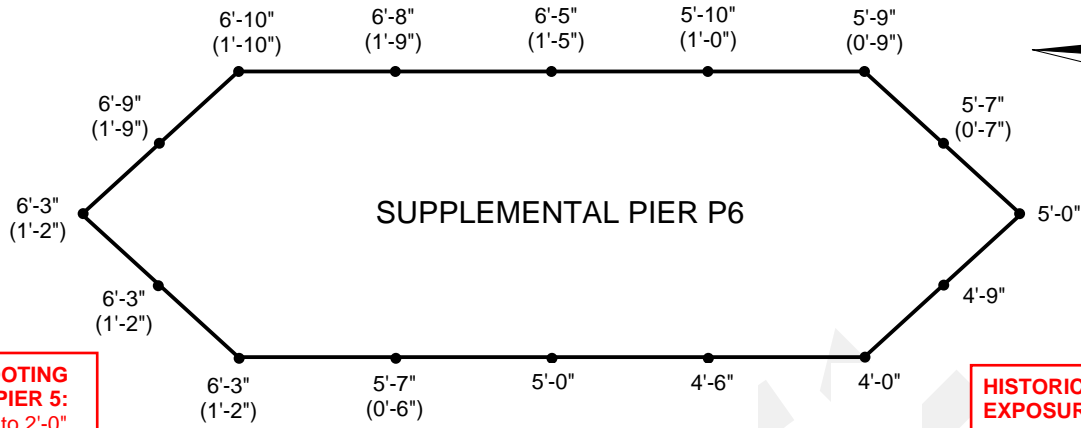


**Notes:**

- 1) All measurement in black ink are from the top of Pier Stem to the Streambed, followed by the water depth measurement in parentheses.
- 2) Red ink indicates footing exposure. At these locations, the black ink measurement shown is to the top face of the footing. A footing exposure of 0" indicates only the top face is exposed.
- 3) Refer to Sketch 4 for typical Elevation Sketch with footing exposure.

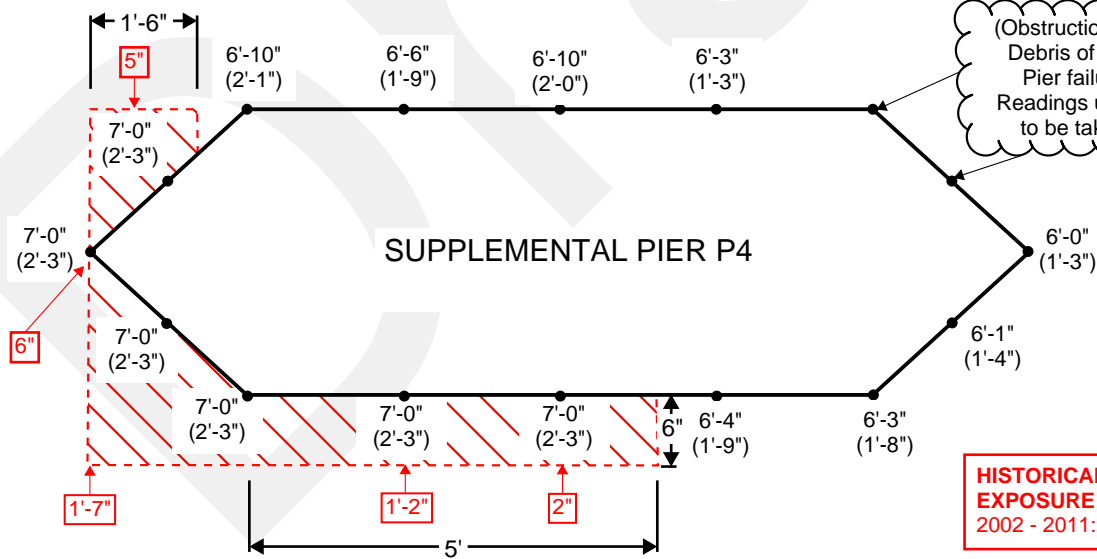
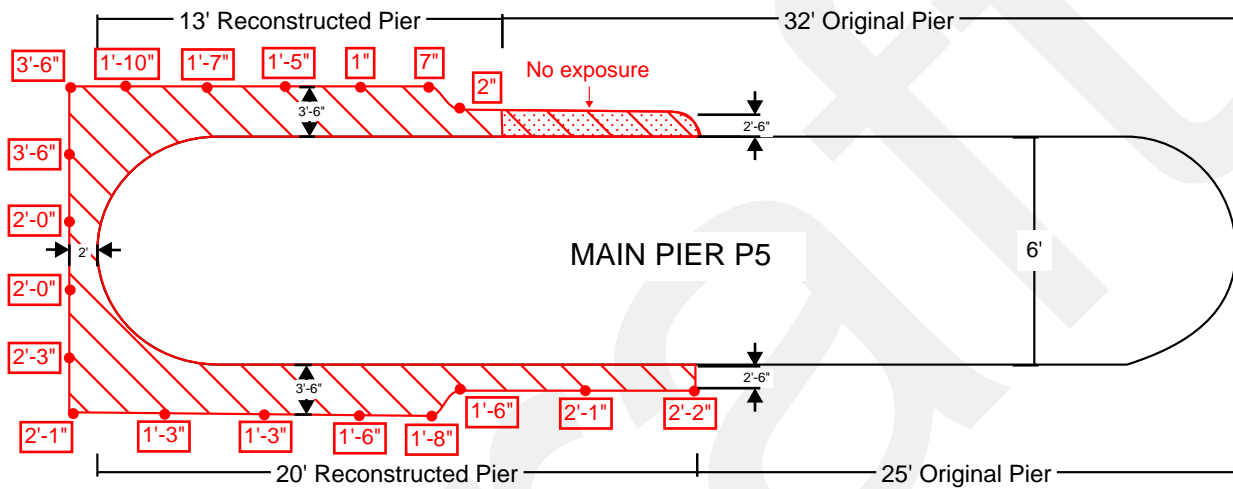
**PLAN VIEW**  
(N.T.S)

