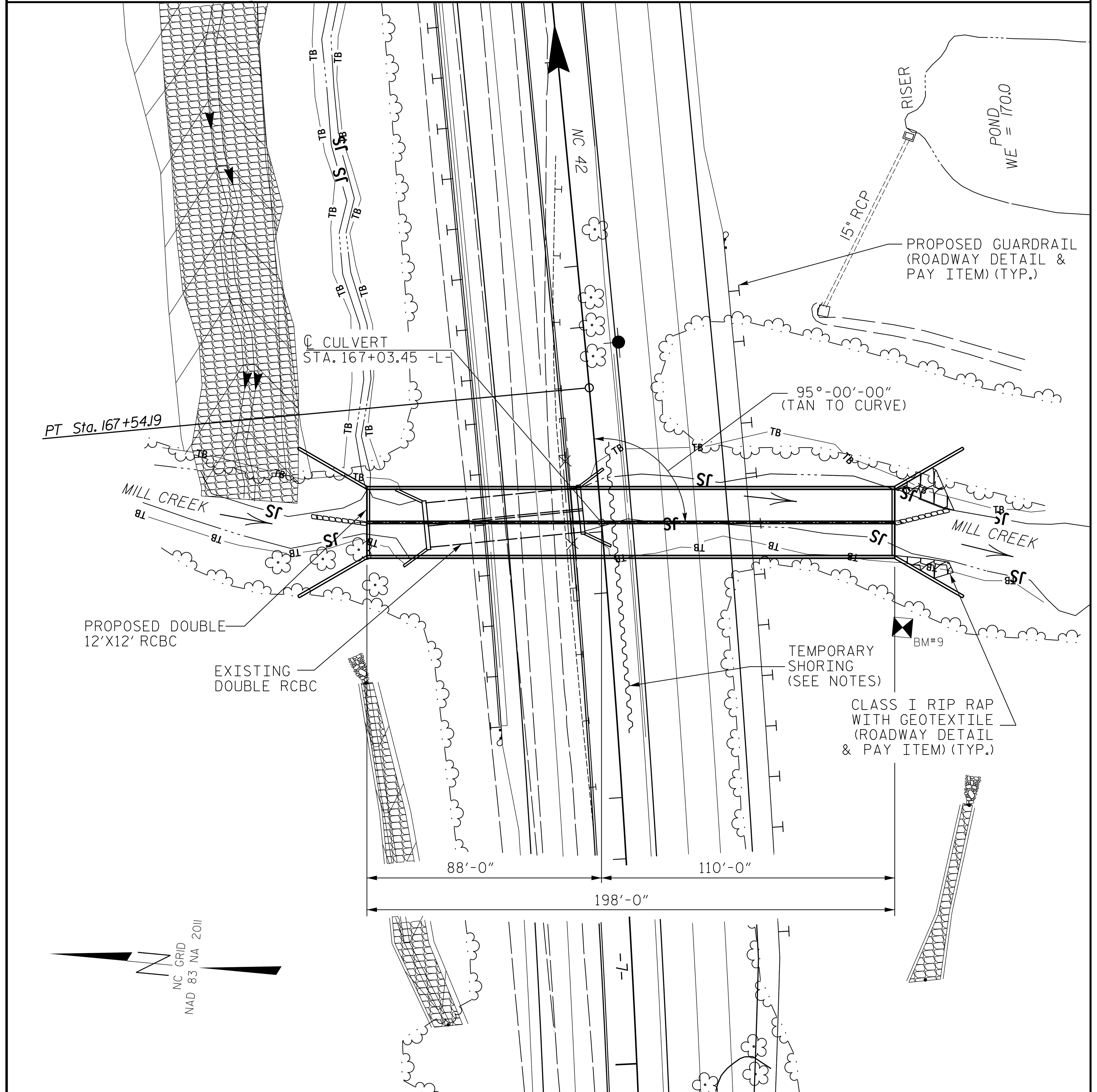
This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

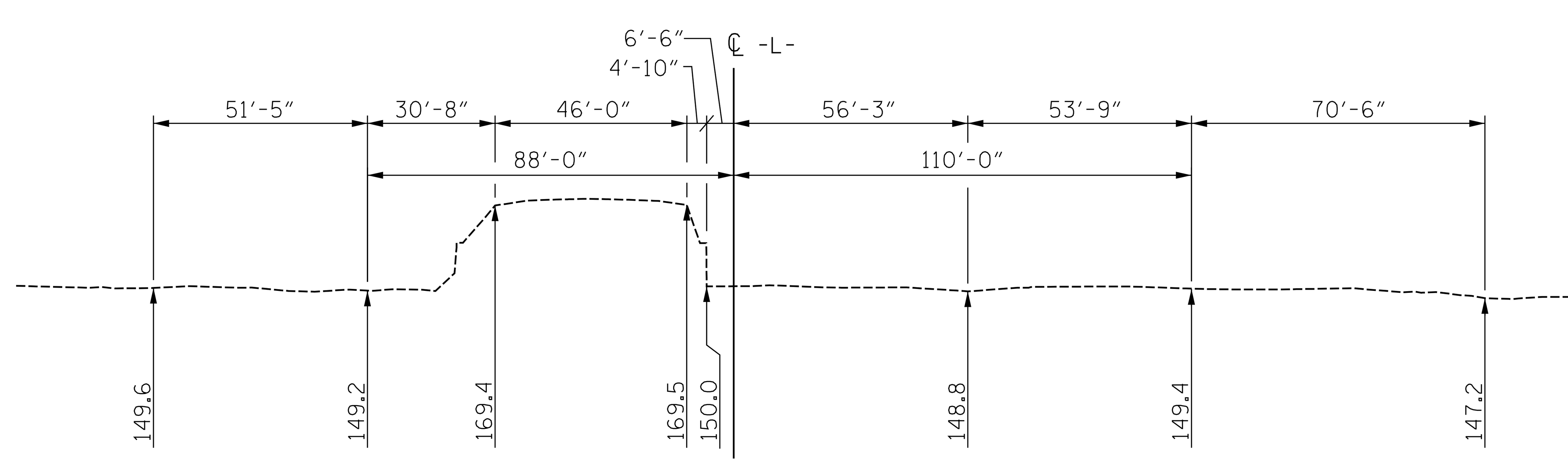
The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.
This file or an individual page shall not be considered a certified document.

BM #9: RAILROAD SPIKE SET IN 15" PINE TREE
118.27' RT OF -BL- STA. 176+57.72 N 691,918.76 E 2,186,774.25 EL. 156.10



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. = 16.4' MIN. = 14.1'

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 C3.

1. FOR STAGE 1A, WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS 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.

MAIN TRANSVERSE STEEL IN THE TOP AND BOTTOM SLABS SHALL BE CONNECTED ALONG THE LONGITUDINAL CONSTRUCTION JOINT EITHER VIA DOWELS OR MECHANICAL COUPLERS. IF ADEQUATE SPACE DOESN'T EXIST DURING STAGING, MECHANICAL COUPLERS HAVE BEEN DETAILED AND SHALL BE USED INSTEAD OF THE DOWELS. MECHANICAL COUPLERS SHALL BE IN ACCORDANCE WITH SECTION 1070-9 OF THE STANDARD SPECIFICATIONS.

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

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC MANAGEMENT PLAN.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE EXISTING STRUCTURE, CONSISTING OF 2 @ 8' X 11.5' RCBC, LENGTH 59'-3" ALONG C/L W/ NATURAL BOTTOM AND LOCATED AT THE PROPOSED STRUCTURE, SHALL BE REMOVED.

THE EXISTING STRUCTURE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING STRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE. THE EXISTING STRUCTURE IS PRESENTLY POSTED FOR LOAD LIMIT.

REMOVAL OF THE EXISTING STRUCTURE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE STRUCTURE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

EXCAVATE 1'-0" MIN. BENEATH CULVERT & WING FOOTING ELEVATIONS. REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

GRADE DATA

GRADE POINT ELEV. @ -L- STA. 167+03.45 = 176.60'
BED ELEV. @ -L- STA. 167+03.00 = 147.90'
ROADWAY SLOPES 3:1

TOTAL STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE	LUMP SUM	
ASBESTOS ASSESSMENT	LUMP SUM	
CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	430	TONS
CLASS A CONCRETE		
BARREL & SILLS @ 4.1 CY/FT	815.8	C.Y.
WINGS ETC.	90.7	C.Y.
TOTAL	906.5	C.Y.
REINFORCING STEEL		
BARREL & SILLS	149,670	LBS.
WINGS ETC.	6,256	LBS.
TOTAL	155,926	LBS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 1900	CFS
FREQUENCY OF DESIGN DISCHARGE	= 50	YRS
DESIGN HIGH WATER ELEVATION	= 160.4	FT
DRAINAGE AREA	= 3.6	SQ MI
BASE DISCHARGE (Q100)	= 2100	CFS
BASE HIGH WATER ELEVATION	= 161.0	FT

OVERTOPPING DATA

OVERTOPPING DISCHARGE	= 2700 (+)	CFS
FREQUENCY OF OVERTOPPING	= 500 (+)	YRS
OVERTOPPING ELEVATION	= 177.5	FT

V&M Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

PROJECT NO. R-3825B
JOHNSTON COUNTY
STATION: 167+03.45 -L-

SHEET 1 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'X12'
CONCRETE BOX CULVERT
ON MILL CREEK
UNDER NC 42 BETWEEN
SR 2677 AND SR 1704

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20771 HARDY L. WILLIS

7/17/2018 8:24:14 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DSG. ENG. OF RECORD.: CDB
DWN. BY: MAF DATE: 12/17
CHKD. BY: HLW DATE: 12/17

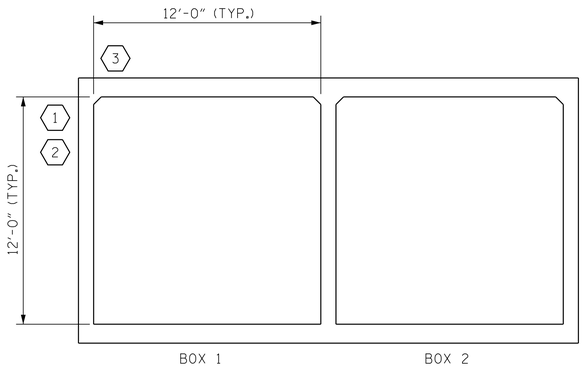
REVISIONS						
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

SHEET NO. C1-1
TOTAL SHEETS 10

V & M PROJECT NO.: 31740-03

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 x 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	2.16	--	1.75	2.34	1	TOP SLAB	5.17	2.16	1	EXT. WALL	1.47	1
		HL-93 (OPERATING)	N/A		2.80	--	1.35	3.04	1	TOP SLAB	5.17	2.80	1	EXT. WALL	1.47	
		HS-20 (INVENTORY)	36.000	2	2.16	77.76	1.75	2.29	1	TOP SLAB	5.17	2.16	1	EXT. WALL	1.47	
		HS-20 (OPERATING)	36.000		2.80	100.80	1.35	2.96	1	TOP SLAB	5.17	2.80	1	EXT. WALL	1.47	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.46	33.21	1.40	6.47	1	EXT. WALL	6.71	2.46	1	EXT. WALL	1.47	
		SNGARBS2	20.000		2.34	46.80	1.40	5.38	1	TOP SLAB	5.17	2.34	1	EXT. WALL	1.47	
		SNAGRIS2	22.000		2.34	51.48	1.40	4.89	1	TOP SLAB	5.17	2.34	1	EXT. WALL	1.47	
		SNCOTTS3	27.250		2.70	73.58	1.40	2.87	1	TOP SLAB	5.17	2.70	1	EXT. WALL	1.47	
		SNAGGRS4	34.925		2.45	85.57	1.40	2.63	1	TOP SLAB	5.17	2.45	1	TOP SLAB	1.43	
		SNS5A	35.550		2.58	91.72	1.40	2.58	1	TOP SLAB	5.17	2.53	1	TOP SLAB	1.43	
		SNS6A	39.950		2.26	90.29	1.40	2.32	1	TOP SLAB	5.17	2.26	1	TOP SLAB	1.43	
		SNS7B	42.000		2.22	93.24	1.40	2.32	1	TOP SLAB	5.17	2.22	1	TOP SLAB	1.43	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.66	87.78	1.40	2.66	1	TOP SLAB	5.17	2.70	1	EXT. WALL	1.47	
		TNT4A	33.075		2.69	88.97	1.40	2.69	1	TOP SLAB	5.17	2.70	1	TOP SLAB	1.43	
		TNT6A	41.600		2.27	94.43	1.40	2.35	1	TOP SLAB	5.17	2.27	1	TOP SLAB	1.43	
		TNT7A	42.000		2.25	94.50	1.40	2.37	1	TOP SLAB	5.17	2.25	1	TOP SLAB	1.43	
		TNT7B	42.000		2.40	100.80	1.40	2.53	1	TOP SLAB	5.17	2.40	1	TOP SLAB	1.43	
		TNAGRIT4	43.000		2.17	93.31	1.40	2.24	1	TOP SLAB	5.17	2.17	1	TOP SLAB	1.43	
		TNAGRT5A	45.000		2.37	106.65	1.40	2.44	1	TOP SLAB	5.17	2.37	1	TOP SLAB	1.43	
		TNAGRT5B	45.000	3	2.02	90.90	1.40	2.48	1	TOP SLAB	5.17	2.02	1	TOP SLAB	1.43	



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. ALL MEASUREMENTS ARE TAKEN FROM THE CENTER OF WALL AND CENTER OF SLAB OF THE BOX NUMBER INDICATED. WALL MEASUREMENTS TAKEN FROM THE CENTER OF BOTTOM SLAB.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

NORTH CAROLINA PROFESSIONAL SEAL 042777 ENGINEER HARDY L. WILLIS
7/17/2018 8:24:14 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 167+03.00 -L-

SHEET 10 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

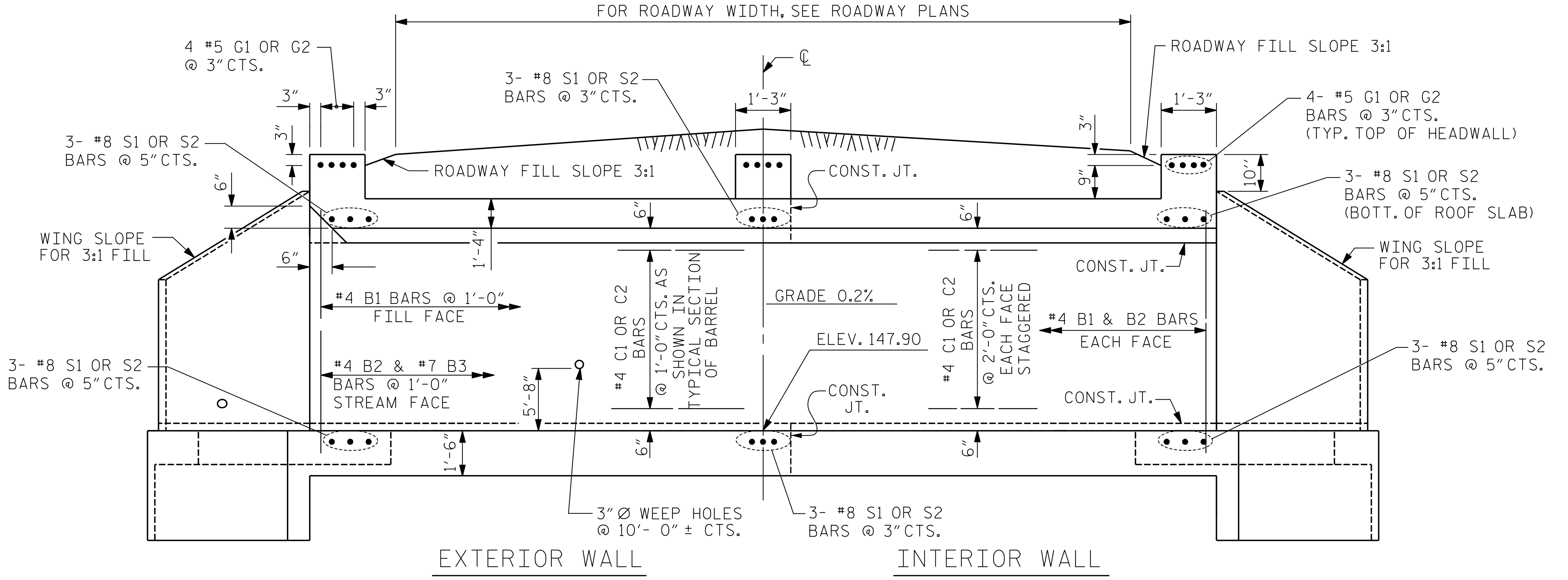
(NON-INTERSTATE TRAFFIC)

