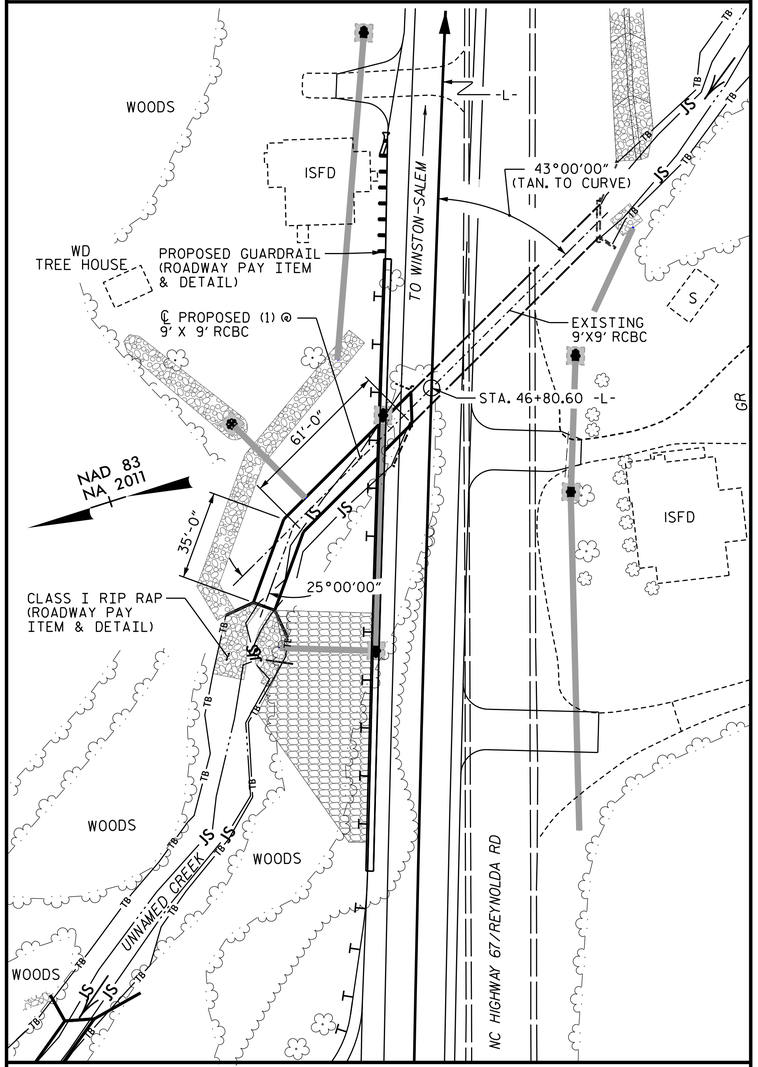
BENCHMARK #5: -L- STA. 46+29.25 RT (N 900314.79, E 1578461.00), ELEV. 770.95



LOCATION SKETCH

LEFT EXTENSION QUANTITIES

CLASS A CONCRETE		
BARREL @	1.12 CY/FT	114.3 C.Y.
WINGS, ETC.		13.2 C.Y.
TOTAL		127.5 C.Y.
REINFORCING STEEL		
BARREL		21,899 LBS.
WINGS, ETC.		937 LBS.
TOTAL		22,836 LBS.
CULVERT EXCAVATION		LUMP SUM
FOUNDATION COND. MATERIAL		104 TONS

ROADWAY DATA

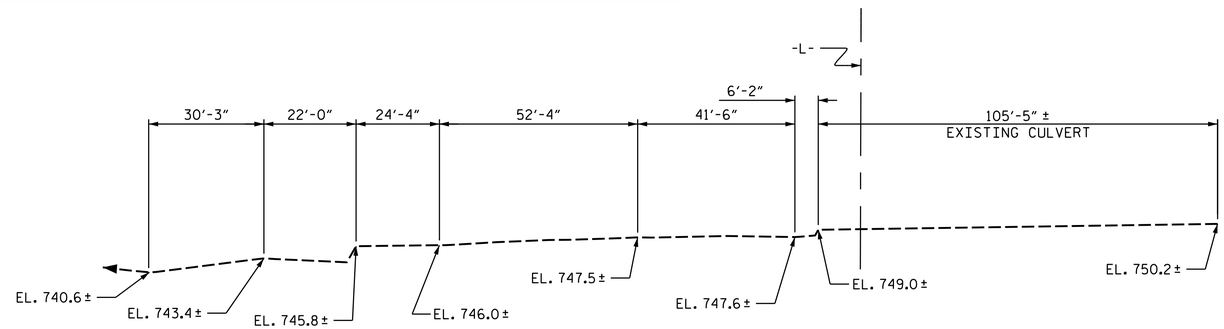
GRADE POINT ELEV. @ STA. 46+80.60-L- = 771.48'
BED ELEV. @ STA. 46+80.60-L- = 749.16'
ROADWAY SLOPES = VARIES

HYDROGRAPHIC DATA

DESIGN DISCHARGE = 500 CFS
FREQUENCY OF DESIGN FLOOD = 50 YRS
DESIGN HIGH WATER ELEVATION = 757.2'
DRAINAGE AREA = 0.7 SQ. MI.
BASIC DISCHARGE (Q100) = 600 CFS
BASIC HIGH WATER ELEVATION = 758.2'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = N/A
FREQUENCY OF OVERTOPPING FLOOD = >500 YRS
OVERTOPPING FLOOD ELEVATION = 771.5'



PROFILE ALONG ℄ CULVERT

NOTES

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

DESIGN FILL---------- 13.45' MAX. 2.00' MIN.

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTES SHEET.

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

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

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.

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

DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL 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.

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

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSION. IN THIS CASE, THE BOTTOM SLAB OF THE EXTENSION SHALL BE POURED AT LEAST 72 HOURS PRIOR TO CUTTING THE WINGS. THE WINGS MAY BE CUT EARLIER PROVIDED THE SLAB CONCRETE STRENGTH HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

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 REINFORCED CONCRETE BOX CULVERT EXTENSION SHALL BE PLACED ON THE STANDARD 1.0 FOOT BLANKET OF FOUNDATION CONDITIONING MATERIAL. FOR FOUNDATION CONDITIONING MATERIAL, SEE SECTION 414 OF THE STANDARD SPECIFICATIONS.

UNDERCUT SOFT/LOOSE SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. IF THE ADDITIONAL UNDERCUT EXCEEDS MORE THAN 1 FT, CONTACT THE GEOTECHNICAL OPERATIONS ENGINEER FOR RECOMMENDATIONS. BACKFILL UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL AS DIRECTED.

THE REQUIRED BEARING CAPACITY AT THE BASE OF THE CULVERT IS 1 TSF. THE REQUIRED BEARING CAPACITY SHALL BE VERIFIED.

PROJECT NO. B-5825
YADKIN/FORSYTH COUNTY
STATION: 46+80.60 -L-

SHEET 1 OF 7

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL C. CHEEK, JR.

Document Signed By: Marshall C. Cheek Jr.
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4/14/2020

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TGS ENGINEERS
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SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9 FT. X 9 FT. CONCRETE BOX CULVERT EXTENSION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-1
1			3			TOTAL SHEETS
2			4			13

STD. NO. CB45_1L

DRAWN BY :	ZCS	DATE :	10/19
CHECKED BY :	MGC	DATE :	12/19
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	12/19

2/7/2020
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User:ZSmith

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	1.27	--	1.75	1.39	1	EXTERIOR WALL	0.38	1.27	1	TOP SLAB	0.85	
		HL-93 (OPERATING)	N/A		1.64	--	1.35	1.80	1	EXTERIOR WALL	0.38	1.64	1	TOP SLAB	0.85	
		HS-20 (INVENTORY)	36.000	2	1.32	47.52	1.75	1.43	1	EXTERIOR WALL	0.38	1.32	1	TOP SLAB	0.85	
		HS-20 (OPERATING)	36.000		1.71	61.56	1.35	1.86	1	EXTERIOR WALL	0.38	1.71	1	TOP SLAB	0.85	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.58	34.83	1.40	2.78	1	TOP SLAB	5.25	2.58	1	TOP SLAB	0.85	
		SNGARBS2	20.000		2.41	48.2	1.40	2.60	1	TOP SLAB	5.25	2.41	1	TOP SLAB	0.85	
		SNAGRIS2	22.000		2.58	56.76	1.40	2.78	1	TOP SLAB	5.25	2.58	1	TOP SLAB	0.85	
		SNCOTTS3	27.250	3	1.58	43.06	1.40	1.67	1	EXTERIOR WALL	0.38	1.58	1	TOP SLAB	0.85	
		SNAGGRS4	34.925		1.79	62.52	1.40	1.86	1	EXTERIOR WALL	0.38	1.79	1	BOTTOM SLAB	0.85	
		SNS5A	35.550		1.79	63.63	1.40	1.83	1	EXTERIOR WALL	0.38	1.79	1	BOTTOM SLAB	0.85	
		SNS6A	39.950		1.79	71.51	1.40	1.83	1	EXTERIOR WALL	0.38	1.79	1	BOTTOM SLAB	0.85	
		SNS7B	42.000		1.79	75.18	1.40	1.83	1	EXTERIOR WALL	0.38	1.79	1	BOTTOM SLAB	0.85	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.58	85.14	1.40	2.78	1	TOP SLAB	0.38	2.58	1	TOP SLAB	0.85	
		TNT4A	33.075		1.88	62.18	1.40	1.90	1	EXTERIOR WALL	0.38	1.88	1	TOP SLAB	0.85	
		TNT6A	41.600		1.88	78.21	1.40	1.90	1	EXTERIOR WALL	0.38	1.88	1	TOP SLAB	0.85	
		TNT7A	42.000		1.88	78.96	1.40	1.90	1	EXTERIOR WALL	0.38	1.88	1	TOP SLAB	0.85	
		TNT7B	42.000		1.88	78.96	1.40	1.90	1	EXTERIOR WALL	0.38	1.88	1	TOP SLAB	0.85	
		TNAGRIT4	43.000		1.80	77.40	1.40	1.84	1	EXTERIOR WALL	0.38	1.80	1	BOTTOM SLAB	0.85	
		TNAGT5A	45.000		1.88	84.60	1.40	1.88	1	EXTERIOR WALL	0.38	1.88	1	TOP SLAB	0.85	
		TNAGT5B	45.000		1.79	80.55	1.40	1.83	1	EXTERIOR WALL	0.38	1.79	1	BOTTOM SLAB	0.85	

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.

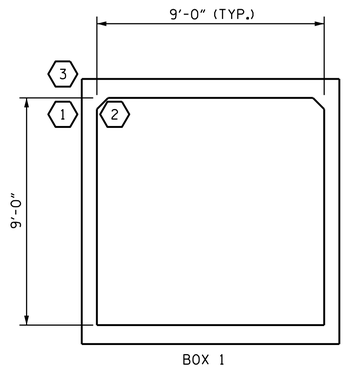
(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



BOX 1

LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. B-5825

YADKIN/FORSYTH COUNTY

STATION: 46+80.60 -L-

SHEET 2 OF 7

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek Jr.

