

**TIP PROJECT: B-5813**

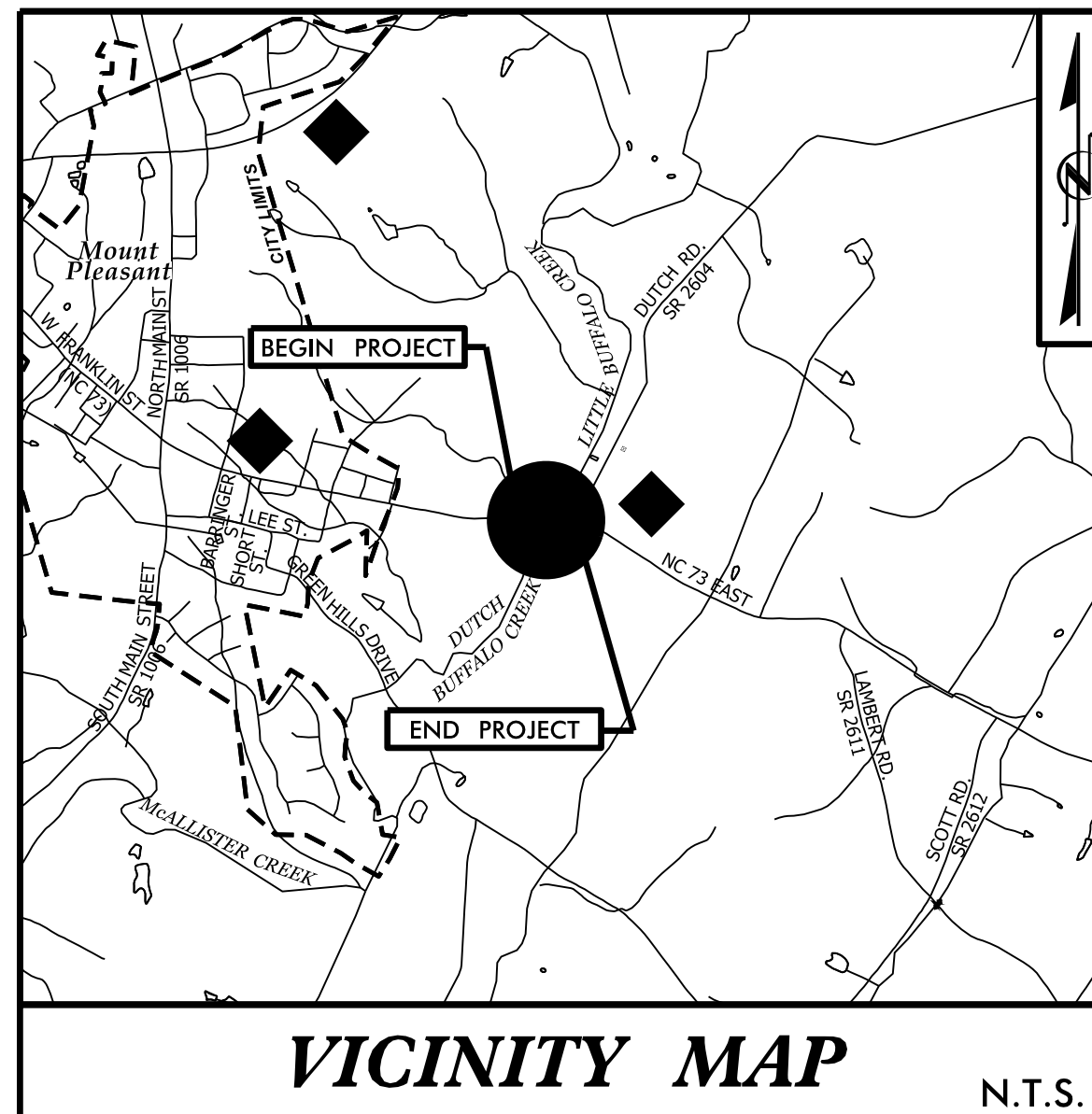
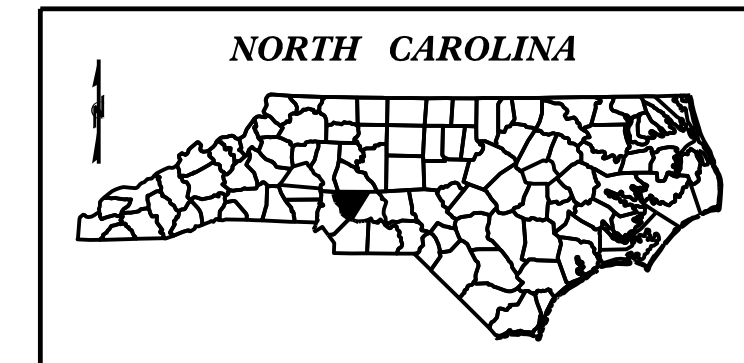
**CONTRACT: C204417**

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

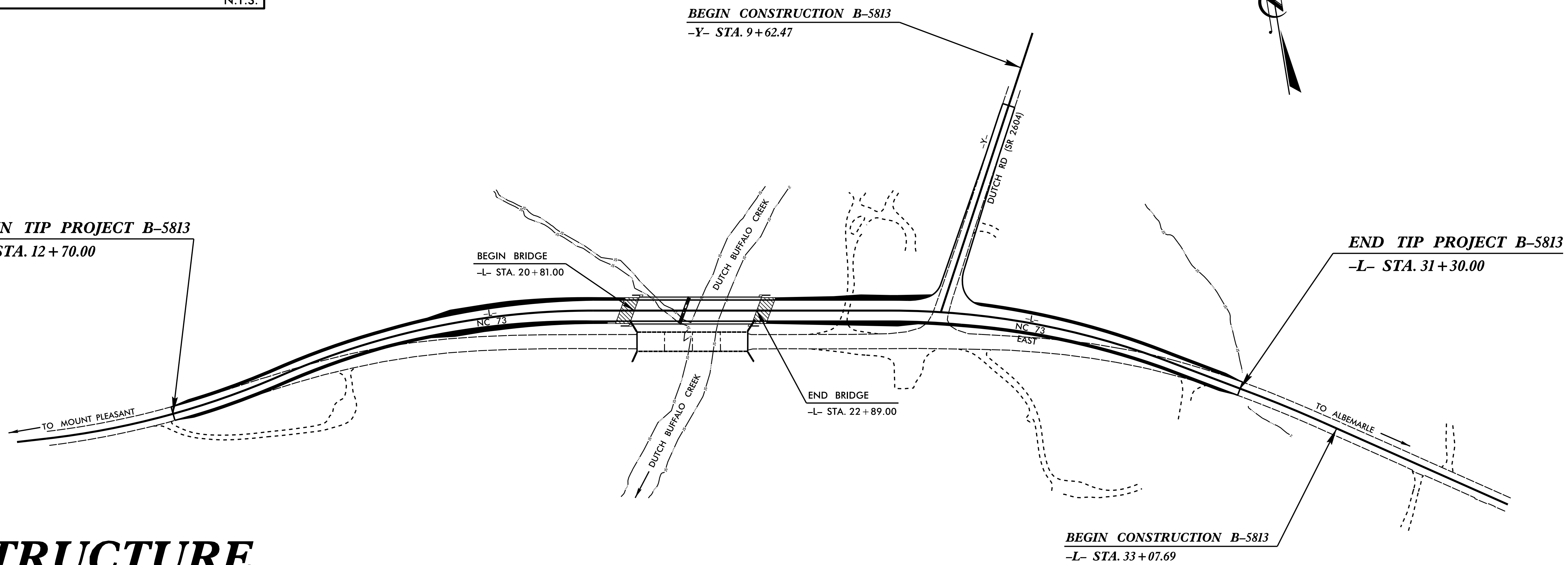
**CABARRUS COUNTY**

**LOCATION: BRIDGE #132 OVER DUTCH BUFFALO CREEK  
ON NC 73**  
**TYPE OF WORK: GRADING, DRAINAGE, PAVING & STRUCTURE**

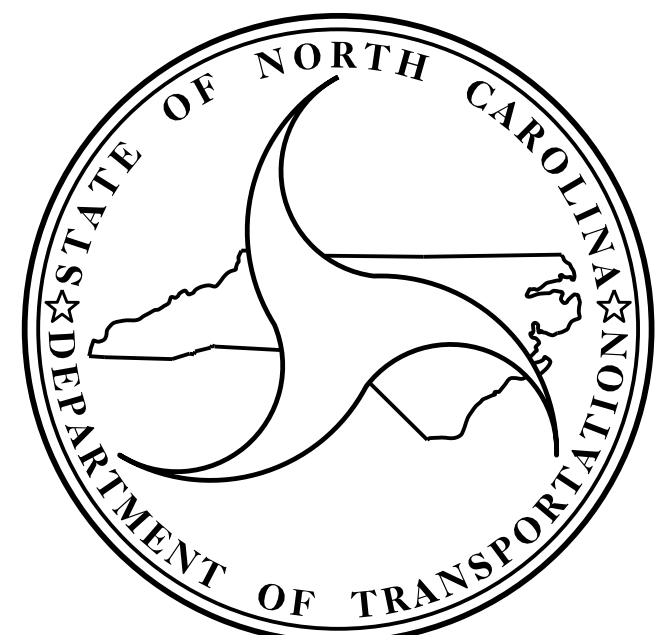
| STATE           | STATE PROJECT REFERENCE NO. | SHEET NO.     | TOTAL SHEETS |
|-----------------|-----------------------------|---------------|--------------|
| N.C.            | B-5813                      | 1             |              |
| STATE PROJ. NO. | P.A. PROJ. NO.              | DESCRIPTION   |              |
| 45767.1.1       | -                           | P.E.          |              |
| 45767.2.1       | -                           | ROW/UTILITIES |              |
| 45767.3.1       | -                           | CONST.        |              |
|                 |                             |               |              |
|                 |                             |               |              |



**BEGIN TIP PROJECT B-5813**  
-L- STA. 12 + 70.00



**STRUCTURE**



**DESIGN DATA**  
ADT 2020 = 8,600  
ADT 2040 = 10,800  
K = 12%  
D = 60%  
T = 5%\*  
V = 60 MPH  
FUNC. CLASSIFICATION:  
MAJOR COLLECTOR  
\* (TTST 1% + DUALS 4%)  
REGIONAL TIER

**PROJECT LENGTH**

LENGTH OF ROADWAY TIP PROJECT B-5813 = 0.313 MILES  
LENGTH OF STRUCTURE TIP PROJECT B-5813 = 0.039 MILES  
TOTAL LENGTH OF TIP PROJECT B-5813 = 0.352 MILES

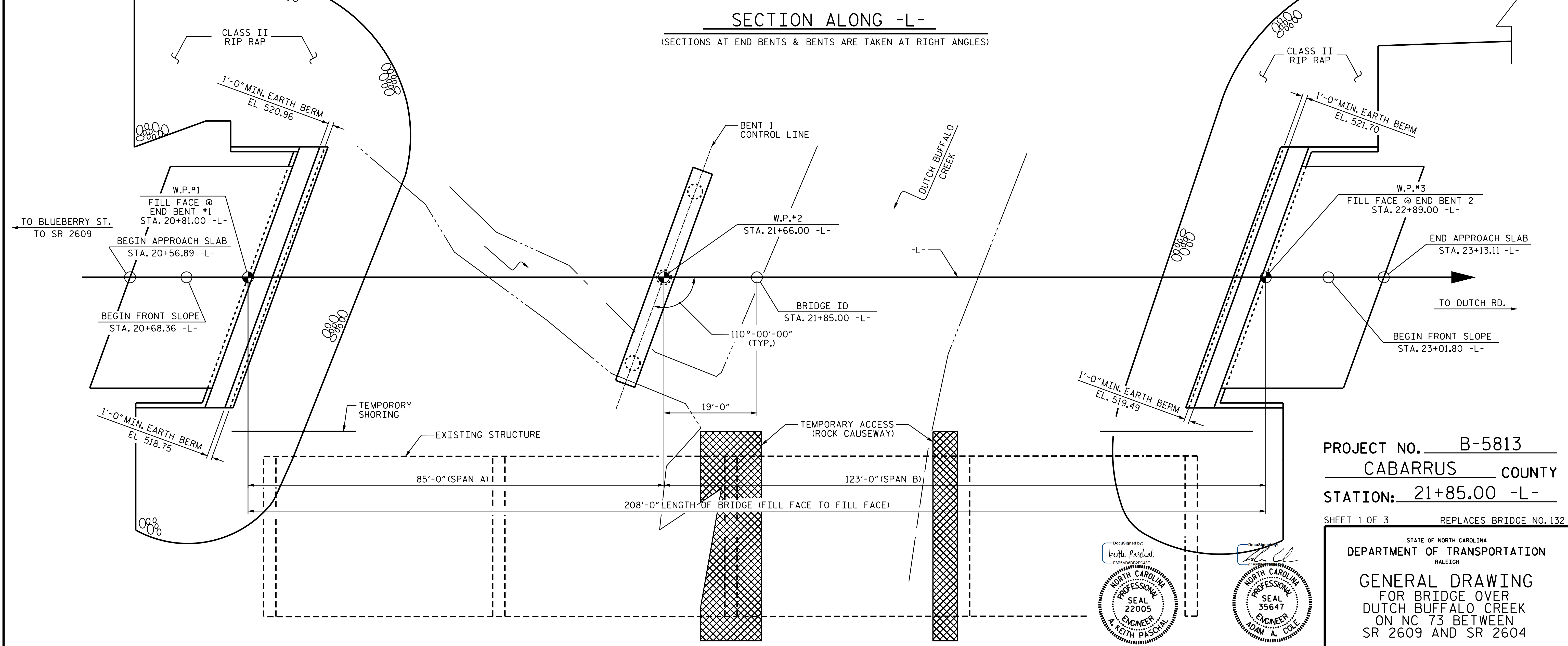
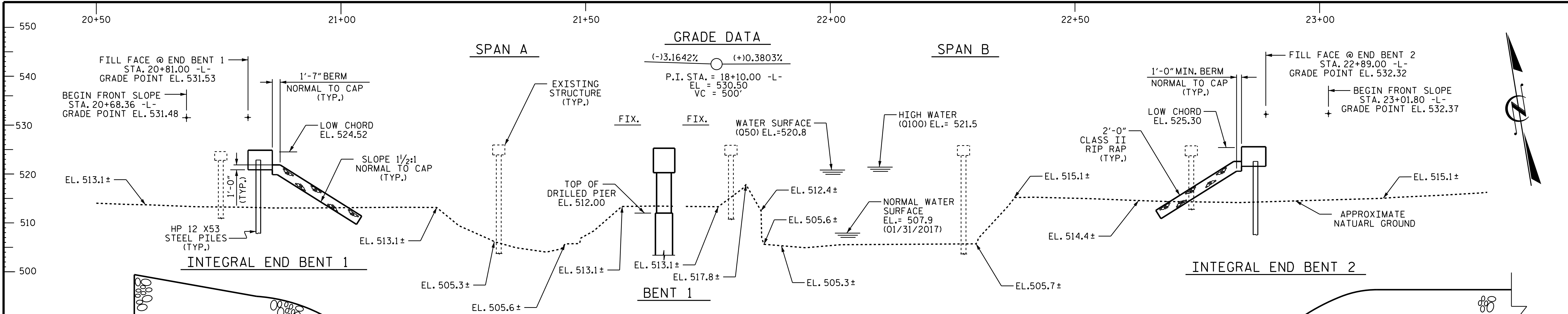
Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
STRUCTURES MANAGEMENT UNIT  
1000 BIRCH RIDGE DR.  
RALEIGH, N.C. 27610

2018 STANDARD SPECIFICATIONS

LETTING DATE : JANUARY 18, 2022

A. KEITH PASCHAL, P.E.  
PROJECT ENGINEER

ADAM A. COLE, P.E.  
PROJECT DESIGN ENGINEER



**PLAN**  
(PILES NOT SHOWN FOR CLARITY)

DRAWN BY : M. G. SHAIKH      DATE : 06/2019  
 CHECKED BY : H.A. LOCKLEAR      DATE : 08/2019  
 DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR      DATE : 06/2019

TEMPORARY ACCESS (ROCK CAUSEWAY)

DocuSigned by:  
 Keith Paschal  
 PROFESSIONAL ENGINEER  
 SEAL 22005  
 A. KEITH PASCHAL  
 4/6/2021

DocuSigned by:  
 Adam A. Cole  
 PROFESSIONAL ENGINEER  
 SEAL 35647  
 ADAM A. COLE  
 4/6/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

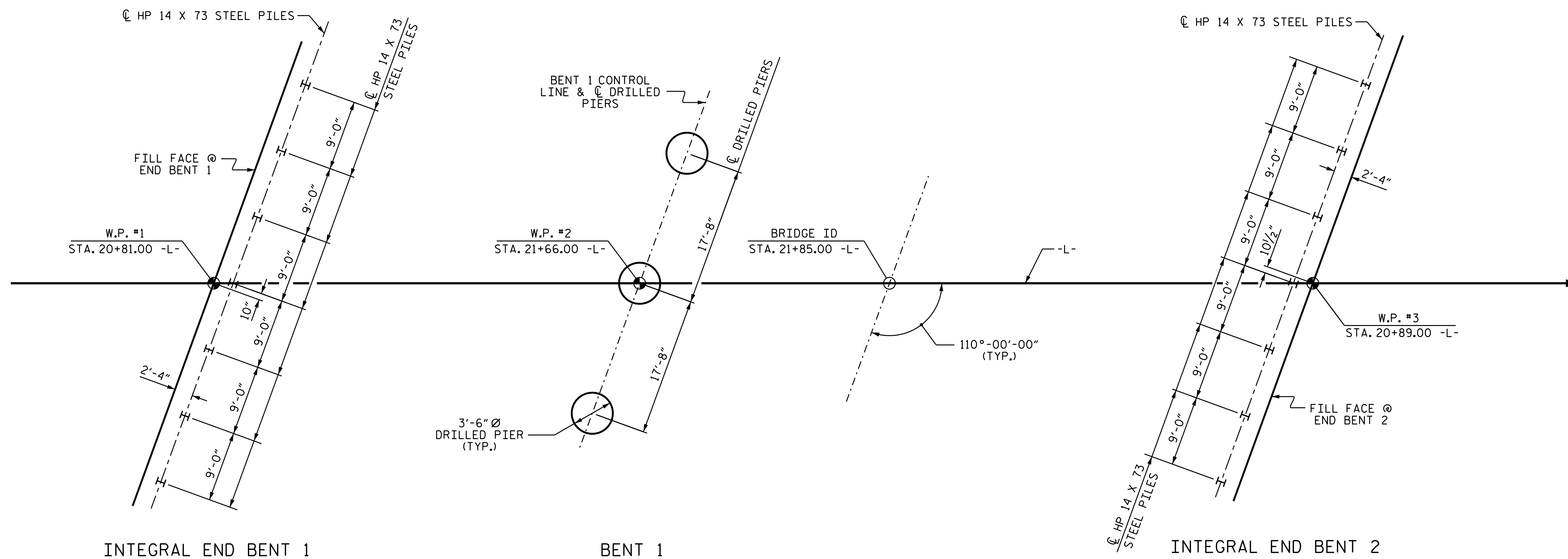
PROJECT NO. B-5813  
 CABARRUS COUNTY  
 STATION: 21+85.00 -L-  
 SHEET 1 OF 3      REPLACES BRIDGE NO. 132

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 FOR BRIDGE OVER  
 DUTCH BUFFALO CREEK  
 ON NC 73 BETWEEN  
 SR 2609 AND SR 2604

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-1          |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |





**FOUNDATION LAYOUT**  
 DIMENSIONS LOCATING PILES & DRILLED PIERS ARE SHOWN TO THE CENTERLINE OF PILES & DRILLED PIERS.

**NOTES**

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 141 TONS PER PILE.

DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 235 TONS PER PILE.

OBSERVE A 3 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT. OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT 1. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATION.

DRILLED PIERS AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 640 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 80 TSF.

INSTALL DRILLED PIERS AT BENT 1 TO A TIP ELEVATION NO HIGHER THAN EL. 483 FT. SATISFY THE REQUIRED TIP RESISTANCE AND HAVE A PENETRATION OF AT LEAST 9 FT. INTO ROCK OR WEATHERED ROCK.

PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT 1. DO NOT EXTEND PERMANENT CASINGS BELOW EL. 493 FT. WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

STANDARD PENETRATION TESTING (SPT) MAY BE REQUIRED FOR DRILLED PIERS AT BENT 1. THE ENGINEER WILL DETERMINE THE NEED FOR SPT. FOR SPT TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

SID INSPECTIONS ARE REQUIRED FOR DRILLED PIERS AT BENT 1. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTION, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATION FOR BENT 1 IS ELEVATION 492 FT. THE SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

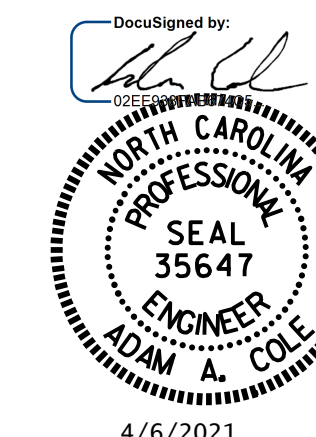
PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 165 TONS PER PILE.

DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 278 TONS PER PILE.

OBSERVE A 3 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT. OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 2 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 FOR BRIDGE OVER  
 DUTCH BUFFALO CREEK  
 ON NC 73 BETWEEN  
 SR 2609 AND SR 2604

DRAWN BY : M. G. SHAIKH DATE : 07/2019  
 CHECKED BY : H. LOCKLEAR DATE : 06/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 06/2019

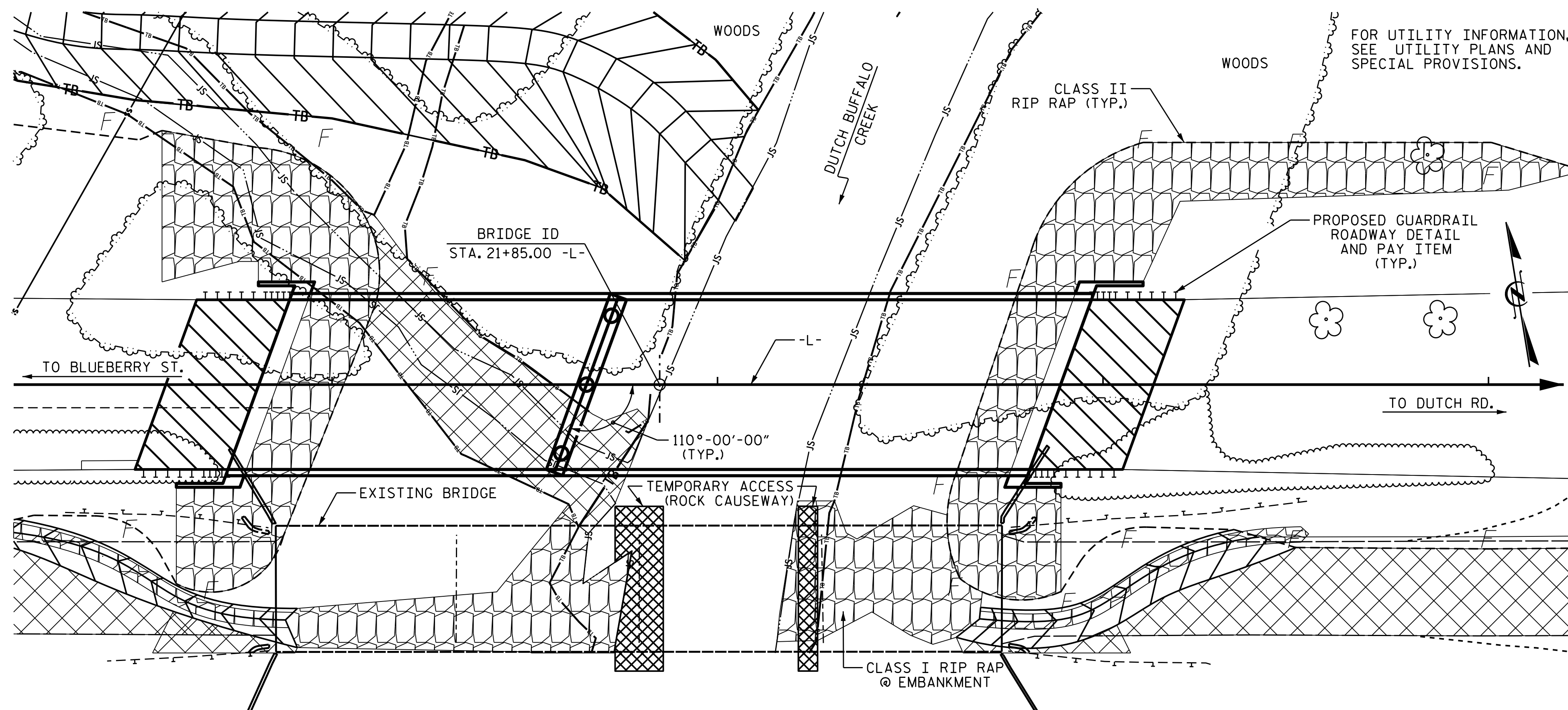
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| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-2          |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |



BENCHMARK 1:, BENCH TIE SPIKE IN 30" OAK TREE 6.56' RT. OF STA. 25+66.07 -L-, ELV 529.70

NOTES



LOCATION SKETCH

HYDRAULIC DATA

DESIGN DISCHARGE \_\_\_\_\_ 8,100 CFS.  
 FREQUENCY OF DESIGN FLOOD \_\_\_\_\_ 50 YRS.  
 DESIGN HIGH WATER ELEVATION \_\_\_\_\_ 520.8 FT.  
 DRAINAGE AREA \_\_\_\_\_ 64.6 SQ.MI.  
 BASE DISCHARGE (Q100) \_\_\_\_\_ 9,200 CFS.  
 BASE HIGH WATER ELEVATION \_\_\_\_\_ 521.5 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE \_\_\_\_\_ 32,500 CFS.  
 FREQUENCY OF OVERTOPPING FLOOD \_\_\_\_\_ 500+ YRS.  
 OVERTOPPING FLOOD ELEVATION \_\_\_\_\_ 531.4 FT.

TOTAL BILL OF MATERIAL

|                | CONSTRUCTION MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS | REMOVAL OF EXISTING STRUCTURE | ASBESTOS ASSESSMENT | 3'-6" Ø DRILLED PIERS IN SOIL | 3'-6" Ø DRILLED PIERS NOT IN SOIL | PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER | SID INSPECTION | SPT TESTING | CSL TESTING | REINFORCED CONCRETE DECK SLAB | GROOVING BRIDGE FLOORS | CLASS A CONCRETE | BRIDGE APPROACH SLABS | REINFORCING STEEL |
|----------------|--|-------------------------------|---------------------|-------------------------------|-----------------------------------|---|----------------|-------------|-------------|-------------------------------|------------------------|------------------|-----------------------|-------------------|
|                | LUMP SUM   | LUMP SUM                      | LUMP SUM            | LIN. FT.                      | LIN. FT.                          | LIN. FT.  | EA.            | EA.         | EA.         | SQ. FT.                       | SQ. FT.                | CU. YDS.         | LUMP SUM              | LBS.              |
| SUPERSTRUCTURE |  | LUMP SUM                      |                     |                               |                                   |   |                |             |             | 9,744                         | 10,462                 |                  | LUMP SUM              |                   |
| END BENT 1     |  |                               |                     |                               |                                   |   |                |             |             |                               |                        | 55.3             |                       | 6,150             |
| BENT 1         |  |                               |                     | 52                            | 35                                | 57  | 3              | 3           |             |                               |                        | 47.2             |                       | 11,094            |
| END BENT 2     |  |                               |                     |                               |                                   |   |                |             |             |                               |                        | 55.9             |                       | 6,155             |
| TOTAL          | LUMP SUM   | LUMP SUM                      | LUMP SUM            | 52                            | 35                                | 57  | 3              | 3           | 1           | 9,744                         | 10,462                 | 158.4            | LUMP SUM              | 23,399            |

TOTAL BILL OF MATERIAL

|                | SPIRAL COLUMN REINFORCING STEEL | MODIFIED 63" PRESTRESSED CONCRETE GIRDERS | PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES | HP 14 X 73 STEEL PILES | CONCRETE BARRIER RAIL | RIP RAP CLASS II (2'-0" THICK) | GEOTEXTILE FOR DRAINAGE | ELASTOMERIC BEARINGS |
|----------------|---------------------------------|---|---|------------------------|-----------------------|--------------------------------|-------------------------|----------------------|
|                | LBS.                            | NO. LIN. FT.                              | EA.   | NO. LIN. FT.           | LIN. FT.              | TONS                           | SQ. YDS.                | LUMP SUM             |
| SUPERSTRUCTURE |                                 | 10 1,018.13                               |   |                        | 412.4                 |                                |                         | LUMP SUM             |
| END BENT 1     |                                 |   | 7   | 7                      | 210                   | 410                            | 455                     |                      |
| BENT 1         | 2,347                           |   |   |                        |                       |                                |                         |                      |
| END BENT 2     |                                 |   | 7   | 7                      | 175                   | 404                            | 449                     |                      |
| TOTAL          | 2,347                           | 10 1,018.13                               | 14  | 14                     | 385                   | 814                            | 904                     | LUMP SUM             |

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.  
 THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.  
 FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.  
 FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.  
 FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.  
 REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.  
 FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

THE EXISTING STRUCTURE CONSISTING OF 4 SPANS 1 @ 47'-7", 1 @ 47'-1", 1 @ 47'-11" AND 1 @ 47'-3" WITH REINFORCED CONCRETE FLOOR ON 5 LINES OF PRESTRESSED CONCRETE GIRDERS @ VARIOUS CTS. AND A CLEAR ROADWAY WIDTH OF 28'-2" ON A SUBSTRUCTURE CONSISTING OF REINFORCED CONCRETE CAPS AND FULL HEIGHT ABUTMENTS AND LOCATED AT THE PROPOSED STRUCTURE LOCATION SHALL BE REMOVED.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE CLOSE PROXIMITY OF TEMPORARY SHORING TO THE PROPOSED END BENTS. SHORING MUST BE INSTALLED ACCURATELY IN ACCORDANCE WITH TRAFFIC CONTROL PLANS.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTOR'S OPTION, AND UPON REMOVAL OF THE CAUSEWAY, THE CLASS II RIP RAP USED IN THE CAUSEWAY MAY BE PLACED AS RIP RAP SLOPE PROTECTION. SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 21+85.00 -L-.

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.

NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES."

THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

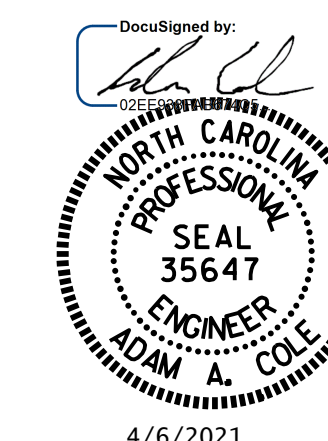
FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 3 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

GENERAL DRAWING  
 FOR BRIDGE OVER  
 DUTCH BUFFALO CREEK  
 ON NC 73 BETWEEN  
 SR 2609 AND SR 2604

DRAWN BY : M. G. SHAIKH DATE : 09/2019  
 CHECKED BY : H.A. LOCKLEAR DATE : 09/2019  
 DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 08/2019

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| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-3          |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |



# LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

| LEVEL              | VEHICLE  | WEIGHT (W)<br>(TONS) | CONTROLLING LOAD RATING # | MINIMUM RATING FACTORS (RF) | TONS = W x RF | STRENGTH I LIMIT STATE               |                           |               |       |                 |                                     |                           |               |       |                 | SERVICE III LIMIT STATE             |                                      |                           |               |       | COMMENT NUMBER |                 |                                     |  |
|--------------------|--|----------------------|---------------------------|-----------------------------|---------------|--------------------------------------|---------------------------|---------------|-------|-----------------|-------------------------------------|---------------------------|---------------|-------|-----------------|-------------------------------------|--------------------------------------|---------------------------|---------------|-------|----------------|-----------------|-------------------------------------|--|
|                    |  |                      |                           |                             |               | MOMENT                               |                           |               |       |                 | SHEAR                               |                           |               |       |                 | MOMENT                              |                                      |                           |               |       |                |                 |                                     |  |
|                    |  |                      |                           |                             |               | LIVE-LOAD FACTORS (γ <sub>LL</sub> ) | DISTRIBUTION FACTORS (DF) | RATING FACTOR | SPAN  | GIRDER LOCATION | DISTANCE FROM LEFT END OF SPAN (ft) | DISTRIBUTION FACTORS (DF) | RATING FACTOR | SPAN  | GIRDER LOCATION | DISTANCE FROM LEFT END OF SPAN (ft) | LIVE-LOAD FACTORS (γ <sub>LL</sub> ) | DISTRIBUTION FACTORS (DF) | RATING FACTOR | SPAN  |                | GIRDER LOCATION | DISTANCE FROM LEFT END OF SPAN (ft) |  |
| DESIGN LOAD RATING | HL-93 (INVENTORY)  | N/A                  | ①                         | 1.097                       | --            | 1.75                                 | 0.892                     | 1.363         | B     | EL              | 59.70                               | 0.941                     | 1.264         | B     | EL              | 83.57                               | 0.80                                 | 0.892                     | 1.097         | B     | EL             | 59.70           |                                     |  |
|                    | HL-93 (OPERATING)  | N/A                  |                           | 1.097                       | --            | 1.35                                 | 0.892                     | 1.767         | B     | EL              | 59.70                               | 0.941                     | 1.639         | B     | EL              | 83.57                               | N/A                                  | --                        | --            | --    | --             | --              |                                     |  |
|                    | HS-20 (INVENTORY)  | 36.000               | ②                         | 1.403                       | 50.500        | 1.75                                 | 0.892                     | 1.788         | A     | EL              | 40.70                               | 0.939                     | 1.403         | A     | EL              | 52.91                               | 0.80                                 | 0.892                     | 1.656         | A     | EL             | 40.7            |                                     |  |
|                    | HS-20 (OPERATING)  | 36.000               |                           | 1.600                       | 57.608        | 1.35                                 | 0.892                     | 2.577         | B     | EL              | 59.70                               | 0.941                     | 2.170         | B     | EL              | 83.57                               | N/A                                  | --                        | --            | --    | --             | --              |                                     |  |
| LEGAL LOAD RATING  | SINGLE VEHICLE (SV)<br>TRUCK TRACTOR SEMI-TRAILER (TTST) | SNSH                 |                           | 3.814                       | 51.496        | 1.40                                 | 0.892                     | 5.149         | A     | EL              | 40.70                               | 0.939                     | 4.049         | A     | EL              | 52.91                               | 0.80                                 | 0.892                     | 3.814         | A     | EL             | 40.7            |                                     |  |
|                    |  | SNGARBS2             | 20.000                    |                             | 2.773         | 55.468                               | 1.40                      | 0.892         | 4.307 | B               | EL                                  | 59.70                     | 0.941         | 3.594 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 2.773 | B              | EL              | 59.70                               |  |
|                    |  | SNAGRIS2             | 22.000                    |                             | 2.580         | 56.758                               | 1.40                      | 0.892         | 4.007 | B               | EL                                  | 59.70                     | 0.941         | 3.319 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 2.580 | B              | EL              | 59.70                               |  |
|                    |  | SNCOTTS3             | 27.250                    |                             | 1.897         | 51.700                               | 1.40                      | 0.892         | 2.561 | A               | EL                                  | 40.70                     | 0.939         | 2.025 | A               | EL                                  | 52.91                                | 0.80                      | 0.892         | 1.897 | A              | EL              | 40.7                                |  |
|                    |  | SNAGGRS4             | 34.925                    |                             | 1.565         | 54.656                               | 1.40                      | 0.892         | 2.430 | B               | EL                                  | 59.70                     | 0.941         | 2.085 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.565 | B              | EL              | 59.70                               |  |
|                    |  | SNS5A                | 35.550                    |                             | 1.533         | 54.511                               | 1.40                      | 0.892         | 2.381 | B               | EL                                  | 59.70                     | 0.941         | 2.097 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.533 | B              | EL              | 59.70                               |  |
|                    |  | SNS6A                | 39.950                    |                             | 1.389         | 55.472                               | 1.40                      | 0.892         | 2.156 | B               | EL                                  | 59.70                     | 0.941         | 1.901 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.389 | B              | EL              | 59.70                               |  |
|                    |  | SNS7B                | 42.000                    |                             | 1.322         | 55.509                               | 1.40                      | 0.892         | 2.052 | B               | EL                                  | 59.70                     | 0.941         | 1.853 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.322 | B              | EL              | 59.70                               |  |
|                    |  | TNAGRIT3             | 33.000                    |                             | 1.688         | 55.700                               | 1.40                      | 0.892         | 2.621 | B               | EL                                  | 59.70                     | 0.941         | 2.272 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.688 | B              | EL              | 59.70                               |  |
|                    |  | TNT4A                | 33.075                    |                             | 1.690         | 55.911                               | 1.40                      | 0.892         | 2.625 | B               | EL                                  | 59.70                     | 0.941         | 2.227 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.690 | B              | EL              | 59.70                               |  |
|                    |  | TNT6A                | 41.600                    |                             | 1.365         | 56.794                               | 1.40                      | 0.892         | 2.120 | B               | EL                                  | 59.70                     | 0.941         | 1.946 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.365 | B              | EL              | 59.70                               |  |
|                    |  | TNT7A                | 42.000                    |                             | 1.363         | 57.254                               | 1.40                      | 0.892         | 2.117 | B               | EL                                  | 59.70                     | 0.941         | 1.913 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.363 | B              | EL              | 59.70                               |  |
|                    |  | TNT7B                | 42.000                    |                             | 1.389         | 58.331                               | 1.40                      | 0.892         | 2.157 | B               | EL                                  | 59.70                     | 0.941         | 1.820 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.389 | B              | EL              | 59.70                               |  |
|                    |  | TNAGRIT4             | 43.000                    |                             | 1.337         | 57.493                               | 1.40                      | 0.892         | 2.076 | B               | EL                                  | 59.70                     | 0.941         | 1.766 | B               | EL                                  | 83.57                                | 0.80                      | 0.892         | 1.337 | B              | EL              | 59.70                               |  |
| TNAGR5A            | 45.000   |                      | 1.268                     | 57.070                      | 1.40          | 0.892                                | 1.970                     | B             | EL    | 59.70           | 0.941                               | 1.738                     | B             | EL    | 83.57           | 0.80                                | 0.892                                | 1.268                     | B             | EL    | 59.70          |                 |                                     |  |
| TNAGR5B            | 45.000   |                      | ③                         | 1.260                       | 56.686        | 1.40                                 | 0.892                     | 1.956         | B     | EL              | 59.70                               | 0.941                     | 1.681         | B     | EL              | 83.57                               | 0.80                                 | 0.892                     | 1.260         | B     | EL             | 59.70           |                                     |  |

LOAD FACTORS:

| DESIGN LOAD RATING FACTORS | LIMIT STATE | γ <sub>DC</sub> | γ <sub>DW</sub> |
|----------------------------|-------------|-----------------|-----------------|
|                            | STRENGTH I  | 1.25            | 1.50            |
|                            | SERVICE III | 1.00            | 1.00            |

NOTES:  
 MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.  
 ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:  
 1.  
 2.  
 3.  
 4.

# CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

② DESIGN LOAD RATING (HS-20)

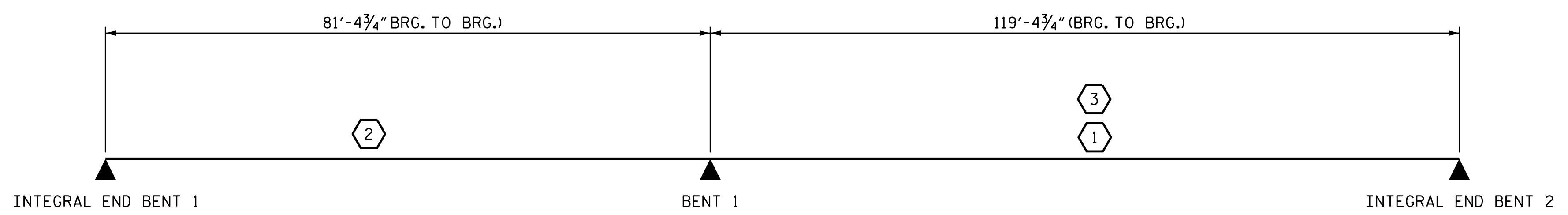
③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

---

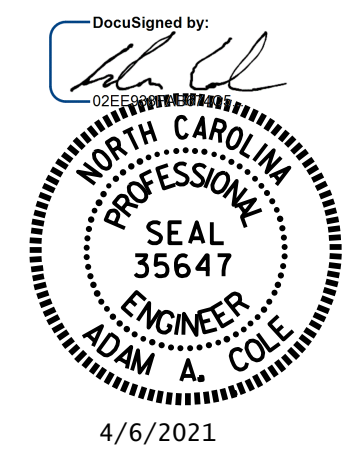
GIRDER LOCATION

I - INTERIOR GIRDER  
 EL - EXTERIOR LEFT GIRDER  
 ER - EXTERIOR RIGHT GIRDER



PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

## LRFR SUMMARY



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 LRFR SUMMARY FOR  
 PRESTRESSED  
 CONCRETE GIRDERS  
 (NON-INTERSTATE TRAFFIC)

|                             |                       |
|-----------------------------|-----------------------|
| ASSEMBLED BY : M. G. SHAIKH | DATE : 07/2019        |
| CHECKED BY : H. LOCKLEAR    | DATE : 08/2019        |
| DRAWN BY : MAA 1/08         | REV. 11/2/08RR MAA/GM |
| CHECKED BY : GM/DI 2/08     | REV. 10/1/11 MAA/GM   |
|                             | REV. 12/17 MAA/THC    |

|   |           |     |       |     |     |       |                  |
|---|-----------|-----|-------|-----|-----|-------|------------------|
| DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED | REVISIONS |     |       |     |     |       | SHEET NO.<br>S-4 |
|   | NO.       | BY: | DATE: | NO. | BY: | DATE: |                  |
|   | 1         |     |       | 3   |     |       |                  |
|   | 2         |     |       | 4   |     |       |                  |

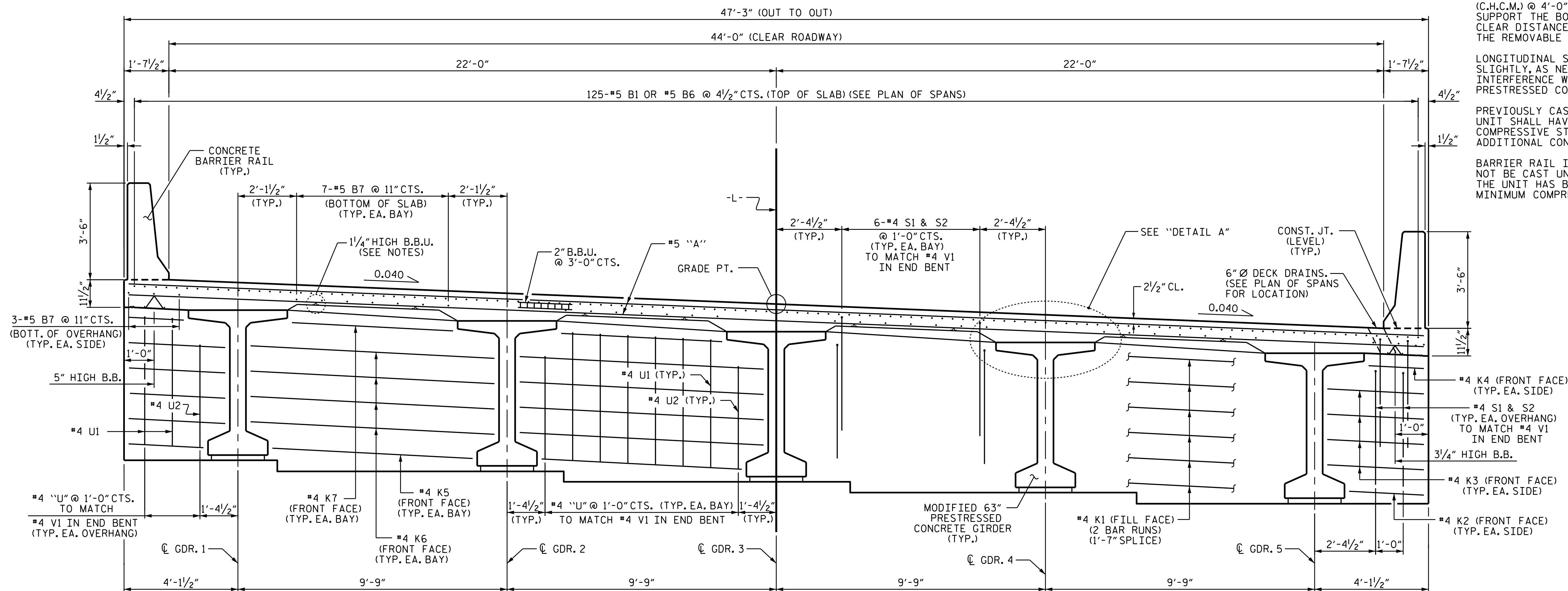
**NOTES**

PROVIDE 1/4" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2 1/2" ABOVE THE TOP OF THE REMOVABLE FORM.

LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

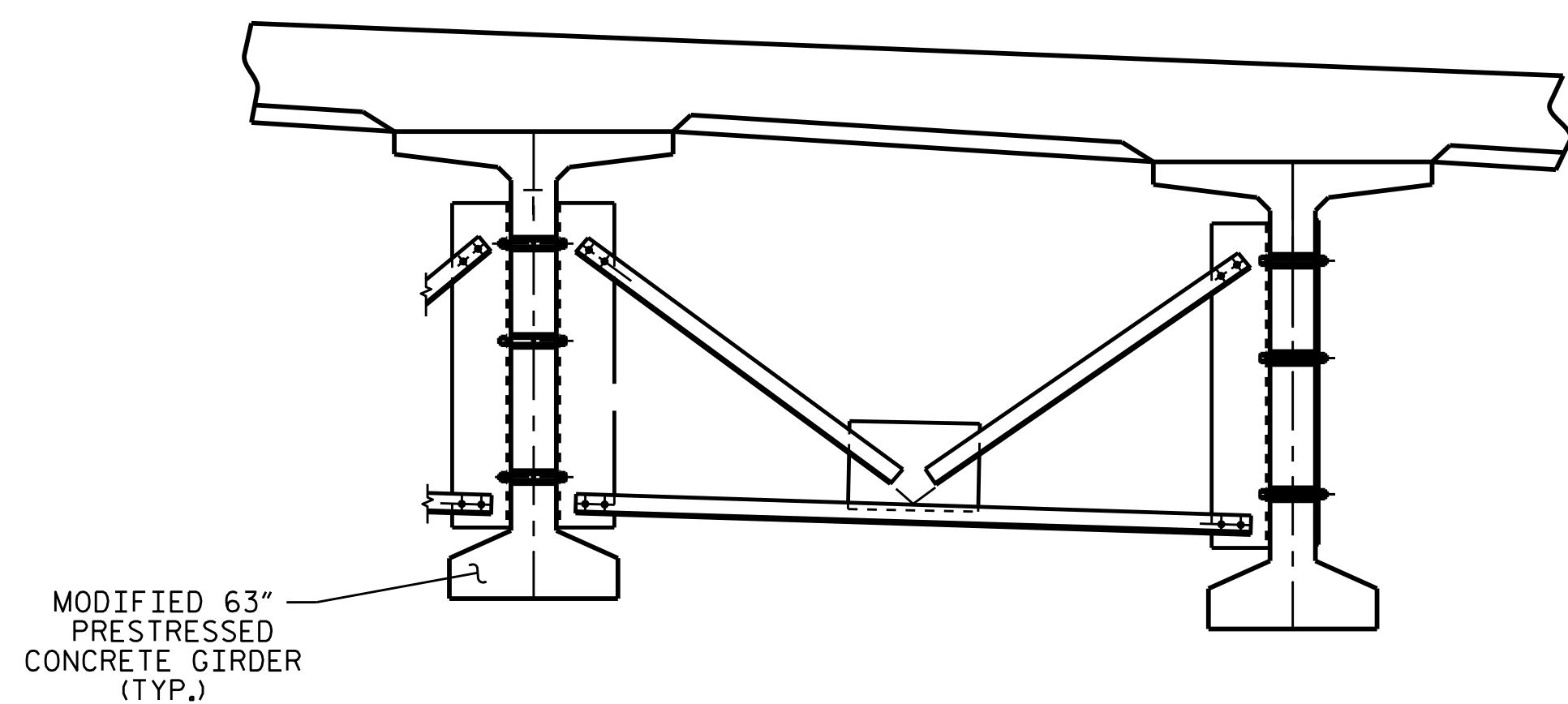
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.