DSG. ENG. OF RECORD.: CDB
DWN. BY: MAF DATE: 12/17
CHKD. BY: HLW DATE: 12/17

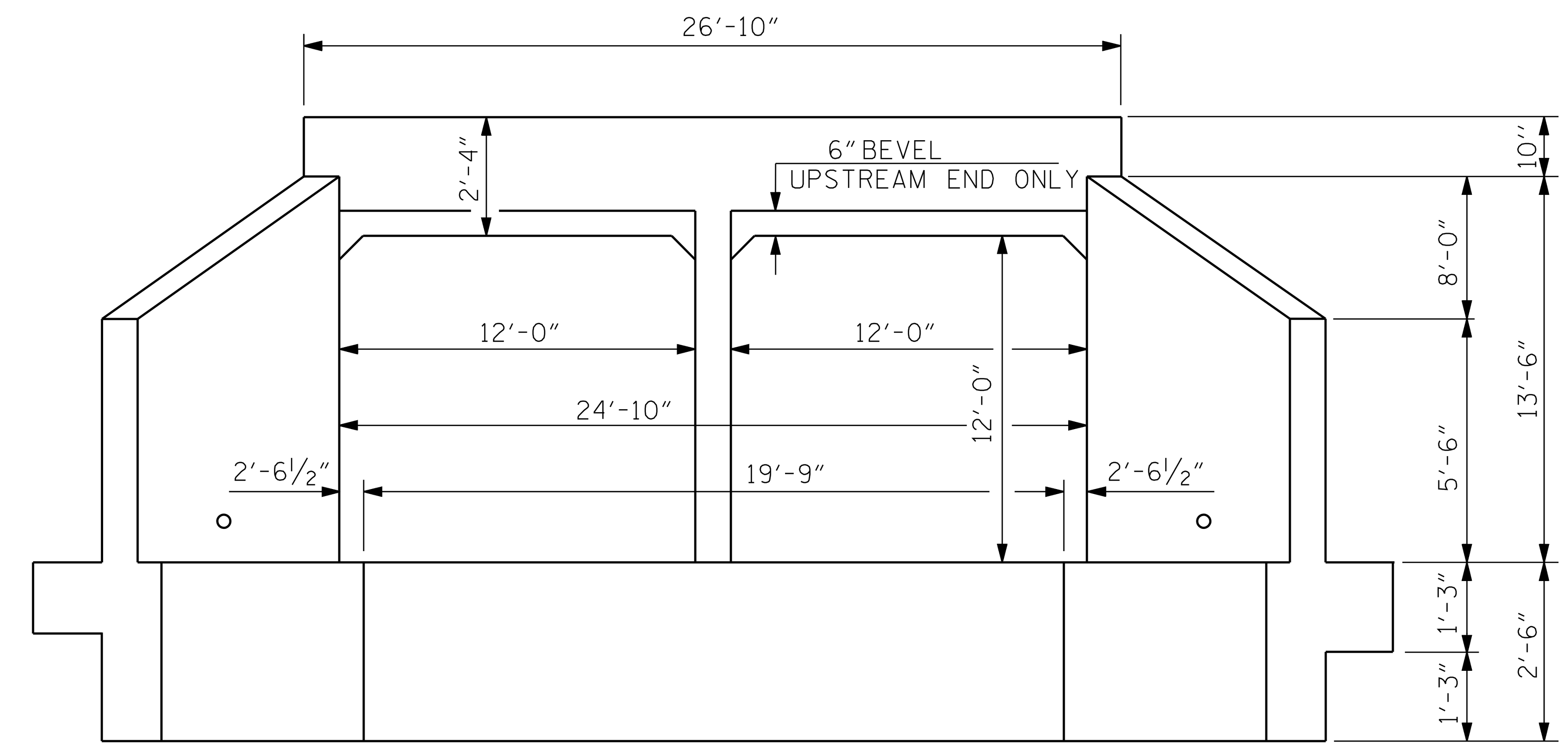
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. C1-10

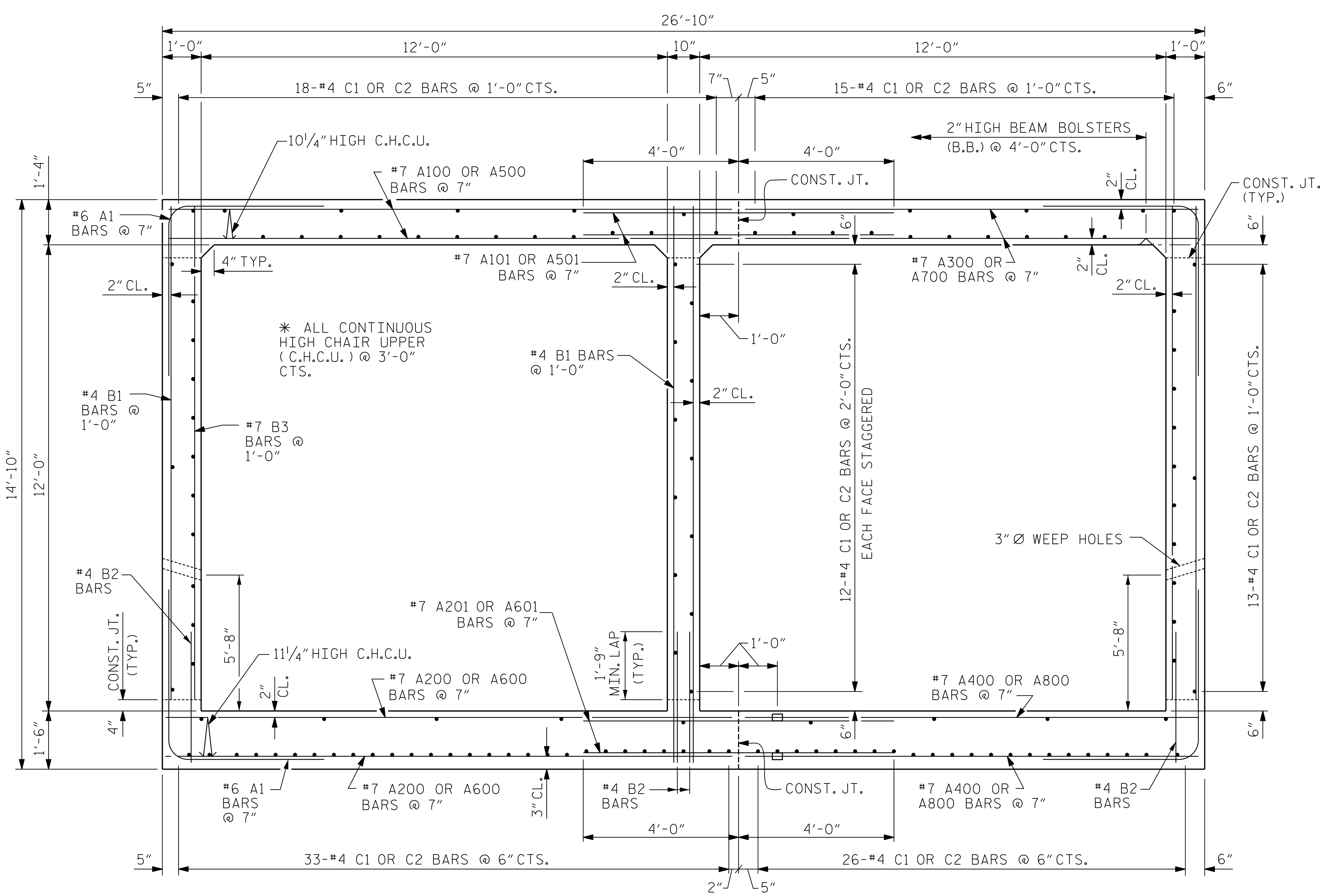
TOTAL SHEETS 10



CULVERT SECTION NORMAL TO ROADWAY

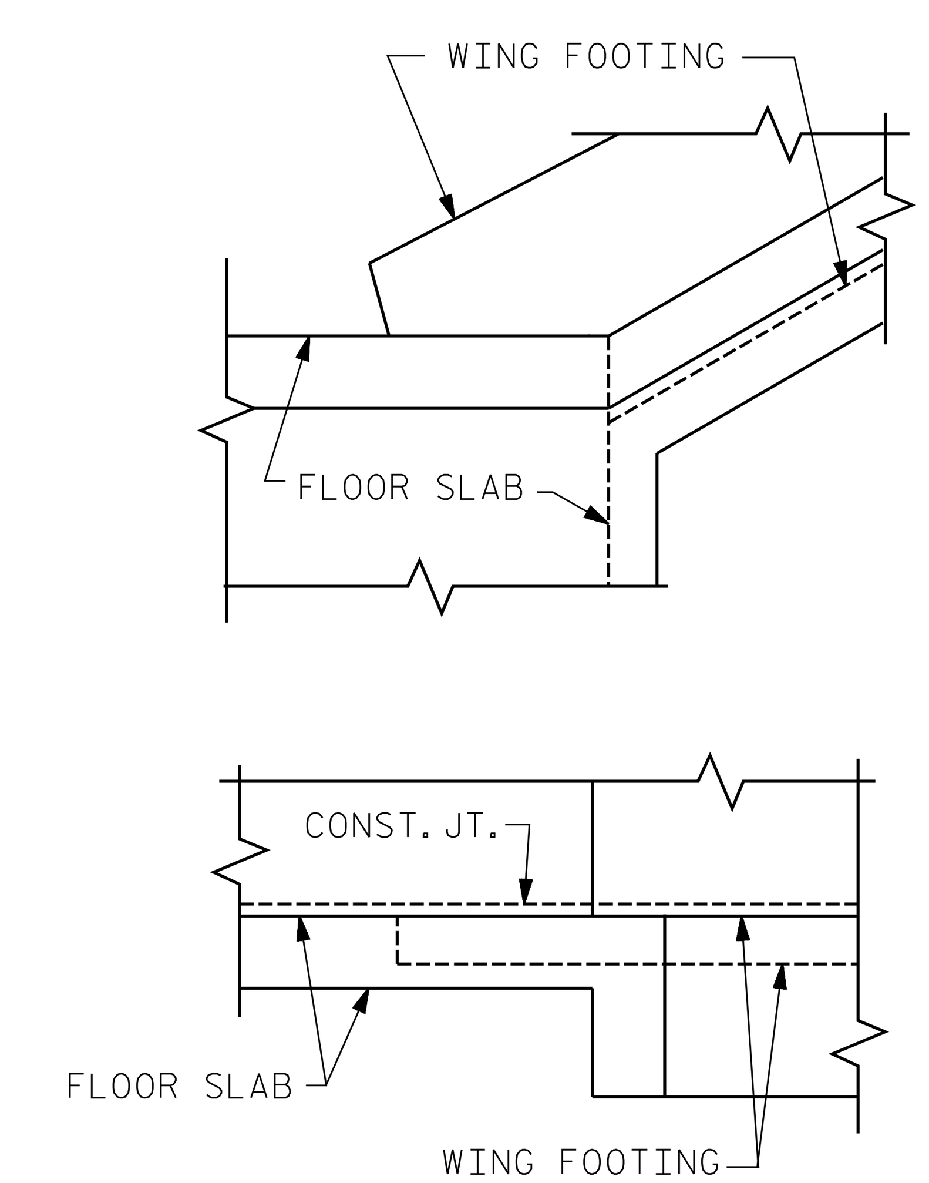


END ELEVATION



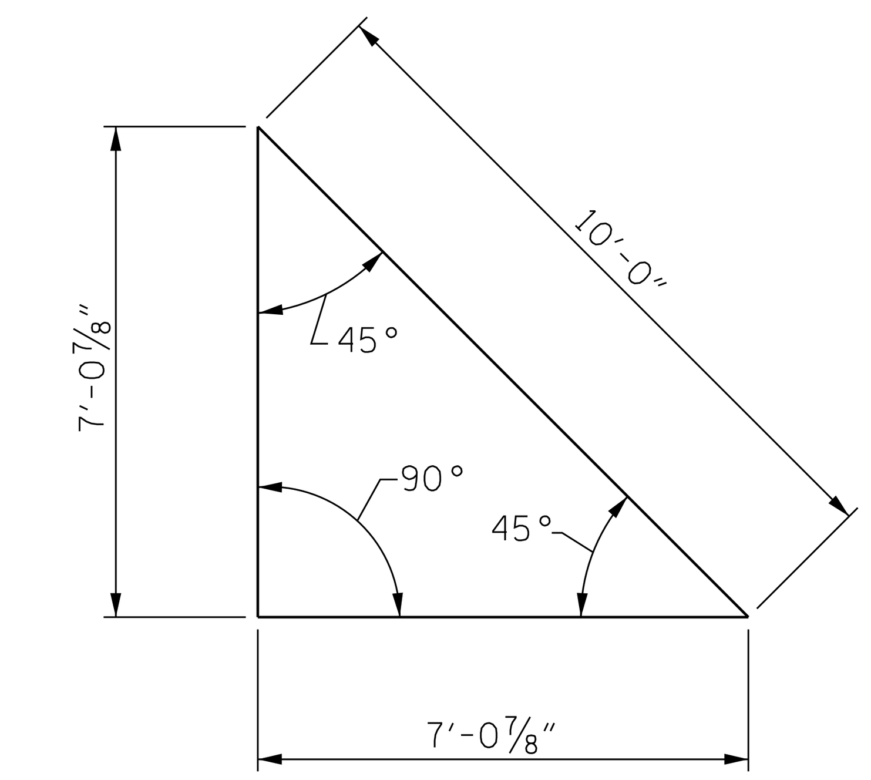
RIGHT ANGLE SECTION OF BARREL

THERE ARE 130 "C" BARS IN SECTION OF BARREL.
(LOOKING DOWNSTREAM)



DETAIL

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



SKEW TRIANGLE

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 167+03.00 -L-

SHEET 2 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 12 FT.
CONCRETE BOX CULVERT
95° SKEW

1971

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20141 HARDY L. WILLIS
7/17/2018 8:24:14 AM EDT

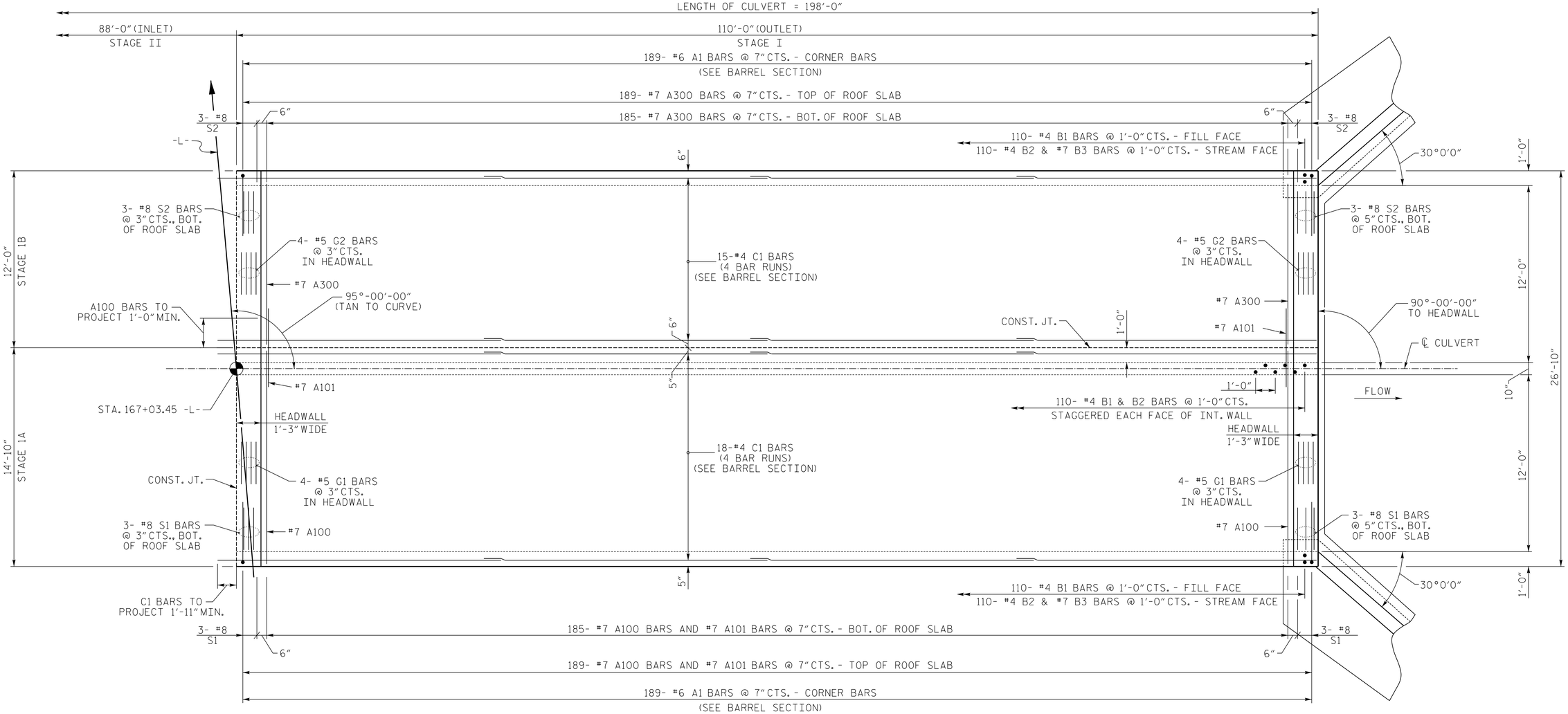
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

V&M Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455 · Charlotte, NC 704-357-0488 · Boone, NC 828-355-9933 · 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 · Atlanta, GA 770-627-3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

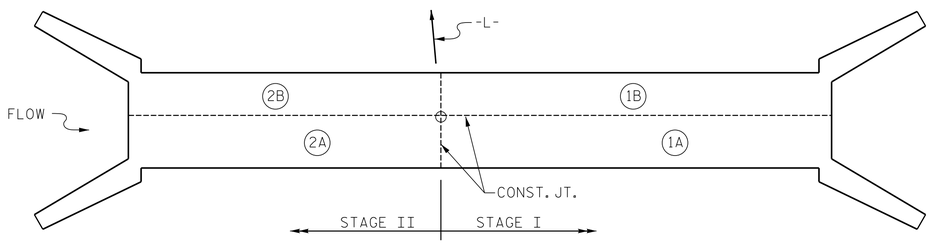
DSG. ENG. OF RECORD.: CDB	
DWN. BY: MAF	DATE: 12/17
CHKD. BY: HLW	DATE: 12/17

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-2
1			3			TOTAL SHEETS
2			4			10



PART PLAN - ROOF SLAB

(STAGE I)
SCALE: NOT TO SCALE



STAGING DIAGRAM

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

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 167+03.45 -L-

SHEET 3 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'X12' CONCRETE BOX CULVERT

ON MILL CREEK
UNDER NC 42 BETWEEN
SR 2677 AND SR 1704

(STAGE I)

