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CONTRACT: DN00122 PROJECT: 17BP.14.R.142

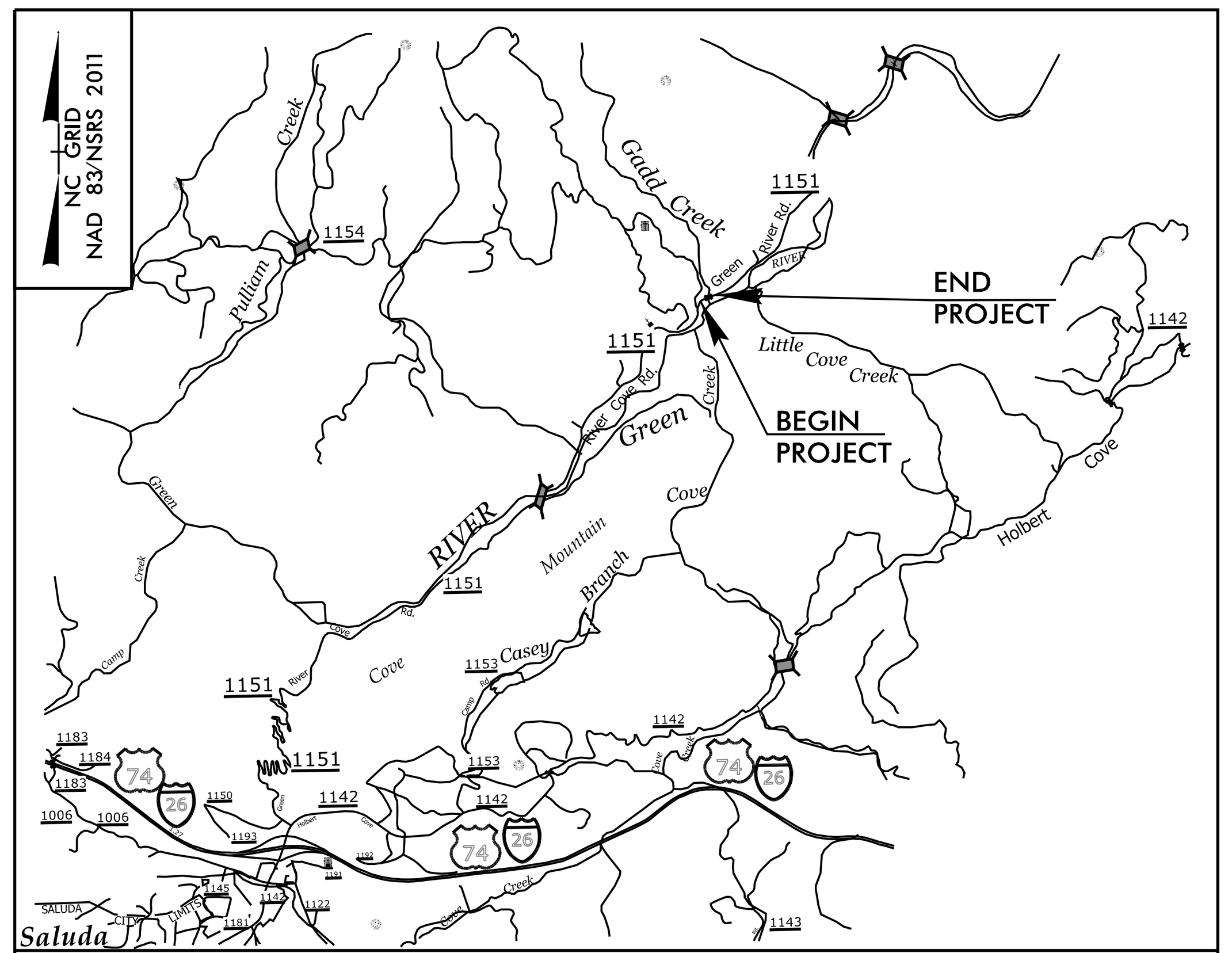
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.14.R.142		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
17BP.14.R.142	N/A	P.E.
17BP.14.R.142	N/A	R/W & UTIL.
17BP.14.R.142	N/A	CONST.

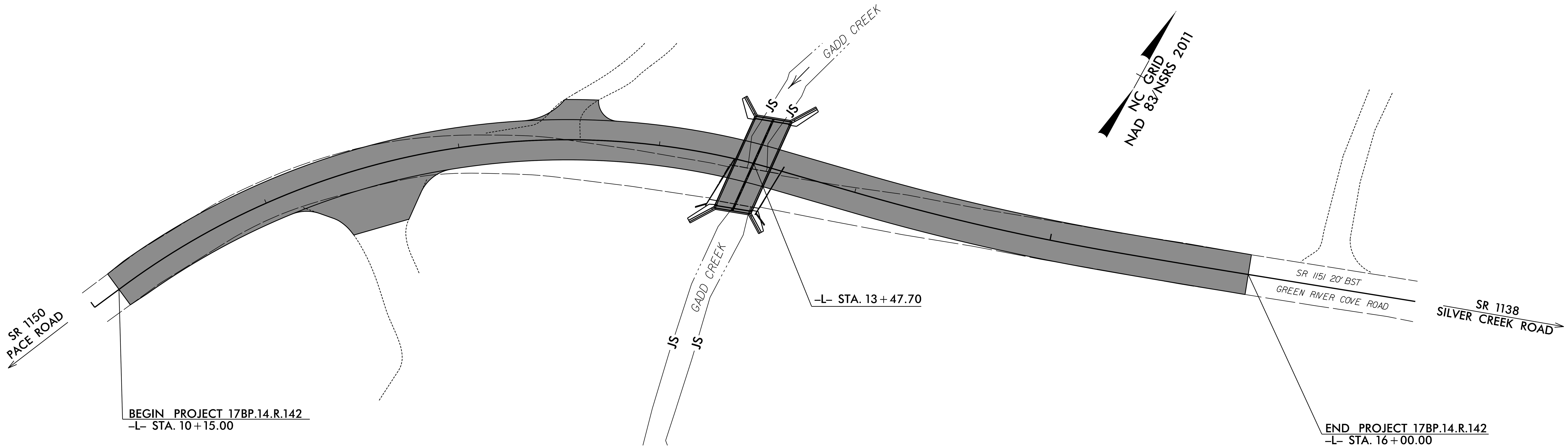
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

POLK COUNTY

REPLACES CULVERT NO. 740189 OVER GADDS CREEK ON SR 1151 (GREEN RIVER COVE ROAD)



VICINITY MAP



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Vaughn & Melton
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- Middlesboro, Kentucky 606-248-6600
- Spartanburg, South Carolina 864-574-4775
- Asheville, North Carolina 828-253-2796

CULVERT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DESIGN DATA

ADT 2016 = 190
ADT 2036 = 280
T = 6%
V = 35 MPH

FUNC CLASS = LOCAL
SUB REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT 17BP.14.R.142 = 0.111 MI

Prepared In the Office of:
VAUGHN & MELTON
1318-F PATTON AVE.
ASHEVILLE NC. 28806
FOR THE NORTH CAROLINA DIVISION OF HIGHWAYS

2012 STANDARD SPECIFICATIONS

LETTING DATE :

