Doug Welch

From: Leslie Lewis
Sent: Tuesday, October 06, 2020 5:41 PM
To: Chris Wallace; Kevin Arnold
Cc: Jon Arps; Wes Kellogg; Walt Peters; Steve Jacobi; Doug Welch
Subject: Div. 1 underwater inspection reports 2nd set
Attachments: 17038(2020-07-20)UW.pdf; 17051(2020-07-19)UW.pdf; 15587(2020-07-21)UW.pdf

15587(2020-07-21)UW/17038(2020-07-20)UW/17051(2020-07-19)UW

All
I have reviewed and submit to you the second set of underwater inspection reports for Division 1 for this inspection cycle. No hard copies will be mailed. The files will be saved to the BMF.

15587 4614-0227X McIntosh S.H. 9 2.5 MI SE US69B
The current NBI ratings for this structure versus the last inspection are as follows:

NBI Item	2020 Rating	2015 Rating
221 Sub	7	7
61 Channel	8	8
113 Scour	8	8

There are no corrective actions recommended.

17038 46E1143N4280000 McIntosh 4622C 0.5MI W OF PORUM LANDING
The current NBI ratings for this structure versus the last inspection are as follows:

NBI Item	2020 Rating	2015 Rating
221 Sub	6	7
61 Channel	8	8
113 Scour	8	8

There are no corrective actions recommended.

17051 6822-0000X Sequoyah I-40 SEQUOYAH/MUSKOGEECO
The current NBI ratings for this structure versus the last inspection are as follows:

NBI Item	2020 Rating	2015 Rating
221 Sub	6	6
61 Channel	7	7
113 Scour	8	8

There are no corrective actions recommended.

Doug
Please save the attached files to the appropriate BMF under UW folder.

As always if you have any questions or concerns please do not hesitate to contact me at 405-822-6009.
Best Regards,
Leslie Lewis PE, CFM
State Bridge Hydraulic Engineer
llewis@odot.org
office 405-521-6500
cell 405-822-6009

OKLAHOMA Transportation

Underwater Inspection of

I-40 over the Arkansas River

Sequoyah County, OK

July 19, 2020

Structure No. 6822-0000-X

NBI No. 17051

PREPARED BY:

CONSOR

LICENSED PROFESSIONAL ENGINEER
MICHAEL DUKES
26634
OKLAHOMA

09/15/2020

Certificate of Authorization: 2518
609 S. Kelly Ave, Suite J-1 • Edmond, OK 73003 • Phone 888.451.6822

To: Leslie Lewis, P.E.

From: CONSOR Engineers, LLC

Date: September 15, 2020

Subject: Underwater Bridge Inspection
NBI 17051, Structure 6822-0000-X, I-40 over the Arkansas River

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On July 19, 2020 as part of EC-2139 Underwater Bridge Inspections, CONSOR Engineers, LLC performed an underwater inspection of the above-referenced structure in Sequoyah County.

The inspection was performed by the following personnel:

Deke Roberts	Team Leader/Diving Supervisor
Randall Fabyanic, P.E.	Diving Inspector
Colt Powell	Diving Inspector
Christian Normandy	Diving Inspector
Jayce Cook	Tender

The bridge is currently open to traffic with no load restrictions.

The current NBI ratings for this structure versus the last inspection are as follows:

NBI Item	2020 Rating	2015 Rating
221 Sub	6	6
61 Channel	7	7
113 Scour	8	8

There are no corrective actions recommended.

The submerged portions of the substructures should be inspected at an interval not to exceed 60 months.

Sincerely,
CONSOR Engineers, LLC

Michael Dukes, P.E.
Project Manager

UNDERWATER INSPECTION REPORT
OF
Structure No. 6822-0000-X
NBI No. 17051

I-40
Over the Arkansas River
Sequoyah County

July 19, 2020

BACKGROUND AND DESCRIPTION OF STRUCTURE

Structure No. 6822-0000-X (NBI 17051) carries I-40 over the Arkansas River approximately 6 miles southeast of Webbers Falls, Oklahoma in Sequoyah County. Refer to the Location Map on Page 6. The bridge was built in 1967 and reconstructed in 1983. It is 1,989-ft long and 68.5-ft wide.

STRUCTURE DESCRIPTION

The bridge is a thirteen-span continuous steel girder structure with a prestressed concrete approach spans supported by two abutments and twelve intermediate piers. Piers 2 and 3 each consist of three concrete columns founded on drilled shafts. Piers 4 and 5 each consist of a concrete hammerhead cap on a reinforced concrete pier wall that is founded on a concrete spread footing that is keyed into rock. Piers 6 through 9 each consist of two concrete columns founded on spread footings that are keyed into rock. Piers 2 through 9 were in the water at the time of the inspection. Refer to Photos 1 through 6 for overall views of the bridge configuration and typical substructure.

AUTHORIZATION AND SCOPE

This Underwater inspection of Structure No. 6822-0000-X, (NBI 17051) was authorized by Engineering Contract No. 2139, Job Piece No. 34690(04). The scope includes an in-depth underwater bridge inspection from the channel bottom to the water surface. Each inspection includes documentation of existing conditions and soundings adjacent to each substructure. This report presents the findings of the underwater inspection.

INSPECTION PROCEDURES

A five-man inspection team, comprised of a registered professional engineer-diver and four technician divers, performed the inspection. Diving was conducted in accordance with OSHA Subpart T. All diving operations were performed using commercial SCUBA. A complete visual/tactile inspection was conducted on all accessible portions of the substructure units below water. Additional cleaning of the substructure surfaces was performed as required to determine the extents of any observed deficiencies.

CRITICAL DEFICIENCIES

No critical deficiencies were observed during the underwater inspection.

DETAILED DESCRIPTION OF CONDITIONS

This section presents a narrative of findings for each individual pier and a discussion of bridge scour conditions. The data provided in this section is graphically represented in Appendix A.

Site Conditions

- Weather: Sunny and Clear
- Air Temperature: 95˚ F
- Water Temperature: 86˚ F
- Water Velocity: 1.0 FPS
- Water Visibility: 3.0-ft
- Max Dive Depth: 30-ft
- Dive Method: SCUBA
- Access: Boat

The water elevation at the time of inspection was 9.4-ft below the top of the drilled shaft. This corresponds to a waterline elevation of 459.9-ft based on elevations acquired from the available plans.

Channel Conditions (NBI Item 61)

The channel in the vicinity of the bridge is straight and is well aligned with the piers. The embankments are stable and protected with natural vegetation. The west channel bank at the bridge is protected with small to medium size rock and riprap. There are no restrictions in the channel. The channel bottom material at the bents/piers consists of gravel and riprap. There is light timber debris at the piers. Refer to Photos 7 through 10 for views of the channel alignment and embankments.

Scour (NBI Item 113)

The Pier 4 seal concrete is exposed up to 10-ft high. The Pier 5 footing is exposed along the west face, up to 4-in high over a 5-ft long area. Both of these exposures are similar to those observed during the 2015 underwater inspection and the 2019 post-flood scour assessment. The footings of the inspected piers are keyed into rock.

Substructure Conditions (ODOT Item 221)

General Notes: The submerged portions of the substructure are in satisfactory condition.

