



CUY-0010-1613

SFN 1801503

November 2015

Bridge Inspection Report

REPORT PREPARED FOR

**Jones
Stuckey**
A Division of 

and

REPORT PREPARED BY

KS
KS ASSOCIATES

Civil Engineers + Surveyors

260 Burns Road, Suite 100

Elyria, Ohio 44035

P 440 365 4730

F 440 365 4790

www.ksassociates.com



**OHIO DEPARTMENT OF
TRANSPORTATION**

Table of Contents

Structure information and Background	3-4
Approach Items	5-6
Deck Items	7-12
Superstructure Items	13-22
Substructure Items	23-25
Channel Items	26
Signs and Utilities	27
General Appraisal and Operating Status	28
Appendix A - SMS Field Report	29-32
Appendix B – GPI Dive Report.	33-54

All Inspection Photos - See Attached DVD



Background

In the Fall of 2015, KS Associates, Inc. performed a routine inspection of the Lorain Carnegie Bridge in Cleveland, Ohio. The structure is approximately 3,515 feet long and carries State Route 10 and pedestrian traffic over the Cuyahoga River Valley. The 13 main spans of the bridge are composed of four lines of cantilever Pratt deck trusses supported by cast-in-place concrete piers on spread footings. Inspection of the main steel superstructure was performed using a ladder and climbing. No special access techniques were required to inspect the remaining components for this routine inspection.

The calculated quantities from the 2014 Element Level Inspection were used when populating the 2015 Bridge Inspection Field Report. The main arch chords are referenced with letters A (north exterior), B (north interior), C (south interior), and D (south exterior). The span units are numbered per the original shop drawings, beginning at Unit 13 at the west abutment and decrementing to Unit 0 at the east pylon. The easternmost span from the east pylon to the east abutment over RTA line is denoted as Span W. Gusset plates are numbered increasing from west to east locally to each span unit.

Structure Information

SFN: 1801503

Main Span: 13 spans (161'-2" to 299'-0"), four lines of cantilever Pratt deck style trusses totaling 2,916'-1"

West Approach: 5 spans, multiple beams set on concrete piers and steel bents totaling 157'-8"

East Approach: Concrete cellular construction approximately 307 feet long and a three-line, 131'-0" long Pratt deck truss span

Abutments: Reinforced concrete walled cell with reinforced slab

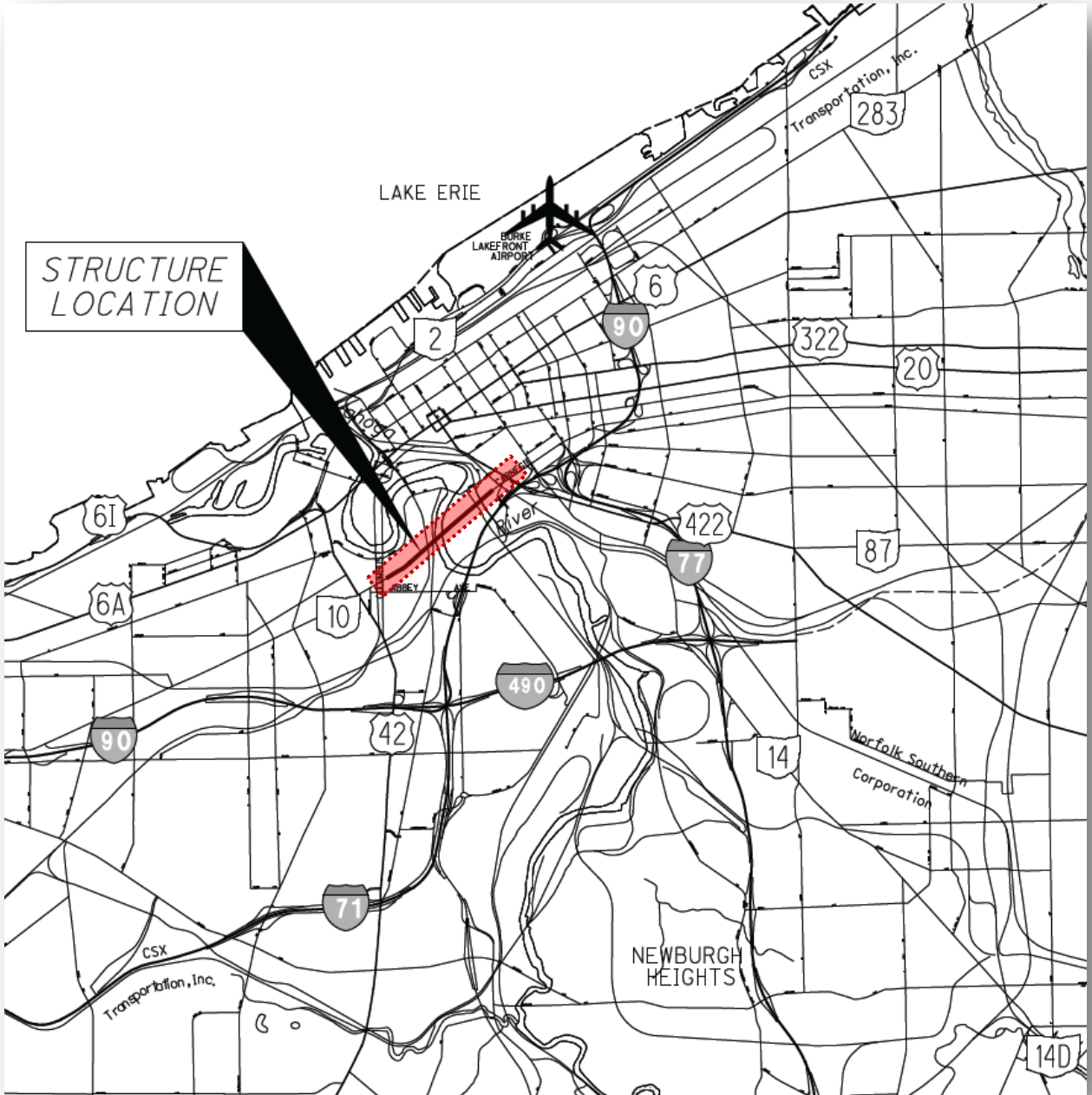
Skew: None

Alignment: Tangent

Superelevation: Normal crown

Year Built: 1932

Location Map



Approach Items

C1. Approach Wearing Surface (EA.) / C2. Approach Slabs (SF)

The east approach pavement is in **rated 2 Good** condition. The west approach pavement has about 20% spalls, patches, or cracks. The approach slabs are in **Good** condition with no signs of settlement or shifting. Due to the surface deficiencies in the west approach, 5% of the total 2075 square feet of approach slab were rated 2. **Overall, 1971 SF are rated 1-Good Condition, and 104 SF are rated 2 -Fair Condition.**



East approach guardrail

C4. Embankment (EA.)^{ded}

All four approach embankments are **rated 1, Good Condition.**

C5. Guardrail (EA.)

The concrete guardrail that extends off all four corners of the bridge are **rated 1, Good Condition** with only minor surface spalling and staining particularly concentrated in the lower third of the interior faces.



Cracks and patches in west approach wearing surface

N36. Safety Features

All Transitions and Guardrail meet current standards.

N36B Coded 1 – N36C Coded 1 – NC36D Coded 1

C6. Approach Summary

The approaches as defined above are **rated 7, Good Condition**, as there were no wearing surface, embankment, or guardrail deficiencies noted that prevented their operation as designed.