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

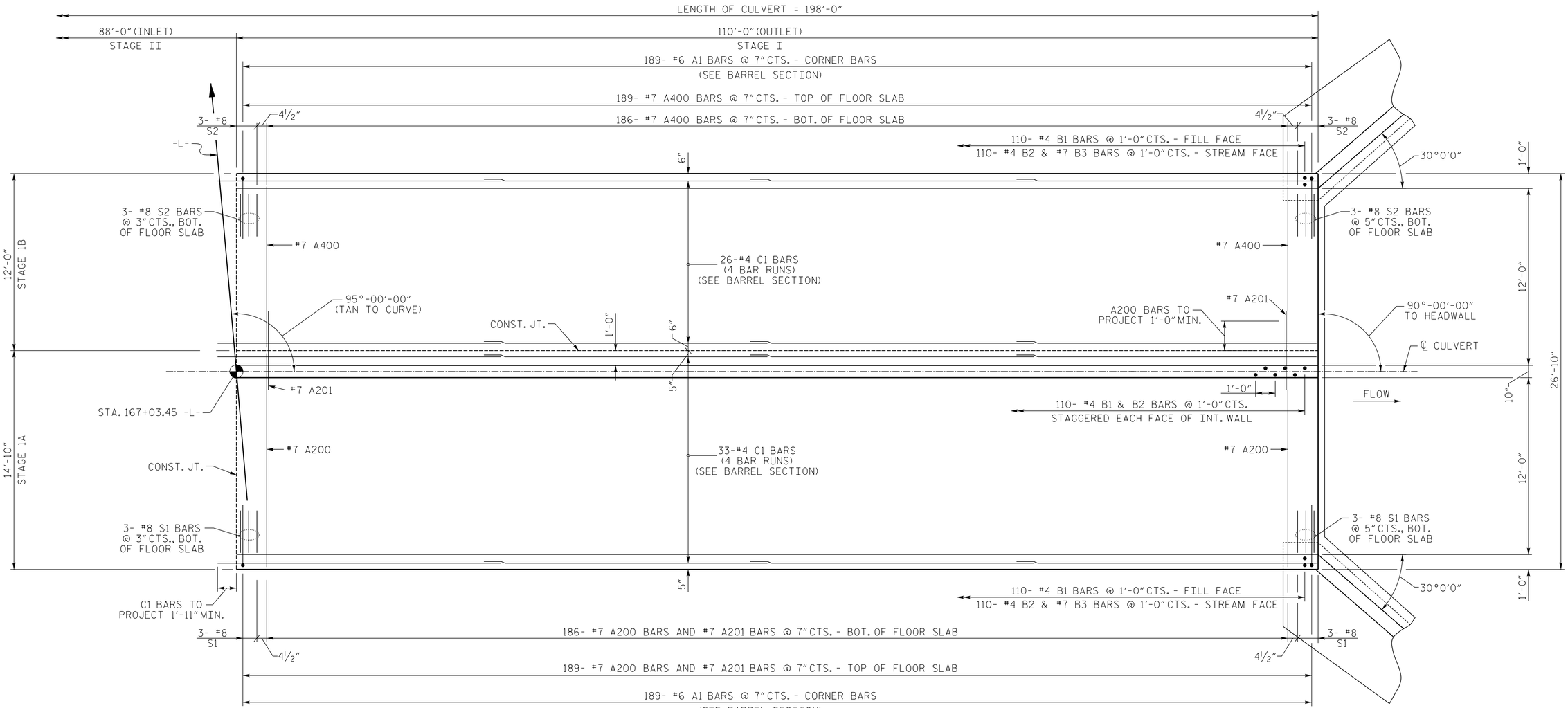
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036971 HARDY L. WILLIS

7/17/2018 8:24:14 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

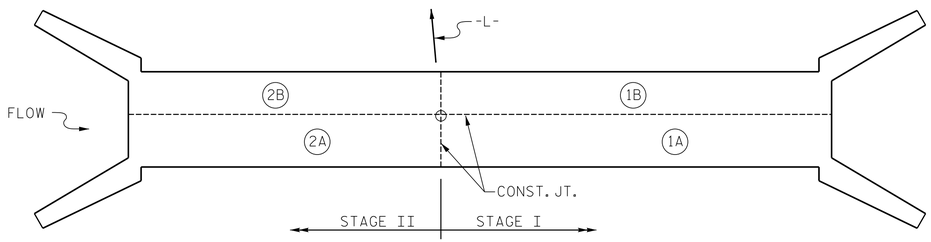
DSG. ENG. OF RECORD.: CDB		REVISIONS						SHEET NO.
DWN. BY: MAF	DATE: 12/17	NO.	BY:	DATE:	NO.	BY:	DATE:	C1-3
CHKD. BY: HLW	DATE: 12/17	1			3			TOTAL SHEETS
		2			4			10

V & M PROJECT NO.: 31740-03



PART PLAN - FLOOR SLAB

(STAGE I)
SCALE: NOT TO SCALE



STAGING DIAGRAM

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

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 167+03.45 -L-

SHEET 4 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'X12' CONCRETE BOX CULVERT

ON MILL CREEK
UNDER NC 42 BETWEEN
SR 2677 AND SR 1704

(STAGE I)

V&M
Vaughn & Melton
Consulting Engineers
Asheville,
North Carolina
828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

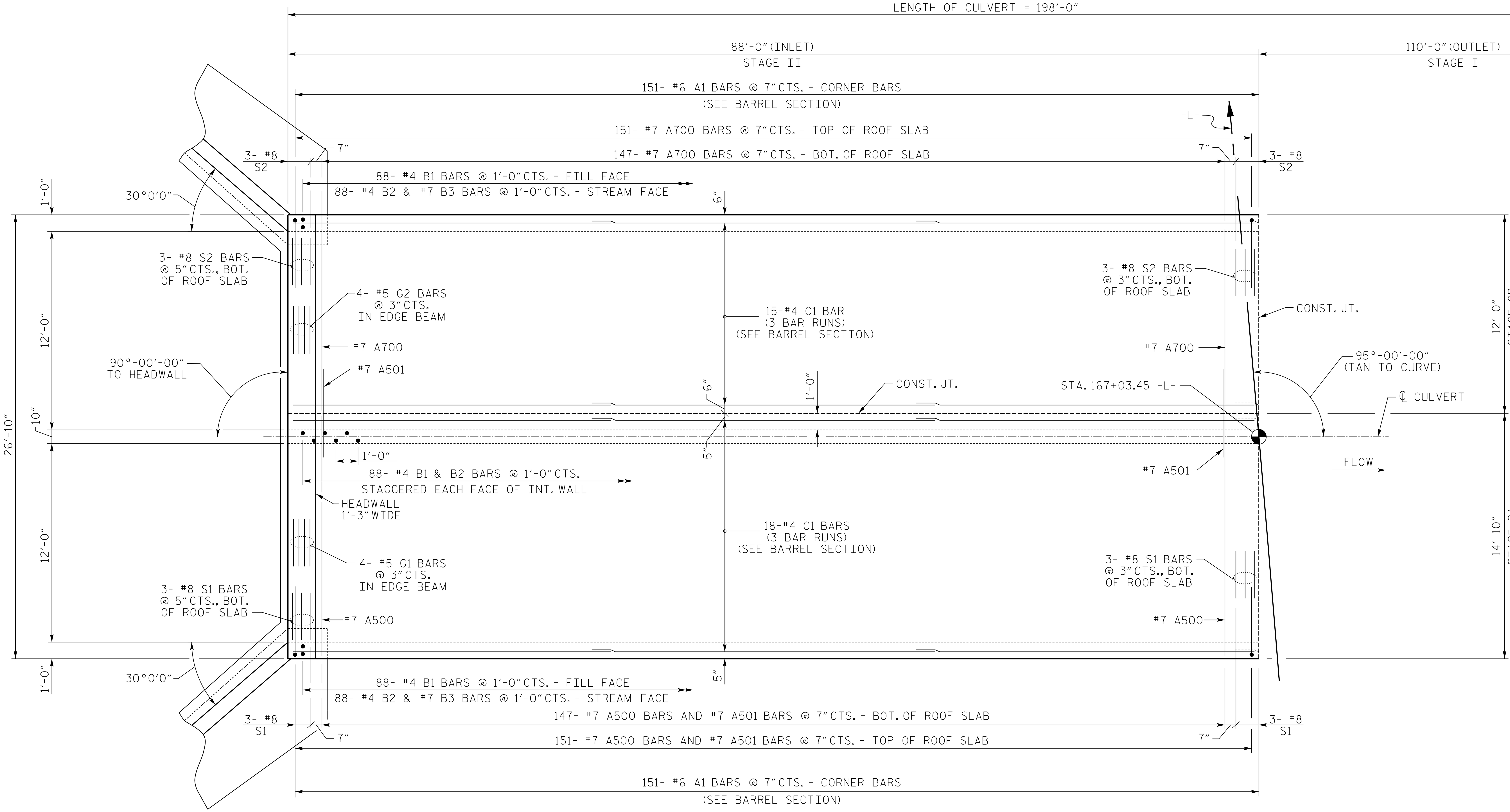
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047711 HARDY L. WILLIS
7/17/2018 8:24:14 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DSG. ENG. OF RECORD.: CDB
DWN. BY: MAF DATE: 12/17
CHKD. BY: HLW DATE: 12/17

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-4
1			3			TOTAL SHEETS
2			4			10

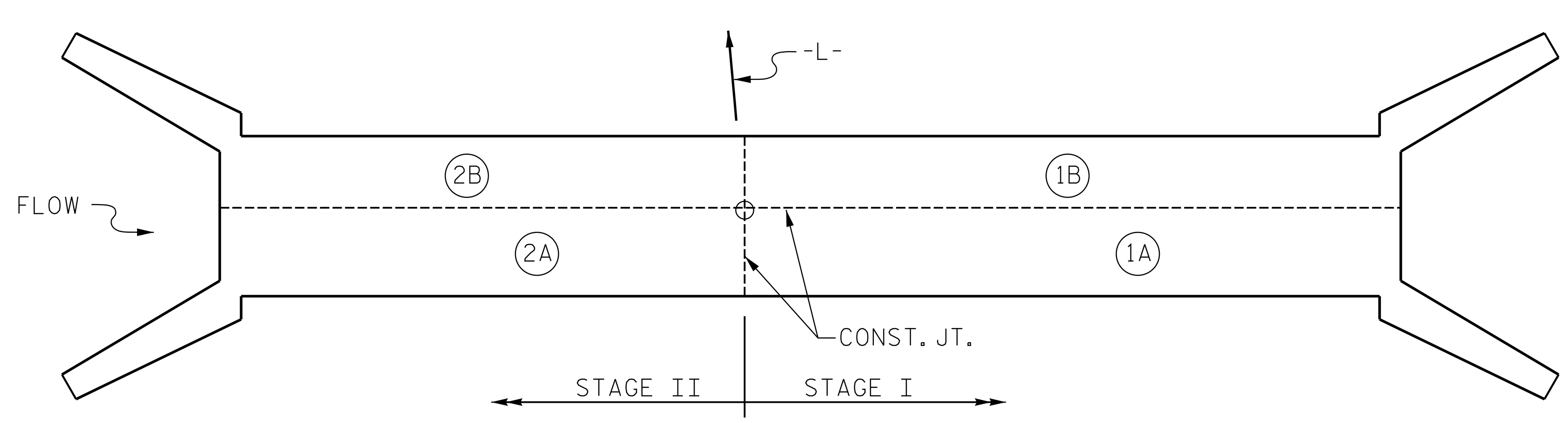
V & M PROJECT NO.: 31740-03



PART PLAN - ROOF SLAB

(STAGE II)

SCALE: NOT TO SCALE



STAGING DIAGRAM

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

V & M PROJECT NO.: 31740-03

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 167+03.45 -L-

SHEET 5 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'X12'
CONCRETE BOX CULVERT

ON MILL CREEK
UNDER NC 42 BETWEEN
SR 2677 AND SR 1704
(STAGE II)

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20790 HARDY L. WILLIS

7/17/2018 8:24:14 AM EDT

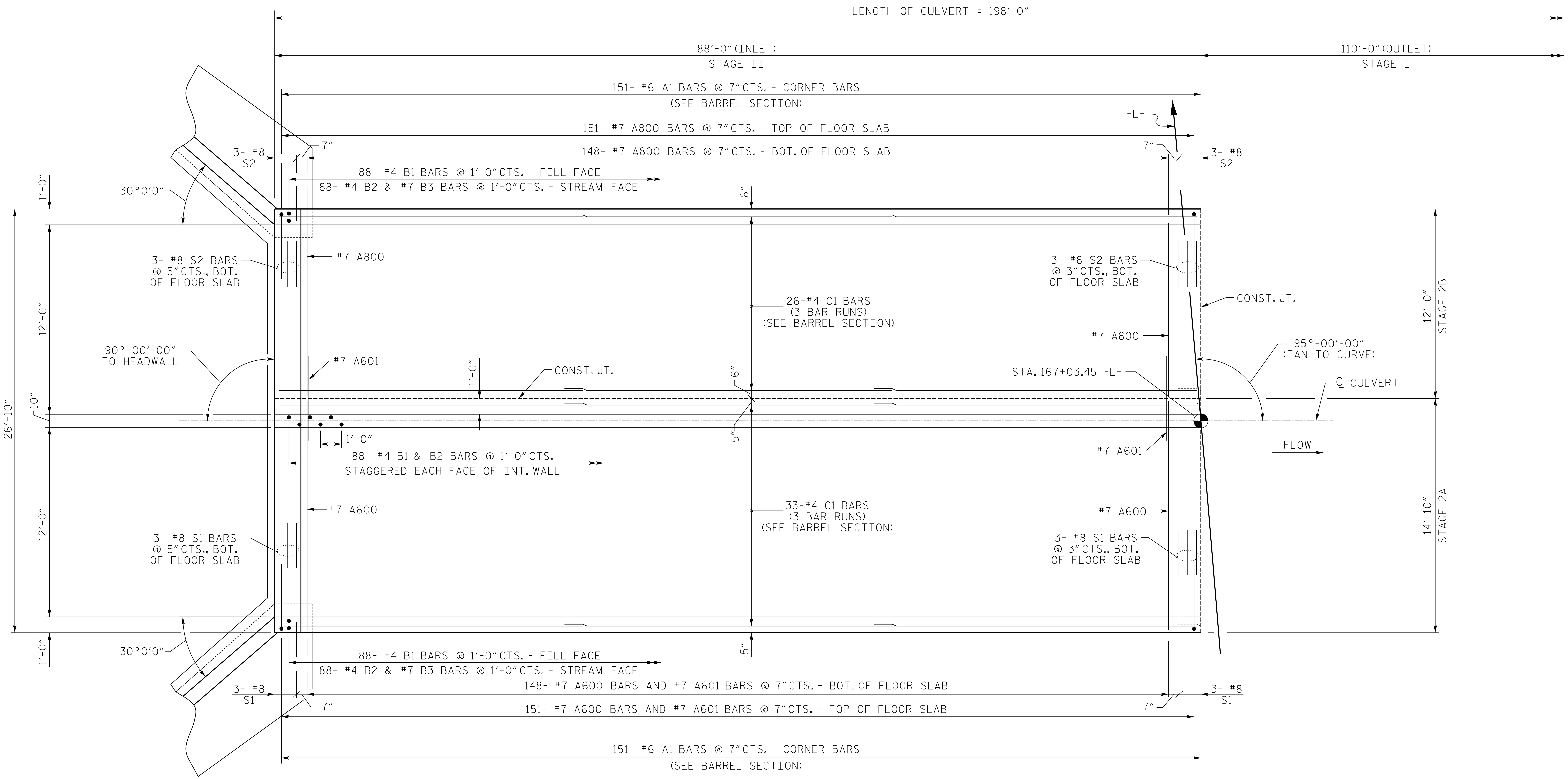
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

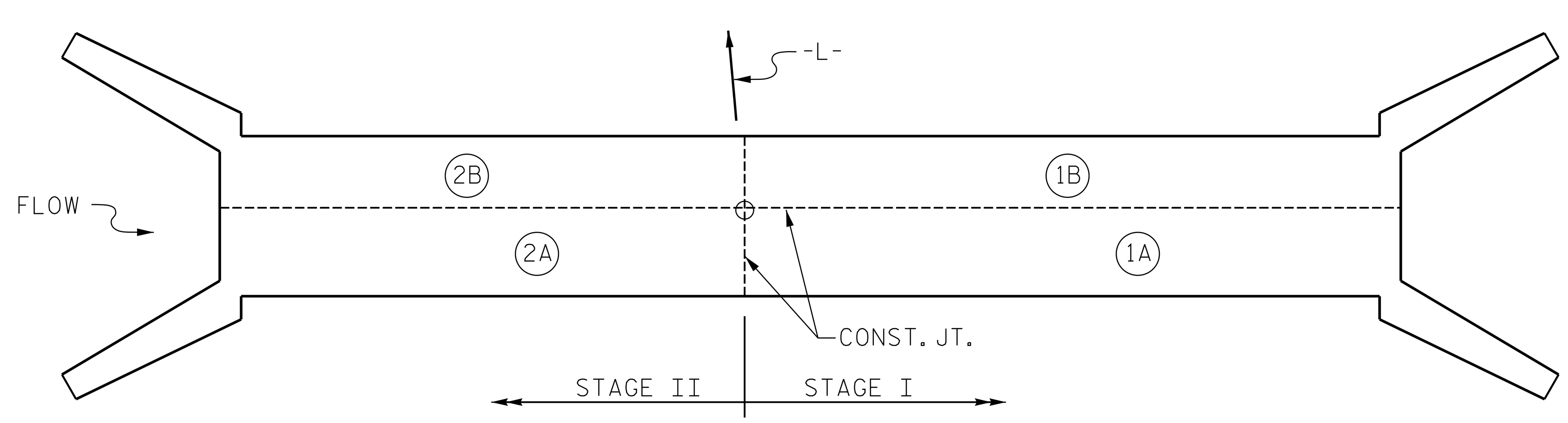
DSG. ENG. OF RECORD.: CDB	
DWN. BY: MAF	DATE: 12/17
CHKD. BY: HLW	DATE: 12/17

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	C1-5
1			3			TOTAL SHEETS	10
2			4				



PART PLAN - FLOOR SLAB

(STAGE II)
SCALE: NOT TO SCALE



STAGING DIAGRAM

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

PROJECT NO. R-3825B
JOHNSTON COUNTY
STATION: 167+03.45 -L-

SHEET 6 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'X12'
CONCRETE BOX CULVERT

ON MILL CREEK
UNDER NC 42 BETWEEN
SR 2677 AND SR 1704
(STAGE II)

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024274 HARDY L. WILLIS
7/17/2018 8:24:14 AM EDT

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

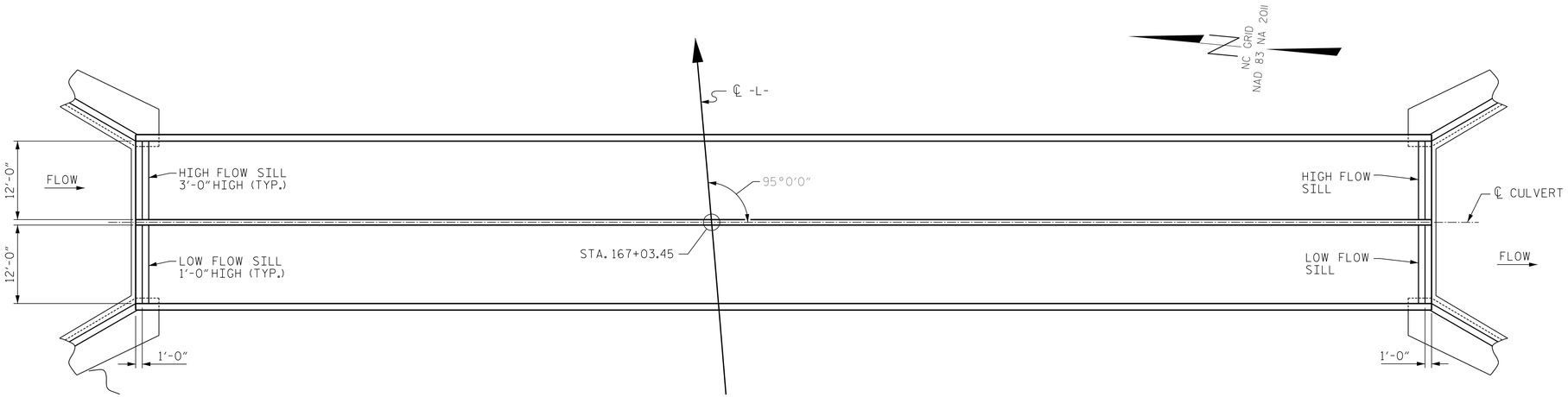
V&M Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796

DSG. ENG. OF RECORD.: CDB
DWN. BY: MAF DATE: 12/17
CHKD. BY: HLW DATE: 12/17

REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		C1-6
1				3				TOTAL SHEETS
2				4				10

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

V & M PROJECT NO.: 31740-03



CULVERT SILL LAYOUT

NOTES

SEE SHEET C1-8 BAR SCHEDULE FOR DOWELS.

