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NOTES

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
 DESIGN FILL = 11.29 (MIN.), 11.68 (MAX.)
 FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTES SHEET.
- AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING DOUBLE BARREL 8 FT. X 8 FT. REINFORCED CONCRETE BOX CULVERT LOCATED AT THE SAME LOCATION AS THE PROPOSED CULVERT SHALL BE REMOVED.
- 3" Ø WEEP HOLES INDICATED ARE TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONCRETE IN THE CULVERT TO BE POURED IN THE FOLLOWING ORDER:
- STAGE I
1. WING FOOTINGS FOR WING 1 AND WING 2, FLOOR SLAB AND EDGE BEAM INCLUDING 4" VERTICAL WALLS TO THE CONSTRUCTION JOINT FOR STAGE I.
 2. REMAINING PORTIONS OF WALLS FULL HEIGHT, WING 1 AND WING 2 FULL HEIGHT FOLLOWED BY CONCRETE SILLS AND ROOF SLAB WITH EDGE BEAM TO THE STAGE I CONSTRUCTION JOINT.
- STAGE II
1. REMOVE EXISTING CULVERT.
 2. WING 3 FOOTING AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS, EDGE BEAM AND CURTAIN WALL TO STAGE II CONSTRUCTION JOINTS.
 3. REMAINING PORTIONS OF WALLS FULL HEIGHT AND WING 3 FULL HEIGHT, CONCRETE SILLS.
- STAGE III
1. WING 4 FOOTING AND REMAINING FLOOR SLAB WITH EDGE BEAM INCLUDING 4" OF EXTERIOR VERTICAL WALL AND REMAINING CURTAIN WALL.
 2. REMAINING PORTIONS OF WALLS FULL HEIGHT, WING 4 FULL HEIGHT AND CONCRETE SILLS.
 3. ROOF SLAB FOR STAGES II & III, HEADWALL AND EDGE BEAM.

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

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.

AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS. THE CONTRACTOR ATTENTION NEEDS TO BE DRAWN TO THE FACT THAT THE OUTLET END OF THE CULVERT WILL HAVE TO BE SKEWED TO KEEP FROM INTERFERING WITH THE STREAM FLOW.

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.

THE REINFORCED CONCRETE BOX CULVERT 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 1 TSF. THE REQUIRED BEARING CAPACITY SHALL BE VERIFIED.

FOR CONSTRUCTION SEQUENCE, SEE EROSION CONTROL PLANS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR TRAFFIC PHASING, SEE TRAFFIC CONTROL PLANS.

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.

TEMPORARY SHORING WILL BE REQUIRED IN THE AREA INDICATED IN THE LOCATION SKETCH.

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.

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

STEEL IN THE BOTTOM SLAB OF STAGE I ONLY 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.

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.

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.

ROADWAY DATA

GRADE POINT ELEV. @ STA 161+48.90-L = 2905.10
 BED ELEV. @ STA. 161+48.90-L = 2885.70
 ROADWAY SLOPES = 2:1

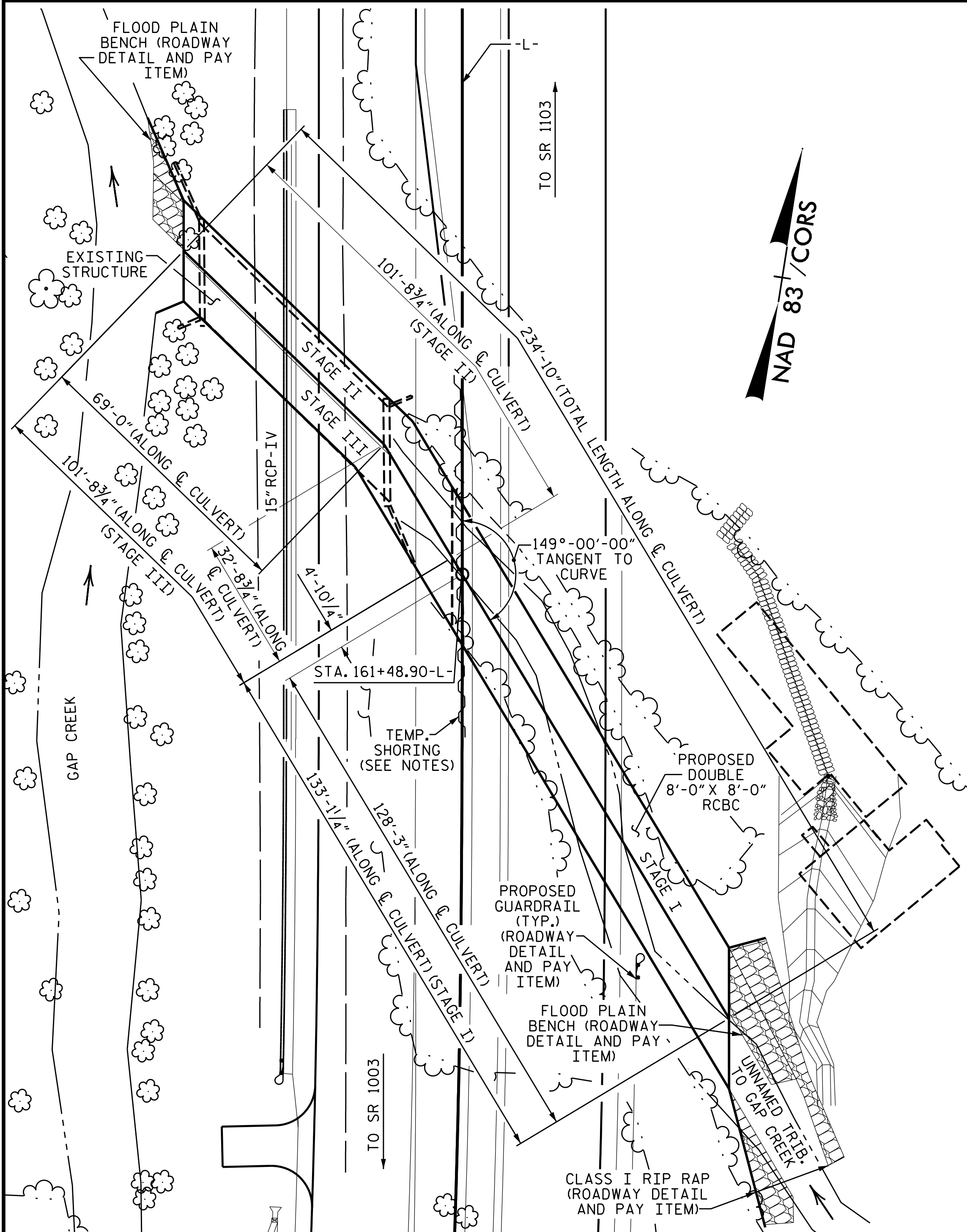
HYDRAULIC DATA

DESIGN DISCHARGE = 550 CFS
 FREQUENCY OF DESIGN FLOOD = 50 YR.
 DESIGN HIGH WATER ELEV. = 2893.00
 DRAINAGE AREA = 1.2 SQ MI.
 BASE DISCHARGE (Q100) = 650 CFS
 BASE HIGH WATER ELEV. = 2893.43

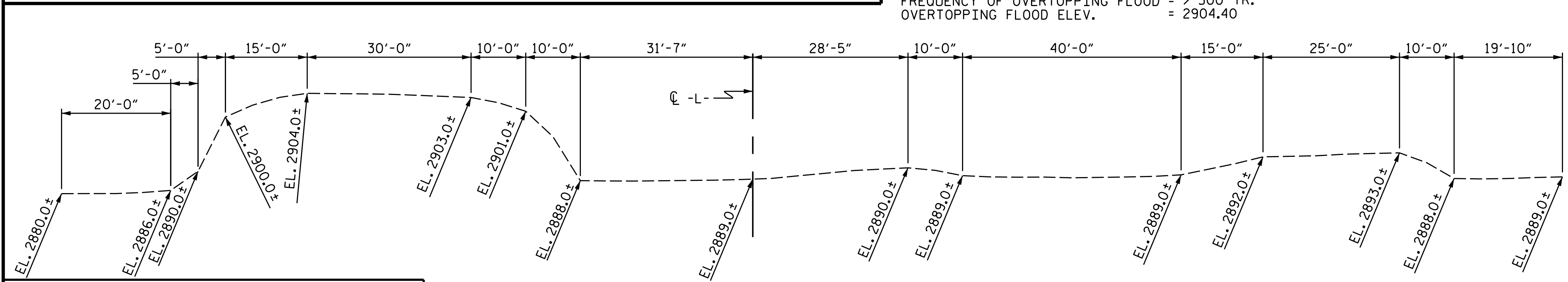
OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = > 900 CFS
 FREQUENCY OF OVERTOPPING FLOOD = > 500 YR.
 OVERTOPPING FLOOD ELEV. = 2904.40

CULVERT EXCAVATION	LUMP SUM
REMOVAL OF EXISTING STRUCTURE	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	
STAGE I	207 TONS
STAGE II & III	158 TONS
TOTAL	365 TONS



LOCATION SKETCH



PROFILE ALONG CULVERT

DRAWN BY: H. T. BARBOUR DATE: 4-11-14
 CHECKED BY: S. B. WILLIAMS DATE: 5-14
 DESIGN ENGINEER OF RECORD: B. A. DUKE DATE: 4-15



Douglas R. Calhoun
 430196908425
 7/22/2015

Marshall G. Cheek, Jr.
 05490268AAB9405
 7/22/2015

TOTAL STRUCTURE QUANTITIES			
STAGE I		STAGE I	
CLASS A CONCRETE		REINFORCING STEEL	
BARREL @ 1.823 C.Y./FT. 242.6 C.Y.		BARREL 32681 LBS.	
WINGS, ETC. 27.7 C.Y.		WINGS, ETC. 2662 LBS.	
TOTAL 270.3 C.Y.		TOTAL 35343 LBS.	
STAGE II & III		STAGE II & III	
CLASS A CONCRETE		REINFORCING STEEL	
BARREL @ 1.823 C.Y./FT. 185.5 C.Y.		BARREL 26626 LBS.	
WINGS, ETC. 19.7 C.Y.		WINGS, ETC. 941 LBS.	
TOTAL 205.2 C.Y.		TOTAL 27567 LBS.	
TOTAL CLASS A CONCRETE 475.5 C.Y.		TOTAL REINFORCING STEEL 62910 LBS.	

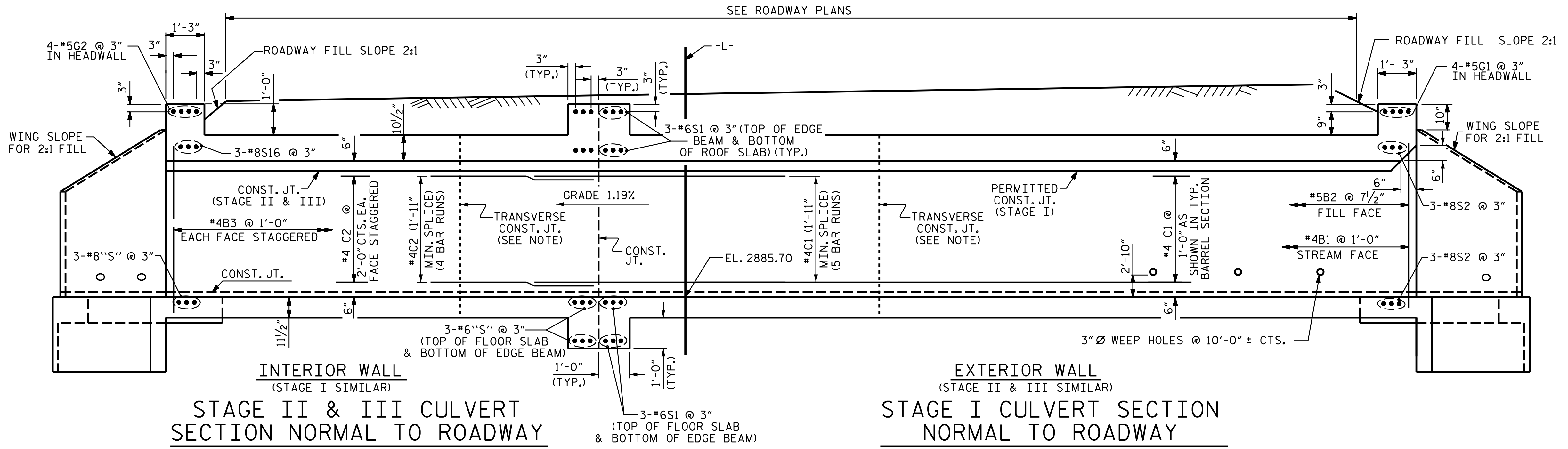
PROJECT NO. R-2915B
 ASHE COUNTY
 STATION: 161+48.90 -L-

SHEET 1 OF 13 CULVERT No. 542

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

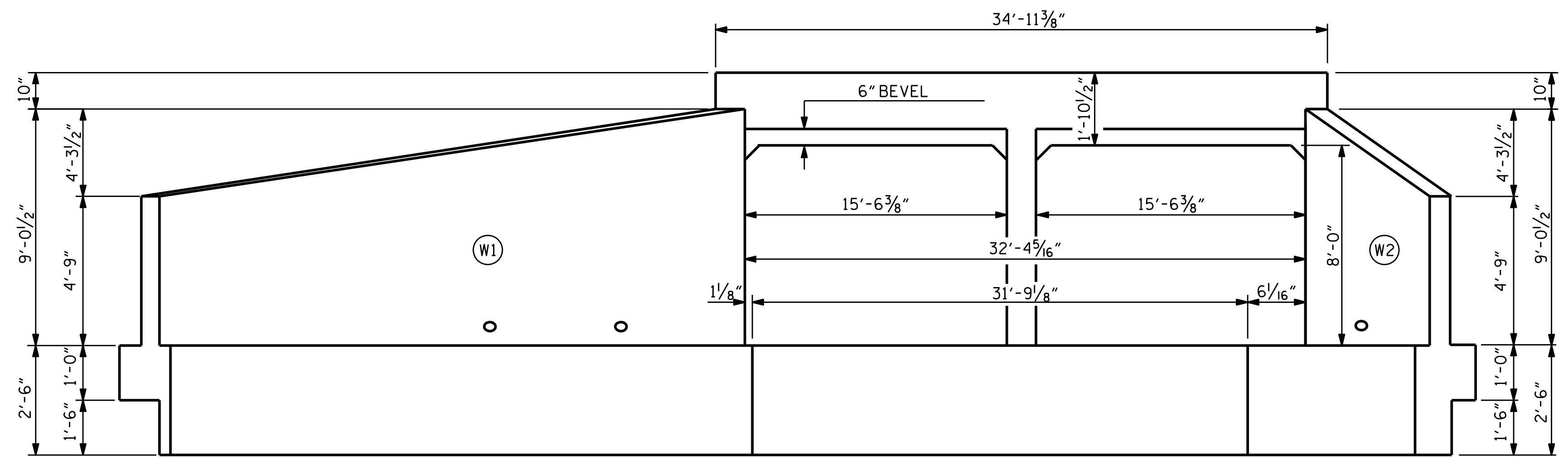
DOUBLE
 8 FT. X 8 FT.
 CONCRETE BOX CULVERT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C06-1
1			3			TOTAL SHEETS
2			4			13



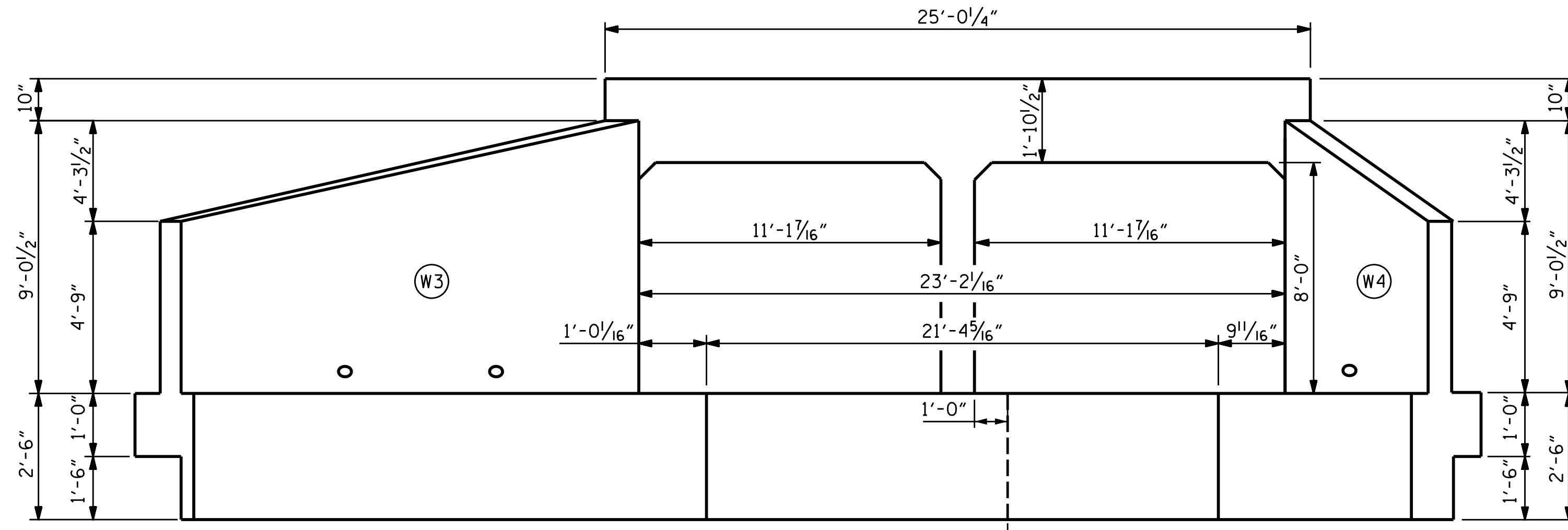
STAGE II & III CULVERT SECTION NORMAL TO ROADWAY

STAGE I CULVERT SECTION NORMAL TO ROADWAY



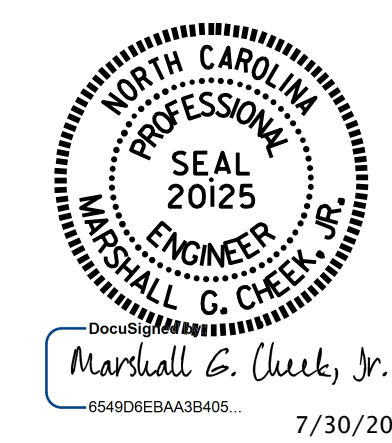
INLET END ELEVATION NORMAL TO SKEW

(LOOKING DOWNSTREAM)
(STAGE I)



OUTLET END ELEVATION NORMAL TO SKEW

(LOOKING UP STREAM)

