

CONTRACT: C201895 TIP PROJECT: B-4196

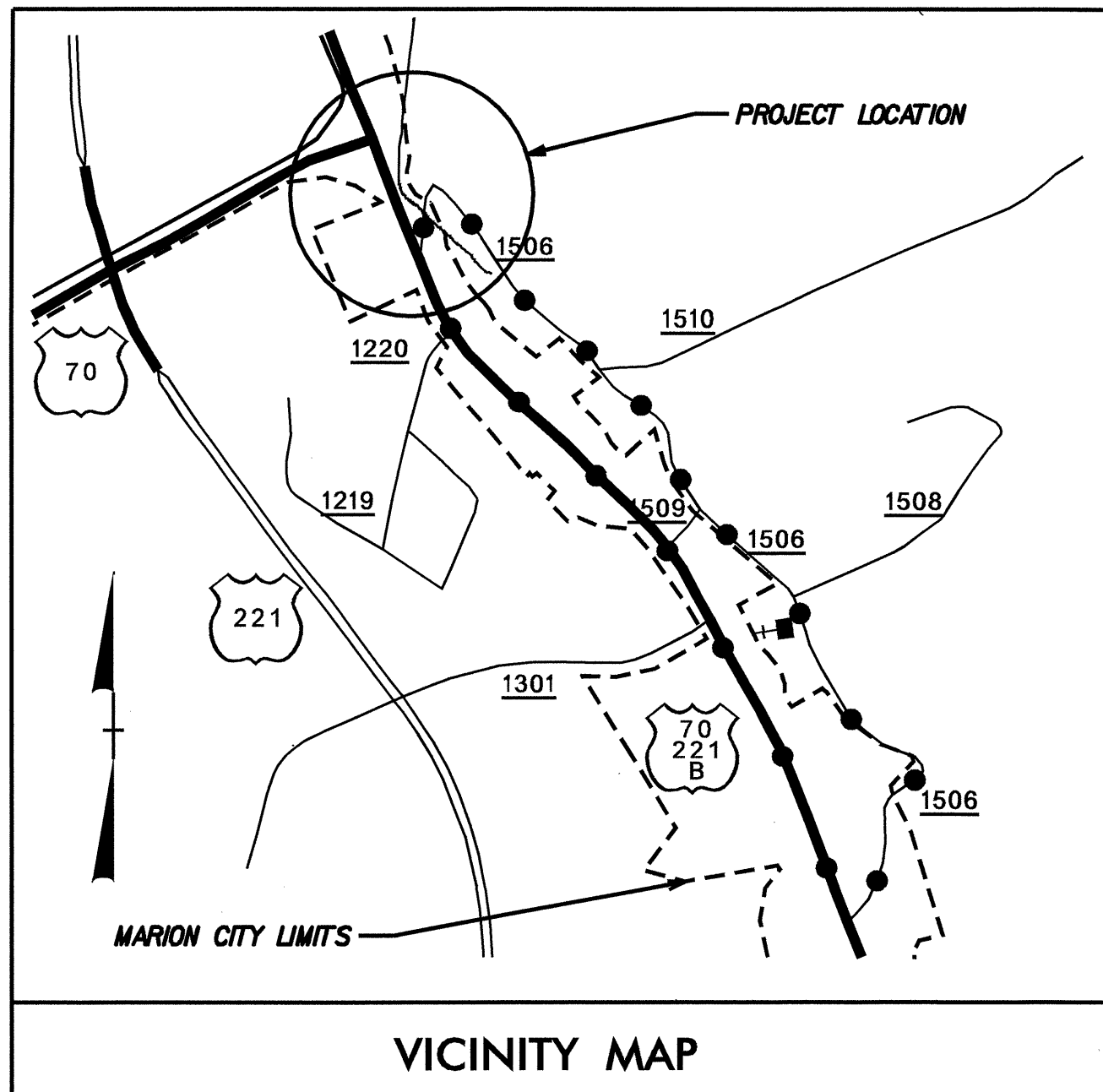
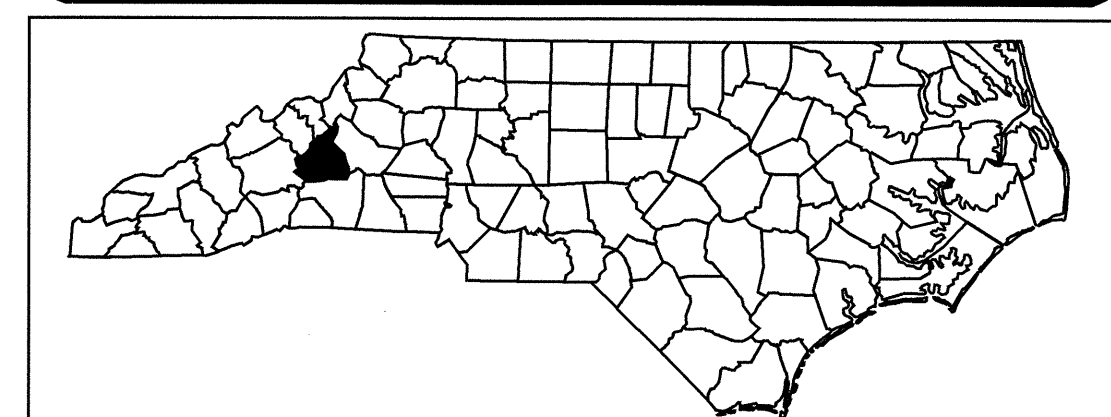
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

McDOWELL COUNTY

**LOCATION: BRIDGE NO. 238 OVER GARDEN CREEK ON
SR 1506, GARDEN CREEK ROAD IN MARION**

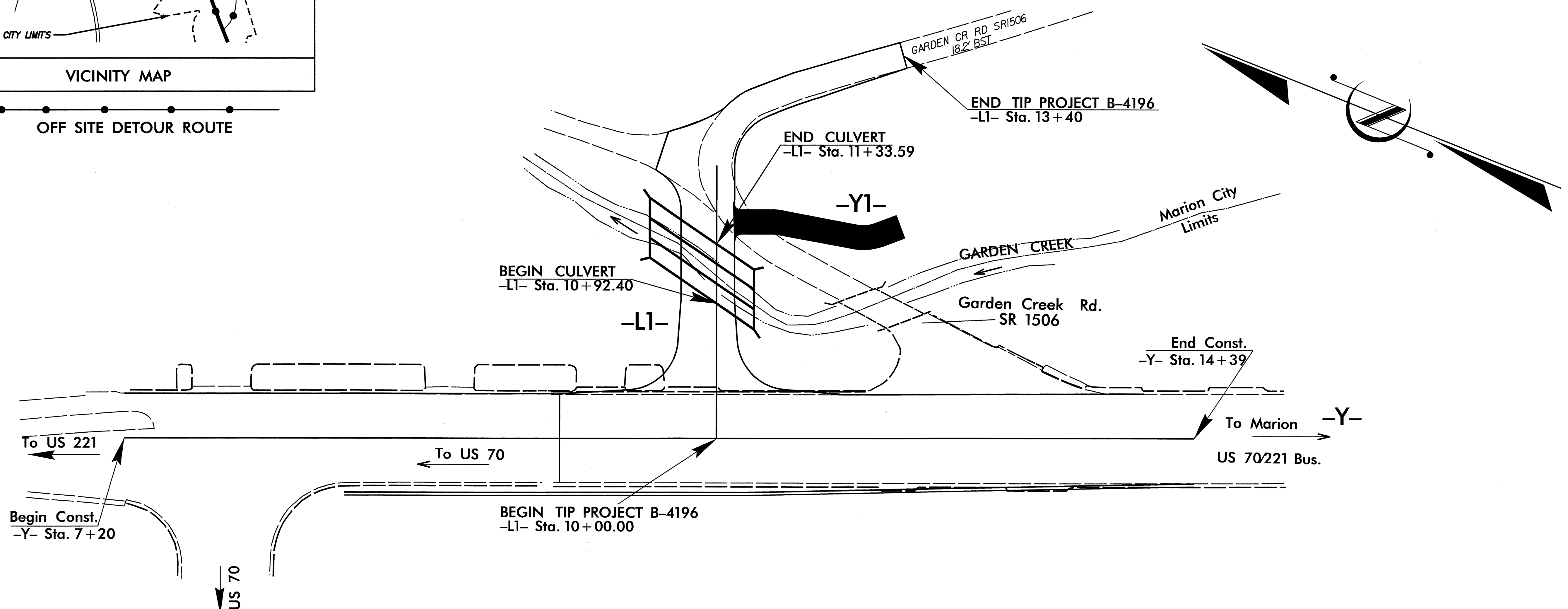
**TYPE OF WORK: GRADING, PAVING, DRAINAGE, GUARDRAIL
CURB AND GUTTER AND CULVERT**

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-----------------|-----------------------------|-------------|--------------|
| N.C. | B-4196 | | |
| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION | |
| 33543.1.1 | BRZ-1506(2) | PE | |
| 33543.2.1 | BRZ-1506(2) | RW, UTIL. | |
| 33543.3.1 | BRZ-1506(2) | CONST. | |



VICINITY MAP
OFF SITE DETOUR ROUTE

CULVERT



DESIGN DATA

| | |
|------------|-----------|
| ADT 2006 = | 1850 ADT |
| ADT 2025 = | 2800 ADT |
| DHV = | 12 % |
| D = | 55 % |
| T = | 3 % * |
| V = | 25 MPH |
| * TTST 1% | * DUAL 2% |

PROJECT LENGTH

| | |
|---------------------------------------|----------|
| LENGTH ROADWAY TIP PROJECT B-4196 = | 0.056 MI |
| LENGTH STRUCTURE TIP PROJECT B-4196 = | 0.008 MI |
| TOTAL LENGTH OF TIP PROJECT B-4196 = | 0.064 MI |

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

2006 STANDARD SPECIFICATIONS

LETTING DATE:
AUGUST 19, 2008

N. N. BULLOCK, PE
PROJECT ENGINEER

KEITH PASCHAL, PE
PROJECT DESIGN ENGINEER

STRUCTURE DESIGN UNIT

**DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA**

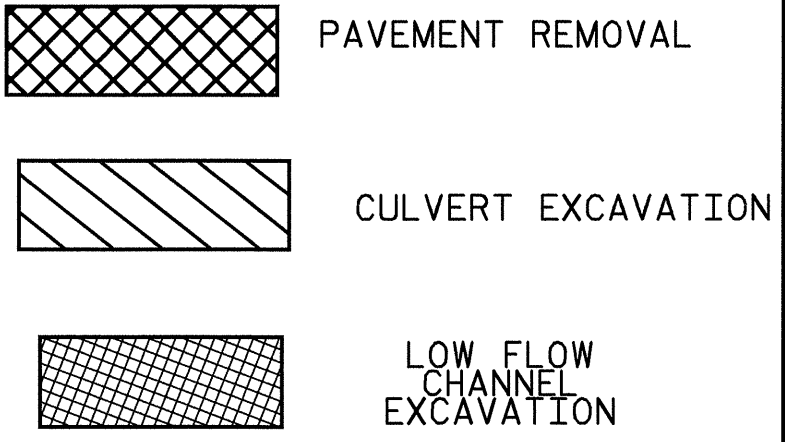
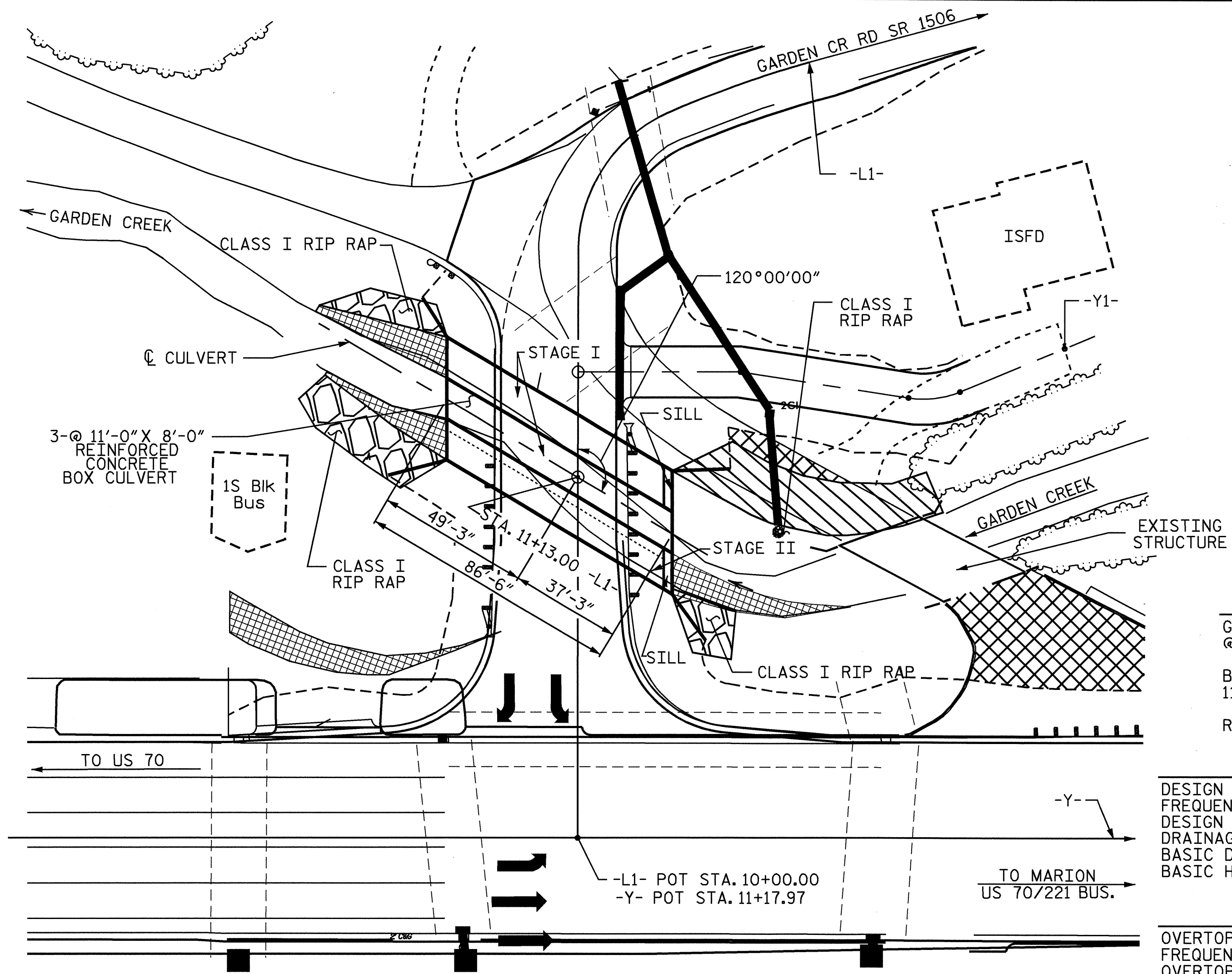
STATE DESIGN ENGINEER _____ P.E.

**DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION**

APPROVED _____ DATE _____
DIVISION ADMINISTRATOR

27-JUN-2008 14:21 R:\SIT\ctur\ee\B4196\jay_khar\va\B4196_ed.CDL01.dgn ksachal

BM 2 : A NAIL IN THE BASE OF A 20" POPULAR TREE 346' LEFT OF -Y- STA. 14+25.73 ELEV. 1231.670.



GRADE DATA

| | |
|--|------------|
| GRADE POINT ELEV. @ STA. 11+13.00 -L1- | = 1227.900 |
| BED ELEV. @ STA. 11+13.00 -L1- | = 1215.850 |
| ROADWAY SLOPES | = 2:1 |

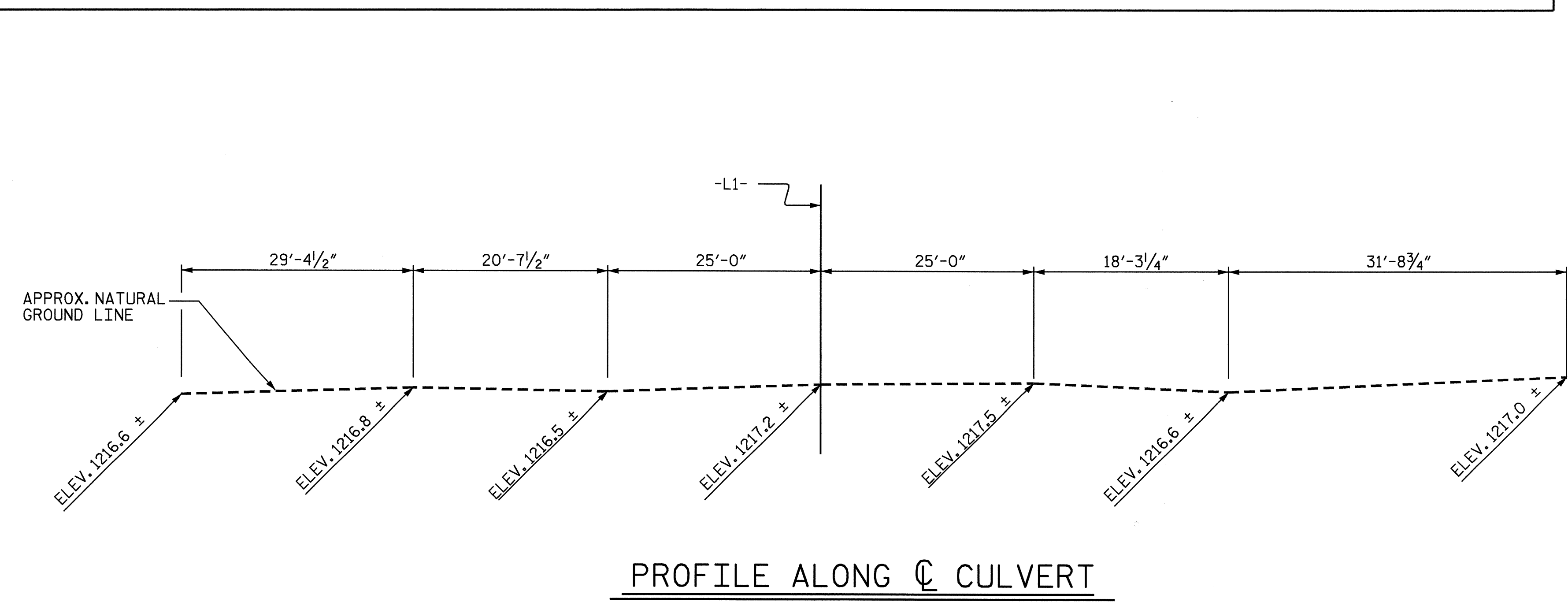
HYDRAULIC DATA

| | |
|-----------------------------|-----------------|
| DESIGN DISCHARGE | = 1200.0 c.f.s. |
| FREQUENCY OF DESIGN FLOOD | = 25 yrs. |
| DESIGN HIGH WATER ELEVATION | = 1225.500 |
| DRAINAGE AREA | = 2.26 sq.mi |
| BASIC DISCHARGE (Q100) | = 1600 c.f.s. |
| BASIC HIGH WATER ELEVATION | = 1227.200 |

OVERTOPPING DATA

| | |
|--------------------------------|---------------|
| OVERTOPPING DISCHARGE | = 1700 c.f.s. |
| FREQUENCY OF OVERTOPPING FLOOD | = 100 + yrs. |
| OVERTOPPING FLOOD ELEVATION | = 1227.600 |

LOCATION SKETCH



PROFILE ALONG CULVERT

TOTAL STRUCTURE QUANTITIES (STAGE I)

| | | |
|---------------------------------------|----------------|------------|
| CLASS A CONCRETE - (STAGE I) | | |
| BARREL | 2,302 C.Y./FT. | 199.1 C.Y. |
| WINGS ETC. | | 25.2 C.Y. |
| TOTAL | | 224.3 C.Y. |
| FOUNDATION COND. MAT'L ----- 153 TONS | | |
| REINFORCING STEEL - (STAGE I) | | |
| BARREL | | 42239 LBS. |
| WINGS ETC. | | 1457 LBS. |
| TOTAL | | 43696 LBS. |

TOTAL STRUCTURE QUANTITIES (STAGE II)

| | | |
|--------------------------------------|----------------|------------|
| CLASS A CONCRETE - (STAGE II) | | |
| BARREL | 0.924 C.Y./FT. | 79.9 C.Y. |
| WINGS ETC. | | 18.2 C.Y. |
| SILL | | 1.6 C.Y. |
| TOTAL | | 99.7 C.Y. |
| FOUNDATION COND. MAT'L ----- 65 TONS | | |
| REINFORCING STEEL - (STAGE II) | | |
| BARREL | | 17523 LBS. |
| WINGS ETC. | | 969 LBS. |
| SILL | | 23 LBS. |
| TOTAL | | 18515 LBS. |

TOTAL BILL OF MATERIAL

| | |
|-------------------|------------|
| CLASS A CONCRETE | |
| STAGE I | 224.3 C.Y. |
| STAGE II | 99.7 C.Y. |
| TOTAL | 324.0 C.Y. |
| REINFORCING STEEL | |
| STAGE I | 43696 LBS. |
| STAGE II | 18515 LBS. |
| TOTAL | 62211 LBS. |

| | |
|-------------------------------|----------------|
| FOUNDATION COND. MAT'L | |
| STAGE I | 153 TONS |
| STAGE II | 65 TONS |
| TOTAL | 218 TONS |
| CULVERT EXCAVATION | ----- LUMP SUM |
| REMOVAL OF EXISTING STRUCTURE | ----- LUMP SUM |

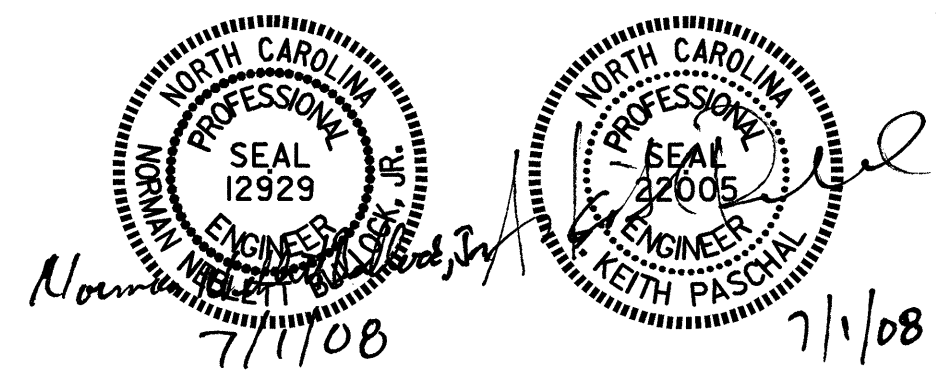
NOTES:

ASSUMED LIVE LOAD -----HS20-44 OR ALTERNATE LOADING.
 DESIGN FILL-----4.80'
 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:
 (STAGE I)
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT.
 (STAGE II)
 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 THE 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 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.
 INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 11+13.00 -L1-"
 AFTER SERVING AS A TEMPORARY STRUCTURE, THE EXISTING STRUCTURE CONSISTING OF A 37'-0" SINGLE SPAN BRIDGE ON VERTICAL TIMBER ABUTMENTS ON TIMBER FLOOR ON I-BEAMS & CHANNELS SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE EXISTING BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT. SEE SPECIAL PROVISION FOR "REMOVAL OF EXISTING STRUCTURE."
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
 NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

F. A. PROJECT NO. BRZ-1506(2)

PROJECT NO. B-4196
MCDOWELL COUNTY
 STATION: 11+13.00 -L1-

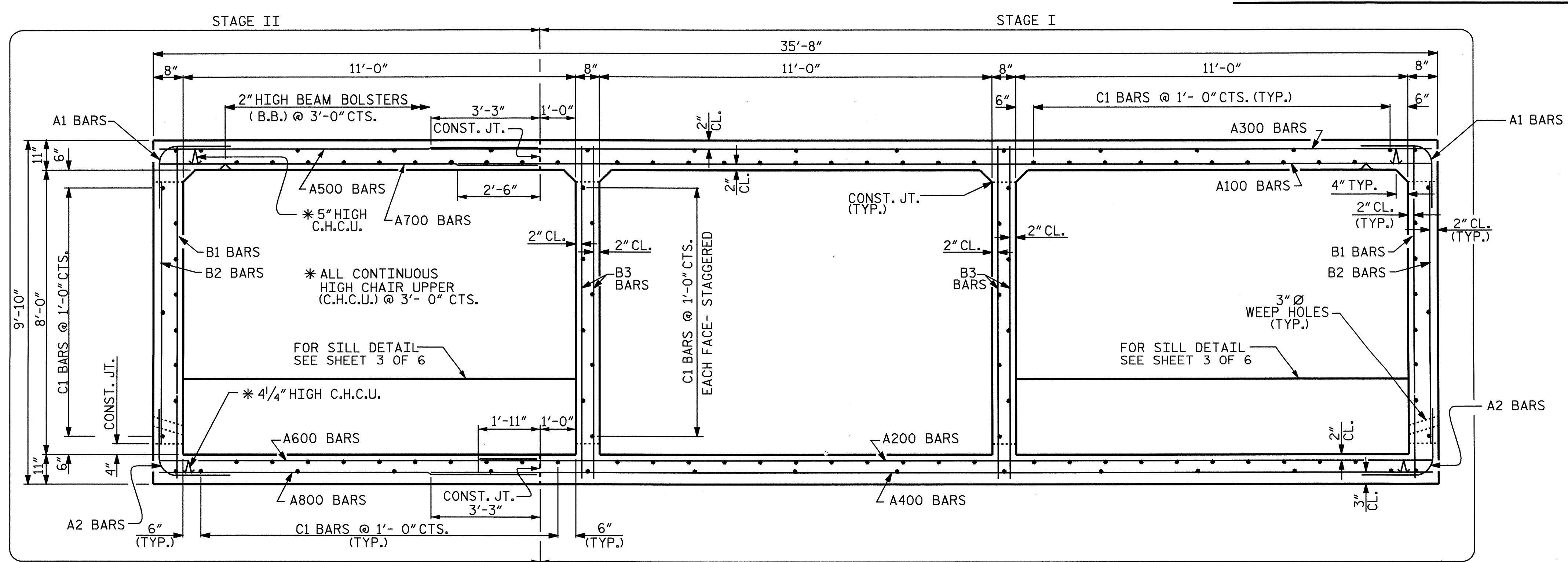
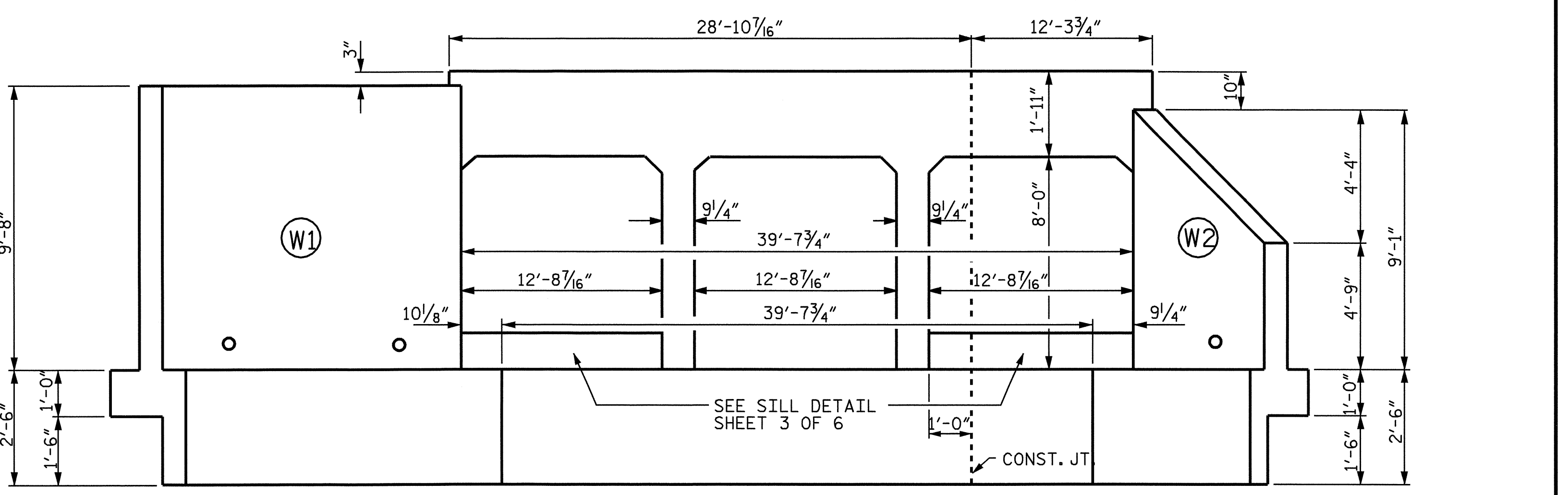
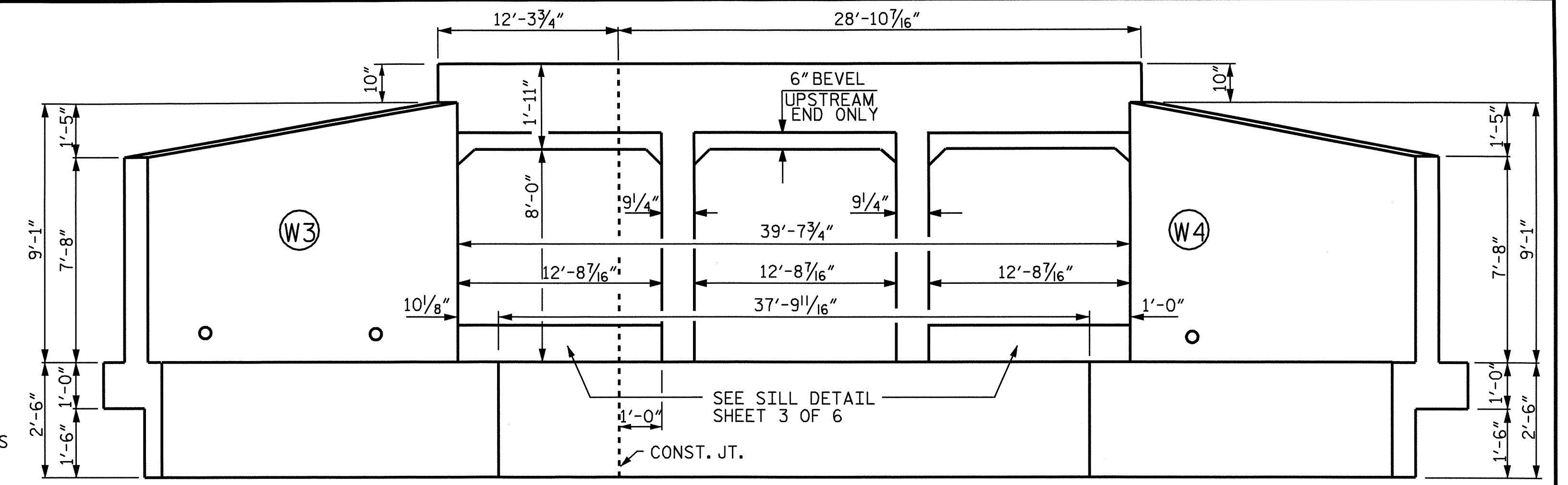
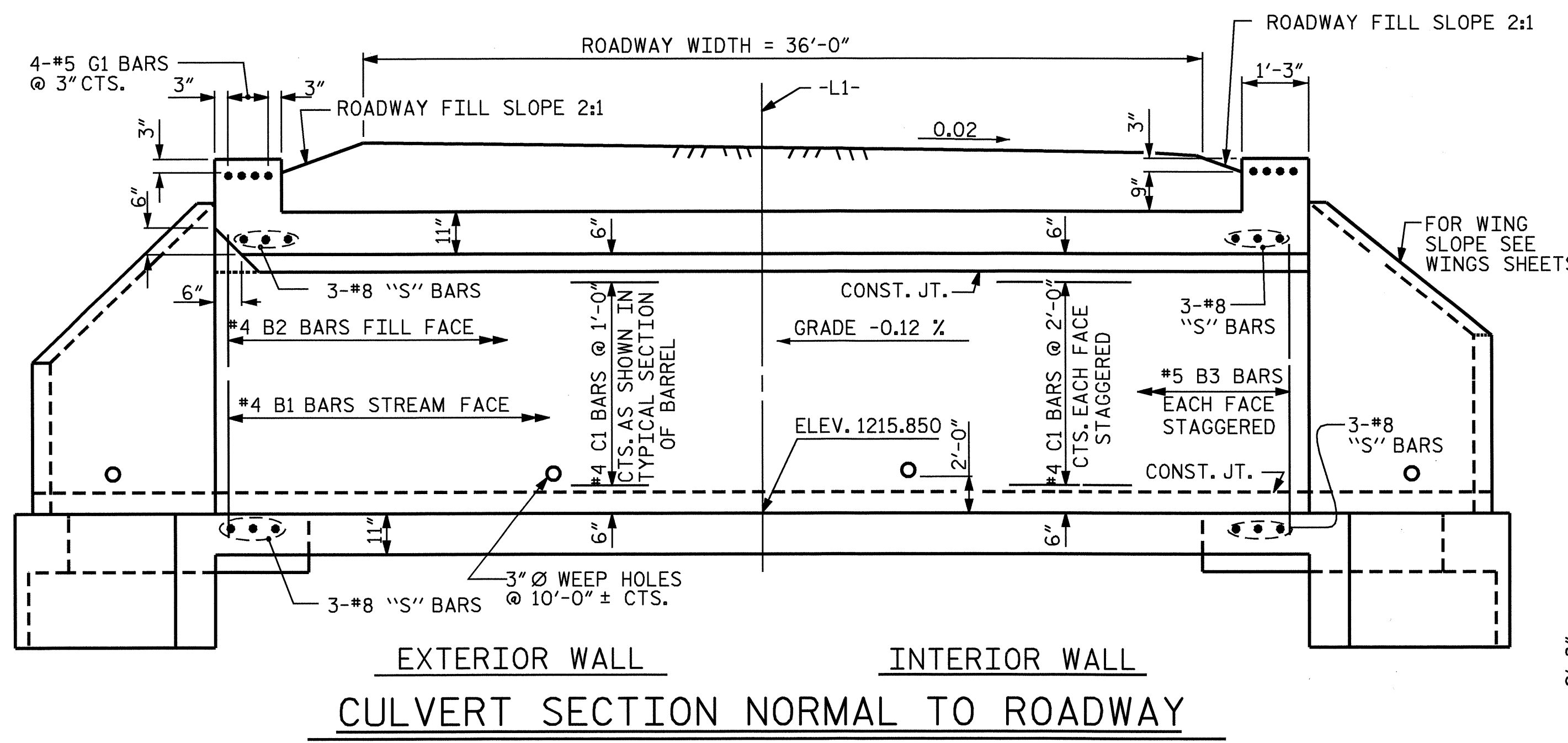
SHEET 1 OF 6
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 BARREL STANDARD
 TRIPLE 11 FT. X 8 FT.
 CONCRETE BOX CULVERT
 120° SKEW