SEE SHEET C1-8 FOR SILL CONCRETE QUANTITY.

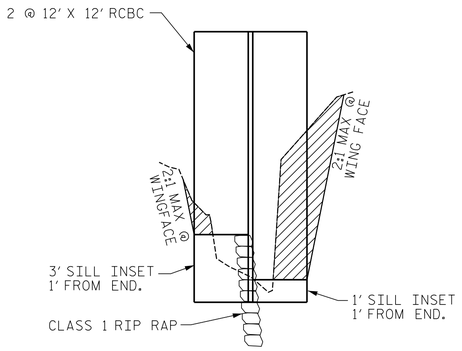
EXCAVATE FLOODPLAIN BENCH 1.0' ABOVE STREAM BED TO MATCH WIDTH OF CULVERT.

FOR CUT CONDITION, USE CLASS I RIP RAP FLOOD BENCH BORDER WITH NATURAL GROUND COVER WITH COIR FIBER MAT INSIDE BORDER. IN FILL CONDITION, USE CLASS 1 RIPRAP FILL THROUGHOUT, WITH NATIVE BED MATERIAL FILLING THE VOIDS ON TOP.

NATIVE MATERIALS CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR 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.

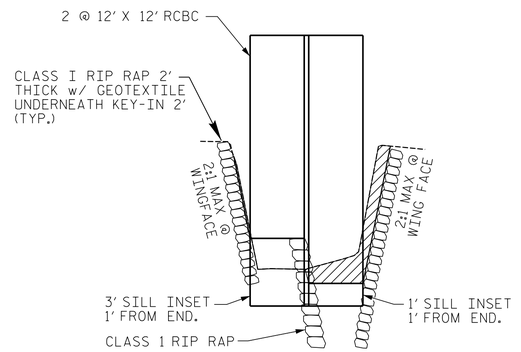
RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW BARREL. IF RIP RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL, NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. RIP RAP IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

BED MATERIALS;
SAND, SMALL TO MEDIUM ROCKS, SMALL BOULDERS



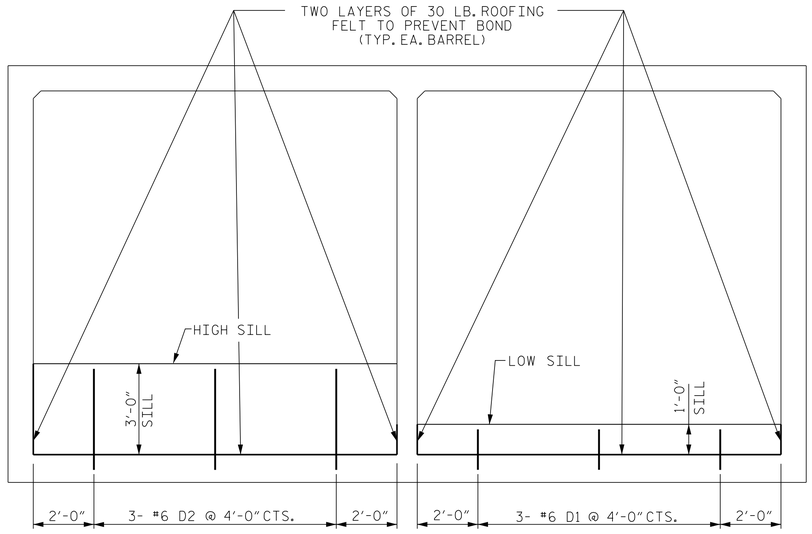
INLET BENCH

FACING DOWNSTREAM



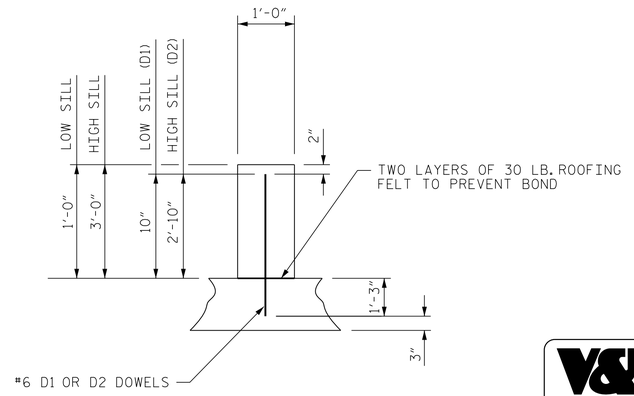
OUTLET BENCH

FACING DOWNSTREAM



OUTLET END ELEVATION

LOOKING DOWNSTREAM



SECTION THROUGH SILL

DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOATED.

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 167+03.45 -L-

SHEET 7 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'X12'
CONCRETE BOX CULVERT

ON MILL CREEK

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028877 HARRY L. WILLIS
7/17/2018 8:24:14 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

V&M Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

DSG. ENG. OF RECORD.: CDB
DWN. BY: MAF DATE: 12/17
CHKD. BY: HLW DATE: 12/17

REVISIONS

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

SHEET NO. C1-7
TOTAL SHEETS 10

V & M PROJECT NO.: 31740-03

BILL OF MATERIAL

STAGE 1A

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	378	6	①	8'-2"	4,637
A100	374	7	STR.	14'-6"	11,085
A101	374	7	STR.	8'-0"	6,116
A200	375	7	STR.	14'-6"	11,114
A201	375	7	STR.	8'-0"	6,132
B1	330	4	STR.	12'-10"	2,829
B2	330	4	STR.	3'-4"	735
B3	110	7	STR.	12'-10"	2,885
C1	304	4	STR.	28'-10"	5,855
D1	3	6	STR.	2'-1"	9
G1	8	5	STR.	15'-8"	131
S1	12	8	STR.	15'-8"	502

REINFORCING STEEL (STAGE 1A): 52,030 LB.

CLASS A CONCRETE (STAGE 1A)

CULVERT BARREL: 262.9 C.Y.
SILLS: 0.5 C.Y.

STAGE 1B

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	378	6	①	8'-2"	4,637
A300	374	7	STR.	11'-8"	8,919
A400	375	7	STR.	11'-8"	8,943
B1	110	4	STR.	12'-10"	943
B2	110	4	STR.	3'-4"	245
B3	110	7	STR.	12'-10"	2,885
C1	216	4	STR.	28'-10"	4,160
D2	3	6	STR.	4'-1"	18
G2	8	5	STR.	10'-10"	90
S2	12	8	STR.	10'-10"	347

REINFORCING STEEL (STAGE 1B): 31,187 LB.

CLASS A CONCRETE (STAGE 1B)

CULVERT BARREL: 188.7 C.Y.
SILLS: 1.3 C.Y.

STAGE 2A

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	302	6	①	8'-2"	3,704
A500	298	7	STR.	14'-6"	8,832
A501	298	7	STR.	8'-0"	4,873
A600	299	7	STR.	14'-6"	8,862
A601	299	7	STR.	8'-0"	4,889
B1	264	4	STR.	12'-10"	2,263
B2	264	4	STR.	3'-4"	588
B3	88	7	STR.	12'-10"	2,308
C2	228	4	STR.	30'-6"	4,645
D1	3	6	STR.	2'-1"	9
G1	4	5	STR.	15'-8"	65
S1	12	8	STR.	15'-8"	502

REINFORCING STEEL (STAGE 2A): 41,542 LB.

CLASS A CONCRETE (STAGE 2A)

CULVERT BARREL: 209.9 C.Y.
SILLS: 0.5 C.Y.

STAGE 2B

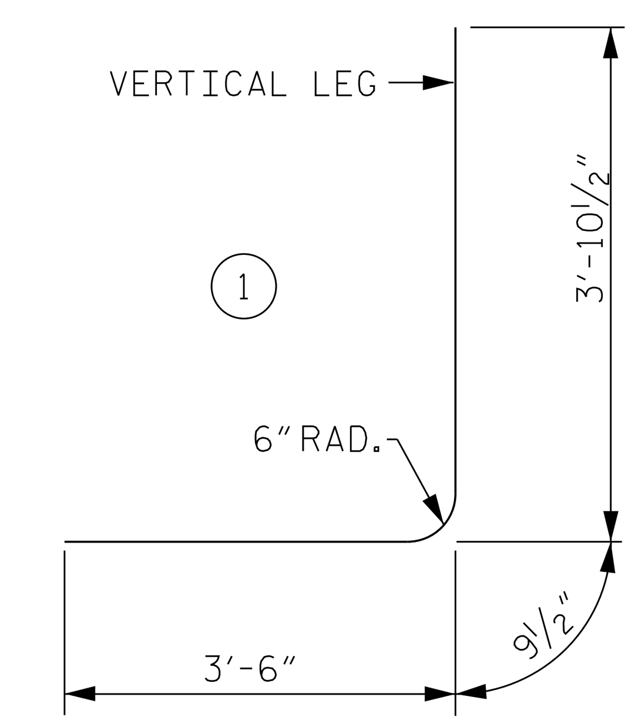
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	302	6	①	8'-2"	3,704
A700	298	7	STR.	11'-8"	7,106
A800	299	7	STR.	11'-8"	7,130
B1	88	4	STR.	12'-10"	754
B2	88	4	STR.	3'-4"	196
B3	88	7	STR.	12'-10"	2,308
C2	162	4	STR.	30'-6"	3,301
D2	3	6	STR.	4'-1"	18
G2	4	5	STR.	10'-10"	45
S2	12	8	STR.	10'-10"	347

REINFORCING STEEL (STAGE 2B): 24,911 LB.

CLASS A CONCRETE (STAGE 2B)

CULVERT BARREL: 150.7 C.Y.
SILLS: 1.3 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"
#7	3'-10"

TOTAL REINFORCING STEEL: 149,670 LB.

CLASS A CONCRETE

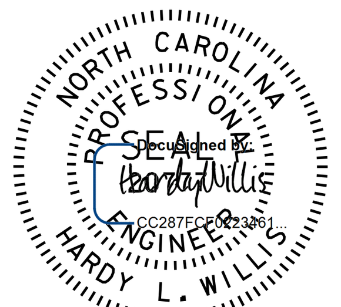
CULVERT BARREL: 812.2 C.Y.
SILLS: 3.6 C.Y.

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 167+03.45 -L-

SHEET 8 OF 10



7/17/2018 8:24:14 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'X12'
CONCRETE BOX CULVERT

ON MILL CREEK

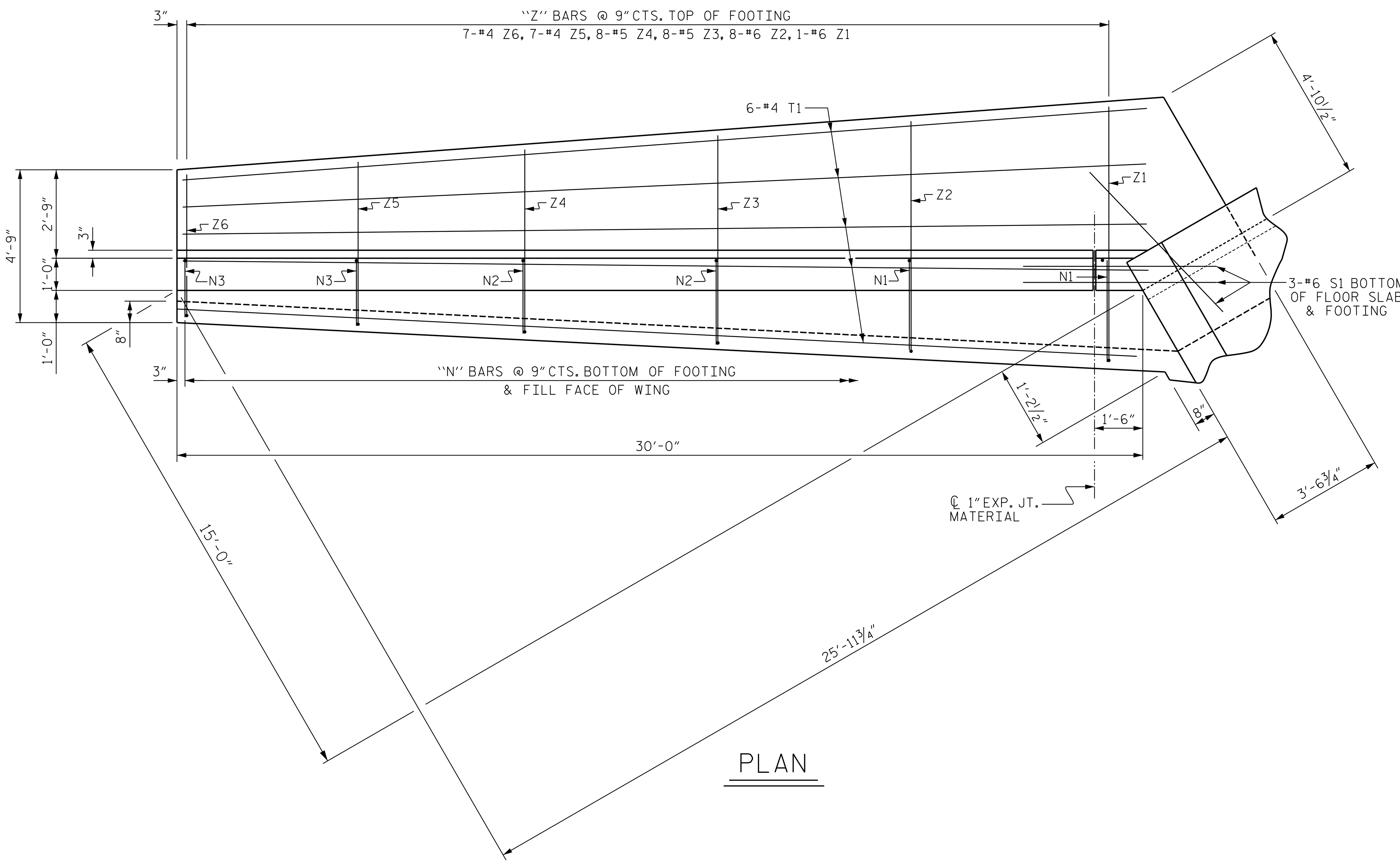
DSG. ENG. OF RECORD.: CDB
DWN. BY: MAF DATE: 12/17
CHKD. BY: HLW DATE: 12/17

