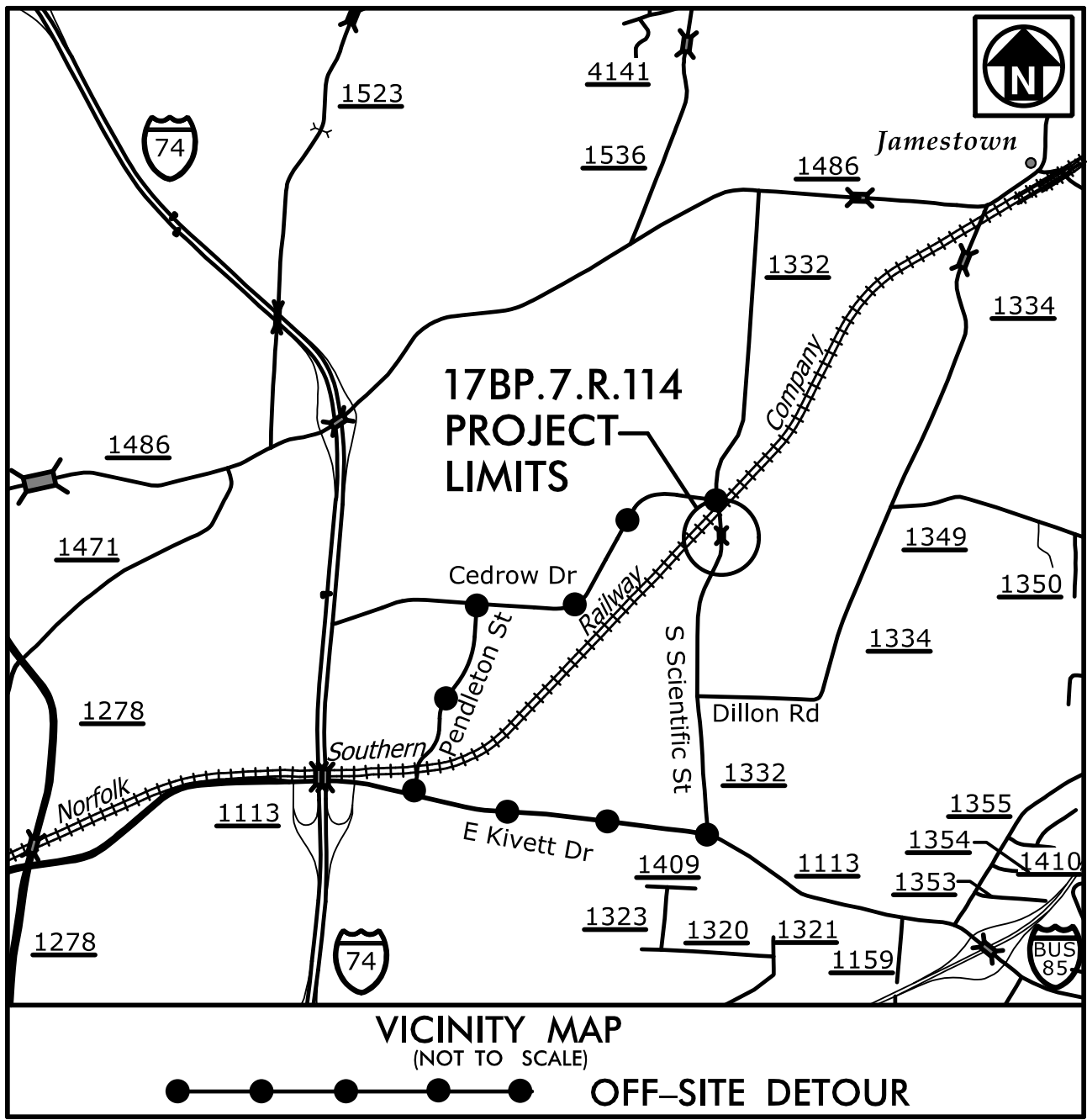


DATE: 5/6/2026
TIME: 10:36 AM PDT
SYSTEM: WGI
DRAWN: WGI
CHECKED: WGI
DESIGNED: WGI
USER: WGI

PROJECT: 17BP.7.R.114

CONTRACT: C205202

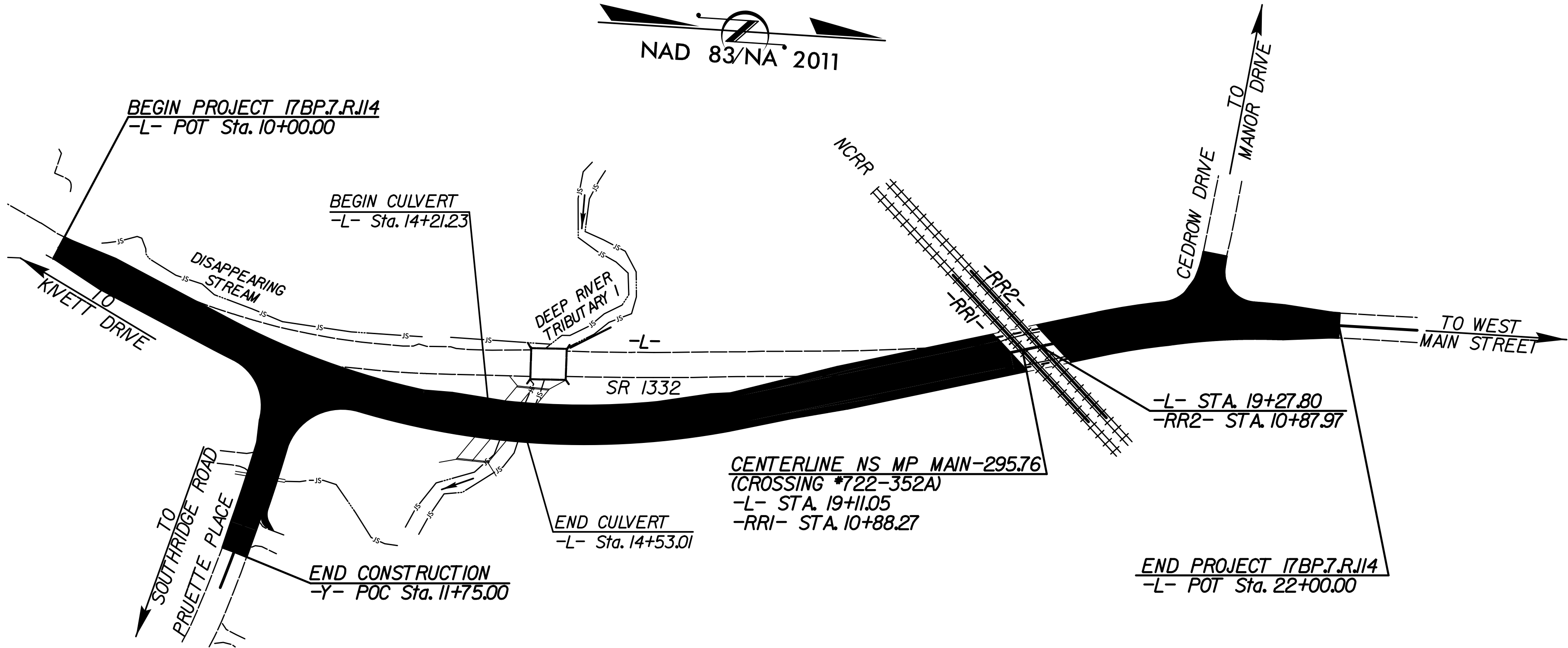


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
GUILFORD COUNTY

LOCATION: BRIDGE #400052 OVER DEEP RIVER TRIBUTARY 1 ON SR 1332 (SCIENTIFIC STREET)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND CULVERT

STRUCTURE PLANS



DESIGN EXCEPTION APPROVED FOR:
VERTICAL SSD (CREST)

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

DESIGN DATA

ADT 2026 = 4125
ADT 2046 = 6625
TTST = 6%
V = 40 MPH
SUB REGIONAL TIER
MAJOR ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY PROJECT = 0.221 MILES
LENGTH STRUCTURE PROJECT = 0.006 MILES
TOTAL LENGTH PROJECT = 0.227 MILES

Structure Plans Prepared In the Office of:
WGI
5640 Dillard Drive, Suite 200, Cary, N.C. 27518
Licensure Number: C-5315

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JUNE 6, 2018

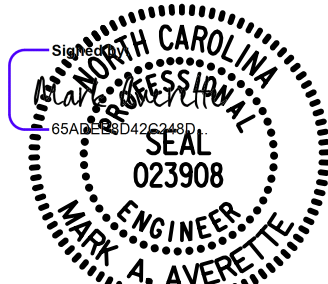
LETTING DATE:
AUGUST 18, 2026

NCDOT CONTACT:

TIM JORDAN, PE
PROJECT ENGINEER
JOSHUA MASSROCK, PE
HYDRAULICS ENGINEER

DANIEL DAGENHART, MS
DIVISION BRIDGE
PROGRAM MANAGER

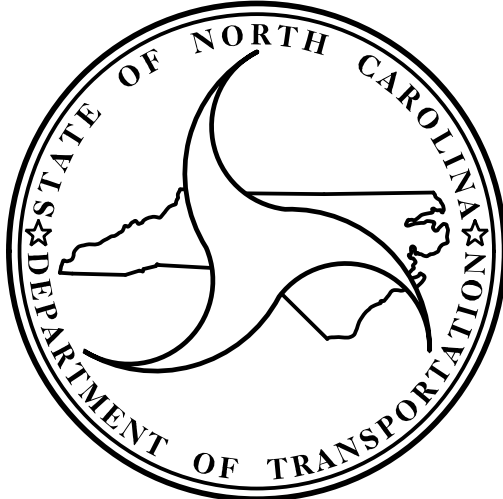
STRUCTURE DESIGN
ENGINEER



5/6/2026 | 10:36 AM PDT

SIGNATURE:

P.E.





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HYDRAULIC DATA:
DESIGN DISCHARGE                      = 1294 CFS
FREQUENCY OF DESIGN FLOOD             = 25 YEAR
DESIGN HIGH WATER ELEVATION           = 770.60
DRAINAGE AREA                         = 1.95 SQ. MI.
BASE DISCHARGE (0 100)               = 1672 CFS
BASE HIGH WATER ELEVATION             = 771.80

