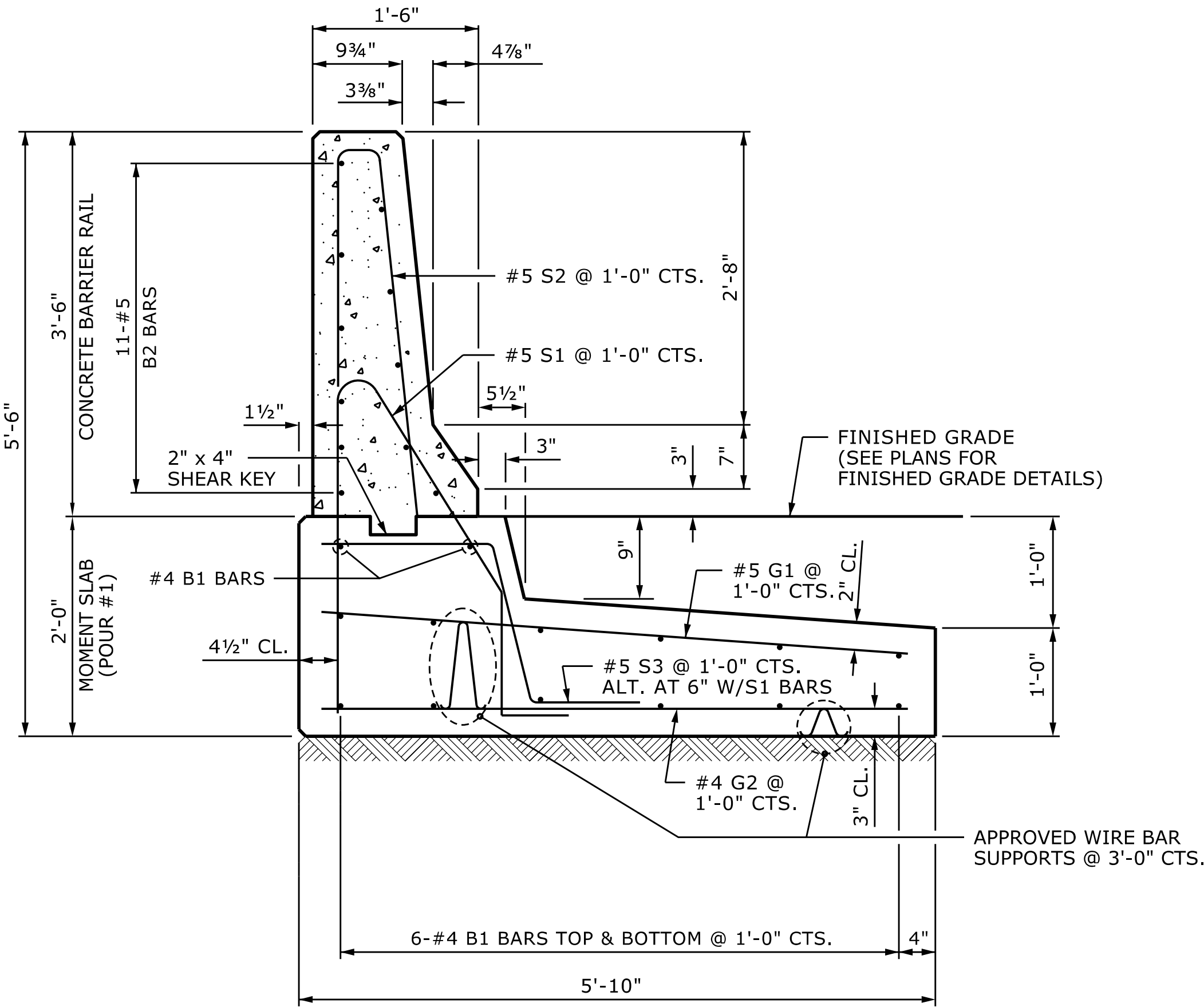
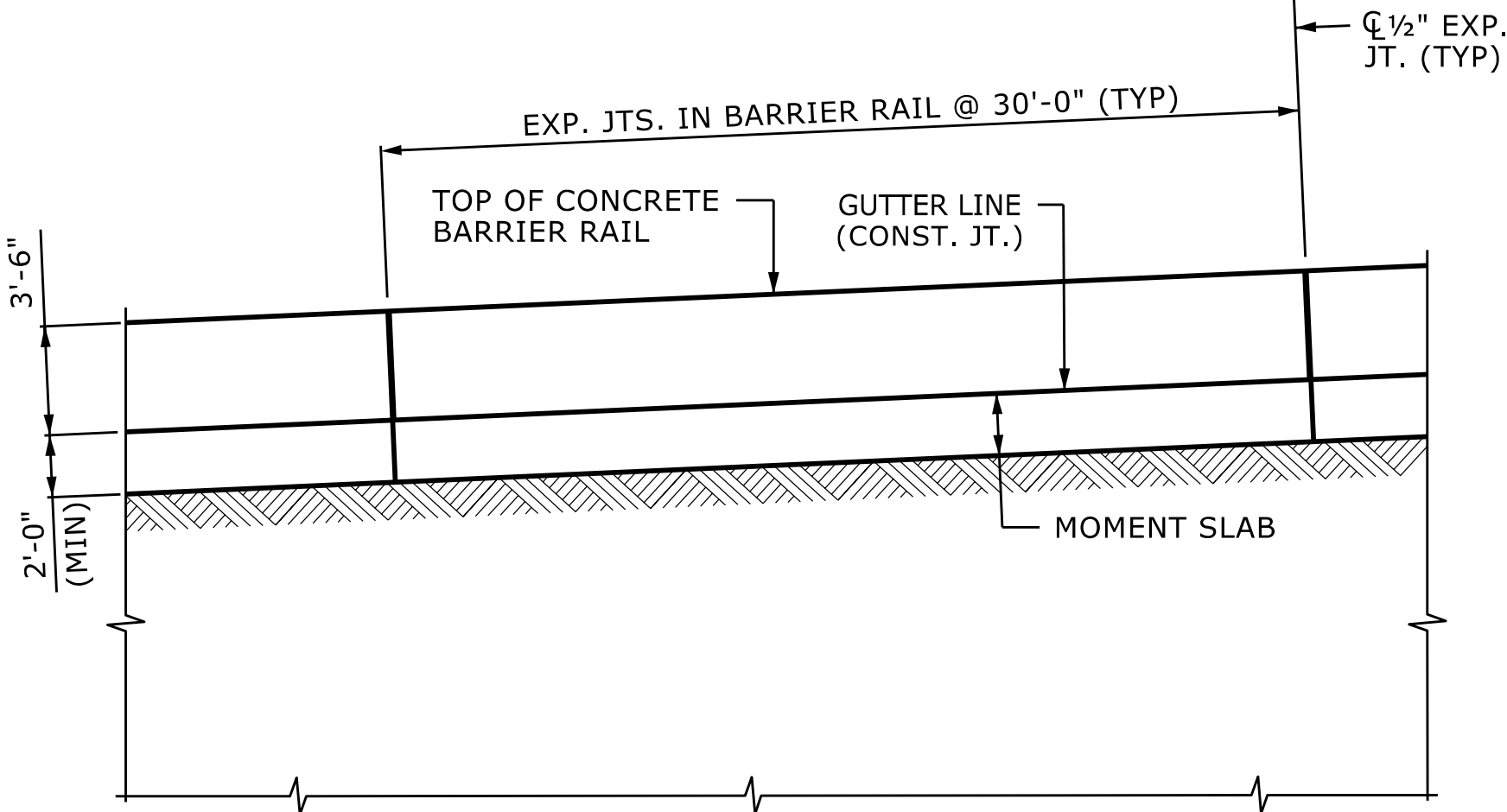




CONCRETE BARRIER RAIL WITH MOMENT SLAB



CONCRETE BARRIER RAIL WITH MOMENT SLAB - PARTIAL ELEVATION

NOTES:

FOR CONCRETE BARRIER RAIL WITH MOMENT SLAB, SEE SECTION 460 OF THE STANDARD SPECIFICATIONS.

CONCRETE BARRIER RAIL WITH MOMENT SLAB SHALL BE A MINIMUM OF 15' IN LENGTH BETWEEN FULL EXPANSION JOINTS.

EXPANSION JOINTS SHALL BE PLACED IN THE BARRIER RAIL AND MOMENT SLAB AT A MAXIMUM SPACING OF 30'.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED SURFACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MID-POINT OF BARRIER RAIL SEGMENTS LESS THAN 20' IN LENGTH.

THE BARRIER RAIL SHALL NOT BE CAST UNTIL THE MOMENT SLAB HAS ATTAINED AN AGE OF THREE CURING DAYS OR A MINIMUM COMPRESSIVE STRENGTH OF 2,000 PSI. IN ADDITION, NO FILL MATERIAL, ASPHALT, OR CONSTRUCTION EQUIPMENT IS ALLOWED ON THE MOMENT SLAB PRIOR TO SATISFYING THE MINIMUM CONCRETE CURING AND STRENGTH REQUIREMENTS.

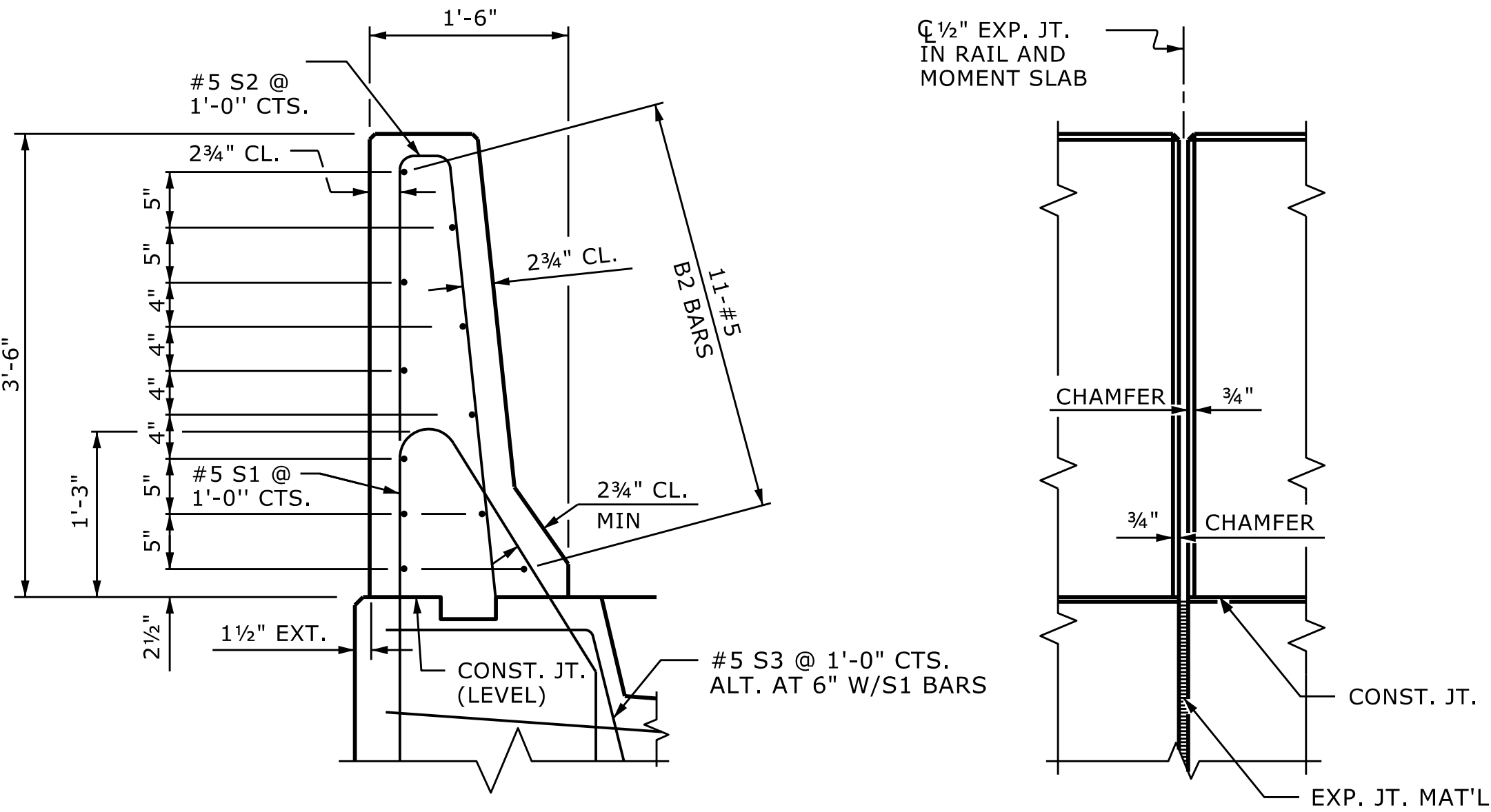
ALL REINFORCING STEEL IN THE BARRIER RAIL SHALL BE EPOXY COATED.

IF EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, BARRIERS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH CONCRETE BARRIER RAIL WITH MOMENT SLAB, CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS SHALL BE REVISED AND SUBMITTED FOR APPROVAL.

REPLACE 4" OF EXISTING MATERIAL BELOW MOMENT SLAB WITH CLASS IV SELECT MATERIAL. THIS SHALL BE INCLUDED IN THE COST OF THE MOMENT SLAB.

PROVIDE 1'-0" MIN. KEY IN ON BACK OF MOMENT SLAB.

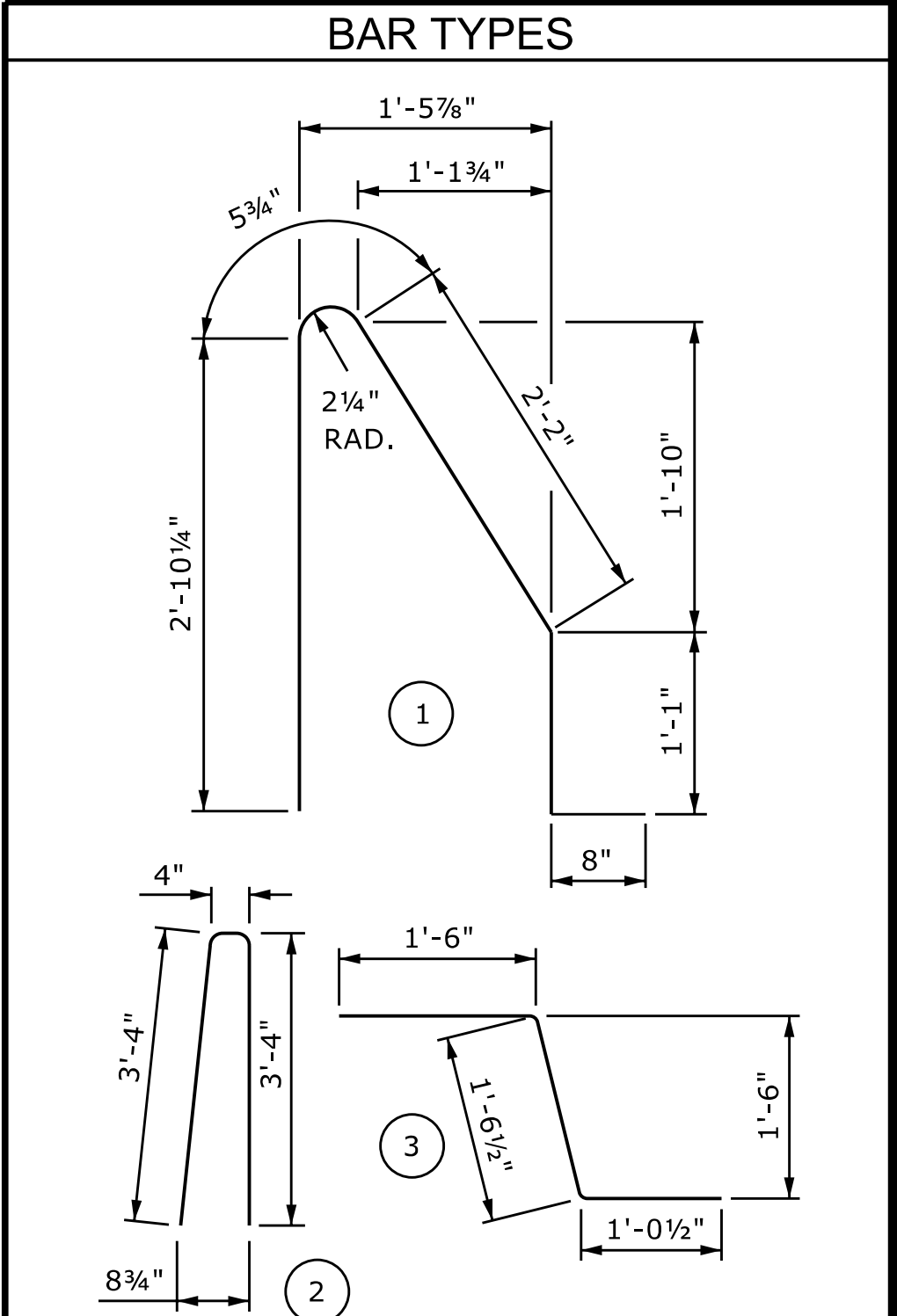
CONCRETE BARRIER RAIL WITH MOMENT SLAB
PAY LENGTH = 60.27 LIN FT



SECTION THRU RAIL

ELEV. @ EXP. JOINTS

BARRIER RAIL DETAILS

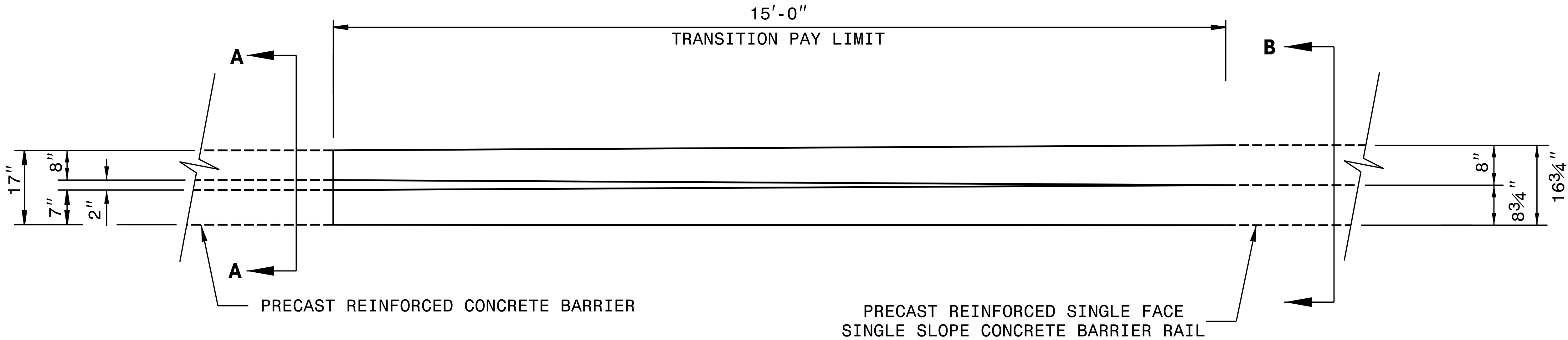


ALL BAR DIMENSIONS ARE OUT TO OUT

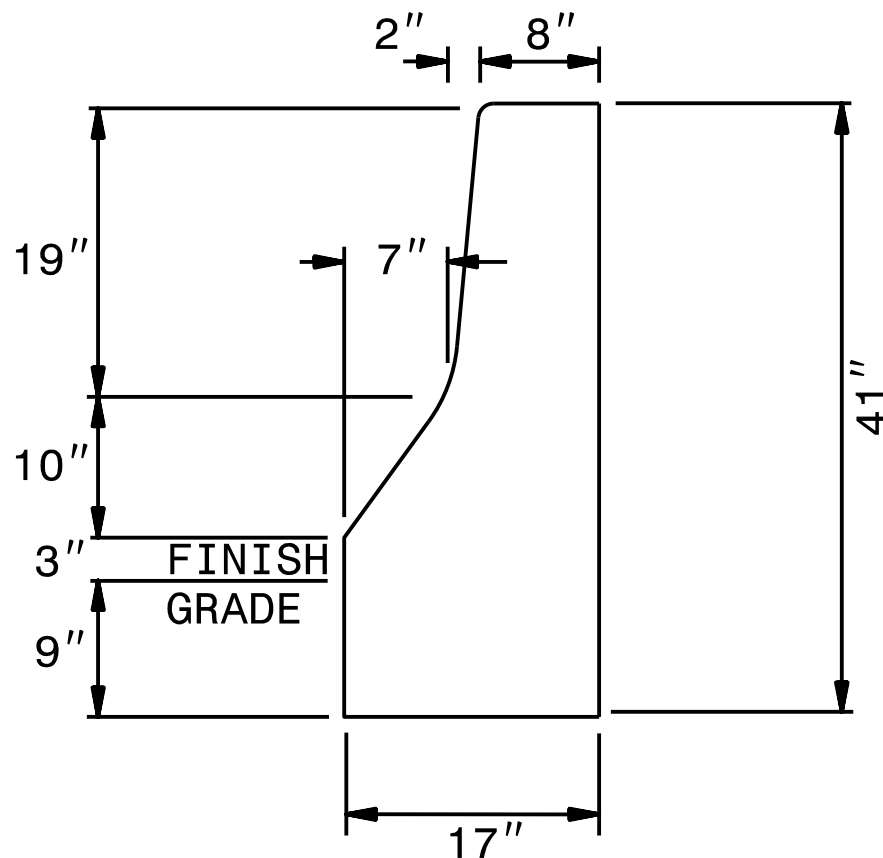
BILL OF MATERIAL

FOR ONE 30'-0" SECTION OF CONCRETE BARRIER RAIL WITH MOMENT SLAB					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#4	STR	29'-7"	277
* B2	11	#5	STR	29'-7"	339
G1	31	#5	STR	5'-6"	178
G2	31	#4	STR	5'-6"	114
* S1	31	#5	1	7'-3"	234
* S2	31	#5	2	7'-0"	226
S3	30	#5	3	4'-1"	128
REINFORCING STEEL					697 LB
* EPOXY COATED REINFORCING STEEL					799 LB
CLASS AA CONCRETE BARRIER RAIL					4.1 CY
CLASS A CONCRETE MOMENT SLAB					9.1 CY
CONCRETE BARRIER RAIL WITH MOMENT SLAB					30 LIN FT

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	2C-7

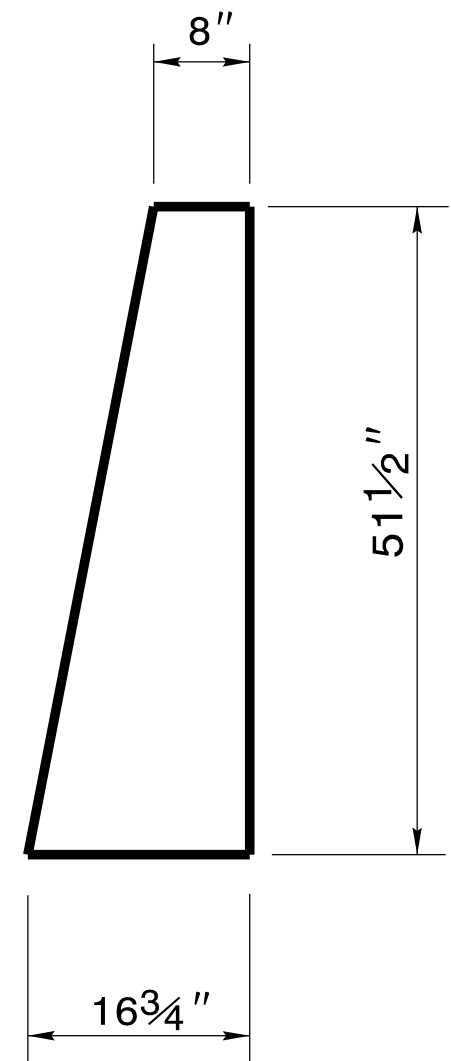


**TRANSITION FROM PRECAST REINFORCED CONCRETE BARRIER
TO PRECAST REINFORCED SINGLE FACE SINGLE SLOPE CONCRETE BARRIER RAIL**



SECTION A-A

PRECAST REINFORCED CONCRETE BARRIER



SECTION B-B

**PRECAST REINFORCED SINGLE FACE
SINGLE SLOPE CONCRETE BARRIER RAIL**

NOTES:

SEE SPECIAL DETAILS PERTAINING TO SINGLE SLOPE BARRIERS
FOR CONSTRUCTION METHODS AND STEEL PLACEMENT.

SEE RDWY. STD DWG. 857.01 FOR PRECAST REINFORCED CONCRETE BARRIER
CONSTRUCTION METHODS AND STEEL PLACEMENT.

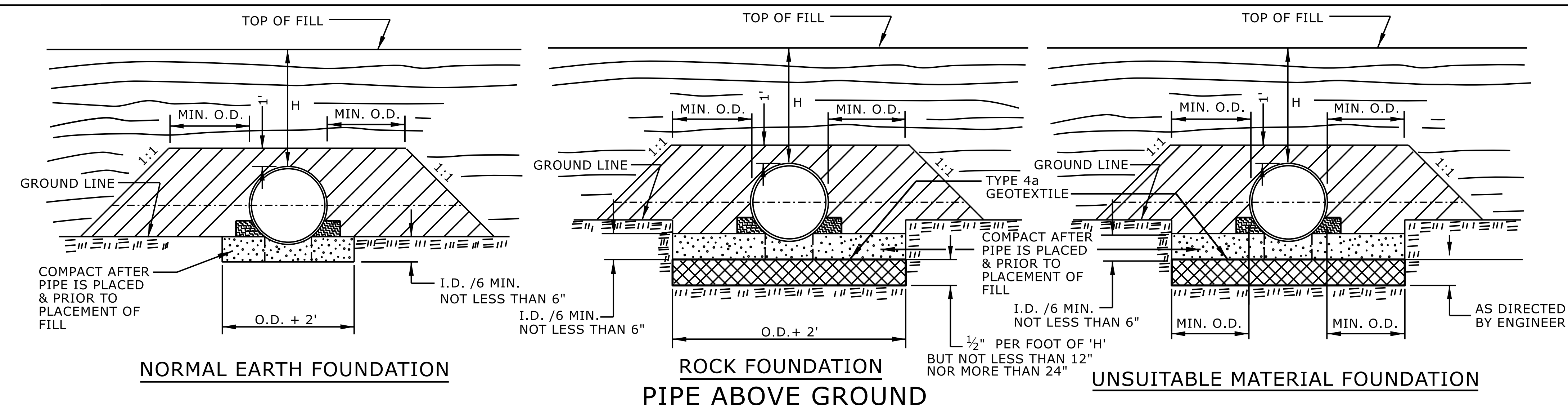
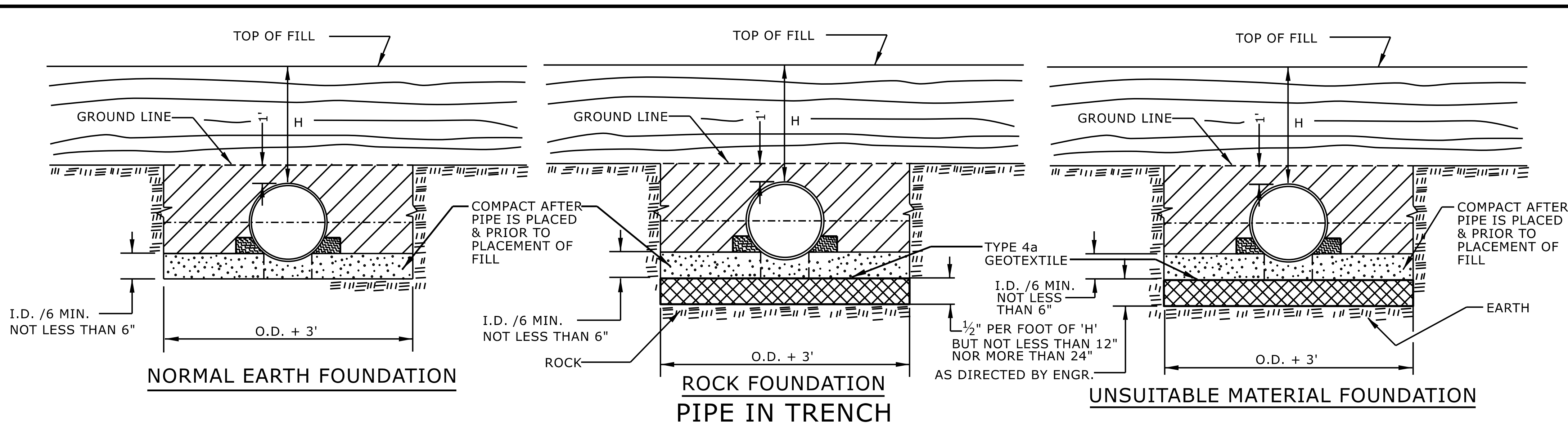
DIMENSIONS OF CONCRETE MEDIAN BARRIER ARE
APPROXIMATE AND SHOULD BE FIELD VERIFIED.

DocuSigned by:
Mohammed Fallaha
4D2654746C7D4E2...
8/10/2026



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**CONCRETE BARRIER
TRANSITION**



GENERAL NOTES:
 I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.
 O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.
 H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT
 ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP
 OF THE EMBANKMENT AT THAT POINT.

	APPROVED SUITABLE LOCAL MATERIAL.
	TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.
	LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

DO NOT OPERATE HEAVY EQUIPMENT OVER ANY PIPE CULVERT UNTIL THE PIPE CULVERT HAS BEEN PROPERLY BACKFILLED AND COVERED WITH AT LEAST 3 FEET OF APPROVED MATERIAL.

REFER TO NCDOT PIPE MATERIAL SELECTION GUIDE AND STANDARD SPECIFICATIONS
FOR ALLOWABLE PIPE FILL HEIGHTS AND PIPE SPECIFICATIONS.

	SPRINGLINE OF PIPE
	SELECT BACKFILL MATERIAL CLASS III OR CLASS II, TYPE 1 ABOVE AND BELOW SPRINGLINE.
	UNDISTURBED EARTH MATERIAL
	SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH TYPE IV GEOTEXTILE AS DIRECTED BY THE ENGINEER.

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ROADWAY DETAIL DRAWING FOR METHOD OF PIPE INSTALLATION FLEXIBLE PIPE

SHEET 1 OF 2

300.01



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ROADWAY DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION
RIGID PIPE

SHEET 2 OF 2
300.01

TOP OF FILL

NORMAL EARTH FOUNDATION

TOP OF FILL

**ROCK FOUNDATION
PIPE IN TRENCH**

TOP OF FILL

UNSUITABLE MATERIAL FOUNDATION

TOP OF FILL

NORMAL EARTH FOUNDATION

TOP OF FILL

**ROCK FOUNDATION
PIPE ABOVE GROUND**

TOP OF FILL

UNSUITABLE MATERIAL FOUNDATION

GENERAL NOTES:

I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.

O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.

H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP OF THE EMBANKMENT AT THAT POINT.

APPROVED SUITABLE LOCAL MATERIAL.

TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.

LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

DO NOT OPERATE HEAVY EQUIPMENT OVER ANY PIPE CULVERT UNTIL THE PIPE CULVERT HAS BEEN PROPERLY BACKFILLED AND COVERED WITH AT LEAST 3 FEET OF APPROVED MATERIAL.

REFER TO NCDOT PIPE MATERIAL SELECTION GUIDE AND STANDARD SPECIFICATIONS FOR ALLOWABLE PIPE FILL HEIGHTS AND PIPE SPECIFICATIONS.

SPRINGLINE OF PIPE

SELECT BACKFILL MATERIAL CLASS III OR CLASS II, BELOW SPRINGLINE.

UNDISTURBED EARTH MATERIAL

SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH TYPE IV GEOTEXTILE AS DIRECTED BY THE ENGINEER.



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Nicole M. Hacker
588432303418405...
8/10/2026

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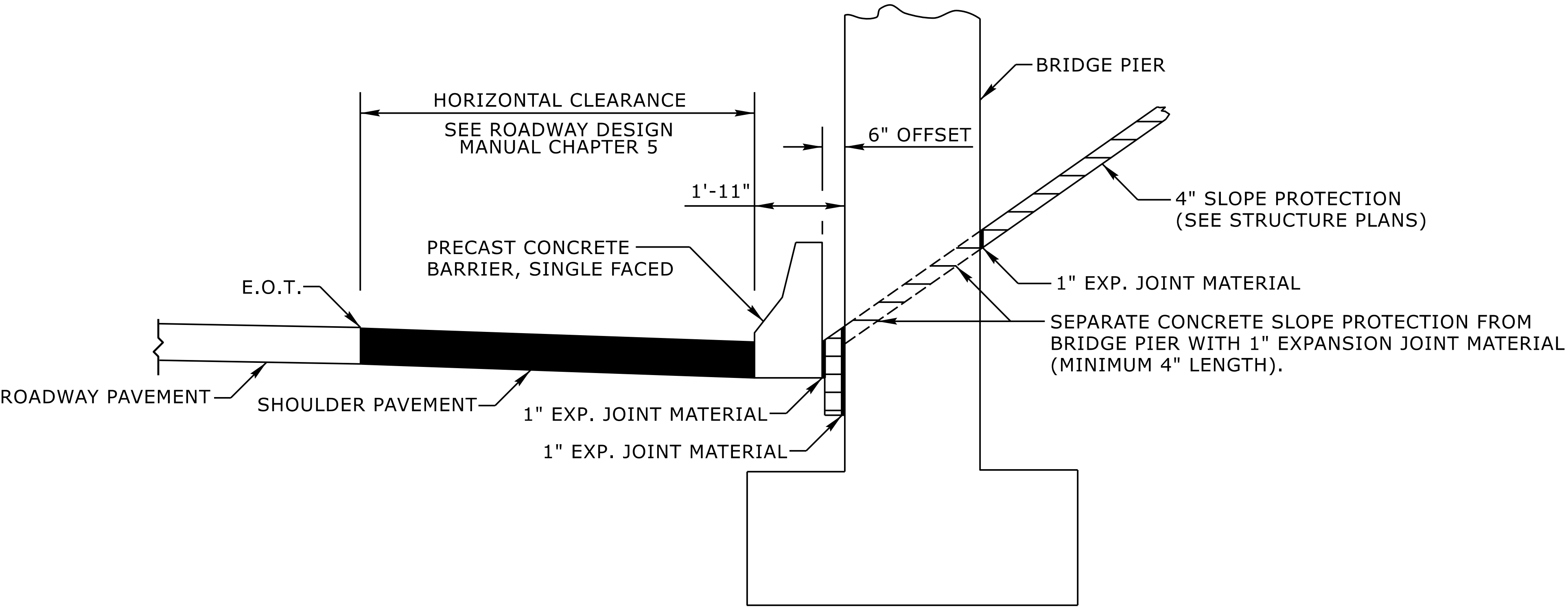
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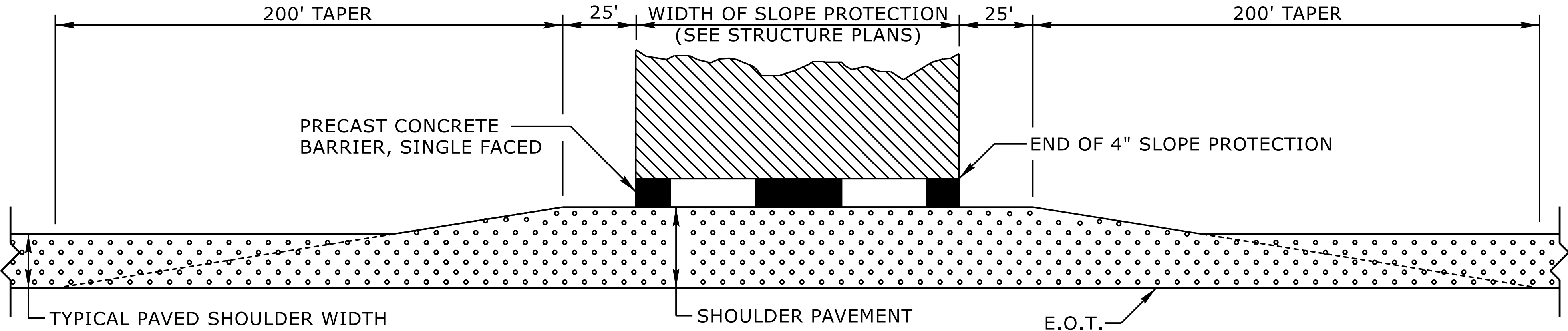
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ELEVATION



PLAN

- NOTES:
1. SHOULDER PAVEMENT SHOULD BE CONSTRUCTED AS SHOWN IN THE PLANS WITH THE SAME PAVEMENT DESIGN USED ON THE PAVED SHOULDER APPROACHING THE STRUCTURE UNDERPASS.
 2. SLOPE PROTECTION SHALL BE REINFORCED CONCRETE IN ACCORDANCE WITH SECTION 462.

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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
**GUIDE FOR PAVING
SHOULDERS UNDER BRIDGES**
METHOD I

SHEET 1 OF 1

610D01



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Nicole M. Hickler
5884323034184C5...
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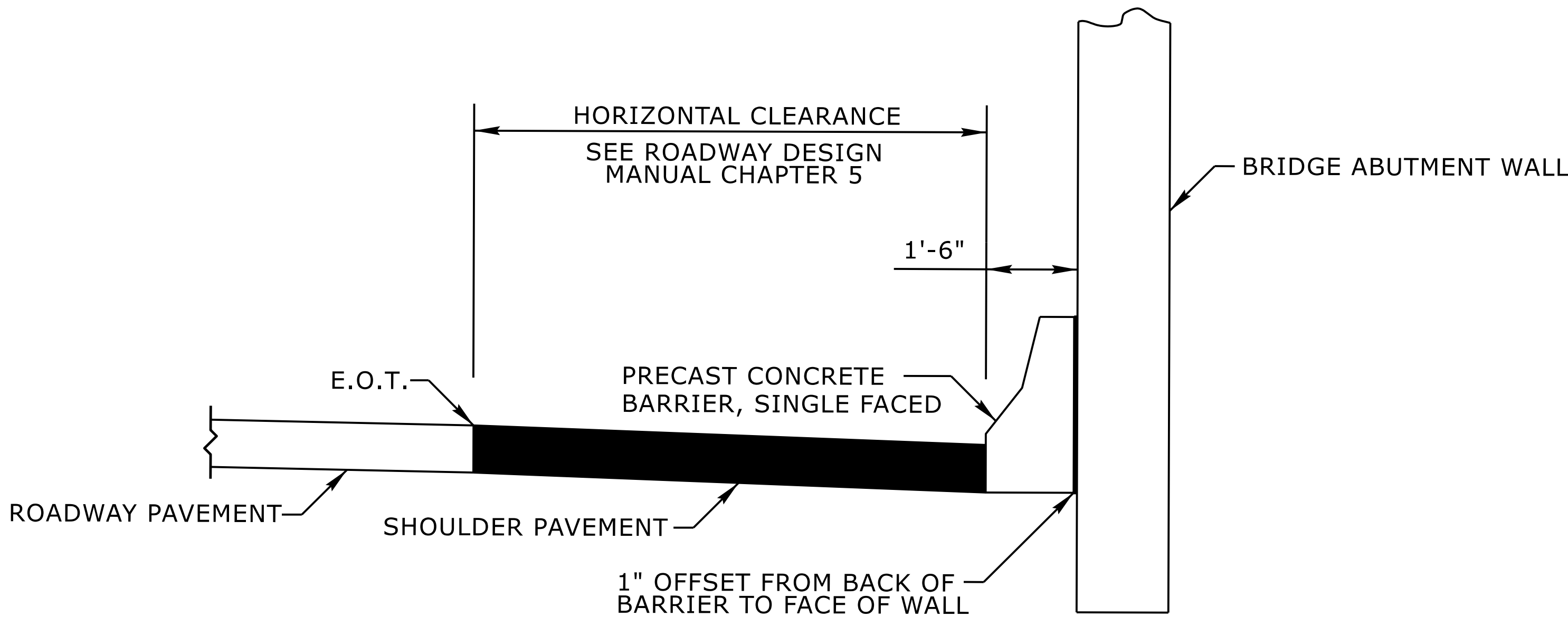
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AND DEVELOPMENT UNIT**

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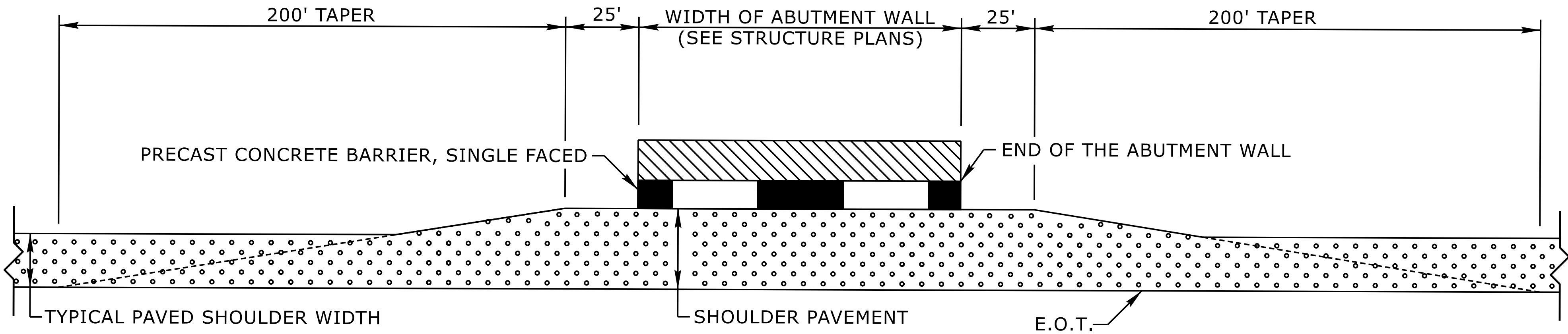
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I-2513AC	2C-11



ELEVATION



PLAN

NOTE:
1. SHOULDER PAVEMENT SHOULD BE CONSTRUCTED AS SHOWN IN THE PLANS WITH THE SAME PAVEMENT DESIGN USED ON THE PAVED SHOULDER APPROACHING THE STRUCTURE UNDERPASS.

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ROADWAY DETAIL DRAWING FOR
**GUIDE FOR PAVING
SHOULDER UNDER BRIDGES**
METHOD IV

SHEET 1 OF 1
610D04



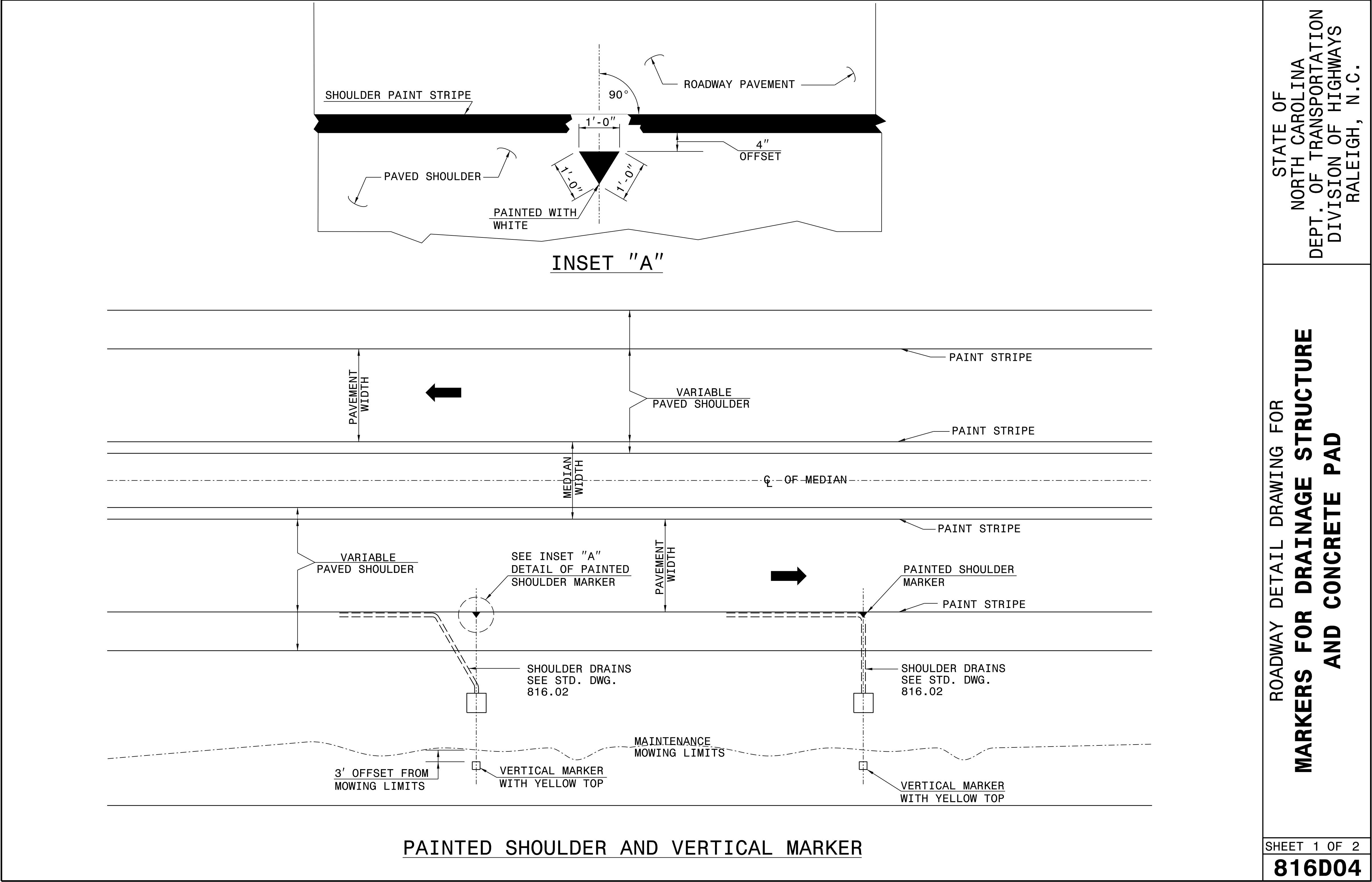
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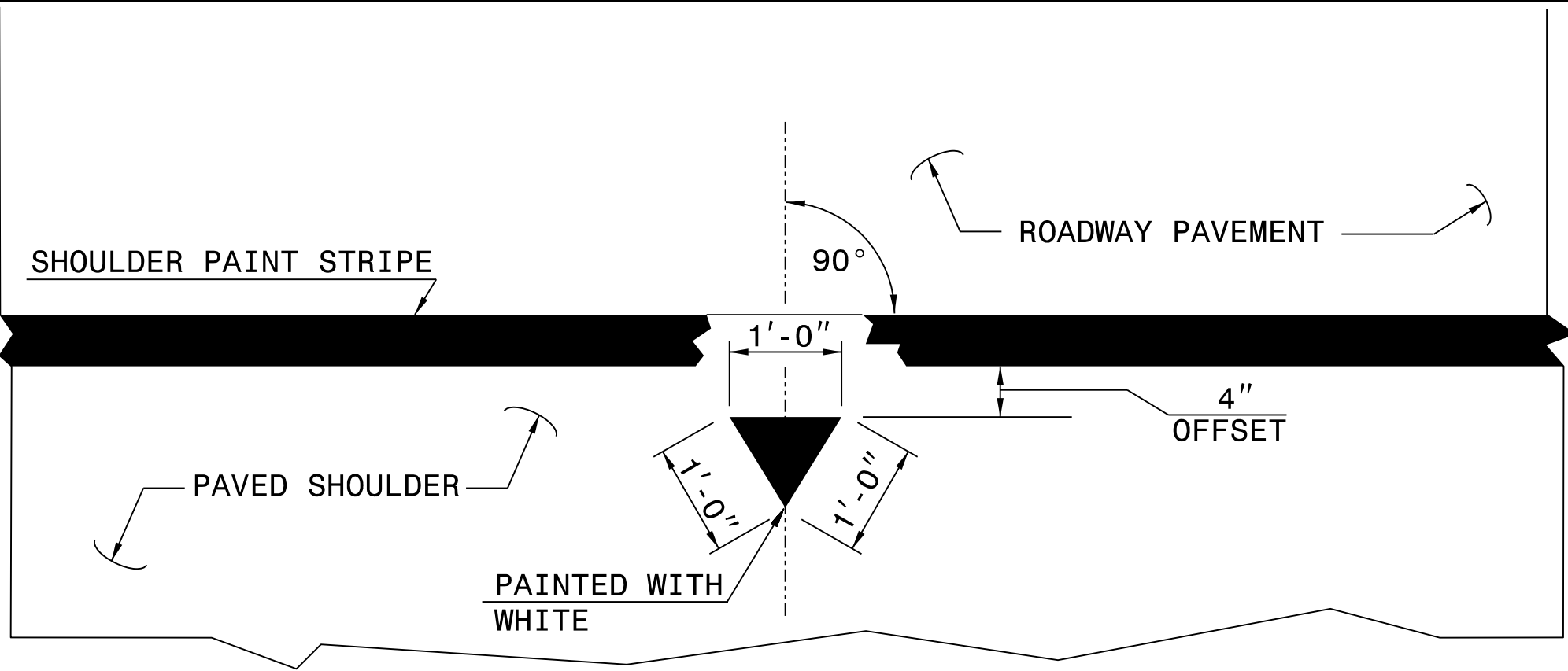
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INSET "A"



PAINTED SHOULDER AND VERTICAL MARKER

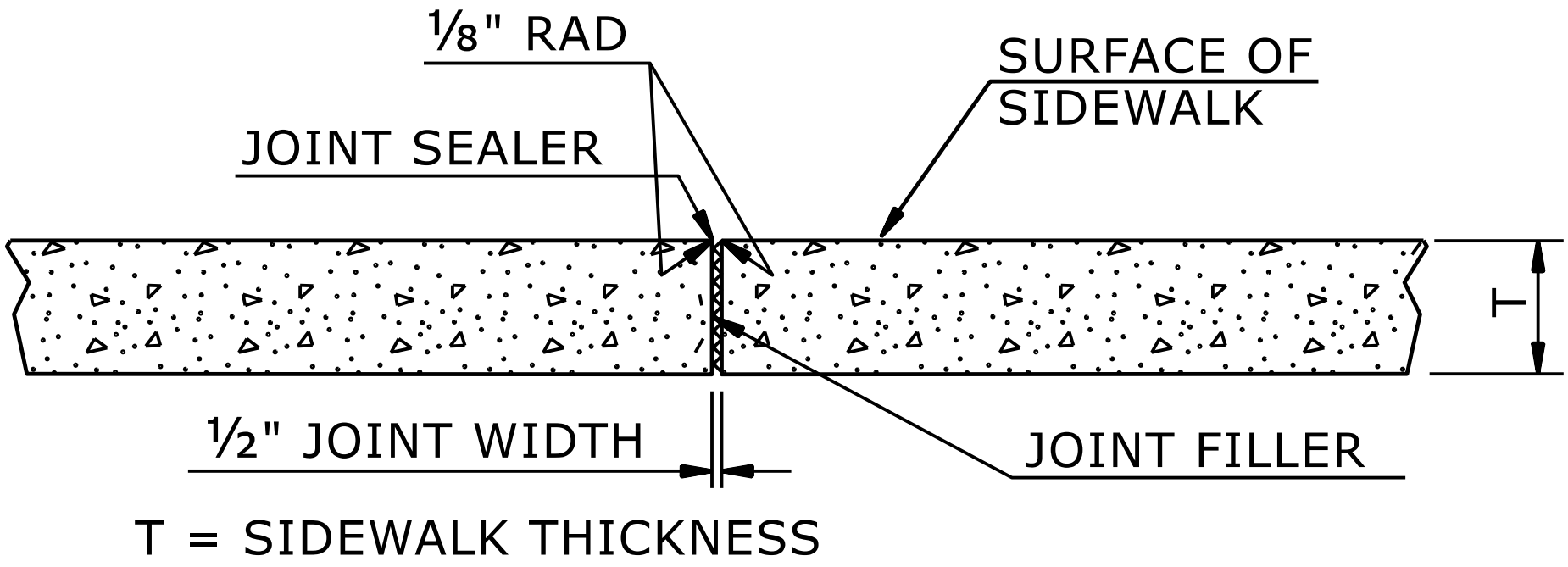
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I-2513AC	2C-13

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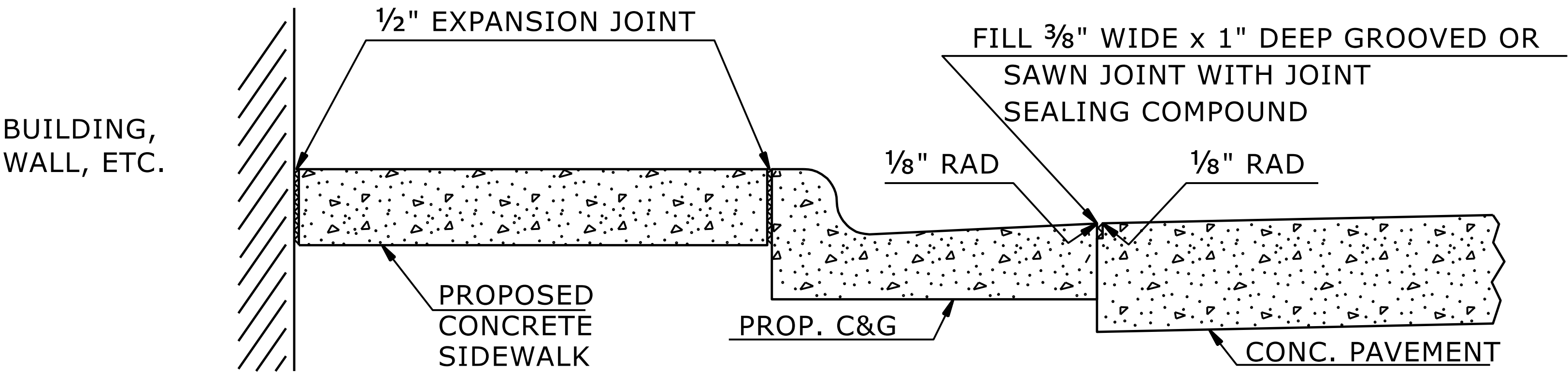
CONSTRUCT STANDARD SIDEWALK 5' WIDE AND 4" THICK UNLESS OTHERWISE DENOTED ON PLANS.