4/14/2020

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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-2
1			3			TOTAL SHEETS
2			4			13

STD. NO. LRFR5

ASSEMBLED BY :	ZCS	DATE :	10/19
CHECKED BY :	MGC	DATE :	10/19
DRAWN BY : WMC	7/11	REV. 10/1/11	MAA/GM
CHECKED BY : GM	7/11	REV. 12/17	MAA/THC

2/6/2020
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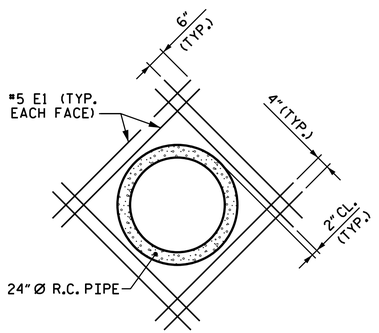
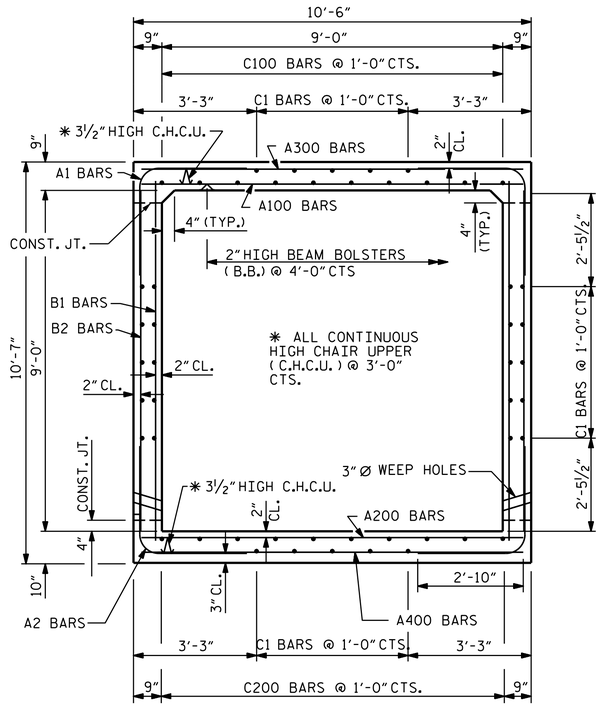
User:ZSmith



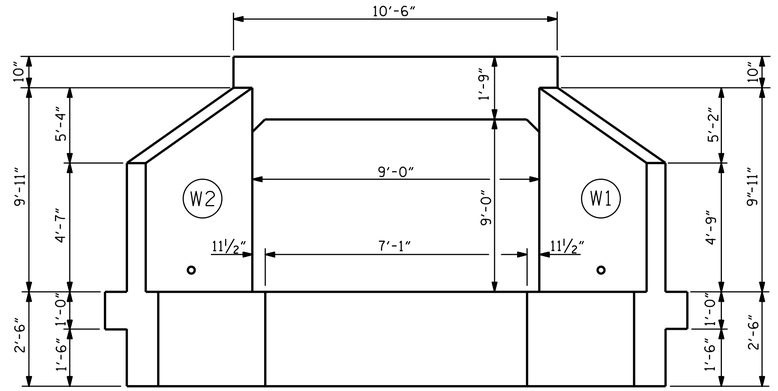
DETAIL A

** THE PIPE THROUGH THE WALL OF THE CULVERT WILL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL WILL BE CUT & FIELD BENT AS NECESSARY TO CLEAR THE PIPE.

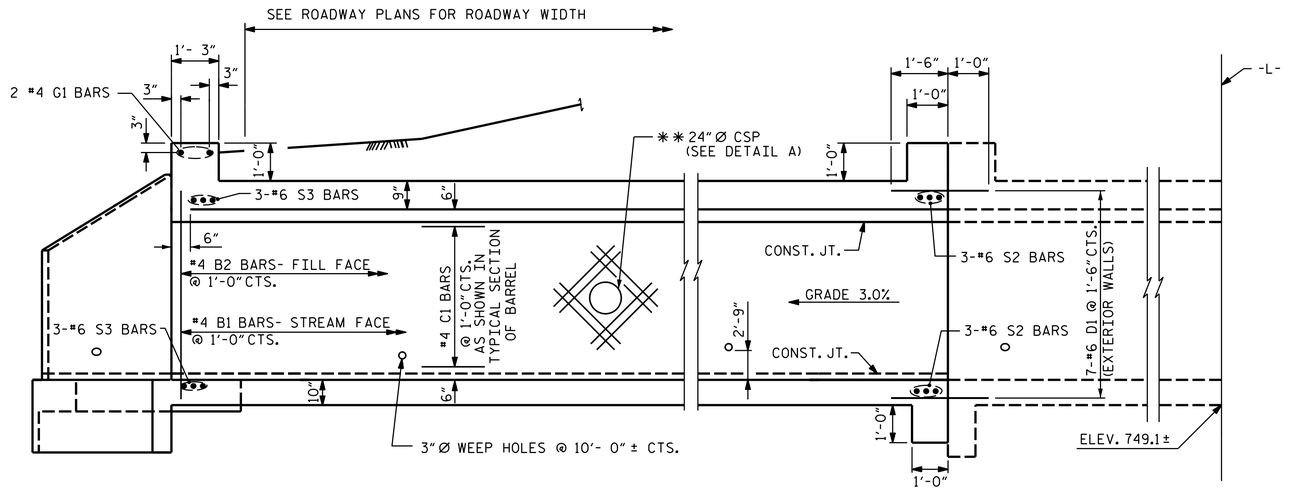


RIGHT ANGLE SECTION OF BARREL

THERE ARE 50 "C" BARS IN SECTION OF BARREL



OUTLET END ELEVATION



LEFT CULVERT SECTION NORMAL TO ROADWAY

PROJECT NO. B-5825
YADKIN/FORSYTH COUNTY
STATION: 46+80.60 -L-

SHEET 3 OF 7

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER
MARSHALL G. CREEK, JR.
Marshall G. Creek Jr.
5FBCC2F3A4DC413...
4/14/2020

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TGS ENGINEERS
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SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9 FT. X 9 FT. CONCRETE BOX CULVERT EXTENSION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-3
1			3			TOTAL SHEETS
2			4			13

STD. NO. CB45_1L

DRAWN BY : ZCS DATE : 10/19
CHECKED BY : MGC DATE : 12/19
DESIGN ENGINEER OF RECORD: ZCS DATE : 12/19

2/6/2020
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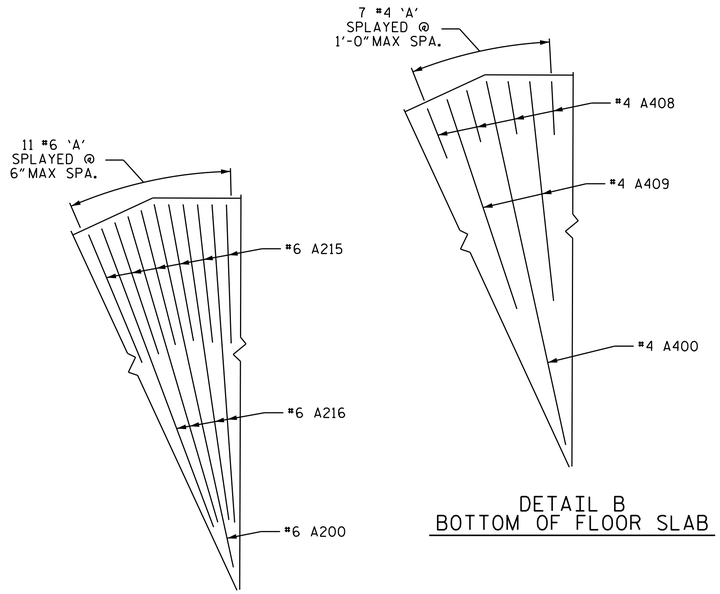
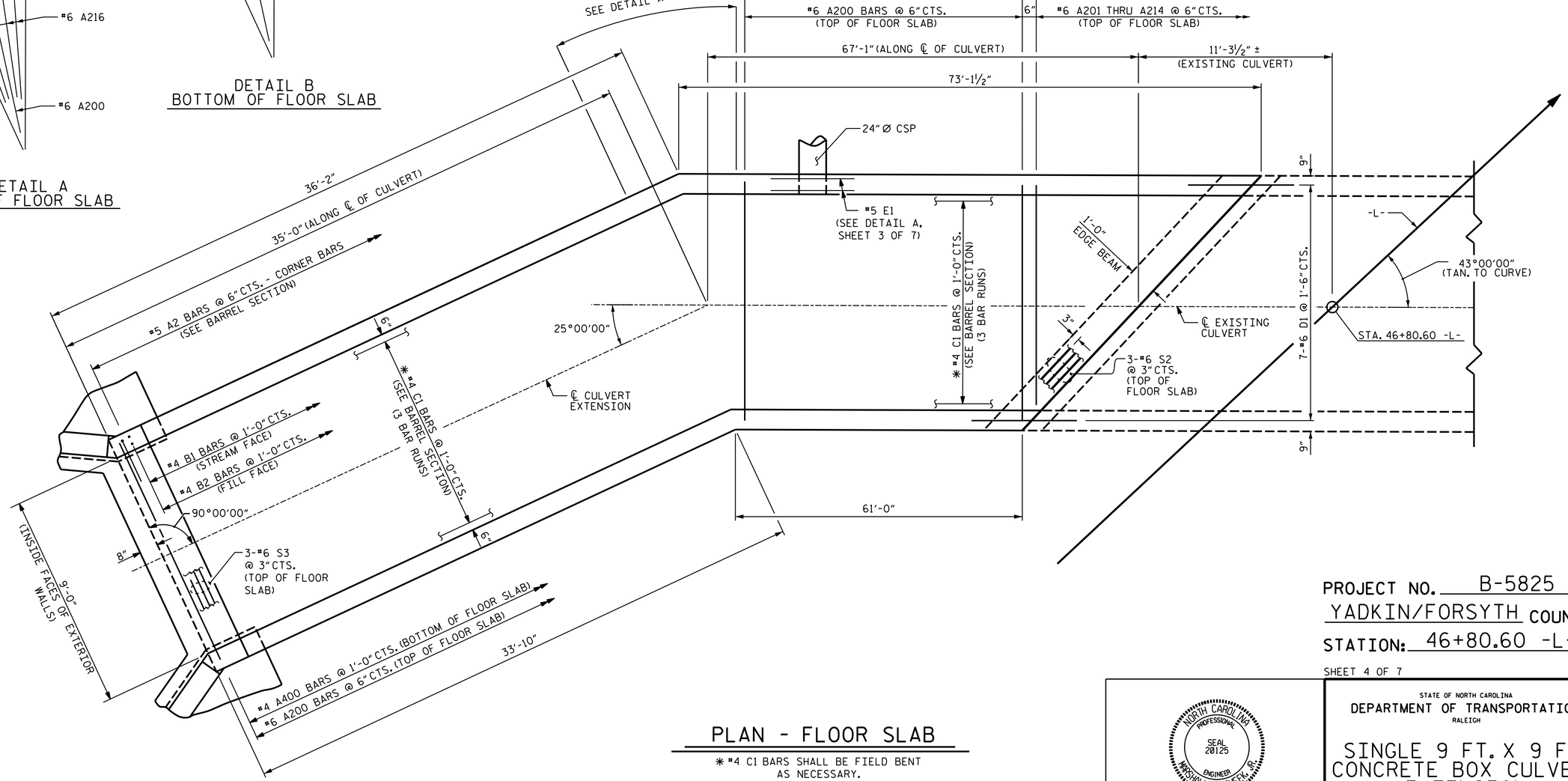
User:ZSmith



DETAIL A
TOP OF FLOOR SLAB

DETAIL B
BOTTOM OF FLOOR SLAB



PLAN - FLOOR SLAB

* #4 C1 BARS SHALL BE FIELD BENT AS NECESSARY.