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

| | | |
|------------------------------------|-------------------------|-----------------|
| ASSEMBLED BY : <u>J. G. KHARVA</u> | DATE : <u>08/15/07</u> | SPECIAL |
| CHECKED BY : <u>J. D. HAWK</u> | DATE : <u>06/19/08</u> | |
| DRAWN BY : <u>J.E. MANGUM</u> | DATE : <u>OCT. 1989</u> | STANDARD |
| CHECKED BY : <u>A.R. BISSETTE</u> | DATE : <u>AUG. 1989</u> | |

ADDED 10-1-90

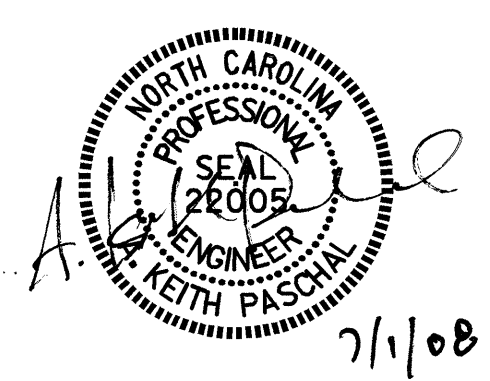


RIGHT ANGLE SECTION OF BARREL @ INLET END

THERE ARE 89 C1 BARS IN SECTION OF BARREL. (STAGE I)
 THERE ARE 37 C1 BARS IN SECTION OF BARREL. (STAGE II)

PROJECT NO. B-4196
MCDOWELL COUNTY
 STATION: 11+13.00 -L1-
 SHEET 2 OF 6

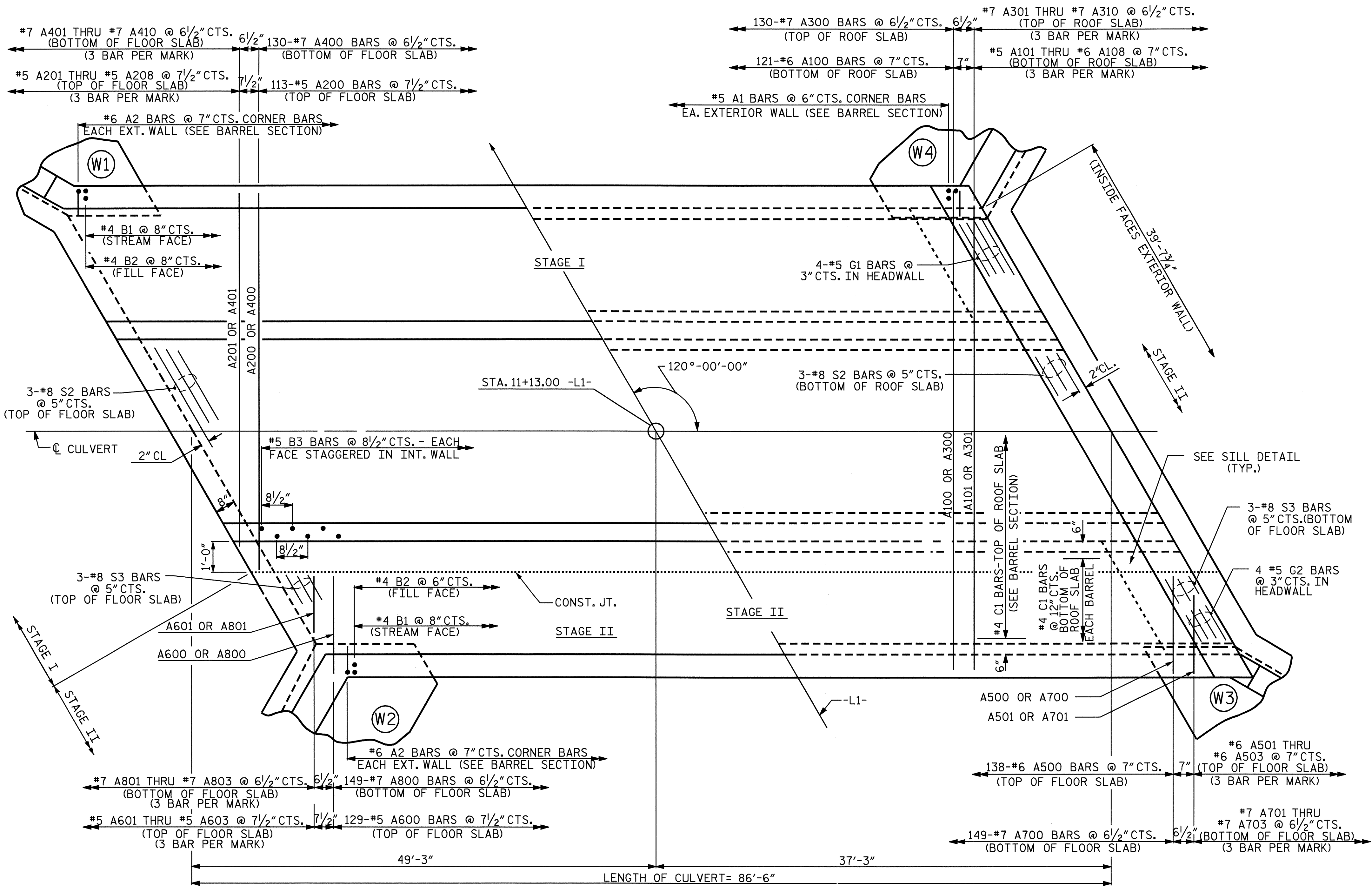
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 11 FT. X 8 FT.
 CONCRETE BOX CULVERT
 120° SKEW



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

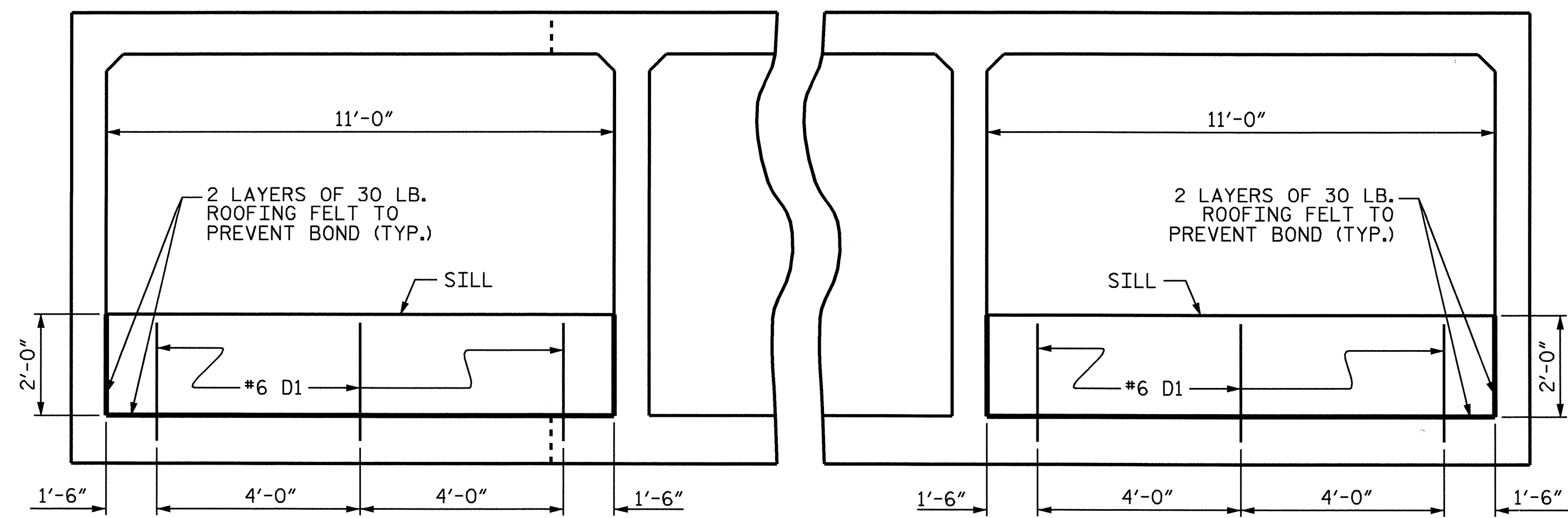
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
 REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.
 REDRAWN BY JEM 10-30 CHECKED BY ARC

| | | |
|----------------------------------|----------------------|-----------------|
| ASSEMBLED BY: <u>J.G. KHARVA</u> | DATE: <u>8/10/07</u> | SPECIAL |
| CHECKED BY: <u>J.D. HAWK</u> | DATE: <u>6/19/08</u> | |
| DRAWN BY: <u>C.F. HOLMES</u> | DATE: <u>11-71</u> | STANDARD |
| CHECKED BY: <u>JOEL JOHNSON</u> | DATE: <u>12-71</u> | |