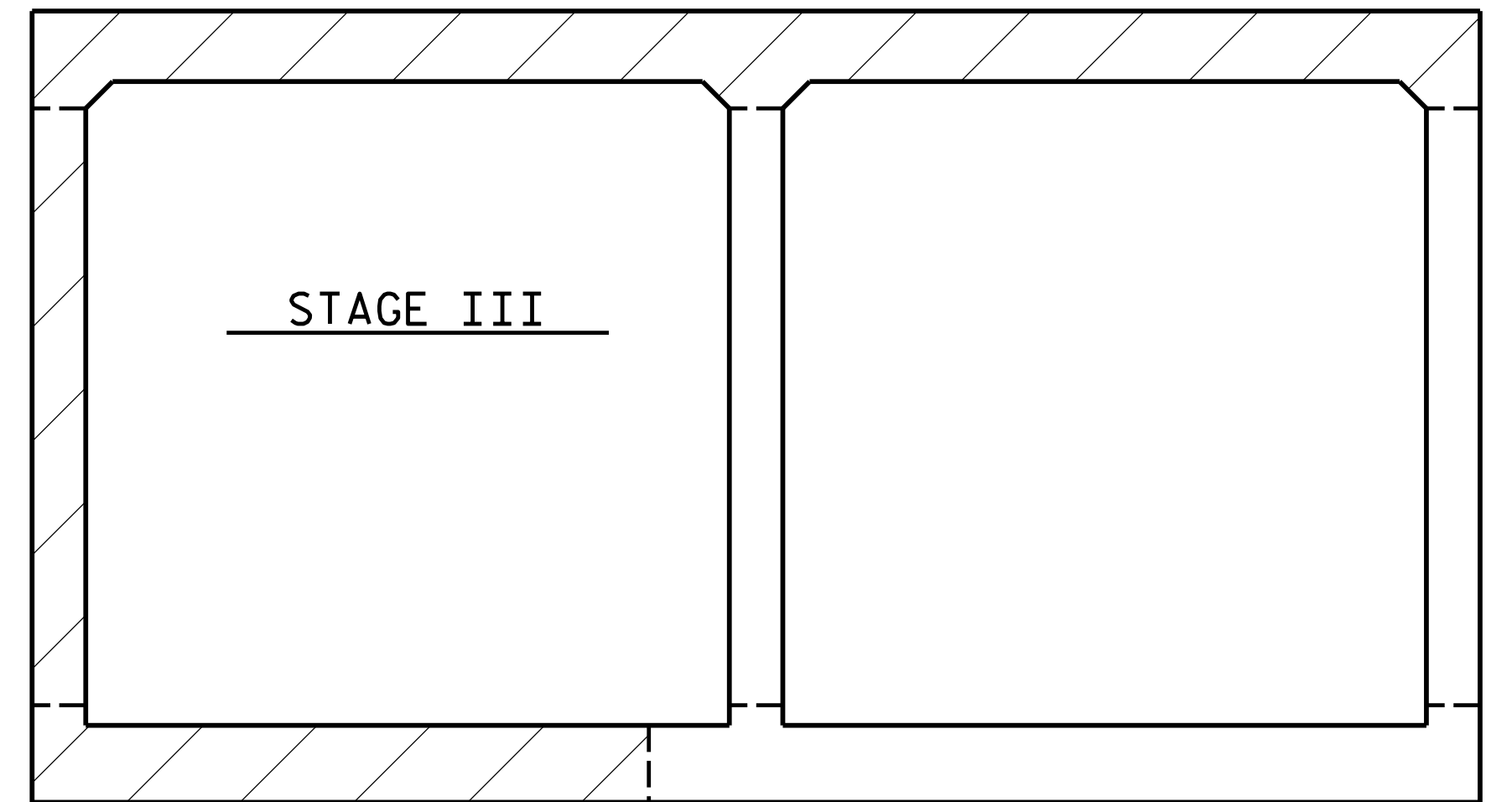
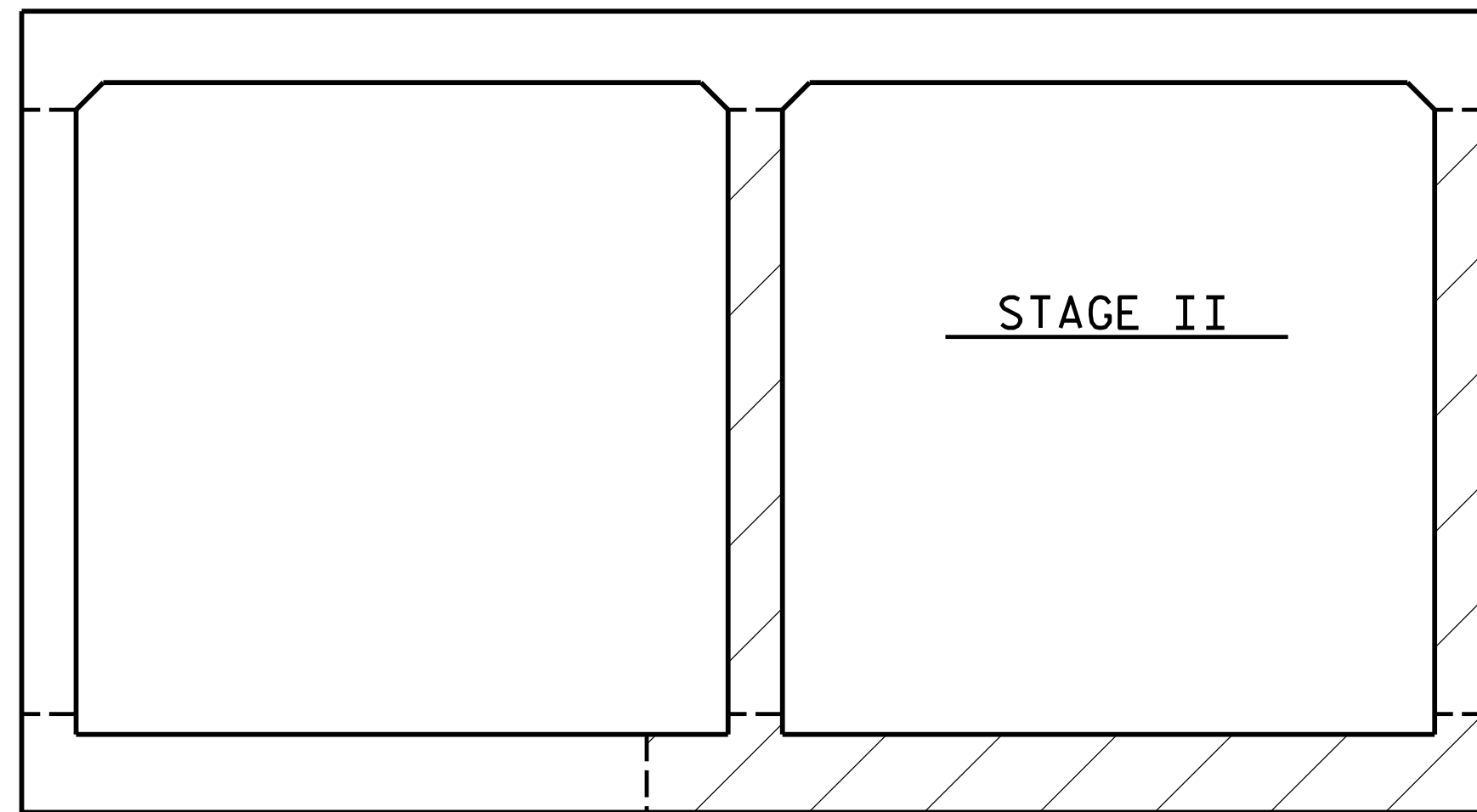
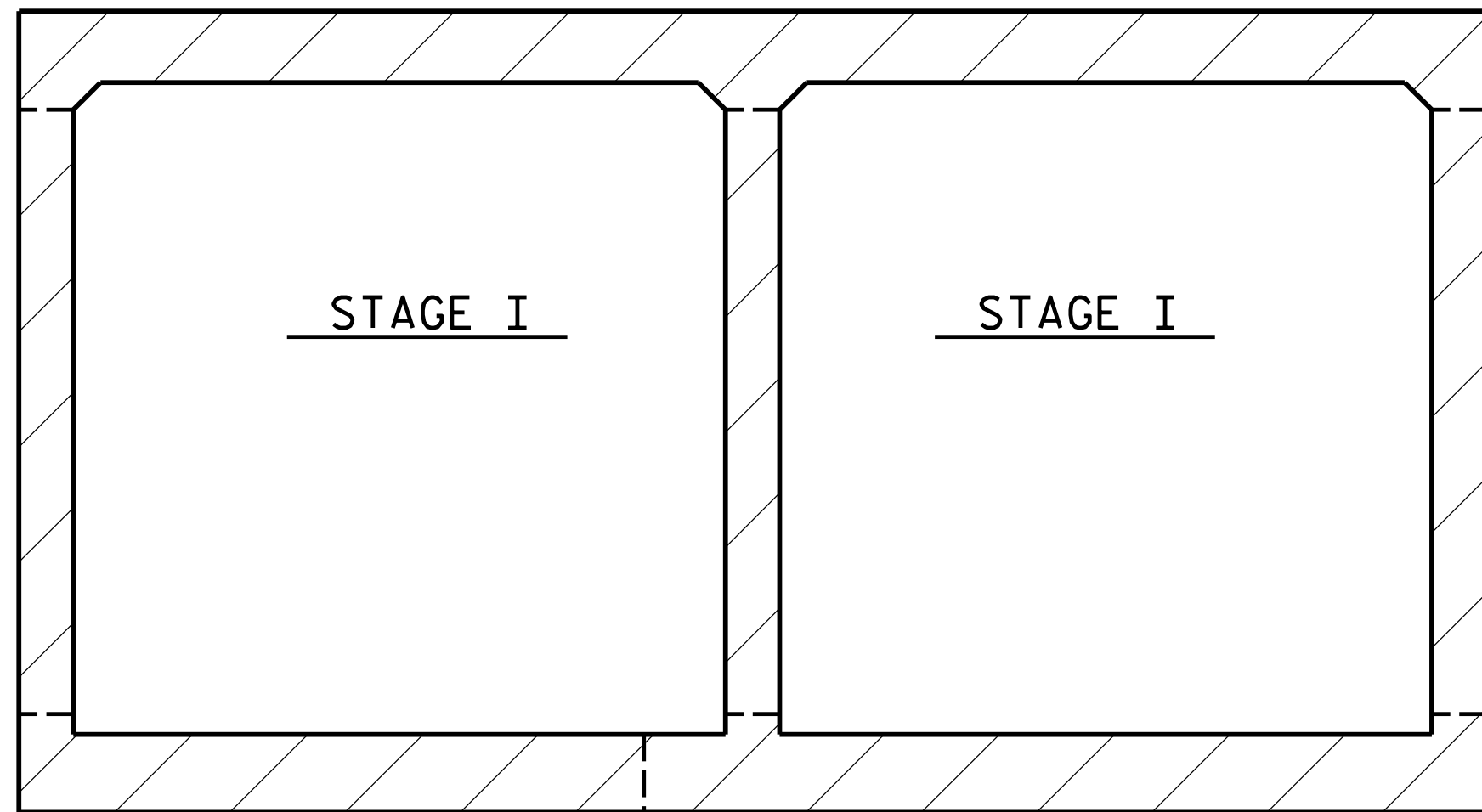


PROJECT NO. R-2915B
 ASHE COUNTY
 STATION: 161+48.90 -L-
 SHEET 2 OF 13

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 8'-0" X 8'-0"
 CONCRETE BOX CULVERT

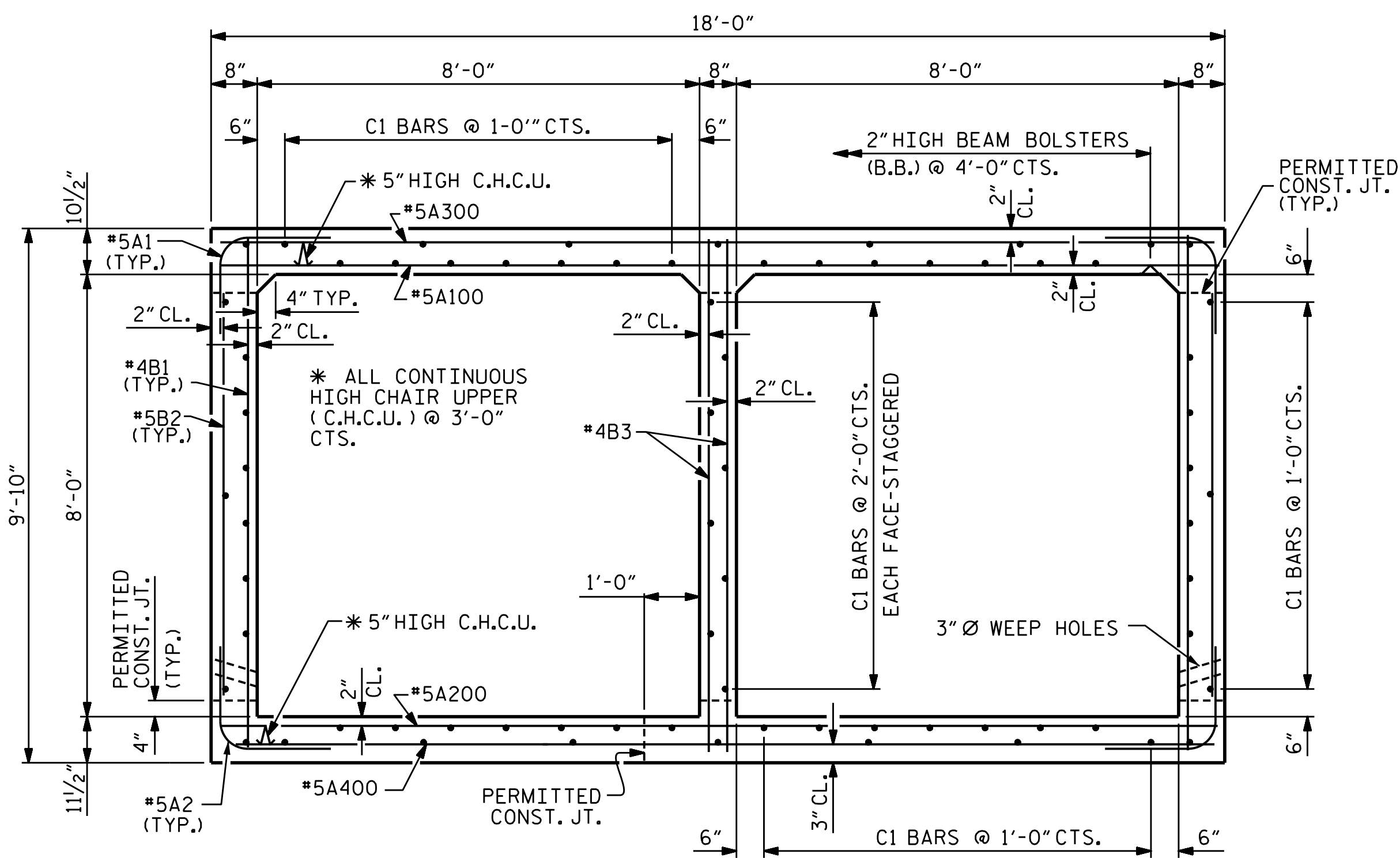
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C06-2
1			3			TOTAL SHEETS
2			4			13

DRAWN BY: H. T. BARBOUR DATE: 4-23-14
 CHECKED BY: S. B. WILLIAMS DATE: 5-14
 DESIGN ENGINEER OF RECORD: B. K. DUKE DATE: 4-15



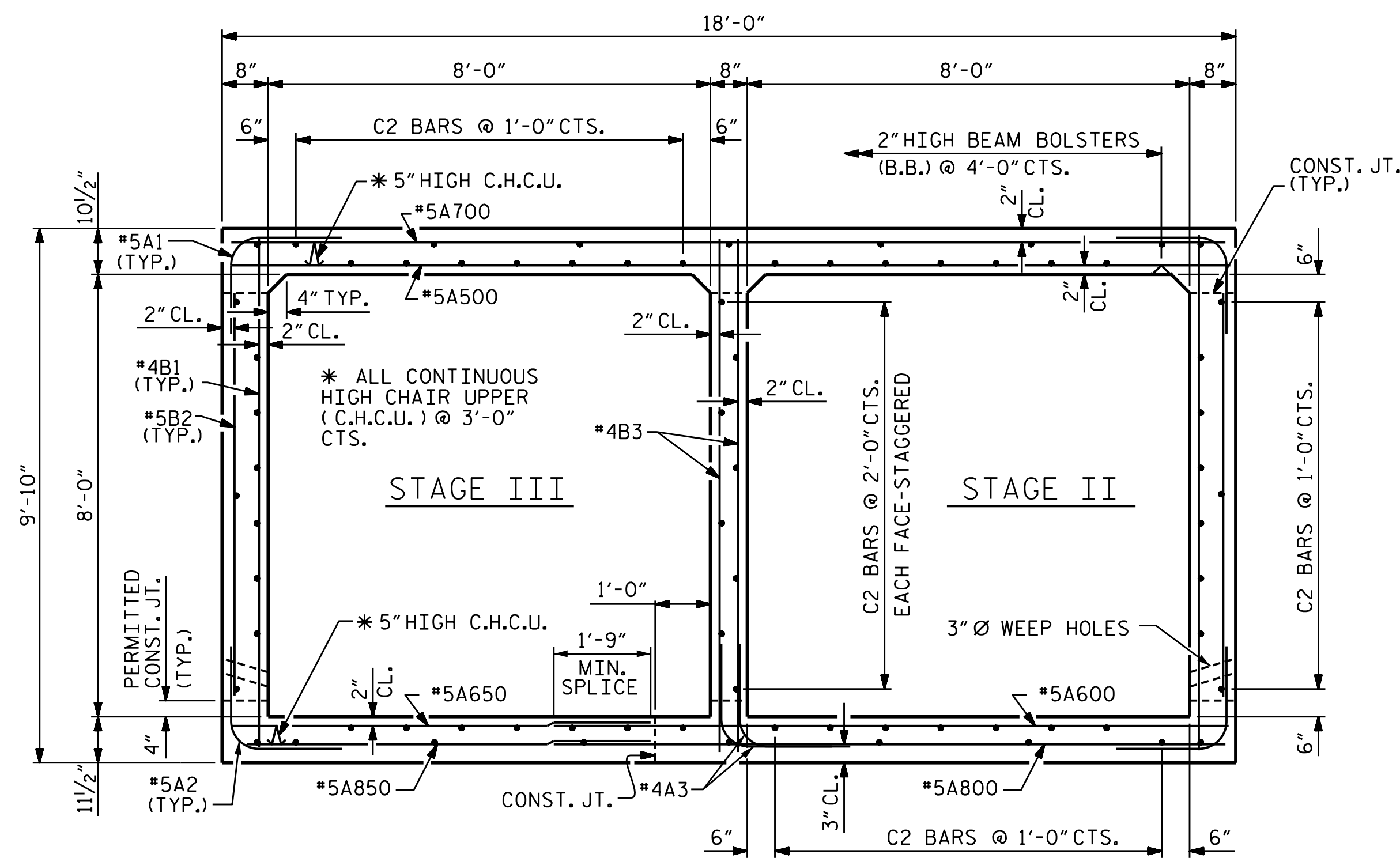
STAGING SEQUENCE

LOOKING DOWNSTREAM



**STAGE I
RIGHT ANGLE SECTION OF BARREL**

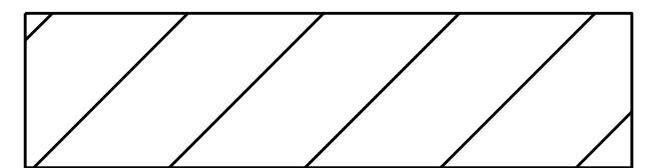
THERE ARE 72 C1 BARS IN SECTION OF BARREL.



**STAGE II & STAGE III
RIGHT ANGLE SECTION OF BARREL**

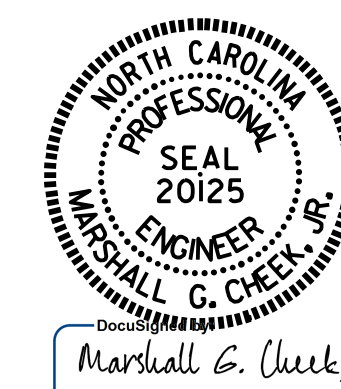
THERE ARE 72 C2 BARS IN SECTION OF BARREL.

