TALBOT AVENUE BRIDGE
CONDITION ASSESSMENT
SILVER SPRING, MARYLAND
Clark Azar & Associates, Inc.

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Date: May 31, 2023

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INTRODUCTION

EXECUTIVE SUMMARY

EverGreene Architectural Arts (EverGreene) was contracted by Clark Azar & Associates, Inc., to complete a condition assessment and provide recommendations for storage and future display of the Talbot Avenue Bridge, located in Silver Spring, Maryland. The purpose of this investigation was to analyze and document the existing conditions of two of the main girders from the disassembled bridge components; to perform microscopy on the original finishes (if extant) and match them to the Munsell color chart; and to provide storage recommendations for the bridge components for the 5 years they are expected to be stored.

EverGreene carried out field investigations on March 22, 2023. Prior to EverGreene's arrival on site the bridge had been disassembled and stored at the Montgomery County Department of Transportation depot. EverGreene also participated in the public "Future Park in Lyttonsville" community meeting with the client on March 30th, 2023. Management oversight was provided by Director of Conservation and Senior Conservator Kelly Caldwell; field investigations were carried out by Kelly Caldwell and Assistant Conservator Meghan Page. Paint microscopy was performed by Brooke Russell and this report was authored by Meghan Page.

Based on the findings from the condition assessment, general recommendations for the bridge were developed encompassing remedial treatments including cleaning and repair, as well as preventive treatments and ongoing maintenance. Following the assessment of the structure it was determined that the corrosion of the bridge was progressing rapidly. The assessment found corrosion; areas with collected debris, soiling, bio-growth, damage caused by wildlife, damage caused by graffiti; locations of material loss, and missing components.

To fully document the deterioration of the bridge for this assessment, a structural map and labeling system was created. This is to help with record keeping of any future work. This map is located in Appendix A.

This report is prepared in fulfillment of the contractual request. It is intended to provide information on existing conditions that can inform future treatment options. It is not intended, nor should it be used as a specification for such treatment. Construction documents may be derived from the information provided herein but by itself this report is not to be used for construction.

PROJECT BACKGROUND[1]

In 1918, the Baltimore & Ohio (B&O) Railroad replaced an existing wooden truss bridge, which passed over the Metropolitan Branch of the railroad connecting the two halves of Talbot Avenue (Figure 1). The previous bridge had become obsolete, providing inadequate transportation between the communities on either side and restricting the railroad from expanding their lines to meet demand. The bridge was built in order to accommodate automobile, pedestrian, and bicycle traffic between the historically African-American community of Lyttonsville, Maryland and the residential subdivisions on the periphery of unincorporated Silver Spring, Maryland. The new, single lane bridge is composed of a through-plate girder in the center span, rolled girders in the end spans, a substructure composed of concrete abutments with metal columns, flared concrete wing walls, and timber floor beams, plank decks, and railings.[2] The structure is 106 feet long, with the inner roadway measuring 14.5 feet wide and 18 feet from edge to edge. The metal portions were fabricated from a repurposed turntable that the B&O removed from its shops in Martinsburg, West Virginia.[3]

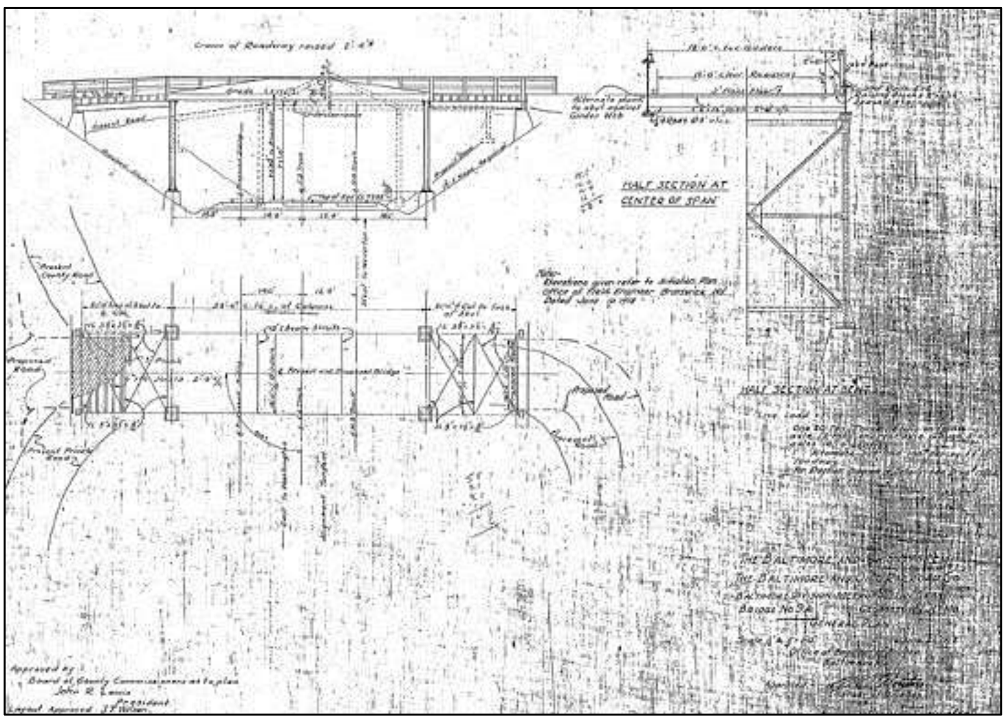

Figure 1:Baltimore and Ohio Railroad Bridge 9A drawing no. 17554, June 21, 2018. (Photo courtesy of Montgomery County Department of Transportation and the Historic American Engineering Record).

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[1] Only limited archival research was included in the scope of this project. Background information was provided by the client, and obtained from web-based resources.

[2] Caroline Hall and Tim Tamburrino. *Maryland Inventory of Historic Bridges: M-85, Talbot Avenue over CSXT Railroad*. (Maryland State Highway Administration/Maryland Historical Trust, 2001), 883-884.

[3] David S.Rotenstein, "HAER Documents the Talbot Avenue Bridge in Silver Spring, MD." *Society for Industrial Archaeology* 48, no. 2. (Spring 2019): 1.

The Talbot Avenue Bridge, as it has come to be known, is one of the few remaining historically significant structures for the Lyttonsville community. In 1853 Samuel Lytton, a freed person of color, purchased four acres of land in the farming community just outside the Silver Spring area.[4] It quickly became a community for free African Americans prior to the Civil War.[5] In 1867, B&O began acquiring land in order to construct a new line which would connect Washington D.C. and the railroad's main line in Frederick County, Maryland. In 1891, two years before Lytton passed away, the railroad condemned a right-of-way through his land in order to build the Georgetown Branch of the Metropolitan line. Soon after Lytton's death in 1893 his farmland was subdivided, and either sold or rented to other African-American people, which further solidified the area as a community for African-Americans. The Metropolitan line served as a boundary between the African-American community of Lyttonsville, as it came to be known, and the Silver Spring community, where racially restrictive deed covenants prevented African-Americans from living and businesses were governed by strict Jim Crow segregation.[6] The Talbot Avenue Bridge became a representation of segregation, as it was used during a time when the residents of the predominately African-American Lyttonsville relied upon the bridge in order to access goods and services in the mostly white neighborhoods on the other side.

The bridge itself has seen a few interventions since its construction in 1918. In 1986 the bridge was rehabilitated: the wood decking was replaced and some of the substructure's steel members in the column bents were either reinforced or replaced.[7] It was also during this time period and before 1995 that a steel guardrail was added to either side of the bridge.