OVERTOPPING FLOOD DATA:
OVERTOPPING DISCHARGE                 = 3800 CFS
FREQUENCY OF OVERTOPPING FLOOD        = 500+ YEAR
OVERTOPPING FLOOD ELEVATION           = 779.60 **
** OVERTOPPING OCCURS AT ROADWAY
SAG AT STA.14+23.30 -L- AT
ROADWAY (HIGH) RIGHT SIDE

```

HORIZONTAL CURVE DATA

PI STA. 14+20.20 -L-
 $\Delta = 39^{\circ}-46'-31.8''$ (LT.)
 $D = 8^{\circ}-11'-06.4''$
 $L = 485.95'$
 $T = 253.23'$
 $R = 700.00'$

TOTAL STRUCTURE QUANTITIES

FOUNDATION NOTES:

NOTES:

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

DESIGN FILL----- 5'-6" (MIN.) AND 9'-0" (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 CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. OUTLET WING FOOTINGS, FLOOR SLAB, AND INLET WING FOOTINGS TO CONSTRUCTION JOINT INCLUDING 4" OF ALL VERTICAL WALLS.

2. THE REMAINING PORTIONS OF THE WALLS AND OUTLET WINGS FULL HEIGHT AND 1'-6" OF INLET WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
3. REMAINING PORTION OF INLET WING FOOTINGS INCLUDING 4" OF WINGS FOLLOWED BY FULL HEIGHT OF INLET WINGS.

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.

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 SHALL BE PAID FOR BY THE CONTRACTOR.

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.

REMOVAL OF THE EXISTING BRIDGE 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 BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE EXISTING STRUCTURE, WHICH SERVES AS A TEMPORARY STRUCTURE, CONSISTS OF 1 SPAN @ 32'-8" WITH A CLEAR ROADWAY WIDTH OF 28'-1". THE SUPERSTRUCTURE CONSISTS OF A STEEL PLANK DECK ON I-BEAMS WITH ASPHALT WEARING SURFACE. THE SUBSTRUCTURE CONSISTS OF MASS CONCRETE ABUTMENTS WITH STEEL CAPS. THE EXISTING STRUCTURE, WHICH IS LOCATED UPSTREAM OF THE PROPOSED STRUCTURE, SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED CULVERT, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

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.

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

FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.

CULVERT MUST BE CAST-IN-PLACE, PRECAST OPTION WILL NOT BE ALLOWED.

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.