LOOKING DOWNSTREAM



PROJECT NO. R-2915B
ASHE COUNTY
 STATION: 161+48.90 -L-

SHEET 3 OF 13



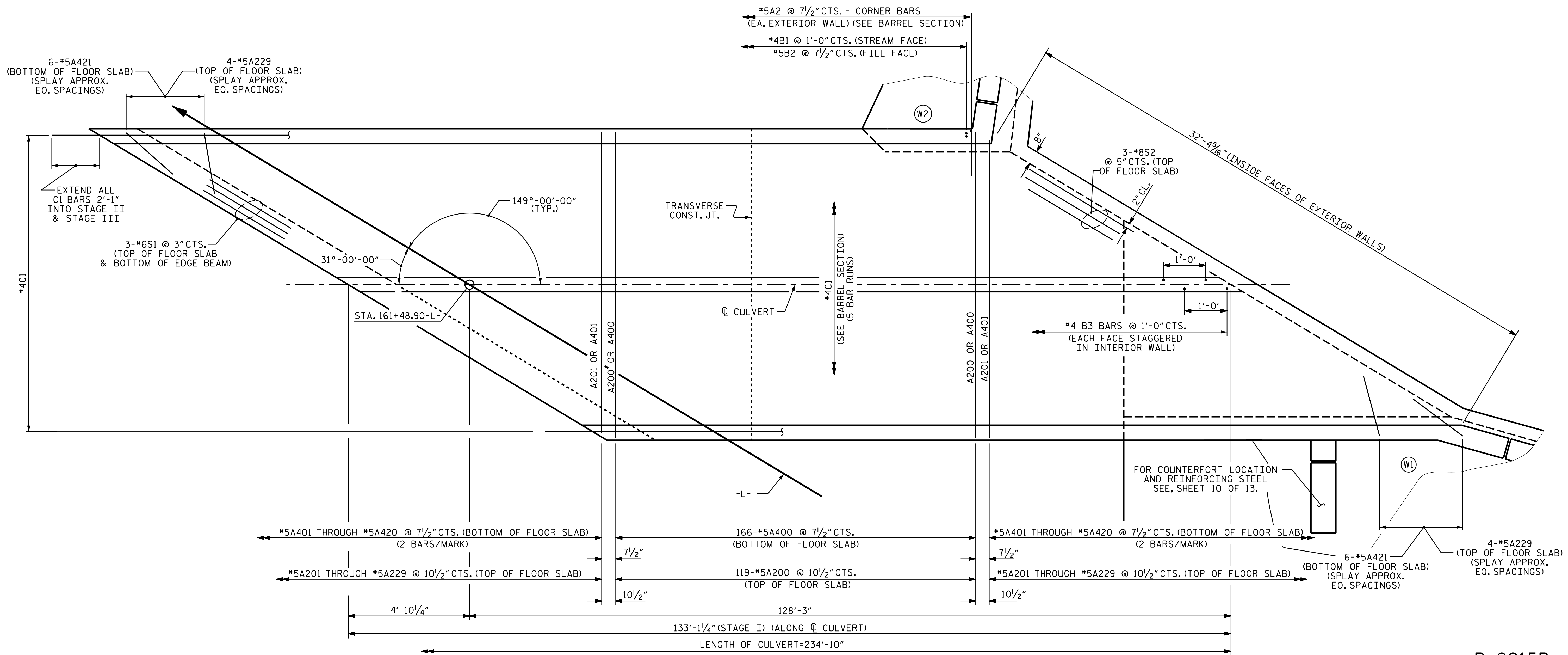
7/22/2015

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**DOUBLE
 8'-0" X 8'-0"
 CONCRETE BOX CULVERT**

DRAWN BY : H. T. BARBOUR DATE : 4-23-14
 CHECKED BY : S. B. WILLIAMS DATE : 5-14
 DESIGN ENGINEER OF RECORD: B. A. DUKE DATE : 4-15

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C06-3
1			3			TOTAL SHEETS
2			4			13

STR. #6

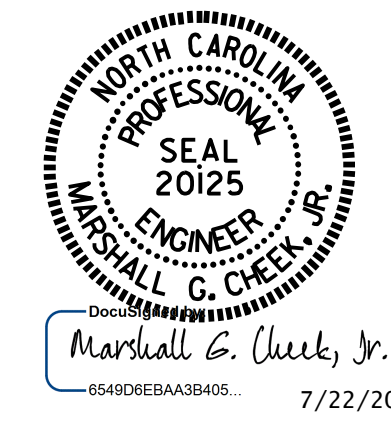


STAGE I PLAN - FLOOR SLAB

NOTE: FOR S11 BARS IN THE FLOOR SLAB & WING FOOTINGS, SEE WING SHEETS.

PROJECT NO. R-2915B
ASHE COUNTY
 STATION: 161+48.90 -L-

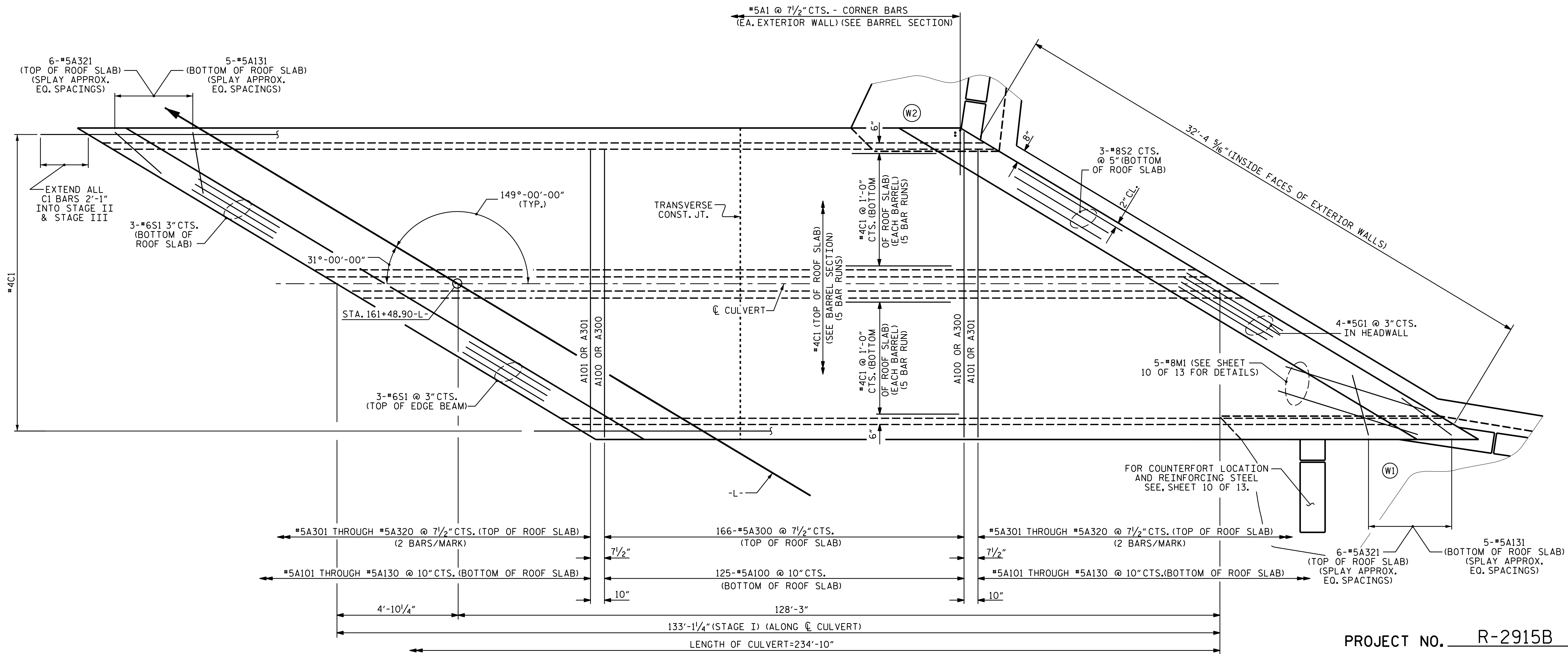
SHEET 4 OF 13



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
DOUBLE
8'-0" X 8'-0"
CONCRETE BOX CULVERT
(STAGE I)

DRAWN BY : H. I. BARBOUR DATE : 4-21-14
 CHECKED BY : S. B. WILLIAMS DATE : 5-14
 DESIGN ENGINEER OF RECORD: B. A. DUKE DATE : 4-15

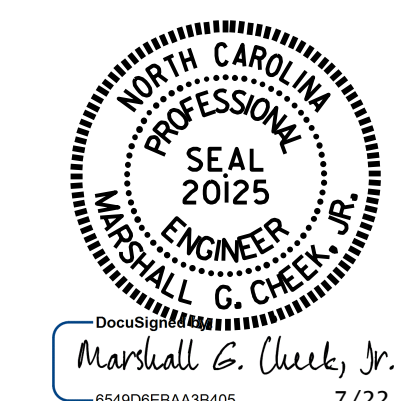
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			13
2			4			



STAGE I PLAN - ROOF SLAB

PROJECT NO. R-2915B
ASHE COUNTY
 STATION: 161+48.90 -L-

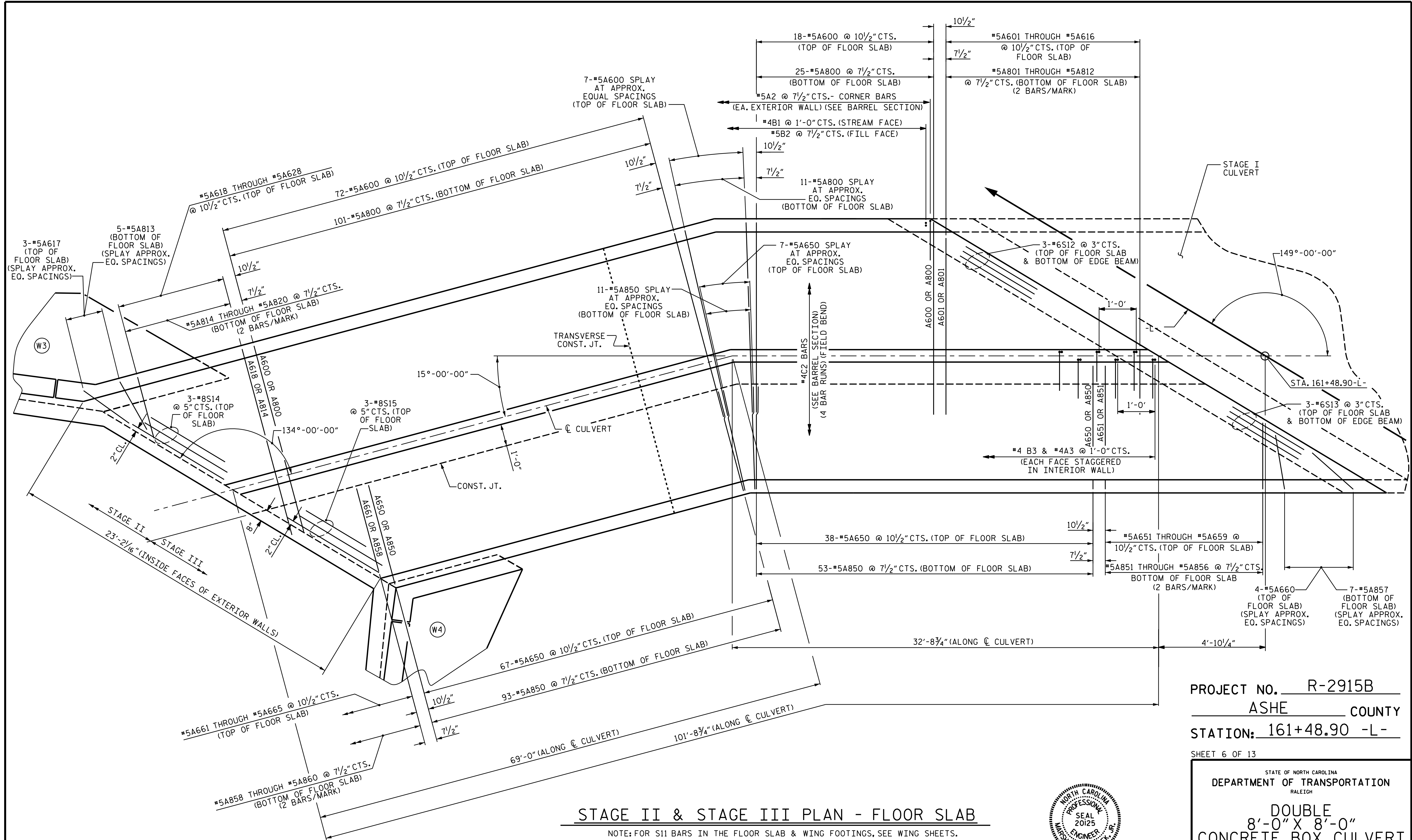
SHEET 5 OF 13



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**DOUBLE
 8'-0" X 8'-0"
 CONCRETE BOX CULVERT
 (STAGE I)**

DRAWN BY : H. T. BARBOUR DATE : 4-21-14
 CHECKED BY : S. B. WILLIAMS DATE : 5-14
 DESIGN ENGINEER OF RECORD: B. A. DUKE DATE : 4-15

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			C06-5
2			4			13



STAGE II & STAGE III PLAN - FLOOR SLAB

NOTE: FOR S11 BARS IN THE FLOOR SLAB & WING FOOTINGS, SEE WING SHEETS.

PROJECT NO. R-2915B
ASHE COUNTY
 STATION: 161+48.90 -L-

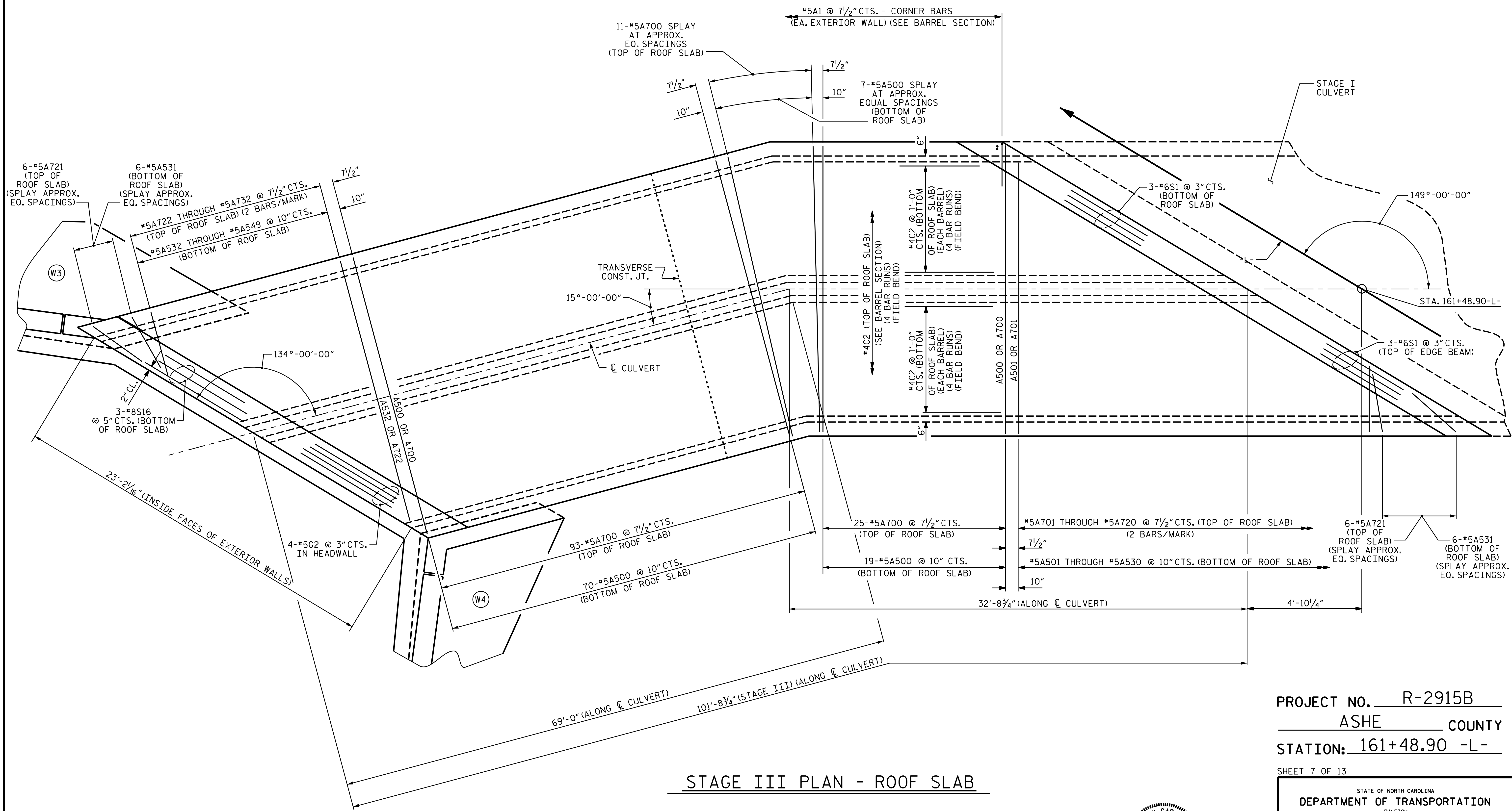
SHEET 6 OF 13



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**DOUBLE
 8'-0" X 8'-0"
 CONCRETE BOX CULVERT
 STAGE II & III**

DRAWN BY : H. T. BARBOUR DATE : 4-23-14
 CHECKED BY : S. B. WILLIAMS DATE : 5-14
 DESIGN ENGINEER OF RECORD: B. A. DUKE DATE : 4-15

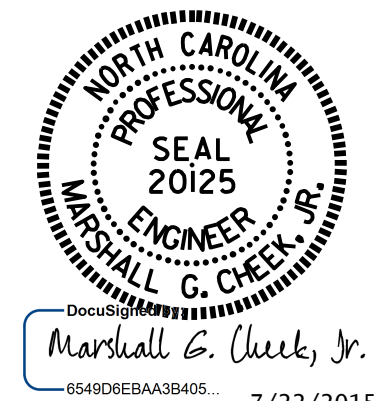
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			C06-6
2			4			13



STAGE III PLAN - ROOF SLAB

PROJECT NO. R-2915B
ASHE COUNTY
 STATION: 161+48.90 -L-

SHEET 7 OF 13



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE
 8'-0" X 8'-0"
 CONCRETE BOX CULVERT
 STAGE II & III

DRAWN BY : H. T. BARBOUR DATE : 4-23-14
 CHECKED BY : S. B. WILLIAMS DATE : 5-14
 DESIGN ENGINEER OF RECORD: B. A. DUKE DATE : 4-15

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			13
2			4			

NOTES

MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT AND SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL BETWEEN THE SILLS 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.

