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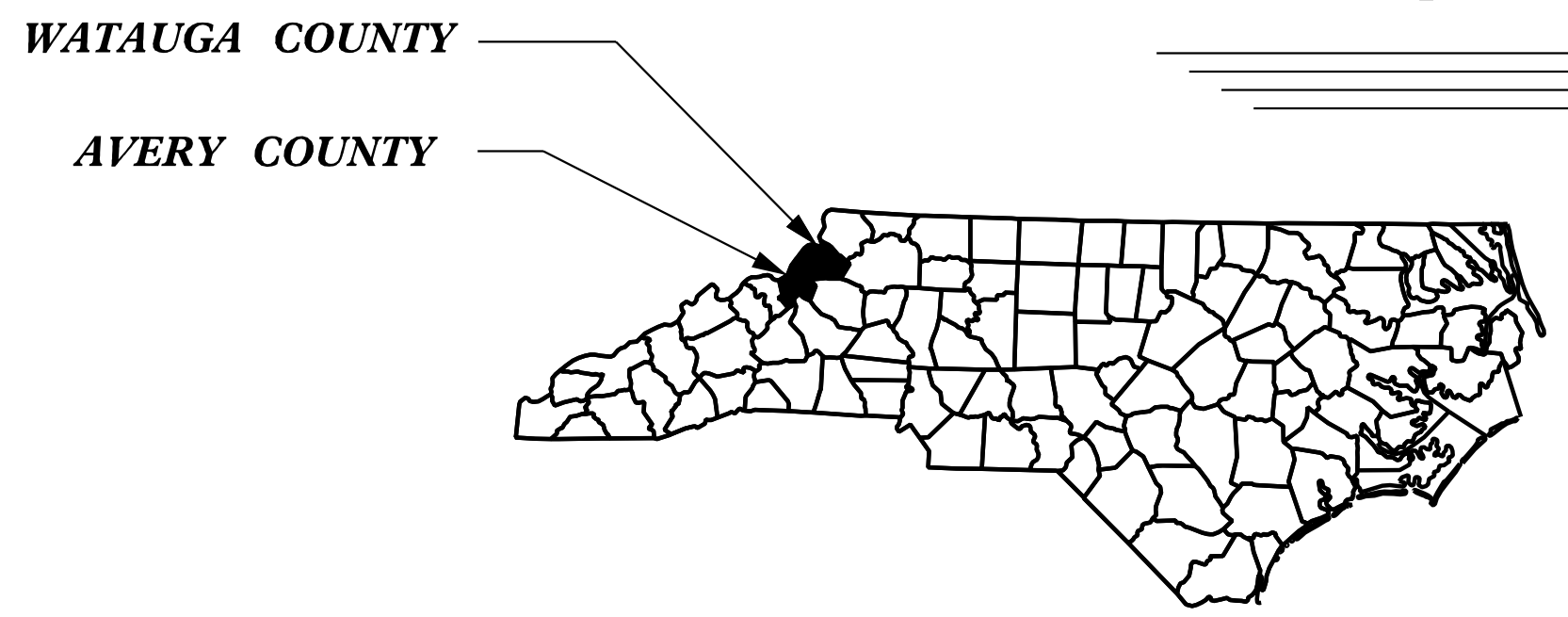
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TIP PROJECT: 15BPR.32
CONTRACT: C204235

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

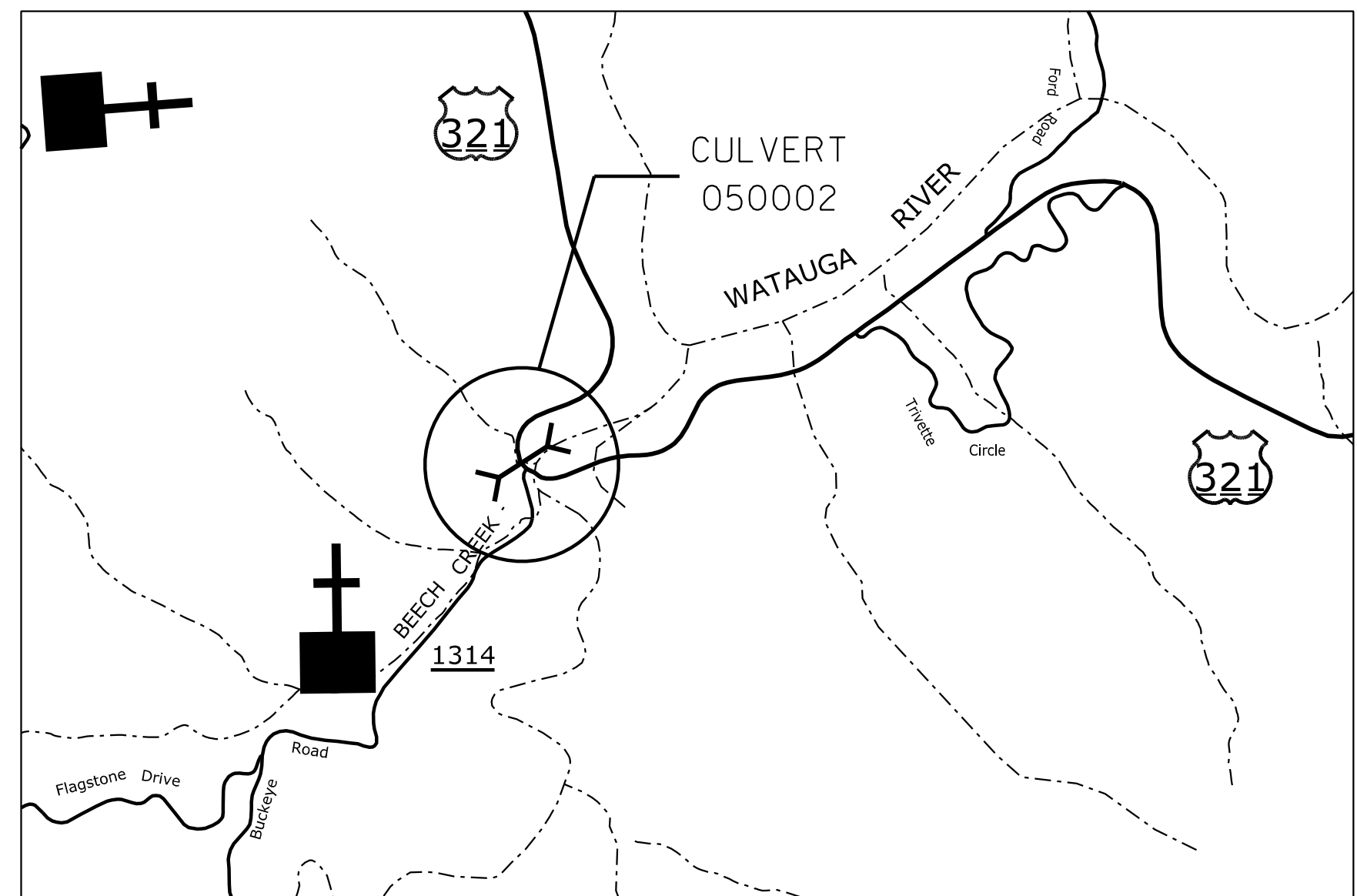
AVERY & WATAUGA COUNTY

STATE	STATE PROJECT REFERENCE NO.	TOTAL SHEETS
N.C.	15BPR.32	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
15BPR.32	-	P.E.
15BPR.32	-	CONSTR.

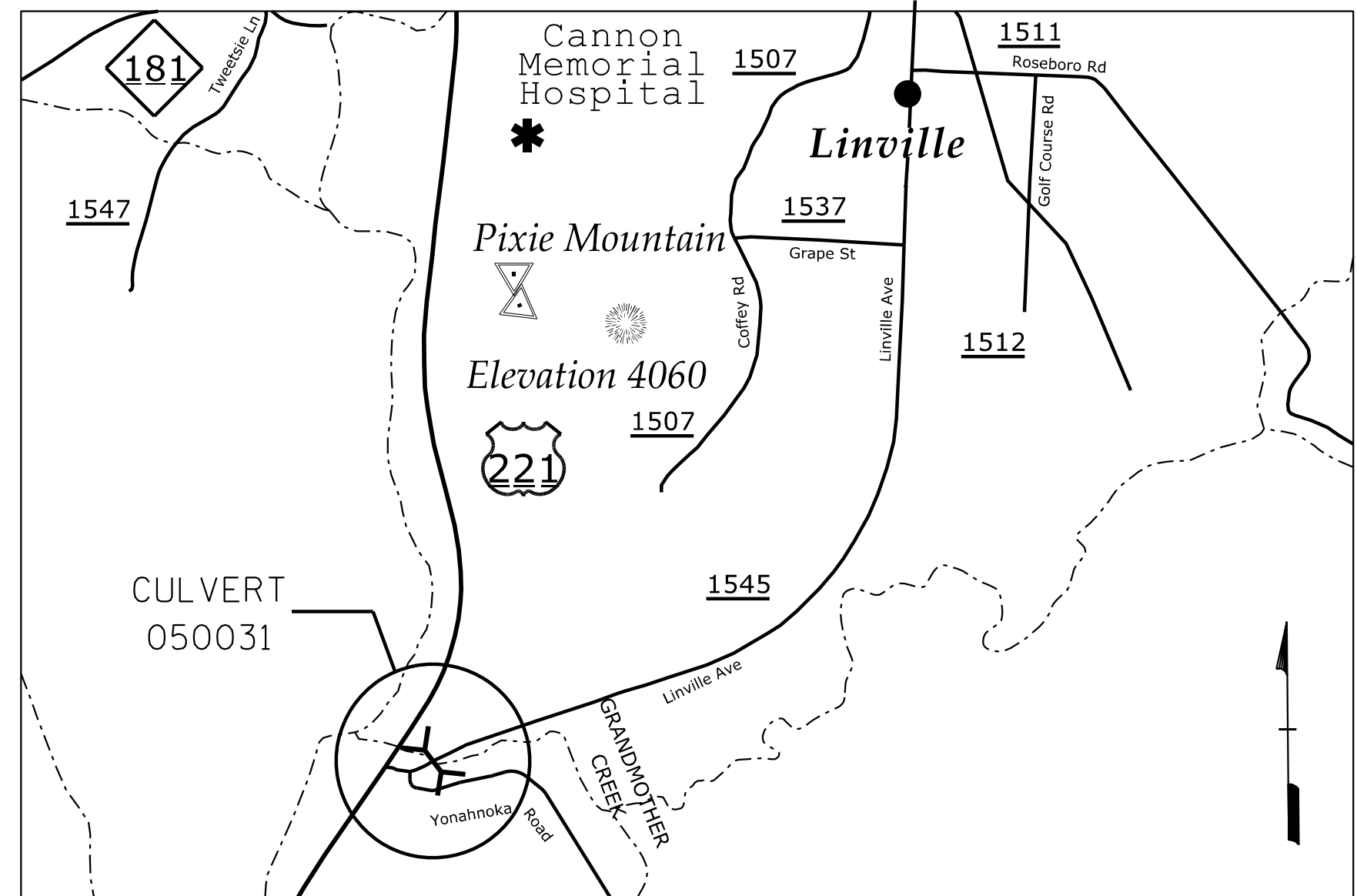


LOCATION: AVERY & WATAUGA COUNTY
AVERY COUNTY CULVERT #02 UNDER US 321 OVER BEECH CREEK
AVERY COUNTY CULVERT #31 UNDER SR 1545 (LINVILLE AVE) OVER GRANDMOTHER CREEK
WATAUGA COUNTY CULVERT #66 UNDER US 321 OVER LAUREL CREEK

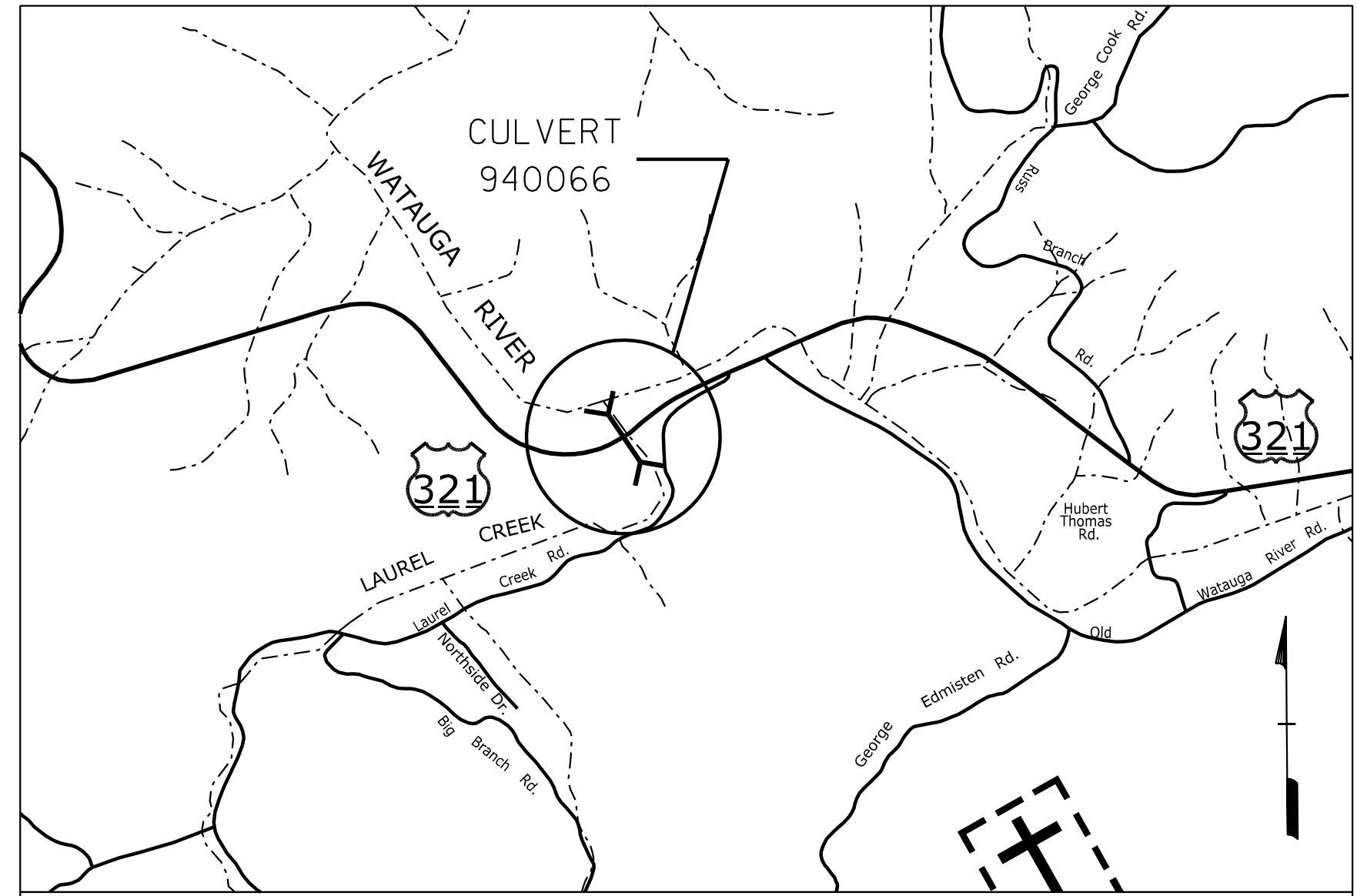
TYPE OF WORK: CULVERT PRESERVATION - SHOTCRETE REPAIR, CONCRETE REPAIR, & EPOXY RESIN INJECTION.



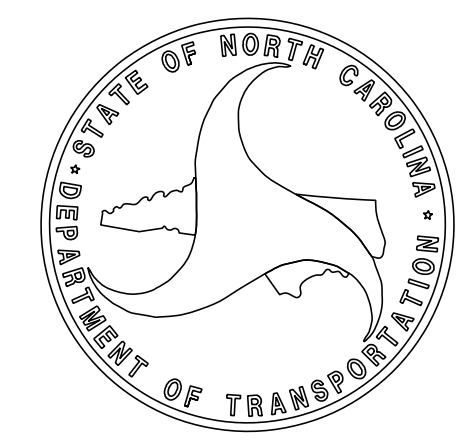
LOCATION SKETCH
 AVERY CULVERT 050002
 LAT 36°15'42.44" / LONG 81°53'49.55"
 SHEETS S-2 THROUGH S-7



LOCATION SKETCH
 AVERY CULVERT 050031
 LAT 36°03'12.61" / LONG 81°52'50.55"
 SHEETS S-8 THROUGH S-15



LOCATION SKETCH
 WATAUGA CULVERT 940066
 LAT 36°15'11.99" / LONG 81°51'12.97"
 SHEETS S-16 THROUGH S-22



DESIGN DATA

AVERY COUNTY		
- #02 ADT 2015	=	1400
- #31 ADT 2012	=	1100
WATAUGA COUNTY		
- #66 ADT	=	2700

PROJECT LENGTH

AVERY COUNTY	
- #02	= 0.014 MI
- #31	= 0.012 MI
WATAUGA COUNTY	
- #66	= 0.006 MI



TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION
 2018 STANDARD SPECIFICATIONS

LETTING DATE:
JANUARY 15, 2019

1223 Jones Franklin Rd.
 Raleigh, N.C. 27606
 License No. F-0377
 Bus: 919 851 8077
 Fax: 919 851 8107

TOM KOCH, P.E.
 PROJECT ENGINEER

ALEX KLINK, E.I.
 PROJECT DESIGN ENGINEER

GENERAL NOTES:

1. INFORMATION INDICATED ON THE LOCATION SKETCH SHALL BE CONSIDERED GENERAL INFORMATION ONLY. CONTRACTOR SHALL CONFIRM, THROUGH OTHER SOURCES, SPECIFIC INFORMATION REGARDING THE BRIDGES, ROADWAYS, UTILITIES, THE SURROUNDING AREA, AND ANY OTHER ASPECTS THAT MAY BE NECESSARY TO PERFORM AND COMPLETE THE PROJECT.
2. REPAIR LOCATIONS AND ESTIMATE OF QUANTITIES ARE GIVEN WITH THE BEST INFORMATION AVAILABLE. IF ADDITIONAL REPAIRS NOT SHOWN ON THE DRAWINGS ARE DEEMED NECESSARY BY THE ENGINEER, THE ENGINEER SHALL NOTE ON THE DRAWINGS THE APPROXIMATE LOCATION AND DESCRIPTION OF THE REPAIRS AND ADJUST THE ACTUAL QUANTITIES ENTERED INTO THE REPAIR QUANTITY TABLE.
3. EXISTING DIMENSIONS AND CULVERT CONDITION ARE FROM THE BEST INFORMATION AVAILABLE. THE CONTRACTOR SHALL FIELD VERIFY THE INFORMATION SHOWN ON THE PLANS AND NOTIFY THE ENGINEER IF ACTUAL DIMENSIONS AND CONDITIONS DIFFER.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FOLLOW ALL STATE AND FEDERAL SAFETY REQUIREMENTS.
5. FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
6. FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
7. FOR EPOXY RESIN INJECTION, SEE SPECIAL PROVISIONS.
8. FOR SHOTCRETE REPAIRS, SEE SPECIAL PROVISIONS.
9. FOR CONCRETE REPAIRS, SEE SPECIAL PROVISIONS.
10. FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
11. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
12. WORK ON CULVERT SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL SUBMIT PLANS FOR CONSTRUCTION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.
13. PRIOR TO BEGINNING WORK, CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL A COMPLETE SEQUENCE OF TASKS FOR EACH OPERATION AFFECTING THE ROADWAY SURFACE AND/OR TRAFFIC.
14. ANY DAMAGE TO EXISTING REINFORCING STEEL, DURING CONTRACTOR'S OPERATIONS, SHALL BE REPAIRED AS DIRECTED BY THE ENGINEER AND PERFORMED AT NO ADDITIONAL COST.
15. THERE IS A BROWN TROUT MORATORIUM AT GRANDMOTHER CREEK. IN-STREAM WORK WILL NOT BE PERMITTED BETWEEN THE DATES OF OCTOBER 15TH AND APRIL 15TH.

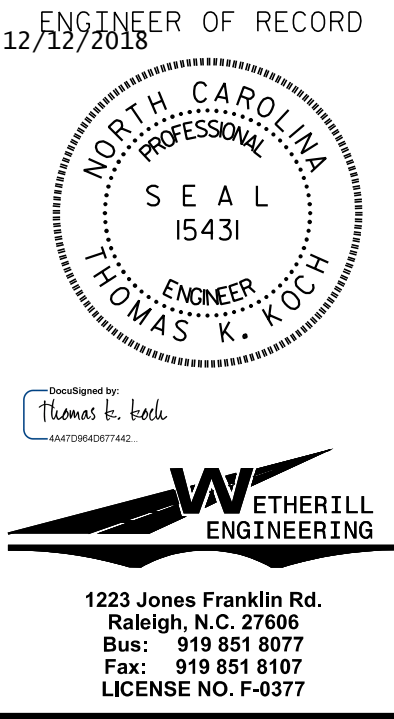
15. THERE IS A BROWN TROUT MORATORIUM AT GRANDMOTHER CREEK. IN-STREAM WORK WILL NOT BE PERMITTED BETWEEN THE DATES OF OCTOBER 15TH AND APRIL 15TH.

