THE CITY OF OKLAHOMA CITY
PUBLIC WORKS DEPARTMENT

BRIDGE ASSESSMENT REPORT

NORTH MIDWEST BOULEVARD OVER CRUTCHO CREEK
OKLAHOMA CITY, OKLAHOMA

JUNE 2021

TABLE OF CONTENTS

Bridge Assessment Report
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OKLAHOMA CITY, OKLAHOMA

EXECUTIVE SUMMARY

CEC met with The City of Oklahoma City at the North Midwest Boulevard bridge over Crutcho Creek on May 18, 2021 to discuss the CX Bridge Repair Notification issued by CONSOR on May 5, 2021. It was decided that the bridge should be closed to traffic.

CONSOR provided superstructure defect mapping drawings for the Subject Bridge on May 21, 2021. The drawings are located in Appendix C of this report.

The existing bridge, built in 1967, consists of a 122 ft. (41ft.-40ft.-41ft.) long structure comprised of rolled steel beam spans. The existing bridge structure is currently classified as structurally deficient due to the existing condition of the superstructure and considered functionally obsolete due to the deck geometry. Record drawings for the Subject Bridge were unavailable at the time of this report.

CEC performed a bridge inspection on May 24th of 2021. The limits of the bridge inspection were from the north to the south abutment and included a visual roadway pavement inspection of approximately 400 ft. from each end of the bridge. The bridge structure and channel through the extents of the bridge were visually inspected. The findings from the field inspection are described on the following pages.

Three construction options were considered for the rehabilitation or replacement of the Subject Bridge:

1) Bridge Rehabilitation

2) Bridge Replacement with 26 ft. Clear Roadway

3) Bridge Replacement with 40 ft. Clear Roadway

The bridge rehabilitation construction option includes full bridge superstructure replacement, substructure repairs, approach slab replacement, and mill and overlay of approach roadway. Both bridge replacement options include the replacement of the existing bridge structure with a 195 ft. (60ft.-75ft.-60ft.) long structure comprised of rolled steel beam spans, approach slab replacement, and approach roadway reconstruction. A detailed description of the proposed bridge rehabilitation and replacement options for construction is included in the "Description of Construction Options" section of this report.

PROJECT LOCATION

The N. Midwest Blvd. Bridge (NBI No. 16953, Local ID No. O-543) over Crutcho Creek is located approximately 1.3 mile south of NE. 63rd Street in Oklahoma County, Oklahoma.

Figure 1 – Project Location Map

Figure 2 – Project Vicinity Map

PROJECT BACKGROUND

Existing Bridge Information

NBI No.	16953
Structure No.	55N3150E1030003
Place Code	Oklahoma City
County	Oklahoma
Facility Carried	N. Midwest Blvd.
Feature Intersected	Crutcho Creek
Coordinates	35° 31'12.64"N, 97°23'20.79"W
ADT	2,800
Year of ADT	2017
Year Built	1967
Bridge Length	121.10 ft.
Bridge Description	41'-40'-41' Rolled Steel Beam Spans
Roadway	26'-0" Clear Roadway with Guardrail
Skew	0° Skew

Note: The ADT shown in the table above is from the 2019 Bridge Inspection Report for the Subject Bridge. The ADT stated on the 2019 Bridge Inspection Report for the N. Midwest Blvd. bridge over the N. Canadian River located approximatly 0.3 mile north of the project site is 5,000 vehicles per day.

Bridge Condition and Functionality

The current and anticipated NBI condition ratings, appraisal ratings, bridge status and sufficiency rating for each bridge is as follows:

NBI No.: 16953 (Local ID No. O-543)

NBI Item	2021 Bridge Assessment Ratings		Construction Option 1 Anticipated Post-Rehabilitation Ratings		Constriction Option 2 Anticipated Post-Rehabilitation Ratings		Constriction Option 3 Anticipated Post-Rehabilitation Ratings	
	Rating	Condition / Description	Rating	Condition / Description	Rating	Condition / Description	Rating	Condition / Description
58. Deck	6	Satisfactory	8	Very Good	9	Excellent	9	Excellent
59. Superstructure	0	Failed	8	Very Good	9	Excellent	9	Excellent
60. Substructure	5	Fair	7	Good	9	Excellent	9	Excellent
61. Channel	6	Bank Slumping	8	Protected	8	Protected	8	Protected
68. Deck Geometry	3	Intolerable	3	Intolerable	3	Intolerable	5	Meets Requirements
113. Scour	8	Stable Above Footing	8	Stable Above Footing	8	Stable Above Footing	8	Stable Above Footing
36A. Bridge Rail	0 - Substandard		1 - Meets Standards		1 - Meets Standards		1 - Meets Standards	
36B. Transition	0 - Substandard		1 - Meets Standards		1 - Meets Standards		1 - Meets Standards	
36C. Approach Rail	0 - Substandard		1 - Meets Standards		1 - Meets Standards		1 - Meets Standards	
36D. Approach Rail Ends	0 - Substandard		1 - Meets Standards		1 - Meets Standards		1 - Meets Standards	
Sufficiency Rating	7.0		79.1		79.1		97.5	
Bridge Status	Structurally Deficient		Functionally Obsolete		Functionally Obsolete		Non-Deficient	

Note: Specific conditions to support the 2021 Bridge Assessment Ratings are described on the following pages.

Right-of-Way

The City of Oklahoma City statutory right-of-way is 33 ft. on each side of the section line. The City of Oklahoma City right-of-way is shown with white lines on the Right-of-Way Location Map (Figure 3). The Stillwater Central Railroad right-of-way is approximately 50 ft. on each side of the railroad tracks. Right-of-way acquisition is not anticipated for Construction Option 1. Construction Options 2 and 3 will require right-of-way acquisition from the property at the northeast corner of the Right-of-Way Location Map (Figure 3) and potentially from the residence at the southwest corner of the Right-of-Way Location Map (Figure 3).

Figure 3 – Right-of-Way Location Map

Utilities

Existing fiber optic line(s), natural gas line, and aerial electric transmission lines are located near the bridge project site. An existing fiber optic line marker is located approximately 30 ft. west of the centerline of N. Midwest Blvd. near the southwest corner of the bridge (Figure 4). The location of the fiber optic line(s) is unknown at the time of this report. A 12.75 inch natural gas transmission line crosses N. Midwest Blvd. approximately 50 ft. north of the bridge (Figure 5). Aerial electric transmission lines are approximately 30 ft. west of the centerline of N. Midwest Blvd. and parallel the road (Figure 6). The location of the existing natural gas line and aerial electric transmission lines are shown in the corresponding utility location maps below (Figures 7 and 8).

Utility relocations for Construction Option 1 are not anticipated at this time. Utility relocations for Construction Options 2 and 3 will be based on the final design. Potential utility conflicts for Construction Options 2 and 3 include overhead electric, natural gas, and fiber optic lines.

Figure 4 – Fiber Optic Line Marker (Near Southwest Corner of Bridge)

Figure 5 – Natural Gas Line Marker (North of Bridge)

Figure 6 – Aerial Electric Transmission Lines (West Side of Bridge)

Figure 7 – Natural Gas Utility Location Map

Figure 8 – Aerial Electric Transmission Lines Location Map

EXISTING APPROACH ROADWAY

Field Assessment and Discussion of Findings

The bridge assessment inspection was conducted on May 24th of 2021. The approach roadway driving surface and guardrail were visually inspected. The limits of the approach roadway inspection extended approximately 400 ft. from each end of the bridge structure.

Existing Pavement and Guardrail Condition

The existing roadway for N. Midwest Blvd. consists of a two lane 24 ft. wide open section with ditches. The existing roadway approaches are asphalt pavement with an unknown pavement thickness. The approach roadway driving surface appears to be in satisfactory condition. No settlement was noted in either approach at the time of the inspection.

Guardrail is located on both east and west sides of the bridge and approaches and along the east side of N. Midwest Blvd. north of the bridge. The guardrail on the southeast corner of the bridge extends approximately 12 ft. from the bridge and is curved towards the field entrance (Figures 14 and 20). The guardrail on the other corners of the bridge extends approximately 40 ft. from the bridge and terminates with a turn down style end treatment (Figure 15). The guardrail through the extents of the bridge has several areas of major impact damage and has become detached from the east side of the bridge (Figures 16 and 17). All existing guardrail bridge connections, transitions, approach guardrail, and approach guardrail end treatments are substandard. The guardrail along the roadway has minor impact damage and shows signs of age and deterioration (Figures 12, 18, and 19).

Existing Geometrics

The existing alignment and geometrics of N. Midwest Blvd. include multiple horizontal curves including horizontal curves north and south of the existing bridge. The posted speed limit is 45 mph. The curve immediately north of the bridge appears to provide line of sight and stopping sight distance based on the posted speed limit. However, if it is determined that the horizontal curve requires geometric corrections or needs to meet a higher design speed then a curve correction may not be a viable option due to the location of the existing creek that runs parallel immediately east of N. Midwest Blvd. Any alignment corrections would impact the existing creek banks and channel.

The assumption was made that no profile grade change will be necessary with either the rehabilitation or bridge replacement options. It is imperative that the hydraulics are thoroughly analyzed to determine the impacts to the finished grade of the roadway. If it is determined that the profile of the bridge is required to be raised due to the hydraulic needs, then additional roadway and bridge design will need to be investigated. Raising the profile of the bridge and approaches will have a significant impact to the at grade railroad crossing immediately south of the bridge.

Figure 9 – Typical Condition of Approach Pavement (North of Bridge)

Figure 10 – Typical Condition of Approach Pavement (South of Bridge)

Figure 11 – Approach Roadway Line of Sight Looking North (Approximately 425 ft. South of Bridge)

Figure 12 – Approach Roadway Line of Sight Looking South (Approximately 350 ft. North of Bridge)

Figure 13 – Condition of At-Grade Railroad Crossing

Figure 14 – Bridge Approach Guardrail at Southeast Corner of Bridge

Figure 15 – Typical Bridge Approach Guardrail

Figure 16 – Typical Condition of Guardrail along East Side of Bridge

Figure 17 – Typical Condition of Guardrail along West Side of Bridge

Figure 18 – Typical Condition of Guardrail along Roadway (North of Bridge)

Figure 19 – Impact Damage to Guardrail along Roadway

Figure 20 – Field Entrance Located at Southeast Corner of Bridge

EXISTING BRIDGE

Field Assessment and Discussion of Findings

The bridge assessment inspection was conducted on May 24th of 2021. The bridge structure and channel through the extents of the bridge were visually inspected.

The bridge was inventoried from south to north for this assessment. Therefore, the spans are numbered from south to north, Spans 1 through 3. The abutments are Abutment 1 and Abutment 2. The piers are Pier 1 and Pier 2. The beams, bearings and bays are numbered from west to east, Girders/ Bearings 1 through 5 and Bays 1 through 4, respectively.

Existing Bridge Deck

The existing bridge deck driving surface is in satisfactory condition with isolated longitudinal and transverse cracks in the asphalt overlay, small areas of asphalt spalling, and failing sealed joints.

Per the 2019 Bridge Inspection Report, a 2 inch thick asphalt overlay wearing surface was placed on the bridge deck in 1991. The bridge deck driving surface has isolated longitudinal and transverse cracks in the asphalt overlay. Spalling of the asphalt wearing surface was observed along the joints above each pier.

The bridge deck soffit is generally in good condition, but is showing signs of delamination, corrosion staining, and spalling with exposed reinforcing steel at the overhangs and bays along the joints above each pier. The typical deck soffit deterioration extends approximately 3 ft. on each side of the joints above each pier. Concrete cracking was observed at the deck haunch above each pier diaphragm. At the time of the inspection, it appeared that the deck has separated from the top of the beams that have buckled at each pier. Hairline cracks were observed throughout the deck soffit between each bay.

The joints above each pier have failed and allow water to drip onto the structure below.

The existing guardrail is showing signs of major impact damage primarily on the east side of the bridge. Several guardrail posts have detached from the side of the bridge deck due to vehicular impact.

Figure 21 – Typical Deck Driving Surface Condition

Figure 22 – Typical Joint above Piers

Figure 23 – Typical Condition of Deck Overhang Soffit at Pier 1

Figure 24 – Typical Condition of Deck Overhang Soffit at Pier 2

Figure 25 – Typical Concrete Cracking of Deck Haunch above Pier Diaphragms

Figure 26 – Typical Condition of Deck Soffit

Figure 27 –Guardrail Impact Damage on East Side of Bridge

Figure 28 – Detached Guardrail Posts on East Side of Bridge

Existing Bridge Superstructure

The existing bridge superstructure consists of three simply-supported rolled steel beam spans. The beams appear to be in poor condition with moderate to heavy corrosion, severe section loss of the webs, web buckling and visible sagging. Areas of moderate to heavy corrosion and steel section loss were observed on the diaphragms and connections above the piers. Light to moderate surface rust was observed on the diaphragms and connections at the abutments and on the intermediate diaphragms. The ends of the beams at the abutments exhibit light to moderate corrosion. Section loss of the beam end web was observed on Beams 4 and 5 at Abutment 2 (Figure 30). The ends of the beams at the piers exhibit moderate to heavy corrosion with severe section loss of the webs and web buckling of the interior beams (Figures 31 - 37). The protective coating of paint on the beams, diaphragms, and bearing assemblies appears to be in poor condition. Several beam ends above the piers were observed to be in contact (Figure 37).