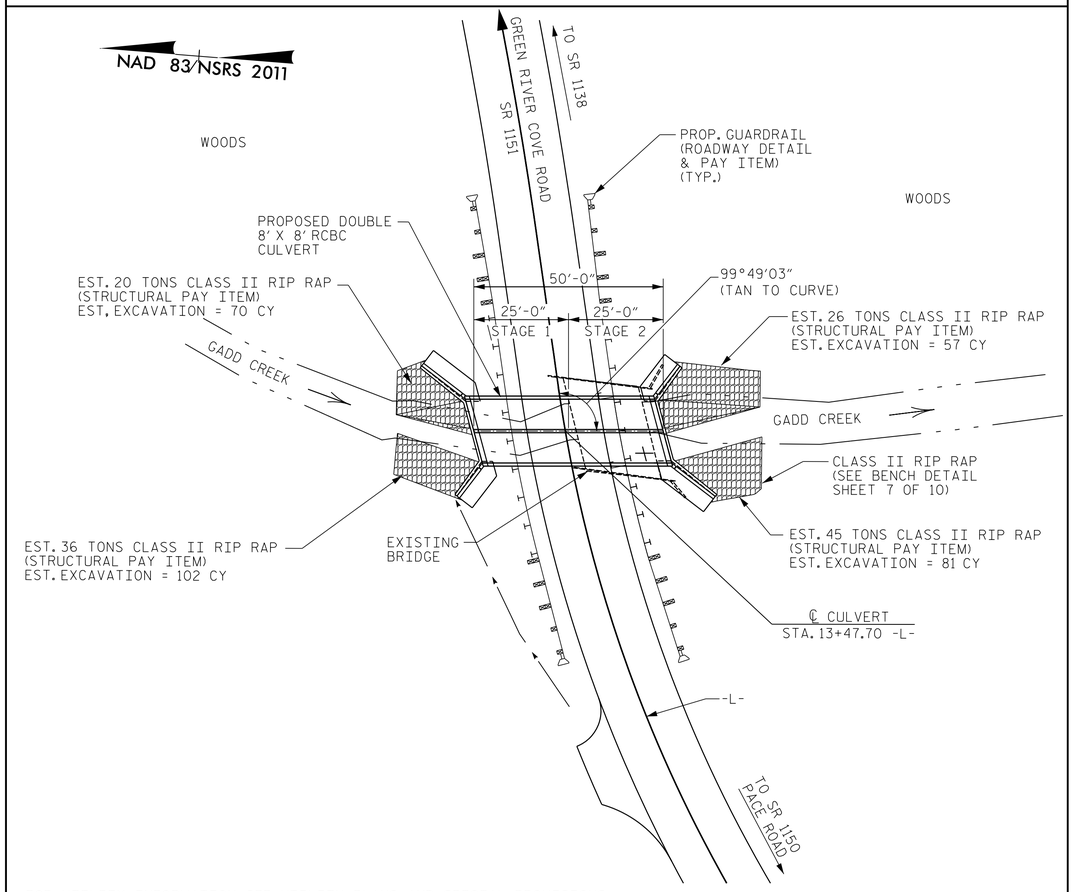
HARDY WILLIS, PE
PROJECT ENGINEER

RYAN SHIPMAN, EI
PROJECT DESIGN ENGINEER

STRUCTURES MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

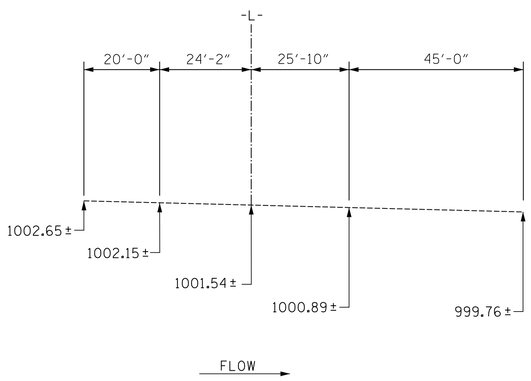
NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS
9/28/2017

BM #1: RR SPIKE IN BASE OF OAK, 27.9' LEFT OF -L- STA. 13+44.63
N 576248.28, E 1018005.79, EL. 1016.49'



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH



PROFILE ALONG ℄ CULVERT

NOTES:

ASSUMED LIVE LOAD ----------HL-93 OR ALTERNATE LOADING

DESIGN FILL----------MAX. = 4.090' MIN. = 3.942'

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER (SEE ALSO "STAGING DIAGRAM", SHEET C-3):

1. FOR STAGE 1A, WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS OF STAGE 1A, FULL HEIGHT, FOLLOWED BY ROOF SLAB AND HEADWALLS.
3. REPEAT SEQUENCE ABOVE FOR STAGES 1B, 2A, AND 2B.

THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

FOR CULVERT DIVERSION DETAILS AND PAY ITEMS, SEE EROSION CONTROL PLANS.

GRADE DATA

GRADE POINT ELEV. @ STA. 13+47.70 -L- = 1013.56±

BED ELEV. @ 13+47.70 -L- = 1001.54±

ROADWAY SLOPES 2:1

EXCAVATE ONE FOOT BELOW THE BOTTOM OF CULVERT AND WING FOOTING ELEVATIONS. REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING STRUCTURE CONSISTING OF A SINGLE SPAN, 26.0 FOOT LONG AND 18'-7 7/16" WIDE BRIDGE WITH TIMBER FLOOR ON STEEL I-BEAMS ON TIMBER ABUTMENTS AND LOCATED AT THE PROPOSE STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS, ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 13+47.70 -L-.

A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 650 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 1008.30 FT
BASE DISCHARGE	= 950 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 1009.30 FT
DRAINAGE AREA	= 1.92 SQ.MI.
W.S. ELEVATION AT DATE OF SURVEY (4/17/2013)	= 1004.20 FT

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 1530 CFS
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING ELEVATION	= 1011.00 FT

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
BARREL @ 1.90 CY/FT	95.2	C.Y.
WINGS ETC.	32.1	C.Y.
TOTAL	127.3	C.Y.
REINFORCING STEEL		
BARREL	15,162	LBS.
WINGS ETC.	2,118	LBS.
TOTAL	17,280	LBS.
CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	65	TONS
REMOVAL OF EXISTING STRUCTURE	LUMP SUM	
CHANNEL SUBSTRATE MATERIAL	72	TONS
RIP-RAP, CLASS II	127	TONS
ASBESTOS ASSESSMENT	LUMP SUM	

HORIZ. CURVE DATA

PI STA. = 14+65.33
Δ = 6° 17' 24.3"(LT)
D = 4° 53' 49.5"
L = 128.45'
T = 64.29'
R = 1,170.00'
SE = 0.04
RO = 34.5

PROJECT NO. 17BP.14.R.142

POLK COUNTY

STATION: 13+47.70 -L-

SHEET 1 OF 10 REPLACE BRIDGE No. 189

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NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILKINS

DocuSigned by: Hardy Wilkins 3/18/2015 CC287FCFD223A...

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

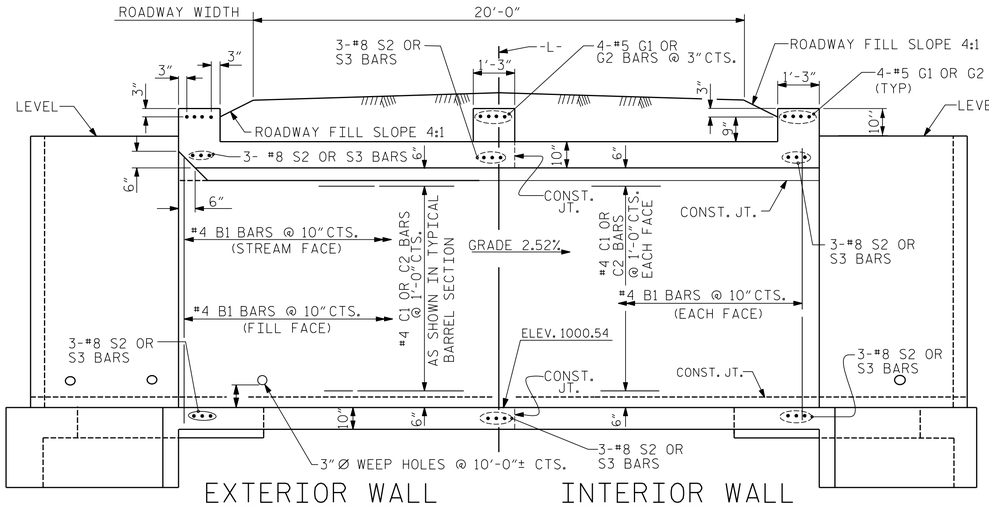
DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT 105° SKEW

