

09/08/99
 29-JAN-2013 12:22
 \$\$\$DCN\$\$\$\$\$\$\$
 mp0016

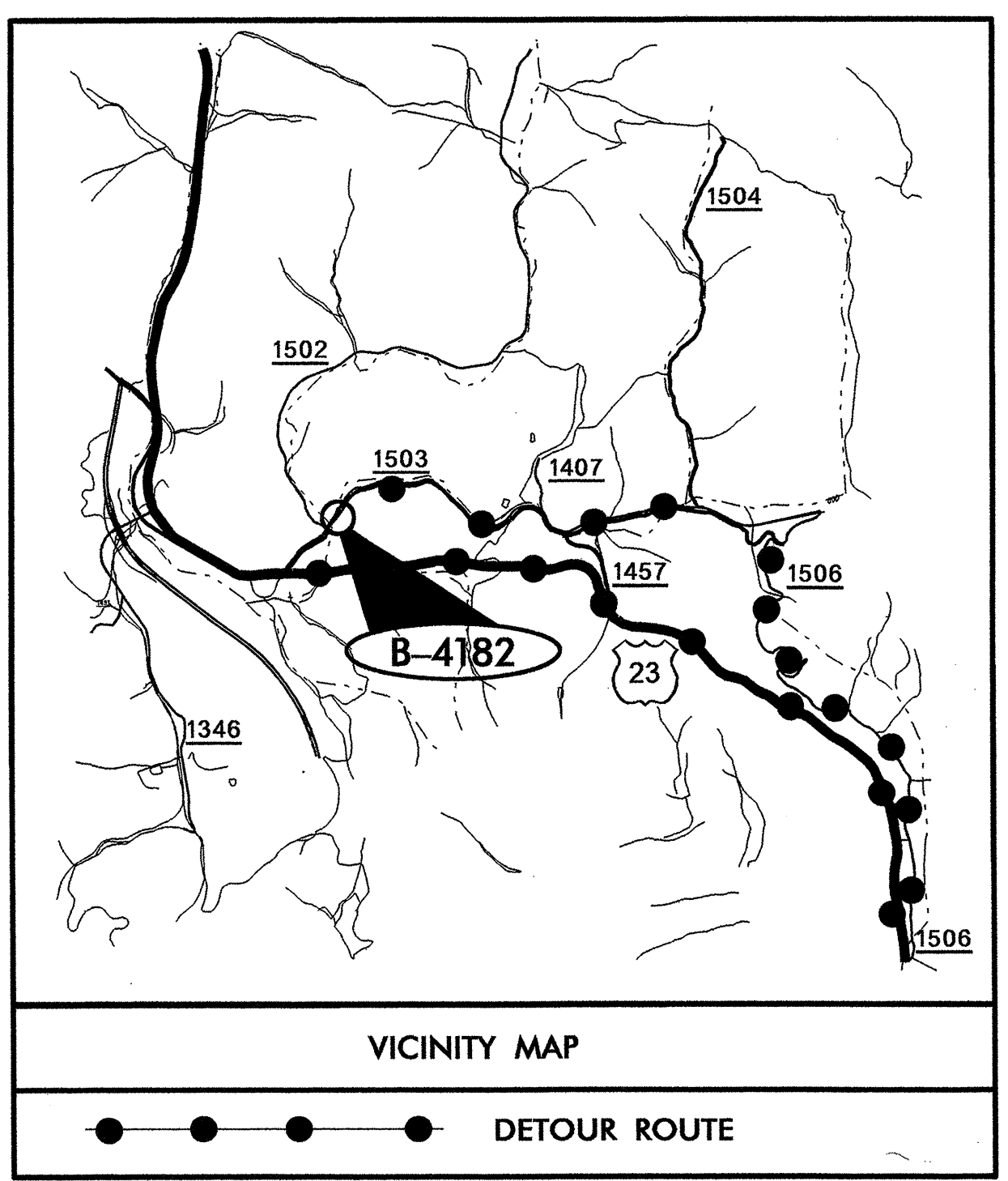
CONTRACT: 17BP.13.R.105 TIP PROJECT: B-4182

CULVERT

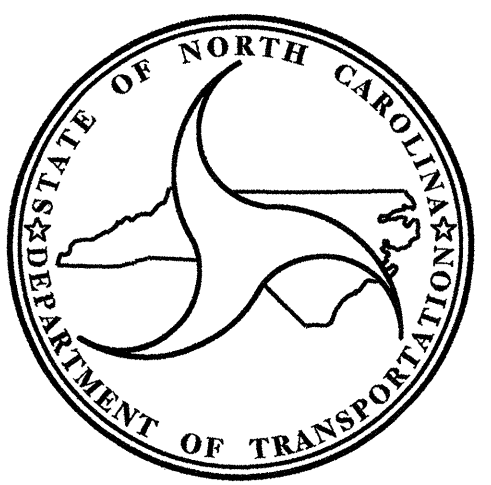
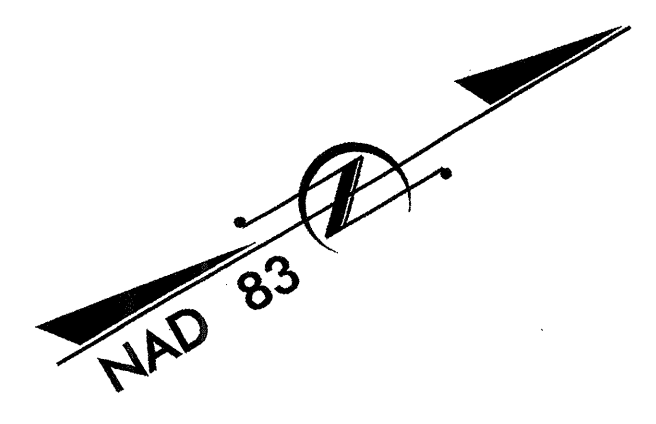
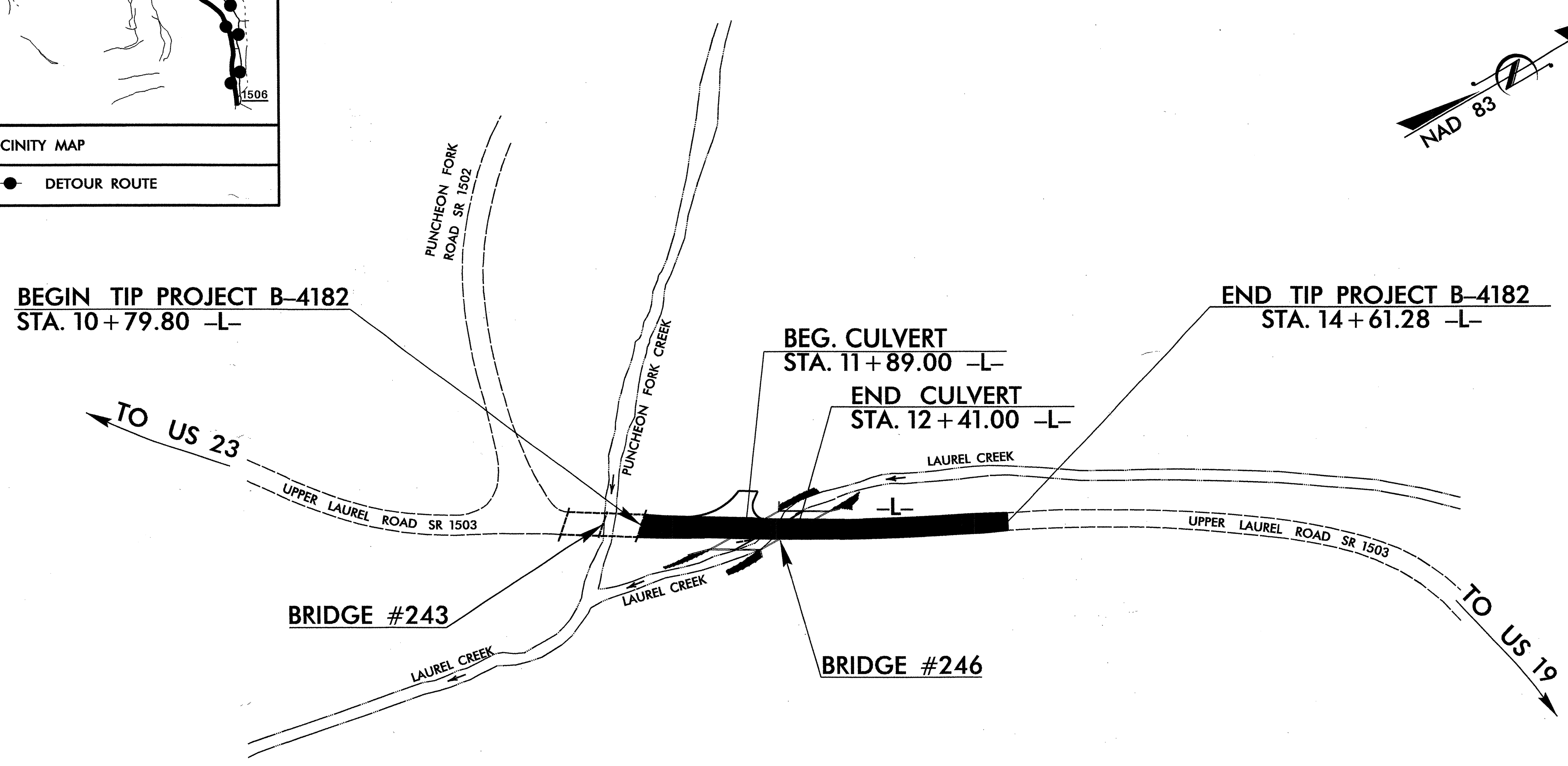
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MADISON COUNTY

LOCATION: BRIDGE 246 OVER LAUREL CREEK ON SR 1503
 TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND CULVERT



| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-----------------|-----------------------------|-------------|--------------|
| N.C. | B-4182 | | |
| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION | |
| 33529.1.1 | BRZ-1503(6) | PE | |
| 33529.2.1 | BRZ-1503(6) | RW, UTIL | |
| 17BP.13.R.105 | | CONST. | |
| | | | |
| | | | |
| | | | |



DESIGN DATA

ADT 2012 = 630
 ADT 2030 = 865
 DHV = 10 %
 D = 60 %
 T = 5 % *
 V = 30 MPH
 * TTST 1 DUAL 4
 FUNC. CLASS LOCAL
 SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT B-4182 = 0.063 mi
 LENGTH STRUCTURE F.A. PROJECT B-4182 = 0.009 mi
 TOTAL LENGTH STATE PROJECT B-4182 = 0.072 mi

Prepared in the Office of:
DIVISION OF HIGHWAYS
 1000 Birch Ridge Dr., Raleigh NC, 27610

2012 STANDARD SPECIFICATIONS

LETTING DATE:
 MARCH 19, 2013

Q. H. NGUYEN, P.E.
 PROJECT ENGINEER

MARC G. CHEEK, P.E.
 PROJECT DESIGN ENGINEER

STRUCTURES MANAGEMENT UNIT
 1000 BIRCH RIDGE DRIVE
 RALEIGH, N.C., 27610

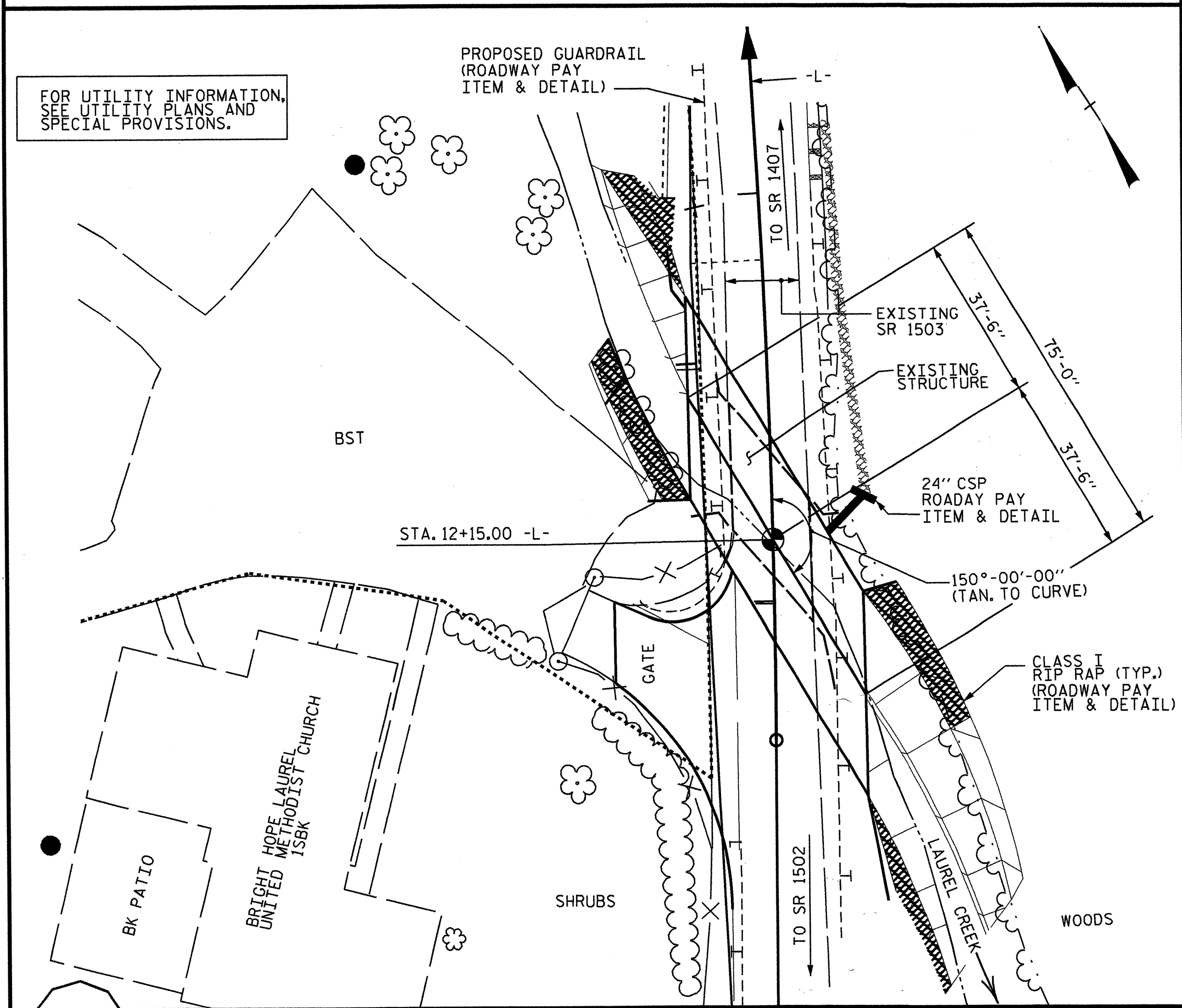
DIVISION OF HIGHWAYS
 STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER
 DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION

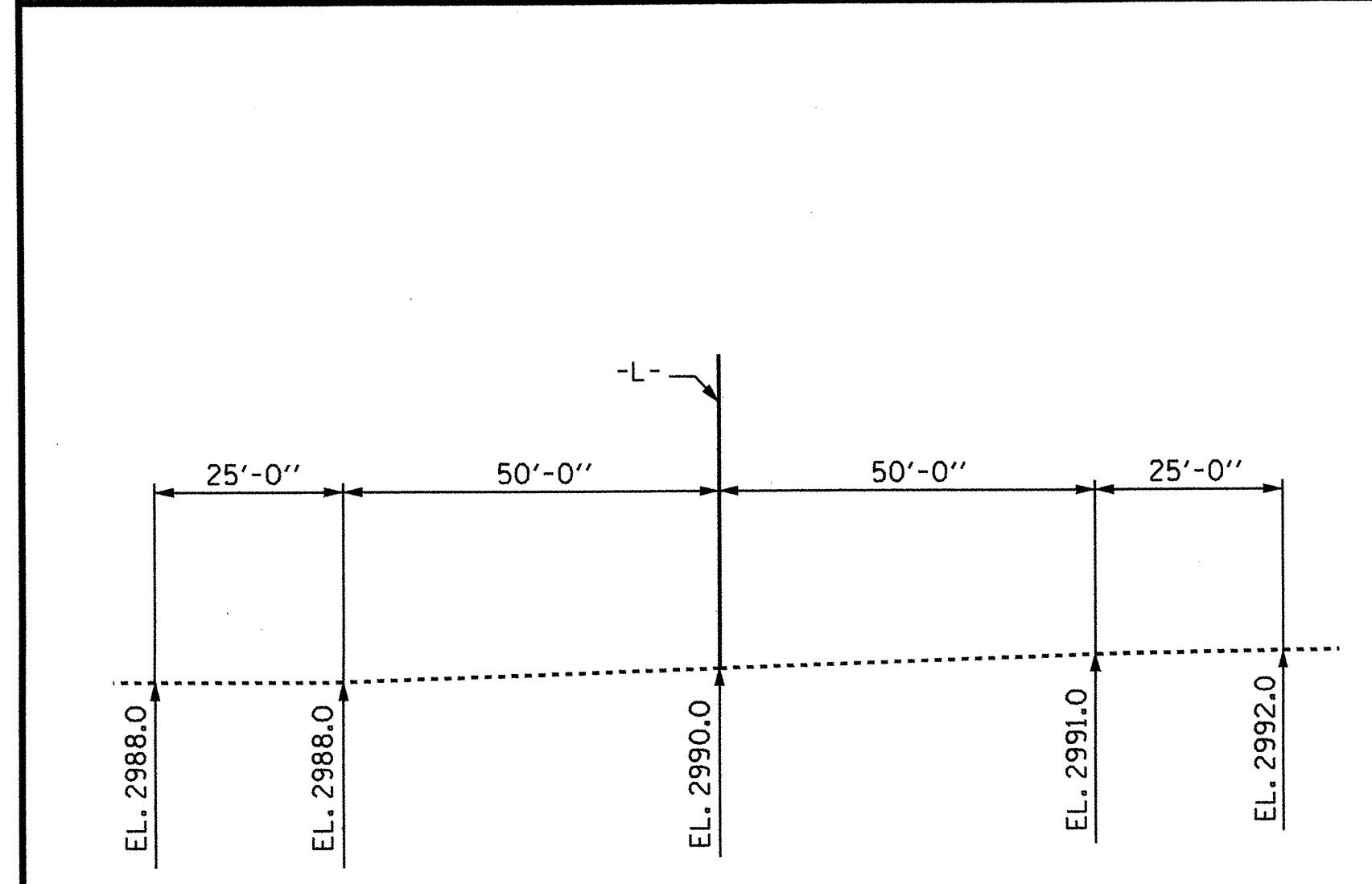
APPROVED
 DIVISION ADMINISTRATOR

P.E.
 DATE

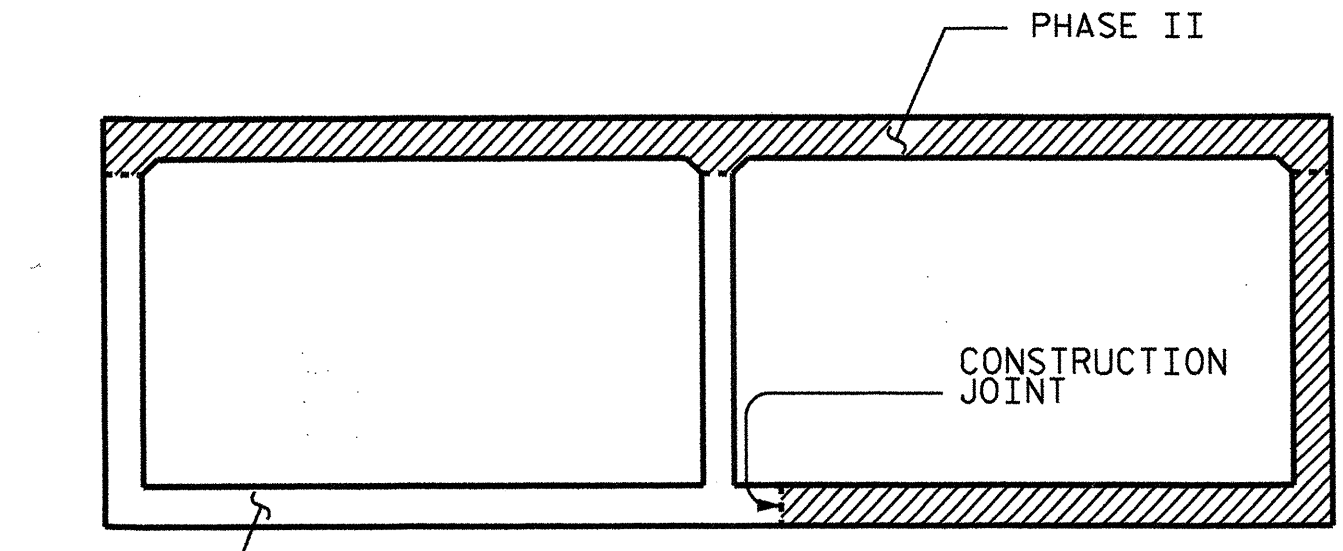
BM #1: CHISELED SQUARE WITH PUNCH HOLE ON SW HEADWALL 23' RIGHT OF -BL- STA. 18+35.00 EL. 2997.79 NAVD 88



LOCATION SKETCH



PROFILE ALONG CULVERT



CONSTRUCTION PHASING

- PHASE II CONSTRUCTION
- PHASE I CONSTRUCTION

NOTES

ASSUMED LIVE LOAD ----- HL93 OR ALTERNATE LOADING.
 DESIGN FILL 2.61 FT.
 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. PHASE I WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE I VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF PHASE I WALLS AND PHASE I WINGS FULL HEIGHT.
 3. PHASE II WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE II VERTICAL WALLS.
 4. THE REMAINING PORTIONS OF PHASE II WALLS AND PHASE II WINGS FULL HEIGHT.
 5. ROOF SLAB AND HEADWALLS.
 THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
 DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
 TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
 AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL 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.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 THE EXISTING 2 SPAN STRUCTURE (1 @ 15'-5", 1 @ 15'-4") WITH A CLEAR ROADWAY WIDTH OF 19'-2" AND A 4 1/2" ASPHALT WEARING SURFACE ON A TIMBER DECK ON 8 LINES OF STEEL I-BEAMS, WITH A SUBSTRUCTURE CONSISTING OF TIMBER CAPS AND TIMBER PILES AT THE END BENTS AND A TIMBER CAP AND TIMBER POST AND SILL CRUTCH BENT, AND LOCATED ON THE SITE OF THE PROPOSED STRUCTURE SHALL BE REMOVED. SEE SPECIAL PROVISION FOR "REMOVAL OF EXISTING STRUCTURE".
 REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

ROADWAY DATA

GRADE POINT EL. @ STA. 12+15.00 -L- = 2998.31
 BED EL. @ STA. 12+15.00 -L- = 2988.46
 ROADWAY SLOPES = 2:1 (LEFT) & VARIABLE (RIGHT)

HYDRAULIC DATA

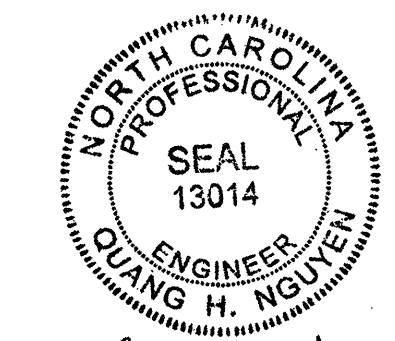
DESIGN DISCHARGE = 1050 C.F.S.
 FREQUENCY OF DESIGN FLOOD = 25 YRS.
 DESIGN HIGH WATER ELEVATION = 2994.8
 DRAINAGE AREA = 6.08 SQ. MI.
 BASIC DISCHARGE (Q100) = 1700 C.F.S.
 BASIC HIGH WATER ELEVATION = 2997.4

OVERTOPPING FLOOD DATA

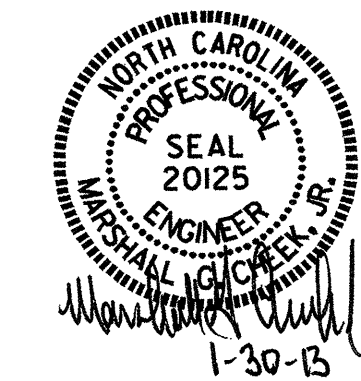
OVERTOPPING DISCHARGE = 1800 C.F.S.
 FREQUENCY OF OVERTOPPING FLOOD = 100+YRS.
 OVERTOPPING FLOOD ELEVATION = 2997.8

TOTAL STRUCTURE QUANTITIES

| | |
|-------------------------------|------------|
| CLASS A CONCRETE | |
| BARREL @ 2.693 CY/FT | 202.0 C.Y. |
| WINGS, ETC. | 36.2 C.Y. |
| TOTAL | 238.2 C.Y. |
| REINFORCING STEEL | |
| BARREL | 28079 LBS. |
| WINGS, ETC. | 1640 LBS. |
| TOTAL | 29719 LBS. |
| FOUNDATION COND. MAT'L | 138 TONS |
| CULVERT EXCAVATION | LUMP SUM |
| REMOVAL OF EXISTING STRUCTURE | LUMP SUM |



Quang H. Nguyen 1-30-13

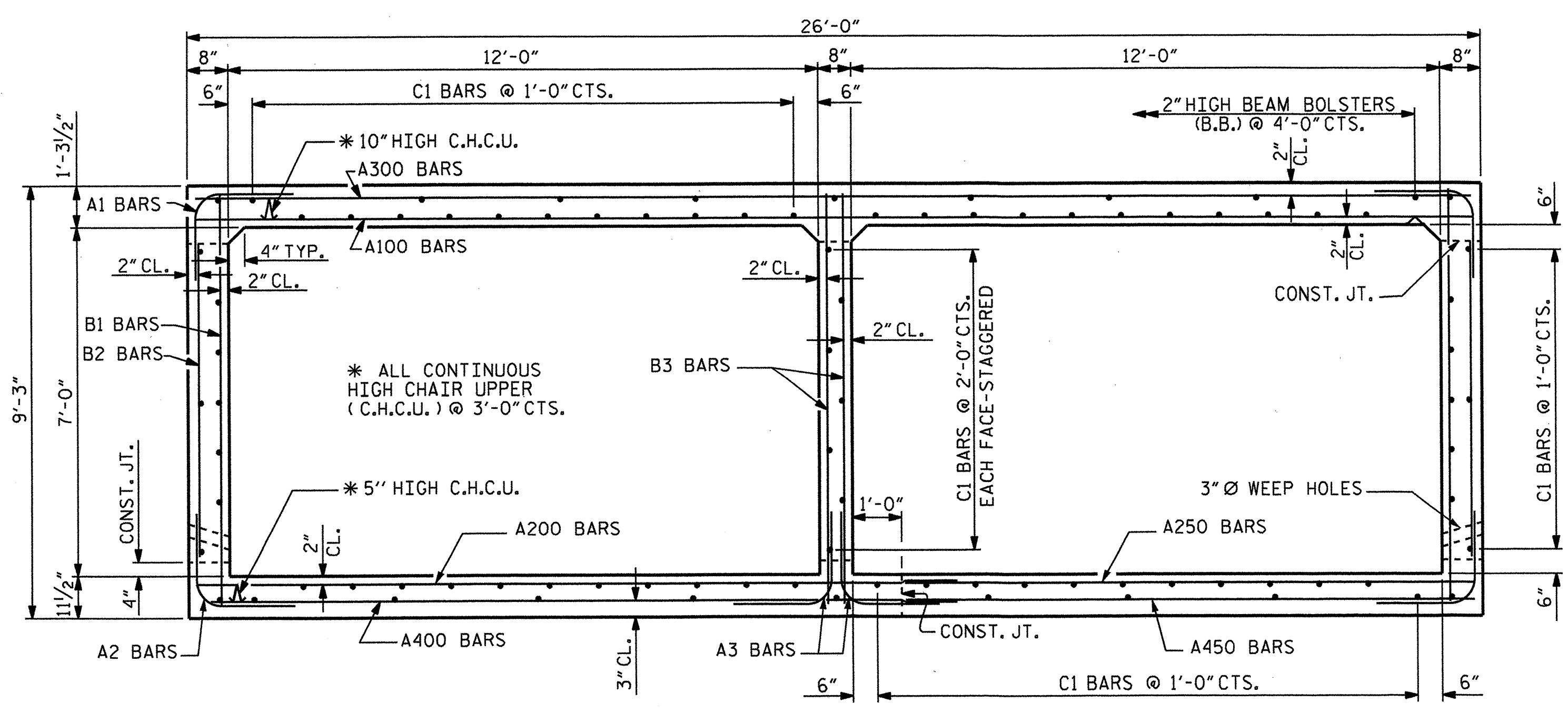


PROJECT NO. B-4182
MADISON COUNTY
 STATION: 12+15.00 -L-

SHEET 1 OF 10 REPLACES BRIDGE No. 246

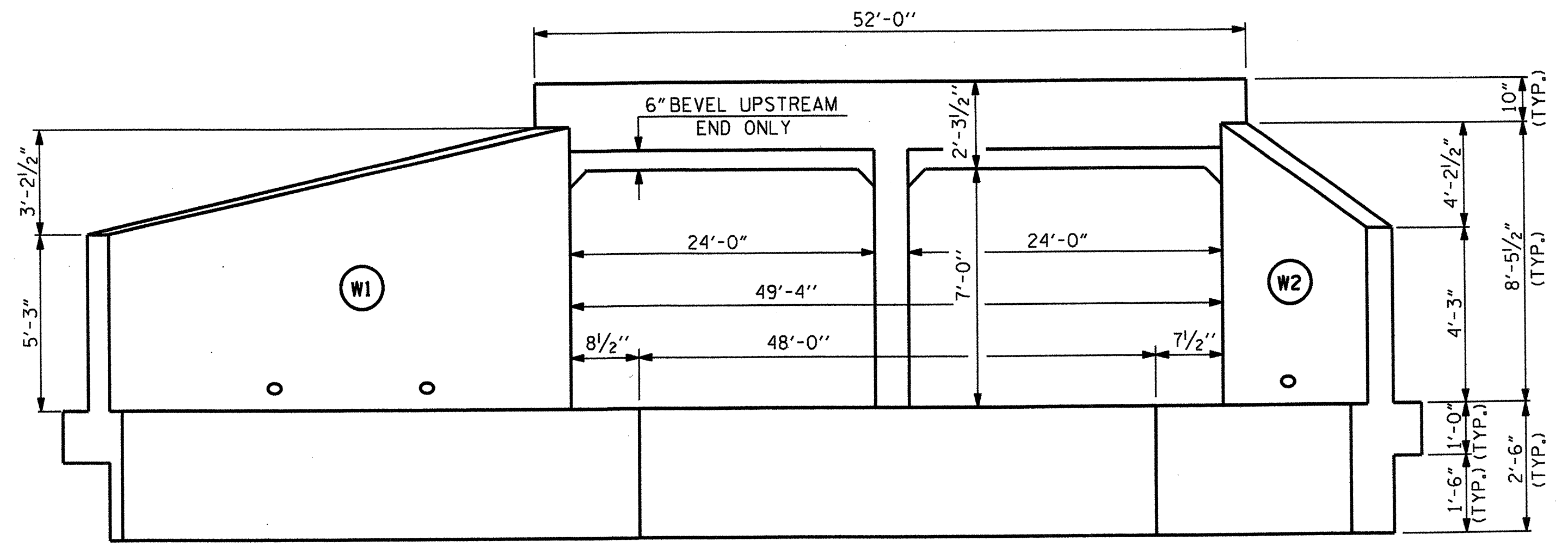
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 12 FT. X 7 FT.
 REINFORCED CONCRETE BOX
 CULVERT
 150° SKEW