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 EXISTING WATER LINE SHALL BE RELOCATED PRIOR TO BEGINNING CONSTRUCTION OF THE CULVERT BARRELS.
SEE SHEET UC-4 IN THE UTILITY PLANS.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 14+37.00 -L-."

I HEREBY CERTIFY THESE PLANS
ARE THE AS-BUILT PLANS

PROJECT NO. 17BP.7.R.114
 GUILFORD COUNTY
 STATION: 14+37.00 -L-

SHEET 1 OF 6 REPLACES BRIDGE #52

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 10 FT.
CONCRETE BOX CULVERT

124° SKEW

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

W WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518

LICENSURE NO. C-4434

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UNLESS ALL SIGNATURES COMPLETED**

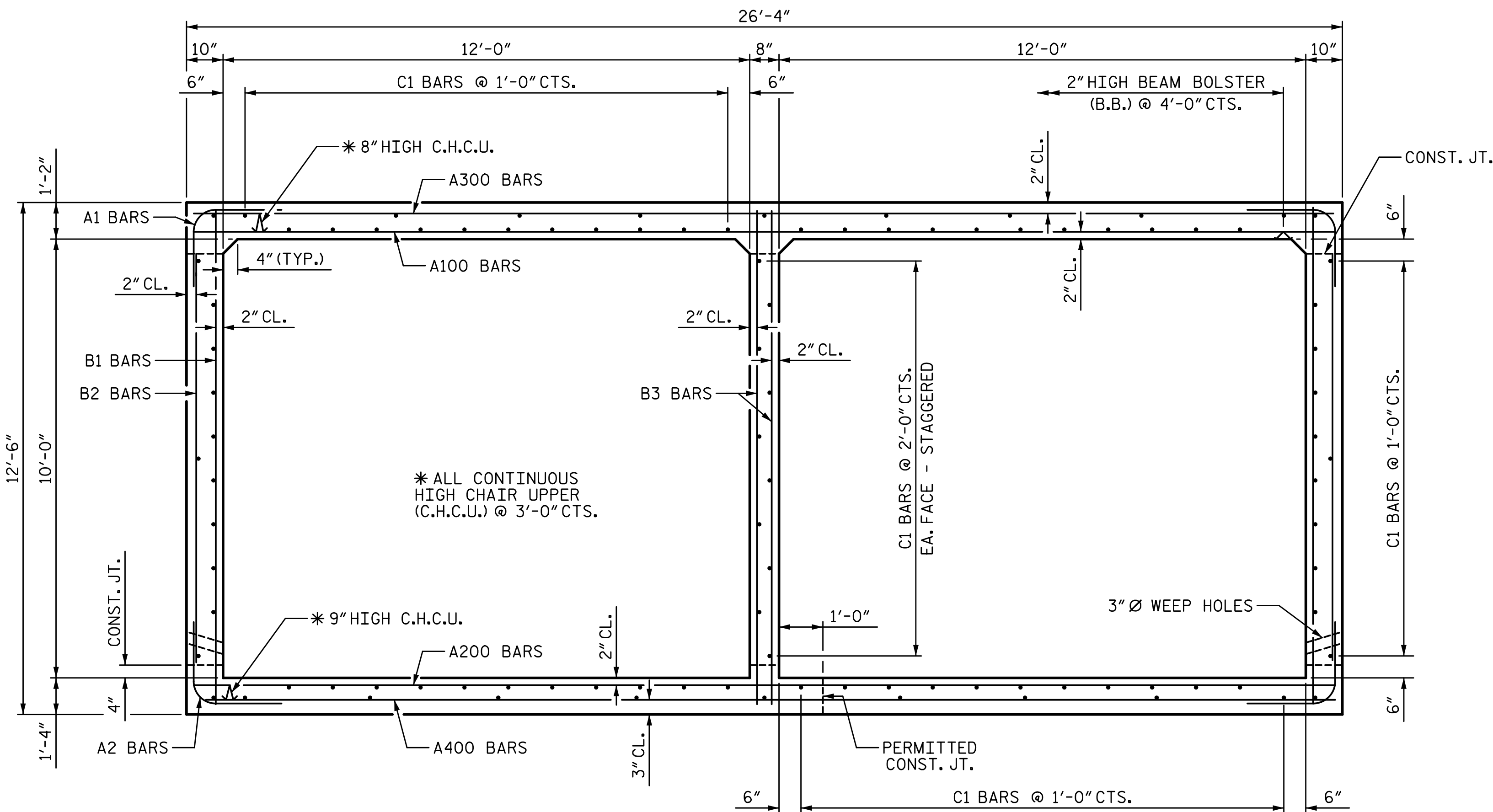


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5/6/2026 | 10:36 AM PDT

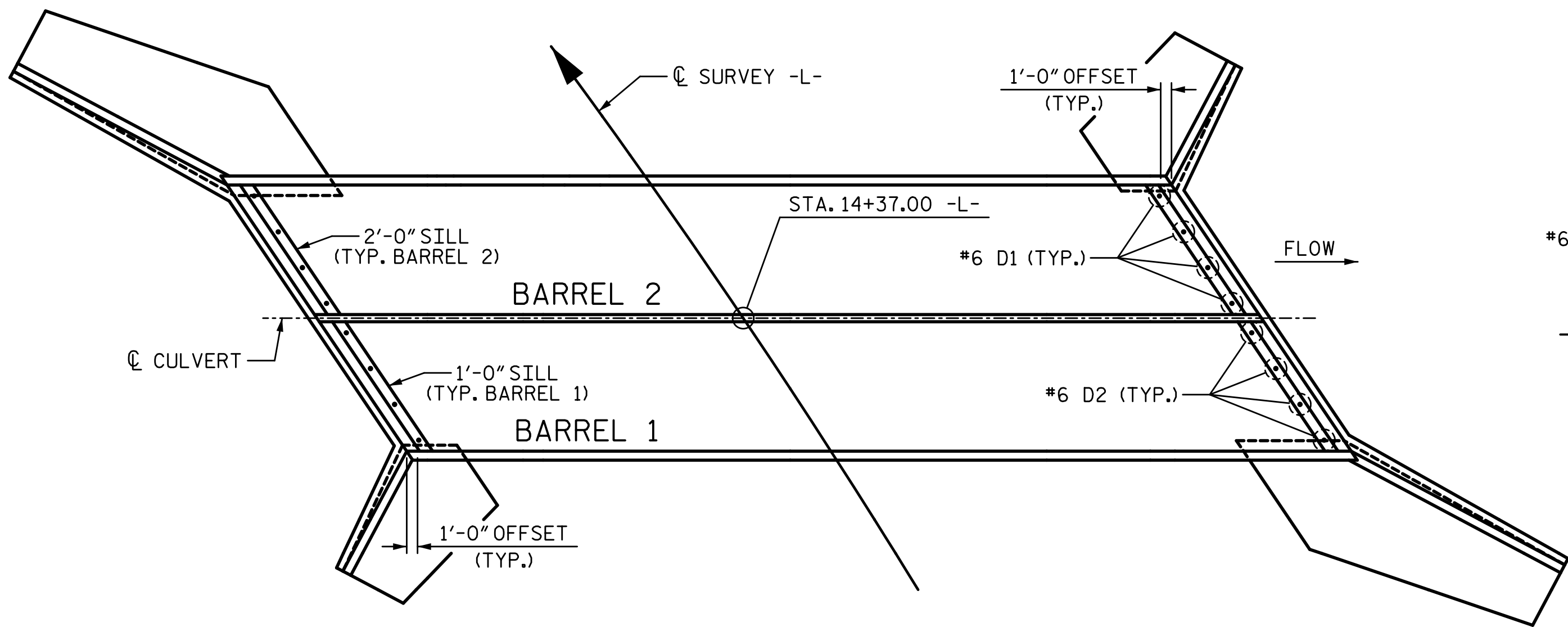
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RIGHT ANGLE SECTION OF BARREL

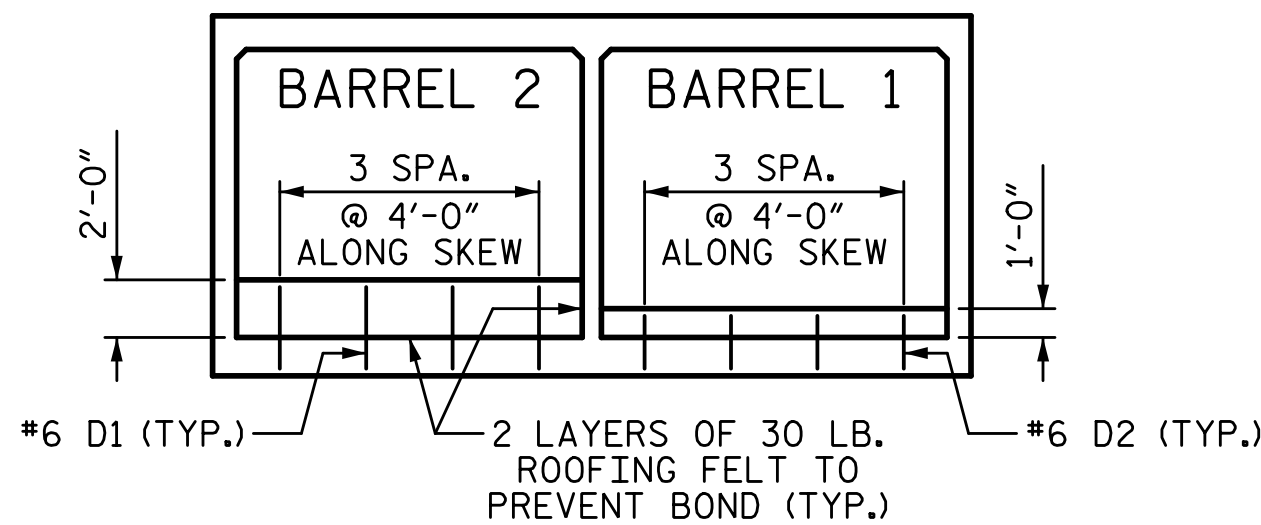
(THERE ARE 98 "C" BARS IN SECTION OF BARREL)
("C" BARS ARE 3 BAR RUNS)



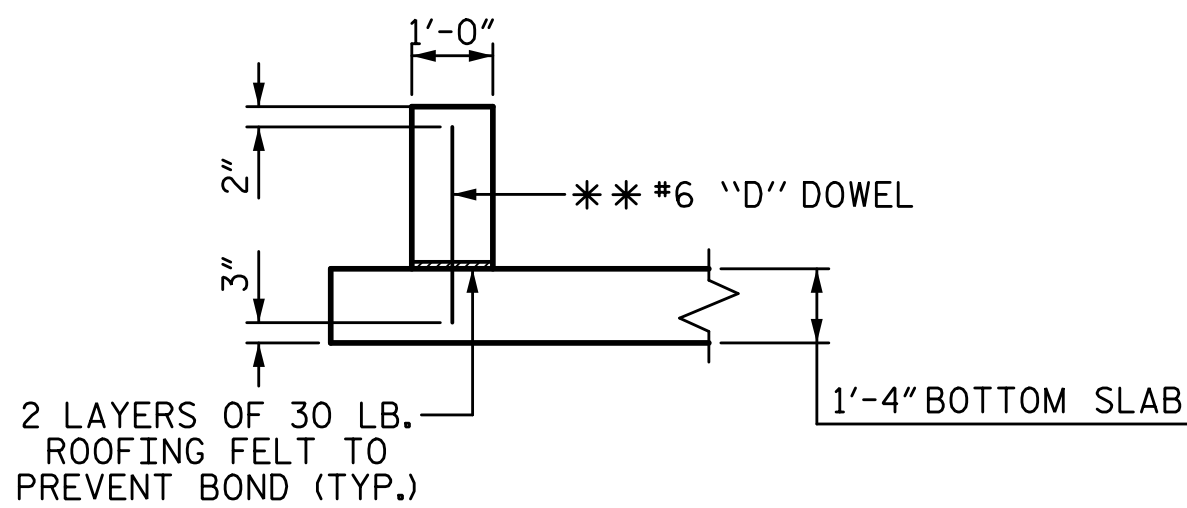
FLOOR PLAN
(SHOWING PLACEMENT OF SILLS)

CULVERT SILL DETAILS

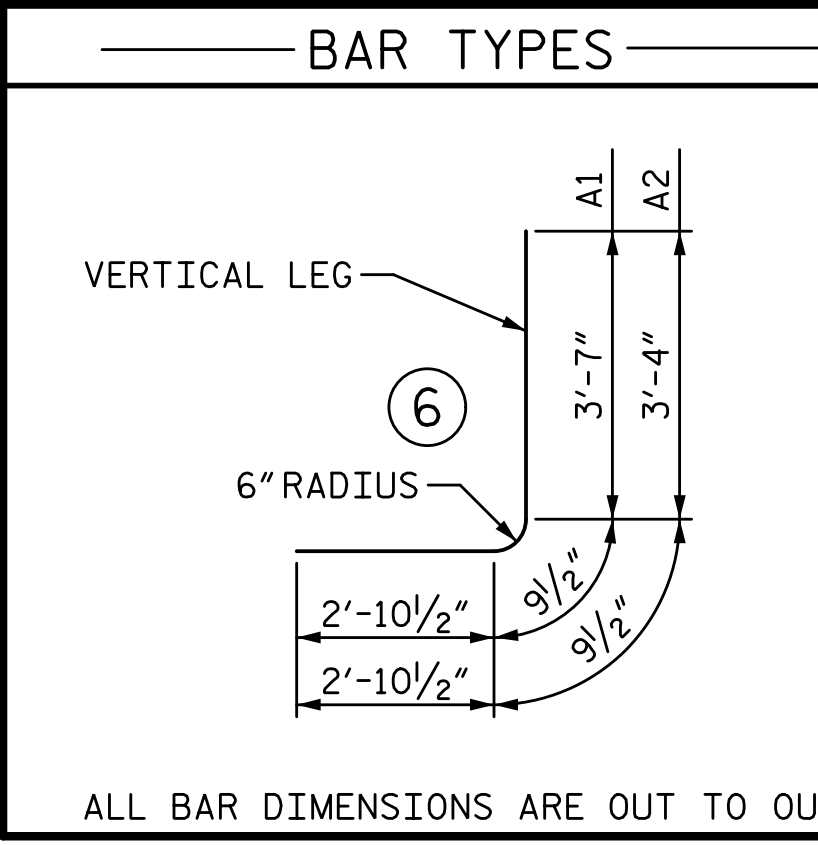
BACKFILL WITH NATIVE MATERIAL TO SILL HEIGHT.
NATIVE MATERIAL CONSIST OF MATERIAL THAT IS
EXCAVATED FROM THE STREAM BED OR FLOOD PLAIN AT THE PROJECT
SITE DURING THE CULVERT CONSTRUCTION. NATIVE MATERIAL IS
SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE
SUBJECT TO PERMIT CONDITIONS.



ELEVATION - LOOKING DOWNSTREAM



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



SPLICE CHART
*5 B1 SPLICE LENGTH = 2'-2"
*4 B3 SPLICE LENGTH = 1'-9"
*4 C1 SPLICE LENGTH = 1'-11"
*6 A200 SPLICE LENGTH = 3'-1"
*7 A400 SPLICE LENGTH = 3'-0"

BILL OF MATERIAL						BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	210	#6	6	7'-3"	2287	A305	2	#7	STR	19'-8"	80
A2	210	#6	6	7'-0"	2208	A306	2	#7	STR	18'-5"	75
A100	84	#6	STR	25'-11"	3270	A307	2	#7	STR	17'-3"	71
A101	2	#6	STR	24'-7"	74	A308	2	#7	STR	16'-0"	65
A102	2	#6	STR	23'-5"	70	A309	2	#7	STR	14'-9"	60
A103	2	#6	STR	22'-2"	67	A310	2	#7	STR	13'-6"	55