The bridge underwent a thorough inspection in 1993, which found the bridge to be in fair to poor condition, with areas of loss, corrosion, and cracking. Rust and delaminated sections were noted to be commonplace, along with damaged or corroded bolts, rotting decking, and erosion of the abutments. Ownership of the bridge was transferred from CSX, the owner of the rail line after B&O, to Montgomery County between 1998 and 2000. Some additional repairs were performed between 2007 and 2008, which attempted to address the safety concerns. After failing a safety inspection in 2017, the bridge was permanently closed to vehicular traffic. Following the centennial celebration of the bridge it was finally broken down and placed in storage for future display in order to make way for the Purple Line construction on the CSX rail line, in 2019.[8] A new, two-lane bridge with large pedestrian and bicycling access is proposed to replace the historic one, which will meet standards and requirements for modern bridge construction.

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4 David S.Rotenstein, "HAER Documents the Talbot Avenue Bridge in Silver Spring, MD." *Society for Industrial Archaeology* 48, no. 2. (Spring 2019): 2.

5 Guy Blanchard and Stephanie Foell. *Maryland Inventory of Historic Properties: Talbot Avenue Bridge*. (Maryland Historical Trust, 2018), 5.

6 History Sidebar, Writings on History and the Production of History. "Talbot Avenue: A Bridge in Black and White." Historian 4 Hire. https://blog.historian4hire.net/2016/09/08/a-bridge-in-black-and-white/

7 Guy Blanchard and Stephanie Foell. *Maryland Inventory of Historic Properties: Talbot Avenue Bridge*. (Maryland Historical Trust, 2018), 10.

8 David S. Rotenstein. *Historic American Engineering Record, Baltimore & Ohio Railroad, Metropolitan Branch Bridge 9A (Talbot Avenue Bridge). HAER No. MD-195.* (Washington, DC: National Parks Service, U.S. Department of Interior, 2019), 2.

ASSESSMENT

METHODOLOGY

EverGreene visited the site on March 22, 2023. Investigations were conducted at the department of transportation depot storage location, where the bridge components were placed after being disassembled by the client prior to EverGreene's arrival on site. The storage location is on private land with no access from the public. The bridge components are being kept on an exposed open air steel structure with multiple levels.

The two plate girders were positioned with their interior sides facing skyward. Investigations were performed in situ, observing and documenting the conditions of all visible areas. The bridge had general measurements taken, and was documented photographically to record existing deterioration including potential structural problems, evidence of previous repairs, and localized areas of weakness or material deficiency.

Paint samples were taken from two locations along the girders and microscopy was performed off site. Any extant paint layers were documented and were color matched using the Munsell color system and then the Sherwin Williams paint system. The results of microscopic analysis, including full sample stratigraphies, are documented. To fully document the deterioration of the bridge for this assessment, a construction diagram and labeling system were created. This is to help with record keeping of any future work. This diagram is located in Appendix A.

Overall, the on-site conditions assessment found corrosion; areas with collected debris, soiling, bio-growth, damage caused by wildlife, damage caused by graffiti; locations of material loss, and missing components. The overall all conditions are listed below, with detailed breakdowns of each section in Appendix A and Images in Appendix B. All descriptions are broken out based on the girders current orientation in storage.

Limitations and Constraints

The scope of the investigation is to document existing conditions, supply a general historic color palette as a reference for future restoration, and provide recommendations for long term storage. Laboratory analysis is confined to visual microscopic examination and color matching; no chemical or instrumental analysis of binding media, pigments, etc. is included in the project scope. Project work was confined to the two steel girders; other structural members were excluded from the investigation scope, but were photographed where possible. The visual survey was performed from the ground or from the structure supporting the girders. The underside of the structure had limited mobility and was confined to a visual survey of what was safely accessible.

Archival Research

Comprehensive archival research was not within the scope of this project. Background information was gathered records provide by the client, along with from records from the Maryland Historical Trust, the Historic American Building Record, and web-based resources

Paint Sampling

Samples of the finishes were collected by removing a small portion of the existing finish layers using a stainless-steel scalpel. A portion of the substrate, in this case corroded metal, was also captured within the sample to ensure the complete stratigraphy, of the existing finish layer structure, could be analyzed and documented. A total of 2 samples were collected from the girders.

CONDITIONS ASSESSMENT

General Construction

The Talbot Avenue Bridge structure was originally 106 feet long, and 18 feet wide. The metal portions were fabricated from a repurposed turntable that the B&O Railroad removed from its shops in Martinsburg, West Virginia (Figure 1). The structure was composed of a through-plate girder in the center span, rolled girders in the end spans, a substructure composed of concrete abutments with metal columns, flared concrete wing walls, and timber floor beams, plank decks, and railings. Talbot Avenue ran east to west between the two steel plate girders which faced north and south

Figure 3 (Right): Overall picture of the two plate girders lying flat at the storage facility in Silver Springs, Maryland. (Photo: EverGreene (March 22, 2023)

Figure 3 (Left): Historic image of the North Plate Girder of the Talbot Avenue Bridge in-situ (year unknown). The blue arrow indicates one of the sixteen (16) vertical stiffeners. The red arrow denotes the angled design of the top flange at the plate girder's middle section. (Photo: year unknown)

The two plate girders were connected by steel I-beams which were severed in 2019 to allow the plate girders to be lain flat in the storage facility (Figure 2). The girders are constructed and held together using rivets and hex bolts. On average the rivets and hex bolts had a diameter of 1.5 inches. The horizontal plate girders are supported by vertical stiffeners. These provide support from buckling by running parallel to the rest of the structure. There are sixteen (16) of these vertical stiffeners creating fourteen (14) large bays and three (3) smaller bays along the plate girder (Figure 3). The plate girders are straight across the bottom flange and have an angular design along the top flange (Figure 3). The space between the top flange and bottom flange varies with its widest point at the middle being 4'10", and is narrowest point on either end being 2' 5". This breaks the plate girder into 3 sections. The straight

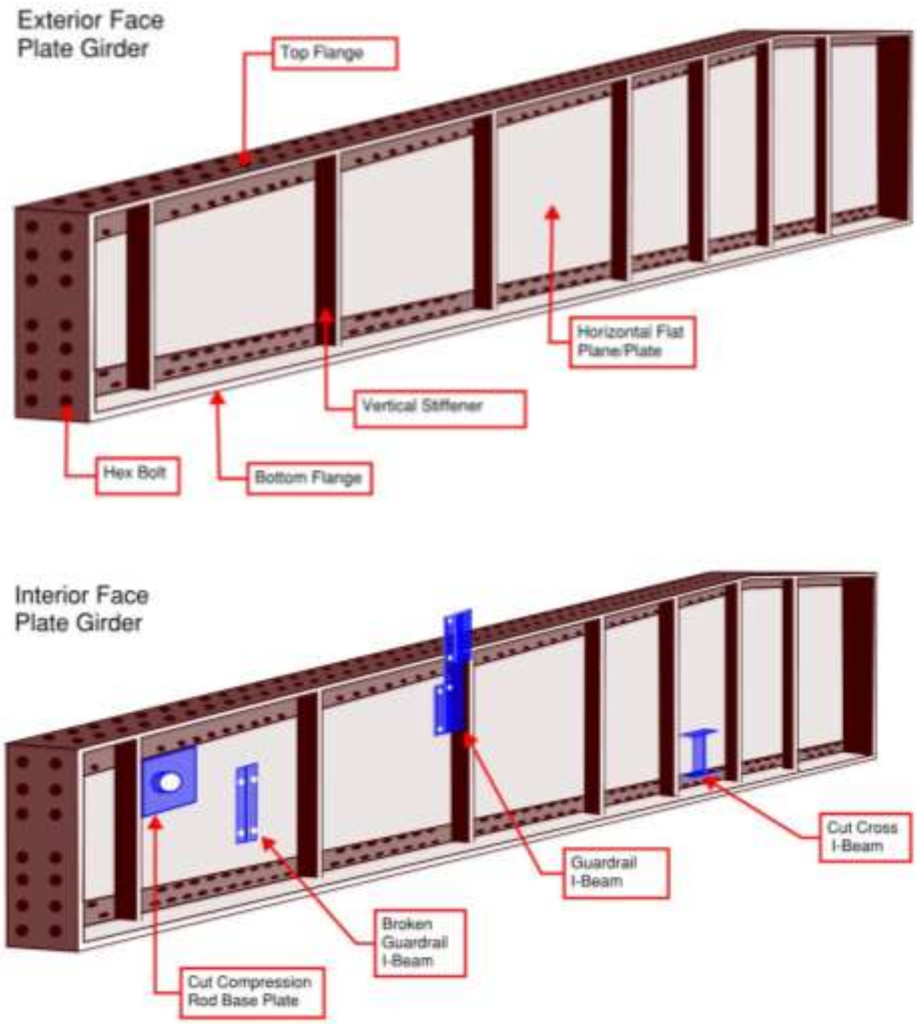


Figure 4: Schematic of the construction of the plate girders. All elements are named on this drawing. (Drawing: EverGreene (March 22, 2023)

middle section is 15'10" long and the two angled sides are 22' long (Figure 4).

