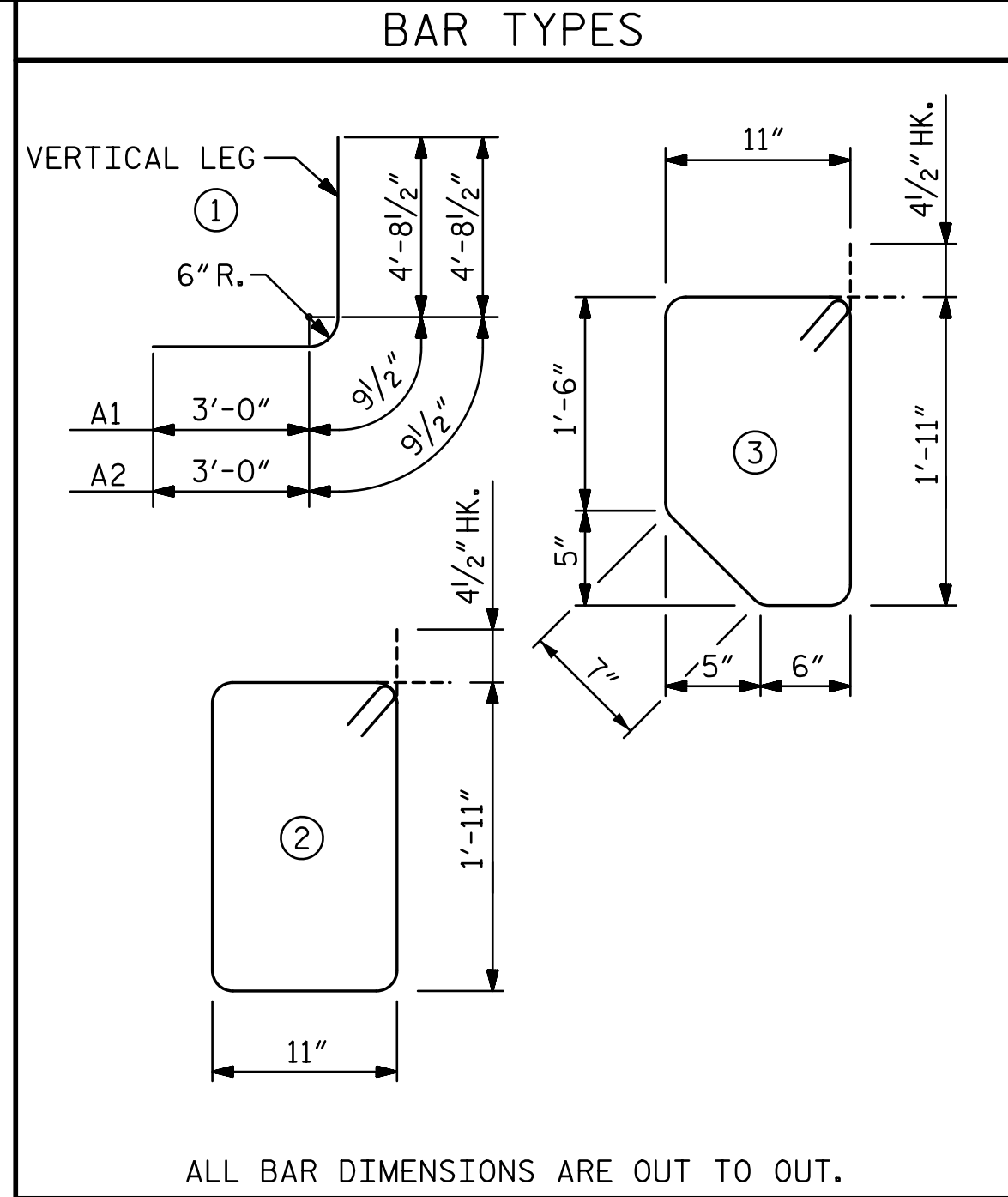


LOCATION SKETCH



BILL OF REINFORCING FOR BARREL

| MARK | NO. | SIZE | TYPE | LENGTH | WEIGHT |
|----------------------------------|-----|------|------|---------|-------------|
| A1 | 194 | #5 | ① | 8'-6" | 1,720 |
| A2 | 194 | #5 | ① | 8'-6" | 1,720 |
| A100 | 97 | #5 | STR | 25'-11" | 2,622 |
| A200 | 97 | #5 | STR | 25'-11" | 2,622 |
| A300 | 97 | #5 | STR | 25'-11" | 2,622 |
| A400 | 97 | #6 | STR | 25'-11" | 3,776 |
| B1 | 194 | #4 | STR | 11'-10" | 1,534 |
| B2 | 194 | #5 | STR | 9'-2" | 1,855 |
| B3 | 129 | #4 | STR | 11'-10" | 1,020 |
| C1 | 196 | #4 | STR | 25'-4" | 3,317 |
| D1 | 8 | #6 | STR | 3'-7" | 43 |
| G1 | 12 | #6 | STR | 25'-11" | 467 |
| S1 | 27 | #4 | ② | 6'-5" | 116 |
| S2 | 27 | #4 | ③ | 6'-2" | 111 |
| TOTAL BARREL REINFORCING STEEL = | | | | | 23,545 LBS. |

NOTES

ASSUMED LIVE LOAD ----- HL-93

DESIGN FILL----- 6.00'

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.

THE EXISTING STRUCTURE CONSISTING OF A SINGLE 30'-6" SPAN TIMBER DECK ON I-BEAMS WITH A CLEAR ROADWAY WIDTH OF 17'-2" SUPPORTED BY TIMBER CAPS WITH POSTS, SILLS, AND TIMBER BULKHEADS, AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED.

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.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE 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. REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT AND SILLS.
3. ROOF SLAB AND HEADWALLS.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET (SHEET C-6 OF 6).

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 3'-0" FOR #5 BARS AND 2'-5" FOR #4 BARS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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.

EXCAVATE 1 FOOT BELOW CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414 OF THE STANDARD SPECIFICATIONS.

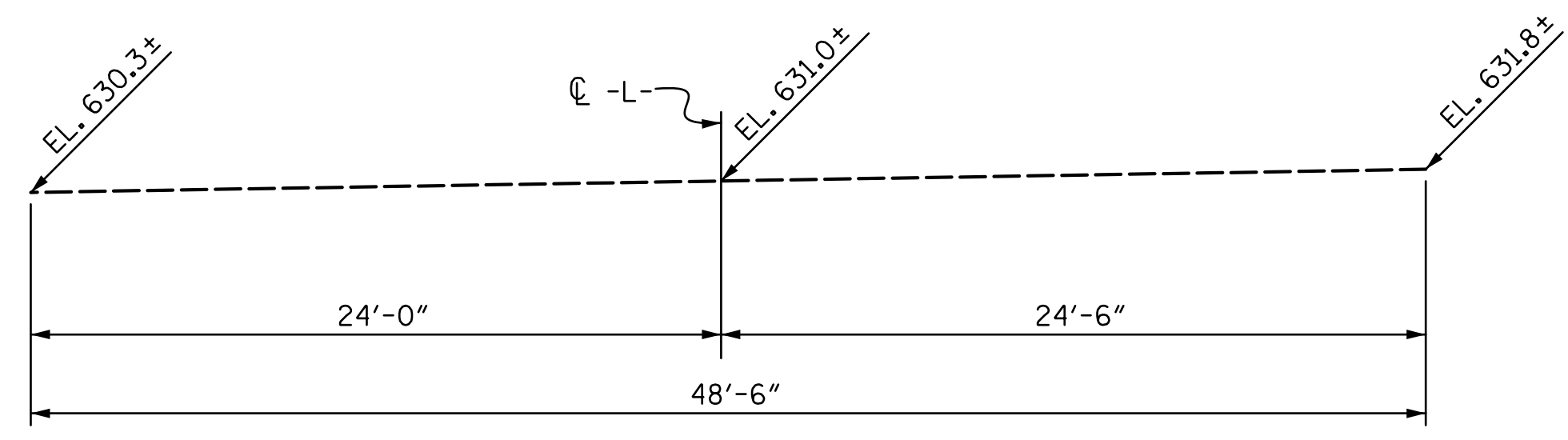
THE SCOUR CRITICAL ELEVATION IS THE BOTTOM OF FOOTING OR FLOOR SLAB ELEVATION. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

NO WORK SHALL BE DONE ON THE CULVERT UNTIL THE AREA OF THE BOX CULVERT HAS BEEN UNDERCUT AND UNSUITABLE MATERIAL REPLACED WITH SUITABLE MATERIAL, PROPERLY COMPACTED TO THE ELEVATION OF THE BOTTOM OF THE PROPOSED FLOOR SLAB. THE LIMITS OF THE UNDERCUT EXCAVATION SHALL BE AT LEAST THE LIMITS OF THE BOX CULVERT INCLUDING THE WINGS.

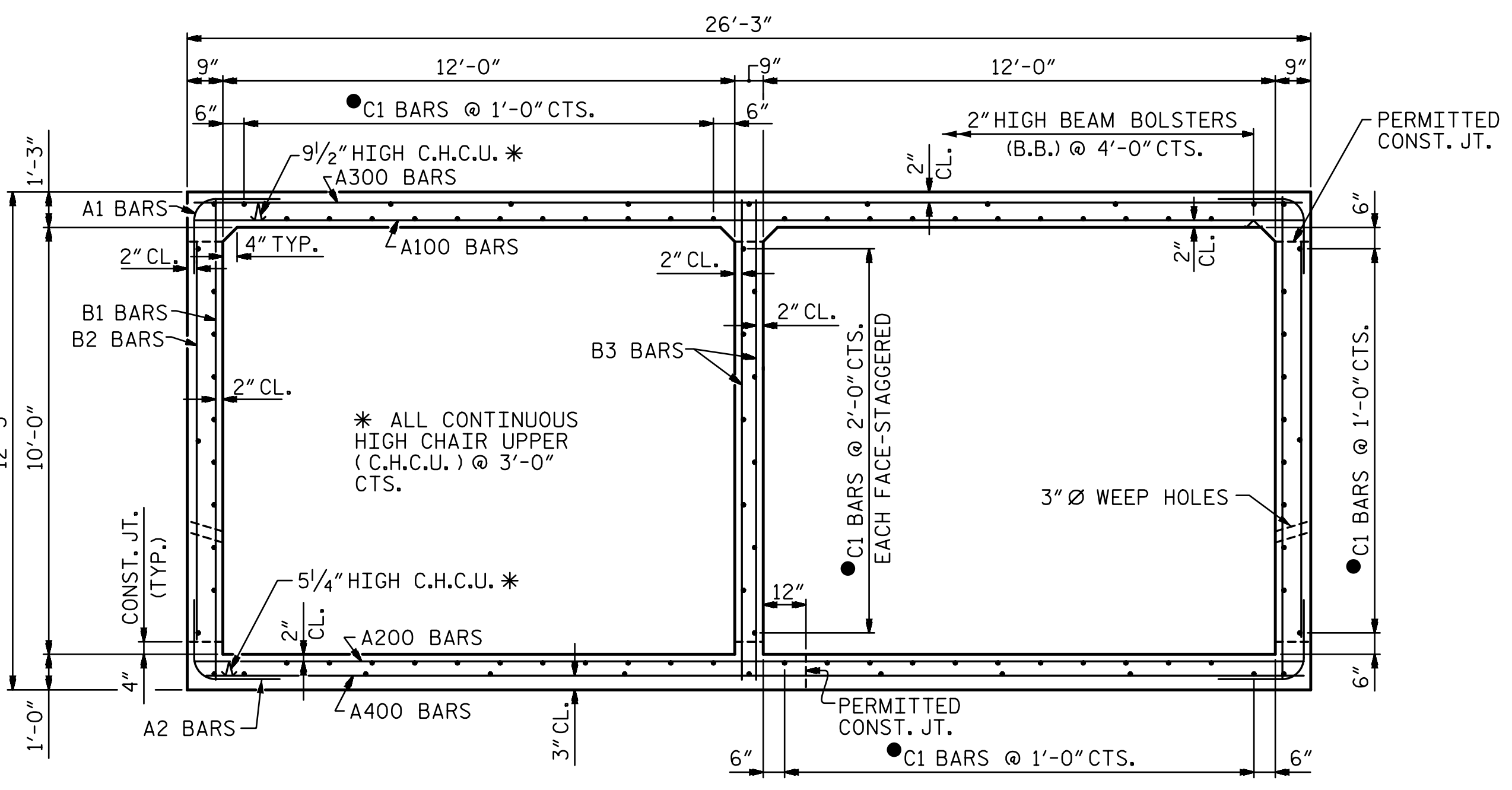
INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE".