Deck Items

C7.1 Floor/Slab (SF)

The underside of the deck has isolated spalls throughout as well as delaminations with efflorescence and exposed steel about to spall. The slab shows heavier distress adjacent to the expansion joints and scuppers. Many of the previous spalls appear to have been coated with rust inhibitor and still show active corrosion. Prior spalls or repair debris is common on the lower lateral bracing and lower chords and poses a safety risk to the public, especially on the west bank over the pedestrian paths.

The east approach tunnel has large spalled areas in all bays with several consecutive transverse bars exposed and broken. Heavy deterioration is present at expansion joints. Overall there are 263,774 square feet. **240,800 square feet of slab are rated 1, Good Condition, 1,971 SF are rated 2 Fair Condition, and 104 SF are rated 3 Poor Condition.**



Typical slab condition adjacent to expansion joints



Spalled areas with rust inhibitor and fresh spalls without, common throughout entire deck underside



Large saturated and spalled areas with exposed and broken bars in east tunnel

C7.2 Edge of Floor/Slab (LF)

The deck edge has isolated spalls throughout and cracking adjacent to expansion joints and floorbeam extensions, but overall is in Good condition. **6,094 feet are rated 1, Good Condition, and 321 linear feet, or about 5% are rated 2, Fair condition** due to the above mentioned scattered defects.



Previously removed spalls on north deck edge

C8. Wearing Surface (SF)

Overall the wearing surface is in **Good** condition. With a few hairline cracks and evidence of very isolated ponding in about 5% of the wearing surface. **170,011 SF are rated 1 Good Condition, and 8948 square feet are rated 2 Fair Condition.**



Wearing surface looking east

C9. Curbs/Sidewalk (LF)

The north walk has been previously repaired at the expansion joints. Both walks have minimal areas of delamination or light cracking with moisture. The south walk shows more deterioration and has vegetation growing in many of the cracked areas adjacent to the curb. Many areas adjacent to the steel curb have been patched and sealed in areas. The steel curb shows minor surface corrosion. Only about 1% of the total 7018 feet of walk and curb rated in **Fair** condition. **6948 Feet rated 1, Good Condition, and 70 feet rated 2, Fair Condition.**



Cracks in previously repaired walk sections

C11. Railing (LF)

There are stained cracks concentrated in the lower third of the entire inside lengths of the exterior parapets. The bikeway railing is in good condition throughout. Because of the general cracking and staining throughout the parapet, 80% of the total 7018 linear feet of railing were rated **fair**. **1,404 feet are rated 1, Good Condition, and 5614 feet are rated 2, Fair Condition.**



Typical railing cracking and staining pattern

N36. Safety Features: Rail

The guardrail type was coded as meeting current acceptable standards. **N36A was coded 1.**

C12. Drainage (EA) ^{ded}

There is minor debris in the deck scuppers and some isolated surface corrosion below the deck in the drainage downspouts, accounting for the less than 5% **Fair** condition state rating. The remainder of the drainage quantity is in **Good** condition. **27 are rated 1 Good Condition, 1 is rated 3 Poor Condition.**

C13. Expansion Joint (LF) ^{ded}

The deck armor is in good condition and level with the wearing surface, but there is evidence of leakage through joint membranes, with some having very slow but steady leaks even when it is not raining. For this reason, **75 feet of the total 1494 linear feet of expansion joint were Rated 2, Fair Condition with the remaining 1,494 are rated 1, Good Condition.**



Debris and leakage common in deck joints

N58. Deck Summary

Overall the deck is in satisfactory condition. There are isolated spalls, throughout, delaminations with efflorescence and exposed steel about to spall. Heavier distress adjacent to the expansion joints and drainage system. Many of the previous spalls have been coated with rust inhibitor and still show active corrosion. **The Deck Summary is rated 6, Satisfactory Condition.**

Superstructure Items

C14. Alignment (EA) ded

The alignment of the 17 primary superstructure members is rated 1, **Good Condition**.

C15.1 Beams/Girders (LF)

The 1207 feet of beams that compose the west approach span are **rated 1, Good Condition** with no notable defects.

C16. Diaphragm/X-Frames (EA)

The 55 cross frames in the west approach span over West 17th Street are **rated 1, Good Condition** with no notable defects.



Beams and cross frames in the west approach

C17. Stringers (LF)

There are very isolated instances of corrosion at floorbeam connections. Some of these locations have minor web loss in areas and isolated through holes. **3671 linear feet, are rated 2, Fair Condition**, or about 10% of the total 36709 linear feet. The remaining **33,038 feet of stringers are rated 1, Good condition**.



Section loss in stringer floorbeam connection adjacent to expansion joint

C18. Floorbeams (LF)

The most distress, including staining and minor section loss concentrated at deck expansion joints, placed **900 linear feet are rated 2, Fair Condition**, or just over 8% of the total 11218 feet of floorbeam. The remaining **10,318 feet are rated 1, Good condition**.



Corrosion in lower flange of D-S03-UC-13 floorbeam

C19. Truss Verticals (EA.)

The verticals are generally good condition, with scattered corrosion to flange angles, especially below deck joints. In Span 1, NE U10L10 has 50% section loss to the outstanding legs of its east flange angles. Nearby, SI U10L10 has deep pitting to both flange angles. Similar deficiencies accounted for the **28, roughly 5% of the Truss Verticals being rated down to 2, Fair condition. The remaining 501 Truss Verticals remain in Good condition.**

C20. Truss Diagonals (EA.)

481, Approximated 95%, of the diagonals are in **rated 1, Good condition. The remaining 25, 5%, are rated 2, Fair condition**, and have active pack rust common to the exterior angles of the north exterior and south exterior diagonal members. Exterior diagonals adjacent to abandoned utility supports have remnants of a bracket welded to its web plates. Elsewhere, several diagonals have lower stay plates with deep section losses or perforations.



Corrosion inside D-S03-UC-13

C21. Truss Upper Chord (EA)

The top chord is in **Good** condition with few significant findings noted. Junction box drains dripping onto the upper chord has caused light corrosion to several exterior upper chord members. At expansion joints, dirt and construction debris is present inside some upper chord connections with the



Corrosion inside D-S07-UC-15

verticals. 512 are rated 1, Good Condition, and 10, Less than 2% of the Truss Upper Chord quantity, is rated in 2, Fair condition to cover these defects.

C22. Truss Lower Chord (EA)

The majority of the lower chord is in **Good** condition apart from various degrees of sections loss and pack rust located between the flange angles and the web plates. Portions of the flange angles of the exterior lower chords have pockets of deep pitting or perforations. The greatest section loss generally is located in Spans 11 and 13. In these spans, twelve lower chord members have between 5% and 22% net section loss as reported by the 2014 inspection report. The chords downstream of expansion joints have significant pack rust. Specifically, the interior chords at span 9 downstream of expansion joint 4 have about 2 inches of pack rust between the upper flange angles.

There is a longitudinal crack in the top north flange angle on the south exterior lower chord in Span 12 between panel points 3 and 4 that has not grown since the previous inspection.

Four members have over 10% estimated/measured section loss. One member has a



Pack rust in the angles and web plates of C-S07-LC-14



Through hole in lower angle of D-S09-LC-11

longitudinal crack in an internally redundant flange angle.

The south interior truss line pin to the zero force member is dislodged at Unit 13 lower chord Panel Point 12. **465** lower chords are rated **1, Good Condition, 52, 10%** are rated **2, Fair Condition, and 5, less than 1%** is rated **3, Poor Condition.**



Crack in lower chord D in Span 12 between PP 03 and 04

C23. Truss Gusset Plate (EA) ded

Truss gusset plates below deck joints show the most distress. Section loss is most severe at these locations but generally present everywhere. A previously documented laminar tear in the south gusset at Unit 7 lower chord Panel Point 7 shows no growth. Advanced section loss commonly occurs above the lower chord and along the edges and ends of diagonal connections. Also commonly occurring are bows along the long free edges of the gussets caused by pack rust.