The only portion of the bridge left whole following the 2019 removal are the North and South plate girders. All of the wooden plank decks, railings, timber floor beams, and vertical metal columns were dismantled (Figures 5 A-D). These were disassembled in such a way that replacing them to their original historic locations would be impossible. All of these bridge pieces are currently stored under the two plate girders on the ground. Additional miscellaneous plates, bolts, railroad ties, and the wooden components are also stored in the same area.

Figure 5 A, B, C, and D: Figures 5A-D are detail images of various parts of the Talbot Avenue Bridge which were not documented as part of the 2023 conservation survey. Figure 5A is a 2015 image of the bridge prior to removal. Figure 5B the blue arrow shows the storage locations for the vertical supports seen in photos 5A. Figure 5C are various metal brackets removed from the Talbot Avenue Bridge. Finally, Figure 5D shows one set of the wooden beams used for the Talbot Avenue Bridge roadway. (Photo A: Talbot Avenue Bridge (http://gbblog.sluggyjunx.com/2016/10/12/the-famous-talbot-ave-bridge-is-slated-for-demolition; 2015); Photo B, C, D: EverGreene (March 22, 2023)

Historic Appearance and Conditions

Based on a combination of historic photographs and previous bridge surveys it can be concluded that the Talbot Avenue bridge was in fair to poor condition at the time of its removal in 2019. The oldest photographs of the bridge uncovered are from 1995 and were taken as part of the "*Maryland Historical Trust Historic Properties State Historic Sites Inventory Form.*" The photographs are in black and white and only one gives a clear visual of the bridge and the conditions of the metal (Figure 6).

Figure 6: 1995 photograph from the "*Maryland Historical Trust Historic Properties State Historic Sites Inventory Form* " inventory of the Talbot Avenue Bridge. This is the fourth (4) photograph, and only close up of the South Girder, taken as part of the documentation. (Photo: Maryland Historical Trust Historic Properties State Historic Sites Inventory Form; 1995)

The oldest color image is from 2007 and is looking southeast at the north plate girder. (Figure 7). In this image the north plate girder has some orange coloration, likely corrosion, between the vertical stiffeners, and remanence of overpainted graffiti which presents as a lighter discoloration in the grey/black coating. Most notable is the deterioration of the east vertical steel support system under the bridge (Figure 8). In this image the east support system is heavily corroded and soiled at the base (Figure 8).

Although, there is no visible loss or exploded corrosion in the 1995 or 2007 image a 1993 inspection the bridge noted the condition as being:

> "…in fair to poor condition with cracking, corrosion and section loss. The top cover plates of the plate girders are heavily rusted and delaminated. The top flanges of the steel beams at the end spans are also rusted and delaminated with minor section loss and the bottom of the timber deck is moderately to heavily rotted.[9]"

It is acknowledged that after the 1993 inspection the bridge continued to deteriorate until it failed a 2017 safety inspection and was marked for demolition.

[9] Caroline Hall and Tim Tamburrino. *Maryland Inventory of Historic Bridges: M-85, Talbot Avenue over CSXT Railroad*. (Maryland State Highway Administration/Maryland Historical Trust, 2001), 883-884.

Figure 7: (Left): 2007 color photograph of the talbot avenue bridge. (Photo: 2007 Talbot Avenue bridge. (2023, January 6). In Wikipedia. https://en.wikipedia.org/wiki/Talbot_Avenue_bridge)

Figure 7 (Right): Close up of the vertical support system seen in Figure 7. Red arrow indicated the soiling and corrosion visible at the base of the structure. (Photo: 2007 Talbot Avenue bridge. (2023, January 6). In Wikipedia. https://en.wikipedia.org/wiki/Talbot_Avenue_bridge)

Following the 2007 photograph more images depict changes to the bridge's conditions including new graffiti on both the north and south plate girders, more orange corrosion along the top and bottom flanges of the plate girders, and material loss from the vertical support structure (Figures 9 and 10).

Figure 9: Photograph of the Talbot Avenue Bridge from 2015. This photo is of the North Plate Girder looking West towards Talbot Avenue. When comparing Figure 7 and Figure 9 the most notable change in condition is the addition of graffiti to the North Plate Girder. (Photo: 2015 Talbot Avenue bridge. (2023, January 6). In Wikipedia. https://en.wikipedia.org/wiki/Talbot_Avenue_bridge)

Figure 8: Photograph of the Talbot Avenue Bridge from 2008 looking north at the South Plate Girder. Noticeably the south side has no graffiti present in 2008. (Photo: Talbot Avenue Bridge; http://www.trainweb.org/oldmainline/metgb1.htm)

By 2019 the bridge was heavily graffitied on both exterior sides, and orange corrosion was visible on a majority of the visible surfaces of both the plate girders and the vertical supports (Figure 11 and 12). When the bridge was removed from Talbot Avenue the horizontal I-beams which connected the north and south plate girders were cut allowing the girders to be stored horizontally graffiti sides down.

Figure 9 and *10:*: Figures 11 (Left) and 12 (Right) are of the Talbot Avenue Bridge in 2019 during the removal. Notes the heavy graffiti on both the North (left) and South (right) sides. (Photos: Talbot Avenue Bridge Facebook Page (2019)

Current Conditions

Overall, the North and South Plate Girders from the Talbot Avenue Bridge are in poor condition. Notable deterioration includes large areas of corrosion, the majority of which has been exasperated due to standing water and exposure to the elements while in storage. Due to the method of storage since its removal in 2019 the corrosion has continued to worsening across a majority of the lower 1/3 of both girders. As noted in the "Historic Conditions" section corrosion has been present on the steel bridge since before the 2019 removal.

Figure 11: Photograph of the 2023 conditions and orientations of the north and south plate girders. Photograph was taken facing north. The north plate girder is located on the west side of the storage area and the south plate girder is located on the east side. (Photo: EverGreene (March 22, 2023)

For the purpose of the survey the current storage compass orientation for the north and south plate girders will be used as reference points for the 2023 condition analysis. The two girders have been divided into fourteen (14) large bays; separated by the sixteen (16) vertical stiffeners. Please see Appendix A for a drawing of the locations of the general conditions of the north and south plate girders.

North Plate Girder

The north plate girder is currently located on the west side of the storage facility. The plate girder is laying with its original exterior side facing down and interior facing skyward. Overall, the north girder is in poor condition and is in worse condition compared to the south girder. A diagram of the following conditions can be seen in Appendix A.

The lower 1/3 of both the skyward and downward sides are heavily corroded. The corrosion is especially evident on hex bolts which have ballooned from 1.5" to 2.5" to 3" in size. Similarly, the rivets have started to expand due to corrosion. This ballooned or exploded steel is also found on the straight steel flange which has expanded in size from 1.25" to 3" in many places. This lower flange is extremely friable to the touch (Figure 14).