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

FOR PLACEMENT OF NATURAL STREAM BED MATERIAL, SEE SPECIAL PROVISIONS.



PROFILE ALONG CULVERT



RIGHT ANGLE SECTION OF BARREL

THERE ARE 98 C1 BARS IN SECTION OF BARREL.

● SPLICE LENGTH FOR C1 BARS = 2'-5"

HYDRAULIC DATA

DESIGN DISCHARGE:----- 550 CFS

FREQUENCY OF DESIGN FLOOD:----- 25 YRS.

DESIGN HIGH WATER ELEVATION:----- 637.2

DRAINAGE AREA:----- 1.1 SQ. MI.

BASIC DISCHARGE (Q100):----- 800 CFS

BASIC HIGH WATER ELEVATION:----- 638.15

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE:----- 1,100+ CFS

FREQUENCY OF OVERTOPPING FLOOD:----- 500+ YRS.

OVERTOPPING FLOOD ELEVATION:----- 643.9

GRADE DATA

GRADE POINT ELEVATION @ STA. 14+73.00 -L- ----- 644.59

BED ELEVATION @ STA. 14+73.00 -L- ----- 631.0±

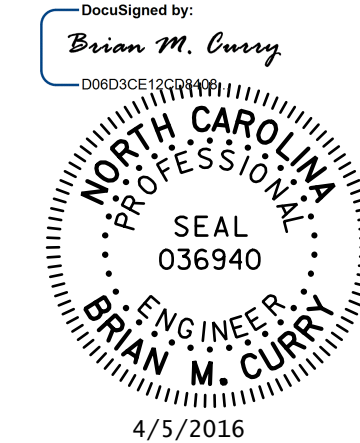
ROADWAY FILL SLOPES ----- 2:1 (MAX)

♦ CULVERT INVERT TO BE BURIED 1'-0" BELOW STREAM BED

TOTAL STRUCTURE QUANTITIES

| | |
|--|--------------------------|
| REMOVAL OF EXISTING STRUCTURE | LUMP SUM |
| CULVERT EXCAVATION | LUMP SUM |
| FOUNDATION CONDITIONING MATERIAL | 95 TONS |
| CLASS A CONCRETE | |
| BARREL: | 3.029 CY/FT = 146.9 C.Y. |
| WINGS, ETC.: | 37.8 C.Y. |
| TOTAL: | 184.7 C.Y. |
| REINFORCING STEEL | |
| BARREL: | 23,545 LBS. |
| WINGS, ETC.: | 3,507 LBS. |
| TOTAL: | 27,052 LBS. |
| PLACEMENT OF NATURAL STREAM BED MATERIAL | LUMP SUM |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



PROJECT NO. 17BP.10.R.52

CABARRUS COUNTY

STATION: 14+73.00 -L-

SHEET 1 OF 6 REPLACES BRIDGE NO. 070

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

DOUBLE BARREL

12 FT. X 10 FT.

CONCRETE BOX CULVERT

90° SKEW

REVISIONS

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

STV ENGINEERS, INC.

900 West Trade St., Suite 715

Charlotte, NC 28202

NC License Number F-0991

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LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

| LEVEL | VEHICLE | WEIGHT (W) (TONS) | CONTROLLING LOAD RATING # | MINIMUM RATING FACTORS (RF) | TONS = W x RF | STRENGTH I LIMIT STATE | | | | | | | | COMMENT NUMBER | | |
|--------------------|-----------------------------------|----------------------|---------------------------------|-----------------------------------|---------------|----------------------------|---------------|---------|--------------|---------------------------------------|---------------|---------|--------------|----------------|---------------------------------------|--|
| | | | | | | LIVE-LOAD FACTORS (%LL) | MOMENT | | | | SHEAR | | | | | |
| | | | | | | | RATING FACTOR | BOX NO. | ELEMENT TYPE | DISTANCE FROM LEFT END OF ELEMENT (±) | RATING FACTOR | BOX NO. | ELEMENT TYPE | | DISTANCE FROM LEFT END OF ELEMENT (±) | |
| DESIGN LOAD RATING | HL-93 (INVENTORY) | N/A | 1 | 1.50 | -- | 1.75 | 1.59 | 1 & 2 | RCBC | 12.00' | 1.50 | 1 & 2 | RCBC | 0.72' | | |
| | HL-93 (OPERATING) | N/A | | 1.94 | -- | 1.35 | 2.07 | 1 & 2 | RCBC | 12.00' | 1.94 | 1 & 2 | RCBC | 0.72' | | |
| | HS-20 (INVENTORY) | 36.000 | 2 | 1.52 | 54.720 | 1.75 | 1.59 | 1 & 2 | RCBC | 12.00' | 1.52 | 1 & 2 | RCBC | 0.72' | | |
| | HS-20 (OPERATING) | 36.000 | | 1.98 | 71.280 | 1.35 | 2.07 | 1 & 2 | RCBC | 12.00' | 1.98 | 1 & 2 | RCBC | 0.72' | | |
| LEGAL LOAD RATING | SINGLE VEHICLE (SV) | SNSH | | 1.84 | 24.840 | 1.40 | 3.76 | 1 & 2 | RCBC | 4.80' | 1.84 | 1 & 2 | RCBC | 0.54' | | |
| | | SNGARBS2 | 20.000 | | 1.78 | 35.600 | 1.40 | 2.65 | 1 & 2 | RCBC | 12.00' | 1.78 | 1 & 2 | RCBC | 0.54' | |
| | | SNAGRIS2 | 22.000 | | 1.77 | 38.940 | 1.40 | 2.44 | 1 & 2 | RCBC | 12.00' | 1.77 | 1 & 2 | RCBC | 0.54' | |
| | | SNCOTTS3 | 27.250 | | 1.52 | 41.420 | 1.40 | 1.95 | 1 & 2 | RCBC | 12.00' | 1.52 | 1 & 2 | RCBC | 0.72' | |
| | | SNAGGRS4 | 34.925 | | 1.47 | 51.340 | 1.40 | 1.58 | 1 & 2 | RCBC | 12.00' | 1.47 | 1 & 2 | RCBC | 0.72' | |
| | | SNS5A | 35.550 | | 1.60 | 56.880 | 1.40 | 1.67 | 1 & 2 | RCBC | 12.00' | 1.60 | 1 & 2 | RCBC | 0.72' | |
| | | SNS6A | 39.950 | | 1.61 | 64.320 | 1.40 | 1.62 | 1 & 2 | RCBC | 12.00' | 1.61 | 1 & 2 | RCBC | 0.72' | |
| | | SNS7B | 42.000 | | 1.57 | 65.940 | 1.40 | 1.57 | 1 & 2 | RCBC | 12.00' | 1.65 | 1 & 2 | RCBC | 0.72' | |
| | TRUCK TRACTOR SEMI-TRAILER (TTST) | TNAGRIT3 | 33.000 | | 1.71 | 56.430 | 1.40 | 1.71 | 1 & 2 | RCBC | 12.00' | 1.77 | 1 & 2 | RCBC | 0.54' | |
| | | TNT4A | 33.075 | | 1.61 | 53.251 | 1.40 | 1.82 | 1 & 2 | RCBC | 12.00' | 1.61 | 1 & 2 | RCBC | 0.72' | |
| | | TNT6A | 41.600 | | 1.58 | 65.728 | 1.40 | 1.68 | 1 & 2 | RCBC | 12.00' | 1.58 | 1 & 2 | RCBC | 0.72' | |
| | | TNT7A | 42.000 | | 1.69 | 70.980 | 1.40 | 1.72 | 1 & 2 | RCBC | 12.00' | 1.69 | 1 & 2 | RCBC | 0.72' | |
| | | TNT7B | 42.000 | | 1.60 | 67.200 | 1.40 | 1.66 | 1 & 2 | RCBC | 12.00' | 1.60 | 1 & 2 | RCBC | 0.72' | |
| | | TNAGRIT4 | 43.000 | | 1.45 | 62.350 | 1.40 | 1.49 | 1 & 2 | RCBC | 12.00' | 1.45 | 1 & 2 | RCBC | 0.72' | |
| | TNACT5A | 45.000 | | 1.49 | 67.050 | 1.40 | 1.55 | 1 & 2 | RCBC | 12.00' | 1.49 | 1 & 2 | RCBC | 0.72' | | |
| | TNACT5B | 45.000 | 3 | 1.32 | 59.400 | 1.40 | 1.32 | 1 & 2 | RCBC | 12.00' | 1.34 | 1 & 2 | RCBC | 0.72' | | |

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

| LOAD TYPE | MAX FACTOR | MIN FACTOR |
|-----------|------------|------------|
| DC | 1.25 | 0.90 |
| DW | 1.50 | 0.65 |
| EV | 1.30 | 0.90 |
| EH | 1.35 | 0.90 |
| ES | 1.35 | 0.90 |
| LS | 1.75 | -- |
| WA | 1.00 | -- |