DRAWN BY: RWW	DATE: 3/2015
CHECKED BY: HLW	DATE: 3/2015
DES. EGR. OF RECORD: RTS	DATE: 3/2015

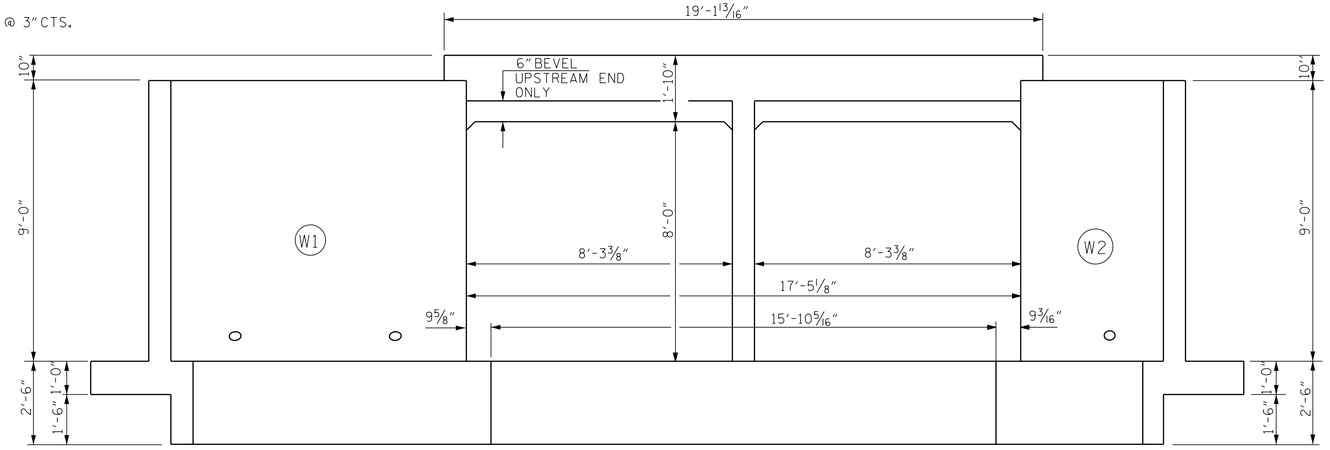
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-1
1			3			TOTAL SHEETS
2			4			10

STD. NO. CB222A

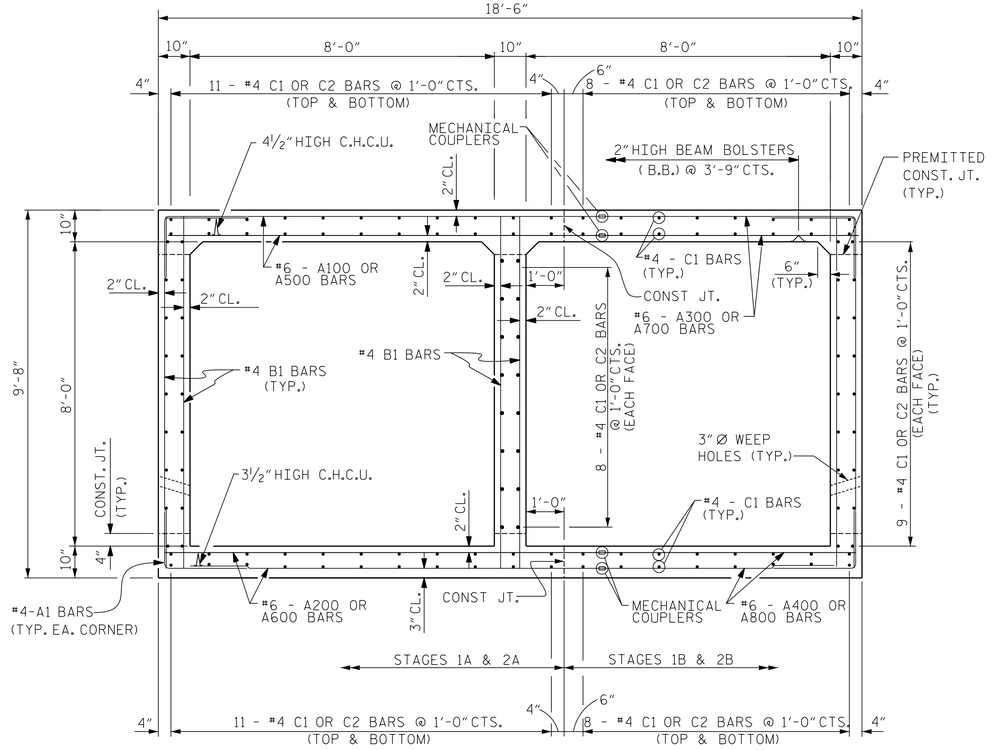
ADDED NOV. 1990



CULVERT SECTION NORMAL TO ROADWAY

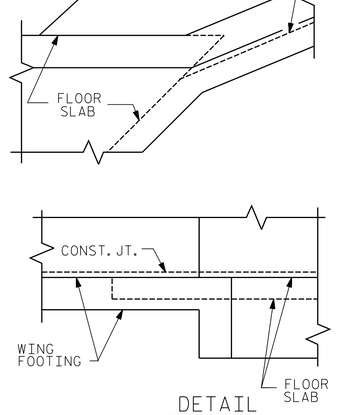


END ELEVATION NORMAL TO SKEW



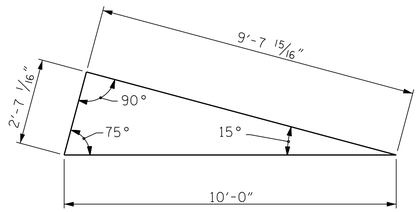
RIGHT ANGLE SECTION OF BARREL

THERE ARE 128 "C" BARS IN SECTION OF BARREL.



DETAIL

CONNECTION OF WING FOOTING AND FLOOR SLAB WHEN WING FOOTING IS THICKER THAN SLAB



SKEW TRIANGLE

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.
REDRAWN 11-90 BY A.R.B. CHECKED BY C.R.K.

ASSEMBLED BY : R.W.W.	DATE : MAR. 2015	SPECIAL	
CHECKED BY : H.L.W.	DATE : MAR. 2015		
DRAWN BY : W. BRYAN STANLEY II	DATE : NOV.1971	STANDARD	
CHECKED BY : JOEL A. JOHNSON	DATE : DEC.1971		

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NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS
DocuSigned by: Hardy Willis 4/28/2017
CC287FCF0223461...

PROJECT NO. 17BP.14.R.142

POLK COUNTY

STATION: 13+47.70 -L-

SHEET 2 OF 10

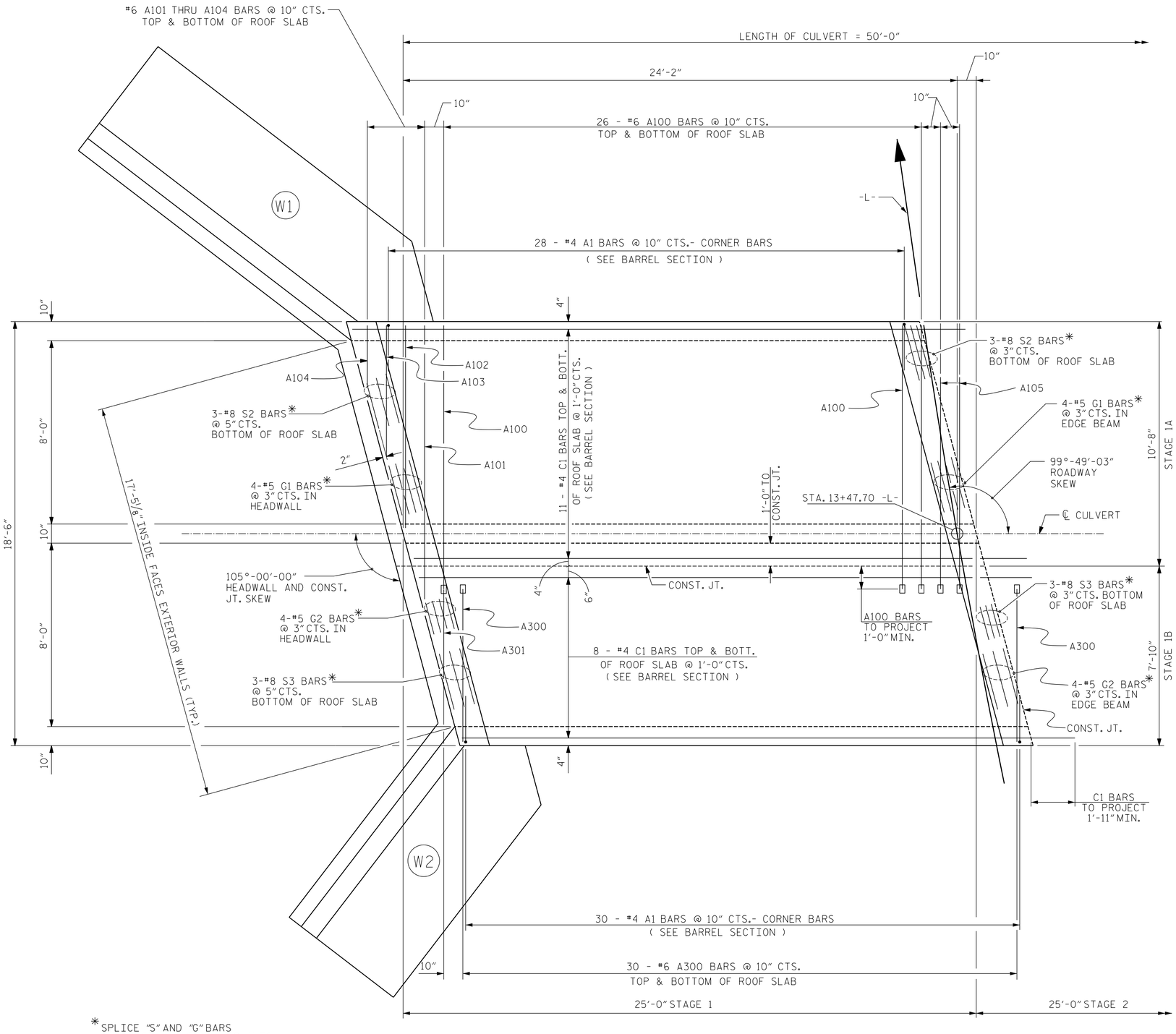
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT 105° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-2
1			3			TOTAL SHEETS
2			4			10