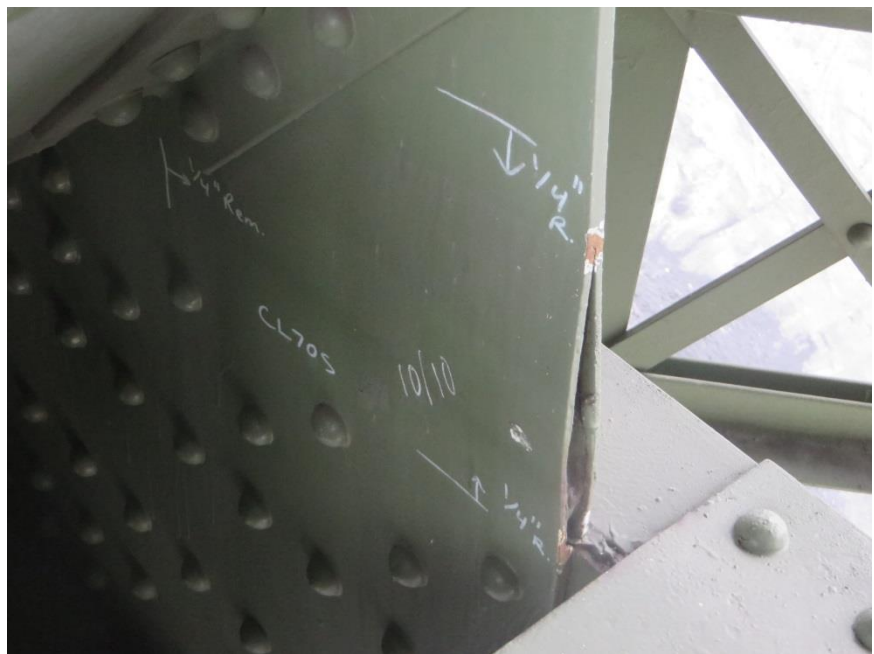


Section loss in D-S05-LC-14

The upper chord gusset plates are in good condition with little corrosion observed. Areas of heaviest corrosion occur below deck expansion joints.

The gussets at the upper chord floorbeam connections below junction box drains are pitted. Of the previously totaled 2116 gussets on the bridge, **1840 are rated 1, Good condition, 200 are rated 2, Fair condition, and the remaining 76 are rated 3, Poor Condition.**

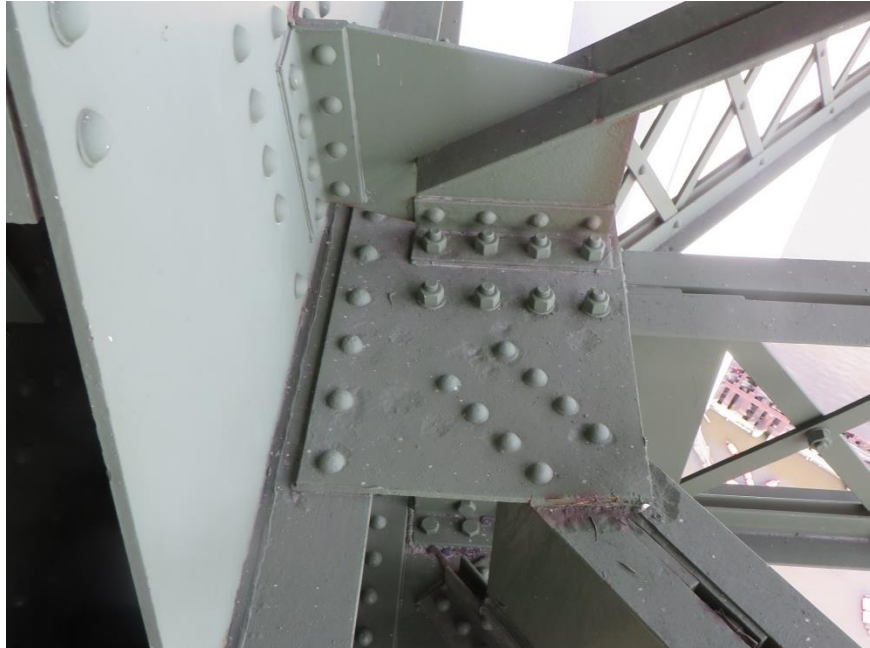
KS did take photos of each lower chord panel point and upper chord panel points. Contact sheet of each panel point are provided to the district.



Laminar tear in C-S07-LC-07 gusset

C24. Lateral Bracing (EA)

Many of the lateral bracing gussets have section lost and pack rust causing their corners to peel away from the lateral bracing members, a problem that occurs more severely below deck joints. The members themselves are in Good condition. **228 are rated 1, Good Condition, and 12, 5%, are down rated to 2, Fair Condition.**



Pitting and corner lifting common in many lateral bracing gussets (C-S11-LC-12 shown)

C25. Sway Bracing (EA)

The sway bracing is in Good condition having only minor pack rust and corrosion at the connections to the verticals below deck joints. **200 are rated 1, Good Condition, and 2, less than one percent, are rated 1, Fair Condition.**

C26. Bearing devices (EA) ded

All of the truss bearings are in fair condition. There is debris and water accumulation in some of the truss bearings. Section loss occurs generally around the pins in the gussets that house the pin assembly. **All 164 bearings are rated 2, Fair Condition.**



Section loss at A-S05-LC-11 Bearing

Not considered in this quantity were the bearings on which the lower utility deck rests. Many are out of alignment and have notable section loss. **All Utility Deck Bearings at expansion joints should be reset or repaired with the upcoming project.** Since the utility deck is not open to the public and does not present a public safety concern, these bearing were not considered with the rating.



Utility deck bearing condition from C-S03-LC-13

C30. Protective Coating System (LF) ded

An estimated 60% of the PCS quantity is in **Good** condition. 20% is in **Fair**, and the remainder is in **Poor** condition. There are scattered areas of peeling and bubbling, especially at expansion joints where water infiltration and active corrosion is occurring. Bad preparation or installation could be the cause of other areas of PCS failure that occur randomly along the primary structural members. There are several areas on the superstructure with active pack rust between gussets, web plates, angles, and lacing, with the worst areas below or downstream of deck joints. **Overall, 36,577 feet are rated 1, Good Condition, 12,192 feet are rated 2, Fair Condition, and 12,192 feet are rated 3, Poor Condition.**



Large PCS failure in lower chord A



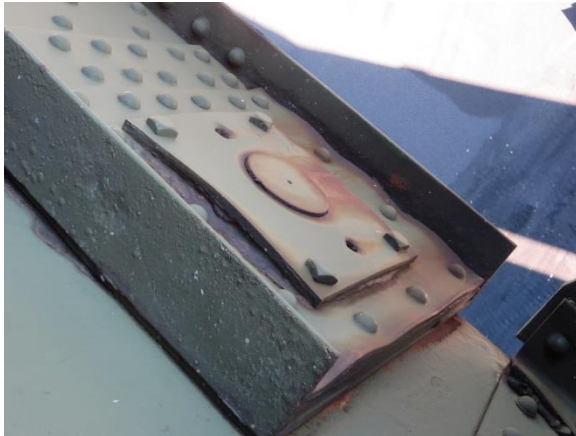
PCS flaking in A-S08-LC-05



Painted debris on exterior of lower chord A

C31. Pins/Hangers/Hinges (EA) ded

The south interior truss line pin to zero force member is dislodged at Unit 13 lower chord Panel Point 12. Since this is connected to a zero force member, it is not considered with the rating of the pin, however, it should be monitored, and repaired with the upcoming project. With general section loss to the pins or adjacent plates, **all 192 pins are rated 2, Fair Condition.**



Pack rust in C-S09-LC-17 pin

32.