Piers 2 and 3: The steel encasements have minor pitting typically 1/16-in deep with random area up to 1/8-in deep. Refer to Photo 9. The steel encasements terminate 10-ft above the channel bottom.

Pier 4: The encasement repair is in satisfactory condition. There are numerous vertical and horizontal cracks with efflorescence. Refer to Photo 10. There are isolated areas of rust staining. The cracks typically start at the waterline and extend to the top of the encasement. The encasement seal is exposed up to 10-ft high and is irregular with areas of voiding. The seal is in fair condition.

Pier 5: Hairline vertical cracks extend from the waterline up with some light efflorescence. The footing is exposed up to 4-in high over a 5-ft long area on the west face.

Pier 6: No significant defects noted.

Pier 7: No significant defects noted.

Pier 8: No significant defects noted.

Pier 9: No significant defects noted.

PREVIOUS CORRECTIVE ACTIONS

No corrective actions have been performed below the waterline since the 2015 underwater inspection.

RECOMMENDATIONS

There are no corrective actions recommended.

The submerged portions of the substructures should be inspected at an interval not to exceed 60 months.

Location Map
Latitude: 35° 29' 16.49"
Longitude: 95° 05' 38.05"

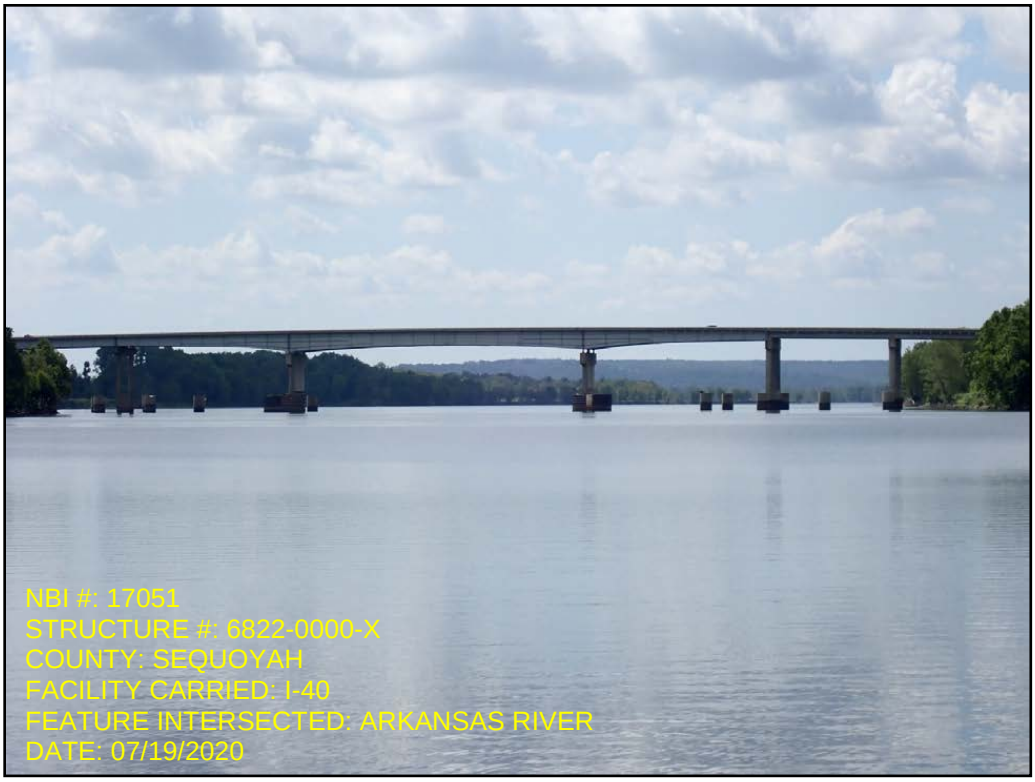


Photo 1 – North elevation

Photo 2 – West approach looking east

Photo 3 – East approach looking west

Photo 4 – Pier 3, typical configuration for Piers 2 and 3

Photo 5 – Pier 5, typical configuration for Piers 4 and 5

Photo 6 – Pier 6, typical configuration for Piers 6-10

Photo 7 – View upstream from under bridge

Photo 8 – View downstream from under bridge

Photo 9 – West embankment

Photo 10 – East channel bank

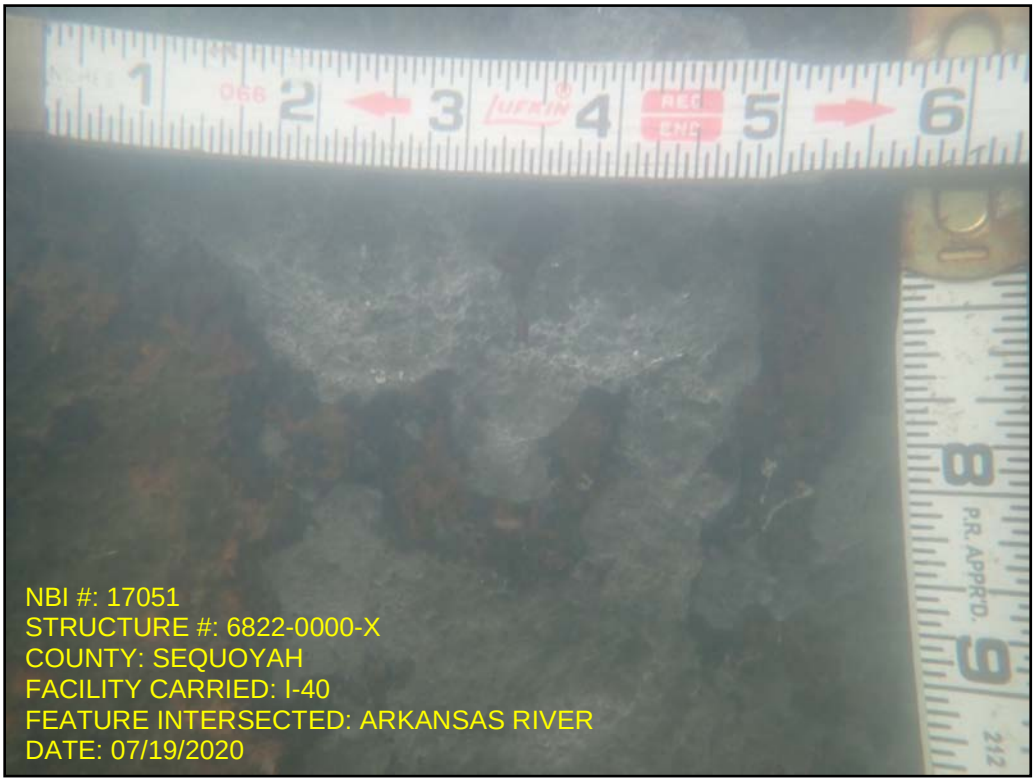


Photo 11 – Pier 3, typical steel condition below waterline

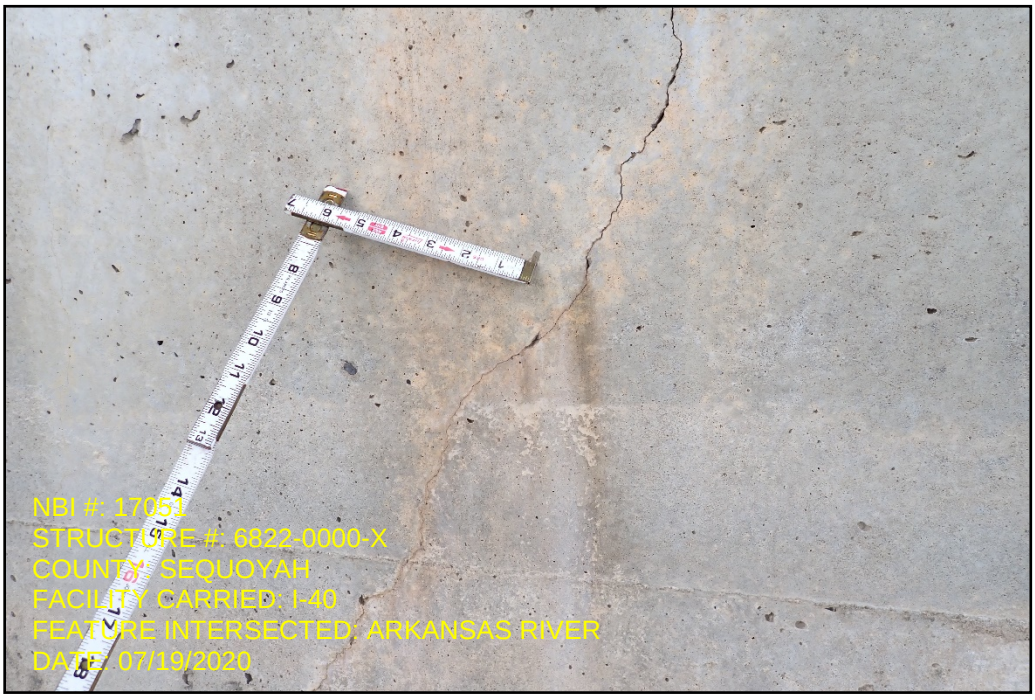
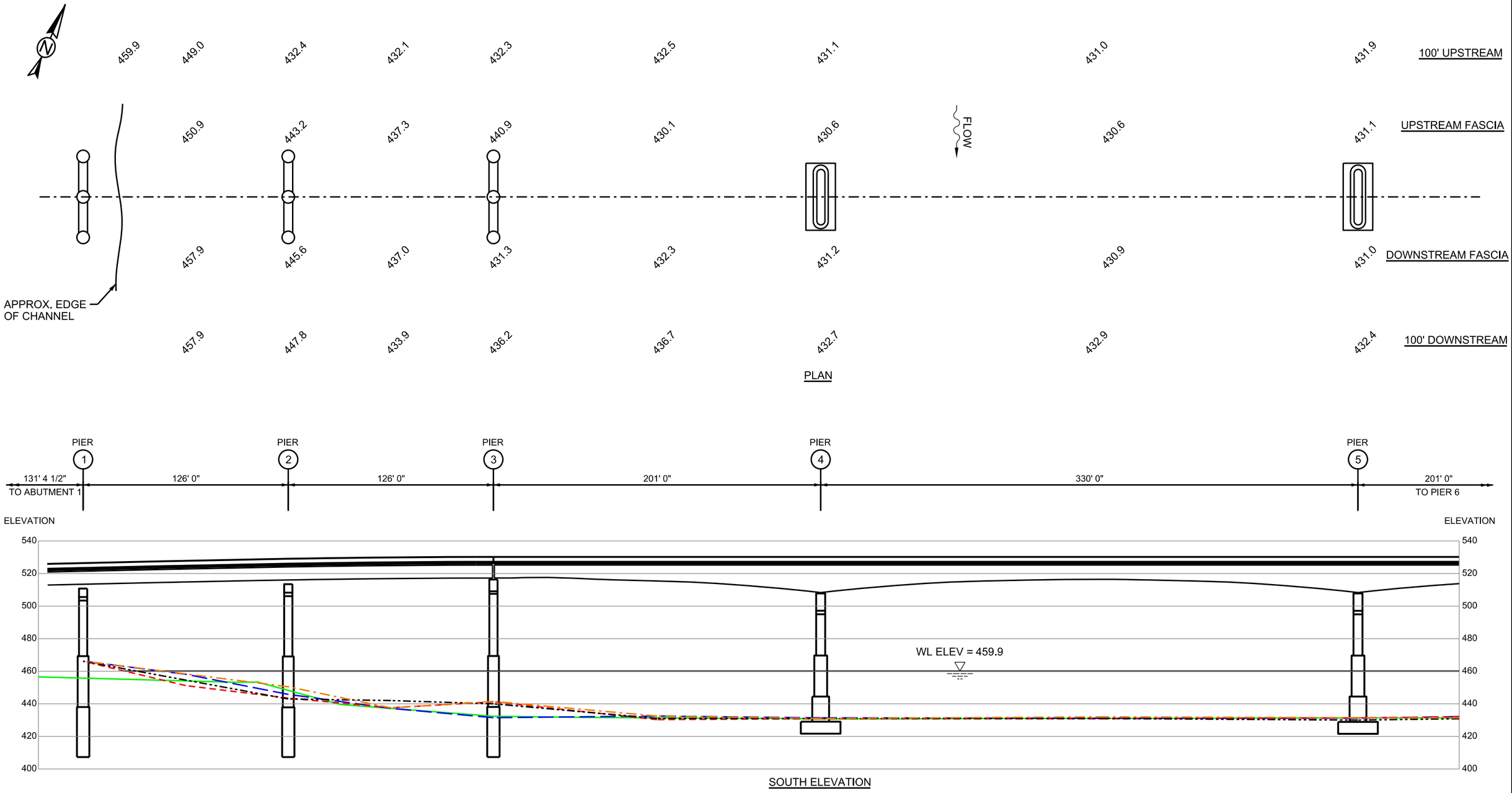


Photo 12 – Pier 4, typical cracking

Photo 13 – Pier 5, typical crack with efflorescence



SOUTH ELEVATION

CHANNEL PROFILE LEGEND	
ORIGINAL	
2015 - DOWNSTREAM FASCIA	
2015 - UPSTREAM FASCIA	
2020 - DOWNSTREAM FASCIA	
2020 - UPSTREAM FASCIA	

GENERAL NOTES:

1. THE WATERLINE AT THE TIME OF THE INSPECTION ON JULY 19, 2020, WAS 9.4-FT BELOW THE DRILLED SHAFT AT PIER 2. THIS CORRESPONDS TO A WATERLINE ELEVATION OF 459.9 BASED ON THE AVAILABLE PLANS.