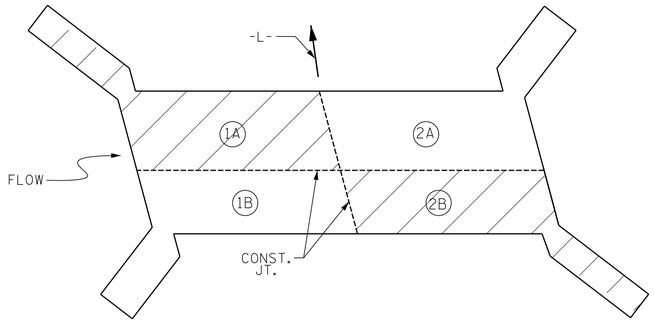
STD. NO. CB222



*SPLICE "S" AND "G" BARS AT CONST. JT. USING MECHANICAL COUPLERS.

ROOF SLAB PLAN

STAGE 1



STAGING DIAGRM

CONSTRUCT THE CULVERT IN THE FOLLOWING SEQUENCE:
1A, 1B, 2A, AND 2B.
SHIFT TRAFFIC BETWEEN 1B AND 2A.

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NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS

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4/28/2017

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PROJECT NO. 17BP.14.R.142

POLK COUNTY

STATION: 13+47.70 -L-

SHEET 3 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT 105° SKEW STAGE 1

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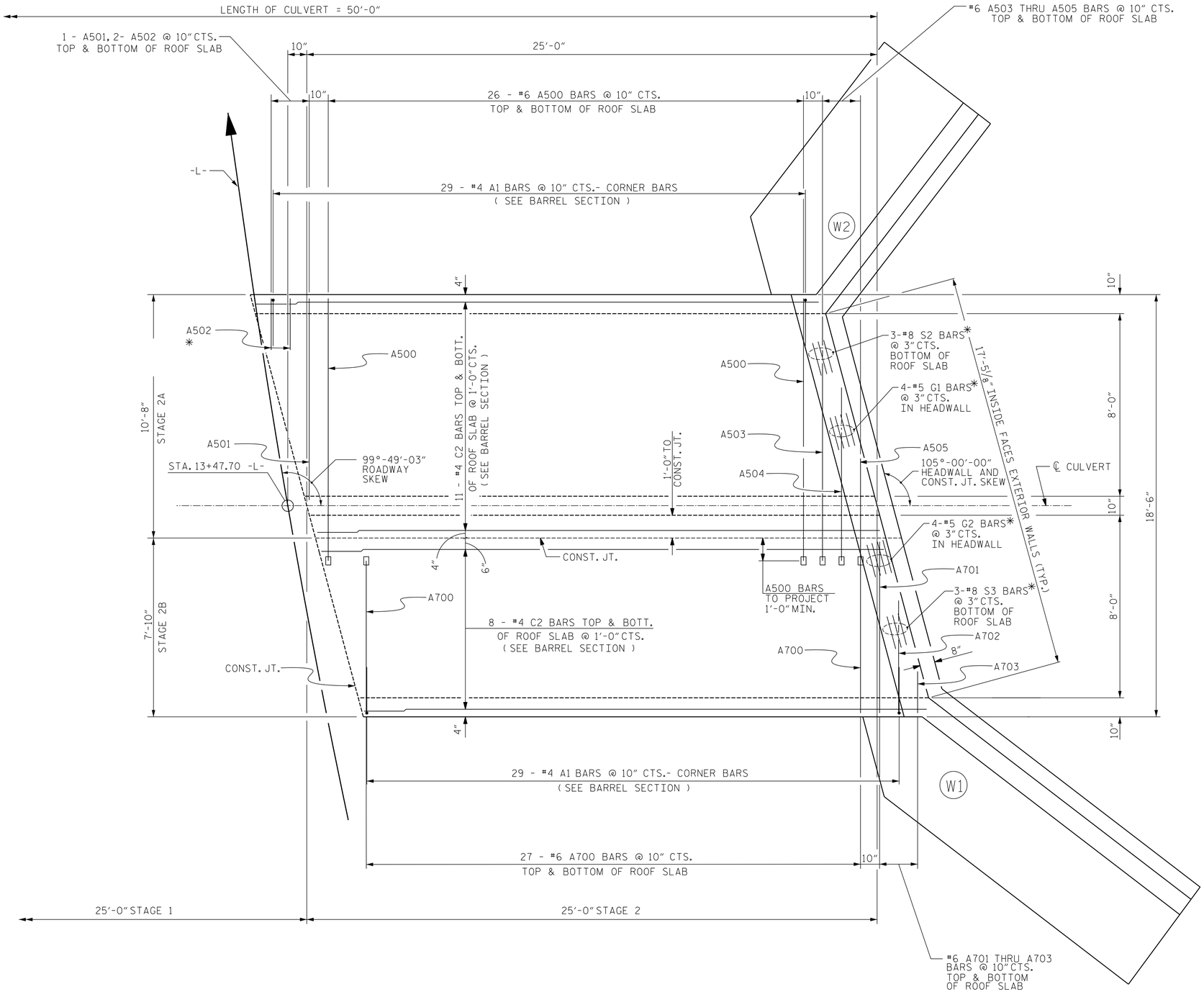
NO.	BY:	DATE:	NO.	BY:	DATE:	C-3
1			3			TOTAL SHEETS
2			4			10



* SPLICE "S" AND "G" BARS AT CONST. JT. USING MECHANICAL COUPLERS.

ROOF SLAB PLAN

STAGE 2

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NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS

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PROJECT NO. 17BP.14.R.142

POLK COUNTY

STATION: 13+47.70 -L-

SHEET 4 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT 105° SKEW STAGE 2

DRAWN BY: RWW	DATE: 3/2015	
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DES. EGR. OF RECORD: RTS	DATE: 3/2015	

