CONTRACT: C201188 TIP PROJECT: R-3415

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3415		

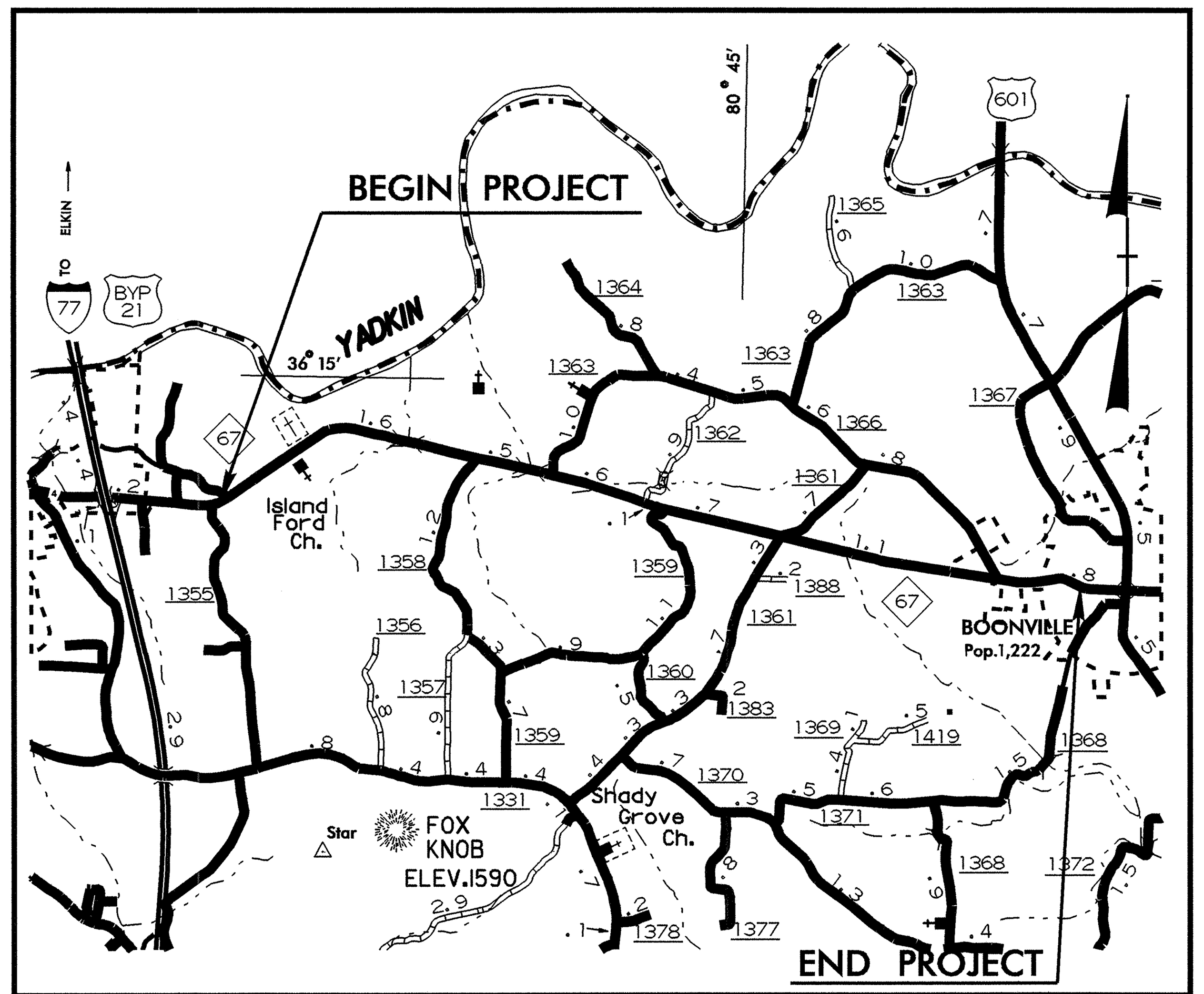
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34541.1.1		P.E.
34541.2.1		R/W & UTILITIES
34541.3.2		CONSTR.

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

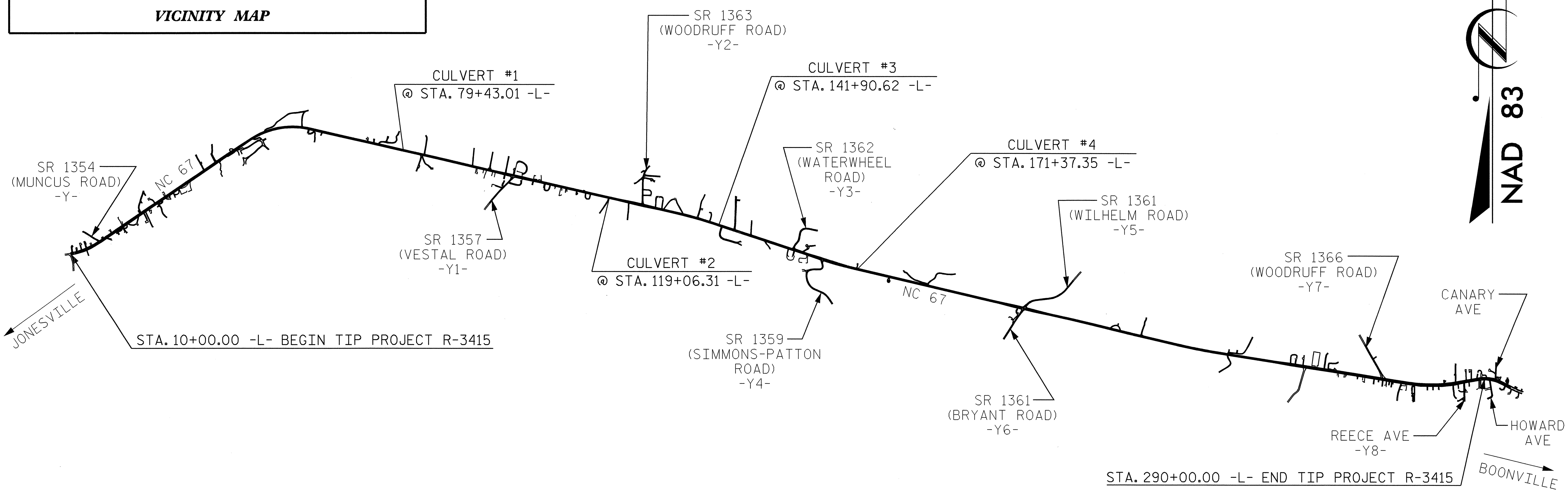
YADKIN COUNTY

LOCATION: NC 67 FROM SR 1355 (MESSICK ROAD) TO JUST WEST OF BOONVILLE

TYPE OF WORK: GRADING, PAVING, WIDENING, DRAINAGE, AND CULVERTS



VICINITY MAP



NAD 83

CULVERTS

DESIGN DATA

ADT 2000 = 7600
ADT 2025 = 13800
DHV = 10 %
D ≐ 60 %
T = 5 % *
V = 50 MPH

* TTST 2 % DUAL 3 %

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-3415 = 5.288 MILES
LENGTH STRUCTURE TIP PROJECT R-3415 = 0.015 MILES
TOTAL LENGTH TIP PROJECT R-3415 = 5.303 MILES

Prepared In the Office of:
DIVISION OF HIGHWAYS
1000 BIRCH RIDGE DR., RALEIGH, NC 27610

2006 STANDARD SPECIFICATIONS

LETTING DATE:
FEBRUARY 20, 2007

B.C. HUNT, P.E.
PROJECT ENGINEER

V.A. PATEL, P.E.
PROJECT DESIGN ENGINEER

STRUCTURE DESIGN UNIT

NORTH CAROLINA PROFESSIONAL SEAL 14552 ENGINEER GREGORY R. PERFETTI

1.11.07

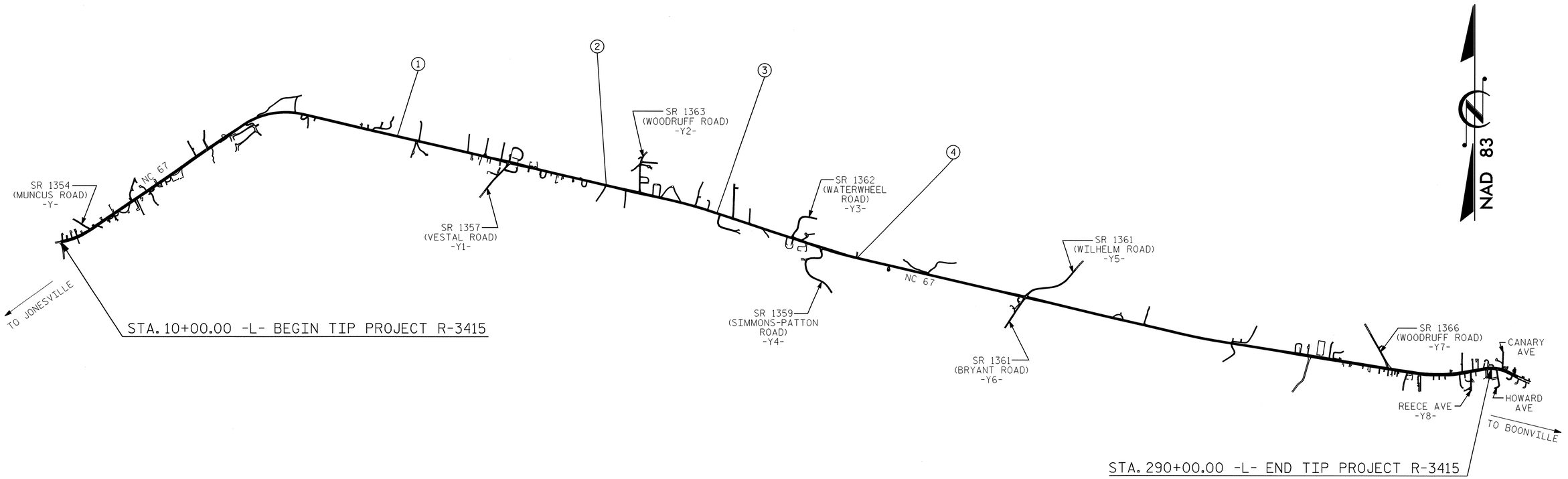
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR ***DATE***

11-JAN-2007 14:46
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
vpatel



INDEX			
STR.	STATION	DESCRIPTION	SHEETS
1	79+43.01 -L-	TRIPLE 9 FT. X 15 FT. RCBC INLET AND OUTLET EXTENSION CARRYING LINEBERRY CREEK BETWEEN SR 1354 AND SR 1357	C-1 THRU C-5
2	119+06.31 -L-	TRIPLE 8 FT. X 12 FT. RCBC INLET EXTENSION AND TRIPLE 8 FT. X 13 FT. RCBC OUTLET EXTENSION CARRYING WILLIAMS CREEK BETWEEN SR 1357 AND SR 1363	C-6 THRU C-11
3	141+90.62 -L-	DOUBLE 8 FT. X 8 FT. RCBC INLET EXTENSION AND DOUBLE 8 FT. X 9.5 FT. RCBC OUTLET EXTENSION CARRYING BRANCH OF WILLIAMS CREEK BETWEEN SR 1363 AND SR 1362	C-12 THRU C-18
4	171+37.35 -L-	SINGLE 6 FT. X 5 FT. RCBC INLET AND OUTLET EXTENSION CARRYING TRIBUTARY TO WILLIAMS CREEK BETWEEN SR 1359 AND SR 1361	C-19 THRU C-24

PROJECT NO. R-3415

YADKIN COUNTY

STATION:

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INDEX SHEET

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

DRAWN BY : M.K. BEARD DATE : 11/04
CHECKED BY : B.C. HUNT DATE : 11/04

21-APR-2006 06:36
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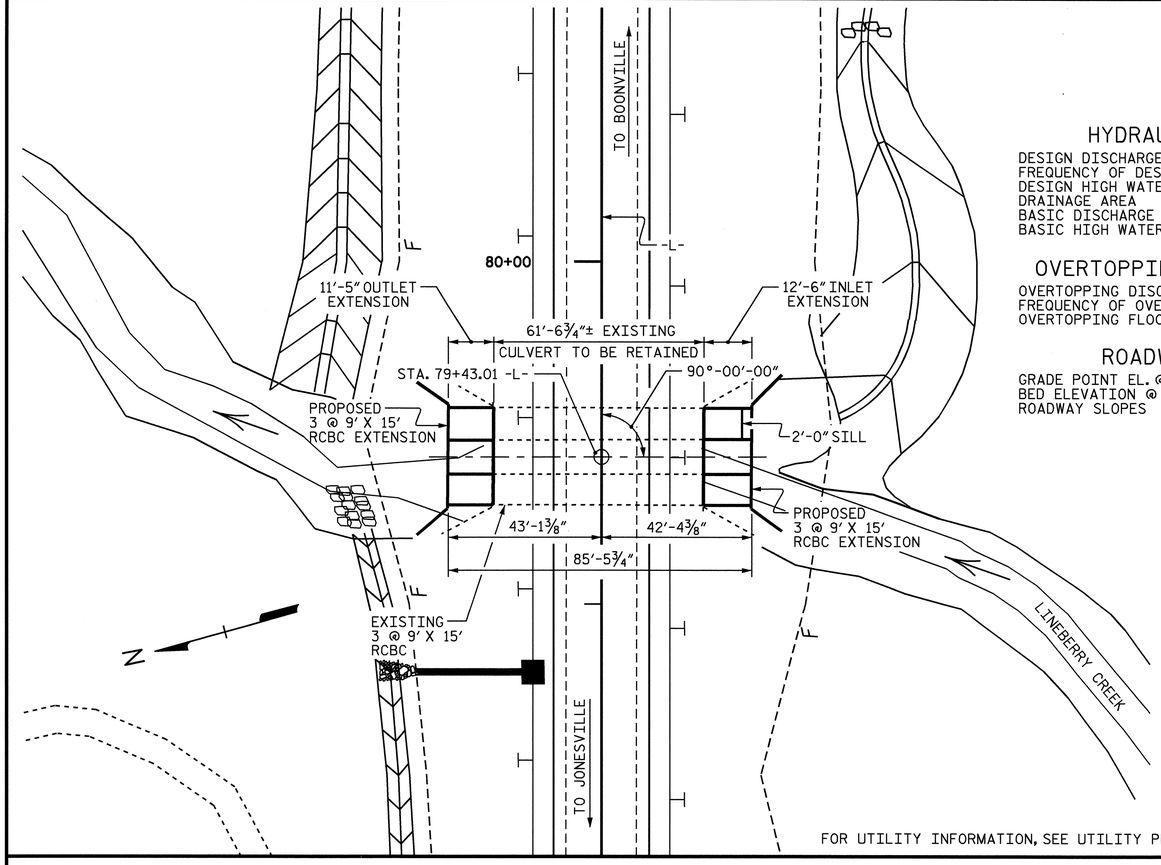
klayne

BENCH MARK TI-42: SET AT PROJECT STA. 79+41.57 -L-, OFFSET 78.3' RIGHT, ELEV. 876.99



LOCATION SKETCH

HYDRAULIC DATA

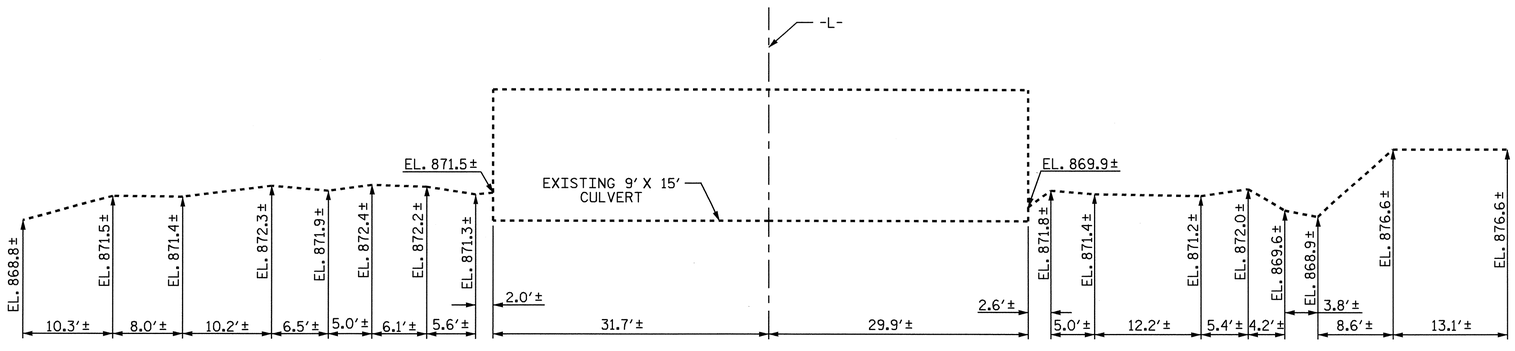
DESIGN DISCHARGE	= 1300 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 878.87
DRAINAGE AREA	= 3.5 SQ. MI.
BASIC DISCHARGE (Q100)	= 1600 CFS
BASIC HIGH WATER ELEVATION	= 879.71

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 2500 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500 YRS.
OVERTOPPING FLOOD ELEVATION	= 895.70

ROADWAY DATA

GRADE POINT EL. @ STA. 79+43.01 -L-	= 895.75
BED ELEVATION @ STA. 79+43.01 -L-	= 868.37
ROADWAY SLOPES	= 2:1



PROFILE ALONG ℄ CULVERT

NOTES

ASSUMED LIVE LOAD ----------HS20-44 OR ALTERNATE LOADING.

DESIGN FILL----------12.66

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

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.

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.

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

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSIONS. 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.

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

A 3' 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 FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

TOTAL STRUCTURE QUANTITIES

	OUTLET EXTENSION	INLET EXTENSION	TOTAL
CLASS A CONCRETE (CUBIC YARDS)			
BARREL @ 4.674 CY/FT	53.4	58.4	
WINGS, ETC.	41.6	41.5	
SILL		0.7	
TOTAL (CUBIC YARDS)	95.0	100.6	195.6
REINFORCING STEEL (LBS)			
BARREL	7,867	8,368	
WINGS, ETC.	3,563	3,562	
TOTAL (LBS)	11,430	11,930	23,360
FOUNDATION COND. MAT'L. (TONS)	25	27	52
CULVERT EXCAVATION			LUMP SUM

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 79+43.01 -L-

SHEET 1 OF 5 CULVERT No. C194

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 9 FT. X 15 FT. CONCRETE BOX CULVERT 90° SKEW

(OUTLET AND INLET EXTENSION)

NORTH CAROLINA PROFESSIONAL SEAL 14891 ENGINEER BRICK CHARLES MUNDY
4/24/06

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-1
1			3			TOTAL SHEETS
2			4			24

STR. #1

ADDED 8-22-89

ASSEMBLED BY : M.K. BEARD DATE : 9/19/03
CHECKED BY : K.D. LAYNE DATE : 12/19/03

21-APR-2006 06:34
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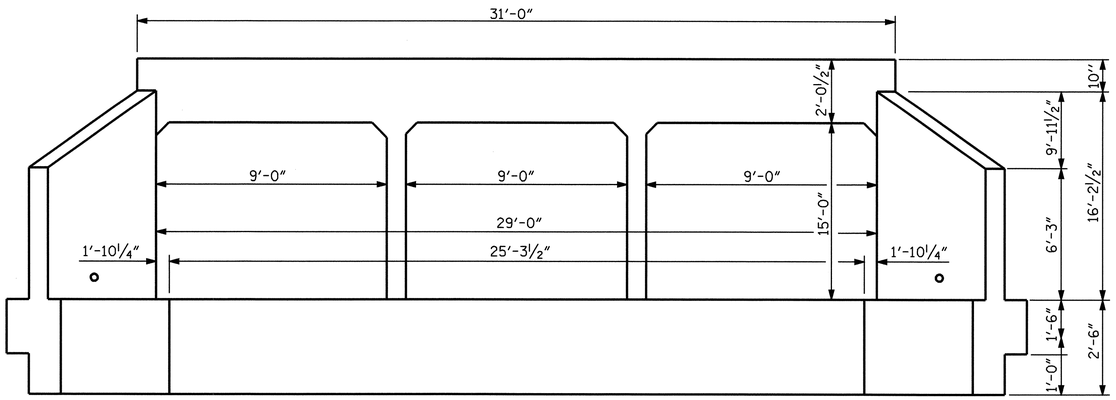
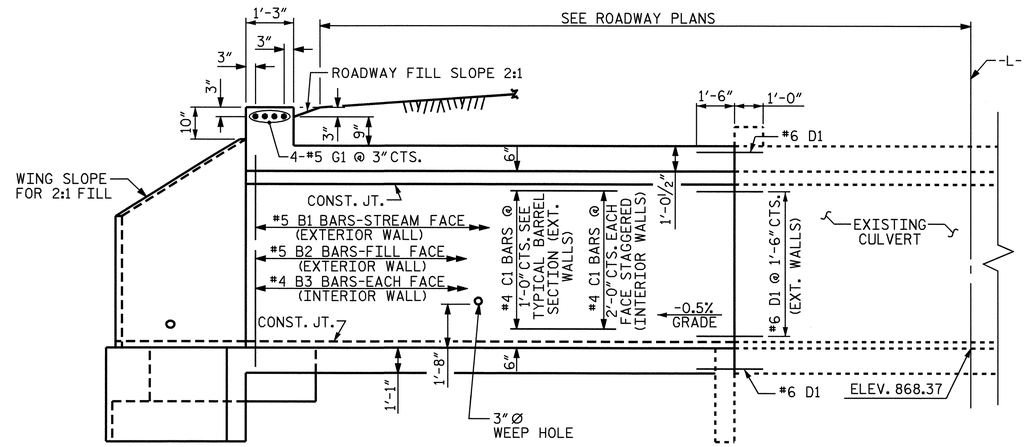
klayne

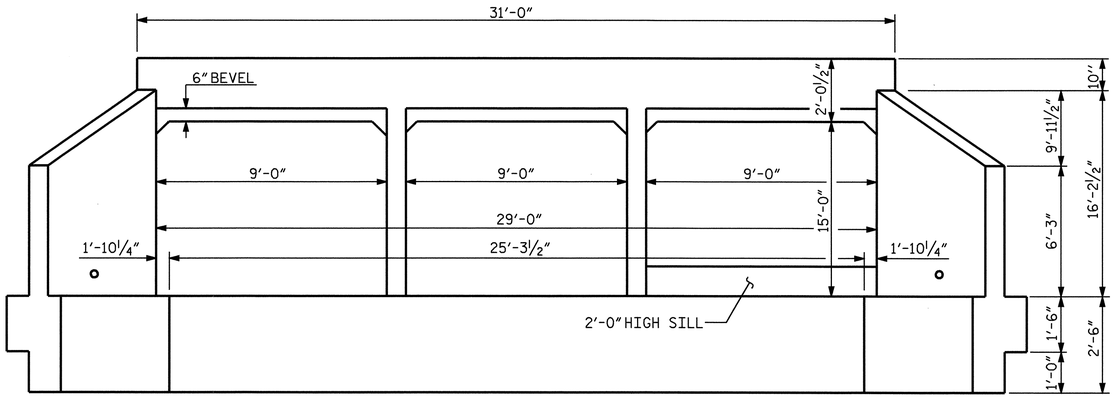


END ELEVATION (OUTLET EXTENSION)

DOWNSTREAM END

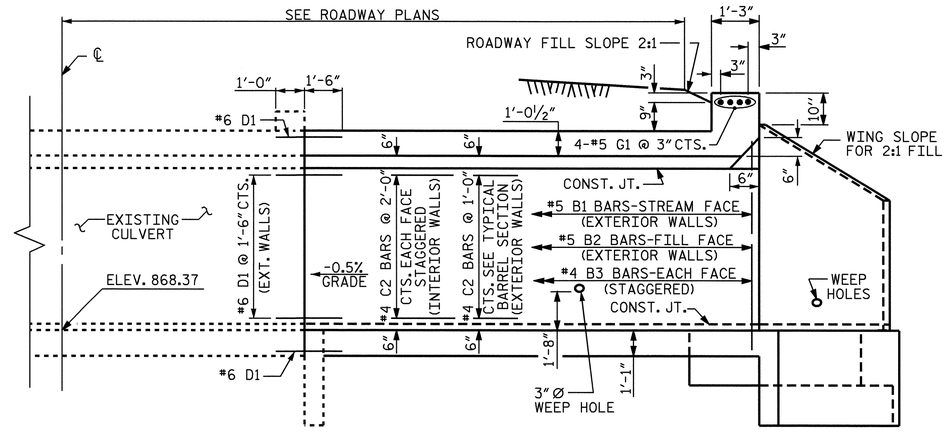


CULVERT SECTION NORMAL TO ROADWAY (OUTLET EXTENSION)



END ELEVATION (INLET EXTENSION)

UPSTREAM END



CULVERT SECTION NORMAL TO ROADWAY (INLET EXTENSION)

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 79+43.01 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 9 FT. X 15 FT. CONCRETE BOX CULVERT 90° SKEW

(OUTLET AND INLET EXTENSION)

NORTH CAROLINA PROFESSIONAL SEAL 17091 ENGINEER WICK CHARLES HUTTO

4/24/06

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-2
1			3			TOTAL SHEETS
2			4			24

STR. #1

REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.
REDRAWN NOV. 1990 BY TSS. CHECKED BY ARB
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.