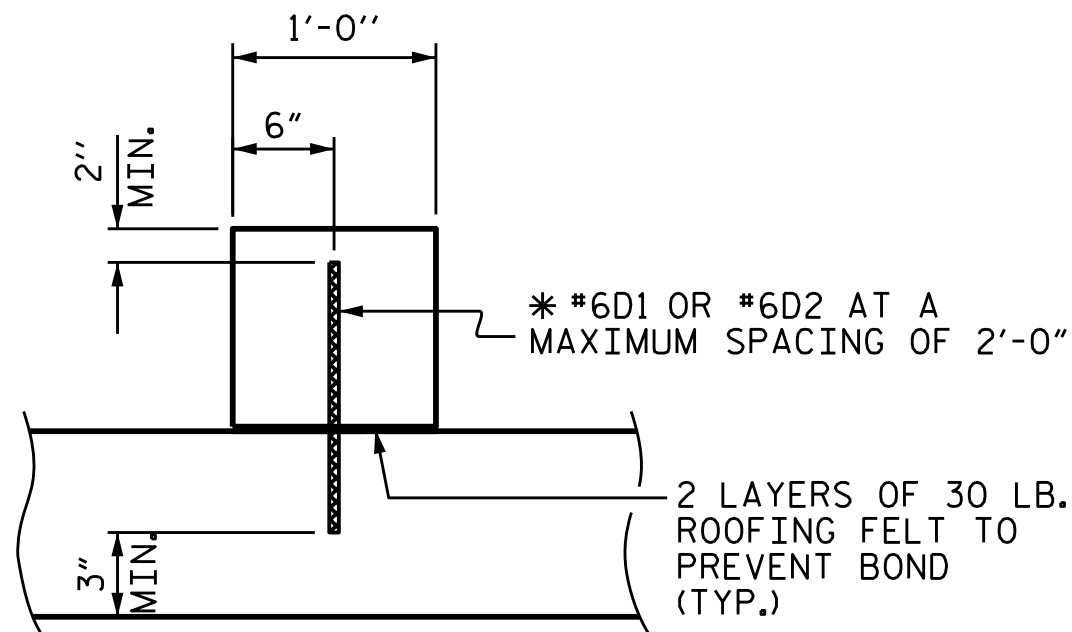
BED MATERIAL SHALL BE SUPPLEMENTED BY CLASS B RIP RAP AS NECESSARY.

THE TOP OF LOW FLOW SILLS SHOULD MATCH THE STREAM BED ELEVATION IN THE LOW FLOW CHANNEL OF THE STREAM.

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

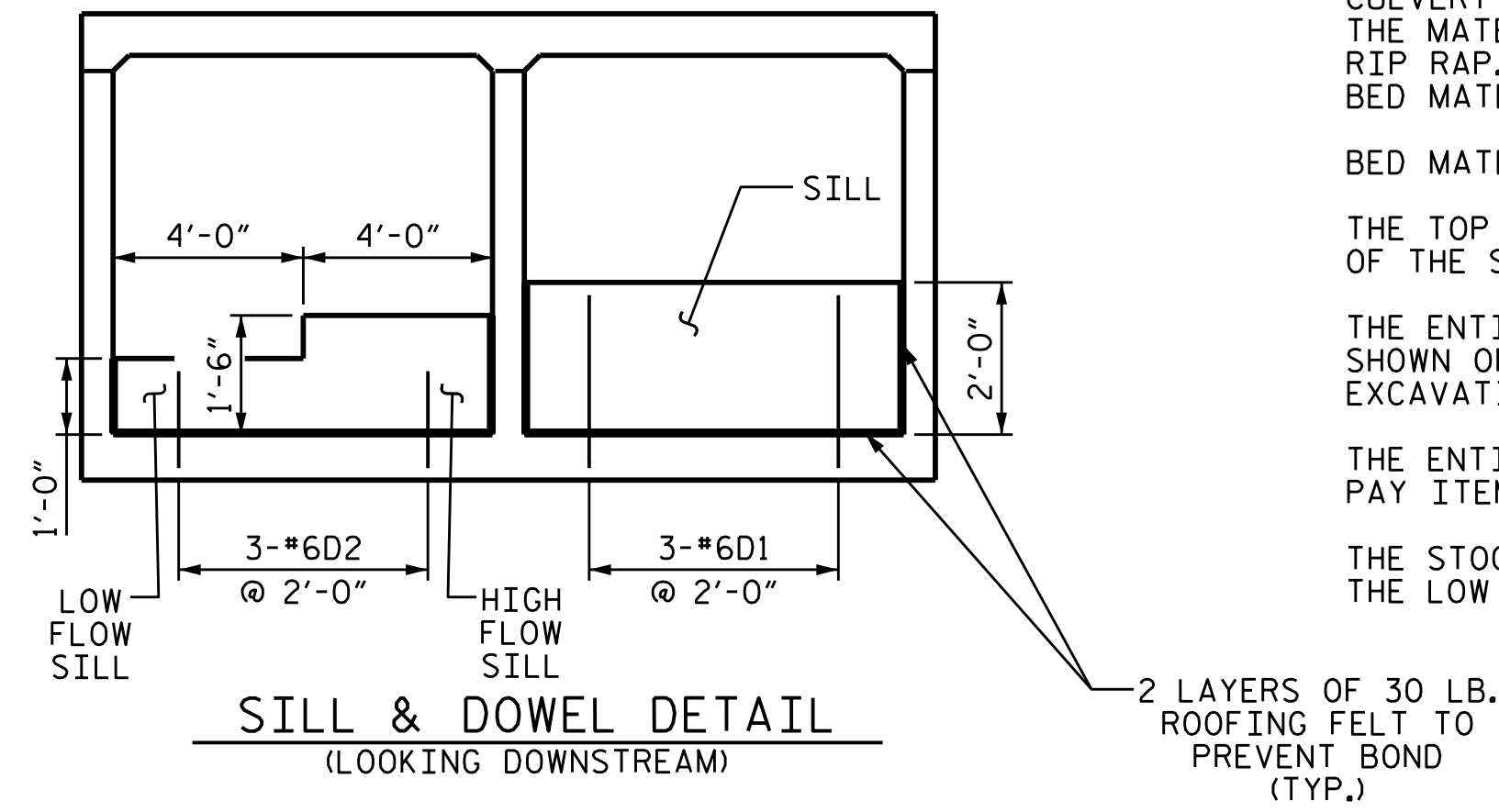
THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE STOCKPILED MATERIAL SHALL BE PLACED TO PROVIDE A 1 FOOT DEPTH LOW FLOW CHANNEL BETWEEN THE LOW FLOW SILLS, AND SHALL BE PLACED TO THE LEVEL OF 2'-0" BETWEEN THE HIGH FLOW SILLS.

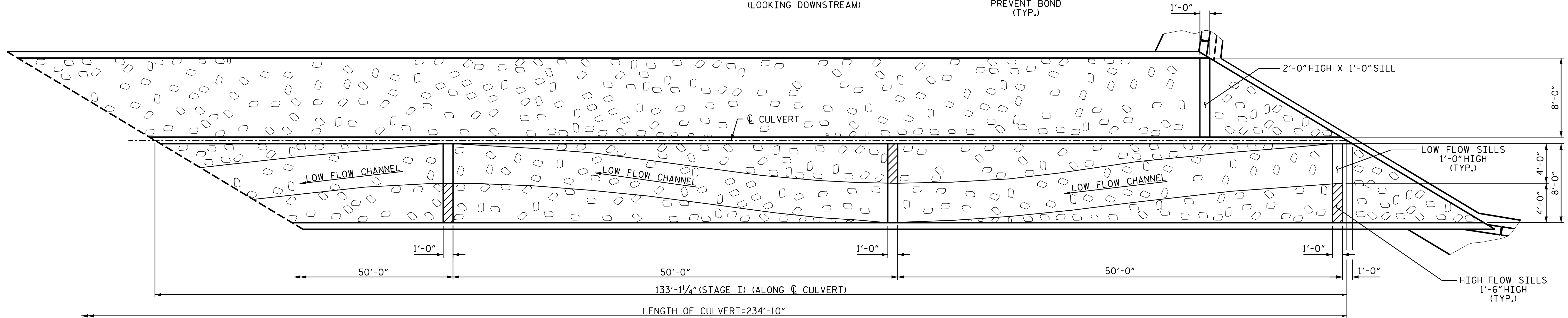


SECTION THROUGH SILL

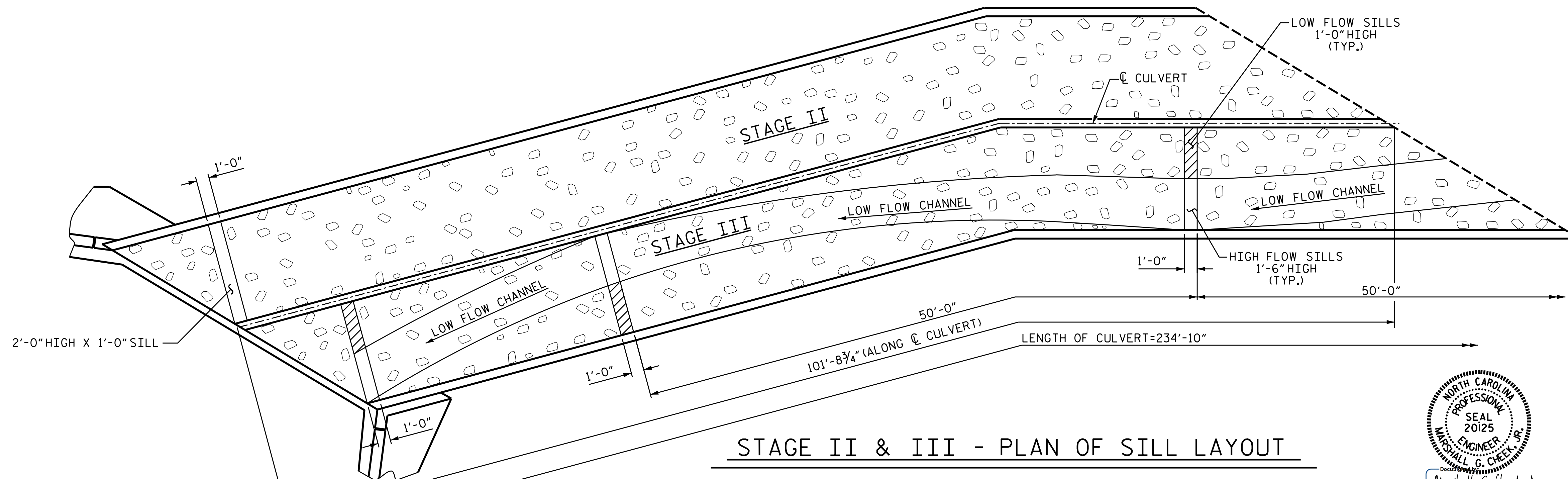
* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.



SILL & DOWEL DETAIL
(LOOKING DOWNSTREAM)



STAGE I - PLAN OF SILL LAYOUT

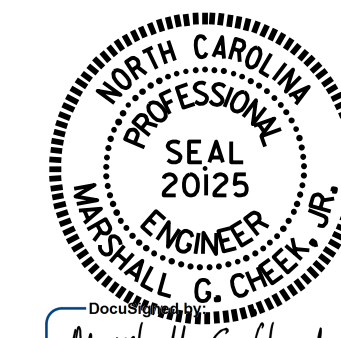


STAGE II & III - PLAN OF SILL LAYOUT

PROJECT NO. R-2915B
ASHE COUNTY
STATION: 161+48.90 -L-

SHEET 8 OF 13

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DOUBLE
8 FT. X 8 FT.
CONCRETE BOX CULVERT



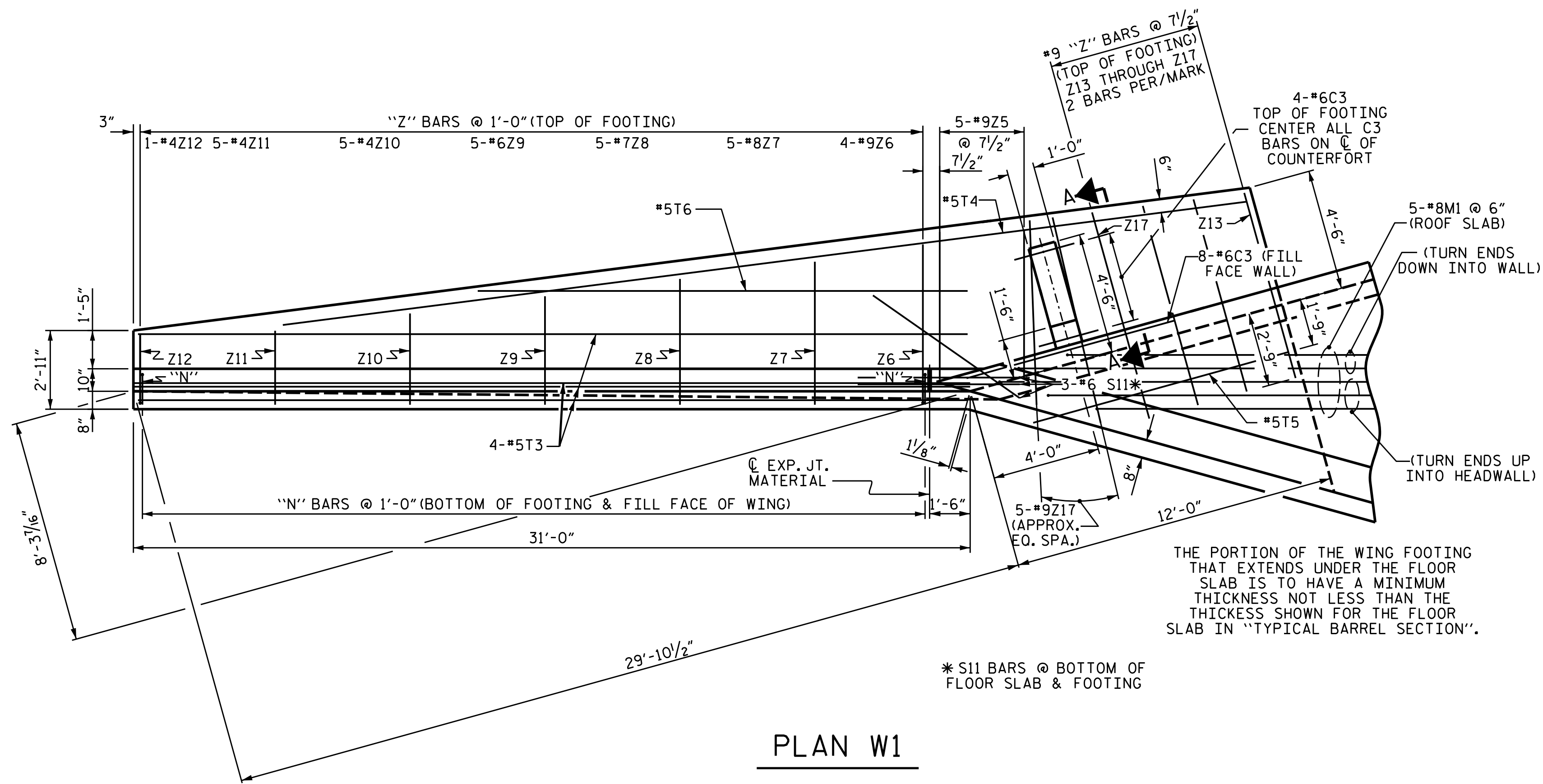
Marshall G. Cheek, Jr.
654902EBA38405 7/22/2015

DRAWN BY: H. I. BARBOUR DATE: 4-29-14
CHECKED BY: S. B. WILLIAMS DATE: 5-14
DESIGN ENGINEER OF RECORD: B. A. DUKE DATE: 4-15

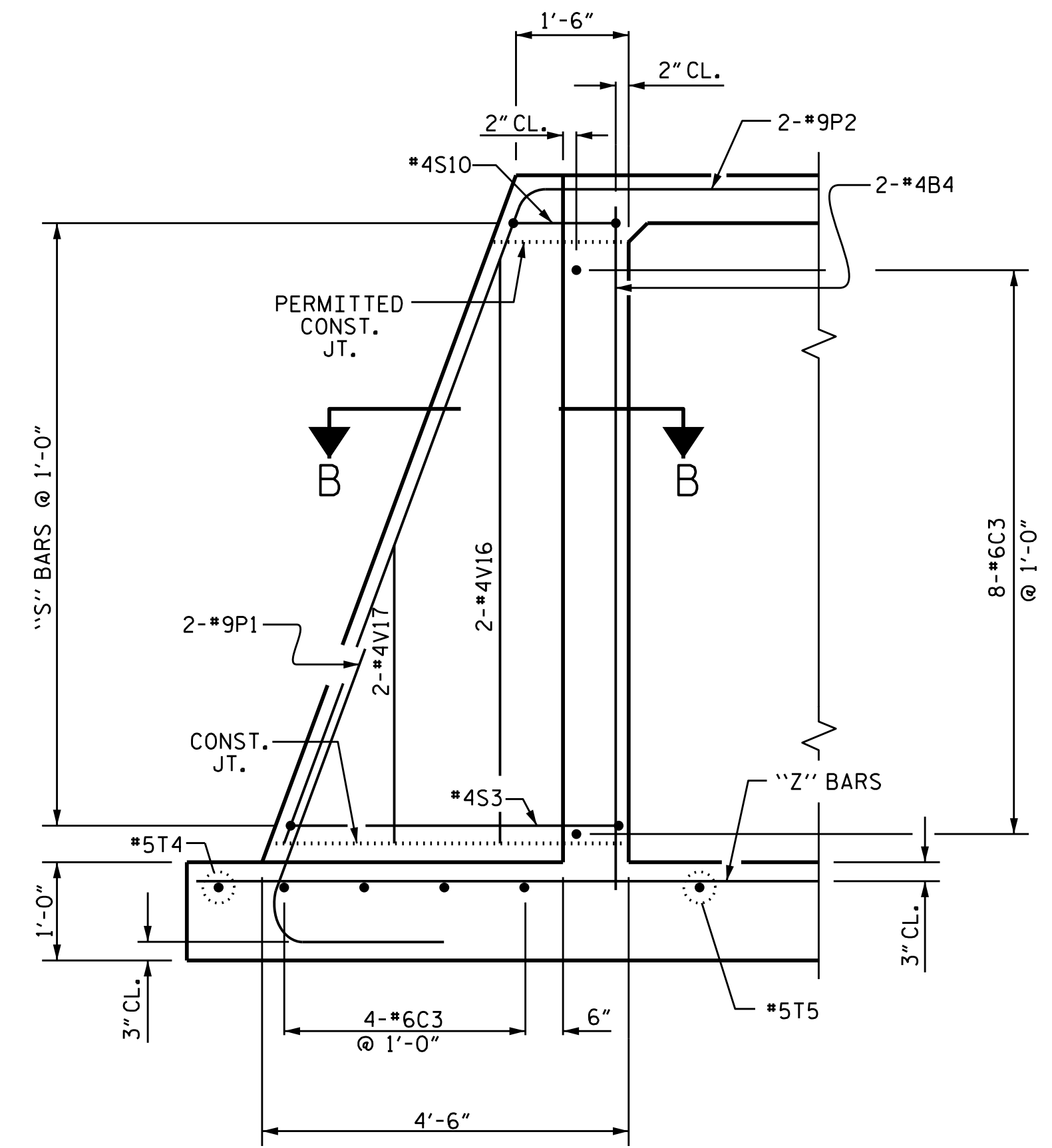
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C06-8
1			3			TOTAL SHEETS
2			4			13