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

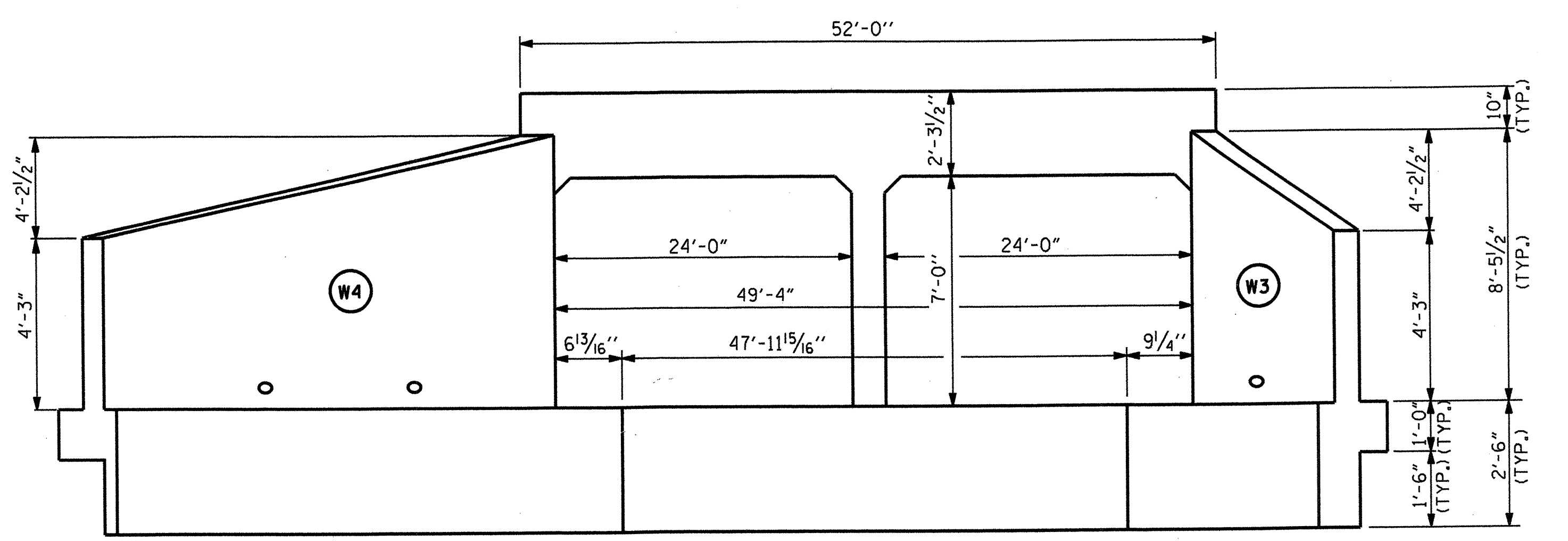


RIGHT ANGLE SECTION OF BARREL

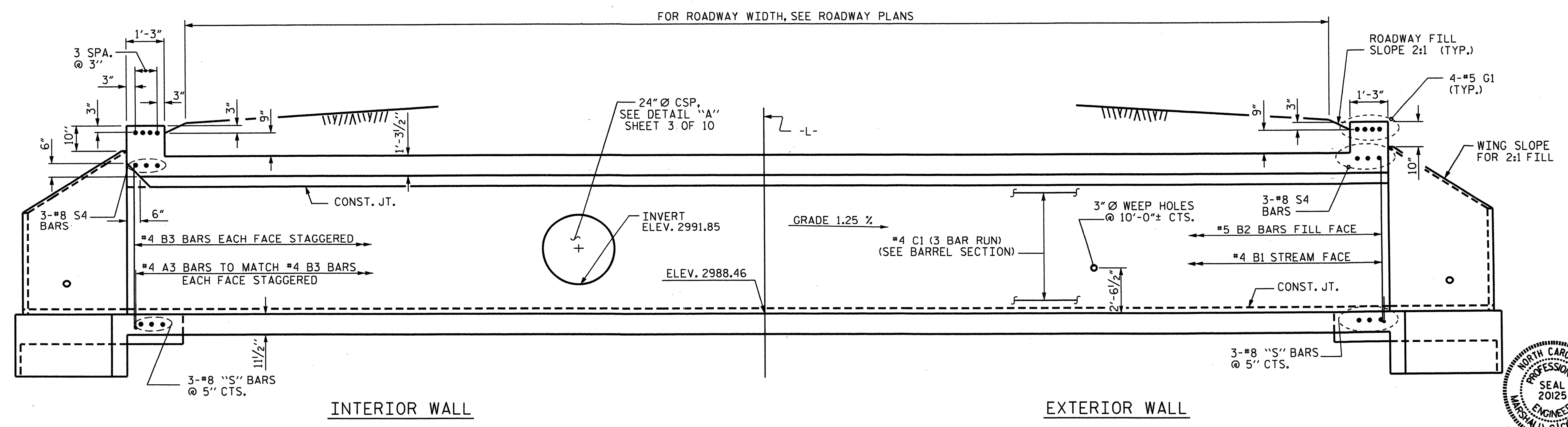
THERE ARE 89 "C" BARS IN SECTION OF BARREL.



INLET END ELEVATION NORMAL TO SKEW



OUTLET END ELEVATION NORMAL TO SKEW



CULVERT SECTION ALONG CULVERT

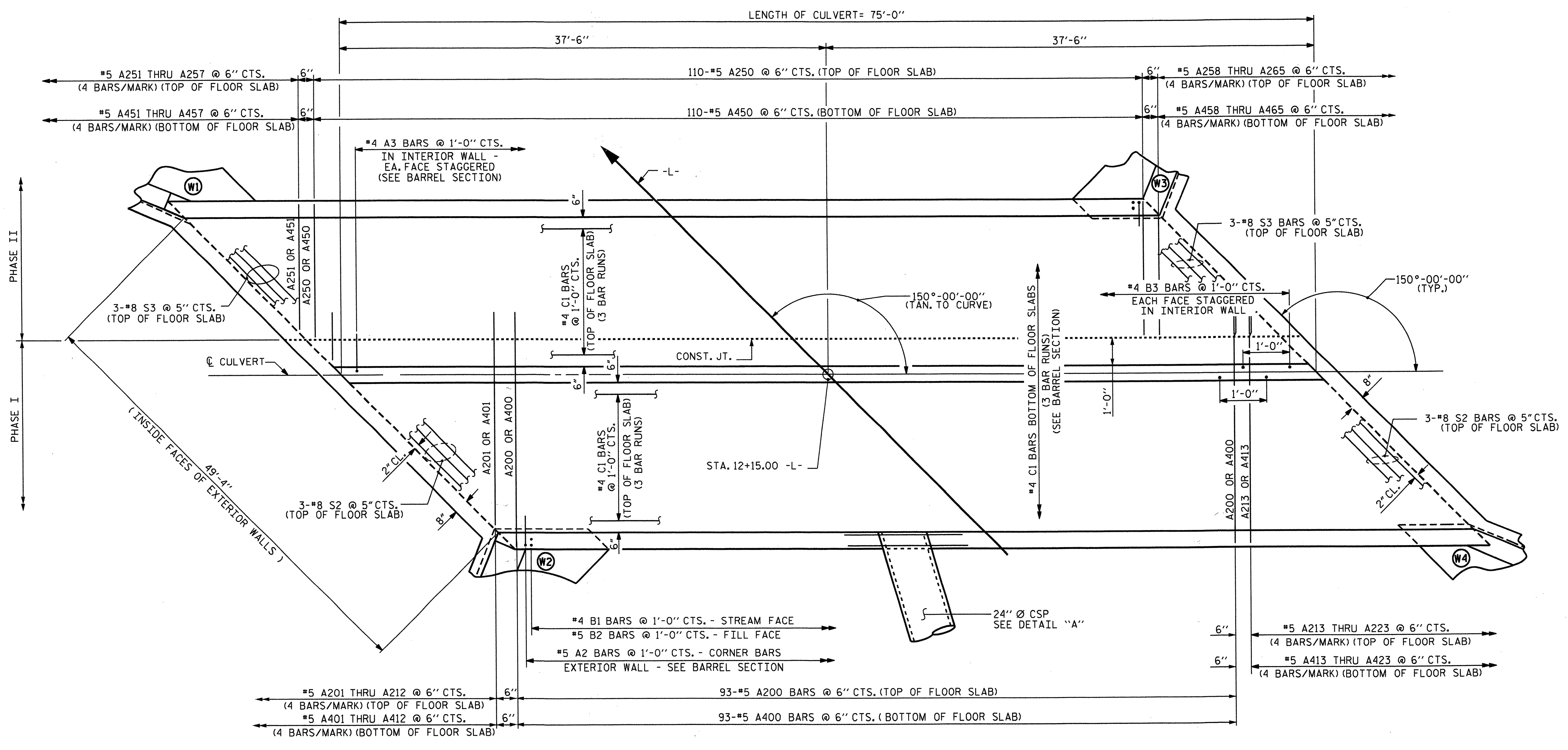
PROJECT NO. B-4182
MADISON COUNTY
 STATION: 12+15.00 -L-
 SHEET 2 OF 10

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 12 FT. X 7 FT.
 REINFORCED CONCRETE
 BOX CULVERT
 150° SKEW

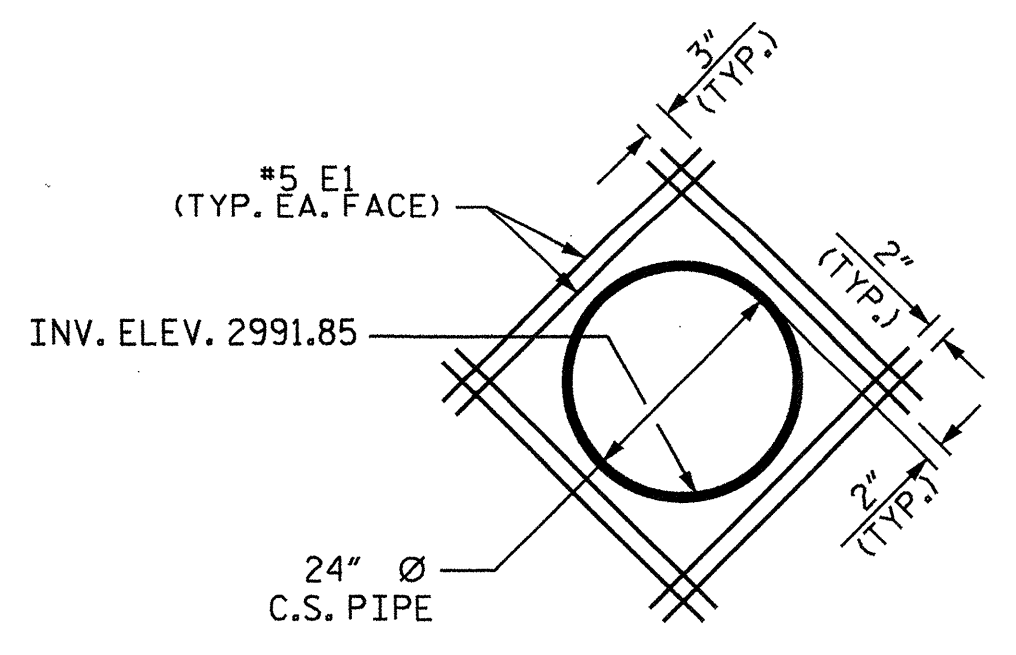
| REVISIONS | | | | | | SHEET NO. | |
|-----------|-----|-------|-----|-----|-------|--------------|--|
| NO. | BY: | DATE: | NO. | BY: | DATE: | C-2 | |
| 1 | | | 3 | | | TOTAL SHEETS | |
| 2 | | | 4 | | | 10 | |

REDRAWN NOV.1990 BY D.P.D. CHECKED BY M.A.J.
 ASSEMBLED BY: V.X. NGUYEN DATE: 8-3-11
 CHECKED BY: D.A. GLADDEN DATE: 12-12





PLAN OF FLOOR SLAB



DETAIL "A"

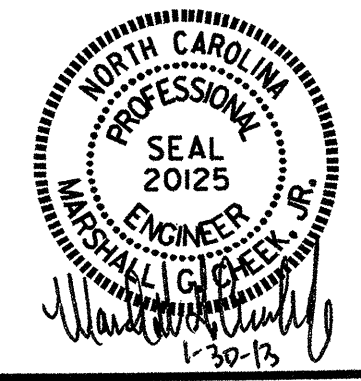
PROJECT NO. B-4182
MADISON COUNTY
 STATION: 12+15.00 -L-

SHEET 3 OF 10

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

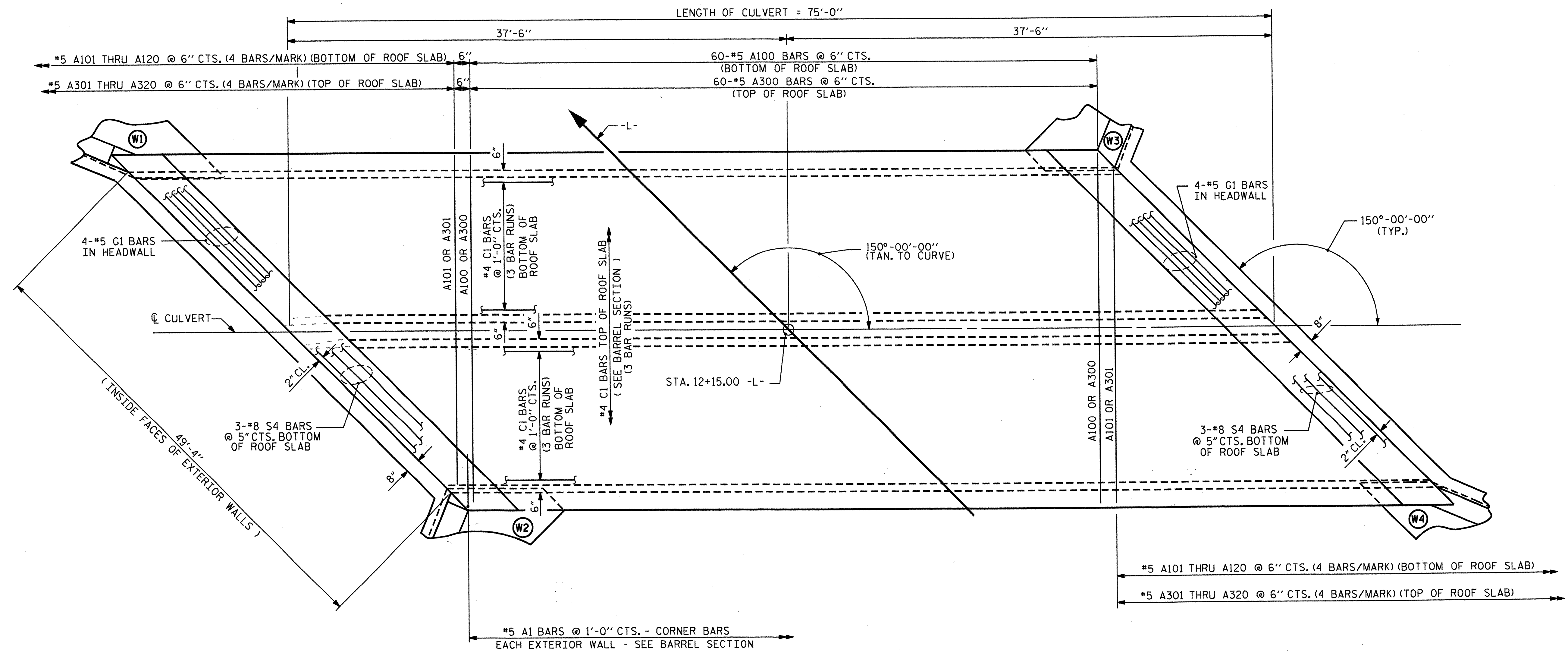
**DOUBLE 12 FT. X 7 FT.
 REINFORCED CONCRETE
 BOX CULVERT
 150° SKEW**

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



REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
 REDRAWN NOV.1990 BY D.P.D. CHECKED BY M.A.L.