A104	2	#6	STR	20'-11"	63	A311	2	#7	STR	12'-3"	50
A105	2	#6	STR	19'-8"	59	A312	2	#7	STR	11'-0"	45
A106	2	#6	STR	18'-5"	55	A313	2	#7	STR	9'-10"	40
A107	2	#6	STR	17'-3"	52	A314	2	#7	STR	8'-7"	35
A108	2	#6	STR	16'-0"	48	A315	2	#7	STR	7'-4"	30
A109	2	#6	STR	14'-9"	44	A316	2	#7	STR	6'-1"	25
A110	2	#6	STR	13'-6"	41	A317	2	#7	STR	4'-10"	20
A111	2	#6	STR	12'-3"	37	A318	2	#7	STR	3'-7"	15
A112	2	#6	STR	11'-0"	33	A319	2	#7	STR	2'-5"	10
A113	2	#6	STR	9'-10"	30	A400	84	#7	STR	25'-11"	4450
A114	2	#6	STR	8'-7"	26	A401	2	#7	STR	24'-7"	100
A115	2	#6	STR	7'-4"	22	A402	2	#7	STR	23'-5"	96
A116	2	#6	STR	6'-1"	18	A403	2	#7	STR	22'-2"	91
A117	2	#6	STR	4'-10"	15	A404	2	#7	STR	20'-11"	86
A118	2	#6	STR	3'-7"	11	A405	2	#7	STR	19'-8"	80
A119	2	#6	STR	2'-5"	7	A406	2	#7	STR	18'-5"	75
A200	84	#6	STR	25'-11"	3270	A407	2	#7	STR	17'-3"	71
A201	2	#6	STR	24'-7"	74	A408	2	#7	STR	16'-0"	65
A202	2	#6	STR	23'-5"	70	A409	2	#7	STR	14'-9"	60
A203	2	#6	STR	22'-2"	67	A410	2	#7	STR	13'-6"	55
A204	2	#6	STR	20'-11"	63	A411	2	#7	STR	12'-3"	50
A205	2	#6	STR	19'-8"	59	A412	2	#7	STR	11'-0"	45
A206	2	#6	STR	18'-5"	55	A413	2	#7	STR	9'-10"	40
A207	2	#6	STR	17'-3"	52	A414	2	#7	STR	8'-7"	35
A208	2	#6	STR	16'-0"	48	A415	2	#7	STR	7'-4"	30
A209	2	#6	STR	14'-9"	44	A416	2	#7	STR	6'-1"	25
A210	2	#6	STR	13'-6"	41	A417	2	#7	STR	4'-10"	20
A211	2	#6	STR	12'-3"	37	A418	2	#7	STR	3'-7"	15
A212	2	#6	STR	11'-0"	33	A419	2	#7	STR	2'-5"	10
A213	2	#6	STR	9'-10"	30	B1	176	#5	STR	12'-0"	2203
A214	2	#6	STR	8'-7"	26	B2	210	#4	STR	9'-4"	1309
A215	2	#6	STR	7'-4"	22	B3	176	#4	STR	12'-0"	1411
A216	2	#6	STR	6'-1"	18						
A217	2	#6	STR	4'-10"	15	C1	294	#4	STR	30'-4"	5957
A218	2	#6	STR	3'-7"	11						
A219	2	#6	STR	2'-5"	7	D1	8	#6	STR	2'-11"	35
A300	84	#7	STR	25'-11"	4450	D2	8	#6	STR	1'-11"	23
A301	2	#7	STR	24'-7"	100						
A302	2	#7	STR	23'-5"	96	G1	8	#5	STR	31'-5"	262
A303	2	#7	STR	22'-2"	91						
A304	2	#7	STR	20'-11"	86	S2	12	#8	STR	31'-5"	1007

TOTAL REINFORCING STEEL		35784 LB
CLASS A CONCRETE BREAKDOWN		
BARREL		289.7 CY
SILLS		3.2 CY

PROJECT NO. 17BP.7.R.114
GUILFORD COUNTY
STATION: 14+37.00 -L-

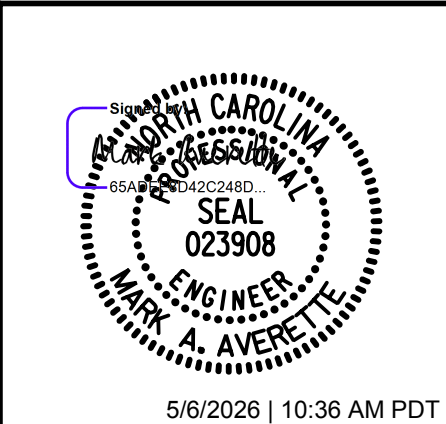
SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 10 FT.