<b>CITY OF STAMFORD</b>	
BRIDGE STRUCTURE NO. 02212	
WEST MAIN STREET OVER RIPPOWAM RIVER STAMFORD, CT	
SCOUR SKETCHES <span style="float: right;">1 of 4</span>	
FIRM: GREENMAN-PEDERSEN, INC.	INSPECTION DATE: 7/20/2021



**HISTORICAL FOOTING EXPOSURE AT PIER 5:**  
2002 & 2007: Up to 2'-0"  
2011: Up to 1'-3"

**HISTORICAL FOOTING EXPOSURE AT PIER 6:**  
2002 - 2011: None



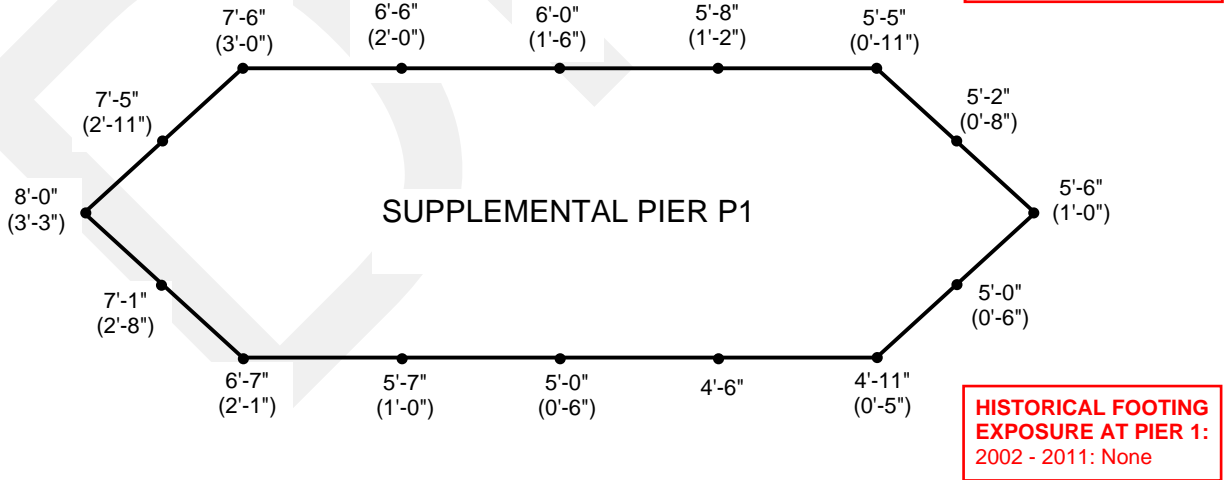
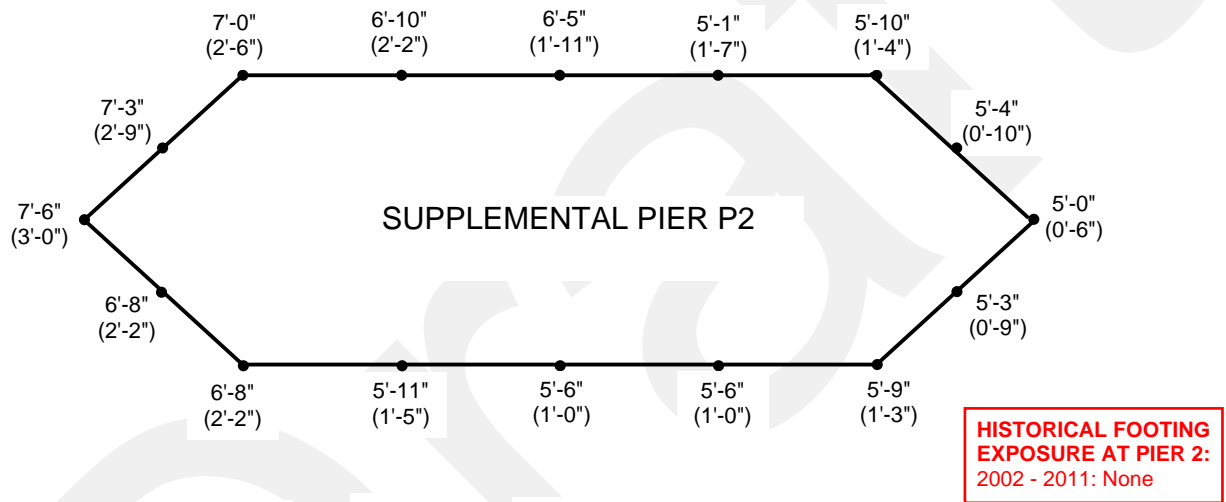
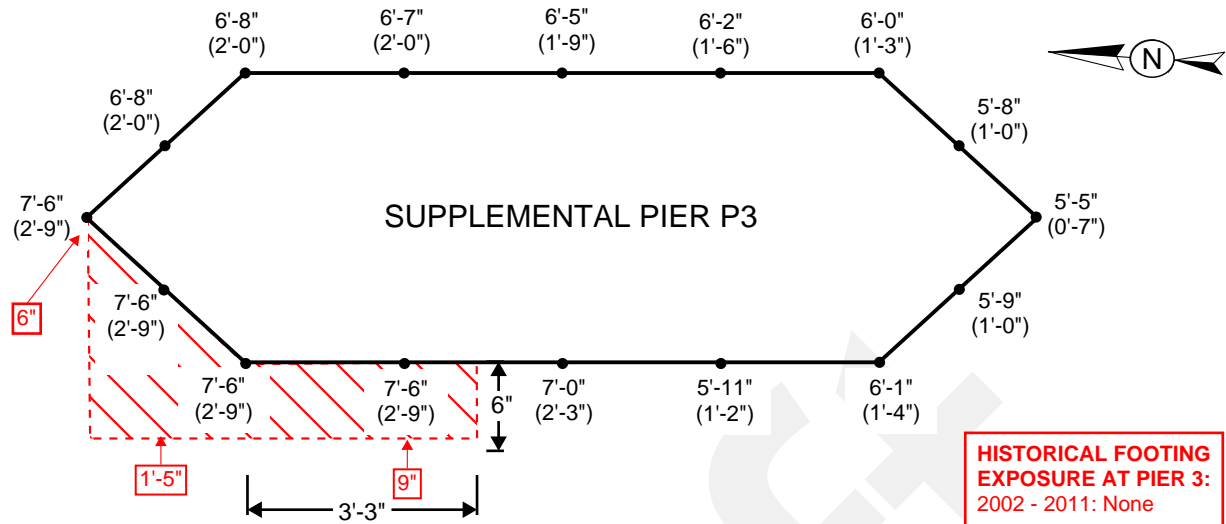
**HISTORICAL FOOTING EXPOSURE AT PIER 4:**  
2002 - 2011: None

**Notes:**

- 1) All measurement in black ink are from the top of Pier Stem to the Streambed, followed by the water depth measurement in parentheses.
- 2) Red ink indicates footing exposure. At these locations, the black ink measurement shown is to the top face of the footing. A footing exposure of 0" indicates only the top face is exposed.
- 3) Refer to Sketch 4 for typical Elevation Sketch with footing exposure.

