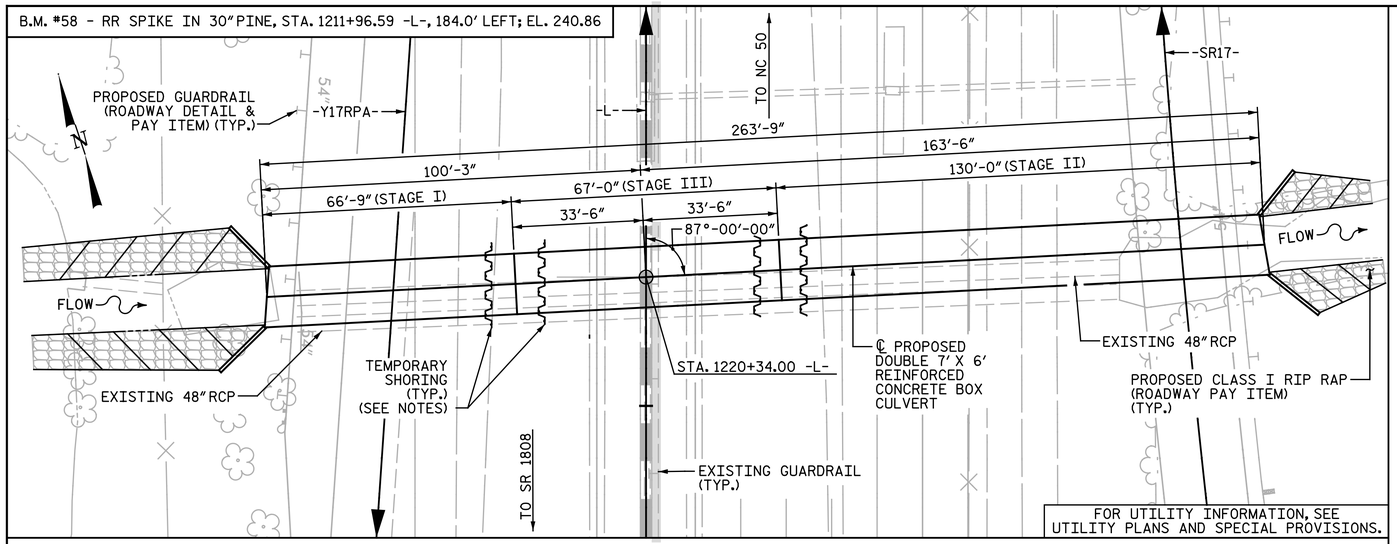

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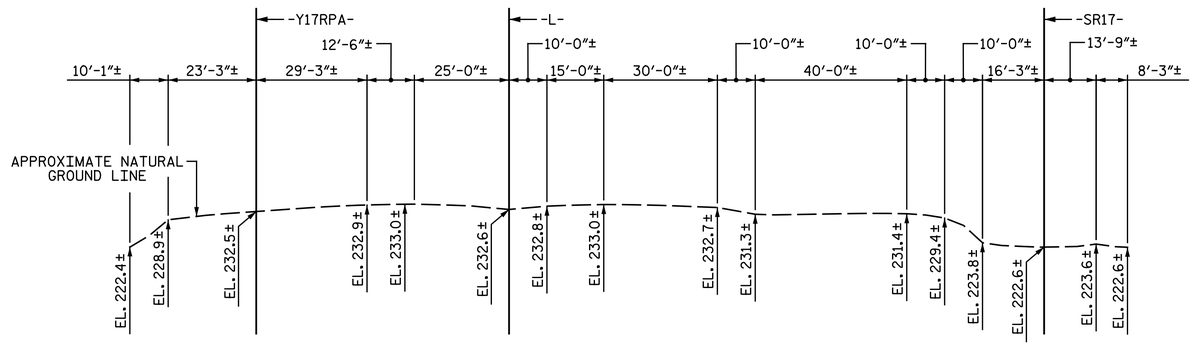


PROFILE ALONG ℄ CULVERT

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

MAXIMUM DESIGN FILL = 5.46'.

MINIMUM DESIGN FILL = 2.35'.

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

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

CONCRETE IN STAGE I AND STAGE II OF 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.

CONCRETE IN STAGE III OF CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. FLOOR SLAB INCLUDING 4"OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS FOLLOWED BY ROOF SLAB.

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 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

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

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.

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.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

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.

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

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

THE COST FOR REMOVAL OF THE EXISTING TWO 48"Ø RCP SHALL BE INCLUDED IN THE PAY ITEM FOR "CULVERT EXCAVATION".

ROADWAY DATA

GRADE POINT ELEV. @ STATION 1220+34.00 -L-	= 234.23
BED ELEV. @ STATION 1220+34.00 -L-	= 223.13
ROADWAY SLOPES	= 3:1

HYDRAULIC DATA

DESIGN DISCHARGE	= 420 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 230.00
DRAINAGE AREA	= 0.93 SQ. MI.
BASE DISCHARGE (Q100)	= 460 C.F.S.
BASE HIGH WATER ELEVATION	= 230.40

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 1070 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= >500 YRS.
OVERTOPPING FLOOD ELEVATION	= 234.20

NOTE: OVERTOPS ROADWAY @ STA. -L- 1220+87.00

TOTAL STRUCTURE QUANTITIES

CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL		
STAGE I	94	TONS
STAGE II	183	TONS
STAGE III	94	TONS
TOTAL	371	TONS
CLASS A CONCRETE		
STAGE I	112.8	C.Y.
STAGE II	207.1	C.Y.
STAGE III	99.8	C.Y.
TOTAL	419.7	C.Y.
REINFORCING STEEL		
STAGE I	14,426	LBS.
STAGE II	27,124	LBS.
STAGE III	13,515	LBS.
TOTAL	55,065	LBS.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS.