ASSEMBLED BY: V. X. NGUYEN DATE: 7-12-11
 CHECKED BY: D.A. GLADDEN DATE: 12-12



PLAN OF ROOF SLAB

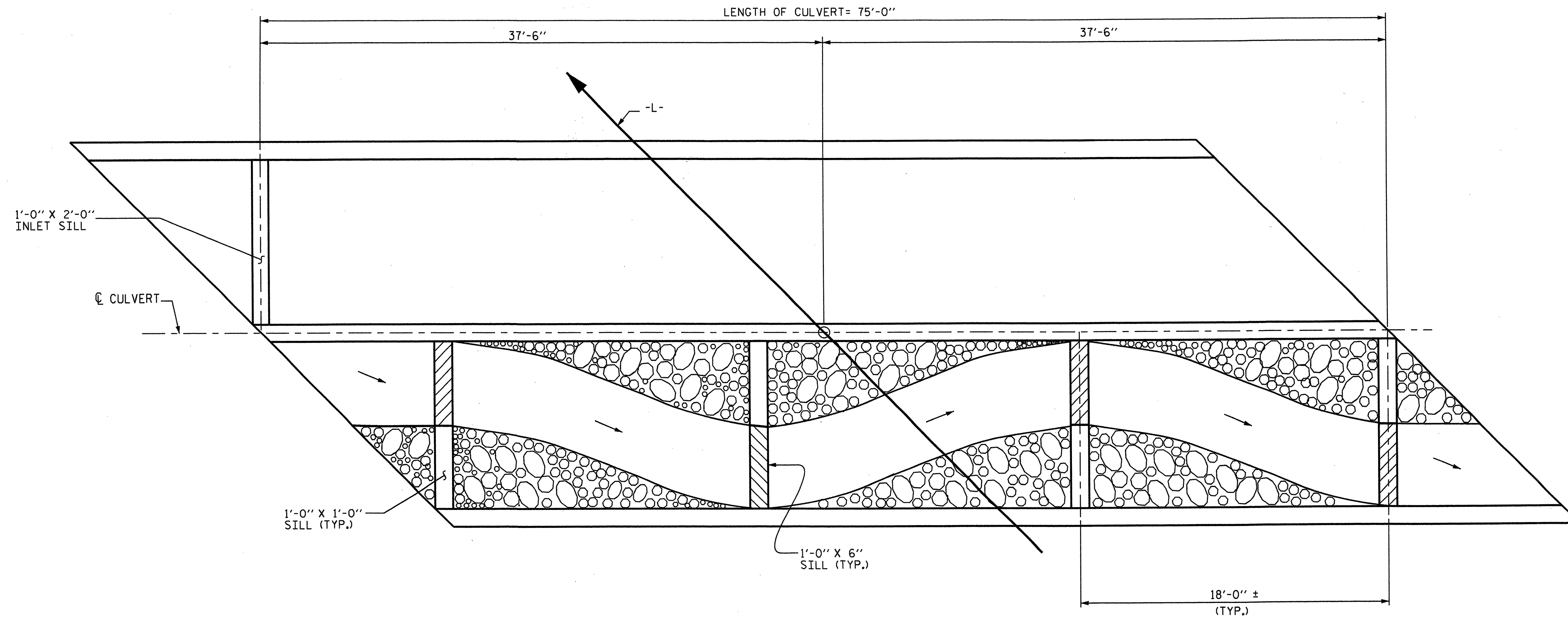
PROJECT NO. B-4182
MADISON COUNTY
 STATION: 12+15.00 -L-

SHEET 4 OF 10
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 12 FT. X 7 FT.
 REINFORCED CONCRETE
 BOX CULVERT
 150° SKEW



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

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
 REDRAWN NOV.1990 BY D.P.D. CHECKED BY M.A.L.
 ASSEMBLED BY: V. X. NGUYEN DATE: 7-12-11
 CHECKED BY: D.A. GLADDEN DATE: 12-12



FLOOR SILL LAYOUT

NOTES

MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT AS SHOWN IN THE FLOOR SILL LAYOUT. BED MATERIAL SHALL BE SUPPLEMENTED WITH CLASS 'B' RIP RAP AS NECESSARY. STONE LARGER THAN 75mm SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL. BED MATERIAL SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

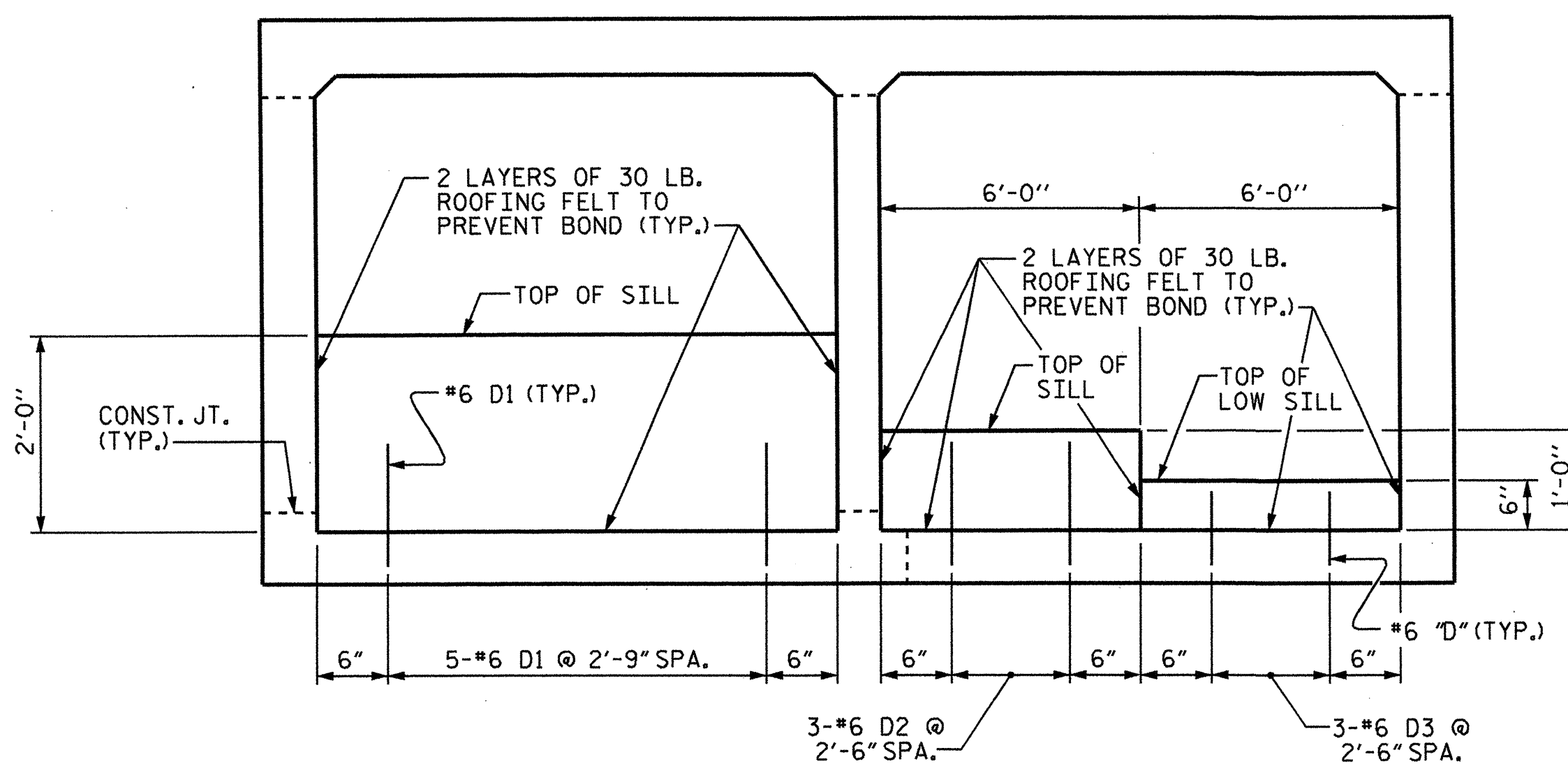
THE ENTIRE COST OF WORK REQUIRED TO PLACE THE EXCAVATED MATERIAL OR SUPPLEMENTAL MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE CONTACT LUMP SUM PRICE BID FOR CULVERT EXCAVATION.

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

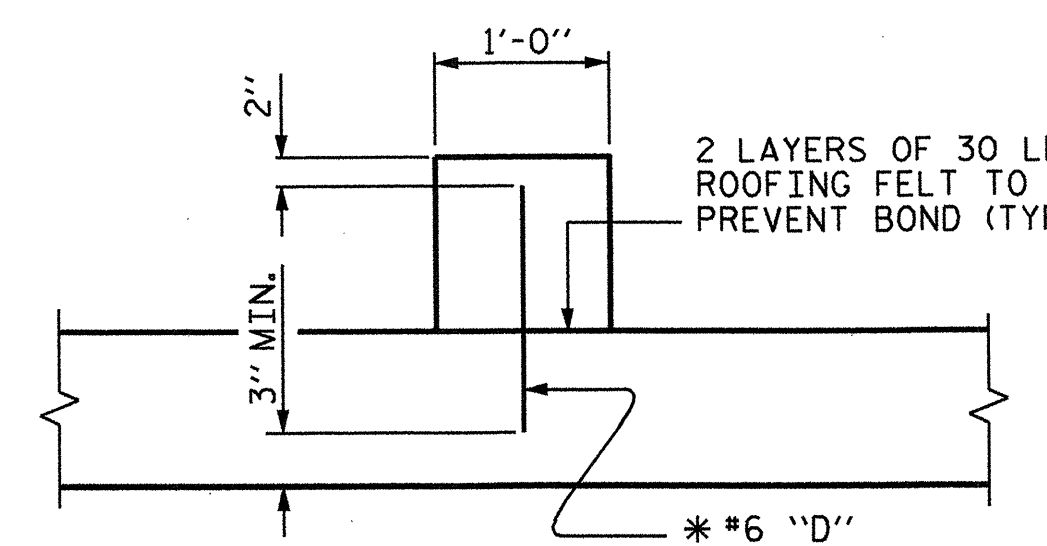
THE STOCKPILED MATERIAL SHALL BE PLACED IN THE LEFT CULVERT BARREL TO A DEPTH OF 2'-0". THE STOCKPILED MATERIAL SHALL BE PLACED IN THE RIGHT BARREL TO THE TOPS OF THE SILL ELEVATIONS TO PROVIDE A CONTINUOUS 6" DEPTH LOW FLOW CHANNEL BETWEEN THE LOW SILLS. A DEPTH OF MATERIAL OF 6" SHALL BE MAINTAINED ALONG THE LOW FLOW CHANNEL.

PROJECT NO. B-4182
MADISON COUNTY
 STATION: 12+15.00 -L-

SHEET 5 OF 10



SILL DETAILS
 LOOKING DOWNSTREAM
END ELEVATION



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

SECTION THROUGH SILL



| STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH | | | | | | SHEET NO. C-5 | |
|--|-----|-------|-----|-----|-------|--------------------|--|
| DOUBLE 12 FT. X 7 FT. REINFORCED CONCRETE BOX CULVERT | | | | | | TOTAL SHEETS 10 | |
| REVISIONS | | | | | | | |
| NO. | BY: | DATE: | NO. | BY: | DATE: | | |
| 1 | | | 3 | | | | |
| 2 | | | 4 | | | | |