GRAPHIC SCALE MEASURED IN FEET

0 60 120

1" = 60'

DATE

JULY, 2020

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

I-40 OVER ARKANSAS RIVER
BRIDGE NO. 17051

ELEVATIONS

PAGE
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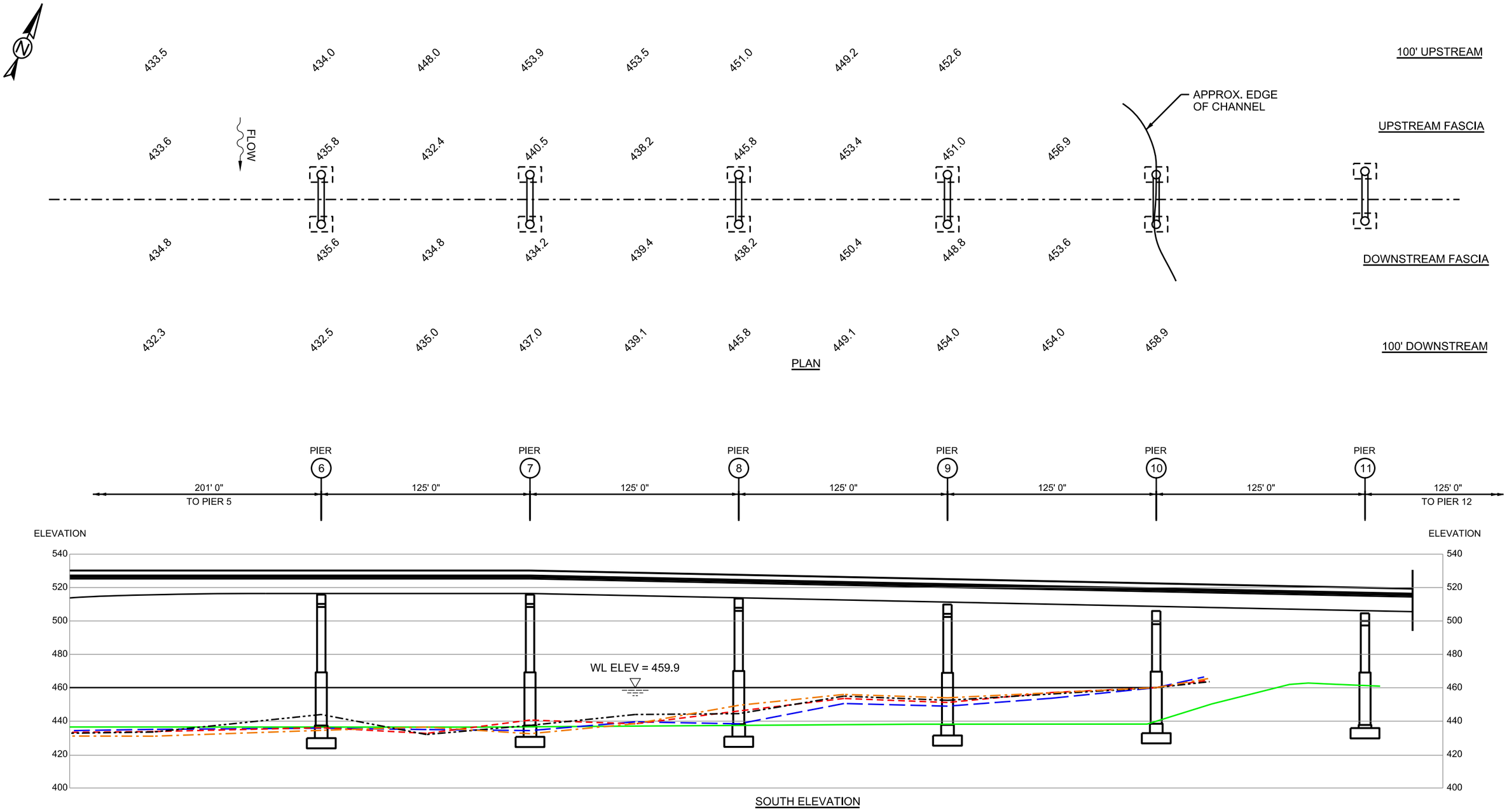
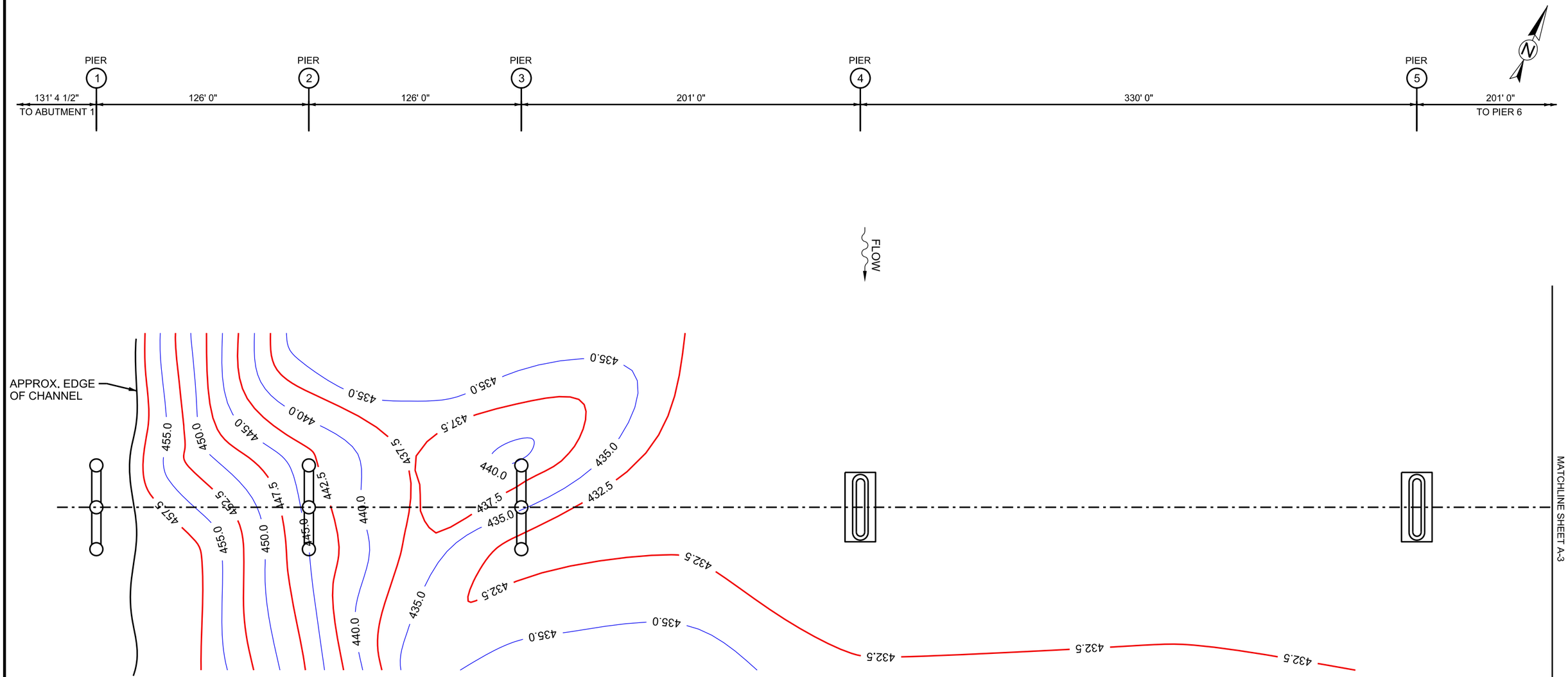


CHANNEL PROFILE LEGEND	
ORIGINAL	
2015 - DOWNSTREAM FASCIA	
2015 - UPSTREAM FASCIA	
2020 - DOWNSTREAM FASCIA	
2020 - UPSTREAM FASCIA	

GENERAL NOTES:

1. THE WATERLINE AT THE TIME OF THE INSPECTION ON JULY 19, 2020, WAS 9.4-FT BELOW THE DRILLED SHAFT AT PIER 2. THIS CORRESPONDS TO A WATERLINE ELEVATION OF 459.9 BASED ON THE AVAILABLE PLANS.

