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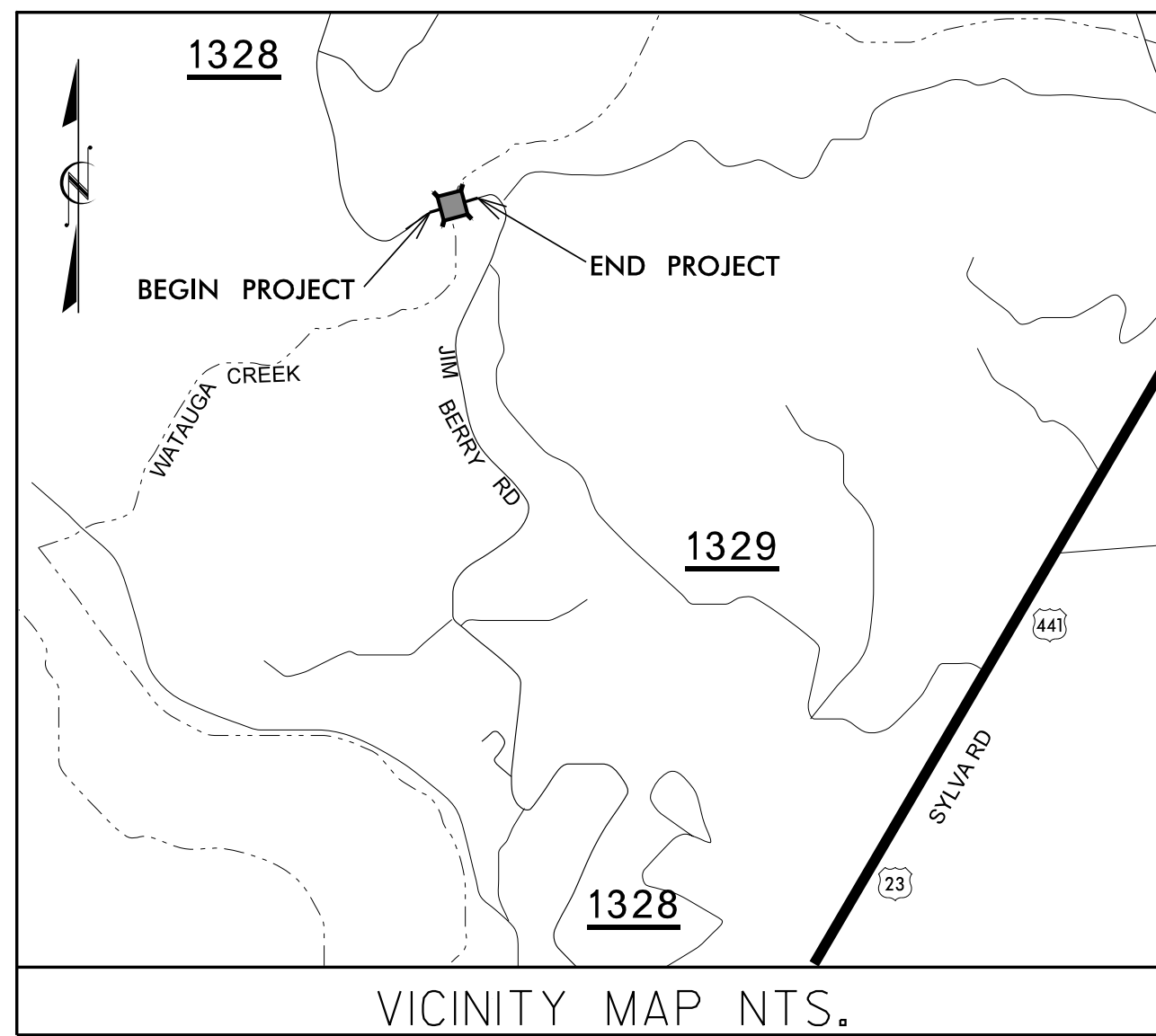
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**CONTRACT: DN00120 TIP NO: 17BP.14.R.140**

|                 |                             |             |              |
|-----------------|-----------------------------|-------------|--------------|
| STATE           | STATE PROJECT REFERENCE NO. | SHEET NO.   | TOTAL SHEETS |
| N.C.            | 17BP.14.R.140               |             |              |
| STATE PROJ. NO. | F.A. PROJ. NO.              | DESCRIPTION |              |
| 45360.1.33      | BRZ-1328(7)                 | PE          |              |
| 45360.1.33      | BRZ-1328(7)                 | RW          |              |
| 17BP.14.R.140   |                             | CONST.      |              |
|                 |                             |             |              |
|                 |                             |             |              |
|                 |                             |             |              |

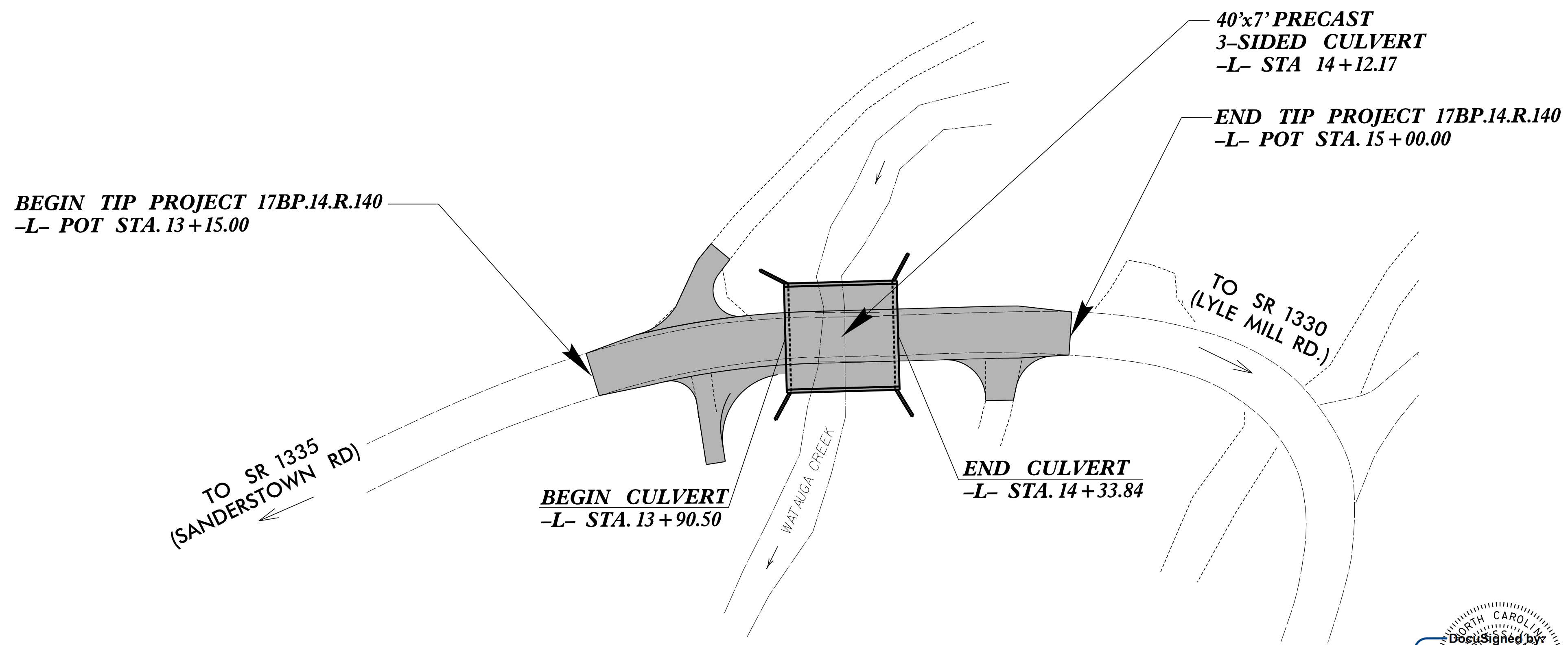
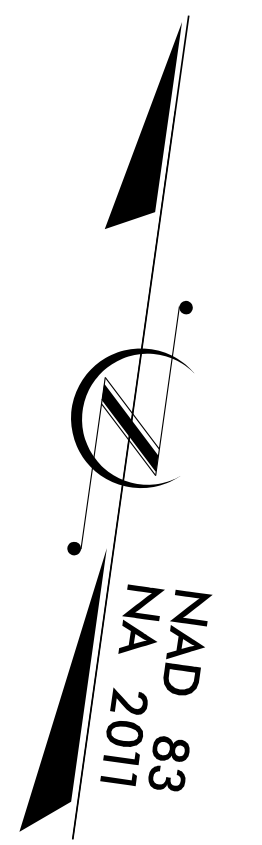
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STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS  
**MACON COUNTY**

*REPLACES BRIDGE NO. 64 OVER WATAUGA CREEK  
ON SR 1328 (JIM BERRY ROAD)*

**CULVERT**



Designed by  
**Hardy Willis**  
Professional Engineer  
No. 23461...  
1/10/2018

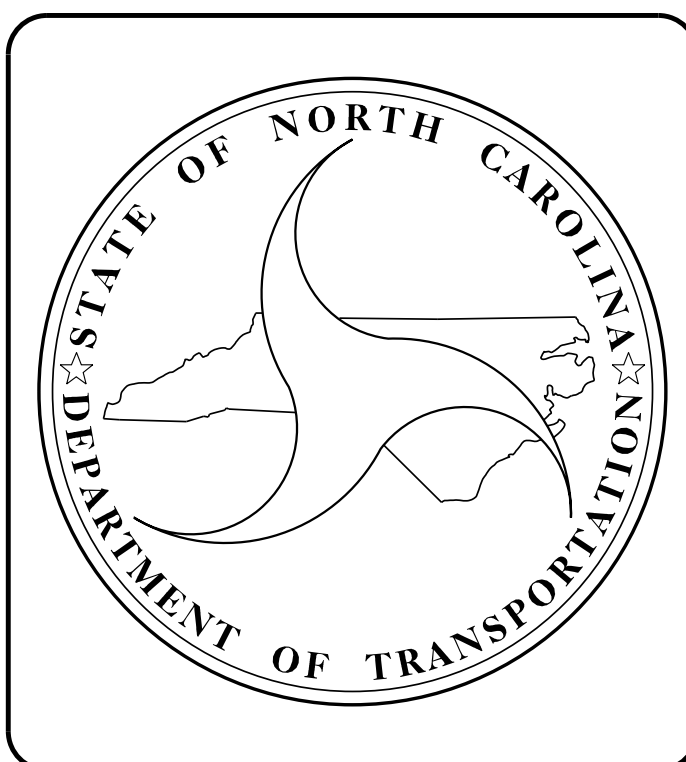
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**DESIGN DATA**

ADT 2009 = 1100  
ADT 2025 = 2200

T = 6 %  
V = 25 MPH

FUNC CLASS = MAJOR COLLECTOR LOCAL

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT 17BP.14.R.140 = 0.035 MI  
LENGTH STRUCTURE TIP PROJECT 17BP.14.R.140 = 0.008 MI  
TOTAL LENGTH OF TIP PROJECT 17BP.14.R.140 = 0.035 MI

Prepared in the Office of:  
**VAUGHN & MELTON**  
1318-F PATTON AVE.  
ASHEVILLE, NC, 28806

FOR THE NORTH CAROLINA DIVISION OF HIGHWAYS

---

2018 STANDARD SPECIFICATIONS

**LETTING DATE :**  
*February 13, 2018*

**HARDY WILLIS, PE**  
*PROJECT ENGINEER*

---

**JASON BARTLEY, EI**  
*PROJECT DESIGN ENGINEER*

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

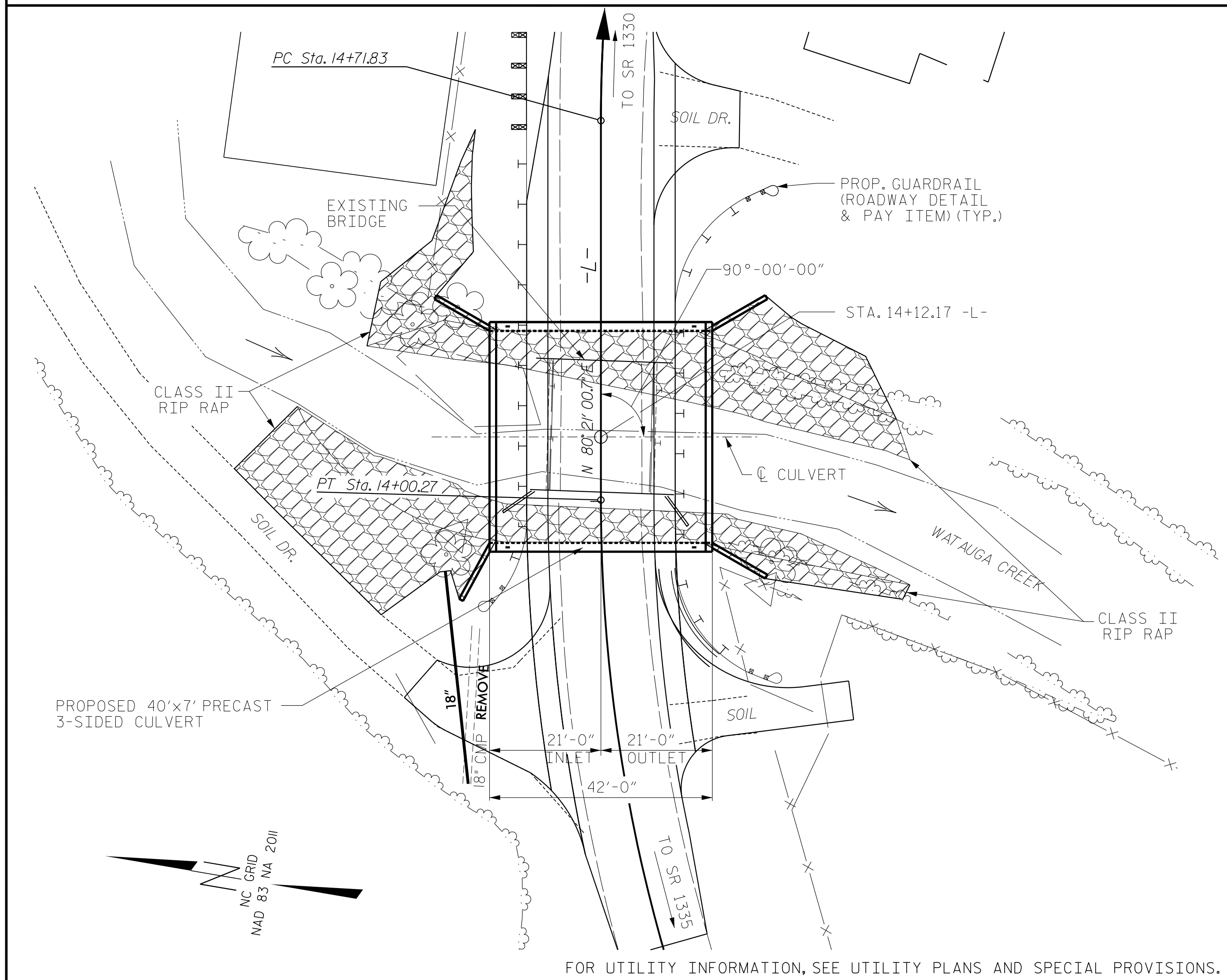
**DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA**

**JOSH DEYTON** P.E.  
*STATE DESIGN ENGINEER*

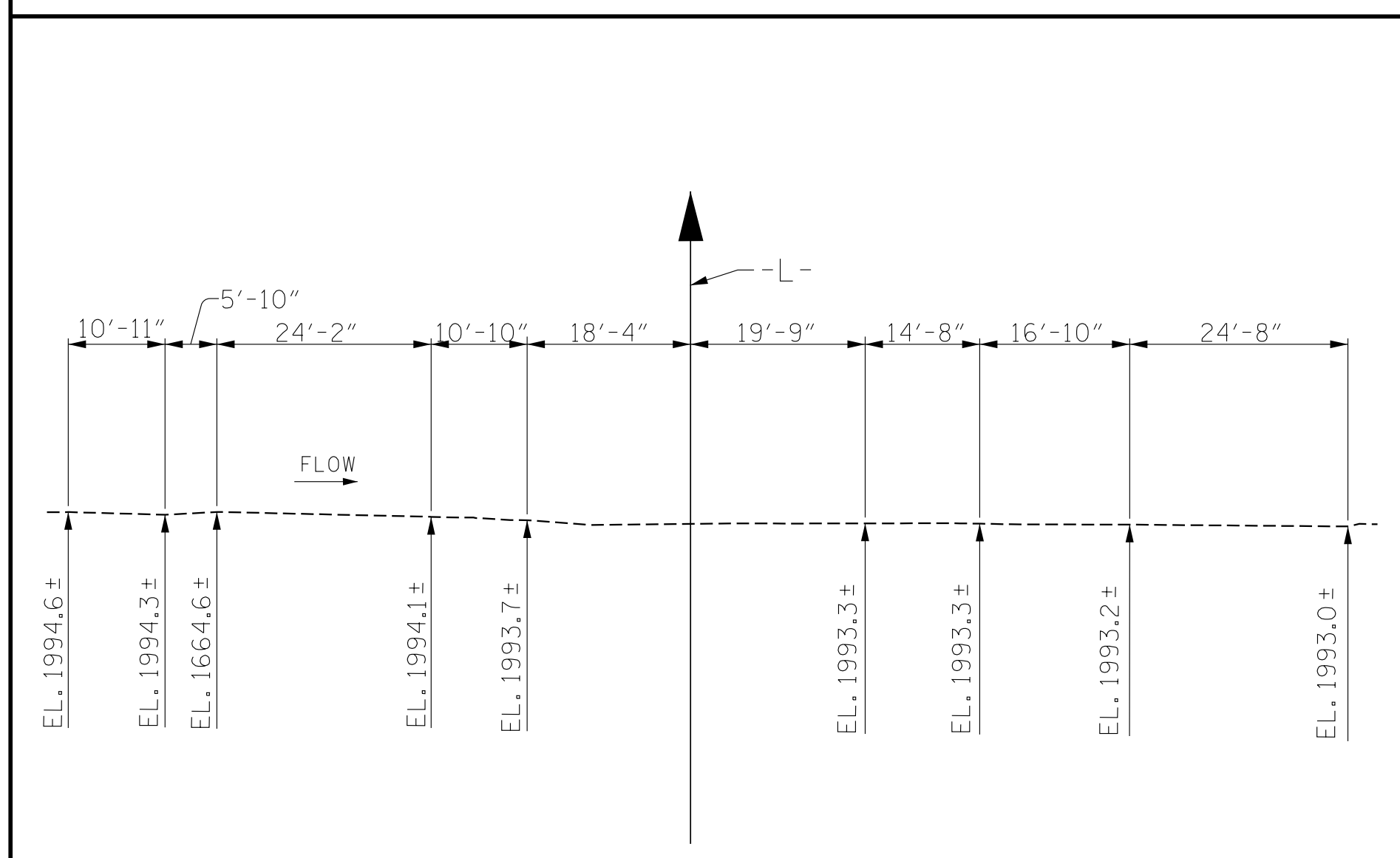
**DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION**