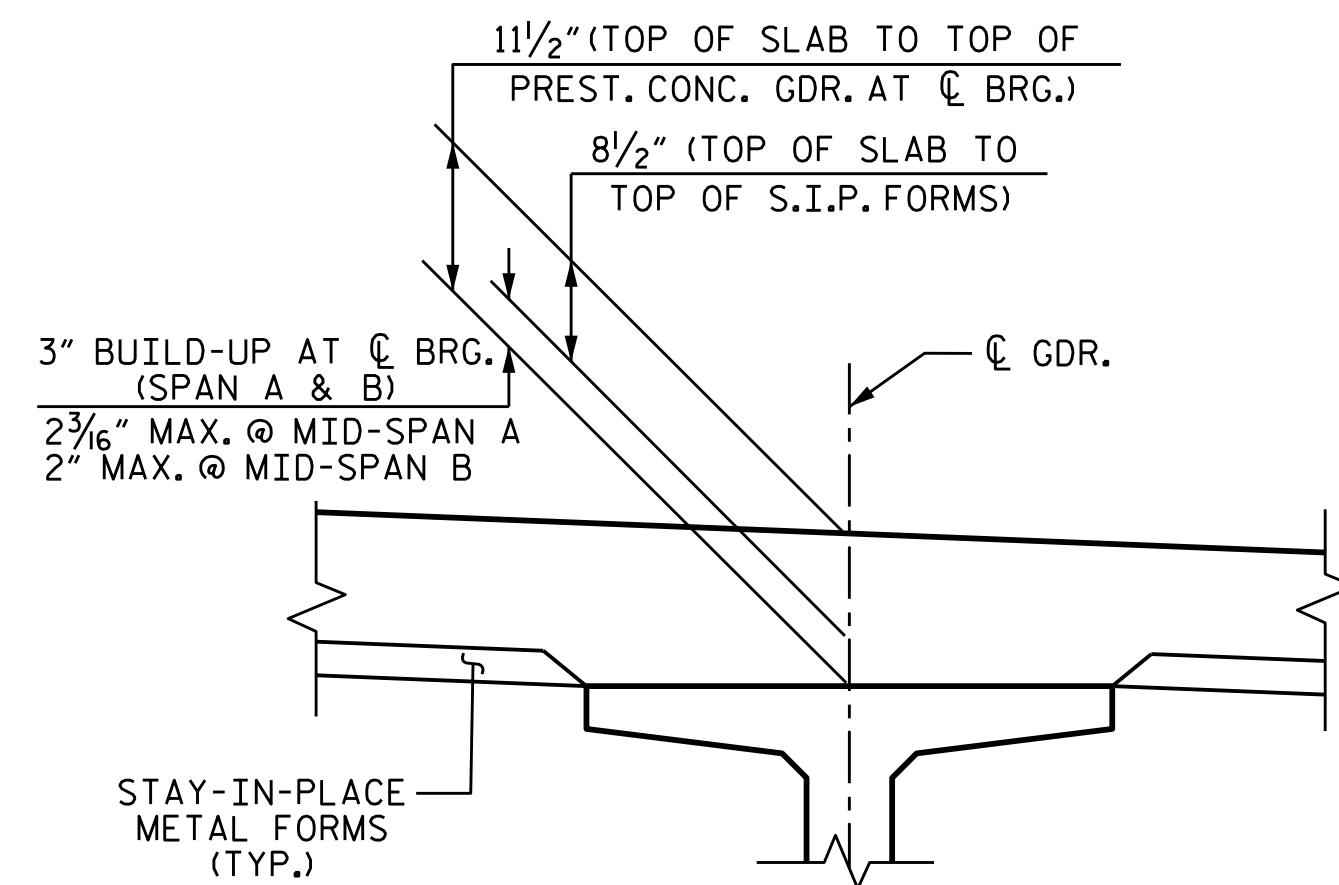
**TYPICAL SECTION @ INTEGRAL END BENT DIAPHRAGMS**

NOTE: #4 U1, #4 U2, #4 S1, & #4 S2 BARS TO MATCH WITH #4 "V" BARS IN INTEGRAL END BENT CAP



**PART SECTION AT INTERMEDIATE DIAPHRAGM**

SHOWING INTERMEDIATE DIAPHRAGM (FOR INTERMEDIATE STEEL DIAPHRAGMS DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 63" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS") (TYP. EA. BAY)



**DETAIL A**

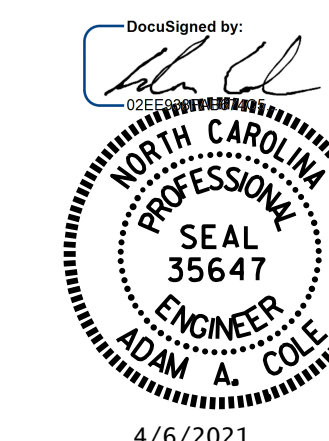
\* BASE ON PREDICTED FINAL CAMBER AND THEORETICAL GRADE LINE ELEVATIONS.

PROJECT NO. B-5813

CABARRUS COUNTY

STATION: 21+85.00 -L-

SHEET 1 OF 3



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

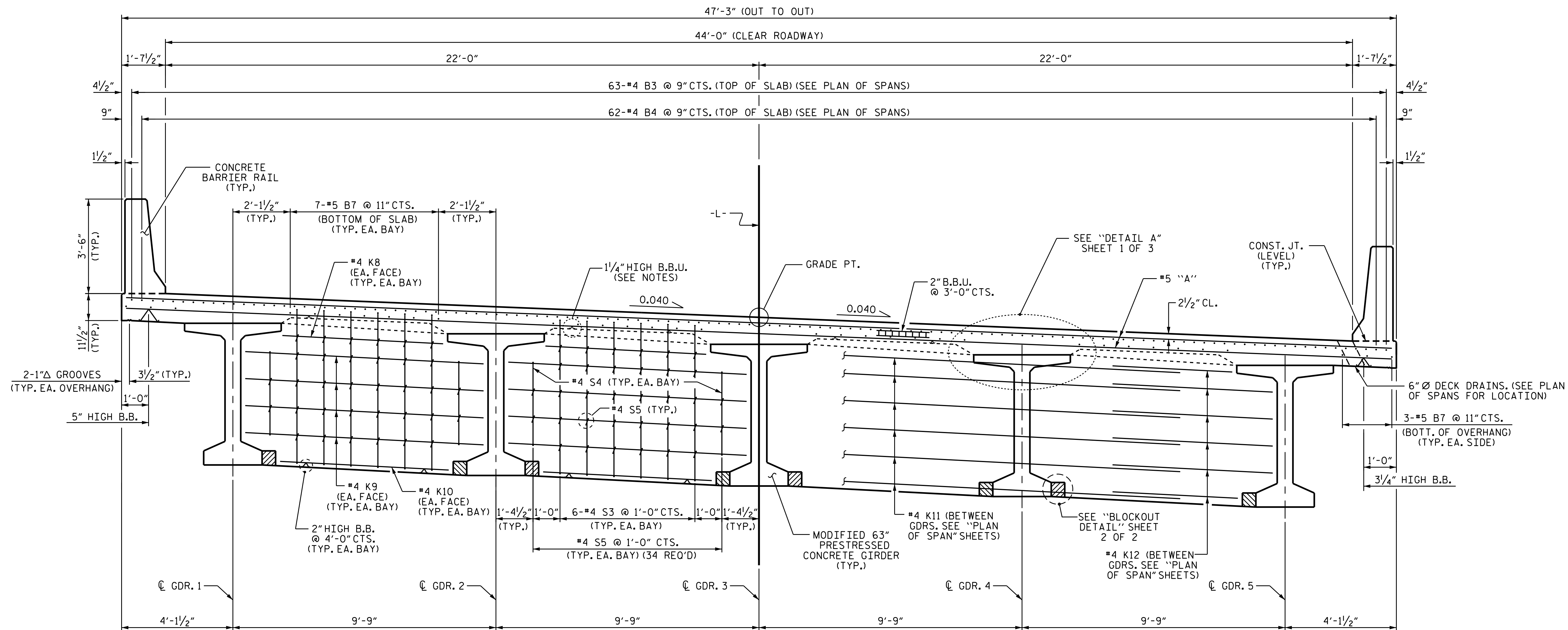
SUPERSTRUCTURE  
TYPICAL SECTION

DRAWN BY : M. G. SHAIKH DATE : 06/2019  
CHECKED BY : H. LOCKLEAR DATE : 08/2019  
DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 06/2019

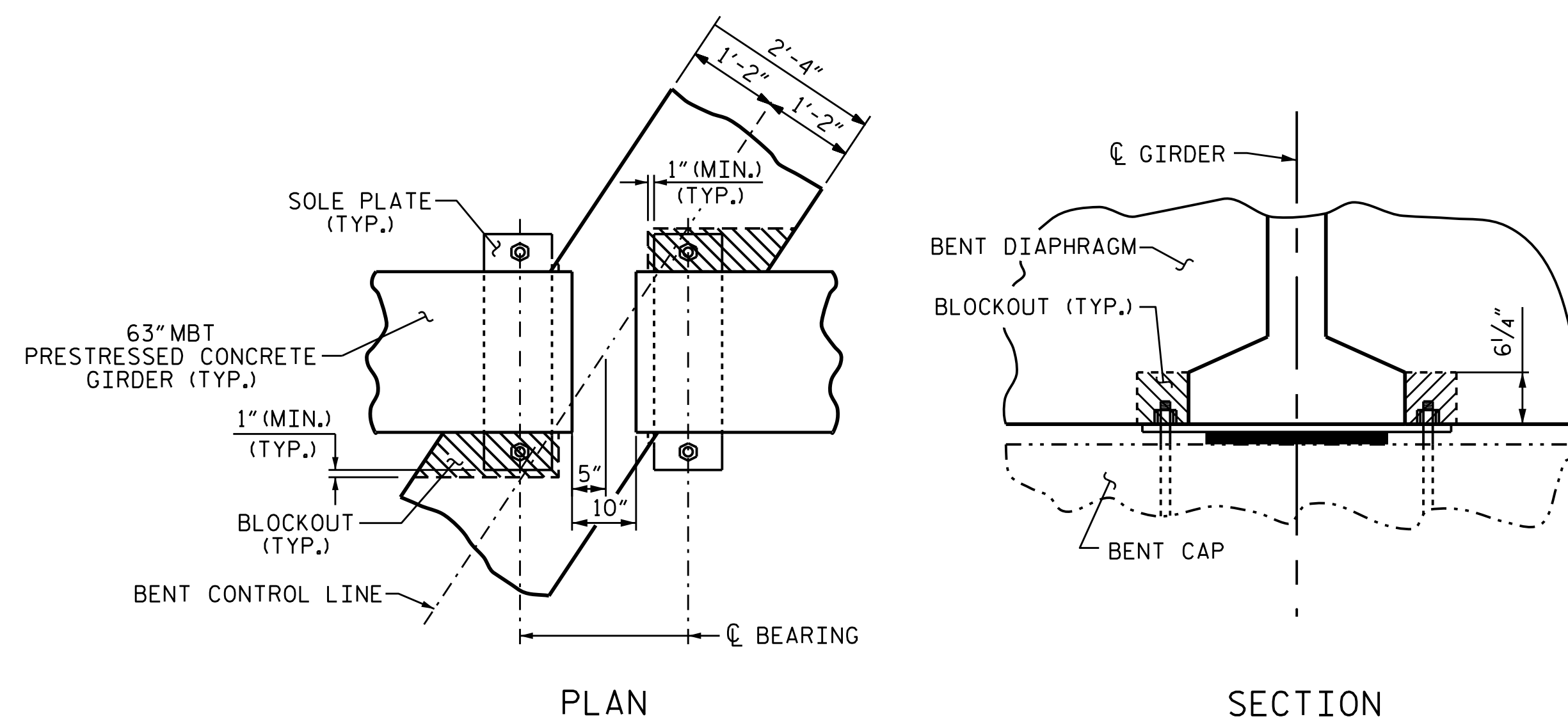
DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-5          |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |





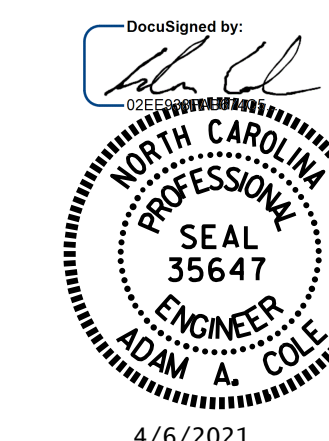
TYPICAL SECTION @ CONTINUOUS BENT DIAPHRAGM



BENT DIAPHRAGM BLOCK-OUT DETAIL

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 2 OF 3



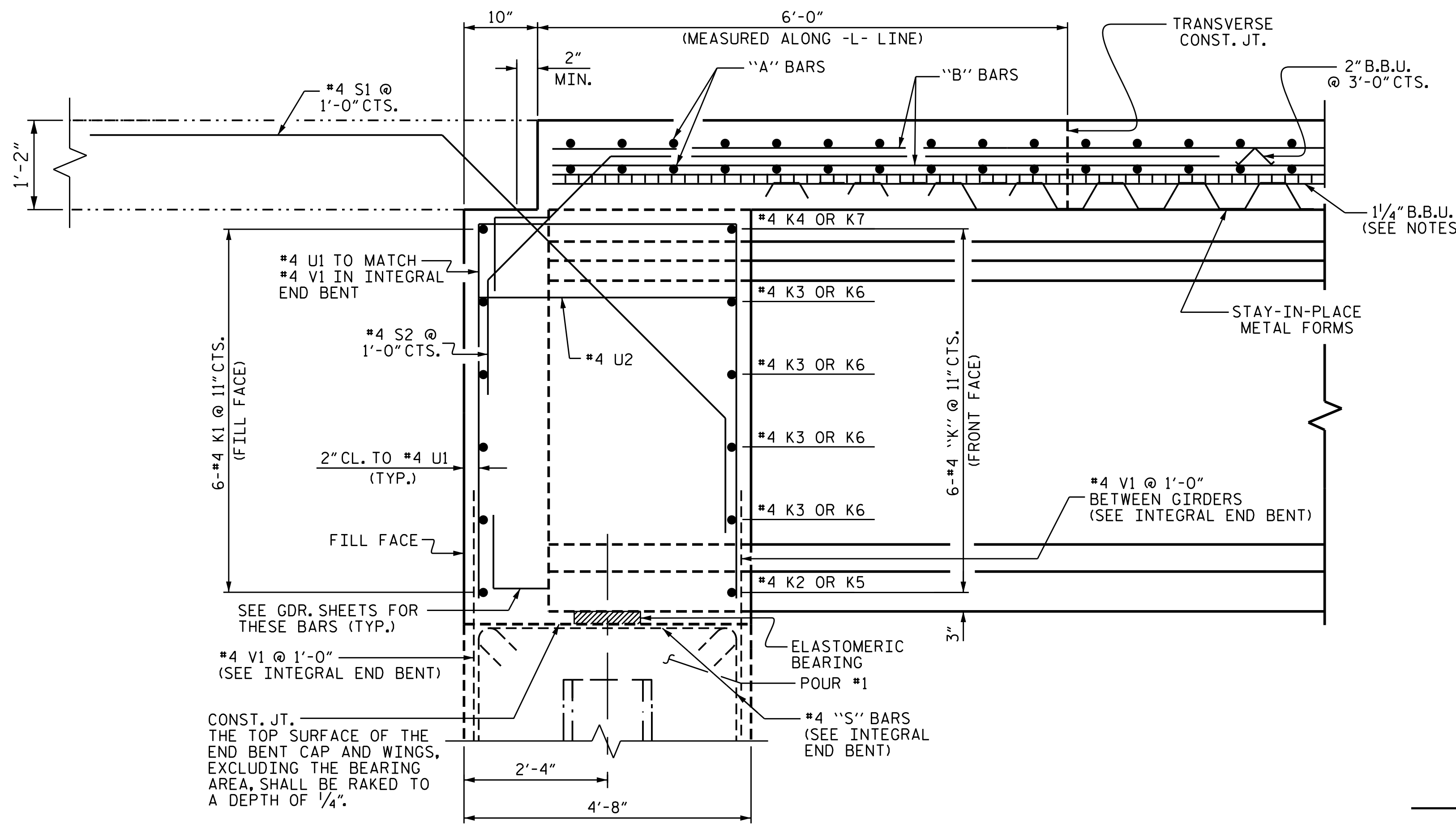
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
 TYPICAL SECTION

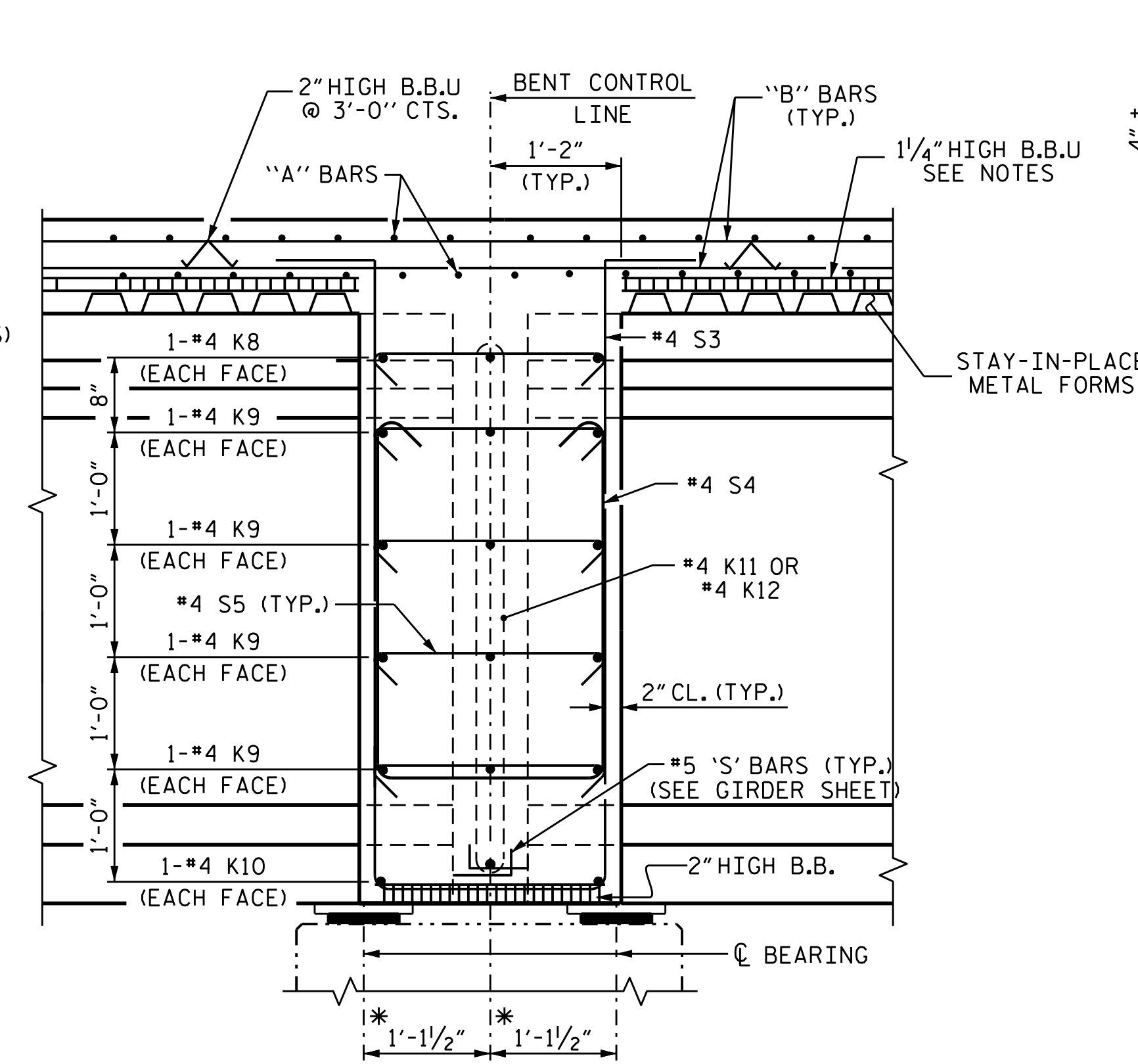
DRAWN BY : M. G. SHAIKH DATE : 06/2019  
 CHECKED BY : H. LOCKLEAR DATE : 08/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 06/2019

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-6          |
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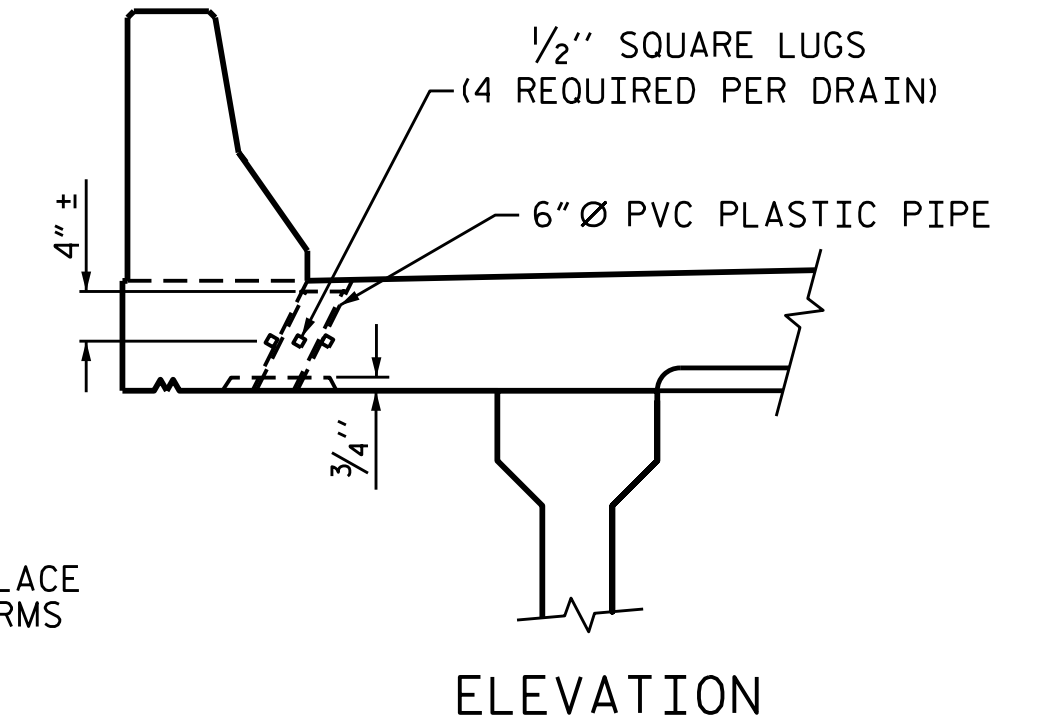


SECTION THRU INTEGRAL END BENT

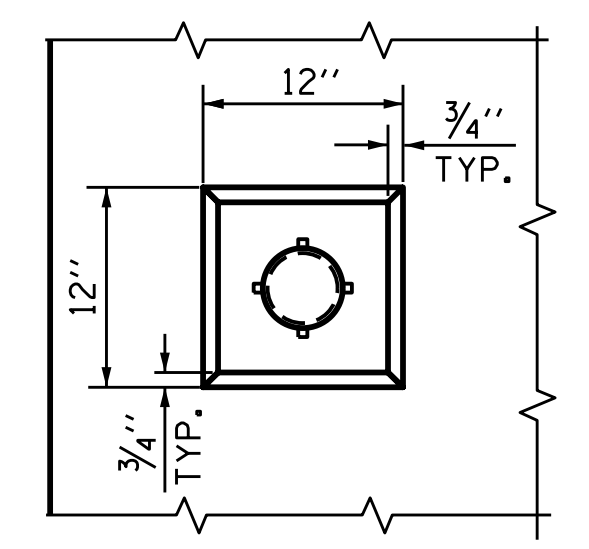


SECTION THROUGH BENT DIAPHRAGM

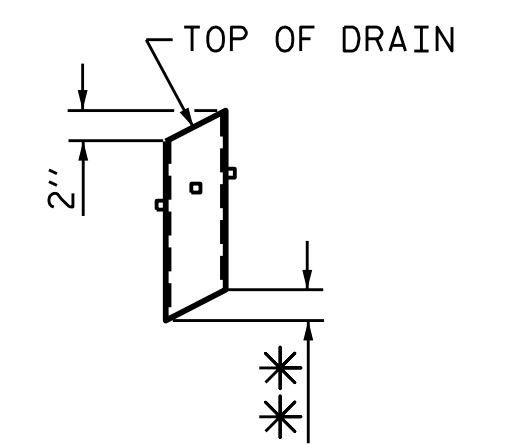
\* ALONG CL GIRDER



ELEVATION



PLAN OF RECESS

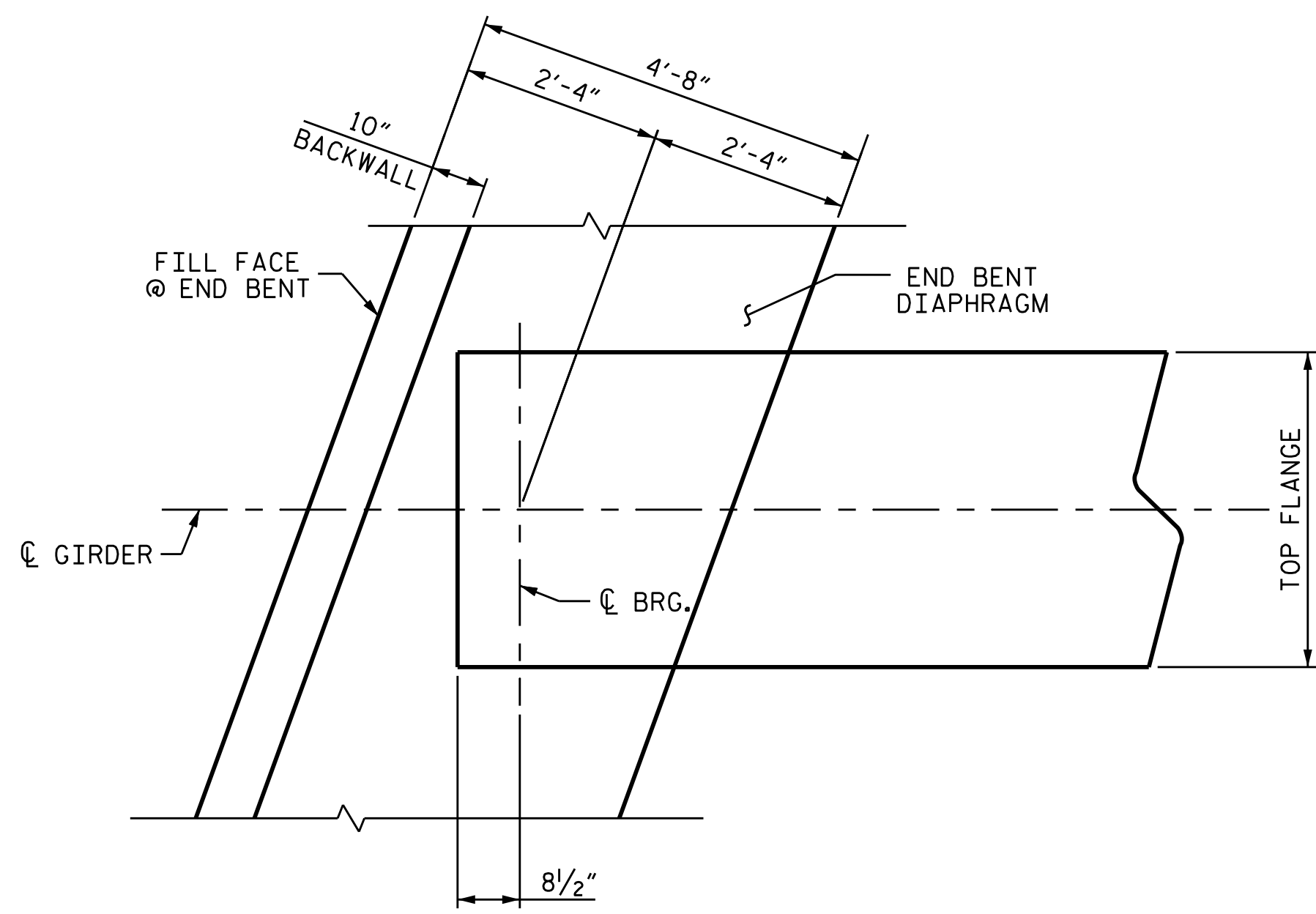


\*\* TO BE SET TO MATCH SLOPE OF BOTTOM OF OVERHANG (22 DRAINS REQUIRED)

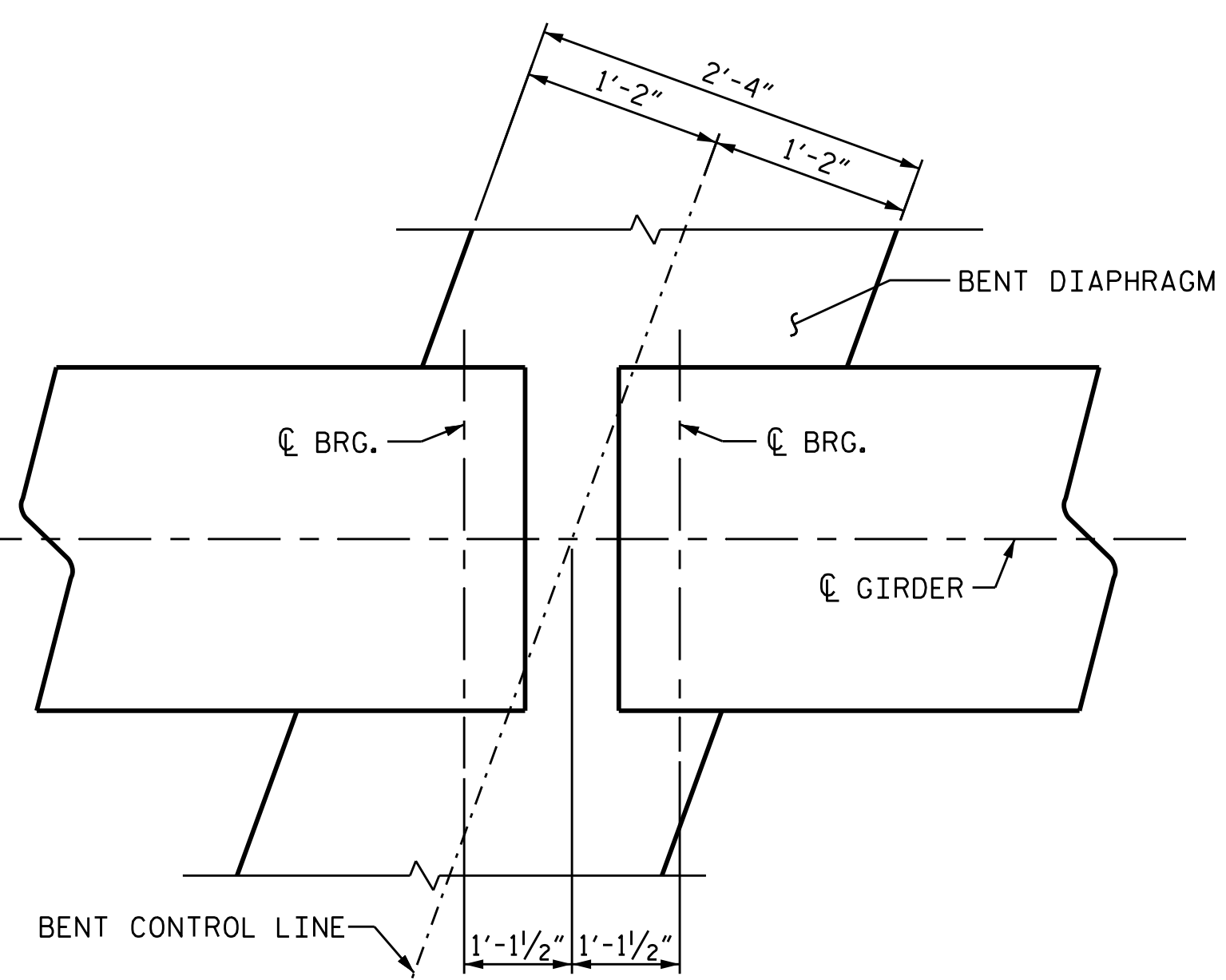
PIPE DETAIL

TOP OF FLOOR DRAINS TO BE SET 3/8" BELOW SURFACE OF SLAB.  
 4 - 1/2" SQUARE LUGS TO BE GLUED TO THE P.V.C. PLASTIC PIPE AT EQUAL SPACES AROUND THE PIPE DRAIN APPROXIMATELY 4" FROM THE TOP OF THE PIPE.  
 THE 6" Ø PVC PIPE AND FITTINGS SHALL BE SCHEDULE 40 AND CONFORM TO ASTM D1785.

DRAIN DETAILS



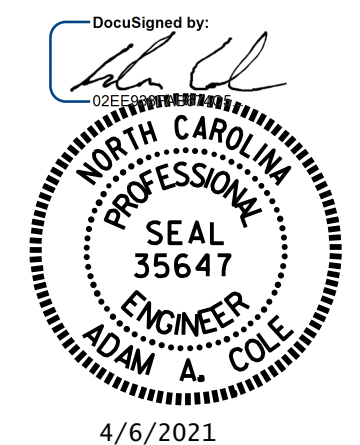
PLAN OF GIRDER AT INTEGRAL END BENT



PLAN OF GIRDER AT BENT

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 3 OF 3

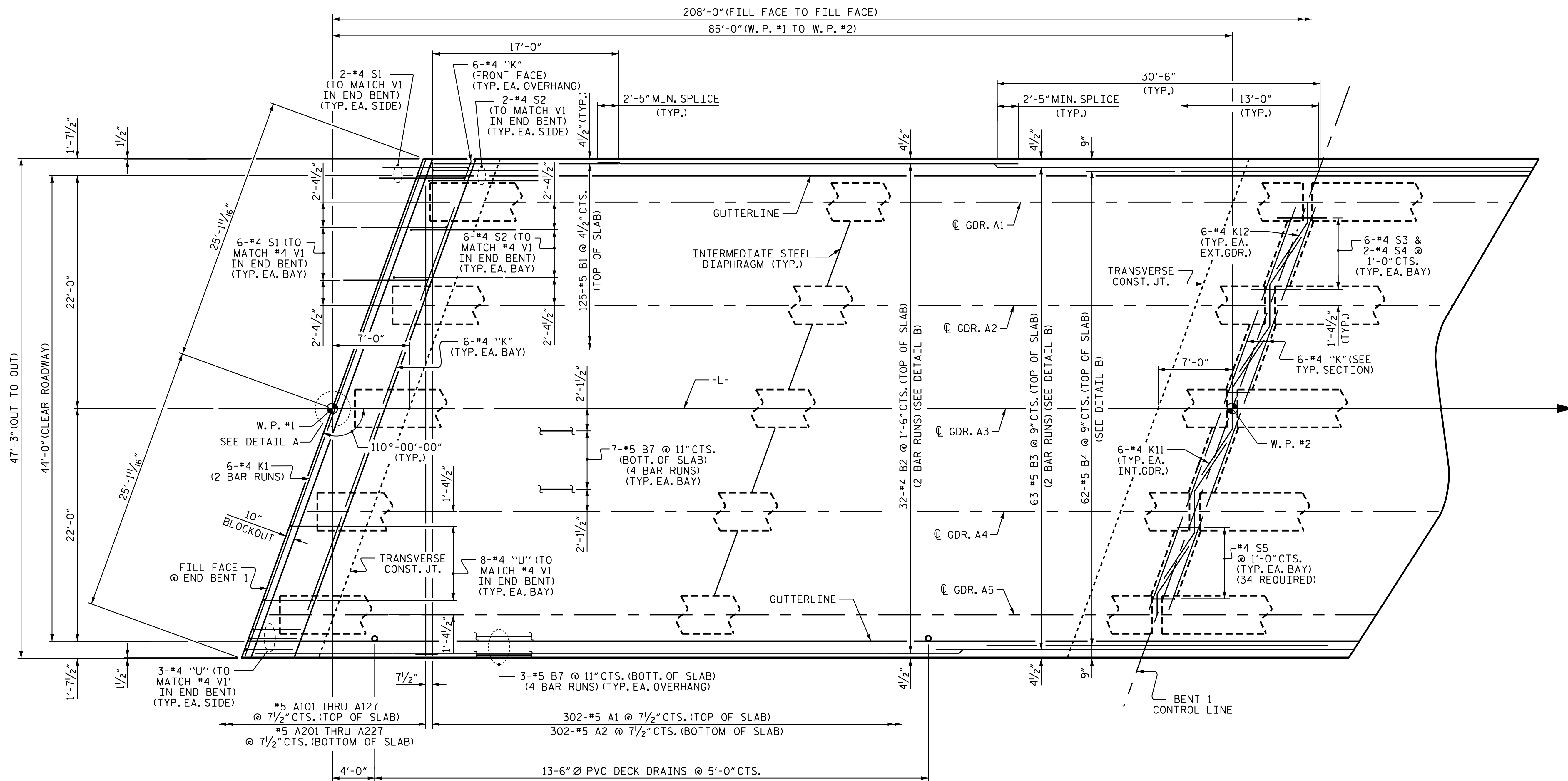


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 TYPICAL SECTION

DRAWN BY : M. G. SHAIKH DATE : 06/2019  
 CHECKED BY : H. LOCKLEAR DATE : 08/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 06/2019

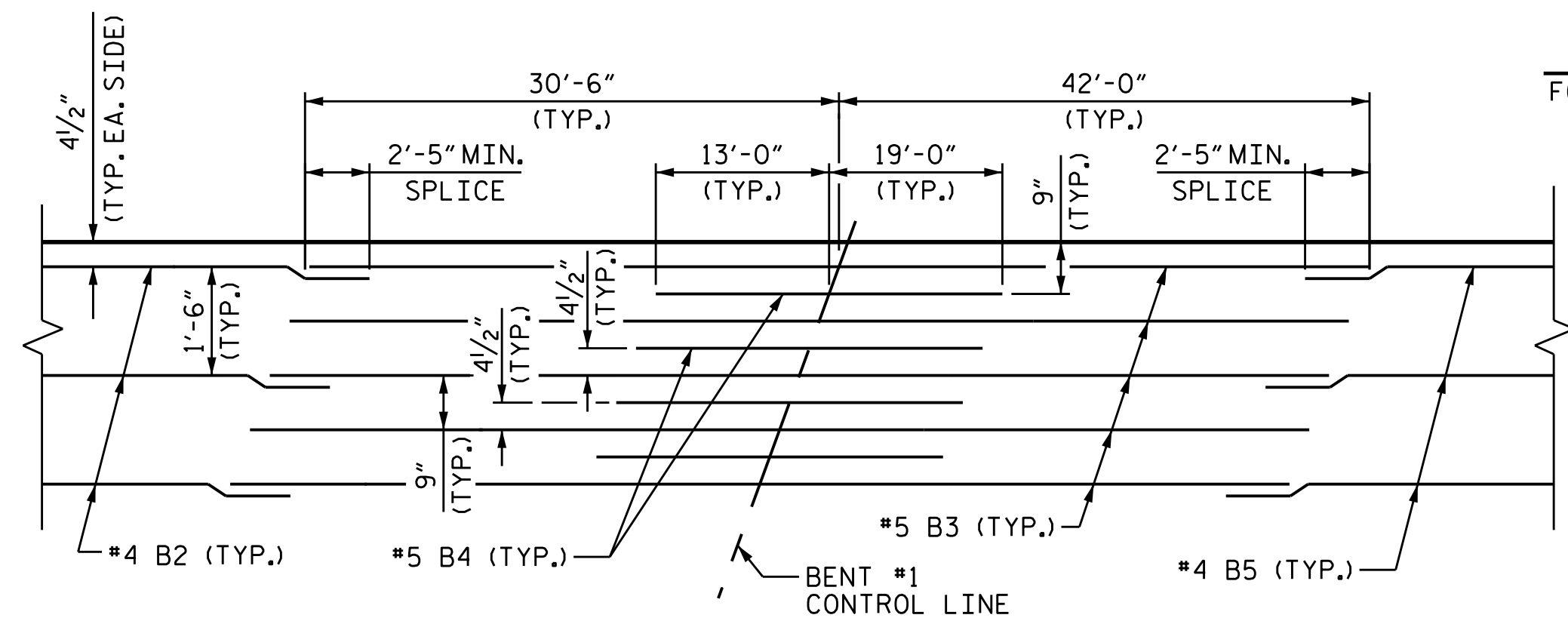
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| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |



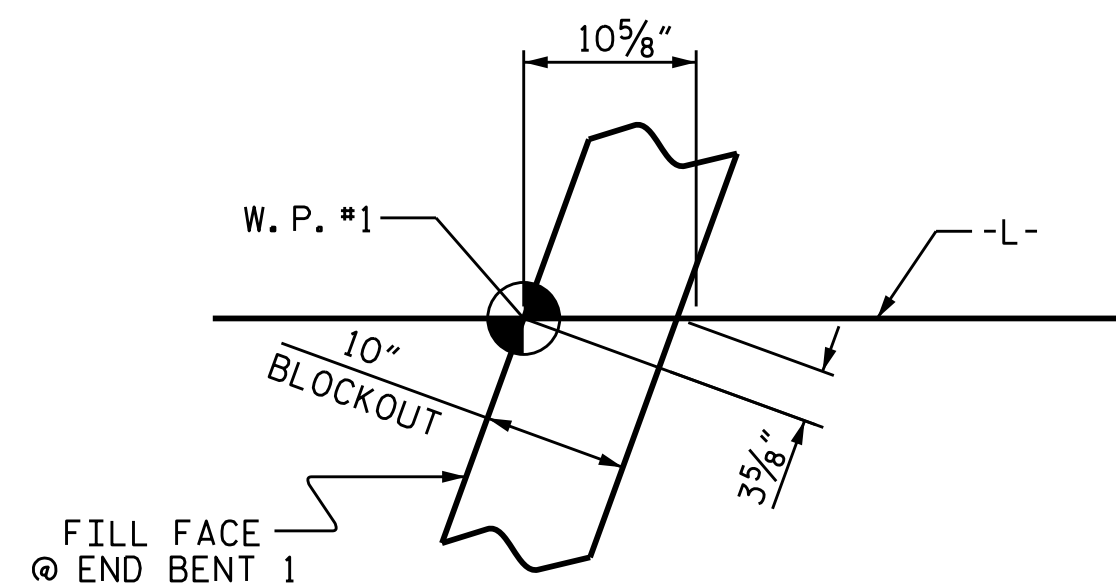


**PLAN OF SPAN A**

FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.  
 FOR TOP OF SLAB REINFORCING AT BENT, SEE "DETAIL B AT BENT 1".



