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TIP PROJECT: R-2915C

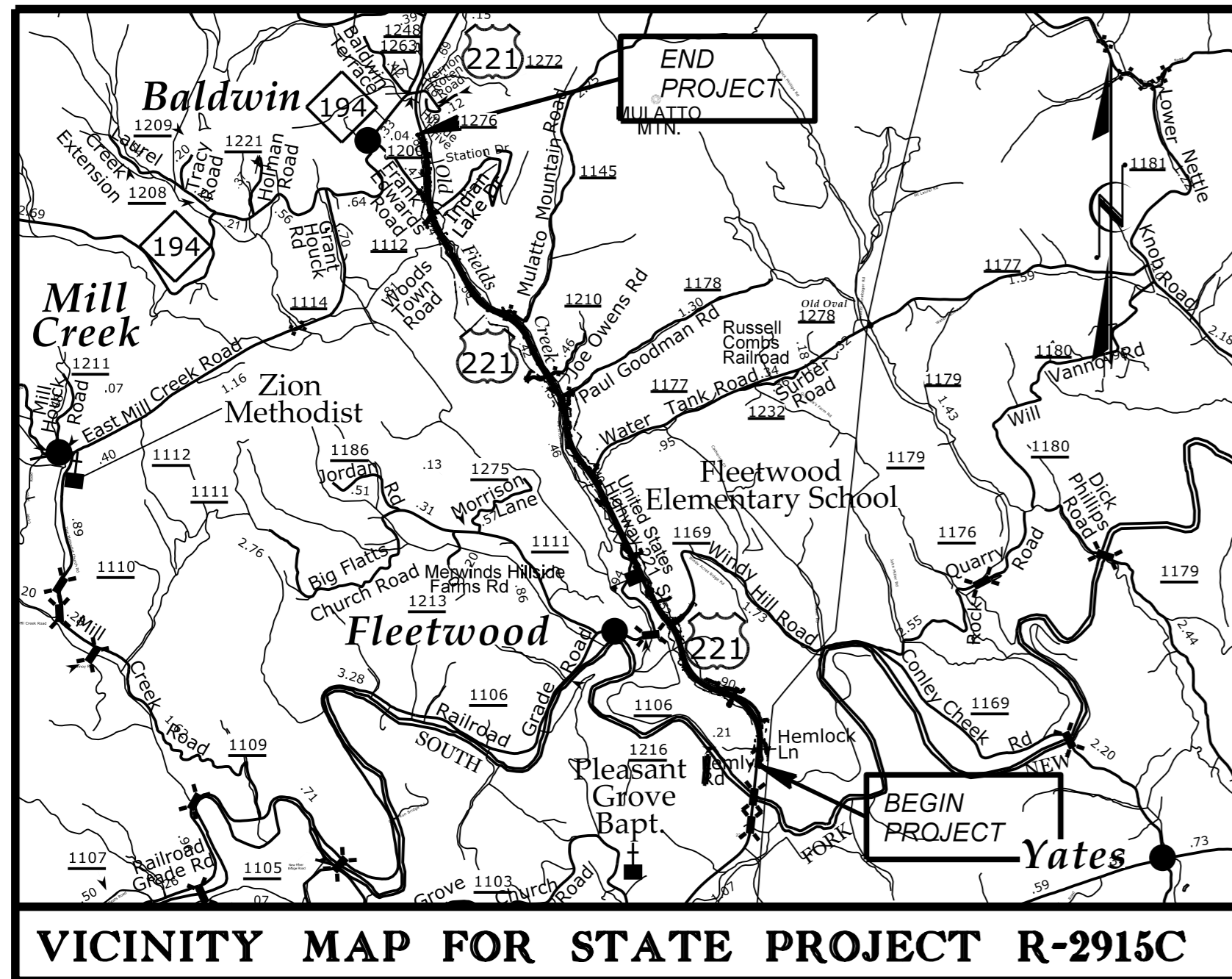
CONTRACT: C203801

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2915C		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34518.1.4	STP-0221(41)	P.E.	
34518.2.FR3	STP-0221(41)	R/W	
34518.2.FR3	STP-0221(41)	UTILITIES	
34518.3.FR3	STP-0221(41)	CONSTR.	

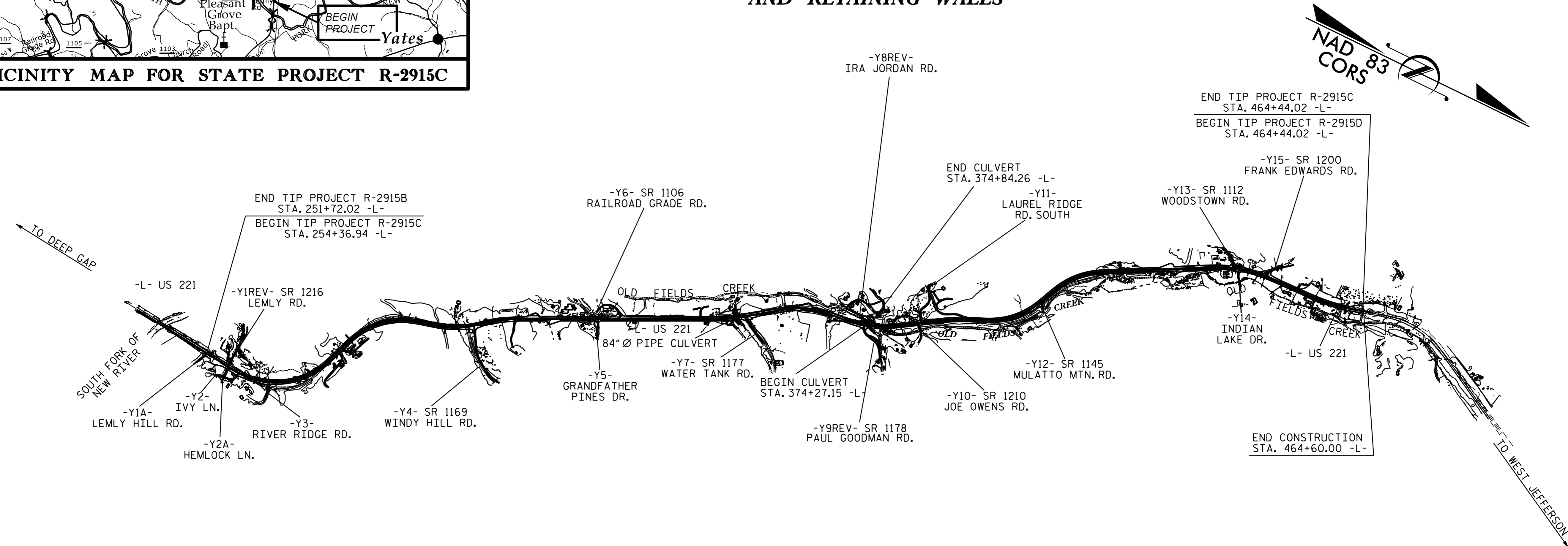
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
ASHE COUNTY

**LOCATION: US 221 FROM NORTH OF SOUTH FORK NEW RIVER
TO SOUTH OF NC 194.**

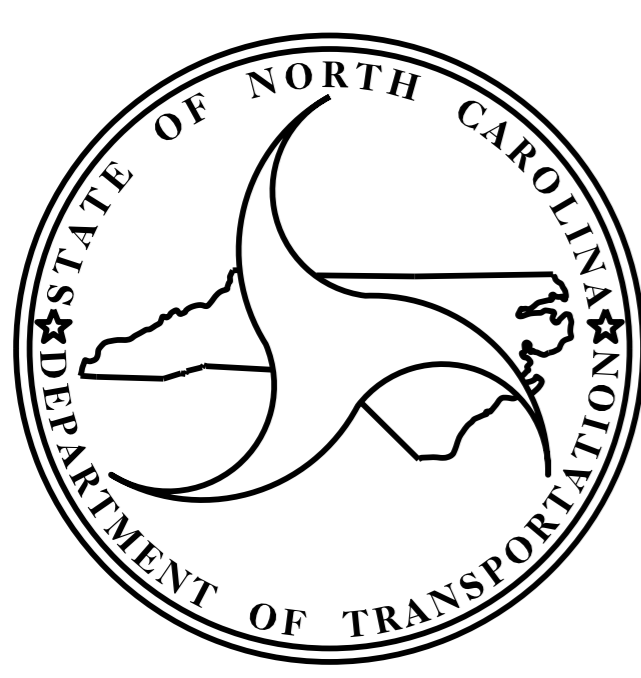
**TYPE OF WORK: GRADING, DRAINAGE, PAVING, CULVERT,
AND RETAINING WALLS**



VICINITY MAP FOR STATE PROJECT R-2915C



STRUCTURES



DESIGN DATA

ADT 2016	=	12,743
ADT 2036	=	21,029
K	=	9 %
D	=	60 %
T	=	9 % *
V	=	60 MPH**
*=(TTST 2%+DUAL 7%)		
FUNC CLASS	=	RURAL ARTERIAL
		STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2915C	=	3.969 MILES
LENGTH STRUCTURE TIP PROJECT R-2915C	=	0.010 MILES
TOTAL LENGTH TIP PROJECT R-2915C	=	3.979 MILES

Prepared in the Office of:
DIVISION OF HIGHWAYS
STRUCTURES MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

2012 STANDARD SPECIFICATIONS

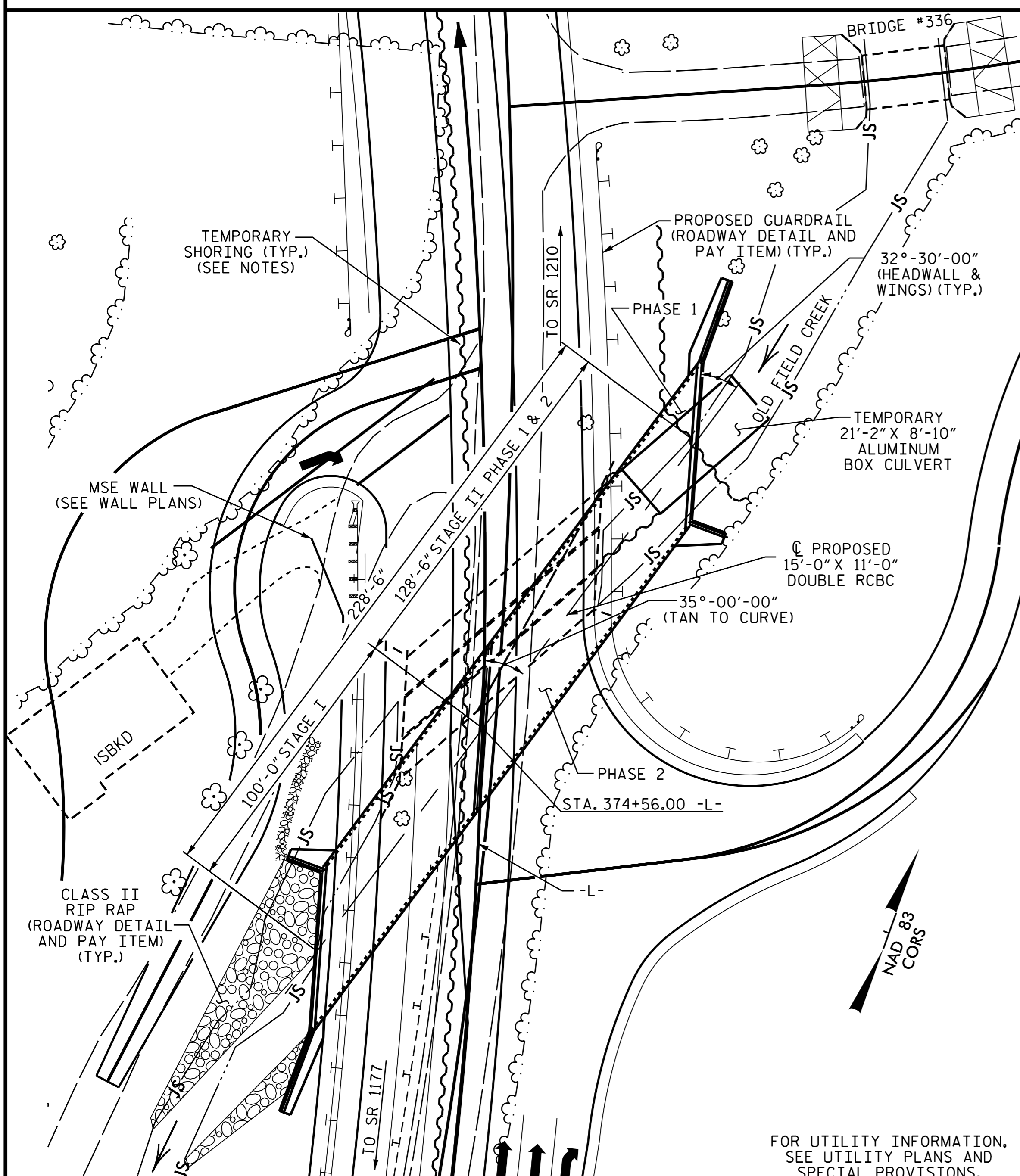
LETTING DATE :
November 15, 2016

D. R. Calhoun, P.E.
PROJECT ENGINEER

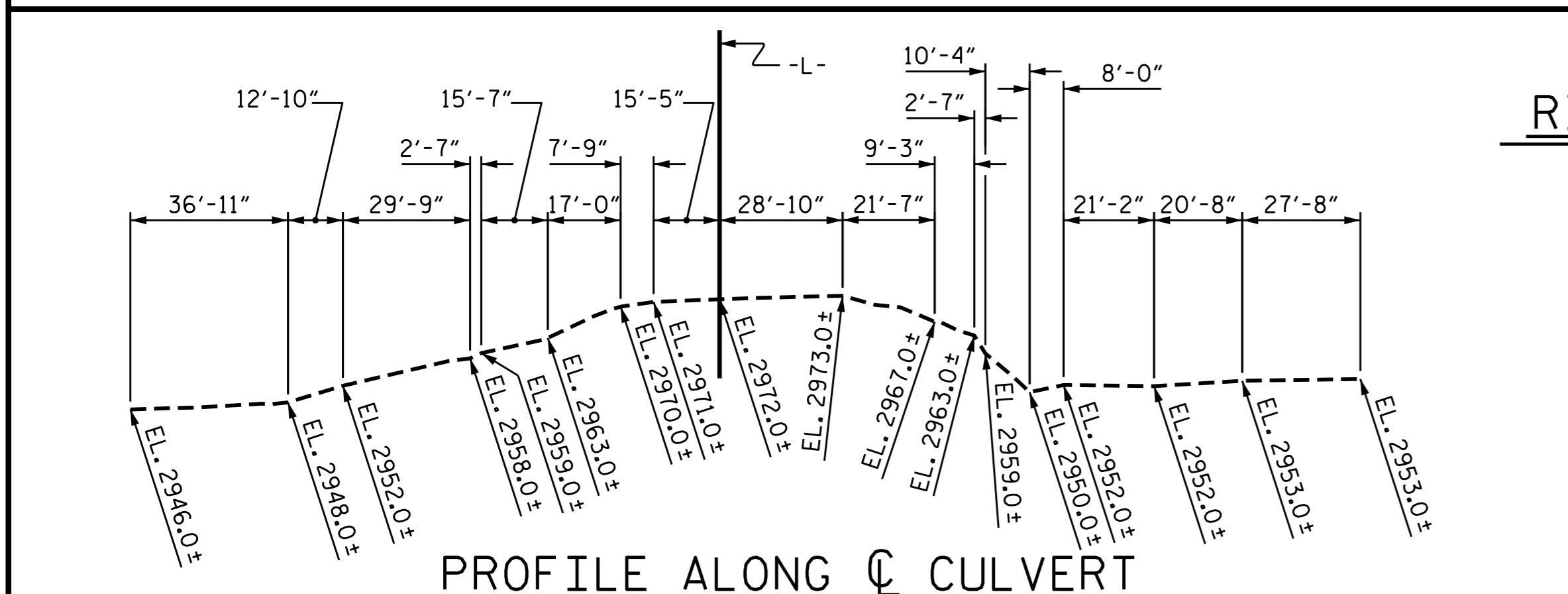
W. S. Arafat, P.E.
PROJECT DESIGN ENGINEER