APPROVED  
DIVISION ADMINISTRATOR \_\_\_\_\_ DATE \_\_\_\_\_

BM #2: 8" SPIKE IN ROOT OF 36" SYCAMORE 68.5' LEFT OF STA. 15+94.11 -L-  
 N 565528.67, E 696839.55 EL. 2019.06'



— LOCATION SKETCH —



PROFILE ALONG CULVERT

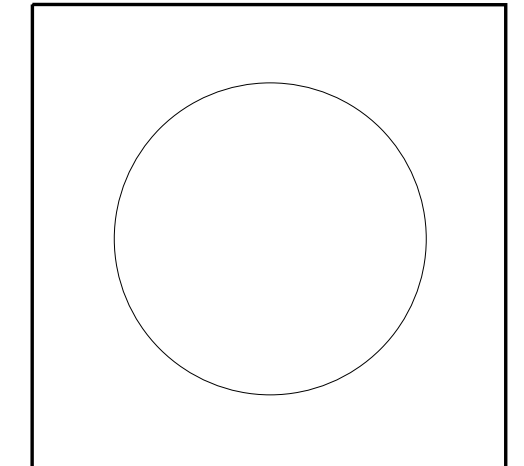
| TOTAL STRUCTURE QUANTITIES   |                |
|--|----------------|
| REMOVAL OF EXISTING STRUCTURE AT STA. 14+12.17 -L-                   | LUMP SUM       |
| PRECAST REINFORCED CONCRETE THREE-SIDED CULVERT AT STA. 14+12.17 -L- | LUMP SUM       |
| CLASS 'A' CONCRETE   | 60.6 CU. YDS.  |
| REINFORCING STEEL  | 4,857 LBS      |
| 12x53 STEEL H-PILES  | 121.0 LIN. FT. |
| CLASS II RIP RAP   | 94.0 TONS      |
| NATIVE MATERIAL  | 87.0 TONS      |
| PILE EXCAVATION IN SOIL  | 55.0 LIN. FT.  |
| PILE EXCAVATION NOT IN SOIL  | 58.0 LIN. FT.  |
| ASBESTOS ASSESSMENT  | LUMP SUM       |
| FOUNDATION EXCAVATION  | 8.7 CU. YDS.   |

| HYDRAULIC DATA                   |                          |
|----------------------------------|--------------------------|
| DESIGN DISCHARGE                 | = 1700 CFS               |
| DESIGN FREQUENCY                 | = 25 YRS                 |
| DESIGN HW ELEVATION              | = 2001.5 FT              |
| BASE DISCHARGE                   | = 2500 CFS               |
| BASE FREQUENCY                   | = 100 YRS                |
| BASE HW ELEVATION                | = 2002.98 FT             |
| OVERTOPPING DISCHARGE            | = 2100 CFS               |
| OVERTOPPING FREQUENCY            | = 25+ YRS                |
| OVERTOPPING ELEVATION            | = 2002.3 FT              |
| DRAINAGE AREA                    | = 7.68 SQ. MI.           |
| W.S. ELEVATION AT DATE OF SURVEY | = 1994.2 FT (10/15/2013) |

GRADE DATA

GRADE POINT ELEV. @ STATION 14+12.17 = 2002.6±  
 BED ELEV. @ STATION 14+12.17 = 1992.24±  
 ROADWAY SLOPES 2:1

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



NOTES:

ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING.  
 DESIGN FILL ----- MAX. = 3.8' MIN. = 2.6'  
 FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTES SHEET.  
 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.  
 CONCRETE IN WINGS SHALL BE POURED IN THE FOLLOWING ORDER:  
 1. FOOTINGS INCLUDING 4" OF ALL VERTICAL WALLS.  
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT.  
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE NCDOT STANDARD SPECIFICATIONS.  
 A 3'-0" STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.  
 FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC MANAGEMENT PLANS.  
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.  
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.  
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.  
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.  
 FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.  
 THE CONTRACTOR SHALL PROVIDE DRIVING EQUIPMENT IN ACCORDANCE WITH SUB-ARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.  
 TEMPORARY SHORING MAY BE REQUIRED. SEE STANDARD DRAWING NO. 1801.01 FOR STANDARD TEMPORARY SHORING.  
 THE EXISTING STRUCTURE CONSISTING OF 1 SPAN, 25'-6" LONG, WITH A CLEAR ROADWAY WIDTH OF 19'-0", WITH TIMBER DECKING ON I-BEAMS ON TIMBER CAPS, POSTS AND SILLS AND TIMBER BULKHEADS AND LOCATED AT THE PROPOSED STRUCTURE, SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.  
 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.  
 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.

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 SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.  
 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.  
 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'.  
 FOR PRECAST REINFORCED THREE-SIDE CULVERT, SEE SPECIAL PROVISIONS.  
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.  
 FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.  
 FOOTING IS DESIGNED FOR ASSUMED PRECAST CULVERT WALL THICKNESS OF 1'-8". HEADWALL IS DESIGNED FOR PRECAST TOP SLAB THICKNESS OF 1'-3".

FOUNDATION RECOMMENDATIONS:

THE SPREAD FOOTINGS ARE DESIGNED FOR A FACTORED RESISTANCE OF 6 TSF. CHECK FIELD CONDITIONS FOR THE REQUIRED RESISTANCE OF 14 TSF JUST BEFORE PLACING CONCRETE.  
 KEY SPREAD FOOTINGS AT LEAST 12" INTO ROCK WITH MINIMUM THICKNESS AS SHOWN ON THE PLANS.  
 THE SCOUR CRITICAL ELEVATION IS THE BOTTOM OF FOOTING. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.  
 FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.  
 PILES AT EAST FOUNDATION ARE DESIGNED FOR A FACTORED RESISTANCE OF 85 TONS PER PILE.  
 DRIVE PILES AT EAST FOUNDATION TO A REQUIRED DRIVING RESISTANCE OF 145 TONS PER PILE.  
 PILE EXCAVATION IS REQUIRED TO INSTALL PILES AT EAST FOUNDATION. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATION 1,978.0 FT. AND HAVE AT LEAST 5 FEET OF PENETRATION INTO WEATHERED ROCK OR CRYSTALLINE ROCK. SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.  
 CONCRETE IS REQUIRED TO FILL HOLES FOR PILE EXCAVATION AT EAST FOUNDATION.

PROJECT NO. 17BP.14.R.140  
 MACON COUNTY  
 STATION: 14+12.17 -L-  
 SHEET 1 OF 9 REPLACES BRIDGE NO. 64

DocuSigned by:  
**Hardy Willis**  
 Professional Engineer  
 License No. 002876  
 State of North Carolina  
 1/10/2018

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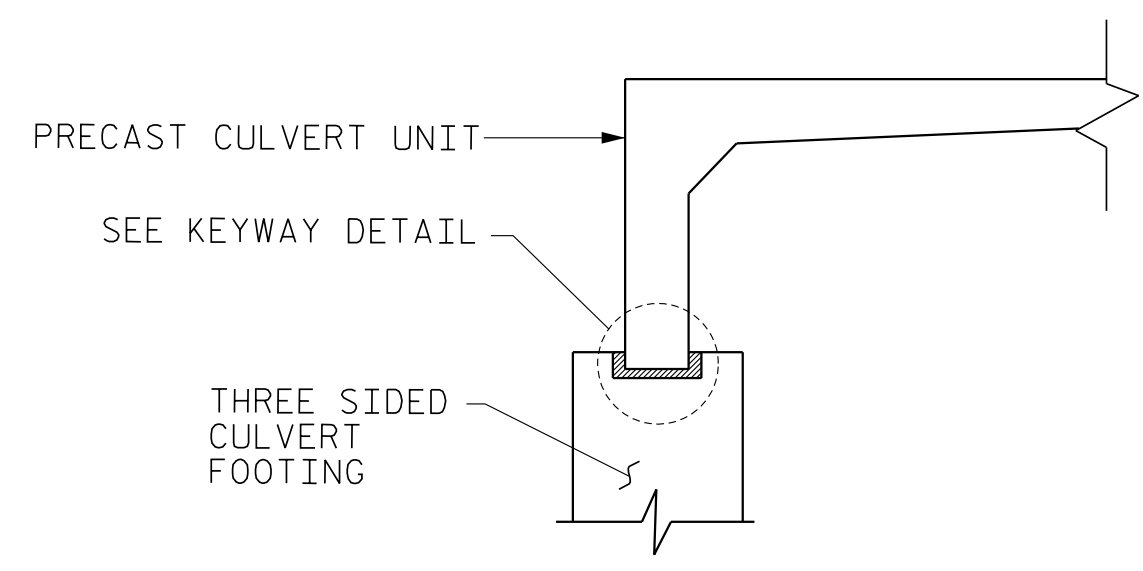
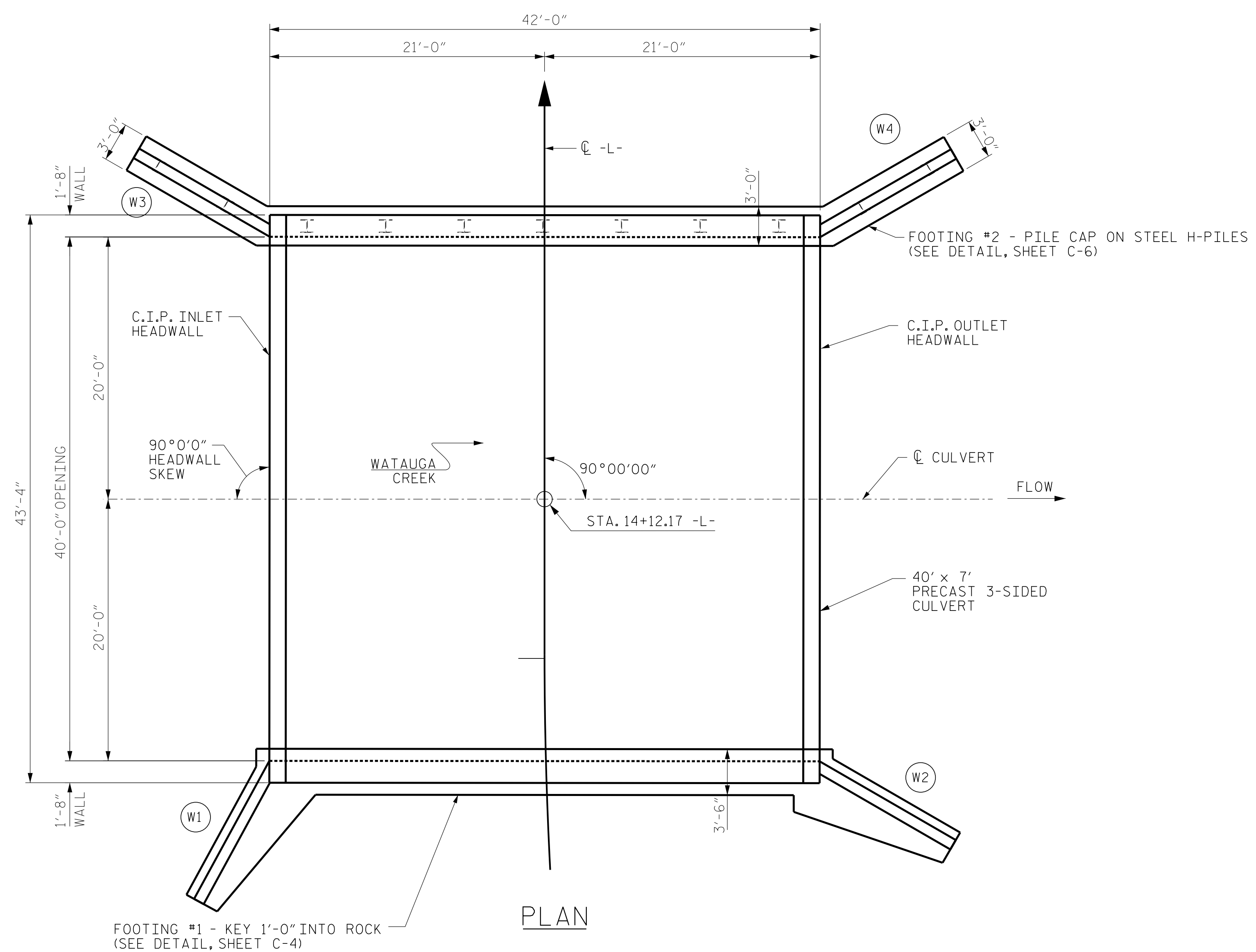
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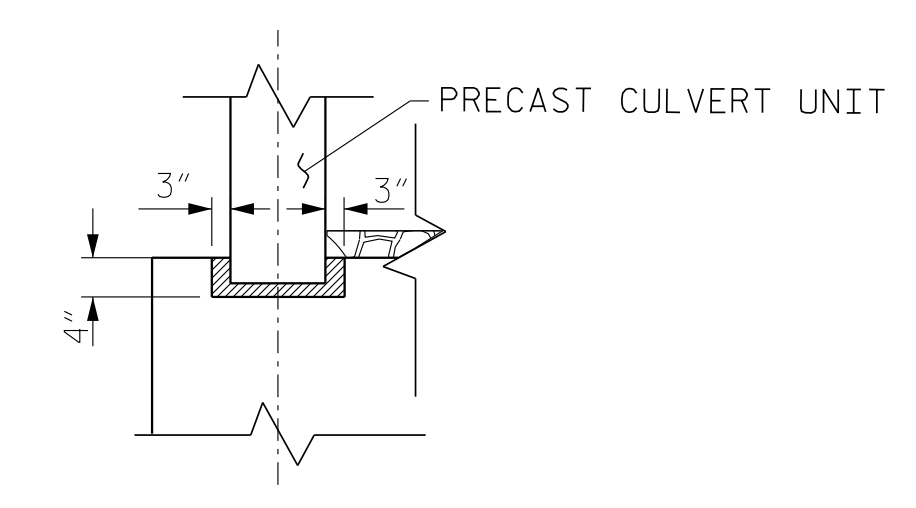
GENERAL DRAWING  
 PRECAST REINFORCED CONCRETE  
 THREE-SIDED CULVERT, 90° SKEW  
 ALONG WATAUGA CREEK  
 ON SR 1328 (JIM BERRY ROAD)  
 BETWEEN SR 1335 AND SR 1330

| REVISIONS |     |       |     |     |       | SHEET NO.<br>C-1  |
|-----------|-----|-------|-----|-----|-------|-------------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: |                   |
| 1         |     |       | 3   |     |       | TOTAL SHEETS<br>9 |
| 2         |     |       | 4   |     |       |                   |

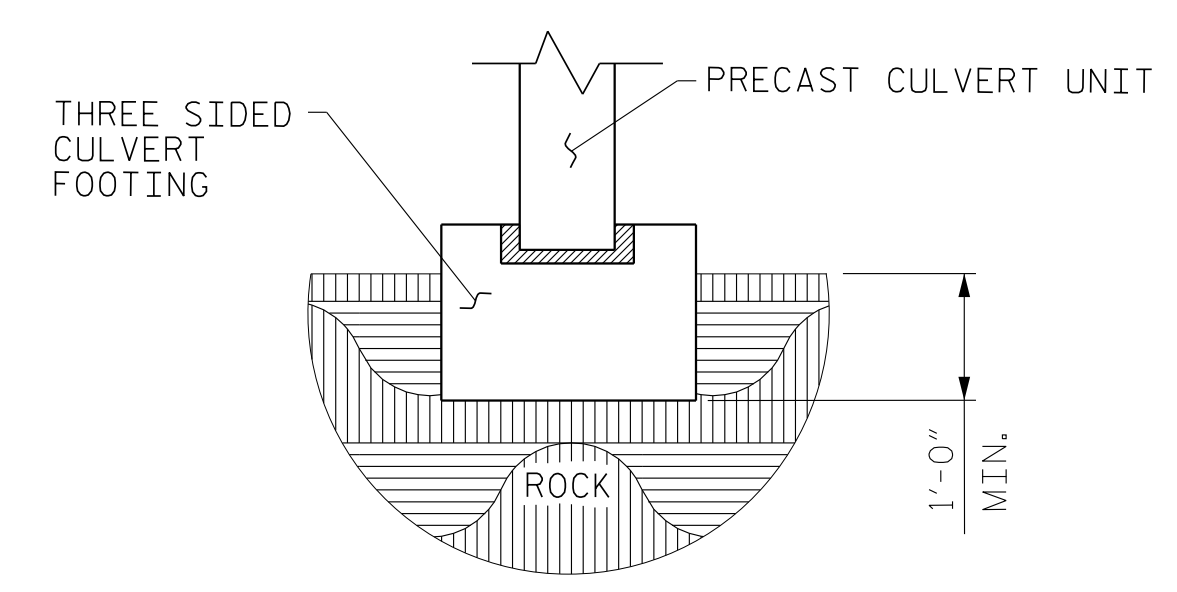
DRAWN BY: FRJ DATE: 8/2016  
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SECTION THRU FOOTING