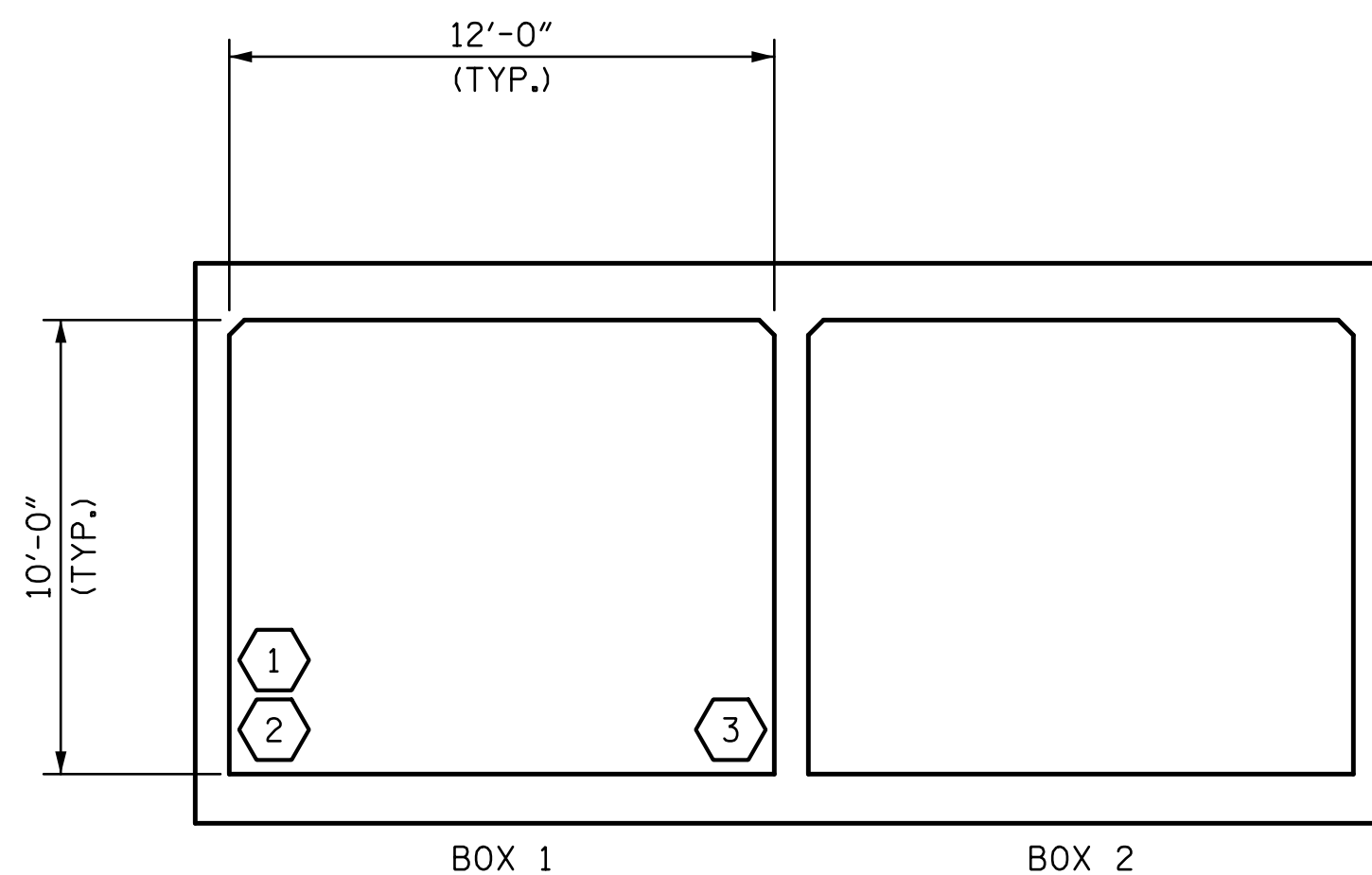
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

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

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



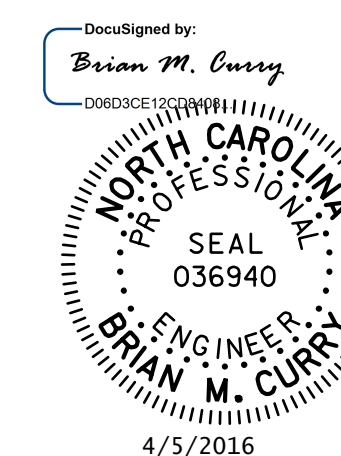
LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. 17BP.10.R.52
CABARRUS COUNTY
STATION: 14+73.00 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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



REVISIONS

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| 1 | | | 3 | | | C-2 |
| 2 | | | 4 | | | TOTAL SHEETS 6 |

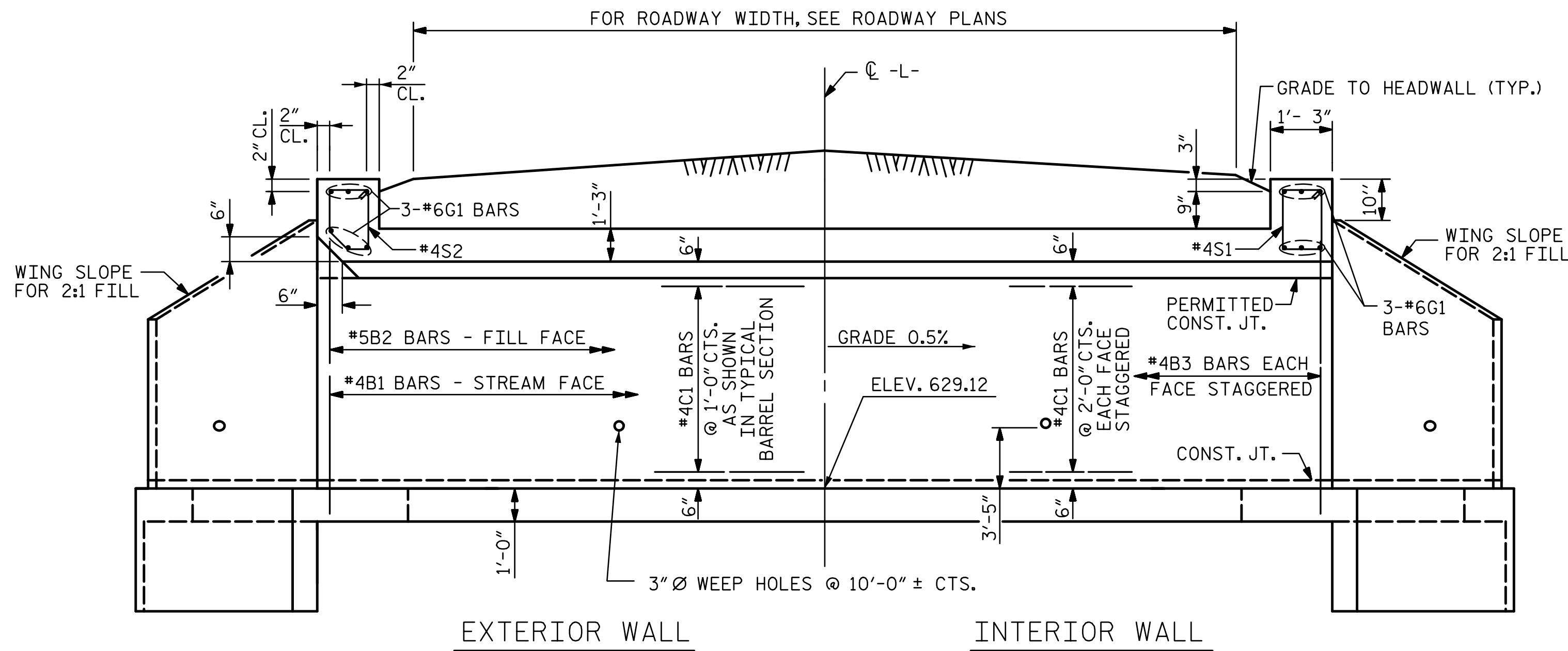
DRAWN BY : LEM DATE : 10-14
CHECKED BY : BMC DATE : 10-14
DESIGN ENGINEER OF RECORD : BMC DATE : 10-14