ASSEMBLED BY : M.K. BEARD DATE : 9/19/03
CHECKED BY : K.D. LAYNE DATE : 12/19/03

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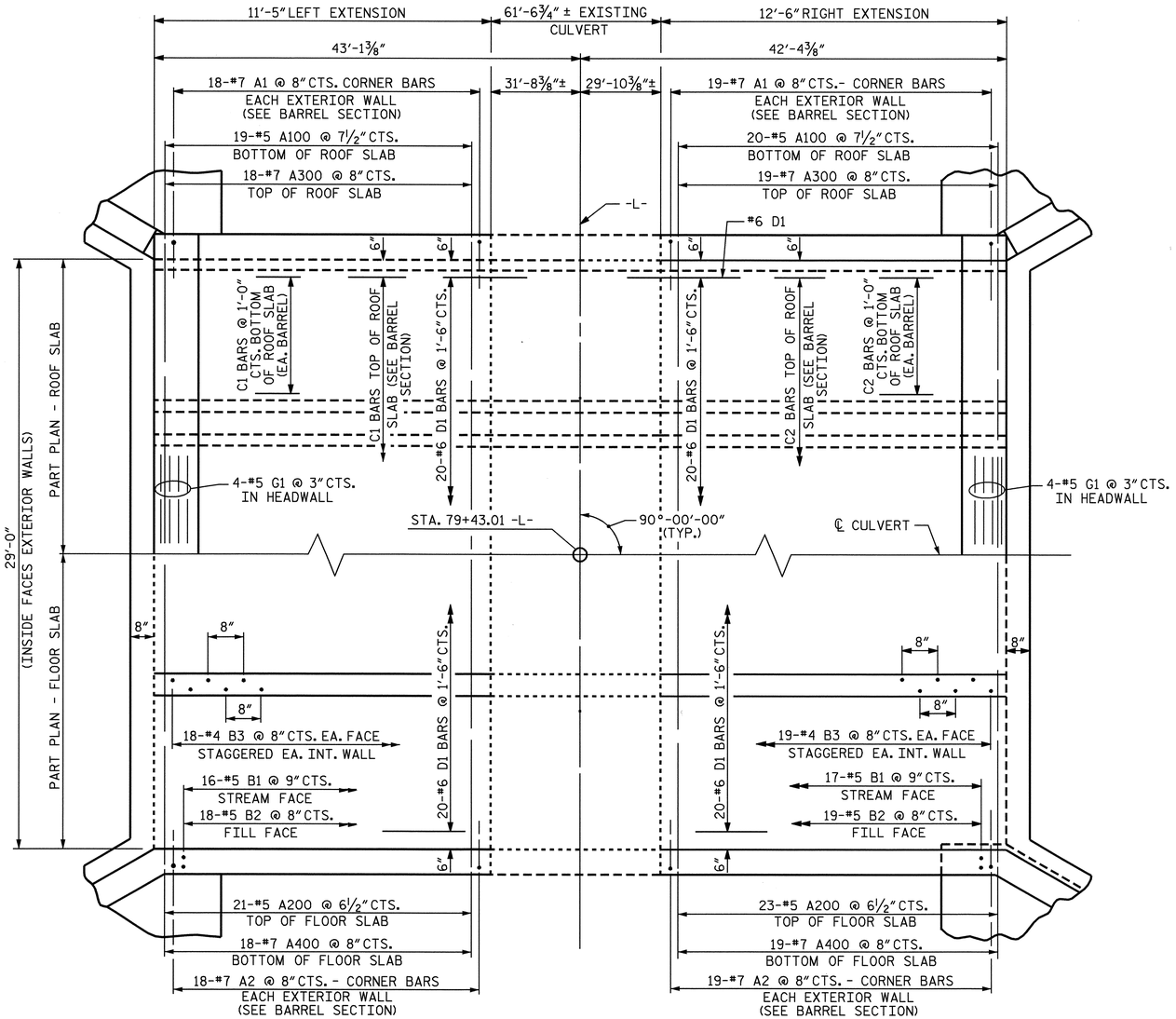

PLAN OF OUTLET EXTENSION

PLAN OF INLET EXTENSION

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 79+43.01 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 9 FT. X 15 FT. CONCRETE BOX CULVERT 90° SKEW

(OUTLET AND INLET EXTENSION)

NORTH CAROLINA PROFESSIONAL SEAL 14091 ENGINEER BRUCE CHARLES HUNT 4/21/06

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-3
1			3			TOTAL SHEETS
2			4			24

STR. #1

DRAWN BY : M.K. BEARD DATE : 11/12/03
CHECKED BY : K.D. LAYNE DATE : 11/21/03

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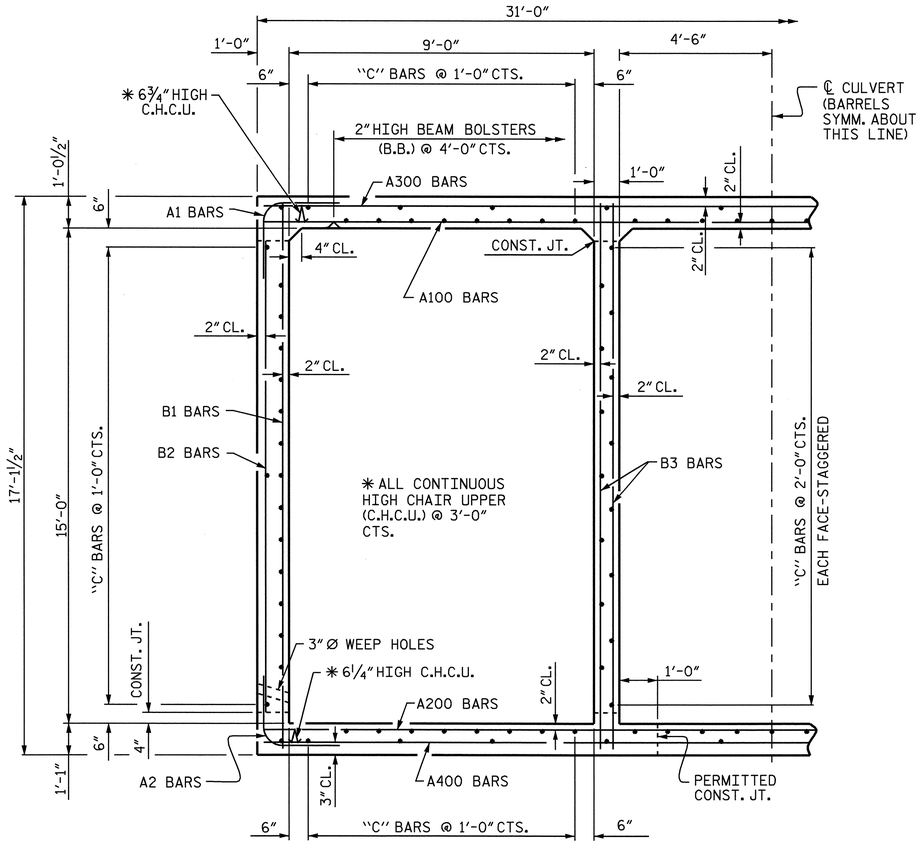
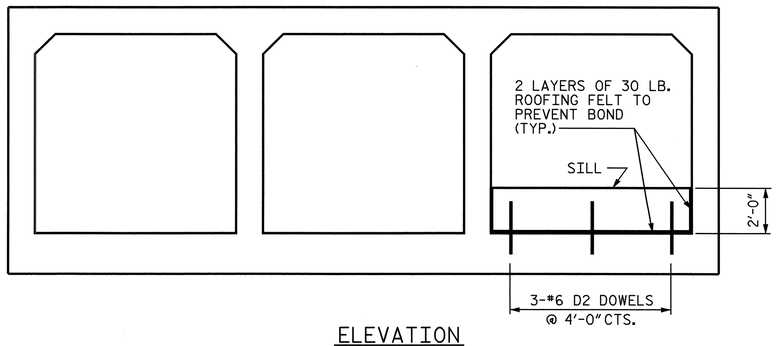
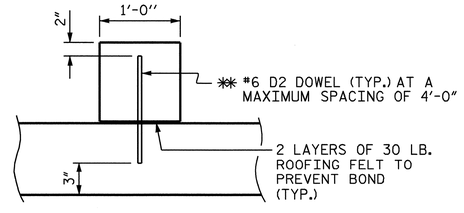


RIGHT ANGLE SECTION OF BARREL

THERE ARE 136 "C" BARS IN SECTION OF BARREL



ELEVATION
(INLET END ONLY)



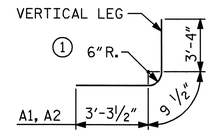
✱✱ DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.

SECTION THROUGH SILL

CULVERT SILL DETAILS

(INLET END ONLY)

BAR TYPE



ALL DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL OUTLET EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	36	7	1	7'- 5"	546
A2	36	7	1	7'- 5"	546
A100	19	5	STR	30'- 7"	606
A200	21	5	STR	30'- 7"	670
A300	18	7	STR	30'- 7"	1125
A400	18	7	STR	30'- 7"	1125
B1	32	5	STR	16'- 7"	553
B2	36	5	STR	14'- 4"	538
B3	72	4	STR	16'- 7"	798
C1	136	4	STR	11'- 1"	1007
D1	60	6	STR	2'- 6"	225
G1	4	5	STR	30'- 8"	128
REINFORCING STEEL					7867 lbs.

BILL OF MATERIAL INLET EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	38	7	1	7'- 5"	576
A2	38	7	1	7'- 5"	576
A100	20	5	STR	30'- 7"	638
A200	23	5	STR	30'- 7"	734
A300	19	7	STR	30'- 7"	1188
A400	19	7	STR	30'- 7"	1188
B1	34	5	STR	16'- 7"	588
B2	38	5	STR	14'- 4"	568
B3	76	4	STR	16'- 7"	842
C2	136	4	STR	12'- 2"	1105
D1	60	6	STR	2'- 6"	225
D2	3	6	STR	2'- 3"	10
G1	4	5	STR	30'- 8"	128
REINFORCING STEEL					8368 lbs.

SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
A200 A400	5 7	1'- 9" 3'- 1"
B1 B3	5 4	1'- 9" 1'- 9"
C1	4	1'-11"

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 79+43.01 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 9 FT. X 15 FT. CONCRETE BOX CULVERT 90° SKEW

(OUTLET AND INLET EXTENSION)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
2			4			24

STR. #1

NORTH CAROLINA PROFESSIONAL SEAL 14091 ENGINEER BRADDOCK CHARLES HUNT 4/21/06

DRAWN BY : M.K. BEARD DATE : 9/19/03
CHECKED BY : K.D. LAYNE DATE : 11/21/03

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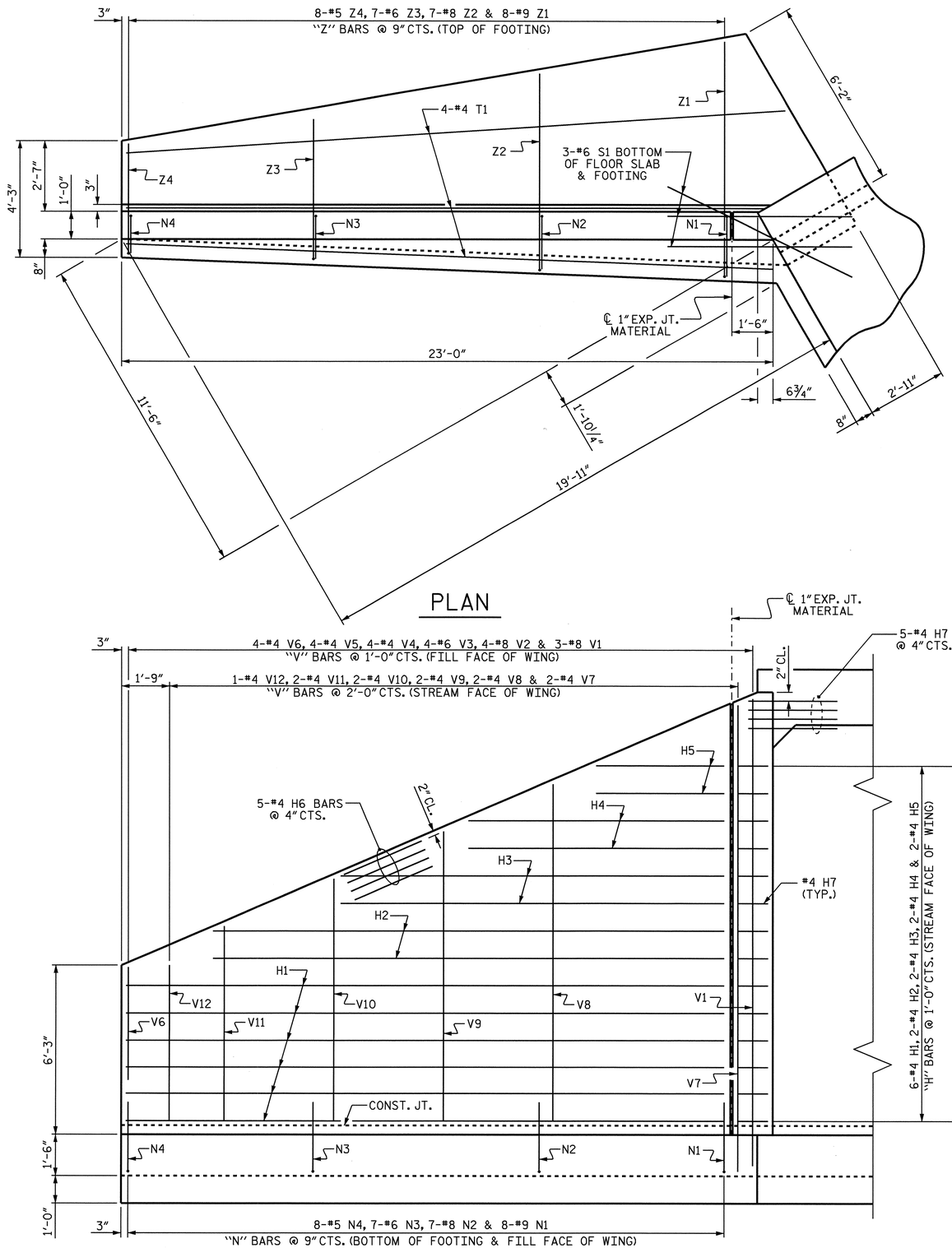
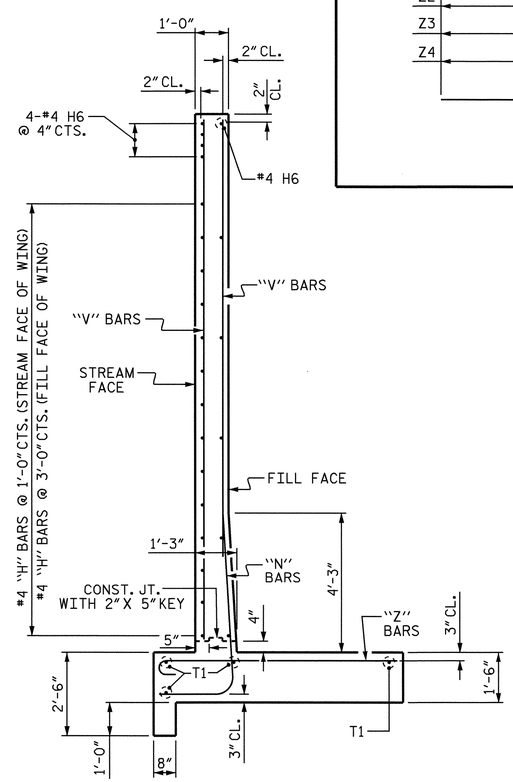
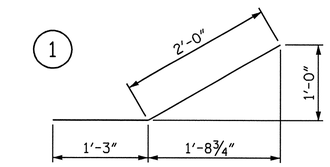
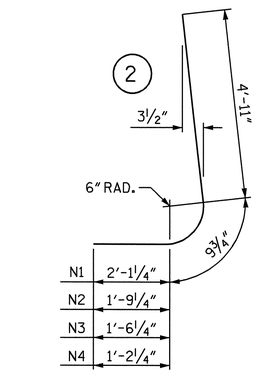


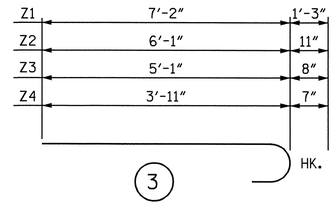


BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.







BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	32	#4	STR	21'- 1"	451
H2	12	#4	STR	18'- 1"	145
H3	12	#4	STR	13'- 4"	107
H4	8	#4	STR	8'- 7"	46
H5	12	#4	STR	3'-10"	31
H6	20	#4	STR	22'- 5"	299
H7	96	#4	1	3'- 3"	208
N1	32	#9	2	7'-10"	852
N2	28	#8	2	7'- 6"	561
N3	28	#6	2	7'- 3"	305
N4	32	#5	2	6'-11"	231
S1	12	#6	STR	6'- 0"	108
T1	16	#4	STR	23'- 0"	246
V1	12	#8	STR	14'- 3"	457
V2	16	#8	STR	12'- 6"	534
V3	16	#6	STR	9'- 9"	234
V4	16	#4	STR	7'- 3"	77
V5	16	#4	STR	5'- 6"	59
V6	16	#4	STR	4'- 0"	43
V7	8	#4	STR	14'- 0"	75
V8	8	#4	STR	12'- 3"	65
V9	8	#4	STR	10'- 6"	56
V10	8	#4	STR	9'- 0"	48
V11	8	#4	STR	7'- 3"	39
V12	4	#4	STR	6'- 3"	17
Z1	32	#9	3	8'- 5"	916
Z2	28	#8	3	7'- 0"	523
Z3	28	#6	3	5'- 9"	242
Z4	32	#5	3	4'- 6"	150

REINFORCING STEEL FOR 4 WINGS 7125 LBS

CLASS A CONCRETE

4 WINGS	77.1 CY
2 HEADWALLS	2.9 CY
END CURTAIN WALLS	3.1 CY
TOTAL	83.1 CY

NORTH CAROLINA PROFESSIONAL SEAL 16091 ENGINEER PATRICK CHARLES HUNT 4/24/06

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 79+43.01 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 15'-0" SLOPE = 2:1

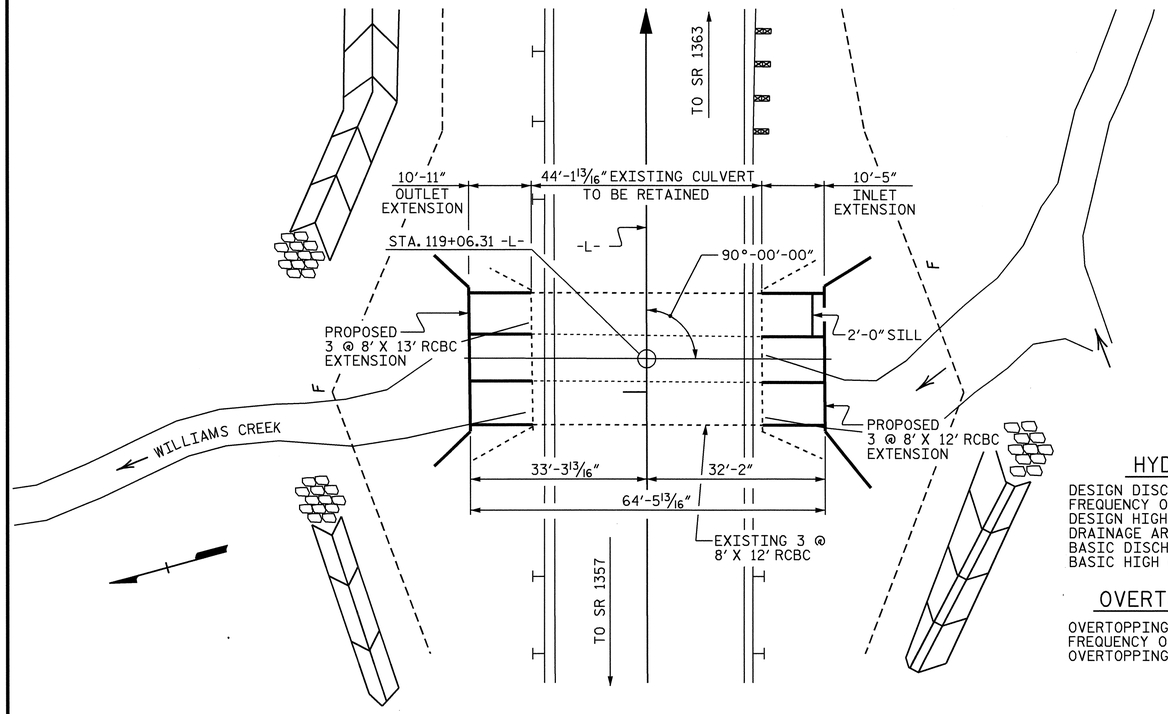
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
2			4			24

STR. #1

DRAWN BY : M.K. BEARD DATE : 9/19/03
CHECKED BY : K.D. LAYNE DATE : 11/21/03

BENCH MARK T2-48: SET POINT @ PROJECT STA. 119+30.82 -L- OFFSET 57.62' RIGHT, ELEV. 882.08



LOCATION SKETCH

HYDRAULICS DATA

DESIGN DISCHARGE	= 1400 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YR.
DESIGN HIGH WATER ELEVATION	= 883.95
DRAINAGE AREA	= 3.6 SQ.MI.
BASIC DISCHARGE (Q100)	= 1700 CFS
BASIC HIGH WATER ELEVATION	= 884.81

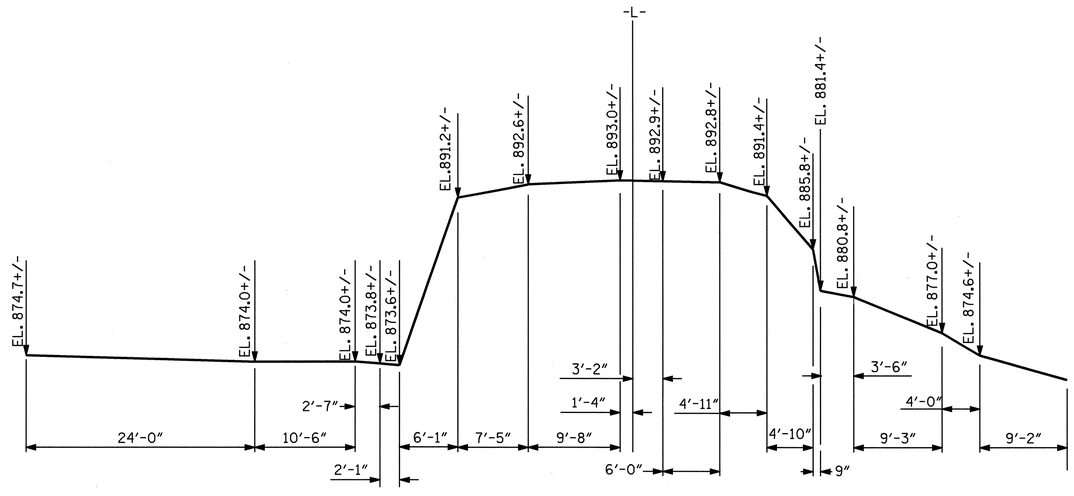
OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= >2500 CFS
FREQUENCY OF OVERTOPPING FLOOD	= >500 YR.
OVERTOPPING FLOOD ELEVATION	= 893.15

ROADWAY DATA

BED ELEV. @ STA. 119+06.31 -L-	= 874.63
ROADWAY SLOPES	= 2:1
GRADE POINT ELEV. @ STA. 119+06.31 -L-	= 893.41

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS



PROFILE ALONG ℄ CULVERT

NOTES

ASSUMED LIVE LOAD ----------HS20-44 OR ALTERNATE LOADING.

DESIGN FILL----------6.63

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. 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.

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.

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

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSIONS. 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.

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

A 3' 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 FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

TOTAL STRUCTURE QUANTITIES

	OUTLET EXTENSION	INLET EXTENSION	TOTAL
CLASS A CONCRETE (CUBIC YARDS)			
BARREL @ 3.169 CY/FT (OUTLET) BARREL @ 3.013 CY/FT (INLET)	34.6	31.4	
WINGS, ETC.	31.2	27.3	
TOTAL (CUBIC YARDS)	65.8	58.7	124.5
REINFORCING STEEL (LBS)			
BARREL	6,964	6,258	
WINGS, ETC.	2,371	1,845	
TOTAL (LBS)	9,335	8,103	17,438
FOUNDATION COND. MAT'L. (TONS)	21	20	41
CULVERT EXCAVATION			LUMP SUM

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 119+06.31 -L-

SHEET 1 OF 6 CULVERT No. C195

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 8 FT. X 12 FT. (INLET EXTENSION) TRIPLE 8 FT. X 13 FT. (OUTLET EXTENSION) CONCRETE BOX CULVERT 90° SKEW