BENCHMARK #5: CHISELED SQUARE IN SW WING WALL OF BRIDGE
 STA. 13+68.00 -Y9-, 120' LEFT; EL. 2964.46 N 946397 E 1257341

NOTES F. A. PROJECT No.: STP-0221(41)



LOCATION SKETCH



PROFILE ALONG CULVERT

DRAWN BY: H. T. BARBOUR DATE: 6-19-16
 CHECKED BY: V. X. NGUYEN DATE: 7-16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

ROADWAY DATA

GRADE POINT EL. @ STA. 374+56.00 -L- = 2974.99
 BED EL. @ STA. 374+56.00 -L- = 2948.16
 ROADWAY SLOPES = 2:1

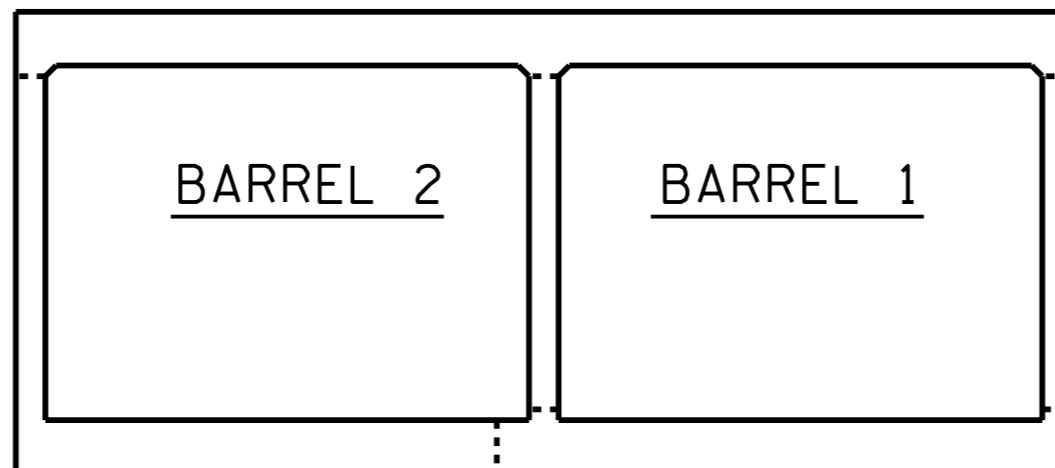
HYDRAULIC DATA

DESIGN DISCHARGE = 1900 C.F.S.
 FREQUENCY OF DESIGN FLOOD = 50 YEARS
 DESIGN HIGH WATER ELEVATION = 2958.60
 DRAINAGE AREA = 6.7 SQ. MI.
 BASE DISCHARGE (Q100) = 2473 C.F.S.
 BASE HIGH WATER ELEVATION = 2959.50

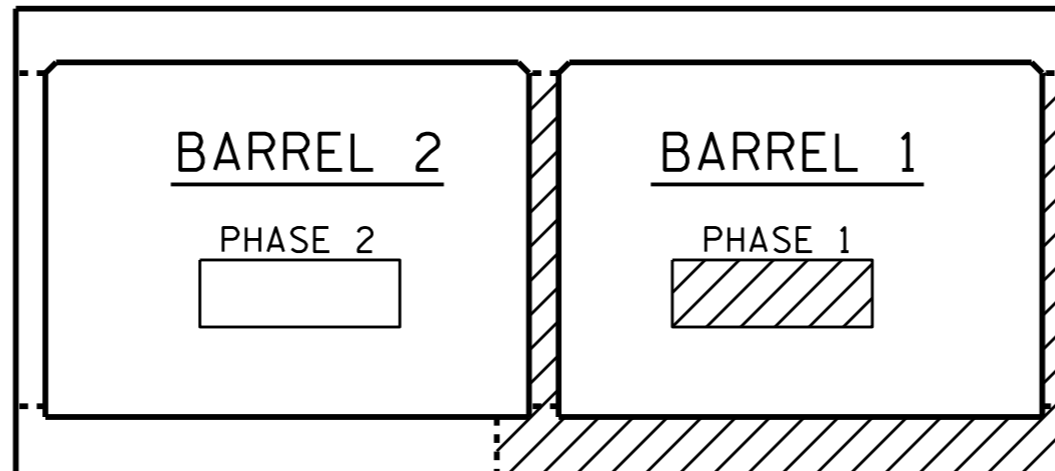
OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 3000(+) C.F.S.
 FREQUENCY OF OVERTOPPING FLOOD = 500+ YEARS
 OVERTOPPING FLOOD ELEVATION = 2973.27
 SHD @ SAG STA. 377+36.56 -L-

I HEREBY CERTIFY THESE PLANS
 ARE THE AS-BUILT PLANS



STAGE I
 RIGHT ANGLE SECTION OF BARREL
 LOOKING DOWNSTREAM



STAGE II - PHASE 1 & 2
 RIGHT ANGLE SECTION OF BARREL
 LOOKING DOWNSTREAM

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
 DESIGN FILL = 13.6 FT. (MIN.), 15.78 FT. (MAX.)
 FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN STAGE I CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS, CURTAIN WALL, EDGE BEAM AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTION OF WALLS AND WINGS FULL HEIGHT.
3. SILLS.
4. ROOF SLAB, EDGE BEAM AND HEADWALL.

CONCRETE IN STAGE II CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. PHASE 1 WING FOOTING, CURTAIN WALL, EDGE BEAM AND FLOOR SLAB TO THE CONSTRUCTION JOINT INCLUDING 4" OF PHASE 1 VERTICAL WALLS.
2. THE REMAINING PORTION OF PHASE 1 WALLS AND PHASE 1 WING FULL HEIGHT.
3. PHASE 2 WING FOOTING, CURTAIN WALL, EDGE BEAM AND FLOOR SLAB TO THE CONSTRUCTION JOINT INCLUDING 4" OF PHASE 2 VERTICAL WALL.
4. THE REMAINING PORTION OF PHASE 2 WALL AND PHASE 2 WING FULL HEIGHT.
5. SILLS.
6. ROOF SLAB, EDGE BEAM AND HEADWALL.

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 FACES OF THE EXTERIOR WALLS 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.

AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING TRIPLE 10.0' X 10.0' BOTTOMLESS CULVERT 92.5' LONG AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING STRUCTURE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE STRUCTURE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE	
STAGE I	599.7 C.Y.
STAGE II	754.6 C.Y.
TOTAL	1354.3 C.Y.
REINFORCING STEEL	
STAGE I	74675 LBS.
STAGE II	98505 LBS.
TOTAL	173180 LBS.
CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMPORARY STRUCTURE	LUMP SUM
REMOVAL OF EXISTING STRUCTURES	LUMP SUM
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	
STAGE I	259 TONS
STAGE II	333 TONS
TOTAL	592 TONS
ASBESTOS ASSESSMENT	LUMP SUM

DETAILED DRAWINGS FOR FALSEWORK AND FORMS FOR THIS CULVERT SHALL BE SUBMITTED. SEE SHEET SN.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

FOR CONSTRUCTION SEQUENCE, SEE EROSION CONTROL PLANS.
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

TRAFFIC ON US 221 SHALL BE MAINTAINED. IN ORDER TO MAINTAIN TRAFFIC THE CULVERT SHALL BE CONSTRUCTED IN SECTIONS AS SHOWN ON THESE PLANS OR AS DIRECTED BY THE ENGINEER.

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.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.

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.

THE RCBC SHALL BE PLACED ON THE STANDARD 1.0 FOOT BLANKET OF FOUNDATION CONDITIONING MATERIAL SEE SECTION 414 OF THE STANDARD SPECIFICATIONS.

THE REQUIRED BEARING CAPACITY AT THE BASE OF THE CULVERT IS 5 TSF. THE REQUIRED BEARING CAPACITY SHALL BE VERIFIED.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

FOR CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMP. ALUMINUM BOX CULVERT, SEE SPECIAL PROVISIONS.

THE EXISTING STRUCTURE CONSISTING OF 1 SPAN @ 31'-8", ON 4" X 8" TIMBER FLOORS WITH A 2.5" ASW ON 9 LINES OF 21" I-BEAMS @ 2'-3" CTS. WITH A CLEAR ROADWAY WIDTH OF 19'-0" ON REINFORCED CONCRETE ABUTMENTS AND LOCATED UPSTREAM FROM PROPOSED STRUCTURE SHALL BE REMOVED. SEE SPECIAL PROVISION FOR REMOVAL OF EXISTING STRUCTURES.

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

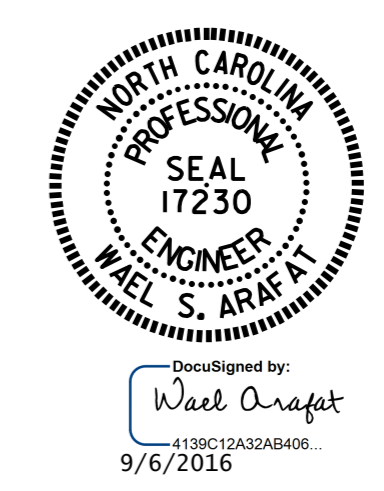
PROJECT NO. R-2915C

ASHE COUNTY

STATION: 374+56.00 -L-

REMOVES BRIDGE #336
 REPLACES STR. #531

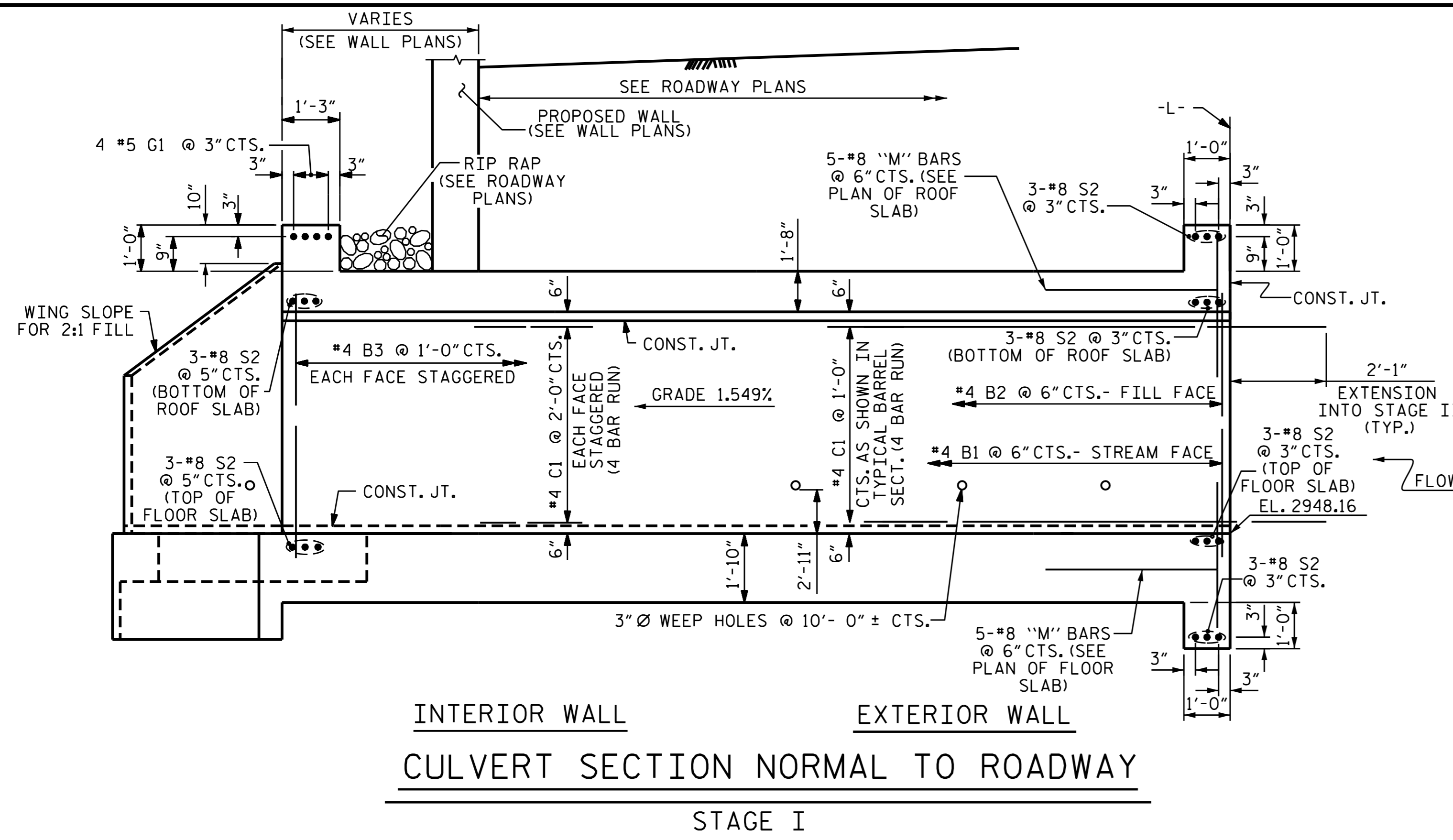
SHEET 1 OF 12



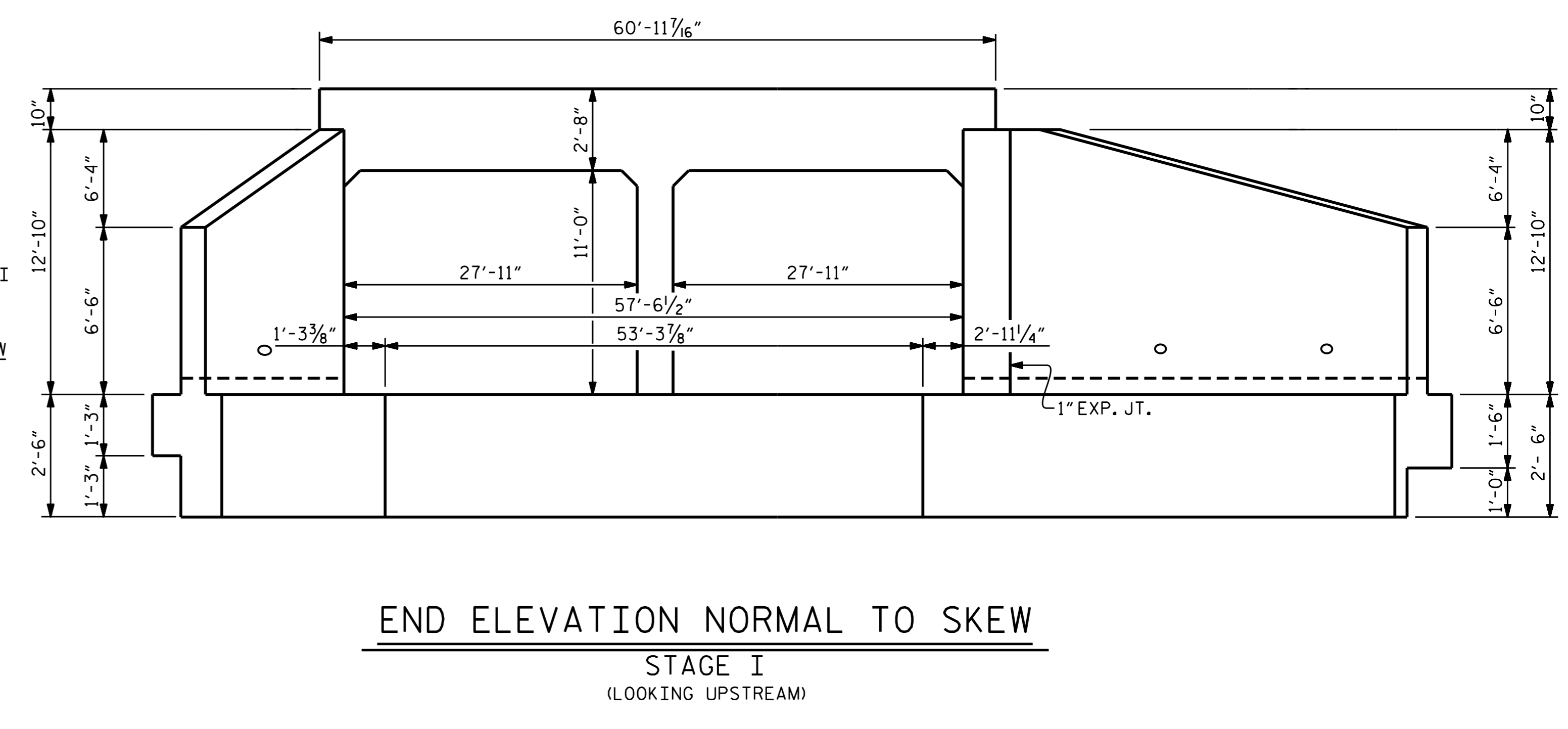
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 15 FT. X 11 FT.
 RCBC
 35°00'-00" SKEW