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

SHEET NO. C1-8

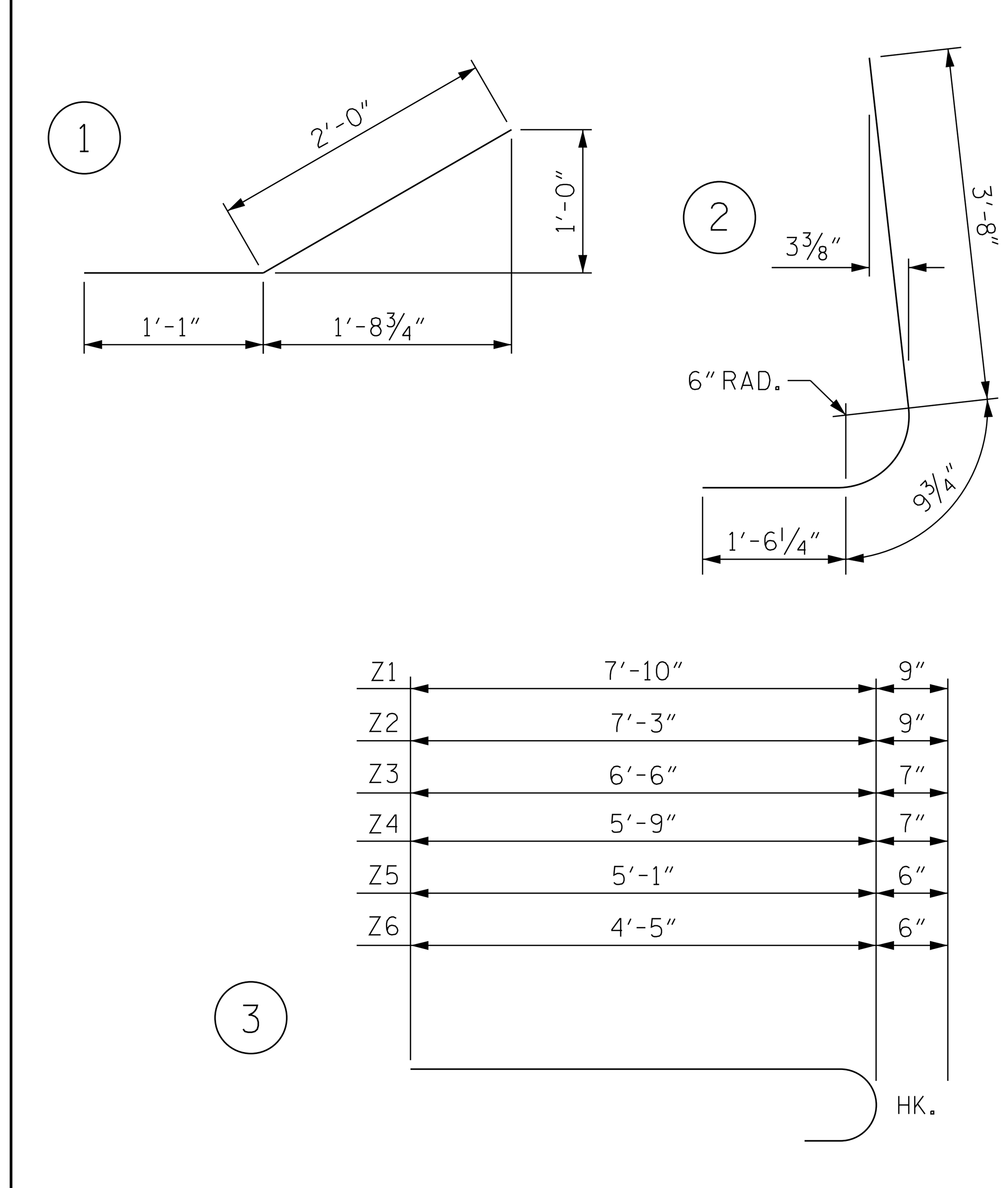
TOTAL SHEETS 10

V & M PROJECT NO.: 31740-03



PLAN

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

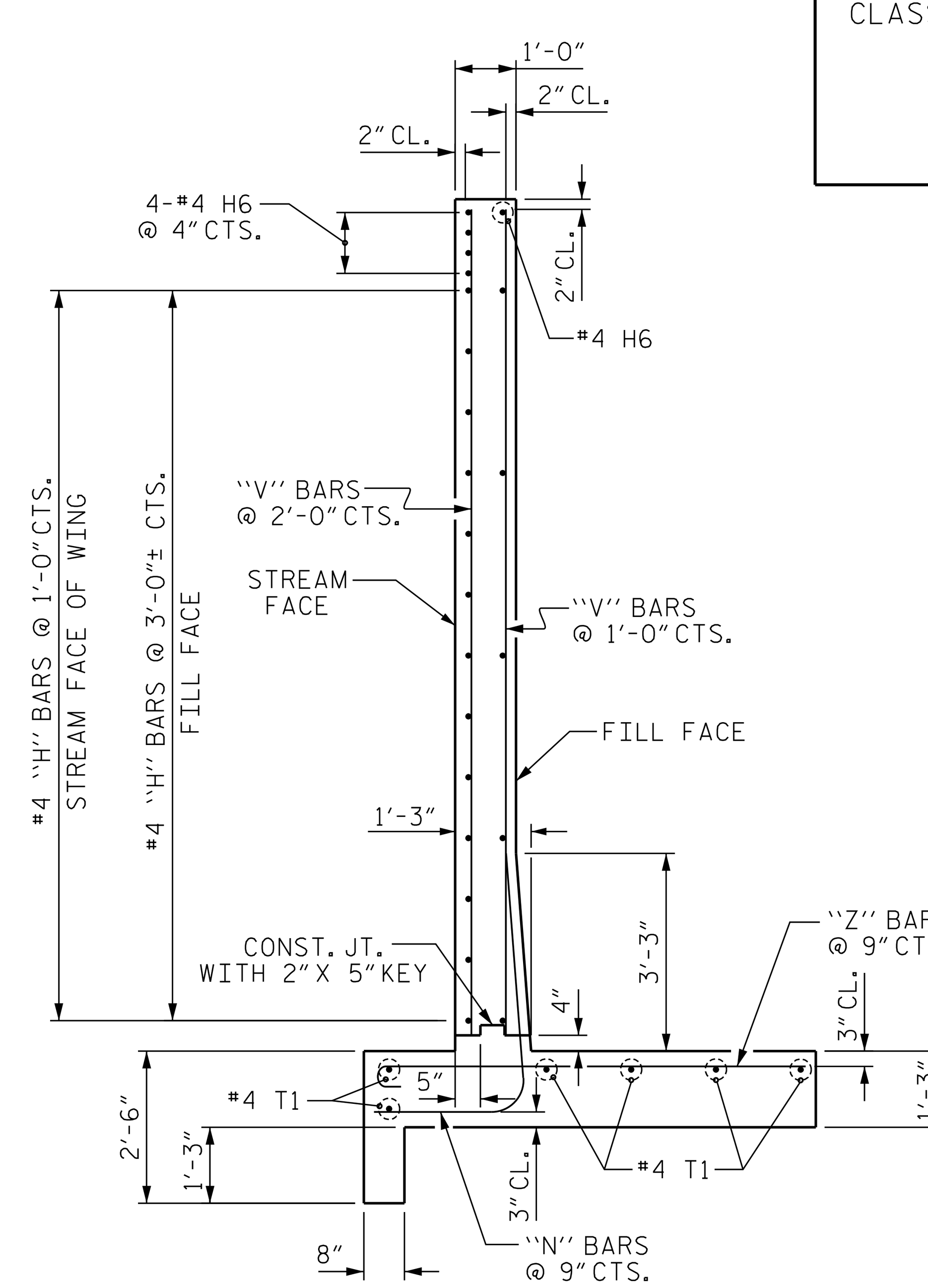
CLASS A CONCRETE

4 WINGS	85.3 CY
2 END CURTAIN WALLS	5.4 CY
TOTAL	90.7 CY

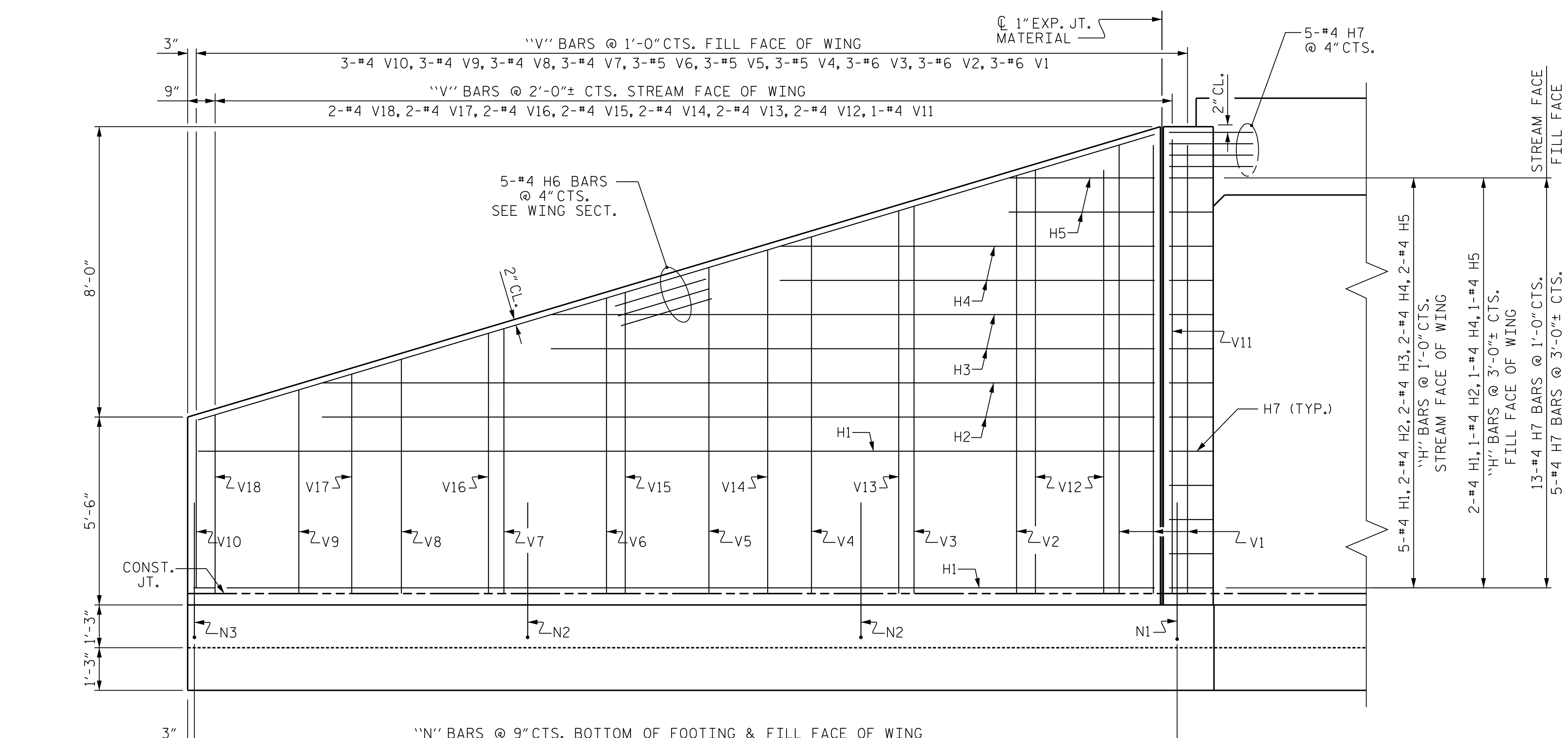
BILL OF MATERIAL FOR ONE WING

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	7	#4	STR	28'-2"	132
H2	3	#4	STR	24'-4"	49
H3	2	#4	STR	17'-8"	24
H4	3	#4	STR	10'-11"	22
H5	3	#4	STR	4'-3"	9
H6	5	#4	STR	29'-2"	97
H7	22	#4	1	3'-1"	45
N1	13	#6	2	6'-0"	117
N2	13	#5	2	6'-0"	81
N3	13	#4	2	6'-0"	52
S1	3	#6	STR	6'-0"	27
T1	6	#4	STR	30'-0"	270
V1	3	#6	STR	12'-1"	54
V2	3	#6	STR	11'-3"	51
V3	3	#6	STR	10'-6"	47
V4	3	#5	STR	9'-8"	30
V5	3	#5	STR	8'-10"	28
V6	3	#5	STR	8'-1"	25
V7	3	#4	STR	7'-3"	15
V8	3	#4	STR	6'-6"	13
V9	3	#4	STR	5'-8"	11
V10	3	#4	STR	4'-10"	10
V11	1	#4	STR	12'-6"	8
V12	2	#4	STR	11'-5"	15
V13	2	#4	STR	10'-4"	14
V14	2	#4	STR	9'-3"	12
V15	2	#4	STR	8'-2"	11
V16	2	#4	STR	7'-2"	10
V17	2	#4	STR	6'-1"	8
V18	2	#4	STR	5'-0"	7
Z1	1	#6	3	8'-7"	13
Z2	8	#6	3	8'-0"	96
Z3	8	#5	3	7'-1"	59
Z4	8	#5	3	6'-4"	53
Z5	7	#4	3	5'-7"	26
Z6	7	#4	3	4'-11"	23

REINFORCING STEEL FOR 1 WING (4 REQ'D) 1,564 LBS



TYPICAL WING SECTION



ELEVATION

Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796

Boone, NC 828-355-9933 · 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 · Atlanta, GA 770-627-3590 · Raleigh, NC 919-977-9455 · Charlotte, NC 704-357-0488

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 167+03.00 -L-

SHEET 9 OF 10

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — HARDY L. WILLIS

7/17/2018 8:24:14 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR CONCRETE BOX CULVERT

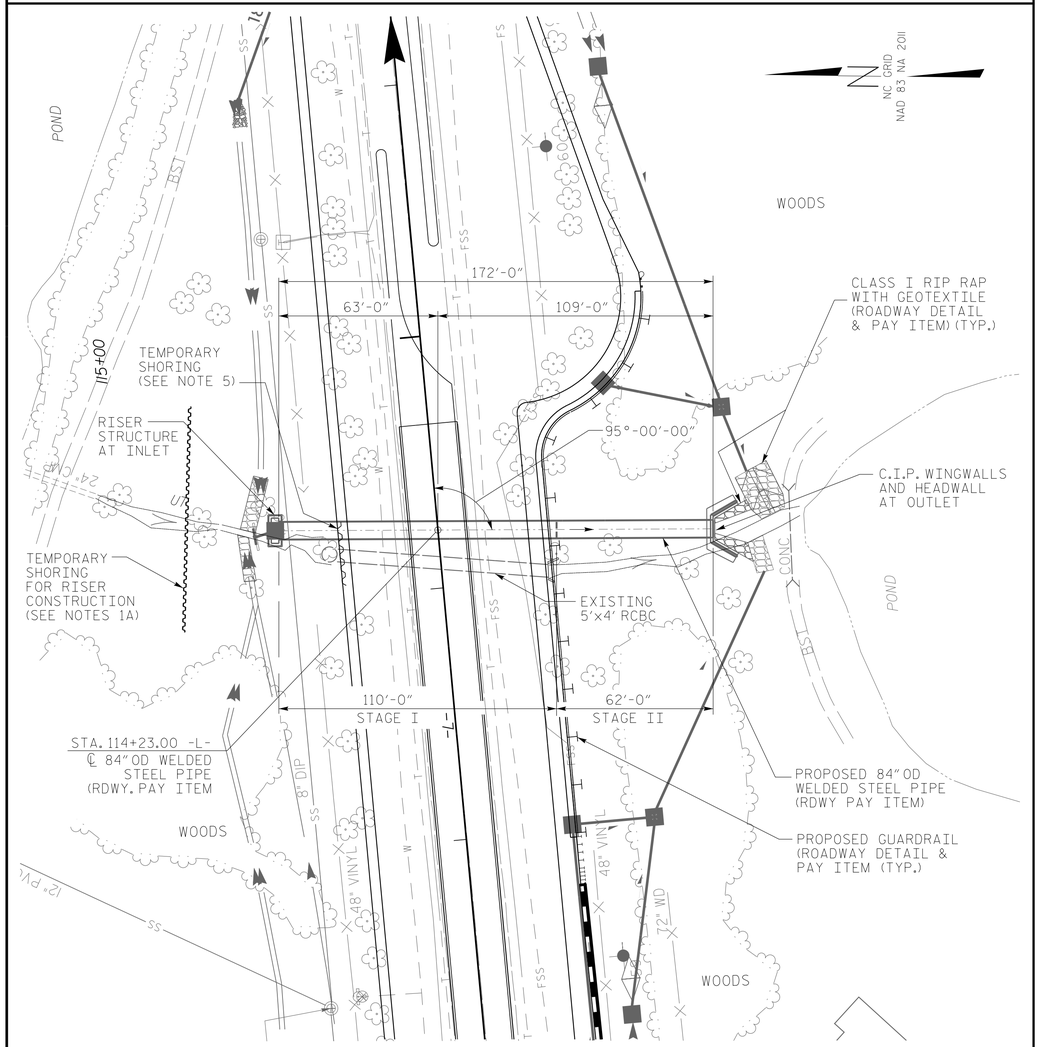
H = 12'-0" SLOPE = 3:1
90° SKEW

DSG. ENG. OF RECORD.: CDB
DWN. BY: MAF DATE: 12/17
CHKD. BY: HLW DATE: 12/17

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

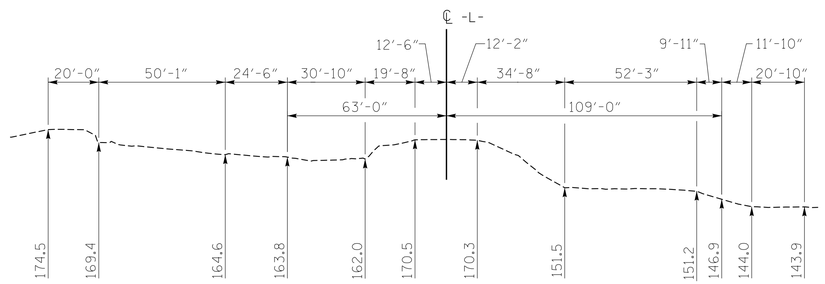
SHEET NO. C1-9
TOTAL SHEETS 10

BM #6: RAILROAD SPIKE SET IN 20" OAK TREE
93.87' LT OF -BL- STA. 115+97.58 N 691,504.54 E 2,180,721.78 EL. 171.66'



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH



PROFILE ALONG ℄ CULVERT

V & M PROJECT NO.: 31740-03

NOTES

ASSUMED LIVE LOAD ----------HL-93 OR ALTERNATE LOADING.
DESIGN FILL----------MAX. = 21.0'

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET "SN".

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

GRADE DATA
GRADE POINT ELEV. @ -L- STA. 114+23.00 = 172.66'
BED ELEV. @ -L- STA. 114+23.00 = 145.10'
ROADWAY SLOPES 6:1 (LEFT), 3:1 (RIGHT)

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC MANAGEMENT PLAN.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE EXISTING STRUCTURE CONSISTING OF 1 @ 5' X 4' RCBC LENGTH 83.8' ALONG C/L W/ DROP STRUCTURE AT UPSTREAM END, 8" DIA. VERTICAL PIPE, AND LOCATED AT THE PROPOSED STRUCTURE, SHALL BE REMOVED.

THE EXISTING STRUCTURE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING STRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE. THE EXISTING STRUCTURE IS PRESENTLY POSTED FOR LOAD LIMIT.

EXCAVATE 1'-0" MIN. BENEATH PIPE INVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414 OF THE STANDARD SPECIFICATIONS.

SHORING LOCATION NO. 1A

FOR TEMPORARY SHORING AND POSITIVE PROTECTION FOR TEMPORARY SHORING, SEE PLANS AND TEMPORARY SHORING PROVISION.

TEMPORARY SHORING IS REQUIRED FOR THE UTILITY INSTALLATION FROM STATION -L- 113+92±, 103.5 FT. LEFT, TO STATION -L- 114+80±, 93.0 FT. LEFT.

BEFORE BEGINNING TEMPORARY SHORING DESIGN OR CONSTRUCTION, SURVEY EXISTING GROUND ELEVATIONS IN THE VICINITY OF SHORING LOCATIONS TO DETERMINE ACTUAL SHORING HEIGHTS.

DESIGN TEMPORARY SHORING FROM STATION -L- 113+92±, 103.5 FT. LEFT, TO STATION -L- 114+80±, 93.0 FT. LEFT, FOR THE FOLLOWING ASSUMED SOIL PARAMETERS AND GROUNDWATER ELEVATION:

- UNIT WEIGHT (γ) = 110 LB/CF
- FRICTION ANGLE (Φ) = 28 DEGREES
- COHESION (c) = 0 LB/SF
- GROUNDWATER ELEVATION = 157.0 FT. ±

LIMITED SUBSURFACE INFORMATION IS AVAILABLE IN THE VICINITY OF TEMPORARY SHORING FROM STATION -L- 113+92±, 103.5 FT. LEFT, TO STATION -L- 114+80±, 93.0 FT. LEFT. THE INFORMATION PROVIDED FOR TEMPORARY SHORING DESIGN WAS ASSUMED AND MAY NOT BE APPLICABLE TO THE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION.

DRIVEN PILING FOR TEMPORARY SHORING FROM STATION -L- 113+92±, 103.5 FT. LEFT, TO STATION -L- 114+80±, 93.0 FT. LEFT MAY NOT PENETRATE BELOW ELEVATION 149 FT. DUE TO OBSTRUCTIONS, VERY DENSE OR HARD SOIL, BOULDERS OR WEATHERED OR HARD ROCK.

DO NOT USE A TEMPORARY WALL FOR TEMPORARY SHORING FROM STATION -L- 113+92±, 103.5 FT. LEFT, TO STATION -L- 114+80±, 93.0 FT. LEFT.