PLACE A GROOVE JOINT 1" DEEP WITH 1/8" RADII IN THE CONCRETE SIDEWALK AT 5' INTERVALS. ONE 1/2" EXPANSION JOINT WILL BE REQUIRED AT 50' INTERVALS. A 1/2" EXPANSION JOINT WILL BE REQUIRED WHERE THE SIDEWALK JOINS ANY RIGID STRUCTURE.

SEE STD. DWG. 848.06 FOR CURB RAMP LOCATION REQUIREMENTS AND CONSTRUCTION GUIDELINES.



TRANSVERSE EXPANSION JOINT
IN SIDEWALK



DETAILS SHOWING JOINTS IN CONCRETE SIDEWALK

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ROADWAY DETAIL DRAWING FOR
CONCRETE SIDEWALK



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SHEET 1 OF 1
848D01

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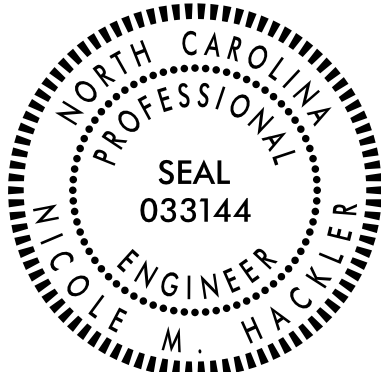
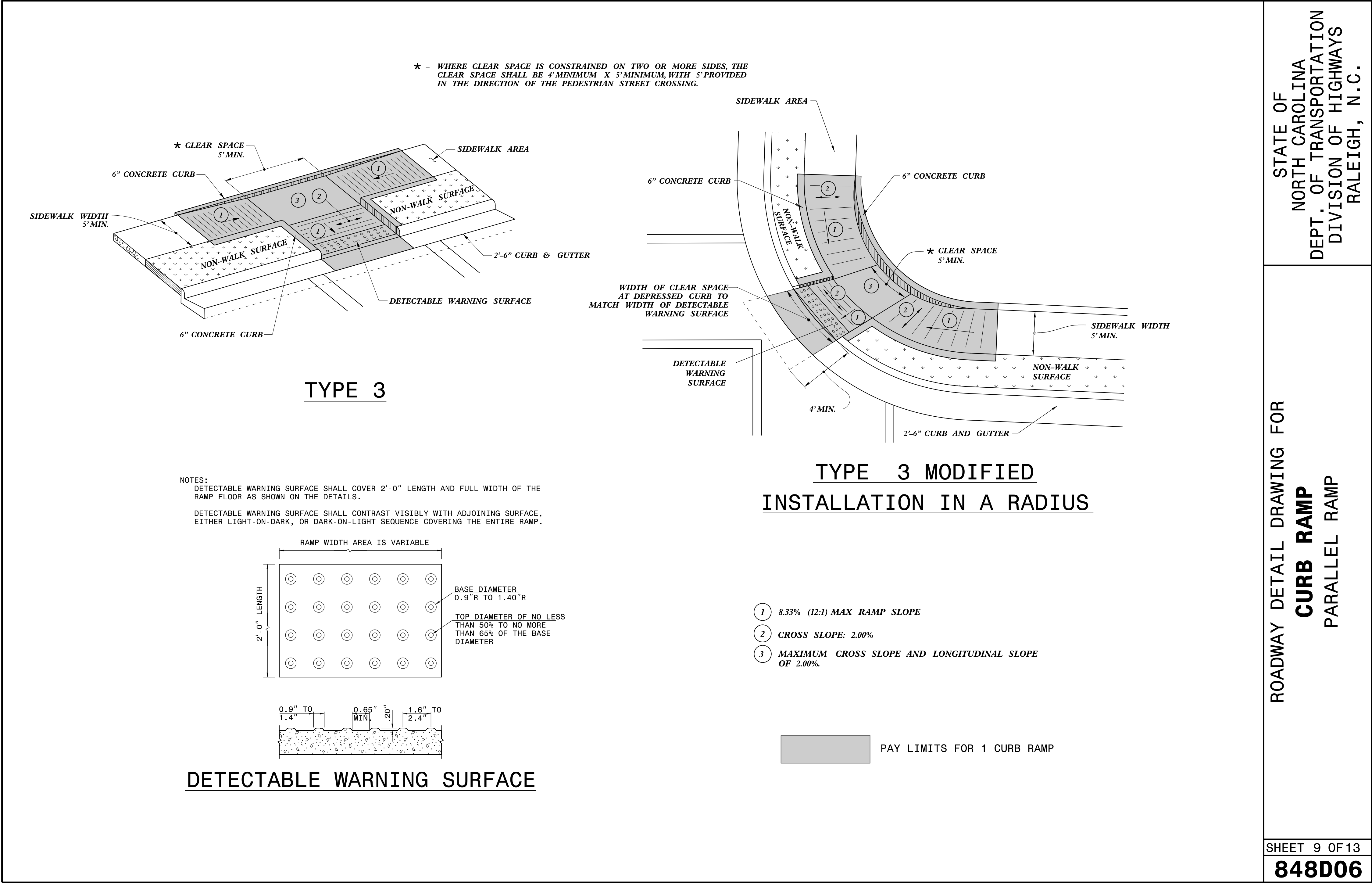
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5884323D304164C5
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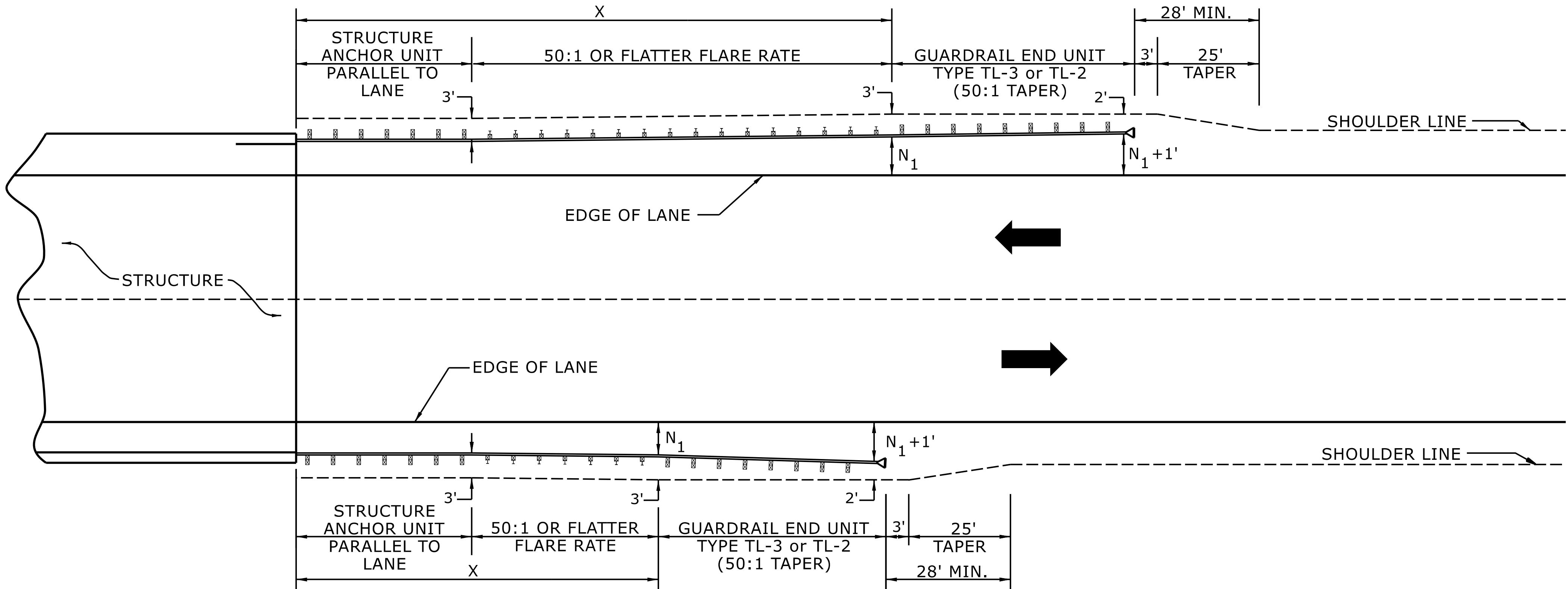
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I-2513AC	2C-15



USE FLARE RATE AS THE CONTROL IF THE "N₁" DISTANCE IS NOT OBTAINED.
("N₁" IS BASED ON SHOULDER WIDTHS IN THE ROADWAY DESIGN MANUAL)

SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

FOR POSTED SPEEDS ≥ 45MPH USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45MPH USE GREU TYPE TL-2

GUARDRAIL LENGTH OF NEED (X) IS CALCULATED BASED ON THE AASHTO ROADSIDE DESIGN GUIDE.

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



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58843203416405...
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LENGTHS AND OFFSETS FOR PROPOSED GUARDRAIL AT TWO LANE - TWO WAY LOCATIONS

SHEET 4 OF 15

862D01

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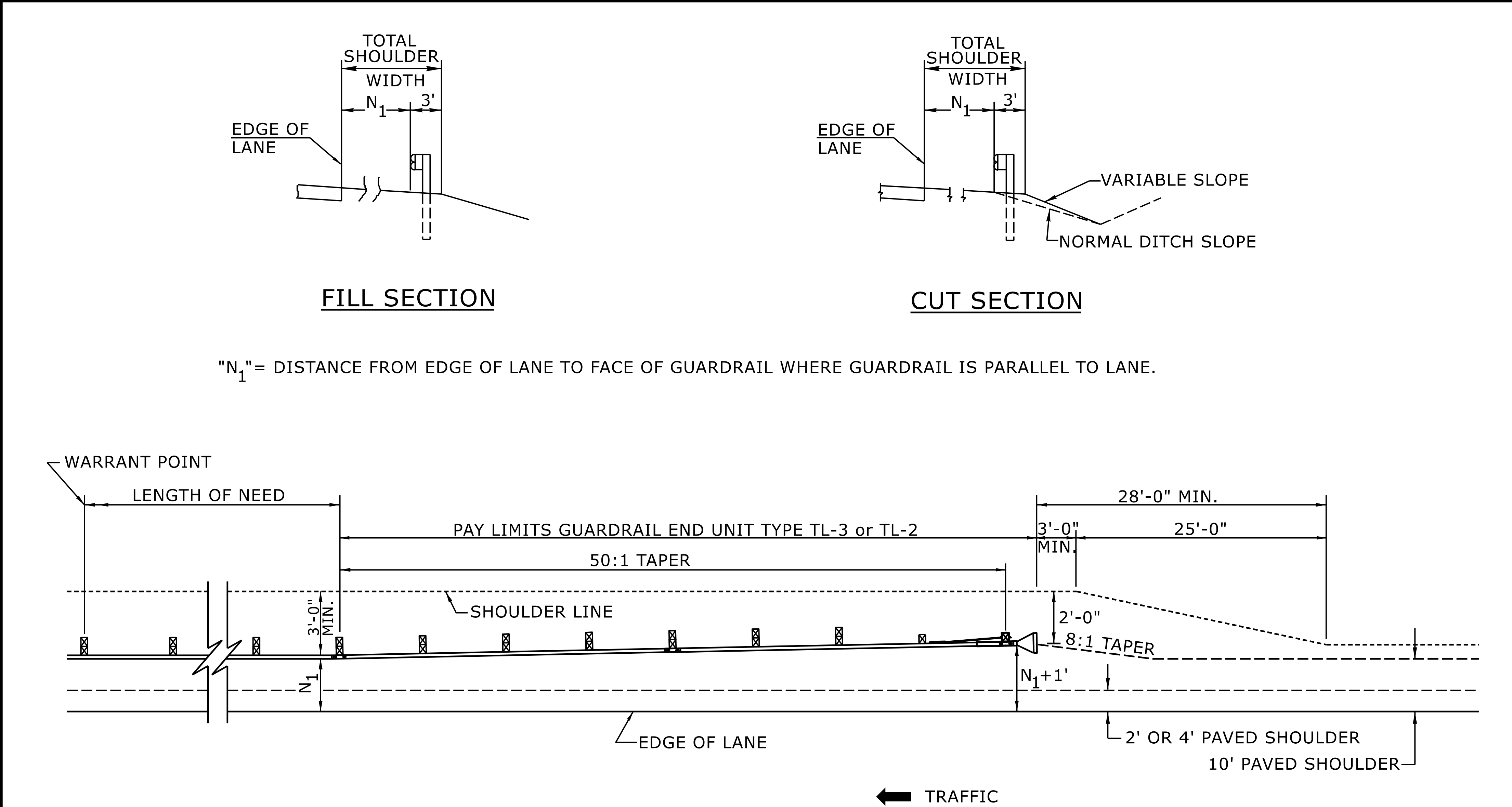
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I-2513AC	2C-16

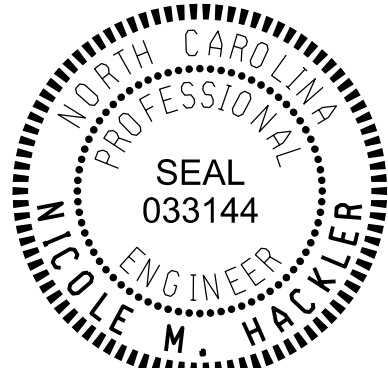


FOR POSTED SPEEDS $\geq$ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS $<$ 45mph USE GREU TYPE TL-2

DETAIL OF BEGINNING OF GUARDRAIL IN CUT OR FILL SECTION

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



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58843203416405...
8/10/2026

SHEET 6 OF 15
862D01

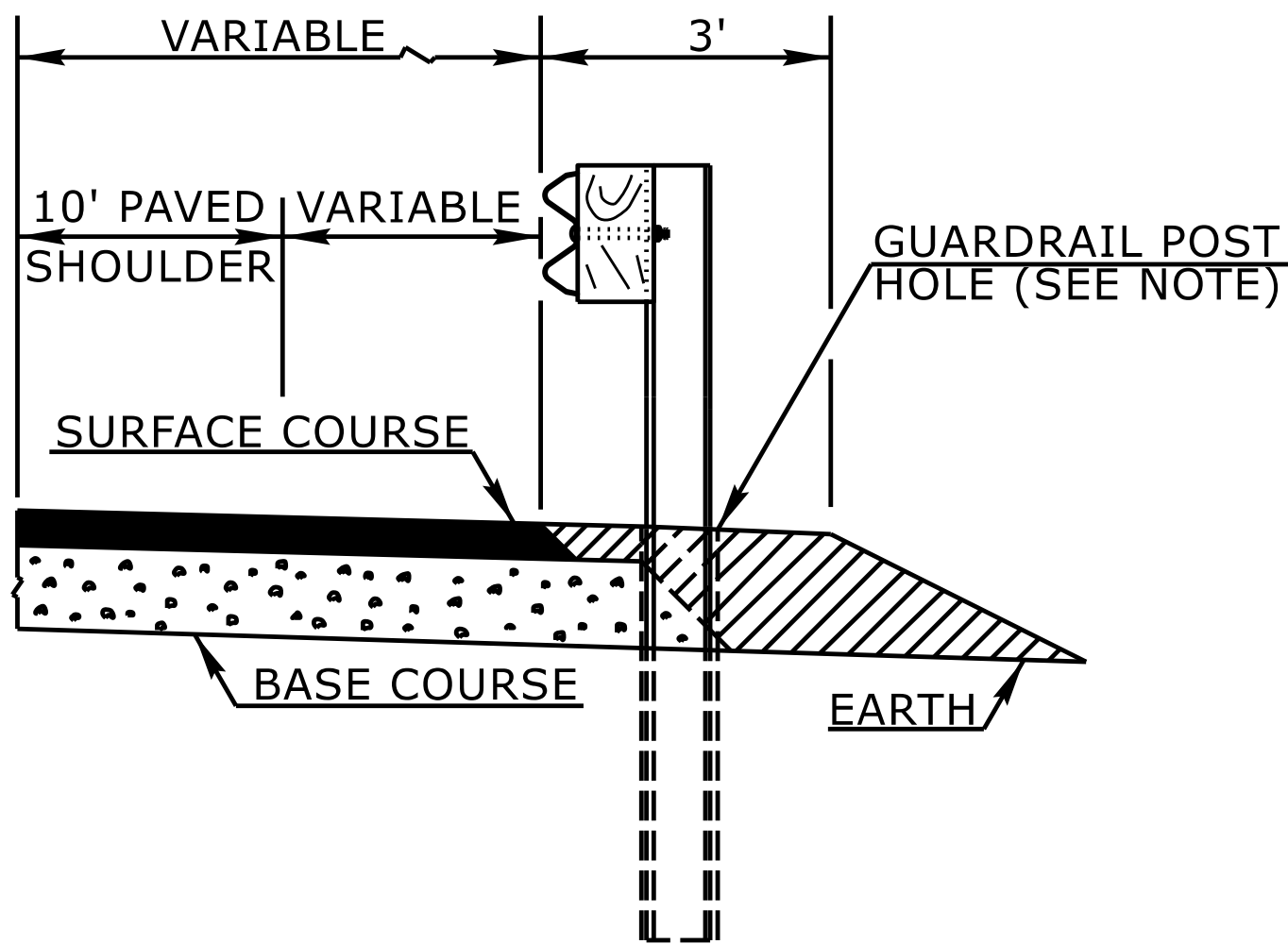
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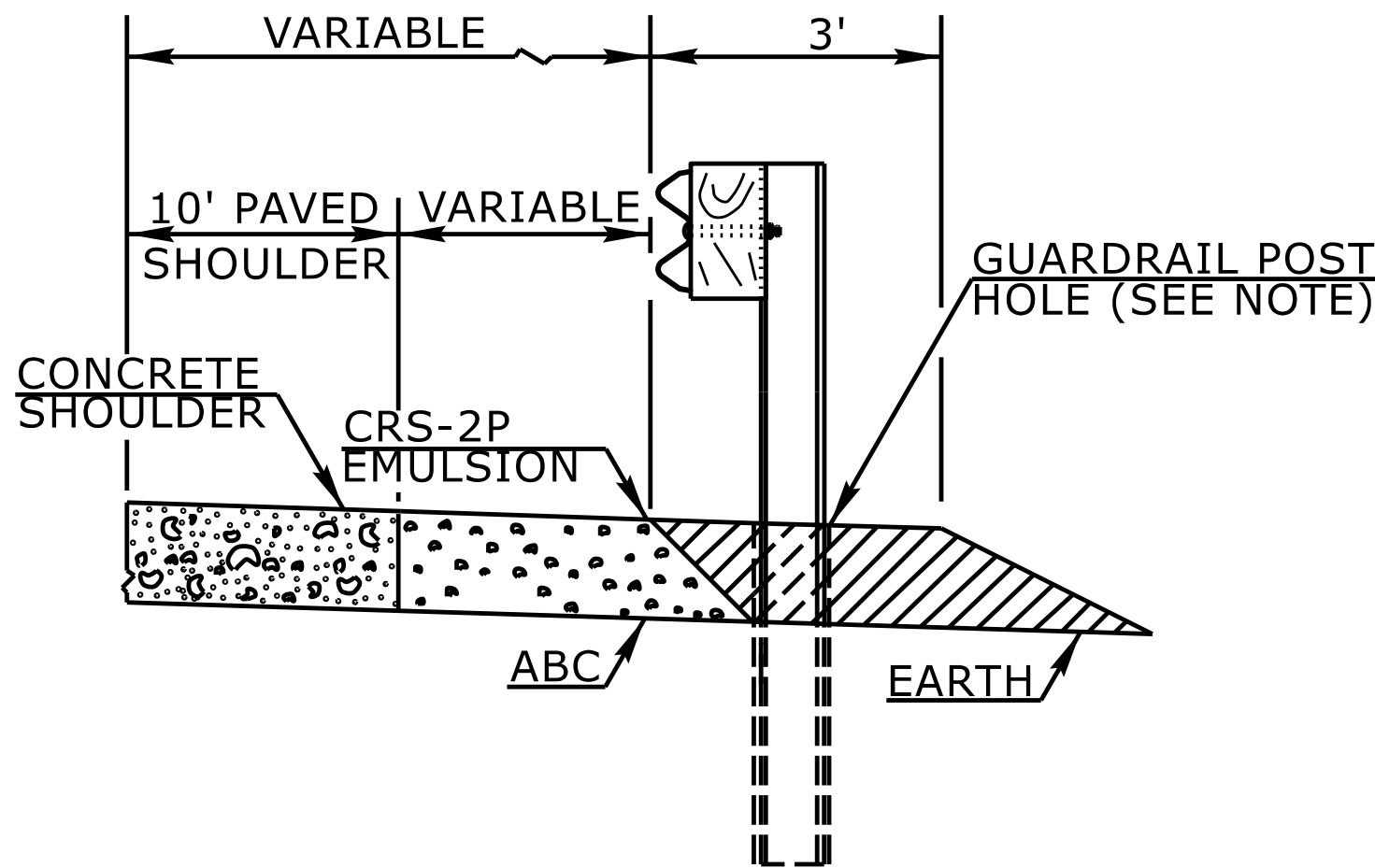
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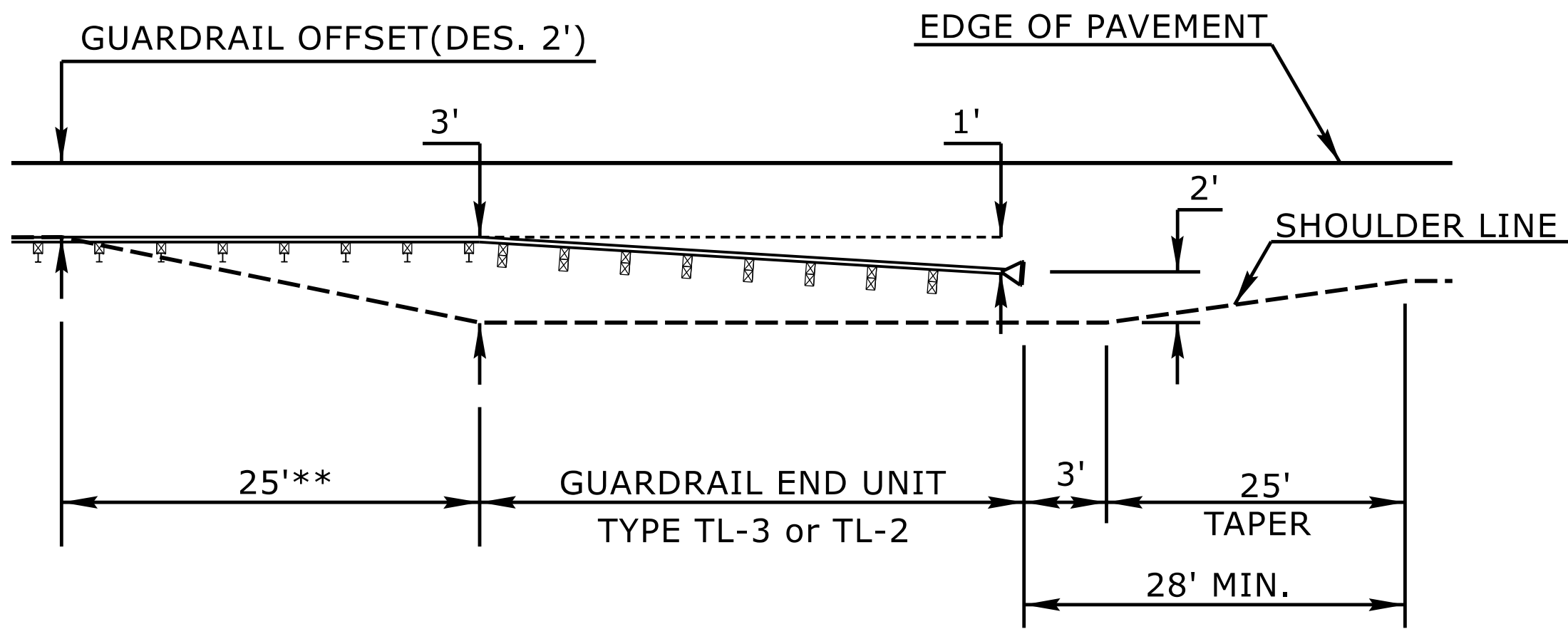
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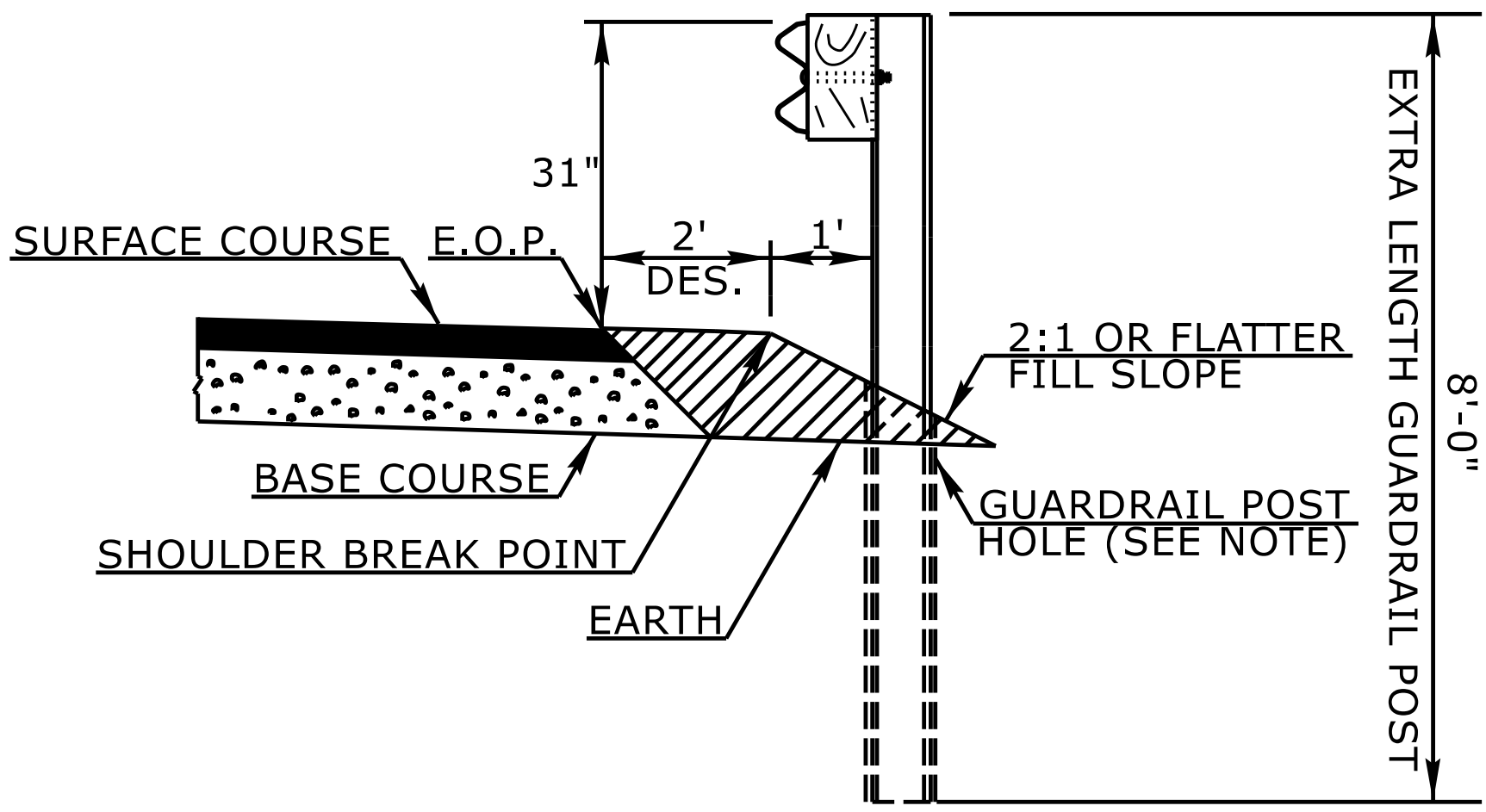
FLEXIBLE PAVED SHOULDER



CONCRETE PAVED SHOULDER



8' GUARDRAIL POST ON 2:1 SLOPE-END UNIT TRANSITION*
PLAN VIEW



8' GUARDRAIL POST ON 2:1 SLOPE*

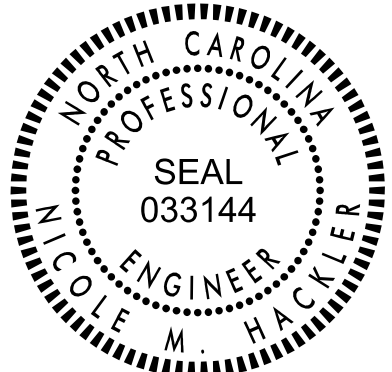
- * THE 8' GUARDRAIL POST ON 2:1 SLOPE DETAIL IS INTENDED FOR USE ONLY IN SEVERELY CONSTRAINED AREAS WITH A POSTED SPEED $\leq$ 60 MPH. GUARDRAIL END UNITS MAY NOT BE PLACED ON THE 2:1 SLOPE AND MUST TRANSITION TO THE SHOULDER.
- ** 8' GUARDRAIL POST SHOULD BE USED IN THIS RANGE

NOTE:
WHEN WOODEN GUARDRAIL POSTS ARE USED, DRILL HOLES THROUGH EARTH MATERIAL AND BASE COURSE. THE POST MAY THEN BE DRIVEN TO THE PROPER DEPTH. DRILL THE HOLE OF SUFFICIENT SIZE TO ACCOMMODATE THE PARTICULAR POST BEING USED. BACKFILL AND TAMP HOLES USING THE EXCAVATED MATERIAL.

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 11 OF 15
862D01



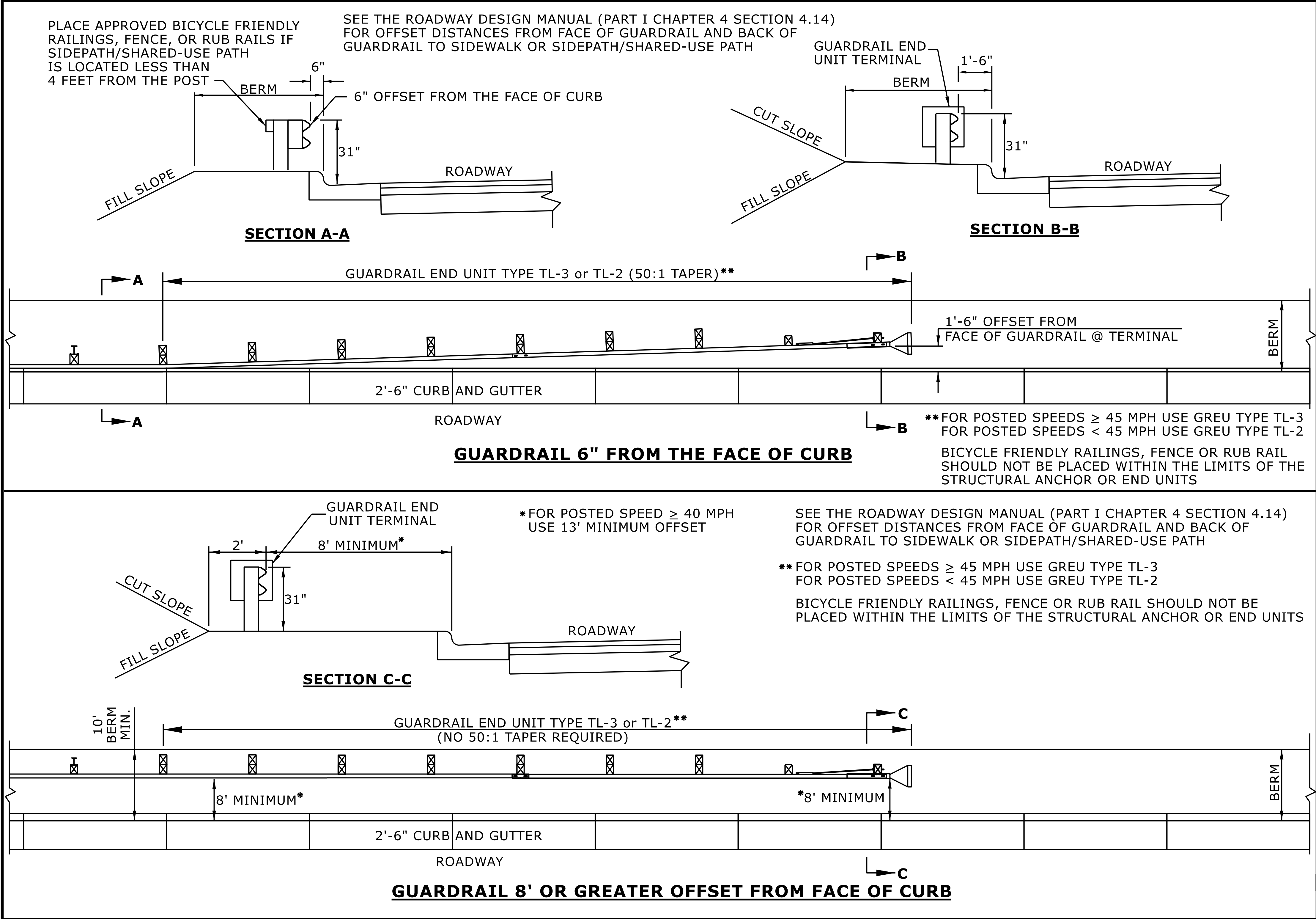
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58843203418405...
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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT
GUARDRAIL TREATMENT AT CURB AND GUTTER

SHEET 12 OF 15
862D01



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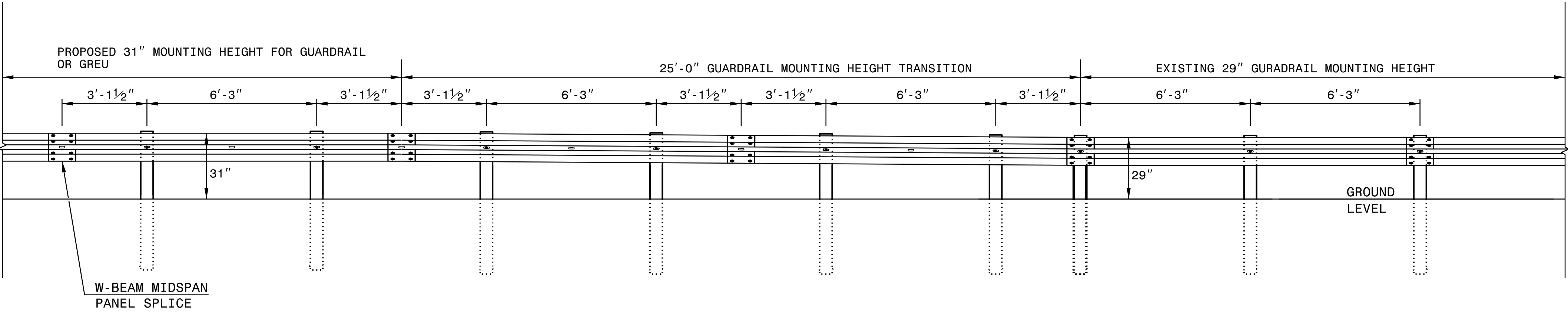
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NOTE: IF EXISTING GUARDRAIL IS LOWER THAN 29", USE AN ADDITIONAL 12'-6" LONG SECTION OF GUARDRAIL,
FOR EVERY 1" OF HEIGHT DIFFERENCE, TO TRANSITION FROM EXISTING GUARDRAIL TO PROPOSED 31" GUARDRAIL.



ELEVATION VIEW

TRANSITION FROM 29" TO 31" W-BEAM GUARDRAIL MOUNTING HEIGHT

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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 5 OF 9
862D02



Signed by:
Nicole M. Hacker
0884332034164CS...
8/10/2026

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**CONTRACTS STANDARDS
AND DEVELOPMENT UNIT**
Office 919-707-8950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: K. Aldridge DATE: 02-25
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.:



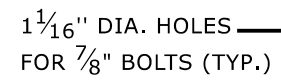
STEEL SPACER TUBE



THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 7/8" DIA. BOLTS WITH NUTS AND WASHERS.

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.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL. THE 1¼" DIA. 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.

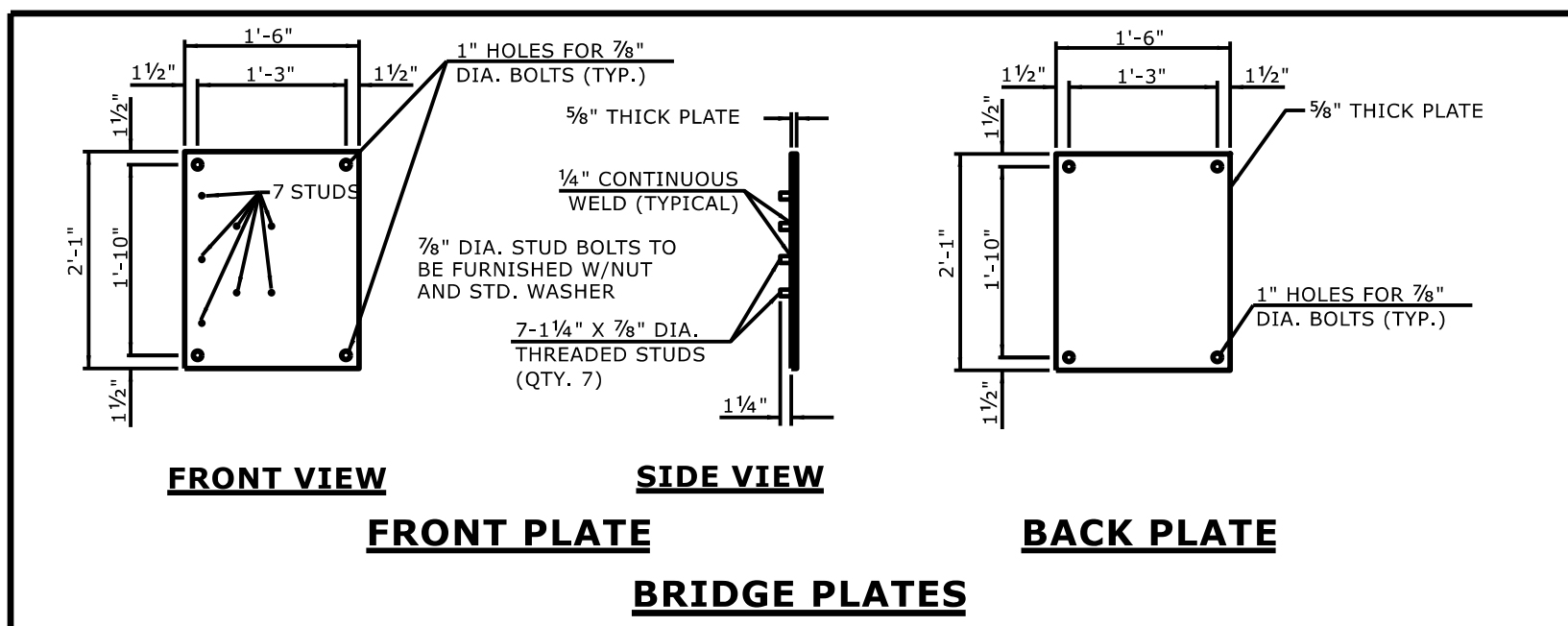


7 BOLT HOLD DOWN PLATE



- GENERAL NOTES:

1. USE NUTS, BOLTS, AND WASHERS CONFORMING TO THE REQUIREMENTS OF A.S.T.M. A-307 AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF STAND. SPECS.
2. TAP NUTS FOR THE 7/8" DIA. STUDS AND BOLTS AFTER GALVANIZING SEE A.S.T.M. A-563.
3. USE PLATES AND TUBES CONFORMING TO THE REQUIREMENTS OF A.S.T.M. A-36 AND GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 1076 OF STAND. SPECS.
4. ADDITIONAL FIELD HOLES MAY BE DRILLED IN STEEL RAIL AS DIRECTED BY THE ENGINEER.
5. INSTALL FACE OF GUARDRAIL AS NEAR AS POSSIBLE TO PLUMB WITH THE PARAPET FACE AT BRIDGE END POST SPACER TUBE LOCATION BY USING STANDARD OR ALTERED SPACER TUBES OR A COMBINATION THEREOF OR AS DIRECTED BY THE ENGINEER. FOR VERY SMALL PARAPET WIDTHS, GUARDRAIL MAY BE INSTALLED AGAINST BRIDGE RAIL WITHOUT SPACER TUBES.
6. DO NOT DRILL BRIDGE RAIL IN ORDER TO INSTALL GUARDRAIL ANCHOR UNIT.
7. USE THIS DETAIL ONLY FOR BRIGES WITH POST AND BEAM TYPE RAIL.
8. ATTACH 1" X 1" BAR AND THREADED STUDS TO PLATE WITH 3/4" WELDS ALL AROUND.
9. 1" X 1" BAR MAY NOT BE NEEDED ON BRIDGE RAILS WHERE FACE OF RAIL DOES NOT PROJECT BEYOND FACE OF POST.
10. PROVIDE SHOP DRAWINGS OF THE PLATES TO THE ENGINEER FOR APPROVAL BEFORE FABRICATING THE PLATES.
11. LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
12. SEE ROADWAY STANDARD DRAWING 862.03 SHEET 3 FOR ADDITIONAL INFORMATION ON THE TYPE III ANCHOR UNIT



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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS TEMPORARY ANCHOR UNIT TYPE THRIE-BEAM

SHEET 8 OF 9

862D03



Signed by

Nicole M. Heckler
5884323D34164G5

8/10/2026

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 MODIFIED BY: _____ DATE: _____
 CHECKED BY: _____ DATE: _____
 FILE SPEC.: _____

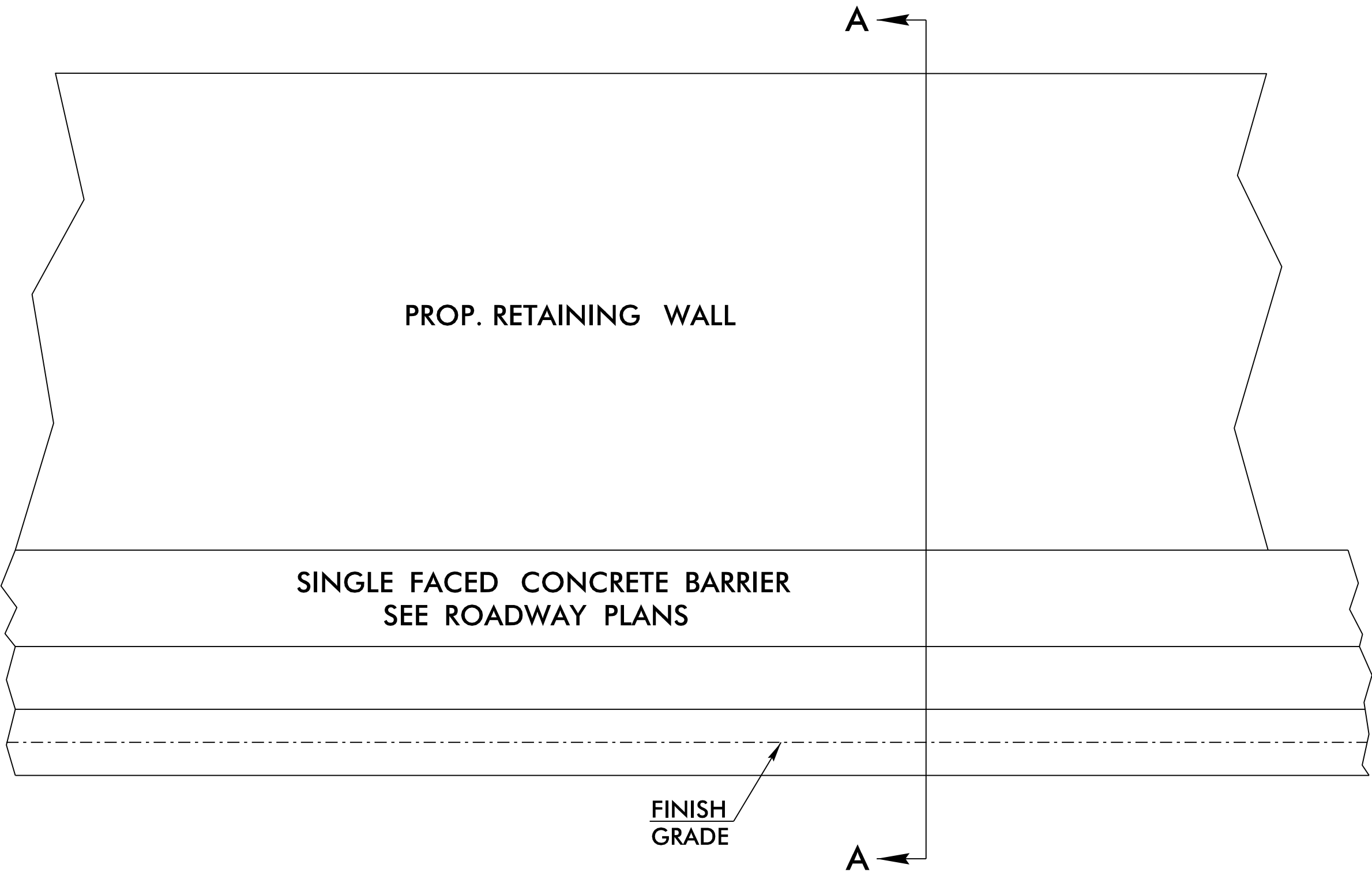


DocuSigned by:
Mohammed Fallaha
102584146C7D4E2...