OCTOBER 1989

REVISIONS

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

SHEET NO. C-6

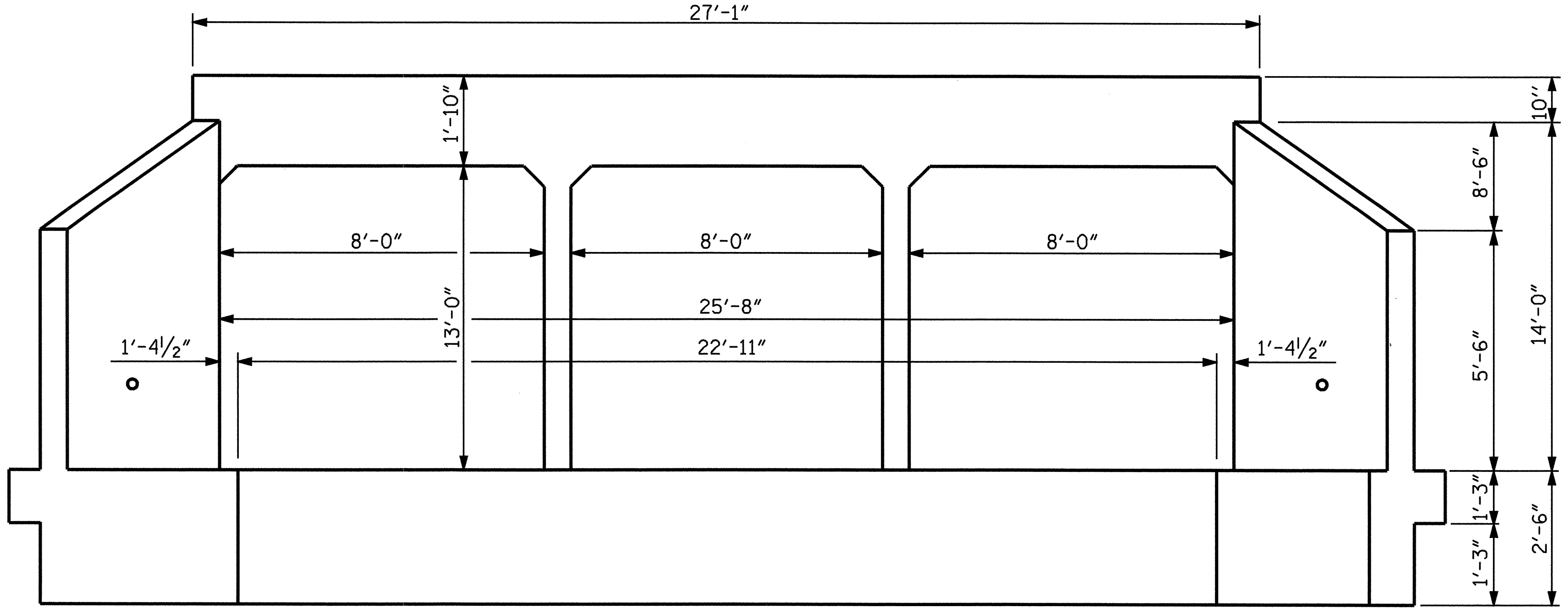
TOTAL SHEETS 24

NORTH CAROLINA PROFESSIONAL SEAL 14091 ENGINEER BRUCE CHARLES HUNT 4/24/06

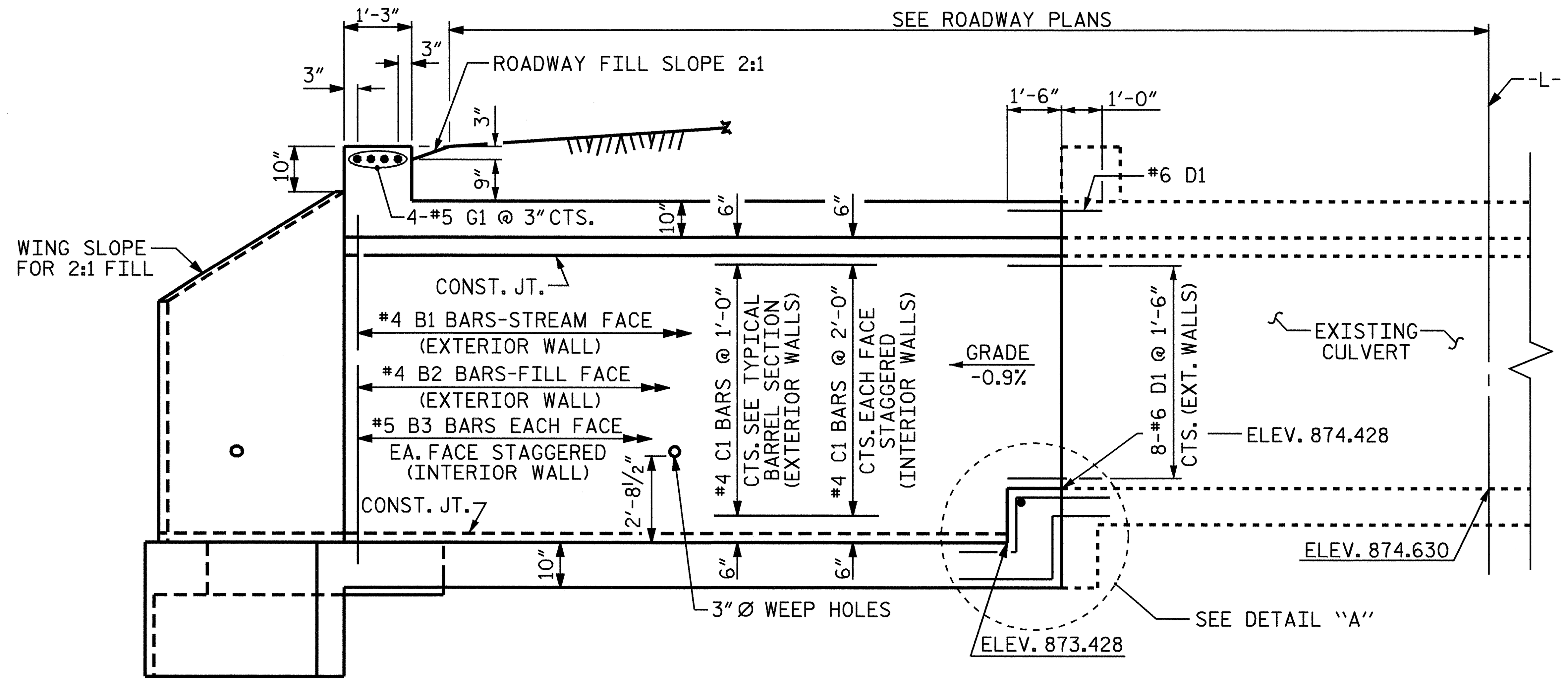
STR. #2

ADDED 8-22-89

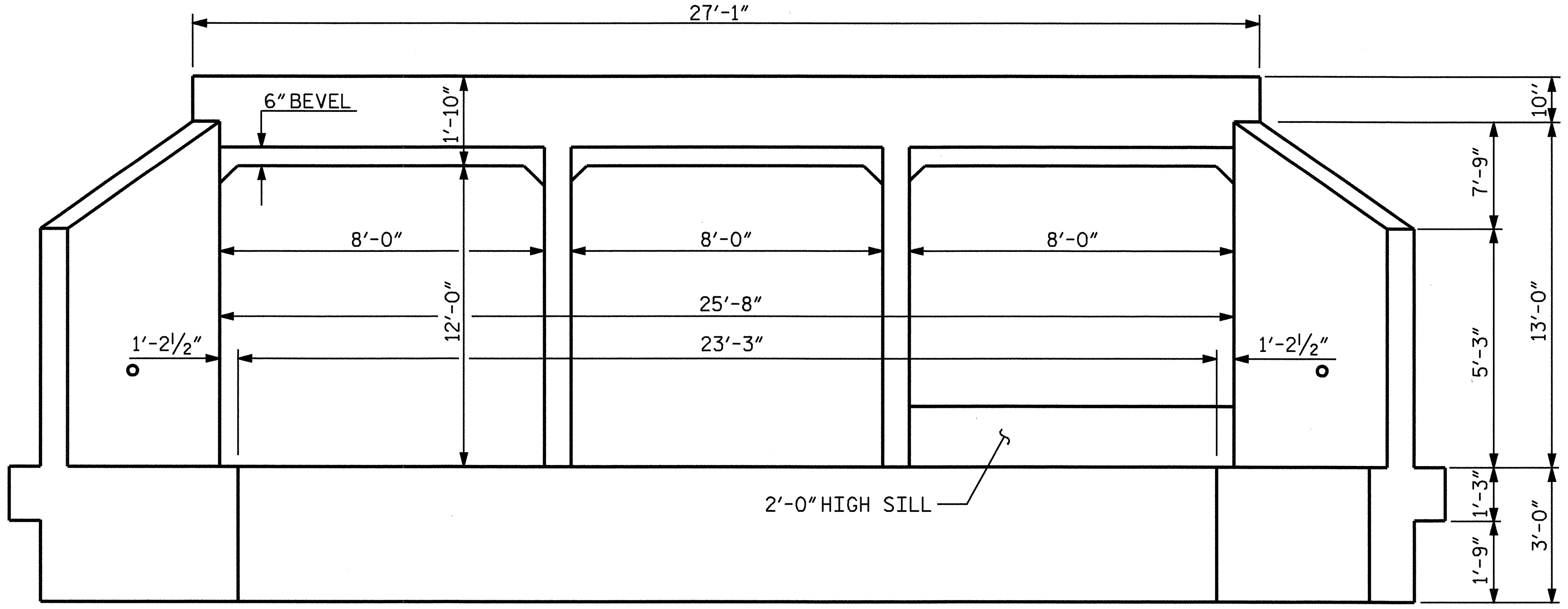
ASSEMBLED BY : M.K. BEARD	DATE : 9/8/03	SPECIAL
CHECKED BY : A.R. CHESSON	DATE : 11/03	
DRAWN BY : J. E. MANGUM	DATE : 10/25/89	STANDARD
CHECKED BY : A.R. BISSETTE	DATE : AUG. 1989	



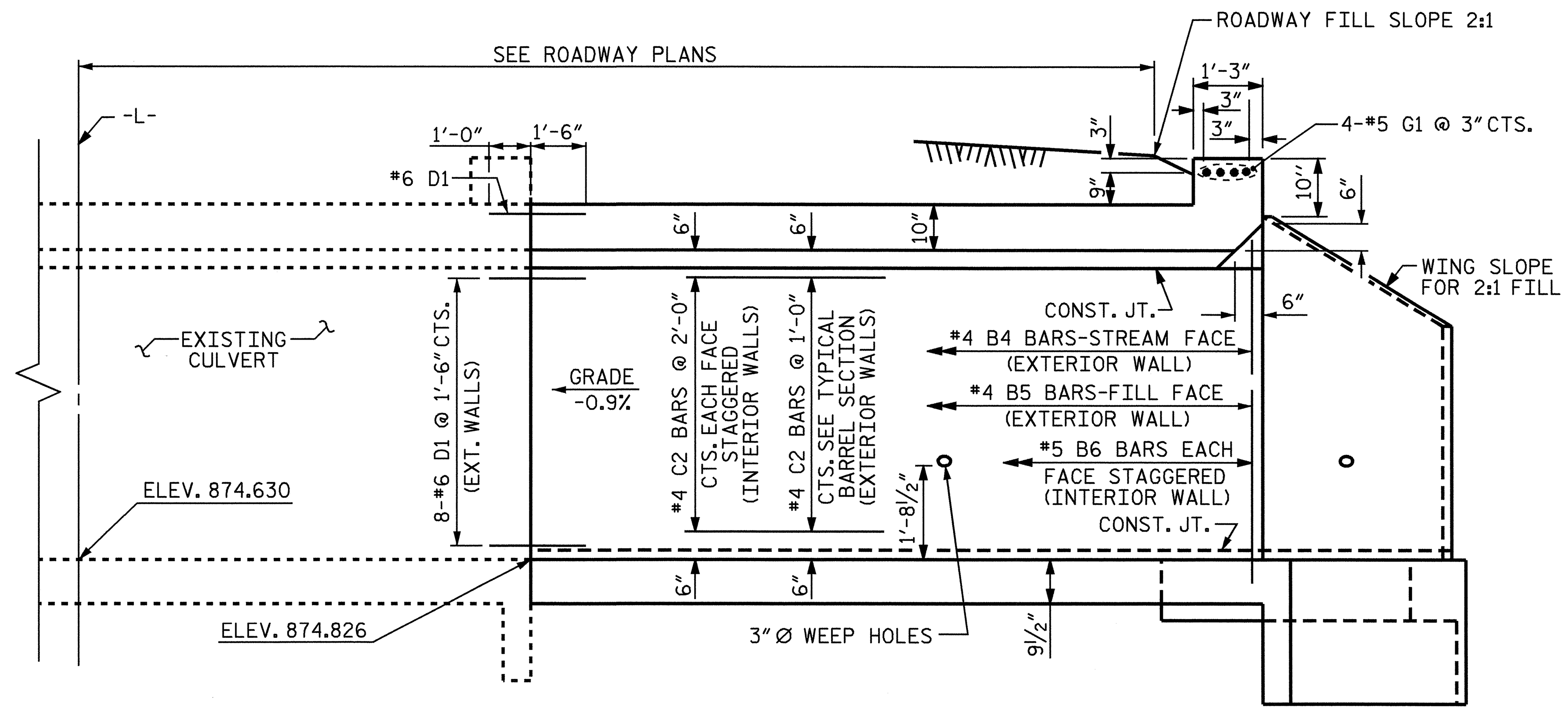
END ELEVATION (OUTLET EXTENSION)



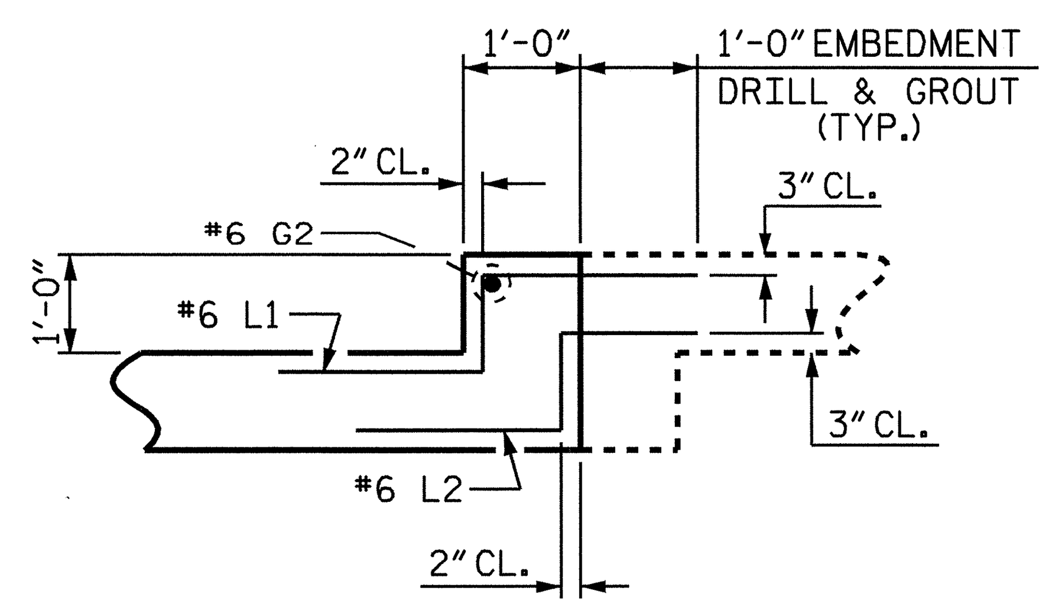
CULVERT SECTION (OUTLET EXTENSION)



END ELEVATION (INLET EXTENSION)



CULVERT SECTION (INLET EXTENSION)



DETAIL "A"

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 119+06.31 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 8 FT. X 12 FT.
(INLET EXTENSION)
TRIPLE 8 FT. X 13 FT.
(OUTLET EXTENSION)
CONCRETE BOX CULVERT
90° SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 4094 BUCK CHARLES HINTON 4/24/06

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		C-7
1			3				TOTAL SHEETS
2			4				24

STR. #2

ASSEMBLED BY : M.K. BEARD	DATE : 9/19/03	SPECIAL
CHECKED BY : A.R. CHESSON	DATE : 11/03	
DRAWN BY : JOEL JOHNSON	DATE : MAR. 1971	STANDARD
CHECKED BY : GARY BROOME	DATE : MAR. 1971	

REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.
REDRAWN NOV. 1990 BY TSS. CHECKED BY ARB
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.

21-APR-2006 06:35
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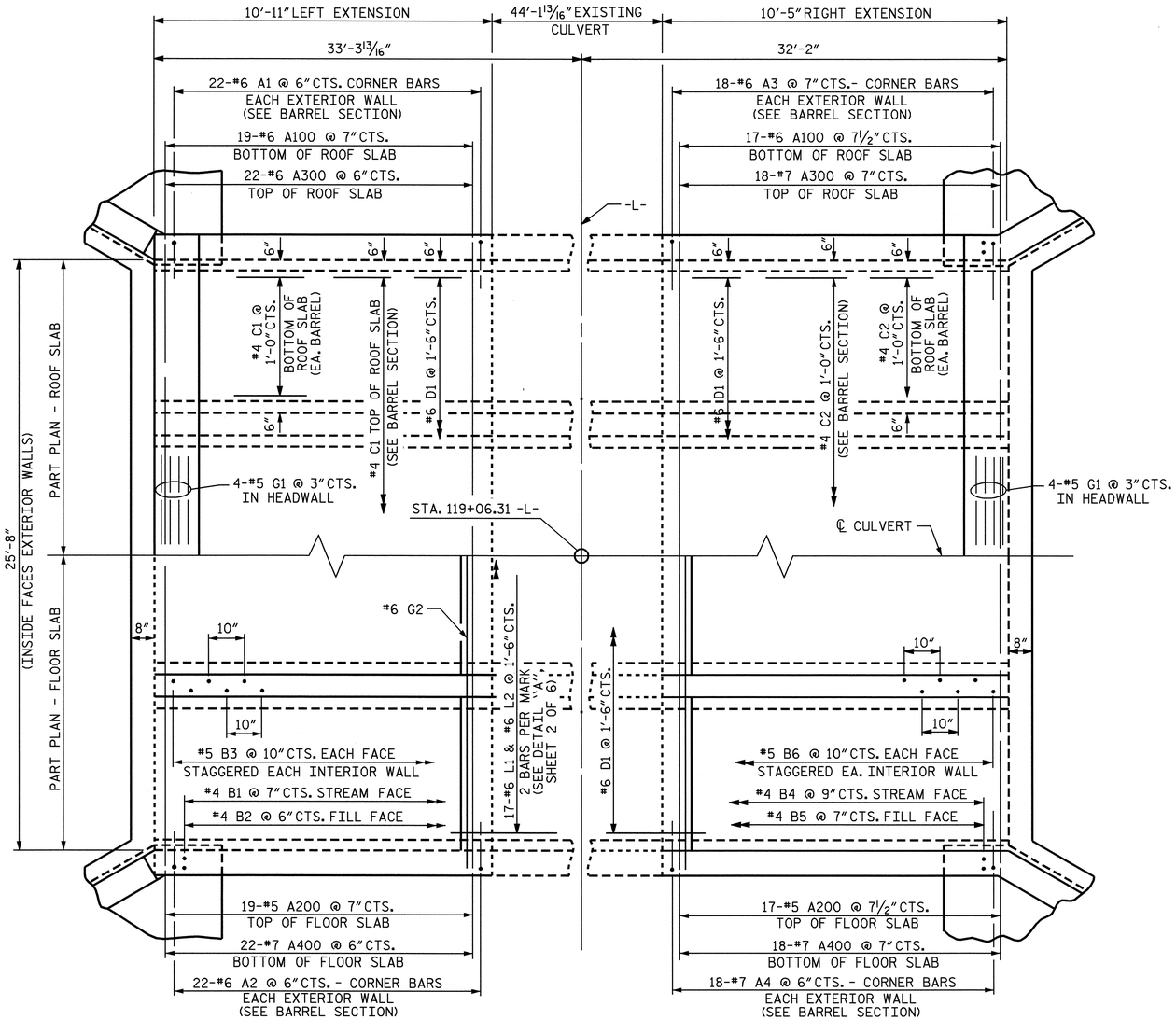
klayne



PLAN OF OUTLET EXTENSION

PLAN OF INLET EXTENSION

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 119+06.31 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 8 FT. X 12 FT. (INLET EXTENSION) TRIPLE 8 FT. X 13 FT. (OUTLET EXTENSION) CONCRETE BOX CULVERT 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-8
1			3			TOTAL SHEETS
2			4			24

STR. #2 NC0005

NORTH CAROLINA PROFESSIONAL SEAL 14091 ENGINEER JOSHUA CHARLES HUNT

4/21/06

DRAWN BY : M.K. BEARD DATE : 10/19/03
CHECKED BY : A.R. CHESSON DATE : 11/03

21-APR-2006 06:35
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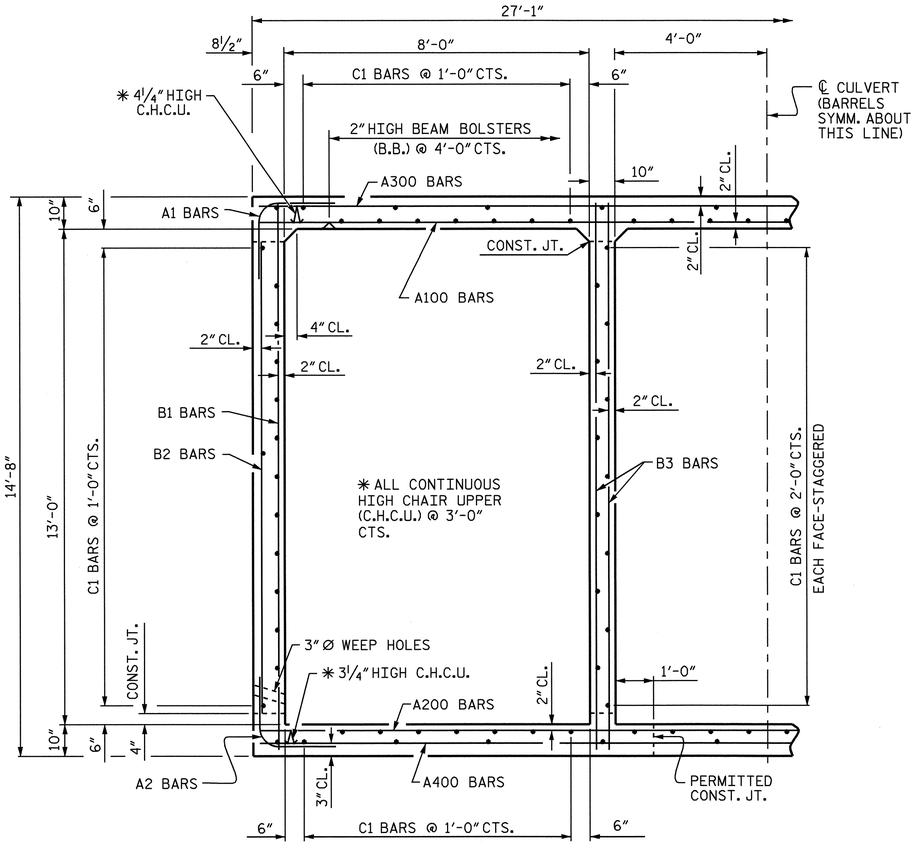
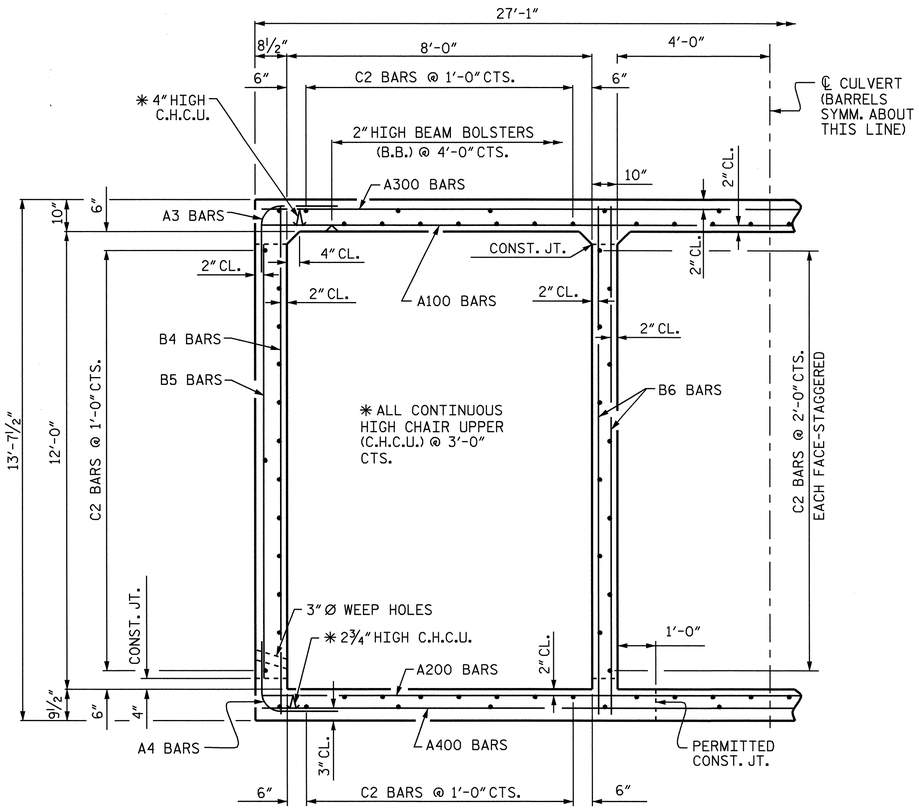
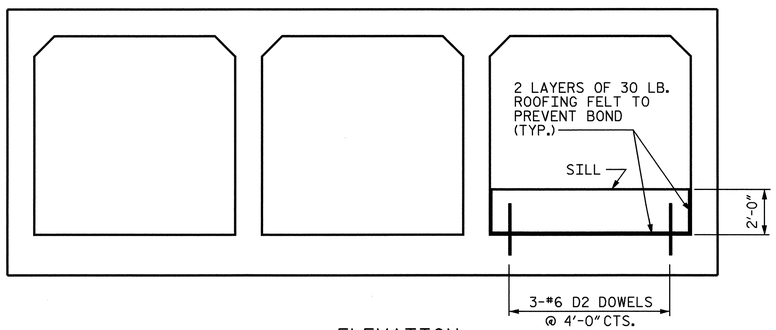


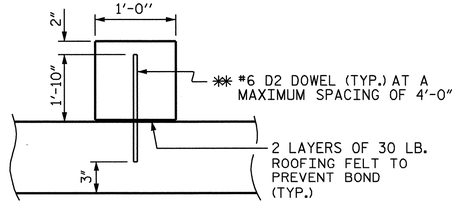
RIGHT ANGLE SECTION OF BARREL
(OUTLET EXTENSION)
THERE ARE 122 "C" BARS IN SECTION OF BARREL



RIGHT ANGLE SECTION OF BARREL
(INLET EXTENSION)
THERE ARE 118 "C" BARS IN SECTION OF BARREL



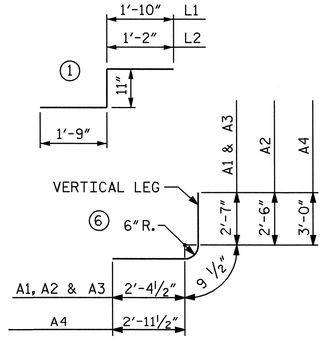
ELEVATION
(INLET END ONLY)



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

SECTION THROUGH SILL

CULVERT SILL DETAILS
(INLET END ONLY)



BAR TYPES
ALL DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL OUTLET EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	44	6	6	5'- 9"	380
A2	44	6	6	5'- 8"	374
A100	19	6	STR	26'- 8"	761
A200	19	5	STR	26'- 8"	528
A300	22	6	STR	26'- 8"	881
A400	22	7	STR	26'- 8"	1199
B1	38	4	STR	14'- 2"	360
B2	44	4	STR	12'- 4"	363
B3	52	5	STR	14'- 2"	768
C1	122	4	STR	10'- 7"	862
D1	36	6	STR	2'- 6"	135
G1	4	5	STR	26'- 9"	111
G2	1	6	STR	26'- 9"	40
L1	17	6	1	4'- 6"	115
L2	17	6	1	3'-10"	98
REINFORCING STEEL					6964 lbs.

BILL OF MATERIAL INLET EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A3	36	6	6	5'- 9"	311
A4	36	7	6	6'- 9"	497
A100	17	6	STR	26'- 8"	681
A200	17	5	STR	26'- 8"	472
A300	18	7	STR	26'- 8"	981
A400	18	7	STR	26'- 8"	981
B4	28	4	STR	13'- 3"	248
B5	36	4	STR	11'- 4"	273
B6	52	5	STR	13'- 3"	709
C2	118	4	STR	10'- 1"	795
D1	50	6	STR	2'- 6"	188
D2	3	6	STR	2'- 5"	11
G1	4	5	STR	26'- 9"	111
REINFORCING STEEL					6258 lbs.

SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
A200	5	1'- 9"
A400	7	3'- 1"
B1	4	1'- 9"
B3	5	1'- 9"
C1	4	1'-11"

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 119+06.31 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 8 FT. X 12 FT.
(INLET EXTENSION)
TRIPLE 8 FT. X 13 FT.
(OUTLET EXTENSION)
CONCRETE BOX CULVERT
90° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 14091 ENGINEER
BRIAN CHARLES HUNT
4/24/06

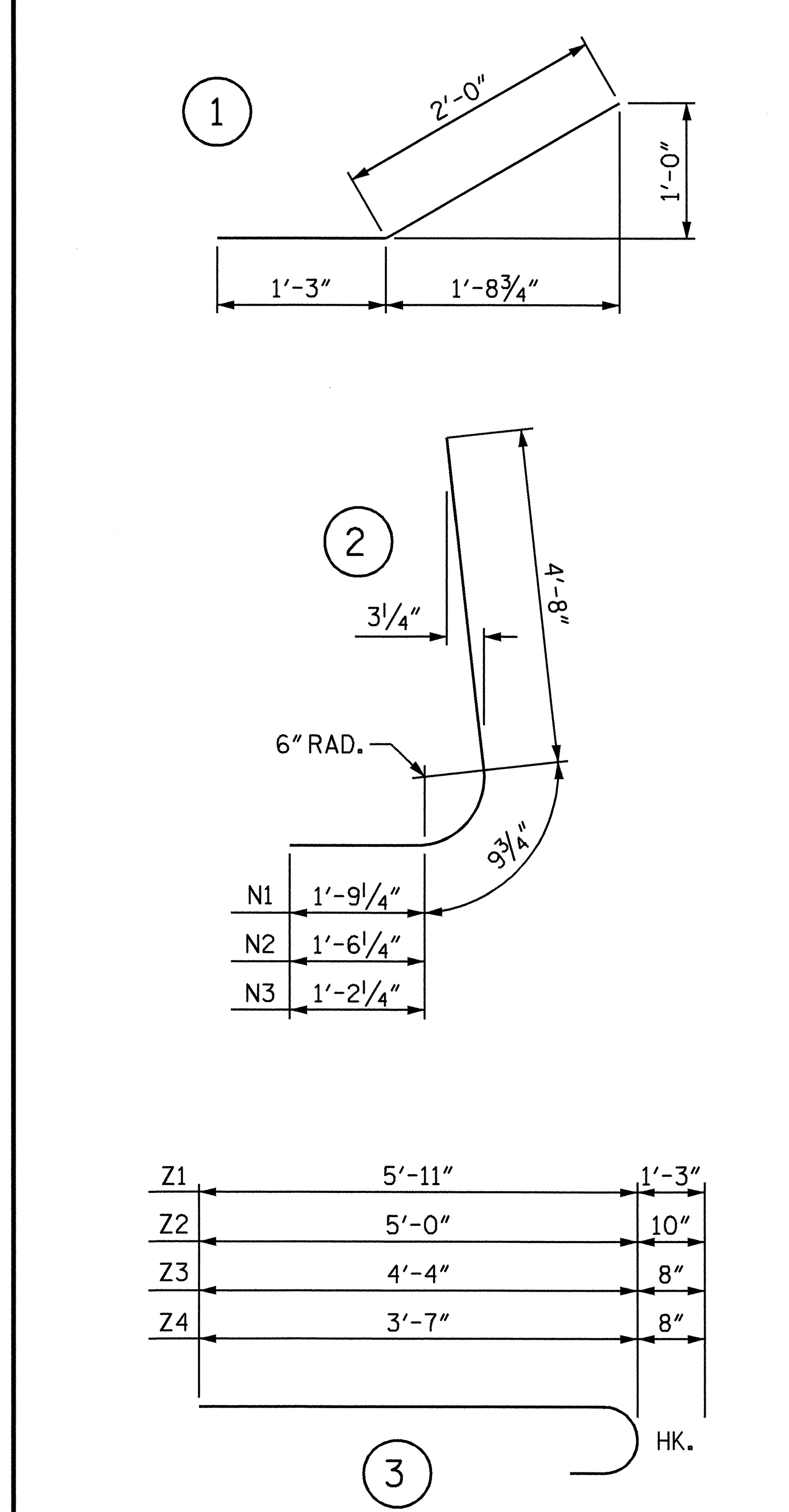
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-9
1			3			TOTAL SHEETS
2			4			24

DRAWN BY : M.K. BEARD DATE : 9/8/03
CHECKED BY : A.R. CHESSON DATE : 11/03

STR. #2

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.

