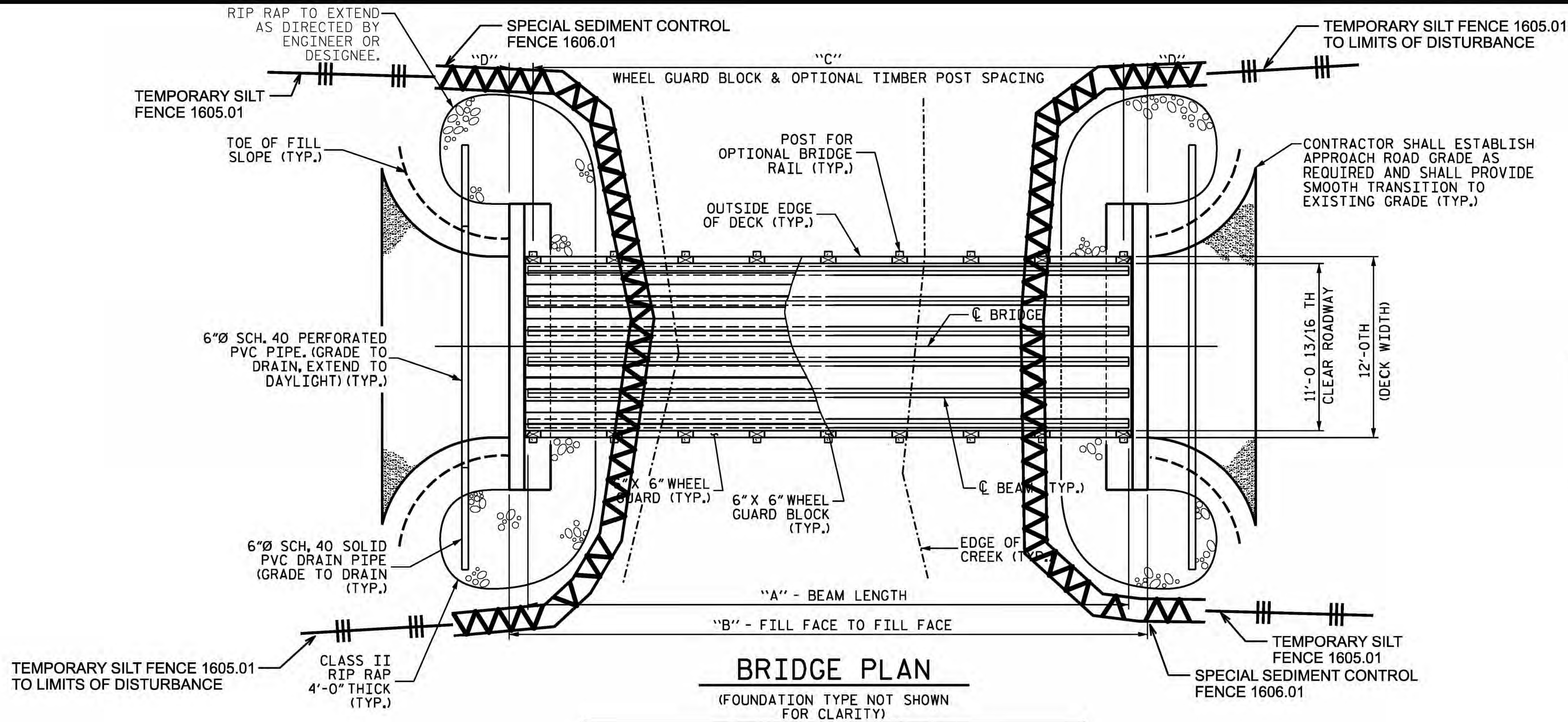
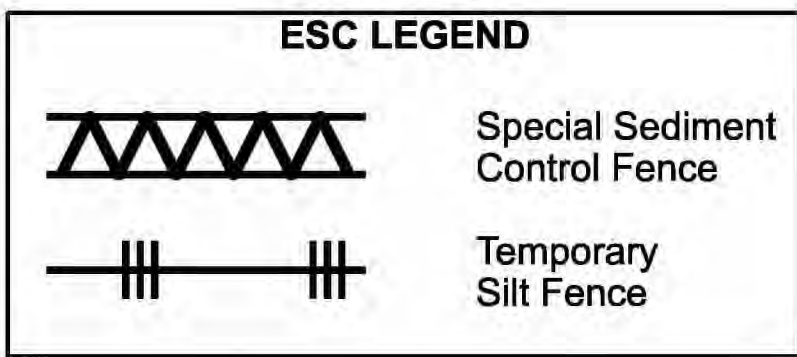
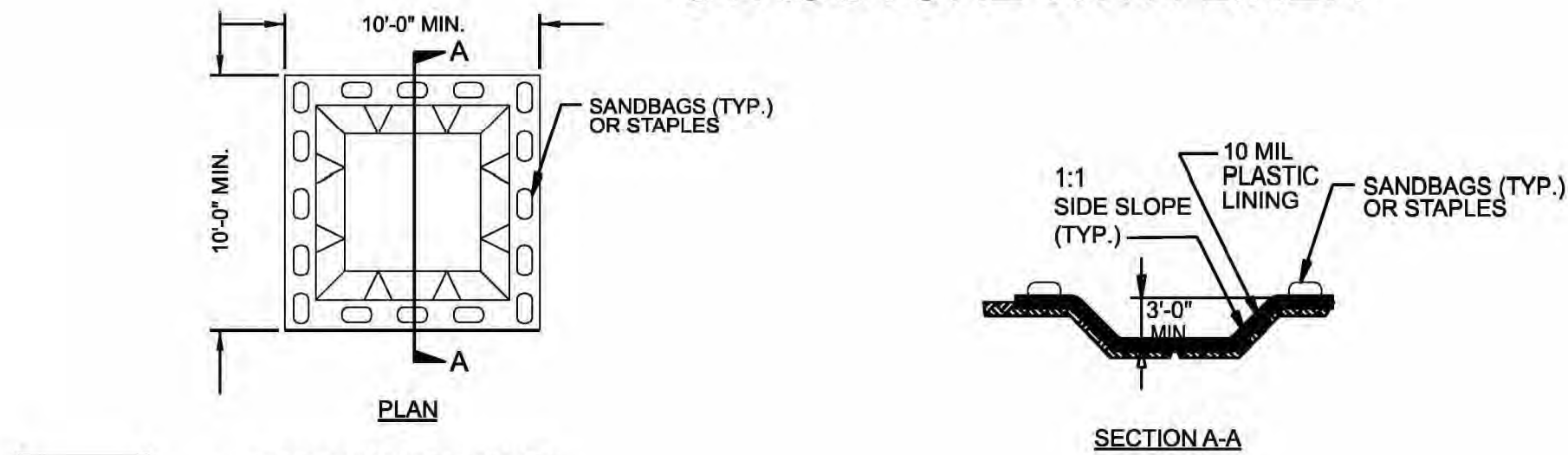




DIMENSIONS TABLE					
SPAN	A	B	C	D	E
20'-0"	20'-0"	22'-6"	5 SPA. @ 3'-8"	2'-1"	19'-9"
30'-0"	30'-0"	32'-6"	7 SPA. @ 4'-0"	2'-3"	29'-9"
40'-0"	40'-0"	42'-6"	9 SPA. @ 4'-3"	2'-1 1/2"	39'-9"
50'-0"	50'-0"	52'-6"	11 SPA. @ 4'-4"	2'-5"	49'-9"



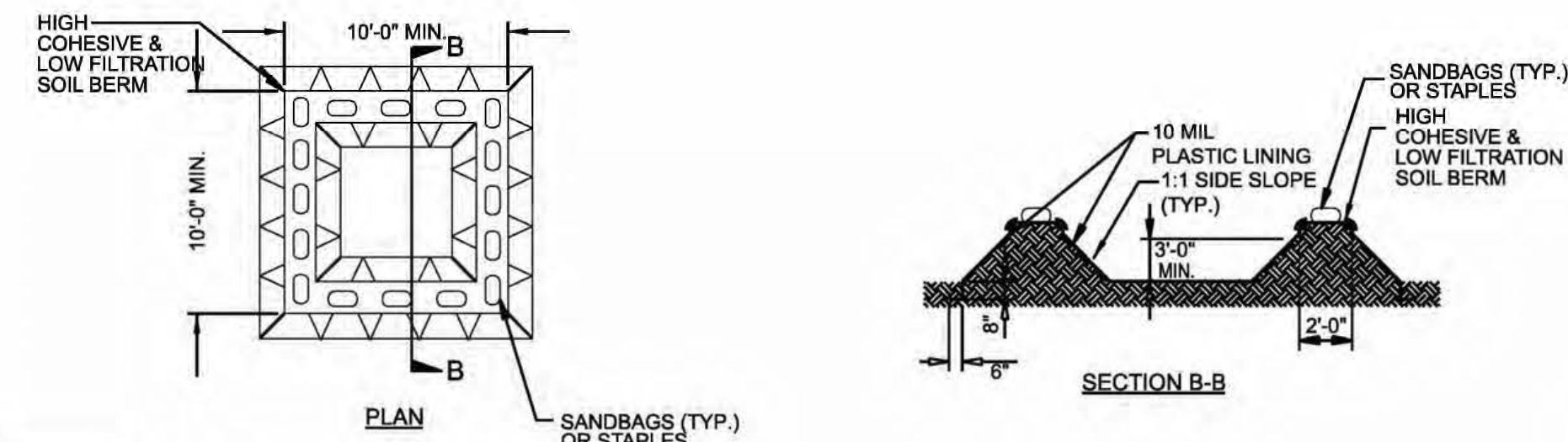
ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



- NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD
 2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.
 3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE

NOT TO SCALE



- NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD
 2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.
 3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

ABOVE GRADE WASHOUT STRUCTURE

NOT TO SCALE

NOTES

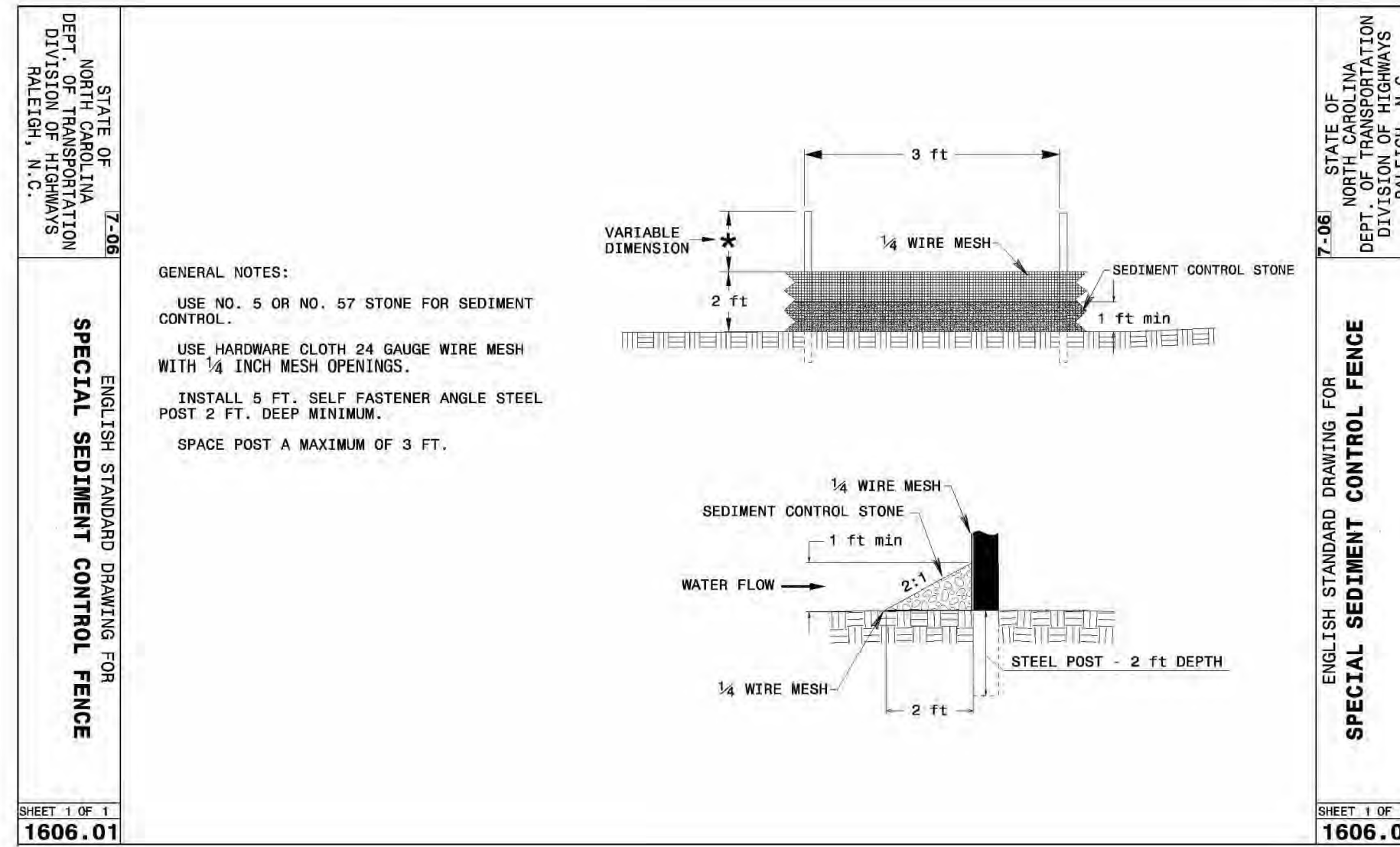
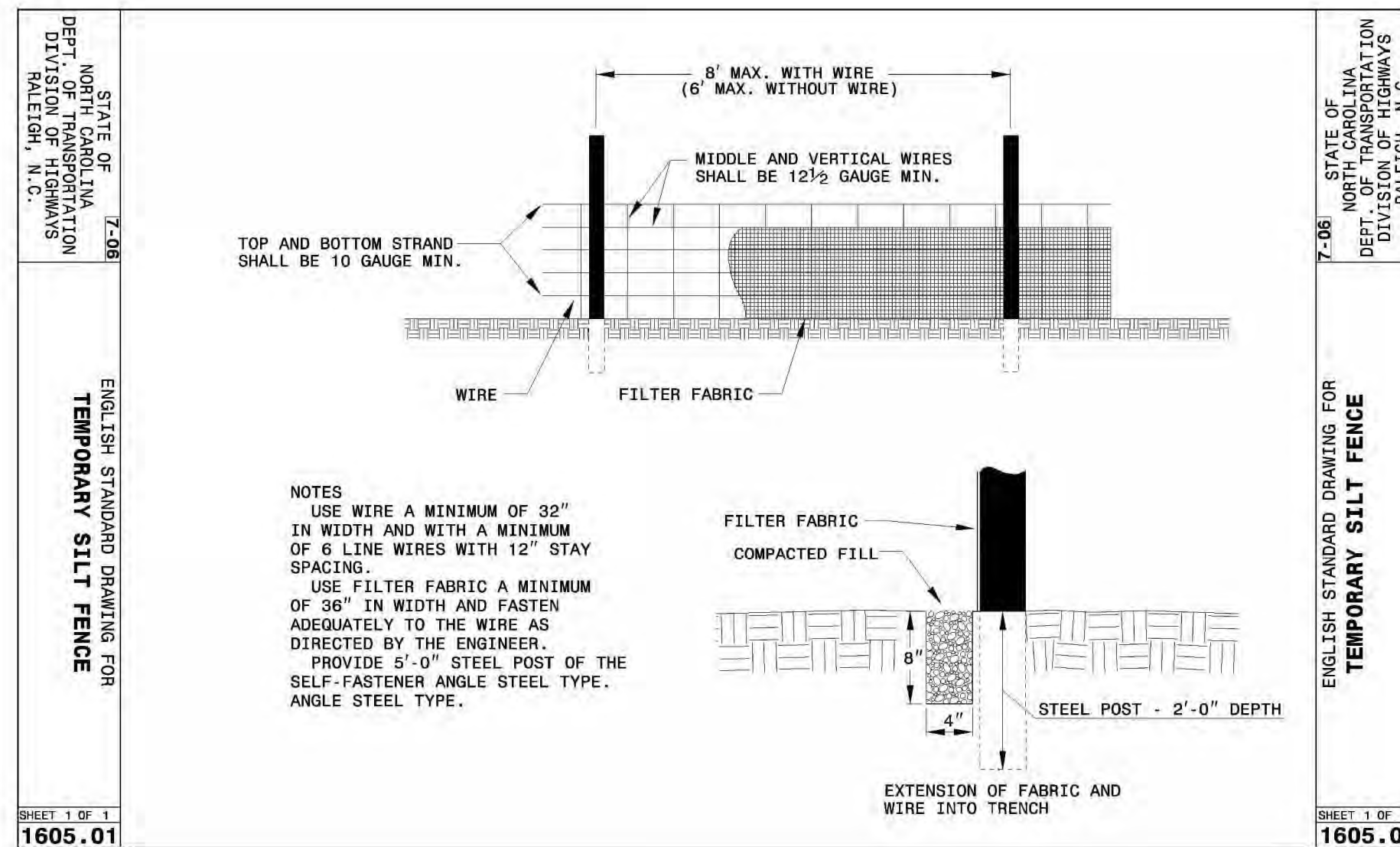
FOR OPTIONAL TIMBER BRIDGE RAIL DETAILS, SEE "OPTIONAL TIMBER BRIDGE RAIL" SHEET.

CONTRACTOR SHALL LOCATE THE EXPANSION BEARING ON THE "UPHILL" END OF THE BRIDGE. THERE WILL BE ONLY ONE EXPANSION BEARING PER BRIDGE.

CONTRACTOR SHALL PROVIDE EROSION CONTROL MEASURES, AS REQUIRED ACCORDING TO NCDOT STANDARD SPECIFICATIONS AND THE CONTRACT DOCUMENTS.

THE CONTRACTOR SHALL SET THE LOW-CHORD ELEVATION OF THE BRIDGE BASED ON EXISTING SITE CONDITIONS AND IN COORDINATION WITH THE ENGINEER, SUCH THAT THE NEW CROSSING PROVIDES CONVEYANCE GREATER THAN OR EQUAL TO THE ORIGINAL DESTROYED CROSSING. THE CONTRACTOR SHALL REFER TO THE BSR WHEN SETTING THE LOW-CHORD ELEVATION OF THE BRIDGE. NO CONSTRUCTION ACTIVITIES SHALL COMMENCE UNTIL ALL PARTIES HAVE AGREED UPON THE LOW-CHORD ELEVATION AND THE DATED PERMIT APPLICATION IS APPROVED.

TIMBER DECKING SHALL BE 2X8 BOARDS. 4X6 TIMBER DECKING (6" DIMENSION HORIZONTAL) MAY BE USED IN LIEU OF 2X8 DECKING; SEE OPTIONAL TYPICAL SECTION ON SHEET S-03 FOR DETAILS.



Signed by:
Matthew D Foster
781932BFAFC8472
4/2/2026 1 6:30:17 PM EDT

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20646
ENGINEER
MATTHEW D. FOSTER

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PRIVATE DRIVEWAY
BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

EROSION CONTROL

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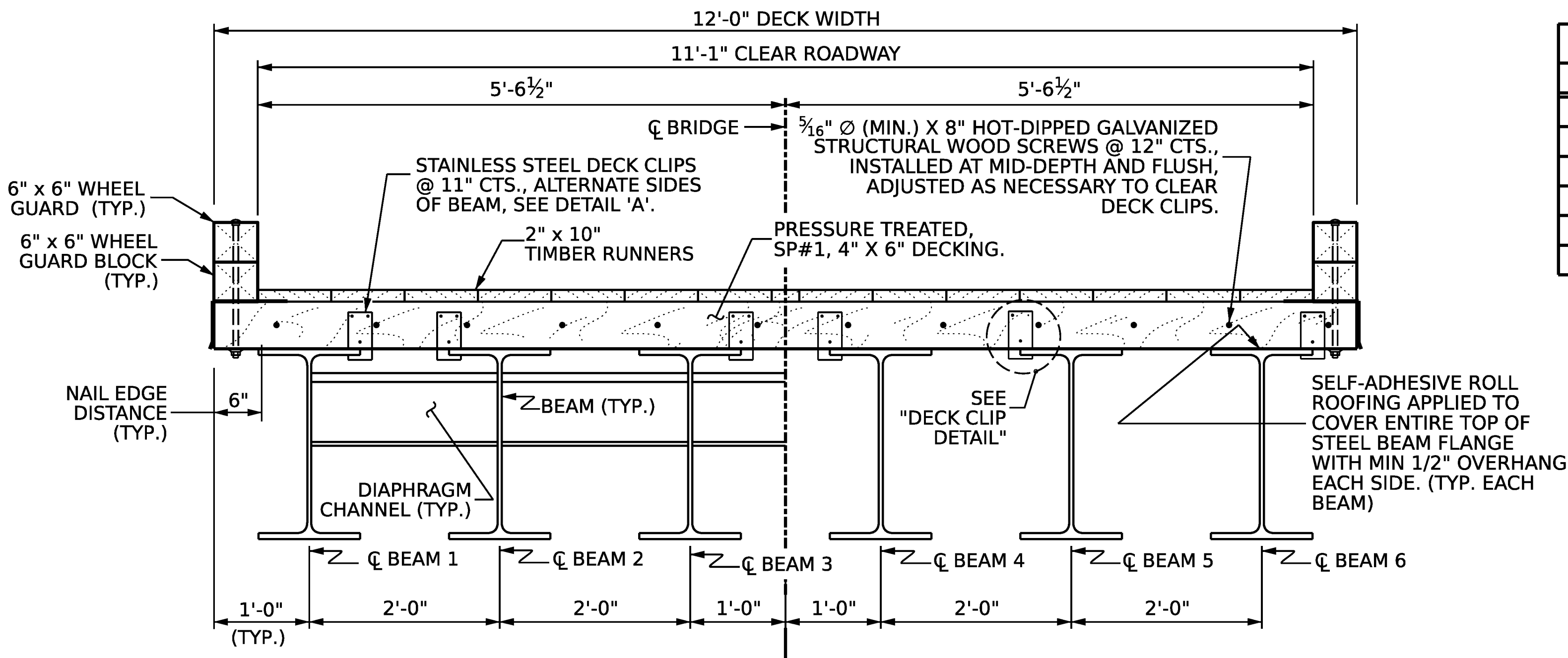
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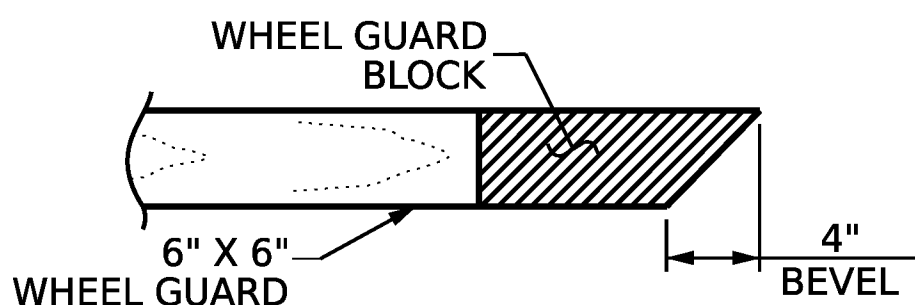
widener
DOI: [https://doi.org/10.1061/\(ASCE\)1090-0268\(2025\)25:5\(505-529\)](https://doi.org/10.1061/(ASCE)1090-0268(2025)25:5(505-529).)
URL: [https://www.ascelibrary.org/ascelibrary/viewdoi.aspx?doi=10.1061/\(ASCE\)1090-0268\(2025\)25:5\(505-529\)](https://www.ascelibrary.org/ascelibrary/viewdoi.aspx?doi=10.1061/(ASCE)1090-0268(2025)25:5(505-529))
Title: *Design of Timber Deck Structures/NC PRB-Steel Beam with Timber Deck Standards/Single Lane Steel Beam with Timber Deck Planks/2. Standard Drawings/20-70 FT - 12 FT DECK WIDTH/2002-S2-Typical Section/typical*

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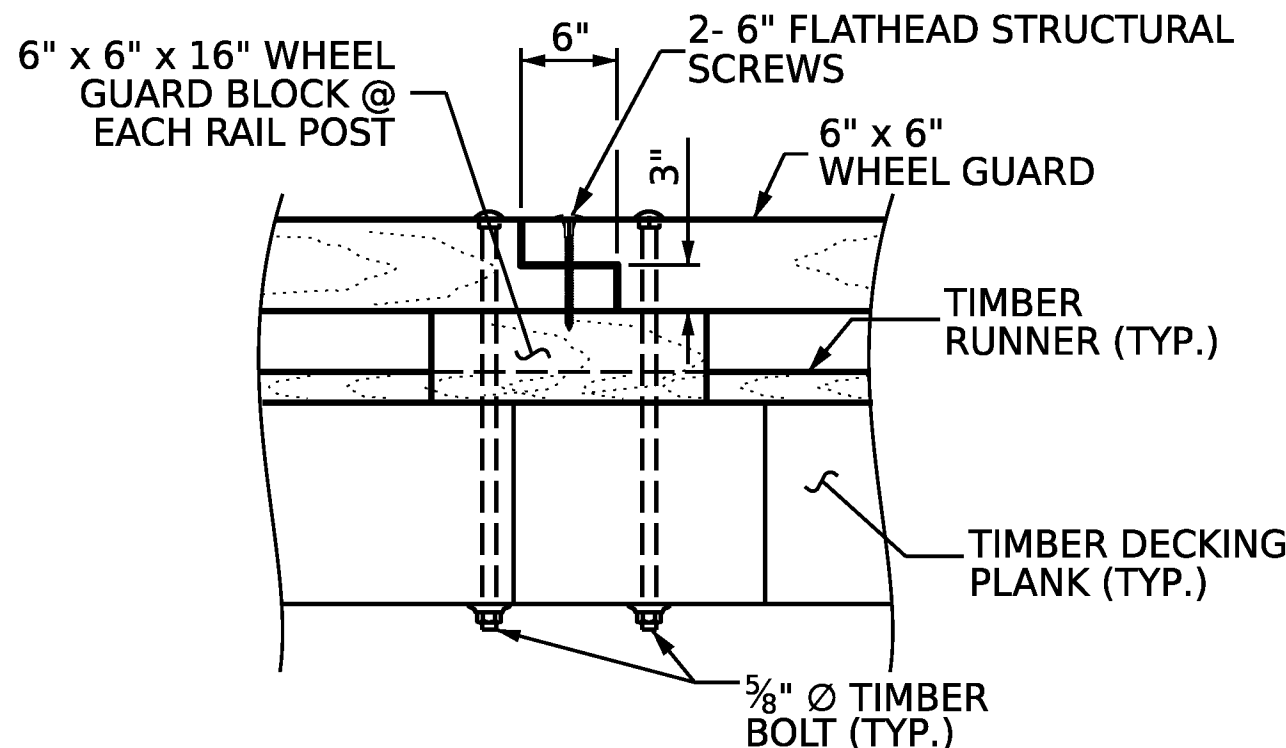
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DATE: 03/11/2026
TIME: 11:25:2006



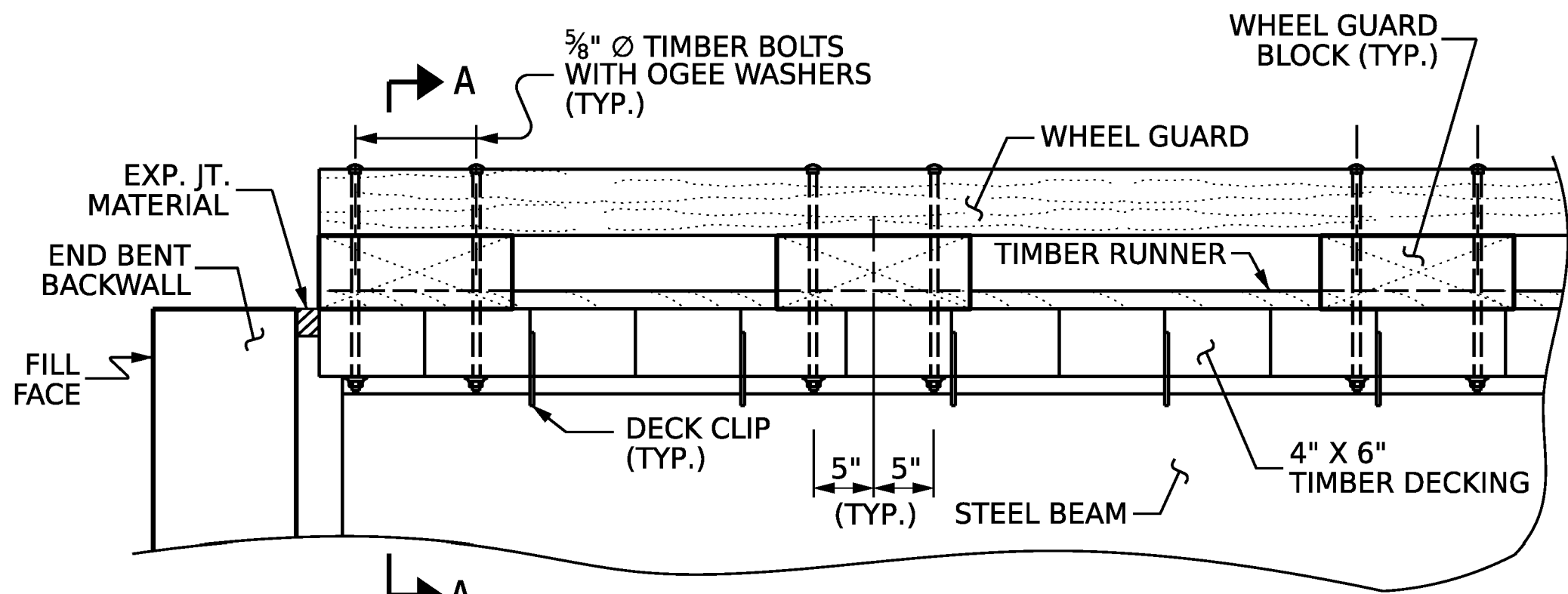
TYPICAL SECTION



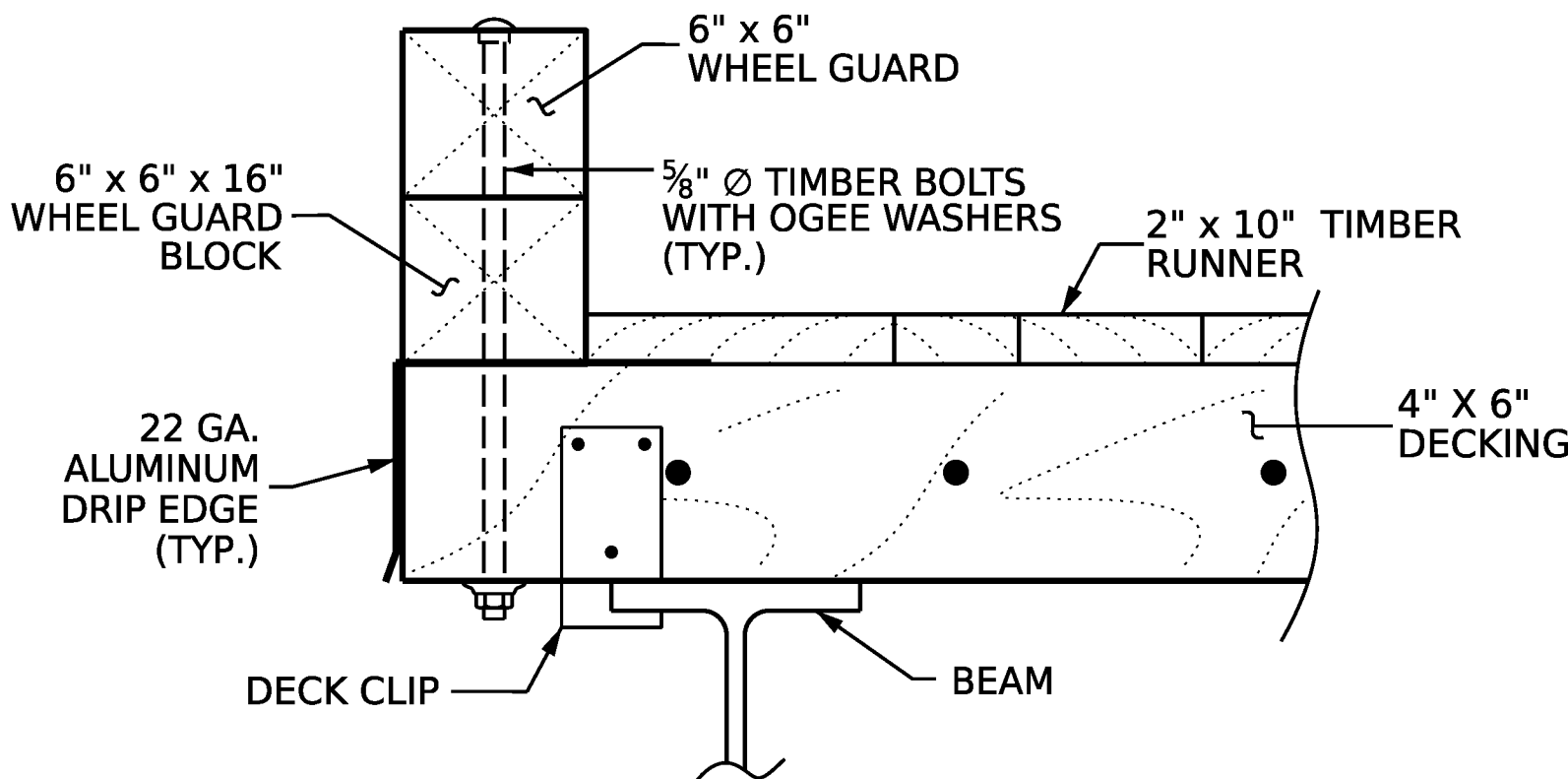
VIEW B-B



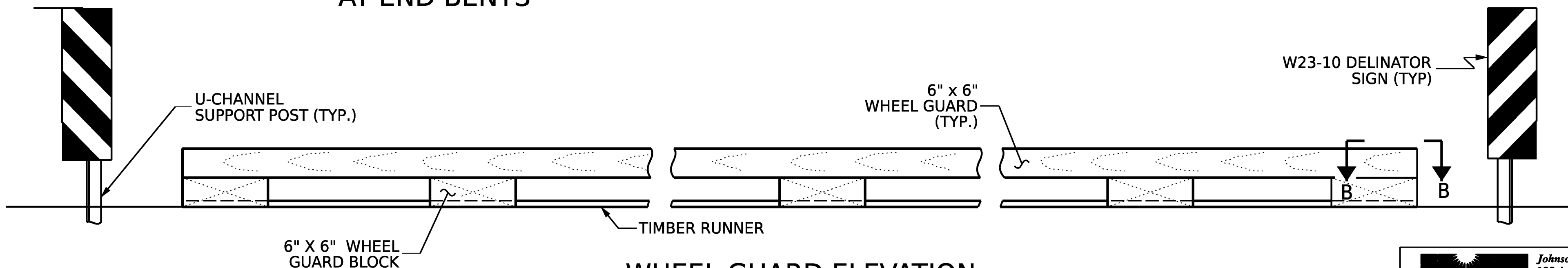
WHEEL GUARD SPLICE DETAIL



WHEEL GUARD DETAIL AT END BENTS

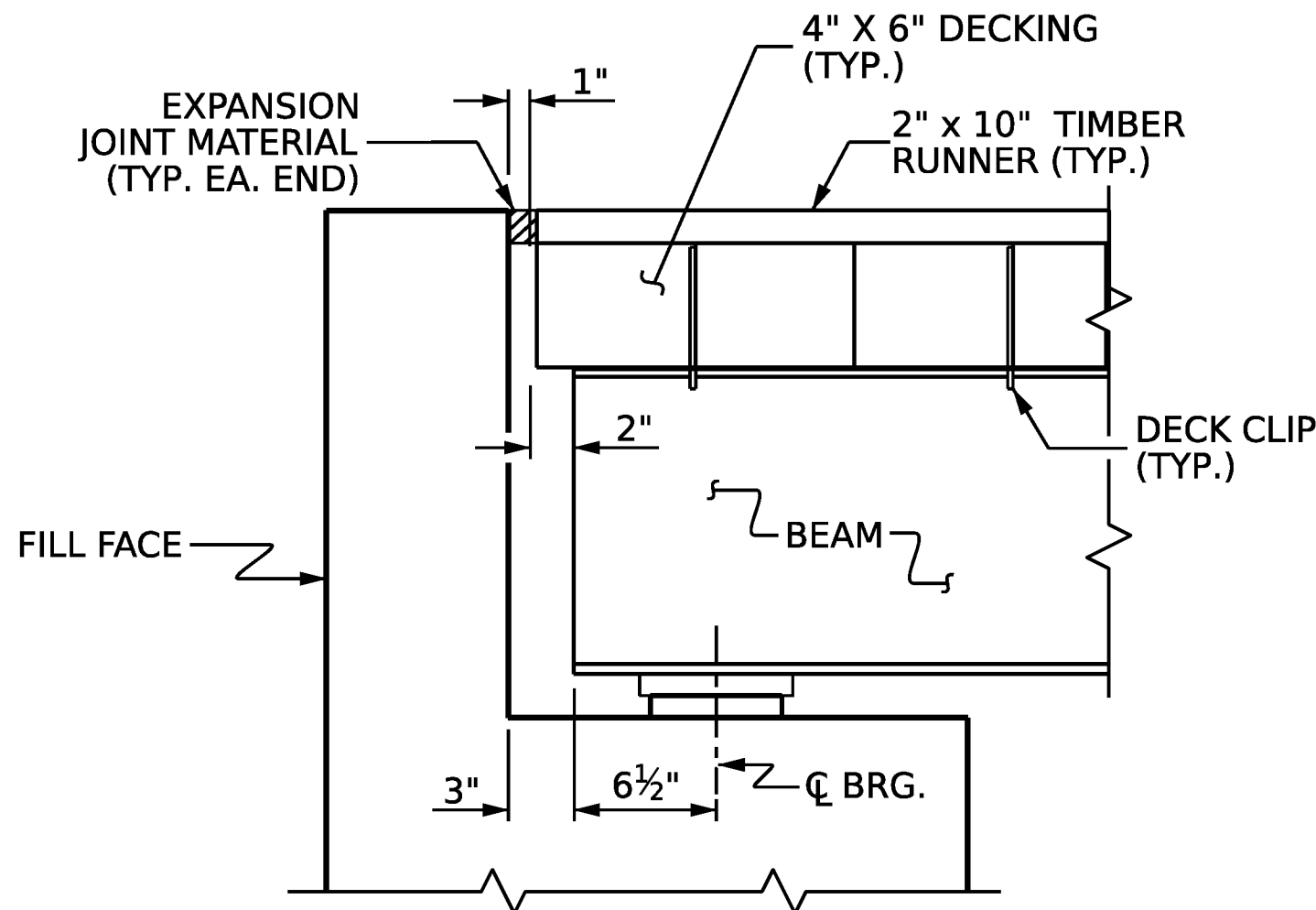


SECTION A-A



WHEEL GUARD ELEVATION

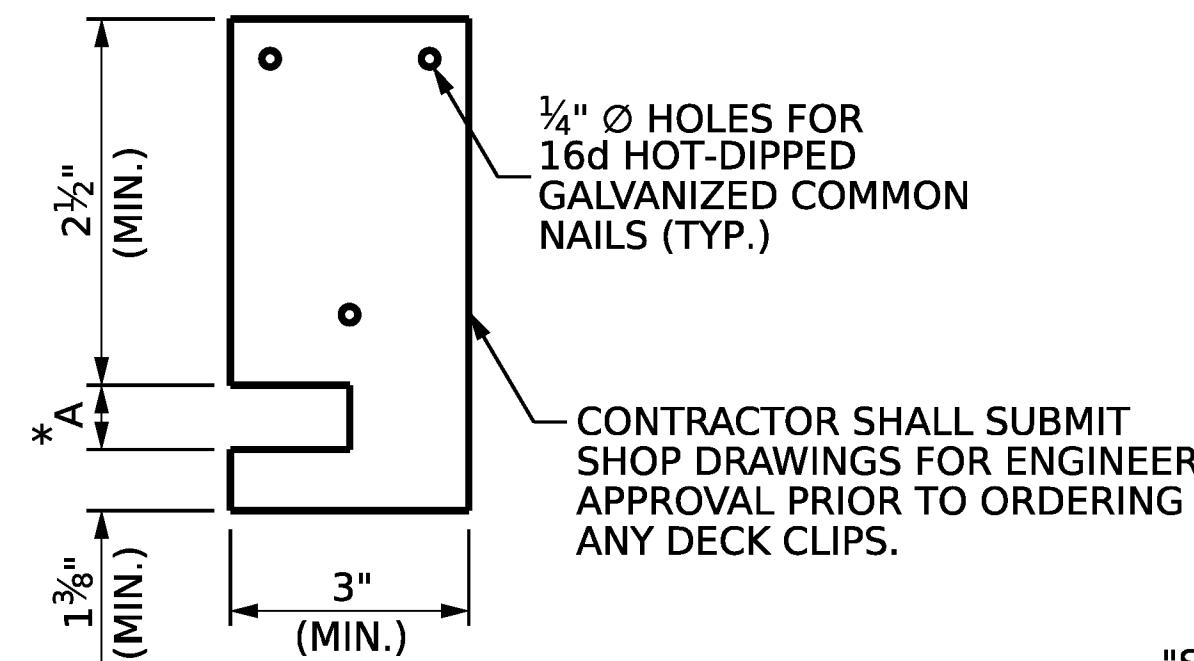
MATERIALS TABLE				
SPAN	BEAM	DIAPHRAGM CHANNEL	DECK PLANK	DECKING SQ. FT.
20'-0"	W16X36	C12X20.7	4X6	244
30'-0"	W21X48	C12X20.7	4X6	364
40'-0"	W24X76	C12X20.7	4X6	484
50'-0"	W24X104	C12X20.7	4X6	604
60'-0"	W30X116	C12X20.7	4X6	724
70'-0"	W33X130	C12X20.7	4X6	844