Figure 12: Detail image of Bay 1 of the bottom flange of the north plate girder. The red arrow shows the condition of the corroded flange cover plate and hex botls and blue arrows shows the area mostly unaffected by the corrosion. (Photo: EverGreene (March 22, 2023)

The horizontal orientation of the plate girder has allowed debris, bio-growth, and moisture buildup in all fourteen (14) of the skyward facing bays. The debris and soiling includes dirt, dead foliage, trash and detached corrosion. The biological growth and plant life is mainly found on the vertical faces of the girder and on the north facing sides of the post-historic projecting I-beams (Figure 15). These I-beams were originally connected to a metal guard rail which ran parallel to the plate girders. A total of 10 guardrail I-beams are on the north girder. Of these 10 I-beams 1 has broken or was cut off and is missing, and 1 is bent out of alignment.

Figure 14: Detail of Bays 12 and 13 of the north plate girder which both have standing water. (Photo: EverGreene (March 22, 2023)

Figure 13: Detail of the guardrail I-beam in Bay 11. Note the bio-growth concentrated on the vertical and skyward facing planes. (Photo: EverGreene (March 22, 2023)

Moisture retention is notable in all fourteen (14) bays, though bays 12 and 13 on the north side of the girder retains 1-2 inches of standing water. This standing water covers a majority of the flat surface. At the time of the survey, it had been over a week since the last rain indicating the standing water does not have the ability to evaporate quickly (Figure 16). Although the overall corrosion is worse on the lower 1/3 of the girder, currently water retention is more prevalent of the upper 2/3 of the girder. Overtime, without intervention, this will lead to the upper 2/3 to deteriorate and corrode in a similar way to the lower 1/3. The beginnings of this can be seen in the sizes of the rivets, hex bolts, and vertical stiffeners on the upper 2/3 of the north girder. Most of the bolts are still the original 1.5 inches in width but have begun to corrode.

On the downward facing side of the north girder there are two type of animal nests, the first being mud daubers and the second a bird nest. There is also active or weeping corrosion in multiple locations, missing bolts, and holes caused by material loss on the flat plane (Figure 17 and 18). These areas of material loss are not visible from the skyward face due to the thick buildup of debris. There is graffiti located in most of the fourteen (14) bays none of which appears to be additions made following the 2019 removal. Biological growth is forming on the vertical faces of the girder near and around the hex bolts. Finally, there is scaling of the flat planes likely caused by fire and soot when the bridge was in use.

Figure 17: The red arrow shows the weeping or active corrosion found on the underside of the North Plate Girder. (Photo: EverGreene (March 22, 2023)

Figure 15: Detail of a bird's nest found on the North side of the North Plate Girder. (Photo: EverGreene (March 22, 2023)

South Plate Girder

The south plate girder is currently located on the east side of the Silver Springs, Maryland storage facility. The plate girder is laying with its original exterior side facing down and interior facing skyward. Overall, the south plate girder is in poor condition, but is in slightly better than the north plate girder. A diagram of the following conditions can be seen in Appendix A.

Like the north girder the lower 1/3 of the skyward and downward sides are heavily corroded (Figure 19). The corrosion is especially evident on the lower 1/3 hex bolts which have ballooned from 1.5" to 2.5 to 3" in size. This ballooned or exploded steel is also found on the straight steel base plate which has expanded in size and is extremely friable to the touch. The friable metal is flaking off the vertical and horizontal faces to the ground below.

Figure 16: Detail of the lower flange of Bay 1 on the south plate girder. The Red arrow shows were the gusset plate and exploded corrosion are separating from the rest of the flange structure. (Photo: EverGreene (March 22, 2023)

The horizontal orientation of the plate girder has allowed debris, bio-growth, and moisture buildup in all fourteen (14) of the skyward facing bays. Debris and soiling includes dirt, dead foliage, trash and detached corrosion. Moisture retention is notable in all fourteen (14) bays. One of the covered bays on the north side of the girder retains 1-2 inches of standing water (Figure 20).

On the downward facing side of the south girder there are multiple locations with mud daubers nests. These are primarily found in corners where two vertical members meet. There is missing bolts and holes caused by material loss on the flat plane. These areas of material loss are not visible from the skyward face due to the buildup of debris. There is graffiti located in many of the fourteen (14) bays and none appears to be additions made post the 2019 removal. Finally, there is some scaling of the flat plane likely caused by fire and soot when the bridge was in use.

Figure 17: Detail of Bay 5 where water is collecting on the west side of the horizontal plane. (Photo: EverGreene (March 22, 2023)

PAINT ANALYSIS

Microscopy Methodology
Two paint samples were collected to color match the presenting layer of paint and to determine if earlier layers of paint were present. The samples were taken from the North Plate Girder from two different bays. The white graffiti is modern and was not sampled. Samples taken while onsite were subsequently analyzed off-site by EverGreene conservators. Samples were examined in cross section under microscope to determine finish stratigraphies, characterize finish layers, and identify historic colors. Unmounted samples were initially examined for color matching. Samples were bifurcated perpendicular to the substrate to reveal cross sections.

Color Matching
Examination and color matching of samples took place under a microscope. Color matches were made to the interior of the identified historic paint layers to avoid interference from factors including migration of binders within the paint layer, fading, or chemical action.

Colors for finish layers are identified using the Munsell standard of color notation. The Munsell system identifies colors within a three-dimensional color space through describing the hue, value and chroma (Figure 21). The hue is the basic color family, such as yellow-red or blue-green (the position on the color wheel). The hue is represented as an abbreviation such as GY for green-yellow. The value is the relative lightness or darkness of the color; the higher the value number, the lighter the color. The chroma is the intensity of the color; the higher the number, the more intense the color. The notations are recorded in the form hue-value/ chroma. A Munsell number of 5YR 9/2, for example, represents a light orange-grey, while a Munsell number of 10B 4/8 represents a dark intense blue. The correlating Sherwin Williams paint color has also been provided for reference.

Figure 21. Page from the Munsell Book of Color, showing color standards for the hue 7.5YR. Value numbers are organized vertically, and chroma numbers proceed horizontally. The Munsell color standards were visually compared to paint layers to provide color matches. (Photo by EverGreene, April 2015)

Historic Materials and Finishes

Paint analysis is predicated on the idea that paint layers closest to the substrate, in this case metal, are the oldest and include the historic design scheme; this assumes that original paint layers have not been weathered off or stripped away. Paint layer sequences include preparatory layers, such as transparent sealers and opaque primers, which must be distinguished from presenting finishes. Visual microscopic examination of paint sample cross sections allows for accurate documentation of paint stratigraphies and colors.

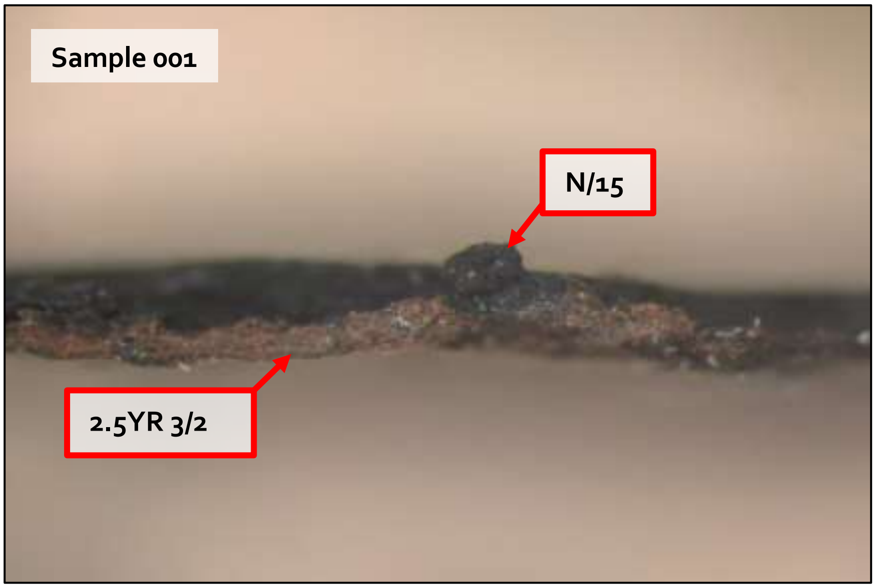
SUMMARY OF PAINT ANALYSIS AND FINDINGS

Two supplemental samples collected from the North Plate Girder from two different Bays. The first was collected from the Flange in Bay 1 and the second was collected from the Vertical Stiffener in Bay 3. These locations would have been situated on the interior of the bridge and had possible remaining original paint as seen in historic photographs. Both samples contain the same number and color sequence of paint layers.