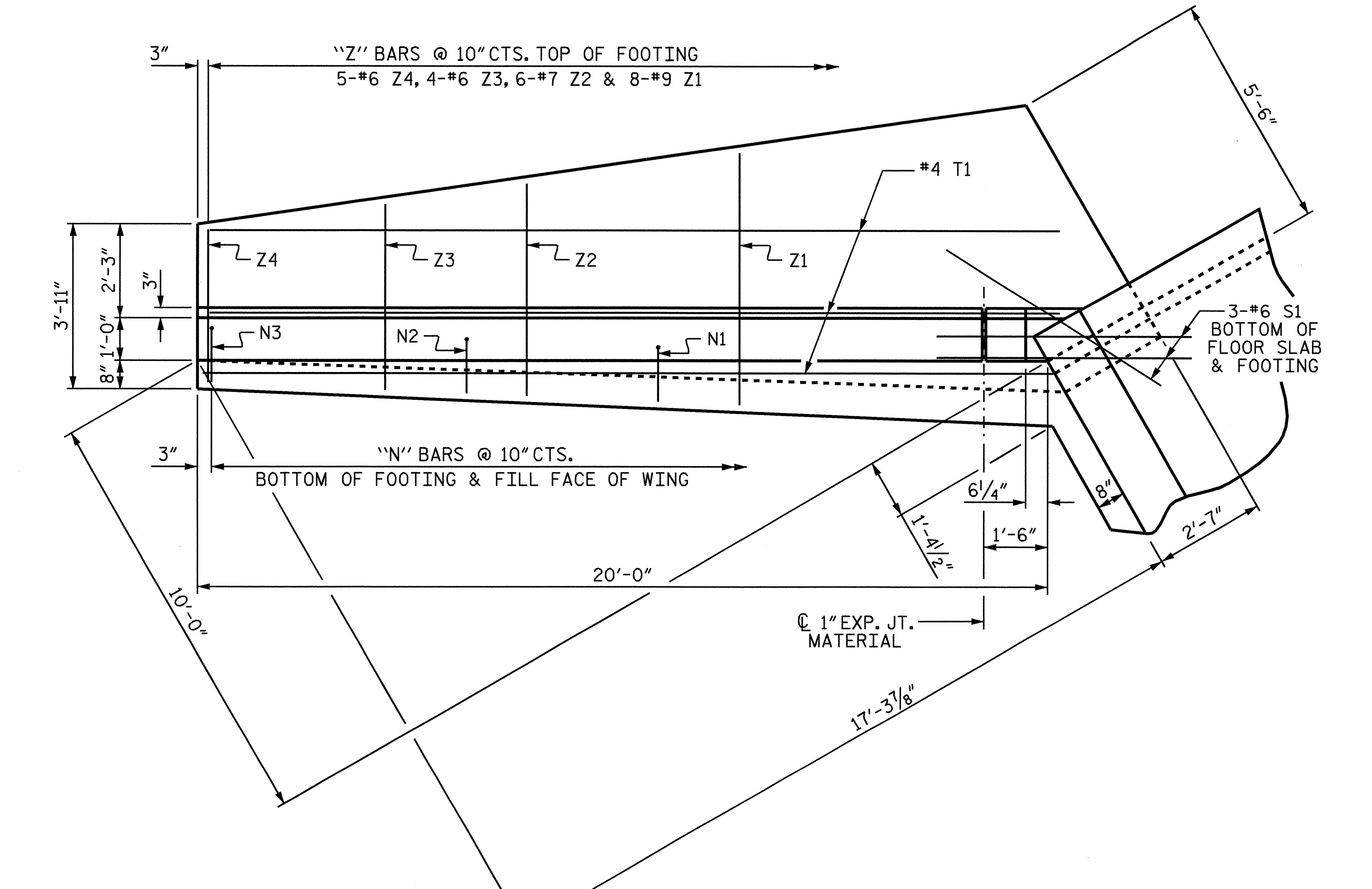


BILL OF MATERIAL

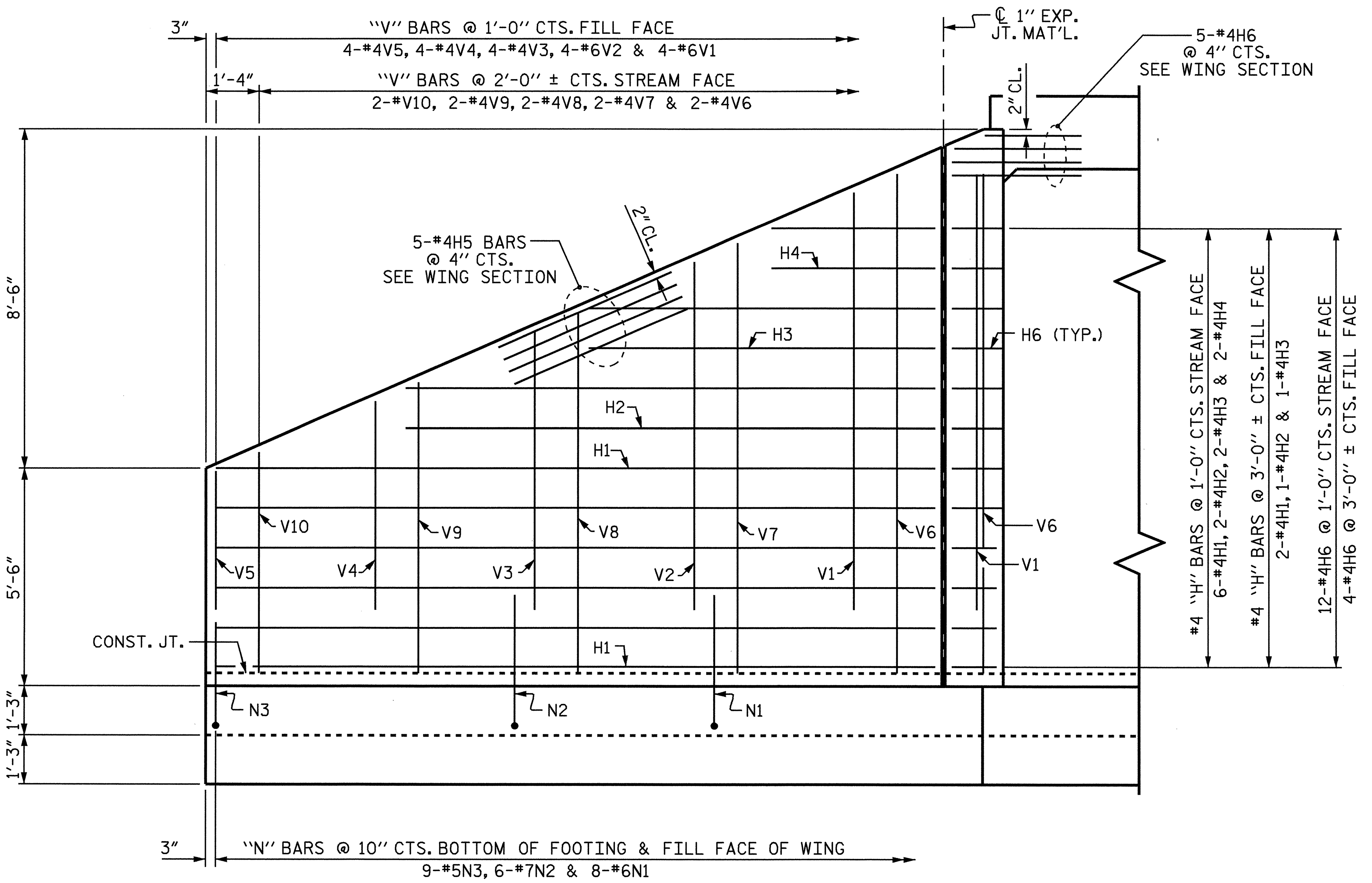
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	16	#4	STR	18'- 1"	193
H2	6	#4	STR	13'- 4"	53
H3	6	#4	STR	8'- 7"	34
H4	4	#4	STR	3'-10"	10
H5	10	#4	STR	19'- 2"	128
H6	42	#4	1	3'- 3"	91
N1	16	#8	2	7'- 3"	310
N2	12	#7	2	7'- 0"	172
N3	18	#5	2	6'- 8"	125
S1	6	#6	STR	6'- 0"	54
T1	8	#4	STR	20'- 0"	107
V1	8	#6	STR	10'- 9"	129
V2	8	#6	STR	9'- 0"	108
V3	8	#4	STR	6'- 9"	36
V4	8	#4	STR	5'- 0"	27
V5	8	#4	STR	3'- 3"	17
V6	4	#4	STR	12'- 6"	33
V7	4	#4	STR	10'- 9"	29
V8	4	#4	STR	9'- 0"	24
V9	4	#4	STR	7'- 3"	19
V10	4	#4	STR	5'- 6"	15
Z1	16	#9	3	7'- 2"	390
Z2	12	#7	3	5'-10"	143
Z3	8	#6	3	5'- 0"	60
Z4	10	#6	3	4'- 3"	64

REINFORCING STEEL FOR 2 WINGS — 2371 LBS

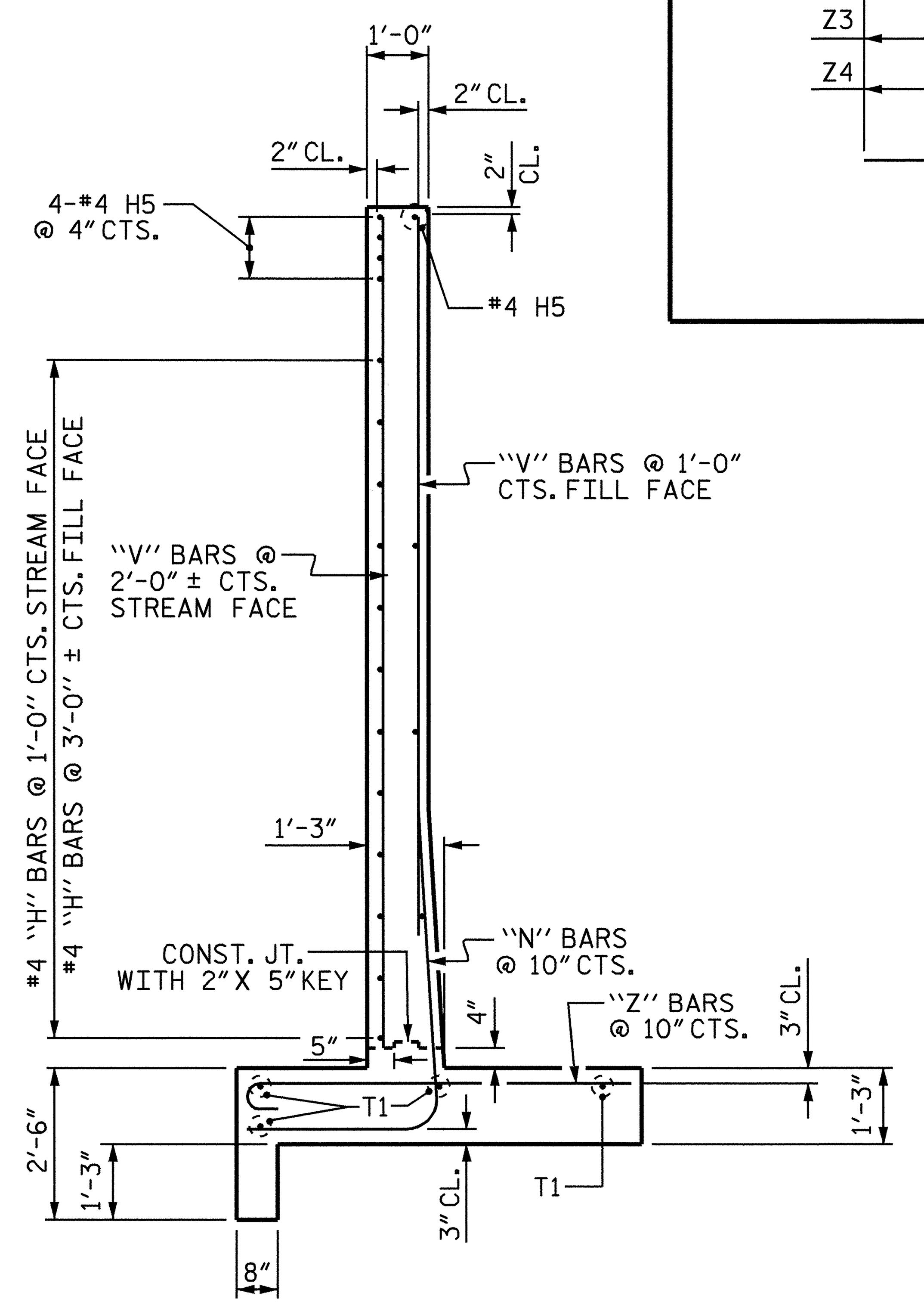
CLASS A CONCRETE
- 2 WINGS — 27.6 CY
- 1 HEADWALL — 1.3 CY
- 1 END CURTAIN WALL — 1.4 CY
- 1 BARREL STEP DOWN — 0.9 CY
- TOTAL — 31.2 CY



PLAN



ELEVATION



TYPICAL WING SECTION

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 119+06.31 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT (OUTLET EXTENSION)

H=13'-0" 90° SKEW SLOPE=2:1

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			C-10
1			3					TOTAL SHEETS
2			4					24

STR. #2

NORTH CAROLINA PROFESSIONAL SEAL 16091 ENGINEER BUCK CHARLES HUNT 4/24/06

DRAWN BY : M.K. BEARD DATE : 9/8/03
CHECKED BY : A.R. CHESSON DATE : 11/03

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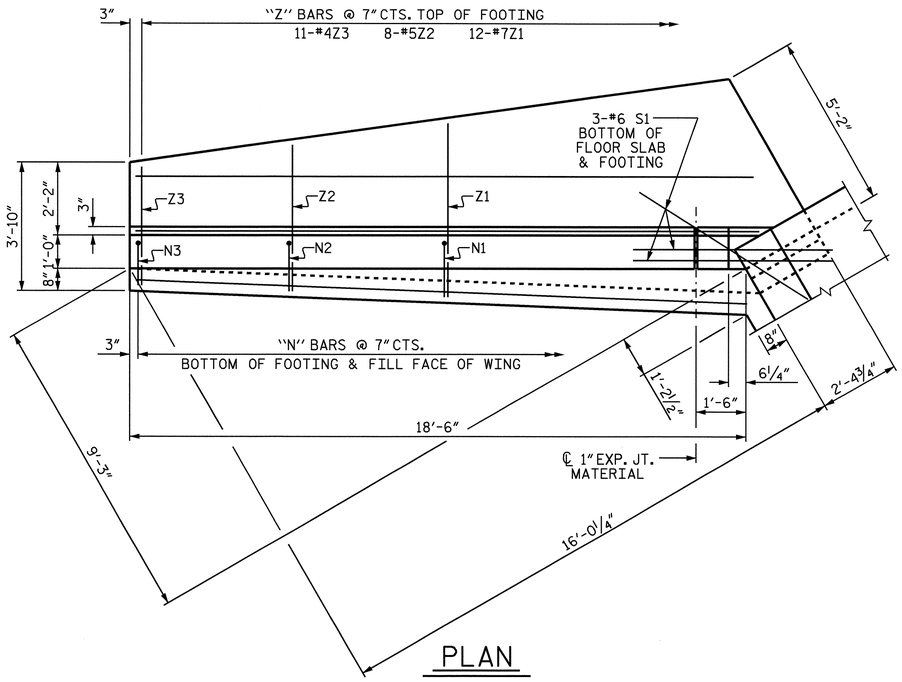
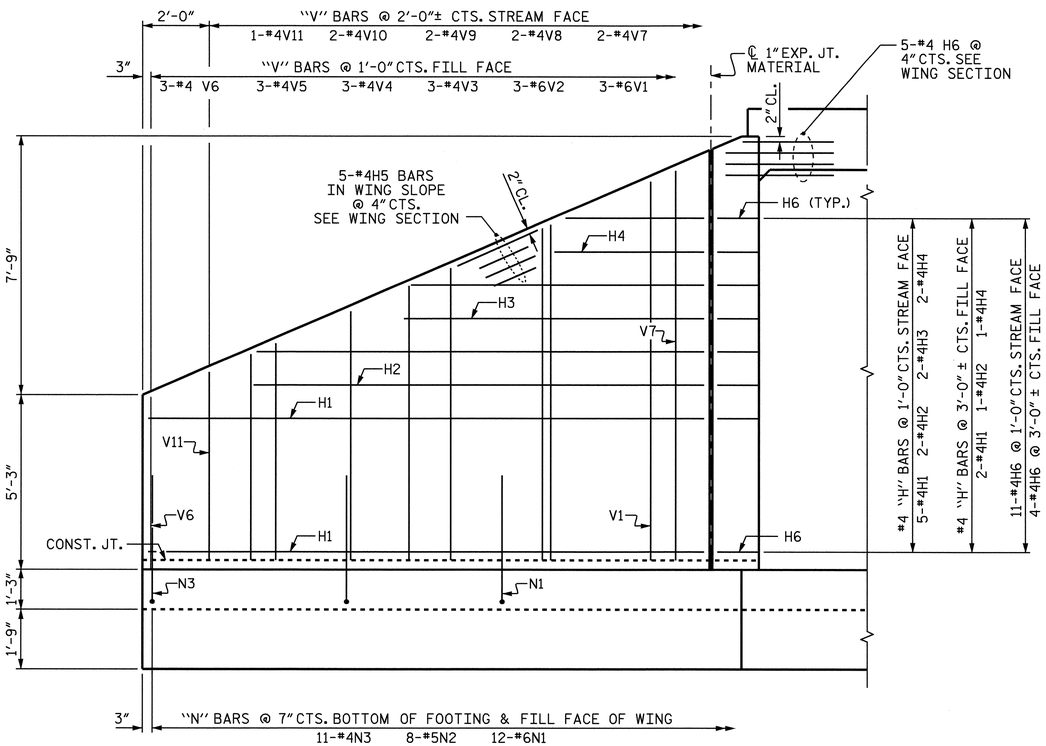


PLAN



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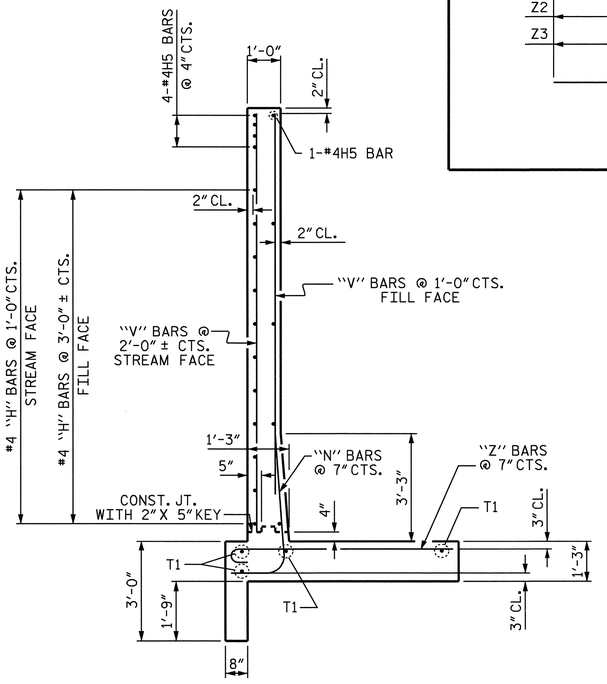
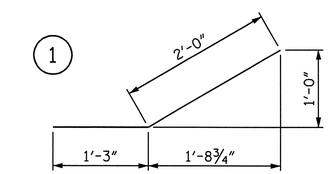
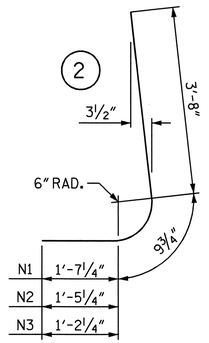


TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.





BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	14	#4	STR	16'- 7"	155
H2	6	#4	STR	13'- 7"	54
H3	4	#4	STR	8'- 8"	23
H4	6	#4	STR	3'-10"	15
H5	10	#4	STR	17'- 6"	117
H6	40	#4	1	3'- 3"	87
N1	24	#6	2	6'- 1"	219
N2	16	#5	2	5'-11"	99
N3	22	#4	2	5'- 8"	83
S1	6	#6	STR	6'- 0"	54
T1	8	#4	STR	18'- 6"	99
V1	6	#6	STR	11'- 0"	99
V2	6	#6	STR	9'- 9"	88
V3	6	#4	STR	7'- 9"	31
V4	6	#4	STR	6'- 6"	26
V5	6	#4	STR	5'- 3"	21
V6	6	#4	STR	4'- 0"	16
V7	4	#4	STR	11'- 3"	30
V8	4	#4	STR	9'- 6"	25
V9	4	#4	STR	7'- 9"	21
V10	4	#4	STR	6'- 3"	17
V11	2	#4	STR	5'- 3"	7
Z1	24	#7	3	6'- 4"	311
Z2	16	#5	3	5'- 4"	89
Z3	22	#4	3	4'- 0"	59

REINFORCING STEEL
FOR 2 WINGS 1845 LBS

CLASS A CONCRETE
2 WINGS 24.0 C.Y.
1 HEADWALL 1.3 C.Y.
1 END CURTAIN WALL 1.7 C.Y.
1 SILL 0.3 C.Y.
TOTAL 27.3 C.Y.

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 119+06.31 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT
(INLET EXTENSION)

H=12'-0" 90° SKEW SLOPE=2:1

NORTH CAROLINA PROFESSIONAL SEAL 14091 ENGINEER BRUCE CHARLES HUNT 4/21/06

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-11
1			3			TOTAL SHEETS
2			4			24

STR. #2

DRAWN BY : M.K. BEARD DATE : 9/8/03
CHECKED BY : A.R. CHESSON DATE : 11/03

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21-APR-2006 06:35
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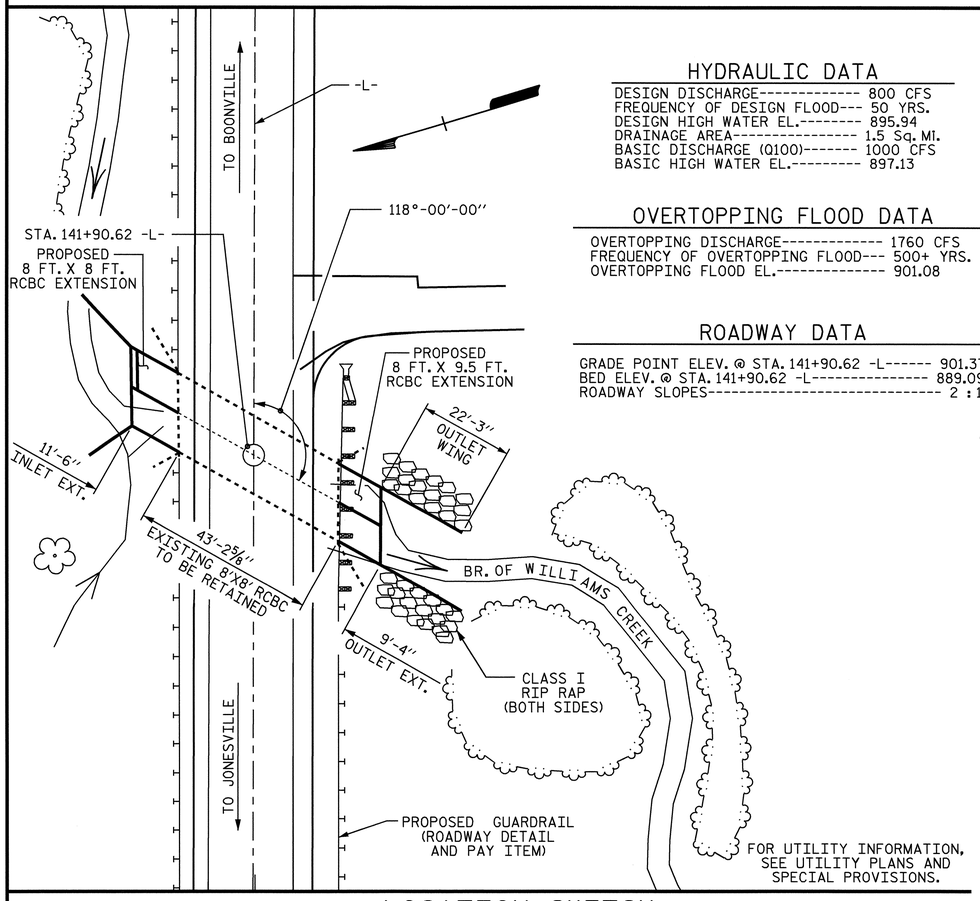
BENCH MARK T3-51: SET @ PROJECT STA. 142+25.18 -L-, OFFSET 56.38' LEFT, ELEV. 895.82



LOCATION SKETCH

HYDRAULIC DATA

DESIGN DISCHARGE---------- 800 CFS
FREQUENCY OF DESIGN FLOOD--- 50 YRS.
DESIGN HIGH WATER EL.-------- 895.94
DRAINAGE AREA---------- 1.5 Sq. Mi.
BASIC DISCHARGE (Q100)------- 1000 CFS
BASIC HIGH WATER EL.--------- 897.13

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE---------- 1760 CFS
FREQUENCY OF OVERTOPPING FLOOD--- 500+ YRS.
OVERTOPPING FLOOD EL.---------- 901.08

ROADWAY DATA

GRADE POINT ELEV. @ STA. 141+90.62 -L------ 901.37
BED ELEV. @ STA. 141+90.62 -L---------- 889.09
ROADWAY SLOPES---------- 2 :1

NOTES

ASSUMED LIVE LOAD ----------HS20-44 OR ALTERNATE LOADING.

DESIGN FILL---------- LEFT 3.95 RIGHT 4.02

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:

INLET EXTENSION
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.

OUTLET EXTENSION
1. WING FOOTINGS, APRON 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.

AT THE CONTRACTOR'S OPTION THE VERTICAL CONSTRUCTION JOINT BETWEEN THE OUTLET WINGS AND THE BARREL MAY BE ELIMINATED AND THE 'C' BARS IN THE BARREL MAY BE EXTENDED TO REPLACE THE 'D' AND 'H' BARS IN THE WINGS.

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 CONTRUCTION 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.

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

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSIONS. 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.