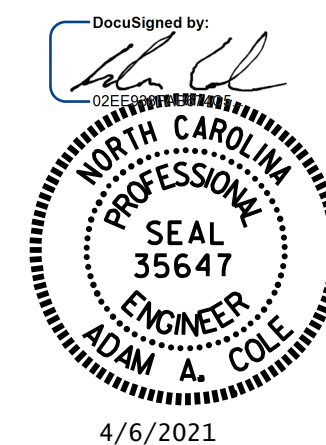
**DETAIL B AT BENT 1**



**DETAIL A**

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 1 OF 2



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**PLAN OF SPAN A**

DRAWN BY: M. G. SHAIKH DATE: 06/2019  
 CHECKED BY: H. LOCKLEAR DATE: 08/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE: 06/2019

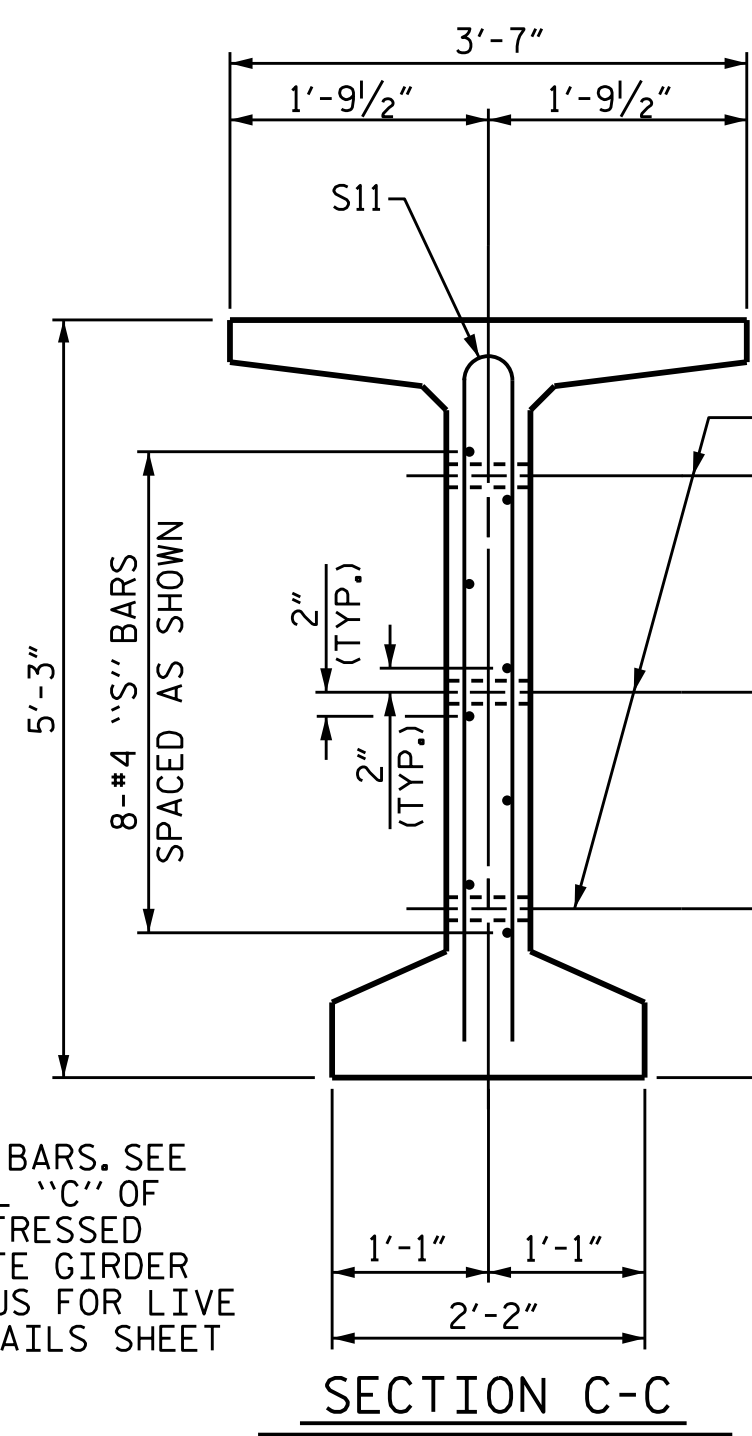
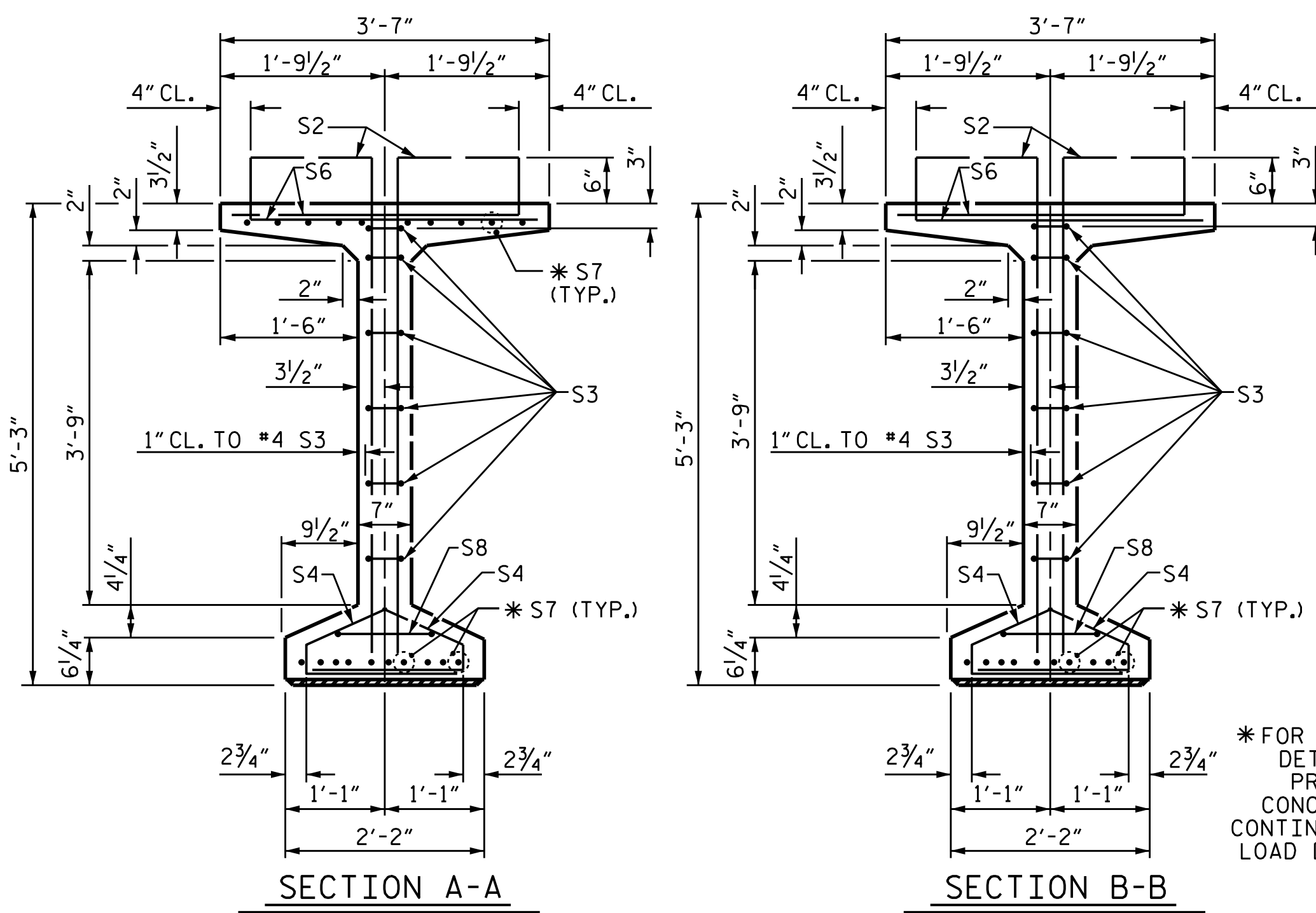
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-8          |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |





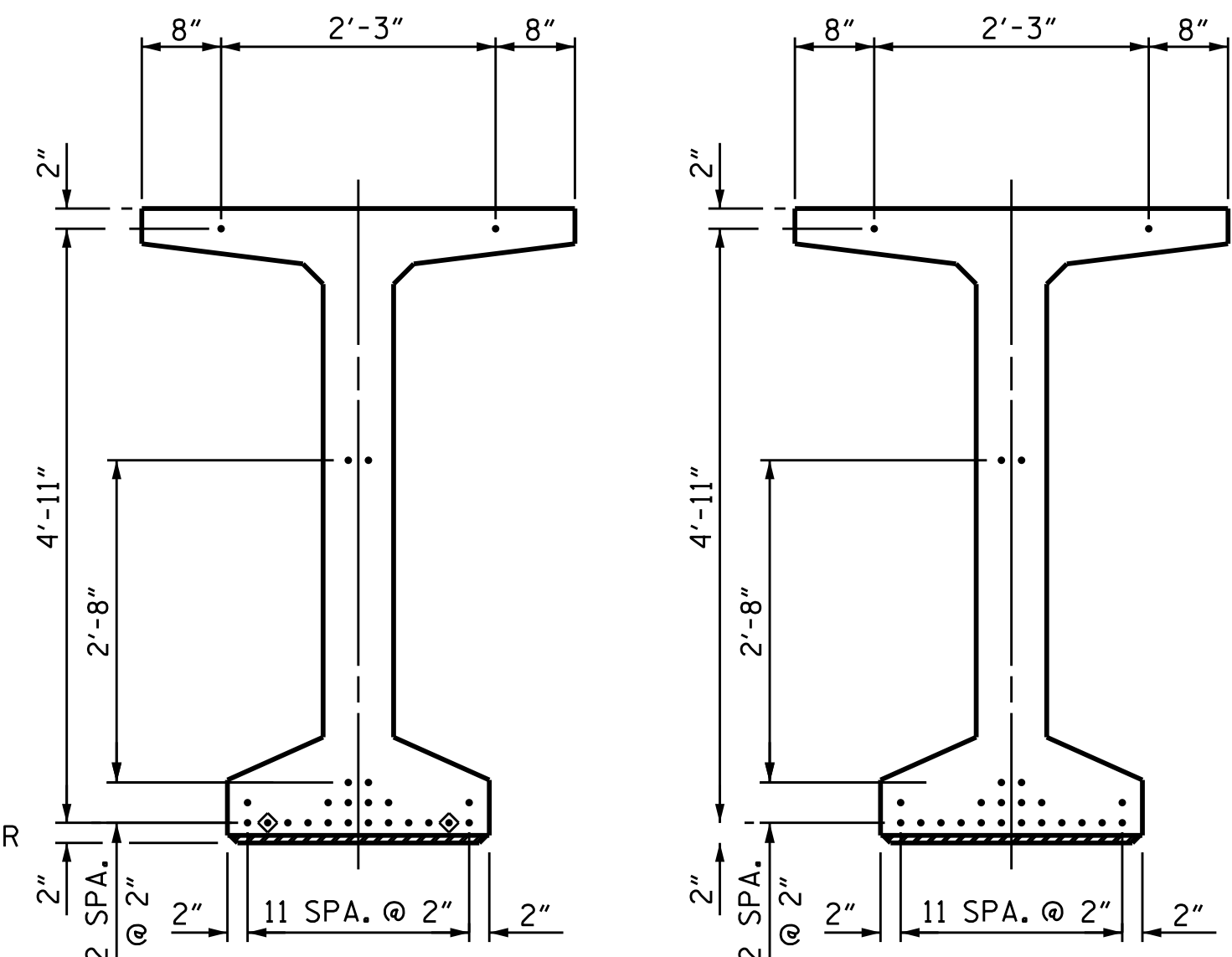




1 1/2" Ø FORMED HOLE. SEE ELEVATION FOR LOCATION. FOR DIM. "A", "B" & "C", SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.)

**DEBONDING LEGEND**  
 ● FULLY BONDED STRANDS  
 ◆ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER

\* FOR S7 BARS, SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET



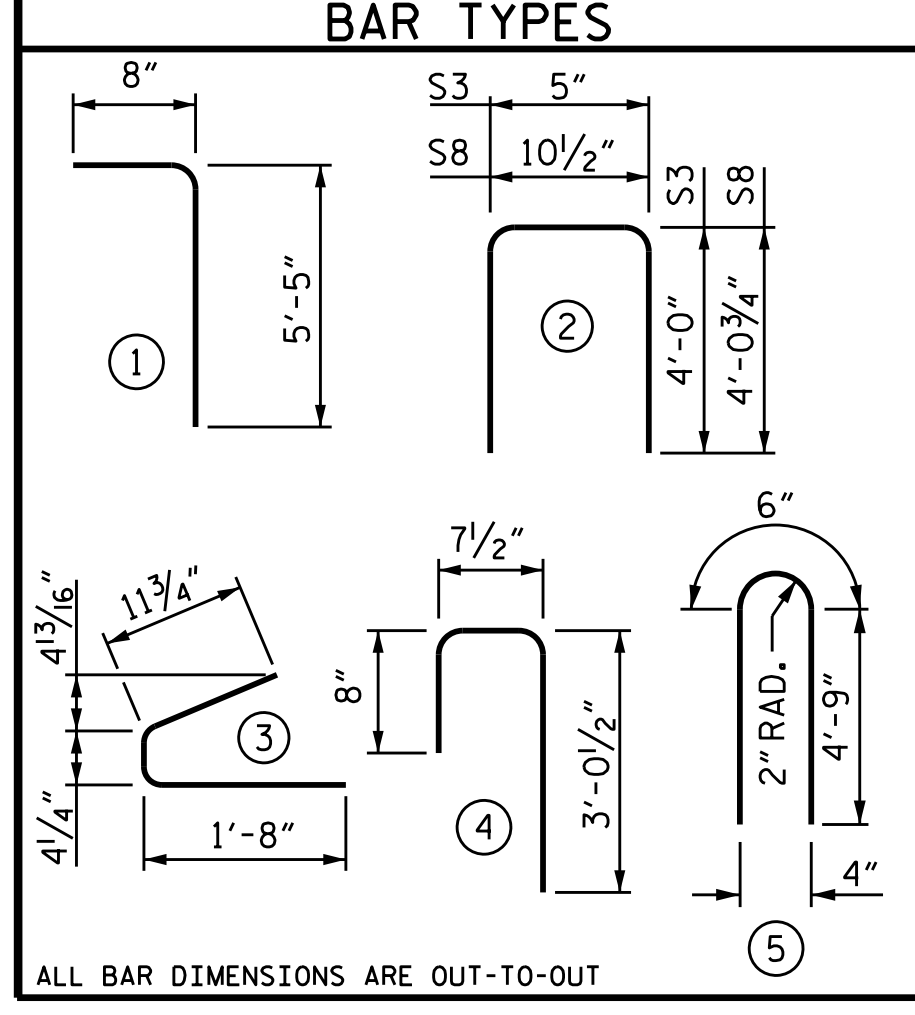
AT END OF GIRDER AT CL OF GIRDER  
 0.6" Ø LOW RELAXATION STRAND LAYOUT

| 0.6" Ø L. R. GRADE 270 STRANDS |                                     |                                     |
|--------------------------------|-------------------------------------|-------------------------------------|
| AREA (SQUARE INCHES)           | ULTIMATE STRENGTH (LBS. PER STRAND) | APPLIED PRESTRESS (LBS. PER STRAND) |
| 0.217                          | 58,600                              | 43,950                              |

| REINFORCING STEEL FOR ONE GDR |        |      |      |        |        |
|-------------------------------|--------|------|------|--------|--------|
| BAR                           | NUMBER | SIZE | TYPE | LENGTH | WEIGHT |
| S1                            | 154    | #4   | 1    | 6'-1"  | 626    |
| S2                            | 24     | #5   | 1    | 6'-1"  | 152    |
| S3                            | 12     | #4   | 2    | 8'-5"  | 67     |
| S4                            | 72     | #4   | 3    | 3'-0"  | 144    |
| S6                            | 178    | #5   | 4    | 4'-4"  | 804    |
| *S7                           | 30     | #5   | STR  | 3'-8"  | 115    |
| S8                            | 2      | #5   | 2    | 9'-0"  | 19     |
| S9                            | 15     | #5   | STR  | 3'-3"  | 51     |
| S10                           | 2      | #3   | STR  | 1'-10" | 1      |
| S11                           | 4      | #5   | 5    | 10'-0" | 42     |
| S12                           | 8      | #4   | STR  | 8'-0"  | 43     |

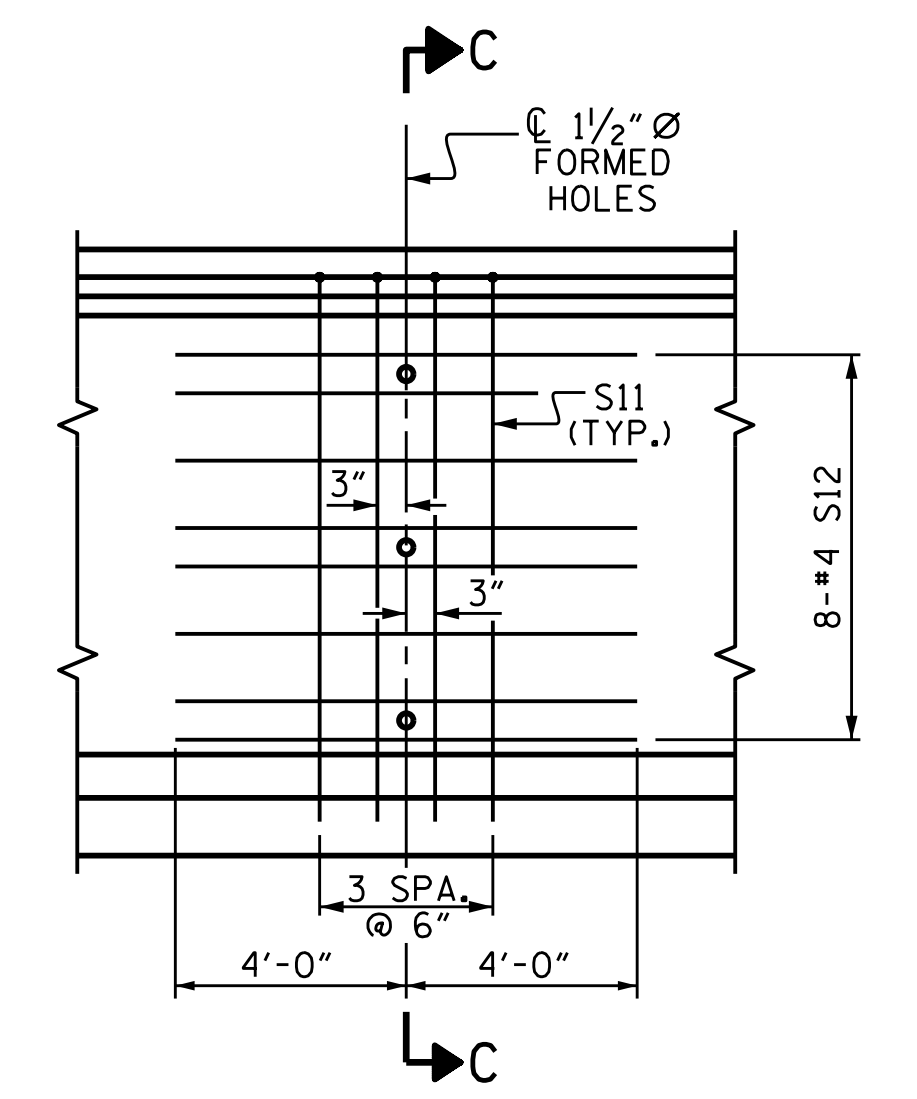
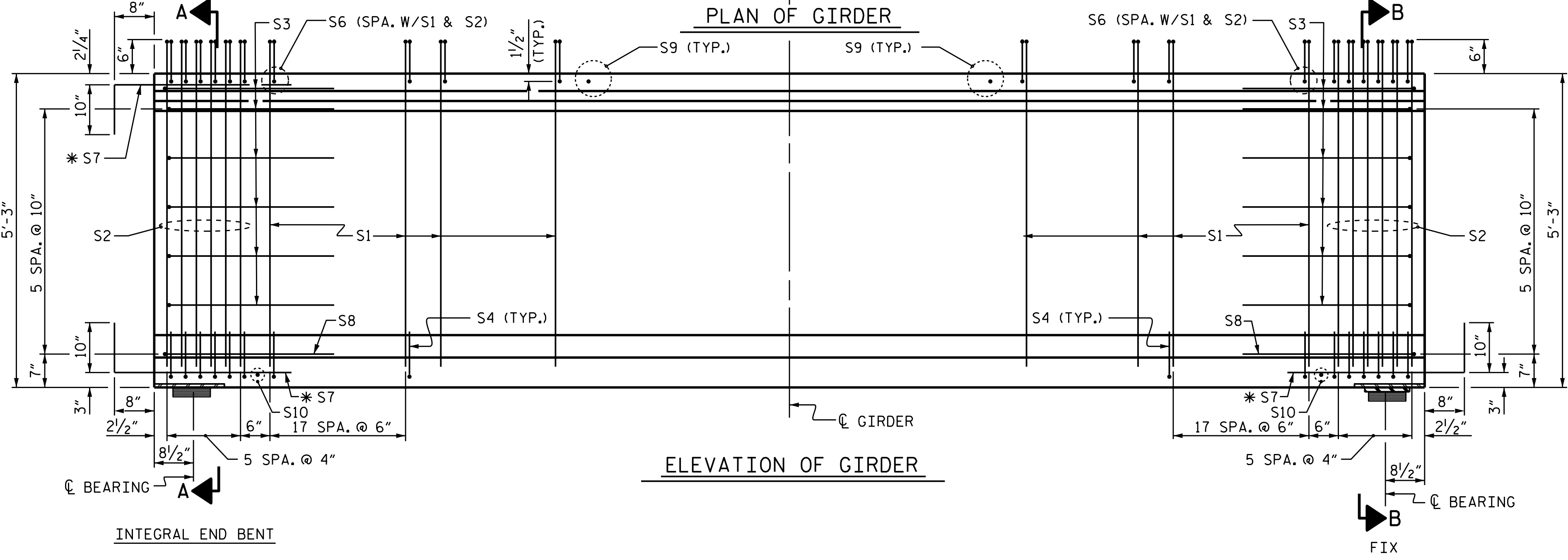
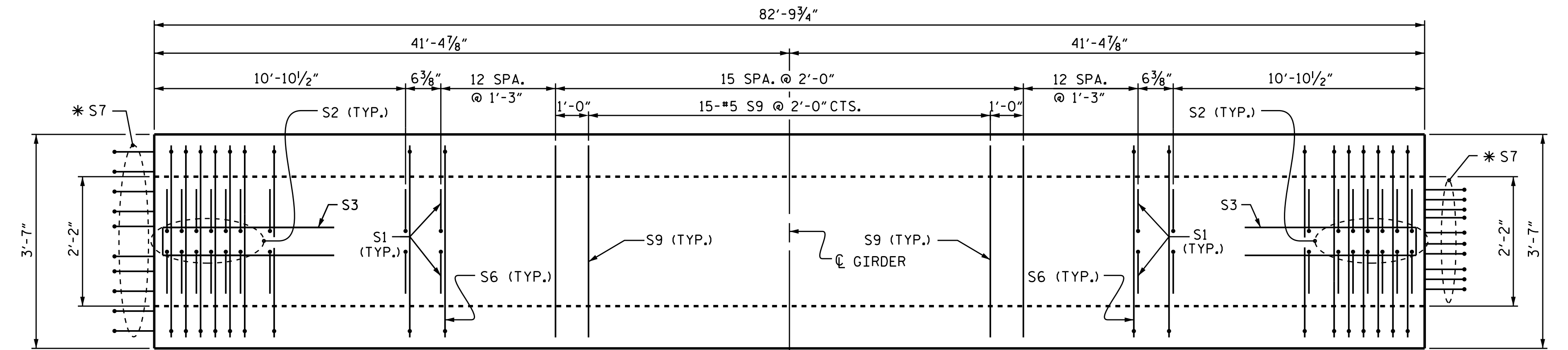
\* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.



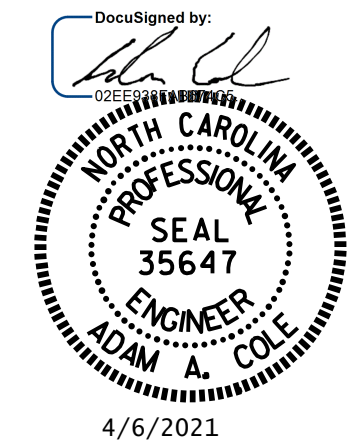
| QUANTITIES FOR ONE GIRDER |                    |                     |
|---------------------------|--------------------|---------------------|
| REINFORCING STEEL         | 5,500 PSI CONCRETE | 0.6" Ø L.R. STRANDS |
| LB.                       | C.Y.               | No.                 |
| 2,064                     | 16.4               | 24                  |

| GIRDERS REQUIRED |            |              |
|------------------|------------|--------------|
| NUMBER           | LENGTH     | TOTAL LENGTH |
| 5                | 82'-9 3/4" | 414'-0 3/4"  |



**PARTIAL ELEVATION**  
 SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. (FOR ALL EXTERIOR GIRDERS AND INTERIOR GIRDERS WITH 70° ≤ SKEW ≤ 110°)



|                             |                    |
|-----------------------------|--------------------|
| ASSEMBLED BY : M. G. SHAIKH | DATE : 07/2019     |
| CHECKED BY : H. LOCKLEAR    | DATE : 08/2019     |
| DRAWN BY : EEM 2/6/97       | REV. 6/13 MAA/GM   |
| CHECKED BY : VAP 2/6/97     | REV. 1/15 MAA/TMG  |
|                             | REV. 12/17 MAA/THC |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

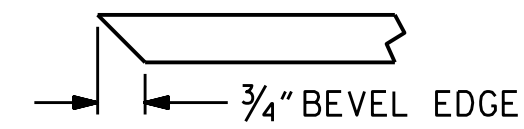
PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-  
 SHEET 1 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 63" PRESTRESSED CONCRETE  
 MODIFIED BULB TEE  
 CONTINUOUS FOR LIVE LOAD  
 (SPAN A)

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-11         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
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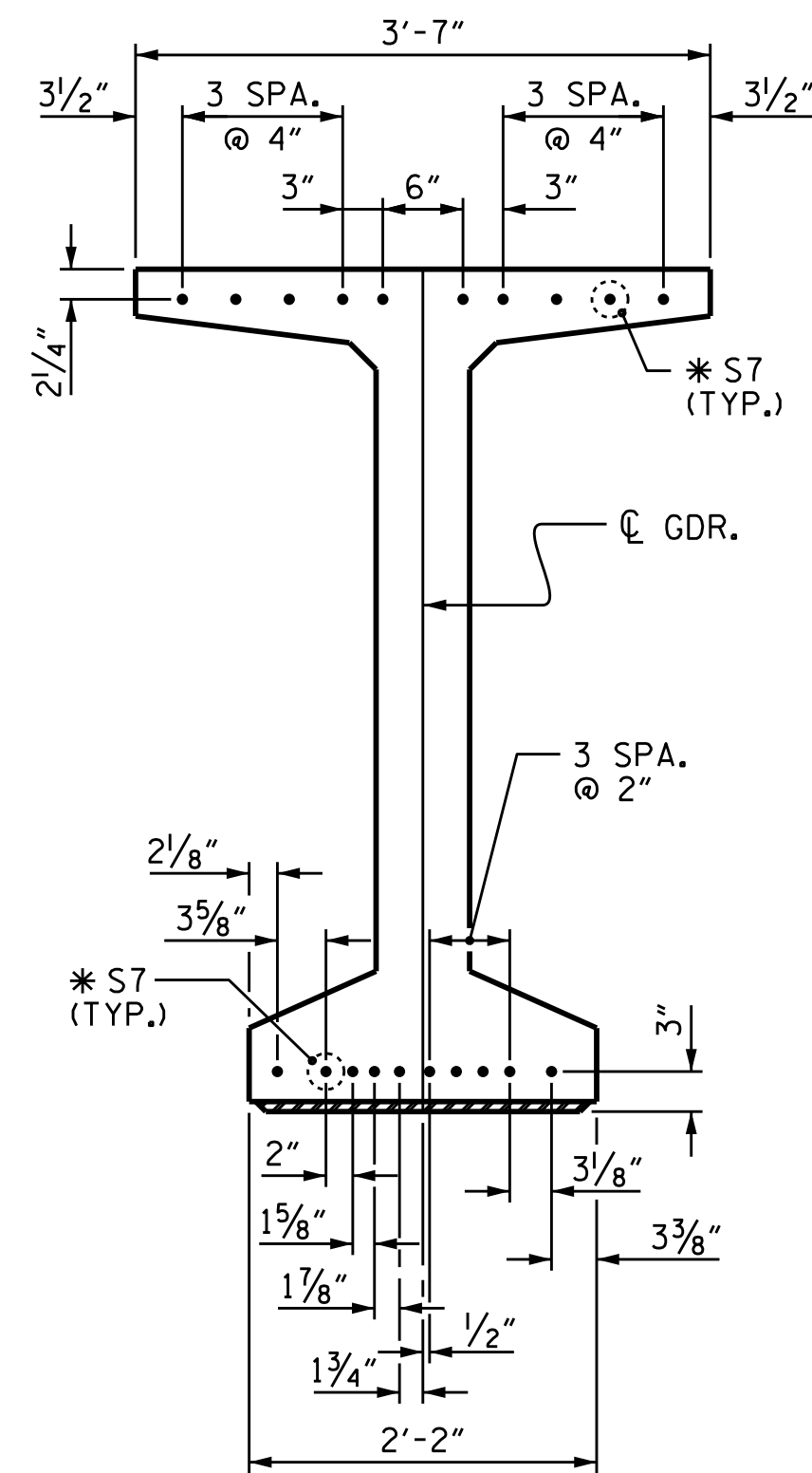






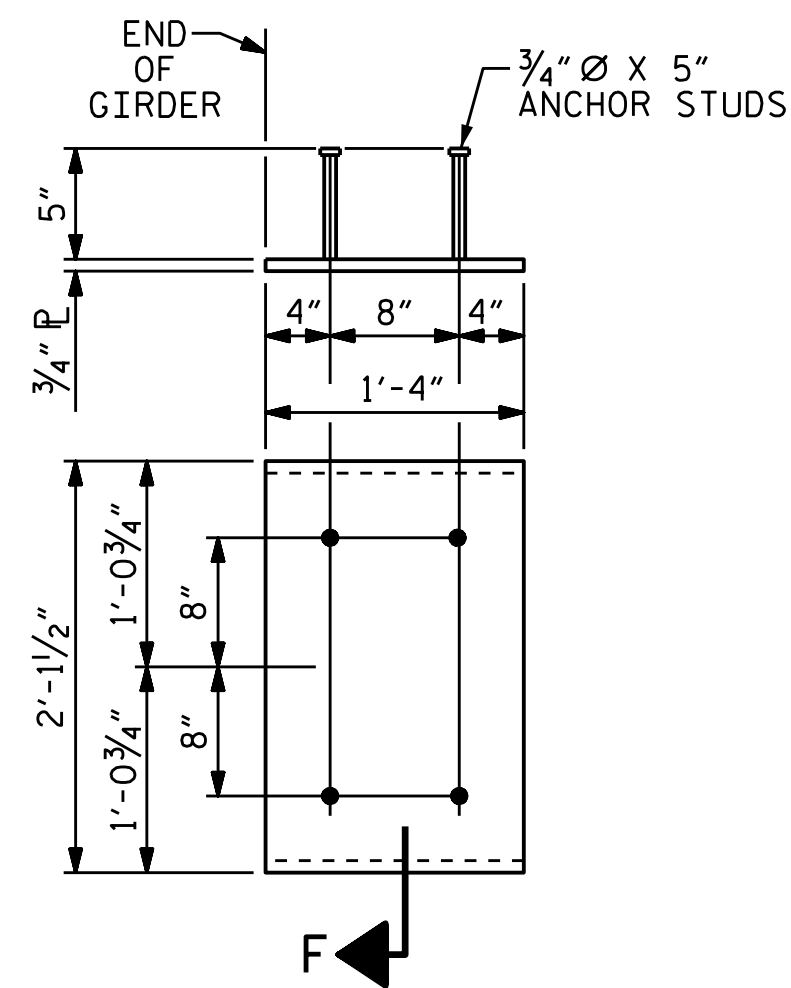
**SECTION "F"**

(SEE NOTES)



**DETAIL "C"**

(FOR 63" MODIFIED BULB TEES)



**EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE IV GIRDER AND 63" MODIFIED BULB TEES**

(2 REQ'D PER GIRDER)

**NOTES**

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL SHALL BE GRADE 60.

APPLY EPOXY PROTECTIVE COATING TO END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4,300 PSI. FOR SPANS A AND 8,000 PSI FOR SPAN B.

DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

A 2" X 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 63" AND 72" MODIFIED BULB TEES ONLY.

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.

**DEAD LOAD DEFLECTION TABLE FOR GIRDER**

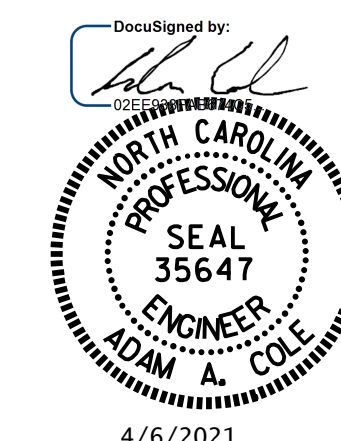
| 0.6" Ø LOW RELAXATION                   | SPAN B          |       |       |       |       |       |       |       |       |       |        |       |        |        |       |       |        |        |       |       |       |       |       |       |        |        |       |       |        |        |       |        |       |       |       |       |       |       |       |       |       |   |
|---|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|--------|--------|-------|-------|--------|--------|-------|-------|-------|-------|-------|-------|--------|--------|-------|-------|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
|   | FOURIETH POINTS | 0     | 0.025 | 0.050 | 0.075 | 0.100 | 0.125 | 0.150 | 0.175 | 0.200 | 0.225  | 0.250 | 0.275  | 0.300  | 0.325 | 0.350 | 0.375  | 0.400  | 0.425 | 0.450 | 0.475 | 0.500 | 0.525 | 0.550 | 0.575  | 0.600  | 0.625 | 0.650 | 0.675  | 0.700  | 0.725 | 0.750  | 0.775 | 0.800 | 0.825 | 0.850 | 0.875 | 0.900 | 0.925 | 0.950 | 0.975 | 0 |
| CAMBER (GIRDER ALONE IN PLACE) †        | 0               | 0.026 | 0.051 | 0.076 | 0.100 | 0.123 | 0.146 | 0.168 | 0.189 | 0.208 | 0.227  | 0.243 | 0.259  | 0.272  | 0.284 | 0.294 | 0.303  | 0.309  | 0.314 | 0.316 | 0.318 | 0.316 | 0.314 | 0.309 | 0.303  | 0.294  | 0.284 | 0.272 | 0.259  | 0.243  | 0.227 | 0.208  | 0.189 | 0.168 | 0.146 | 0.123 | 0.100 | 0.076 | 0.051 | 0.026 | 0     |   |
| * DEFLECTION DUE TO SUPERIMPOSED D.L. ‡ | 0               | 0.019 | 0.038 | 0.056 | 0.074 | 0.092 | 0.109 | 0.125 | 0.140 | 0.154 | 0.168  | 0.180 | 0.192  | 0.202  | 0.211 | 0.218 | 0.225  | 0.229  | 0.233 | 0.235 | 0.236 | 0.235 | 0.233 | 0.229 | 0.225  | 0.218  | 0.211 | 0.202 | 0.192  | 0.180  | 0.168 | 0.154  | 0.140 | 0.125 | 0.109 | 0.092 | 0.074 | 0.056 | 0.038 | 0.019 | 0     |   |
| FINAL CAMBER †                          | 0               | 1/16" | 3/16" | 1/4"  | 5/16" | 3/8"  | 7/16" | 1/2"  | 9/16" | 5/8"  | 11/16" | 3/4"  | 13/16" | 13/16" | 7/8"  | 7/8"  | 15/16" | 15/16" | 1"    | 1"    | 1"    | 1"    | 1"    | 1"    | 15/16" | 15/16" | 7/8"  | 7/8"  | 13/16" | 13/16" | 3/4"  | 11/16" | 5/8"  | 9/16" | 1/2"  | 7/16" | 3/8"  | 5/16" | 1/4"  | 3/16" | 1/16" | 0 |

**DEAD LOAD DEFLECTION TABLE FOR GIRDER**

| 0.6" Ø LOW RELAXATION                   | SPAN A           |       |       |       |       |       |        |       |       |        |        |        |       |       |        |       |       |       |       |       |      |
|---|------------------|-------|-------|-------|-------|-------|--------|-------|-------|--------|--------|--------|-------|-------|--------|-------|-------|-------|-------|-------|------|
|   | TWENTIETH POINTS | 0     | 0.05  | 0.10  | 0.15  | 0.20  | 0.25   | 0.30  | 0.35  | 0.40   | 0.45   | 0.50   | 0.55  | 0.60  | 0.65   | 0.70  | 0.75  | 0.80  | 0.85  | 0.90  | 0.95 |
| CAMBER (GIRDER ALONE IN PLACE) †        | 0                | 0.021 | 0.041 | 0.060 | 0.078 | 0.092 | 0.106  | 0.115 | 0.124 | 0.128  | 0.131  | 0.128  | 0.124 | 0.115 | 0.106  | 0.092 | 0.078 | 0.060 | 0.041 | 0.021 | 0    |
| * DEFLECTION DUE TO SUPERIMPOSED D.L. ‡ | 0                | 0.010 | 0.019 | 0.028 | 0.036 | 0.043 | 0.050  | 0.055 | 0.059 | 0.061  | 0.062  | 0.061  | 0.059 | 0.055 | 0.050  | 0.043 | 0.036 | 0.028 | 0.019 | 0.010 | 0    |
| FINAL CAMBER †                          | 0                | 1/8"  | 1/4"  | 3/8"  | 1/2"  | 9/16" | 11/16" | 3/4"  | 3/4"  | 13/16" | 13/16" | 13/16" | 3/4"  | 3/4"  | 11/16" | 9/16" | 1/2"  | 3/8"  | 1/4"  | 1/8"  | 0    |

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 3 OF 4



4/6/2021

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 PRESTRESSED CONCRETE GIRDER  
 CONTINUOUS FOR LIVE LOAD  
 DETAILS

DRAWN BY : M. G. SHAIKH DATE : 07/2019  
 CHECKED BY : H. LOCKLEAR DATE : 08/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 06/2021

DOCUMENT NOT CONSIDERED  
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 SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-13         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |



**STRUCTURAL STEEL NOTES**

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.

TENSION ON THE ASTM A325 BOLTS THROUGH THE ANGLE MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL 1/4 TURN.

THE PLATES, BENT PLATES, AND ANGLES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM, THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

GALVANIZE THE HIGH STRENGTH BOLTS, NUTS, WASHERS AND DIRECT TENSION INDICATORS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

USE AN ASTM F436 HARDENED WASHER WITH STANDARD AND SLOTTED HOLES UNDER EACH BOLT HEAD AND NUT.

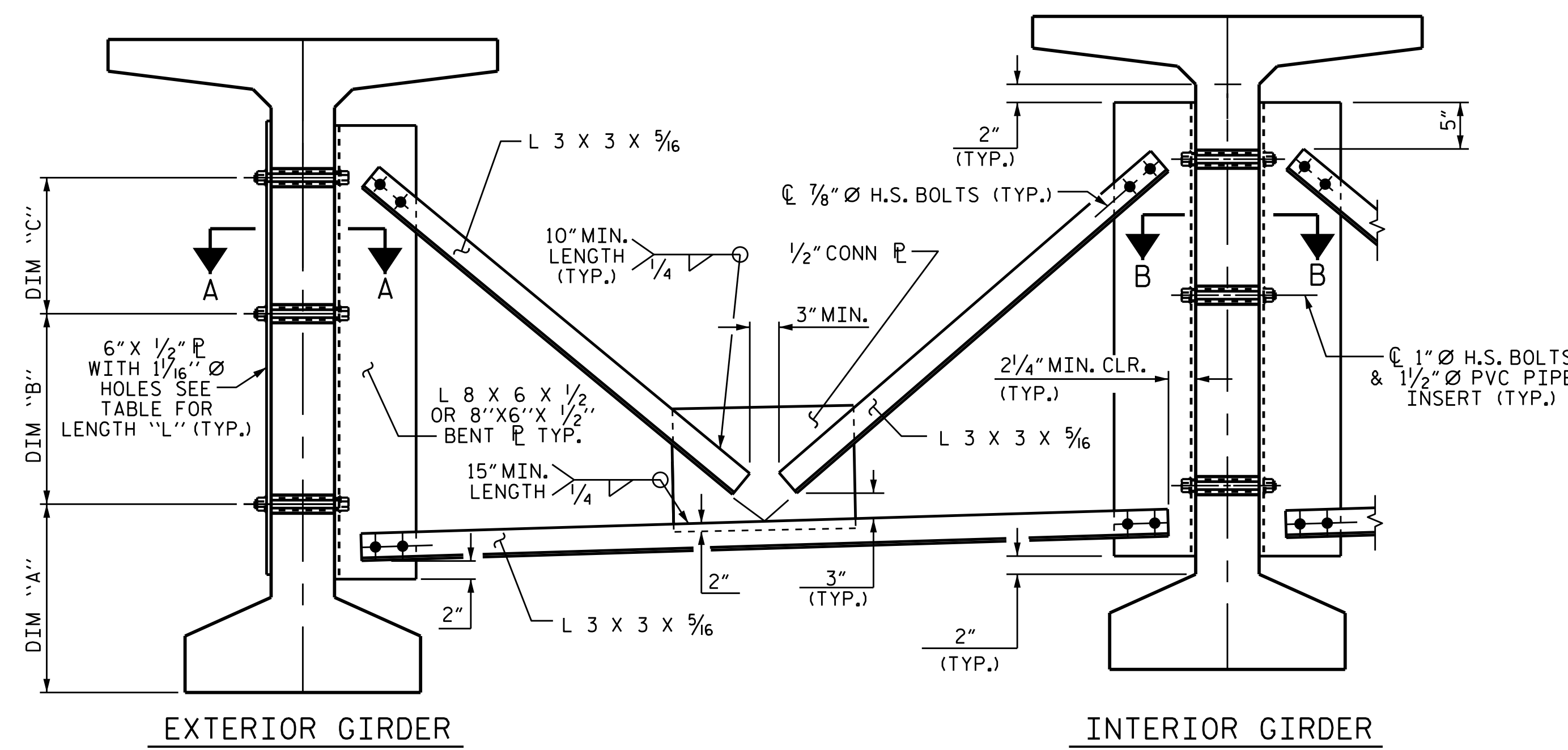
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

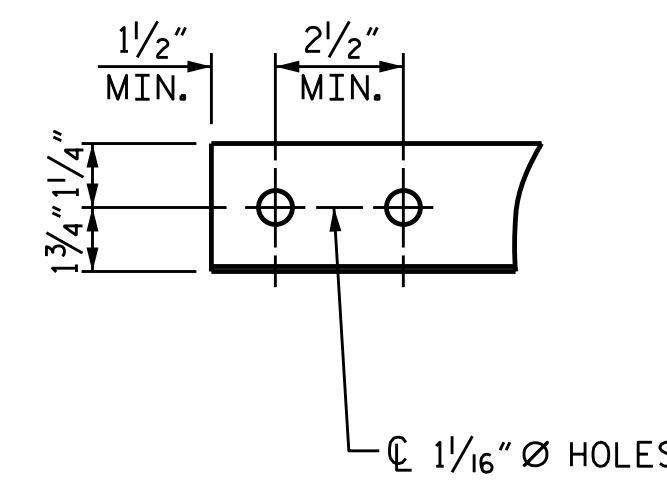
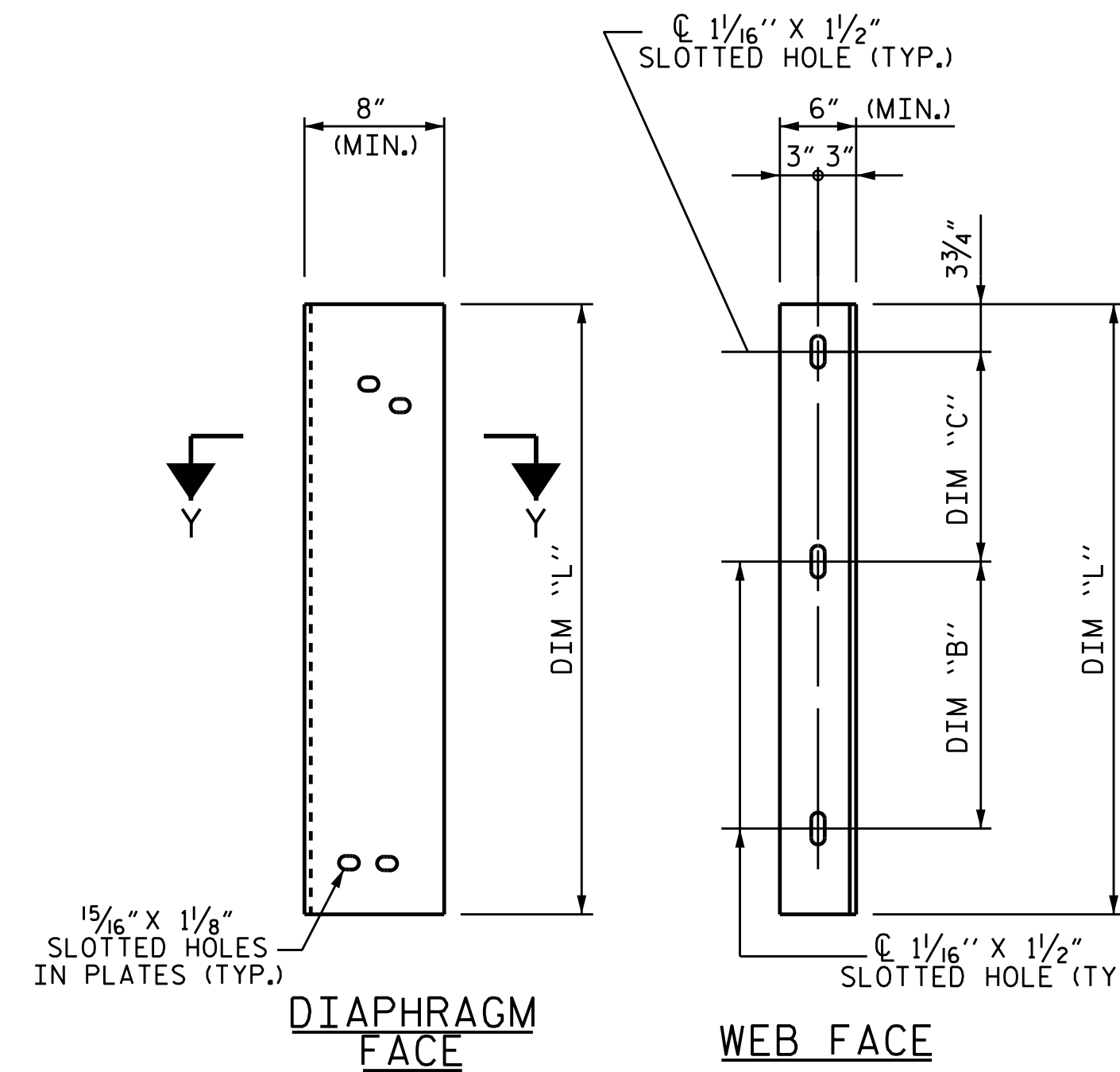
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

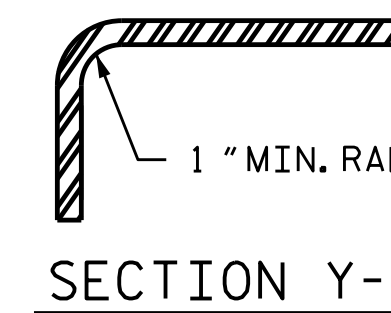
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.