Free pin at C-S13-LC-12

Fatigue (LF) ded

No fatigue distress was noted at any of the field tack welded utility or drainage attachments. **All 60,691 feet of primary steel members are rated 1, Good Condition for fatigue.**

N59. Superstructure Summary

The overall superstructure is in fair condition. However, **The superstructure summary is rated 4, Poor Condition**, primarily due to the 5 lower chords and 76 truss gusset plates that are rated a 3, poor condition. Though the structure has 4 truss girder lines, it is not considered a redundant structure. The bridge is formed by two, twin trusses, adjacent to one another with no significant connection between the two pairs. The bridge is currently scheduled for rehabilitation of these members. KS did take photos of each lower chord panel point and upper chord panel points. Contact sheet of each panel point are provided to the district electronically.

Substructure Items

C33. Abutment Walls (LF)

There is minimal staining and hairline cracks in the abutment faces. A quantity of 20 linear feet of the total 171 linear feet of abutment walls was downrated from Good to **Fair** to reflect these deficiencies. **151 feet are rated 1, Good Condition, and 20 feet are rated 2, Fair Condition.**



East abutment face

C36. Pier Walls (LF)

The east pylon is in Good condition with about 25% in Fair condition having minor cracking, staining, or previously patched areas. **65 feet are rated 1, Good Condition, and 5 are rated 2, Fair Conditions.**



Pier 8 west face showing patches, cracks, and hole in left tower

C37. Pier Caps (LF)

About 50% of the pier cap quantity is in Good condition and the remainder is in Fair condition. The nonstructural portions of the pier towers were not considered in the rating but are in poor condition and pose a risk to public safety as they continue to deteriorate. Many of the pier tower roofs have been removed, but those that remain show active degradation with debris accumulating on the pier cap below. The inspection manholes in the pier caps are in poor condition. There is little remaining lip to support the lid and care should be taken when walking around or opening them. **539 feet are rated 1, Good Condition, and 540 feet are rated 2, Fair Condition.**



Degrading pier tower roof

C38. Pier Columns/Bents (EA)

The pier columns are in Good condition with a quantity of about 7% placed in Fair condition to account for areas of staining, cracking, or delamination concentrated around previously patched areas. The base of the Pier 8 north column west face has a hole approximately 2' x 3' into the lower column cell filled with trash. **65 are rated 1, Good Condition, and 5 are rated 2, Fair Condition.**



Deteriorated manhole casting in Pier 9

C39. Backwalls (LF)

As reported by the 2014 inspection report, a vertical crack approximated 12'-6" tall exists in the East Pylon backwall behind the north exterior truss line between the sandstone fascia and abutment concrete but shows no growth. Of the total 171 linear feet of backwall, **120 linear feet rated 1, Good condition, 34 are rated 2, Fair Condition, and 17 are rated 3, Poor Condition.**

C40. Wingwalls (EA)

All four wingwalls are **rated 1, Good Condition**, having only scattered areas of light staining or efflorescence.



Crack in east pylon backwall

C42. Scour (EA) ded

The bridge had an underwater bridge inspection on July 14, 2015 by GPI under contract with Jones-Stuckey. See Attached. They found a change in the exposure of the footing at Pier 10 (West Pier), Column D, where the exposure of the footing has advanced since the 2010 dive inspection. "The maximum vertical exposure was measured to be 3.7 feet. 9.5 horizontal feet of footing are exposed along the south side and 18 horizontal feet are exposed on the east face of the footer."

No change significant change was noted at other locations. Pier 9 (East Pier) , Column A shown less exposure to the footing.

Timber debris is still lodged at the northeast corner of pier 10.

Both piers are rated 1, Good Condition.

C43. Slope Protection (EA) ded

All slopes are in **Good** condition and well vegetated.

N60. Substructure Summary

The overall substructure is **rated 7, Good Condition.**

Channel Items

C51. Alignment (LF) ded

All 200 feet of the channel alignment is in rated 2, Fair Condition. Water is flowing along the south column of Pier 10 and the north column of Pier 9. The channel has sharp meanders.



C52. Protection (LF) ded

The west bank channel protection is in **Good** condition and the east bank channel protection is in **Poor** condition since the bulkhead protecting the east bank at Pier 9 has failed. **100 feet are**

rated 1, Good Condition, and

100 feet are rated 3, Poor Conditions

Collapsed channel protection at east bank

C53. Hydraulic Opening (EA) ded

The hydraulic opening is sufficient and is **rated a 1, Good Conditions.**

C54. Navigation Lights (EA) ded

None of the navigation lights are operating. They appear to be without power or the bulbs are burned out. All 6 are **rated 4, Critical Condition.**



Navigation Lights not working

N61. Channel Summary

Primarily due to the channel protection and the navigation lights, The channel summary is **rated a 4, Poor Condition.**

Sign/Utility Items

C55 Signs (EA.)

There are 15 signs on the structure which are **rated 1, Good Condition**. The two speed limit facing westbound traffic are mounted to light poles behind the new bike path and bike path railing. They are difficult to see.

Utilities

The gas main appears recently rehabilitated with new pedestals, rollers, and restraints along its length on the bridge.

The PVC telecom conduits are damaged and cables are exposed, especially in the east tunnel. The telecom structural supports, sheds, and corrugated roofs/walls are heavily corroded. Many steel pieces are hanging or have fallen to the utility deck below.

There is a large spall and exposed reinforcement in base of concrete light pole on the south side of the road near Pier 2. Others show progressing deterioration.

Of all the street light, only 6 were not operational. The architectural lighting is not considered as part of the rating, but the light fixture at shining on the west face of the northwest pylon is loose and shakes when the wind is blowing. Concrete debris has filled the upward facing lighting which shines on the west face of the southeast pylon. Lighting at both east pylons is nonoperational and half the lights at the west pylons are out.

Overall 6,036 feet are rated 1, Good Condition and 3,018 feet of utilities are rated 2, Fair Condition.



Damaged conduit in east tunnel



Spalled light post on south railing

N59, 60, or 62 General Appraisal

The General Appraisal for the structure **is rated a 4, Poor Condition**, primarily due to the 5 lower chords and 76 truss gusset plates that are rated a 3, poor condition. Though the structure has 4 truss girder lines, it is not considered a redundant structure. The bridge is formed by two, twin trusses, adjacent to one another with no significant connection between the two pairs. The bridge is currently scheduled for rehabilitation of these members. KS did take photos of each lower chord panel point and upper chord panel points. Contact sheet of each panel point are provided to the district electronically.

N41. Operating Status

The operating status of the structure is rated "A" open no restrictions for the upper deck.