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

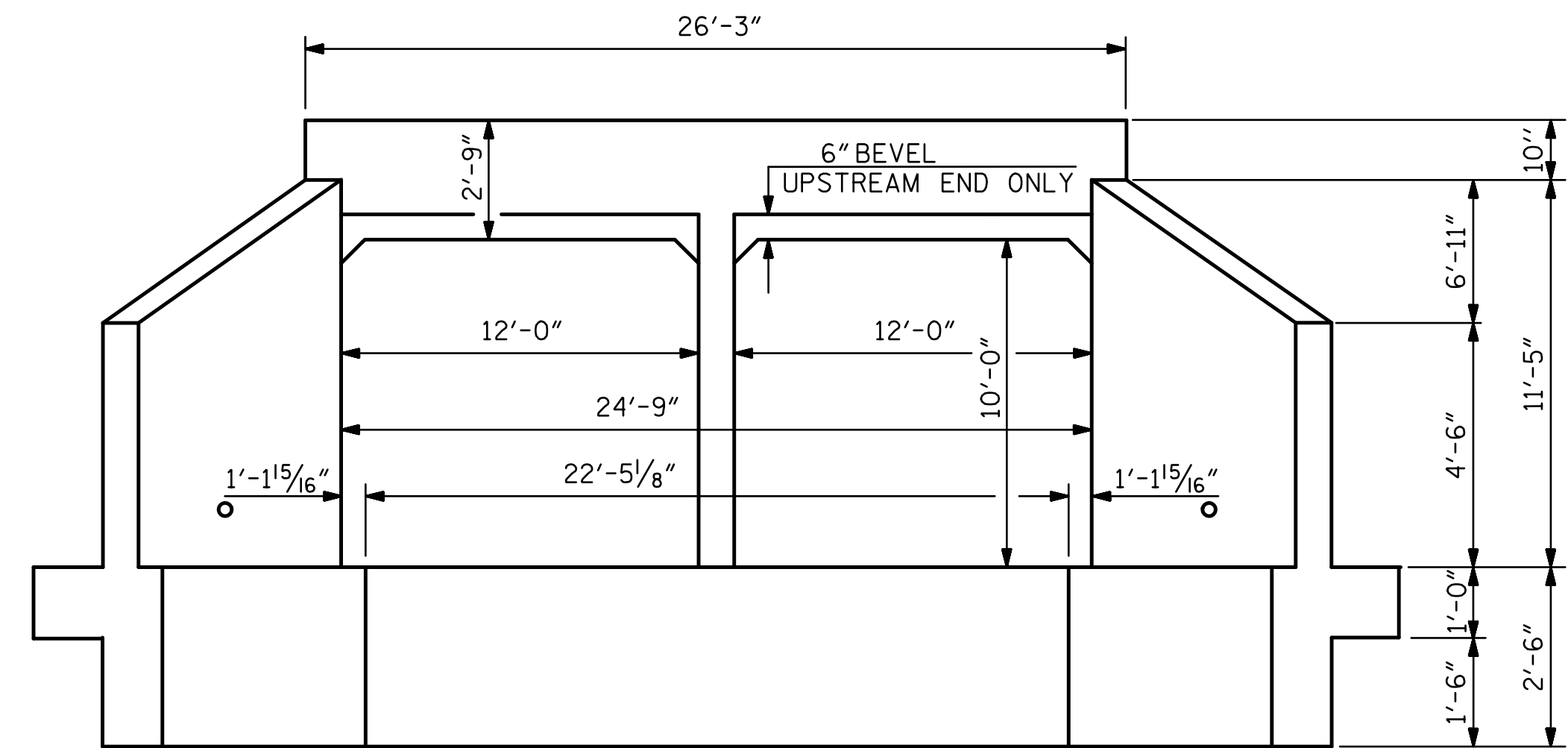


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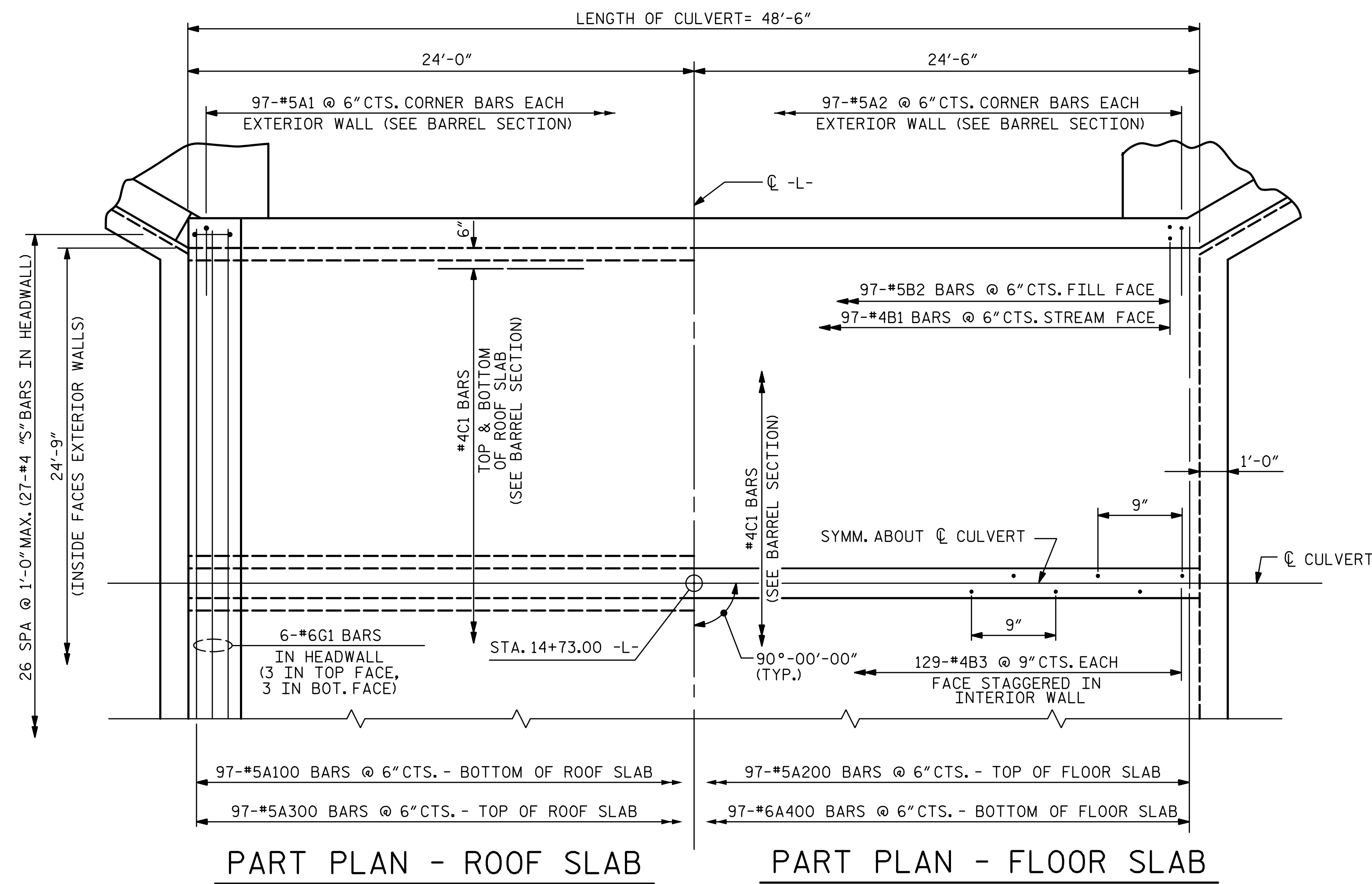
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CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION

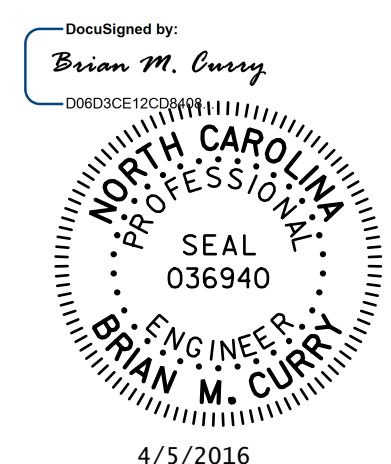


PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

PROJECT NO. 17BP.10.R.52
CABARRUS COUNTY
 STATION: 14+73.00 -L-
 SHEET 3 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
BARREL STANDARD
DOUBLE 12 FT. X 10 FT.
CONCRETE BOX CULVERT
90° SKEW



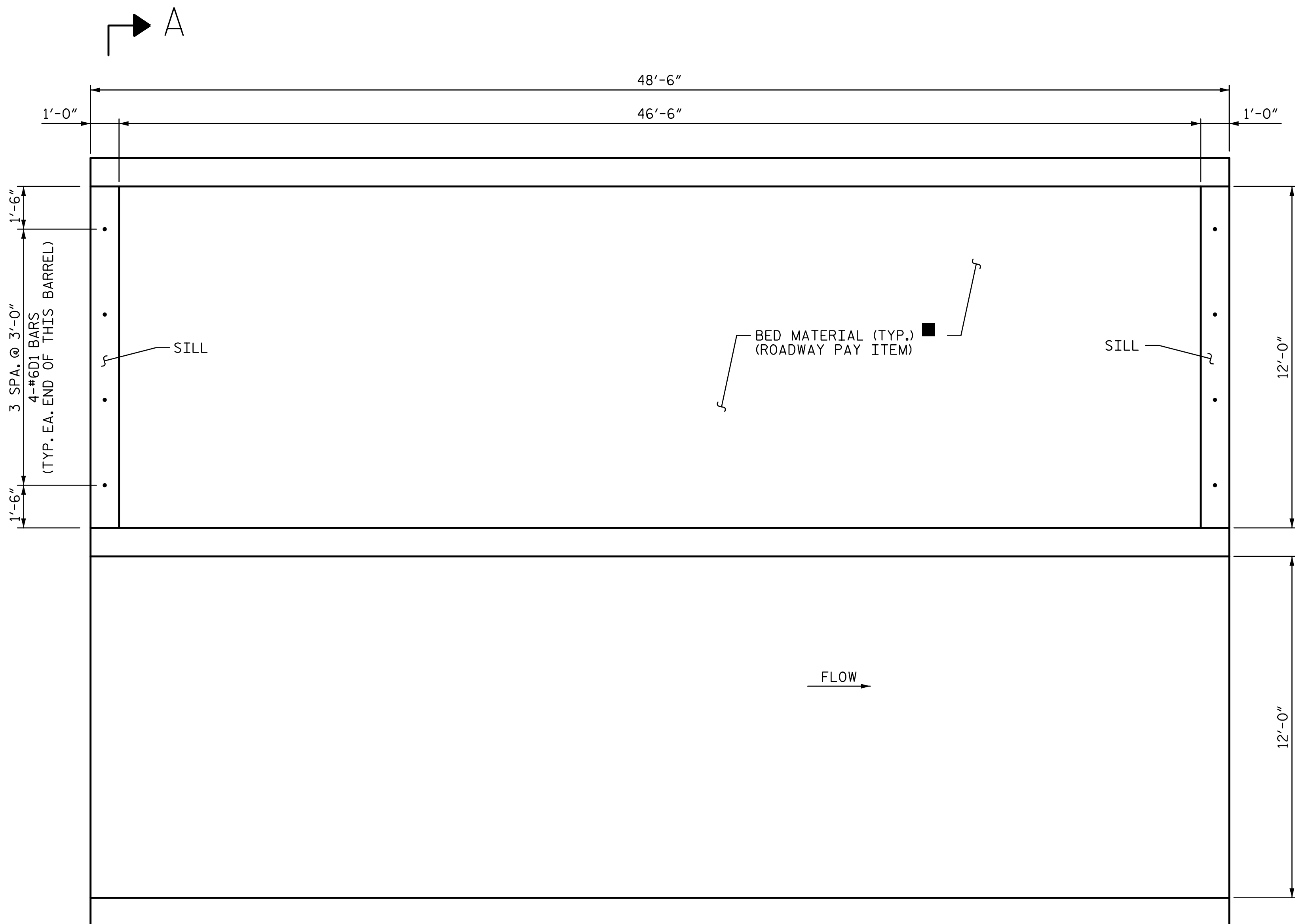
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 CHECKED BY : BMC DATE : 10-14
 DESIGN ENGINEER OF RECORD : BMC DATE : 10-14