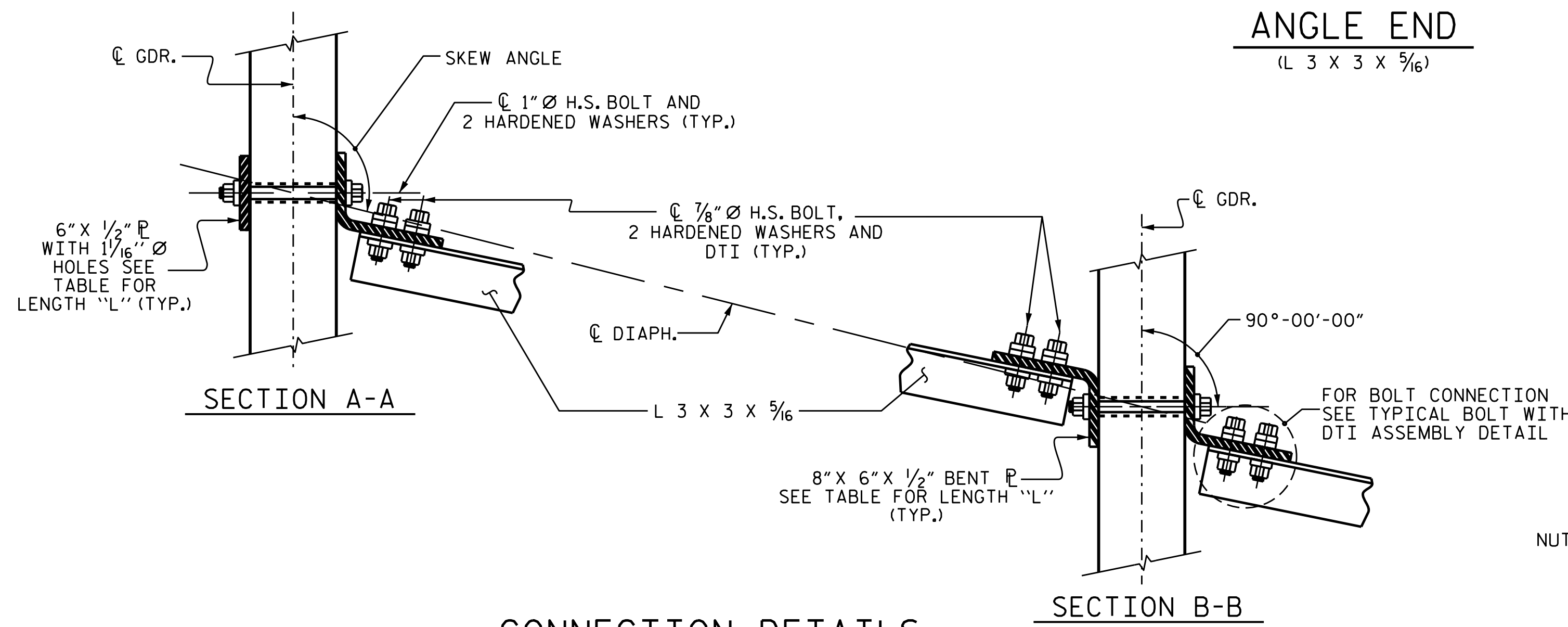
**PART SECTION AT INTERMEDIATE DIAPHRAGM**  
(63" BULB TEE BULB TEE GIRDER SHOWN)



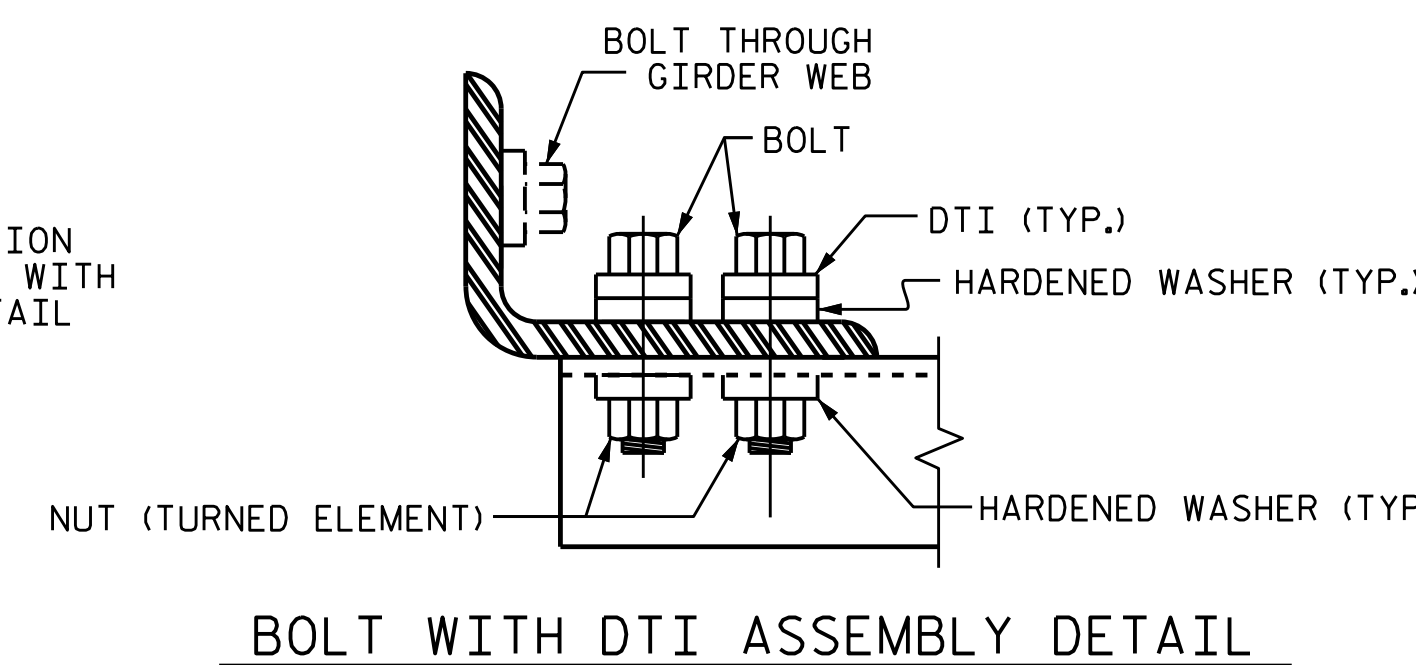
**ANGLE END**  
(L 3 x 3 x 5/16)



**CONNECTOR PLATE DETAIL**



**CONNECTION DETAILS**



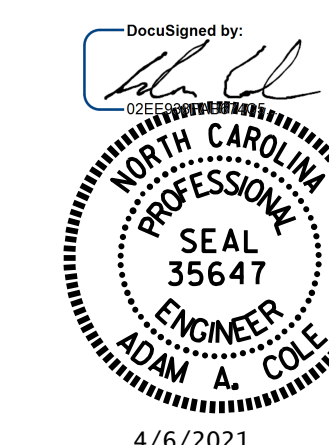
**BOLT WITH DTI ASSEMBLY DETAIL**

**TABLE**

| GIRDER TYPE  | DIM "A"   | DIM "B" | DIM "C" | DIM "L" |
|--------------|-----------|---------|---------|---------|
| 63" BULB TEE | 1'-7 3/4" | 1'-3"   | 1'-3"   | 3'-5"   |

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 4 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 INTERMEDIATE  
 STEEL DIAPHRAGMS  
 FOR 63"  
 MODIFIED BULB TEE  
 PRESTRESSED CONCRETE  
 GIRDERS

DRAWN BY : M. G. SHAIKH DATE : 07/2019  
 CHECKED BY : H. LOCKLEAR DATE : 08/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 06/2019

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-14         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |

**NOTES**

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

THE 2" Ø PIPE SLEEVE SHALL BE CUT FROM SCHEDULE 40 PVC PLASTIC PIPE. THE PVC PLASTIC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

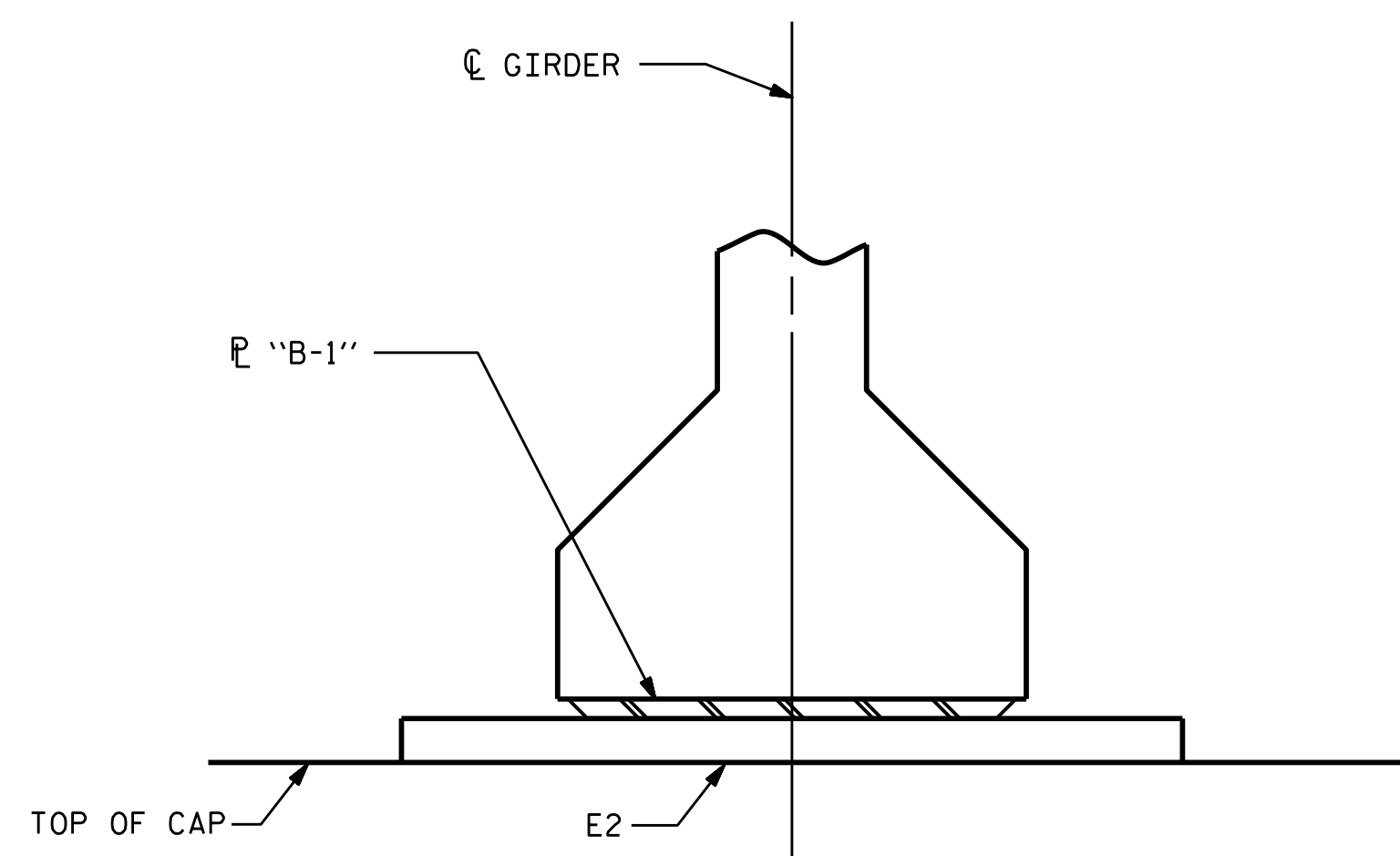
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, WASHERS AND NUTS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

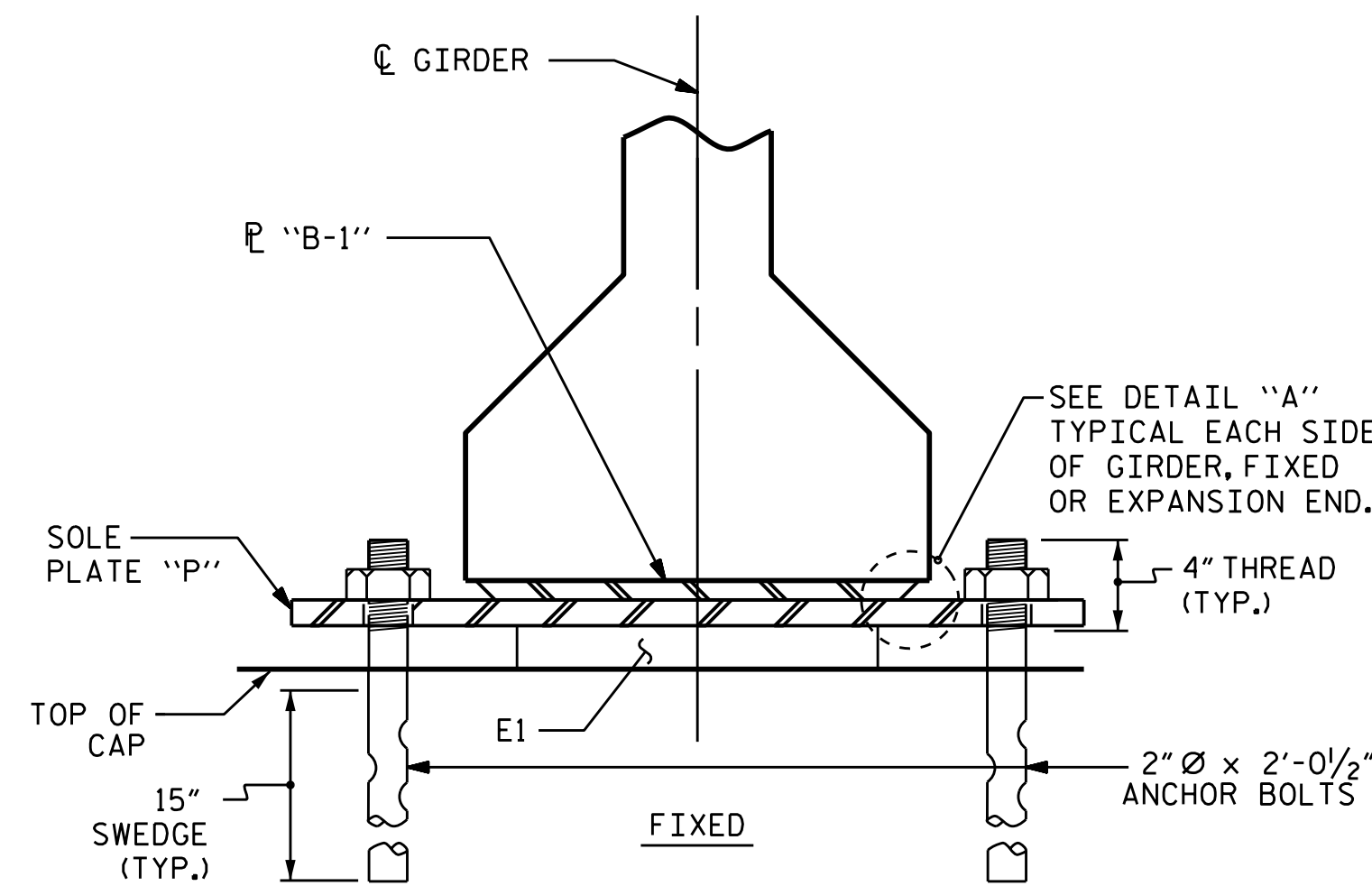
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

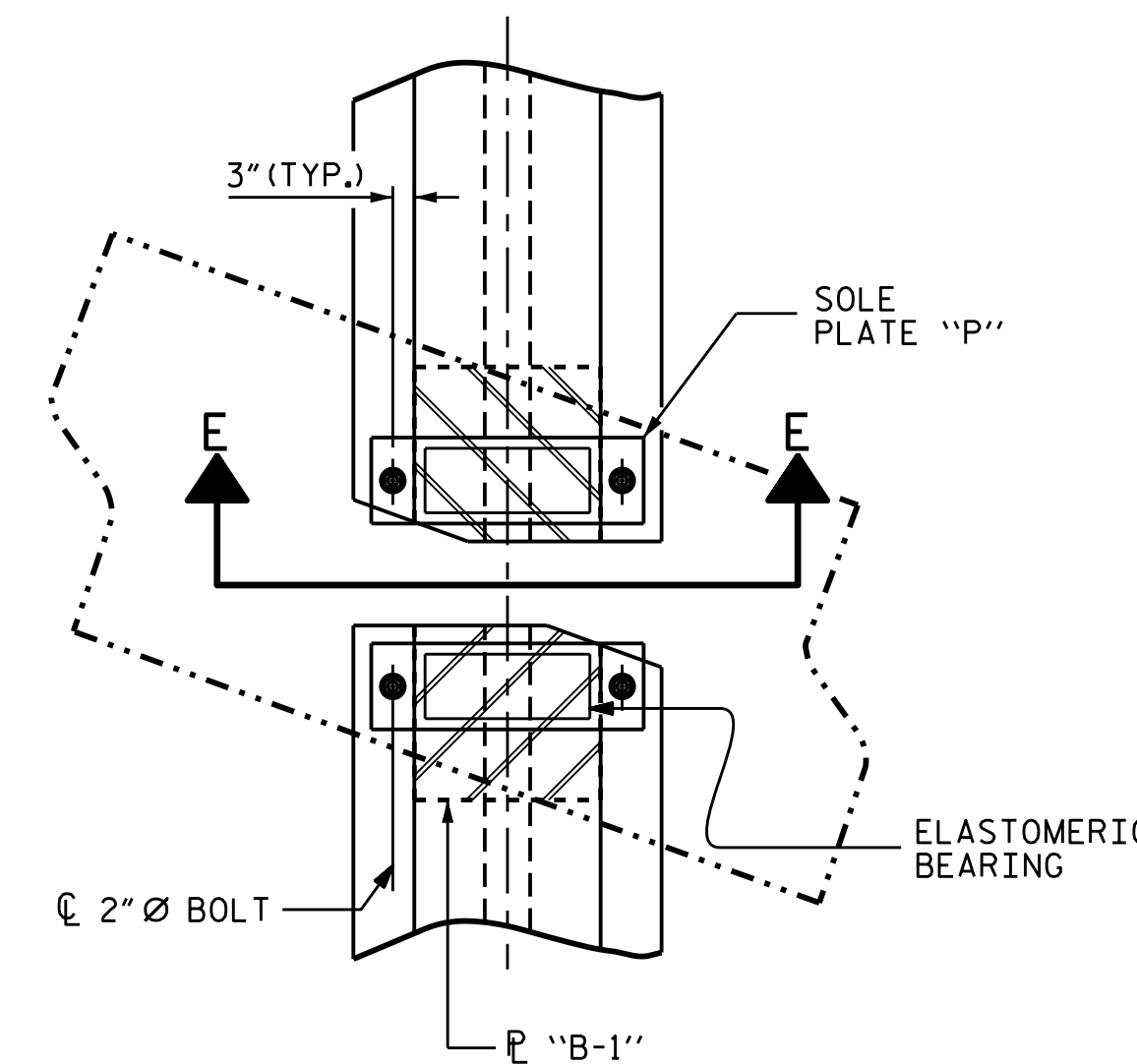
ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



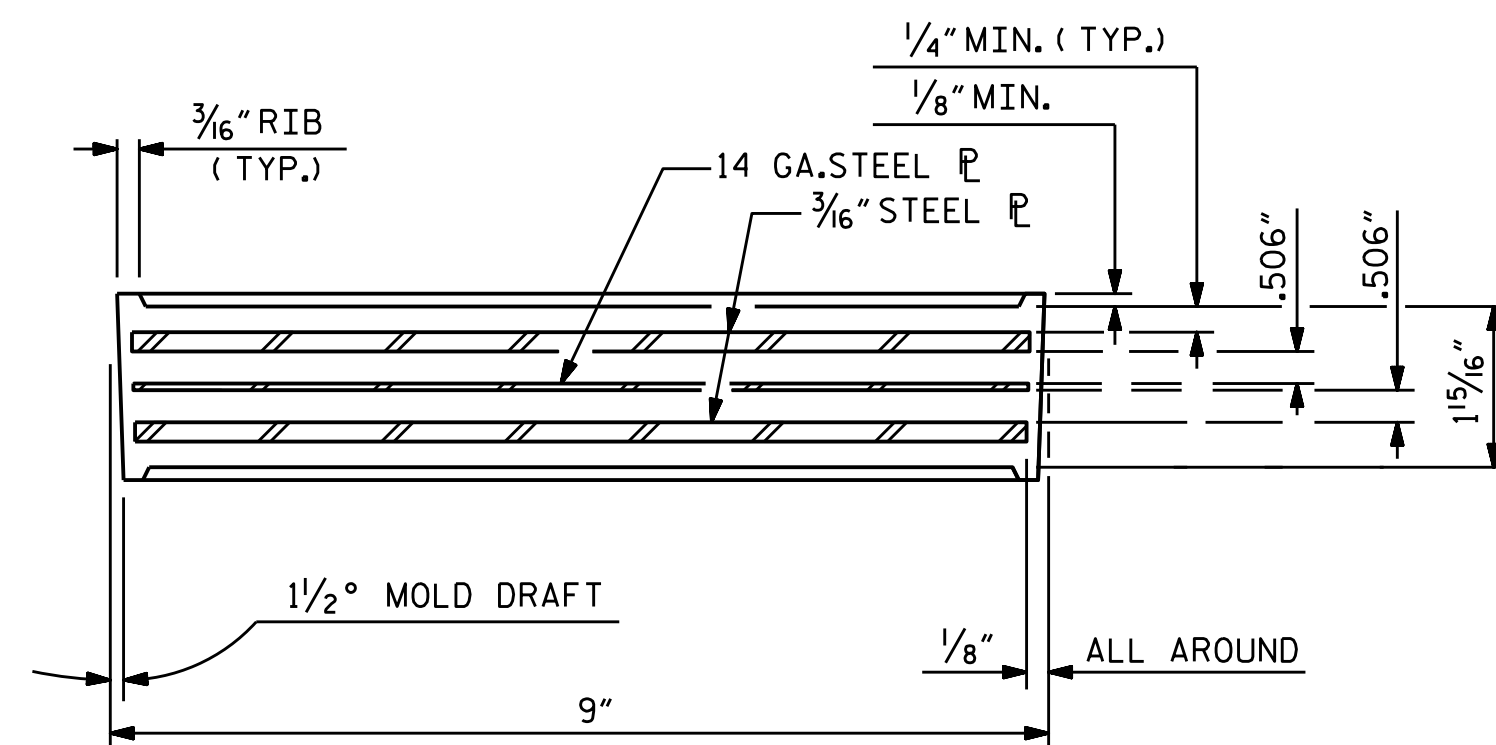
**SECTION D-D**  
SHOWING SECTION AT INTEGRAL END BENT



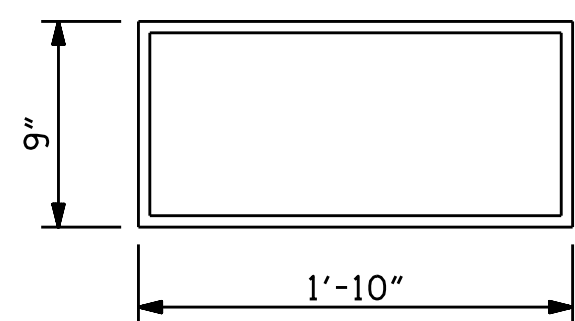
**SECTION E-E**  
SHOWING SECTION AT BENT



**PLAN VIEW AT BENTS**

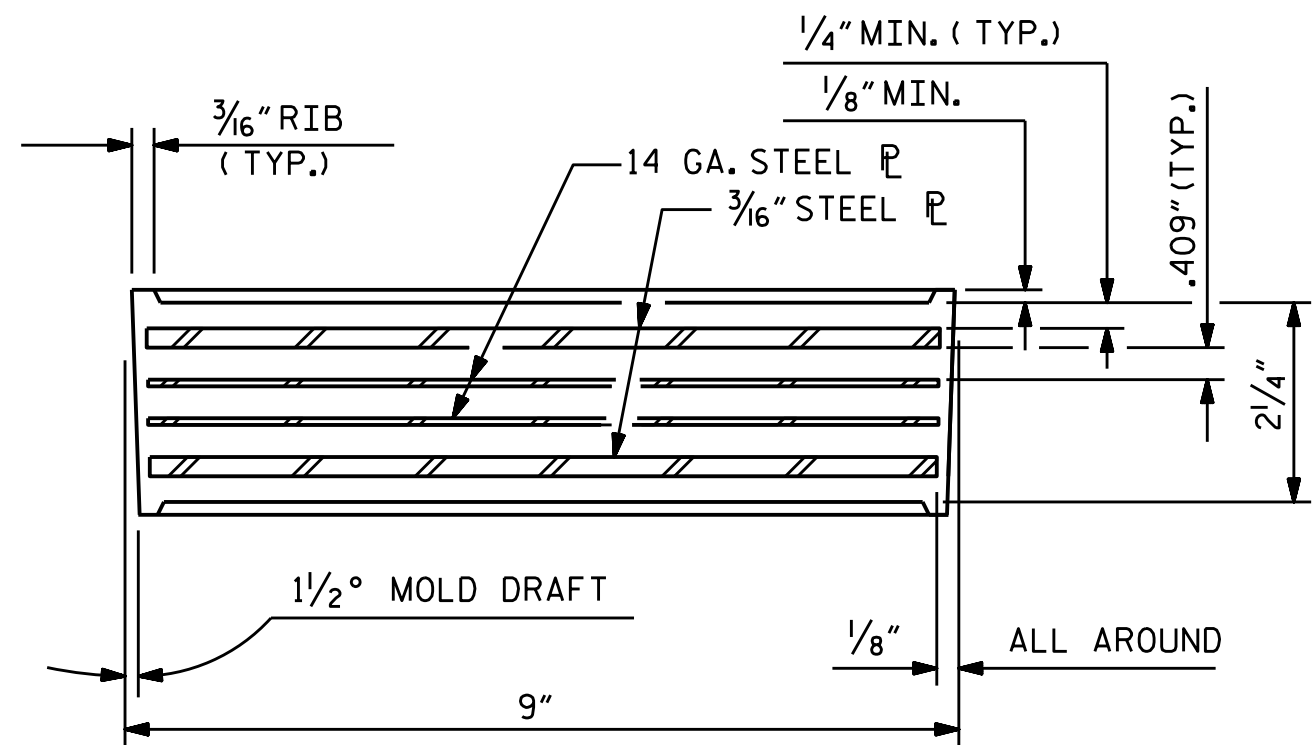


**TYPICAL SECTION OF ELASTOMERIC BEARINGS**

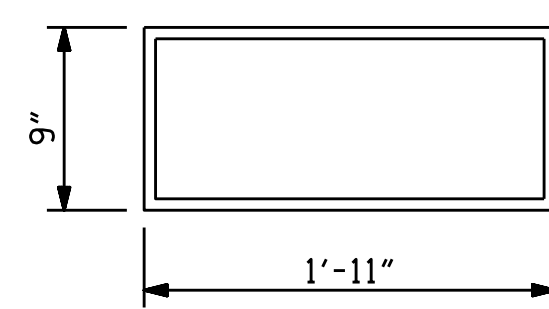


**E2 (10 REQ'D)**  
**PLAN VIEW OF ELASTOMERIC BEARING**

**TYPE IV**  
(FOR INTEGRAL END BENTS ONLY)

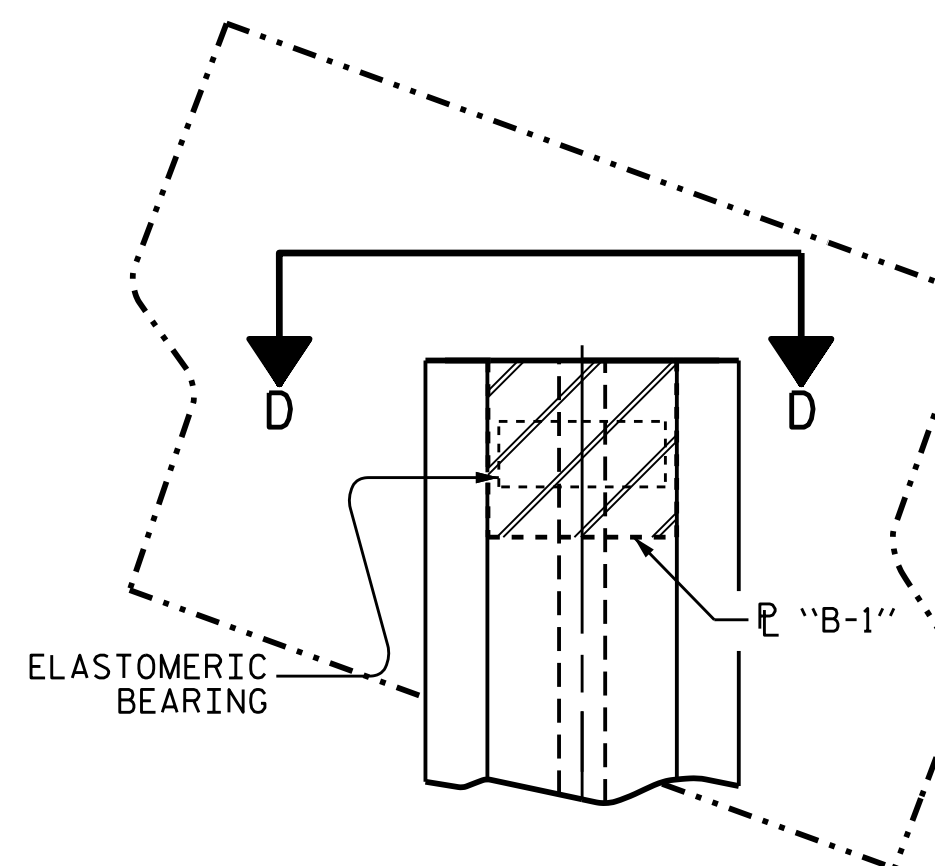


**TYPICAL SECTION OF ELASTOMERIC BEARINGS**



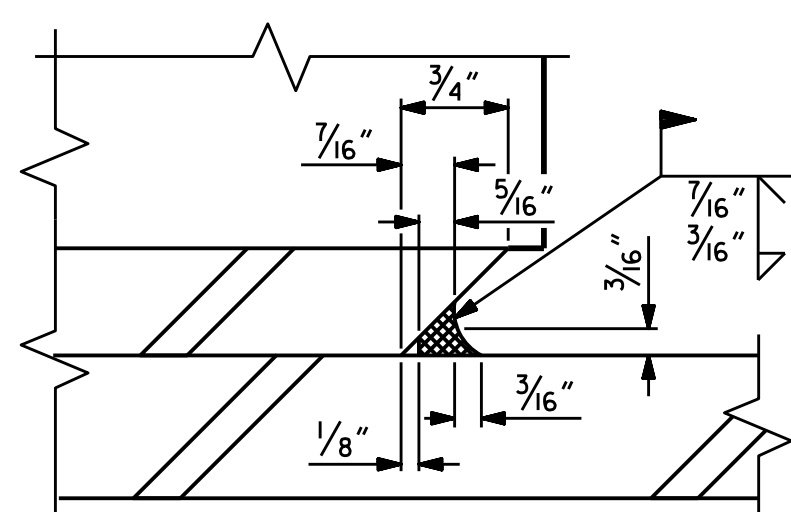
**E1 (10 REQ'D)**  
**PLAN VIEW OF ELASTOMERIC BEARING**

**TYPE V**  
(FOR BENT ONLY)

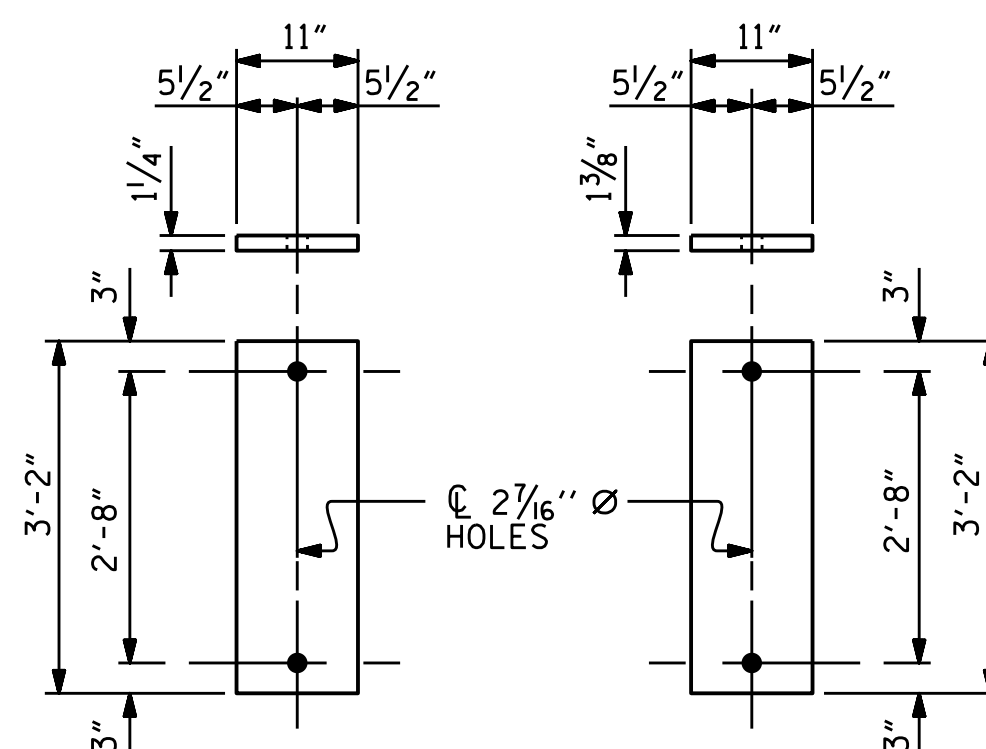


**PLAN VIEW AT INTEGRAL END BENTS**

| MAXIMUM ALLOWABLE SERVICE LOADS |       |
|---------------------------------|-------|
| D.L.+L.L. (NO IMPACT)           |       |
| TYPE IV                         | 225 k |
| TYPE V                          | 365 k |



**DETAIL "A"**

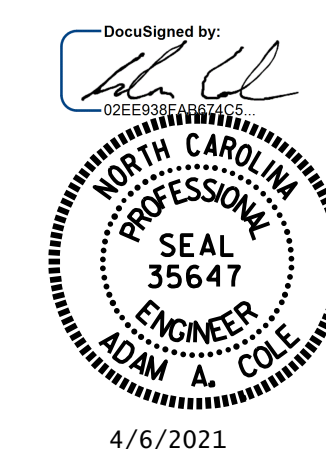


**SOLE PLATE DETAILS ("P")**

|                             |                    |
|-----------------------------|--------------------|
| ASSEMBLED BY : M. G. SHAIKH | DATE : 07/2019     |
| CHECKED BY : H. LOCKLEAR    | DATE : 08/2019     |
| DRAWN BY : EEM 2/97         | REV. 6/13 AAC/MAA  |
| CHECKED BY : VAP 2/97       | REV. 1/15 MAA/TMG  |
|                             | REV. 12/17 MAA/THC |

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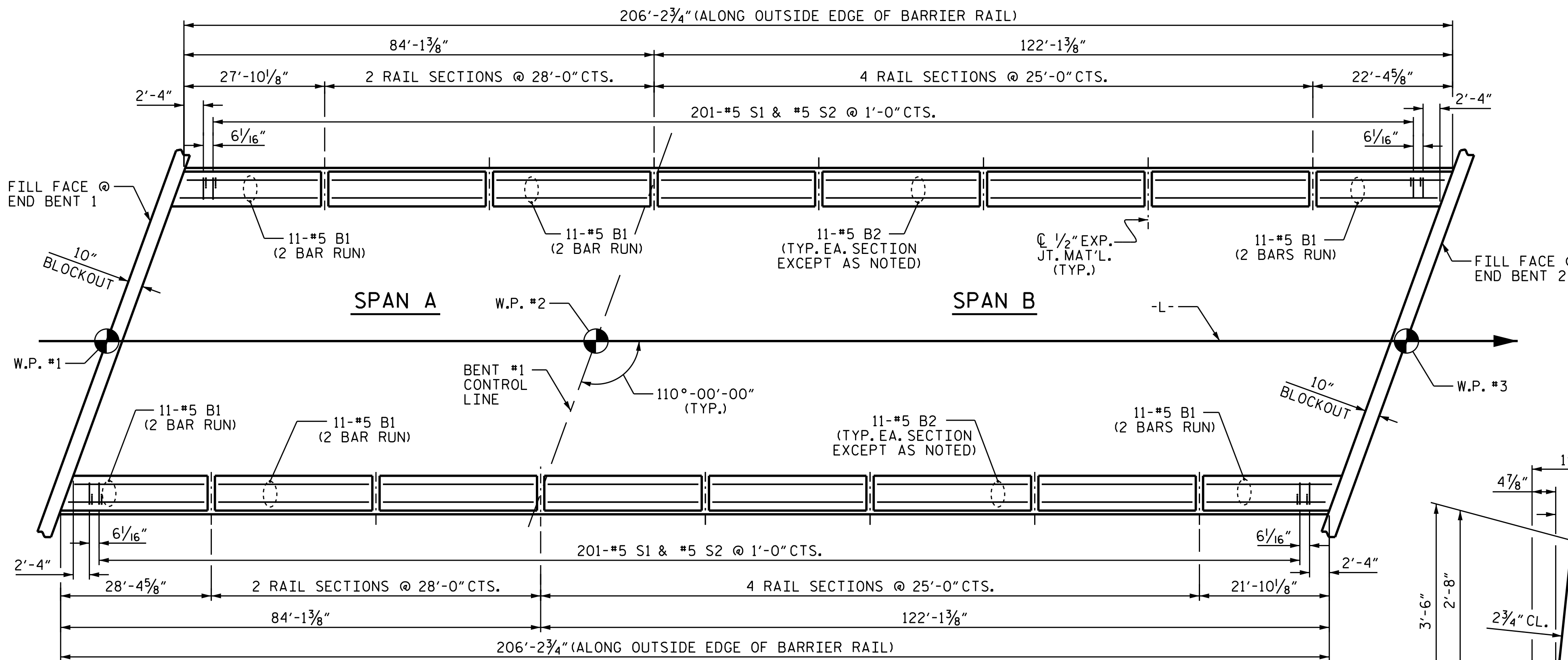
| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-15         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |



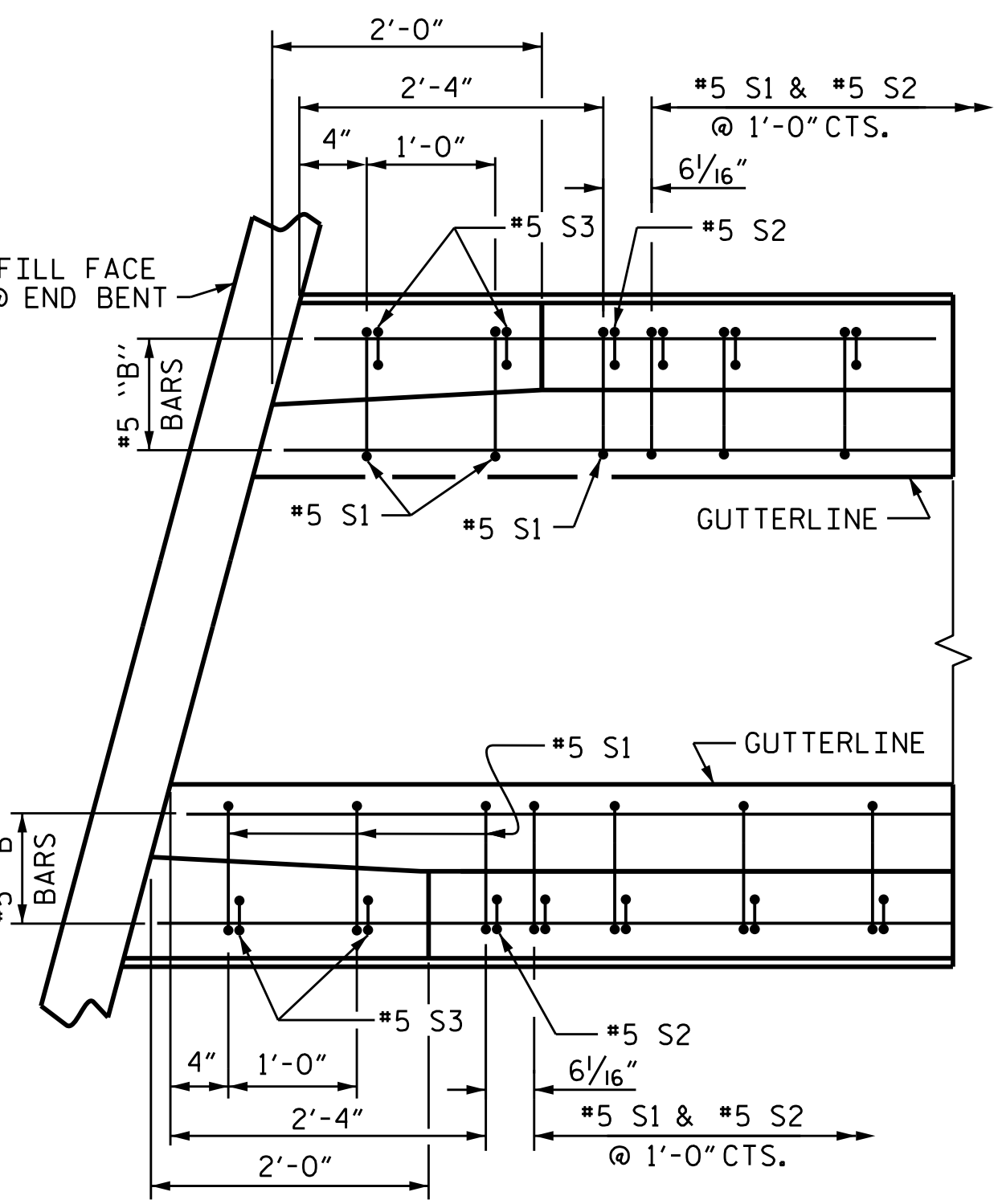
PROJECT NO. B-5813  
CABARRUS COUNTY  
STATION: 21+85.00 -L-

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
**ELASTOMERIC BEARING DETAILS**  
PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

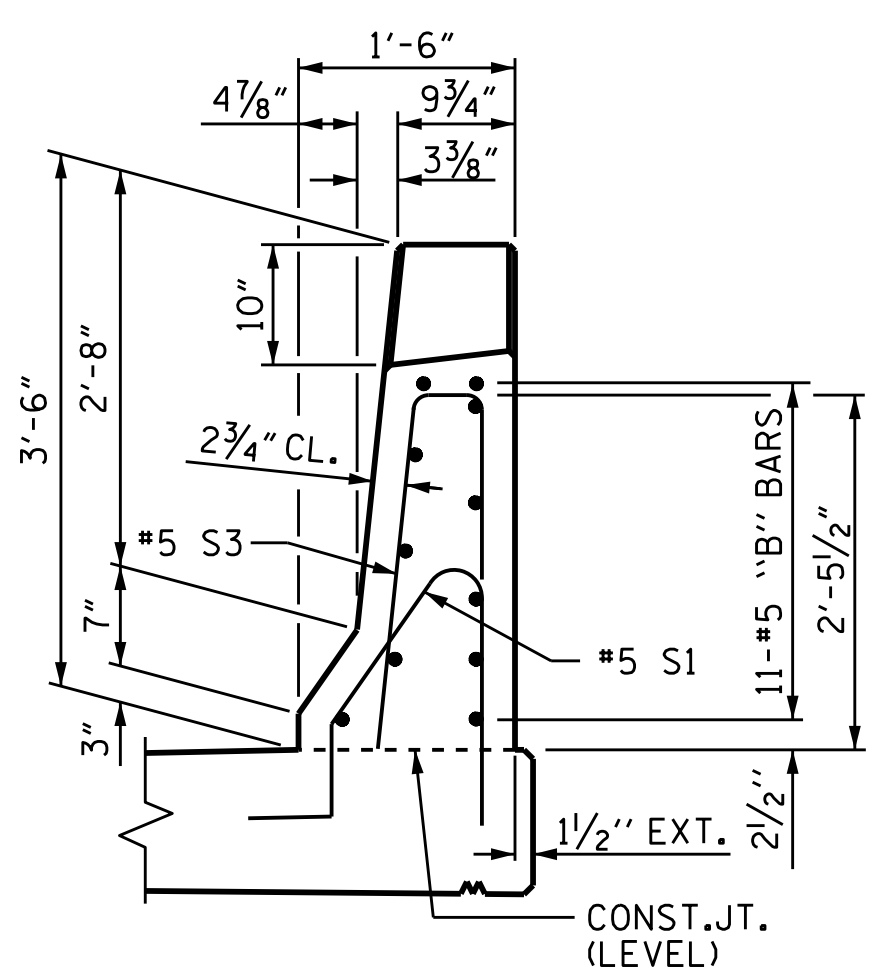




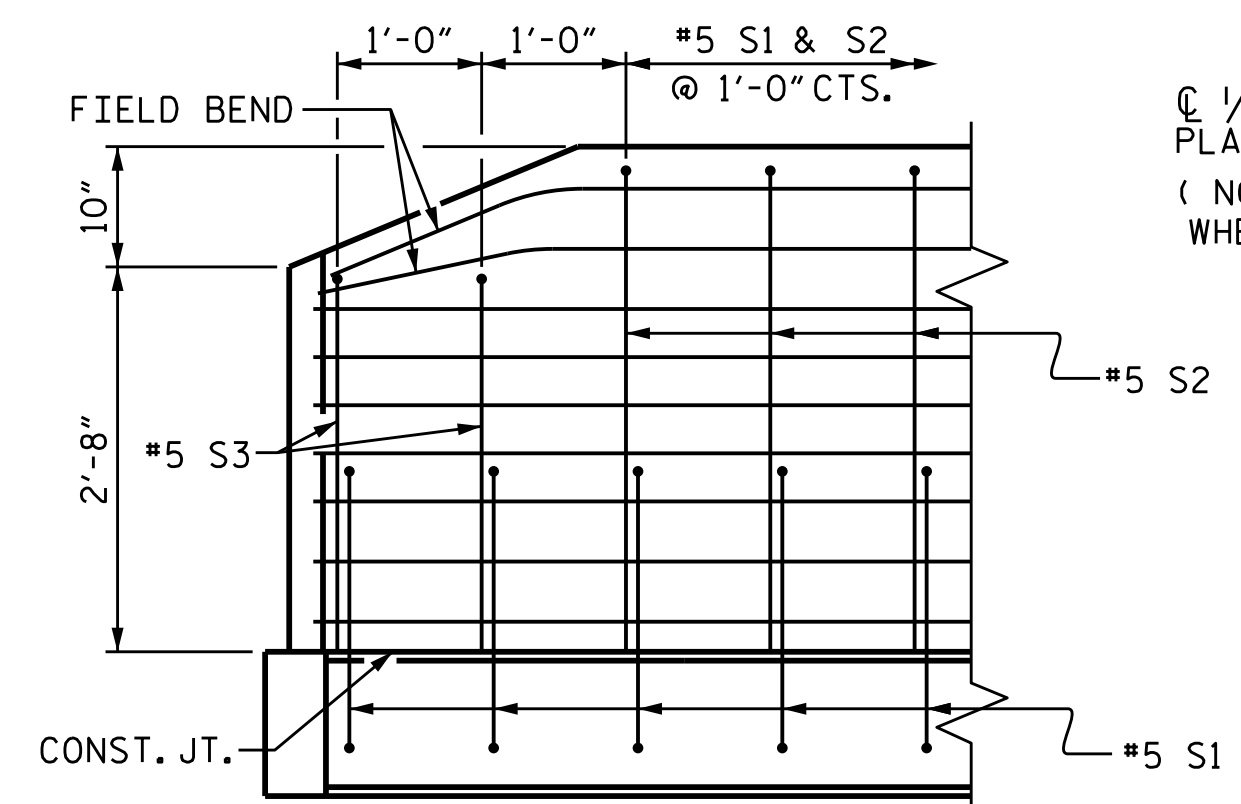
PLAN



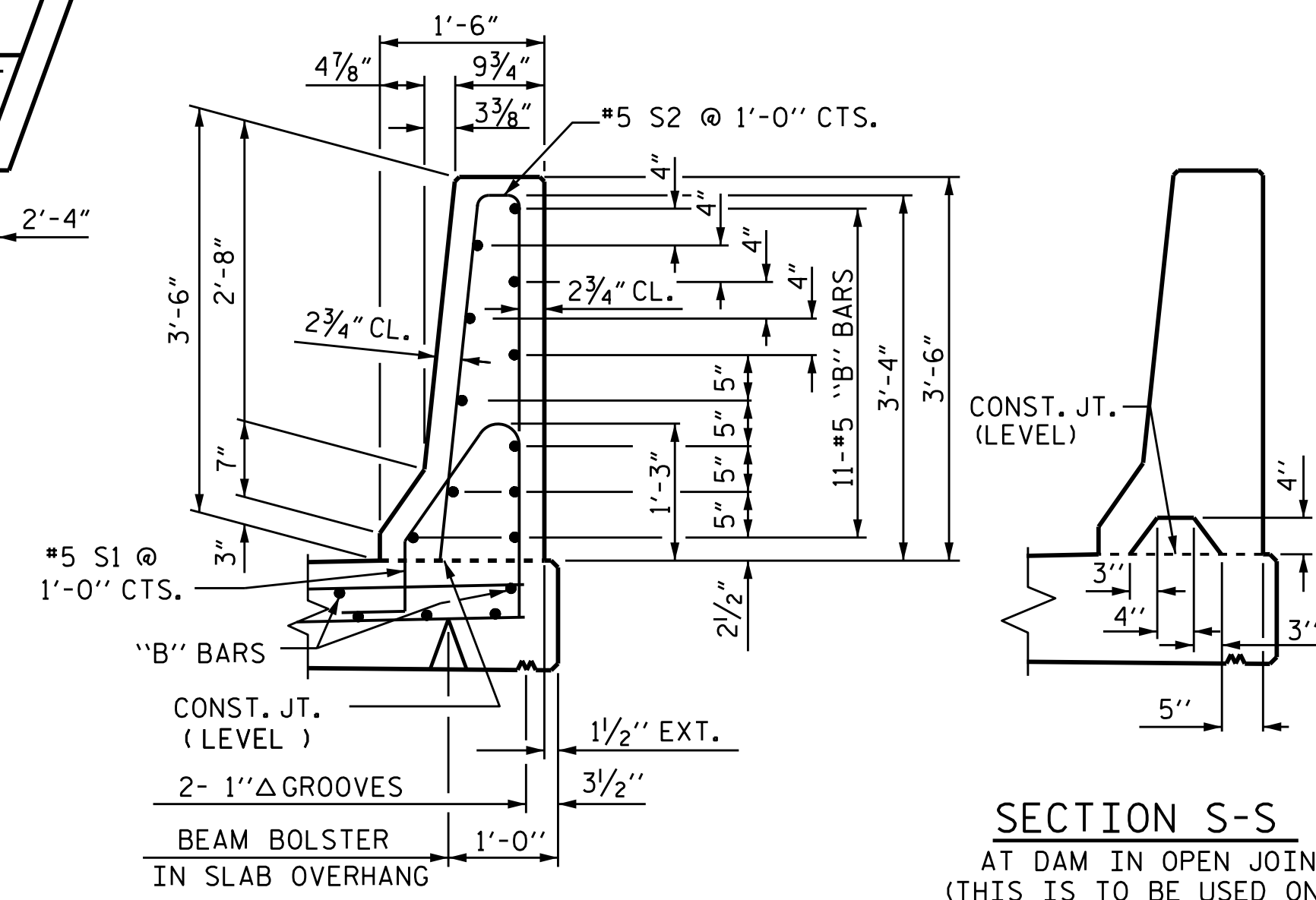
PLAN



END VIEW

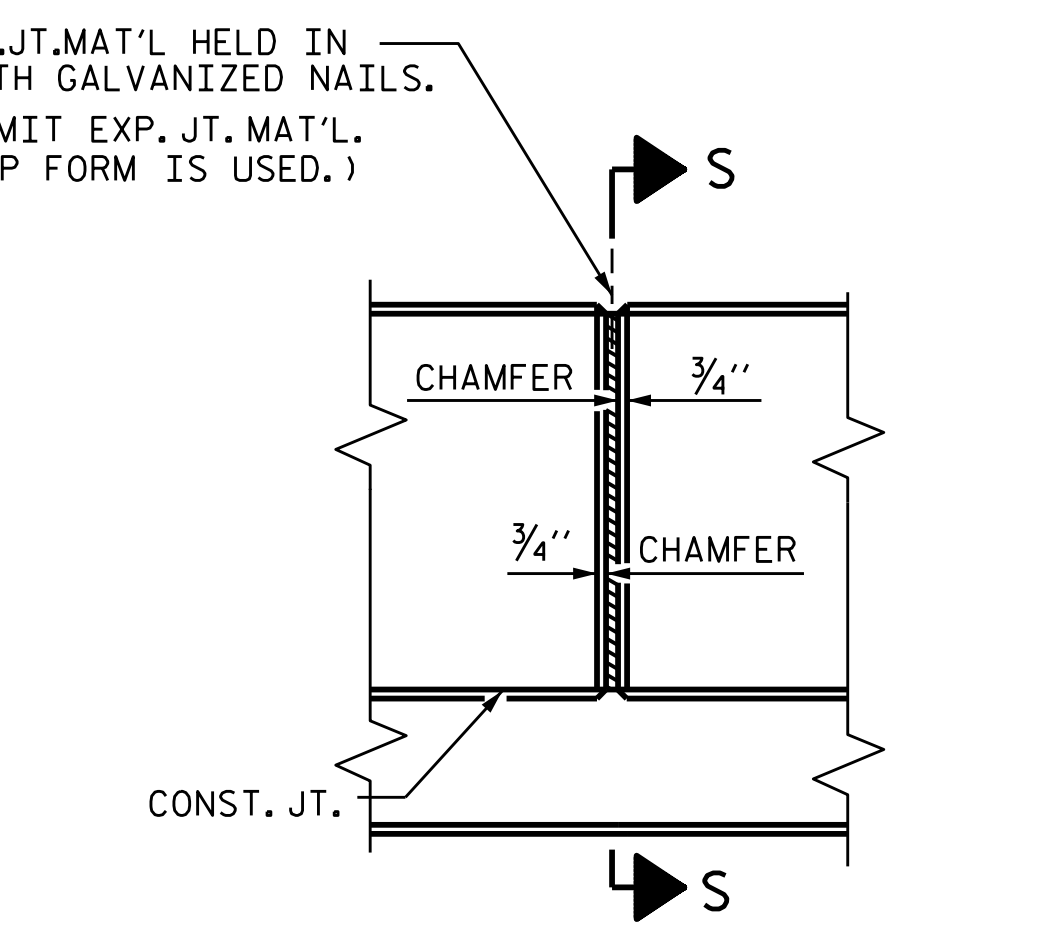


SIDE VIEW



SECTION S-S  
AT DAM IN OPEN JOINT  
(THIS IS TO BE USED ONLY  
WHEN SLIP FORM IS USED)