**STATE OF OHIO
BRIDGE INSPECTION FIELD REPORT**

SFN 1801503 Bridge Number CUY-00010-1613 Year Built 1932
 DIST 12 Feature Intersected CUY RIVER VALLEY & FI RR Municipality Cleveland

	Qty.	condition state				cr
		1	2	3	4	
APPROACH ITEMS						
c1. Wearing Surface (EA)	2	2				
c2. Slab (SF)	2075	1971	104			
c3. Relief Joint (LF)	-					
c4. Embankment (EA) ^{ded}	4	4				
c5. Guardrail (EA)	4	4				
N36. Safety Features: Tr, Gr, Tm		1,1,1				
c6. Approach Summary						7

	Qty.	condition state				cr
		1	2	3	4	
DECK ITEMS						
c7.1 Floor/Slab (SF)	263774	240800	12000	12000		
c7.2 Edge of Floor/Slab (LF)	6415	6094	321			
c8. Wearing Surface (SF)	178959	170011	8948			
c9. Curbs/Sidewalk (LF)	7018	6948	70			
c10. Median (LF)	-					
c11. Railing (LF)	7018	1404	5614			
N36. Safety Features: Rail						
c12. Drainage (EA) ^{ded}	28	27	1			
c13. Expansion Joint (LF) ^{ded}	1494	1419	75			
N58. Deck Summary						6

	Qty.	condition state				cr
		1	2	3	4	
SUPERSTRUCTURE ITEMS						
c14. Alignment (EA) ^{ded}	17	17				
c15.1 Beams/Girders (LF)	1207	1207				
c15.2 Slab (SF)						
c16. Diaphragm/X-Frames (EA)	55	55				
c17. Stringers (LF)	36709	33038	3671			
c18. Floorbeams (LF)	11218	10318	900			
c19. Truss Verticals (EA)	529	501	28			
c20. Truss Diagonals (EA)	506	481	25			
c21. Truss Upper Chord (EA)	522	512	10			
c22. Truss Lower Chord (EA)	522	465	52	5		
c23. Truss Gusset Plate (EA) ^{ded}	2116	1840	200	76		
c24. Lateral Bracing (EA)	240	228	12			
c25. Sway Bracing (EA)	202	200	2			
c26. Bearing Devices (EA) ^{ded}	164		164			
c27. Arch (LF)						
c28. Arch Column/Hanger (EA)						
c29. Arch Spandrel Walls (LF)						
c30. Prot. Coating System (LF) ^{ded}	60961	36577	12192	12192		
c31. Pins/Hangers/Hinges (EA) ^{ded}	192		192			
c32. Fatigue (LF) ^{ded}	60691	60961				
N59. Superstructure Summary						4

	Qty.	condition state				cr
		1	2	3	4	
SUBSTRUCTURE ITEMS						
c33. Abutment Walls (LF)	171	151	20			
c34. Abutment Caps (LF)	-					
c35. Abut. Colmns/Bents (EA)	-					
c36. Pier Walls (LF)	166	124	42			
c37. Pier Caps (LF)	1079	539	540			
c38. Pier Columns/Bents (EA)	70	65	5			
c39. Backwalls (LF)	171	120	34	17		
c40. Wingwalls (EA)	4	4				
c42. Scour (EA) ^{ded}	2	2				
c43. Slope Protection (EA) ^{ded}	1	1				
N60. Substructure Summary						7

	Qty.	condition state				cr
		1	2	3	4	
CULVERT ITEMS						
c44. General (LF)	-					
c45. Alignment (LF) ^{ded}	-					
c46. Shape (LF) ^{ded}	-					
c47. Seams (EA) ^{ded}	-					
c48. Headwall/Endwall (EA)	-					
c49. Scour (EA) ^{ded}	-					
c50. Abutments (LF)	-					
N62. Culvert Summary						-

	Qty.	condition state				cr
		1	2	3	4	
CHANNEL ITEMS						
c51. Alignment (LF) ^{ded}	200		200			
c52. Protection (LF) ^{ded}	200	100		100		
c53. Hydraulic Opening (EA) ^{ded}	2	2				
c54. Navigation Lights (EA) ^{ded}	6				6	
N61. Channel Summary						4

	Qty.	condition state				cr
		1	2	3	4	
SIGN/UTILITY ITEMS						
c55. Signs (EA) ^{ded}	-	15				1
c56. Sign Supports (EA) ^{ded}	-					
c57. Utilities (LF) ^{ded}	9054	6036	3018			
N59, 60 or 62 General Appraisal						4
N41. Operating Status						A

Inspector Name Michael Malloy, Jr., Rob Pfingsten, Amy White, Mark Moellman
Inspection Date/Type 11/19/15 Routine
Reviewer Name Michael Malloy, Jr.
Review Date 02/08/2016-
PE Number (Insp or Rev) 60048

STATE OF OHIO BRIDGE INSPECTION FIELD REPORT

Appendix A

SFN: 1801503

Bridge Number: CUY-00010-1613

Year Built: 1932

DIST: 12

Feature Intersected: CUY RIVER VALLEY & FI RR

Municipality: Cleveland

Approach Items

c1. Approach Wearing Surface

East approach pavement in good condition. West approach pavement has about 20% spalls, patches, or cracks.

c2. Approach Slabs

No signs of settlement or shifting.

c5. Guardrail

Minor surface spalling and staining.

Deck Items

c7.1. Floor/Slab

Isolated spalls, throughout, delaminations with efflorescence and exposed steel about to spall. Heavier distress adjacent to the expansion joints and scuppers. Many of the previous spalls appear to have been coated with rust inhibitor and still show active corrosion.

Large spalled areas in all bays of east approach tunnel. Consecutive transverse bars broken in East Subway. Heavy deterioration at expansion joints.

c7.2. Edge of Floor/Slab

Isolated spalls throughout, cracking adjacent to expansion joints and floorbeam extensions.

c8. Wearing Surface

Overall good condition. Few hairline cracks, evidence of very isolated ponding.

c9. Curb/Sidewalk/Walkway

North walk has been previously repaired at expansion joints. Minimal areas of delamination or light cracking with moisture. South walk shows more deterioration. Area adjacent to steel curb has been patched and sealed in areas. Steel curb shows minor surface corrosion.

c11. Railing

Stained cracks in concentrated in the lower third of the entire inside lengths of the exterior parapets. Bikeway railing is in good condition throughout.

c12. Drainage

Minor debris in deck scuppers.

c13. Expansion Joint

Evidence of leakage through joint membranes. Deck armor in good condition and level with wearing surface.

STATE OF OHIO BRIDGE INSPECTION FIELD REPORT

Appendix A

SFN: 1801503

Bridge Number: CUY-00010-1613

Year Built: 1932

DIST: 12

Feature Intersected: CUY RIVER VALLEY & FI RR

Municipality: Cleveland

Superstructure Items

c14. Alignment

The alignment of all primary structural steel members is good.

c15.2 Slab

See c7.1.

c16. Diaphragm/X-Frames

All diaphragms and cross frames on the west approach span are in good condition.

c17. Stringers

Very isolated instances of corrosion at floorbeam connections. Minor web loss in areas, isolated through holes.

c18. Floorbeams

Most distress including staining and minor section loss concentrated at deck expansion joints.

c19. Truss Verticals

The verticals are generally good condition, with scattered corrosion to flange angles, especially below deck joints. In Span 1, NE U10L10 has 50% section loss to the outstanding legs of its east flange angles. Nearby, SI U10L10 has deep pitting to both flange angles.

c20. Truss Diagonals

The diagonals are in good condition, with active pack rust common to the exterior corners of the north exterior and south exterior diagonal members. Exterior diagonals adjacent to abandoned utility supports have remnants of a bracket welded to it web plates. Elsewhere, several diagonals have lower stay plates with deep section losses or perforations.

c21. Truss Upper Chord

The top chord is in good condition with few significant findings noted. Junction box drains dripping onto the upper chord has caused light corrosion to several exterior upper chord members. At expansion joints, dirt and construction debris is present inside some upper chord connections with the verticals.

c22. Truss Lower Chord

The majority of the lower chord is in good condition apart from various degrees of sections loss and pack rust located between the flange angles and the web plates. Portions of the flange angles of the exterior lower chords have pockets of deep pitting or perforations. The greatest section loss generally is located in Spans 11 and 13. In these spans, twelve lower chord members have between 5% and 22% net section loss as reported by the 2014 inspection report. The chords downstream of expansion joints have significant pack rust. Specifically, the interior chords at span 9 downstream of expansion joint 4 have about 2 inches of pack rust between the upper flange angles.