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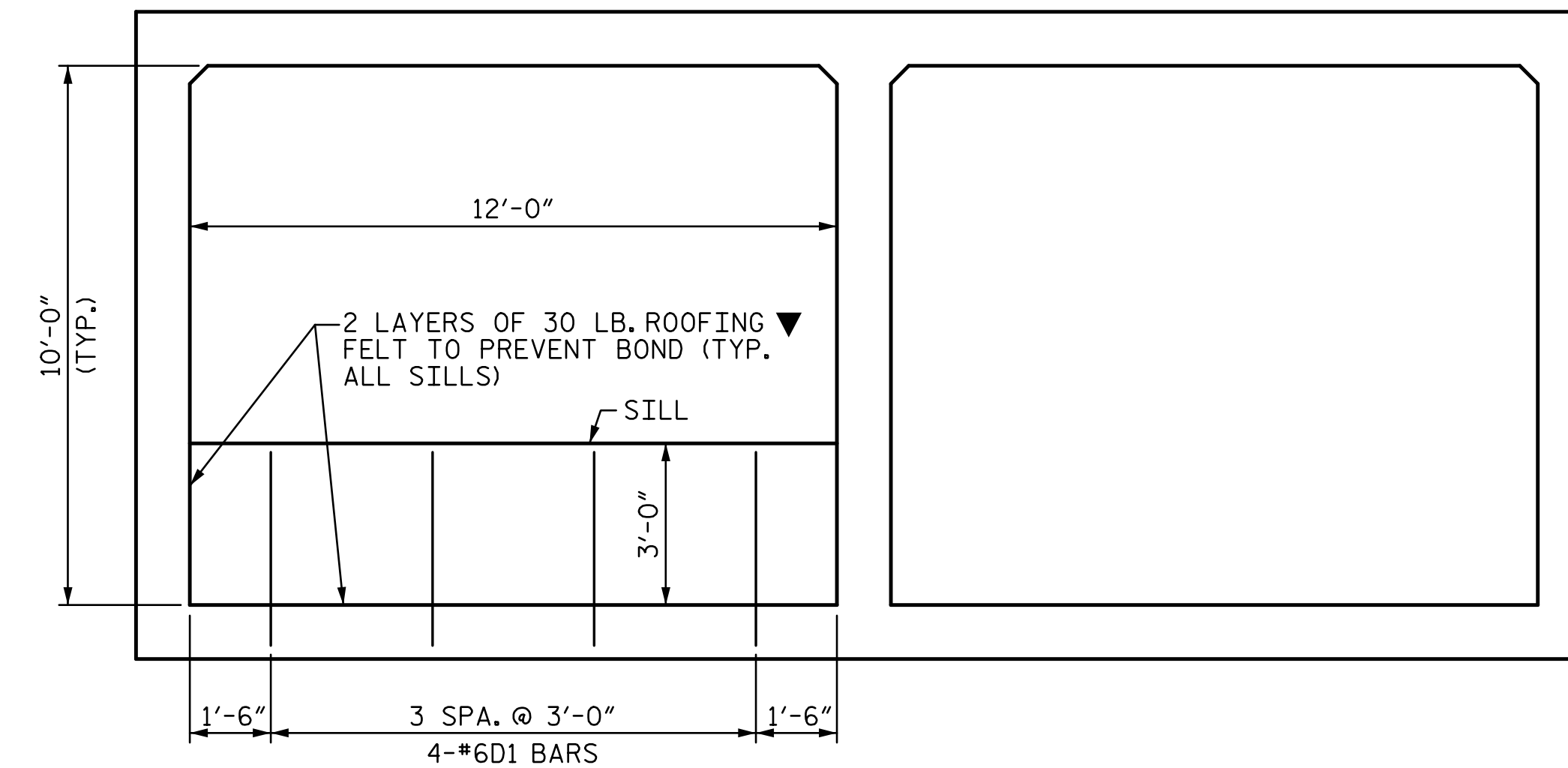
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| 2 | | | 4 | | | TOTAL SHEETS 6 |

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PLAN VIEW - LOCATION OF SILLS

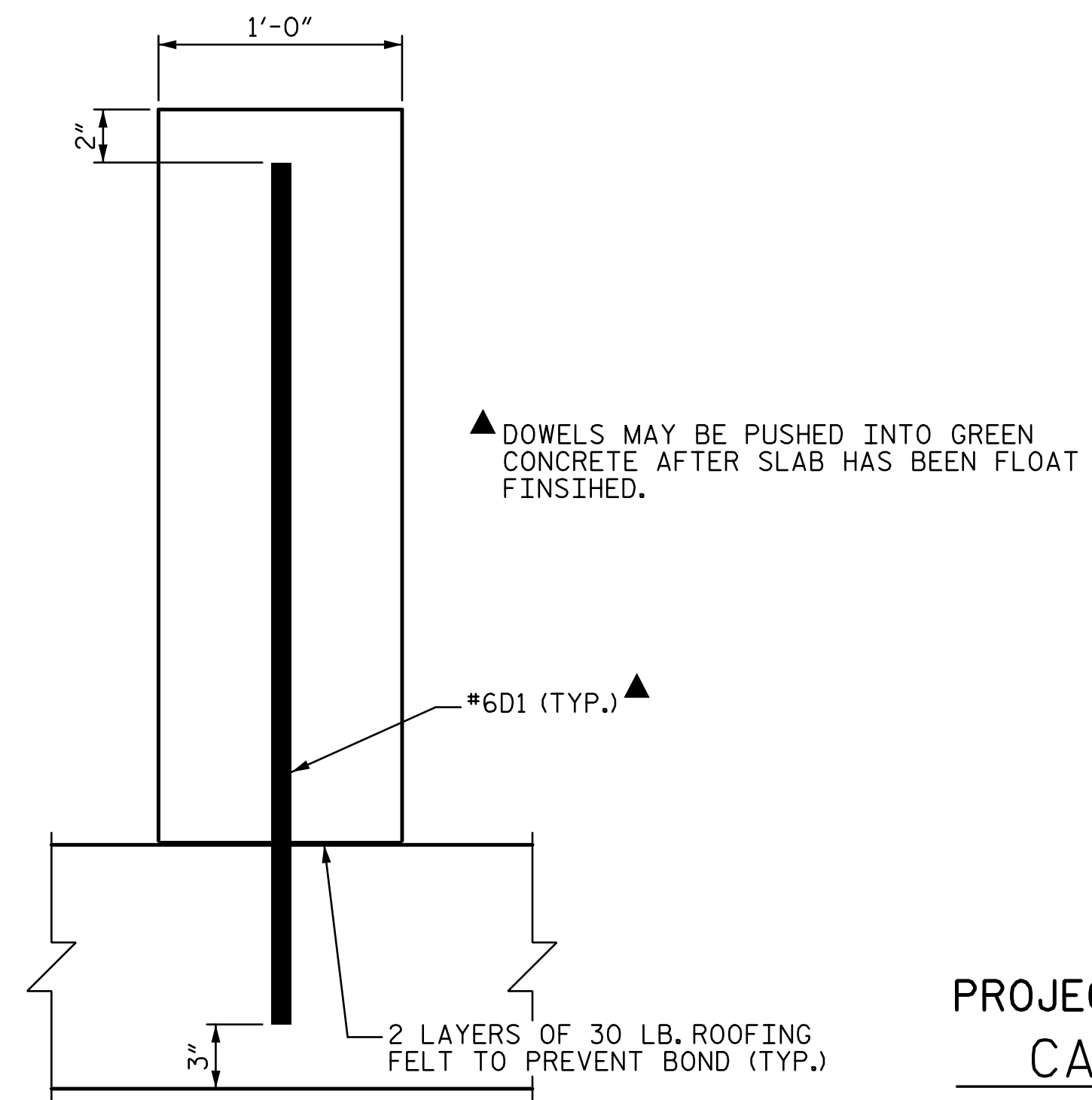
■ NATURAL STREAM BED MATERIAL SHALL BE USED TO BACKFILL THE CULVERT BETWEEN SILLS. SEE SPECIAL PROVISION FOR 'PLACEMENT OF NATURAL STREAM BED MATERIAL'.



SECTION A-A

SECTION AT INLET END SHOWN. SECTION AT OUTLET END IS SIMILAR.

▼ THE COST OF THE ROOFING FELT IS INCIDENTAL AND SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.



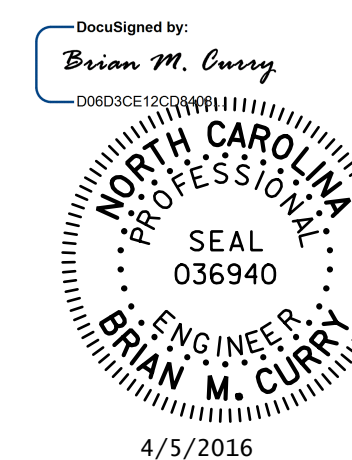
SECTION THROUGH SILL

PROJECT NO. 17BP.10.R.52
CABARRUS COUNTY
 STATION: 14+73.00 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

CULVERT SILL DETAILS



4/5/2016

DRAWN BY : LEM DATE : 10-14
 CHECKED BY : BMC DATE : 10-14
 ENGINEER OF RECORD : BMC DATE : 10-14

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

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 THREAD LENGTH 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 AND IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

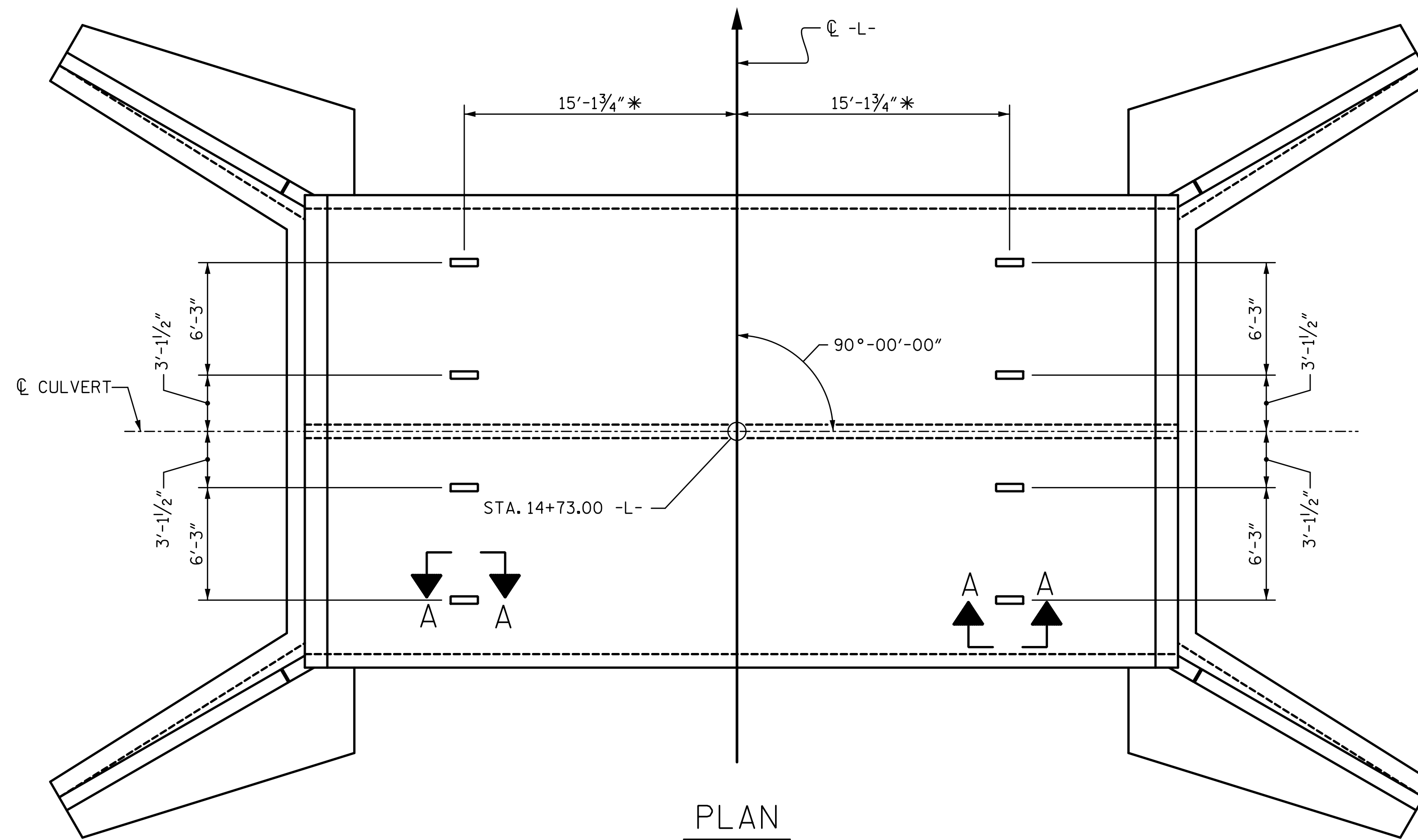
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