GRAPHIC SCALE MEASURED IN FEET	DATE		
0 60 120 1" = 60'	JULY, 2020	609 S. Kelly Avenue Suite J-1 Edmond, OK 73003 PH.: 405.285.2560 CONSOR	I-40 OVER ARKANSAS RIVER BRIDGE NO. 17051 ELEVATIONS PAGE A-2



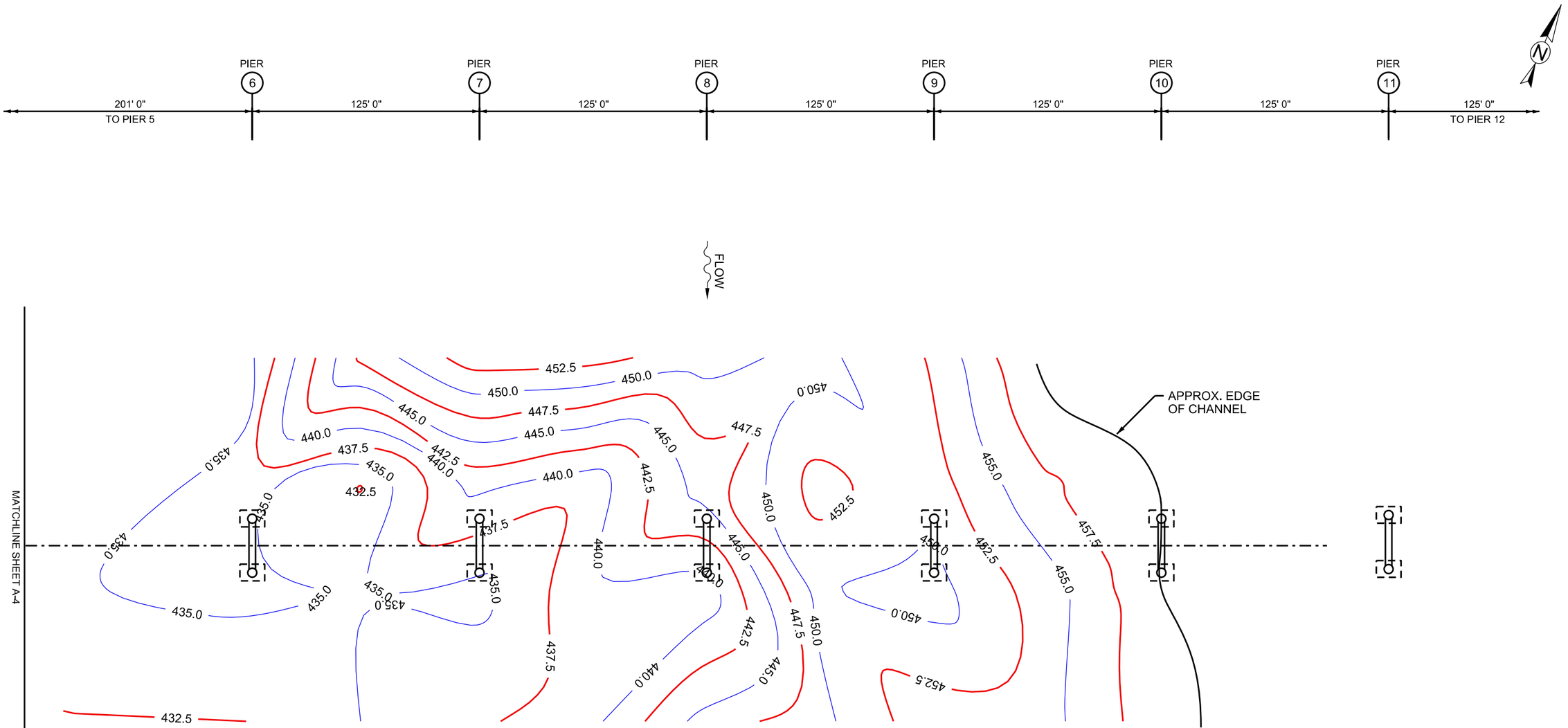
GENERAL NOTES:

1. THE WATERLINE AT THE TIME OF THE INSPECTION ON JULY 19, 2020, WAS 9.4-FT BELOW THE DRILLED SHAFT AT PIER 2. THIS CORRESPONDS TO A WATERLINE ELEVATION OF 459.9 BASED ON THE AVAILABLE PLANS.

LEGEND:

XXX.X SOUNDING MEASUREMENT

GRAPHIC SCALE MEASURED IN FEET 0 60 120 1" = 60'	DATE JULY, 2020	609 S. Kelly Avenue Suite J-1 Edmond, OK 73003 PH.: 405.285.2560 CONSOR	I-40 OVER ARKANSAS RIVER BRIDGE NO. 17051 BATHYMETRIC SURVEY PAGE A-3