PROJECT NO. I-5883

HARNETT COUNTY

STATION: 1220+34.00 -L-

SHEET 1 OF 5

NORTH CAROLINA PROFESSIONAL SEAL 043878 ENGINEER AMANDA H. SHARPE

DocuSigned by: Amanda H. Sharpe 81D6FFF4ECEF4D2...

4/27/2021

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 7 FT. X 6 FT. CONCRETE BOX CULVERT 87° SKEW

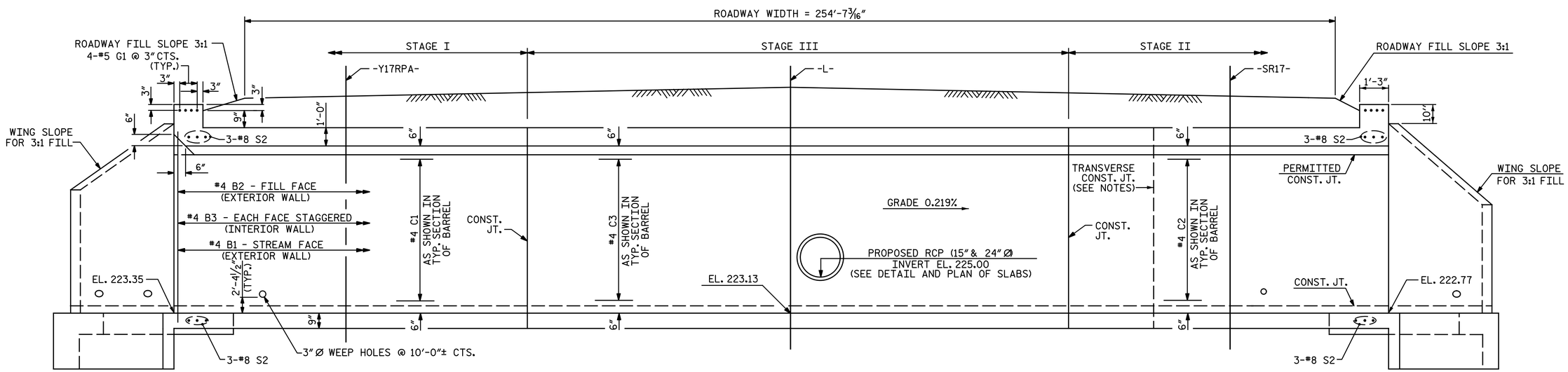
DRAWN BY : N. B. SPEAKS DATE : 3-13-19
CHECKED BY : A. H. SHARPE DATE : 4-26-21

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

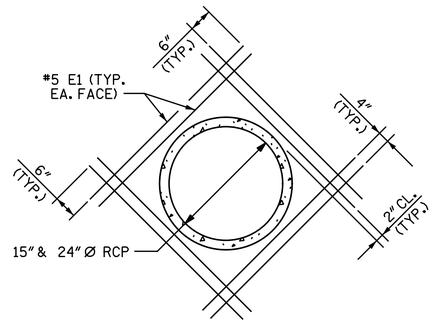
Michael Baker INTERNATIONAL

Michael Baker Engineering
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
NC License No.: F-1084