IT MAY BE PREFERRED TO USE A TEMPORARY SOIL NAIL WALL FOR TEMPORARY SHORING FROM STATION -L- 113+92±, 103.5 FT. LEFT, TO STATION -L- 114+80±, 93.0 FT. LEFT. FOR TEMPORARY SOIL NAIL WALLS, SEE TEMPORARY SOIL NAIL WALLS PROVISION.

SHORING NOTE 5

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

TOTAL STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE	LUMP SUM	
ASBESTOS ASSESSMENT	LUMP SUM	
CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	180 *	TONS
CLASS A CONCRETE		
2GI RISER	29.1	C.Y.
OUTLET	12.8	C.Y.
TOTAL	41.9	C.Y.
REINFORCING STEEL		
2GI RISER	4,065	LBS.
OUTLET	1,067	LBS.
TOTAL	5,132	LBS.
TEMPORARY SHORING FOR RISER CONSTRUCTION	10,600	SQ. FT.

* NOTE: DO NOT PLACE FOUNDATION CONDITIONING MATERIAL UNTIL APPROVAL BY ENGINEER.

HYDRAULIC DATA

DESIGN DISCHARGE	= 37	CFS
FREQUENCY OF DESIGN DISCHARGE	= 50	YRS
DESIGN HIGH WATER ELEVATION	= 166.6	FT
DRAINAGE AREA	= 0.33	SQ MI
BASE DISCHARGE (Q100)	= 39	CFS
BASE HIGH WATER ELEVATION	= 166.67	FT

OVERTOPPING DATA

OVERTOPPING DISCHARGE	= 129 (+)	CFS
FREQUENCY OF OVERTOPPING	= 500 (+)	YRS
OVERTOPPING ELEVATION	= 170.9	FT

V&M Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20777 HARDY L. WILLIS
7/17/2018 8:15:56 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. R-3825B
JOHNSTON COUNTY
STATION: 114+23.00 -L-

SHEET 1 OF 7

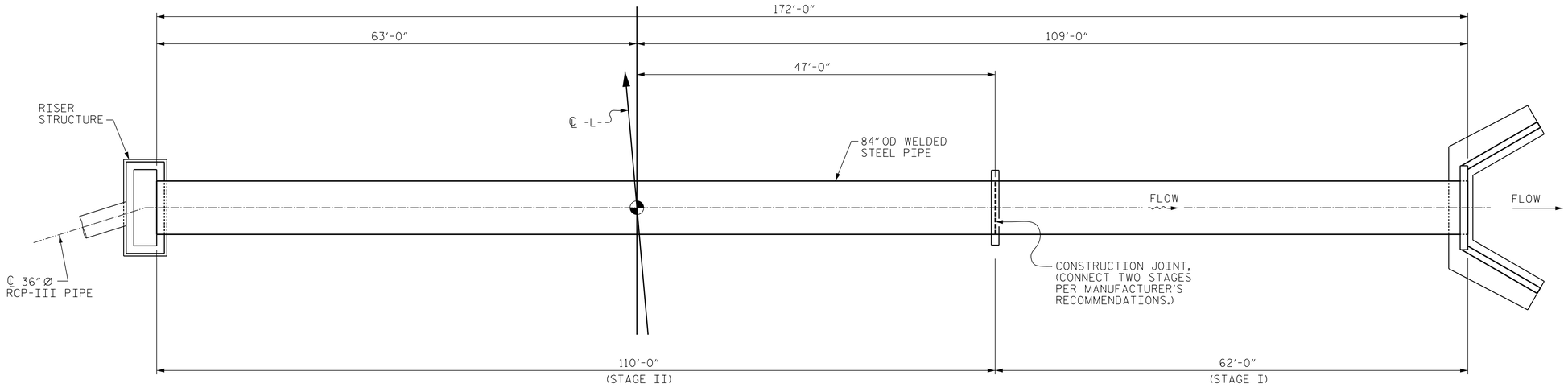
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

84" OD WELDED STEEL PIPE W/ RISER STRUCTURE

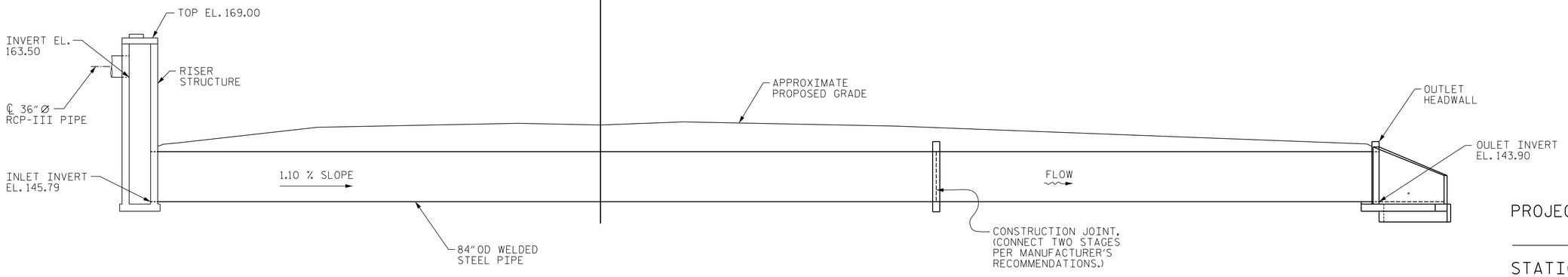
ON UT TO NEUSE RIVER
UNDER NC 42 BETWEEN
SR 1704 AND SR 2677

DSG. ENG. OF RECORD.: CB
DWN. BY: MAF DATE: 3/18
CHKD. BY: HLW DATE: 3/18

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-1
1			3			TOTAL SHEETS
2			4			7



PLAN VIEW



ELEVATION

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

NORTH CAROLINA PROFESSIONAL SEAL — Hardy L. Willis — ENGINEER

7/17/2018 8:15:56 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DSG. ENG. OF RECORD.: CB
DWN. BY: MAF DATE: 3/18
CHKD. BY: HLW DATE: 3/18

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
1			3			TOTAL SHEETS
2			4			7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

84" OD WELDED STEEL PIPE W/ RISER STRUCTURE

ON UT TO NEUSE RIVER
UNDER NC 42 BETWEEN
SR 1704 AND SR 2677

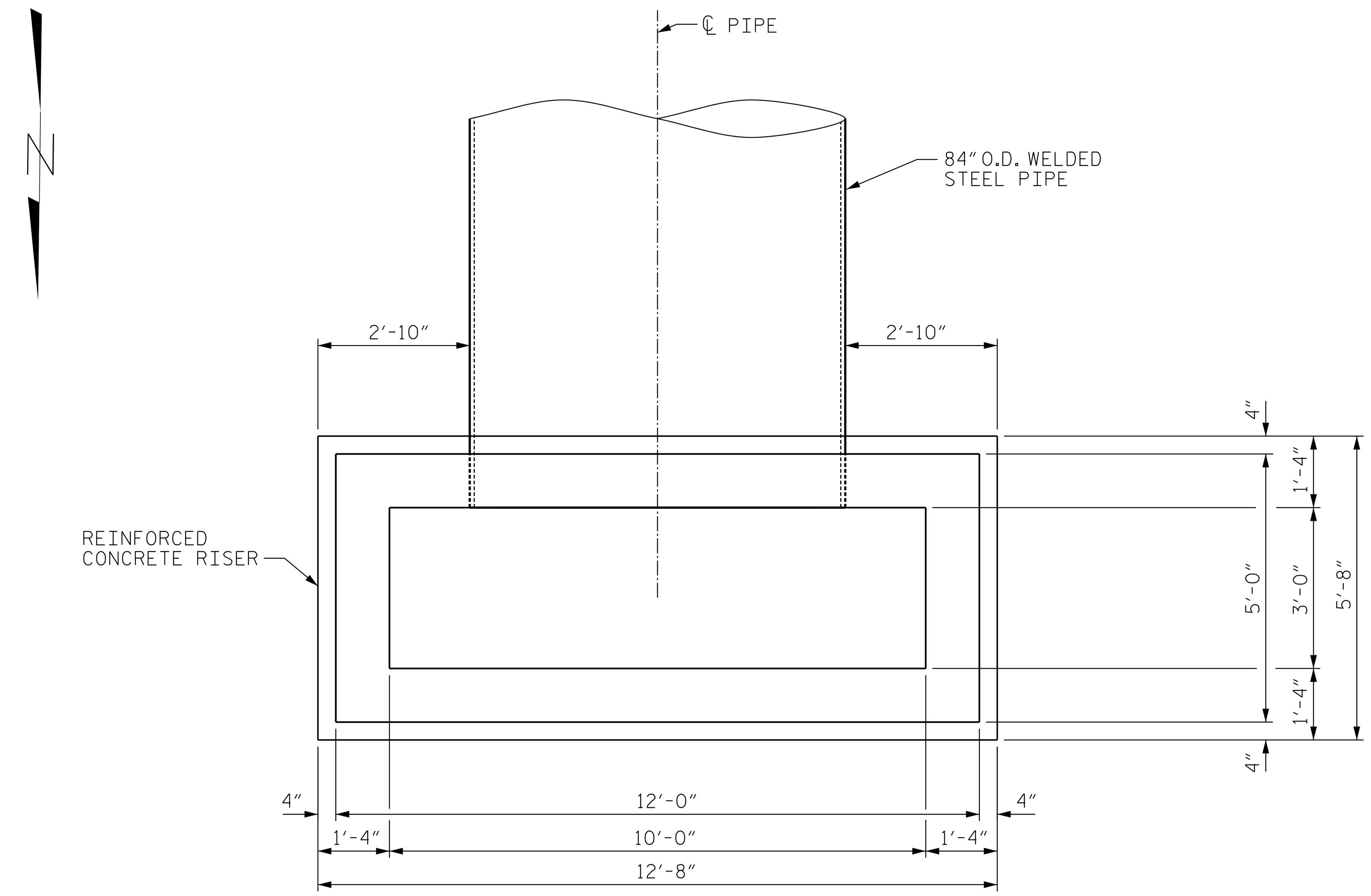
PROJECT NO. R-3825B

JOHNSTON COUNTY

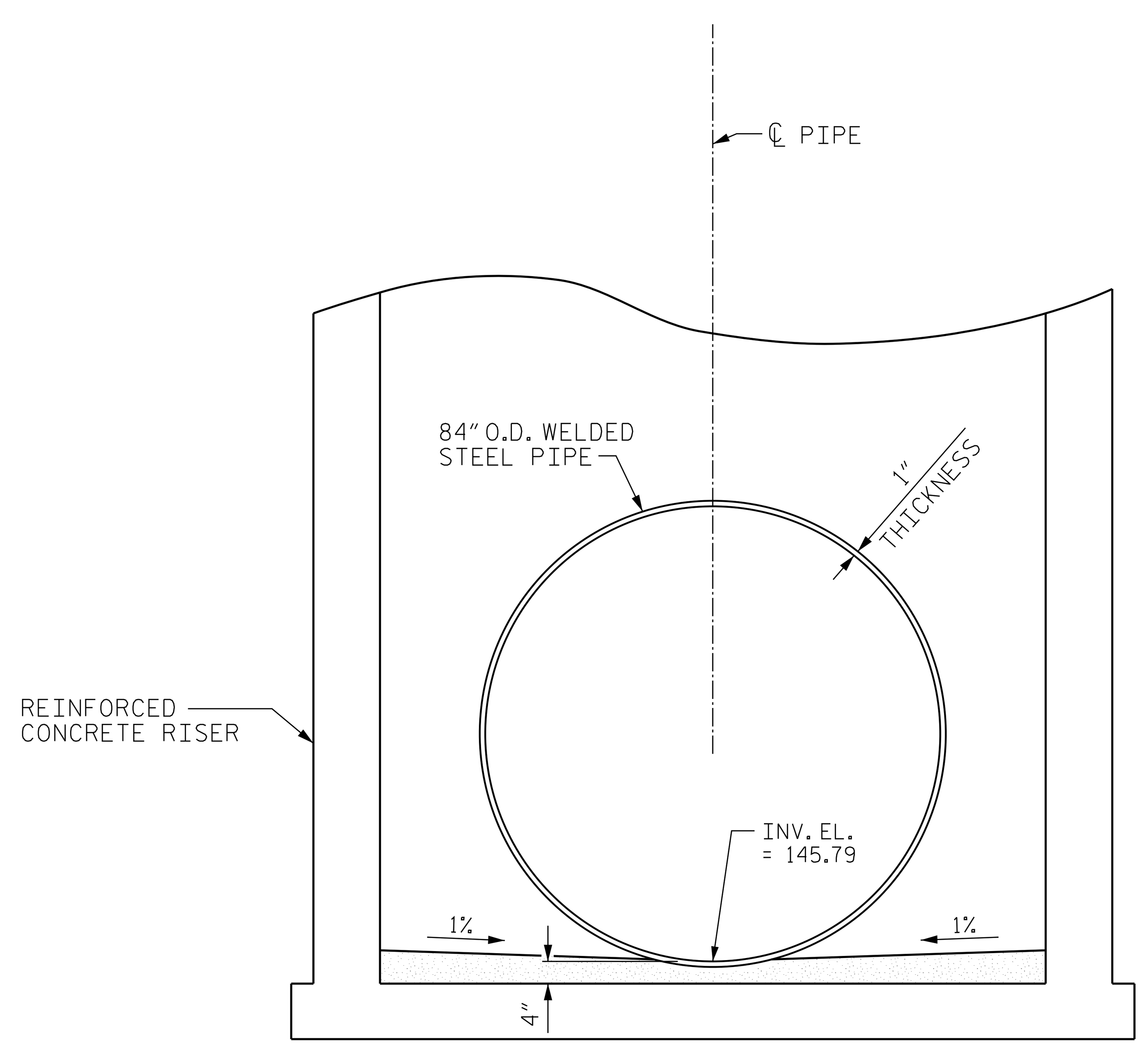
STATION: 114+23.00 -L-

SHEET 2 OF 7

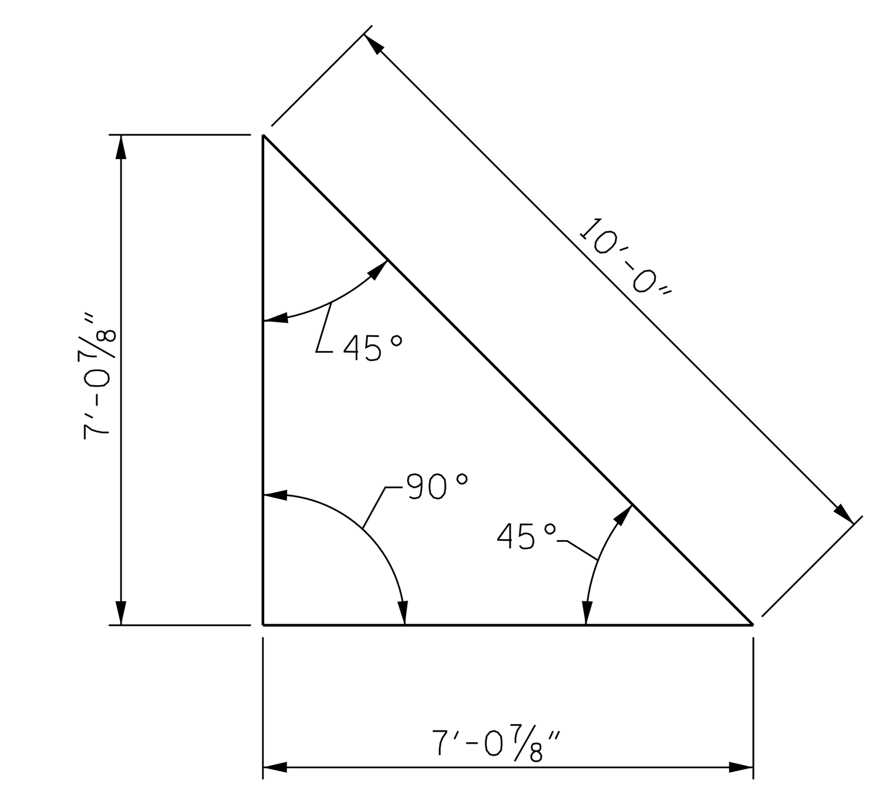
V & M PROJECT NO.: 31740-03



PLAN VIEW AT PIPE INLET



ELEVATION VIEW AT PIPE INLET



SKEW TRIANGLE

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 114+23.00 -L-

SHEET 3 OF 7

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL
HARDY L. WILLIS

7/17/2018 8:15:56 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

84″ OD WELDED STEEL PIPE W/ RISER STRUCTURE

ON UT TO NEUSE RIVER UNDER NC 42 BETWEEN SR 1704 AND SR 2677

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828·253·2796
Raleigh, NC 919·977·9455
Charlotte, NC 704·357·0488
Boone, NC 828·355·9933
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
Atlanta, GA 770·627·3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

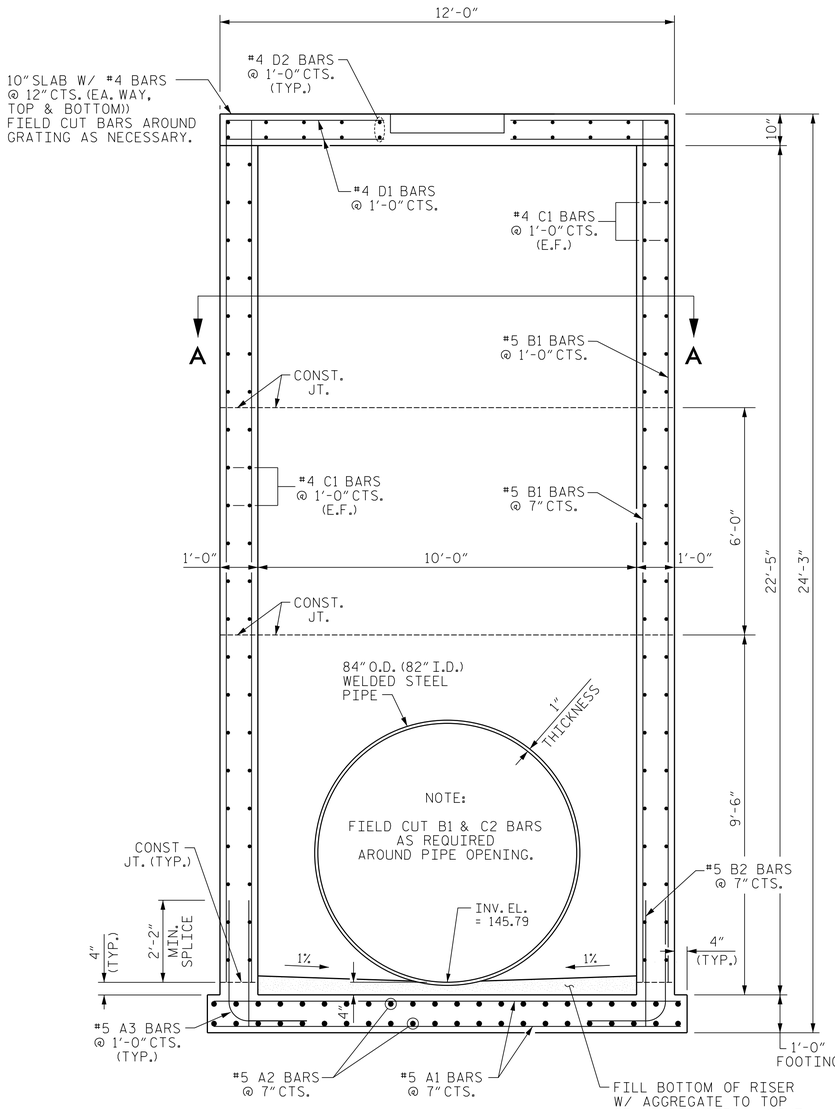
DSG. ENG. OF RECORD.: CB	
DWN. BY: MAF	DATE: 3/18
CHKD. BY: HLW	DATE: 3/18