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

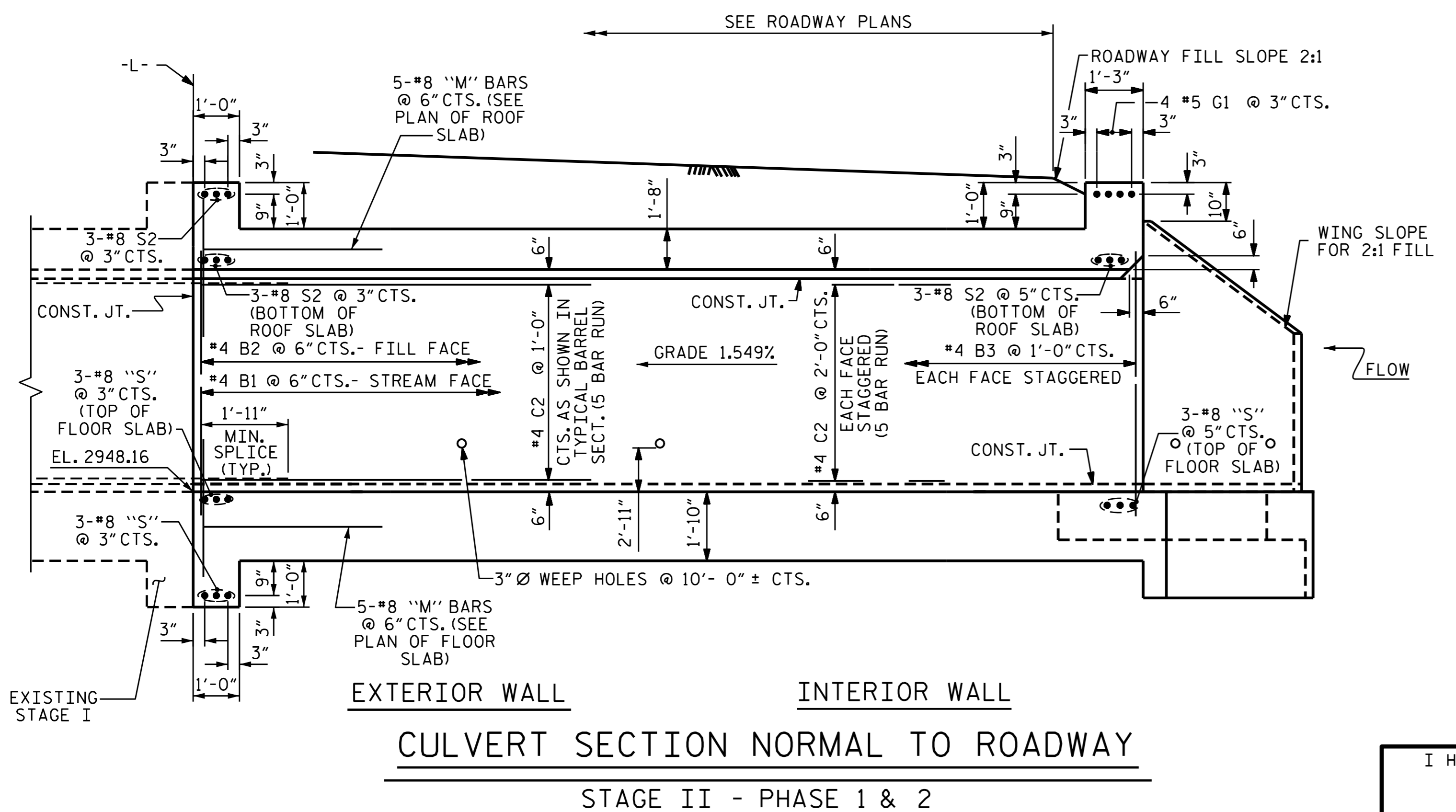
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NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			C-1
2			4			12



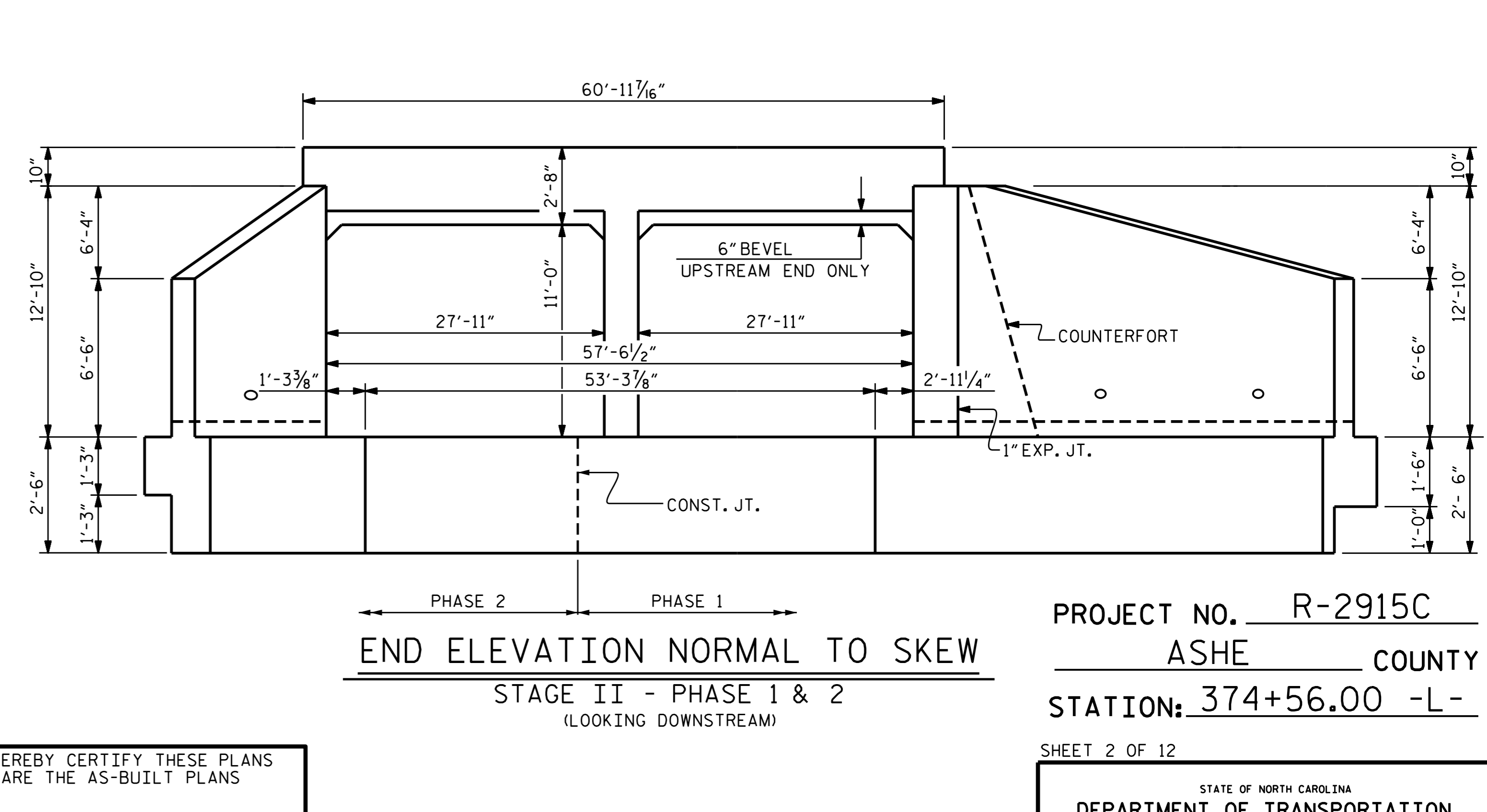
INTERIOR WALL
 CULVERT SECTION NORMAL TO ROADWAY
 STAGE I



END ELEVATION NORMAL TO SKEW
 STAGE I
 (LOOKING UPSTREAM)



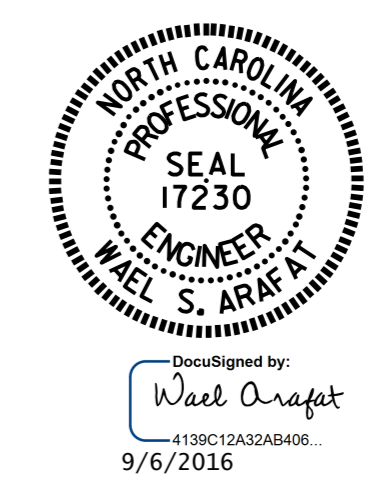
EXTERIOR WALL
 CULVERT SECTION NORMAL TO ROADWAY
 STAGE II - PHASE 1 & 2



END ELEVATION NORMAL TO SKEW
 STAGE II - PHASE 1 & 2
 (LOOKING DOWNSTREAM)

I HEREBY CERTIFY THESE PLANS
 ARE THE AS-BUILT PLANS

PROJECT NO. R-2915C
 ASHE COUNTY
 STATION: 374+56.00 -L-
 SHEET 2 OF 12

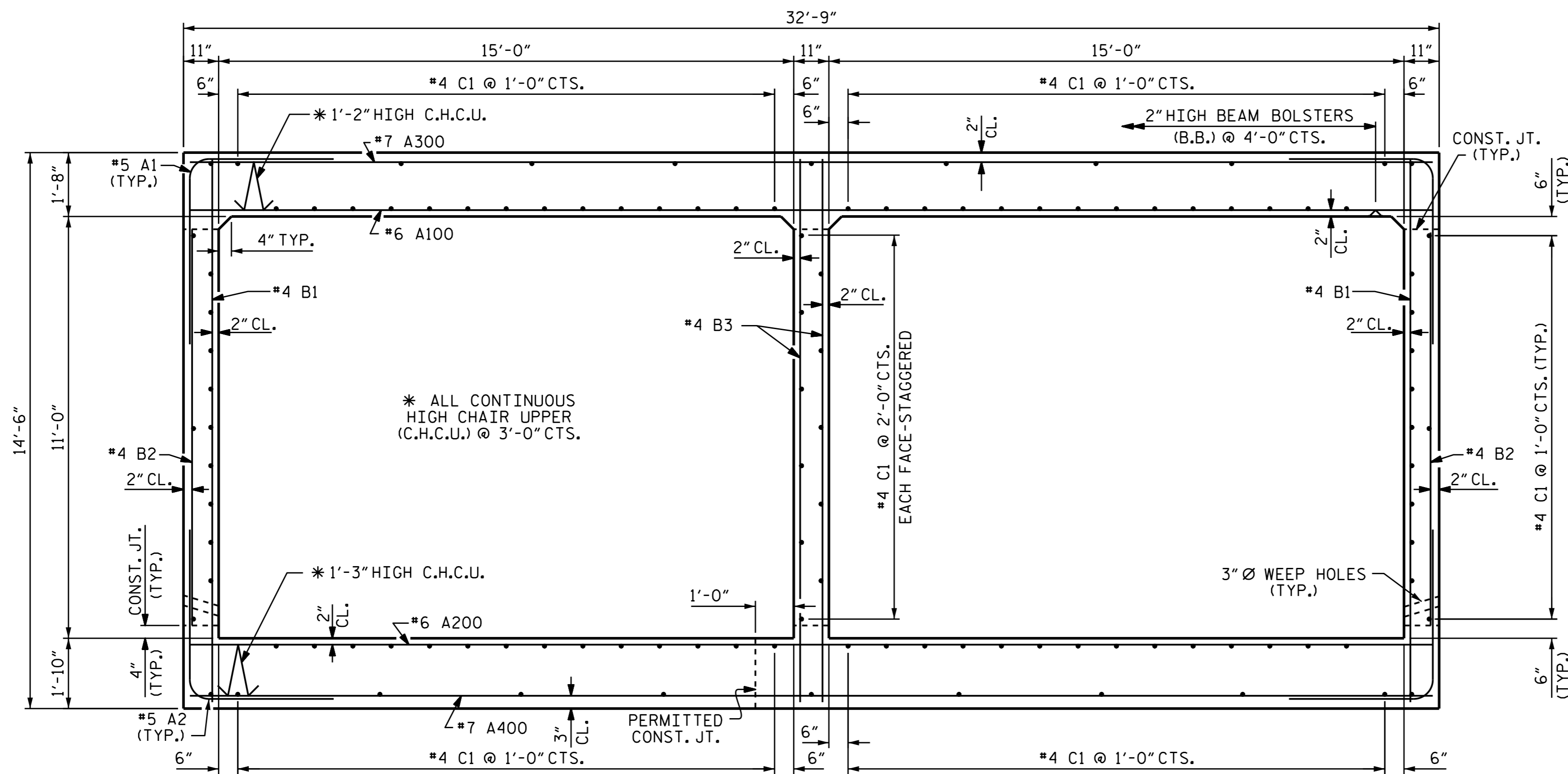


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 15 FT. X 11 FT.
 RCBC
 35°00'-00" SKEW

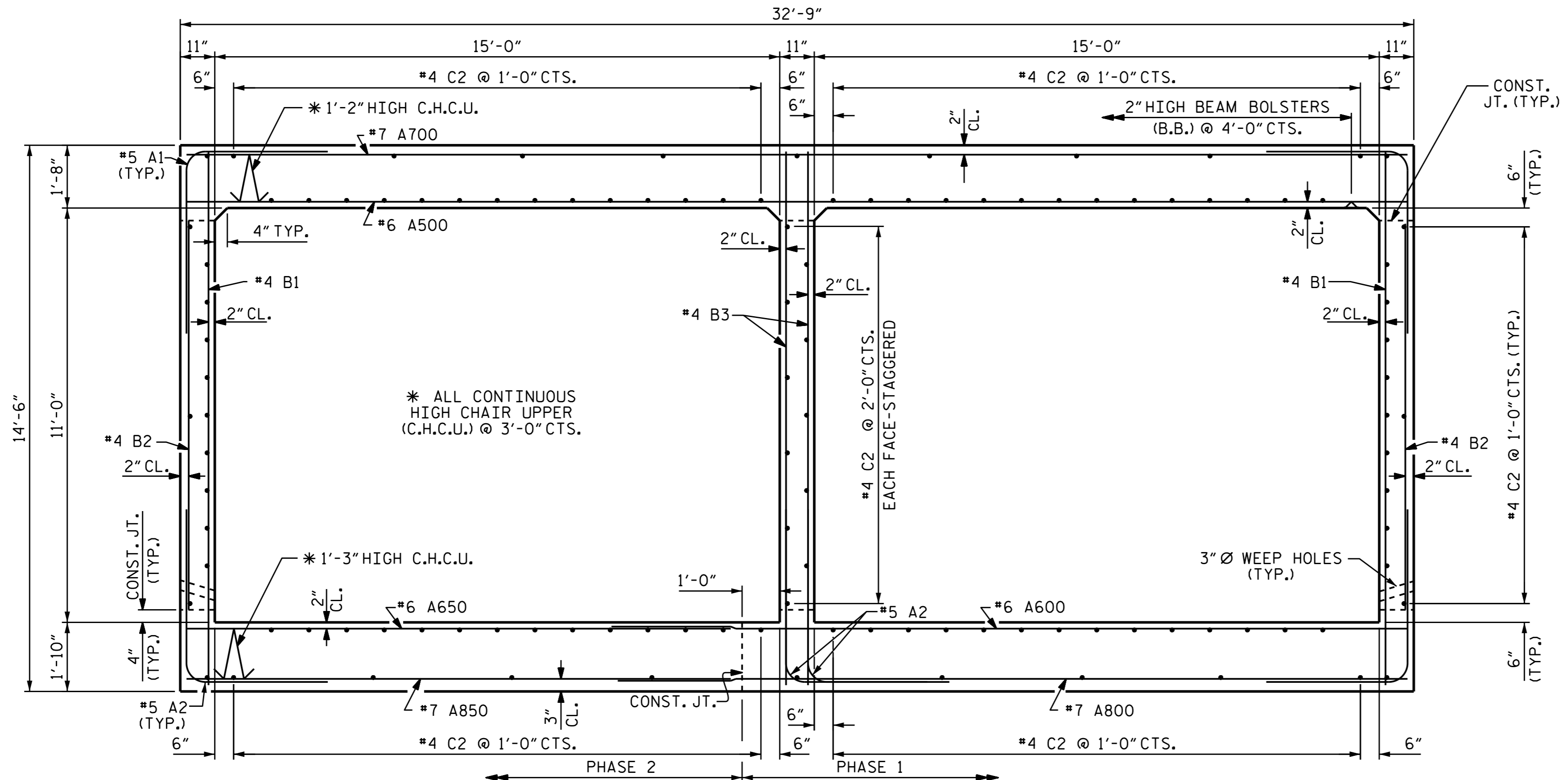
DRAWN BY: H. T. BARBOUR DATE: 6-20-16
 CHECKED BY: V. X. NGUYEN DATE: 7-16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-2
1			3			TOTAL SHEETS 12
2			4			