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

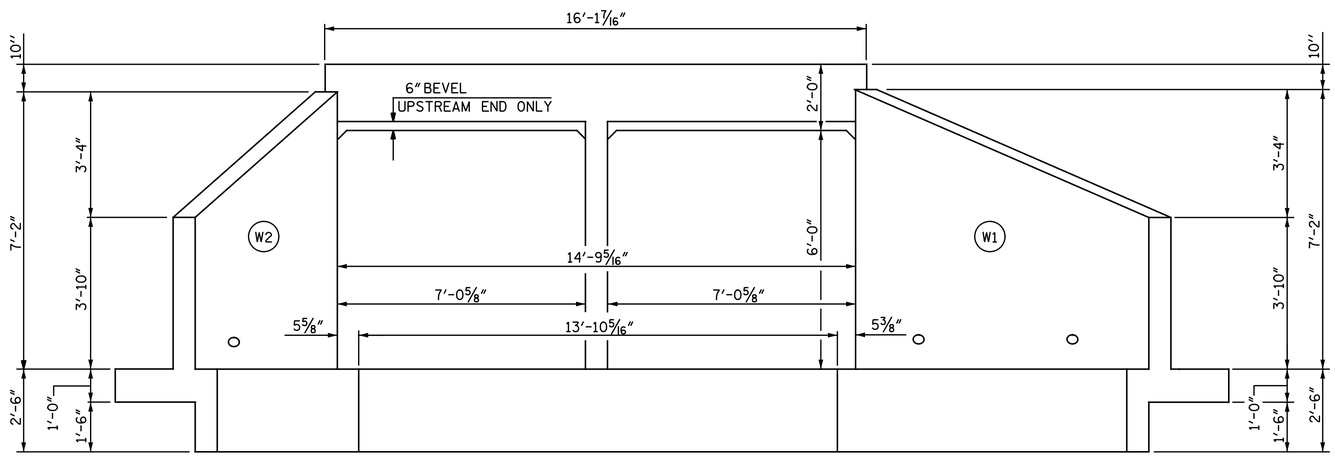


CULVERT SECTION NORMAL TO -L-



DETAIL OF REINFORCING STEEL AROUND 15" & 24" Ø RCP

THE 15" & 24" DIAMETER REINFORCED CONCRETE PIPES THROUGH THE SIDEWALL OF THE CULVERT SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE FIELD BENT OR CUT AS NECESSARY TO CLEAR THE PIPES.



END ELEVATION NORMAL TO SKEW

(INVERT END OF CULVERT SHOWN, OUTLET END OF CULVERT SIMILAR BUT WINGS OPPOSITE)

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS.

DRAWN BY : N. B. SPEAKS DATE : 3-13-19
CHECKED BY : A. H. SHARPE DATE : 2-25-20

NORTH CAROLINA PROFESSIONAL SEAL 043878 ENGINEER AMANDA H. SHARPE

DocuSigned by: Amanda H. Sharpe 81D6FFF4ECEF4D2...
4/7/2020

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REVISIONS						SHEET NO.
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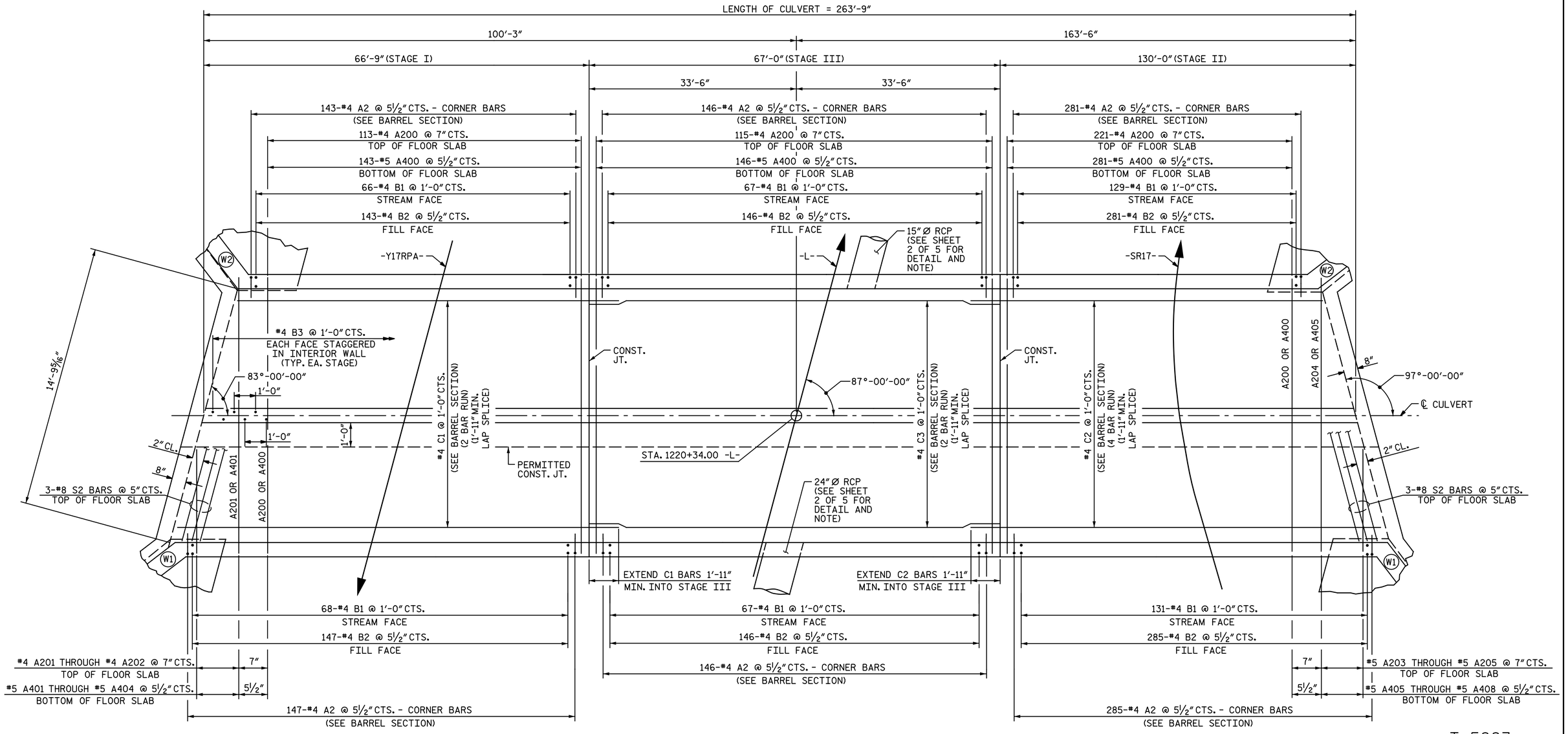
1			3			TOTAL SHEETS
2			4			7

PROJECT NO. I-5883
HARNETT COUNTY
STATION: 1220+34.00 -L-
SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 7 FT. X 6 FT. CONCRETE BOX CULVERT 87° SKEW



PLAN OF FLOOR SLAB

PROJECT NO. I-5883

HARNETT COUNTY

STATION: 1220+34.00 -L-

SHEET 3 OF 5

NORTH CAROLINA PROFESSIONAL SEAL 043878 ENGINEER AMANDA H. SHARPE

DocuSigned by: Amanda H. Sharpe 81D6FFF4ECEF4D2...