SECTION THRU RAIL



ELEVATION AT EXPANSION JOINTS  
BARRIER RAIL DETAILS

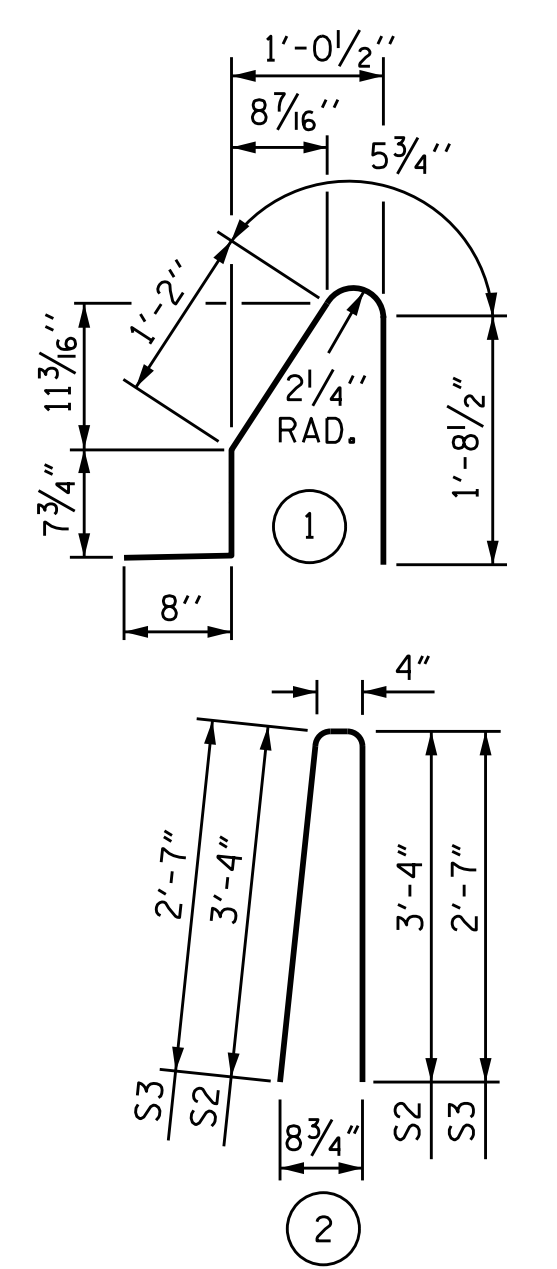
NOTES

THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

BAR TYPES



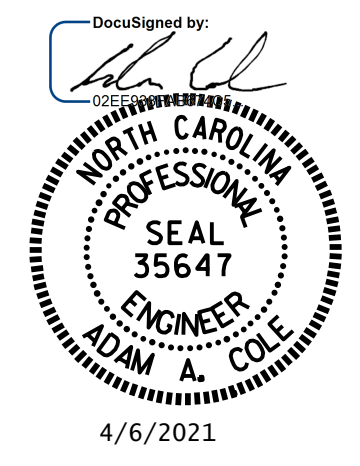
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

| BAR                              | NO. | SIZE | TYPE | LENGTH | WEIGHT         |
|----------------------------------|-----|------|------|--------|----------------|
| * B1                             | 176 | #5   | STR  | 15'-7" | 2861           |
| * B2                             | 88  | #5   | STR  | 24'-7" | 2256           |
| * S1                             | 414 | #5   | 1    | 4'-8"  | 2015           |
| * S2                             | 406 | #5   | 2    | 7'-0"  | 2964           |
| * S3                             | 8   | #5   | 2    | 5'-5"  | 45             |
| * EPOXY COATED REINFORCING STEEL |     |      |      |        | 10141 LBS.     |
| CLASS AA CONCRETE                |     |      |      |        | 56.1 CU. YDS.  |
| CONCRETE BARRIER RAIL            |     |      |      |        | 412.4 LIN. FT. |

PROJECT NO. B-5813  
CABARRUS COUNTY  
STATION: 21+85.00 -L-



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
CONCRETE  
BARRIER RAIL

DRAWN BY : M. G. SHAIKH DATE : 07/2019  
CHECKED BY : H. LOCKLEAR DATE : 08/2019  
DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 06/2019

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| REVISIONS |     |       |     |     |       | SHEET NO.<br>S-16  |
|-----------|-----|-------|-----|-----|-------|--------------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: |                    |
| 1         |     |       | 3   |     |       | TOTAL SHEETS<br>29 |
| 2         |     |       | 4   |     |       |                    |

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD-DOWN PLATE AND 4 - 1/8" Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A309. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1/8" Ø GALVANIZED BOLTS, NUTS 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.)

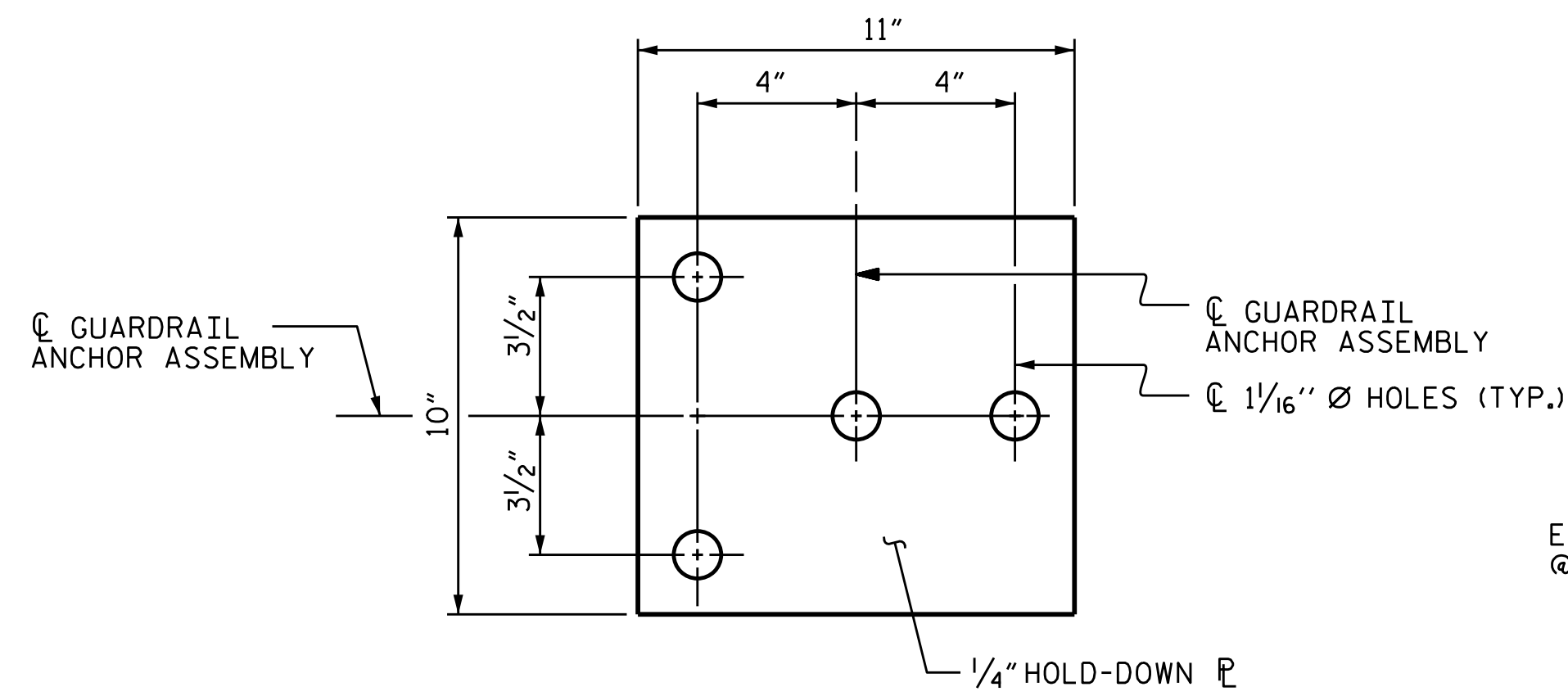
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

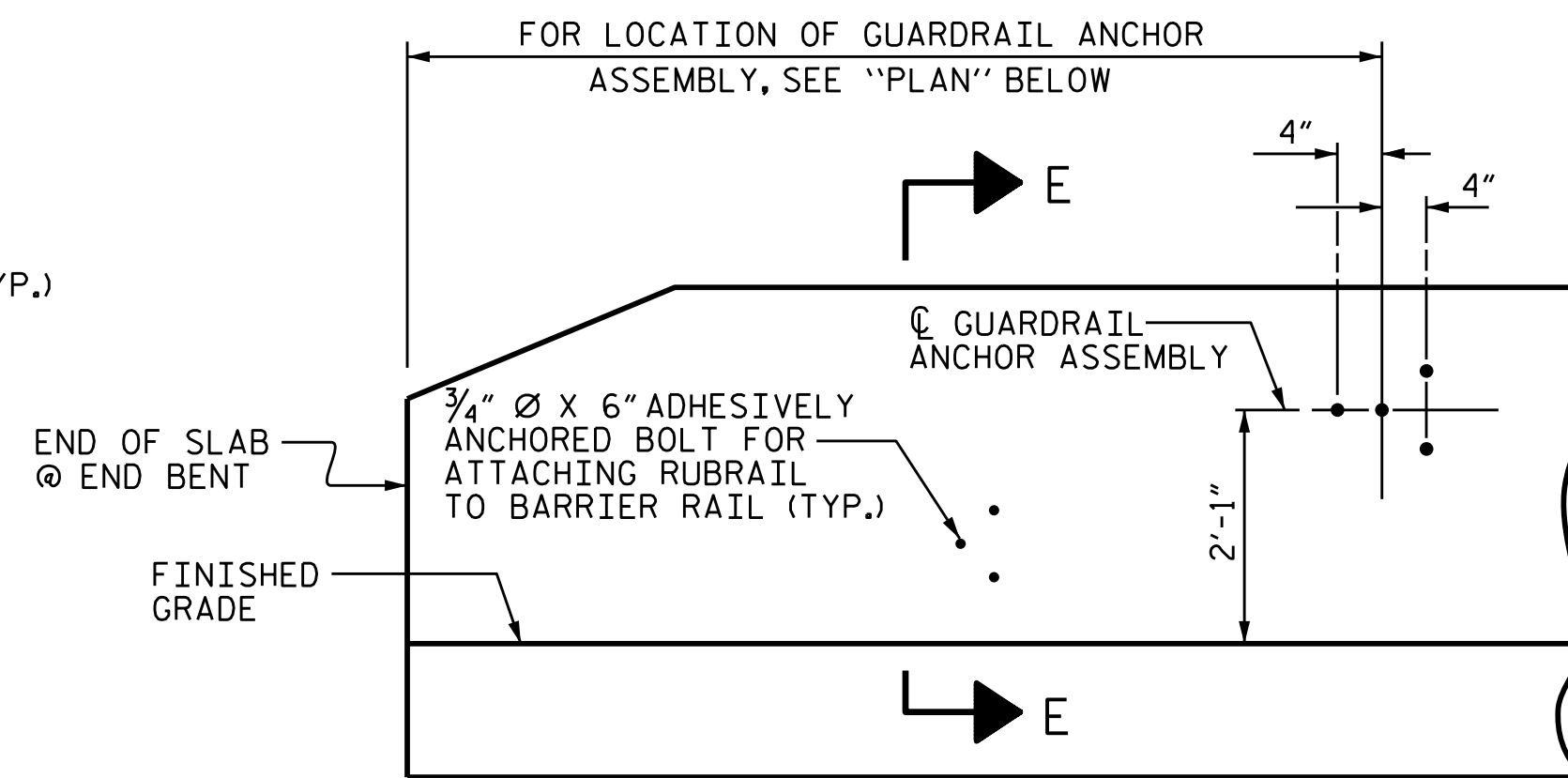
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

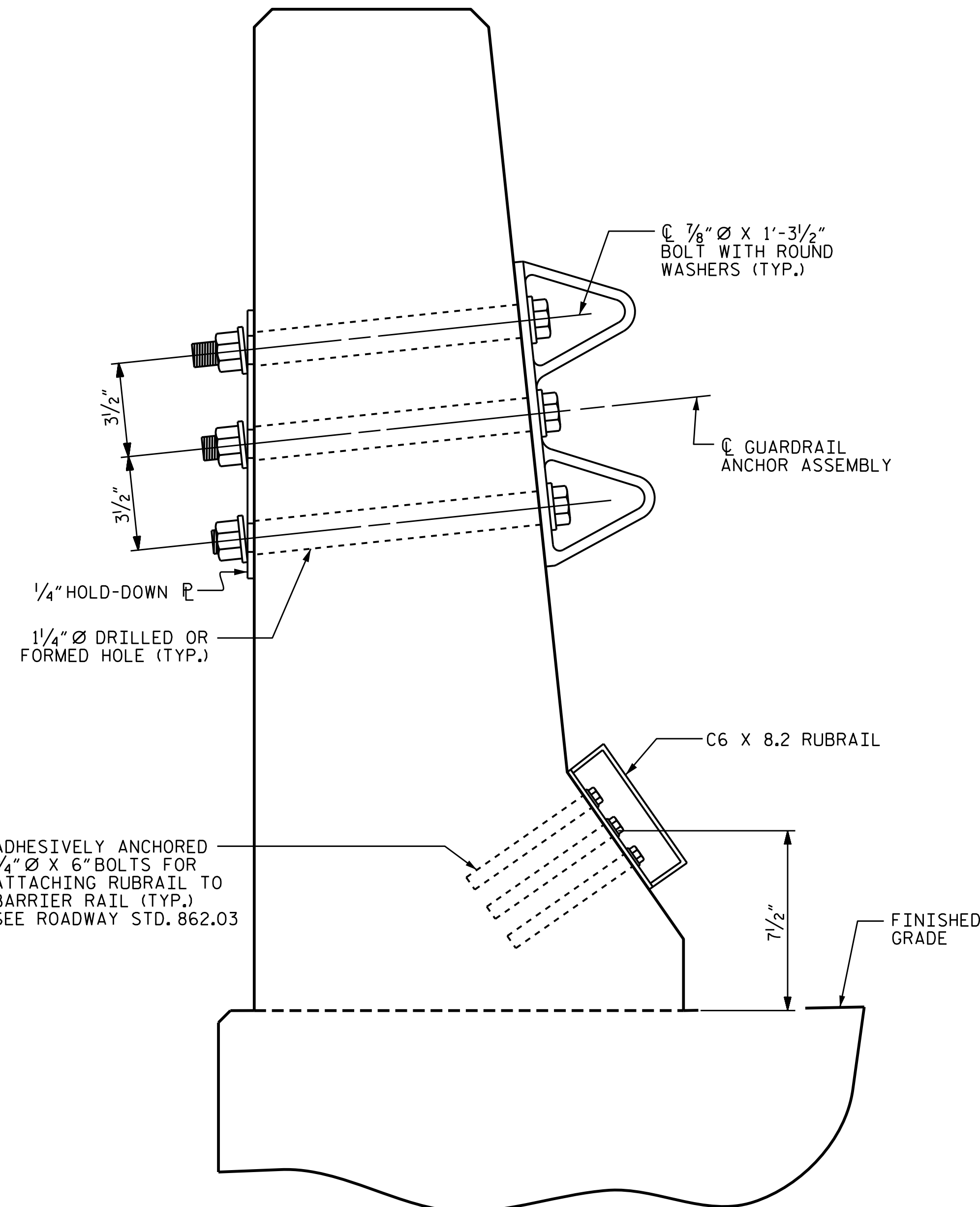
THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



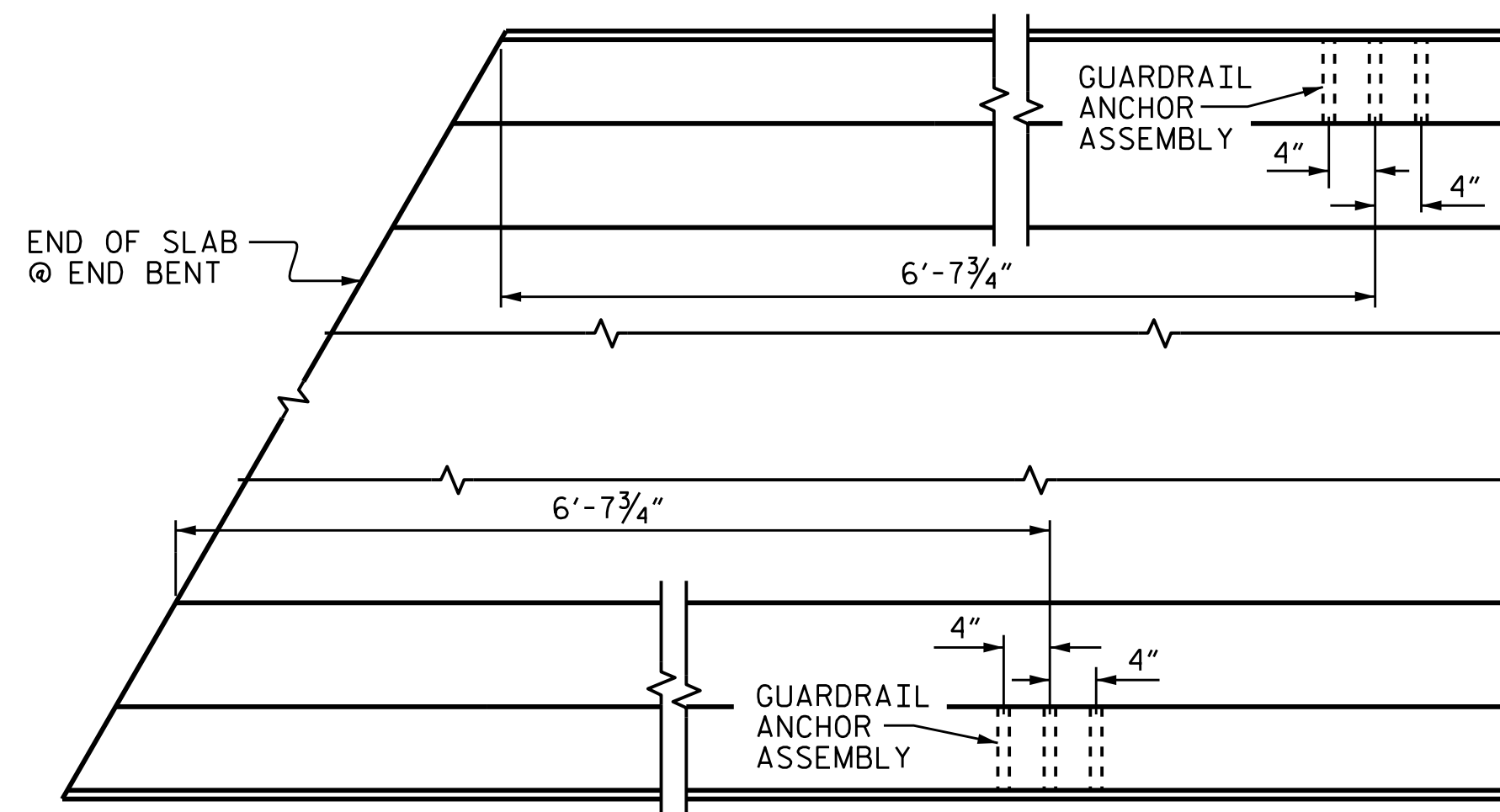
PLAN



ELEVATION



SECTION E-E  
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

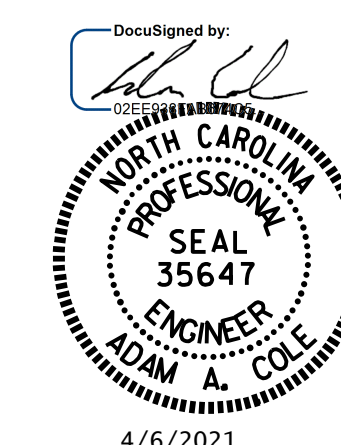
END BENT #1 SHOWN, END BENT #2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENTS

\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 GUARDRAIL ANCHORAGE  
 FOR BARRIER RAIL

DRAWN BY : M. G. SHAIKH DATE : 07/2019  
 CHECKED BY : H. LOCKLEAR DATE : 08/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 06/2019

06-APR-2021 13:00  
 RA:\Structures\Final Plans\400.035.B5813.SMU.GR.0017.120132.dgn  
 aacole

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-17         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |

(SHT 1b) STD. NO. GRA2

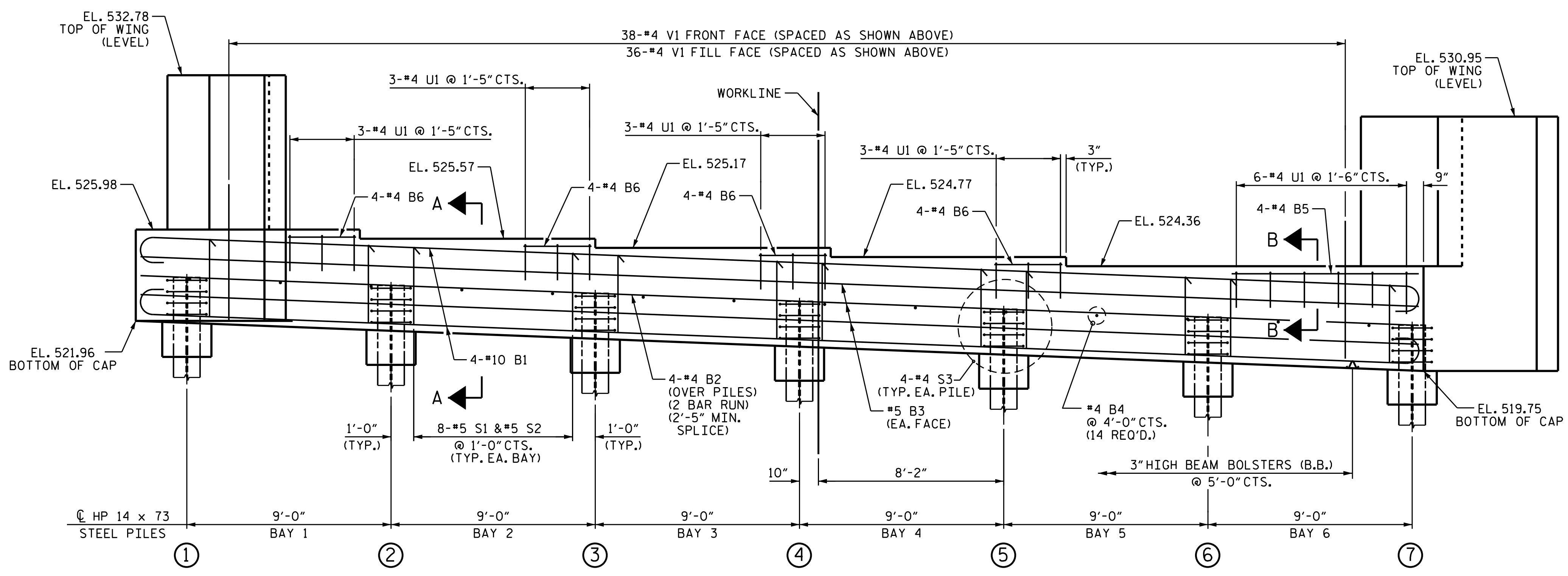
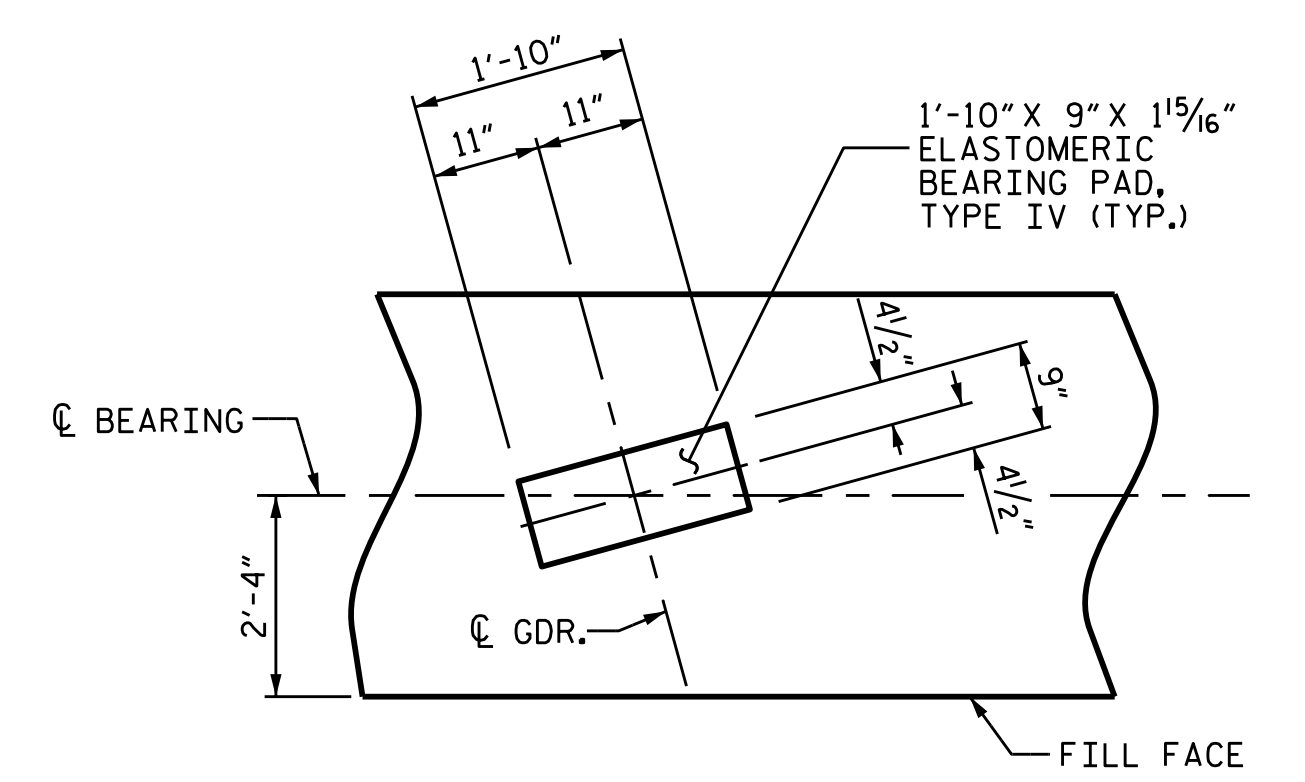
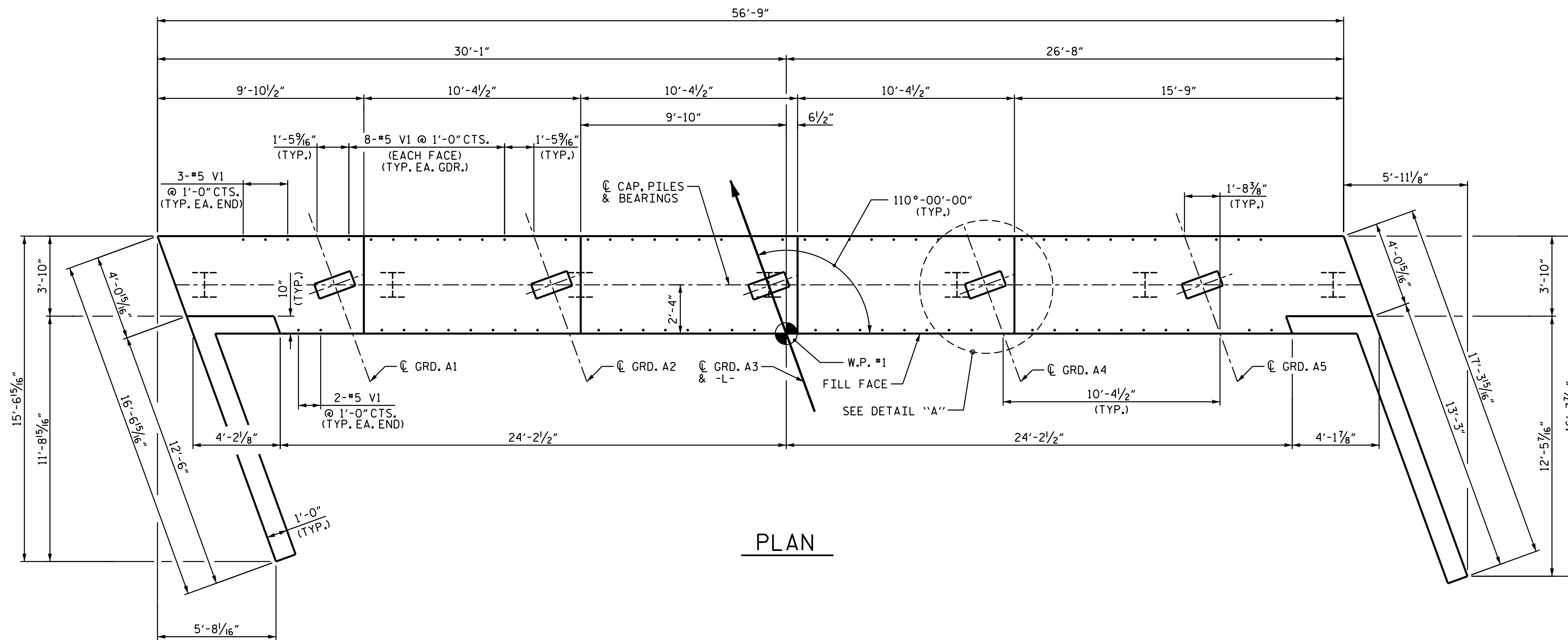




**NOTES:**

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR #4 V1 BARS.

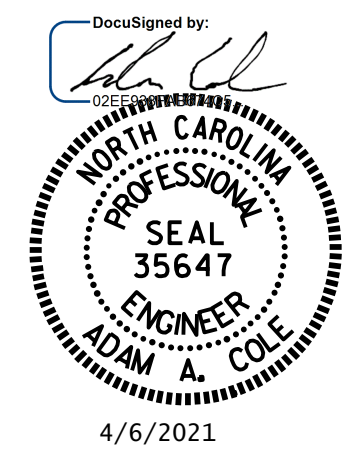
THE TOP PART OF THE END BENT CAP AND WINGS, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".



| TOP OF PILE ELEVATIONS |         |
|------------------------|---------|
| ①                      | 523.925 |
| ②                      | 523.575 |
| ③                      | 523.225 |
| ④                      | 522.874 |
| ⑤                      | 522.524 |
| ⑥                      | 522.174 |
| ⑦                      | 521.824 |

PROJECT NO. B-5813  
 CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 1 OF 3

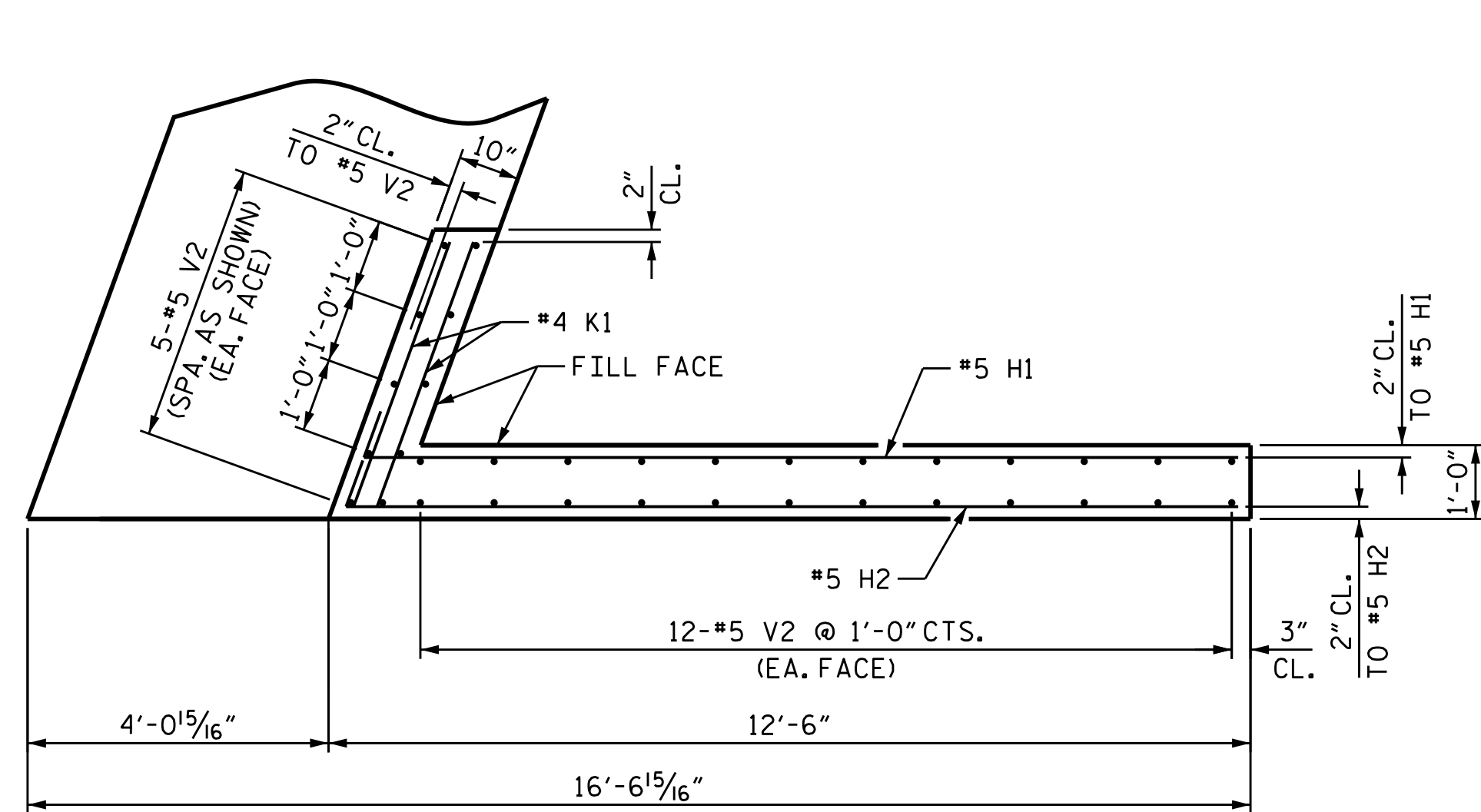


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 INTEGRAL END BENT 1

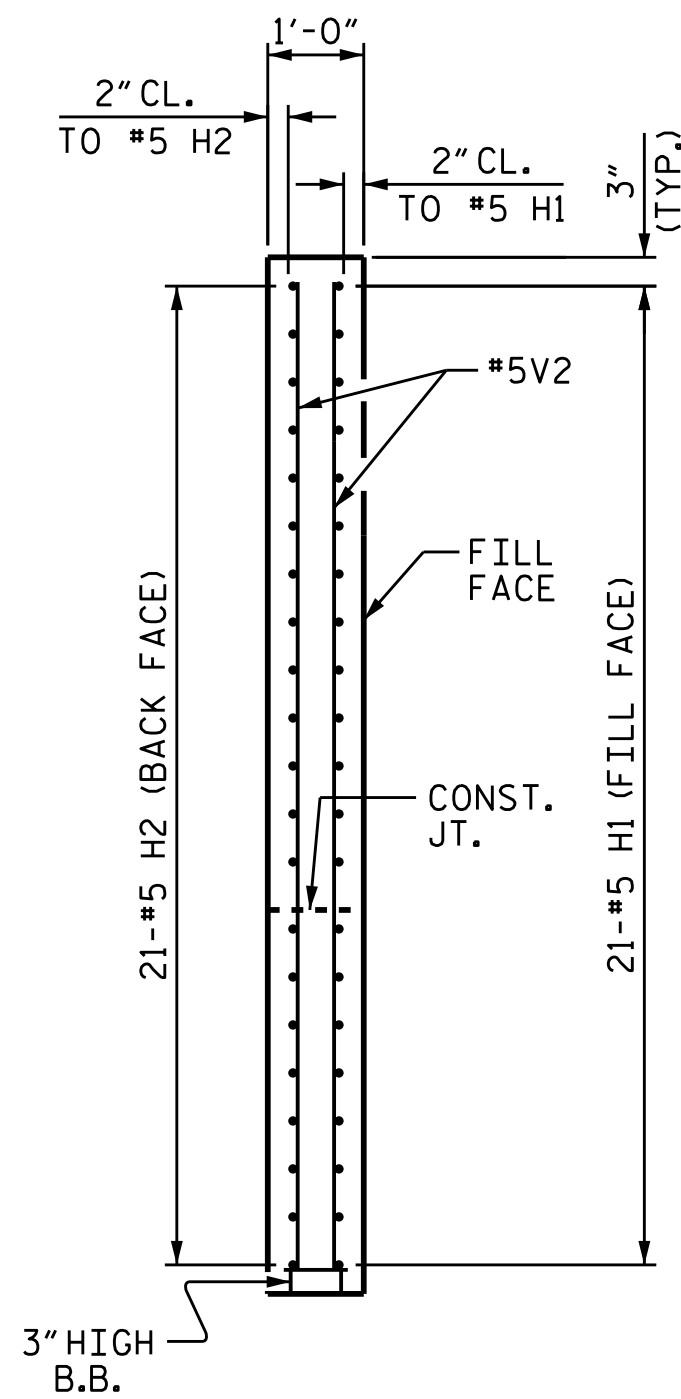
DRAWN BY : M. G. SHAIKH DATE : 09/2019  
 CHECKED BY : H. LOCKLEAR DATE : 09/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 08/2019

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-19         |
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| 2         |     |       | 4   |     |       | 29           |

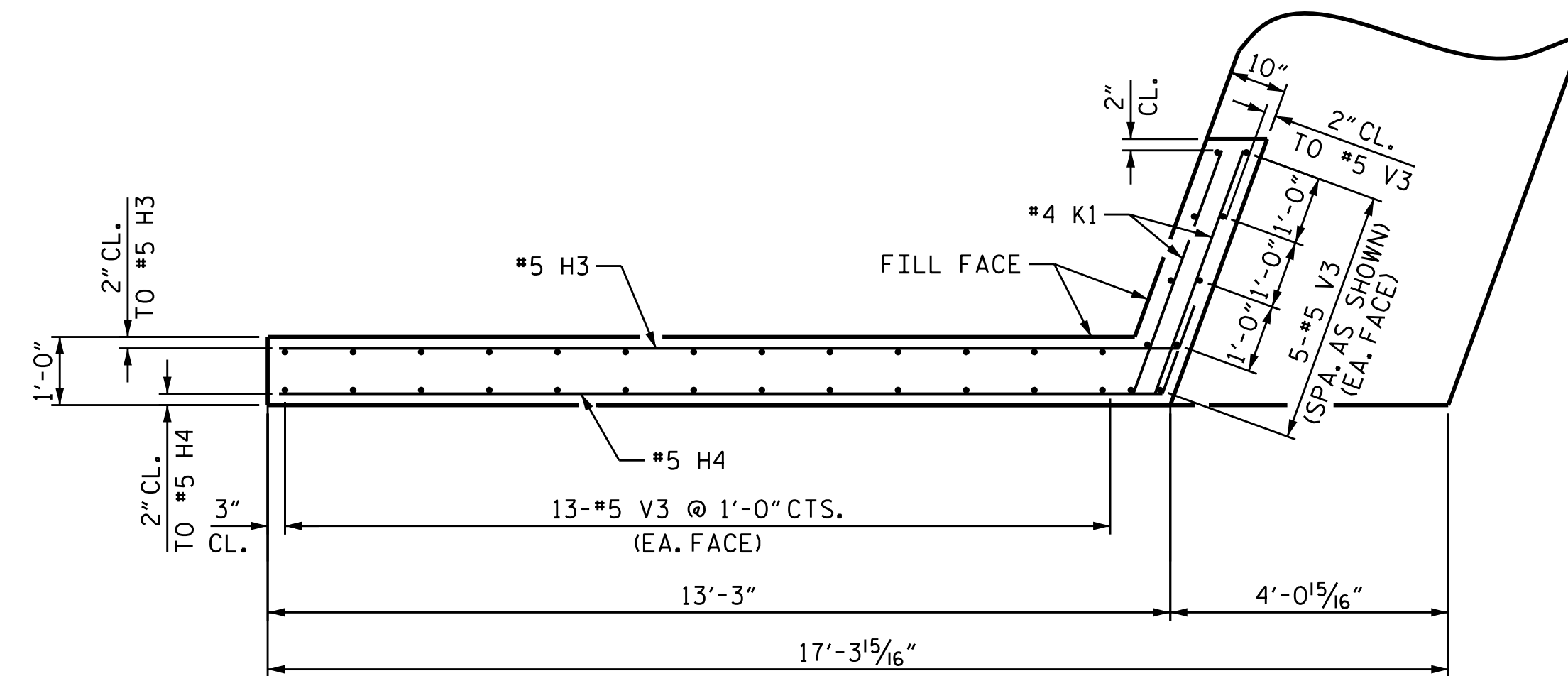




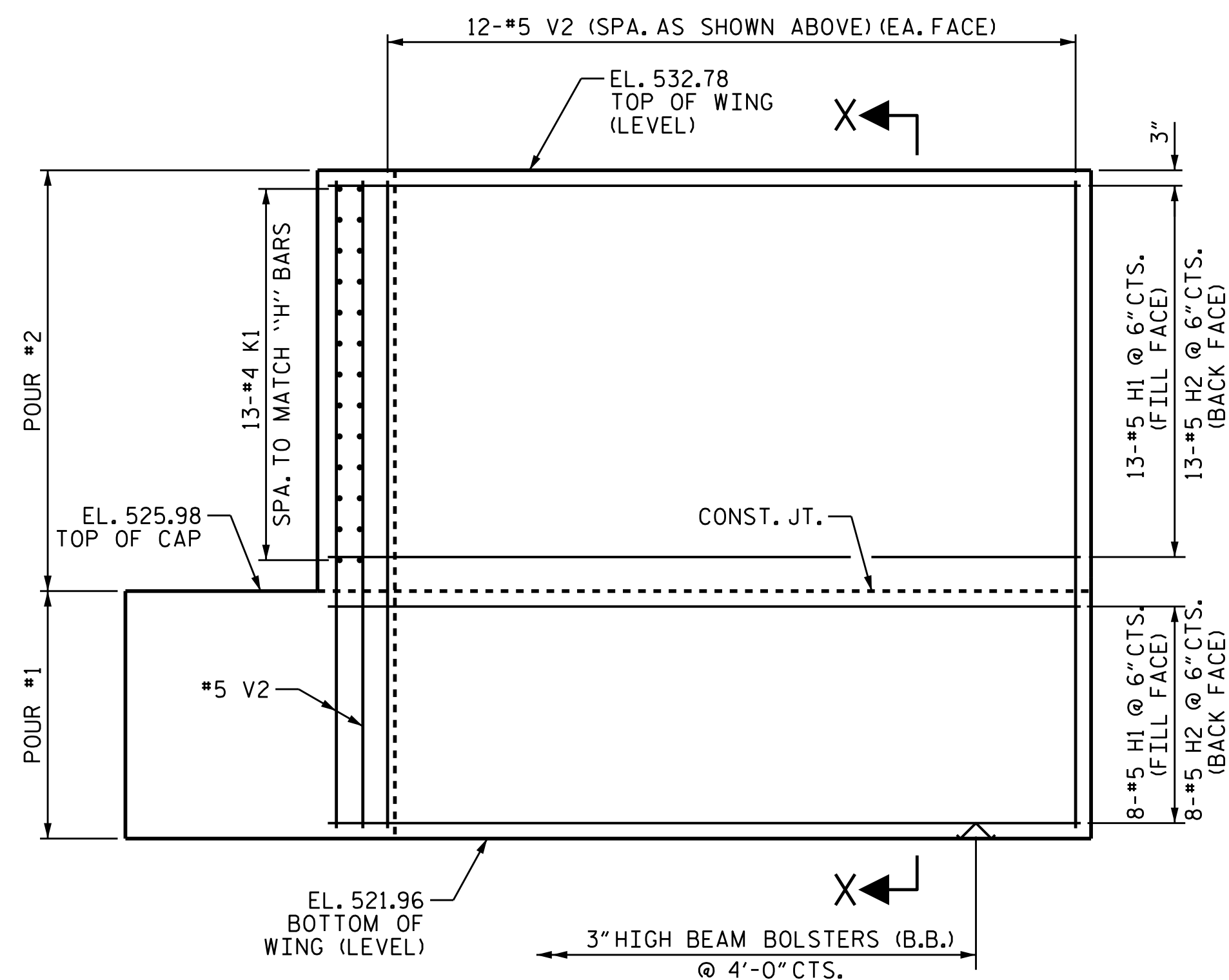
PLAN OF LEFT WING - W1



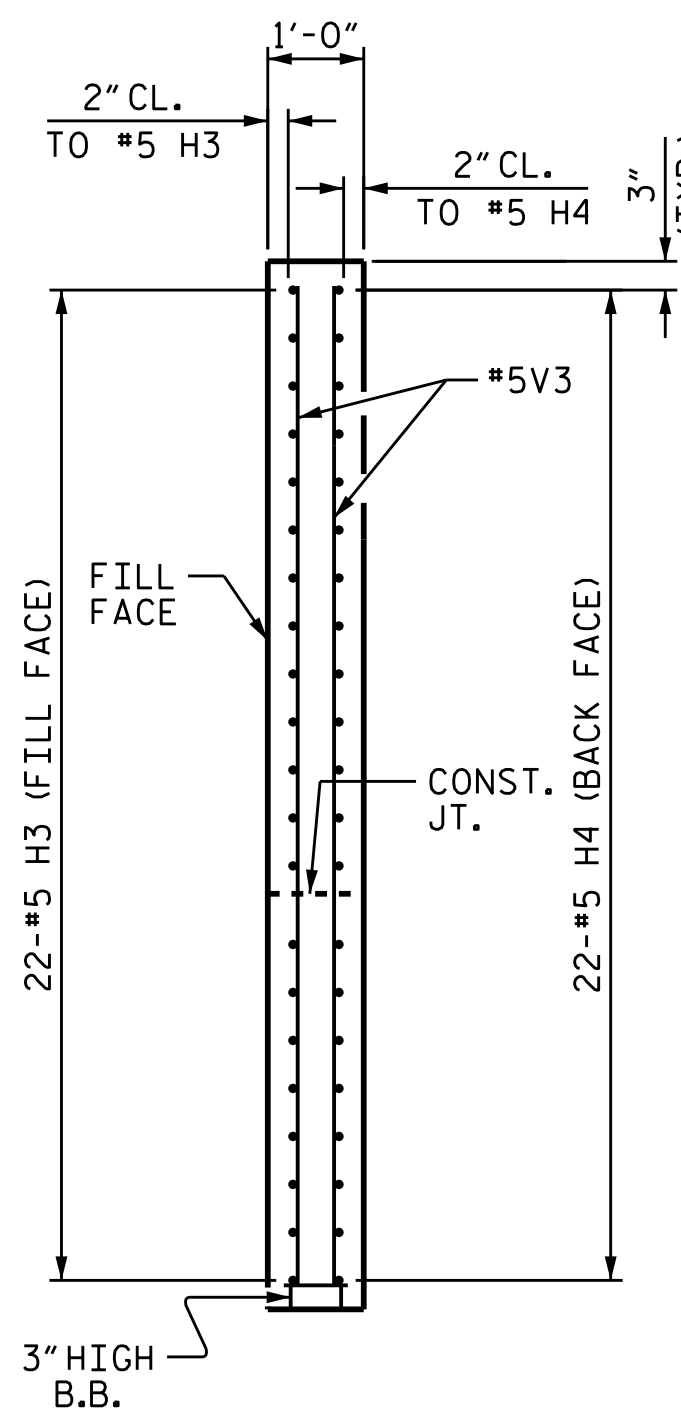
SECTION X-X



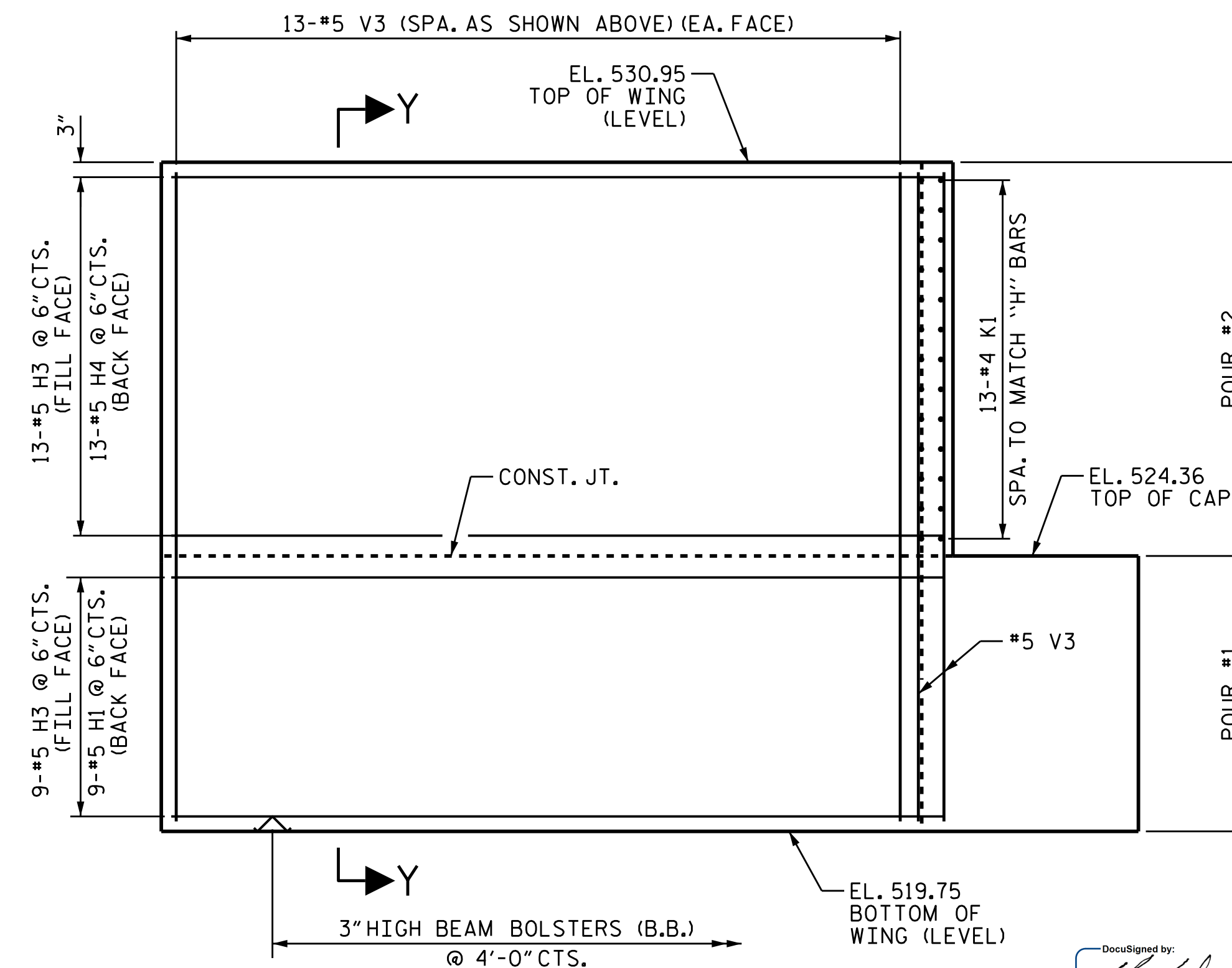
PLAN OF RIGHT WING - W2



ELEVATION OF LEFT WING - W1



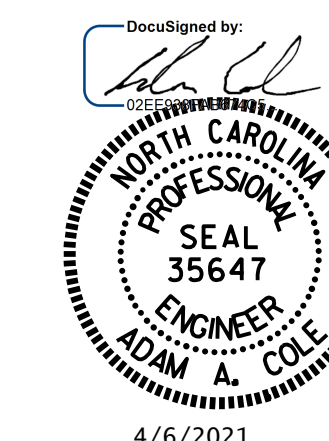
SECTION Y-Y



ELEVATION OF RIGHT WING - W2

PROJECT NO. B-5813  
 CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 2 OF 3