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
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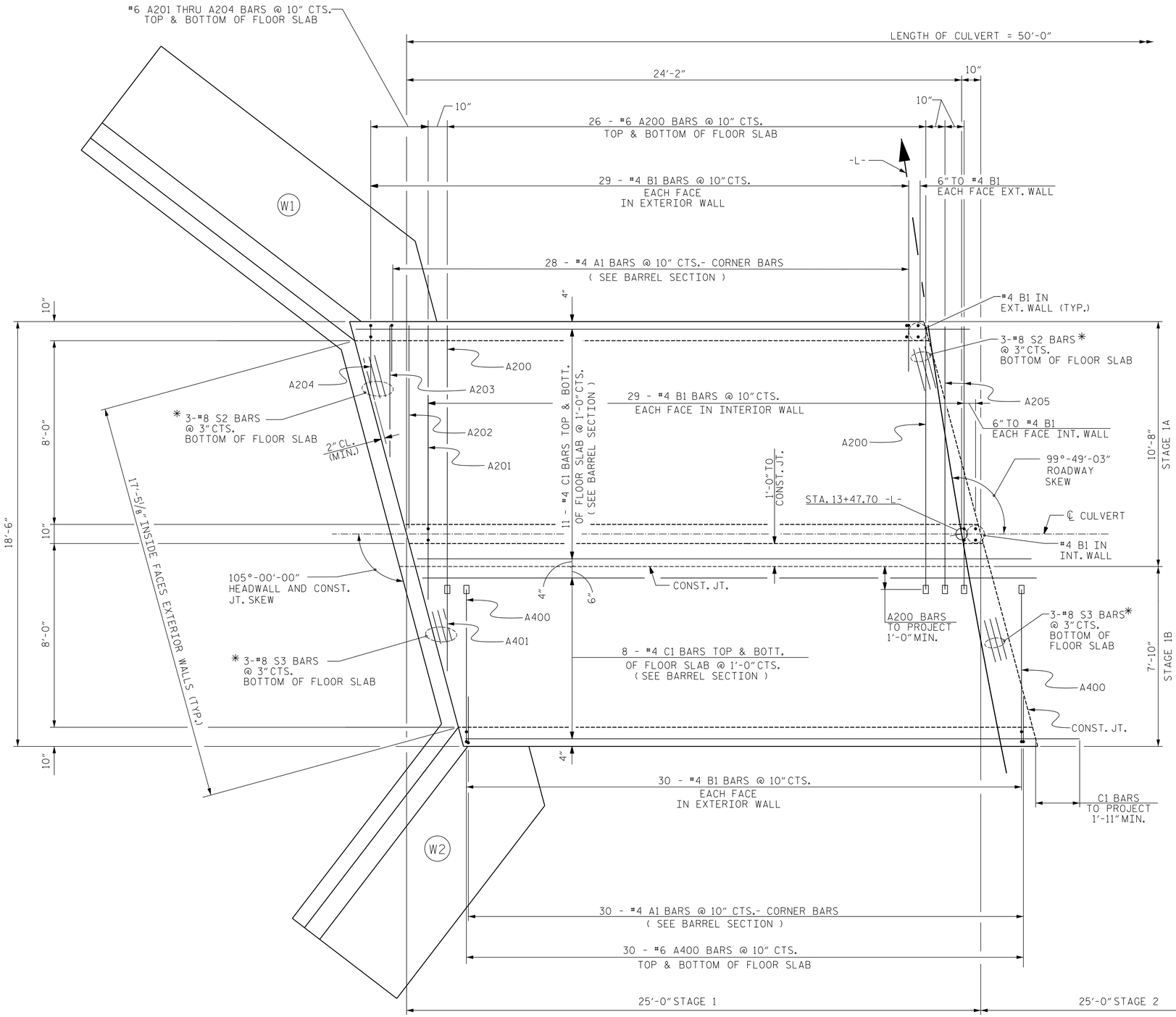

* SPLICE "S" AND "G" BARS AT CONST. JT. USING MECHANICAL COUPLERS.

FLOOR SLAB PLAN

STAGE 1

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NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS

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10/28/2017

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PROJECT NO. 17BP.14.R.142

POLK COUNTY

STATION: 13+47.70 -L-

SHEET 5 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT 105° SKEW STAGE 1

DRAWN BY: RWW	DATE: 3/2015	
CHECKED BY: HLW	DATE: 3/2015	
DES. EGR. OF RECORD: RTS	DATE: 3/2015	

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
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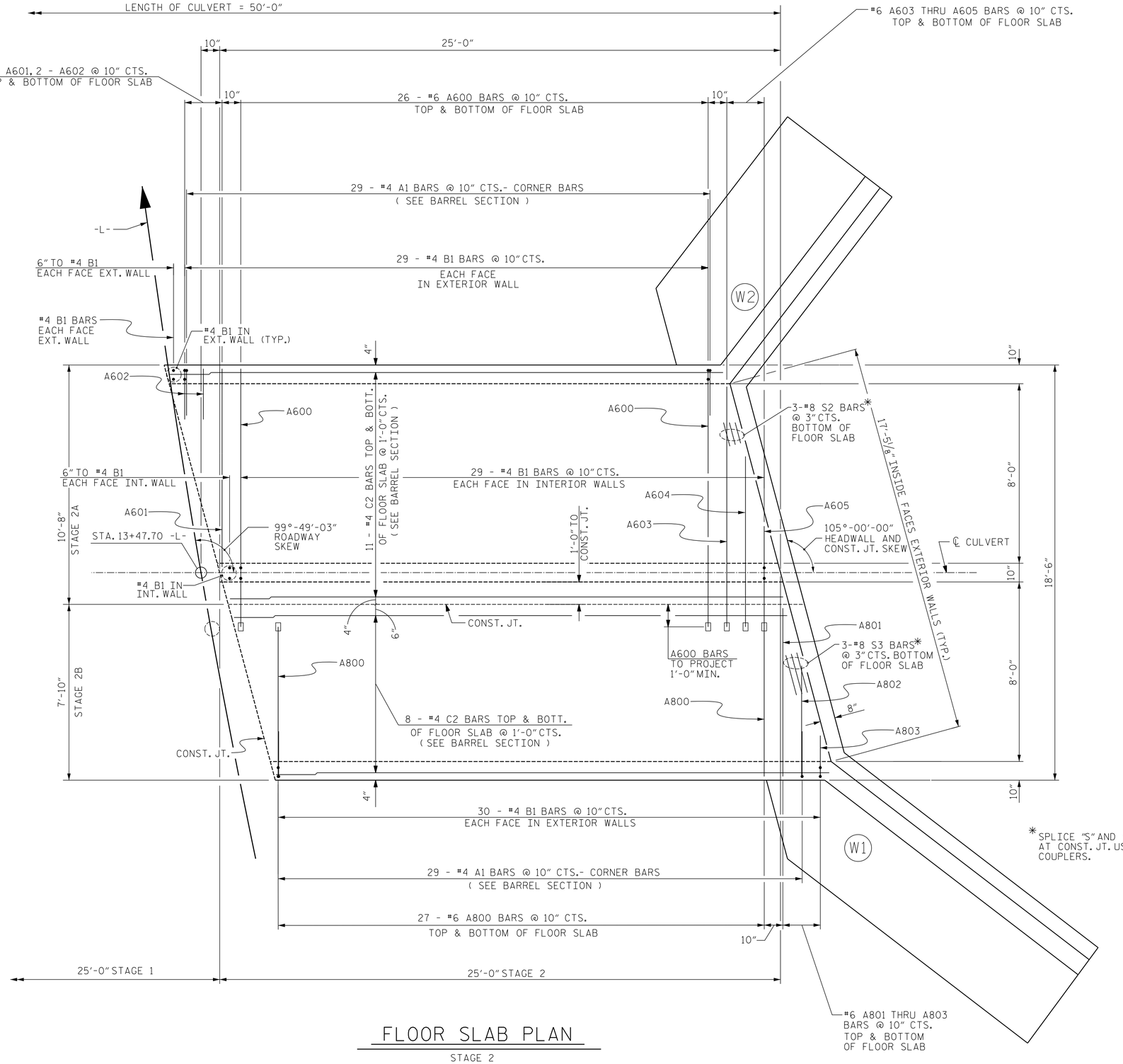

* SPLICE "S" AND "G" BARS AT CONST. JT. USING MECHANICAL COUPLERS.

FLOOR SLAB PLAN

STAGE 2

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NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS

DocuSigned by: HardyWillis CC287FCF0223461...