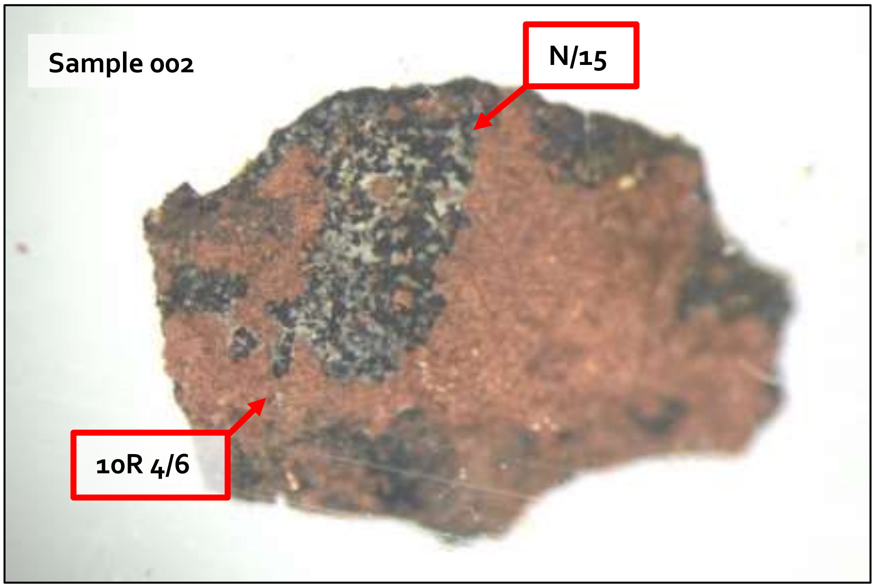
Both samples are likely original to the structure due to the few paint layers extracted. Both have a red-brown of brown primer layer followed by a singular black painting campaign. The sample collected from the Flange in Bay 1 fluoresced when put under UV light indicating the primer layer was red lead primer. This layer was a preparatory layer used when painting exterior metals to prevent rust and corrosion from forming on ferrous metals. As typical with painted industrial structures a primer layer would be present. The presenting color is summarized in Table 1.

LOCATION	COLOR	MUNSELL NO.	SHERWIN WILLIAMS COLOR
North Plate Girder Bay 1 Flange	Black	N/15	SW 6258 Tricorn Black
North Plate Girder Bay 3 Vertical Stiffener	Black	N/15	SW 6258 Tricorn Black

Sample Layer Stratigraphy
Paint layer structures and colors are described for each sample in the following pages. These layers are assigned Munsell number matches in addition to a descriptive color name.



Sample 001, North Plate Girder Bay 1 Flange			
Layer	**Color**	**Munsell No.**	**Note**
Metal	-	-	Substrate
1	Brown	2.5YR 3/2	Primer - Fluorescence as red lead
2	Black	N/15	Presenting



Sample 002, North Plate Girder Bay 3 Vertical Stiffener			
Layer	**Color**	**Munsell No.**	**Note**
Metal	-	-	Substrate
1	Red-Brown	10R 4/6	Primer
2	Black	N/15	Presenting

RECOMMENDATIONS

Storage Recommendations

Due to the compromised condition of the metal on the Talbot Avenue Plate Girders, in particular the corrosion on the lower 1/3, the debris and moisture throughout, and biological growth on the vertical elements, EverGreene recommends the following for the storage of the bridge components:

- The entire bridge should be kept on location, but a tarped roof to shed water away from the bridge should be installed. The roof should be installed on angle in a way that the water and moisture is shed away from the structure. The tarps should allow air flow to the sculpture, but not allow in excess moisture which could cause more corrosion. Do not have the tarp rest on the metal girders.
- Prior to being put under cover the structure should be completely dry of all surface moisture to deter further corrosion or deterioration from occurring by getting trapped under the tarped roof.
- The entire structure should be thoroughly cleaned to remove debris from the horizonal surfaces. This will allow the metal to dry out and prevent further corrosion. Surfaces should be cleaned with clean, filtered water and a dilute solution of a conservation grade non-ionic detergent to remove surface soiling. Synthetic or natural bristle brushes without metal ferrules should be used to aid in cleaning and to avoid scratching the surface in areas with heavier soiling.
- A dilute solution of a biological cleaner like D/2 Biological Solution, is recommended for all elements presenting with biological growth. This cleaning process should be used where biological growth is found, following any general cleaning. The D/2 product is a biocide and acts to kill active growth, where general cleaning does not.
- The surfaces should be assessed after washing. Repeat cleanings as needed. In the case of corrosion, the corrosion should be carefully removed and the source of the corrosion addressed. Seeing that the historic elements are to be in storage for several years prior to reuse, additional stabilization of active corrosion may be required.
- Surrounding wildlife and vegetation should be removed or rehomed to protect the bridge components from deterioration.
- The storage should be regularly monitored. Routine checks to confirm that the tarp is functioning and in place and that moisture is not collecting in new places. This should occur at a minimum of every 4 months. If debris is found the skyward surfaces should be cleaned. No metal scrappers or tools should be used, only plastic. Should further deterioration of the steel be observed a conservator should be contacted to confirm if additional stabilization is required.
- If the pallets of additional bridge materials like the plates, bolts, etc. are to be reutilized they should also be moved under the sloped tarped area.

Treatment/Display Recommendations

It is understood that the goal of the project is to revitalize the bridge and incorporate the two steel girders in the new park design. To facilitate this, additional planning and design will be required.

The Talbot Bridge structure will be located outdoors in an area of high visitor density once on display. This will increase the potential for damages from climbing, touching, kicking/tripping, and vandalism. Even in ideal conditions the material used as part of the cleaning and restoration work will need regular maintenance to prevent accelerated deterioration of the bridge.

Prior to going on display and following the cleaning, a structural engineer should be consulted to determine the structural stability of the North and South Plate girders. The structural engineer should also be involved in the design process, to ensure that the mounting requirements for the girders align with the aesthetic design for the new park.

During the final design process additional treatments will likely be required to stabilize the salvaged bridge elements. This may include cutting away sections that are too deteriorated to reuse, painting, or welding new structural supports. Once on display to the public the following conditions should be monitored:

- Signs of wear or other deterioration of any protective coatings (blanched, pealing, or opaque appearance, exposed metal).
- Signs of new unstable corrosion, generally visible in the form of small red/brown spots.
- The presence and amount of dirt, gum, soot, bird excrement, spilled drinks or food, and other forms of particulate matter.
- New post-historic graffiti or other forms of vandalism.
- Cracks, holes, open seams, and/or any missing/damaged parts.

All future procedures, findings, materials, and other information should be entered into a conservation maintenance file. In addition, photographic documentation should be performed yearly, or when other conditions necessitate it, i.e., occurrence of vandalism, etc. Aside from the general inspection and cleaning, unskilled practitioners should not perform repair work. It is highly advised that a conservator who specializes in the conservation of outdoor metal structures be called before any repair work is attempted.