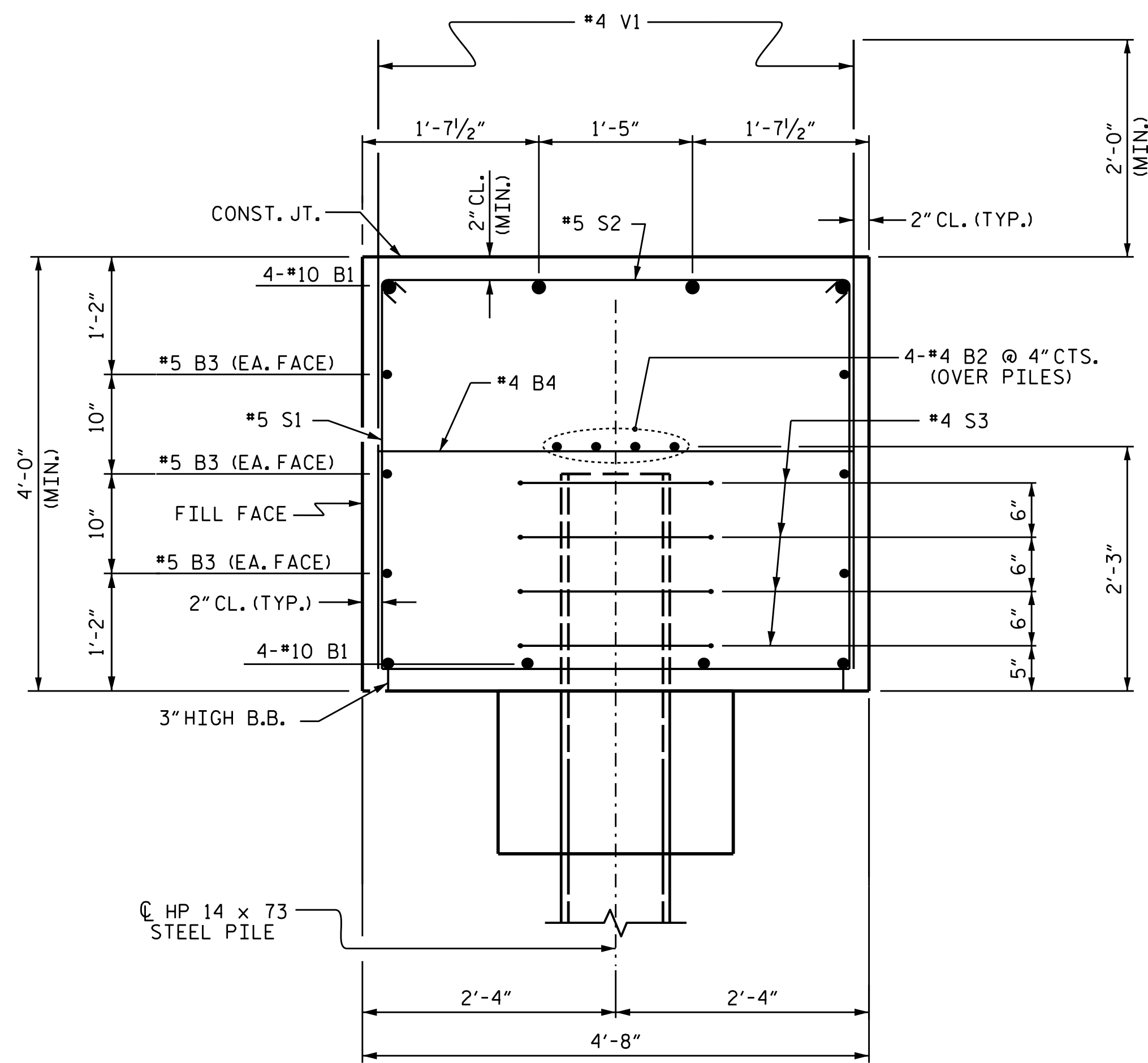


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 INTEGRAL  
 END BENT 1

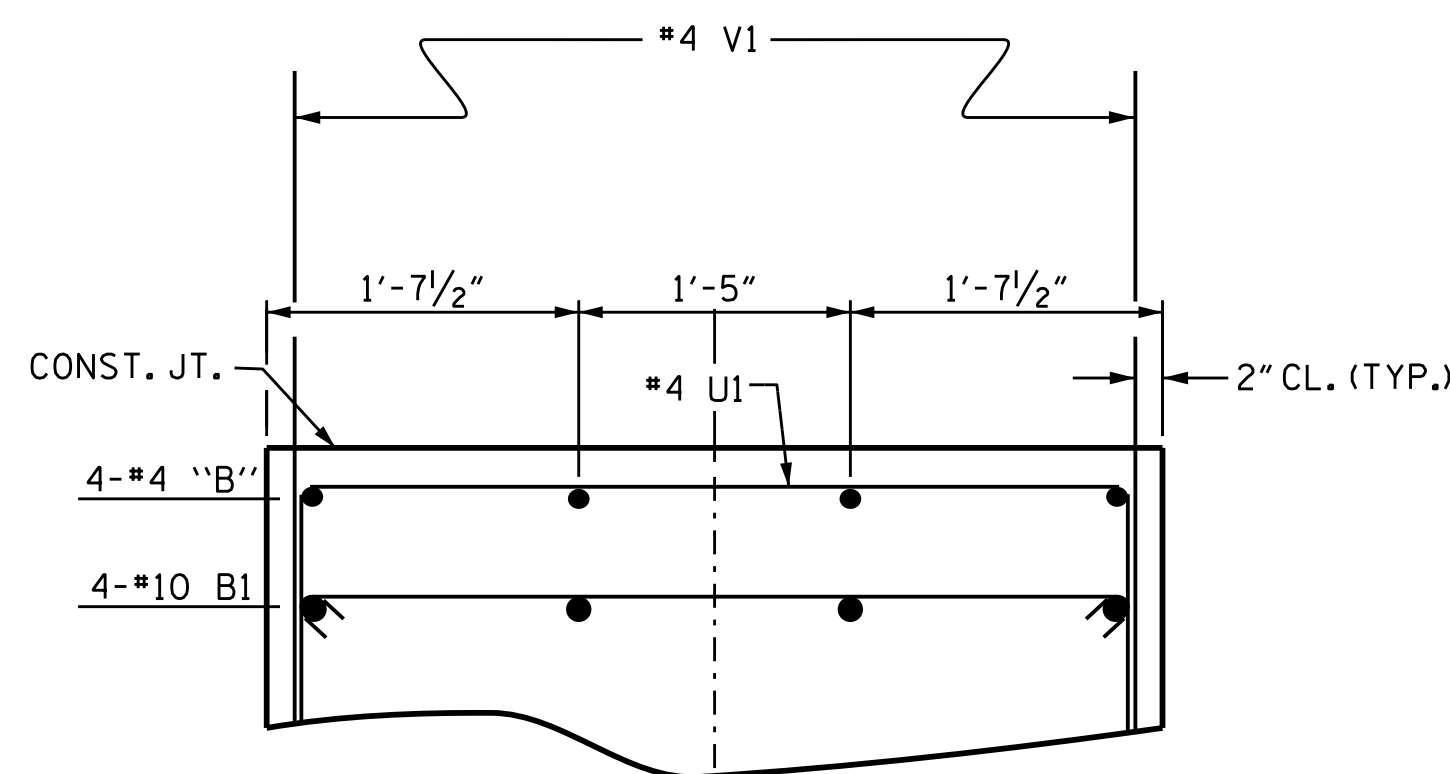
DRAWN BY: M. G. SHAIKH DATE: 09/2019  
 CHECKED BY: H. A. LOCKLEAR DATE: 09/2018  
 DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE: 08/2018

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

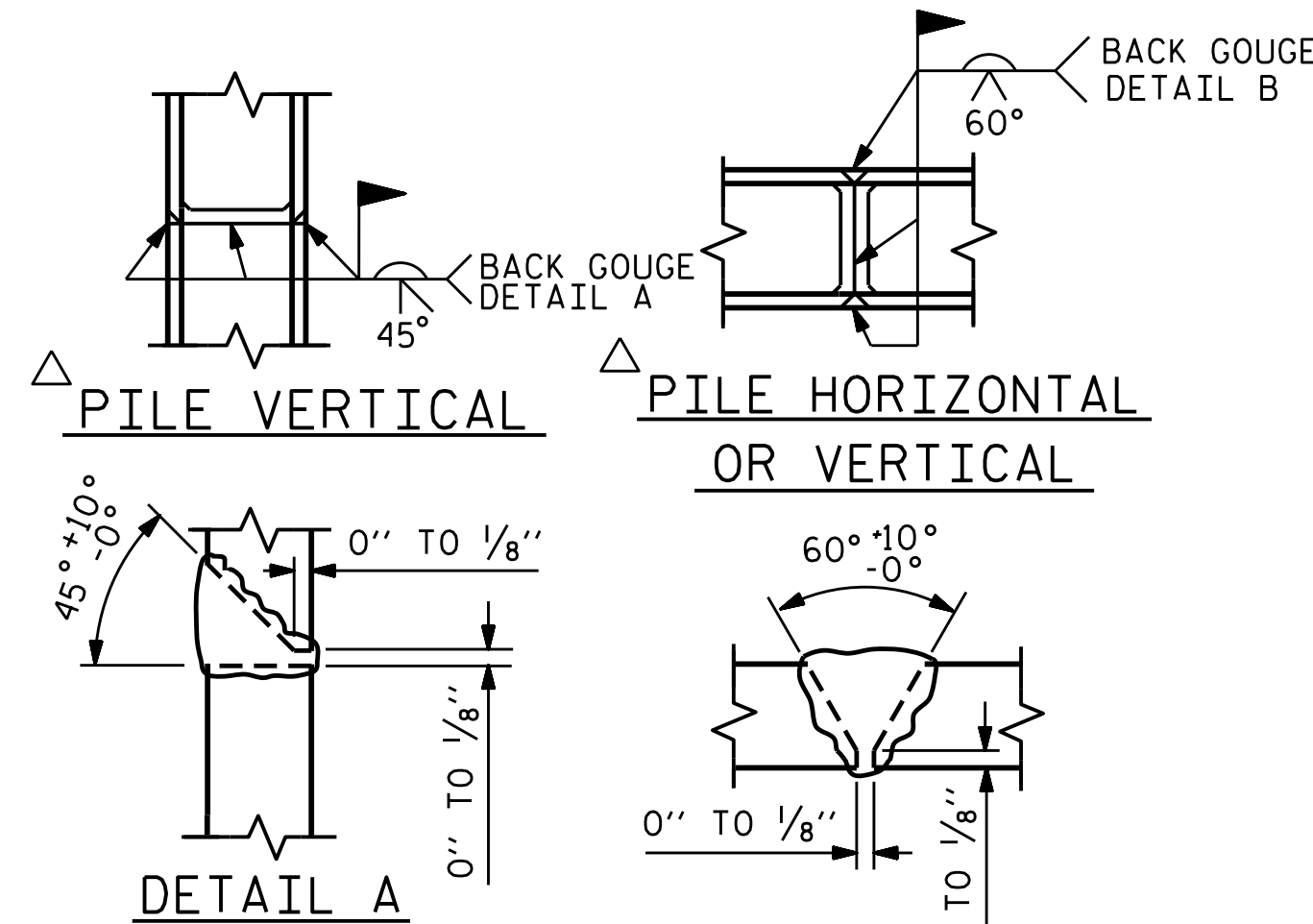
| REVISIONS |     |       |     |     |       | SHEET NO.    |
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| 2         |     |       | 4   |     |       | 29           |



SECTION A-A

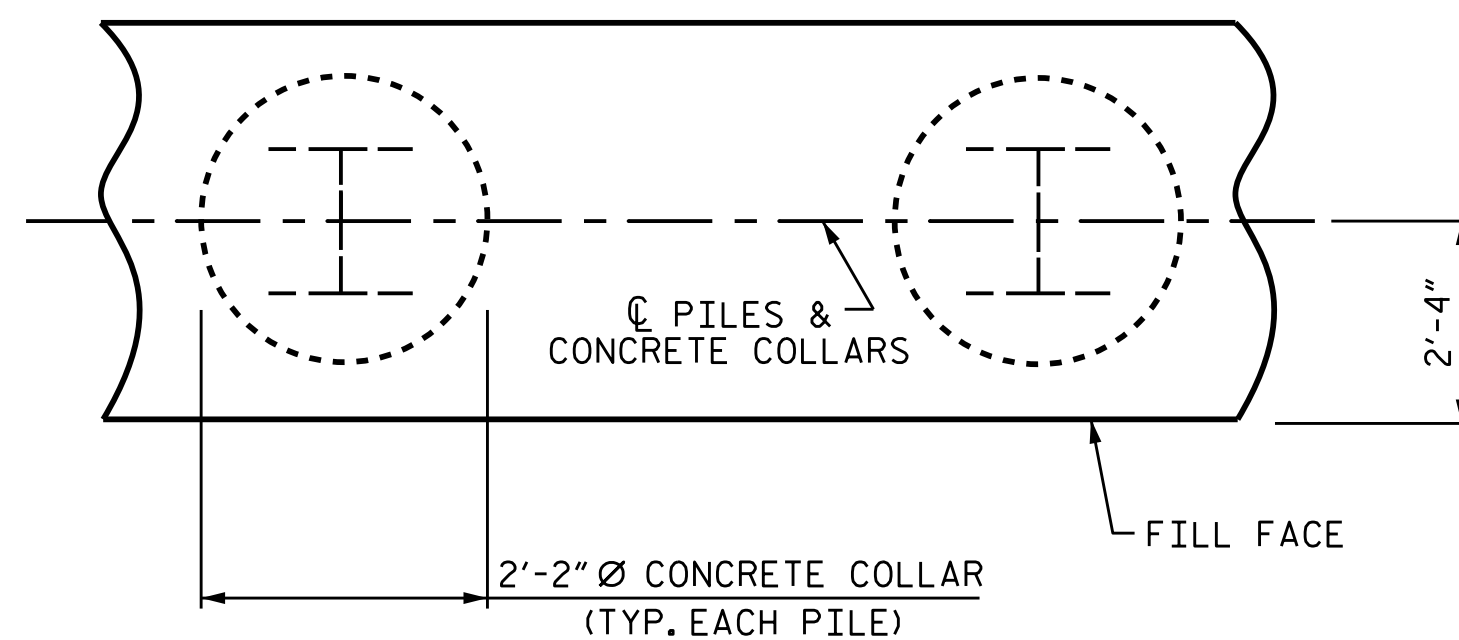


PARTIAL SECTION B-B

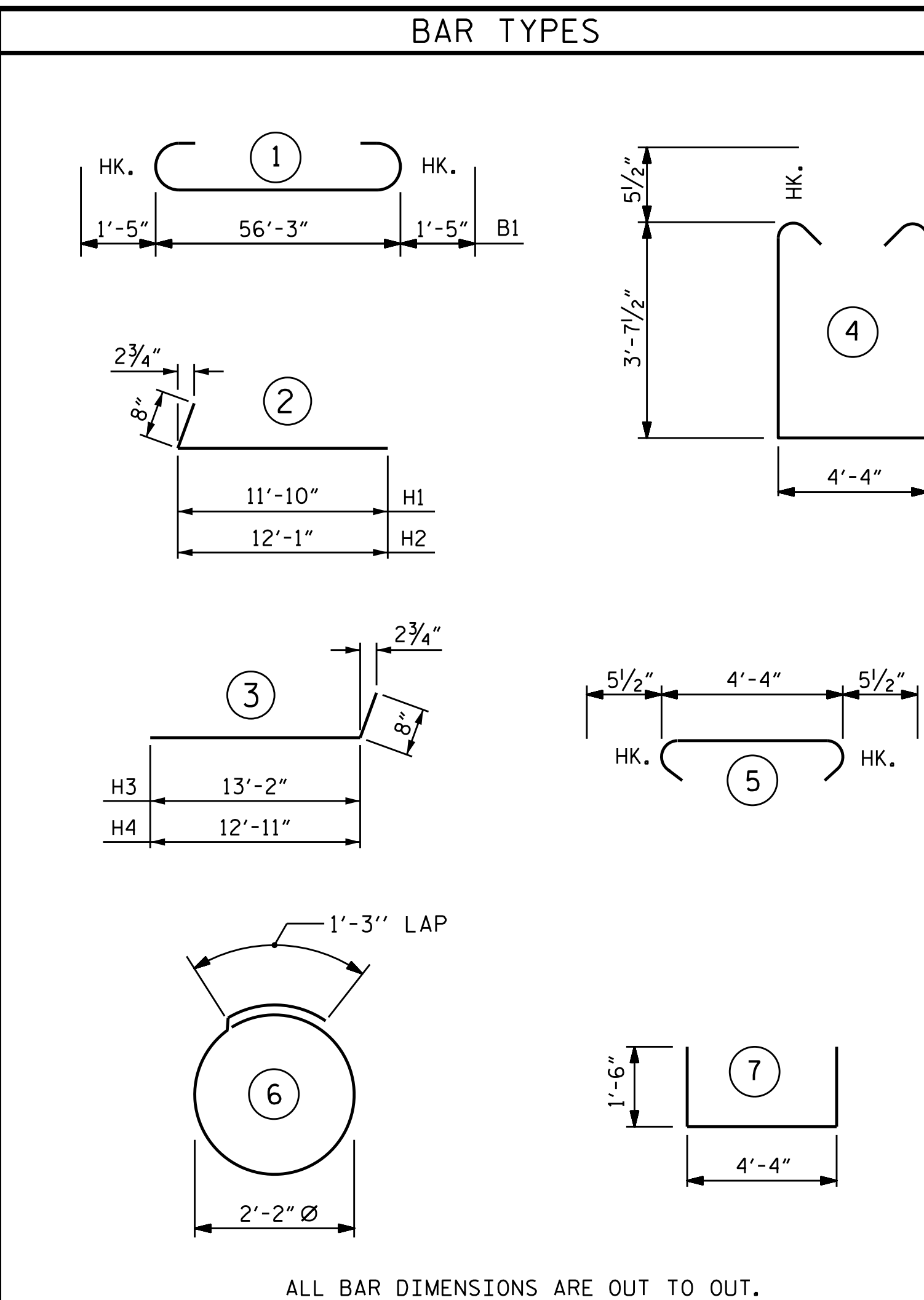


POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



PLAN



ALL BAR DIMENSIONS ARE OUT TO OUT.

| BILL OF MATERIAL |     |      |      |         |        |
|------------------|-----|------|------|---------|--------|
| BAR              | NO. | SIZE | TYPE | LENGTH  | WEIGHT |
| B1               | 8   | #10  | 1    | 59'-1"  | 2034   |
| B2               | 8   | #4   | STR  | 29'-5"  | 157    |
| B3               | 6   | #5   | STR  | 56'-5"  | 353    |
| B4               | 14  | #4   | STR  | 4'-2"   | 39     |
| B5               | 4   | #4   | STR  | 8'-3"   | 22     |
| B6               | 16  | #4   | STR  | 3'-0"   | 32     |
|                  |     |      |      |         |        |
| H1               | 21  | #5   | 2    | 12'-6"  | 274    |
| H2               | 21  | #5   | 2    | 12'-9"  | 279    |
| H3               | 22  | #5   | 3    | 13'-10" | 317    |
| H4               | 22  | #5   | 3    | 13'-7"  | 312    |
|                  |     |      |      |         |        |
| K1               | 52  | #4   | STR  | 3'-9"   | 130    |
|                  |     |      |      |         |        |
| S1               | 48  | #5   | 4    | 12'-6"  | 626    |
| S2               | 48  | #5   | 5    | 5'-3"   | 263    |
| S3               | 28  | #4   | 6    | 8'-1"   | 151    |
|                  |     |      |      |         |        |
| U1               | 18  | #4   | 7    | 7'-4"   | 88     |
|                  |     |      |      |         |        |
| V1               | 74  | #4   | STR  | 6'-0"   | 297    |
| V2               | 34  | #5   | STR  | 10'-5"  | 369    |
| V3               | 36  | #5   | STR  | 10'-10" | 407    |

REINFORCING STEEL = 6150 LBS.

CLASS A CONCRETE

POUR #1 (CAP, CON. COLLARS, & LOWER PART OF WINGS) = 46.8 C.Y.

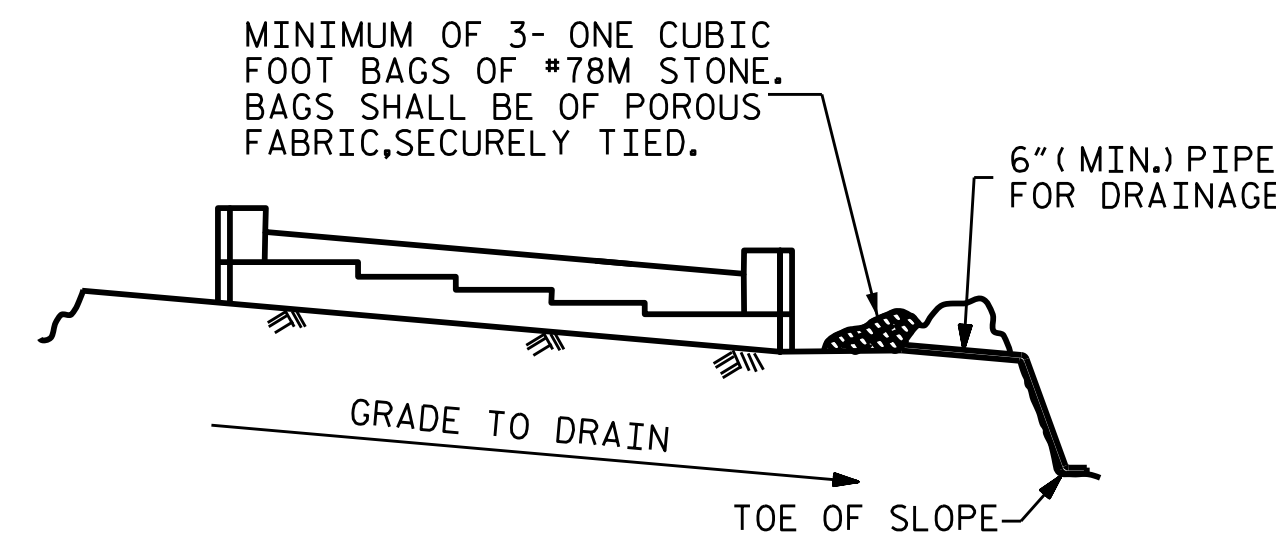
POUR #2 (UPPER PART OF WINGS) = 8.5 C.Y.

TOTAL = 55.3 C.Y.

HP 14 X 73 STEEL PILES

No. 7 \_\_\_\_\_ LIN FT. 210

PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES \_\_\_\_\_ NO.: 7



MINIMUM OF 3- ONE CUBIC FOOT BAGS OF #78M STONE. BAGS SHALL BE OF POROUS FABRIC, SECURELY TIED.

6" (MIN.) PIPE FOR DRAINAGE

GRADE TO DRAIN

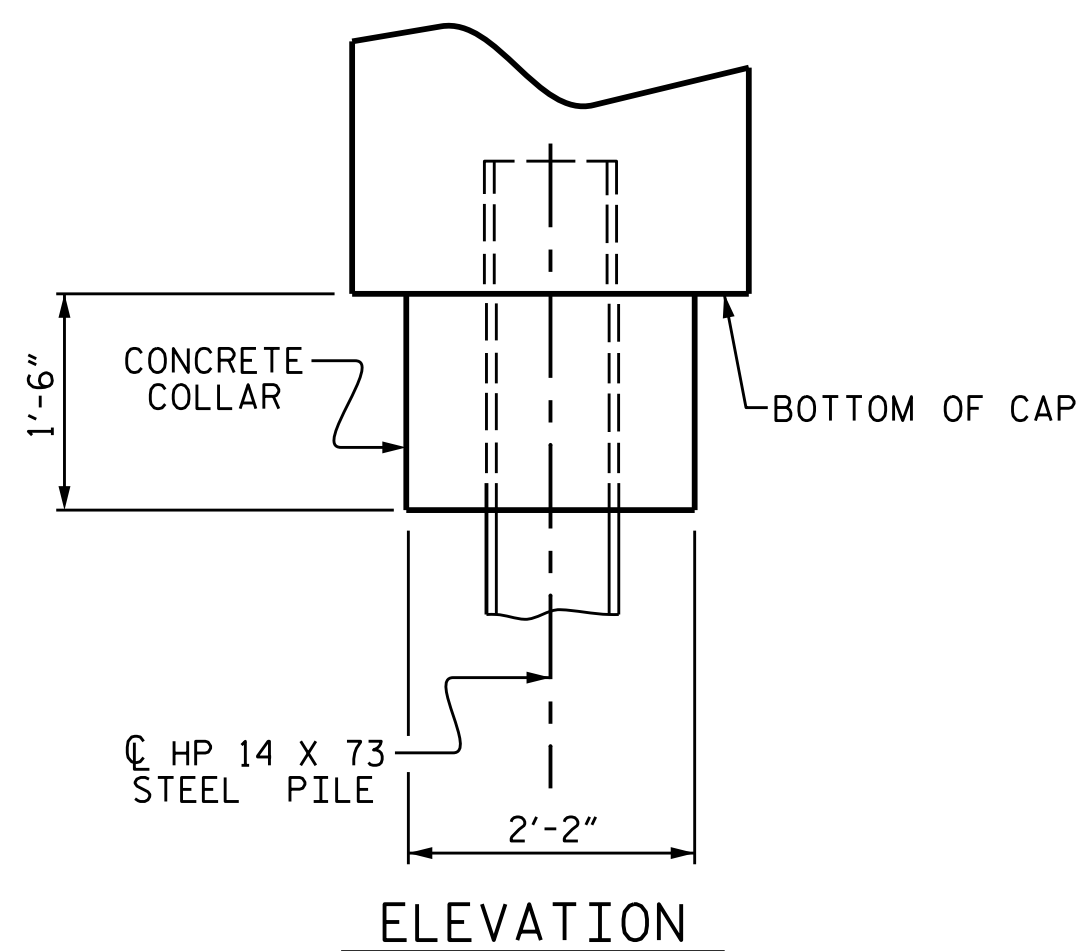
TOE OF SLOPE

BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

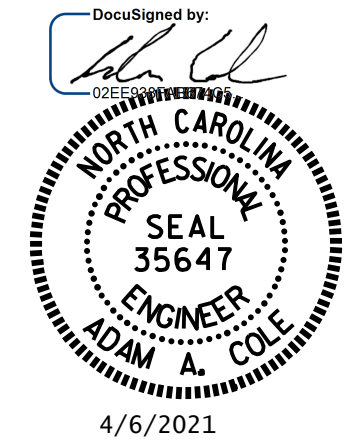
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL



PROJECT NO. B-5813

CABARRUS COUNTY

STATION: 21+85.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

SUBSTRUCTURE

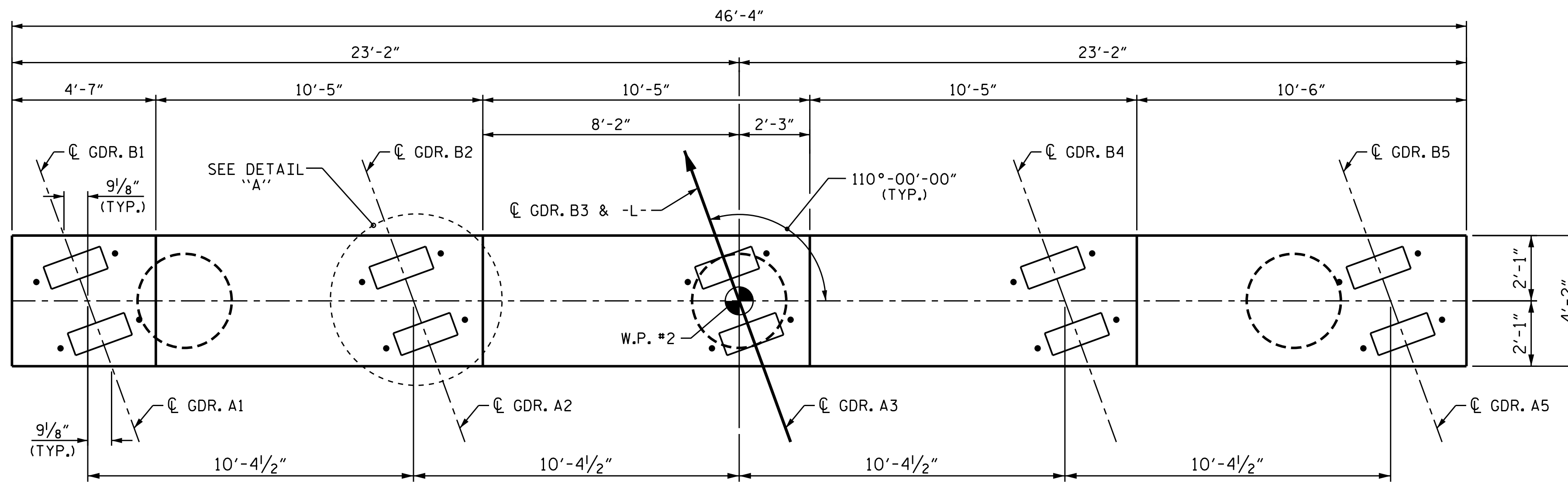
INTEGRAL

END BENT 1

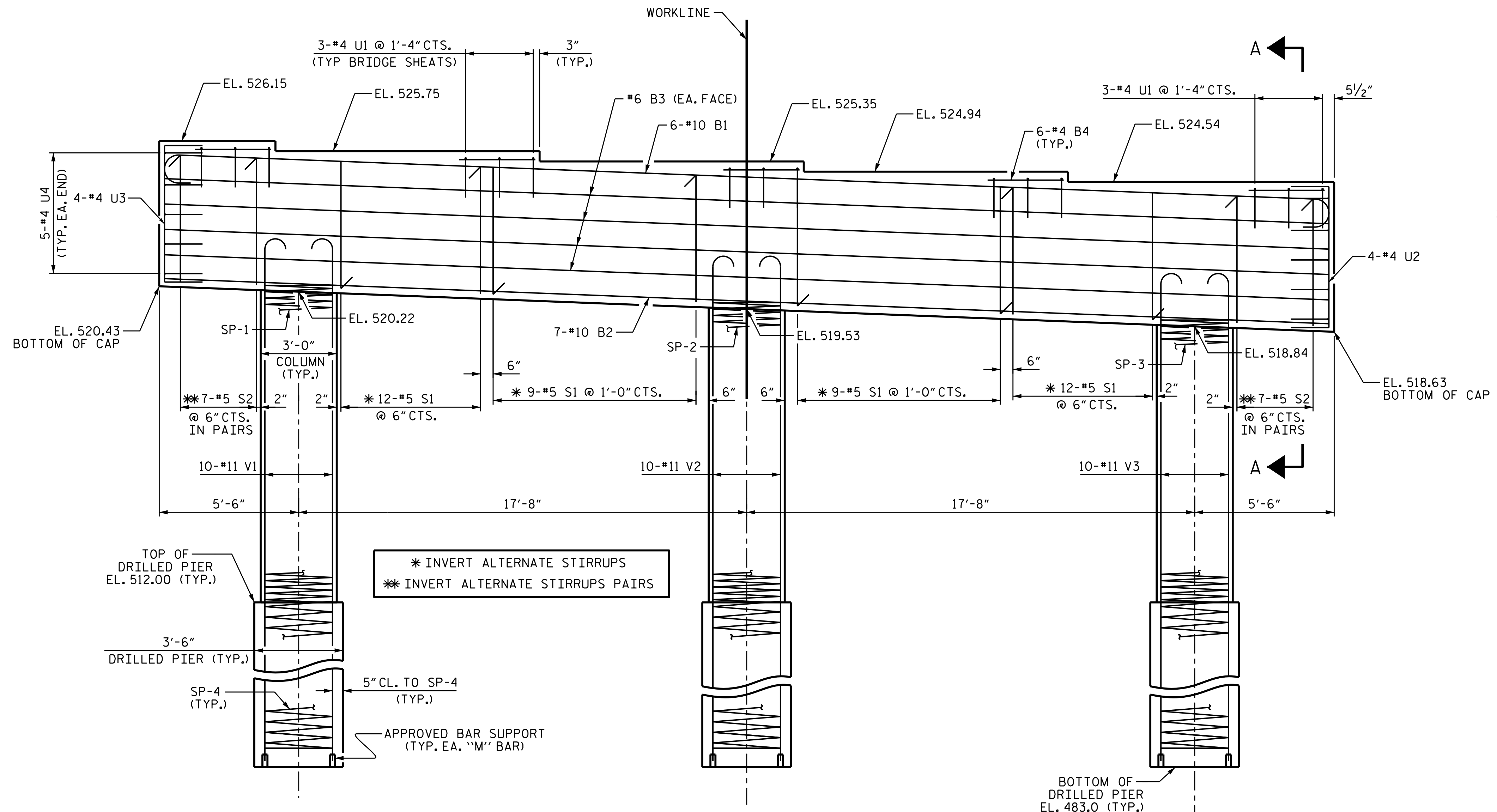
|                            |              |        |         |
|----------------------------|--------------|--------|---------|
| DRAWN BY :                 | M. G. SHAIKH | DATE : | 09/2019 |
| CHECKED BY :               | H. LOCKLEAR  | DATE : | 09/2019 |
| DESIGN ENGINEER OF RECORD: | H. LOCKLEAR  | DATE : | 08/2019 |

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-21         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |





PLAN



ELEVATION

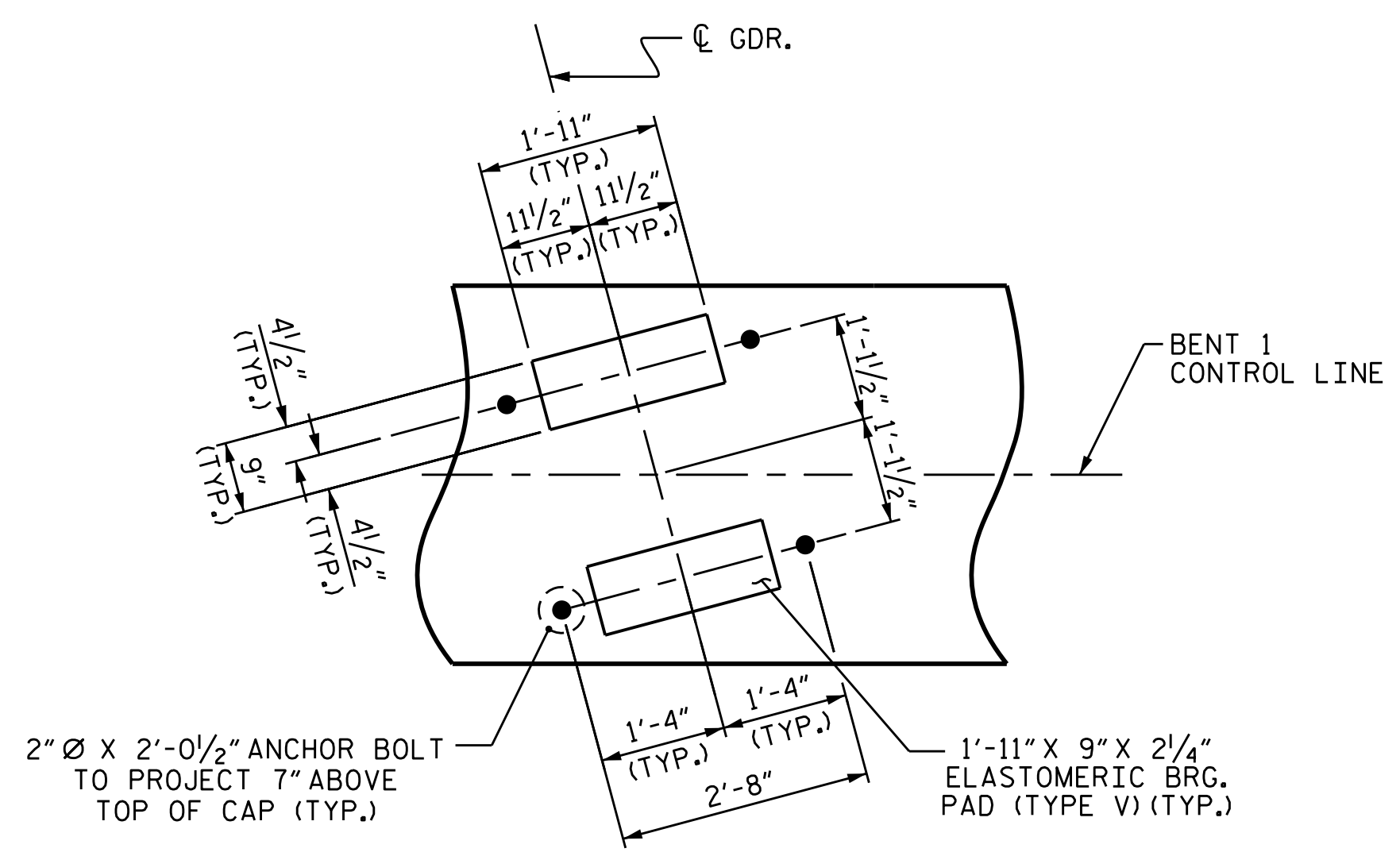
NOTES

ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL".

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

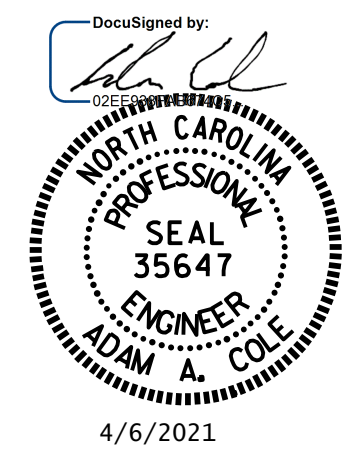
HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.



DETAIL "A"  
TYP. EA. GDR.

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 1 OF 2



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 BENT 1

DRAWN BY : M. G. SHAIKH DATE : 09/2019  
 CHECKED BY : H. A. LOCKLEAR DATE : 09/2019  
 DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 08/2019

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-22         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |

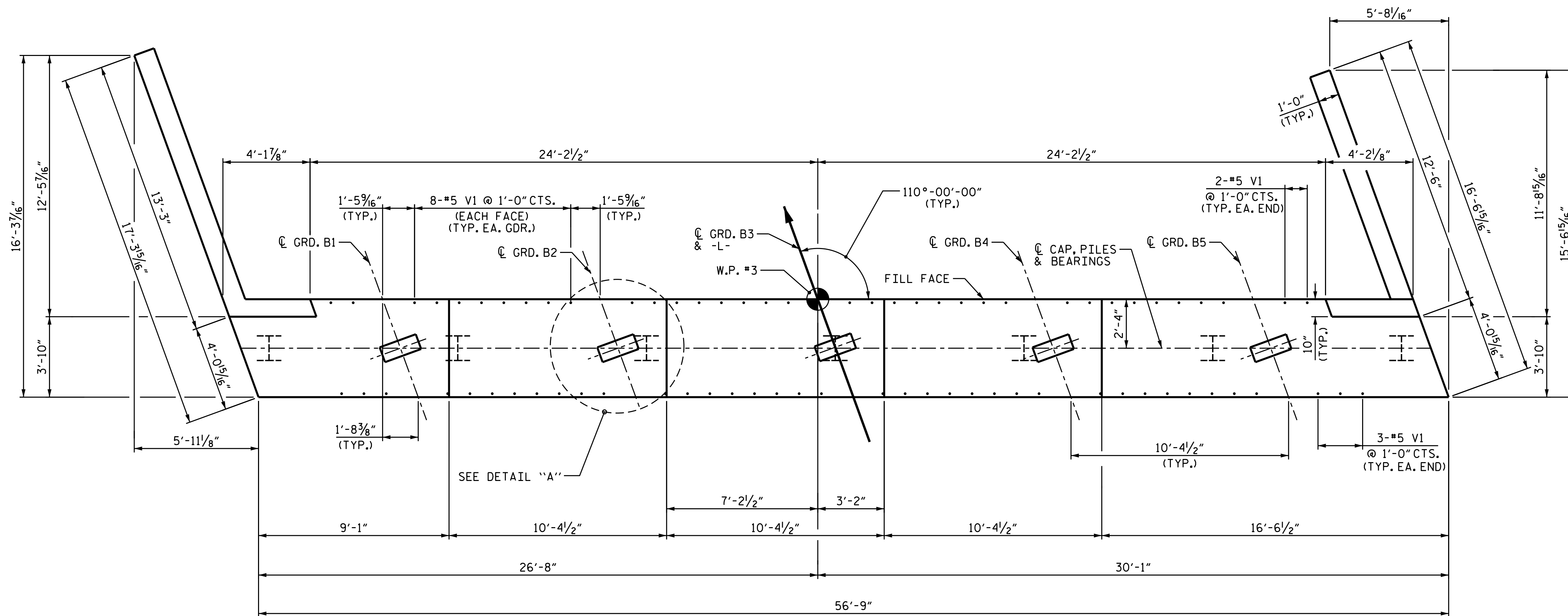




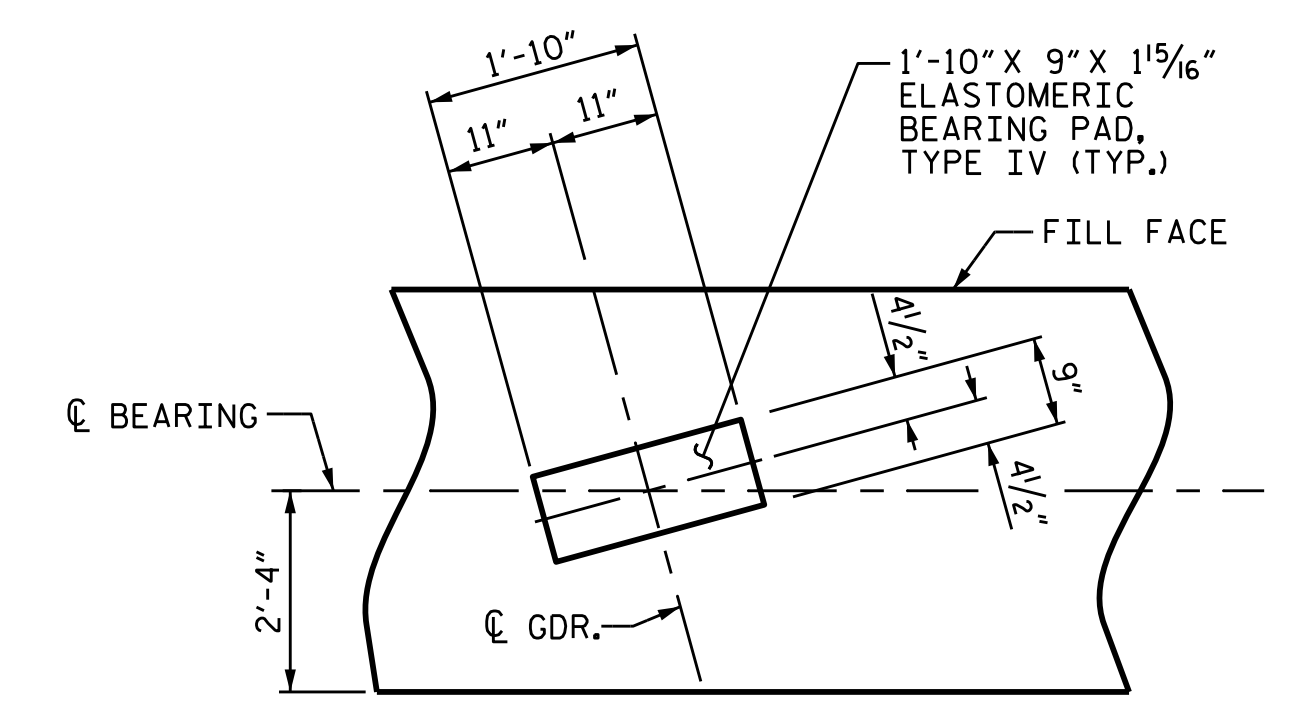
**NOTES:**

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR #4 VI BARS.