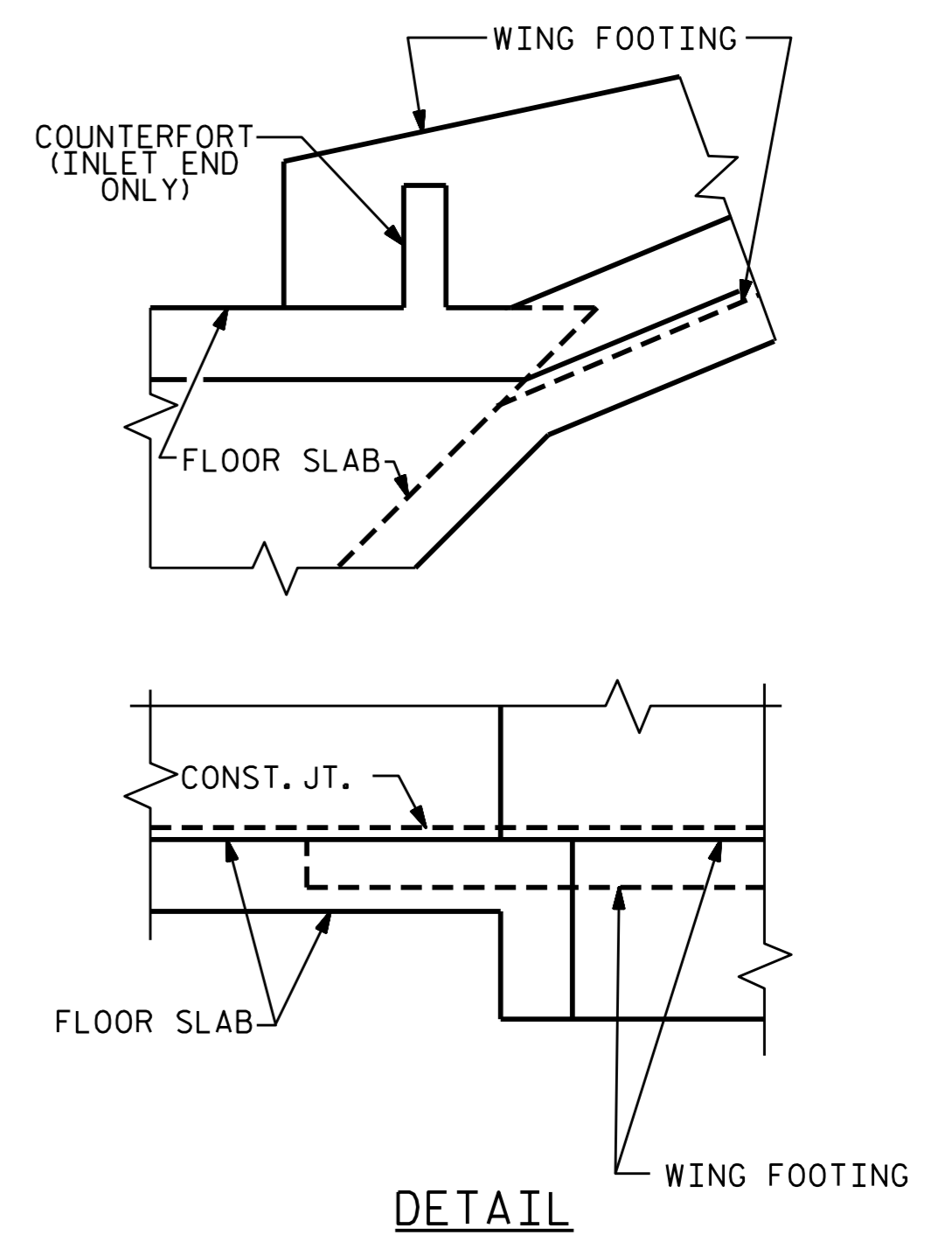


**STAGE I
RIGHT ANGLE SECTION OF BARREL**
(THERE ARE 113 "C" IN SECTION OF BARREL.)
(LOOKING DOWNSTREAM)



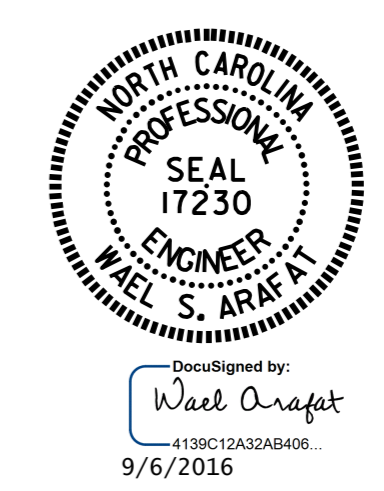
**STAGE II - PHASE 1 & 2
RIGHT ANGLE SECTION OF BARREL**
(THERE ARE 113 "C" IN SECTION OF BARREL.)
(LOOKING DOWNSTREAM)

I HEREBY CERTIFY THESE PLANS
ARE THE AS-BUILT PLANS



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

PROJECT NO. R-2915C
ASHE COUNTY
STATION: 374+56.00 -L-
SHEET 3 OF 12



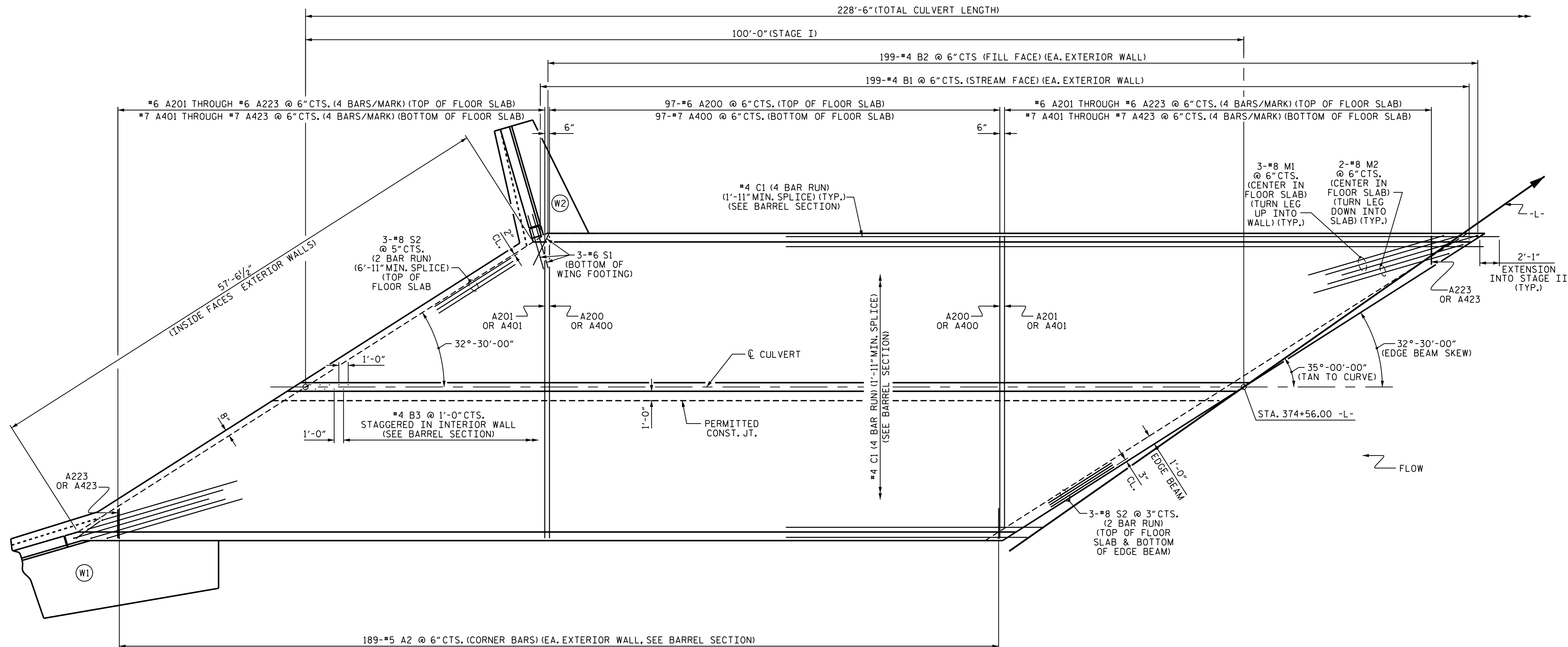
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

**DOUBLE 15 FT. X 11 FT.
RCBC
35°00'-00" SKEW**

DRAWN BY: H. T. BARBOUR DATE: 6-20-16
CHECKED BY: V. X. NGUYEN DATE: 7-16
DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

DOCUMENT NOT CONSIDERED
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SIGNATURES COMPLETED

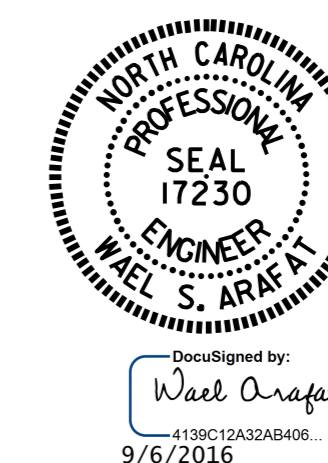
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-3
1			3			TOTAL SHEETS
2			4			12



PLAN OF FLOOR SLAB

PROJECT NO. R-2915C
ASHE COUNTY
 STATION: 374+56.00 -L-

SHEET 4 OF 12

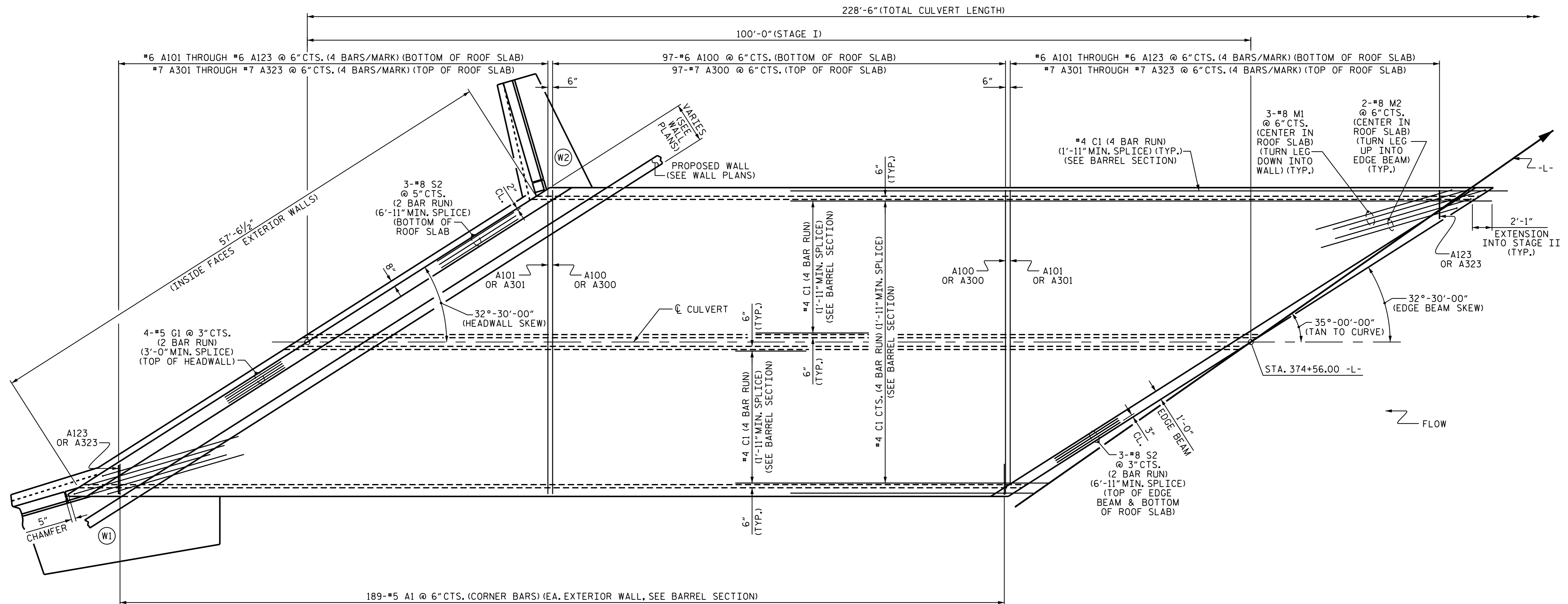


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 15 FT. X 11 FT.
 RCBC
 35°00'-00" SKEW
 (STAGE I)

DRAWN BY: H. T. BARBOUR DATE: 6-23-16
 CHECKED BY: V. X. NGUYEN DATE: 7-16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

DOCUMENT NOT CONSIDERED
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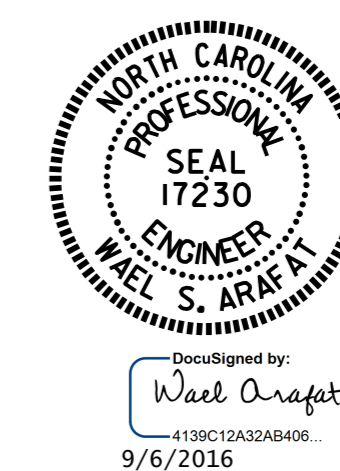
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
2			4			12



PLAN OF ROOF SLAB

PROJECT NO. R-2915C
ASHE COUNTY
 STATION: 374+56.00 -L-

SHEET 5 OF 12



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 15 FT. X 11 FT.
 RCBC
 35°00'-00" SKEW
 (STAGE I)

DRAWN BY: H. T. BARBOUR DATE: 6-23-16
 CHECKED BY: V. X. NGUYEN DATE: 7-16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

DOCUMENT NOT CONSIDERED
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REVISIONS						SHEET NO. C-5 TOTAL SHEETS 12
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

228'-6" TOTAL CULVERT LENGTH

128'-6" (STAGE II-PHASE 1 & PHASE 2)

256-#4 B2 @ 6" CTS. (FILL FACE) (EA. EXTERIOR WALL)

256-#4 B1 @ 6" CTS. (STREAM FACE) (EA. EXTERIOR WALL)

#6 A601 THROUGH #6 A612 @ 6" CTS. (4 BARS/MARK) (TOP OF FLOOR SLAB)
#7 A801 THROUGH #7 A812 @ 6" CTS. (4 BARS/MARK) (BOTTOM OF FLOOR SLAB)

189-#6 A600 @ 6" CTS. (TOP OF FLOOR SLAB)
189-#7 A800 @ 6" CTS. (BOTTOM OF FLOOR SLAB)

#6 A613 THROUGH #6 A626 @ 6" CTS. (4 BARS/MARK) (TOP OF FLOOR SLAB)
#7 A813 THROUGH #7 A826 @ 6" CTS. (4 BARS/MARK) (BOTTOM OF FLOOR SLAB)

245-#5 A2 @ 6" CTS. (CORNER BARS) (EA. EXTERIOR WALL, SEE BARREL SECTION)

#4 C2 (5 BAR RUN) (1'-11" MIN. SPLICE) (TYP.) (SEE BARREL SECTION)

3-#8 M1 @ 6" CTS. (CENTER IN FLOOR SLAB) (TURN LEG UP INTO WALL) (TYP.)
2-#8 M2 @ 6" CTS. (CENTER IN FLOOR SLAB) (TURN LEG DOWN INTO SLAB) (TYP.)