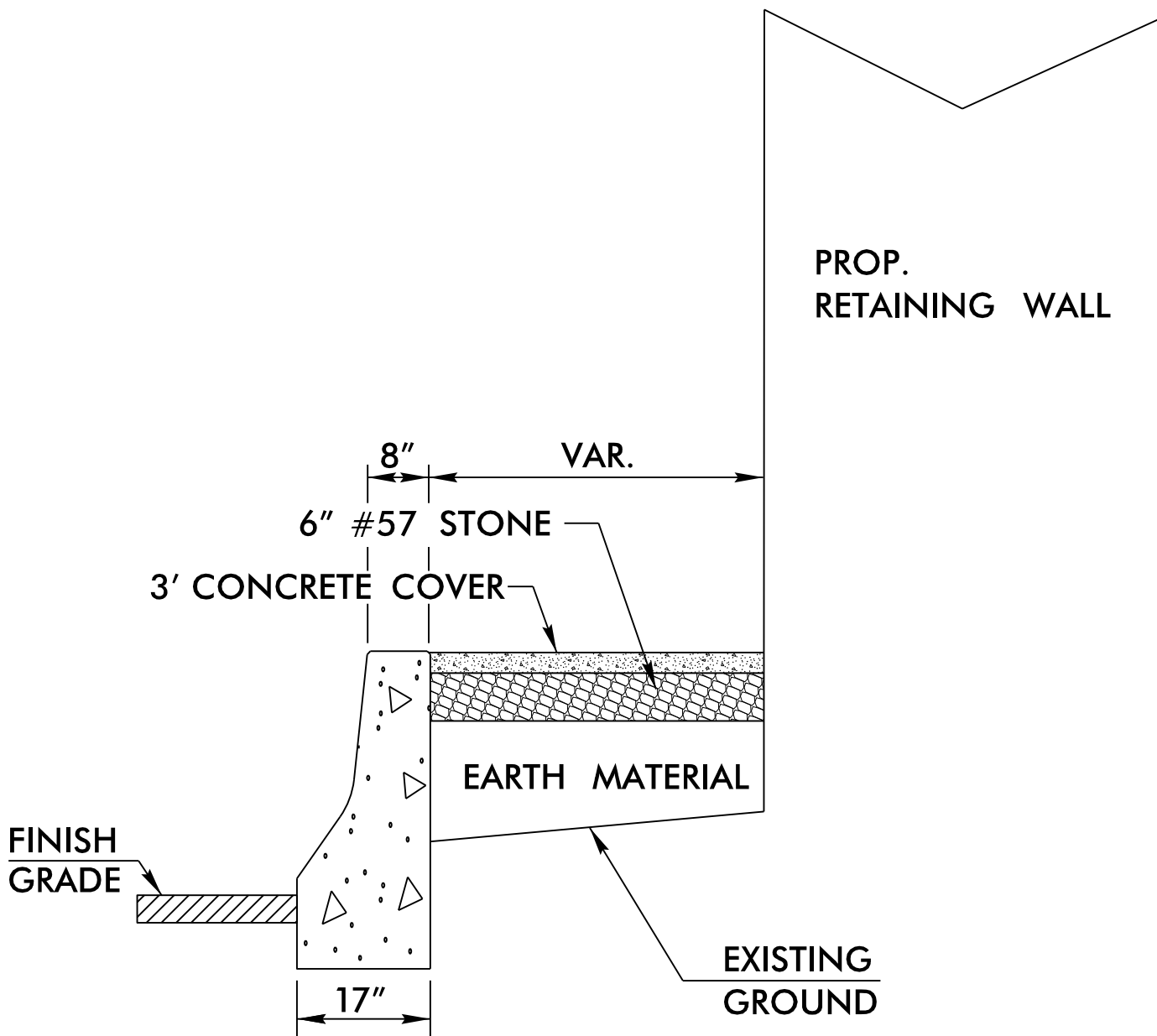
8/10/2026

GENERAL NOTES:

- CONSTRUCT EXPANSION AND CONTRACTION JOINTS AS SHOWN IN STANDARD DRAWING 854.01.
- SEAL EXPANSION JOINTS WITH JOINT FILLER. (SEE SECTION 1028 OF THE SPECIFICATIONS)
- SUBMIT ALTERNATIVE METHODS FOR STEEL FABRICATION PLACEMENT FOR REVIEW AND APPROVAL.
- USE AN APPROVED BONDING SYSTEM IN ACCORDANCE WITH SECTION 1081 OF THE STANDARD SPECIFICATIONS.
- SEE STD. 857.01 FOR SINGLE FACED BARRIER.



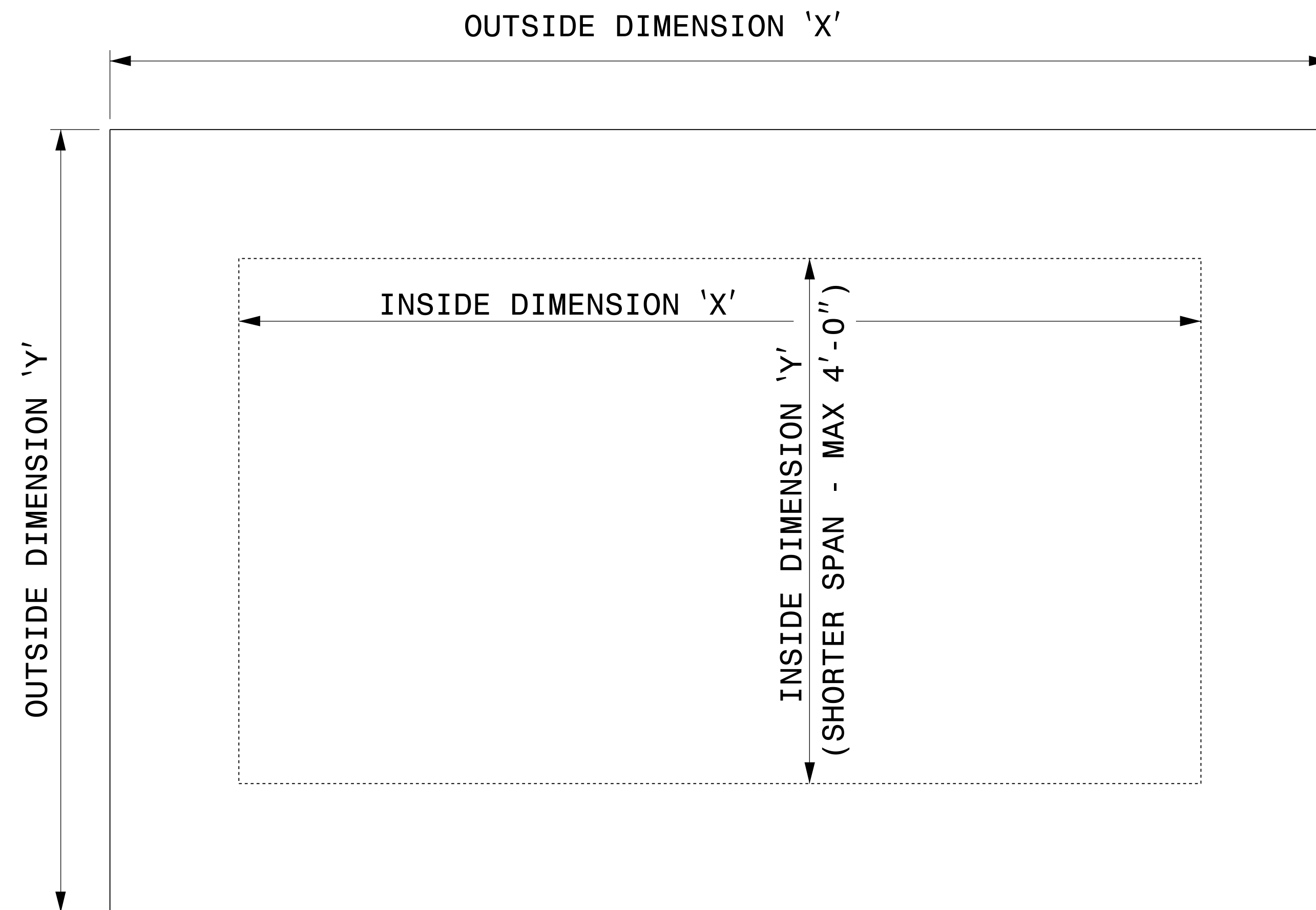
ELEVATION



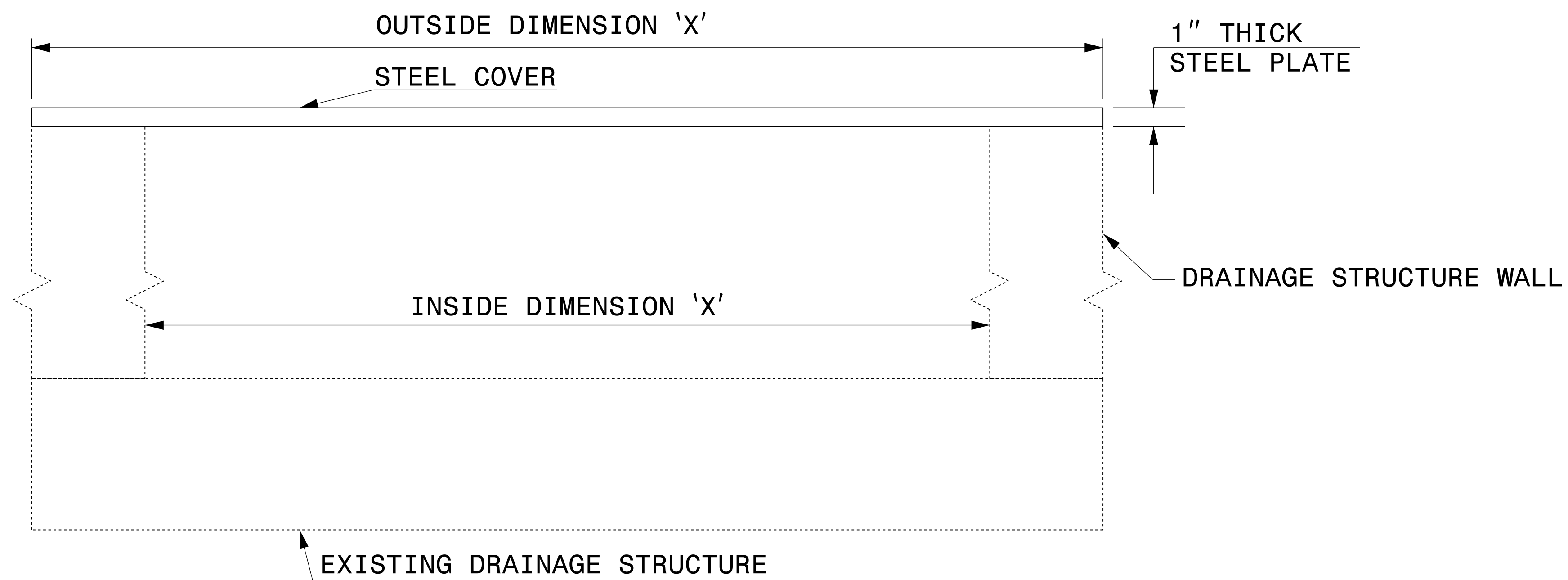
SECTION A-A

CONCRETE CAP
FOR SINGLE FACED
BARRIER FILL

ORIGINAL BY:	DATE:	3-10-26
MODIFIED BY:	DATE:	
CHECKED BY:	DATE:	
FILE SPEC:	DATE:	

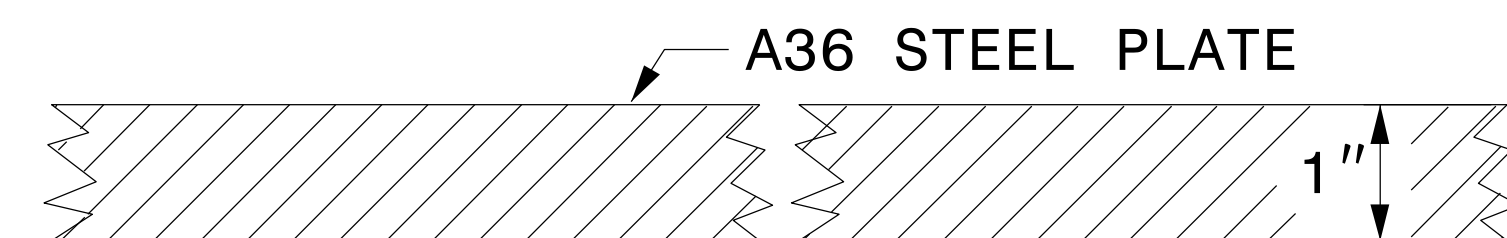


PLAN VIEWS



ELEVATION VIEWS

- USE GRADE A36 STEEL
- STEEL COVERS ARE FOR TEMPORARY USE DURING PHASE CONSTRUCTION.
- FILL SHALL BE PLACED DIRECTLY OVER THE STEEL PLATES.
- SEE ROADWAY PLANS AND PROVISIONS FOR LOCATIONS
- QUANTITIES TO BE PAID FOR AT THE UNIT PRICE BID PER EACH.



SECTION VIEW OF STEEL TOP PLATE

Signed by:
Nicole M. Heckler
5884323D34164C5...
8/10/2026



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Office 919-707-6950 FAX 919-250-4119

**DETAIL OF TEMPORARY
1" STEEL COVER
OVER DRAINAGE STRUCTURE**

ORIGINAL BY: E.E. WARD DATE: 2-2-98
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: eric:/usr/details/metric/stand/stlcvr2.dgn

\$\$\$\$SYTIME\$\$\$\$\$
 \$\$\$\$SYSDGNS\$\$\$\$\$
 \$\$\$\$USERNAME\$\$\$\$\$



SHARED-USE PATH PEDESTRIAN SAFETY RAILING WITH CONCRETE FOOTING SHALL BE PLACED BETWEEN BACK OF RETAINING WALL AND SHARED-USE PATH AT RETAINING WALL NO. 18

CONSTRUCT RAILING AND POSTS OF 1 1/2" O.D. GALVANIZED SCHEDULE 40 STEEL PIPE MEETING THE REQUIREMENTS OF ASTM A53 GRADE B.

REPAIR GALVANIZING IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

WELD IN ACCORDANCE WITH ARTICLE 1072-18 OF THE STANDARD SPECIFICATIONS.

ALL EXPOSED SURFACES SHALL BE PAINTED WITH A COMPATIBLE BLACK VINYL PAINT.

USE CLASS 'A' CONCRETE FOR PEDESTRIAN SAFETY RAIL FOOTINGS.

PLACEMENT OF PEDESTRIAN SAFETY RAIL IN RELATION TO SHOULDER BREAK POINT AND PATH MAY BE MODIFIED AS DIRECTED BY THE ENGINEER.

RAILING ACCOMODATES PEDESTRIANS AND BICYCLES IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

MAXIMUM SPACING BETWEEN EXPANSION JOINTS IS 40'-0". LOCATE EXPANSION JOINTS BETWEEN POSTS ON EITHER SIDE OF RETAINING WALL EXPANSION JOINTS.

FIELD SPLICES ARE SIMILAR TO EXPANSION JOINTS AND MAY BE NECESSARY TO FACILITATE HANDLING; BUT THE TOP RAIL MUST BE CONTINUOUS ACROSS A MINIMUM OF TWO POSTS. MAKE CORNERS AND CHANGES IN TANGENTIAL LONGITUDINAL ALIGNMENT WITH A 9" BEND RADIUS OR TERMINATE ADJOINING SECTIONS WITH MITERED END SECTIONS WHEN SAFETY RAILS ARE NOT REQUIRED. FOR CHANGES IN TANGENTIAL LONGITUDINAL ALIGNMENT GREATER THAN 45°, POSITION POSTS A MAXIMUM 2'-0" EACH SIDE OF THE CORNER, BUT NOT AT THE CORNER APEX.

SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL.



PROJECT REFERENCE NO.	SHEET NO.
1-2513AC	2C-23
STRUCTURE ENGINEER	
	
Prepared in the Office of:	NC FIRM LICENSE No# F-0342 4348 Wade Park Boulevard Suite 200 Raleigh, NC 27607 (919) 854-1820 / (919) 854-6259# AX1
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\\SEP-2017 1155\projects\Special Details\howerton\840D17 Minimum Depth Type A.dgn
Jhowerton At CSD-262595

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DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
CONCRETE GRATED DROP INLET TYPE 'A'
12" THRU 72" PIPE

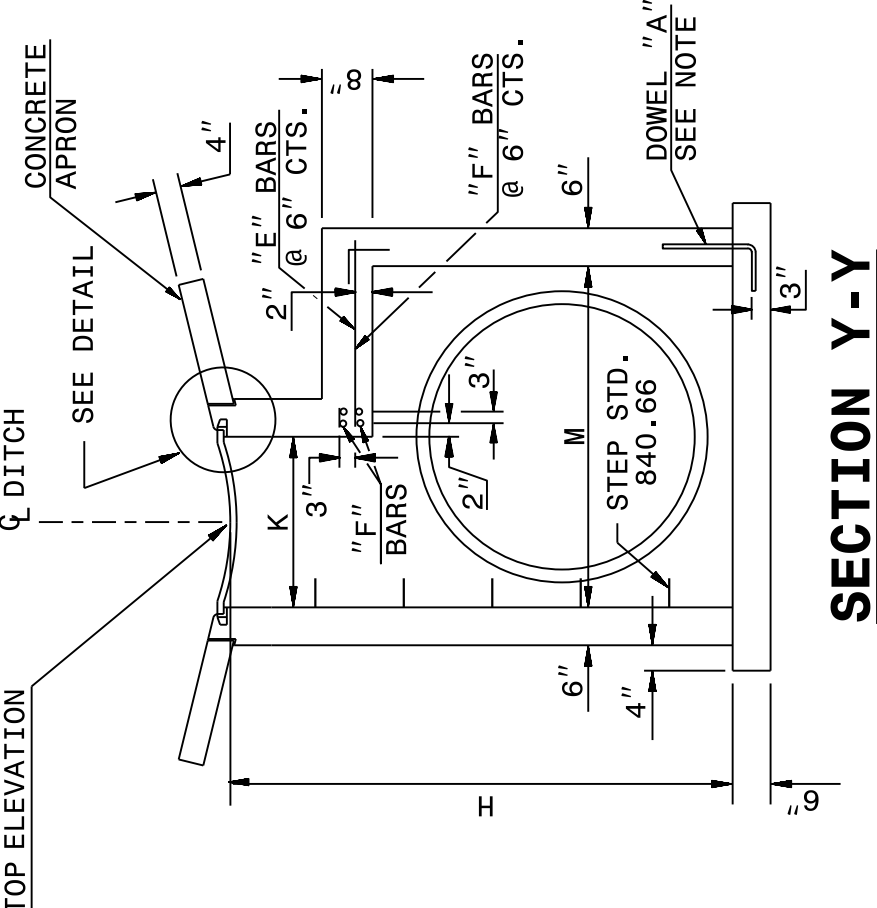
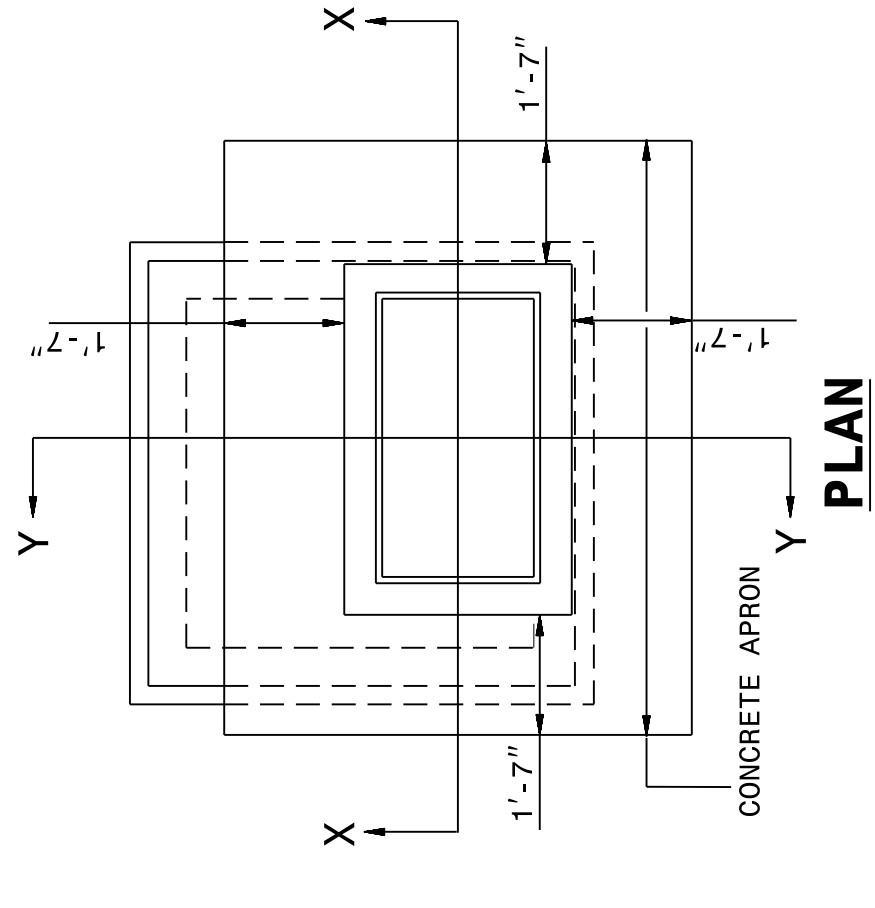
SHEET 1 OF 2
840d17

GENERAL NOTES:
USE CLASS "B" CONCRETE THROUGHOUT.
PROVIDE ALL GRATED DROP INLETS OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.
OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.
USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.
IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.
CONSTRUCT WITH PIPE CROWNS MATCHING.
USE STANDARD FRAMES AND GRATES 840.22 (SHOWN), 840.24 (SHOWN), 840.20 (NOT SHOWN) OR 840.29 (NOT SHOWN).
SEE STANDARD DRAWING 840.25 FOR ATTACHMENT OF FRAMES AND GRATES.
CHAMFER ALL EXPOSED CORNERS 1".
DRAWING NOT TO SCALE.
MAX. DEPTH OF THIS STRUCTURE FROM TOP OF BOTTOM SLAB TO TOP ELEVATION IS 12 FEET.

STATE OF
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ENGLISH DETAIL DRAWING FOR
CONCRETE GRATED DROP INLET TYPE 'A'
12" THRU 72" PIPE

SHEET 1 OF 2
840d17



DETAIL
(APRON SUPPORT NOTCH)

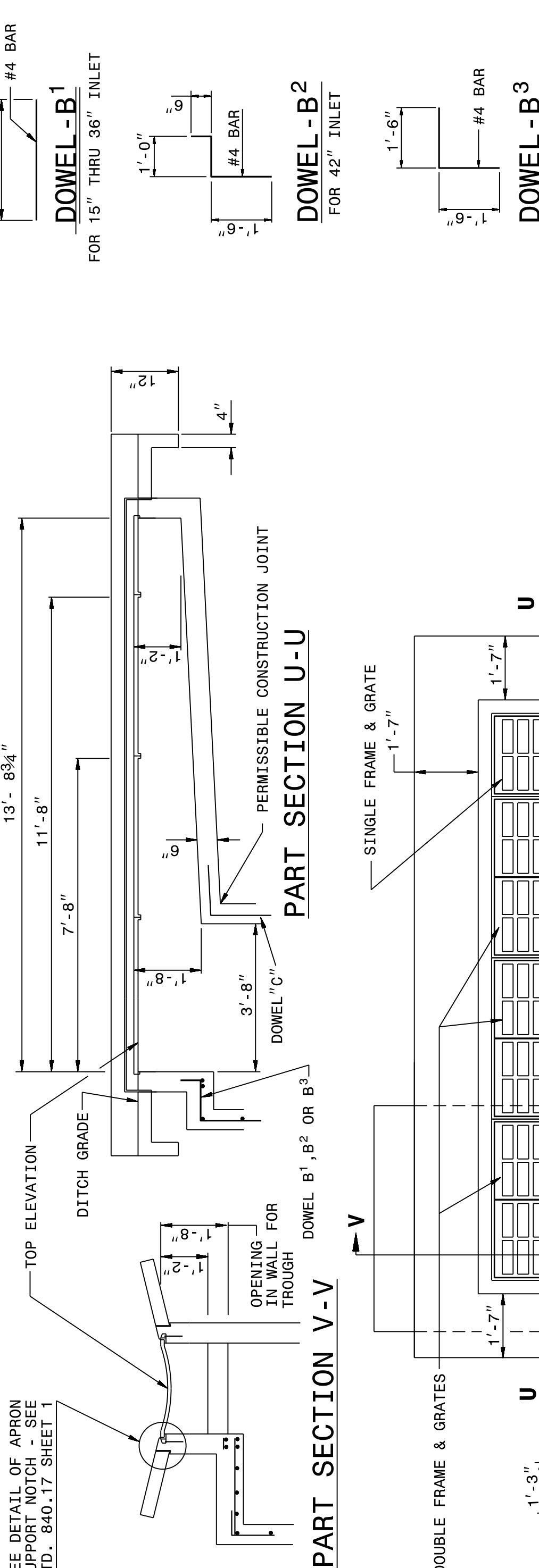
SECTION Y-Y

SECTION X-X

STATE OF
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RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
CONCRETE GRATED DROP INLET TYPE 'A'
12" THRU 72" PIPE

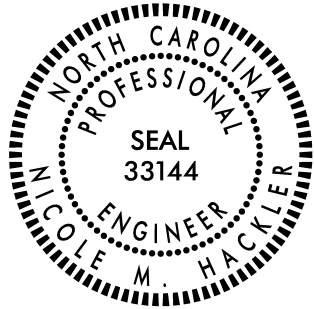
SHEET 2 OF 2
840d17



QUANTITY TO BE ADDED FOR EACH 2' INCREMENT INLET OPENING						
ADDITIONAL INLETS	2'-0"	4'-0"	6'-0"	8'-0"	10'-0"	12'-0"
CONCRETE CU. YDS.	0.191	0.417	0.665	0.897	1.145	1.380
CONCRETE APRON CU. YDS.	0.074	0.148	0.222	0.296	0.370	0.444

MIN. DIMENSIONS AND QUANTITIES FOR CONCRETE GRATED DROP INLET (BASED ON MIN. HEIGHT, H)									
DIMENSIONS OF BOX AND PIPE					REINFORCING STEEL - NO. 4 BARS				
PIPE	SPAN	WIDTH	SPAN	WIDTH	HEIGHT	BARS E	BARS F	BARS G	BARS H
D	J	K	L	M	H	NO.	LENGTH	NO.	LENGTH
12"	3'-8"	2'-0"	3'-8"	2'-0"	2'-3"	—	—	—	—
15"	3'-8"	2'-0"	3'-8"	2'-0"	2'-5"	—	—	—	—
18"	24"	—	—	—	2'-0"	8	4'-9"	—	—
24"	—	—	—	—	2'-10"	8	4'-11"	—	—
30"	—	—	—	—	3'-8"	8	2'-0"	7	4'-9"
36"	—	—	—	—	4'-0"	8	2'-5"	8	4'-11"
42"	—	—	—	—	4'-10"	10	3'-1"	9	5'-7"
48"	—	—	—	—	5'-4"	11	3'-7"	10	6'-1"
54"	—	—	—	—	6'-0"	12	4'-1"	11	6'-7"
60"	—	—	—	—	6'-6"	13	4'-9"	12	7'-3"
66"	—	—	—	—	7'-2"	14	5'-4"	14	7'-10"
72"	—	—	—	—	7'-8"	15	5'-11"	15	8'-5"

CU YDS CONC. IN BOX					DEDUCTIONS FOR ONE PIPE				
H	PER	TOTAL	APRON	TOTAL	C.S.	R.C.			
0.926	0.247	0.395	0.395	1.745	0.015	0.024			
0.988	0.247	0.395	0.395	1.745	0.023	0.036			
1.050	0.247	0.395	0.395	1.745	0.033	0.049			
1.362	0.278	0.395	0.395	1.745	0.059	0.085			
1.644	0.288	0.395	0.395	1.745	0.082	0.127			
1.931	0.321	0.395	0.395	1.745	0.132	0.178			
2.500	0.370	0.395	0.395	1.745	0.180	0.243			
3.013	0.407	0.395	0.395	1.745	0.235	0.317			
3.589	0.444	0.395	0.395	1.745	0.297	0.401			
4.539	0.494	0.395	0.395	1.745	0.367	0.495			
5.061	0.537	0.395	0.395	1.745	0.444	0.599			
5.860	0.580	0.395	0.395	1.745	0.528	0.713			



Signed by:
Nicole M. Howerton
588432303416405.
8/10/2026

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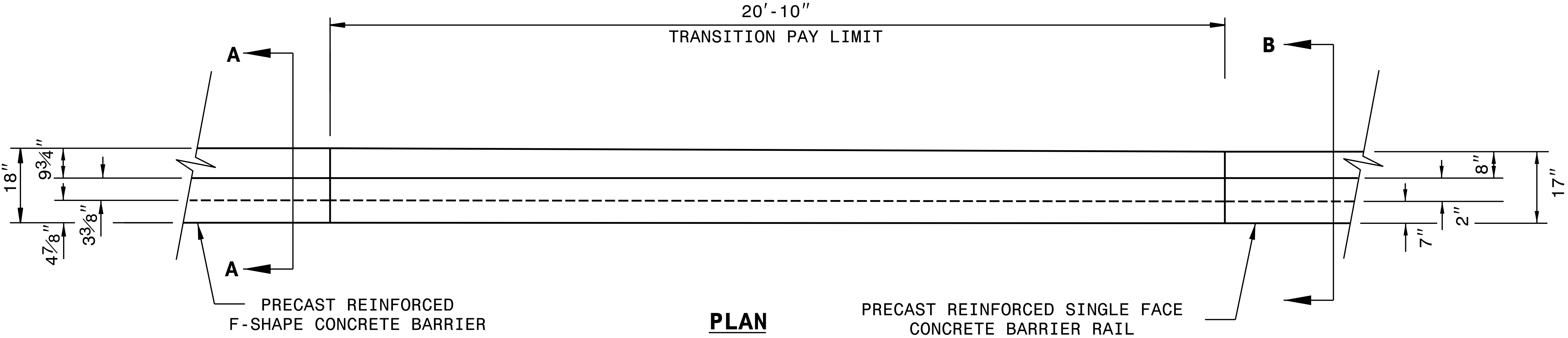
SEE TITLE BLOCK

ORIGINAL BY: J. Howerton DATE: 1/22/14
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: jhowerton\minimum_depth_type A.dgn

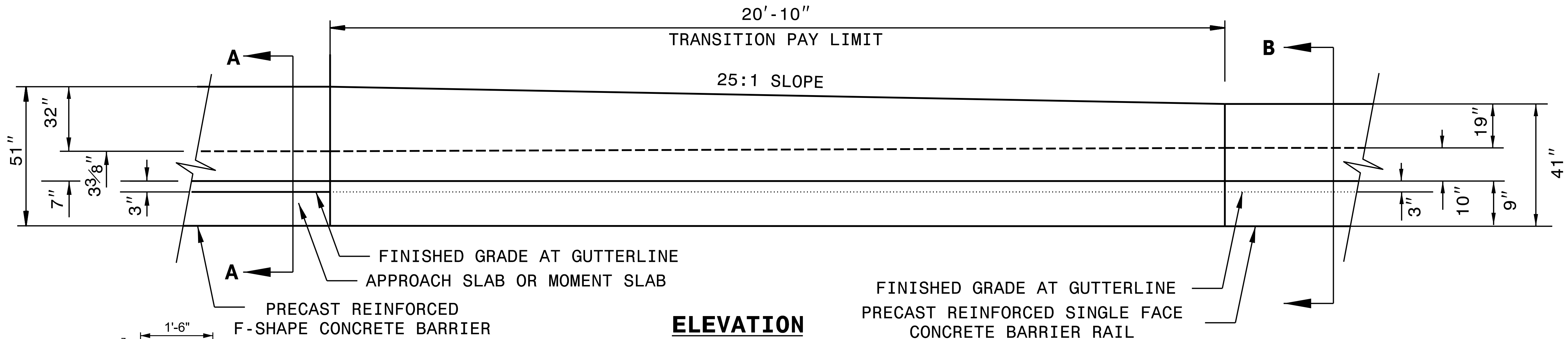
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PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	2C-25

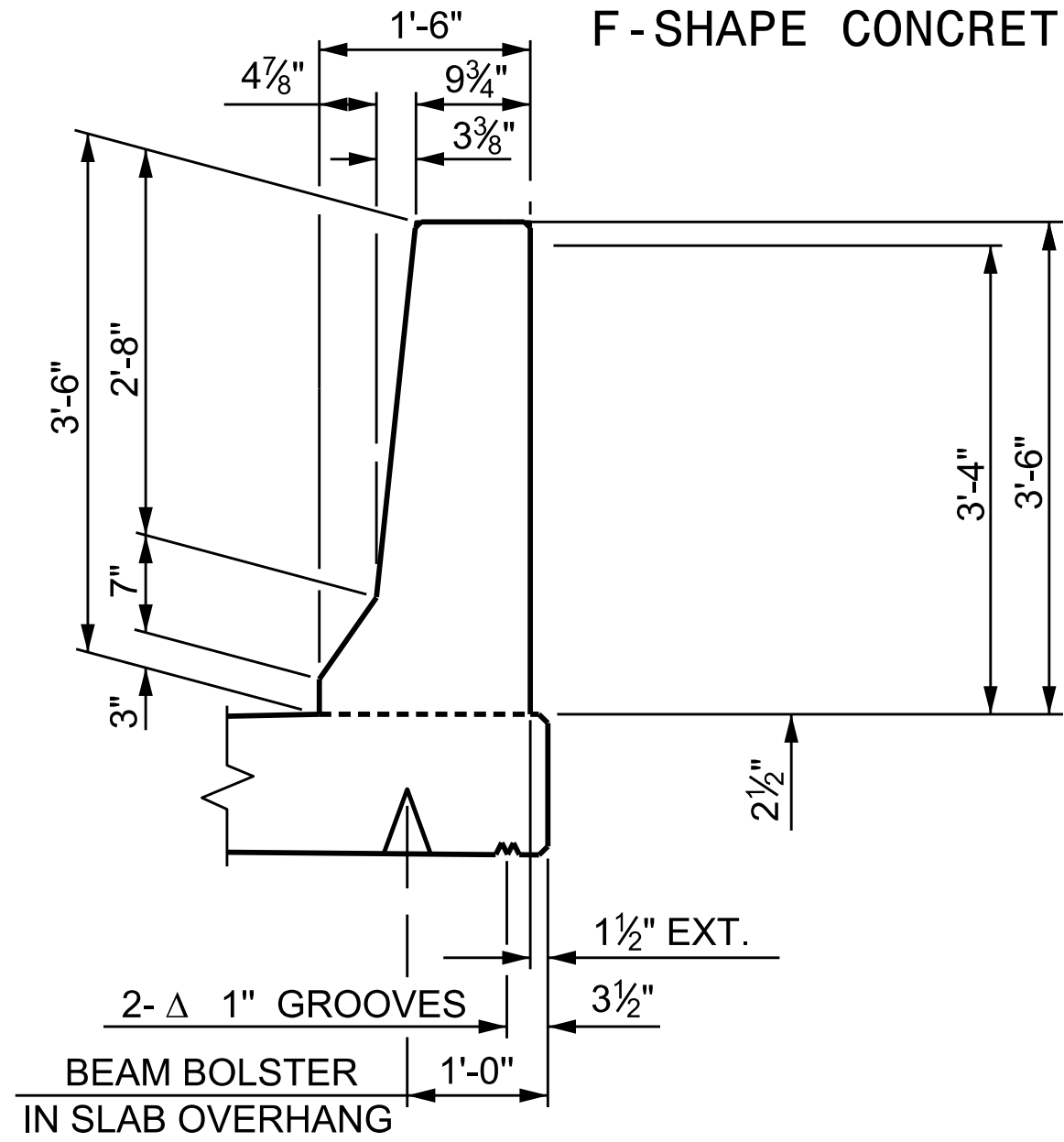
**TRANSITION FROM PRECAST REINFORCED F-SHAPE CONCRETE BARRIER WITH MOMENT SLAB
TO PRECAST REINFORCED SINGLE FACE CONCRETE BARRIER RAIL**



PLAN



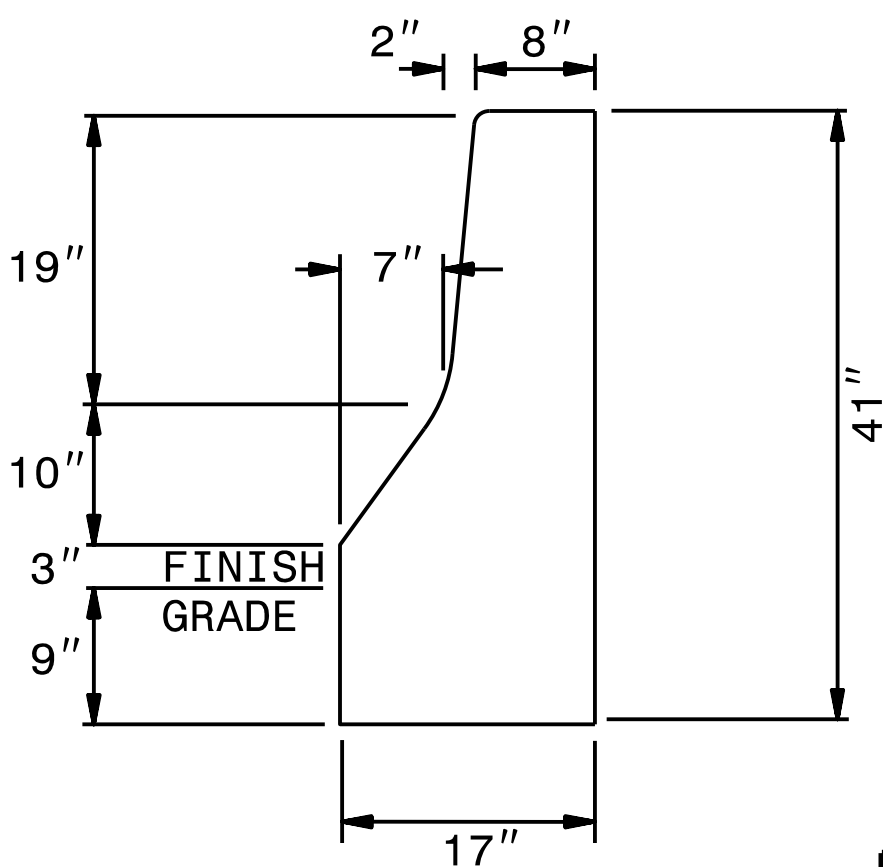
ELEVATION



SECTION A-A

PRECAST REINFORCED F-SHAPE CONCRETE BARRIER

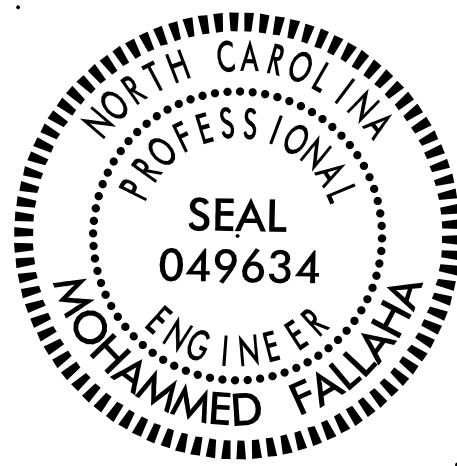
NOTES:
SEE SPECIAL DETAILS PERTAINING TO SINGLE SLOPE BARRIERS
FOR CONSTRUCTION METHODS AND STEEL PLACEMENT.
SEE RDWY. STD DWG. 857.01 FOR PRECAST REINFORCED CONCRETE BARRIER
CONSTRUCTION METHODS AND STEEL PLACEMENT.
DIMENSIONS OF CONCRETE BARRIER ARE
APPROXIMATE AND SHOULD BE FIELD VERIFIED.