PROJECT NO. B-5825
YADKIN/FORSYTH COUNTY
STATION: 46+80.60 -L-

SHEET 4 OF 7

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Digitally signed by Marshall G. Cheek Jr.
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4/14/2020

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PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9 FT. X 9 FT. CONCRETE BOX CULVERT EXTENSION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-4
1			3			TOTAL SHEETS
2			4			13

DRAWN BY : ZCS DATE : 10/19
CHECKED BY : MGC DATE : 12/19
DESIGN ENGINEER OF RECORD: ZCS DATE : 12/19

2/7/2020
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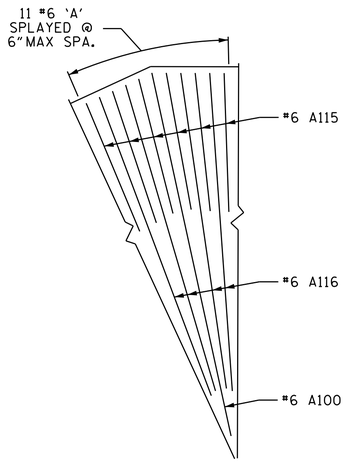
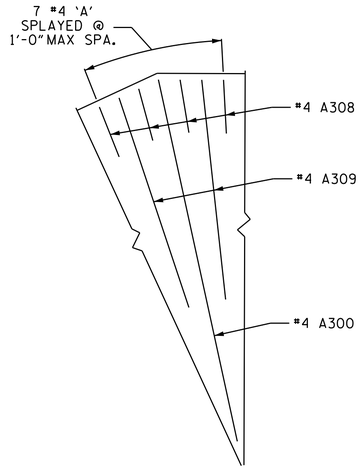
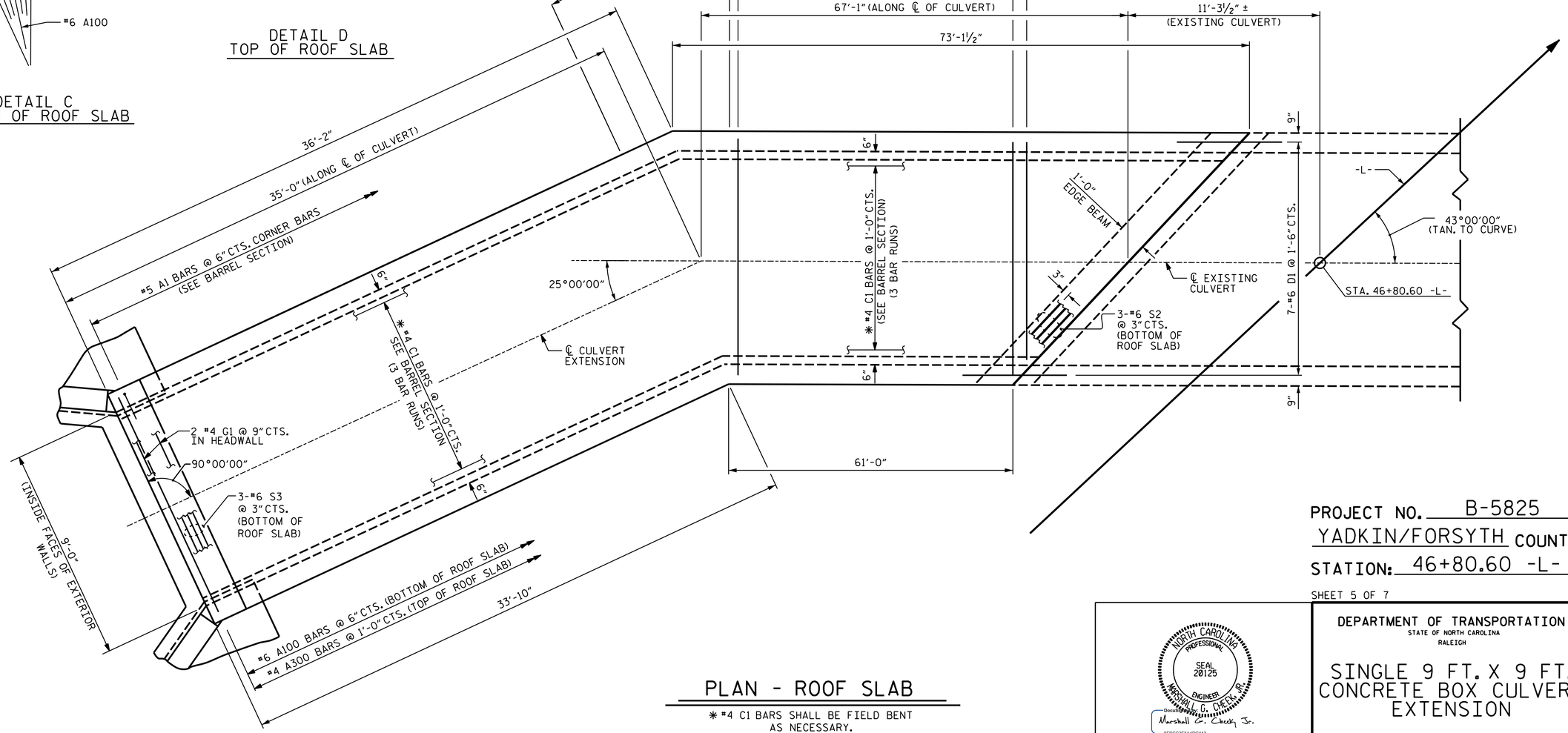
User:ZSmith



DETAIL C
BOTTOM OF ROOF SLAB



DETAIL D
TOP OF ROOF SLAB



PLAN - ROOF SLAB

* #4 C1 BARS SHALL BE FIELD BENT AS NECESSARY.

PROJECT NO. B-5825
YADKIN/FORSYTH COUNTY
STATION: 46+80.60 -L-

SHEET 5 OF 7

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL C. CHEEK, JR.
Marshall C. Cheek Jr.
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4/14/2020

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DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA
RALEIGH

SINGLE 9 FT. X 9 FT. CONCRETE BOX CULVERT EXTENSION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-5
1			3			TOTAL SHEETS
2			4			13

DRAWN BY : ZCS DATE : 10/19
CHECKED BY : MGC DATE : 12/19
DESIGN ENGINEER OF RECORD: ZCS DATE : 12/19

2/6/2020
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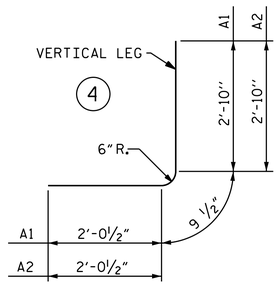
User:ZSmith

REINFORCING STEEL BAR SCHEDULE

BAR	No.	SIZE	TYPE	LENGTH	WEIGHT
A1	416	#5	4	5'-8''	2459
A2	416	#5	4	5'-8''	2459
A100	191	#6	STR	10'-2''	2917
A101	1	#6	STR	9'-10''	15
A102	1	#6	STR	9'-4''	14
A103	1	#6	STR	8'-9''	13
A104	1	#6	STR	8'-3''	12
A105	1	#6	STR	7'-9''	12
A106	1	#6	STR	7'-2''	11
A107	1	#6	STR	6'-8''	10
A108	1	#6	STR	6'-1''	9
A109	1	#6	STR	5'-7''	8
A110	1	#6	STR	5'-0''	8
A111	1	#6	STR	4'-6''	7
A112	1	#6	STR	4'-0''	6
A113	1	#6	STR	3'-5''	5
A114	1	#6	STR	2'-11''	4
A115	6	#6	STR	3'-8''	33
A116	4	#6	STR	8'-5''	51
A200	191	#6	STR	10'-2"	2917
A201	1	#6	STR	9'-10''	15
A202	1	#6	STR	9'-4''	14
A203	1	#6	STR	8'-9''	13
A204	1	#6	STR	8'-3''	12
A205	1	#6	STR	7'-9''	12
A206	1	#6	STR	7'-2''	11
A207	1	#6	STR	6'-8''	10
A208	1	#6	STR	6'-1''	9
A209	1	#6	STR	5'-7''	8
A210	1	#6	STR	5'-0''	8
A211	1	#6	STR	4'-6''	7
A212	1	#6	STR	4'-0''	6
A213	1	#6	STR	3'-5''	5
A214	1	#6	STR	2'-11''	4
A215	6	#6	STR	3'-8''	33
A216	4	#6	STR	8'-5''	51
A300	96	#4	STR	10'-2''	652
A301	1	#4	STR	9'-4"	6
A302	1	#4	STR	8'-3''	6
A303	1	#4	STR	7'-2''	5
A304	1	#4	STR	6'-1''	4
A305	1	#4	STR	5'-0''	3
A306	1	#4	STR	4'-0''	3
A307	1	#4	STR	2'-11''	2
A308	4	#4	STR	1'-5''	4
A309	2	#4	STR	5'-10''	8
A400	96	#4	STR	10'-2''	652
A401	1	#4	STR	9'-4"	6
A402	1	#4	STR	8'-3''	6
A403	1	#4	STR	7'-2''	5
A404	1	#4	STR	6'-1''	4
A405	1	#4	STR	5'-0''	3
A406	1	#4	STR	4'-0''	3
A407	1	#4	STR	2'-11''	2
A408	4	#4	STR	1'-5''	4
A409	2	#4	STR	5'-10''	8
B1	416	#4	STR	9'-6''	2640
B2	416	#4	STR	9'-0''	2501
C1	150	#4	STR	37'-8''	3774
G1	2	#4	STR	10'-2'	14
S2	6	#6	STR	13'-8"	123
S3	6	#6	STR	10'-2"	92
E1	16	#5	STR	4'-7"	76
D1	28	#6	STR	2'-6"	105

TOTAL REINFORCING STEEL

21,899 LBS.



BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART		
BAR	SIZE	SPLICE LENGTH
C1	#4	2'-5"
B1	#4	2'-5"

PROJECT NO. B-5825

YADKIN/FORSYTH COUNTY

STATION: 46+80.60 -L-

SHEET 6 OF 7

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL C. CHEEK, JR.

Marshall C. Cheek Jr.

5FBCC2F3A4DC413...