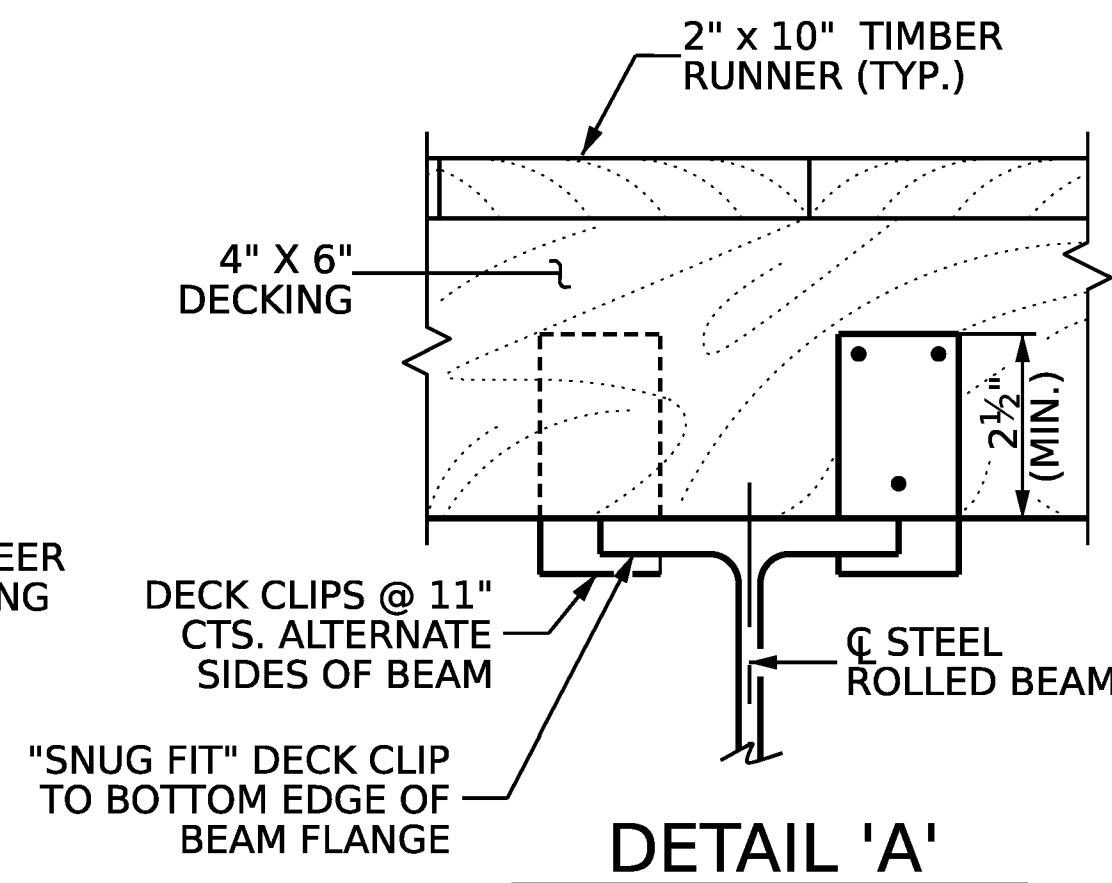
SECTION AT END BENT

DECK CLIP DIMENSIONS		
SPAN	BEAM	*A
20'-0"	W16X36	1/2"
30'-0"	W21X48	1/2"
40'-0"	W24X76	3/4"
50'-0"	W24X104	13/16"
60'-0"	W30X116	15/16"
70'-0"	W33X130	15/16"

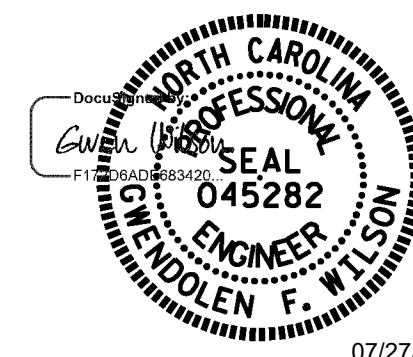
* DIMENSION A IS FOR INFORMATION ONLY. IT IS BASED ON THE FLANGE THICKNESS PLUS A 1/16" TOLERANCE. THE CONTRACTOR SHALL VERIFY THIS DIMENSION WITH DECK CLIP SUPPLIER. THE DECK CLIP SHALL HAVE A SNUG FIT TO THE BEAM FLANGE.



DECK CLIP DETAIL



DETAIL 'A'



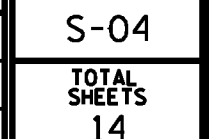
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**PRIVATE DRIVEWAY
BRIDGE STANDARDS**
SINGLE LANE STEEL BEAM BRIDGE
4X6 TIMBER DECK
**OPTIONAL TYPICAL SECTION
& RAIL DETAILS**

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DIMENSIONS TABLE

FOR ADDITIONAL NOTES, SEE "TYPICAL SECTION & RAIL DETAILS" SHEET, "OPTIONAL TYPICAL SECTION & RAIL DETAILS", AND "GENERAL NOTES" SHEET.

**RIP ONE DECK BOARD (CLOSURE BOARD) AS NECESSARY
TO PROVIDE A TIGHT, UNIFORM FIT.**

This technical drawing illustrates the cross-section of a bridge deck, detailing its structural components and dimensions. The deck width is specified as 12'-0".

- Dimensions:**
 - "A"** - BEAM LENGTH: Indicated by a dimension line at the bottom.
 - "B"** - FILL FACE TO FILL FACE: Indicated by a dimension line at the bottom.
 - "C"**: WHEEL GUARD BLOCK & OPTIONAL RAIL POSTS SPACING, indicated by a dimension line at the bottom.
 - "D"**: Indicated by dimension lines near the bottom corners.
 - Vertical Dimensions:**
 - Overall DECK WIDTH: 12'-0"
 - CLEAR ROADWAY: 11'-1"
 - Overhang (TYP.): 1'-0" on both sides.
 - Individual sections are marked as 6'-0" wide.
 - A central section is marked as 2'-0" (TYP.) wide.
- Structural Components:**
 - BEAM (TYP.)**: Horizontal structural members supporting the deck.
 - BRIDGE DECK CLIP @ 12" MAX. ON ALTERNATE SIDE OF EACH BEAM FOR 2" X 8" TIMBER DECKING (TYP.)**
 - BRIDGE DECK CLIP @ 11" MAX. ON ALTERNATE SIDE OF EACH BEAM FOR 4" X 6" TIMBER DECKING (TYP.)**
 - WHEEL GUARD BLOCK (TYP.)**: Located along the top and bottom edges of the deck.
 - Rail Post for Optional Bridge Rail (TYP.)**: Positioned between the wheel guard blocks.
 - L 5" x 5" x 5/8" TOP FLANGE OF SPAN FOR REQUIRED FOR**: A label pointing to a specific structural detail on the right side.
 - ONE 2" X WILL REQUIRE BE RIPPED**: A note indicating a requirement for a component on the right side.
- Other Labels:**
 - FILL FACE**: Points to the outer vertical boundaries of the deck.
 - CL BRIDGE**: A label pointing to the centerline of the bridge structure.

L 5" x 5" x $\frac{5}{16}$ " ANGLE 12'-0" LONG, WELD TO TOP FLANGE OF EACH BEAM (TYP. EACH END OF SPAN FOR 2" X 8" DECKING). NO ANGLE REQUIRED FOR THE 4" X 6" TIMBER DECKING

ONE 2" X 10" RUNNER
WILL REQUIRE TO
BE RIPPED FOR FIT

END BENT 2

BUTT JOINT
(TYP.)

STEEL BEAM_
(TYP.)

WHEN BUTT JOINTS ARE
— REQUIRED IN A PLANK RUN,
DETAIL THE BUTT JOINTS OVER
THE CENTERLINE OF THE BEAM

4'-6" MIN.

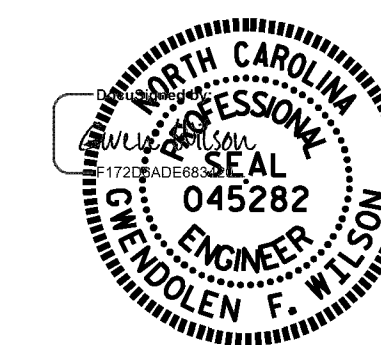
BUTT JOINTS
STAGGERED EVERY
FOURTH ROW (TYP.)

A diagram of a shoulder cross-section. It shows a vertical edge on the left, a horizontal line representing the shoulder surface, and a sloped line representing the cut. The slope is labeled "30° - 40° CUT". A vertical dimension line on the left indicates a height of "1'". A horizontal arrow at the bottom points to the right, labeled "TRAFFIC DIRECTION".

STEEL BEAM
(TYP.)

4" FLATHEAD STRUCTURAL TIMBER
SCREW COUNTERSUNK (TYP.)

TIMBER RUNNER BUTT JOINT DETAIL



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PRIVATE DRIVEWAY
BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

PLAN OF SPAN

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26	1		3			TOTAL SHEETS 14
26	2		4			

BUTT JOINTS SHALL BE OVER THE CENTERLINE OF A BEAM.
JOINTS SHALL BE STAGGERED EVERY FOURTH DECK BOARD.
NONE ALLOWED AT THE EXTERIOR BEAMS.

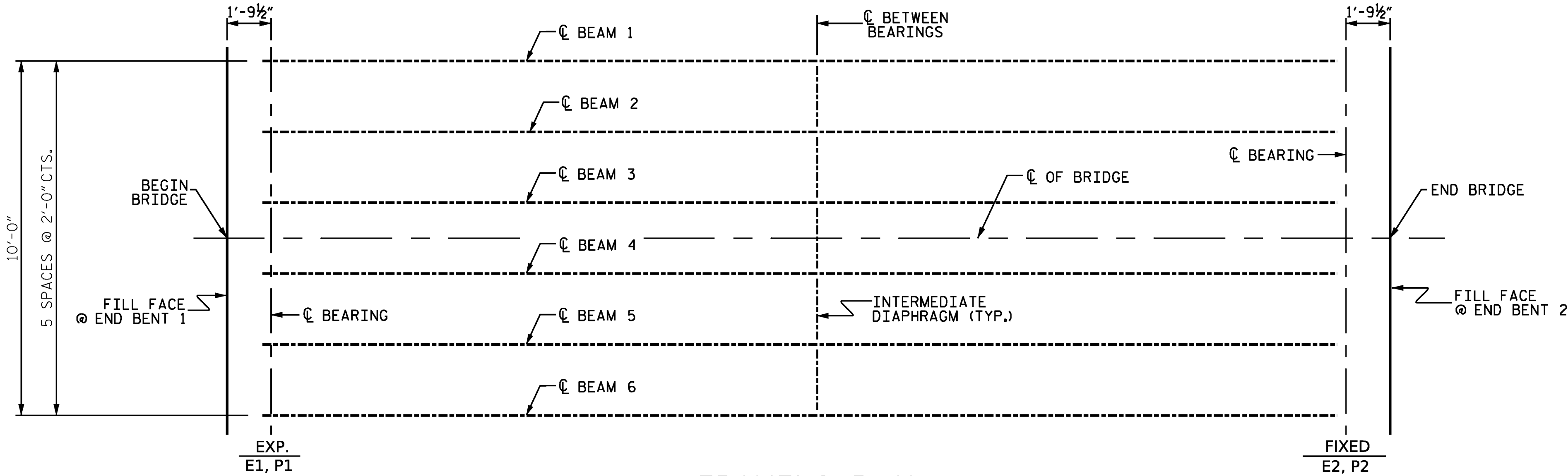


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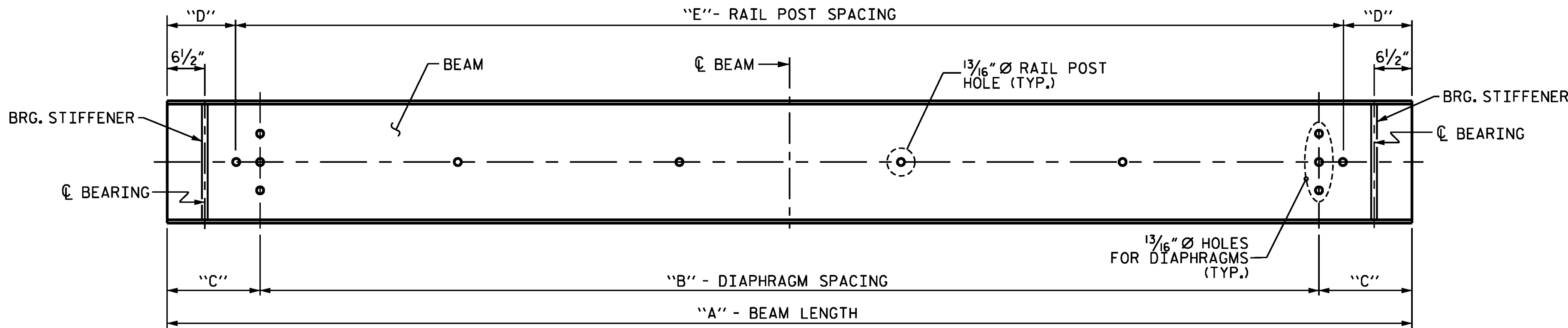
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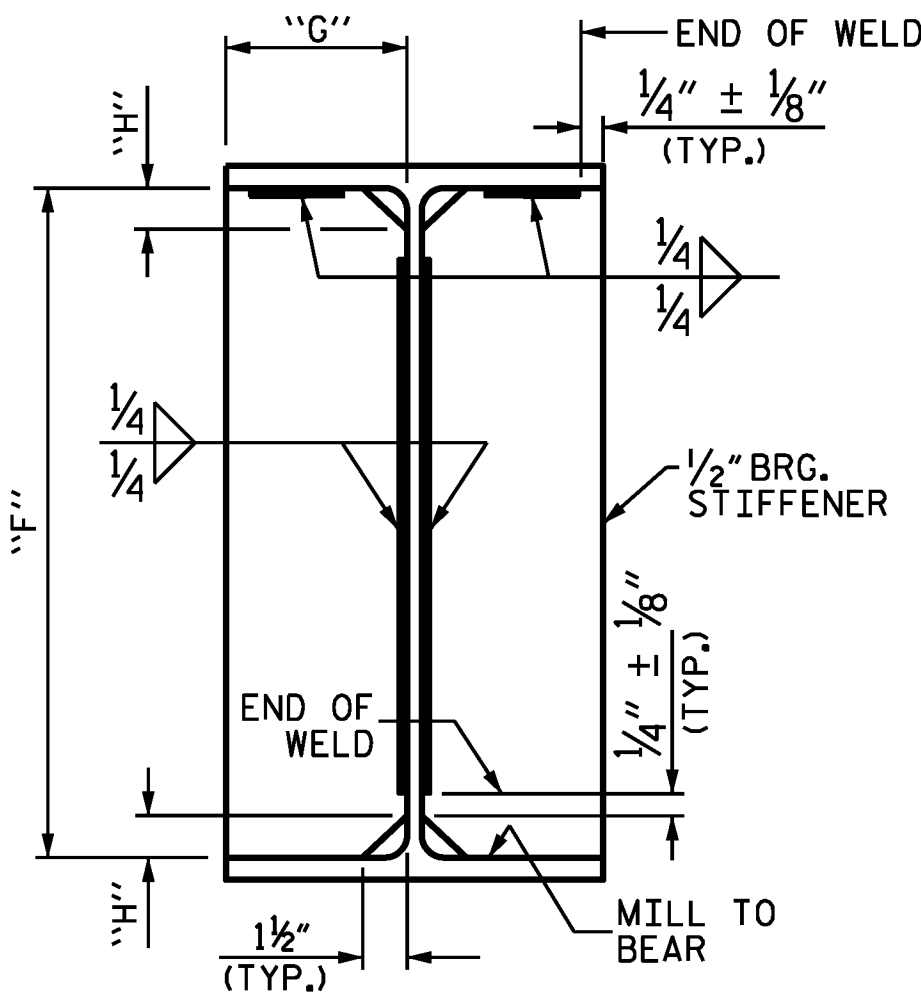


FRAMING PLAN
EXPANSION BEARING SHALL BE PLACED ON THE "UPHILL" END OF THE BRIDGE.



BEAM FLANGE ELEVATION
SHOWING DIAPHRAGM HOLES FOR ALL BEAMS, AND RAIL POST HOLES FOR EXTERIOR BEAMS.

BEAM DIMENSION TABLE							
SPAN	BEAM	CHANNEL	A	B	C	D	E
20'-0"	W16X36	C12X20.7	20'-0"	2 SPA. @ 7'-0"	3'-0"	10"	5 SPA. @ 3'-8"
30'-0"	W21X48	C12X20.7	30'-0"	2 SPA @ 12'-0"	3'-0"	1'-0"	7 SPA. @ 4'-0"
40'-0"	W24X76	C12X20.7	40'-0"	2 SPA. @ 17'-0"	3'-0"	10 1/2"	9 SPA. @ 4'-3"
50'-0"	W24X104	C12X20.7	50'-0"	2 SPA. @ 22'-0"	3'-0"	1'-2"	11 SPA. @ 4'-4"
60'-0"	W30X116	C12X20.7	60'-0"	4 SPA. @ 13'-6"	3'-0"	1'-0 3/4"	13 SPA. @ 4'-5 1/2"
70'-0"	W33X130	C12X20.7	70'-0"	4 SPA. @ 16'-0"	3'-0"	1'-3"	15 SPA. @ 4'-6"

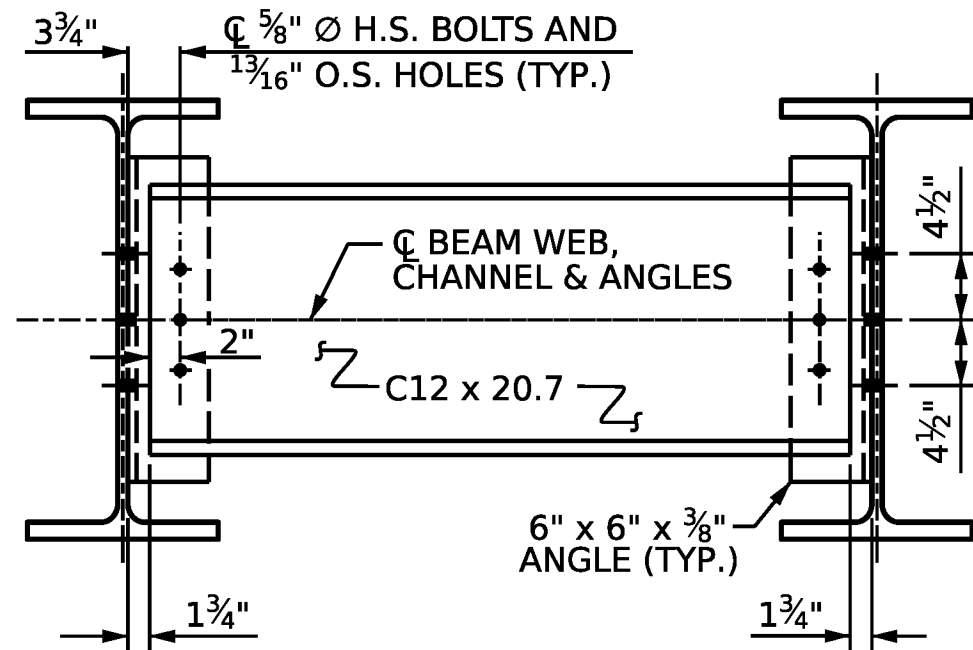


SECTION VIEW - BRG. STIFFENER

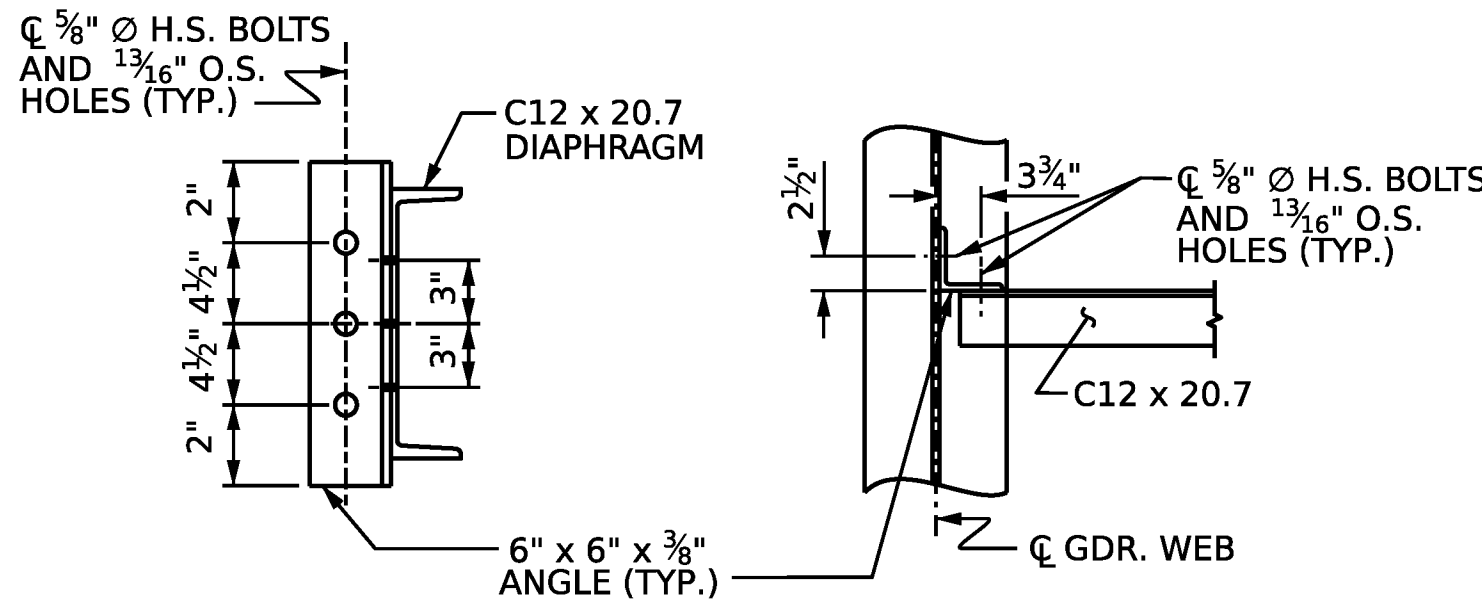
STIFFENER DIMENSION			
BEAM	F	G	H
W16X36	1'-3"	3 3/8"	2"
W21X48	1'-7 3/4"	3 7/8"	2"
W24X76	1'-10 9/16"	4 1/4"	2 3/16"
W24X104	1'-10 9/16"	6 1/8"	2 3/4"
W30X116	2'-4 1/4"	5"	3 1/16"
W33X130	2'-7 3/8"	5 1/2"	3 1/8"

NOTES

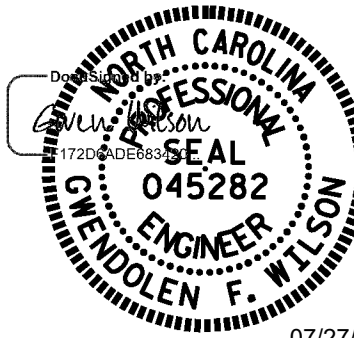
- NO SALVAGED BEAMS SHALL BE USED, UNLESS OTHERWISE NOTED ON THE PLANS.
- NO SHOP CAMBER REQUIRED, TURN NATURAL MILL CAMBER UP.
- ALL STRUCTURAL STEEL FIELD CONNECTIONS SHALL BE 5/8" DIA. GALVANIZED HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.
- BEAMS SHALL BE PLACED PARALLEL TO THE CHORD.
- CONTRACTORS OPTION TO WELD CONNECTOR TO BEAM PRIOR TO SHOP COATING.
- SEE "GENERAL NOTES" SHEET FOR COATING.



DIAPHRAGM DETAILS



ANGLE DETAILS



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TIMBER DECK
**FRAMING PLAN &
BEAM DETAILS**



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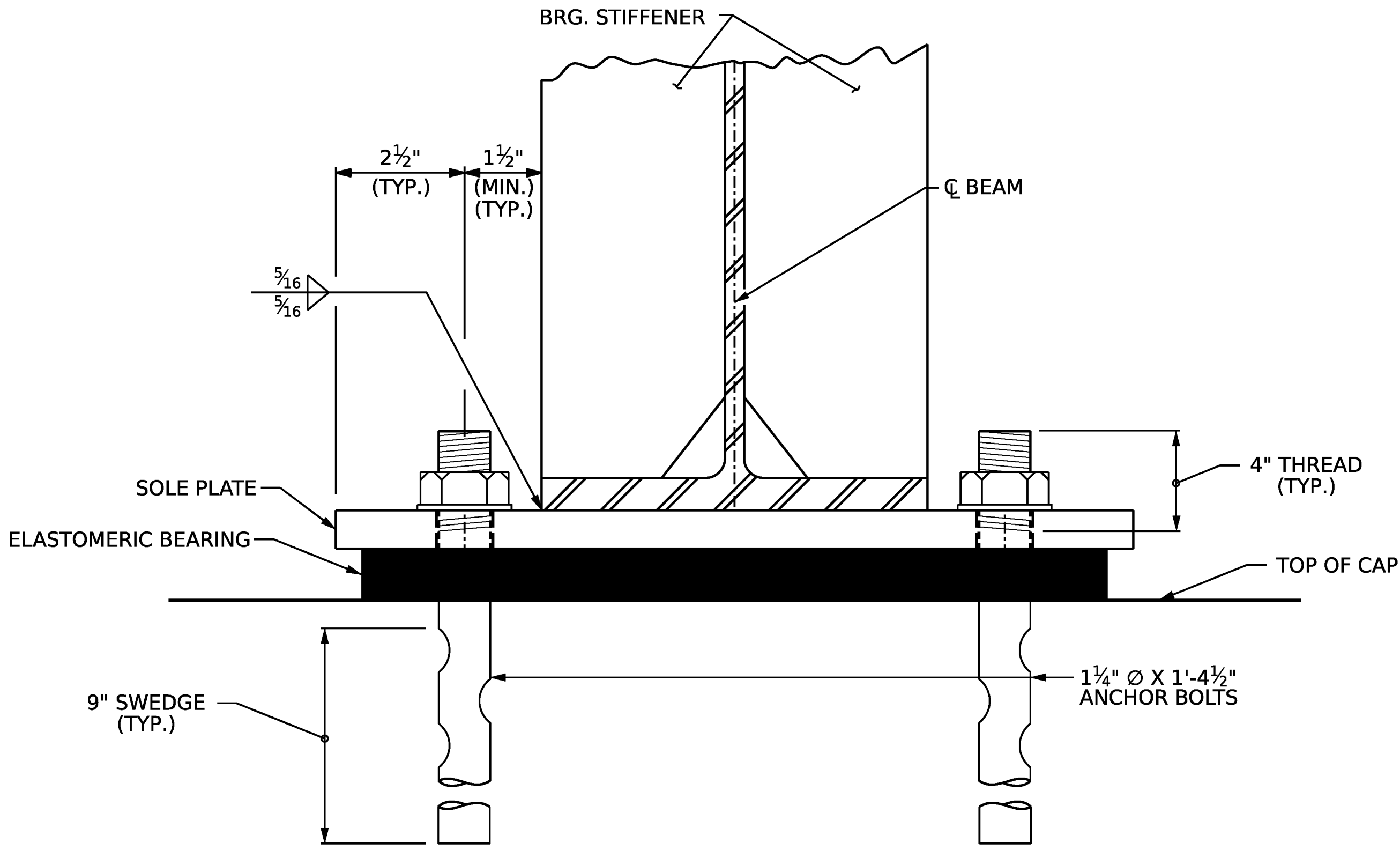
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TIME: 1/25/2026



SECTION AT BEARING
END VIEW

DIMENSIONS TABLE						
SPAN	BEAM	FLANGE WIDTH	TYPE	A	B	C
20'-0"	W16X36	7"	I	11"	1'-3"	1'-4"
30'-0"	W21X48	8 1/8"	II	1'-1"	1'-5"	1'-6"
40'-0"	W24X76	9"	II	1'-1"	1'-5"	1'-6"
50'-0"	W24X104	12 3/4"	III	1'-4"	1'-8"	1'-9"
60'-0"	W30X116	10 1/2"	IV	1'-3"	1'-7"	1'-8"
70'-0"	W33X130	11 1/2"	IV	1'-3"	1'-7"	1'-8"

NOTES

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

AT ALL SUPPORTS, 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.

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

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.

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. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLTS, NUTS, AND WASHERS. SHOP INSPECTION IS REQUIRED.

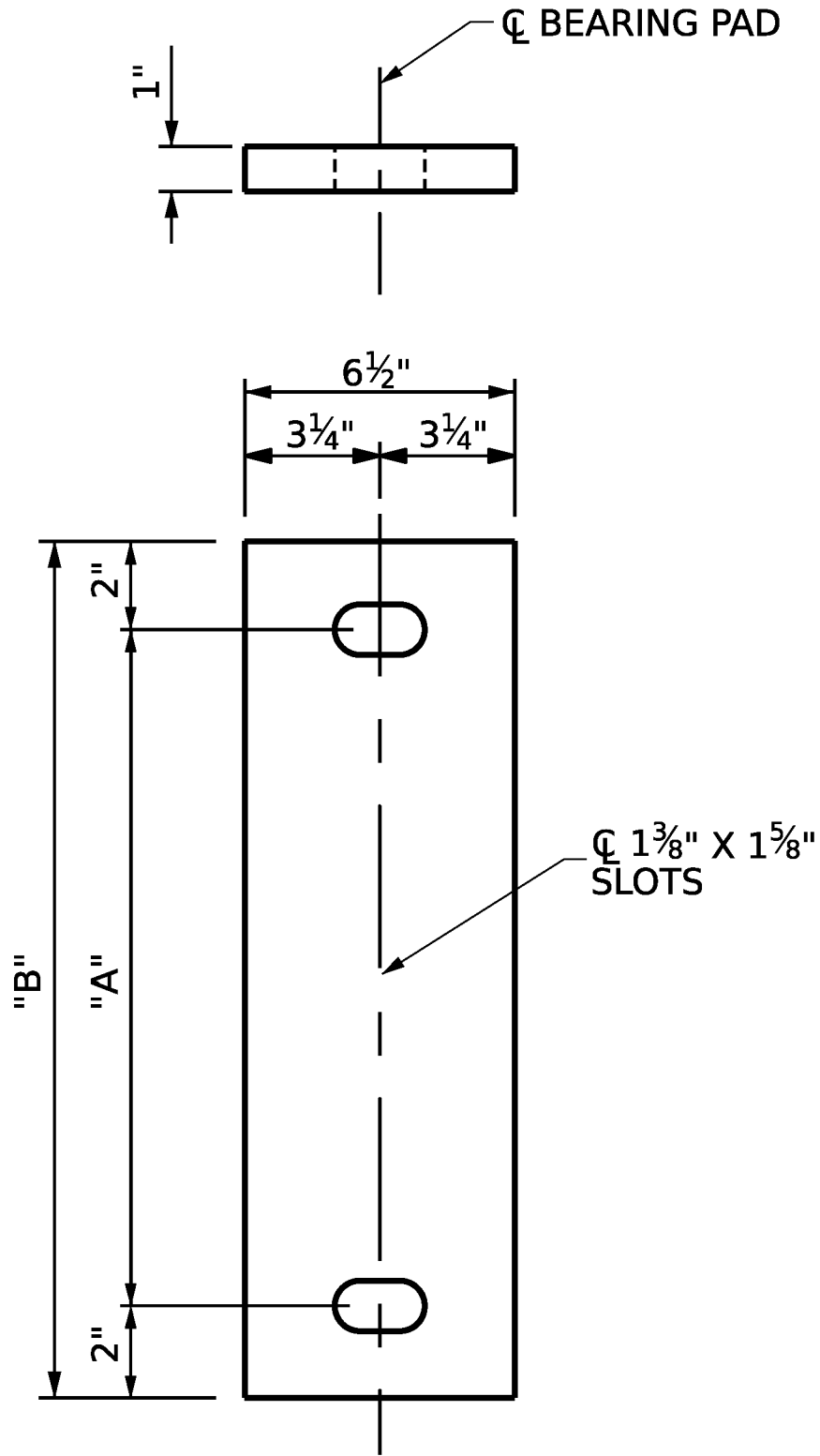
AT THE APPROVAL OF THE ENGINEER, SOLE PLATES AT THE EXPANSION END MAY BE FIELD WELDED.

WHEN FIELD WELDING THE SOLE PLATE TO THE GIRDER FLANGE, 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.