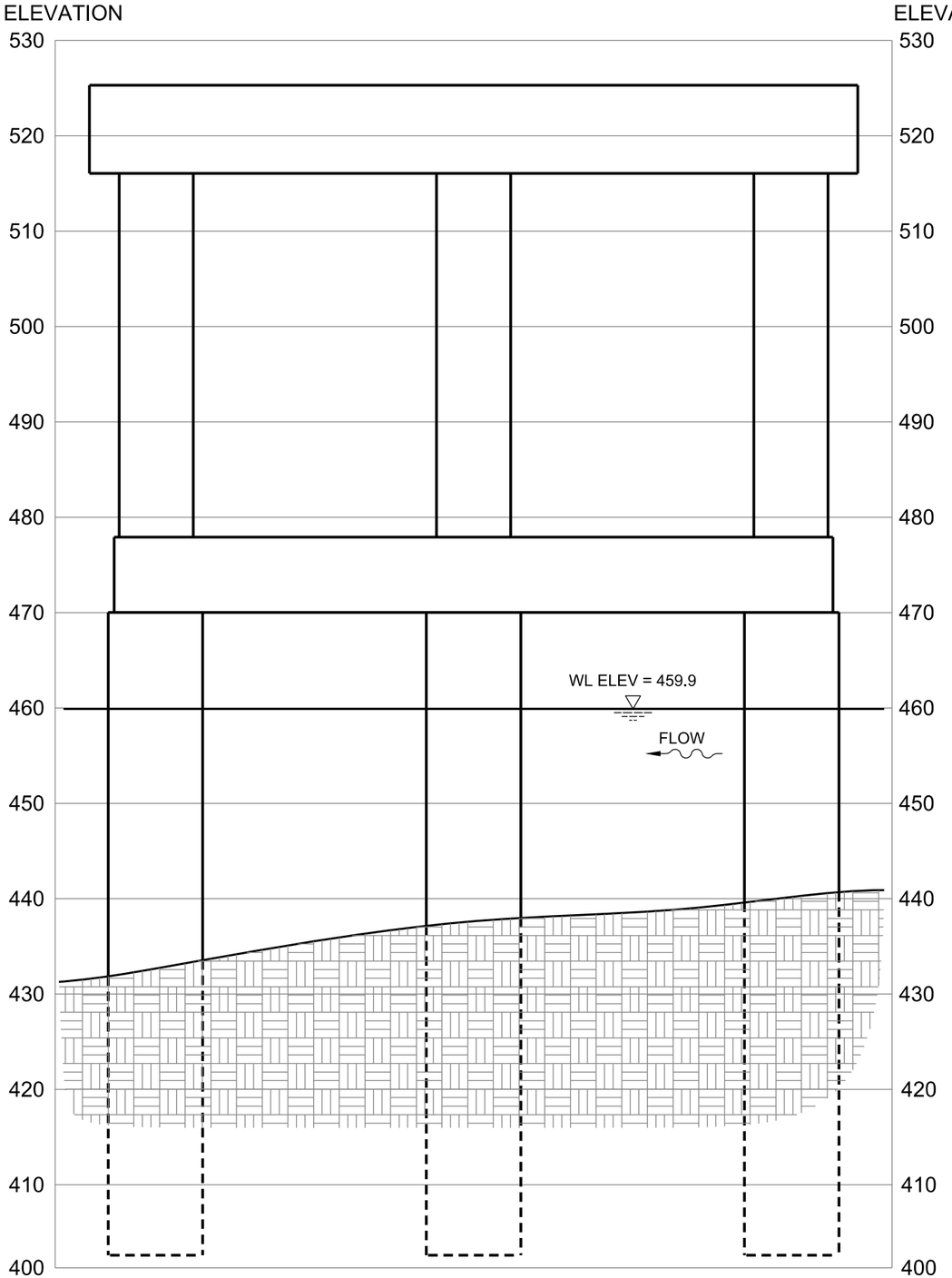
GENERAL NOTES:

1. THE WATERLINE AT THE TIME OF THE INSPECTION ON JULY 19, 2020, WAS 9.4-FT BELOW THE DRILLED SHAFT AT PIER 2. THIS CORRESPONDS TO A WATERLINE ELEVATION OF 459.9 BASED ON THE AVAILABLE PLANS.

LEGEND:

XXX.X SOUNDING MEASUREMENT

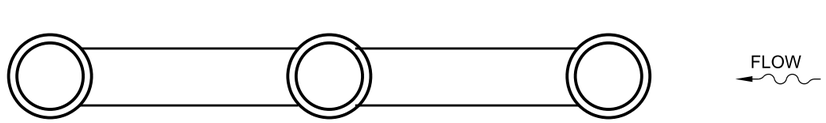
GRAPHIC SCALE MEASURED IN FEET 0 60 120 1" = 60'	DATE JULY, 2020	609 S. Kelly Avenue Suite J-1 Edmond, OK 73003 PH.: 405.285.2560 CONSOR	I-40 OVER ARKANSAS RIVER BRIDGE NO. 17051 BATHYMETRIC SURVEY PAGE A-4



EAST ELEVATION

INSPECTION NOTES:

GN THE STEEL ENCASMENTS AT PIERS 2 AND 3 HAVE MINOR PITTING TYPICALLY 1/16-IN DEEP WITH RANDOM AREAS UP TO 1/8-IN DEEP.



PLAN

GRAPHIC SCALE MEASURED IN FEET

0 15 30

1" = 15'

DATE

JUL, 2020

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

I-40 OVER ARKANSAS RIVER
BRIDGE NO. 17051

PIER 3 PLAN & ELEVATION

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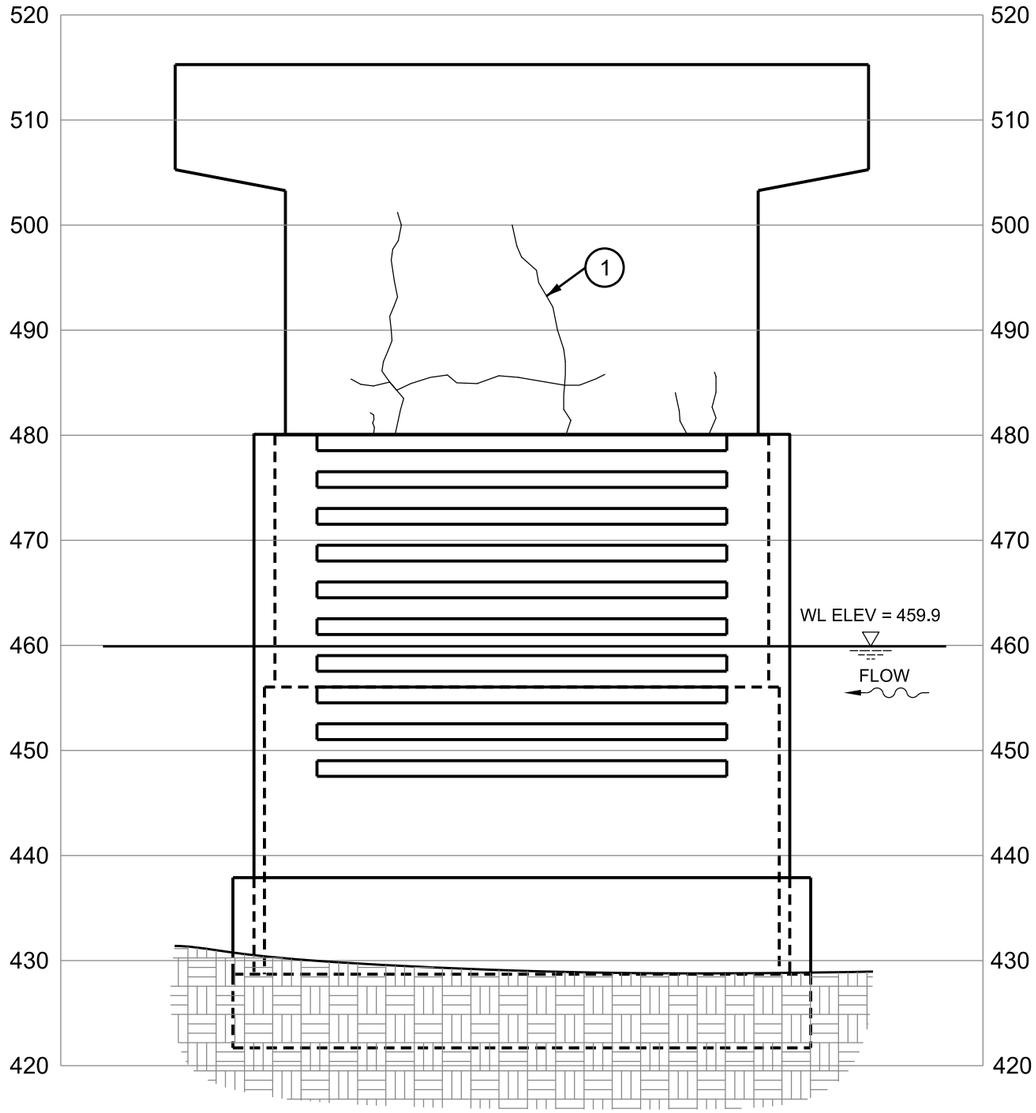
ELEVATION