4/14/2020

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9 FT. X 9 FT. CONCRETE BOX CULVERT EXTENSION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-6
1			3			TOTAL SHEETS
2			4			13

DRAWN BY : ZCS DATE : 10/19

CHECKED BY : MGC DATE : 12/19

DESIGN ENGINEER OF RECORD: ZCS DATE : 12/19

2/7/2020
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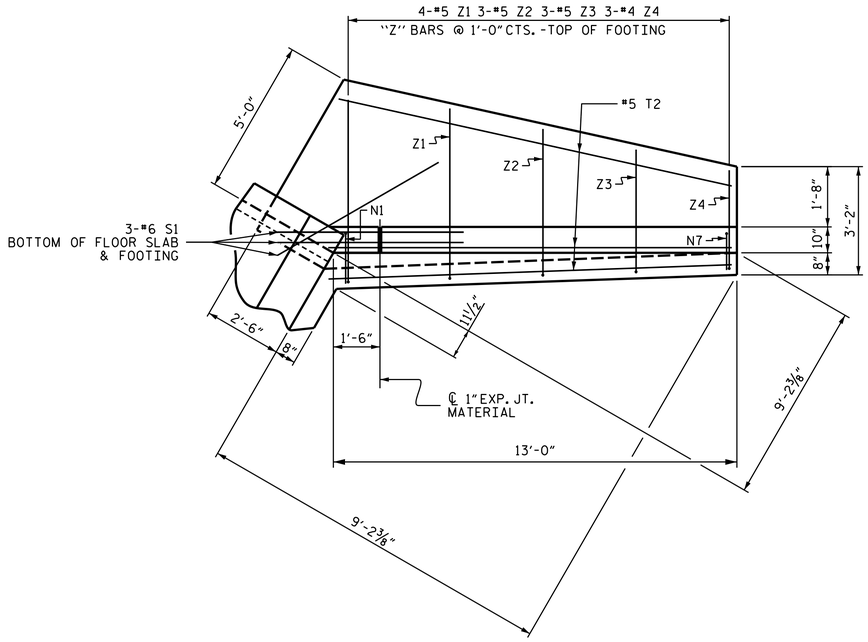
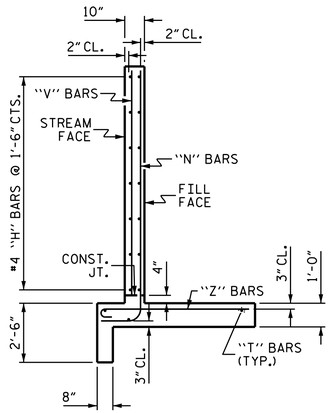
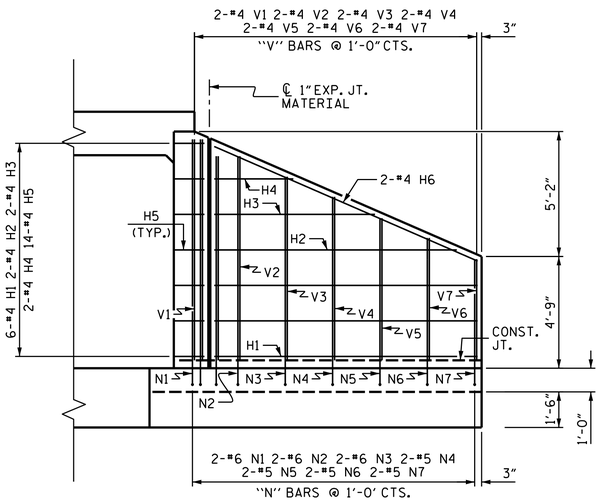
User:ZSmith



PLAN W1



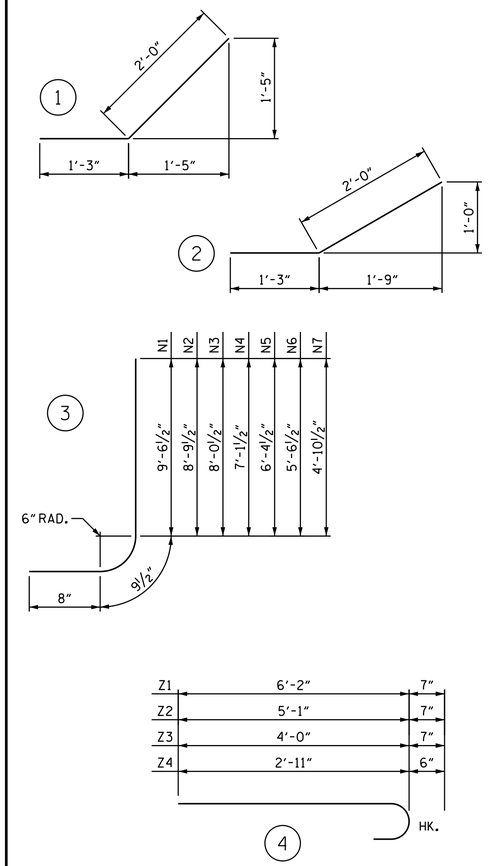
TYPICAL WING SECTION



ELEVATION W1

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	11'-1"	89
H2	4	#4	STR	10'-3"	27
H3	4	#4	STR	6'-9"	18
H4	4	#4	STR	2'-10"	8
H5	28	#4	1	3'-3"	61
H6	4	#4	STR	11'-11"	32
N1	4	#6	3	11'-0"	66
N2	4	#6	3	10'-3"	62
N3	4	#6	3	9'-6"	57
N4	4	#5	3	8'-7"	36
N5	4	#5	3	7'-10"	33
N6	4	#5	3	7'-0"	29
N7	4	#5	3	6'-4"	26
S1	6	#6	STR	6'-0"	54
T1	6	#5	STR	13'-0"	81
V1	4	#4	STR	9'-0"	24
V2	4	#4	STR	8'-2"	22
V3	4	#4	STR	7'-5"	20
V4	4	#4	STR	6'-7"	18
V5	4	#4	STR	5'-10"	16
V6	4	#4	STR	5'-0"	13
V7	4	#4	STR	4'-3"	11
Z1	8	#5	4	6'-9"	56
Z2	6	#5	4	5'-8"	35
Z3	6	#5	4	4'-7"	29
Z4	6	#4	4	3'-5"	14

REINFORCING STEEL FOR 2 WINGS 937 LBS

CLASS A CONCRETE

2 WINGS	12.4 CY
1 HEADWALL	0.5 CY
1 END CURTAIN WALL	0.3 CY
TOTAL	13.2 CY

DRAWN BY : ZCS DATE : 10/19
CHECKED BY : MGC DATE : 12/19
DESIGN ENGINEER OF RECORD: ZCS DATE : 12/19

PROJECT NO. B-5825
YADKIN/FORSYTH COUNTY
STATION: 46+80.60 -L-

SHEET 7 OF 7

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
SFBCC2F3A4DC413...
4/14/2020

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DEPARTMENT OF TRANSPORTATION
RALEIGH

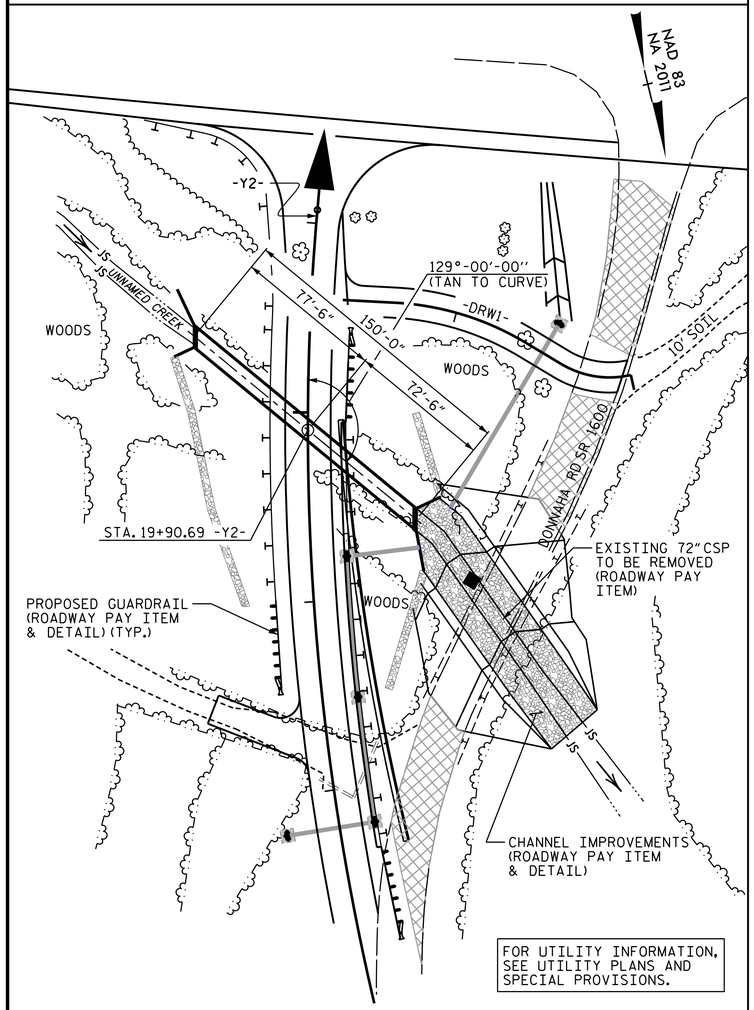
WINGS FOR CONCRETE BOX CULVERT

H = 9'-0" 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-7
1			3			TOTAL SHEETS
2			4			13

STD. NO. CW4509

BENCHMARK #2: -Y2- STA 19+05.80, 84.07 RT., ELEV. 756.60



LOCATION SKETCH

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			
BARREL @	1.59 CY/FT	238.5	C.Y.
WINGS, ETC.		45.8	C.Y.
SILLS		2.0	C.Y.
TOTAL		286.3	C.Y.
REINFORCING STEEL			
BARREL		30311	LBS.
WINGS, ETC.		3276	LBS.
TOTAL		33587	LBS.
CULVERT EXCAVATION		LUMP SUM	
FOUNDATION COND. MATERIAL		159	TONS

HYDROGRAPHIC DATA

DESIGN DISCHARGE _____ = 500 CFS
FREQUENCY OF DESIGN FLOOD_____= 50 YRS
DESIGN HIGH WATER ELEVATION _____= 746.2'
DRAINAGE AREA _____= 0.7 SQ. MI.
BASIC DISCHARGE (Q100)_____= 600 CFS
BASIC HIGH WATER ELEVATION_____= 747.1'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE _____= N/A
FREQUENCY OF OVERTOPPING FLOOD__= >500 YRS
OVERTOPPING FLOOD ELEVATION _____= 761.4'

GRADE DATA

GRADE POINT ELEV. @ STA. 19+90.69 -Y2- = 766.22
BED ELEV. @ STA. 19+90.69 -Y2-_____= 736.90
ROADWAY SLOPES_____= 2 :1

NOTES

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

DESIGN FILL RANGE ---------- 16.50' TO 19.10'

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTES SHEET.

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

CONCRETE IN CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

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.

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

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL 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.

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 IEU 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. FOROPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.