12/11/2019

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 7 FT. X 6 FT.
CONCRETE BOX CULVERT
87° SKEW

DRAWN BY : N. B. SPEAKS DATE : 3-13-19
CHECKED BY : A. H. SHARPE DATE : 6-14-19

Michael Baker INTERNATIONAL

Michael Baker Engineering
8000 Regency Parkway, Suite 600
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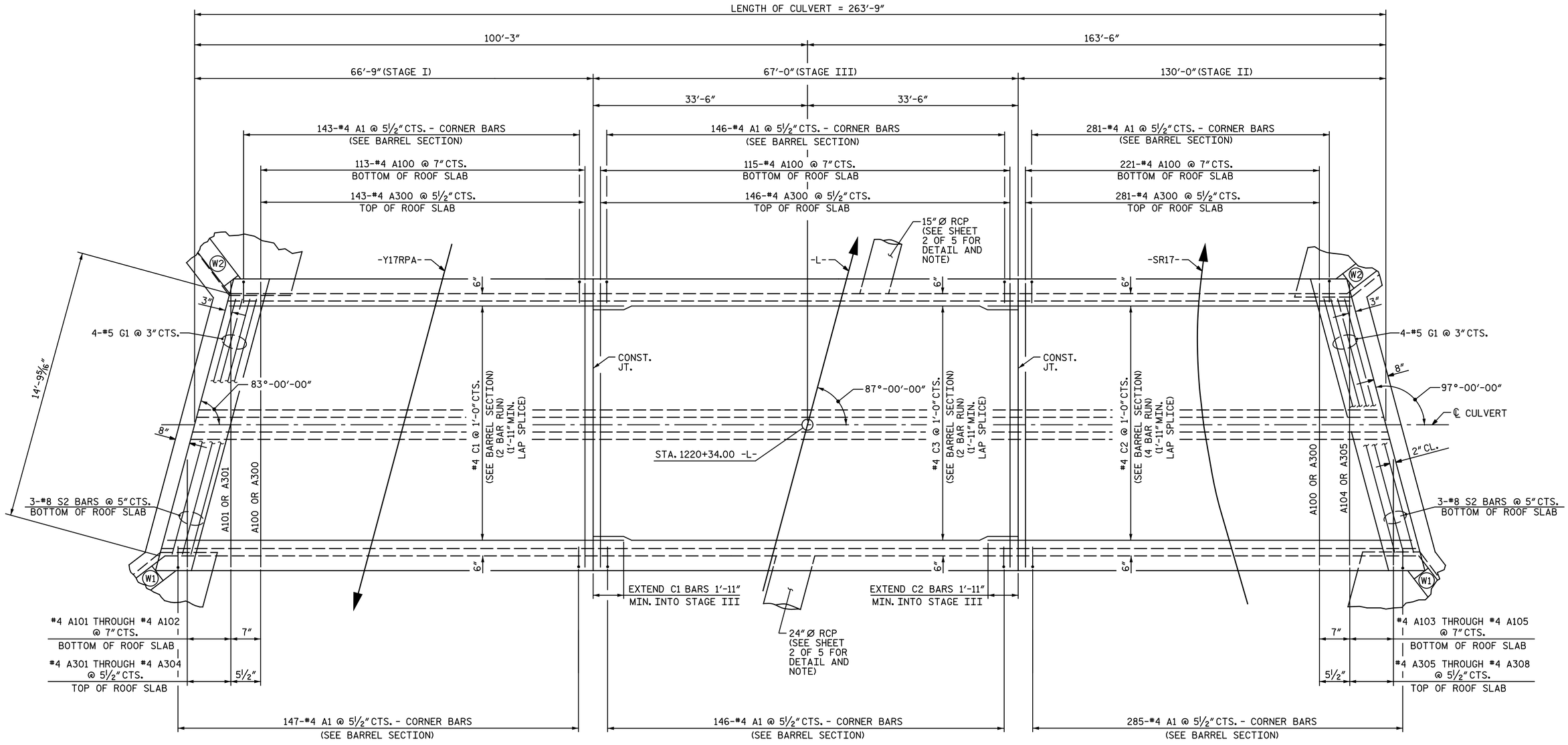
1			3			TOTAL SHEETS
2			4			7



PLAN OF ROOF SLAB

PROJECT NO. I-5883

HARNETT COUNTY

STATION: 1220+34.00 -L-

SHEET 4 OF 5

NORTH CAROLINA PROFESSIONAL SEAL 043878 ENGINEER AMANDA H. SHARPE

DocuSigned by: Amanda H. Sharpe 81D6FFF4ECEF4D2...