CONCRETE BOX CULVERT

124° SKEW

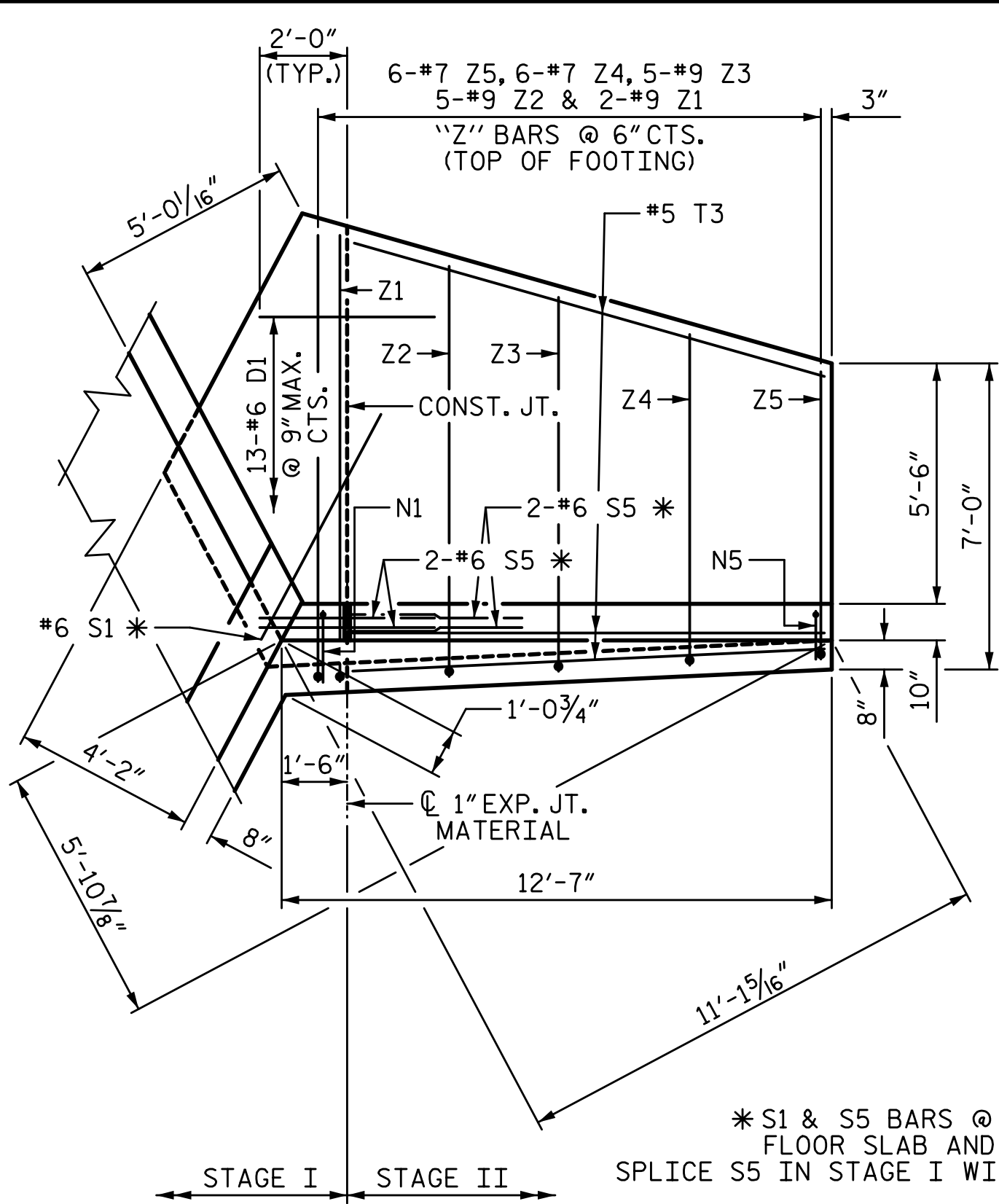
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NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			



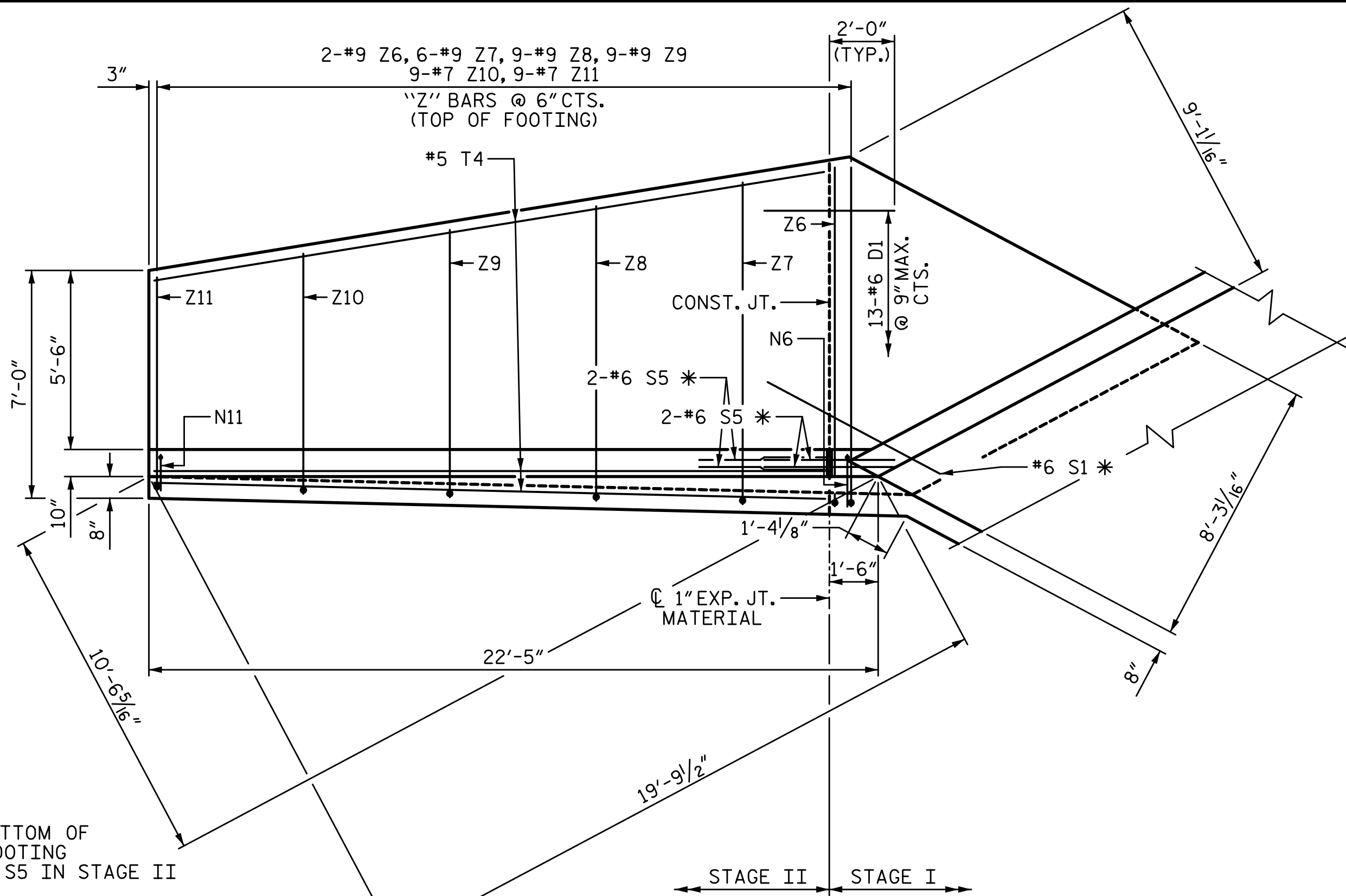
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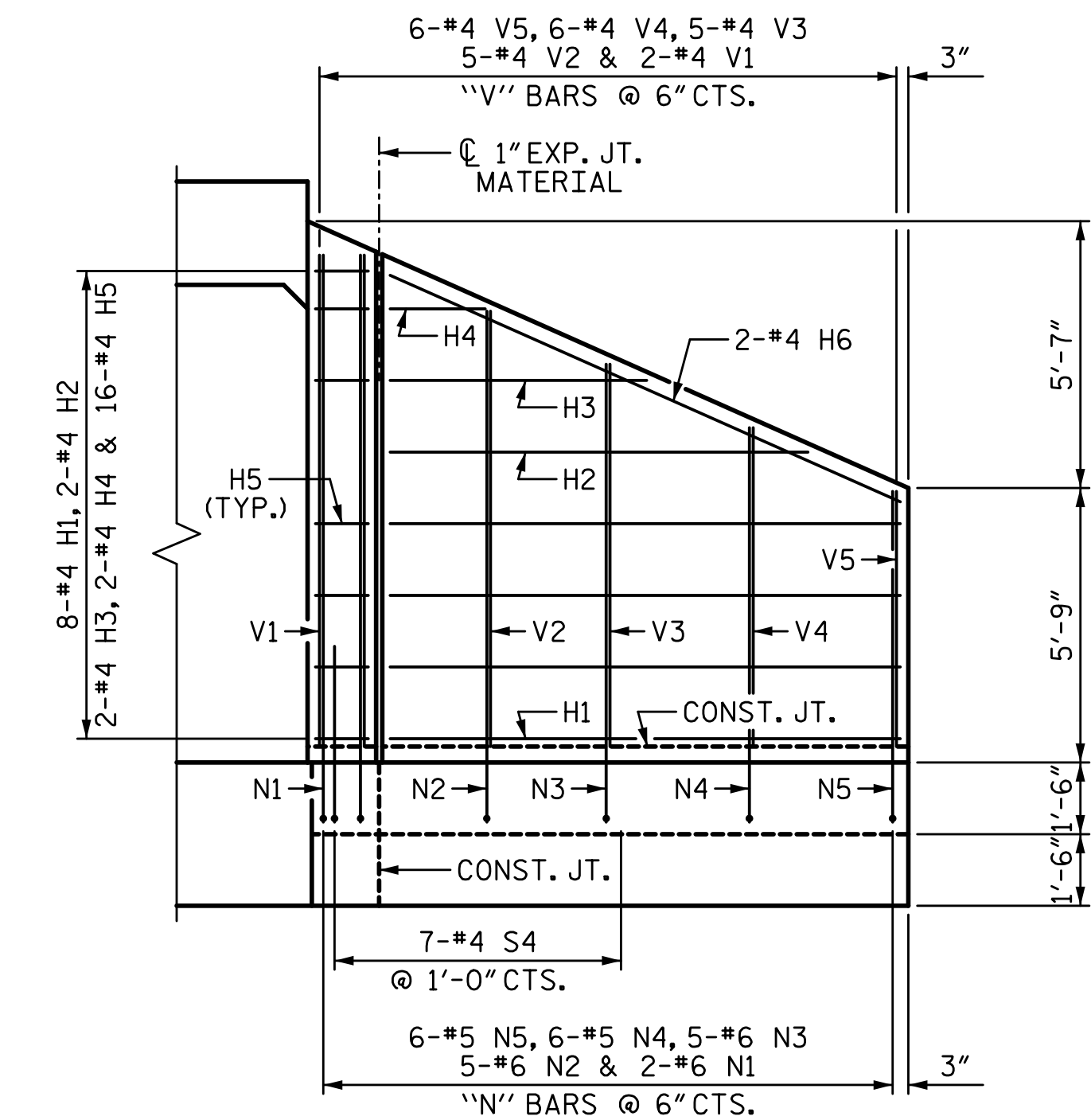
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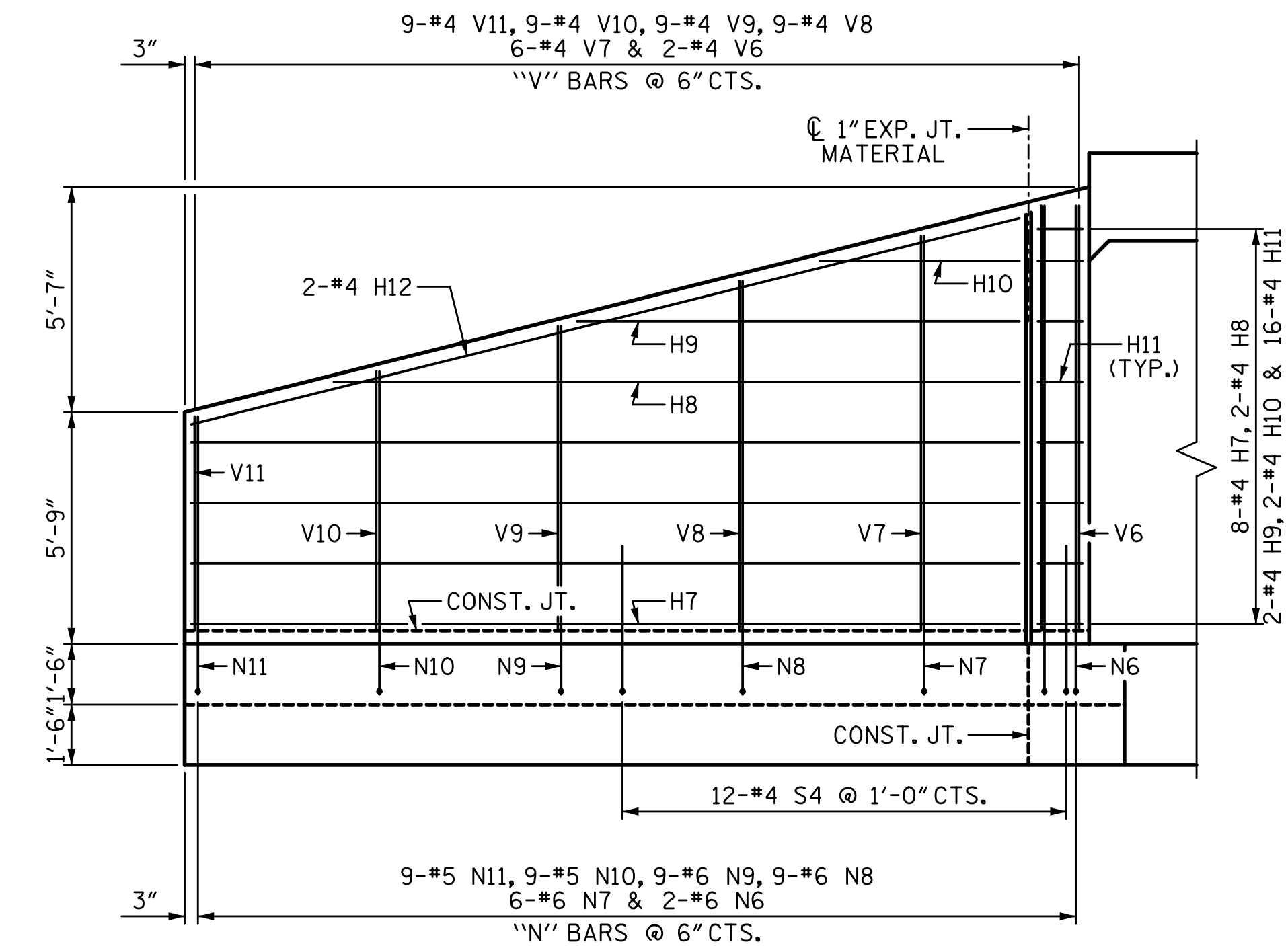
PLAN W4



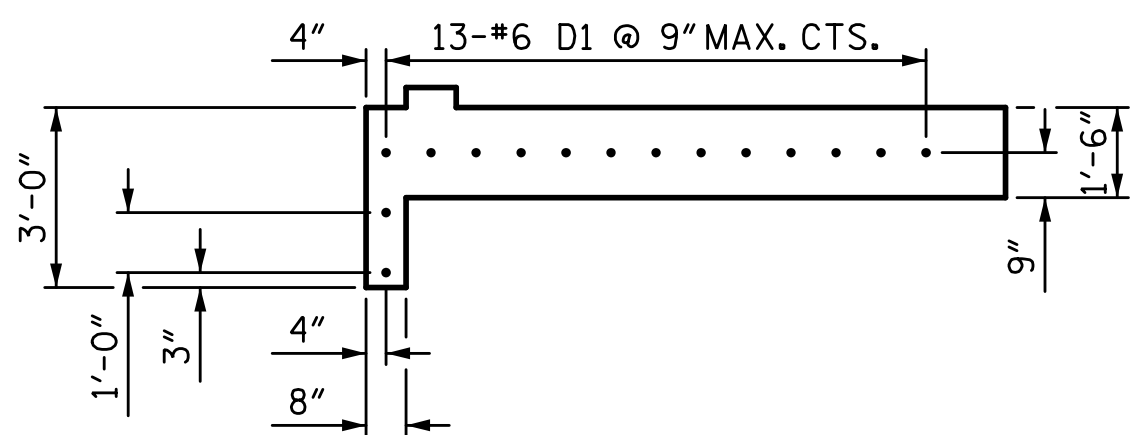
PLAN W3



ELEVATION W4



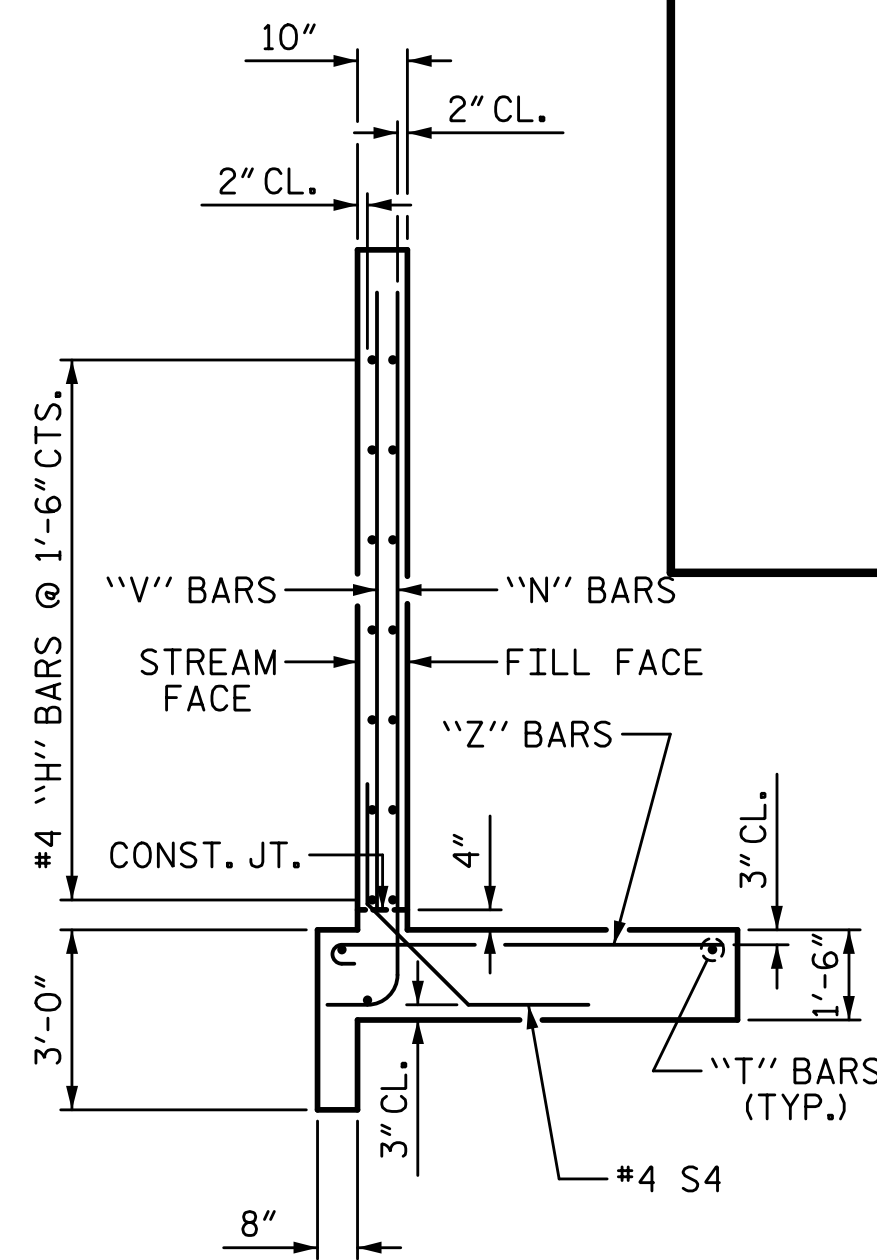
ELEVATION W3



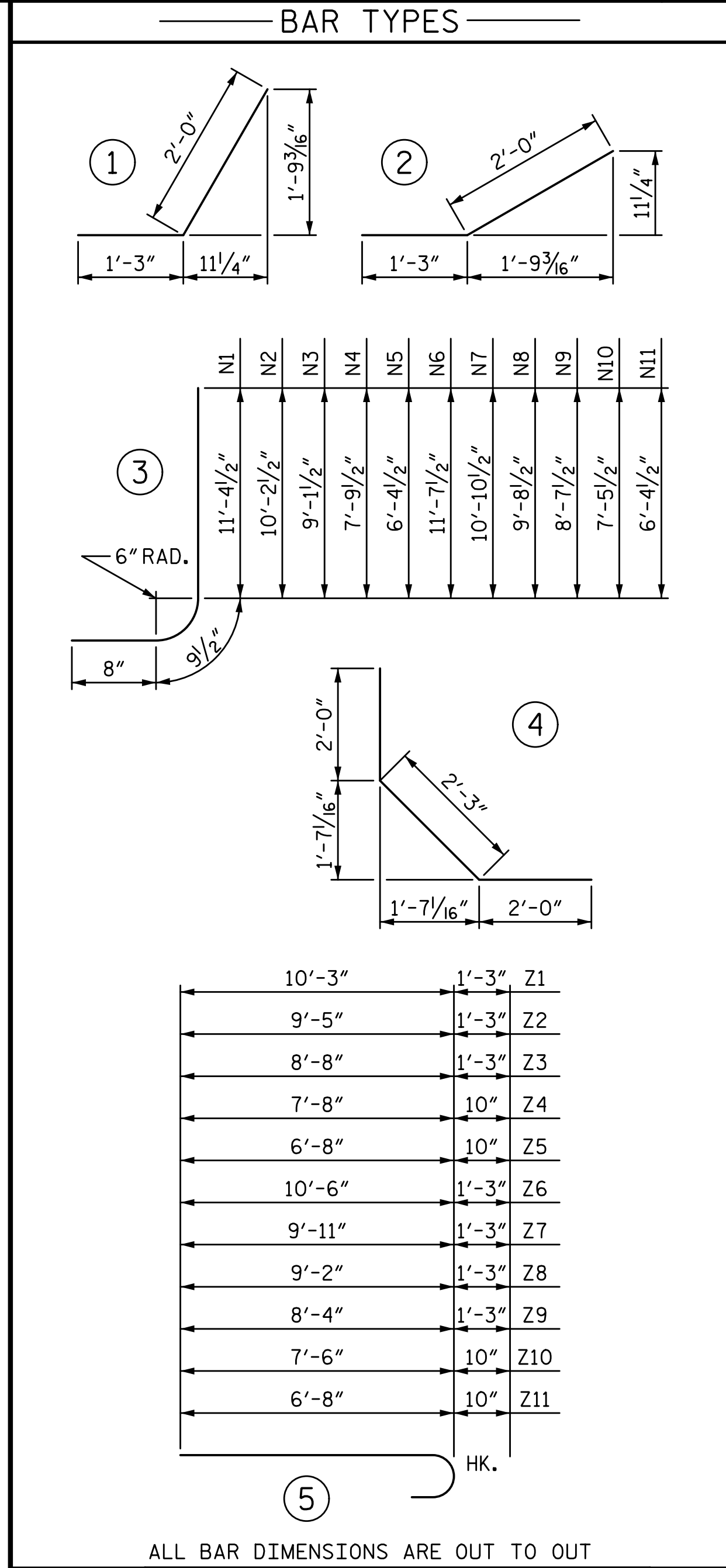
WING FOOTING SECTION

AT CONSTRUCTION JOINT SHOWING DOWEL LOCATIONS

DRAWN BY: T. BANKOVICH DATE: 4-21
CHECKED BY: B.S. COX DATE: 4-21
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24



TYPICAL WING SECTION



ALL BAR DIMENSIONS ARE OUT TO OUT				
CLASS A CONCRETE BREAKDOWN - INLET				
STAGE I				
2 WING WALLS TO CONST. JT.	6.6	CY		
HEADWALL	1.5	CY		
CURTAIN WALL	2.0	CY		
TOTAL	10.1	CY		
STAGE II				
2 WING WALLS	25.3	CY		
TOTAL	25.3	CY		

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
D1	30	#6	STR	4'-0"	180
H1	8	#4	STR	10'-9"	57
H2	2	#4	STR	8'-10"	12
H3	2	#4	STR	5'-7"	7
H4	2	#4	STR	2'-2"	3
H5	16	#4	1	3'-3"	35
H6	2	#4	STR	11'-9"	16
H7	8	#4	STR	20'-7"	110
H8	2	#4	STR	17'-1"	23
H9	2	#4	STR	11'-1"	15
H10	2	#4	STR	5'-0"	7
H11	16	#4	2	3'-3"	35
H12	2	#4	STR	21'-2"	28
N1	2	#6	3	12'-10"	39
N2	5	#6	3	11'-8"	88
N3	5	#6	3	10'-7"	79
N4	6	#5	3	9'-3"	58
N5	6	#5	3	7'-10"	49
N6	2	#6	3	13'-1"	39
N7	6	#6	3	12'-4"	111
N8	9	#6	3	11'-2"	151
N9	9	#6	3	10'-1"	136
N10	9	#5	3	8'-11"	84
N11	9	#5	3	7'-10"	74
S1	2	#6	STR	6'-0"	18
S4	19	#4	4	6'-3"	79
S5	8	#6	STR	4'-0"	48
T3	3	#5	STR	10'-9"	34
T4	3	#5	STR	20'-7"	64
V1	2	#4	STR	10'-3"	14
V2	5	#4	STR	9'-2"	31
V3	5	#4	STR	8'-0"	27
V4	6	#4	STR	6'-8"	27
V5	6	#4	STR	5'-4"	21
V6	2	#4	STR	10'-6"	14
V7	6	#4	STR	9'-9"	39
V8	9	#4	STR	8'-8"	52
V9	9	#4	STR	7'-7"	46
V10	9	#4	STR	6'-5"	39
V11	9	#4	STR	5'-3"	32
Z1	2	#9	5	11'-6"	78
Z2	5	#9	5	10'-8"	181
Z3	5	#9	5	9'-11"	169
Z4	6	#7	5	8'-6"	104
Z5	6	#7	5	7'-6"	92
Z6	2	#9	5	11'-9"	80
Z7	6	#9	5	11'-2"	228
Z8	9	#9	5	10'-5"	319
Z9	9	#9	5	9'-7"	293
Z10	9	#7	5	8'-4"	153