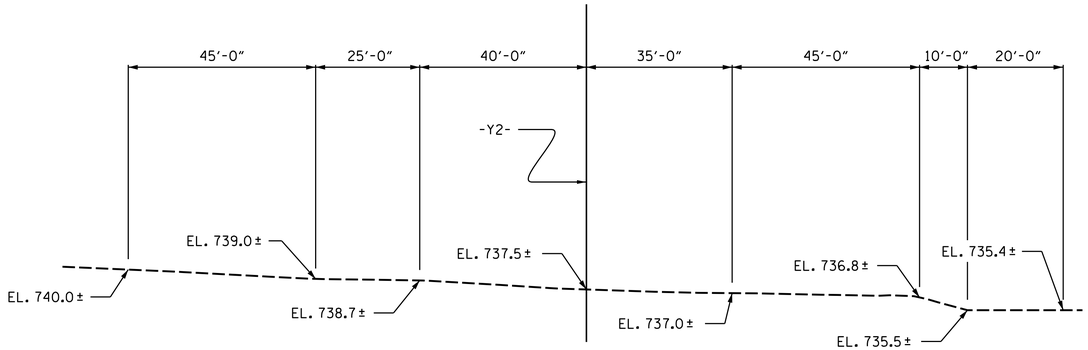
FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

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.



PROFILE ALONG ℄ CULVERT

PROJECT NO. B-5825
YADKIN/FORSYTH COUNTY
STATION: 19+90.69 -Y2-

SHEET 1 OF 6

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
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4/14/2020

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CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9 FT. X 10 FT. CONCRETE BOX CULVERT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-1
1			3			TOTAL SHEETS
2			4			13

DRAWN BY : STM DATE : 09/19
CHECKED BY : MGC DATE : 11/19
DESIGN ENGINEER OF RECORD: STM DATE : 02/20

2/20/2020
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User:smassinople

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)	1.20	--	1.75	1.20	1	BOTTOM SLAB	5.50	1.44	1	BOTTOM SLAB	5.50	
		HL-93 (OPERATING)	N/A		1.56	--	1.35	1.56	1	BOTTOM SLAB	5.50	1.87	1	BOTTOM SLAB	5.50	
		HS-20 (INVENTORY)	36.000	(2)	1.22	43.92	1.75	1.22	1	BOTTOM SLAB	5.50	1.44	1	BOTTOM SLAB	5.50	
		HS-20 (OPERATING)	36.000		1.59	57.24	1.35	1.59	1	BOTTOM SLAB	5.50	1.87	1	BOTTOM SLAB	5.50	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	(3)	1.80	24.30	1.40	1.91	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		SNGARBS2	20.000		1.75	35.00	1.40	1.75	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		SNAGRIS2	22.000		1.70	37.40	1.40	1.70	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		SNCOTTS3	27.250		1.50	40.88	1.40	1.50	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		SNAGGRS4	34.925		1.63	56.93	1.40	1.63	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		SNS5A	35.550		1.79	63.63	1.40	1.79	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		SNS6A	39.950		1.74	69.51	1.40	1.74	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		SNS7B	42.000		1.58	66.36	1.40	1.58	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.64	54.12	1.40	1.64	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		TNT4A	33.075		1.58	52.26	1.40	1.58	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		TNT6A	41.600		1.58	65.73	1.40	1.58	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		TNT7A	42.000		1.58	66.36	1.40	1.58	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		TNT7B	42.000		1.58	66.36	1.40	1.58	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		TNAGRIT4	43.000		1.58	67.94	1.40	1.58	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		TNAGT5A	45.000		1.58	71.10	1.40	1.58	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	
		TNAGT5B	45.000		1.58	71.10	1.40	1.58	1	BOTTOM SLAB	5.50	1.80	1	BOTTOM SLAB	5.50	

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.

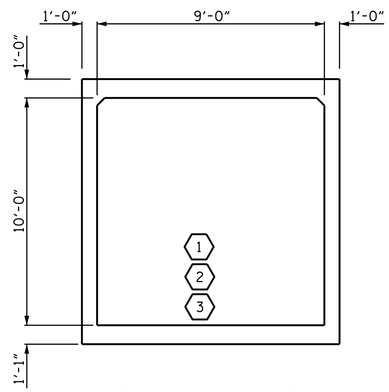
(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

PROJECT NO. B-5825

YADKIN/FORSYTH COUNTY

STATION: 19+90.69 -Y2-

SHEET 2 OF 6

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL C. CHEEK, JR.

DocuSigned by: Marshall C. Cheek Jr. 5FBCC2F3A4DC413...

4/14/2020

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CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
1			3			TOTAL SHEETS
2			4			13

STD. NO. LRFR5

ASSEMBLED BY :	STM	DATE :	10/19
CHECKED BY :	MGC	DATE :	10/19
DRAWN BY : WMC	7/11	REV. 10/1/11	MAA/GM
CHECKED BY : GM	7/11	REV. 12/17	MAA/THC

2/7/2020
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User:ZSmith

2/20/2020
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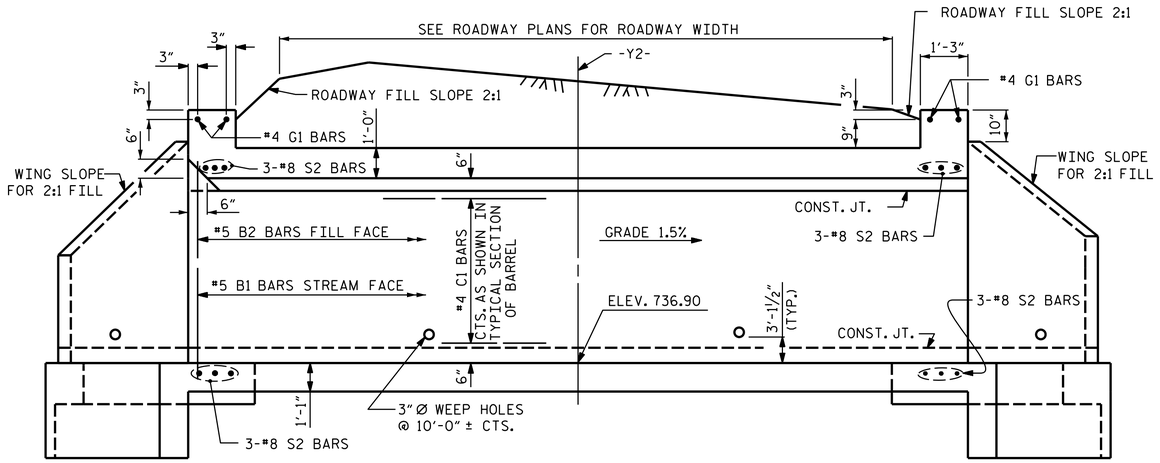
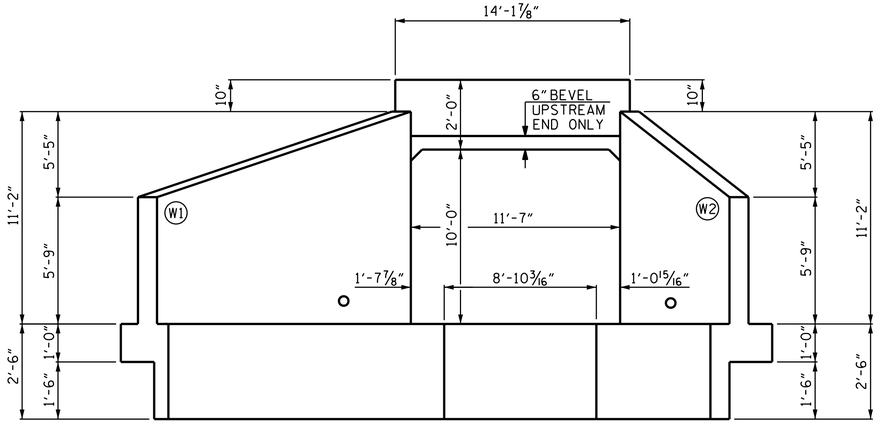
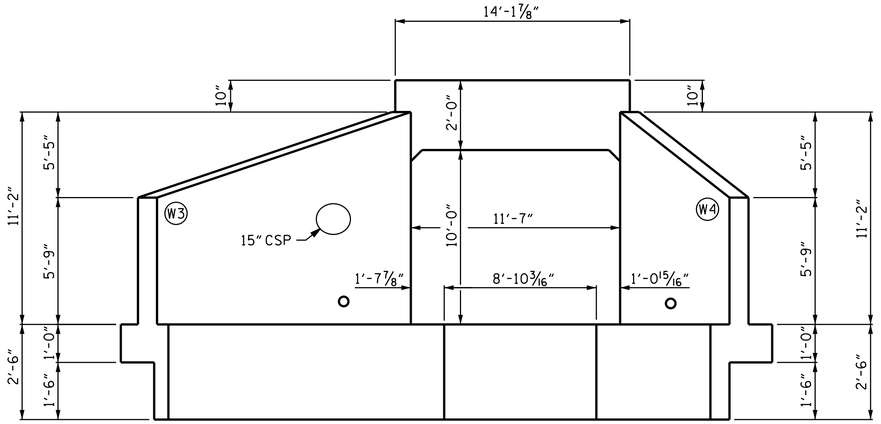
User:smassinople



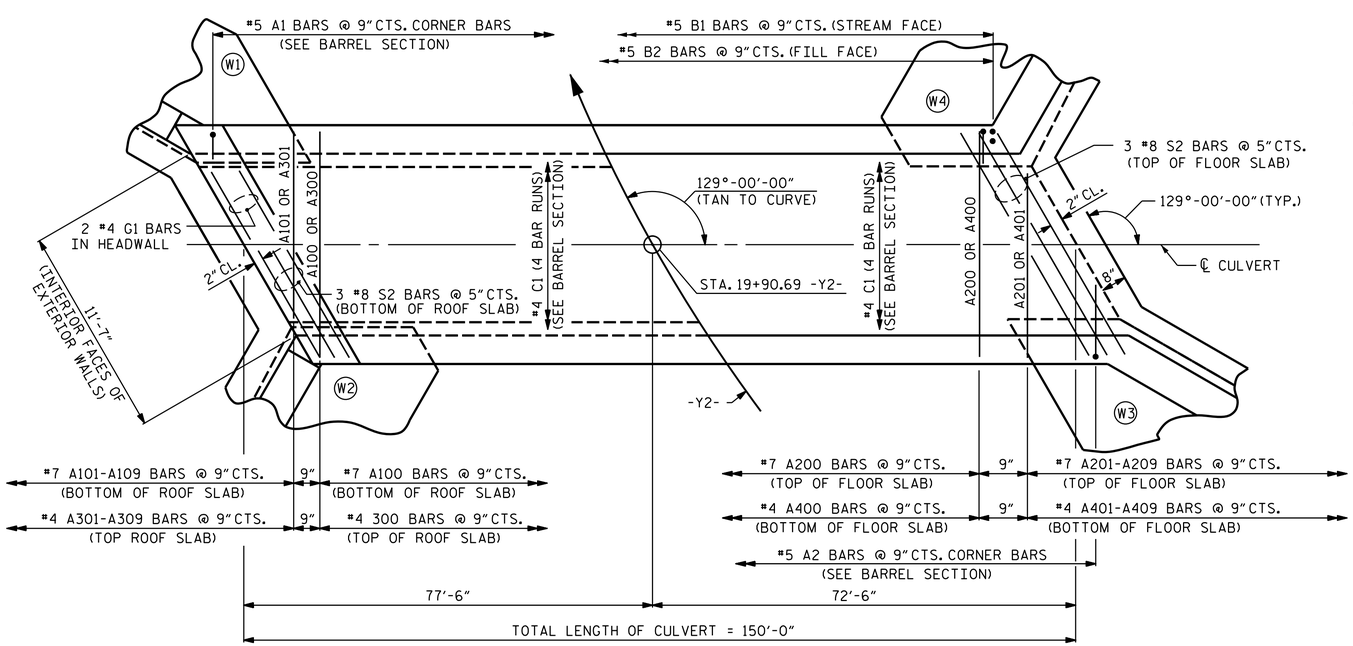
CULVERT SECTION NORMAL TO ROADWAY



INLET ELEVATION NORMAL TO SKEW



OUTLET ELEVATION NORMAL TO SKEW



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.
REVISED 8-22-89 BY A.R.B. CHECKED BY C.R.K.
REDRAWN 8-22-89
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.