12/11/2019

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 7 FT. X 6 FT. CONCRETE BOX CULVERT 87° SKEW

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1			3			TOTAL SHEETS
2			4			7

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NC License No.: F-1084

DRAWN BY : N. B. SPEAKS DATE : 3-13-19
CHECKED BY : A. H. SHARPE DATE : 6-14-19

STAGE I QUANTITIES

CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	94	TONS
CLASS A CONCRETE		
BARREL @ 1.49 CY/FT	99.4	C.Y.
WINGS, ETC.	13.4	C.Y.
TOTAL	112.8	C.Y.
REINFORCING STEEL		
BARREL	13,712	LBS.
WINGS, ETC.	714	LBS.
TOTAL	14,426	LBS.

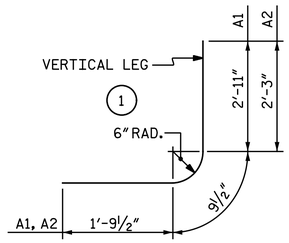
STAGE II QUANTITIES

CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	183	TONS
CLASS A CONCRETE		
BARREL @ 1.49 CY/FT	193.7	C.Y.
WINGS, ETC.	13.4	C.Y.
TOTAL	207.1	C.Y.
REINFORCING STEEL		
BARREL	26,410	LBS.
WINGS, ETC.	714	LBS.
TOTAL	27,124	LBS.

STAGE III QUANTITIES

CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	94	TONS
CLASS A CONCRETE		
BARREL @ 1.49 CY/FT	99.8	C.Y.
WINGS, ETC.	0.0	C.Y.
TOTAL	99.8	C.Y.
REINFORCING STEEL		
BARREL	13,515	LBS.
WINGS, ETC.	0	LBS.
TOTAL	13,515	LBS.

BAR TYPE



ALL DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL — STAGE I

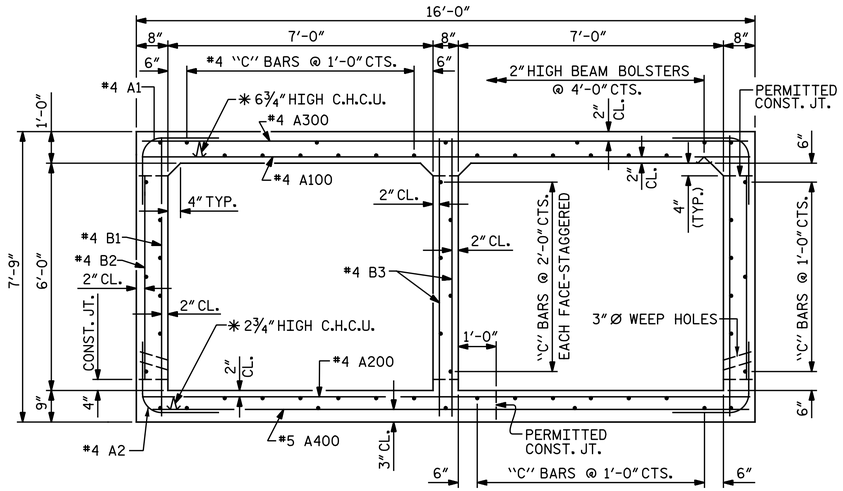
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	290	#4	1	5′ - 6″	1,065
A2	290	#4	1	4′ - 10″	936
A100	113	#4	STR.	15′ - 8″	1,183
A101	1	#4	STR.	11′ - 2″	7
A102	1	#4	STR.	6′ - 5″	4
A200	113	#4	STR.	15′ - 8″	1,183
A201	1	#4	STR.	11′ - 2″	7
A202	1	#4	STR.	6′ - 5″	4
A300	143	#4	STR.	15′ - 8″	1,497
A301	1	#4	STR.	14′ - 3″	10
A302	1	#4	STR.	10′ - 6″	7
A303	1	#4	STR.	6′ - 9″	5
A304	1	#4	STR.	3′ - 0″	2
A400	143	#5	STR.	15′ - 8″	2,337
A401	1	#5	STR.	14′ - 3″	15
A402	1	#5	STR.	10′ - 6″	11
A403	1	#5	STR.	6′ - 9″	7
A404	1	#5	STR.	3′ - 0″	3
B1	134	#4	STR.	7′ - 4″	656
B2	290	#4	STR.	5′ - 4″	1,033
B3	133	#4	STR.	7′ - 4″	652
C1	116	#4	STR.	35′ - 9″	2,770
G1	4	#5	STR.	15′ - 9″	66
S2	6	#8	STR.	15′ - 9″	252
REINFORCING STEEL				LBS.	13,712