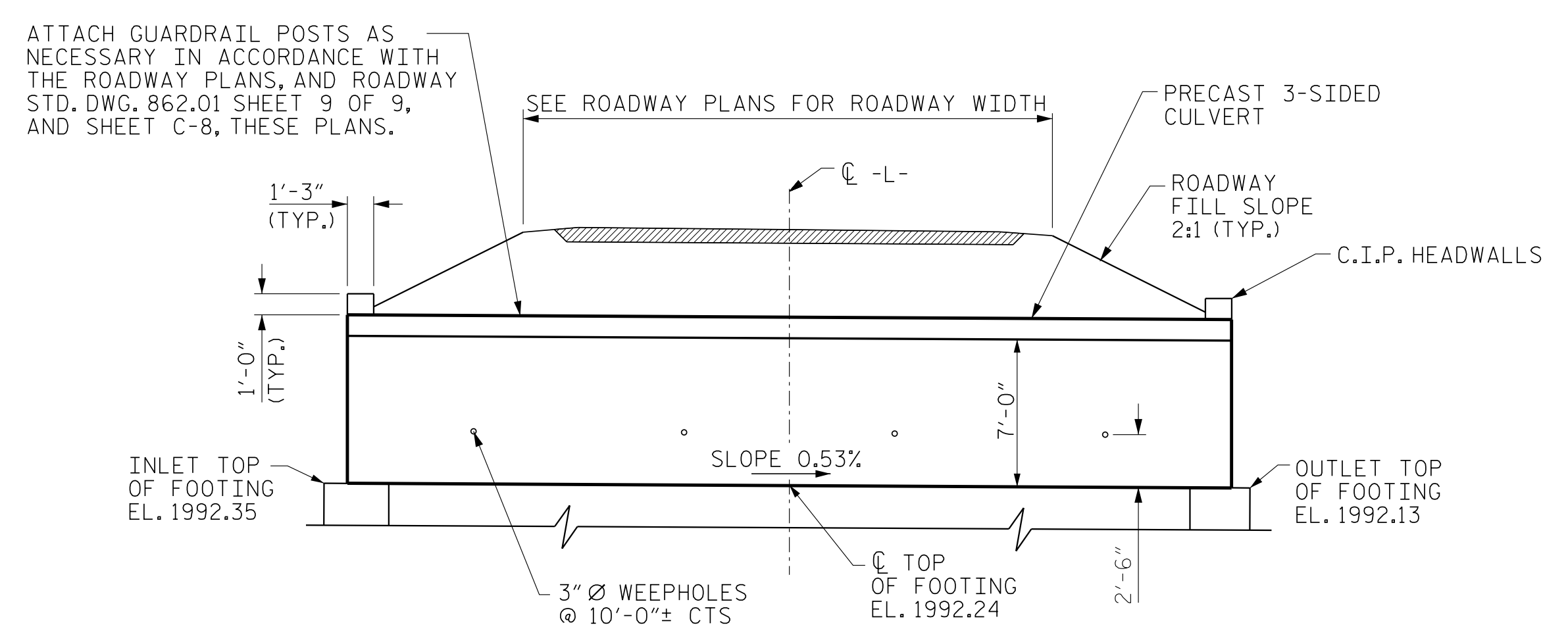
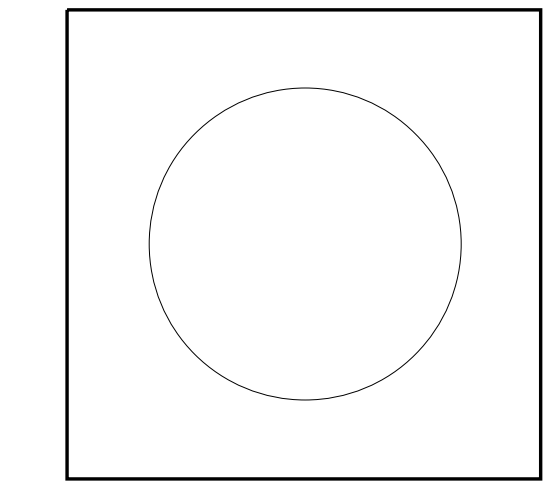
KEYWAY DETAIL



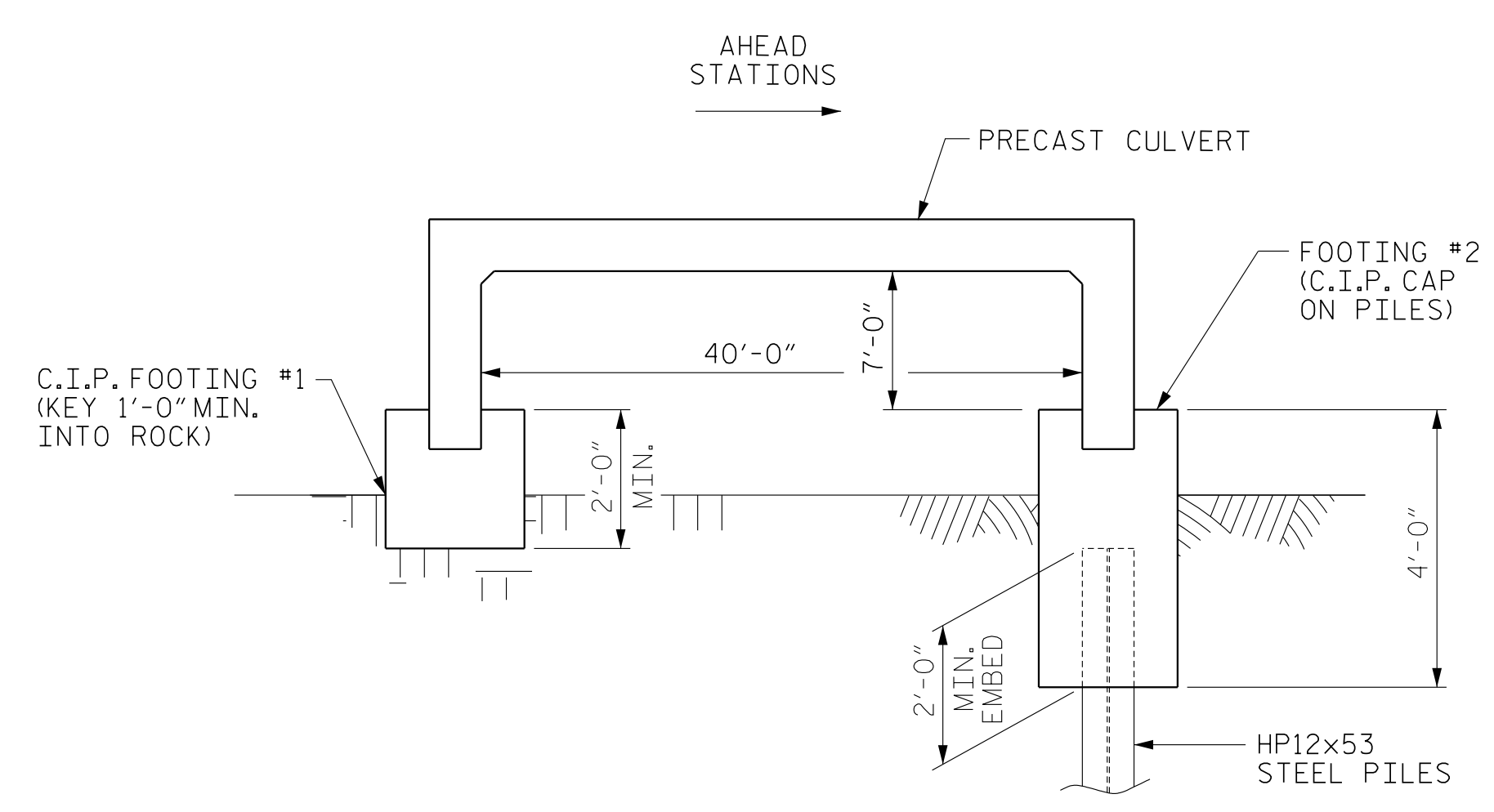
KEYED FOOTING DETAIL

SIDES OF FOOTING SHALL BE IN CONTACT WITH UNDISTURBED MATERIAL FOR MINIMUM DIMENSION SHOWN  
THIS PERTAINS TO FOOTING #1 ONLY

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



CULVERT SECTION NORMAL TO ROADWAY  
(WINGS ARE NOT SHOWN FOR CLARITY)



SECTION FACING UPSTREAM

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DESIGNED BY  
SEAL  
Hardy Willis  
10/10/2018

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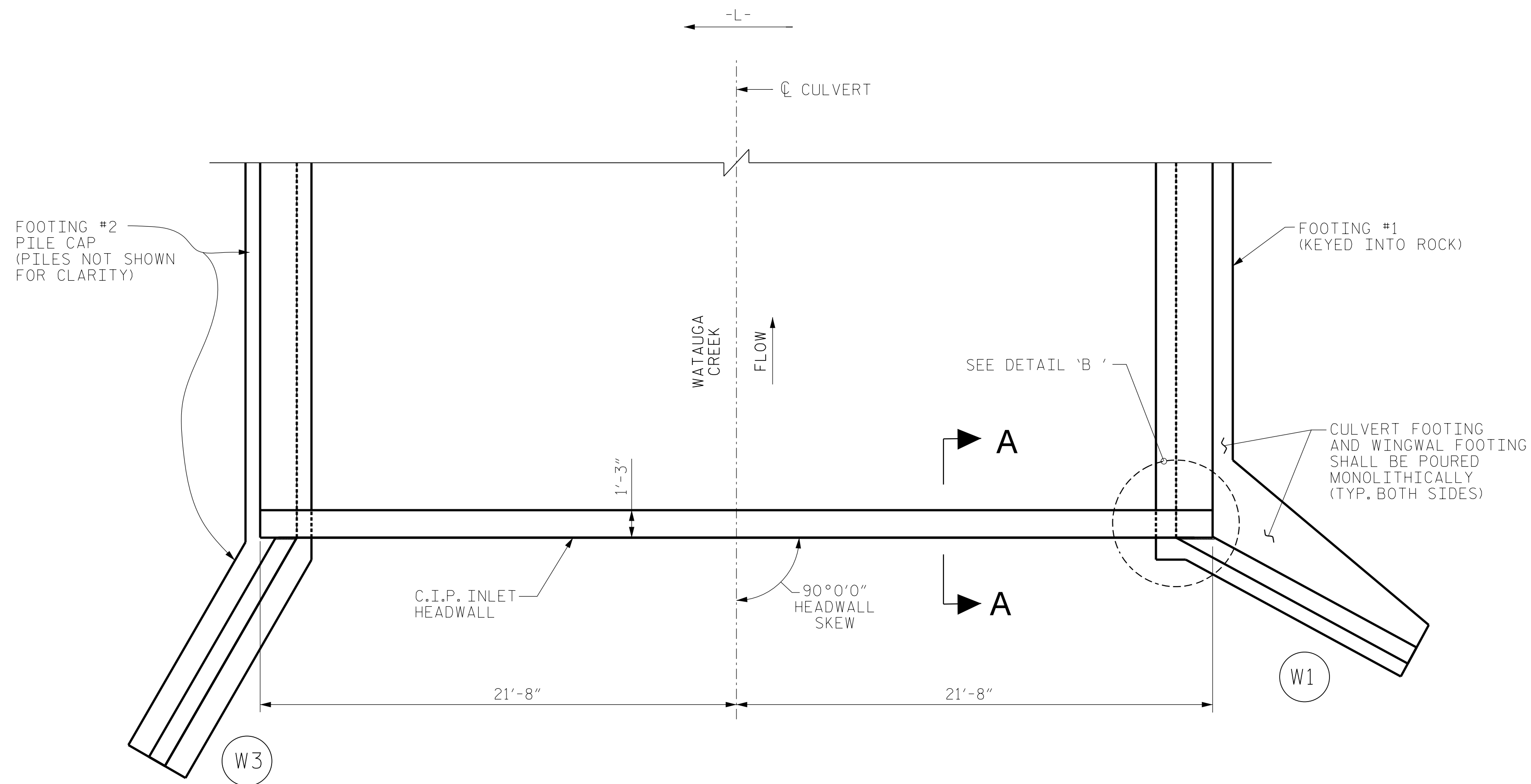
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MACON COUNTY  
STATION: 14+12.17 -L-

SHEET 2 OF 9

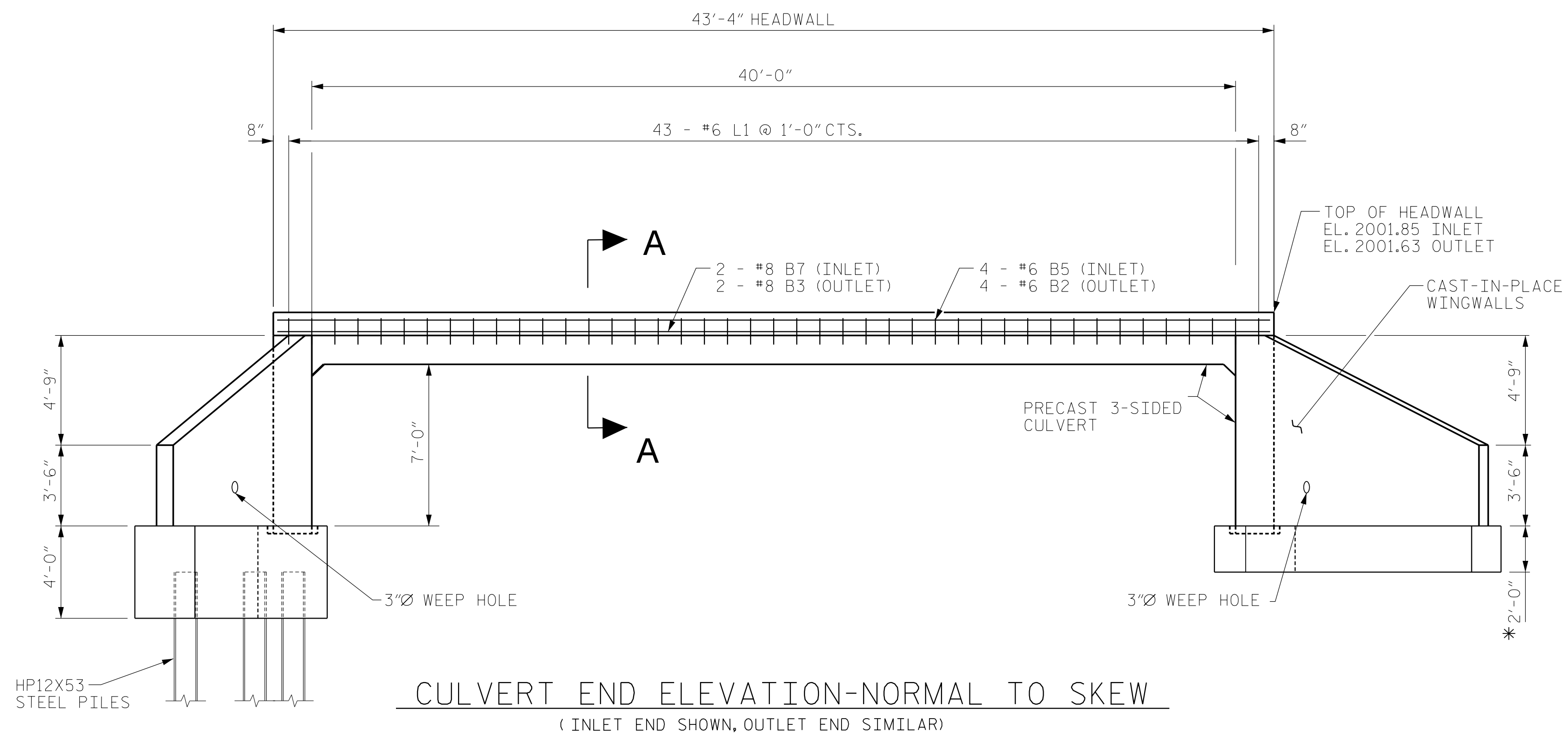
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RALEIGH

PRECAST REINFORCED CONCRETE THREE-SIDED CULVERT, 90° SKEW ALONG WATAUGA CREEK ON SR 1328 (JIM BERRY ROAD) BETWEEN SR 1335 AND SR 1330

| REVISIONS |     |       |     |     |       | SHEET NO.<br>C-2  |
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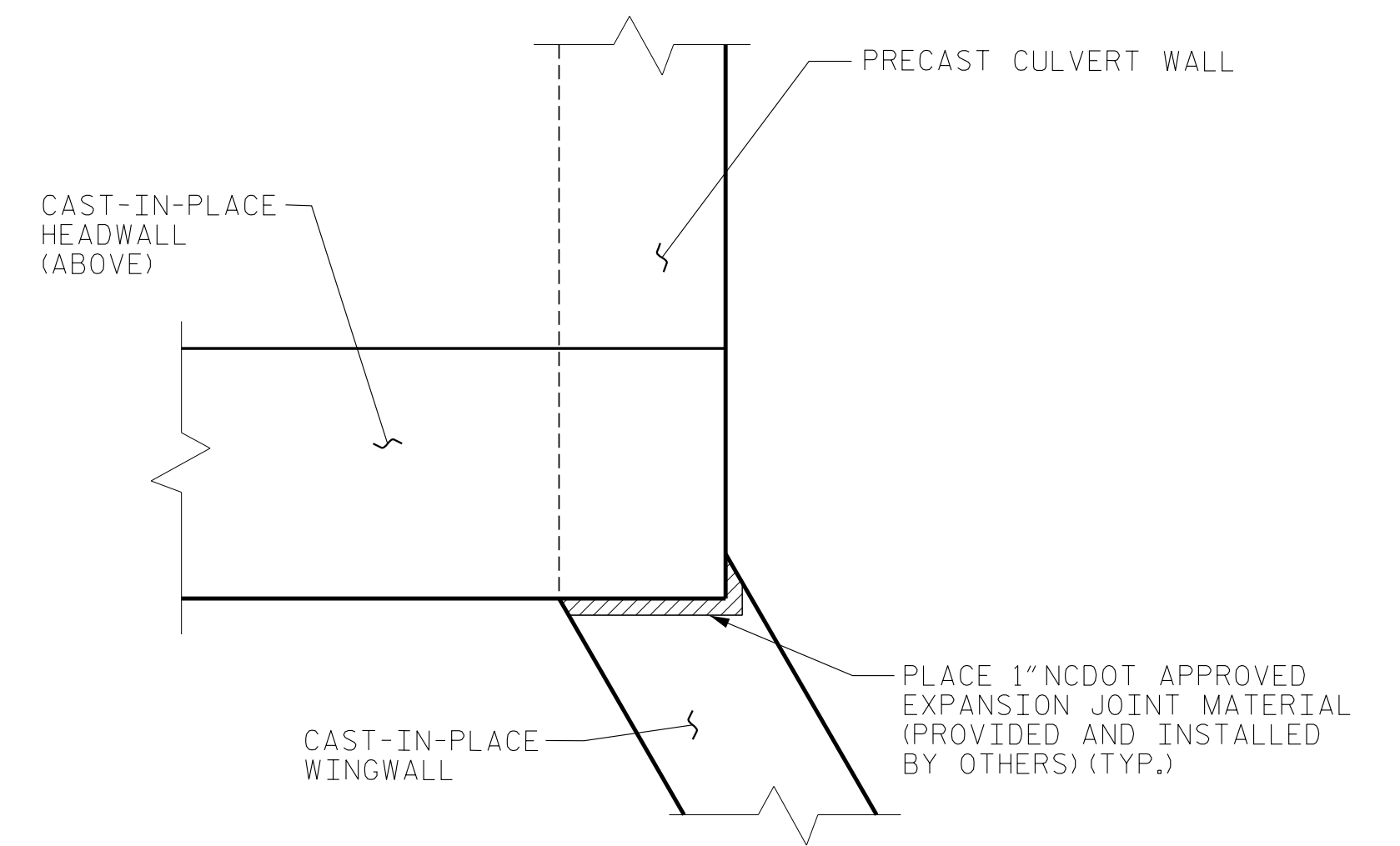