TOTAL BILL OF MATERIAL			
CULVERT NO. 050031	SHOTCRETE REPAIRS	CONCRETE REPAIRS	EPOXY RESIN INJECTION
	CU. FT.	CU. FT.	LIN. FT.
TOTALS	107.3	0.0	462.0



LOCATION SKETCH

PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050031
 SHEET 2 OF 8



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
GENERAL NOTES 28' x 14' REINFORCED CONCRETE ARCH CULVERT ON SR 1541 (LINVILLE AVE) OVER GRANDMOTHER CREEK					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					TOTAL SHEETS 23

DOCUMENT NOT CONSIDERED FINAL
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DRAWN BY : A. KLINK DATE : 07/18
 CHECKED BY : T. KOCH DATE : 08/18

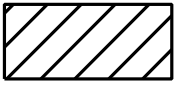
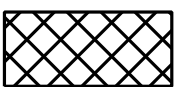
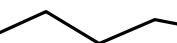
1223 Jones Franklin Rd.
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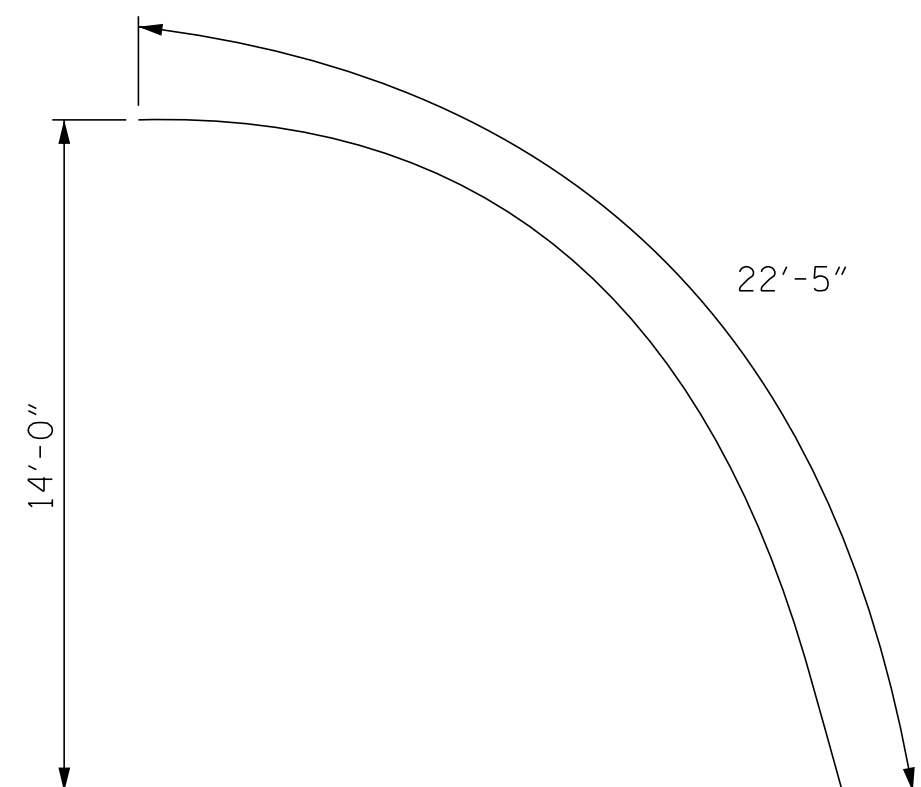
NOTES

- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
- REPAIR LOCATIONS AND ESTIMATE OF QUANTITIES ARE BASED ON THE BEST INFORMATION AVAILABLE. IF ADDITIONAL REPAIRS NOT SHOWN ON THE DRAWINGS ARE DEEMED NECESSARY BY THE ENGINEER, THE ENGINEER WILL NOTE ON THE DRAWINGS THE APPROXIMATE LOCATION AND DESCRIPTION OF THE REPAIRS AND ENTER THE ACTUAL QUANTITIES INTO THE AS-BUILT REPAIR QUANTITY TABLE.
- CONCRETE REPAIRS MAY BE SUBSTITUTED IN LIEU OF SHOTCRETE REPAIRS WITH THE APPROVAL OF THE ENGINEER.
- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

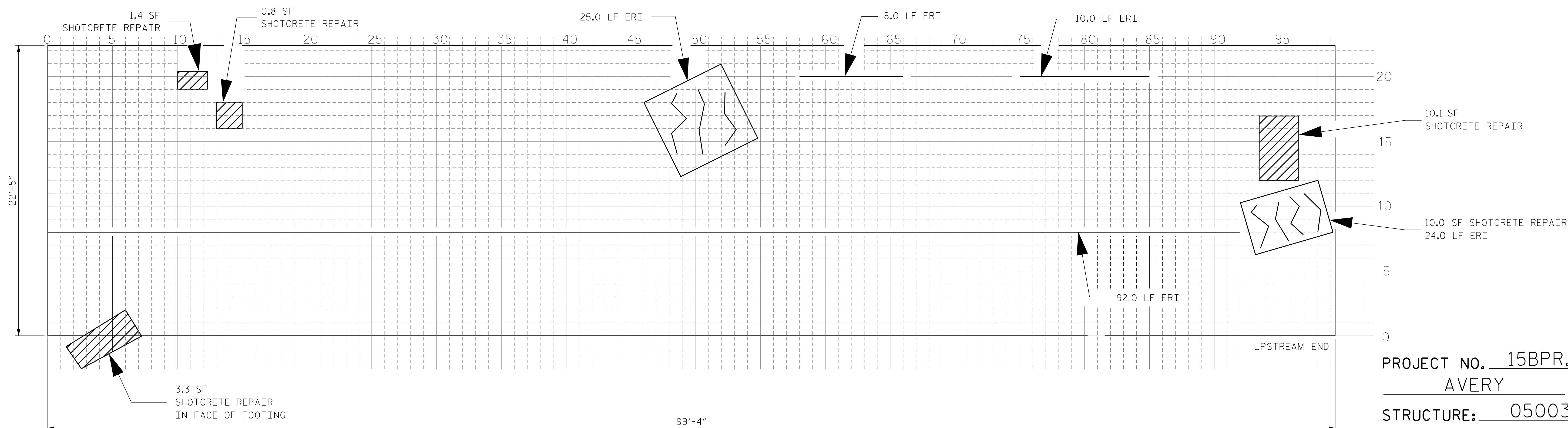
AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
BARREL NORTH WALL	25.6	12.8		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
BARREL NORTH WALL	0.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
BARREL NORTH WALL	159.0			

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



UNWRAPPED ARCH WALL DETAIL



NORTH WALL


PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050031
 SHEET 3 OF 8

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 CHECKED BY : T. KOCH DATE : 08/18

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12/12/2018
 ENGINEER OF RECORD

 THOMAS K. KOCH
 ENGINEER
 15431
 Prepared by:
 Thomas K. Koch

 WETHERILL
 ENGINEERING
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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 BARREL NORTH WALL



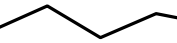
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2			4			23

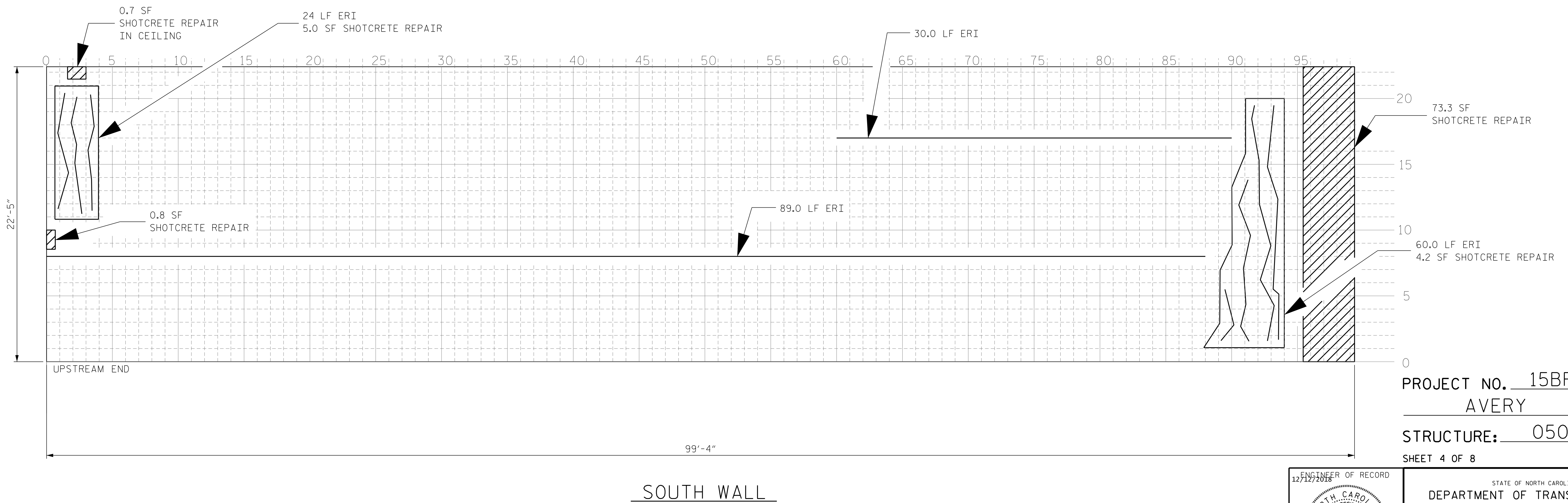
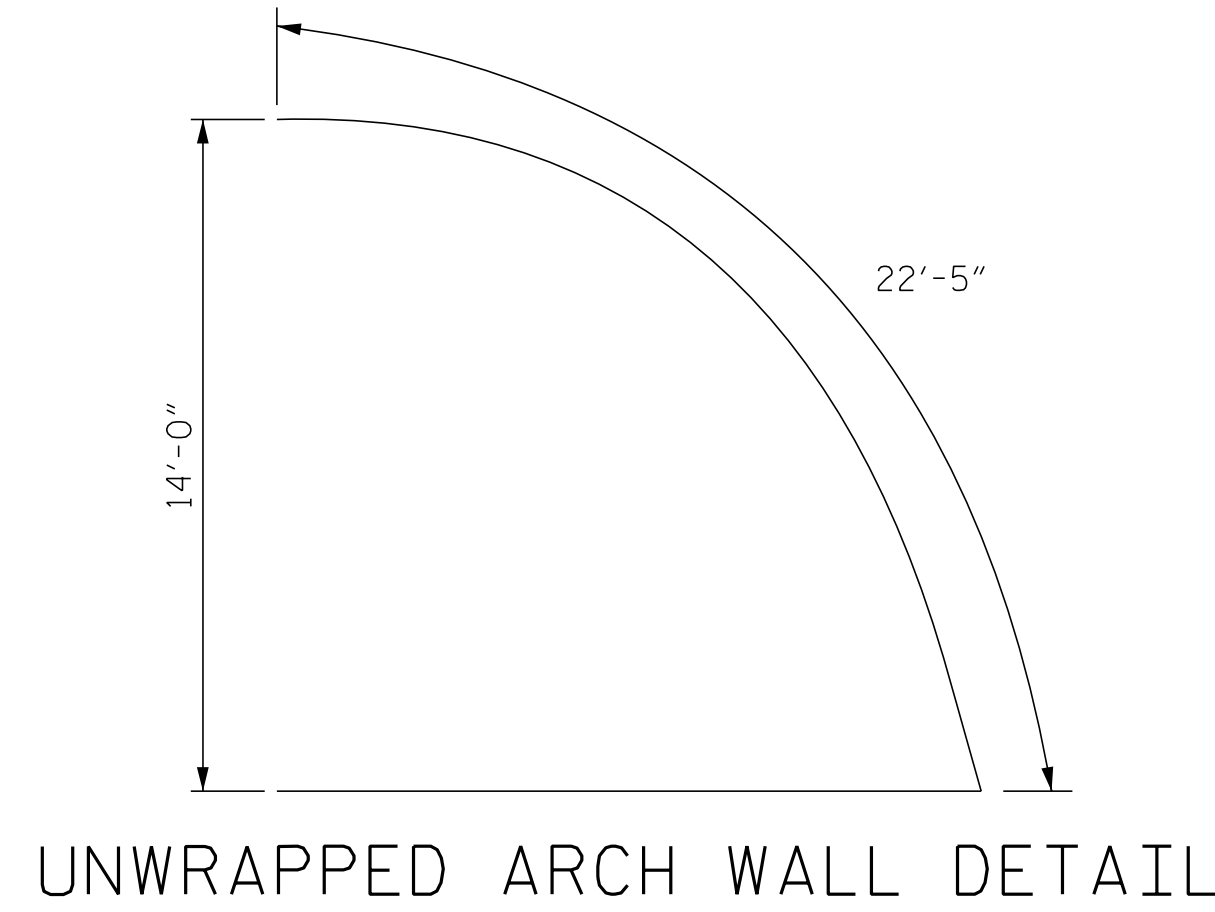
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- CONCRETE REPAIRS MAY BE SUBSTITUTED IN LIEU OF SHOTCRETE REPAIRS WITH THE APPROVAL OF THE ENGINEER.
- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
BARREL SOUTH WALL	84.0	42.0		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
BARREL SOUTH WALL	0.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
BARREL SOUTH WALL	203.0			

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)

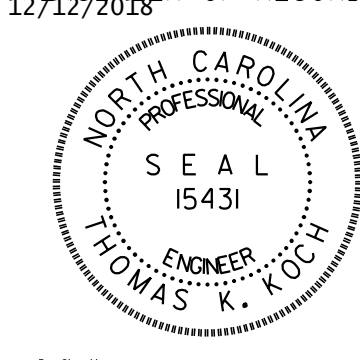



PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050031
 SHEET 4 OF 8

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ENGINEER OF RECORD
 12/12/2018

 Thomas K. Koch
 ENGINEER
 15431

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 LICENSE NO. F-0377

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

BARREL SOUTH WALL

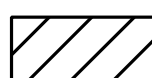

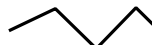
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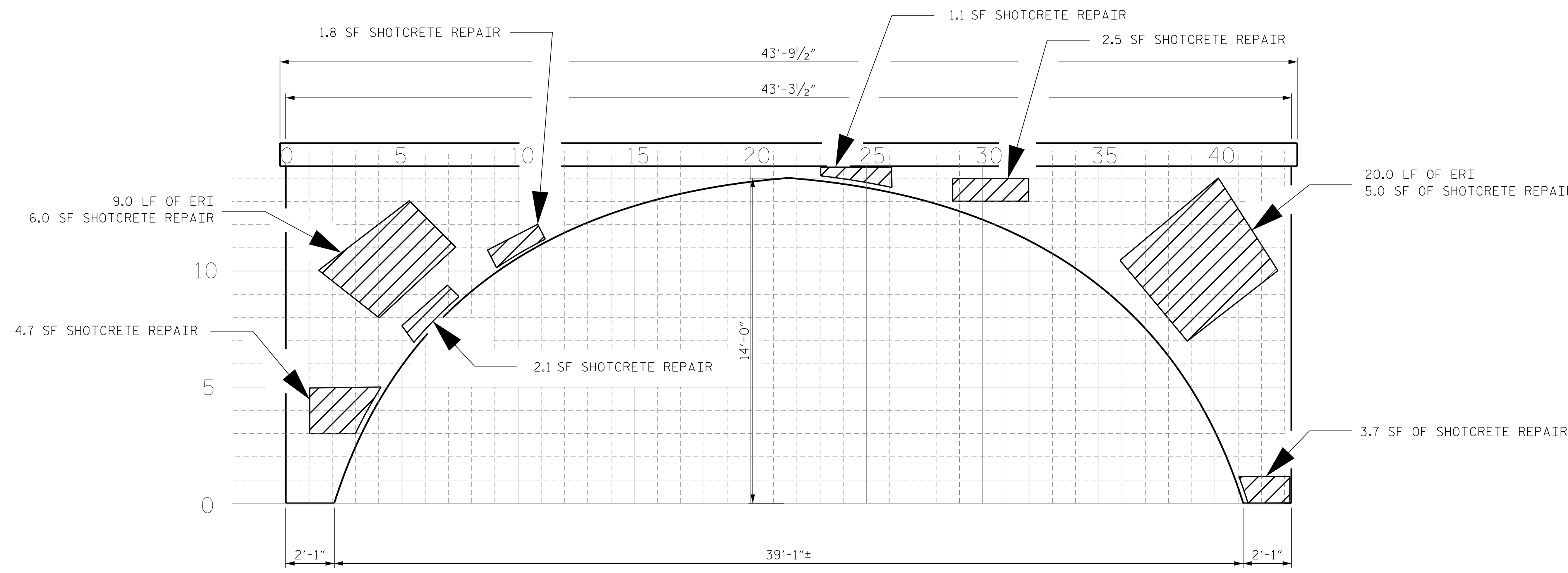
AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
DOWNSTREAM FACE	26.9	13.5		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
DOWNSTREAM FACE	0.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
DOWNSTREAM FACE	29.0			

NOTES

- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
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- CONCRETE REPAIRS MAY BE SUBSTITUTED IN LIEU OF SHOTCRETE REPAIRS WITH THE APPROVAL OF THE ENGINEER.
- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



DOWNSTREAM FACE

PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050031

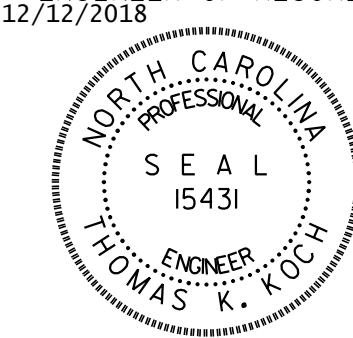
SHEET 5 OF 8

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ENGINEER OF RECORD
 12/12/2018



Developed by
 Thomas K. Koch



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 LICENSE NO. F-0377

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOWNSTREAM HEADWALL




REVISIONS						SHEET NO.
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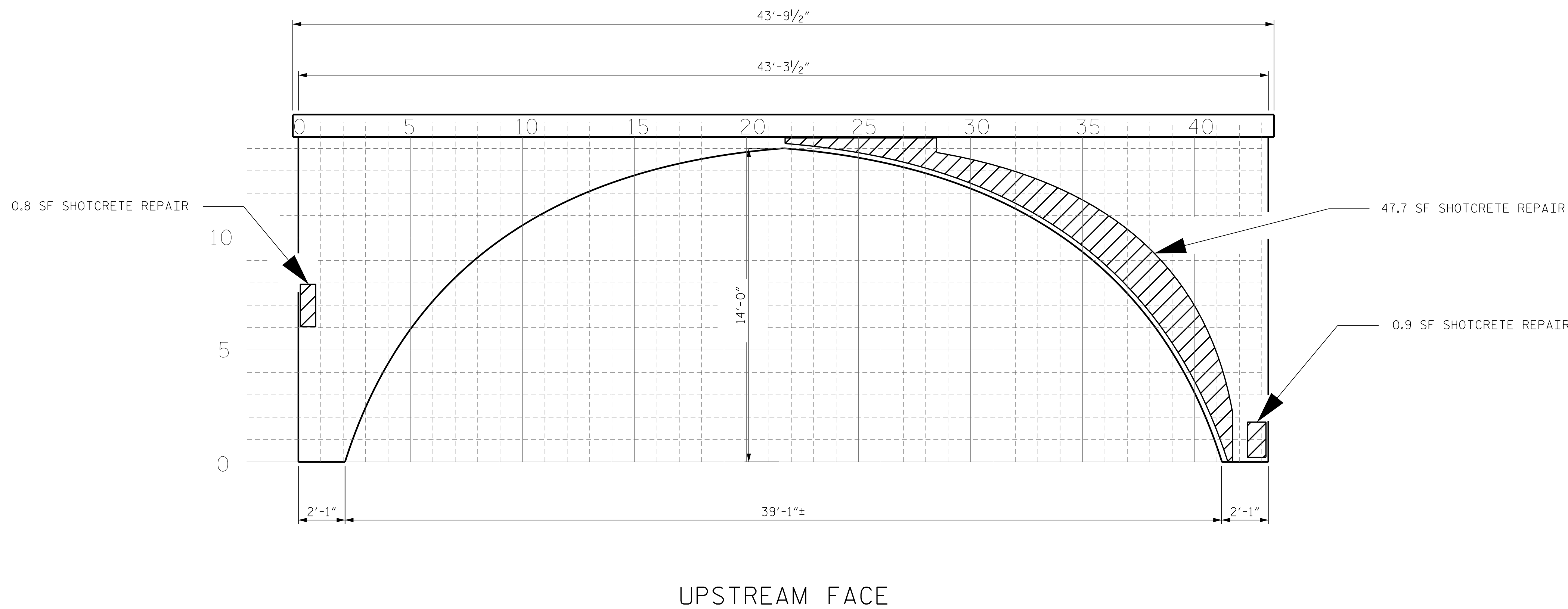
AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
UPSTREAM FACE	49.4	24.7		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
UPSTREAM FACE	0.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
UPSTREAM FACE	0.0			