BILL OF MATERIAL — STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	566	#4	1	5′ - 6″	2,079
A2	566	#4	1	4′ - 10″	1,827
A100	221	#4	STR.	15′ - 8″	2,313
A103	1	#4	STR.	13′ - 3″	9
A104	1	#4	STR.	8′ - 6″	6
A105	1	#4	STR.	3′ - 9″	3
A200	221	#4	STR.	15′ - 8″	2,313
A203	1	#4	STR.	13′ - 3″	9
A204	1	#4	STR.	8′ - 6″	6
A205	1	#4	STR.	3′ - 9″	3
A300	281	#4	STR.	15′ - 8″	2,941
A305	1	#4	STR.	13′ - 7″	9
A306	1	#4	STR.	9′ - 10″	7
A307	1	#4	STR.	6′ - 1″	4
A308	1	#4	STR.	2′ - 4″	2
A400	281	#5	STR.	15′ - 8″	4,592
A405	1	#5	STR.	13′ - 7″	14
A406	1	#5	STR.	9′ - 10″	10
A407	1	#5	STR.	6′ - 1″	6
A408	1	#5	STR.	2′ - 4″	2
B1	260	#4	STR.	7′ - 4″	1,274
B2	566	#4	STR.	5′ - 4″	2,016
B3	260	#4	STR.	7′ - 4″	1,274
C2	232	#4	STR.	34′ - 8″	5,373
G1	4	#5	STR.	15′ - 9″	66
S2	6	#8	STR.	15′ - 9″	252
REINFORCING STEEL				LBS.	26,410

BILL OF MATERIAL — STAGE III

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	292	#4	1	5′ - 6″	1,073
A2	292	#4	1	4′ - 10″	943
A100	115	#4	STR.	15′ - 8″	1,204
A200	115	#4	STR.	15′ - 8″	1,204
A300	146	#4	STR.	15′ - 8″	1,528
A400	146	#5	STR.	15′ - 8″	2,386
B1	134	#4	STR.	7′ - 4″	656
B2	292	#4	STR.	5′ - 4″	1,040
B3	133	#4	STR.	7′ - 4″	652
C3	116	#4	STR.	34′ - 6″	2,673
E1	32	#5	STR.	4′ - 8″	156
REINFORCING STEEL				LBS.	13,515



RIGHT ANGLE SECTION OF BARREL

THERE ARE 58 "C" BARS IN SECTION OF BARREL.
* ALL CONTINUOUS HIGH CHAIR UPPER (C.H.C.U.) @ 3′-0″ CTS.

SPLICE LENGTH CHART		
BAR	SIZE	SPLICE LENGTH
A200	#4	2′-5″
A400	#5	2′-2″
B1, B3	#4	1′-5″
C1, C2, C3	#4	1′-11″

PROJECT NO. I-5883
HARNETT COUNTY
STATION: 1220+34.00 -L-

SHEET 5 OF 5

NORTH CAROLINA PROFESSIONAL SEAL 043878 ENGINEER AMANDA H. SHARPE

DocuSigned by: Amanda H. Sharpe 81D6FFF4ECEF402...

12/11/2019

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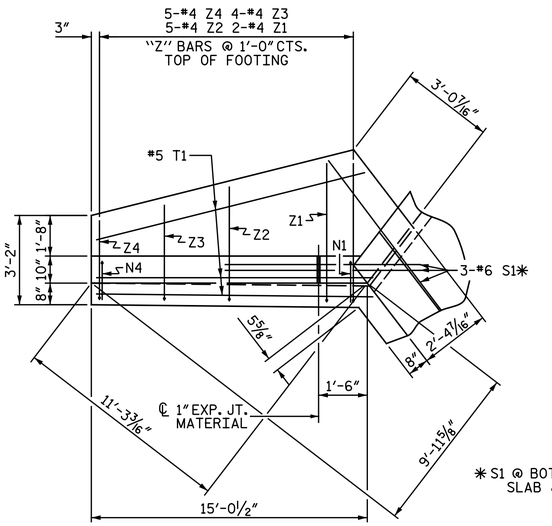
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

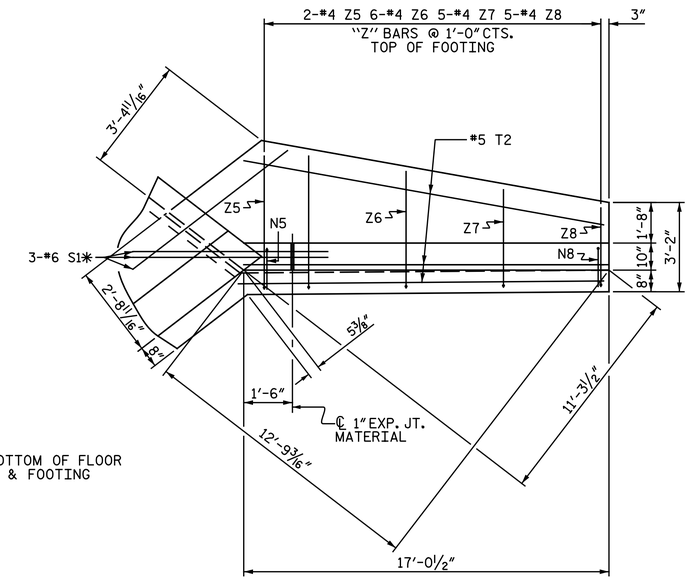
DOUBLE 7 FT. X 6 FT. CONCRETE BOX CULVERT 87° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-5
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : N. B. SPEAKS DATE : 3-13-19
CHECKED BY : A. H. SHARPE DATE : 6-14-19