**HEADWALL PLAN**  
(INLET END SHOWN, OUTLET END SIMILAR)

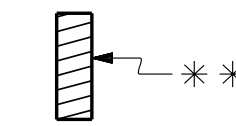


**CULVERT END ELEVATION-NORMAL TO SKEW**  
(INLET END SHOWN, OUTLET END SIMILAR)

\* MIN. FOOTING DEPTH, MAINTAIN 1'-0" MIN. ROCK EMBEDMENT

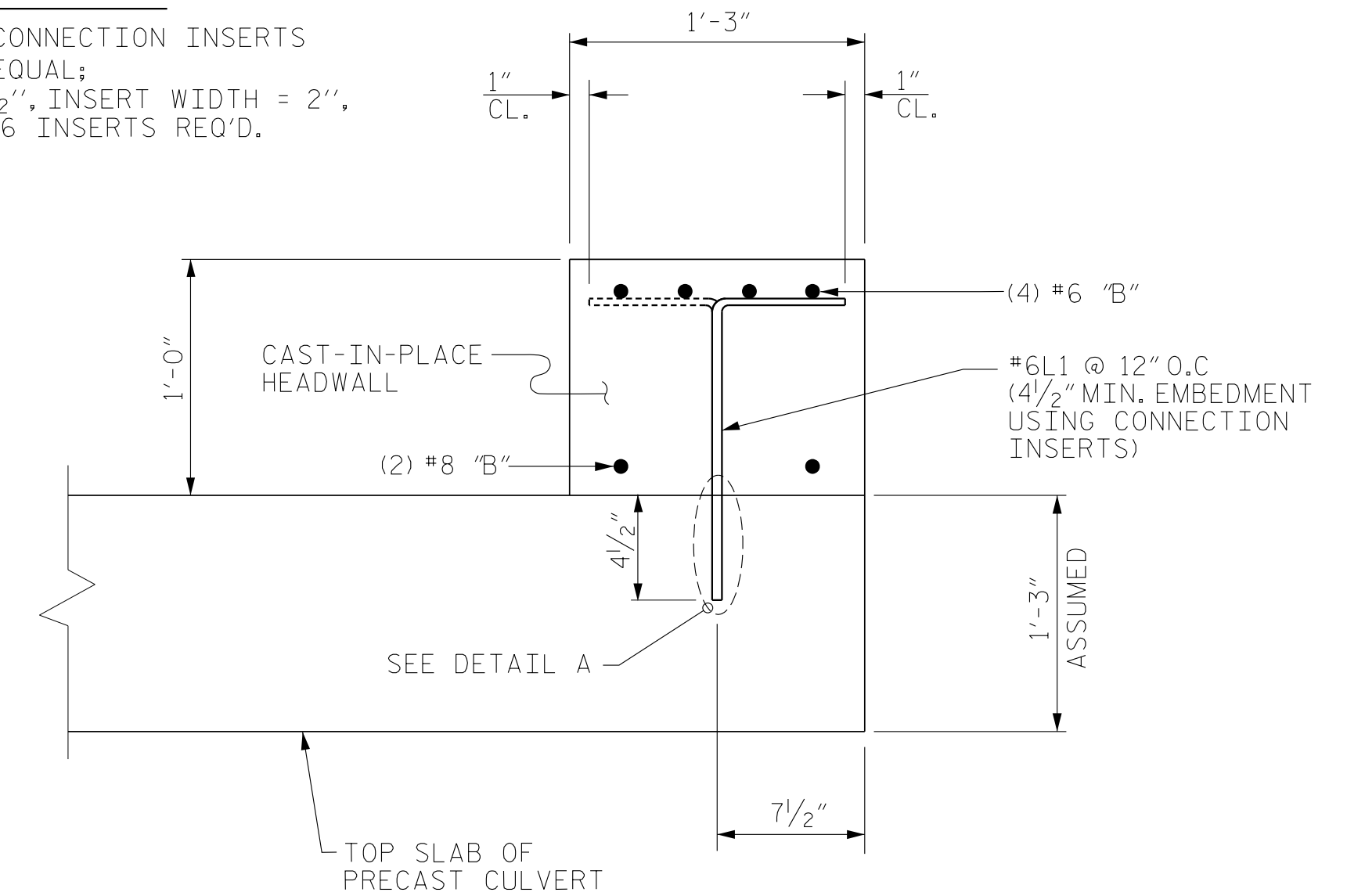


**DETAIL "B"**



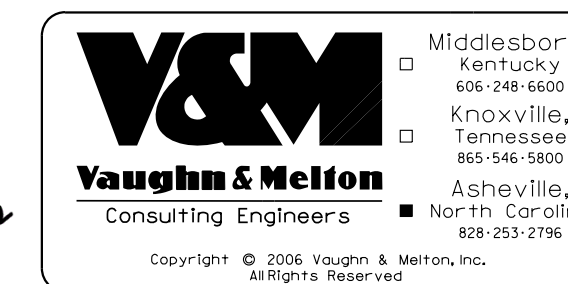
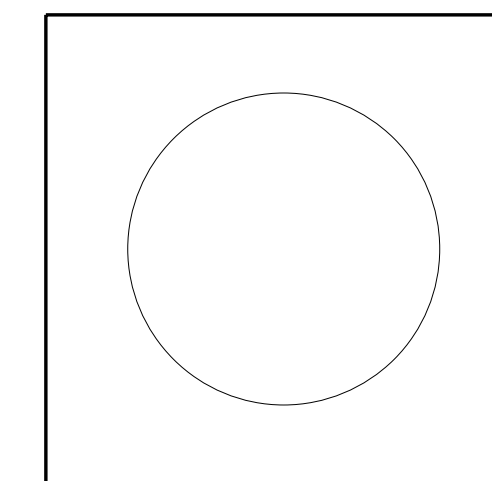
**DETAIL A**

\*\* STRUCTURAL CONNECTION INSERTS  
2 STRUT OR EQUAL;  
LENGTH = 4 1/2"; INSERT WIDTH = 2";  
DIA. = 3/4". 86 INSERTS REQ'D.



**SECTION A-A**

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



PROJECT NO. 17BP.14.R.140

MACON COUNTY

STATION: 14+12.17 -L-

SHEET 3 OF 9

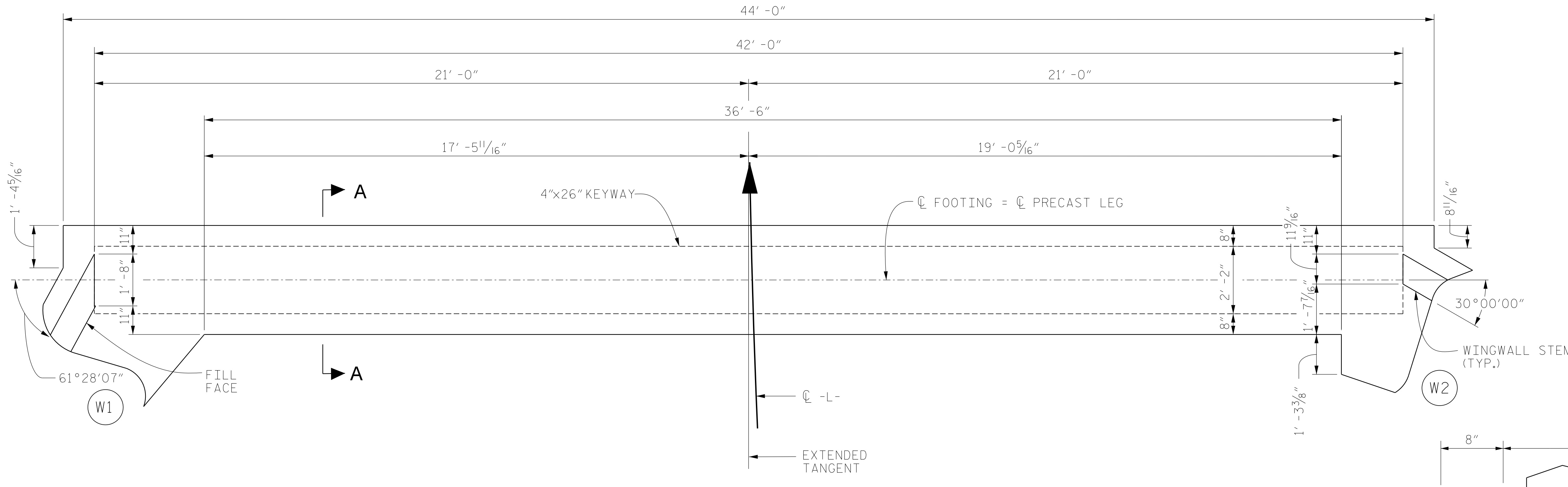
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**CAST-IN-PLACE HEADWALL DETAILS**

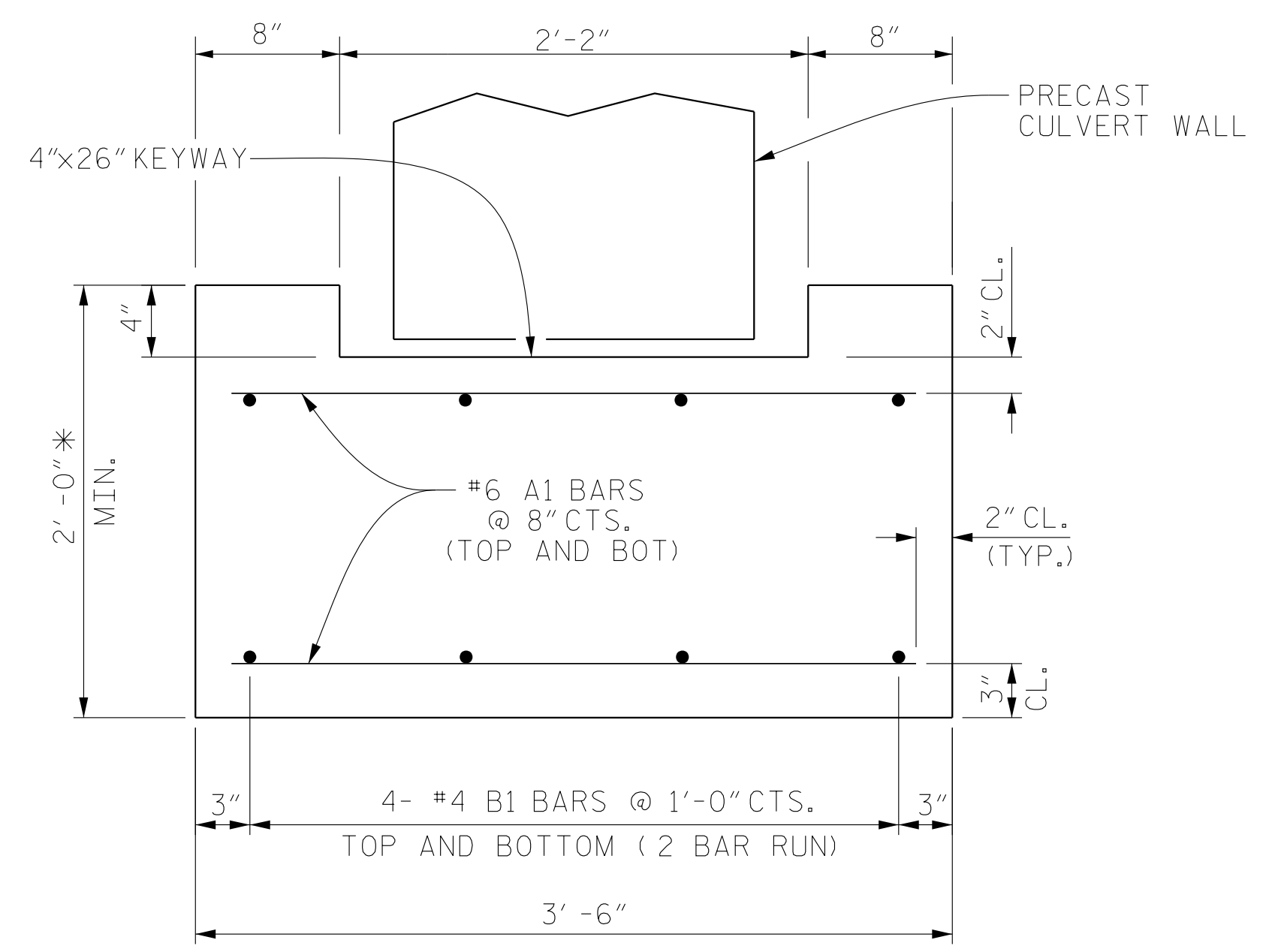
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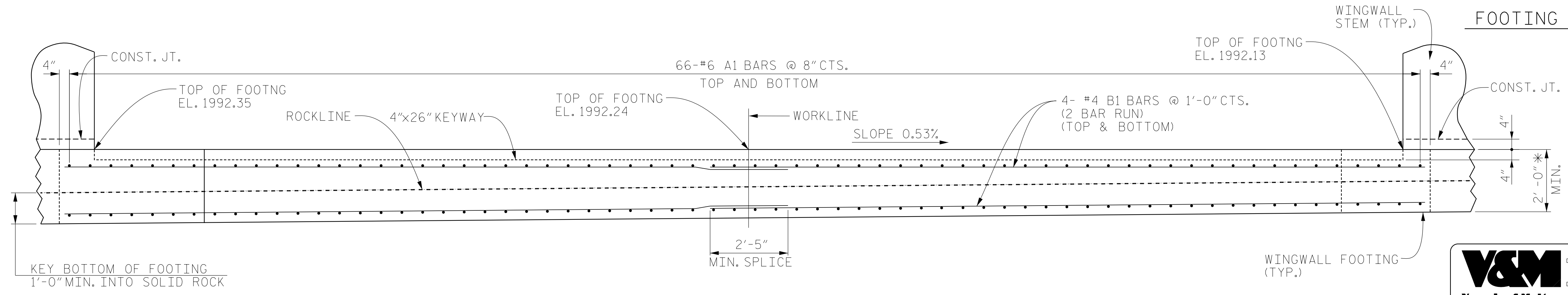
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| 1         |     |       | 3   |     |       | TOTAL SHEETS<br>9 |
| 2         |     |       | 4   |     |       |                   |



FOOTING #1 - PLAN



FOOTING #1 - SECTION A-A



FOOTING #1 - ELEVATION

\* MAINTAIN 1'-0" MIN. EMBEDMENT IN ROCK

PROJECT NO. 17BP.14.R.140  
 MACON COUNTY  
 STATION: 14+12.17 -L-

SHEET 4 OF 9

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

FOOTING #1 DETAILS

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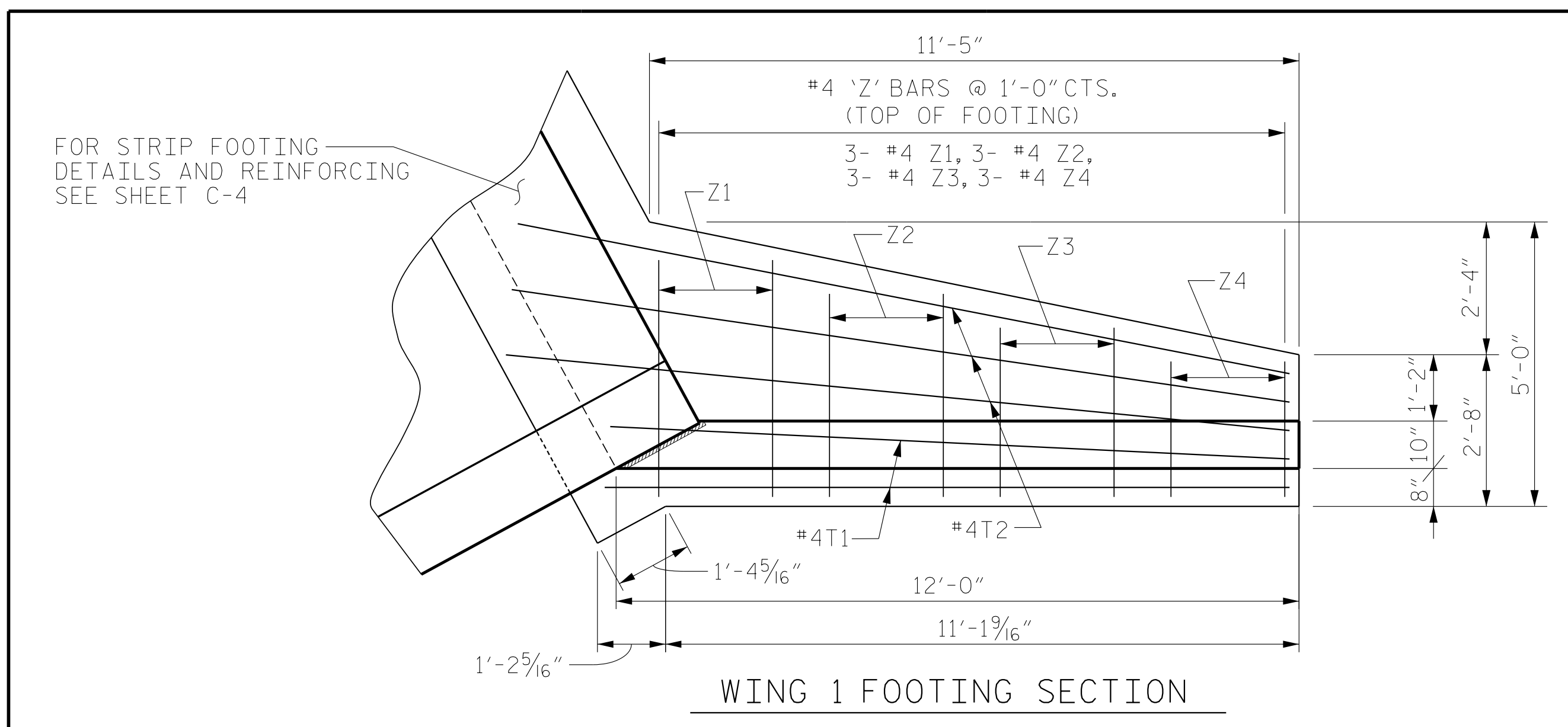
Not signed by  
 Hardy L. Willis  
 1/10/2018