Figure 29 –Typical Beam End Condition at Abutments

Figure 30 – Beam Web Section Loss (Abutment 2, Beam 5)

Figure 31 – Web Section Loss with Distortion of Bottom Flange

Figure 32 – Condition of Exterior Beams at Pier 1

Figure 33 – Web Section Loss with Distortion of Bottom Flange

Figure 34 – Web Section Loss and Web Buckling with Distortion of Bottom Flange

Figure 35 – Web Section Loss and Web Buckling

Figure 36 – Typical Condition of Diaphragms above Piers

Figure 37 – Typical Beam Spacing Between Spans at Piers

Figure 38 – Typical Condition of Bearing Assembly

Existing Bridge Substructure

The abutments consist of reinforced concrete seats with concrete pile foundations. The abutments are in satisfactory condition with isolated areas of concrete delamination and cracking on the abutment seats and backwalls. Undermining of the abutment seat with exposed concrete piles was observed at the both abutments.

The piers consist of reinforced concrete pier caps with concrete pile foundations. The pier caps and piles are in satisfactory condition with isolated areas of concrete delamination, concrete spalling with exposed reinforcing steel, and isolated areas of vertical cracking on the pier caps.

Figure 39 – Typical Condition of Abutment Seats

Figure 40 – Bridge Header at Abutment 1

Figure 41 – Bridge Header at Abutment 2

Figure 42 – Typical Condition of Pier 2

Figure 43 – Typical Condition of Pier 1

Figure 44 – Typical Condition of Pier Cap End

Figure 45 – Channel through Bridge Extents

Figure 46 – Channel Debris at West Side of Bridge

Preliminary Hydraulic Analysis

The following information was used to determine a preliminary bridge configuration for Construction Options 2 and 3:

Crutcho Creek in the vicinity of N. Midwest Blvd. is in a FEMA Regulatory floodplain, Zone AE. The FIS shows the N. Midwest Blvd. bridge being incorporated in the North Canadian River floodplain and the water surface elevations are dictated by the North Canadian River. The roadway on either side of the North Canadian River bridge overtops between the 10% and 2% events. According to the HEC-2 model data for Crutcho Creek as provided by the City, the Midwest Blvd. bridge has a deck elevation approximately 3.5 feet above the overtopping elevations around the North Canadian River bridge. Based on the North Canadian River FIS water surface profiles, the bridge at Crutcho Creek would overtop between the 2% and 1% events.

The estimated preliminary bridge size is based on the drainage area and flows for Crutcho Creek without considering the effects of the North Canadian River. The flow rates from the 1983 USGS Urban Flood Analysis in Oklahoma City and the FIS were considered and compared to the StreamStats flowrates at the Midwest Blvd. bridge. The StreamStats flow rates were used to estimate a preliminary bridge size, based on a discussion with the City. The City's hydraulic requirements for the bridge are to provide an opening to pass the 2% flows with some freeboard and not overtop Midwest Blvd. with the 1% flows. The target velocity used to determine the structure configuration is 7 feet per second. The estimated preliminary bridge size is a 195ft (60ft.-75ft.-60ft.) long span bridge. This bridge size will likely have little effect on the overtopping frequency caused by the North Canadian River.

This estimated bridge size is based on limited existing information and was not modeled. The final bridge size may vary and will need to be verified through updated hydraulic models with current survey and effective hydraulic models from FEMA.

DESCRIPTION OF CONSTRUCTION OPTIONS

Three options were considered for the bridge: 1) bridge rehabilitation, 2) bridge replacement with 26 ft. clear roadway, and 3) bridge replacement with 40 ft. clear roadway. A detailed description of the rehabilitation and replacement options for consideration is included in the following pages of the report.

Crutcho Creek is classified as a blue line stream on the USGS Topographic Map. The bridge headers will be reshaped and protected with rip-rap as part of Construction Option 1; this will result in minimal changes to the existing channel. Construction Options 2 and 3 consist of the construction of a new longer bridge. This will require the reshaping of the channel through the extents of the bridge. A 404 permit will be required for each construction option shown in this report.

Right-of-way acquisition is not anticipated for Construction Option 1; however, Construction Options 2 and 3 will require right-of-way acquisition as stated in the Right-of-Way section of this report.

Utility relocations for Construction Option 1 are not anticipated at this time. Utility relocations for Construction Options 2 and 3 will be based on the final design. Potential utility conflicts for Construction Options 2 and 3 include overhead electric, natural gas, and fiber optic lines.

The estimated construction time for each option is shown in the following table:

Construction Option Description	Construction Time
Option 1: Bridge Rehabilitation	210 Calendar Days
Option 2: Bridge Replacement with 26ft. Clear Roadway	300 Calendar Days
Option 3: Bridge Replacement with 40ft. Clear Roadway	330 Calendar Days

Construction Option 1: Bridge Rehabilitation

Description of Construction Option 1

Bridge Construction:

Construction Option 1 consists of the rehabilitation of the existing substructure and the replacement of the existing superstructure and approach slabs. Record drawings for the Subject Bridge were unavailable at the time of this report; therefore, careful consideration must be used when designing the new superstructure to not exceed the loads the existing structure was intended to support.

The proposed bridge deck will match the extents of the existing bridge and will be constructed with concrete traffic rails (TR-4) and an 8 inch deck slab. The traffic rails will have drain openings to allow for drainage through the bridge extents. The proposed new superstructure will consist of rolled beams or plate girders.

Drainage flumes will be constructed at each corner of the bridge prevent scour at the abutment wings.

All spalled or delaminated concrete at the abutments and piers will be repaired with pneumatically placed mortar or class AA concrete, if necessary. Corrosion inhibitor will be applied to the repaired areas on the substructure. Urethane coating surface treatment, CIM 1000 or approved equivalent, will be applied to the top of the abutment seats and pier caps, 6 inches down from the top of the bridge seat and pier cap, and along the entire abutment backwall. Concrete cracking of the substructure will be repaired with epoxy injection. The bridge header slope will be excavated down approximately 2 ft. to allow access under the bridge seats. The exposed abutment piles will be encased in CLSM. The abutment headers will be reshaped. Rip-rap will be placed around the abutment headers through the extents of the bridge.

Roadway Construction:

North Midwest Boulevard

The rehabilitation of the existing bridge requires the finished grade to remain the same. This is due to the close proximity of the railroad immediately south of the bridge. A short transition with coldmilling and an asphalt overlay will provide a smooth transition from the new bridge surface to the existing asphalt roadway at each bridge approach. An estimated length of 50 ft. will be required to transition from the bridge to the existing roadway profile.

The guardrail located along the bridge approaches will be removed and replaced with a new guardrail system including asphalt guardrail widening. The guardrail at both approaches will include a connection to the new bridge concrete rail and a modified guardrail length at each end of the bridge approaches. The guardrail south of the bridge will be modified to accommodate the railroad and the property entrance at the southeast corner of the bridge. The guardrail north of the bridge on the east side can be extended approximately 100 ft. with a GET and w-beam single guardrail, however, the guardrail on the west side of N. Midwest Blvd. will terminate south of the existing commercial drive and will be modified to accommodate the drive entrance.

Right-of-way acquisition and utility relocation is not anticipated for this proposed option.

Traffic Control Operations and Sequencing:

The rehabilitation of the bridge will require N. Midwest Blvd. to be closed during construction operations and a detour route established. Advanced warning devices and signs will be placed prior to the construction site and detour signs will be installed throughout the entire detour route to efficiently and safely route traffic around the construction site.

Construction Option 2: Bridge Replacement (26 ft. Clear Roadway)

Description of Construction Option 2

Bridge Construction:

Construction Option 2 consists of the replacement of the existing bridge structure with a 195 ft. (60ft.-75ft.-60ft.) long integral bridge comprised of rolled steel beam spans with 26 ft. clear roadway and 0 degree skew. The proposed structure length is based on the preliminary hydraulic analysis as stated in this report. The typical section across the bridge includes two 12 ft. lanes with two 1 ft. shoulders and concrete traffic rails (TR-4) with openings. All details of the bridge shall be expected to match typical bridge construction for stream crossings.

The bridge headers and channel bank will be reshaped as required for the new proposed bridge length. All disturbed areas of the channel bank and bridge headers will be protected with rip-rap.

Roadway Construction:

North Midwest Boulevard

As mentioned in Construction Option 1 with the bridge rehabilitation, the project extents are limited due to the close proximity of the railroad immediately the south of the bridge. The finished grade of the new bridge will be approximately the same as the existing bridge structure. A short transition with coldmilling and an asphalt overlay will provide a smooth transition from the new bridge surface to the existing asphalt roadway at each bridge approach. An estimated length of 50 ft. will be required to transition from the bridge to the existing ro adway profile.

The guardrail located along the bridge approaches will be removed and replaced with a new guardrail system including asphalt guardrail widening where necessary. The guardrail at both approaches will include a connection to the new bridge concrete rail and a modified guardrail length at each end of the bridge approaches. The guardrail south of the bridge will be modified to accommodate the railroad and the property entrance at the southeast corner of the bridge. The guardrail north of the bridge on the east side can be extended approximately 100 ft. with a GET and w-beam single guardrail, however, the guardrail on the west side of N. Midwest Blvd. will terminate south of the existing commercial drive and will be modified to accommodate the drive entrance.

Right-of-way acquisition and utility relocation are anticipated for this proposed option.

Traffic Control Operations and Sequencing:

The replacement of the bridge will require N. Midwest Blvd. to be closed during construction operations and a detour route established. Advanced warning devices and signs will be placed prior to the construction site and detour signs will be installed throughout the entire detour route to efficiently and safely route traffic around the construction site.

Construction Option 3: Bridge Replacement (40 ft. Clear Roadway)

Description of Construction Option 3

Bridge Construction:

Construction Option 3 consists of the replacement of the existing bridge structure with a 195 ft. (60ft.-75ft.-60ft.) long integral bridge comprised of rolled steel beam spans with 40 ft. clear roadway and 0 degree skew. The proposed structure length is based on the preliminary hydraulic analysis as stated in this report. The typical section across the bridge includes two 12 ft. lanes with two 8 ft. shoulders and concrete traffic rails (TR-4) with openings. All details of the bridge shall be expected to match typical bridge construction for stream crossings.

The bridge headers and channel bank will be reshaped as required for the new proposed bridge length. All disturbed areas of the channel bank and bridge headers will be protected with rip-rap.

Roadway Construction:

North Midwest Boulevard

Similar to Construction Options 1 and 2, the project extents are limited due to the close proximity of the railroad immediately the south of the bridge. A short transition with coldmilling and an asphalt overlay will provide a smooth transition from the new bridge surface to the existing asphalt roadway at each bridge approach. An estimated length of 50 ft. will be required to transition from the bridge to the existing roadway profile; however, an additional 50 ft. of coldmilling and asphalt overlay north of the bridge will be necessary to accommodate the new 8 ft. shoulders.

The roadway approaches will need to accommodate the new bridge clear roadway width of 40 ft. and will consist of two 12 ft. driving lanes and two 8 ft. shoulders. Therefore, the addition of 8 ft. shoulders will be added to the existing 12 ft. driving lanes for approximately 100 ft. on the northeast side of the bridge approach, approx. 15 ft. on the northwest side of the bridge approach due to the close proximity to the commercial drive, approx. 10 ft. on the southwest side of the bridge approach and no widening on the southeast side of the bridge approach due to the existing drive location.

The guardrail located along the bridge approaches will be removed and replaced with a new guardrail system including asphalt guardrail widening where necessary. The guardrail at both approaches will include a connection to the new bridge concrete rail and a modified guardrail length at each end of the bridge approaches. The guardrail south of the bridge will be modified to accommodate the railroad and the property entrance at the southeast corner of the bridge. The guardrail north of the bridge on the east side can be extended approximately 100 ft. with a GET and w-beam single guardrail, however, the guardrail on the west side of N. Midwest Blvd. will terminate south of the existing commercial drive and will be modified to accommodate the drive entrance.

Right-of-way acquisition and utility relocation are anticipated for this proposed option.