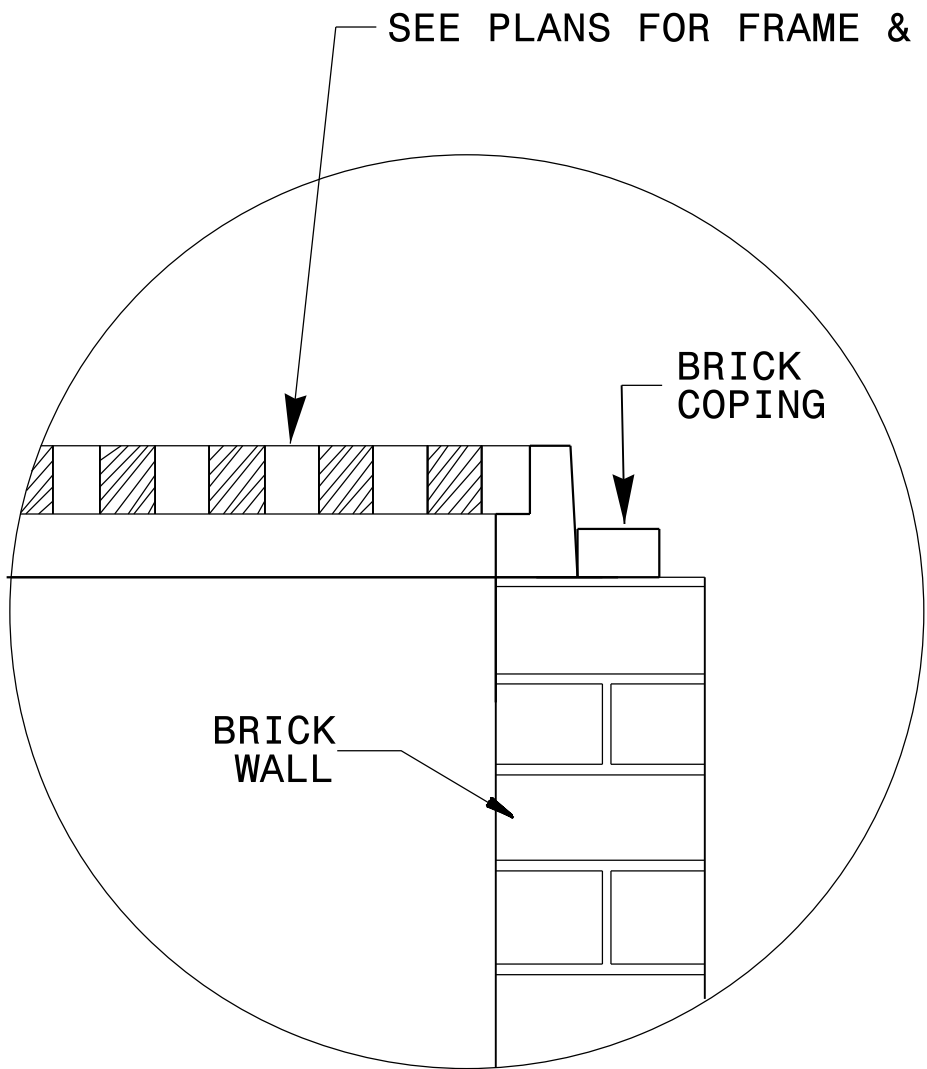
SECTION B-B
PRECAST REINFORCED
SINGLE FACE
CONCRETE BARRIER

**CONCRETE BARRIER
TRANSITION**

DocuSigned by:
Mohammed Fallaha
4D2954746C7D4E2...
8/10/2026

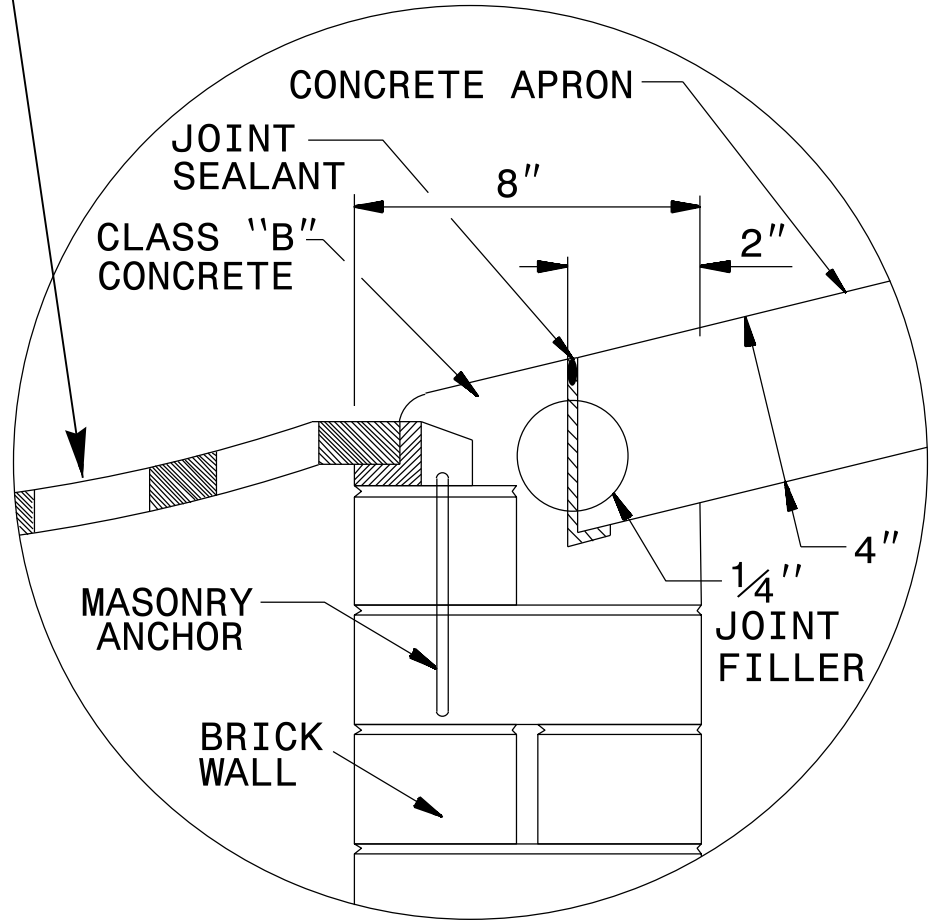


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GRATE PLACEMENT DETAIL

FOR DROP INLETS

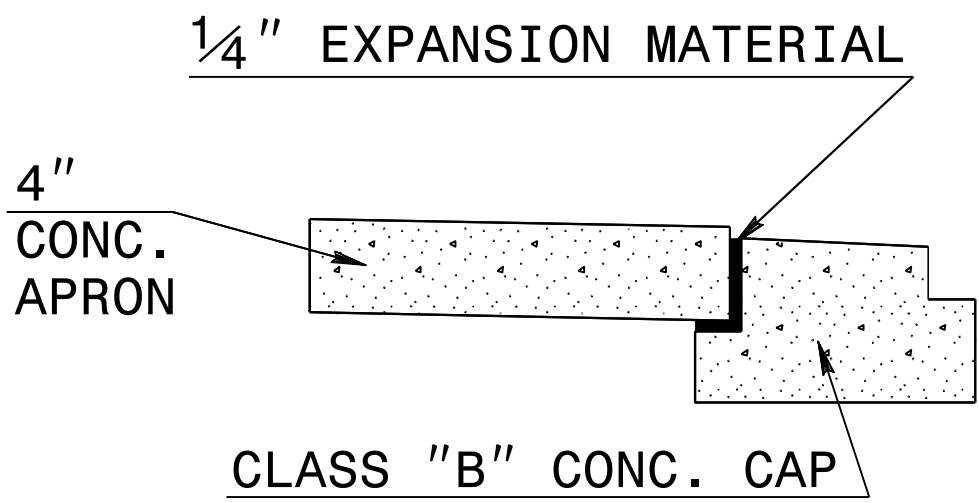


GRATE PLACEMENT DETAIL

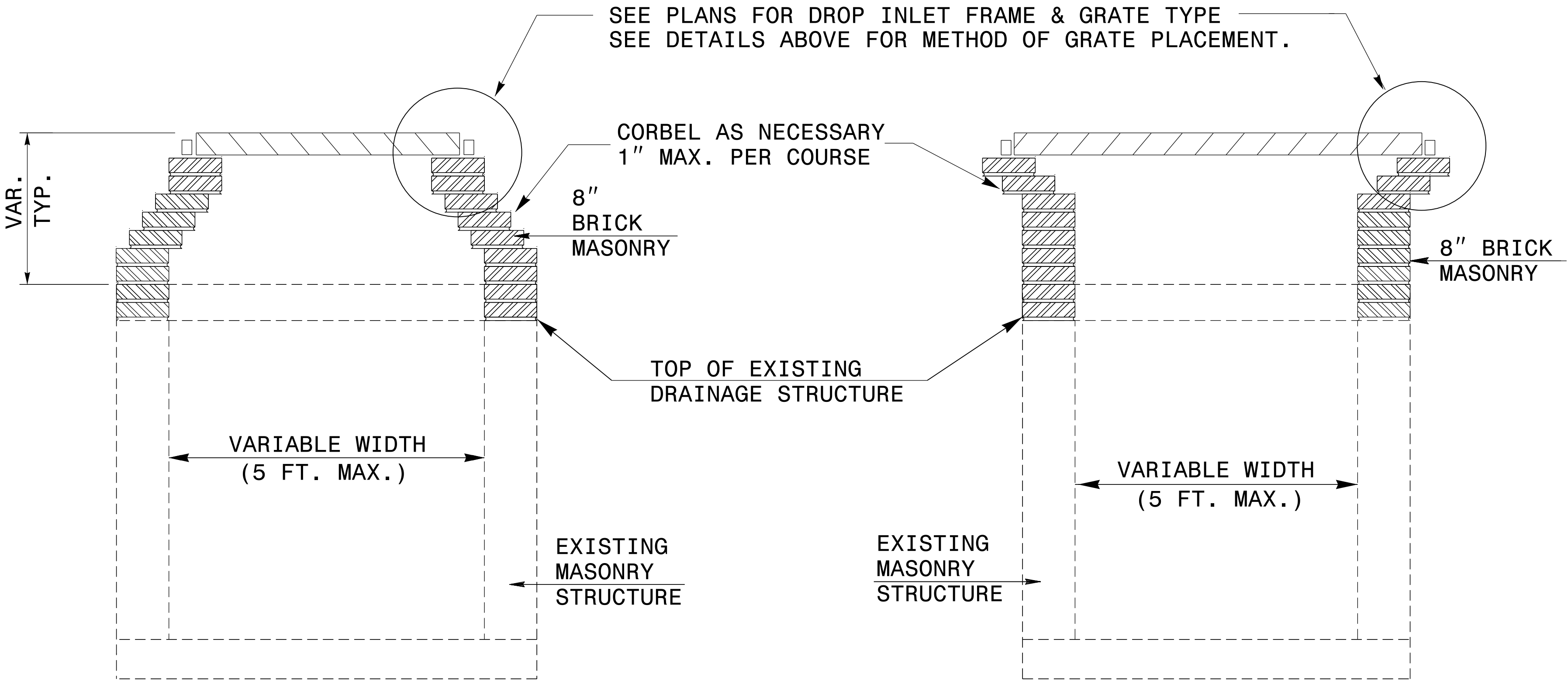
FOR GRATED DROP INLETS

GENERAL NOTES:

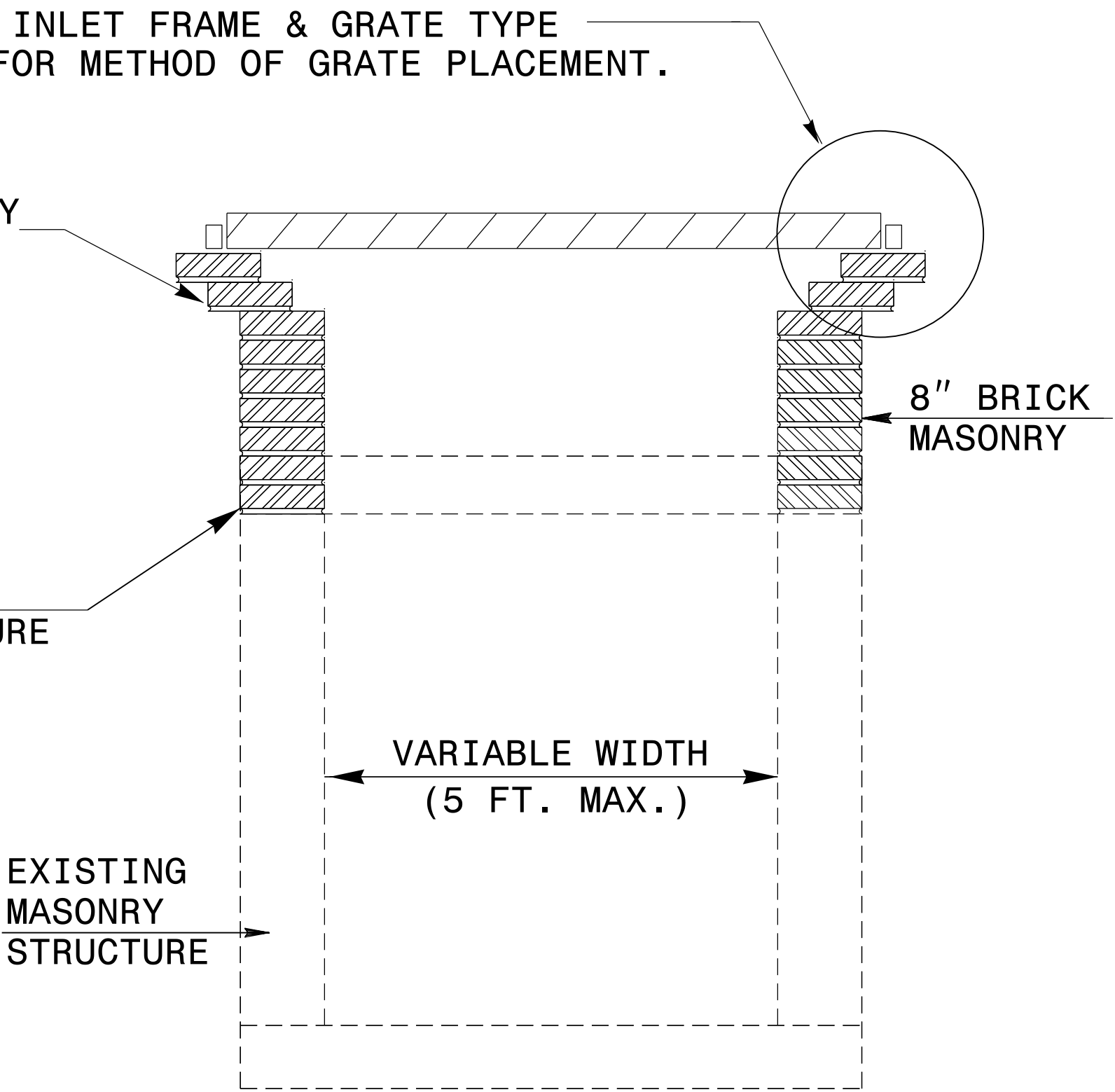
- CONSTRUCT IN ACCORDANCE WITH SECTION 859 OF THE STANDARD SPECIFICATIONS.
- USE CLASS B CONCRETE.
- THE DIMENSIONS FOR THE EXISTING BOXES ARE APPROXIMATE AND MAY VARY SLIGHTLY.
- JUMBO CONCRETE BRICK WILL BE PERMITTED. 4" CONCRETE BRICK OR 8" SOLID CONCRETE BLOCK ARE REQUIRED FOR DRAINAGE STRUCTURE.
- INCLUDE 18" CONCRETE APRON IN UNIT PRICE BID PER EACH, CONVERT EXISTING CATCH BASIN TO DROP INLET.
- SPECIAL DESIGN IS REQUIRED FOR USE UNDER PAVEMENT.
- CONFIRM DIMENSIONS ON EACH INDIVIDUAL FRAME & GRATE PROPOSAL.
- SEE STD. DRAWING 840.25 FOR MASONRY ANCHORAGE.



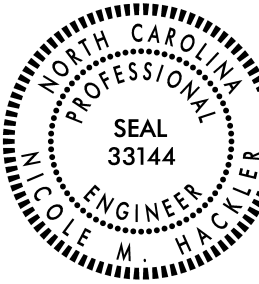
EXPANSION JOINT DETAIL



TYPICAL SECTION



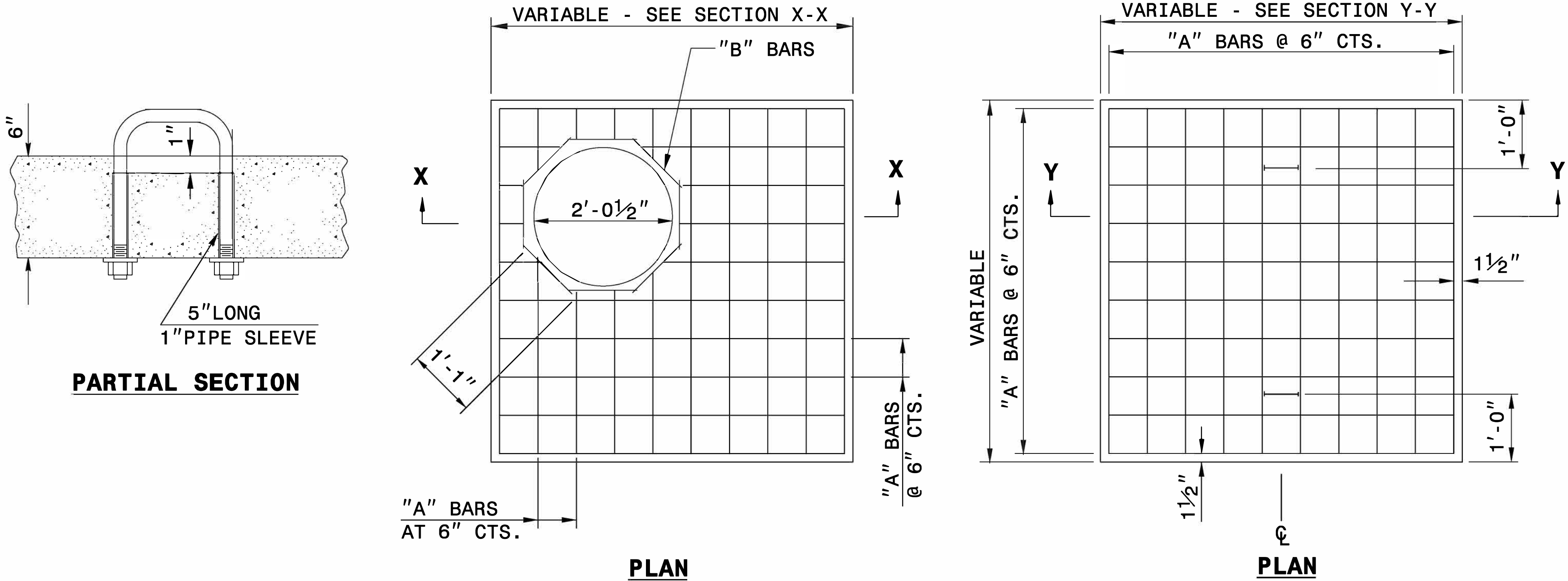
TYPICAL SECTION



Signed by:
Nicole M. Hecker
8/10/2026

CONTRACT STANDARDS AND DEVELOPMENT UNIT			
Office 919-707-6950		FAX 919-250-4119	
DETAIL TO CONVERT EXISTING CATCH BASIN OR JUNCTION BOX TO DI OR 2-GI			
ORIGINAL BY:	T.S.S.	DATE:	NOV. 1997
MODIFIED BY:	T.S.S.	DATE:	FEB. 2000
CHECKED BY:		DATE:	
FILE SPEC.: s:usr/details/stand/cbtdi02.dgn			

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	2C-28



GENERAL NOTES:

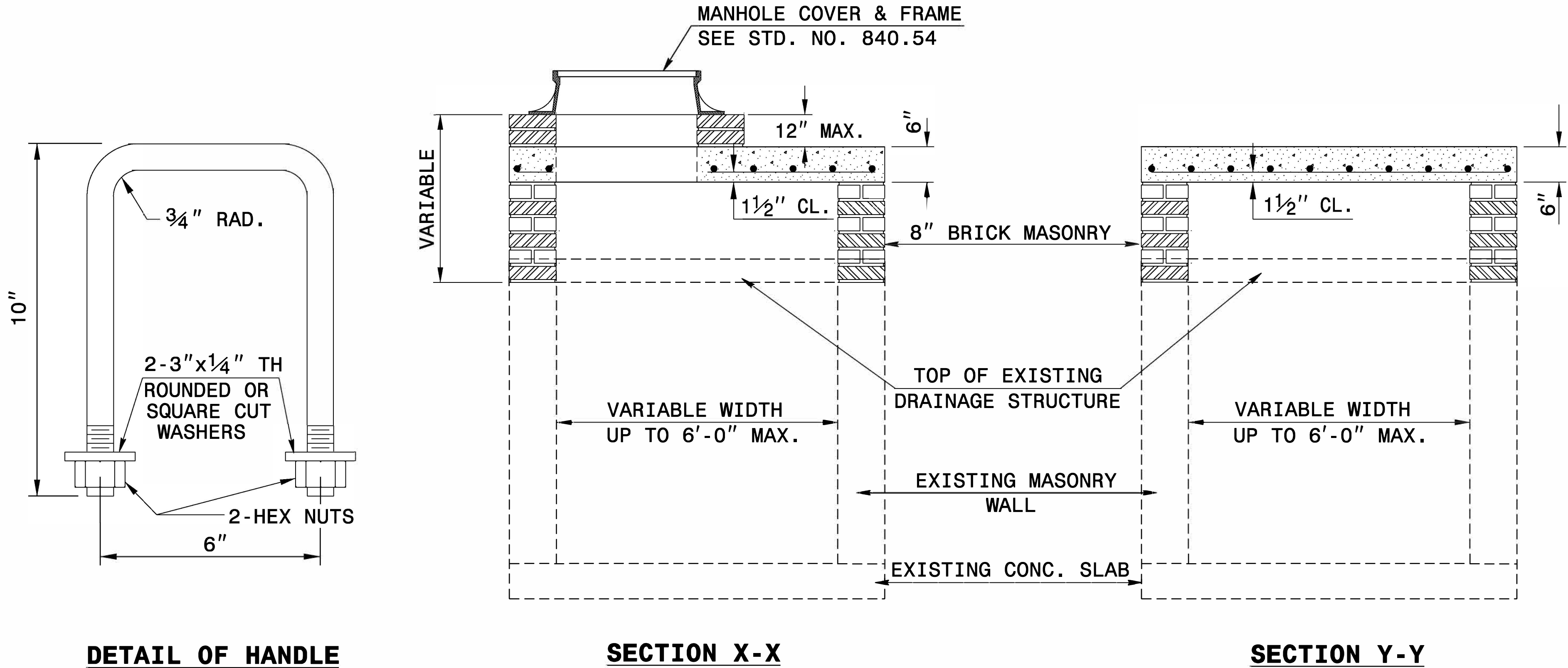
CONSTRUCT IN ACCORDANCE WITH SECTION 859 OF THE STANDARD SPECIFICATIONS.

THE DIMENSIONS FOR THE EXISTING BOXES ARE APPROXIMATE AND MAY VARY SLIGHTLY.

DETAIL INTENDED FOR NON-TRAFFIC BEARING DRAINAGE STRUCTURES.

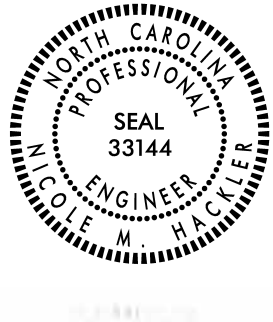
BILL OF MATERIALS				
REINFORCING STEEL				
CODE	SIZE	QTY.	LENGTH	REINF. STEEL LBS.
A	#4	20	4'-6"	60.12
B	#4	8	1'-1"	5.79
TOTAL				65.91 *
MASONRY				CU YDS
TOP SLAB CONCRETE CLASS "B"				.4326 *
BRICK MASONRY PER FT HT (MIN)				.4111

*** NOTE:**
QUANTITIES BASED ON 3'-6" X 3'-6" DRAINAGE STRUCTURE. ADJUST QUANTITIES FOR LARGER STRUCTURES AND MANHOLE CONSTRUCTION.



Signed by:
Nicole M. Heckler
S684320304164CS...

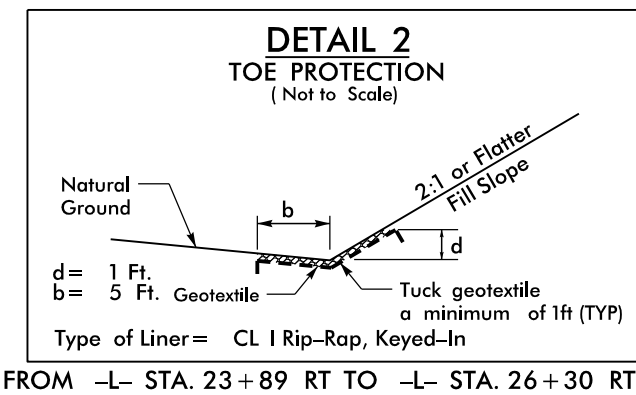
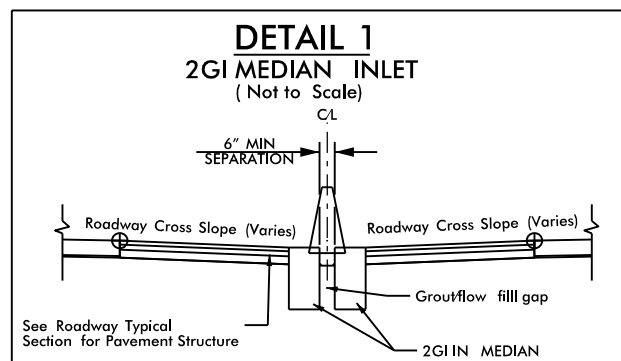
8/10/2026



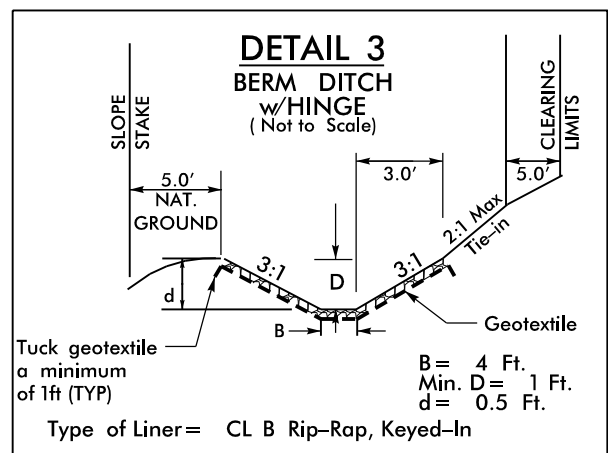
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CONTRACT STANDARDS AND DEVELOPMENT UNIT	
Office 919-707-6950	FAX 919-250-4119
DETAIL TO CONVERT EXISTING DI, CB, OTCB or GI TO JUNCTION BOX (MANHOLE OPTIONAL)	
ORIGINAL BY: T.S.S.	DATE: NOV.1997
MODIFIED BY: T.S.S.	DATE: FEB.2000
CHECKED BY:	DATE:
FILE SPEC.: ds174:/usr/details/stand/boxtojb.dgn	

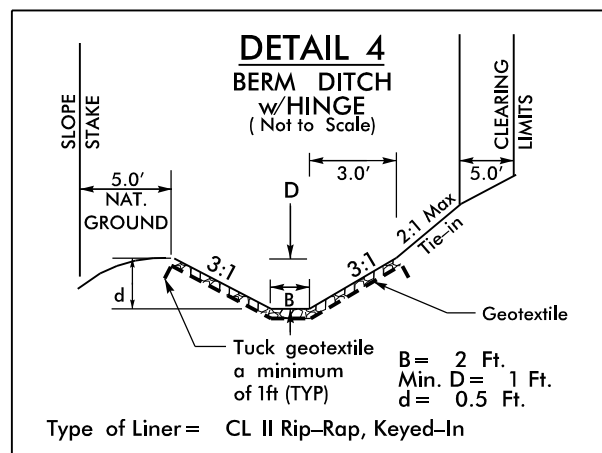
5/14/99



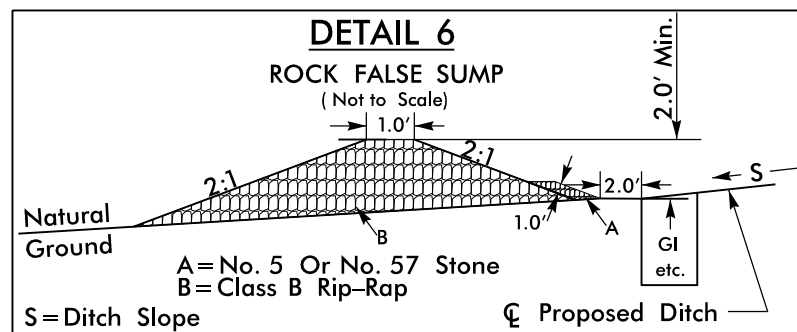
FROM -L- STA. 23+89 RT TO -L- STA. 26+30 RT



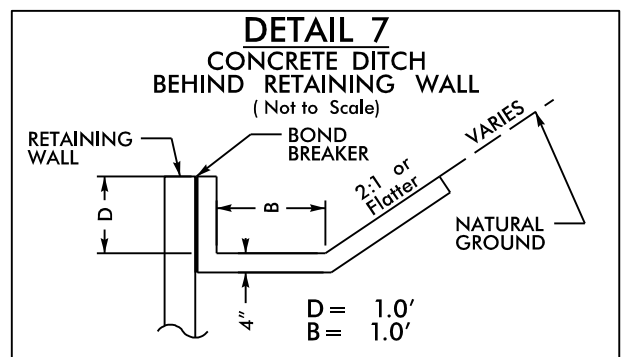
FROM -L- STA. 14+00 RT TO -L- STA. 15+50 RT



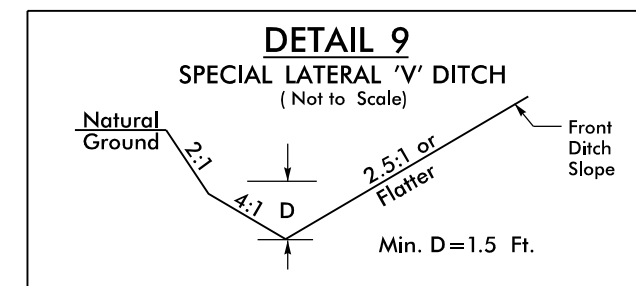
FROM -L- STA. 17+60 RT TO -L- STA. 20+00 RT



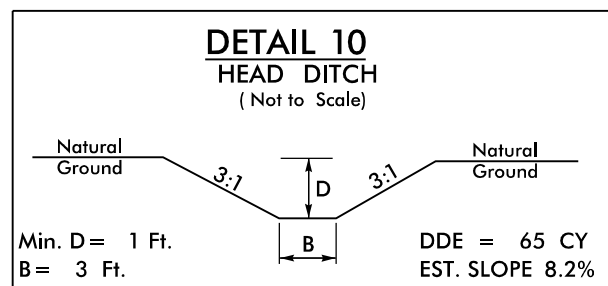
-L- STA. 15+05 RT
-L- STA. 14+41 RT



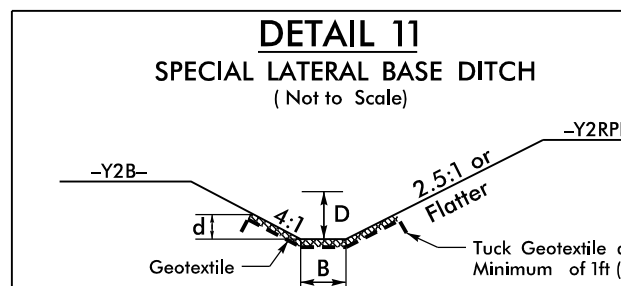
FROM -Y2A- STA. 12+45 LT TO -Y2- STA. 28+96 LT
FROM -Y2B- STA. 11+57 LT TO -Y2B- STA. 14+78 LT
FROM -Y8- STA. 19+59 RT TO -Y8- STA. 21+04 RT
FROM -L- STA. 47+77 TO -L- STA. 53+00 RT
FROM -L- STA. 53+01 TO -L- STA. 55+42 RT
FROM -L- STA. 53+86 TO -L- STA. 55+65 LT
FROM -L- STA. 55+66 TO -L- STA. 63+81 LT
FROM -L- STA. 85+57 TO -L- STA. 98+25 LT
FROM -Y3- STA. 23+50 LT TO -L- STA. 26+50 LT
FROM -Y3RPD- STA. 18+50 RT TO -L- STA. 98+55 RT
FROM -Y3RPA- STA. 22+48 LT TO -L- STA. 98+25 LT
FROM -L- STA. 115+50 RT TO -L- STA. 121+00 RT



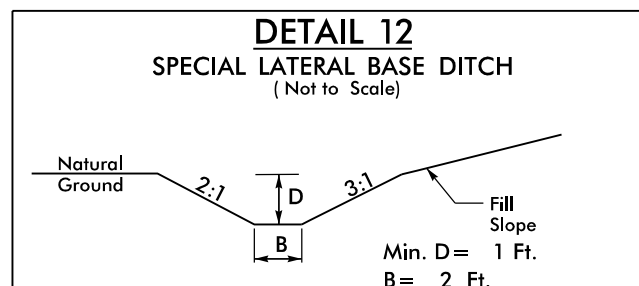
FROM -L- STA. 30+18 LT TO STA. 31+50 LT
FROM -L- STA. 34+00 LT TO STA. 35+75 LT



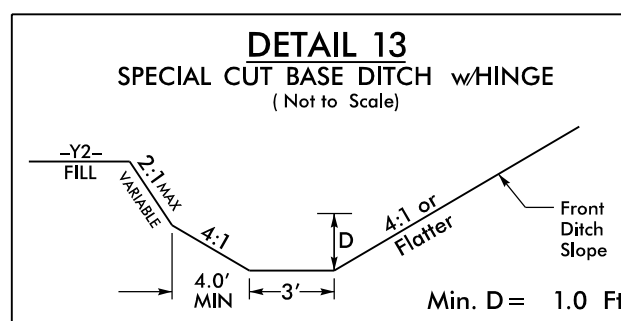
FROM -Y2B- STA. 18+33 RT TO -Y2B- STA. 17+84 RT



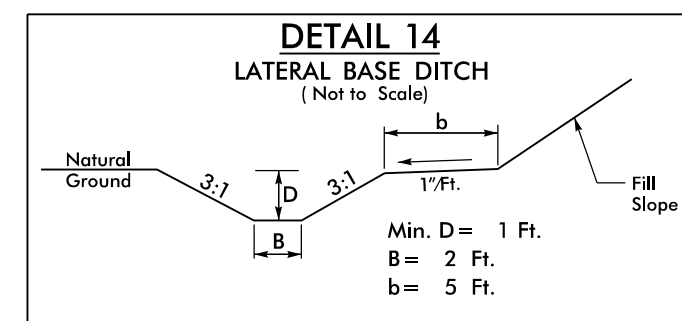
Type of Liner= CLASS I Rip-Rap, Keyed-In
FROM -Y2B- STA. 16+00 RT TO -Y2B- STA. 15+00 RT



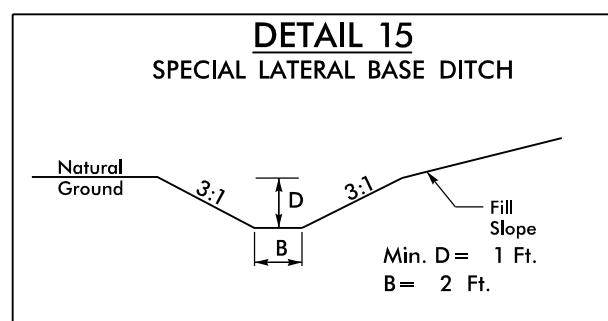
FROM -Y2B- STA. 21+65 LT TO -Y2B- STA. 19+84 LT



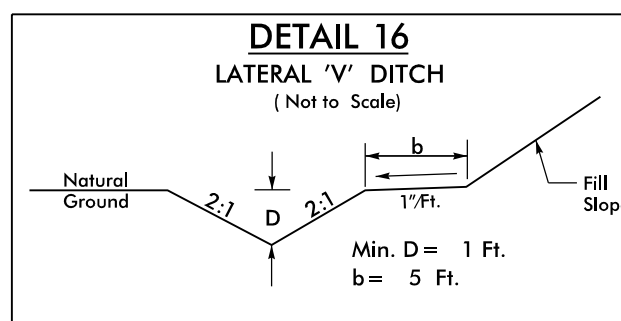
FROM -Y2RPC- STA. 31+30 RT TO -Y2RPC- STA. 32+81 RT



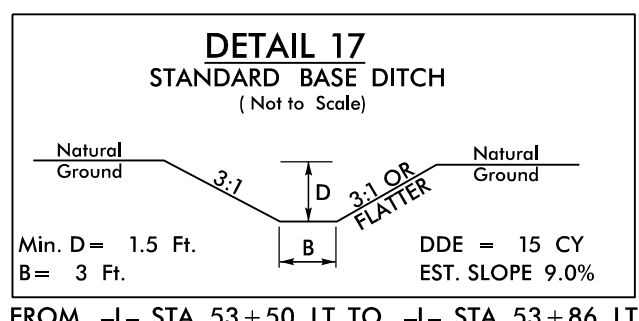
FROM -Y2C- STA. 11+50 RT TO -Y2C- STA. 12+50 RT



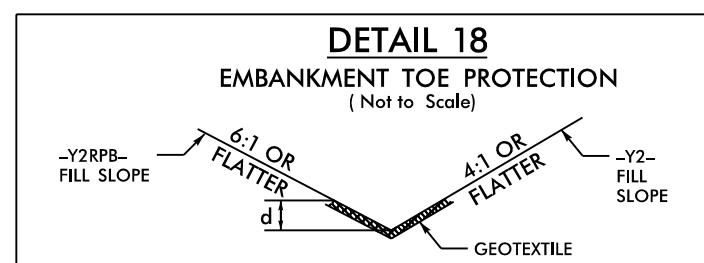
FROM -RP32- STA. 11+23 LT TO -RP32- STA. 14+26 LT



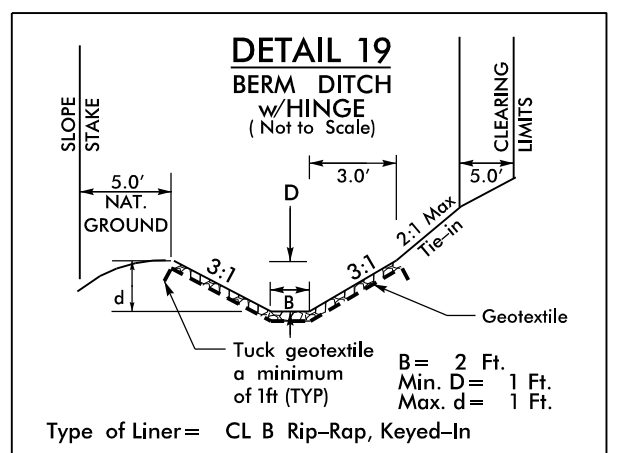
FROM -L- STA. 18+50 LT TO -L- STA. 19+40 LT



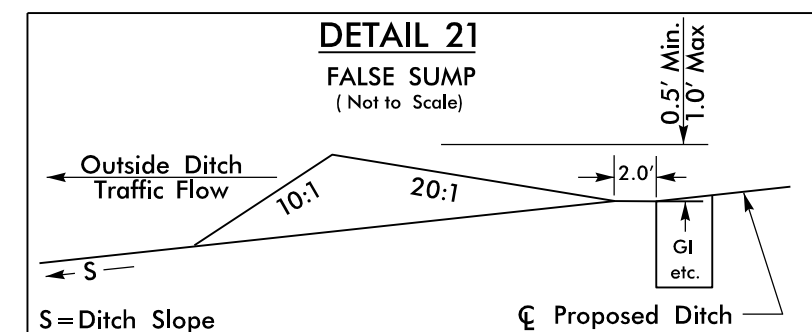
FROM -L- STA. 53+50 LT TO -L- STA. 53+86 LT



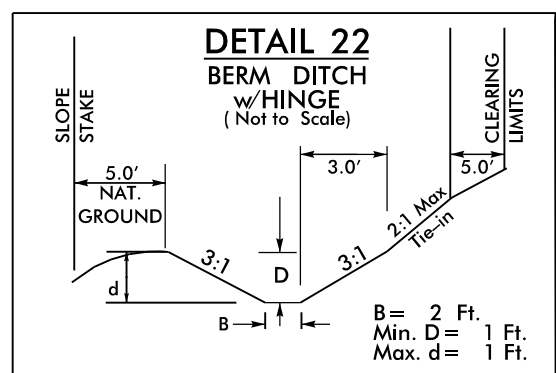
Type of Liner= Class I Rip-Rap
FROM -L- STA. 53+50 LT TO -Y2- STA. 21+22 RT



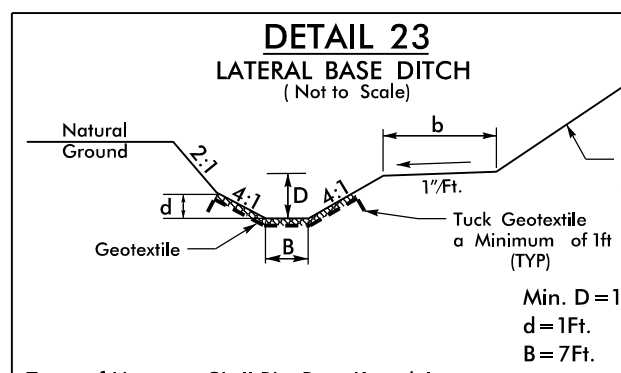
FROM -L- STA. 39+25 RT TO -L- STA. 42+00 RT



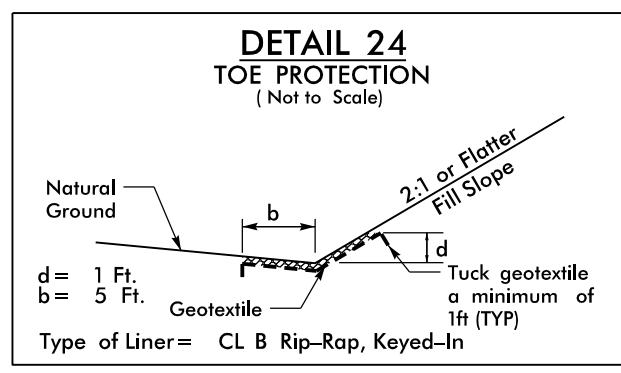
AT -L- STA. 35+44 LT
AT -L- STA. 35+56 RT
AT -L- STA. 37+24 RT
AT -L- STA. 39+30 RT
AT -L- STA. 39+31 RT
AT -L- STA. 40+73 RT
AT -L- STA. 48+04 LT
AT -L- STA. 51+44 LT
AT -L- STA. 41+55 RT
AT -Y3RPD- STA. 15+78 RT
AT -Y3RPD- STA. 19+93 LT
AT -Y3RPD- STA. 21+05 LT
AT -L- STA. 108+87 LT
AT -L- STA. 111+37 LT
AT -L- STA. 113+98 LT



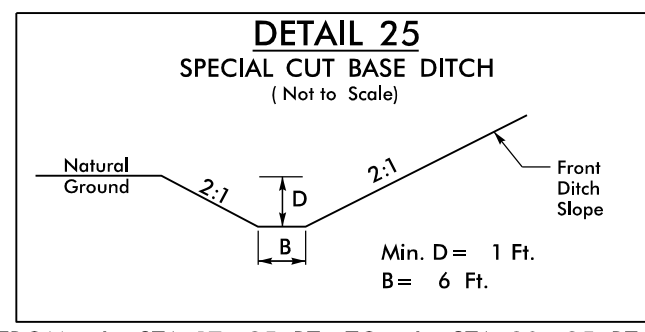
FROM -L- STA. 32+68 LT TO -L- STA. 35+00 LT
FROM -L- STA. 30+50 RT TO -L- STA. 32+50 RT
FROM -L- STA. 34+50 RT TO -L- STA. 37+19 RT
FROM -L- STA. 37+87 RT TO -L- STA. 39+25 RT



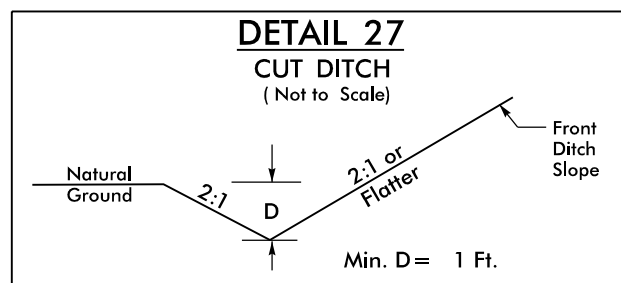
Type of Liner= CL II Rip-Rap, Keyed-In
FROM -L- STA. 26+35 RT TO -L- STA. 28+50 RT



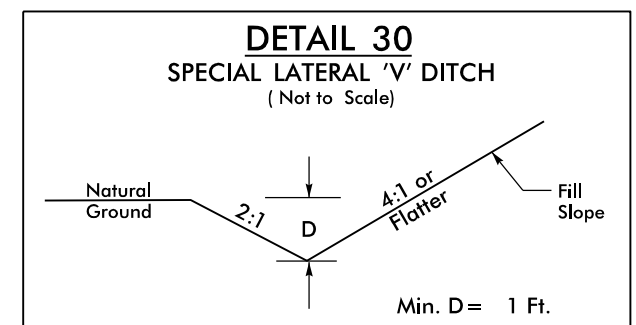
FROM -L- STA. 26+00 LT TO -L- STA. 27+50 LT



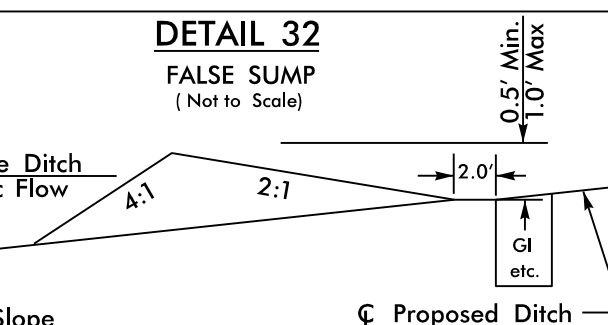
FROM -L- STA. 17+35 RT TO -L- STA. 20+25 RT



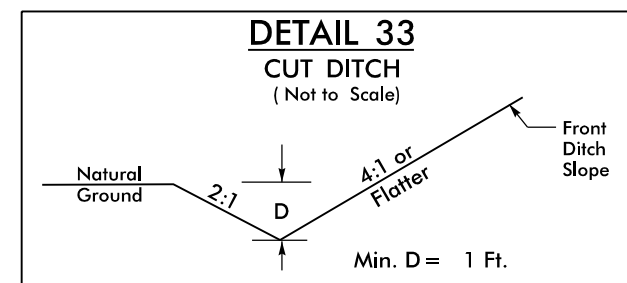
FROM -L- STA. 14+50 LT TO -L- STA. 15+09 LT
FROM -L- STA. 16+50 LT TO -L- STA. 18+50 LT



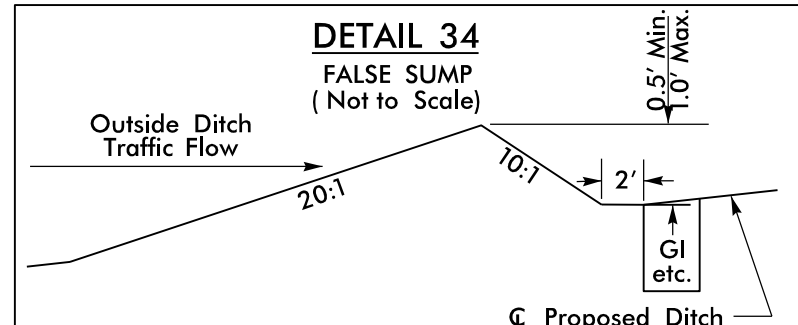
FROM -DW3- STA. 10+53 LT TO -DW3- STA. 11+46 LT



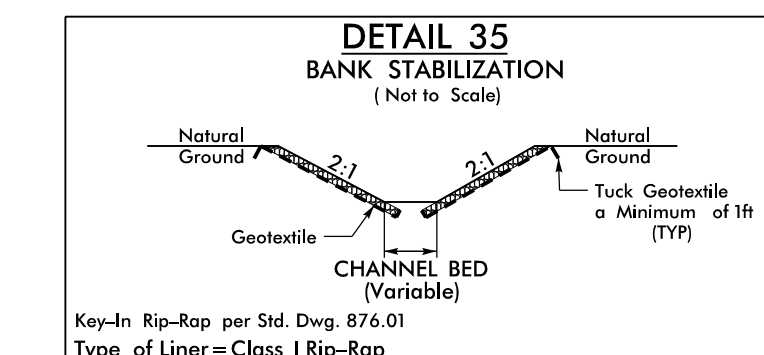
-L- STA. 16+38 RT
-Y2B- STA. 17+12 RT
-Y2B- STA. 17+79 RT
-Y8- STA. 19+63 LT



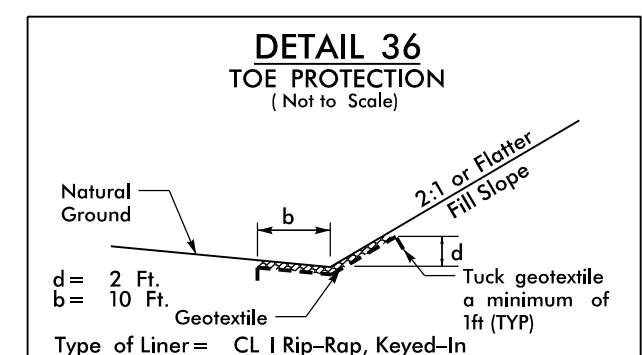
FROM -Y2- STA. 15+30 RT TO -Y2- STA. 17+30 RT



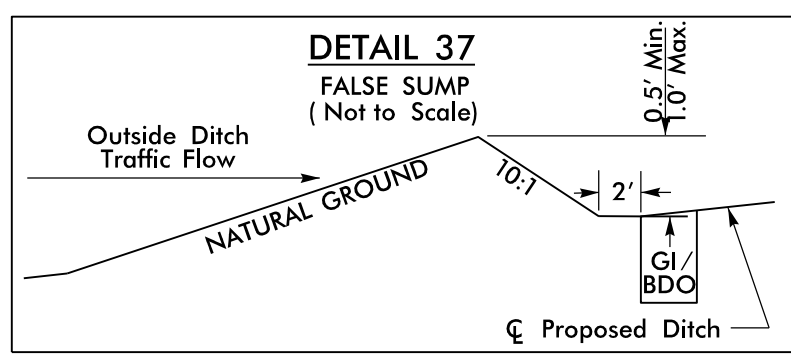
AT -L- STA. 19+45 LT
AT -RP32- STA. 14+40 LT
AT -RP32- STA. 14+86 LT
AT -RP32- STA. 15+95 RT
AT -Y3RPA- STA. 16+40 LT
AT -L- STA. 106+38 RT
AT -L- STA. 108+38 RT
AT -L- STA. 111+97 RT
AT -L- STA. 115+87 RT
AT -L- STA. 117+85 RT



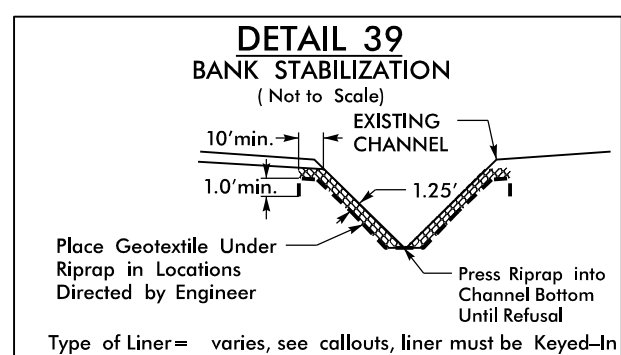
FROM -L- STA. 23+81 LT TO -L- STA. 23+86 LT
FROM -RP23- STA. 20+64 RT TO -RP23- STA. 20+91 RT
FROM -RP32- STA. 20+49 LT TO -RP32- STA. 20+64 LT
FROM -RP23- STA. 34+80 RT TO -RP23- STA. 35+00 RT



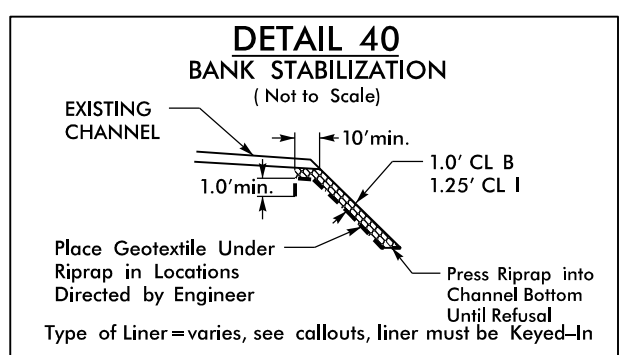
FROM -L- STA. 20+30 RT TO -L- STA. 23+88 RT