DRAWN BY: M. POOLE DATE: 01/12
 CHECKED BY: D.A. GLADDEN DATE: 12-12

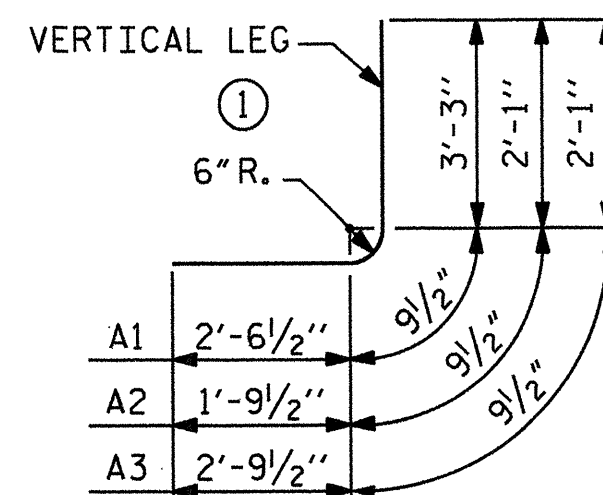
BILL OF MATERIAL

PHASE I & PHASE II

| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT | BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT | BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT | | | | | | | | | | | | | | | |
|------|------|--------|------|---------|--------|------|-----|------|------|---------|--------|--|-----|------|------|---------|--------|-----|------|--------|------|----|--------|------|----|--------|----|----|--------|-----|----|--------|
| A100 | 60 | #5 | STR | 25'- 7" | 1601 | A300 | 60 | #5 | STR | 25'- 7" | 1601 | A1 | 150 | #5 | 1 | 6'- 7" | 1030 | | | | | | | | | | | | | | | |
| A101 | 8 | #5 | STR | 24'- 5" | 204 | A301 | 8 | #5 | STR | 24'- 5" | 204 | A2 | 150 | #5 | 1 | 4'-8" | 730 | | | | | | | | | | | | | | | |
| A102 | 8 | #5 | STR | 23'- 3" | 194 | A302 | 8 | #5 | STR | 23'- 3" | 194 | A3 | 150 | #4 | 1 | 5'-8" | 568 | | | | | | | | | | | | | | | |
| A103 | 8 | #5 | STR | 22'- 2" | 185 | A303 | 8 | #5 | STR | 22'- 2" | 185 | | | | | | | | | | | | | | | | | | | | | |
| A104 | 8 | #5 | STR | 21'- 0" | 175 | A304 | 8 | #5 | STR | 21'- 0" | 175 | B1 | 150 | #4 | STR | 8'- 9" | 877 | | | | | | | | | | | | | | | |
| A105 | 8 | #5 | STR | 19'-10" | 165 | A305 | 8 | #5 | STR | 19'-10" | 165 | B2 | 150 | #5 | STR | 6'- 4" | 991 | | | | | | | | | | | | | | | |
| A106 | 8 | #5 | STR | 18'- 8" | 156 | A306 | 8 | #5 | STR | 18'- 8" | 156 | B3 | 150 | #4 | STR | 8'- 9" | 877 | | | | | | | | | | | | | | | |
| A107 | 8 | #5 | STR | 17'- 6" | 146 | A307 | 8 | #5 | STR | 17'- 6" | 146 | | | | | | | | | | | | | | | | | | | | | |
| A108 | 8 | #5 | STR | 16'- 4" | 136 | A308 | 8 | #5 | STR | 16'- 4" | 136 | C1 | 267 | #4 | STR | 26'- 2" | 4667 | | | | | | | | | | | | | | | |
| A109 | 8 | #5 | STR | 15'- 2" | 127 | A309 | 8 | #5 | STR | 15'- 2" | 127 | | | | | | | | | | | | | | | | | | | | | |
| A110 | 8 | #5 | STR | 14'- 1" | 118 | A310 | 8 | #5 | STR | 14'- 1" | 118 | D1 | 5 | #6 | STR | 2'- 6" | 19 | | | | | | | | | | | | | | | |
| A111 | 8 | #5 | STR | 12'-11" | 108 | A311 | 8 | #5 | STR | 12'-11" | 108 | D2 | 12 | #6 | STR | 1'- 6" | 27 | | | | | | | | | | | | | | | |
| A112 | 8 | #5 | STR | 11'- 9" | 98 | A312 | 8 | #5 | STR | 11'- 9" | 98 | D3 | 12 | #6 | STR | 1'- 0" | 18 | | | | | | | | | | | | | | | |
| A113 | 8 | #5 | STR | 10'- 7" | 88 | A313 | 8 | #5 | STR | 10'- 7" | 88 | | | | | | | | | | | | | | | | | | | | | |
| A114 | 8 | #5 | STR | 9'- 5" | 79 | A314 | 8 | #5 | STR | 9'- 5" | 79 | E1 | 16 | #5 | STR | 3'-6" | 58 | | | | | | | | | | | | | | | |
| A115 | 8 | #5 | STR | 8'- 3" | 69 | A315 | 8 | #5 | STR | 8'- 3" | 69 | | | | | | | | | | | | | | | | | | | | | |
| A116 | 8 | #5 | STR | 7'- 1" | 59 | A316 | 8 | #5 | STR | 7'- 1" | 59 | G1 | 8 | #5 | STR | 51'- 3" | 428 | | | | | | | | | | | | | | | |
| A117 | 8 | #5 | STR | 6'- 0" | 50 | A317 | 8 | #5 | STR | 6'- 0" | 50 | | | | | | | | | | | | | | | | | | | | | |
| A118 | 8 | #5 | STR | 4'-10" | 40 | A318 | 8 | #5 | STR | 4'-10" | 40 | S2 | 6 | #8 | STR | 33'- 6" | 537 | | | | | | | | | | | | | | | |
| A119 | 8 | #5 | STR | 3'- 8" | 31 | A319 | 8 | #5 | STR | 3'- 8" | 31 | S3 | 6 | #8 | STR | 22'- 8" | 363 | | | | | | | | | | | | | | | |
| A120 | 8 | #5 | STR | 2'- 6" | 21 | A320 | 8 | #5 | STR | 2'- 6" | 21 | S4 | 6 | #8 | STR | 51'- 3" | 821 | | | | | | | | | | | | | | | |
| A200 | 93 | #5 | STR | 16'- 5" | 1592 | A400 | 94 | #5 | STR | 16'- 5" | 1592 | REINFORCING STEEL = 28079 LBS. | | | | | | | | | | | | | | | | | | | | |
| A201 | 4 | #5 | STR | 15'- 3" | 64 | A401 | 4 | #5 | STR | 15'- 3" | 64 | BAR TYPE | | | | | | | | | | | | | | | | | | | | |
| A202 | 4 | #5 | STR | 14'- 1" | 59 | A402 | 4 | #5 | STR | 14'- 1" | 59 | | | | | | | | | | | | | | | | | | | | | |
| A203 | 4 | #5 | STR | 12'-11" | 54 | A403 | 4 | #5 | STR | 12'-11" | 54 | <table border="1"> <thead> <tr><th>BAR</th><th>SIZE</th><th>SPLICE</th></tr> </thead> <tbody> <tr><td>A200</td><td>#5</td><td>2'- 2"</td></tr> <tr><td>A400</td><td>#5</td><td>2'- 2"</td></tr> <tr><td>C1</td><td>#4</td><td>1'-11"</td></tr> <tr><td>"S"</td><td>#8</td><td>4'-11"</td></tr> </tbody> </table> | | | | | | BAR | SIZE | SPLICE | A200 | #5 | 2'- 2" | A400 | #5 | 2'- 2" | C1 | #4 | 1'-11" | "S" | #8 | 4'-11" |
| BAR | SIZE | SPLICE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A200 | #5 | 2'- 2" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A400 | #5 | 2'- 2" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C1 | #4 | 1'-11" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| "S" | #8 | 4'-11" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A204 | 4 | #5 | STR | 11'- 9" | 49 | A404 | 4 | #5 | STR | 11'- 9" | 49 | | | | | | | | | | | | | | | | | | | | | |
| A205 | 4 | #5 | STR | 10'- 7" | 44 | A405 | 4 | #5 | STR | 10'- 7" | 44 | | | | | | | | | | | | | | | | | | | | | |
| A206 | 4 | #5 | STR | 9'- 5" | 39 | A406 | 4 | #5 | STR | 9'- 5" | 39 | | | | | | | | | | | | | | | | | | | | | |
| A207 | 4 | #5 | STR | 8'- 4" | 35 | A407 | 4 | #5 | STR | 8'- 4" | 35 | | | | | | | | | | | | | | | | | | | | | |
| A208 | 4 | #5 | STR | 7'- 2" | 30 | A408 | 4 | #5 | STR | 7'- 2" | 30 | | | | | | | | | | | | | | | | | | | | | |
| A209 | 4 | #5 | STR | 6'- 0" | 25 | A409 | 4 | #5 | STR | 6'- 0" | 25 | | | | | | | | | | | | | | | | | | | | | |
| A210 | 4 | #5 | STR | 4'-10" | 20 | A410 | 4 | #5 | STR | 4'-10" | 20 | | | | | | | | | | | | | | | | | | | | | |
| A211 | 4 | #5 | STR | 4'- 6" | 19 | A411 | 4 | #5 | STR | 4'- 6" | 19 | | | | | | | | | | | | | | | | | | | | | |
| A212 | 4 | #5 | STR | 4'- 4" | 18 | A412 | 4 | #5 | STR | 4'- 4" | 18 | | | | | | | | | | | | | | | | | | | | | |
| A213 | 4 | #5 | STR | 15'- 1" | 63 | A413 | 4 | #5 | STR | 15'- 1" | 63 | | | | | | | | | | | | | | | | | | | | | |
| A214 | 4 | #5 | STR | 13'-11" | 58 | A414 | 4 | #5 | STR | 13'-11" | 58 | | | | | | | | | | | | | | | | | | | | | |
| A215 | 4 | #5 | STR | 12'- 9" | 53 | A415 | 4 | #5 | STR | 12'- 9" | 53 | | | | | | | | | | | | | | | | | | | | | |
| A216 | 4 | #5 | STR | 11'- 7" | 48 | A416 | 4 | #5 | STR | 11'- 7" | 48 | | | | | | | | | | | | | | | | | | | | | |
| A217 | 4 | #5 | STR | 10'- 5" | 43 | A417 | 4 | #5 | STR | 10'- 5" | 43 | | | | | | | | | | | | | | | | | | | | | |
| A218 | 4 | #5 | STR | 9'- 3" | 39 | A418 | 4 | #5 | STR | 9'- 3" | 39 | | | | | | | | | | | | | | | | | | | | | |
| A219 | 4 | #5 | STR | 8'- 1" | 34 | A419 | 4 | #5 | STR | 8'- 1" | 34 | | | | | | | | | | | | | | | | | | | | | |
| A220 | 4 | #5 | STR | 6'-11" | 29 | A420 | 4 | #5 | STR | 6'-11" | 29 | | | | | | | | | | | | | | | | | | | | | |
| A221 | 4 | #5 | STR | 5'- 9" | 24 | A421 | 4 | #5 | STR | 5'- 9" | 24 | | | | | | | | | | | | | | | | | | | | | |
| A222 | 4 | #5 | STR | 4'- 7" | 19 | A422 | 4 | #5 | STR | 4'- 7" | 19 | | | | | | | | | | | | | | | | | | | | | |
| A223 | 4 | #5 | STR | 3'- 5" | 14 | A423 | 4 | #5 | STR | 3'- 5" | 14 | | | | | | | | | | | | | | | | | | | | | |
| A250 | 110 | #5 | STR | 11'- 4" | 1300 | A450 | 110 | #5 | STR | 11'- 4" | 1300 | | | | | | | | | | | | | | | | | | | | | |
| A251 | 4 | #5 | STR | 10'- 2" | 42 | A451 | 4 | #5 | STR | 10'- 2" | 42 | | | | | | | | | | | | | | | | | | | | | |
| A252 | 4 | #5 | STR | 9'- 0" | 38 | A452 | 4 | #5 | STR | 9'- 0" | 38 | | | | | | | | | | | | | | | | | | | | | |
| A253 | 4 | #5 | STR | 7'-10" | 33 | A453 | 4 | #5 | STR | 7'-10" | 33 | | | | | | | | | | | | | | | | | | | | | |
| A254 | 4 | #5 | STR | 6'- 8" | 28 | A454 | 4 | #5 | STR | 6'- 8" | 28 | | | | | | | | | | | | | | | | | | | | | |
| A255 | 4 | #5 | STR | 5'- 6" | 23 | A455 | 4 | #5 | STR | 5'- 6" | 23 | | | | | | | | | | | | | | | | | | | | | |
| A256 | 4 | #5 | STR | 4'- 4" | 18 | A456 | 4 | #5 | STR | 4'- 4" | 18 | | | | | | | | | | | | | | | | | | | | | |
| A257 | 4 | #5 | STR | 3'- 2" | 13 | A457 | 4 | #5 | STR | 3'- 2" | 13 | | | | | | | | | | | | | | | | | | | | | |
| A258 | 4 | #5 | STR | 10'- 6" | 44 | A458 | 4 | #5 | STR | 10'- 6" | 44 | | | | | | | | | | | | | | | | | | | | | |
| A259 | 4 | #5 | STR | 9'- 4" | 39 | A459 | 4 | #5 | STR | 9'- 4" | 39 | | | | | | | | | | | | | | | | | | | | | |
| A260 | 4 | #5 | STR | 8'- 3" | 34 | A460 | 4 | #5 | STR | 8'- 3" | 34 | | | | | | | | | | | | | | | | | | | | | |
| A261 | 4 | #5 | STR | 7'- 1" | 30 | A461 | 4 | #5 | STR | 7'- 1" | 30 | | | | | | | | | | | | | | | | | | | | | |
| A262 | 4 | #5 | STR | 5'-11" | 25 | A462 | 4 | #5 | STR | 5'-11" | 25 | | | | | | | | | | | | | | | | | | | | | |
| A263 | 4 | #5 | STR | 4'- 9" | 20 | A463 | 4 | #5 | STR | 4'- 9" | 20 | | | | | | | | | | | | | | | | | | | | | |
| A264 | 4 | #5 | STR | 3'- 7" | 15 | A464 | 4 | #5 | STR | 3'- 7" | 15 | | | | | | | | | | | | | | | | | | | | | |
| A265 | 4 | #5 | STR | 2'- 5" | 10 | A465 | 4 | #5 | STR | 2'- 5" | 10 | | | | | | | | | | | | | | | | | | | | | |

REINFORCING STEEL = 28079 LBS.

BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART

| BAR | SIZE | SPLICE |
|------|------|--------|
| A200 | #5 | 2'- 2" |
| A400 | #5 | 2'- 2" |
| C1 | #4 | 1'-11" |
| "S" | #8 | 4'-11" |

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
PDR/RAW NOV.1990 BY D.P.D. CHECKED BY M.A.J.

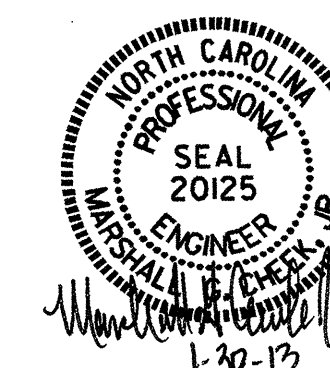
ASSEMBLED BY : V. X. NGUYEN DATE : 12-5-12
CHECKED BY : D.A. GLADDEN DATE : 12-12-

PROJECT NO. B-4182
MADISON COUNTY
STATION: 12+15.00 -L-

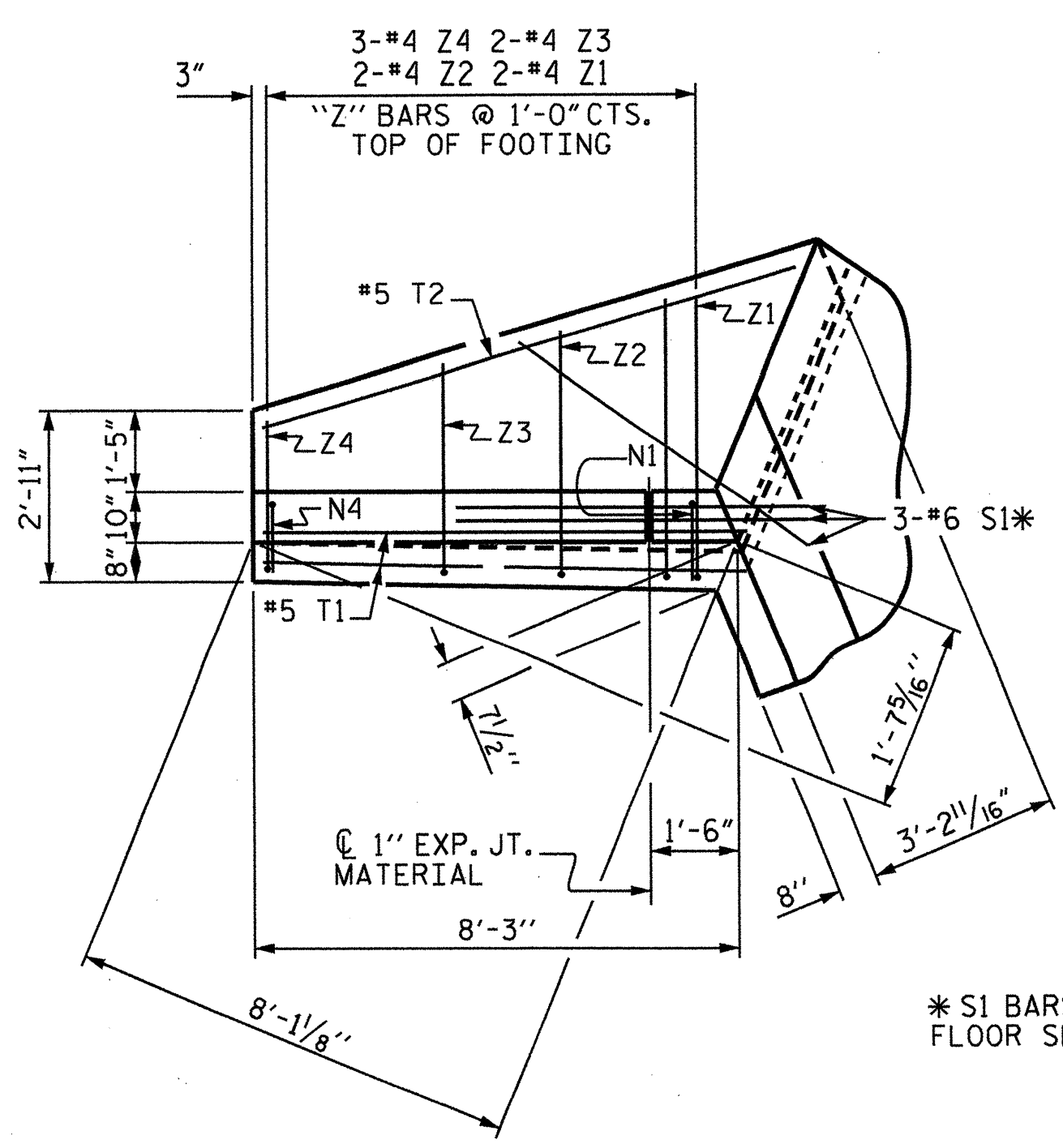
SHEET 6 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