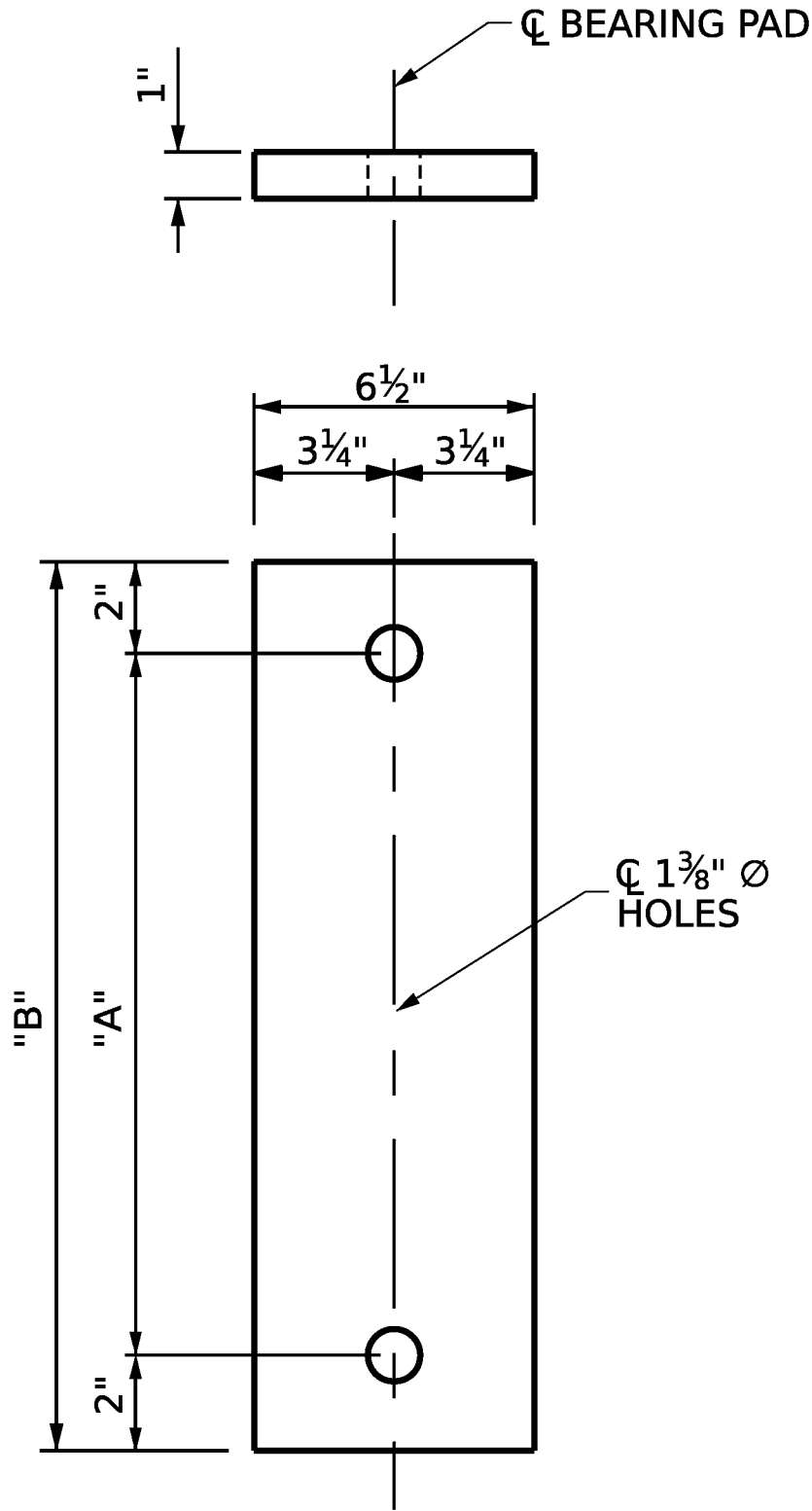
ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

AT NO ADDITIONAL COST, THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CAST-IN-PLACE ANCHORS. LEVEL 1 FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ANCHOR BOLT IS 30 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

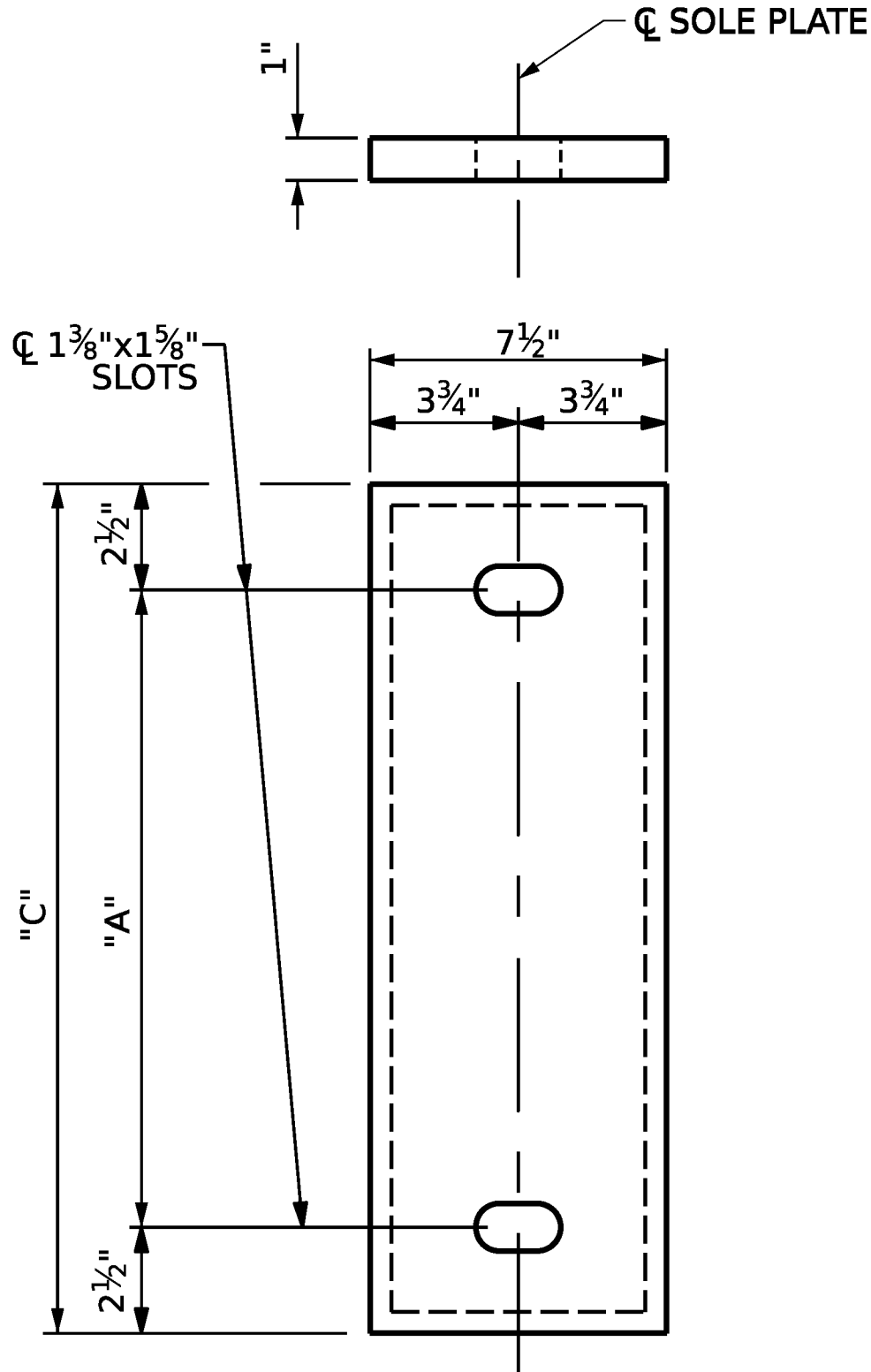
ADHESIVELY ANCHORED ANCHOR BOLTS SHALL BE THREADED FULL LENGTH.



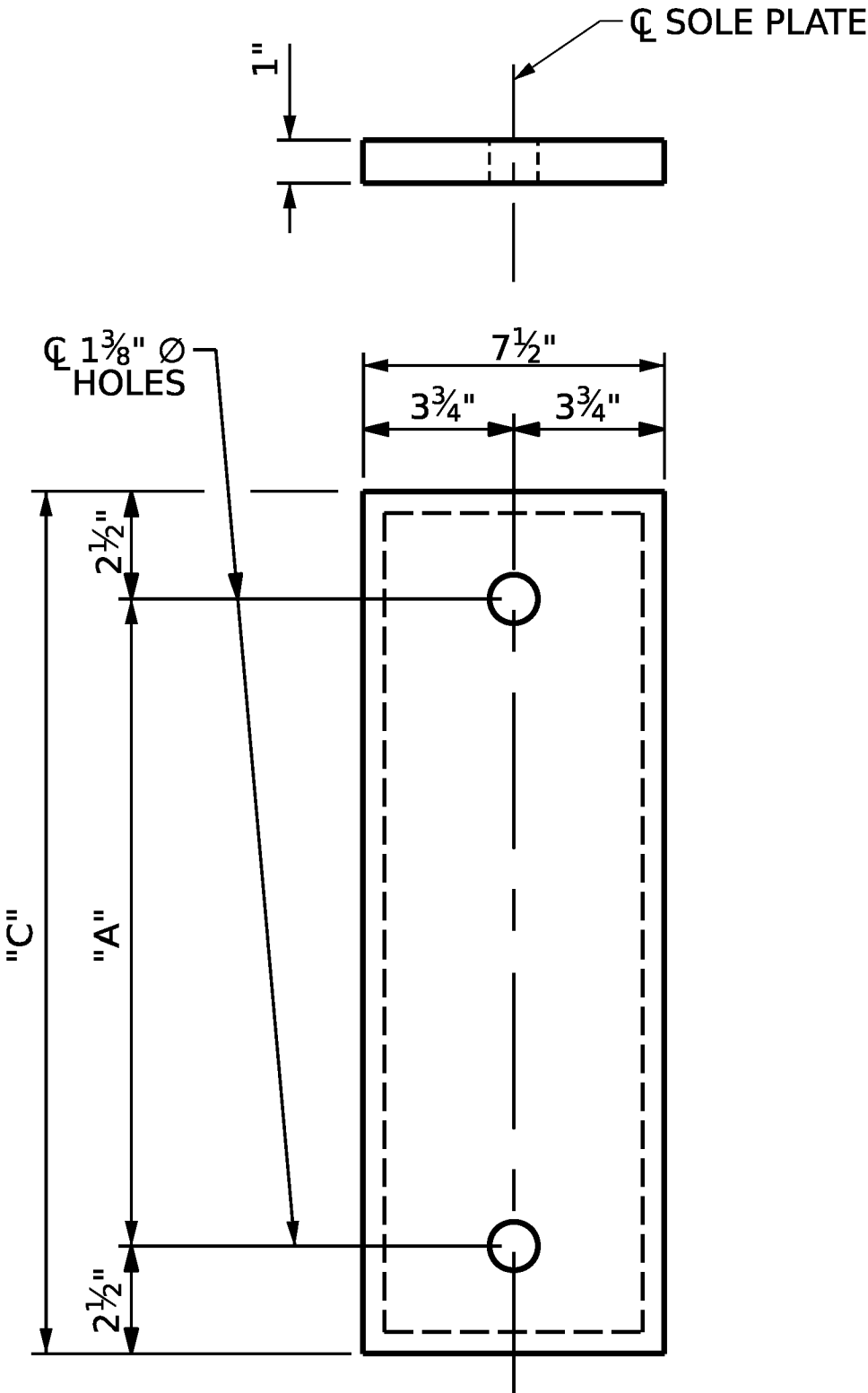
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(6 REQ'D)
EXPANSION



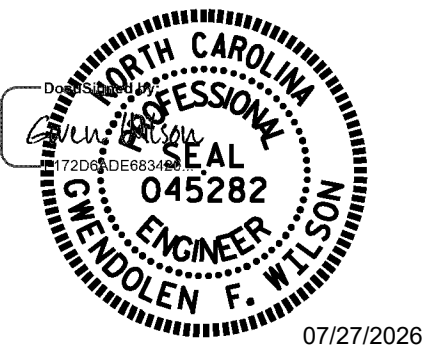
E2 ELASTOMERIC BEARING DETAILS
(6 REQ'D)
FIXED



P1 SOLE PLATE DETAILS
(6 REQ'D)
EXPANSION



P2 SOLE PLATE DETAILS
(6 REQ'D)
FIXED



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BRIDGE STANDARDS
SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

BEARING DETAILS

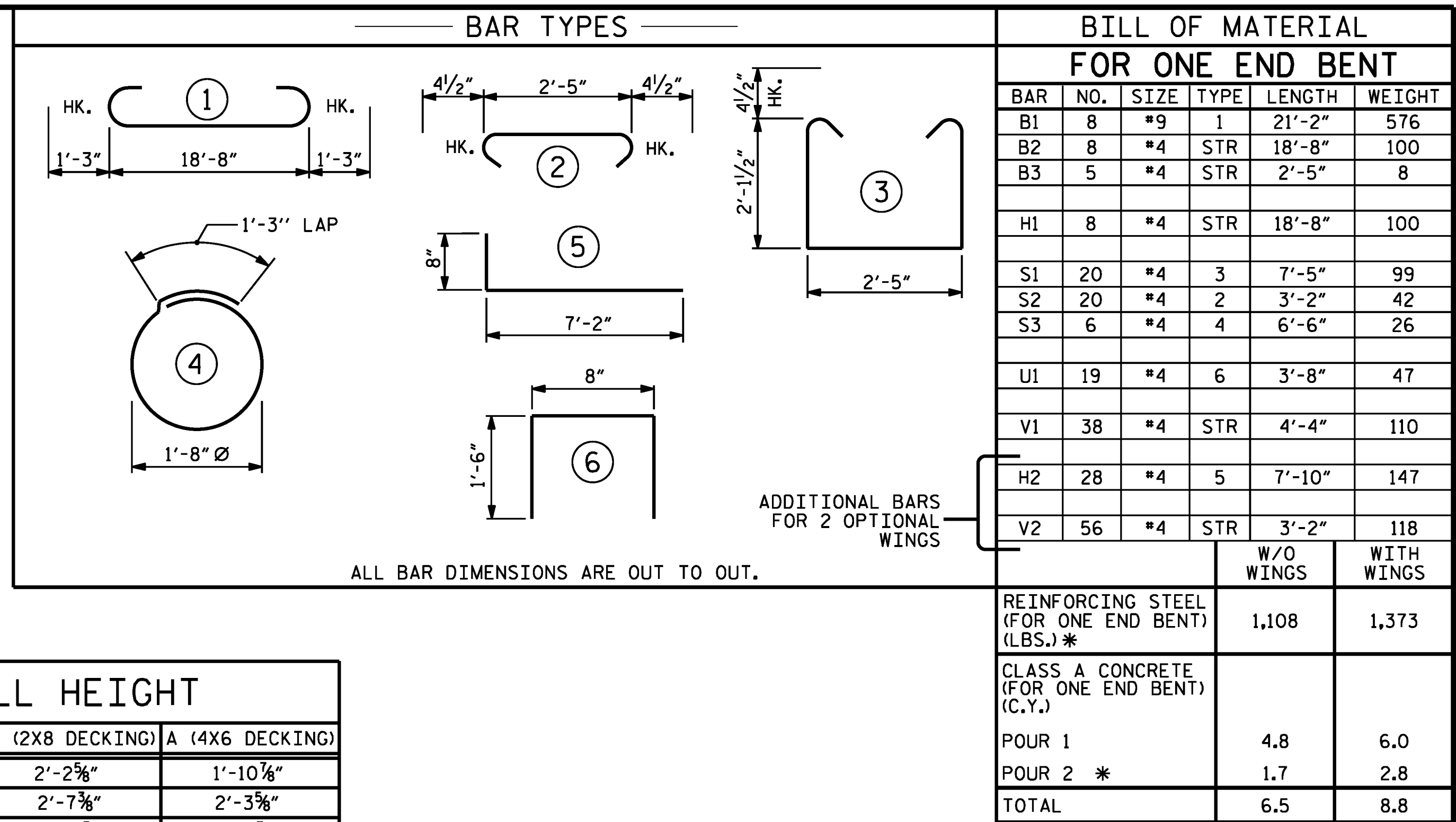
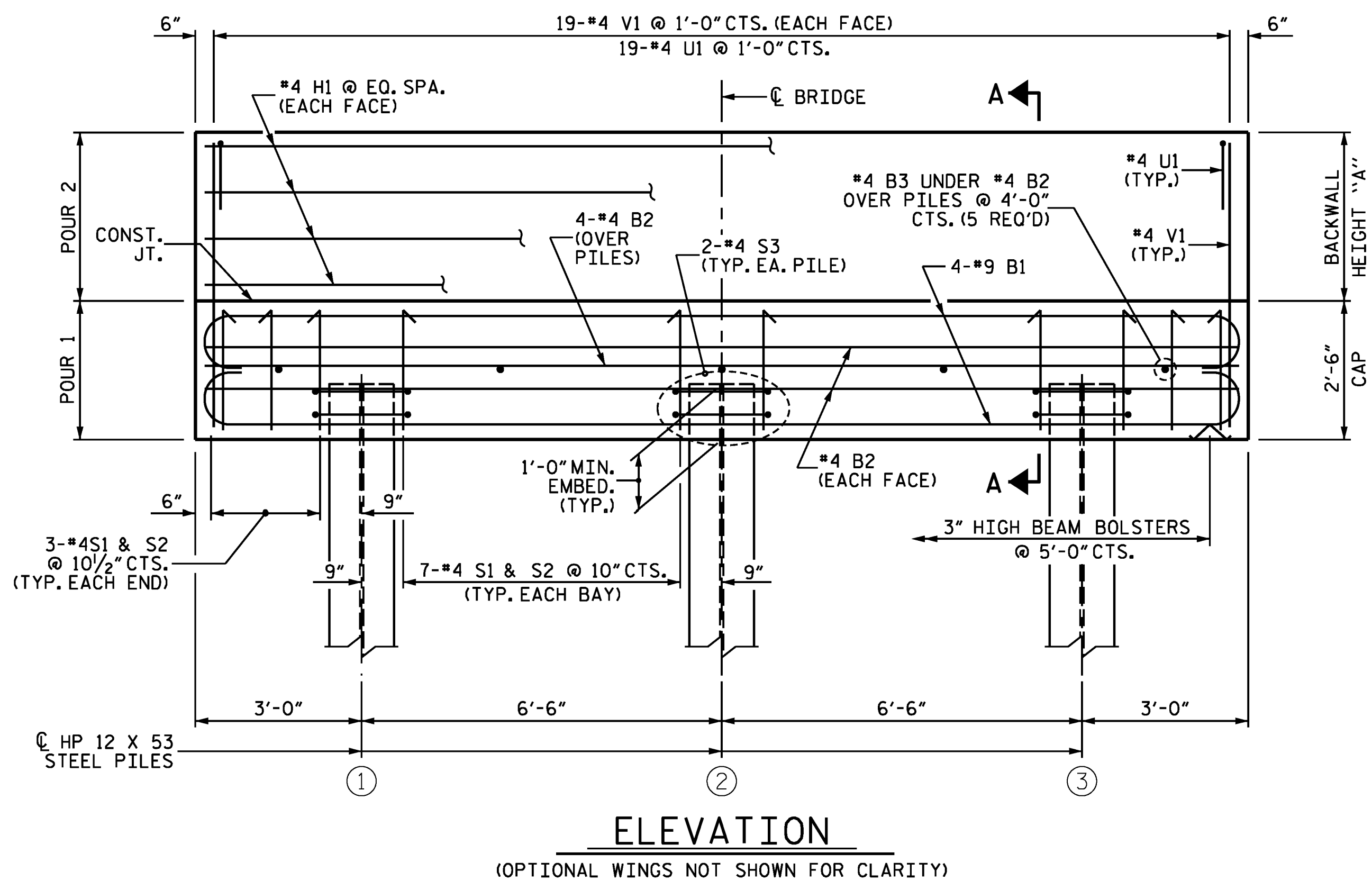
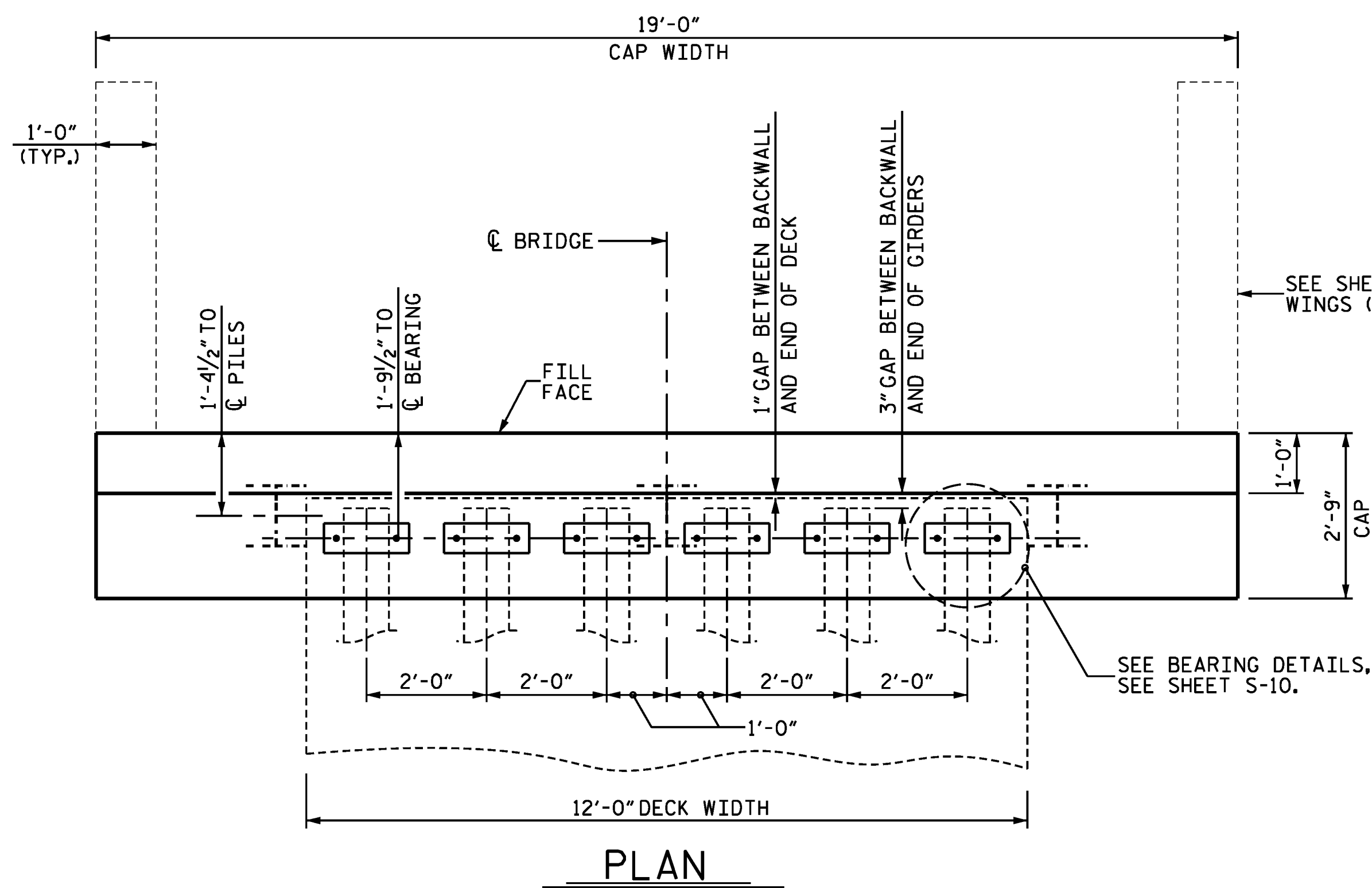
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NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 14
2			4			



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DATE: 04/2026
DATE: 04/2026



BACKWALL HEIGHT			
SPAN	BEAM	A (2X8 DECKING)	A (4X6 DECKING)
20'-0"	W16X36	2'-2 ⁵ / ₈ "	1'-10 ⁷ / ₈ "
30'-0"	W21X48	2'-7 ³ / ₈ "	2'-3 ³ / ₈ "
40'-0"	W24X76	2'-10 ³ / ₈ "	2'-6 ⁷ / ₈ "
50'-0"	W24X104	2'-10 ³ / ₄ "	2'-7"
60'-0"	W30X116	3'-4 ³ / ₄ "	3'-1"
70'-0"	W33X130	3'-7 ³ / ₄ "	3'-4"

DIMENSION "A" (BACKWALL HEIGHT) VARIES BASED ON DECKING TYPE. USE VALUES CORRESPONDING TO SELECTED DECKING OPTION.

GENERAL NOTES

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

CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

WINGS MAY BE REQUIRED AT THE DIRECTION OF THE
ENGINEER OR DESIGNEE.

FOR OPTIONAL WINGS FOR END BENT, SEE SHEET S-10.

FOR BEARING DETAILS, SEE SHEET S-10.

FOR PILE SPLICE DETAILS, SEE SHEET S-10.

"V" BARS BASED ON SHORTEST BACKWALL HEIGHT USING
2X8 DECKING. ADJUST LENGTH TO MAINTAIN REQUIRED
MIN. CLEARANCE AT BOTTOM OF CAP AND TOP OF BACKWALL.

FOUNDATION NOTES

DRIVEN PILES

INSTALL PILES IN ACCORDANCE WITH SECTION 450 OF THE
STANDARD SPECIFICATIONS.

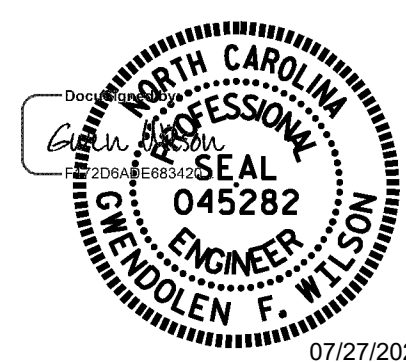
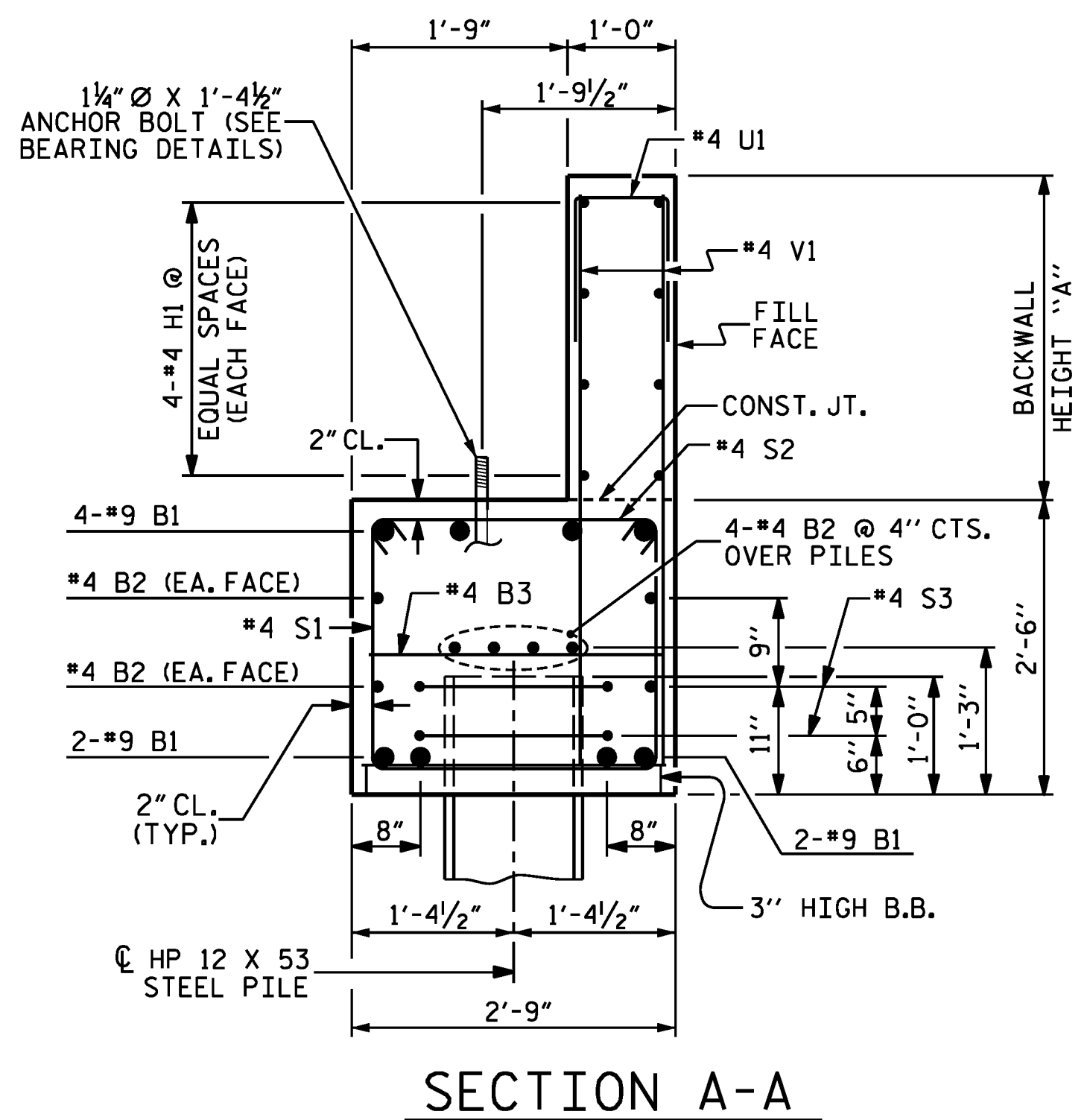
DO NOT INSTALL PILES UNTIL FILL HAS BEEN PLACED.

DRIVE PILES TO A MINIMUM PENETRATION OF AT LEAST 10 FEET INTO NATURAL GROUND OR CHANNEL BOTTOM.

DRIVE ALL PILES TO "REFUSAL" BELOW MINIMUM PENETRATION.

PREDRILLING OR SPUDDING MAY BE REQUIRED TO ACHIEVE THE MINIMUM PILE PENETRATION.

SUBMIT THE PROPOSED PILE DRIVING METHODS AND EQUIPMENT FOR ACCEPTANCE BY THE ENGINEER.



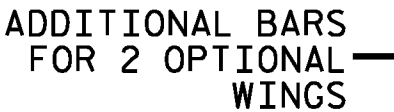
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NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE TIMBER DECK

END BENT DRIVEN PILES



BILL OF MATERIAL FOR ONE END BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	21'-2"	576
B2	8	#4	STR	18'-8"	100
B3	5	#4	STR	2'-5"	8
H1	8	#4	STR	18'-8"	100
S1	20	#4	3	7'-5"	99
S2	20	#4	2	3'-2"	42
S3	6	#4	4	6'-6"	26
U1	19	#4	6	3'-8"	47
V1	38	#4	STR	4'-4"	110
H2	28	#4	5	7'-10"	147
V2	56	#4	STR	3'-2"	118
			W/O WINGS	WITH WINGS	
REINFORCING STEEL (FOR ONE END BENT) (LBS.) *			1,108	1,373	
CLASS A CONCRETE (FOR ONE END BENT) (C.Y.)					
POUR 1			4.8	6.0	
POUR 2 *			1.7	2.8	
TOTAL			6.5	8.8	

* REINFORCING AND CONCRETE QUANTITIES ARE BASED ON THE SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. CONTRACTOR SHALL ADJUST FOR 4X6 DECKING OR INCREASED BACKWALL HEIGHT.

BACKWALL HEIGHT			
SPAN	BEAM	A (2X8 DECKING)	A (4X6 DECKING)
20'-0"	W16X36	2'-2 $\frac{5}{8}$ "	1'-10 $\frac{7}{8}$ "
30'-0"	W21X48	2'-7 $\frac{3}{8}$ "	2'-3 $\frac{5}{8}$ "
40'-0"	W24X76	2'-10 $\frac{5}{8}$ "	2'-6 $\frac{1}{8}$ "
50'-0"	W24X104	2'-10 $\frac{3}{4}$ "	2'-7"
60'-0"	W30X116	3'-4 $\frac{3}{4}$ "	3'-1"
70'-0"	W33X130	3'-7 $\frac{3}{4}$ "	3'-4"

DIMENSION "A" (BACKWALL HEIGHT) VARIES BASED ON DECKING TYPE. USE VALUES CORRESPONDING TO SELECTED DECKING OPTION.

GENERAL NOTES

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

CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH
LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL
MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

WINGS MAY BE REQUIRED AT THE DIRECTION OF THE ENGINEER OR DESIGNEE.

FOR OPTIONAL WINGS FOR END BENT, SEE SHEET S-10.

FOR BEARING DETAILS, SEE SHEET S-10.

FOR PILE SPLICE DETAILS, SEE SHEET S-10.

"V" BARS BASED ON SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. ADJUST LENGTH TO MAINTAIN REQUIRED MIN. CLEARANCE AT BOTTOM OF CAP AND TOP OF BACKWALL.

FOUNDATION NOTES

DRILLED-IN PILES

ROCK QUALITY DESIGNATION (RQD)
GEOLOGICAL STRENGTH INDEX (GSI)

INSTALL DRILLED-IN PILES IN ACCORDANCE WITH SECTION 450 OF THE STANDARD SPECIFICATIONS.

MINIMUM PILE PENETRATION OF 10-FT INTO NATURAL GROUND
OR CHANNEL BOTTOM IS REQUIRED.

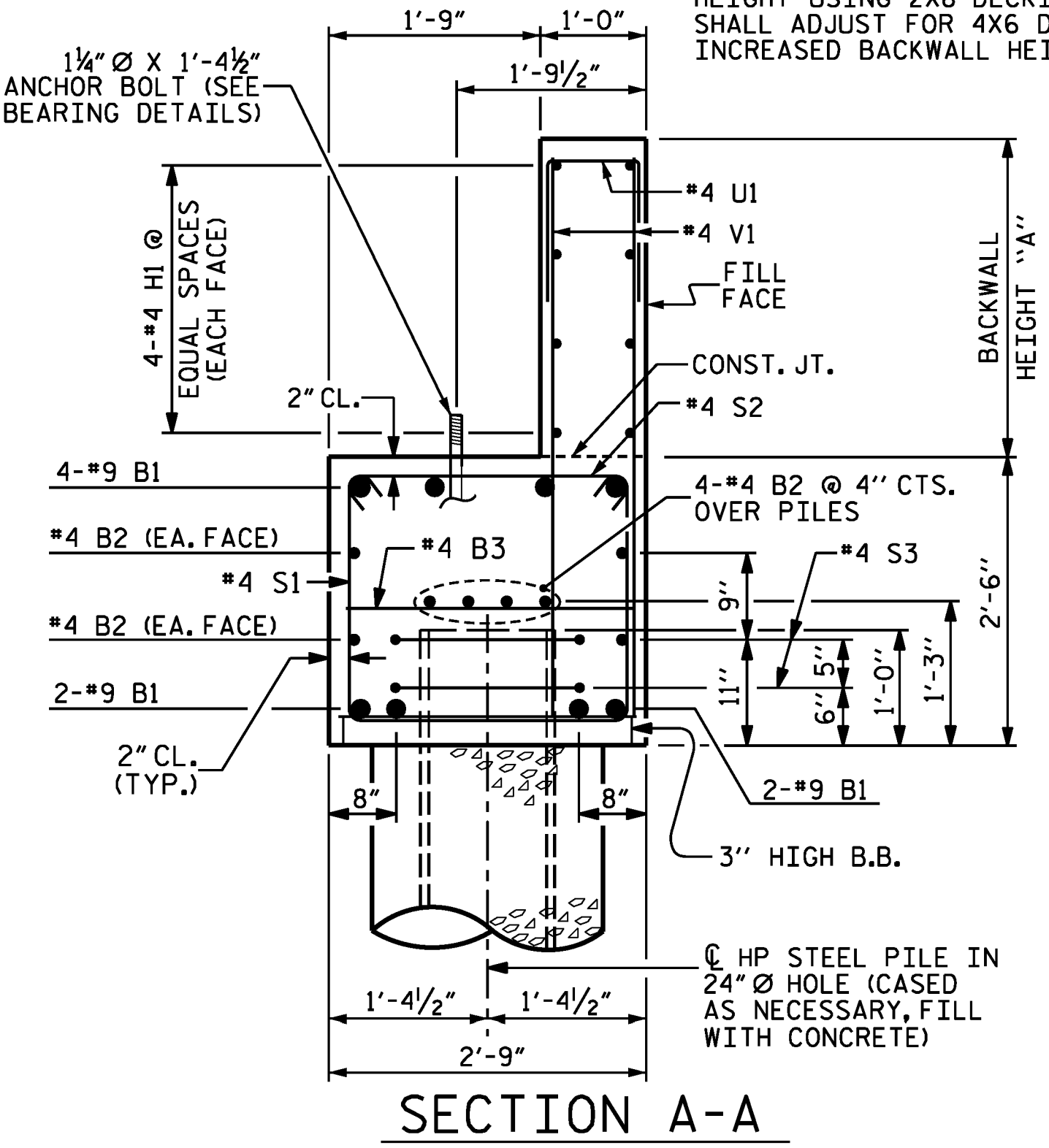
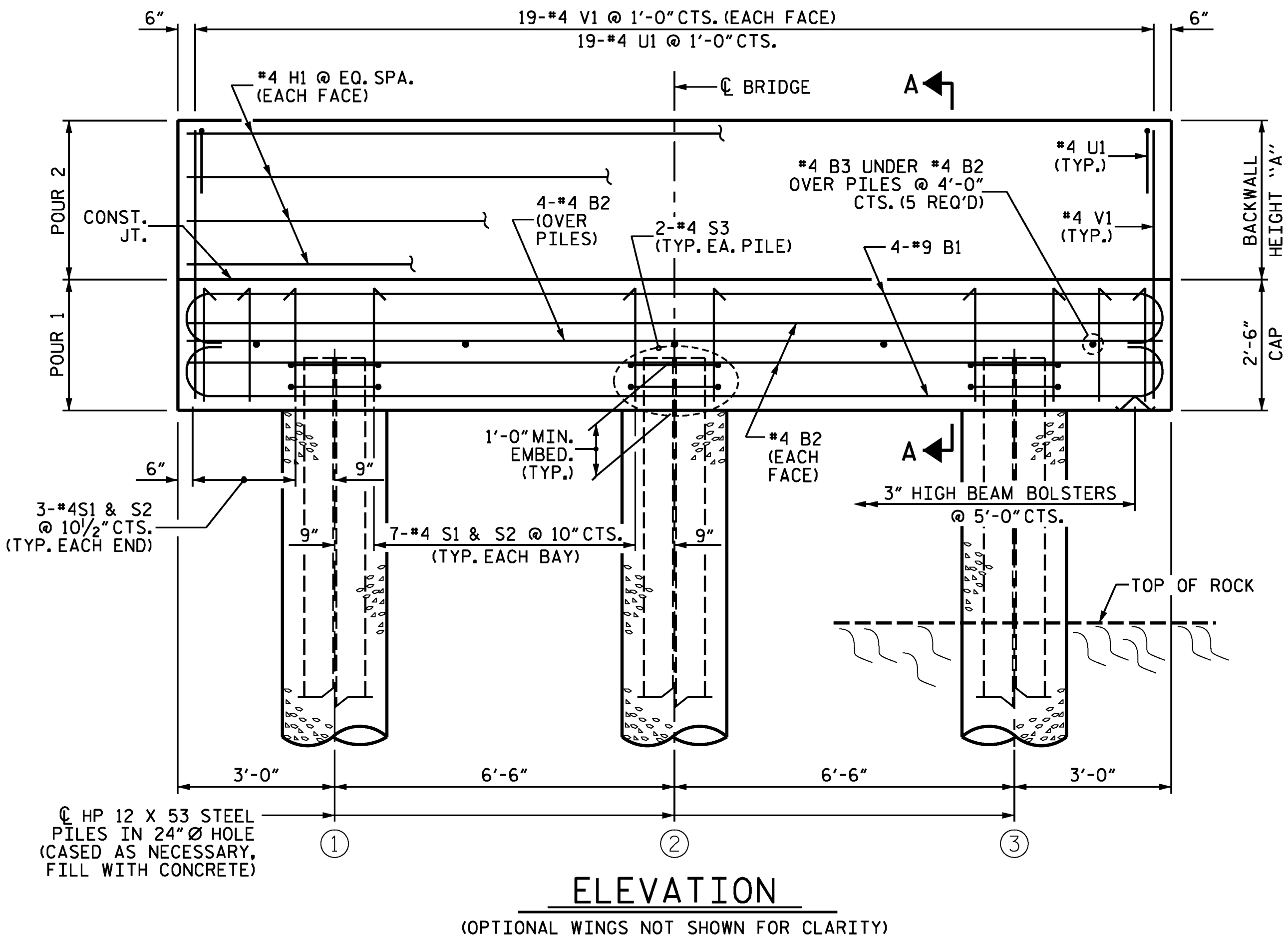
MINIMUM ROCK SOCKET DEPTHS, UNLESS OTHERWISE INDICATED
ON PROJECT SPECIFIC DATA SHEET:

4' MINIMUM (RQD >70, GSI >50)
6' MINIMUM (RQD 30-70, GSI 30-50)
8' MINIMUM (RQD <30, GSI <30)

REFER TO BORING LOGS FOR RQD AND GSI DATA.