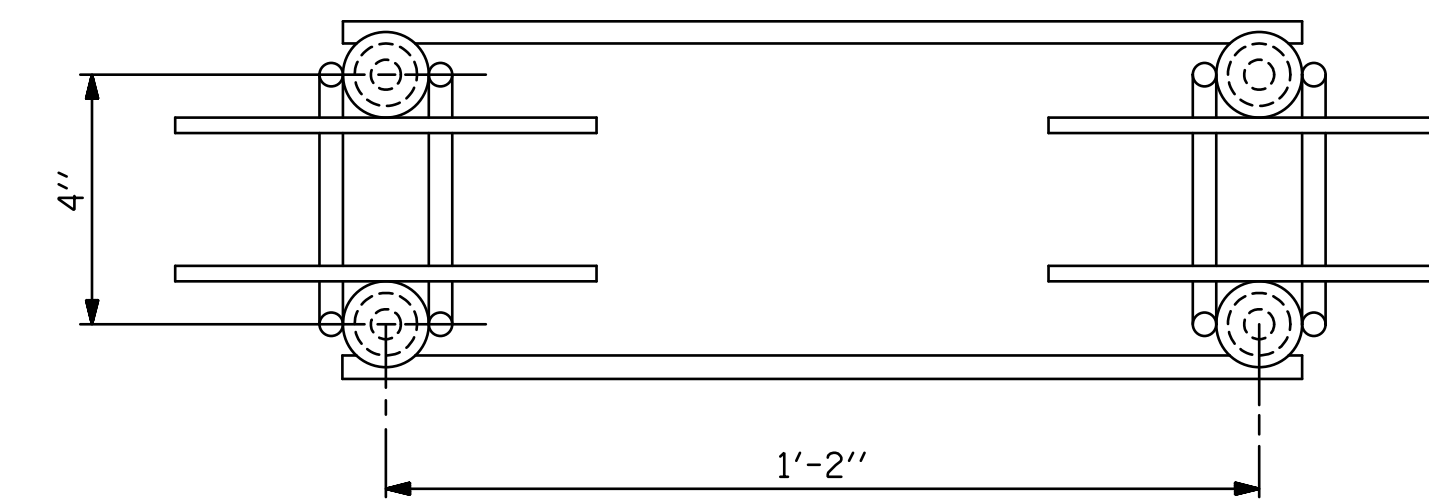
THE COST FOR GUARDRAIL, POSTS, AND POST BASE PLATES SHALL BE INCLUDED IN THE ROADWAY PAY ITEMS.

ROOF SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHALL BE TAKEN TO MINIMIZE THE SHIFTING OF REINFORCING STEEL.

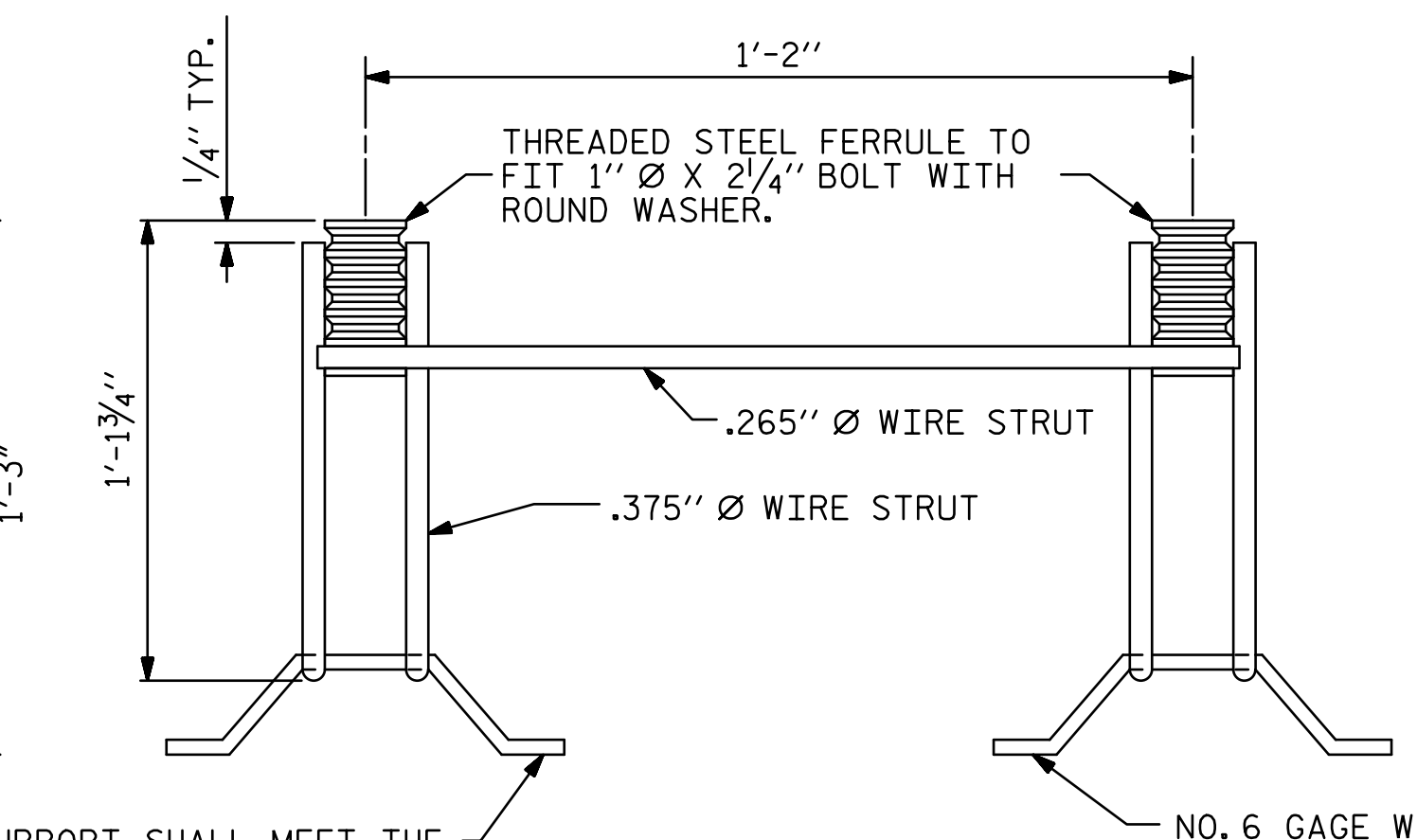
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1" Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.



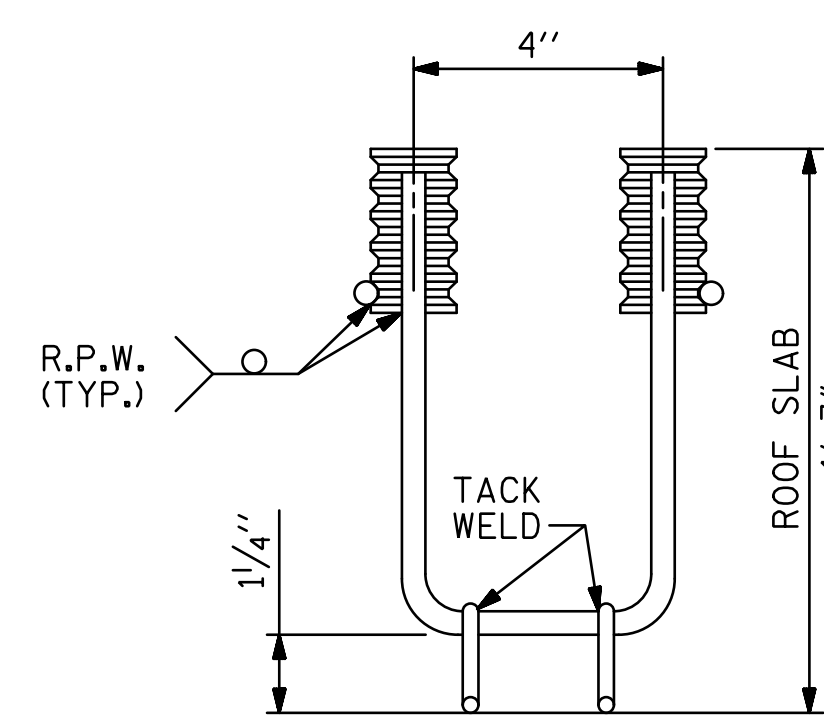
PLAN
 SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.
 * THIS DIMENSION TO BE CONFIRMED BY THE ENGINEER IN THE FIELD.