BAR SCHEDULE

STAGE I												STAGE II & III																	
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	426	#5	1	5'-0"	2222	A229	10	#5	STR	2'-6"	26	A1	326	#5	1	5'-0"	1700	A610	1	#5	STR	7'-3"	8	A728	2	#5	STR	8'-8"	18
A2	426	#5	1	4'-8"	2073							A2	326	#5	1	4'-8"	1587	A611	1	#5	STR	6'-9"	7	A729	2	#5	STR	7'-5"	15
A100	125	#5	STR	17'-8"	2303	A300	166	#5	STR	17'-8"	3059	A3	204	#4	1	4'-4"	591	A612	1	#5	STR	6'-3"	7	A730	2	#5	STR	6'-1"	13
A101	2	#5	STR	17'-3"	36	A301	4	#5	STR	17'-0"	71	A500	96	#5	STR	17'-8"	1769	A613	1	#5	STR	5'-8"	6	A731	2	#5	STR	4'-9"	10
A102	2	#5	STR	16'-9"	35	A302	4	#5	STR	16'-3"	68	A501	1	#5	STR	17'-6"	18	A614	1	#5	STR	5'-2"	5	A732	2	#5	STR	3'-6"	7
A103	2	#5	STR	16'-3"	34	A303	4	#5	STR	15'-6"	65	A502	1	#5	STR	17'-0"	18	A615	1	#5	STR	4'-5"	5						
A104	2	#5	STR	15'-9"	33	A304	4	#5	STR	14'-9"	62	A503	1	#5	STR	16'-6"	17	A616	1	#5	STR	4'-2"	4	A800	137	#5	STR	12'-3"	1750
A105	2	#5	STR	15'-3"	32	A305	4	#5	STR	14'-0"	58	A504	1	#5	STR	16'-0"	17	A617	3	#5	STR	2'-6"	8	A801	2	#5	STR	11'-7"	24
A106	2	#5	STR	14'-9"	31	A306	4	#5	STR	13'-3"	55	A505	1	#5	STR	15'-6"	16	A618	1	#5	STR	12'-4"	13	A802	2	#5	STR	10'-10"	23
A107	2	#5	STR	14'-3"	30	A307	4	#5	STR	12'-6"	52	A506	1	#5	STR	15'-0"	16	A619	1	#5	STR	11'-5"	12	A803	2	#5	STR	10'-1"	21
A108	2	#5	STR	13'-9"	29	A308	4	#5	STR	11'-9"	49	A507	1	#5	STR	14'-6"	15	A620	1	#5	STR	10'-6"	11	A804	2	#5	STR	9'-4"	19
A109	2	#5	STR	13'-3"	28	A309	4	#5	STR	11'-0"	46	A508	1	#5	STR	14'-0"	15	A621	1	#5	STR	9'-8"	10	A805	2	#5	STR	8'-7"	18
A110	2	#5	STR	12'-9"	27	A310	4	#5	STR	10'-3"	43	A509	1	#5	STR	13'-6"	14	A622	1	#5	STR	8'-9"	9	A806	2	#5	STR	7'-10"	16
A111	2	#5	STR	12'-3"	26	A311	4	#5	STR	9'-6"	40	A510	1	#5	STR	13'-0"	14	A623	1	#5	STR	7'-10"	8	A807	2	#5	STR	7'-1"	15
A112	2	#5	STR	11'-9"	25	A312	4	#5	STR	8'-9"	37	A511	1	#5	STR	12'-6"	13	A624	1	#5	STR	6'-11"	7	A808	2	#5	STR	6'-4"	13
A113	2	#5	STR	11'-3"	23	A313	4	#5	STR	8'-0"	33	A512	1	#5	STR	12'-0"	13	A625	1	#5	STR	6'-0"	6	A809	2	#5	STR	5'-7"	12
A114	2	#5	STR	10'-9"	22	A314	4	#5	STR	7'-3"	30	A513	1	#5	STR	11'-6"	12	A626	1	#5	STR	5'-1"	5	A810	2	#5	STR	4'-10"	10
A115	2	#5	STR	10'-3"	21	A315	4	#5	STR	6'-6"	27	A514	1	#5	STR	11'-0"	11	A627	1	#5	STR	4'-2"	4	A811	2	#5	STR	4'-1"	9
A116	2	#5	STR	9'-9"	20	A316	4	#5	STR	5'-9"	24	A515	1	#5	STR	10'-6"	11	A628	1	#5	STR	3'-3"	3	A812	2	#5	STR	3'-4"	7
A117	2	#5	STR	9'-3"	19	A317	4	#5	STR	5'-0"	21	A516	1	#5	STR	10'-0"	10							A813	5	#5	STR	2'-6"	13
A118	2	#5	STR	8'-9"	18	A318	4	#5	STR	4'-3"	18	A517	1	#5	STR	9'-6"	10	A650	112	#5	STR	7'-4"	857	A814	2	#5	STR	11'-4"	24
A119	2	#5	STR	8'-3"	17	A319	4	#5	STR	3'-6"	15	A518	1	#5	STR	9'-0"	9	A651	1	#5	STR	6'-11"	7	A815	2	#5	STR	10'-1"	21
A120	2	#5	STR	7'-9"	16	A320	4	#5	STR	2'-9"	11	A519	1	#5	STR	8'-6"	9	A652	1	#5	STR	6'-4"	7	A816	2	#5	STR	8'-9"	18
A121	2	#5	STR	7'-3"	15	A321	12	#5	STR	2'-6"	31	A520	1	#5	STR	8'-0"	8	A653	1	#5	STR	5'-10"	6	A817	2	#5	STR	7'-5"	15
A122	2	#5	STR	6'-9"	14	A400	166	#5	STR	17'-8"	3059	A521	1	#5	STR	7'-6"	8	A654	1	#5	STR	5'-4"	6	A818	2	#5	STR	6'-2"	13
A123	2	#5	STR	6'-3"	13	A401	4	#5	STR	17'-0"	71	A522	1	#5	STR	7'-0"	7	A655	1	#5	STR	4'-9"	5	A819	2	#5	STR	4'-10"	10
A124	2	#5	STR	5'-9"	12	A402	4	#5	STR	16'-3"	68	A523	1	#5	STR	6'-6"	7	A656	1	#5	STR	4'-3"	4	A820	2	#5	STR	3'-7"	7
A125	2	#5	STR	5'-3"	11	A403	4	#5	STR	15'-6"	65	A524	1	#5	STR	6'-0"	6	A657	1	#5	STR	3'-9"	4						
A126	2	#5	STR	4'-9"	10	A404	4	#5	STR	14'-9"	62	A525	1	#5	STR	5'-6"	6	A658	1	#5	STR	3'-2"	3	A850	157	#5	STR	7'-4"	1201
A127	2	#5	STR	4'-3"	9	A405	4	#5	STR	14'-0"	58	A526	1	#5	STR	5'-0"	5	A659	1	#5	STR	2'-8"	3	A851	2	#5	STR	6'-10"	14
A128	2	#5	STR	3'-9"	8	A406	4	#5	STR	13'-3"	55	A527	1	#5	STR	4'-6"	5	A660	4	#5	STR	2'-6"	10	A852	2	#5	STR	6'-1"	13
A129	2	#5	STR	3'-3"	7	A407	4	#5	STR	12'-6"	52	A528	1	#5	STR	4'-0"	4	A661	1	#5	STR	6'-7"	7	A853	2	#5	STR	5'-4"	11
A130	2	#5	STR	2'-9"	6	A408	4	#5	STR	11'-9"	49	A529	1	#5	STR	3'-6"	4	A662	1	#5	STR	5'-8"	6	A854	2	#5	STR	4'-7"	10
A131	10	#5	STR	2'-6"	26	A409	4	#5	STR	11'-0"	46	A530	1	#5	STR	3'-0"	3	A663	1	#5	STR	4'-9"	5	A855	2	#5	STR	3'-10"	8
A200	119	#5	STR	17'-8"	2193	A410	4	#5	STR	10'-3"	43	A531	12	#5	STR	2'-6"	31	A664	1	#5	STR	3'-10"	4	A856	2	#5	STR	3'-1"	6
A201	2	#5	STR	17'-3"	36	A411	4	#5	STR	9'-6"	40	A532	1	#5	STR	17'-6"	18	A665	1	#5	STR	2'-11"	3	A857	7	#5	STR	2'-6"	18
A202	2	#5	STR	16'-9"	35	A412	4	#5	STR	8'-9"	37	A533	1	#5	STR	16'-8"	17	A700	129	#5	STR	17'-8"	2377	A858	2	#5	STR	6'-2"	13
A203	2	#5	STR	16'-2"	34	A413	4	#5	STR	8'-0"	33	A534	1	#5	STR	15'-9"	16	A701	2	#5	STR	17'-1"	36	A859	2	#5	STR	4'-11"	10
A204	2	#5	STR	15'-8"	33	A414	4	#5	STR	7'-3"	30	A535	1	#5	STR	14'-11"	16	A702	2	#5	STR	16'-4"	34	A860	2	#5	STR	3'-7"	7
A205	2	#5	STR	15'-2"	32	A415	4	#5	STR	6'-6"	27	A536	1	#5	STR	14'-1"	15	A703	2	#5	STR	15'-7"	33	B1	204	#4	STR	9'-4"	1272
A206	2	#5	STR	14'-8"	31	A416	4	#5	STR	5'-9"	24	A537	1	#5	STR	13'-2"	14	A704	2	#5	STR	14'-10"	31	B2	326	#5	STR	7'-4"	2493
A207	2	#5	STR	14'-1"	29	A417	4	#5	STR	5'-0"	21	A538	1	#5	STR	12'-4"	13	A705	2	#5	STR	14'-1"	29	B3	204	#4	STR	9'-4"	1272
A208	2	#5	STR	13'-7"	28	A418	4	#5	STR	4'-3"	18	A539	1	#5	STR	11'-6"	12	A706	2	#5	STR	13'-4"	28						
A209	2	#5	STR	13'-1"	27	A419	4	#5	STR	3'-6"	15	A540	1	#5	STR	10'-7"	11	A707	2	#5	STR	12'-7"	26	C2	288	#4	STR	27'-10"	5355
A210	2	#5	STR	12'-6"	26	A420	4	#5	STR	2'-9"	11	A541	1	#5	STR	9'-9"	10	A708	2	#5	STR	11'-10"	25						
A211	2	#5	STR	12'-0"	25	A421	12	#5	STR	2'-6"	31	A542	1	#5	STR	8'-11"	9	A709	2	#5	STR	11'-0"	23	D1	3	#6	STR	2'-6"	11
A212	2	#5	STR	11'-6"	24							A543	1	#5	STR	8'-0"	8	A710	2	#5	STR	10'-4"	22	D2	9	#6	STR	1'-6"	20
A213	2	#5	STR	10'-11"	23	B1	266	#4	STR	9'-4"	1658	A544	1	#5	STR	7'-2"	7	A711	2	#5	STR	9'-7"	20	G2	4	#5	STR	24'-5"	102
A214	2	#5	STR	10'-5"	22	B2	426	#5	STR	7'-4"	3258	A545	1	#5	STR	6'-4"	7	A712	2	#5	STR	8'-10"	18						
A215	2	#5	STR	9'-11"	21	B3	266	#4	STR	9'-4"	1658	A546	1	#5	STR	5'-5"	6	A713	2	#5	STR	8'-1"	17						
A216	2	#5	STR	9'-4"	19							A547	1	#5	STR	4'-7"	5	A714	2	#5	STR	7'-3"	15	S1	6	#6	STR	34'-3"	309
A217	2	#5	STR	8'-10"	18	C1	360	#4	STR	28'-7"	6874	A548	1	#5	STR	3'-9"	4	A715	2	#5	STR	6'-6"	14	S12	6	#6	STR	22'-11"	207
A218	2	#5	STR	8'-4"	17							A549	1	#5	STR	2'-10"	3	A716	2	#5	STR	5'-9"	12	S13	6	#6	STR	14'-6"	131
A219	2	#5	STR	7'-9"	16	D1	3	#6	STR	2'-6"	11	A600	97	#5	STR	12'-3"	1239	A717	2	#5	STR	5'-0"	10	S14	3	#8	STR	19'-8"	158
A220	2	#5	STR	7'-3"	15	D2	9	#6	STR	1'-6"	20	A601	1	#5	STR	12'-0"	13	A718	2	#5	STR	4'-3"	9	S15	3	#8	STR	10'-5"	83
A221	2	#5	STR	6'-9"	14							A602	1	#5	STR	11'-6"	12	A719	2	#5	STR	3'-6"	7	S16	3	#8	STR	2	

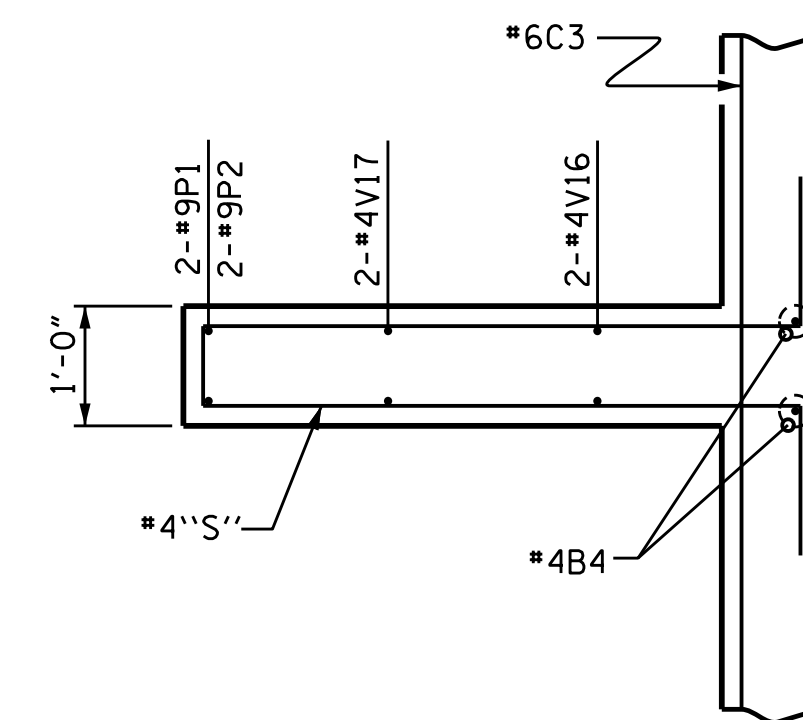


PLAN W1



SECTION A-A

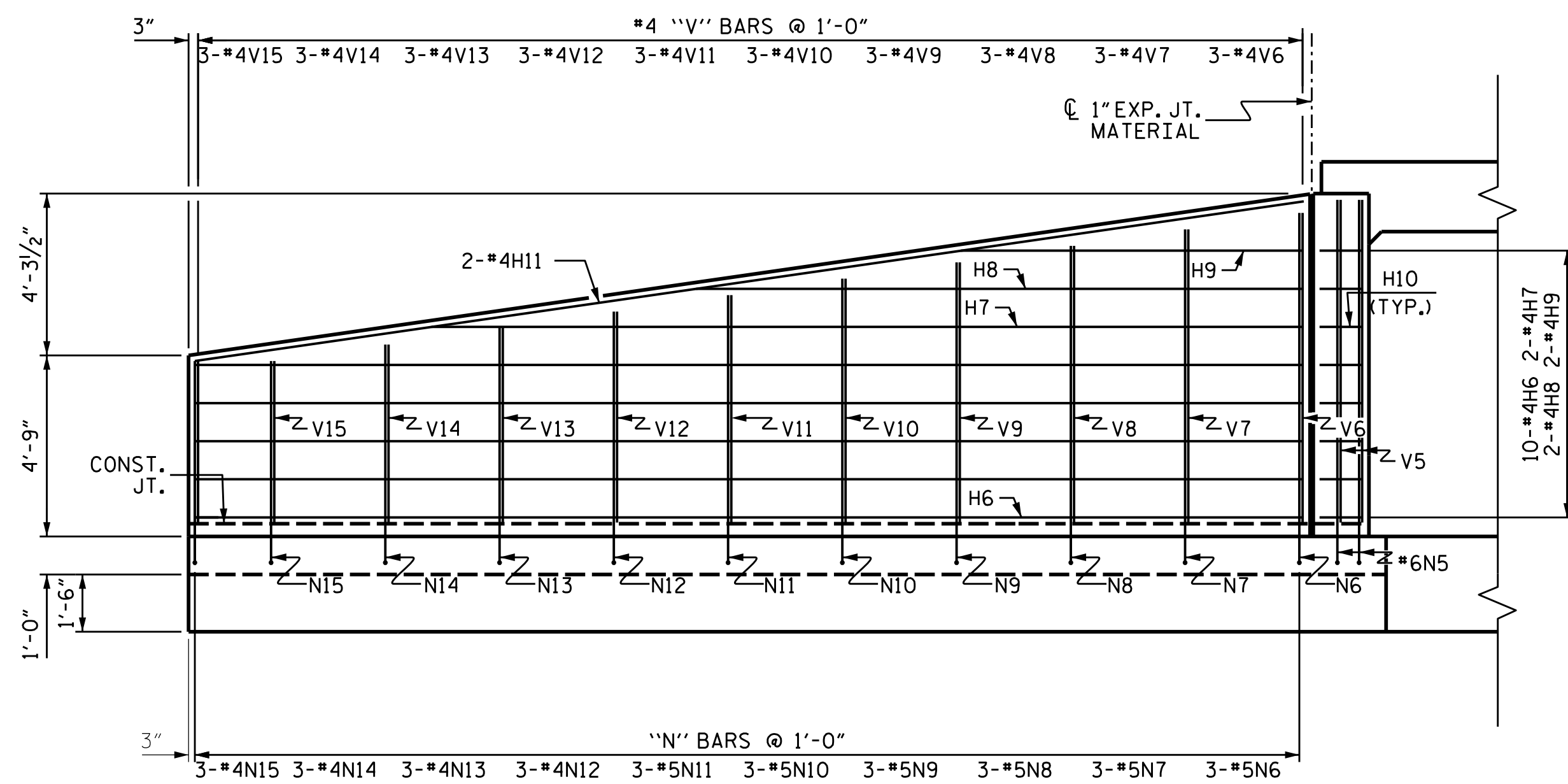
STANDARD REINFORCING
STEEL IN BARREL
NOT SHOWN