NOTES

- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
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- CONCRETE REPAIRS MAY BE SUBSTITUTED IN LIEU OF SHOTCRETE REPAIRS WITH THE APPROVAL OF THE ENGINEER.
- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050031

SHEET 6 OF 8

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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

UPSTREAM HEADWALL

REVISIONS




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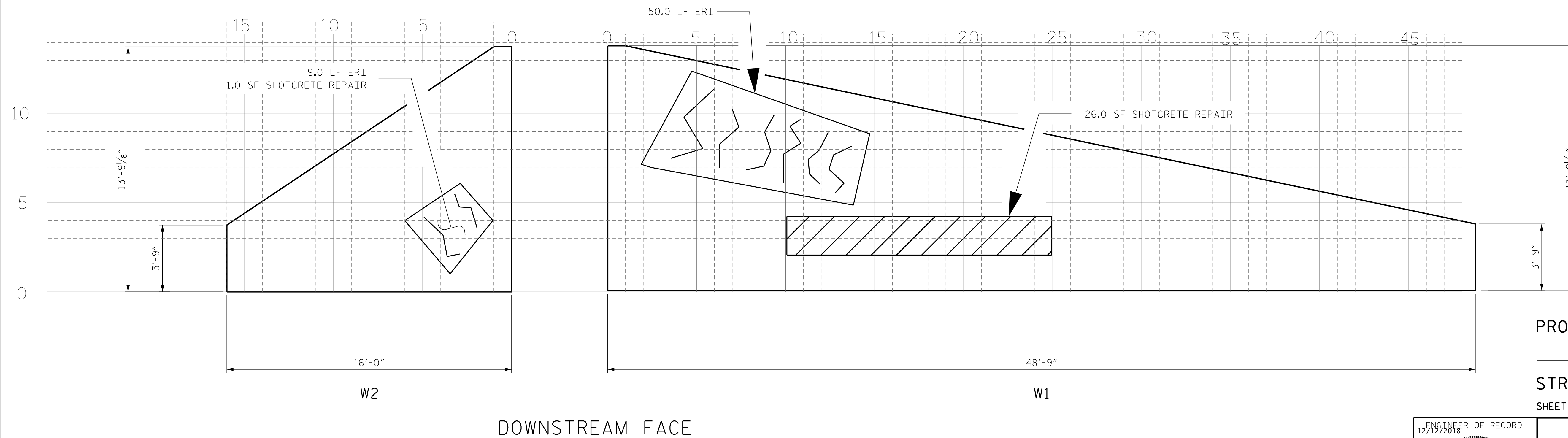
NOTES

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- CONCRETE REPAIRS MAY BE SUBSTITUTED IN LIEU OF SHOTCRETE REPAIRS WITH THE APPROVAL OF THE ENGINEER.
- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
DOWNSTREAM FACE	27.0	13.5		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
DOWNSTREAM FACE	0.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
DOWNSTREAM FACE	59.0			

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)

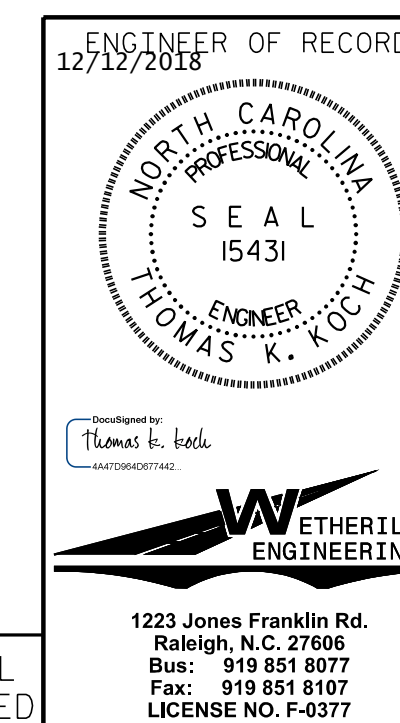


PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050031
 SHEET 7 OF 8

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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOWNSTREAM WING FACES

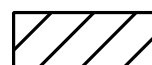

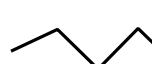
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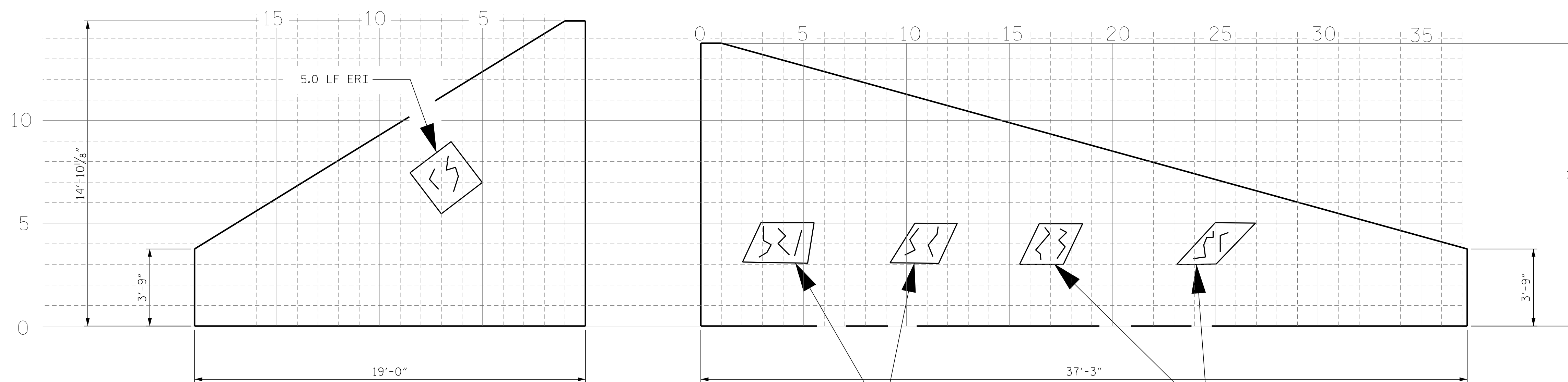
AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
UPSTREAM FACE	1.5	0.8		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
UPSTREAM FACE	0.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
UPSTREAM FACE	12.0			

NOTES

- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET.
- REPAIR LOCATIONS AND ESTIMATE OF QUANTITIES ARE BASED ON THE BEST INFORMATION AVAILABLE. IF ADDITIONAL REPAIRS NOT SHOWN ON THE DRAWINGS ARE DEEMED NECESSARY BY THE ENGINEER, THE ENGINEER WILL NOTE ON THE DRAWINGS THE APPROXIMATE LOCATION AND DESCRIPTION OF THE REPAIRS AND ENTER THE ACTUAL QUANTITIES INTO THE AS-BUILT REPAIR QUANTITY TABLE.
- CONCRETE REPAIRS MAY BE SUBSTITUTED IN LIEU OF SHOTCRETE REPAIRS WITH THE APPROVAL OF THE ENGINEER.
- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

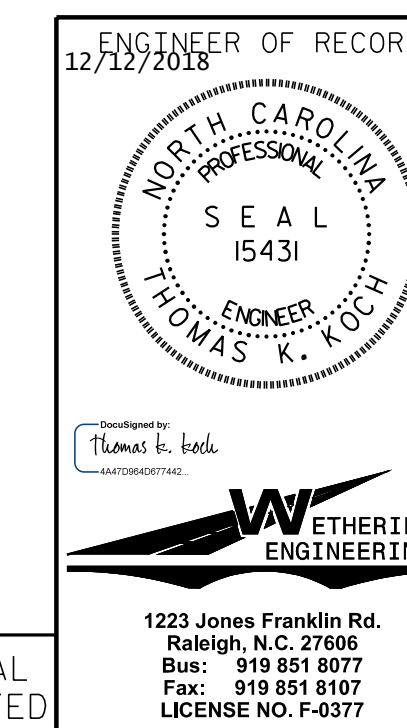
-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



4 AREAS
TOTAL = 12.0 LF ERI
1.5 SF SHOTCRETE REPAIR

PROJECT NO. 15BPR.32
 AVERY COUNTY
STRUCTURE: 050031
SHEET 8 OF 8

UPSTREAM FACE



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

UPSTREAM
WING FACES

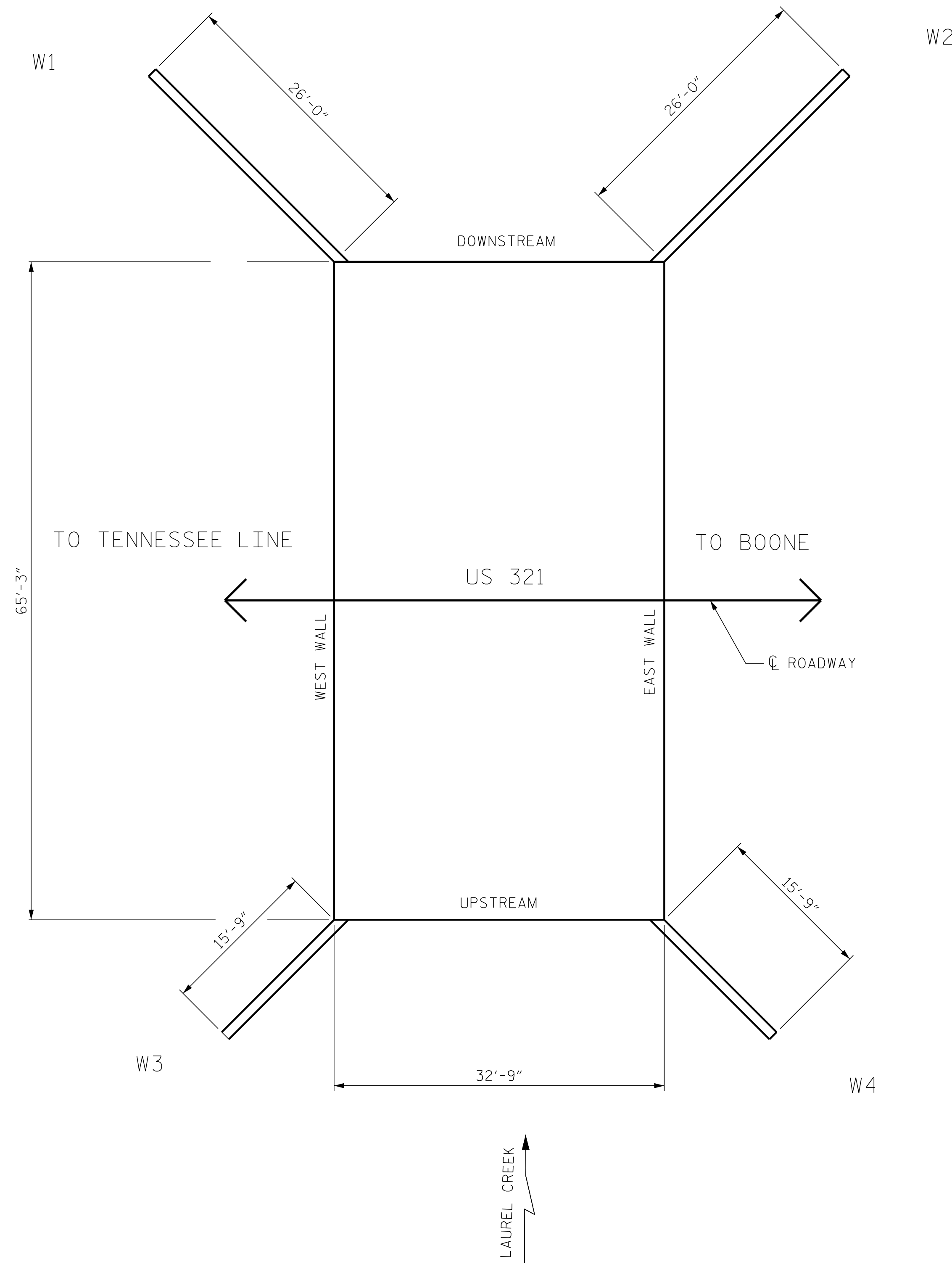
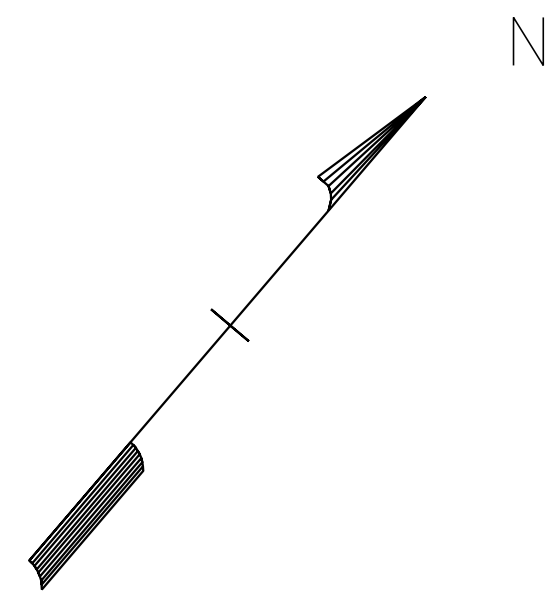
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NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			23

DRAWN BY : A. KLINK DATE : 07/18
CHECKED BY : T. KOCH DATE : 08/18

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P:\2018\18153.22_15BPR.32_MCDOT Culvert Preservation\DWG\AVERY 050031\Avery 31 CULVERT PLAN.dgn
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PLAN

SCOPE OF WORK

1. REMOVE UNSOUND CONCRETE AND PREPARE FOR SHOTCRETE AND/OR CONCRETE REPAIR AREAS.
2. PERFORM SHOTCRETE AND/OR CONCRETE REPAIRS IN PREPARED AREAS.
3. PERFORM EPOXY RESIN INJECTION OF DESIGNATED CONCRETE CRACKS.

NOTES

1. CULVERT INFORMATION IS TAKEN FROM THE ORIGINAL PLANS AND THE ROUTINE INSPECTION REPORT DATED JULY 28, 2017. THE CULVERT ORIENTATION CONFORMS TO THE BRIDGE INSPECTION REPORT.

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I HEREBY CERTIFY THAT THIS
 STRUCTURE WAS REHABILITATED ACCORDING
 TO THESE PLANS OR AS NOTED HEREIN

 RESIDENT ENGINEER DATE

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PROJECT NO. 15BPR.32
WATAUGA COUNTY
 STRUCTURE: 940066
 SHEET 1 OF 7

ENGINEER OF RECORD
 12/12/2018

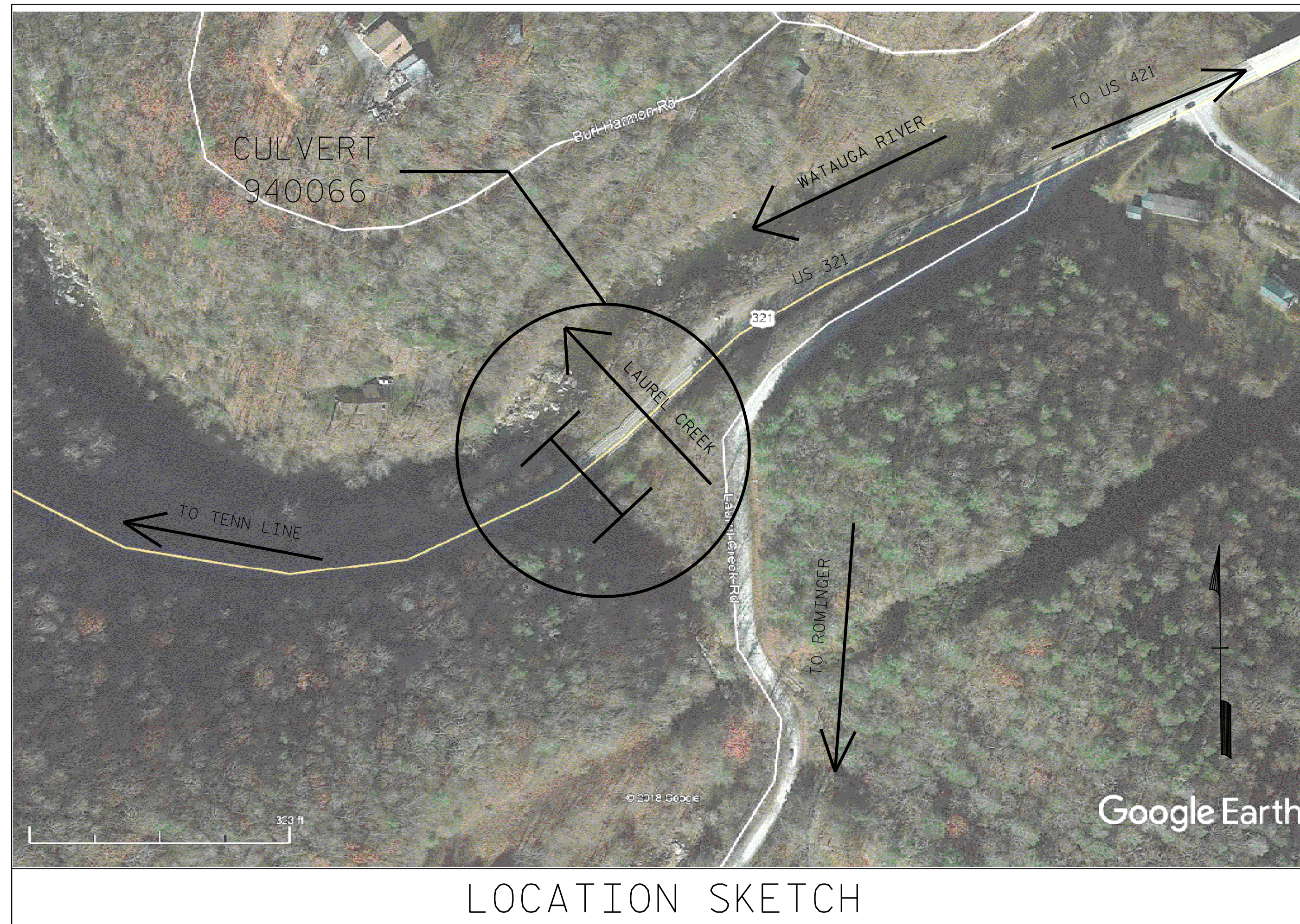
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STATE OF NORTH CAROLINA					
DEPARTMENT OF TRANSPORTATION					
RALEIGH					
GENERAL DRAWING					
30' x 19' REINFORCED					
CONCRETE ARCH					
CULVERT ON US 321					
OVER LAUREL CREEK					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. S-16
					TOTAL SHEETS 23

GENERAL NOTES:

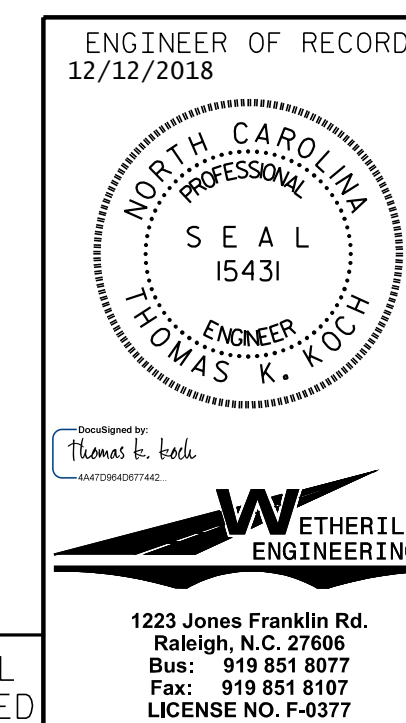
1. INFORMATION INDICATED ON THE LOCATION SKETCH SHALL BE CONSIDERED GENERAL INFORMATION ONLY. CONTRACTOR SHALL CONFIRM, THROUGH OTHER SOURCES, SPECIFIC INFORMATION REGARDING THE BRIDGES, ROADWAYS, UTILITIES, THE SURROUNDING AREA, AND ANY OTHER ASPECTS THAT MAY BE NECESSARY TO PERFORM AND COMPLETE THE PROJECT.
2. REPAIR LOCATIONS AND ESTIMATE OF QUANTITIES ARE GIVEN WITH THE BEST INFORMATION AVAILABLE. IF ADDITIONAL REPAIRS NOT SHOWN ON THE DRAWINGS ARE DEEMED NECESSARY BY THE ENGINEER, THE ENGINEER SHALL NOTE ON THE DRAWINGS THE APPROXIMATE LOCATION AND DESCRIPTION OF THE REPAIRS AND ADJUST THE ACTUAL QUANTITIES ENTERED INTO THE REPAIR QUANTITY TABLE.
3. EXISTING DIMENSIONS AND CULVERT CONDITION ARE FROM THE BEST INFORMATION AVAILABLE. THE CONTRACTOR SHALL FIELD VERIFY THE INFORMATION SHOWN ON THE PLANS AND NOTIFY THE ENGINEER IF ACTUAL DIMENSIONS AND CONDITIONS DIFFER.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FOLLOW ALL STATE AND FEDERAL SAFETY REQUIREMENTS.
5. FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
6. FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
7. FOR EPOXY RESIN INJECTION, SEE SPECIAL PROVISIONS.
8. FOR SHOTCRETE REPAIRS, SEE SPECIAL PROVISIONS.
9. FOR CONCRETE REPAIRS, SEE SPECIAL PROVISIONS.
10. FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
11. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
12. WORK ON CULVERT SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL SUBMIT PLANS FOR CONSTRUCTION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.
13. PRIOR TO BEGINNING WORK, CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL A COMPLETE SEQUENCE OF TASKS FOR EACH OPERATION AFFECTING THE ROADWAY SURFACE AND/OR TRAFFIC.
14. ANY DAMAGE TO EXISTING REINFORCING STEEL, DURING CONTRACTOR'S OPERATIONS, SHALL BE REPAIRED AS DIRECTED BY THE ENGINEER AND PERFORMED AT NO ADDITIONAL COST.