Traffic Control Operations and Sequencing:

The replacement of the bridge will require N. Midwest Blvd. to be closed during construction operations and a detour route established. Advanced warning devices and signs will be placed prior to the construction site and detour signs will be installed throughout the entire detour route to efficiently and safely route traffic around the construction site.

COST ESTIMATE

Itemized cost estimates were developed for each option based on preliminary quantities from the field investigation and the scope for each construction option as described above. The unit costs used in the estimates are based on recent bid history for construction projects located in central Oklahoma. The preliminary itemized cost estimates are located in Appendix B of the report.

The table below is a summary of the preliminary construction costs for each proposed construction option.

	Option 1	Option 2	Option 3
Bridge	$ 643,070	$ 1,134,820	$ 1,436,960
Roadway and Traffic	$ 70,790	$ 80,560	$ 92,840
Construction	$ 107,943	$ 127,769	$ 143,490
Subtotal	$ 821,803	$ 1,343,149	$ 1,673,290
15% Contingency	$ 123,280	$ 201,480	$ 251,000
Total	$ 945,083	$ 1,544,629	$ 1,924,290

APPENDIX A

2019 BRIDGE INSPECTION REPORT

Oklahoma Dept. of Transportation - Bridge Inspection Report

NBI No.:	Structure No.:	Local ID:	Suff. Rating:	
16953	55N3150E1030003	O-543	55.60	FO

IDENTIFICATION

Bridge Description:
41ft., 40ft., 41ft. I-BEAM SPANS

1. State: Oklahoma
2. Division: Division 4
3. County: OKLAHOMA
4. City: OKLA. CITY
Admin Area: Unknown
5a. On/Under: Route On Structure
5b. Kind of Hwy: City Street
5c. Lvl of Srvc: Mainline
5d. Route No.: N3150
5e. Dir. Sufx: N/A (NBI)
7. Facility Carried : MIDWEST BLVD
6. Feat. Intersect: CREEK
9. Location: 1.3S OF NE 63RD ST
11. Mile Post: 5.729 mi
13. LRS Inv. / Sub Rte: -1 / -1
16. Latitude: 35° 31' 12.64"
17. Longitude: 097° 23' 20.79"
98. Border Brdg: Unknown (P)
% Responsible: 0.00
99. Border Brdg #: Unknown

INSPECTION

Type	Insp. Req.	Insp. Done	Freq.	Insp. Date	Next Insp.
NBI:		1	24 months	6/3/2019	06/03/2021
FC:	N	0		NA	NA
UW:	N	0		NA	NA
OS:	N	0		NA	NA

CLASSIFICATION

12. Base Hwy Net.: Not on Base Network
20. Toll Facility: On free road
21. Custodian: City
22. Owner: City
26. Function Class: 07 Rural Mjr Collector
37. Historical Sig.: Not eligible for NRHP
100. Def. Hwy: Not a STRAHNET hwy
101. Parallel Str.: No || bridge exists
102. Traffic Dir.: 2-way traffic
103. Temp. Str.: Not Applicable (P)
104. Hwy System: Not on NHS
105. Fed Land Hwy: N/A (NBI)
110. Defense Hwy: Not a STRAHNET hwy
112. NBIS Length: Long Enough

STRUCTURE TYPE AND MATERIALS

43a/b. Main Span: Steel / Stringer/Girder
44a/b. Appr. Span: N/A / Not Applicable (P)
45. # of Main Spans: 3
46. # of Appr. Spans: 0
107. Deck Type: Concrete-Cast-in-Place
108a. Wearing Surface: Bituminous
108b. Membrane: None
108c. Deck protection: None

CONDITION

58. Deck: 6 Satisfactory
62. Culvert: N/A (NBI)
59. Sup.: 5 Fair
61. Chan./Chan. Prot.: 6 Bank Slumping
60. Sub: 6 Satisfactory

Flowline Notes

2019, FL=21.4ft to E TOC.
Drift U.S. end - trees and brush, East to top of curb FL 22.4 FT. with 60 IN.

AGE AND SERVICE

19. Detour Length: 4.0 mi
27. Year Built: 1967
28a/b. Lanes on/und: 2 / 0
29. ADT: 2,800
30. Year of ADT: 2017
42a/b. Type of Svc on/und: Highway / Waterway
106. Year Reconst.: -1
109. Truck ADT: 15%

LOAD RATING AND POSTING

31. Design Load: M 18 (H 20)
41. Post. Status: P Posted for load
70. Posting: 5 At/Above Legal Loads
Date Rated: 09/26/2013
63. Op / 65. Inv. Rating Meth.: 1 LF Load Factor / 1 LF Load Factor

	H	HS	3-3	EV3	SHV
64. Operating Rating (tons):	24.00	41.00	15.00	0.00	0.00
66. Inventory Rating (tons):	17.00	25.00			

GEOMETRIC DATA

10. Vert. Clearance: 99.99 ft
32. Appr Rwy Width: 25.00 ft
33. Median: No median
34. Skew: 0.00°
35. Struct. Flared: No flare
47 Horizontal Clr: 26.00 ft
48. Length Max Span: 41.00 ft
49. Struct. Length: 121.10 ft
50a. Curb/Sdwlk Width L: 0.00 ft
50b. Curb/Sdwlk Width R: 0.00 ft
51. Width Curb to Curb: 26.00 ft
52. Width Out to Out: 28.70 ft
Deck Area: 3,475.63 sq. ft
53. Min. Vert. Cl. Ovr Brg: 99.99 ft
54a. Min. Vt. Undclr. Ref.: N Feature not hwy c
54b. Min. Vert. Undclr.: 0.00 ft
55a. Min. Lat. Undclr. Ref: N Feature not hwy
55. Min. Lat. Underclr. R: 0.00 ft
56. Min. Lat. Underclr. L: 0.00 ft

APPRAISAL

36a. Brdg Rail: 0 Substandard
36b. Transition: 0 Substandard
36c. Appr. Rail: 0 Substandard
36d. Appr. Rail Ends: 0 Substandard
67. Str Evaluation: 5 Above Min Tolera
68. Deck Geom.: 3 Intolerable - Correct
69. Vert./Horiz. Undclr: Not applicable (NB
71. Waterway Adeq: 7 Above Minimum
72. Appr. Alignment: 6 Equal Min Criteria
113. Scour Critical: 8 Stable Above Footin

PROPOSED IMPROVEMENTS

94. Bridge Cost: $352,000
95. Roadway Cost: $194,000
96. Total Cost: $563,000
97. Yr. of Cost Est.: 2015
75. Type of Work: 31 Repl-Load Capacity
76. Lngth of Improvement: 226.2 ft
114. Future ADT: 4,480
115. Yr. of Future ADT: 2037

NAVIGATION DATA

38. Nav. Control: Permit Not Required
39. Vert. Clearance: 0.0 ft
40. Horiz. Clearance: 0.0 ft
111. Pier Protect.: Not Applicable (P)
116. Lift Bridge Vert. Clr.: 0.0 ft

OKLAHOMA ITEMS

200c. Temperature: 74
200d. Weather: Cloudy
201. Struc. Stl. ASTM Desig.: -1 / -1
202. Waterprf. Membrane: -1
Date Installed: 01/01/1901
203. Type Exp. Device: Open Joint-No Device
204. Type of Railing: W-Beam
205. Material Quantity: -1.00
208a. Type of Abutment: Skeleton
b. Type of Found.: Concrete Piling
209. Type of Pier/Found.: B / No
Concrete Piling
210. Foundation Elev.:

-1.00	-1.00	-1.00
-1.00	-1.00	-1.00

211. Wear. Surf. Prot. Sys:
Date Installed: 01/01/1901
213. Utilities Attached:
214a. Posted Weight Limit: 191919
b. Posted Speed Limit: 45
c. Narrow/1way Brdg Sign: No
d. Vertical Clr. Sign: No
Adv. Warning Sign: No
e. Navigation Lights?: No
Working/Not Working: No
215. Overpass: ACOG
221. Substr. Cond. (U/W):
222. Fill Over RCB:
223. Appr. Slab/Rwy Cond.: 3
225. Paint Type/Ovrct: Red Lead 3 Coat System
N/A
226. Date Painted: 1967
227. Paint Color: Silver
233. Deck Forming:
238. School Bus Rte.: Desired bus route
240. Appr. Rwy Type.: Asphalt/Bituminous
243. Grdr Spacing/No.: 72.00 /
244. Span Lengths: 41 | 40 | 41
245. Girder Depth: 24.00
246a. Type of Ovelay: Chipseal
b. Overlay Thickness: 2.00
c. Overlay Date: 07/19/1991
d. Ovly Depth Changed >1": N
247. Protective Systems:
248. # Field Splices w/ Corrosion:
249. Scour Crit. POA Exists?: No
250. Headwall:
254. Thru Truss Type:
257a. OkiePROS Truck Routing: _
258. Plans w/Found.in ODOT File:
259. Scour Eval. in ODOT File:
263. Interchange at Intersection: _
264. Interstate Milepoint: -1.00

Oklahoma Dept. of Transportation - Bridge Inspection Report

NBI No.:	Structure No.:	Local ID:	Suff. Rating:	
16953	55N3150E1030003	O-543	55.60	FO

Inspection Date: 5/29/19 Jared Wooten

Invoice No.: HWL550619 Inspected With: -1

BRIDGE NOTES:

REVIEWED 5/12/2017. RET. USE [124/117] [241/225]

INSPECTION NOTES: 5/29/19

Very Heavy Truck Traffic Posted 19 tons, not required(rates 24 tons)*

ELEMENT CONDITION STATE DATA

Elem. / Env	Description	Unit	Total Qty	% 1	Qty. 1	% 2	Qty. 2	% 3	Qty. 3	% 4	Qty. 4
12 / 4	Re Concrete Deck	sq.ft	3,148.00	86%	2,708.00	14%	440.00	0%	0.00	0%	0.00
	FX - Deck VISIBLE @ BOTH JOINTS WITH SOME SPILLING. S JOINT WITH VISIBLE REBAR.										
510 / 4	Wearing Surfaces	sq.ft	3,148.00	88%	2,770.00	12%	378.00	0%	0.00	0%	0.00
	MINOR CRACKING - LOOSE AT JOINTS										
107 / 4	Steel Opn Girder/Beam	ft	456.00	0%	0.00	100%	456.00	0%	0.00	0%	0.00
	FX - Minor rust showing thru paint.										
515 / 4	Steel Protective Coating	sq.ft	4,166.00	0%	0.00	0%	0.00	100%	4,166.00	0%	0.00
	POOR CONDITION										
205 / 4	Re Conc Column	each	16.00	75%	12.00	19%	3.00	6%	1.00	0%	0.00
	FX - Minor drift scrapes on two piles - (2) piles @ North pile has minor spalls - (1) pile with exposed rebar- no change										
215 / 4	Re Conc Abutment	ft	59.00	83%	49.00	17%	10.00	0%	0.00	0%	0.00
	FX - Minor vertical cracks - Minor spall starting at N. Abut E. end										
234 / 4	Re Conc Pier Cap	ft	59.00	78%	46.00	22%	13.00	0%	0.00	0%	0.00
	FX - Minor vertical cracks at both caps										
304 / 4	Open Expansion Joint	ft	60.00	0%	0.00	0%	0.00	0%	0.00	100%	60.00
	(PX) Joint leaking on girders causing corrosion to form with section loss.										
311 / 4	Moveable Bearing	each	15.00	0%	0.00	0%	0.00	100%	15.00	0%	0.00
	FX - Areas of light to moderate rust with minor section loss										
313 / 4	Fixed Bearing	each	15.00	0%	0.00	0%	0.00	100%	15.00	0%	0.00
	FX - Areas of light to moderate rust with minor section loss										
330 / 4	Metal Bridge Railing	ft	243.00	42%	101.00	50%	122.00	0%	0.00	8%	20.00
	PX - NEW WEST RAIL - E. RAIL MAJOR IMPACT DAMAGE 20ft. OF E.SEND - SOME POST RIPPED AWAY FROM STR.										
919 / 4	St.(Rail) Prot. Coat	(SF)	280.00	0%	0.00	100%	280.00	0%	0.00	0%	0.00
	Aging.										
859 / 4	Soffit	(EA)	1.00	0%	0.00	100%	1.00	0%	0.00	0%	0.00
	FX - Isolated hairline cracks. Some minor spalls.										
865 / 4	St.Open Gird End(5Ft	(LF)	150.00	0%	0.00	67%	100.00	27%	40.00	7%	10.00
	PX - Heavy corrosion on girder ends at pier #1 & #2 - E. beam at North abutment has 6in. x 2in. hole in web at bottom flange approx 6in. from bearing 5ft. of moderate loss to (2) @ N abutment. Web of E beam at pier 1 of span 1 is failing due to corrosion hole.										
963 / 4	Steel Section Loss SF	(EA)	1.00	0%	0.00	100%	1.00	0%	0.00	0%	0.00
	PX - Loss due to corrosion on girders at south pier. north pier and outside girder ends north abutment. Hole in web of E.beam at N.abutment										
968 / 4	Erosion SF	(EA)	1.00	100%	1.00	0%	0.00	0%	0.00	0%	0.00
	Erosion under both abuts. Exposed Concrete Pile.										