3-#8 S3 @ 3" CTS. (6'-11" MIN. SPLICE) (TOP OF FLOOR SLAB & BOTTOM OF EDGE BEAM)

32°-30'-00" (EDGE BEAM SKEW)

3-#8 S3 @ 5" CTS. (6'-11" MIN. SPLICE) (TOP OF FLOOR SLAB)

32°-30'-00" (HEADWALL SKEW)

STA. 374+56.00 -L-

PHASE 1
PHASE 2

3-#8 S4 @ 3" CTS. (TOP OF FLOOR SLAB & BOTTOM OF EDGE BEAM)

#4 B3 @ 1'-0" CTS. STAGGERED IN INTERIOR WALL (SEE BARREL SECTION)

#4 A2 @ 1'-0" CTS. STAGGERED IN INTERIOR WALL (SEE BARREL SECTION)

A651 OR A851

A650 OR A850

A650 OR A850

A661 OR A861

A669 OR A869

#6 A651 THROUGH #6 A660 @ 6" CTS. (4 BARS/MARK) (TOP OF FLOOR SLAB)
#7 A851 THROUGH #7 A860 @ 6" CTS. (4 BARS/MARK) (BOTTOM OF FLOOR SLAB)

207-#6 A650 @ 6" CTS. (TOP OF FLOOR SLAB)
207-#7 A850 @ 6" CTS. (BOTTOM OF FLOOR SLAB)

#6 A661 THROUGH #6 A669 @ 6" CTS. (4 BARS/MARK) (TOP OF FLOOR SLAB)
#7 A861 THROUGH #7 A869 @ 6" CTS. (4 BARS/MARK) (BOTTOM OF FLOOR SLAB)

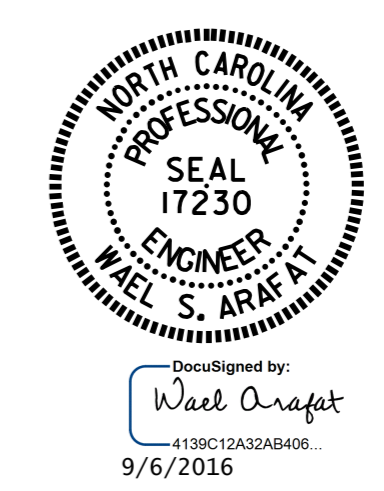
256-#4 B1 @ 6" CTS. (STREAM FACE) (EA. EXTERIOR WALL)

256-#4 B2 @ 6" CTS. (FILL FACE) (EA. EXTERIOR WALL)

PLAN OF FLOOR SLAB

PROJECT NO. R-2915C
ASHE COUNTY
STATION: 374+56.00 -L-

SHEET 6 OF 12

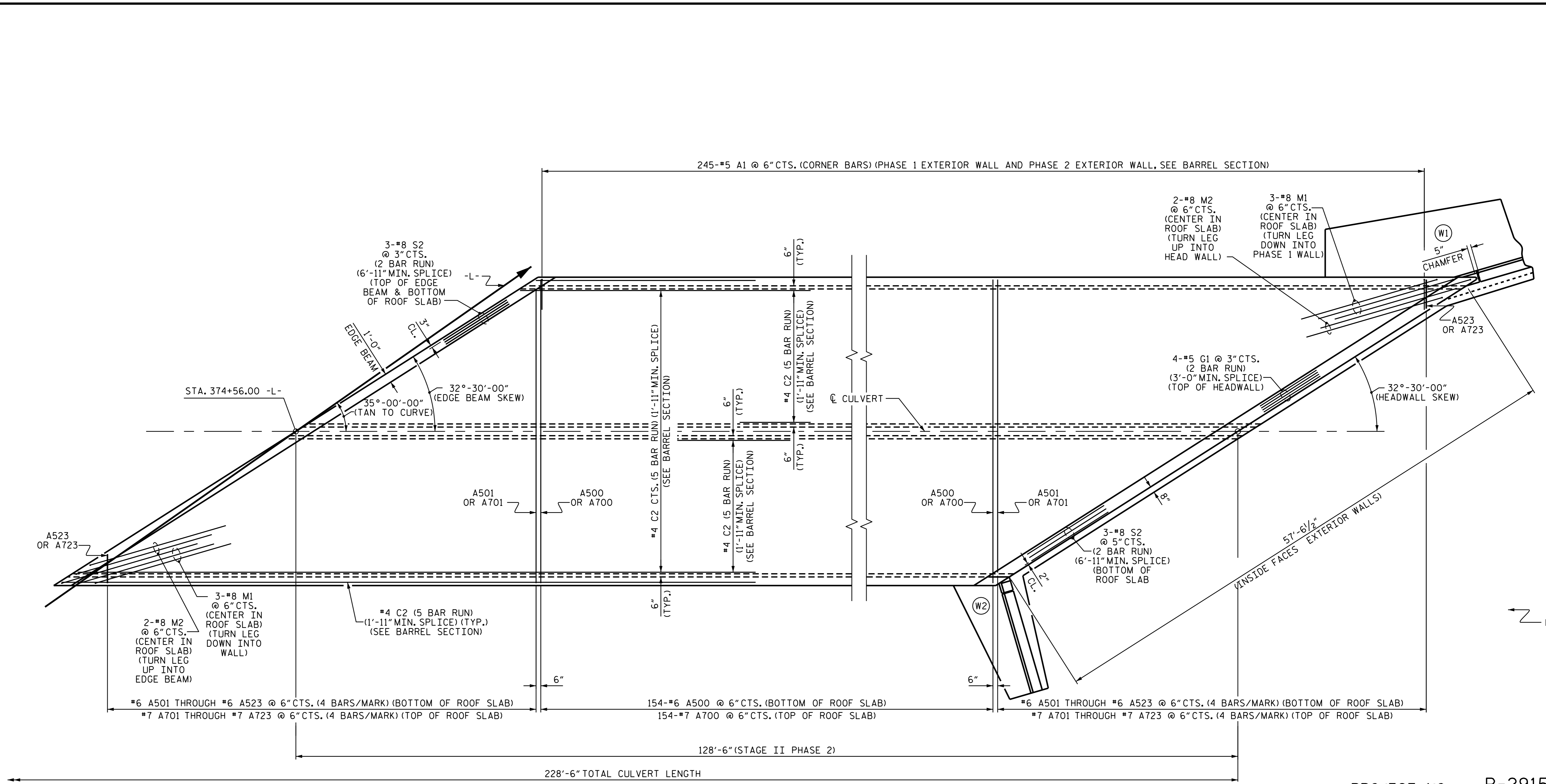


STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DOUBLE 15 FT. X 11 FT.
RCBC
35°00'-00" SKEW
(STAGE II-PHASE 1 & PHASE 2)

DRAWN BY: H. T. BARBOUR DATE: 6-23-16
CHECKED BY: V. X. NGUYEN DATE: 7-16
DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO. C-6 TOTAL SHEETS 12
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			



PLAN OF ROOF SLAB

PROJECT NO. R-2915C
ASHE COUNTY
 STATION: 374+56.00 -L-

SHEET 7 OF 12

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 15 FT. X 11 FT.
 RCBC
 35°00'-00" SKEW
 (STAGE II-PHASE 2)



Designed by
 Wael Arafat
 A139C12A32AB406
 9/6/2016

DRAWN BY : H. T. BARBOUR DATE : 6-23-16
 CHECKED BY : V. X. NGUYEN DATE : 7-16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE : 7-16

DOCUMENT NOT CONSIDERED
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 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-7
1			3			TOTAL SHEETS
2			4			12

NOTES

MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT AND SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL AS SHOWN. THE MATERIAL SHALL BE NATURAL STONE WITH A GRADATION SIZE SIMILAR TO THAT OF CLASS B RIP RAP. STONES LARGER THAN 6 INCHES SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL. BED MATERIAL SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER, AND MAY BE SUBJECT TO PERMIT CONDITIONS.

THE STOCKPILED MATERIAL SHALL BE PLACED TO PROVIDE A DEPTH OF 1 FOOT IN LOW FLOW BARREL, AND 3 FEET IN THE HIGH FLOW BARREL.

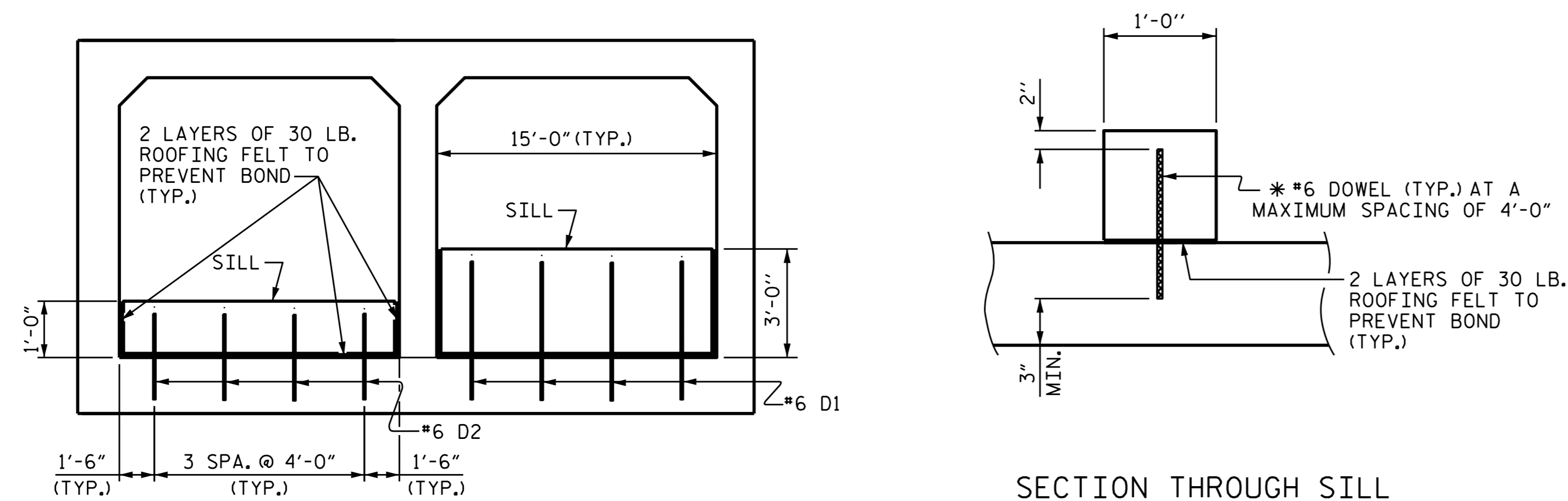
THE TOP OF BED MATERIAL IN THE LOW FLOW BARREL SHOULD MATCH THE STREAM BED ELEVATION.

BED MATERIAL SHALL BE SUPPLEMENTED BY CLASS B RIP RAP AS NECESSARY IN THE HIGH FLOW BARREL ONLY.

BED MATERIAL SHALL BE PLACED ON TOP OF THE SUPPLEMENTAL FILL, IF USED, TO PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE.

THE ENTIRE COST OF WORK REQUIRED TO PLACE EXCAVATED OR SUPPLEMENTAL MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICE BID FOR CULVERT EXCAVATION.

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



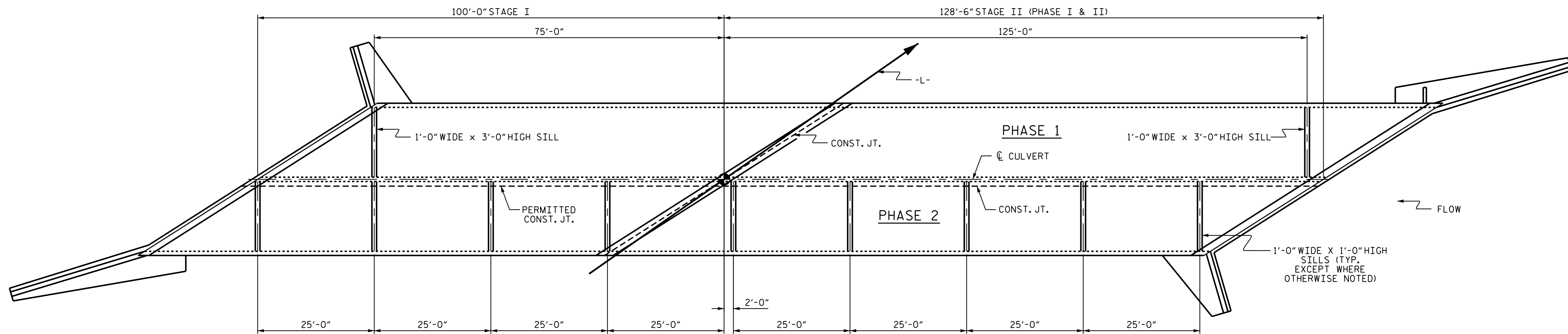
SECTION THROUGH SILL

* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.

ELEVATION

CULVERT SILL DETAILS

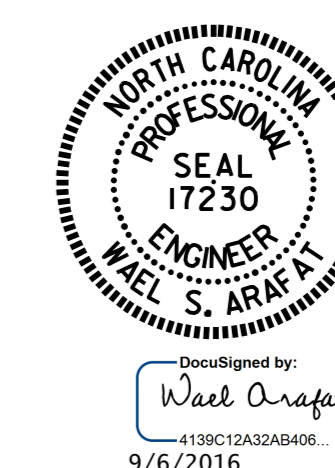
(LOOKING DOWN STREAM)



PLAN VIEW SHOWING SILL LOCATIONS

PROJECT NO. R-2915C
ASHE COUNTY
 STATION: 374+56.00 -L-

SHEET 8 OF 12



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 15 FT. X 11 FT.
 RCBC
 35°00'-00" SKEW
 (STAGES I & II)

DRAWN BY: H. T. BARBOUR DATE: 6-28-16
 CHECKED BY: V. X. NGUYEN DATE: 7-16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

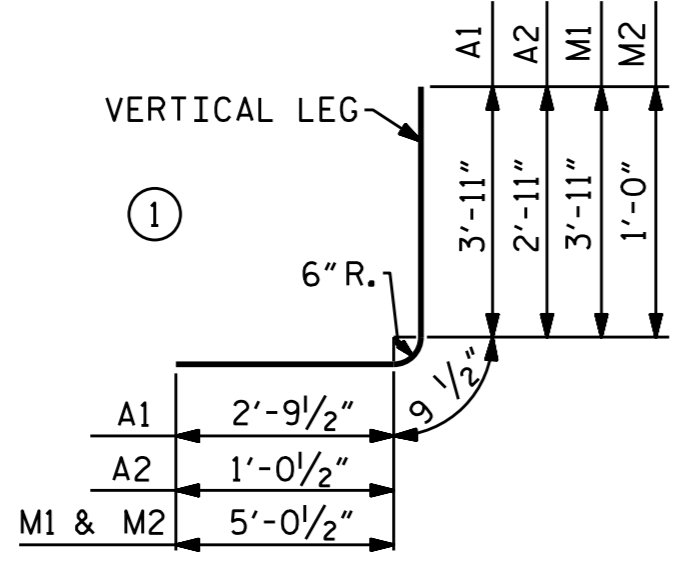
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C-8
2			4			TOTAL SHEETS 12

REINFORCING BAR SCHEDULE

STAGE I

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars A1 through A306.