There is a longitudinal crack in the top north flange angle on the south exterior lower chord in Span 12 between panel points 3 and 4 that has not grown since the previous inspection.

c23. Truss Gusset Plate

Truss gusset plates below deck joints show the most distress. Section loss is most severe at these locations but generally present everywhere. Previously documented laminar tear in the south gusset at Unit 7 lower chord Panel Point 7 shows no growth. Advanced section loss commonly occurs above the lower chord and along the edges and ends of diagonal connections. Also commonly occurring are bows along the long free edges of the gussets caused by pack rust.

The upper chord gusset plates are in good condition with little corrosion observed. Areas of heaviest corrosion occur below deck expansion joints. The gussets at the upper chord floorbeam connections below junction box drains are pitted.

c24. Lateral Bracing

Lateral bracing gussets below deck joints have section lost and pack rust causing their corners to peel away from the lateral bracing members, especially below deck joints.

c25. Sway Bracing

The sway bracing is in good condition having only minor pack rust and corrosion at the connections to the verticals below deck joints.

STATE OF OHIO BRIDGE INSPECTION FIELD REPORT

Appendix A

SFN: 1801503

Bridge Number: CUY-00010-1613

Year Built: 1932

DIST: 12

Feature Intersected: CUY RIVER VALLEY & FI RR

Municipality: Cleveland

c26. Bearing Devices

Debris and water accumulation in some of the truss bearings. Section loss generally occurring around the pins in the gussets that house the pin assembly.

c30. Prot. Coating System

Scattered areas of peeling and bubbling, especially at expansion joints where water infiltration and active corrosion is occurring. There are several areas on the superstructure with active pack rust between gussets, web plates, angles, and lacing, with the worst areas below or downstream of deck joints.

c31. Pins/Hangers/Hinges

South interior truss line pin to zero force member is dislodged at Unit 13 lower chord Panel Point 12.

Substructure Items

c33. Abutment Walls

Minimal staining and hairline cracks in abutment faces.

c37. Pier Caps

Pier caps are in good condition. Pier towers were not considered in the rating but are in poor condition and pose a risk to public safety. Many of the pier tower roofs have been removed, but those that remain show active degradation with debris accumulating below. Advise against walking on manhole lids due to casting corrosion.

c38. Pier Columns/Bents

Areas of cracking/delamination concentrated around previously patched areas. Base of pier 8 north column west face has a hole approximately 2' x 3' into lower column cell filled with trash.

c39. Backwalls

Vertical crack approximated 12'-6" in East Pylon backwall behind the north exterior truss line between the sandstone fascia and abutment concrete.

c42. Scour

The bridge had an underwater bridge inspection on July 14, 2015 by GPI under contract with Jones-Stuckey. See Attached. They found a change in the exposure of the footing at Pier 10 (West Pier), Column D, where the exposure of the footing has advanced since the 2010 dive inspection.

"The maximum vertical exposure was measured to be 3.7 feet. 9.5 horizontal feet of footing are exposed along the south side and 18 horizontal feet are exposed on the east face of the footer." No change significant change was noted at other locations. Pier 9 (East Pier) , Column A shown less exposure to the footing. Timber debris is still lodged at the northeast corner of pier 10.

c43. Slope Protection

All slopes well vegetated.

Channel Items

c51. Alignment

The channel alignment is in fair condition. Water is flowing along the south column of Pier 10 and the north column of Pier 9. Channel has sharp meanders.

c52. Protection

The bulkhead protecting the east bank at Pier 9 has failed.

c54. Navigation Lights

All navigation lights are non-operational.

Sign/Utility Items

c57. Utilities

Gas main appears recently rehabilitated (new pedestals, rollers, restraints)

Telecom PVC conduits are damaged and cables are exposed, especially in the east tunnel

Telecom structural supports, sheds, and corrugated roofs/walls are heavily corroded. Many steel pieces are hanging or have fallen to the utility deck below.

Large spall and exposed reinforcement in base of concrete light pole on the south side of the road near Pier 2.

**Underwater Inspection of
SFN - 1801503
Hope Memorial Bridge (US 10) over the Cuyahoga River
(CUY-10-16.13)
July 14, 2015
For
Ohio Department of Transportation
District-12**



(North Elevation of Bridge)

By
GPI/Greenman-Pedersen, Inc.

Eric Thorkildsen, P.E. 78663
Reviewer

Contents

Structure Inventory Data 3
 Structure Data - General Information..... 3
 Substructure Data - General Information 3
 Channel Description - General Description of Channel 3
Inspection Inventory and Appraisal Information 4
 Structure Location Information..... 4
 Inspection Data..... 4
 Substructure Inspection Data 5
 Waterline 5
Description of Structure 5
Inspection Operations 5
Inspection Findings 6
Comparison to Previous Report and Summary of Inspection 8
Conclusions and Recommendations 8
Appendix A 9
 Location Map, Soundings and Drawings 9
Appendix B 12
 Photographs 13

Structure Inventory Data

Structure Data - General Information

Superstructure Type:	Steel Cantilever Deck Truss
Number of Spans:	Thirteen Spans
Total Length:	3,285 Feet

Substructure Data - General Information

Abutments:	N/A
Wingwalls:	None
Piers:	Reinforced concrete piers on reinforced concrete spread footings
Slope Protection:	East embankment has large riprap/concrete chunks between columns with pavement over the top grouted in place. West embankment has timber retaining wall between columns.

Channel Description - General Description of Channel

The Cuyahoga River flows South to North under this structure. The thalweg of this river runs between Pier 9 and Pier 10 mid-span. A maximum water depth of 29.5 feet was found along North fascia mid-span in the thalweg. Flow at this bridge was approximately less than 1 foot per second.

Inspection Report

Inspection Inventory and Appraisal Information

Structure Location Information

Structure File Number:	1800930
Facility:	US Route 10
Feature:	Cuyahoga River
County:	Cuyahoga

Inspection Data

Team Leader-Diver:	Dave Cornish, P.E.
P.E. Reviewer:	Eric Thorkildsen, P.E.
Dive Team:	Michael Nitchman Marty Faulk

Type of Equipment Used:	Commercial Scuba
-------------------------	------------------

Date & Time:	07/14/2015
Water Temperature:	70 Degrees F
Waterway Velocity (Current):	1 Foot/Second
Depth Turbidity (Visibility):	Less than 1 Foot
Type of Material of Streambed:	Timber debris and soft mud.

Presence & Condition of Riprap Or Scour Countermeasures:	Riprap between columns of Pier 9 is in good condition.
---	--

Extent of Marine Growth on Substructure Elements:	Light marine growth.
--	----------------------

Substructure Inspection Data

Substructures Inspected:	Piers 9 and 10.
General Shape:	- Reinforced concrete piers on reinforced concrete spread footings
Maximum Water Depth At Substructure Inspected:	-Approximately 29.5 feet was found along north fascia mid-span.

Waterline

Water Level References:	The top surface of the timber retaining wall between Columns C and D on Pier 10.
Water Surfaces:	The waterline was approximately 2.6 feet below the reference.

Description of Structure

Bridge CUY-10-16.13 (1801503) carries US Route 10 over the Cuyahoga River in Cleveland, OH. The original bridge was constructed in 1932. Rehabilitation projects have taken place over the years. Only Pier 9 on the east shore and Pier 10 on the west shore of this structure were inspected during this underwater inspection. Each Pier was made up of 4 columns, these will be lettered A to D from north to south. No other SSU's were underwater. The numbering convention will follow ODOT standards, numbering from rear (East) to forward (West) abutment.