DRAWN BY :	STM	DATE :	09/19
CHECKED BY :	MGC	DATE :	11/19
DESIGN ENGINEER OF RECORD:	STM	DATE :	02/20

PROJECT NO. B-5825
YADKIN/FORSYTH COUNTY
STATION: 19+90.69 -Y2-
SHEET 3 OF 6

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
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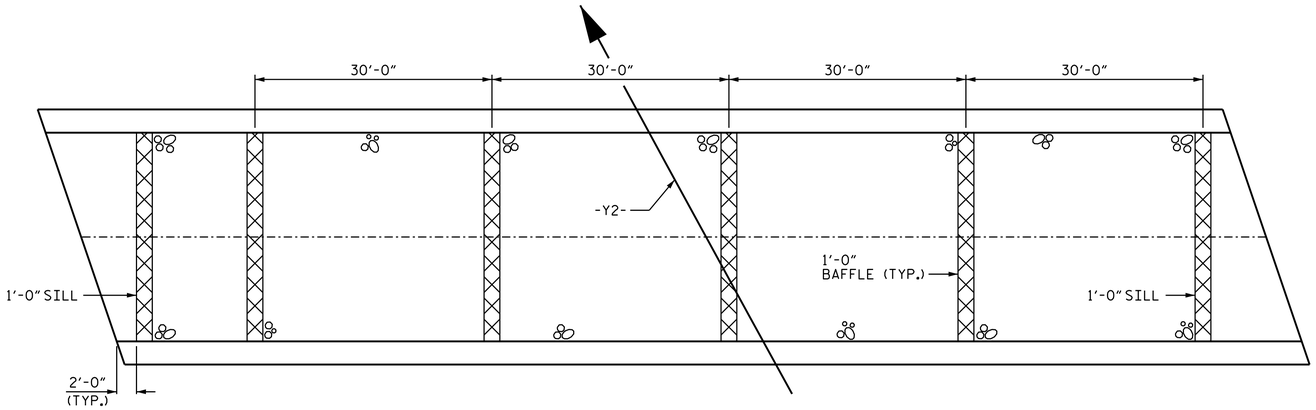
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9 FT.X 10 FT. CONCRETE BOX CULVERT 129° SKEW

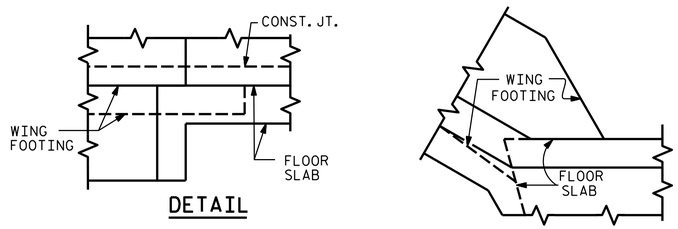
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-3
1			3			TOTAL SHEETS
2			4			13

STD. NO. CB331

2/20/2020
X:\NCDOT\B-5825\Structures\Str. #3 - I9+90.69 -Y2-\Final plan
User:smassinople

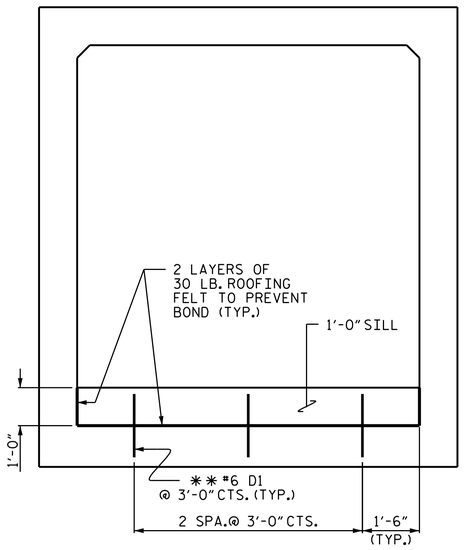


PLAN OF SILL AND BAFFLE LOCATIONS

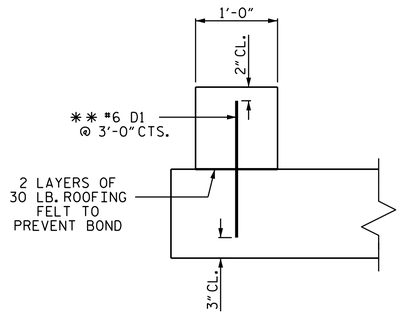


DETAIL

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



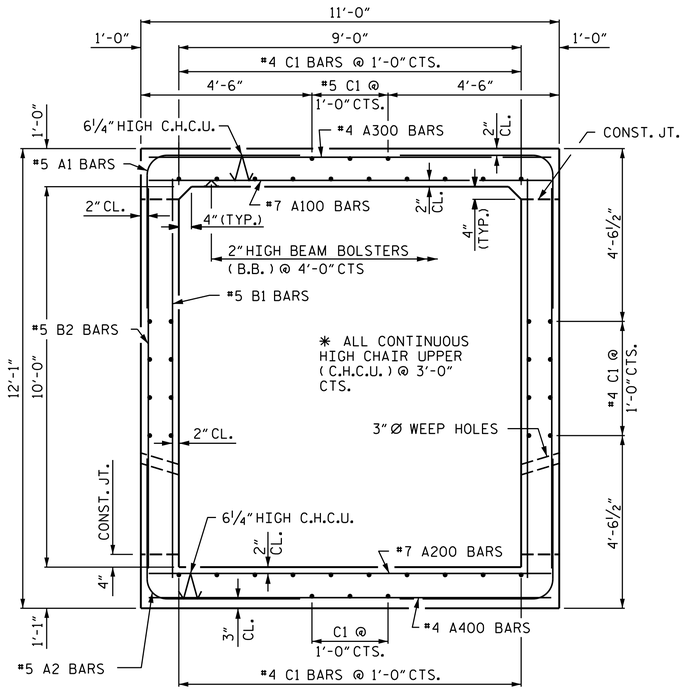
ELEVATION VIEW NORMAL TO SKEW



SECTION THROUGH SILL

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

SILL AND BAFFLE DETAILS



RIGHT ANGLE SECTION OF BARREL

THERE ARE 42 "C" BARS IN SECTION OF BARREL

NOTES

NATIVE MATERIAL EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT AS SHOWN IN THE "PLAN OF SILL AND BAFFLE LOCATIONS". RIP-RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE CULVERT BARREL. IF RIP-RAP IS USED TO LINE THE BARREL, NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

THE ENTIRE COST OF WORK REQUIRED TO PLACE THE EXCAVATED MATERIAL OR SUPPLEMENTAL MATERIAL SHOWN IN 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 & BAFFLES SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

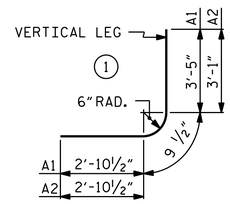
STREAMBED MATERIAL SHOULD BE PLACED LEVEL WITH THE TOP OF THE SILLS/BAFFLES.

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER
WESTON G. CHEEK, JR.
Marshall G. Cheek Jr.
5FBCC2F3A4DC413...
4/14/2020

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

BAR TYPES



DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART

BAR	SIZE	SPLICE LENGTH
C1	#4	2'-5"
B1	#5	2'-4"

BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	394	#5	1	7'-1"	2911
A2	394	#5	1	6'-9"	2774
A100	188	#7	STR	10'-7"	4067
A101	2	#7	STR	10'-1"	41
A102	2	#7	STR	9'-2"	37
A103	2	#7	STR	8'-3"	34
A104	2	#7	STR	7'-4"	30
A105	2	#7	STR	6'-5"	26
A106	2	#7	STR	5'-5"	22
A107	2	#7	STR	4'-6"	18
A108	2	#7	STR	3'-7"	15
A109	2	#7	STR	2'-8"	11
A200	188	#7	STR	10'-7"	4067
A201	2	#7	STR	10'-1"	41
A202	2	#7	STR	9'-2"	37
A203	2	#7	STR	8'-3"	34
A204	2	#7	STR	7'-4"	30
A205	2	#7	STR	6'-5"	26
A206	2	#7	STR	5'-5"	22
A207	2	#7	STR	4'-6"	18
A208	2	#7	STR	3'-7"	15
A209	2	#7	STR	2'-8"	11
A300	188	#4	STR	10'-7"	1329
A301	2	#4	STR	10'-1"	13
A302	2	#4	STR	9'-2"	12
A303	2	#4	STR	8'-3"	11
A304	2	#4	STR	7'-4"	10
A305	2	#4	STR	6'-5"	9
A306	2	#4	STR	5'-5"	7
A307	2	#4	STR	4'-6"	6
A308	2	#4	STR	3'-7"	5
A309	2	#4	STR	2'-8"	4
A400	188	#4	STR	10'-7"	1329
A401	2	#4	STR	10'-1"	13
A402	2	#4	STR	9'-2"	12
A403	2	#4	STR	8'-3"	11
A404	2	#4	STR	7'-4"	10
A405	2	#4	STR	6'-5"	9
A406	2	#4	STR	5'-5"	7
A407	2	#4	STR	4'-6"	6
A408	2	#4	STR	3'-7"	5
A409	2	#4	STR	2'-8"	4
B1	394	#5	STR	10'-6"	4315
B2	394	#5	STR	9'-8"	3972
C1	168	#4	STR	39'-3"	4405
D1	18	#6	STR	1'-8"	45
G1	4	#4	STR	13'-8"	37
S2	12	#8	STR	13'-8"	438
REINFORCING STEEL					30311 LBS.