EAST ELEVATION

ELEVATION

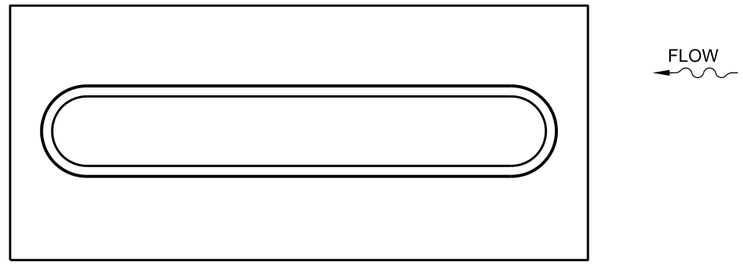
INSPECTION NOTES:

GN THE ENCASEMENT REPAIR IS IN SATISFACTORY CONDITION.

GN THERE ARE ISOLATED AREAS OF RUST STAINING.

GN THE ENCASEMENT IS EXPOSED UP TO 10-FT HIGH AND IS IRREGULAR WITH AREAS OF VOIDING.

1 THERE ARE NUMEROUS VERTICAL AND HORIZONTAL CRACKS WITH EFFLORESCENCE STARTING AT THE WATERLINE AND EXTEND TO THE TOP OF THE ENCASEMENTS.



PLAN

GRAPHIC SCALE MEASURED IN FEET

0 15 30

1" = 15'

DATE

JUL, 2020

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

I-40 OVER ARKANSAS RIVER
BRIDGE NO. 17051

PIER 4 PLAN & ELEVATION

PAGE
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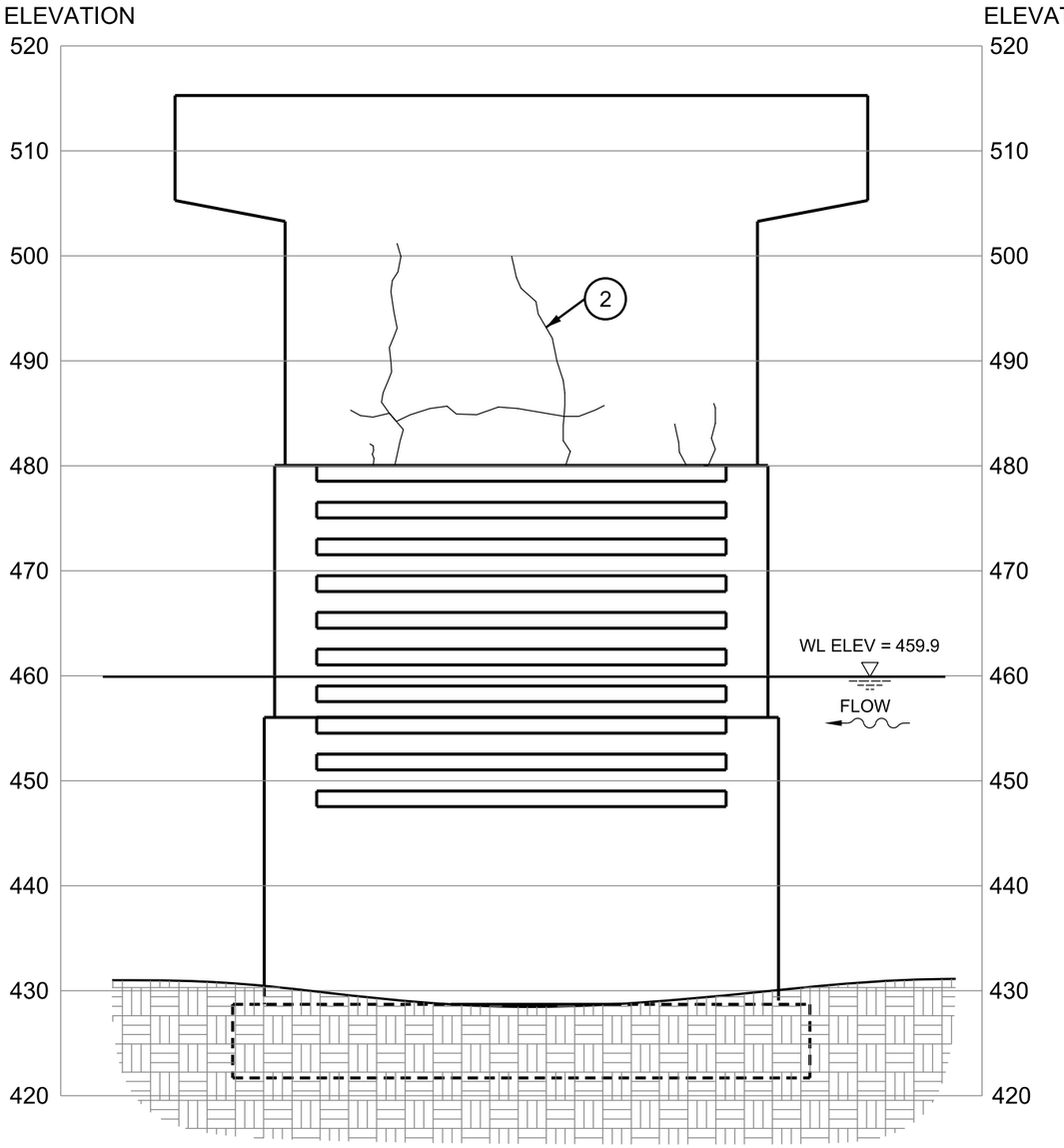
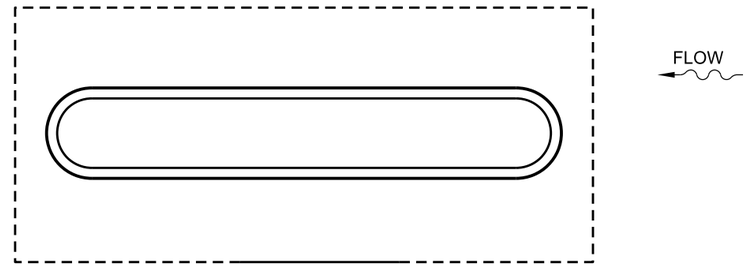


WEST ELEVATION

INSPECTION NOTES:

GN THE PIER 5 FOOTING IS EXPOSED UP TO 4"H x 4'L ON THE WEST FACE.