APPENDIX B

PRELIMINARY ITEMIZED COST ESTIMATES

PRELIMINARY ITEMIZED COST ESTIMATE
N. MIDWEST BLVD. OVER CRUTCHO CREEK
NBI NO. 16953

BRIDGE

ITEM DESCRIPTION	UNITS	UNIT PRICE	OPTION 1		OPTION 2		OPTION 3	
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
UNCLASSIFIED EXCAVATION	C.Y.	$ 10.50	265.0	$ 2,790	2,500.0	$ 26,250	2,500.0	$ 26,250
SUBSTRUCTURE EXCAVATION	C.Y.	$ 21.50	0.0	$ -	100.0	$ 2,150	120.0	$ 2,580
CLSM BACKFILL	C.Y.	$ 185.00	110.0	$ 20,350	48.0	$ 8,880	134.0	$ 24,790
APPROACH SLAB	S.Y.	$ 240.00	115.0	$ 27,600	115.0	$ 27,600	187.4	$ 44,980
SAW-CUT GROOVING	S.Y.	$ 9.00	379.7	$ 3,420	470.7	$ 4,240	1,055.5	$ 9,500
CONCRETE RAIL (TR-4)	L.F.	$ 95.00	312.0	$ 29,640	465.1	$ 44,190	461.0	$ 43,800
STRUCTURAL STEEL	LB.	$ 2.10	78,106.7	$ 164,030	102,780.0	$ 215,840	152,570.0	$ 320,400
WEATHERING STEEL FIXED BEARING ASSEBLY	EA.	$ 1,800.00	10.0	$ 18,000	6.0	$ 10,800	8.0	$ 14,400
WEATHERING STEEL EXP. BEARING ASSEBLY	EA.	$ 1,800.00	20.0	$ 36,000	12.0	$ 21,600	16.0	$ 28,800
ELASTOMERIC BEARING PADS	EA.	$ 250.00	0.0	$ -	12.0	$ 3,000	16.0	$ 4,000
ELASTOMERIC COATING	S.F.	$ 15.00	682.8	$ 10,250	0.0	$ -	0.0	$ -
CLASS AA CONCRETE	C.Y.	$ 800.00	117.4	$ 93,920	159.5	$ 127,600	237.9	$ 190,320
CLASS A CONCRETE	C.Y.	$ 750.00	0.0	$ -	134.4	$ 100,800	183.7	$ 137,780
CLASS C CONCRETE	C.Y.	$ 700.00	25.0	$ 17,500	25.0	$ 17,500	25.0	$ 17,500
EPOXY COATED REINFORCING STEEL	LB.	$ 1.50	28,402.0	$ 42,610	67,420.0	$ 101,130	86,230.0	$ 129,350
PILES, FURNISHED (HP 10X42)	L.F.	$ 40.00	0.0	$ -	700.0	$ 28,000	980.0	$ 39,200
PILES, DRIVEN (HP 10X42)	L.F.	$ 20.00	0.0	$ -	700.0	$ 14,000	980.0	$ 19,600
WATER REPELLENT (VISUALLY INSPECTED)	S.Y.	$ 4.80	308.0	$ 1,480	481.0	$ 2,310	589.0	$ 2,830
DRILLED SHAFTS 60" DIAMETER	L.F.	$ 950.00	0.0	$ -	210.0	$ 199,500	210.0	$ 199,500
PNEUMATICALLY PLACED MORTAR	S.Y.	$ 750.00	35.0	$ 26,250	0.0	$ -	0.0	$ -
SEALER CRACK PREPARATION	L.F.	$ 9.00	51.5	$ 470	103.0	$ 930	163.0	$ 1,470
SEALER RESIN	GAL.	$ 220.00	0.6	$ 140	1.2	$ 270	1.8	$ 400
PREPARATION OF CRACKS, ABOVE WATER	L.F.	$ 32.00	30.0	$ 960	0.0	$ -	0.0	$ -
EPOXY RESIN, ABOVE WATER	GAL.	$ 100.00	2.4	$ 240	0.0	$ -	0.0	$ -
CORROSION INHIBITOR(SURFACE APPLIED)	S.Y.	$ 45.00	45.5	$ 2,050	0.0	$ -	0.0	$ -
TYPE I PLAIN RIPRAP WITH FILTER BLANKET	TON	$ 56.00	860.0	$ 48,160	1,800.0	$ 100,800	1,800.0	$ 100,800
6" PERFORATED PIPE UNDERDRAIN ROUND	L.F.	$ 40.00	0.0	$ -	52.0	$ 2,080	84.0	$ 3,360
6" NON-PERF. PIPE UNDERDRAIN ROUND	L.F.	$ 40.00	0.0	$ -	40.0	$ 1,600	40.0	$ 1,600
REMOVAL OF BRIDGE ITEMS	L.SUM	$ 100,000.00	1.0	$ 100,000	0.0	$ -	0.0	$ -
REMOVAL OF EXISTING BRIDGE STRUCTURE	L.SUM	$ 100,000.00	0.0	$ -	1.0	$ 100,000	1.0	$ 100,000
BRIDGE SUBTOTAL			**$**	**643,070**	**$**	**1,134,820**	**$**	**1,436,960**

ROADWAY AND TRAFFIC

ITEM DESCRIPTION	UNITS	UNIT PRICE	OPTION 1		OPTION 2		OPTION 3	
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
UNCLASSIFIED EXCAVATION	C.Y.	$ 25.00	100	$ 2,500	100	$ 2,500	100	$ 2,500
UNCLASSIFIED BORROW	C.Y.	$ 30.00	250	$ 7,500	750	$ 22,500	750	$ 22,500
SOLID SLAB SODDING	S.Y.	$ 5.00	295	$ 1,480	206	$ 1,030	206	$ 1,030
TACK COAT	GAL.	$ 15.00	20	$ 300	20	$ 300	39	$ 590
ASPHALT CONCRETE	TON	$ 200.00	63	$ 12,600	52	$ 10,400	108	$ 21,600
COLD MILLING PAVEMENT	S.Y.	$ 6.00	267	$ 1,610	267	$ 1,610	400	$ 2,400
REMOVAL OF GUARD RAIL	L.F.	$ 6.00	375	$ 2,250	375	$ 2,250	375	$ 2,250
REMOVAL OF ASPHALT PAVEMENT	S.Y.	$ 12.00	0	$ -	360	$ 4,320	360	$ 4,320
BEAM GUARDRAIL W-BEAM SINGLE	L.F.	$ 26.00	125	$ 3,250	148	$ 3,850	148	$ 3,850
GUARDRAIL END TREATMENT (GET)	EA.	$ 2,800.00	2	$ 5,600	1	$ 2,800	1	$ 2,800
GUARDRAIL THRIE-BEAM CONNECTION	EA.	$ 2,500.00	3	$ 7,500	1	$ 2,500	1	$ 2,500
4" TRAFFIC STRIPING	L.F.	$ 1.00	1200	$ 1,200	1500	$ 1,500	1500	$ 1,500
TRAFFIC CONTROL	LSUM	VARIES	1	$ 25,000	1	$ 25,000	1	$ 25,000
ROADWAY AND TRAFFIC SUBTOTAL			**$**	**70,790**	**$**	**80,560**	**$**	**92,840**

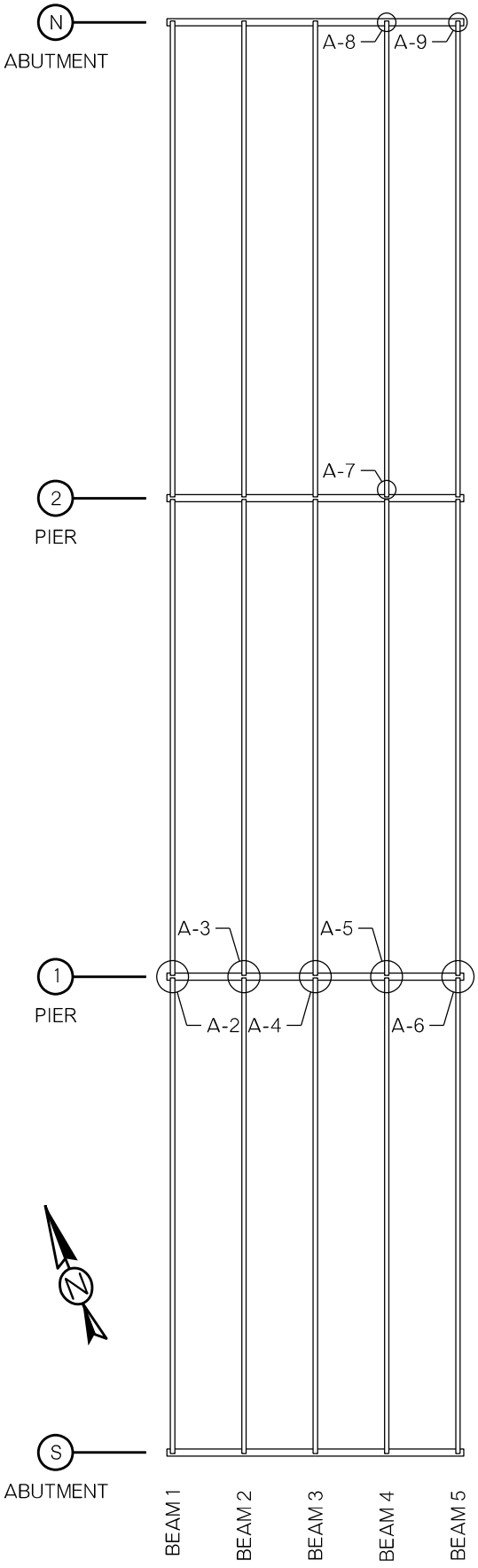
CONSTRUCTION

ITEM DESCRIPTION	UNITS	UNIT PRICE	OPTION 1		OPTION 2		OPTION 3	
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
SURVEY	LSUM	VARIES	1	$ 45,000	1	$ 40,000	1	$ 40,000
MOBILIZATION	LSUM	VARIES	1	$ 62,943	1	$ 87,769	1	$ 103,490
CONSTRUCTION SUBTOTAL			**$**	**107,943**	**$**	**127,769**	**$**	**143,490**

	OPTION 1	OPTION 2	OPTION 3
SUBTOTAL	$ 821,803	$ 1,343,149	$ 1,673,290
15% CONTINGENCY	$ 123,280	$ 201,480	$ 251,000
TOTAL	**$ 945,083**	**$ 1,544,629**	**$ 1,924,290**

APPENDIX C

SUPERSTRUCTURE DEFECT DRAWINGS (PROVIDED BY CONSOR)



Span	Location	Beam	Face	Camera	Photos	Notes
3	P2	1	E	-	-	Typical minor section loss adjacent to diaphragm connection near beam end.
3	P2	1	W	-	-	Insignificant section loss.
3	P2	2	E	-	-	Typical minor section loss adjacent to diaphragm connection near beam end.
3	P2	2	W	-	-	Typical minor section loss adjacent to diaphragm connection near beam end.
3	P2	3	E	LWB	985	1" H x 36" L x 1/8" D pitting at bottom of web adjacent to flange along with typical section loss.
3	P2	3	W	LWB	986	Typical minor section loss adjacent to diaphragm connection near beam end.
3	P2	4	E	LWB	982-83	Moderate section loss near beam end. See Sheet A-7
3	P2	4	W	LWB	984	Moderate section loss near beam end. See Sheet A-7
3	P2	5	E	LWB	981	Insignificant section loss.
3	P2	5	W	LWB	980	Typical minor section loss adjacent to diaphragm connection near beam end.
3	NAB	1	E	BLO	34	Typical minor section loss adjacent to diaphragm connection near beam end.
3	NAB	1	W	BLO	35-36	Typical minor section loss adjacent to diaphragm connection near beam end.
3	NAB	2	W	BLO	33, 37, 38	Typical minor section loss adjacent to diaphragm connection near beam end.
3	NAB	3	E	BLO	39-40	Typical minor section loss adjacent to diaphragm connection near beam end.
3	NAB	3	W	BLO	32	Typical minor section loss adjacent to diaphragm connection near beam end.
3	NAB	4	E	BLO	41	Moderate section loss in beam end. See Sheet A-8
3	NAB	4	W	BLO	31	Moderate section loss in beam end. See Sheet A-8
3	NAB	5	E	BLO	23-30	Serious section loss to web adjacent to bottom flange. See Sheet A-9
3	NAB	5	W	BLO	42-43	Serious section loss to web adjacent to bottom flange. See Sheet A-9