-L- STA. 13+96 RT
-L- STA. 42+07 LT
-L- STA. 42+07 RT
-L- STA. 30+42 RT
-Y2RPC- STA. 31+26 RT

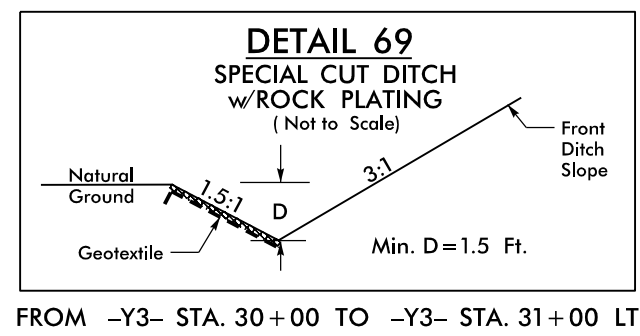
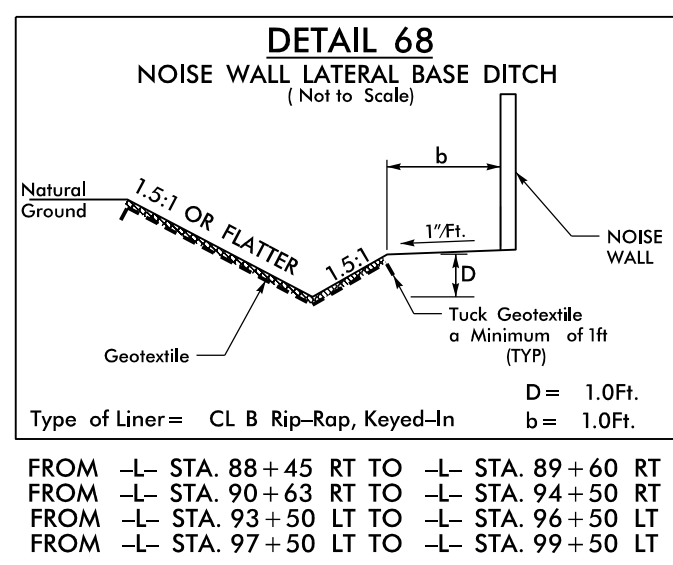
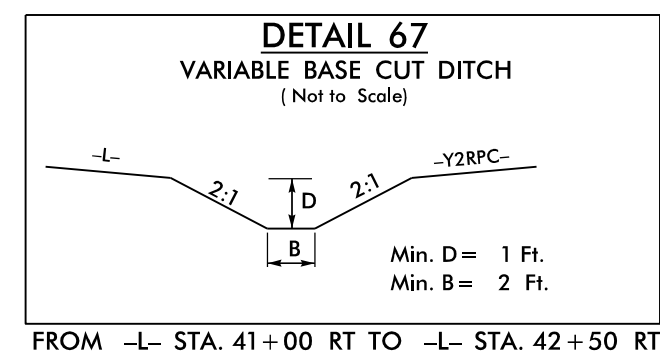
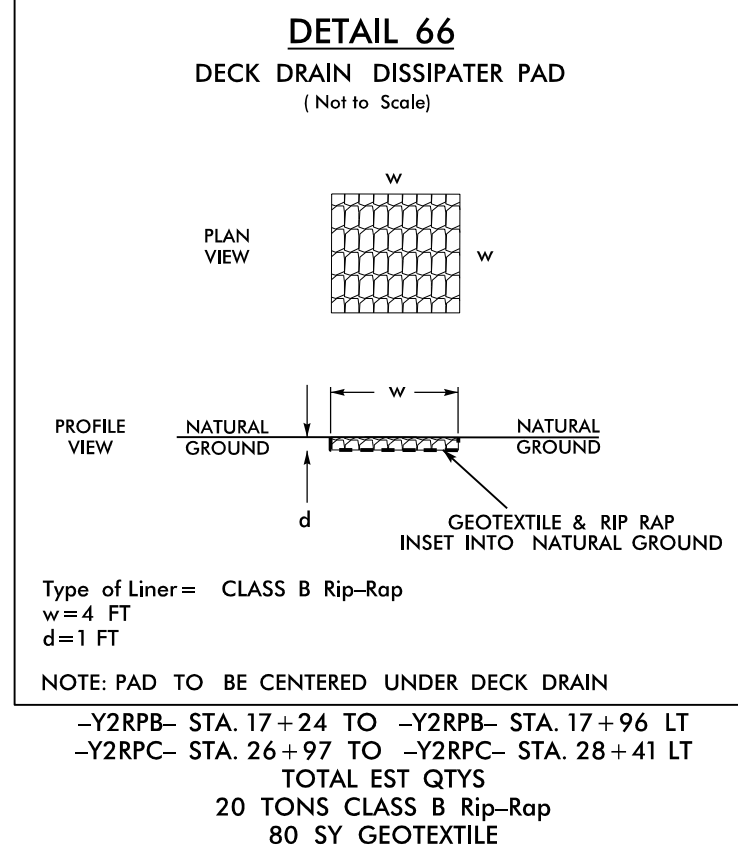
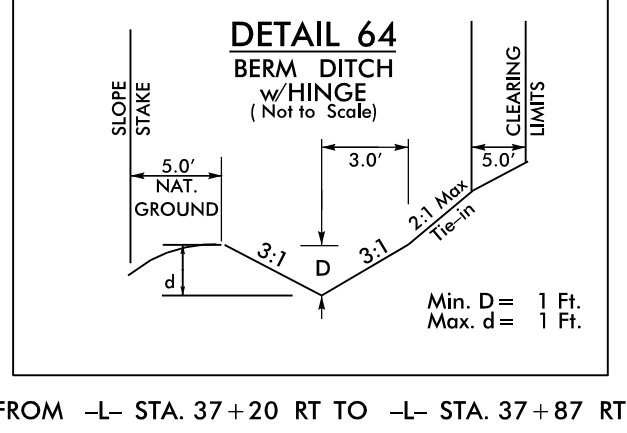
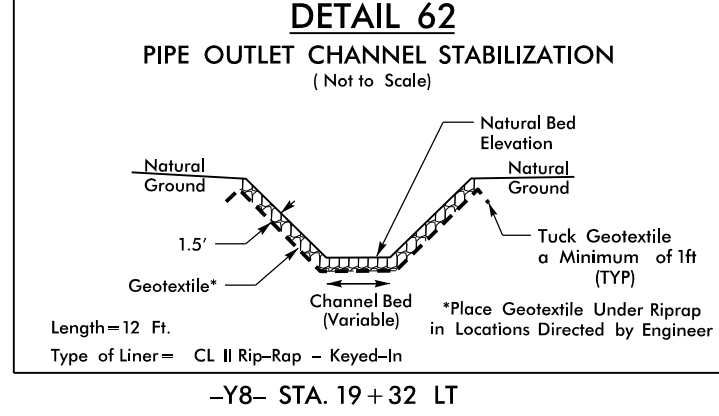
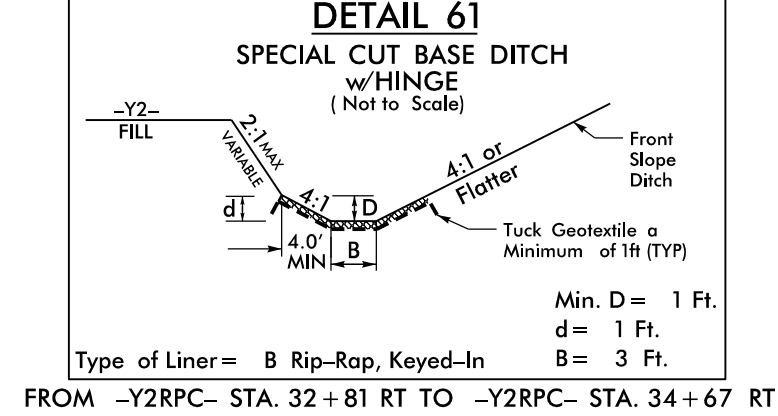
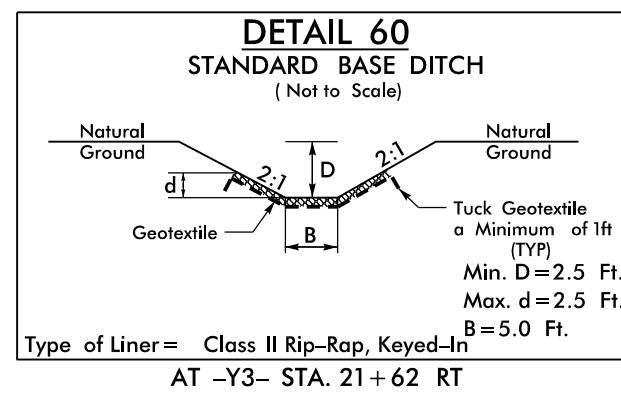
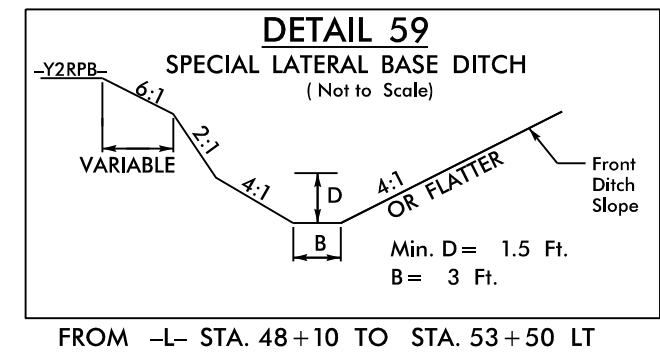
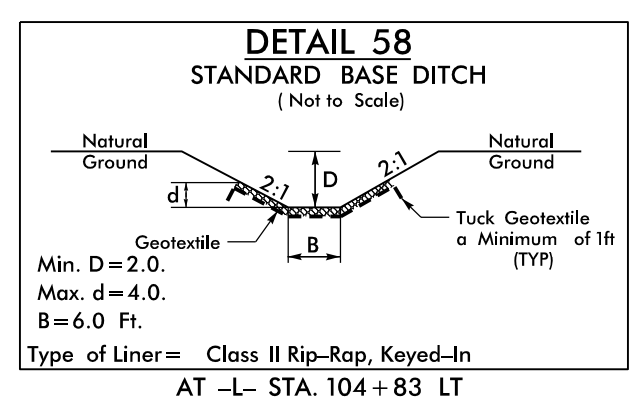
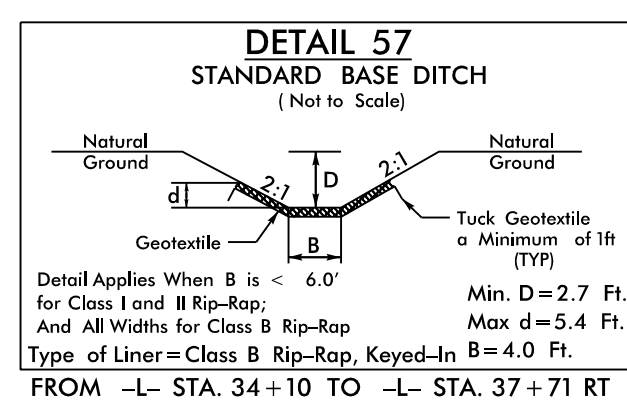
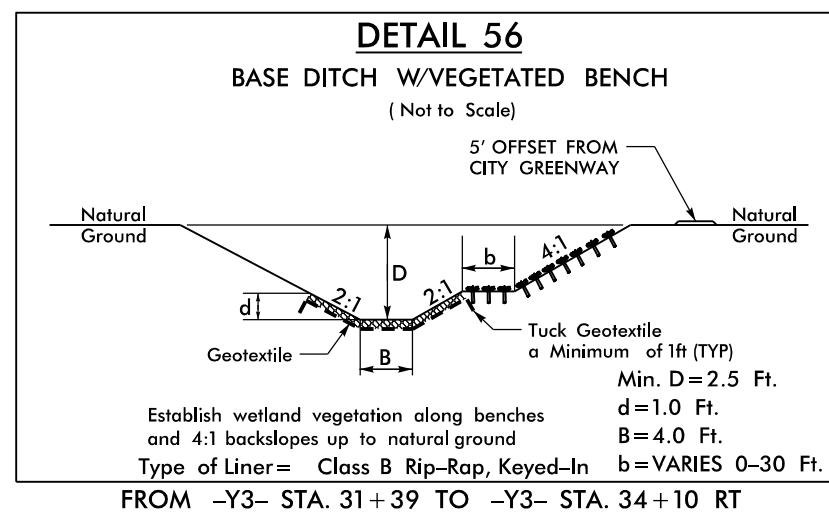
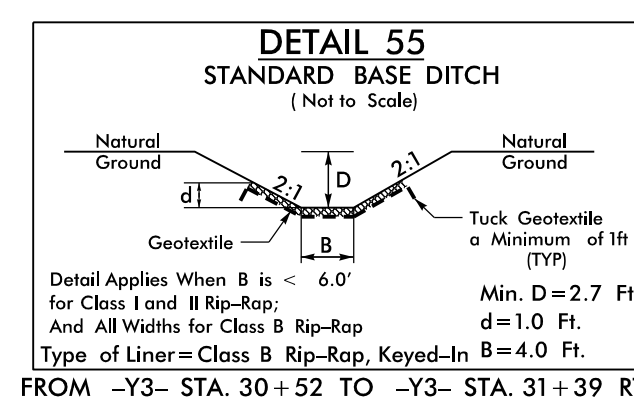
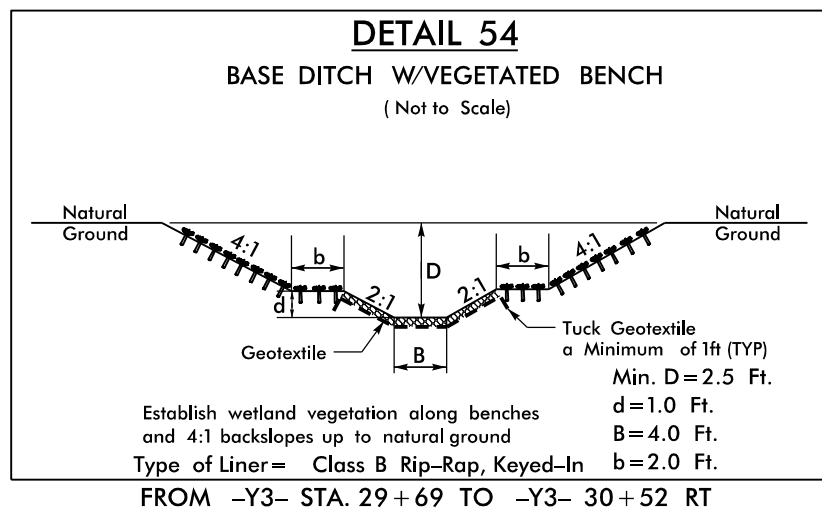
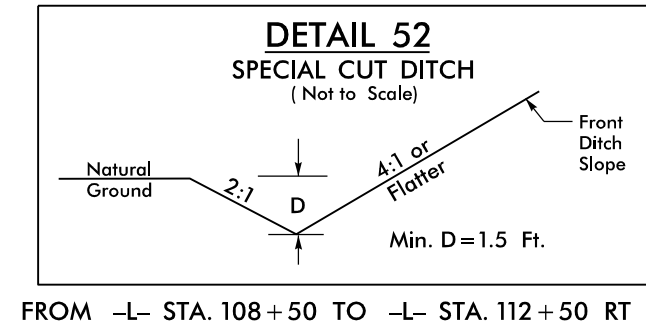
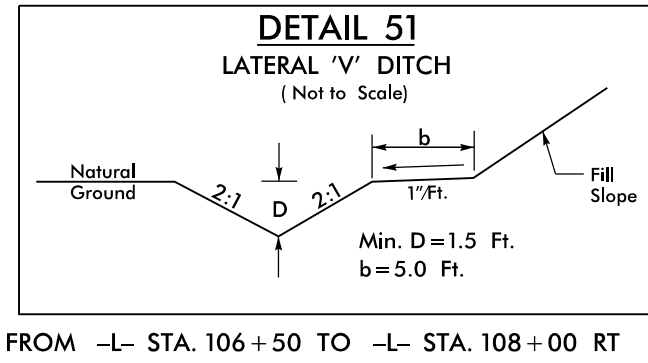
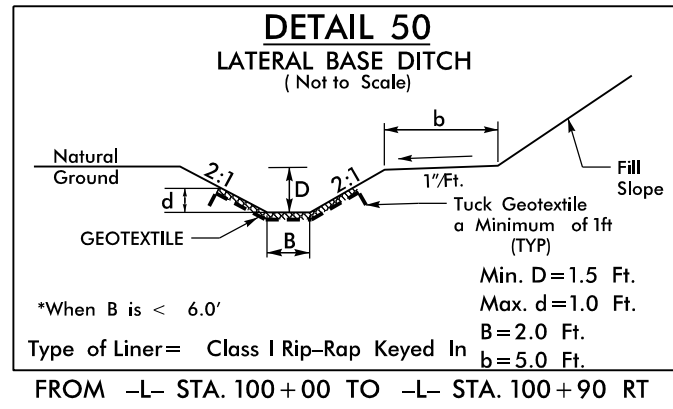
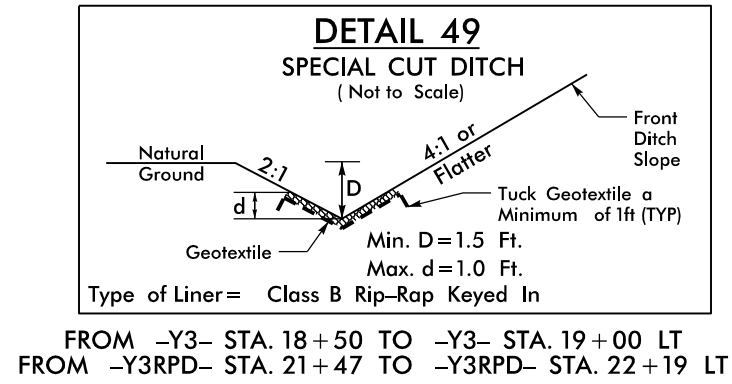
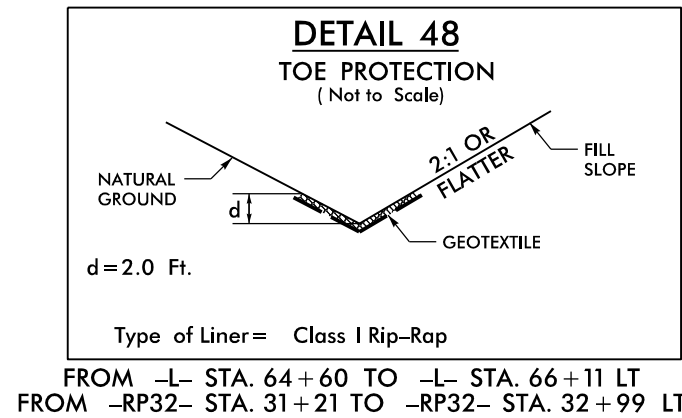
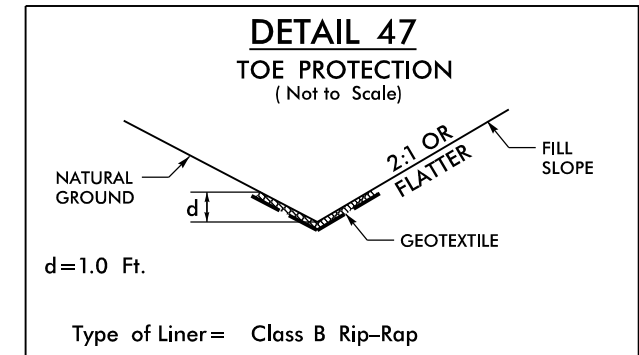
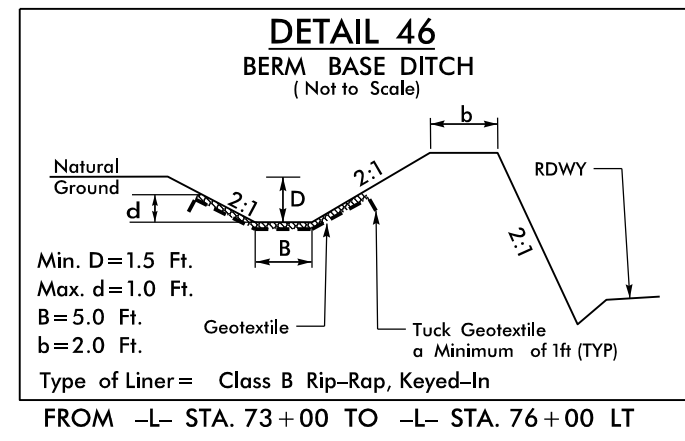
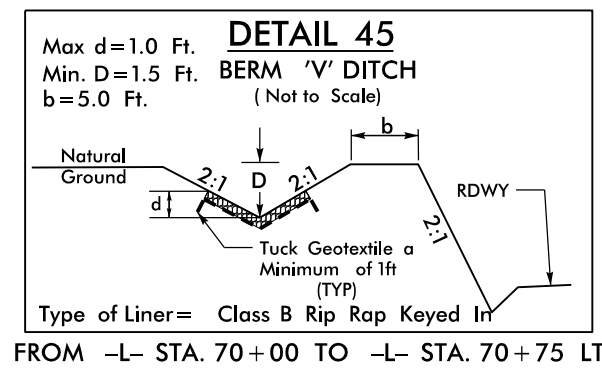
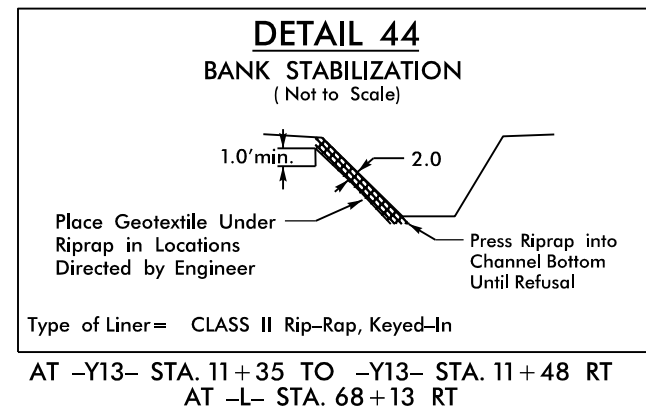
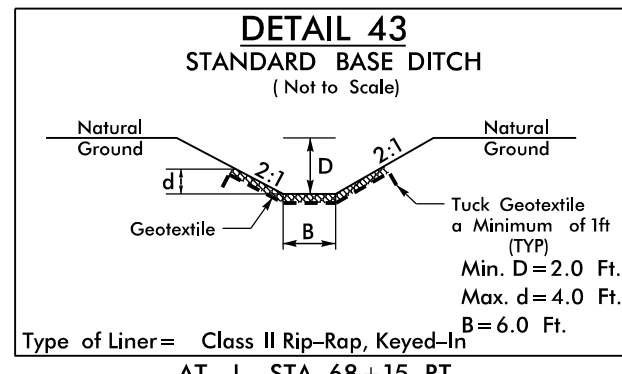
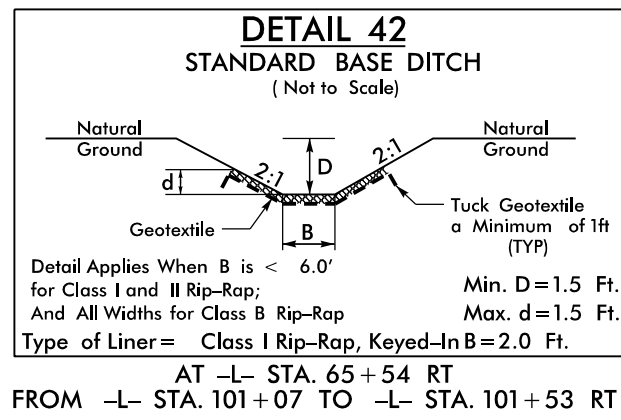
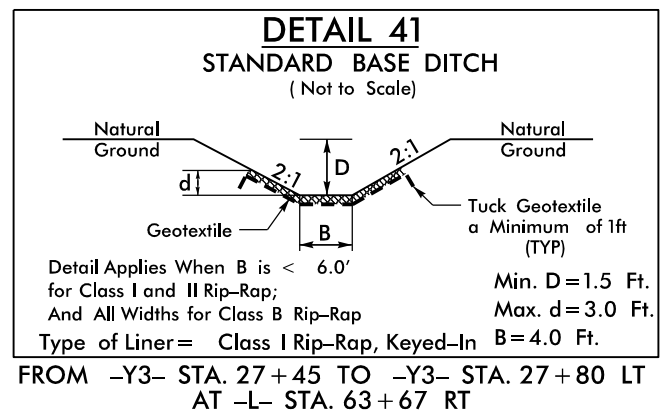


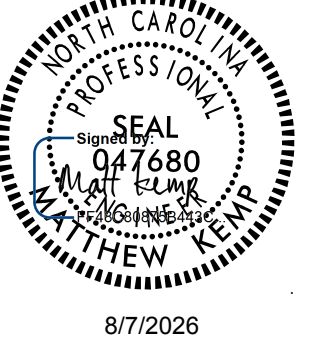
FROM -L- STA. 12+88 RT TO -L- STA. 13+15 RT
FROM -L- STA. 43+73 LT TO -L- STA. 44+12 LT

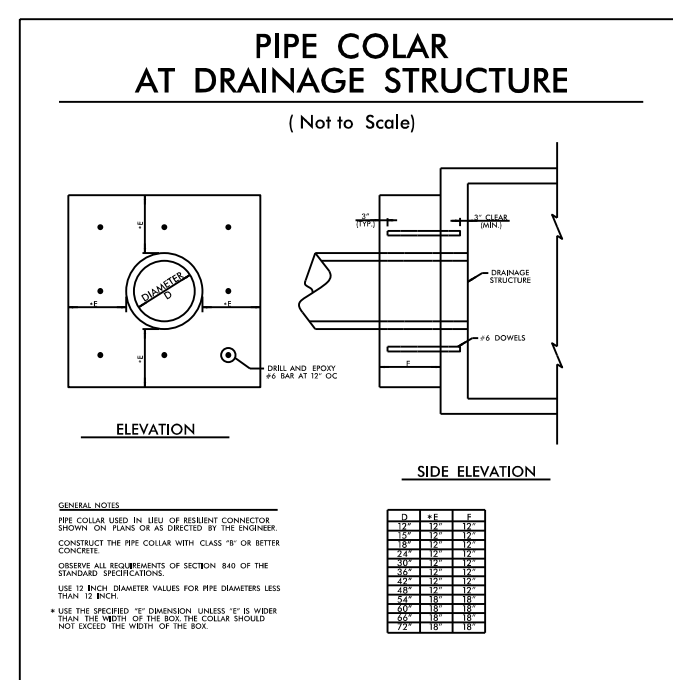
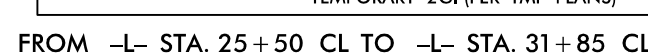
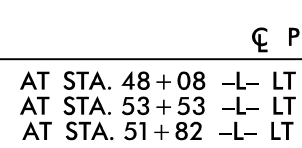
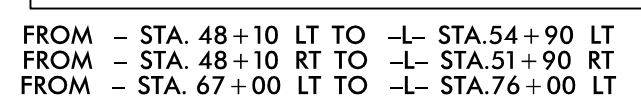
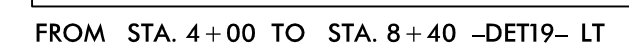
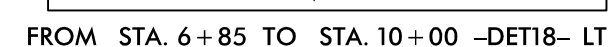
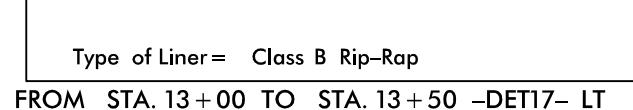
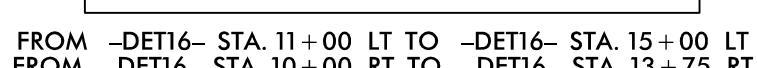
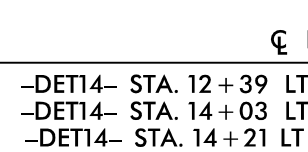
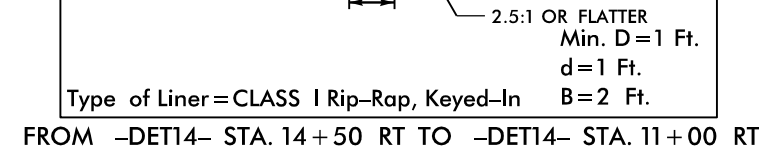
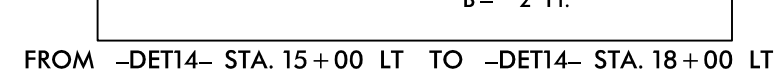
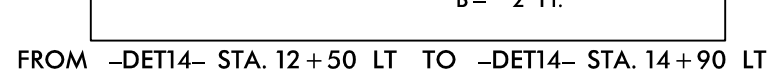
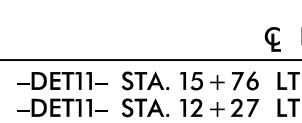
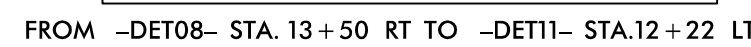
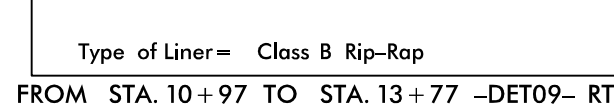
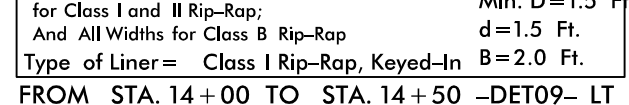
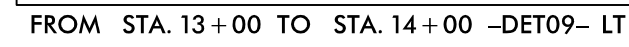
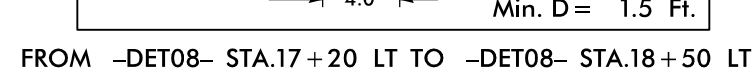
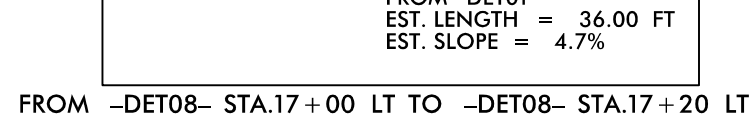
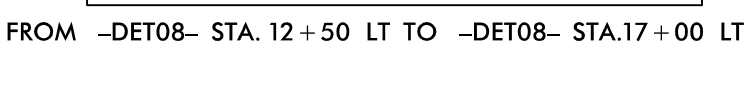
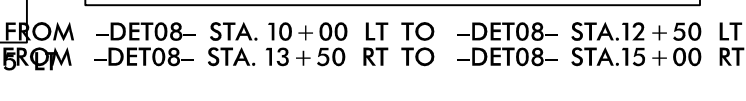
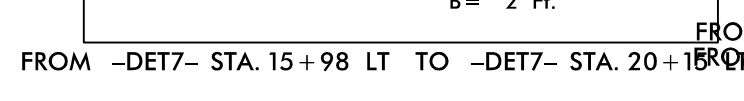
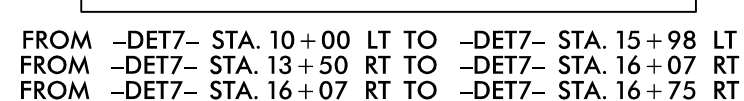
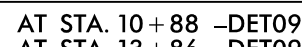
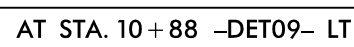
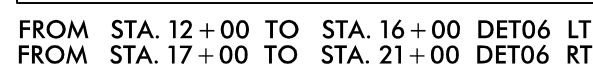
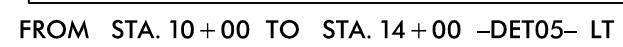
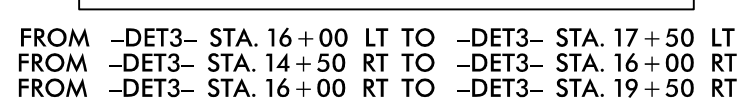
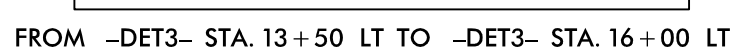
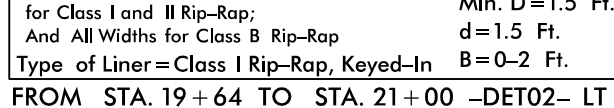
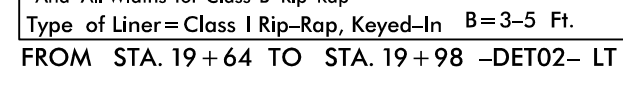
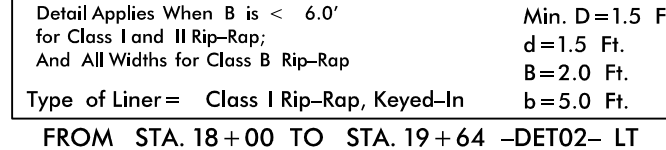
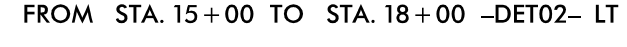
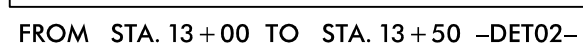
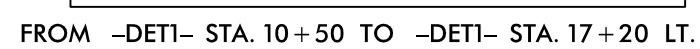


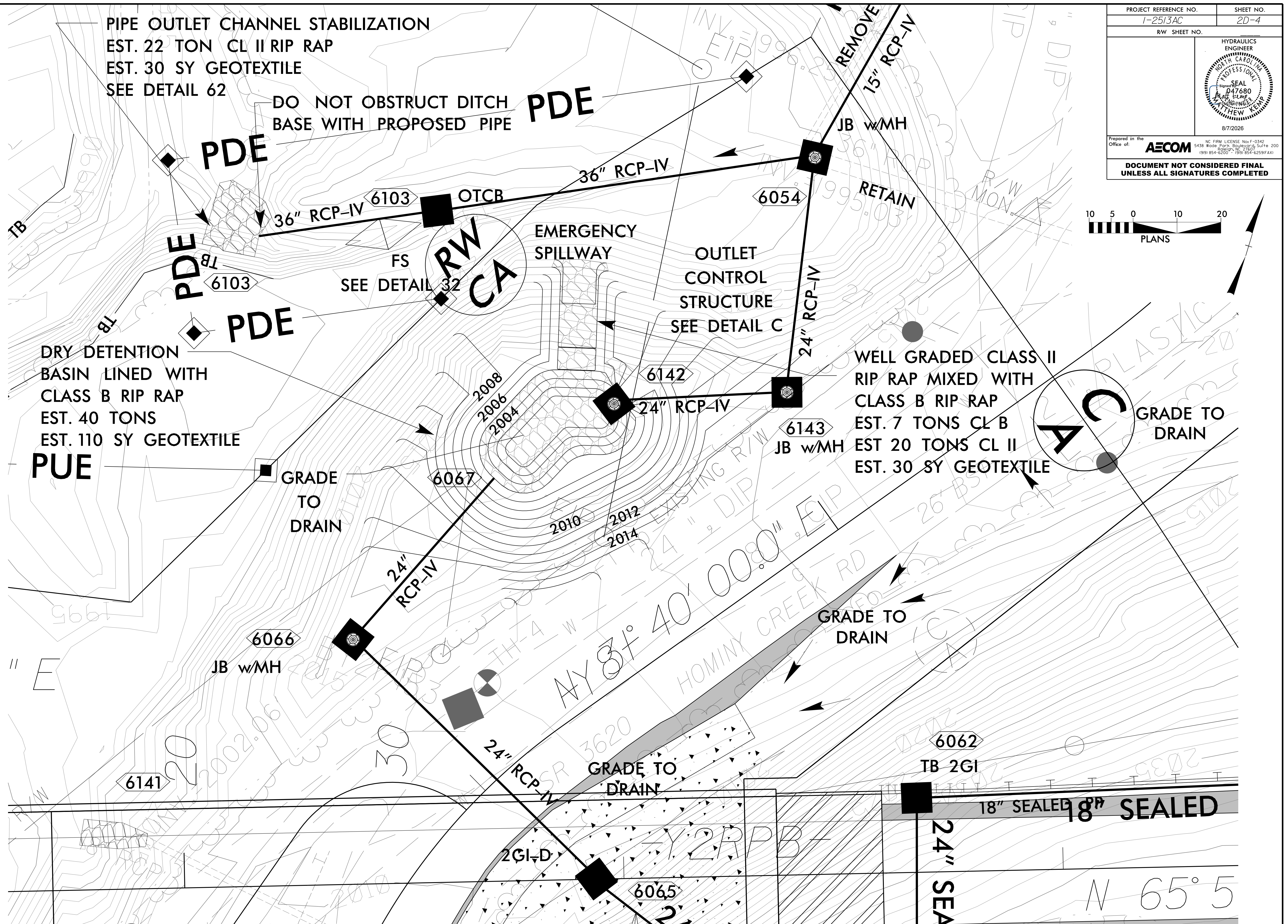
-Y7- STA. 18+28 LT
-Y8- STA. 14+17 LT
-Y8- STA. 15+74 LT
-Y8- STA. 17+98 LT

PROJECT REFERENCE NO.	SHEET NO.
1-2513AC	2D-1
RW SHEET NO.	
HYDRAULICS ENGINEER	HYDRAULICS ENGINEER
8/7/2026	8/12/2026
Prepared in the Office of:	NC FIRM LICENSE No. F-0342 5438 Wade Park Boulevard, Suite 200 Raleigh, NC 27607 (919) 854-6200 • (919) 854-6258(FAX)
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

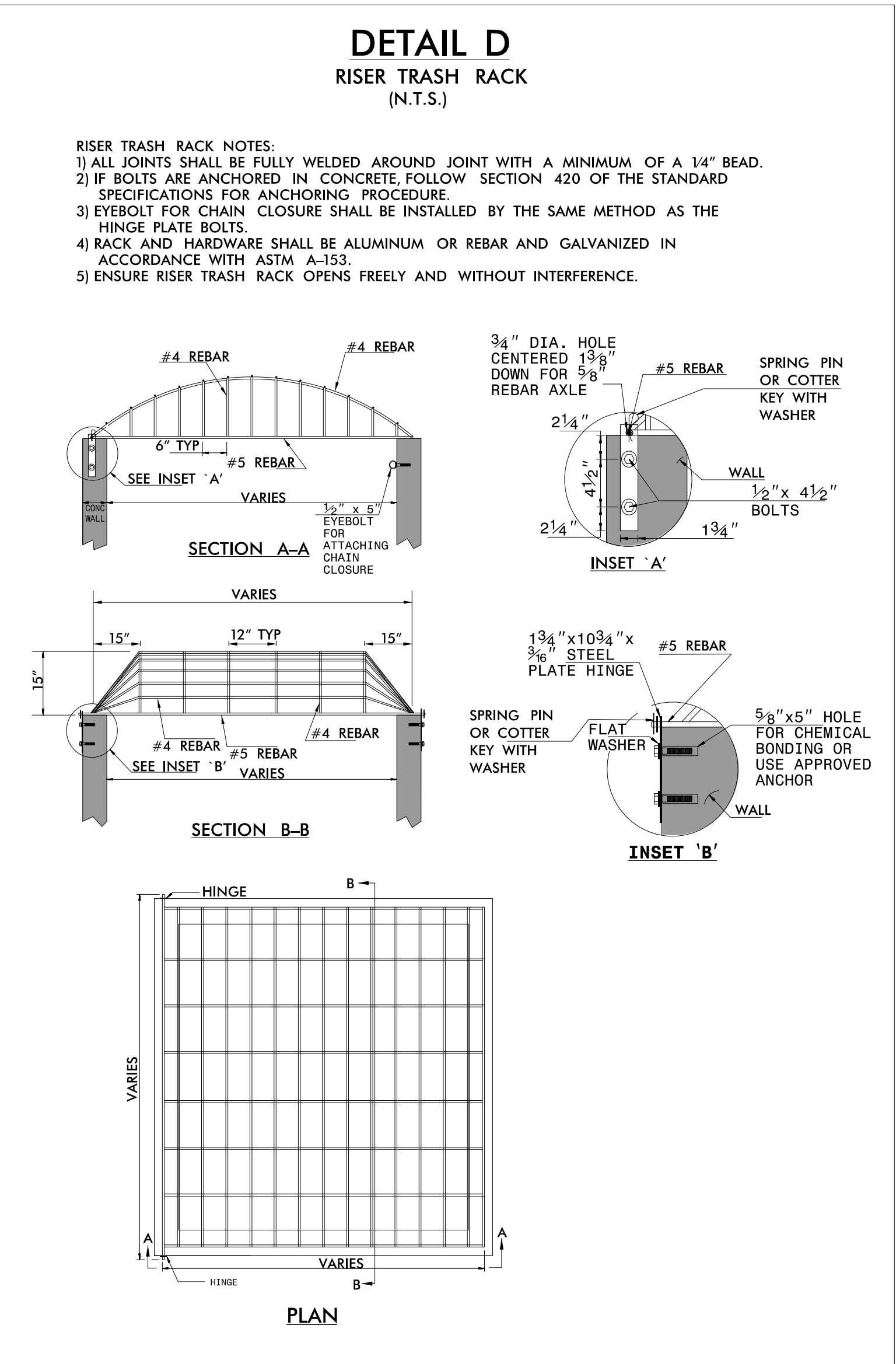
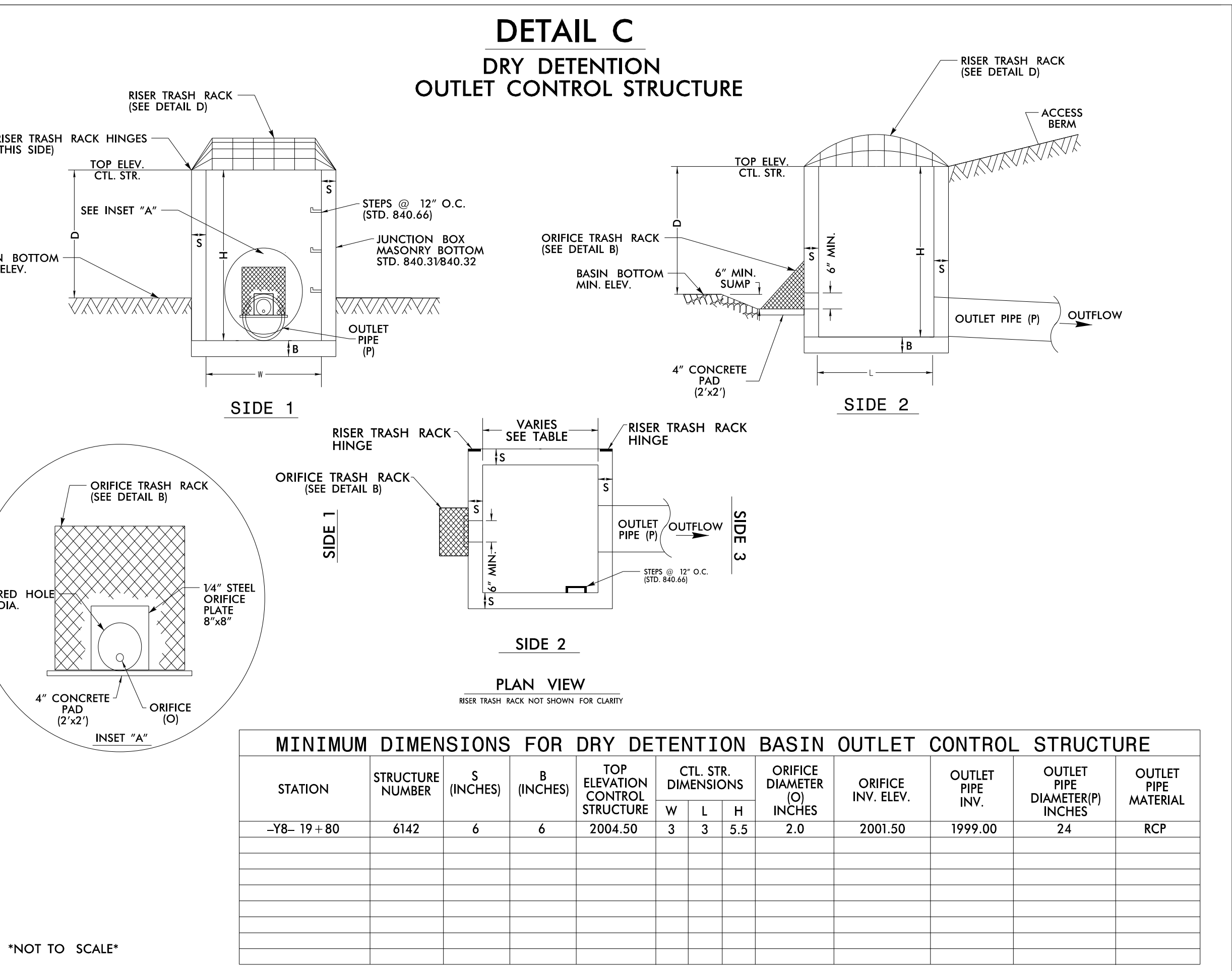


PROJECT REFERENCE NO.	SHEET NO.
1-2513AC	2D-2
RW SHEET NO.	
HYDRAULICS ENGINEER	HYDRAULICS ENGINEER
	
8/7/2026	8/12/2026
Prepared in the Office of: AECOM NC FIRM LICENSE No.F-0342 5438 Wade Park Boulevard, Suite 200 Raleigh, NC 27607 (919) 854-6200 • (919) 854-6258(FAX)	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

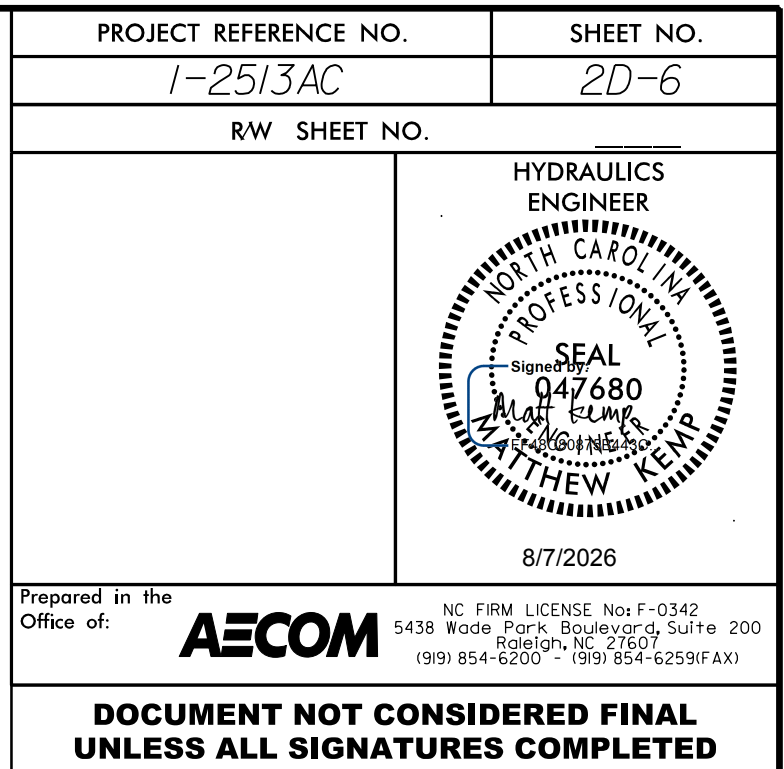




REVISIONS



FOR STRUCTURE NO. 6142 SEE SHEET 6



8/17/99

REVISIONS

6/28/2006
P-2013A
Mohammed Fallah

FILTRATION BASIN DETAILS – DRAINAGE STRUCTURE NO. 6147 (ALIGNMENT –Y2B–)

GENERAL NOTES:

① ENGINEERED SOIL MEDIA

Filtration Basin Soil Mix Blend

The Engineered Soil Mix shall consist of the following blend:

Recycled Expanded Slate Fines 80%
Approved Compost Organic Component 20%

Mechanically mix 1 part compost with 4 parts of the expanded slate fines until a uniform distribution of the components is achieved. The slate aggregate fines and organic component consist of the following:

Recycled Expanded Slate Fines

The recycled expanded slate aggregate fines shall conform to the following screening operation:

Sieve Size	% Retained
#4	4-8%
#8	28-38%
#16	46-58%
#30	63-75%
#50	74-84%
#100	82-90%
Fine Material	2.79-3.53% passing #100

Organic Component

The compost or organic component shall conform to the following specifications:

- Humus material shall have an ash content of no less than 8 percent and no more than 40 percent.
- The pH of the organic matter shall be between 5.5 and 8.5.
- The salt content shall be less than 10 millimho/cm at 25 degrees C, (Ece <10) on a saturated past extract.
- Types of acceptable composted products can be derived from yard wastes, low in salts, low in phosphorus (P205 below 1% wet wt. bas us), free from weed seeds, free of pathogens and other deleterious materials.
- Composted pine bark products are conditionally acceptable (stable humus must be present).
- Sludge-based materials are not acceptable including municipal swage sludge bio-solids.
- The organic amendment must have a Carbon/Nitrogen ratio of <25:1.
- The compost shall be aerobic without malodorous presence of decomposition products.
- From 75 to 100 percent organic amendment particles shall pass the 4.0 mm sieve size.
- From 45 to 65 percent moisture measure via wet-weight basis.
- Free of stones, debris, plant material.
- Organic content must be above 50% on a dry weight basis.
- Metals and contaminants must meet or exceed US EPA Standard 40.