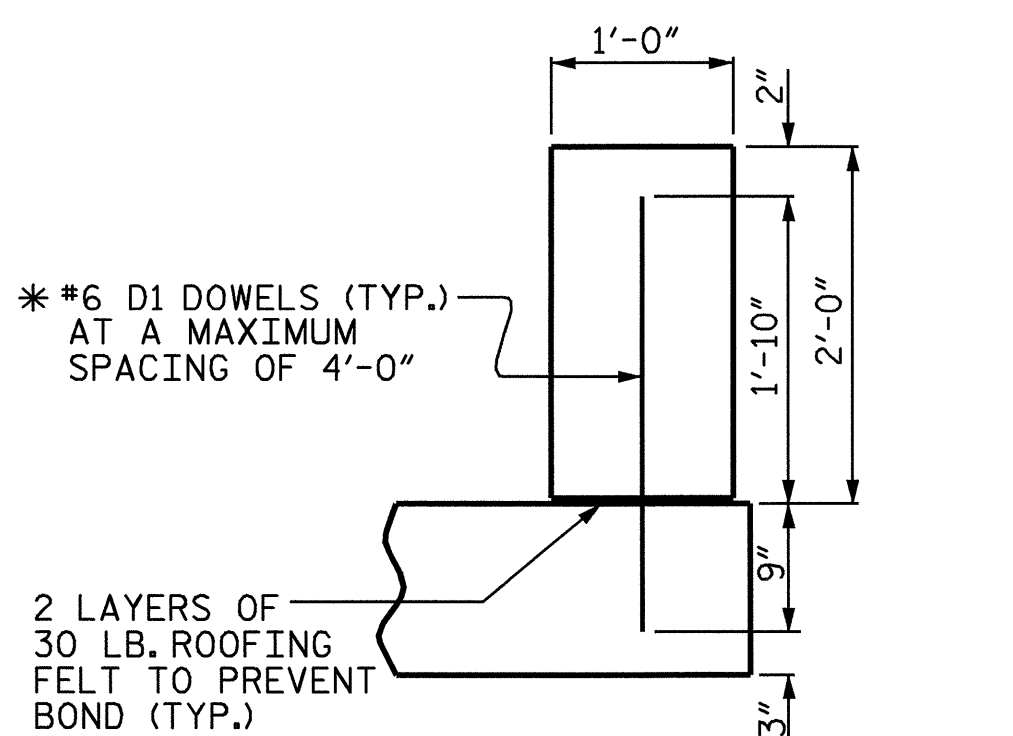


PART PLAN - FLOOR SLAB

PART PLAN - ROOF SLAB



ELEVATION VIEW - INLET
CULVERT SILL DETAIL



SECTION THROUGH 1'-0" SILL
* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.

| SILL QUANTITIES (INCLUDED IN TOTAL FOR STRUCTURE) | | | | |
|--|------|---------|--------|----------|
| STAGE II | | | | |
| BAR NO. | SIZE | TYPE | LENGTH | WEIGHT |
| D1 | 6 | #6 STR. | 2'-7" | 23 |
| REINFORCING STEEL | | | | 23 |
| CLASS A CONCRETE | | | | 1.6 C.Y. |
| TOTAL REINFORCING STEEL | | | | 23 LBS. |
| TOTAL CLASS A CONCRETE | | | | 1.6 C.Y. |

BILL OF MATERIAL

| STAGE I | | | | | STAGE II | | | | | | |
|-------------------|-----|------|------|---------|----------|----------------------------|-----|------------|------|--------|--------|
| BAR | No. | SIZE | TYPE | LENGTH | WEIGHT | BAR | No. | SIZE | TYPE | LENGTH | WEIGHT |
| A1 | 165 | #5 | 6 | 4'-8" | 803 | A1 | 165 | #5 | 6 | 4'-8" | 803 |
| A2 | 146 | #7 | 6 | 6'-11" | 2064 | A2 | 146 | #7 | 6 | 6'-11" | 2064 |
| A100 | 121 | #6 | STR | 27'-3" | 4952 | A500 | 138 | #6 | STR | 10'-3" | 2125 |
| A101 | 6 | #6 | STR | 24'-6" | 221 | A501 | 6 | #6 | STR | 7'-5" | 67 |
| A102 | 6 | #6 | STR | 21'-6" | 194 | A502 | 6 | #6 | STR | 4'-5" | 40 |
| A103 | 6 | #6 | STR | 18'-6" | 166 | A503 | 8 | #6 | STR | 1'-4" | 16 |
| A104 | 6 | #6 | STR | 15'-5" | 139 | A600 | 129 | #5 | STR | 10'-3" | 1379 |
| A105 | 6 | #6 | STR | 12'-5" | 112 | A601 | 6 | #5 | STR | 7'-5" | 46 |
| A106 | 6 | #6 | STR | 9'-5" | 85 | A602 | 6 | #5 | STR | 4'-7" | 29 |
| A107 | 6 | #6 | STR | 6'-4" | 57 | A603 | 8 | #5 | STR | 1'-9" | 15 |
| A108 | 12 | #6 | STR | 3'-4" | 60 | A700 | 149 | #7 | STR | 10'-3" | 3122 |
| A200 | 113 | #5 | STR | 26'-9" | 3153 | A701 | 6 | #7 | STR | 7'-7" | 93 |
| A201 | 6 | #5 | STR | 24'-0" | 150 | A702 | 6 | #7 | STR | 4'-10" | 59 |
| A202 | 6 | #5 | STR | 20'-9" | 130 | A703 | 10 | #7 | STR | 2'-0" | 41 |
| A203 | 6 | #5 | STR | 17'-6" | 110 | A800 | 149 | #7 | STR | 10'-3" | 3122 |
| A204 | 6 | #5 | STR | 14'-3" | 89 | A801 | 6 | #7 | STR | 7'-7" | 93 |
| A205 | 6 | #5 | STR | 11'-0" | 69 | A802 | 6 | #7 | STR | 4'-10" | 59 |
| A206 | 6 | #5 | STR | 7'-9" | 48 | A803 | 10 | #7 | STR | 2'-0" | 41 |
| A207 | 6 | #5 | STR | 4'-6" | 28 | B1 | 129 | #4 | STR | 9'-4" | 804 |
| A208 | 8 | #5 | STR | 1'-3" | 10 | B2 | 172 | #4 | STR | 7'-6" | 862 |
| A300 | 130 | #7 | STR | 28'-1" | 7462 | B3 | 484 | #4 | STR | 9'-4" | 3018 |
| A301 | 6 | #7 | STR | 25'-7" | 314 | C1 | 148 | #4 | STR | 23'-0" | 2274 |
| A302 | 6 | #7 | STR | 22'-9" | 279 | G2 | 8 | #5 | STR | 9'-2" | 76 |
| A303 | 6 | #7 | STR | 19'-11" | 244 | S3 | 12 | #8 | STR | 9'-2" | 293 |
| A304 | 6 | #7 | STR | 17'-1" | 210 | REINFORCING STEEL | | | | 17523 | LBS. |
| A305 | 6 | #7 | STR | 14'-3" | 175 | SPLICE LENGTH CHART | | | | | |
| A306 | 6 | #7 | STR | 11'-6" | 141 | BAR | | SIZE | | LENGTH | |
| A307 | 6 | #7 | STR | 8'-9" | 107 | B1, B2, B3 | #4 | 1'-9" | | | |
| A308 | 6 | #7 | STR | 5'-10" | 72 | C1 | #4 | 1'-11" | | | |
| A309 | 6 | #7 | STR | 3'-1" | 38 | BAR TYPE | | | | | |
| A310 | 6 | #7 | STR | 2'-1" | 26 | VERTICAL LEG | | 6" RAD. | | | |
| A400 | 130 | #7 | STR | 28'-1" | 7462 | A1 | | 2'-1" | | A2 | |
| A401 | 6 | #7 | STR | 25'-7" | 314 | A1 | | 1'-9 1/2" | | A2 | |
| A402 | 6 | #7 | STR | 22'-9" | 279 | A2 | | 2'-11 1/2" | | | |
| A403 | 6 | #7 | STR | 19'-11" | 244 | DIMENSIONS ARE OUT TO OUT. | | | | | |
| A404 | 6 | #7 | STR | 17'-1" | 210 | | | | | | |
| A405 | 6 | #7 | STR | 14'-3" | 175 | | | | | | |
| A406 | 6 | #7 | STR | 11'-6" | 141 | | | | | | |
| A407 | 6 | #7 | STR | 8'-9" | 107 | | | | | | |
| A408 | 6 | #7 | STR | 5'-10" | 72 | | | | | | |
| A409 | 6 | #7 | STR | 3'-1" | 38 | | | | | | |
| A410 | 6 | #7 | STR | 2'-1" | 26 | | | | | | |
| B1 | 129 | #4 | STR | 9'-4" | 804 | | | | | | |
| B2 | 172 | #4 | STR | 7'-6" | 862 | | | | | | |
| B3 | 484 | #4 | STR | 9'-4" | 3018 | | | | | | |
| C1 | 356 | #4 | STR | 23'-0" | 5470 | | | | | | |
| G1 | 8 | #5 | STR | 30'-3" | 340 | | | | | | |
| S2 | 12 | #8 | STR | 30'-3" | 969 | | | | | | |
| REINFORCING STEEL | | | | 42239 | | LBS. | | | | | |

PROJECT NO. B-4196
MCDOWELL COUNTY
 STATION: 11+13.00 -L1-

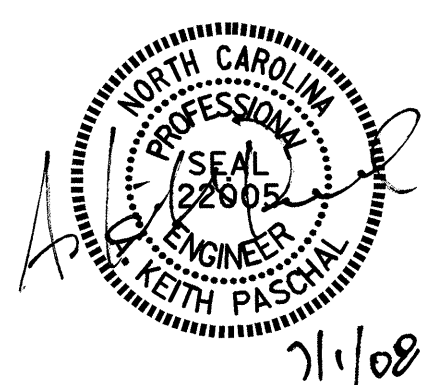
SHEET 3 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

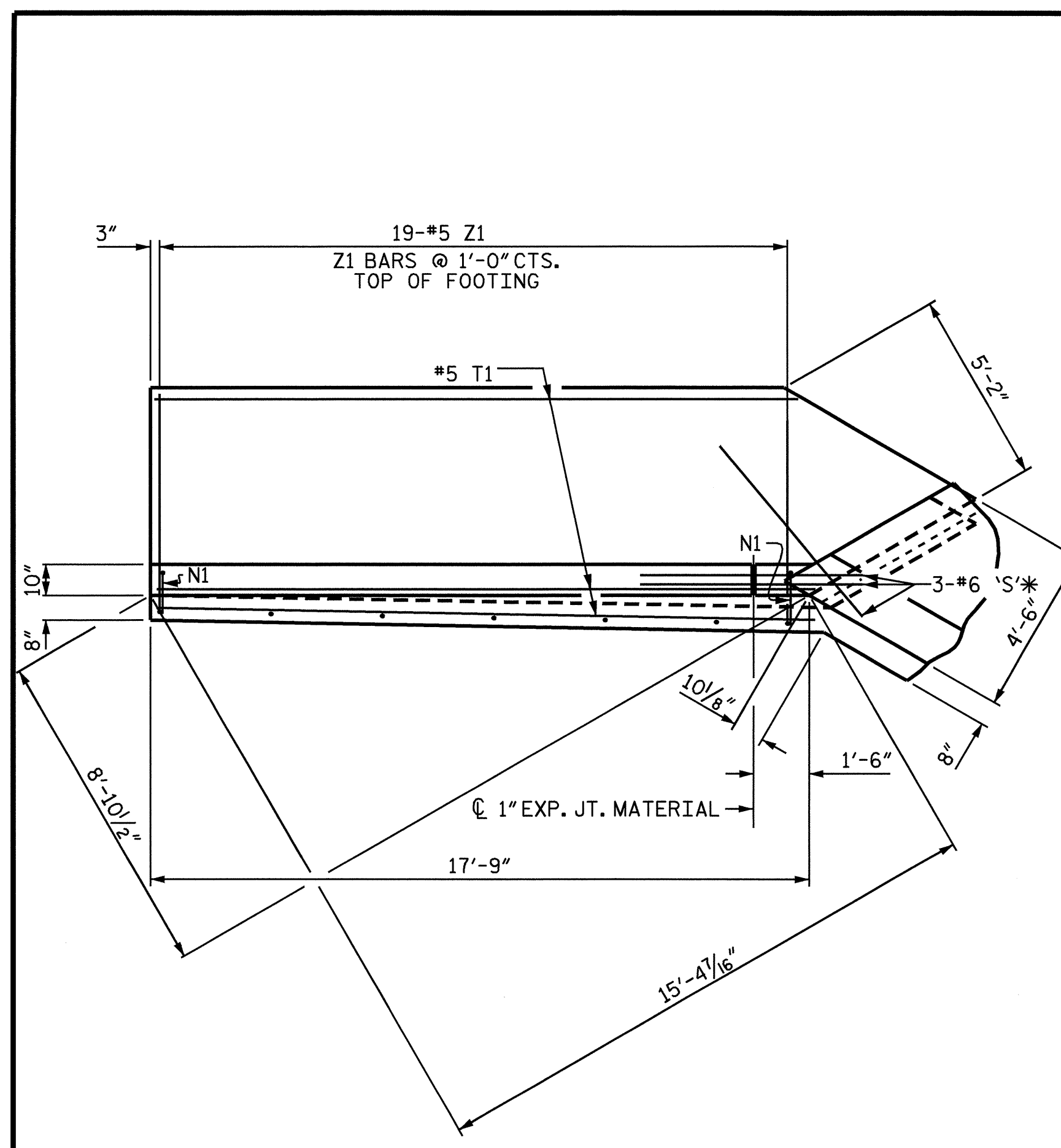
TRIPLE 11 FT. X 8 FT.
 CONCRETE BOX CULVERT
 120° SKEW

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

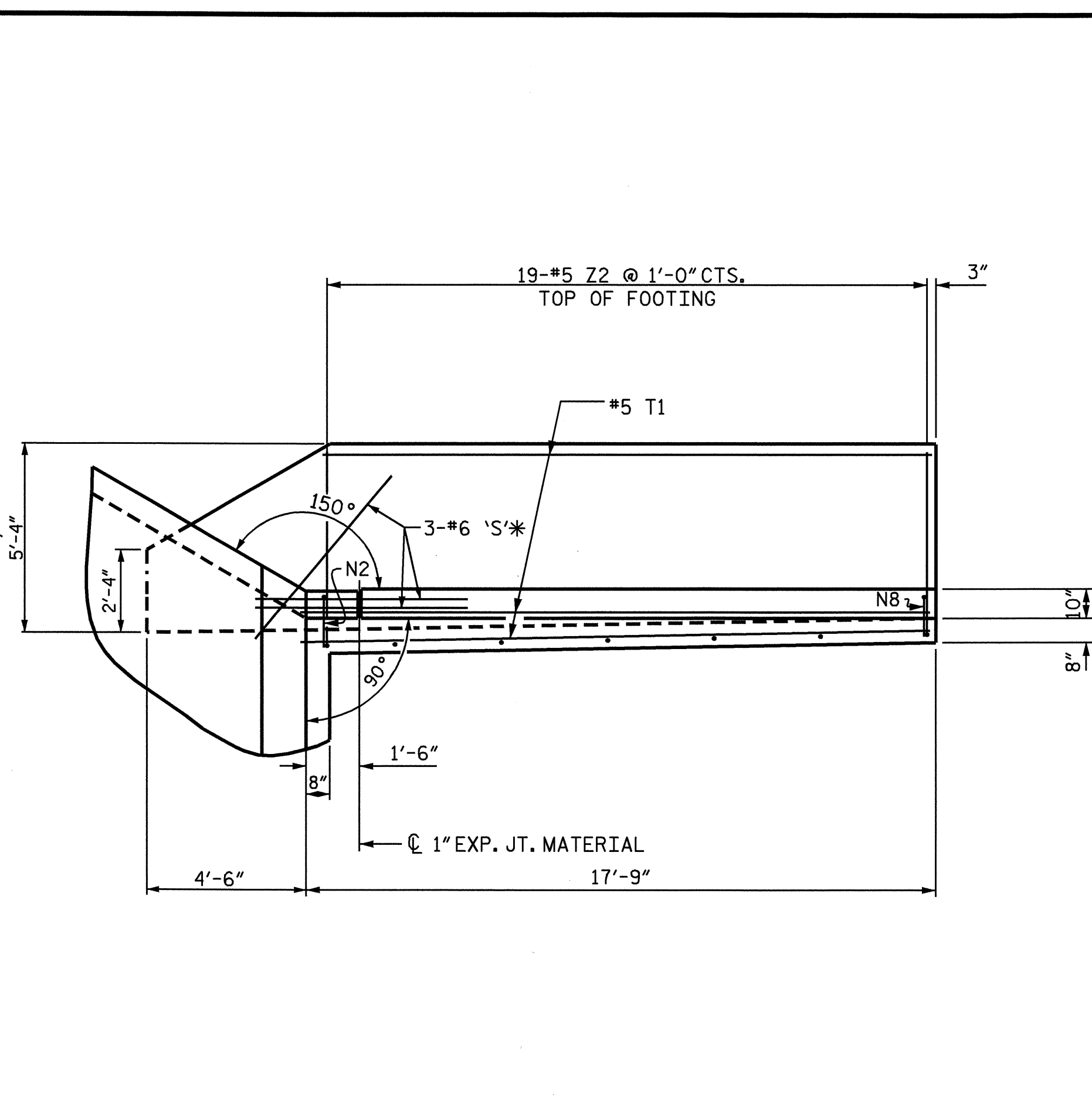
DRAWN BY: J. G. KHARVA DATE: 8/10/07
 CHECKED BY: J. D. HAWK DATE: 6/19/08