**PLAN VIEW**  
(N.T.S)

<b>CITY OF STAMFORD</b>	
BRIDGE STRUCTURE NO. 02212	
WEST MAIN STREET OVER RIPPOWAM RIVER STAMFORD, CT	
SCOUR SKETCHES <span style="float: right;">2 of 4</span>	
FIRM: GREENMAN-PEDERSEN, INC.	INSPECTION DATE: 7/20/2021

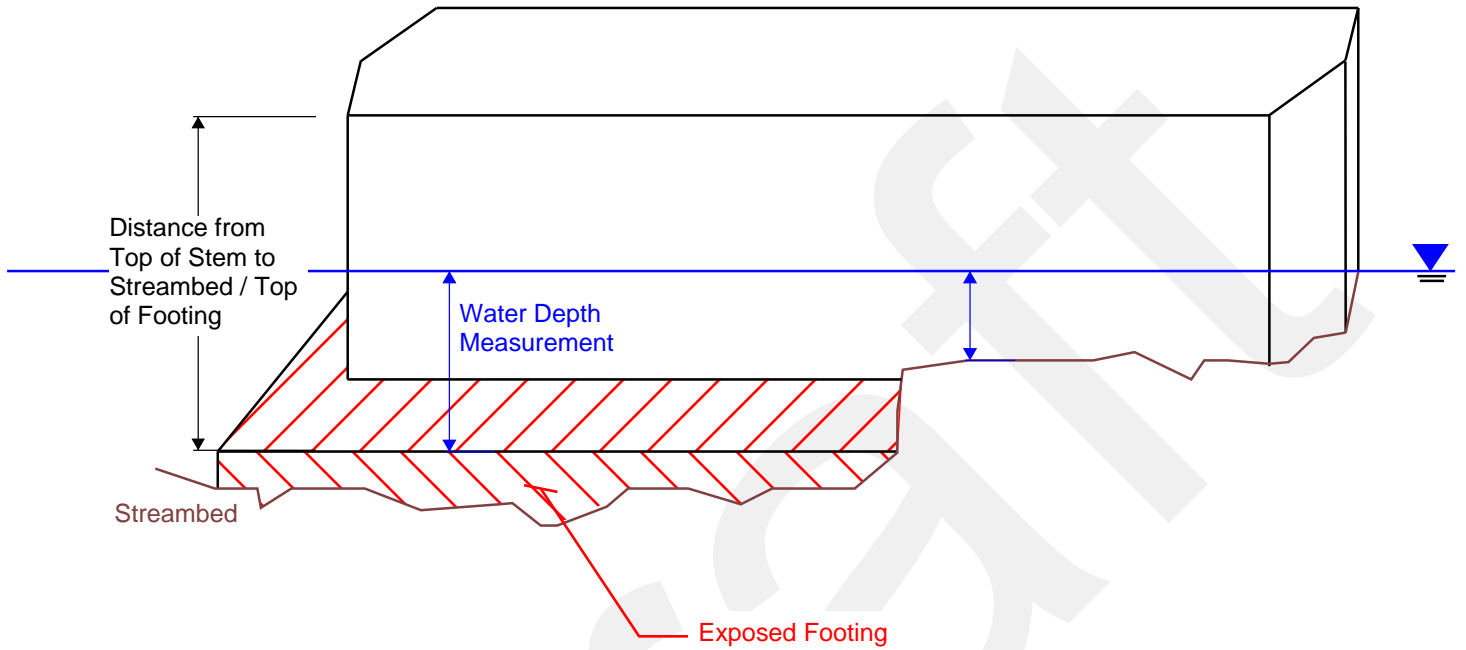


**Notes:**

- 1) All measurement in black ink are from the top of Pier Stem to the Streambed, followed by the water depth measurement in parentheses.
- 2) Red ink indicates footing exposure. At these locations, the black ink measurement shown is to the top face of the footing. A footing exposure of 0" indicates only the top face is exposed.
- 3) Refer to Sketch 4 for typical Elevation Sketch with footing exposure.