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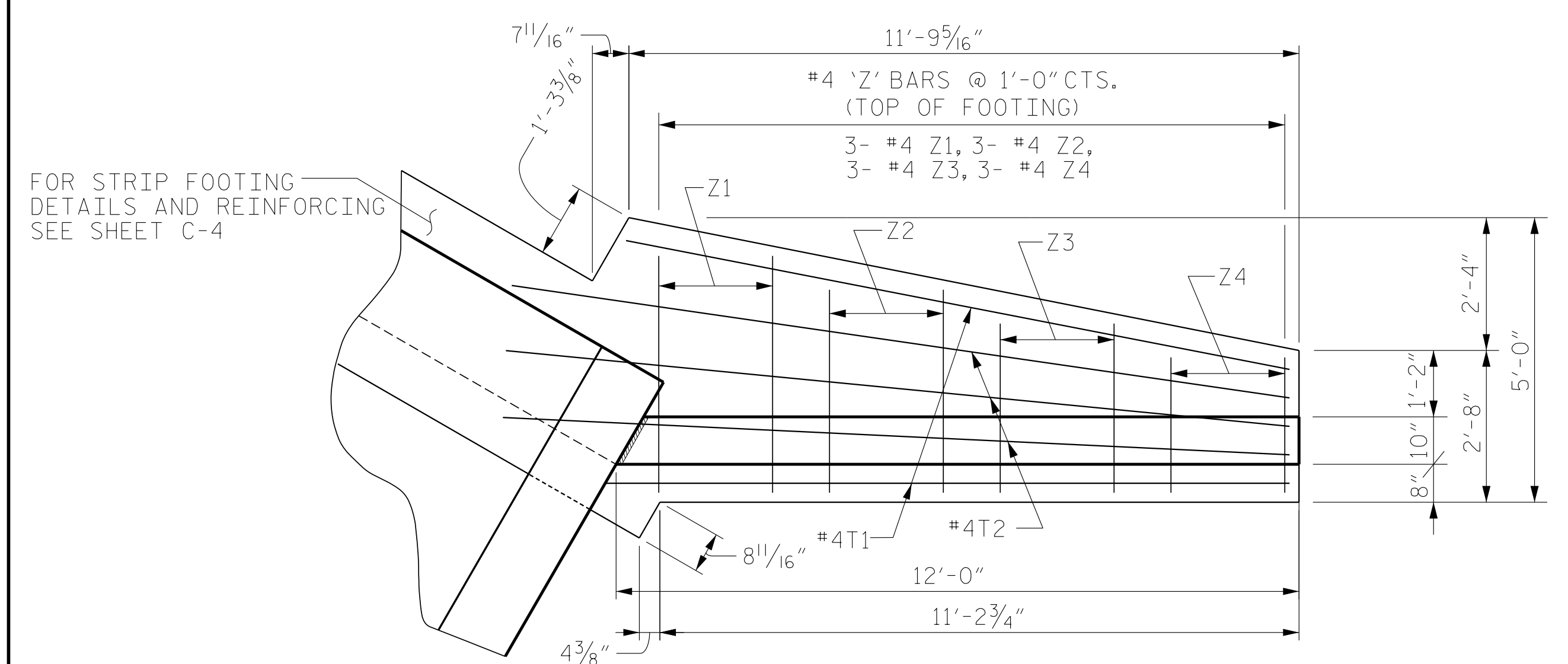
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| REVISIONS |     |       |     |     |       |
|-----------|-----|-------|-----|-----|-------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: |
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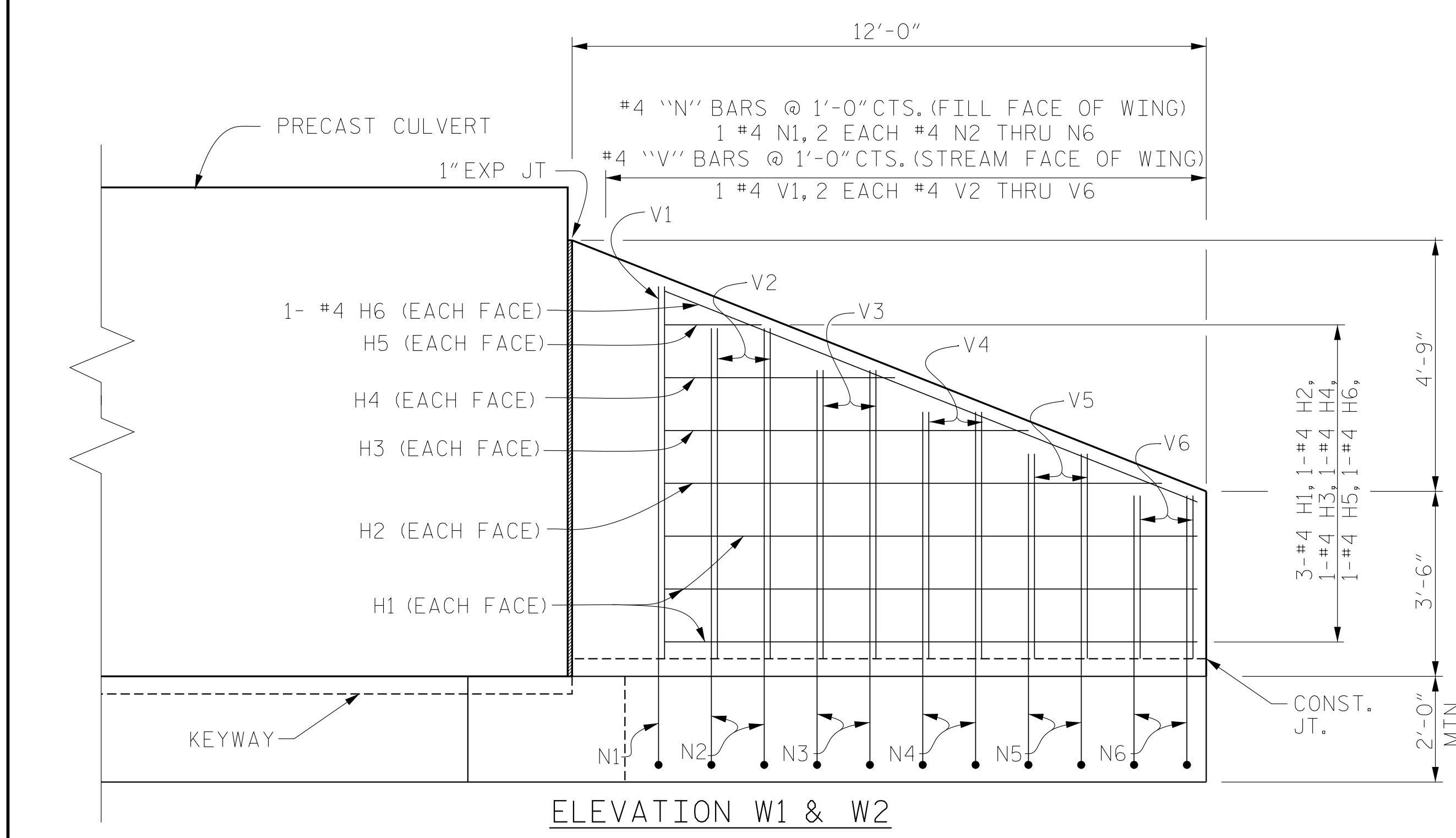
SHEET NO. C-4  
 TOTAL SHEETS 9



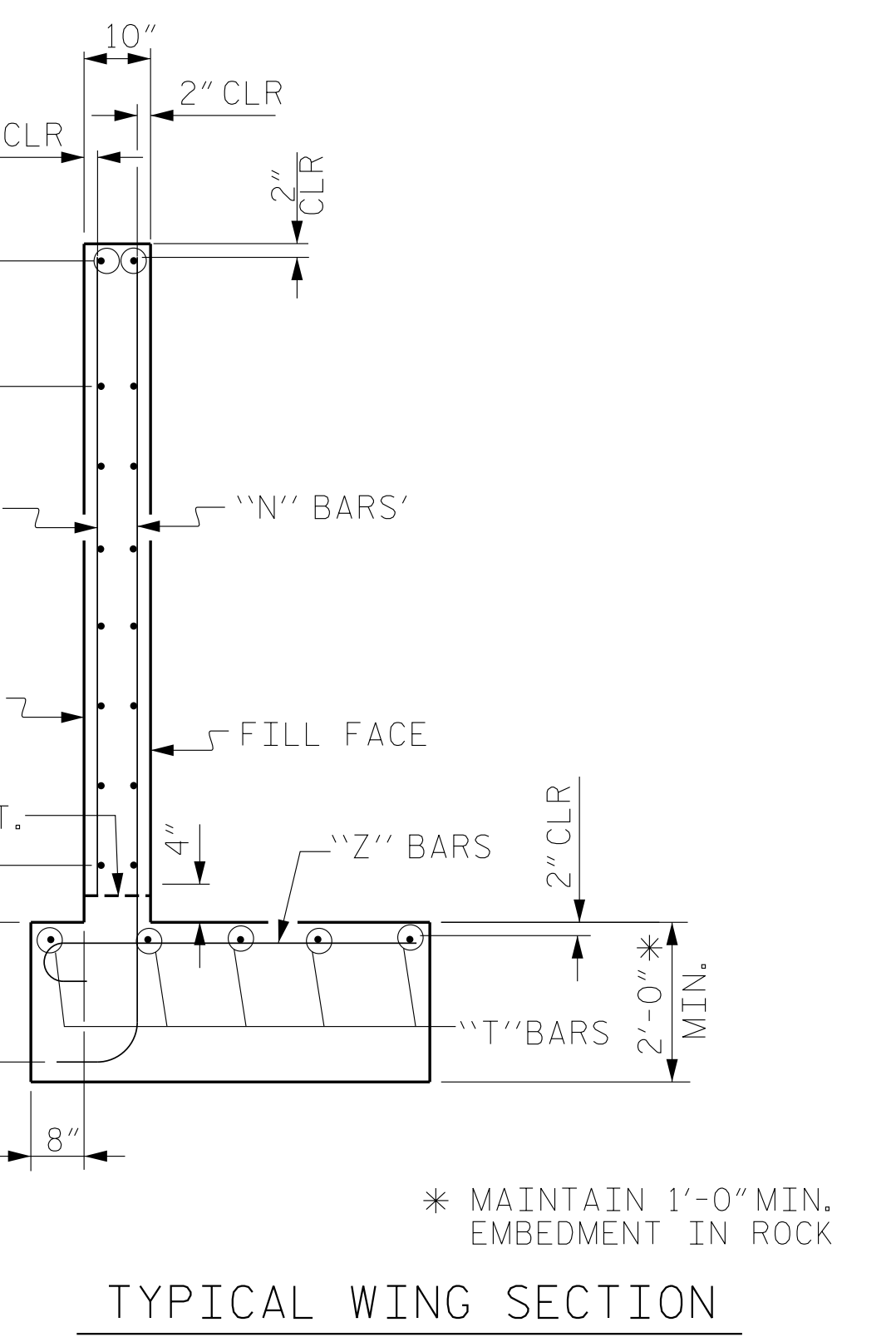
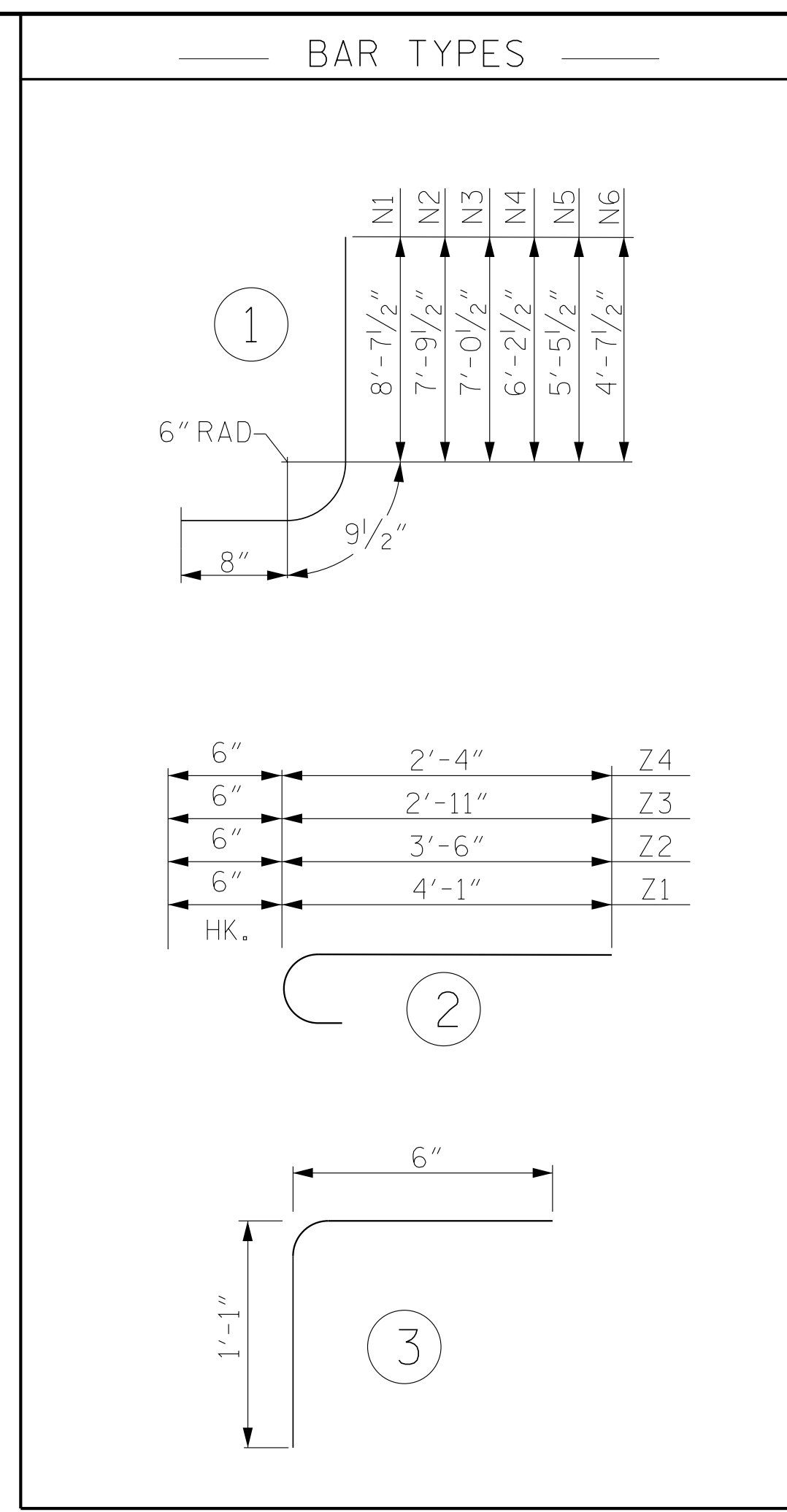
WING 1 FOOTING SECTION



WING 2 FOOTING SECTION



ELEVATION W1 & W2



TYPICAL WING SECTION

| BILL OF MATERIAL                                   |     |      |      |         |        |     |     |      |      |         |        |
|--|-----|------|------|---------|--------|-----|-----|------|------|---------|--------|
| FOOTING #1, INLET HEADWALL AND WINGWALLS (W1 & W2) |     |      |      |         |        |     |     |      |      |         |        |
| BAR  | NO. | SIZE | TYPE | LENGTH  | WEIGHT | BAR | NO. | SIZE | TYPE | LENGTH  | WEIGHT |
| A1   | 132 | 6    | STR  | 3'-2"   | 628    | T1  | 4   | 4    | STR  | 11'-10" | 32     |
|  |     |      |      |         |        | T2  | 6   | 4    | STR  | 14'-4"  | 57     |
| B1   | 16  | 4    | STR  | 23'-1"  | 247    | V1  | 2   | 4    | STR  | 7'-0"   | 9      |
| B2   | 4   | 6    | STR  | 43'-0"  | 258    | V2  | 4   | 4    | STR  | 6'-3"   | 17     |
| B3   | 2   | 8    | STR  | 43'-0"  | 230    | V3  | 4   | 4    | STR  | 5'-5"   | 14     |
|  |     |      |      |         |        | V4  | 4   | 4    | STR  | 4'-8"   | 12     |
| L1   | 43  | 6    | 3    | 1'-7"   | 102    | V5  | 4   | 4    | STR  | 3'-10"  | 10     |
|  |     |      |      |         |        | V6  | 4   | 4    | STR  | 3'-1"   | 8      |
| H1   | 12  | 4    | STR  | 10'-1"  | 81     | Z1  | 6   | 4    | 2    | 4'-7"   | 18     |
| H2   | 4   | 4    | STR  | 9'-5"   | 25     | Z2  | 6   | 4    | 2    | 4'-0"   | 16     |
| H3   | 4   | 4    | STR  | 6'-10"  | 18     | Z3  | 6   | 4    | 2    | 3'-5"   | 14     |
| H4   | 4   | 4    | STR  | 4'-4"   | 12     | Z4  | 6   | 4    | 2    | 2'-10"  | 11     |
| H5   | 4   | 4    | STR  | 1'-10"  | 5      |     |     |      |      |         |        |
| H6   | 4   | 4    | STR  | 10'-10" | 29     |     |     |      |      |         |        |
| N1   | 2   | 4    | 1    | 10'-1"  | 13     |     |     |      |      |         |        |
| N2   | 4   | 4    | 1    | 9'-3"   | 25     |     |     |      |      |         |        |
| N3   | 4   | 4    | 1    | 8'-6"   | 23     |     |     |      |      |         |        |
| N4   | 4   | 4    | 1    | 7'-8"   | 20     |     |     |      |      |         |        |
| N5   | 4   | 4    | 1    | 6'-11"  | 18     |     |     |      |      |         |        |
| N6   | 4   | 4    | 1    | 6'-1"   | 16     |     |     |      |      |         |        |

REINFORCING STEEL 1968 LBS.