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

SHEET NO. C2-3

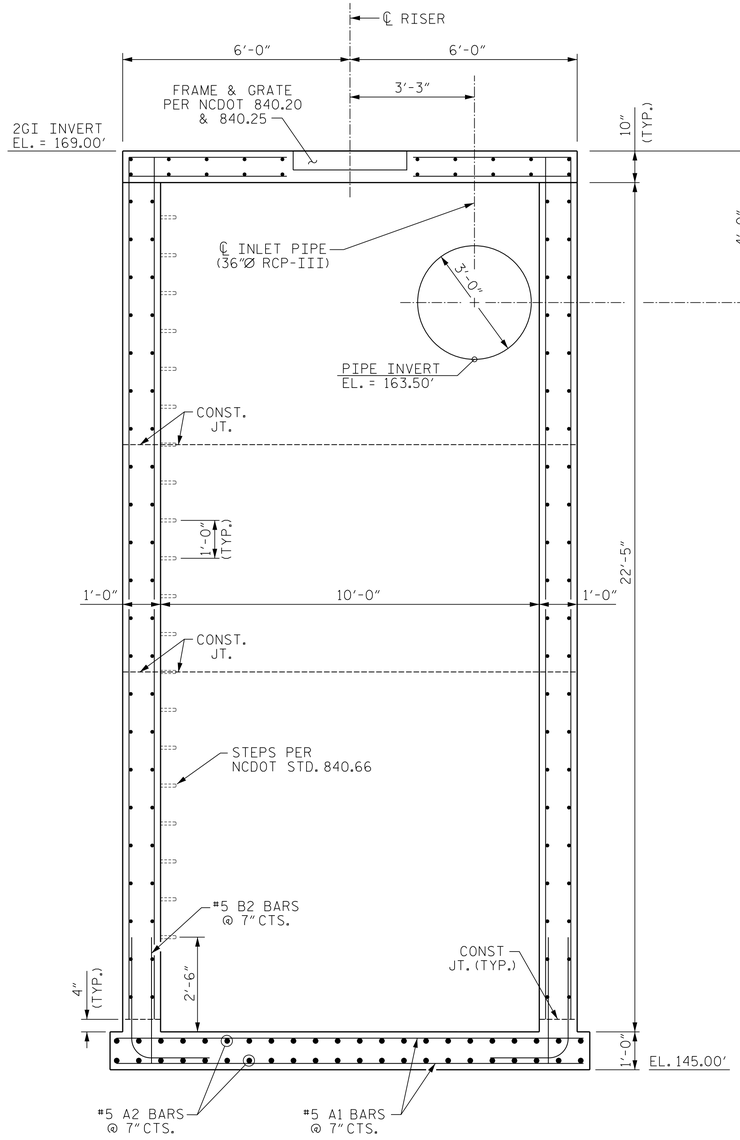
TOTAL SHEETS 7

V & M PROJECT NO.: 31740-03

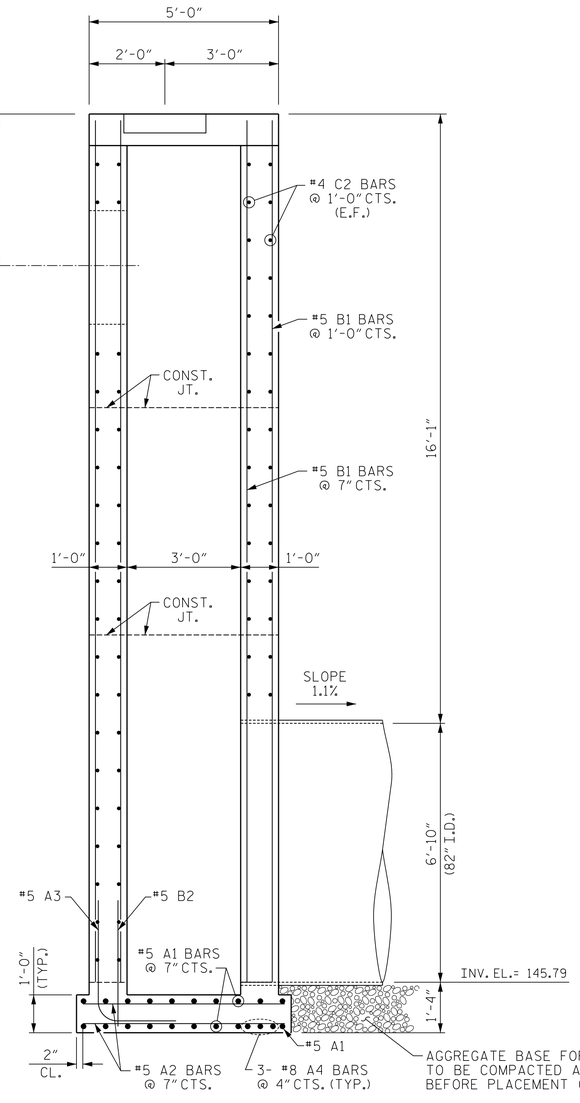


SECTION LOOKING SOUTH

FOR SECTION A-A, SEE SHEET C2-5.



SECTION LOOKING NORTH



LOOKING EAST

2GI RISER DETAILS

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 114+23.00 -L-

SHEET 4 OF 7

V&M
Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL HARDY L. WILLIS

7/17/2018 8:15:56 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DSG. ENG. OF RECORD.: CB
DWN. BY: MAF DATE: 3/18
CHKD. BY: HLW DATE: 3/18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

84"OD WELDED STEEL PIPE W/ RISER STRUCTURE

ON UT TO NEUSE RIVER UNDER NC 42 BETWEEN SR 1704 AND SR 2677

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-4
1			3			TOTAL SHEETS
2			4			7

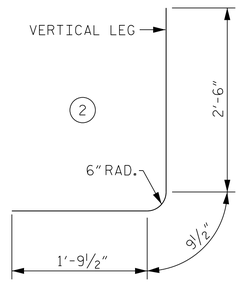
V & M PROJECT NO.: 31740-03

2GI RISER BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	20	5	STR.	12'-4"	257
A2	44	5	STR.	5'-4"	245
A3	34	5	2	5'-1"	180
A4	3	8	STR.	12'-4"	99
B1	82	5	STR.	22'-8"	1939
B2	48	5	STR.	3'-4"	167
C1	92	4	STR.	4'-8"	287
C2	92	4	STR.	11'-8"	717
D1	12	4	STR.	11'-8"	94
D2	26	4	STR.	4'-8"	81

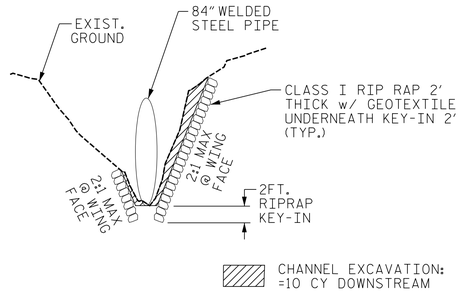
TOTAL REINFORCING STEEL: 4,065 LBS.

CLASS 'A' CONCRETE: 29.1 C.Y.



SPLICE LENGTH CHART

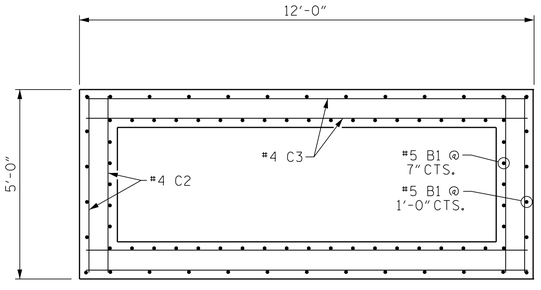
BAR SIZE	SPLICE LENGTH
#4	1'-9"
#5	2'-2"
#6	2'-9"



BED MATERIALS;
SAND, SMALL TO MEDIUM ROCKS, SMALL BOULDERS

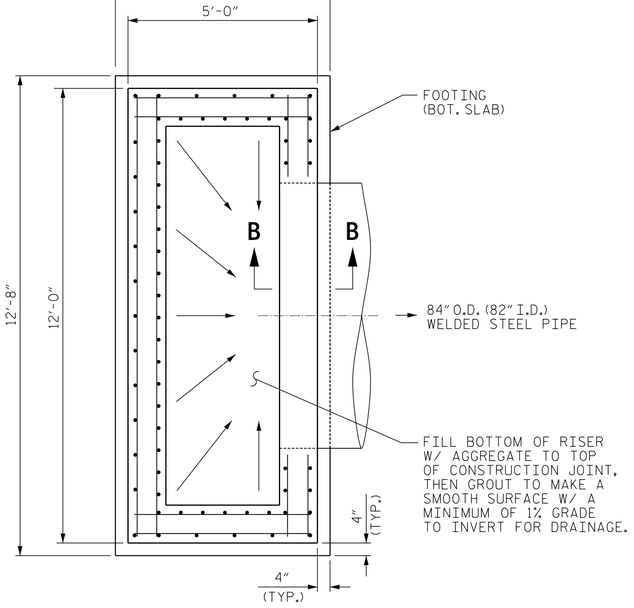
OUTLET BENCH

FACING DOWNSTREAM

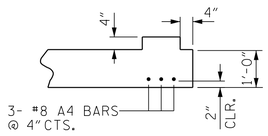


SECTION A-A

(SEE SHEET C2-4 FOR LOCATION)



PLAN AT JUNCTION OF 2GI RISER AND 84" O.D. WELDED STEEL PIPE



SECTION B-B

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 114+23.00 -L-

SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

84" OD WELDED STEEL PIPE W/ RISER STRUCTURE

ON UT TO NEUSE RIVER UNDER NC 42 BETWEEN SR 1704 AND SR 2677

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796

Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042697 HARDY L. WILLIS

7/17/2018 8:15:56 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

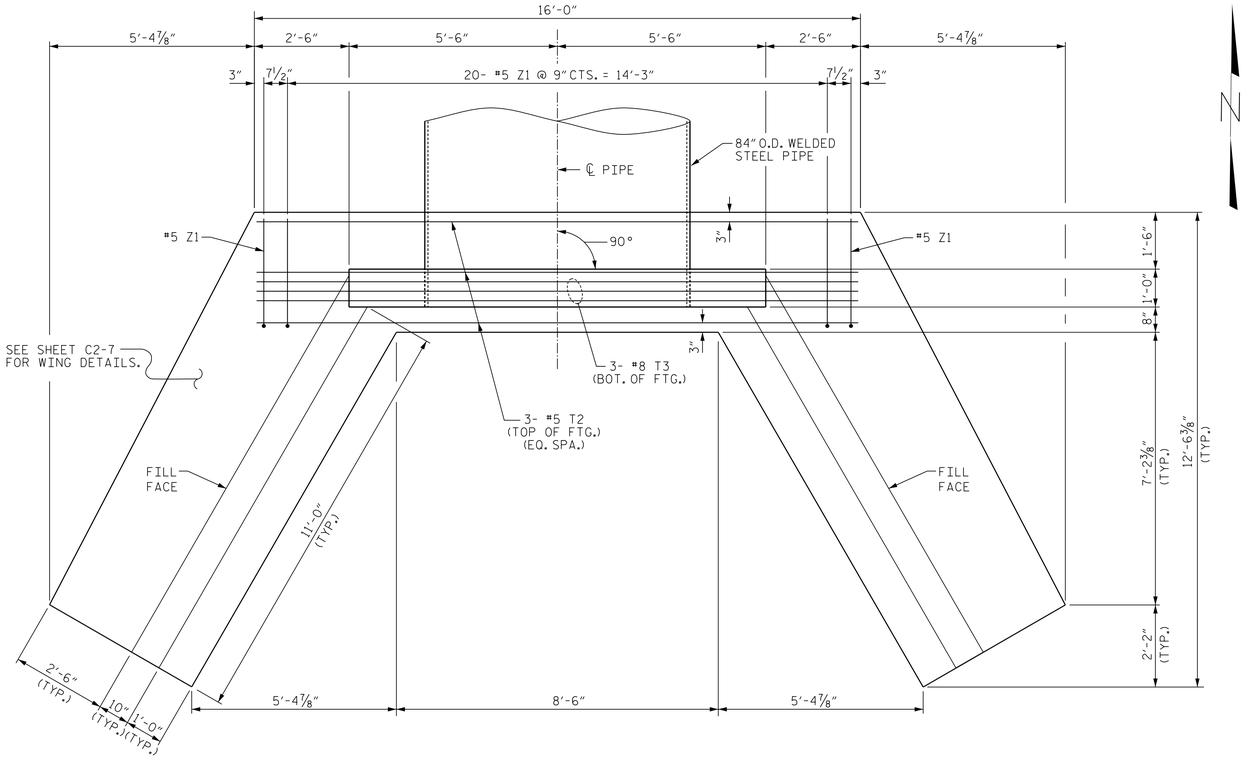
DSG. ENG. OF RECORD.: CB
DWN. BY: MAF DATE: 3/18
CHKD. BY: HLW DATE: 3/18

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

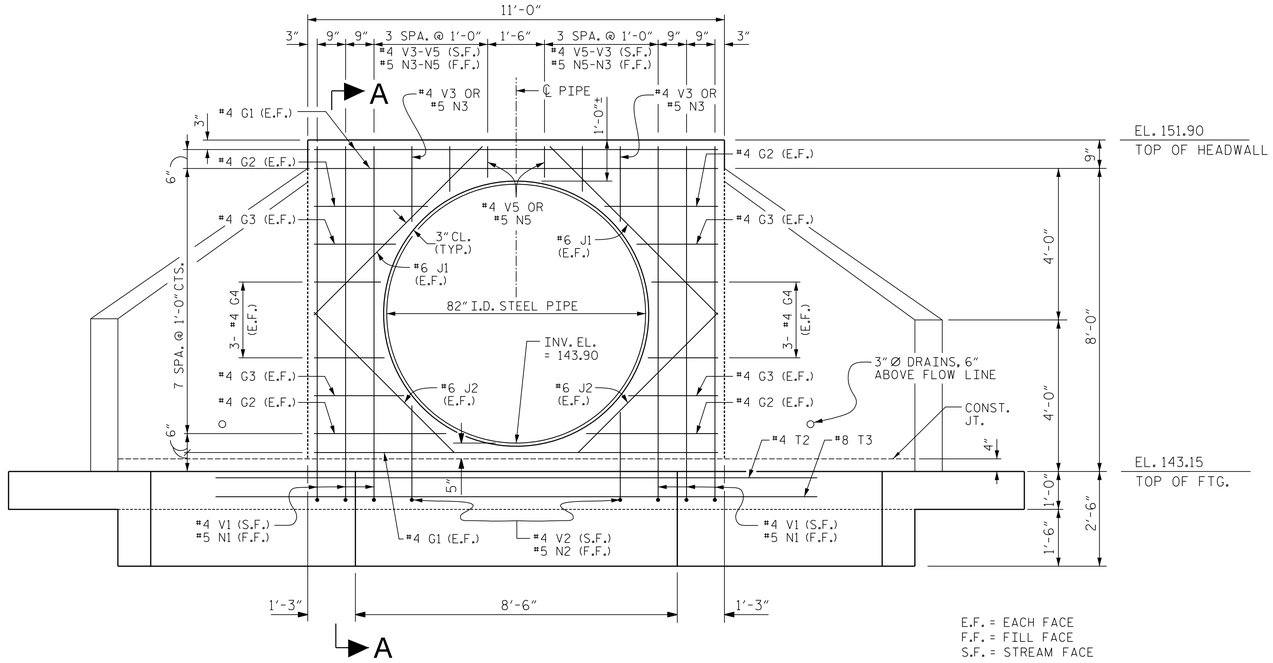
SHEET NO. C2-5

TOTAL SHEETS 7

V & M PROJECT NO.: 31740-03



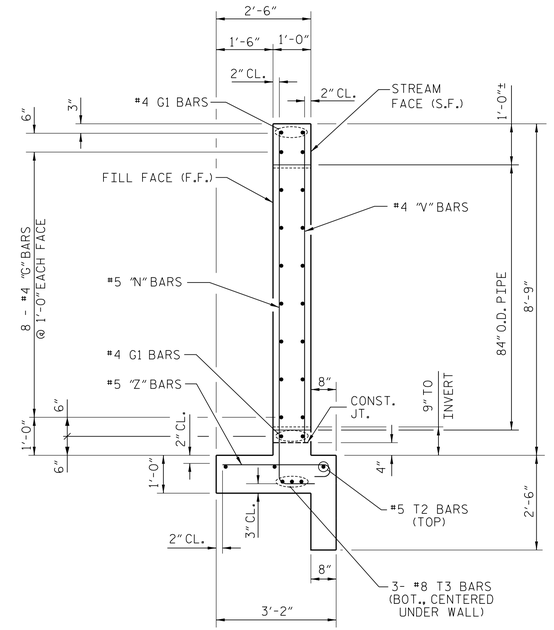
HEADWALL PLAN VIEW AT PIPE OUTLET



E.F. = EACH FACE
F.F. = FILL FACE
S.F. = STREAM FACE

HEADWALL ELEVATION VIEW AT PIPE OUTLET

NOTE: DETAILS SCALED TO MATCH NCDOT 838.39.