PLAN



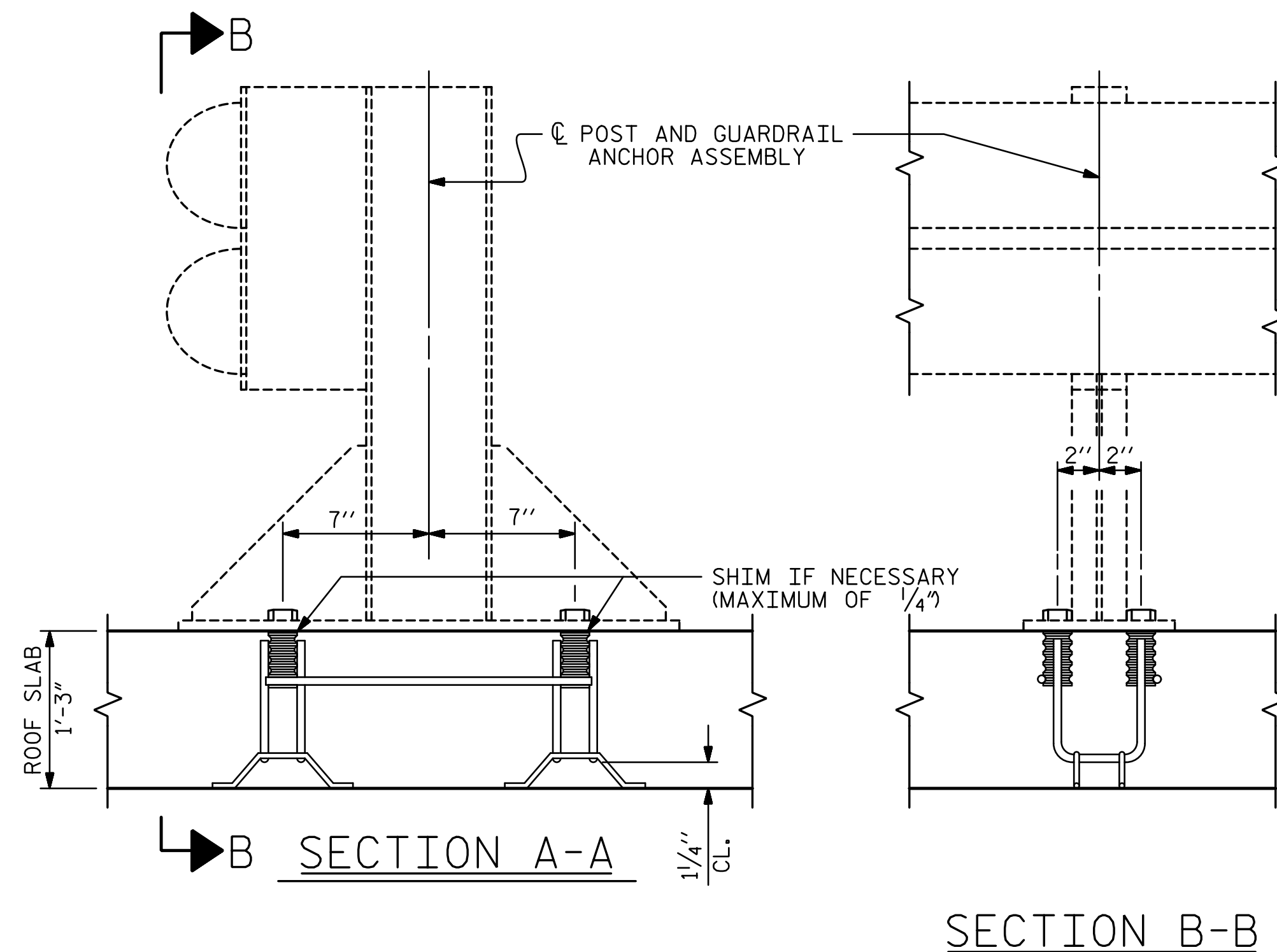
SIDE VIEW



ELEVATION

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

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS



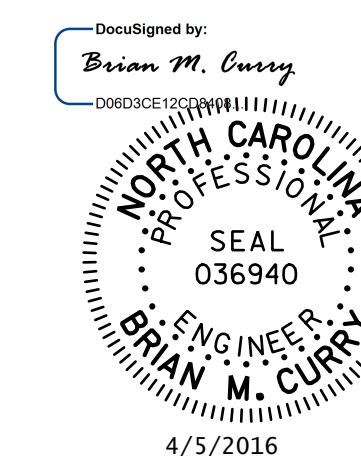
SECTION A-A

SECTION B-B

PROJECT NO. 17BP.10.R.52
CABARRUS COUNTY
 STATION: 14+73.00 -L-

SHEET 5 OF 6

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



4/5/2016

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

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED



STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

STD. NO. GRA1

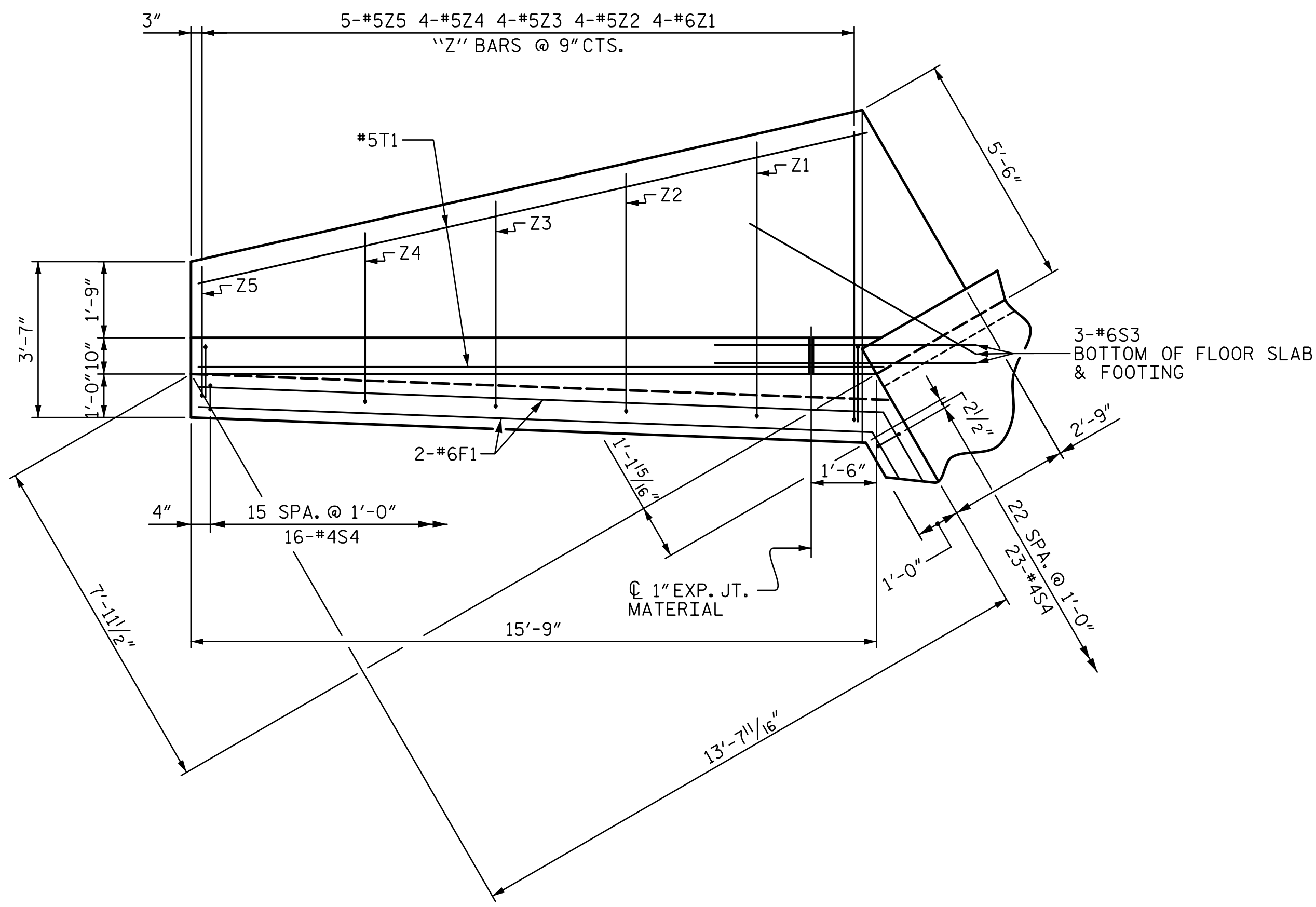
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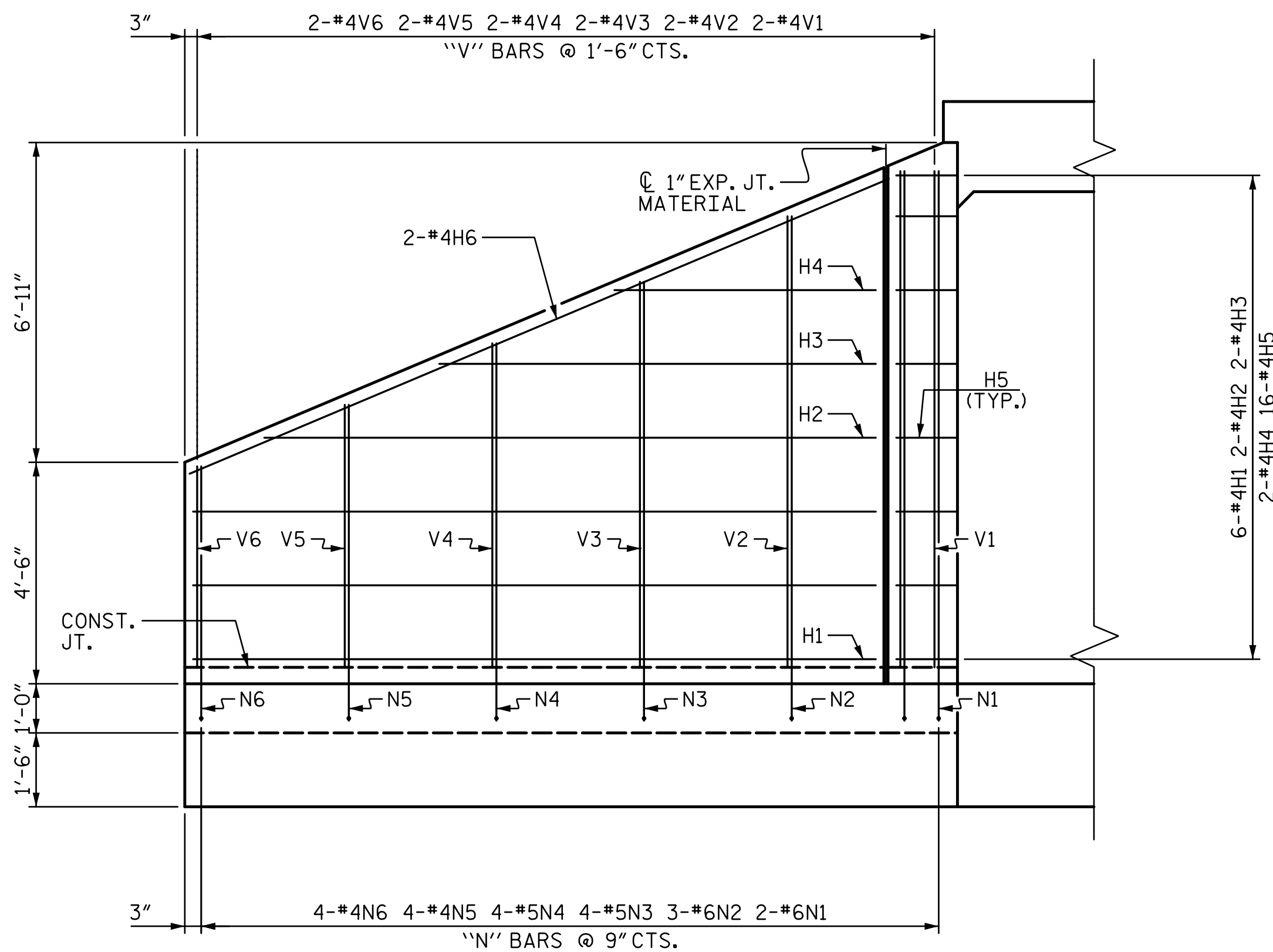
bcjrfy

| | | | |
|----------------------|----------|--------------|---------|
| ASSEMBLED BY : | LEM | DATE : | 10-14 |
| CHECKED BY : | BMC | DATE : | 10-14 |
| ENGINEER OF RECORD : | BMC | DATE : | 10-14 |
| 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 |