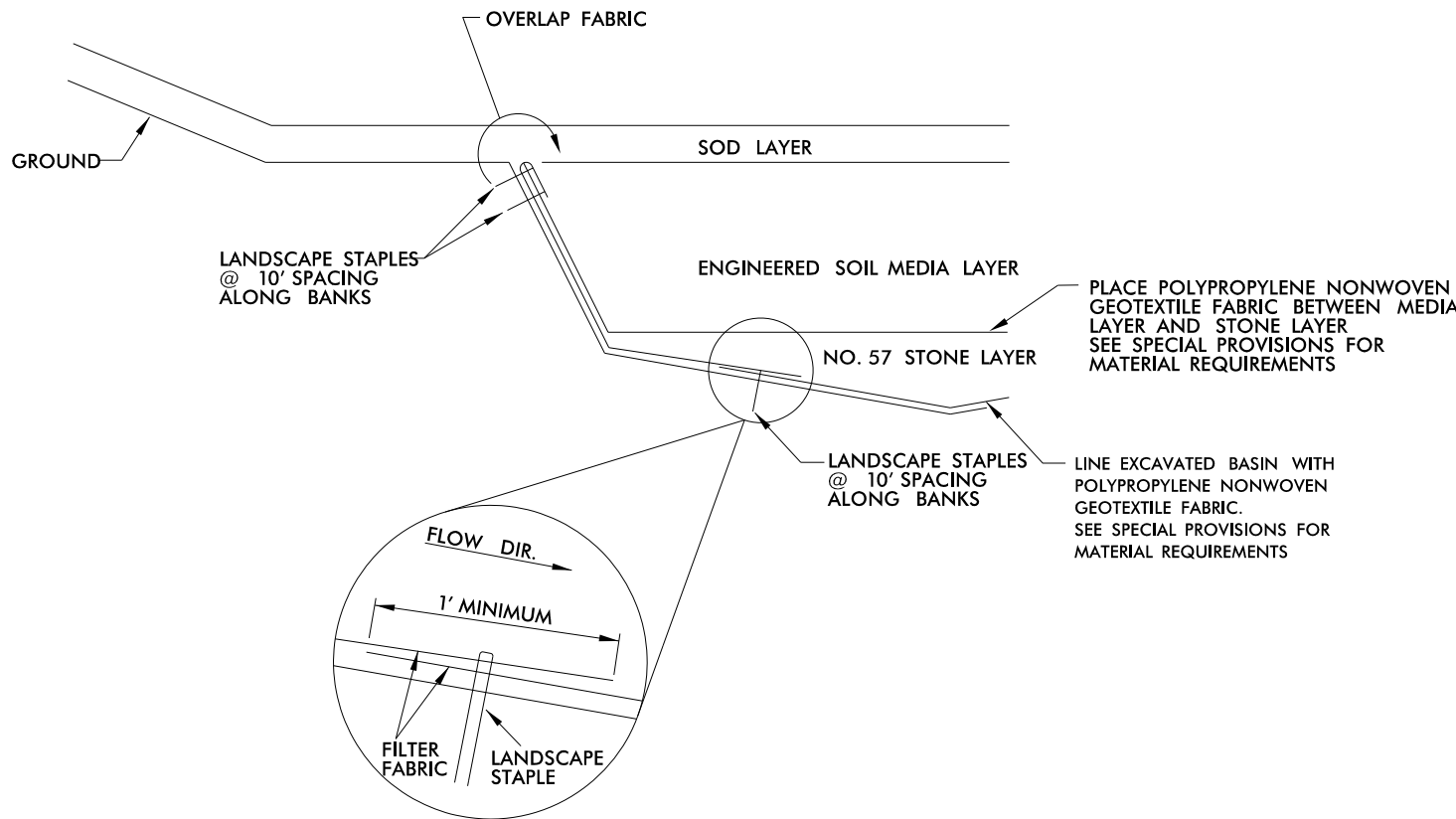
② WASHED GRAVEL (NO. 57 STONE), LIMESTONE BASED AGGREGATES SHOULD NOT BE USED

③ FESCUE/BLEUGRASS BLEND SOD: THE SOD SOIL LAYER SHALL CONTAIN MINIMAL CLAY CONTENT IN ORDER TO FACILITATE FILTRATION. THE SOD SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION (TOP OF SOD IS FINISHED GRADE)

④ THE UNDERDRAIN PIPES SHALL HAVE A MINIMUM SLOPE OF 0.005 FT./FT.

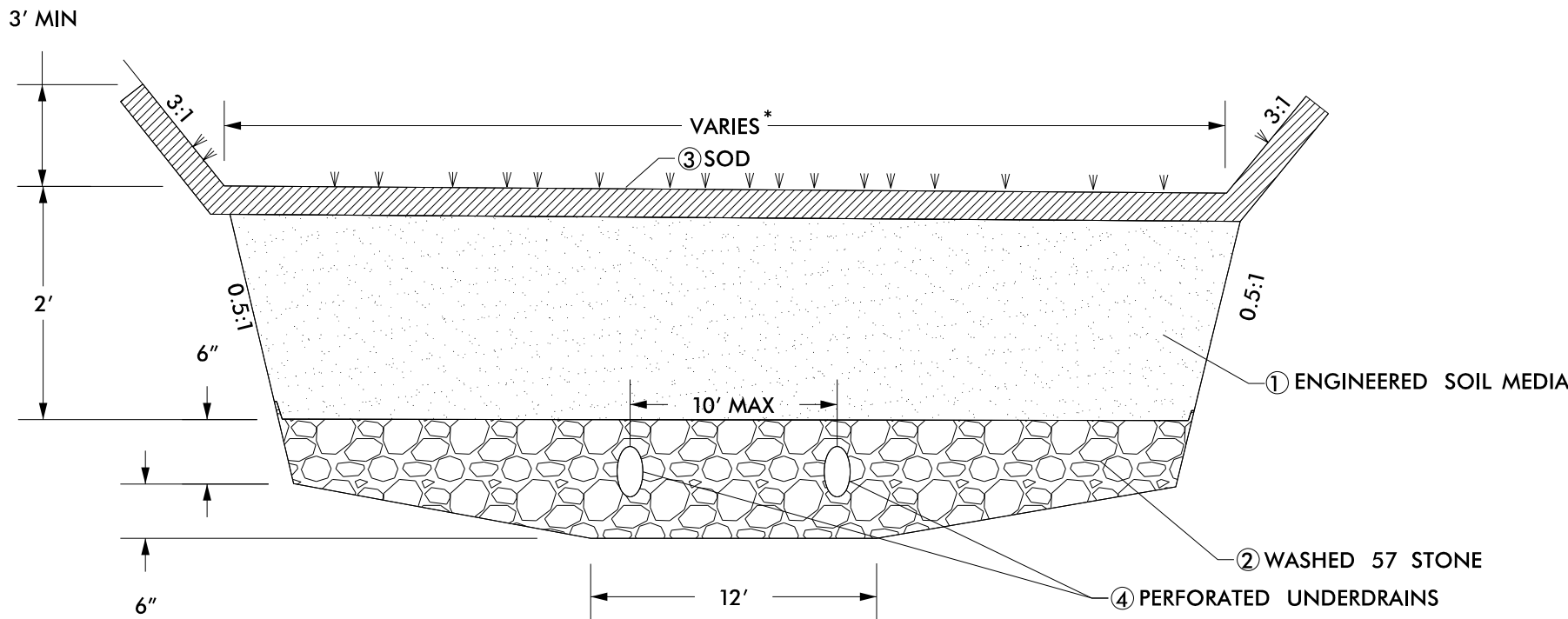
⑤ FOR FURTHER FILTRATION BASIN DETAIL, SEE PROJECT SPECIAL PROVISIONS.

DETAIL F FILTRATION BASIN FABRIC INSTALLATION N.T.S.



NOTES:

- LINING FABRIC SHOULD BE FOLDED BACK TO OVERLAP DIVIDING FABRIC AND SECURED WITH LANDSCAPE STAPLES TO ENSURE SEALING THE STONE FROM SOIL.
- FABRIC SHOULD BE LAYED IN A WAY TO PREVENT WATER FROM FLOWING BETWEEN OVERLAPPED PIECES. (SEE BLOWUP)
- FABRIC SHOULD BE OVERLAPPED A MINIMUM OF 12 INCHES AND SECURED WITH STAPLES.
- NO OVERLAPPING SHOULD OCCUR UNDER DRAIN PIPES.

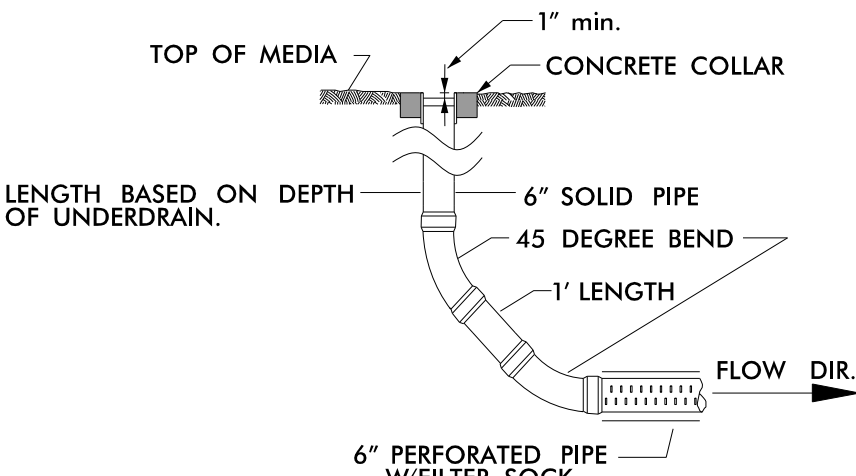


DETAIL E TYPICAL FILTRATION CROSS SECTION NOT TO SCALE

DETAIL G UNDERDRAIN CLEANOUTS

END CLEANOUT

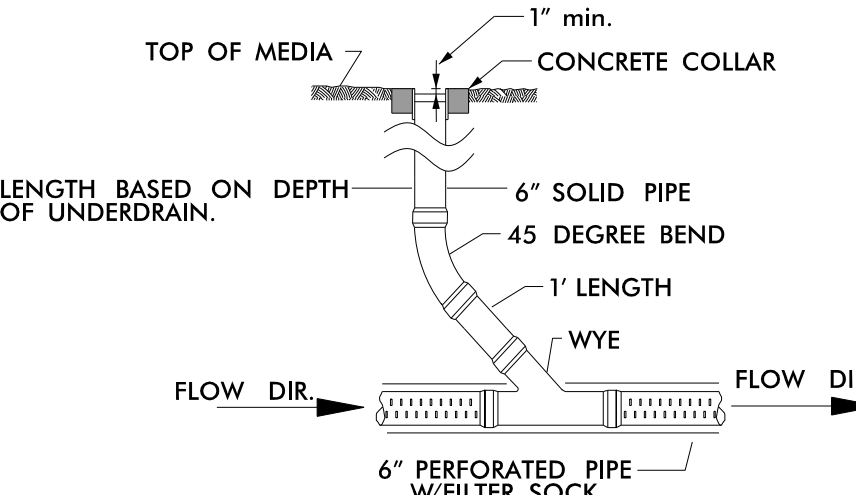
*NOT TO SCALE



NOTE: ONLY UNDERDRAIN PIPE SHOULD BE PERFORATED

MIDWAY CLEANOUT

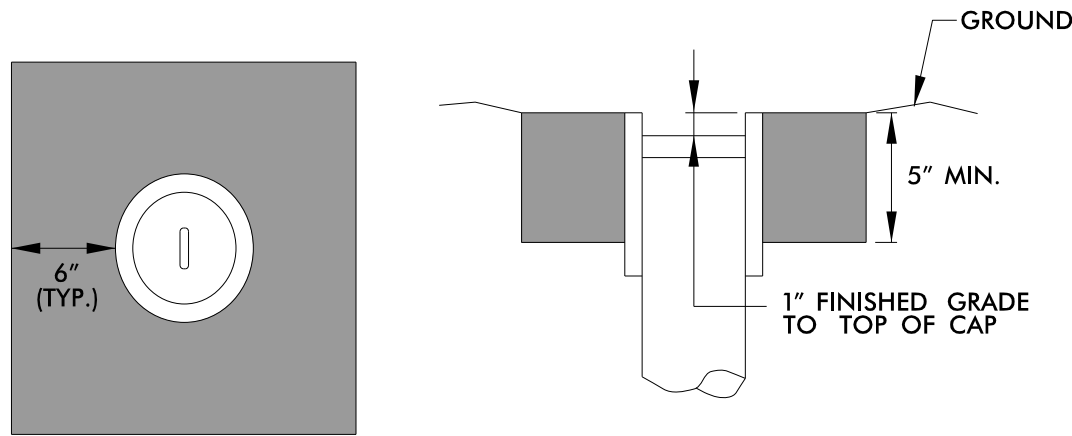
(USED ON AS NEEDED BASIS, AS DIRECTED BY THE ENGINEER)



NOTE: ONLY UNDERDRAIN PIPE SHOULD BE PERFORATED

*NOT TO SCALE

RECESSED CLEANOUT W/CONCRETE COLLAR



TOP VIEW

SIDE VIEW

NOTES:

- CLEANOUT CAP SHALL BE RECESSED 1" MIN. BELOW GROUND, REMOVABLE, WATER TIGHT, AND CLOSED UNDER NORMAL CONDITIONS.
- CONCRETE SHALL BE 3,000 PSI.
- THIS CONCRETE COLLAR DETAIL SHALL BE APPLIED TO ALL CLEANOUTS ON PROJECT.
- USE 45 DEG. ELBOWS AT ALL BENDS IN PIPE CLEANOUTS.

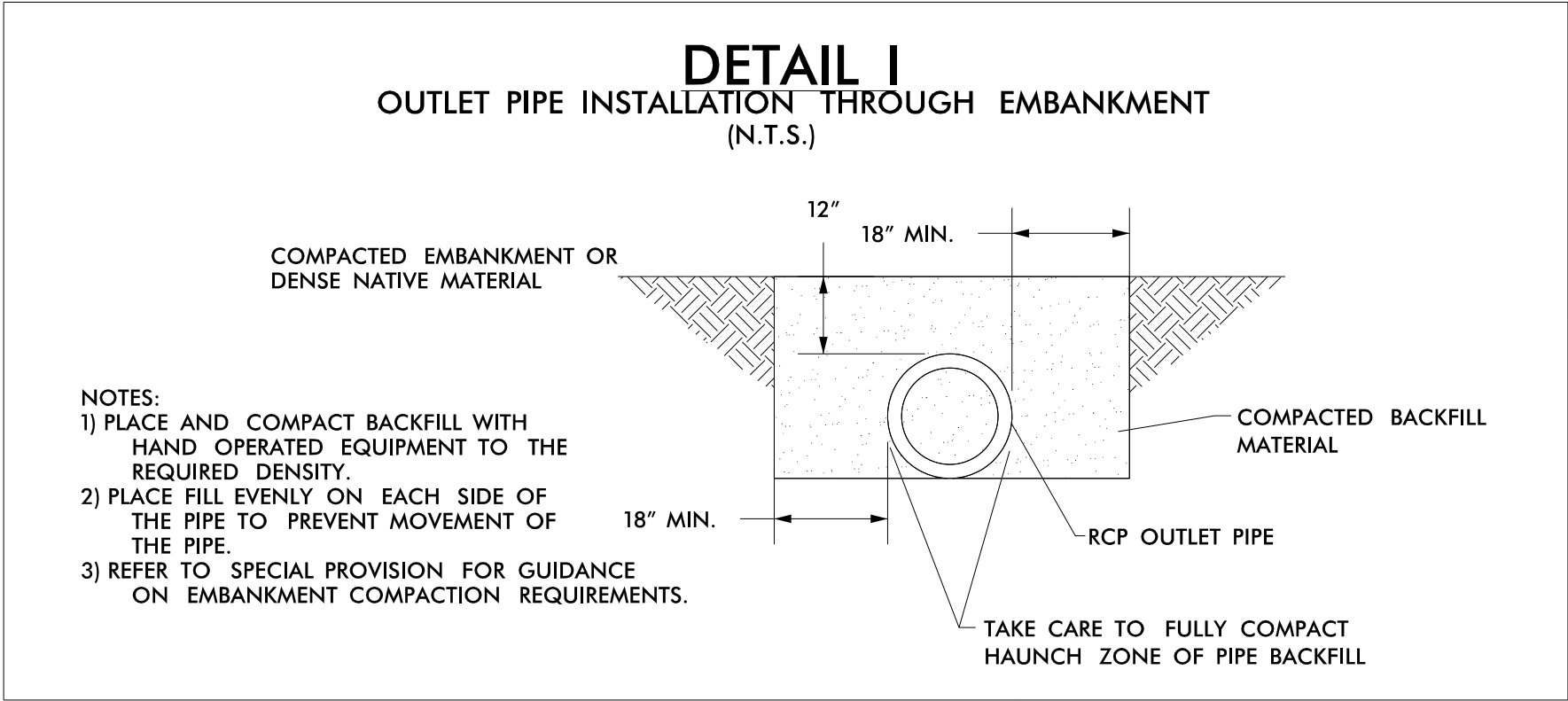
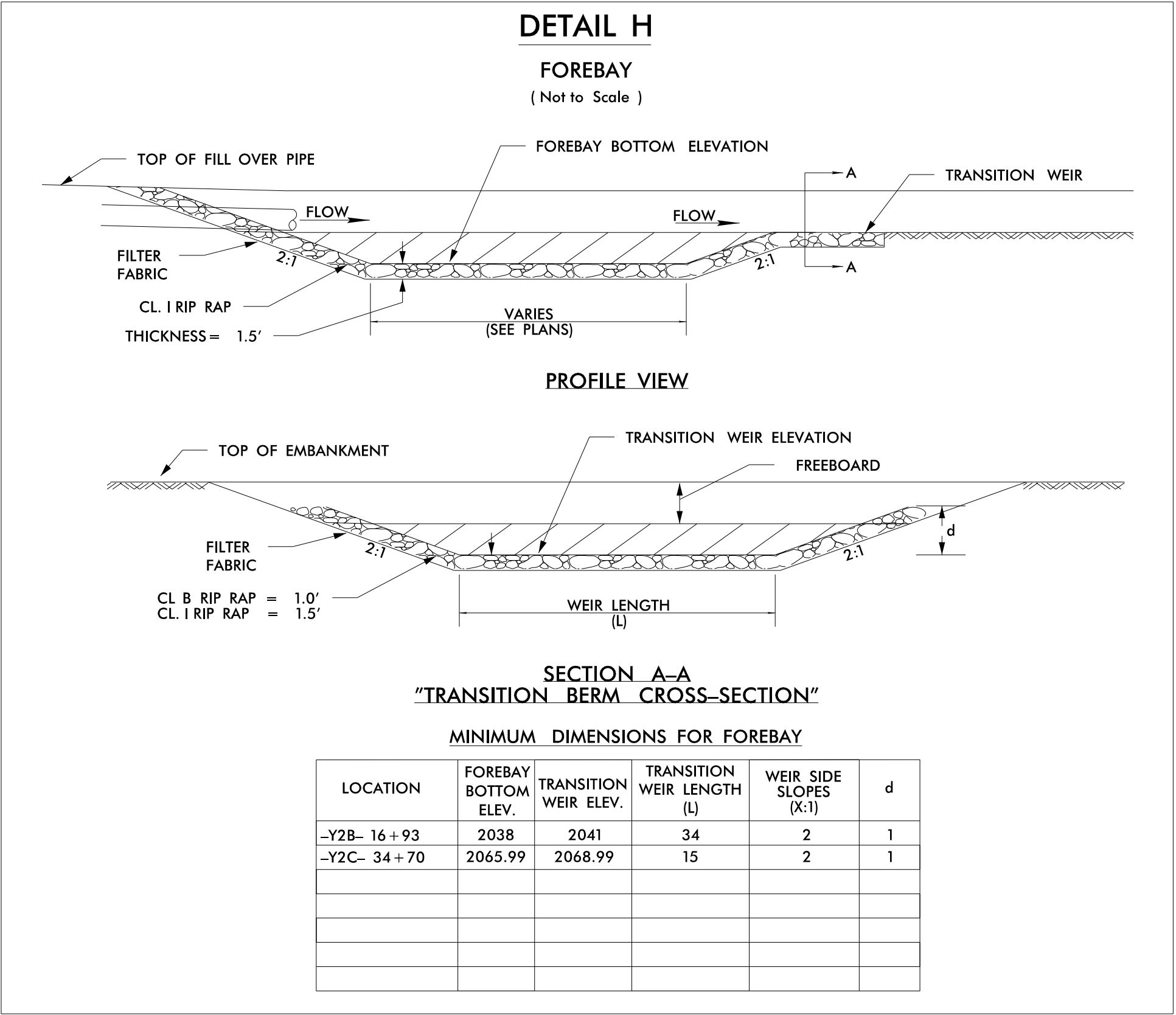
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FOR STRUCTURE NO. 6147 SEE SHEET 6

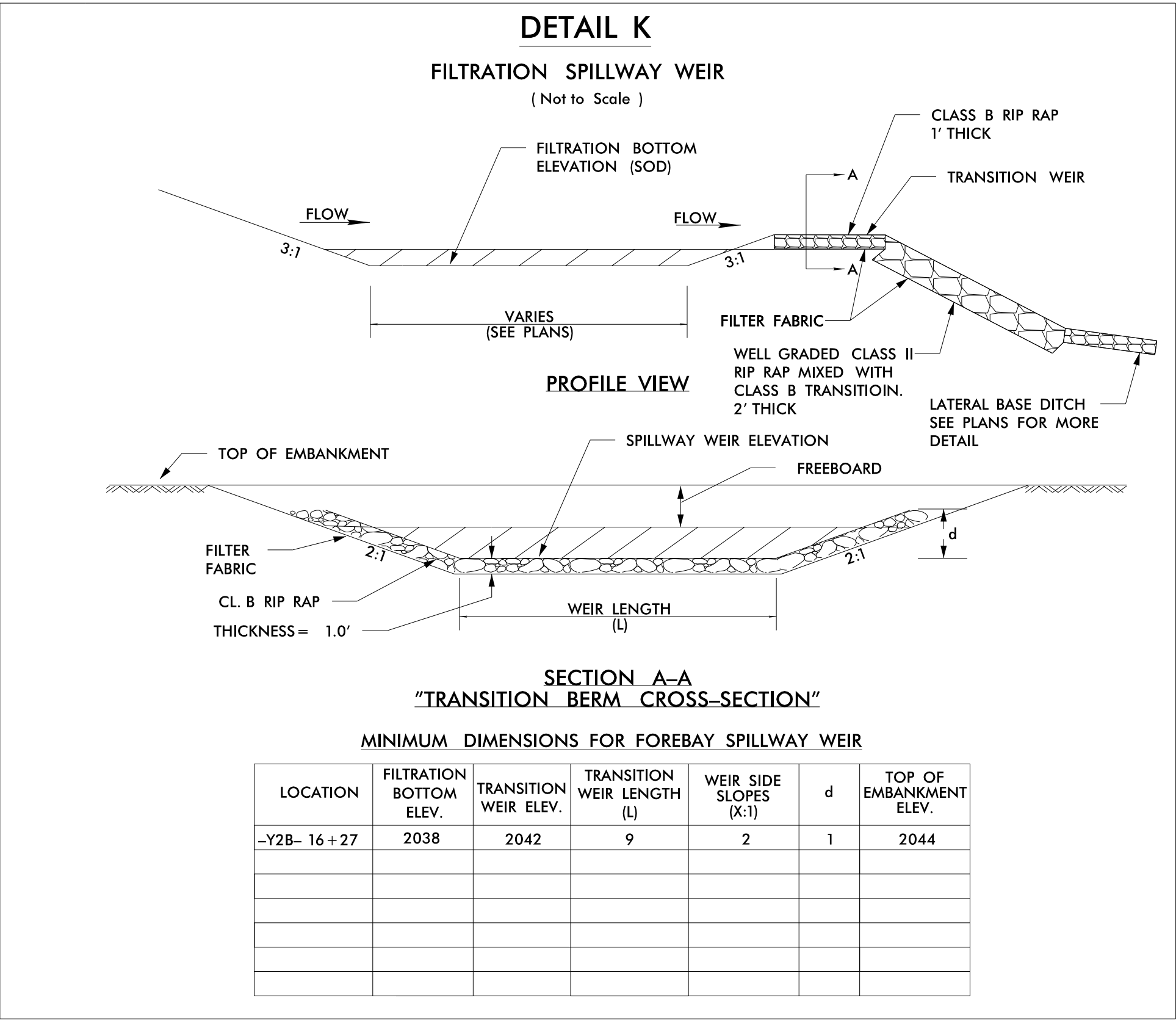
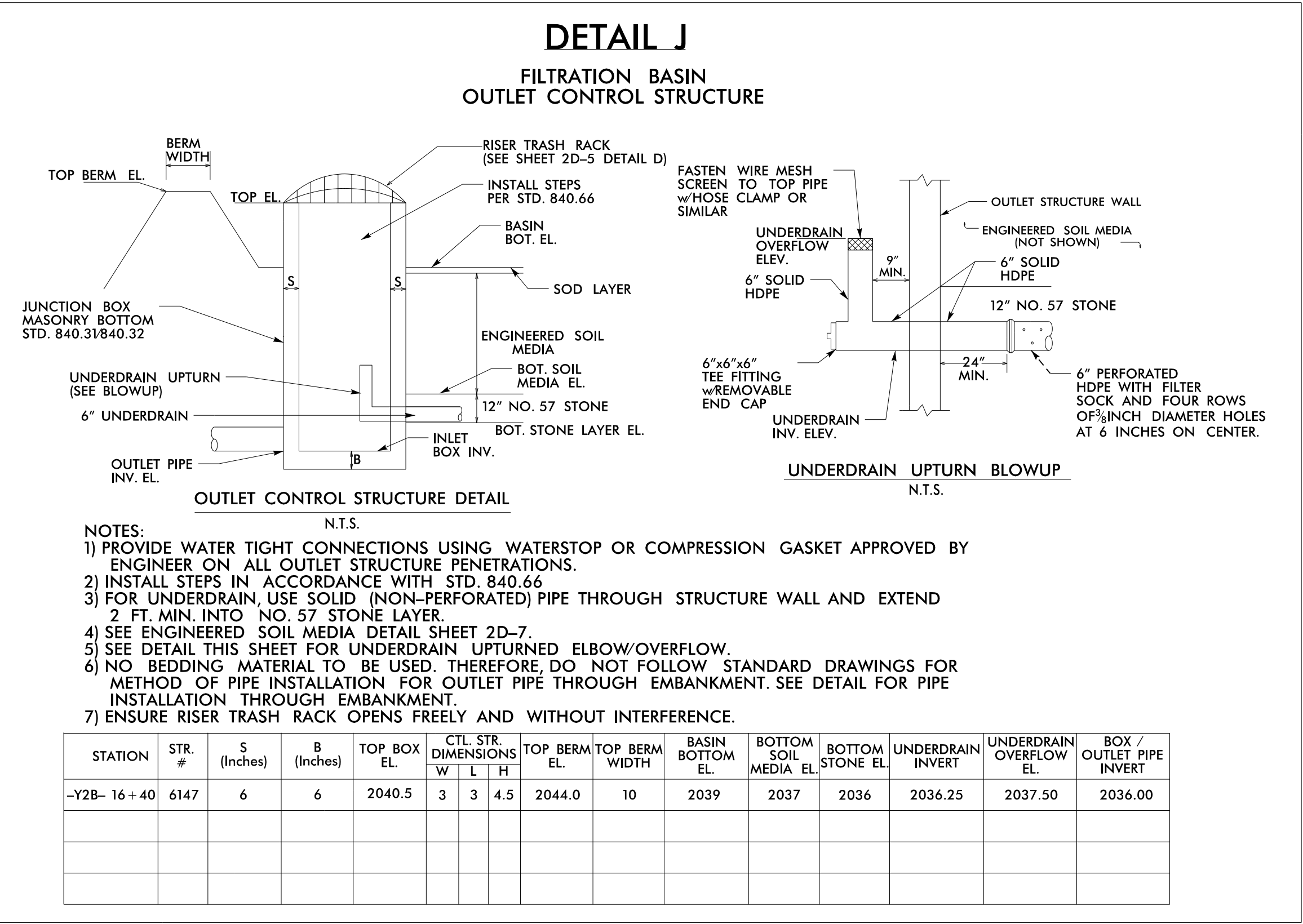
PROJECT REFERENCE NO.	SHEET NO.
1-2513AC	2D-7
RW SHEET NO.	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

8/17/99

FILTRATION BASIN DETAILS – DRAINAGE STRUCTURE NO. 6147 (ALIGNMENT –Y2B–)



PROJECT REFERENCE NO.	SHEET NO.
1-2513AC	2D-8
RW SHEET NO.	
HYDRAULICS ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



FOR STRUCTURE NO. 6147 SEE SHEET 6

REVISIONS

6/28/2026
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12/06/07

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STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

I-2513AC

DRAINAGE DITCH EXCAVATION

LINE	SIDE	STATION	STATION	VOLUME (CY)
-L-	LT	18 + 50	19 + 40	95
-L-	RT	26 + 35	28 + 50	796
-L-	LT	53 + 50	53 + 86	17
-L-	RT	63 + 67	63 + 67	8
-L-	RT	65 + 54	65 + 54	3
-L-	RT	68 + 15	68 + 15	45
-L-	RT	101 + 07	101 + 53	25
-L-	LT	104 + 83	104 + 83	30
-Y2B-	RT	17 + 84	18 + 33	65
-Y2B-	LT	19 + 84	21 + 65	958
-Y2C-	RT	11 + 50	12 + 50	93
-Y3-	RT	21 + 62	21 + 62	105
-Y3-	LT	27 + 45	27 + 80	60
-Y3-	RT	29 + 69	30 + 52	195
-Y3-	RT	30 + 52	31 + 39	60
-Y3-	RT	31 + 39	34 + 10	405
-Y3-	RT	34 + 10	38 + 10	910
-Y8-	LT	19 + 22	19 + 85	160
-Y13-	RT	11 + 35	11 + 48	150
-DET02-	LT	19 + 64	19 + 98	17
-DET02-	LT	19 + 64	21 + 00	820
-DET08-	LT	17 + 00	17 + 20	4
-DET09-	LT	13 + 00	14 + 00	135
-DET09-	LT	14 + 00	14 + 50	60
-DET18-	LT	6 + 85	10 + 00	2,135
-Y2B- (FILTRATION BASIN)	RT	16 + 25	17 + 00	205
-Y8- (DRY DETENTION BASIN)	LT	19 + 25	20 + 00	985
			TOTAL	8,541
			SAY	8,550

SUMMARY OF BASIN COMPONENT ITEMS

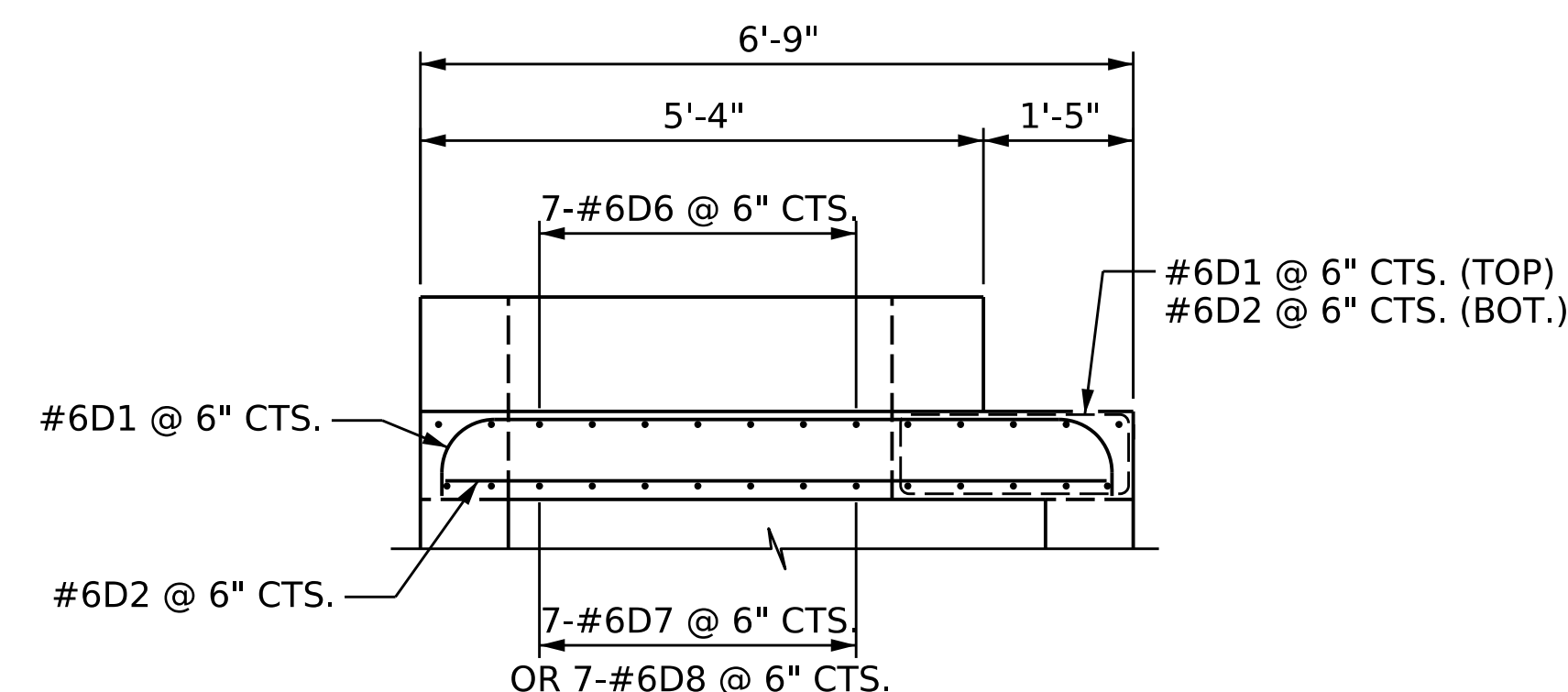
(for Stormwater BMP's)

ITEM DESCRIPTION	UNIT	QUANTITY		
		DRY DETENTION BASIN	FILTRATION BASIN	PROJECT TOTALS
MASONRY DRAINAGE STRUCTURE /OUTLET CONTROL STRUCTURE	EA	1	1	2
RISER TRASH RACK	EA	1	1	2
ORIFICE TRASH RACK	EA	0	1	1
6" CLEANOUT	EA	0	4	4
6" CLEANOUT CAP (THREADED)	EA	0	4	4
6" X 6" X 6" HDPE TEE	EA	0	1	1
6" HDPE 45-DEGREE BEND	EA	0	1	1
UNDERDRAIN PIPE - 6" HDPE PERFORATED	LF	0	90	90
UNDERDRAIN PIPE - 6" HDPE NONPERFORATED	LF	0	15	15
POLYPROPYLENE NONWOVEN GEOTEXTILE FABRIC	SY	140	420	560
FESCUE /BLUEGRASS BLEND SOD	SY	0	260	260
ENGINEERED SOIL MEDIA	CY	0	53	53
WASHED NO. 57 STONE	TON	0	35	35
RIPRAP CL. B	TON	47	26	73
RIPRAP CL. I	TON	0	80	80
RIPRAP CL. II	TON	20	30	50

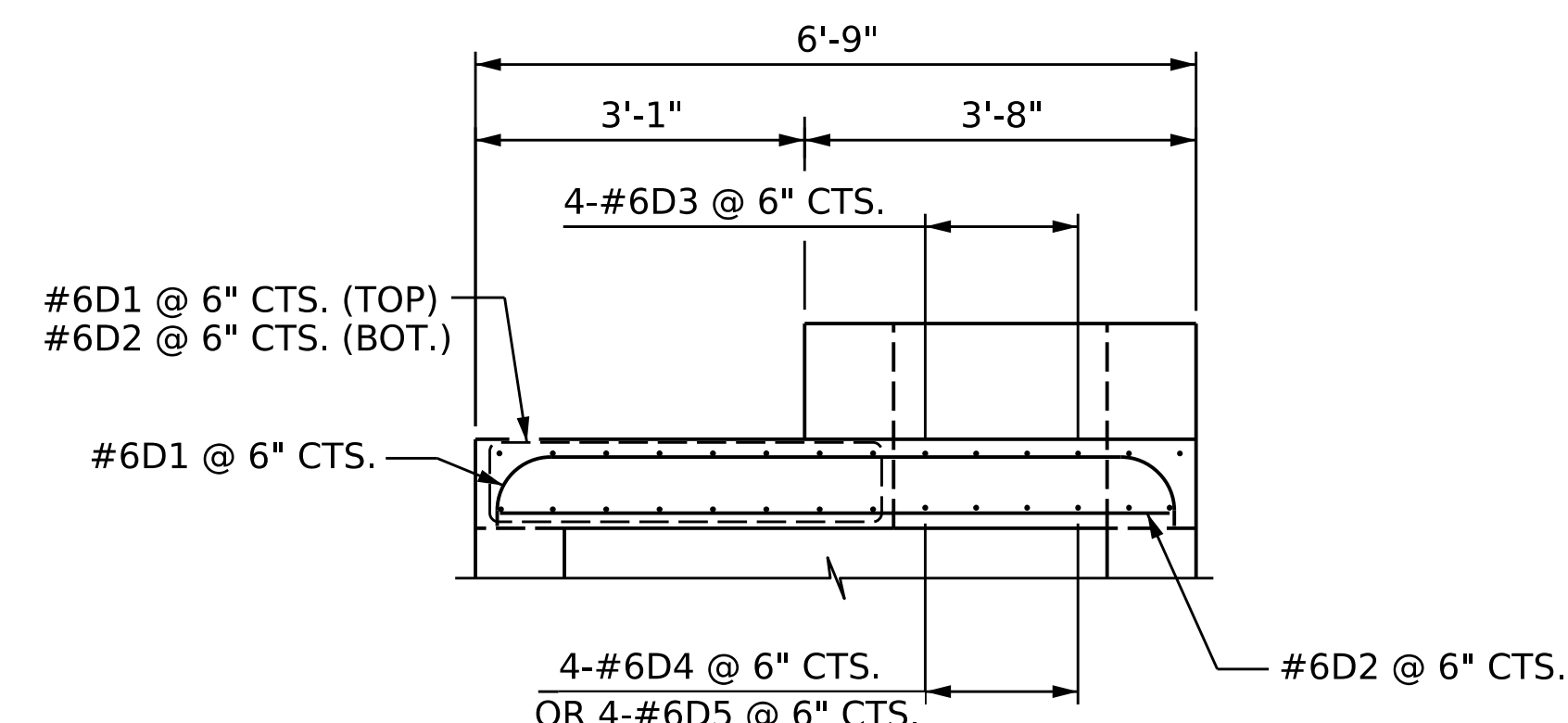
BERM DITCH CONSTRUCTION

LINE	STATION	STATION	LOCATION	LINEAR FEET
-L-	14 + 00	15 + 50	RT	150
-L-	17 + 60	20 + 00	RT	240
-L-	30 + 50	32 + 50	RT	200
-L-	32 + 68	35 + 00	LT	232
-L-	34 + 50	37 + 19	RT	269
-L-	37 + 20	37 + 87	RT	67
-L-	37 + 87	39 + 25	RT	138
-L-	39 + 25	42 + 00	RT	275
-L-	70 + 00	70 + 75	LT	75
-L-	73 + 00	76 + 00	LT	300
DET 2	18 + 00	19 + 64	LT	164
			TOTAL	2,110
			SAY	2,125

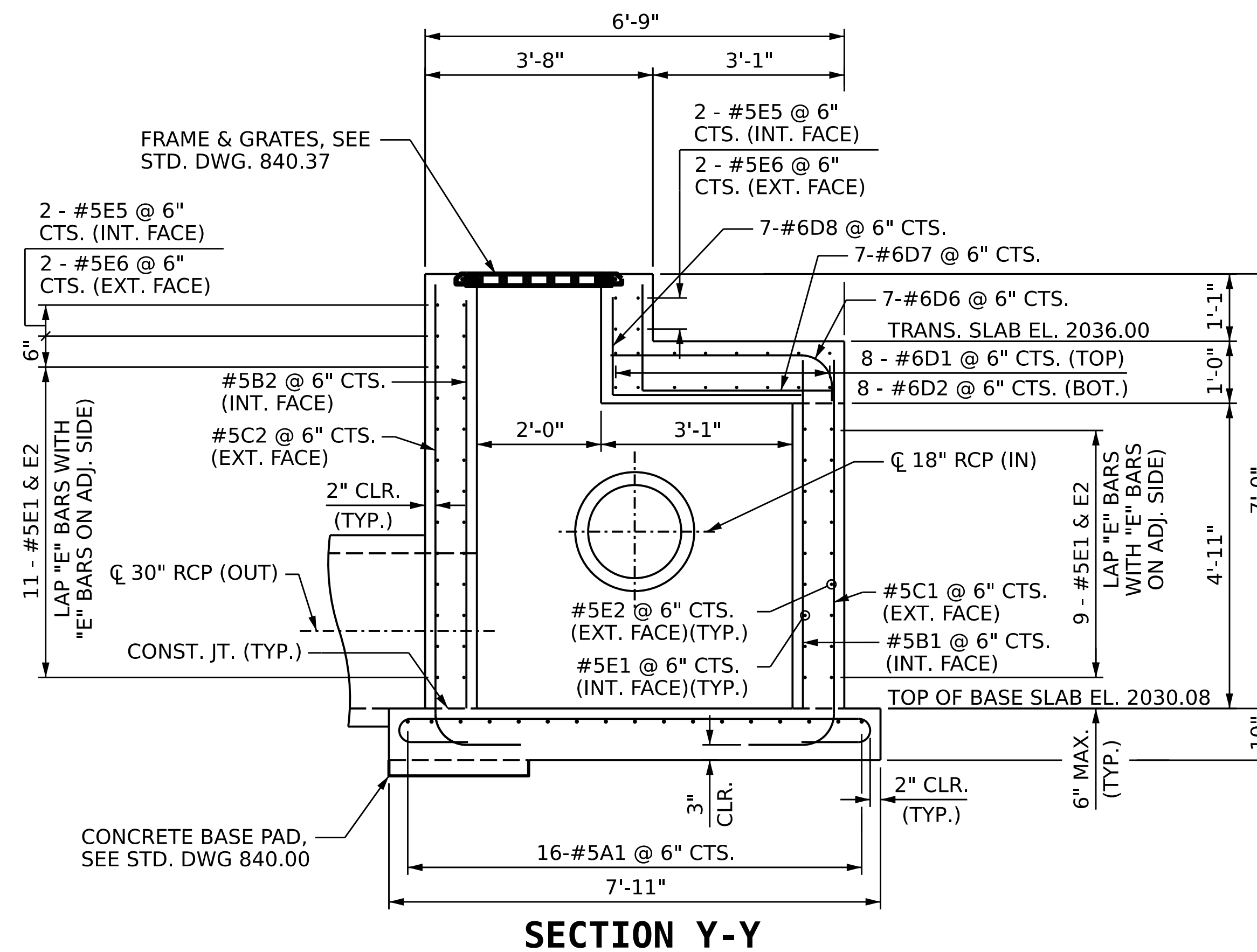
FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



SECTION A-A



SECTION B-B



SECTION Y-Y

PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 40+73.00 -L-



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STR. NO. 0507

REVISIONS						SHEET NO. 2D-10
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

DRAWN BY :	M. CATER	DATE :	04/2026
CHECKED BY :	J.C. MORRISON	DATE :	04/2026
DESIGN ENGINEER OF RECORD:	A. VASUDEVAN	DATE :	04/2026

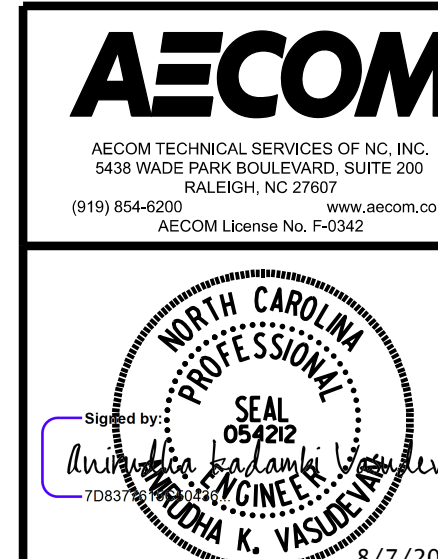
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SIGNATURES COMPLETED

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FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL
DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 102+01.00 -L-



STR No. 0812

REVISIONS						SHEET NO. 2D-11
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

DRAWN BY :	M. CATER	DATE :	04/2026
CHECKED BY :	D. RITACCO	DATE :	04/2026
DESIGN ENGINEER OF RECORD:	A. VASUDEVAN	DATE :	04/2026

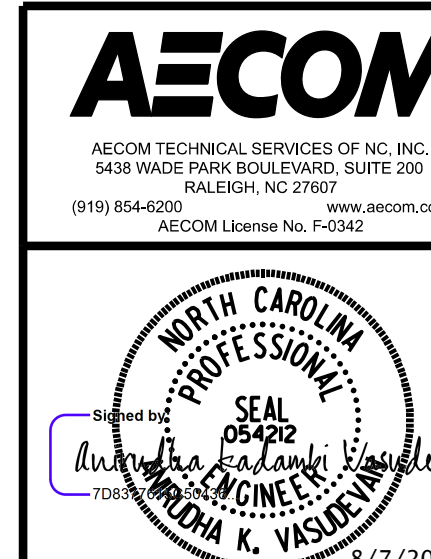
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SIGNATURES COMPLETED

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL
DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



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SIGNATURES COMPLETED

PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 107+14.00 -L-



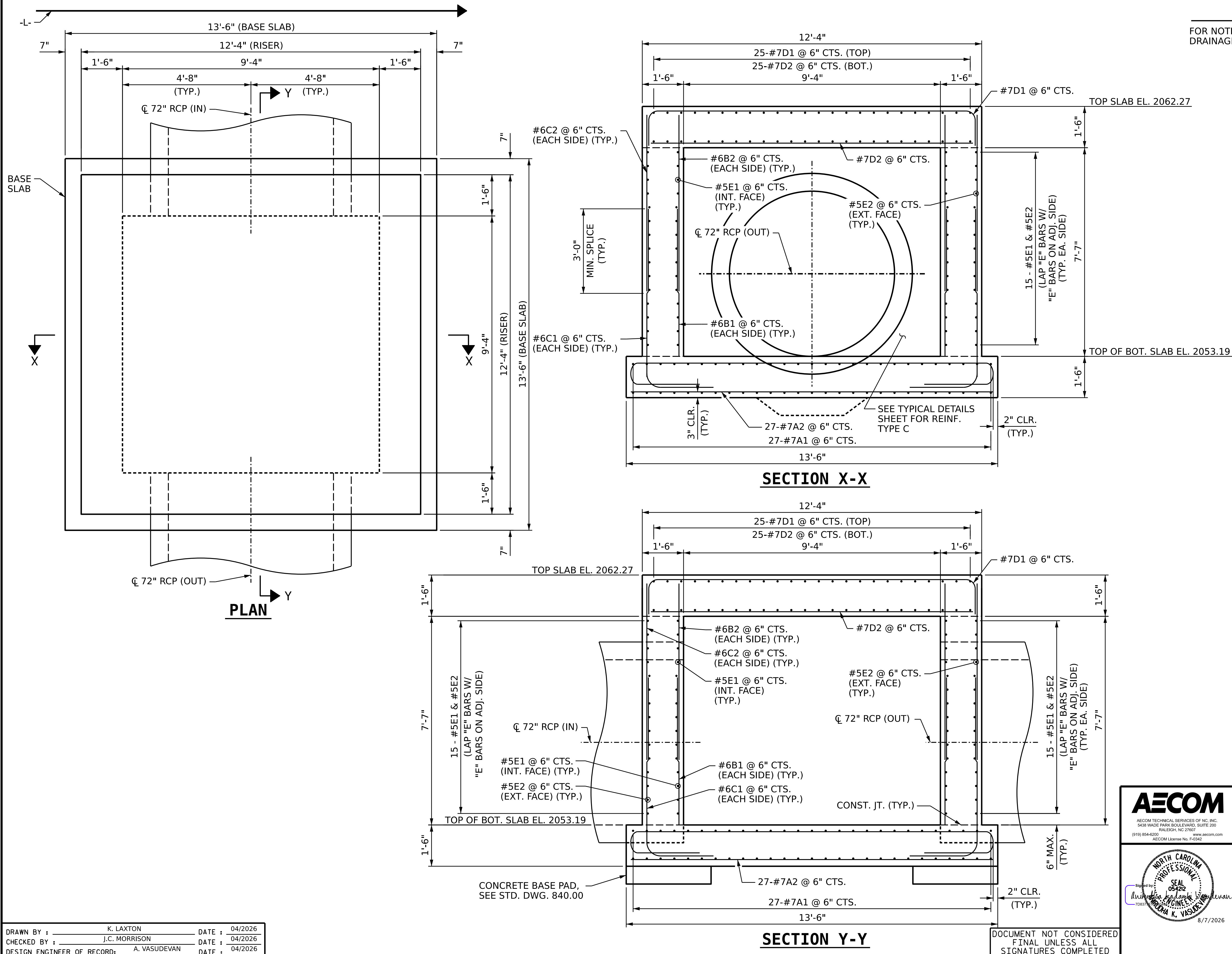
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SPECIAL JUNCTION BOX WITH MANHOLE

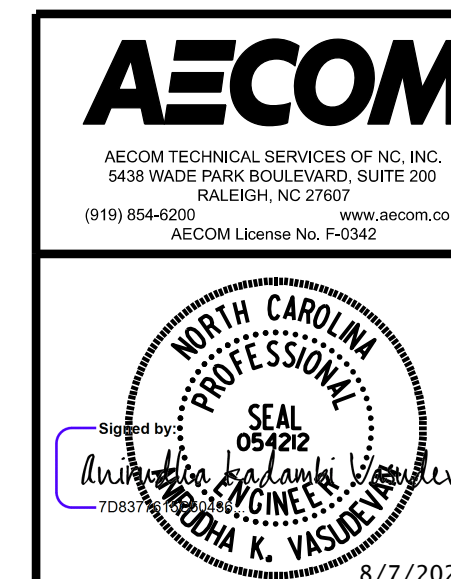
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NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



DOCUMENT NOT CONSIDERED
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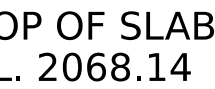
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BUNCOMBE COUNTY
 STATION: 107+14.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

**SPECIAL JUNCTION BOX
W/ SLAB LID**

STR. No. 0840

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



FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.

PROJECT NO. I-2513 AC

BUNCOMBE COUNTY

STATION: 104+61.00 -L-

**SPECIAL JUNCTION
BOX W/ SLAB LID**

STR. No. 0841

REVISIONS				
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2D-14

DRAWN BY : M. CATER DATE : 02/2026

DOCUMENT NOT CONSIDERE

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET



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AECOM
AECOM TECHNICAL SERVICES OF NC, INC.
5438 WADE PARK BOULEVARD, SUITE 200
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

SPECIAL CATCH BASIN

STR No. 1011

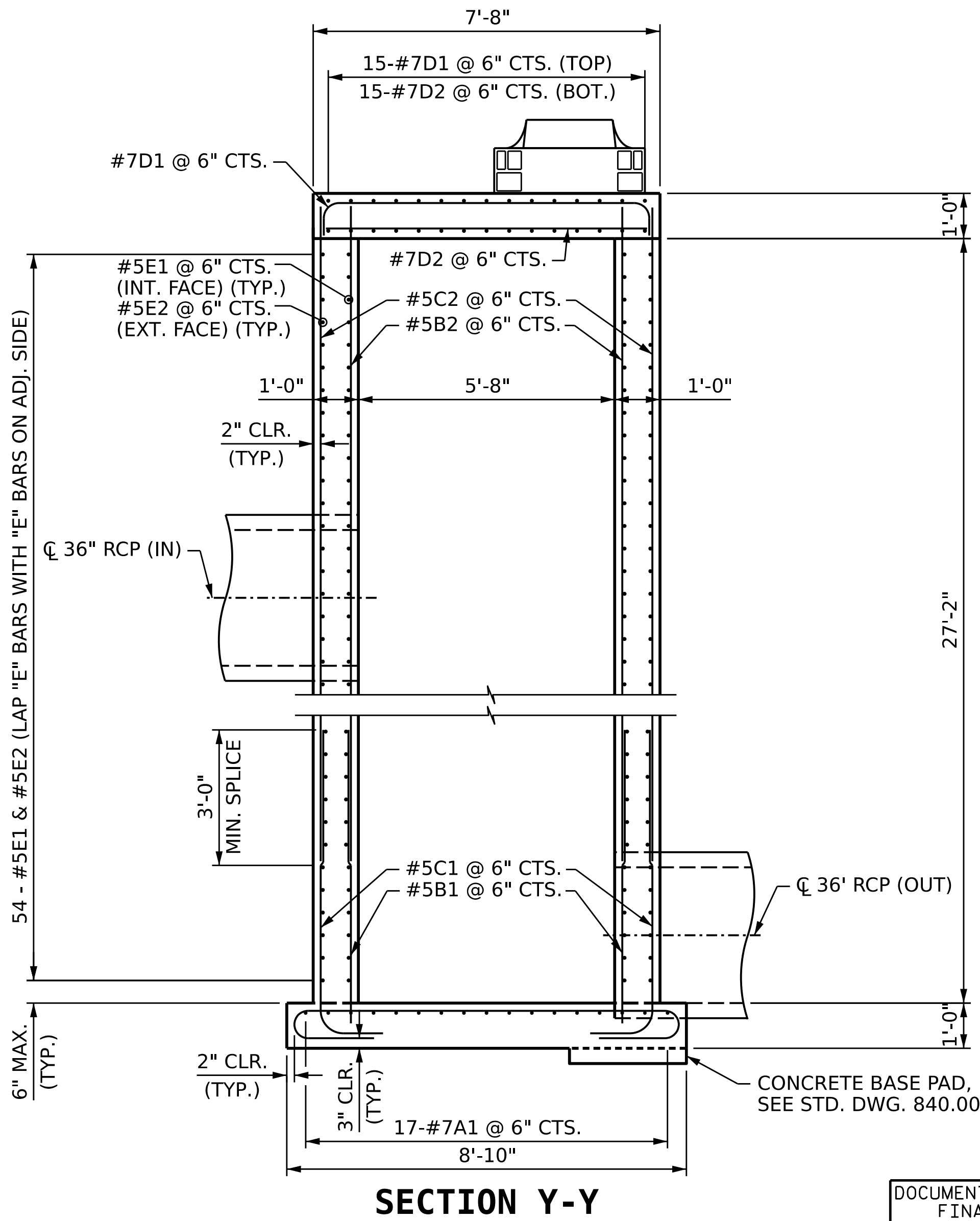
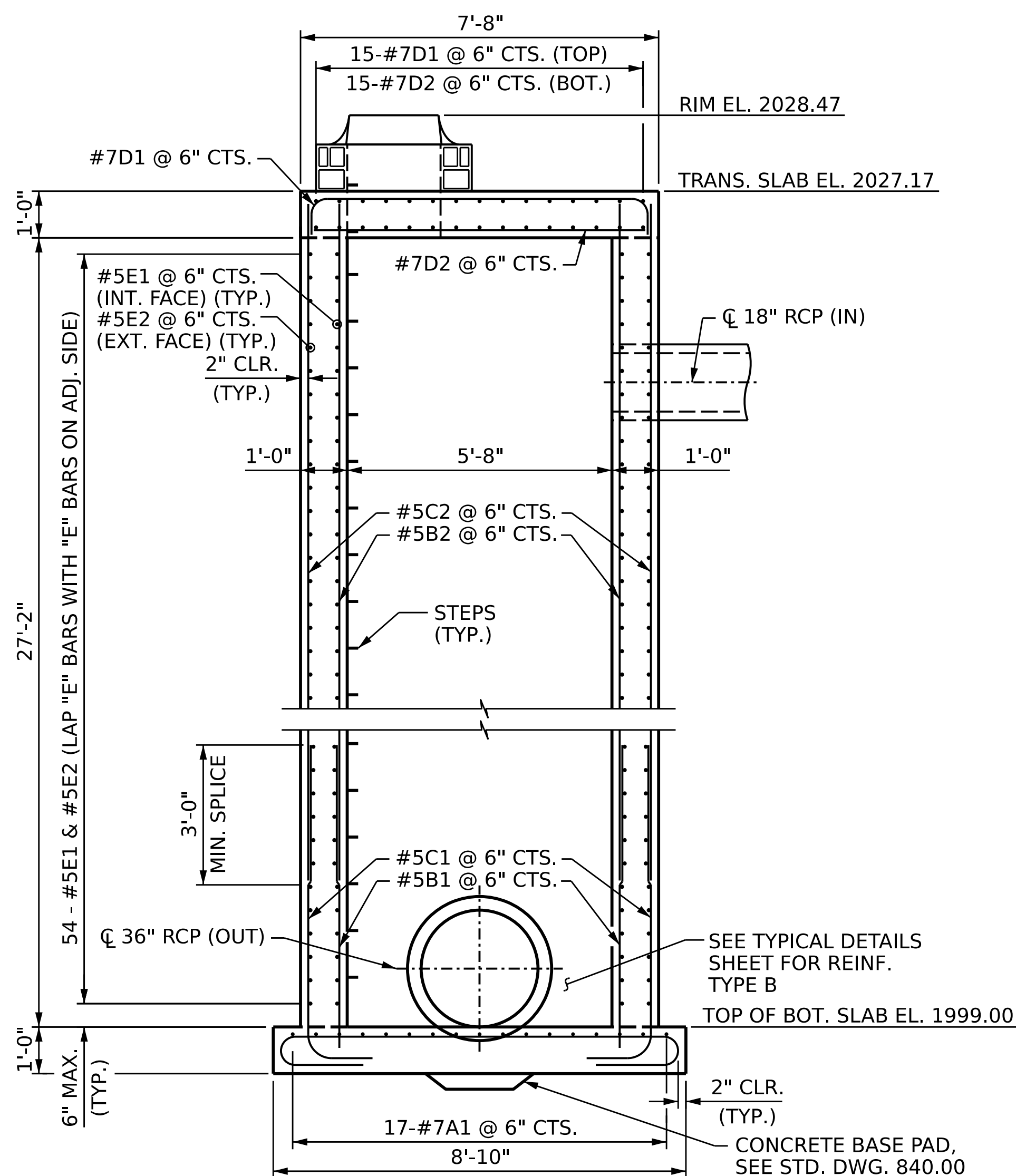
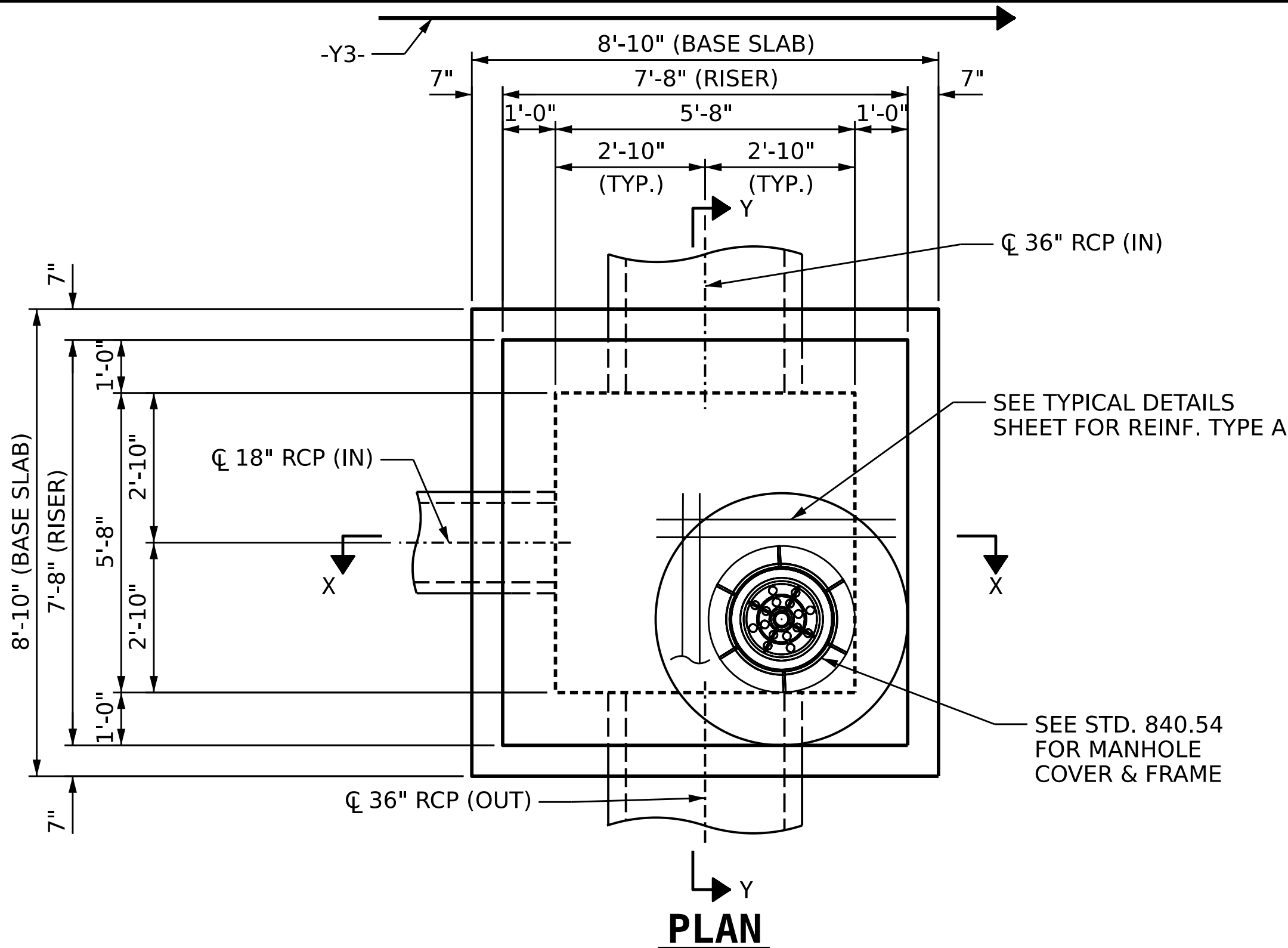
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NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

DRAWN BY : M. CATER DATE : 04/2026
 CHECKED BY : D. RITACCO DATE : 04/2026
 DESIGN ENGINEER OF RECORD: A. VASUDEVAN DATE : 04/2026

8/6/2026
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cgterm

NOTES

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 21+67.00 -Y3-

AECOM
 AECOM TECHNICAL SERVICES OF NC, INC.
 5438 WADE PARK BOULEVARD, SUITE 200
 RALEIGH, NC 27607
 (919) 854-6200
 AECOM License No. F02342

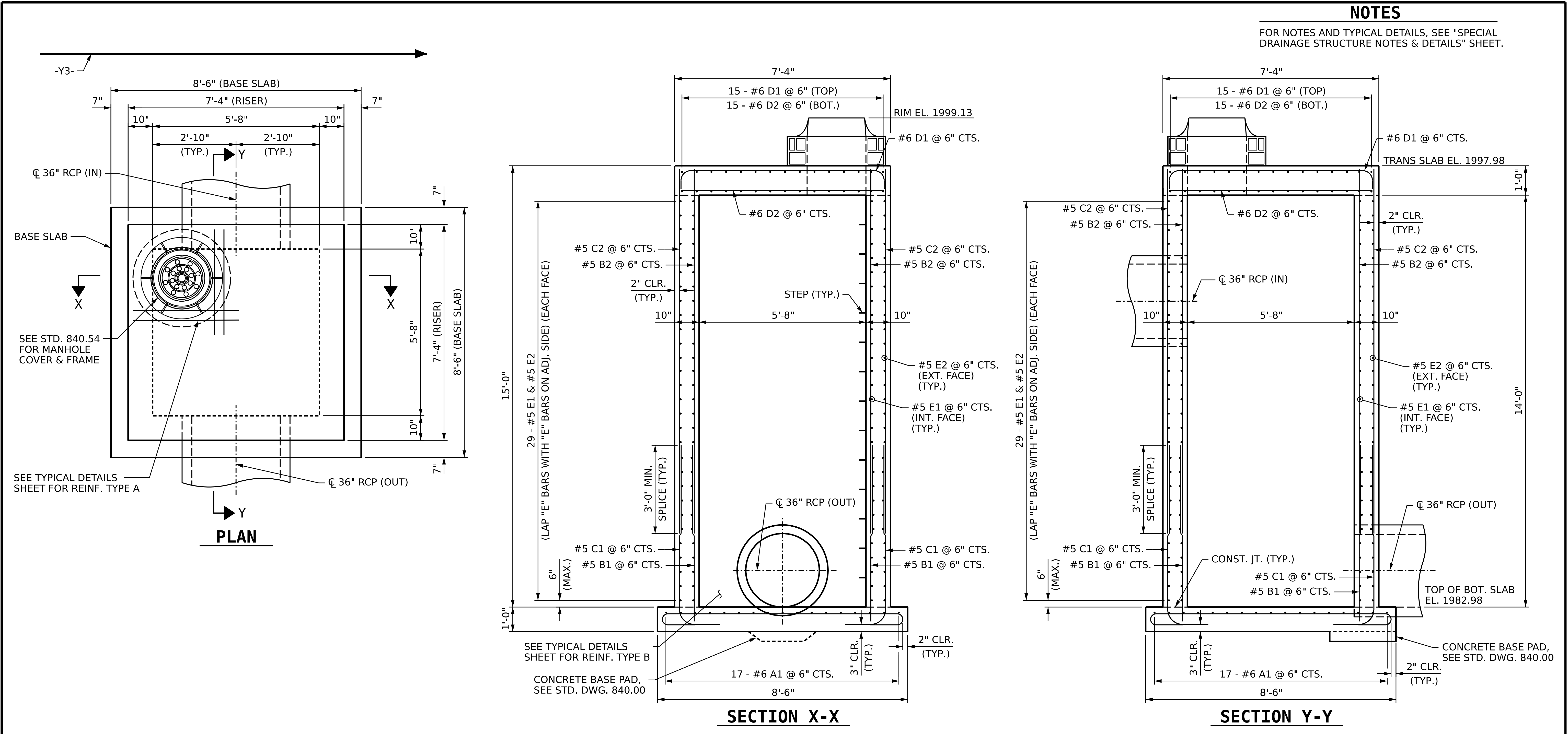
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SPECIAL JUNCTION BOX WITH MANHOLE
STR. No. 1028

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			2D-16
2			4			TOTAL SHEETS

DOCUMENT NOT CONSIDERED
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 SIGNATURES COMPLETED

DRAWN BY : M. CATER DATE : 04/2026
 CHECKED BY : D. RITACCO DATE : 04/2026
 DESIGN ENGINEER OF RECORD: A. VASUDEVAN DATE : 04/2026

8/6/2026
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 caterm



NOTES
FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.

PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
STATION: 21+65.00 -Y3-

AECOM
AECOM TECHNICAL SERVICES OF NC, INC.
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RALEIGH, NC 27607
(919) 854-6200
www.aecom.com
AECOM License No. F02342

Seal of North Carolina Professional Engineer
A. Vasudevan
054212
Civil Engineering
8/7/2026

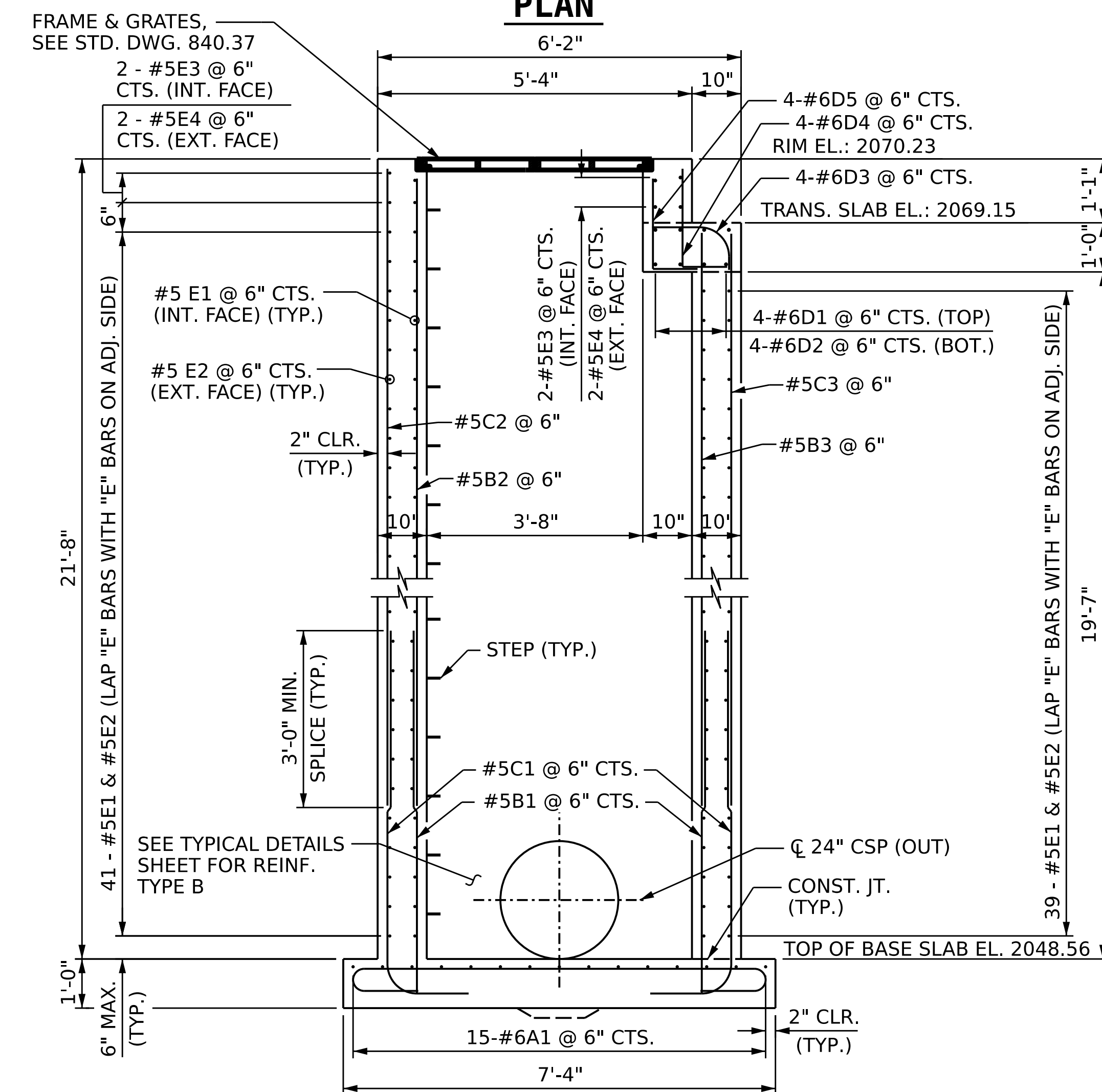
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SPECIAL JUNCTION BOX WITH MANHOLE
STR. No. 1030

REVISIONS						SHEET NO. 2D-17 TOTAL SHEETS
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

DRAWN BY : M. CATER DATE : 02/2026
CHECKED BY : C. MORRISON DATE : 02/2026
DESIGN ENGINEER OF RECORD: A. VASUDEVAN DATE : 04/2026

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
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8/6/2026
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caterm

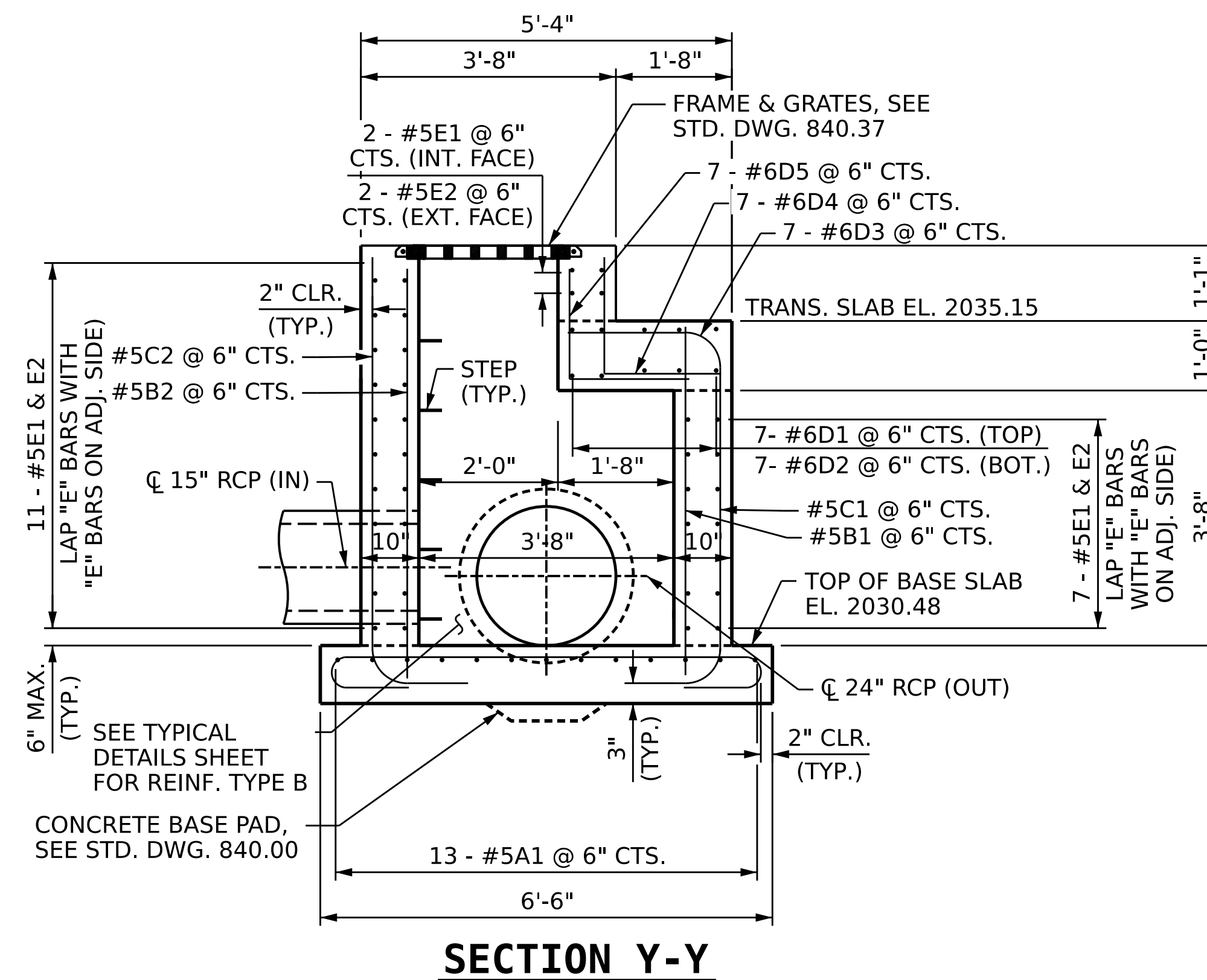
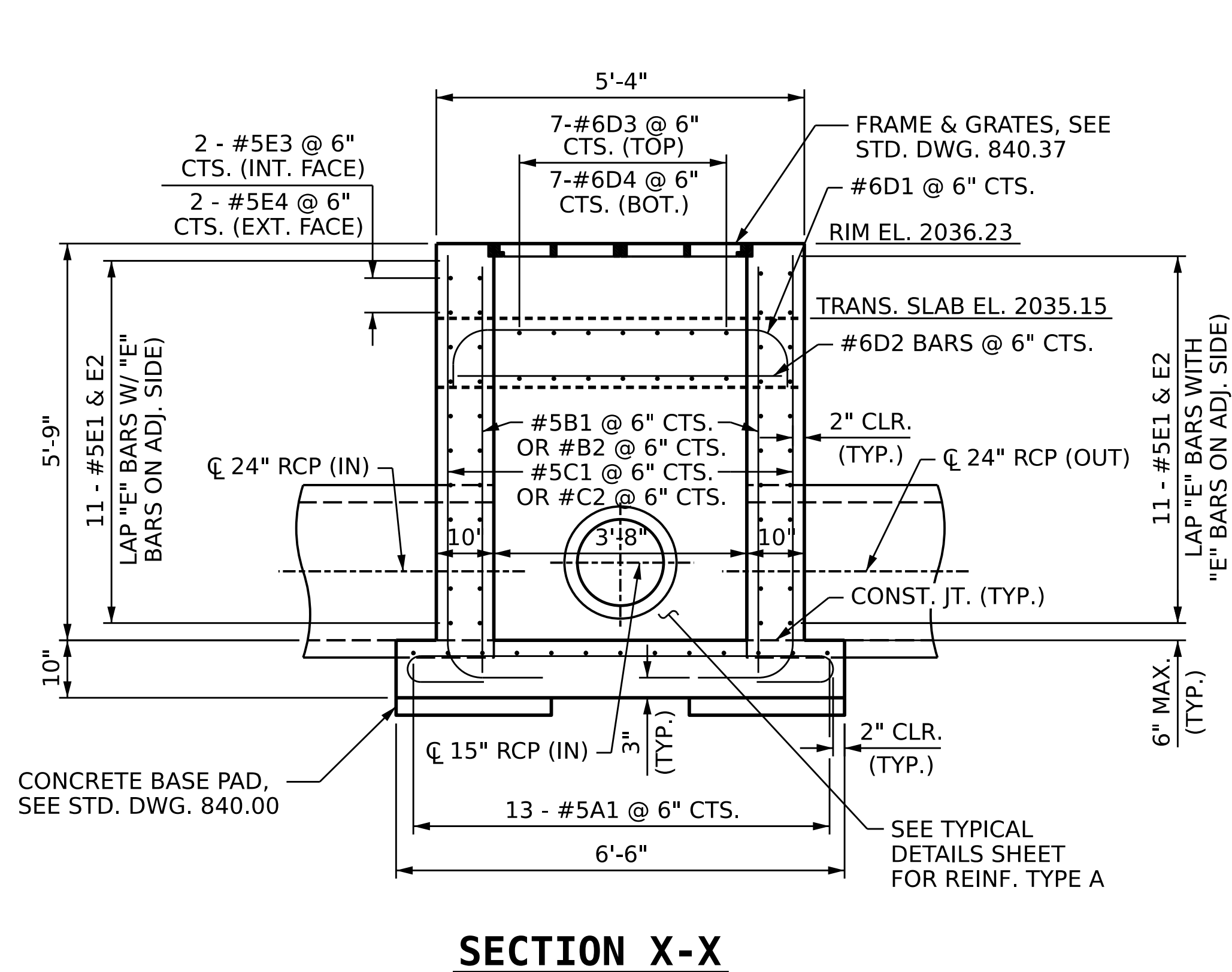


DRAWN BY :	M. CATER	DATE :	04/2026
CHECKED BY :	D. RITACCO	DATE :	04/2026
DESIGN ENGINEER OF RECORD:	A. VASUDEVAN	DATE :	04/2026



REVISIONS						SHEET NO. 2D-18
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET



PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 41+97.00 -L-

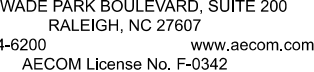


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AECOM License No. F04362

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SPECIAL TRAFFIC BEARING GRADED DROP INLET

STR. No. 6115



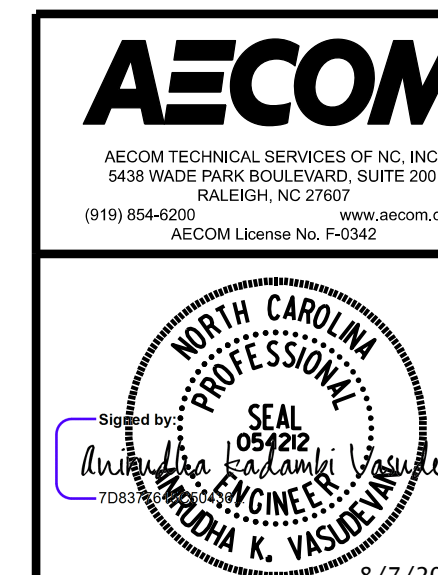
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FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



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SIGNATURES COMPLETED

PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 42+33.00 -L-



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SPECIAL TRAFFIC BEARING GRATED DROP INLET

STR. No. 6120

REVISIONS						SHEET NO. 2D-20
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



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5436 WADE PARK BOULEVARD, SUITE 200
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com

AECOM License No. F-0342


Signed by: Michael A. Vasquez, PE
70636
MICHAEL A. VASQUEZ, PE

STR. No. 6130

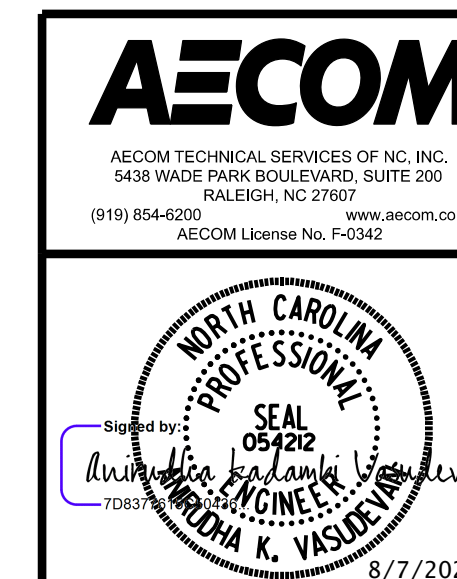
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NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL
DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



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SIGNATURES COMPLETED

PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 15+72.00 -L-



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

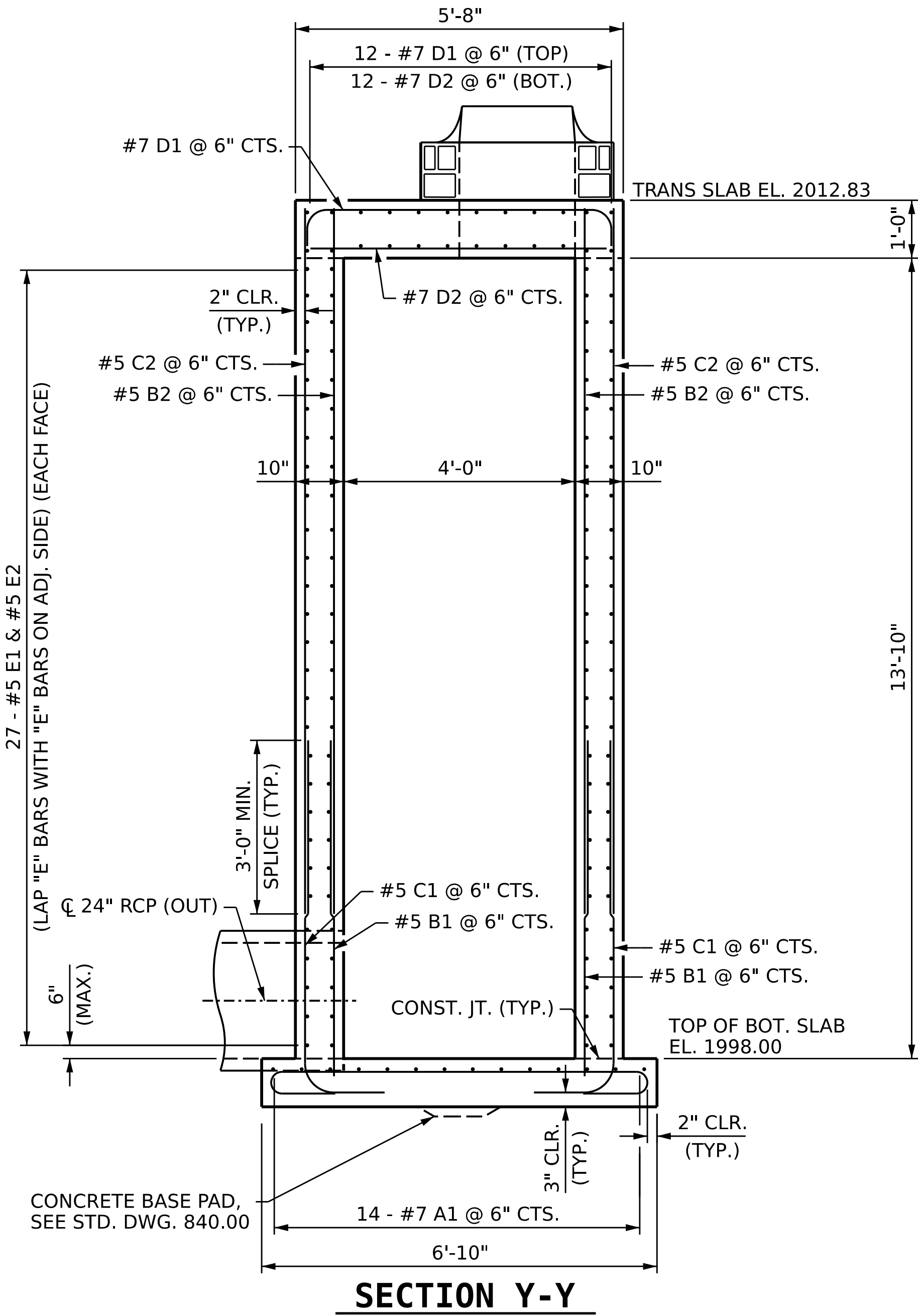
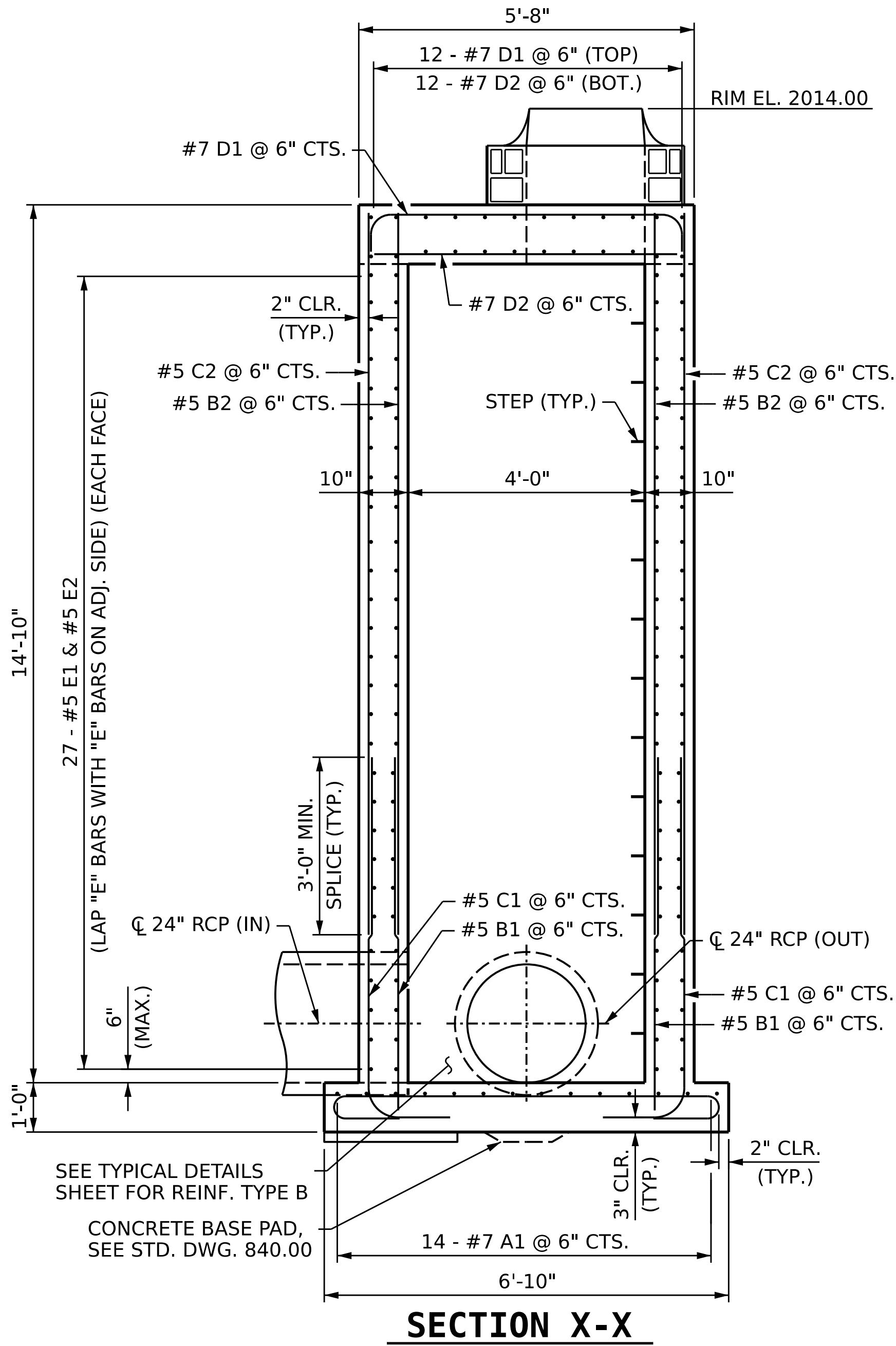
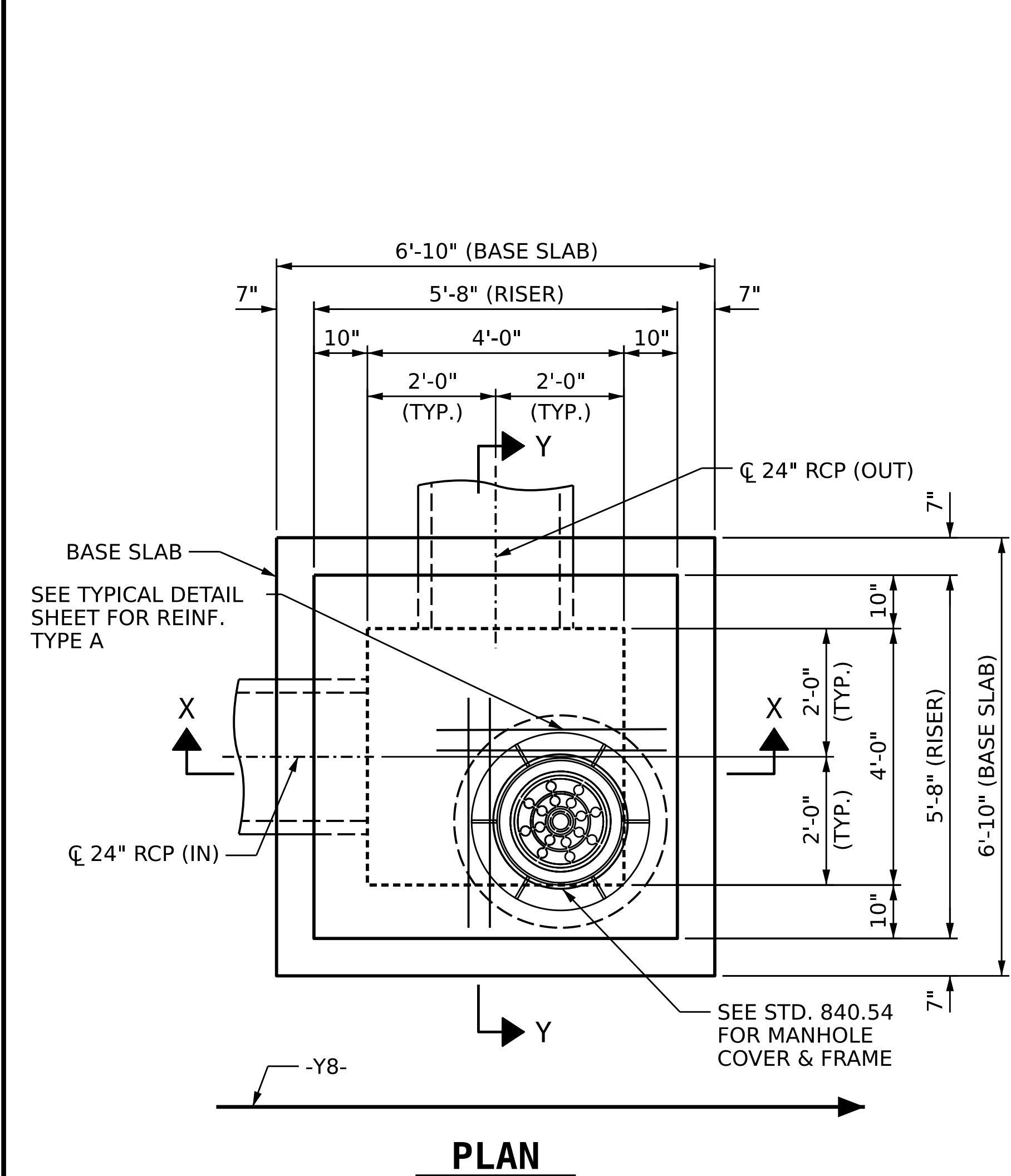
**SPECIAL JUNCTION
BOX FOR TRAFFIC
BEARING DROP INLET**

STR. No. 6132

REVISIONS						SHEET NO. 2D-22
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

NOTES

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
STATION: 20+09.00 -Y8-

DRAWN BY :	M. CATER	DATE :	02/2026
CHECKED BY :	A. VESUDEVAN	DATE :	04/2026
DESIGN ENGINEER OF RECORD:	A. VASUDEVAN	DATE :	04/2026

8/6/2026
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caterm

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

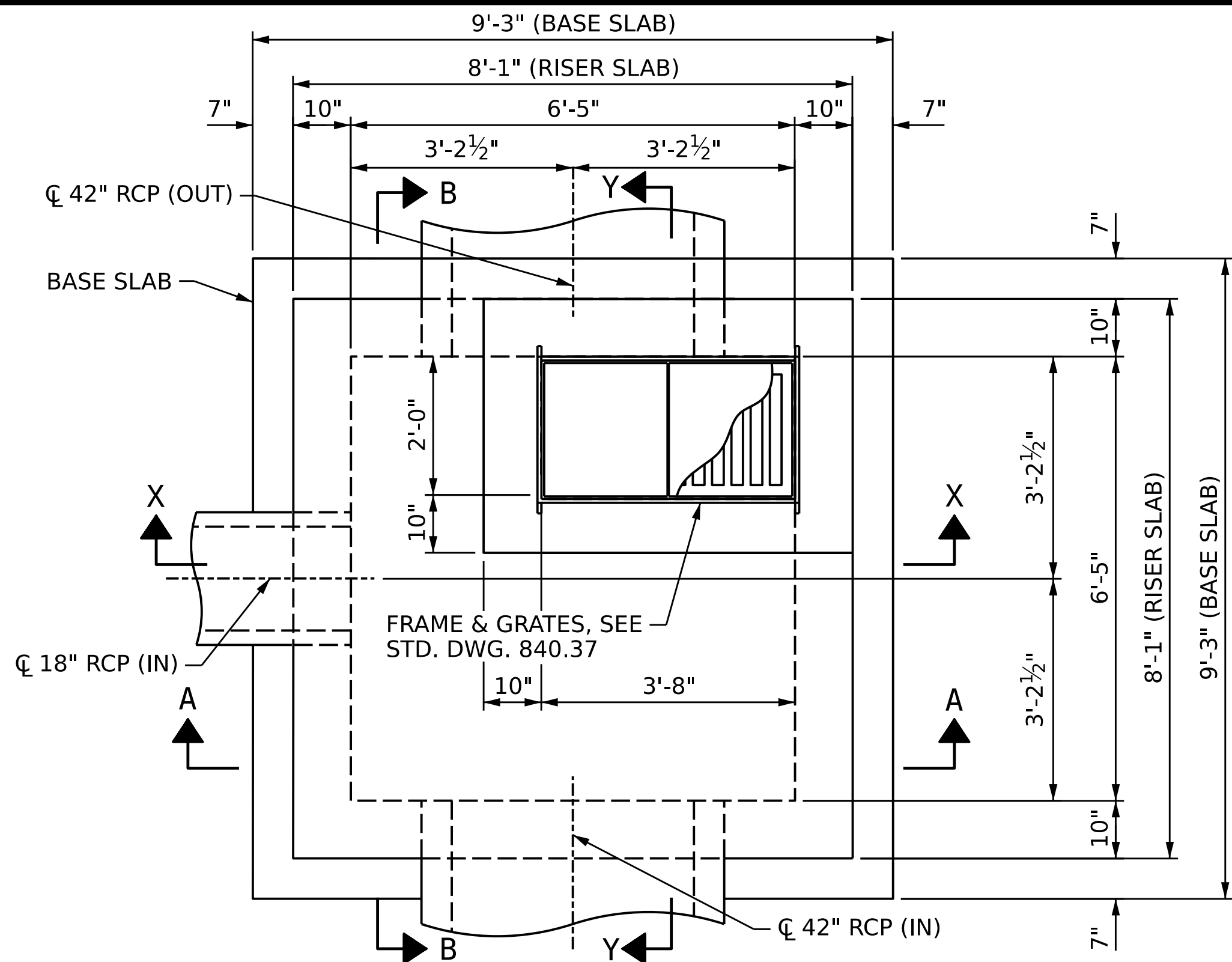


STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

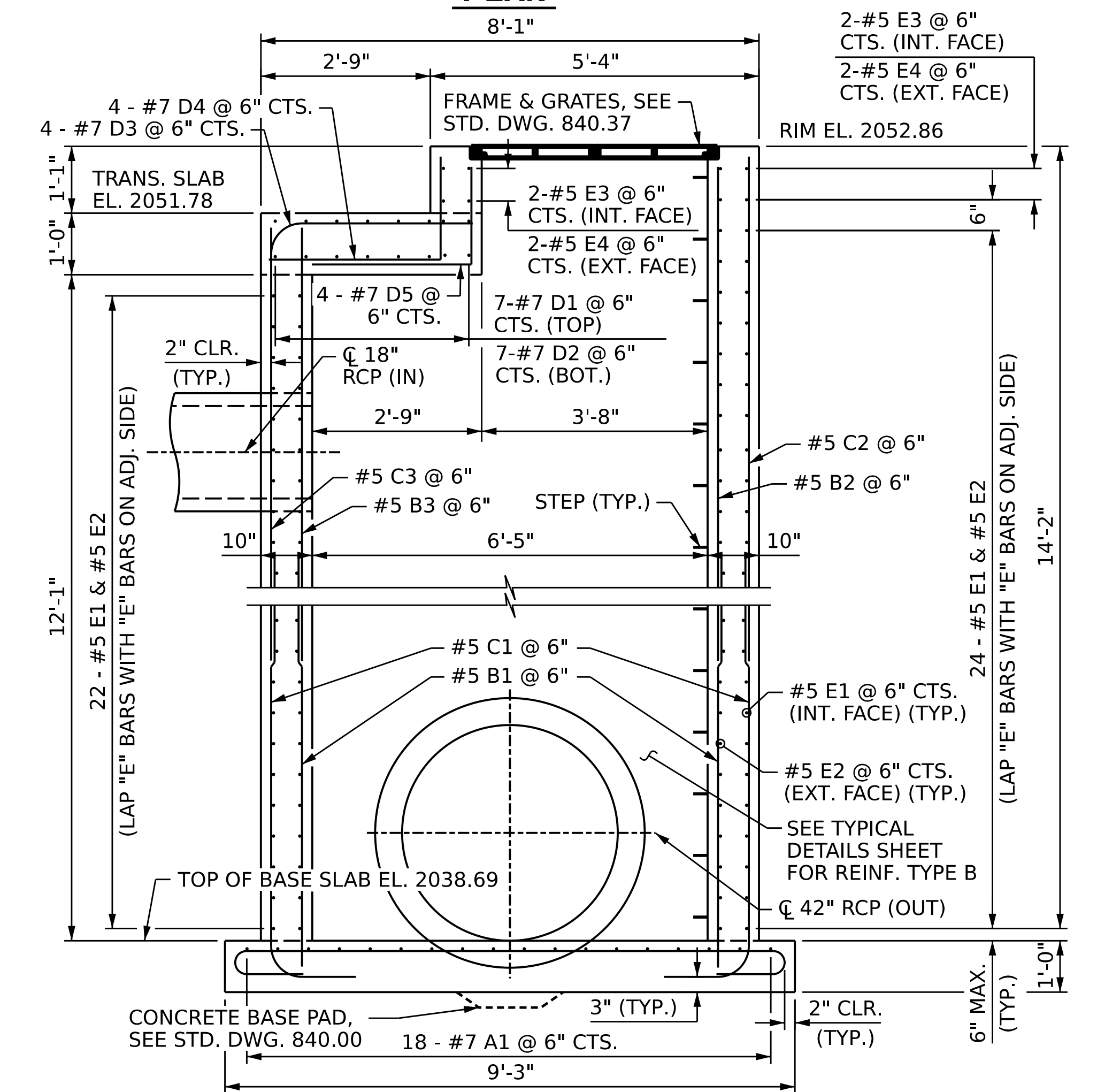
SPECIAL JUNCTION
BOX WITH MANHOLE

STR. No. 6143

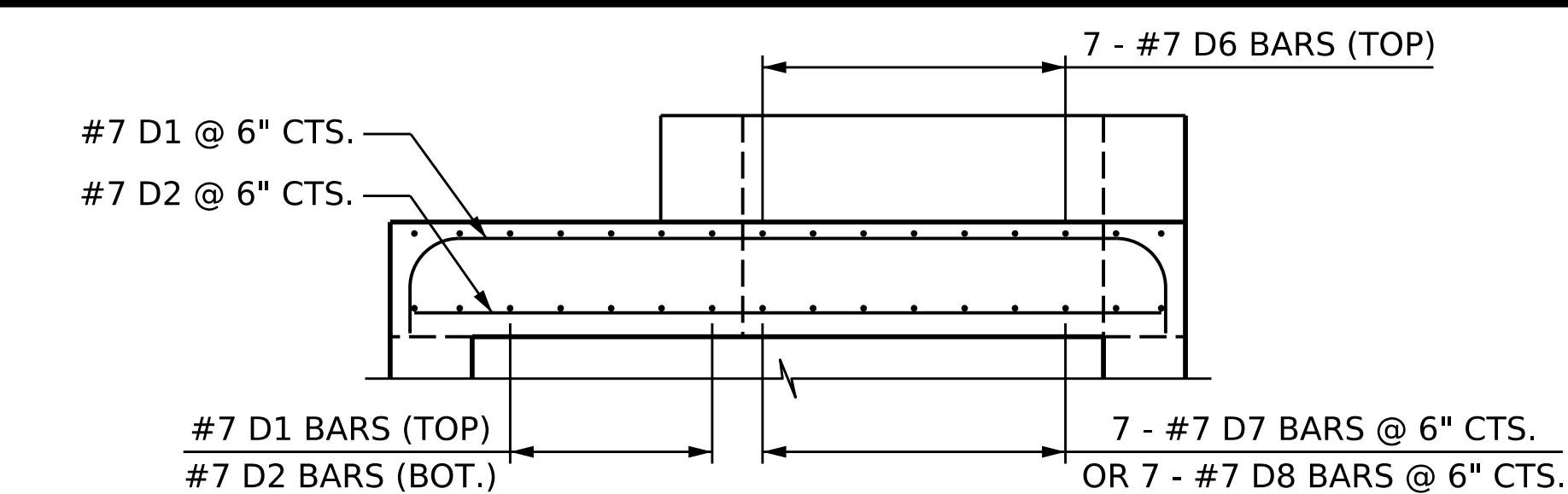
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			TOTAL SHEETS