SECTION A-A AT PIPE OUTLET

PROJECT NO. R-3825B

JOHNSTON COUNTY

STATION: 114+23.00 -L-

SHEET 6 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

84"OD WELDED STEEL PIPE W/ RISER STRUCTURE

ON UT TO NEUSE RIVER
UNDER NC 42 BETWEEN
SR 1704 AND SR 2677

V&M
Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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
Atlanta, GA 770-627-3590

Copyright © 2006 Vaughn & Melton, Inc. All Rights Reserved

NORTH CAROLINA PROFESSIONAL SEAL 038787 ENGINEER HARDY L. WILLIS

7/17/2018 8:15:56 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

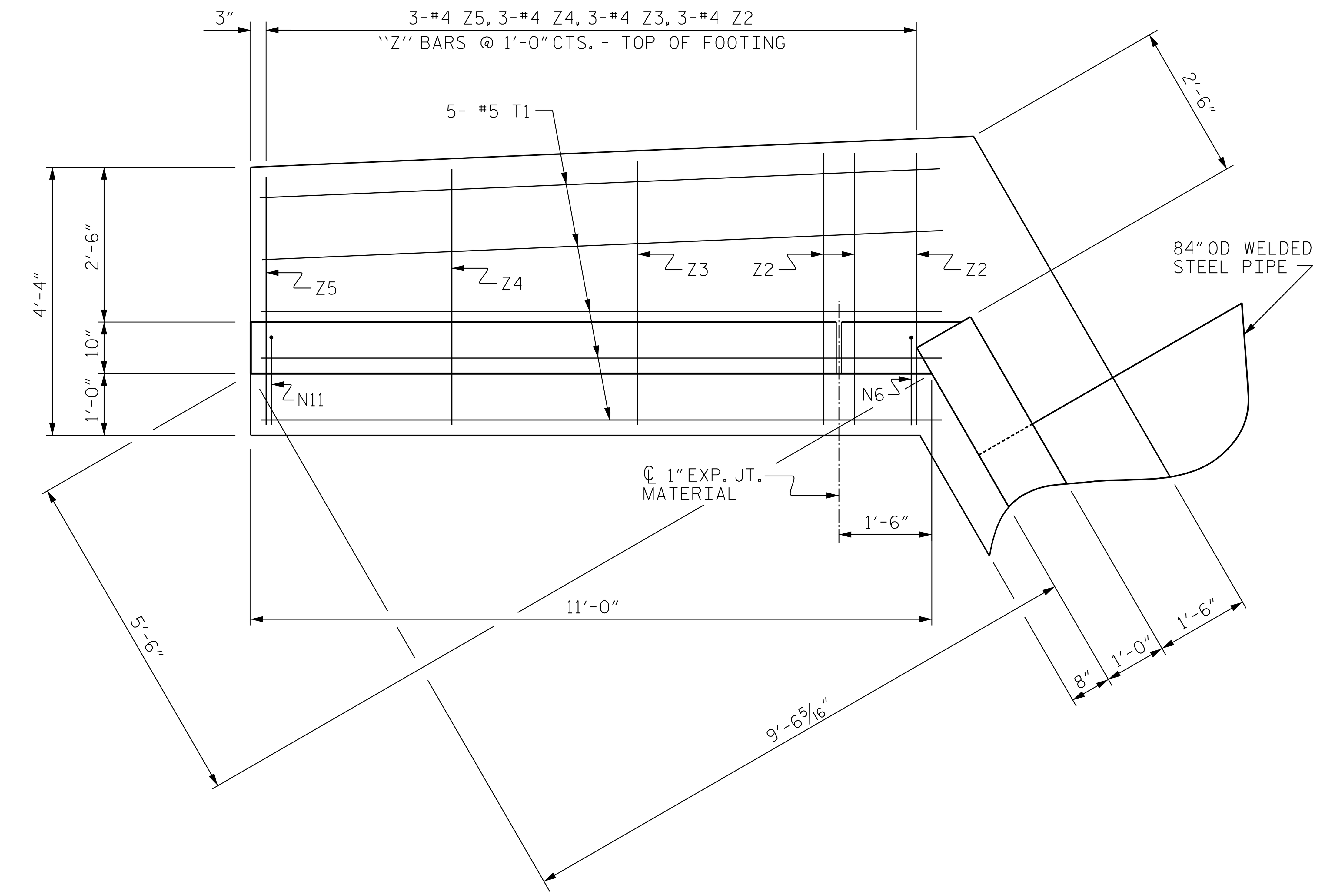
DSG. ENG. OF RECORD.: CB
DWN. BY: MAF DATE: 3/18
CHKD. BY: HLW DATE: 3/18

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

SHEET NO. C2-6

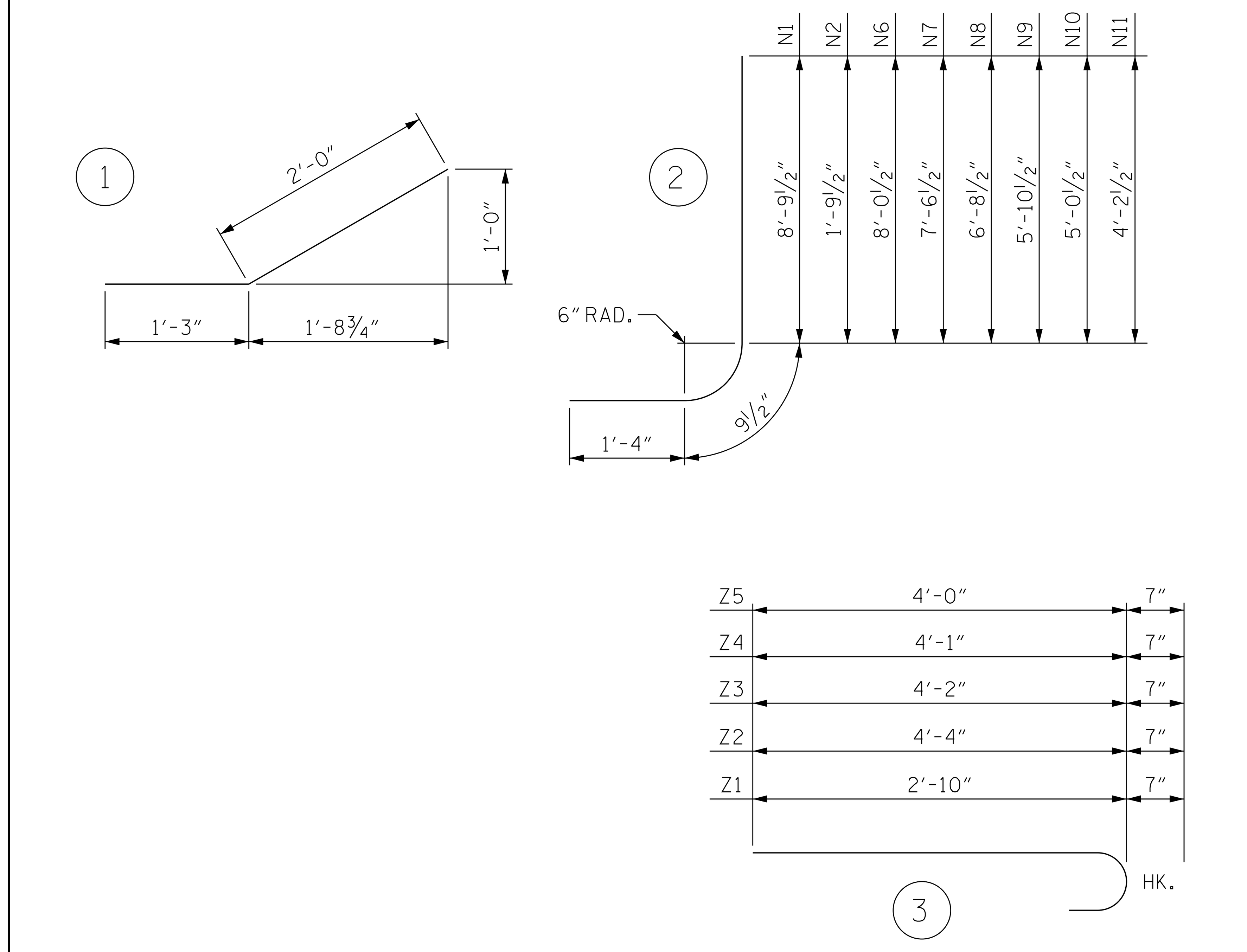
TOTAL SHEETS 7

V & M PROJECT NO.: 31740-03



PLAN

BAR TYPES

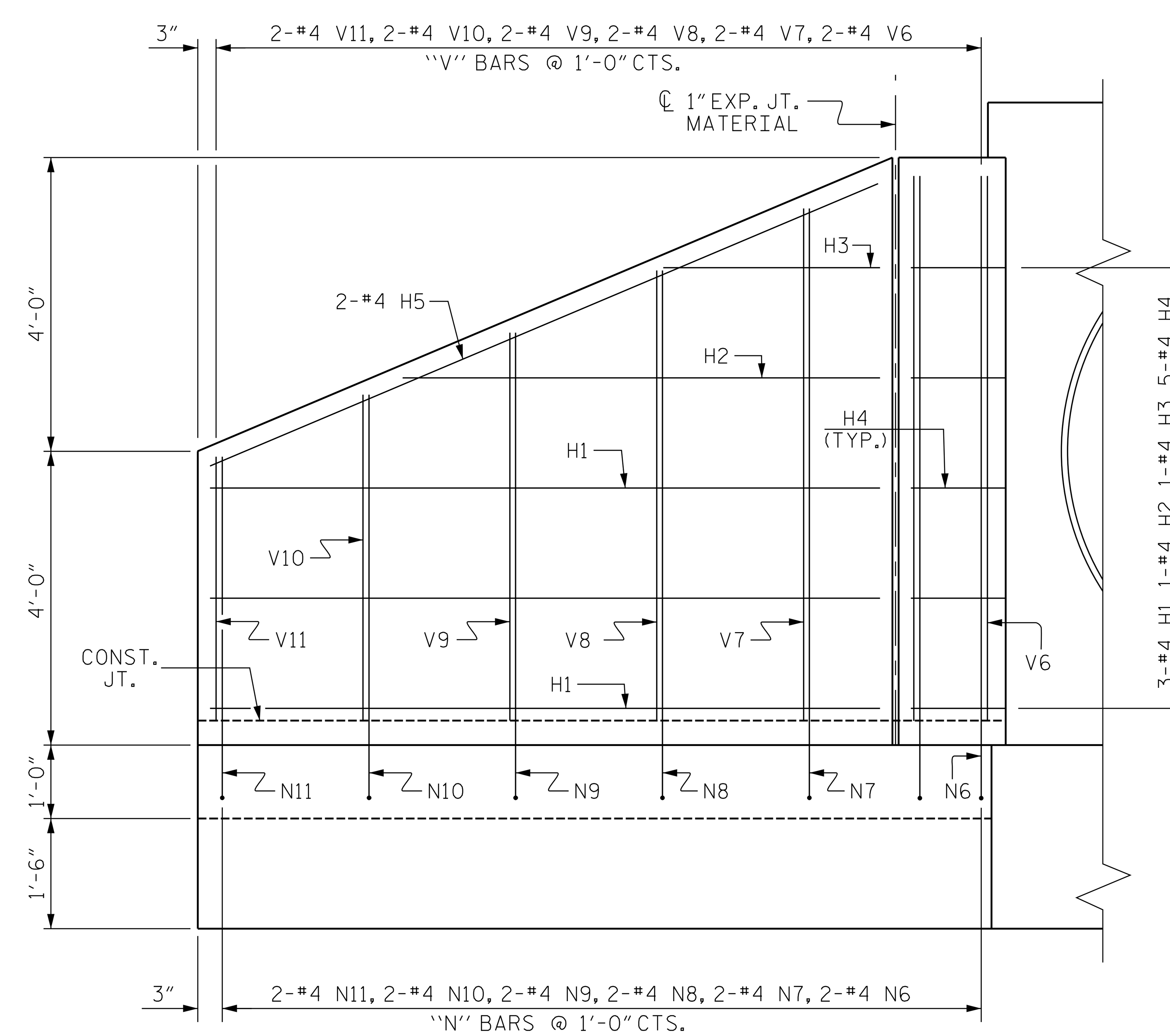


ALL BAR DIMENSIONS ARE OUT TO OUT.

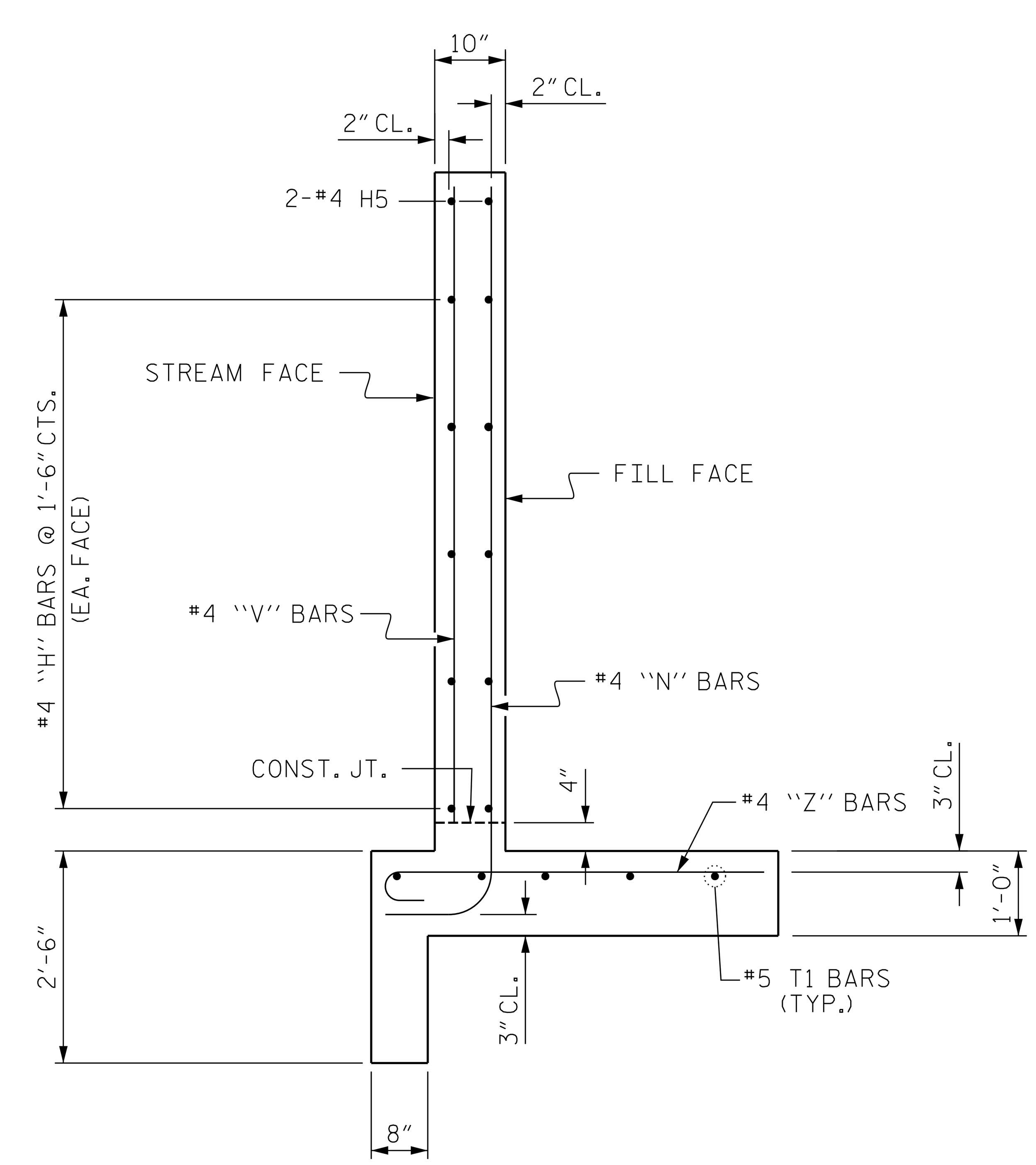
BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
G1	6	#4	STR	10'-8"	43
G2	8	#4	STR	3'-3"	17
G3	8	#4	STR	2'-3"	12
G4	12	#4	STR	1'-9"	14
H1	12	#4	STR	9'-2"	73
H2	4	#4	STR	6'-6"	17
H3	4	#4	STR	3'-0"	8
H4	20	#4	1	3'-3"	43
H5	4	#4	STR	9'-10"	26
J1	4	#6	STR	6'-7"	40
J2	4	#6	STR	5'-0"	30
N1	6	#5	2	10'-11"	68
N2	2	#5	2	3'-11"	8
N3	2	#5	STR	2'-2"	5
N4	2	#5	STR	1'-4"	3
N5	2	#5	STR	1'-1"	2
N6	4	#4	2	10'-2"	27
N7	2	#4	2	9'-8"	13
N8	2	#4	2	8'-10"	12
N9	2	#4	2	8'-0"	11
N10	2	#4	2	7'-2"	10
N11	2	#4	2	6'-4"	8
T1	10	#5	STR	11'-0"	115
T2	3	#5	STR	15'-10"	50
T3	3	#8	STR	15'-10"	127
V1	6	#4	STR	8'-3"	33
V2	2	#4	STR	1'-3"	2
V3	2	#4	STR	2'-2"	3
V4	2	#4	STR	1'-4"	2
V5	2	#4	STR	1'-1"	1
V6	4	#4	STR	7'-5"	20
V7	4	#4	STR	7'-0"	19
V8	4	#4	STR	6'-2"	16
V9	4	#4	STR	5'-3"	14
V10	4	#4	STR	4'-5"	12
V11	4	#4	STR	3'-7"	10
Z1	22	#5	3	3'-5"	78
Z2	6	#4	3	4'-11"	20
Z3	6	#4	3	4'-9"	19
Z4	6	#4	3	4'-8"	19
Z5	6	#4	3	4'-7"	18

REINFORCING STEEL
FOR 2 WINGS & OUTLET 1,067 LBS

CLASS A CONCRETE		
2 WINGS	8.0	CY
1 OUTLET	3.7	CY
END CURTAIN WALL	1.1	CY
TOTAL	12.8	CY



ELEVATION



TYPICAL WING SECTION

7/17/2018 8:15:56 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. R-3825B
JOHNSTON COUNTY
STATION: 114+23.00 -L-

SHEET 7 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING DETAILS

H = 8'-0" SLOPE = 2:1
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-7
1			3			TOTAL SHEETS
2			4			7

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 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 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.

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

ENGLISH

JANUARY, 1990

STD. NO. SN