1/28/2017

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PROJECT NO. 17BP.14.R.142

POLK COUNTY

STATION: 13+47.70 -L-

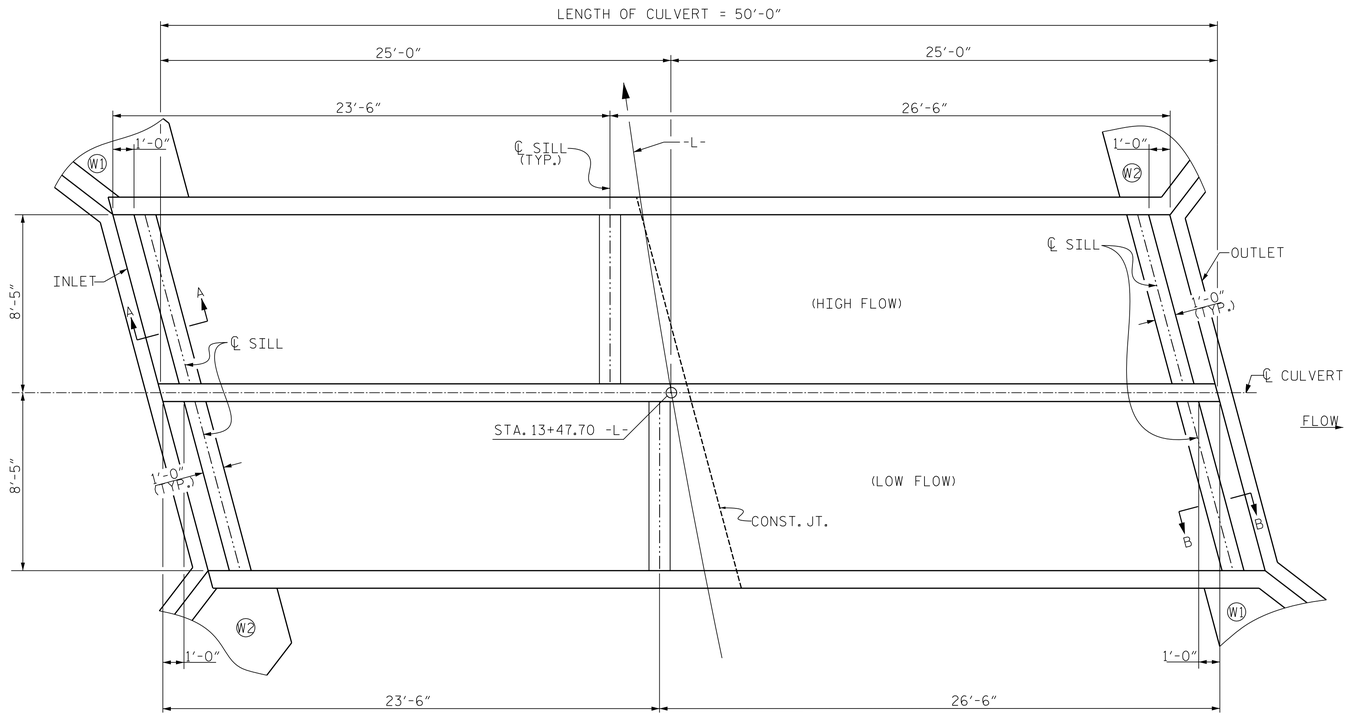
SHEET 6 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT 105° SKEW STAGE 2

DRAWN BY: RWW	DATE: 3/2015	
CHECKED BY: HLW	DATE: 3/2015	
DES. EGR. OF RECORD: RTS	DATE: 3/2015	

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6
1			3			TOTAL SHEETS
2			4			10



CULVERT SILL LAYOUT

NOTES

NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OF FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW CULVERT BARREL. IF RIP RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL. NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

THE STOCKPILED NATIVE MATERIAL SHALL BE PLACED AS SHOWN IN THE "PLAN OF FLOOR SILL LAYOUT "SKETCH TO PROVIDE A 1'-0" DEPTH LOW FLOW CHANNEL BETWEEN LOW FLOW SILLS, AND SHALL BE PLACED TO A DEPTH OF 2'-0" BETWEEN HIGH FLOW SILLS.

SUPPLEMENTAL STONE OF SIMILAR CHARACTERISTIC OF THE NATIVE MATERIAL MAY BE USED AS NECESSARY WITH APPROVAL BY ENGINEER.

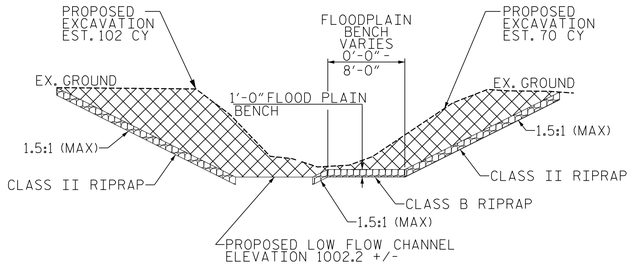
THE ENTIRE COST OF WORK REQUIRED TO PLACE THE EXCAVATED MATERIAL SHALL BE INCLUDED IN THE CONTRACT PRICE BID FOR CHANNEL SUBSTRATE MATERIAL.

THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

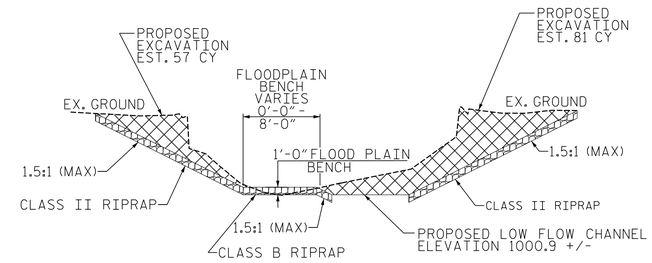
TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

DO NOT SET ELEVATION OF HIGH SILL ABOVE BANK FILL.

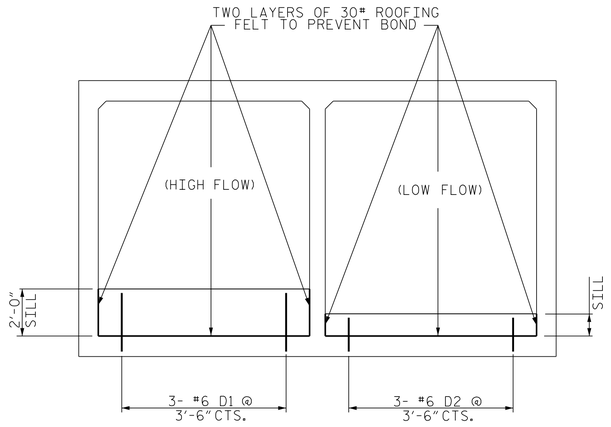
NUMBER OF SILLS DETERMINED BY THE ENGINEER.



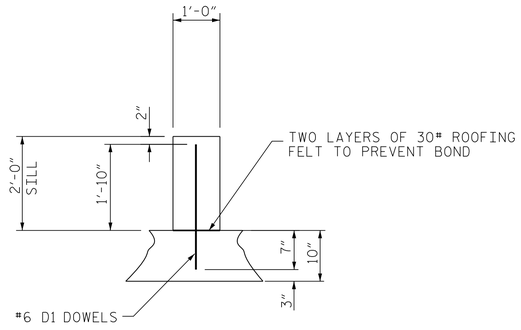
INLET CHANNEL
& FLOODPLAIN BENCH PROFILE
(LOOKING UPSTREAM)



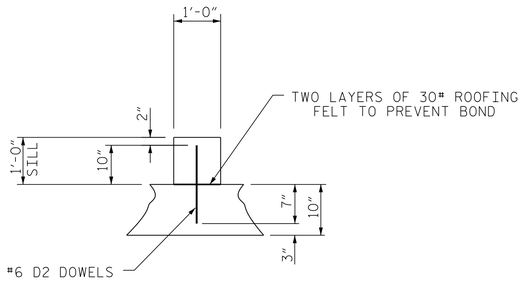
OUTLET CHANNEL
& FLOODPLAIN BENCH PROFILE
(LOOKING DOWNSTREAM)



END ELEVATION
LOOKING DOWNSTREAM



SECTION "A-A"
DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOATED.



SECTION "B-B"
DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOATED.

SILL DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER R. L. WILLIS
DocuSigned by: Hardy Willis
CC287FCF0223461...
4/28/2017

PROJECT NO. 17BP.14.R.142
POLK COUNTY
STATION: 13+47.70 -L-
SHEET 7 OF 10

V&M Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Atlanta, GA 770-627-3509

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT 105° SKEW

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY: RWW	DATE: 3/2015	
CHECKED BY: HLW	DATE: 3/2015	
DES. EGR. OF RECORD: RTS	DATE: 3/2015	

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

SHEET NO. C-7
TOTAL SHEETS 10

BILL OF MATERIAL

STAGE 1A

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	56	4	①	5'-7"	209
A100	52	6	STR.	11'-6"	898
A101	2	6	STR.	11'-11"	36
A102	2	6	STR.	8'-10"	27
A103	2	6	STR.	5'-8"	17
A104	2	6	STR.	2'-7"	8
A105	4	6	STR.	9'-2"	55
A200	52	6	STR.	11'-6"	898
A201	2	6	STR.	11'-11"	36
A202	2	6	STR.	8'-10"	27
A203	2	6	STR.	5'-8"	17
A204	2	6	STR.	2'-7"	8
A205	4	6	STR.	9'-2"	55
B1	120	4	STR.	9'-3"	741
C1	78	4	STR.	26'-9"	1394
D1	6	6	STR.	2'-5"	22
G1	8	5	STR.	11'-10"	99
S2	12	8	STR.	11'-10"	379

REINFORCING STEEL (STAGE 1A): 4,926 LB.