Inspection Operations

The underwater inspection was performed by Greenman-Pedersen Inc. on July 14, 2015. This regularly scheduled Underwater Dive Inspection included a 100% Level I inspection and a 10% Level II inspection. Commercial scuba, probing and tactile methods were used to complete inspection. Soundings were taken along all substructure units, mid span and up to 30 feet upstream and downstream of the bridge using a fathometer.

Inspection Findings

Channel

- The channel has stayed relatively the same since the last inspection with some minor changes in streambed elevation.
- The bottom material around Pier 9 and Pier 10 consists of timber debris with soft mud with up to 2.5 feet of penetration.

Pier 9 (East Pier), Column A

- Scaling up to 1½ inches on concrete surfaces below water as documented in underwater inspection done in 2010 and has not advanced in severity.
- Riprap and concrete that was dumped between Columns A and B for embankment protection had been documented in previous underwater report in 2010 of being undermined up to 3.7 feet. We were not able to locate this during this inspection. (See Photo 8)

Pier 9 (East Pier), Column B

- Scaling up to 1 inch on concrete surfaces below water as documented in underwater inspection done in 2010 and has not advanced in severity.

Pier 9 (East Pier), Column C and D

- Dry

Pier 10 (West Pier), Column A

- Dry

Pier 10 (West Pier), Column B

- Scaling up to 1½ inches on concrete surfaces below water as documented in underwater inspection done in 2010 and has not advanced in severity.
- Random small corner spalls along south face corner.

Pier 10 (West Pier), Column C

- Scaling up to 1½ inches on concrete surfaces below water as documented in underwater inspection done in 2010 and has not advanced in severity.
- Top two course of timber retaining wall at column C interface are showing signs of softness and rot. Rest of wall is in good condition.

Pier 10 (West Pier), Column D

- Scaling up to 1½ inches on concrete surfaces below water as documented in underwater inspection done in 2010 and has not advanced in severity.
- Timber debris lodged at northeast corner of pier.

- The southeast corner of the pier footing is exposed along the east face of Column D. The maximum vertical exposure was measured to be 3.7 feet. 9.5 horizontal feet of footing are exposed along the south side and 18 horizontal feet are exposed on the east face of the footer. This was documented in underwater inspection done in 2010 and has advanced in severity.
- The footer extends 7.3 feet east of the east face of Column D. Also, the footer extends 7.7 feet south of the south face of Column D. The flat concrete of the southeast corner top of footer has numerous 2-foot diameter boulders laying on it. This was documented in underwater inspection done in 2010 and has not advanced in severity.

Embankments

- Embankments no signs of erosion or sloughing.
- Debris is jammed between west fendering system and southwest embankment at upstream nose of Pier 10.

Fendering System

- West fendering system is in fair condition with less than 10% missing vertical timbers. However, there is section damaged near Pier 10 Column D.(See Photo 15)
- East fendering system is in poor condition and has failed. This was documented in underwater inspection done in 2010 and has advanced in severity. (See Photo 10)

Comparison to Previous Report and Summary of Inspection

Overall, the majority of deficiencies noted in this report are the same from 2010 inspection. One minor but notable change was the horizontal exposure on the east face of the footing of Pier 10 Column D increased by 1 foot. Other changes from previous report were timber debris located at the northeast corner Pier 10 Column D, small corner spalls on south face of Pier 10 Column B and top two courses of timber retaining wall at column C interface showing signs of softness and rot. Concrete was sounded in numerous locations and found to be in good condition. Typically overall the concrete surfaces of columns of Piers 9 and 10 were in good condition with light scaling. Retaining wall was sounded in numerous areas and found to be in good condition, except the above mentioned area. No undermining of footers was observed.