APPENDIX A: BRIDGE CONSTRUCTION AND CONDITIONS DIAGRAMS

Talbot Bridge Condition Assessment Key

Low level Rusting

High level Rusting

Active corrosion due to exposure to pooling water

Cut Cross I-beam - Perpendicular to bottom flange and is fixed to the structure as support. Cut during relocation

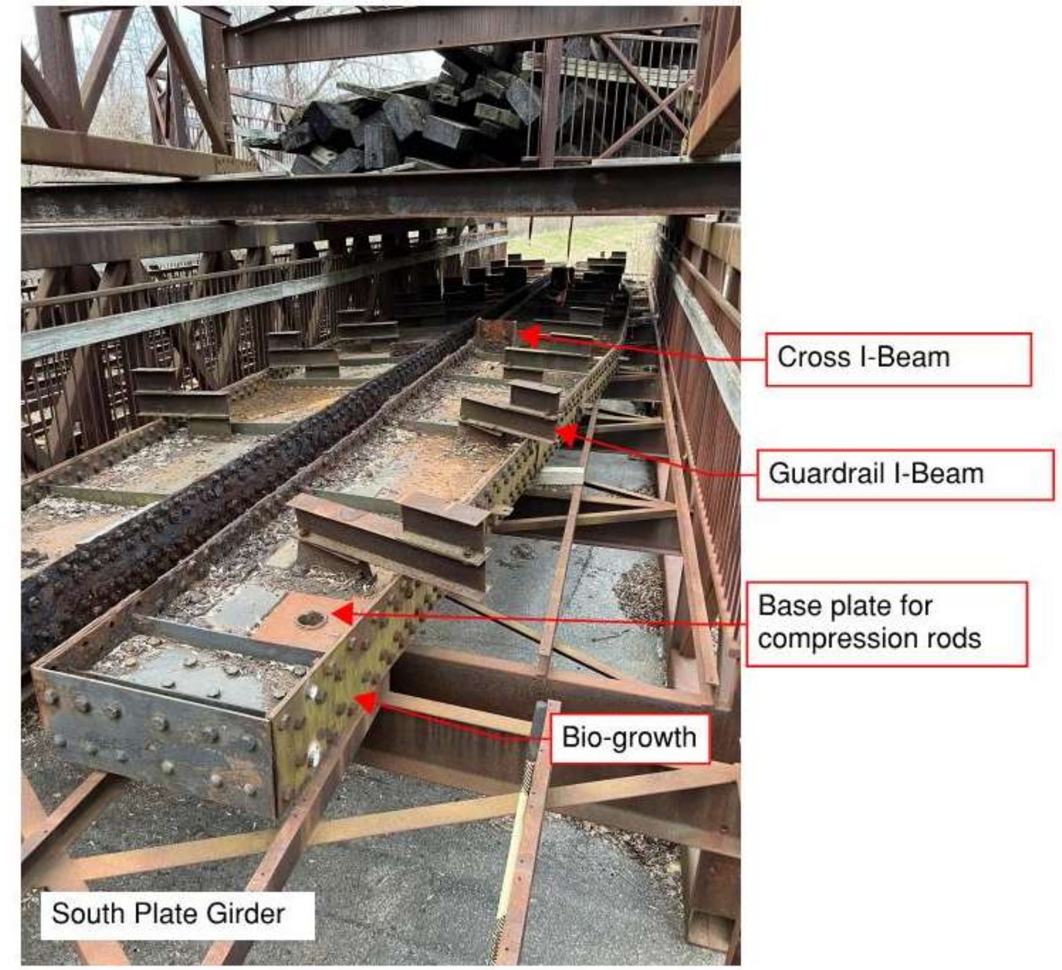
Guardrail I-beam - Connection points for removed metal guardrail system

Cut Compression Rod Base Plate that were installed to move the bridge

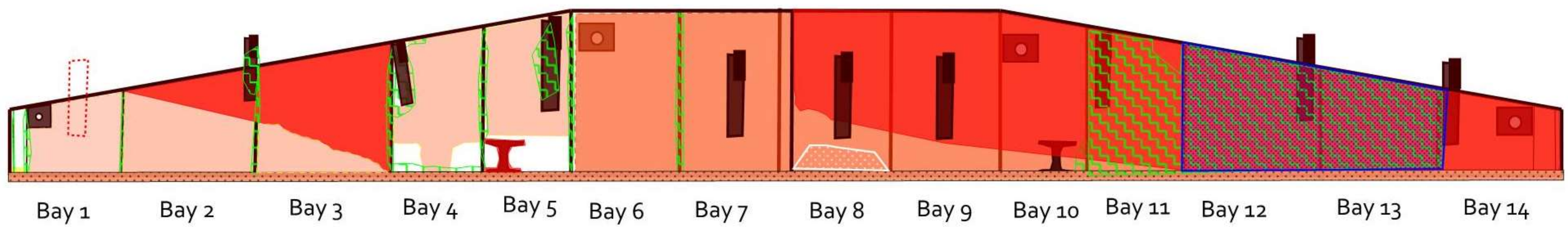
Biogrowth - green staining on metal

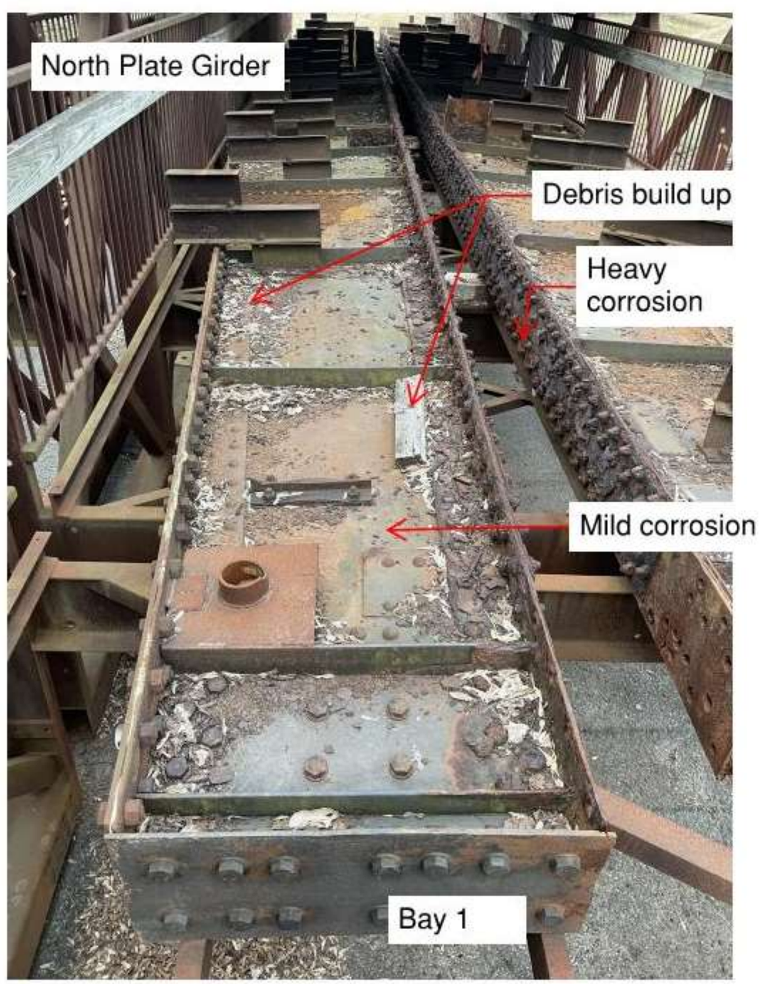
Standing water

Tide line from mineral deposit (white dotted area)



North Plate Girder





Field Notes:

General: Bottom flange and lower 1/3 of the horizontal plate is heavily corroded. Uncovered portions of the bridge have pooling water and/or show evidence of previous moisture collection. Exposed areas exhibit signs of active ferrous corrosion which is easily distinguished by orange material build up. Biogrowth of various degrees is found on the vertical elements in most bays.