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

A 3' 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 FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

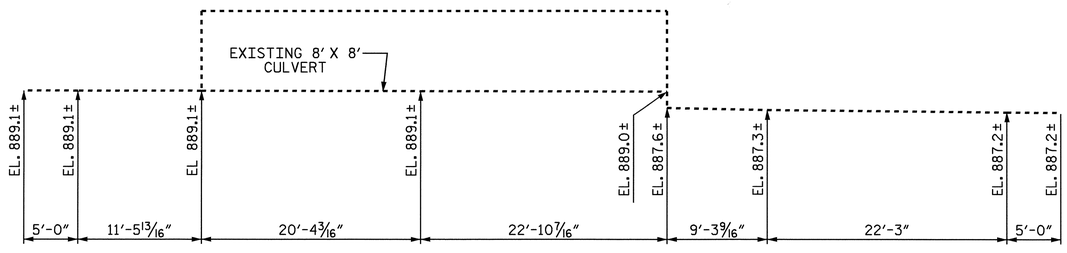
FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE (C.Y.)	OUTLET EXT.	INLET EXT.	TOTAL
INLET BARREL @ 1.601 CY/FT =		18.4	
OUTLET BARREL @ 1.712 CY/FT =	16.0		
WINGS, HEADWALLS, SILL, ETC. =		16.0	
OUTLET WINGS, HEADWALL, ETC. =	21.4		
TOTAL =	37.4	34.4	71.8
REINFORCING STEEL (Lbs)	**OUTLET EXT.**	**INLET EXT.**	**TOTAL**
BARREL =	7,501	4,007	
2 WINGS ETC. =		833	
TOTAL =	7,501	4,840	12,341
FOUNDATION COND. MAT'L (Tons)	40	15	55
CLASS I RIP RAP (Tons)	42	0	42
FILTER FABRIC FOR DRAINAGE (Sq. Yds)	48	0	48
CULVERT EXCAVATION =			LUMP SUM

SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
A200	4	1'- 9"
A400	6	2'- 4"
B1	4	1'- 9"
B3	4	1'- 9"
C1	4	1'-11"



PROFILE ALONG ℄ CULVERT

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 141+90.62 -L-

SHEET 1 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT (INLET EXTENSION)

DOUBLE 8 FT. X 9.5 FT. CONCRETE BOX CULVERT (OUTLET EXTENSION)

118° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-12
1			3			TOTAL SHEETS
2			4			24

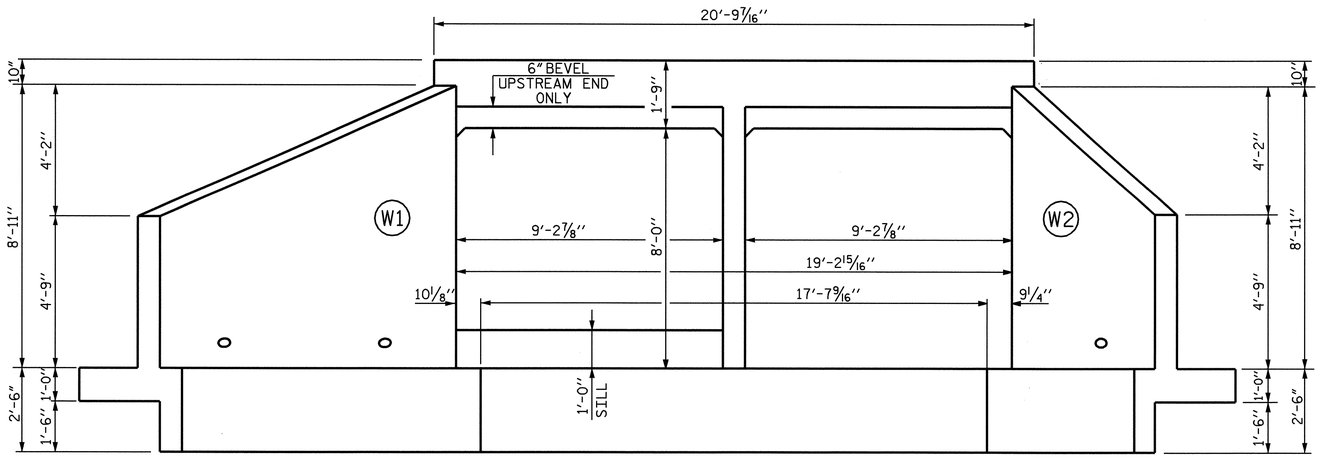
NORTH CAROLINA PROFESSIONAL SEAL 14081 ENGINEER CHUCK CHARLES HUNT 4/24/06

NORTH CAROLINA PROFESSIONAL SEAL 23371 ENGINEER VIPUL A. PATEL 4/24/06

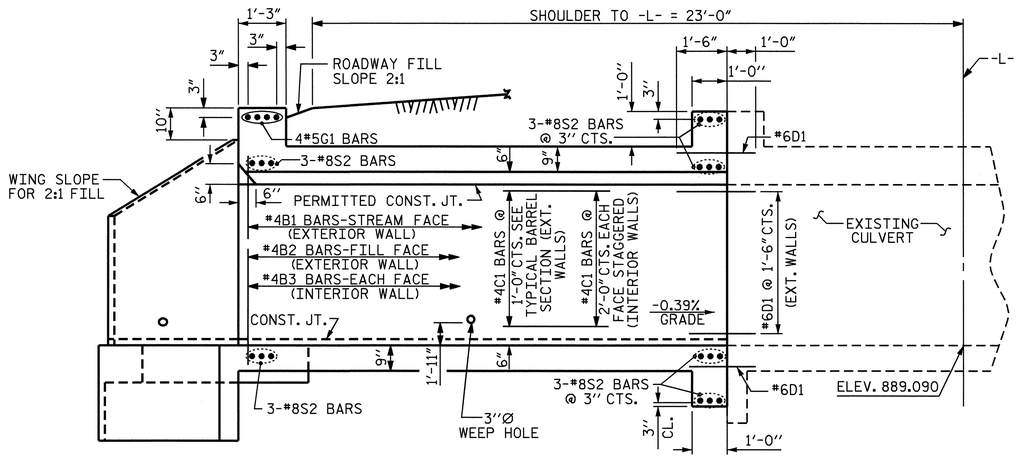
ASSEMBLED BY : J.P. ADAMS DATE : 3/9/04
CHECKED BY : A.K. PATEL DATE : 3/29/04
DRAWN BY : R.W. WRIGHT DATE : OCT. 1989
CHECKED BY : C.R.K. DATE : OCT. 1989

ADDED NOV. 1990

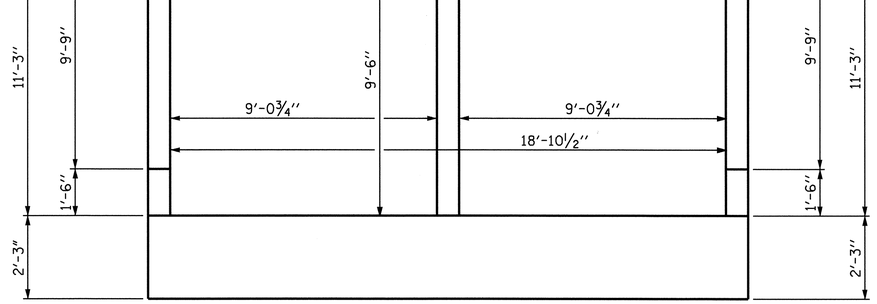
STR. #3



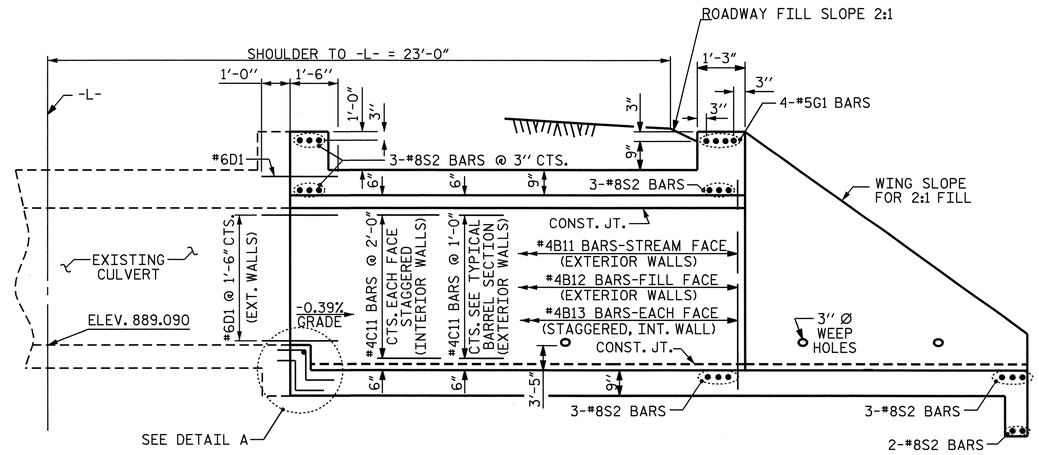
END ELEVATION (INLET EXTENSION)



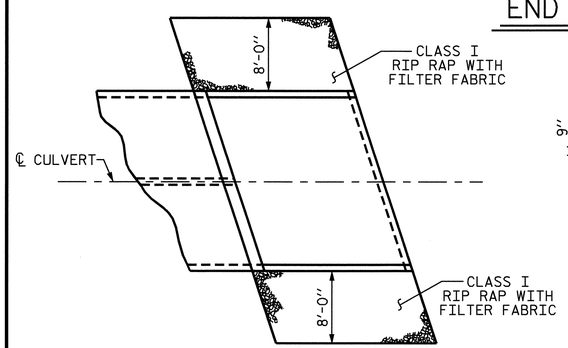
CULVERT SECTION NORMAL TO ROADWAY (INLET EXTENSION)



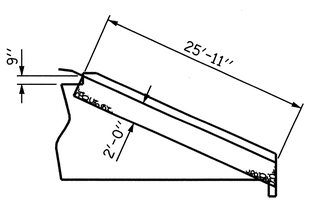
END ELEVATION (OUTLET EXTENSION)



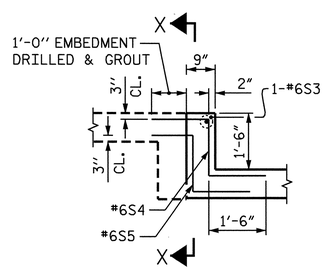
CULVERT SECTION NORMAL TO ROADWAY (OUTLET EXTENSION)



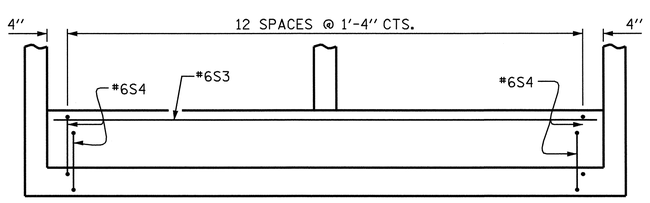
PLAN VIEW



ELEVATION VIEW



DETAIL A



VIEW X-X

OUTLET WING RIP RAP DETAILS

DRAWN BY : J.P. ADAMS DATE : 2/23/04
CHECKED BY : A.K. PATEL DATE : 3/30/04

21-APR-2006 06:35
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klayne

NORTH CAROLINA PROFESSIONAL SEAL 23371 ENGINEER ANKUR A. PATEL
4/24/06

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 141+90.62 -L-

SHEET 2 OF 7

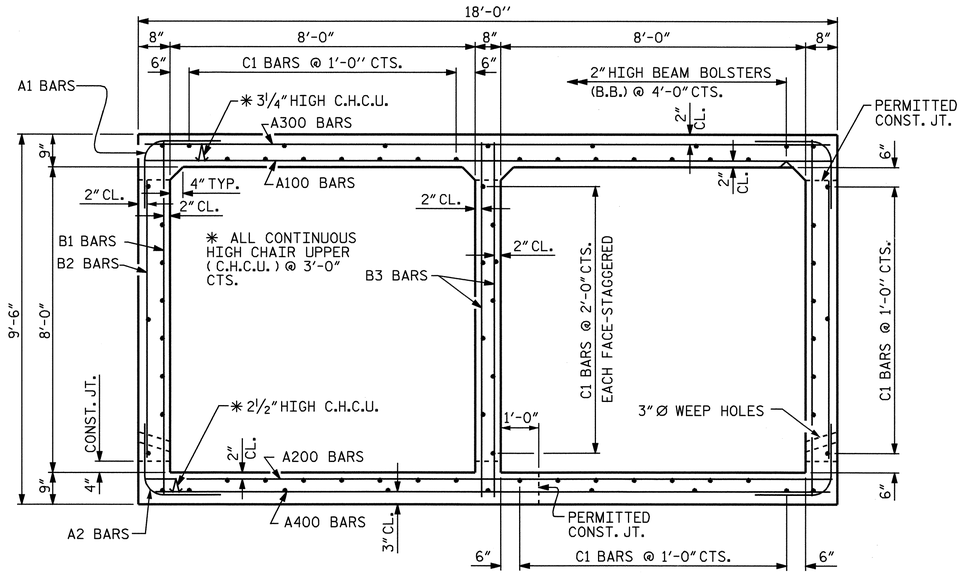
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT (INLET EXTENSION)

DOUBLE 8 FT. X 9.5 FT. CONCRETE BOX CULVERT (OUTLET EXTENSION)
118° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-13
1			3			TOTAL SHEETS
2			4			24

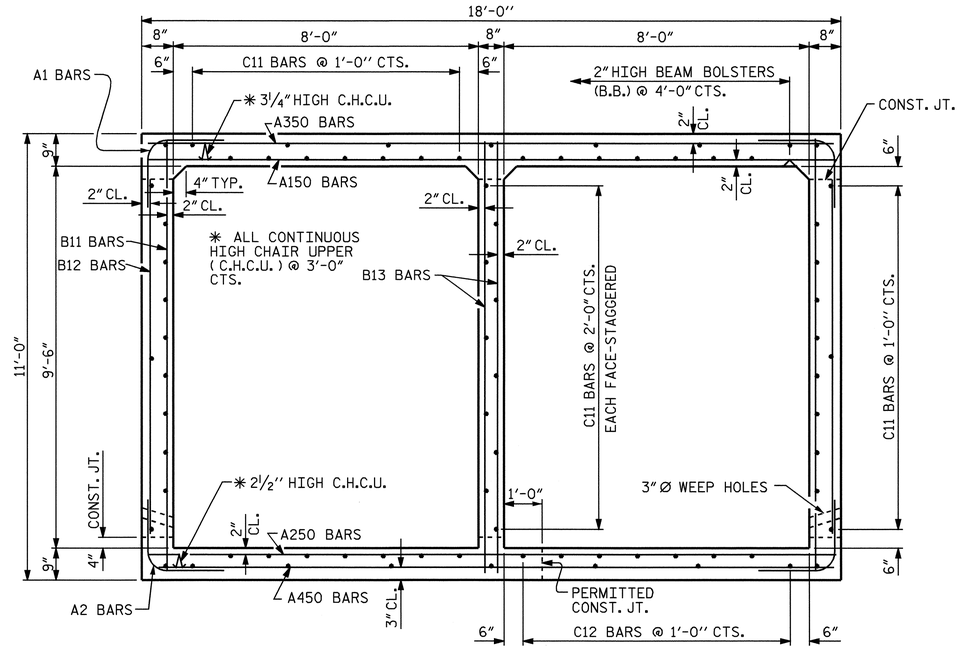
STR. #3



RIGHT ANGLE SECTION OF BARREL

INLET EXTENSION

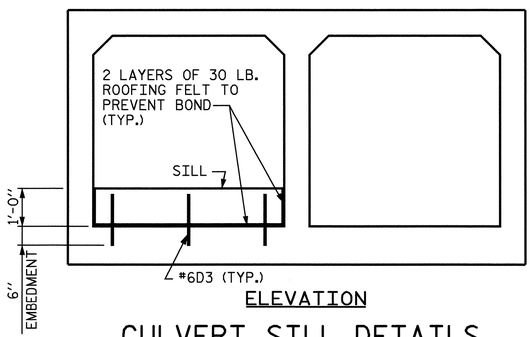
THERE ARE 72 "C" BARS IN SECTION OF BARREL.



RIGHT ANGLE SECTION OF BARREL

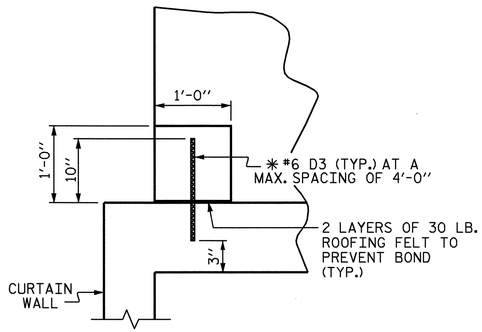
OUTLET EXTENSION

THERE ARE 78 "C" BARS IN SECTION OF BARREL.



ELEVATION

CULVERT SILL DETAILS



SECTION THROUGH SILL

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

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 141+90.62 -L-

SHEET 3 OF 7

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT (INLET EXTENSION)

DOUBLE 8 FT. X 9.5 FT. CONCRETE BOX CULVERT (OUTLET EXTENSION)

118° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 23371 ENGINEER VIPUL A. PATEL

4/24/06

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-14
1			3			TOTAL SHEETS
2			4			24

DRAWN BY : J.P. ADAMS DATE : 3/10/04

CHECKED BY : A.K. PATEL DATE : 3/30/04

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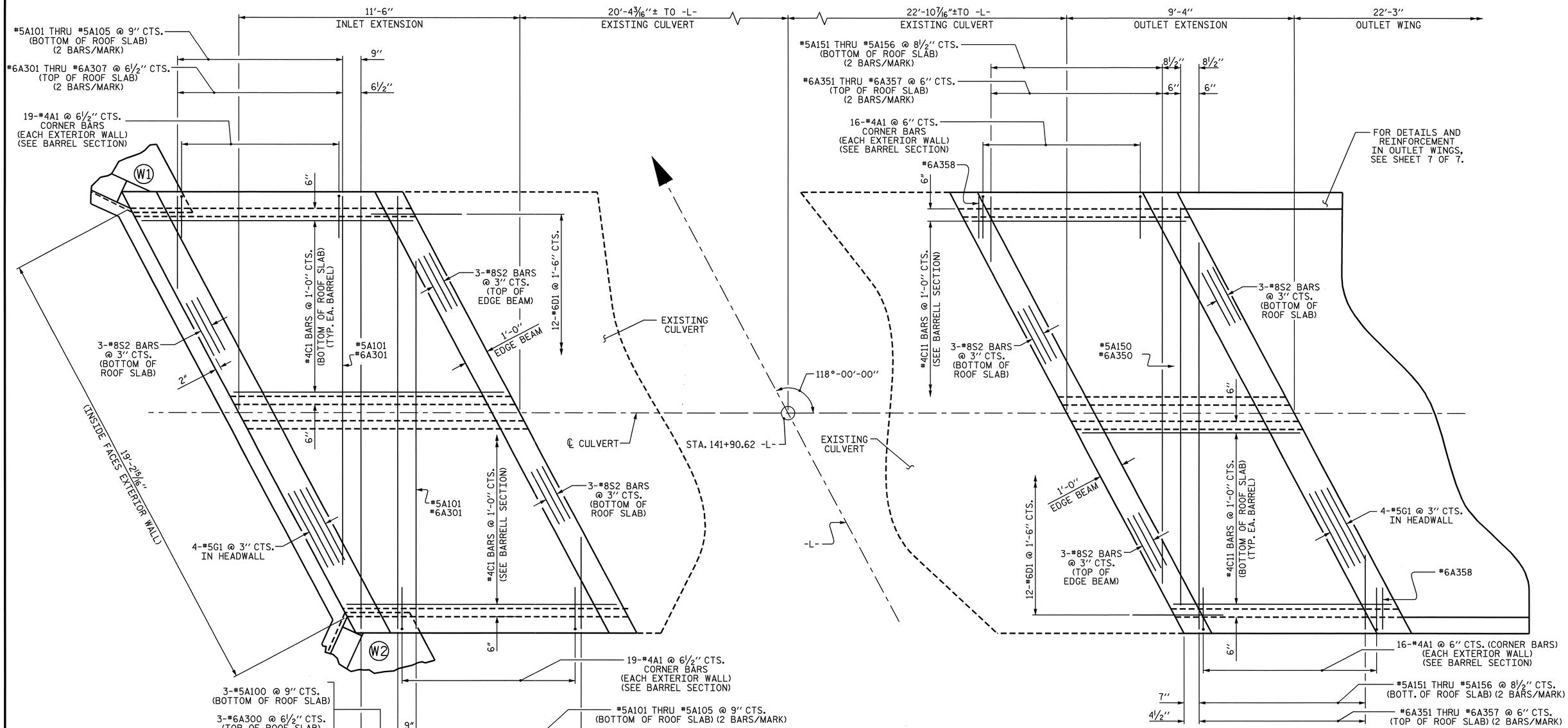
STR. #3



INLET EXTENSION

OUTLET EXTENSION

PLAN OF ROOF SLAB

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 141+90.62 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT (INLET EXTENSION)

DOUBLE 8 FT. X 9.5 FT. CONCRETE BOX CULVERT (OUTLET EXTENSION)

118° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-15
1			3			TOTAL SHEETS
2			4			24

NORTH CAROLINA PROFESSIONAL SEAL 23371 ENGINEER VIPUL A. PATEL
4/24/06

DRAWN BY : J.P. ADAMS DATE : 3/10/04
CHECKED BY : A.K. PATEL DATE : 3/30/04

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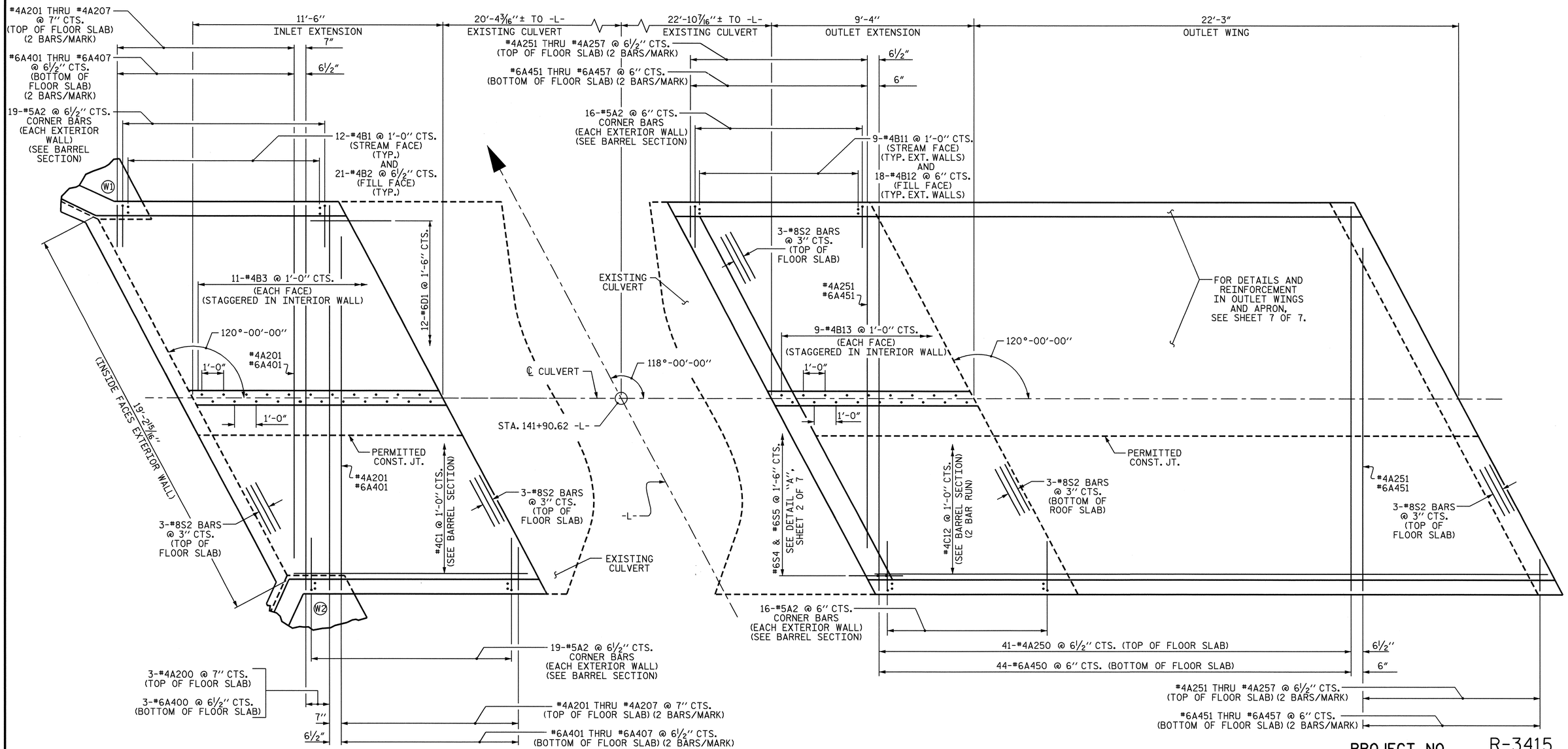

INLET EXTENSION

OUTLET EXTENSION

PLAN OF FLOOR SLAB

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 141+90.62 -L-

SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT (INLET EXTENSION)

DOUBLE 8 FT. X 9.5 FT. CONCRETE BOX CULVERT (OUTLET EXTENSION)

118° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 23371 ENGINEER JAMES A. PATEL

4/24/06

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-16
1			3			TOTAL SHEETS
2			4			24

STR. #3

DRAWN BY : J.P. ADAMS DATE : 3/2/04
CHECKED BY : A.K. PATEL DATE : 3/30/04

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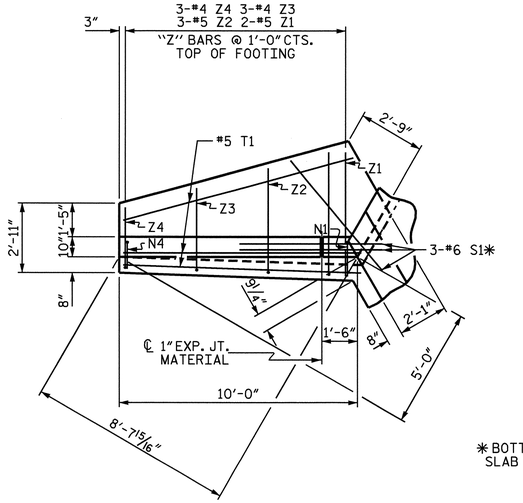
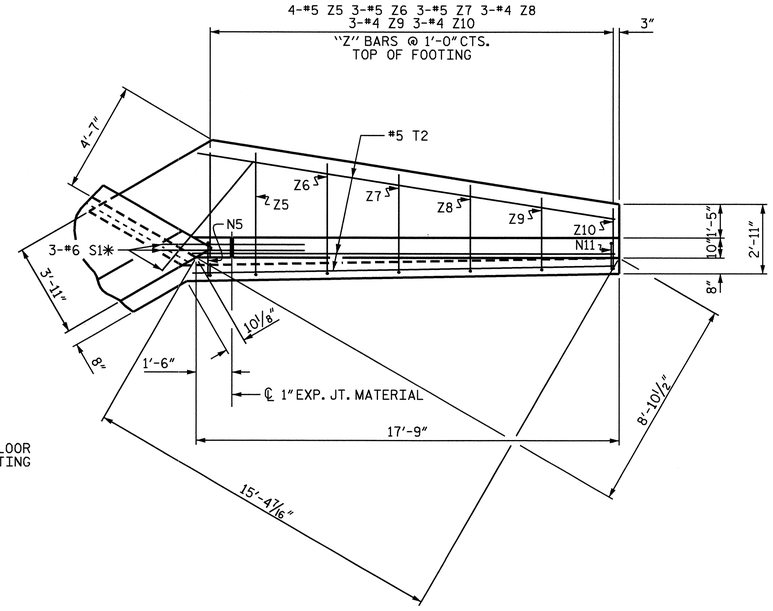
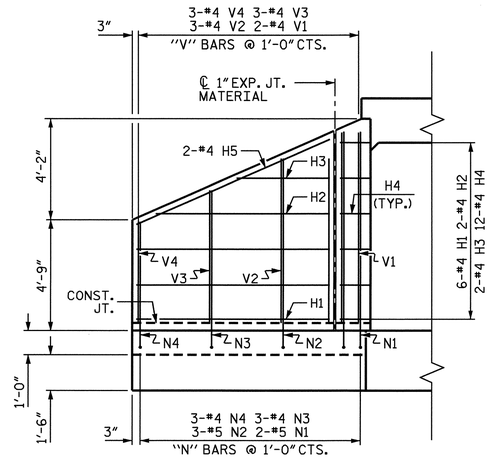




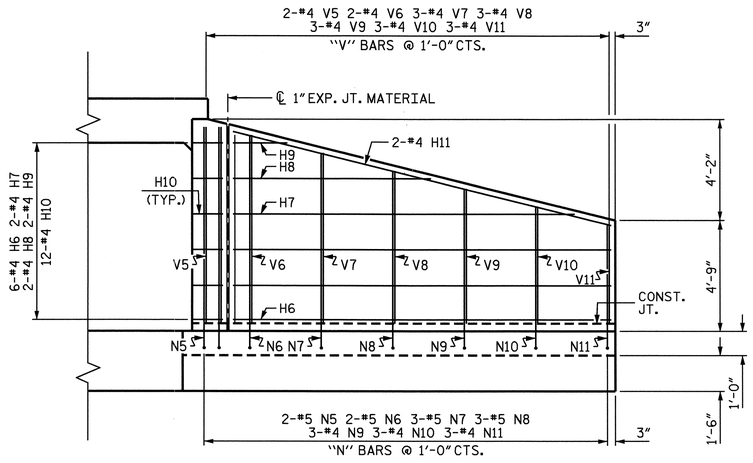
* BOTTOM OF FLOOR SLAB AND FOOTING

PLAN W2

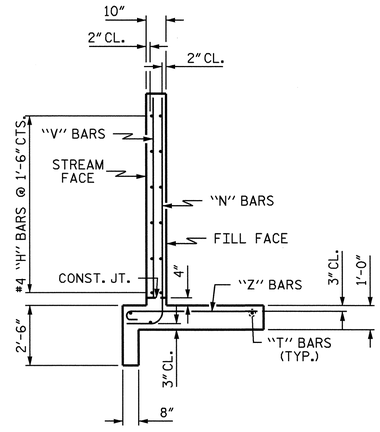
PLAN W1



ELEVATION W2



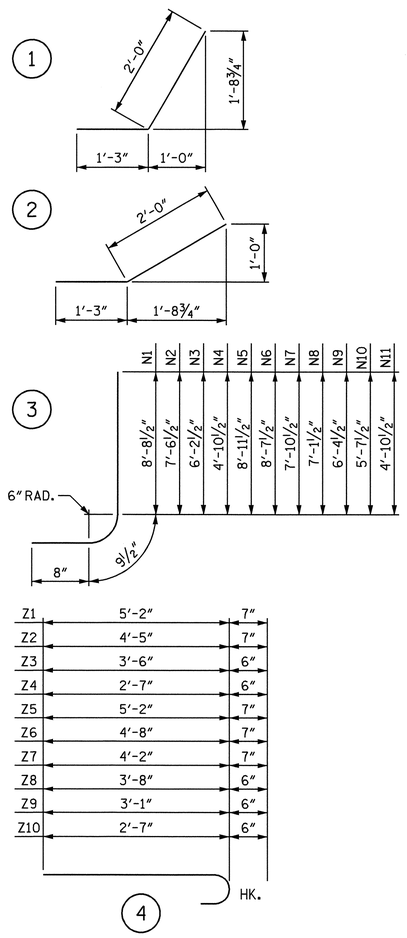
ELEVATION W1



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



Z1	5'-2"	7"
Z2	4'-5"	7"
Z3	3'-6"	6"
Z4	2'-7"	6"
Z5	5'-2"	7"
Z6	4'-8"	7"
Z7	4'-2"	7"
Z8	3'-8"	6"
Z9	3'-1"	6"
Z10	2'-7"	6"

HK.