**PLAN VIEW**  
(N.T.S)

<b>CITY OF STAMFORD</b>	
BRIDGE STRUCTURE NO. 02212	
WEST MAIN STREET OVER RIPPOWAM RIVER STAMFORD, CT	
SCOUR SKETCHES <span style="float: right;">3 of 4</span>	
FIRM: GREENMAN-PEDERSEN, INC.	INSPECTION DATE: 7/20/2021



ELEVATION VIEW  
(N.T.S)

Notes:

- 1) The Elevation View depicted above is of a typical Supplemental Pier with footing exposure (for reference). Streambed varies.

<p><i>CITY OF STAMFORD</i>          BRIDGE STRUCTURE NO. 02212          WEST MAIN STREET OVER RIPPOWAM RIVER          STAMFORD, CT</p>	
<p>SCOUR SKETCHES <span style="float: right;">4 of 4</span></p>	
<p>FIRM: GREENMAN-PEDERSEN, INC.</p>	<p>INSPECTION DATE: 7/20/2021</p>

**APPENDIX B**  
**LIMITS OF UNDERDECK SPALL IN SPAN 2 AND**  
**LIMITS OF PIER 5 GANGWAY**

# SUPPLEMENTAL SHEET

JOB NO. 170-1965

BRIDGE NO. 02212

FIELD ORIGINAL       TRANSCRIBED BY: \_\_\_\_\_

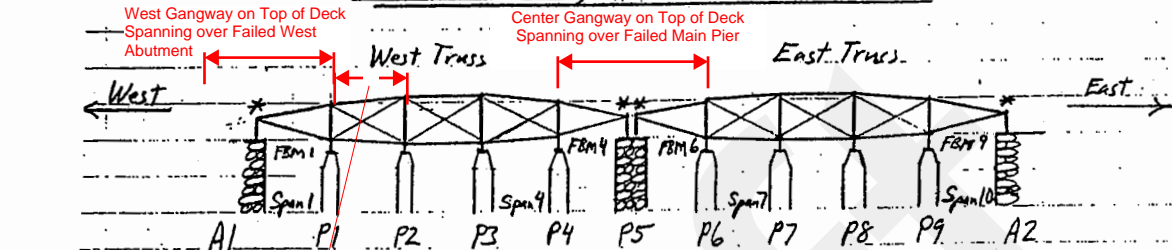
DATE: 01/14/02

SHEET 11 OF 65

DESCRIPTION: KEY PLAN

CREW: WMK

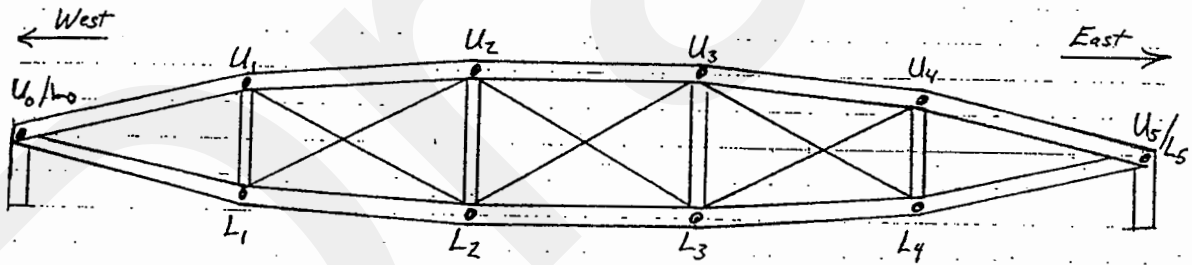
## New Numbering System - Current Use



Underdeck Spall between Floorbeams 1 & 2

\* No floorbeams appear to exist at indicated endposts. Stringers are encased in concrete and appear to bear directly on abutments and Pier 5. However numbering system is continued as if floorbeams do exist (ie, FBM 5 @ Pier 5) in order to maintain the pattern of Floorbeam number matching Pier number.