PILES SHALL BE SEATED IN THE BOTTOM OF THE EXCAVATION.
PILE DRIVING IS NOT REQUIRED.

BACKFILL WITH CONCRETE ONLY. DO NOT PROCEED WITH CONSTRUCTION ACTIVITIES UNTIL THE 28 DAY STRENGTH IS ACHIEVED.



SHEET 1 OF 2



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EMERGENCY MANAGEMENT
PRIVATE DRIVEWAY
BRIDGE STANDARD
SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

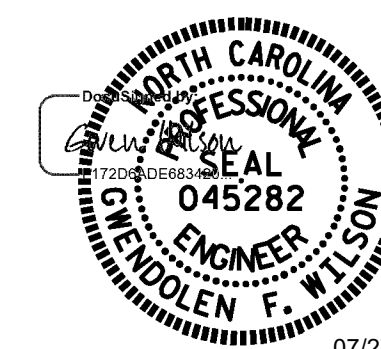
END BENT DRILLED-IN PILES

REVISIONS						SHEET NO. S-09
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 14
2			4			



RIGHT SIDE WING SHOWN,
LEFT SIDE WING SIMILAR.

WING HEIGHT DEPENDENT
ON BACKWALL HEIGHT.



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SIGNATURES COMPLETED

SHEET 2 OF 2

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE TIMBER DECK

OPTIONAL WINGS FOR DRIVEN OR DRILLED-IN PILES

REVISONS						SHEET NO. S-10
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 14
2			4			

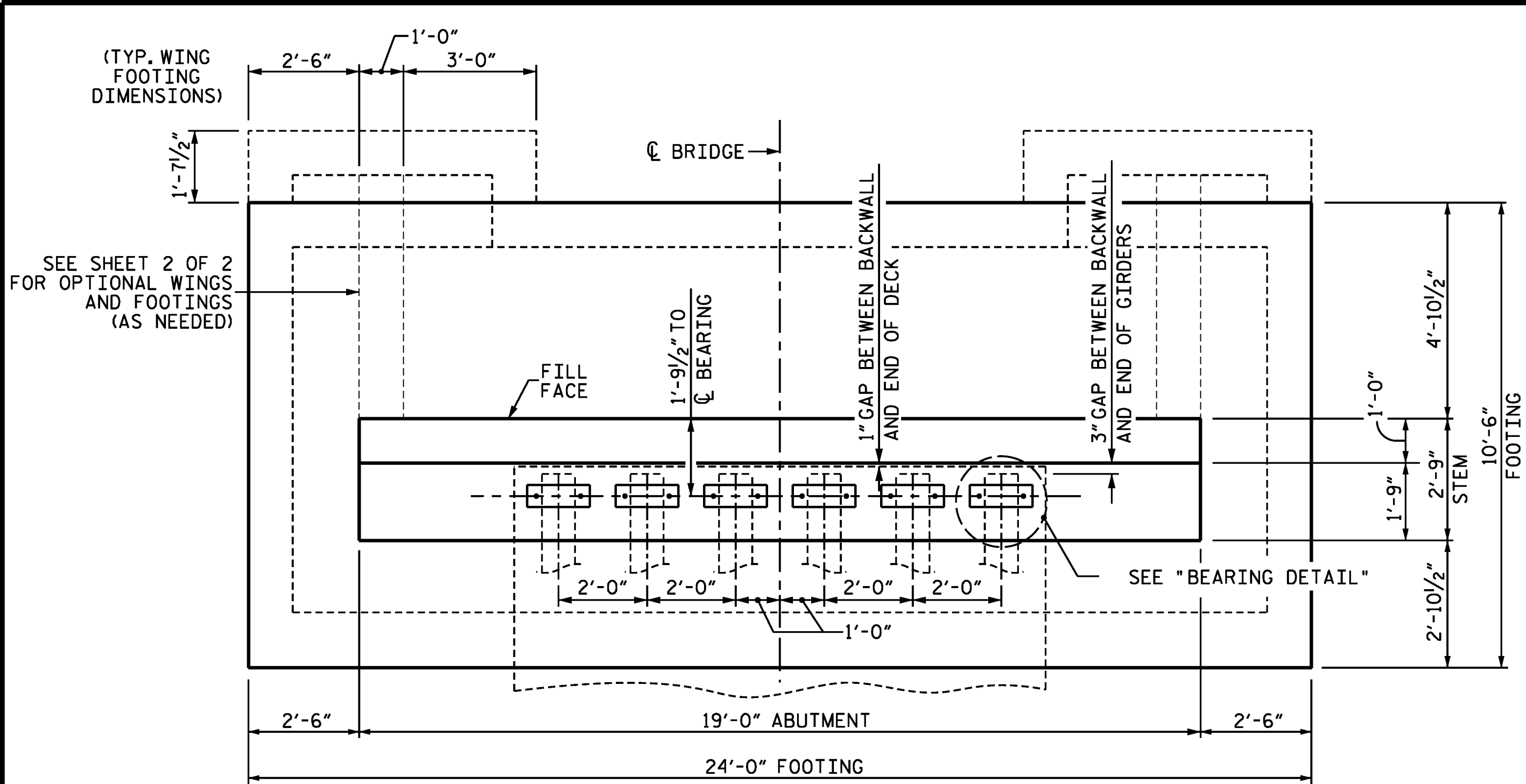


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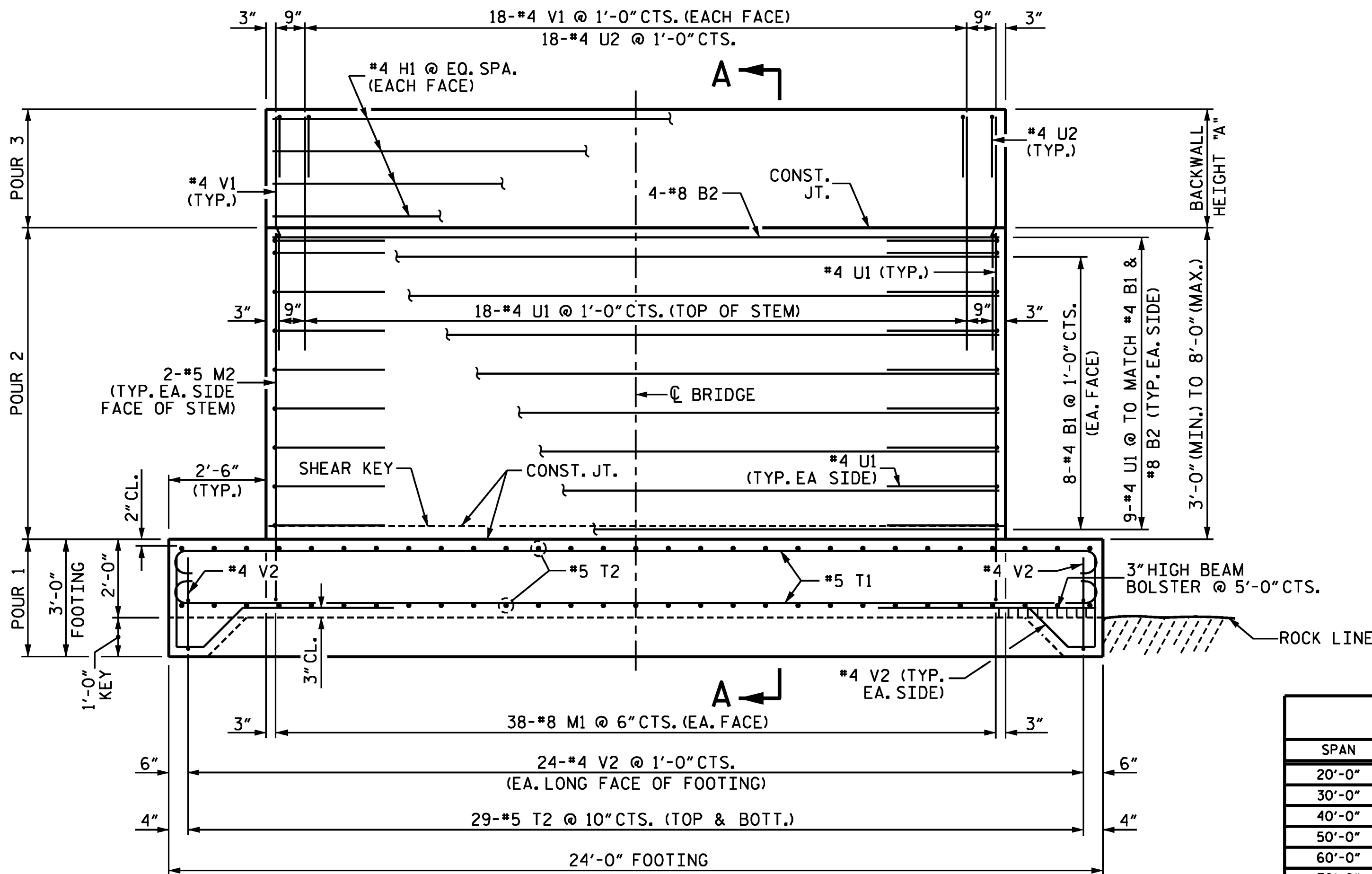
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DATE: 04/2020
DATE: 04/2020

\\jc0101\pwworking.com\jmt-jw-01\Documents\Projects\2025\25-00529\25-00529-00\Design\Structures\NC PRB-Steel Beam with Timber Deck Standards\Single Lane Steel Beam with Timber Deck Plans\2 Standard Drawings\20-TO FT - 12 FT DECK WIDTH\01-Sil-End Bent Spread Footing
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TIME: 11:25:20 AM



PLAN

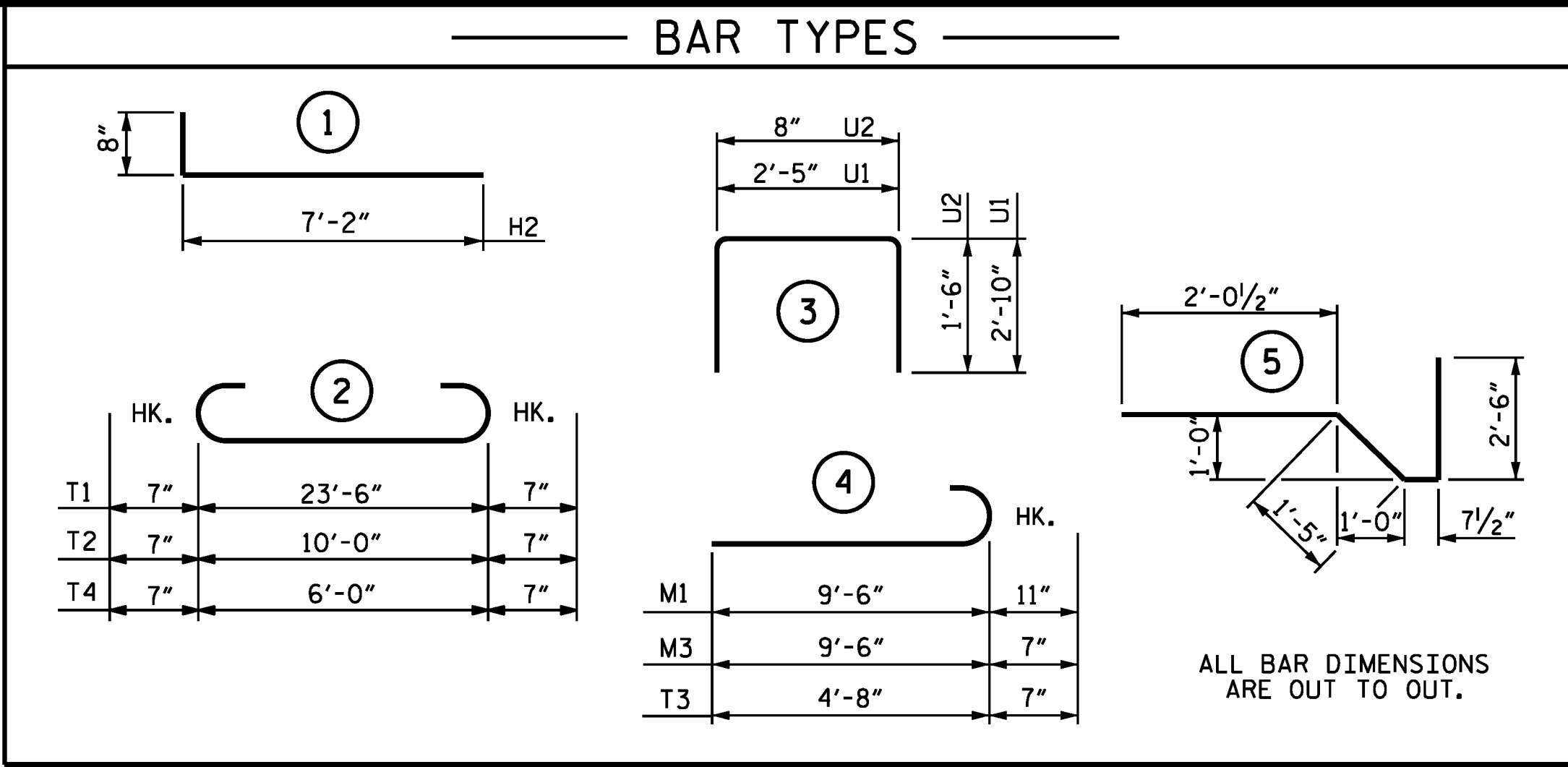


ELEVATION

(OPTIONAL WINGS NOT SHOWN FOR CLARITY)

BACKWALL HEIGHT			
SPAN	BEAM	A (2X8 DECKING)	A (4X6 DECKING)
20'-0"	W16X36	2'-2 3/4"	1'-10 3/8"
30'-0"	W21X48	2'-7 3/8"	2'-3 3/8"
40'-0"	W24X76	2'-10 3/8"	2'-6 3/8"
50'-0"	W24X104	2'-10 3/4"	2'-7"
60'-0"	W30X116	3'-4 3/4"	3'-1"
70'-0"	W33X130	3'-7 3/4"	3'-4"

DIMENSION "A" (BACKWALL HEIGHT) VARIES BASED ON DECKING TYPE. USE VALUES CORRESPONDING TO SELECTED DECKING OPTION.



GENERAL NOTES

U1 BARS IN STEM MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

WINGS MAY BE REQUIRED AT THE DIRECTION OF THE ENGINEER OR DESIGNEE.

FOR OPTIONAL WINGS FOR END BENT, SEE SHEET 2 OF 2.

FOR SECTION A-A, SEE SHEET 2 OF 2.

THE FINAL STEM WALL HEIGHT SHALL BE DETERMINED IN THE FIELD BASED ON EXISTING ROCK ELEVATIONS. THE STEM WALL HEIGHT SHALL NOT BE LESS THAN 3'-0" OR GREATER THAN 8'-0".

END BENT REINFORCEMENT AND DETAILS ARE BASED ON A MAXIMUM STEM WALL HEIGHT OF 8'-0" AND THE SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. CONTRACTOR SHALL ADJUST REINFORCEMENT FOR FIELD-VERIFIED STEM WALL HEIGHTS AND BACKWALL HEIGHTS WHILE MAINTAINING BAR SIZES, SPACING, SPLICE LENGTHS, AND OVERALL CONFIGURATION SHOWN.

FOUNDATION NOTES

SPREAD FOOTING

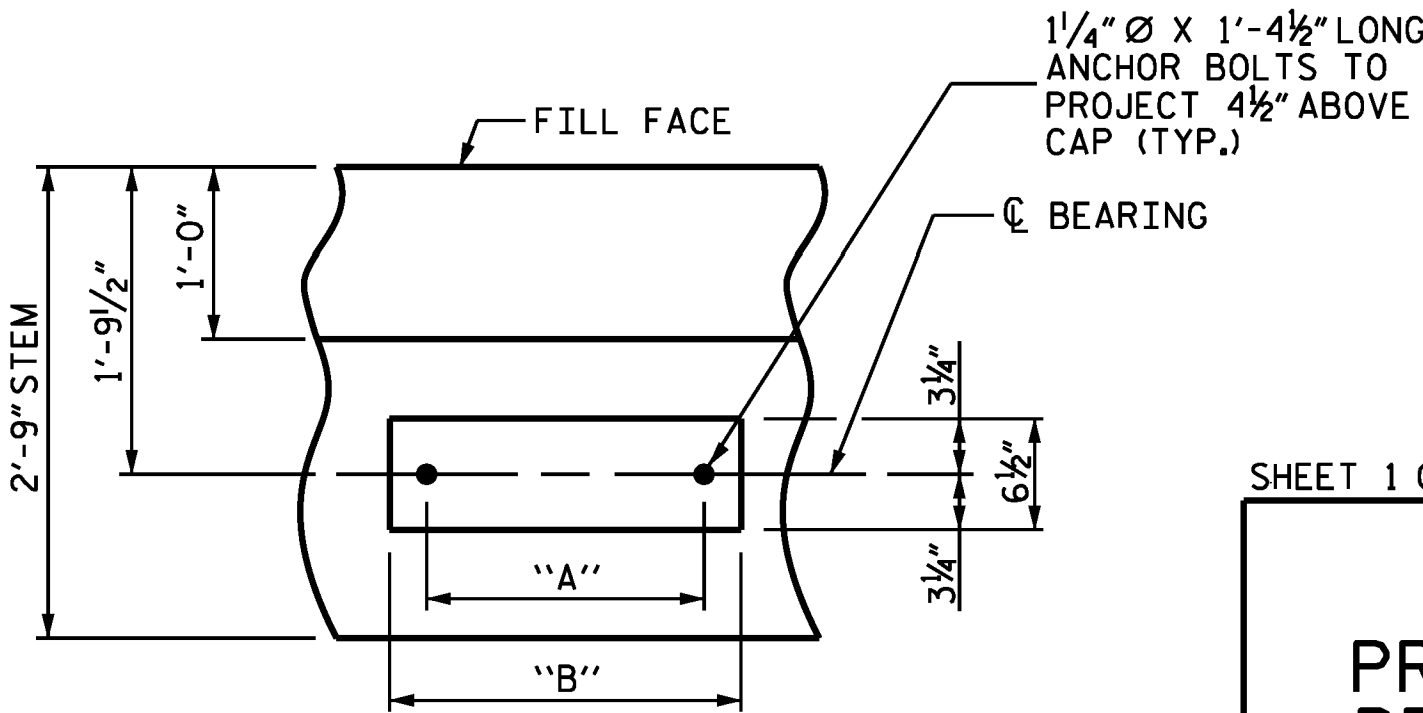
FOUNDATION EXCAVATIONS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH SECTION 410 OF THE SPECIFICATIONS.

A GEOTECHNICAL ENGINEER LICENSED IN THE STATE OF NORTH CAROLINA SHALL OBSERVE THE BEARING SURFACE AND CONFIRM THE FOOTING IS CONSTRUCTED ON ROCK. THE ENGINEER SHALL PROVIDE A LETTER VERIFYING ACCEPTANCE OF THE BEARING SURFACE.

CLEAN ALL ROCK OF LOOSE MATERIAL AND CUT TO A FIRM SURFACE, AS DIRECTED BY THE ENGINEER AND FILL WITH CONCRETE, MORTAR OR GROUT. LEAVE ROCK SURFACE IN A ROUGH CONDITION.

BEARING SURFACE MUST RESIST A MAXIMUM APPLIED BEARING PRESSURE OF 5.0 KSF.

KEY IN FOOTINGS AT LEAST 1 FT INTO ROCK.

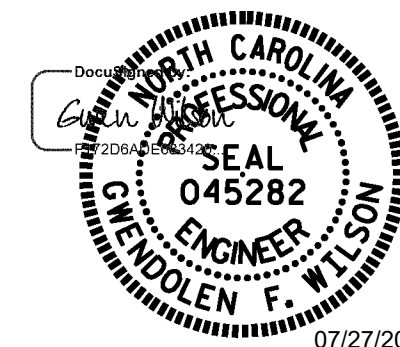


BEARING DETAIL

(TYP. EACH BEARING LOCATION)
REFER TO DIMENSIONS TABLE ON SHEET S-07 FOR DIMENSIONS A AND B.

** BILL OF MATERIAL					
FOR ONE END BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	16	#4	STR	18'-8"	200
B2	4	#8	STR	18'-8"	199
H1	8	#4	STR	18'-8"	100
M1	76	#8	4	10'-5"	2,114
M2	4	#5	STR	7'-6"	31
T1	26	#5	2	24'-8"	669
T2	58	#5	2	11'-2"	676
U1	38	#4	3	8'-1"	205
U2	20	#4	3	3'-8"	49
V1	40	#4	STR	6'-0"	160
V2	70	#4	5	6'-7"	308
H2	52	#4	1	7'-10"	272
M3	40	#5	4	10'-1"	421
M4	40	#5	STR	5'-4"	223
T3	32	#5	4	5'-3"	175
T4	8	#5	2	7'-2"	60
V2	22	#4	5	6'-7"	97
REINFORCING STEEL (W/O WINGS)				4711 LBS.	
REINFORCING STEEL (WITH WINGS)				5959 LBS.	
CLASS A CONCRETE BREAKDOWN					
POUR #1	FOOTING			22.5 C.Y.	
POUR #2	END BENT STEM			15.5 C.Y.	
POUR #3	BACKWALL			1.6 C.Y.	
WINGWALLS (OPTIONAL)				7.5 C.Y.	
TOTAL CLASS A CONCRETE (W/O WINGS)				39.6 C.Y.	
TOTAL CLASS A CONCRETE (WITH WINGS)				47.1 CY	

**THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE QUANTITIES AND REINFORCING BARS SHOWN IN THE BILL OF MATERIAL ARE BASED ON AN 8'-0" MAXIMUM STEM WALL HEIGHT AND THE SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. THE CONTRACTOR IS RESPONSIBLE FOR THE FINAL QUANTITIES BASED ON THE ACTUAL STEM WALL AND BACKWALL HEIGHTS.



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SHEET 1 OF 2

NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT					
PRIVATE DRIVEWAY BRIDGE STANDARDS					
SINGLE LANE STEEL BEAM BRIDGE TIMBER DECK					
END BENT SPREAD FOOTING					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S-11					TOTAL SHEETS 14



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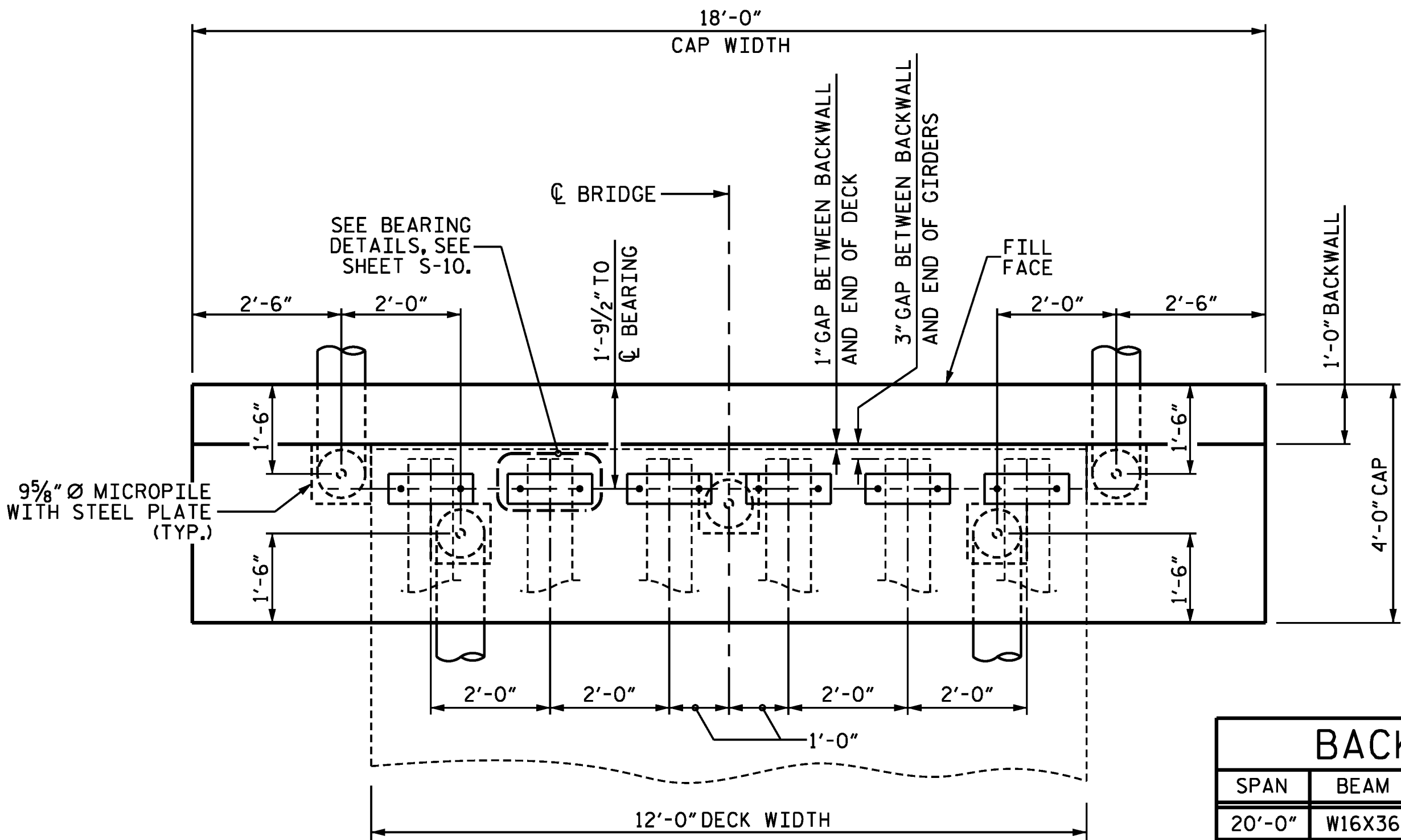
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DATE: 1/25/2026



PLAN

BACKWALL HEIGHT			
SPAN	BEAM	A (2X8 DECKING)	A (4X6 DECKING)
20'-0"	W16X36	2'-2 5/8"	1'-10 1/8"
30'-0"	W21X48	2'-7 3/8"	2'-3 5/8"
40'-0"	W24X76	2'-10 3/8"	2'-6 1/8"
50'-0"	W24X104	2'-10 3/4"	2'-7"
60'-0"	W30X116	3'-4 3/4"	3'-1"
70'-0"	W33X130	3'-7 3/4"	3'-4"

DIMENSION "A" (BACKWALL HEIGHT) VARIES BASED ON DECKING TYPE. USE VALUES CORRESPONDING TO SELECTED DECKING OPTION.

GENERAL NOTES

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

CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

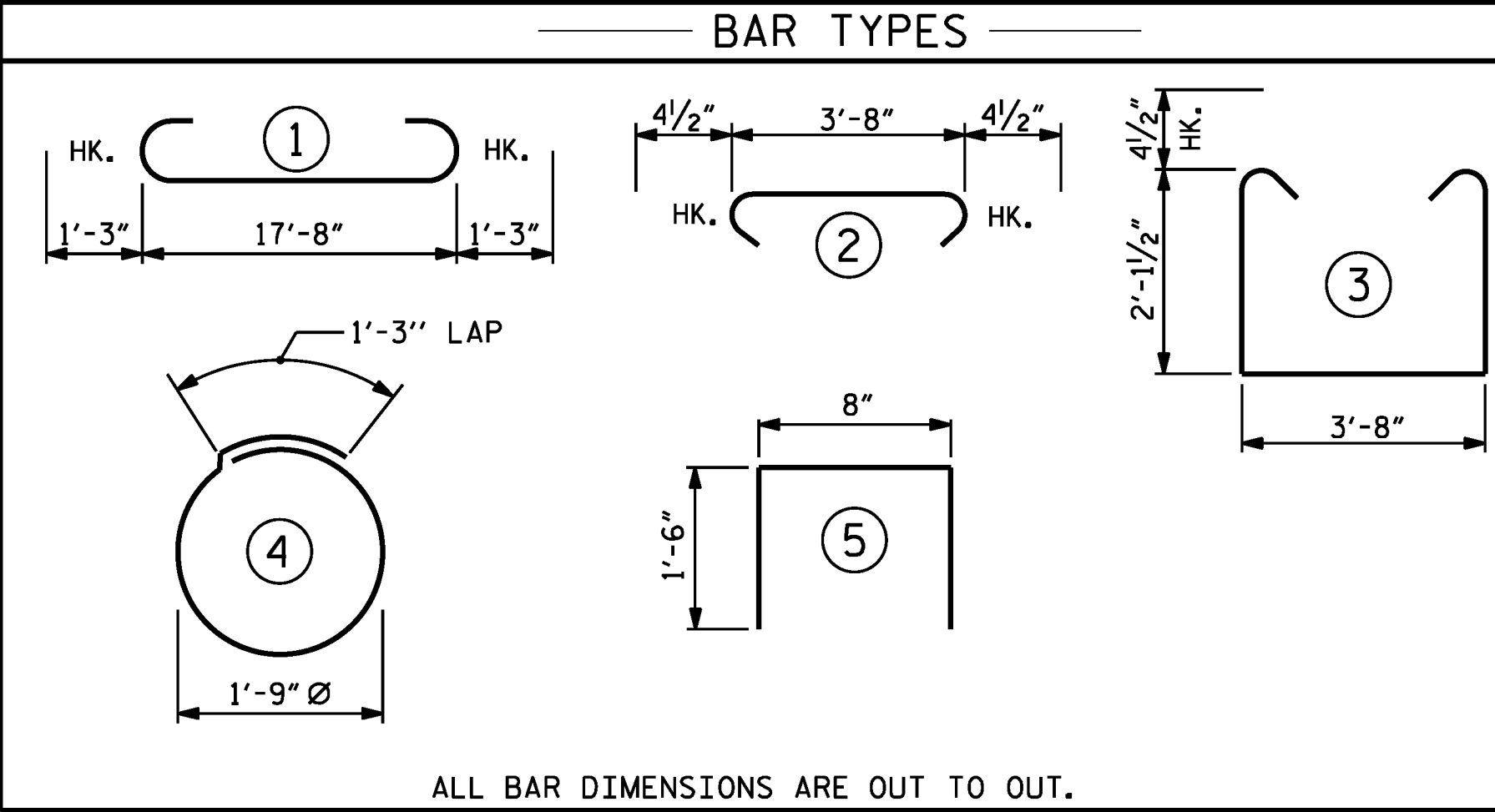
FOR BEARING DETAILS, SEE SHEET S-10.

"V" BARS BASED ON SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. ADJUST LENGTH TO MAINTAIN REQUIRED MIN. CLEARANCE AT BOTTOM OF CAP AND TOP OF BACKWALL.

REFER TO MICROPILE DRAWINGS FOR MICROPILE REQUIREMENTS, PROPERTIES AND OTHER DETAILS.

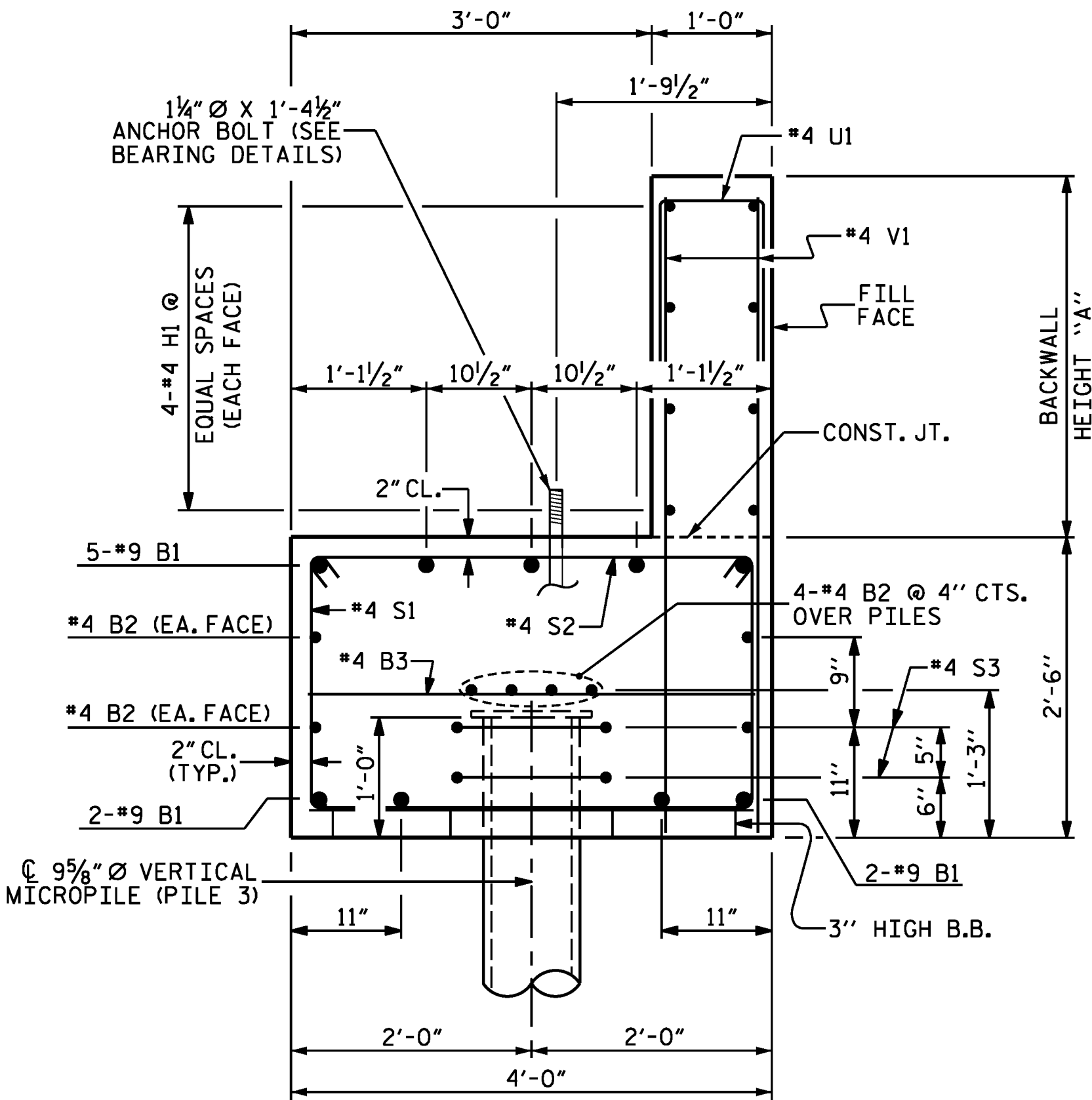
FOUNDATION NOTES MICROPILES

FOR MICROPILES, SEE SPECIAL PROVISIONS.



* REINFORCING AND CONCRETE QUANTITIES ARE BASED ON THE SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. CONTRACTOR SHALL ADJUST FOR 4X6 DECKING OR INCREASED BACKWALL HEIGHT.

BILL OF MATERIAL FOR ONE END BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	9	#9	1	20'-2"	617
B2	8	#4	STR	17'-8"	94
B3	5	#4	STR	3'-8"	12
H1	8	#4	STR	17'-8"	94
U1	18	#4	5	3'-8"	44
S1	22	#4	3	8'-8"	127
S2	22	#4	2	4'-5"	65
S3	10	#4	4	6'-9"	45
V1	36	#4	STR	4'-4"	104
REINFORCING STEEL (FOR ONE END BENT)					* 1,202 LBS.
CLASS A CONCRETE (FOR ONE END BENT)					POUR 1 6.7 C.Y. POUR 2 * 1.5 C.Y. TOTAL 8.2 C.Y.



SECTION A-A

(PILES 1, 2, 4 & 5 ARE BATTERED 30° AND NOT SHOWN FOR CLARITY)



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NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT					
PRIVATE DRIVEWAY BRIDGE STANDARDS					
SINGLE LANE STEEL BEAM BRIDGE TIMBER DECK					
END BENT MICROPILES					
REVISIONS					SHEET NO. S-13
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
TOTAL SHEETS					14

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Candler, NC, 28715
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DWN. BY: WDC DATE: 06/2026
CHKD. BY: GFW DATE: 06/2026
DES. EGR. OF RECORD: GFW DATE: 06/2026

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DATE: 1/25/2026
TIME: 11:25:20 AM

STRUCTURAL STEEL / HARDWARE NOTES:

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50 AND PAINTED IN ACCORDANCE WITH SYSTEM 1 OR GALVANIZED IN ACCORDANCE WITH THE STRUCTURAL STEEL COATINGS PROGRAM AND ARTICLE 442-8 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

COATING APPLICATION FOR ALL STRUCTURAL STEEL SHALL NOT BE PERFORMED UNTIL SHOP FABRICATION INCLUDING CUTTING, DRILLING AND WELDING HAS BEEN COMPLETED.

ALL HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATION, UNLESS OTHERWISE NOTED ON THE PLANS.

DO NOT DRIVE LAG/STRUCTURAL SCREWS WITH A HAMMER, SCREW OR TORQUE LAG/STRUCTURAL SCREWS.

SCREWS SHALL BE OF SUFFICIENT LENGTH TO PROVIDE FULL THREAD ENGAGEMENT INTO RECEIVING MEMBERS.

REPAIR ANY DAMAGED GALVANIZED SURFACES IN ACCORDANCE WITH STANDARD SPECIFICATION ARTICLE 1076-7.

REPAIR ANY DAMAGED PAINTED SURFACES IN ACCORDANCE WITH SECTION 442 OF THE STANDARD SPECIFICATIONS.

STRUCTURAL WOOD SCREWS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATION.

TIMBER / LUMBER NOTES:

ALL TIMBER AND LUMBER MEMBERS SHALL BE TREATED NO.1 SOUTHERN PINE AND CONFORM TO SECTION 1082 OF THE STANDARD SPECIFICATIONS.

ALL TIMBER DIMENSIONS SHOWN ON THE PLANS ARE NOMINAL DIMENSIONS. DESIGN IS BASED ON ACTUAL DRESSED DIMENSIONS.

PRE-DRILL HOLES IN TIMBER MEMBERS RECEIVING BOLTS TO ELIMINATE SPLITTING. PRE-DRILL HOLES FOR SCREWS AS NECESSARY TO PREVENT SPLITTING IN TIMBER MEMBERS.

DESIGN LOADS:

LIVE LOAD:

TRUCK LOAD:

THIS BRIDGE WAS DESIGNED FOR:

HS20
GVWR = 72,000 LBS
NUMBER OF AXLES: 3
AXLE WEIGHTS:
GAWR FRONT = 8,000 LBS
GAWR INTERMEDIATE = 32,000 LBS
GAWR REAR = 32,000 LBS

EV2
GVWR = 57,500 LBS
NUMBER OF AXLES: 2
AXLE WEIGHTS:
GAWR FRONT = 24,000 LBS
GAWR REAR = 33,500 LBS

EV3
GVWR = 86,000 LBS
NUMBER OF AXLES: 3
AXLE WEIGHTS:
GAWR FRONT = 24,000 LBS
GAWR INTERMEDIATE = 31,000 LBS
GAWR REAR = 31,000 LBS

LIVE LOAD FACTORS:

HS-20 = 1.30
EV2 = 1.3
EV3 = 1.3

LIVE LOAD FACTORS LOAD RATING:

HS-20 = 1.35
EV2 = 1.0
EV3 = 1.0

MULTIPLE PRESENCE FACTOR:

MPF = 1.0

LANE LOAD:

NO LANE LOAD WAS APPLIED.

IMPACT:

DYNAMIC IMPACT FOR WOOD/TIMBER COMPONENTS IS ZERO. DYNAMIC IMPACT FACTOR FOR ALL OTHER COMPONENTS IS 33%.

DEAD LOADS:

WEARING SURFACES SHALL NOT BE ALLOWED.

WEIGHT OF TIMBER = 40 PCF.

DESIGN ASSUMPTIONS/PARAMETERS:

SUPERSTRUCTURE WILL BE SIX LINES OF I-BEAMS.

BRIDGE IS SINGLE SPAN.

BRIDGE WIDTH = 12'-0" OUT TO OUT.

GENERAL NOTES:

THIS BRIDGE IS DESIGNED IN ACCORDANCE WITH THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT) "STRUCTURES MANAGEMENT UNIT MANUAL", DATED 6/15/23, 2024 NCDOT IN-KIND TIMBER BRIDGE REPLACEMENT PROGRAM, AND THE AASHTO "LRFD BRIDGE DESIGN SPECIFICATIONS", 9th EDITION.

THESE DRAWINGS ARE INTENDED ONLY FOR USAGE IN THE INSTALLATION OF SINGLE SPAN I-BEAM BRIDGES FOR PRIVATE DRIVEWAYS IN COUNTIES AS LISTED IN THE CONTRACT DOCUMENTS BY NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT IN RESPONSE TO THE DAMAGE CAUSED BY HURRICANE HELENE.

BRIDGE CONSTRUCTION, WORKMANSHIP, AND MATERIALS SHALL BE IN ACCORDANCE WITH THE NCDOT "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES", 2024 EDITION.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

IT IS ASSUMED THAT THERE ARE NO UTILITY CONFLICTS. THE CONTRACTOR SHALL INVESTIGATE THE PRESENCE OF UTILITIES BEFORE COMMENCING WORK.

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.

FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.

ALL DIMENSIONS SHOWN ARE HORIZONTAL OR VERTICAL, UNLESS OTHERWISE NOTED.

CONTRACTOR SHALL SET BRIDGE ELEVATIONS SUCH THAT WATER WILL DRAIN AND NOT POND ON THE BRIDGE DECK AND MINIMUM LONGITUDINAL GRADE SHALL BE 0.5% AND MAXIMUM GRADE SHALL BE 6%.

FOR PILE-SUPPORTED END BENTS, PLACE APPROACH EMBANKMENT (CORE MATERIAL) PRIOR TO PILE INSTALLATION.

THIS BRIDGE HAS BEEN DESIGNED FOR ADTT < 100.

EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON SHEET EC-01 ARE FOR GENERAL GUIDANCE ONLY AND REPRESENT MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL PROVIDE, INSTALL, AND MAINTAIN ALL REQUIRED EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, CONTRACT DOCUMENTS, AND APPLICABLE REGULATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MODIFYING THESE MEASURES AND PROVIDING ANY ADDITIONAL DEVICES NECESSARY TO ACCOUNT FOR ACTUAL SITE CONDITIONS, INCLUDING GROUNDWATER CONDITIONS AND WEATHER EVENTS, AND TO PREVENT SEDIMENT FROM LEAVING THE PROJECT SITE.

ALL REFERENCES WITHIN THESE PLANS TO "STANDARD SPECIFICATIONS" OR "NCDOT SPECIFICATIONS" SHALL BE GOVERNED BY THE NCDOT "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" DATED JANUARY 2024.

TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, INCLUDING THE SPECIAL PROVISIONS, AND IN CONFORMANCE WITH THE NCDOT STANDARD SPECIFICATIONS, NCDOT ROADWAY STANDARD DRAWINGS, AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING, INSTALLING, AND MAINTAINING ALL TRAFFIC CONTROL DEVICES NECESSARY TO SAFELY CONDUCT THE WORK AND PROTECT THE TRAVELING PUBLIC.

MATERIAL PROPERTIES:

CONCRETE: MINIMUM COMPRESSIVE STRENGTH, f'c = 3,000 psi (CLASS A)

STRUCTURAL STEEL: AASHTO M270, GRADE 50.

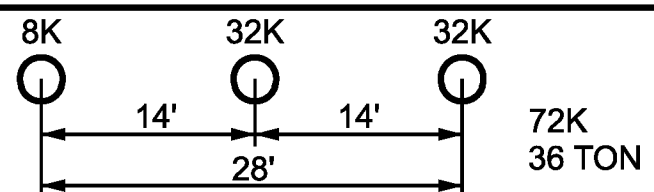
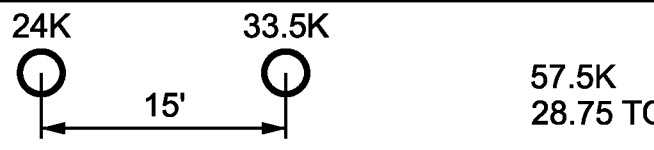
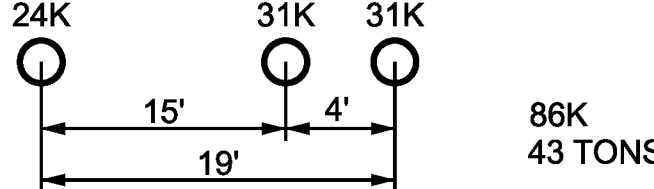
WELDS: SMAW, 70 KSI ELECTRODES PER NCDOT STANDARD SPECIFICATIONS.

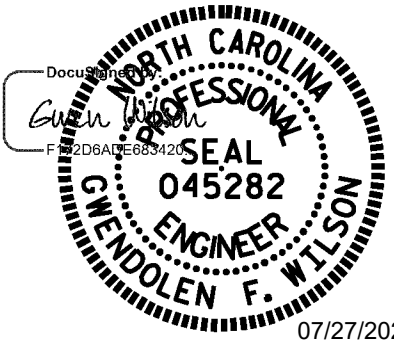
ANCHOR BOLTS: ASTM F1554, GRADE 55.

BOLTS SHALL CONFORM TO ASTM F3125, GRADE A325. PROVIDE GALVANIZED NUTS AND WASHERS COMPATIBLE WITH THE BOLTS.

TIMBER: ALL TIMBER & DIMENSIONAL LUMBER SHALL BE NO. 1 VISUALLY GRADED, SOUTHERN PINE WITH REFERENCE DESIGN VALUES OF: Fbo = 1.35 ksi AND Fvo = 0.175 ksi OR GREATER.

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS WITH A SHEAR MODULUS OF 0.110 KSI.

DESIGN VEHICLES	
REF.#	SCHEMATIC
HS-20	
EV2	
EV3	



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DATE: 04/2026
DATE: 04/2026
DATE: 04/2026

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

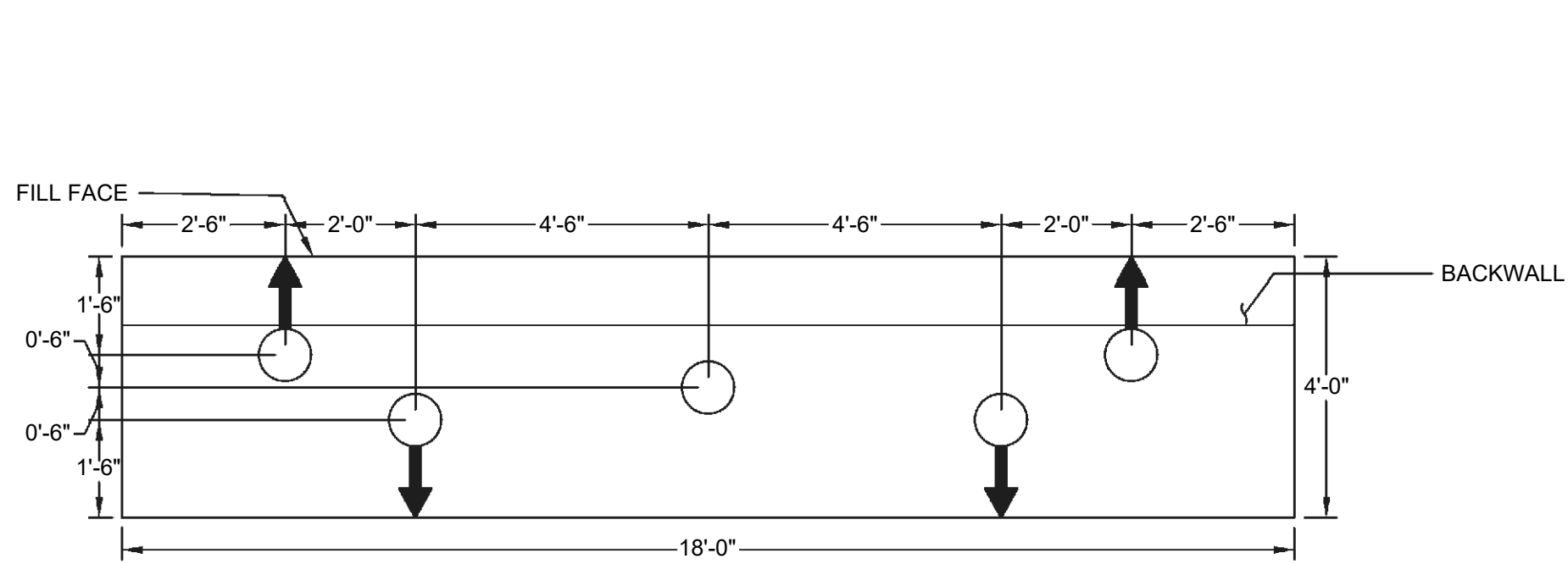
PRIVATE DRIVEWAY
BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

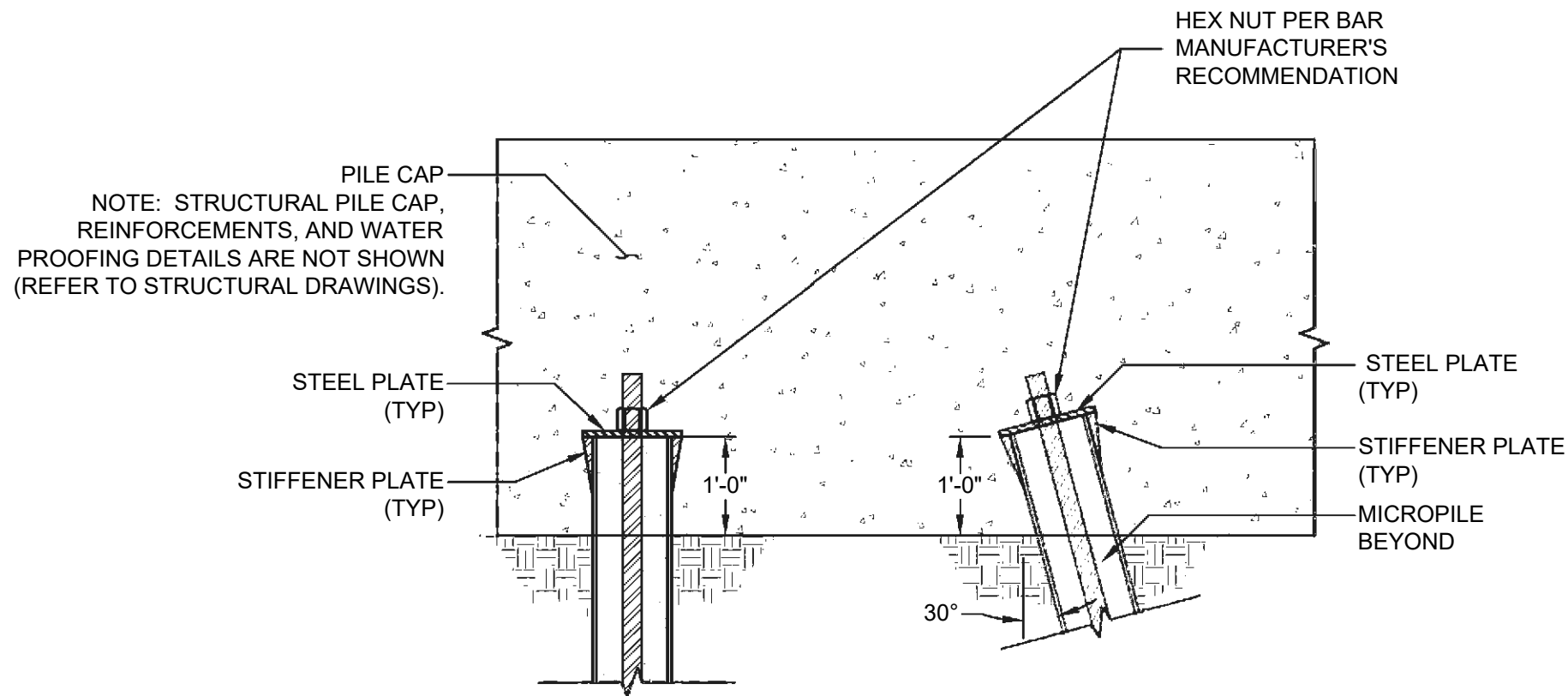
GENERAL NOTES

REVISIONS						SHEET NO. S-14
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS 14
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2			4			

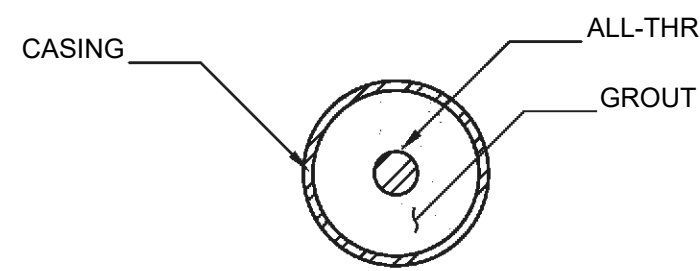
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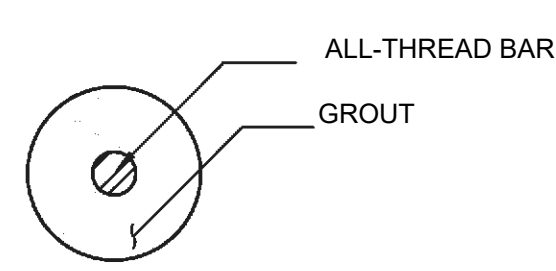
1 PILE CAP CONFIGURATION
Scale: N.T.S.



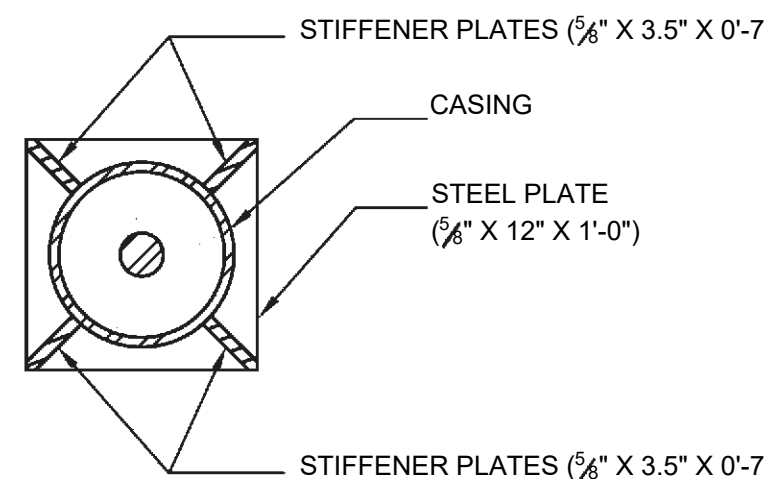
4 MICROPILE TO CAP CONNECTION
Scale: N.T.S.



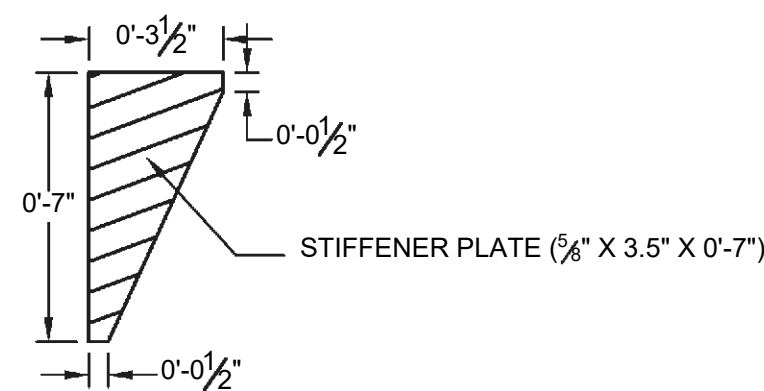
A UNBONDED LENGTH
Scale: N.T.S.



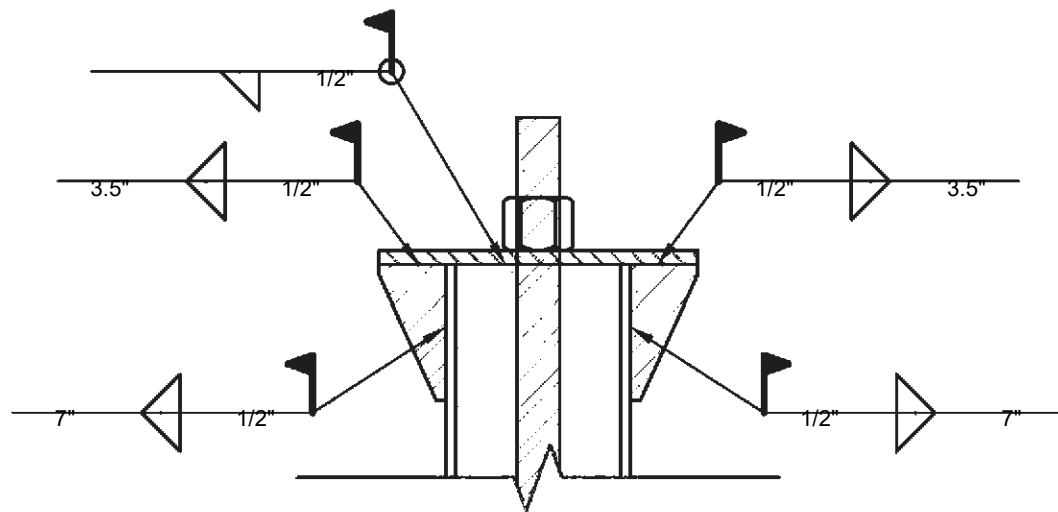
B BONDED LENGTH
Scale: N.T.S.



5 CASING, STEEL PLATE AND STIFFENER ARRANGEMENT (PLAN VIEW)
Scale: N.T.S.

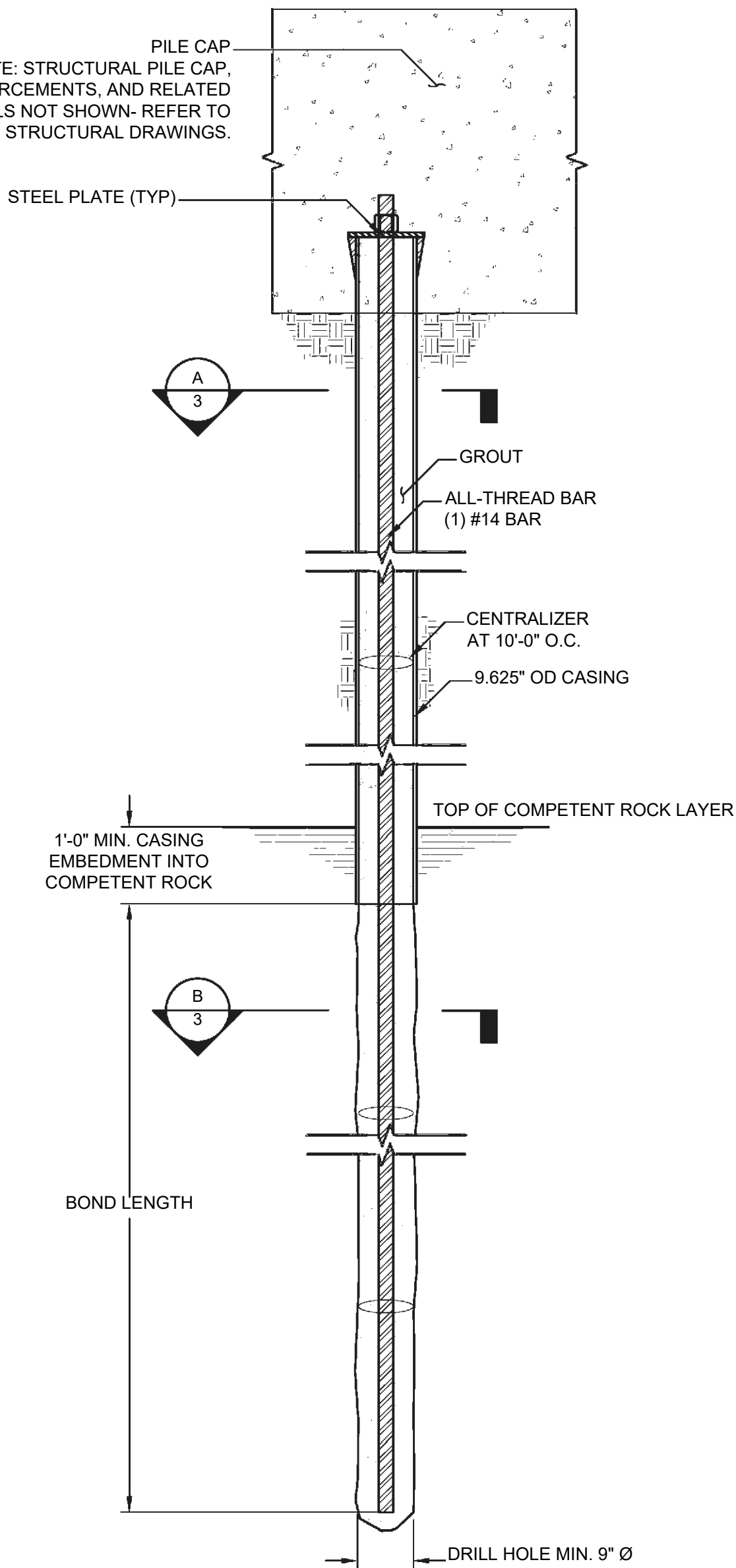


6 STIFFENER PLATE
Scale: N.T.S.

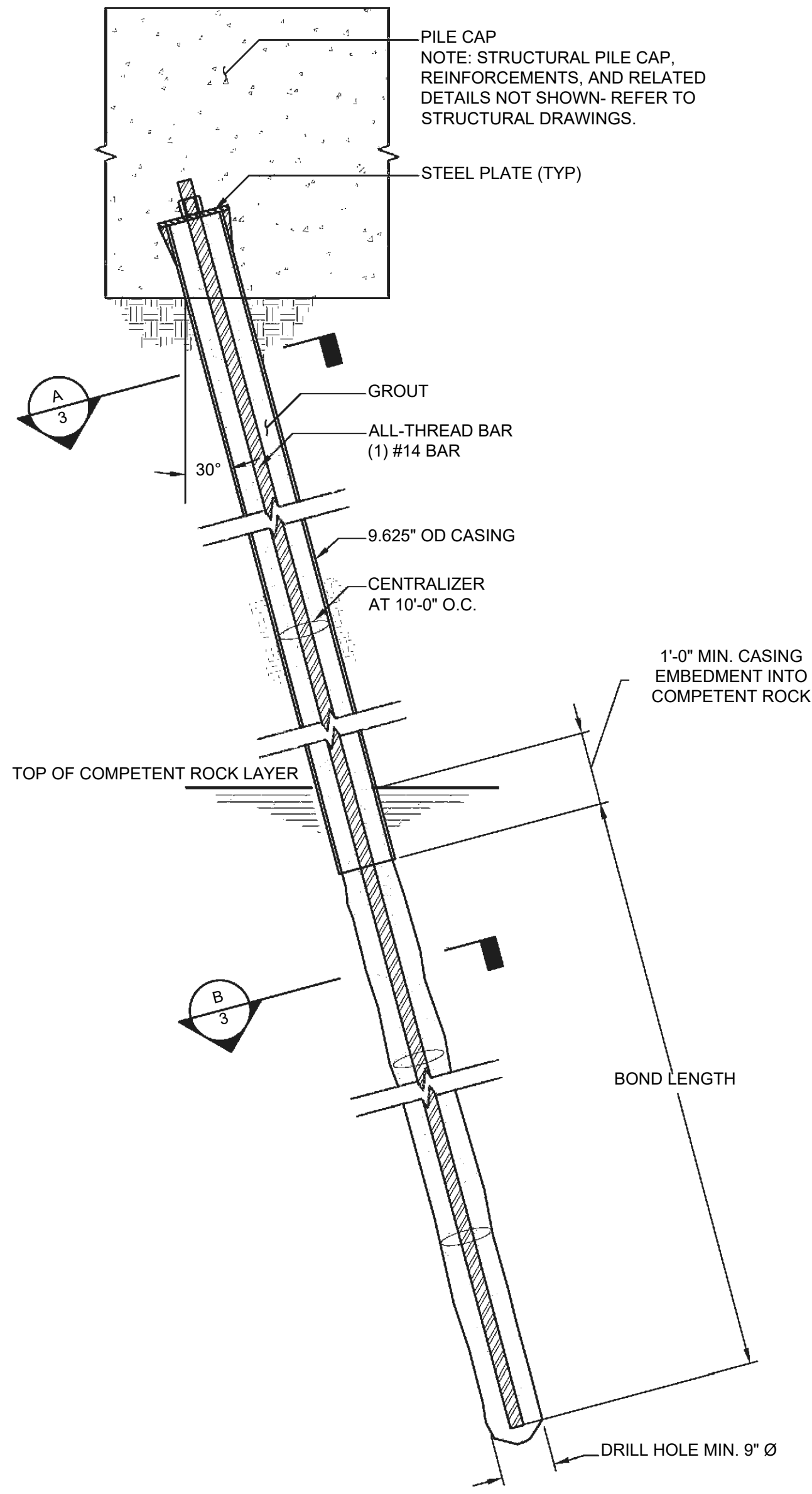


7 CASING, STEEL PLATE AND STIFFENER WELDED JOINT
Scale: N.T.S.

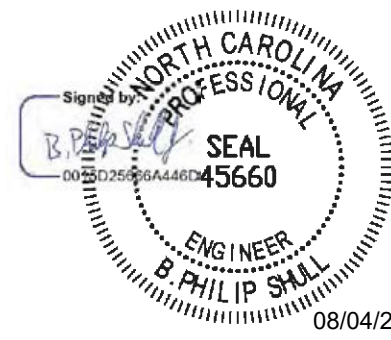
- NOTES:
- PILE CAP DESIGN INCLUDING PILE CAP THICKNESS, AND PILE CAP REINFORCEMENT TO BE DETERMINED FROM STRUCTURAL DESIGN PERFORMED BY OTHERS.
 - PRIOR TO INSTALLATION OF PRODUCTION MICROPILES, THE FOLLOWING VERIFICATION LOAD TEST NEEDS TO BE PERFORMED:
 - ONE (1) AXIAL LOAD TEST.
 - MICROPILES USED FOR VERIFICATION LOAD TESTING SHALL BE SACRIFICIAL.
 - CASING JOINT MUST NOT BE LOCATED WITHIN 5 FT DEPTH FROM THE BOTTOM OF THE PILE CAP.
 - MICROPILE SHALL BOND INTO BEDROCK. GROUT-TO-ROCK BOND LENGTH ARE SUBJECT TO SITE SPECIFIC GEOTECHNICAL EXPLORATION. BOND STRENGTH TO BE PROVIDED BY THE GEOTECHNICAL ENGINEER AND CONFIRMED BY LOAD TEST.
 - THE ENGINEER RESERVES THE RIGHT TO REVISE THE DESIGN AND ADJUST TIP ELEVATIONS AND BOND LENGTHS BASED ON LOAD TEST AND VERIFICATION TEST PERFORMANCE, AND ACTUAL GROUND CONDITIONS.
 - REFER TO SHEET 1 - MICROPILE NOTES FOR ADDITIONAL INFORMATION AND REQUIREMENTS.



2 VERTICAL MICROPILE
Scale: N.T.S.



3 BATTERED MICROPILE
Scale: N.T.S.



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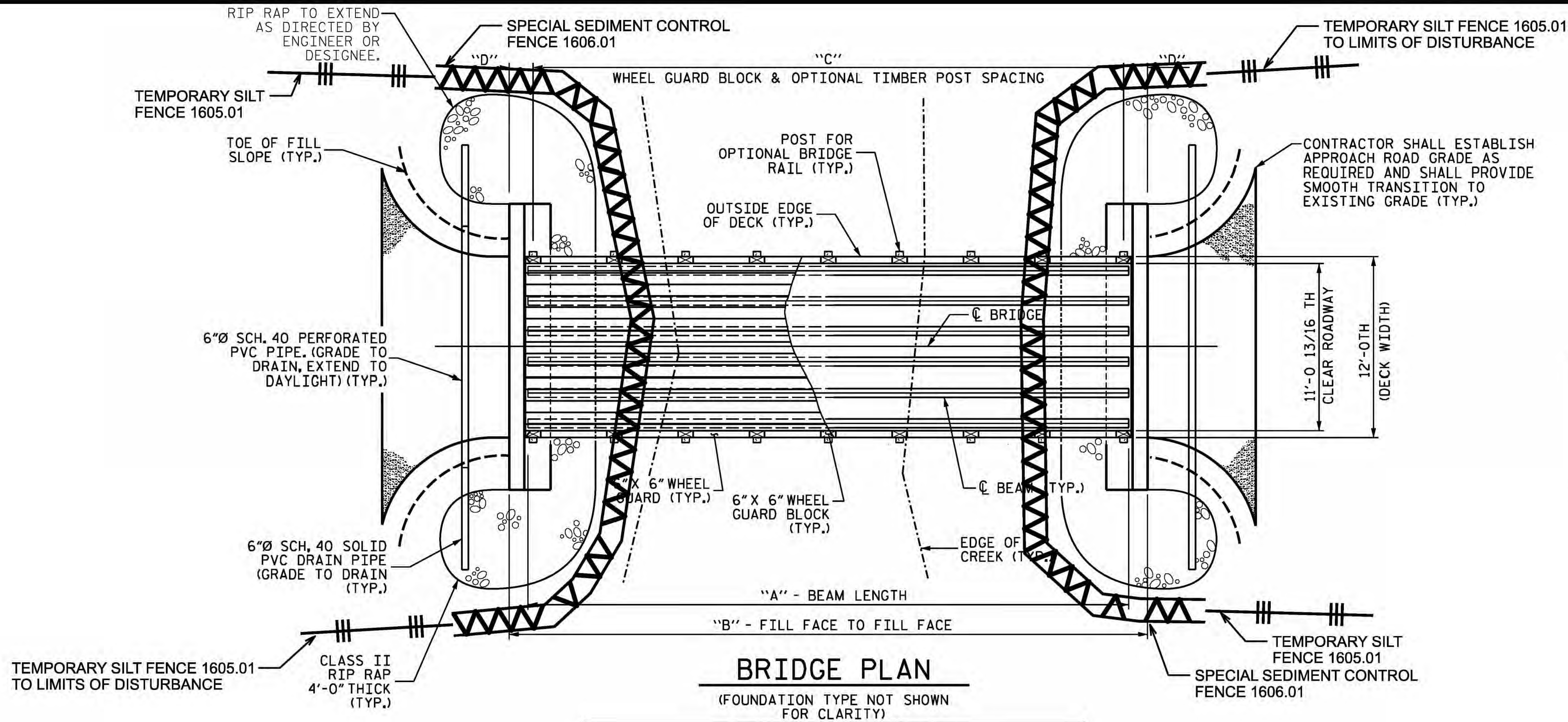
REVISIONS						SHEET NO. 2 OF 2
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 2
2			4			

Schnabel
ENGINEERING

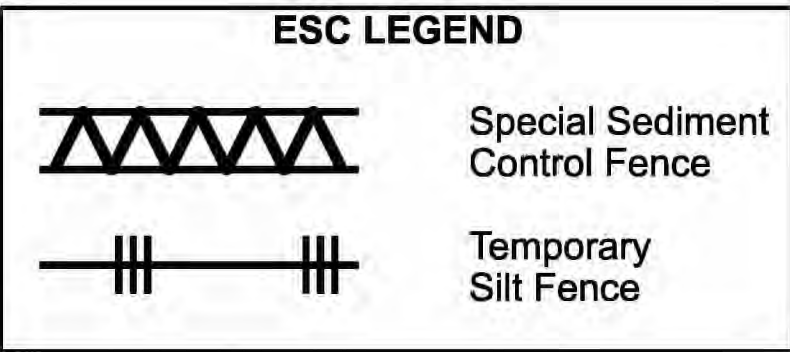
3902 Market Street,
Wilmington, NC 28403
schnabel-eng.com

DWN. BY: ABS
CHKD. BY: JAS
DES. EGR. OF RECORD: BPS

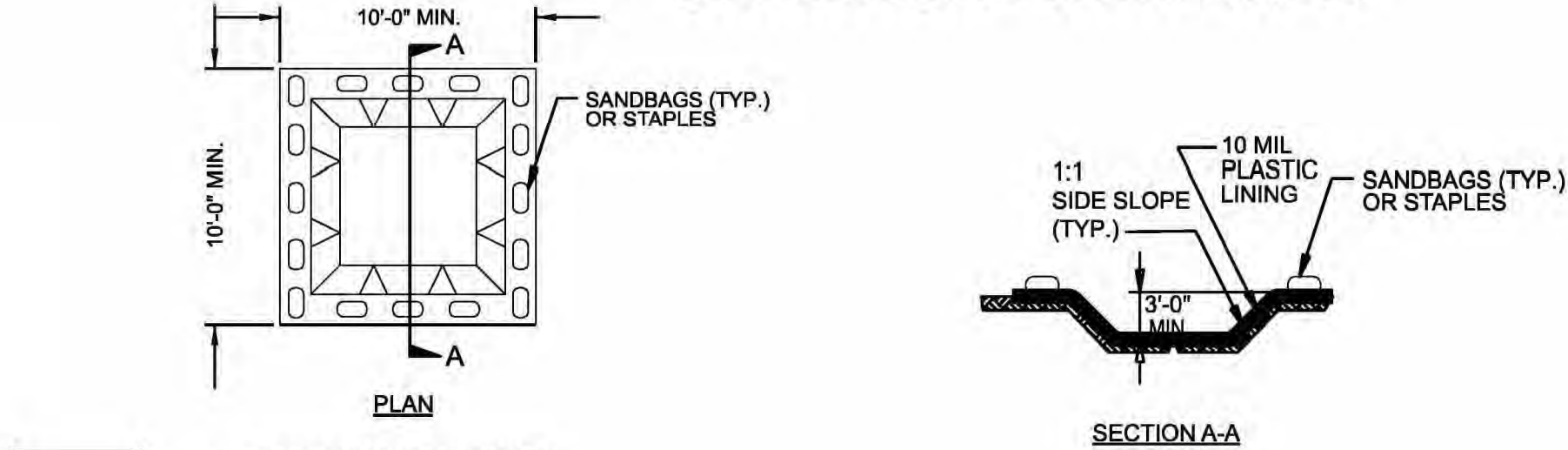
DATE: 07/10/26
DATE: 07/10/26
DATE: 07/27/26



DIMENSIONS TABLE					
SPAN	A	B	C	D	E
20'-0"	20'-0"	22'-6"	5 SPA. @ 3'-8"	2'-1"	19'-9"
30'-0"	30'-0"	32'-6"	7 SPA. @ 4'-0"	2'-3"	29'-9"
40'-0"	40'-0"	42'-6"	9 SPA. @ 4'-3"	2'-1 1/2"	39'-9"
50'-0"	50'-0"	52'-6"	11 SPA. @ 4'-4"	2'-5"	49'-9"

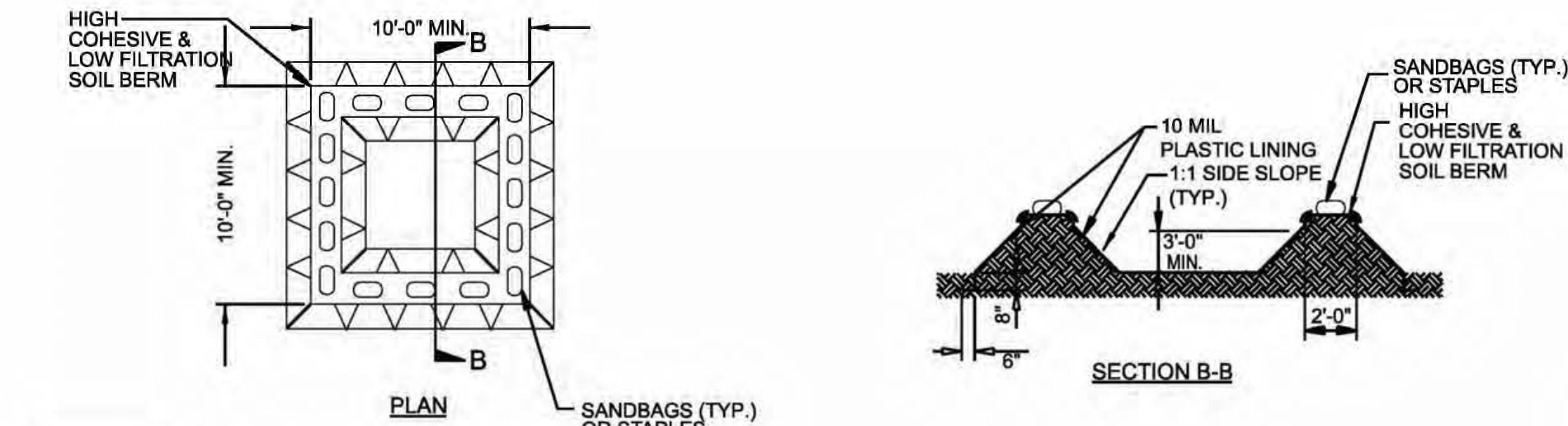


ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



- NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD
 2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.
 3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE



- NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD
 2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.
 3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

ABOVE GRADE WASHOUT STRUCTURE

NOTES

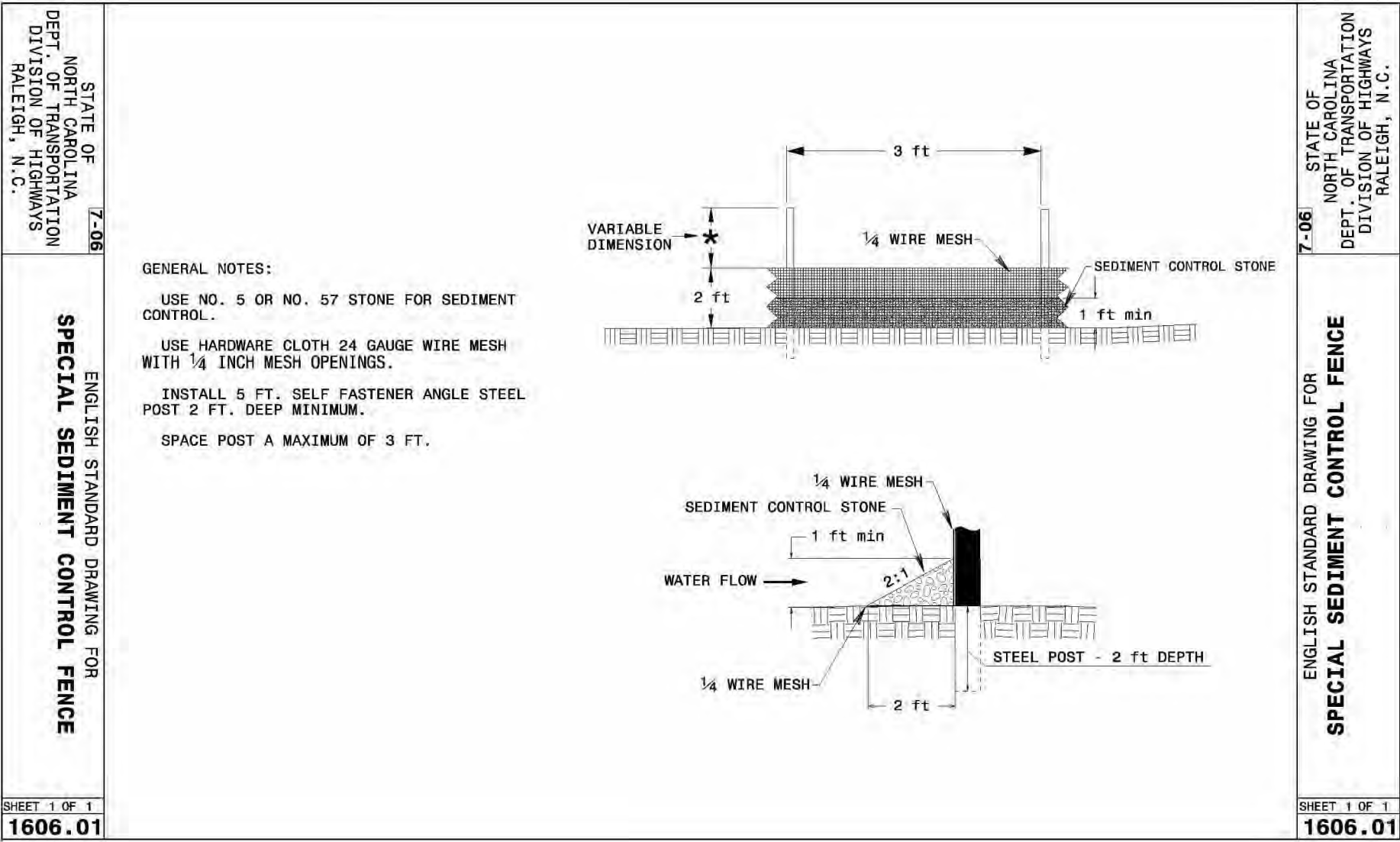
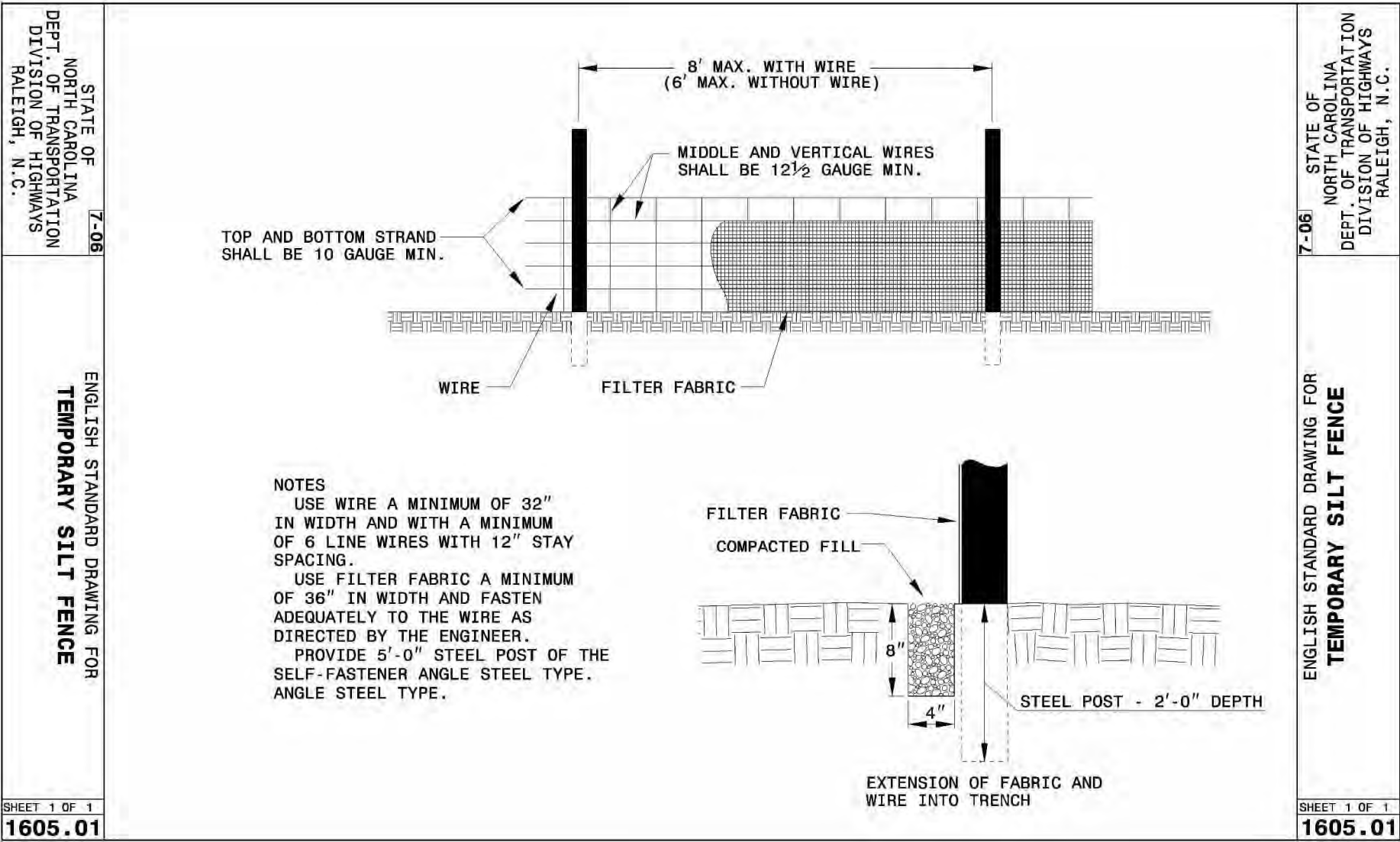
FOR OPTIONAL TIMBER BRIDGE RAIL DETAILS, SEE "OPTIONAL TIMBER BRIDGE RAIL" SHEET.

CONTRACTOR SHALL LOCATE THE EXPANSION BEARING ON THE "UPHILL" END OF THE BRIDGE. THERE WILL BE ONLY ONE EXPANSION BEARING PER BRIDGE.

CONTRACTOR SHALL PROVIDE EROSION CONTROL MEASURES, AS REQUIRED ACCORDING TO NCDOT STANDARD SPECIFICATIONS AND THE CONTRACT DOCUMENTS.

THE CONTRACTOR SHALL SET THE LOW-CHORD ELEVATION OF THE BRIDGE BASED ON EXISTING SITE CONDITIONS AND IN COORDINATION WITH THE ENGINEER, SUCH THAT THE NEW CROSSING PROVIDES CONVEYANCE GREATER THAN OR EQUAL TO THE ORIGINAL DESTROYED CROSSING. THE CONTRACTOR SHALL REFER TO THE BSR WHEN SETTING THE LOW-CHORD ELEVATION OF THE BRIDGE. NO CONSTRUCTION ACTIVITIES SHALL COMMENCE UNTIL ALL PARTIES HAVE AGREED UPON THE LOW-CHORD ELEVATION AND THE DATED PERMIT APPLICATION IS APPROVED.

TIMBER DECKING SHALL BE 2X8 BOARDS. 4X6 TIMBER DECKING (6" DIMENSION HORIZONTAL) MAY BE USED IN LIEU OF 2X8 DECKING; SEE OPTIONAL TYPICAL SECTION ON SHEET S-03 FOR DETAILS.



Signed by:
Matthew D Foster
781932BFAFC8472
4/2/2026 1 6:30:17 PM EDT



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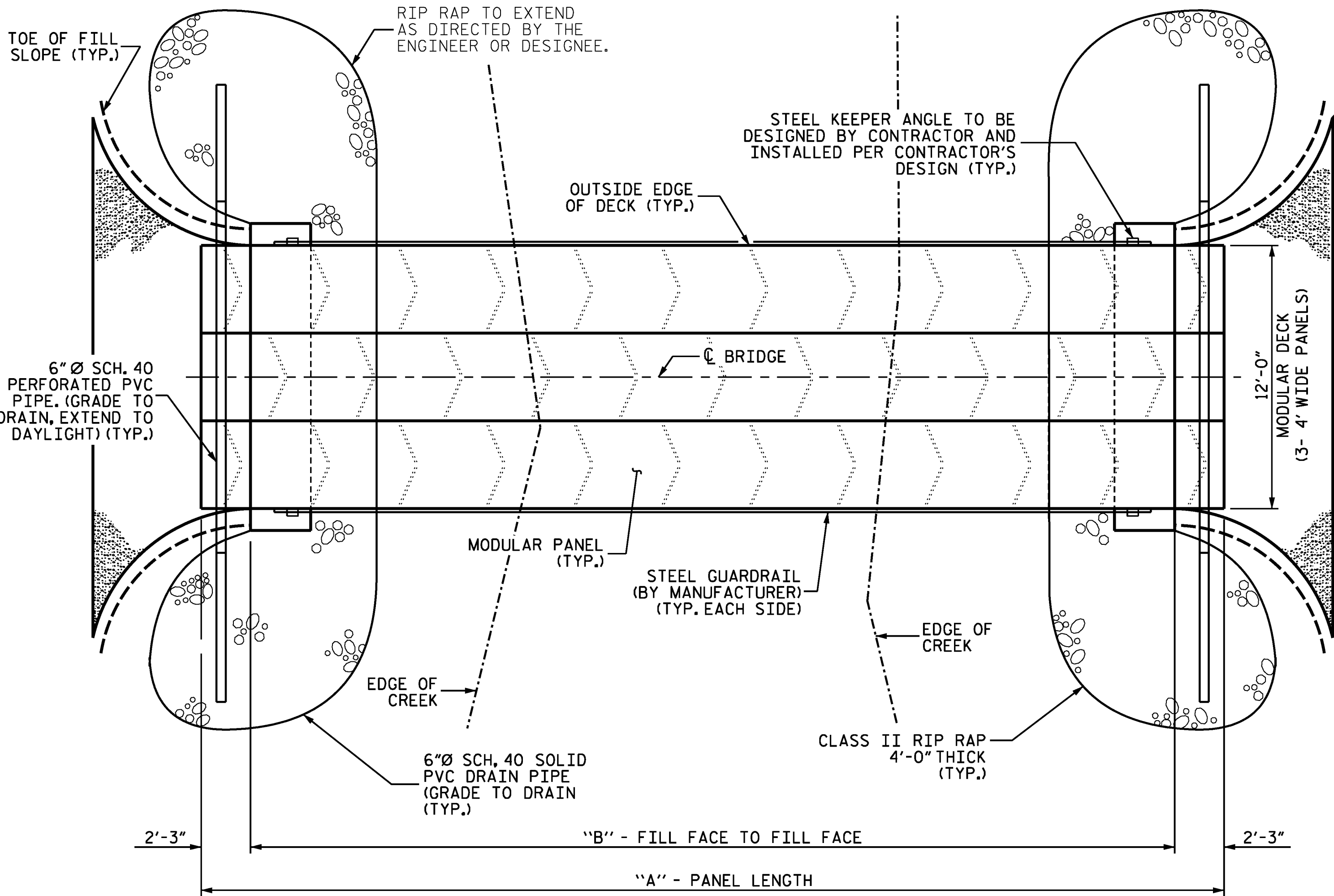
NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT
PRIVATE DRIVEWAY
BRIDGE STANDARDS
SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK
EROSION CONTROL

REVISIONS						SHEET NO. EC-01
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 13
2			4			

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DES. EGR. OF RECORD: GFW
DATE: 04/2026
DATE: 04/2026
DATE: 04/2026

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CHKD. BY: GFW
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DATE: 04/2026
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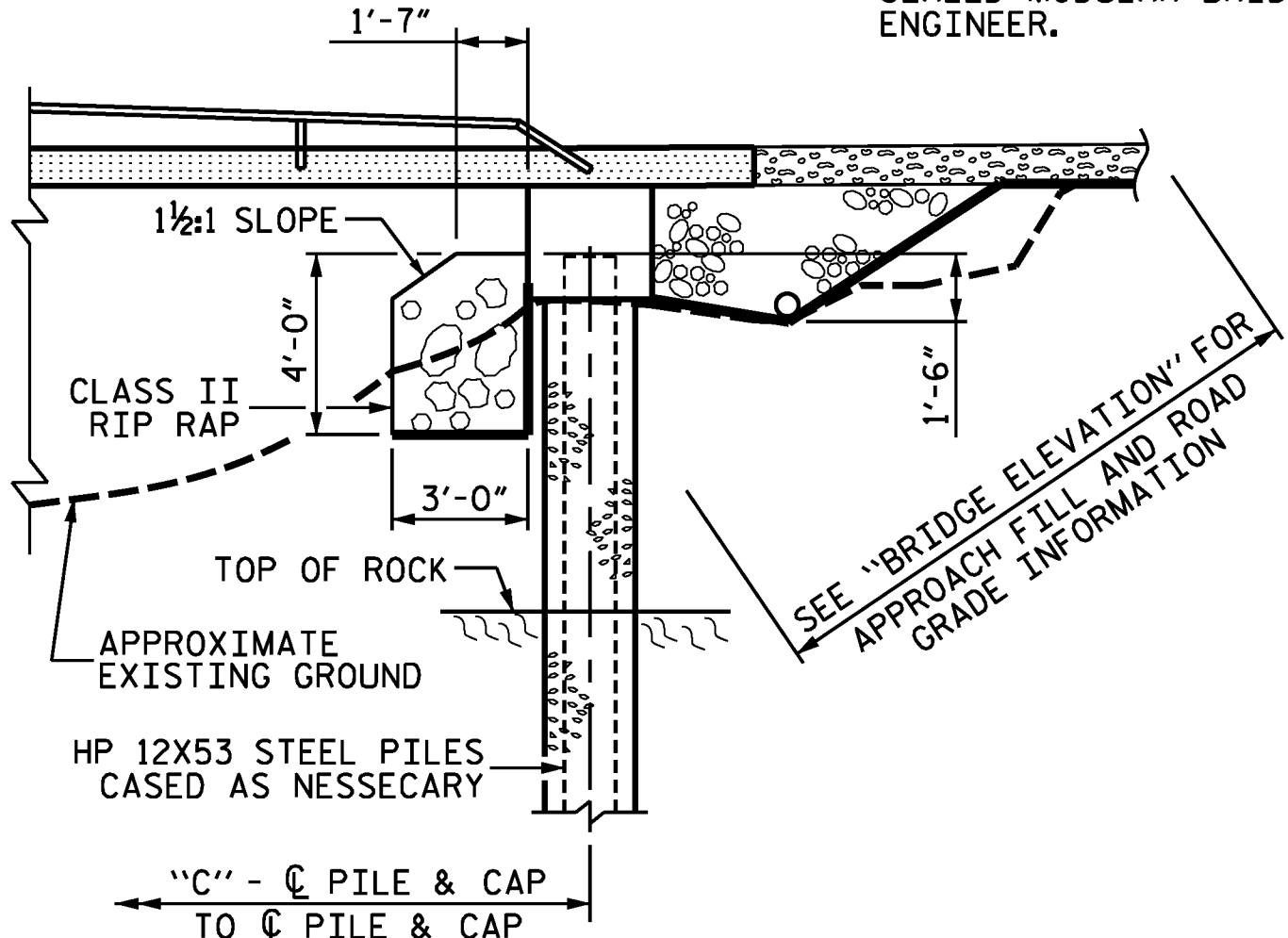


BRIDGE PLAN

(FOUNDATION TYPE NOT SHOWN FOR CLARITY)

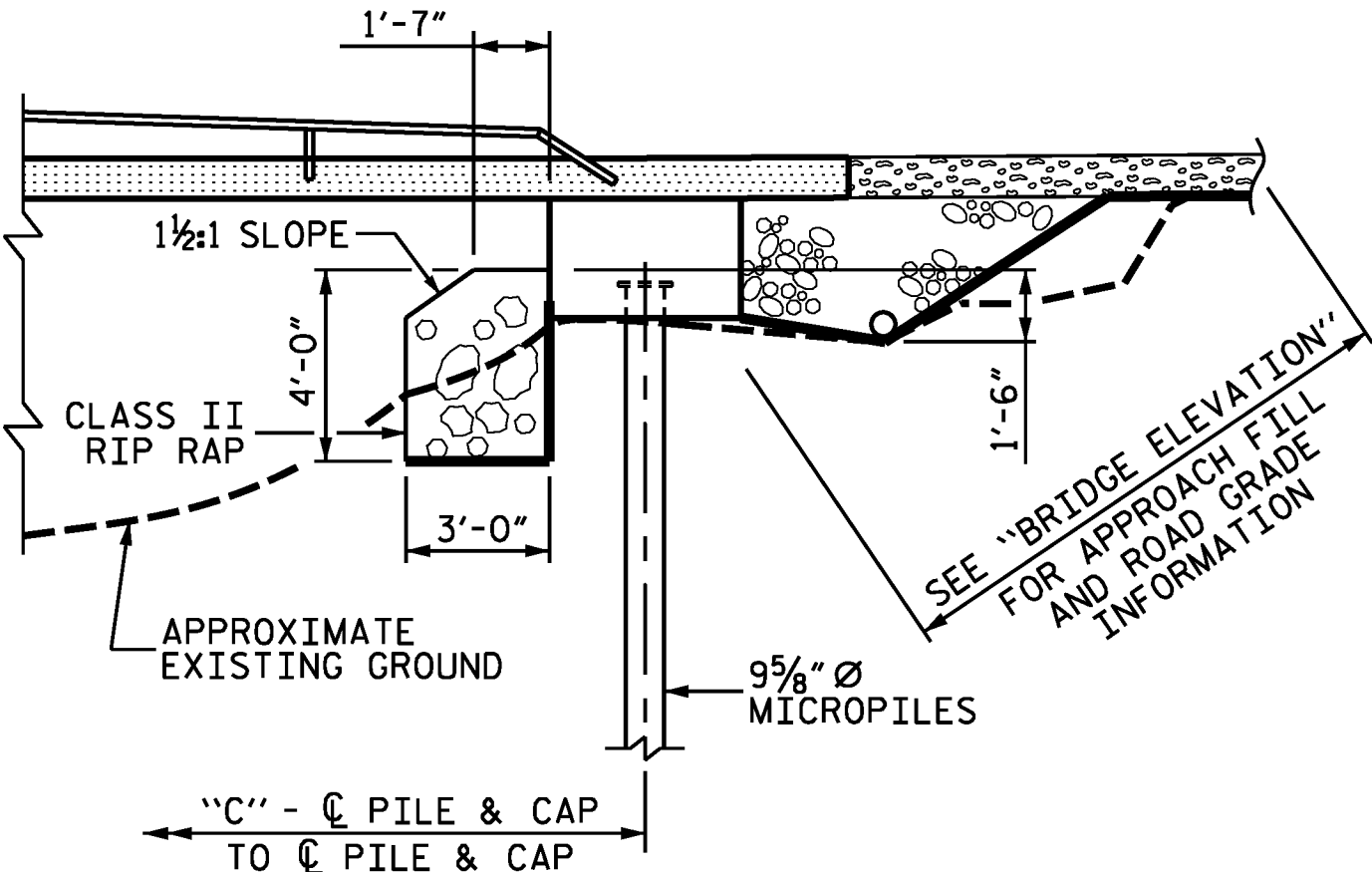
DIMENSIONS TABLE		
A	B	C
30'-0"	25'-6"	22'-9"
40'-0"	35'-6"	32'-9"
50'-0"	45'-6"	42'-9"
60'-0"	55'-6"	52'-9"

CONTRACTOR SHALL ESTABLISH APPROACH ROAD GRADE AS REQUIRED AND SHALL PROVIDE SMOOTH TRANSITION TO EXISTING GRADE (TYP.)



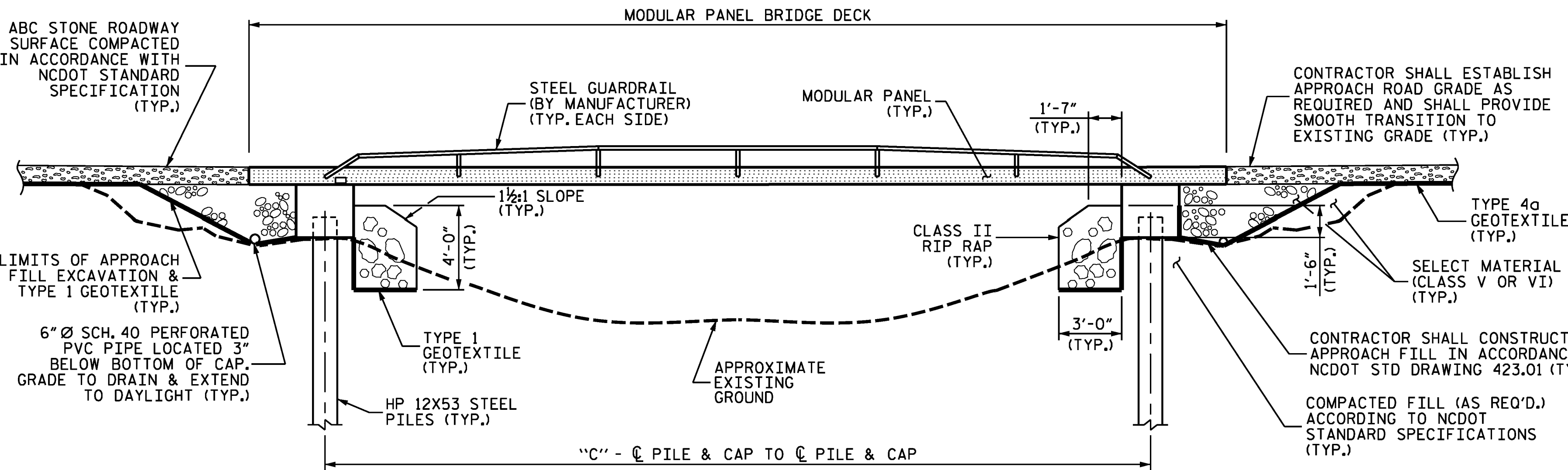
BRIDGE PARTIAL ELEVATION

(SHOWING DRILLED-IN 12X53 STEEL PILES FOUNDATION)



BRIDGE PARTIAL ELEVATION

(SHOWING MICROPILES FOUNDATION)



BRIDGE ELEVATION

(SHOWING DRIVEN 12X53 STEEL PILES FOUNDATION)

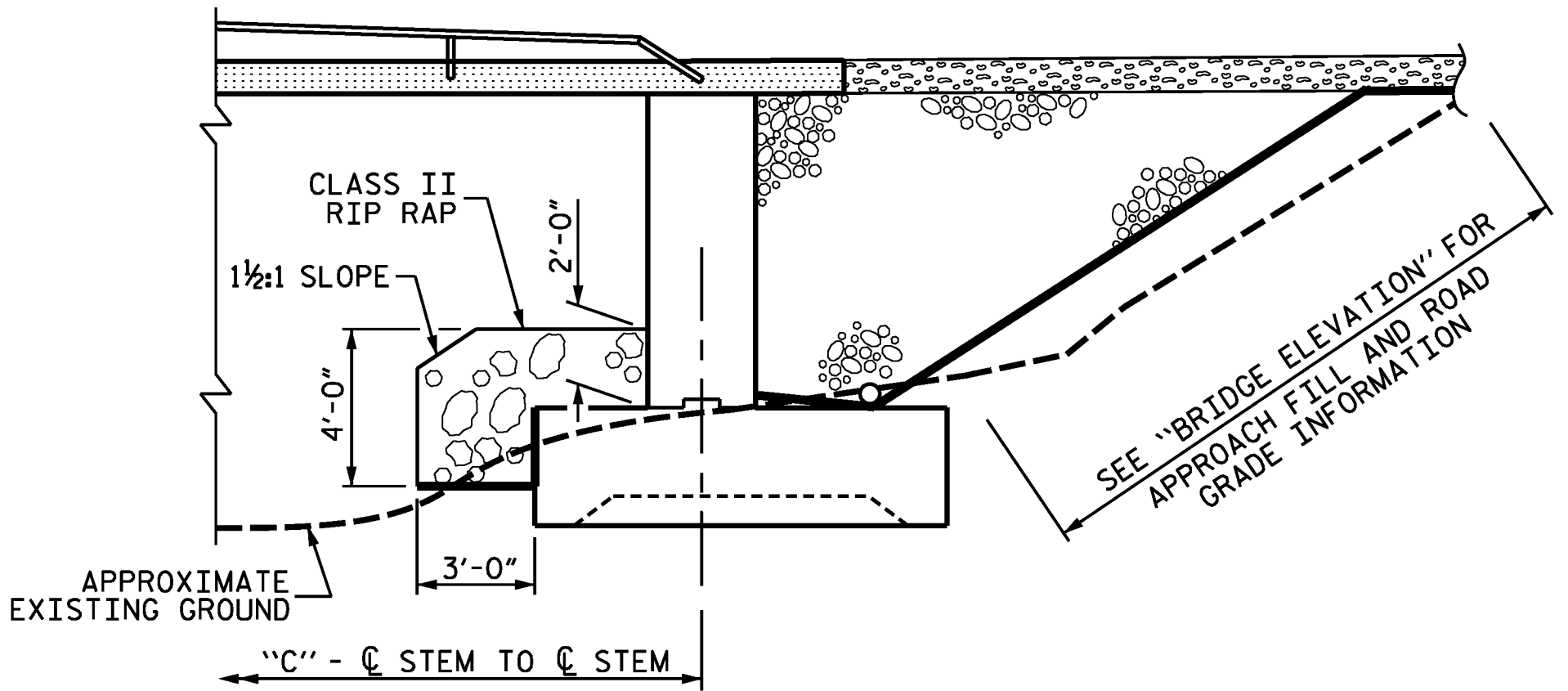
NOTES

CONTRACTOR SHALL LOCATE THE EXPANSION END OF THE SUPERSTRUCTURE ON THE "UPHILL" END OF THE BRIDGE. ONLY ONE EXPANSION END SHALL BE PERMITTED PER BRIDGE, WITH THE OPPOSITE END FUNCTIONING AS THE FIXED (RESTRAINED) END.

CONTRACTOR SHALL PROVIDE EROSION CONTROL MEASURES, AS REQUIRED ACCORDING TO NCDOT STANDARD SPECIFICATIONS AND THE CONTRACT DOCUMENTS.

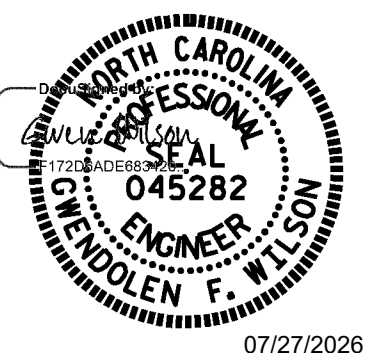
THE CONTRACTOR SHALL SET THE LOW-CHORD ELEVATION OF THE BRIDGE BASED ON EXISTING SITE CONDITIONS AND IN COORDINATION WITH THE ENGINEER, SUCH THAT THE NEW CROSSING PROVIDES CONVEYANCE GREATER THAN OR EQUAL TO THE ORIGINAL DESTROYED CROSSING. THE CONTRACTOR SHALL REFER TO THE BSR WHEN SETTING THE LOW-CHORD ELEVATION OF THE BRIDGE. NO CONSTRUCTION ACTIVITIES SHALL COMMENCE UNTIL ALL PARTIES HAVE AGREED UPON THE LOW-CHORD ELEVATION AND THE DATED PERMIT APPLICATION IS APPROVED.

MODULAR BRIDGE SUPERSTRUCTURE AND STEEL GUARDRAIL SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. FINAL DESIGN, LAYOUT, GEOMETRY, AND DETAILS SHALL BE DESIGNED BY THE CONTRATOR AS PART OF THE MODULAR BRIDGE SYSTEM. THE CONTRACTOR SHALL PROVIDE SEALED MODULAR BRIDGE PLANS PREPARED BY A LICENSED NORTH CAROLINA PROFESSIONAL ENGINEER.



BRIDGE PARTIAL ELEVATION

(SHOWING SPREAD FOOTING FOUNDATION)



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NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT
**PRIVATE DRIVEWAY
BRIDGE STANDARDS**
MODULAR PANEL BRIDGE
GENERAL DRAWING

REVISIONS						SHEET NO. S-01
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

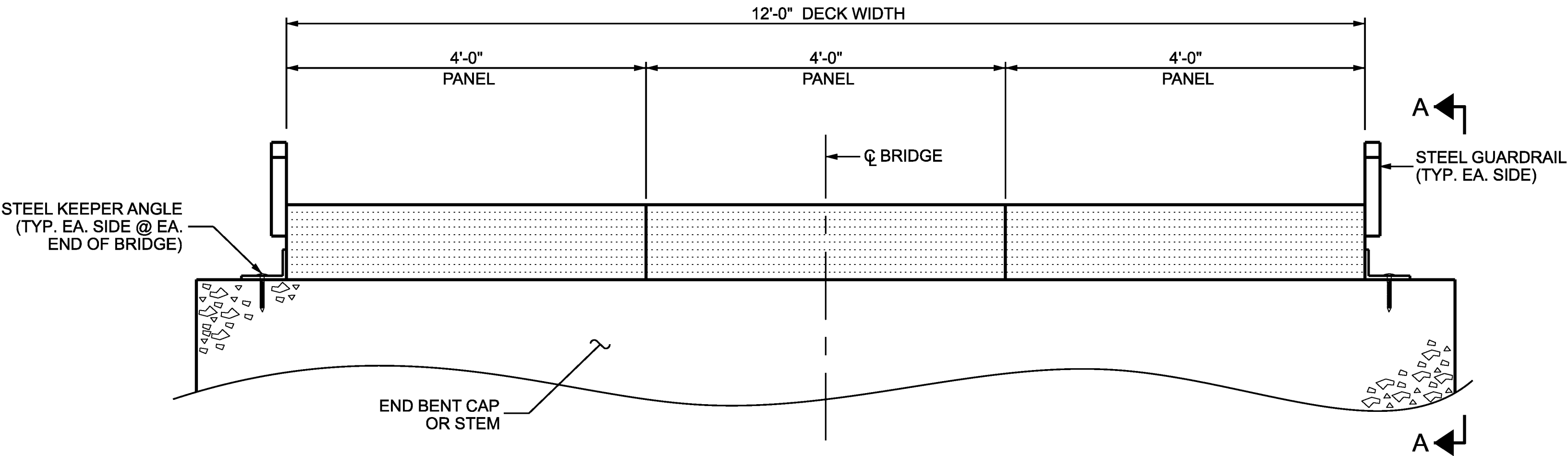


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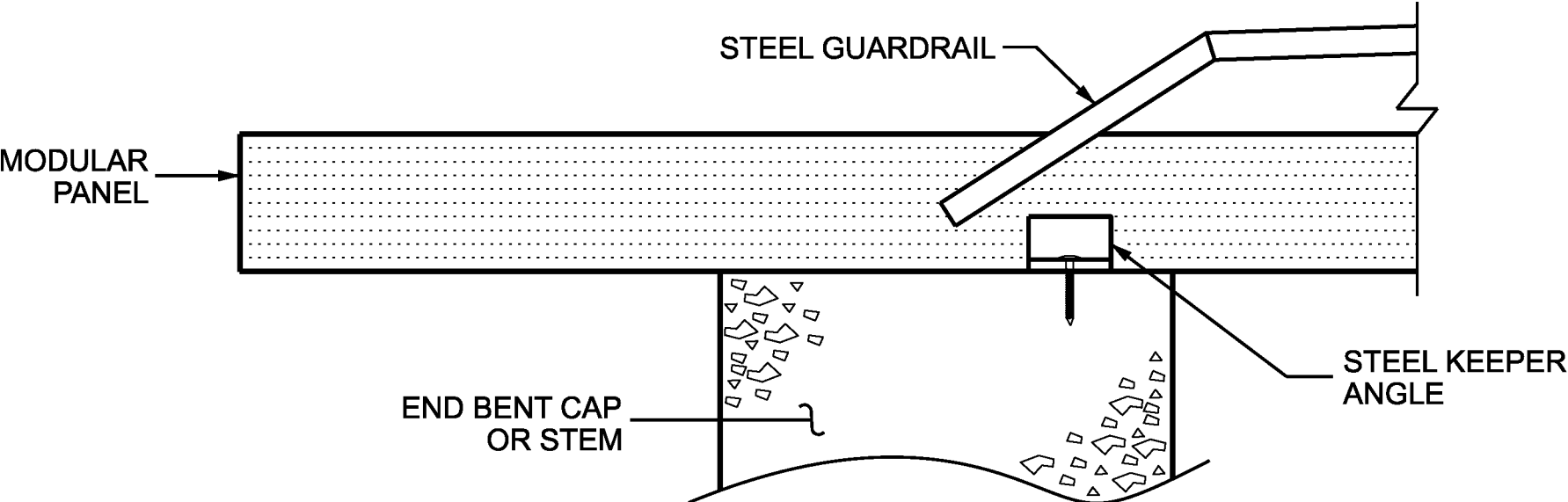
DWN. BY: BC/WDC
CHKD. BY: GFW
DES. EGR. OF RECORD: GFW

DATE: 05/2026
DATE: 05/2026
DATE: 05/2026

THE MODULAR BRIDGE SHALL BE POSITIONED TO PROVIDE A UNIFORM OVERHANG BEYOND THE FILL FACE OF EACH END BENT. THE OVERHANG SHALL BE SUPPORTED FULL LENGTH. THE CONTRACTOR SHALL PROVIDE A COMPACTED AGGREGATE BEARING SURFACE TO SUPPORT THE SUPERSTRUCTURE OVERHANG.

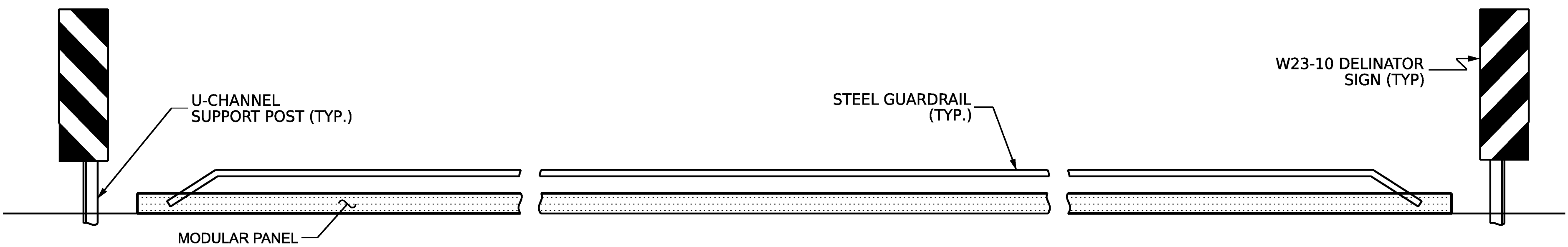


TYPICAL SECTION



VIEW A-A

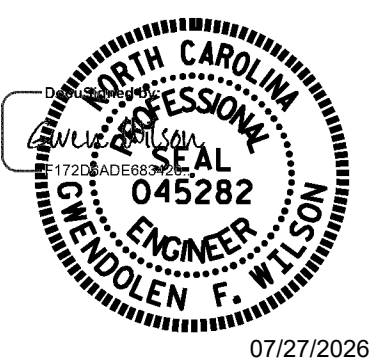
THE MODULAR BRIDGE SHALL BE POSITIONED TO PROVIDE A UNIFORM OVERHANG BEYOND THE FILL FACE OF EACH END BENT. THE OVERHANG SHALL BE SUPPORTED FULL LENGTH. THE CONTRACTOR SHALL PROVIDE A COMPACTED AGGREGATE BEARING SURFACE TO SUPPORT THE SUPERSTRUCTURE OVERHANG.



STEEL GUARDRAIL ELEVATION

NOTE:

THE MODULAR BRIDGE SUPERSTRUCTURE, INCLUDING GUARDRAIL, AND STEEL KEEPER ANGLES, SHALL BE DESIGNED, PROVIDED, AND INSTALLED BY THE CONTRACTOR. THE SYSTEM SHALL BE CONFIGURED WITH ONE FIXED END AND ONE EXPANSION END. SEALED DESIGN PLANS SHALL BE SUBMITTED FOR REVIEW PRIOR TO FABRICATION.