LOCATION SKETCH

TOTAL BILL OF MATERIAL			
CULVERT NO. 940066	SHOTCRETE REPAIRS	CONCRETE REPAIRS	EPOXY RESIN INJECTION
	CU. FT.	CU. FT.	LIN. FT.
TOTALS	125.4	41.8	37.0

PROJECT NO. 15BPR.32
WATAUGA COUNTY
 STRUCTURE: 940066
 SHEET 2 OF 7



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

GENERAL NOTES
 30' x 19' REINFORCED
 CONCRETE ARCH
 CULVERT ON US 321
 OVER LAUREL CREEK

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			23

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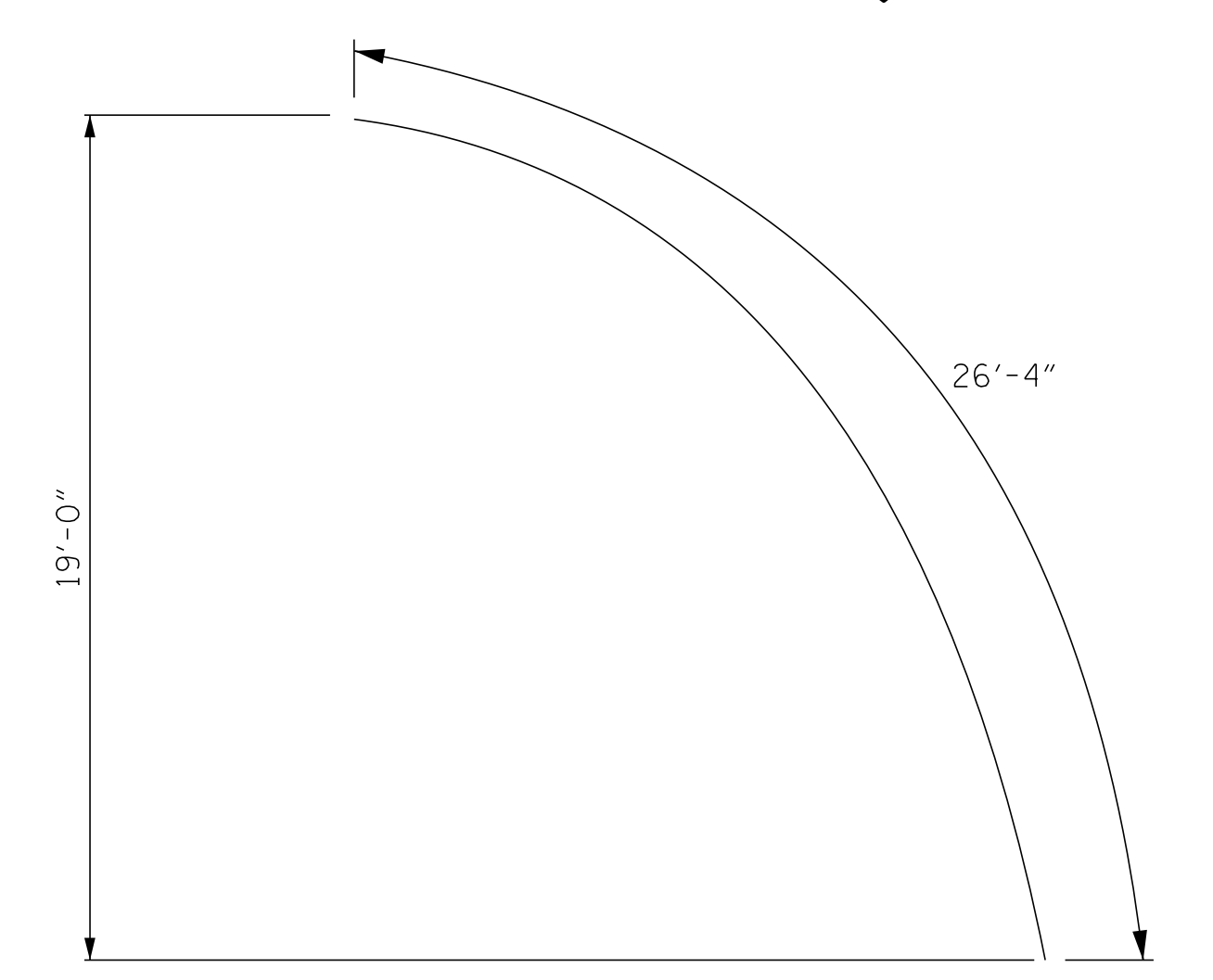
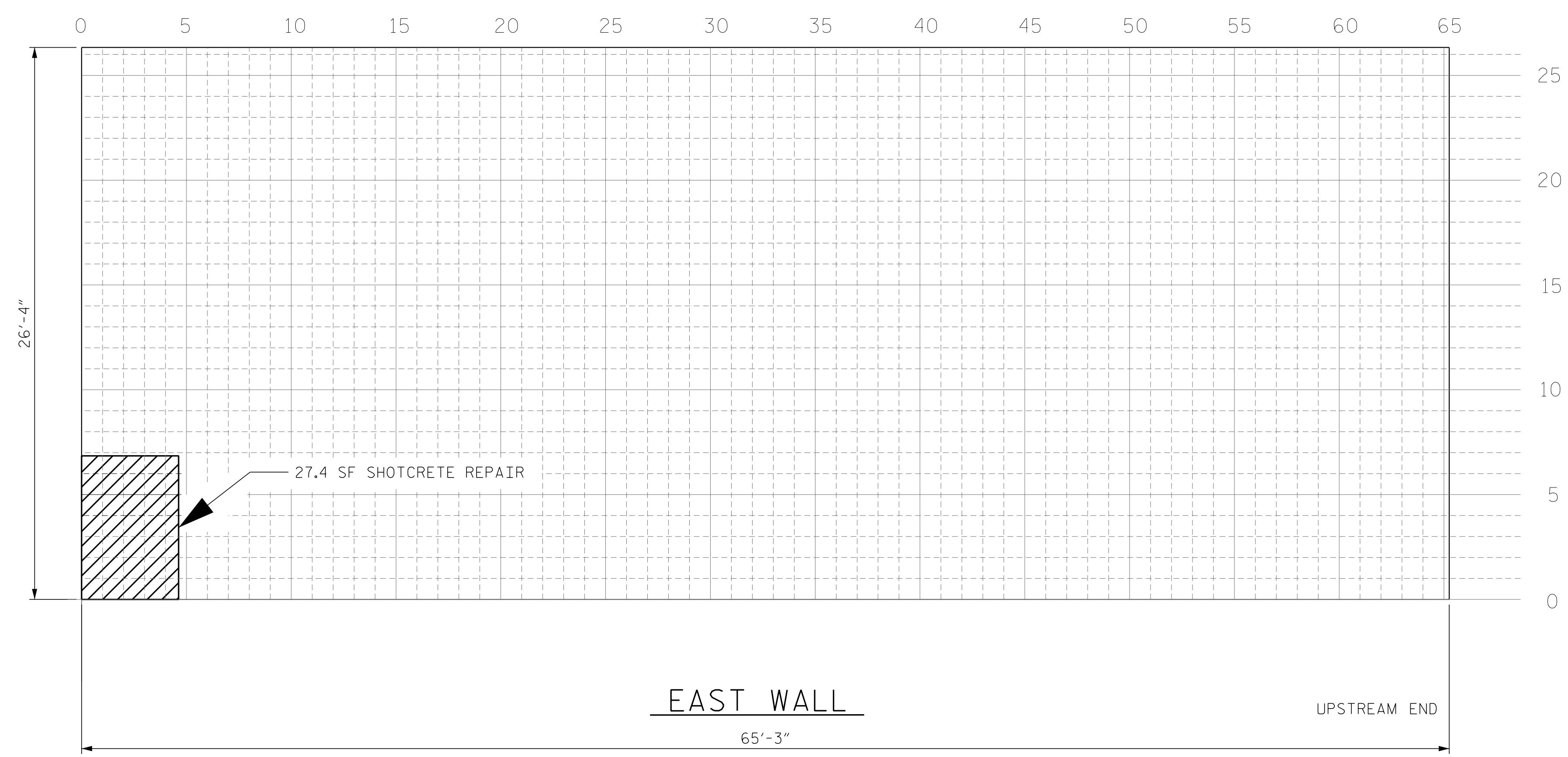
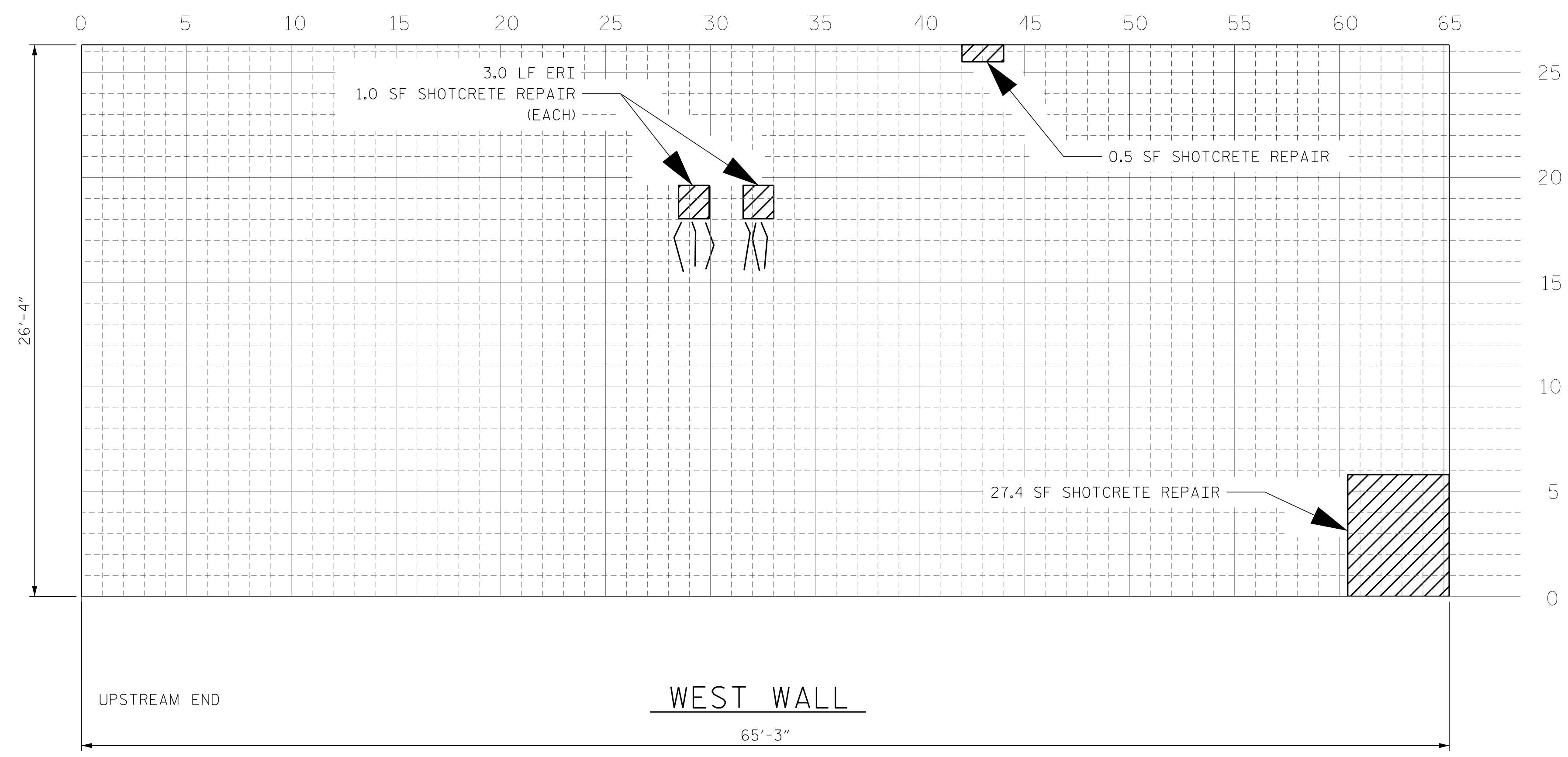
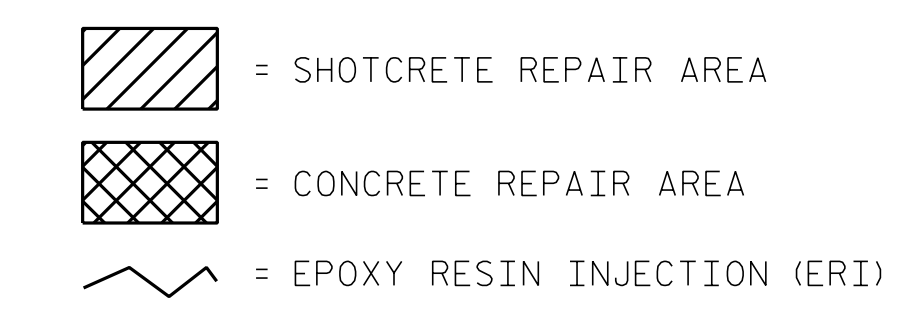
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AS-BUILT REPAIR QUANTITY TABLE				
	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
BARREL 1	57.3	28.7		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
BARREL 1	0.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
BARREL 1	6.0			

NOTES

- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
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- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.



UNWRAPPED ARCH WALL DETAIL

PROJECT NO. 15BPR.32
WATAUGA COUNTY
 STRUCTURE: 940066
 SHEET 3 OF 7

ENGINEER OF RECORD
 12/12/2018

 Thomas K. Koch
 ETHERILL ENGINEERING
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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
BARREL EAST AND WEST FACES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			23

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INDEX

CULVERT NO.	COORDINATES (LAT/LONG)	DESCRIPTION	SHEETS
050002	36°15'42.44" / 81°53'49.55"	30'x19' REINFORCED CONCRETE DOUBLE ARCH CULVERT ON US 321 OVER BEECH CREEK	S-2 THRU S-7
050031	36°03'12.61" / 81°52'50.55"	28'x14' REINFORCED CONCRETE ARCH CULVERT ON SR 1545 (LINVILLE AVE) OVER GRANDMOTHER CREEK	S-8 THRU S-15
940066	36°15'11.99" / 81°51'12.97"	30'x19' REINFORCED CONCRETE ARCH CULVERT ON US 321 OVER LAUREL CREEK	S-16 THRU S-22
		CONCRETE REPAIR DETAILS	S-23

TOTAL BILL OF MATERIAL SUMMARY

CULVERT NO.	SHOTCRETE REPAIRS	CONCRETE REPAIRS	EPOXY RESIN INJECTION
	CU. FT.	CU. FT.	LIN. FT.
050002	249.4	125.5	243.0
050031	107.3	0.0	462.0
940066	125.4	41.8	37.0
TOTALS	482.1	167.3	742.0

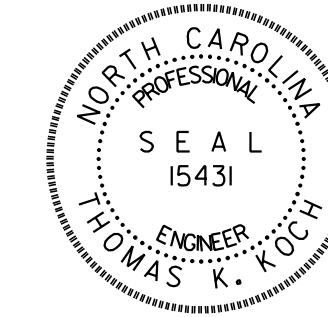
PROJECT NO. 15BPR.32

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12/12/2018



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LICENSE NO. F-0377

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INDEX SHEET

REVISIONS				SHEET NO.	
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1			3		
2			4		

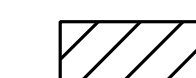


SHEET NO. S-1
TOTAL SHEETS 23

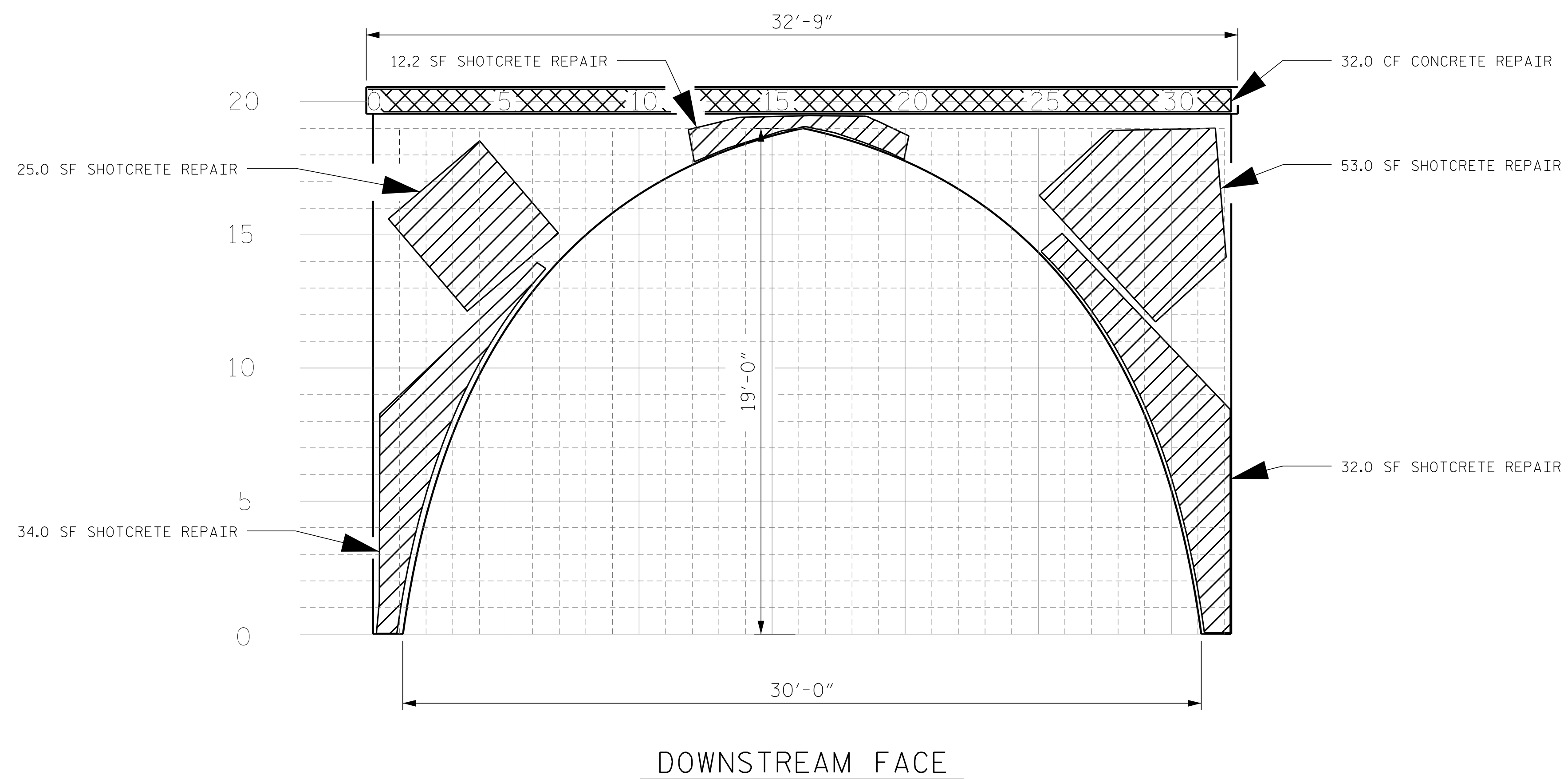
AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
DOWNSTREAM FACE	156.2	78.1		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
DOWNSTREAM FACE	32.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
DOWNSTREAM FACE	0.0			