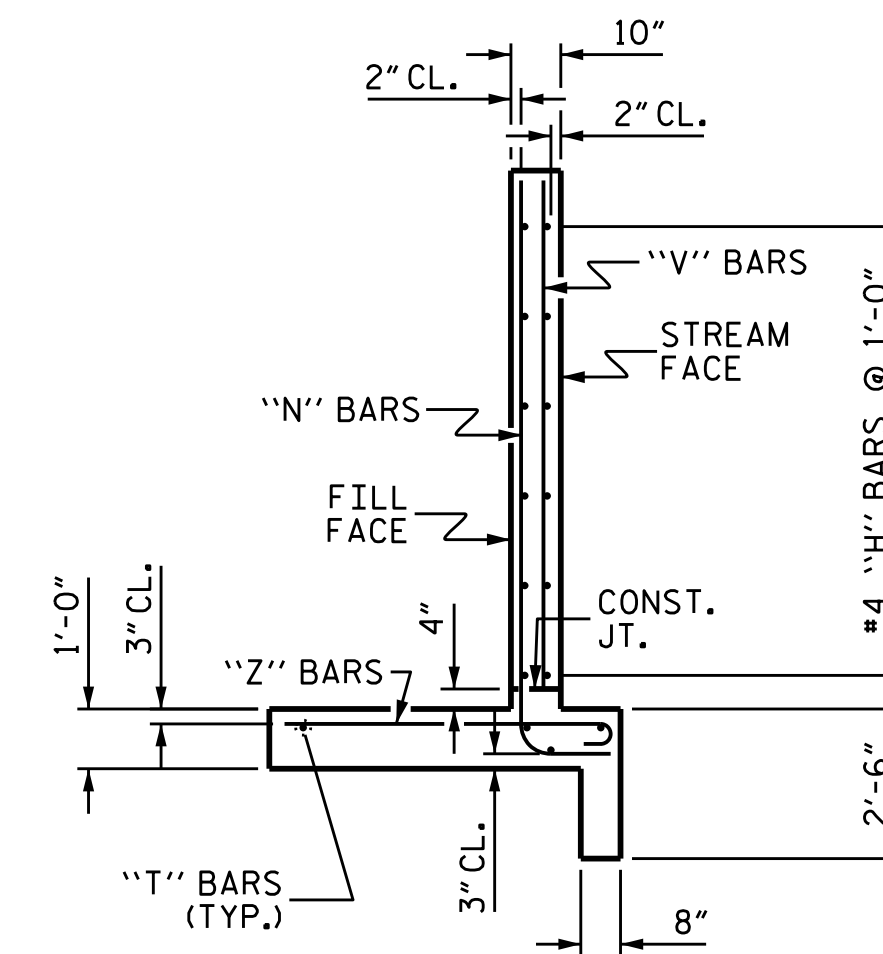
SECTION B-B



7/22/2015



ELEVATION W1



TYPICAL WING
SECTION

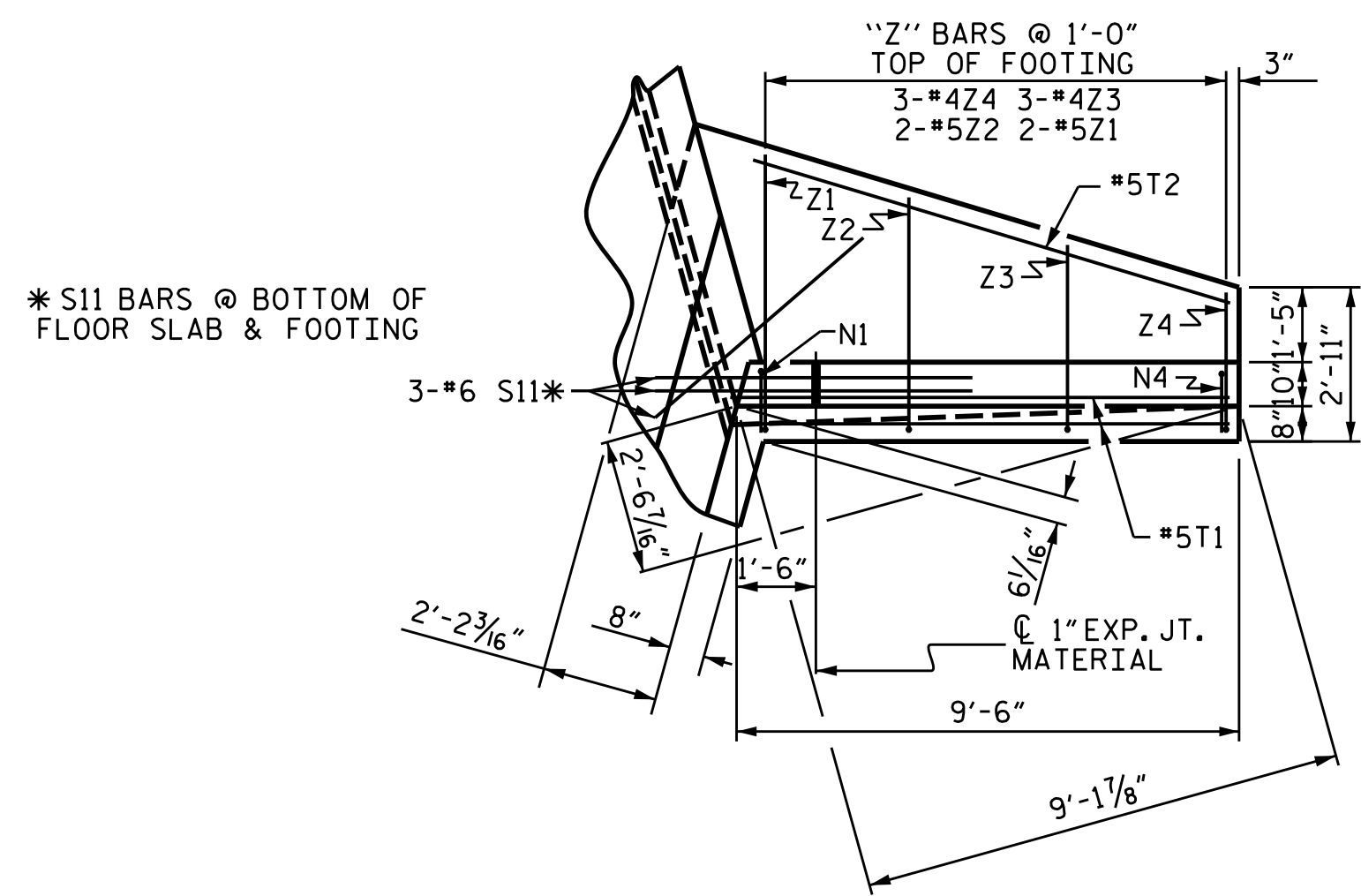
PROJECT NO. R-2915B
ASHE COUNTY
STATION: 161+48.90 -L-

SHEET 10 OF 13

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
WING FOR
CONCRETE BOX CULVERT
H = 8'-0" SLOPE = 2:1
149° SKEW (STAGE I)

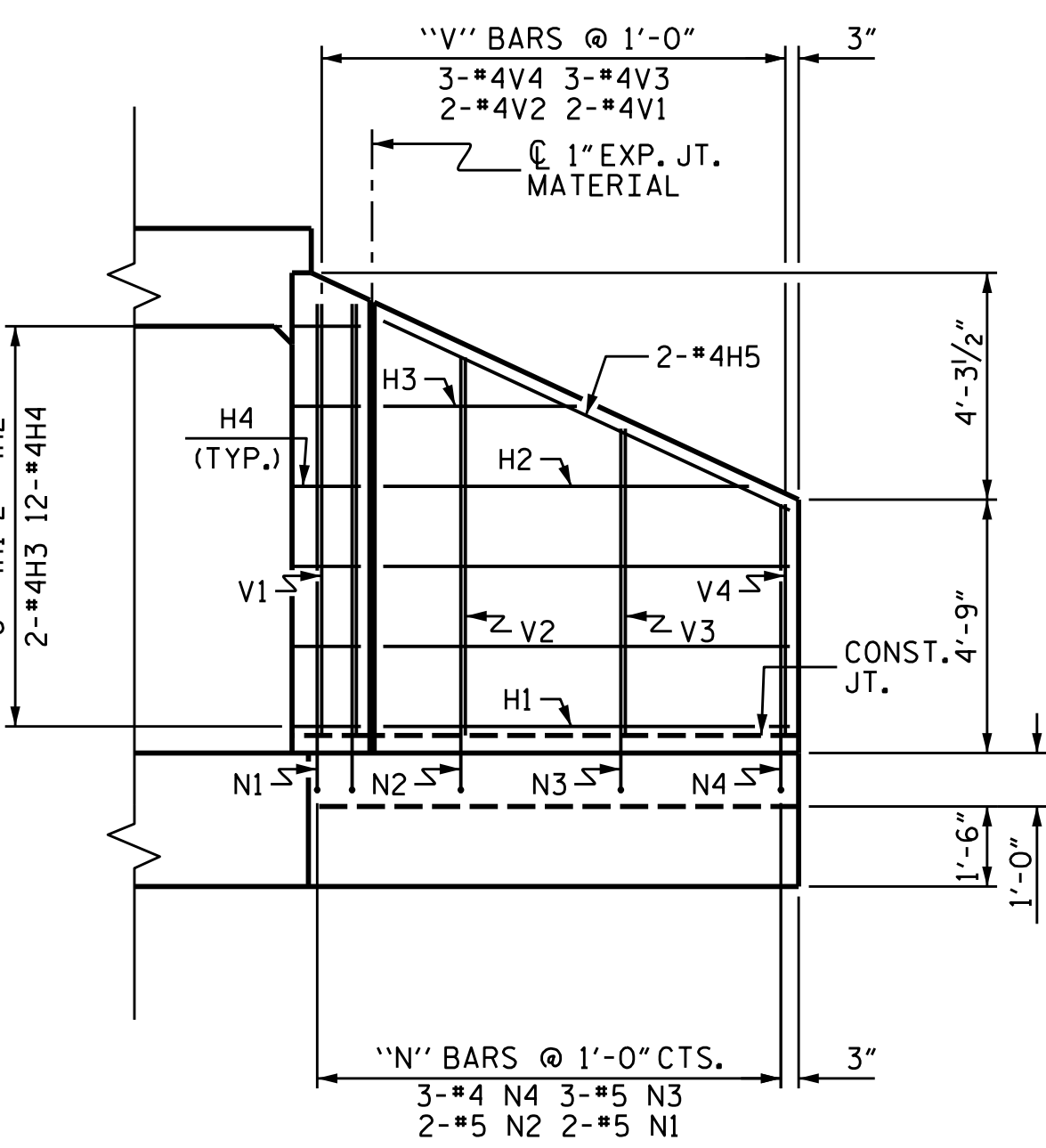
ASSEMBLED BY : H. T. BARBOUR DATE : 5-5-14
CHECKED BY : S. B. WILLIAMS DATE : 5-14
DESIGN ENGINEER OF RECORD:
B. A. DUKE DATE : 4-15

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C06-10
1			3			TOTAL SHEETS
2			4			13

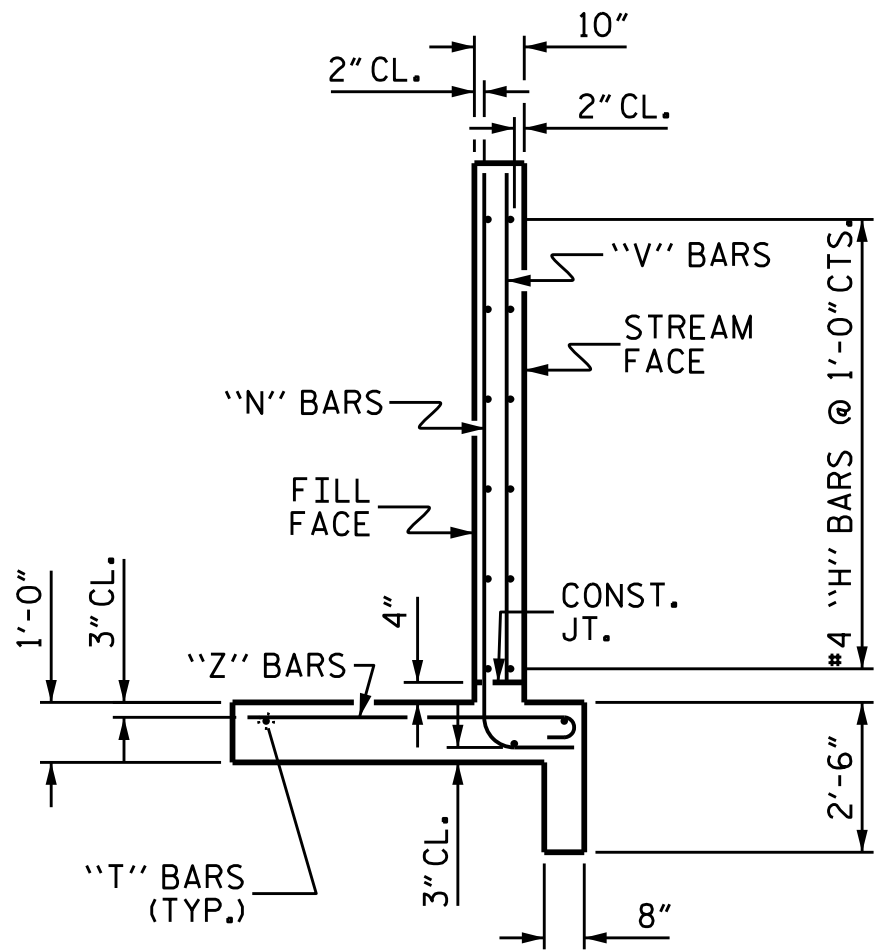


PLAN W2

* S11 BARS @ BOTTOM OF FLOOR SLAB & FOOTING

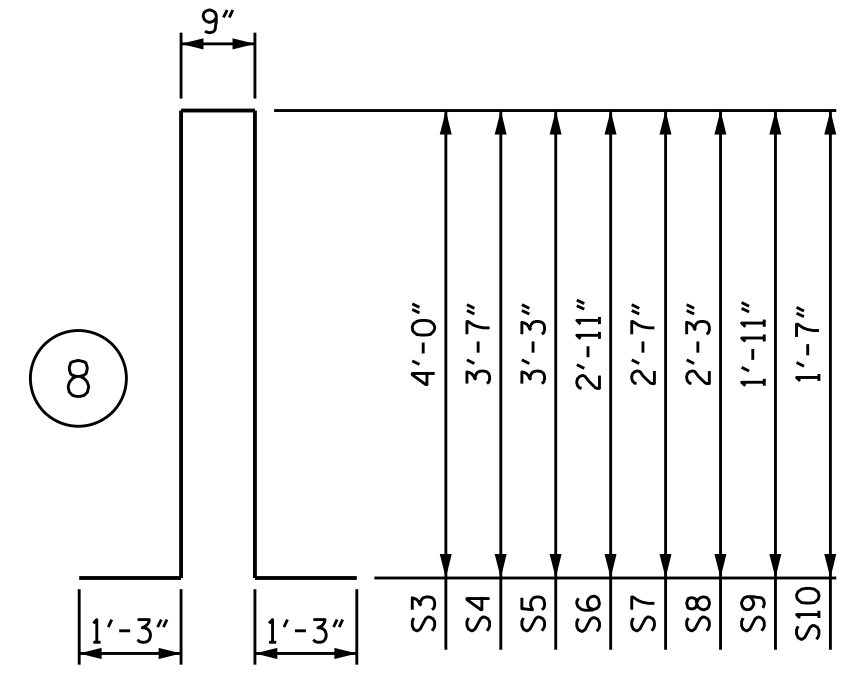
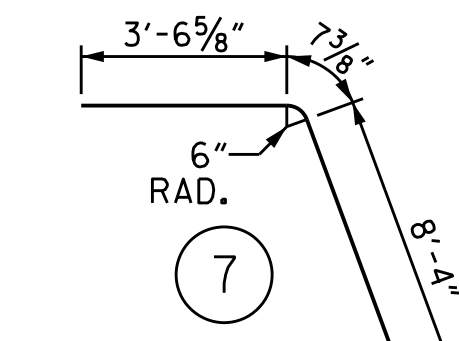
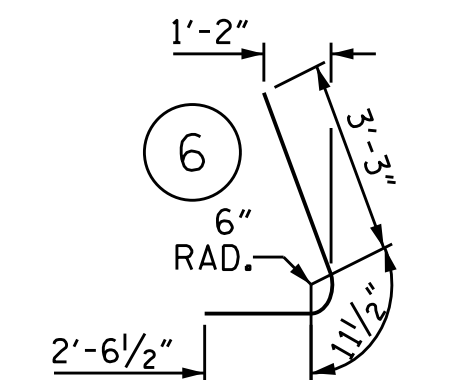
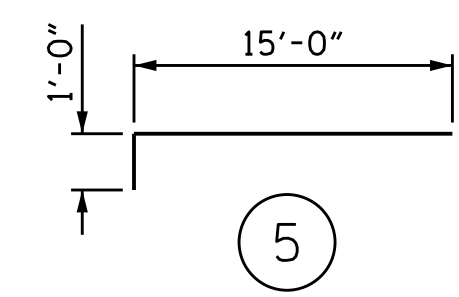
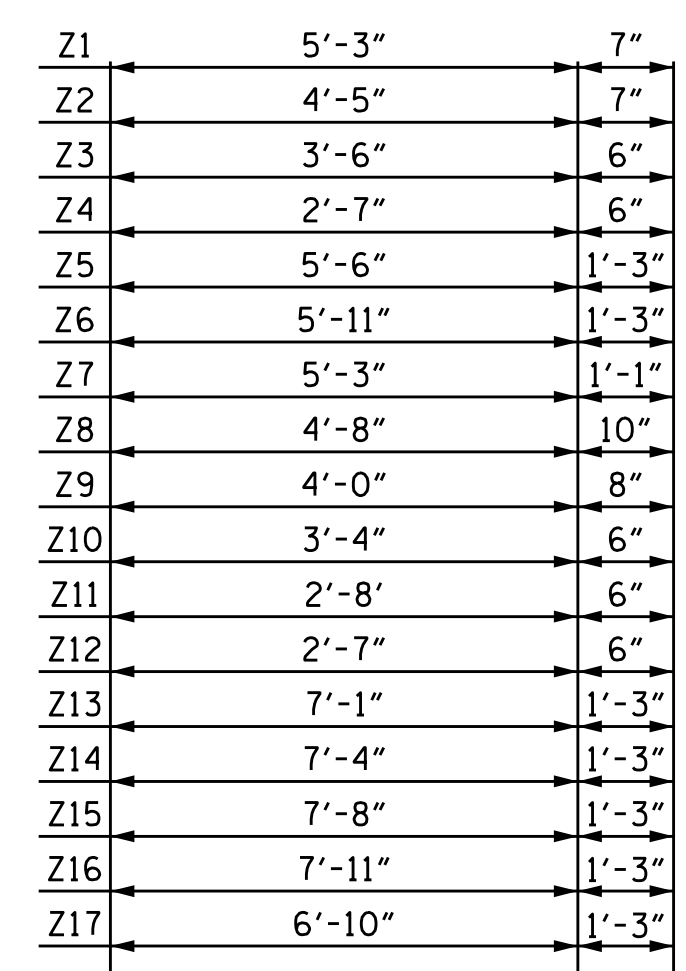
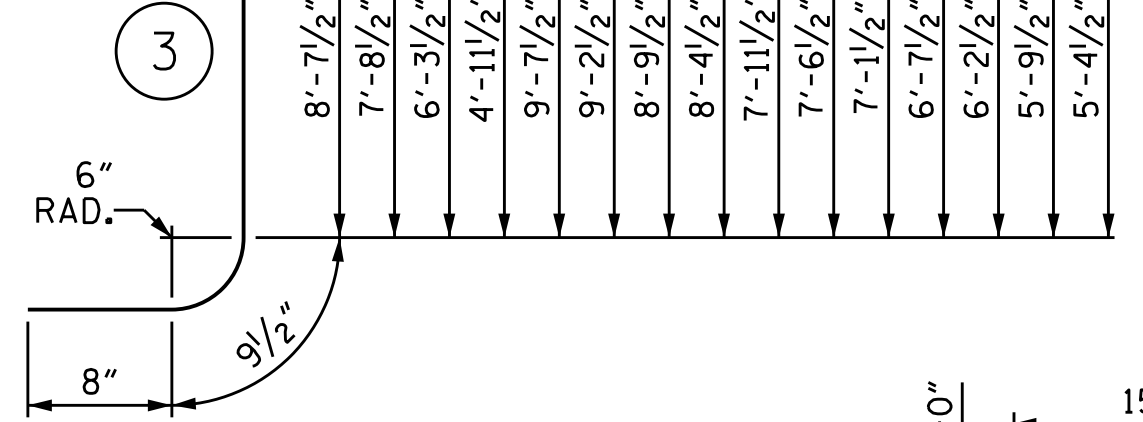
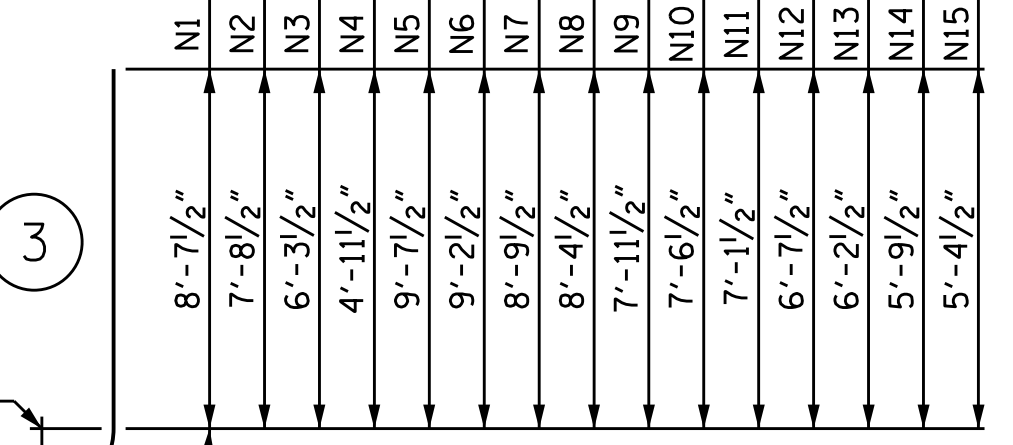
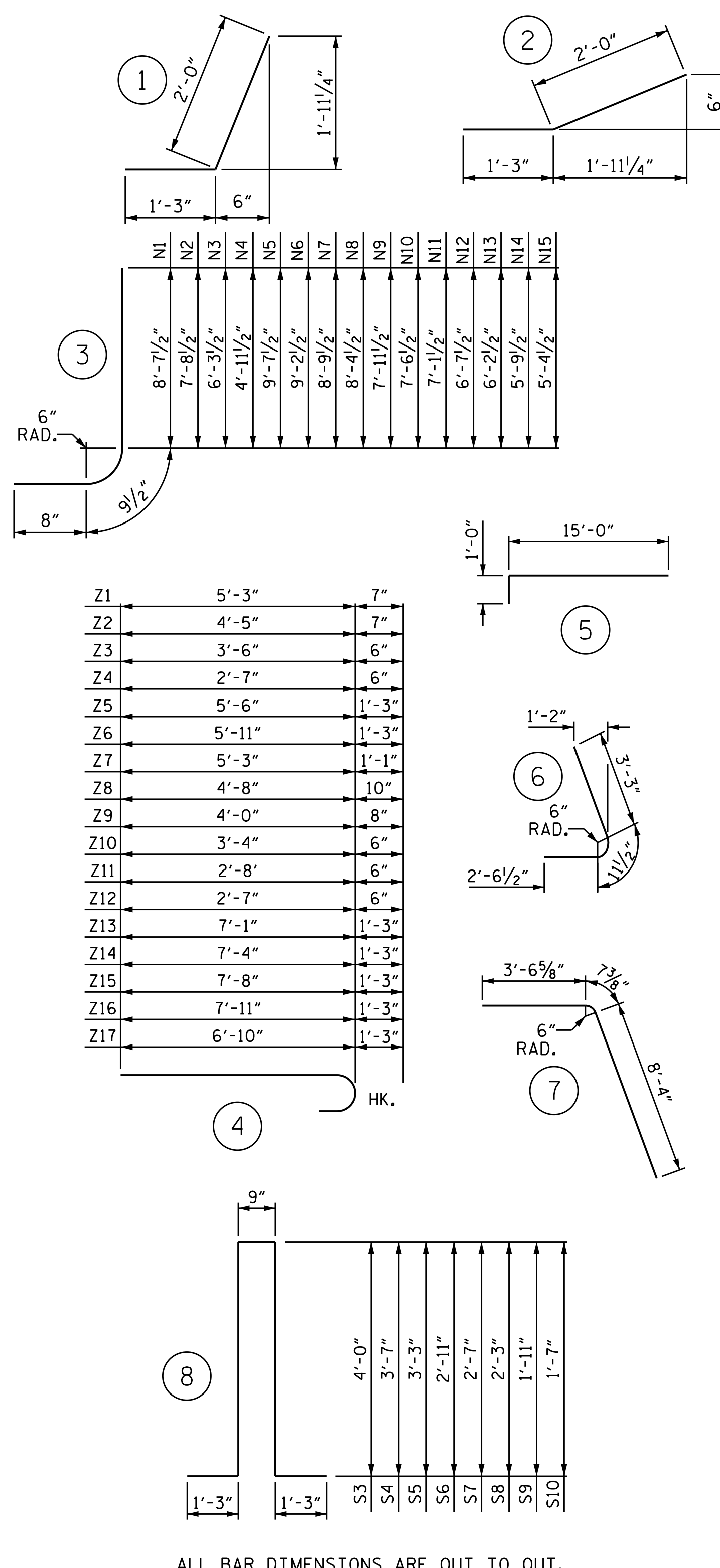