PROJECT NO. B-5825
YADKIN/FORSYTH COUNTY
STATION: 19+90.69 -Y2-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

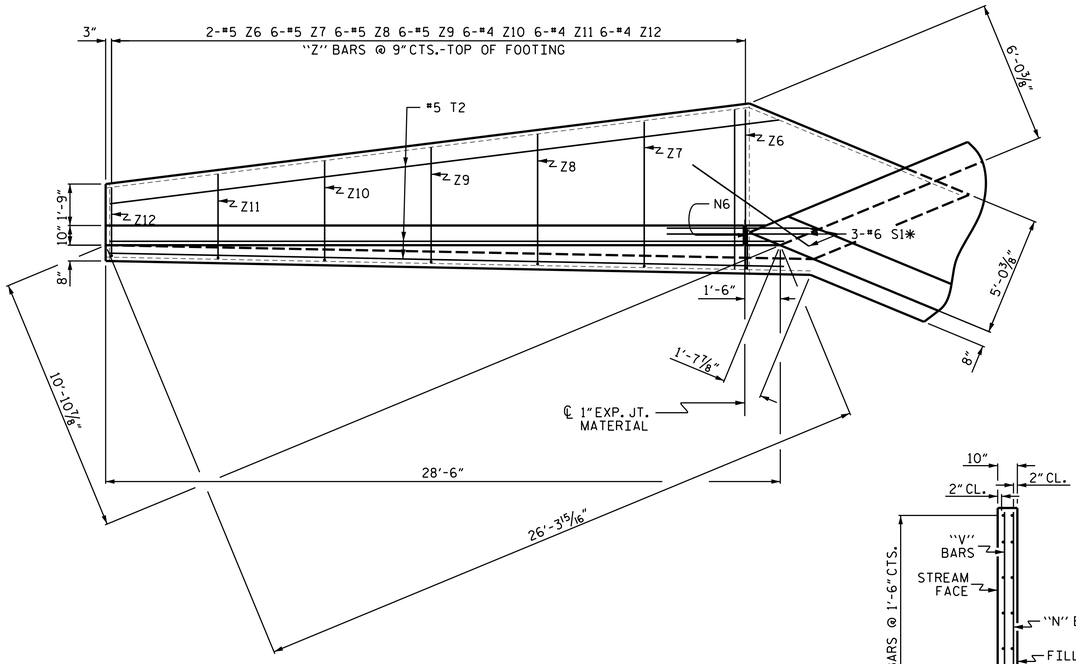
SINGLE 9 FT.X 10 FT. CONCRETE BOX CULVERT 129° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-4
1			3			TOTAL SHEETS
2			4			13

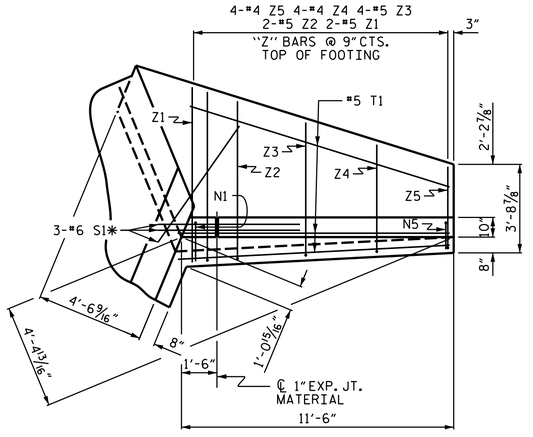
STD. NO. CB331

DRAWN BY : STM DATE : 09/19
CHECKED BY : MGC DATE : 11/19
DESIGN ENGINEER OF RECORD: STM DATE : 02/20

REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.
REVISED 8-22-89 BY A.R.B. CHECKED BY C.R.K.
REDRAWN 8-22-89
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.

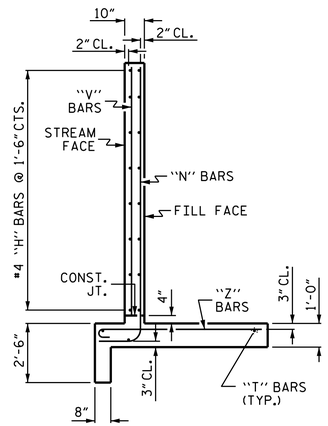


PLAN W1



* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING

PLAN W2

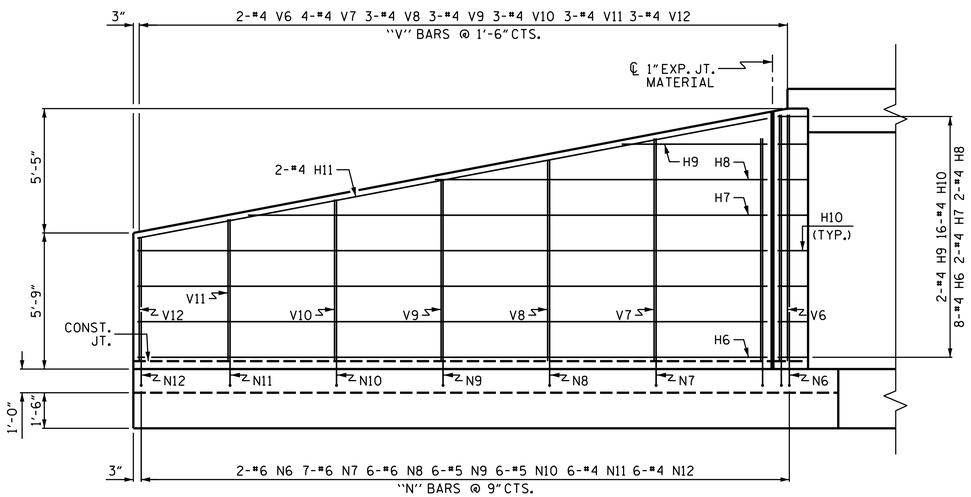


TYPICAL WING SECTION

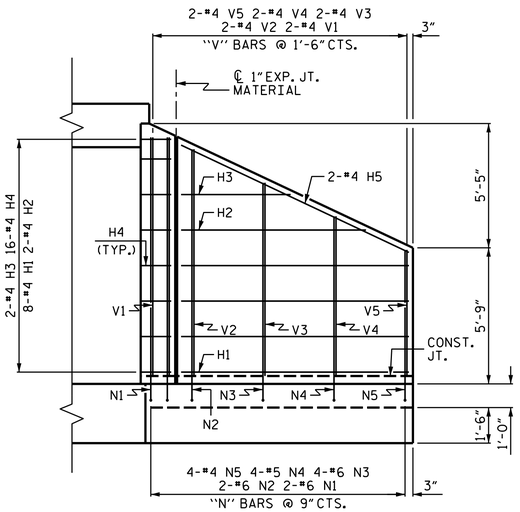
NOTES

GI BARS IN HEADWALL ARE INCLUDED WITH BARREL REINFORCING STEEL.

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.



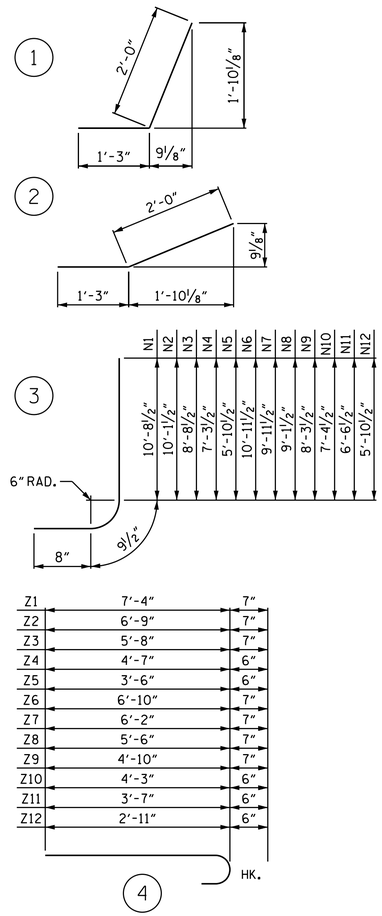
ELEVATION W1



ELEVATION W2

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	9'-7"	51
H2	2	#4	STR	7'-10"	10
H3	2	#4	STR	4'-9"	6
H4	16	#4	1	3'-3"	35
H5	2	#4	STR	10'-7"	14
H6	8	#4	STR	26'-7"	142
H7	2	#4	STR	22'-1"	30
H8	2	#4	STR	14'-5"	19
H9	2	#4	STR	6'-9"	9
H10	16	#4	2	3'-3"	35
H11	2	#4	STR	27'-11"	37
N1	2	#6	3	12'-2"	37
N2	2	#6	3	11'-7"	35
N3	4	#6	3	10'-2"	61
N4	4	#5	3	8'-9"	37
N5	4	#4	3	7'-4"	20
N6	2	#6	3	12'-5"	37
N7	7	#6	3	11'-5"	120
N8	6	#6	3	10'-7"	95
N9	6	#5	3	9'-9"	61
N10	6	#5	3	8'-10"	55
N11	6	#4	3	8'-0"	32
N12	6	#4	3	7'-4"	29
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	11'-6"	36
T2	3	#5	STR	28'-6"	89
V1	2	#4	STR	10'-1"	13
V2	2	#4	STR	9'-7"	13
V3	2	#4	STR	8'-2"	11
V4	2	#4	STR	6'-9"	9
V5	2	#4	STR	5'-4"	7
V6	2	#4	STR	10'-5"	14
V7	4	#4	STR	9'-6"	25
V8	3	#4	STR	8'-7"	17
V9	3	#4	STR	7'-9"	16
V10	3	#4	STR	6'-11"	14
V11	3	#4	STR	6'-0"	12
V12	3	#4	STR	5'-3"	11
Z1	2	#5	4	7'-11"	17
Z2	2	#5	4	7'-4"	15
Z3	4	#5	4	6'-3"	26
Z4	4	#4	4	5'-1"	14
Z5	4	#4	4	4'-0"	11
Z6	2	#5	4	7'-5"	15
Z7	6	#5	4	6'-9"	42
Z8	6	#5	4	6'-1"	38
Z9	6	#5	4	5'-5"	34
Z10	6	#4	4	4'-9"	19
Z11	6	#4	4	4'-1"	16
Z12	6	#4	4	3'-5"	14