NOTES

- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
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- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



PROJECT NO. 15BPR.32
WATAUGA COUNTY
 STRUCTURE: 940066

SHEET 4 OF 7

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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOWNSTREAM HEADWALLS

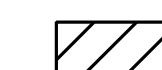

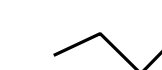
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2			4			23

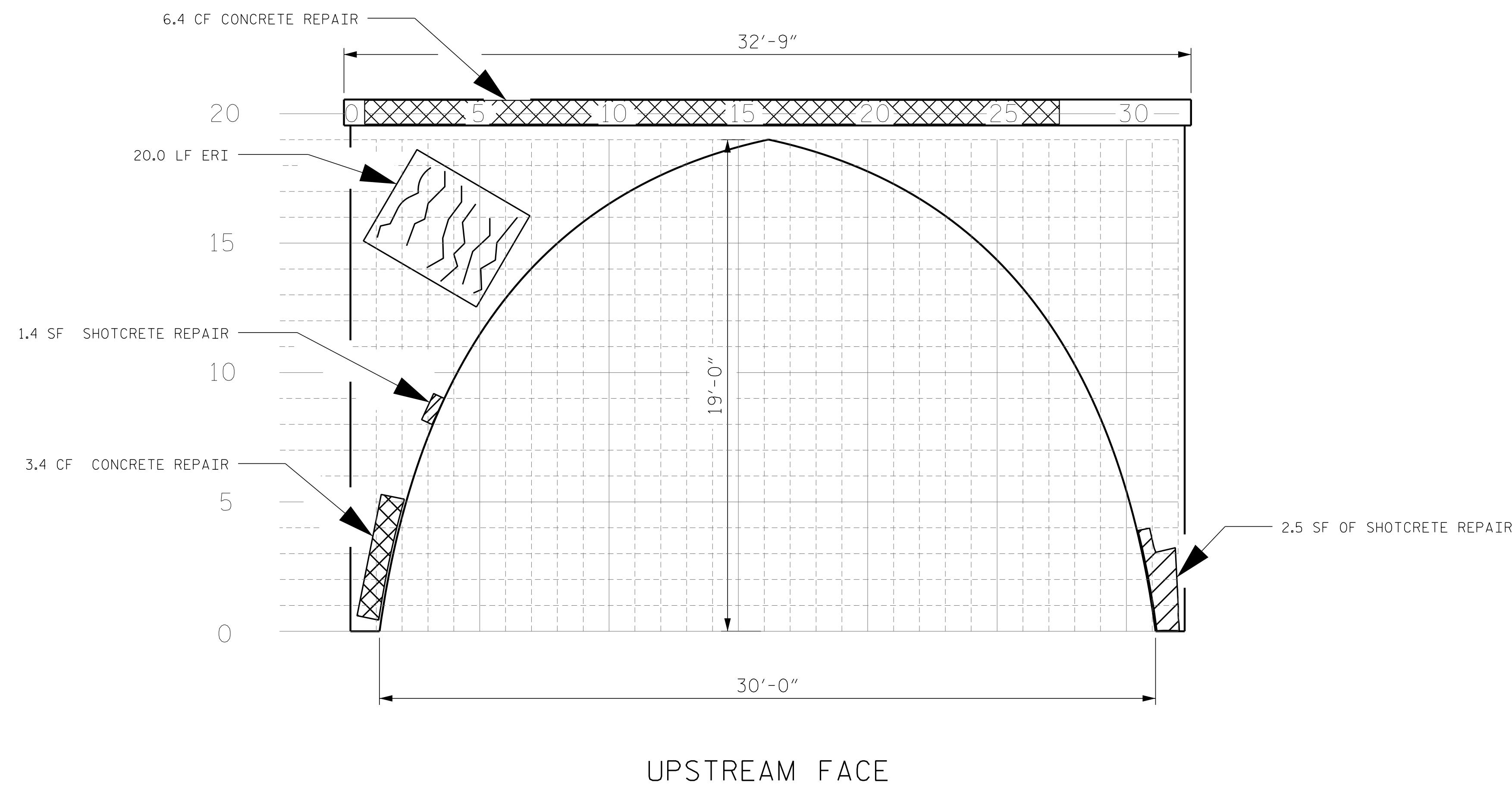
AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
UPSTREAM FACE	3.9	2.0		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
UPSTREAM FACE	9.8			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
UPSTREAM FACE	20.0			

NOTES

- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
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- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



PROJECT NO. 15BPR.32
WATAUGA COUNTY
 STRUCTURE: 940066

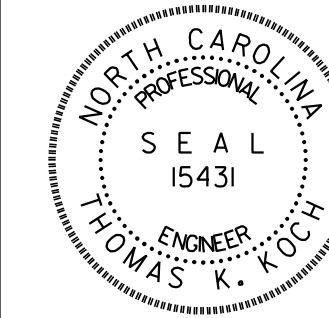
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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

UPSTREAM HEADWALLS



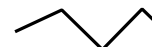
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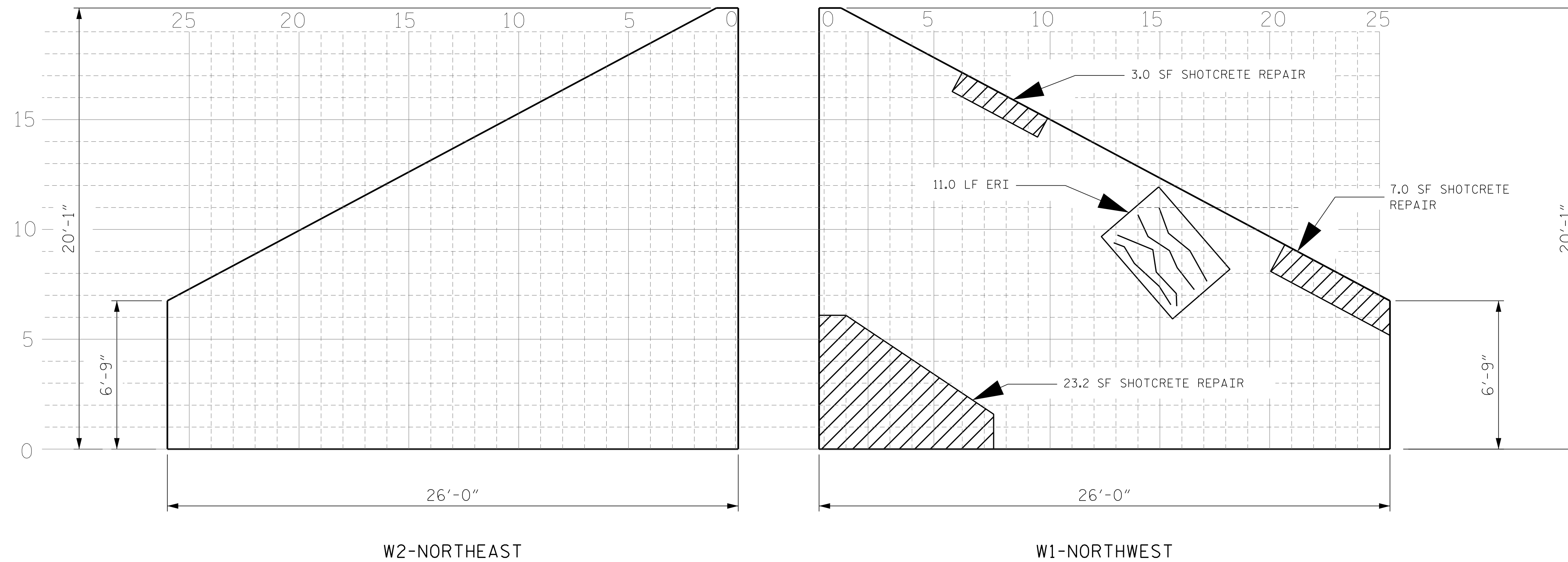
AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
SHOTCRETE REPAIRS				
DOWNSTREAM FACE	33.2	16.6		
CONCRETE REPAIRS				
DOWNSTREAM FACE	0.0			
EPOXY RESIN INJECTION				
DOWNSTREAM FACE	11.0			

NOTES

- NO DAMAGE WAS FOUND ON WINGWALL W2 DURING STRUCTURAL INSPECTION.
- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
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- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



DOWNSTREAM WINGS

PROJECT NO. 15BPR.32
WATAUGA COUNTY
 STRUCTURE: 940066

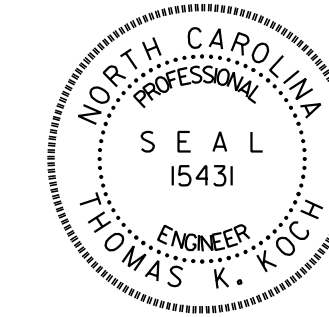
SHEET 6 OF 7

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ENGINEER OF RECORD
 12/12/2018



Thomas K. Koch
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 Fax: 919 851 8107
 LICENSE NO. F-0377

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOWNSTREAM WING FACES



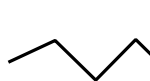
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NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			23

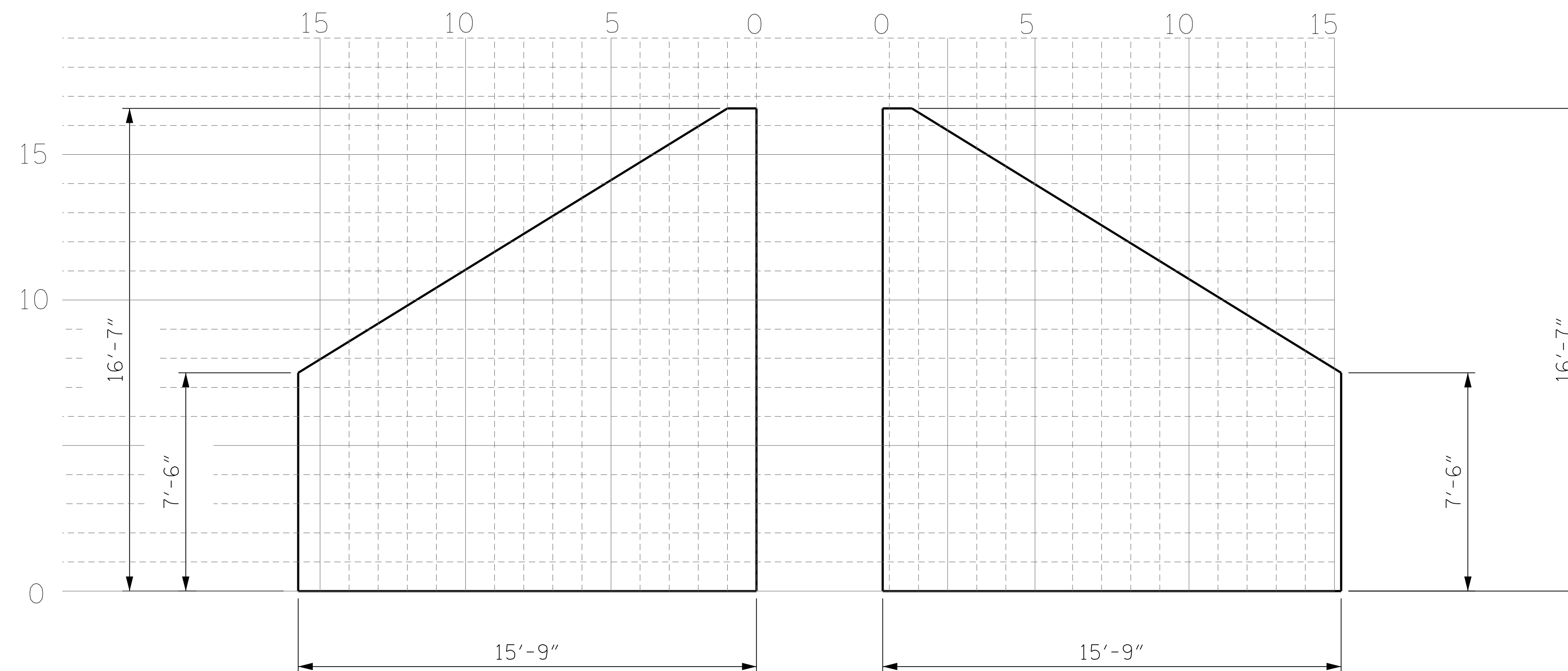
AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
UPSTREAM FACE	0.0	0.0		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
UPSTREAM FACE	0.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
UPSTREAM FACE	0.0			

NOTES

- NO DAMAGE WAS FOUND ON WINGWALLS W3 AND W4 DURING STRUCTURAL INSPECTION.
- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
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- CONCRETE REPAIRS MAY BE SUBSTITUTED IN LIEU OF SHOTCRETE REPAIRS WITH THE APPROVAL OF THE ENGINEER.
- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



W3-SOUTHWEST

W4-SOUTHEAST

UPSTREAM WINGS

PROJECT NO. 15BPR.32

WATAUGA COUNTY

STRUCTURE: 940066

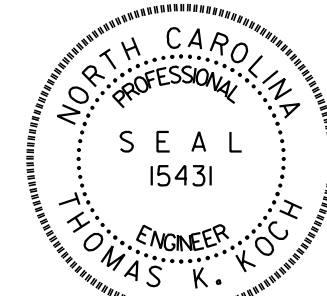
SHEET 7 OF 7

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ENGINEER OF RECORD
12/12/2018



Thomas K. Yoch
ENGINEER

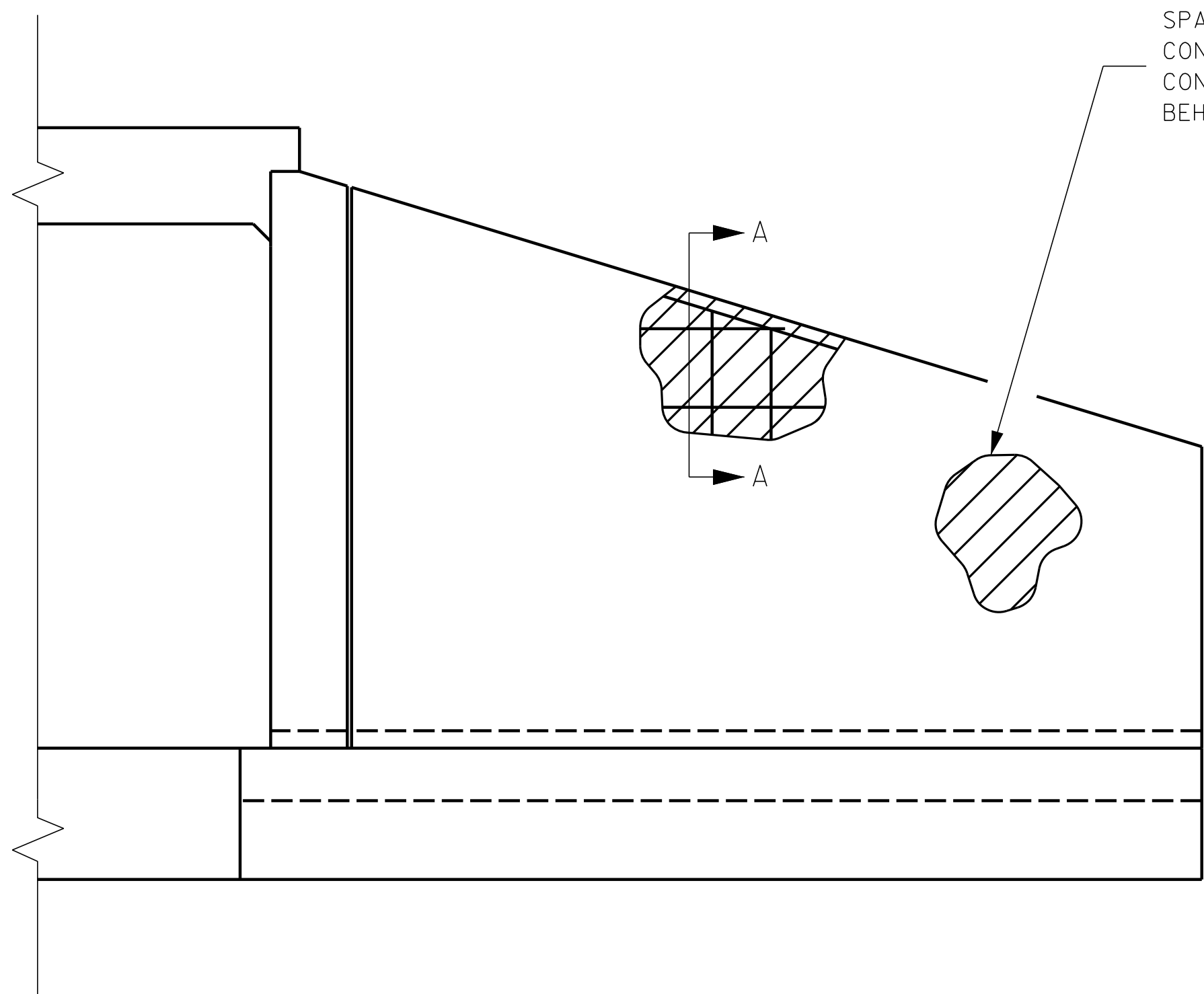


1223 Jones Franklin Rd.
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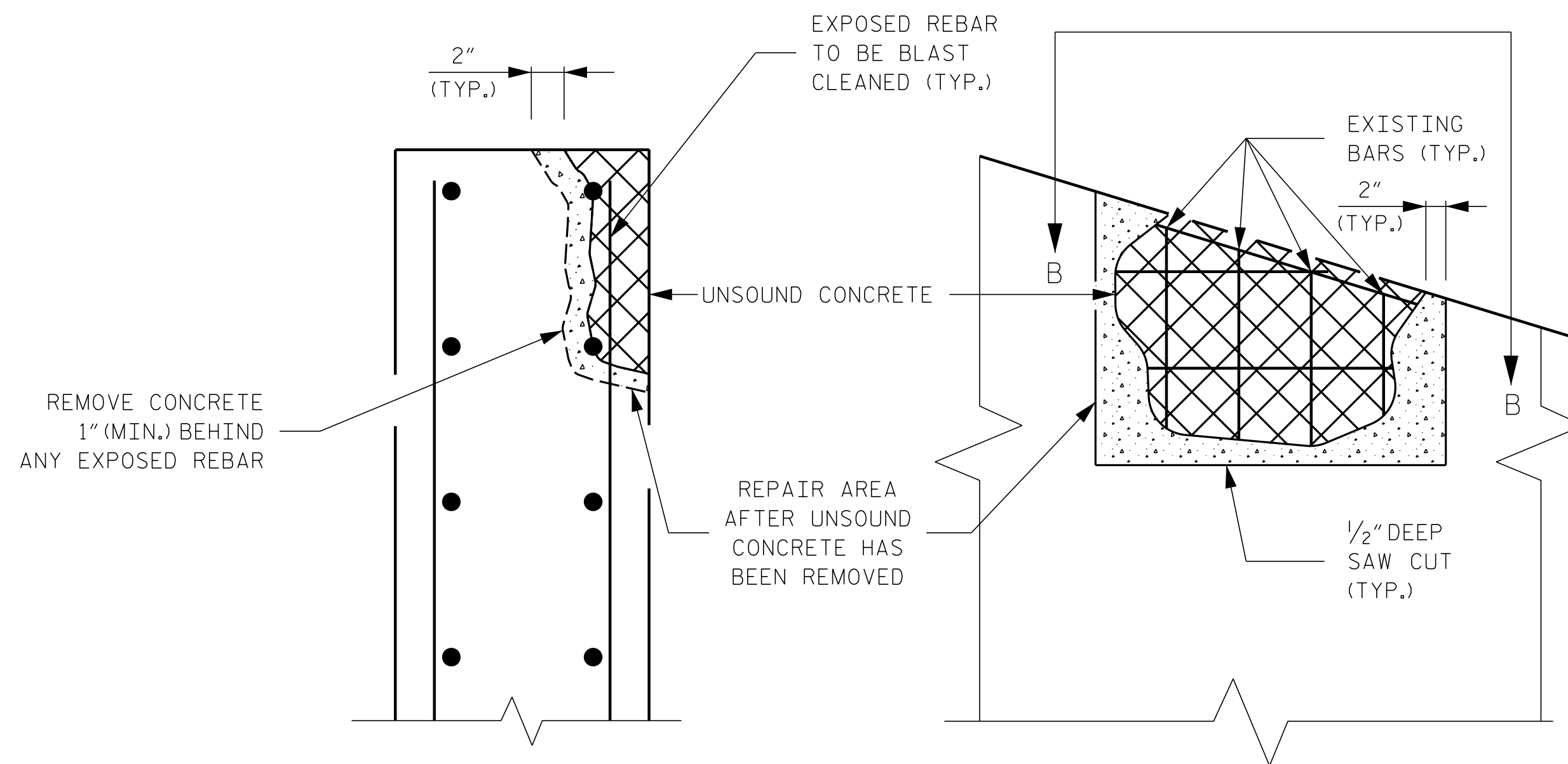
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