## Truss Member Numbering System



### Examples of Member Numbers -

Upper Chord:  $U_2-U_3$ ,  $U_5-U_4$

Lower Chord:  $L_2-L_3$ ,  $L_4-L_5$

Vertical:  $U_1-L_1$ ,  $U_3-L_3$

Diagonal:  $U_1-L_2$ ,  $U_4-L_3$

Endpost:  $U_0-L_0$ ,  $U_5-L_5$

### Truss Numbers -

Truss #1 on North Side

i.e. West Truss #1, East Truss #1

Truss #2 on South Side

i.e. West Truss #2, East Truss #2

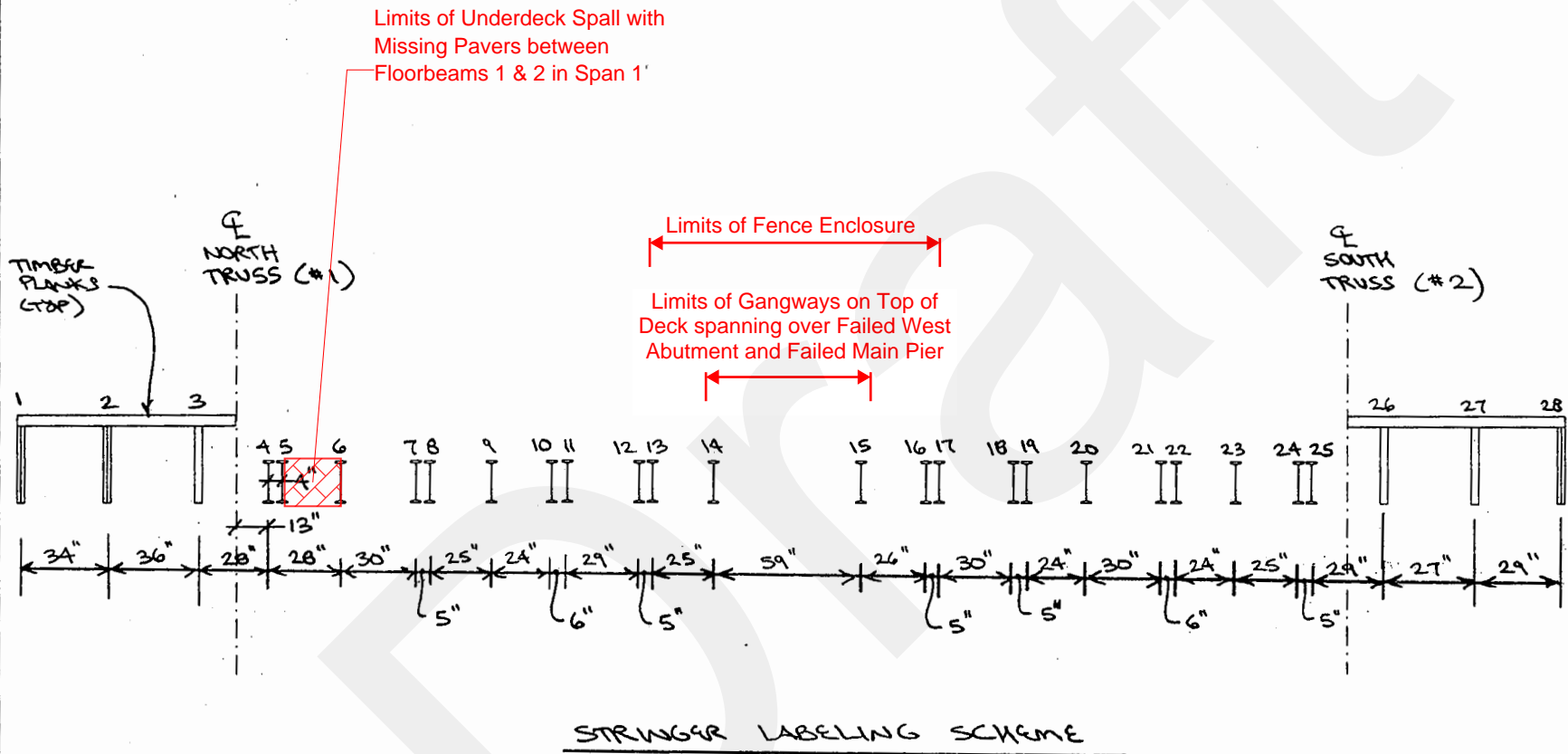
For Stringer Numbering, use same system as employed by Consultant inspectors at 2/7/91. In Depth Inspection. See cross-section from 2/7/91 report