Span	Location	Beam	Face	Camera	Photos	Notes
2	P1	1	E	DAL	487-88	Moderate section loss in beam end. See Sheet A-2
2	P1	1	W	DAL	489-90	No significant section loss
2	P1	2	E	DAL	492-93	Moderate section loss in beam end. See Sheet A-3
2	P1	2	W	DAL	491	Moderate section loss in beam end. See Sheet A-3
2	P1	3	E	DAL	526-31	Serious section loss and local web failure with distortion to bottom flange. See Sheet A-4
2	P1	3	W	DAL	494-504	Serious section loss and local web failure with distortion to bottom flange. See Sheet A-4
2	P1	4	E	DAL	532-43	Serious section loss and local web failure with distortion to bottom flange. See Sheet A-5
2	P1	4	W	DAL	507-520	Serious section loss and local web failure with distortion to bottom flange. See Sheet A-5
2	P1	5	E	DAL	553-57	Serious section loss and local web failure with distortion to bottom flange. See Sheet A-6
2	P1	5	W	DAL	544-52	Serious section loss and local web failure with distortion to bottom flange. See Sheet A-6
2	P2	1	E	-	-	Typical minor section loss adjacent to diaphragm connection near beam end.
2	P2	1	W	-	-	Insignificant section loss.
2	P2	2	E	LWB	987	Typical minor section loss adjacent to diaphragm connection near beam end.
2	P2	2	W	-	-	Typical minor section loss adjacent to diaphragm connection near beam end.
2	P2	3	E	LWB	989	Typical minor section loss adjacent to diaphragm connection near beam end.
2	P2	3	W	LWB	988	Typical minor section loss adjacent to diaphragm connection near beam end.
2	P2	4	W	LWB	990	Typical minor section loss adjacent to diaphragm connection near beam end.
2	P2	4	E	LWB	991	Typical minor section loss adjacent to diaphragm connection near beam end.
2	P2	5	E	LWB	981	Typical minor section loss adjacent to diaphragm connection near beam end.
2	P2	5	W	LWB	992-93	Typical minor section loss adjacent to diaphragm connection near beam end.

Span	Location	Beam	Face	Camera	Photos	Notes
1	SAB	1	E	JMF	20	No significant section loss
1	SAB	1	W	JMF	21	No significant section loss
1	SAB	2	E	JMF	18	No significant section loss
1	SAB	2	W	JMF	19	No significant section loss
1	SAB	3	E	JMF	16	No significant section loss
1	SAB	3	W	JMF	17	No significant section loss
1	SAB	4	E	JMF	14	No significant section loss
1	SAB	4	W	JMF	15	No significant section loss
1	SAB	5	E	JMF	12	No significant section loss
1	SAB	5	W	JMF	13	No significant section loss
1	P1	1	W	DAL	489-90	No significant section loss
1	P1	1	E	JMF	10	Moderate section loss in beam end. See Sheet A-2
1	P1	2	E	JMF	8	Moderate section loss in beam end. See Sheet A-3
1	P1	2	W	JMF	9	No significant section loss
1	P1	3	E	JMF	6	Serious section loss and local web failure. See Sheet A-4
1	P1	3	W	JMF	7	Serious section loss and local web failure. See Sheet A-4
1	P1	4	E	JMF	4	Serious section loss with distortion of web and bottom flange. See Sheet A-5
1	P1	4	W	JMF	5	Serious section loss with distortion of web and bottom flange. See Sheet A-5
1	P1	5	E	JMF	3	Serious section loss with distortion of web and bottom flange. See Sheet A-6
1	P1	5	W	JMF	2	Serious section loss with distortion of web and bottom flange. See Sheet A-6

GENERAL NOTES:

1. Beam ends typically have section loss up to 1/8" deep adjacent to diaphragm connection angles.
2. Beam ends at piers typically have section loss up to 1/16" deep in the bottom face of the bottom flange adjacent to bearing, extending up to 12" into the span.
3. Significant section loss was mapped, and is illustrated in sheets 2 through 9.

GRAPHIC SCALE MEASURED IN FEET

0 15 30

1" = 15'

DATE

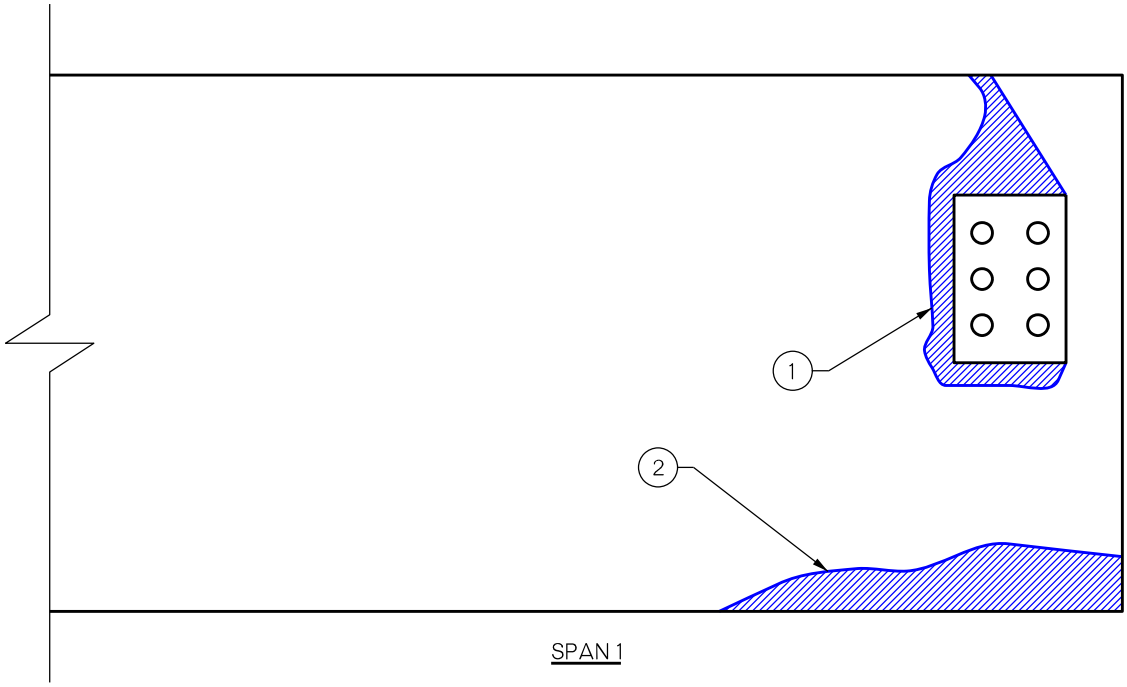
MAY 2021

609 S. Kelly Avenue
Suite J-1
Edmond, OK 73003
PH.: 405.285.2560
CONSOR

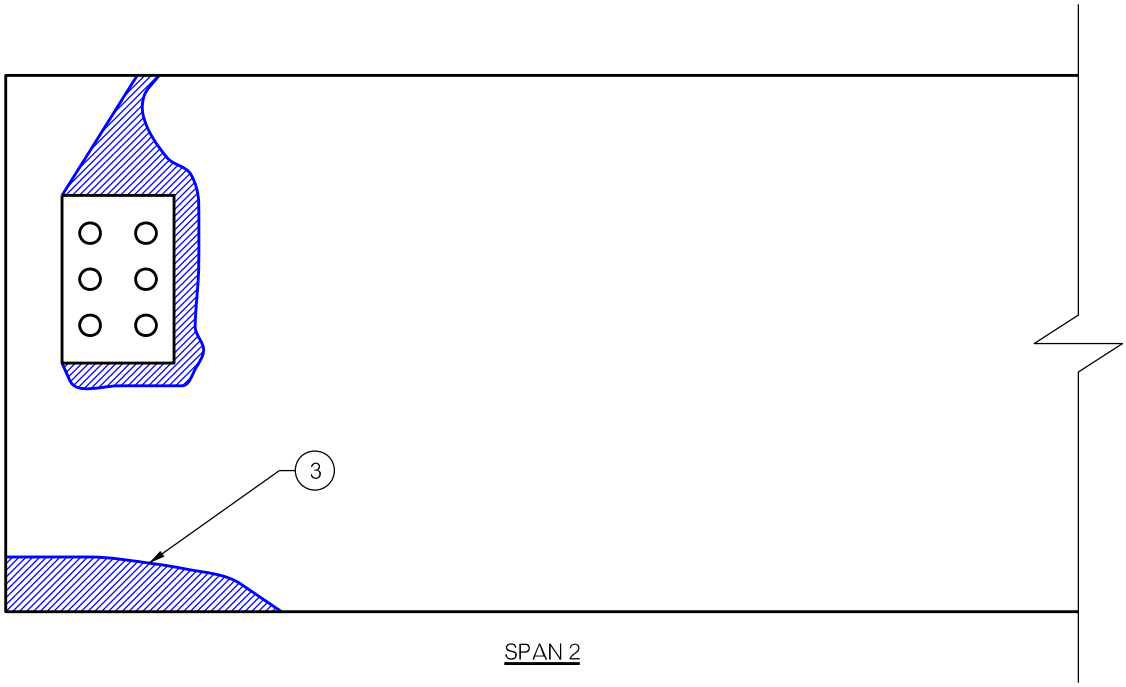
MIDWEST BLVD. OVER CREEK
BRIDGE NO. 16953 (O-543)

PLAN VIEW

PAGE
A-1



SPAN 1



SPAN 2

Note	Camera	Nos.	Defeciencies
1	JMF	10	Section loss up to 1/4" D
2	JMF	10	4" H x 16" L x 1/4" D in web adjacent to bottom flange
3	DAL	487-88	2" H x 12: L x 1/8" D in web adjacent to bottom flange

SECTION LOSS CORROSION HOLE CRACK/FRACTURE

GRAPHIC SCALE MEASURED IN FEET

0 9" 18"

1" = 9"

DATE

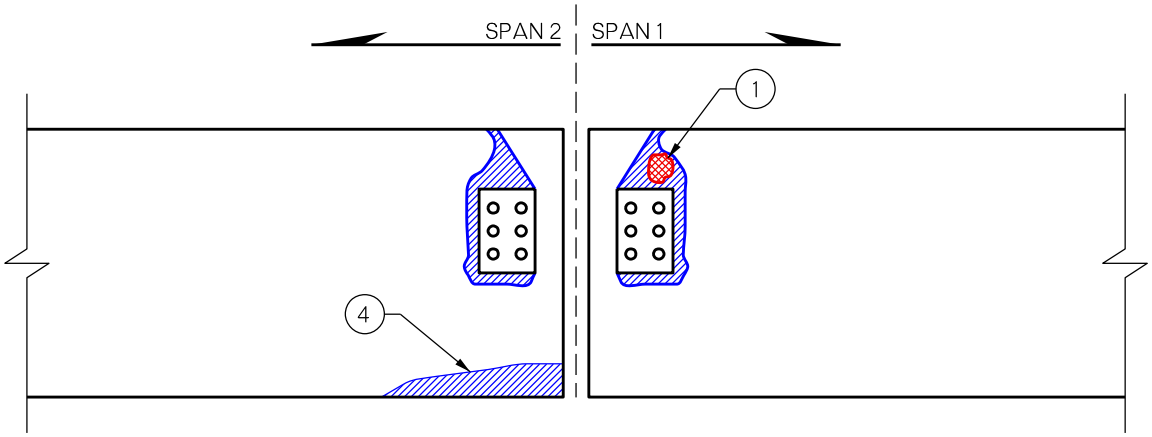
MAY 2021

609 S. Kelly Avenue
Suite J-1
Edmond, OK 73003
PH.: 405.285.2560
CONSOR

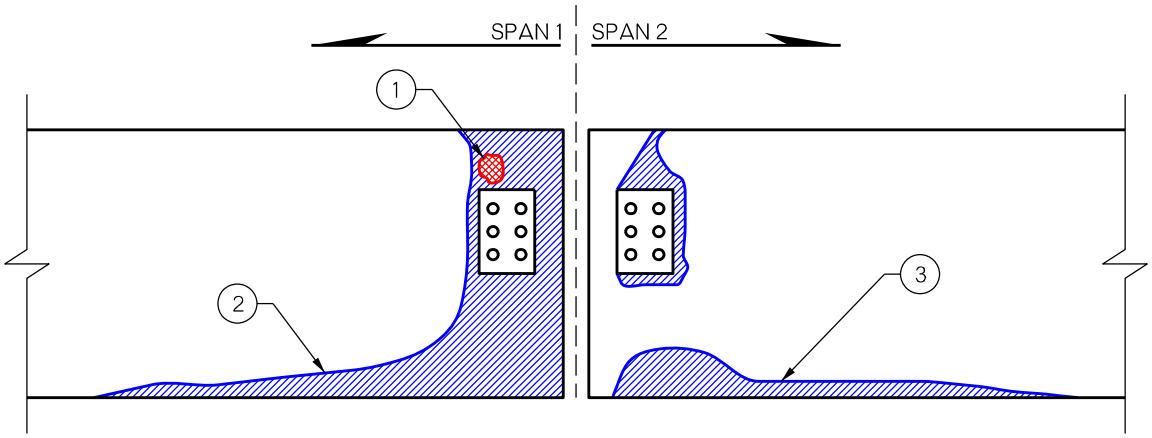
MIDWEST BLVD. OVER CREEK
BRIDGE NO. 16953 (O-543)