CLASS A CONCRETE (STAGE 1A)

CULVERT BARREL 29.2 C.Y.

SILLS 1.2 C.Y.

STAGE 1B

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	60	4	①	5'-7"	224
A300	60	6	STR.	6'-8"	601
A301	2	6	STR.	3'-6"	11
A400	60	6	STR.	6'-8"	601
A401	2	6	STR.	3'-6"	11
B1	60	4	STR.	9'-3"	371
C1	50	4	STR.	26'-9"	893
D2	6	6	STR.	1'-5"	13
G2	8	5	STR.	6'-11"	58
S3	12	8	STR.	6'-11"	222

REINFORCING STEEL (STAGE 1B): 3,005 LB.

CLASS A CONCRETE (STAGE 1B)

CULVERT BARREL 18.4 C.Y.

SILLS 0.6 C.Y.

STAGE 2A

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	58	4	①	5'-7"	216
A500	52	6	STR.	11'-6"	898
A501	2	6	STR.	8'-10"	27
A502	4	6	STR.	2'-3"	14
A503	2	6	STR.	10'-8"	32
A504	2	6	STR.	7'-7"	23
A505	2	6	STR.	4'-5"	13
A600	52	6	STR.	11'-6"	898
A601	2	6	STR.	8'-10"	27
A602	4	6	STR.	2'-3"	14
A603	2	6	STR.	10'-8"	32
A604	2	6	STR.	7'-7"	23
A605	2	6	STR.	4'-5"	13
B1	120	4	STR.	9'-3"	741
C2	78	4	STR.	24'-8"	1285
D1	3	6	STR.	2'-5"	11
G1	4	5	STR.	11'-10"	49
S2	6	8	STR.	11'-10"	190

REINFORCING STEEL (STAGE 2A): 4,506 LB.

CLASS A CONCRETE (STAGE 2A)

CULVERT BARREL 29.2 C.Y.

SILLS 0.6 C.Y.

STAGE 2B

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	58	4	①	5'-7"	216
A700	54	6	STR.	6'-8"	541
A701	2	6	STR.	7'-6"	23
A702	2	6	STR.	4'-11"	15
A703	2	6	STR.	1'-9"	5
A800	54	6	STR.	6'-8"	541
A801	2	6	STR.	7'-6"	23
A802	2	6	STR.	4'-11"	15
A803	2	6	STR.	1'-9"	5
B1	60	4	STR.	9'-3"	371
C2	50	4	STR.	24'-8"	824
D2	3	6	STR.	1'-5"	6
G2	4	5	STR.	6'-11"	29
S3	6	8	STR.	6'-11"	111

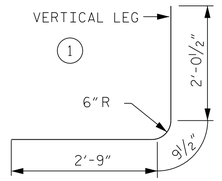
REINFORCING STEEL (STAGE 2B): 2,725 LB.

CLASS A CONCRETE (STAGE 2B)

CULVERT BARREL 18.4 C.Y.

SILLS 0.3 C.Y.

BAR TYPES



BAR DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTH CHART

BAR SIZE	SPLICE LENGTH
#4	1'-9"
#5	2'-2"
#6	2'-9"

TOTAL REINFORCING STEEL: 15,162 LB.

TOTAL CLASS A CONCRETE

CULVERT BARREL 95.2 C.Y.

SILLS 2.7 C.Y.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS

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3/28/2017

Vaughn & Melton
Consulting Engineers
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PROJECT NO. 17BP.14.R.142

POLK COUNTY

STATION: 13+47.70 -L-

SHEET 8 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

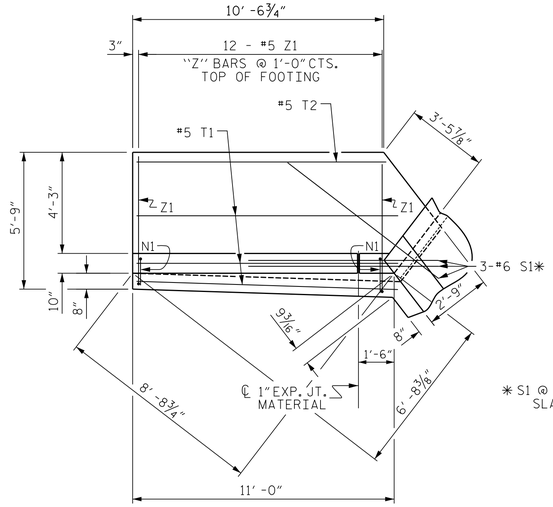
DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT 105° SKEW

DRAWN BY: RWW DATE: 3/2015

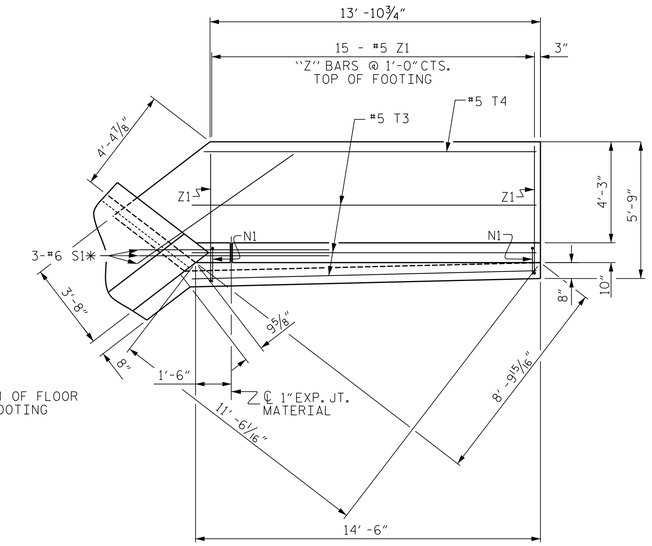
CHECKED BY: HLW DATE: 3/2015

DES. EGR. OF RECORD: RTS DATE: 3/2015

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-8
1			3			TOTAL SHEETS
2			4			10



PLAN W2

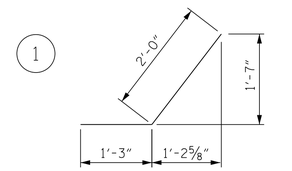


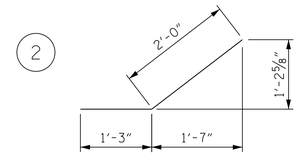
✱S1 @ BOTTOM OF FLOOR SLAB & FOOTING

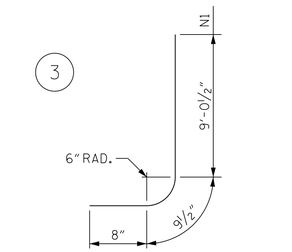
PLAN W1

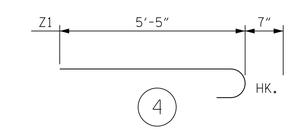
BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.