7/1/08

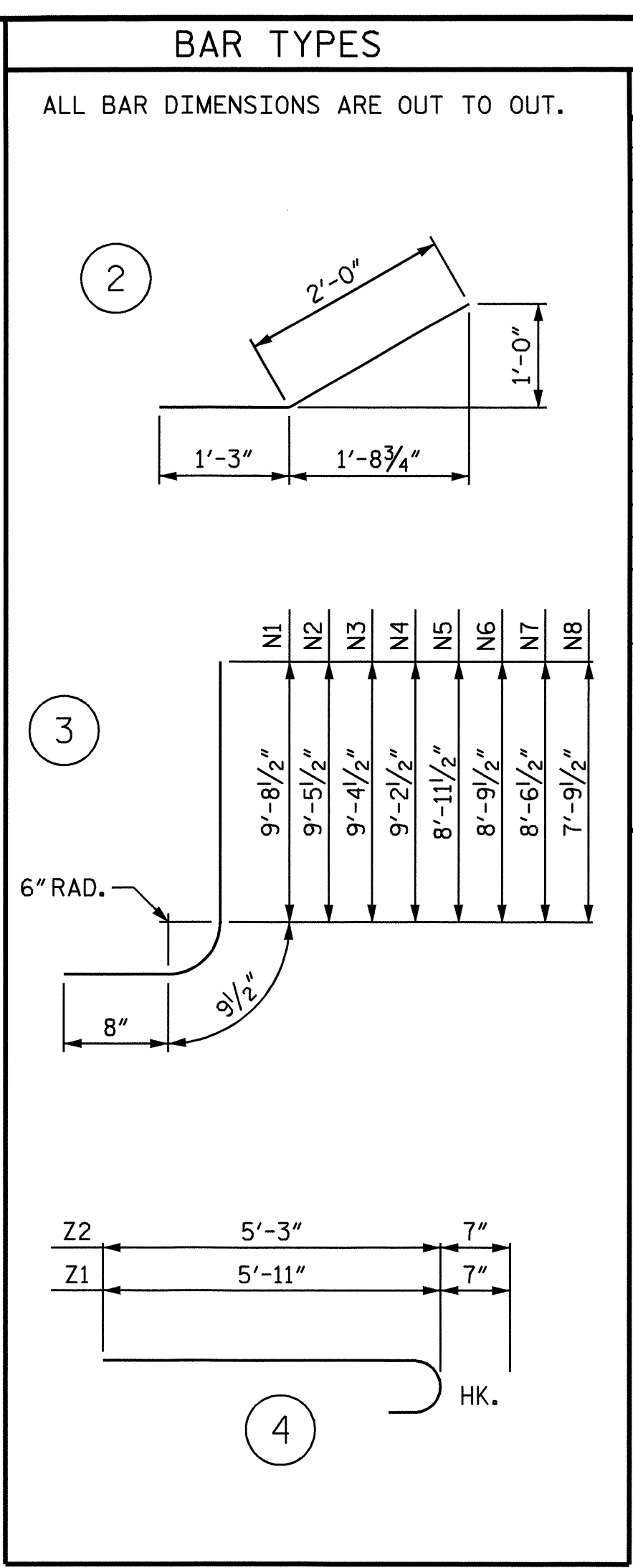


PLAN W1
(OUTLET)



PLAN W4
(INLET)

*BOTTOM OF FLOOR
 SLAB AND FOOTING

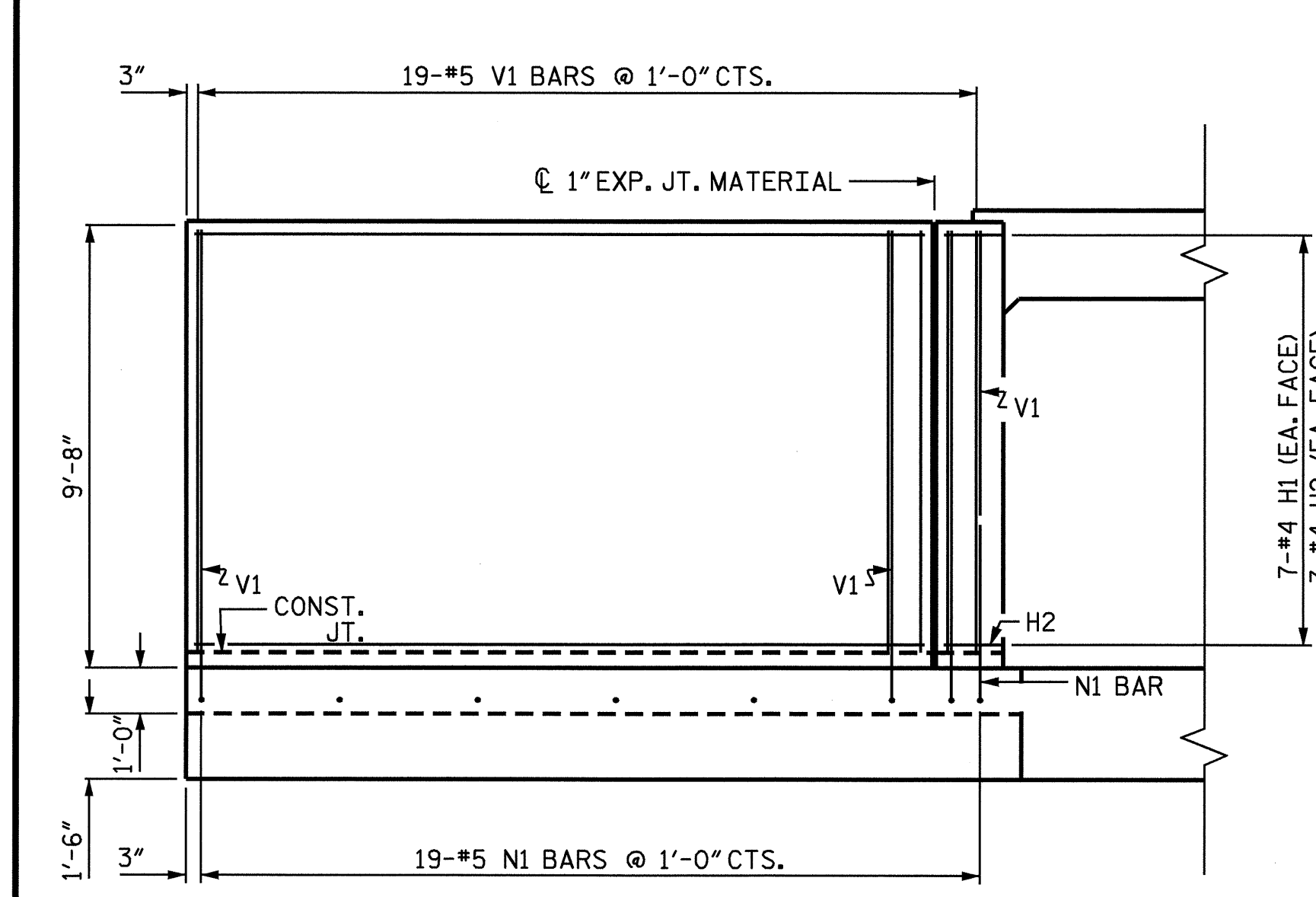


BAR TYPES
 ALL BAR DIMENSIONS ARE OUT TO OUT.

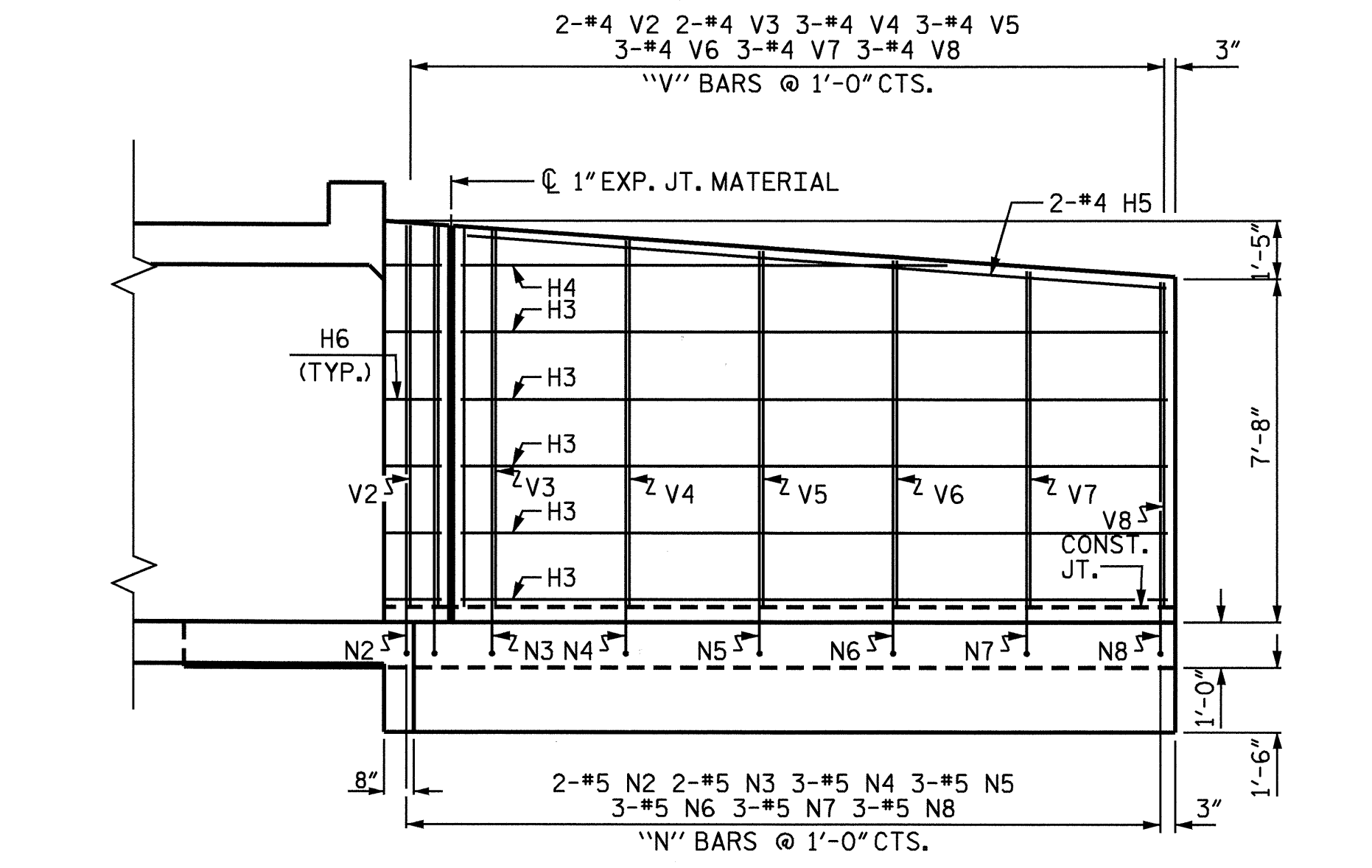
| STAGE I (W1) | | | | | |
|---------------------------------|-----|------|------|---------|---------|
| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT |
| H1 | 14 | #4 | STR | 15'-10" | 148 |
| H2 | 14 | #4 | 2 | 3'-3" | 30 |
| N1 | 19 | #5 | 3 | 11'-2" | 221 |
| S1 | 3 | #6 | STR | 6'-0" | 27 |
| T1 | 3 | #5 | STR | 17'-9" | 56 |
| V1 | 19 | #5 | STR | 9'-2" | 182 |
| Z1 | 19 | #5 | 4 | 6'-6" | 129 |
| REINFORCING STEEL FOR WING (W1) | | | | | 793 LBS |
| CLASS A CONCRETE WING | | | | | 10.6 CY |
| END CURTAIN WALL | | | | | 1.6 CY |
| TOTAL | | | | | 12.2 CY |