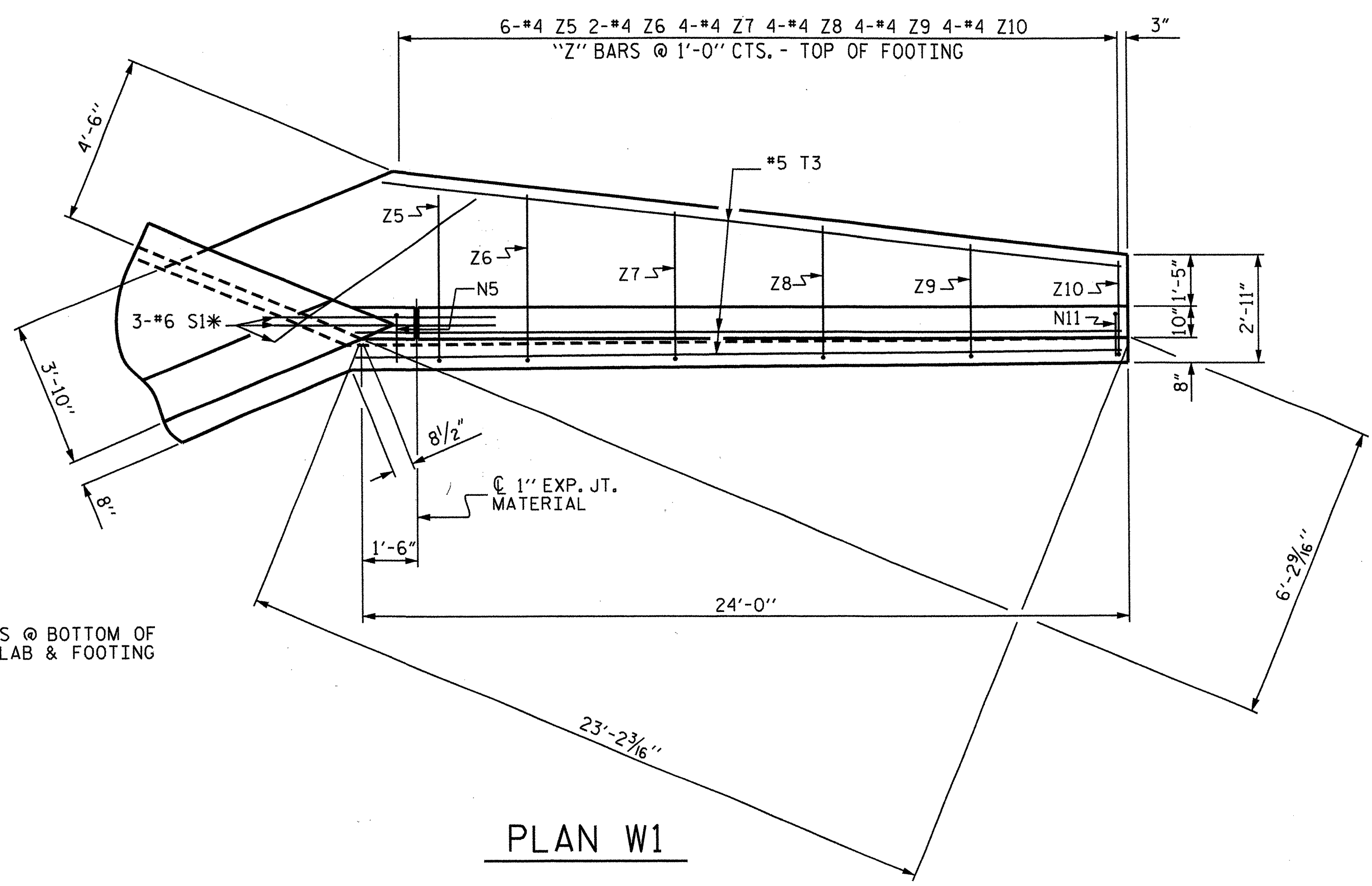
DOUBLE 12 FT. X 7 FT.
REINFORCED CONCRETE
BOX CULVERT
150° SKEW



| REVISIONS | | | | | | SHEET NO. | |
|-----------|-----|-------|-----|-----|-------|--------------|--|
| NO. | BY: | DATE: | NO. | BY: | DATE: | C-6 | |
| 1 | | | 3 | | | TOTAL SHEETS | |
| 2 | | | 4 | | | 10 | |