UPDATE NO.	DATE	COMPANY	CREW
△			
△			
△			
△			

Baker

SUPPLEMENTAL SHEET  
 FIELD ORIGINAL     TRANSCRIBED BY: \_\_\_\_\_  
 DESCRIPTION: **KEY PLAN**

JOB NO. 170-1965  
 DATE: 8/14/02  
 CREW: JUNK  
 SHEET 12 OF 65  
 BRIDGE NO. 02212



STRINGER LABELING SCHEME

NOTES:  
 STRINGERS 1, 2, 3, 26, 27, 28 ARE TIMBER  
 STRINGERS 4, 6-12 & 17-24 ARE BUILT-UP MEMBERS: 6"x 1/2" WEB, 4 2x2x 1/4" FLANGES  
 STRINGERS 5, 13-16 & 25 ARE ROLLED SHAPES  
 CONCRETE DECK NOT SHOWN FOR CLARITY

UPDATE NO.	DATE	COMPANY	CREW
△			
△			
△			
△			



Breach in Fencing

Limits of Underdeck Spall



**APPENDIX C**  
**BREACHES IN PROTECTIVE FENCING**

---

**From:** Mark Nyerges  
**Sent:** Wednesday, July 28, 2021 4:43 PM  
**To:** Casolo, Louis  
**Cc:** 'Barisic, Zvonko'; Kevin Healy; Daniel Cheng; Samantha Huffman; 'McGrath, Mark'  
**Subject:** Rippowam River Bridge - Protective Fencing Breaches (as of 7/20/21)  
**Attachments:** Protective Fencing Breaches (Plan View).pdf; DSCF5543.JPG; DSCF5544.JPG; DSCF5445.JPG; DSCF5441.JPG; DSCF5446.JPG

Lou,

The following is a detailed list of the protective fencing breaches (5 total) observed during our field inspection performed on 7/20/21 - they are recommended for repair to ensure the pedestrian traffic does not impact the area of failed deck in Span 1 adjacent to the north truss, or the other restricted zones:

- 1) At the West Approach, there is a breach at the NW corner of the enclosure, allowing pedestrian access over the restricted West Abutment area. **See Photo #DSCF5543.**
- 2) At the West Approach, there is another breach at the SW corner of the enclosure, allowing pedestrian access over the restricted West Abutment Area. **See Photo #DSCF5544.**
- 3) At the west end of the bridge, there is a breach allowing pedestrian access into the restricted south side of the deck. **See Photo #DSCF5445.**
- 4) At the east end of the bridge, there is a breach allowing pedestrian access into the restricted north side of the deck. **See Photo #DSCF5441.**
- 5) At the East Approach, there is a breach allowing pedestrian access into the restricted original timber south pedestrian walkway. **See Photo #DSCF5446.**

Feel free to call if you have any questions or would like additional information.

Thanks,  
Mark

Mark Nyerges, P.E.  
*Manager, Bridge Inspection and Bridge Management*

8 Wright Street, Suite 107, Westport, CT 06880  
o +1 (203) 604-6731 | c +1 (609) 577-9066  
[mnyerges@gpinet.com](mailto:mnyerges@gpinet.com) | [www.gpinet.com](http://www.gpinet.com)



Engineering | Design | Planning | Construction Management

An Equal Opportunity Employer



Breach at NW  
App. corner of  
enclosure.

#DSCF5543

Breach at NE  
end of bridge,  
adjacent to  
Pier 9.

#DSCF5441

Breach at SW  
end of bridge,  
adjacent to  
Pier 1.

#DSCF5445

Breach at SW  
App. corner of  
enclosure.

#DSCF5544

Breach at SE  
corner of  
enclosure.

#DSCF5446



**DSCF5443**



**DSCF5544**



**DSCF5445**



**DSCF5441**



**DSCF5446**