Z11	9	#7	5	7'-6"	138
TOTAL REINFORCING STEEL FOR 2 WINGS					3856 LB

PROJECT NO. 17BP.7.R.114

GUILFORD COUNTY

STATION: 14+37.00 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INLET WINGS FOR
CONCRETE BOX CULVERT
H = 10'-0"
SLOPE = 2:1

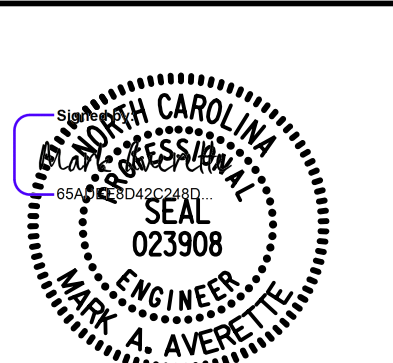
124° SKEW

REVISIONS

NO. BY: DATE: NO. BY: DATE: NO. BY: DATE:

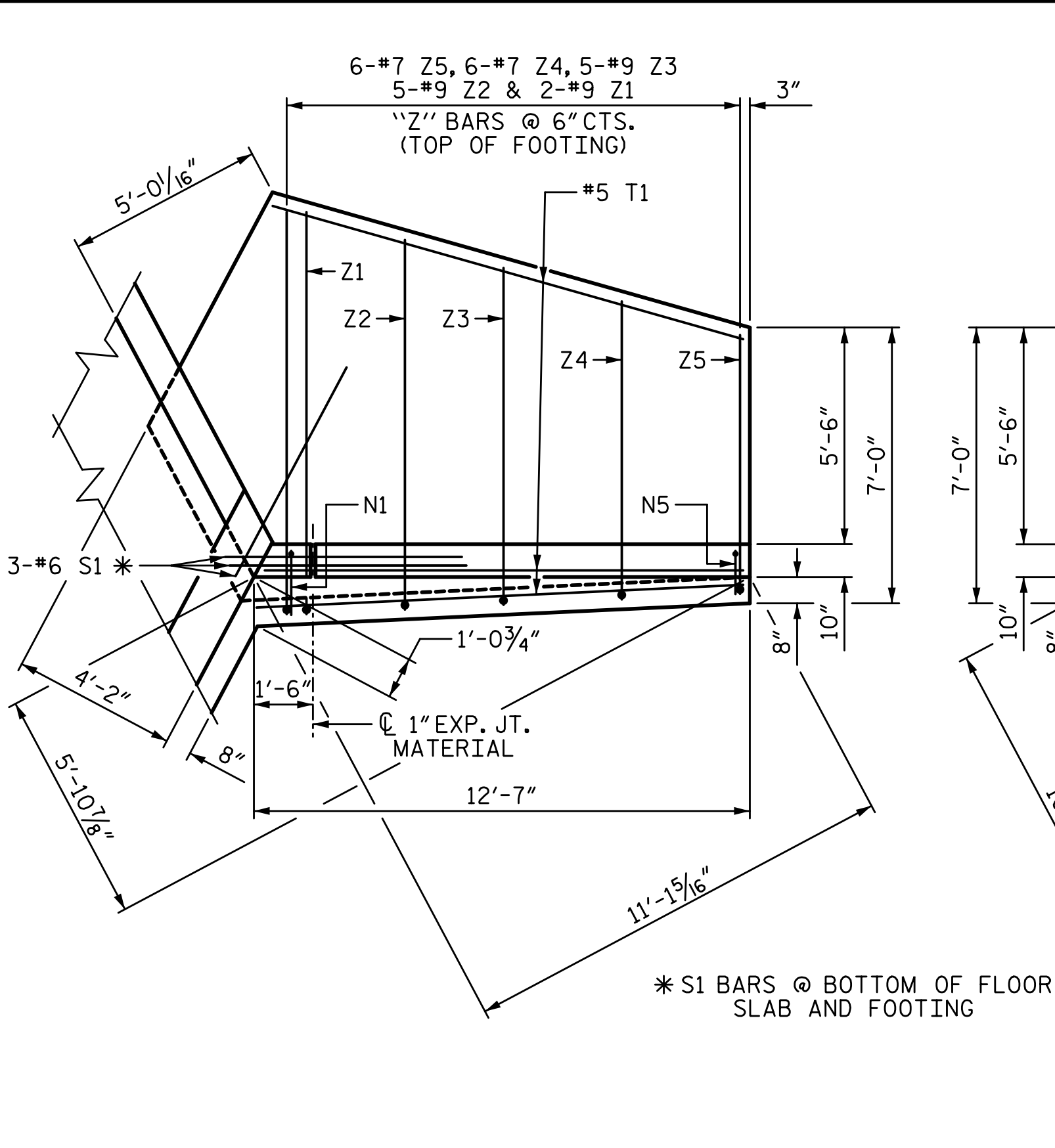
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SHEET NO. C-4
TOTAL SHEETS 6

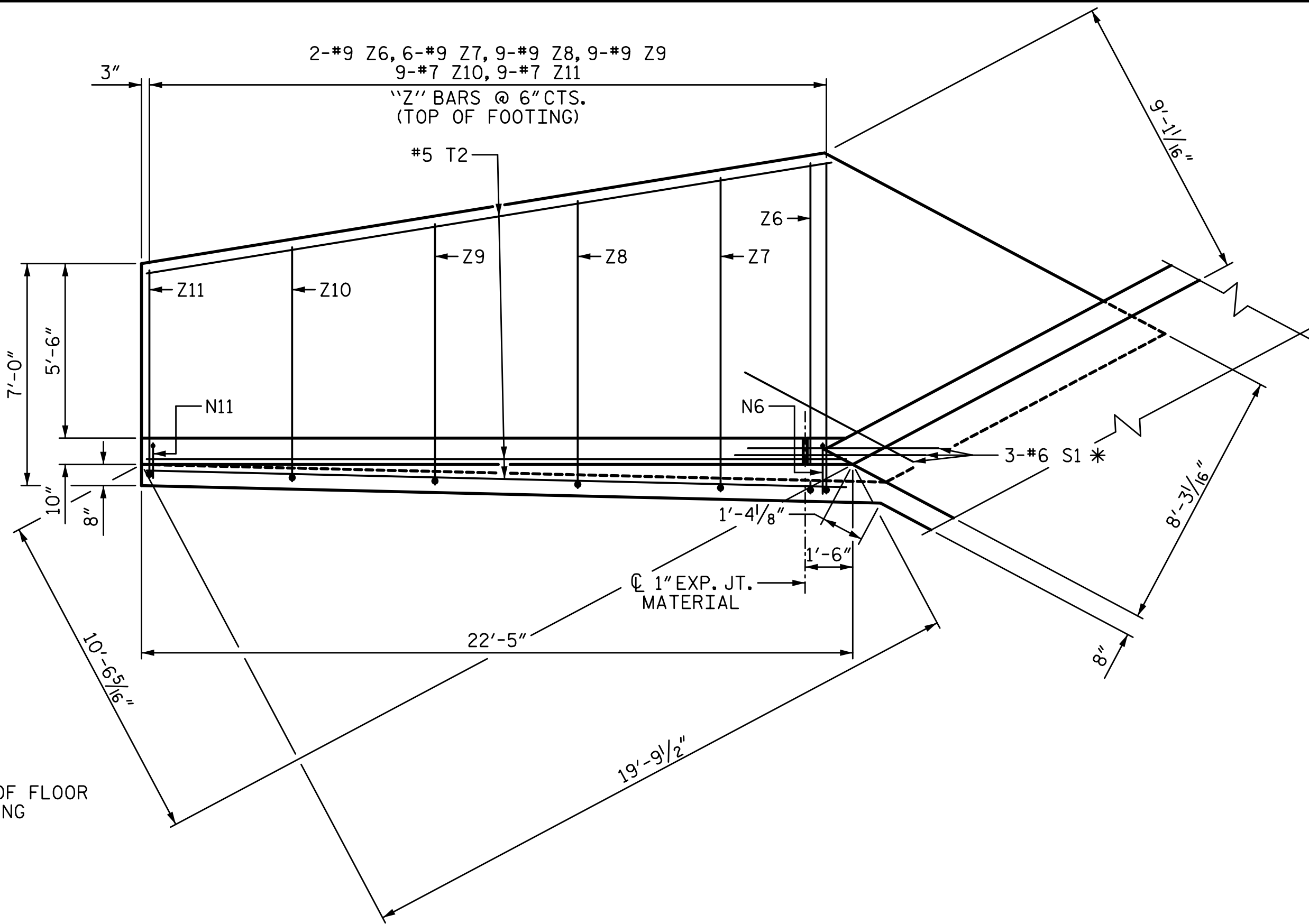


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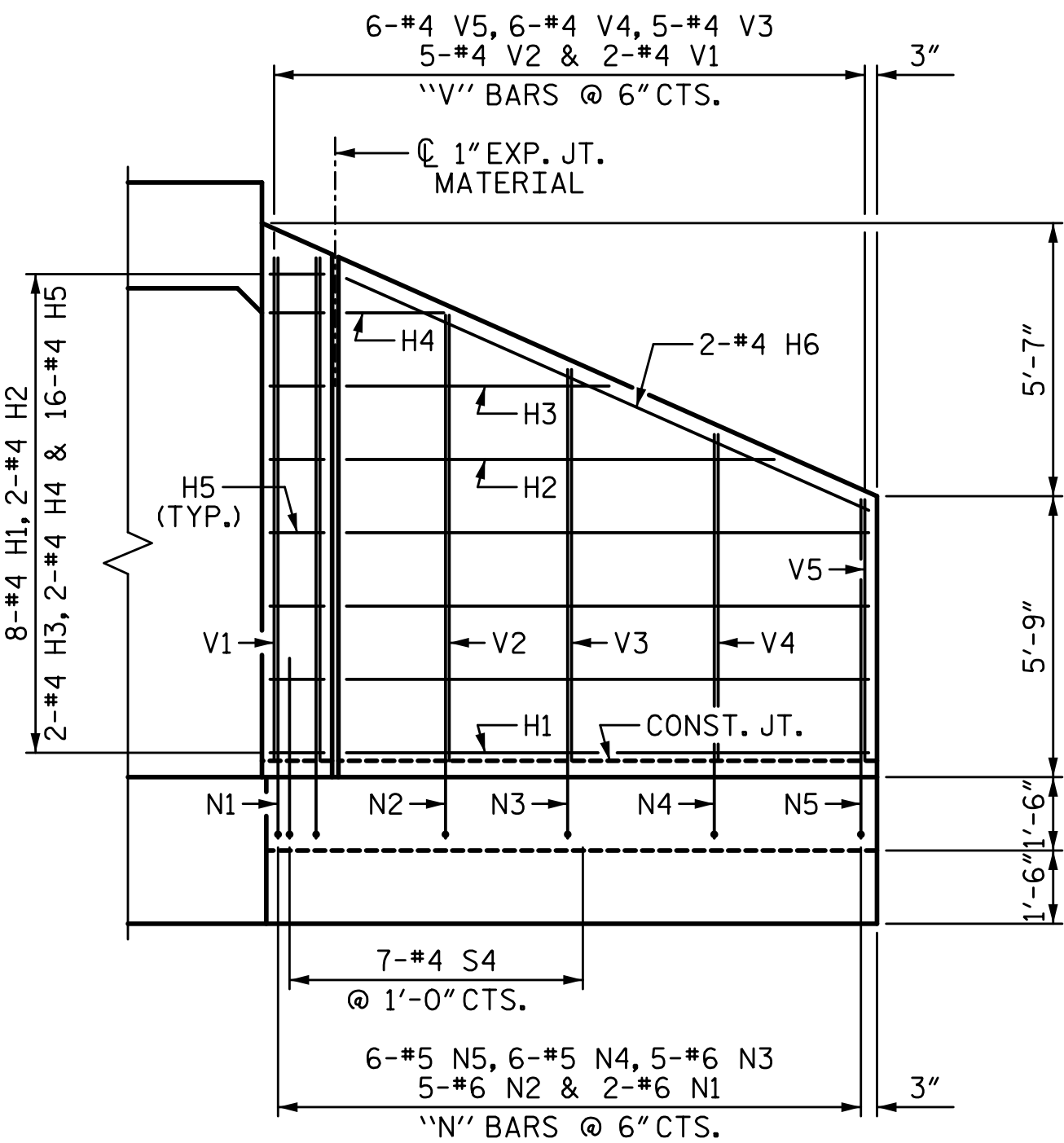
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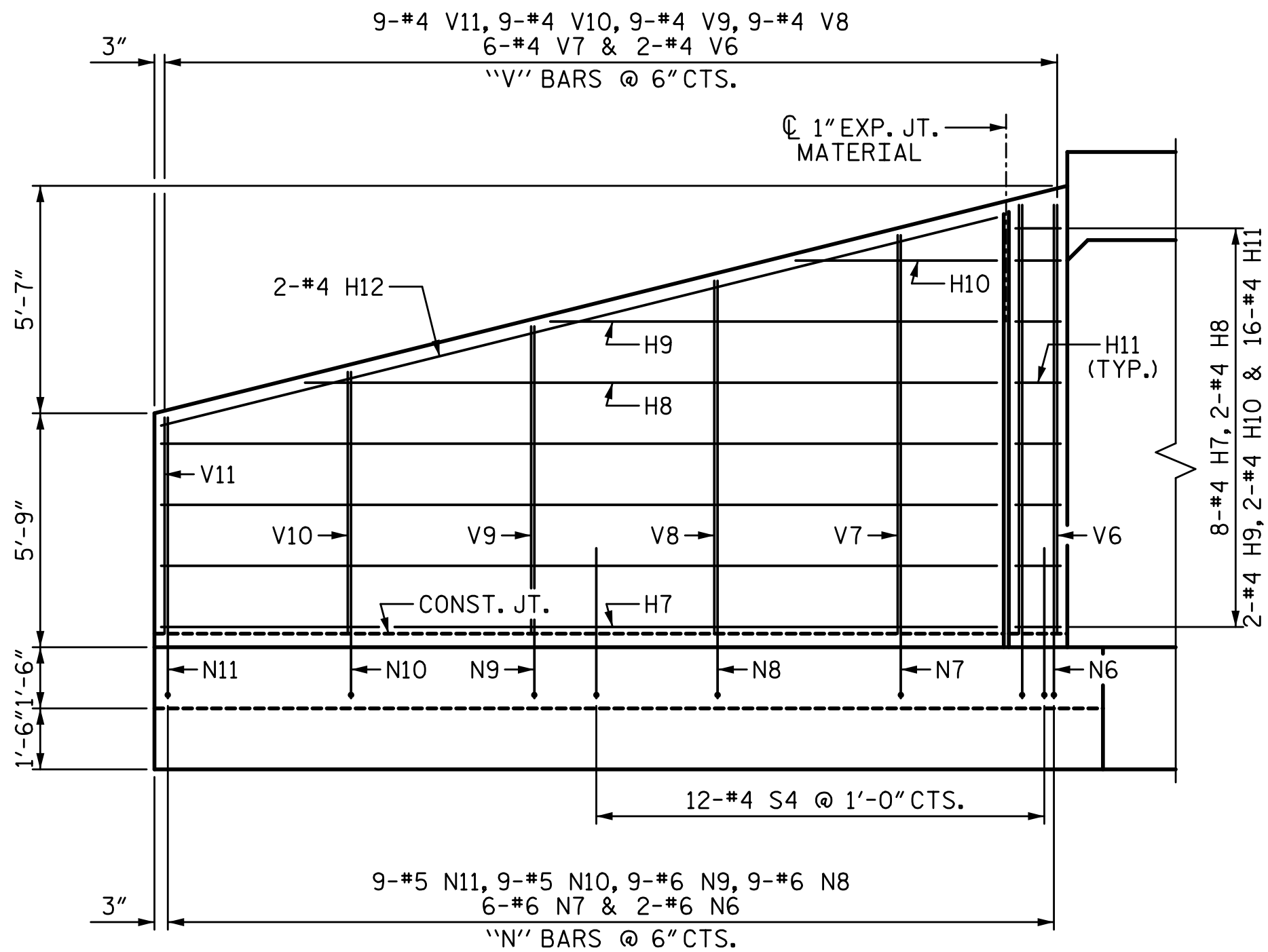
PLAN W2



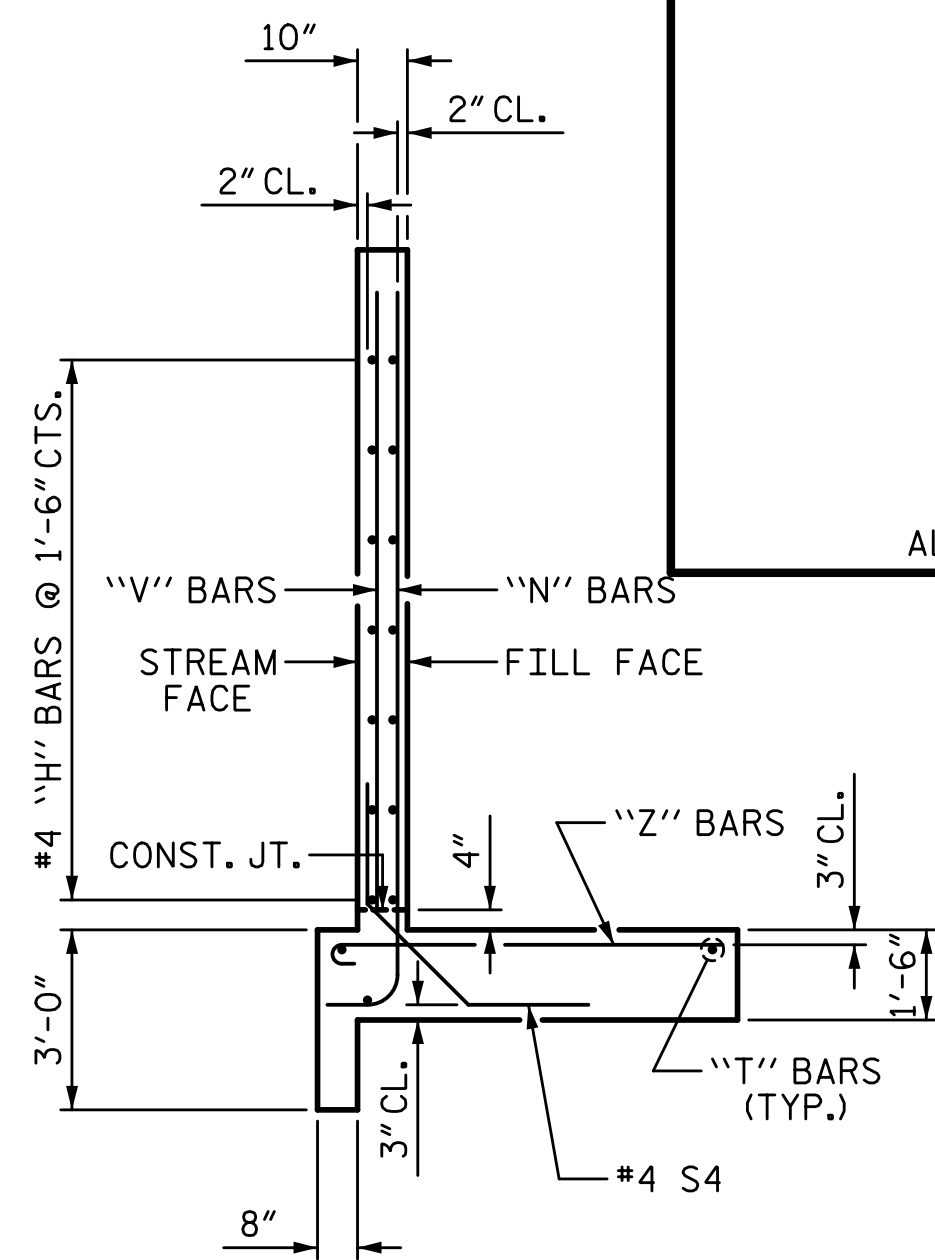
PLAN W1



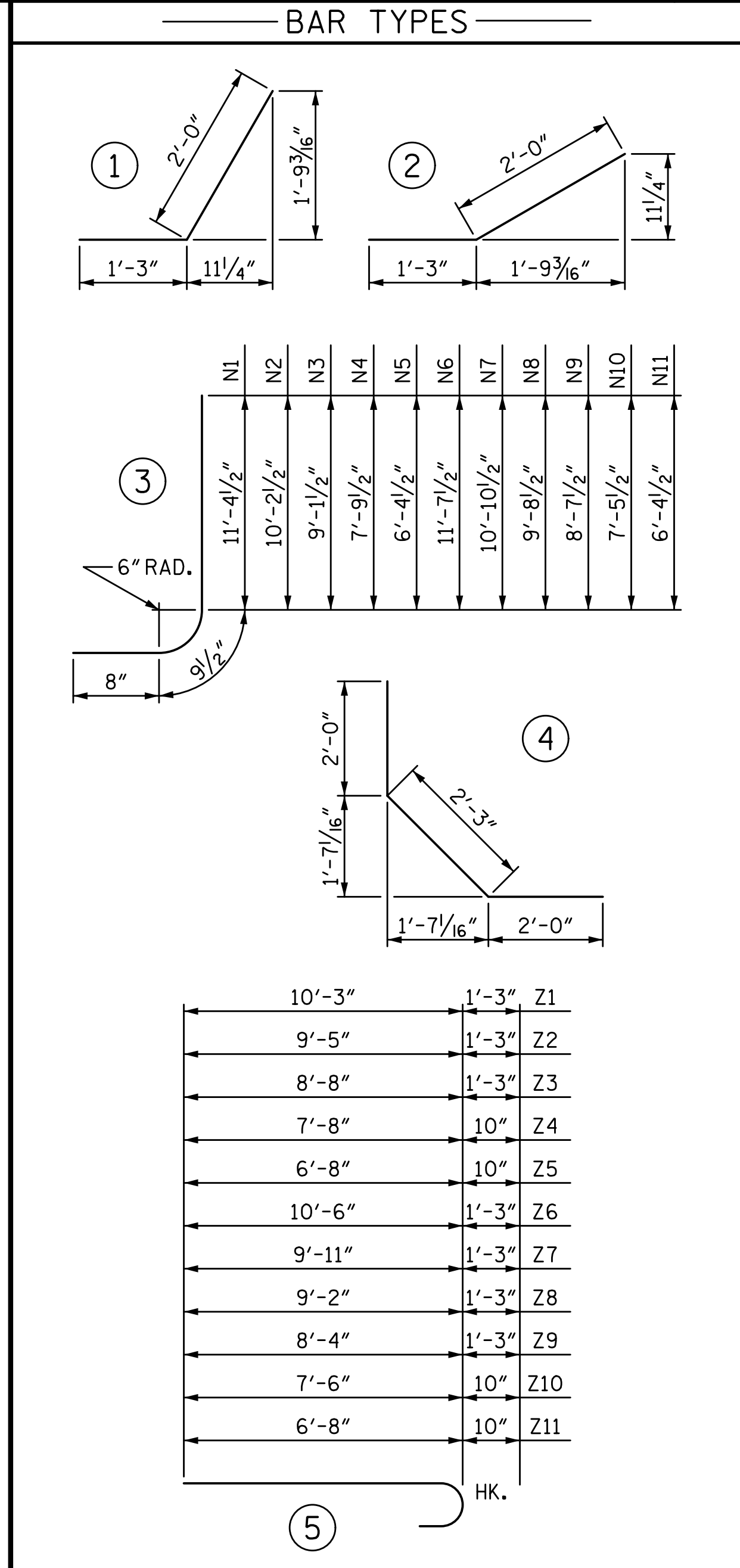
ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION



ALL BAR DIMENSIONS ARE OUT TO OUT

CLASS A CONCRETE BREAKDOWN - OUTLET		
2 WINGS	31.8	CY
HEADWALL	1.5	CY
CURTAIN WALL	2.0	CY
TOTAL	35.3	CY

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	10'-9"	57
H2	2	#4	STR	8'-10"	12
H3	2	#4	STR	5'-7"	7
H4	2	#4	STR	2'-2"	3
H5	16	#4	1	3'-3"	35
H6	2	#4	STR	11'-9"	16
H7	8	#4	STR	20'-7"	110
H8	2	#4	STR	17'-1"	23
H9	2	#4	STR	11'-1"	15
H10	2	#4	STR	5'-0"	7
H11	16	#4	2	3'-3"	35
H12	2	#4	STR	21'-2"	28
N1	2	#6	3	12'-10"	39
N2	5	#6	3	11'-8"	88
N3	5	#6	3	10'-7"	79
N4	6	#5	3	9'-3"	58
N5	6	#5	3	7'-10"	49
N6	2	#6	3	13'-1"	39
N7	6	#6	3	12'-4"	111
N8	9	#6	3	11'-2"	151
N9	9	#6	3	10'-1"	136
N10	9	#5	3	8'-11"	84
N11	9	#5	3	7'-10"	74
S1	6	#6	STR	6'-0"	54
S4	19	#4	4	6'-3"	79
T1	3	#5	STR	12'-3"	38
T2	3	#5	STR	22'-0"	69
V1	2	#4	STR	10'-3"	14
V2	5	#4	STR	9'-2"	31
V3	5	#4	STR	8'-0"	27
V4	6	#4	STR	6'-8"	27
V5	6	#4	STR	5'-4"	21
V6	2	#4	STR	10'-6"	14
V7	6	#4	STR	9'-9"	39
V8	9	#4	STR	8'-8"	52
V9	9	#4	STR	7'-7"	46
V10	9	#4	STR	6'-5"	39
V11	9	#4	STR	5'-3"	32
Z1	2	#9	5	11'-6"	78
Z2	5	#9	5	10'-8"	181
Z3	5	#9	5	9'-11"	169
Z4	6	#7	5	8'-6"	104
Z5	6	#7	5	7'-6"	92
Z6	2	#9	5	11'-9"	80
Z7	6	#9	5	11'-2"	228
Z8	9	#9	5	10'-5"	319
Z9	9	#9	5	9'-7"	293
Z10	9	#7	5	8'-4"	153
Z11	9	#7	5	7'-6"	138

TOTAL REINFORCING STEEL FOR 2 WINGS 3673 LB

PROJECT NO. 17BP.7.R.114