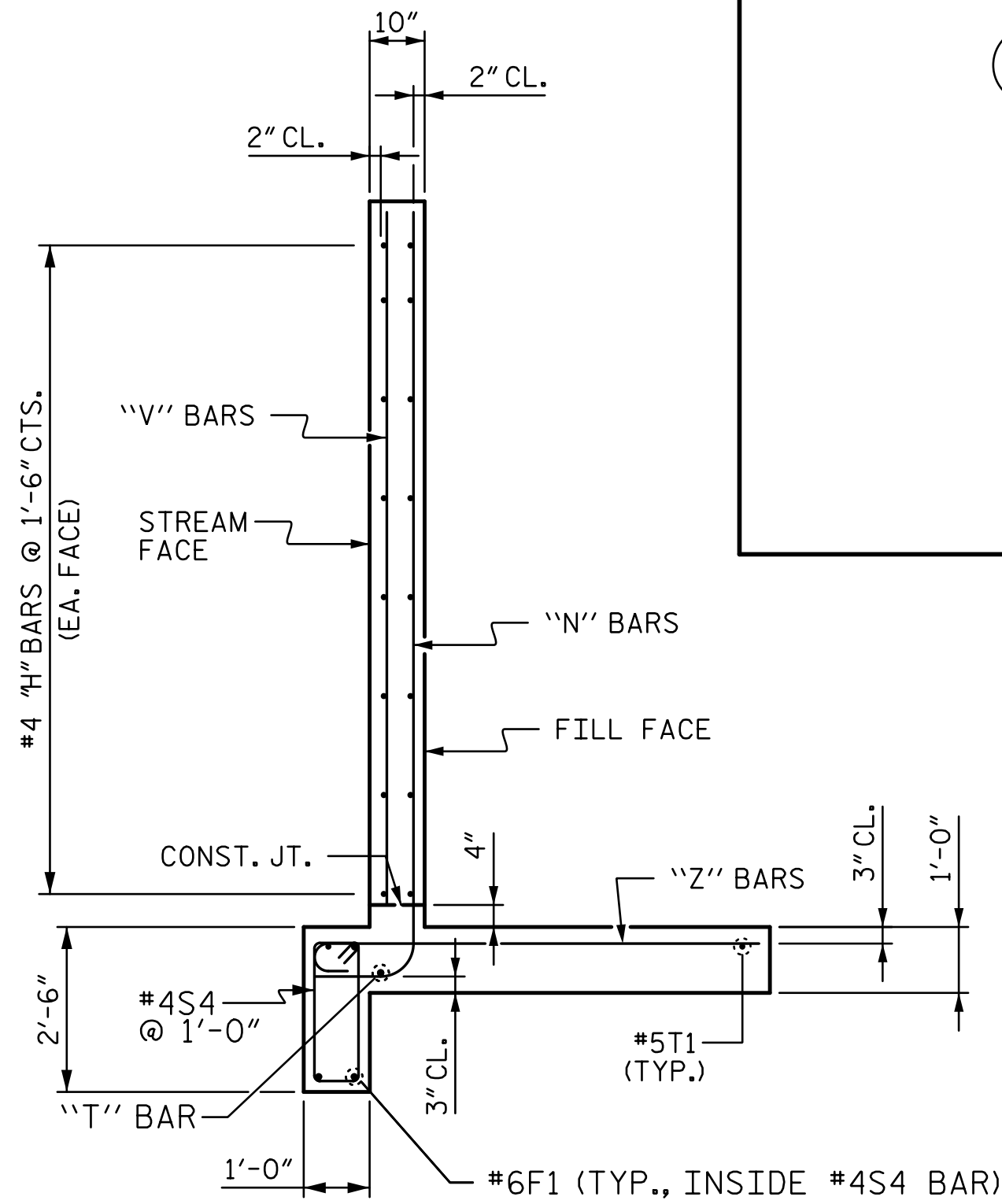
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PLAN



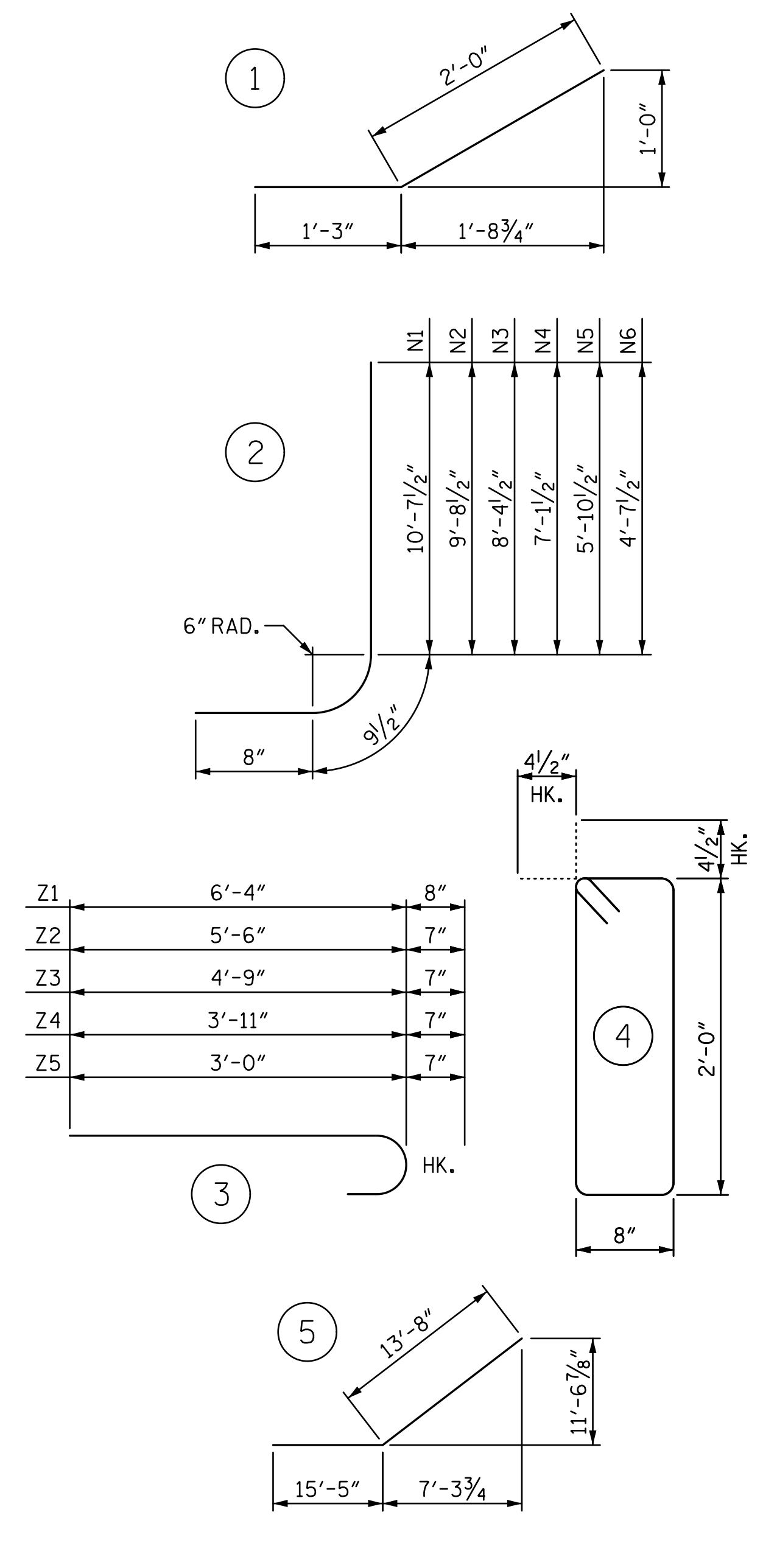
ELEVATION



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



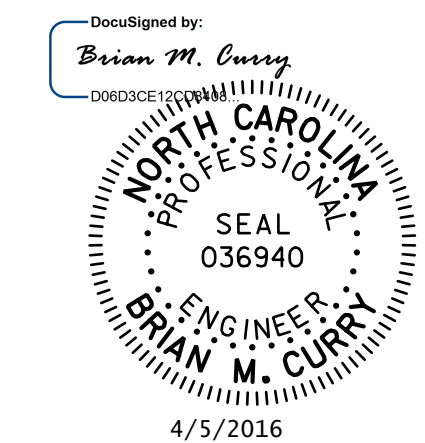
BILL OF MATERIAL

| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT |
|-----|-----|------|------|---------|--------|
| F1 | 16 | #6 | ⑤ | 29'-1" | 699 |
| H1 | 24 | #4 | STR | 13'-10" | 222 |
| H2 | 8 | #4 | STR | 12'-5" | 66 |
| H3 | 8 | #4 | STR | 8'-10" | 47 |
| H4 | 8 | #4 | STR | 5'-4" | 29 |
| H5 | 64 | #4 | ① | 3'-3" | 139 |
| H6 | 8 | #4 | STR | 15'-5" | 82 |
| N1 | 8 | #6 | ② | 12'-1" | 146 |
| N2 | 12 | #6 | ② | 11'-2" | 201 |
| N3 | 16 | #5 | ② | 9'-10" | 164 |
| N4 | 16 | #5 | ② | 8'-7" | 143 |
| N5 | 16 | #4 | ② | 7'-4" | 78 |
| N6 | 16 | #4 | ② | 6'-1" | 65 |
| S3 | 12 | #6 | STR | 6'-0" | 108 |
| S4 | 110 | #4 | ④ | 6'-1" | 447 |
| T1 | 8 | #5 | STR | 15'-9" | 131 |
| V1 | 8 | #4 | STR | 10'-1" | 54 |
| V2 | 8 | #4 | STR | 9'-2" | 49 |
| V3 | 8 | #4 | STR | 7'-10" | 42 |
| V4 | 8 | #4 | STR | 6'-7" | 35 |
| V5 | 8 | #4 | STR | 5'-4" | 29 |
| V6 | 8 | #4 | STR | 4'-1" | 22 |
| Z1 | 16 | #6 | ③ | 7'-0" | 168 |
| Z2 | 16 | #5 | ③ | 6'-1" | 102 |
| Z3 | 16 | #5 | ③ | 5'-4" | 89 |
| Z4 | 16 | #5 | ③ | 4'-6" | 75 |
| Z5 | 20 | #5 | ③ | 3'-7" | 75 |

REINFORCING STEEL FOR 4 WINGS 3,507 LBS
 CLASS A CONCRETE
 4 WINGS 31.2 CY
 2 HEADWALLS 2.4 CY
 END CURTAIN WALLS 4.2 CY
 TOTAL 37.8 CY

PROJECT NO. 17BP.10.R.52
 CABARRUS COUNTY
 STATION: 14+73.00 -L-

SHEET 6 OF 6
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD WINGS
 FOR
 CONCRETE BOX CULVERT
 H = 10'-0" SLOPE = 2:1
 90° SKEW



DRAWN BY : LEM DATE : 10-14
 CHECKED BY : BMC DATE : 10-14
 ENGINEER OF RECORD : BMC DATE : 10-14

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV 100 YEARS
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

| REVISIONS | | | | SHEET NO. |
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| 1 | | | 3 | |
| 2 | | | 4 | |

C-6
TOTAL SHEETS 6

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

JANUARY, 1990