UPSTREAM WING FACES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			23

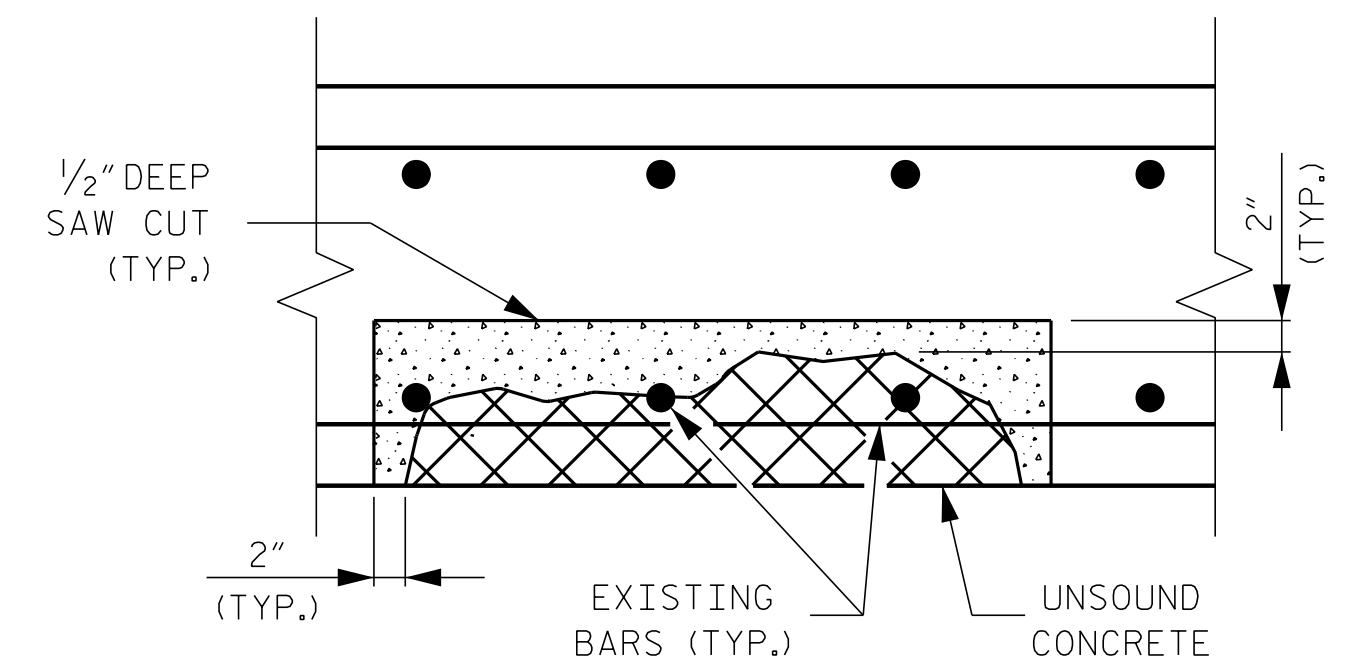


WALL REPAIRS



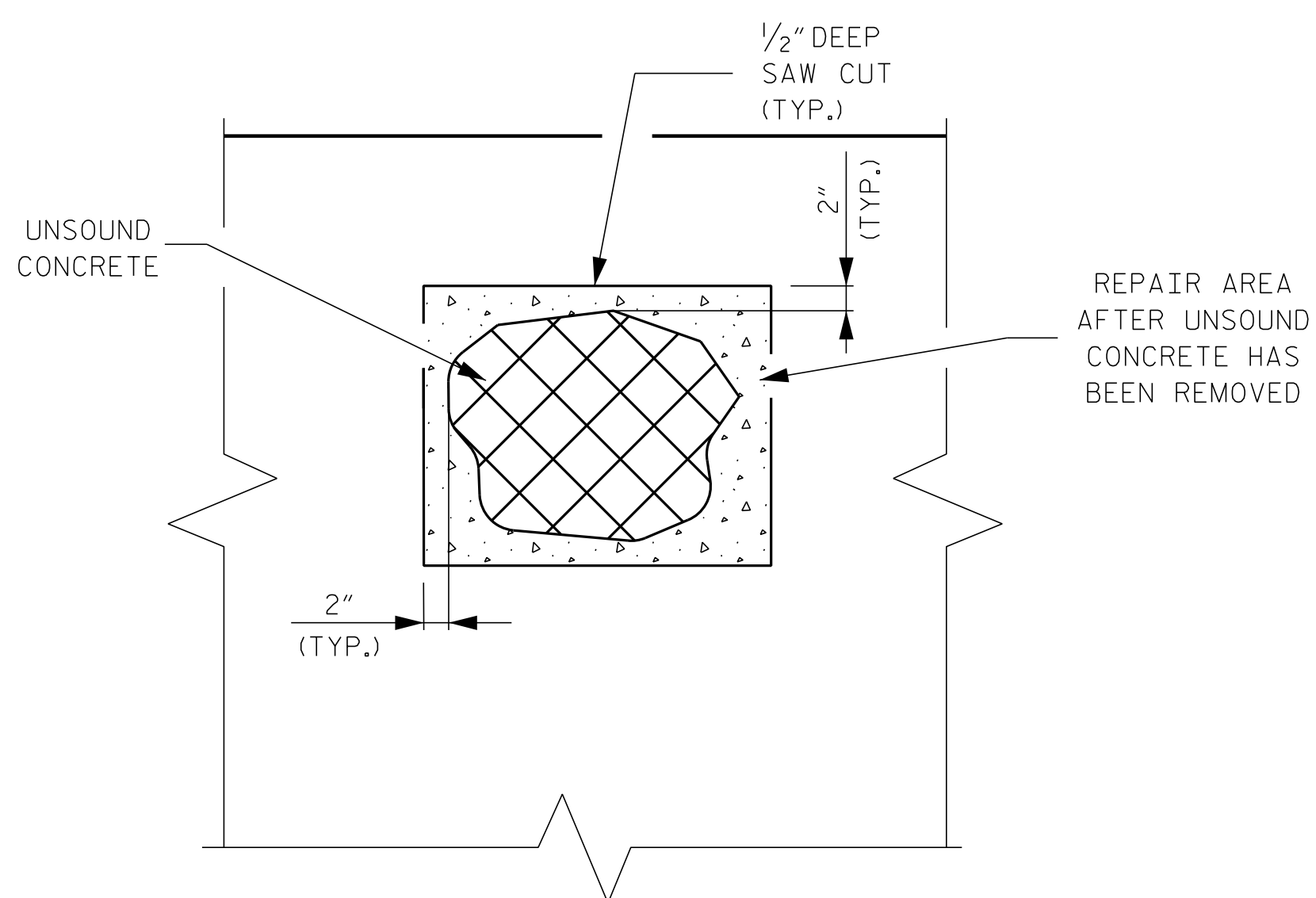
SECTION A-A

ELEVATION



VIEW B-B

DAMAGED CONCRETE
CORNER REPAIR DETAILS



DAMAGED CONCRETE
FACE REPAIR DETAILS

NOTES

1. MATCH CURVATURE OF ARCH CULVERTS UNLESS ADDITIONAL CONCRETE IS NECESSARY TO ADEQUATELY COVER REINFORCEMENT.
2. REMOVE UNSOUND CONCRETE TO THE EXTENT NECESSARY, MINIMUM 1" BEHIND REBAR AND MINIMUM OF 2" CLEARANCE TO SAWCUT.
3. NO MORE THEN ONE-THIRD OF A MEMBER'S CROSS SECTIONAL AREA SHALL BE REMOVED AT ONE TIME. SHOULD IT BECOME NECESSARY TO REMOVE MORE THAN 30% OF A MEMBERS CROSS SECTIONAL AREA, NOTIFY THE ENGINEER PRIOR TO PROCEEDING.
4. REINFORCING STEEL WHICH IS DETERMINED BY THE ENGINEER TO BE REPLACED, SHALL BE REMOVED TO A POINT WHERE IT IS SOUND. THE PATCH SHALL EXTEND A SUFFICIENT DISTANCE BEYOND THIS POINT TO DEVELOP A SPLICE LENGTH OF 1 FT MINIMUM.

PROJECT NO. 15BPR.32

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE REPAIR
DETAILS

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-23
TOTAL SHEETS 23

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	-----	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	- -	20,000 LBS. PER SQ. IN.
	- -	27,000 LBS. PER SQ. IN.
	- -	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION - GRADE 60	- - -	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	-----	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	-----	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR UNTREATED EXTREME FIBER STRESS	- - -	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	- - - -	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	- - - - -	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED $\frac{3}{4}$ " WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO $1\frac{1}{2}$ " RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A $\frac{1}{4}$ " FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A $\frac{1}{4}$ " RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE $\frac{7}{8}$ " \emptyset SHEAR STUDS FOR THE $\frac{3}{4}$ " \emptyset STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - $\frac{7}{8}$ " \emptyset STUDS FOR 4 - $\frac{3}{4}$ " \emptyset STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF $\frac{7}{8}$ " \emptyset STUDS ALONG THE BEAM AS SHOWN FOR $\frac{3}{4}$ " \emptyset STUDS BASED ON THE RATIO OF 3 - $\frac{7}{8}$ " \emptyset STUDS FOR 4 - $\frac{3}{4}$ " \emptyset STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST $\frac{3}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY $\frac{1}{16}$ " INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

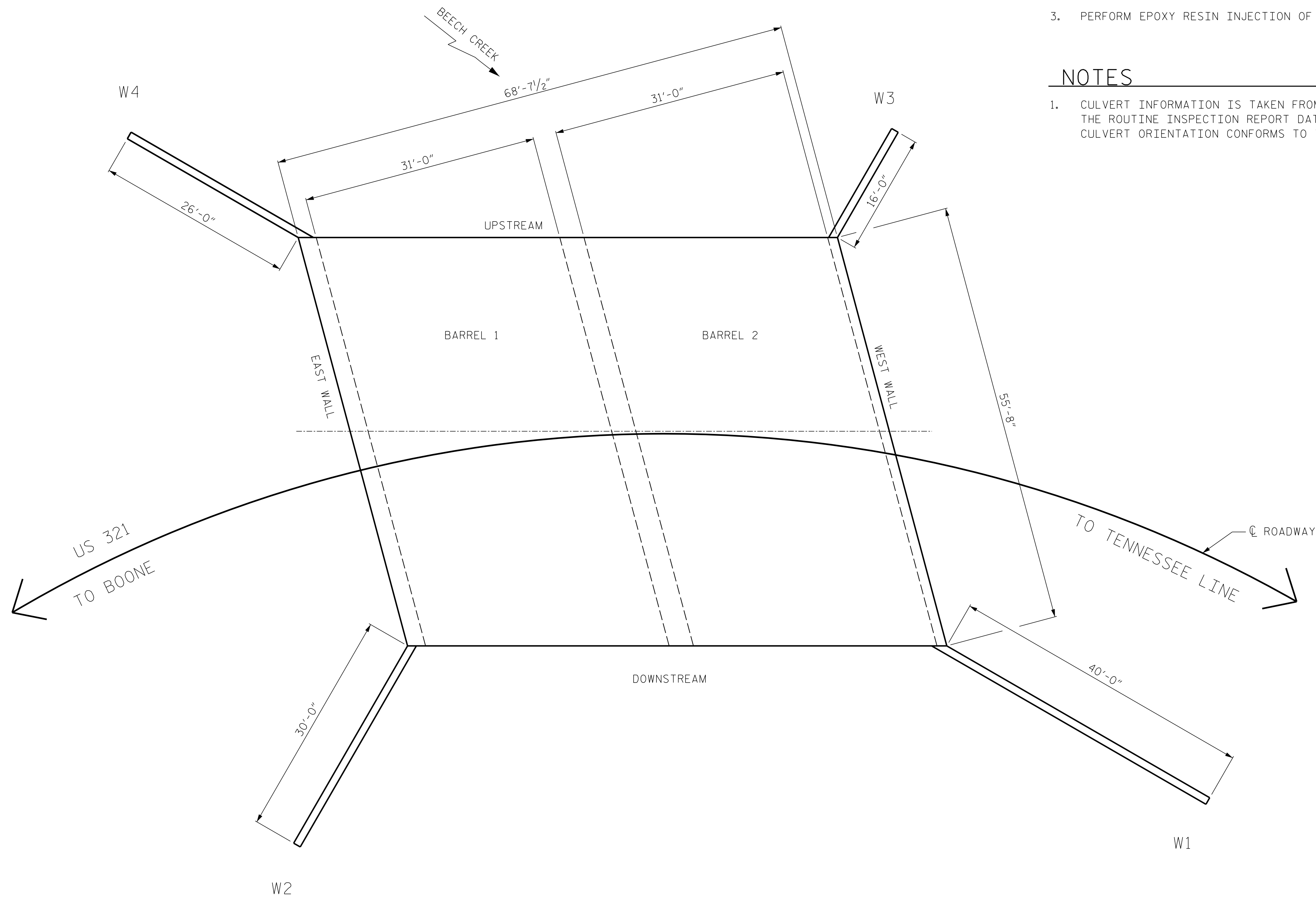
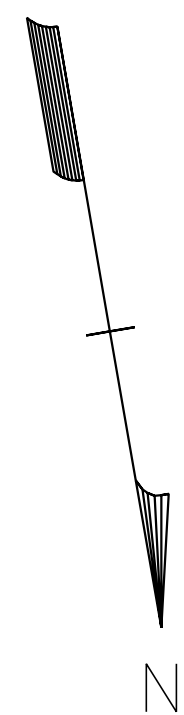
SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

ENGLISH

JANUARY, 1990

STD. NO. SN



SCOPE OF WORK

1. REMOVE UNSOUND CONCRETE AND PREPARE FOR SHOTCRETE AND/OR CONCRETE REPAIR AREAS.
2. PERFORM SHOTCRETE AND/OR CONCRETE REPAIRS IN PREPARED AREAS.
3. PERFORM EPOXY RESIN INJECTION OF DESIGNATED CONCRETE CRACKS.

NOTES

1. CULVERT INFORMATION IS TAKEN FROM THE ORIGINAL PLANS AND THE ROUTINE INSPECTION REPORT DATED MAY 10, 2017. THE CULVERT ORIENTATION CONFORMS TO THE BRIDGE INSPECTION REPORT.

PLAN

I HEREBY CERTIFY THAT THIS STRUCTURE WAS REHABILITATED ACCORDING TO THESE PLANS OR AS NOTED HEREIN

RESIDENT ENGINEER _____ DATE _____

PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050002

SHEET 1 OF 6

ENGINEER OF RECORD
12/12/2018

THOMAS K. KOCH
ENGINEER
15431

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
30' x 19' REINFORCED
CONCRETE DOUBLE ARCH CULVERT
ON US 321 OVER BEECH CREEK

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
2			4			23

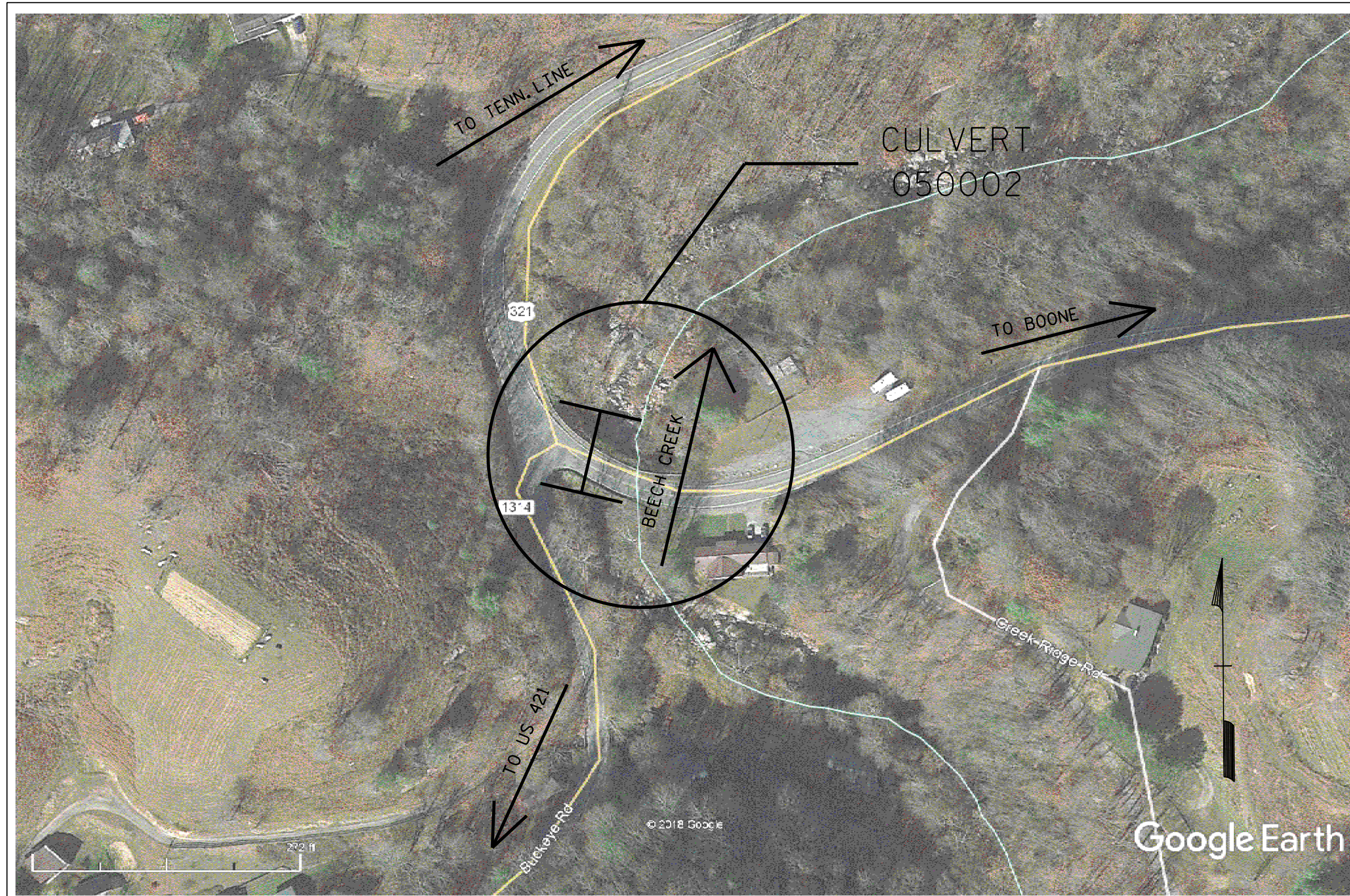
DRAWN BY : A. KLINK DATE : 07-18
 CHECKED BY : T. KOCH DATE : 08-18

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GENERAL NOTES:

1. INFORMATION INDICATED ON THE LOCATION SKETCH SHALL BE CONSIDERED GENERAL INFORMATION ONLY. CONTRACTOR SHALL CONFIRM, THROUGH OTHER SOURCES, SPECIFIC INFORMATION REGARDING THE BRIDGES, ROADWAYS, UTILITIES, THE SURROUNDING AREA, AND ANY OTHER ASPECTS THAT MAY BE NECESSARY TO PERFORM AND COMPLETE THE PROJECT.
2. REPAIR LOCATIONS AND ESTIMATE OF QUANTITIES ARE GIVEN WITH THE BEST INFORMATION AVAILABLE. IF ADDITIONAL REPAIRS NOT SHOWN ON THE DRAWINGS ARE DEEMED NECESSARY BY THE ENGINEER, THE ENGINEER SHALL NOTE ON THE DRAWINGS THE APPROXIMATE LOCATION AND DESCRIPTION OF THE REPAIRS AND ADJUST THE ACTUAL QUANTITIES ENTERED INTO THE REPAIR QUANTITY TABLE.
3. EXISTING DIMENSIONS AND CULVERT CONDITION ARE FROM THE BEST INFORMATION AVAILABLE. THE CONTRACTOR SHALL FIELD VERIFY THE INFORMATION SHOWN ON THE PLANS AND NOTIFY THE ENGINEER IF ACTUAL DIMENSIONS AND CONDITIONS DIFFER.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FOLLOW ALL STATE AND FEDERAL SAFETY REQUIREMENTS.
5. FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
6. FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
7. FOR EPOXY RESIN INJECTION, SEE SPECIAL PROVISIONS.
8. FOR SHOTCRETE REPAIRS, SEE SPECIAL PROVISIONS.
9. FOR CONCRETE REPAIRS, SEE SPECIAL PROVISIONS.
10. FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
11. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
12. WORK ON CULVERT SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL SUBMIT PLANS FOR CONSTRUCTION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.
13. PRIOR TO BEGINNING WORK, CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL A COMPLETE SEQUENCE OF TASKS FOR EACH OPERATION AFFECTING THE ROADWAY SURFACE AND/OR TRAFFIC.
14. ANY DAMAGE TO EXISTING REINFORCING STEEL, DURING CONTRACTOR'S OPERATIONS, SHALL BE REPAIRED AS DIRECTED BY THE ENGINEER AND PERFORMED AT NO ADDITIONAL COST.