STAGE I TOTAL REINFORCING STEEL 70220



BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

DRAWN BY: H. T. BARBOUR DATE: 7-1-16
CHECKED BY: V. X. NGUYEN DATE: 7-16
DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

REINFORCING BAR SCHEDULE

STAGE II PHASE 1

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars A1 through A626.

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars A800 through A826.

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars B1 through B3.

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars C1 through C2.

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars D1 through D2.

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars M1 through M2.

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars S1 through S2.

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars S3.

STAGE II PHASE 1 TOTAL REINFORCING STEEL 35116 LBS.

REINFORCING BAR SCHEDULE

STAGE II PHASE 2

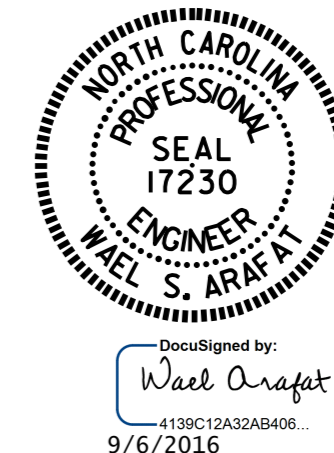
Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars A1 through A826 and B1 through B2.

STAGE II PHASE 2 TOTAL REINFORCING STEEL 58349 LBS.

SPLICE CHART

Table with columns: BAR, SIZE, SPLICE LENGTH. Contains splice lengths for bars A600 through A699.

Table with columns: BAR, NO., SIZE, TYPE, LENGTH, WEIGHT. Contains data for bars A700 through A723.



STAGE I STRUCTURE QUANTITIES

Table with columns: CLASS, QUANTITY, UNIT. Lists quantities for concrete (barrels, sills, wings) and steel.

Table with columns: REINFORCING STEEL, QUANTITY, UNIT. Lists quantities for steel (barrels, wings) and total.

CULVERT EXCAVATION LUMP SUM

Table with columns: FOUNDATION CONDITIONING MATERIAL, QUANTITY, UNIT. Lists material quantities.

STAGE II STRUCTURE QUANTITIES

PHASE 1

Table with columns: CLASS, QUANTITY, UNIT. Lists quantities for concrete and steel for Phase 1.

Table with columns: REINFORCING STEEL, QUANTITY, UNIT. Lists quantities for steel for Phase 1.

CULVERT EXCAVATION LUMP SUM

Table with columns: FOUNDATION CONDITIONING MATERIAL, QUANTITY, UNIT. Lists material quantities for Phase 1.

PHASE 2

Table with columns: CLASS, QUANTITY, UNIT. Lists quantities for concrete and steel for Phase 2.

Table with columns: REINFORCING STEEL, QUANTITY, UNIT. Lists quantities for steel for Phase 2.

CULVERT EXCAVATION LUMP SUM

Table with columns: FOUNDATION CONDITIONING MATERIAL, QUANTITY, UNIT. Lists material quantities for Phase 2.

PROJECT NO. R-2915C
ASHE COUNTY
STATION: 374+56.00 -L-

SHEET 9 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 15 FT. X 11 FT.
RCBC
35°00'-00" SKEW
(STAGES I & II)

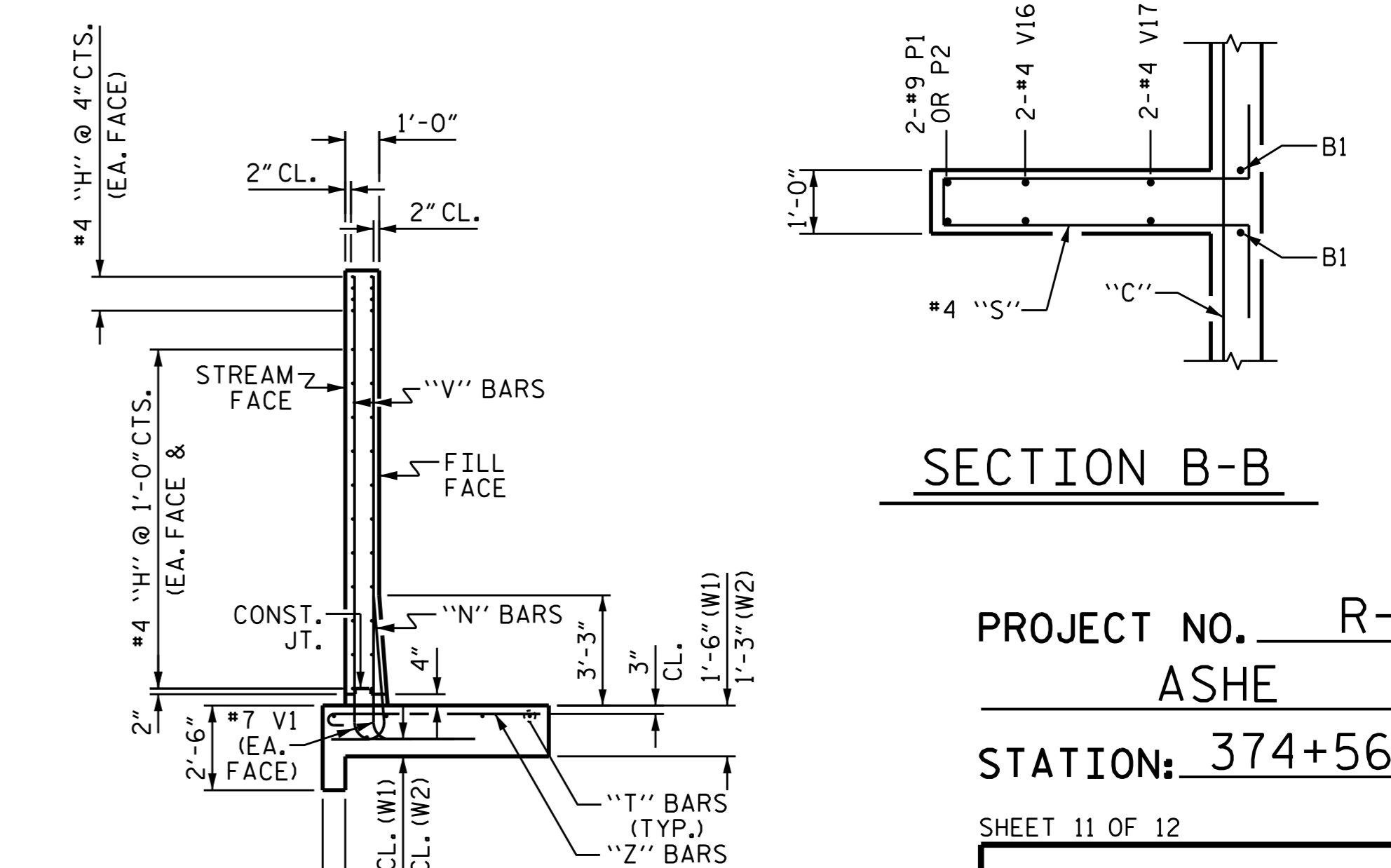
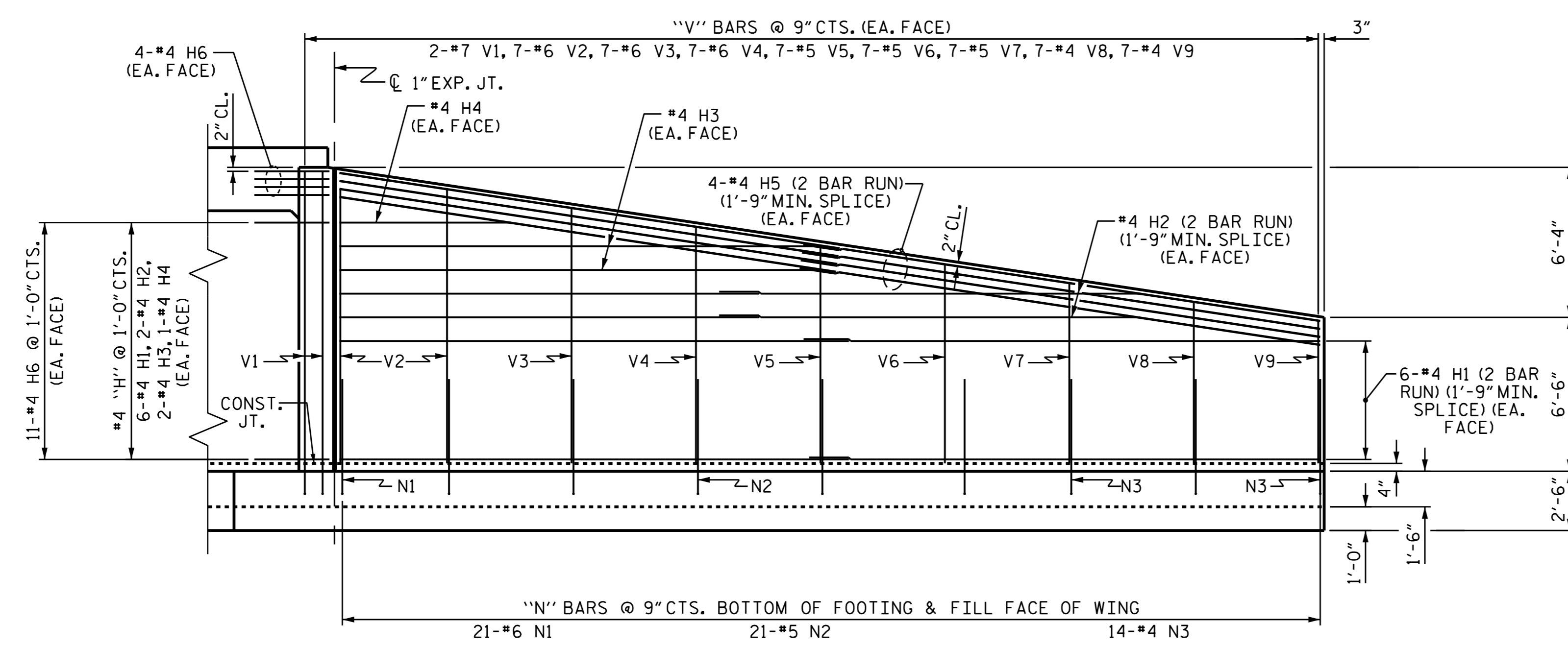
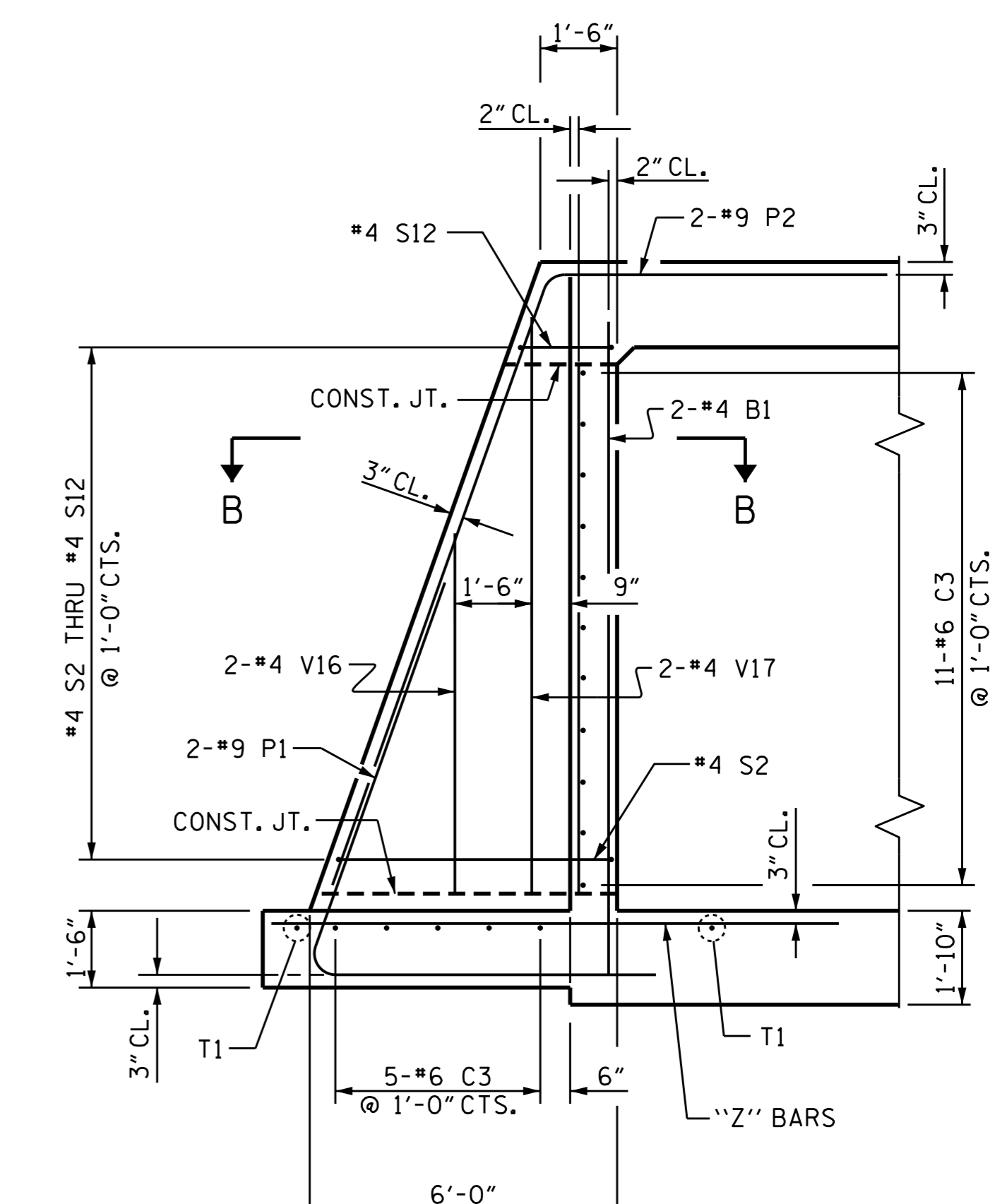
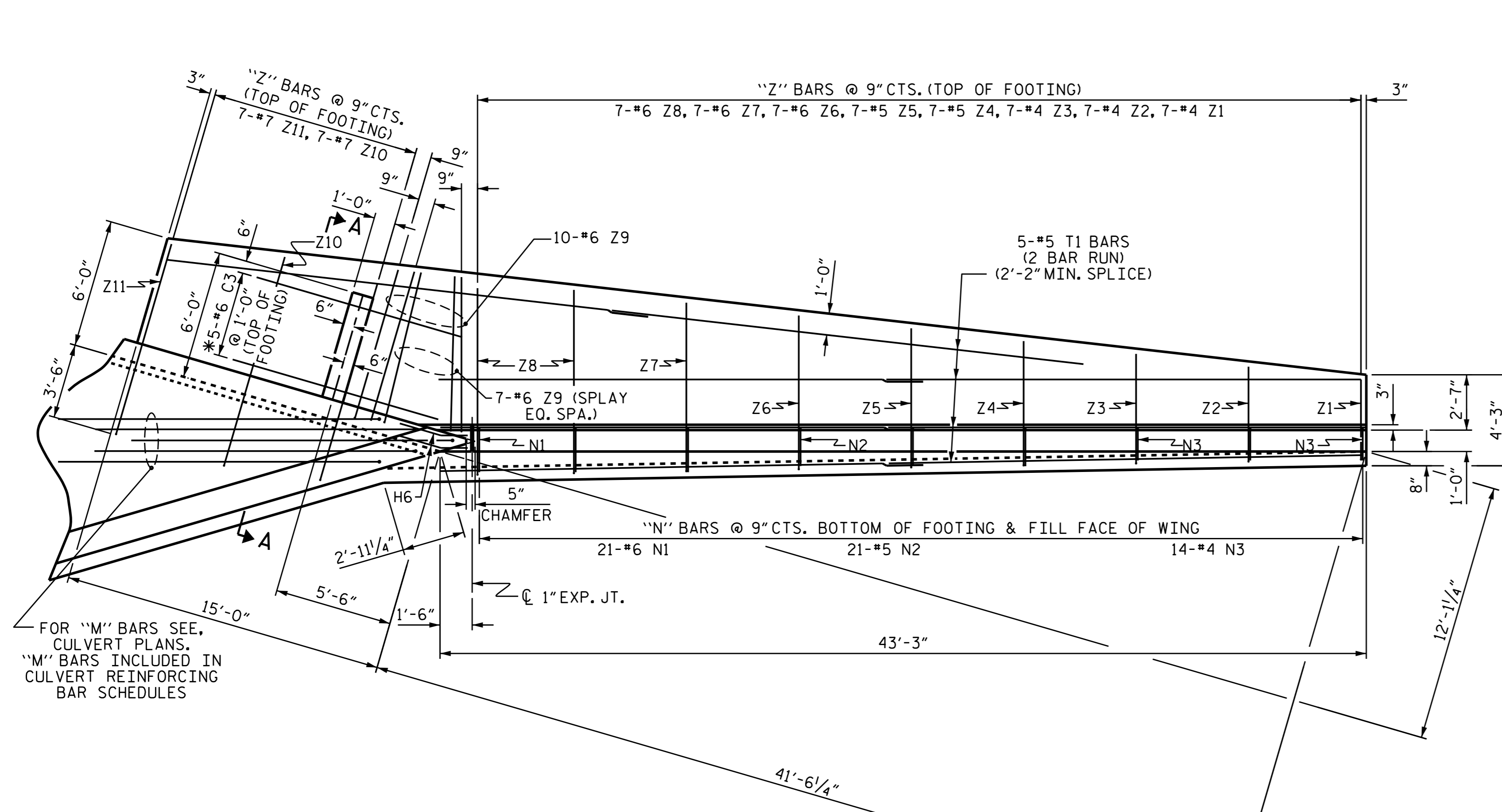
REVISIONS

Table with columns: NO., BY, DATE, NO., BY, DATE. Lists revision history.