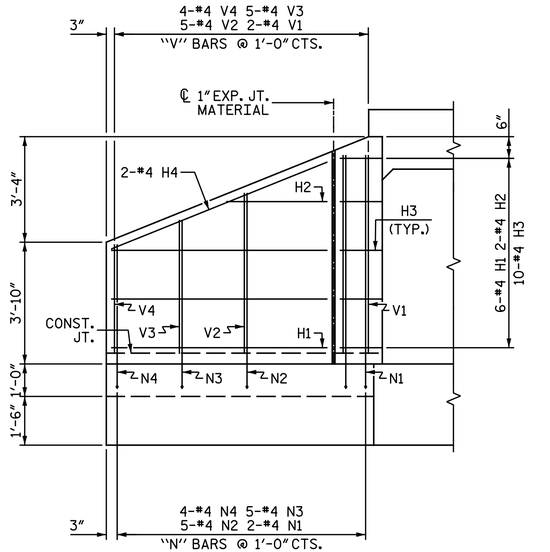


PLAN W2

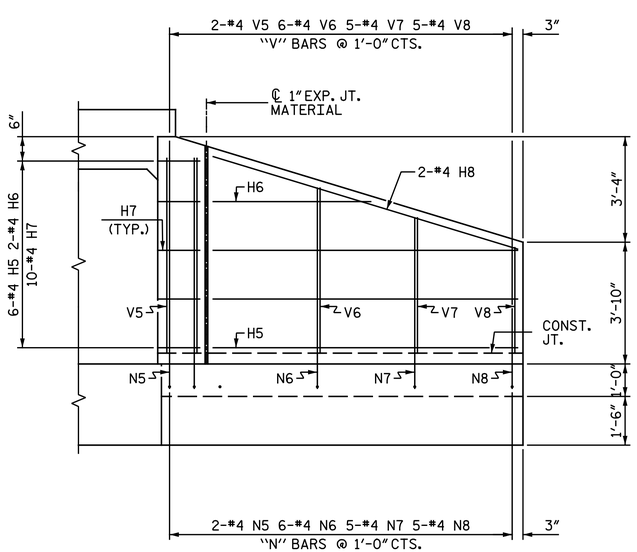


PLAN W1

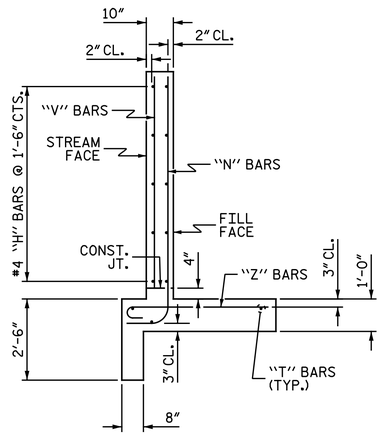
* S1 @ BOTTOM OF FLOOR SLAB & FOOTING



ELEVATION W2



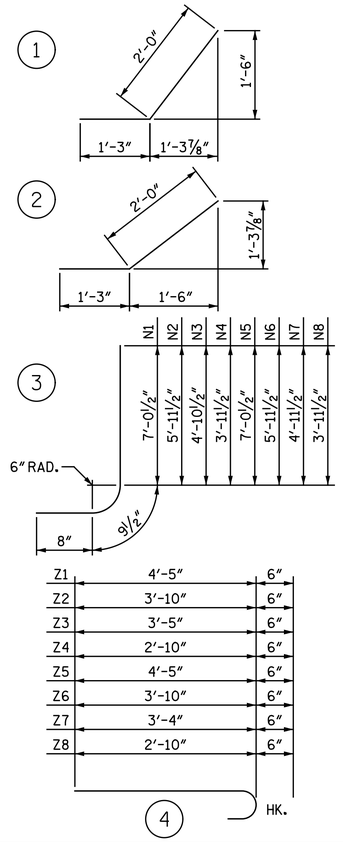
ELEVATION W1



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



Z1	4'-5" 6"
Z2	3'-10" 6"
Z3	3'-5" 6"
Z4	2'-10" 6"
Z5	4'-5" 6"
Z6	3'-10" 6"
Z7	3'-4" 6"
Z8	2'-10" 6"

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR.	13' - 1"	105
H2	4	#4	STR.	6' - 8"	18
H3	20	#4	1	3' - 3"	43
H4	4	#4	STR.	13' - 6"	36
H5	12	#4	STR.	15' - 2"	122
H6	4	#4	STR.	7' - 10"	21
H7	20	#4	2	3' - 3"	43
H8	4	#4	STR.	15' - 5"	41
N1	4	#4	3	8' - 6"	23
N2	10	#4	3	7' - 5"	50
N3	10	#4	3	6' - 4"	42
N4	8	#4	3	5' - 5"	29
N5	4	#4	3	8' - 6"	23
N6	12	#4	3	7' - 5"	59
N7	10	#4	3	6' - 5"	43
N8	10	#4	3	5' - 5"	36
S1	12	#6	STR.	6' - 0"	108
T1	6	#5	STR.	14' - 7"	91
T2	6	#5	STR.	16' - 7"	104
V1	4	#4	STR.	6' - 5"	17
V2	10	#4	STR.	5' - 5"	36
V3	8	#4	STR.	4' - 6"	24
V4	10	#4	STR.	3' - 4"	22
V5	4	#4	STR.	6' - 6"	17
V6	12	#4	STR.	5' - 4"	43
V7	10	#4	STR.	4' - 4"	29
V8	10	#4	STR.	3' - 4"	22
Z1	4	#4	4	4' - 11"	13
Z2	10	#4	4	4' - 4"	29
Z3	8	#4	4	3' - 11"	21
Z4	10	#4	4	3' - 4"	22
Z5	4	#4	4	4' - 11"	13
Z6	12	#4	4	4' - 4"	35
Z7	10	#4	4	3' - 10"	26
Z8	10	#4	4	3' - 4"	22