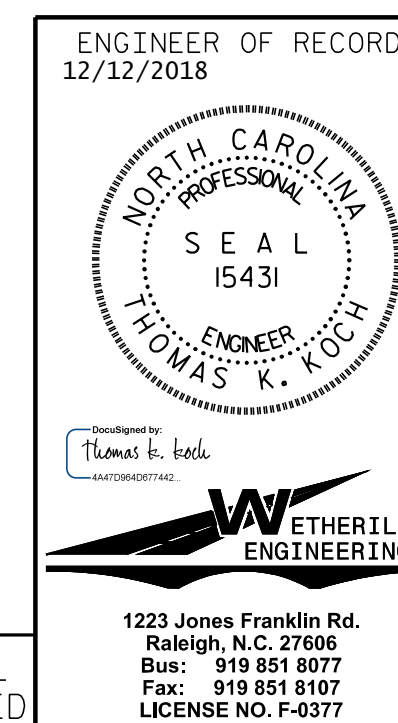


LOCATION SKETCH

TOTAL BILL OF MATERIAL			
CULVERT NO. 050002	SHOTCRETE REPAIRS	CONCRETE REPAIRS	EPOXY RESIN INJECTION
	CU. FT.	CU. FT.	LIN. FT.
TOTALS	249.4	125.5	243.0

PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050002

SHEET 2 OF 6



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 GENERAL NOTES
 30' x 19' REINFORCED
 CONCRETE DOUBLE ARCH CULVERT
 ON US 321 OVER BEECH CREEK

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-3
1			3			TOTAL SHEETS
2			4			23

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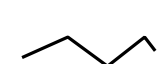
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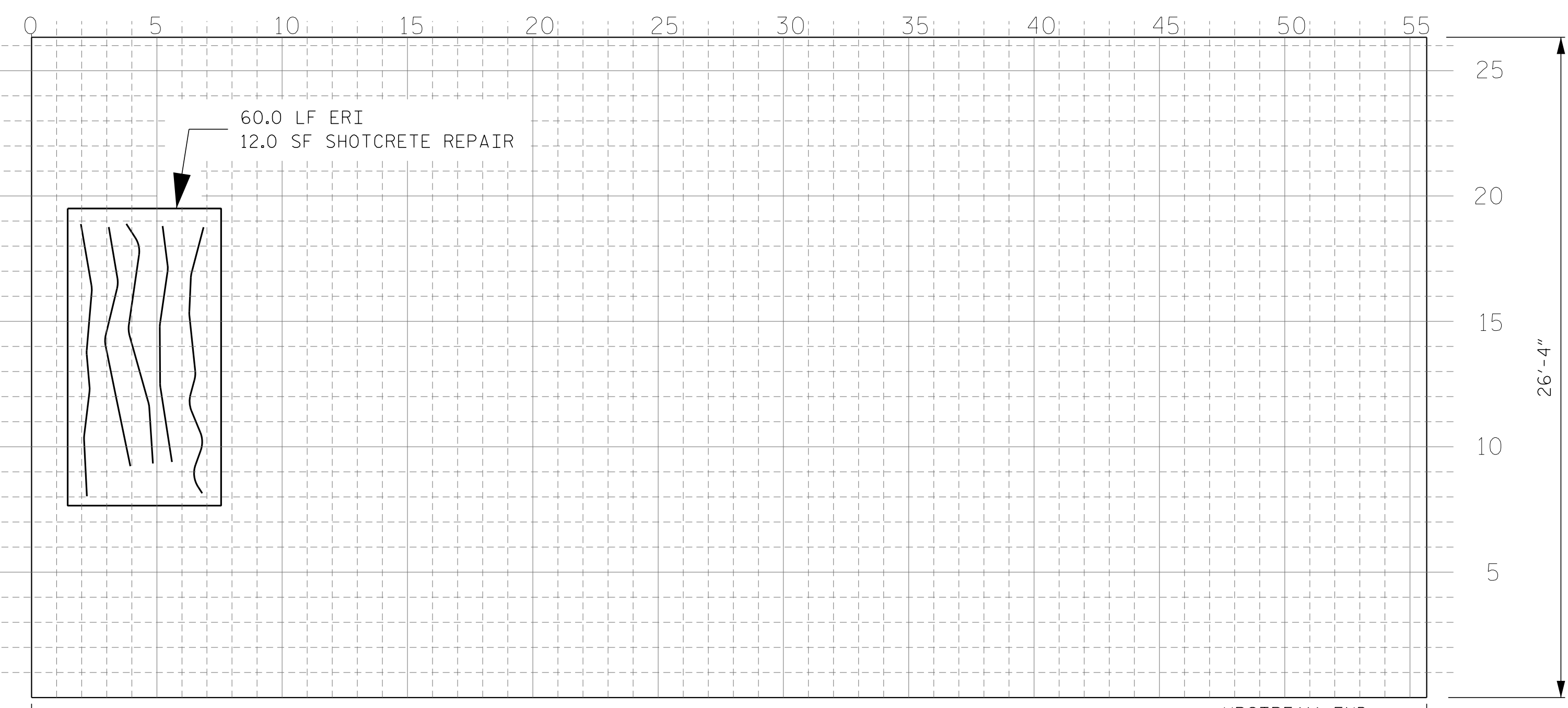
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	QUANTITIES			
	ESTIMATE		ACTUAL	
	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
SHOTCRETE REPAIRS				
BARREL 1	18.0	9.0		
CONCRETE REPAIRS				
BARREL 1		9.5		
EPOXY RESIN INJECTION				
BARREL 1	100.0			

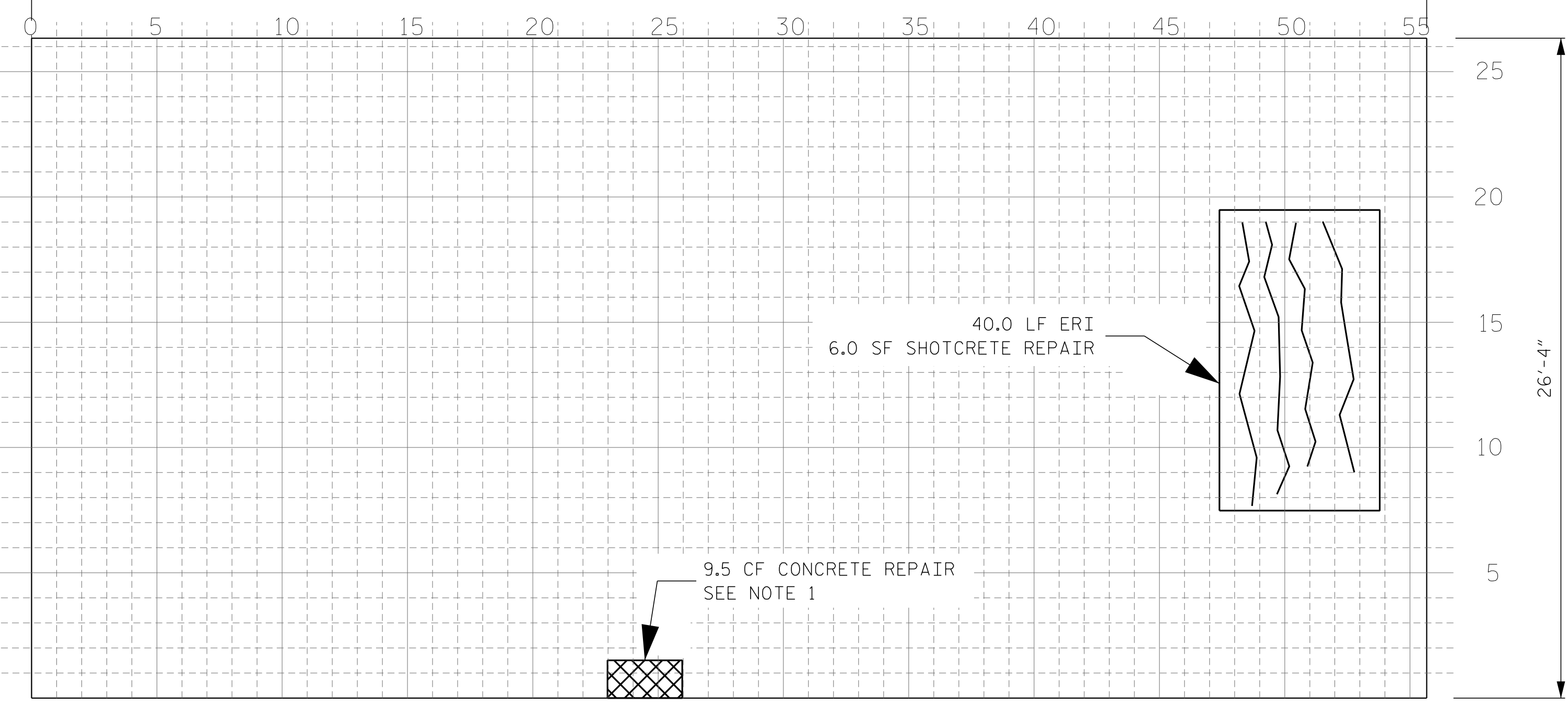
NOTES

- TOTAL OF 6 SPALLS IN FACE OF FOOTING
- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET.
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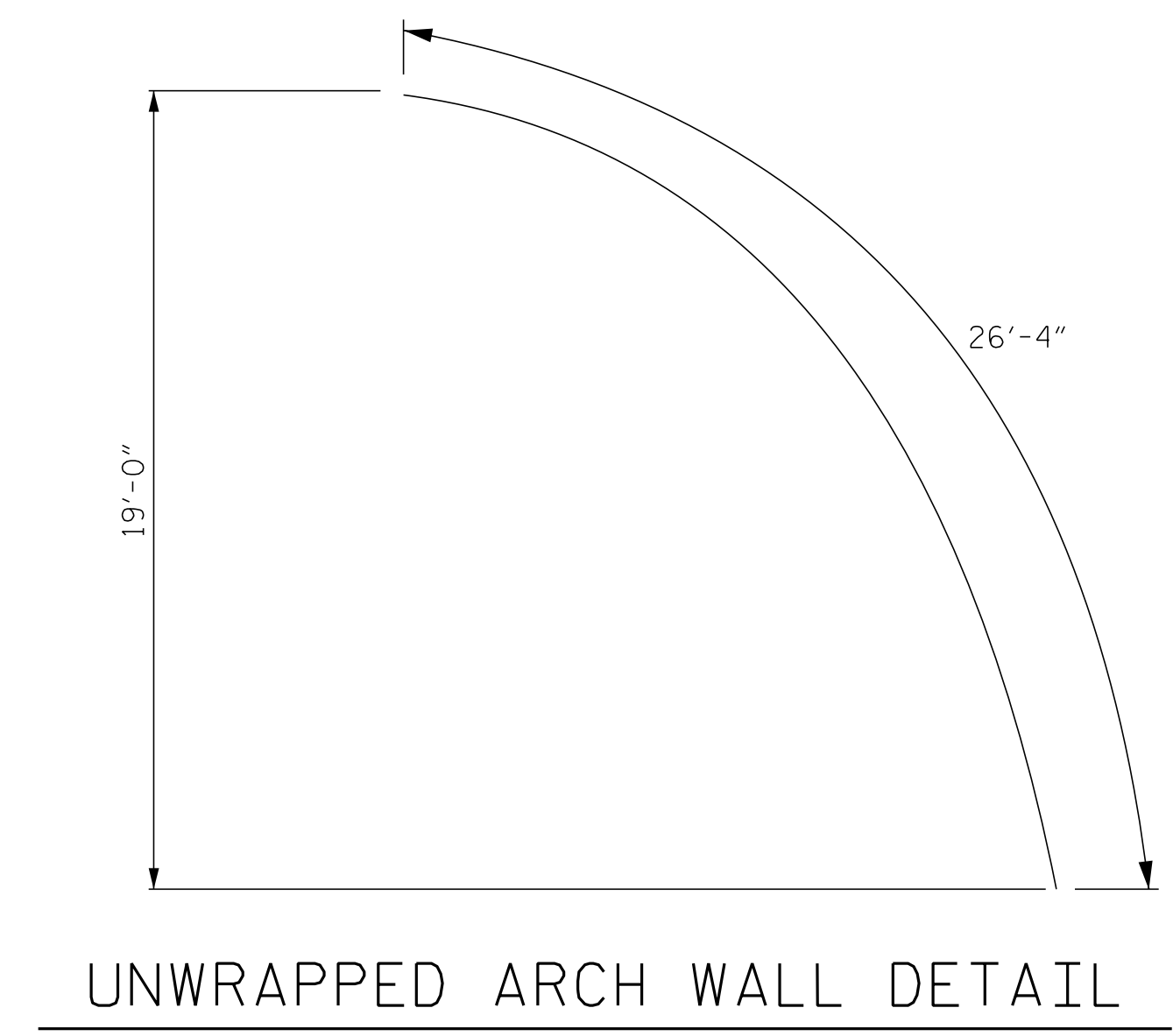
-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



BARREL 1 EAST WALL



BARREL 1 WEST WALL



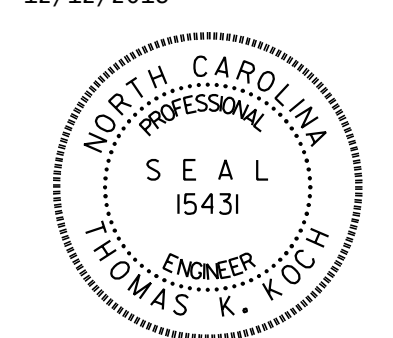
UNWRAPPED ARCH WALL DETAIL

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ENGINEER OF RECORD
12/12/2018



Developed by
Thomas K. Koch



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL 1 WALLS



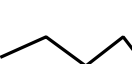
PROJECT NO. 15BPR.32
AVERY COUNTY
 STRUCTURE: 050002
 SHEET 3 OF 6

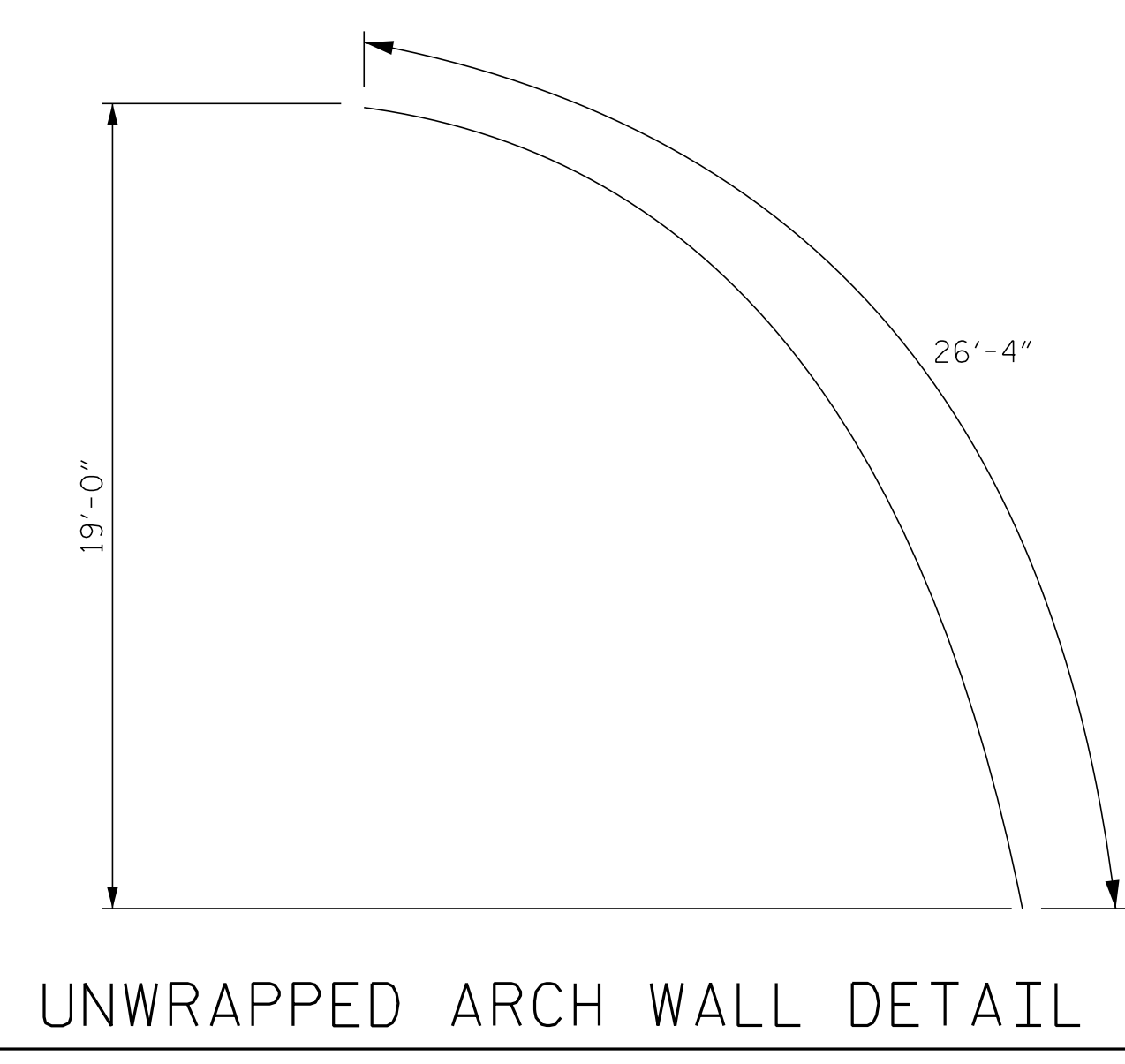
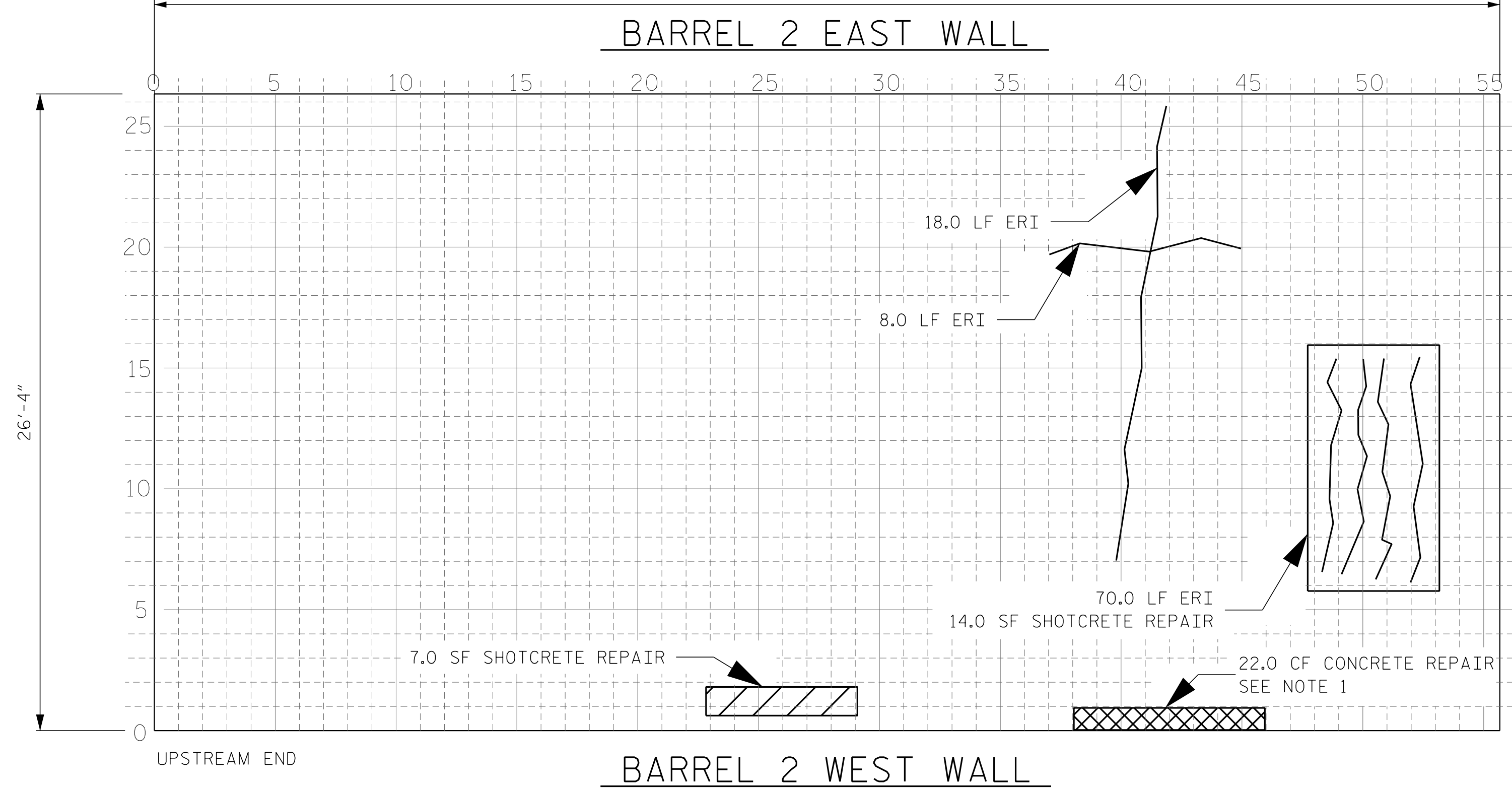
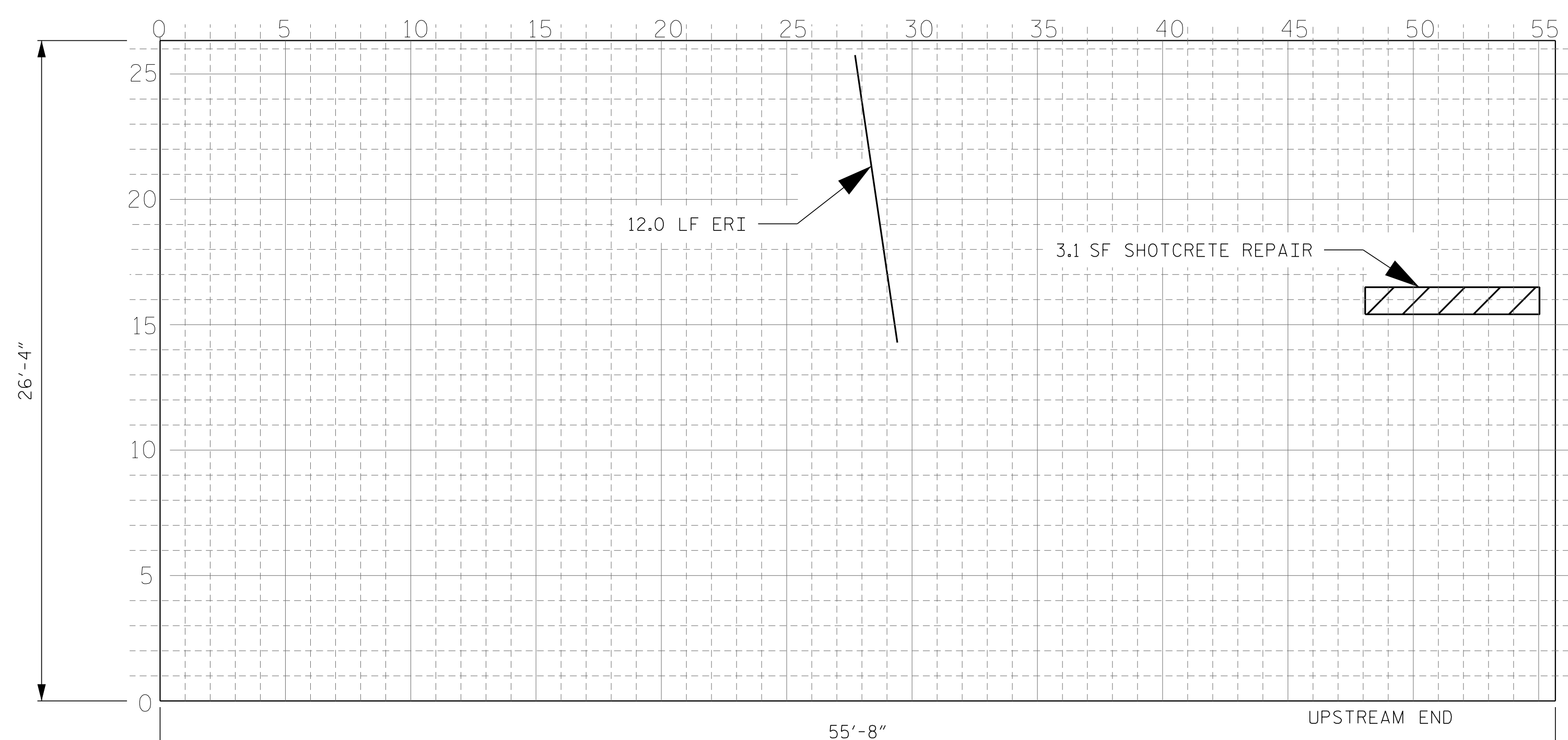
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			23