BEAM 1 AT PIER 1, EAST FACE

PAGE
A-2



WEST FACE



EAST FACE

Note	Camera	Nos.	Defeciencies
1	JMF	8	2" diameter corrosion hole inside area of tapered section loss above angle
2	JMF	8	4" H x 42" L x 1/4" D section loss in web along bottom flange.
3	DAL	492-93	5" H x 47" L x up to 5/32" D section loss in web along bottom flange
4	DAL	491	1.5: H x 11" L x up to 1/16" D section loss in web along bottom flange

SECTION LOSS CORROSION HOLE CRACK/FRACTURE

GRAPHIC SCALE MEASURED IN FEET

0 18" 36"

1" = 18'

DATE

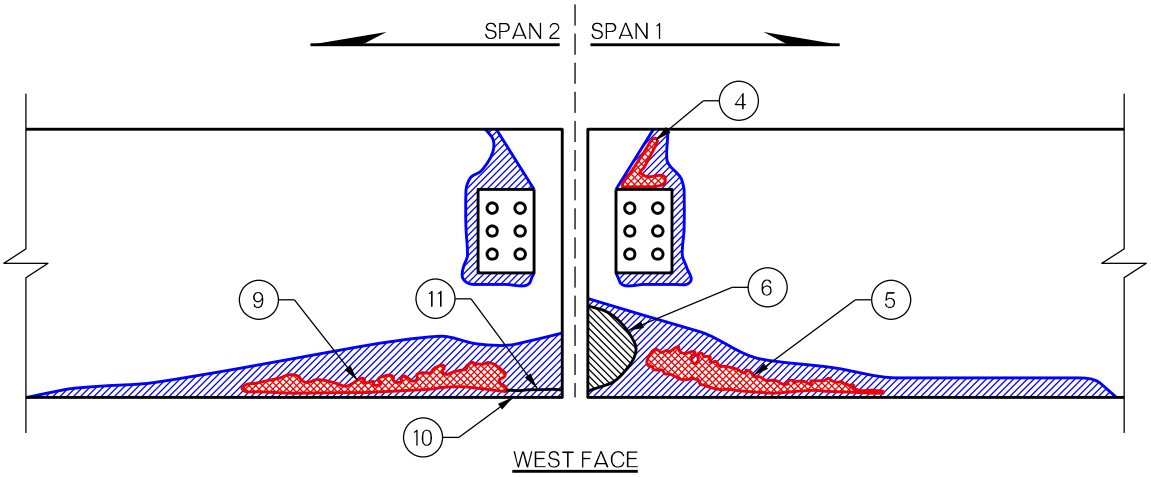
MAY 2021

609 S. Kelly Avenue
Suite J-1
Edmond, OK 73003
PH.: 405.285.2560
CONSOR

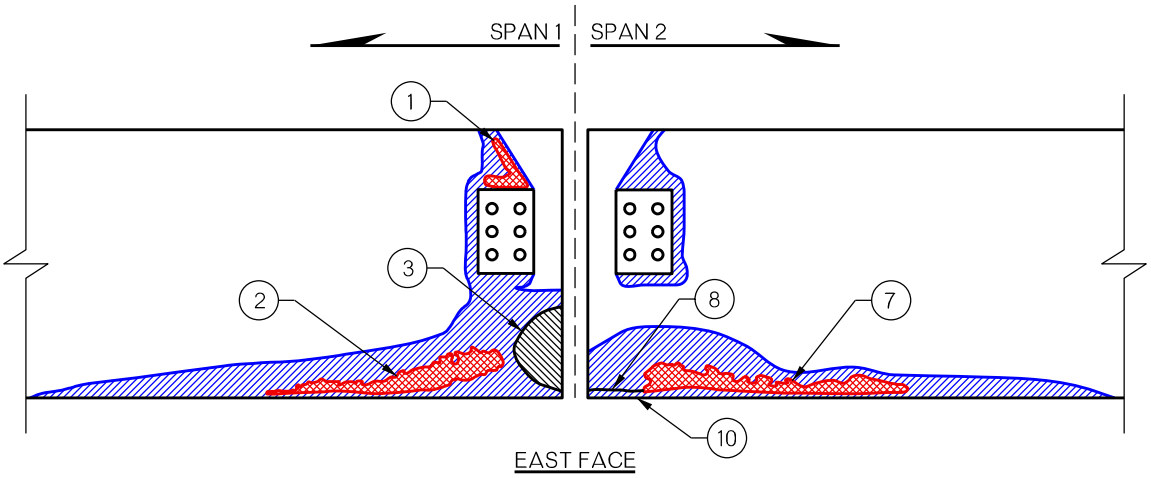
MIDWEST BLVD. OVER CREEK
BRIDGE NO. 16953 (O-543)

BEAM 2 AT PIER 1

PAGE
A-3

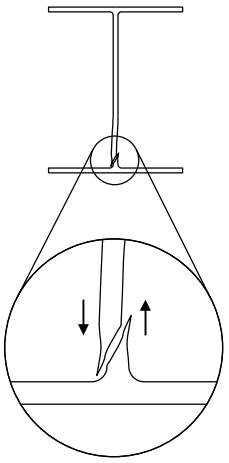


WEST FACE



EAST FACE

Note	Camera	Nos.	Defeciencies
1	JMF	6	5" H x 4" L corrosion hole in web above angle inside area of tapered section loss
2	JMF	6	3" H x 32" L corrosion hole in web adjacent to bottom flange inside 4" H x 48" L area of tapered section loss.
3	JMF	6	Local web buckling at beam end, likely resultant from neighboring beam web crushing
4	JMF	7	5" H x 4" L corrosion hole in web above angle inside area of tapered section loss
5	JMF	7	3" H x 32" L corrosion hole in web adjacent to bottom flange inside 4" H x 44" L area of tapered section loss.
6	JMF	7	Local web buckling at beam end, likely resultant from neighboring beam web crushing
7	DAL	526-28	3" H x 23" L corrosion hole in web adjacent to bottom flange inside 6" H x 49" L area of tapered section loss
8	DAL	529-31	5" long corrosion crack extending from end of corrosion hole to end of beam; web has fractured and top portion is sliding past bottom portion along crack (see illustration)
9	DAL	494-501	3" H x 23" L corrosion hole in web adjacent to bottom flange inside 6" H x 46" L area of tapered section loss
10	DAL	498-501	Bottom flange is distorted due to web at beam end crushing down
11	DAL	502-504	5" long corrosion crack extending from end of corrosion hole to end of beam; web has fractured and top portion is sliding past bottom portion along crack (see illustration)



ILLUSTRATION

SECTION LOSS CORROSION HOLE CRACK/FRACTURE BUCKLED WEB

GRAPHIC SCALE MEASURED IN FEET

0 18" 36"

1" = 18'

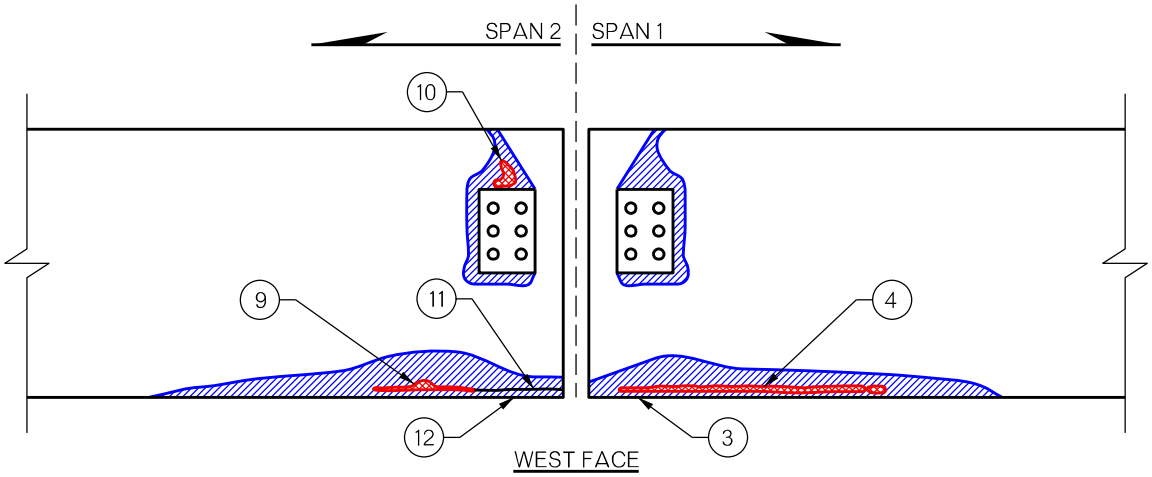
DATE

MAY 2021

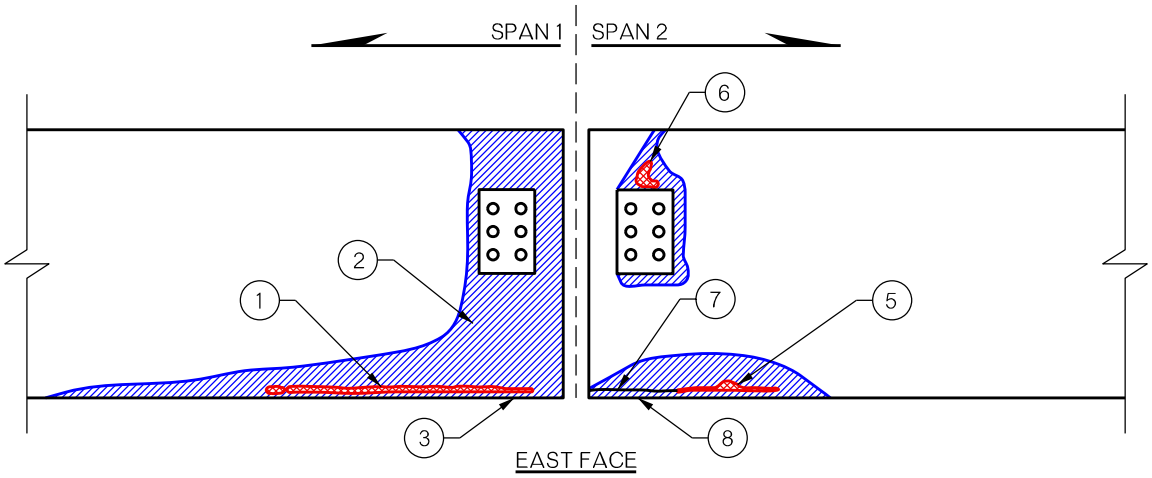
609 S. Kelly Avenue
Suite J-1
Edmond, OK 73003
PH.: 405.285.2560
CONSOR

MIDWEST BLVD. OVER CREEK
BRIDGE NO. 16953 (O-543)

BEAM 3 AT PIER 1

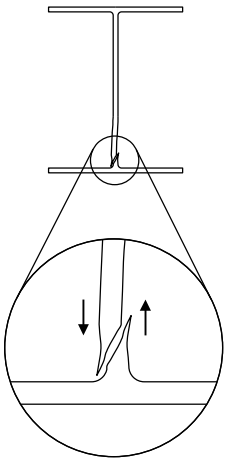


WEST FACE



EAST FACE

Note	Camera	Nos.	Defeciencies
1	JMF	4	1" H x 24" L corrosion hole in web adjacent to bottom flange inside 3" H x 48" L area of tapered section loss
2	JMF	4	10" L x full-height x up to 1/8" deep in web at beam end
3	JMF	5	Bottom flange is distorted due to web at beam end crushing down
4	JMF	5	1" H x 24" L corrosion hole in web adjacent to bottom flange inside 3" H x 32" L area of tapered section loss
5	DAL	532-35	3/4" H x 9.5" L corrosion hole in web adjacent to bottom flange inside 4" H x 16" L area of tapered section loss
6	DAL	536-38	2" diameter corrosion hole in web above angle inside area of tapered section loss
7	DAL	534-35	8" L corrosion crack extending from end of corrosion hole to end of beam; web has fractured and top portion is sliding past bottom portion along crack (see illustration)
8	DAL	539-43	Bottom flange is distorted due to web at beam end crushing down
9	DAL	507-16	3/4" H x 9.5" L corrosion hole in web adjacent to bottom flange inside 4" H x 31" L area of tapered section loss
10	DAL	512-13	2" diameter corrosion hole in web above angle inside area of tapered section loss
11	DAL	514-16	8" L corrosion crack extending from end of corrosion hole to end of beam; web has fractured and top portion is sliding past bottom portion along crack (see illustration)
12	DAL	517-520	Bottom flange is distorted due to web at beam end crushing down