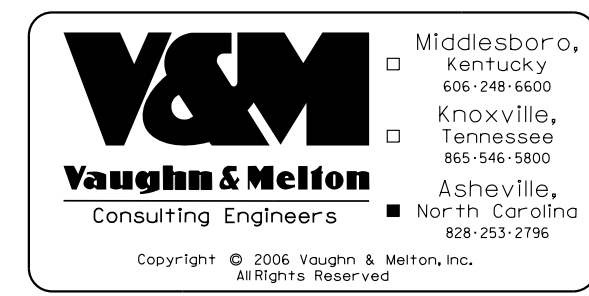
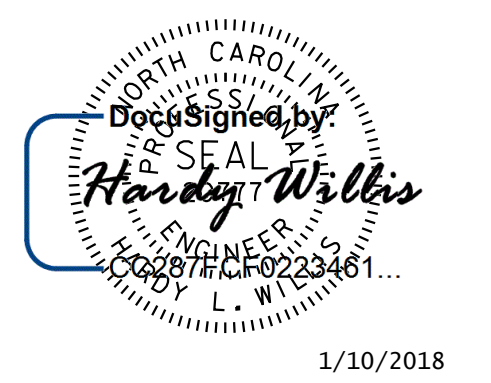
| CLASS A CONCRETE BREAKDOWN               |                  |
|--|------------------|
| POUR #1 FOOTING ** (CULVERT & WING WALL) | 20.5 C.Y.        |
| POUR #2 WING WALL STEMS                  | 4.1 C.Y.         |
| POUR #3 HEADWALL                         | 2.0              |
| <b>TOTAL CLASS A CONCRETE</b>            | <b>26.6 C.Y.</b> |

\*\* FOOTING QUANTITY BASED ON ASSUMED AVERAGE FOOTING THICKNESS OF 2'-6".

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PROJECT NO. 17BP.14.R.140  
 MACON COUNTY  
 STATION: 14+12.17 -L-

SHEET 5 OF 9

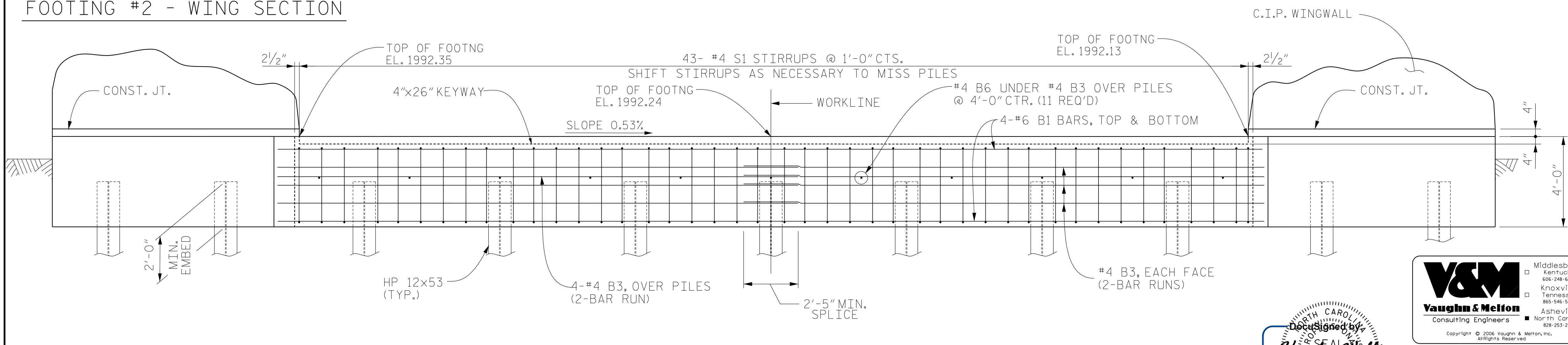
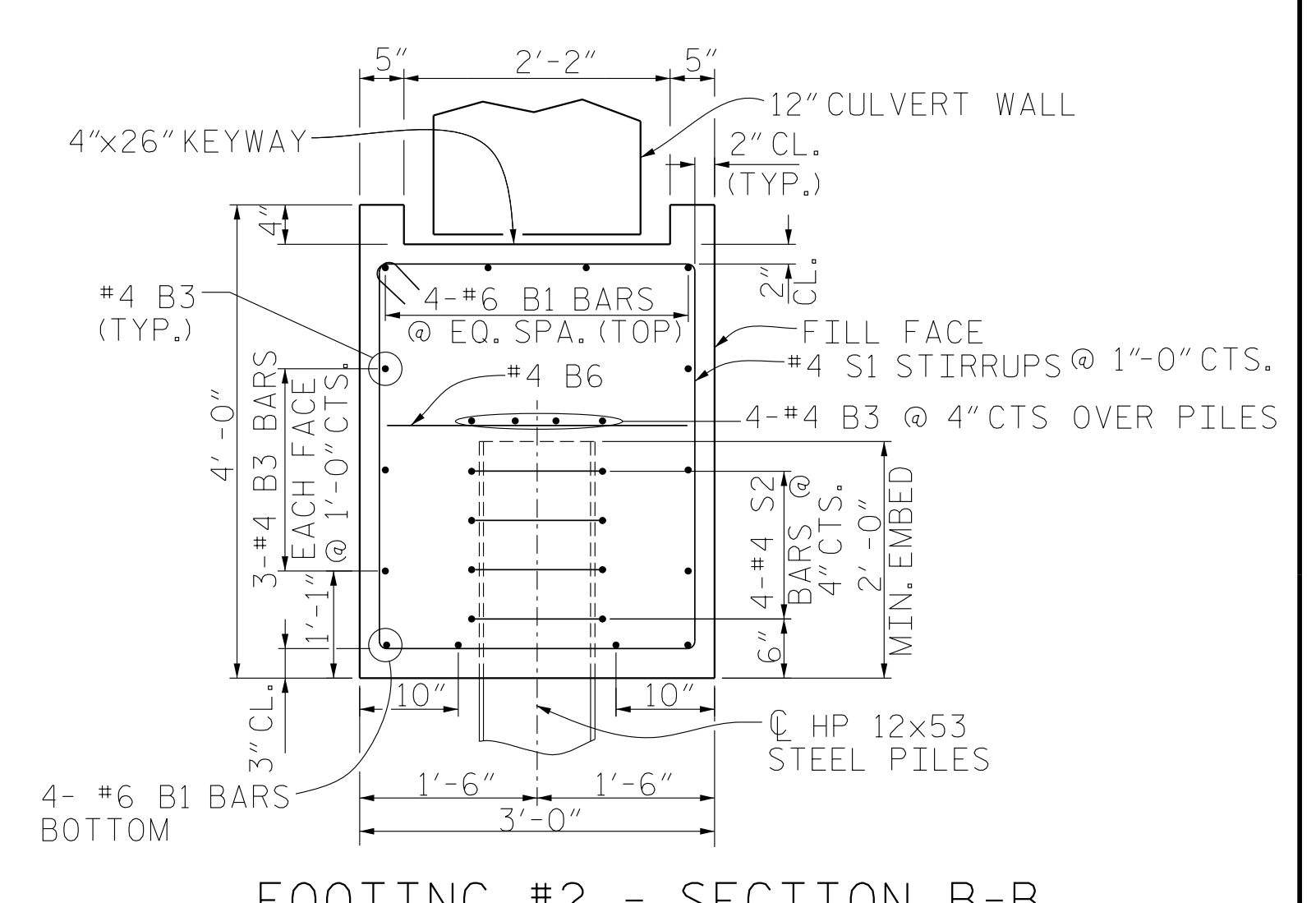
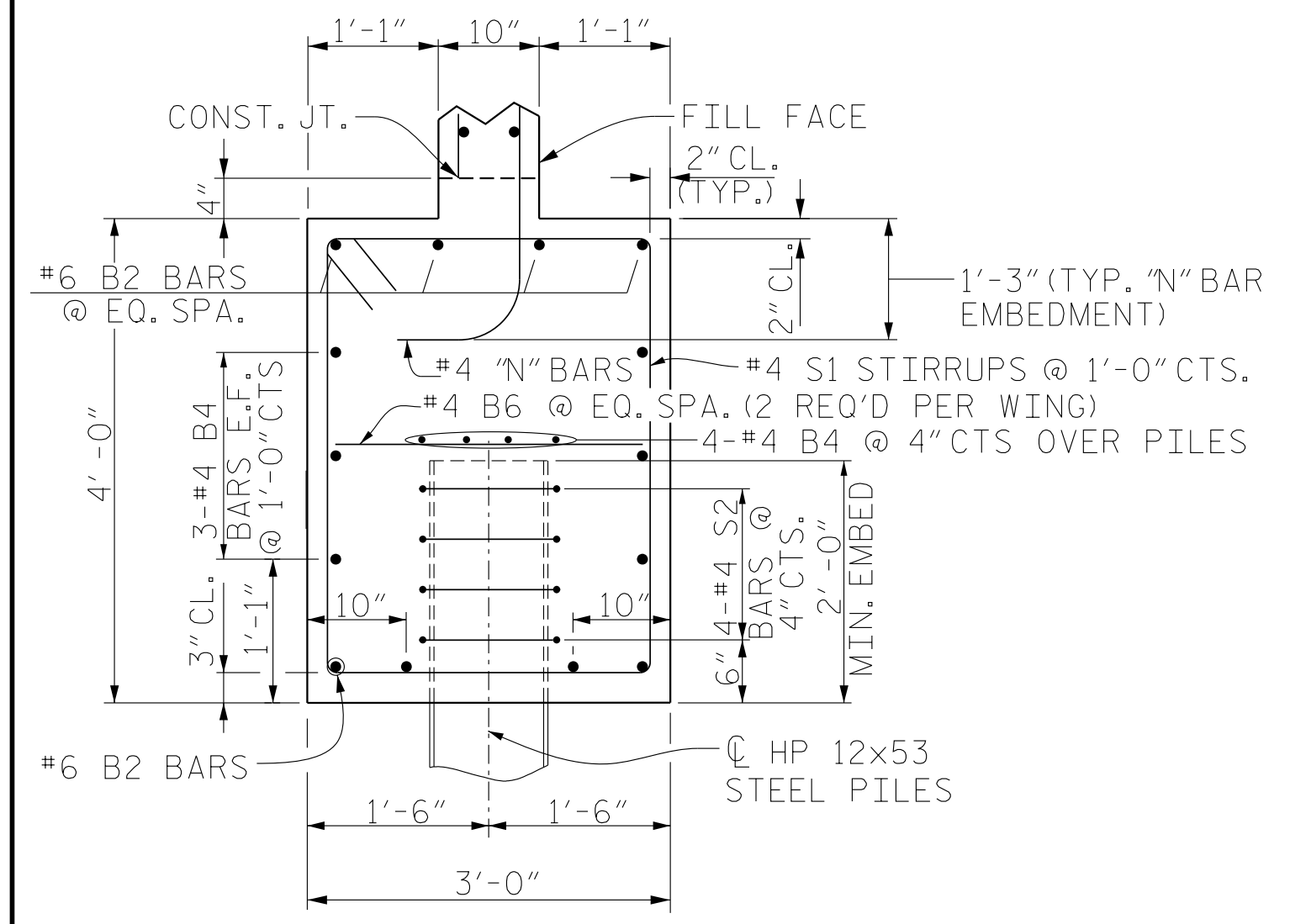
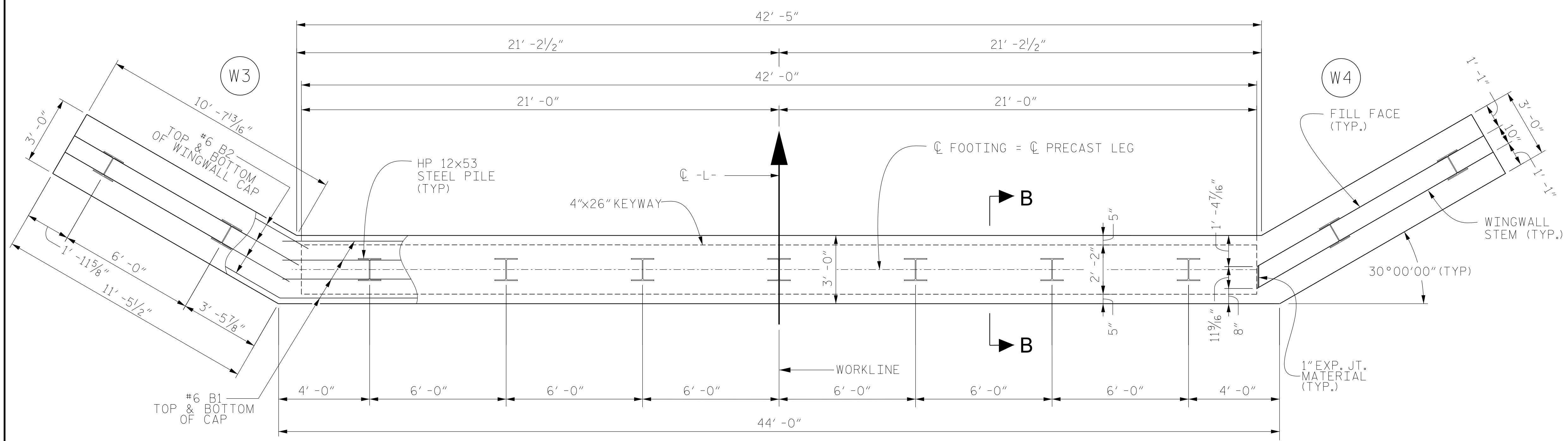


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 DEPARTMENT OF TRANSPORTATION  
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FOOTING #1  
 WINGWALL DETAILS

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| NO.       | BY: | DATE: | NO. | BY: | DATE: | C-5          |   |
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| 2         |     |       | 4   |     |       |              |   |