ELEVATION W2



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT		
B4	2	#4	STR	8'-9"	12	V1	2	#4	STR	8'-1"	11
						V2	2	#4	STR	7'-1"	9
C3	12	#6	STR	8'-0"	144	V3	3	#4	STR	5'-9"	12
						V4	3	#4	STR	4'-4"	9
H1	6	#4	STR	7'-7"	30	V5	2	#4	STR	8'-5"	11
H2	2	#4	STR	6'-10"	9	V6	3	#4	STR	8'-1"	16
H3	2	#4	STR	3'-7"	5	V7	3	#4	STR	7'-8"	15
H4	12	#4	1	3'-3"	26	V8	3	#4	STR	7'-3"	15
H5	2	#4	STR	8'-5"	11	V9	3	#4	STR	6'-10"	14
H6	10	#4	STR	29'-1"	194	V10	3	#4	STR	6'-4"	13
H7	2	#4	STR	22'-10"	31	V11	3	#4	STR	5'-11"	12
H8	2	#4	STR	15'-11"	21	V12	3	#4	STR	5'-6"	11
H9	2	#4	STR	9'-0"	12	V13	3	#4	STR	5'-1"	10
H10	16	#4	2	3'-3"	35	V14	3	#4	STR	4'-8"	9
H11	2	#4	STR	29'-5"	39	V15	3	#4	STR	4'-2"	8
						V16	2	#4	STR	8'-0"	11
M1	5	#8	5	16'-0"	214	V17	2	#4	STR	4'-0"	5
N1	2	#5	3	10'-1"	21	Z1	2	#5	4	5'-10"	12
N2	2	#5	3	9'-2"	19	Z2	2	#5	4	5'-0"	10
N3	3	#5	3	7'-9"	24	Z3	3	#4	4	4'-0"	8
N4	3	#4	3	6'-5"	13	Z4	3	#4	4	3'-1"	6
N5	2	#6	3	11'-1"	33	Z5	5	#9	4	6'-9"	115
N6	3	#5	3	10'-8"	33	Z6	4	#9	4	7'-2"	97
N7	3	#5	3	10'-3"	32	Z7	5	#8	4	6'-4"	85
N8	3	#5	3	9'-10"	31	Z8	5	#7	4	5'-6"	56
N9	3	#5	3	9'-5"	29	Z9	5	#6	4	4'-8"	35
N10	3	#5	3	9'-0"	28	Z10	5	#4	4	3'-10"	13
N11	3	#5	3	8'-7"	27	Z11	5	#4	4	3'-2"	11
N12	3	#4	3	8'-1"	16	Z12	1	#4	4	3'-1"	2
N13	3	#4	3	7'-8"	15	Z13	2	#9	4	8'-4"	57
N14	3	#4	3	7'-3"	15	Z14	2	#9	4	8'-7"	58
N15	3	#4	3	6'-10"	14	Z15	2	#9	4	8'-11"	61
						Z16	2	#9	4	9'-2"	62
						Z17	7	#9	4	8'-1"	192
P1	2	#9	6	6'-9"	46						
P2	2	#9	7	12'-6"	85						
									REINFORCING STEEL FOR 2 WINGS	2662 LBS.	
									CLASS A CONCRETE		
									2 WINGS	21.5 C.Y.	
									1 HEADWALL	1.6 C.Y.	
									1 END CURTAIN WALL	2.0 C.Y.	
									2 EDGE BEAMS	2.6 C.Y.	
									TOTAL	27.7 C.Y.	
T1	2	#5	STR	9'-6"	20						
T2	1	#5	STR	9'-3"	10						
T3	4	#5	STR	30'-9"	128						
T4	1	#5	STR	36'-0"	38						
T5	1	#5	STR	9'-9"	10						
T6	1	#5	STR	18'-5"	19						

PROJECT NO. R-2915B
ASHE COUNTY
 STATION: 161+48.90 -L-

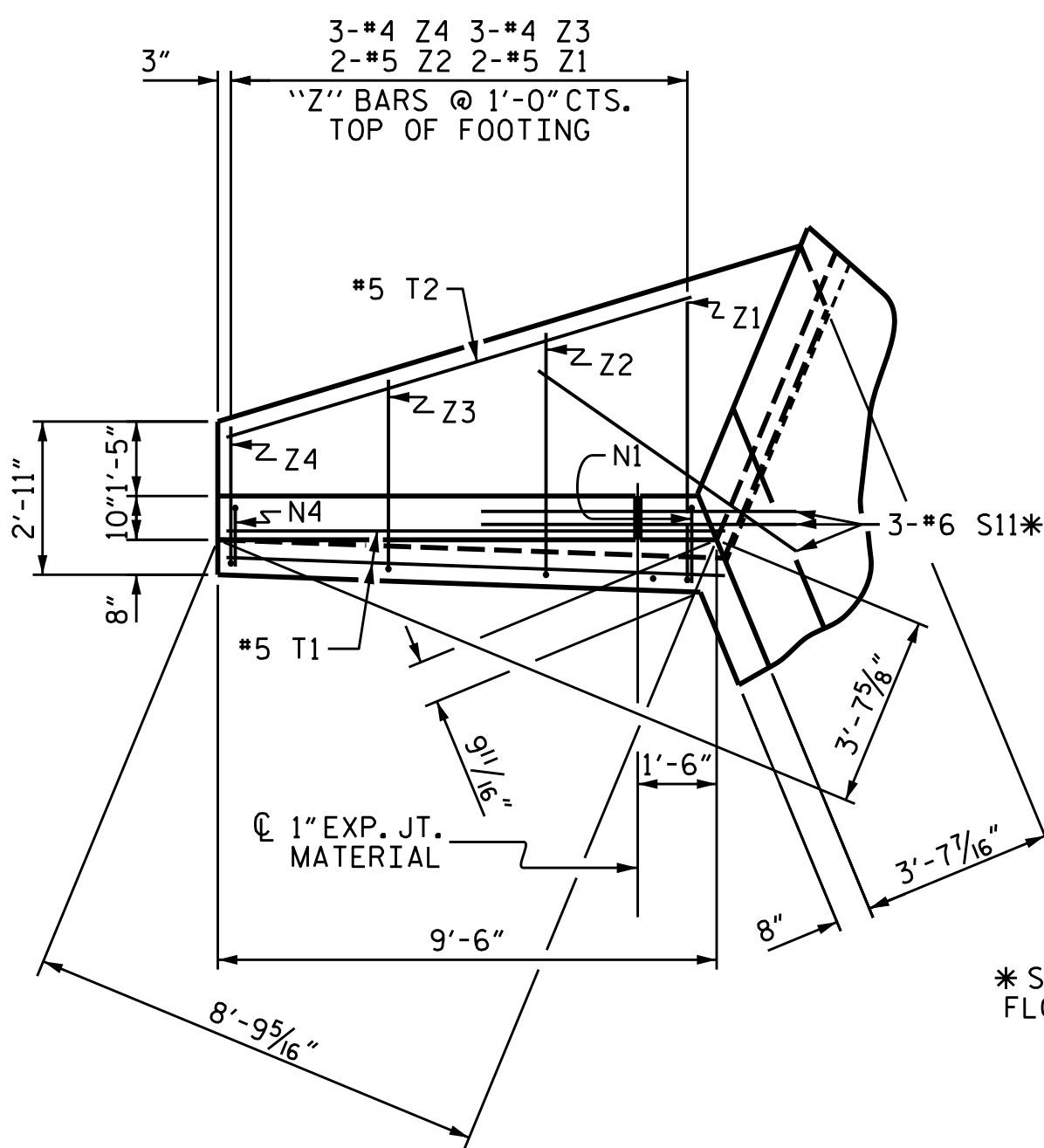
SHEET 11 OF 13



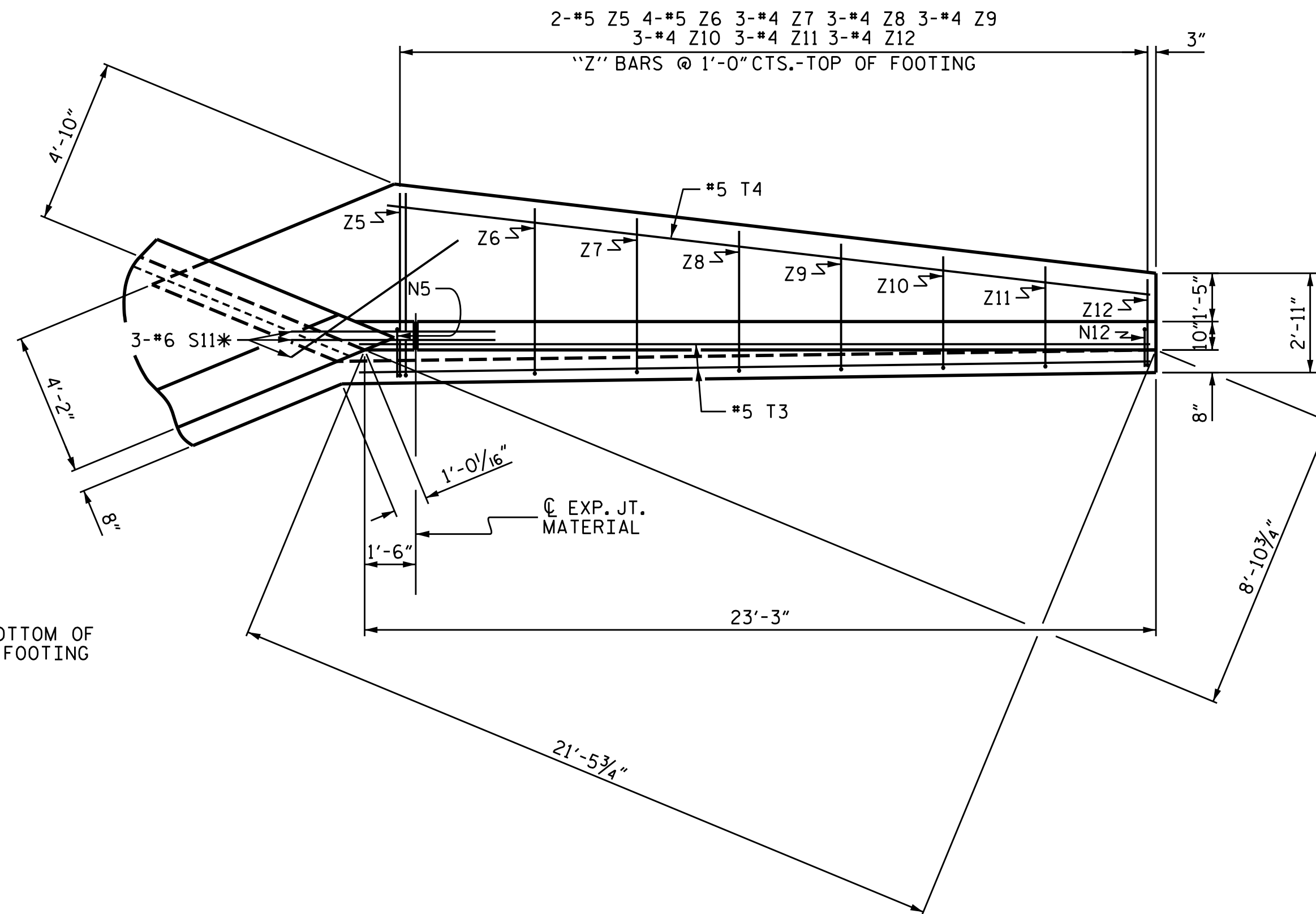
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 WING FOR
 CONCRETE BOX CULVERT
 H = 8'-0" SLOPE = 2:1
 149° SKEW (STAGE I)

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	CO6-11	
1			3			TOTAL SHEETS	
2			4			13	

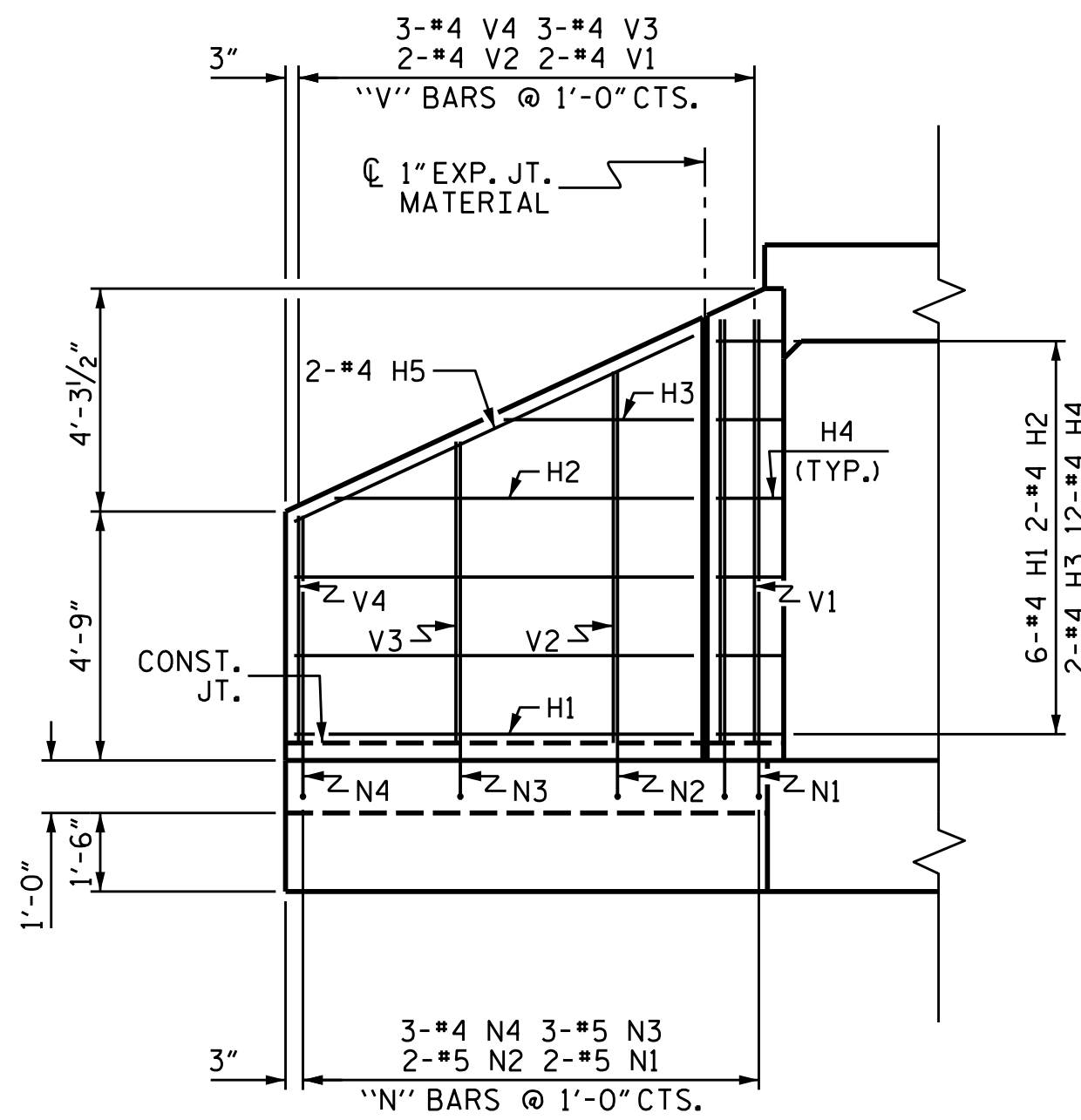
ASSEMBLED BY : H. T. BARBOUR DATE : 5-7-14
 CHECKED BY : S. B. WILLIAMS DATE : 5-14
 DESIGN ENGINEER OF RECORD:
 B. A. DUKE DATE : 4-15