BILL OF MATERIAL

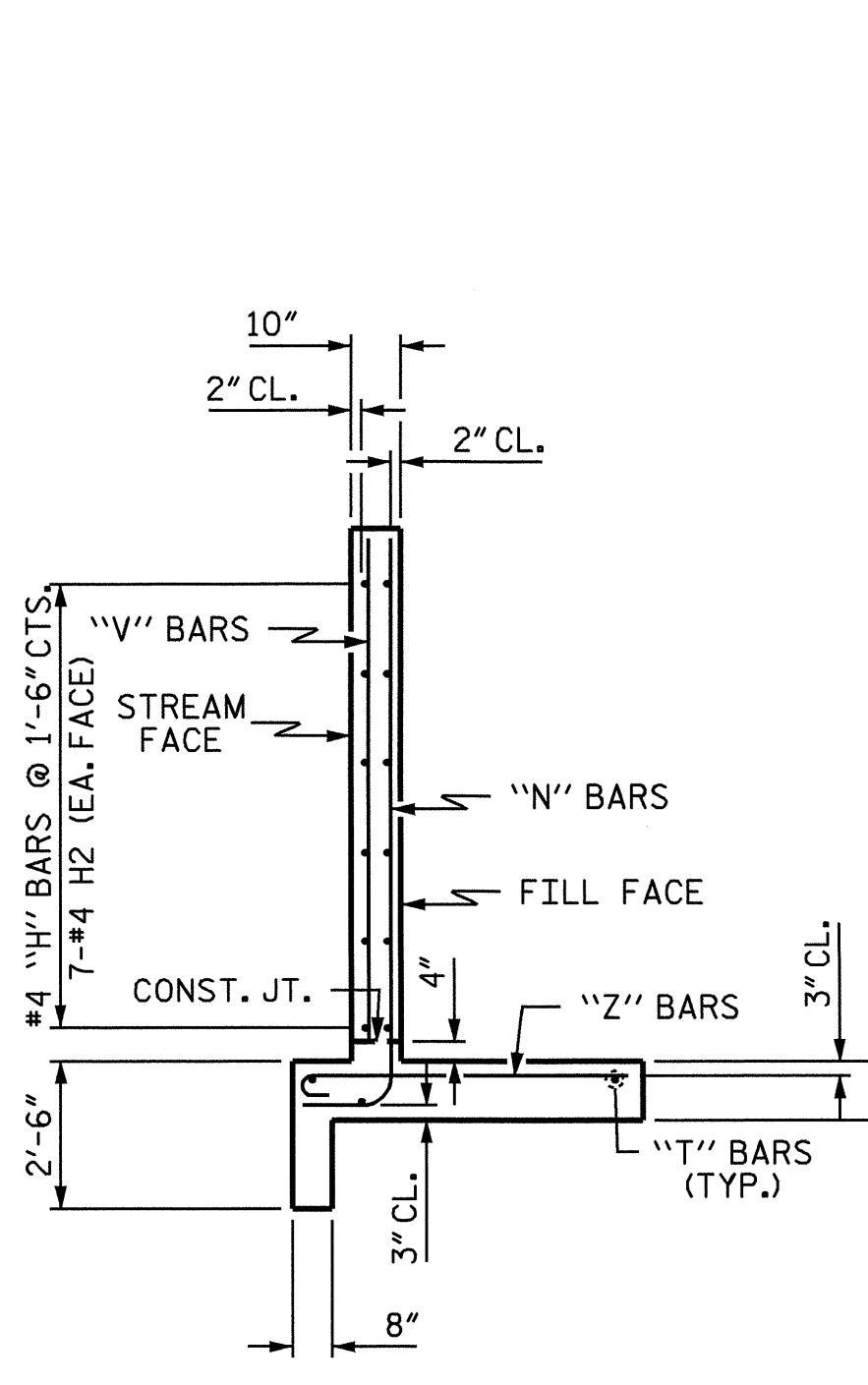
| STAGE I (W4) | | | | | |
|---------------------------------|-----|------|------|---------|---------|
| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT |
| H3 | 10 | #4 | STR | 15'-10" | 106 |
| H4 | 2 | #4 | STR | 10'-1" | 13 |
| H5 | 2 | #4 | STR | 15'-11" | 21 |
| H6 | 12 | #4 | 2 | 3'-3" | 26 |
| N2 | 2 | #5 | 3 | 10'-11" | 23 |
| N3 | 2 | #5 | 3 | 10'-10" | 23 |
| N4 | 3 | #5 | 3 | 10'-8" | 33 |
| N5 | 3 | #5 | 3 | 10'-5" | 33 |
| N6 | 3 | #5 | 3 | 10'-3" | 32 |
| N7 | 3 | #5 | 3 | 10'-0" | 31 |
| N8 | 3 | #5 | 3 | 9'-3" | 29 |
| S1 | 3 | #6 | STR | 6'-0" | 54 |
| T1 | 3 | #5 | STR | 17'-9" | 56 |
| V2 | 2 | #4 | STR | 8'-5" | 11 |
| V3 | 2 | #4 | STR | 8'-4" | 11 |
| V4 | 3 | #4 | STR | 8'-3" | 16 |
| V5 | 3 | #4 | STR | 7'-10" | 16 |
| V6 | 3 | #4 | STR | 7'-8" | 15 |
| V7 | 3 | #4 | STR | 7'-5" | 15 |
| V8 | 3 | #4 | STR | 7'-3" | 15 |
| Z2 | 19 | #5 | 4 | 5'-10" | 116 |
| REINFORCING STEEL FOR WING (W4) | | | | | 668 LBS |
| CLASS A CONCRETE WING | | | | | 10.8 CY |
| END CURTAIN WALL | | | | | 1.6 CY |
| TOTAL | | | | | 12.4 CY |



ELEVATION W1
(OUTLET)



ELEVATION W4
(INLET)



TYPICAL WING SECTION

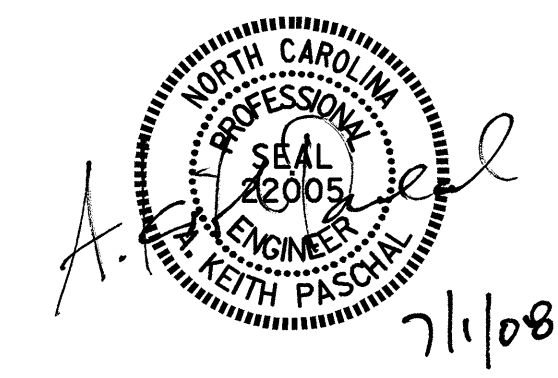
TOTAL WINGS QUANTITIES (STAGE I)

| CLASS A CONCRETE | |
|------------------|-----------|
| W1 ETC | 12.8 C.Y. |
| W4 ETC | 12.4 C.Y. |
| TOTAL | 25.2 C.Y. |

| REINFORCING STEEL | |
|-------------------|-----------|
| W1 ETC | 791 LBS. |
| W4 ETC | 666 LBS. |
| TOTAL | 1457 LBS. |

PROJECT NO. B-4196
MCDOWELL COUNTY
 STATION: 11+13.00 -L1-
 SHEET 4 OF 6

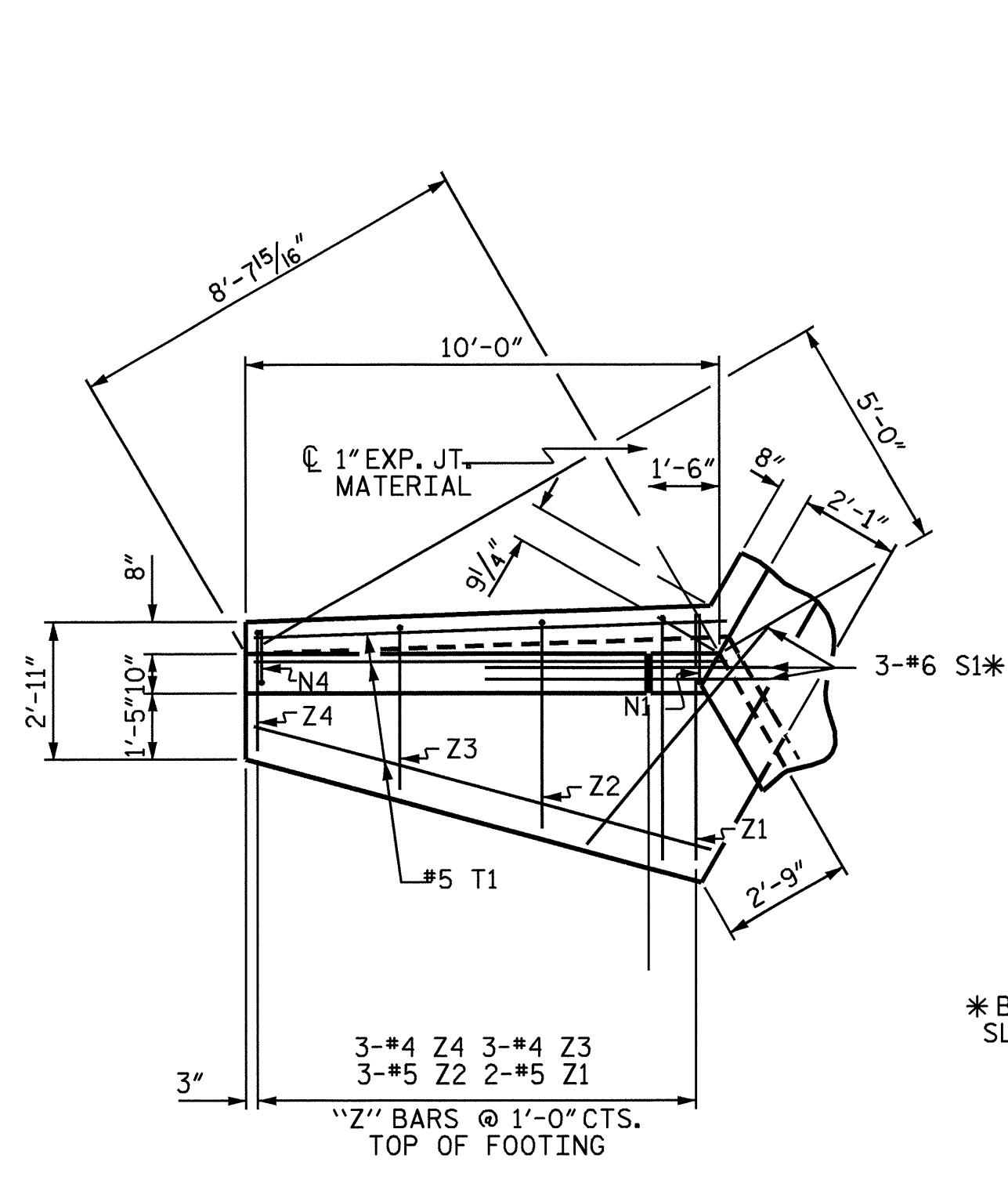
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
WINGS FOR CONCRETE BOX CULVERT (STAGE I)
 H = 8'-0"



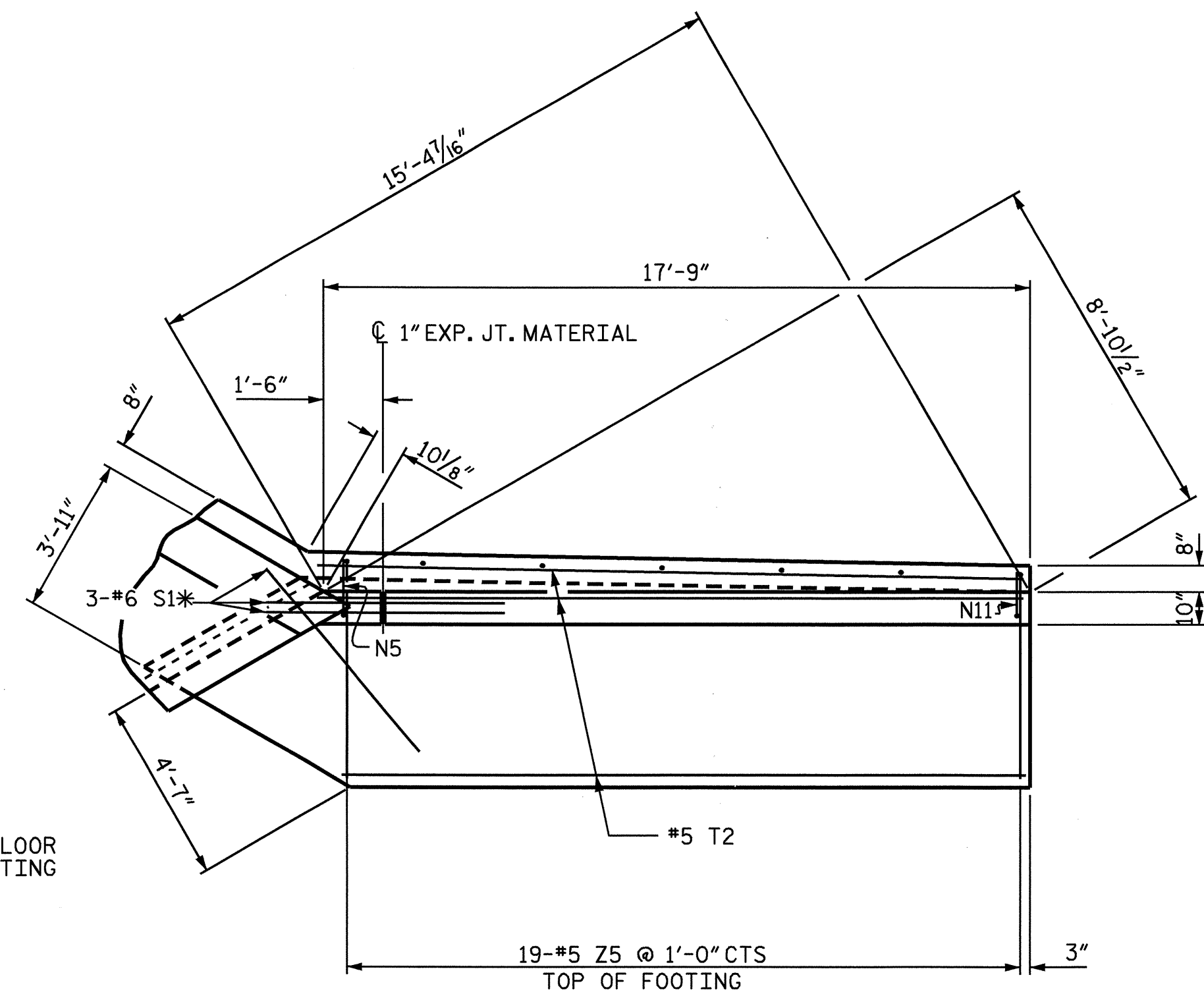
ASSEMBLED BY : J. G. KHARVA
 CHECKED BY : J. D. HAWK
 DATE : 06-12-08
 DATE : 06-19-08