North Plate Girder Points of Interest:

Bay 1: Missing guardrail I-beam; missing gusset plate
Bay 2: biogrowth on vertical plains
Bay 3: Evidence of moisture collection, very damp; Active corrosion
Bay 4: Guardrail I-beam – bent ~3" out of alignment; Active corrosion
Bay 5: I-beam is heavily corroded; Guardrail I-beam has biogrowth
Bay 6: Overall less corrosion
Bay 7: Bay is covered by a partial roof ; I-Beam in better condition due to being covered – no biogrowth, less corrosion
Bay 8: Bay is covered by a partial roof ; tide line white mineral deposit
Bay 9: Bay is covered by a partial roof ; I-Beam in better condition due to being covered – no biogrowth, less corrosion
Bay 10: Bay is covered by a partial roof; Active corrosion; Cross girder – Heavily corroded
Bay 11: North corner is very damp
Bay 12: Approx 1-2" of water, thick biogrowth
Bay 13: Approx 1-2" of water, thick biogrowth.
Bay 14: Gusset plate in place

North Plate Girder Detailed Condition Notes

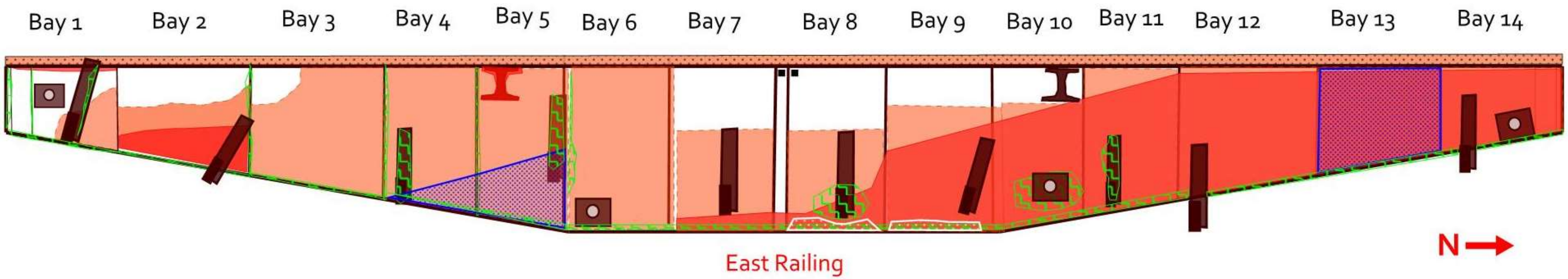
The following is a breakdown of the conditions found on the skyward face of each of the north plate girders fourteen (14) bays reviewed from West to East. Images of the following conditions by bay can be seen in Appendix B.

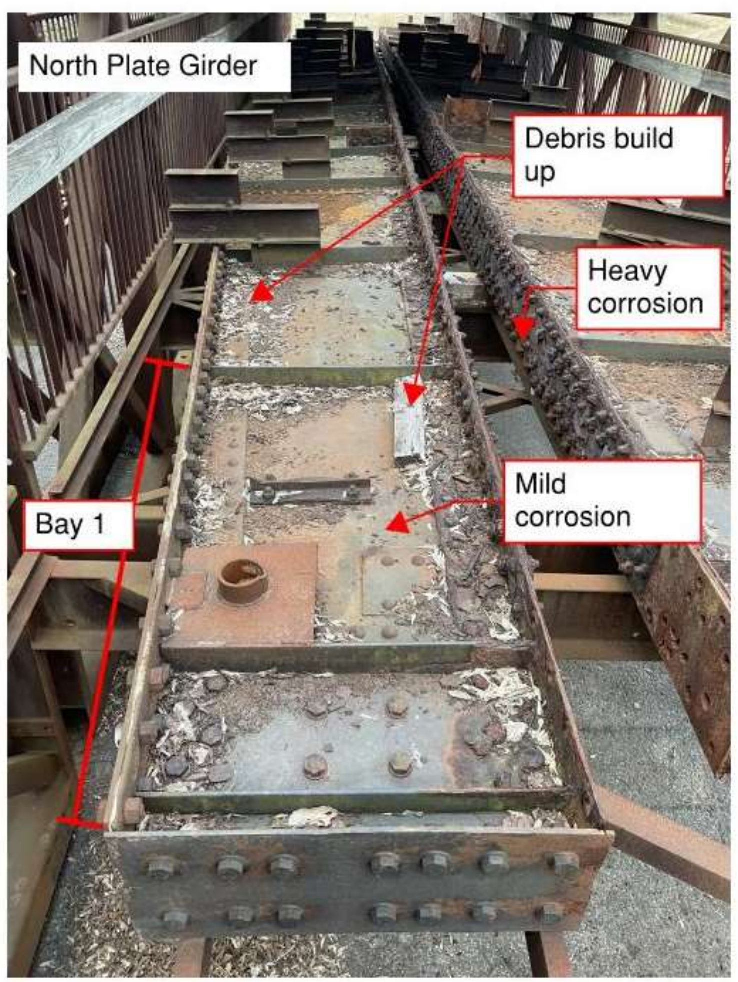
- Bay 1: Gusset plate is missing from the south side of the bottom flange. Hex bolts used to adhere gusset plate are also missing leaving holes in the bottom flange. Bottom flange is very weak and friable to the touch. Single guardrail I-beam is broken off or was otherwise severed from the structure. Horizontal flat plane is filled with debris including but not limited to dirt, bioogrowth, plant foliage, and metal debris. Minimal moisture buildup in this bay. South side has potentially original paint on the exterior face (Paint Sample 1 was removed from this location). Post historic plat weld to vertical planes are in ok condition.
- Bay 2: Bottom flange is very weak and friable to the touch, but has less corrosion than Bay 1. Single guardrail I-beam in fair condition bio-growth on vertical planes. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Minimal moisture buildup in this bay.
- Bay 3: Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Fresh bright orange corrosion is present at the center of the horizontal plane. Moisture buildup is concentrated in the north corner leaving an approximately ¼" thick area of damp mud.
- Bay 4: Bottom flange is very weak and friable to the touch. Single guardrail I-beam in fair condition, is bent 3" out of plane, and has bio-growth on vertical planes. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Minimal moisture buildup in this bay. (Paint Sample 2 was removed from this location)
- Bay 5: Bottom flange is very weak and friable to the touch. Single guardrail I-beam in fair condition, and has bio-growth on vertical planes. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Minimal moisture buildup in this bay. Second type of I-beam in poor condition. Heavily corroded and cut down from its original size.
- Bay 6: Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Moisture buildup in this bay on the north side thick bio-growth on flat plane.
- Bay 7: Has a partial roof. Bottom flange is very weak and friable to the touch. Single guardrail I-beam in fair condition. Horizontal flat plane is filled with debris including but not limited to dirt, plant foliage, and metal debris.
- Bay 8: Has a partial roof. Bottom flange is very weak and friable to the touch, areas actively detaching from the flange. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Single guardrail I-beam in fair condition Fresh bright orange corrosion is present. Moisture buildup is concentrated in the north corner. West

vertical plane has a mineral deposit tide line from previous standing water.