REINFORCING STEEL FOR 4 WINGS	LBS.	1,428
CLASS A CONCRETE		
4 WINGS	C.Y.	23.6
2 HEADWALLS	C.Y.	1.5
2 END CURTAIN WALLS	C.Y.	1.7
TOTAL	C.Y.	26.8

PROJECT NO. I-5883

HARNETT COUNTY

STATION: 1220+34.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR CONCRETE BOX CULVERT

H = 6'-0" SLOPE = 3:1
87° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 043878 ENGINEER AMANDA H. SHARPE

DocuSigned by: Amanda H. Sharpe 81D6FFF4ECEF4D2...

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Cary, North Carolina 27518
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REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. C1-6

TOTAL SHEETS 7

DRAWN BY : N. B. SPEAKS DATE : 3-13-19
CHECKED BY : A. H. SHARPE DATE : 3-25-19

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 (γLL)	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⟩	1.15	--	1.75	1.15	1	TOP SLAB	3.07	1.17	1	TOP SLAB	6.61	
		HL-93 (OPERATING)	N/A		1.49	--	1.35	1.49	1	TOP SLAB	3.07	1.52	1	TOP SLAB	6.61	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.15	41.40	1.75	1.15	1	TOP SLAB	3.07	1.23	1	TOP SLAB	6.61	
		HS-20 (OPERATING)	36.000		1.50	54.00	1.35	1.50	1	TOP SLAB	3.07	1.60	1	TOP SLAB	6.61	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH	12.500		2.31	28.88	1.40	2.31	1	TOP SLAB	3.07	2.84	1	TOP SLAB	6.61	
		S3C	21.500		2.11	45.37	1.40	2.11	1	TOP SLAB	3.07	2.15	1	TOP SLAB	6.61	
		S3A	22.750		2.11	48.00	1.40	2.11	1	TOP SLAB	3.07	2.11	1	TOP SLAB	6.61	
		S4A	26.750		2.10	56.18	1.40	2.11	1	TOP SLAB	3.07	2.10	1	TOP SLAB	6.61	
		S5A	30.500		2.04	62.22	1.40	2.19	1	TOP SLAB	3.07	2.04	1	TOP SLAB	6.61	
		S6A	34.500		1.98	68.31	1.40	2.20	1	TOP SLAB	3.07	1.98	1	TOP SLAB	6.61	
		S7B	38.500	⟨3⟩	1.97	75.85	1.40	2.23	1	TOP SLAB	3.07	1.97	1	TOP SLAB	6.61	
		S7A	40.000		1.98	79.20	1.40	2.20	1	TOP SLAB	3.07	1.98	1	TOP SLAB	6.61	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28.250		2.11	59.61	1.40	2.11	1	TOP SLAB	3.07	2.11	1	TOP SLAB	6.61	
		T5B	32.000		2.10	67.20	1.40	2.11	1	TOP SLAB	3.07	2.10	1	TOP SLAB	6.61	
		T6A	36.000		2.08	74.88	1.40	2.11	1	TOP SLAB	3.07	2.08	1	TOP SLAB	6.61	
		T7A	40.000		2.08	83.20	1.40	2.11	1	TOP SLAB	3.07	2.08	1	TOP SLAB	6.61	
		T7B	40.000		2.00	80.00	1.40	2.11	1	TOP SLAB	3.07	2.00	1	TOP SLAB	6.61	

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.

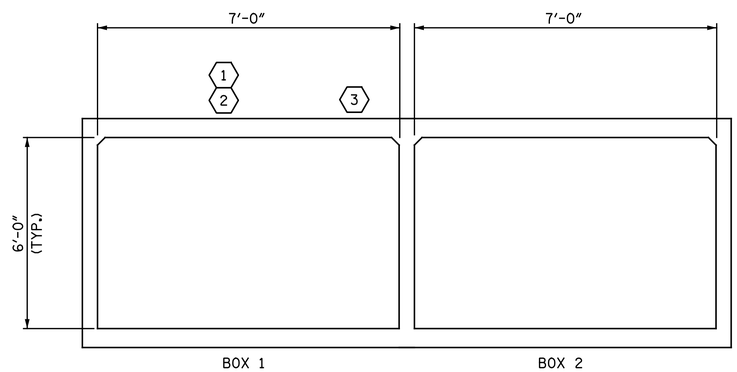
⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. I-5883

HARNETT COUNTY

STATION: 1220+34.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 043878 ENGINEER AMANDA H. SHARPE

DocuSigned by: Amanda H. Sharpe 81D6FFF4ECEF402...

12/11/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (INTERSTATE TRAFFIC)

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

Michael Baker INTERNATIONAL

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CHECKED BY : A. H. SHARPE DATE : 3-25-19

STD. NO. LRFR6

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.

ENGLISH

JANUARY, 1990

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