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

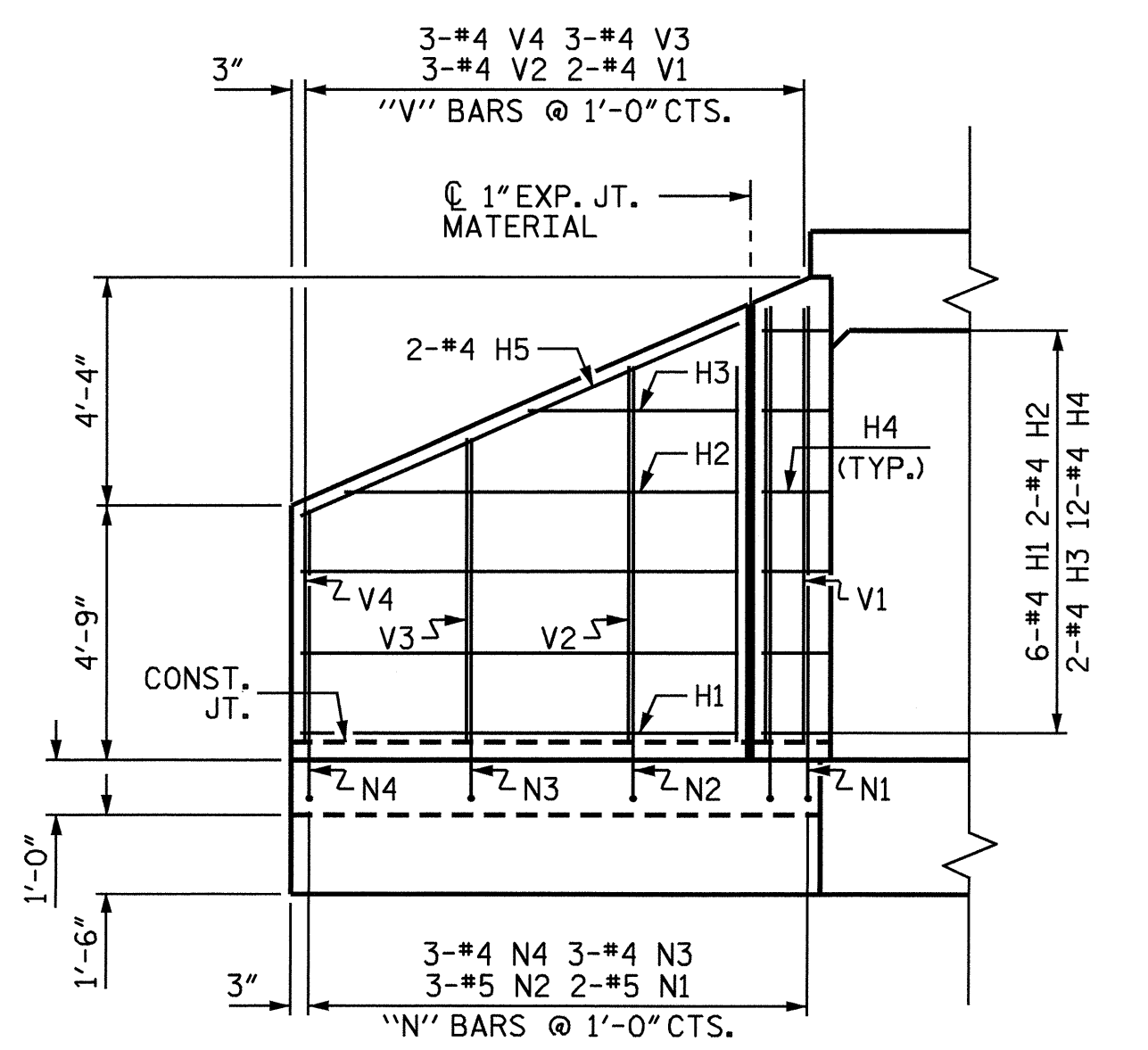
| REVISIONS | | | | | | SHEET NO. | |
|-----------|-----|-------|-----|-----|-------|--------------|--|
| NO. | BY: | DATE: | NO. | BY: | DATE: | C-4 | |
| 1 | | | 3 | | | TOTAL SHEETS | |
| 2 | | | 4 | | | 6 | |



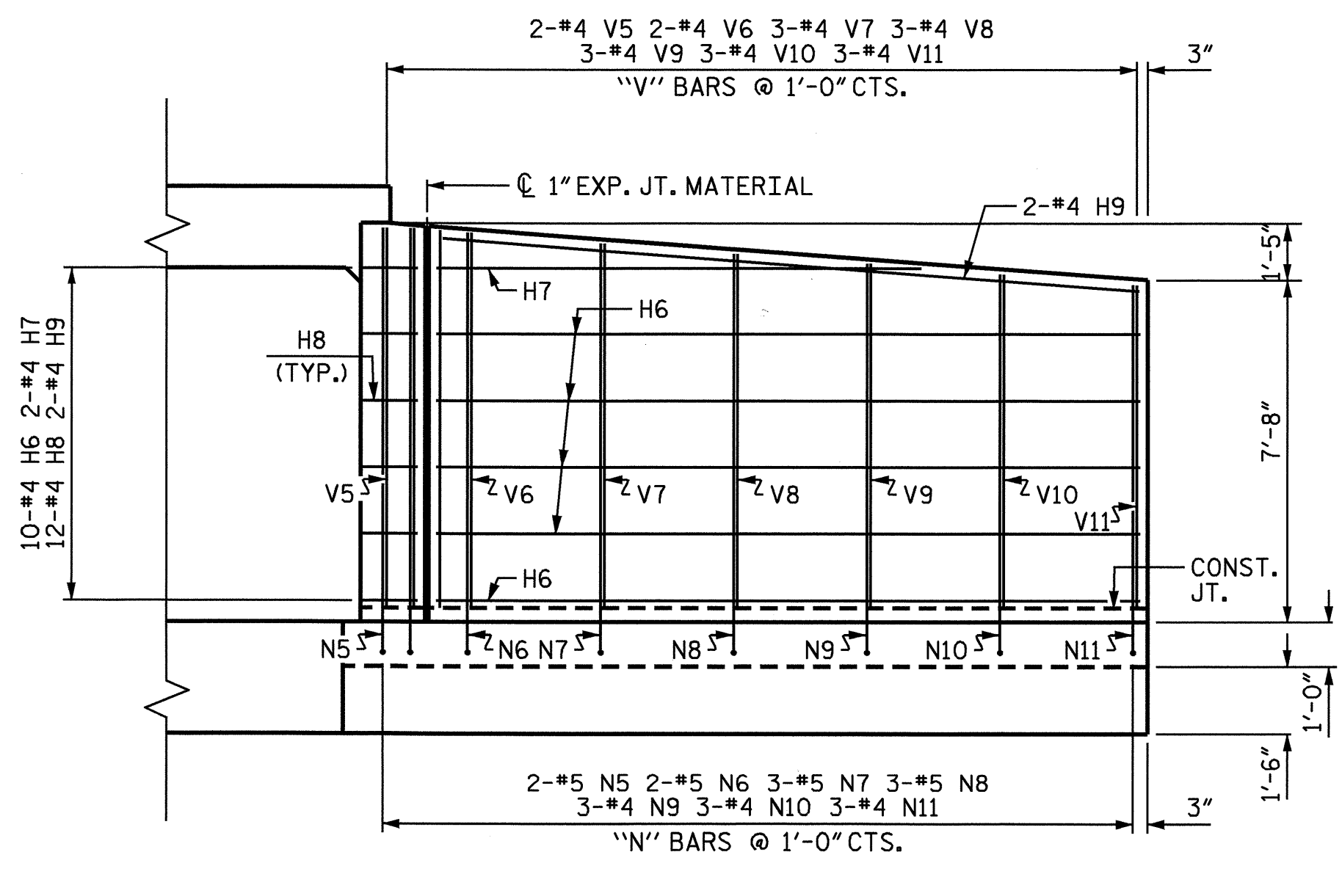
PLAN W2
(OUTLET)



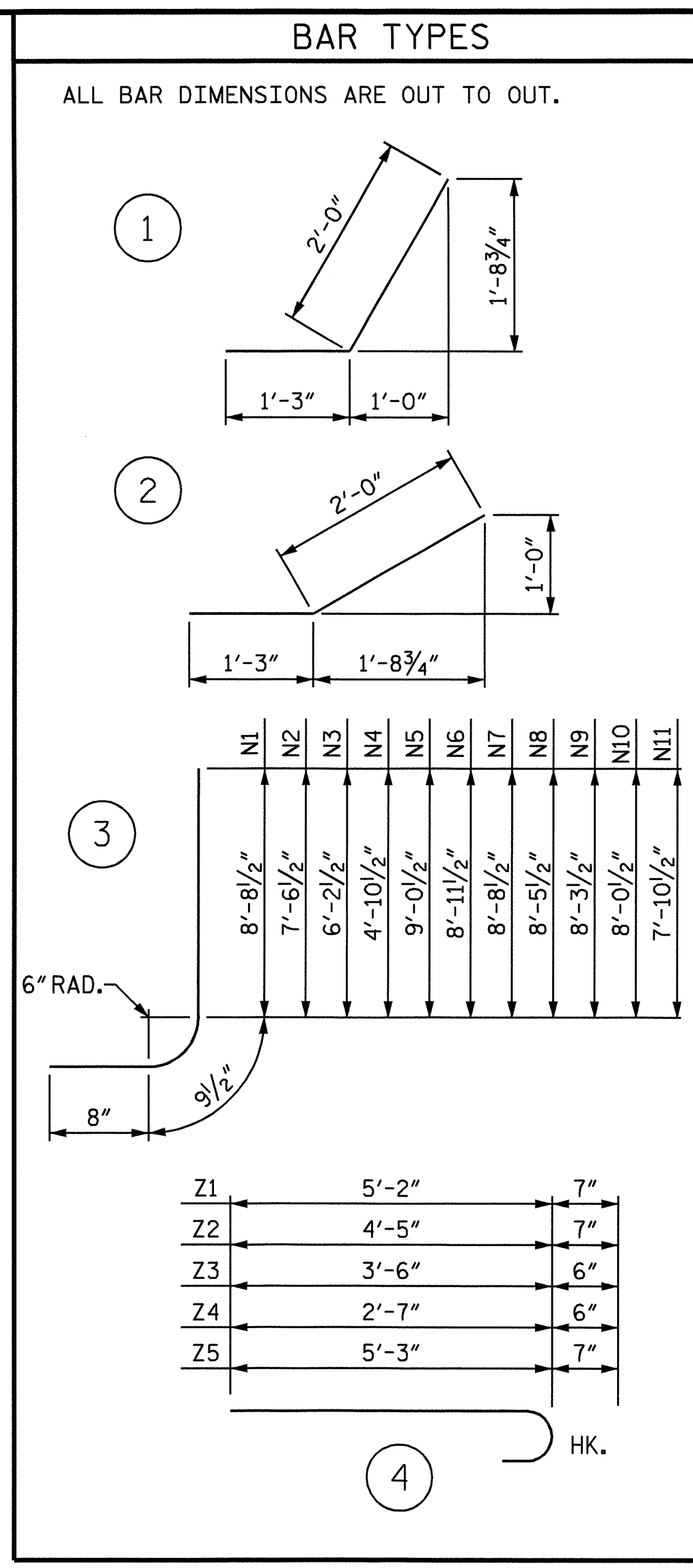
PLAN W3
(INLET)



ELEVATION W2
(OUTLET)



ELEVATION W3
(INLET)



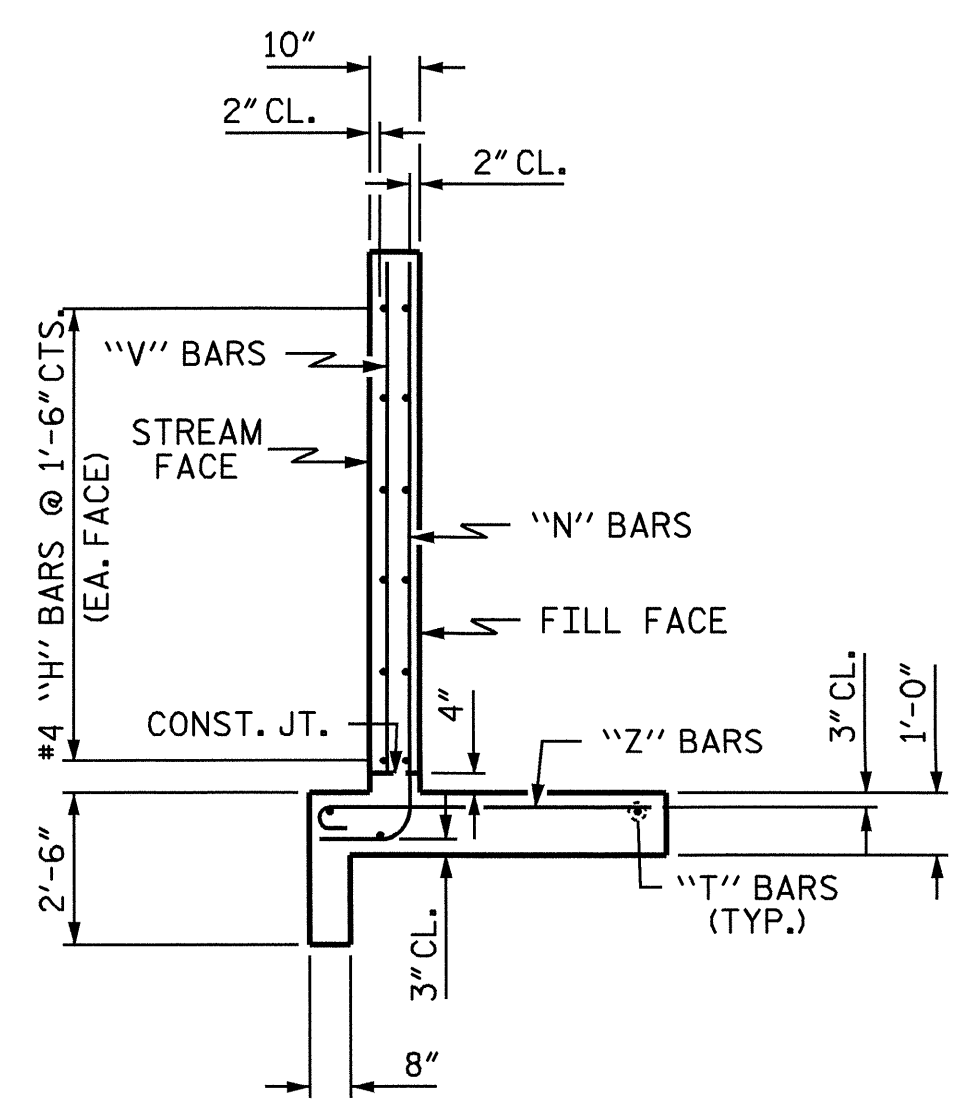
| BILL OF MATERIAL | | | | | |
|------------------|-----|------|------|--------|--------|
| STAGE II (W2) | | | | | |
| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT |
| H1 | 6 | #4 | STR | 8'-1" | 32 |
| H2 | 2 | #4 | STR | 7'-3" | 10 |
| H3 | 2 | #4 | STR | 3'-11" | 5 |
| H4 | 12 | #4 | 1 | 3'-3" | 26 |
| H5 | 2 | #4 | STR | 8'-10" | 12 |
| 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 |
| S1 | 3 | #6 | STR | 6'-0" | 27 |
| T1 | 3 | #5 | STR | 10'-0" | 31 |
| 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 |
| 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 | 19 | #5 | 4 | 5'-10" | 116 |

| | |
|---------------------------------|---------------|
| REINFORCING STEEL FOR WING (W2) | 307 LBS |
| CLASS A CONCRETE WING | 4.2 CY |
| HEADWALL | 1.9 CY |
| END CURTAIN WALL | 0.4 CY |
| TOTAL | 6.5 CY |

| BILL OF MATERIAL | | | | | |
|------------------|-----|------|------|---------|--------|
| STAGE II (W3) | | | | | |
| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT |
| H6 | 10 | #4 | STR | 15'-10" | 106 |
| H7 | 2 | #4 | STR | 10'-4" | 14 |
| H8 | 12 | #4 | 2 | 3'-3" | 26 |
| H9 | 2 | #4 | STR | 15'-11" | 21 |
| N5 | 2 | #5 | 3 | 10'-6" | 22 |
| N6 | 2 | #5 | 3 | 10'-5" | 22 |
| N7 | 3 | #5 | 3 | 10'-2" | 32 |
| N8 | 3 | #5 | 3 | 9'-11" | 31 |
| N9 | 3 | #5 | 3 | 9'-9" | 31 |
| N10 | 3 | #5 | 3 | 9'-6" | 30 |
| N11 | 3 | #5 | 3 | 9'-4" | 29 |
| S1 | 3 | #6 | STR | 6'-0" | 27 |
| T2 | 3 | #5 | STR | 17'-9" | 56 |
| V5 | 2 | #4 | STR | 8'-5" | 11 |
| V6 | 2 | #4 | STR | 8'-4" | 11 |
| V7 | 3 | #4 | STR | 8'-1" | 16 |
| V8 | 3 | #4 | STR | 7'-10" | 16 |
| V9 | 3 | #4 | STR | 7'-8" | 15 |
| V10 | 3 | #4 | STR | 7'-5" | 15 |
| V11 | 3 | #4 | STR | 7'-3" | 15 |
| Z5 | 19 | #5 | 4 | 5'-10" | 116 |

| | |
|---------------------------------|----------------|
| REINFORCING STEEL FOR WING (W3) | 662 LBS |
| CLASS A CONCRETE WING | 9.4 CY |
| HEADWALL | 1.9 CY |
| END CURTAIN WALL | 0.4 CY |
| TOTAL | 11.7 CY |

| TOTAL WINGS QUANTITIES (STAGE II) | | |
|-----------------------------------|-------------|-------------|
| CLASS A CONCRETE | | |
| W2 ETC | 6.5 | C.Y. |
| W3 ETC | 11.7 | C.Y. |
| TOTAL | 18.2 | C.Y. |
| REINFORCING STEEL | | |
| W2 ETC | 307 | LBS. |
| W3 ETC | 662 | LBS. |
| TOTAL | 969 | LBS. |