REINFORCING STEEL FOR 2 WINGS 1609 LBS

CLASS A CONCRETE

2 WINGS	21.7	CY
1 HEADWALL	0.7	CY
1 END CURTAIN WALL	0.5	CY
TOTAL	22.9	CY

PROJECT NO. B-5825

YADKIN/FORSYTH COUNTY

STATION: 19+90.69 -Y2-

SHEET 5 OF 6

ASSEMBLED BY :	STM	DATE :	10/19
CHECKED BY :	MGC	DATE :	11/19
DRAWN BY :	CCJ		01/00
CHECKED BY :	RWW		03/00

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

4/14/2020

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

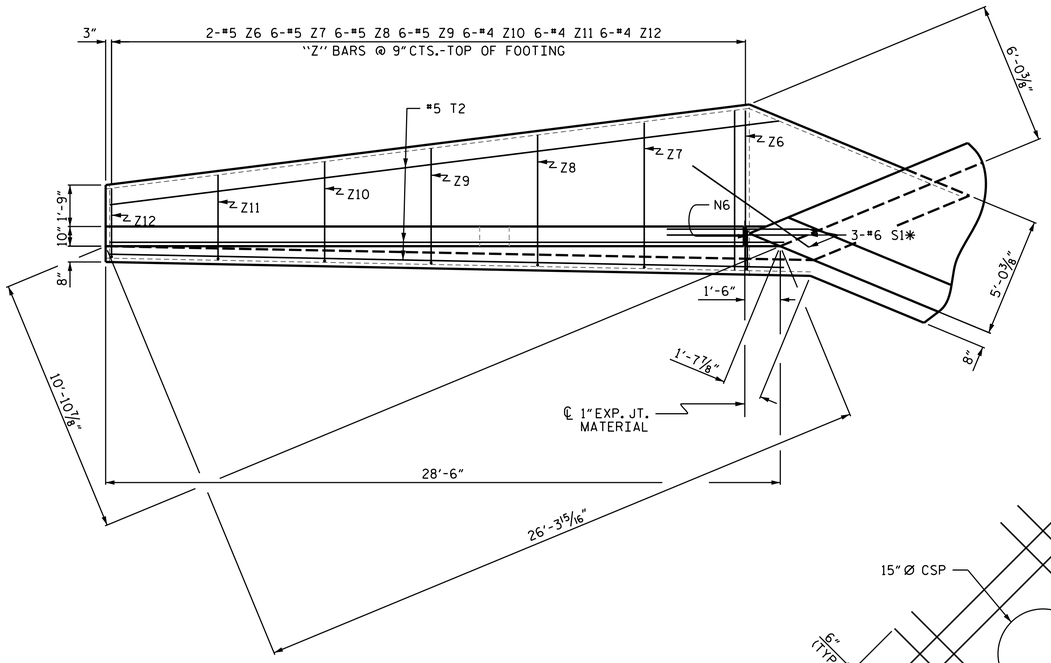
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

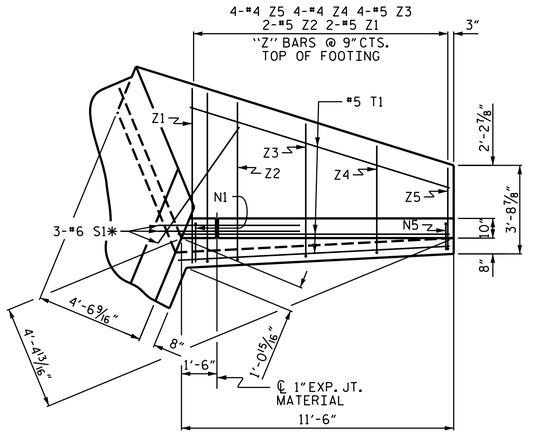
H = 10'-0" SLOPE = 2:1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-5
1			3			TOTAL SHEETS
2			4			13

STD. NO. CW4510

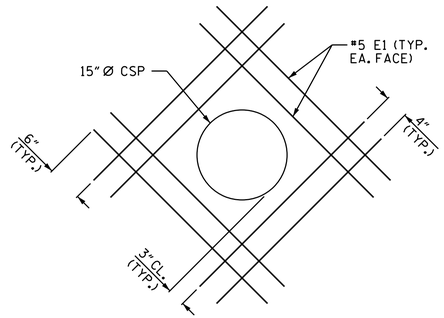


PLAN W3



* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING

PLAN W4



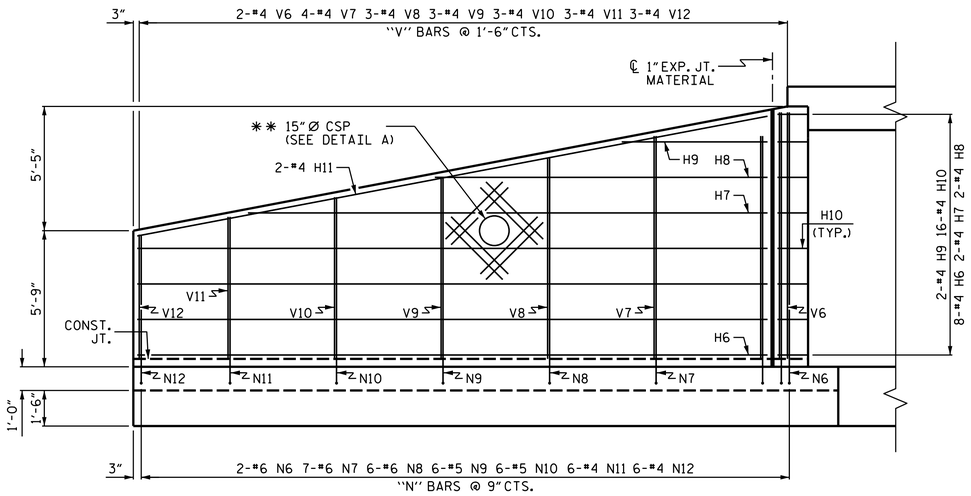
DETAIL A

** THE PIPE THROUGH THE WING WILL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL WILL BE CUT & FIELD BENT AS NECESSARY TO CLEAR THE PIPE.

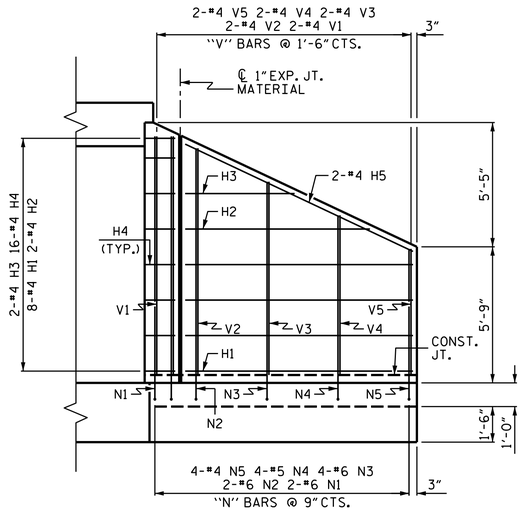
NOTES

G1 BARS IN HEADWALL ARE INCLUDED WITH BARREL REINFORCING STEEL.

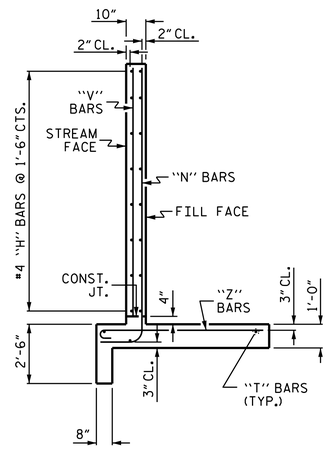
A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.



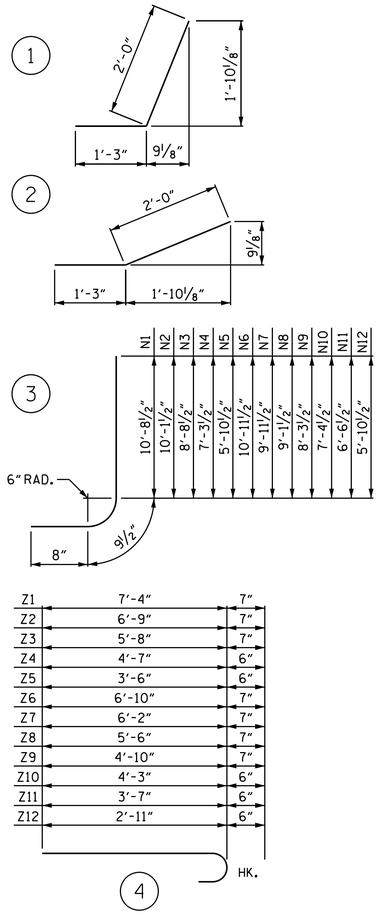
ELEVATION W3



ELEVATION W4



TYPICAL WING SECTION



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	9'-7"	51
H2	2	#4	STR	7'-10"	10
H3	2	#4	STR	4'-9"	6
H4	16	#4	1	3'-3"	35
H5	2	#4	STR	10'-7"	14
H6	8	#4	STR	26'-7"	142
H7	2	#4	STR	22'-1"	30
H8	2	#4	STR	14'-5"	19
H9	2	#4	STR	6'-9"	9
H10	16	#4	2	3'-3"	35
H11	2	#4	STR	27'-11"	37
N1	2	#6	3	12'-2"	37
N2	2	#6	3	11'-7"	35
N3	4	#6	3	10'-2"	61
N4	4	#5	3	8'-9"	37
N5	4	#4	3	7'-4"	20
N6	2	#6	3	12'-5"	37
N7	7	#6	3	11'-5"	120
N8	6	#6	3	10'-7"	95
N9	6	#5	3	9'-9"	61
N10	6	#5	3	8'-10"	55
N11	6	#4	3	8'-0"	32
N12	6	#4	3	7'-4"	29
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	11'-6"	36
T2	3	#5	STR	28'-6"	89
V1	2	#4	STR	10'-1"	13
V2	2	#4	STR	9'-7"	13
V3	2	#4	STR	8'-2"	11
V4	2	#4	STR	6'-9"	9
V5	2	#4	STR	5'-4"	7
V6	2	#4	STR	10'-5"	14
V7	4	#4	STR	9'-6"	25
V8	3	#4	STR	8'-7"	17
V9	3	#4	STR	7'-9"	16
V10	3	#4	STR	6'-11"	14
V11	3	#4	STR	6'-0"	12
V12	3	#4	STR	5'-3"	11
Z1	2	#5	4	7'-11"	17
Z2	2	#5	4	7'-4"	15
Z3	4	#5	4	6'-3"	26
Z4	4	#4	4	5'-1"	14
Z5	4	#4	4	4'-0"	11
Z6	2	#5	4	7'-5"	15
Z7	6	#5	4	6'-9"	42
Z8	6	#5	4	6'-1"	38
Z9	6	#5	4	5'-5"	34
Z10	6	#4	4	4'-9"	19
Z11	6	#4	4	4'-1"	16
Z12	6	#4	4	3'-5"	14
E1	16	#5	STR	3'-6"	58

REINFORCING STEEL FOR 2 WINGS	1667 LBS
CLASS A CONCRETE	
2 WINGS	21.7 CY
1 HEADWALL	0.7 CY
1 END CURTAIN WALL	0.5 CY
TOTAL	22.9 CY

PROJECT NO. B-5825

YADKIN/FORSYTH COUNTY

STATION: 19+90.69 -Y2-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 10'-0" SLOPE = 2:1

ASSEMBLED BY :	STM	DATE :	10/19
CHECKED BY :	MGC	DATE :	11/19
DRAWN BY :	CCJ		01/00
CHECKED BY :	RWW		03/00

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-6
1			3			TOTAL SHEETS
2			4			13

STD. NO. CW4510

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION - GRADE 60	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR UNTREATED EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" 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 ¼" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

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ENGLISH

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STD. NO. SN

REV. 6-16-95 EEM (/) RGW
REV. 8-16-99 RWW (/) LES
REV. 5-7-03 RWW (/) JTE
REV. 5-1-06 TLA (/) GM
REV. 10-1-11 MAA (/) GM
REV. 12-17 MAA (/) THC

6/6/2019
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User:smassinople