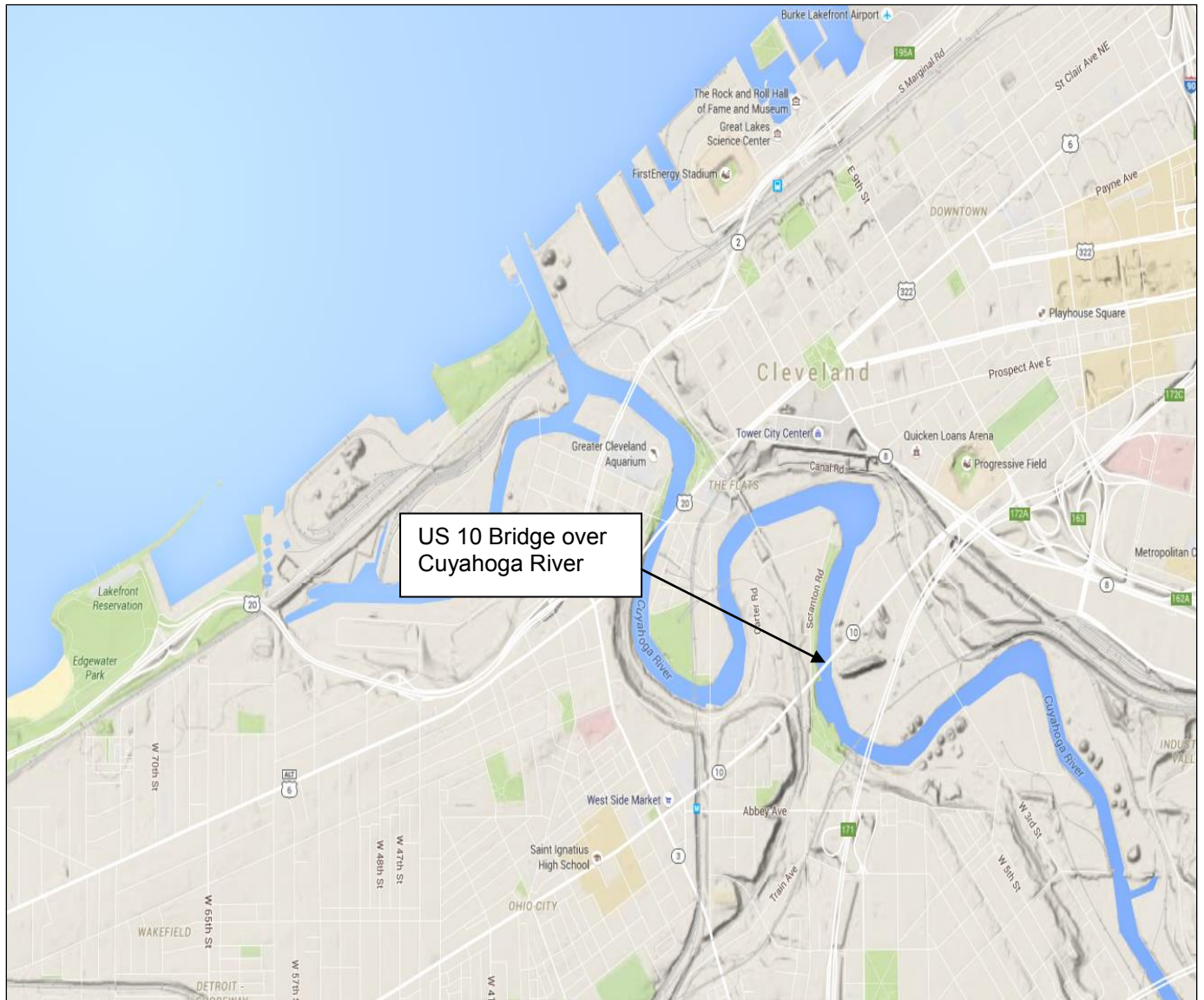
Conclusions and Recommendations

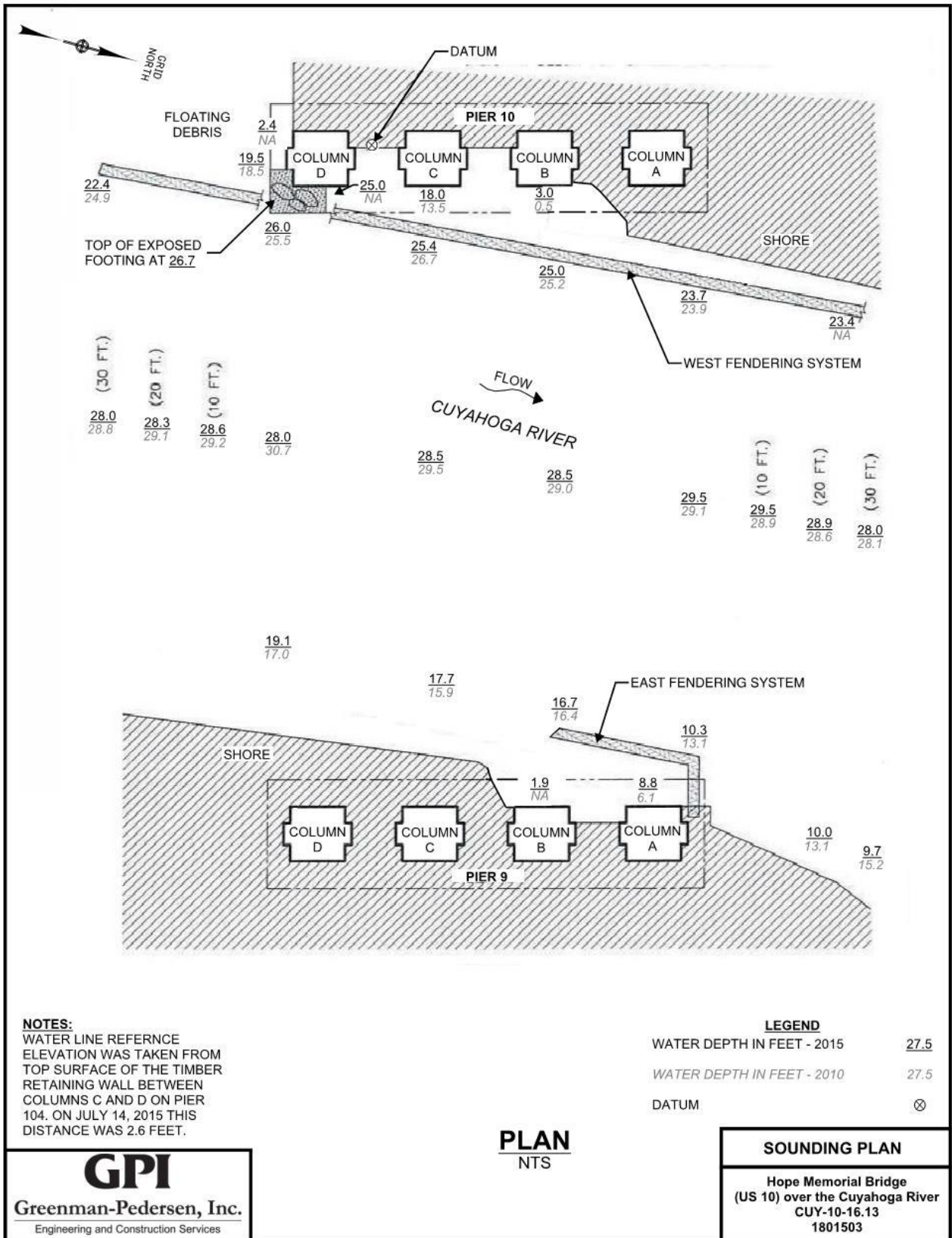
- We recommend a fendering system be installed to protect Pier 9 from boat and barge impacts. Place riprap around and on top of footing at Pier 10 Column D to prevent further footing being exposed. Remove debris between west fendering system and southwest embankment. Remove timber debris at upstream nose of Pier 10. Re-inspect the submerged substructure units at the normal maximum recommended interval of five (5) years and after a significant event such as flood, impact or other phenomenon that could affect the structural integrity of the bridge.

GPI/Greenman-Pedersen, Inc.

Appendix A

Location Map, Soundings and Drawings





Appendix B

Photographs



Photograph 1
Overall View of
the North
Elevation.
Looking South



Photograph 2
Overall View of
the South
Elevation.
Looking North.



Photograph 3
North approach
(downstream)
Looking North.



Photograph 4
South approach
(upstream).
Looking south.



Photograph 5
View of Pier 9,
West Face.
Looking East.



Photograph 6
View of Pier 9
Column A,
Looking
Northeast.



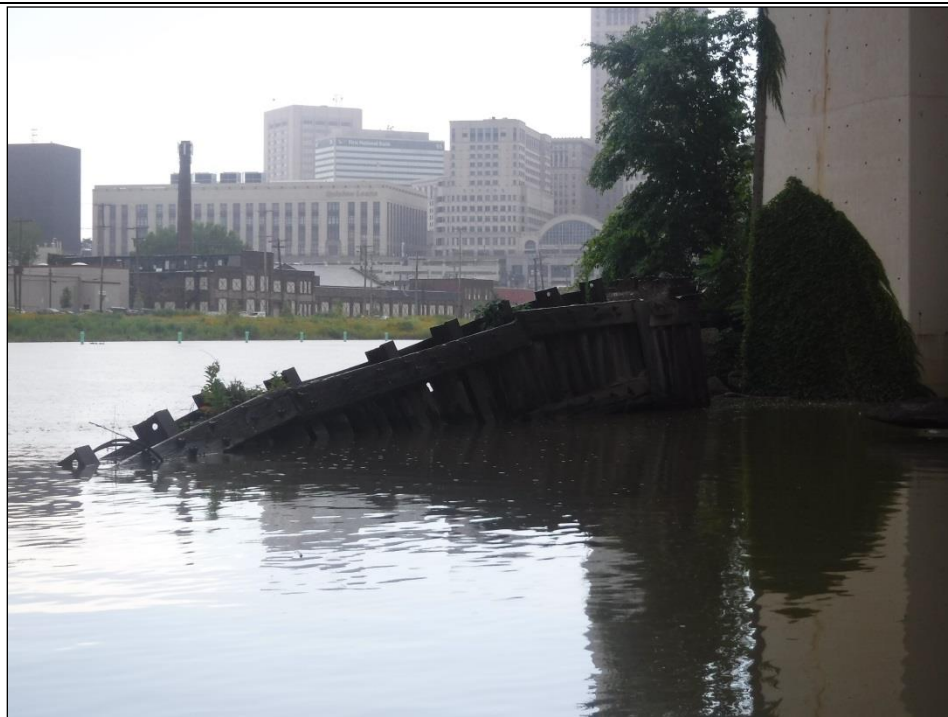
Photograph 7
View of Pier 9
Column B,
Looking East.



Photograph 8
View of
embankment
Pier 9 between
Column A and B,
Looking East.



Photograph 9
View of
embankment
Pier 9 between
Column B,
Looking
Southeast.



Photograph
10
View of failed
East Fendering
System, Looking
North.



Photograph
11
View of Pier 10,
East Face.
Looking West.



Photograph
12
View of Pier 10
Column B, C and
D, Looking
Southwest.



Photograph 13
View of debris between fender system and Southwest embankment, Looking Southwest.



Photograph 14
View of typical condition of West fendering system, Looking West.



Photograph
15
View of damage
to West
fendering system
near Column D
of Pier, Looking
Southwest.



Photograph
16
View of
Northwest
Embankment.



Photograph
17
View of View of
Southwest
Embankment.



Photograph
18
View of View of
Northeast
Embankment.



Photograph
19
View of View of
Southeast
Embankment.