4

BILL OF MATERIAL

INLET WINGS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	8'-1"	32
H2	2	#4	STR	7'-3"	10
H3	2	#4	STR	3'-11"	5
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	8'-10"	12
H6	6	#4	STR	15'-10"	63
H7	2	#4	STR	14'-4"	19
H8	2	#4	STR	8'-3"	11
H9	2	#4	STR	2'-3"	3
H10	12	#4	2	3'-3"	26
H11	2	#4	STR	16'-4"	22
N1	2	#5	3	10'-2"	21
N2	3	#5	3	9'-0"	28
N3	3	#4	3	7'-8"	15
N4	3	#4	3	6'-4"	13
N5	2	#5	3	10'-5"	22
N6	2	#5	3	10'-1"	21
N7	3	#5	3	9'-4"	29
N8	3	#5	3	8'-7"	27
N9	3	#4	3	7'-10"	16
N10	3	#4	3	7'-1"	14
N11	3	#4	3	6'-4"	13
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	10'-0"	31
T2	3	#5	STR	17'-9"	56
V1	2	#4	STR	8'-1"	11
V2	3	#4	STR	7'-0"	14
V3	3	#4	STR	5'-8"	11
V4	3	#4	STR	4'-4"	9
V5	2	#4	STR	8'-4"	11
V6	2	#4	STR	8'-0"	11
V7	3	#4	STR	7'-3"	15
V8	3	#4	STR	6'-6"	13
V9	3	#4	STR	5'-9"	12
V10	3	#4	STR	5'-0"	10
V11	3	#4	STR	4'-3"	9
Z1	2	#5	4	5'-9"	12
Z2	3	#5	4	5'-0"	16
Z3	3	#4	4	4'-0"	8
Z4	3	#4	4	3'-1"	6
Z5	4	#5	4	5'-9"	24
Z6	3	#5	4	5'-3"	16
Z7	3	#5	4	4'-9"	15
Z8	3	#4	4	4'-2"	8
Z9	3	#4	4	3'-7"	7
Z10	3	#4	4	3'-1"	6
REINFORCING STEEL					833 LBS

CLASS A CONCRETE

2 WINGS	12.2 CY
1 HEADWALL	0.9 CY
1 END CURTAIN WALL	1.1 CY
1 SILL	0.3 CY
2 EDGE BEAMS	1.5 CY
TOTAL	16.0 CY

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 141+90.62 -L-

SHEET 6 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD INLET WINGS FOR CONCRETE BOX CULVERT

H = 8'-0" SLOPE = 2:1

120° SKEW

INLET EXTENSION

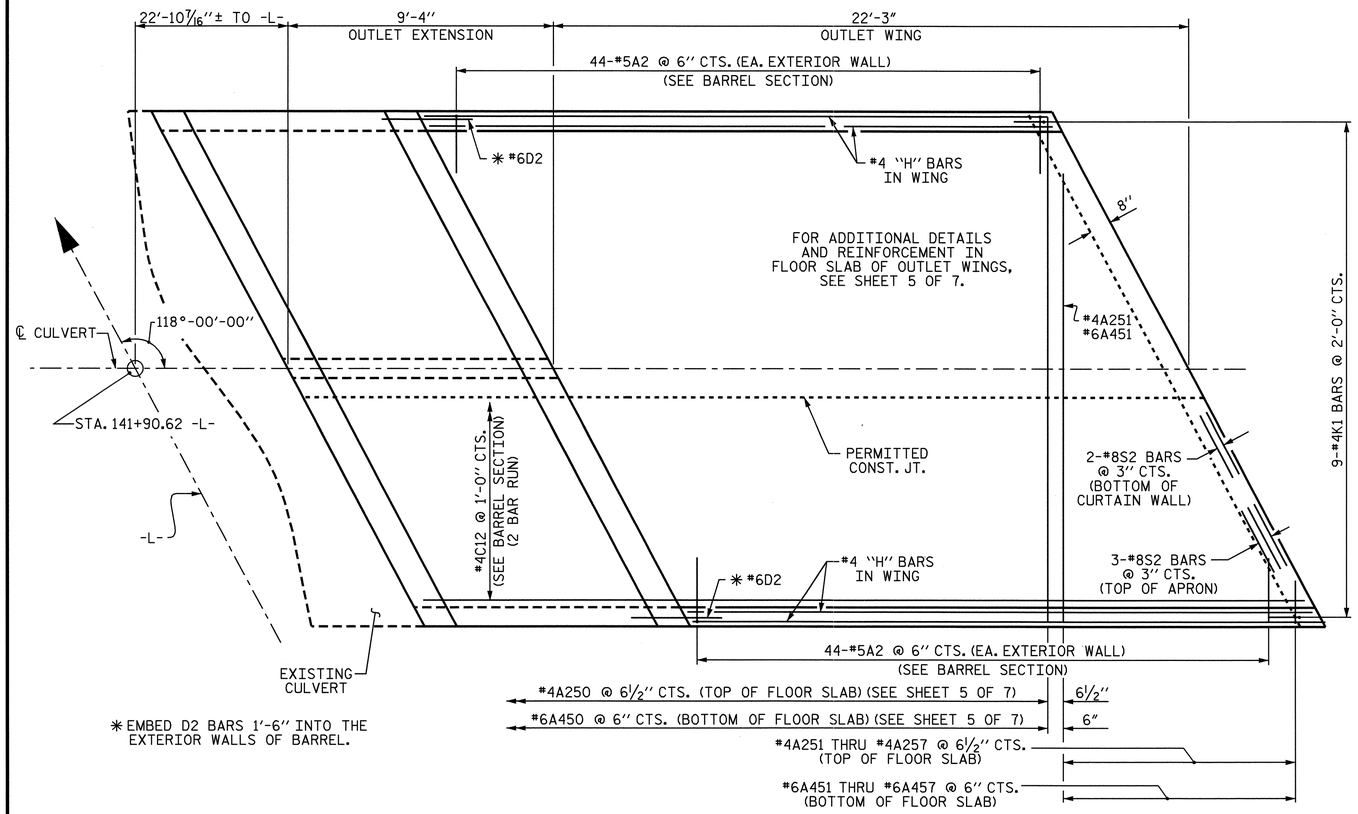
NORTH CAROLINA PROFESSIONAL SEAL 23371 ENGINEER VIPUL A. PATEL

4/24/06

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-17
1			3			TOTAL SHEETS
2			4			24

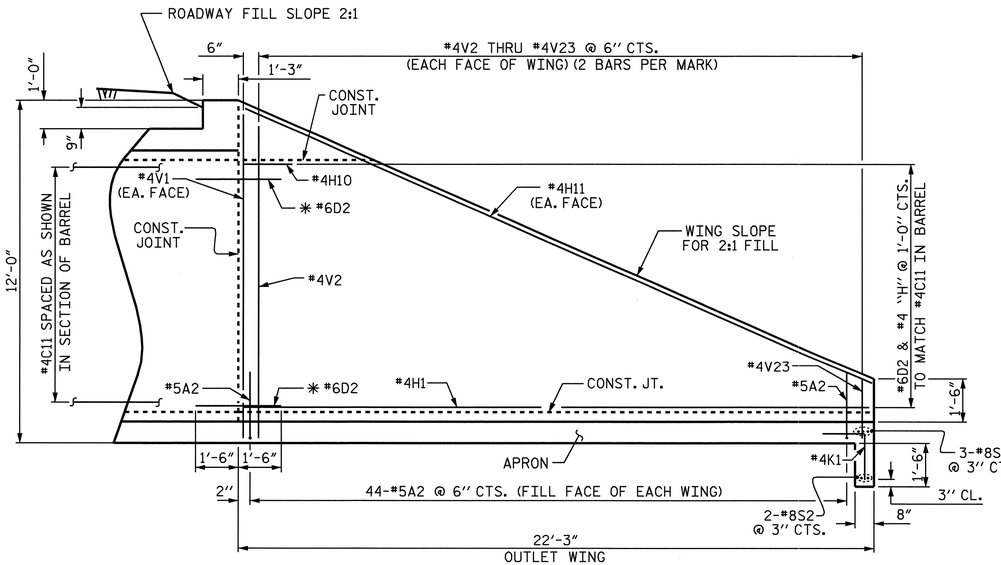
ASSEMBLED BY : J.P. ADAMS	DATE : 3/4/04
CHECKED BY : A.K. PATEL	DATE : 3/30/04
DRAWN BY : CCJ 11/99	
CHECKED BY : RWW 03/00	

STR. #3 STD. NO. CW6008

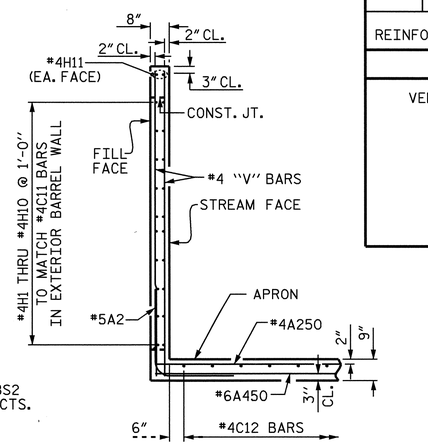


* EMBED D2 BARS 1'-6" INTO THE EXTERIOR WALLS OF BARREL.

PLAN OF OUTLET WING



OUTLET WING SECTION



TYPICAL WING SECTION

BILL OF MATERIAL

INLET EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	38	#4	5	4'-2"	106
A2	38	#5	5	4'-5"	175
A100	3	#5	STR	17'-8"	55
A101	4	#5	STR	15'-0"	63
A102	4	#5	STR	12'-2"	51
A103	4	#5	STR	9'-4"	39
A104	4	#5	STR	6'-7"	27
A105	4	#5	STR	3'-9"	16
A200	3	#4	STR	17'-8"	35
A201	4	#4	STR	15'-11"	43
A202	4	#4	STR	13'-9"	37
A203	4	#4	STR	11'-7"	31
A204	4	#4	STR	9'-4"	25
A205	4	#4	STR	7'-2"	19
A206	4	#4	STR	5'-0"	13
A207	4	#4	STR	2'-7"	7
A300	3	#6	STR	17'-8"	80
A301	4	#6	STR	16'-2"	97
A302	4	#6	STR	14'-2"	85
A303	4	#6	STR	12'-1"	73
A304	4	#6	STR	10'-1"	61
A305	4	#6	STR	8'-0"	48
A306	4	#6	STR	6'-0"	36
A307	4	#6	STR	3'-11"	24
A400	3	#6	STR	17'-8"	80
A401	4	#6	STR	16'-2"	97
A402	4	#6	STR	14'-2"	85
A403	4	#6	STR	12'-1"	73
A404	4	#6	STR	10'-1"	61
A405	4	#6	STR	8'-0"	48
A406	4	#6	STR	6'-0"	36
A407	4	#6	STR	3'-11"	24
B1	24	#4	STR	9'-1"	146
B2	42	#4	STR	7'-4"	206
B3	22	#4	STR	9'-1"	133
C1	72	#4	STR	11'-1"	533
D1	42	#6	STR	2'-6"	158
D3	3	#6	STR	1'-4"	6
G1	4	#5	STR	20'-0"	83
S2	18	#8	STR	20'-0"	961
REINFORCING STEEL = 4007 LBS					

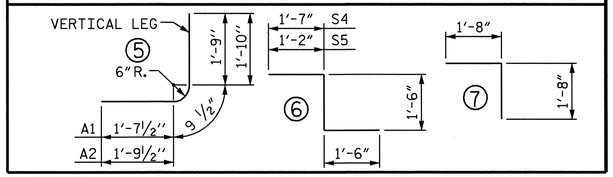
OUTLET EXTENSION AND OUTLET WING

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	32	#4	5	4'-2"	89
A2	120	#5	5	4'-5"	553
A150	1	#5	STR	16'-10"	18
A151	4	#5	STR	14'-7"	61
A152	4	#5	STR	11'-11"	50
A153	4	#5	STR	9'-3"	39
A154	4	#5	STR	6'-7"	27
A155	4	#5	STR	3'-11"	16
A156	4	#5	STR	2'-7"	11
A250	41	#4	STR	17'-8"	484
A251	4	#4	STR	15'-8"	42
A252	4	#4	STR	13'-8"	37
A253	4	#4	STR	11'-7"	31
A254	4	#4	STR	9'-7"	26
A255	4	#4	STR	7'-6"	20
A256	4	#4	STR	5'-6"	15
A257	4	#4	STR	3'-6"	9
A350	1	#6	STR	16'-10"	25
A351	4	#6	STR	15'-4"	92
A352	4	#6	STR	13'-5"	81
A353	4	#6	STR	11'-7"	70
A354	4	#6	STR	9'-8"	58
A355	4	#6	STR	7'-10"	47
A356	4	#6	STR	5'-11"	36
A357	4	#6	STR	4'-1"	25
A358	2	#6	STR	2'-2"	7
A450	44	#6	STR	17'-8"	1168
A451	4	#6	STR	16'-0"	96
A452	4	#6	STR	14'-1"	85
A453	4	#6	STR	12'-3"	74
A454	4	#6	STR	10'-4"	62
A455	4	#6	STR	8'-6"	51
A456	4	#6	STR	6'-7"	40
A457	4	#6	STR	4'-9"	29
B11	18	#4	STR	10'-7"	127
B12	36	#4	STR	8'-10"	212
B13	18	#4	STR	10'-7"	127
C11	55	#4	STR	8'-11"	328
C12	46	#4	STR	16'-7"	510
D1	30	#6	STR	2'-6"	113
D2	22	#6	STR	3'-0"	99

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
G1	4	#5	STR	20'-0"	83
H1	4	#4	STR	21'-11"	59
H2	4	#4	STR	21'-8"	58
H3	4	#4	STR	19'-4"	52
H4	4	#4	STR	17'-1"	46
H5	4	#4	STR	14'-9"	39
H6	4	#4	STR	12'-6"	33
H7	4	#4	STR	10'-3"	27
H8	4	#4	STR	7'-11"	21
H9	4	#4	STR	5'-8"	15
H10	4	#4	STR	3'-4"	9
H11	4	#4	STR	23'-11"	64
K1	9	#4	7	3'-4"	20
S2	17	#8	STR	20'-0"	908
S3	1	#6	STR	18'-5"	28
S4	12	#6	6	4'-7"	83
S5	12	#6	6	4'-2"	75
V1	4	#4	STR	11'-7"	31
V2	8	#4	STR	11'-1"	59
V3	8	#4	STR	10'-8"	57
V4	8	#4	STR	10'-3"	55
V5	8	#4	STR	9'-9"	52
V6	8	#4	STR	9'-4"	50
V7	8	#4	STR	8'-11"	48
V8	8	#4	STR	8'-6"	45
V9	8	#4	STR	8'-0"	43
V10	8	#4	STR	7'-7"	41
V11	8	#4	STR	7'-2"	38
V12	8	#4	STR	6'-9"	36
V13	8	#4	STR	6'-3"	33
V14	8	#4	STR	5'-10"	31
V15	8	#4	STR	5'-5"	29
V16	8	#4	STR	5'-0"	27
V17	8	#4	STR	4'-6"	24
V18	8	#4	STR	4'-1"	22
V19	8	#4	STR	3'-8"	20
V20	8	#4	STR	3'-3"	17
V21	8	#4	STR	2'-9"	15
V22	8	#4	STR	2'-4"	12
V23	4	#4	STR	2'-1"	6

REINFORCING STEEL = 7501 LBS

BAR TYPES



BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. R-3415

YADKIN COUNTY

STATION: 141+90.62 -L-

SHEET 7 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

OUTLET WINGS FOR
DOUBLE 8 FT. X 9.5 FT.
CONCRETE BOX CULVERT

H = 9'-6" SLOPE = 2:1

118° SKEW
(OUTLET EXTENSION)

NORTH CAROLINA PROFESSIONAL SEAL 23371 ENGINEER VIMAL A. PATEL
4/24/06

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-18
1			3			TOTAL SHEETS
2			4			24

STR. #3

DRAWN BY : J.P. ADAMS DATE : 3/11/04
CHECKED BY : A.K. PATEL DATE : 3/29/04

21-APR-2006 06:36
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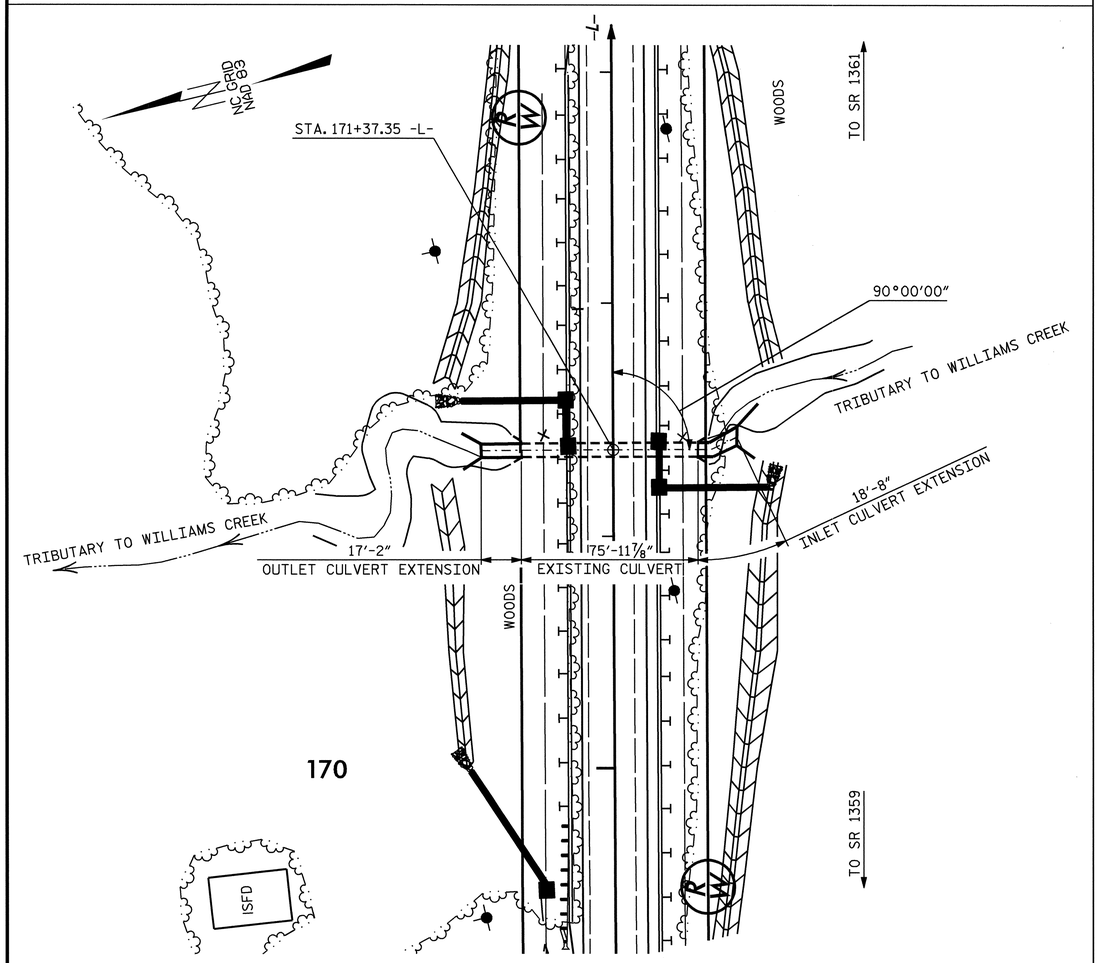
klayne

BENCH MARK IS: T4-55: SET AT PROJECT STA. 171+84.17 -L-, OFFSET 162.8' RIGHT EL. 986.21 NGVD 29



LOCATION SKETCH

NOTE: FOR UTILITY CONFLICTS, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

ROADWAY DATA

GRADE POINT EL. @ STA. 171+37.35-L- ___ = 1002.504
BED ELEVATION @ STA. 171+37.35-L- ___ = 979.470
ROADWAY SLOPES _____ = 2 : 1

HYDRAULIC DATA

DESIGN DISCHARGE _____ = 200 ft³/s
FREQUENCY OF DESIGN FLOOD _____ = 50 YRS
DESIGN HIGH WATER ELEVATION _____ = 985.160
DRAINAGE AREA _____ = 162 Ac
BASIC DISCHARGE (Q100) _____ = 240 ft³/s
BASIC HIGH WATER ELEVATION _____ = 985.960

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE _____ = 720 ft³/s
FREQUENCY OF OVERTOPPING FLOOD ____ = > 500 YRS
OVERTOPPING FLOOD ELEVATION _____ = 1002.500

TOTAL STRUCTURE QUANTITIES

	OUTLET EXTENSION	INLET EXTENSION	TOTAL
CLASS A CONCRETE (CUBIC YARDS)			
BARREL @ 0.715 CY / FT	12.3	13.3	
WINGS, ETC.	5.7	6.9	
TOTAL (CUBIC YARDS)	18.0	20.2	38.2
REINFORCING STEEL (LBS)			
BARREL	1,447	1,761	
WINGS, ETC.	340	406	
TOTAL (LBS)	1,787	2,167	3,954
FOUNDATION COND. MAT'L (TONS)	9	10	19
CULVERT EXCAVATION			LUMP SUM

NOTES

ASSUMED LIVE LOAD ---------- HS20 OR ALTERNATE LOADING.

DESIGN FILL: LEFT EXTENSION = 17.64 FEET, RIGHT EXTENSION = 18.28 FEET

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 EXTENSION FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. OUTLET EXTENSION REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT. FOLLOWED BY EXTENSION ROOF AND HEADWALL.
3. INLET EXTENSION FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
4. INLET EXTENSION REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT. FOLLOWED BY EXTENSION ROOF AND HEADWALL.

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

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.

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

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.

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

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

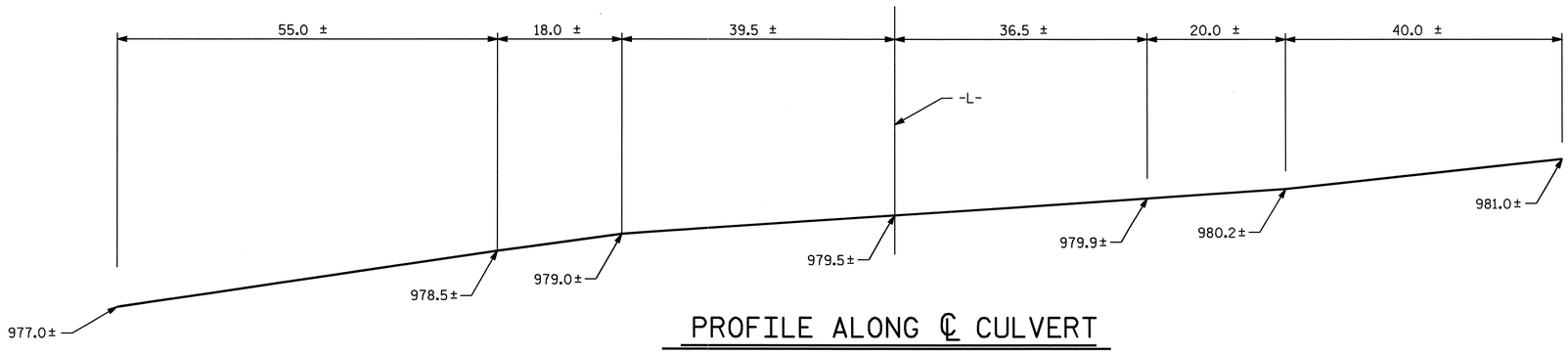
A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.