THE TOP PART OF THE END BENT CAP AND WINGS, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

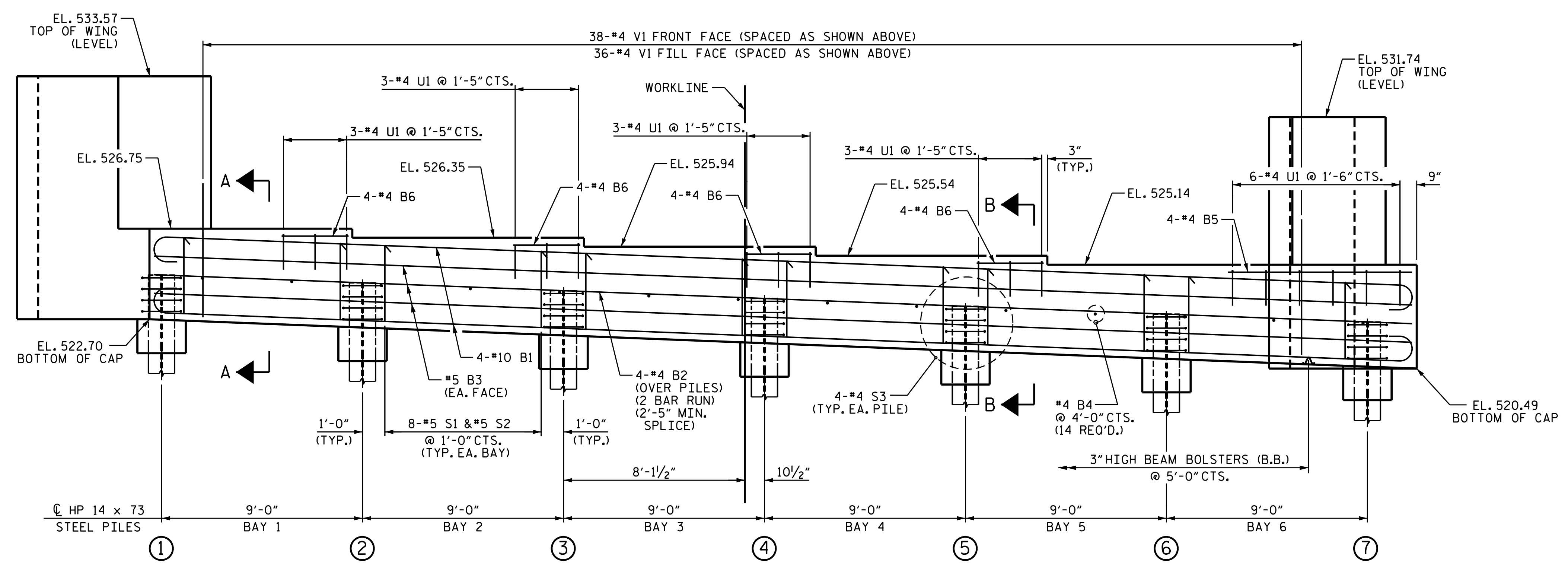


**PLAN**



**DETAIL "A"**

(TYP. EA. GDR.)

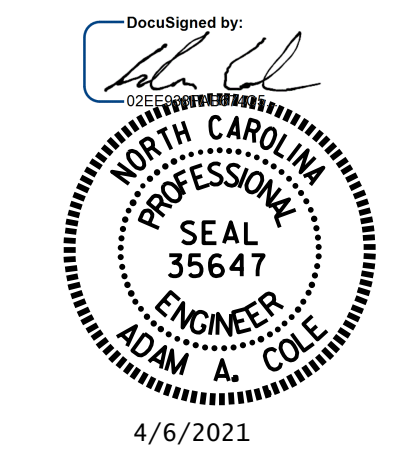


**ELEVATION**

| TOP OF PILE ELEVATIONS |         |
|------------------------|---------|
| ①                      | 524.666 |
| ②                      | 524.316 |
| ③                      | 523.966 |
| ④                      | 523.616 |
| ⑤                      | 523.266 |
| ⑥                      | 522.915 |
| ⑦                      | 522.565 |

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

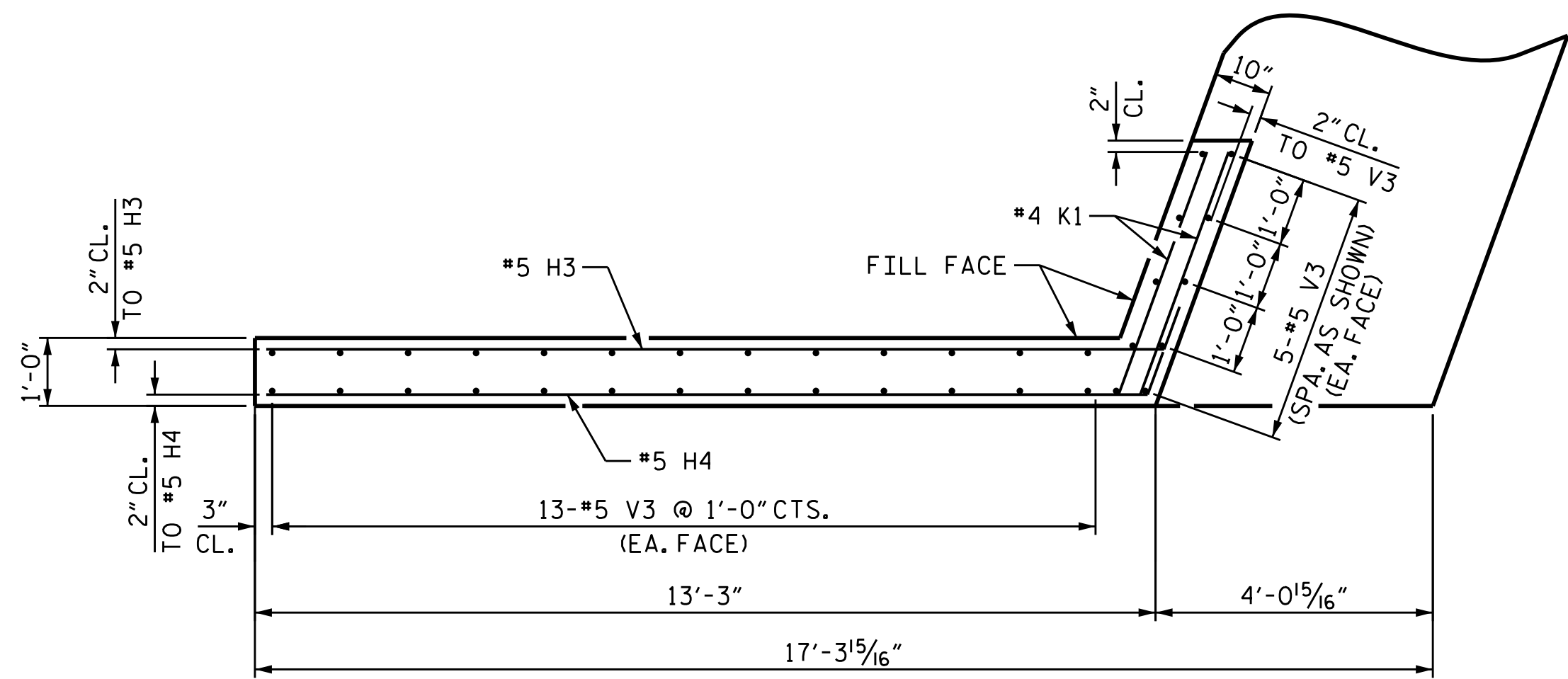
SHEET 1 OF 3



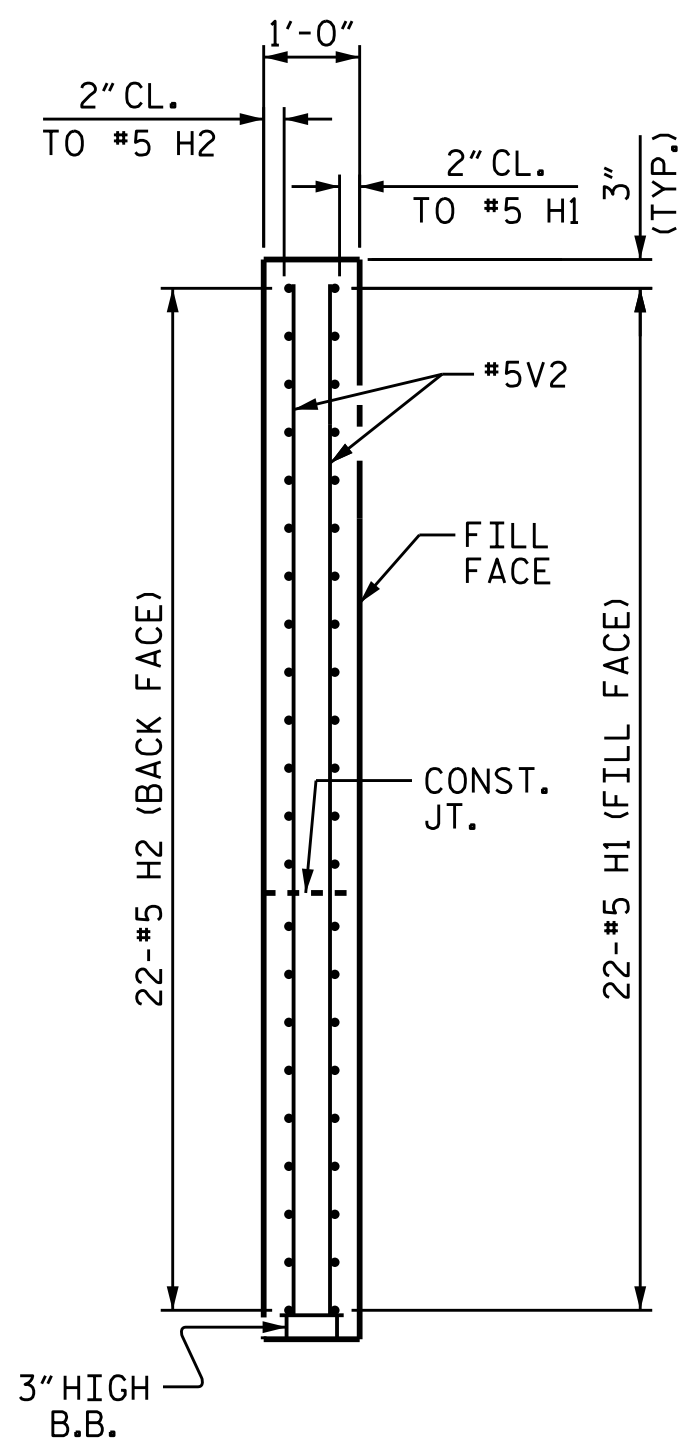
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
**INTEGRAL END BENT 2**

DRAWN BY : M. G. SHAIKH DATE : 09/2019  
 CHECKED BY : H. LOCKLEAR DATE : 09/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 08/2019

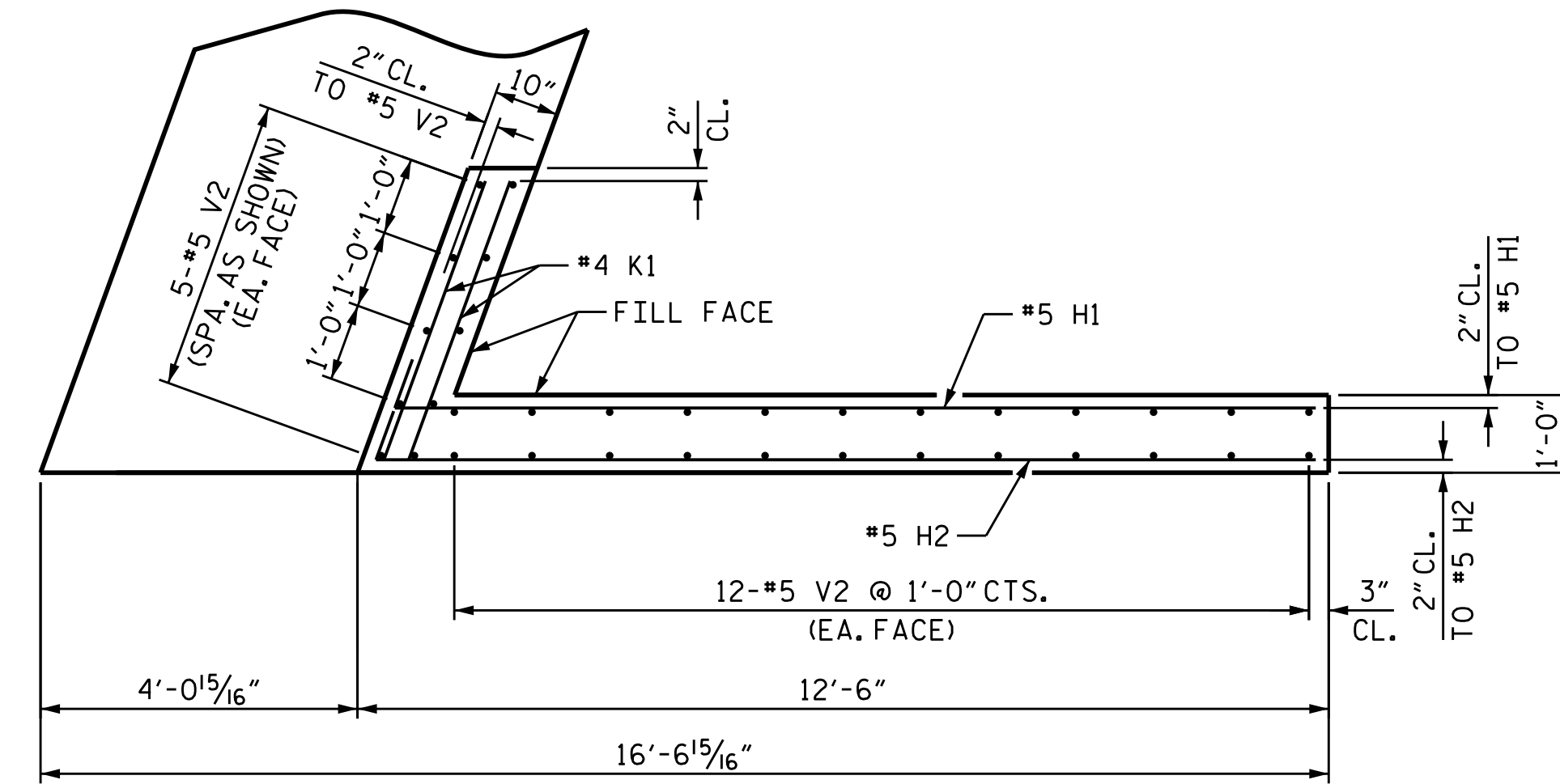
| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-24         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |



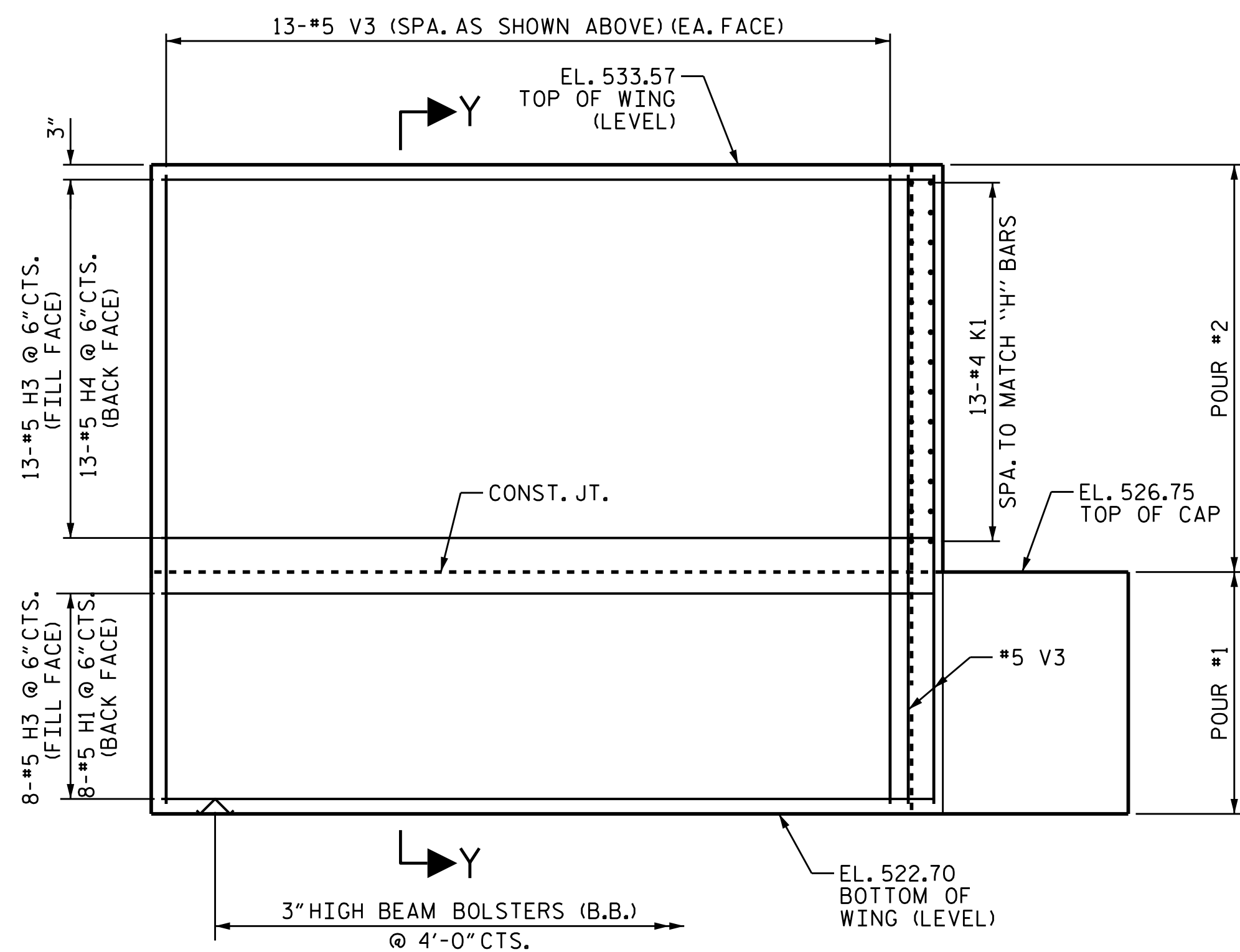
PLAN OF LEFT WING - W1



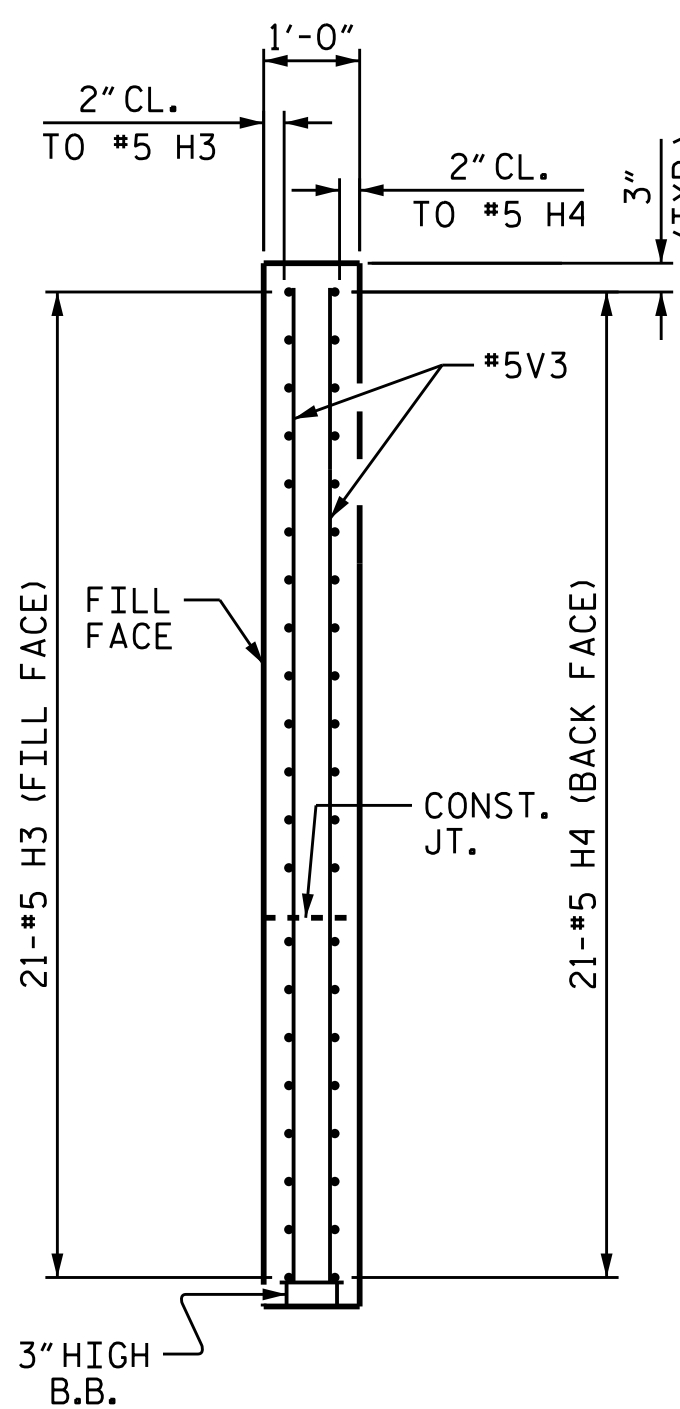
SECTION X-X



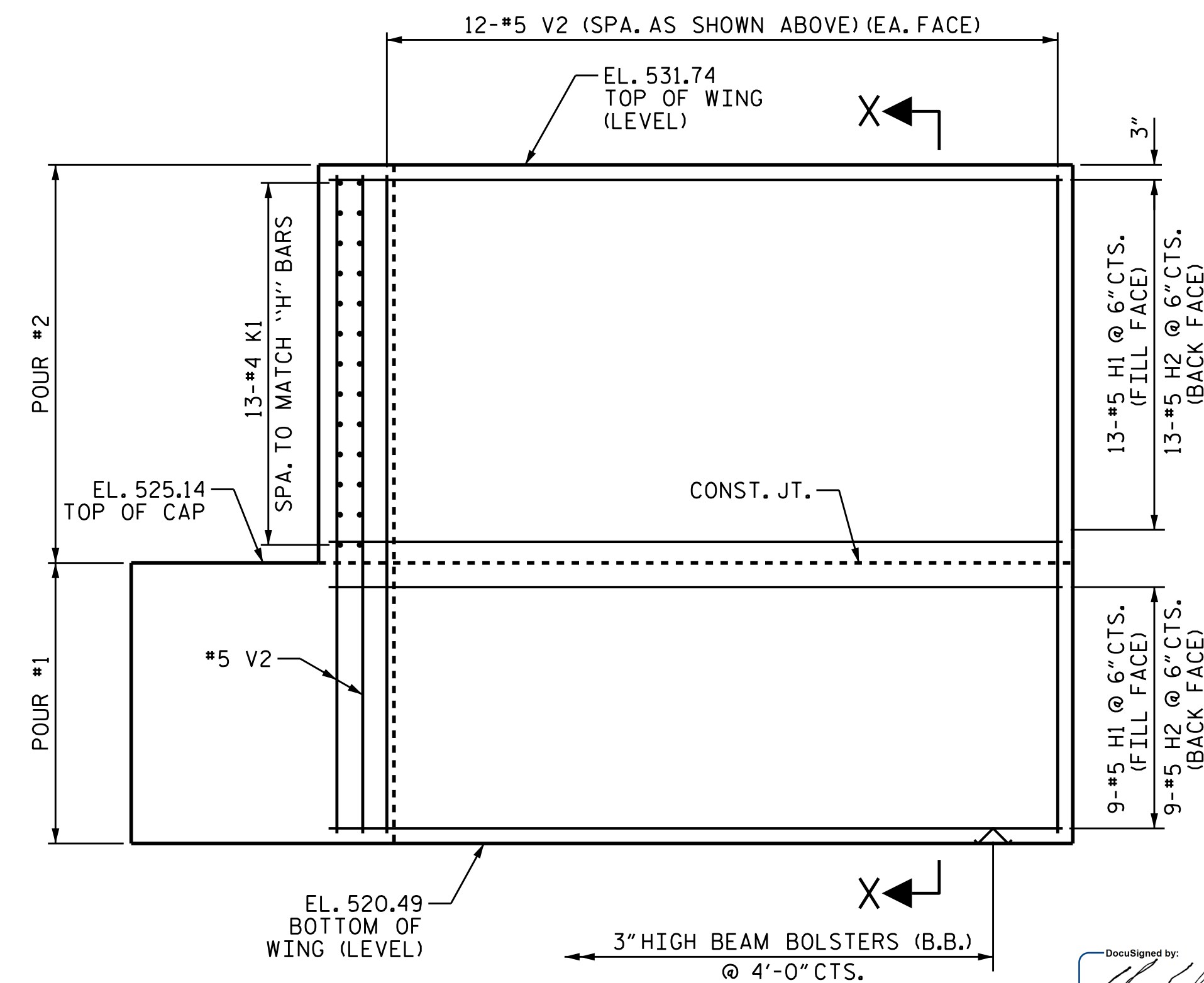
PLAN OF RIGHT WING - W2



ELEVATION OF LEFT WING - W1



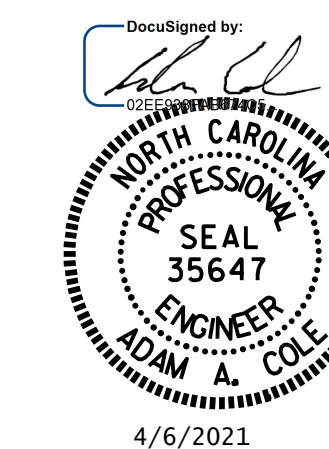
SECTION Y-Y



ELEVATION OF RIGHT WING - W2

PROJECT NO. B-5813  
 CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 2 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

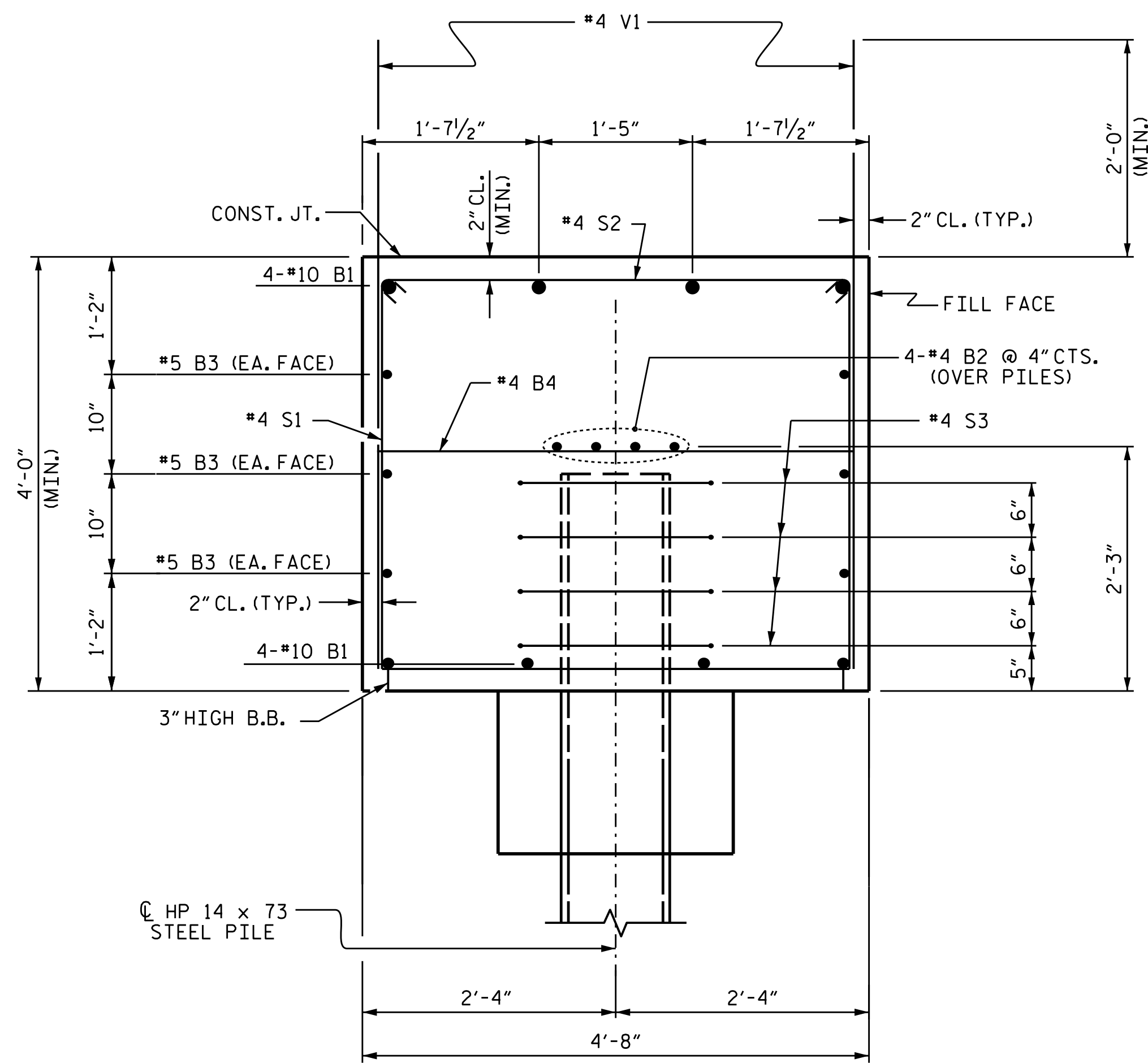
SUBSTRUCTURE  
 INTEGRAL  
 END BENT 2

DRAWN BY : M. G. SHAIKH DATE : 09/2019  
 CHECKED BY : H. A. LOCKLEAR DATE : 09/2018  
 DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 08/2018

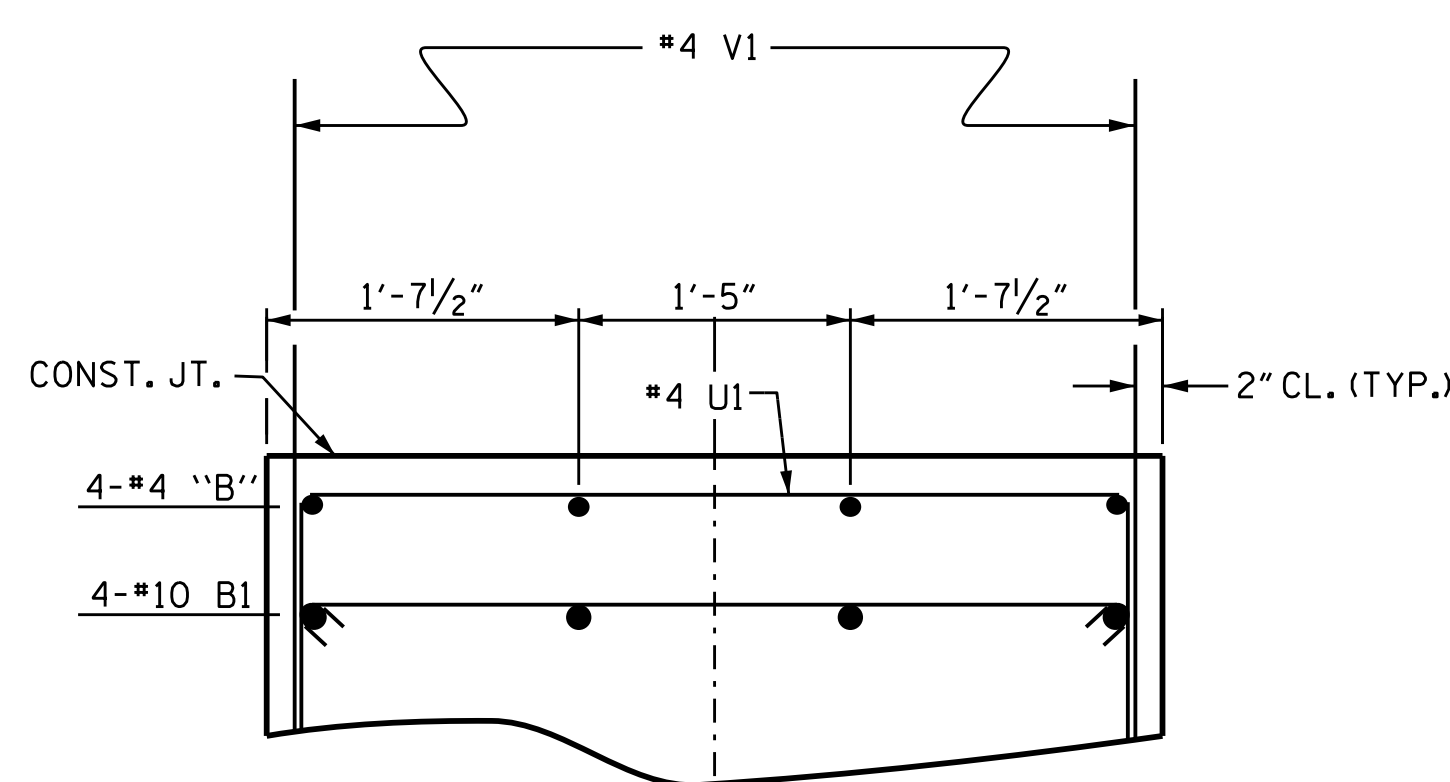
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO. |
|-----------|-----|-------|-----|-----|-------|-----------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-25      |
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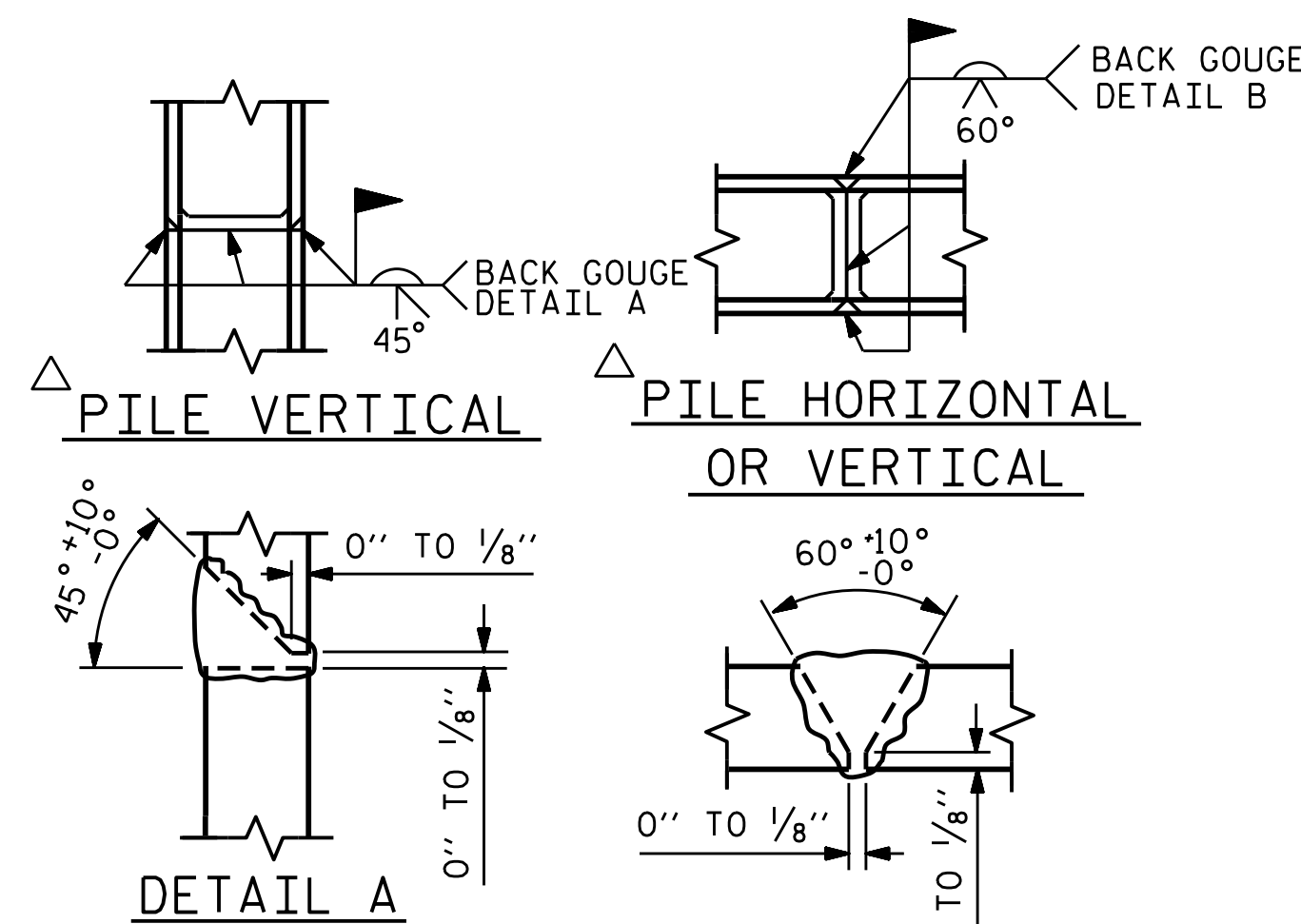




SECTION A-A

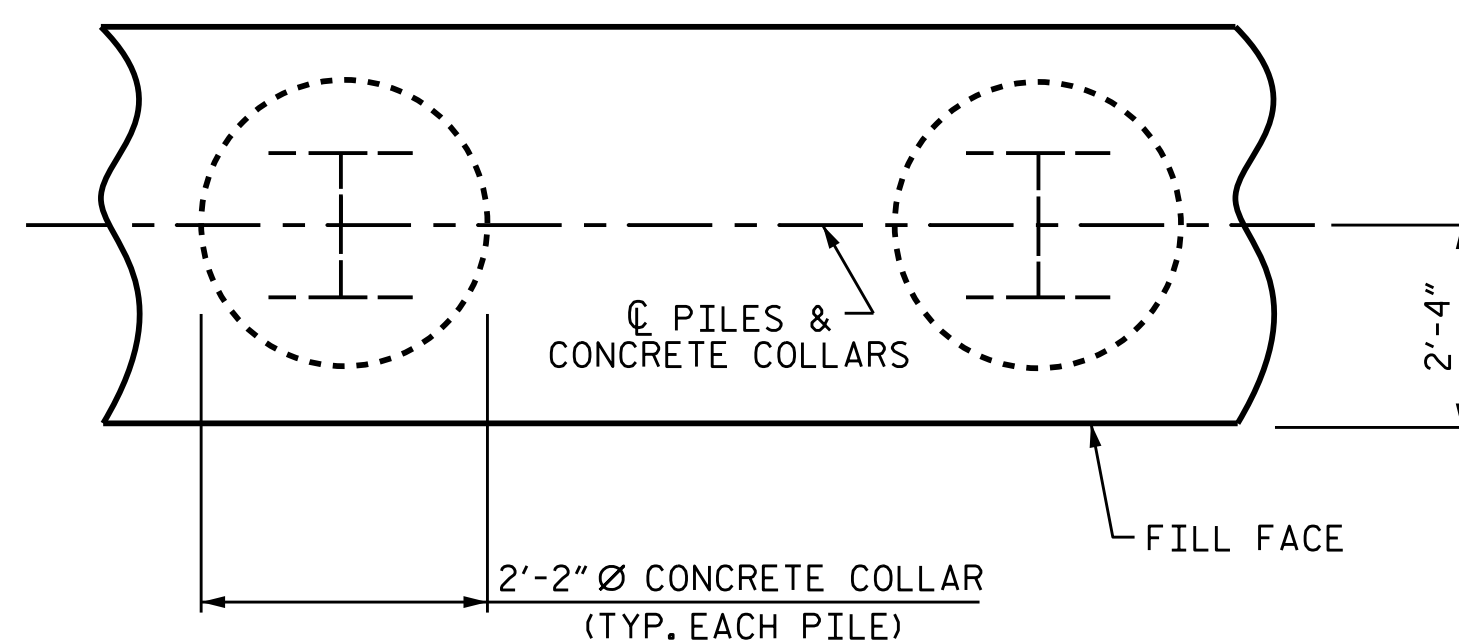


PARTIAL SECTION B-B

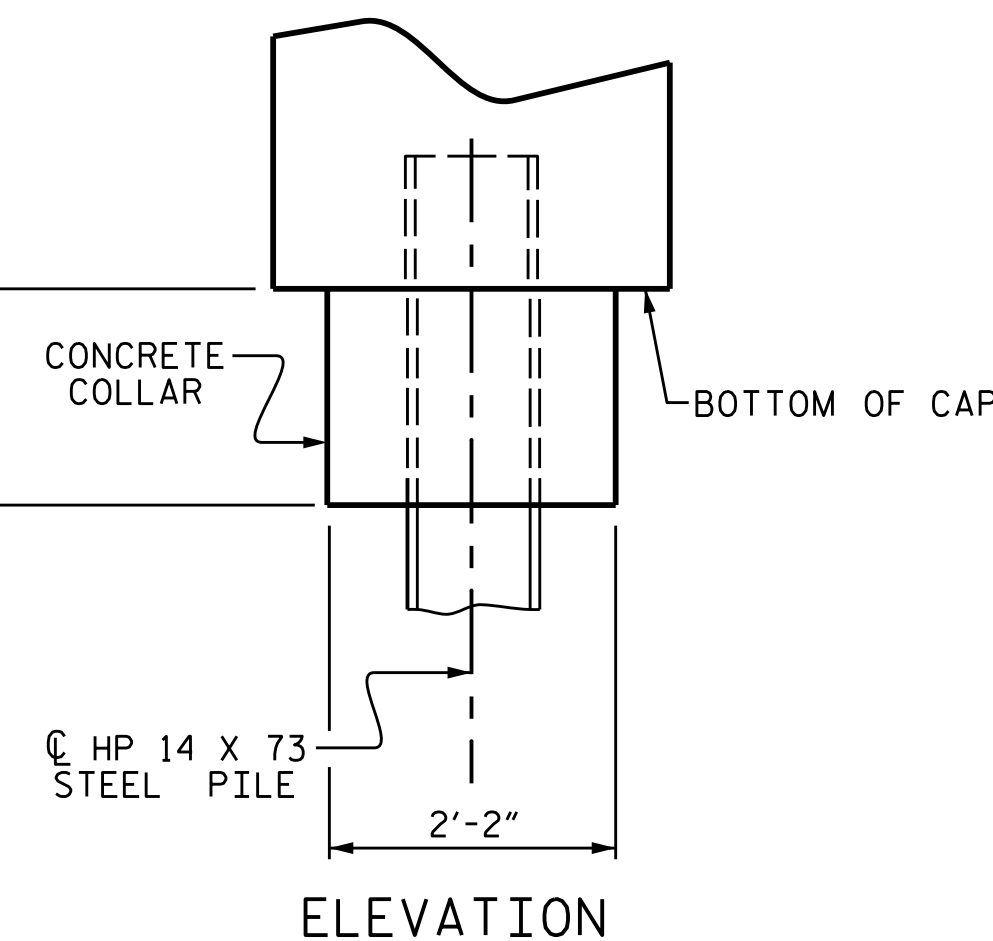


POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



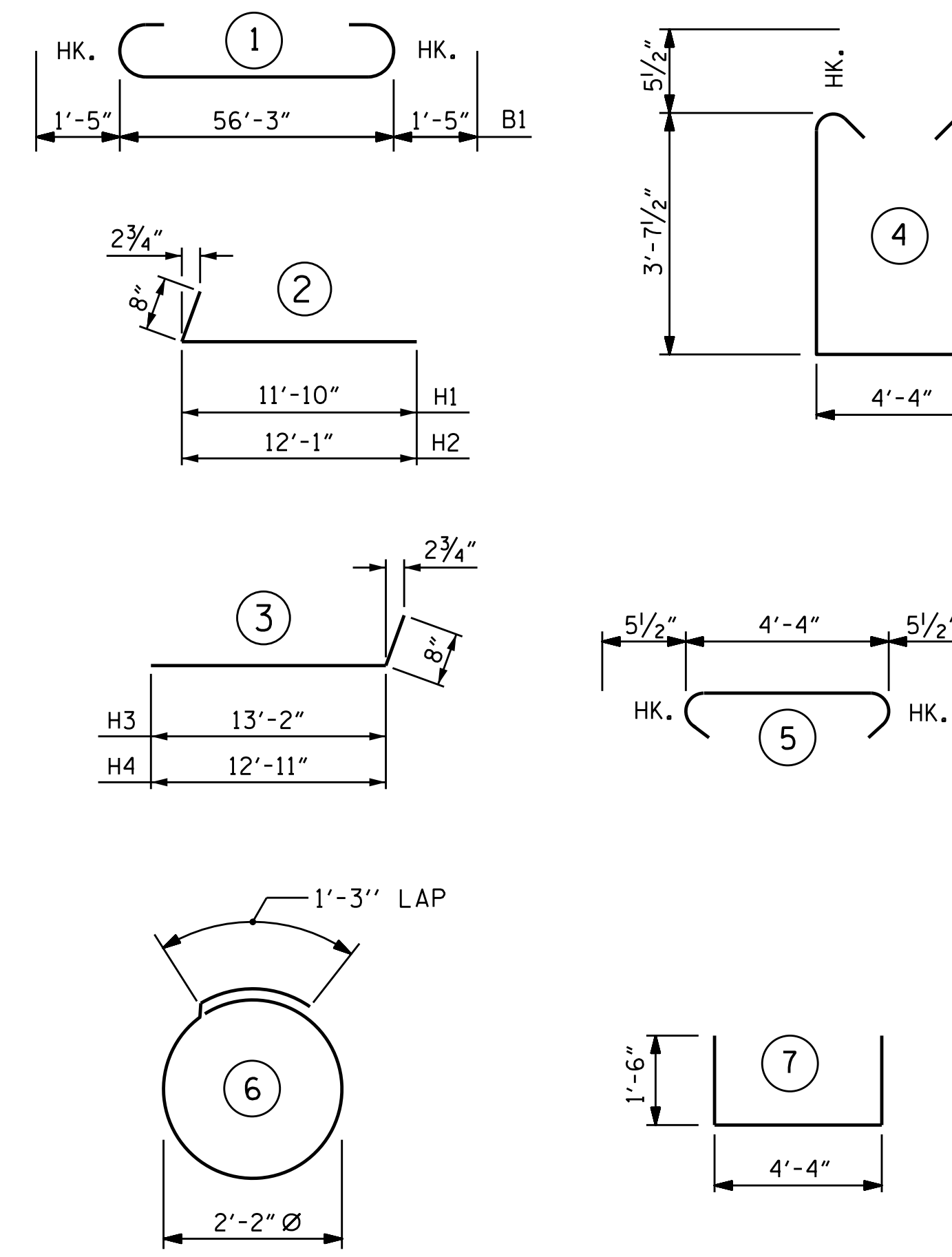
PLAN



ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

| BAR | NO. | SIZE | TYPE | LENGTH  | WEIGHT |
|-----|-----|------|------|---------|--------|
| B1  | 8   | #10  | 1    | 59'-1"  | 2034   |
| B2  | 8   | #4   | STR  | 29'-5"  | 157    |
| B3  | 6   | #5   | STR  | 56'-5"  | 353    |
| B4  | 14  | #4   | STR  | 4'-2"   | 39     |
| B5  | 4   | #4   | STR  | 8'-3"   | 22     |
| B6  | 16  | #4   | STR  | 3'-0"   | 32     |
| H1  | 21  | #5   | 2    | 12'-6"  | 274    |
| H2  | 21  | #5   | 2    | 12'-9"  | 279    |
| H3  | 22  | #5   | 3    | 13'-10" | 317    |
| H4  | 22  | #5   | 3    | 13'-7"  | 312    |
| K1  | 52  | #4   | STR  | 3'-9"   | 130    |
| S1  | 48  | #5   | 4    | 12'-6"  | 626    |
| S2  | 48  | #5   | 5    | 5'-3"   | 263    |
| S3  | 28  | #4   | 6    | 8'-1"   | 151    |
| U1  | 18  | #4   | 7    | 7'-4"   | 88     |
| V1  | 74  | #4   | STR  | 6'-0"   | 297    |
| V2  | 34  | #5   | STR  | 10'-11" | 387    |
| V3  | 36  | #5   | STR  | 10'-6"  | 394    |

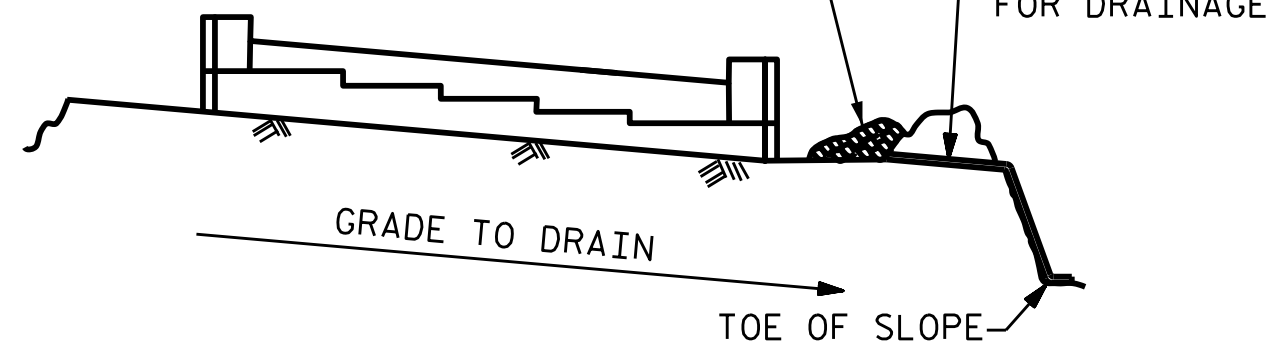
REINFORCING STEEL = 6155 LBS.