ILLUSTRATION

SECTION LOSS CORROSION HOLE CRACK/FRACTURE

GRAPHIC SCALE MEASURED IN FEET

0 18" 36"

1" = 18'

DATE

MAY 2021

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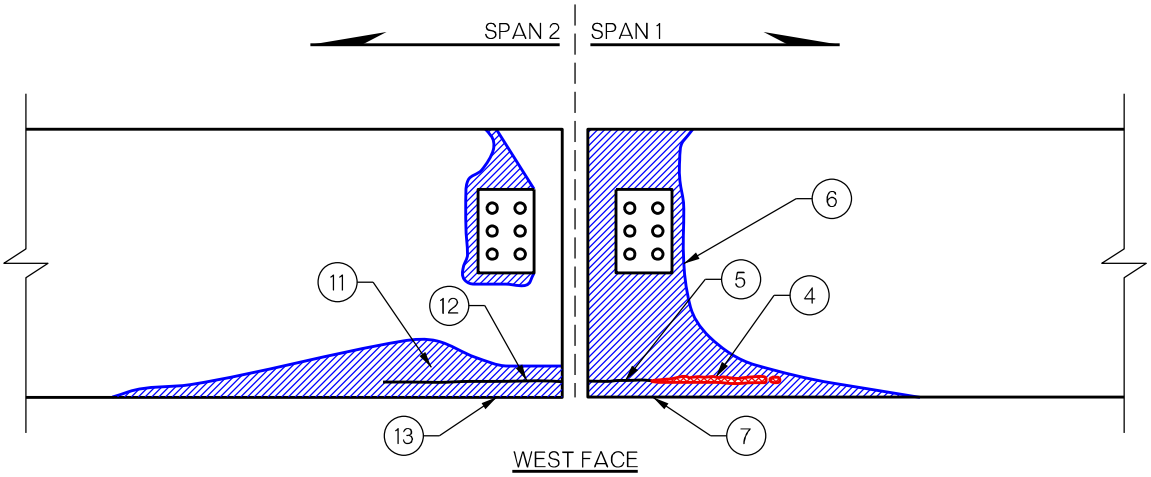
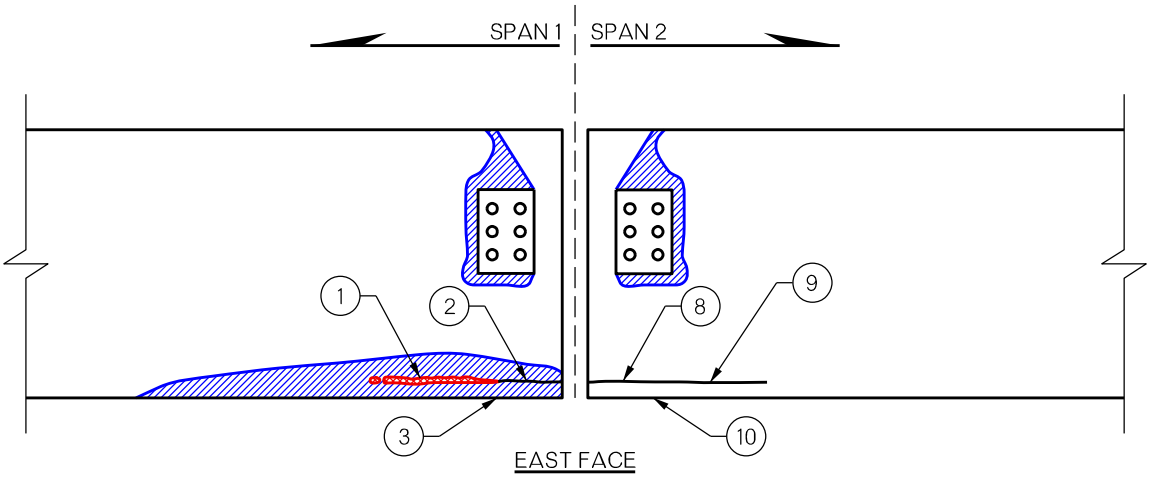
CONSOR

MIDWEST BLVD. OVER CREEK
BRIDGE NO. 16953 (O-543)

BEAM 4 AT PIER 1

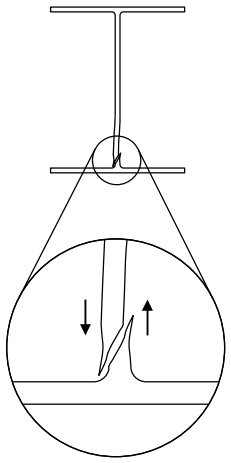


WEST FACE



EAST FACE

Note	Camera	Nos.	Defeciencies
1	JMF	3	1" H x 21" L corrosion hole in web adjacent to bottom flange inside 36" L x 5" H area of tapered section loss. Note that the corrosion hole is partially collapsed.
2	JMF	3	The web above and below the corrosion hole has partially collapsed, with the upper portion of the web sliding past the lower portion of the web and bearing on the bottom flange over the end 7" of the beam. See illustration.
3	JMF	3	Bottom flange is distorted due to web at beam end crushing down
4	JMF	2	1" H x 21" L corrosion hole in web adjacent to bottom flange inside 30" L x 3" H area of tapered section loss. Note that the corrosion hole is partially collapsed.
5	JMF	2	The web above and below the corrosion hole has partially collapsed, with the upper portion of the web sliding past the lower portion of the web and bearing on the bottom flange over the end 7" of the beam. See illustration.
6	JMF	2	10" L x full-height x up to 1/8" deep in web at beam end
7	JMF	2	Bottom flange is distorted due to web at beam end crushing down
8	DAL	555-57	16" L collapsed corrosion hole in web adjacent to bottom flange; no significant adjacent section loss
9	DAL	555-57	The web above and below the corrosion hole has collapsed, with the upper portion of the web sliding past the lower portion of the web and bearing on the bottom flange. See illustration.
10	DAL	554, 57	Bottom flange is distorted due to web at beam end crushing down
11	DAL	544-46	16" L collapsed corrosion hole in web adjacent to bottom flange inside 4.5" H x 36" L area of tapered section loss
12	DAL	547-48	The web above and below the corrosion hole has collapsed, with the upper portion of the web sliding past the lower portion of the web and bearing on the bottom flange. See illustration.
13	DAL	550-52	Bottom flange is distorted due to web at beam end crushing down



ILLUSTRATION

SECTION LOSS CORROSION HOLE CRACK/FRACTURE

GRAPHIC SCALE MEASURED IN FEET

0 18" 36"

1" = 18'

DATE

MAY 2021

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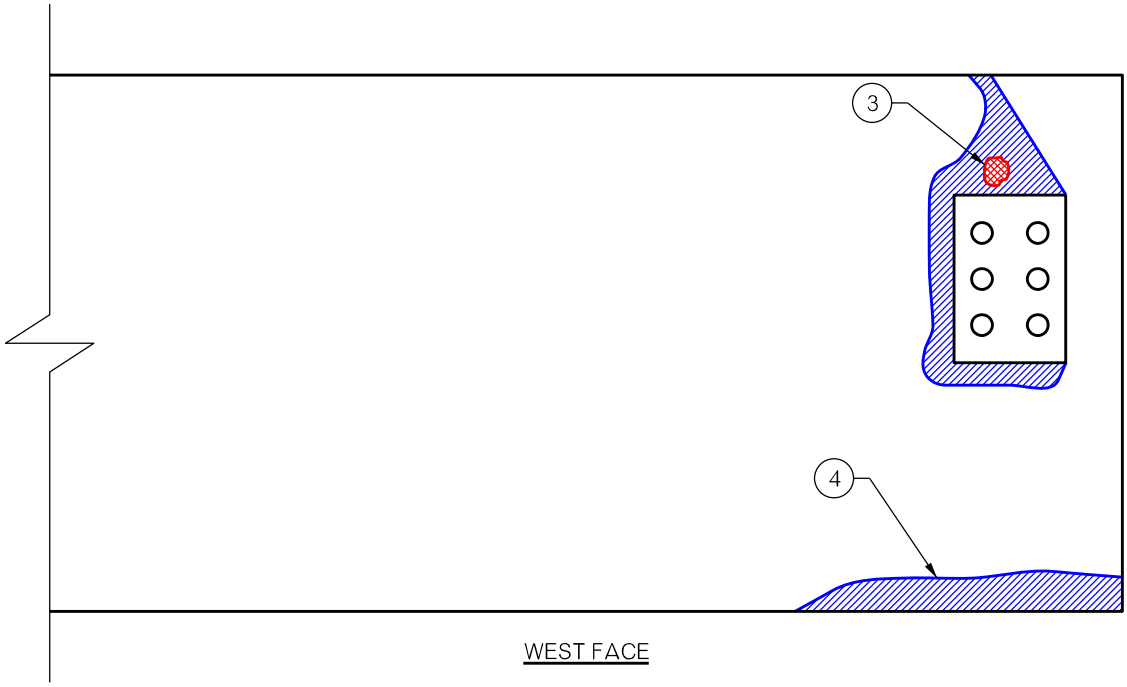
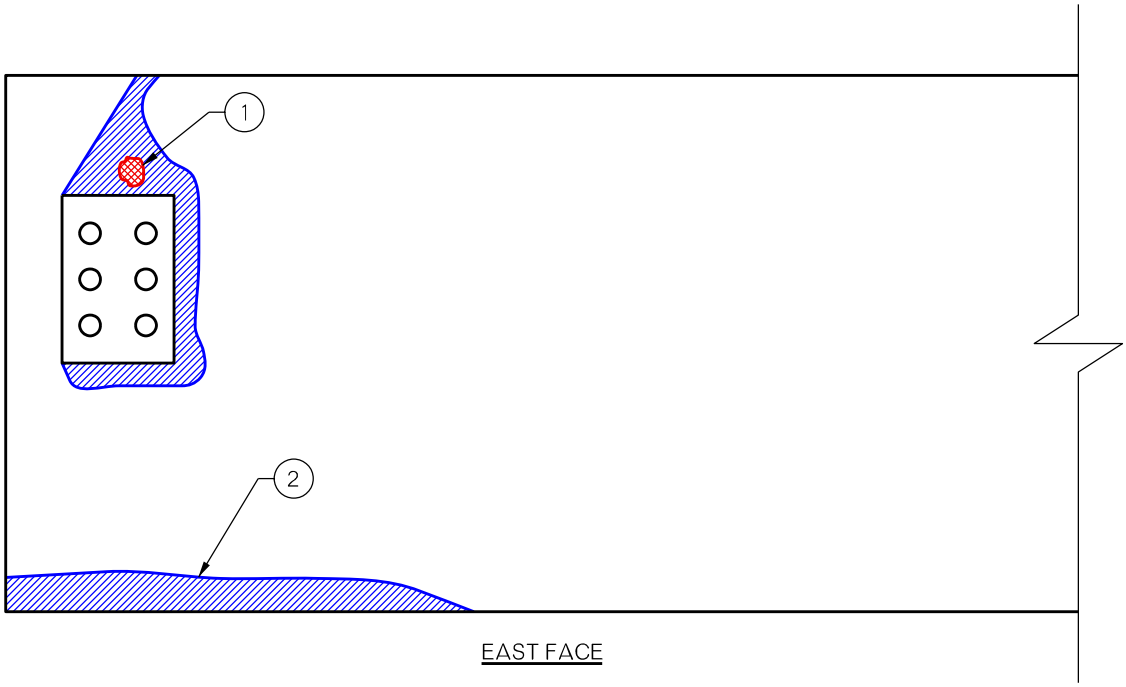
CONSOR

MIDWEST BLVD. OVER CREEK
BRIDGE NO. 16953 (O-543)

BEAM 5 AT PIER 1



WEST FACE



EAST FACE

Note	Camera	Nos.	Defeciencies
1	LWB	982	3/4" diameter corrosion hole in web above angle inside 4.5" L x 9" H area of tapered section loss
2	LWB	983	1" H x 18" L x 1/8" D pitting at bottom of web adjacent to flange
3	LWB	984	3/4" diameter corrosion hole in web above angle inside 4" L x 6" H area of tapered section loss
4	-	-	1" H x 12" L x 1/8" D pitting at bottom of web adjacent to flange