	QUANTITIES			
	ESTIMATE		ACTUAL	
	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
SHOTCRETE REPAIRS				
BARREL 2	24.1	12.1		
CONCRETE REPAIRS				
BARREL 2		22.0		
EPOXY RESIN INJECTION				
BARREL 2	108.0			

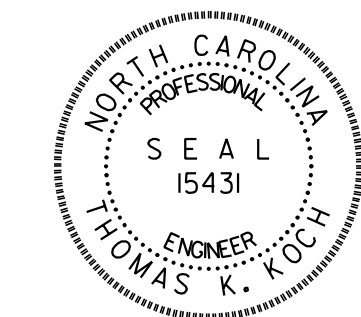
NOTES

1. ALONG FACE OF FOOTING
2. VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET.
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-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050002
 SHEET 4 OF 6

ENGINEER OF RECORD
 12/12/2018

 ENGINEER
 THOMAS K. KOCH
 1223 Jones Franklin Rd.
 Raleigh, N.C. 27606
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 Fax: 919 851 8107
 LICENSE NO. F-0377

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
BARREL 2 WALLS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			23

DRAWN BY : A. KLINK DATE : 07/18
 CHECKED BY : T. KOCH DATE : 08/18

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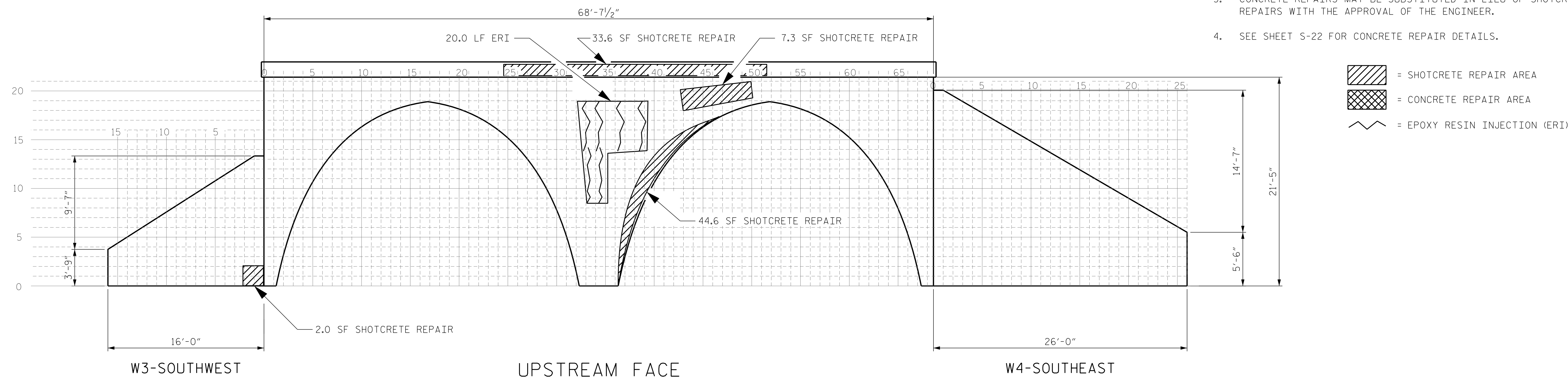
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AS-BUILT REPAIR QUANTITY TABLE

	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
UPSTREAM FACE	87.5	43.8		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
UPSTREAM FACE	0.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
UPSTREAM FACE	20.0			

NOTES

- VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
- REPAIR LOCATIONS AND ESTIMATE OF QUANTITIES ARE BASED ON THE BEST INFORMATION AVAILABLE. IF ADDITIONAL REPAIRS NOT SHOWN ON THE DRAWINGS ARE DEEMED NECESSARY BY THE ENGINEER, THE ENGINEER WILL NOTE ON THE DRAWINGS THE APPROXIMATE LOCATION AND DESCRIPTION OF THE REPAIRS AND ENTER THE ACTUAL QUANTITIES INTO THE AS-BUILT REPAIR QUANTITY TABLE.
- CONCRETE REPAIRS MAY BE SUBSTITUTED IN LIEU OF SHOTCRETE REPAIRS WITH THE APPROVAL OF THE ENGINEER.
- SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.



PROJECT NO. 15BPR.32
 AVERY COUNTY
 STRUCTURE: 050002

SHEET 5 OF 6

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ENGINEER OF RECORD
 12/12/2018

THOMAS K. KOCH
 ENGINEER
 15431

WETHERILL ENGINEERING

1223 Jones Franklin Rd.
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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

UPSTREAM HEADWALL
 AND WINGS

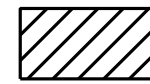
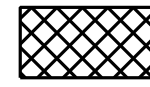
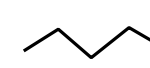
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			23

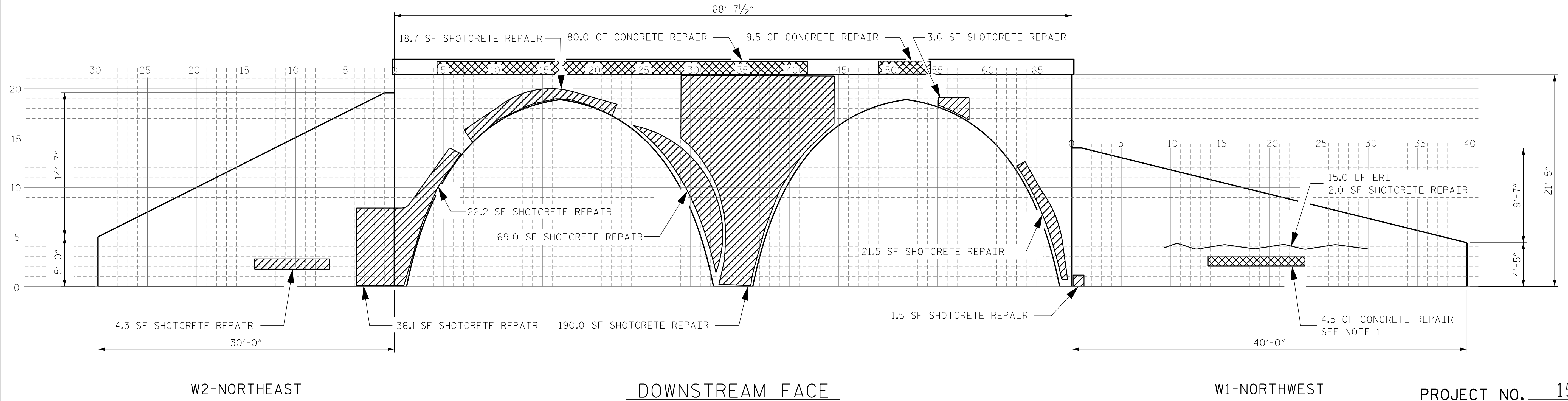
NOTES

1. SPALL IN CONCRETE BUILD-UP IN FRONT OF WING.
2. VALUES IN CHART REPRESENT ESTIMATED REPAIR TOTALS AFTER REMOVAL OF UNSOUND CONCRETE, MINIMUM OF 1" BEHIND REBAR AND MINIMUM 2" CLEARANCE TO SAWCUT. FOR REPAIR DETAILS, SEE "TYPICAL REPAIR DETAILS" SHEET
3. REPAIR LOCATIONS AND ESTIMATE OF QUANTITIES ARE BASED ON THE BEST INFORMATION AVAILABLE. IF ADDITIONAL REPAIRS NOT SHOWN ON THE DRAWINGS ARE DEEMED NECESSARY BY THE ENGINEER, THE ENGINEER WILL NOTE ON THE DRAWINGS THE APPROXIMATE LOCATION AND DESCRIPTION OF THE REPAIRS AND ENTER THE ACTUAL QUANTITIES INTO THE AS-BUILT REPAIR QUANTITY TABLE.
4. CONCRETE REPAIRS MAY BE SUBSTITUTED IN LIEU OF SHOTCRETE REPAIRS WITH THE APPROVAL OF THE ENGINEER.
5. SEE SHEET S-22 FOR CONCRETE REPAIR DETAILS.

AS-BUILT REPAIR QUANTITY TABLE

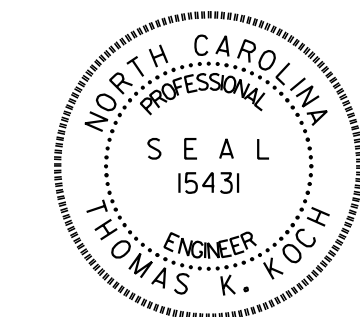
	QUANTITIES			
	ESTIMATE		ACTUAL	
SHOTCRETE REPAIRS	AREA SQ. FT.	VOLUME CU. FT.	AREA SQ. FT.	VOLUME CU. FT.
DOWNSTREAM FACE	368.9	184.5		
CONCRETE REPAIRS	VOLUME CU. FT.		VOLUME CU. FT.	
DOWNSTREAM FACE	94.0			
EPOXY RESIN INJECTION	LIN. FT.		LIN. FT.	
DOWNSTREAM FACE	15.0			

-  = SHOTCRETE REPAIR AREA
-  = CONCRETE REPAIR AREA
-  = EPOXY RESIN INJECTION (ERI)



PROJECT NO. 15BPR.32
AVERY COUNTY
 STRUCTURE: 050002
 SHEET 6 OF 6

ENGINEER OF RECORD
 12/12/2018



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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOWNSTREAM HEADWALL AND WINGS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			23

DRAWN BY: A. KLINK DATE: 07/18
 CHECKED BY: T. KOCH DATE: 08/18

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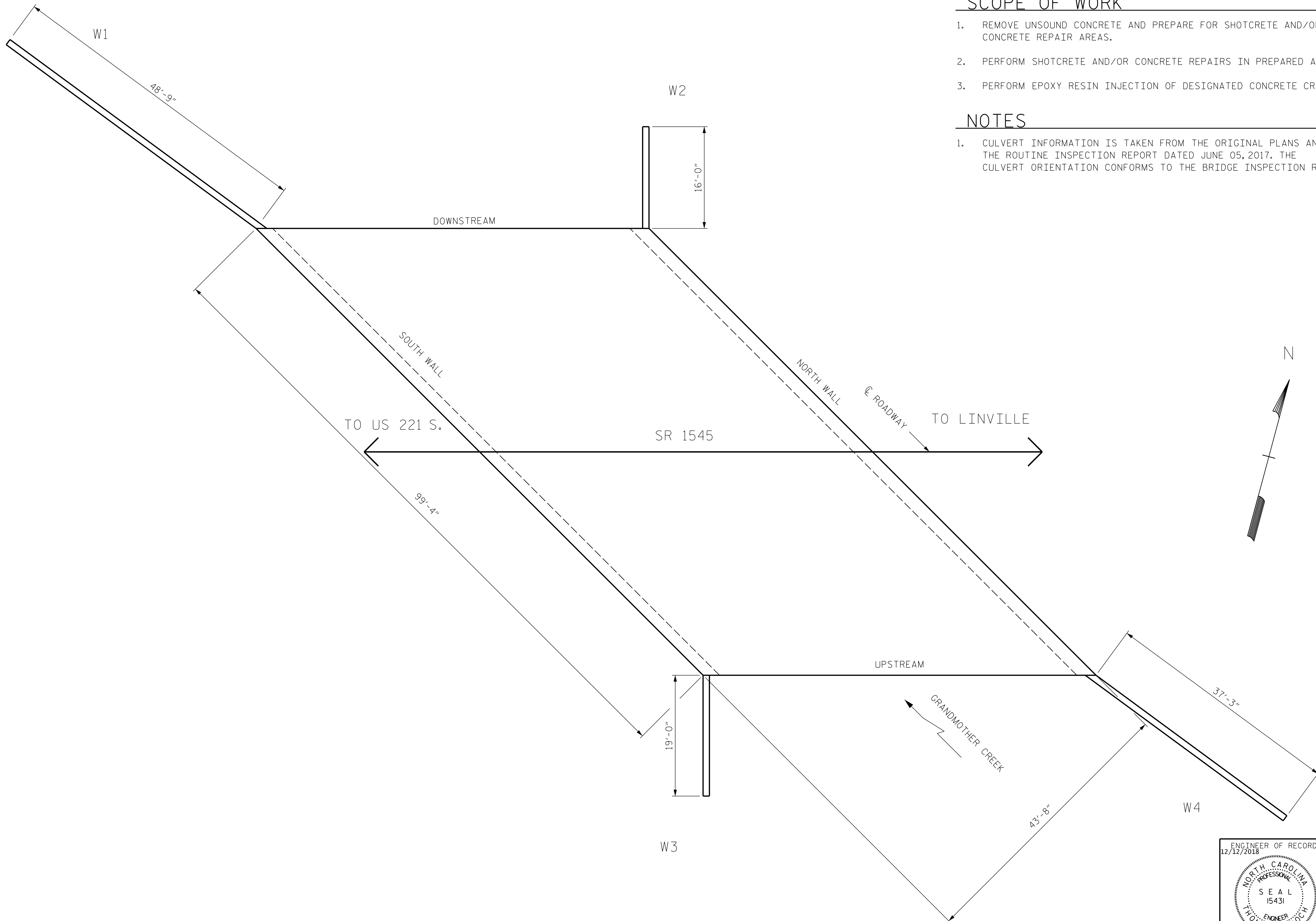
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SCOPE OF WORK

1. REMOVE UNSOUND CONCRETE AND PREPARE FOR SHOTCRETE AND/OR CONCRETE REPAIR AREAS.
2. PERFORM SHOTCRETE AND/OR CONCRETE REPAIRS IN PREPARED AREAS.
3. PERFORM EPOXY RESIN INJECTION OF DESIGNATED CONCRETE CRACKS.

NOTES

1. CULVERT INFORMATION IS TAKEN FROM THE ORIGINAL PLANS AND THE ROUTINE INSPECTION REPORT DATED JUNE 05, 2017. THE CULVERT ORIENTATION CONFORMS TO THE BRIDGE INSPECTION REPORT.



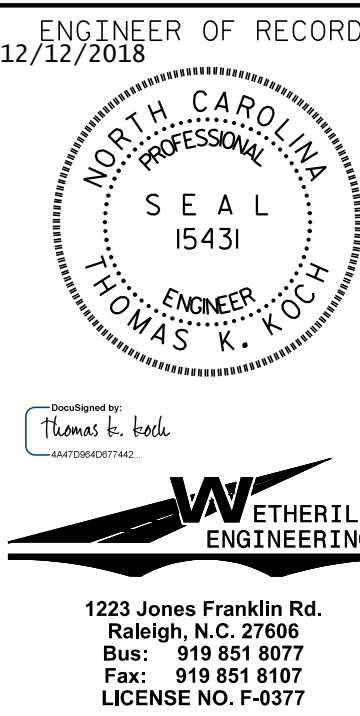
I HEREBY CERTIFY THAT THIS STRUCTURE WAS REHABILITATED ACCORDING TO THESE PLANS OR AS NOTED HEREIN

RESIDENT ENGINEER _____ DATE _____

PROJECT NO. 15BPR.32
AVERY COUNTY
 STRUCTURE: 050031

SHEET 1 OF 8

PLAN



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 GENERAL DRAWING
 28' x 14' REINFORCED
 CONCRETE ARCH CULVERT
 ON SR 1545 (LINVILLE AVE)
 OVER GRANDMOTHER CREEK

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			23

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