2 PIER 5 HAS HAIRLINE VERTICAL CRACKS THAT START AT THE WATERLINE EXTENDING UP WITH SOME LIGHT EFFLORESCENCE.



PLAN

GRAPHIC SCALE MEASURED IN FEET

0 15 30

1" = 15'

DATE

JUL, 2020

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

I-40 OVER ARKANSAS RIVER
BRIDGE NO. 17051

PIER 5 PLAN & ELEVATION

PAGE
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Oklahoma Dept. of Transportation

Underwater Bridge Inspection Report

NBI No.: **17051** Structure No.: **6822 0000 X** Local No.: **-1**

Description 3-125ft. P/S CONCRETE GIRDERS, 3-CONT. PLATE GIRDER SPANS (200ft.-330ft.-200), 4-125ft., 3-125ft. CONT. PLATE GIRDER SPANS

Facility Carried :	I-40	No. of Main Spans	10	UW Insp Done	Yes
Feature Intersecte	ARKANSAS RIVER	No. of Appr. Spans	3	UW Freq. :	60
Location :	SEQUOYAH-MUSKOGEE CO	Year Built :	1967	UW Next Date	07/19/2025
County :	SEQUOYAH	Year Reconst. :	1983	UW Last Insp.	07/19/2020
Temperature :	95	Structure Length :	1,989.0		
Weather :	Clear	Custodian :	State		
Substr. Cond. (U/W	Satisfactory Condition	Owner :	State		
Scour Critical (i113	8 Stable Above Footing				

General Inspection Notes

Routine Notes:
PX-Reconnect metal bridge railing at two adjacent locations over pier 12 and replace the missing railing posts near midspan of span 13 and patch adjacent spalled concrete. PX-Patch spalls with exposed reinforcement in the bridge rail. PX-Patch spalls in driving surface near pourable control joints as listed in the table in the “Driving Surface” section of the report.PX-Repair cracks in the bearing boxes at the modular joint supports at pier 3. Install shim plates below the bearing blocks to prevent future cracking.PX-Repair the cracked and broken modular support bars and equidistant control bars at piers 6 and 10. Install countermeasures to keep the joint supports in place to prevent further cracking.PX-Repair transverse separation beam at support box 2 of pier 6. PX-Repair/replace the modular joint seals over piers 3 6 and 10 to prevent water from leaking into superstructure.PX-Replace pourable joint seal at the abutments.PX-Replace missing bolts at stringer connections.PX-Drill out end of crack in the stringer diaphragm over floor beam 5 span 6 between stringers 3 and 4.PX-Consider drilling out the ends of the cracks in the lower lateral bracing gusset plates at locations as listed in the “Floor Bracing System” below.PX-Reattach the dampener rod bolts/nuts at missing locations and replace dampener rod where fractured. PX-Consider patching the large spall at pier 6 at the base of the north column.PX-Repair the broken seismic cable anchorages. PX-Reset the elastomeric bearings for girder 1 for span 4 at pier 3 and remove paint from the stainless steel sliding surface of the elastomeric bearings at pier 3. PX-Remove paint from the stainless steel sliding surfaces of the elastomeric bearings at pier 3.PX-Removing the pack rust from below the rocker bearings to allow proper movement of the bearings. FX-Monitor full depth transverse cracking in original portion of the deck for growth and change in density.FX-Monitor sagging middle transverse separation beam of pier 6 joint. FX-Monitor the locations of cracks which have been retrofitted with drilled holes for signs of crack propagation beyond the drilled holes. FX-Monitor lateral bracing gusset plate connections to girder webs at undercuts and flame cuts.FX-Monitor possible crack at the end of the weld for the vertical stiffener under floor beam 7 girder 4 span 6.FX-Monitor crack in poor quality weld between the lower lateral bracing gusset plate and the vertical web stiffener for girder 3 at floor beam 5 span 6 for propagation into the girder base-metal.FX-Monitor lamination and/or undercut at the girder web adjacent to the end of the lower lateral bracing gusset plate weld at girder 4 south face of floor beam 2 span 6.FX-Monitor exposed ends of tendons for corrosion. FX-Monitor crack in the vertical web stiffener of girder 3 at floor beam 2 span 8. FX-Monitor pack rust between stringer top flanges floor beam top flanges and diaphragm top flanges and the deck soffit for growth and possible affects to driving surface.FX-Monitor gouge in floor beam 3 span 6 near girder 2 for cracking.FX-Monitor pack rust between floor beam webs and gusset plateS especially near piers.FX-Monitor the corrosion hole in the lower lateral bracing gusset plate at girder 4 span 6 over pier 6 for growth or deterioration.FX-Monitor the erosion that has developed adjacent to the south end of the east abutment apron.FX-Monitor corrosion to east abutment bearings. FX-Monitor cracking in approach slabs for potholes.FX-Monitor girder webs for signs of distress in locations with gouging. FX-Monitor pack rust between girder vertical web stiffeners and floor beam truss lower chord gusset plates for growth and distortion.FX-Monitor girder bottom flange splice plate for pack rust initiation.FX-Monitor region of painted over pitting that is reactivating on the bottom flange of girder 4 south face at floor beam 6 span 4.

Streambed / Scour Notes

The Pier 5 footing is exposed up to 4"H x 5'L along the west face.
2020 Underwater Channel Notes: The channel in the vicinity of the bridge is straight. The embankments are stable and protected with natural vegetation. The west channel bank at the bridge is protected with small to medium size rock and riprap.
There are no restrictions in the channel. The channel bottom material at the bents/piers consists of gravel and riprap. There is some light timber debris at the piers, however; it is not restricting flow.

2020 Underwater General Notes:The columns are in good condition. The repair at Pier 4 is in satisfactory condition with vertical cracks and light efflorescence. The repair seal is exposed and is irregular with areas of voiding. Pier 5 has minor vertical cracks with random areas of light efflorescence.

Recommendations

There are no repair recommendations as a result of the underwater inspection.

Oklahoma Dept. of Transportation

Underwater Bridge Inspection Report

NBI No.: **17051** Structure No.: **6822 0000 X** Local No.: **-1**

Abutment 1 [ ] Dry, not inspected at this time.

Pier Group this report applies to : [1-15]

	Column-Footing No. 1		Column-Footing No. 2		Column-Footing No. 3		Column-Footing No. 4		Common Footing
Pier 1									
	Dry, not inspected at this time.								
Pier 2	1		1		1				
	Encasements have minor pitting up to 1/16-in deep with random areas up to 1/8-in deep. Steel encasement terminates 10-ft above the channel bottom. The concrete is irregular below the steel encasements. Light timber debris present.								
Pier 3	1		1		1				
	The steel encasements have minor pitting typically 1/16-in deep with random area up to 1/8-in deep. The steel encasements terminate 10-ft above the channel bottom.								
Pier 4	2								
	The pier repair has vertical and horizontal cracks with efflorescence from the waterline extending up to the cap. The repair seal is exposed and in fair condition.								
Pier 5	2	1							
	Hairline vertical cracks extend from the waterline up with some light efflorescence. The footing is exposed up to 4”H x 4’L on the south face.								
Pier 6	1		1						
	No significant defects noted.								
Pier 7	1		1						
	No significant defects noted.								
Pier 8	1		1						
	No significant defects noted.								
Pier 9	1		1						
	No significant defects noted.								
Pier 10									
	Dry, not inspected at this time.								
Pier 11									
	Dry, not inspected at this time.								
Pier 12									
	Dry, not inspected at this time.								
Pier 13									
Pier 14									
Pier 15									

Abutment 2 [ ] Dry, not inspected at this time.