- Bay 9: Has a partial roof. Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Single guardrail I-beam in fair condition. Fresh bright orange corrosion is present. Moisture buildup is concentrated in the north corner. West vertical plane has a mineral deposit tide line from previous standing water.
- Bay 10: Has a Partial Roof. Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Fresh bright orange corrosion is present at the center of the horizontal plane. Moisture buildup is concentrated in the north corner leaving an approximately ¼" thick area of damp mud. West vertical plane has a mineral deposit tide line from previous standing water. Second type of vertical I-beam like that in Bay 5 is in poor condition. Heavily corroded and friable. Has been cut down from its original size.
- Bay 11: Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Moisture buildup is concentrated in the north corner leaving an approximately ¼" thick area of damp mud. Single guardrail I-beam in fair to poor condition. North and skyward sides are heavily covered in bio-growth.
- Bay 12: Bottom flange is friable to the touch. Horizontal flat plane has active water collection concentrated on the west side approximately 1-2" deep. The east side has some debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. East side is also missing a bolt leaving a 1" hole in the plat plane. Single guardrail I-beam in fair condition. Top flange has grey-white caulking between the two plates. This top girder also has a diagonal grinder cut.
- Bay 13: Bottom flange is friable to the touch. Horizontal flat plane has active water collection concentrated on the west side approximately 1-2" deep. West vertical plane has a mineral deposit tide line indicating the standing water is typically higher. The east side has ¼" of mud and debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Top flange has grey-white caulking between the two plates. This top girder also has a diagonal grinder cut.
- Bay 14: Gusset plate is missing from Bay 1 is present on Bay 14. Hex bolts used to adhere gusset plate are missing. Bottom flange is very weak and friable to the touch. Single guardrail I-beam is broken off or was otherwise severed from the structure. Horizontal flat plane is filled with debris including but not limited to dirt, bioogrowth, plant foliage, and metal debris. Minimal moisture buildup in this bay. North side has potentially original paint on the exterior face

South Plate Girder





Field Notes:

General: Bottom flange and lower 1/3 of the horizontal plate is heavily corroded. Uncovered portions of the bridge have pooling water and/or show evidence of previous moisture collection. Exposed areas exhibit signs of active ferrous corrosion which is easily distinguished by orange material build up. Biogrowth of various degrees is found on the vertical elements in most bays.

South Plate Girder Points of Intrest:

Bay 1: Guardrail I-beam out of alignment ~10", twisted; gusset plate in place
Bay 2: Guardrail connector out of alignment ~10" twisted
Bay 3: Debris build up; biogrowth on vertical points
Bay 4: Collecting water and very damp;
Bay 5: Approx 1-2" of water, Tar like material dripping from the wooden railroad beams (Stored above the bridge) onto the steel bridge components
Bay 6: Debris build up; overall better conditions
Bay 7: Bay is covered by a partial roof ; no biogrowth on I-beam
Bay 8: Bay is covered by a partial roof; no biogrowth on I-beam; active corrosion; Corrosion hole ~2" and missing bolt hole ~1" in size on west side; tide line white mineral deposit
Bay 9: Bay is covered by a partial roof; Guard rail connector out of alignment ~3" twisted; tide line white mineral deposit
Bay 10: Bay is covered by a partial roof; Cut Cross I-beam in poor condition – large hole (~5") and corrosion on vertical sections
Bay 11: Biogrowth on vertical points; east side is very damp
Bay 12: Pants and bio-growth on vertical points; east side is very damp
Bay 13: East side is very damp and is starting to collect water
Bay 14: Active corrosion; biogrowth on vertical points; Paint present on the end; missing gusset plate; vine like vegetation growing from ground and taking over

South Plate Girder Detailed Condition Notes

The following is a breakdown of the conditions found on the skyward face of each of the south girders fourteen (14) bays reviewed from west to east. Images of the following conditions by bay can be seen in Appendix B.

- Bay 1: Gusset plate is intact connected to the bottom flange but the hex bolts used to adhere gusset plate are missing. Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bioogrowth, plant foliage, and metal debris. Minimal moisture buildup in this bay. South side has potentially original paint on the exterior face Single guardrail I-beam in fair condition, is bent 10" out of plane, and has bio-growth on vertical planes.
- Bay 2: Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bioogrowth, plant foliage, and metal debris. Minimal moisture buildup in this bay. Single guardrail I-beam in fair condition, is bent 10" out of plane, and has thick bio-growth on vertical planes.
- Bay 3: Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Fresh bright orange corrosion is present.
- Bay 4: Bottom flange is very weak and friable to the touch. Large areas are actively detaching from the flange. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Fresh bright orange corrosion is present. Moisture buildup is concentrated in the east side leaving an approximately 1/2" thick area of damp mud and some active water collection. Single guardrail I-beam in fair to poor condition. North and skyward sides are heavily covered in bio-growth.
- Bay 5: Bottom flange is very weak and friable to the touch. Large areas are actively detaching from the flange. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Moisture buildup is concentrated in the east side leaving an approximately 1/4" thick area of damp mud and active water collection approximately 1-2" deep. Single guardrail I-beam in fair to poor condition. Tar like material dripping from the wooden railroad beams (Stored above the girder) onto the I-beam. Second type of I-beam in poor condition. The I-beam is heavily corroded with a 2.75" hole on the vertical face, and cut down from its original size.
- Bay 6: Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris.
- Bay 7: Has a Partial Roof. Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Single guardrail I-beam in fair condition.
- Bay 8: Has a partial roof. Bottom flange is very weak and friable to the touch, areas actively detaching from the flange. Horizontal flat plane is filled with debris including but not limited to

dirt, bio-growth, plant foliage, and metal debris. Corrosion hole (~2") in size and a missing bolt hole (~1") on horizontal part of girder. Fresh bright orange corrosion is present as well as active weeping corrosion. Moisture buildup is concentrated in the east side. White mineral buildup on the rivets on the east side. Single guardrail I-beam in fair condition.

- Bay 9: Has a partial roof. Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Minimal moisture buildup in this bay. Single guardrail I-beam in fair condition, is bent 3" out of plane. White mineral buildup on the rivets on the east side. Fresh bright orange corrosion is present.
- Bay 10: Has a partial roof. Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Moisture buildup is concentrated in the east side leaving an approximately 1/4" thick area of damp mud. Second type of vertical I-beam like in Bay 5 is in poor condition. The I-beam is heavily corroded with a 5" hole on the vertical face, and cut down from its original size.
- Bay 11: Bottom flange is very weak and friable to the touch. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. Moisture buildup is concentrated in the east side leaving an approximately ¼" thick area of damp mud. Single guardrail I-beam in fair to poor condition. North and skyward sides are heavily covered in bio-growth.
- Bay 12: Bottom flange is friable to the touch. Moisture buildup is concentrated in the east side leaving an approximately ¼" thick area of damp mud. Horizontal flat plane is filled with debris including but not limited to dirt, bio-growth, plant foliage, and metal debris. West side has thick moss on the vertical plane. Single guardrail I-beam in fair to poor condition. North and skyward sides are heavily covered in bio-growth.
- Bay 13: Bottom flange is friable to the touch. Moisture buildup is concentrated in the east side leaving an approximately 1/2" thick area of damp mud and some active water collection. The west side of the horizontal flat plane has debris including but not limited to dirt, bio-growth, plant foliage, and metal debris.
- Bay 14: Gusset plate is missing from the North side of the bottom flange. Hex bolts used to adhere gusset plate are also missing leaving holes in the bottom flange. Bottom flange is very weak and friable to the touch. Single guardrail I-beam in fair condition. Horizontal flat plane is filled with debris including but not limited to dirt, bioogrowth, plant foliage, and metal debris. Minimal moisture buildup in this bay. North side has potentially original paint on the exterior face. Post historic plat weld to vertical planes are in ok condition. Vegetation from ground growing and taking over the edge of the girder.

APPENDIX B: CONDITIONS GALLERY

North Plate Girder	Bays South to North
	Bay 1
	Bay 2

	Bay 3
	Bay 4

	Bay 5
	Bay 6

	Bay 7
	Bay 8

	Bay 9
	Bay 10

	Bay 11
	Bay 12
	Bay 13

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South Plate Girder	Bays South to North
	Bay 1
	Bay 2

	Bay 3
	Bay 4

	Bay 5
	Bay 6

	Bay 7
	Bay 8

	Bay 9
	Bay 10

	Bay 11
	Bay 12

	Bay 13
	Bay 14