TYPICAL WING SECTION

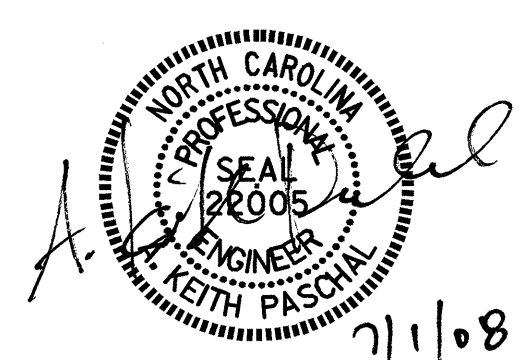
PROJECT NO. B-4196
MCDOWELL COUNTY
 STATION: 11+13.00 -L1-

SHEET 5 OF 6
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
WINGS FOR CONCRETE BOX CULVERT (STAGE II)

H = 8'-0"

| REVISIONS | | | | | | SHEET NO. | |
|-----------|-----|-------|-----|-----|-------|--------------|--|
| NO. | BY: | DATE: | NO. | BY: | DATE: | C-5 | |
| 1 | | | 3 | | | TOTAL SHEETS | |
| 2 | | | 4 | | | 6 | |

ASSEMBLED BY : J. G. KHARVA DATE : 06-12-08
 CHECKED BY : J. D. HAWK DATE : 06-19-08
 DRAWN BY : CCJ 11/99
 CHECKED BY : RWW 03/00



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 1/16" 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.

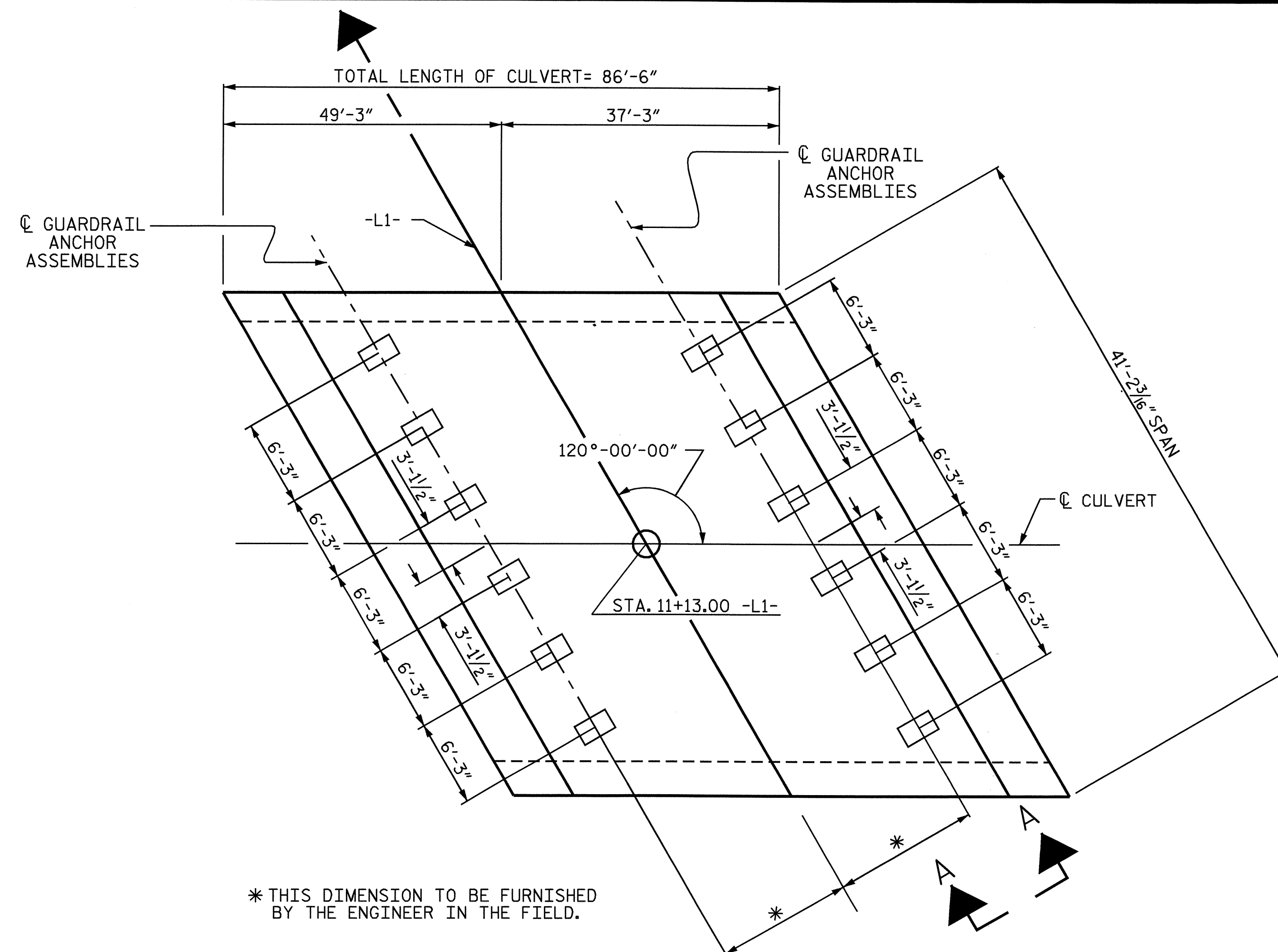
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

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.

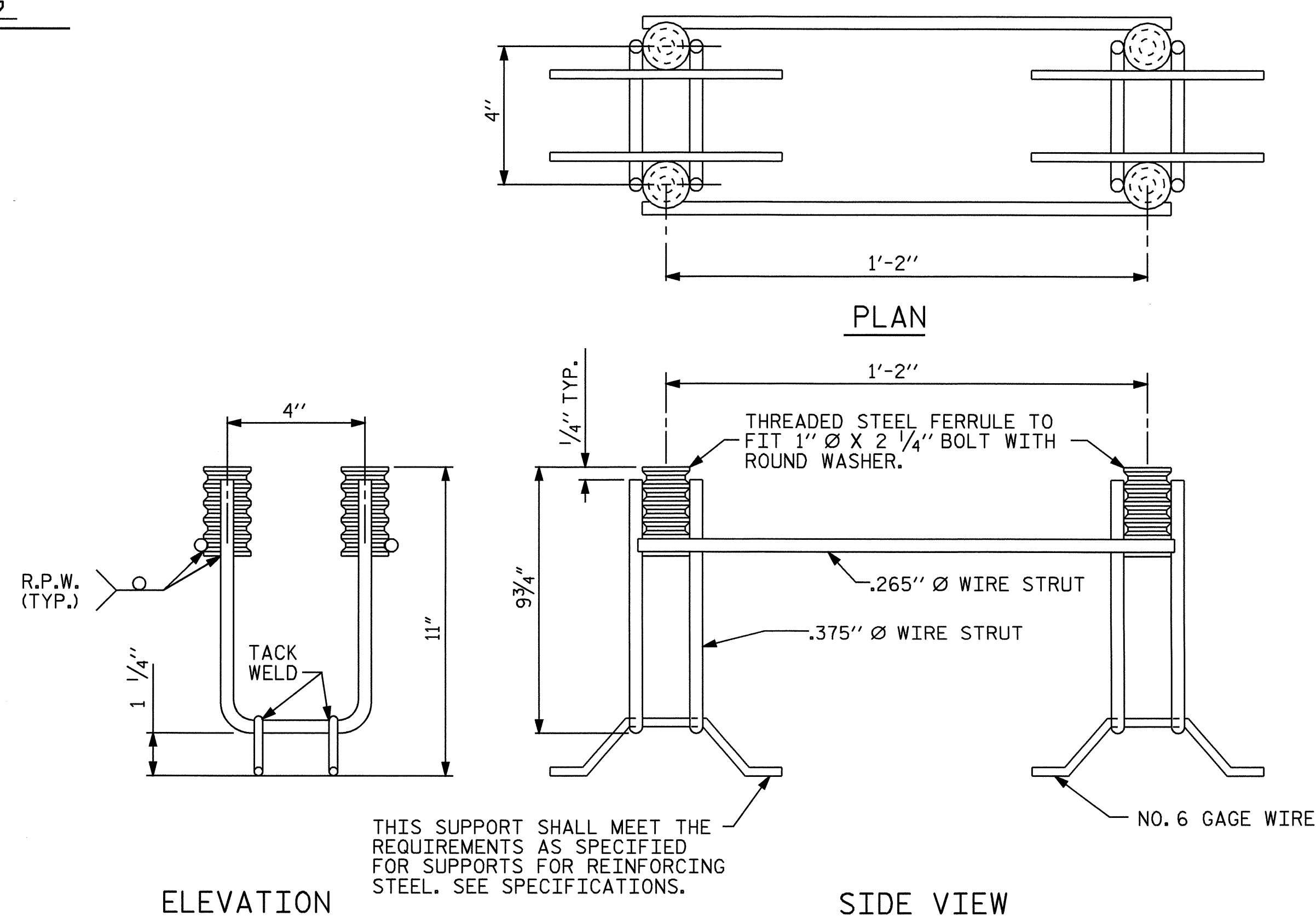
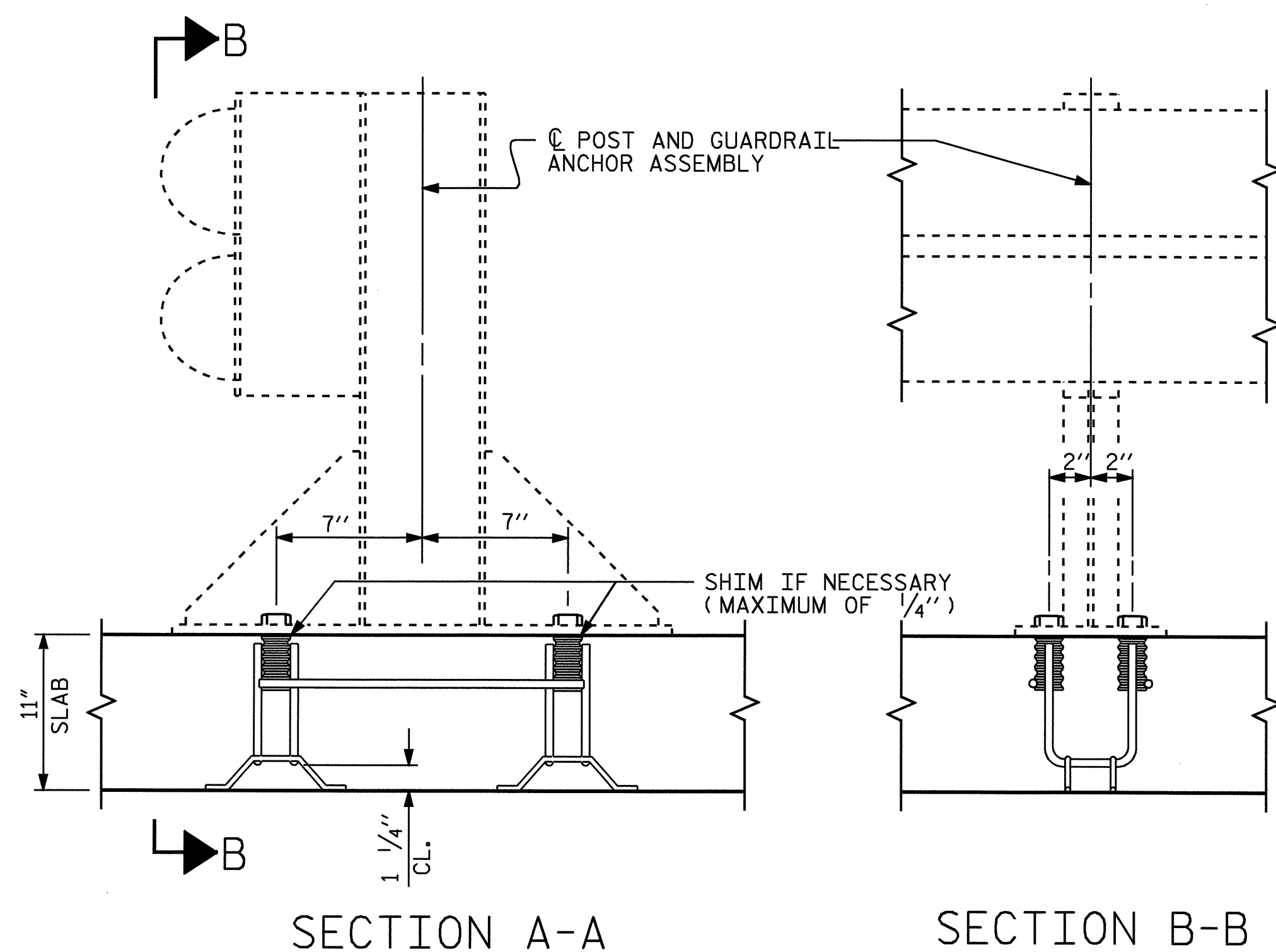
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1" Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE SPECIAL PROVISIONS.



* THIS DIMENSION TO BE FURNISHED BY THE ENGINEER IN THE FIELD.

PLAN OF PRECAST CULVERT GUARDRAIL POST SPACING

SHOWING GUARDRAIL ANCHOR ASSEMBLY SPACING



Professional Engineer Seal for Keith Pascoal, No. 22005, dated 7/1/08.

PROJECT NO. B-4196
MCDOWELL COUNTY
STATION: 11+13.00 -L1-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
ANCHORAGE DETAILS
FOR GUARDRAIL
ANCHOR ASSEMBLY
FOR CULVERTS

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

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

STD. NO. GRA1

ASSEMBLED BY : J. G. KHARVA DATE : 05/28/08
CHECKED BY : J. D. HAWK DATE : 06-19-08
DRAWN BY : FCJ 6/88 REV. 7/10/01 LES/RDR
CHECKED BY : ARB 6/88 REV. 5/7/03 RWW/JTE
REV. 5/1/06R KMM/GM

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN