

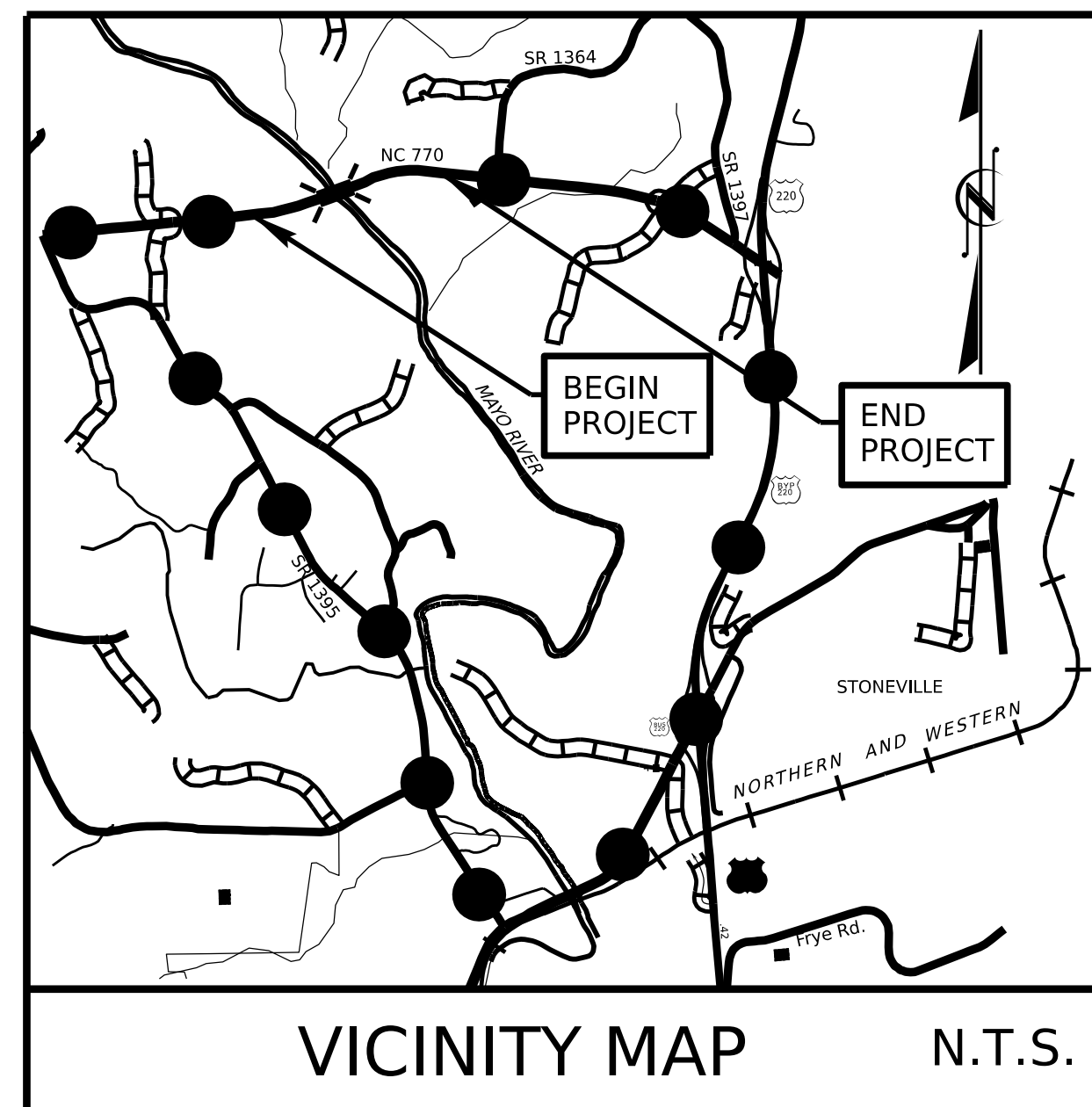
# **OPENX SAMPLE PLANSET**

**This sample planset is for demonstrating appearance, sheet layout, and plan preparation only. The design content is illustrative and not intended for design or construction use.**

**Refer to applicable Manuals, Standards, and Guidelines for actual design requirements. This sample is not a substitute for compliance with engineering standards.**

**TIP PROJECT: BR-0093**

**CONTRACT: C204929**



DETOUR ROUTE ●—●—●

STATE OF NORTH CAROLINA

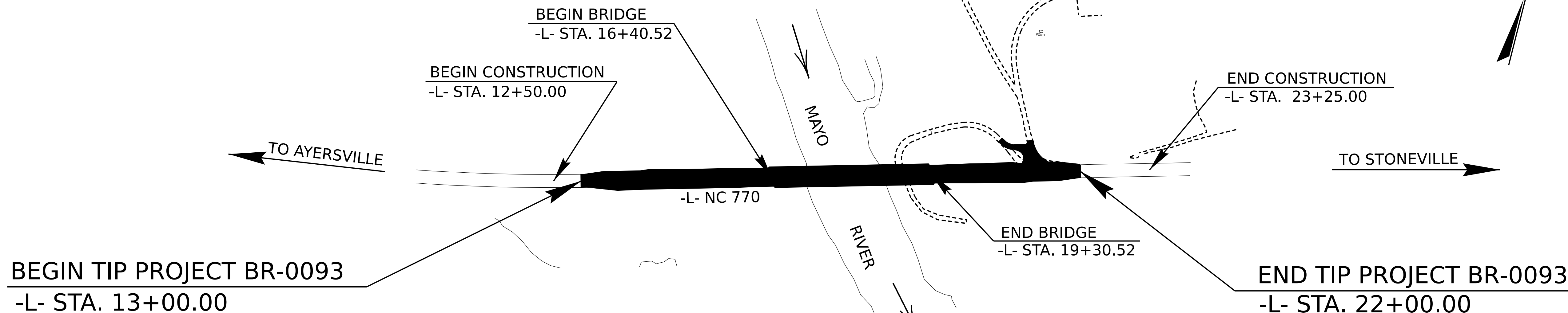
DIVISION OF HIGHWAYS

# ROCKINGHAM COUNTY

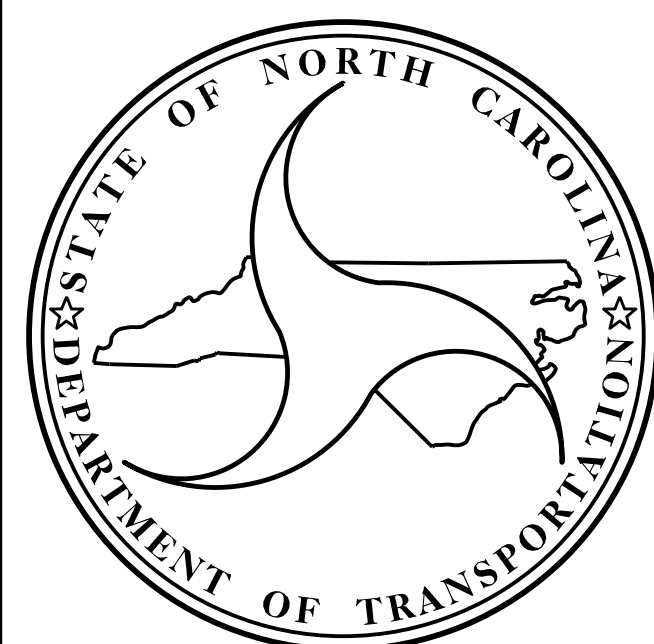
**LOCATION: BRIDGE #780035 ON NC 770 OVER MAYO RIVER**

**TYPE OF WORK: GRADING, PAVING, DRAINAGE, AND STRUCTURE**

| STATE           | STATE PROJECT REFERENCE NO. | SHEET NO.   | TOTAL SHEETS |
|-----------------|-----------------------------|-------------|--------------|
| N.C.            | BR-0093                     |             |              |
| STATE PROJ. NO. | P.A. PROJ. NO.              | DESCRIPTION |              |
| 67093.1.1       | N/A                         | P.E.        |              |
| 67093.2.1       | N/A                         | UTIL /RW    |              |
| 67093.3.1       | N/A                         | CONST.      |              |
|                 |                             |             |              |
|                 |                             |             |              |



## STRUCTURES



**DESIGN DATA**

ADT (2024) = 2,315  
 ADT (2045) = 2,800  
 K = 9 %  
 D = 65 %  
 T = 10 % \*  
 V = 60 MPH  
 \* (TTST 4 %, DUAL 6 %)  
 FUNC CLASS = MAJOR COLLECTOR  
 REGIONAL TIER

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT BR-0093 = 0.115 MILES  
 LENGTH STRUCTURE TIP PROJECT BR-0093 = 0.055 MILES  
 TOTAL LENGTH TIP PROJECT BR-0093 = 0.170 MILES

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

2024 STANDARD SPECIFICATIONS

LETTING DATE :  
 JUNE 18, 2024

KRISTY W. ALFORD, PE  
 PROJECT ENGINEER

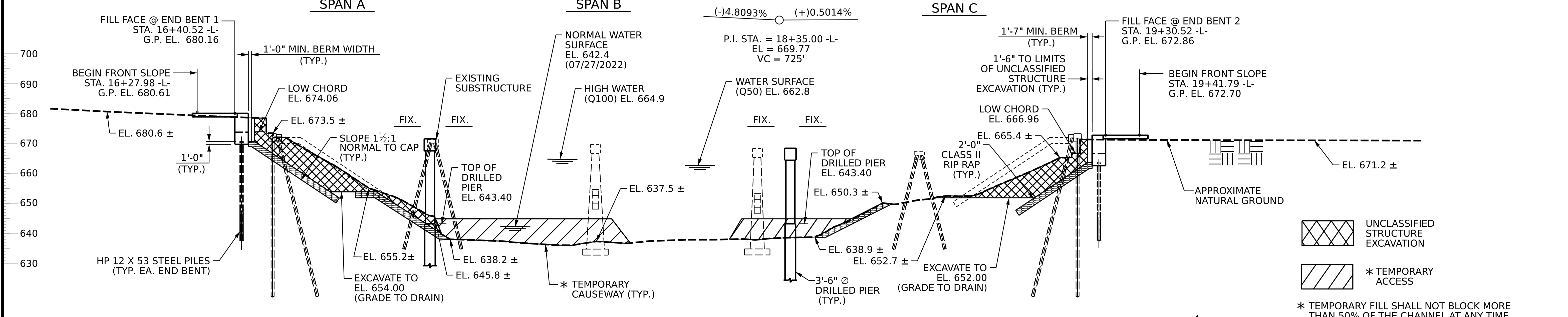
FRANCESCA LEA, PE  
 PROJECT DESIGN ENGINEER

16+00.00      16+50.00      17+00.00      17+50.00      18+00.00      18+50.00      19+00.00      19+50.00

**GRADE DATA**

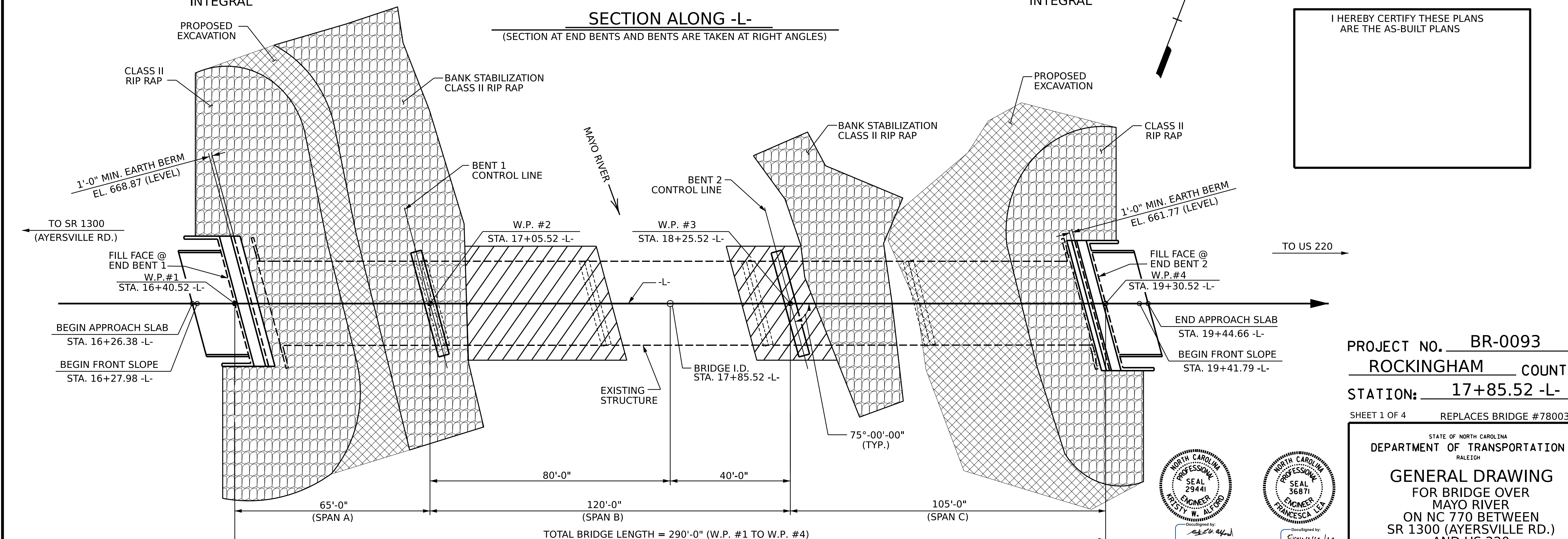
(-)4.8093%      (+)0.5014%

P.I. STA. = 18+35.00 -L-  
EL. = 669.77  
VC = 725'



**SECTION ALONG -L-**

(SECTION AT END BENTS AND BENTS ARE TAKEN AT RIGHT ANGLES)

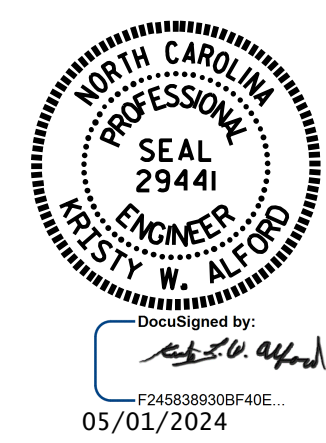


I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 1 OF 4 REPLACES BRIDGE #780035

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER  
 MAYO RIVER  
 ON NC 770 BETWEEN  
 SR 1300 (AYERSVILLE RD.)  
 AND US 220



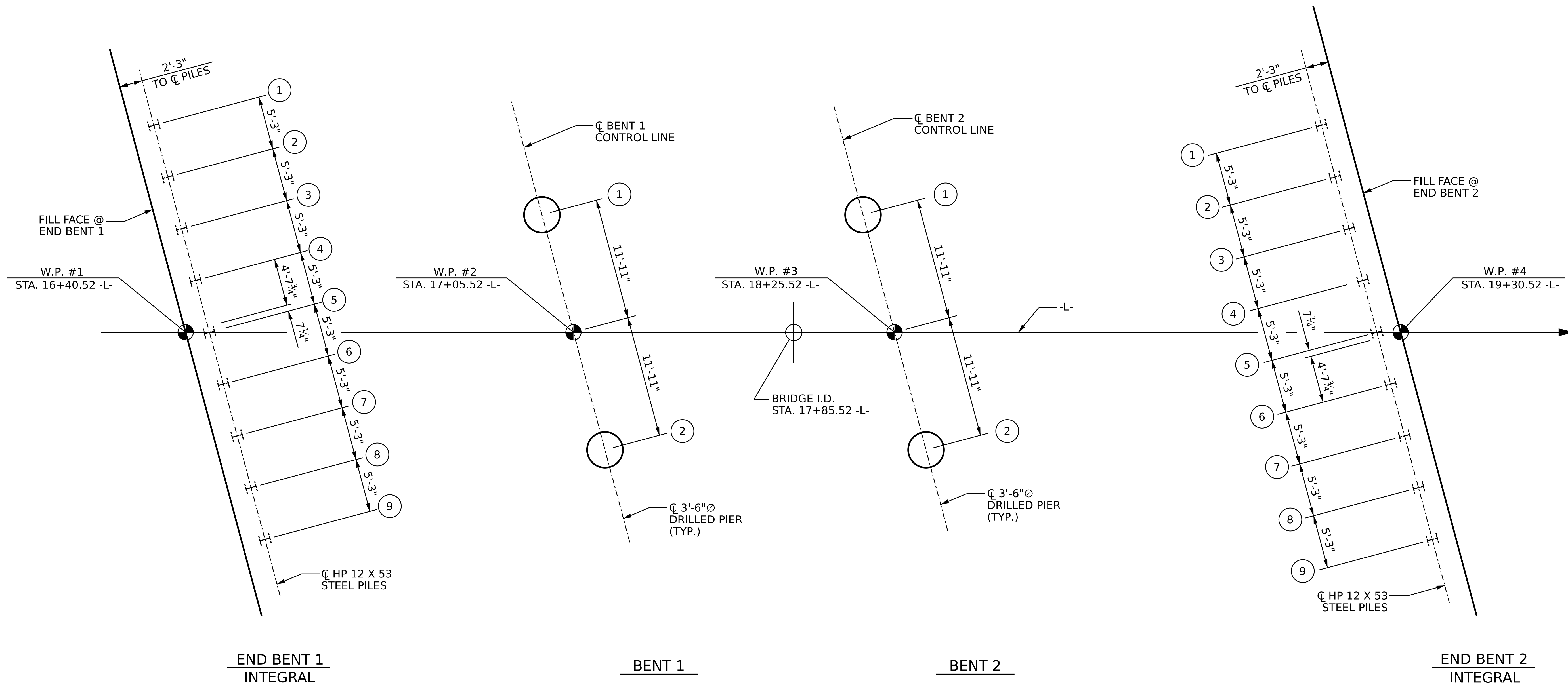
DRAWN BY : E. BAYISSA / Q.T. NGUYEN DATE : 11/2023  
 CHECKED BY : Z. MALIK DATE : 01/2024  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 05/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

TOTAL SHEETS: 36

4/25/2024  
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 fileo



**FOUNDATION LAYOUT**

DIMENSIONS LOCATING PILES AND DRILLED PIERS ARE SHOWN TO THE CENTERLINE OF PILES AND DRILLED PIERS

**NOTES**

- FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- DO NOT DEWATER DRILLED PIER EXCAVATIONS AT BENT NO. 1 AND BENT NO. 2. CLEAN THE BOTTOM OF EXCAVATIONS WITH A SUBMERSIBLE PUMP OR AN AIRLIFT. WET PLACEMENT OF CONCRETE IS REQUIRED.
- FOR PILES, SEE PILES PROVISION AND SECTION 450 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 2 OF 4



DocuSigned by:  
 Francesca Lea  
 8790AD96950584EF...  
 05/01/2024

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 FOR BRIDGE OVER  
 MAYO RIVER  
 ON NC 770 BETWEEN  
 SR 1300 (AYERSVILLE RD.)  
 AND US 220

DRAWN BY : Q. T. NGUYEN DATE : 11/2023  
 CHECKED BY : Z. MALIK DATE : 01/2024  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 05/2023

2/28/2024  
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 ttnguyen1

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-02         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 36           |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

**SUMMARY OF PILE INFORMATION/INSTALLATION**

(Blank entries indicate item is not applicable to structure)

| End Bent/<br>Bent No,<br>Pile(s) ##<br>(e.g., "Bent 1,<br>Piles 1-5") | Factored<br>Resistance<br>per Pile<br>TONS | Pile Cut-Off<br>(Top of Pile)<br>Elevation<br>FT | Estimated<br>Pile Lenth<br>per Pile<br>FT | Scour<br>Critical<br>Elevation<br>FT | Driven Piles  |   |   | Predrilling for Piles*                      |   |   | Drilled-In Piles   |  |   |
|---|--|--|---|--------------------------------------|---|---|---|---|---|---|--|--|---|
|   |  |  |   |                                      | Min Pile<br>Tip (Tip<br>No Higher<br>Than) Elev<br>FT | Required<br>Driving<br>Resistance<br>(RDR)** per Pile<br>TONS | Total<br>Pile<br>Redrives<br>Quantity<br>EACH | Predrilling<br>Length<br>per Pile<br>Lin FT | Predrilling<br>Elevation<br>(Elev Not To<br>Predrill Below)<br>FT | Maximum<br>Predrilling<br>Dia<br>INCHES | Pile Exc<br>Excavation<br>(Bottom of<br>Hole) Elev<br>FT | Pile Exc<br>Not In<br>Soil<br>per Pile<br>Lin FT | Pile Exc<br>In Soil<br>per Pile<br>Lin FT |
| End Bent 1, Piles 1-9   | 85   | 671.87   | 35  |                                      |   | 145   |   |   |   |   |  |  |   |
| End Bent 2, Piles 1-9   | 110  | 664.77   | 35  |                                      |   | 185   |   |   |   |   |  |  |   |
|   |  |  |   |                                      |   |   | 9   |   |   |   |  |  |   |

\*Predrilling for Piles is required for end bents/bents with a predrilling length and at the Contractor's option for end bents/bents with predrilling information but no predrilling length.

\*\* RDR =  $\frac{\text{Factored Resistance} + \text{Factored Downdrag Load} + \text{Factored Dead Load}}{\text{Dynamic Resistance Factor}} + \frac{\text{Nominal Scour Resistance}}{\text{Scour Resistance Factor}} + \text{Nominal Downdrag Resistance}$

**PILE DESIGN INFORMATION**

(Blank entries indicate item is not applicable to structure)

| End Bent/<br>Bent No,<br>Pile(s) ##<br>(e.g., "Bent 1,<br>Piles 1-5") | Factored<br>Axial<br>Load<br>per Pile<br>TONS | Factored<br>Downdrag<br>Load<br>per Pile<br>TONS | Factored<br>Dead<br>Load*<br>per Pile<br>TONS | Dynamic<br>Resistance<br>Factor | Nominal<br>Downdrag<br>Resistance<br>per Pile<br>TONS | Nominal<br>Scour Resistance<br>per Pile<br>TONS | Scour<br>Resistance<br>Factor<br>(Default = 1.00) |
|---|---|--|---|---------------------------------|---|---|---|
| End Bent 1, Piles 1-9   | 85  |  |   | 0.6                             |   |   | 1.00  |
| End Bent 2, Piles 1-9   | 110   |  |   | 0.6                             |   |   | 1.00  |

\*Factored Dead Load is factored weight of pile above the ground line.

**SUMMARY OF DRILLED PIER INFORMATION/INSTALLATION**

(Blank entries indicate item is not applicable to structure)

| End Bent/<br>Bent No,<br>Pier(s) ##<br>(e.g., "Bent 1,<br>Piers 1-3") | Factored<br>Resistance<br>per Pier<br>TONS | Minimum<br>Pier Tip<br>(Tip No<br>Higher Than)<br>Elevation<br>FT | Required Tip<br>Resistance<br>per Pier<br>TSF | Scour<br>Critical<br>Elevation<br>FT | Minimum<br>Drilled Pier<br>Penetration Into<br>Rock per Pier<br>Lin FT | Drilled<br>Pier<br>Length<br>per Pier<br>Lin FT | Drilled<br>Pier<br>Length<br>Not In Soil<br>per Pier<br>Lin FT | Drilled<br>Pier<br>Length<br>In Soil<br>per Pier<br>Lin FT | Permanent<br>Steel<br>Casing<br>Required?<br>YES or<br>MAYBE | Permanent Steel<br>Casing Tip Elevation<br>(Elev Not To Extend<br>Casing Below)<br>FT | Permanent Steel<br>Casing Length*<br>per Pier<br>Lin FT |
|---|--|---|---|--------------------------------------|--|---|--|--|--|---|---|
| Bent 1, Piers 1-2   | 635  | 620   | 150   | 633                                  |  | 14.0  | 9.4  | YES  | 635  | 8.4   |   |
| Bent 2, Piers 1-2   | 685  | 619   | 165   | 633                                  |  | 15.1  | 9.3  | YES  | 635  | 8.4   |   |

\*Permanent Steel Casing Length equals the difference between the ground line or top of drilled pier elevation, whichever is higher, and the permanent casing tip elevation.

**SUMMARY OF DYNAMIC PILE TESTING/PILE ORDER LENGTHS**

(Blank entries indicate item is not applicable to structure)

| End Bent/<br>Bent No  | Dynamic Pile Testing                                    |  |  | Pile Order Lengths      |  |
|-----------------------|---|--|--|-------------------------|--|
|                       | Dynamic Pile<br>Testing<br>Required?<br>YES or<br>MAYBE | Dynamic Pile<br>Testing<br>Test Pile<br>Length<br>FT | Total<br>Dynamic Pile<br>Testing<br>Quantity<br>EACH | End Bent/<br>Bent No(s) | Pile Order<br>Length<br>Basis*<br>EST or Dynamic<br>Pile Testing |
| End Bent 1, Piles 1-9 | MAYBE   | 40   | 1  |                         |  |
| End Bent 2, Piles 1-9 | MAYBE   | 40   |  |                         |  |

\*EST = Pile order lengths from estimated pile lengths. For groups of end bents/bents with pile order lengths based on dynamic pile testing, the first end bent/bent no. listed for each group is the representative end bent/bent with dynamic pile testing.

**SUMMARY OF DRILLED PIER TESTING**

(Blank entries indicate item is not applicable to structure)

| End Bent/<br>Bent No,<br>Pier(s) ##<br>(e.g., "Bent 1,<br>Piers 1-3") | Standard<br>Penetration<br>Test<br>(SPT)<br>Required?<br>YES or<br>MAYBE | Crosshole<br>Sonic<br>Logging<br>(CSL)<br>Required?* | Total<br>CSL Tube<br>Length<br>(For All<br>Tubes)<br>per Pier<br>Lin FT | Shaft<br>Inspection<br>Device<br>(SID)<br>Required?<br>YES or<br>MAYBE | Pile<br>Integrity<br>Test<br>(PIT)<br>Required?<br>MAYBE |
|---|--|--|---|--|--|
| Bent 1, Piers 1-2   | MAYBE  | MAYBE  | 100   | MAYBE  |  |
| Bent 2, Piers 1-2   | MAYBE  | MAYBE  | 104   | MAYBE  |  |
| <b>TOTAL QTY:</b>   | 2  | 2  | 408   | 2  |  |

\*CSL Tubes are required if CSL Testing is or may be required. The number of CSL Tubes per drilled pier is equal to one tube per foot of design pier diameter with at least 4 tubes per pier. The length of each CSL Tube is equal to the drilled pier length plus 1.5 ft.

**NOTES:**

- The Pile and Drilled Pier Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Jacob Wessell, P.E., NC PE 030395) on 8-7-2023.
- Total Pile Driving Equipment Setup quantity (not shown in Pile Foundation Tables) equals the number of driven piles, i.e., the number of piles with a Required Driving Resistance.
- The Engineer will determine the need for SPTs, CSL Testing, and SID Inspections when these items may be required.

PROJECT NO. BR-0093

ROCKINGHAM COUNTY

STATION: 17+85.52 -L-

SHEET 3 OF 4



DocuSigned by:  
Francesca Lea  
05/01/2024

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**PILE AND DRILLED PIER  
FOUNDATION TABLES**

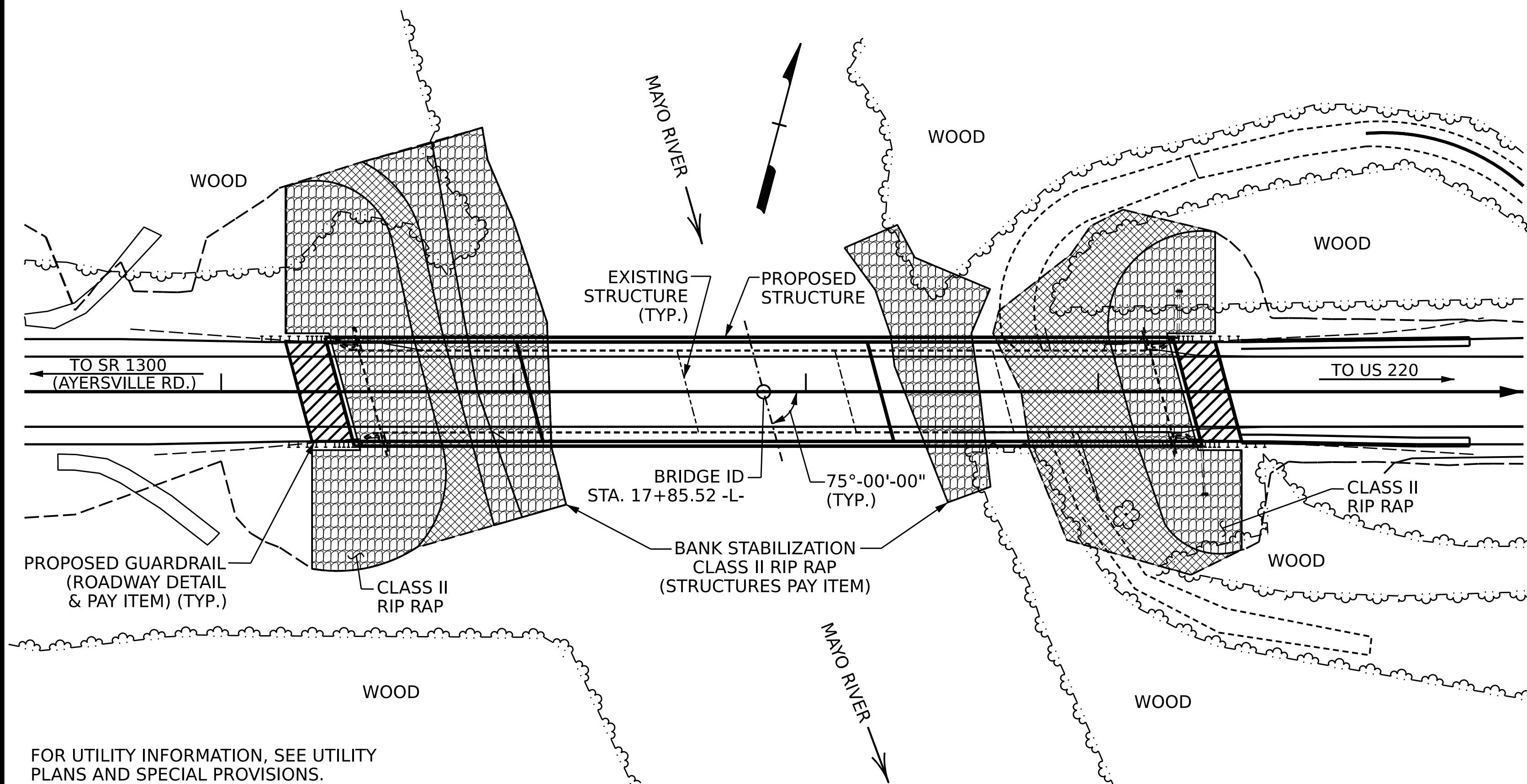
REVISIONS

| NO. | BY: | DATE: | NO. | BY: | DATE: | SHEET NO.       |
|-----|-----|-------|-----|-----|-------|-----------------|
| 1   |     |       | 3   |     |       | S-03            |
| 2   |     |       | 4   |     |       | TOTAL SHEETS 36 |

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

DRAWN BY : Q. T. NGUYEN DATE : 03/2024  
CHECKED BY : F. LEA DATE : 03/2024

BM #1: STA. 9+93 -L-, 82' LT (RAILROAD SPIKE IN 24" POPLAR), EL. 721.47'



LOCATION SKETCH

NOTES

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
- THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
- FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
- 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.
- REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 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 17+85.52 -L-.
- NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.
- 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.
- THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 79' LEFT AND 54' RIGHT OF CENTERLINE ROADWAY AT END BENT #1 AND 63' EACH SIDE OF CENTERLINE ROADWAY AT END BENT #2 AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

- THE EXISTING STRUCTURE CONSISTING OF 1 @ 54.5', 3 @ 54', AND 1 @ 54.5' SPANS, CLEAR ROADWAY WIDTH OF 28' WITH 4 LINES OF 45" PRECAST PRESTRESSED CONCRETE GIRDERS @ 8' CTS., END BENTS AND INTERIOR BENTS 1 & 4 ON RC CAP ON PPC PILES, INTERIOR BENTS 2 & 3 ON RC CAP AND POSTS AND LOCATED AT PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT.
- 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.
- 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.
- THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES."
- THE SCOUR CRITICAL ELEVATION FOR BENTS NO. 1 AND 2 IS ELEVATION 633 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
- THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.
- FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.
- TEMPORARY CAUSEWAY SHALL NOT BE PERMITTED TO BLOCK THE CONFLUENCE OF ANY JURISDICTIONAL TRIBUTARY STREAM WITH MAYO RIVER.
- TEMPORARY FILL SHALL NOT BLOCK MORE THAN 50 PERCENT OF THE CHANNEL AT ANY TIME.

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

|                | CONSTRUCTION MAINTENANCE, AND REMOVAL OF TEMP ACCESS STA. 17+85.52 -L- | REMOVAL OF EXISTING STRUCTURE AT STA. 17+85.52 -L- | ASBESTOS ASSESSEMENT | 3'-6" Ø DRILLED PIERS IN SOIL | 3'-6" Ø DRILLED PIERS NOT IN SOIL | PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIERS | SID INSPECTIONS | SPT TESTING | CSL TESTING | UNCLASSIFIED STRUCTURE EXCAVATION AT STA. 17+85.52 -L- | REINFORCED CONCRETE DECK SLAB | GROOVING BRIDGE FLOORS | CLASS A CONCRETE |
|----------------|--|--|----------------------|-------------------------------|-----------------------------------|--|-----------------|-------------|-------------|--|-------------------------------|------------------------|------------------|
|                | LUMP SUM   | LUMP SUM   | LUMP SUM             | LIN. FT.                      | LIN. FT.                          | LIN. FT.   | EA.             | EA.         | EA.         | LUMP SUM   | SQ. FT.                       | SQ. FT.                | CU. YDS.         |
| SUPERSTRUCTURE |  |  |                      |                               |                                   |  |                 |             |             |  | 10,738                        | 9,835                  |                  |
| END BENT 1     |  |  |                      |                               |                                   |  |                 |             |             |  |                               |                        | 41.0             |
| BENT 1         |  |  |                      | 18.8                          | 28.0                              | 16.8   |                 |             |             |  |                               |                        | 39.1             |
| BENT 2         |  |  |                      | 18.6                          | 30.2                              | 16.8   |                 |             |             |  |                               |                        | 37.2             |
| END BENT 2     |  |  |                      |                               |                                   |  |                 |             |             |  |                               |                        | 40.0             |
| TOTAL          | LUMP SUM   | LUMP SUM   | LUMP SUM             | 37.4                          | 58.2                              | 33.6   | 2               | 2           | 2           | LUMP SUM   | 10,738                        | 9,835                  | 157.3            |

HYDRAULIC DATA

|                             |               |
|-----------------------------|---------------|
| DESIGN DISCHARGE            | = 26,332 CFS  |
| FREQUENCY OF DESIGN FLOOD   | = 50 YRS.     |
| DESIGN HIGH WATER ELEVATION | = 662.8 FT.   |
| DRAINAGE AREA               | = 293 SQ. MI. |
| BASIC DISCHARGE (Q100)      | = 31,689 CFS  |
| BASIC HIGH WATER ELEVATION  | = 664.9 FT.   |

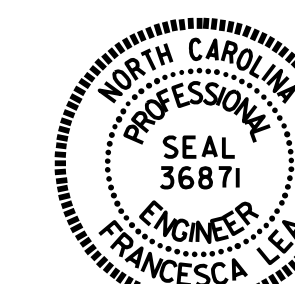
OVERTOPPING FLOOD DATA

|                                |             |
|--------------------------------|-------------|
| OVERTOPPING DISCHARGE          | = N/A CFS   |
| FREQUENCY OF OVERTOPPING FLOOD | = 500+ YRS. |
| OVERTOPPING FLOOD ELEVATION *  | = 671.4 FT  |

\* CL @ SAG STA. 21+29 -L-  
WS ELEVATION TAKEN @ RIVER STATION 45929 (U/S TOE)

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
STATION: 17+85.52 -L-

SHEET 4 OF 4



Designed by  
Francesca Lea  
B79DADB650584EF  
05/01/2024

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
GENERAL DRAWING  
FOR BRIDGE OVER  
MAYO RIVER  
ON NC 770 BETWEEN  
SR 1300 (AYERSVILLE RD.)  
AND US 220

DRAWN BY : Q. T. NGUYEN DATE : 12/2023  
CHECKED BY : F. LEA DATE : 03/2024  
DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 09/2023

4/24/2024  
R:\Structures\Plans\401.007\_BR0093.SMU.GD.S04.780035.dgn  
tnguyen

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

TOTAL SHEETS: 36

LOAD FACTORS:

|                            |             |               |               |
|----------------------------|-------------|---------------|---------------|
| DESIGN LOAD RATING FACTORS | LIMIT STATE | $\gamma_{DC}$ | $\gamma_{DW}$ |
|                            | STRENGTH I  | 1.25          | 1.50          |
|                            | SERVICE III | 1.00          | 1.00          |

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

| LEVEL              | VEHICLE                           | WEIGHT (W)<br>(TONS) | CONTROLLING LOAD RATING<br># | MINIMUM RATING FACTORS (RF) | TONS = W X RF | STRENGTH I LIMIT STATE |                           |               |      |                 |                                     |                           |               |      |                 | SERVICE III LIMIT STATE             |                        |                           |               |      | COMMENT NUMBER |                 |                                     |  |
|--------------------|-----------------------------------|----------------------|------------------------------|-----------------------------|---------------|------------------------|---------------------------|---------------|------|-----------------|-------------------------------------|---------------------------|---------------|------|-----------------|-------------------------------------|------------------------|---------------------------|---------------|------|----------------|-----------------|-------------------------------------|--|
|                    |                                   |                      |                              |                             |               | MOMENT                 |                           |               |      |                 | SHEAR                               |                           |               |      |                 | MOMENT                              |                        |                           |               |      |                |                 |                                     |  |
|                    |                                   |                      |                              |                             |               | LIVELOAD FACTORS (VLL) | 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) | LIVELOAD FACTORS (VLL) | DISTRIBUTION FACTORS (DF) | RATING FACTOR | SPAN |                | GIRDER LOCATION | DISTANCE FROM LEFT END OF SPAN (ft) |  |
| DESIGN LOAD RATING | HL-93(Inventory)                  | N/A                  | 1                            | 1.05                        | --            | 1.75                   | 0.877                     | 1.23          | B    | 1               | 59.13                               | 0.971                     | 1.06          | C    | 3               | 84.83                               | 0.80                   | 0.877                     | 1.05          | B    | 1              | 59.13           |                                     |  |
|                    | HL-93(Operating)                  | N/A                  | --                           | 1.38                        | --            | 1.35                   | 0.877                     | 1.60          | B    | 1               | 59.13                               | 0.971                     | 1.38          | C    | 3               | 84.83                               | N/A                    | --                        | --            | --   | --             | --              |                                     |  |
|                    | HS-20(Inventory)                  | 36.000               | 2                            | 1.40                        | 50.41         | 1.75                   | 0.877                     | 1.79          | B    | 1               | 59.13                               | 0.971                     | 1.40          | C    | 3               | 84.83                               | 0.80                   | 0.877                     | 1.52          | B    | 1              | 59.13           |                                     |  |
|                    | HS-20(Operating)                  | 36.000               | --                           | 1.82                        | 65.35         | 1.35                   | 0.877                     | 2.32          | B    | 1               | 59.13                               | 0.971                     | 1.82          | C    | 3               | 84.83                               | N/A                    | --                        | --            | --   | --             | --              |                                     |  |
| LEGAL LOAD RATING  | SINGLE VEHICLE (SV)               | SNSH                 | 13.500                       | --                          | 3.69          | 49.78                  | 1.40                      | 0.877         | 5.42 | B               | 1                                   | 59.13                     | 0.966         | 4.07 | A               | 2                                   | 54.50                  | 0.80                      | 0.877         | 3.69 | B              | 1               | 59.13                               |  |
|                    |                                   | SNGARBS2             | 20.000                       | --                          | 2.64          | 52.75                  | 1.40                      | 0.877         | 3.88 | B               | 1                                   | 59.13                     | 0.966         | 2.92 | A               | 2                                   | 54.50                  | 0.80                      | 0.877         | 2.64 | B              | 1               | 59.13                               |  |
|                    |                                   | SNAGRIS2             | 22.000                       | --                          | 2.45          | 53.99                  | 1.40                      | 0.877         | 3.61 | B               | 1                                   | 59.13                     | 0.966         | 2.73 | A               | 2                                   | 54.50                  | 0.80                      | 0.877         | 2.45 | B              | 1               | 59.13                               |  |
|                    |                                   | SNCOTTS3             | 27.250                       | --                          | 1.83          | 49.92                  | 1.40                      | 0.877         | 2.69 | B               | 1                                   | 59.13                     | 0.966         | 2.03 | A               | 2                                   | 54.50                  | 0.80                      | 0.877         | 1.83 | B              | 1               | 59.13                               |  |
|                    |                                   | SNAGGRS4             | 34.925                       | --                          | 1.49          | 51.97                  | 1.40                      | 0.877         | 2.19 | B               | 1                                   | 59.13                     | 0.966         | 1.71 | A               | 2                                   | 54.50                  | 0.80                      | 0.877         | 1.49 | B              | 1               | 59.13                               |  |
|                    |                                   | SNS5A                | 35.550                       | --                          | 1.46          | 51.83                  | 1.40                      | 0.877         | 2.14 | B               | 1                                   | 59.13                     | 0.966         | 1.74 | A               | 2                                   | 54.50                  | 0.80                      | 0.877         | 1.46 | B              | 1               | 59.13                               |  |
|                    |                                   | SNS6A                | 39.950                       | --                          | 1.32          | 52.76                  | 1.40                      | 0.877         | 1.94 | B               | 1                                   | 59.13                     | 0.971         | 1.59 | C               | 3                                   | 84.83                  | 0.80                      | 0.877         | 1.32 | B              | 1               | 59.13                               |  |
|                    | SNS7B                             | 42.000               | --                           | 1.26                        | 52.79         | 1.40                   | 0.877                     | 1.85          | B    | 1               | 59.13                               | 0.971                     | 1.55          | C    | 3               | 84.83                               | 0.80                   | 0.877                     | 1.26          | B    | 1              | 59.13           |                                     |  |
|                    | TRUCK TRACTOR SEMI-TRAILER (TTST) | TNAGRIT3             | 33.000                       | --                          | 1.61          | 52.98                  | 1.40                      | 0.877         | 2.36 | B               | 1                                   | 59.13                     | 0.966         | 1.90 | A               | 2                                   | 54.50                  | 0.80                      | 0.877         | 1.61 | B              | 1               | 59.13                               |  |
|                    |                                   | TNT4A                | 33.075                       | --                          | 1.61          | 53.18                  | 1.40                      | 0.877         | 2.36 | B               | 1                                   | 59.13                     | 0.966         | 1.84 | A               | 2                                   | 54.50                  | 0.80                      | 0.877         | 1.61 | B              | 1               | 59.13                               |  |
|                    |                                   | TNT6A                | 41.600                       | --                          | 1.30          | 54.03                  | 1.40                      | 0.877         | 1.91 | B               | 1                                   | 59.13                     | 0.971         | 1.63 | C               | 3                                   | 84.83                  | 0.80                      | 0.877         | 1.30 | B              | 1               | 59.13                               |  |
|                    |                                   | TNT7A                | 42.000                       | --                          | 1.30          | 54.47                  | 1.40                      | 0.877         | 1.91 | B               | 1                                   | 59.13                     | 0.971         | 1.60 | C               | 3                                   | 84.83                  | 0.80                      | 0.877         | 1.30 | B              | 1               | 59.13                               |  |
|                    |                                   | TNT7B                | 42.000                       | --                          | 1.32          | 55.51                  | 1.40                      | 0.877         | 1.94 | B               | 1                                   | 59.13                     | 0.971         | 1.52 | C               | 3                                   | 84.83                  | 0.80                      | 0.877         | 1.32 | B              | 1               | 59.13                               |  |
|                    |                                   | TNAGRIT4             | 43.000                       | --                          | 1.27          | 54.70                  | 1.40                      | 0.877         | 1.87 | B               | 1                                   | 59.13                     | 0.971         | 1.48 | C               | 3                                   | 84.83                  | 0.80                      | 0.877         | 1.27 | B              | 1               | 59.13                               |  |
| TNAGT5A            |                                   | 45.000               | --                           | 1.21                        | 54.29         | 1.40                   | 0.877                     | 1.77          | B    | 1               | 59.13                               | 0.971                     | 1.45          | C    | 3               | 84.83                               | 0.80                   | 0.877                     | 1.21          | B    | 1              | 59.13           |                                     |  |
| TNAGT5B            | 45.000                            | 3                    | 1.20                         | 53.92                       | 1.40          | 0.877                  | 1.76                      | B             | 1    | 59.13           | 0.971                               | 1.41                      | C             | 3    | 84.83           | 0.80                                | 0.877                  | 1.20                      | B             | 1    | 59.13          |                 |                                     |  |
| EV LOAD RATING     | EV2                               | 28.750               | --                           | 1.85                        | 53.24         | 1.30                   | 0.877                     | 2.93          | B    | 1               | 59.13                               | 0.966                     | 2.21          | A    | 2               | 54.50                               | 0.80                   | 0.877                     | 1.85          | B    | 1              | 59.13           |                                     |  |
|                    | EV3                               | 43.000               | 4                            | 1.22                        | 52.61         | 1.30                   | 0.877                     | 1.94          | B    | 1               | 59.13                               | 0.966                     | 1.49          | A    | 2               | 54.50                               | 0.80                   | 0.877                     | 1.22          | B    | 1              | 59.13           |                                     |  |

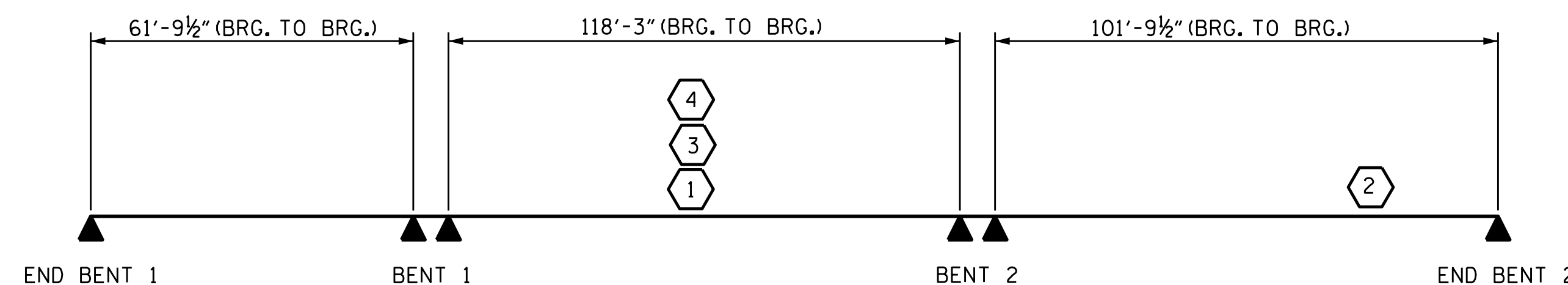
NOTES:

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.

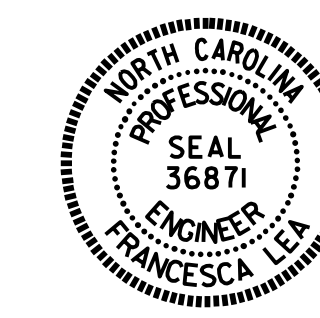
|                               |                                  |
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| #                             | CONTROLLING LOAD RATING          |
| 1                             | DESIGN LOAD RATING (HL-93)       |
| 2                             | DESIGN LOAD RATING (HS-20)       |
| 3                             | LEGAL LOAD RATING **             |
| 4                             | EMERGENCY VEHICLE LOAD RATING ** |
| ** SEE CHART FOR VEHICLE TYPE |                                  |

|                 |                        |
|-----------------|------------------------|
| GIRDER LOCATION |                        |
| 2, 3            | - INTERIOR GIRDER      |
| 1               | - EXTERIOR LEFT GIRDER |



LRFR SUMMARY

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-



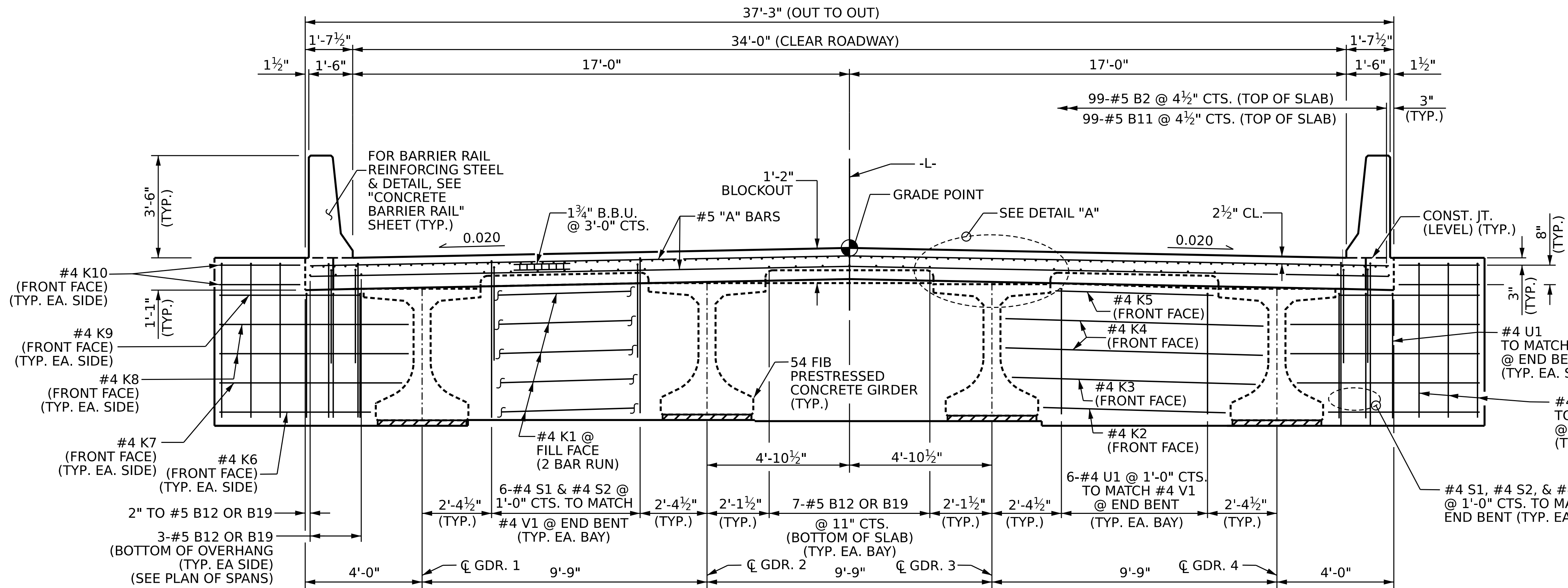
DocuSigned by:  
 Francesca Lea  
 879DADB65084EF  
 05/01/2024

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 LRFR SUMMARY FOR  
 PRESTRESSED  
 CONCRETE GIRDERS  
 (NON-INTERSTATE TRAFFIC)

|                          |                        |
|--------------------------|------------------------|
| ASSEMBLED BY: E. BAYISSA | DATE: 10/2023          |
| CHECKED BY: Z. MALIK     | DATE: 01/2024          |
| DRAWN BY: MAA 1/08       | REV. 11/12/08RR MAA/GM |
| CHECKED BY: GM/DI 2/08   | REV. 10/1/18 MAA/GM    |
|                          | REV. 04/23 BNB/AM      |

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

|           |     |       |     |     |       |              |
|-----------|-----|-------|-----|-----|-------|--------------|
| REVISIONS |     |       |     |     |       | SHEET NO.    |
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-05         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 36           |



**TYPICAL SECTION AT INTEGRAL END BENT**

SHOWING ABUTMENT WALL @ FILL FACE OF END BENTS

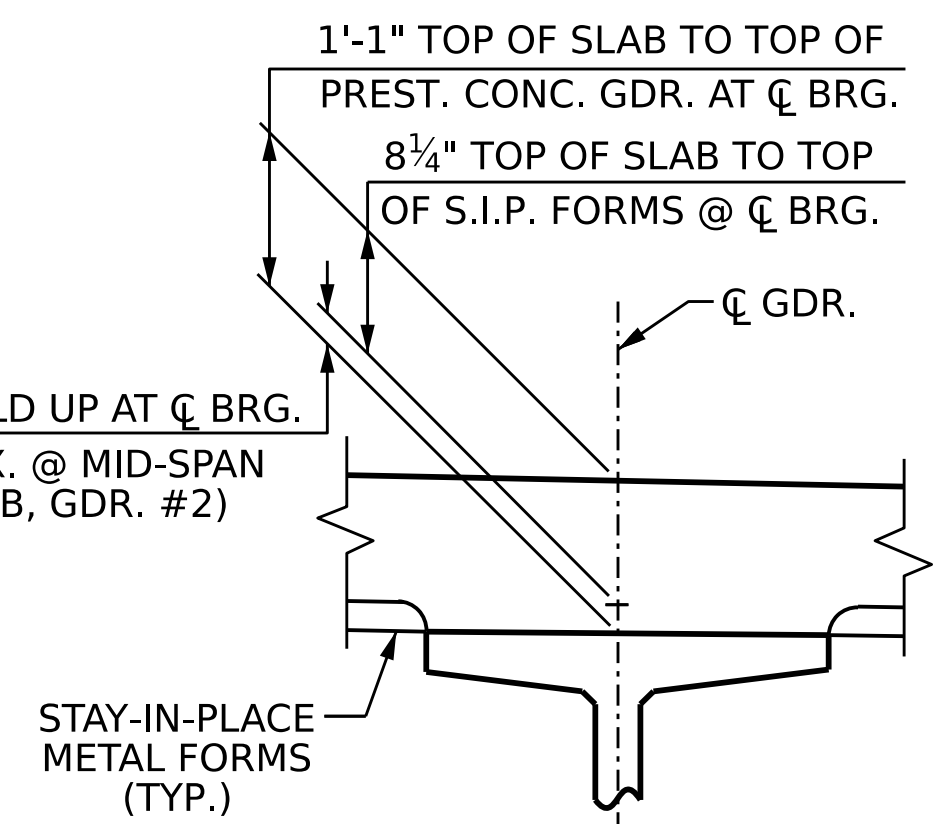
**NOTES**

PROVIDE 1 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.

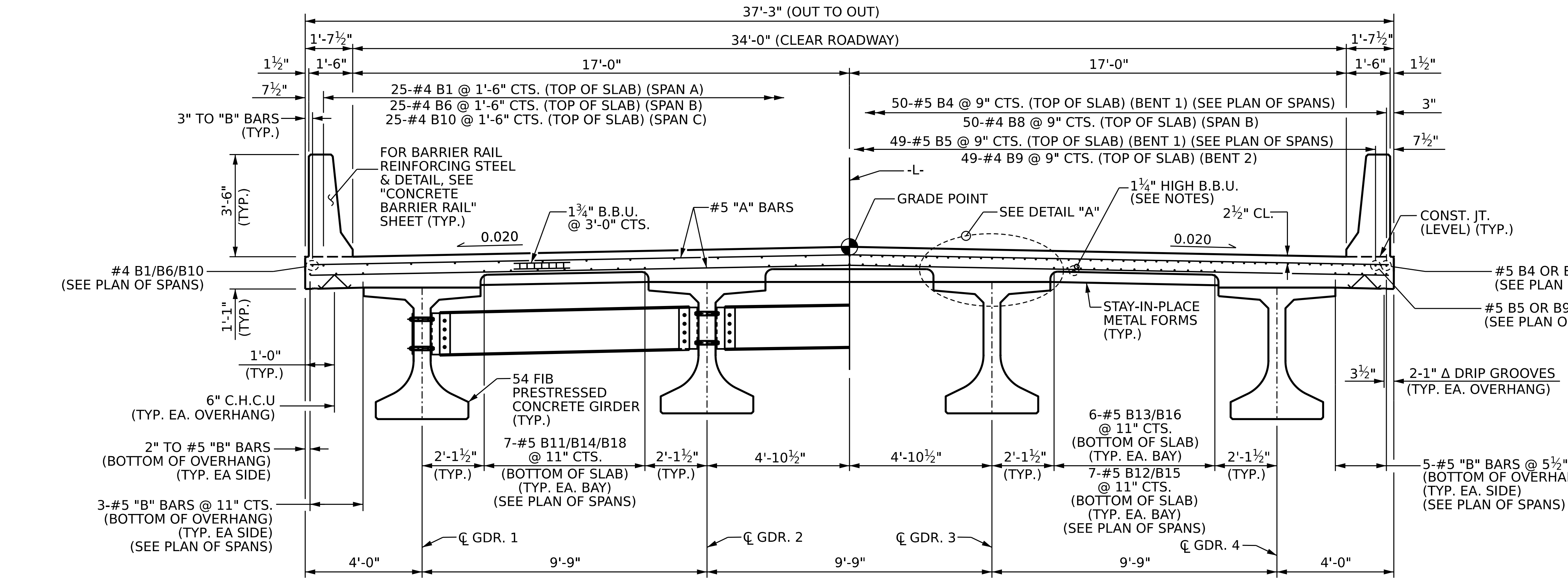
BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

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.



**DETAIL "A"**

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



**PARTIAL TYPICAL SECTION AT INTERMEDIATE DIAPHRAGM**

**PARTIAL TYPICAL SECTION AT LINK SLAB AT BENTS**

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 1 OF 2



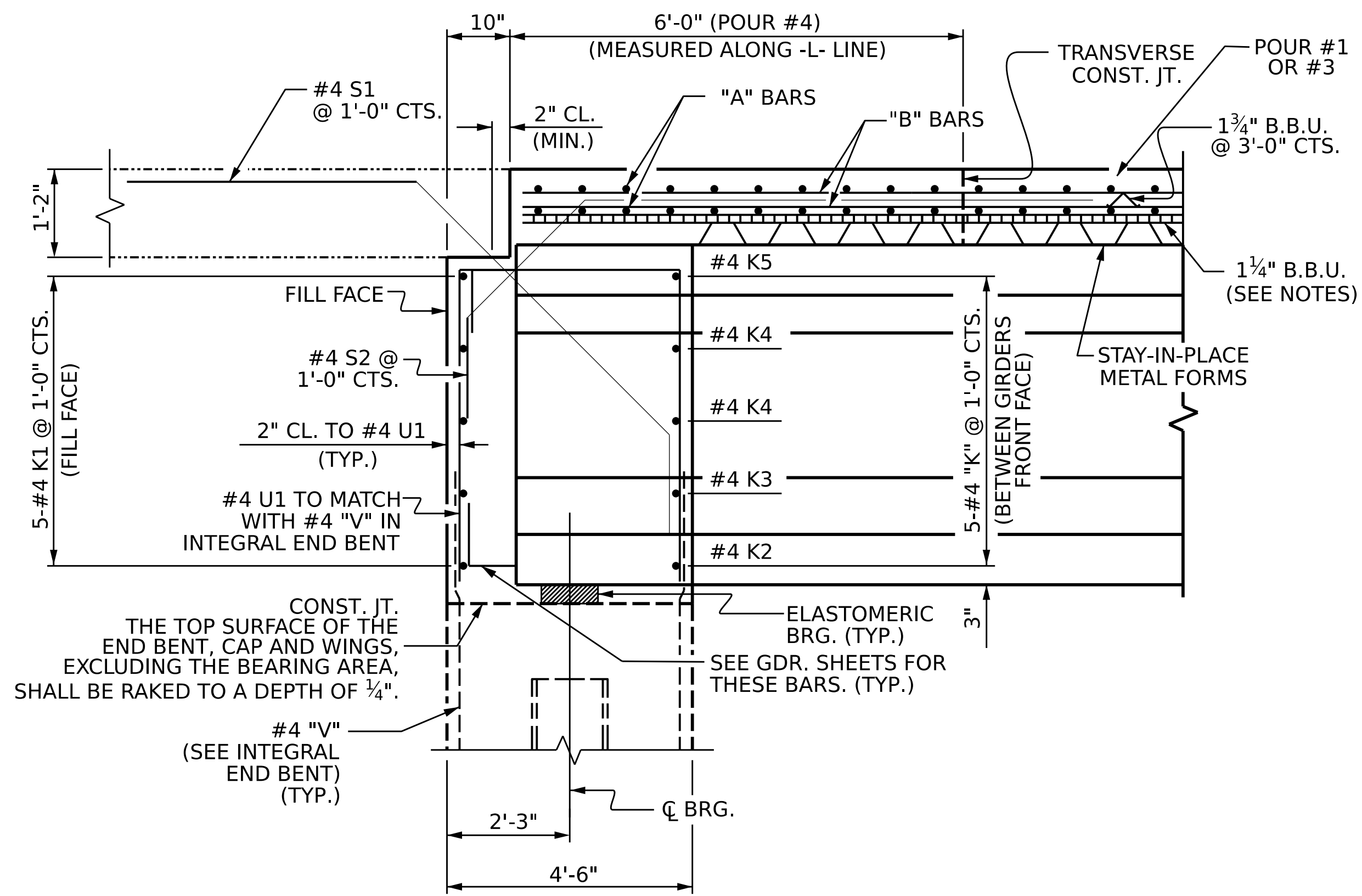
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 TYPICAL SECTION

DRAWN BY : Q. T. NGUYEN DATE : 10/2023  
 CHECKED BY : Z. MALIK DATE : 12/2023  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 09/2023

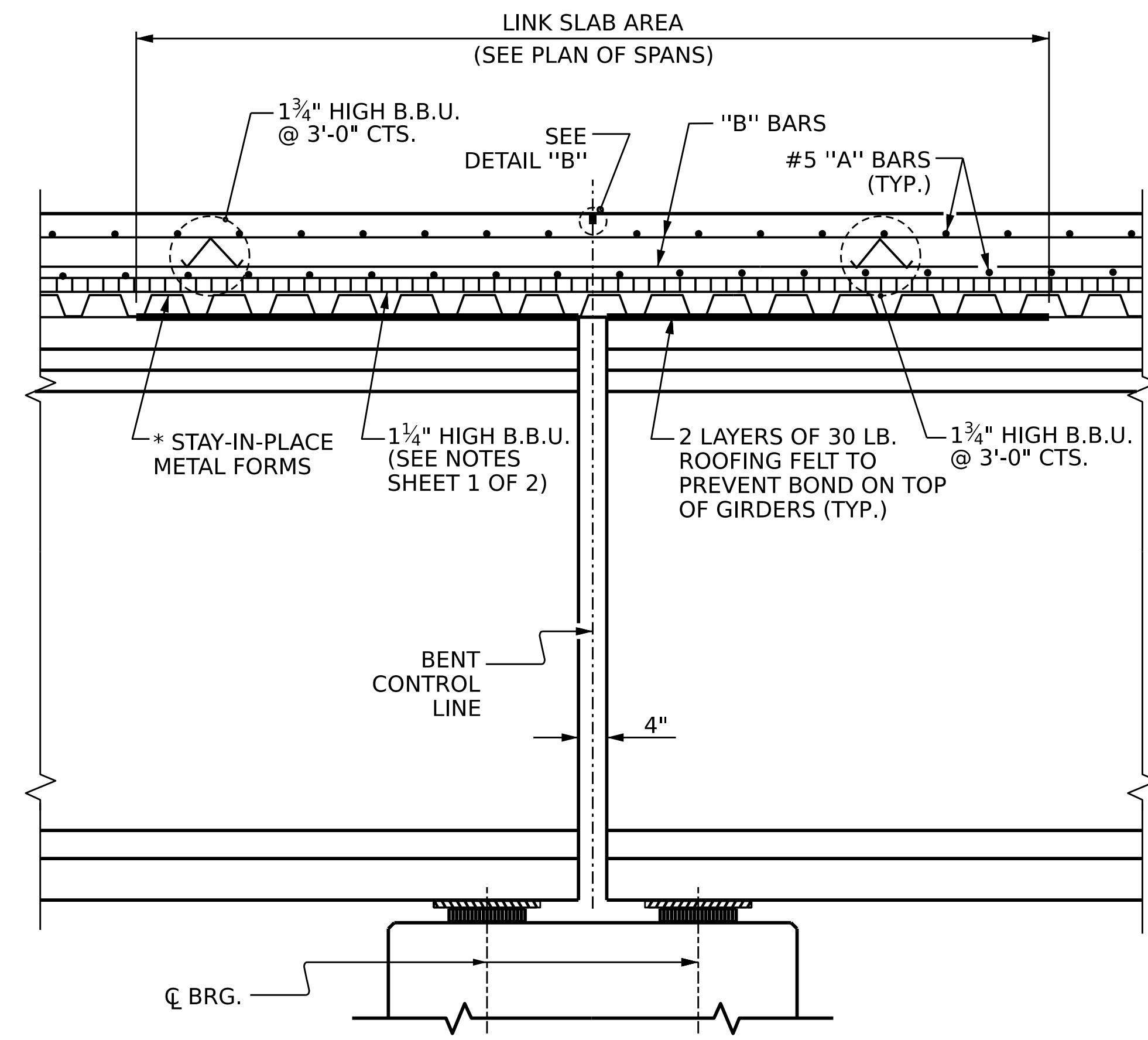
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|-----------|-----|-----------|-----|-----|-------|--------------|
| NO.       | BY: | DATE:     | NO. | BY: | DATE: | TOTAL SHEETS |
| 1         |     |           | 3   |     |       | 36           |
| 2         |     |           | 4   |     |       |              |

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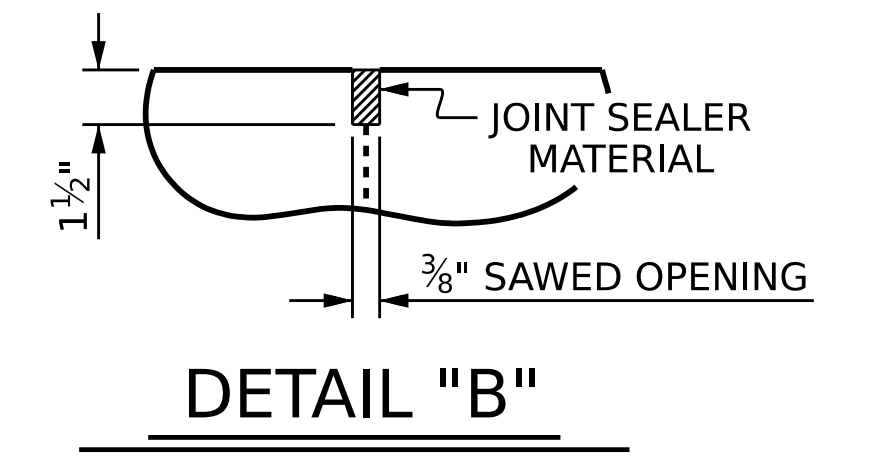


**SECTION AT INTEGRAL END BENT**

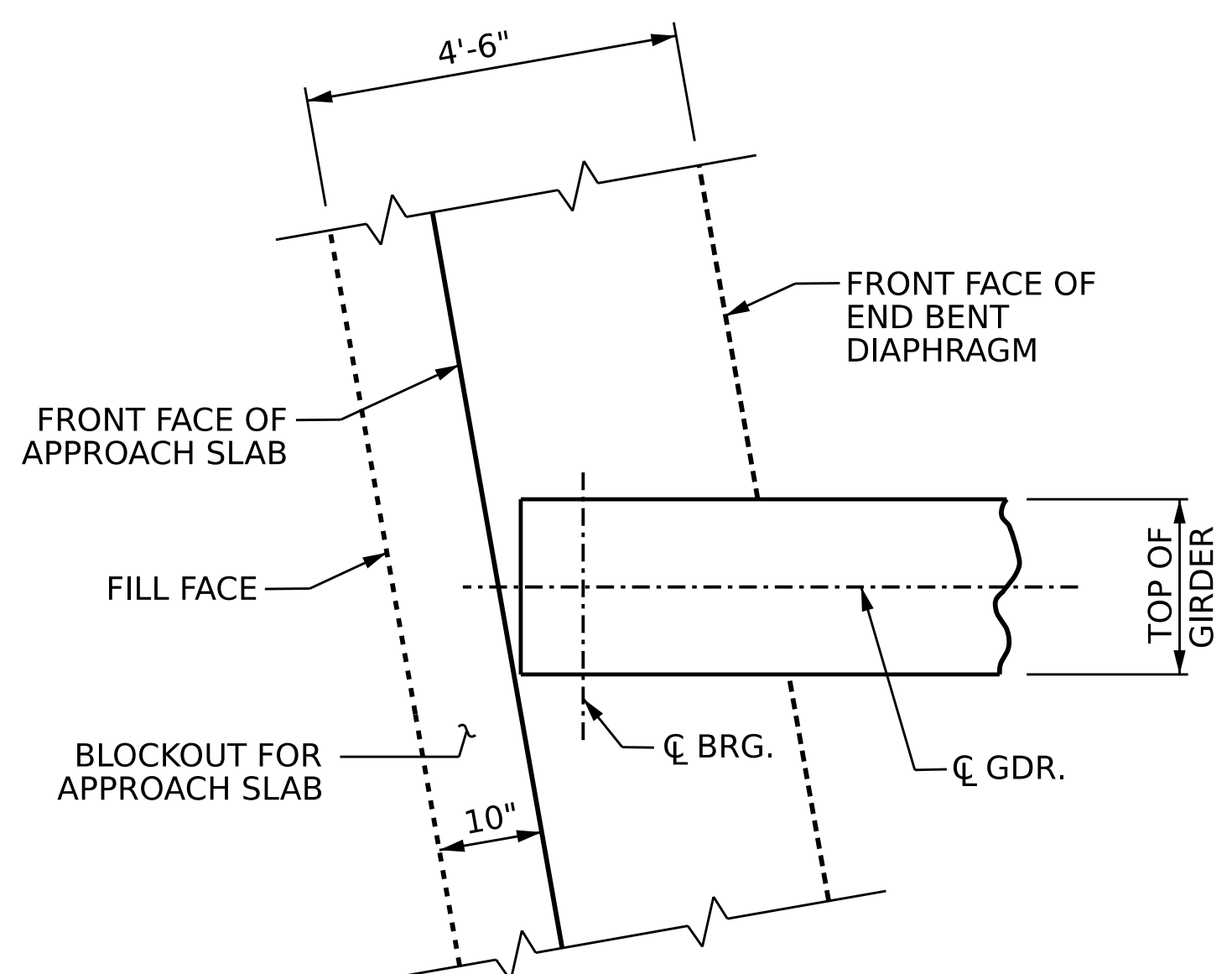


**SECTION @ LINK SLAB**

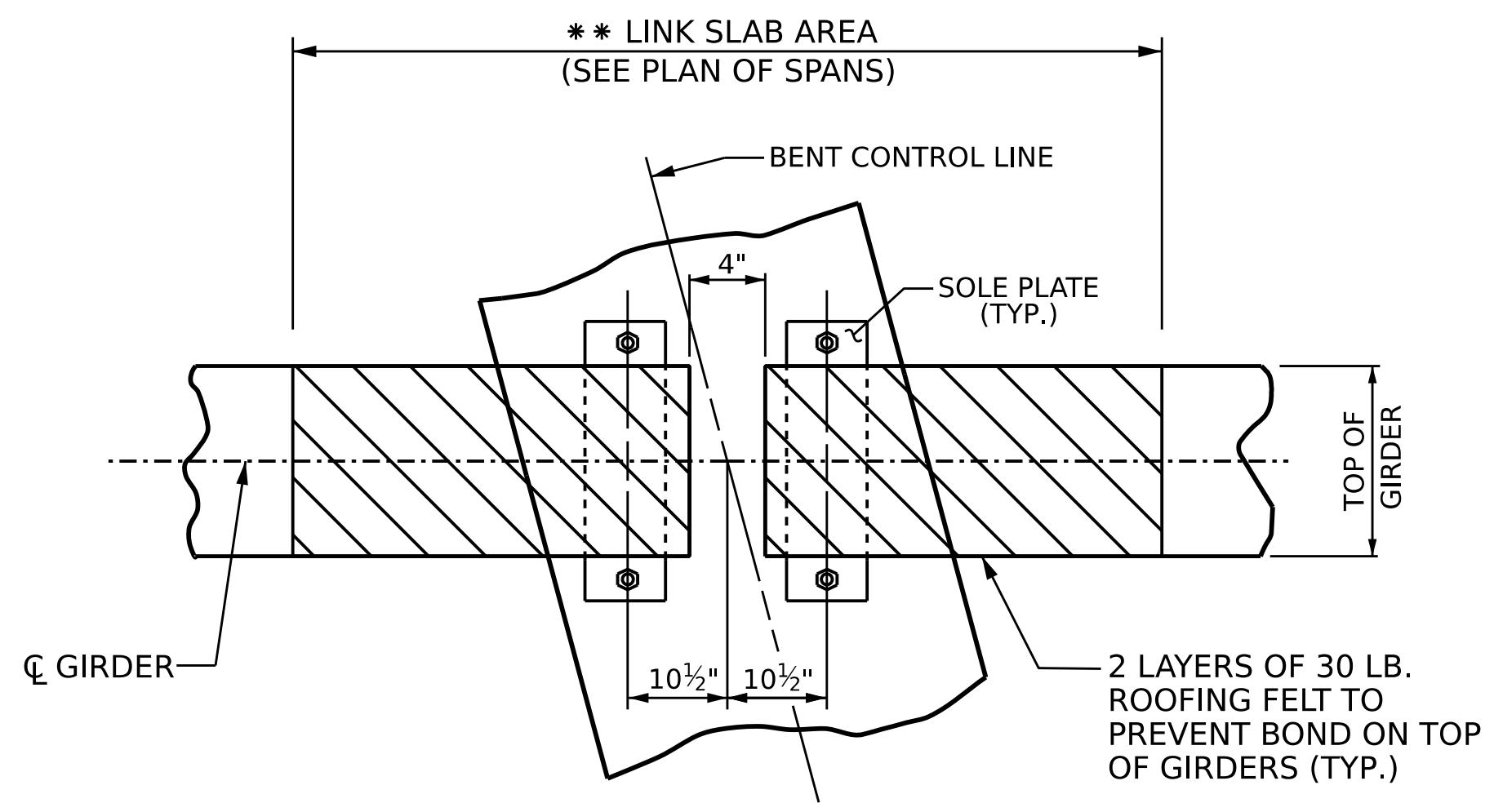
\* STAY-IN-PLACE METAL FORMS SHALL NOT BE WELDED TO THE SUPPORT ANGLES WITHIN THE LINK SLAB AREAS.



A 1 1/2" DEEP, 3/8" WIDE CONTRACTION JOINT AT BENT CONTROL LINE SHALL BE SAWN WITHIN 24 HOURS OF POURING THE LINK SLAB DECK. THE JOINT SHALL BE FILLED WITH JOINT SEALER MATERIAL. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.



**PLAN OF GIRDER @ INTEGRAL END BENT**



**PLAN @ INTERIOR BENTS**

\*\* THE TOP OF GIRDER IN THE REGION OF THE LINK SLAB SHALL BE SMOOTH (NOT RAKED) AND FREE OF STIRRUPS, ANCHOR STUDS, DECK FORMWORK ATTACHMENTS, AND OVERHANG FALSEWORK/FORMWORK ATTACHMENTS.

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-  
 SHEET 2 OF 2

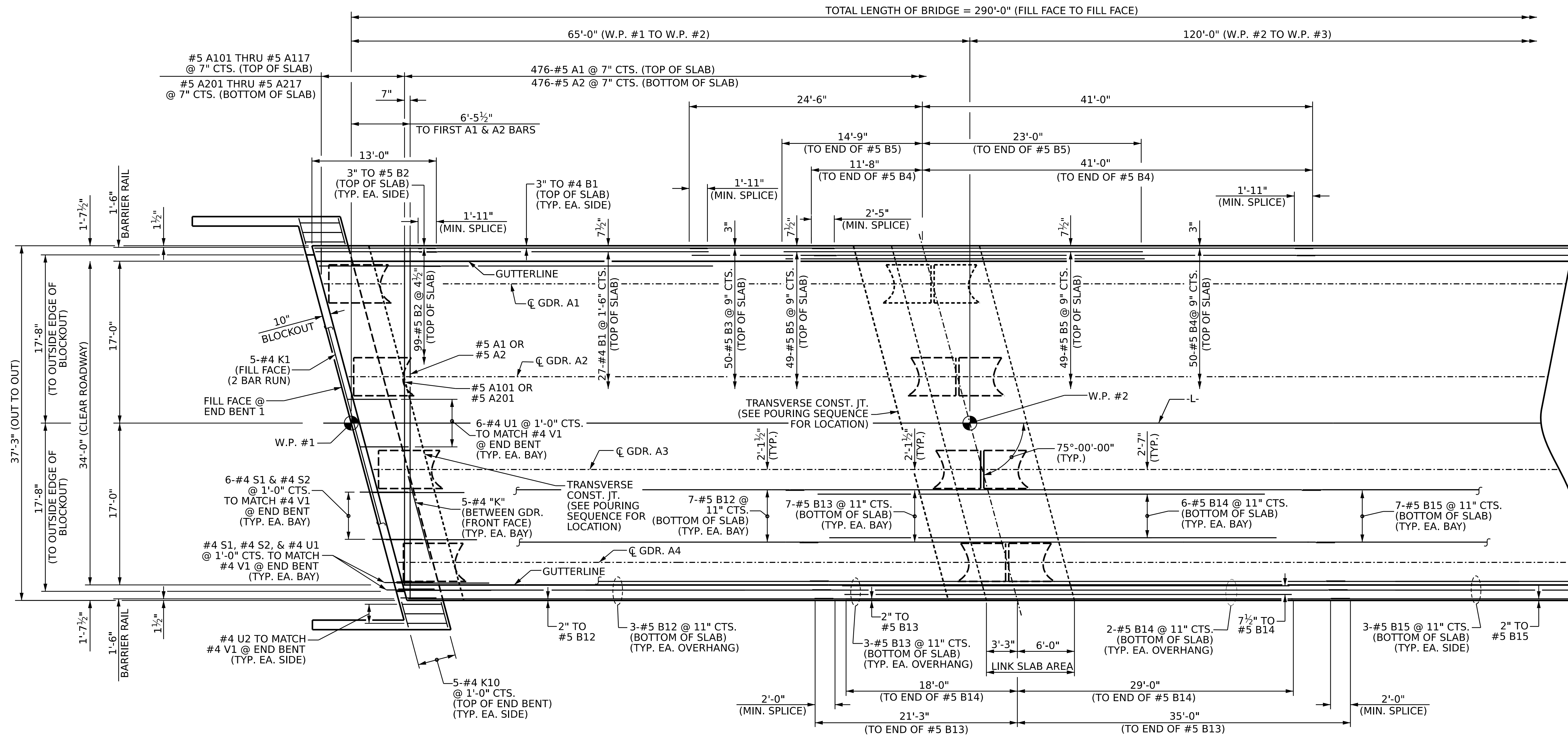


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 TYPICAL SECTION

DRAWN BY : Q. T. NGUYEN DATE : 10/2023  
 CHECKED BY : ZIA MALIK DATE : 12/2023  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 09/2023

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-07         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 36           |

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**PLAN OF SPAN A**

FOR INTERMEDIATE DIAPHRAGM LOCATION, SEE "FRAMING PLAN" SHEET.  
 FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGM FOR 54" FIB" SHEET.

PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 1 OF 5



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 PLAN OF SPAN A

DRAWN BY : Q. T. NGUYEN DATE : 10/2023  
 CHECKED BY : Z. MALIK DATE : 12/2023  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 09/2023

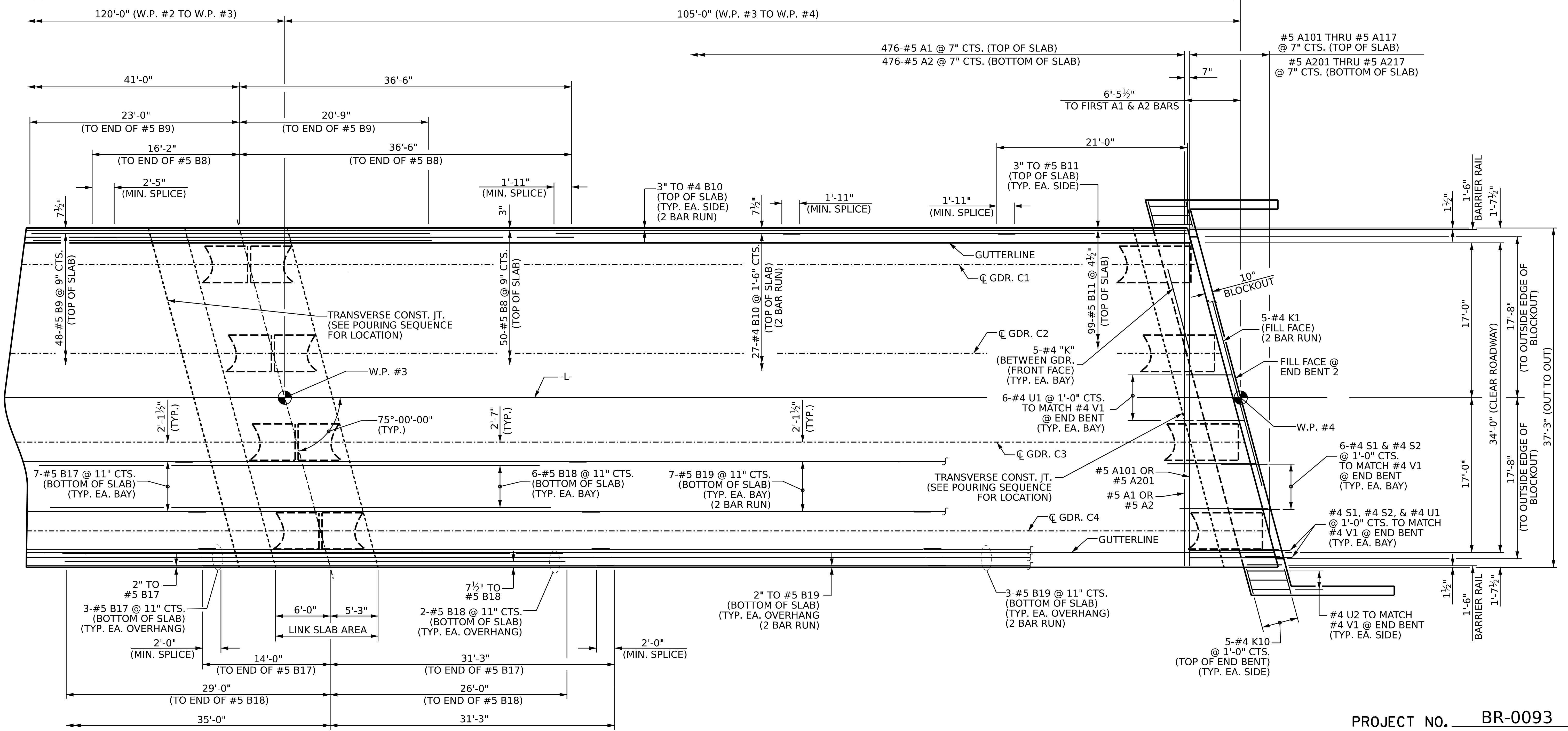
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

TOTAL SHEETS: 36



TOTAL LENGTH OF BRIDGE = 290'-0" (FILL FACE TO FILL FACE)



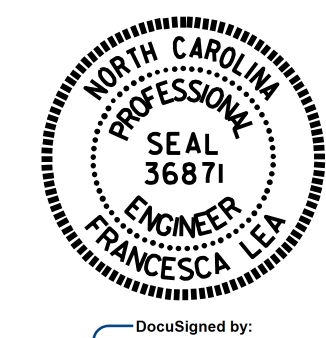
**PLAN OF SPAN C**

FOR INTERMEDIATE STEEL DIAPHRAGM LOCATION, SEE "FRAMING PLAN" SHEET.

FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGM 54" FIB" SHEET.

PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 3 OF 5

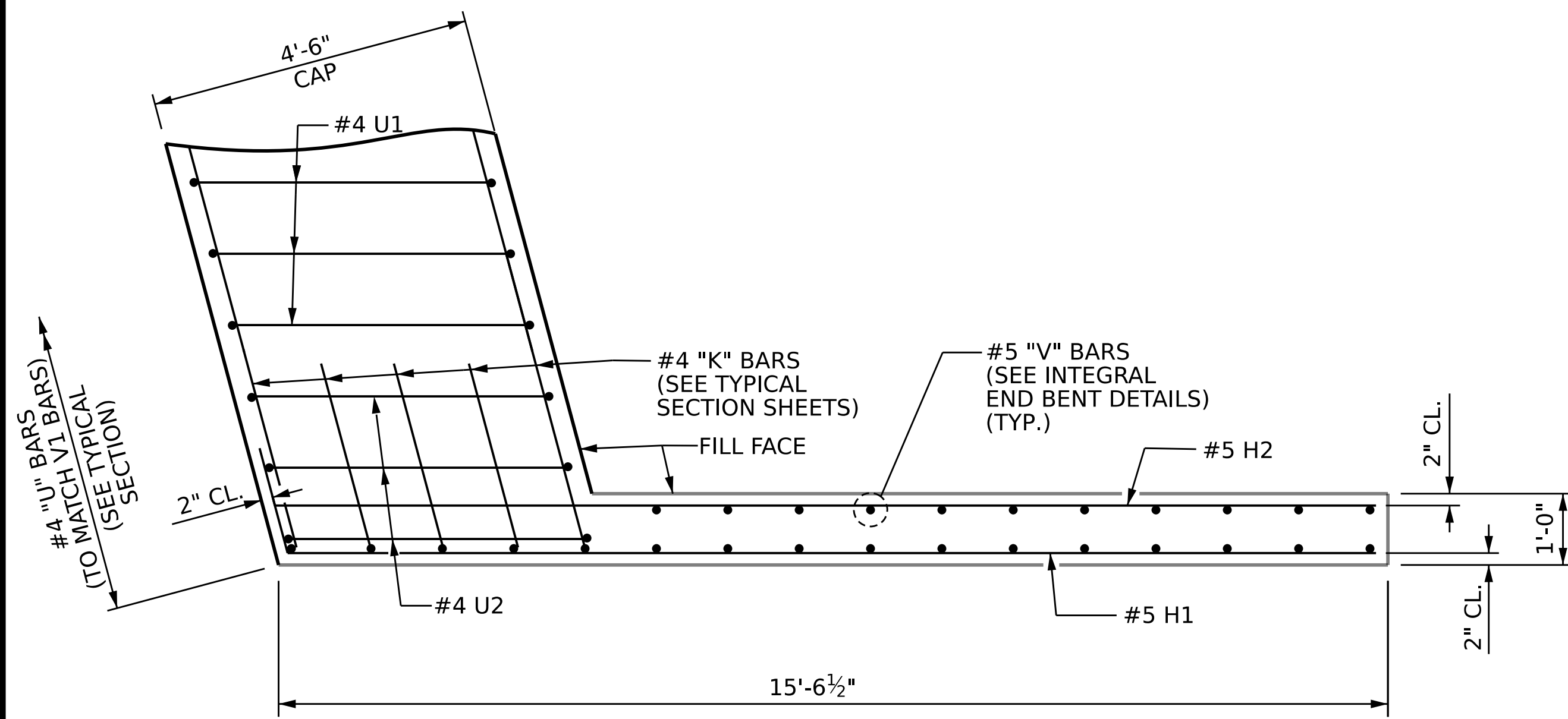


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 PLAN OF SPAN C

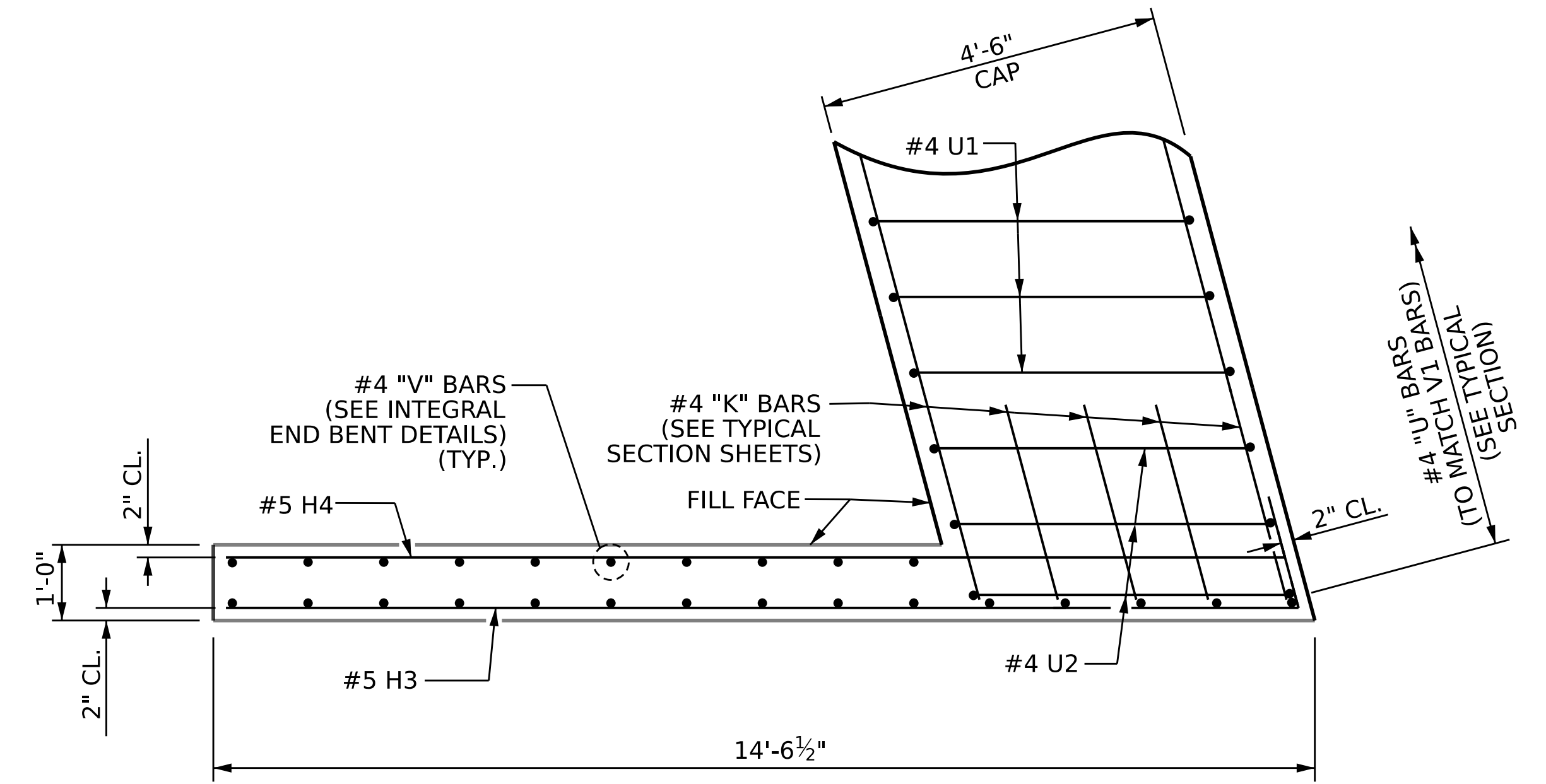
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 CHECKED BY: Z. MALIK DATE: 12/2023  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 09/2023

| REVISIONS |     |       |     | SHEET NO. |       |
|-----------|-----|-------|-----|-----------|-------|
| NO.       | BY: | DATE: | NO. | BY:       | DATE: |
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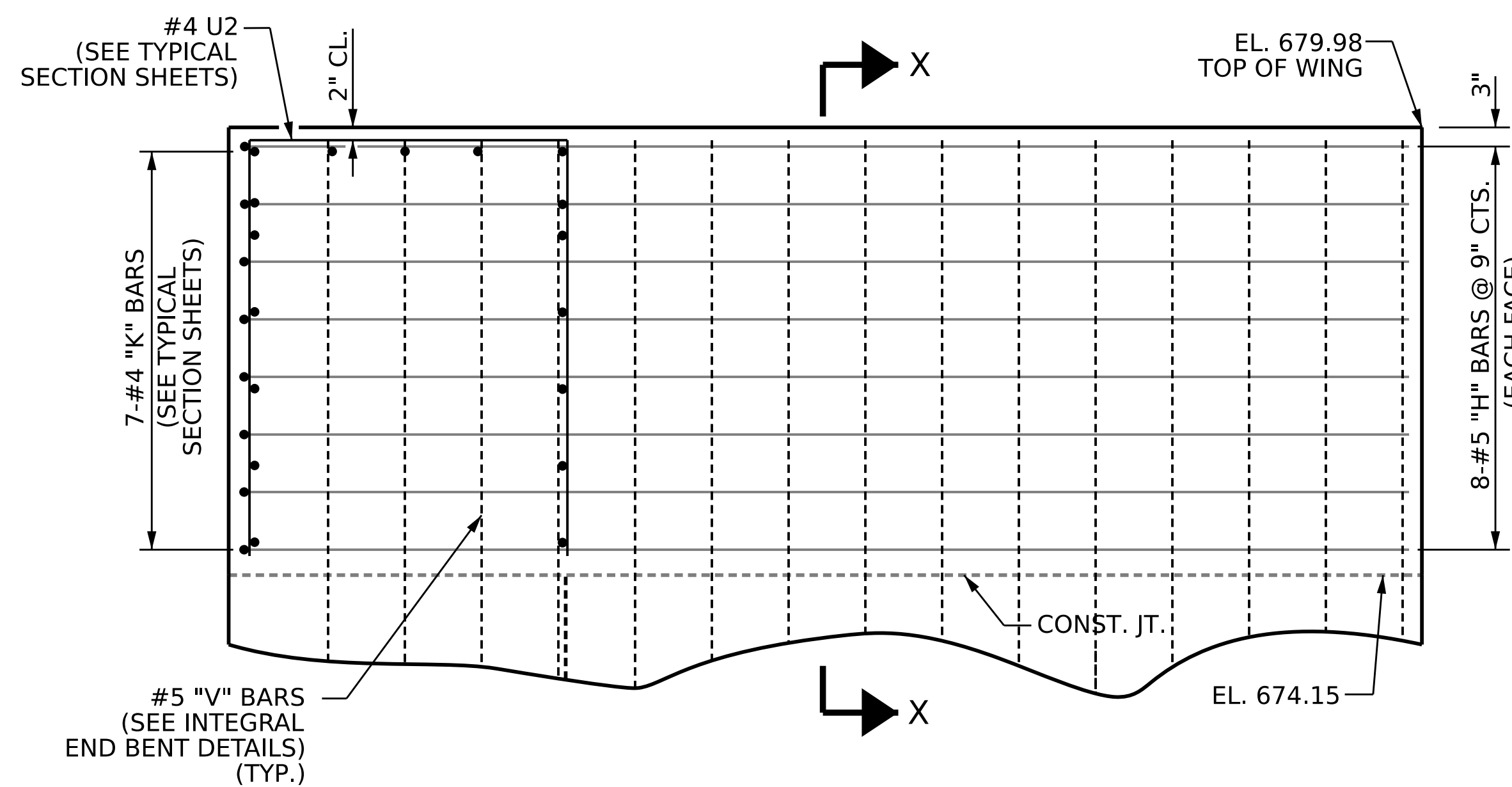
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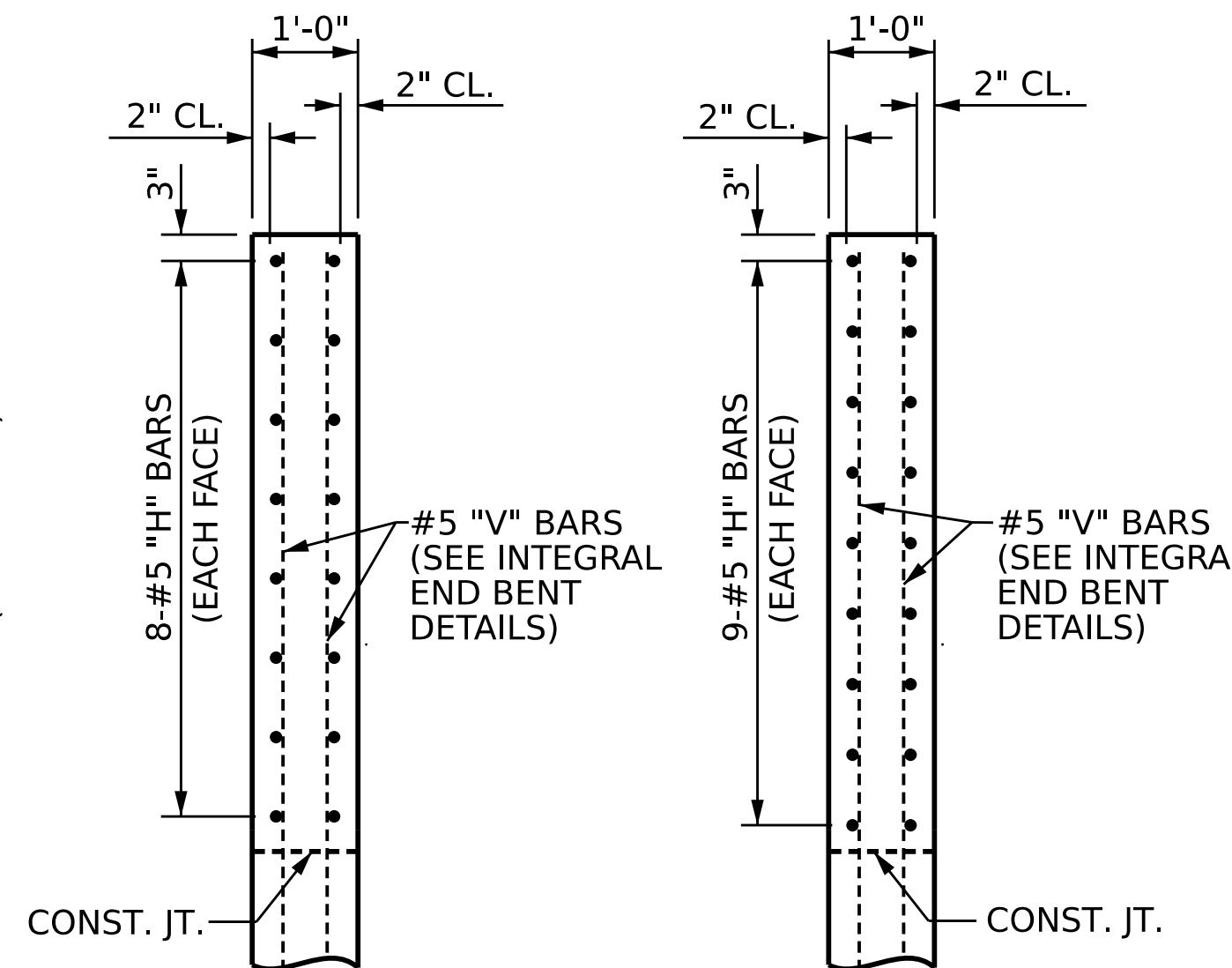
PLAN OF WING W1



PLAN OF WING W2

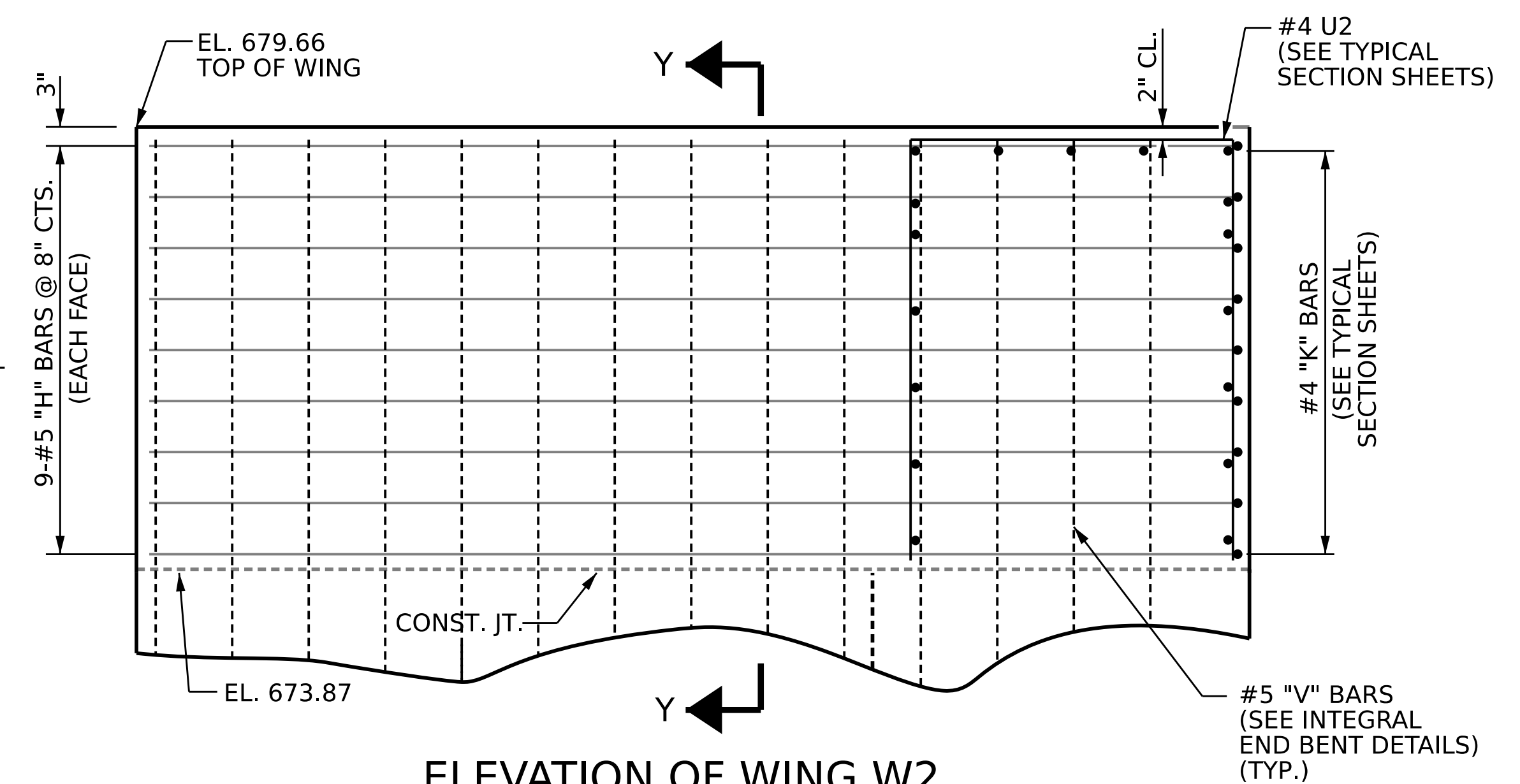


ELEVATION OF WING W1



SECTION X-X

SECTION Y-Y



ELEVATION OF WING W2

UPPER WINGS AT INTEGRAL END BENT 1

FOR LOWER WING REINFORCING STEEL AND DETAILS, SEE "INTEGRAL END BENT 1" SHEETS

PROJECT NO. BR-0093

ROCKINGHAM COUNTY

STATION: 17+85.52 -L-

SHEET 4 OF 5



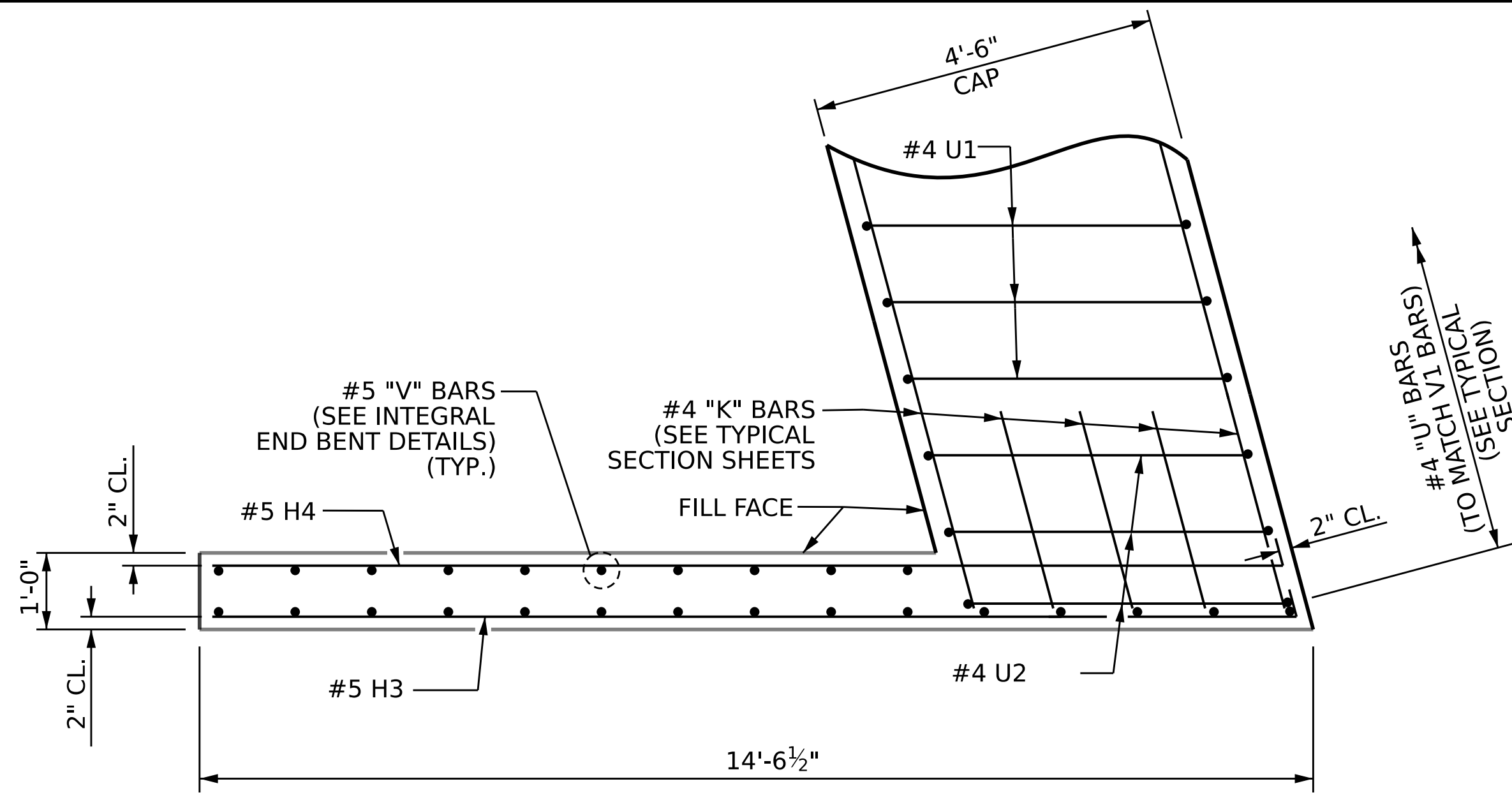
DocuSigned by:  
Francesca Ua  
B79DADB8E5D84EF  
05/01/2024

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
SUPERSTRUCTURE  
PLAN OF SPANS  
DETAILS AT END BENT 1

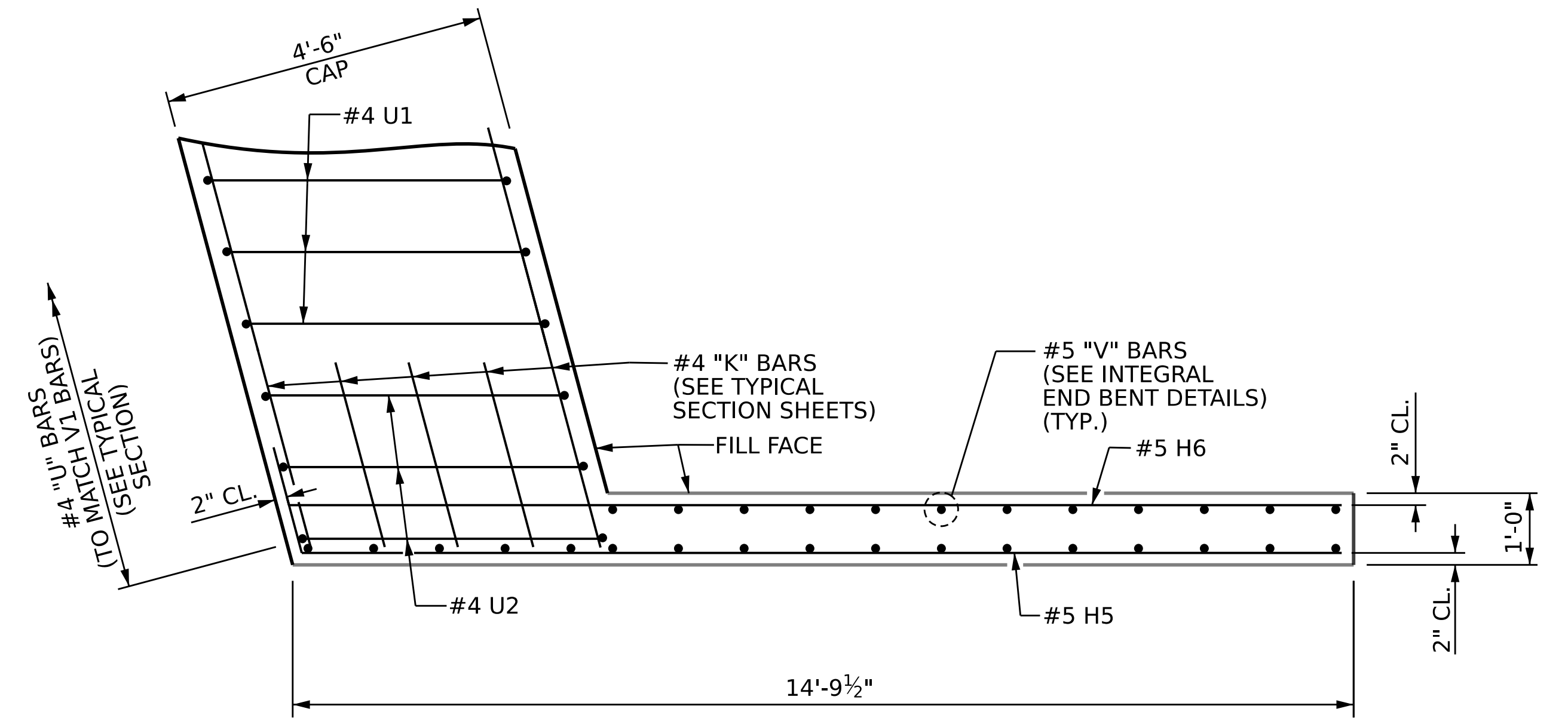
DRAWN BY : Q. T. NGUYEN DATE : 10/2023  
CHECKED BY : ZIA MALIK DATE : 12/2023  
DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 09/2023

DOCUMENT NOT CONSIDERED  
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SIGNATURES COMPLETED

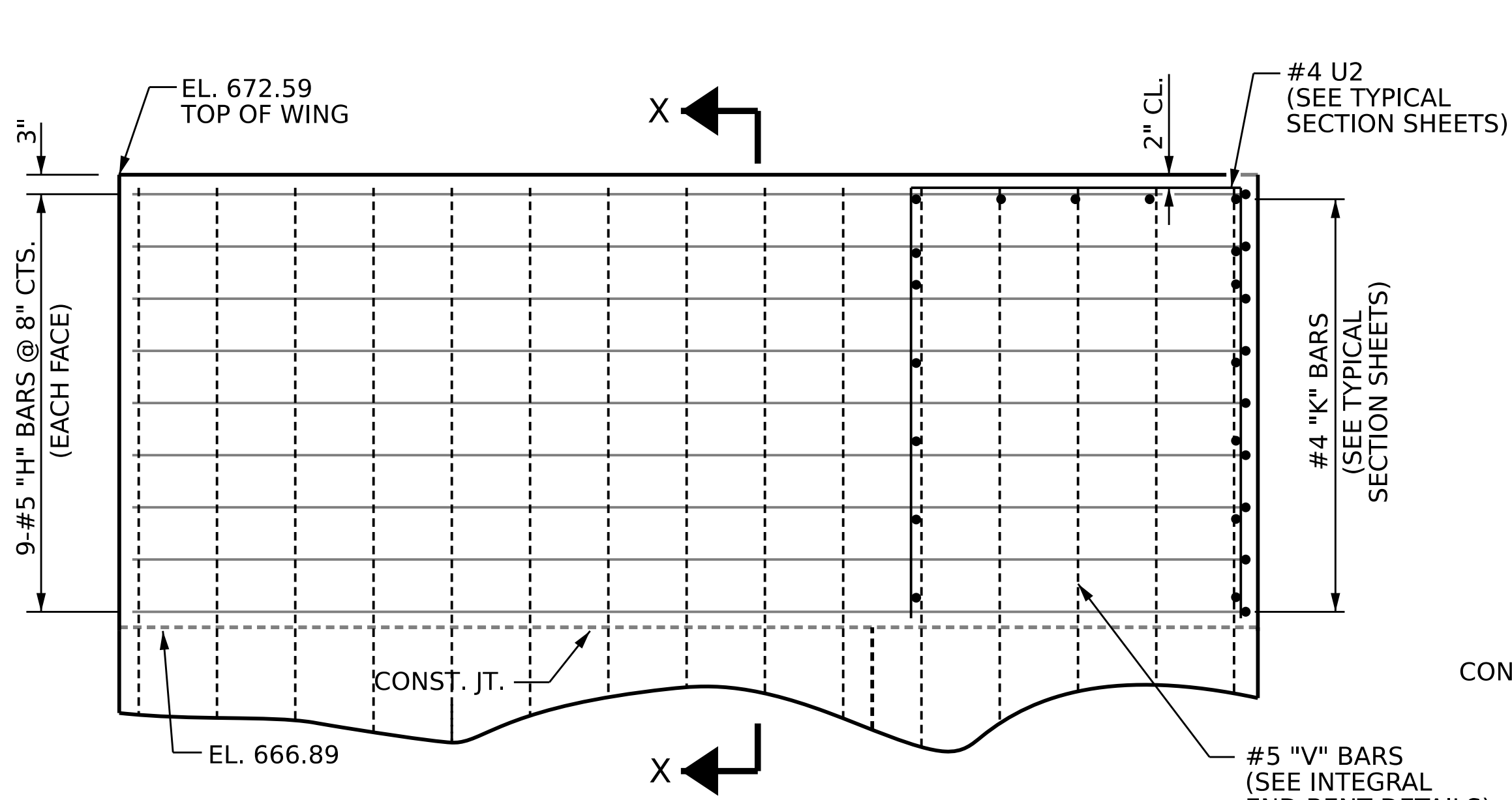
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| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-11         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 36           |



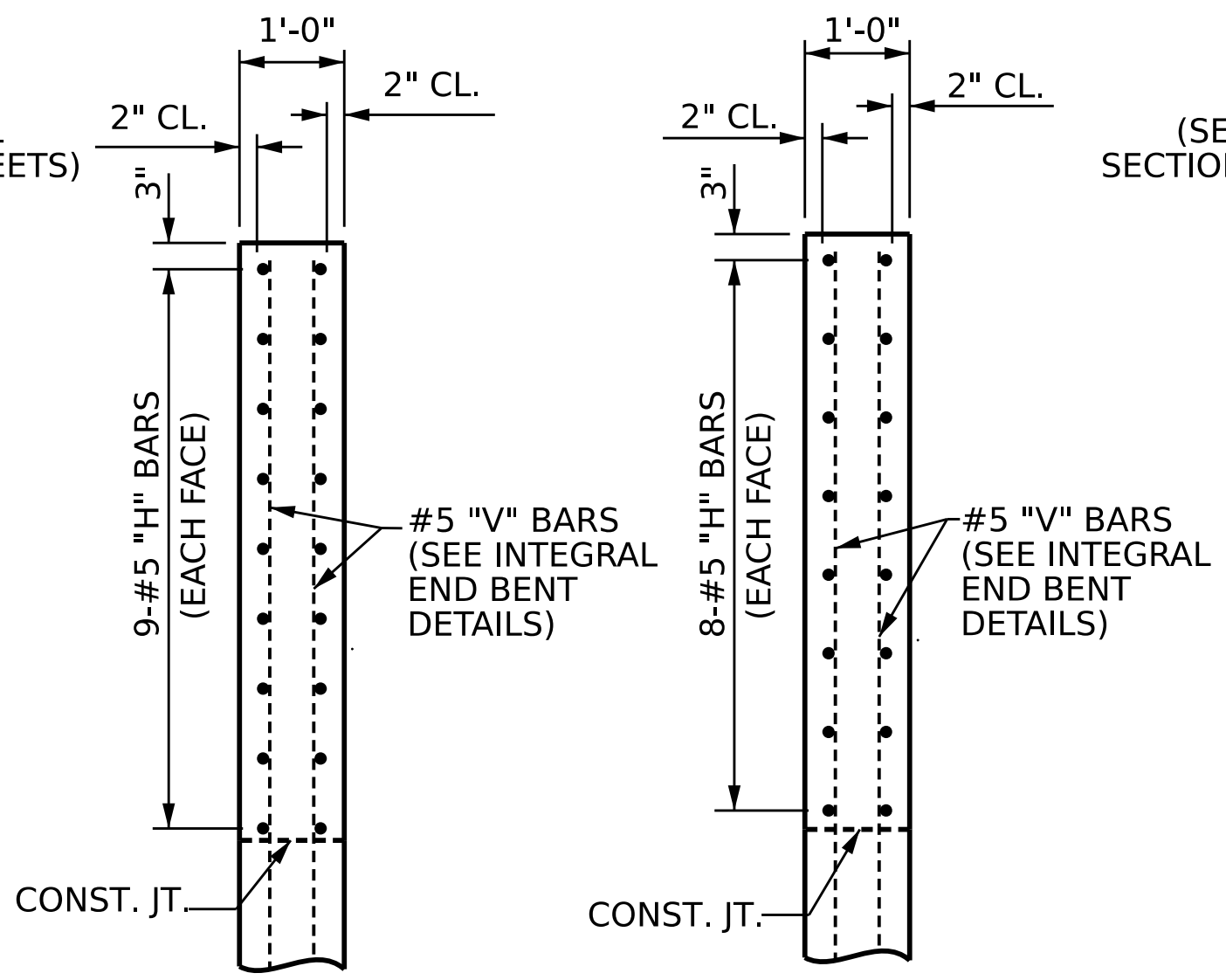
PLAN OF WING W1



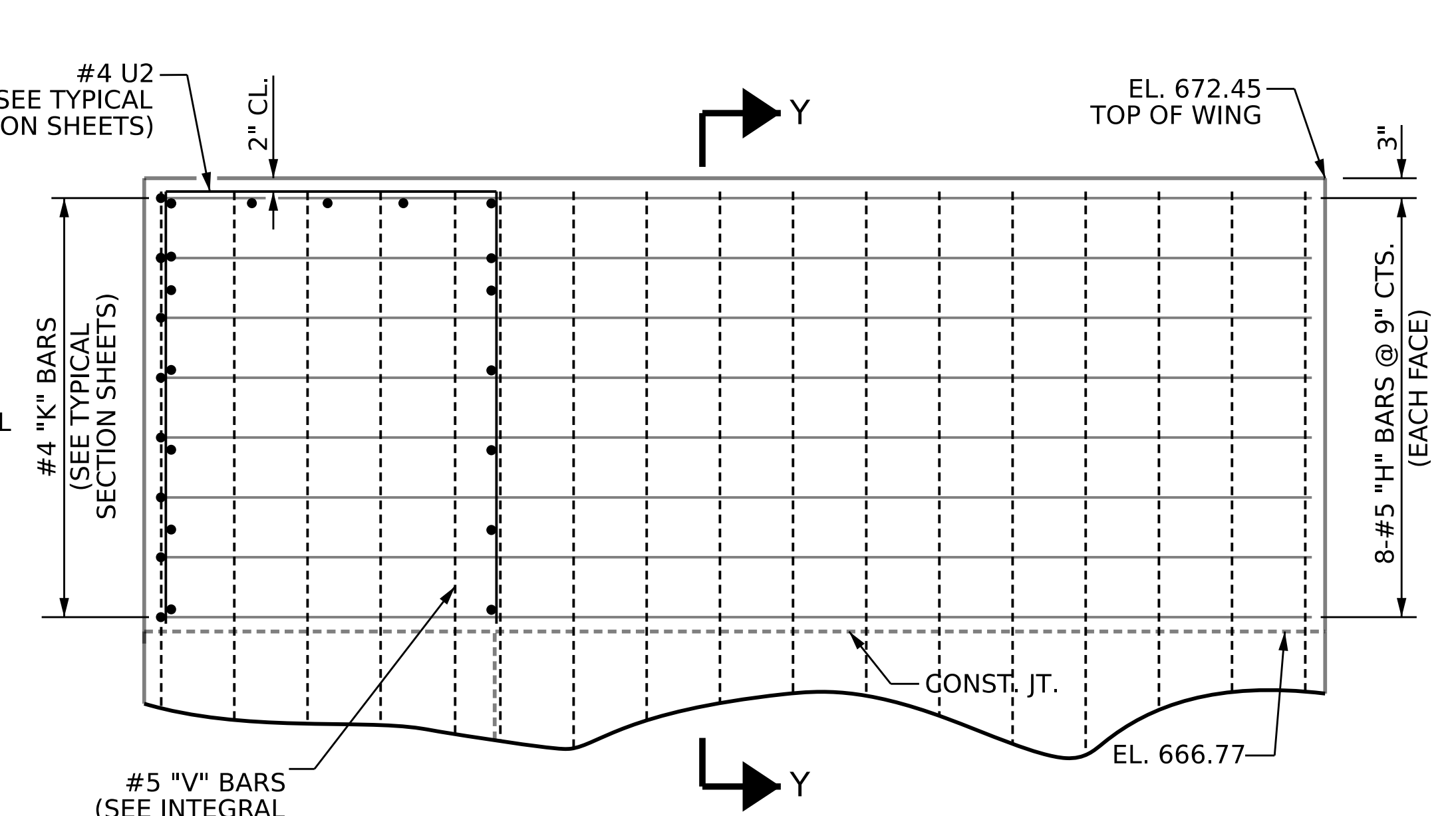
PLAN OF WING W2



ELEVATION OF WING W1



SECTION X-X SECTION Y-Y



ELEVATION OF WING W2

UPPER WINGS AT INTEGRAL END BENT 2

FOR LOWER WING REINFORCING STEEL AND DETAILS, SEE "INTEGRAL END BENT 2" SHEETS

PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 5 OF 5

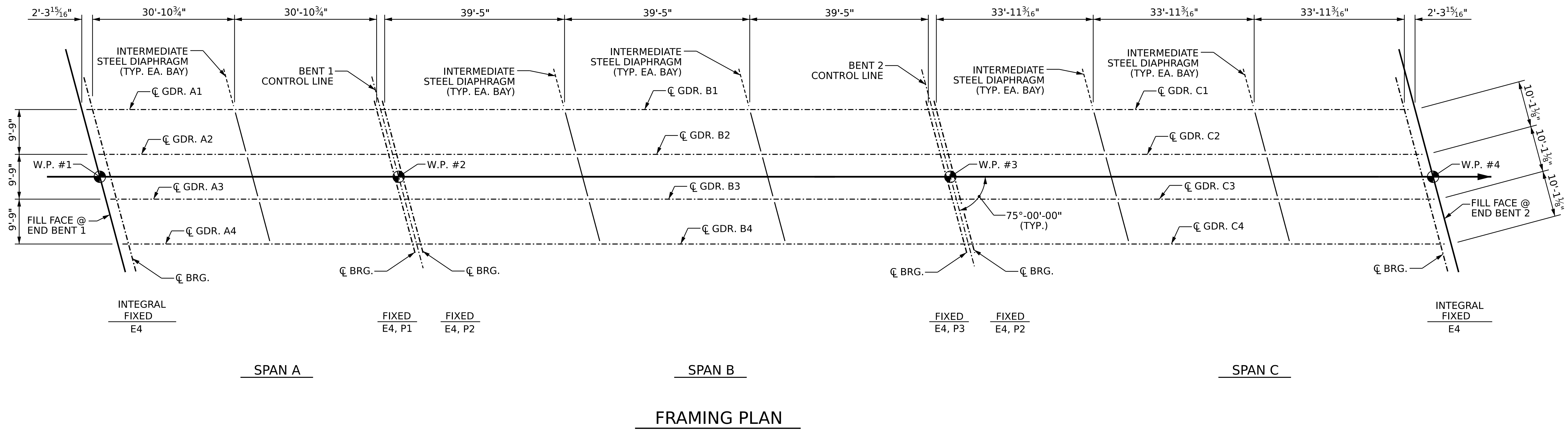


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 PLAN OF SPANS  
 DETAILS AT END BENT 2

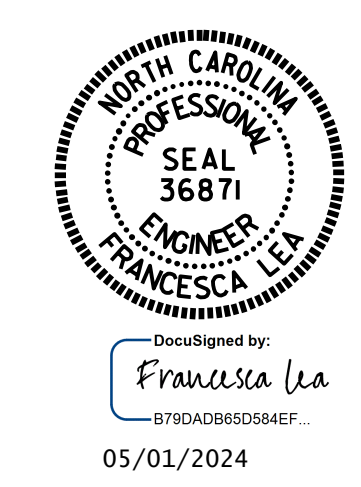
DRAWN BY: Q. T. NGUYEN DATE: 10/2023  
 CHECKED BY: ZIA MALIK DATE: 12/2023  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 09/2023

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 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO.<br>S-12 |
|-----------|-----|-------|-----|-----|-------|-------------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: |                   |
| 1         |     |       | 3   |     |       | TOTAL SHEETS      |
| 2         |     |       | 4   |     |       | 36                |



PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

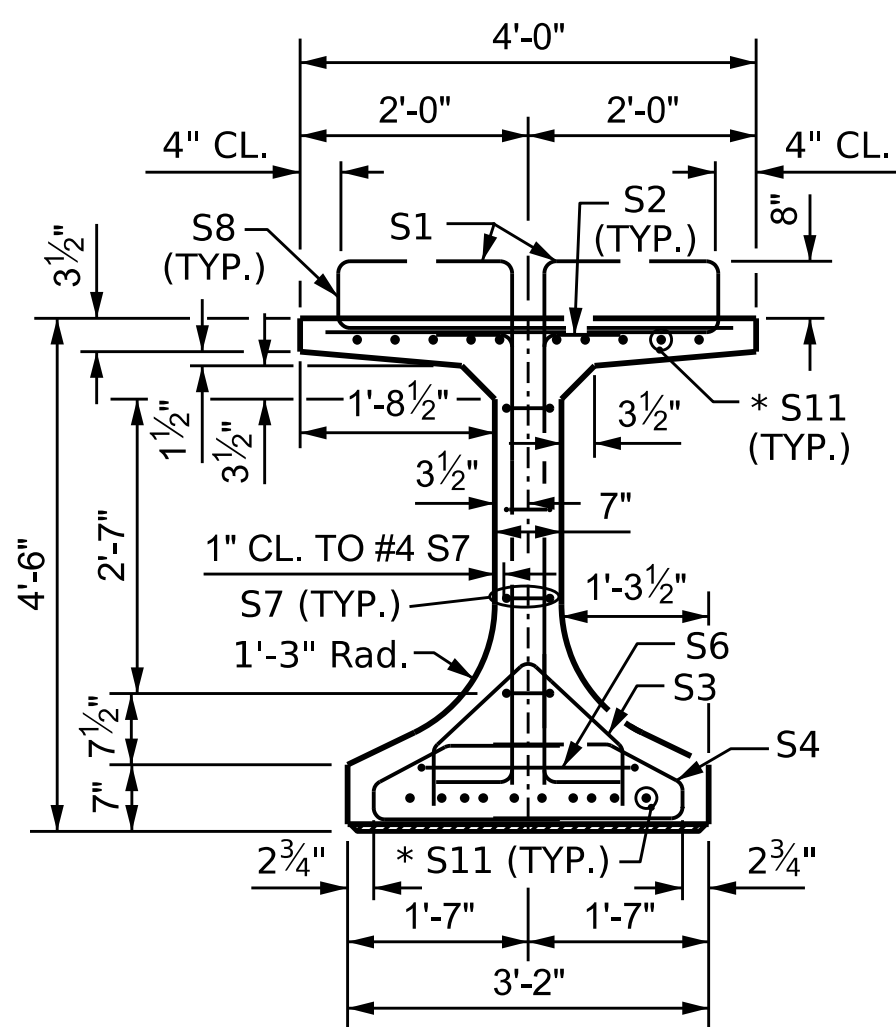
**SUPERSTRUCTURE  
 FRAMING PLAN**

DRAWN BY : E. BAYISSA \ Q. T. NGUYEN DATE : 11/2023  
 CHECKED BY : Z. MALIK DATE : 10/2023  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 07/2023

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-13         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 36           |

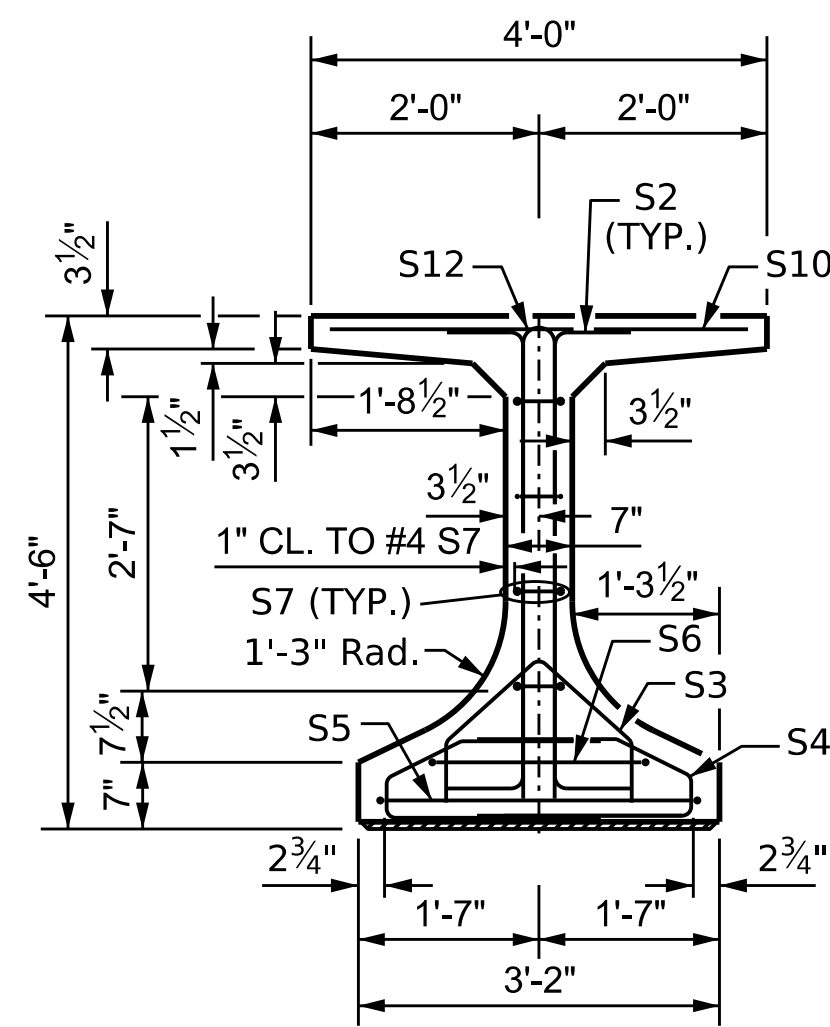
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

2/21/2024  
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 ttnguyen1

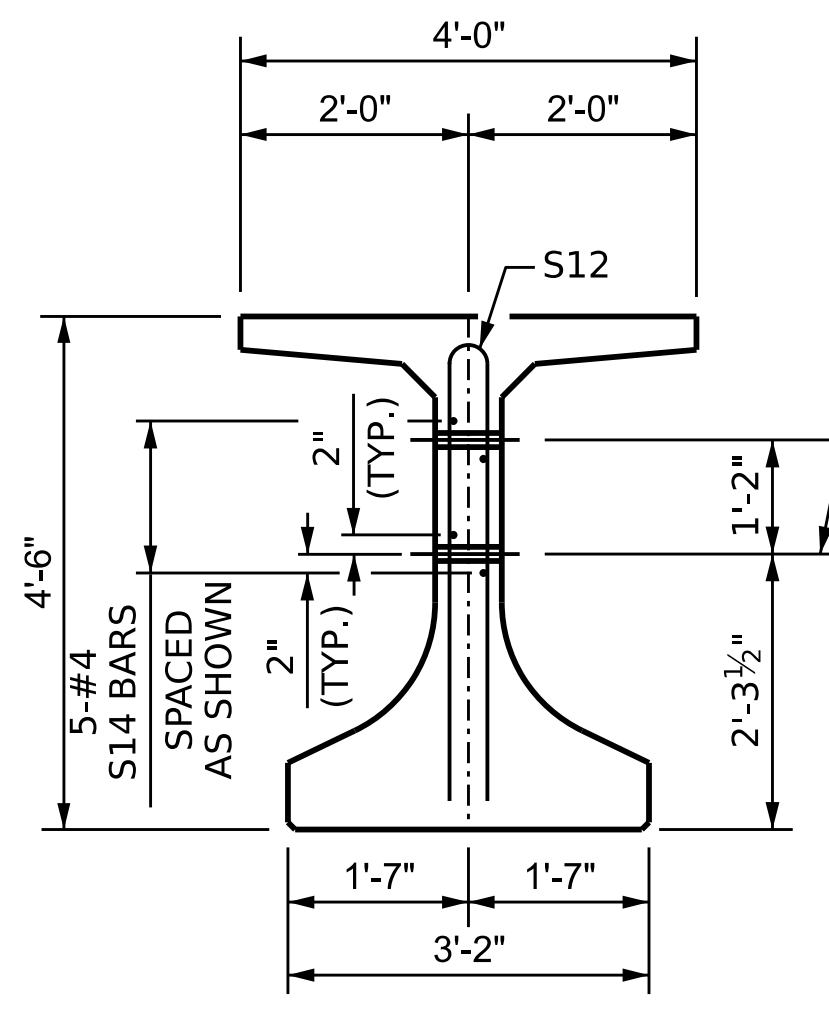


SECTION A-A

\* FOR S11 BARS, SEE DETAIL "C" OF "FLORIDA I BEAM INTEGRAL END BENT DETAILS" SHEET



SECTION B-B



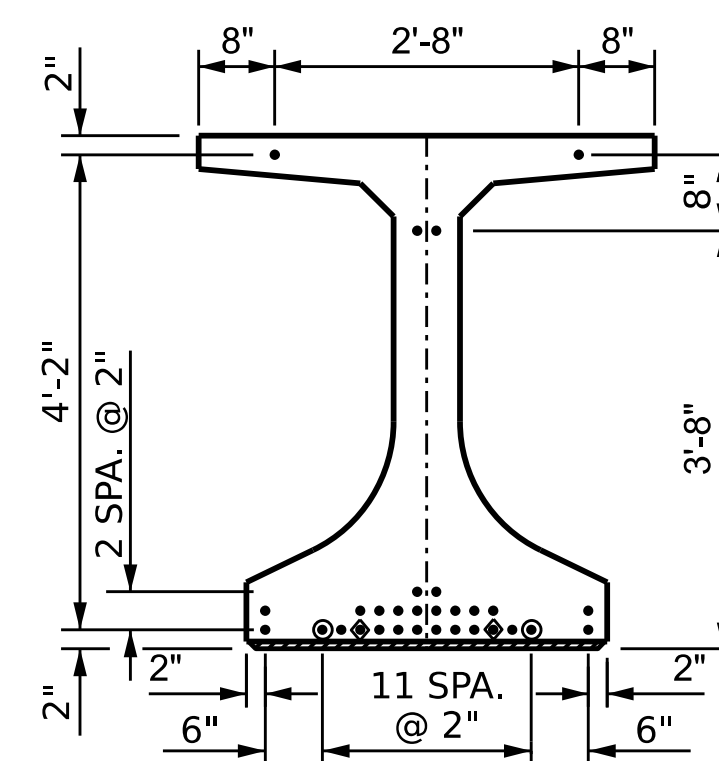
SECTION C-C

(S8, S9 AND S10 BARS NOT SHOWN)

1 1/2" Ø FORMED HOLE. (SEE FRAMING PLAN FOR LOCATION)

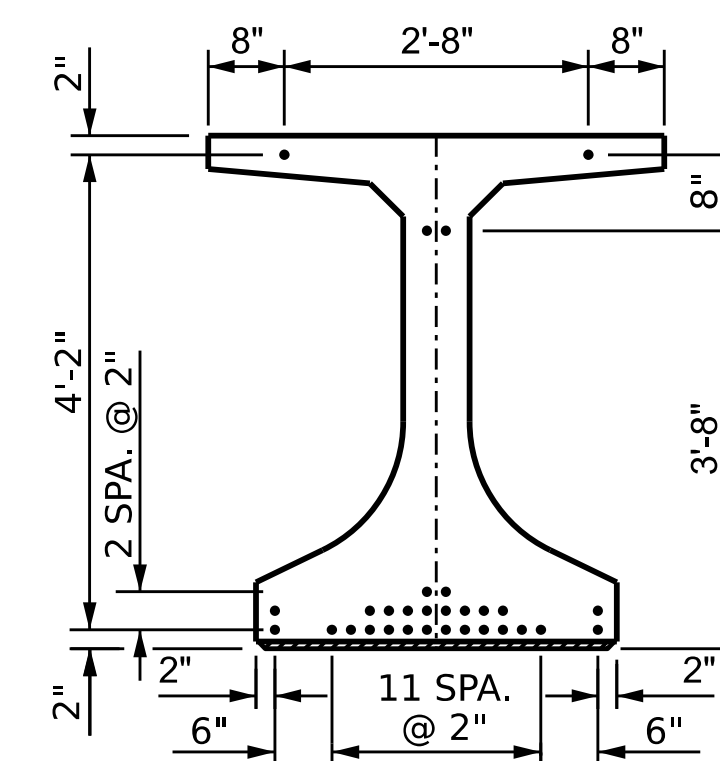
DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

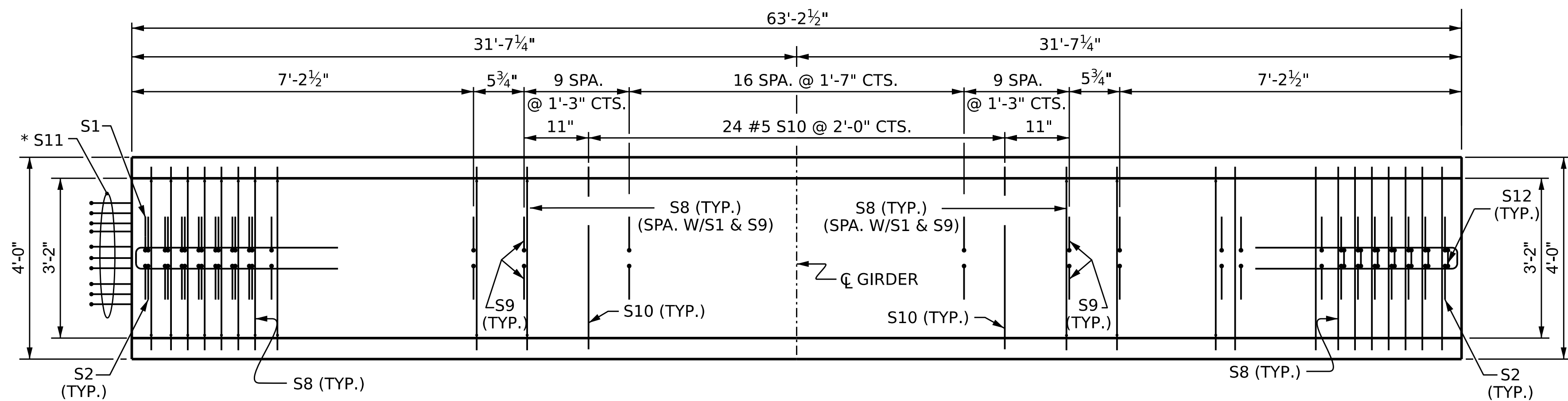


AT END OF GIRDER

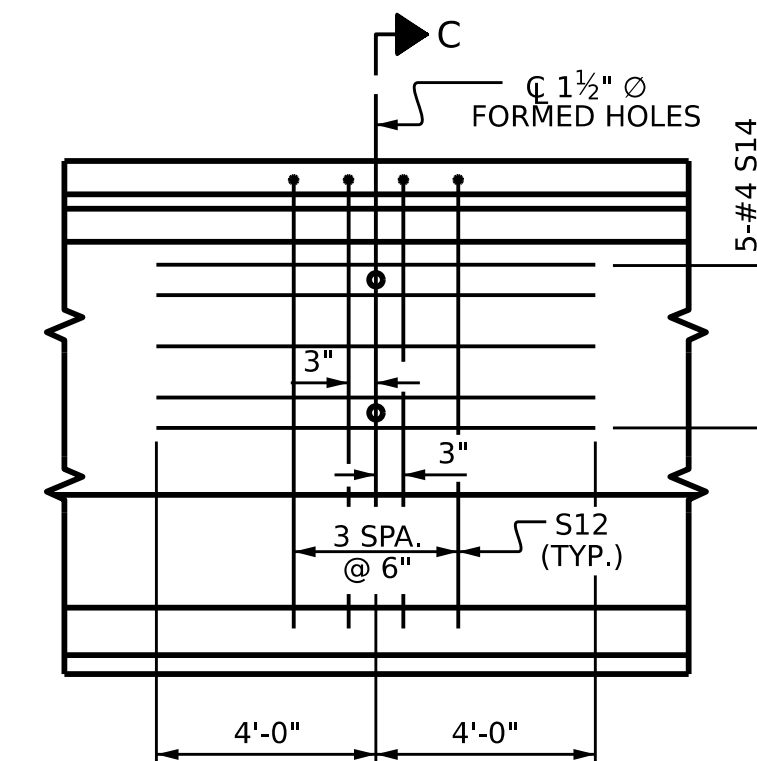
0.6" Ø LOW RELAXATION STRAND LAYOUT



AT C OF GIRDER

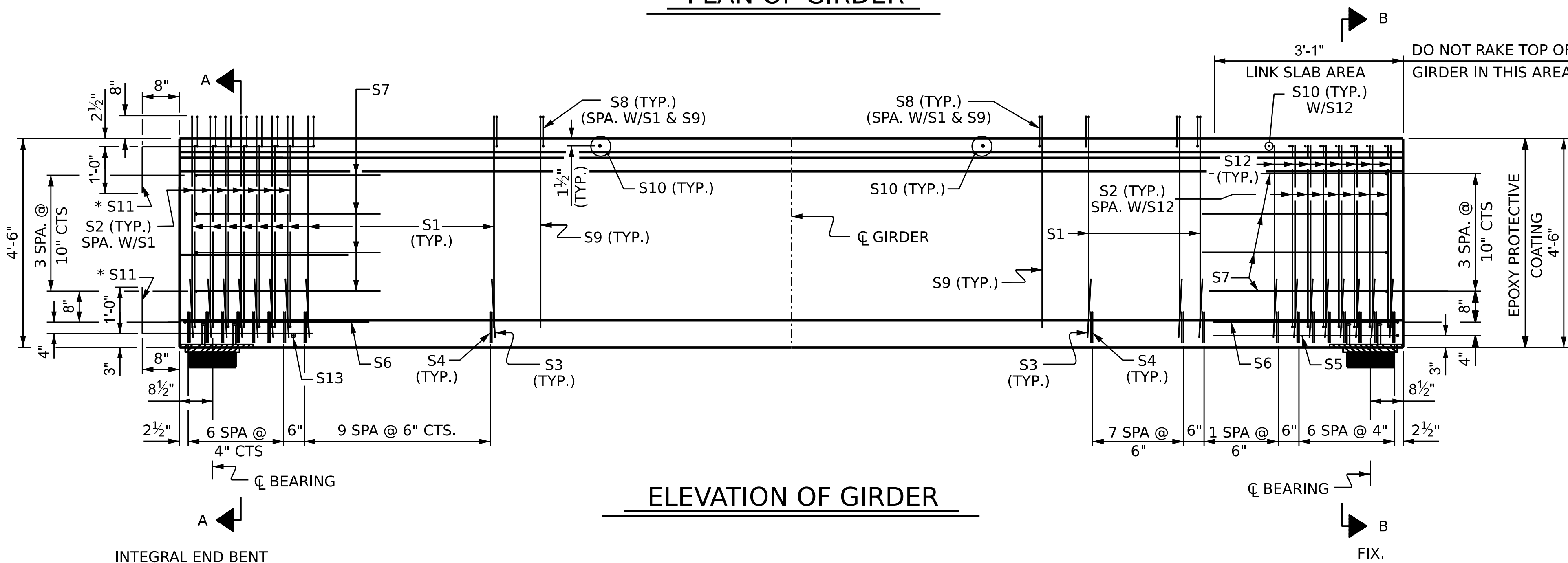


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS.



ELEVATION OF GIRDER

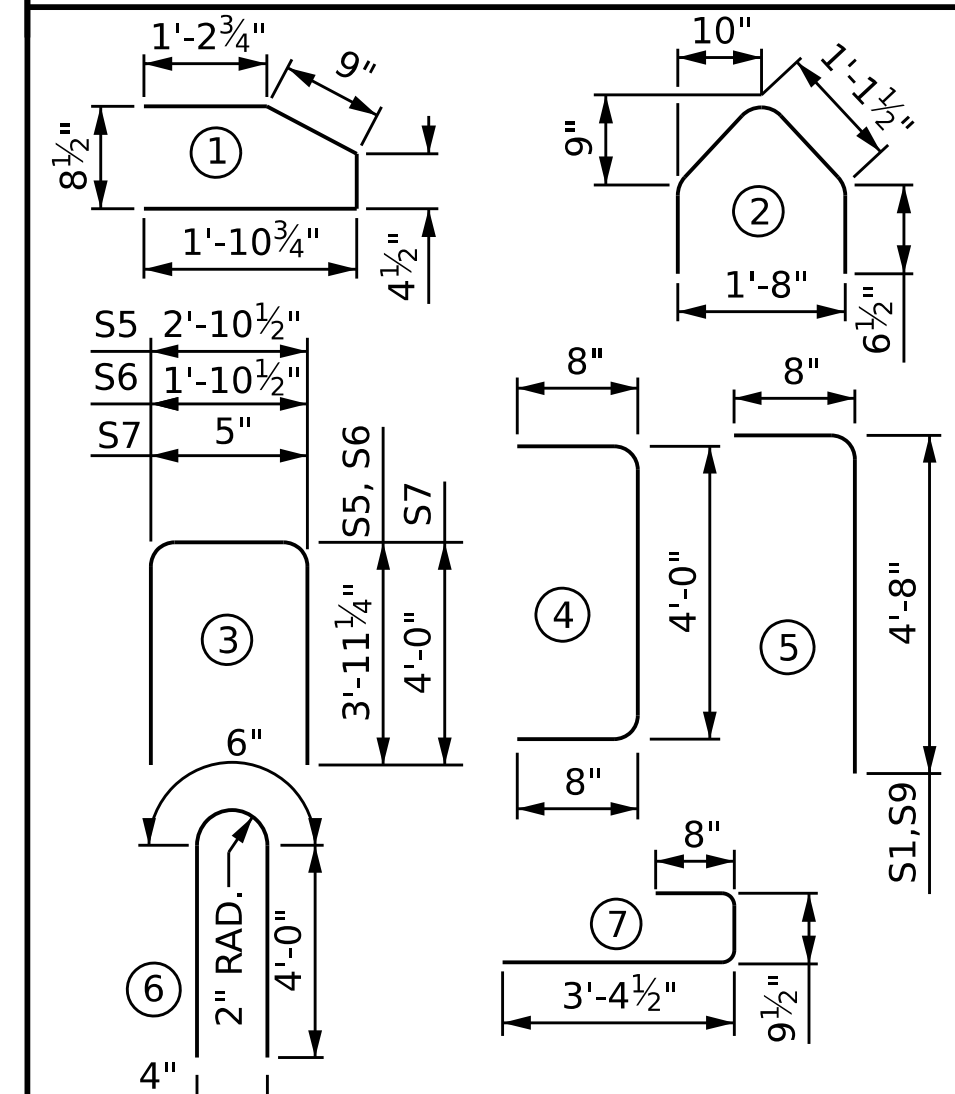
INTEGRAL END BENT

\* NOTE:

S11 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

| 0.6" Ø L. R. GRADE 270 STRANDS |                                     |                                     |        |        |
|--------------------------------|-------------------------------------|-------------------------------------|--------|--------|
| AREA (SQ. 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                             | #5                                  | 5                                   | 5'-4"  | 289    |
| S2                             | #5                                  | 4                                   | 5'-4"  | 156    |
| S3                             | #3                                  | 2                                   | 3'-4"  | 43     |
| S4                             | #3                                  | 1                                   | 4'-3"  | 109    |
| S5                             | #5                                  | 3                                   | 10'-9" | 11     |
| S6                             | #5                                  | 3                                   | 9'-9"  | 20     |
| S7                             | #4                                  | 3                                   | 8'-5"  | 45     |
| S8                             | #5                                  | 7                                   | 4'-10" | 615    |
| S9                             | #4                                  | 5                                   | 5'-4"  | 249    |
| S10                            | #5                                  | STR                                 | 3'-8"  | 122    |
| *S11                           | #6                                  | STR                                 | 4'-8"  | 140    |
| S12                            | #5                                  | 6                                   | 8'-6"  | 106    |
| S13                            | #3                                  | STR                                 | 2'-10" | 1      |
| S14                            | #4                                  | STR                                 | 8'-0"  | 27     |

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

| REINFORCING STEEL | 6500PSI CONCRETE | 0.6" Ø L.R. STRANDS |
|-------------------|------------------|---------------------|
| LB.               | C.Y.             | No.                 |
| 1934              | 15.2             | 30                  |

GIRDERS REQUIRED

| NUMBER | LENGTH     | TOTAL LENGTH |
|--------|------------|--------------|
| 4      | 63'-2 1/2" | 252'-10"     |

PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 54" FIB PRESTRESSED  
 CONCRETE GIRDER  
 INTEGRAL END BENT  
 LINK SLAB  
 SPAN A

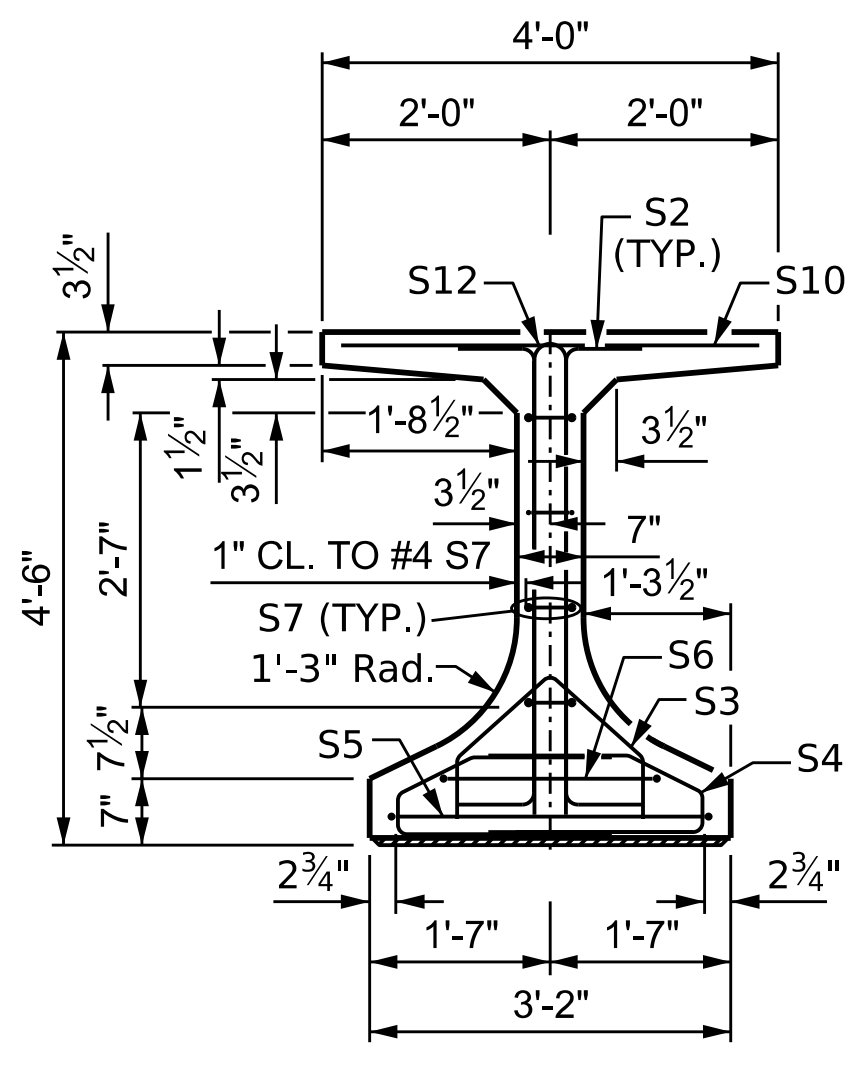


DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

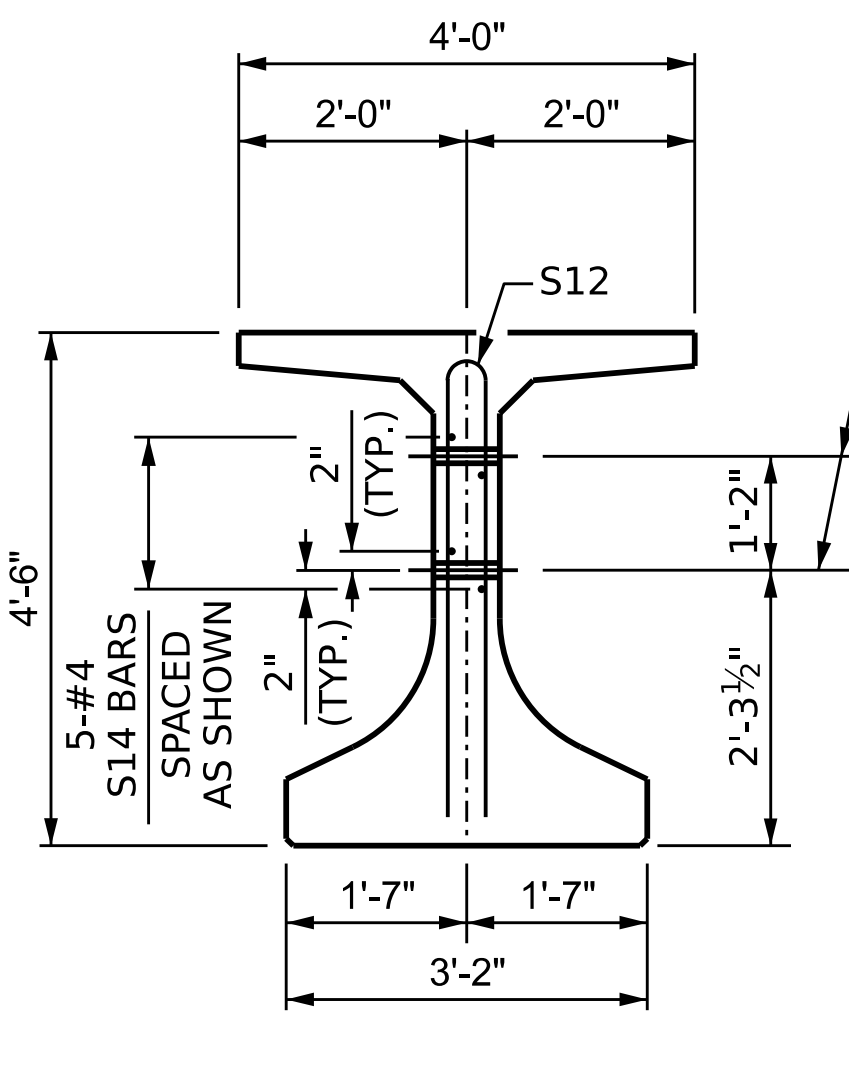
| REVISIONS |     |       |     | SHEET NO. |
|-----------|-----|-------|-----|-----------|
| NO.       | BY: | DATE: | NO. | DATE:     |
| 1         |     |       | 3   |           |
| 2         |     |       | 4   |           |

ASSEMBLED BY : E. BAYISSA DATE : 07/2023  
 CHECKED BY : Z. MALIK DATE : 10/2023  
 DRAWN BY : BNB 01/21  
 CHECKED BY : AAI 08/22





SECTION B-B

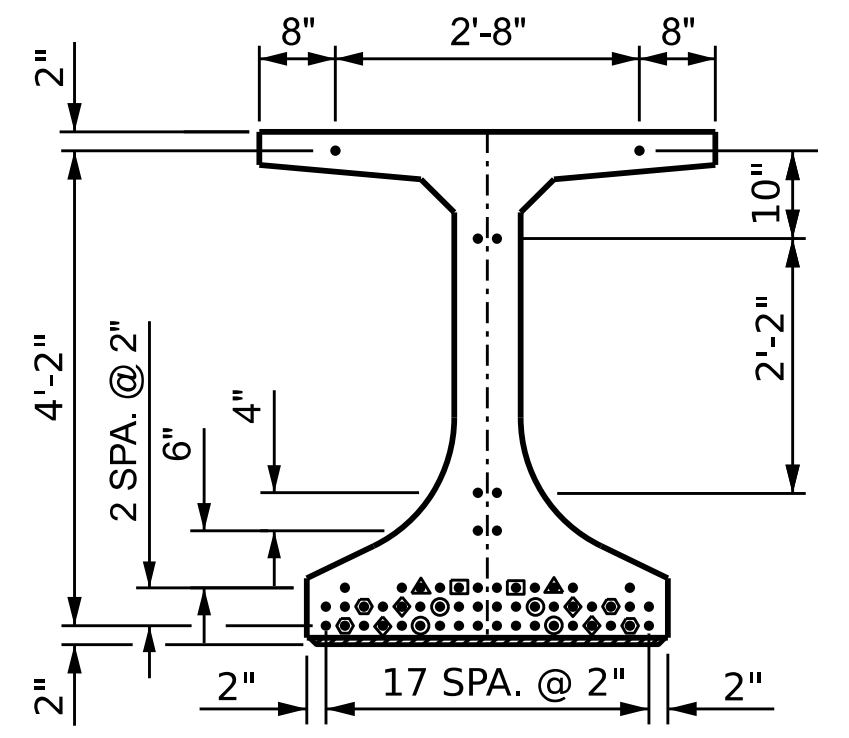


SECTION C-C  
(S8, S9 AND S10 BARS NOT SHOWN)

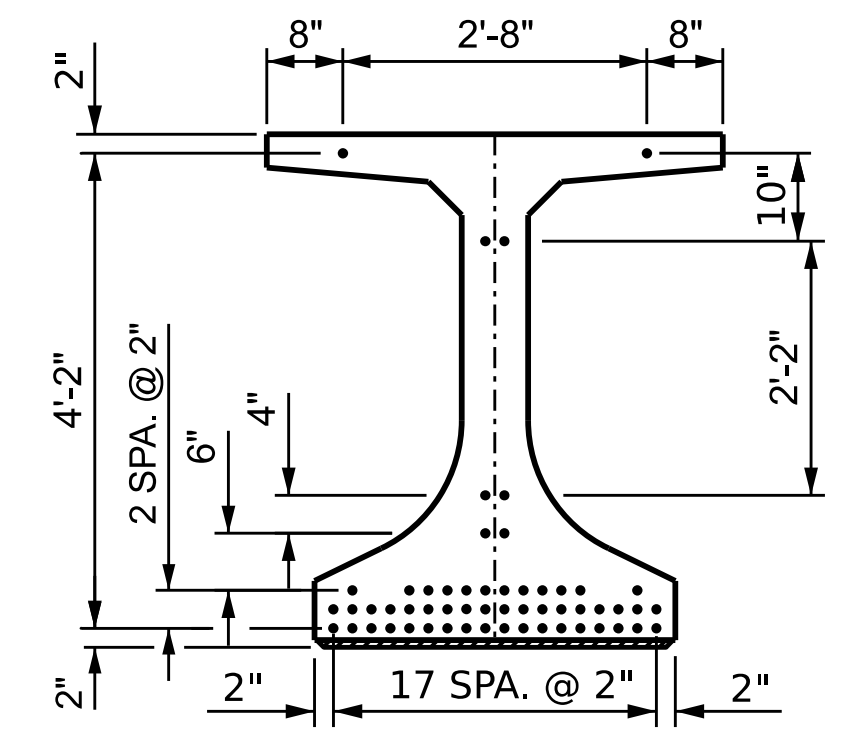
1/2" Ø FORMED HOLE. (SEE FRAMING PLAN FOR LOCATION)

DEBONDING LEGEND

- FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ⊙ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ◇ STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER
- ⊕ STRANDS DEBONDED FOR 18'-0" FROM END OF GIRDER

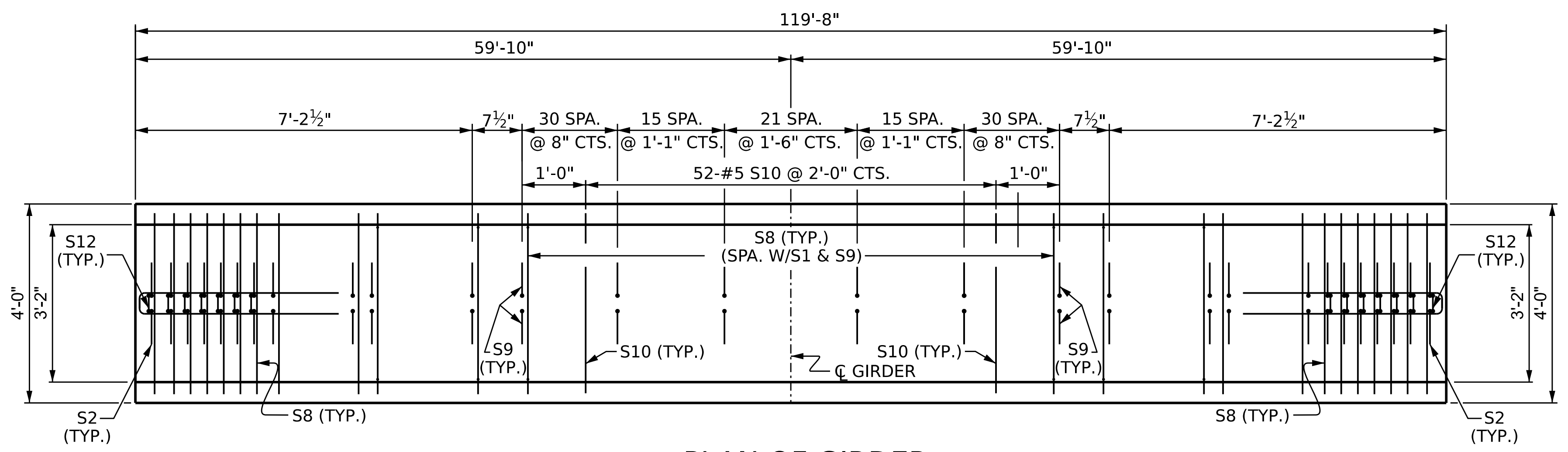


AT END OF GIRDER

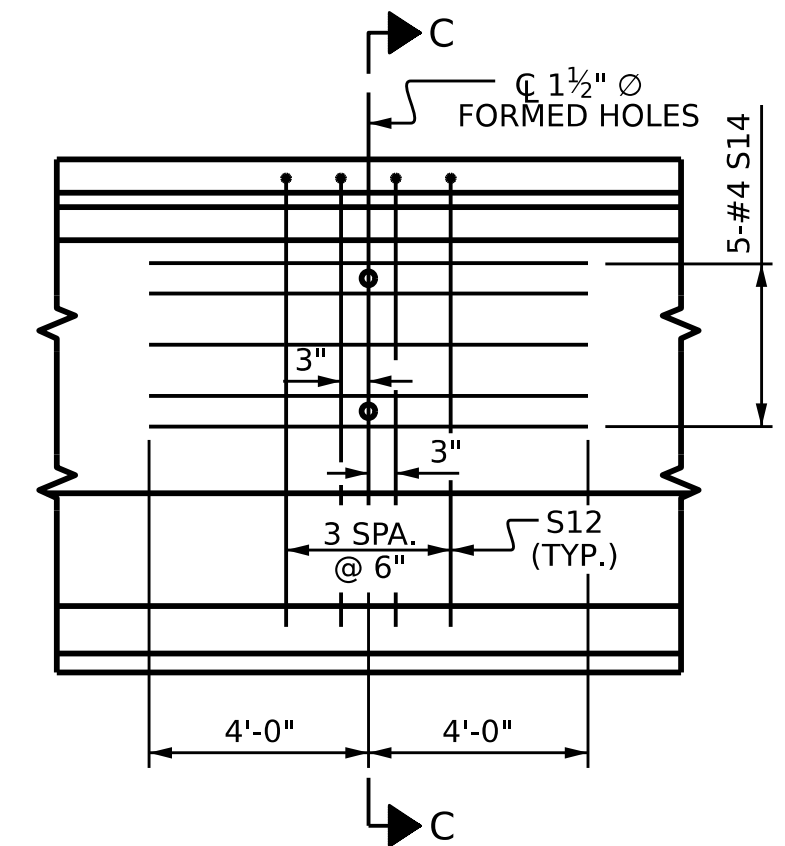


AT C OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

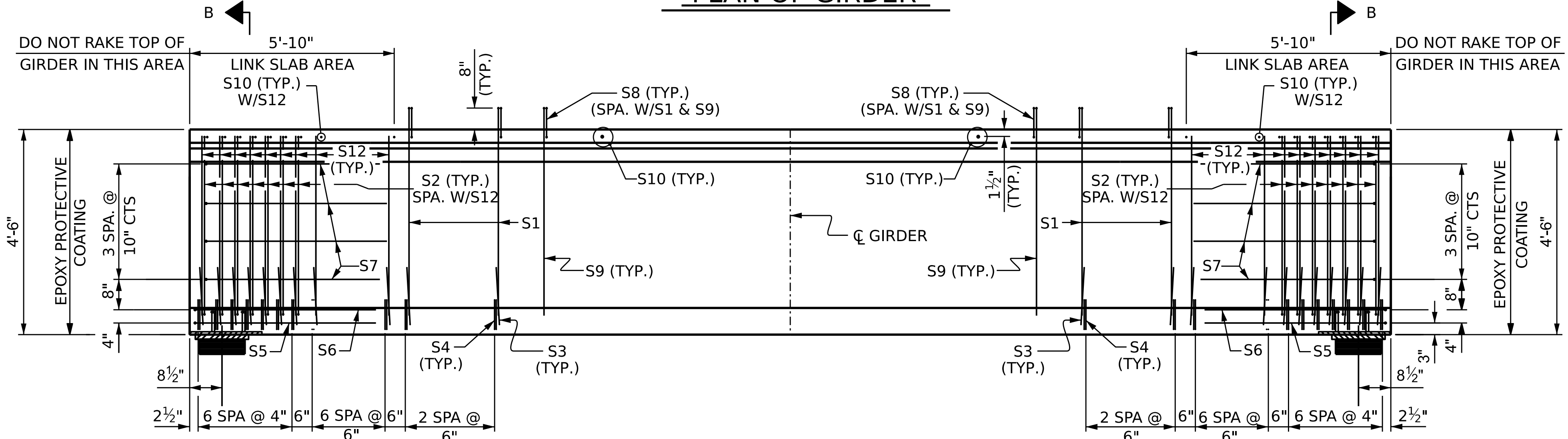


PLAN OF GIRDER



PARTIAL ELEVATION

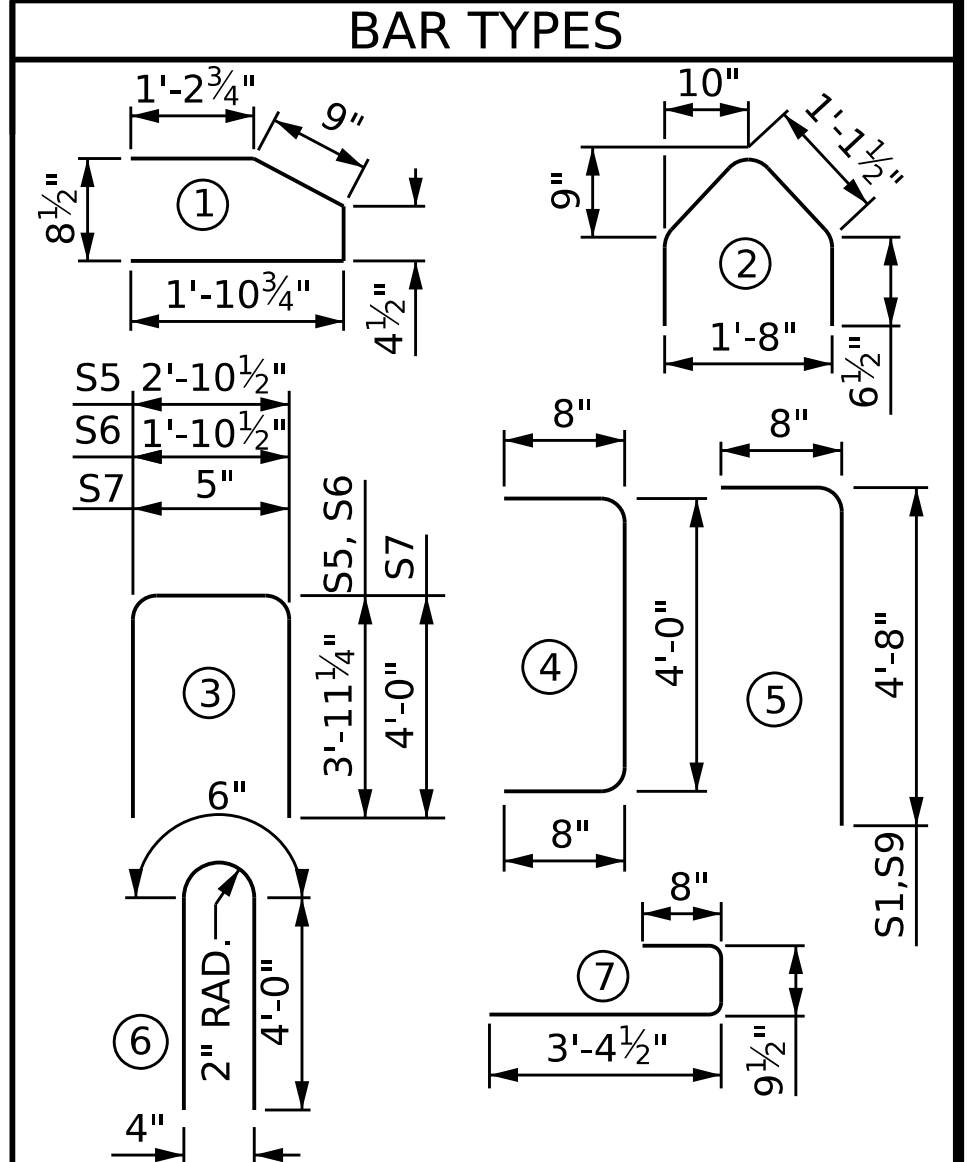
SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS



ELEVATION OF GIRDER

| 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                            | 12   | #5   | 5'-4"  | 67     |
| S2                            | 28   | #5   | 4'-4"  | 156    |
| S3                            | 34   | #3   | 2'-4"  | 43     |
| S4                            | 68   | #3   | 1'-3"  | 109    |
| S5                            | 2    | #5   | 3'-10" | 22     |
| S6                            | 2    | #5   | 3'-9"  | 20     |
| S7                            | 8    | #4   | 3'-5"  | 45     |
| S8                            | 236  | #5   | 7'-4"  | 1190   |
| S9                            | 224  | #4   | 5'-4"  | 798    |
| S10                           | 80   | #5   | STR    | 306    |
| S12                           | 36   | #5   | 6'-8"  | 319    |
| S14                           | 10   | #4   | STR    | 53     |



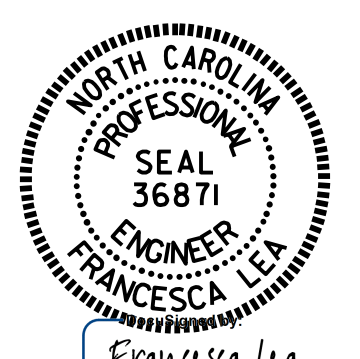
| QUANTITIES FOR ONE GIRDER |                        |                         |
|---------------------------|------------------------|-------------------------|
| REINFORCING STEEL LB.     | 9500 PSI CONCRETE C.Y. | 0.6" Ø L.R. STRANDS No. |
| 3128                      | 28.7                   | 56                      |

| GIRDERS REQUIRED |         |              |
|------------------|---------|--------------|
| NUMBER           | LENGTH  | TOTAL LENGTH |
| 4                | 119'-8" | 478'-8"      |

PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 54" FIB PRESTRESSED  
 CONCRETE GIRDER  
 LINK SLAB  
 SPAN B

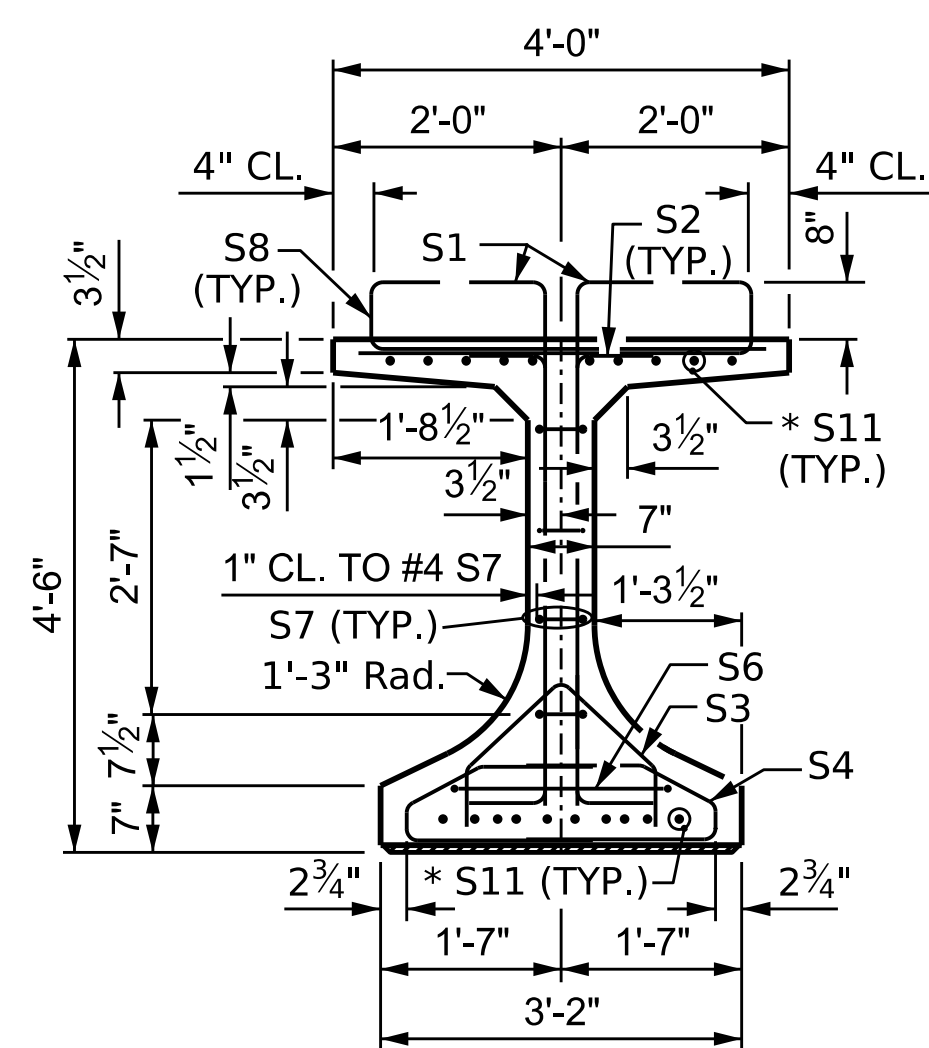


| REVISIONS |     |       |     | SHEET NO. |
|-----------|-----|-------|-----|-----------|
| NO.       | BY: | DATE: | NO. | DATE:     |
| 1         |     |       | 3   |           |
| 2         |     |       | 4   |           |

|              |      |
|--------------|------|
| TOTAL SHEETS | S-15 |
|              | 36   |

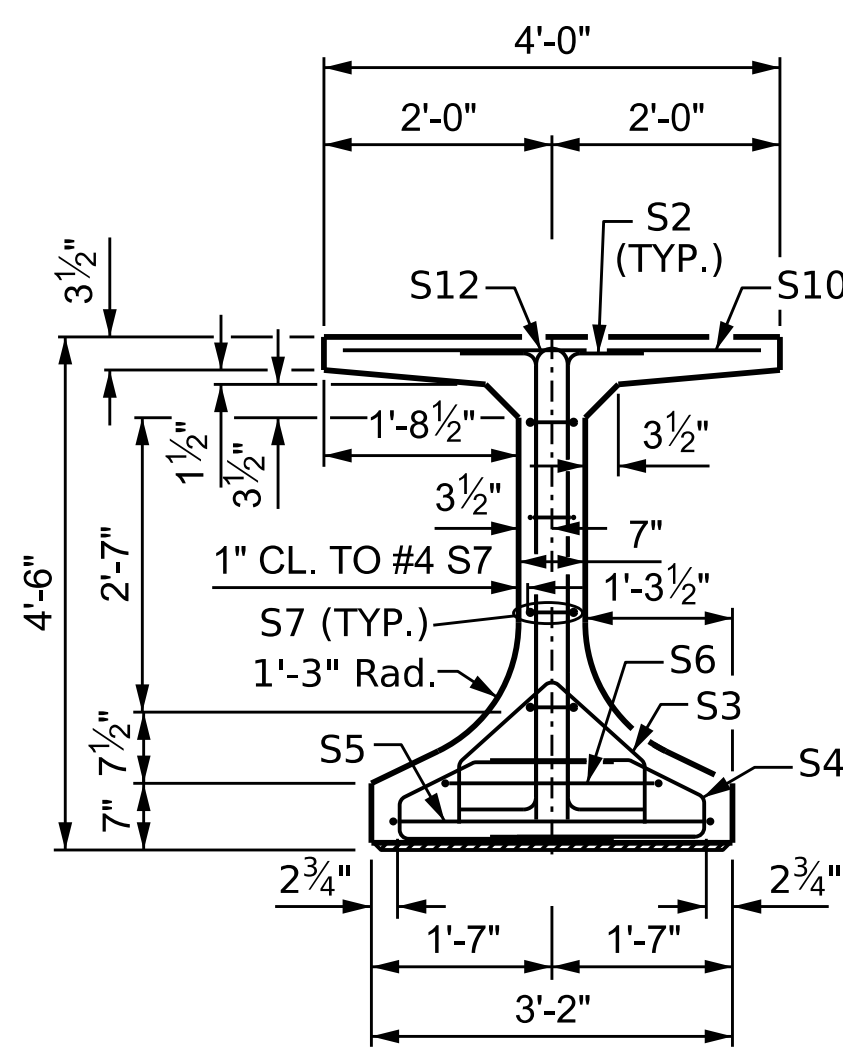
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY: E. BAYISSA DATE: 07/2023  
 CHECKED BY: Z. MALIK DATE: 10/2023  
 DRAWN BY: BNB 01/21  
 CHECKED BY: AAI 08/22

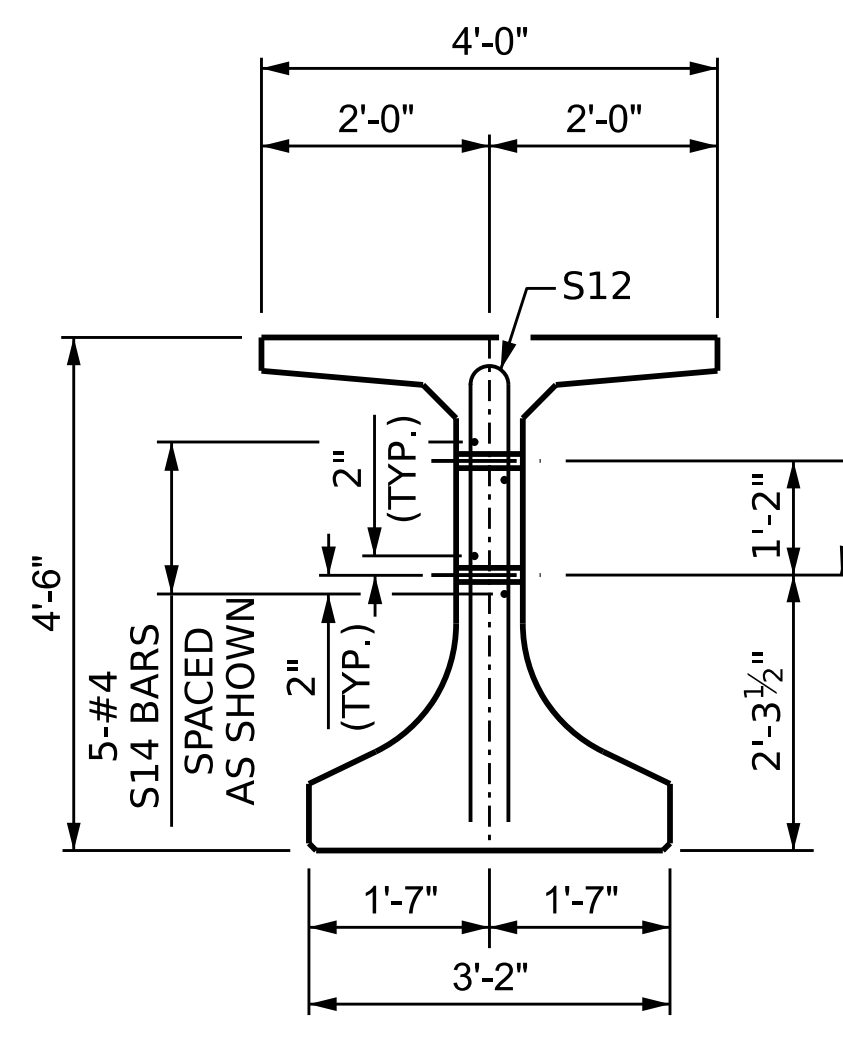


SECTION A-A

\* FOR S11 BARS, SEE DETAIL "C" OF "FLORIDA I BEAM INTEGRAL END BENT DETAILS" SHEET



SECTION B-B

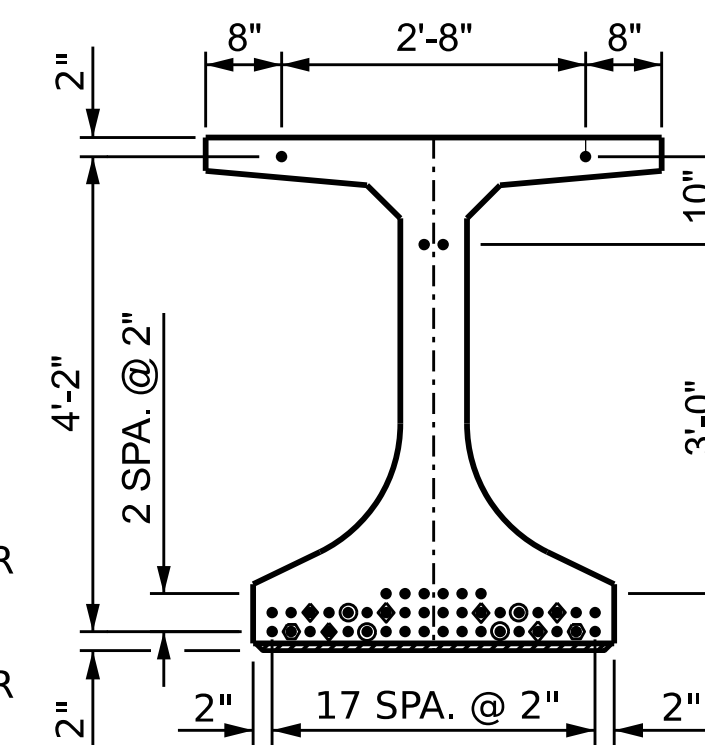


SECTION C-C  
(S8, S9 AND S10 BARS NOT SHOWN)

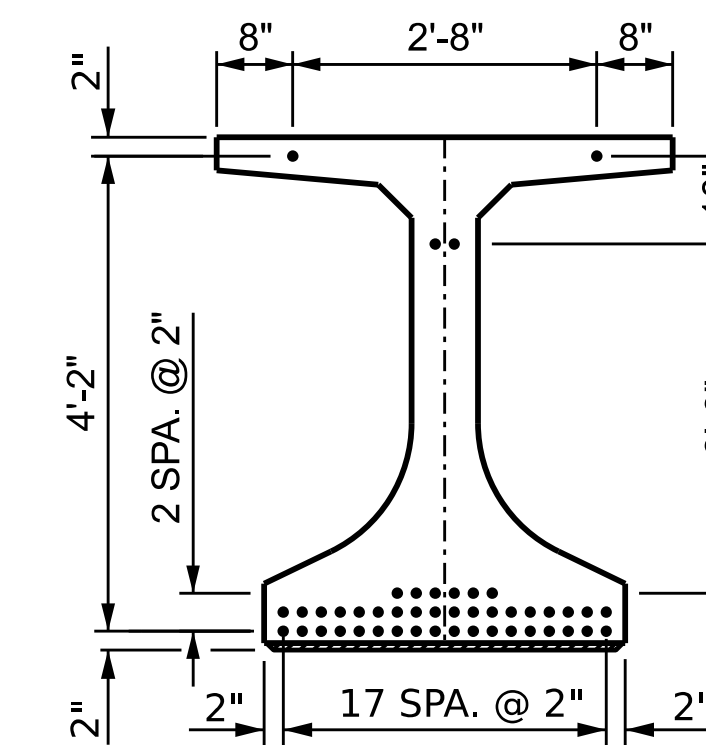
∅ 1 1/2" FORMED HOLE. (SEE FRAMING PLAN FOR LOCATION)

DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ◇ STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER
- ⊙ STRANDS DEBONDED FOR 18'-0" FROM END OF GIRDER



AT END OF GIRDER

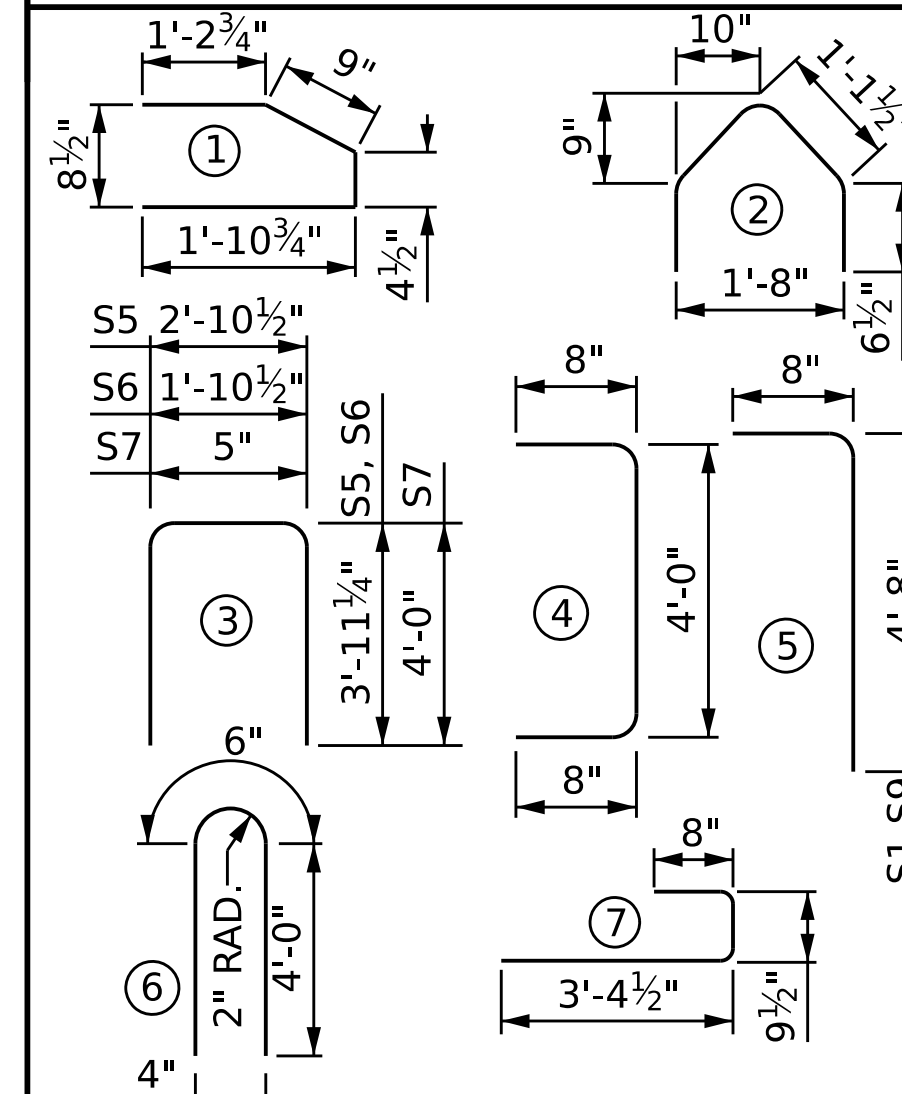


AT ∅ OF GIRDER

0.6" ∅ LOW RELAXATION STRAND LAYOUT

| 0.6" ∅ 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                             | 44                                  | #5                                  | 5'-4"     | 245    |
| S2                             | 28                                  | #5                                  | 4'-4"     | 156    |
| S3                             | 34                                  | #3                                  | 2'-4"     | 43     |
| S4                             | 68                                  | #3                                  | 1'-3"     | 109    |
| S5                             | 1                                   | #5                                  | 3'-10'-9" | 11     |
| S6                             | 2                                   | #5                                  | 3'-9'-9"  | 20     |
| S7                             | 8                                   | #4                                  | 3'-8"     | 45     |
| S8                             | 198                                 | #5                                  | 7'-4'-10" | 998    |
| S9                             | 154                                 | #4                                  | 5'-4"     | 549    |
| S10                            | 56                                  | #5                                  | STR       | 214    |
| * S11                          | 20                                  | #6                                  | STR       | 140    |
| S12                            | 20                                  | #5                                  | 6'-8"     | 177    |
| S13                            | 1                                   | #3                                  | STR       | 1      |
| S14                            | 10                                  | #4                                  | STR       | 53     |

BAR TYPES



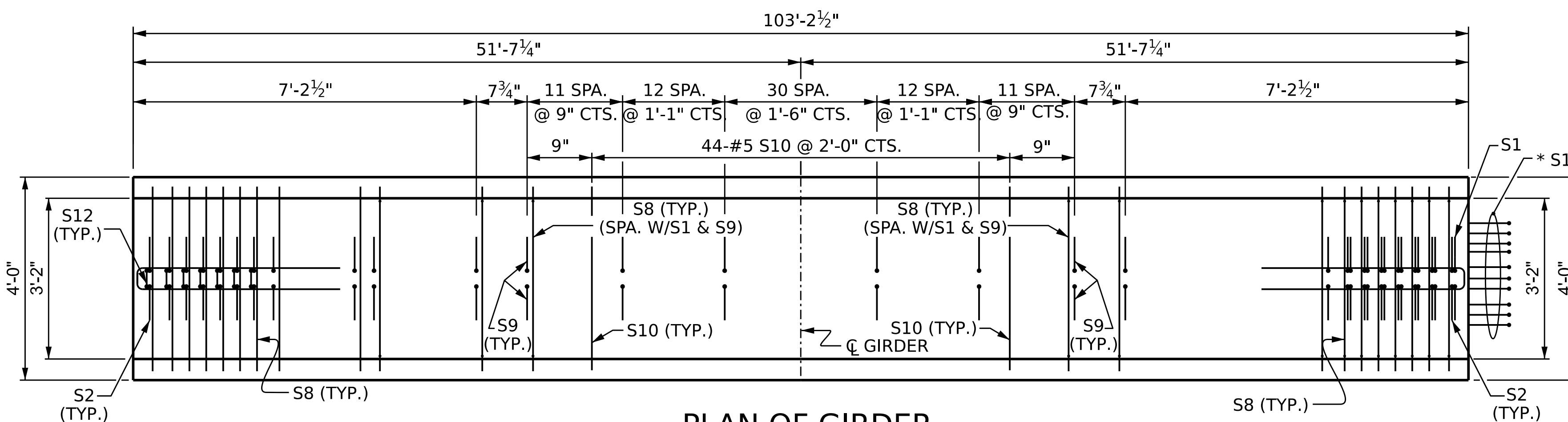
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

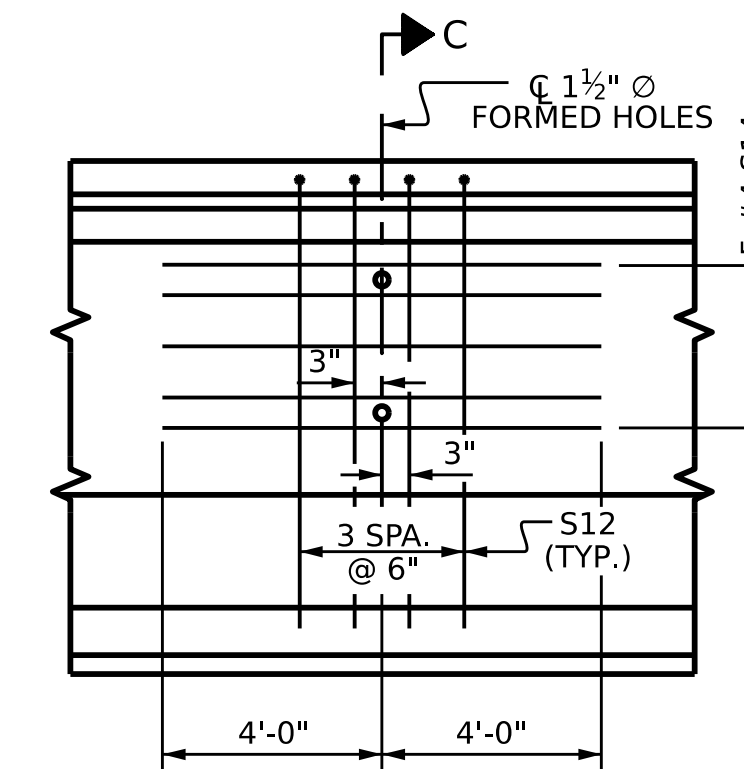
| REINFORCING STEEL | 8000 PSI CONCRETE | 0.6" ∅ L.R. STRANDS |
|-------------------|-------------------|---------------------|
| LB.               | C.Y.              | No.                 |
| 2761              | 24.8              | 46                  |

GIRDERS REQUIRED

| NUMBER | LENGTH      | TOTAL LENGTH |
|--------|-------------|--------------|
| 4      | 103'-2 1/2" | 412'-10"     |

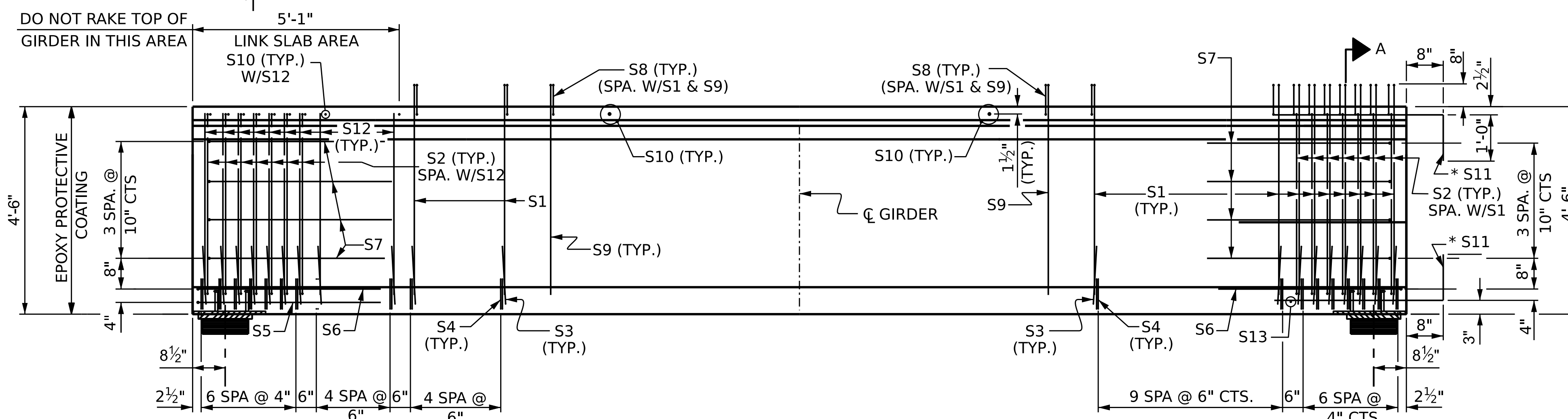


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS



ELEVATION OF GIRDER

INTEGRAL END BENT

\* NOTE:  
S11 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.



PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
STATION: 17+85.52 -L-

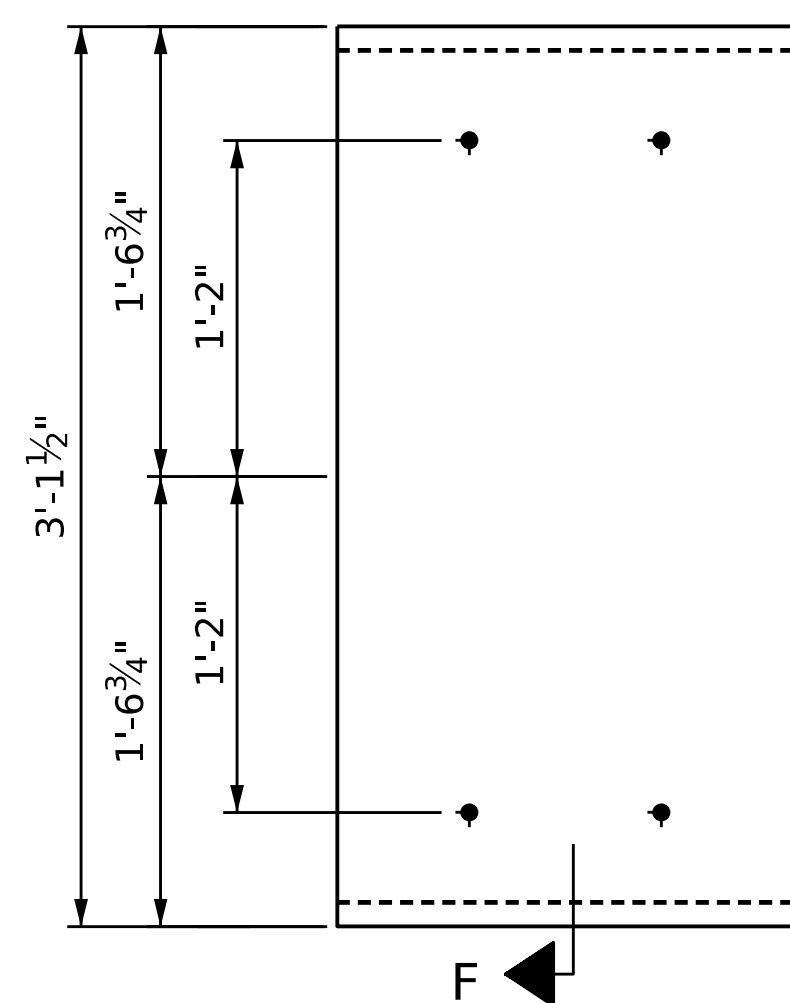
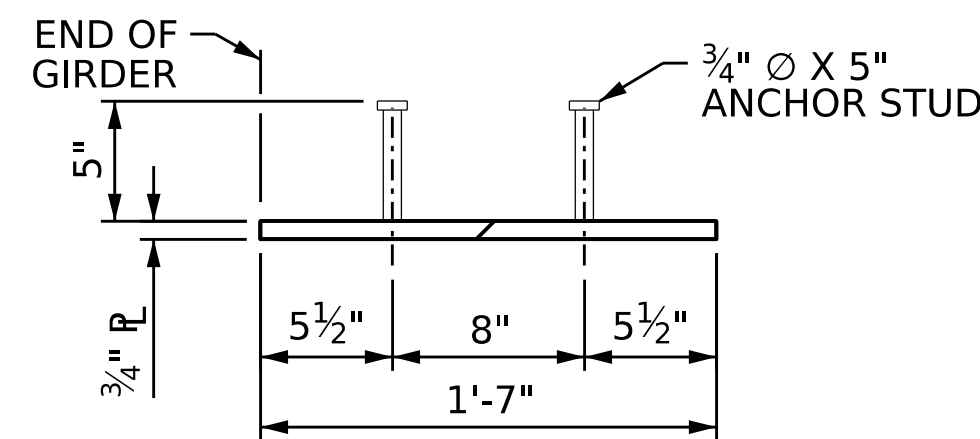
SHEET 3 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
54" FIB PRESTRESSED  
CONCRETE GIRDER  
LINK SLAB  
SPAN C

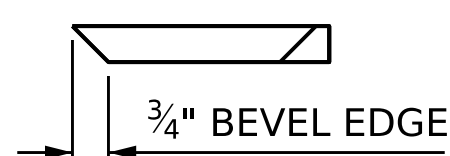
| REVISIONS |     |       |     | SHEET NO. |
|-----------|-----|-------|-----|-----------|
| NO.       | BY: | DATE: | NO. | DATE:     |
| 1         |     |       | 3   |           |
| 2         |     |       | 4   |           |

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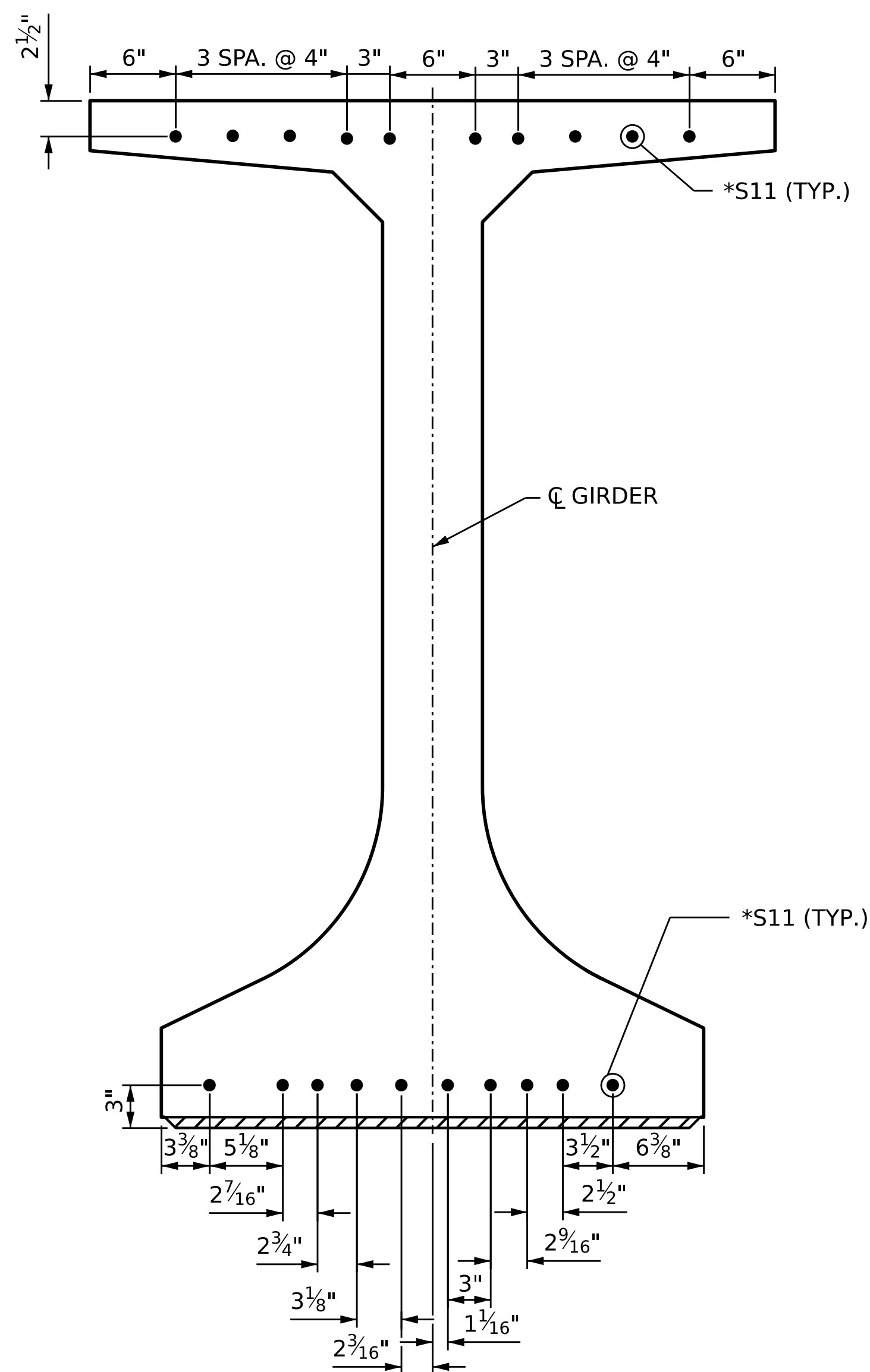
ASSEMBLED BY: E. BAYISSA DATE: 07/2023  
CHECKED BY: Z. MALIK DATE: 10/2023  
DRAWN BY: BNB 01/21  
CHECKED BY: AAI 08/22



**EMBEDDED PLATE "B-1" DETAILS  
FOR FLORIDA I BEAM**  
(2 REQ'D PER GIRDER)



**SECTION "F"**  
(SEE NOTES)



**DETAIL "C"**  
(FLORIDA I BEAM)

**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 SUB SECTION 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 4600 PSI FOR SPAN A, NOT LESS THAN 7200 PSI FOR SPAN B, AND NOT LESS THAN 5600 PSI FOR SPAN C.

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" AND THE PORTION WITHIN THE LINK SLAB AREAS, SHALL BE RAKED TO A DEPTH OF 1/4".

NO WELDING OF THE FORMS OR FALSEWORK TO THE TOP OF THE GIRDER WILL BE PERMITTED IN THE LINK SLAB AREAS.

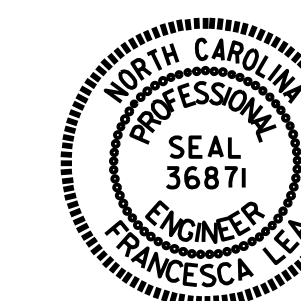
THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.

PROJECT NO. BR-0093

ROCKINGHAM COUNTY

STATION: 17+85.52 -L-

SHEET 4 OF 4



DocuSigned by:  
Francesca Lee  
05/01/2024

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
FLORIDA I BEAMS  
INTEGRAL END BENT  
DETAILS

|                          |               |
|--------------------------|---------------|
| ASSEMBLED BY: E. BAYISSA | DATE: 01/2024 |
| CHECKED BY: ZIA MALIK    | DATE: 01/2024 |
| DRAWN BY: AAI 09/23      |               |
| CHECKED BY: -            |               |

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   |     |       | 36           |

## 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 ¼ 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.

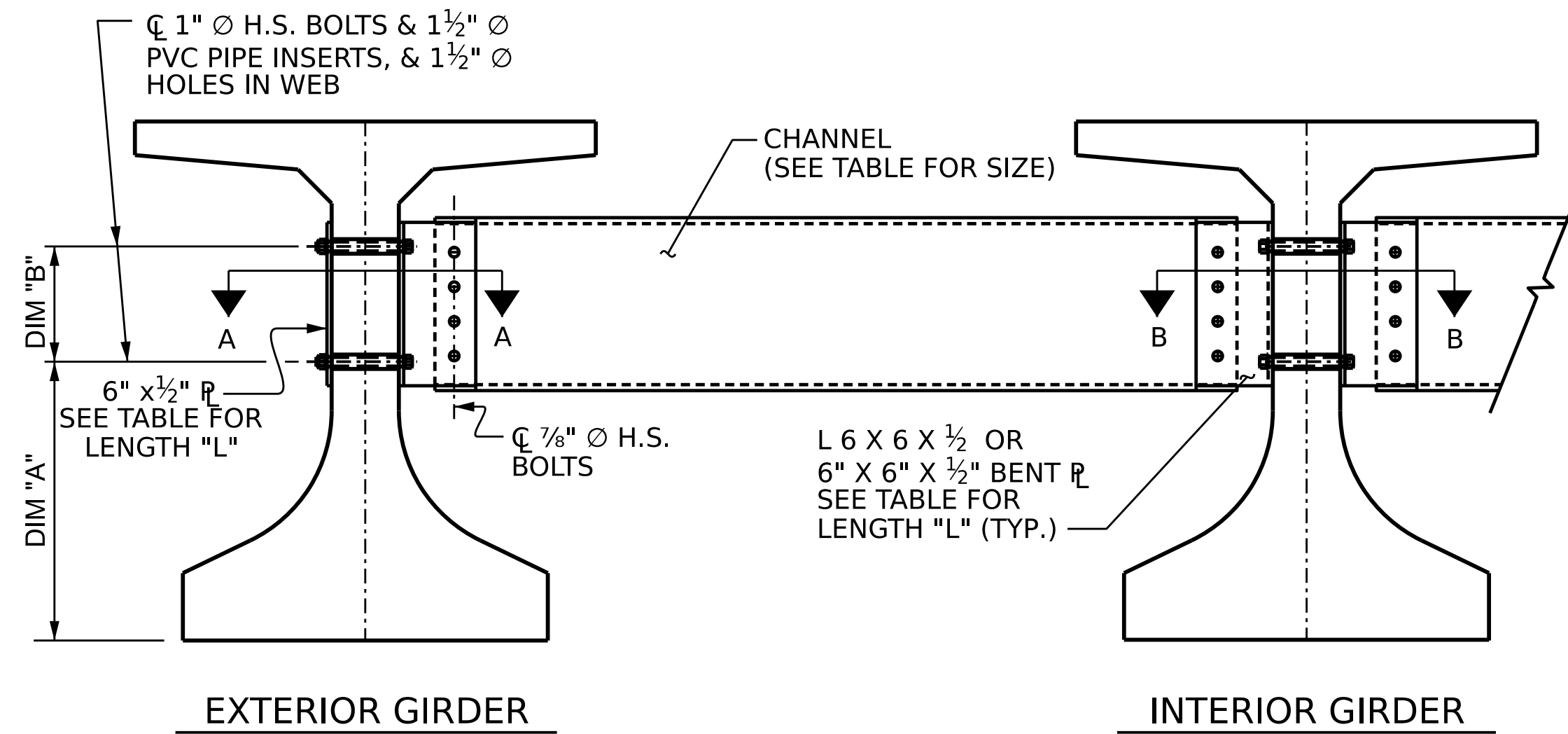
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST ¼" PROJECTION BEYOND THE NUT.

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.

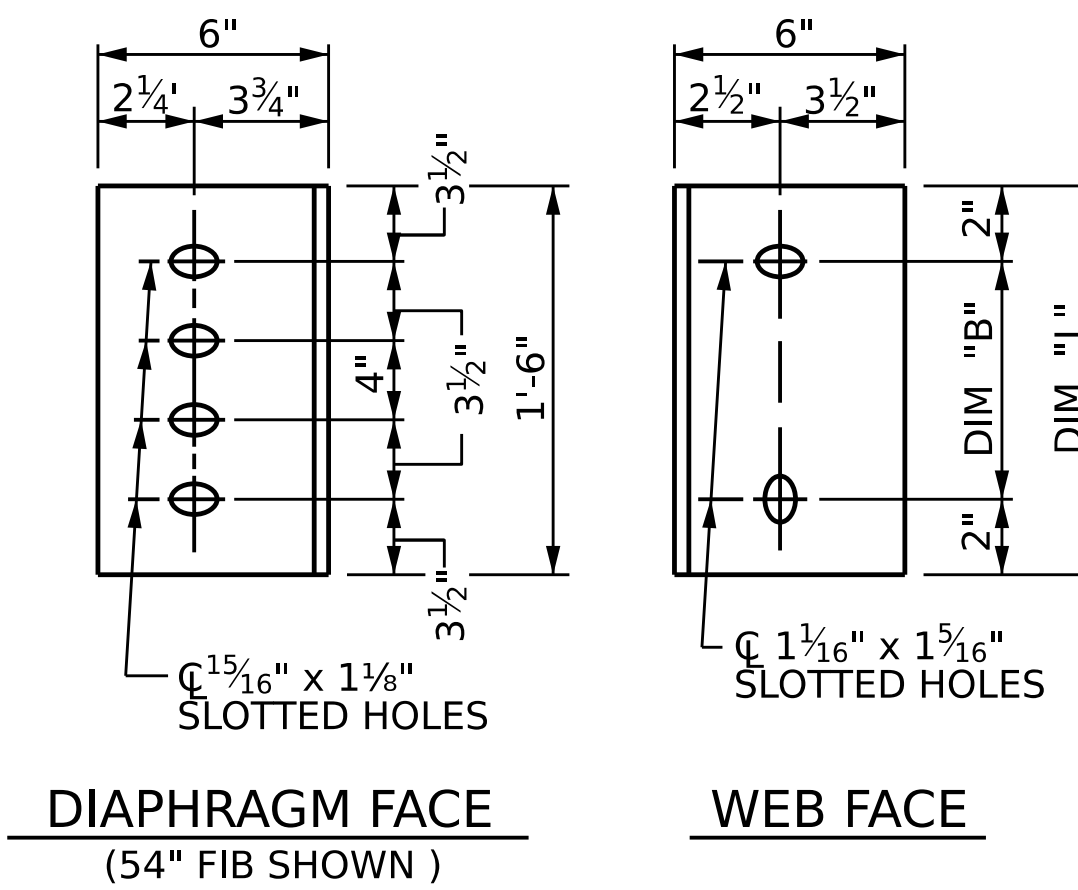
IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

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

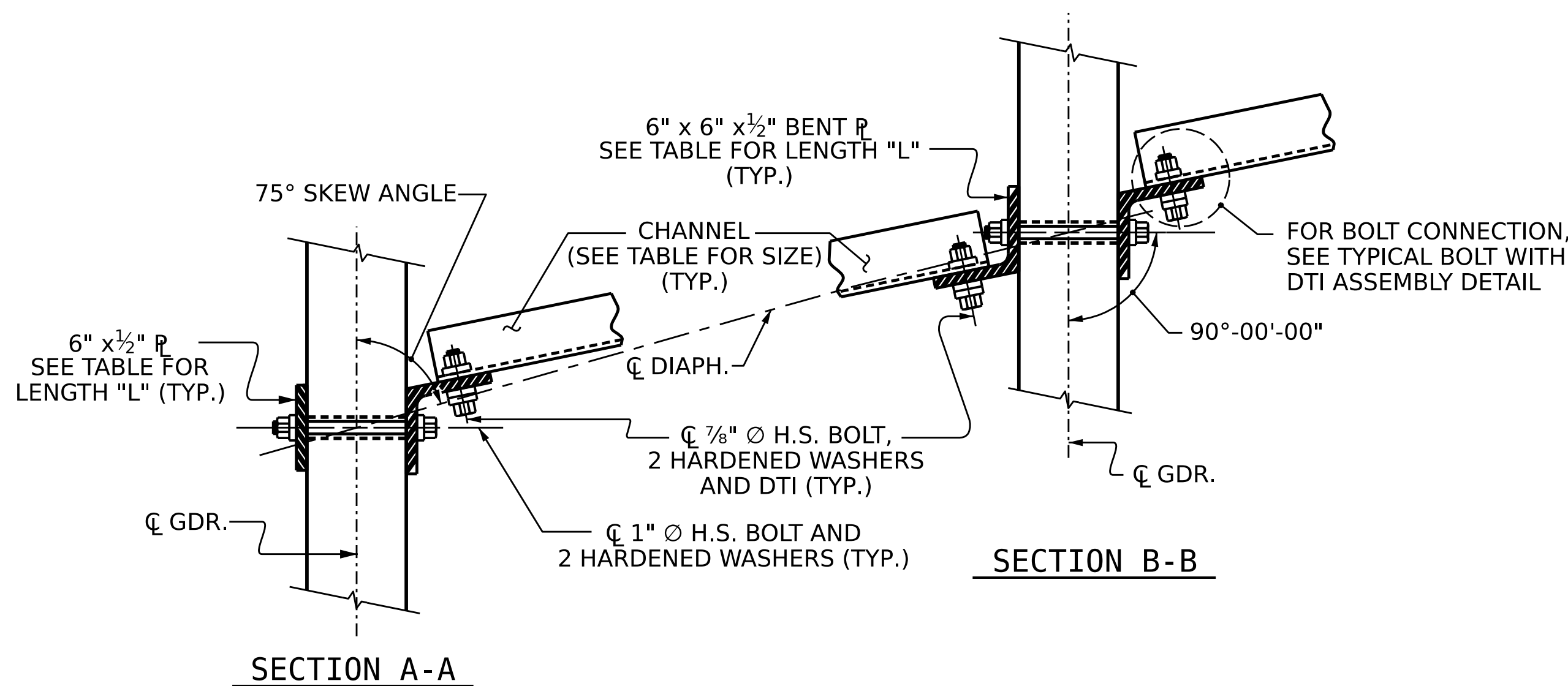


### PART SECTION AT INTERMEDIATE DIAPHRAGM

(54" FIB SHOWN)

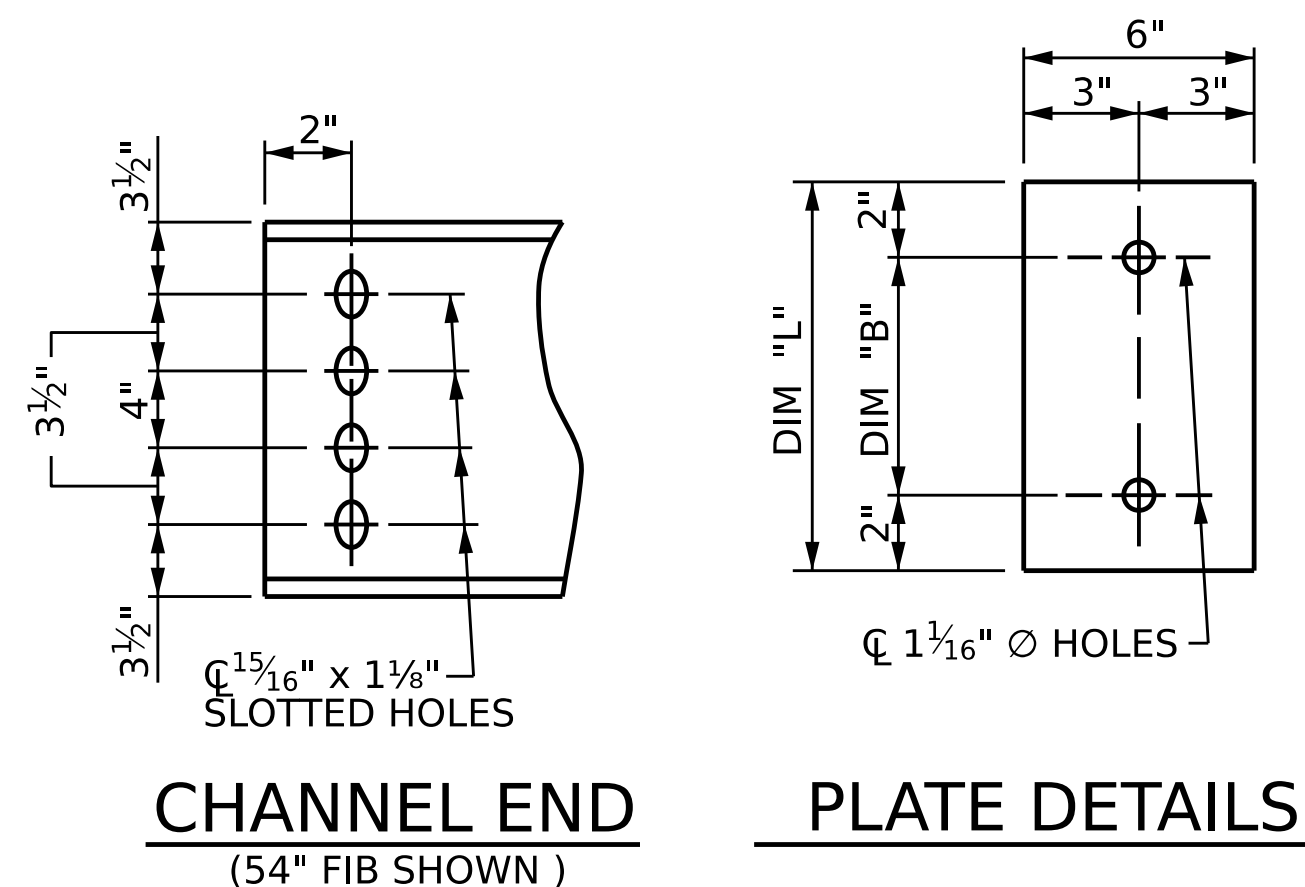


### CONNECTOR PLATE DETAILS

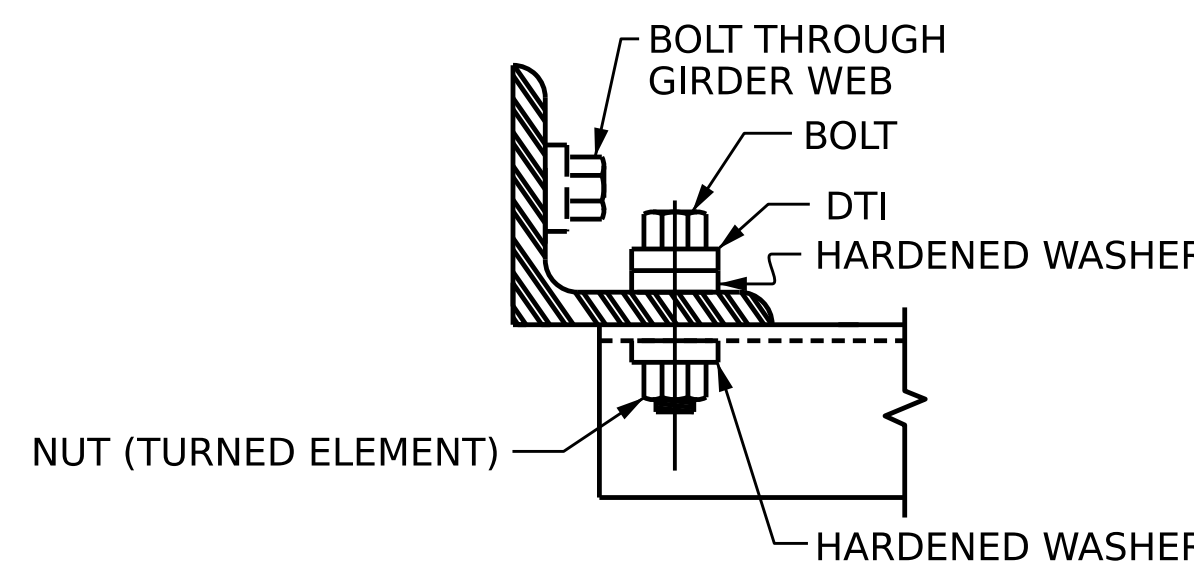


### CONNECTION DETAILS

(FOR 70° ≤ SKEW < 90°)



### CHANNEL END PLATE DETAILS

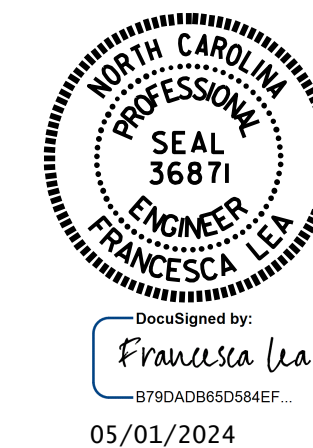


### BOLT WITH DTI ASSEMBLY DETAIL

### TABLE

| GIRDER TYPE | CHANNEL SIZE | DIM "A" | DIM "B" | DIM "L" |
|-------------|--------------|---------|---------|---------|
| 54" FIB     | MC 18 x 42.7 | 2'-3½"  | 1'-2"   | 1'-6"   |

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
**INTERMEDIATE  
 STEEL DIAPHRAGMS  
 FOR 54" FIB**

|                          |                |
|--------------------------|----------------|
| ASSEMBLED BY : E.BAYISSA | DATE : 07/2023 |
| CHECKED BY : ZIA MALIK   | DATE : 10/2023 |
| DRAWN BY : BNB 01/21     | REV. ---/--    |
| CHECKED BY : AAI 01/21   | REV. ---/--    |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO.       |
|-----------|-----|-------|-----|-----|-------|-----------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-18            |
| 1         |     |       | 3   |     |       | TOTAL SHEETS 36 |
| 2         |     |       | 4   |     |       |                 |

**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.

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.

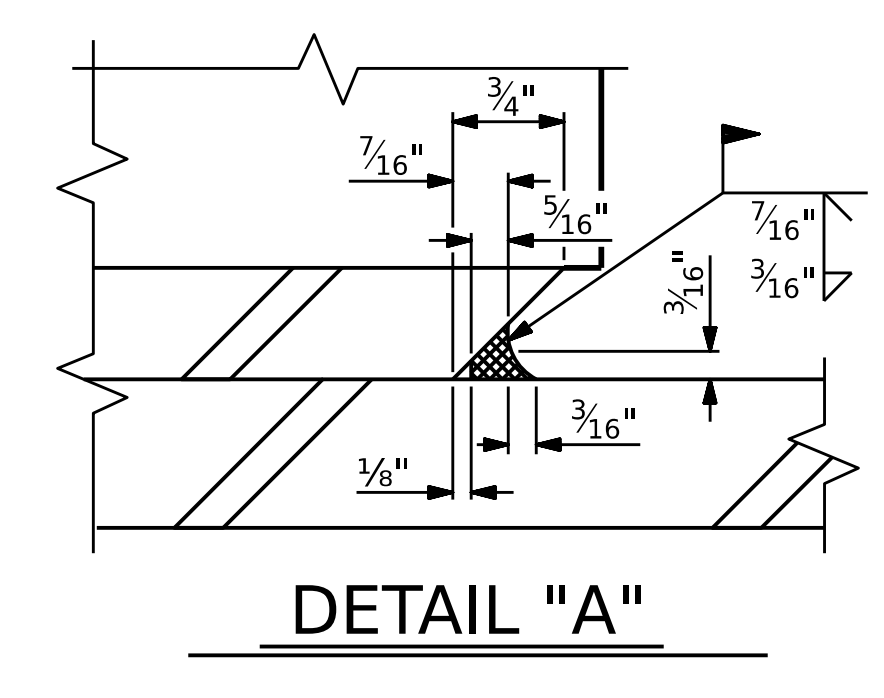
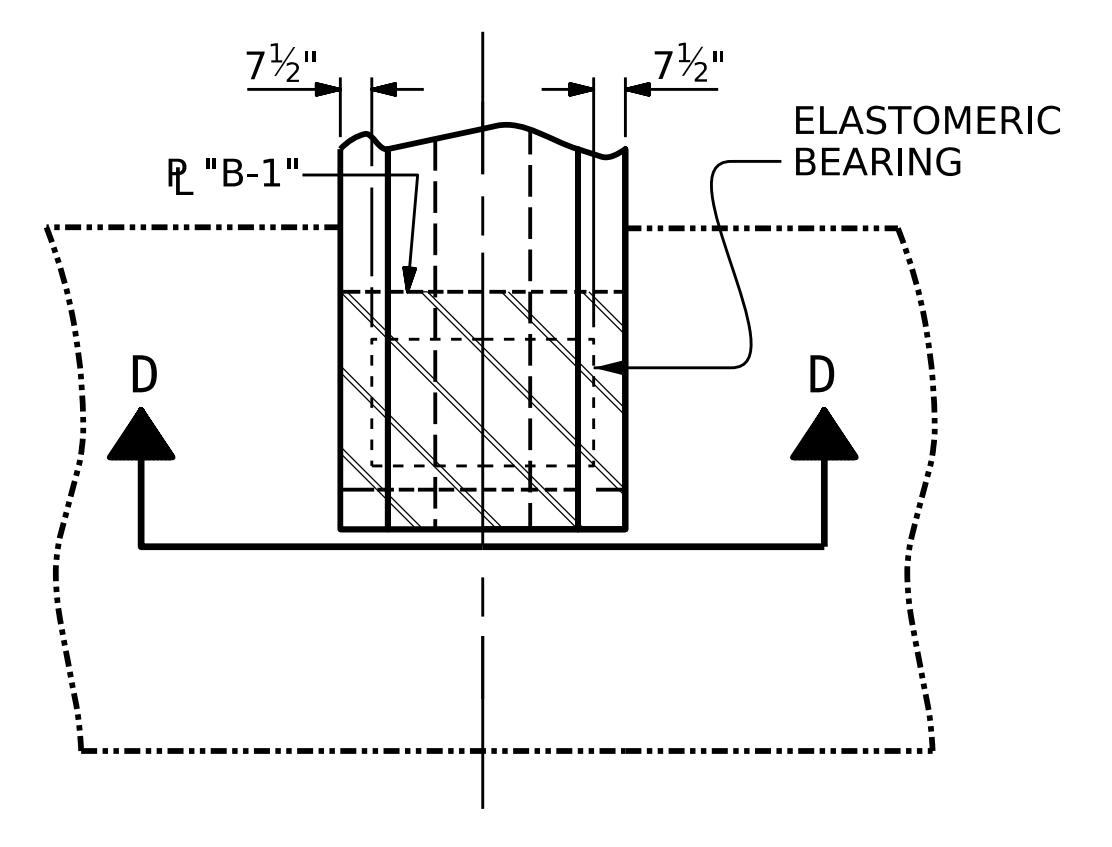
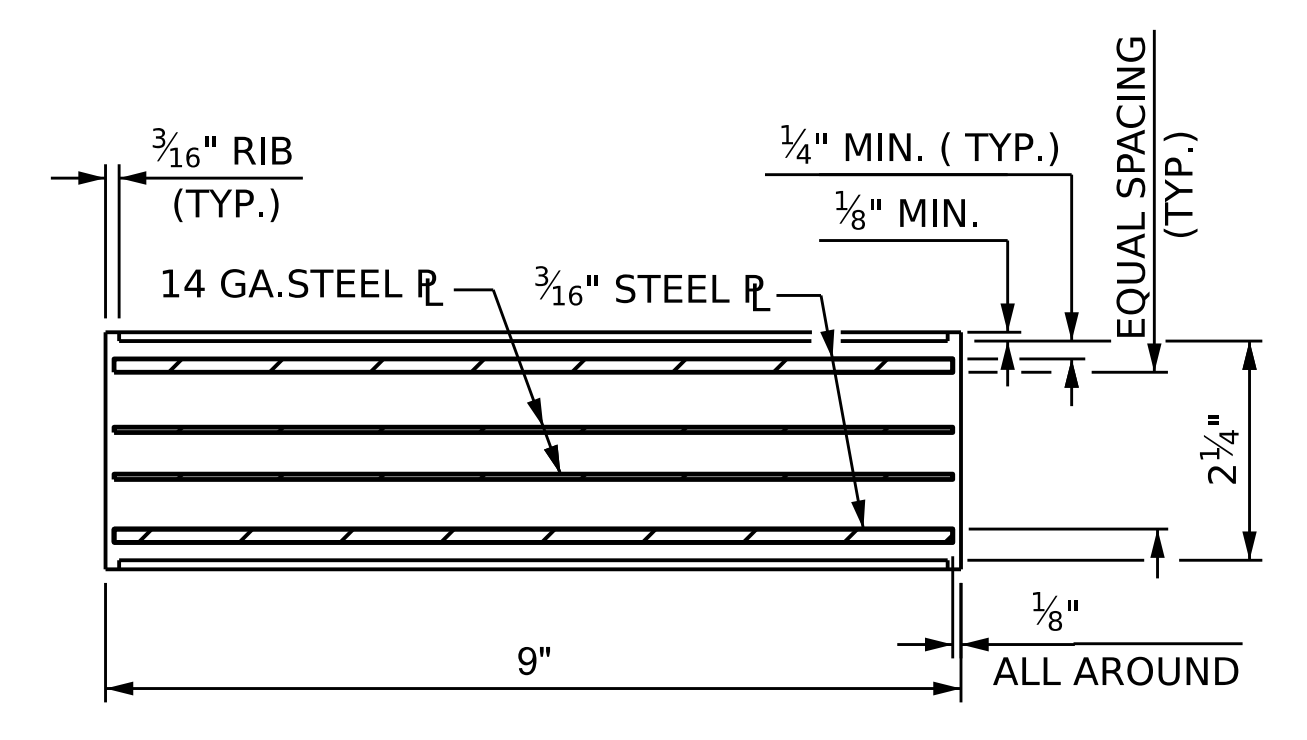
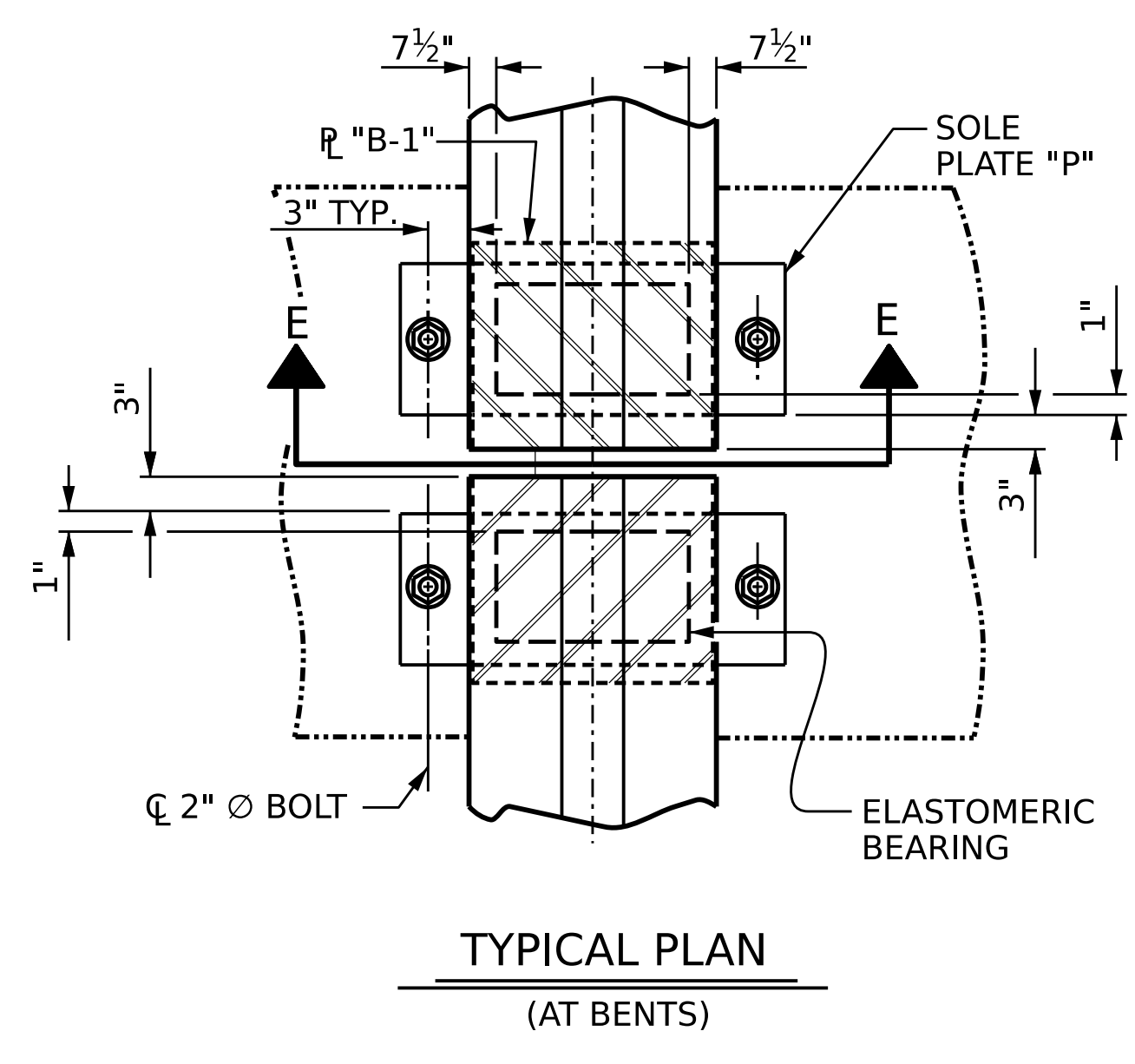
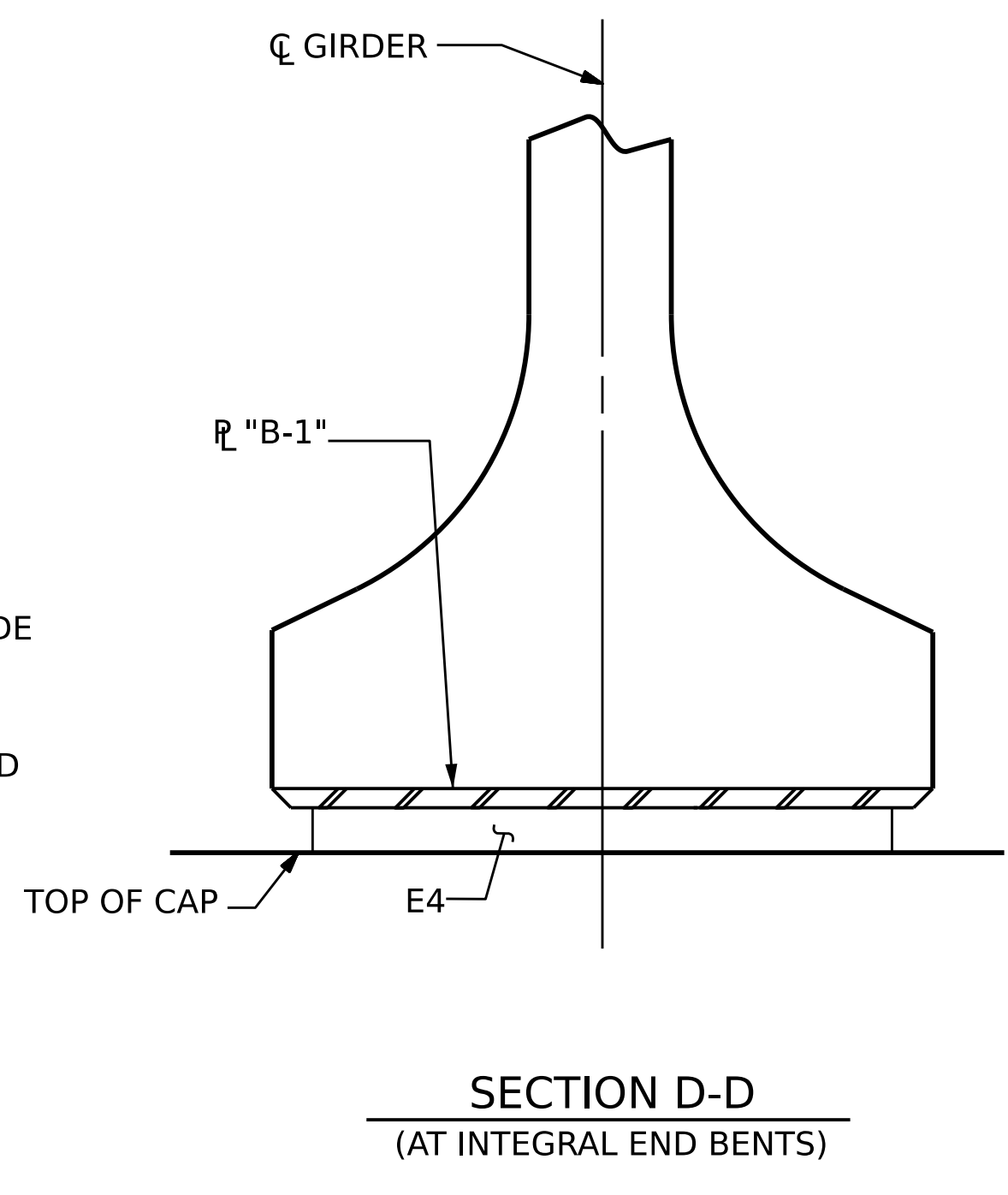
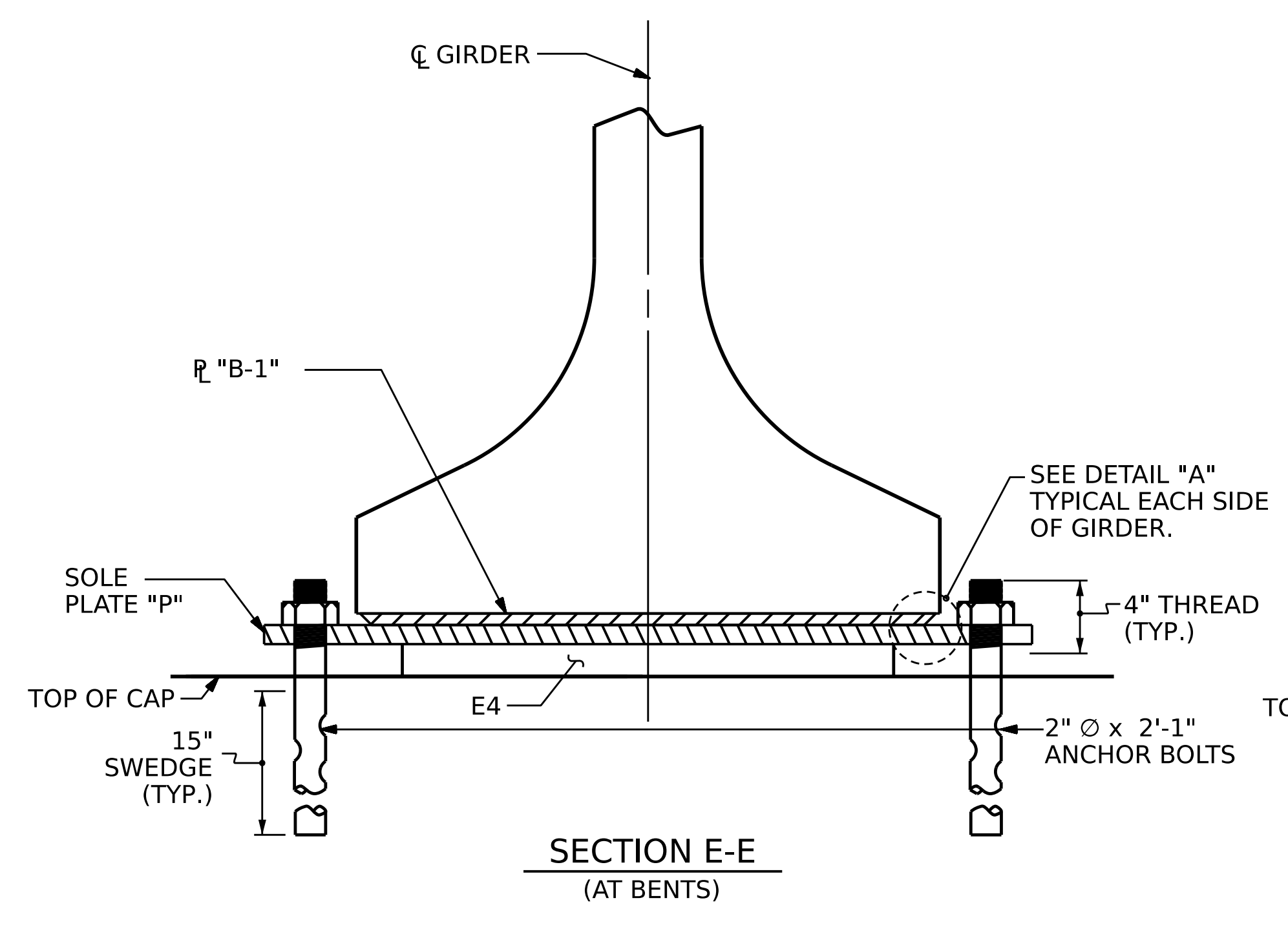
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

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 STANDARD SPECIFICATIONS.

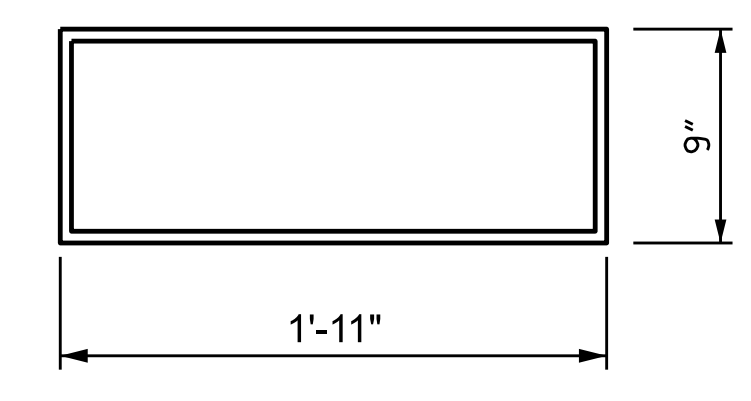
ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



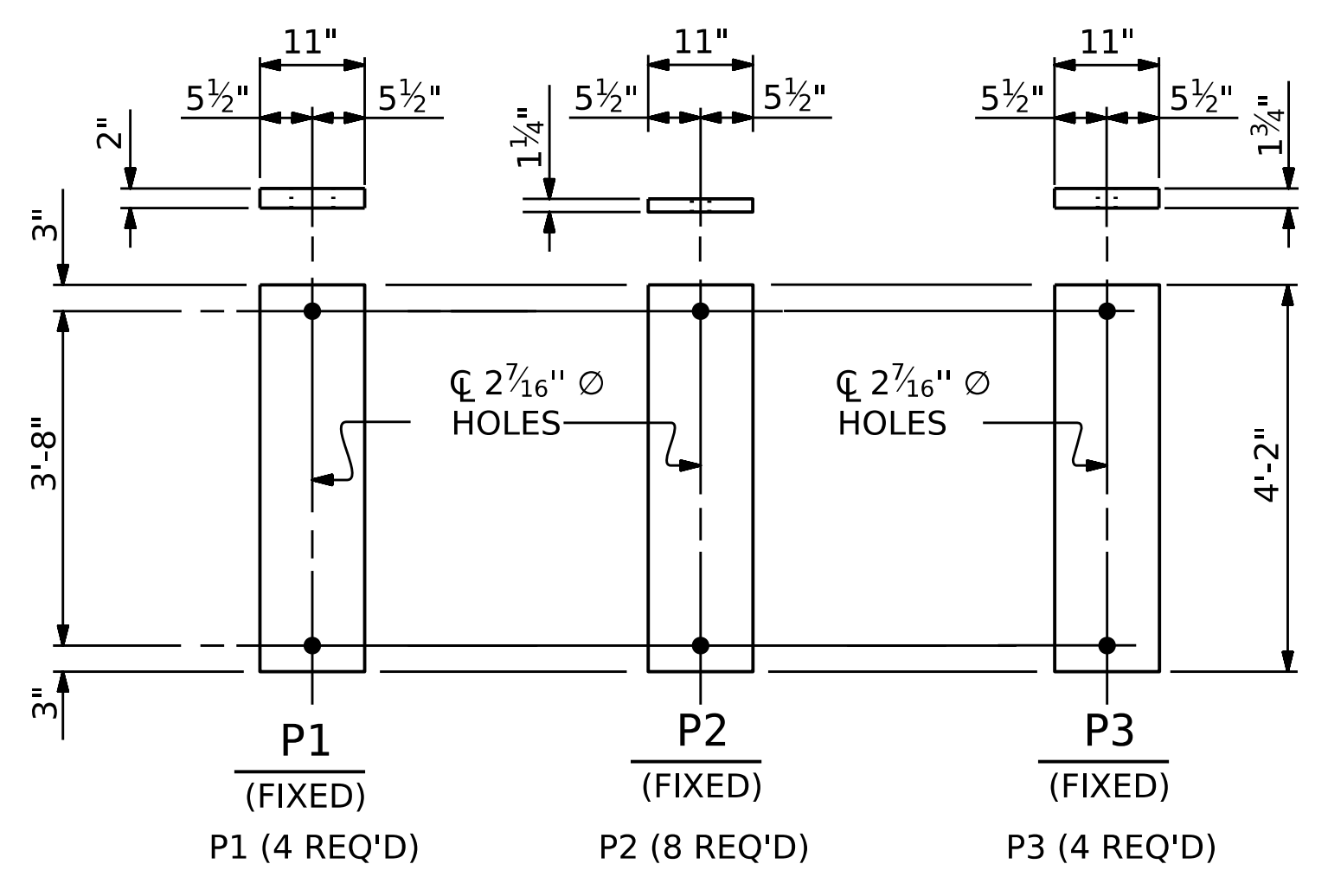
|                                 |       |
|---------------------------------|-------|
| MAXIMUM ALLOWABLE SERVICE LOADS |       |
| D.L.+L.L. (NO IMPACT)           |       |
| TYPE V                          | 365 k |

TYPICAL SECTION OF ELASTOMERIC BEARINGS

TYPICAL PLAN AT INTEGRAL END BENTS

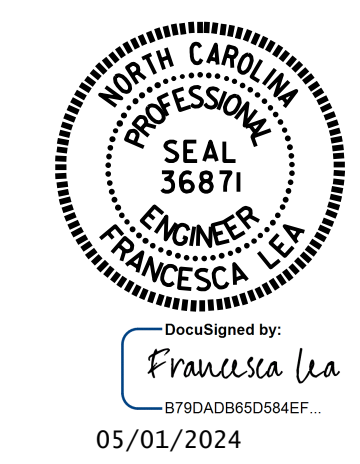


E4 (24 REQ'D) PLAN VIEW OF ELASTOMERIC BEARING TYPE V



SOLE PLATE DETAILS ("P")

PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 ELASTOMERIC BEARING  
 DETAILS  
 FIB SUPERSTRUCTURE

DRAWN BY: E. BAYISSA DATE: 07/2023  
 CHECKED BY: Z. MALIK DATE: 10/2023  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 07/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-19         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 36           |

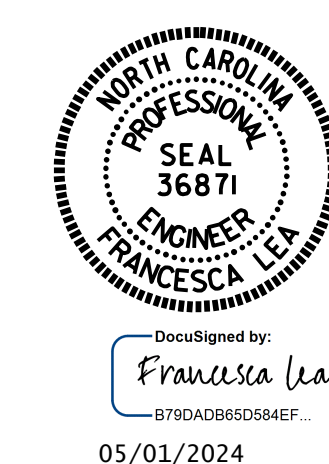
| DEAD LOAD DEFLECTION TABLE FOR GIRDERS |                  |     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |   |
|--|------------------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| SPAN A                                 |                  |     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |   |
| 0.6"Ø LOW RELAXATION                   | GIRDERS 1 THRU 4 |     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |   |
| TWENTIETH POINTS                       | 0                | .05 | .1    | .15   | .2    | .25   | .3    | .35   | .4    | .45   | .5    | .55   | .6    | .65   | .7    | .75   | .8    | .85   | .9    | .95   | 0     |   |
| CAMBER (GIRDER ALONE IN PLACE)         | ↑                | 0   | 0.012 | 0.023 | 0.033 | 0.044 | 0.052 | 0.060 | 0.065 | 0.070 | 0.072 | 0.074 | 0.072 | 0.070 | 0.065 | 0.060 | 0.052 | 0.044 | 0.033 | 0.023 | 0.012 | 0 |
| * DEFLECTION DUE TO SUPERIMPOSED D.L.  | ↓                | 0   | 0.003 | 0.007 | 0.01  | 0.013 | 0.015 | 0.018 | 0.019 | 0.021 | 0.021 | 0.022 | 0.021 | 0.021 | 0.019 | 0.018 | 0.015 | 0.013 | 0.01  | 0.007 | 0.003 | 0 |
| FINAL CAMBER                           | ↑                | 0   | 1/8"  | 3/16" | 5/16" | 3/8"  | 7/16" | 1/2"  | 9/16" | 5/8"  | 9/16" | 5/8"  | 5/8"  | 9/16" | 9/16" | 1/2"  | 7/16" | 3/8"  | 5/16" | 3/16" | 1/8"  | 0 |

| DEAD LOAD DEFLECTION TABLE FOR GIRDERS |                  |      |       |      |      |       |      |       |      |       |      |        |      |        |        |      |      |        |        |        |      |      |      |        |        |        |      |      |        |        |      |        |      |       |      |       |      |       |      |      |       |   |
|--|------------------|------|-------|------|------|-------|------|-------|------|-------|------|--------|------|--------|--------|------|------|--------|--------|--------|------|------|------|--------|--------|--------|------|------|--------|--------|------|--------|------|-------|------|-------|------|-------|------|------|-------|---|
| SPAN B                                 |                  |      |       |      |      |       |      |       |      |       |      |        |      |        |        |      |      |        |        |        |      |      |      |        |        |        |      |      |        |        |      |        |      |       |      |       |      |       |      |      |       |   |
| 0.6"Ø LOW RELAXATION                   | GIRDERS 1 THRU 4 |      |       |      |      |       |      |       |      |       |      |        |      |        |        |      |      |        |        |        |      |      |      |        |        |        |      |      |        |        |      |        |      |       |      |       |      |       |      |      |       |   |
| FOURIETH POINTS                        | 0                | .025 | .05   | .075 | .1   | .125  | .15  | .175  | .2   | .225  | .25  | .275   | .3   | .325   | .35    | .375 | .4   | .425   | .45    | .475   | .5   | .525 | .55  | .575   | .6     | .625   | .65  | .675 | .7     | .725   | .75  | .775   | .8   | .825  | .85  | .875  | .9   | .925  | .95  | .975 | 0     |   |
| CAMBER (GIRDER ALONE IN PLACE)         | ↑                | 0    | 0.03  | 0.05 | 0.08 | 0.1   | 0.13 | 0.15  | 0.18 | 0.2   | 0.22 | 0.24   | 0.25 | 0.27   | 0.28   | 0.29 | 0.31 | 0.32   | 0.32   | 0.33   | 0.33 | 0.33 | 0.33 | 0.32   | 0.32   | 0.31   | 0.29 | 0.28 | 0.27   | 0.25   | 0.24 | 0.22   | 0.2  | 0.18  | 0.15 | 0.13  | 0.1  | 0.08  | 0.05 | 0.03 | 0     |   |
| * DEFLECTION DUE TO SUPERIMPOSED D.L.  | ↓                | 0    | 0.02  | 0.04 | 0.06 | 0.08  | 0.10 | 0.11  | 0.13 | 0.15  | 0.16 | 0.18   | 0.19 | 0.21   | 0.21   | 0.22 | 0.23 | 0.24   | 0.24   | 0.25   | 0.25 | 0.25 | 0.25 | 0.24   | 0.24   | 0.23   | 0.22 | 0.21 | 0.21   | 0.19   | 0.18 | 0.16   | 0.15 | 0.13  | 0.11 | 0.10  | 0.08 | 0.06  | 0.04 | 0.02 | 0     |   |
| FINAL CAMBER                           | ↑                | 0    | 1/16" | 1/8" | 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" | 15/16" | 1"   | 1"   | 1"   | 15/16" | 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" | 1/8" | 1/16" | 0 |

| DEAD LOAD DEFLECTION TABLE FOR GIRDERS |                  |      |       |       |      |      |       |       |      |        |      |        |      |        |      |         |         |        |        |        |         |         |         |        |        |        |         |         |      |        |      |        |      |        |      |       |       |      |      |       |       |   |
|--|------------------|------|-------|-------|------|------|-------|-------|------|--------|------|--------|------|--------|------|---------|---------|--------|--------|--------|---------|---------|---------|--------|--------|--------|---------|---------|------|--------|------|--------|------|--------|------|-------|-------|------|------|-------|-------|---|
| SPAN C                                 |                  |      |       |       |      |      |       |       |      |        |      |        |      |        |      |         |         |        |        |        |         |         |         |        |        |        |         |         |      |        |      |        |      |        |      |       |       |      |      |       |       |   |
| 0.6"Ø LOW RELAXATION                   | GIRDERS 1 THRU 4 |      |       |       |      |      |       |       |      |        |      |        |      |        |      |         |         |        |        |        |         |         |         |        |        |        |         |         |      |        |      |        |      |        |      |       |       |      |      |       |       |   |
| FOURIETH POINTS                        | 0                | .025 | .05   | .075  | .1   | .125 | .15   | .175  | .2   | .225   | .25  | .275   | .3   | .325   | .35  | .375    | .4      | .425   | .45    | .475   | .5      | .525    | .55     | .575   | .6     | .625   | .65     | .675    | .7   | .725   | .75  | .775   | .8   | .825   | .85  | .875  | .9    | .925 | .95  | .975  | 0     |   |
| CAMBER (GIRDER ALONE IN PLACE)         | ↑                | 0    | 0.02  | 0.04  | 0.06 | 0.08 | 0.09  | 0.11  | 0.13 | 0.15   | 0.16 | 0.17   | 0.19 | 0.20   | 0.21 | 0.22    | 0.23    | 0.23   | 0.24   | 0.24   | 0.24    | 0.24    | 0.23    | 0.23   | 0.22   | 0.21   | 0.20    | 0.19    | 0.17 | 0.16   | 0.15 | 0.13   | 0.11 | 0.09   | 0.08 | 0.06  | 0.04  | 0.02 | 0    |       |       |   |
| * DEFLECTION DUE TO SUPERIMPOSED D.L.  | ↓                | 0    | 0.01  | 0.02  | 0.03 | 0.05 | 0.06  | 0.07  | 0.08 | 0.09   | 0.10 | 0.10   | 0.11 | 0.12   | 0.13 | 0.13    | 0.14    | 0.14   | 0.14   | 0.15   | 0.15    | 0.15    | 0.14    | 0.14   | 0.14   | 0.14   | 0.13    | 0.13    | 0.12 | 0.11   | 0.10 | 0.10   | 0.09 | 0.08   | 0.07 | 0.06  | 0.05  | 0.03 | 0.02 | 0.01  | 0     |   |
| FINAL CAMBER                           | ↑                | 0    | 1/16" | 3/16" | 1/4" | 3/8" | 7/16" | 9/16" | 5/8" | 11/16" | 3/4" | 13/16" | 7/8" | 15/16" | 1"   | 1 1/16" | 1 1/16" | 1 1/8" | 1 1/8" | 1 1/8" | 1 3/16" | 1 3/16" | 1 3/16" | 1 1/8" | 1 1/8" | 1 1/8" | 1 1/16" | 1 1/16" | 1"   | 15/16" | 7/8" | 13/16" | 3/4" | 11/16" | 5/8" | 9/16" | 7/16" | 3/8" | 1/4" | 3/16" | 1/16" | 0 |

\* INCLUDES FUTURE WEARING SURFACE.  
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
STATION: 17+85.52 -L-

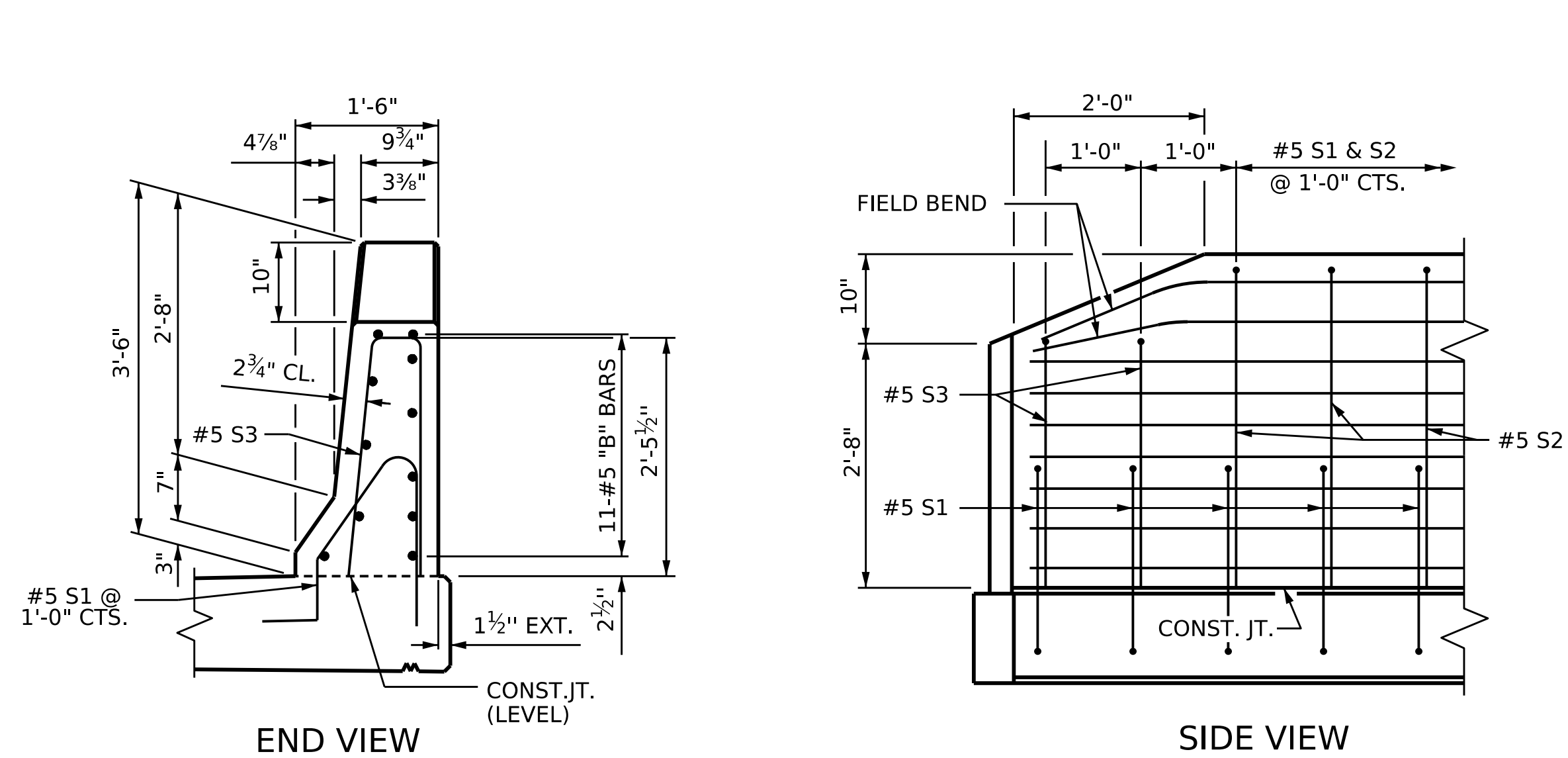


STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
SUPERSTRUCTURE  
DEFLECTION TABLE

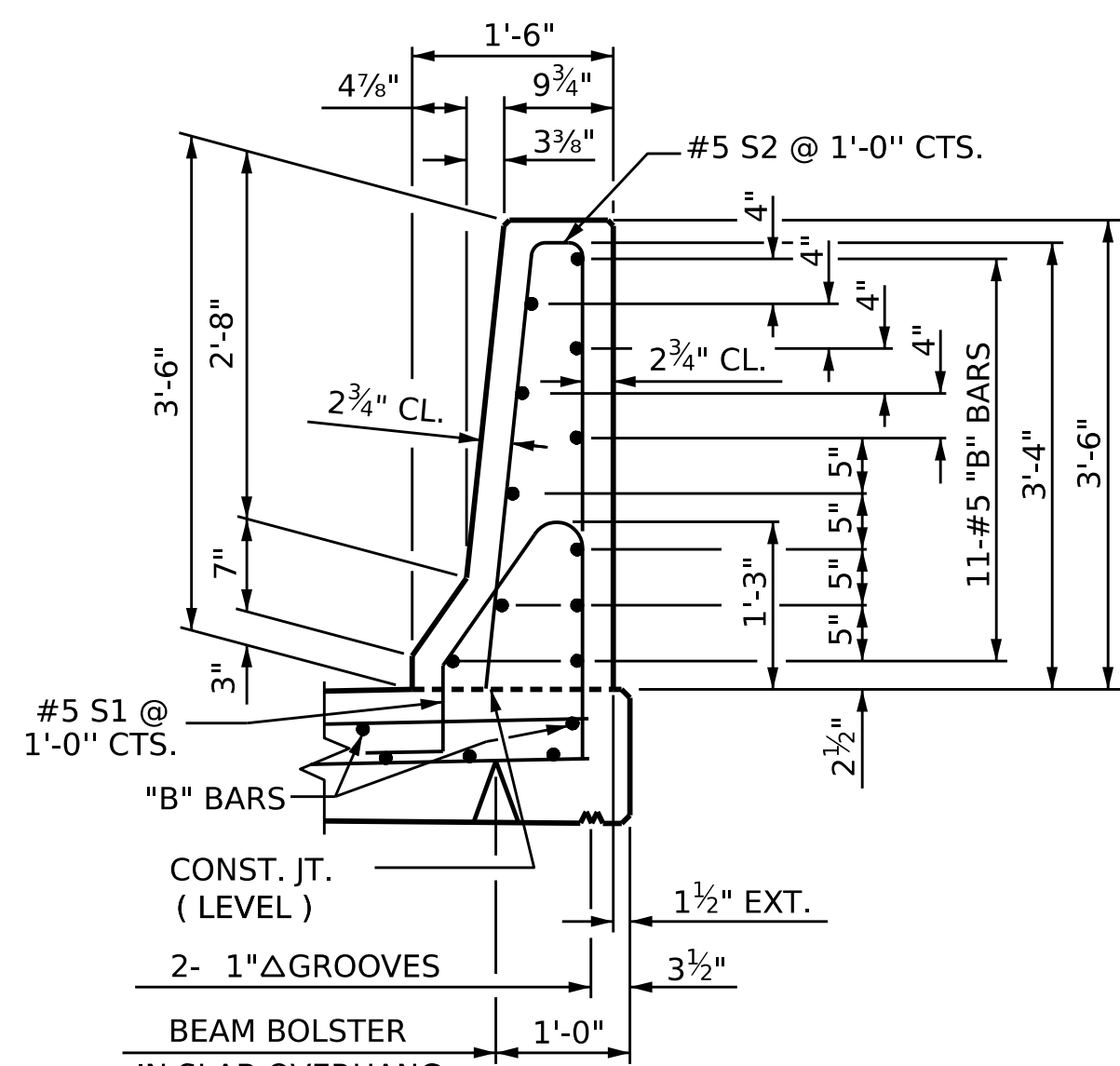
DRAWN BY : E. BAYISSA DATE : 01/2024  
CHECKED BY : ZIA MALIK DATE : 01/2024  
DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 11/2023

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

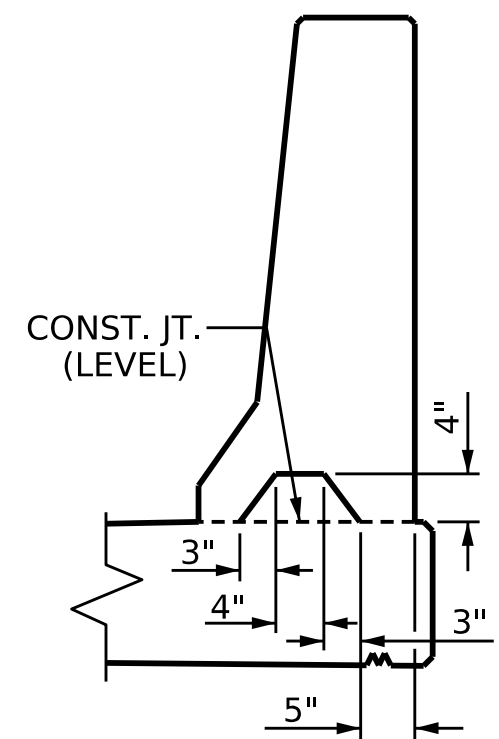
| REVISIONS |     |       |     |     |       | SHEET NO.    |
|-----------|-----|-------|-----|-----|-------|--------------|
| NO.       | BY: | DATE: | NO. | BY: | DATE: | S-20         |
| 1         |     |       | 3   |     |       | TOTAL SHEETS |
| 2         |     |       | 4   |     |       | 36           |



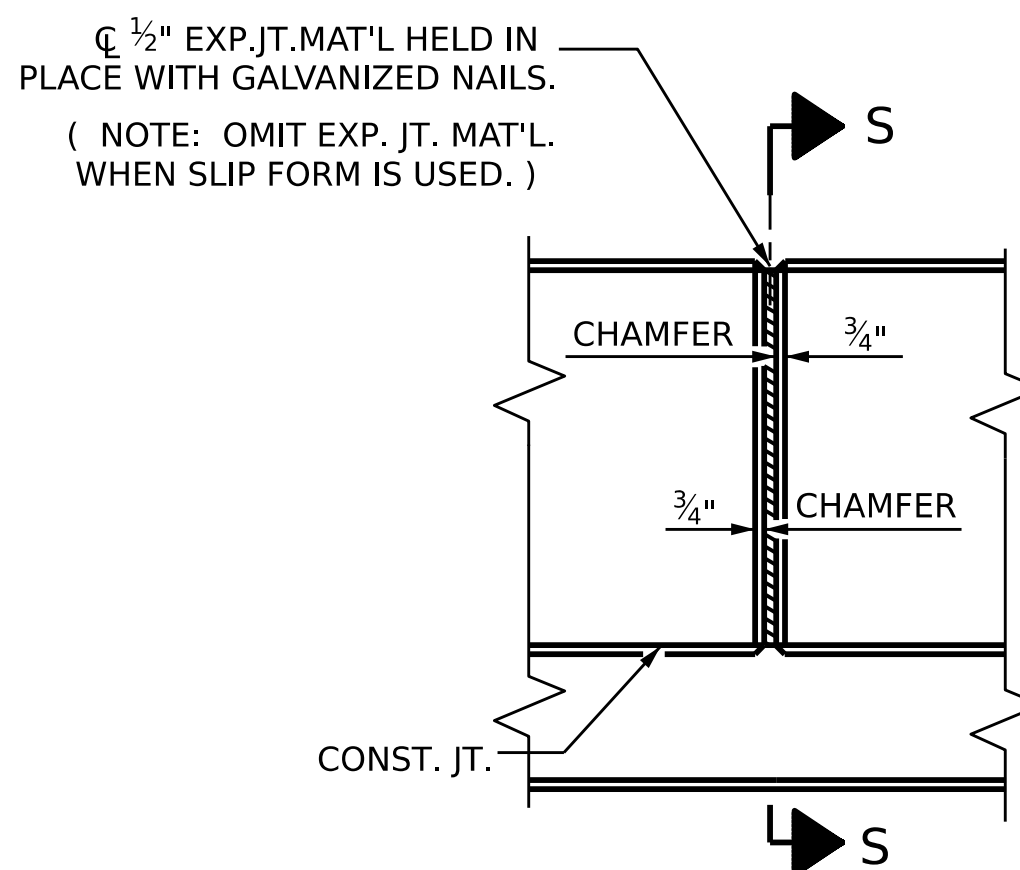
END OF RAIL DETAILS



SECTION THRU RAIL



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



ELEVATION AT EXPANSION JOINTS  
BARRIER RAIL DETAILS

NOTES

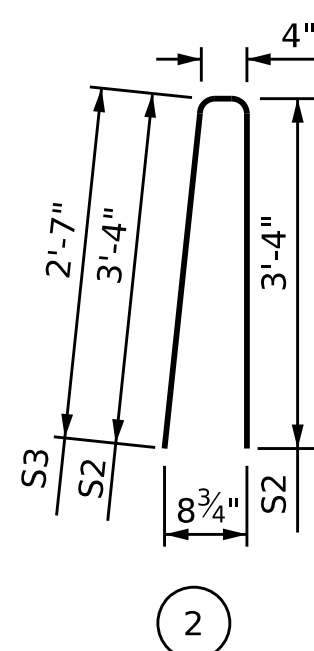
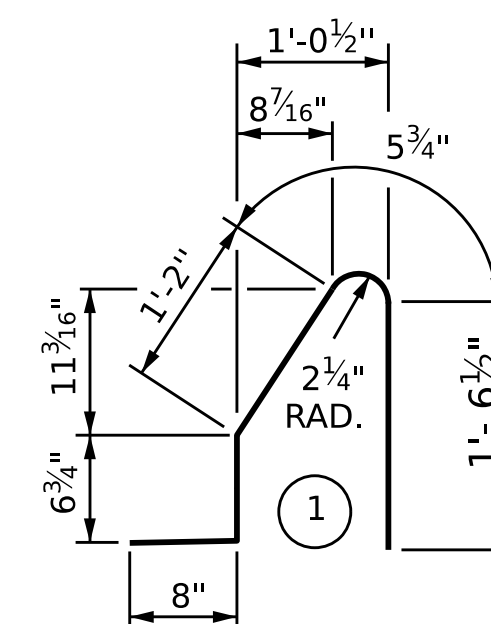
THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

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.

1/2" EXP. JT. MAT'L HELD IN PLACE WITH GALVANIZED NAILS.  
(NOTE: OMIT EXP. JT. MAT'L WHEN SLIP FORM IS USED.)

BAR TYPES



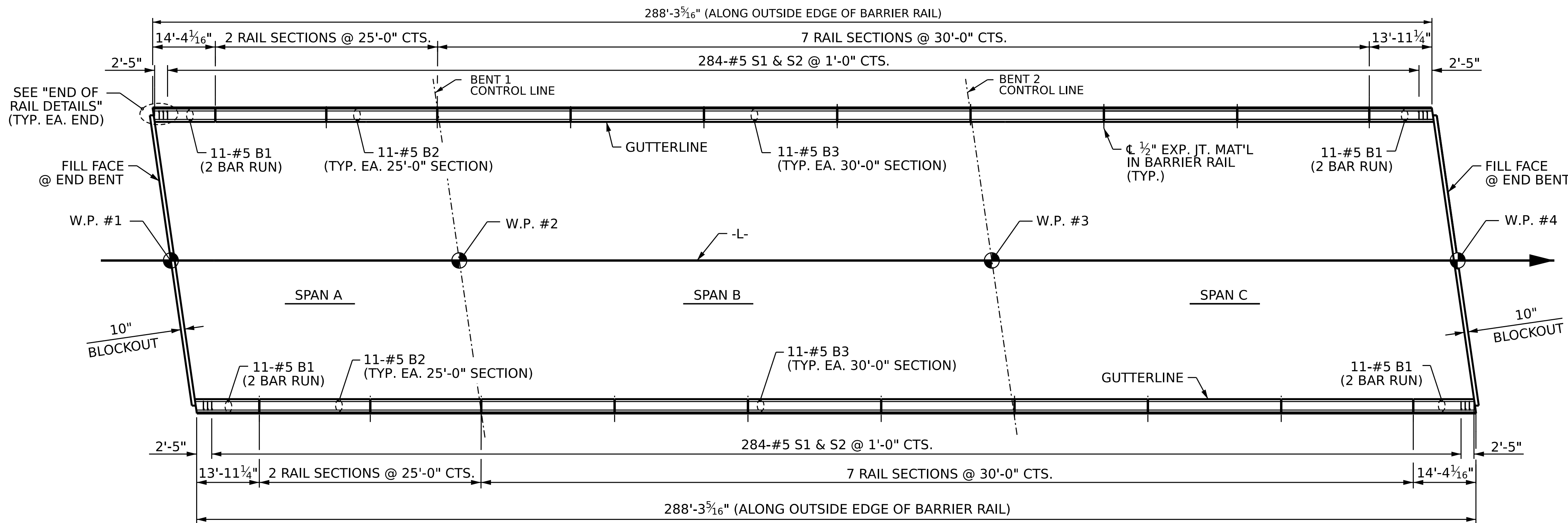
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

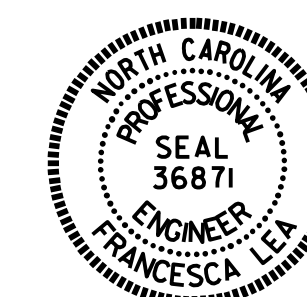
| BAR  | NO. | SIZE | TYPE | LENGTH | WEIGHT |
|------|-----|------|------|--------|--------|
| * B1 | 88  | #5   | STR  | 8'-6"  | 780    |
| * B2 | 44  | #5   | STR  | 24'-7" | 1128   |
| * B3 | 154 | #5   | STR  | 29'-7" | 4752   |
| * S1 | 576 | #5   | 1    | 4'-5"  | 2653   |
| * S2 | 568 | #5   | 2    | 7'-0"  | 4147   |
| * S3 | 8   | #5   | 2    | 5'-6"  | 46     |

|                       |  |                 |
|-----------------------|--|-----------------|
| EPOXY COATED          |  |                 |
| * REINFORCING STEEL   |  | 13,506 LBS.     |
| CLASS AA CONCRETE     |  | 78.5 CU. YDS.   |
| CONCRETE BARRIER RAIL |  | 576.55 LIN. FT. |



PLAN OF CONCRETE BARRIER RAIL

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
STATION: 17+85.52 -L-



Designed by  
Francesca Lea  
E-790AD8ASD8AEF...  
05/01/2024

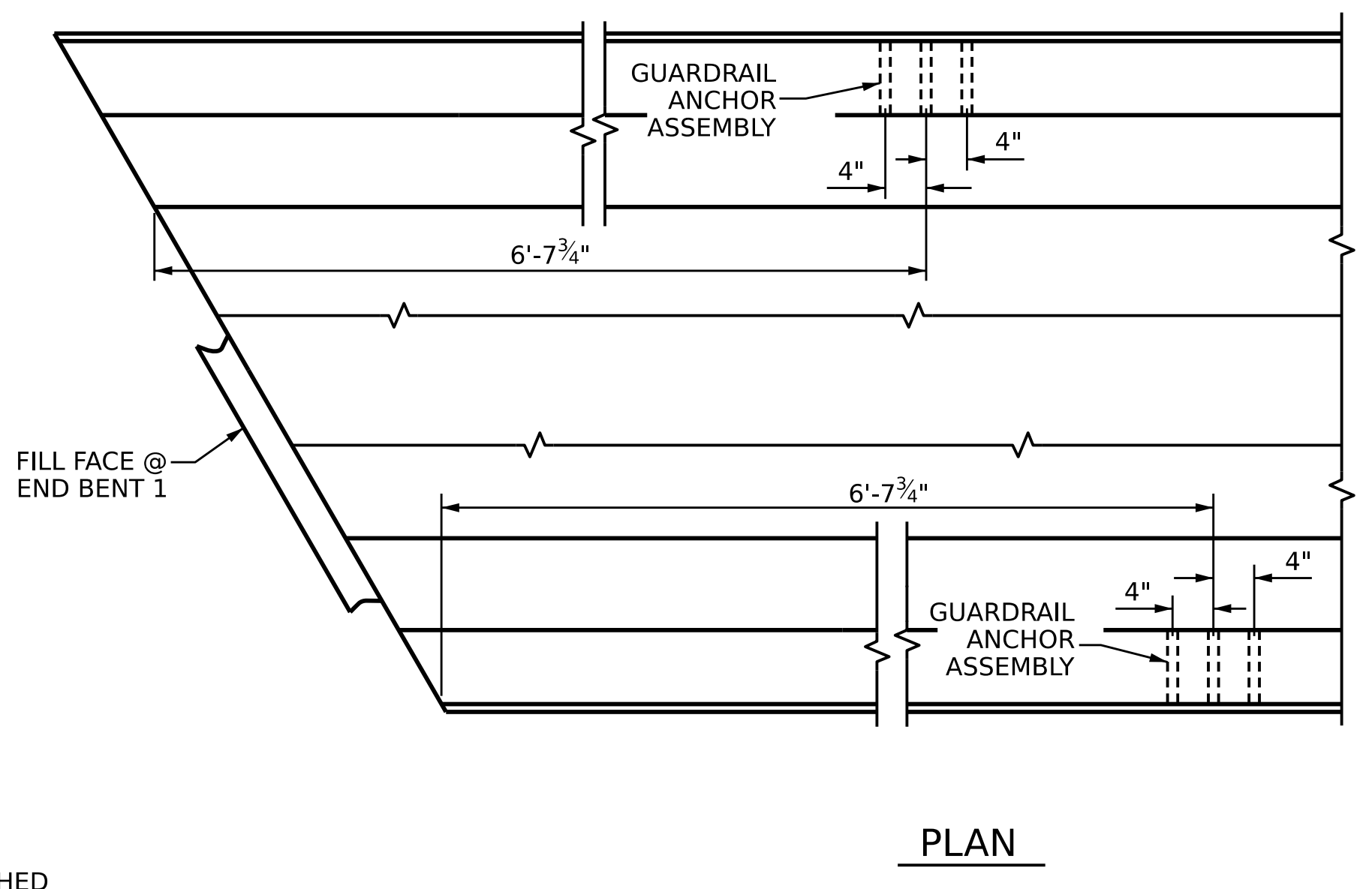
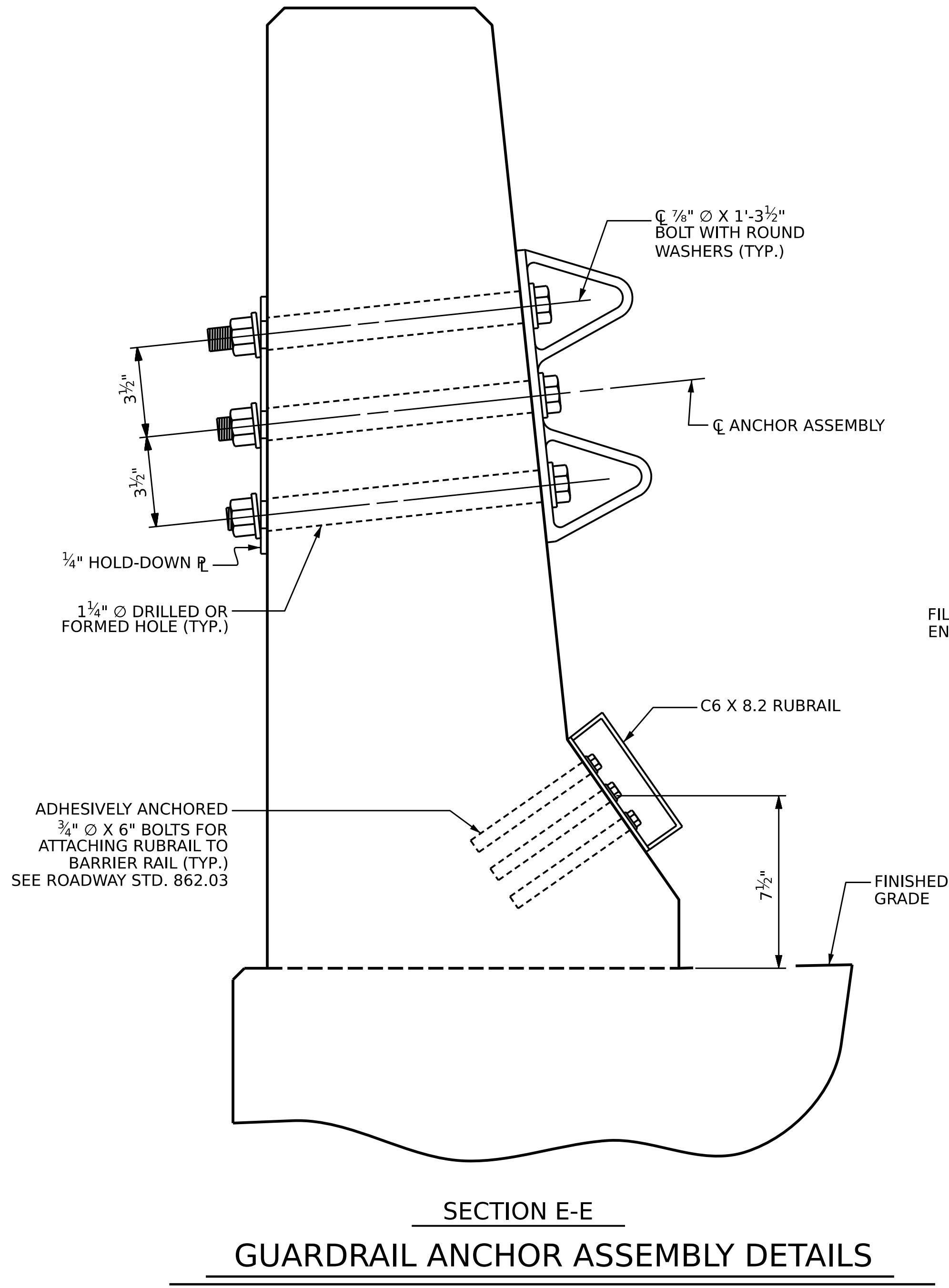
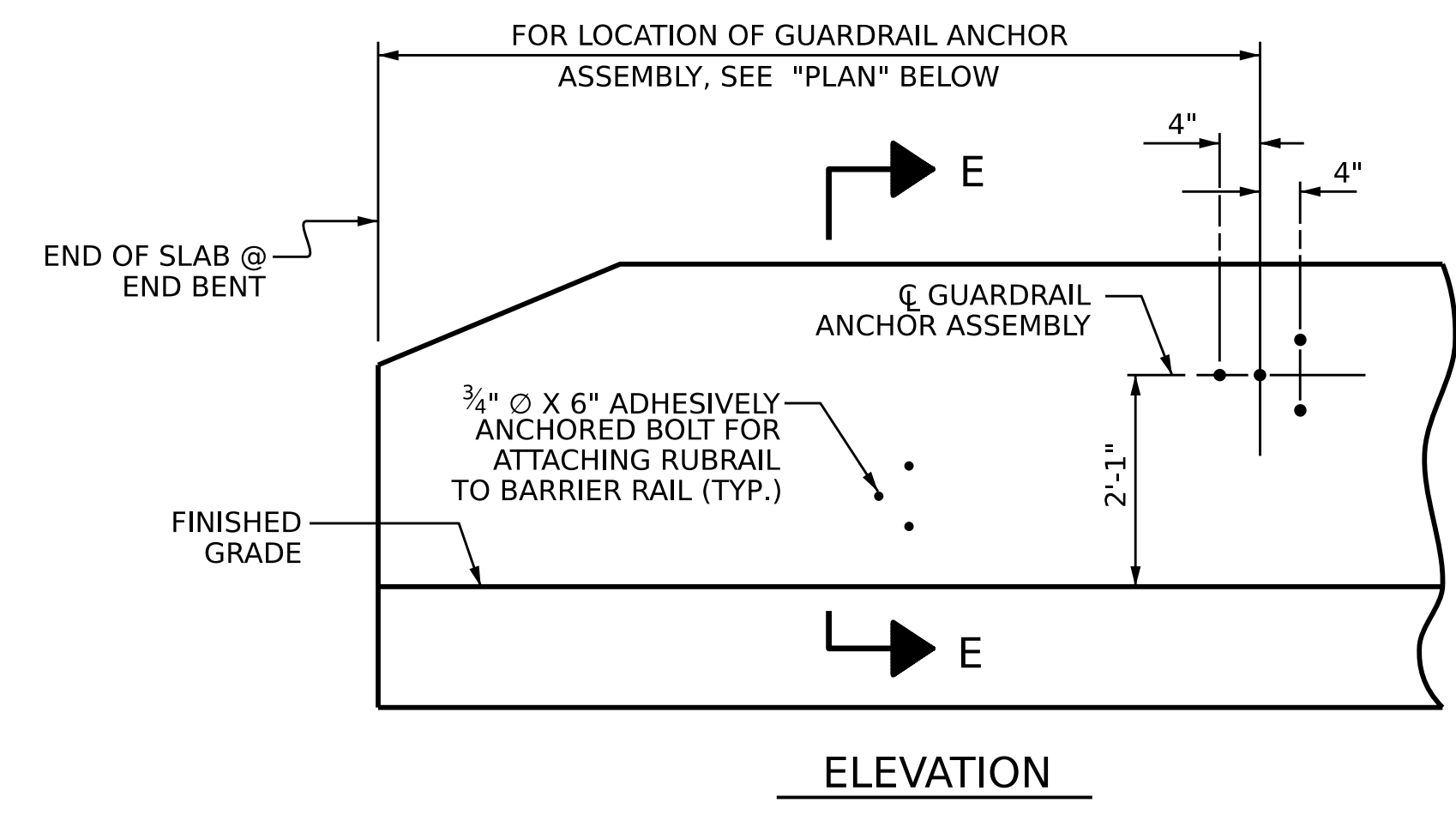
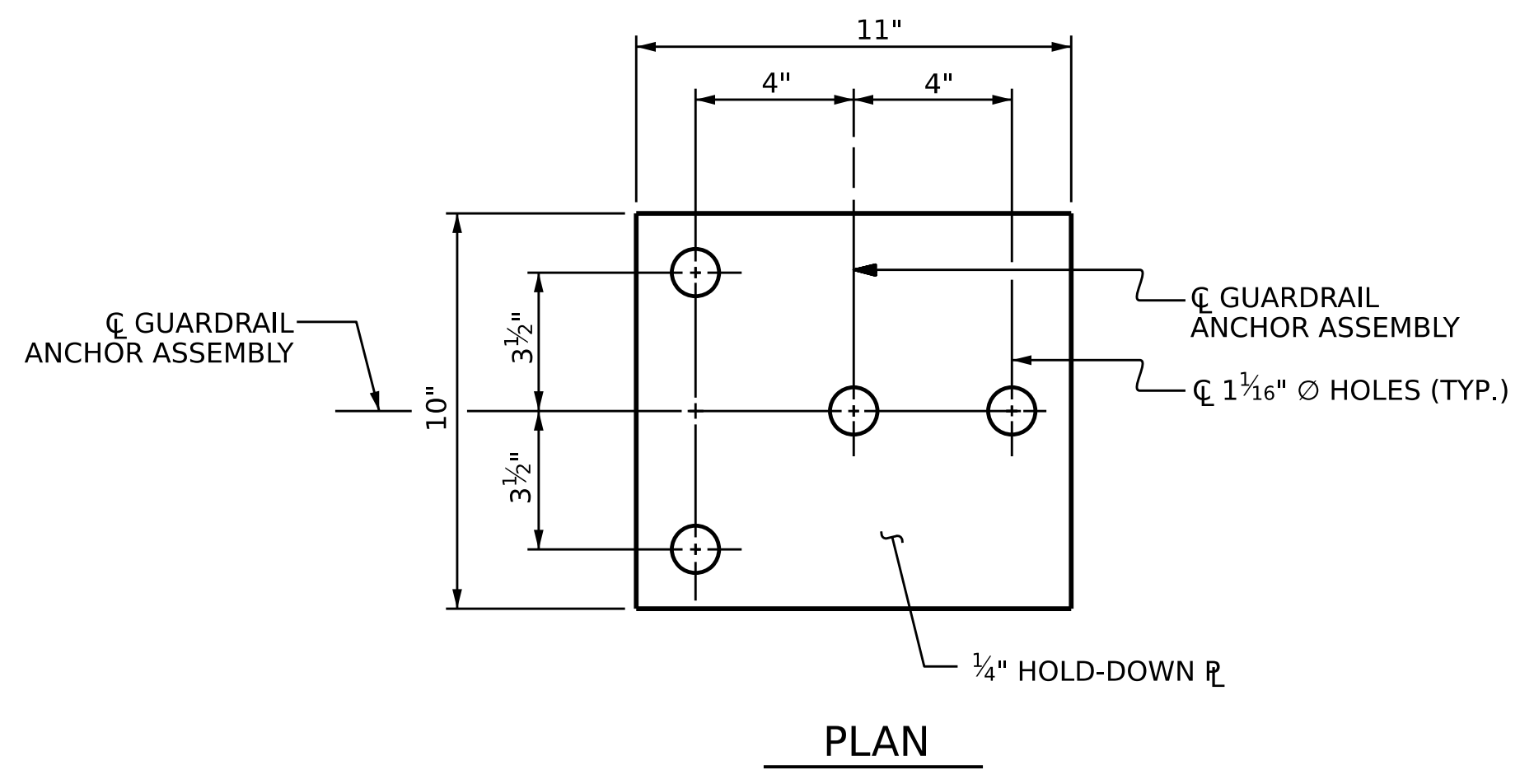
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
CONCRETE  
BARRIER RAIL

|               |            |            |         |
|---------------|------------|------------|---------|
| ASSEMBLED BY: | E. BAYISSA | DATE:      | 02/2024 |
| CHECKED BY:   | Z. MALIK   | DATE:      | 02/2024 |
| DRAWN BY:     | ARB 5/87   | REV. 7/12  | MAA/GM  |
| CHECKED BY:   | SJD 9/87   | REV. 6/13  | MAA/GM  |
|               |            | REV. 12/17 | MAA/THC |

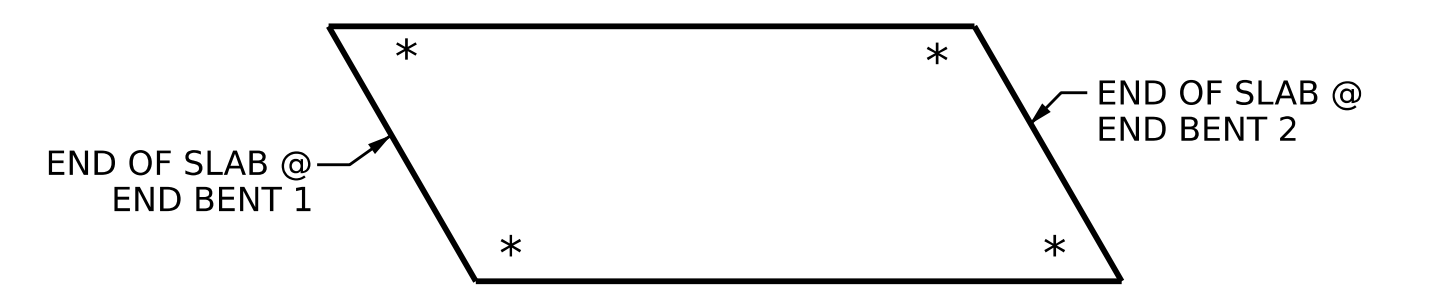
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SIGNATURES COMPLETED

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

TOTAL SHEETS: 36



LOCATION OF ANCHORS FOR GUARDRAIL  
END BENT 1 SHOWN, END BENT 2 SIMILAR



SKETCH SHOWING POINTS OF ATTACHMENTS  
\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

**NOTES**

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD-DOWN PLATE AND 4-7/8" O 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 AASHTO M291. 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 7/8" O 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.

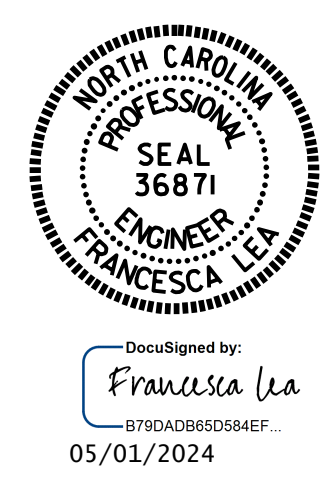
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

THE 1 1/4" O 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" O X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" O 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.

|                            |                    |
|----------------------------|--------------------|
| ASSEMBLED BY: Q. T. NGUYEN | DATE: 11/2023      |
| CHECKED BY: Z. MALIK       | DATE: 01/2024      |
| DRAWN BY: TLA 5/06         | REV. 7/12 MAA/GM   |
| CHECKED BY: GM 5/06        | REV. 6/13 MAA/GM   |
|                            | REV. 12/17 MAA/THC |

2/27/2024  
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tnguyenl



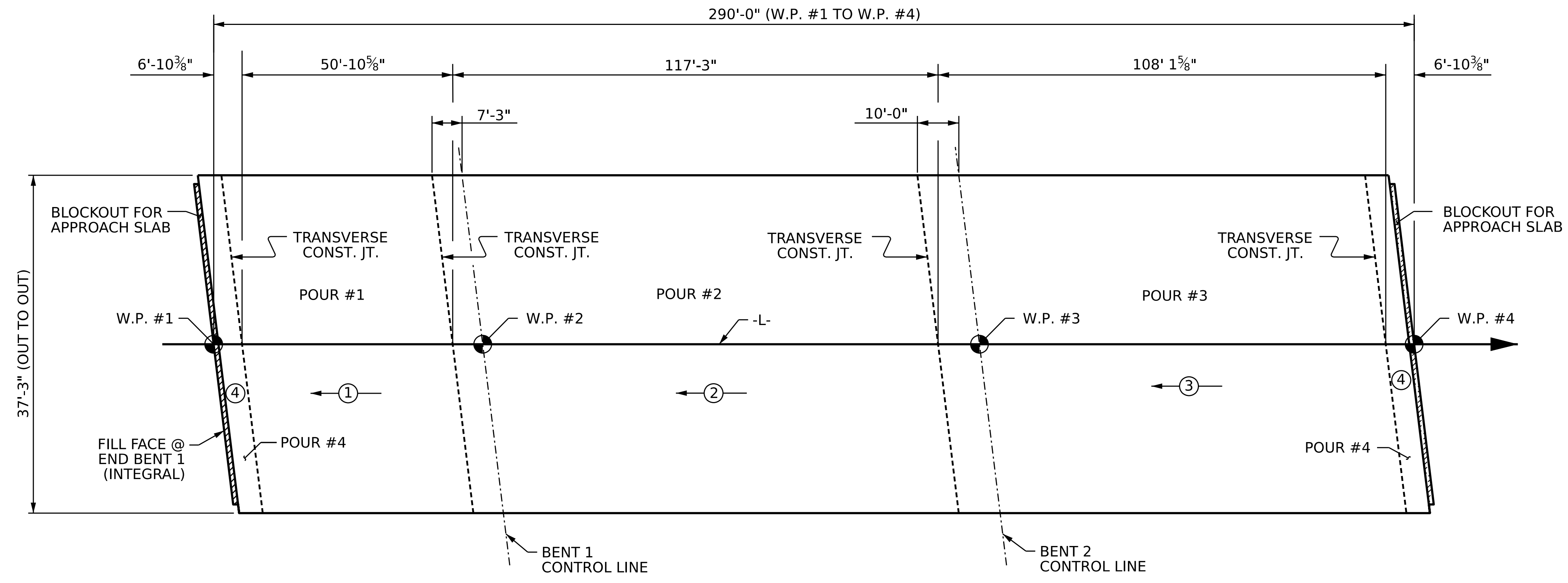
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PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
STATION: 17+85.52 -L-

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

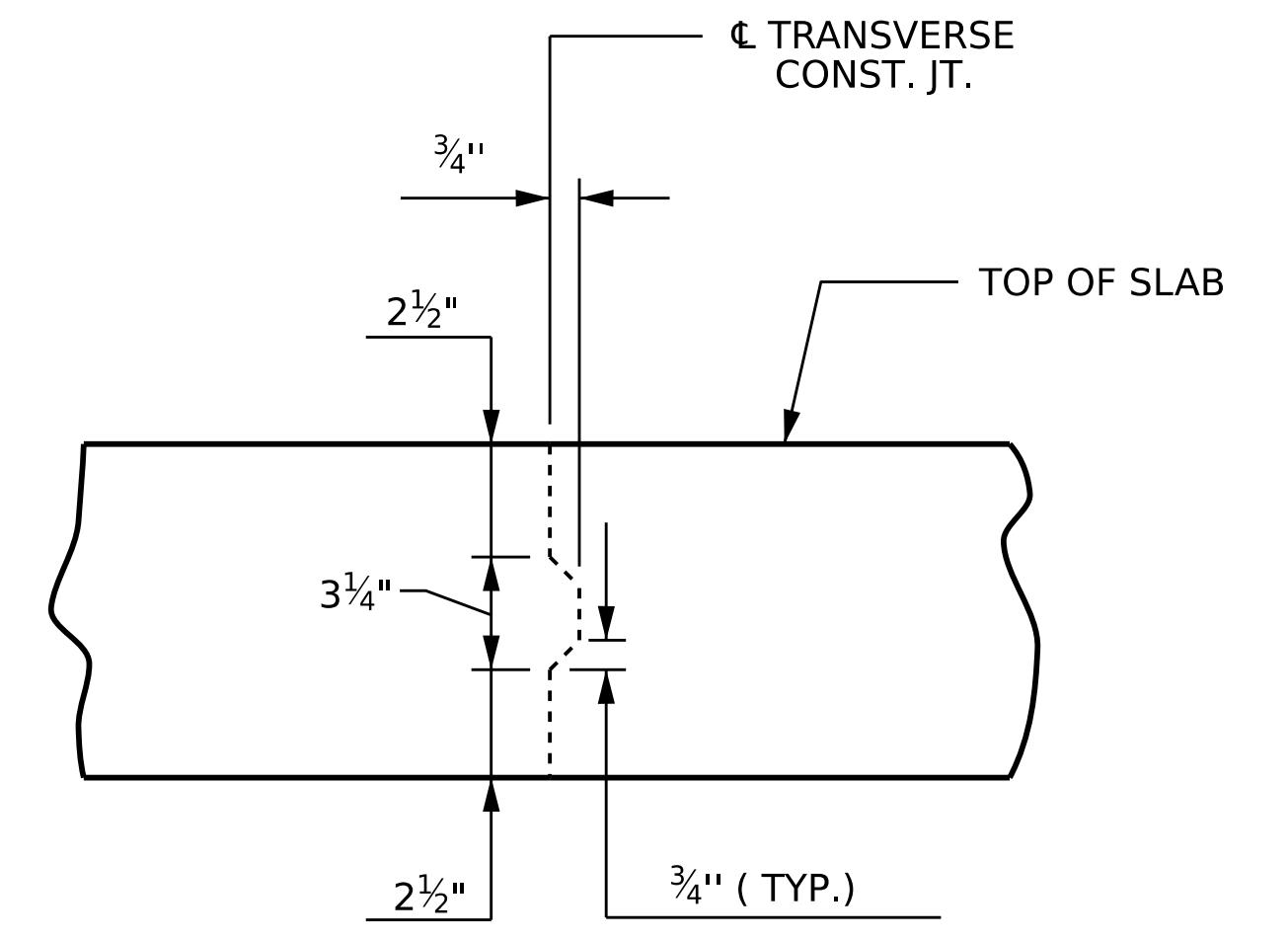
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| 2         |     |       | 4   |     |       | 36           |





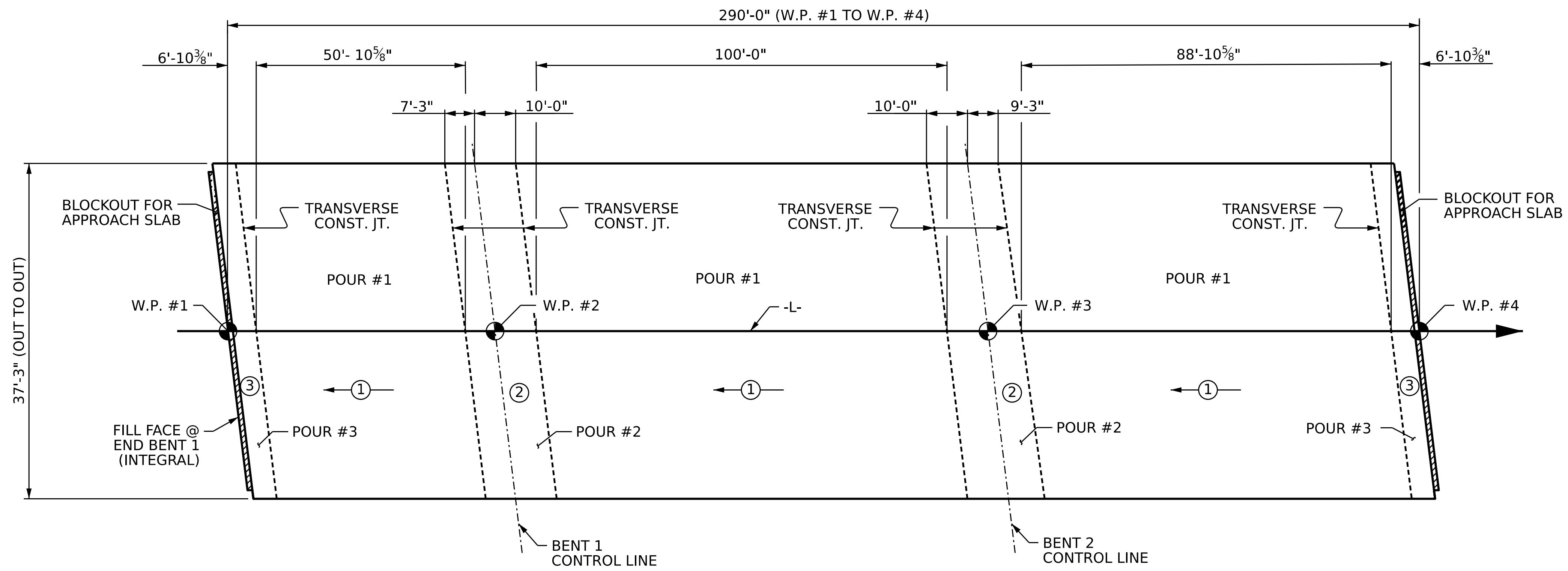
**POURING SEQUENCE**

POURS #2, #3, AND #4 CANNOT BE STARTED UNTIL THE ADJACENT POUR REACHES A MIN. OF 3000PSI



**TRANSVERSE CONSTRUCTION JOINT DETAIL**

NOTE: REINFORCING STEEL IN SLAB NOT SHOWN. LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT



**OPTIONAL POURING SEQUENCE**

POUR #2 CANNOT BE STARTED UNTIL BOTH ADJACENT POUR #1 REACH A MIN. OF 3000PSI

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-



Designed by:  
 Francesca Lea  
 5790AD86D5084EF...  
 05/01/2024

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**POURING SEQUENCE**

DRAWN BY: E. BAYISSA DATE: 02/2024  
 CHECKED BY: Z. MALIK DATE: 02/2024  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 06/2023

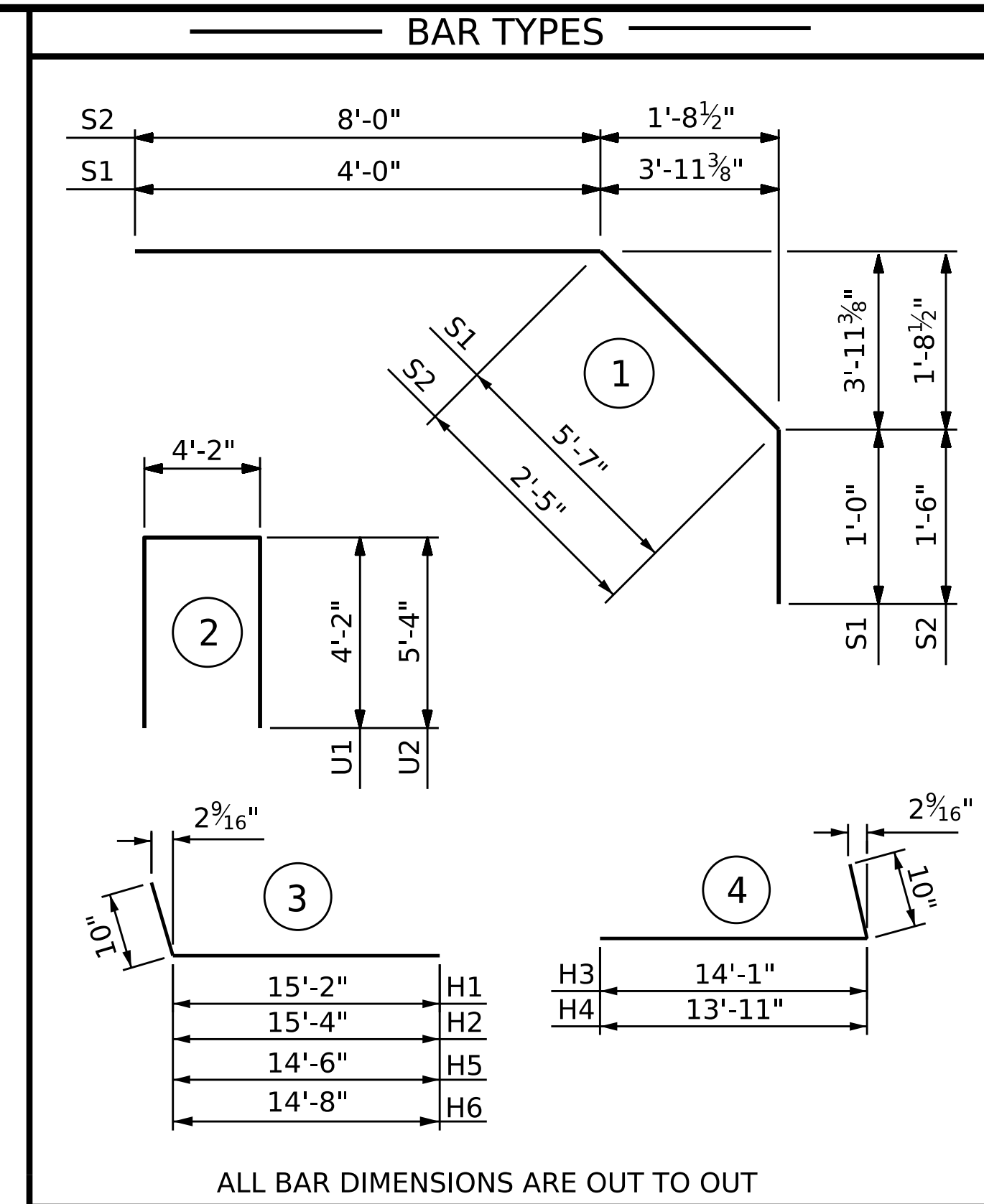
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| 2         |     |       | 4   |     |       | 36           |

3/7/2024  
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 ttnguyen1

# REINFORCING BAR SCHEDULE

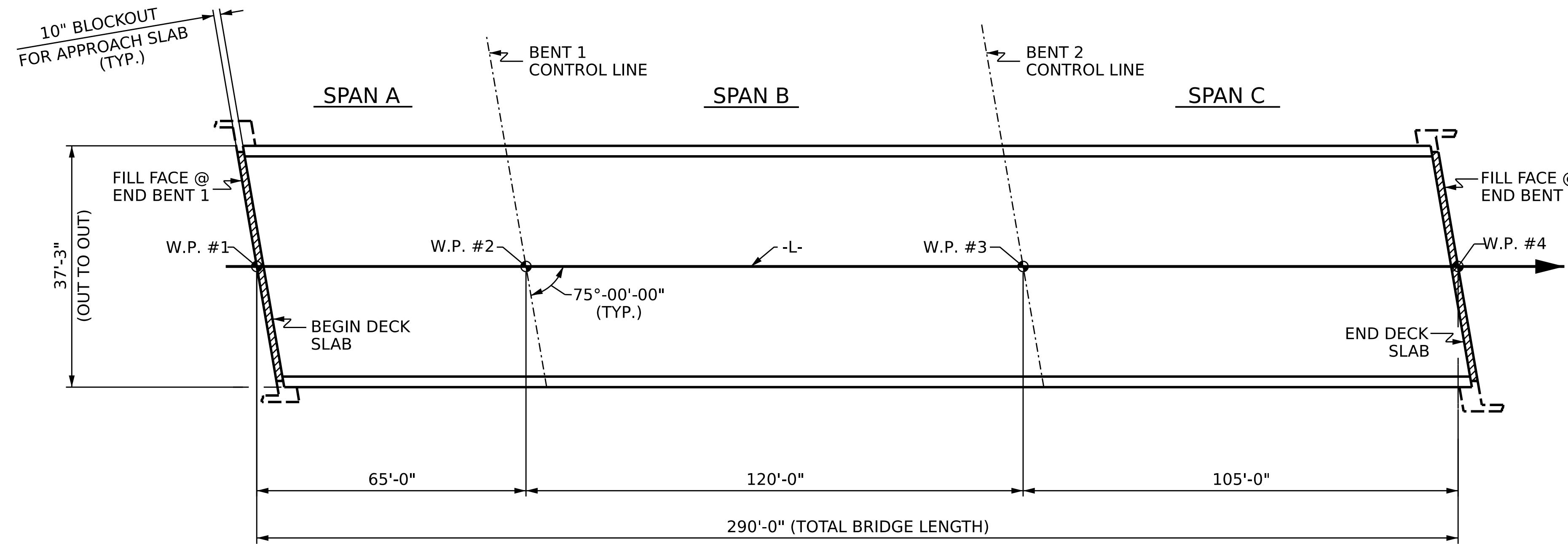
| SPANS A & C |     |      |      |         |        |      |     |      |      |         |        | SPANS A-B-C                      |     |      |      |         |        |       |     |      |      |             |        |
|-------------|-----|------|------|---------|--------|------|-----|------|------|---------|--------|----------------------------------|-----|------|------|---------|--------|-------|-----|------|------|-------------|--------|
| BAR         | No. | SIZE | TYPE | LENGTH  | WEIGHT | BAR  | No. | SIZE | TYPE | LENGTH  | WEIGHT | BAR                              | No. | SIZE | TYPE | LENGTH  | WEIGHT | BAR   | No. | SIZE | TYPE | LENGTH      | WEIGHT |
| * A101      | 2   | #5   | STR. | 36'-6"  | 76     | A201 | 2   | #5   | STR. | 36'-6"  | 76     | K1                               | 20  | #4   | STR. | 23'-1"  | 308    | * A1  | 476 | #5   | STR. | 36'-11"     | 18,328 |
| * A102      | 2   | #5   | STR. | 34'-4"  | 72     | A202 | 2   | #5   | STR. | 34'-4"  | 72     | K2                               | 6   | #4   | STR. | 6'-3"   | 25     | A2    | 476 | #5   | STR. | 36'-11"     | 18,328 |
| * A103      | 2   | #5   | STR. | 32'-2"  | 67     | A203 | 2   | #5   | STR. | 32'-2"  | 67     | K3                               | 6   | #4   | STR. | 8'-4"   | 33     |       |     |      |      |             |        |
| * A104      | 2   | #5   | STR. | 29'-11" | 62     | A204 | 2   | #5   | STR. | 29'-11" | 62     | K4                               | 12  | #4   | STR. | 8'-9"   | 70     | * B1  | 27  | #4   | STR. | 30'-6"      | 550    |
| * A105      | 2   | #5   | STR. | 27'-9"  | 58     | A205 | 2   | #5   | STR. | 27'-9"  | 58     | K5                               | 6   | #4   | STR. | 5'-5"   | 22     | * B2  | 99  | #5   | STR. | 12'-10"     | 1,325  |
| * A106      | 2   | #5   | STR. | 25'-7"  | 53     | A206 | 2   | #5   | STR. | 25'-7"  | 53     | K6                               | 4   | #4   | STR. | 5'-1"   | 14     | * B3  | 50  | #5   | STR. | 15'-3"      | 795    |
| * A107      | 2   | #5   | STR. | 23'-5"  | 49     | A207 | 2   | #5   | STR. | 23'-5"  | 49     | K7                               | 4   | #4   | STR. | 6'-1"   | 16     | * B4  | 50  | #5   | STR. | 52'-8"      | 2,747  |
| * A108      | 2   | #5   | STR. | 21'-3"  | 44     | A208 | 2   | #5   | STR. | 21'-3"  | 44     | K8                               | 8   | #4   | STR. | 6'-5"   | 34     | * B5  | 49  | #5   | STR. | 37'-9"      | 1,929  |
| * A109      | 2   | #5   | STR. | 19'-1"  | 40     | A209 | 2   | #5   | STR. | 19'-1"  | 40     | K9                               | 4   | #4   | STR. | 4'-8"   | 12     | * B6  | 54  | #4   | STR. | 21'-11"     | 791    |
| * A110      | 2   | #5   | STR. | 16'-11" | 35     | A210 | 2   | #5   | STR. | 16'-11" | 35     | K10                              | 40  | #4   | STR. | 2'-8"   | 71     | * B7  | 50  | #5   | STR. | 27'-3"      | 1,421  |
| * A111      | 2   | #5   | STR. | 14'-9"  | 31     | A211 | 2   | #5   | STR. | 14'-9"  | 31     |                                  |     |      |      |         |        | * B8  | 50  | #5   | STR. | 52'-8"      | 2,747  |
| * A112      | 2   | #5   | STR. | 12'-6"  | 26     | A212 | 2   | #5   | STR. | 12'-6"  | 26     | H1                               | 8   | #5   | 3    | 16'-1"  | 134    | * B9  | 49  | #5   | STR. | 43'-9"      | 2,236  |
| * A113      | 2   | #5   | STR. | 10'-4"  | 22     | A213 | 2   | #5   | STR. | 10'-4"  | 22     | H2                               | 8   | #5   | 3    | 16'-3"  | 136    | * B10 | 54  | #4   | STR. | 26'-3"      | 947    |
| * A114      | 2   | #5   | STR. | 8'-2"   | 17     | A214 | 2   | #5   | STR. | 8'-2"   | 17     | H3                               | 18  | #5   | 4    | 14'-11" | 280    | * B11 | 99  | #5   | STR. | 20'-10"     | 2,151  |
| * A115      | 2   | #5   | STR. | 6'-0"   | 13     | A215 | 2   | #5   | STR. | 6'-0"   | 13     | H4                               | 18  | #5   | 4    | 14'-9"  | 277    |       |     |      |      |             |        |
| * A116      | 2   | #5   | STR. | 3'-10"  | 8      | A216 | 2   | #5   | STR. | 3'-10"  | 8      | H5                               | 8   | #5   | 3    | 15'-4"  | 128    | B12   | 27  | #5   | STR. | 44'-9"      | 1,260  |
| * A117      | 2   | #5   | STR. | 1'-8"   | 3      | A217 | 2   | #5   | STR. | 1'-8"   | 3      | H6                               | 8   | #5   | 3    | 15'-6"  | 129    | B13   | 27  | #5   | STR. | 56'-3"      | 1,584  |
| * S1        | 44  | #4   | 1    | 10'-7"  | 311    | U1   | 48  | #4   | 2    | 12'-6"  | 401    |                                  |     |      |      |         |        | B14   | 22  | #5   | STR. | 47'-0"      | 1,078  |
| * S2        | 44  | #4   | 1    | 11'-11" | 350    | U2   | 12  | #4   | 2    | 14'-11" | 120    |                                  |     |      |      |         |        | B15   | 27  | #5   | STR. | 54'-0"      | 1,521  |
|             |     |      |      |         |        |      |     |      |      |         |        | REINFORCING STEEL                |     |      |      |         |        |       |     |      |      | 2,887 LBS.  |        |
|             |     |      |      |         |        |      |     |      |      |         |        | * EPOXY COATED REINFORCING STEEL |     |      |      |         |        |       |     |      |      | 1,338 LBS.  |        |
|             |     |      |      |         |        |      |     |      |      |         |        | REINFORCING STEEL                |     |      |      |         |        |       |     |      |      | 29,119 LBS. |        |
|             |     |      |      |         |        |      |     |      |      |         |        | * EPOXY COATED REINFORCING STEEL |     |      |      |         |        |       |     |      |      | 35,967 LBS. |        |



ALL BAR DIMENSIONS ARE OUT TO OUT

| SUPERSTRUCTURE BILL OF MATERIAL |                   |                   |                                |
|---------------------------------|-------------------|-------------------|--------------------------------|
|                                 | CLASS AA CONCRETE | REINFORCING STEEL | EPOXY COATED REINFORCING STEEL |
|                                 | ( CU. YDS. )      | ( LBS. )          | ( LBS. )                       |
| POUR #1                         | 66.4              | ---               | ---                            |
| POUR #2                         | 153.0             | ---               | ---                            |
| POUR #3                         | 141.2             | ---               | ---                            |
| POUR #4                         | 95.4              | ---               | ---                            |
| TOTALS**                        | 456.0             | 32,006            | 37,305                         |

\*\* QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

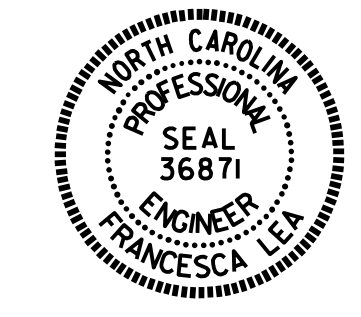


**LAYOUT FOR COMPUTING AREA  
REINFORCED CONCRETE DECK SLAB  
( SQ. FT. = 10,738 )**

| SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS |   |          |                |          |                            |
|--|---|----------|----------------|----------|----------------------------|
| BAR SIZE   | SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPETS, AND BARRIER RAILS |          | APPROACH SLABS |          | PARAPETS AND BARRIER RAILS |
|  | EPOXY COATED  | UNCOATED | EPOXY COATED   | UNCOATED |                            |
| #4   | 1'-11"  | 1'-7"    | 1'-11"         | 1'-7"    | 2'-6"                      |
| #5   | 2'-5"   | 2'-0"    | 2'-5"          | 2'-0"    | 3'-1"                      |
| #6   | 2'-10"  | 2'-5"    | 3'-7"          | 2'-5"    | 3'-8"                      |
| #7   | 4'-2"   | 2'-9"    |                |          |                            |
| #8   | 4'-9"   | 3'-2"    |                |          |                            |

| GROOVING BRIDGE FLOORS |              |
|------------------------|--------------|
| APPROACH SLABS         | 898 SQ.FT.   |
| BRIDGE DECK            | 8,937 SQ.FT. |
| TOTAL                  | 9,835 SQ.FT. |

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-



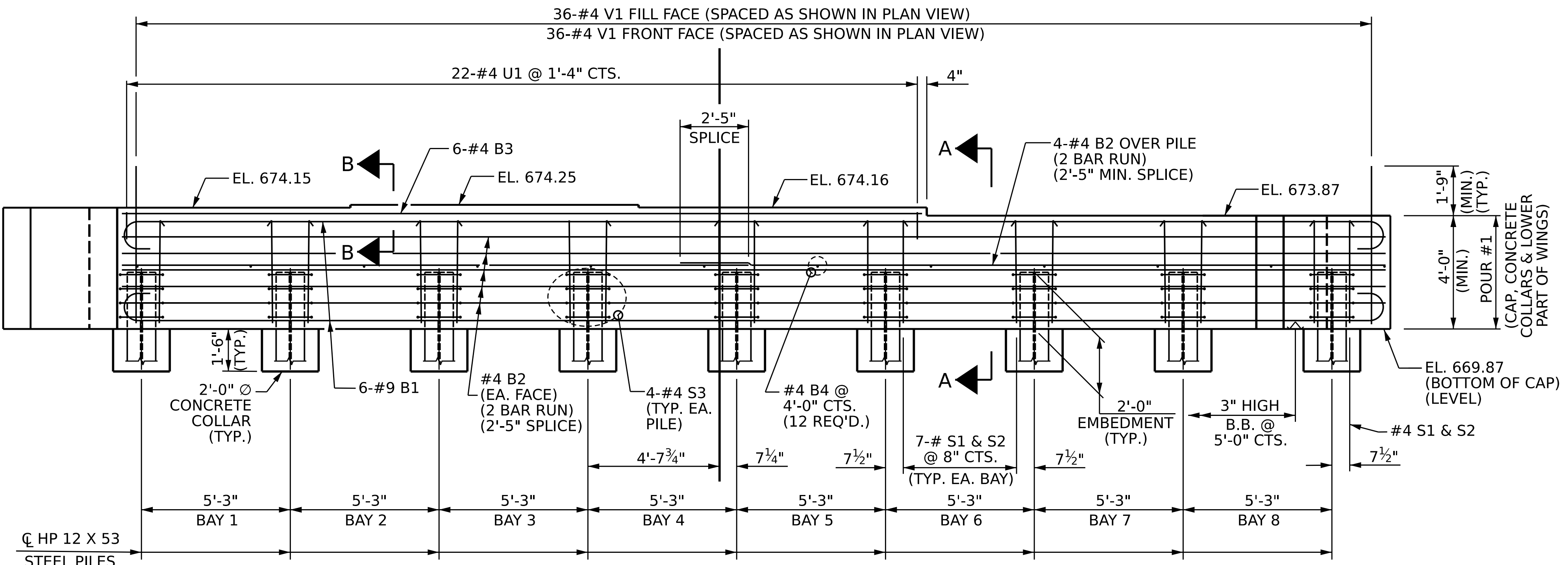
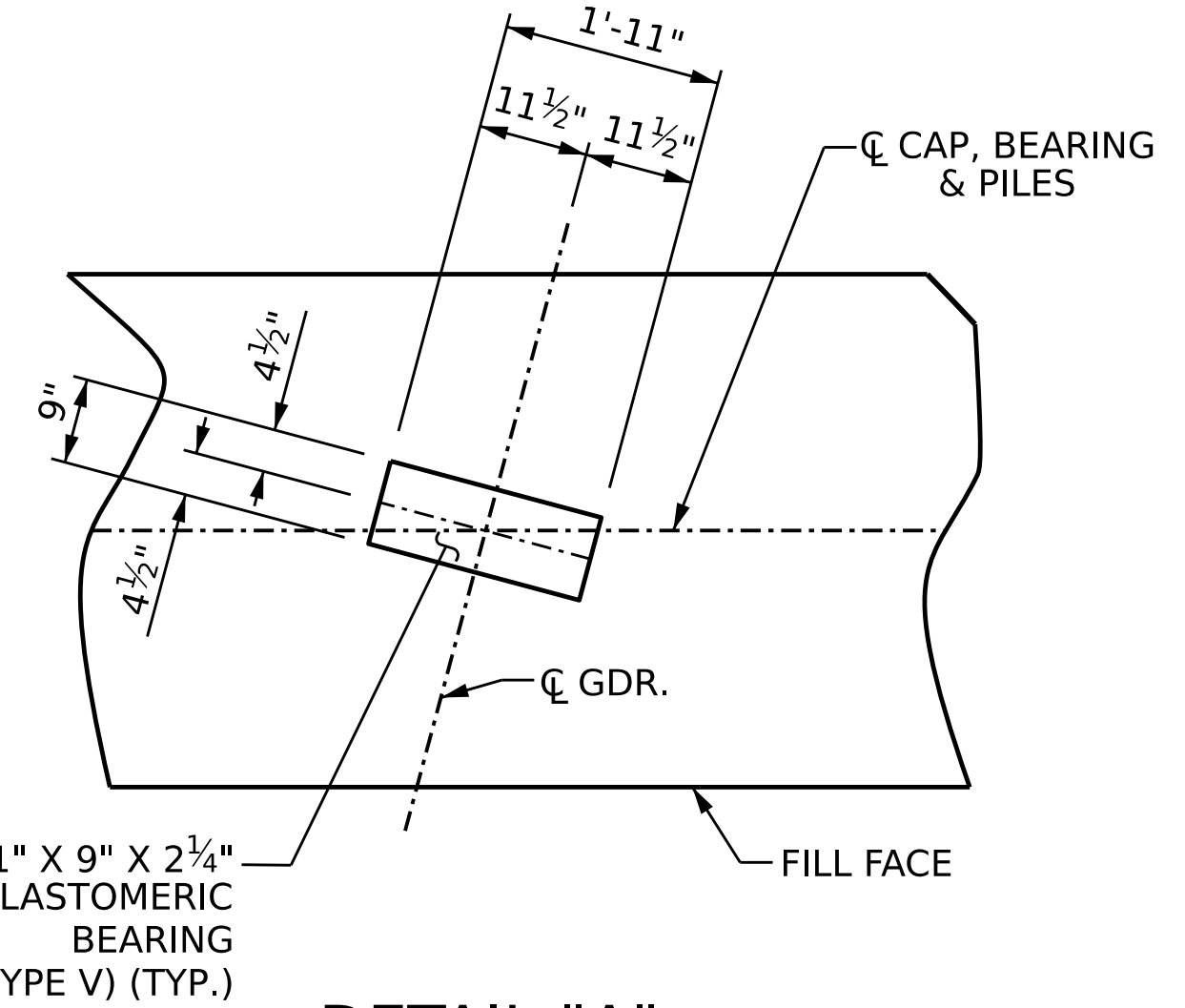
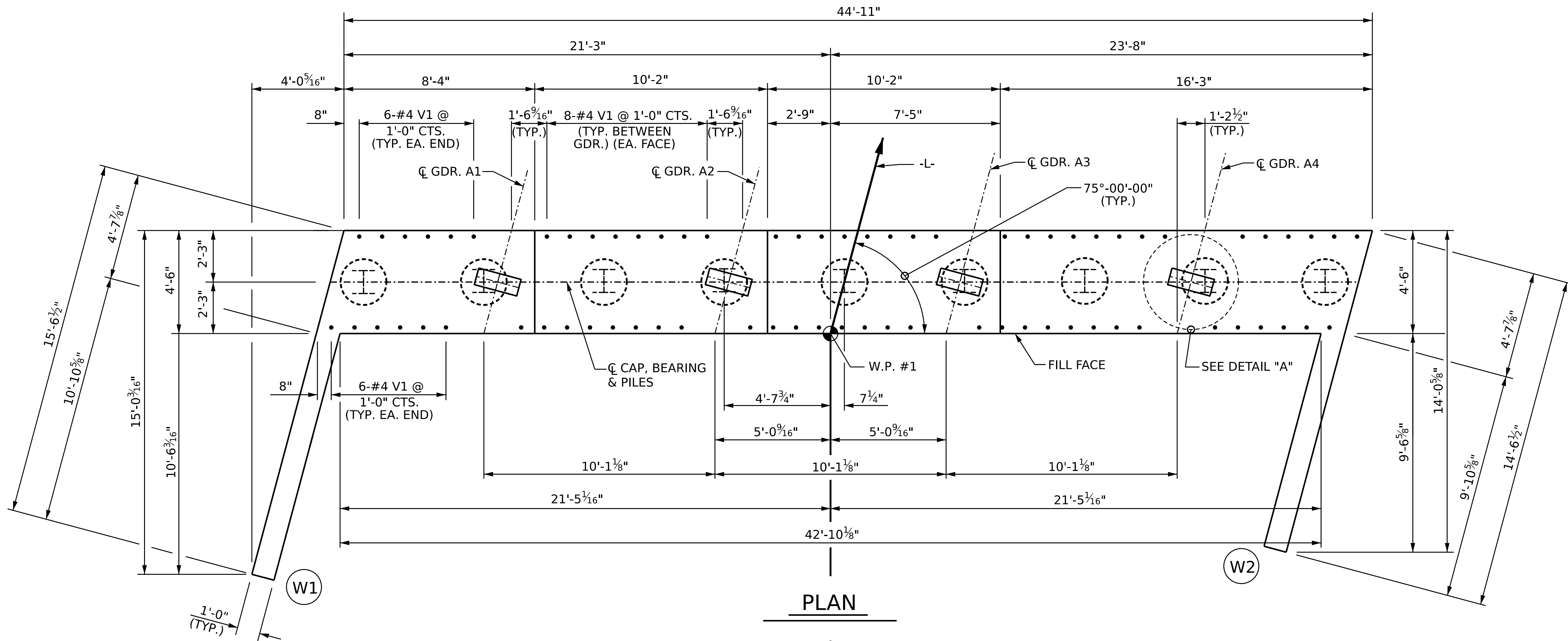
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

## SUPERSTRUCTURE BILL OF MATERIAL

DRAWN BY : E. BAYISSA DATE : 02/2024  
 CHECKED BY : F. LEA DATE : 03/2024  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 09/2023

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

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**NOTES**

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

SEE THE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

THE UPPER PART OF INTEGRAL PORTION AND WINGS SHALL BE POURED WITH THE SUPERSTRUCTURE. SEE SUPERSTRUCTURE PLAN OF SPANS.

THE TOP SURFACE OF POUR #1 OF THE END BENT CAP AND WINGS, EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-  
 SHEET 1 OF 3

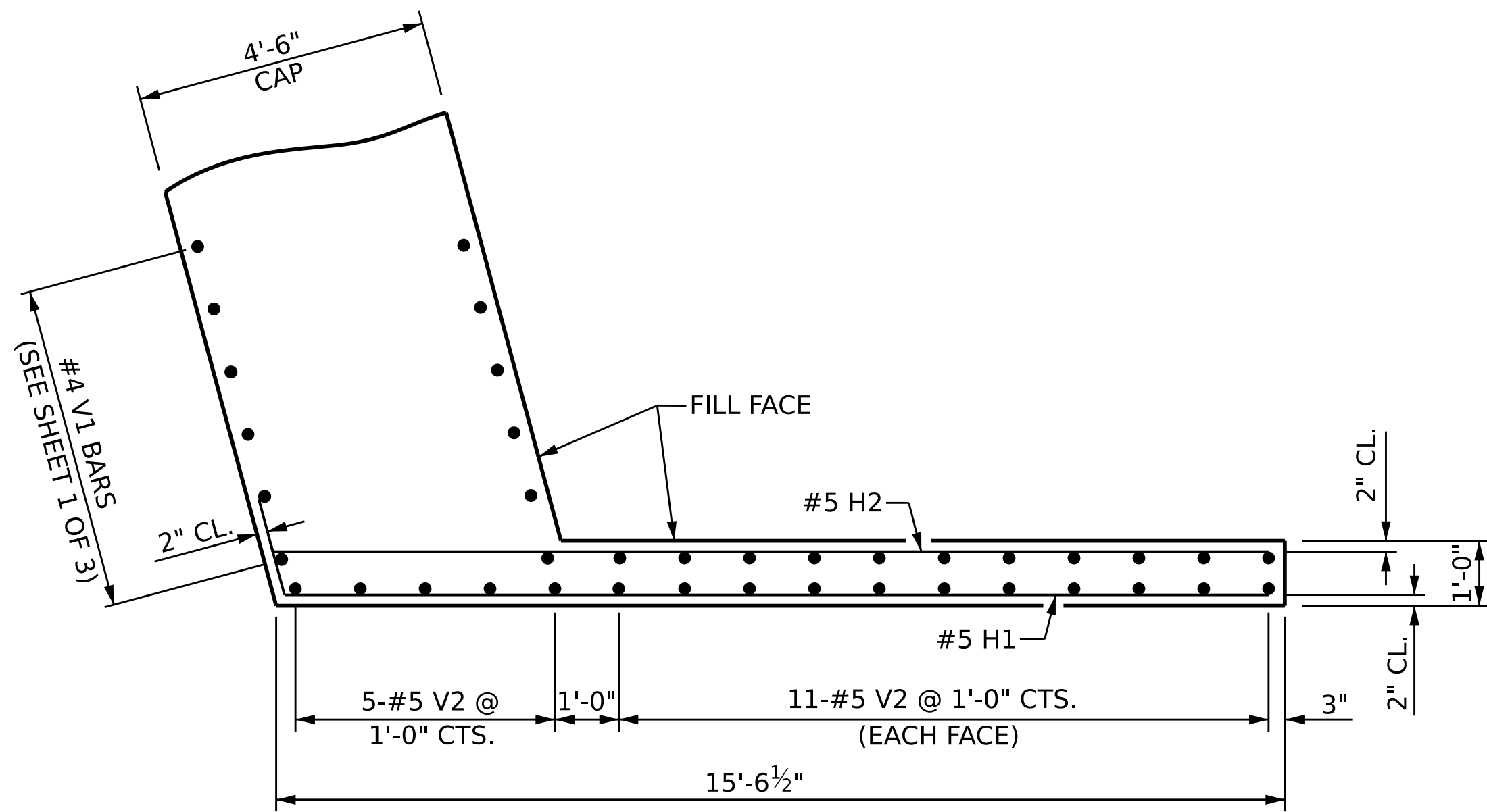


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1  
 INTEGRAL

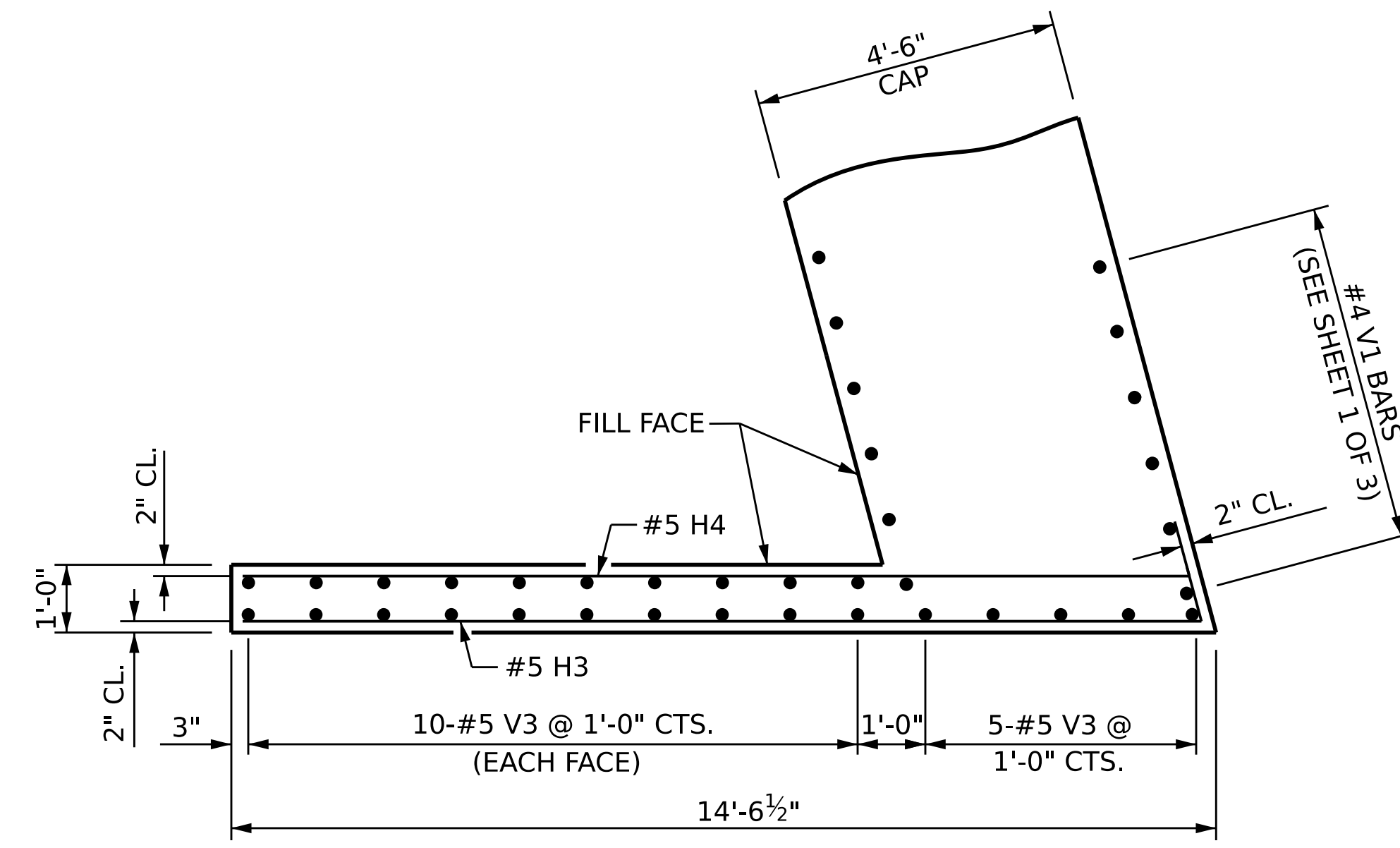
DRAWN BY: E. BAYISSA / Q.T. NGUYEN DATE: 11/2023  
 CHECKED BY: F. LEA DATE: 11/2023  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 09/2023

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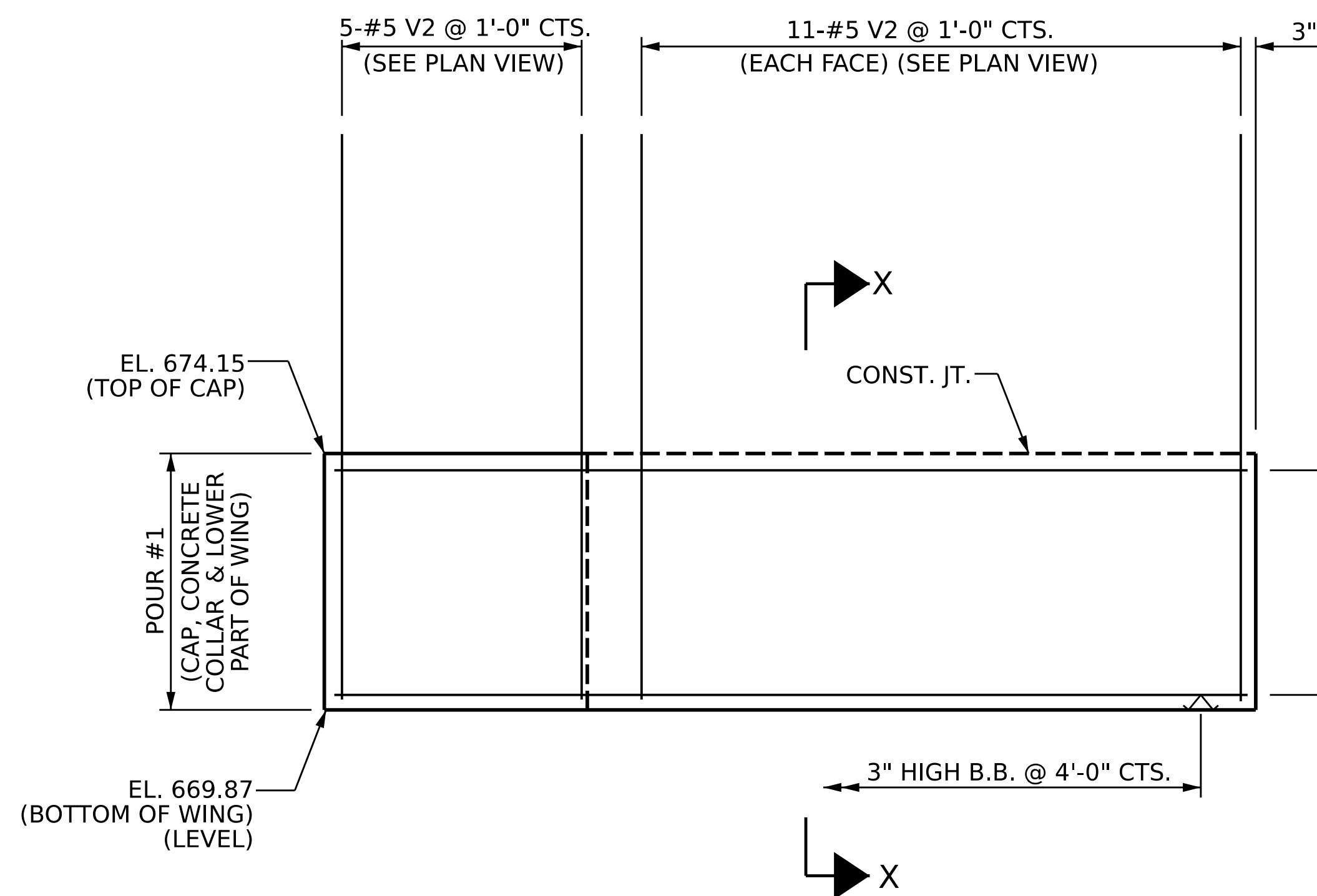
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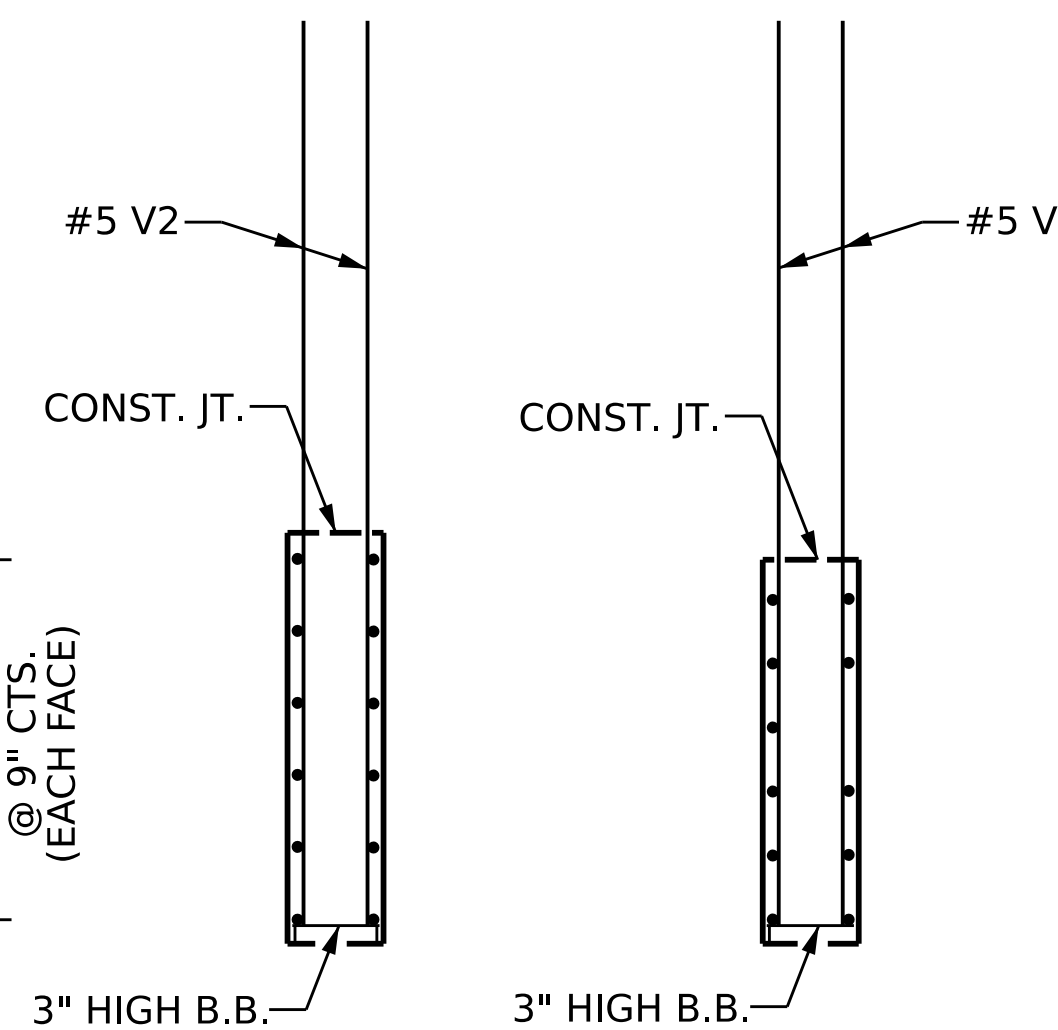
PLAN OF WING W1



PLAN OF WING W2

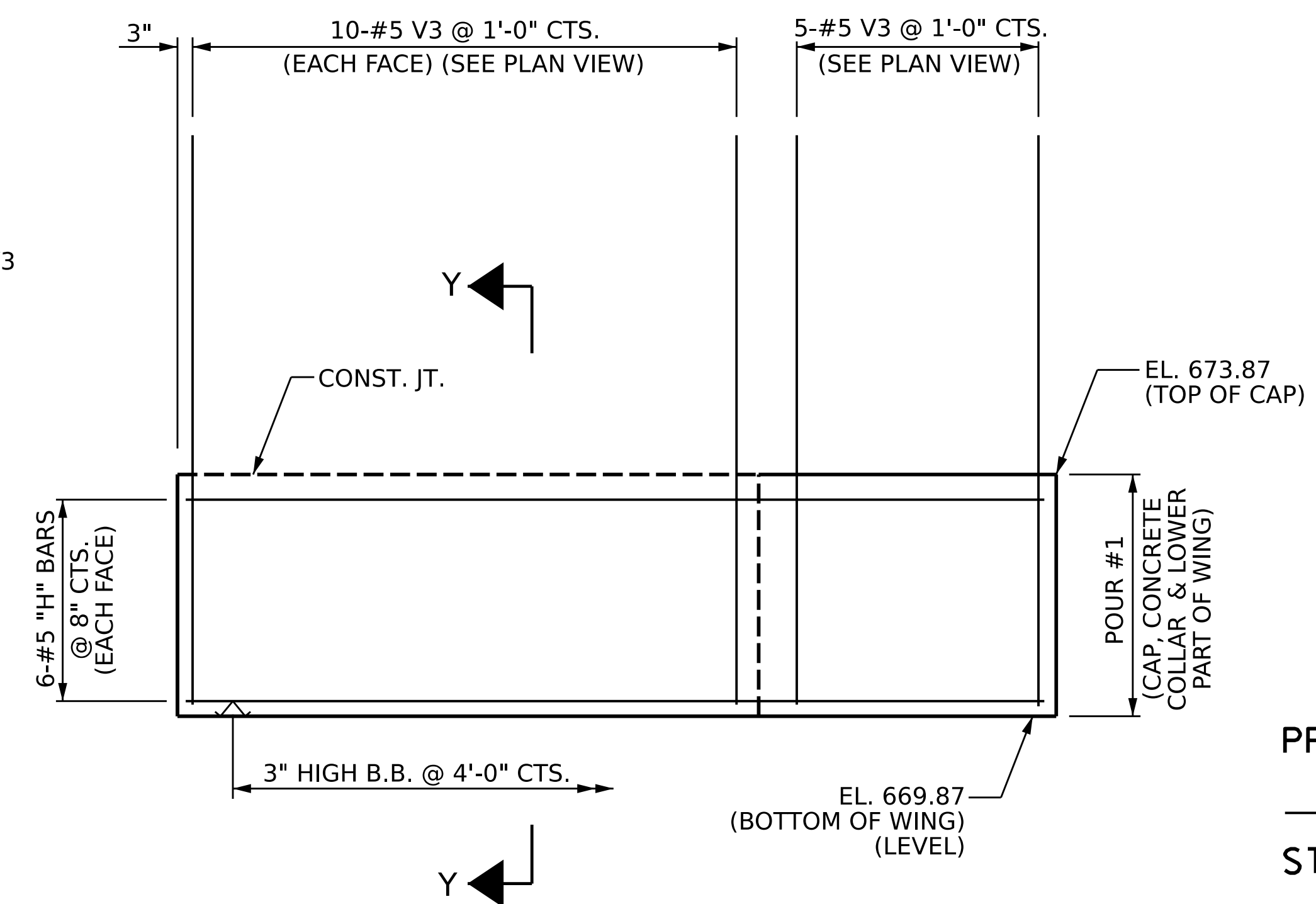


ELEVATION OF WING W1



SECTION X-X

SECTION Y-Y



ELEVATION OF WING W2

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 2 OF 3

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

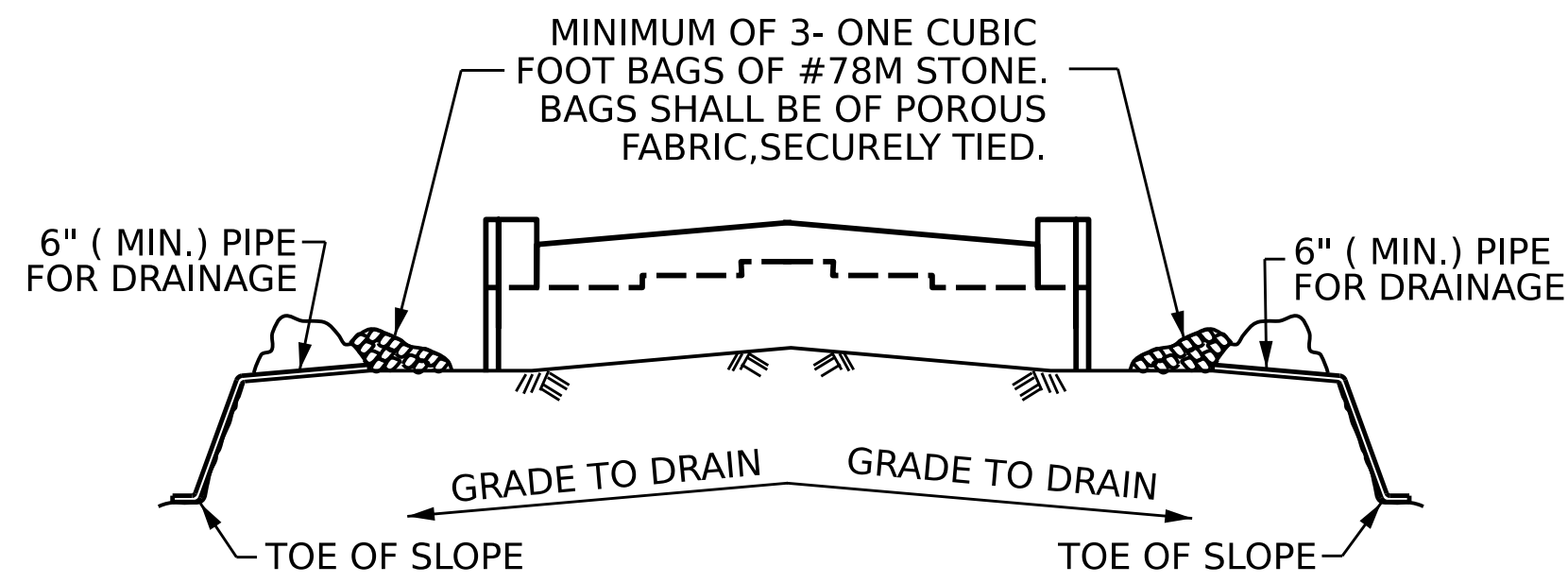


Designed by  
 Francesca Lea  
 05/01/2024

DRAWN BY : E. BAYISSA / Q.T. NGUYEN DATE : 11/2023  
 CHECKED BY : F. LEA DATE : 11/2023  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 09/2023

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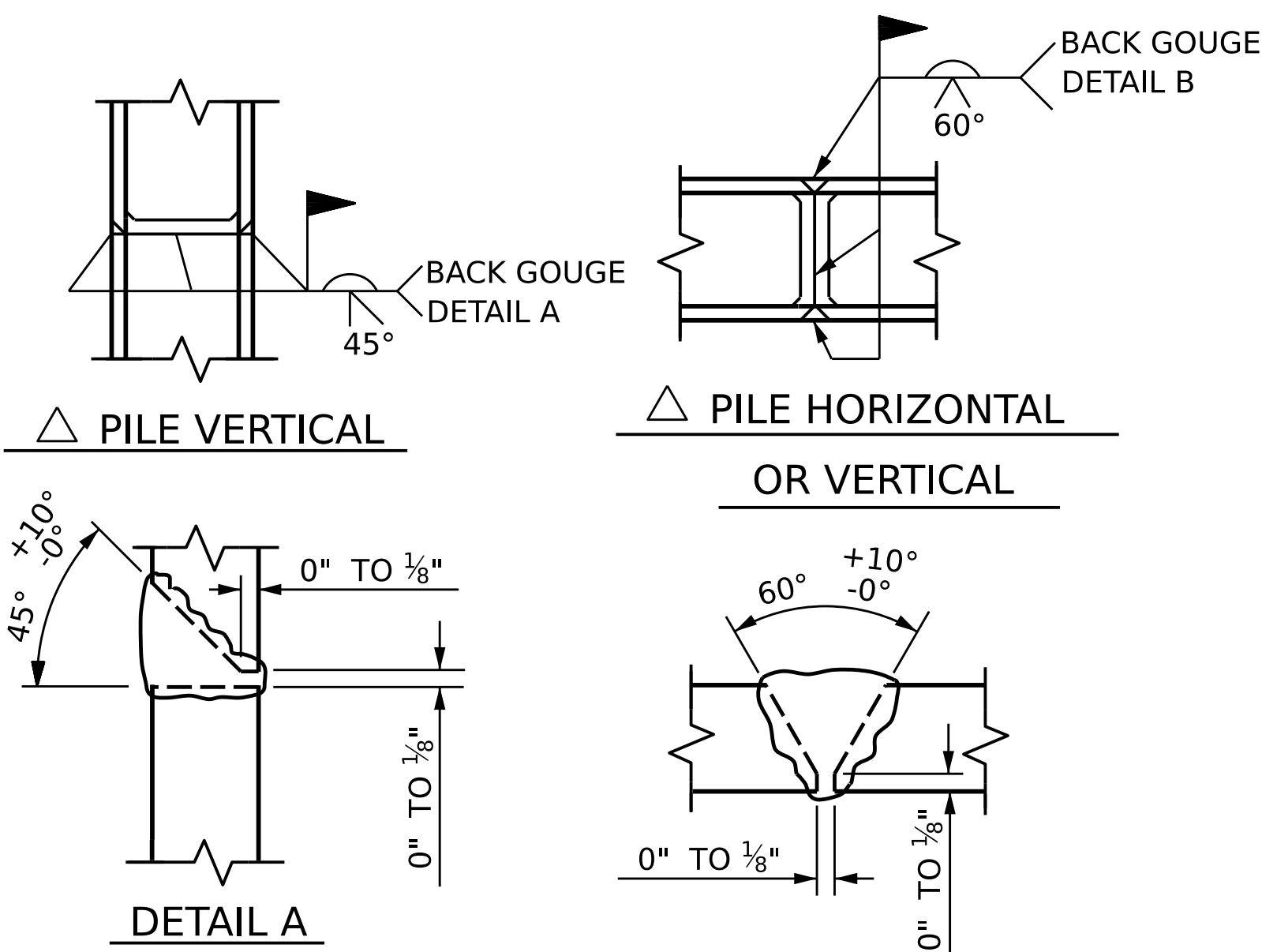


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

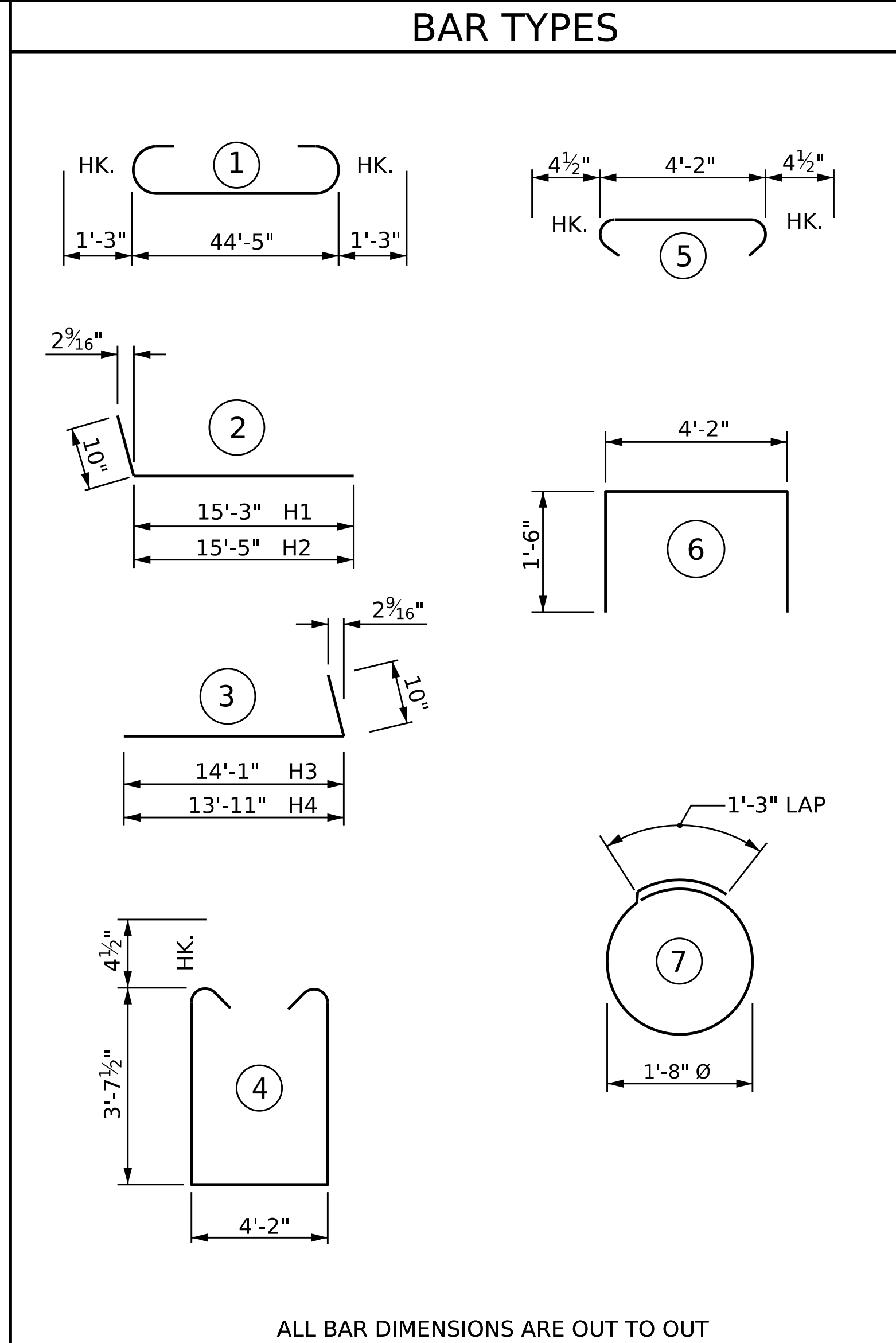
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

**TEMPORARY DRAINAGE AT END BENT**



△ POSITION OF PILE DURING WELDING.

**PILE SPLICE DETAILS**



**BILL OF MATERIAL**

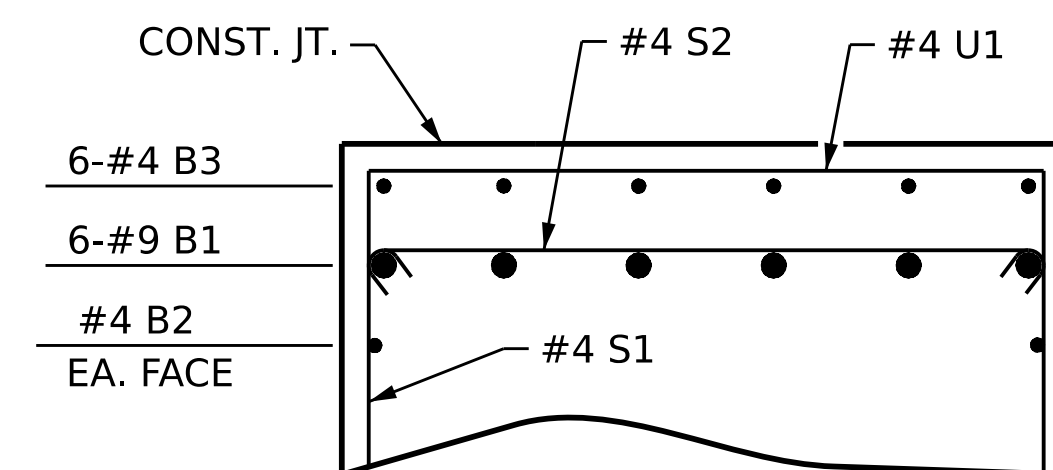
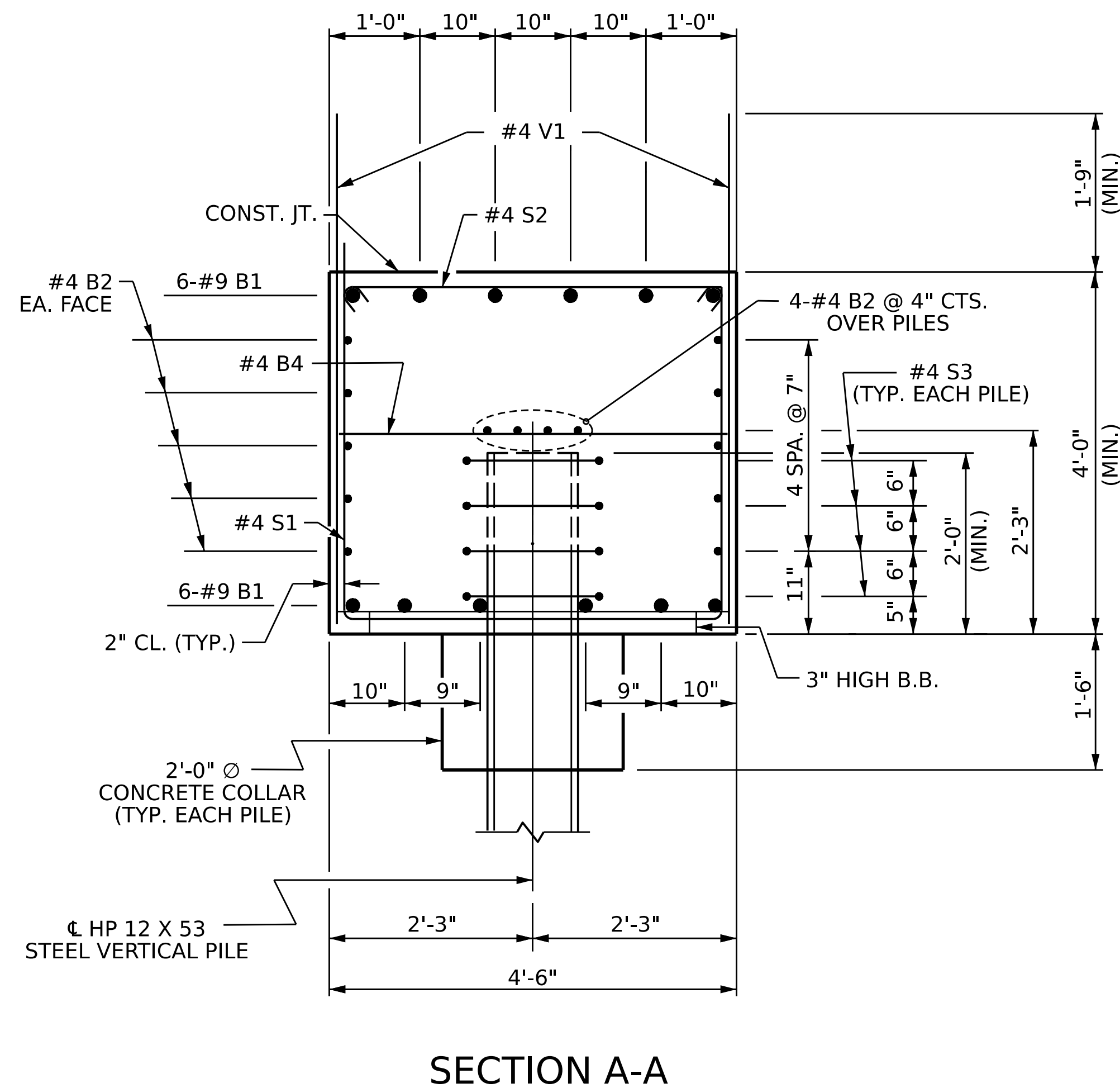
**END BENT 1**

| BAR | NO. | SIZE | TYPE | LENGTH  | WEIGHT |
|-----|-----|------|------|---------|--------|
| B1  | 12  | #9   | 1    | 46'-11" | 1914   |
| B2  | 28  | #4   | STR  | 23'-6"  | 440    |
| B3  | 6   | #4   | STR  | 28'-4"  | 114    |
| B4  | 12  | #4   | STR  | 4'-2"   | 33     |
| H1  | 6   | #5   | 2    | 16'-1"  | 101    |
| H2  | 6   | #5   | 2    | 16'-3"  | 102    |
| H3  | 6   | #5   | 3    | 14'-11" | 93     |
| H4  | 6   | #5   | 3    | 14'-9"  | 92     |
| S1  | 57  | #4   | 4    | 12'-2"  | 463    |
| S2  | 57  | #4   | 5    | 4'-11"  | 187    |
| S3  | 36  | #4   | 7    | 6'-6"   | 156    |
| U1  | 22  | #4   | 6    | 7'-2"   | 105    |
| V1  | 72  | #4   | STR  | 5'-7"   | 269    |
| V2  | 27  | #5   | STR  | 9'-9"   | 275    |
| V3  | 25  | #5   | STR  | 9'-5"   | 246    |

REINFORCING STEEL LBS. 4,589

CLASS A CONCRETE

POUR #1 CU. YDS. 41.0  
(CAP, CONCRETE COLLARS & LOWER PART OF WINGS)



DocuSigned by:  
Francesca Lea  
B79DADB8E5084EF  
05/01/2024

PROJECT NO. BR-0093

ROCKINGHAM COUNTY

STATION: 17+85.52 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE

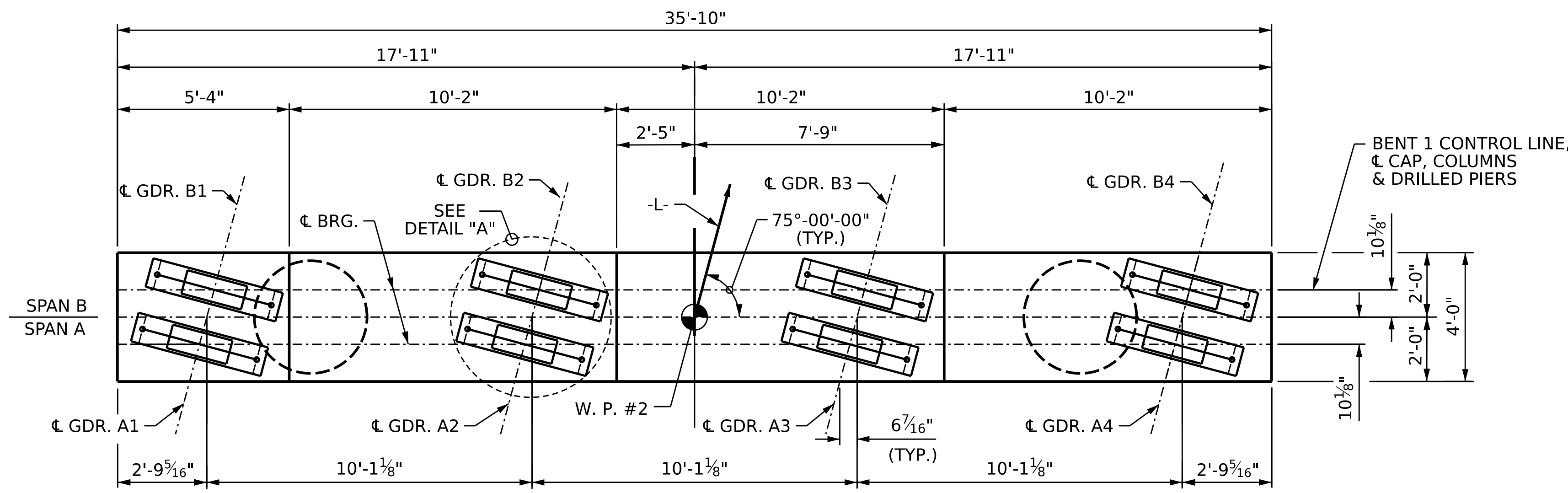
END BENT 1  
INTEGRAL

**REVISIONS**

| NO. | BY: | DATE: | NO. | BY: | DATE: | SHEET NO.       |
|-----|-----|-------|-----|-----|-------|-----------------|
| 1   |     |       | 3   |     |       | S-27            |
| 2   |     |       | 4   |     |       | TOTAL SHEETS 36 |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

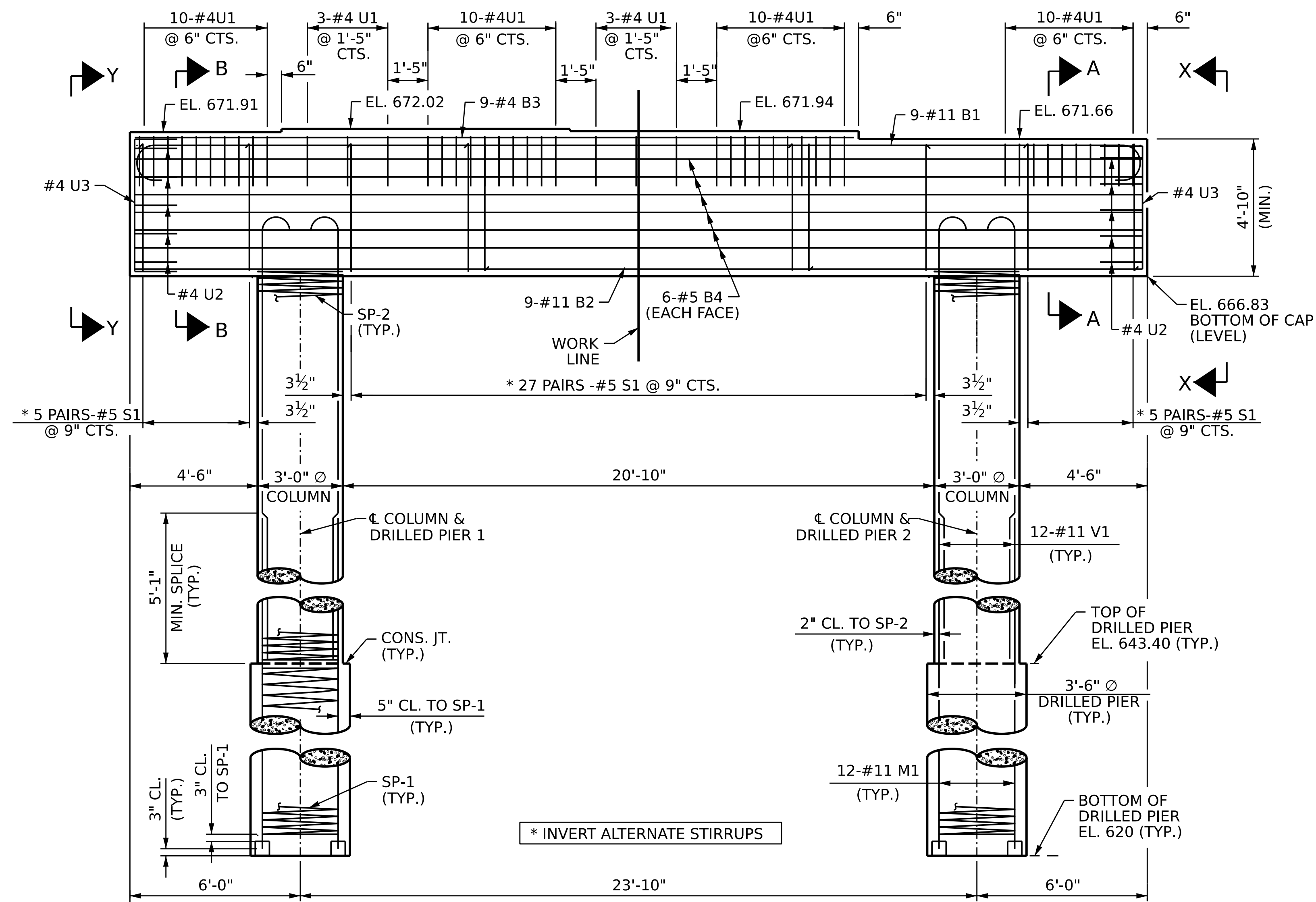
DRAWN BY: E. BAYISSA / Q.T. NGUYEN DATE: 11/2023  
CHECKED BY: F. LEA DATE: 11/2023  
DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 09/2023



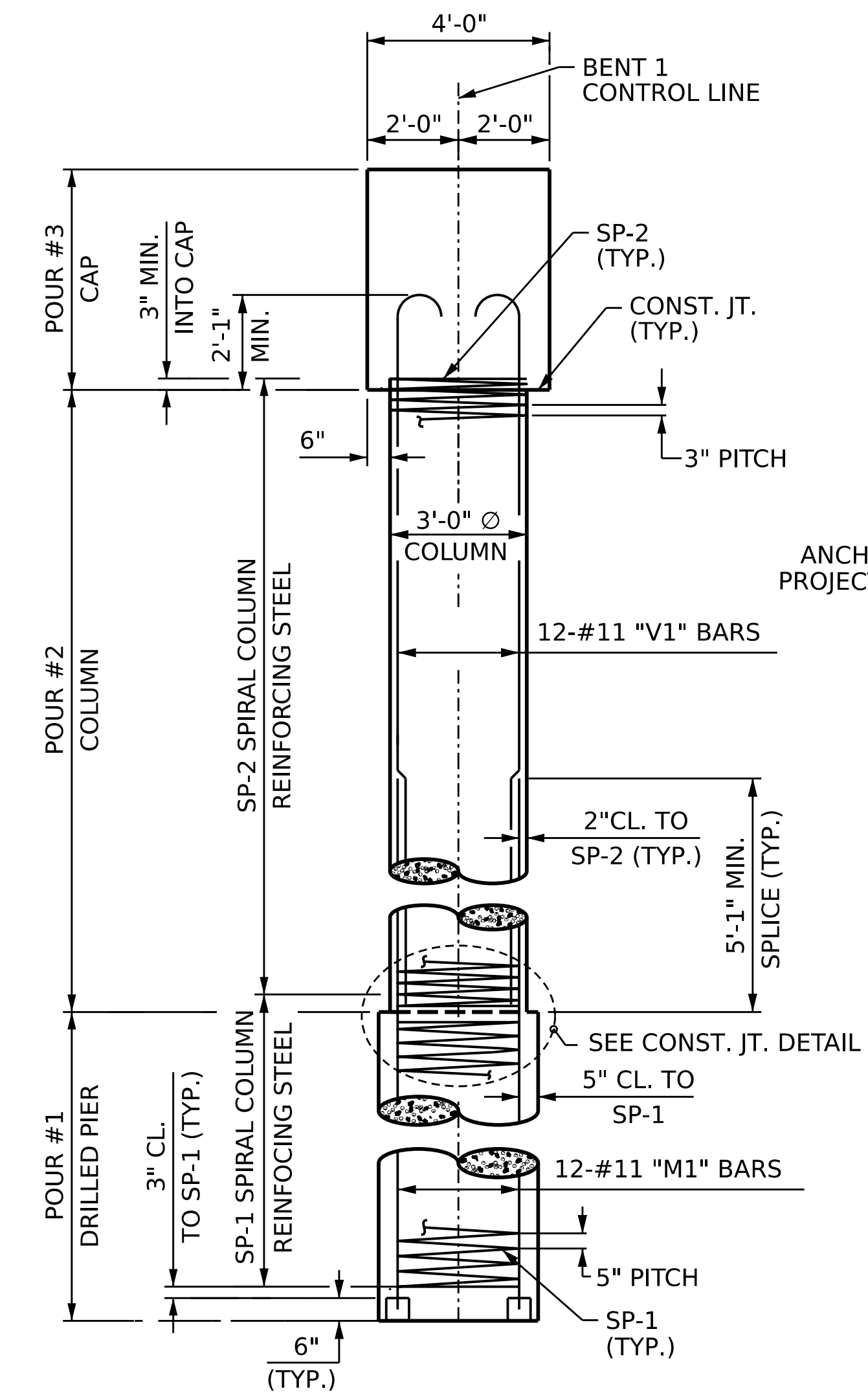
**PLAN**

**NOTE**

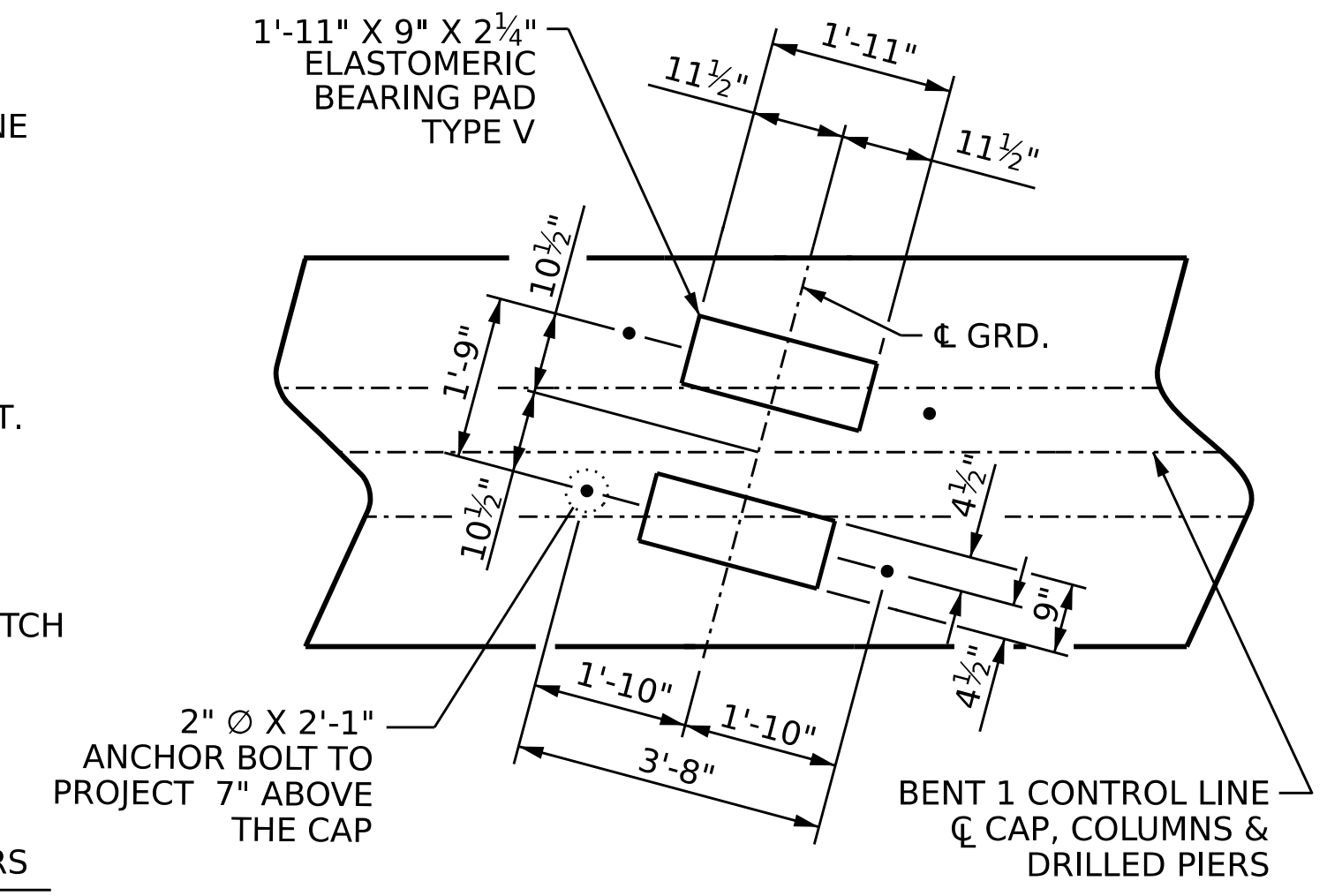
STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.  
 HOOKS ON "V" BARS MAYBE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.  
 ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL" OR "EPOXY COATED SPIRAL 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.  
 SPLICING OF THE LONGITUDINAL BARS ON THE DRILLED PIER WILL NOT BE PERMITTED.  
 NO SEPARATE PAYMENT SHALL BE MADE FOR ANY ADDITIONAL STEEL REQUIRED IN CONSTRUCTION OF DRILLED PIER AS THIS IS CONSIDERED INCIDENTAL TO THE LINEAR FOOT PRICE FOR DRILLED PIER.



**ELEVATION**

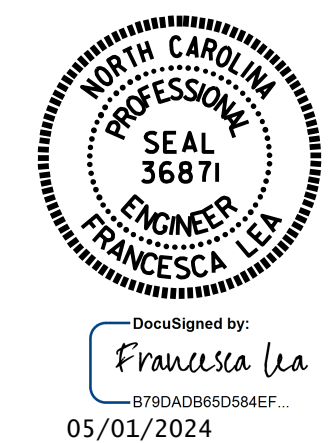


**END ELEVATION**



**DETAIL "A"**  
(TYP. EA. GDR.)

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-  
 SHEET 1 OF 2

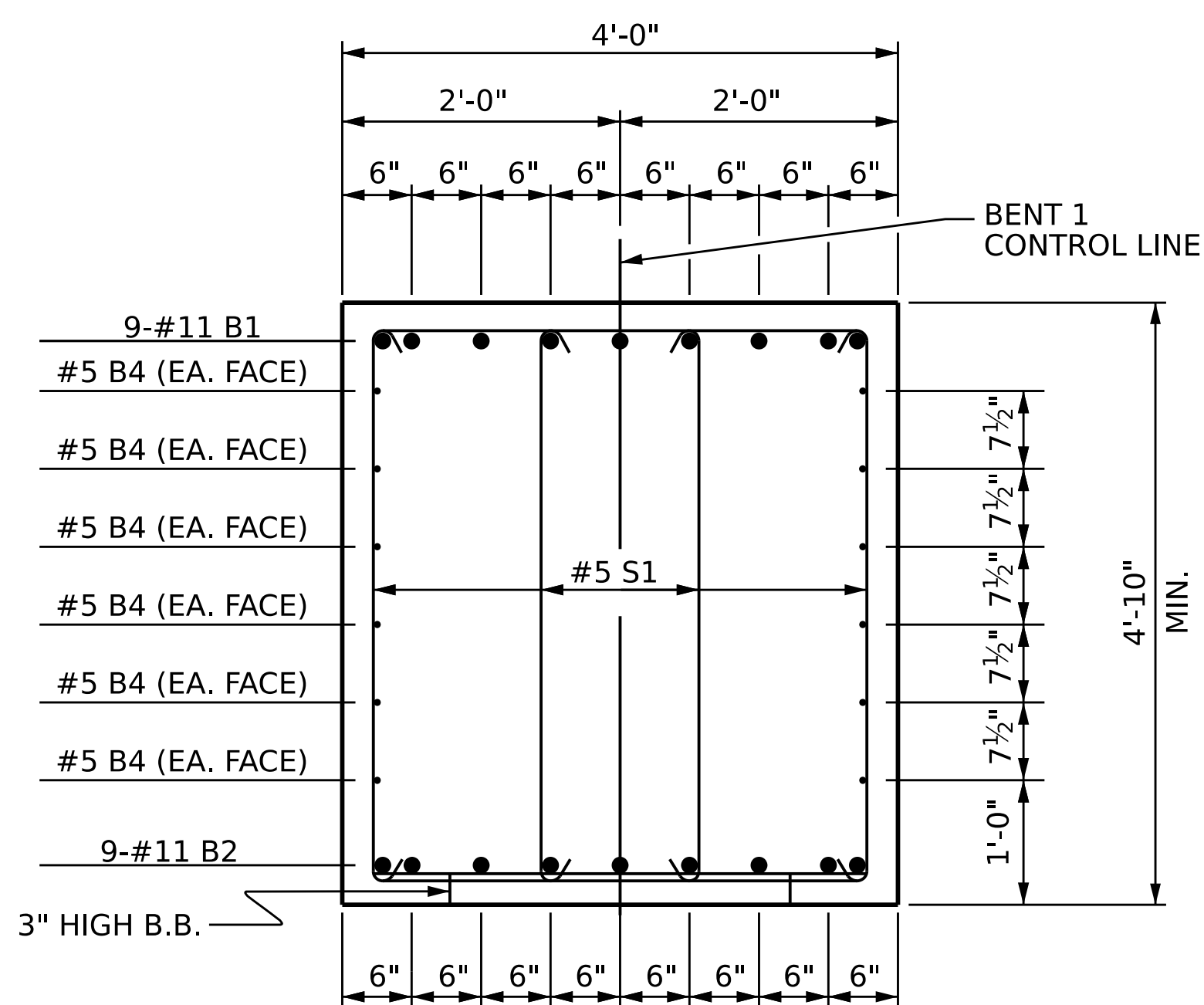


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
**BENT 1**

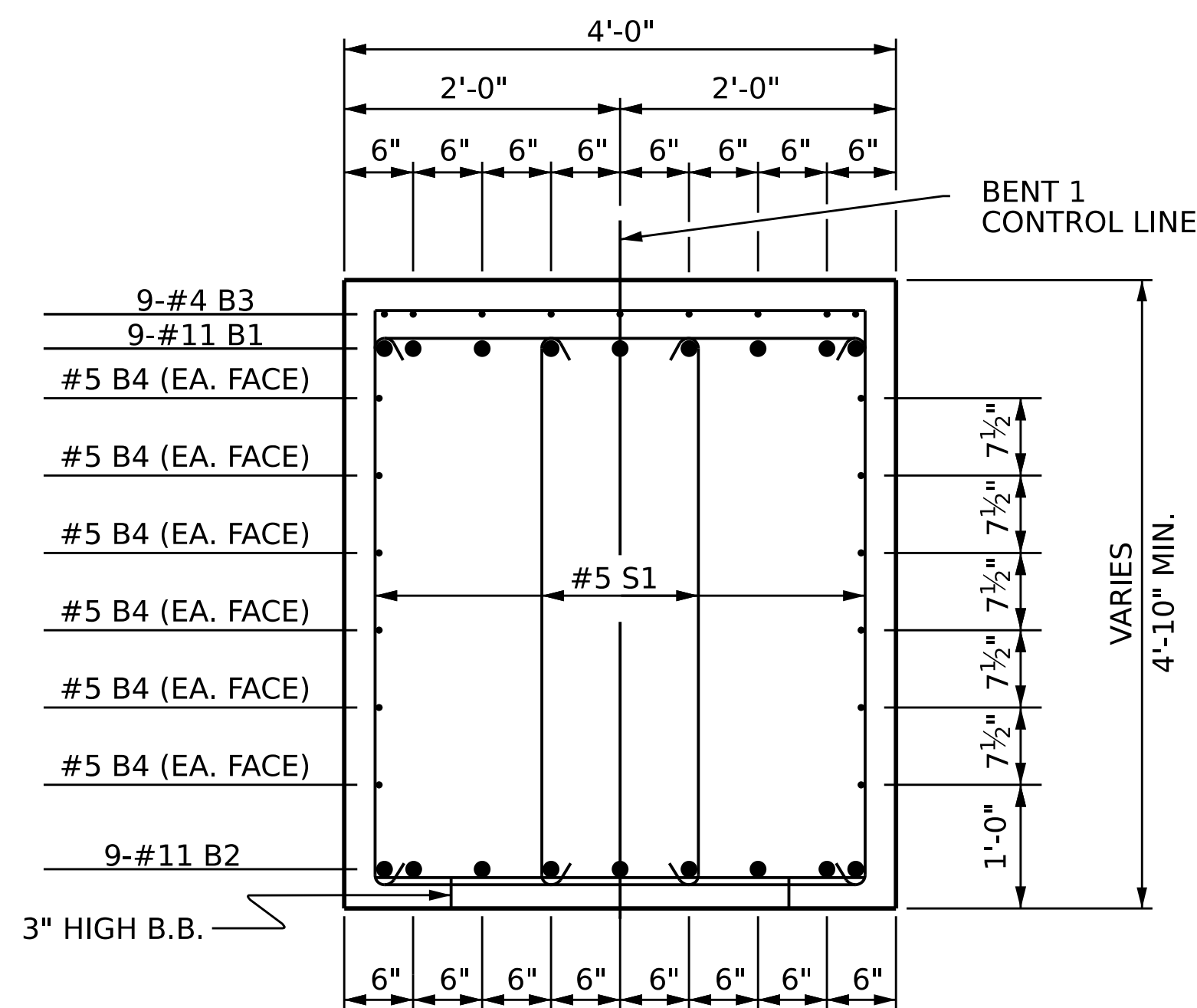
DRAWN BY : E. BAYISSA DATE : 12/2023  
 CHECKED BY : F. LEA DATE : 12/2023  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 09/2023

| REVISIONS |     |       |     | SHEET NO. |       |
|-----------|-----|-------|-----|-----------|-------|
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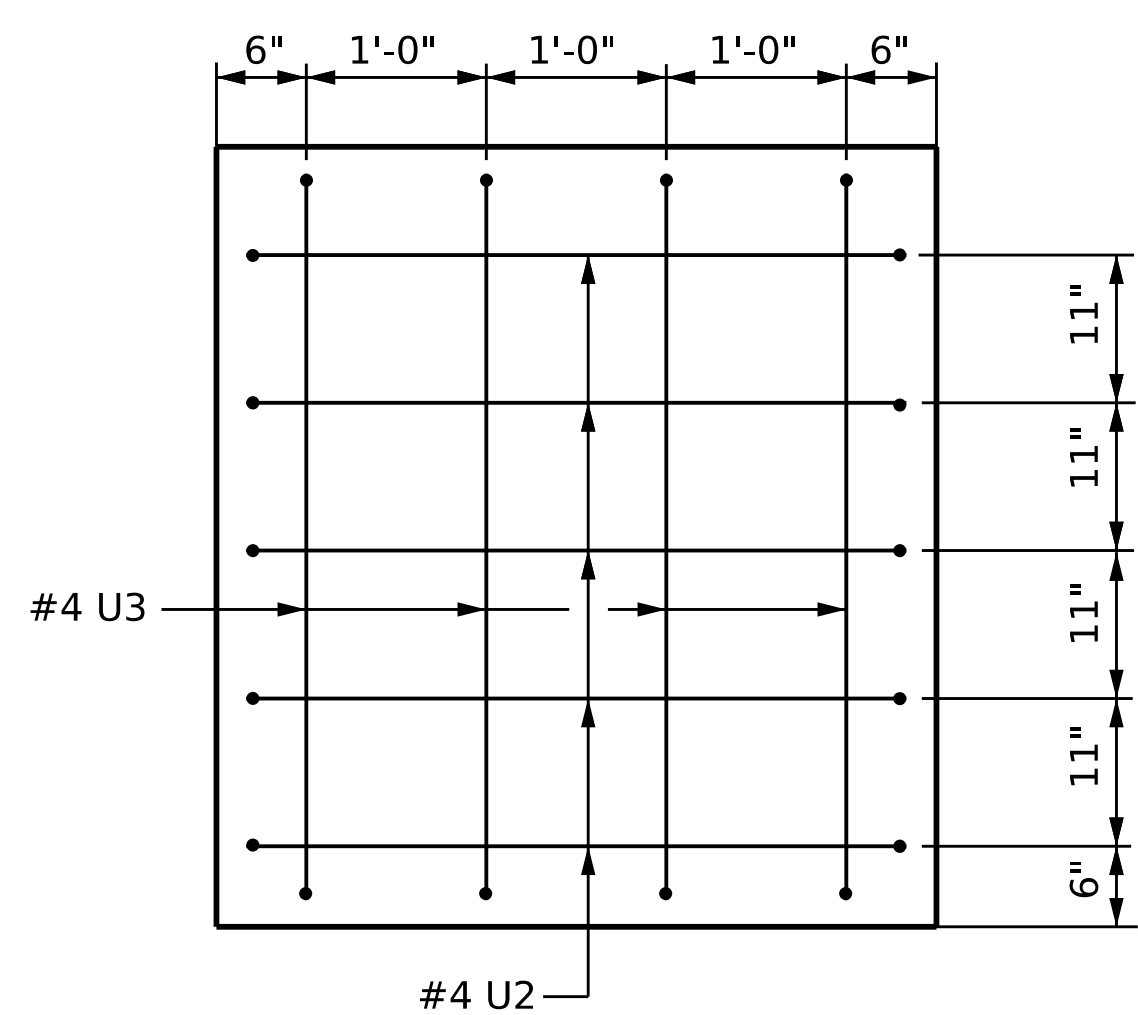
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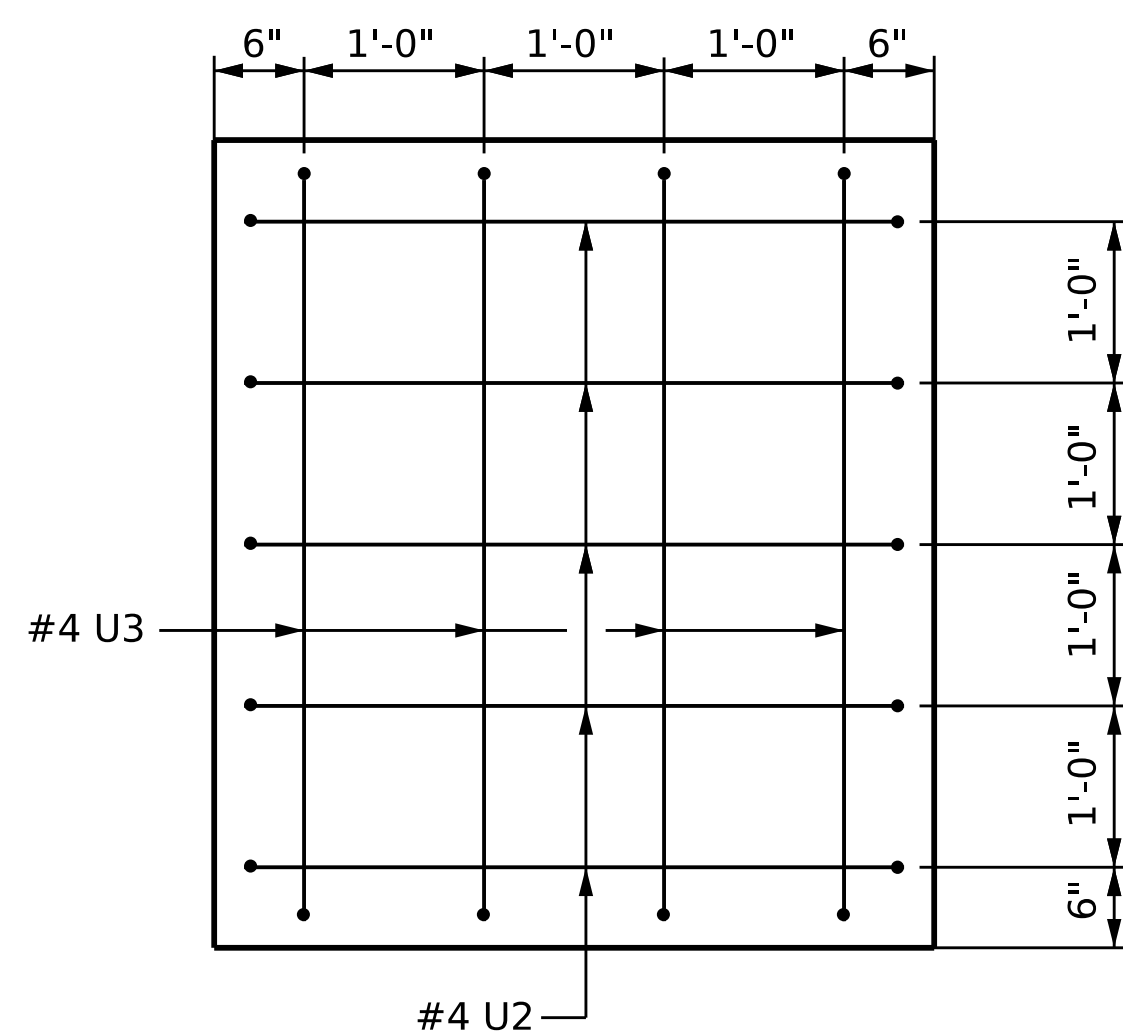
SECTION A-A



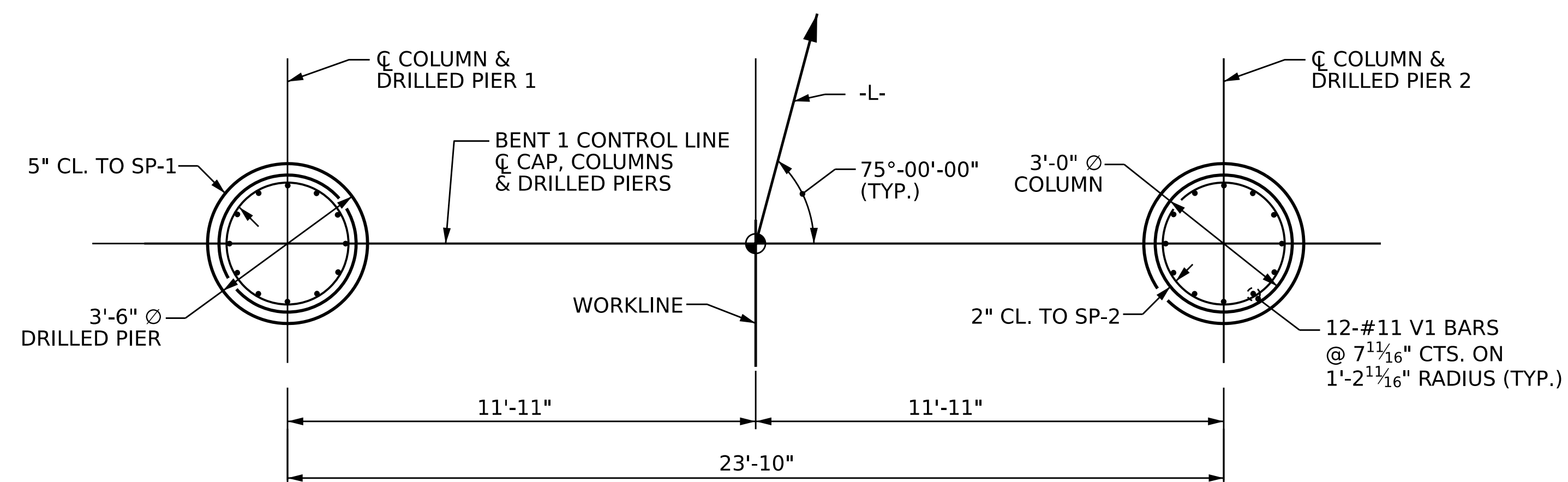
SECTION B-B



SECTION X-X

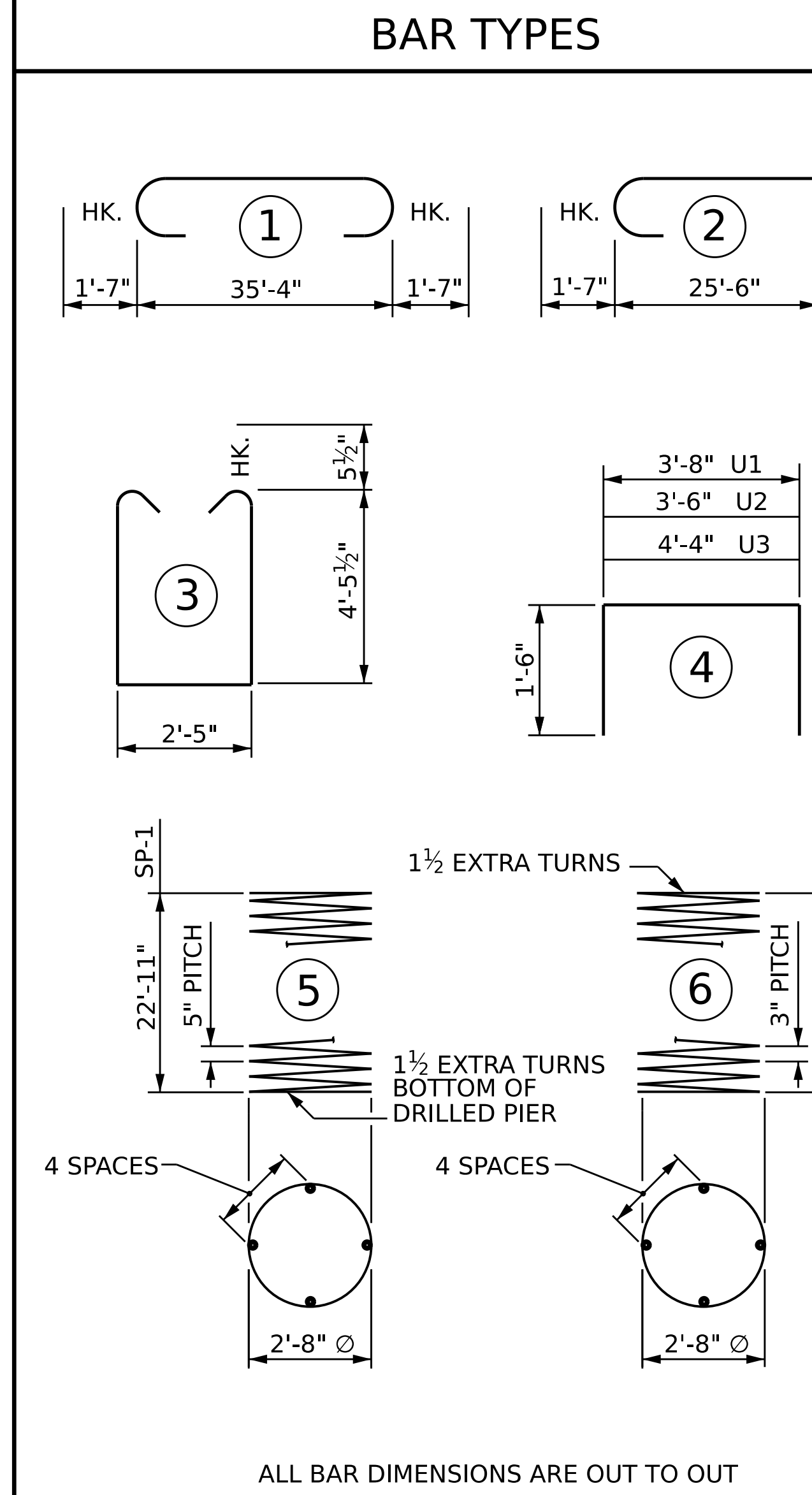


SECTION Y-Y



PLAN OF DRILLED PIERS AND COLUMNS

(REINFORCING STEEL AND DIMENSIONS ARE TYPICAL FOR EACH DRILLED PIER AND COLUMN)



ALL BAR DIMENSIONS ARE OUT TO OUT

\* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.  
 \*\* THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

BILL OF MATERIAL

BENT 1

| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT |
|-----|-----|------|------|--------|--------|
| B1  | 9   | #11  | 1    | 38'-6" | 1841   |
| B2  | 9   | #11  | STR  | 35'-6" | 1698   |
| B3  | 9   | #4   | STR  | 25'-4" | 152    |
| B4  | 6   | #5   | STR  | 35'-6" | 222    |
| M1  | 24  | #11  | STR  | 31'-2" | 3974   |
| S1  | 74  | #5   | 3    | 12'-3" | 945    |
| U1  | 46  | #4   | 4    | 6'-8"  | 205    |
| U2  | 10  | #4   | 4    | 6'-6"  | 43     |
| U3  | 8   | #4   | 4    | 7'-4"  | 39     |
| V1  | 24  | #11  | 2    | 27'-1" | 3453   |

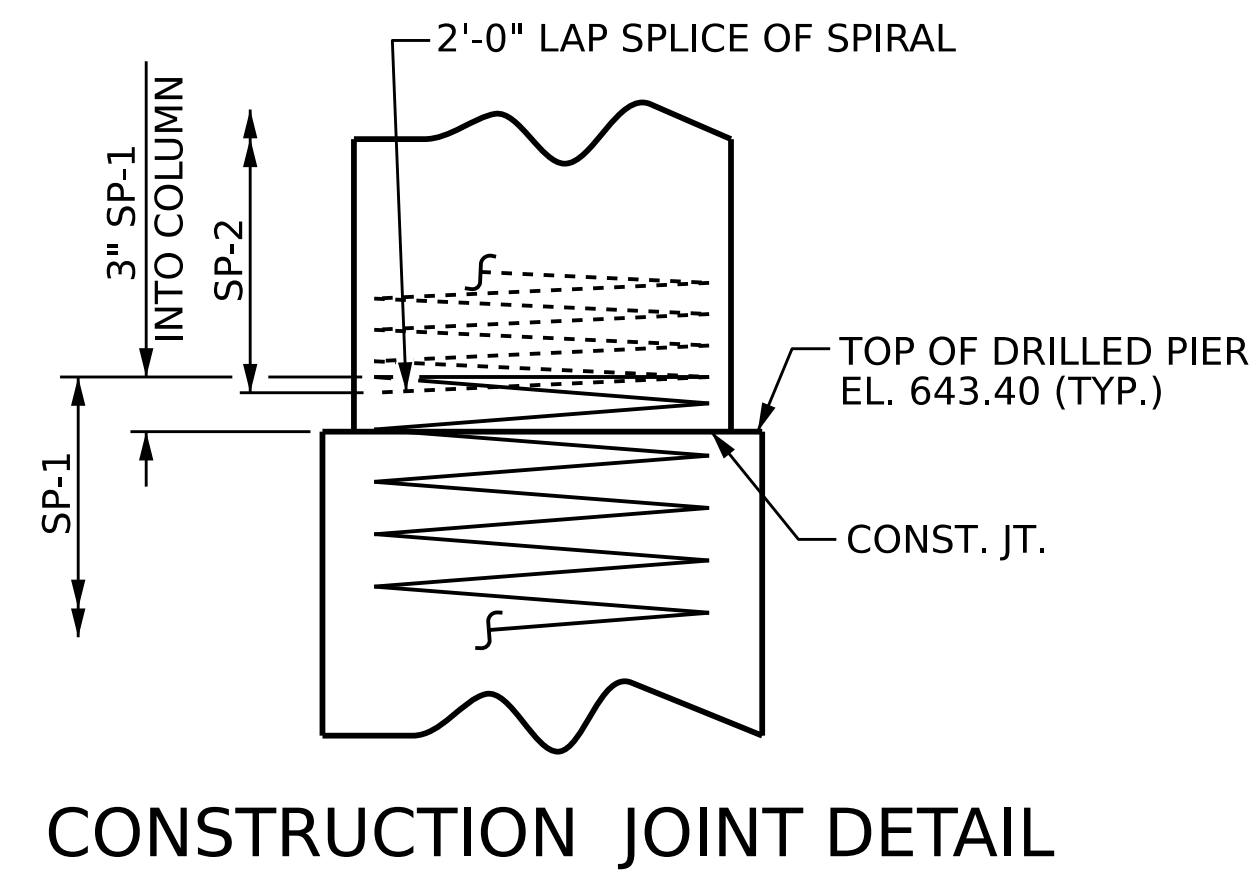
REINFORCING STEEL LBS. 12,573

|      |   |    |   |         |      |
|------|---|----|---|---------|------|
| SP-1 | 2 | *  | 5 | 464'-9" | 969  |
| SP-2 | 2 | ** | 6 | 796'-3" | 1064 |

SPIRAL COLUMN REINFORCING STEEL LBS. 2,033

CLASS A CONCRETE  
 POUR #2 - COLUMN CU. YDS. 12.3  
 POUR #3 - CAP CU. YDS. 26.8  
 TOTAL CU. YDS. 39.1

DRILLED PIER CONCRETE  
 POUR #1 - DRILLED PIERS CU. YDS. 16.7



CONSTRUCTION JOINT DETAIL

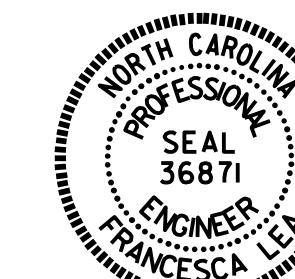
PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 18+75.52 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE

BENT 1



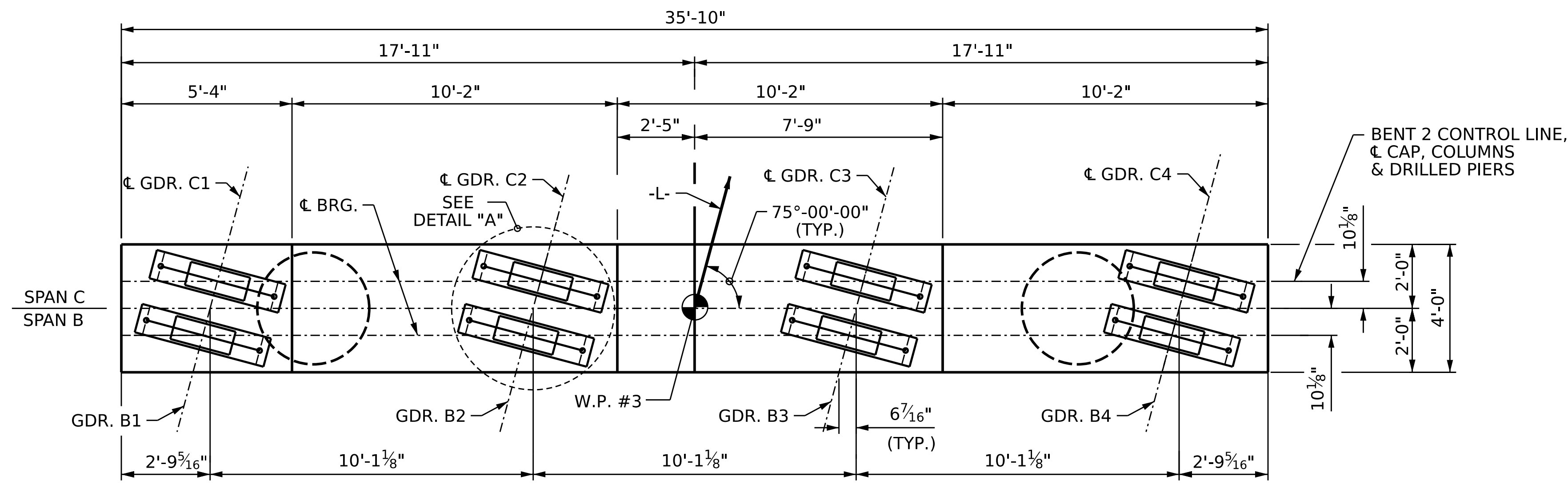
DocuSigned by:  
 Francesca Lea  
 05/01/2024

REVISIONS

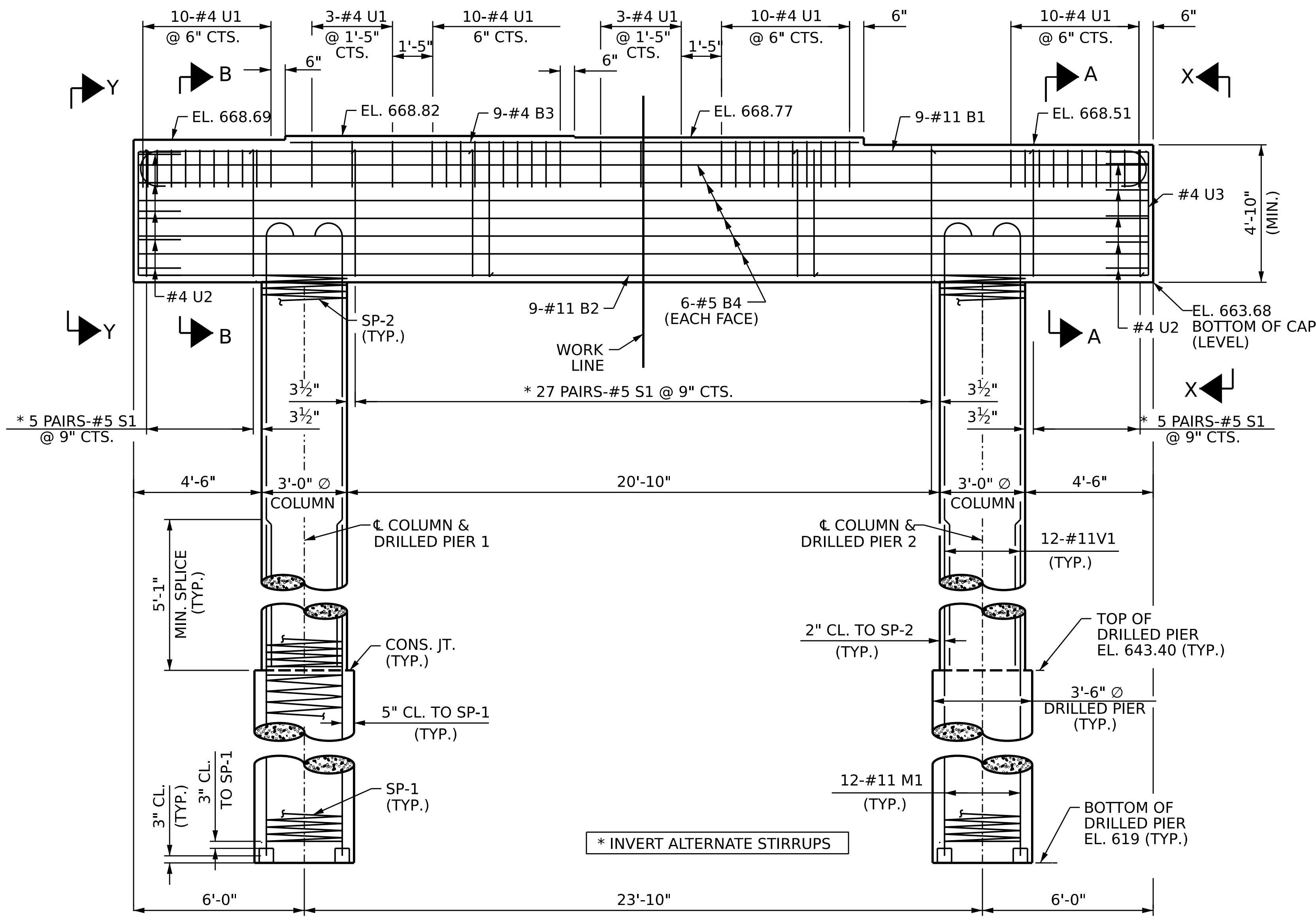
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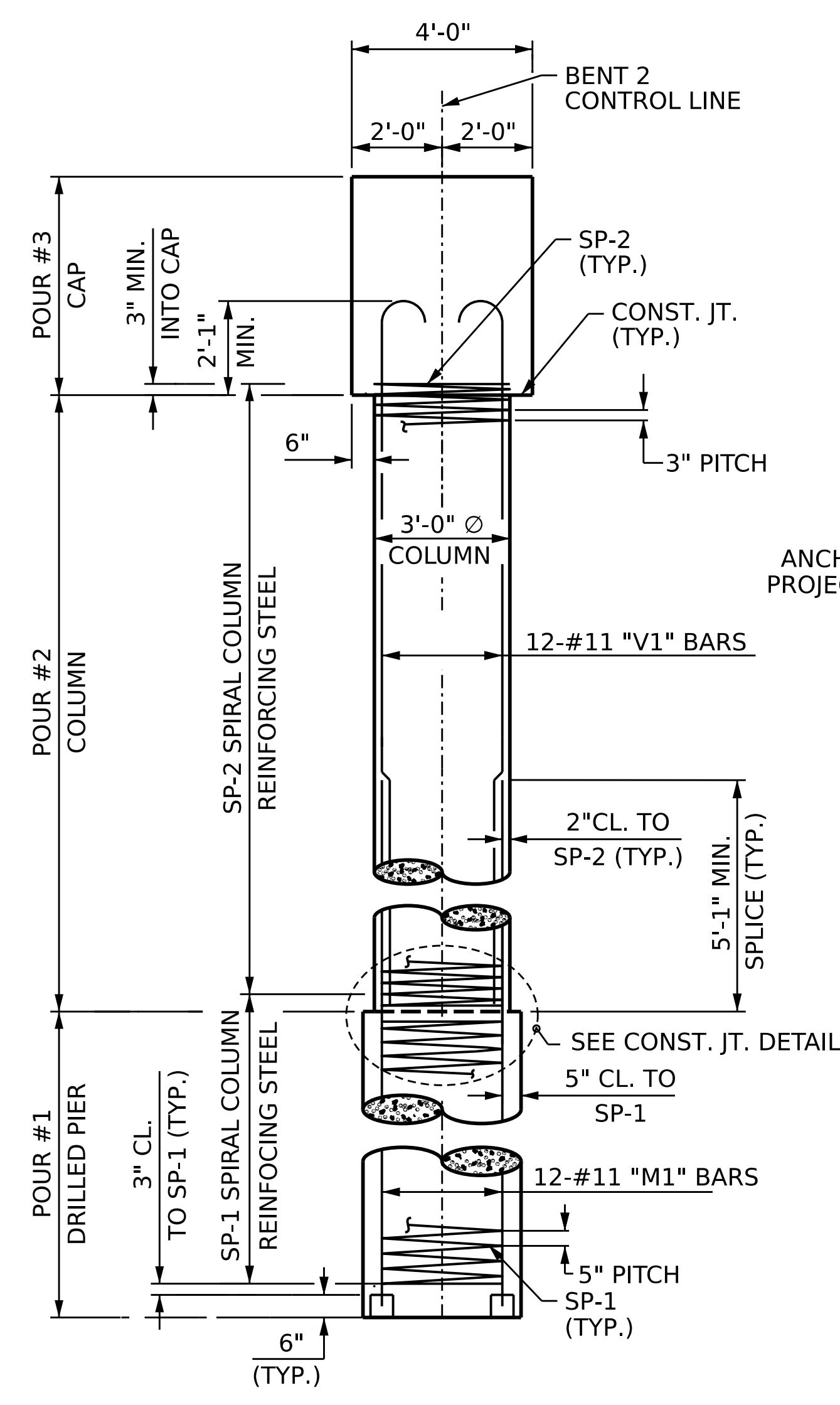
DRAWN BY: E. BAYISSA DATE: 12/2023  
 CHECKED BY: F. LEA DATE: 01/2024  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 09/2023



**PLAN**



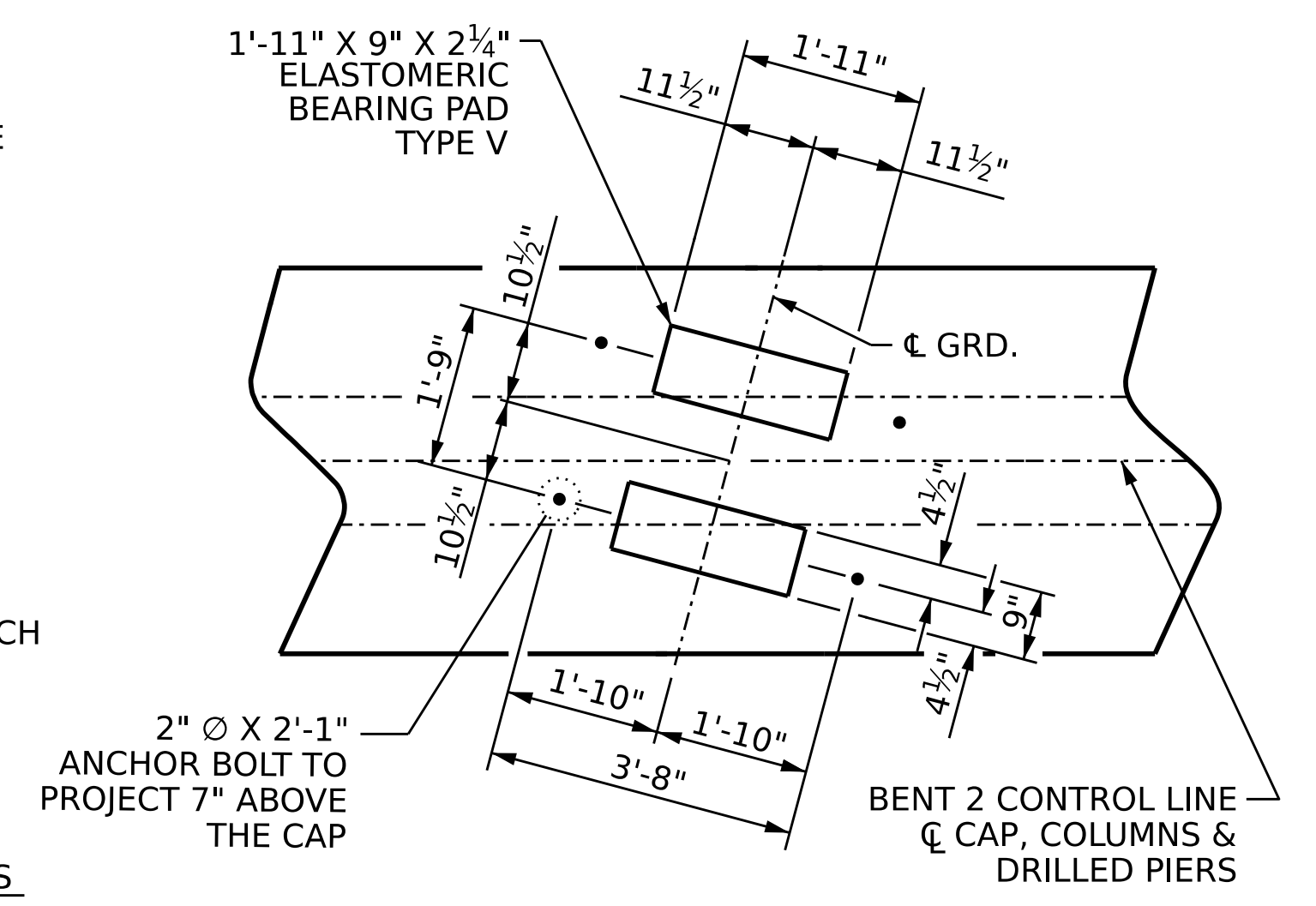
**ELEVATION**



**END ELEVATION**

**NOTES:**

- STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.
- HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.
- ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL" OR "EPOXY COATED SPIRAL COLUMN REINFORCING STEEL".
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**DETAIL "A"**  
(TYP. EA. GDR.)

PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-  
 SHEET 1 OF 2



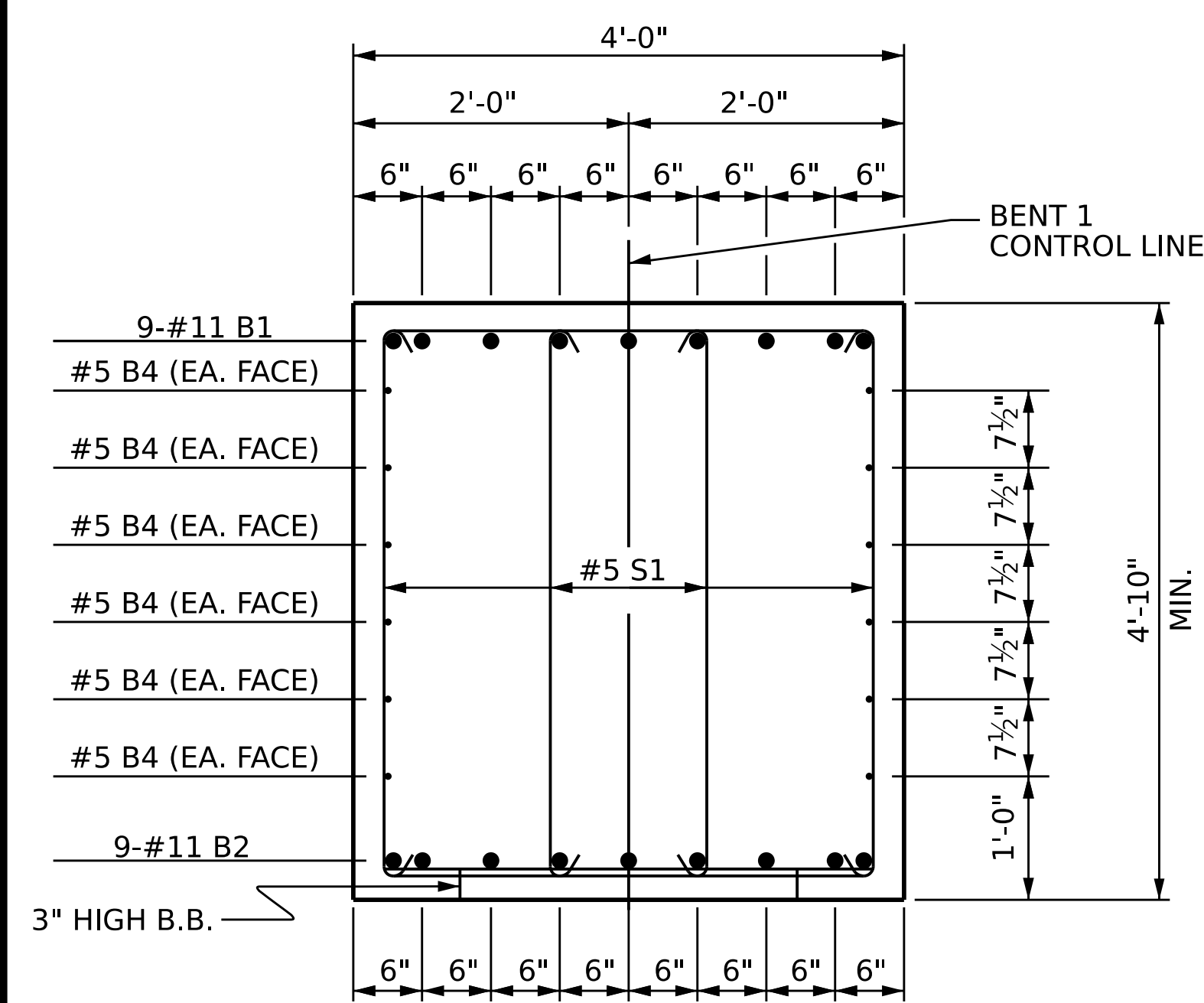
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 BENT 2

DRAWN BY : E. BAYISSA DATE : 12/2023  
 CHECKED BY : F. LEA DATE : 01/2024  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 09/2023

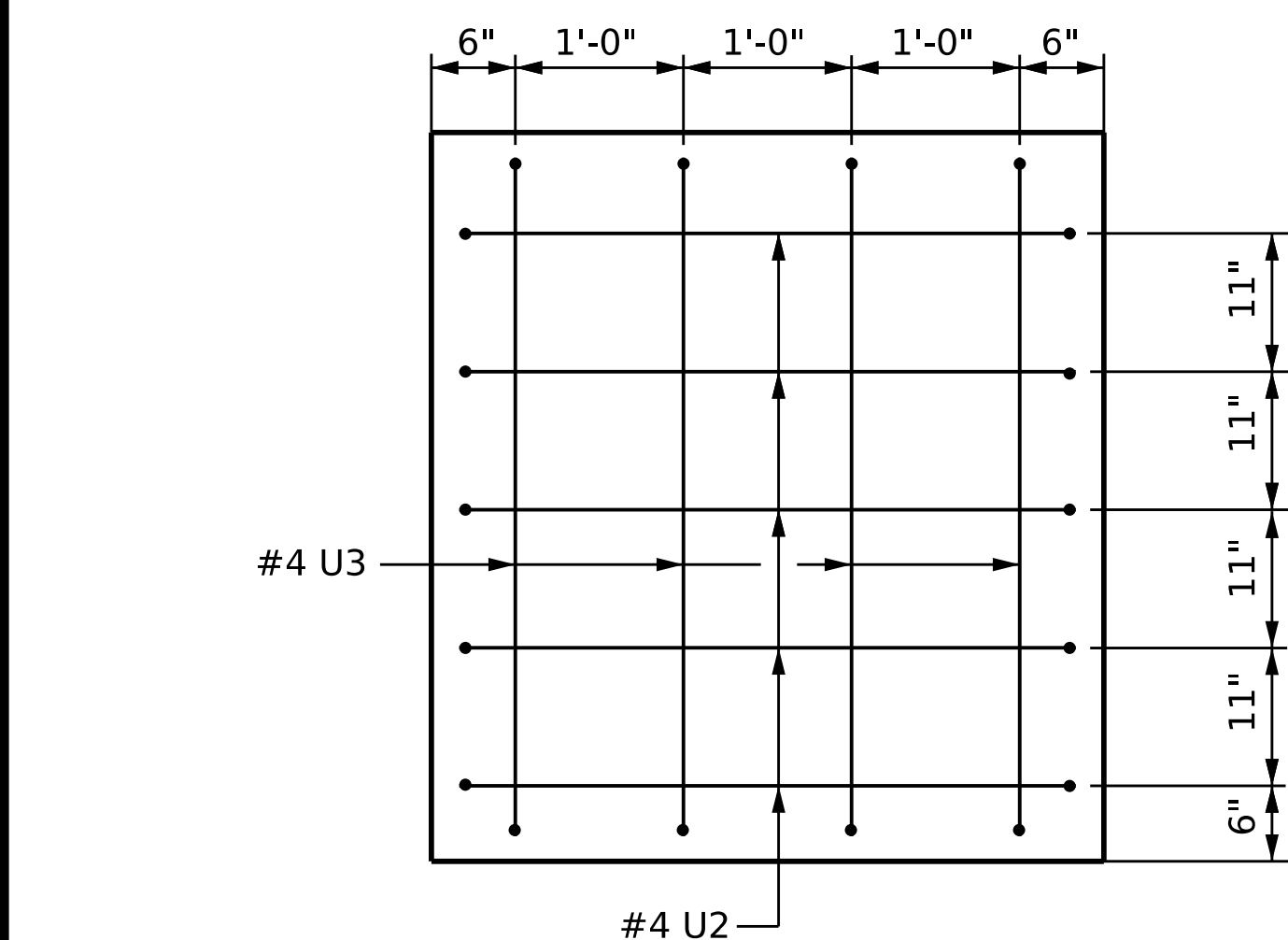
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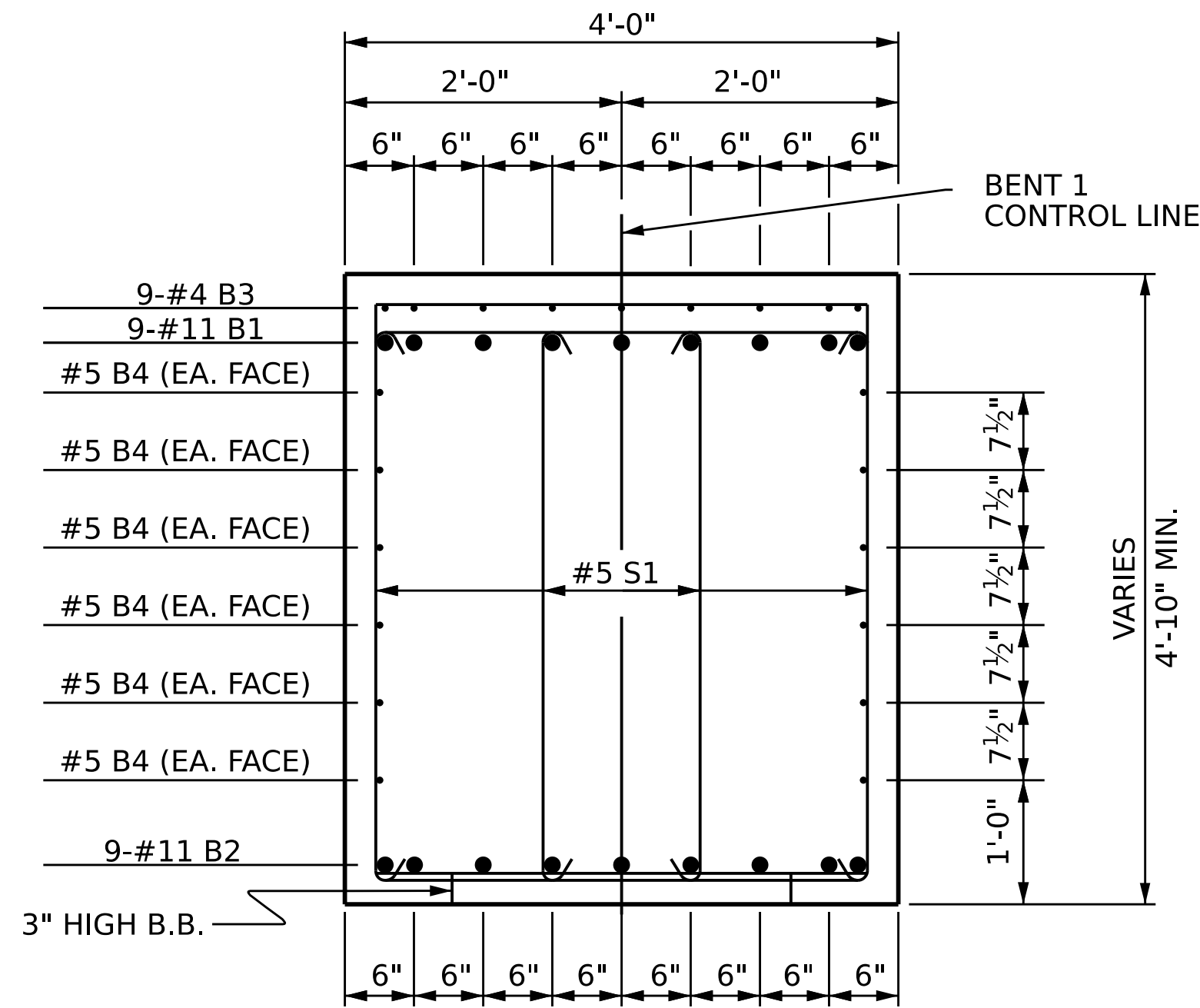




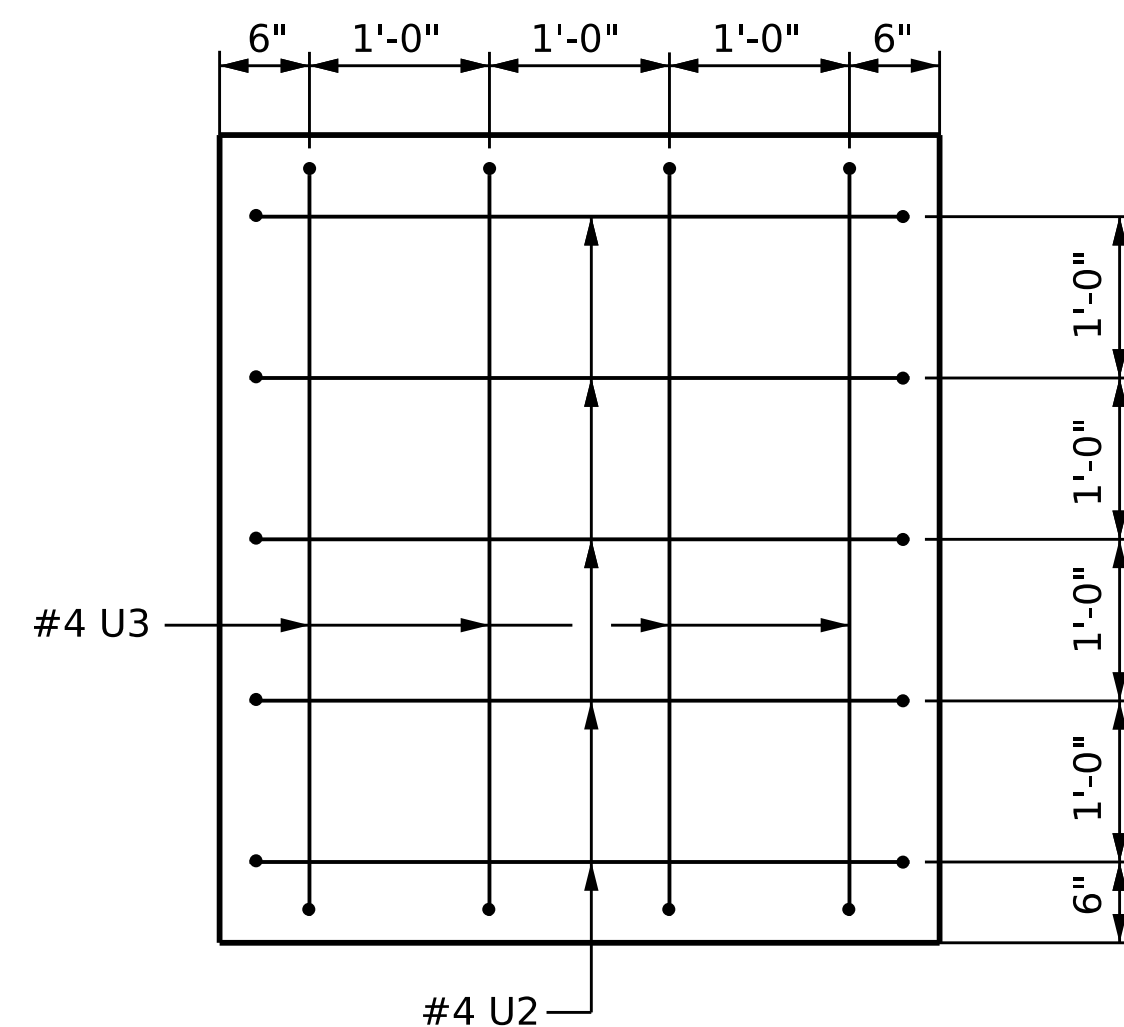
SECTION A-A



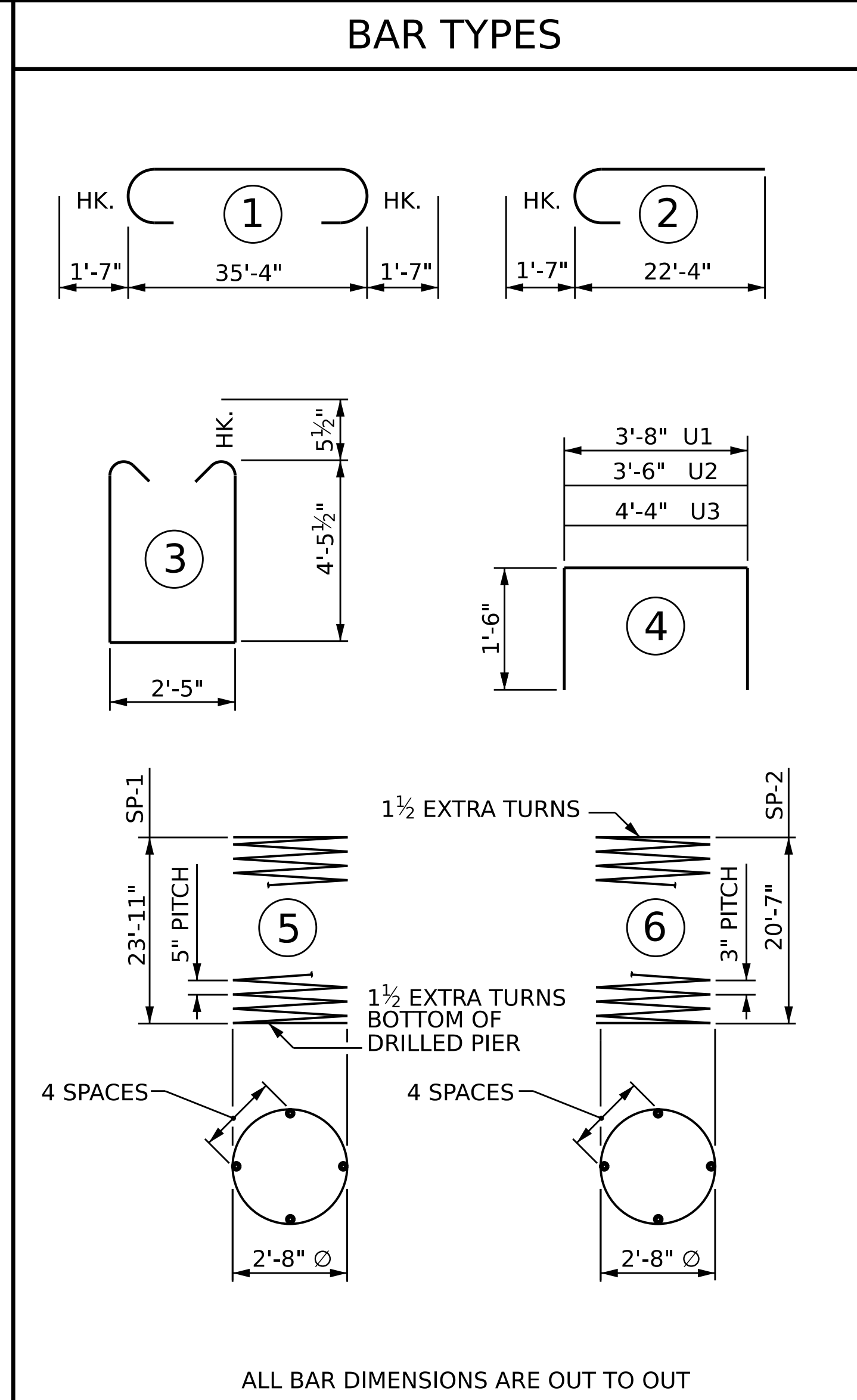
SECTION X-X



SECTION B-B



SECTION Y-Y

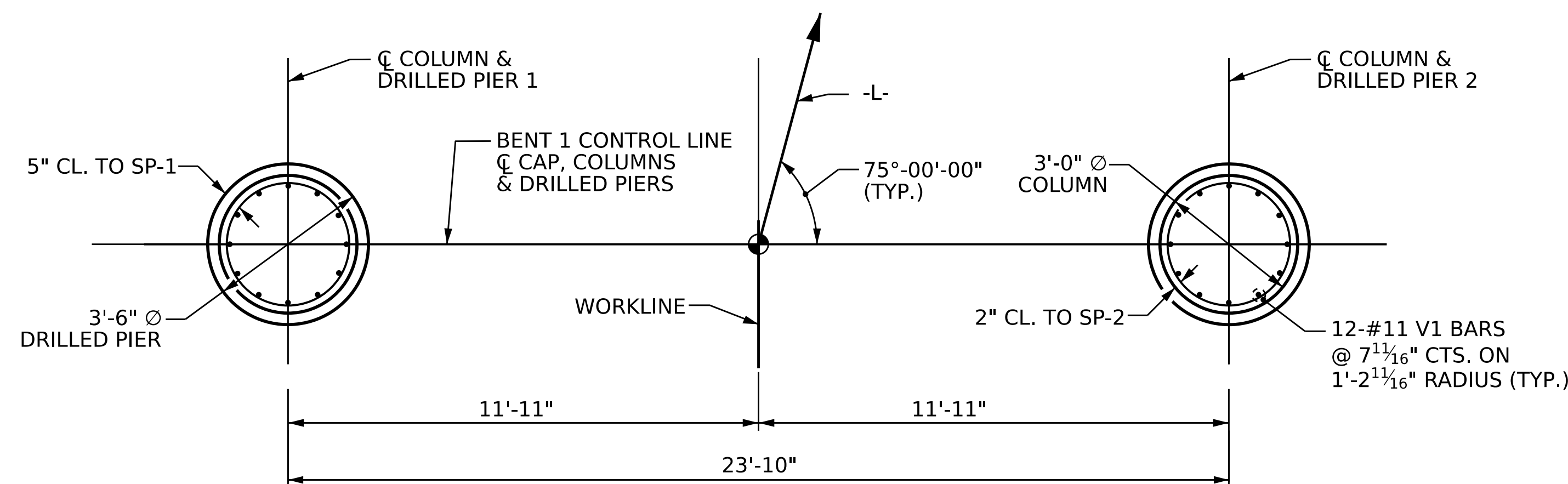


ALL BAR DIMENSIONS ARE OUT TO OUT

\* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.  
 \*\* THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

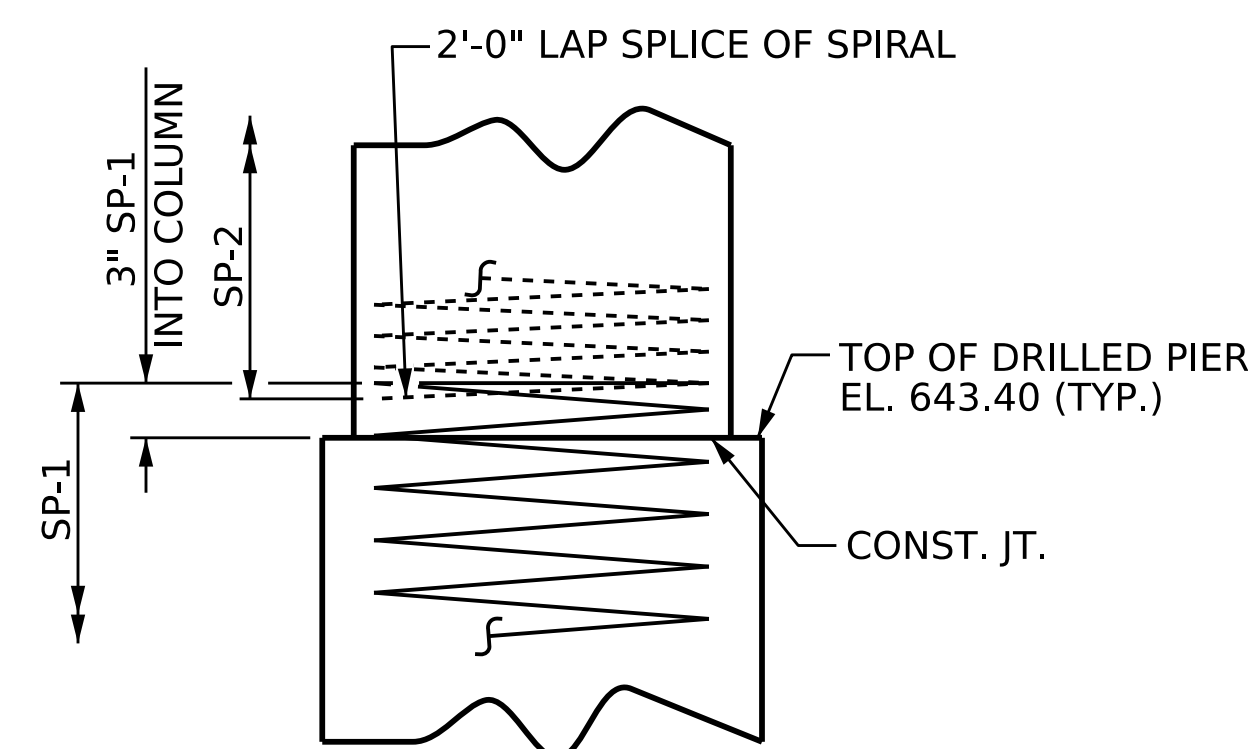
BILL OF MATERIAL

| BENT 2                          |     |      |      |          |        |
|---------------------------------|-----|------|------|----------|--------|
| BAR                             | NO. | SIZE | TYPE | LENGTH   | WEIGHT |
| B1                              | 9   | #11  | 1    | 38'-6"   | 1841   |
| B2                              | 9   | #11  | STR  | 35'-6"   | 1698   |
| B3                              | 9   | #4   | STR  | 20'-0"   | 120    |
| B4                              | 6   | #5   | STR  | 35'-6"   | 222    |
| M1                              | 24  | #11  | STR  | 32'-2"   | 4102   |
| S1                              | 74  | #5   | 3    | 12'-3"   | 945    |
| U1                              | 46  | #4   | 4    | 6'-8"    | 205    |
| U2                              | 10  | #4   | 4    | 6'-6"    | 43     |
| U3                              | 8   | #4   | 4    | 7'-4"    | 39     |
| V1                              | 24  | #11  | 2    | 23'-11"  | 3050   |
| REINFORCING STEEL               |     |      |      | LBS.     | 12,265 |
| SP-1                            | 2   | *    | 5    | 485'-3"  | 1012   |
| SP-2                            | 2   | **   | 6    | 693'-1"  | 926    |
| SPIRAL COLUMN REINFORCING STEEL |     |      |      | LBS.     | 1,938  |
| CLASS A CONCRETE                |     |      |      |          |        |
| POUR #2 - COLUMN                |     |      |      | CU. YDS. | 10.6   |
| POUR #3 - CAP                   |     |      |      | CU. YDS. | 26.6   |
| TOTAL                           |     |      |      | CU. YDS. | 37.2   |
| DRILLED PIER CONCRETE           |     |      |      |          |        |
| POUR #1 - DRILLED PIERS         |     |      |      | CU. YDS. | 17.4   |

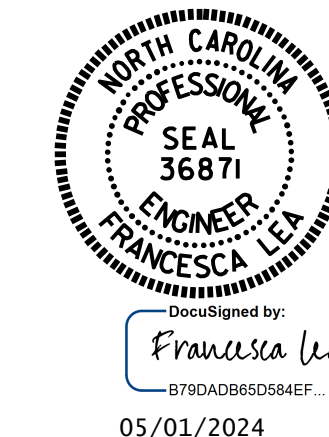


PLAN OF DRILLED PIERS AND COLUMNS

(REINFORCING STEEL AND DIMENSIONS ARE TYPICAL FOR EACH DRILLED PIER AND COLUMN)



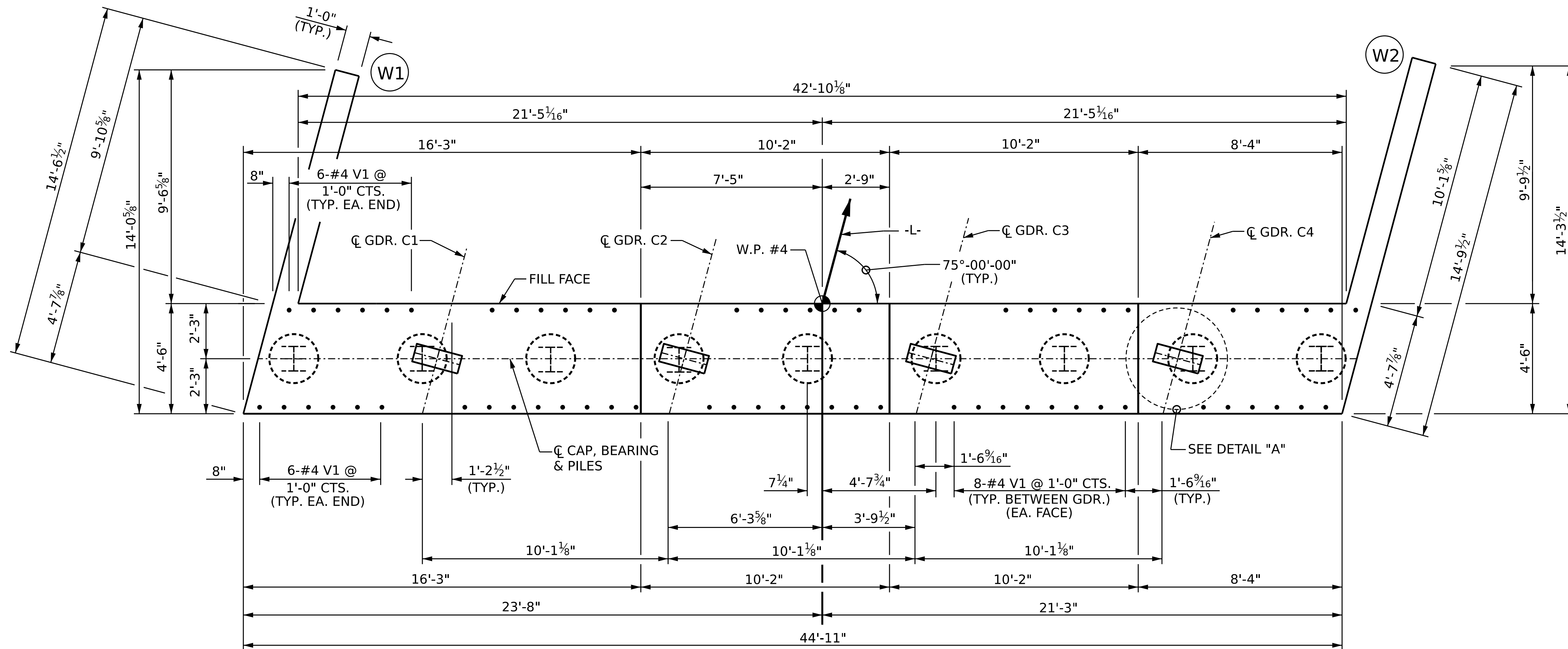
CONSTRUCTION JOINT DETAIL



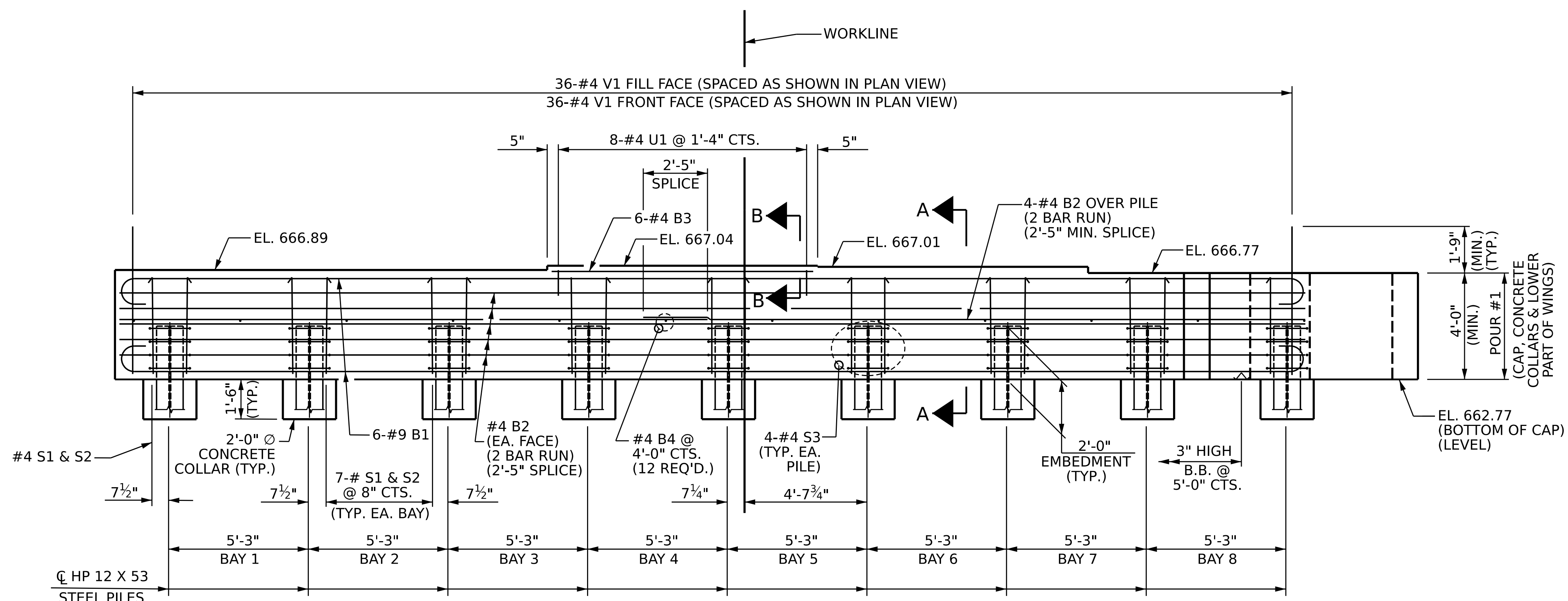
PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-  
 SHEET 2 OF 2

| STATE OF NORTH CAROLINA<br>DEPARTMENT OF TRANSPORTATION<br>RALEIGH |     |       |     |                    |
|--|-----|-------|-----|--------------------|
| SUBSTRUCTURE<br>BENT 2   |     |       |     |                    |
| REVISIONS  |     |       |     | SHEET NO.          |
| NO.  | BY: | DATE: | NO. | DATE:              |
| 1  |     |       | 3   |                    |
| 2  |     |       | 4   |                    |
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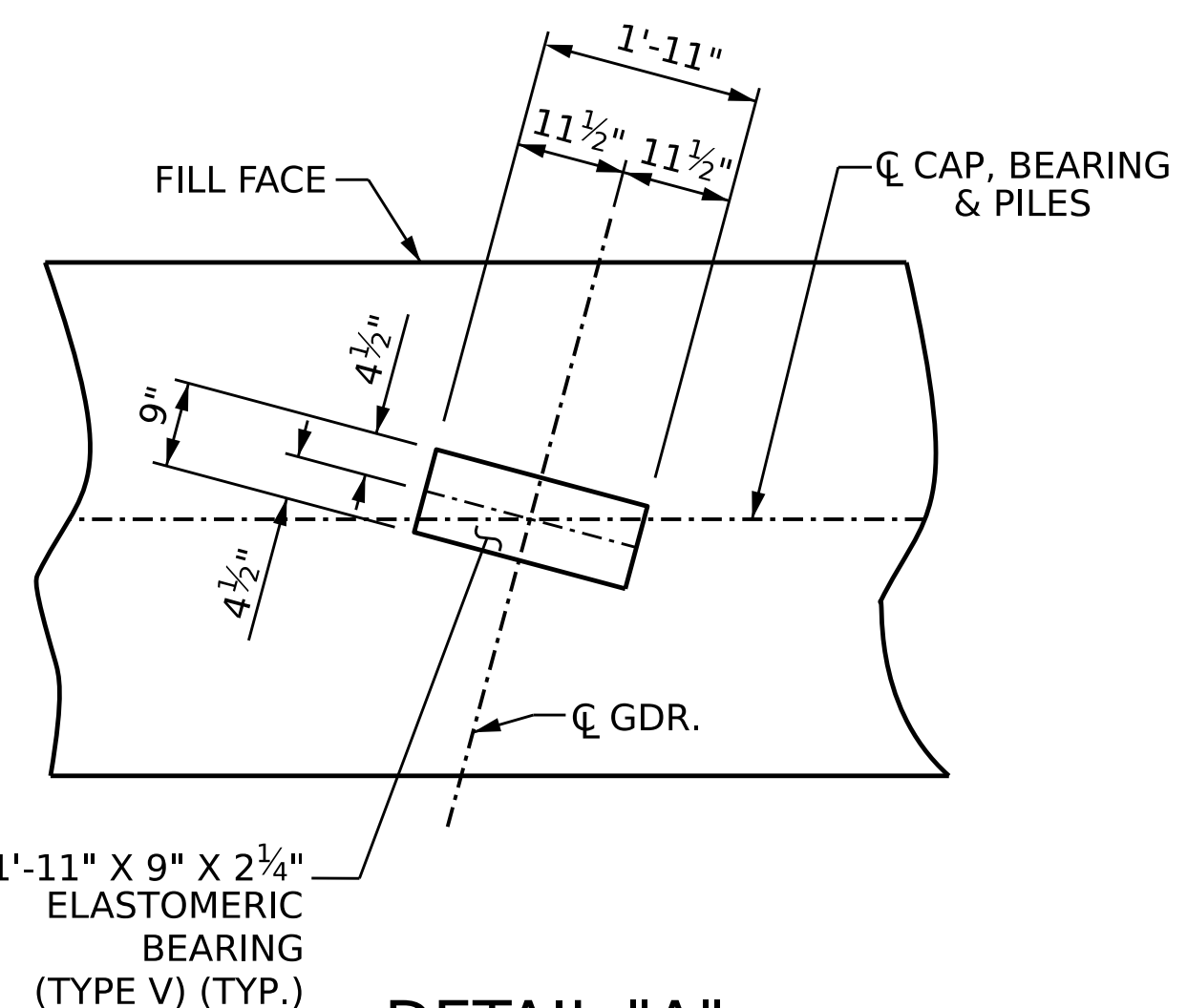
DRAWN BY : E. BAYISSA DATE : 12/2023  
 CHECKED BY : F. LEA DATE : 01/2024  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 09/2023



PLAN



ELEVATION



DETAIL "A"

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR #4 V1 BARS.  
 SEE THE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.  
 THE UPPER PART OF INTEGRAL PORTION AND WINGS SHALL BE POURED WITH THE SUPERSTRUCTURE. SEE SUPERSTRUCTURE PLAN OF SPANS.  
 THE TOP SURFACE OF POUR #1 OF THE END BENT CAP AND WINGS, EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 1 OF 3  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 2  
 INTEGRAL



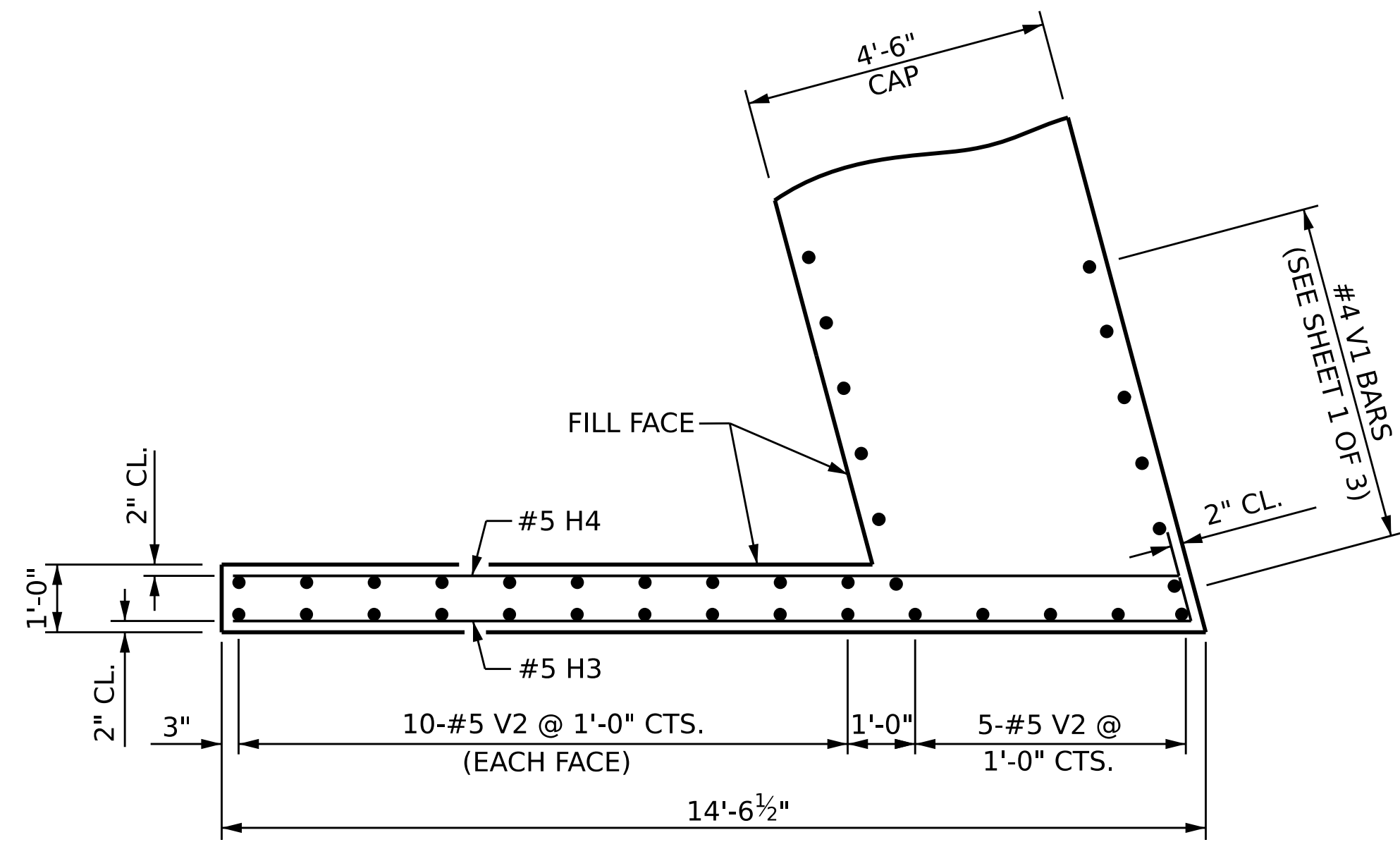
DocuSigned by:  
 Francesca Lea  
 B790ADB05084EF  
 05/01/2024

DRAWN BY: E. BAYISSA / Q.T. NGUYEN DATE: 11/2023  
 CHECKED BY: F. LEA DATE: 12/2023  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 09/2023

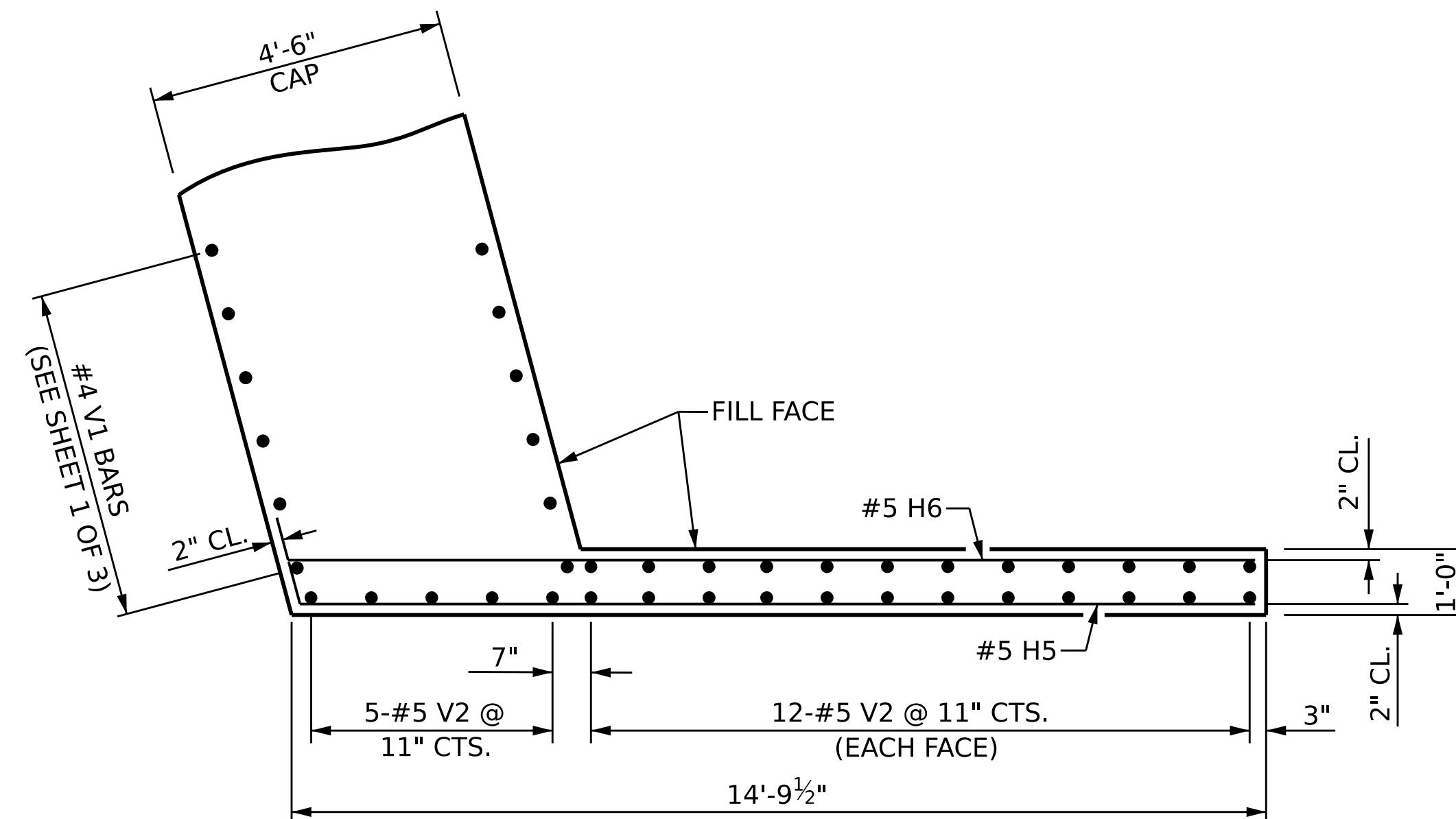
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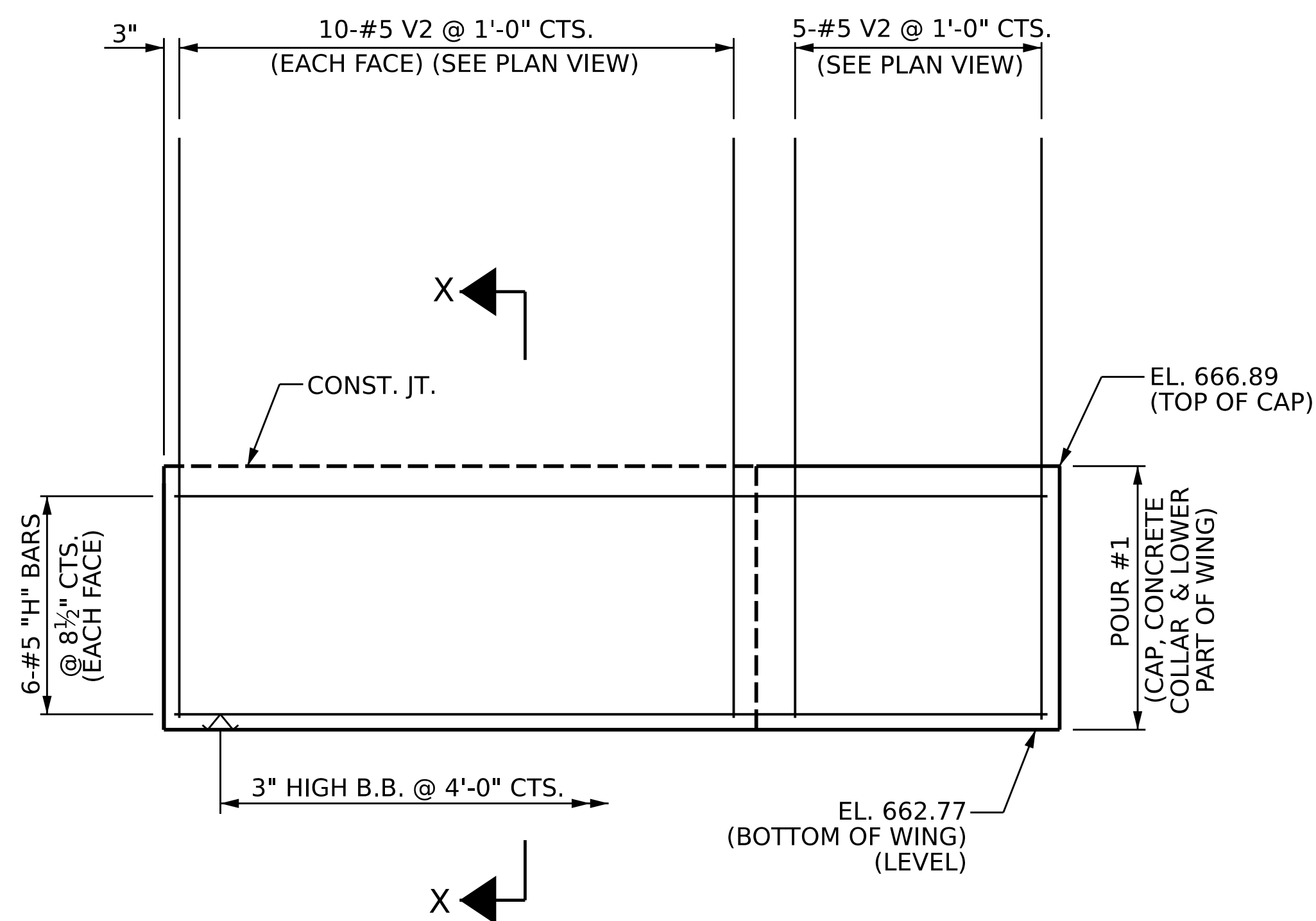
S-32  
 TOTAL SHEETS  
 36



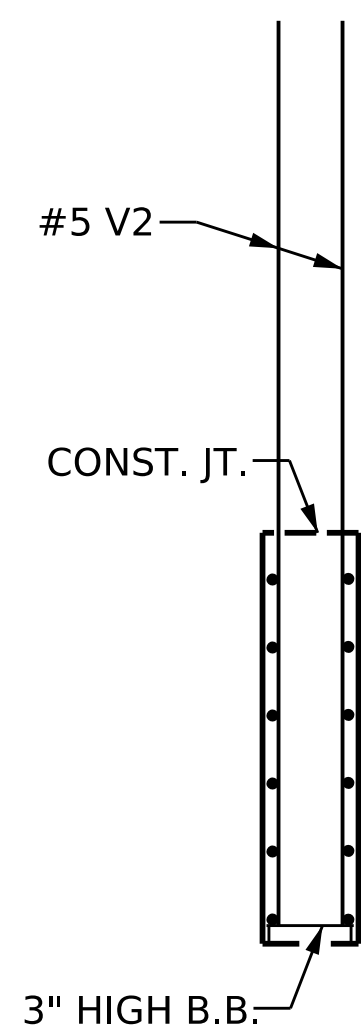
PLAN OF WING W1



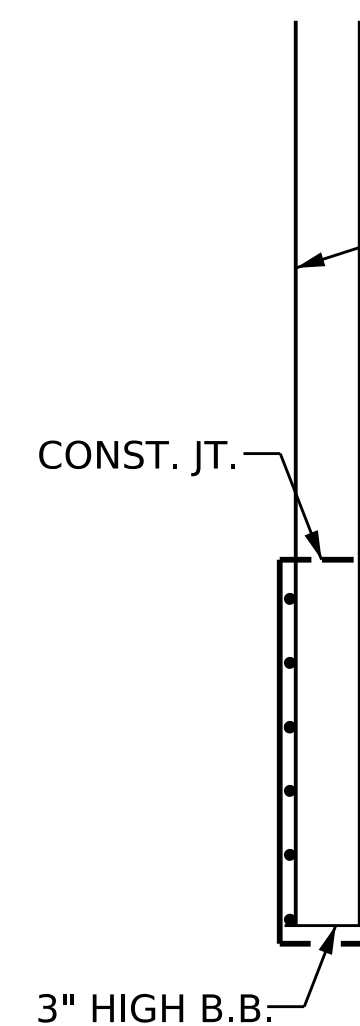
PLAN OF WING W2



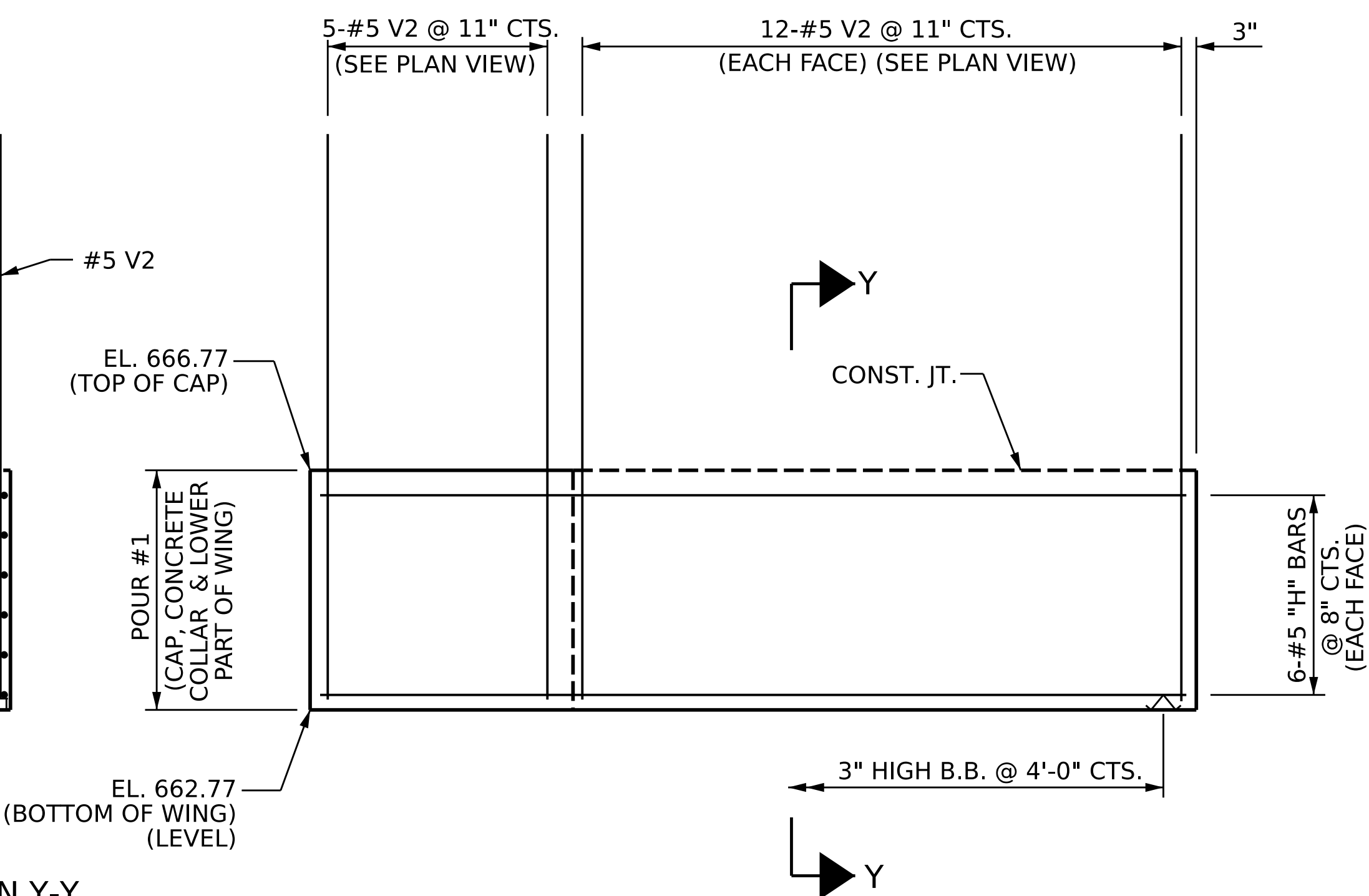
ELEVATION OF WING W1



SECTION X-X



SECTION Y-Y



ELEVATION OF WING W2

PROJECT NO. BR-0093  
 ROCKINGHAM COUNTY  
 STATION: 17+85.52 -L-

SHEET 2 OF 3



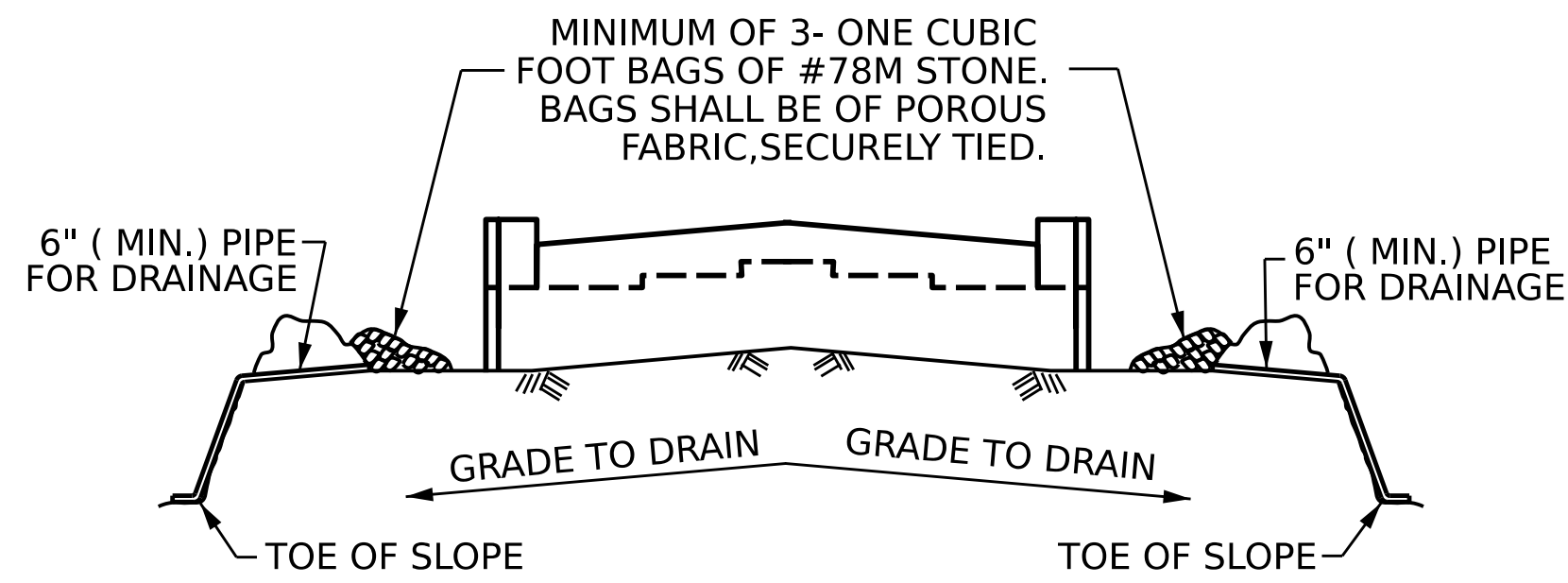
Designed by:  
 Francesca Lea  
 05/01/2024

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

DRAWN BY : E. BAYISSA / Q.T. NGUYEN DATE : 11/2023  
 CHECKED BY : F. LEA DATE : 12/2023  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE :

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 FINAL UNLESS ALL  
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| REVISIONS |     |       |     |     |       | SHEET NO.    |
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| 2         |     |       | 4   |     |       | 36           |

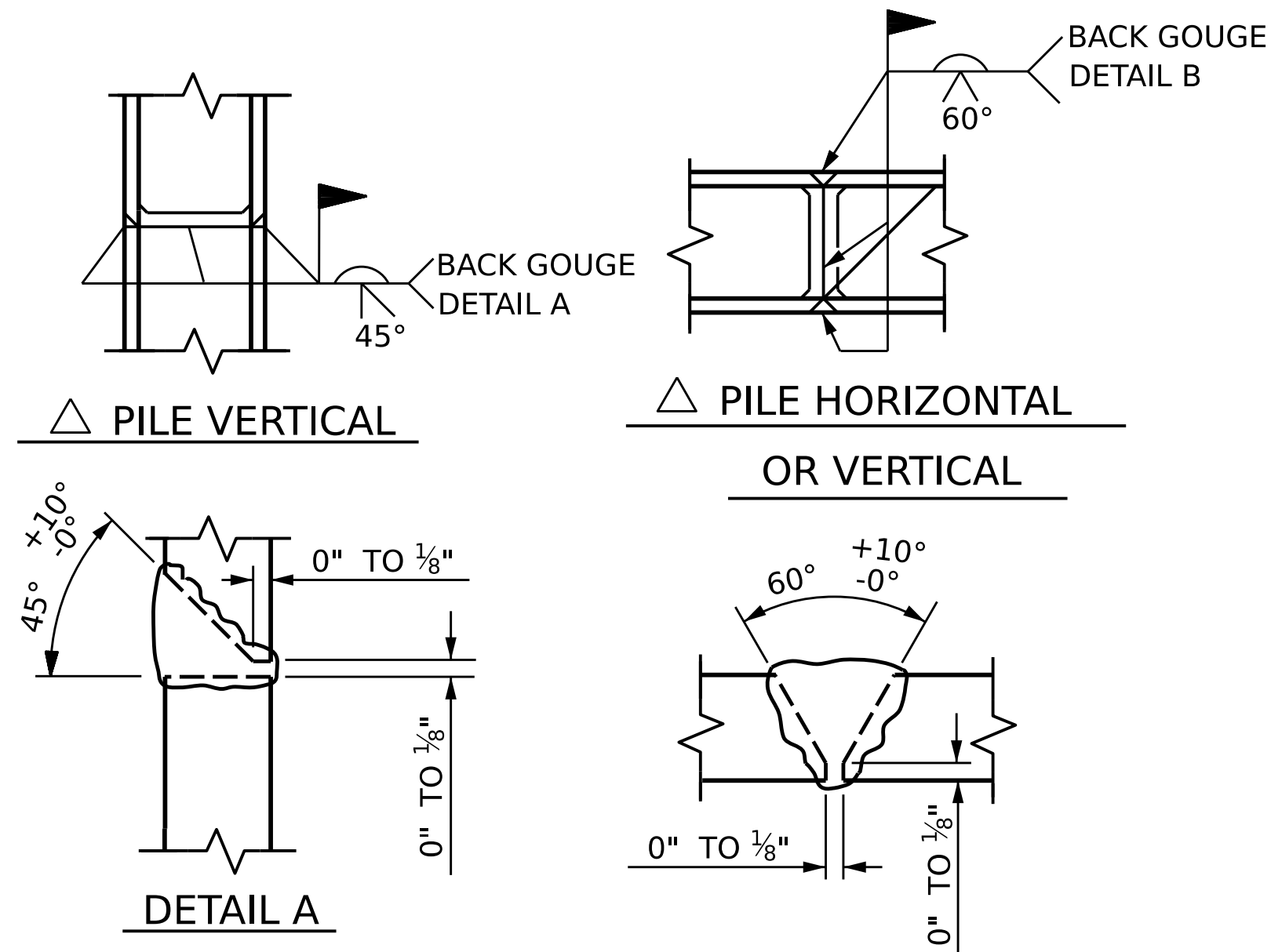


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

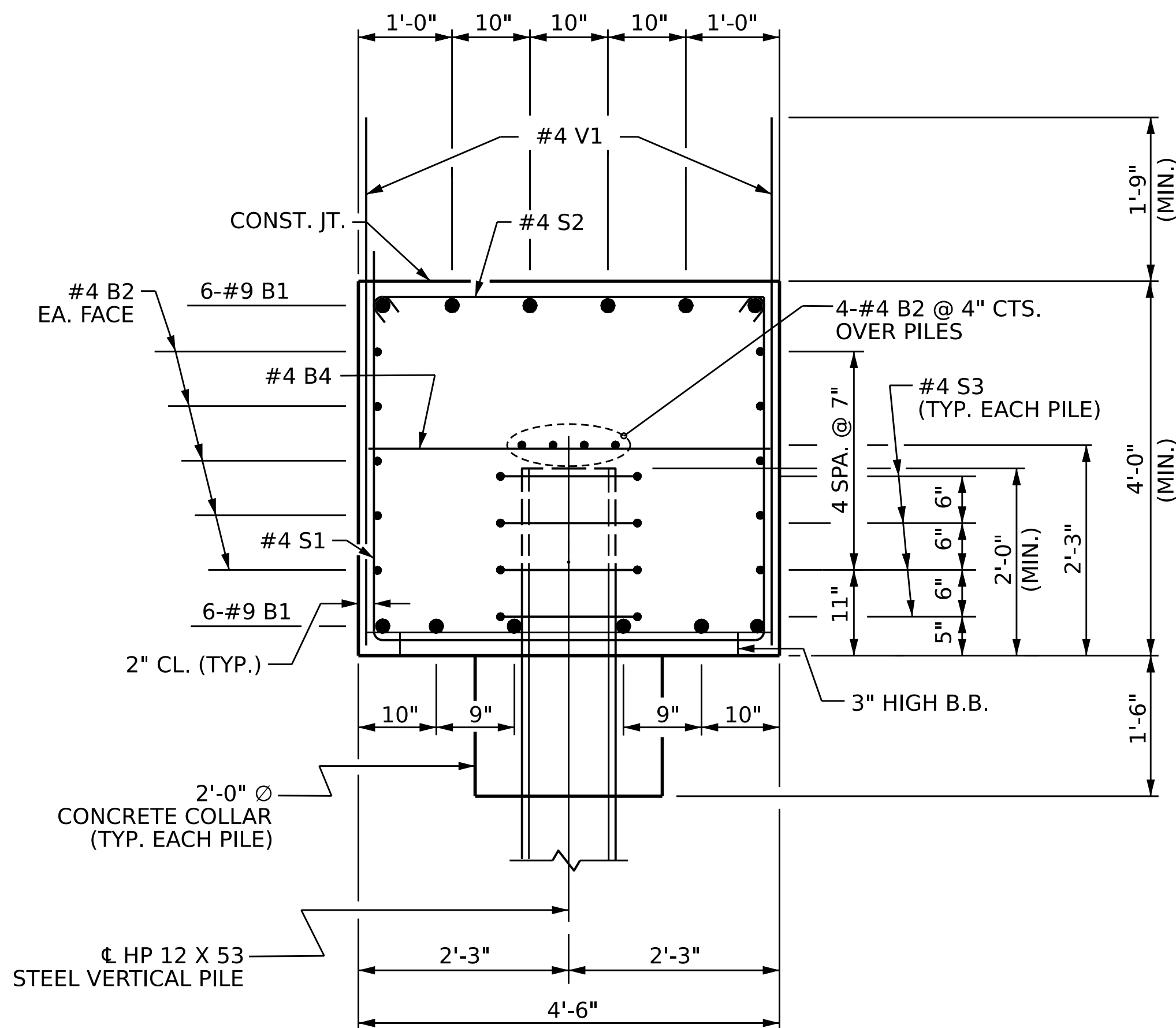
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

**TEMPORARY DRAINAGE AT END BENT**

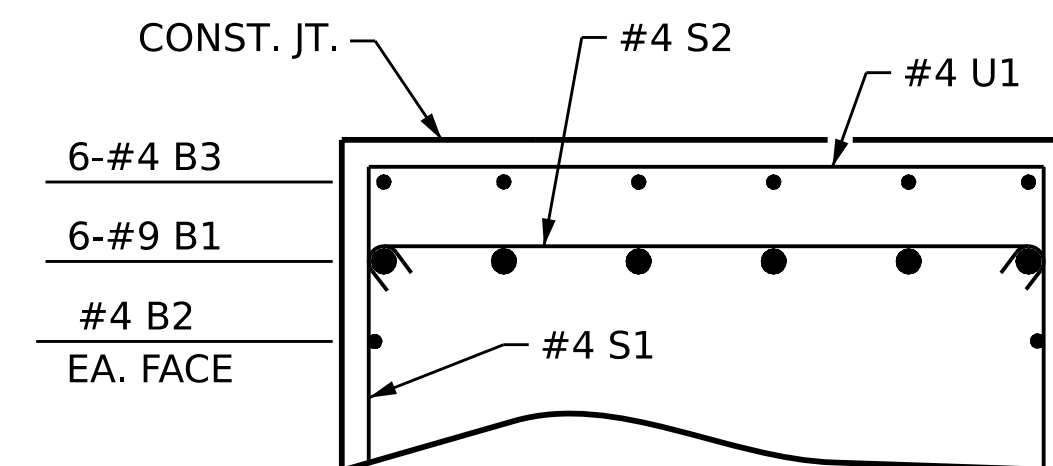


△ POSITION OF PILE DURING WELDING.

**PILE SPLICE DETAILS**



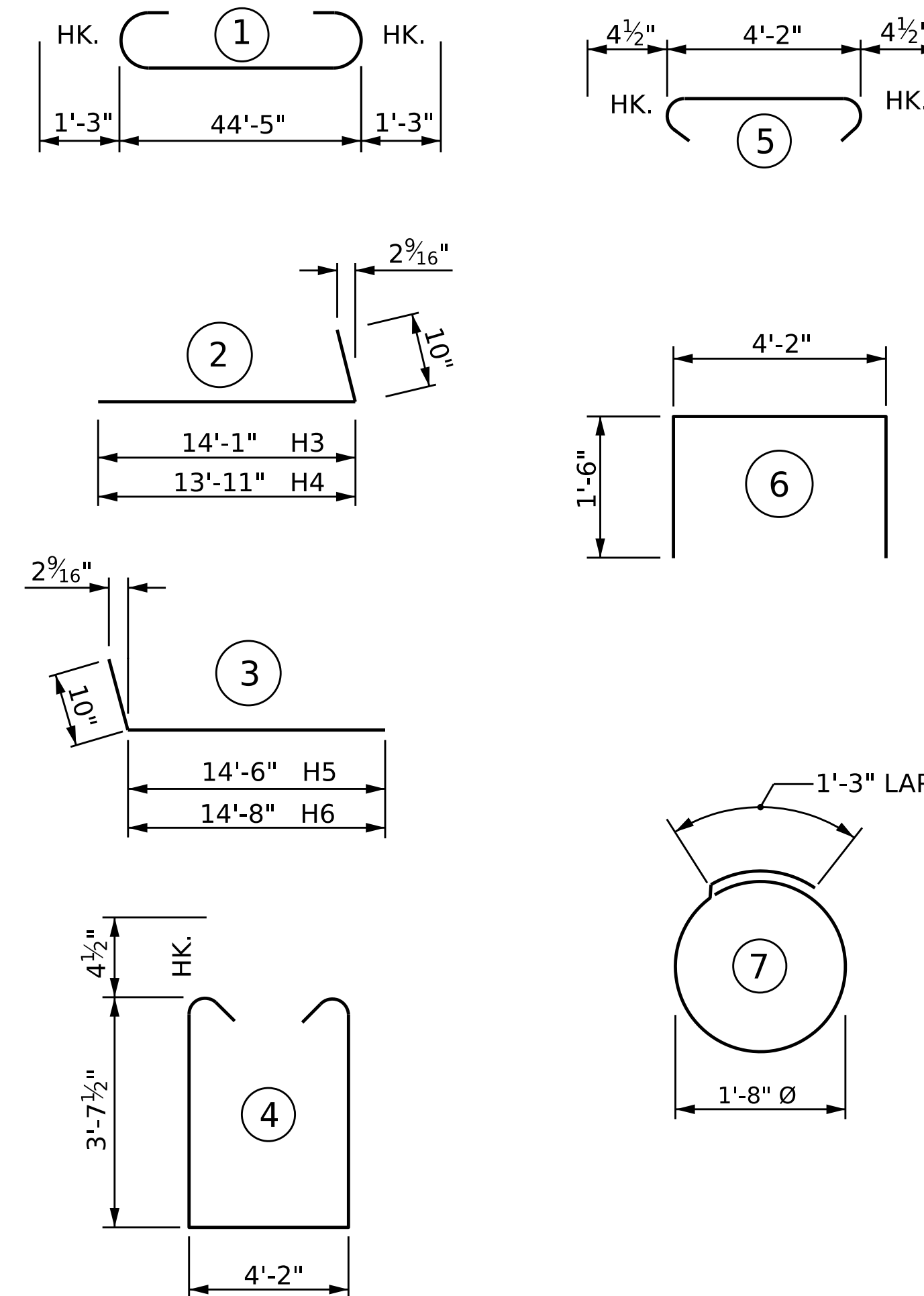
**SECTION A-A**



**PARTIAL SECTION B-B**

ALL BAR DIMENSIONS ARE OUT TO OUT

**BAR TYPES**



**BILL OF MATERIAL**

**END BENT 2**

| BAR | NO. | SIZE | TYPE | LENGTH  | WEIGHT |
|-----|-----|------|------|---------|--------|
| B1  | 12  | #9   | 1    | 46'-11" | 1914   |
| B2  | 28  | #4   | STR  | 23'-6"  | 440    |
| B3  | 6   | #4   | STR  | 9'-10"  | 39     |
| B4  | 12  | #4   | STR  | 4'-2"   | 33     |
| H3  | 6   | #5   | 2    | 14'-11" | 93     |
| H4  | 6   | #5   | 2    | 14'-9"  | 92     |
| H5  | 6   | #5   | 3    | 15'-4"  | 96     |
| H6  | 6   | #5   | 3    | 15'-6"  | 97     |
| S1  | 57  | #4   | 4    | 12'-2"  | 463    |
| S2  | 57  | #4   | 5    | 4'-11"  | 187    |
| S3  | 36  | #4   | 7    | 6'-6"   | 156    |
| U1  | 8   | #4   | 6    | 7'-2"   | 38     |
| V1  | 72  | #4   | STR  | 5'-7"   | 269    |
| V2  | 54  | #5   | STR  | 9'-4"   | 526    |

REINFORCING STEEL LBS. 4,444

CLASS A CONCRETE

POUR #1 CU. YDS. 40.0  
(CAP, CONCRETE COLLARS & LOWER PART OF WINGS)

PROJECT NO. BR-0093

ROCKINGHAM COUNTY

STATION: 17+85.52 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE

END BENT 2  
INTEGRAL



DocuSigned by:  
Francesca Lea  
B79DAD86D584EF  
05/01/2024

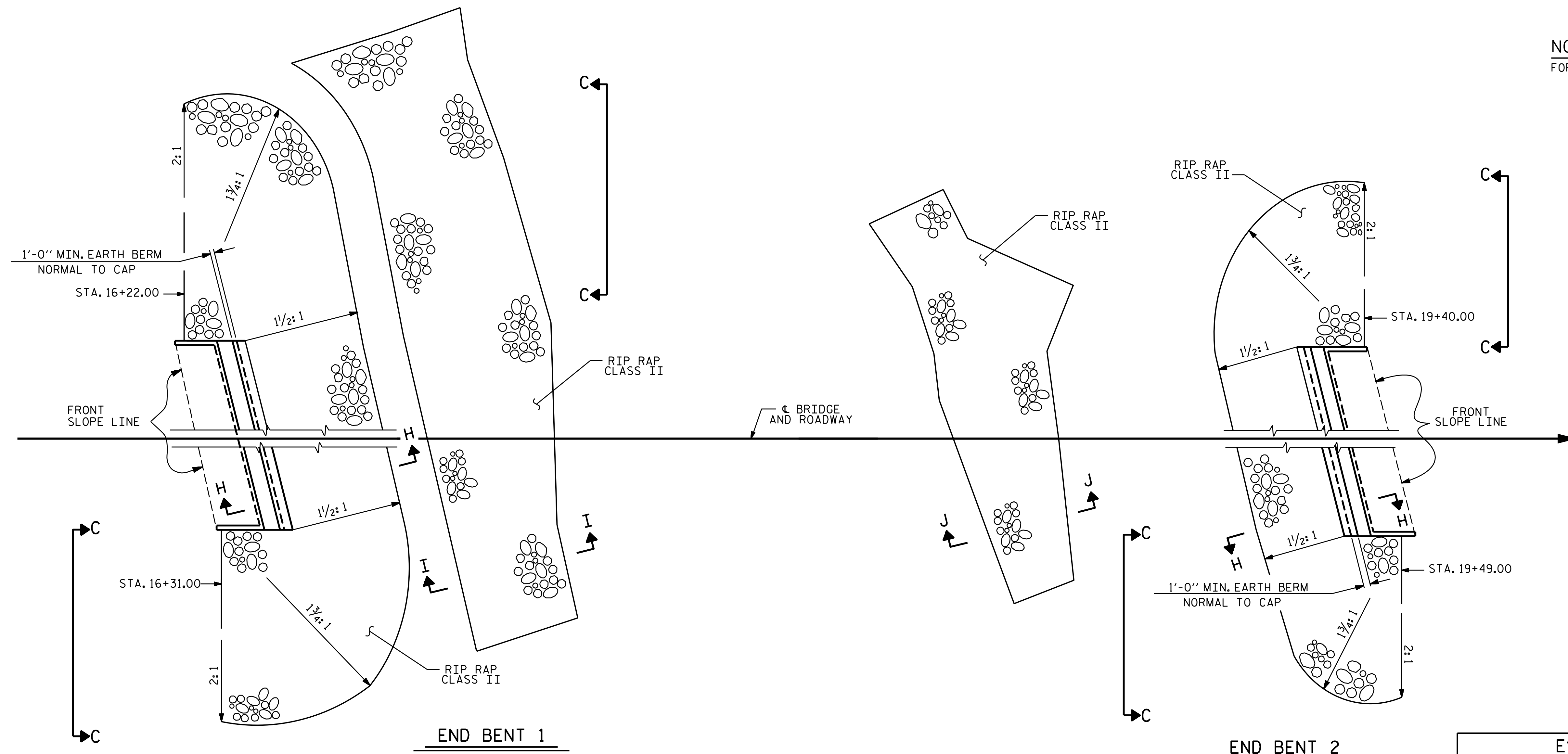
**REVISIONS**

| NO. | BY: | DATE: | NO. | BY: | DATE: | SHEET NO.       |
|-----|-----|-------|-----|-----|-------|-----------------|
| 1   |     |       | 3   |     |       | S-34            |
| 2   |     |       | 4   |     |       | TOTAL SHEETS 36 |

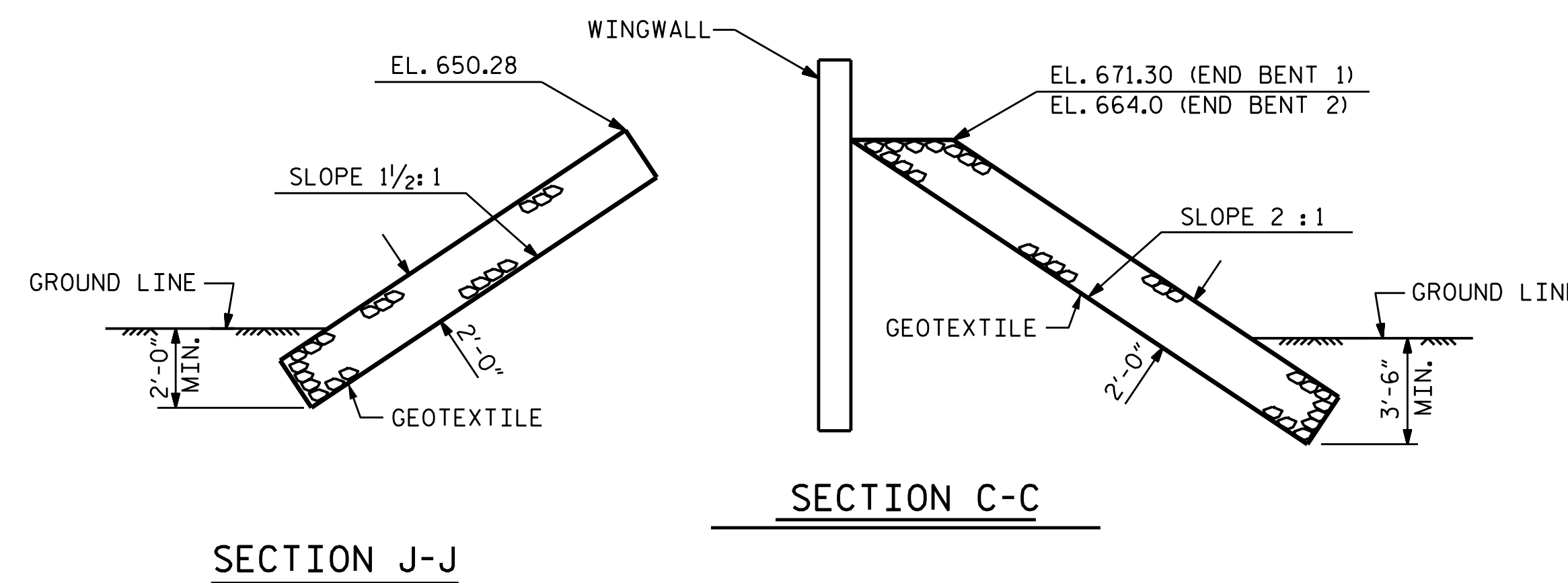
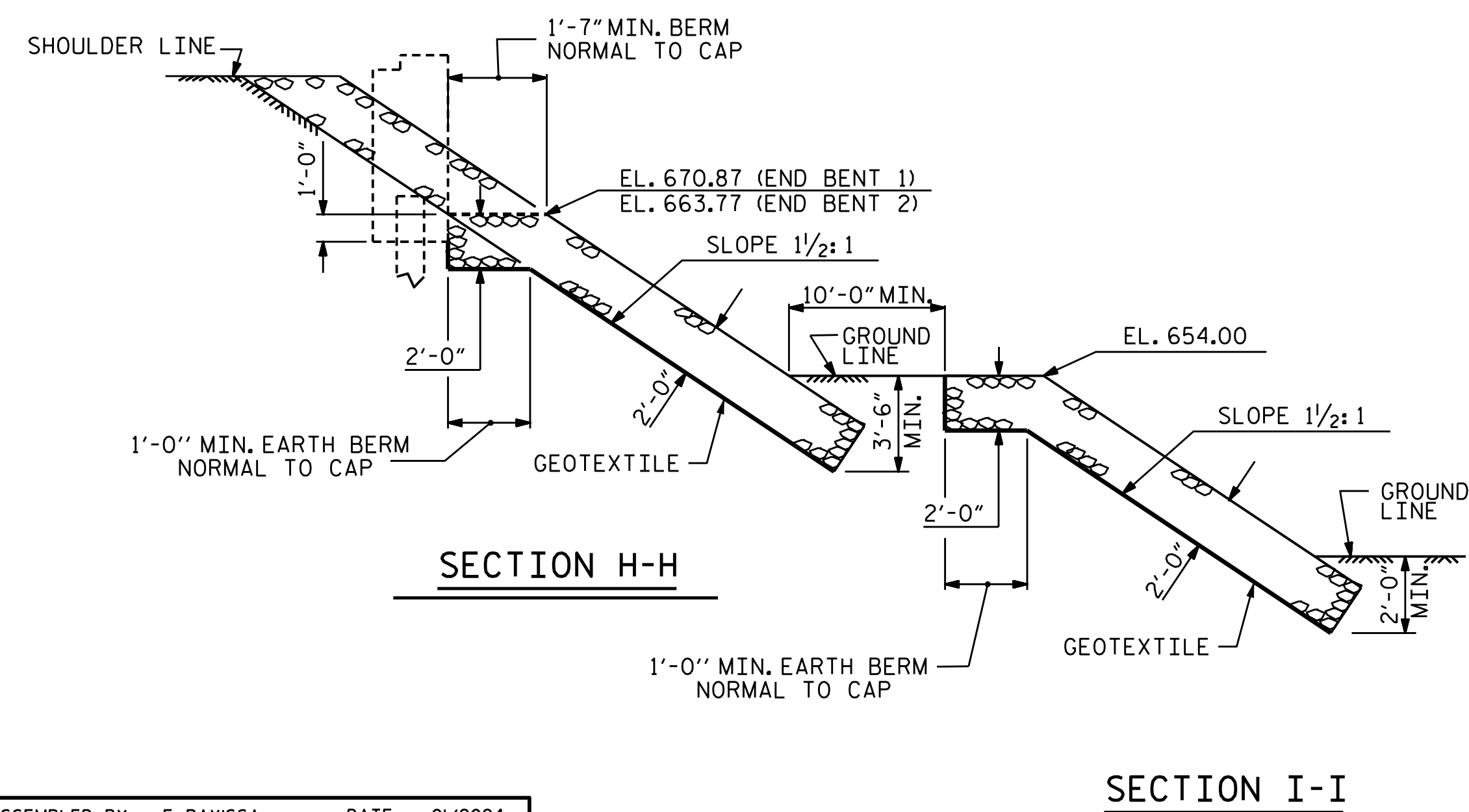
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY: E. BAYISSA / Q.T. NGUYEN DATE: 11/2023  
CHECKED BY: F. LEA DATE: 12/2023  
DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 09/2023

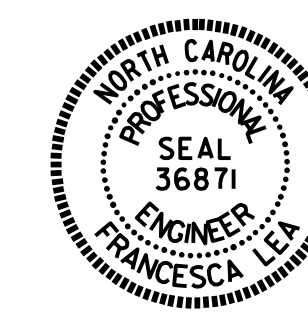
NOTES :  
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



| ESTIMATED QUANTITIES          |                                      |                            |
|-------------------------------|--------------------------------------|----------------------------|
| BRIDGE @ STA.<br>17+85.52 -L- | RIP RAP<br>CLASS II<br>(2'-0" THICK) | GEOTEXTILE<br>FOR DRAINAGE |
|                               | TONS                                 | SQUARE YARDS               |
| END BENT 1                    | 1560                                 | 1735                       |
| END BENT 2                    | 940                                  | 1045                       |



PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
STATION: 17+85.52 -L-



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD  
RIP RAP DETAILS

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

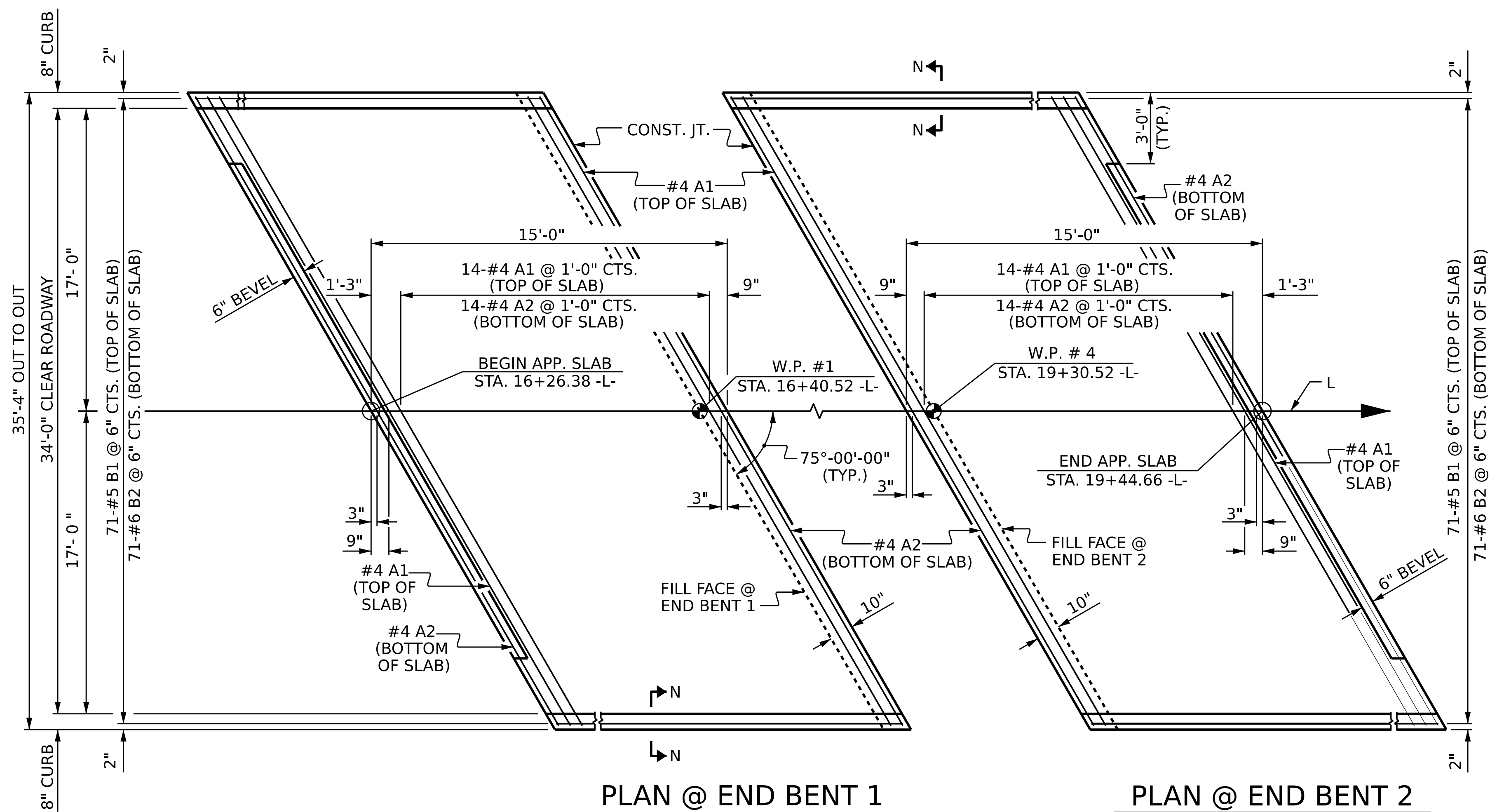
ASSEMBLED BY : E. BAYISSA DATE : 01/2024  
CHECKED BY : ZIA MALIK DATE : 02/2024  
DRAWN BY : REK 1/84  
CHECKED BY : RDU 1/84

MAA/GM  
MAA/GM  
MAA/THC

2/27/2024  
R:\Structures\Plans\401.069.BR-0093.SMU.RR.S35.780035.dgn  
tnguyenl

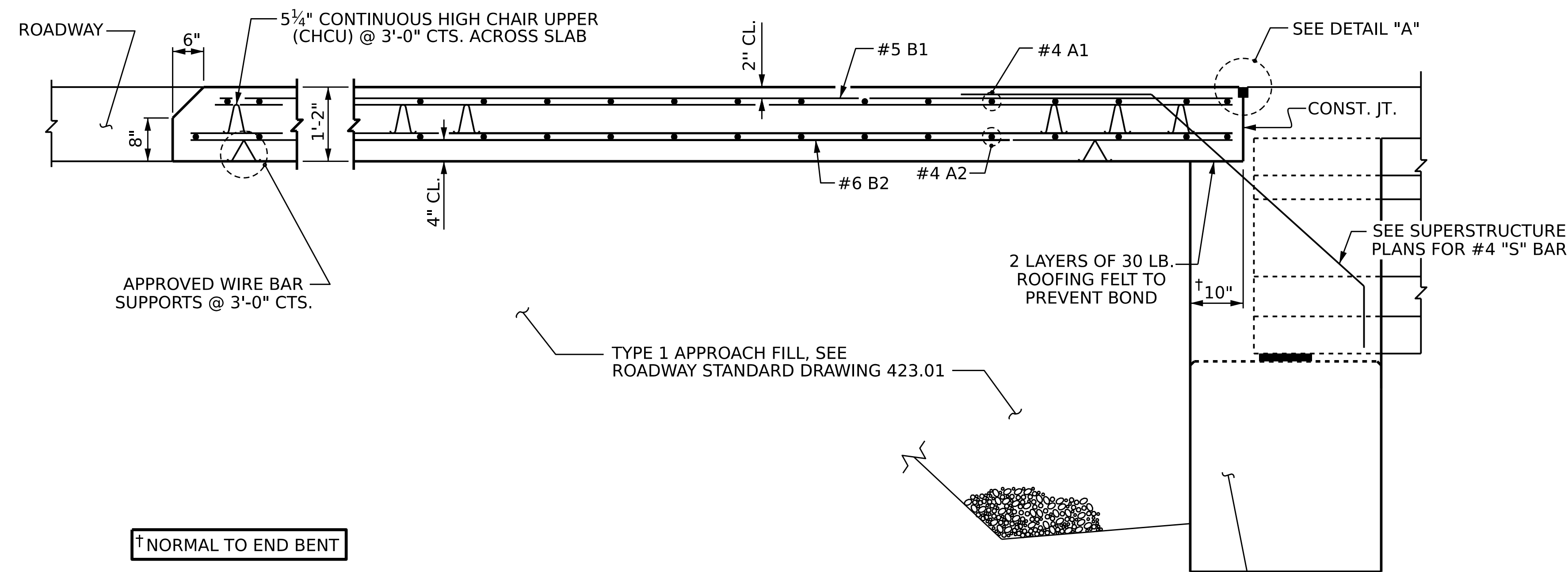
DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

SHEET NO.  
S-35  
TOTAL SHEETS  
36

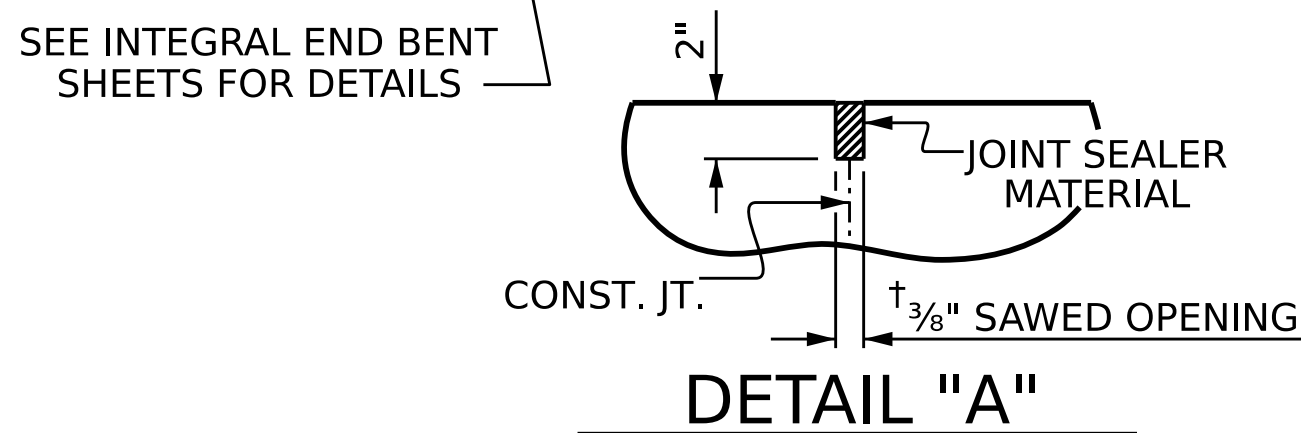


PLAN @ END BENT 1 PLAN @ END BENT 2

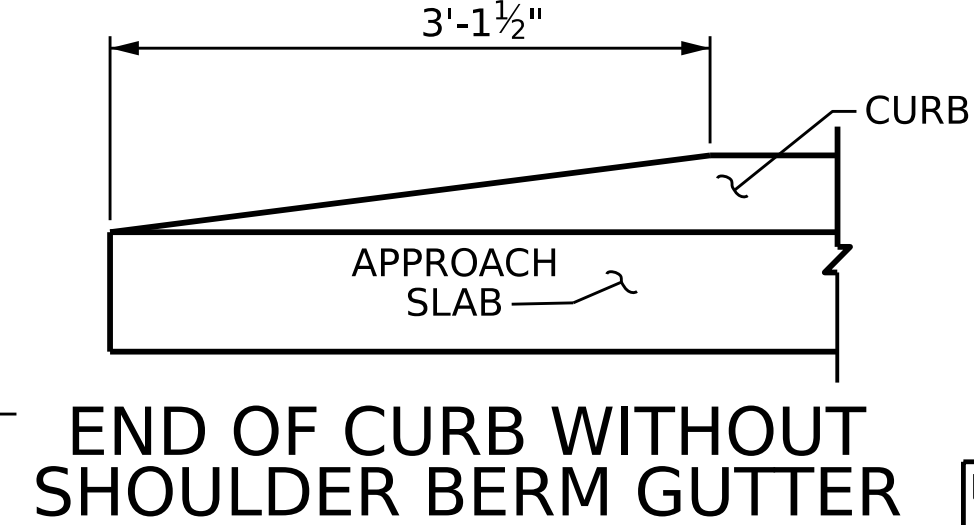
DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



SECTION THRU SLAB



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER

NOTES

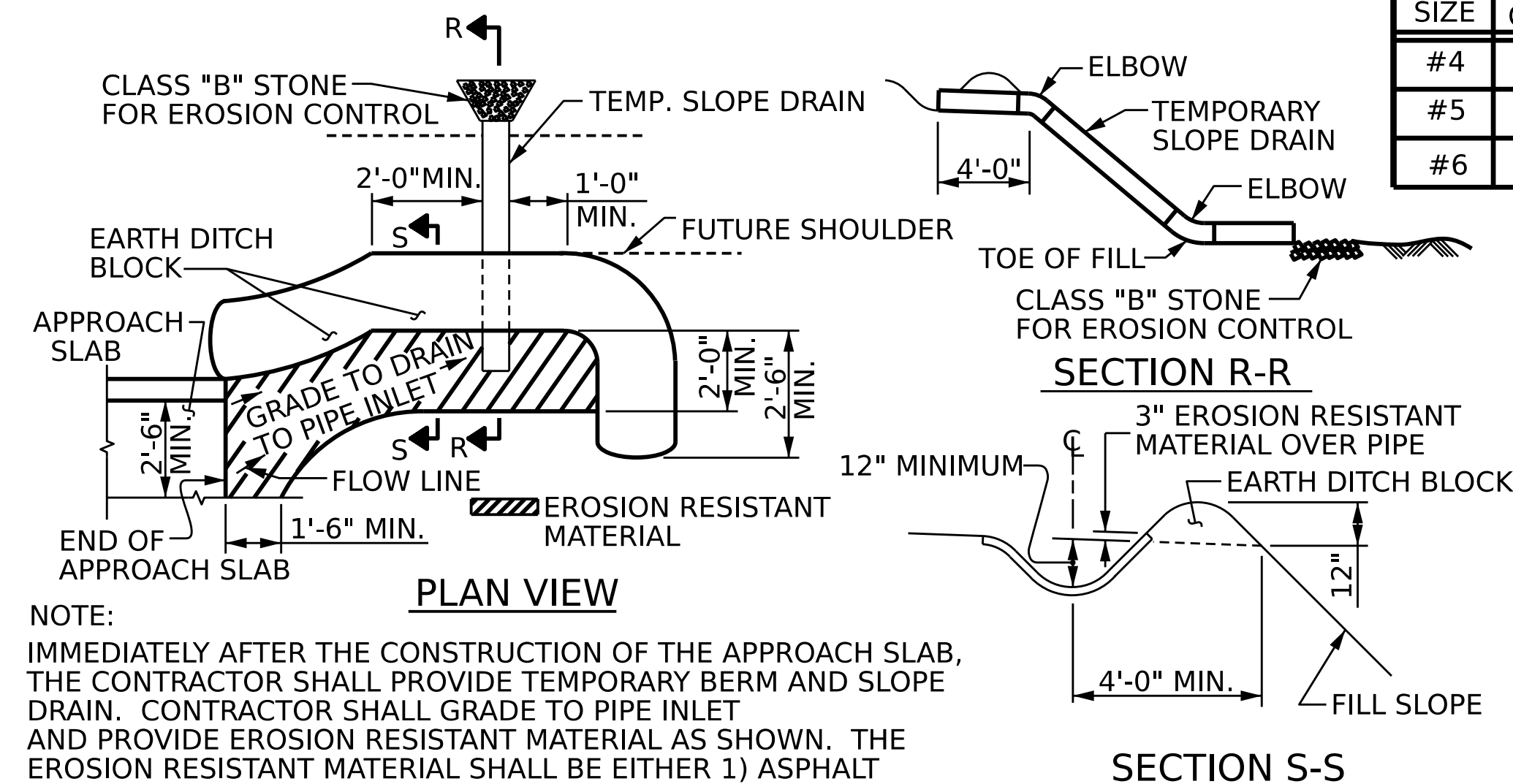
FOR BRIDGE APPROACH FILL, SEE ROADWAY PLANS.

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

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 SAWS 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.

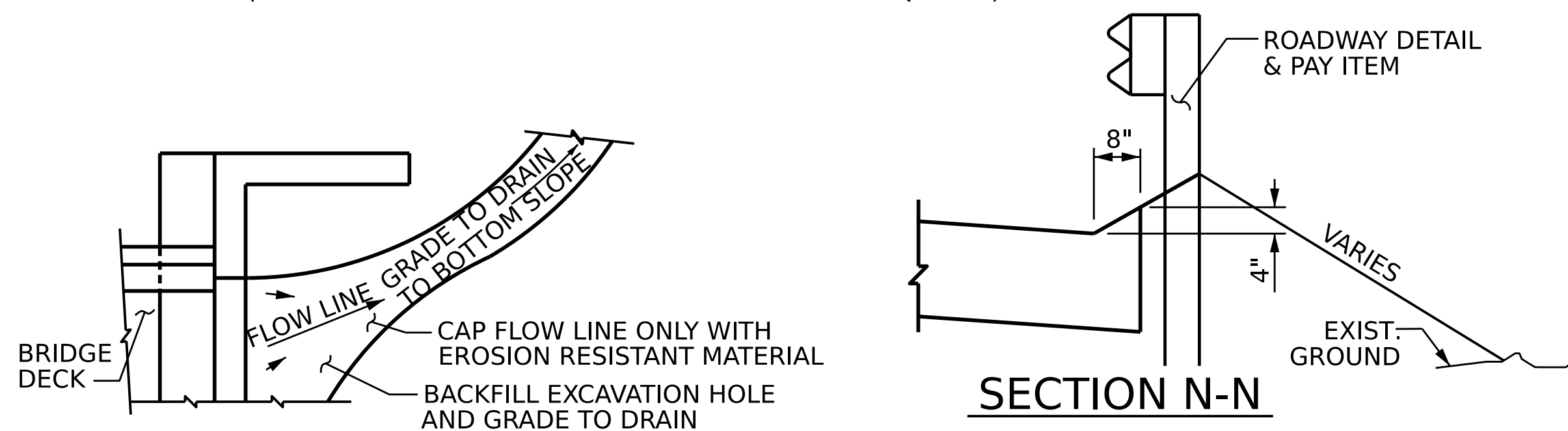
AT THE CONTRACTORS OPTION "TYPE 1A - ALTERNATE APPROACH FILL" (ROADWAY STD. 423.02) MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT IN LIEU OF "TYPE 1 - APPROACH FILL".



NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

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

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT |
|-----|-----|------|------|--------|--------|
| *A1 | 16  | #4   | STR  | 36'-2" | 387    |
| A2  | 16  | #4   | STR  | 36'-2" | 387    |
| *B1 | 71  | #5   | STR  | 14'-2" | 1049   |
| B2  | 71  | #6   | STR  | 14'-7" | 1555   |

REINFORCING STEEL LBS. 1942  
\* EPOXY COATED REINFORCING STEEL LBS. 1436

CLASS AA CONCRETE C. Y. 23

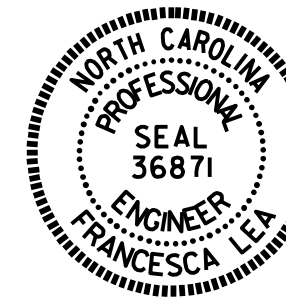
SPLICE LENGTHS

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

|               |            |            |         |
|---------------|------------|------------|---------|
| ASSEMBLED BY: | E. BAYISSA | DATE :     | 07/2023 |
| CHECKED BY :  | Z. MALIK   | DATE :     | 10/2023 |
| DRAWN BY :    | TLA 10/05  | REV. 12/17 | MAA/THC |
| CHECKED BY :  | GM 5/06    | REV. 06/19 | ENB/THC |
|               |            | REV. 07/23 | BNB/SNM |

4/25/2024 R:\Structures\Plans\401.071.BR-0093.SMU.AS.536.780035.dgn tnguyenl

DocuSigned by: Francesca Lea 8790AD8E0584EF... 05/01/2024



PROJECT NO. BR-0093  
ROCKINGHAM COUNTY  
STATION: 17+85.52 -L-

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

| NO. | BY: | DATE: | NO. | BY: | DATE: | SHEET NO.       |
|-----|-----|-------|-----|-----|-------|-----------------|
| 1   |     |       | 3   |     |       | S-36            |
| 2   |     |       | 4   |     |       | TOTAL SHEETS 36 |

## STANDARD NOTES

### DESIGN DATA:

|   |                                  |
|---|----------------------------------|
| SPECIFICATIONS .....  | AASHTO (CURRENT)                 |
| LIVE LOAD .....   | SEE PLANS                        |
| IMPACT ALLOWANCE .....  | SEE AASHTO                       |
| STRESS IN EXTREME FIBER OF<br>STRUCTURAL STEEL - AASHTO M270 GRADE 36 ..... | 20,000 LBS. PER SQ. IN.          |
| - AASHTO M270 GRADE 50W .....   | 27,000 LBS. PER SQ. IN.          |
| - AASHTO M270 GRADE 50 .....  | 27,000 LBS. PER SQ. IN.          |
| REINFORCING STEEL IN TENSION - GRADE 60 .....                               | 24,000 LBS. PER SQ. IN.          |
| CONCRETE IN COMPRESSION .....   | 1,200 LBS. PER SQ. IN.           |
| CONCRETE IN SHEAR .....   | SEE AASHTO                       |
| 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 2024 "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  $1\frac{1}{2}$ " RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A  $\frac{1}{4}$ " FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A  $\frac{1}{4}$ " RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

### DOWELS:

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

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

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

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

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

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

### REINFORCING STEEL:

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

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

### STRUCTURAL STEEL:

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

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

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

### HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

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

### SPECIAL NOTES:

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