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SHEET 6 OF 9

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FOOTING #2 DETAILS

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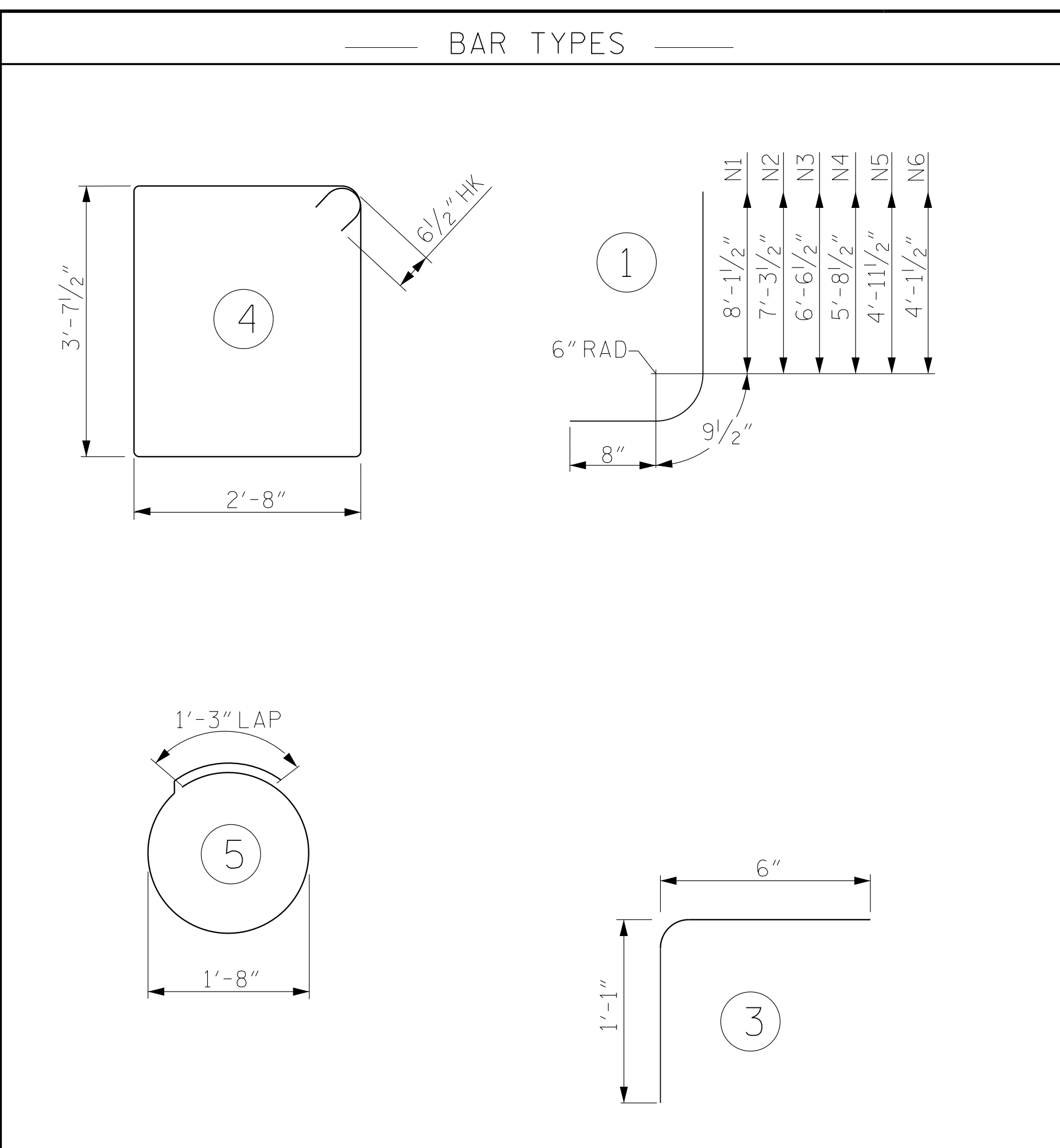
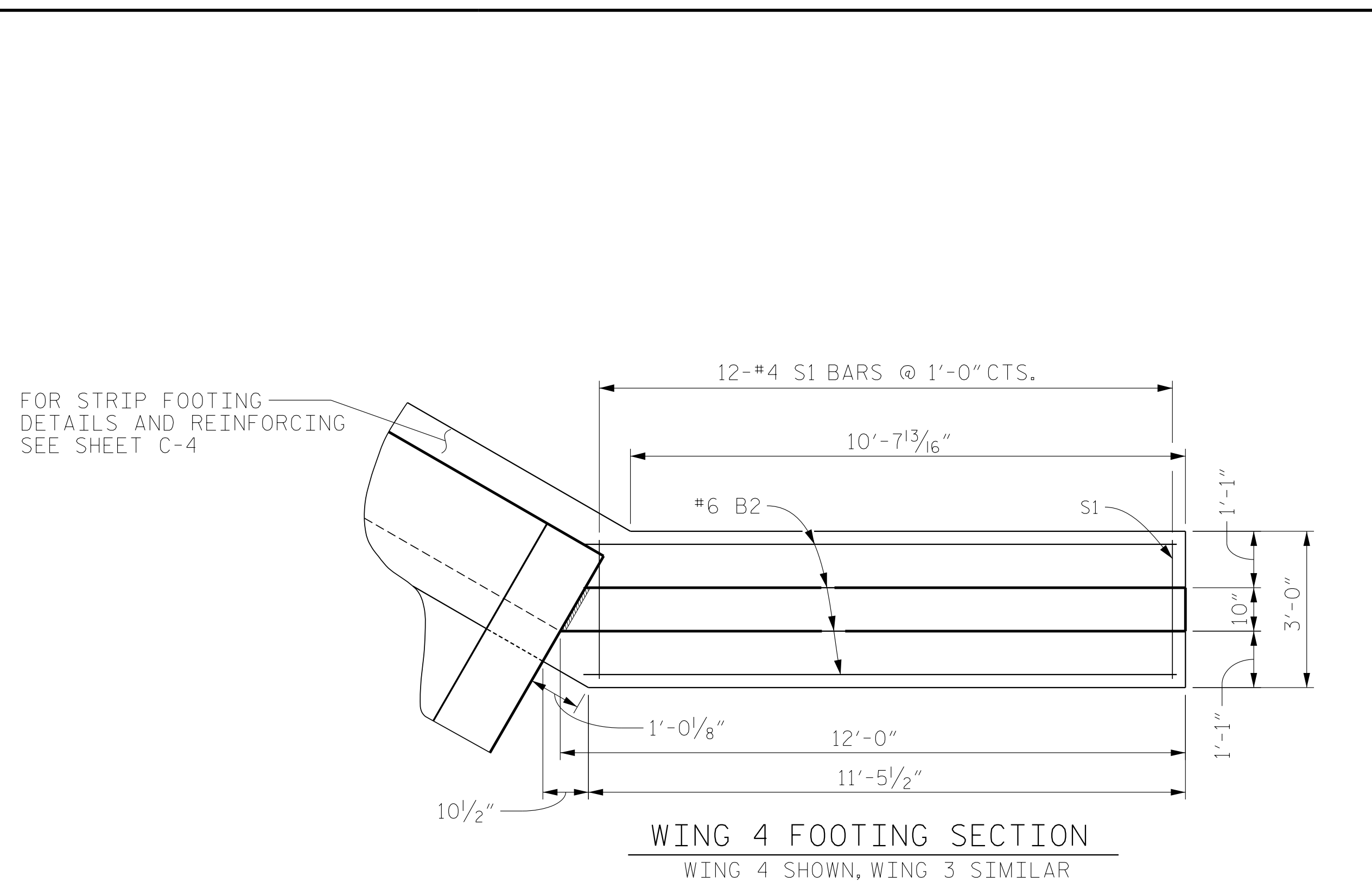
DESIGNED BY  
 HAROLD L. WILSON  
 1/10/2018

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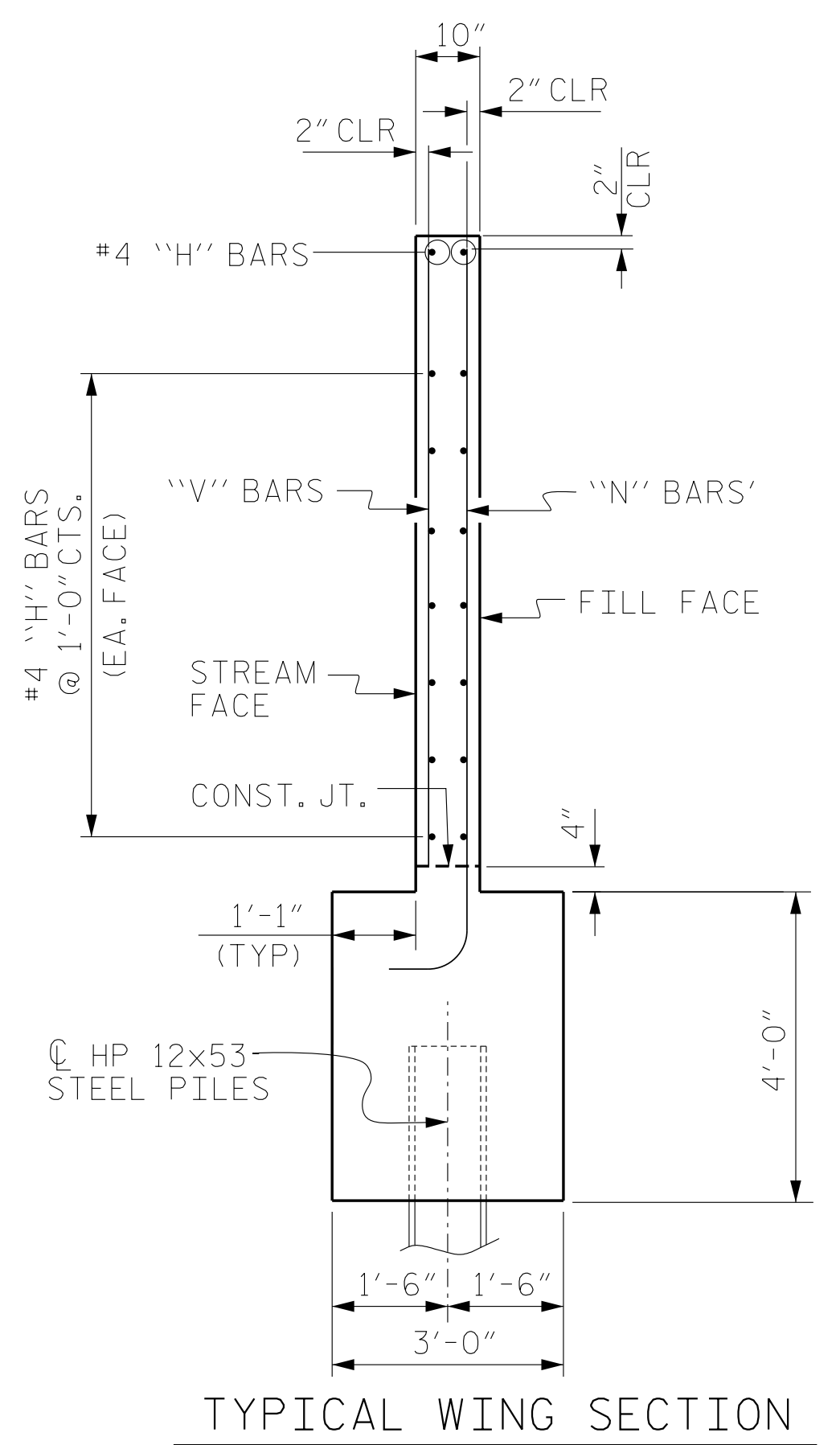
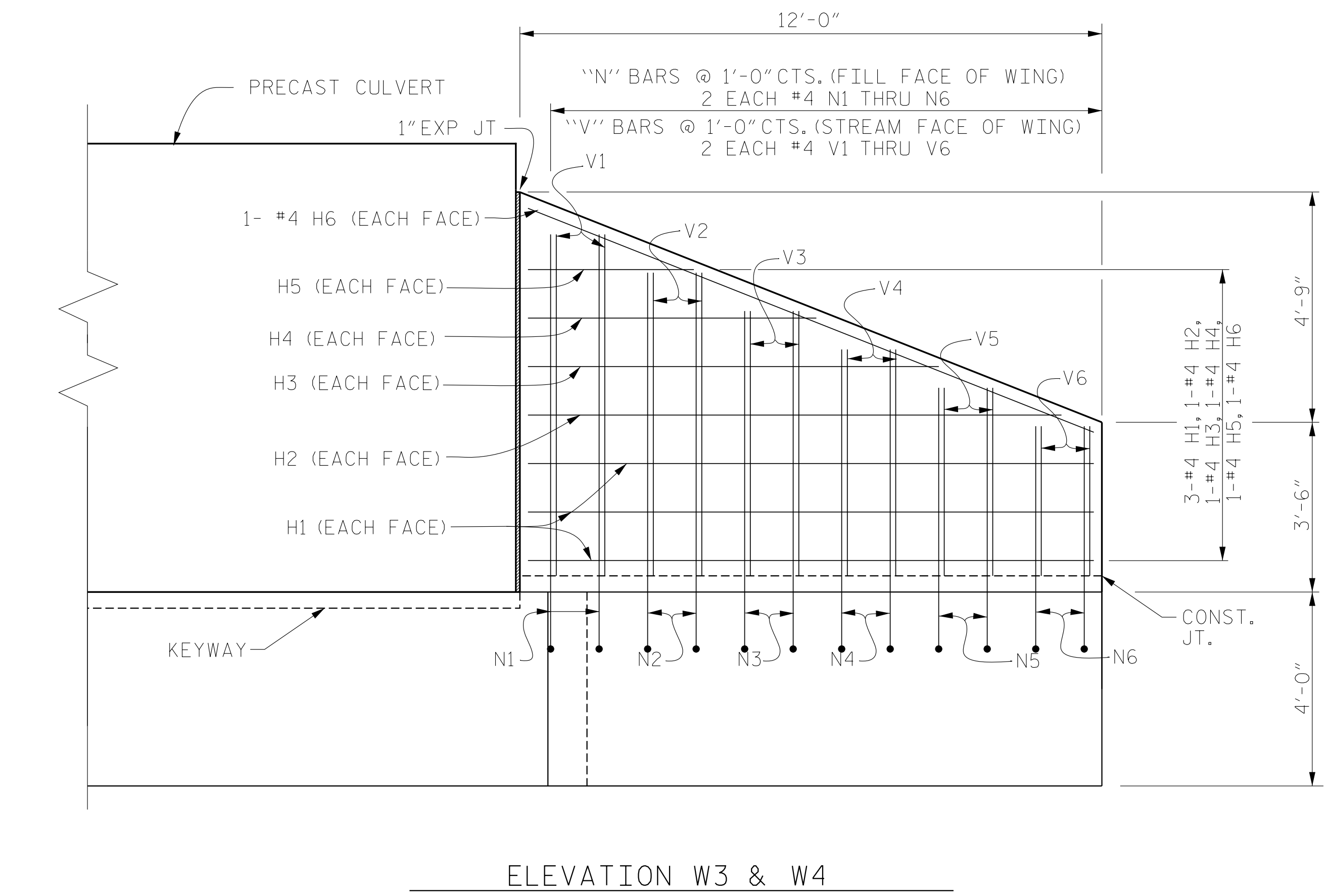
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| NO.       | BY: | DATE: | NO. | BY: | DATE: | C-6          |  |
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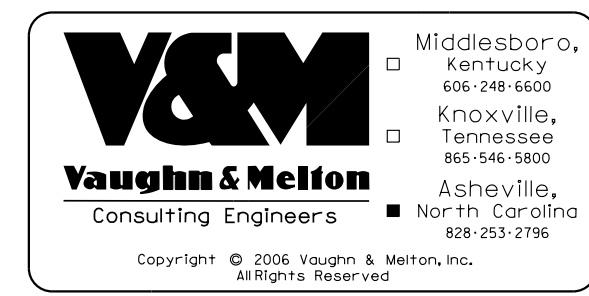
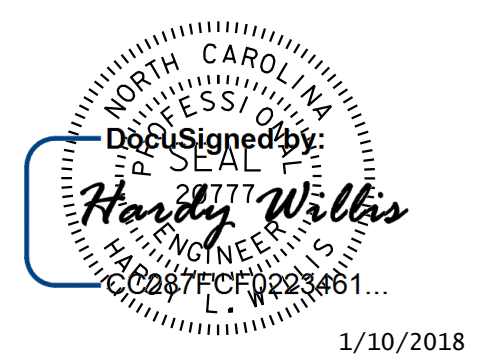




| BILL OF MATERIAL                                    |     |      |      |        |        |         |     |      |      |        |        |
|---|-----|------|------|--------|--------|---------|-----|------|------|--------|--------|
| FOOTING #2, OUTLET HEADWALL AND WINGWALLS (W3 & W4) |     |      |      |        |        |         |     |      |      |        |        |
| BAR NO.   | NO. | SIZE | TYPE | LENGTH | WEIGHT | BAR NO. | NO. | SIZE | TYPE | LENGTH | WEIGHT |
| B1  | 8   | 6    | STR  | 43'-8" | 525    | V1      | 4   | 4    | STR  | 7'-0"  | 19     |
| B2  | 16  | 6    | STR  | 11'-4" | 272    | V2      | 4   | 4    | STR  | 6'-3"  | 17     |
| B3  | 20  | 4    | STR  | 23'-1" | 185    | V3      | 4   | 4    | STR  | 5'-5"  | 14     |
| B4  | 12  | 4    | STR  | 11'-4" | 91     | V4      | 4   | 4    | STR  | 4'-8"  | 12     |
| B5  | 4   | 6    | STR  | 43'-0" | 258    | V5      | 4   | 4    | STR  | 3'-10" | 10     |
| B6  | 15  | 4    | STR  | 2'-8"  | 27     | V6      | 4   | 4    | STR  | 3'-1"  | 8      |
| B7  | 2   | 8    | STR  | 43'-0" | 230    |         |     |      |      |        |        |
| L1  | 43  | 6    | 3    | 1'-7"  | 102    | S1      | 67  | 4    | 4    | 13'-8" | 612    |
|   |     |      |      |        |        | S2      | 44  | 4    | 5    | 6'-6"  | 191    |
| H1  | 12  | 4    | STR  | 11'-8" | 94     |         |     |      |      |        |        |
| H2  | 4   | 4    | STR  | 11'-0" | 29     |         |     |      |      |        |        |
| H3  | 4   | 4    | STR  | 8'-5"  | 22     |         |     |      |      |        |        |
| H4  | 4   | 4    | STR  | 5'-11" | 16     |         |     |      |      |        |        |
| H5  | 4   | 4    | STR  | 3'-5"  | 9      |         |     |      |      |        |        |
| H6  | 4   | 4    | STR  | 12'-6" | 33     |         |     |      |      |        |        |
| N1  | 4   | 4    | 1    | 9'-7"  | 26     |         |     |      |      |        |        |
| N2  | 4   | 4    | 1    | 8'-9"  | 23     |         |     |      |      |        |        |
| N3  | 4   | 4    | 1    | 8'-0"  | 21     |         |     |      |      |        |        |
| N4  | 4   | 4    | 1    | 7'-2"  | 19     |         |     |      |      |        |        |
| N5  | 4   | 4    | 1    | 6'-5"  | 17     |         |     |      |      |        |        |
| N6  | 4   | 4    | 1    | 5'-7"  | 15     |         |     |      |      |        |        |



| FOOTING #2 (CULVERT & WINGS)  |              | REINFORCING STEEL                     |           | 2889 LBS. |  |
|-------------------------------|--------------|---------------------------------------|-----------|-----------|--|
| HP 12x53 STEEL PILES NO.: 11  | 121.0 LIN FT | CLASS A CONCRETE BREAKDOWN            |           |           |  |
| PILE EXCAVATION (IN SOIL)     | 55.0 LIN FT  | POUR #1 FOOTING (CULVERT & WING WALL) | 27.9 C.Y. |           |  |
| PILE EXCAVATION (NOT IN SOIL) | 58.0 LIN FT  | POUR #2 WING WALL STEMS               | 4.3 C.Y.  |           |  |
|                               |              | POUR #3 HEADWALL                      | 2.0 C.Y.  |           |  |
|                               |              | TOTAL CLASS A CONCRETE                | 34.2 C.Y. |           |  |



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STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 FOOTING #2  
 WINGWALL DETAILS

| REVISIONS |     |       |     |     |       | SHEET NO.    |   |
|-----------|-----|-------|-----|-----|-------|--------------|---|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | C-7          |   |
| 1         |     |       | 3   |     |       | TOTAL SHEETS | 9 |
| 2         |     |       | 4   |     |       |              |   |