GUILFORD COUNTY
STATION: 14+37.00 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

OUTLET WINGS FOR
CONCRETE BOX CULVERT
H = 10'-0" SLOPE = 2:1

124° SKEW

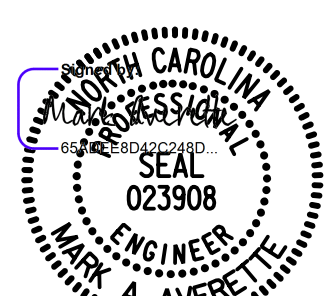
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. C-5
TOTAL SHEETS 6



5640 Dillard Drive, Suite 200
Cary, NC 27518

LICENSURE NO. C-4434



5/6/2026 10:36 AM PDT

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

LOAD FACTORS:

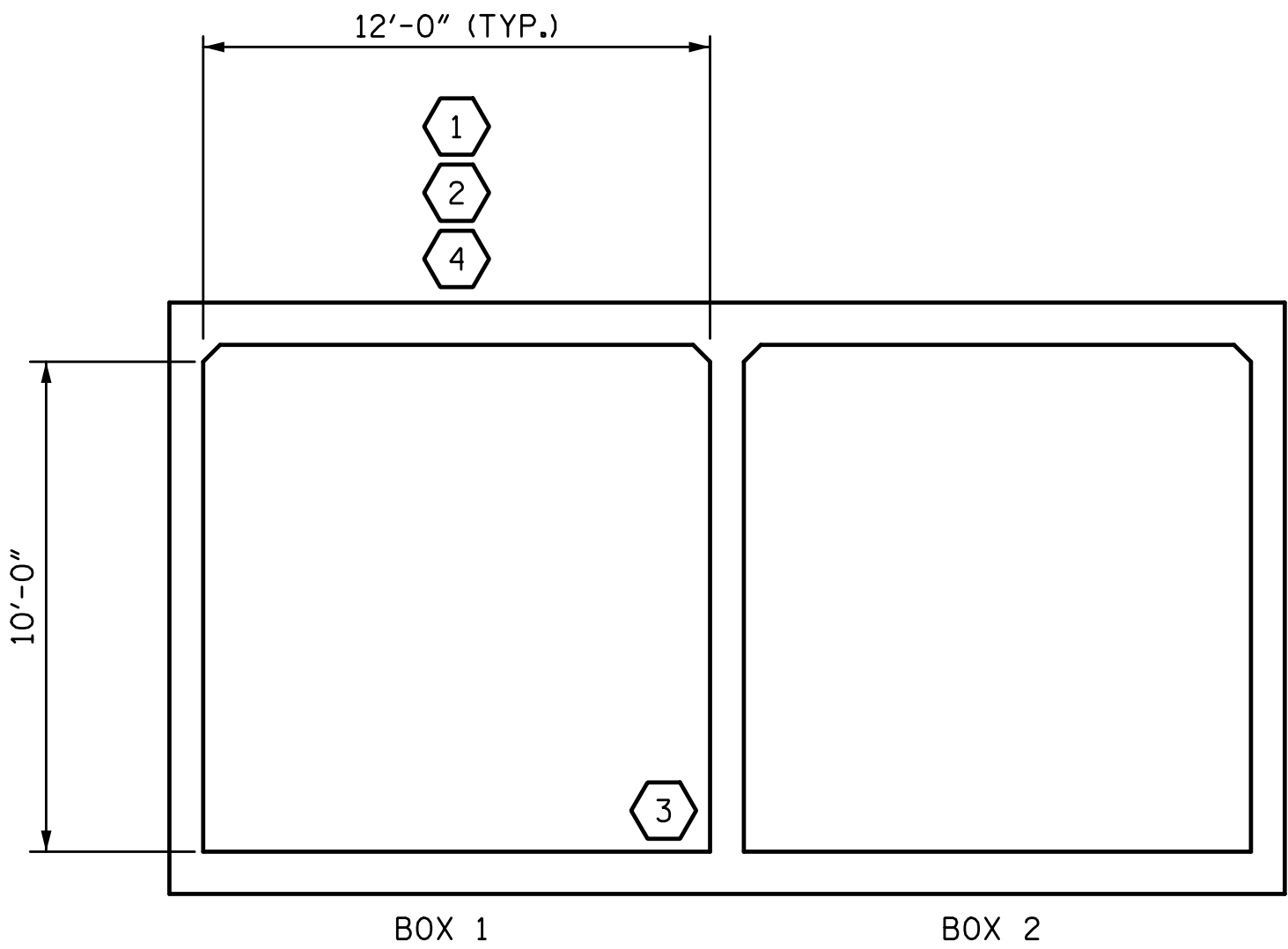
DESIGN LOAD RATING FACTORS		
LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

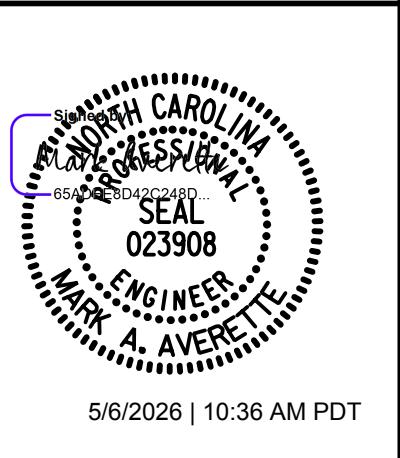
#	CONTROLLING LOAD RATING
1	DESIGN LOAD RATING (HL-93)
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING **
4	EMERGENCY VEHICLE LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS																
LOAD TYPE	VEHICLE	WEIGHT (W) (TONS)	#	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE										COMMENT NUMBER
						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	HL-93 (INVENTORY)	N/A	1	1.89	- -	1.75	1.89	1	TOP (ROOF) SLAB - MID	6.42	2.28	1	TOB (ROOF) SLAB - RT END	11.75		
	HL-93 (OPERATING)	N/A		2.45	- -	1.35	2.45	1	TOP (ROOF) SLAB - MID	6.42	2.96	1	TOB (ROOF) SLAB - RT END	11.75		
	HS-20 (INVENTORY)	36.000	2	1.97	70.9	1.75	1.97	1	TOP (ROOF) SLAB - MID	6.42	2.37	1	TOB (ROOF) SLAB - RT END	11.75		
	HS-20 (OPERATING)	36.000		2.55	91.9	1.35	2.55	1	TOP (ROOF) SLAB - MID	6.42	3.07	1	TOP (ROOF) SLAB - RT END	11.75		
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH		3.59	48.5	1.40	4.08	1	TOP (ROOF) SLAB - MID	6.42	3.59	1	EXT WALL - BOT	0		
		SNGARBS2	20.000		3.58	71.6	1.40	3.82	1	TOP (ROOF) SLAB - MID	6.42	3.58	1	EXT WALL - BOT	0	
		SNAGRIS2	22.000		3.58	78.8	1.40	3.64	1	BOT (FLOOR) SLAB - RT END	12.42	3.58	1	EXT WALL - BOT	0	
		SNCOTTS3	27.250		2.36	64.3	1.40	2.36	1	TOP (ROOF) SLAB - MID	6.42	2.84	1	TOP (ROOF) SLAB - RT END	11.75	
		SNAGGRS4	34.925		2.38	83.1	1.40	2.38	1	BOT (FLOOR) SLAB - RT END	12.42	2.64	1	TOP (ROOF) SLAB - RT END	11.75	
		SNS5A	35.550		2.52	89.6	1.40	2.52	1	BOT (FLOOR) SLAB - RT END	12.42	2.78	1	TOP (ROOF) SLAB - RT END	11.75	
		SNS6A	39.950		2.24	89.5	1.40	2.24	1	BOT (FLOOR) SLAB - RT END	12.42	2.74	1	TOP (ROOF) SLAB - RT END	11.75	