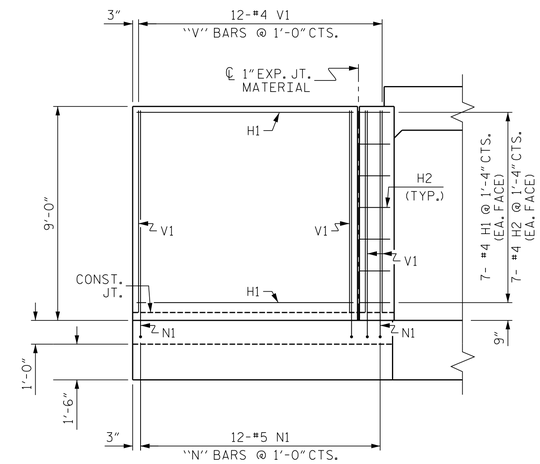
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	28	#4	STR	9′-1″	170
H2	28	#4	1	3′-3″	61
H3	28	#4	STR	12′-7″	235
H4	28	#4	2	3′-3″	61
N1	54	#5	3	10′-6″	591
S1	12	#6	STR	8′-0″	144
T1	6	#5	STR	11′-0″	69
T2	2	#5	STR	10′-6″	22
T3	6	#5	STR	14′-6″	91
T4	2	#5	STR	14′-0″	29
V1	54	#4	STR	8′-6″	307
Z1	54	#5	4	6′-0″	338

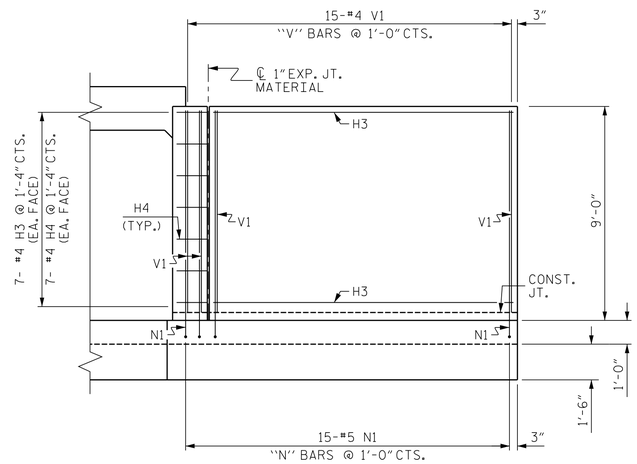
REINFORCING STEEL FOR 4 WINGS 2,118 LBS

CLASS A CONCRETE

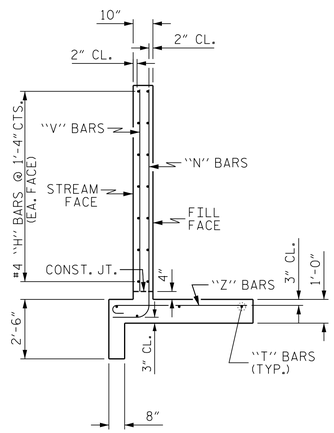
4 WINGS	27.3	CY
2 HEADWALLS	1.8	CY
1 EDGE BEAM	.9	CY
2 END CURTAIN WALLS	2.1	CY
TOTAL	32.1	CY



ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION

DocuSigned by: Hardy L. Willis CC287FCF0223461... 4/28/2017

NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS

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PROJECT NO. 17BP.14.R.142

POLK COUNTY

STATION: 13+47.70 -L-

SHEET 9 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR CONCRETE BOX CULVERT

H = 8′-0″ SLOPE = 4:1

105° SKEW

DRAWN BY: RWW DATE: 3/2015
CHECKED BY: HLW DATE: 3/2015
DES. EGR. OF RECORD: RTS DATE: 3/2015

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

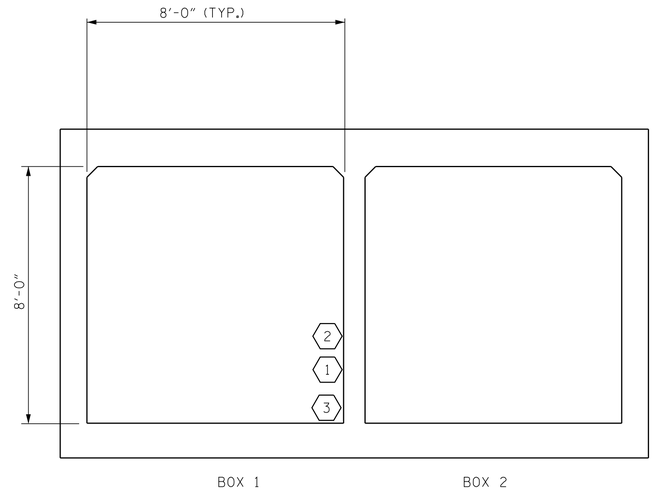
SHEET NO. C-9

TOTAL SHEETS 10

STD. NO. CW7508

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT				SHEAR				
								RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	⟨1⟩	1.57	--	1.75	1.81	1	EXTERIOR WALL	8.33	1.57	1	BOTTOM SLAB	7.82	
		HL-93 (OPERATING)	N/A		2.04	--	1.35	2.35	1	EXTERIOR WALL	8.33	2.04	1	BOTTOM SLAB	7.82	·
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.57	56.52	1.75	1.85	1	BOTTOM SLAB	8.42	1.57	1	BOTTOM SLAB	7.82	·
		HS-20 (OPERATING)	36.000	·	2.04	73.44	1.35	2.40	1	BOTTOM SLAB	8.42	2.04	1	TOP SLAB	7.82	·
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	·	2.97	40.10	1.40	2.97	1	EXTERIOR WALL	8.33	2.97	1	TOP SLAB	7.82	·
		SNGARBS2	20.000	·	2.76	55.20	1.40	2.84	1	EXTERIOR WALL	8.33	2.76	1	TOP SLAB	7.82	·
		SNAGRIS2	22.000	·	2.87	63.14	1.40	2.97	1	EXTERIOR WALL	8.33	2.87	1	BOTTOM SLAB	7.82	·
		SNCOTTS3	27.250	·	2.23	60.77	1.40	2.74	1	BOTTOM SLAB	8.42	2.23	1	BOTTOM SLAB	7.82	·
		SNAGGRS4	34.925	·	1.90	66.36	1.40	2.35	1	BOTTOM SLAB	8.42	1.90	1	BOTTOM SLAB	7.82	·
		SNS5A	35.550	·	2.21	78.57	1.40	2.73	1	BOTTOM SLAB	8.42	2.21	1	BOTTOM SLAB	7.82	·
		SNS6A	39.950	·	2.26	90.29	1.40	2.79	1	BOTTOM SLAB	8.42	2.26	1	BOTTOM SLAB	7.82	·
		SNS7B	42.000	·	2.43	102.06	1.40	2.99	1	BOTTOM SLAB	8.42	2.43	1	BOTTOM SLAB	7.82	·
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	·	2.30	75.90	1.40	2.82	1	BOTTOM SLAB	8.42	2.30	1	BOTTOM SLAB	7.82	·
		TNT4A	33.075	·	2.47	81.70	1.40	3.04	1	BOTTOM SLAB	8.42	2.47	1	BOTTOM SLAB	7.82	·
		TNT6A	41.600	·	2.52	104.83	1.40	3.10	1	BOTTOM SLAB	8.42	2.52	1	BOTTOM SLAB	7.82	·
		TNT7A	42.000	·	2.77	116.34	1.40	3.41	1	BOTTOM SLAB	8.42	2.77	1	BOTTOM SLAB	7.82	·
		TNT7B	42.000	·	2.77	116.34	1.40	3.41	1	BOTTOM SLAB	8.42	2.77	1	BOTTOM SLAB	7.82	·
		TNAGRIT4	43.000	⟨3⟩	1.90	81.70	1.40	2.34	1	BOTTOM SLAB	8.42	1.90	1	BOTTOM SLAB	7.82	·
		TNAGT5A	45.000	·	2.07	93.15	1.40	2.55	1	BOTTOM SLAB	8.42	2.07	1	BOTTOM SLAB	7.82	·
		TNAGT5B	45.000	·	2.07	93.15	1.40	2.55	1	BOTTOM SLAB	8.42	2.07	1	BOTTOM SLAB	7.82	·



LRFR SUMMARY

(LOOKING DOWNSTREAM)

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

1.
2.
3.
4.

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

PROJECT NO. 17BP.14.R.142

POLK COUNTY

STATION: 13+47.70 -L-

SHEET 10 OF 10

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NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-10
1			3			TOTAL SHEETS
2			4			10

STD. NO. LRFR5

ASSEMBLED BY : RWW	DATE : 3/2015	
CHECKED BY : HLW	DATE : 3/2015	
DRAWN BY : WMC 7/11	REV. 10/1/11	MAA/GM
CHECKED BY : GM 7/11		

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.
- AASHTO M270 GRADE 50W	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	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 2012 "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 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 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 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 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø 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 5/16" 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 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

REV. 6-16-95 EEM (/) RGW REV. 5-7-03 RWW (/) JTE REV. 10-1-11 MAA (/) GM
REV. 8-16-99 RWW (/) LES REV. 5-1-06 TLA (/) GM