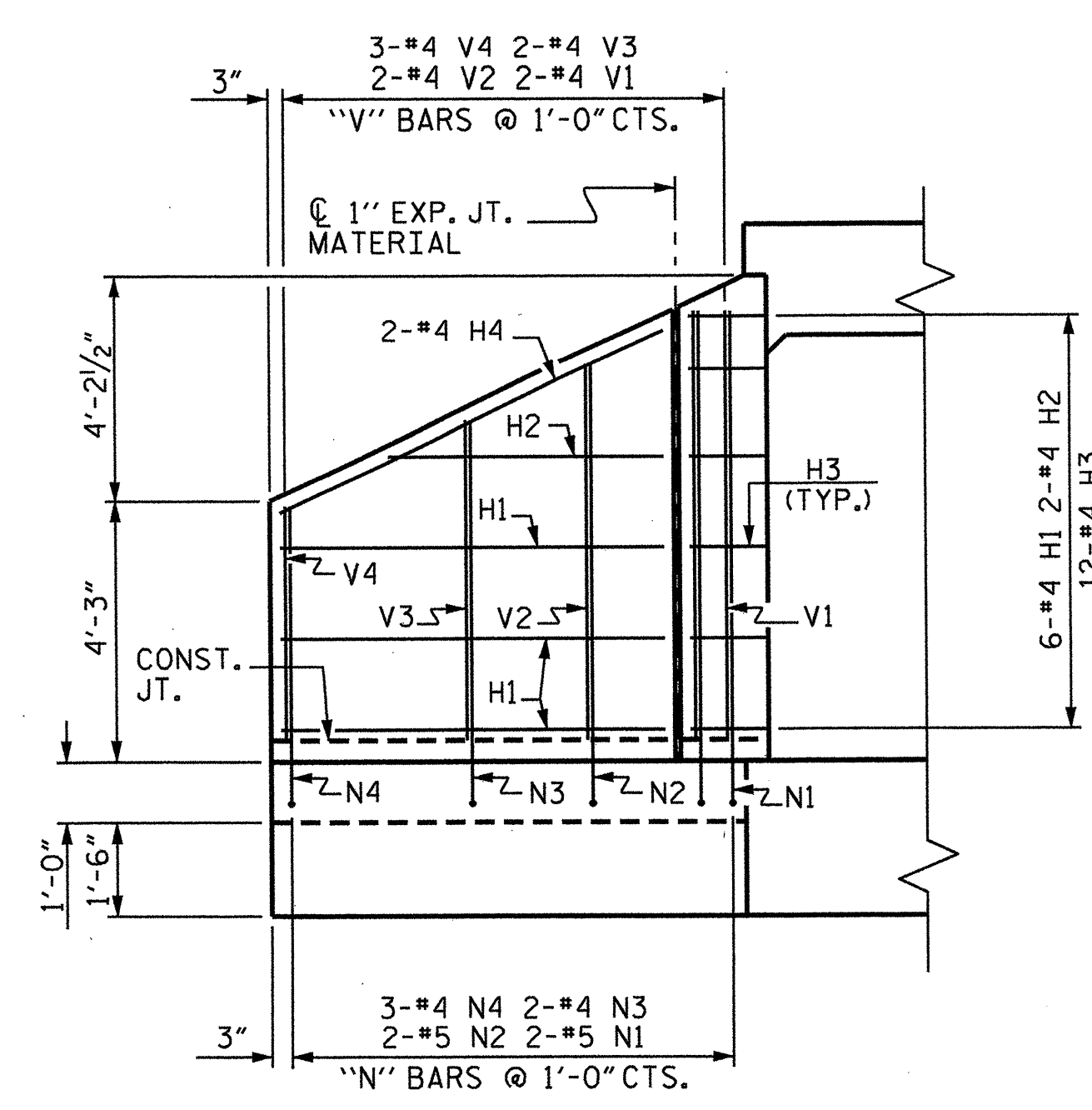


PLAN W2

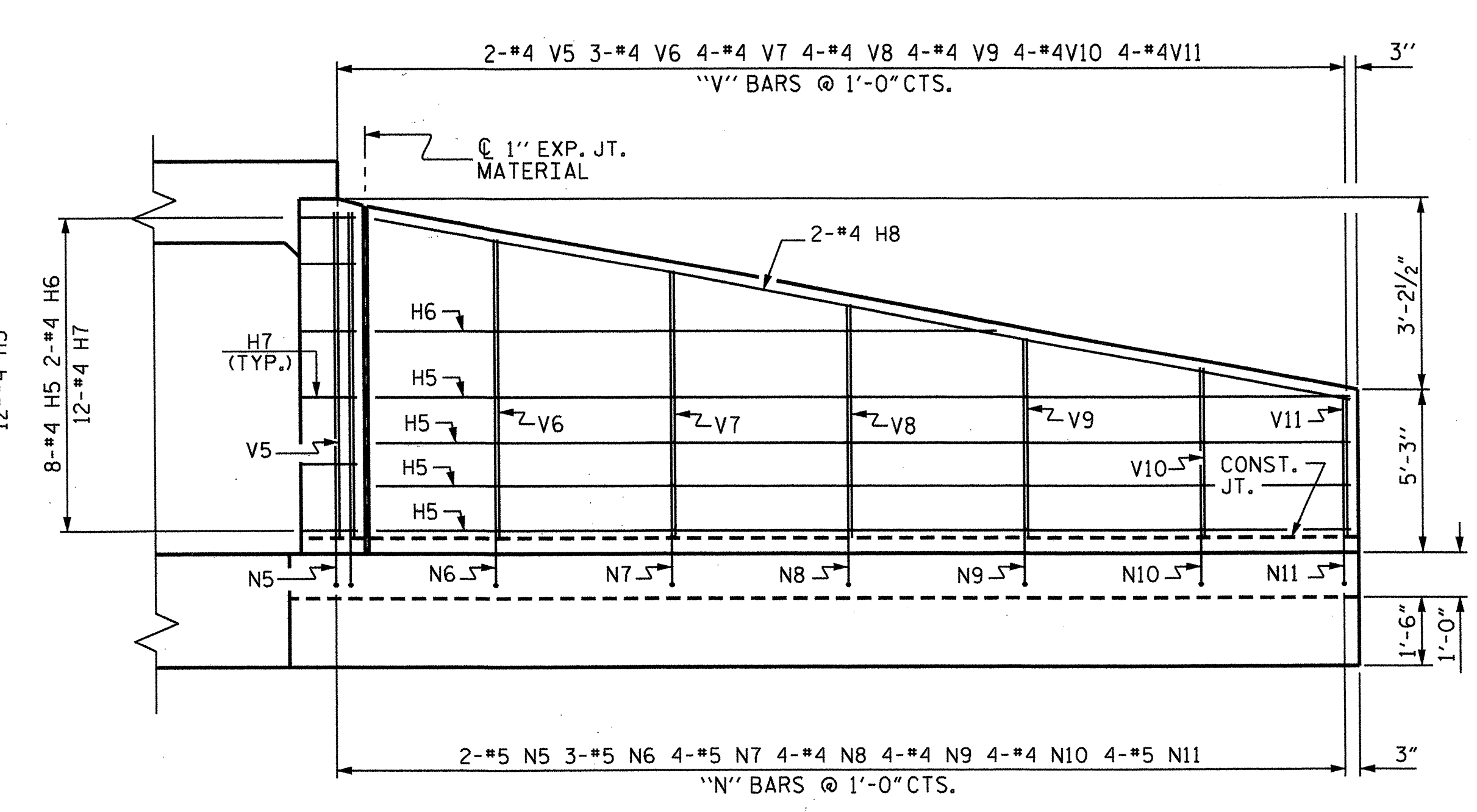


PLAN W1

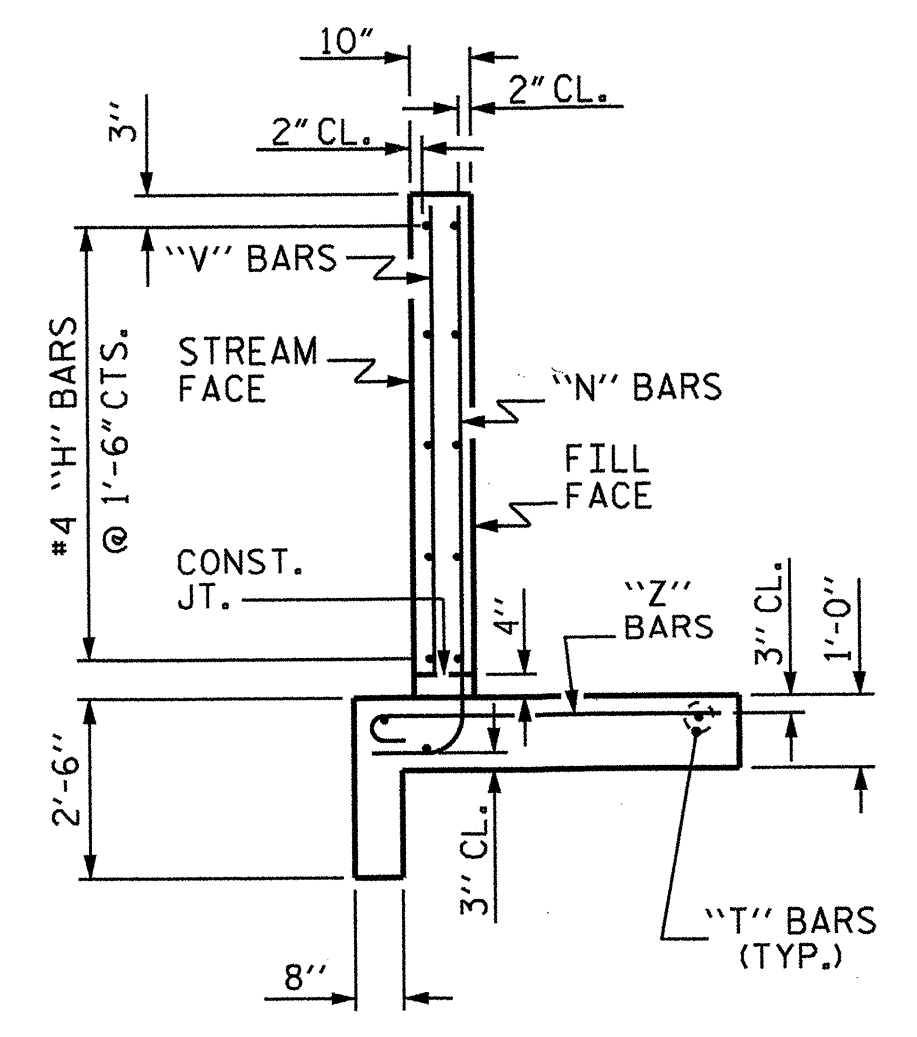
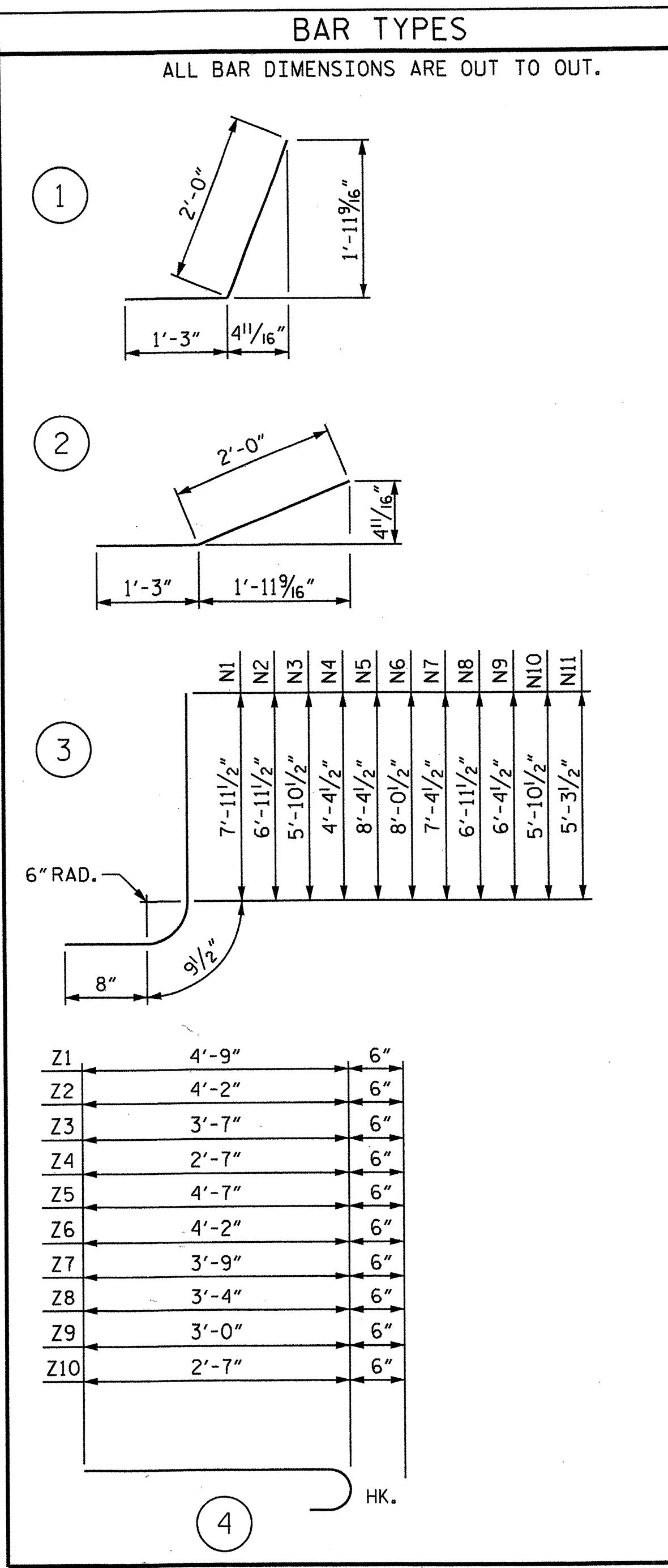
NOTE:
A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.



ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION

| BILL OF MATERIAL | | | | | |
|------------------|------|------|--------|--------|-----|
| BAR NO. | SIZE | TYPE | LENGTH | WEIGHT | |
| H1 | 6 | #4 | STR | 6'-4" | 25 |
| H2 | 2 | #4 | STR | 4'-10" | 6 |
| H3 | 12 | #4 | 1 | 3'-3" | 26 |
| H4 | 2 | #4 | STR | 7'-0" | 9 |
| H5 | 8 | #4 | STR | 22'-1" | 118 |
| H6 | 2 | #4 | STR | 13'-0" | 17 |
| H7 | 12 | #4 | 2 | 3'-3" | 26 |
| H8 | 2 | #4 | STR | 22'-3" | 30 |

| | | | | | |
|-----|---|----|---|--------|----|
| N1 | 2 | #5 | 3 | 9'-5" | 20 |
| N2 | 2 | #5 | 3 | 8'-5" | 18 |
| N3 | 2 | #4 | 3 | 7'-4" | 10 |
| N4 | 3 | #4 | 3 | 5'-10" | 12 |
| N5 | 2 | #5 | 3 | 9'-10" | 21 |
| N6 | 3 | #5 | 3 | 9'-6" | 30 |
| N7 | 4 | #5 | 3 | 8'-10" | 37 |
| N8 | 4 | #4 | 3 | 8'-5" | 22 |
| N9 | 4 | #4 | 3 | 7'-10" | 21 |
| N10 | 4 | #4 | 3 | 7'-4" | 20 |
| N11 | 4 | #4 | 3 | 6'-9" | 18 |

| | | | | | |
|----|---|----|-----|--------|----|
| S1 | 6 | #6 | STR | 6'-0" | 54 |
| T1 | 2 | #5 | STR | 8'-3" | 17 |
| T2 | 1 | #5 | STR | 9'-0" | 9 |
| T3 | 3 | #5 | STR | 23'-9" | 74 |

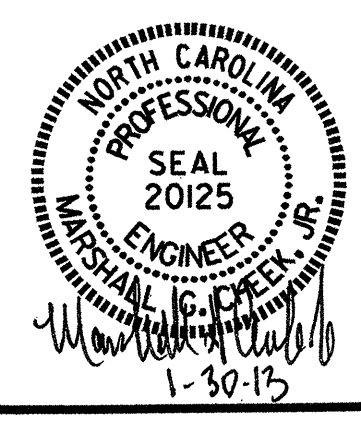
| | | | | | |
|-----|---|----|-----|--------|----|
| V1 | 2 | #4 | STR | 7'-4" | 10 |
| V2 | 2 | #4 | STR | 6'-4" | 8 |
| V3 | 2 | #4 | STR | 5'-3" | 7 |
| V4 | 3 | #4 | STR | 3'-9" | 8 |
| V5 | 2 | #4 | STR | 7'-9" | 10 |
| V6 | 3 | #4 | STR | 7'-4" | 15 |
| V7 | 4 | #4 | STR | 6'-10" | 18 |
| V8 | 4 | #4 | STR | 6'-3" | 17 |
| V9 | 4 | #4 | STR | 5'-9" | 15 |
| V10 | 4 | #4 | STR | 5'-2" | 14 |
| V11 | 4 | #4 | STR | 4'-8" | 12 |

| | | | | | |
|-----|---|----|---|--------|---|
| Z1 | 2 | #4 | 4 | 5'-3" | 7 |
| Z2 | 2 | #4 | 4 | 4'-8" | 6 |
| Z3 | 2 | #4 | 4 | 4'-1" | 5 |
| Z4 | 3 | #4 | 4 | 5'-1" | 6 |
| Z5 | 4 | #4 | 4 | 5'-1" | 7 |
| Z6 | 2 | #4 | 4 | 4'-8" | 3 |
| Z7 | 4 | #4 | 4 | 4'-3" | 6 |
| Z8 | 4 | #4 | 4 | 3'-10" | 6 |
| Z9 | 4 | #4 | 4 | 3'-6" | 5 |
| Z10 | 4 | #4 | 4 | 3'-1" | 4 |

| REINFORCING STEEL FOR 2 WINGS | | 833 LBS. |
|-------------------------------|--|----------------|
| CLASS A CONCRETE | | 13.6 CY |
| 2 WINGS | | 2.4 CY |
| 1 HEADWALL | | 3.0 CY |
| 1 END CURTAIN WALL | | 3.0 CY |
| TOTAL | | 19.0 CY |

PROJECT NO. B-4182
MADISON COUNTY
STATION: 12+15.00 -L-
SHEET 7 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
LEFT SIDE WINGS
FOR
CONCRETE BOX CULVERT
H = 7'-0" SLOPE = 2:1



| REVISIONS | | | | | | SHEET NO. | |
|-----------|-----|-------|-----|-----|-------|-----------------|--|
| NO. | BY: | DATE: | NO. | BY: | DATE: | C-7 | |
| 1 | | | 3 | | | TOTAL SHEETS 10 | |
| 2 | | | 4 | | | | |

NOTES

- THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :
- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2 1/2".
 - B. 4 - 1" Ø X 2 1/4" BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1" Ø X 2 1/4" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)
 - C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

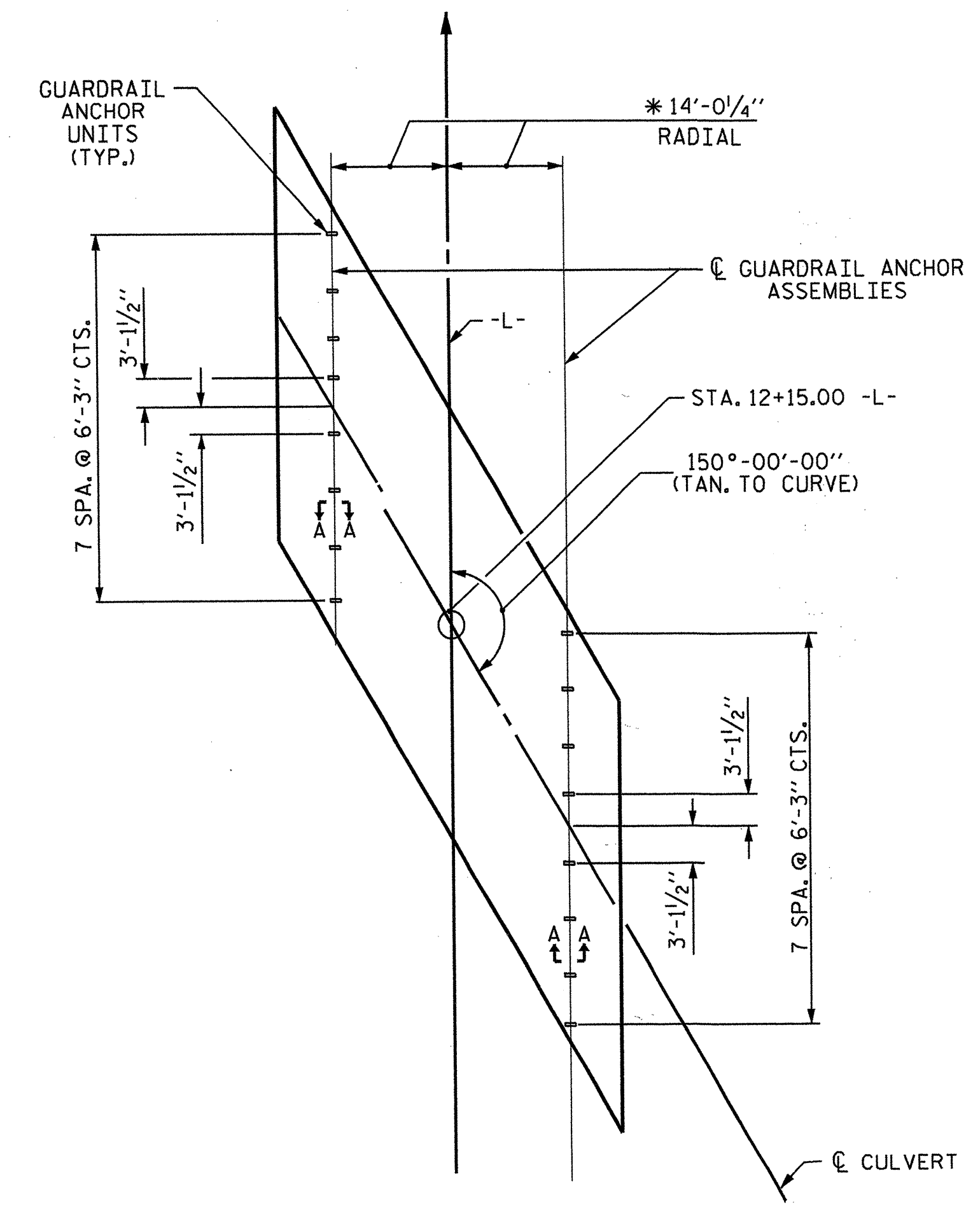
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED. PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

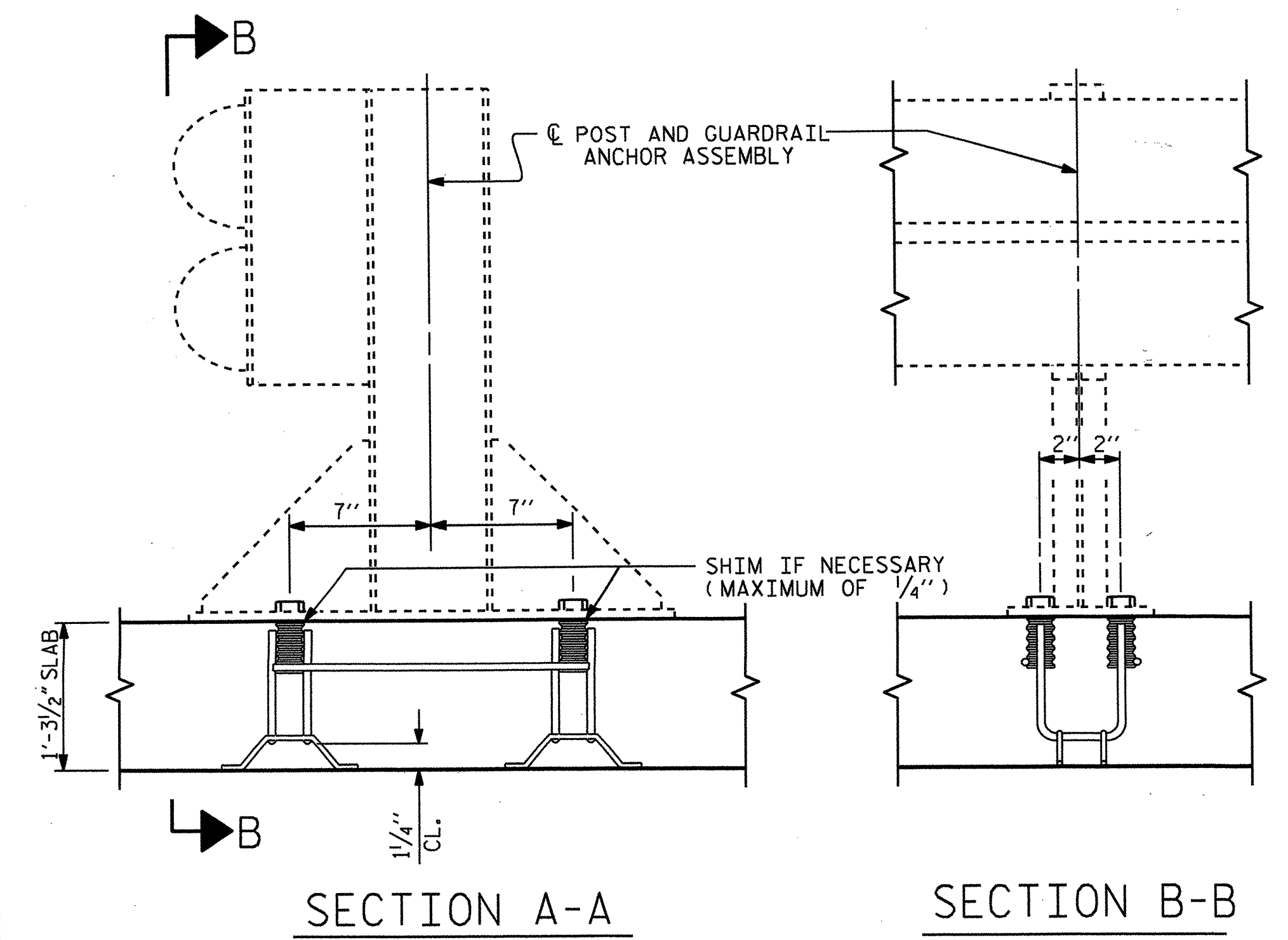
SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1" Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.