SHEET NO.

C-9
TOTAL SHEETS 12

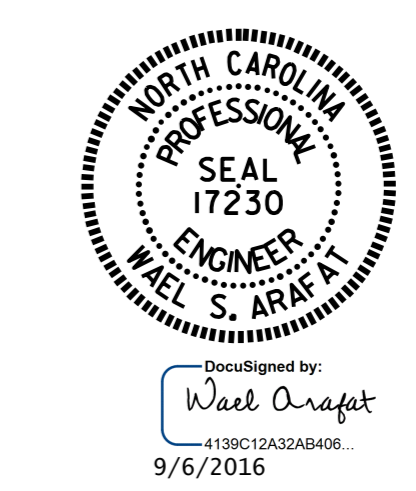
DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



SECTION B-B

PROJECT NO. R-2915C
ASHE COUNTY
STATION: 374+56.00 -L-

SHEET 11 OF 12



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

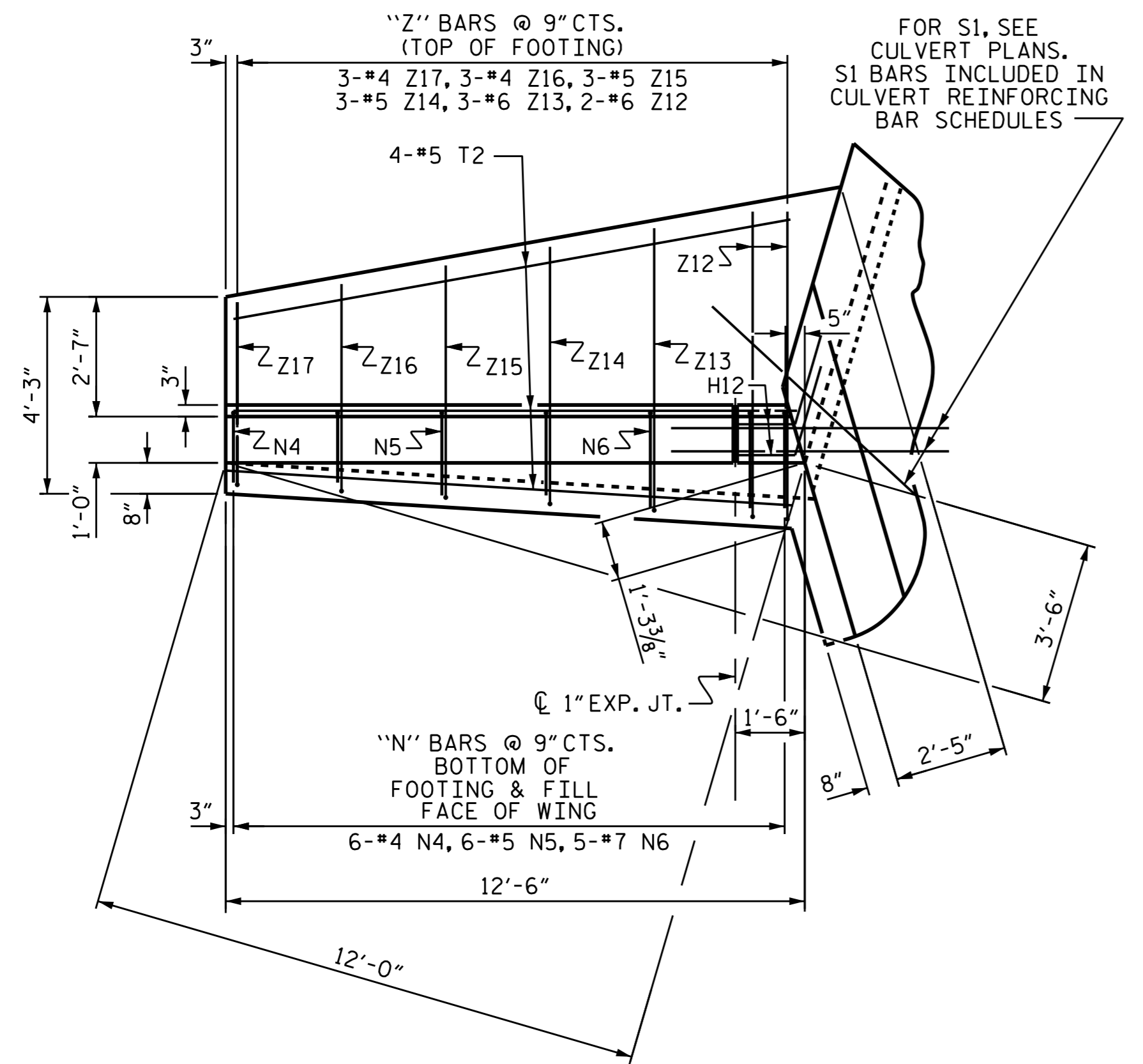
WINGS FOR
CONCRETE BOX CULVERT

H = 11'-0" SLOPE = 2:1
32°-30'-00" SKEW

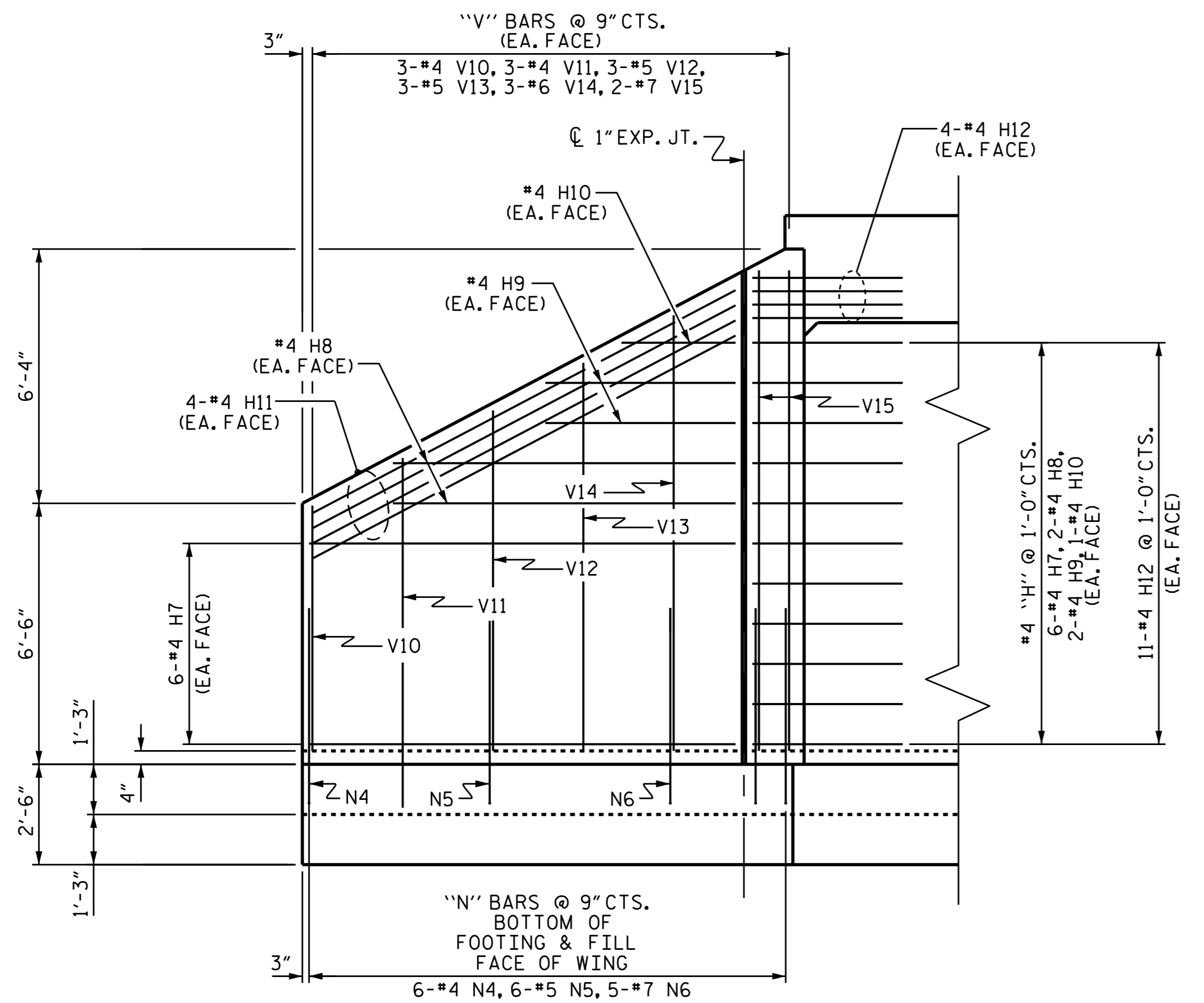
DRAWN BY: H. T. BARBOUR DATE: 7-11-16
CHECKED BY: V. X. NGUYEN DATE: 7-16
DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-10
1			3			TOTAL SHEETS
2			4			12