CLASS A CONCRETE  
 POUR #1 (CAP, CON. COLLARS, & LOWER PART OF WINGS) = 47.4 C.Y.  
 POUR #2 (UPPER PART OF WINGS) = 8.5 C.Y.  
 TOTAL = 55.9 C.Y.

HP 14 X 73 STEEL PILES  
 No. 7 \_\_\_\_\_ LIN FT. 175

PILE DRIVING EQUIPMENT SETUP FOR  
 HP 14 X 73 STEEL PILES \_\_\_\_\_ NO.: 7

MINIMUM OF 3- ONE CUBIC FOOT BAGS OF #78M STONE. BAGS SHALL BE OF POROUS FABRIC, SECURELY TIED.



BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

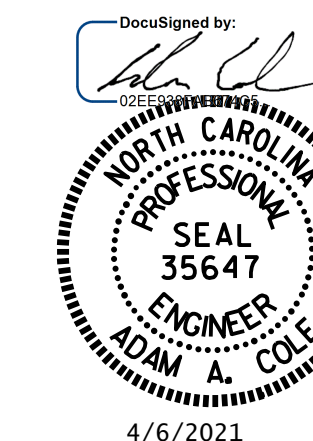
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

DRAWN BY : M. G. SHAIKH DATE : 09/2019  
 CHECKED BY : H. LOCKLEAR DATE : 09/2019  
 DESIGN ENGINEER OF RECORD: H. LOCKLEAR DATE : 08/2019

06-APR-2021 13:00  
 RA:\Structures\Final Plans\400.053.B5813.SMU.E2.0026.120132.dgn  
 dacciole

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED



PROJECT NO. B-5813  
 CABARRUS COUNTY  
 STATION: 21+85.00 -L-  
 SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

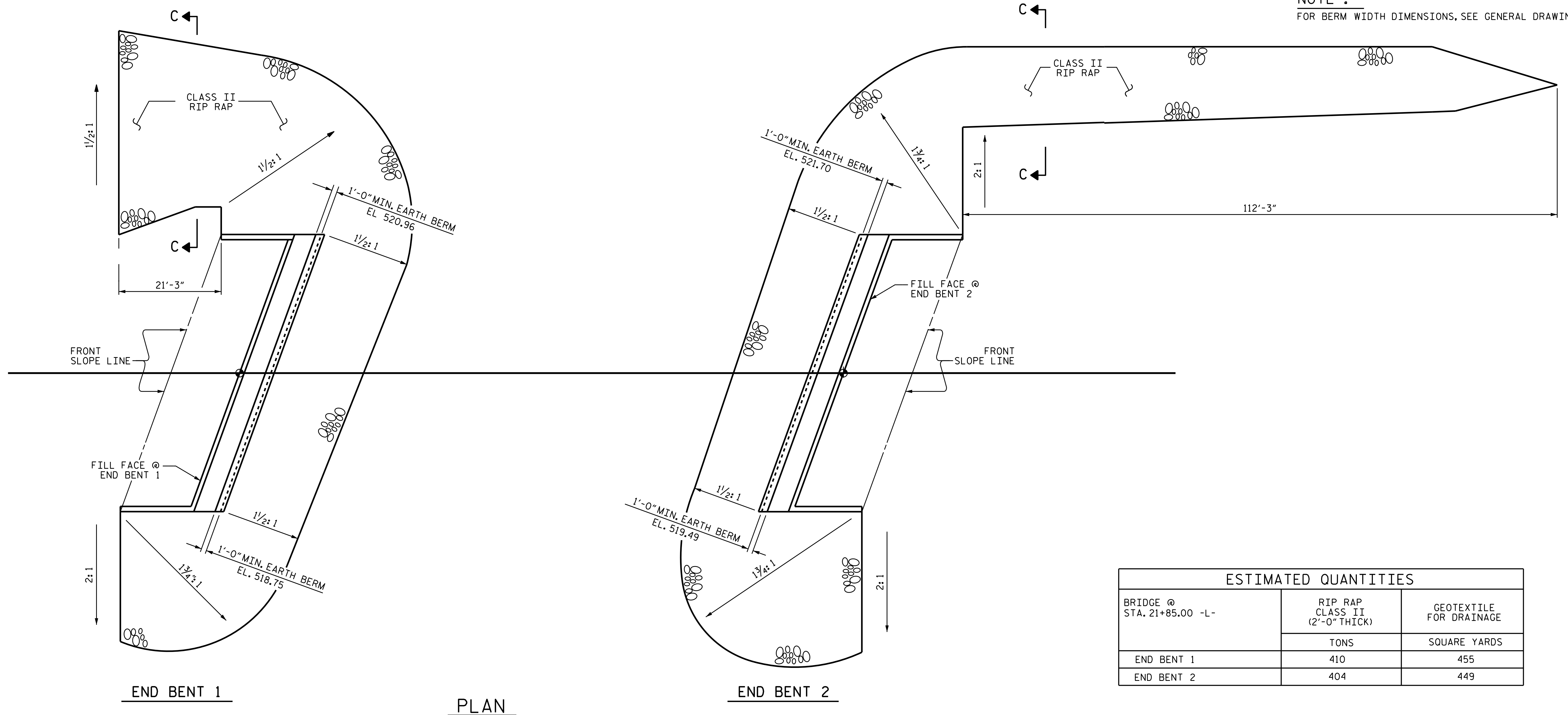
SUBSTRUCTURE  
 INTEGRAL  
 END BENT 2

REVISIONS

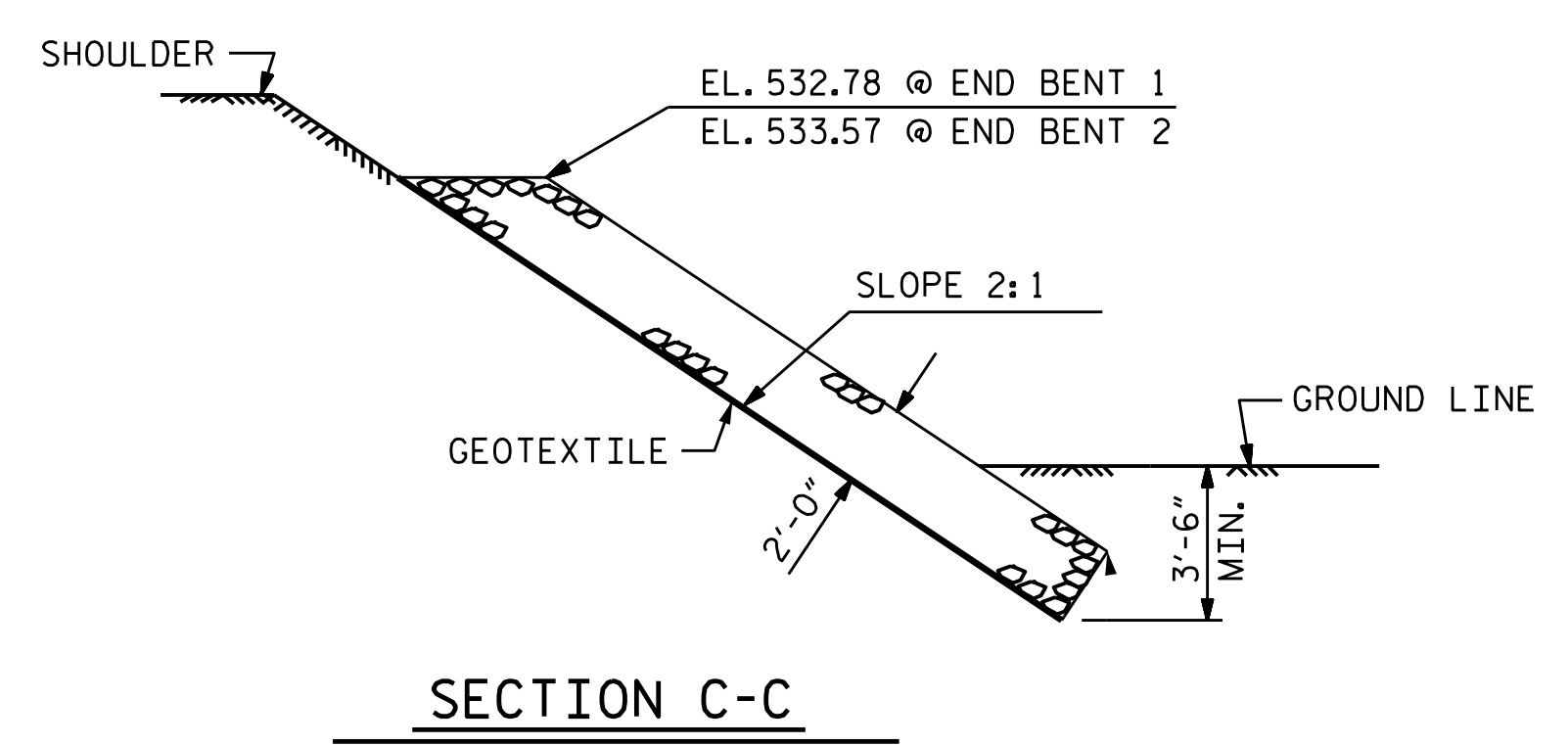
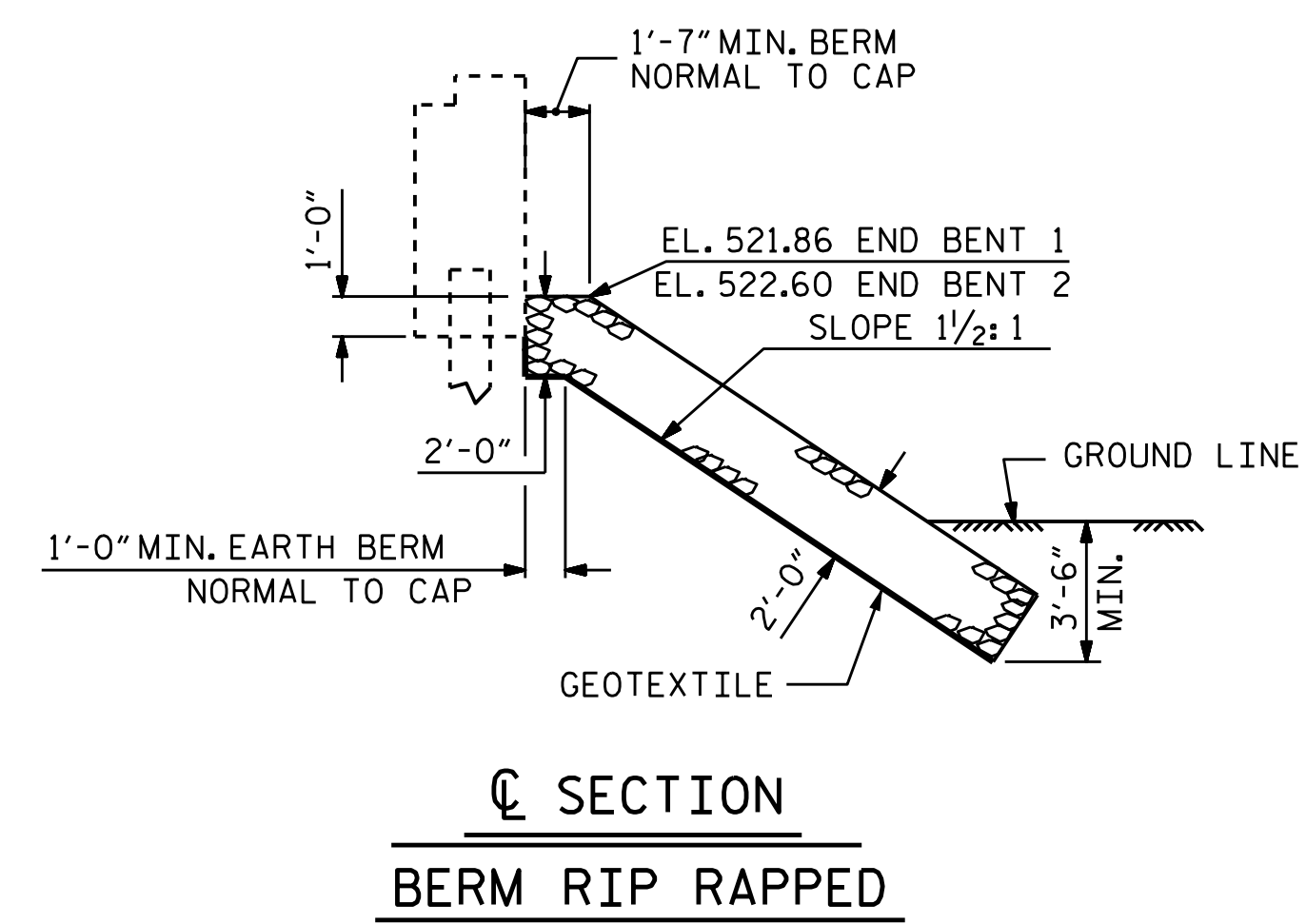
| NO. | BY: | DATE: | NO. | BY: | DATE: |
|-----|-----|-------|-----|-----|-------|
| 1   |     |       | 3   |     |       |
| 2   |     |       | 4   |     |       |

SHEET NO.  
 S-26  
 TOTAL SHEETS  
 29

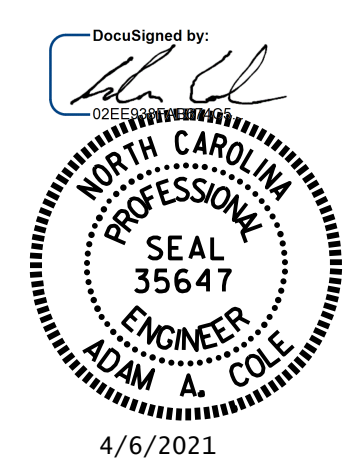
NOTE :  
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



| ESTIMATED QUANTITIES          |                                      |                            |
|-------------------------------|--------------------------------------|----------------------------|
| BRIDGE @<br>STA. 21+85.00 -L- | RIP RAP<br>CLASS II<br>(2'-0" THICK) | GEOTEXTILE<br>FOR DRAINAGE |
|                               | TONS                                 | SQUARE YARDS               |
| END BENT 1                    | 410                                  | 455                        |
| END BENT 2                    | 404                                  | 449                        |



PROJECT NO. B-5813  
CABARRUS COUNTY  
STATION: 21+85.00 -L-



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

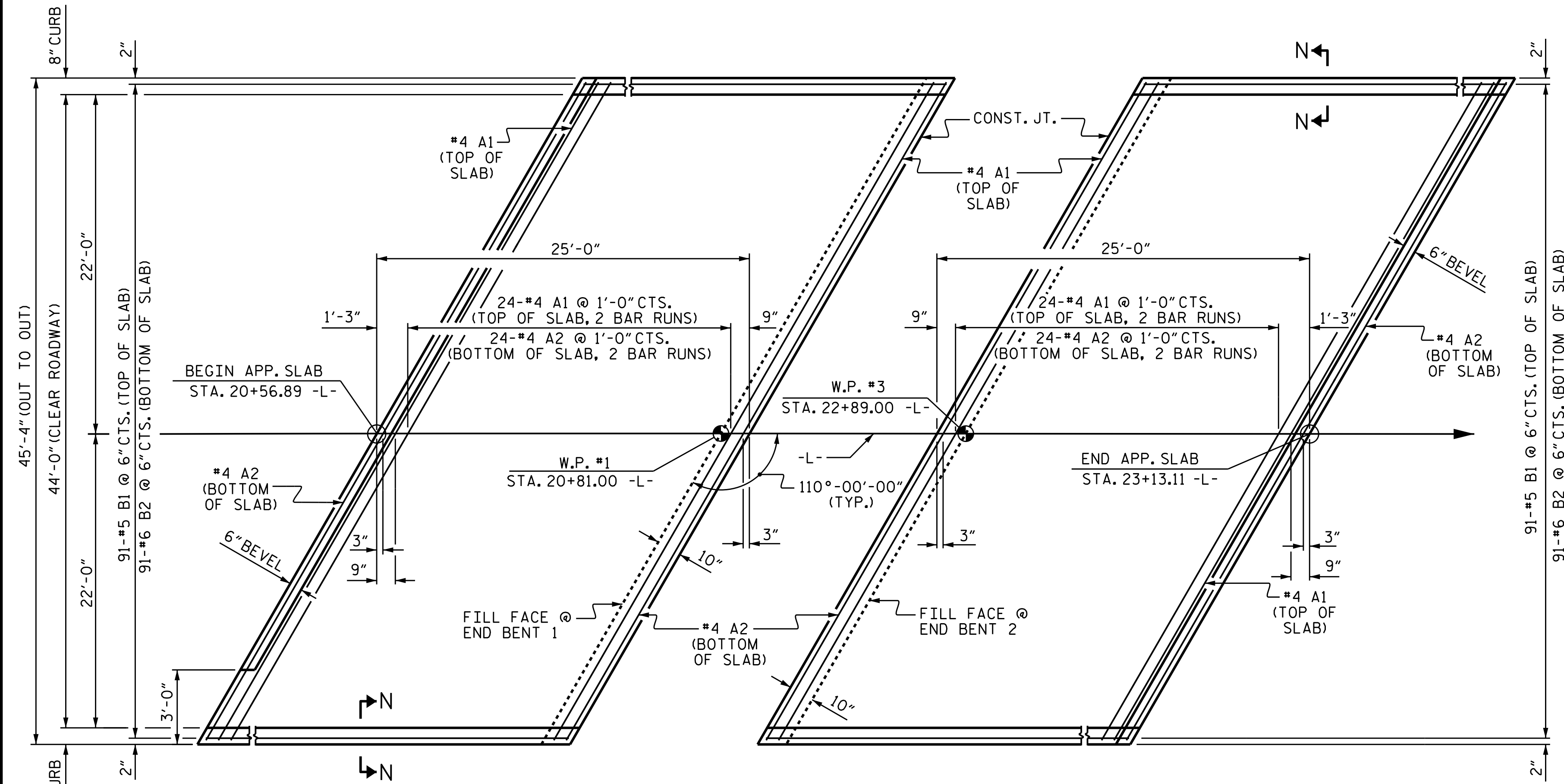
## RIP RAP DETAILS

ASSEMBLED BY : M. G. SHAIKH    DATE : 07/2019  
CHECKED BY : H. LOCKLEAR    DATE : 08/2019  
DRAWN BY : REK 1/84    REV. 10/1/11    MAA/GM  
CHECKED BY : RDU 1/84    REV. 12/21/11    MAA/GM  
REV. 12/17    MAA/THC

| NO. | REVISIONS |       |  | NO. | REVISIONS |       |                 | SHEET NO. |
|-----|-----------|-------|--|-----|-----------|-------|-----------------|-----------|
|     | BY:       | DATE: |  |     | BY:       | DATE: |                 |           |
| 1   |           |       |  | 3   |           |       | S-27            |           |
| 2   |           |       |  | 4   |           |       | TOTAL SHEETS 29 |           |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

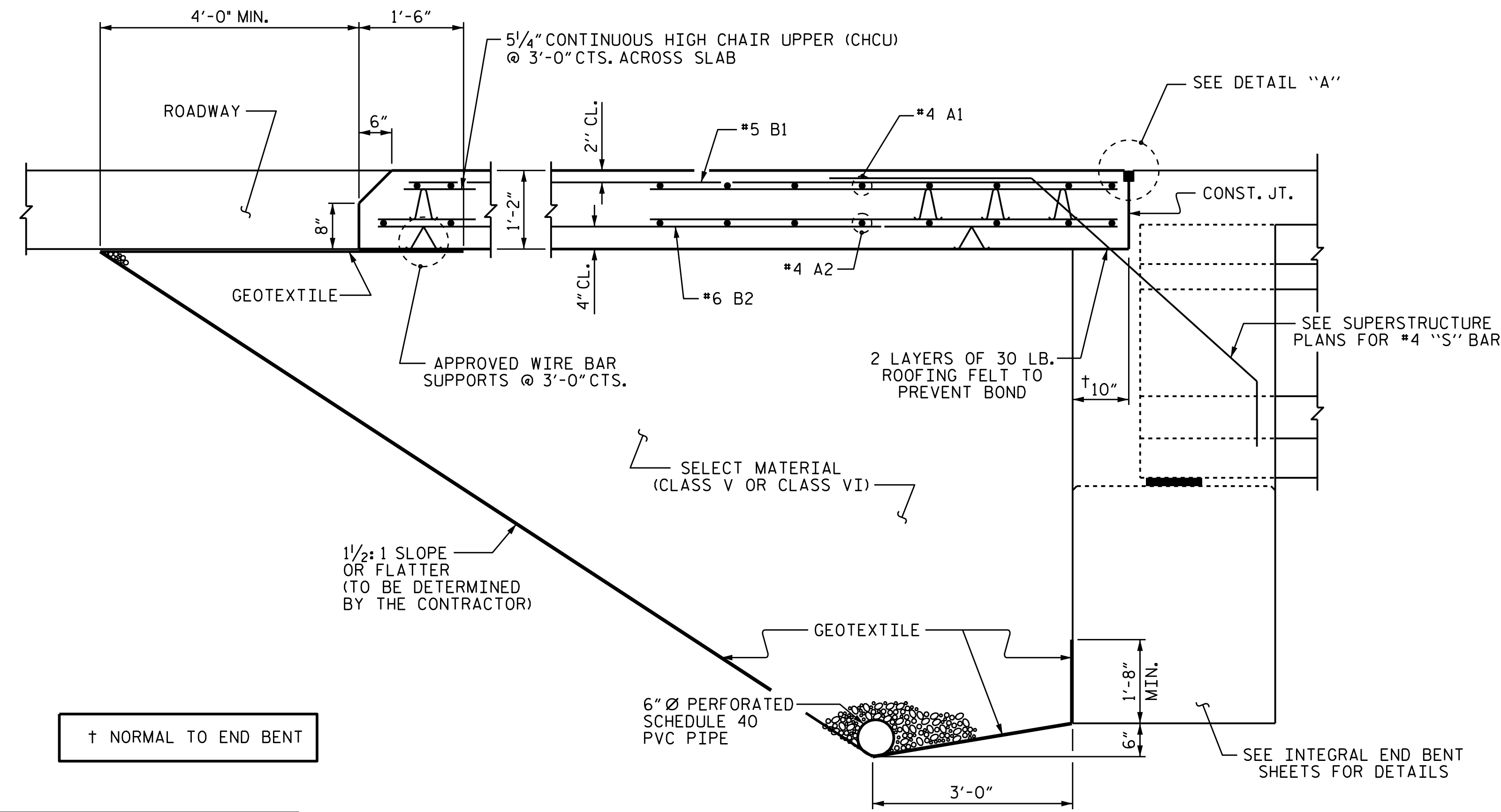




PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)

NOTES

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE I IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

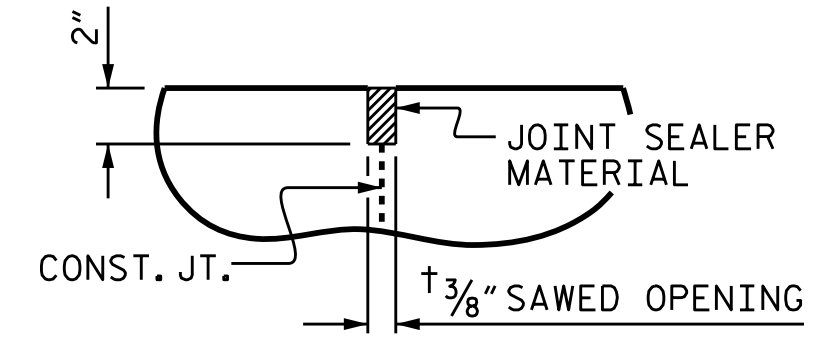
BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

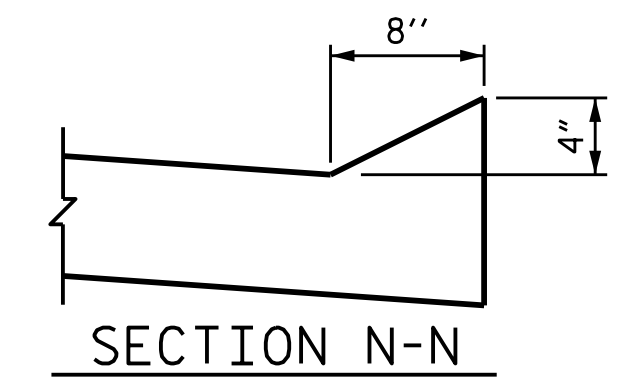
| BAR                              | NO. | SIZE | TYPE | LENGTH     | WEIGHT |
|----------------------------------|-----|------|------|------------|--------|
| * A1                             | 52  | #4   | STR  | 24'-11"    | 866    |
| A2                               | 52  | #4   | STR  | 24'-11"    | 866    |
| * B1                             | 91  | #5   | STR  | 24'-0"     | 2278   |
| B2                               | 91  | #6   | STR  | 24'-6"     | 3349   |
| REINFORCING STEEL                |     |      |      | 4215 LBS.  |        |
| * EPOXY COATED REINFORCING STEEL |     |      |      | 3144 LBS.  |        |
| CLASS AA CONCRETE                |     |      |      | 51.9 C. Y. |        |

SPLICE LENGTHS

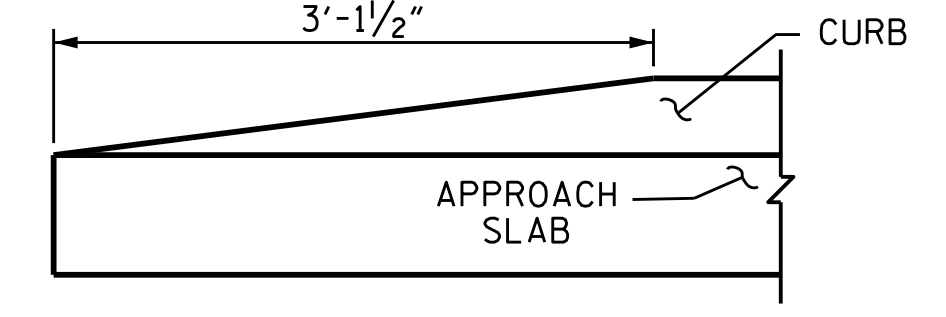
| BAR SIZE | EPOXY COATED | UNCOATED |
|----------|--------------|----------|
| #4       | 1'-11"       | 1'-7"    |
| #5       | 2'-5"        | 2'-0"    |
| #6       | 3'-7"        | 2'-5"    |



DETAIL "A"



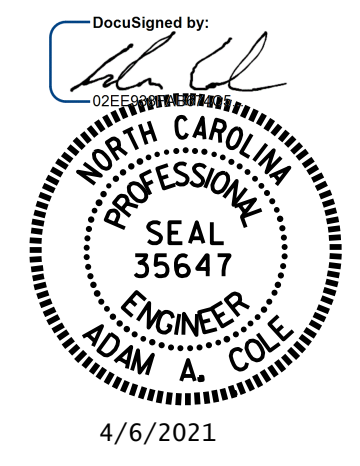
SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

PROJECT NO. B-5813  
 CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 1 OF 2



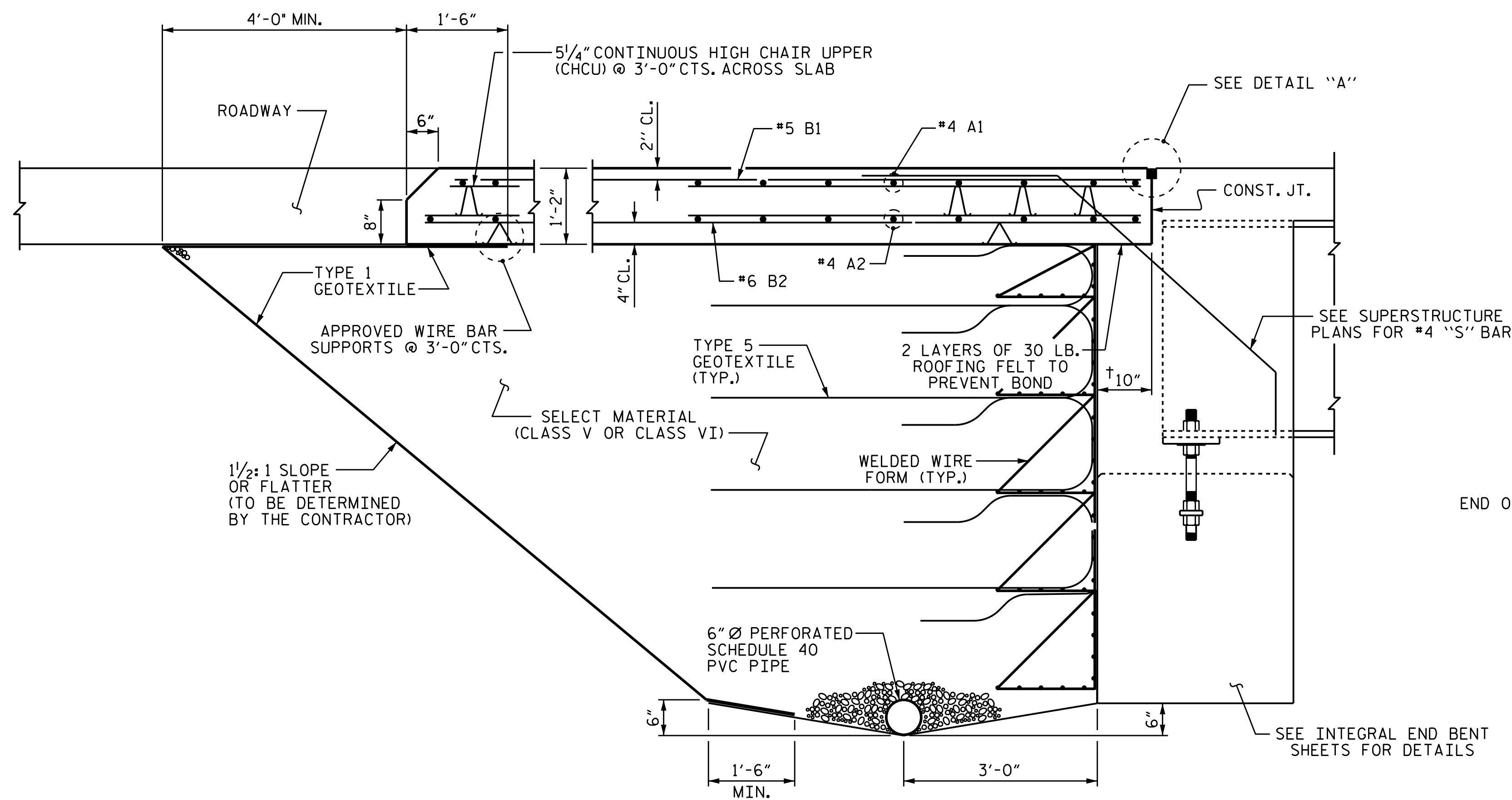
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT WITH FLEXIBLE PAVEMENT

|                             |                      |
|-----------------------------|----------------------|
| ASSEMBLED BY : M. G. SHAIKH | DATE : 07/2019       |
| CHECKED BY : H. LOCKLEAR    | DATE : 08/2019       |
| DRAWN BY : TLA 10/05        | REV. 12/21/11 MAA/GM |
| CHECKED BY : GM 5/06        | REV. 6/13 MAA/GM     |
|                             | REV. 12/17 MAA/THC   |

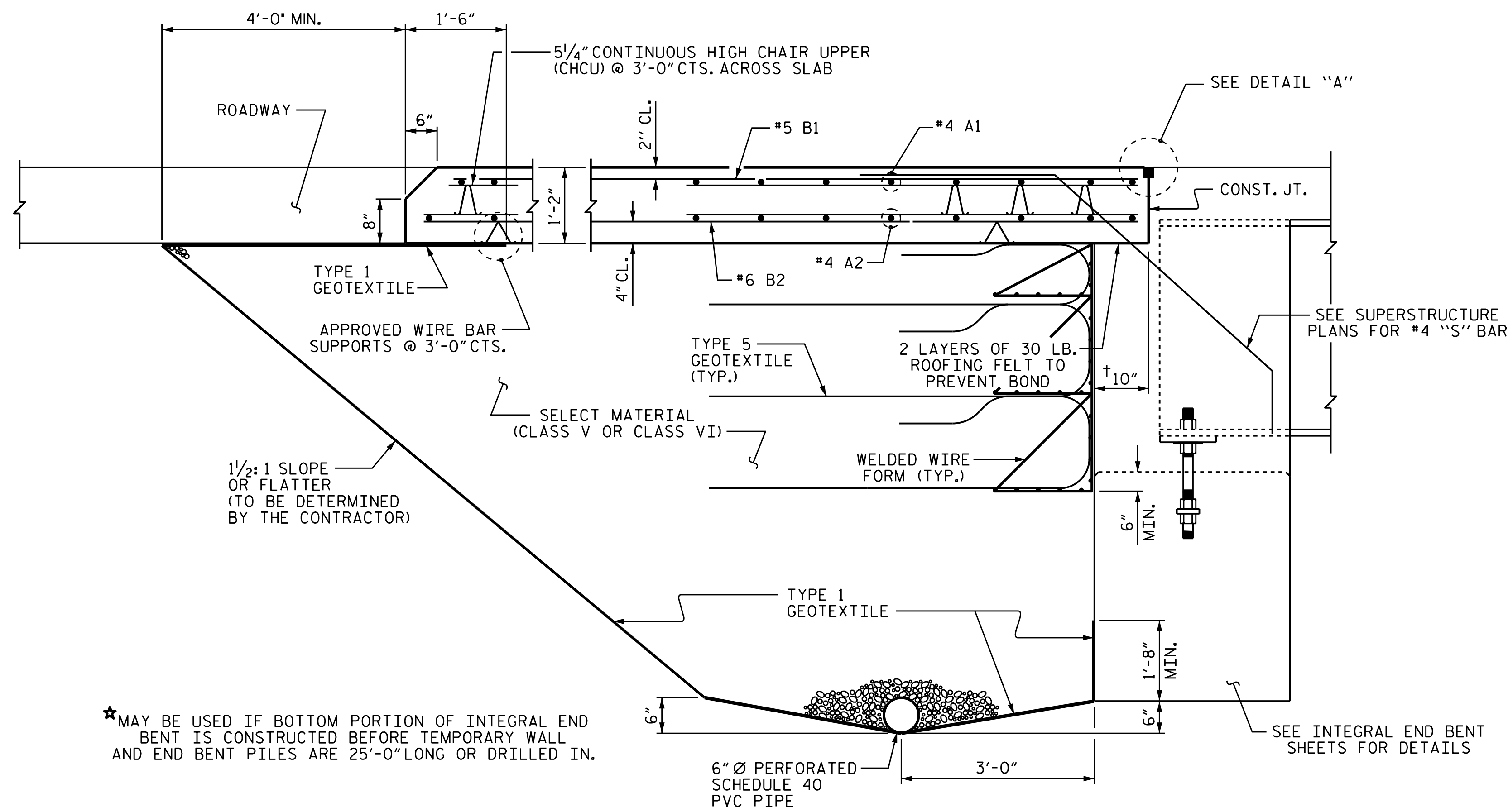
| REVISIONS |     |       |     |     |       | SHEET NO.<br>S-28  |
|-----------|-----|-------|-----|-----|-------|--------------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: |                    |
| 1         |     |       | 3   |     |       | TOTAL SHEETS<br>29 |
| 2         |     |       | 4   |     |       |                    |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

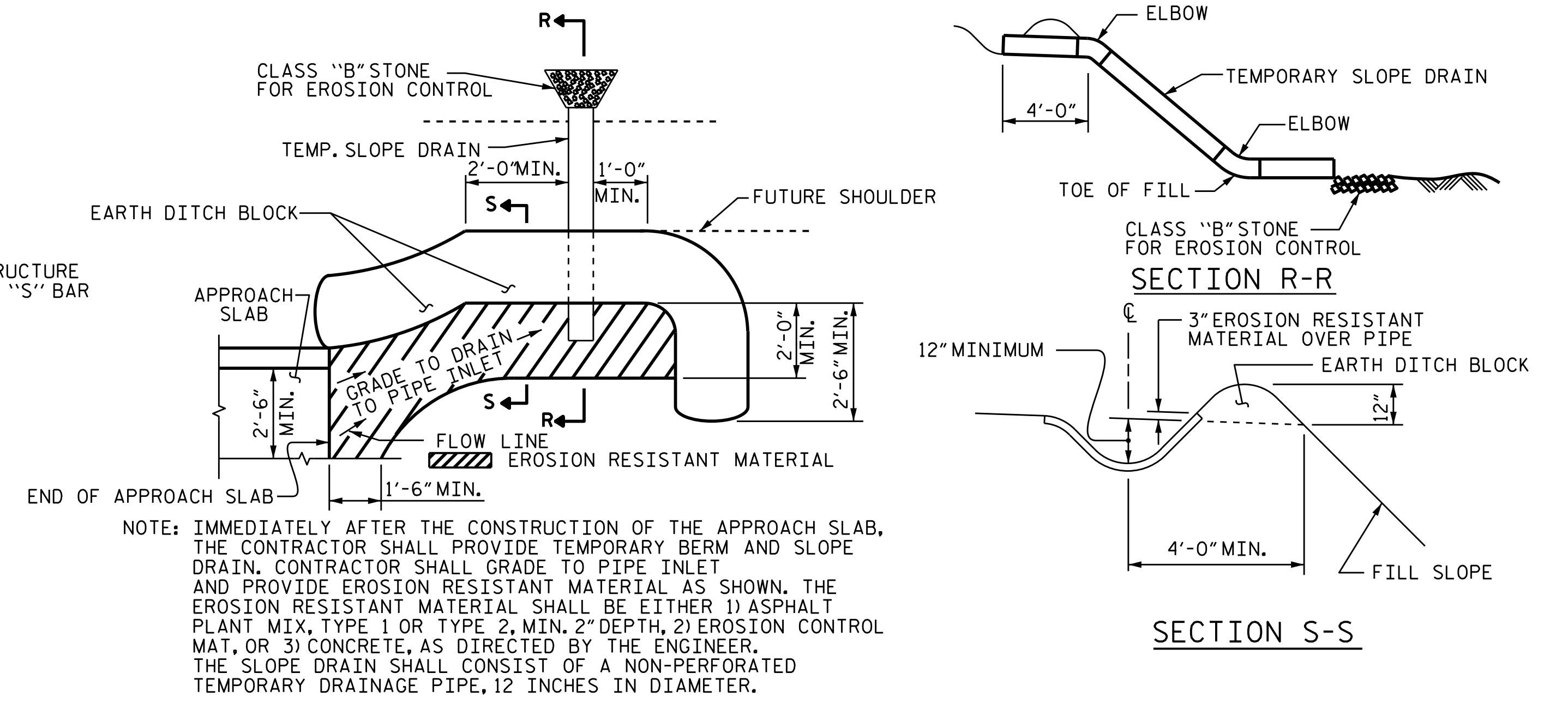




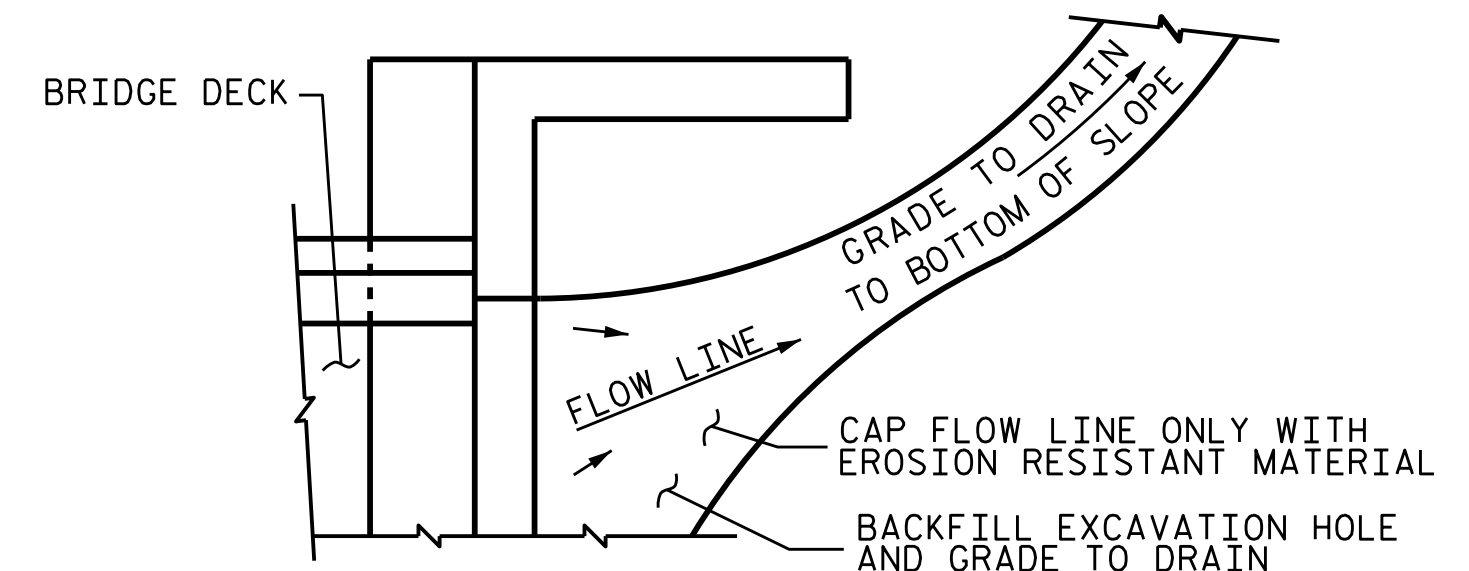
**SECTION THRU SLAB**  
(TYPE A - ALTERNATE APPROACH FILL)



**SECTION THRU SLAB**  
(TYPE A - ALTERNATE APPROACH FILL)



**TEMPORARY BERM AND SLOPE DRAIN DETAILS**  
(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

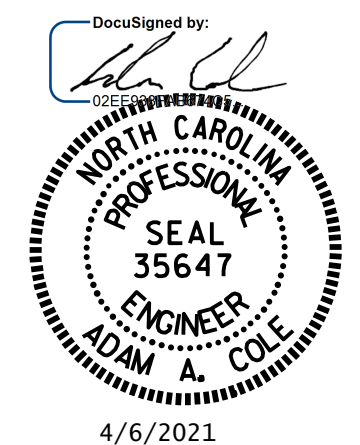
**TEMPORARY DRAINAGE DETAIL**

PROJECT NO. B-5813  
CABARRUS COUNTY  
 STATION: 21+85.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 BRIDGE APPROACH SLAB  
 FOR INTEGRAL ABUTMENT  
 WITH FLEXIBLE PAVEMENT



|                             |                      |
|-----------------------------|----------------------|
| ASSEMBLED BY : M. G. SHAIKH | DATE : 07/2019       |
| CHECKED BY : H. LOCKLEAR    | DATE : 08/2019       |
| DRAWN BY : TLA 10/05        | REV. 12/21/11 MAA/GM |
| CHECKED BY : GM 5/06        | REV. 6/13 MAA/GM     |
|                             | REV. 12/17 MAA/THC   |

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-29         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 29           |



## 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.          |
|   | --    | 27,000 LBS. PER SQ. IN.          |
|   | --    | 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  $\frac{3}{16}$ " 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

JANUARY, 1990

STD. NO. SN