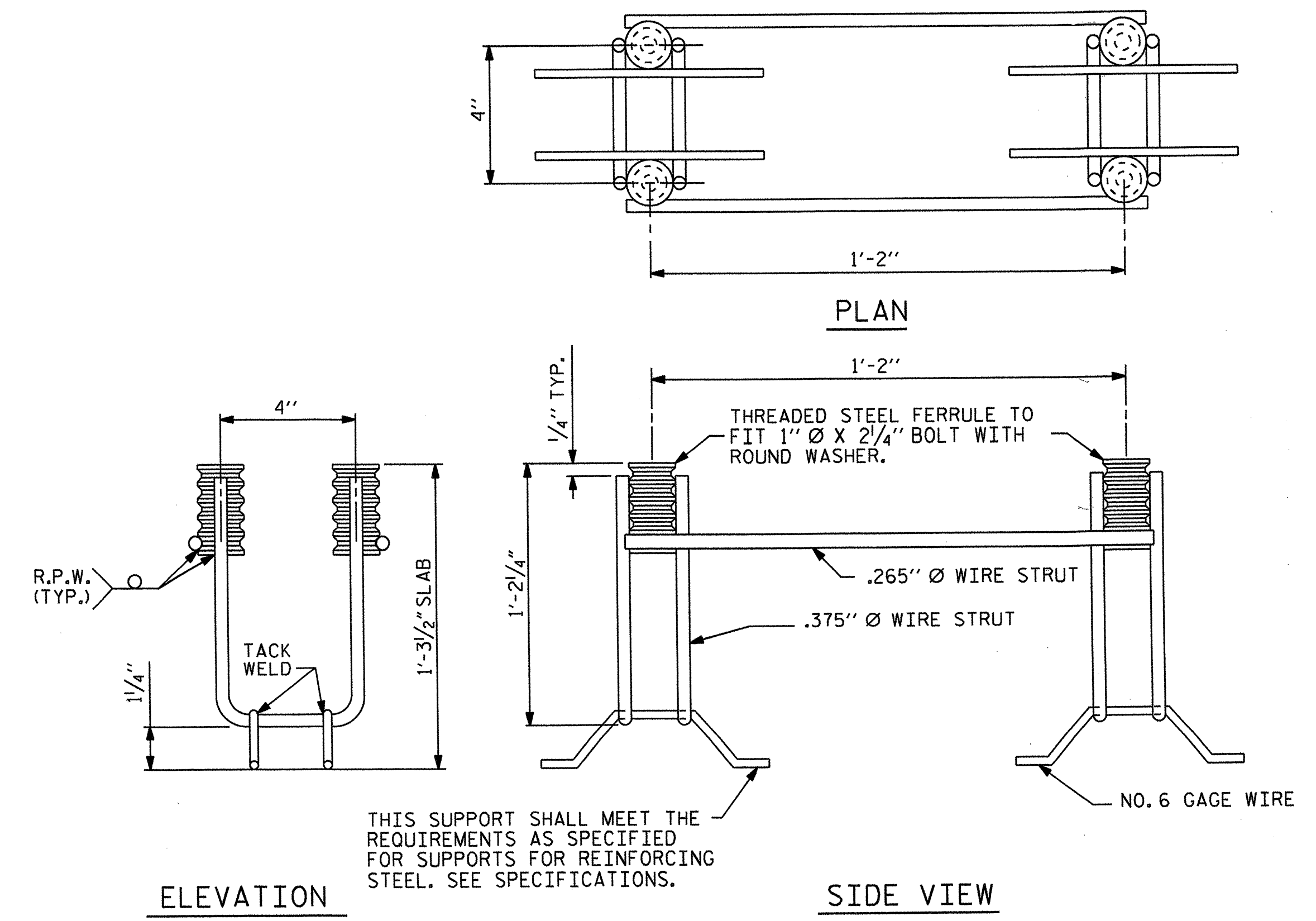
PLAN

* DIMENSION TO BE VERIFIED BY THE ENGINEER



SECTION A-A

SECTION B-B



ELEVATION

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

THIS SUPPORT SHALL MEET THE REQUIREMENTS AS SPECIFIED FOR SUPPORTS FOR REINFORCING STEEL. SEE SPECIFICATIONS.



PROJECT NO. B-4182
MADISON COUNTY
STATION: 12+15.00 -L-
SHEET 9 OF 10

| | | | | | |
|--|-----|-------|-----|-----|--------------------|
| STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH | | | | | |
| ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS | | | | | |
| REVISIONS | | | | | |
| NO. | BY: | DATE: | NO. | BY: | DATE: |
| 1 | | | 3 | | |
| 2 | | | 4 | | |
| | | | | | SHEET NO. C-9 |
| | | | | | TOTAL SHEETS 10 |

| | | | |
|----------------|--------------|--------|---------------------|
| ASSEMBLED BY : | M. POOLE | DATE : | 01/12 |
| CHECKED BY : | D.A. GLADDEN | DATE : | 12/12 |
| DRAWN BY : | FCJ | 6/88 | REV. 5/7/03 RWW/JTE |
| CHECKED BY : | ARB | 6/88 | REV. 5/1/06R KMM/GM |
| | | | REV. 10/1/11 MAA/GM |

**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 | | | | |
|--------------------------|--------------------------------------|----------------------|---------------------------------|-----------------------------------|---------------|---------------------------|---------------|-------------|-----------------|--|---------------|----------------|-------------|-----------------|--|--|
| | | | | | | MOMENT | | | | SHEAR | | | | | | |
| | | | | | | LIVE-LOAD FACTORS (%L) | 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 | 1.16 | -- | 1.75 | 1.16 | 1 | TOP SLAB | 5.38 | 1.20 | 1 | BOTTOM SLAB | 11.70 | | |
| | HL-93 (OPERATING) | N/A | | 1.50 | -- | 1.35 | 1.50 | 1 | TOP SLAB | 5.38 | 1.55 | 1 | BOTTOM SLAB | 11.70 | | |
| | HS-20 (INVENTORY) | 36.000 | 2 | 1.20 | 43.14 | 1.75 | 1.34 | 1 | BOTTOM SLAB | 12.35 | 1.20 | 1 | BOTTOM SLAB | 11.70 | | |
| | HS-20 (OPERATING) | 36.000 | | 1.55 | 55.93 | 1.35 | 1.74 | 1 | BOTTOM SLAB | 12.35 | 1.55 | 1 | BOTTOM SLAB | 11.70 | | |
| LEGAL LOAD RATING | SINGLE VEHICLE (SV) | SN5H | | 2.46 | 33.25 | 1.40 | 2.46 | 1 | TOP SLAB | 5.38 | 2.85 | 1 | TOP SLAB | 11.53 | | |
| | | SNGARBS2 | 20.000 | | 2.30 | 46.10 | 1.40 | 2.30 | 1 | TOP SLAB | 5.38 | 2.39 | 1 | BOTTOM SLAB | 11.70 | |
| | | SNAGRIS2 | 22.000 | | 2.19 | 48.08 | 1.40 | 2.44 | 1 | BOTTOM SLAB | 12.35 | 2.19 | 1 | BOTTOM SLAB | 11.70 | |
| | | SNCOTTS3 | 27.250 | | 1.45 | 39.42 | 1.40 | 1.45 | 1 | TOP SLAB | 5.38 | 1.53 | 1 | TOP SLAB | 11.53 | |
| | | SNAGGRS4 | 34.925 | | 1.37 | 47.81 | 1.40 | 1.49 | 1 | BOTTOM SLAB | 12.35 | 1.37 | 1 | BOTTOM SLAB | 11.70 | |
| | | SNS5A | 35.550 | | 1.35 | 48.12 | 1.40 | 1.46 | 1 | BOTTOM SLAB | 12.35 | 1.35 | 1 | BOTTOM SLAB | 11.70 | |
| | | SNS6A | 39.950 | | 1.34 | 53.69 | 1.40 | 1.45 | 1 | BOTTOM SLAB | 12.35 | 1.34 | 1 | BOTTOM SLAB | 11.70 | |
| | | SN57B | 42.000 | | 1.28 | 53.67 | 1.40 | 1.43 | 1 | BOTTOM SLAB | 12.35 | 1.28 | 1 | BOTTOM SLAB | 11.70 | |
| | TRUCK TRACTOR SEMI-TRAILER (TTS1) | TNAGRIT3 | 33.000 | | 1.47 | 48.53 | 1.40 | 1.65 | 1 | BOTTOM SLAB | 12.35 | 1.47 | 1 | BOTTOM SLAB | 11.70 | |
| | | TNT4A | 33.075 | | 1.46 | 48.39 | 1.40 | 1.59 | 1 | BOTTOM SLAB | 12.35 | 1.46 | 1 | BOTTOM SLAB | 11.70 | |
| | | TNT6A | 41.600 | | 1.35 | 56.07 | 1.40 | 1.57 | 1 | BOTTOM SLAB | 12.35 | 1.35 | 1 | BOTTOM SLAB | 11.70 | |
| | | TNT7A | 42.000 | | 1.28 | 53.81 | 1.40 | 1.46 | 1 | BOTTOM SLAB | 12.35 | 1.28 | 1 | BOTTOM SLAB | 11.70 | |
| | | TNT7B | 42.000 | | 1.38 | 57.83 | 1.40 | 1.48 | 1 | BOTTOM SLAB | 12.35 | 1.38 | 1 | BOTTOM SLAB | 11.70 | |
| | | TNAGRIT4 | 43.000 | 3 | 1.13 | 48.76 | 1.40 | 1.25 | 1 | BOTTOM SLAB | 12.35 | 1.13 | 1 | BOTTOM SLAB | 11.70 | |
| | | TNAGT5A | 45.000 | | 1.25 | 56.10 | 1.40 | 1.38 | 1 | BOTTOM SLAB | 12.35 | 1.25 | 1 | BOTTOM SLAB | 11.70 | |
| TNACT5B | 45.000 | | 1.15 | 51.74 | 1.40 | 1.29 | 1 | BOTTOM SLAB | 12.35 | 1.15 | 1 | BOTTOM SLAB | 11.70 | | | |

LOAD FACTORS:

| STRENGTH I LIMIT STATE | LOAD TYPE | MAX FACTOR | MIN FACTOR |
|-------------------------------------|-----------|---------------|---------------|
| | DC | | 1.25 |
| DW | | 1.50 | 0.65 |
| DESIGN LOAD RATING FACTORS | EV | 1.30 | 0.90 |
| | EH | 1.35 | 0.50 OR 0.90 |
| | ES | 1.35 | 0.50 OR 0.90 |
| | LS | 1.75 | 0.00 |
| | WA | 1.00 | 0.00 |

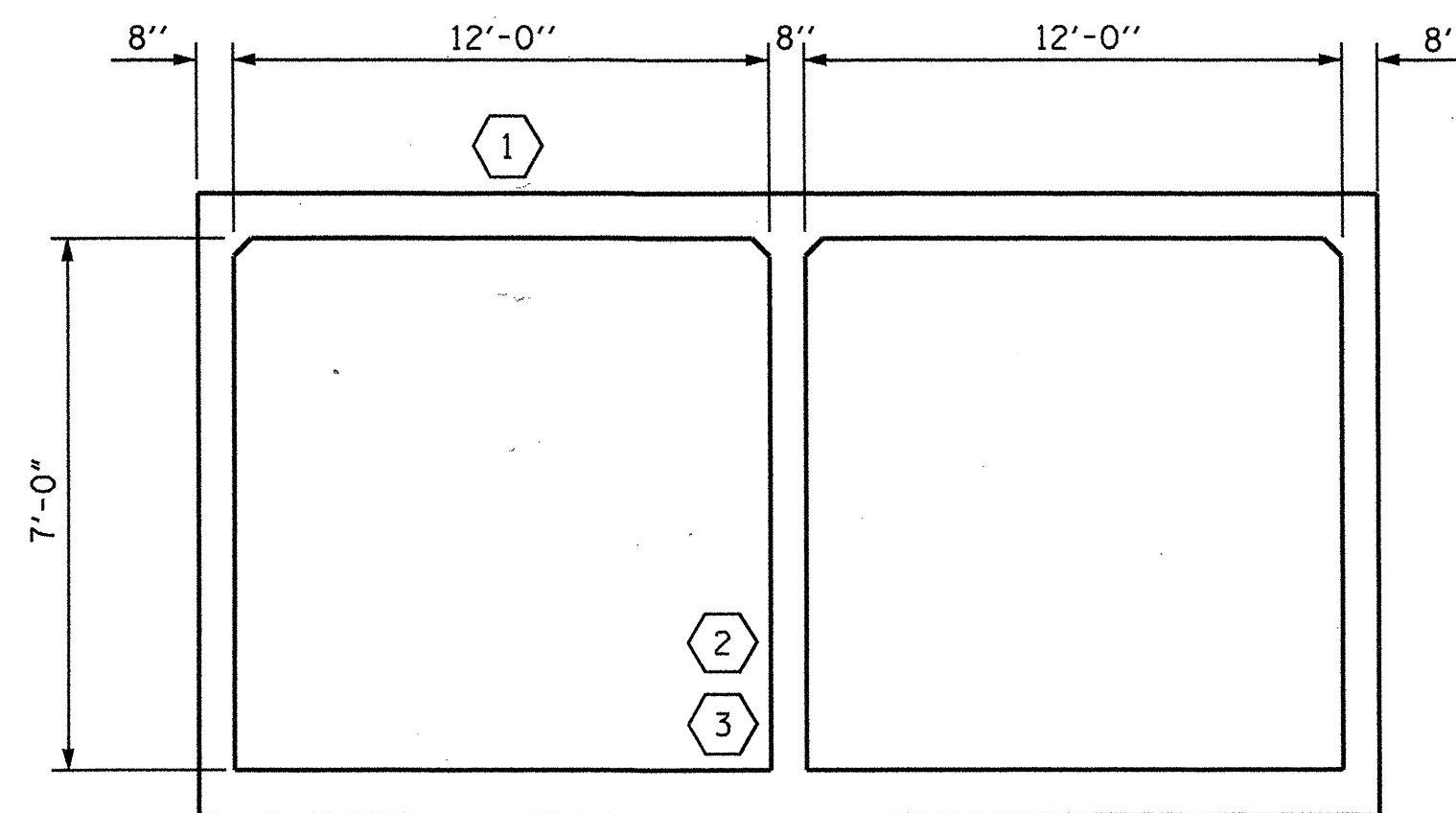
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

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



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. B-4182
MADISON COUNTY
STATION: 12+15.00 -L-

SHEET 10 OF 10

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



ASSEMBLED BY: M. POOLE DATE: 01/12
CHECKED BY: D.A. GLADDEN DATE: 12/12
DRAWN BY: WMC 7/11 REV. 10/1/11 MAA/GM
CHECKED BY: GM 7/11

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

STD. NO. LRFR5

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 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

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

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

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB. METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. 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

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