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NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY
BRIDGE STANDARDS

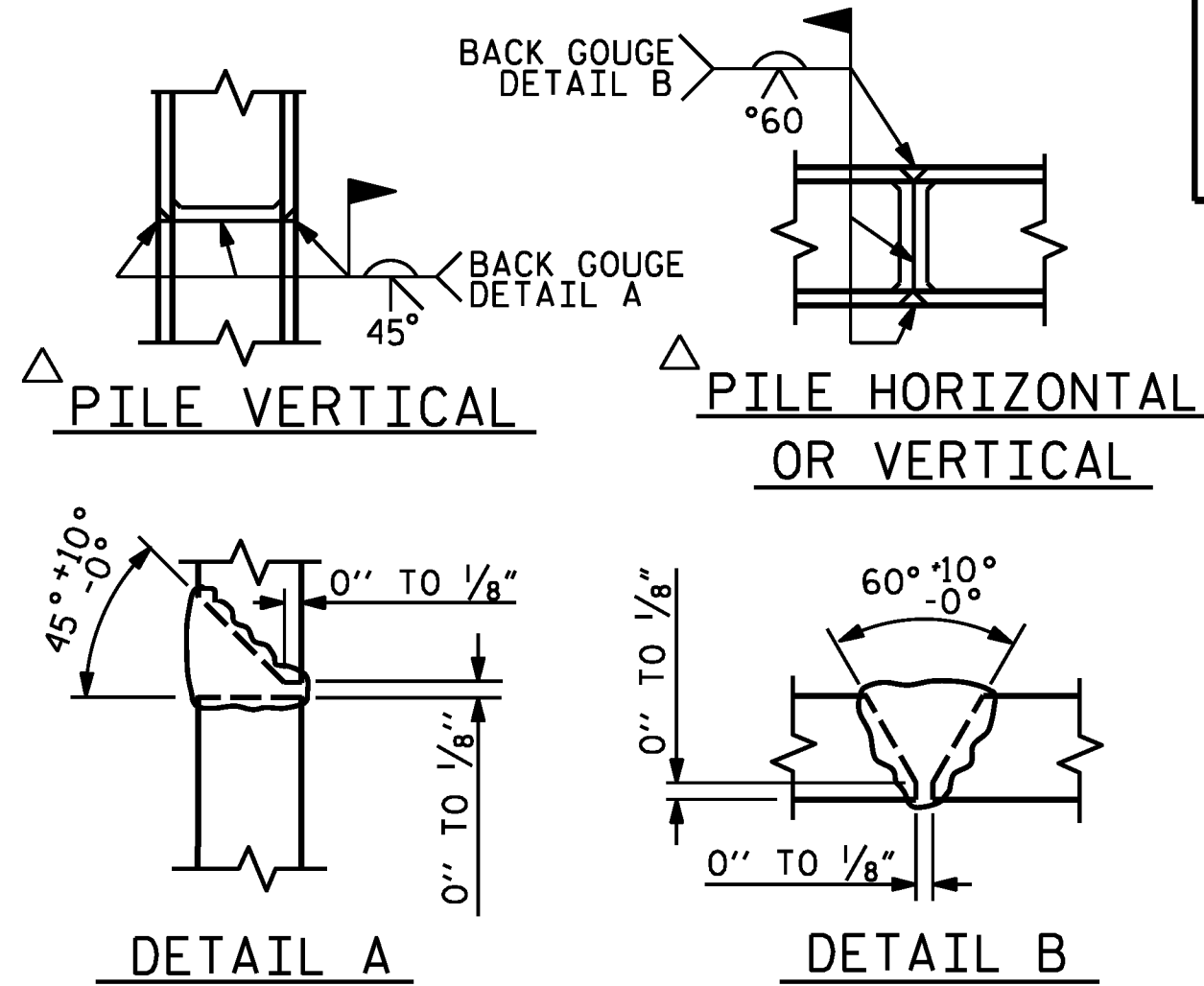
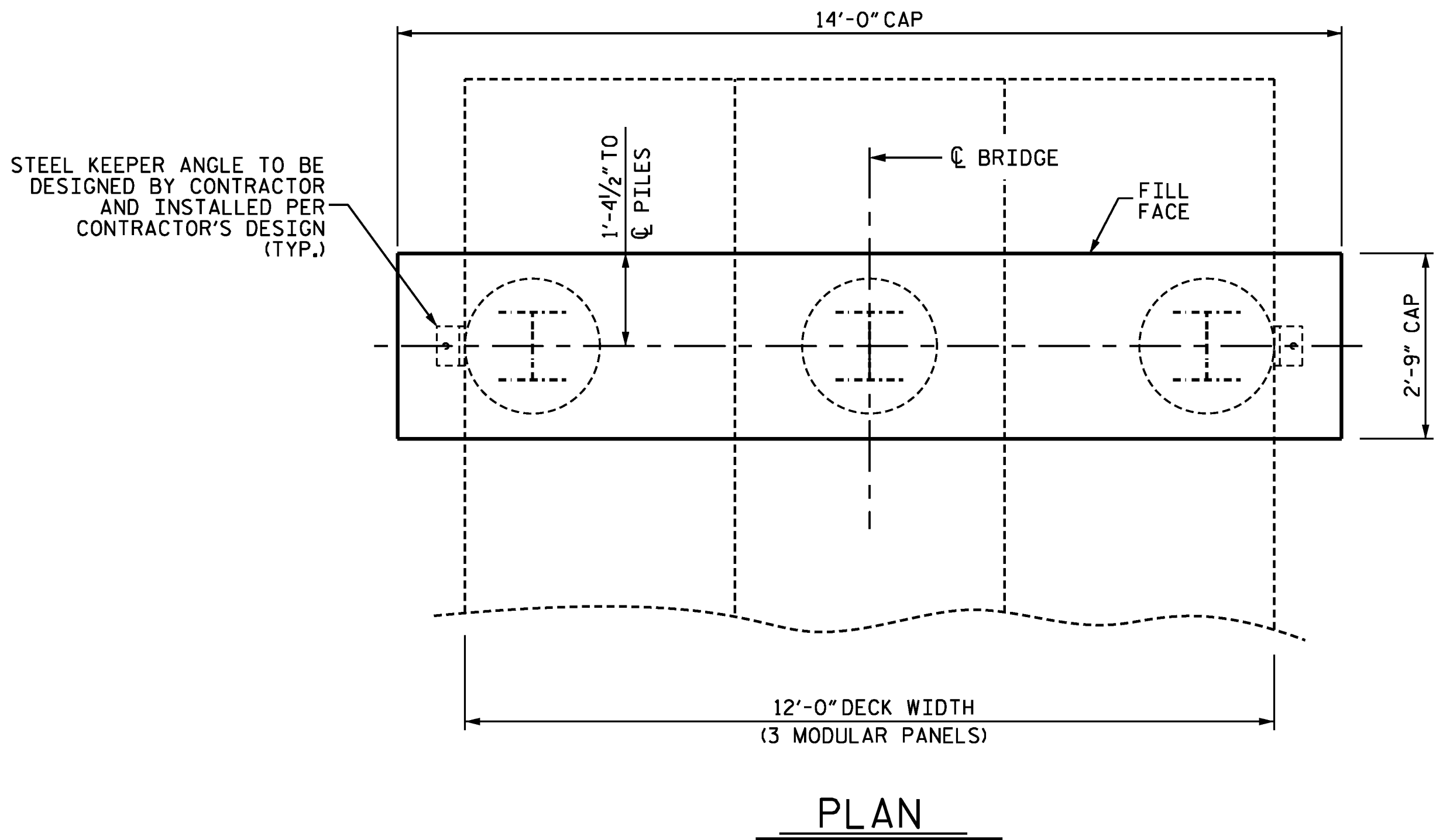
MODULAR PANEL BRIDGE

TYPICAL SECTION
& NOTES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-02
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2			4			

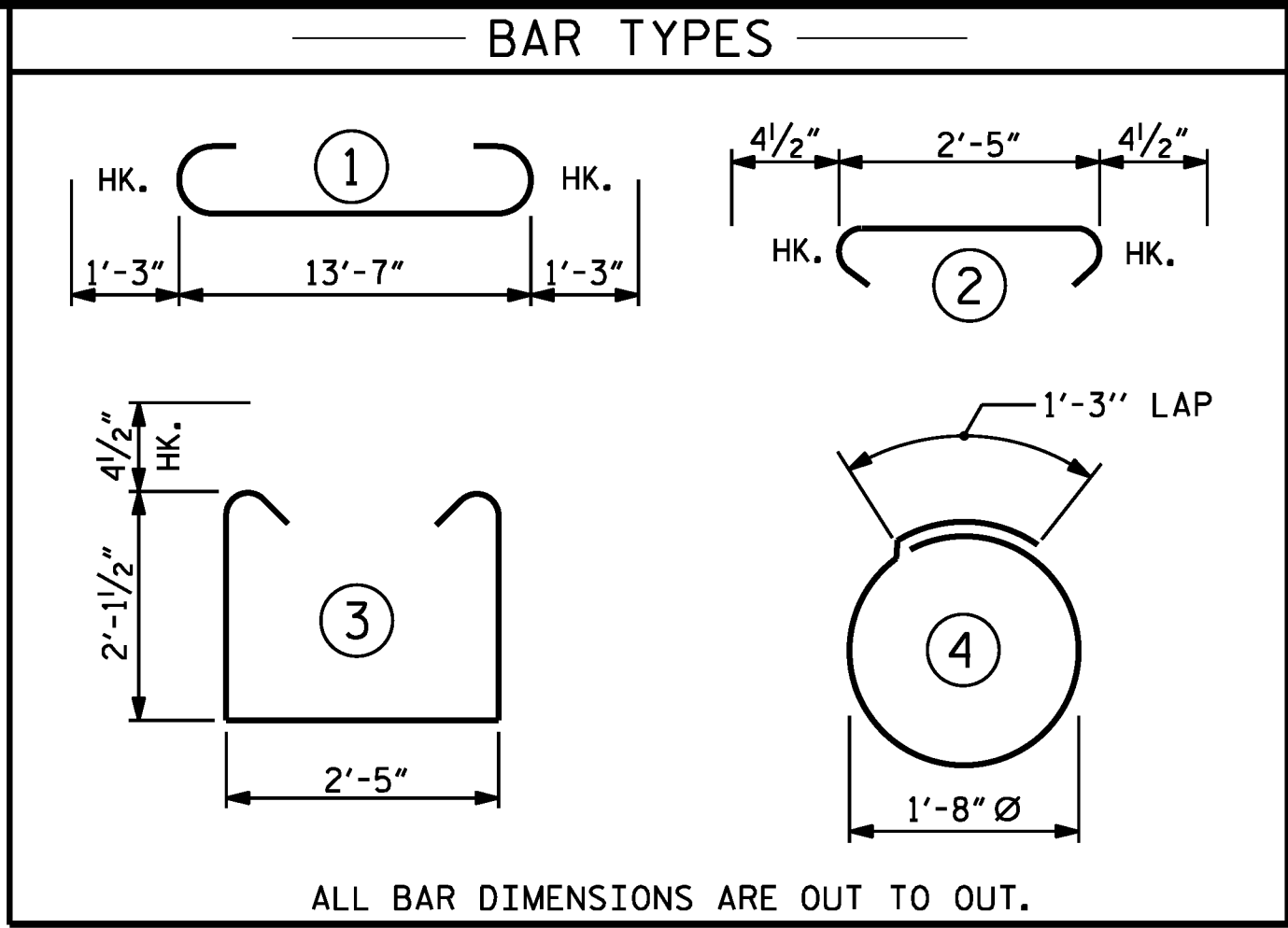
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DES. EGR. OF RECORD: GFW DATE: 05/2026



PILE SPLICE DETAILS

△ POSITION OF PILE DURING WELDING.



BILL OF MATERIAL FOR ONE END BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	16'-1"	437
B2	8	#4	STR	13'-8"	73
B3	4	#4	STR	2'-5"	7
S1	14	#4	3	7'-5"	69
S2	14	#4	2	3'-2"	30
S3	6	#4	4	6'-6"	26
REINFORCING STEEL (FOR ONE END BENT)					642 LBS.
CLASS A CONCRETE (FOR ONE END BENT)					3.6 C.Y.

GENERAL NOTES

CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH
LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL
MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

MODULAR BRIDGE SUPERSTRUCTURE SHOWN IS SCHEMATIC ONLY.
ACTUAL MODULAR BRIDGE SYSTEM CONFIGURATION AND MEMBER
SIZING SHALL BE DETERMINED BY THE CONTRACTOR TO MEET
THE SPECIFIED DESIGN LOADS.

FOUNDATION NOTES

DRILLED-IN PILES

ROCK QUALITY DESIGNATION (ROD)
GEOLOGICAL STRENGTH INDEX (GSI)

INSTALL DRILLED-IN PILES IN ACCORDANCE WITH SECTION
450 OF THE STANDARD SPECIFICATIONS.

MINIMUM PILE PENETRATION OF 10-FT INTO NATURAL GROUND
OR CHANNEL BOTTOM IS REQUIRED.

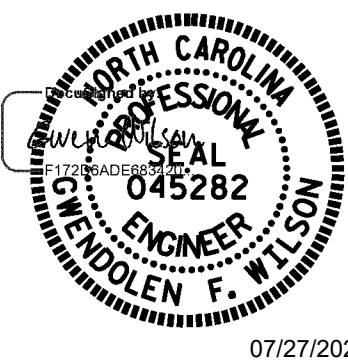
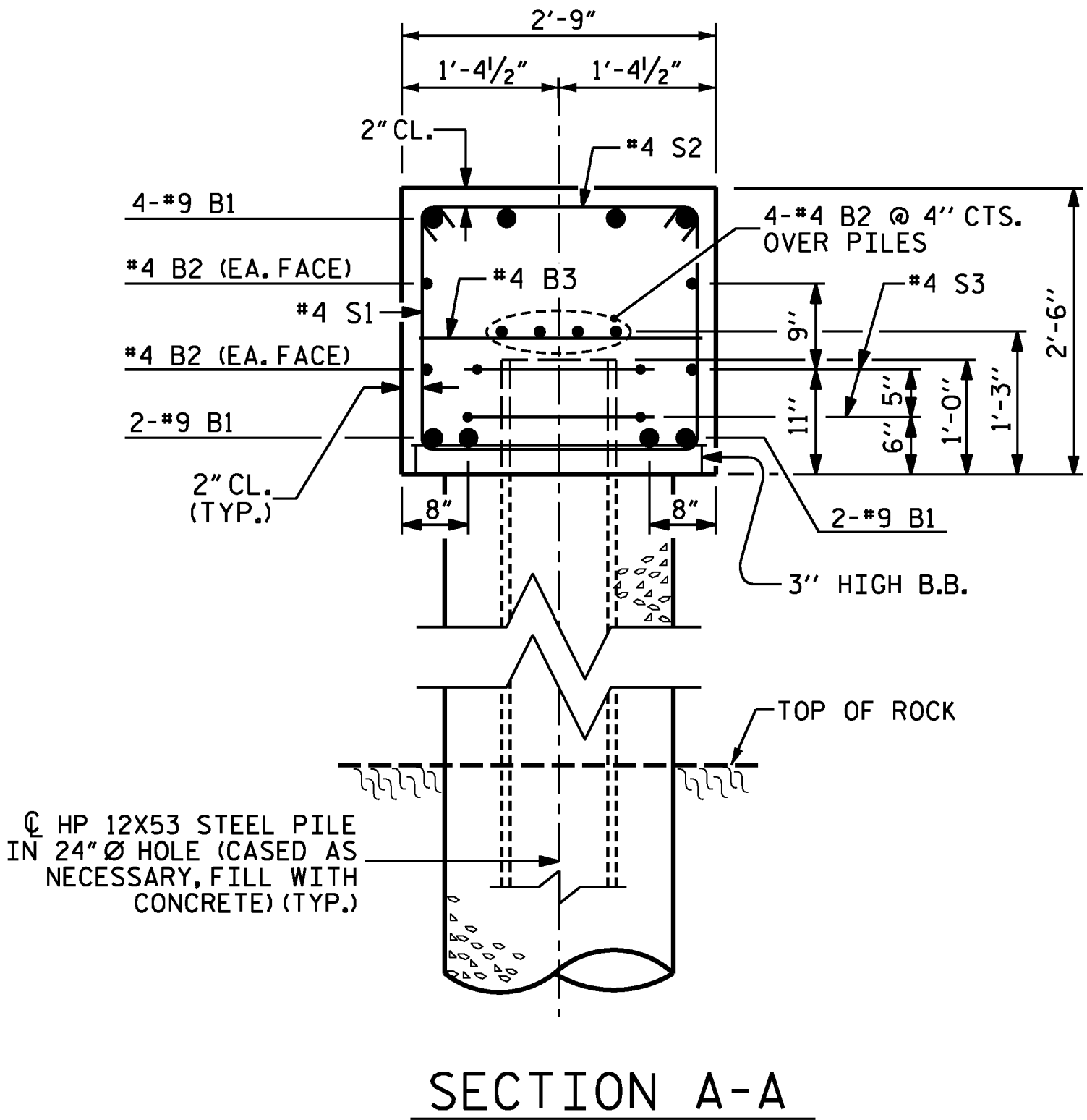
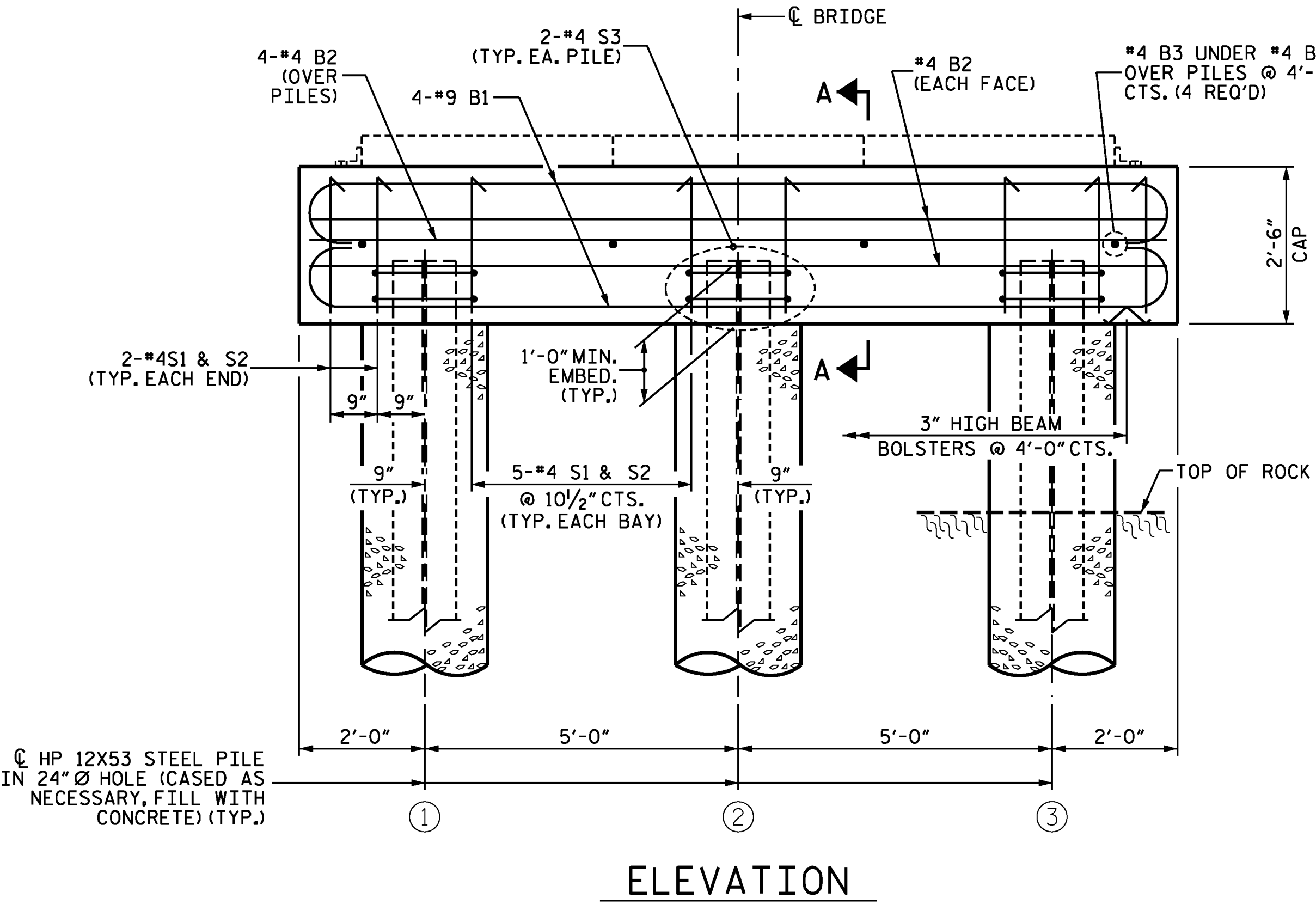
MINIMUM ROCK SOCKET DEPTHS, UNLESS OTHERWISE INDICATED
ON PROJECT SPECIFIC DATA SHEET:

4'-0" MINIMUM (ROD >70, GSI >50)
6'-0" MINIMUM (ROD 30-70, GSI 30-50)
8'-0" MINIMUM (ROD <30, GSI <30)

REFER TO BORING LOGS FOR ROD AND GSI DATA.

PILES SHALL BE SEATED IN THE BOTTOM OF THE EXCAVATION.
PILE DRIVING IS NOT REQUIRED.

BACKFILL WITH CONCRETE ONLY. DO NOT PROCEED WITH
CONSTRUCTION ACTIVITIES UNTIL THE 28 DAY STRENGTH
IS ACHIEVED.



DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

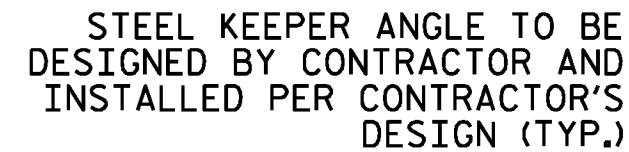


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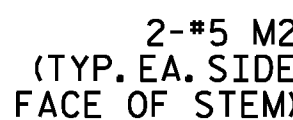
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CHKD. BY: GFW
DES. EGR. OF RECORD: GFW

DATE: 05/2026
DATE: 05/2026
DATE: 05/2026

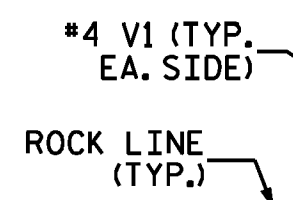
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PLAN



ELEVATION



SECTION A-A

CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

THE FINAL STEM WALL HEIGHT SHALL BE DETERMINED IN THE FIELD BASED ON EXISTING ROCK ELEVATIONS. THE STEM WALL HEIGHT SHALL NOT BE LESS THAN 3'-0" OR GREATER THAN 8'-0.

STEM WALL REINFORCEMENT AND DETAILS ARE BASED ON A MAXIMUM STEM WALL HEIGHT OF 8'-0". THE CONTRACTOR SHALL ADJUST THE HORIZONTAL REINFORCEMENT LAYOUT TO ACCOMMODATE FIELD-VERIFIED STEM WALL HEIGHTS WHILE MAINTAINING REBAR SIZES, SPACING, LAP LENGTHS, AND THE OVERALL REINFORCING CONFIGURATION SHOWN IN THE STRUCTURAL PLANS AND DETAILS.

MODULAR BRIDGE SUPERSTRUCTURE SHOWN IS SCHEMATIC ONLY. ACTUAL MODULAR BRIDGE SYSTEM CONFIGURATION AND MEMBER SIZING SHALL BE DETERMINED BY THE CONTRACTOR TO MEET THE SPECIFIED DESIGN LOADS.

SPREAD FOOTING

FOUNDATION EXCAVATIONS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH SECTION 410 OF THE STANDARD SPECIFICATIONS.

A GEOTECHNICAL ENGINEER LICENSED IN THE STATE OF NORTH CAROLINA SHALL OBSERVE THE BEARING SURFACE AND CONFIRM THE FOOTING IS CONSTRUCTED ON ROCK. THE ENGINEER SHALL PROVIDE A LETTER VERIFYING ACCEPTANCE OF THE BEARING SURFACE.

CLEAN ALL ROCK OF LOOSE MATERIAL AND CUT TO A FIRM SURFACE, AS DIRECTED BY THE ENGINEER AND FILL WITH CONCRETE, MORTAR OR GROUT. LEAVE ROCK SURFACE IN A ROUGH CONDITION.

BEARING SURFACE MUST RESIST A MAXIMUM APPLIED BEARING PRESSURE OF 3.0 TSF.

KEY IN FOOTINGS AT LEAST 1 FT INTO ROCK.

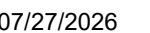
FOR ONE END BENT

REINFORCING STEEL	3,189 LBS.
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CLASS A CONCRETE BREAKDOWN

*** THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE QUANTITIES AND REINFORCING BARS SHOWN IN THE BILL OF MATERIAL ARE BASED ON AN 8'-0" MAXIMUM STEM WALL HEIGHT. THE CONTRACTOR IS RESPONSIBLE FOR THE FINAL QUANTITIES BASED ON THE ACTUAL STEM WALL HEIGHT.

BAR TYPES



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NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

MODULAR PANEL BRIDGE

END BENT
SPREAD FOOTING

6	NO.	BY:	DATE:	NO.	BY:	DATE:
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SHEET NO.

S-05

**TOTAL
SHEETS**
7



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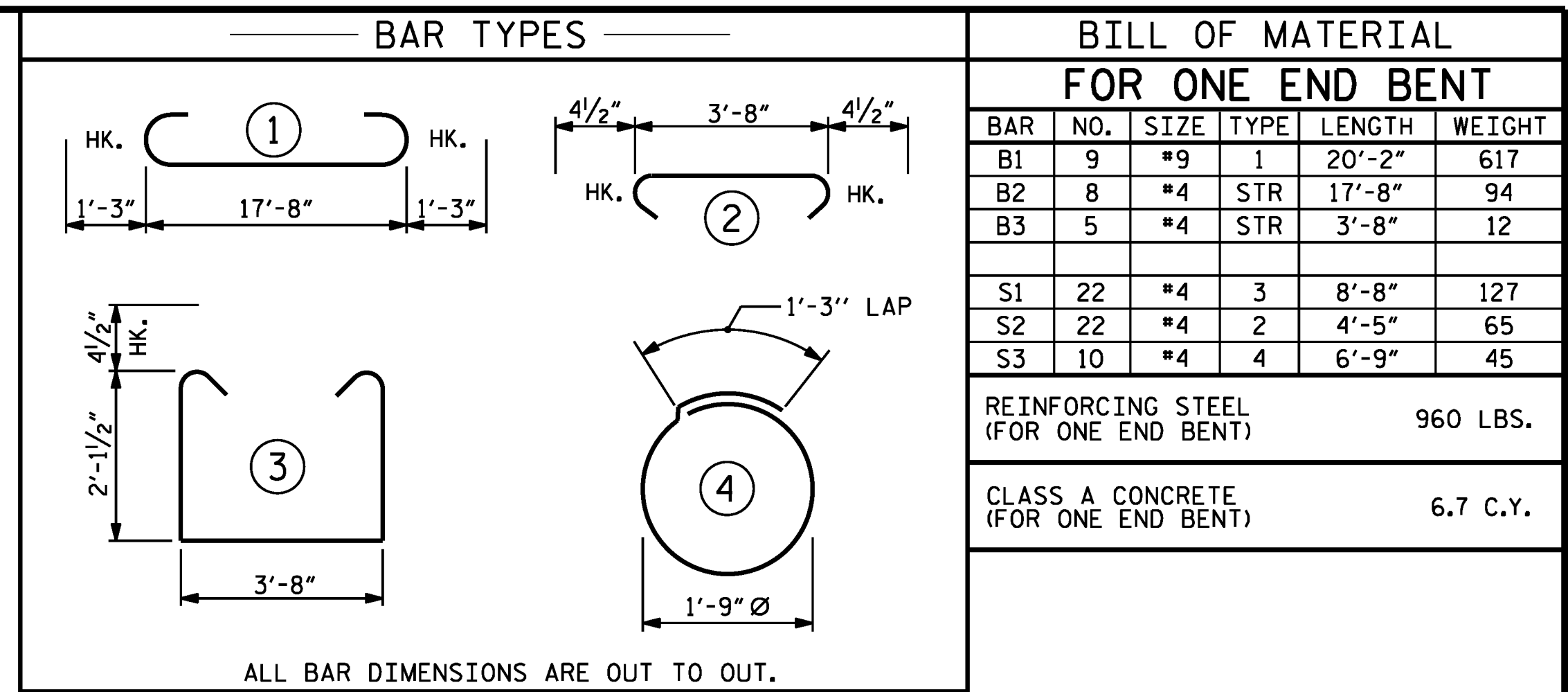
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DES. EGR. OF RECORD: GFW

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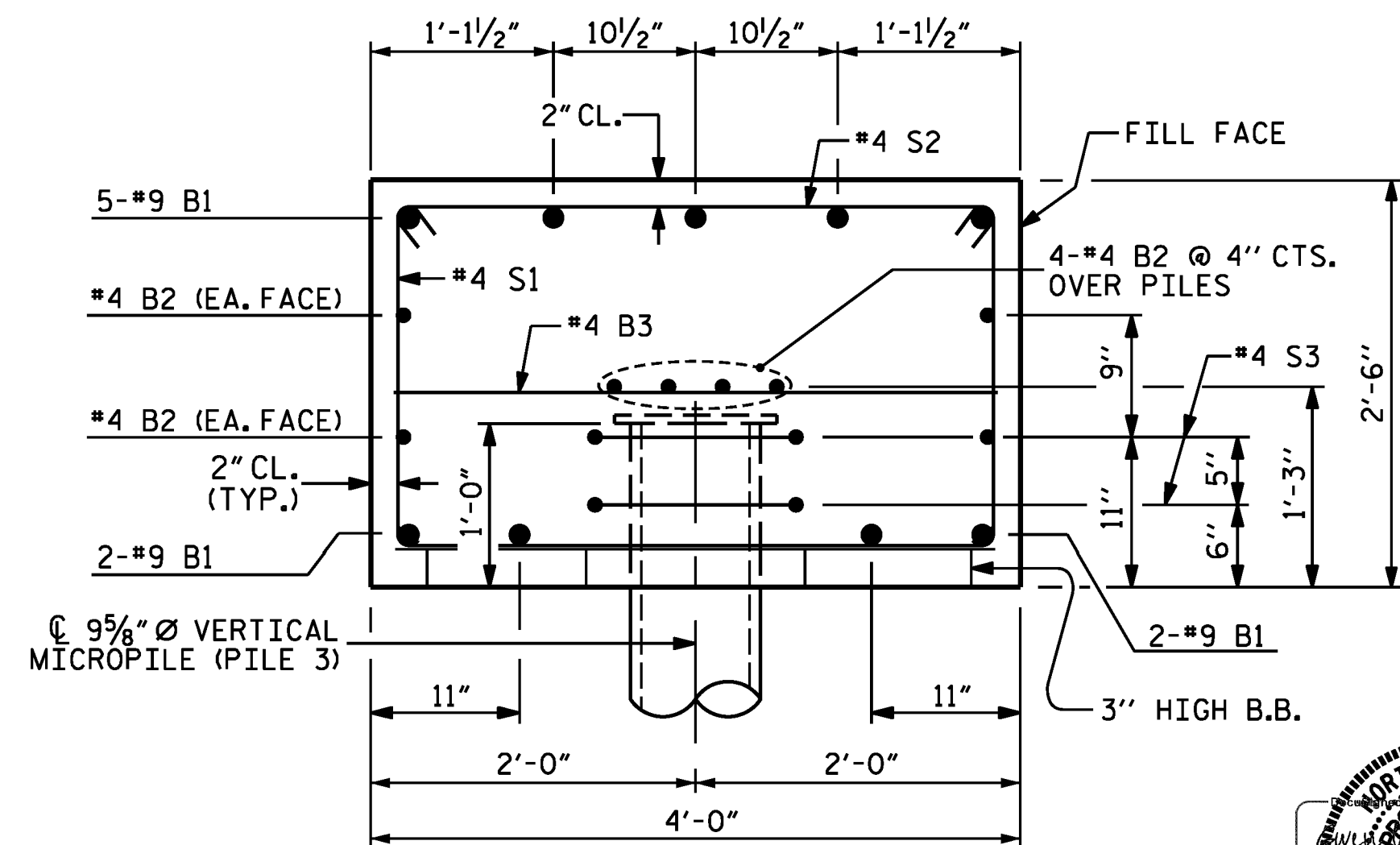
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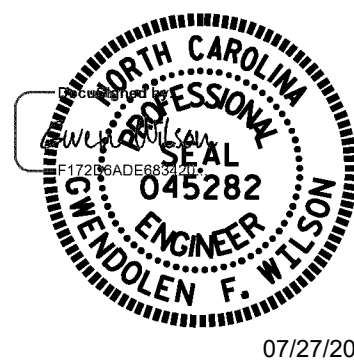
CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH
LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL
MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

REFER TO MICROPILE DRAWINGS FOR MICROPILE
REQUIREMENTS, PROPERTIES AND OTHER DETAILS.

FOR MICROPILES, SEE SPECIAL PROVISIONS.



(PILES 1, 2, 4 & 5 ARE BATTERED 30°
AND NOT SHOWN FOR CLARITY)



DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

**PRIVATE DRIVEWAY
 BRIDGE STANDARDS**

MODULAR PANEL BRIDGE

**END BENT
 MICROPILES**

REVISIONS						SHEET NO. S-06
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1			3			
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SHEET NO.	S-07
TOTAL SHEETS	7

GENERAL

THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO DRILLING ANY MICROPILE. EXISTING UTILITIES THAT INTERFERE WITH THE MICROPILES SHALL BE ABANDONED OR RELOCATED PRIOR TO PERFORMING THE INSTALLATION OF THE MICROPILES.

THE CONTRACTOR SHALL DETERMINE AND SELECT THE MOST APPROPRIATE DRILLING METHODS, AND GROUTING METHOD TO ACHIEVE OR EXCEED THE MINIMUM REQUIRED DESIGN CRITERIA AND DESIGN LOAD IN THE MICROPILES.

THESE DRAWINGS DO NOT ADDRESS SAFETY ISSUES RELATED TO THE CONSTRUCTION WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SAFETY AND PROVIDE A SAFETY PLAN CONFORMING TO OSHA STANDARDS.

CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS AND CHECK FOR CLEARANCES PRIOR TO THE START OF WORK. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS TO THE CONSTRUCTION DETAILS SHOWN. CONTRACTOR SHALL NOTIFY ENGINEER WHEN THE PLANS NEED TO BE MODIFIED DUE TO FIELD CONDITIONS.

CONTRACTOR SHALL WORK COOPERATIVELY WITH THE ENGINEER WHEN MODIFICATIONS TO THE PLANS ARE NEEDED DUE TO ACTUAL/ EXPOSED FIELD CONDITIONS.

DESIGN CODES

- FHWA MICROPILES DESIGN AND CONSTRUCTION REFERENCE MANUAL. PUBLICATION NUMBER FHWA NHI-05-039, DECEMBER 2005.
- AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 2024
- BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE ACI 318-19.
- AISC STEEL CONSTRUCTION MANUAL, 16TH EDITION
- NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES

DESIGN CONSIDERATIONS

9½" MICROPILE ELEMENT FOR BOTH GEOTECHNICAL AND STRUCTURAL CAPACITY HAS BEEN CONSIDERED. A FIXED CONNECTION BETWEEN THE MICROPILE AND THE PILE CAP HAS BEEN CONSIDERED FOR THE ANALYSIS. THE MICROPILES SHALL BE FULLY CASED THROUGH UNBONDED ZONE WITH A MAXIMUM UNBONDED LENGTH OF 15 FT AND A MINIMUM OF 1 FT CASING PENETRATION INTO THE BEARING STRATUM. THE BOND ZONE SHALL BE UNCASD. THE DESIGN EVALUATED TYPE A (GRAVITY GROUT ONLY) MICROPILE PER FHWA.

THIS DESIGN DOES NOT CONSIDER ANY UNSUPPORTED MICROPILE LENGTH. ADEQUATE MEASURES SHALL BE PROVIDED TO PREVENT SCOUR OR UNDERMINING.

THE CONTRACTOR SHALL VERIFY BOND STRENGTH THROUGH MICROPILE TESTING. BOND LENGTHS OF THE MICROPILES ARE SUBJECT TO CHANGE BASED ON THE TESTING RESULTS.

THE UNFACTORED DESIGN AXIAL LOAD FOR THE MICROPILE DESIGN, DL=138.00 KIPS COMPRESSION

MATERIALS

CONCRETE. MINIMUM CONCRETE STRENGTH REQUIREMENTS AND OTHER PROPERTIES FOR THE PILE CAPS/ FOUNDATION MATS SHALL BE DETERMINED BY OTHERS. REFER TO STRUCTURAL DRAWINGS FOR PROPERTIES AND OTHER DETAILS.

GROUT. THE GROUT SHALL BE A PUMPABLE NEAT CEMENT WITH A MINIMUM 3-DAY COMPRESSIVE STRENGTH OF 2,000 PSI AND A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI, IN ACCORDANCE WITH ASTM C109 AND APPROVED BY NCDOT (TYPE-2).

NUTS, COUPLERS, AND WASHERS. NUTS, COUPLERS, AND WASHERS SHALL BE SUPPLIED PER BAR MANUFACTURER'S RECOMMENDATIONS .

PLATES. PLATES SHALL BE Fy=50 KSI PER ASTM A572.

WELDS. SMAW, 70KSI ELECTRODES PER NCDOT STANDARD SPECIFICATIONS.

MICROPILE CASING. MICROPILE CASING SHALL CONSIST OF 9.625" OD, THICKNESS = 0.5" Fy=80 KSI STEEL. THE MICROPILE JOINTS SHALL HAVE TAPERED THREADS.

THREADED BAR. THREADED BAR SHALL CONSIST OF #14 ALL-THREAD-BAR, WILLIAMS FORM OR EQUIVALENT WITH A MINIMUM YIELD STRENGTH OF 75 KSI. (ASTM A615).

THREADED BAR FOR VERIFICATION TEST. ONE #20 (2.50-IN Ø) 75 KSI ALL-THREAD BAR SHALL BE USED FOR THE SACRIFICIAL PILE(S) FOR VERIFICATION LOAD TEST.

MICROPILE INSTALLATION

IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CHOOSE DRILLING MEANS AND METHODS THAT WILL MAINTAIN OPEN DRILL HOLES, WHICH DO NOT PROMOTE MINING AND LOOSENING OF THE MICROPILE AT THE PERIMETER OF THE DRILL HOLE DUE TO THE USE OF HIGH FLUSH VOLUMES AND PRESSURES. EXTERNAL DISCHARGE AND FLUSHING ALONG OUTSIDE MICROPILE CASING IS NOT PERMITTED. IF EXTERNAL FLUSHING/DISCHARGE OCCURS, ALL EXTERNAL ANNULUS/VOIDS AND CAVITIES MUST BE POSITIVELY GROUTED CLOSED WITH TREMIE METHODS, TO FULL CASING DEPTH, ON THE SAME DAY AS THE DRILLING.

MICROPILES SHALL BE INSTALLED WITH THE MINIMUM LENGTHS AND DIAMETER INDICATED IN THESE PLANS.

GROUTING

CONTRACTOR SHALL USE A STABLE NEAT CEMENT GROUT. THE GROUTING EQUIPMENT USED SHALL BE HIGH SHEAR AND PRODUCE A GROUT FREE OF LUMPS AND UNMIXED CEMENT.

THE GROUTING EQUIPMENT SHALL BE SIZED TO ALLOW FOR MICROPILE GROUTING TO BE PLACED IN ONE CONTINUOUS OPERATION. THE GROUT SHALL BE INJECTED FROM THE LOWEST POINT OF THE DRILL HOLE AND INJECTION SHALL CONTINUE UNTIL UNCONTAMINATED GROUT FLOWS FROM THE TOP OF THE HOLE. THE MIXER SHALL BE CAPABLE OF CONTINUOUS AGITATION OF THE GROUT.

TOLERANCES

INDIVIDUAL ELEMENTS SHALL BE POSITIONED PLUS OR MINUS 3 INCHES FROM THE DESIGN LOCATIONS SHOWN ON THE PLANS. THE INCLINATION SHALL BE PLUS OR MINUS 3 DEGREES OF THAT SHOWN ON THE PLANS.

FIELD QUALITY CONTROL

GROUT FOR MICROPILES SHALL BE PLACED AND TESTED IN ACCORDANCE WITH SECTION 1003 OF NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.

RECORDS

THE FOLLOWING RECORDS SHALL BE PREPARED FOR THE PROJECT ENGINEER. THE RECORDS SHALL BE SUBMITTED WITHIN 72 HOURS AFTER EACH MICROPILE INSTALLATION IS COMPLETED. THE RECORDS SHALL INCLUDE THE FOLLOWING MINIMUM INFORMATION:

- DRILLING DURATION AND OBSERVATIONS (E.G., FLUSH RETURN).
- MICROPILE LOAD TEST REPORTS
- INFORMATION ON SUBSURFACE MATERIALS ENCOUNTERED, INCLUDING DESCRIPTION OF STRATA, OBSTRUCTIONS, VOIDS, WATER, ETC.
- LENGTH OF UNBONDED ZONE, BONDED ZONE, COUPLERS, AND TOTAL LENGTH OF MICROPILE.
- DESCRIPTION OF UNUSUAL INSTALLATION BEHAVIOR, CONDITIONS.
- ANY DEVIATIONS FROM THE INTENDED PARAMETERS.
- GROUT PRESSURES ATTAINED, WHERE APPLICABLE.
- GROUT QUANTITIES PUMPED, SPECIFIC GRAVITY.
- MICROPILE MATERIALS AND DIMENSIONS.

LOAD TESTING

PRIOR TO INSTALLATION OF PRODUCTION MICROPILES, THE FOLLOWING VERIFICATION LOAD TEST NEEDS TO BE PERFORMED:
* ONE (1) AXIAL LOAD TEST.

MICROPILES USED FOR VERIFICATION LOAD TESTING SHALL BE SACRIFICIAL.

LOAD TESTING SHALL BE PERFORMED IN ACCORDANCE WITH ASTM D3689 OR ASTM D1143.

UNLESS OTHERWISE APPROVED, TESTING OF A MICROPILE SHALL NOT BE PERFORMED UNTIL THE MINIMUM COMPRESSIVE STRENGTH OF THE GROUT HAS REACHED AT LEAST 80% OF THE DESIGN STRENGTH, OR A MINIMUM OF 7 DAYS AFTER GROUT PLACEMENT, WHICHEVER OCCURS LAST.

TESTING EQUIPMENT.

TESTING EQUIPMENT SHALL BE PROVIDED BY THE CONTRACTOR AND SHALL INCLUDE A MINIMUM OF TWO (2) DIAL GAUGES, A DIAL GAUGE SUPPORT, JACK AND PRESSURE GAUGE, A PUMP AND A REACTION FRAME. RECENT CALIBRATION CURVES FOR THE JACK, PUMP, AND GAUGES SHALL BE SUBMITTED TO SCHNABEL 14 DAYS PRIOR TO TESTING ACTIVITIES.

A MINIMUM OF TWO (2) DIAL GAUGES CAPABLE OF MEASURING TO 0.001 INCH SHALL BE USED TO MEASURE THE MICROPILE MOVEMENT. THE DIAL GAUGES SHALL HAVE MINIMUM TRAVEL SUFFICIENT TO ALLOW THE TEST TO BE PERFORMED WITHOUT RE-SETTING THE DIAL GAUGE. THE DIAL GAUGES SHALL BE ALIGNED WITHIN 5 DEGREES OF THE AXIS OF THE ELEMENT AND SHALL BE SUPPORTED INDEPENDENT OF THE JACKING SET UP AND THE WALL. A HYDRAULIC JACK, PRESSURE GAUGE AND PUMP SHALL BE USED TO APPLY AND MEASURE THE TEST LOAD.

THE JACK AND PRESSURE GAUGE SHALL BE CALIBRATED WITHIN THE LAST 12 MONTHS BY AN INDEPENDENT TESTING LABORATORY AS A UNIT. THE PRESSURE GAUGE SHALL BE GRADUATED IN 50 PSI INCREMENT OR LESS AND SHALL HAVE A RANGE NOT EXCEEDING TWICE THE ANTICIPATED MAXIMUM PRESSURE DURING TESTING UNLESS APPROVED OTHERWISE BY SCHNABEL. THE RAM TRAVEL OF THE JACK SHALL BE SUFFICIENT TO ENABLE THE TEST TO BE PERFORMED WITHOUT RESETTING THE JACK. THE JACK SHALL BE CAPABLE OF APPLYING EACH TEST LOAD INCREMENT IN LESS THAN 1 MINUTE.

THE JACK SHALL BE INDEPENDENTLY SUPPORTED AND CENTERED OVER THE ELEMENT SO THAT THE ELEMENT DOES NOT CARRY THE WEIGHT OF THE JACK. THE STRESSING EQUIPMENT SHALL BE PLACED OVER THE ELEMENT IN SUCH A MANNER THAT THE JACK, BEARING PLATES AND THE STRESSING ANCHORAGE ARE IN ALIGNMENT. THE JACK SHALL BE POSITIONED AT THE BEGINNING OF THE TEST SUCH THAT UNLOADING AND REPOSITIONING OF THE JACK DURING THE TEST WILL NOT BE REQUIRED.

THE REACTION FRAME SHALL BE SUFFICIENTLY RIGID AND OF ADEQUATE DIMENSION SUCH THAT EXCESSIVE DEFORMATION OF THE TEST APPARATUS REQUIRING REPOSITIONING OF ANY COMPONENTS DOES NOT OCCUR DURING TESTING. WHERE THE REACTION FRAME BEARS DIRECTLY ON THE ROCK, THE REACTION FRAME SHALL BE DESIGNED TO PREVENT FRACTURE OF THE ROCK.

PRE-PRODUCTION VERIFICATION LOAD TEST.

ONE (1) AXIAL LOAD TEST SHALL BE PERFORMED ON A SACRIFICIAL MICROPILE, PRIOR TO INSTALLATION OF THE PRODUCTION MICROPILES, TO VERIFY THE INSTALLATION METHODS, BOND STRENGTH, AND DESIGN ASSUMPTIONS. ALL VERIFICATION TEST DATA SHALL BE RECORDED BY A QUALIFIED GEOTECHNICAL ENGINEER. THE MICROPILE INSTALLED FOR THE VERIFICATION TEST SHALL BE CONSTRUCTED USING THE SAME EQUIPMENT, METHODS, AND HOLE DIAMETERS AS PLANNED FOR THE PRODUCTION MICROPILES. THE UNBONDED LENGTH OF THE TEST MICROPILE SHALL EXTEND FROM THE TOP OF THE MICROPILE DOWN TO THE TOP OF THE BONDED ZONE.

THE SACRIFICIAL MICROPILE SHALL UTILIZE #20 GRADE 75 ALL-THREAD BAR WITH A MINIMUM YIELD STRENGTH OF 368 KIPS. THE BAR LOAD DURING TESTING SHALL NOT EXCEED 90% OF ITS MINIMUM ULTIMATE TENSILE STRENGTH. THE LOCATION OF THE TEST MICROPILE SHALL BE SELECTED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. THE TEST SHALL FOLLOW THE GENERAL GUIDELINES OF ASTM D3689 OR ASTM D1143 EXCEPT AS NOTED HEREIN.

THE TEST SHALL BE PERFORMED USING THE FOLLOWING LOAD SEQUENCE:

LOAD	HOLD TIME IN MINUTES
AL	2.5
0.15 DL	2.5
0.30 DL	2.5
0.45 DL	2.5
AL	1
0.15 DL	1
0.45 DL	1
0.60 DL	2.5
0.75 DL	2.5
0.90 DL	2.5
1.00 DL	2.5
AL	1
0.15 DL	1
1.00 DL	1
1.15 DL	2.5
1.30 DL	10 RECORDED AT 1, 2, 3, 4, 5, 6, 10 (*)
1.45 DL	2.5
AL	1
0.15 DL	1
1.45 DL	1
1.60 DL	1
1.75 DL	2.5
1.90 DL	2.5
2.00 DL	60 RECORDED AT 1, 2, 3, 4, 5, 6, 10, 20, 30, 40, 50, 60
1.50 DL	5
1.00 DL	5
0.50 DL	5
AL	5

DL = UNFACTORED DESIGN LOAD= 138.00 KIPS COMPRESSION
AL = ALIGNMENT LOAD

(*) WHERE TOTAL MOVEMENT BETWEEN 1 TO 10 MINUTES EXCEEDS THE SPECIFIED MAXIMUM CREEP MOVEMENT, THE TEST LOAD IS MAINTAINED FOR AN ADDITIONAL 50 MINUTES AND TOTAL MOVEMENT IS RECORDED AT 20, 30, 40, 50, AND 60 MINUTES.

THE ALIGNMENT LOAD (AL) SHOULD BE THE MINIMUM LOAD REQUIRED TO ALIGN THE TESTING APPARATUS AND SHOULD NOT EXCEED 10 PERCENT OF THE DESIGN LOAD (DL). DIAL GAUGES SHOULD BE ZEROED AFTER ALIGNMENT LOAD HAD BEEN APPLIED.

EACH NEW LOAD INCREMENT SHALL BE HELD FOR 5.0 MINUTES OR UNTIL STABLE DEFLECTION READINGS ARE OBTAINED UNDER THE INTENDED LOAD. THE LOADS AT 130% AND 200% DESIGN LOAD SHALL BE HELD FOR A MINIMUM OF 10 MINUTES OR UNTIL THE RATE OF MOVEMENT CRITERION IS MET IN ACCORDANCE WITH THE TEST ACCEPTANCE CRITERIA ESTABLISHED BELOW. THE MAXIMUM TEST LOAD SHALL BE HELD FOR 60 MINUTES.

ACCEPTANCE CRITERIA.

AT THE END OF THE CREEP TEST LOAD HOLD, THE TEST PILE SHALL HAVE A CREEP RATE NOT EXCEEDING 0.04 IN/LOG CYCLE TIME (1 TO 10 MINUTES) OR 0.08 IN/LOG CYCLE TIME (6 TO 60 MINUTES). THE CREEP RATE SHALL BE LINEAR OR DECREASING THROUGHOUT THE CREEP LOAD HOLD PERIOD.

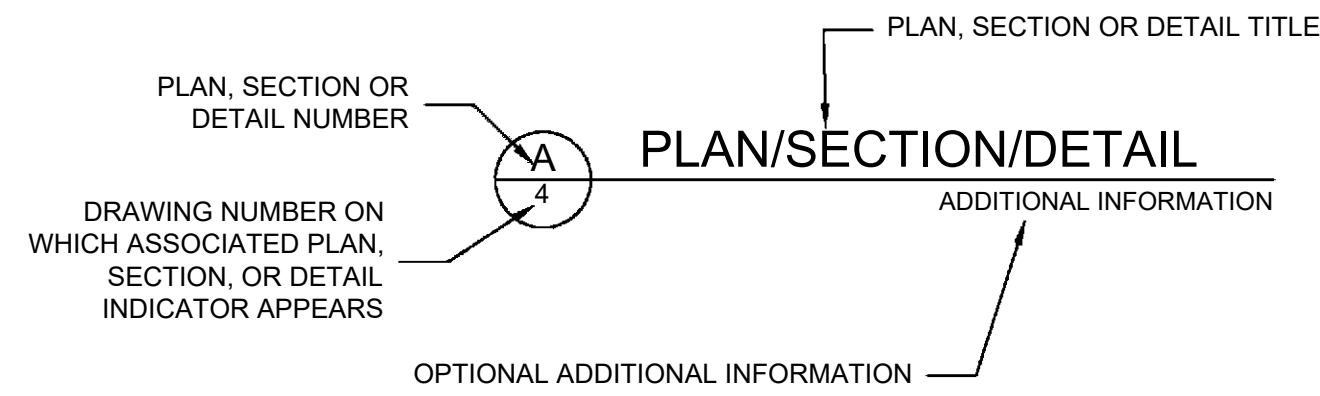
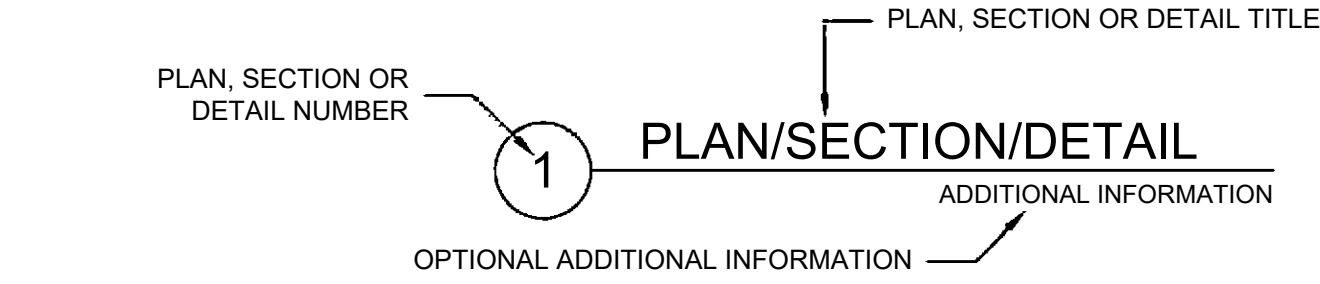
PULLOUT FAILURE DOES NOT OCCUR AT 2.00 DL. FAILURE IS DEFINED AS A SLOPE OF THE LOAD VERSUS DEFLECTION CURVE (AT THE END OF INCREMENT) EXCEEDING 0.025 IN/KIP.

IF ONE OF THE ACCEPTANCE CRITERIA IS NOT MET, THE PILE SHALL BE CONSIDERED AS NOT MEETING THE DESIGN REQUIREMENTS. IN THIS CASE, THE CONTRACTOR SHALL EITHER MODIFY THE INSTALLATION PROCEDURES OR THE MICROPILE BOND LENGTH SHALL BE INCREASED.

FAILURE BEYOND 200% OF THE DESIGN TEST LOAD SHALL NOT BE A CAUSE FOR REJECTION OF THE TEST PILE.

DRAWING SYMBOLS LEGEND

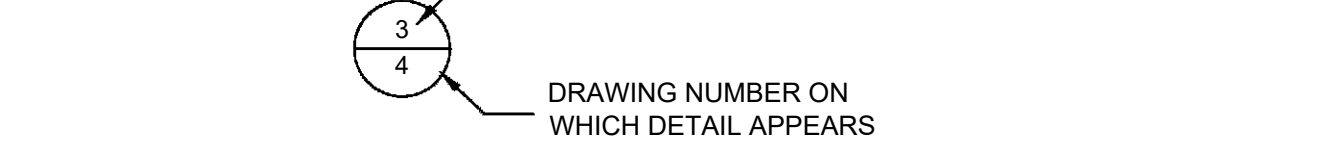
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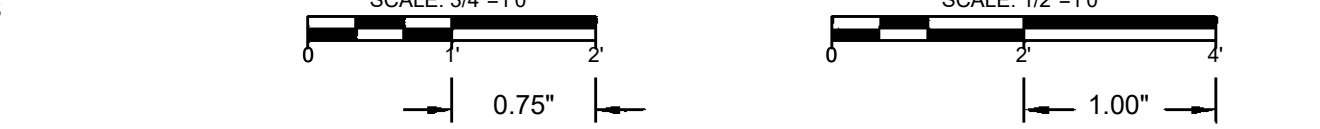
SECTION INDICATOR



DETAIL INDICATOR



SCALE INDICATOR



** VERBAL SCALE IS SHOWN FOR CONVENIENCE. ALL DRAWINGS SHOULD BE CHECKED TO ENSURE THAT THE SCALE BAR ITSELF IS SHOWN AT ACTUAL SIZE. DRAWINGS NOT PLOTTED AT THEIR INTENDED SIZE (ANSI D 22" x 34") WILL NOT SCALE PROPERLY.

ABBREVIATIONS:

AL	ALIGNMENT LOAD	MIN	MINIMUM
CL	CENTERLINE	MUTS	MINIMUM ULTIMATE TENSILE STRENGTH
DWG	DRAWING	N.T.S.	NOT TO SCALE
DTL	DESIGN TEST LOAD	O.C.	ON CENTER
EL	ELEVATION	O.D.	OUTER DIAMETER
FT	FOOT	PSI	POUNDS PER SQUARE INCH
IN	INCHES	SHT	SHEET
KSI	KIPS PER SQUARE INCH	TYP	TYPICAL
MAX	MAXIMUM		



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SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

**PRIVATE DRIVEWAY
BRIDGE STANDARDS**

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

**END BENT
MICROPILE NOTES**

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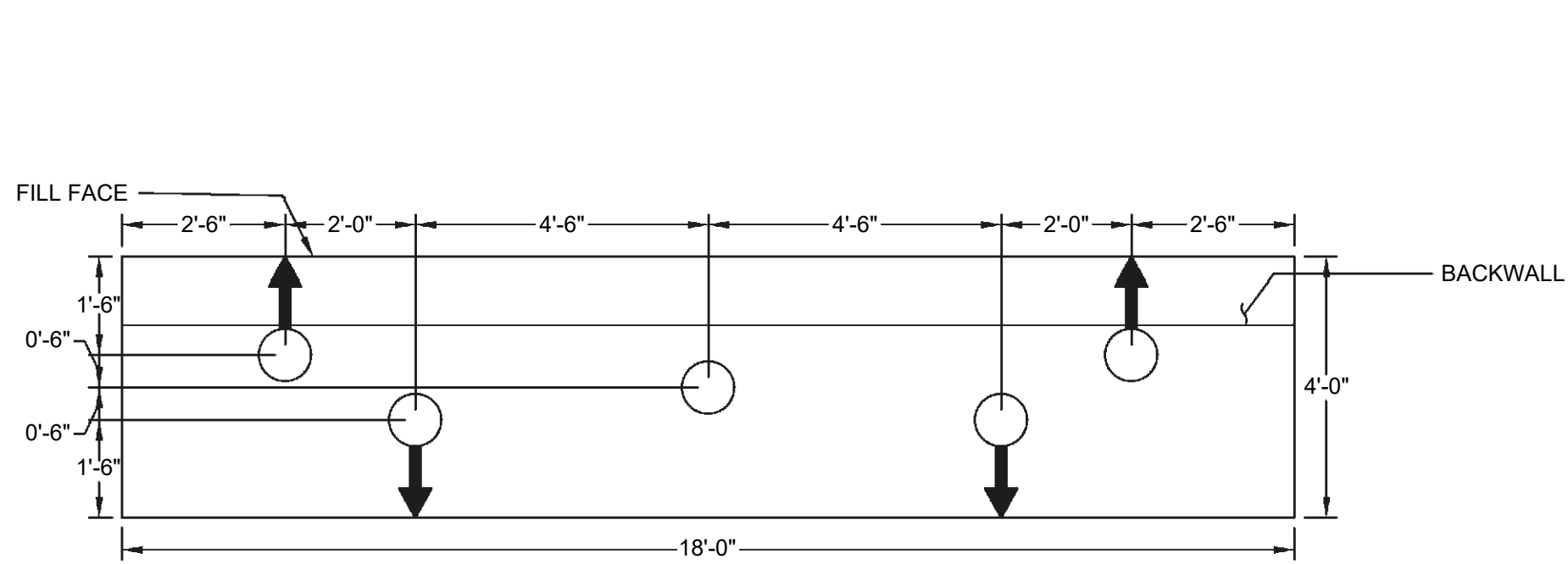
3902 Market Street,
Wilmington, NC 28405
schnabel-eng.com

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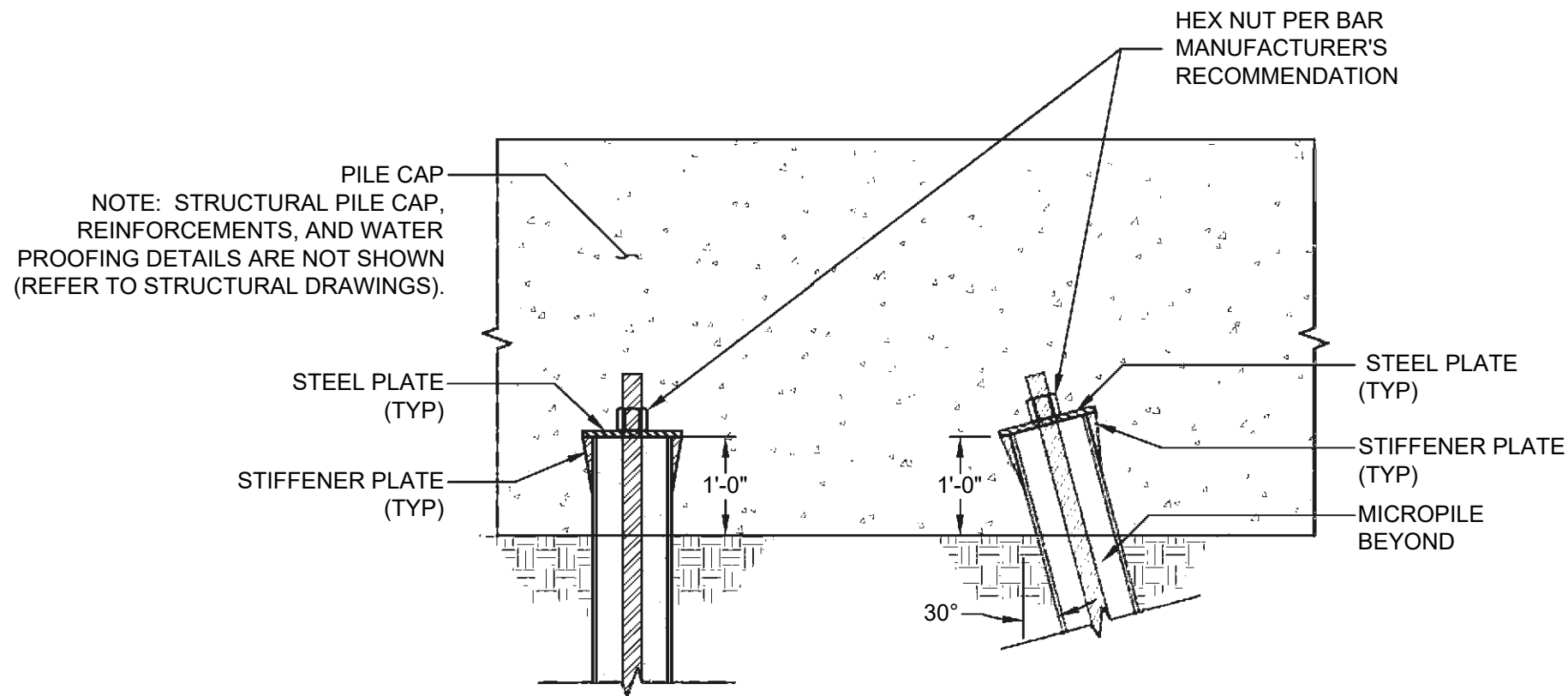
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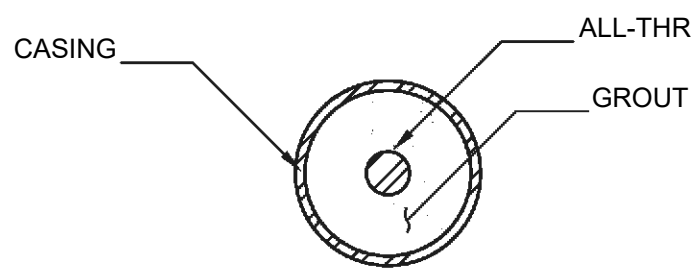
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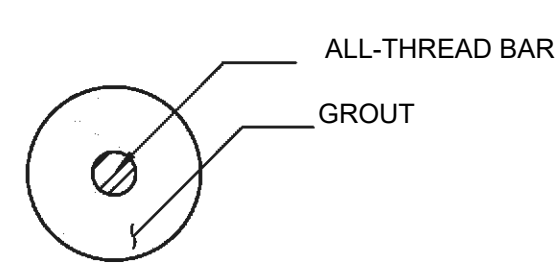
1 PILE CAP CONFIGURATION
Scale: N.T.S.



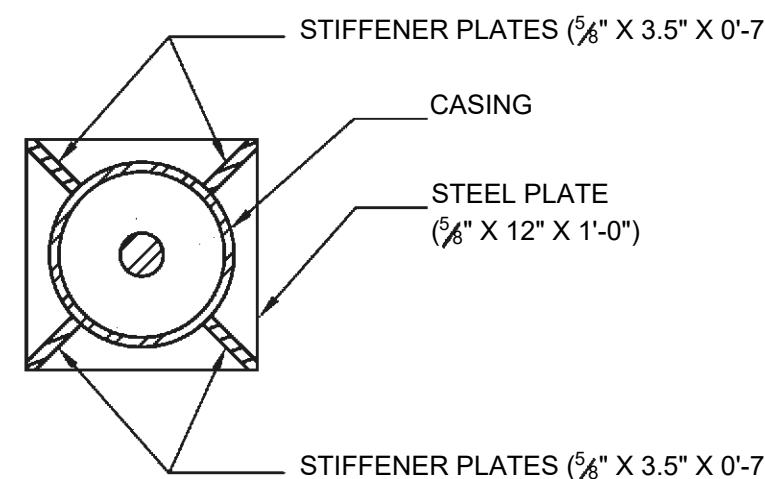
4 MICROPILE TO CAP CONNECTION
Scale: N.T.S.



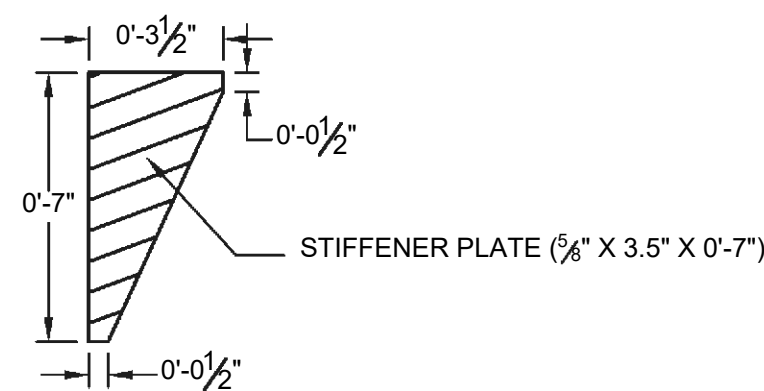
A UNBONDED LENGTH
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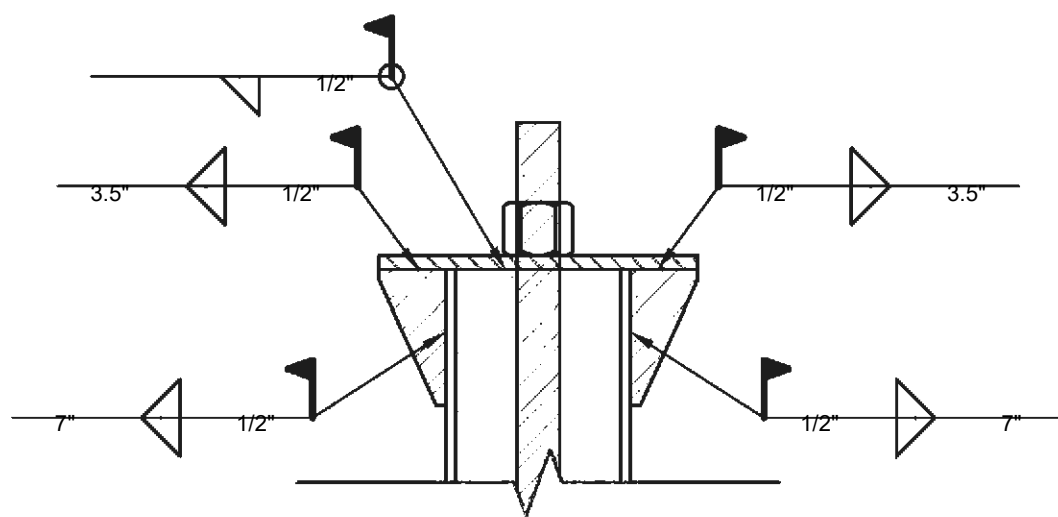
B BONDED LENGTH
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5 CASING, STEEL PLATE AND STIFFENER ARRANGEMENT (PLAN VIEW)
Scale: N.T.S.

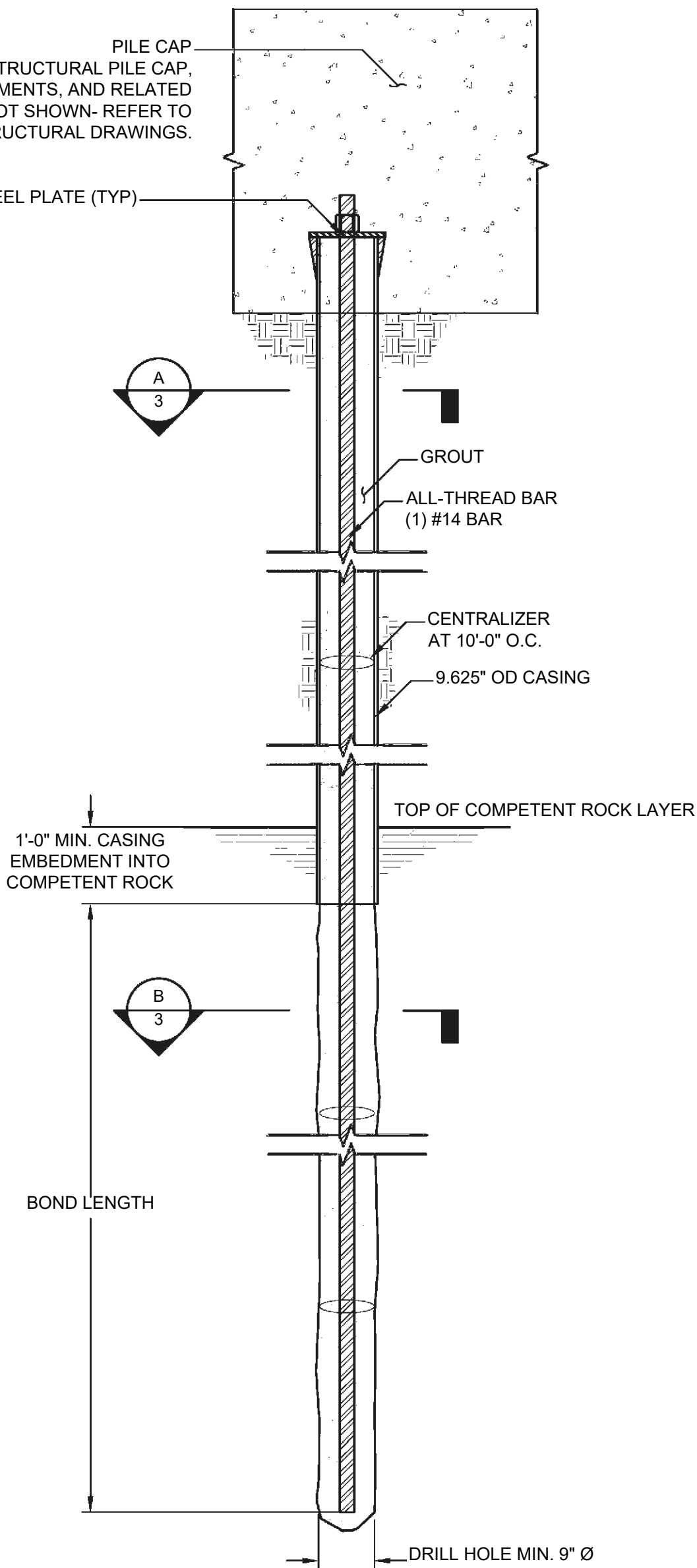


6 STIFFENER PLATE
Scale: N.T.S.

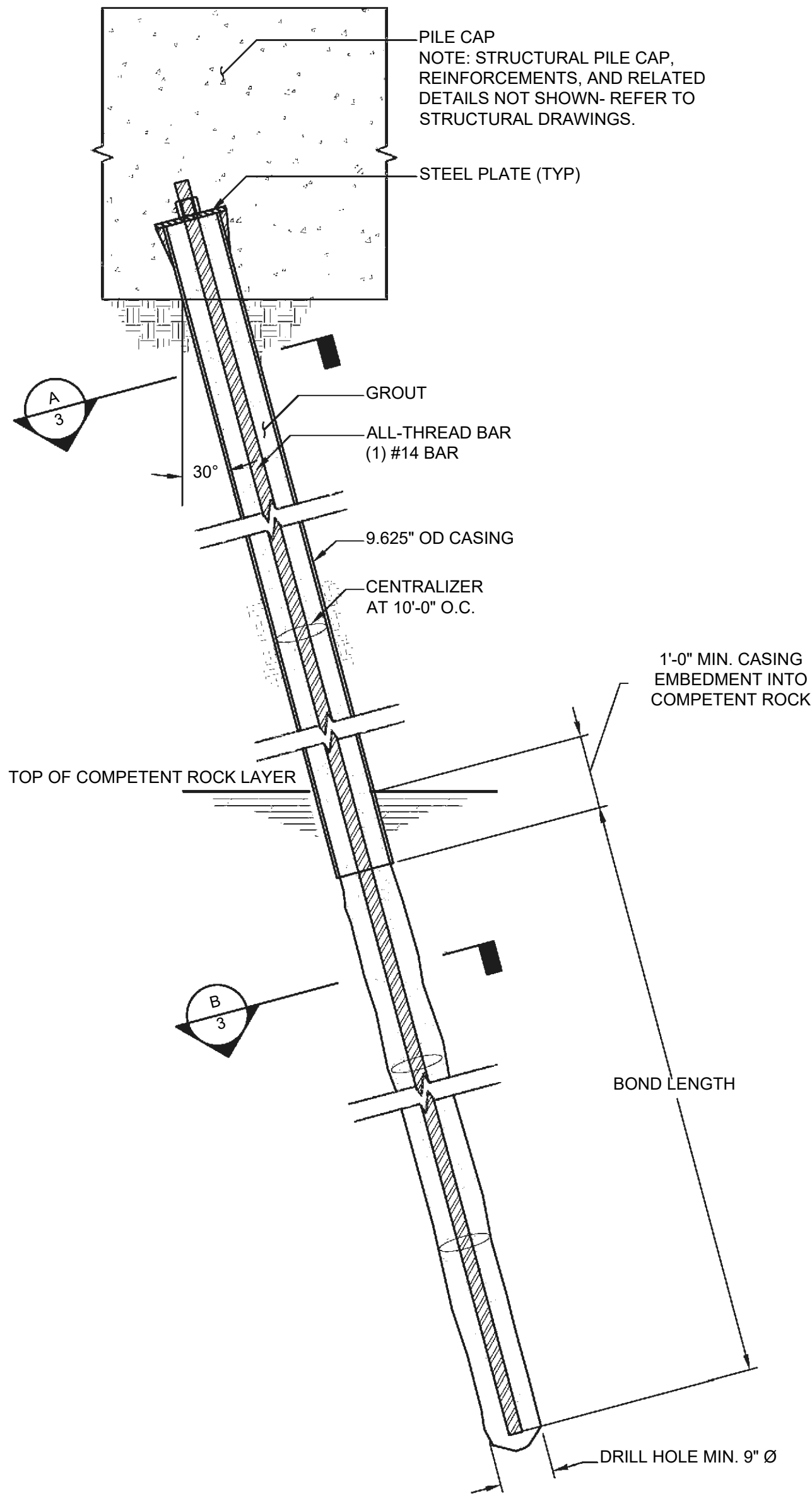


7 CASING, STEEL PLATE AND STIFFENER WELDED JOINT
Scale: N.T.S.

- NOTES:
1. PILE CAP DESIGN INCLUDING PILE CAP THICKNESS, AND PILE CAP REINFORCEMENT TO BE DETERMINED FROM STRUCTURAL DESIGN PERFORMED BY OTHERS.
 2. PRIOR TO INSTALLATION OF PRODUCTION MICROPILES, THE FOLLOWING VERIFICATION LOAD TEST NEEDS TO BE PERFORMED:
 - ONE (1) AXIAL LOAD TEST.
 3. MICROPILES USED FOR VERIFICATION LOAD TESTING SHALL BE SACRIFICIAL.
 4. CASING JOINT MUST NOT BE LOCATED WITHIN 5 FT DEPTH FROM THE BOTTOM OF THE PILE CAP.
 5. MICROPILE SHALL BOND INTO BEDROCK. GROUT-TO-ROCK BOND LENGTH ARE SUBJECT TO SITE SPECIFIC GEOTECHNICAL EXPLORATION. BOND STRENGTH TO BE PROVIDED BY THE GEOTECHNICAL ENGINEER AND CONFIRMED BY LOAD TEST.
 6. THE ENGINEER RESERVES THE RIGHT TO REVISE THE DESIGN AND ADJUST TIP ELEVATIONS AND BOND LENGTHS BASED ON LOAD TEST AND VERIFICATION TEST PERFORMANCE, AND ACTUAL GROUND CONDITIONS.
 7. REFER TO SHEET 1 - MICROPILE NOTES FOR ADDITIONAL INFORMATION AND REQUIREMENTS.



2 VERTICAL MICROPILE
Scale: N.T.S.



3 BATTERED MICROPILE
Scale: N.T.S.



DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

REVISIONS						SHEET NO. 2 OF 2
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 2
2			4			

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DWN. BY: ABS
CHKD. BY: JAS
DES. EGR. OF RECORD: BPS
DATE: 07/10/26
DATE: 07/10/26
DATE: 07/27/26