PLAN W2



ELEVATION W2

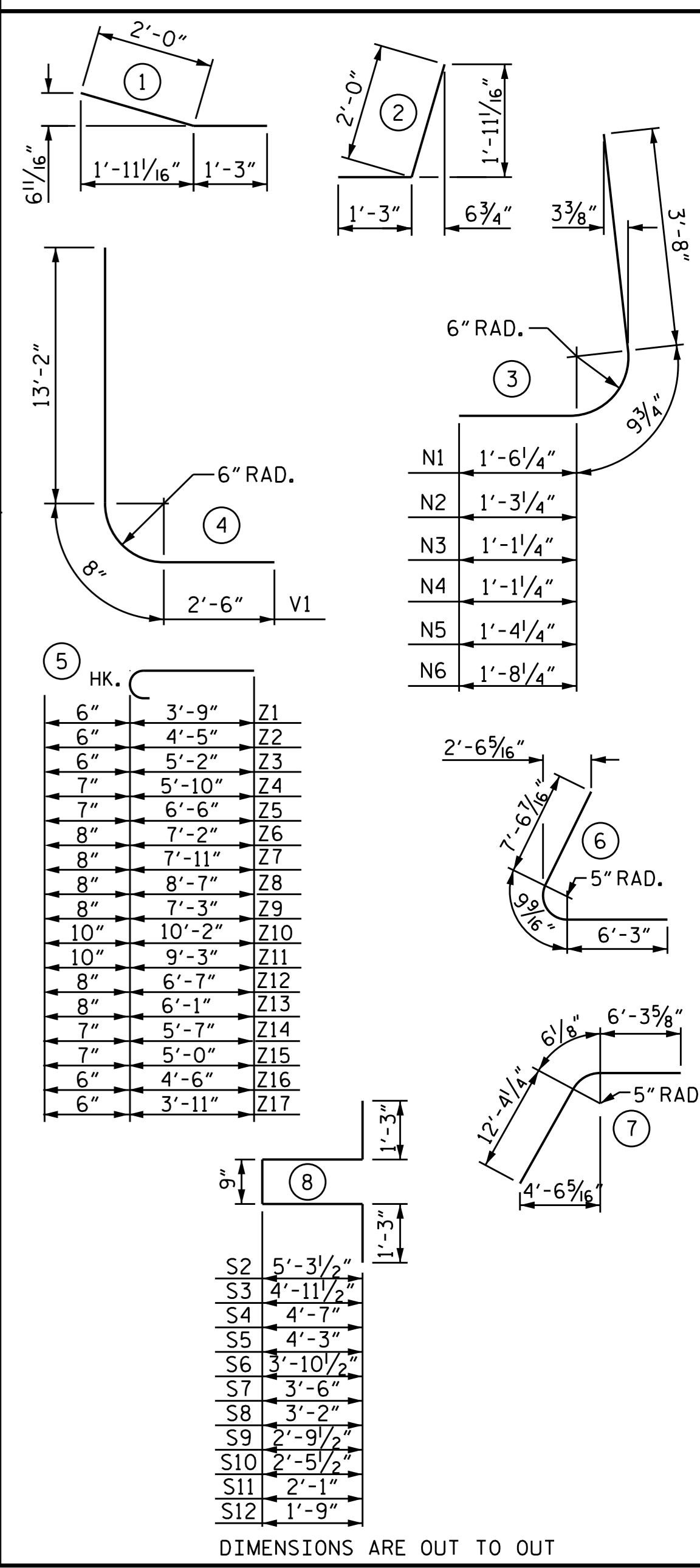
REINFORCING STEEL BAR SCHEDULE

WING 1 STAGE I					WING 2 STAGE I & STAGE II PHASE 2					WING 1 STAGE II PHASE 1							
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT			
H1	24	#4	STR	21'-7"	346	H7	12	#4	STR	10'-7"	85	B1	2	#4	STR	12'-9"	17
H2	8	#4	STR	17'-9"	95	H8	4	#4	STR	8'-6"	23	H3	16	#6	STR	10'-0"	240
H3	4	#4	STR	20'-6"	55	H9	4	#4	STR	4'-8"	12	H4	2	#4	STR	21'-7"	346
H4	2	#4	STR	7'-3"	10	H10	2	#4	STR	2'-10"	4	H5	16	#4	STR	17'-9"	95
H5	16	#4	STR	21'-10"	233	H11	8	#4	STR	11'-11"	64	H6	8	#4	STR	20'-6"	55
H6	30	#4	1	3'-3"	65	H12	30	#4	2	3'-3"	65	H2	4	#4	STR	7'-3"	10
N1	21	#6	3	6'-0"	189	N4	6	#4	3	5'-7"	22	H3	2	#4	STR	7'-3"	10
N2	21	#5	3	5'-9"	126	N5	6	#5	3	5'-10"	37	H4	16	#4	STR	21'-10"	233
N3	14	#4	3	5'-7"	52	N6	5	#7	3	6'-2"	63	H5	30	#4	1	3'-3"	65
T1	10	#5	STR	22'-7"	236	T2	4	#5	STR	12'-2"	51	N1	21	#6	3	6'-0"	189
V1	4	#7	4	16'-4"	134	V10	6	#4	STR	6'-1"	24	N2	21	#5	3	5'-9"	126
V2	14	#6	STR	11'-6"	242	V11	6	#4	STR	7'-3"	29	N3	14	#4	3	5'-7"	52
V3	14	#6	STR	10'-9"	226	V12	6	#5	STR	8'-5"	53	P1	2	#9	6	14'-7"	99
V4	14	#6	STR	9'-11"	209	V13	6	#5	STR	9'-8"	60	P2	2	#9	7	19'-2"	130
V5	14	#5	STR	9'-2"	134	V14	6	#6	STR	10'-10"	98	S2	1	#4	8	13'-10"	9
V6	14	#5	STR	8'-4"	122	V15	4	#7	STR	11'-11"	97	S3	1	#4	8	13'-2"	9
V7	14	#5	STR	7'-7"	111	Z12	2	#6	5	7'-3"	22	S4	1	#4	8	12'-5"	8
V8	14	#4	STR	6'-9"	63	Z13	3	#6	5	6'-9"	30	S5	1	#4	8	11'-9"	8
V9	14	#4	STR	6'-0"	56	Z14	3	#5	5	6'-2"	19	S6	1	#4	8	11'-0"	7
Z1	7	#4	5	4'-3"	20	Z15	3	#5	5	5'-7"	17	S7	1	#4	8	10'-3"	7
Z2	7	#4	5	4'-11"	23	Z16	3	#4	5	5'-0"	10	S8	1	#4	8	9'-7"	6
Z3	7	#4	5	5'-8"	26	Z17	3	#4	5	4'-5"	9	S9	1	#4	8	8'-10"	6
Z4	7	#5	5	6'-5"	47	REINFORCING STEEL FOR 1 W2 WING (STAGE I & STAGE II) (2 REQ'D.) 894 LBS.											
Z5	7	#5	5	7'-1"	52	REINFORCING STEEL FOR 1 W1 WING (STAGE I) 3561 LBS.											
Z6	7	#6	5	7'-10"	82	REINFORCING STEEL FOR 1 W1 WING (STAGE II) 4146 LBS.											
Z7	7	#6	5	8'-7"	90	T1	10	#5	STR	22'-7"	236	V1	4	#7	4	16'-4"	134
Z8	7	#6	5	9'-3"	97	V2	14	#6	STR	11'-6"	242	V2	14	#6	STR	11'-6"	242
Z9	10	#6	5	7'-11"	119	V3	14	#6	STR	10'-9"	226	V3	14	#6	STR	10'-9"	226
Z10	7	#7	5	11'-0"	157	V4	14	#6	STR	9'-11"	209	V4	14	#6	STR	9'-11"	209
Z11	7	#7	5	10'-1"	144	V5	14	#5	STR	9'-2"	134	V5	14	#5	STR	9'-2"	134
REINFORCING STEEL FOR 1 W1 WING (STAGE II) 4146 LBS.																	
Z1	7	#4	5	4'-3"	20	V6	14	#5	STR	8'-4"	122	V6	14	#5	STR	8'-4"	122
Z2	7	#4	5	4'-11"	23	V7	14	#5	STR	7'-7"	111	V7	14	#5	STR	7'-7"	111
Z3	7	#4	5	5'-8"	26	V8	14	#4	STR	6'-9"	63	V8	14	#4	STR	6'-9"	63
Z4	7	#5	5	6'-5"	47	V9	14	#4	STR	6'-0"	56	V9	14	#4	STR	6'-0"	56
Z5	7	#5	5	7'-1"	52	V10	2	#4	STR	7'-1"	9	V10	2	#4	STR	7'-1"	9
Z6	7	#6	5	7'-10"	82	V11	2	#4	STR	11'-4"	15	V11	2	#4	STR	11'-4"	15
Z7	7	#6	5	8'-7"	90	Z1	7	#4	5	4'-3"	20	Z1	7	#4	5	4'-3"	20
Z8	7	#6	5	9'-3"	97	Z2	7	#4	5	4'-11"	23	Z2	7	#4	5	4'-11"	23
Z9	10	#6	5	7'-11"	119	Z3	7	#4	5	5'-8"	26	Z3	7	#4	5	5'-8"	26
Z10	7	#7	5	11'-0"	157	Z4	7	#5	5	6'-5"	47	Z4	7	#5	5	6'-5"	47
Z11	7	#7	5	10'-1"	144	Z5	7	#5	5	7'-1"	52	Z5	7	#5	5	7'-1"	52
REINFORCING STEEL FOR 1 W1 WING (STAGE II) 4146 LBS.																	
Z1	7	#4	5	4'-3"	20	Z6	7	#6	5	7'-10"	82	Z6	7	#6	5	7'-10"	82
Z2	7	#4	5	4'-11"	23	Z7	7	#6	5	8'-7"	90	Z7	7	#6	5	8'-7"	90
Z3	7	#4	5	5'-8"	26	Z8	7	#6	5	9'-3"	97	Z8	7	#6	5	9'-3"	97
Z4	7	#5	5	6'-5"	47	Z9	10	#6	5	7'-11"	119	Z9	10	#6	5	7'-11"	119
Z5	7	#5	5	7'-1"	52	Z10	7	#7	5	11'-0"	157	Z10	7	#7	5	11'-0"	157
Z6	7	#6	5	7'-10"	82	Z11	7	#7	5	10'-1"	144	Z11	7	#7	5	10'-1"	144
Z7	7	#6	5	8'-7"	90	REINFORCING STEEL FOR 1 W1 WING (STAGE II) 4146 LBS.											
Z8	7	#6	5	9'-3"	97	REINFORCING STEEL FOR 1 W1 WING (STAGE II) 4146 LBS.											
Z9	10	#6	5	7'-11"	119	REINFORCING STEEL FOR 1 W1 WING (STAGE II) 4146 LBS.											
Z10	7	#7	5	11'-0"	157	REINFORCING STEEL FOR 1 W1 WING (STAGE II) 4146 LBS.											
Z11	7	#7	5	10'-1"	144	REINFORCING STEEL FOR 1 W1 WING (STAGE II) 4146 LBS.											

WING QUANTITIES

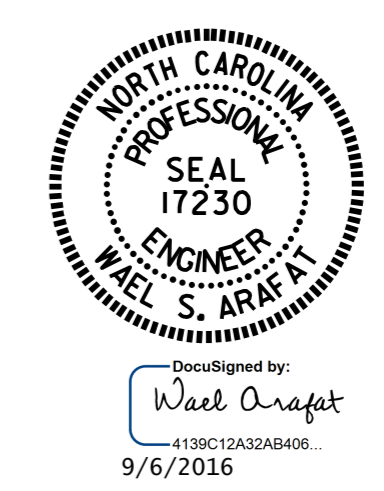
CLASS A CONCRETE	
STAGE I	
2 WINGS	47.8 C.Y.
1 END CURTAIN WALL	3.3 C.Y.
1 HEADWALL	2.8 C.Y.
2 EDGE BEAMS	4.5 C.Y.
TOTAL STAGE I	58.4 C.Y.
REINFORCING STEEL	
STAGE I, WING 1	3561 LBS.
STAGE I, WING 2	894 LBS.
TOTAL STAGE I WINGS	4455 LBS.
CLASS A CONCRETE	
STAGE II-PHASE 1	
PHASE 1 WING	8.4 C.Y.
PHASE 1 END CURTAIN WALL	1.8 C.Y.
PHASE 1 EDGE BEAM	1.2 C.Y.
TOTAL PHASE 1	11.4 C.Y.
STAGE II-PHASE 2	
PHASE 2 WING	40.5 C.Y.
PHASE 2 END CURTAIN WALLS	1.5 C.Y.
PHASE 2 HEADWALL	2.8 C.Y.
PHASE 2 EDGE BEAMS	3.3 C.Y.
TOTAL PHASE 2	48.1 C.Y.
TOTAL STAGE II CLASS A CONCRETE	59.5 C.Y.
REINFORCING STEEL	
STAGE II-PHASE 1 WING	4146 LBS.
STAGE II-PHASE 2 WING	894 LBS.
TOTAL STAGE II WINGS	5040 LBS.

BAR TYPES



PROJECT NO. R-2915C
 ASHE COUNTY
 STATION: 374+56.00 -L-

SHEET 12 OF 12



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
WINGS FOR CONCRETE BOX CULVERT
 H = 11'-0" SLOPE = 2:1
 32°-30'-00" SKEW

DRAWN BY: H. T. BARBOUR DATE: 7-11-16
 CHECKED BY: V. X. NGUYEN DATE: 7-16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 7-16

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-11
1			3			TOTAL SHEETS
2			4			12

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

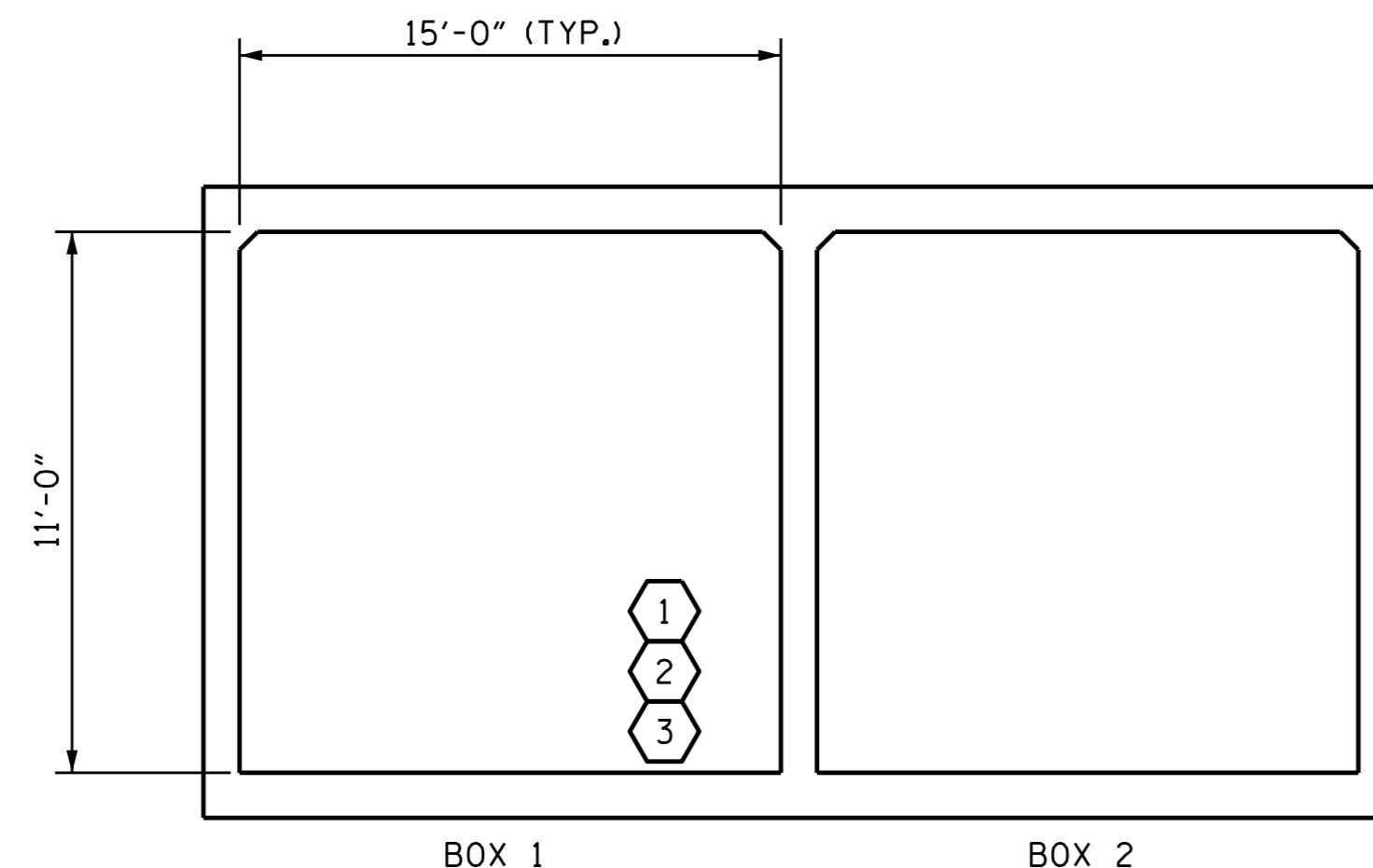
LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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 (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	1.59	--	1.75	4.26	1	TOP SLAB	6.76	1.59	1	BOTTOM SLAB	14.07		
	HL-93 (OPERATING)	N/A		2.06	--	1.35	5.52	1	TOP SLAB	6.76	2.06	1	BOTTOM SLAB	14.07		
	HS-20 (INVENTORY)	36.000	2	1.59	57.09	1.75	4.88	1	BOT CORNER WALL	12.11	1.59	1	BOTTOM SLAB	14.07		
	HS-20 (OPERATING)	36.000		2.06	74.00	1.35	6.33	1	BOT. CORNER WALL	12.11	2.06	1	BOTTOM SLAB	14.07		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.75	50.63	1.40	6.37	1	BOT. CORNER WALL	12.11	3.75	1	EXTERIOR WALL	11.17	
		SNGARBS2	20.000		3.04	60.71	1.40	6.36	1	BOT. CORNER WALL	12.11	3.04	1	TOP SLAB	14.14	
		SNAGRIS2	22.000		2.89	63.49	1.40	6.31	1	BOT. CORNER WALL	12.11	2.89	1	TOP SLAB	14.14	
		SNCOTTS3	27.250		1.97	53.58	1.40	5.32	1	TOP SLAB	6.76	1.97	1	TOP SLAB	14.14	
		SNAGGRS4	34.925		1.80	62.94	1.40	5.16	1	TOP SLAB	6.76	1.80	1	TOP SLAB	14.14	
		SNS5A	35.550		1.70	60.28	1.40	4.83	1	TOP SLAB	6.76	1.70	1	TOP SLAB	14.14	
		SNS6A	39.950		1.65	65.90	1.40	4.74	1	TOP SLAB	6.76	1.65	1	TOP SLAB	14.14	
		SNS7B	42.000		1.57	65.91	1.40	4.63	1	TOP SLAB	6.76	1.57	1	TOP SLAB	14.14	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.06	67.93	1.40	6.07	1	BOT. CORNER WALL	12.11	2.06	1	BOTTOM SLAB	14.07	
		TNT4A	33.075		2.08	68.85	1.40	5.89	1	TOP SLAB	6.76	2.08	1	BOTTOM SLAB	14.07	
		TNT6A	41.600		1.77	73.50	1.40	5.51	1	TOP SLAB	6.37	1.77	1	BOTTOM SLAB	14.07	
		TNT7A	42.000		1.75	73.42	1.40	6.01	1	BOT. CORNER WALL	12.11	1.75	1	BOTTOM SLAB	14.07	
		TNT7B	42.000		1.82	76.34	1.40	5.00	1	TOP SLAB	6.76	1.82	1	BOTTOM SLAB	14.07	
		TNAGRIT4	43.000		1.65	71.15	1.40	5.04	1	TOP SLAB	6.37	1.65	1	BOTTOM SLAB	14.07	
		TNAGT5A	45.000		1.59	71.42	1.40	5.13	1	TOP SLAB	6.37	1.59	1	BOTTOM SLAB	14.07	
TNAGT5B	45.000		3	1.53	68.74	1.40	4.91	1	TOP SLAB	6.76	1.53	1	BOTTOM SLAB	14.07		

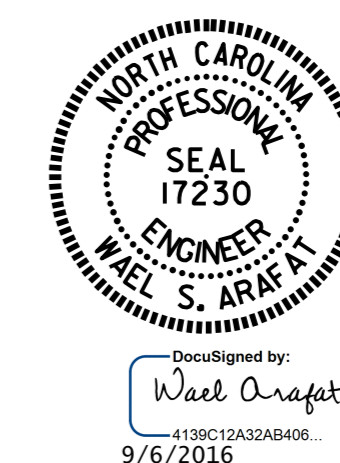
#	CONTROLLING LOAD RATING
1	DESIGN LOAD RATING (HL-93)
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. R-2915C
ASHE COUNTY
 STATION: 374+56.00 -L-

SHEET 10 OF 12



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERTS
 (NON-INTERSTATE TRAFFIC)

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

REVISIONS						SHEET NO. C-12
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 12
2			4			

ASSEMBLED BY : H. T. BARBOUR DATE : 7-6-16
 CHECKED BY : V. X. NGUYEN DATE : 7-16
 DRAWN BY : WMC 7/11 REV. 10/1/11 MAA/GM
 CHECKED BY : CM 7/11