SECTION LOSS CORROSION HOLE CRACK/FRACTURE

GRAPHIC SCALE MEASURED IN FEET

0 9" 18"

1" = 9"

DATE

MAY 2021

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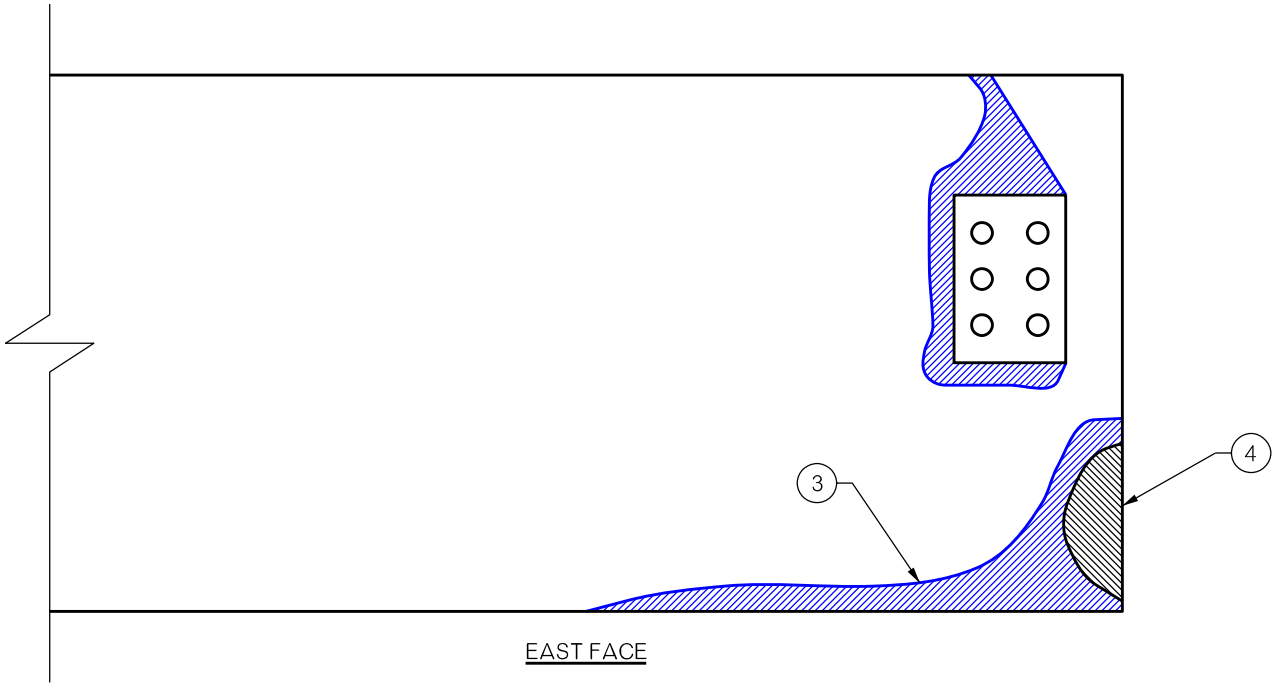
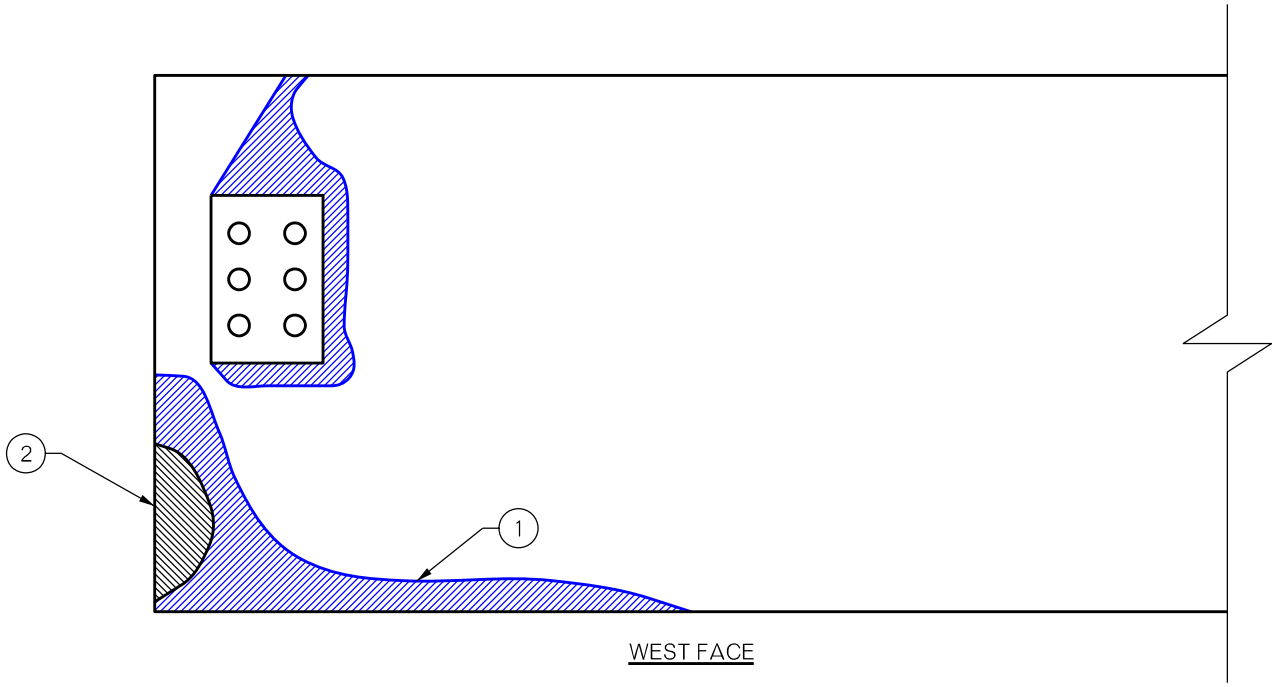
MIDWEST BLVD. OVER CREEK
BRIDGE NO. 16953 (O-543)

BEAM 4, SPAN 3 AT PIER 2



EAST FACE



WEST FACE

Note	Camera	Nos.	Defeciencies
1	BLO	41	3" H x 24" L x 1/16" D pitting at bottom of web adjacent to flange, extending up to 10" H near end of beam.
2	BLO	41	Localized distortion near bottom of at very end of beam web consistent with local web crippling
3	BLO	31	3" H x 24" L x 1/16" D pitting at bottom of web adjacent to flange, extending up to 12" H near end of beam.
4	BLO	31	Localized distortion near bottom of at very end of beam web consistent with local web crippling

SECTION LOSS CORROSION HOLE CRACK/FRACTURE DISTORTED WEB

GRAPHIC SCALE MEASURED IN FEET

0 9" 18"

1" = 9"

DATE

MAY 2021

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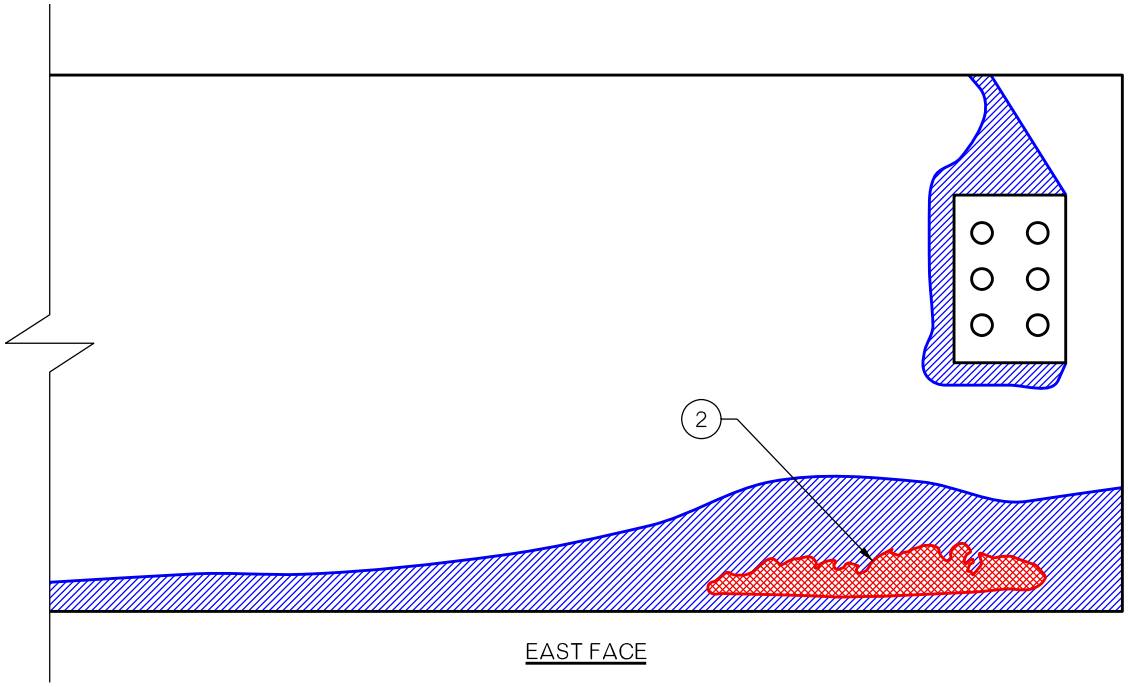
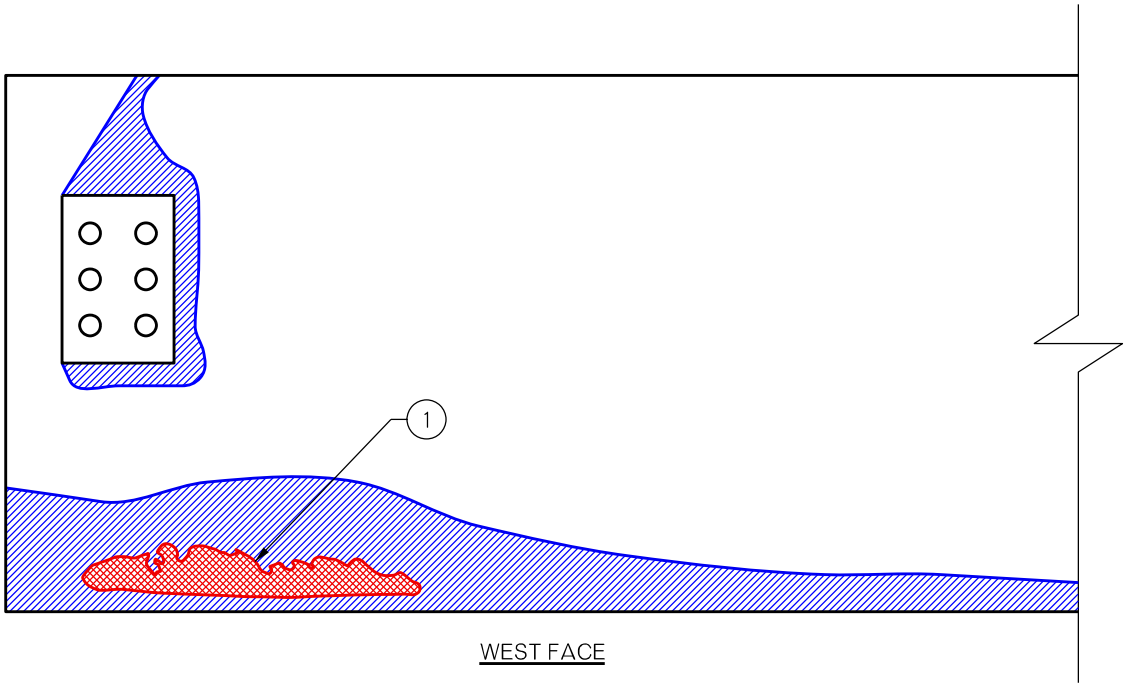
CONSOR

MIDWEST BLVD. OVER CREEK
BRIDGE NO. 16953 (O-543)

BEAM 4, SPAN 3 AT NORTH ABUTMENT



EAST FACE



WEST FACE

Note	Camera	Nos.	Defeciencies
1	BLO	29-30	4" H x 16" L corrosion hole inside 53" L x up to 7" H area of tapered section loss
2	BLO	42-43	4" H x 16" L corrosion hole inside 53" L x up to 7" H area of tapered section loss

SECTION LOSS CORROSION HOLE CRACK/FRACTURE

GRAPHIC SCALE MEASURED IN FEET

0 9" 18"

1" = 9"

DATE

MAY 2021

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BEAM 5, SPAN 3 AT NORTH ABUTMENT