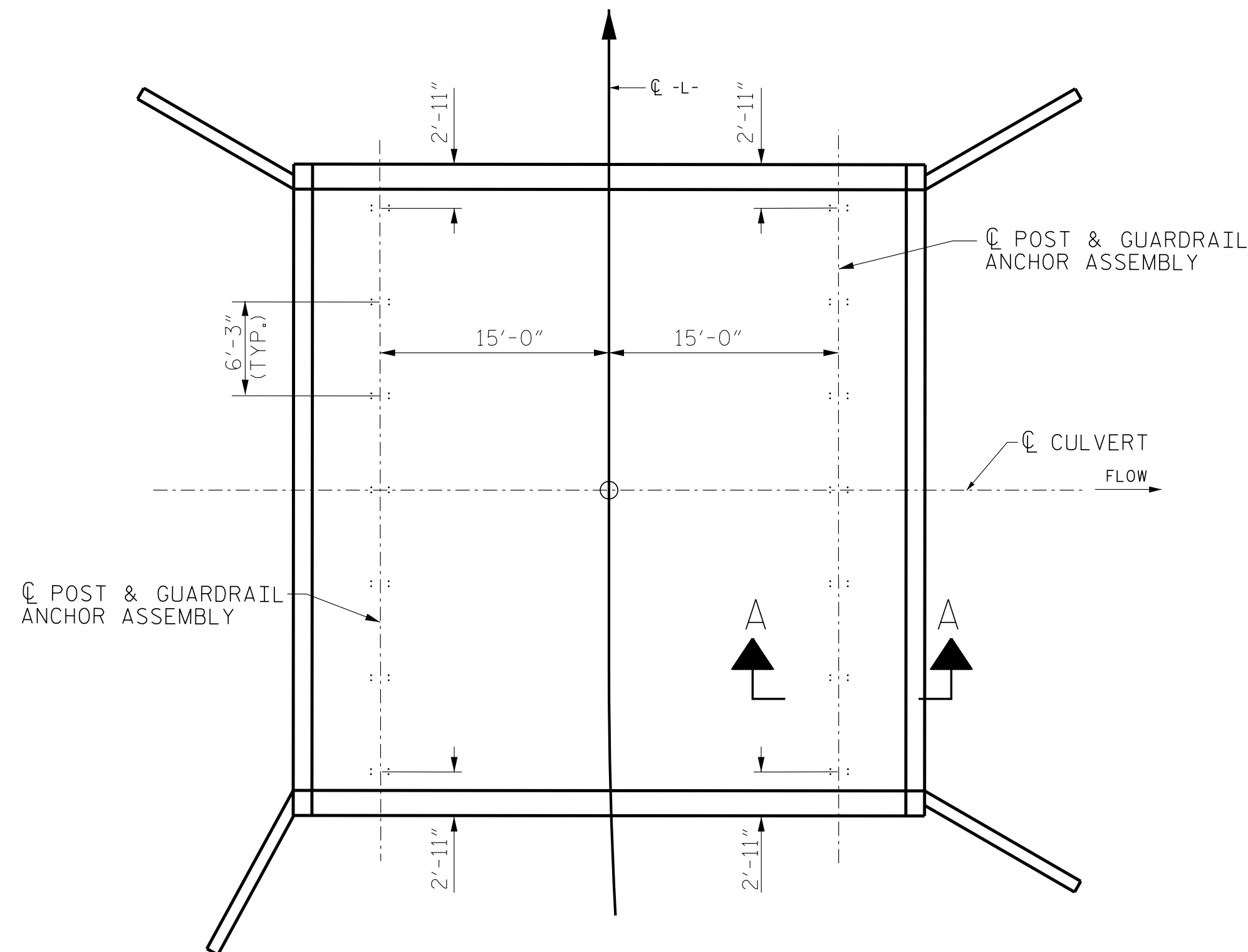
DRAWN BY: FRJ DATE: 8/2016  
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NOTES

ALL GUARDRAIL ATTACHMENTS SHALL BE MADE USING ADHESIVELY ANCHORED ANCHOR BOLTS. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

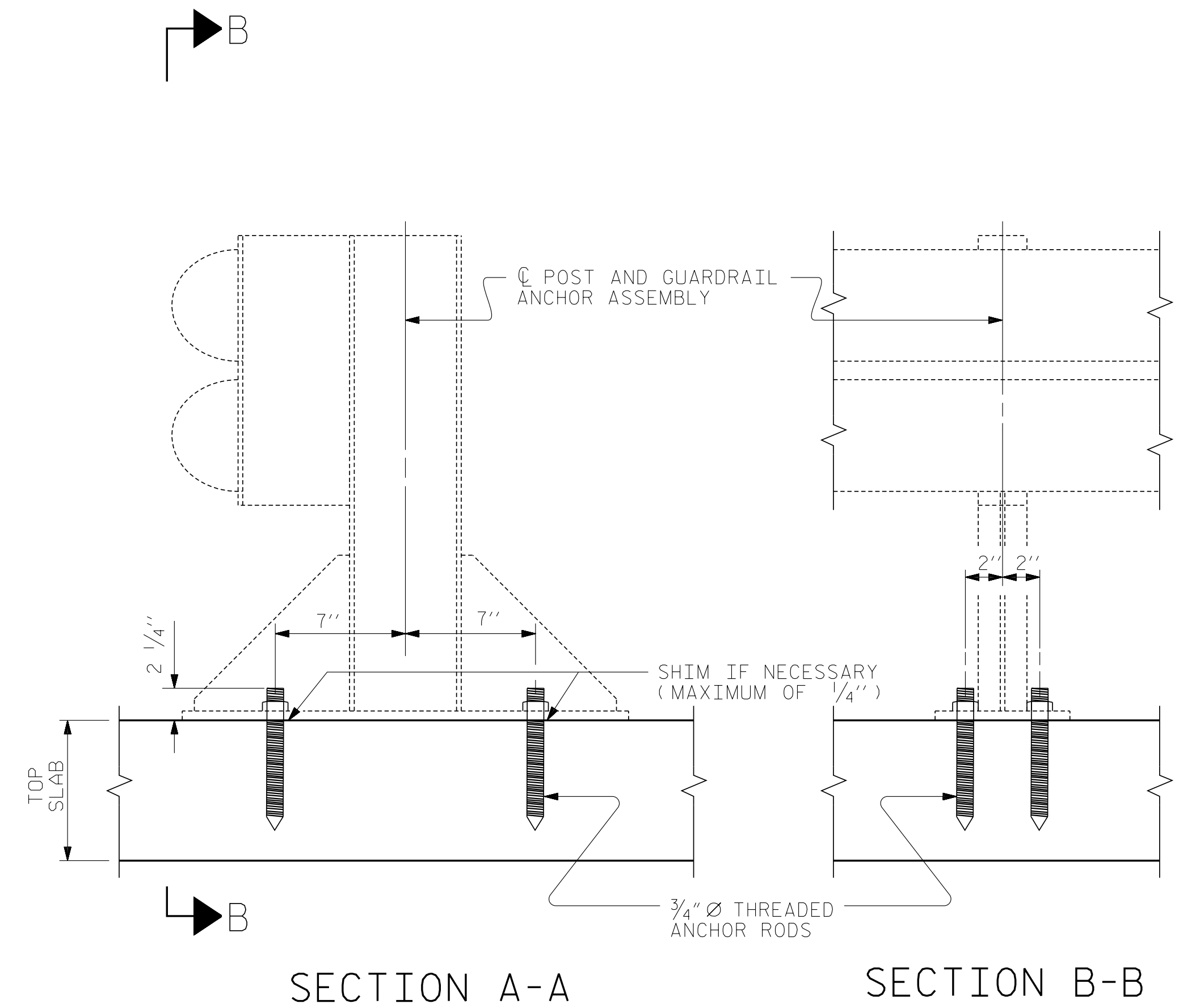
ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE 3/4" Ø AND SHALL MEET THE REQUIREMENTS OF ASTM A325. BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.

PAYMENT FOR GUARDRAIL, POST AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.



PLAN OF PRECAST CULVERT  
GUARDRAIL SPACING

NOTE: GUARDRAIL POSTS PLACEMENT AS SHOWN. GUARDRAIL POSTS AND THREADED ANCHOR RODS MUST CLEAR ALL JOINTS OF PRECAST CONCRETE CULVERT UNITS.



SECTION A-A

SECTION B-B

**V&M**  
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Consulting Engineers

Middlesboro, Kentucky 606-248-5600  
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SHEET 8 OF 9

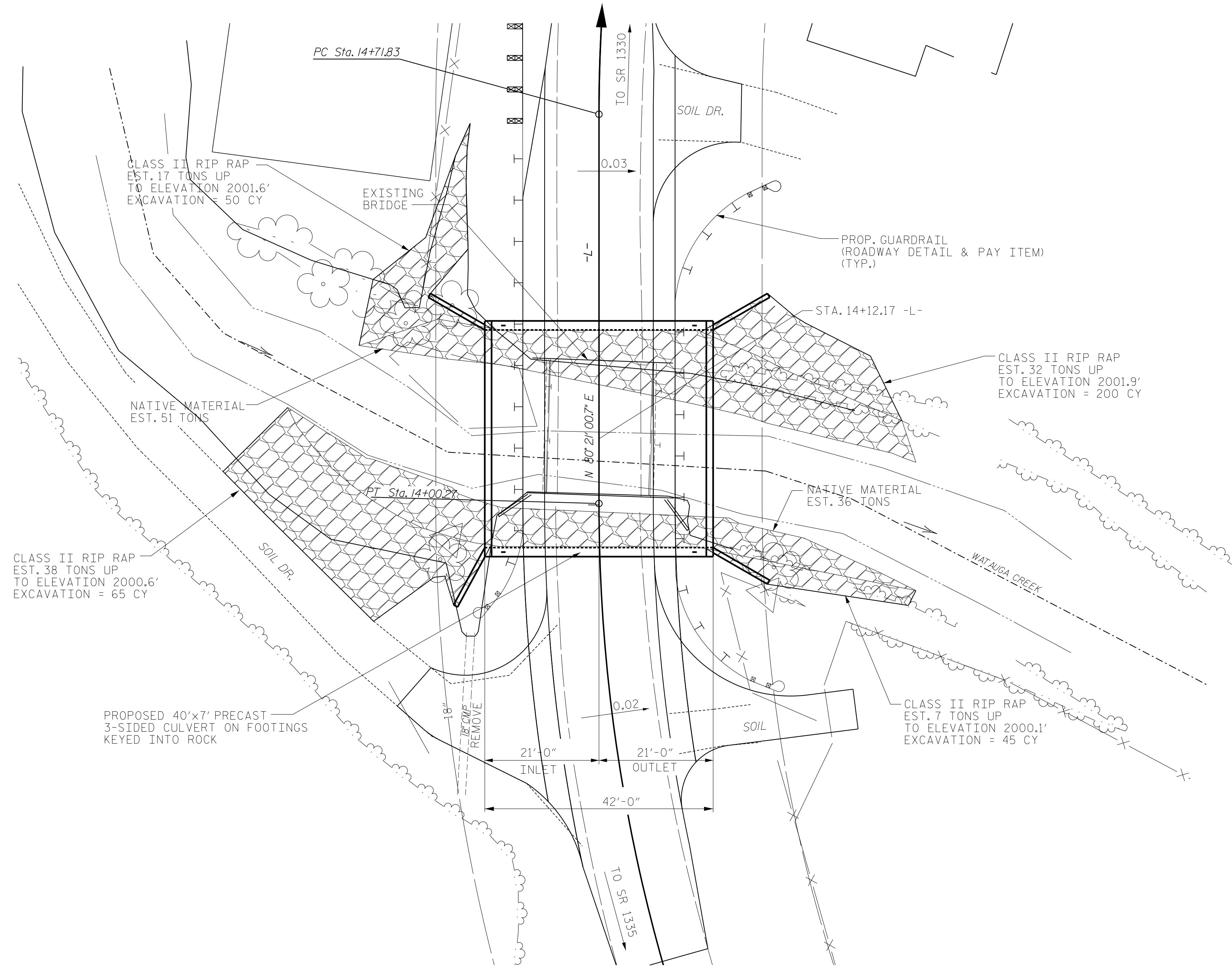
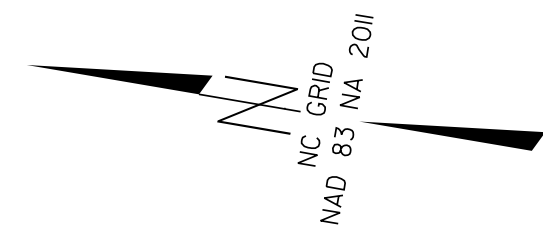
Designed by:  
*Hardy Willis*  
Professional Engineer  
No. 28766  
1/10/2018

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

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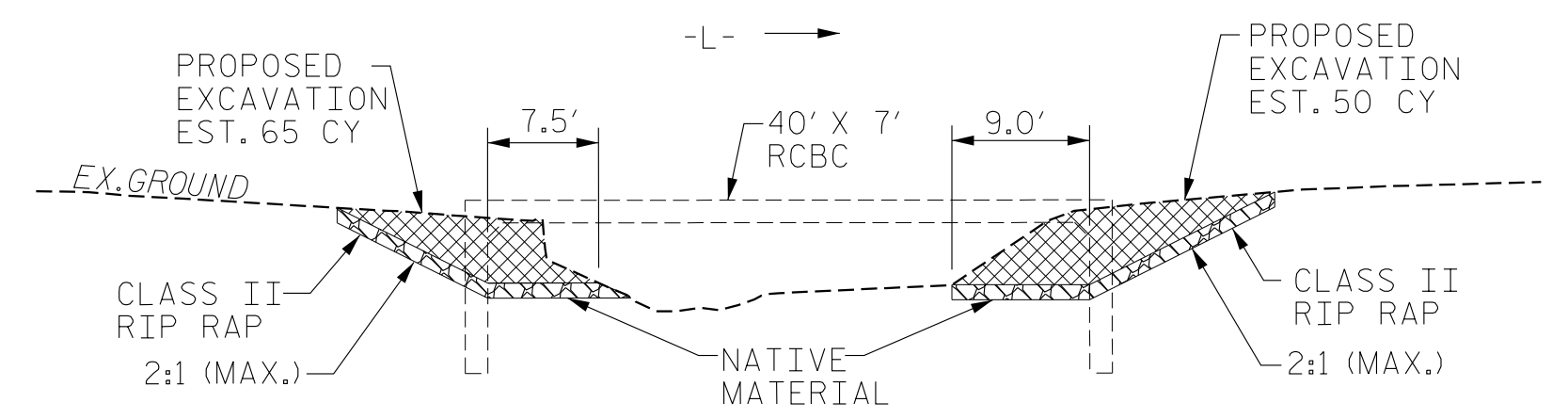
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| NO.       | BY: | DATE: | NO. | BY: | DATE: | C-8          |
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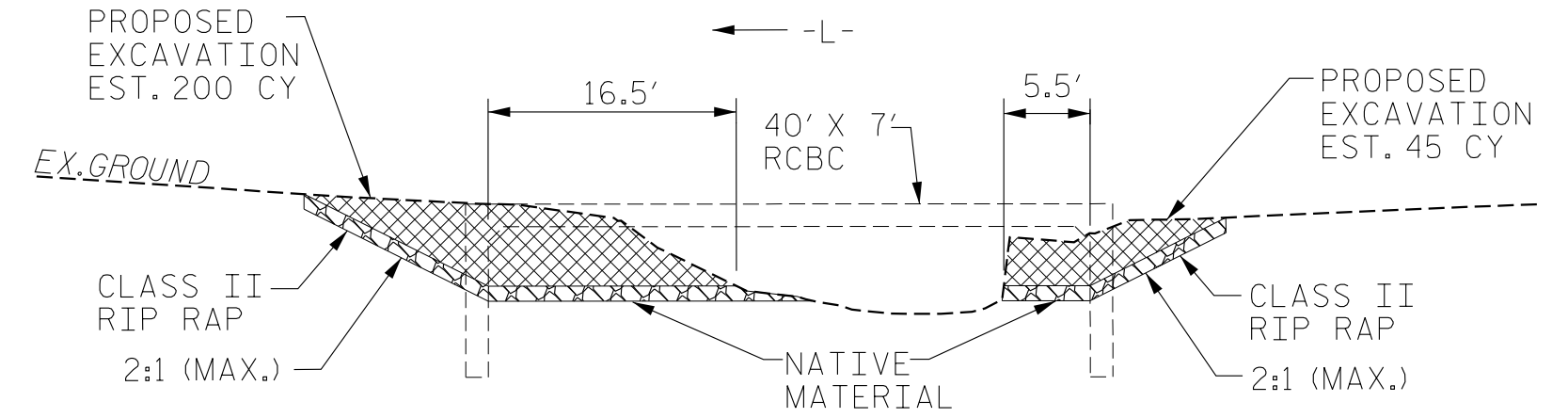


PLAN - RIPRAP

NOTES:  
 NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL. IF RIP RAP IS USED, NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.



INLET CHANNEL & FLOODPLAIN BENCH PROFILE (LOOKING UPSTREAM)



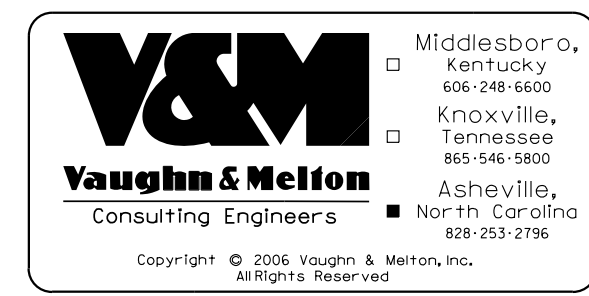
OUTLET CHANNEL & FLOODPLAIN BENCH PROFILE (LOOKING DOWNSTREAM)

PROJECT NO. 17BP.14.R.140  
 MACON COUNTY  
 STATION: 14+12.17 -L-

SHEET 9 OF 9

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

FLOODPLAIN BENCH DETAILS



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| 1         |     |       | 3   |     |       | TOTAL SHEETS<br>9 |
| 2         |     |       | 4   |     |       |                   |

## 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<br>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<br>EXTREME FIBER STRESS - - - -  | 1,800 LBS. PER SQ. IN.           |
| COMPRESSION PERPENDICULAR TO GRAIN<br>OF TIMBER - - - - -                 | 375 LBS. PER SQ. IN.             |
| EQUIVALENT FLUID PRESSURE OF EARTH - - - - -                              | 30 LBS. PER CU. FT.<br>(MINIMUM) |

### MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

### CONCRETE:

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

### CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED  $\frac{3}{4}$ " WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO  $\frac{1}{2}$ " RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A  $\frac{1}{4}$ " 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  $\frac{1}{4}$ " 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  $\frac{7}{8}$ "  $\emptyset$  SHEAR STUDS FOR THE  $\frac{3}{4}$ "  $\emptyset$  STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF  $\frac{7}{8}$ "  $\emptyset$  STUDS ALONG THE BEAM AS SHOWN FOR  $\frac{3}{4}$ "  $\emptyset$  STUDS BASED ON THE RATIO OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  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  $\frac{5}{16}$ " 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  $\frac{1}{16}$ " 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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