		SNS7B	42.000		2.20	92.4	1.40	2.20	1	BOT (FLOOR) SLAB - RT END	12.42	2.67	1	TOP (ROOF) SLAB - RT END	11.75	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.71	89.4	1.40	2.71	1	BOT (FLOOR) SLAB - RT END	12.42	3.53	1	TOP (ROOF) SLAB - RT END	11.75	
		TNT4A	33.075		2.76	91.3	1.40	2.76	1	BOT (FLOOR) SLAB - RT END	12.42	3.22	1	TOP (ROOF) SLAB - RT END	11.75	
		TNT6A	41.600		2.35	97.8	1.40	2.35	1	BOT (FLOOR) SLAB - RT END	12.42	2.84	1	TOP (ROOF) SLAB - RT END	11.75	
		TNT7A	42.000		2.31	97.0	1.40	2.31	1	BOT (FLOOR) SLAB - RT END	12.42	3.05	1	TOP (ROOF) SLAB - RT END	11.75	
		TNT7B	42.000		2.42	101.6	1.40	2.42	1	BOT (FLOOR) SLAB - RT END	12.42	2.73	1	TOP (ROOF) SLAB - RT END	11.75	
		TNAGRIT4	43.000		2.32	99.8	1.40	2.32	1	BOT (FLOOR) SLAB - RT END	12.42	2.84	1	TOP (ROOF) SLAB - RT END	11.75	
TNAGT5A		45.000		2.28	102.6	1.40	2.28	1	BOT (FLOOR) SLAB - RT END	12.42	2.93	1	TOP (ROOF) SLAB - RT END	11.75		
TNAGT5B		45.000	3	2.07	93.2	1.40	2.07	1	BOT (FLOOR) SLAB - RT END	12.42	2.65	1	TOP (ROOF) SLAB - RT END	11.75		
EMERGENCY VEHICLE (EV)	EV2	28.750		2.88	82.8	1.30	2.88	1	TOP (ROOF) SLAB - MID	6.42	3.33	1	TOP (ROOF) SLAB - RT END	11.75		
	EV3	43.000	4	2.05	88.2	1.30	2.05	1	TOP (ROOF) SLAB - MID	6.42	2.43	1	TOP (ROOF) SLAB - RT END	11.75		



LRFR SUMMARY
(LOOKING DOWNSTREAM)

DRAWN BY: T. BANKOVICH	DATE: 4-21
CHECKED BY: B.S. COX	DATE: 4-21
DESIGN ENGINEER OF RECORD: M.A. AVERETTE	DATE: 11-24



PROJECT NO. 17BP.7.R.114
GUILFORD COUNTY
STATION: 14+37.00 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

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

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UNLESS ALL SIGNATURES COMPLETED

5/6/2026 1:30:01 PM P:\Raleigh\Projects\2017\Division 7 (Mott MacDonald)\17BP7R114 Gulford 52 (119 DBL12X10 RCBC)\Structures\Drawings\Final - 2024 Standards\410-17BP7R114-SMU-SN-400052.dgn

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 2024 "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.

STANDARD NOTES

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. FINIS 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.