PROFILE ALONG ℄ CULVERT

ASSEMBLED BY : R. L. CHESSON DATE : 2003 JULY
CHECKED BY : A. R. CHESSON DATE : 1-04

NORTH CAROLINA PROFESSIONAL SEAL 24091 ENGINEER BRICK CHARLES HUNT
4/24/06

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 171+37.35 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE BARREL 6 FT. X 5 FT. CONCRETE BOX CULVERT 90° SKEW INLET AND OUTLET EXTENSIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-19
1			3			TOTAL SHEETS
2			4			24

STR #4

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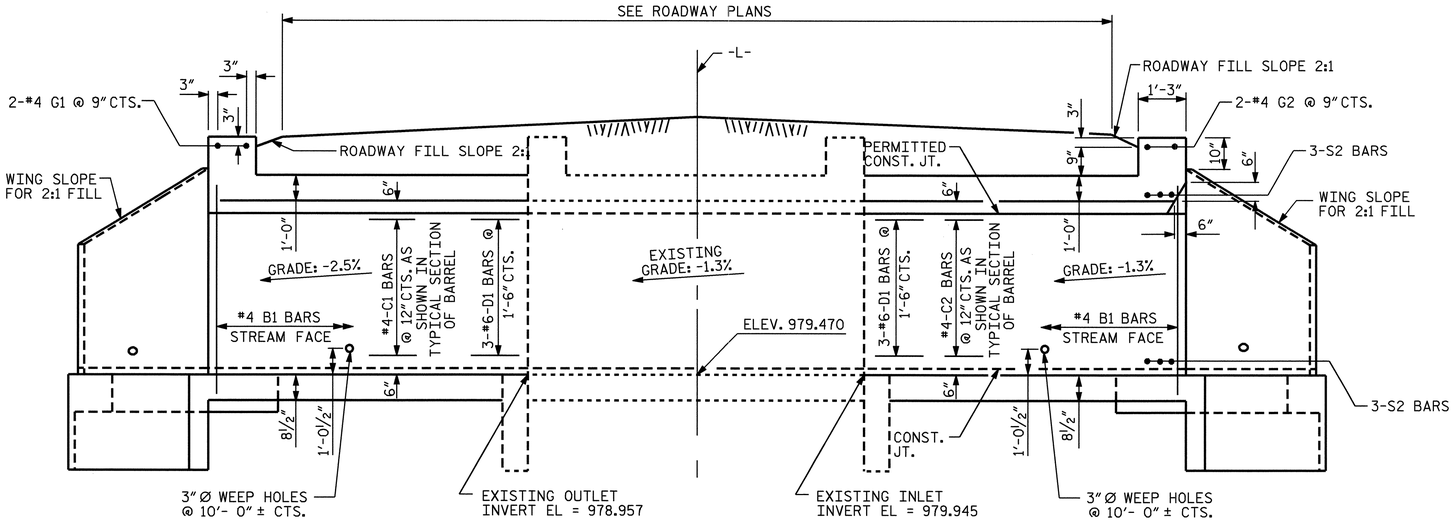
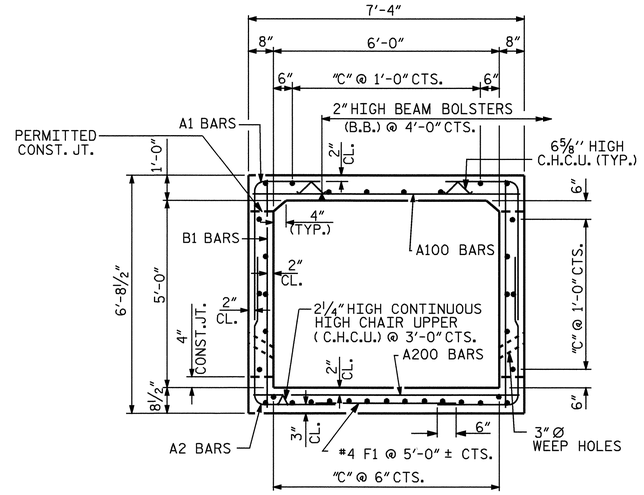
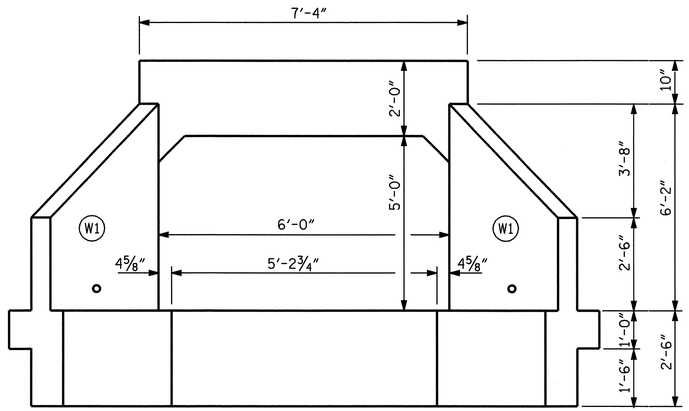


CULVERT SECTION NORMAL TO ROADWAY

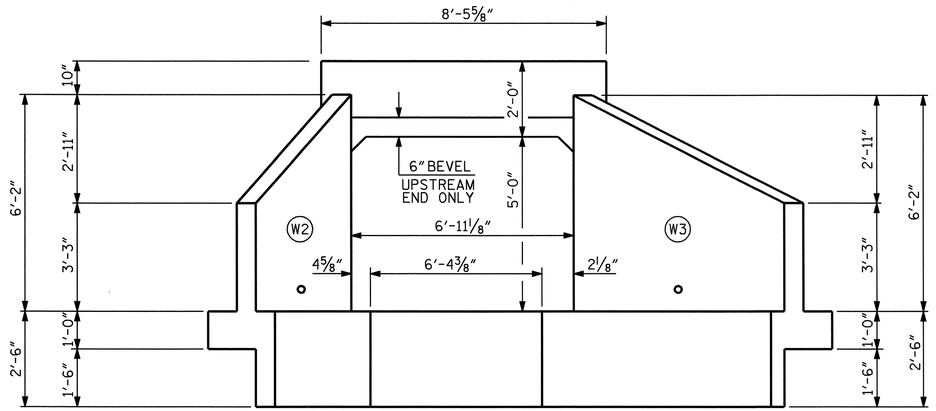


RIGHT ANGLE SECTION OF BARREL

THERE ARE 36 "C" BARS IN SECTION OF BARREL



OUTLET END ELEVATION



INLET END ELEVATION NORMAL TO SKEW

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 8-22-1989
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.

ASSEMBLED BY : R. L. CHESSON DATE : 2003 AUGUST
CHECKED BY : A. R. CHESSON DATE : 1-04
DRAWN BY : R. WRIGHT DATE : AUG. 1989
CHECKED BY : A.R. BISSETTE DATE : AUG. 1989

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 171+37.35 -L-
SHEET 2 OF 6

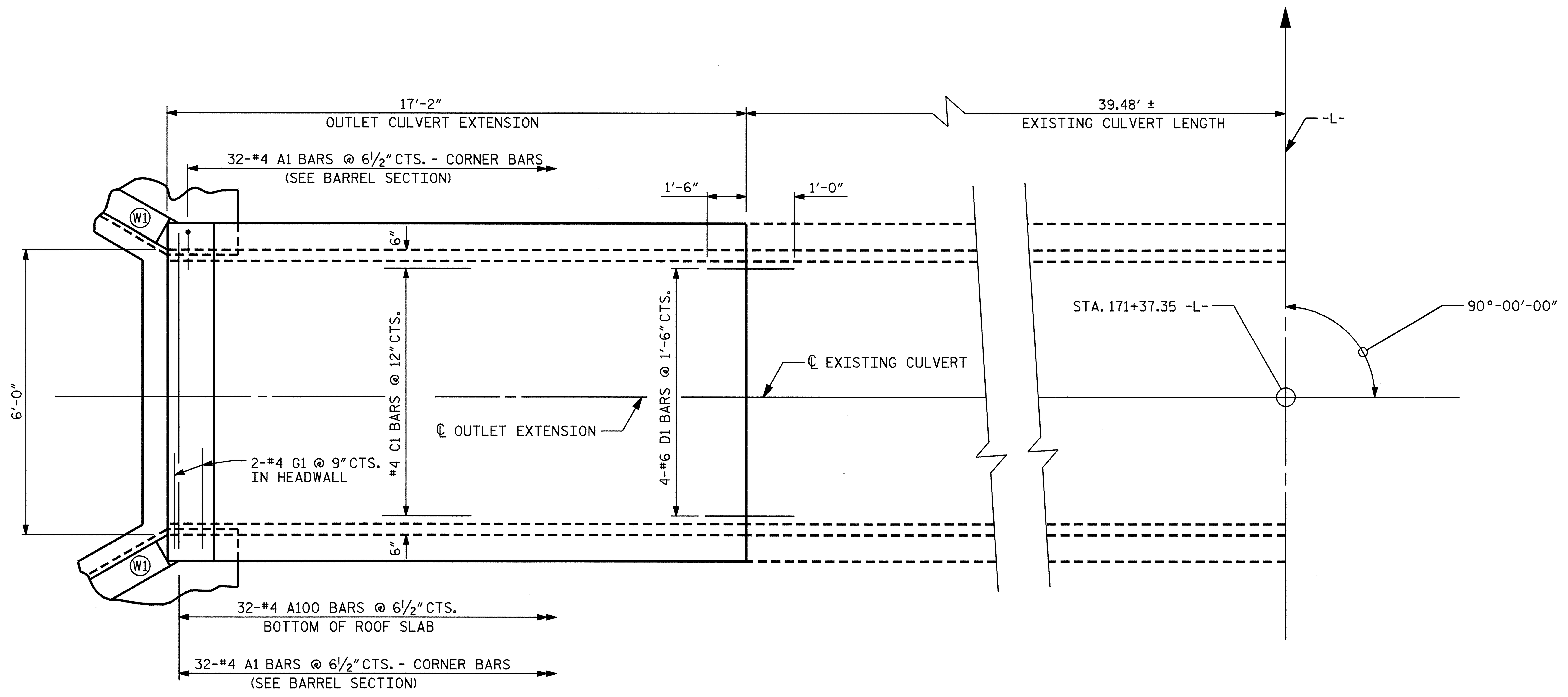
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE BARREL 6 FT. X 5 FT. CONCRETE BOX CULVERT 90° SKEW INLET AND OUTLET EXTENSIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-20
1			3			TOTAL SHEETS
2			4			24

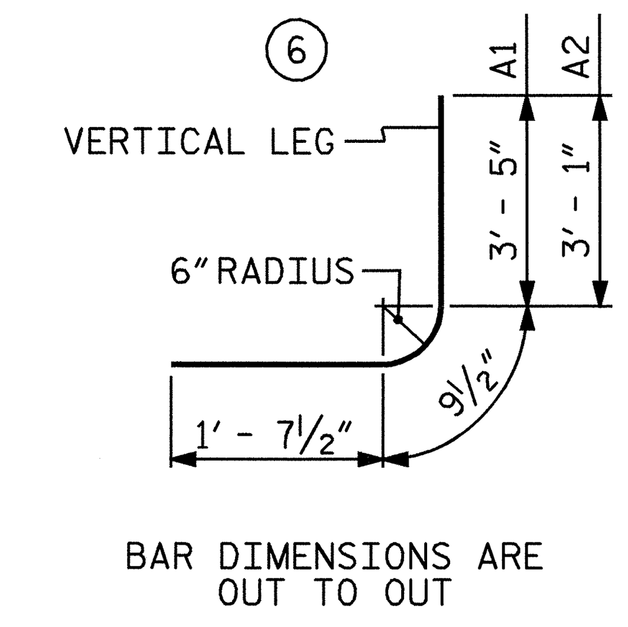
NORTH CAROLINA PROFESSIONAL SEAL 14091 ENGINEER BRADDOCK CHARLES HUNTER
4/29/04

STR #4



OUTLET EXTENSION - ROOF SLAB PLAN

BAR TYPE



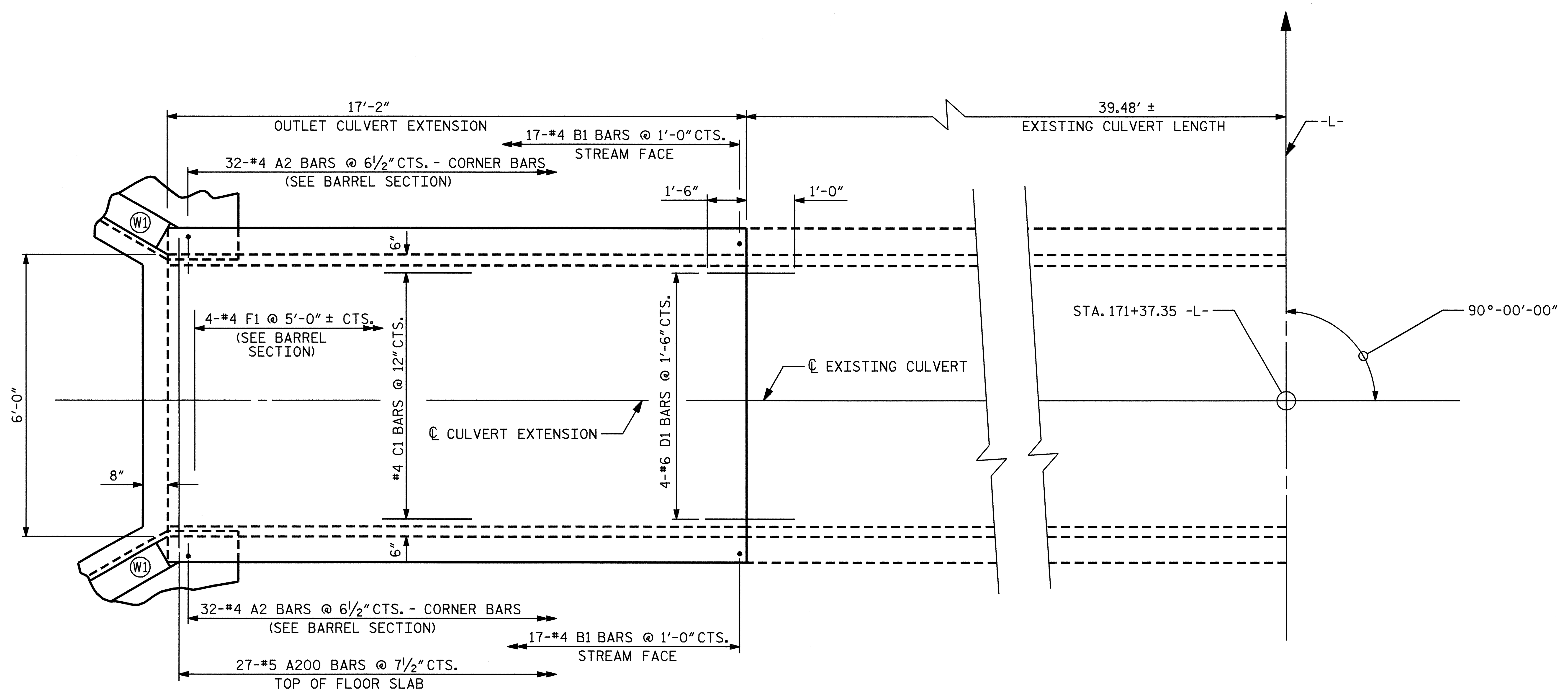
SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
B1	#4	1' - 9"
C1	#4	1' - 11"

REINFORCING STEEL OUTLET EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	32	4	STR	6' - 11"	148
A200	27	5	STR	6' - 11"	195
A1	64	4	6	5' - 10"	249
A2	64	4	6	5' - 6"	235
B1	34	4	STR	6' - 2"	140
C1	36	4	STR	16' - 10"	405
D1	14	6	STR	2' - 6"	53
F1	4	4	STR	4' - 9"	13
G1	2	4	STR	7 - 0"	9

TOTAL (LBS.) = 1,447



OUTLET EXTENSION - FLOOR SLAB PLAN

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 171+37.35 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE BARREL 6 FT. X 5 FT. CONCRETE BOX CULVERT 90° SKEW OUTLET EXTENSION

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER
4/24/06

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-21
1			3			TOTAL SHEETS
2			4			24

DRAWN BY : R. L. CHESSON DATE : 2003 AUGUST
CHECKED BY : A. R. CHESSON DATE : 1-04

STR #4

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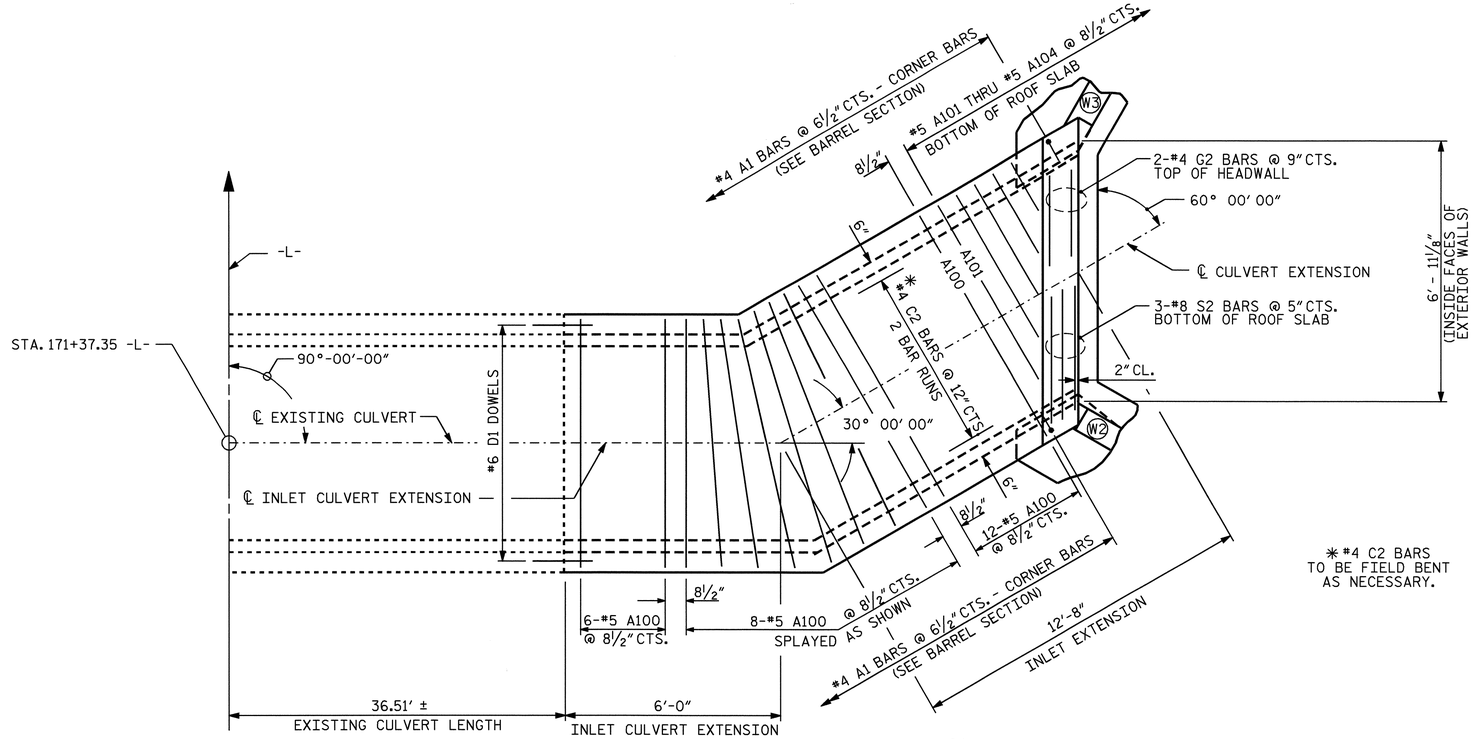
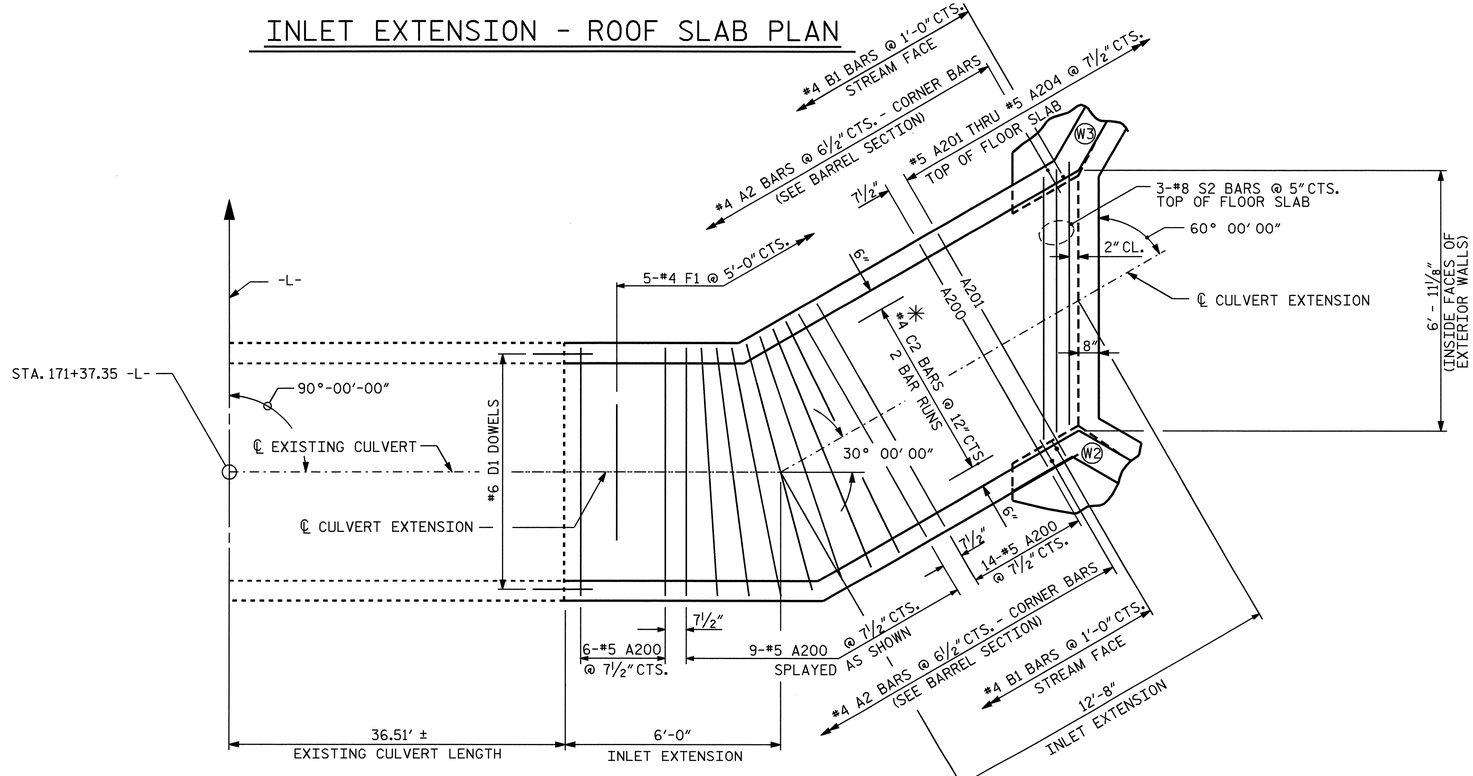


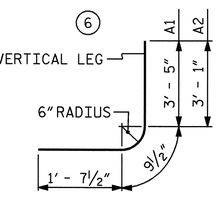
INLET EXTENSION - ROOF SLAB PLAN



INLET EXTENSION - FLOOR SLAB PLAN

DRAWN BY : R. L. CHESSON DATE : 2003 AUGUST
CHECKED BY : A. R. CHESSON DATE : 1-04

BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
B1	#4	1′ - 9"
C1	#4	1′ - 11"

REINFORCING STEEL INLET EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	26	5	STR	6′ - 11"	188
A101	1	5	STR	6′ - 2"	6
A102	1	5	STR	5′ - 0"	5
A103	1	5	STR	3′ - 9"	4
A104	1	5	STR	2′ - 6"	3
A200	29	5	STR	6′ - 11"	209
A201	1	5	STR	6′ - 0"	6
A202	1	5	STR	4′ - 11"	5
A203	1	5	STR	3′ - 10"	4
A204	1	5	STR	2′ - 9"	3
A1	62	4	6	5′ - 10"	242
A2	62	4	6	5′ - 6"	228
B1	38	4	STR	6′-2"	157
C2	72	4	STR	7′ - 8"	493
D1	14	6	STR	2′ - 6"	53
F1	5	4	STR	4′ - 9"	16
G2	2	4	STR	8′ - 0"	11
S2	6	8	STR	8′ - 0"	128

TOTAL (LBS.) = 1,761

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 171+37.35 -L-

SHEET 4 OF 6

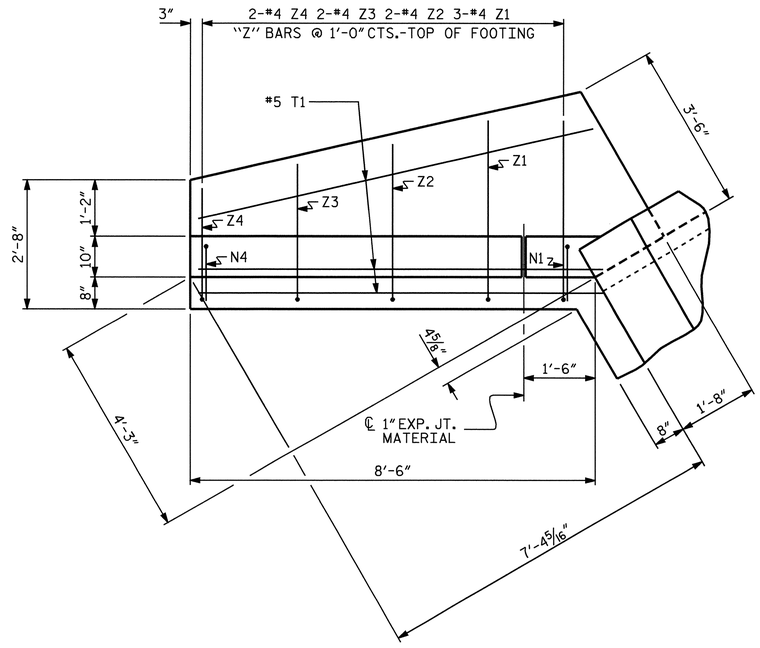
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE BARREL 6 FT. X 5 FT. CONCRETE BOX CULVERT 90° SKEW INLET EXTENSION

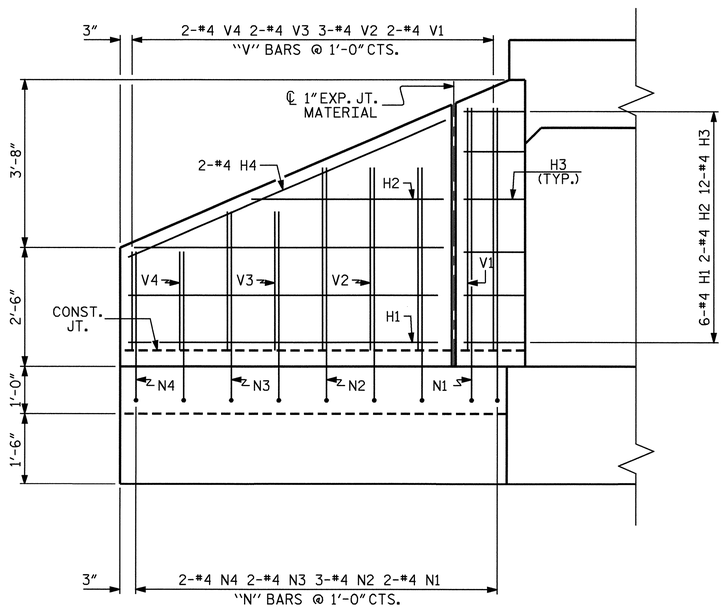
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-22
1			3			TOTAL SHEETS
2			4			24

NORTH CAROLINA PROFESSIONAL SEAL 14091 ENGINEER DERRICK CHARLES HUNT
11/29/06

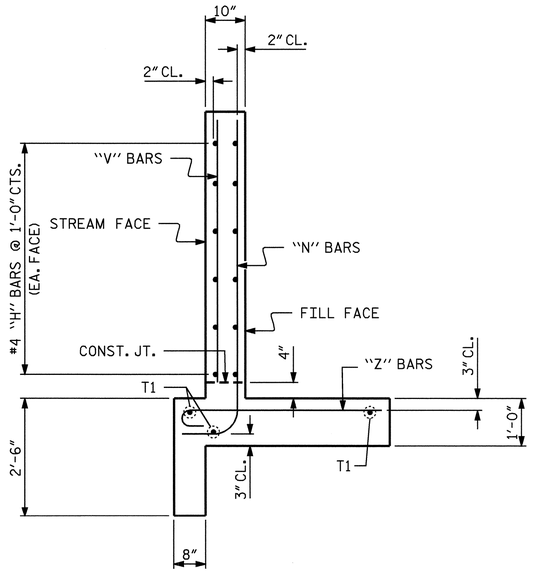
STR #4



PLAN W1



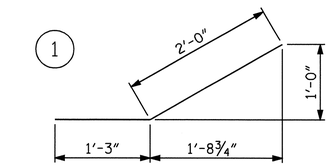
ELEVATION W1

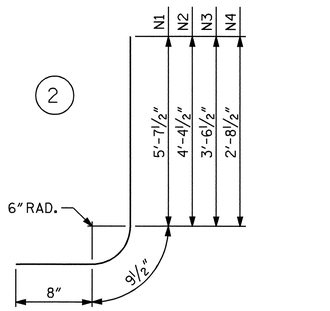


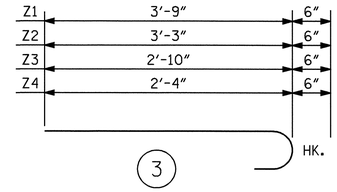
TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.







BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	6'-6"	52
H2	4	#4	STR	4'-0"	11
H3	24	#4	1	3'-3"	52
H4	4	#4	STR	7'-3"	19
N1	4	#4	2	7'-1"	19
N2	6	#4	2	5'-10"	23
N3	4	#4	2	5'-0"	13
N4	4	#4	2	4'-2"	11
T1	6	#5	STR	8'-6"	53
V1	4	#4	STR	5'-1"	14
V2	6	#4	STR	3'-10"	15
V3	4	#4	STR	2'-11"	8
V4	4	#4	STR	2'-1"	6
Z1	6	#4	3	4'-3"	17
Z2	4	#4	3	3'-9"	10
Z3	4	#4	3	3'-4"	9
Z4	4	#4	3	2'-10"	8

REINFORCING STEEL
FOR 2 WINGS 340 LBS

CLASS A CONCRETE
2 WINGS 5.0 CY
1 HEADWALL 0.4 CY
1 END CURTAIN WALL 0.3 CY
TOTAL 5.7 CY

ASSEMBLED BY : R. L. CHESSON DATE : 2003 AUG
CHECKED BY : A. R. CHESSON DATE : 1-04

DRAWN BY : CCJ 10/99
CHECKED BY : RWW 03/00

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 171+37.35 -L-
SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 5'-0" SLOPE = 2:1
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-23
1			3			TOTAL SHEETS
2			4			24

NORTH CAROLINA PROFESSIONAL SEAL 14091 ENGINEER BUCK CHARLES HUNT

STR #4 STD. NO. CW9005

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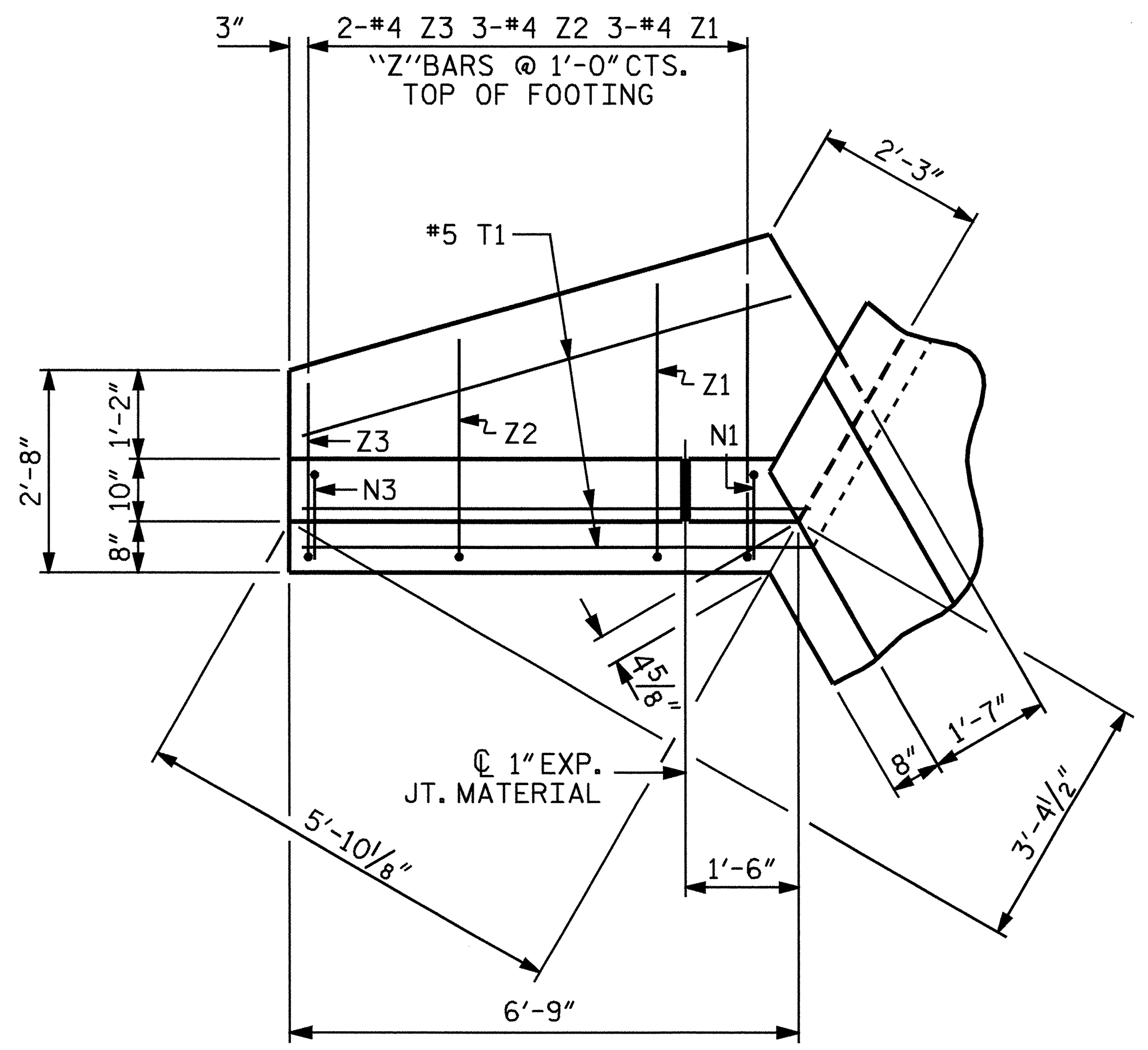
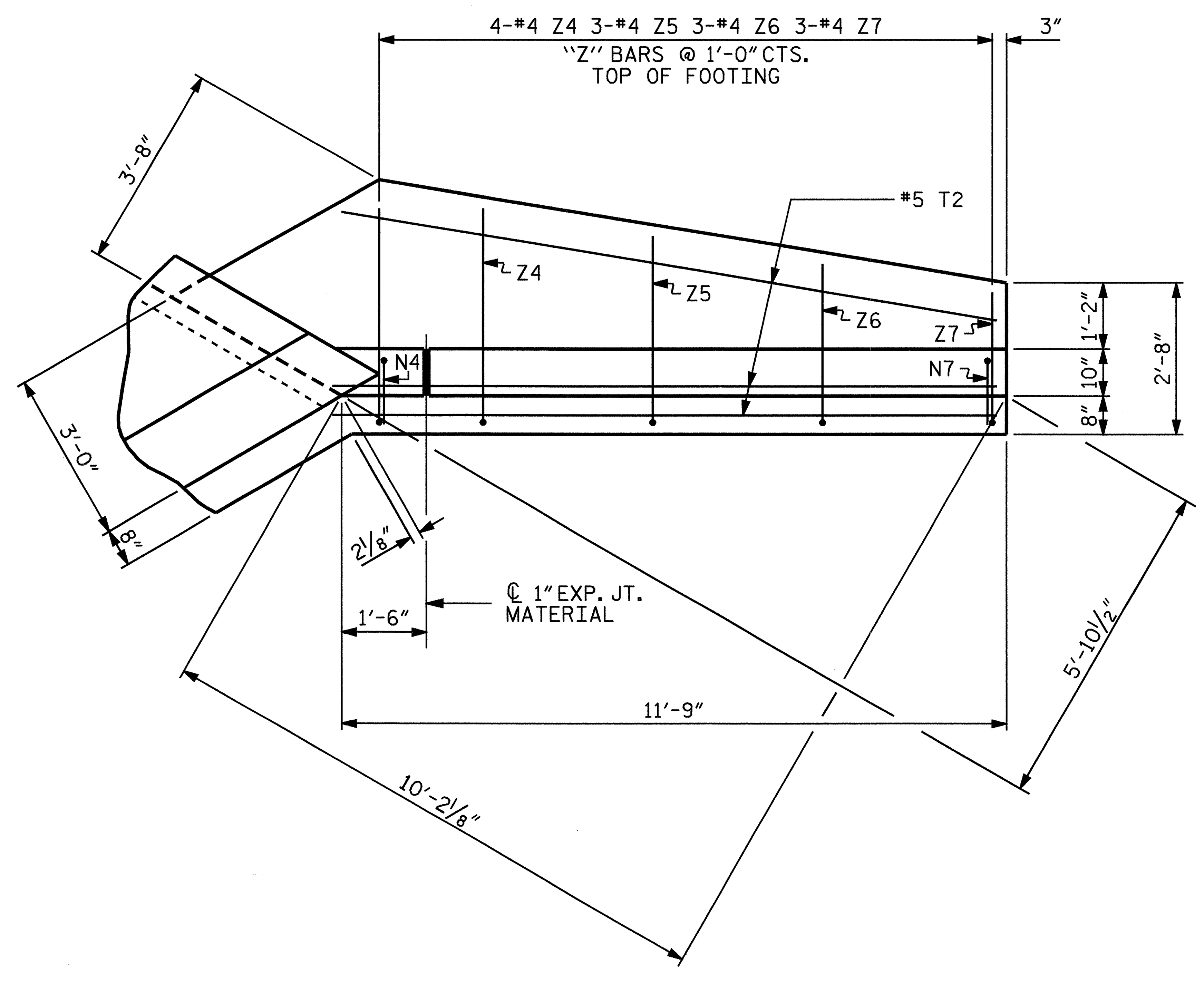
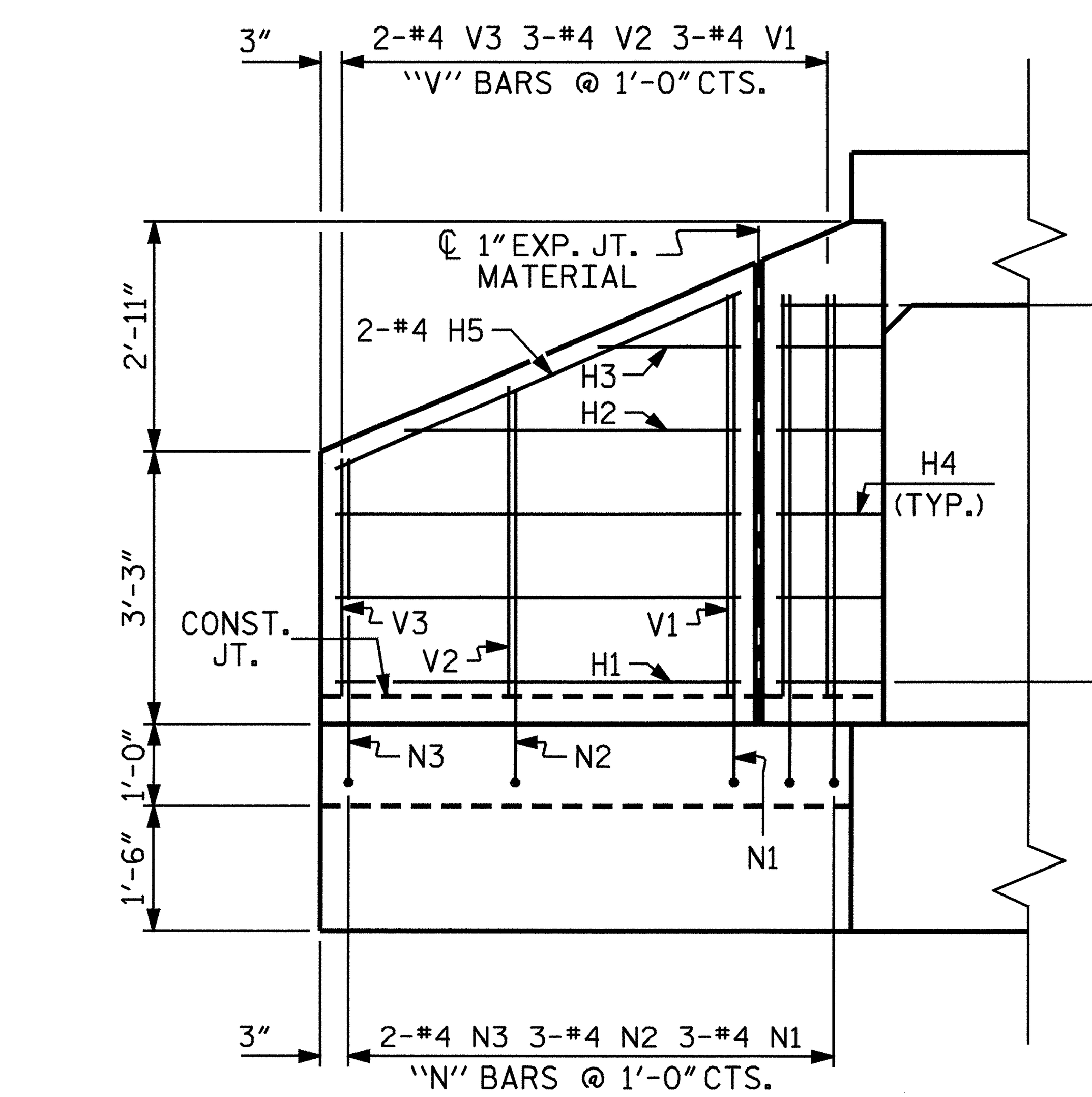
klayne



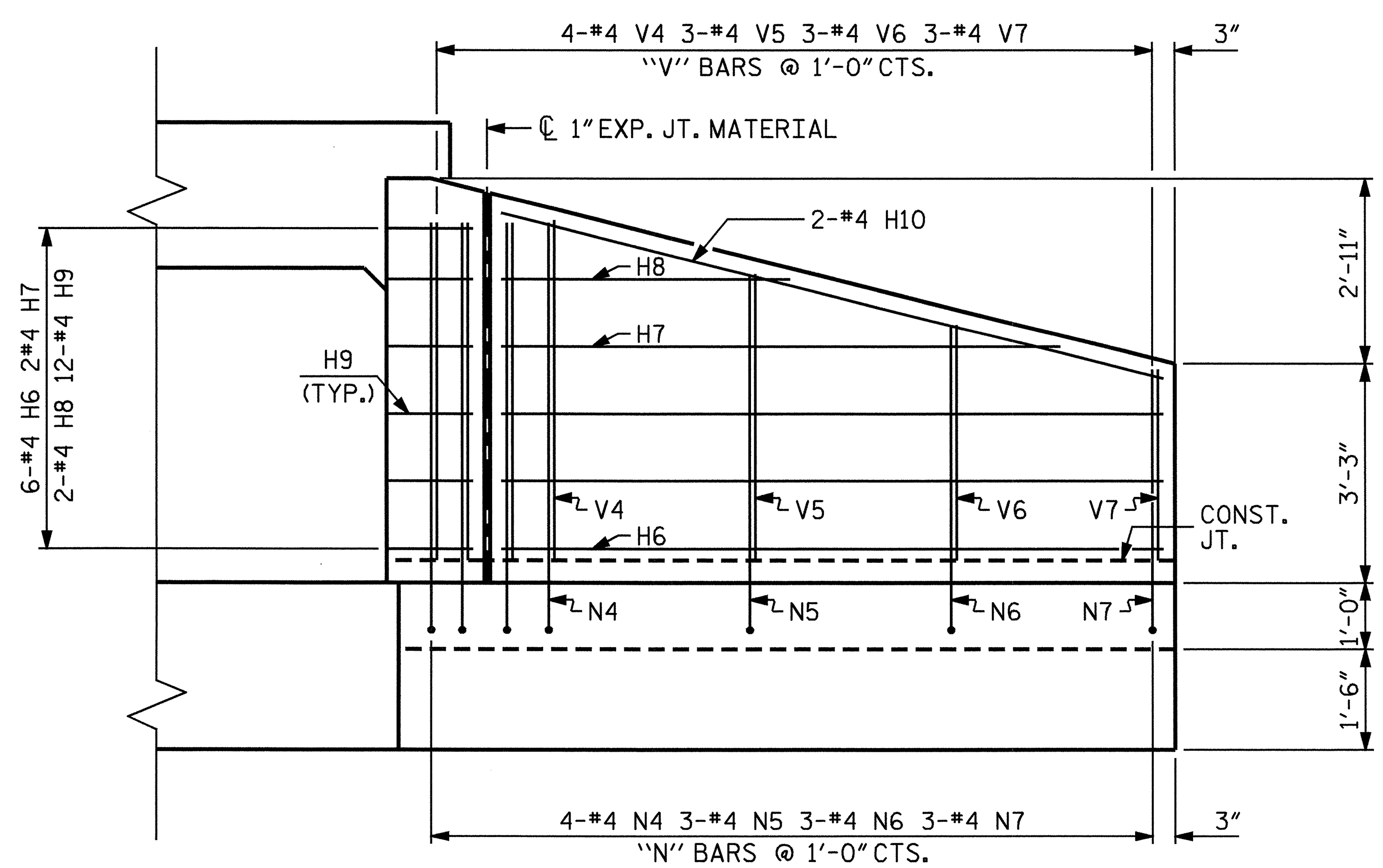
PLAN W2



PLAN W3



ELEVATION W2



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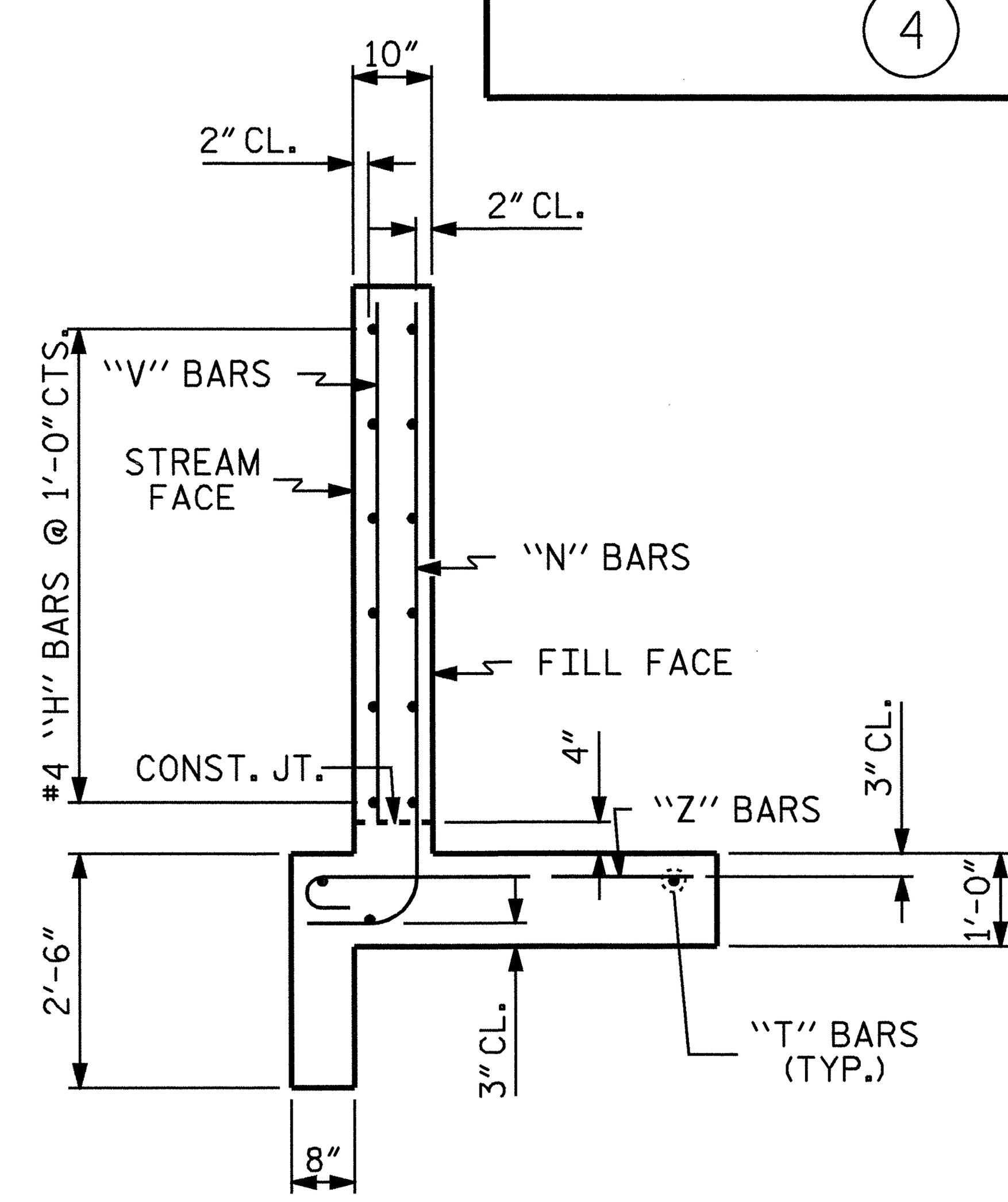
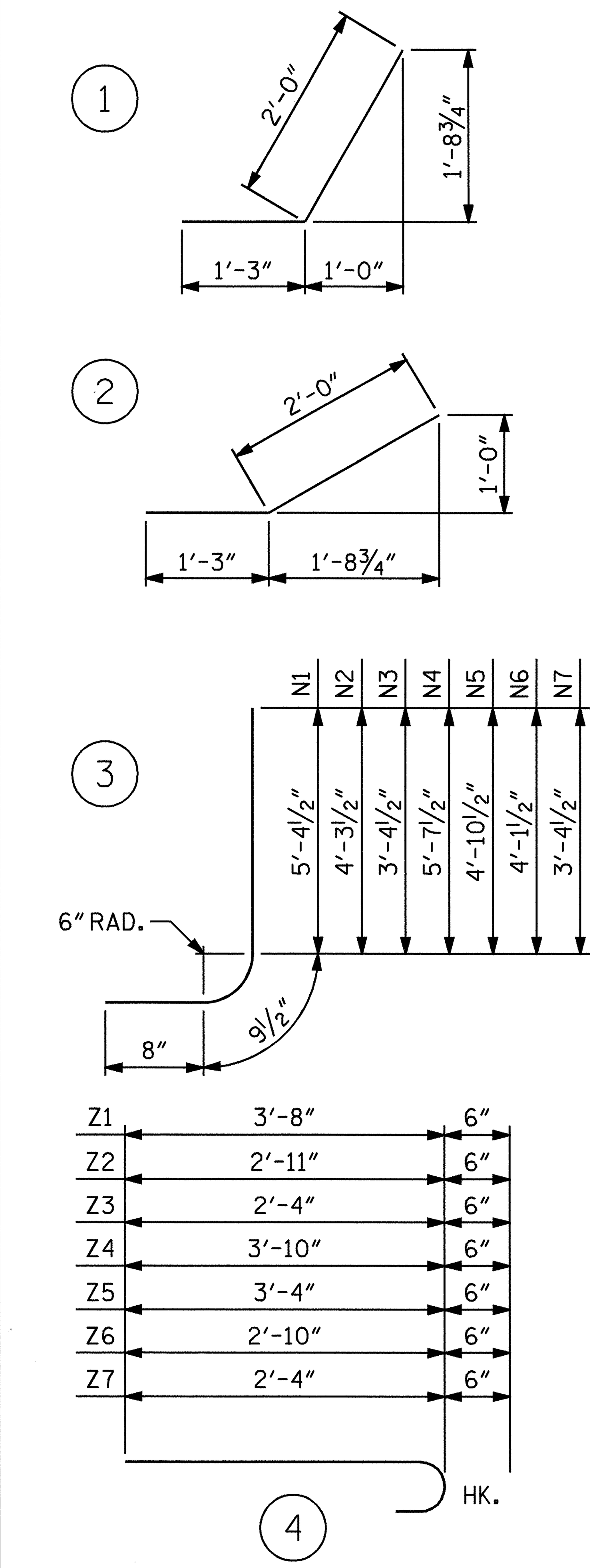


TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	4'-10"	19
H2	2	#4	STR	4'-0"	5
H3	2	#4	STR	1'-9"	2
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	5'-3"	7
H6	6	#4	STR	9'-10"	39
H7	2	#4	STR	8'-4"	11
H8	2	#4	STR	4'-3"	6
H9	12	#4	2	3'-3"	26
H10	2	#4	STR	10'-2"	14
N1	3	#4	3	6'-10"	14
N2	3	#4	3	5'-9"	12
N3	2	#4	3	4'-10"	6
N4	4	#4	3	7'-1"	19
N5	3	#4	3	6'-4"	13
N6	3	#4	3	5'-7"	11
N7	3	#4	3	4'-10"	10
T1	3	#5	STR	6'-9"	21
T2	3	#5	STR	11'-9"	37
V1	3	#4	STR	4'-9"	10
V2	3	#4	STR	3'-8"	7
V3	2	#4	STR	2'-10"	4
V4	4	#4	STR	5'-0"	13
V5	3	#4	STR	4'-3"	9
V6	3	#4	STR	3'-6"	7
V7	3	#4	STR	2'-10"	6
Z1	3	#4	4	4'-2"	8
Z2	3	#4	4	3'-4"	7
Z3	2	#4	4	2'-10"	4
Z4	4	#4	4	4'-4"	12
Z5	3	#4	4	4'-0"	8
Z6	3	#4	4	3'-4"	7
Z7	3	#4	4	2'-10"	6

REINFORCING STEEL
FOR 2 WINGS 406 LBS

CLASS A CONCRETE
2 WINGS 6.1 CY
1 HEADWALL 0.4 CY
1 END CURTAIN WALL 0.4 CY
TOTAL 6.9 CY

PROJECT NO. R-3415
YADKIN COUNTY
STATION: 171+37.35 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 5'-0" SLOPE = 2:1
60° OR 120° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 14095 ENGINEER DICK CHARLES HUNT
4/24/06

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			C-24
1			3					TOTAL SHEETS
2			4					24

ASSEMBLED BY : R. L. CHESSON DATE : 2003 AUG
CHECKED BY : A. R. CHESSON DATE : 1-04

DRAWN BY : CCJ 11/99
CHECKED BY : RWW 03/00

STR #4 STD. NO. CW6005

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 2002 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; CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP; AND CLASS S SHALL BE USED FOR UNDERWATER FOOTING SEALS.

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.

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 WITH THE EXCEPTION OF #2 BARS WHICH MAY BE FABRICATED FROM COLD DRAWN STEEL WIRE. 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.

PLACEMENT OF BEAM OR GIRDER MEMBERS ON TRUCKS FOR HAULING SHALL BE DONE IN COMPLIANCE WITH LIMITS SHOWN ON SKETCHES PROVIDED TO THE MATERIALS AND TEST UNIT APPROVED BY THE STRUCTURE DESIGN UNIT DATED MAY 8, 1991. THESE SKETCHES PRIMARILY LIMIT THE UNSUPPORTED CANTILEVER LENGTH OF MEMBERS. WHEN THE CONTRACTOR WISHES TO PLACE MEMBERS ON TRUCKS NOT IN ACCORDANCE WITH THESE LIMITS, TO SHIP BY RAIL, TO ATTACH SHIPPING RESTRAINTS TO THE MEMBERS OR TO INVERT MEMBERS, HE SHALL SUBMIT A SKETCH FOR APPROVAL PRIOR TO SHIPPING. SEE ALSO ARTICLE 1072-11.

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

STD. NO. SN

REV. 6-16-95 EEM W RGW REV. 6-27-02 RWW W JTE