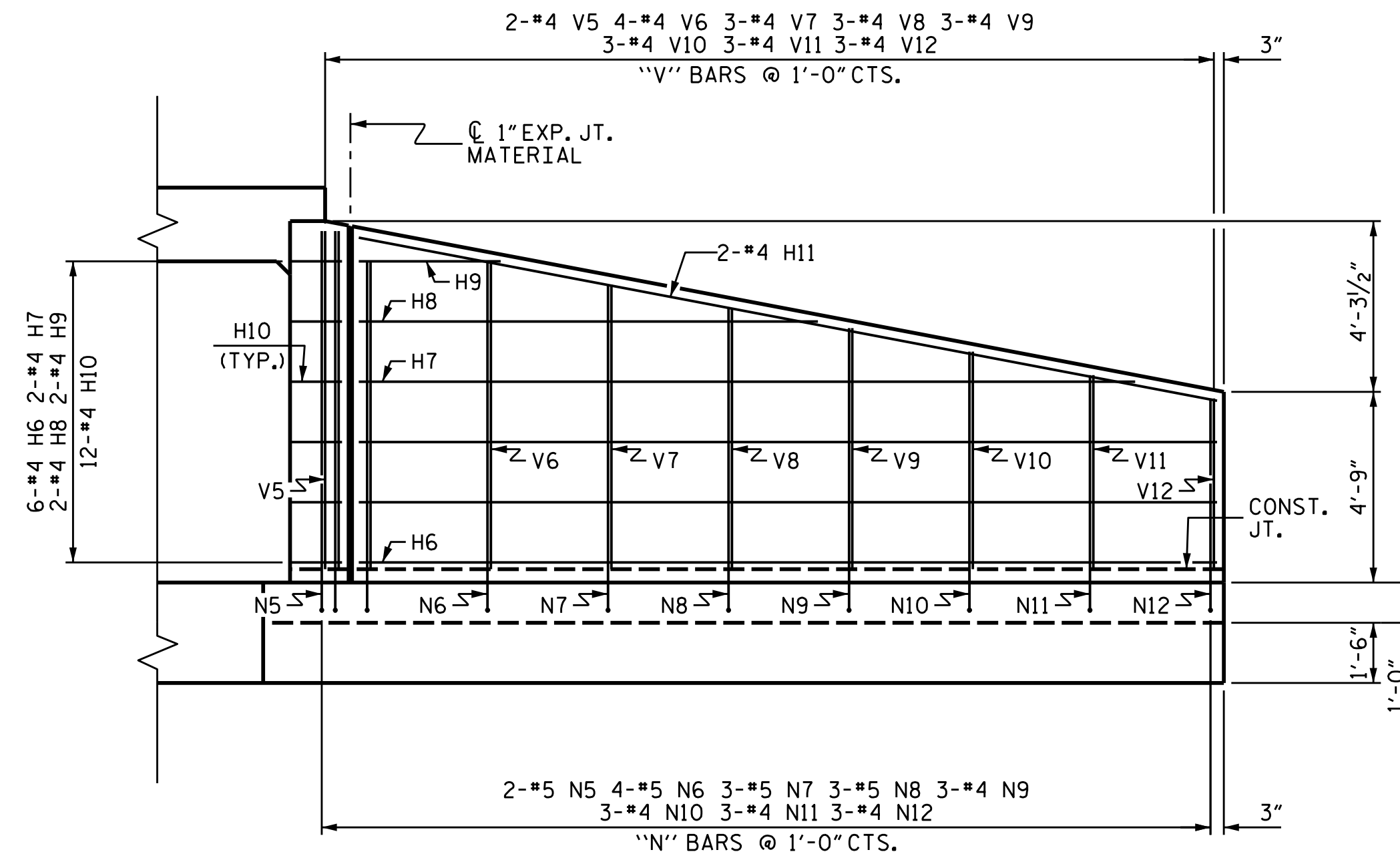
PLAN W4



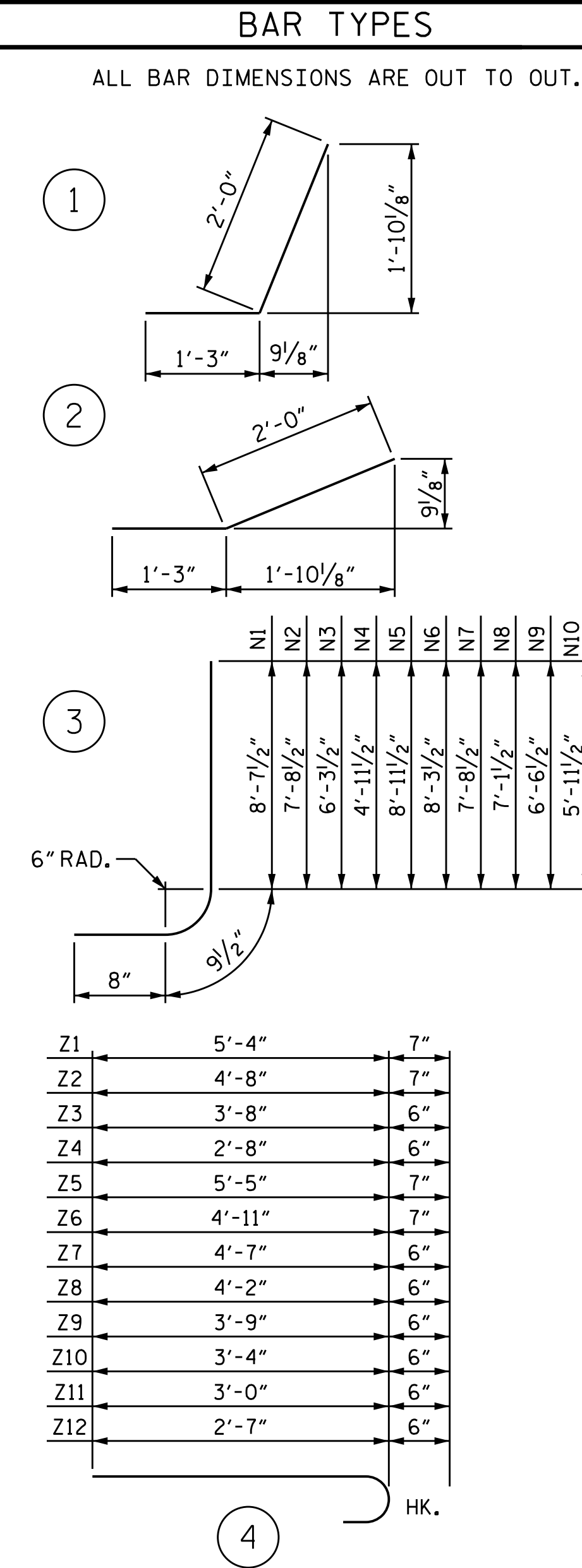
PLAN W3



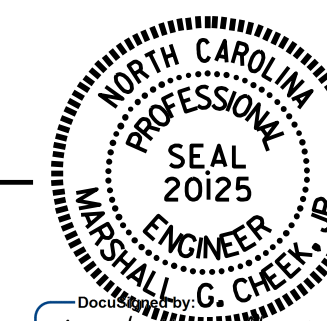
ELEVATION W4



ELEVATION W3



TYPICAL WING SECTION



BILL OF MATERIAL					
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
H1	6	#4	STR	7'-7"	30
H2	2	#4	STR	6'-10"	9
H3	2	#4	STR	3'-7"	5
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	8'-5"	11
H6	6	#4	STR	21'-4"	86
H7	2	#4	STR	19'-4"	26
H8	2	#4	STR	11'-5"	15
H9	2	#4	STR	3'-6"	5
H10	12	#4	2	3'-3"	26
H11	2	#4	STR	21'-9"	29
N1	2	#5	3	10'-1"	21
N2	2	#5	3	9'-2"	19
N3	3	#5	3	7'-9"	24
N4	3	#4	3	6'-5"	13
N5	2	#5	3	10'-5"	22
N6	4	#5	3	9'-9"	41
N7	3	#5	3	9'-2"	29
N8	3	#5	3	8'-7"	27
N9	3	#4	3	8'-0"	16
N10	3	#4	3	7'-5"	15
N11	3	#4	3	6'-11"	14
N12	3	#4	3	6'-4"	13
S11	6	#6	STR	6'-0"	54
T1	2	#5	STR	9'-6"	20
T2	1	#5	STR	9'-3"	10
T3	2	#5	STR	23'-3"	48
T4	1	#5	STR	22'-7"	24
V1	2	#4	STR	8'-1"	11
V2	2	#4	STR	7'-1"	9
V3	3	#4	STR	5'-9"	12
V4	3	#4	STR	4'-4"	9
V5	2	#4	STR	8'-5"	11
V6	4	#4	STR	7'-8"	20
V7	3	#4	STR	7'-1"	14
V8	3	#4	STR	6'-6"	13
V9	3	#4	STR	6'-0"	12
V10	3	#4	STR	5'-5"	11
V11	3	#4	STR	4'-10"	10
V12	3	#4	STR	4'-3"	9
Z1	2	#5	4	5'-11"	12
Z2	2	#5	4	5'-3"	11
Z3	3	#4	4	4'-2"	8
Z4	3	#4	4	3'-2"	6
Z5	2	#5	4	6'-0"	13
Z6	4	#5	4	5'-6"	23
Z7	3	#4	4	5'-1"	10
Z8	3	#4	4	4'-8"	9
Z9	3	#4	4	4'-3"	9
Z10	3	#4	4	3'-10"	8
Z11	3	#4	4	3'-6"	7
Z12	3	#4	4	3'-1"	6
REINFORCING STEEL FOR 2 WINGS				941 LBS.	
CLASS A CONCRETE					
2 WINGS				14.6 C.Y.	
1 HEADWALL				1.2 C.Y.	
1 END CURTAIN WALL				1.3 C.Y.	
2 EDGE BEAMS				2.6 C.Y.	
TOTAL				19.7 C.Y.	

PROJECT NO. R-2915B
 ASHE COUNTY
 STATION: 161+48.90 -L-

SHEET 12 OF 13

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD WINGS
 FOR
 CONCRETE BOX CULVERT
 H = 8'-0" SLOPE = 2:1
 (STAGE II & III)

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C06-12	
1			3			TOTAL SHEETS	
2			4			13	

ASSEMBLED BY : H. T. BARBOUR DATE : 5-2-14
 CHECKED BY : S. B. WILLIAMS DATE : 5-14
 DRAWN BY : CCJ 01/00
 CHECKED BY : RWW 03/00

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

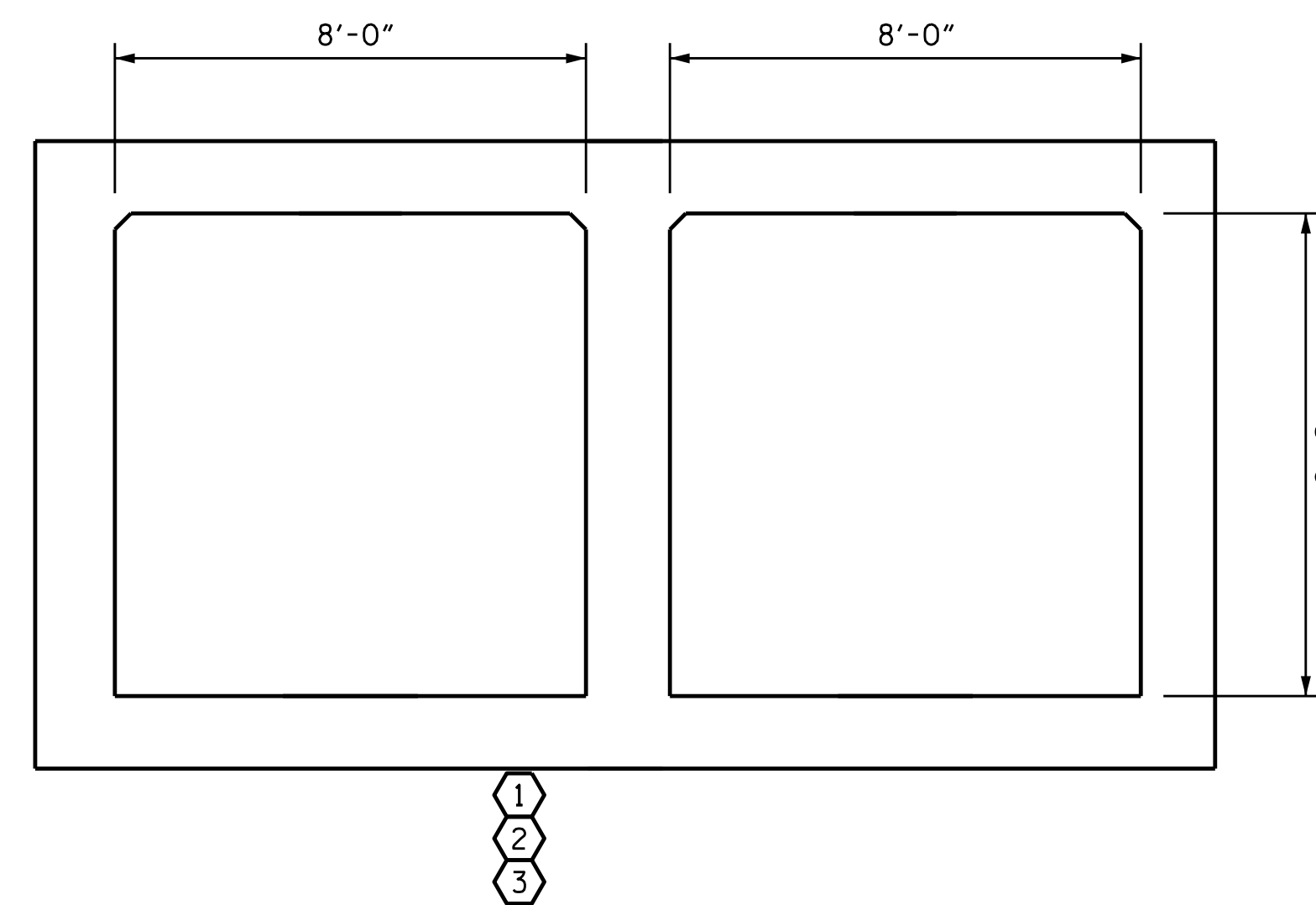
LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						LIVE-LOAD FACTORS (γ _{LL})	MOMENT				SHEAR					
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.76	--	1.75	3.08	1	TOP SLAB	3.68	1.76	1	BOTTOM SLAB	7.64		
	HL-93 (OPERATING)	N/A		2.28	--	1.35	3.99	1	TOP SLAB	3.68	2.28	1	BOTTOM SLAB	7.64		
	HS-20 (INVENTORY)	36.000	②	2.18	78.30	1.75	4.65	1	TOP SLAB	3.68	2.18	1	BOTTOM SLAB	7.64		
	HS-20 (OPERATING)	36.000		2.82	101.50	1.35	6.03	1	TOP SLAB	3.68	2.82	1	BOTTOM SLAB	7.64		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		4.87	65.68	1.40	6.96	1	EXTERIOR WALL	4.68	4.87	1	BOTTOM SLAB	7.64		
		SNGARBS2	20.000		4.24	84.73	1.40	6.96	1	EXTERIOR WALL	4.68	4.24	1	BOTTOM SLAB	7.64	
		SNAGRIS2	22.000		3.92	86.23	1.40	6.96	1	EXTERIOR WALL	4.68	3.92	1	BOTTOM SLAB	7.64	
		SNCOTTS3	27.250		2.20	59.90	1.40	3.85	1	TOP SLAB	3.68	2.20	1	BOTTOM SLAB	7.64	
		SNAGGRS4	34.925		2.16	75.52	1.40	3.84	1	TOP SLAB	3.68	2.16	1	BOTTOM SLAB	7.64	
		SNS5A	35.550		2.03	72.19	1.40	3.97	1	TOP SLAB	3.68	2.03	1	BOTTOM SLAB	7.64	
		SNS6A	39.950	③	1.93	77.12	1.40	3.97	1	TOP SLAB	3.68	1.93	1	BOTTOM SLAB	7.64	
		SNS7B	42.000		1.93	81.08	1.40	3.94	1	TOP SLAB	3.68	1.93	1	BOTTOM SLAB	7.64	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		3.02	99.80	1.40	5.30	1	TOP SLAB	3.68	3.02	1	BOTTOM SLAB	7.64	
		TNT4A	33.075		2.46	81.53	1.40	4.56	1	TOP SLAB	3.68	2.46	1	BOTTOM SLAB	7.64	
		TNT6A	41.600		2.23	92.89	1.40	4.03	1	TOP SLAB	3.68	2.23	1	BOTTOM SLAB	7.64	
		TNT7A	42.000		2.33	97.73	1.40	4.65	1	TOP SLAB	3.68	2.33	1	BOTTOM SLAB	7.64	
		TNT7B	42.000		2.14	89.90	1.40	4.14	1	TOP SLAB	3.68	2.14	1	BOTTOM SLAB	7.64	
		TNAGRIT4	43.000		2.14	91.94	1.40	4.36	1	TOP SLAB	3.68	2.14	1	BOTTOM SLAB	7.64	
TNAGT5A	45.000		2.08	93.61	1.40	4.48	1	TOP SLAB	3.68	2.08	1	BOTTOM SLAB	7.64			
TNAGT5B	45.000		1.96	88.01	1.40	4.56	1	TOP SLAB	3.68	1.96	1	BOTTOM SLAB	7.64			

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	0.50 OR 0.90
ES	1.35	0.50 OR 0.90
LS	1.75	--
WA	1.00	--

NOTE:
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

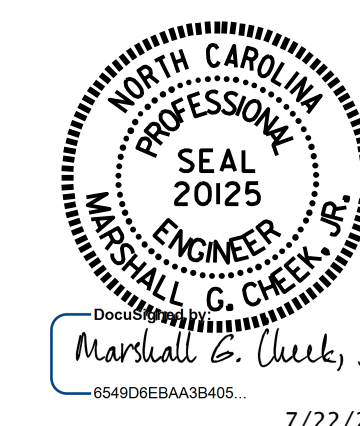
#	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY

PROJECT NO. R-2915B
ASHE COUNTY
 STATION: 161+48.90 -L-

SHEET 13 OF 13



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

ASSEMBLED BY : C. EICHELBERGER DATE : 1/21/2015
 CHECKED BY : B.A. DUKE DATE : 1/22/2015
 DRAWN BY : CHE 7/11 REV. 10/1/11 MAA/GM
 CHECKED BY : GM 7/11

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C06-13
1			3			TOTAL SHEETS
2			4			13