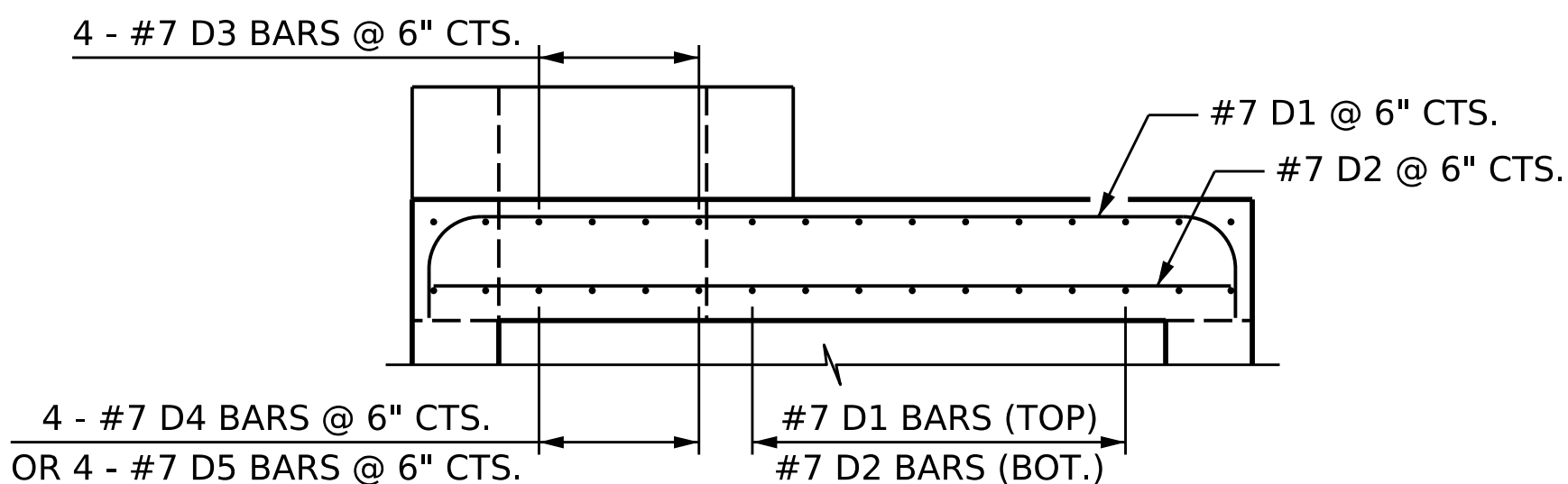
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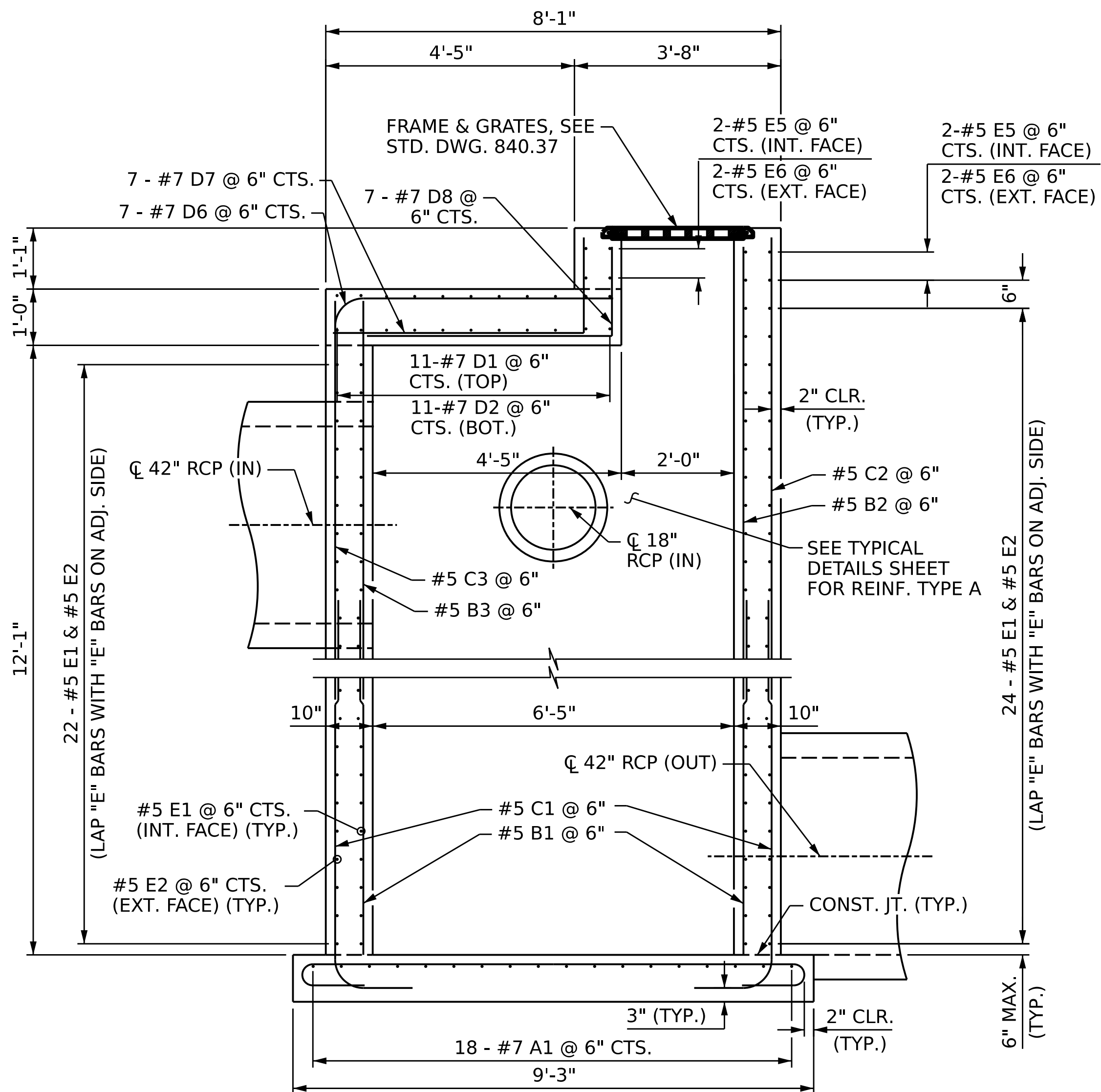
SECTION X-X



SECTION A-A



SECTION B-B



SECTION Y-Y

NOTES

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.

PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 15+93.00 -RP32-

AECOM
 AECOM TECHNICAL SERVICES OF NC, INC.
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 RALEIGH, NC 27607
 (919) 854-6200 www.aecom.com
 AECOM License No. F02342

SEAL
 05422
 NORTH CAROLINA
 PROFESSIONAL
 ENGINEER
 A. VASUDEVAN
 8/7/2026

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**SPECIAL TRAFFIC BEARING
 GRATED DROP INLET**

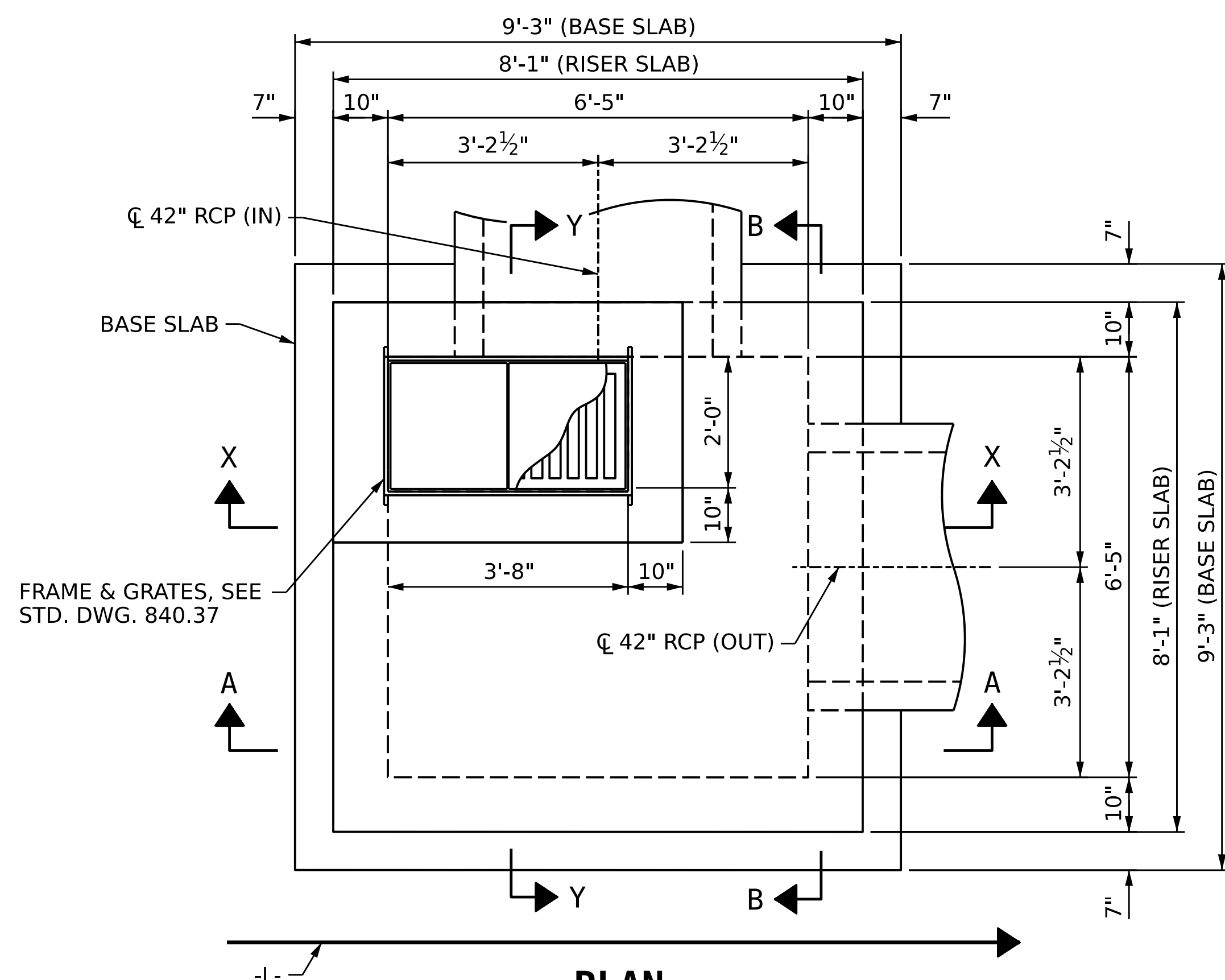
STR. No. 6202

DRAWN BY : M. CATER DATE : 02/2026
 CHECKED BY : C. MORRISON DATE : 04/2026
 DESIGN ENGINEER OF RECORD: A. VASUDEVAN DATE : 04/2026

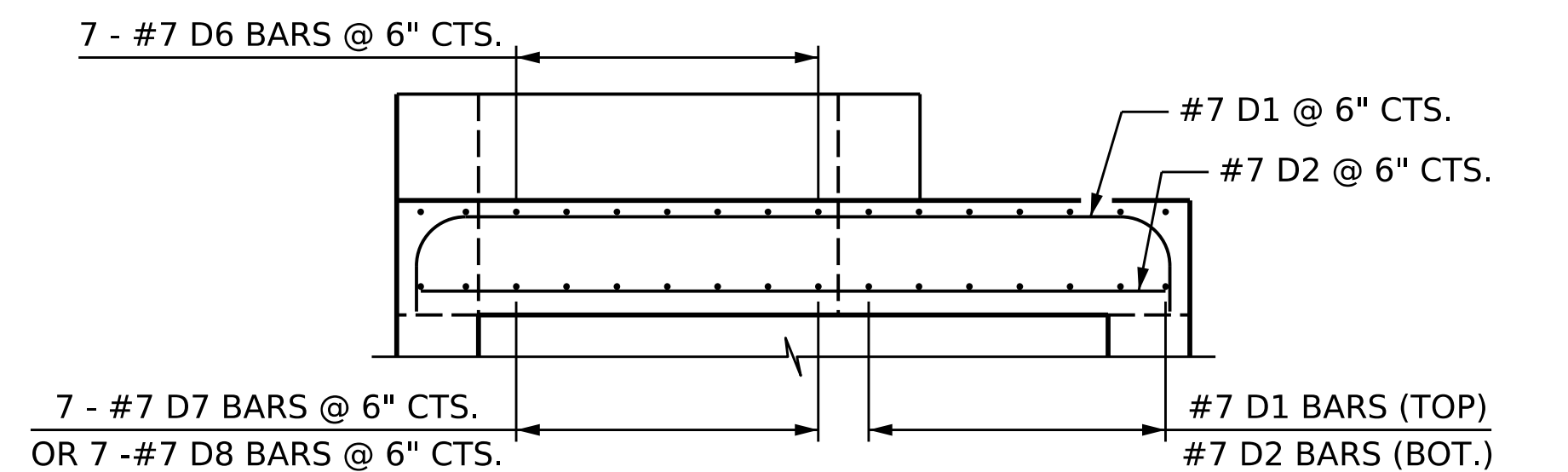
8/6/2026
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DOCUMENT NOT CONSIDERED
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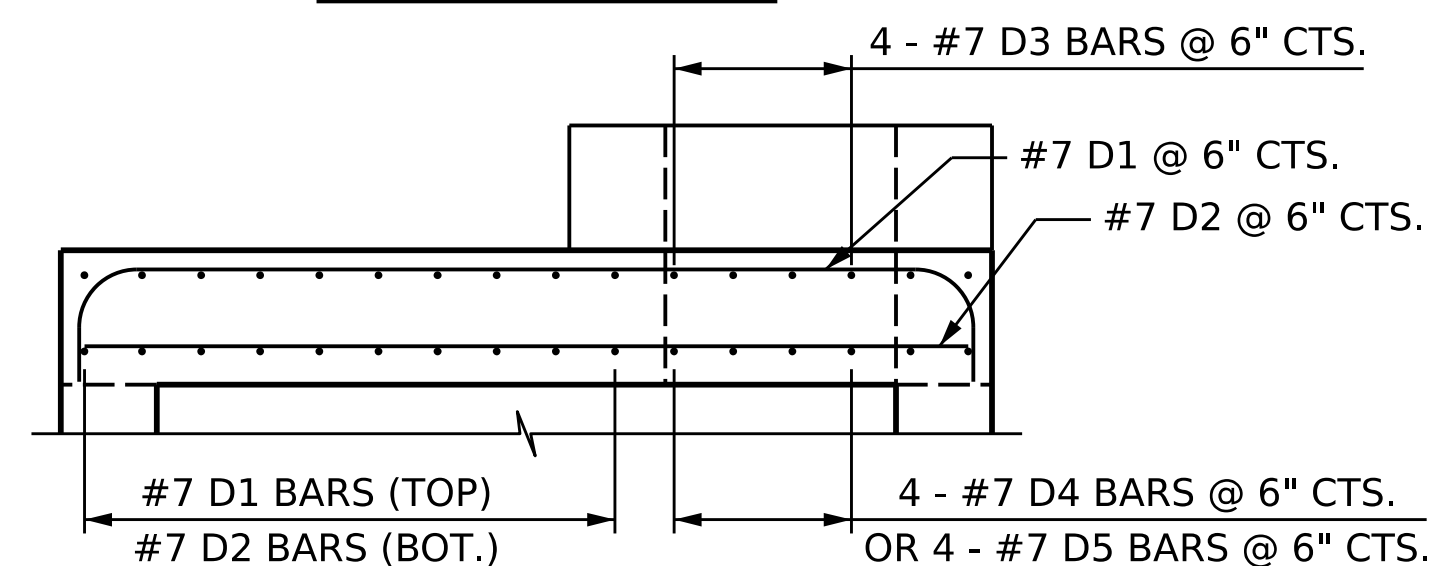
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			TOTAL SHEETS



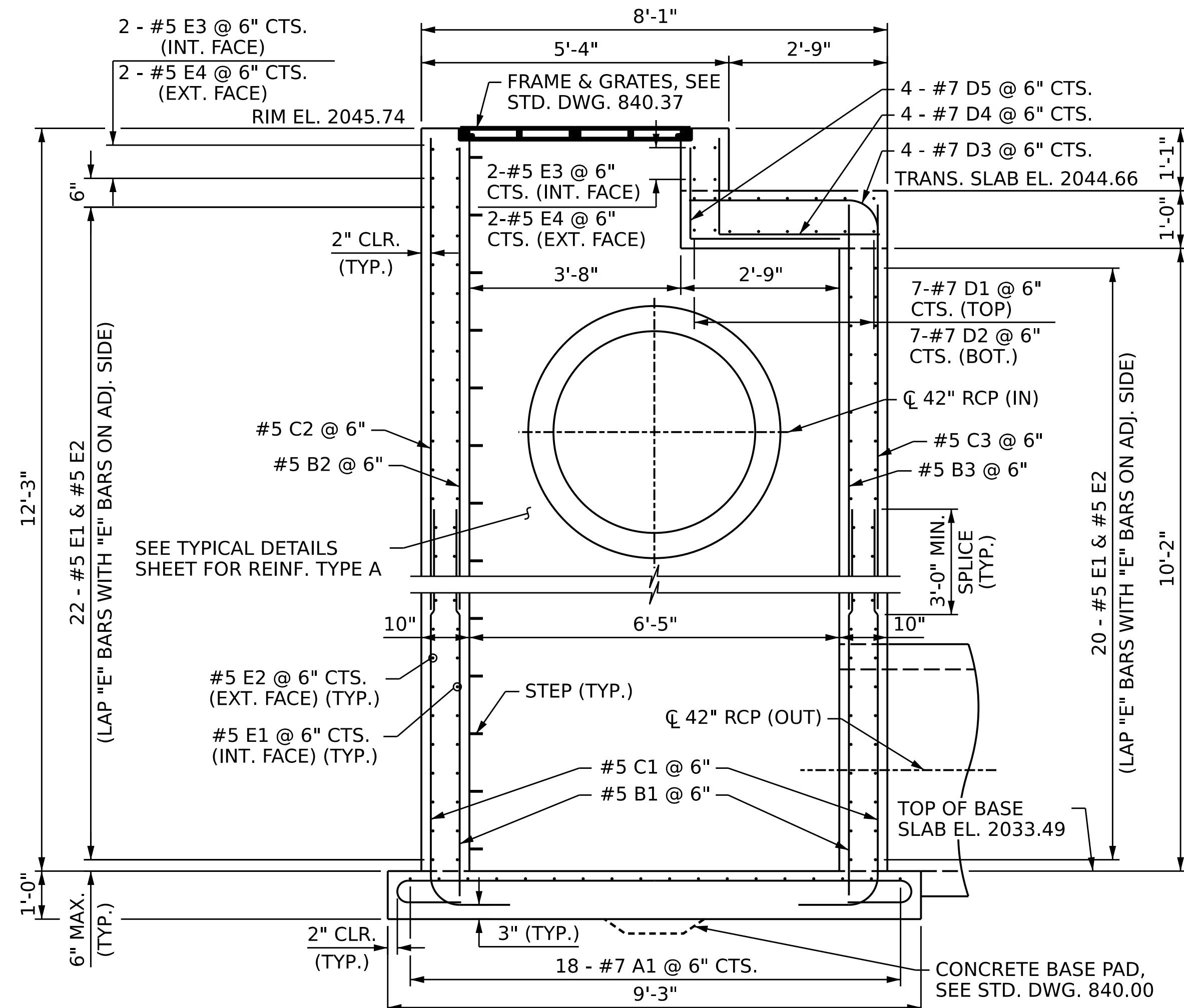
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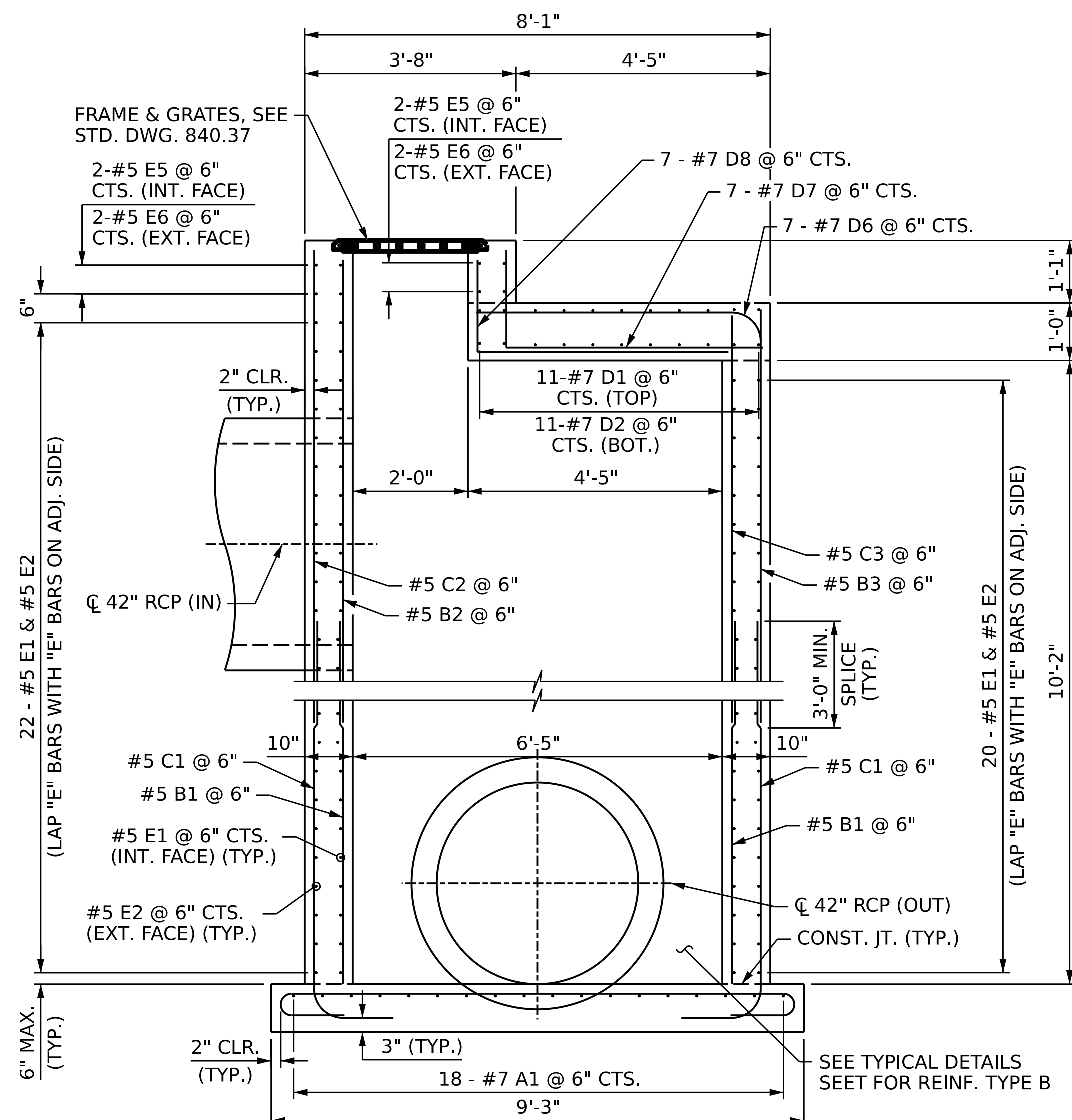
SECTION A-A



SECTION B-B



SECTION X-X



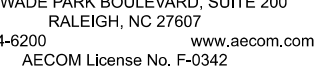
SECTION Y-Y

NOTES

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.

PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 61+50.00 -L-

 AECOM TECHNICAL SERVICES OF INC. 5438 WADE PARK BOULEVARD, SUITE 200 RALEIGH, NC 27607 (919) 854-6200 www.aecom.com AECOM License No. F-0342	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SPECIAL TRAFFIC BEARING GRADED DROP INLET STR. No. 6212
--	--



Seal by: *Anna K. Vasudevan*
70637

STR. No. 6212

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			2D-25 TOTAL SHEETS
2			4			

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL
DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



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RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

**NORTH CAROLINA
PROFESSIONAL
ENGINEER**

Signed by: *Amir H. Gafar*
054212
7083 *Amir H. Gafar*
K. VASUDEVAN

8/7/2012

**SPECIAL JUNCTION
BOX W/ SLAB LID**

STR. NO. 6229

REVISIONS						SHEET NO. 2D-26
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



SEE TYPICAL DETAILS
SHEET FOR REINF.
TYPE C

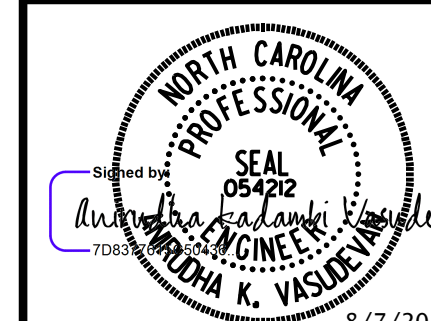
PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 22+03.00 -RP23-



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

**SPECIAL JUNCTION BOX
W/ SLAB LID**

STR. No. 6274



REVISIONS						SHEET NO. 2D-27
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

DRAWN BY :	M. CATER	DATE :	03/2026
CHECKED BY :	D. RITACCO	DATE :	04/2026
DESIGN ENGINEER OF RECORD:	A. VASUDEVAN	DATE :	04/2026

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SIGNATURES COMPLETED

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL
DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



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SIGNATURES COMPLETED

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RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

**NORTH CAROLINA
PROFESSIONAL
ENGINEER**

Sealed by
SEAL
054212
Andrew K. Vasilenko
708373
ALEX K. VASILENKO
8/17/2012

STR. No. 7068

REVISIONS						SHEET NO. 2D-28
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.

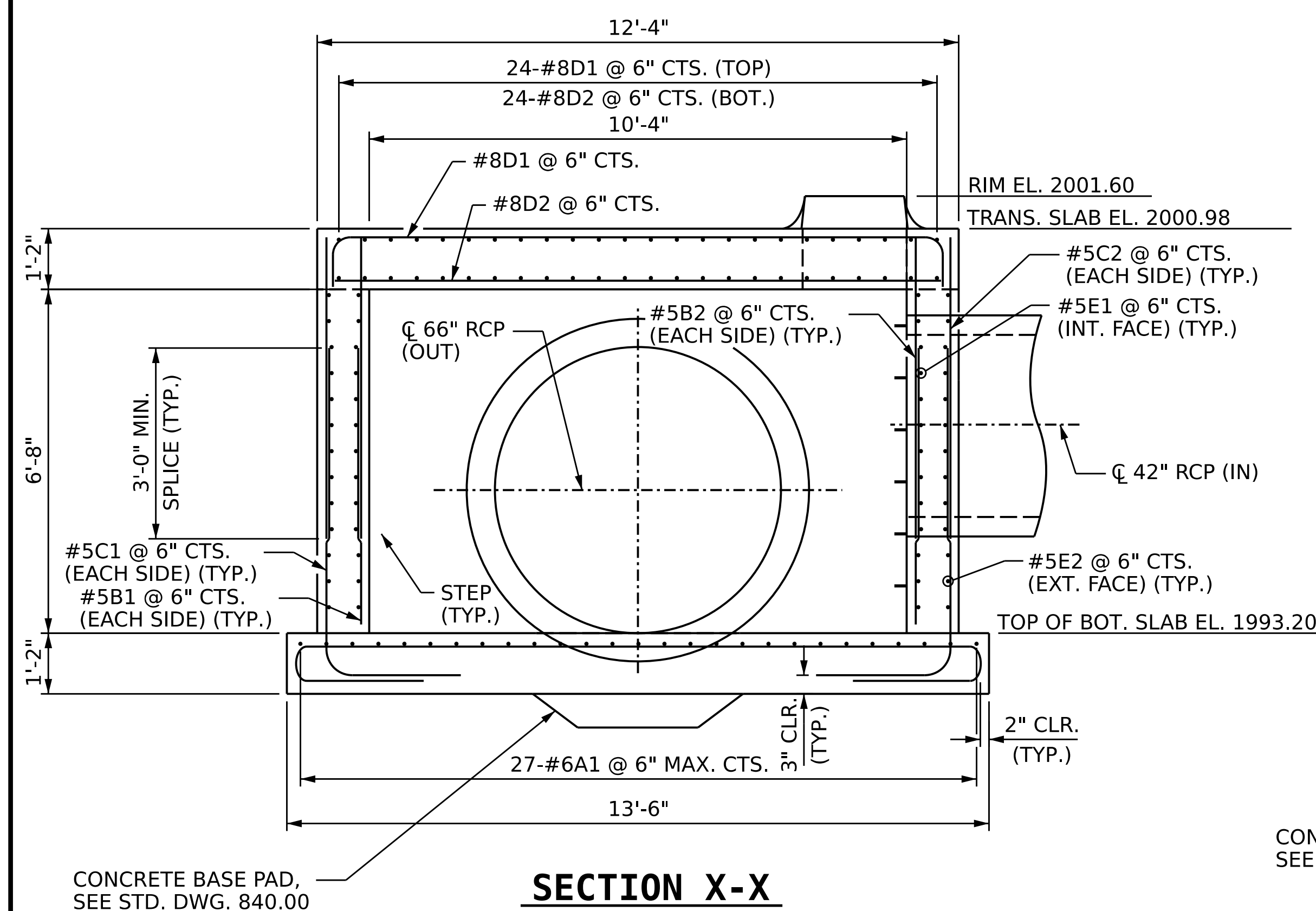


PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 31+20.00 -RP23-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
**SPECIAL TRAFFIC BEARING
GRADED DROP INLET**

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

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL
DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



DRAWN BY :	M. CATER	DATE :	06/2026
CHECKED BY :	A. VESUDEVAN	DATE :	06/2026
DESIGN ENGINEER OF RECORD:	A. VASUDEVAN	DATE :	04/2026



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SIGNATURES COMPLETED

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AECOM TECHNICAL SERVICES OF, INC.
5438 WIDE PARK BOULEVARD, SUITE 200
RALEIGH, NC 27607

(919) 854-6200 www.aecom.com

AECOM License No. F-0342


Sealed by: _____
Michael A. Vasconcelos
70837

8/7/20

STR No. 7112

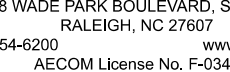
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2			4			

FOR NOTES AND TYPICAL DETAILS, SEE "SPECIAL DRAINAGE STRUCTURE NOTES & DETAILS" SHEET.



PROJECT NO. I-2513 AC
BUNCOMBE COUNTY
 STATION: 18+33.00 -Y3-

 AECOM TECHNICAL SERVICES OF KS, INC. 5438 WADE PARK BOULEVARD, SUITE 200 RALEIGH, NC 27607 (919) 854-6200 www.aecom.com AECOM License No. F02362	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SPECIAL JUNCTION BOX W/ SLAB LID STR. No. 7116
--	--



Signed: *M. K. Vasilev*
7/26/2026
MILDA K. VASILEV

8/7/2026

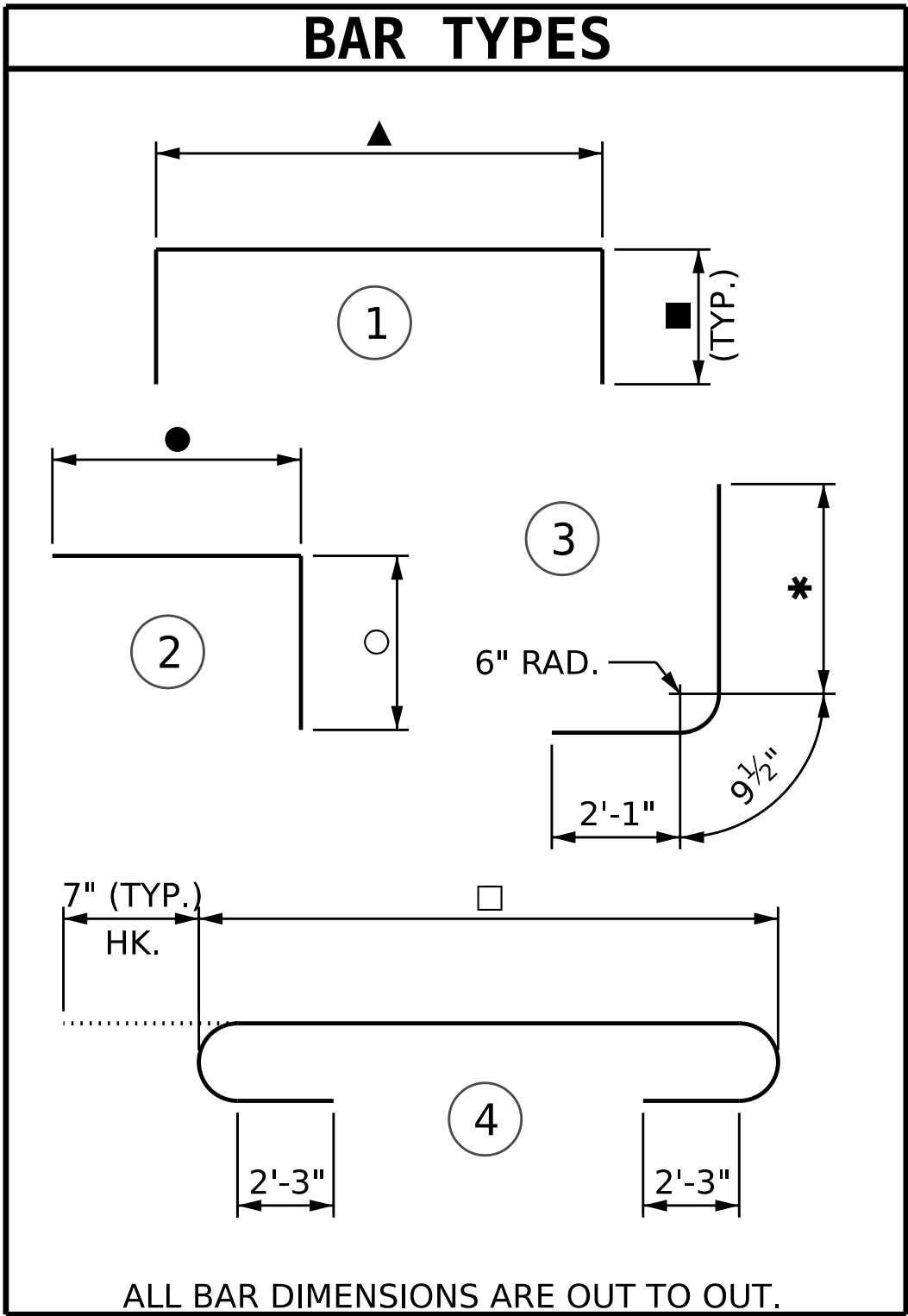
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DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

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B1	39	5	STR	6'-0"	244	B1	54	5	STR	6'-0"	338	B1	54	5	STR	6'-0"	338	B1	32	5	STR	6'-0"	200	B1	32	5	STR	6'-0"	200	
B2	15	5	STR	18'-10"	295	B2	15	5	STR	11'-4"	177	B2	15	5	STR	9'-7"	150	B2	20	5	STR	11'-7"	242	B2	20	5	STR	13'-0"	271	
B3	24	5	STR	18'-3"	457	B3	39	5	STR	10'-7"	430	B3	39	5	STR	8'-8"	353	B3	12	5	STR	10'-8"	134	B3	12	5	STR	12'-3"	153	
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C2	17	5	STR	19'-0"	337	C2	17	5	STR	11'-6"	204	C2	17	5	STR	9'-7"	170	C2	24	5	STR	11'-7"	290	C2	24	5	STR	13'-2"	330	
C3	30	5	STR	18'-1"	566	C3	45	5	STR	10'-7"	497	C3	45	5	STR	8'-8"	407	C3	16	5	STR	10'-8"	178	C3	16	5	STR	12'-3"	204	
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D2	11	6	STR	5'-10"	96	D2	19	7	STR	7'-9"	301	D2	19	7	STR	7'-9"	301	D2	5	6	STR	5'-0"	38	D2	5	6	STR	5'-0"	38	
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D8	7	6	2	3'-11"	41	D8	7	7	2	5'-10"	83	D8	7	7	2	5'-10"	83	E2	106	5	1	6'-8"	737	E2	118	5	1	6'-8"	820	
																		E3	4	5	1	4'-1"	17	E3	4	5	1	4'-1"	17	
E1	160	5	1	6'-7"	1099	E1	100	5	STR	7'-9"	808	E1	84	5	STR	7'-9"	679	E4	4	5	1	4'-11"	21	E4	4	5	1	4'-11"	21	
E2	160	5	1	7'-6"	1252	E2	100	5	STR	7'-9"	808	E2	84	5	STR	7'-9"	679													
E3	4	5	1	4'-1"	17	E3	4	5	1	4'-1"	17	E3	4	5	1	4'-1"	17	T1	48	4	STR	3'-11"	126	T1	48	4	STR	3'-11"	126	
E4	4	5	1	4'-11"	21	E4	4	5	1	4'-11"	21	E4	4	5	1	4'-11"	21													
E5	4	5	1	5'-9"	24	E5	4	5	1	5'-9"	24	E5	4	5	1	5'-9"	24	REINFORCING STEEL					3,629 LBS.	REINFORCING STEEL					3,904 LBS.	
E6	4	5	1	6'-6"	27	E6	4	5	1	6'-7"	27	E6	4	5	1	6'-7"	27	CLASS AA CONCRETE					9.4 C.Y.	CLASS AA CONCRETE					10.3 C.Y.	
						E7	204	5	2	6'-0"	1277	E7	172	5	2	6'-0"	1076	■ = D1 : 1'-0" ▲ = D1 : 5'-0" ● = D3 : 2'-2"						■ = D1 : 1'-0" ▲ = D1 : 5'-0" ● = D3 : 2'-2"						
T1	32	4	STR	4'-6"	96													E1 : 10"						E1 : 10"						
REINFORCING STEEL						5,872 LBS.	T1	32	4	STR	6'-3"	134	T1	32	4	STR	6'-3"	134	E2 : 10"						E2 : 10"					
CLASS AA CONCRETE						16.7 C.Y.	T2	16	4	STR	3'-11"	42	REINFORCING STEEL					6,865 LBS.	E3 : 10"						E3 : 10"					
■ = D1 : 1'-2" ▲ = D1 : 7'-9" ● = D3 : 1'-3"						REINFORCING STEEL	7,597 LBS.					CLASS AA CONCRETE					14.9 C.Y.	E4 : 10"							E4 : 10"					
E1 : 10"						■ = D1 : 1'-2" ▲ = D1 : 7'-9" ● = D3 : 3'-3"					E3 : 10"						† = A1 : 8"						† = A1 : 8"							
E2 : 10"						E3 : 10"					E3 : 2'-5"						□ = A1 : 6'-2"						□ = A1 : 6'-2"							
E3 : 10"						E4 : 10"					E4 : 3'-3"																			
E4 : 10"																														
E5 : 10"																														

0507						6115						6120						6130								
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT			
A1	32	5	4	13'-3"	442	A1	26	5	4	11'-10"	321	A1	26	5	4	11'-10"	321	A1	26	6	4	11'-10"	462			
B1	44	5	STR	6'-4"	291	B1	32	5	STR	5'-1"	170	B1	32	5	STR	4'-10"	161	B1	32	5	STR	6'-0"	200			
B2	15	5	STR	7'-1"	111	B2	20	5	STR	5'-10"	122	B2	20	5	STR	5'-7"	116	B2	20	5	STR	10'-4"	216			
																		B3	12	5	STR	9'-7"	120			
C1	52	5	3	8'-9"	475	C1	40	5	3	7'-6"	313	C1	40	5	3	7'-3"	302									
C2	17	5	3	9'-7"	171	C2	24	5	3	8'-4"	210	C2	24	5	3	8'-1"	203	C1	40	5	3	9'-5"	393			
																		C2	24	5	STR	10'-6"	263			
D1	13	6	1	8'-5"	164	D1	5	6	1	7'-0"	53	D1	5	6	1	7'-0"	53	C3	16	5	STR	9'-7"	160			
D2	13	6	STR	6'-5"	125	D2	5	6	STR	5'-0"	38	D2	5	6	STR	5'-0"	38									
D3	4	6	2	2'-11"	18	D3	7	6	2	3'-2"	33	D3	7	6	2	3'-2"	33	D1	5	6	1	7'-0"	53			
D4	4	6	2	3'-2"	19	D4	7	6	2	3'-5"	36	D4	7	6	2	3'-3"	34	D2	5	6	STR	5'-0"	38			
D5	4	6	2	2'-10"	17	D5	7	6	2	3'-1"	32	D5	7	6	2	3'-1"	32	D3	7	6	2	3'-2"	33			
D6	7	6	2	4'-7"	48													D4	7	6	2	3'-3"	34			
D7	7	6	2	4'-10"	51	E1	38	5	1	5'-9"	228	E1	38	5	1	5'-9"	228	D5	7	6	2	3'-1"	32			
D8	7	6	2	4'-6"	47	E2	38	5	1	6'-8"	264	E2	38	5	1	6'-8"	264									
						E3	4	5	1	4'-1"	17	E3	4	5	1	4'-1"	17	E1	98	5	1	5'-9"	588			
E1	40	5	1	7'-2"	299	E4	4	5	1	4'-11"	21	E4	4	5	1	4'-11"	21	E2	98	5	1	6'-8"	681			
E2	40	5	1	8'-1"	337													E3	4	5	1	4'-1"	17			
E3	4	5	1	4'-1"	17	T1	16	4	STR	3'-9"	40	T1	16	4	STR	3'-11"	42	E4	4	5	1	4'-11"	21			
E4	4	5	1	4'-11"	21	T2	32	4	STR	4'-6"	96	T2	32	4	STR	4'-6"	96									
E5	4	5	1	5'-9"	24	REINFORCING STEEL					1,994 LBS.	REINFORCING STEEL					1,961 LBS.	T1	16	4	STR	3'-9"	40			
E6	4	5	1	6'-6"	27	CLASS AA CONCRETE					4.4 C.Y.	CLASS AA CONCRETE					4.2 C.Y.	T2	16	4	STR	3'-11"	42			
						■ = D1 : 1'-0" E1 : 10" E2 : 10" E3 : 10" E4 : 10" ▲ = D1 : 5'-0" E1 : 4'-1" E2 : 5'-0" E3 : 2'-5" E4 : 3'-3" ● = D3 : 2'-2" D4 : 1'-7" D5 : 1'-8" ○ = D3 : 1'-0" D4 : 1'-8" D5 : 1'-5" * = C1 : 4'-4" C2 : 5'-3" □ = A1 : 6'-2"					■ = D1 : 1'-0" E1 : 10" E2 : 10" E3 : 10" E4 : 10" ▲ = D1 : 5'-0" E1 : 4'-1" E2 : 5'-0" E3 : 2'-5" E4 : 3'-3" ● = D3 : 2'-2" D4 : 1'-7" D5 : 1'-8" ○ = D3 : 1'-0" D4 : 1'-8" D5 : 1'-5" * = C1 : 4'-6" C2 : 5'-5" □ = A1 : 6'-2"					REINFORCING STEEL					3,393 LBS.					
T1	16	4	STR	3'-11"	42											CLASS AA CONCRETE					8.6 C.Y.	■ = D1 : 1'-0" E1 : 10" E2 : 10" E3 : 10" E4 : 10" ▲ = D1 : 5'-0" E1 : 4'-1" E2 : 5'-0" E3 : 2'-5" E4 : 3'-3" ● = D3 : 2'-2" D4 : 1'-7" D5 : 1'-8" ○ = D3 : 1'-0" D4 : 1'-8" D5 : 1'-5" * = C1 : 6'-6" □ = A1 : 6'-2"				
T2	16	4	STR	4'-6"	48																					
T3	16	4	STR	5'-1"	54																					
REINFORCING STEEL					2,848 LBS.																					
CLASS AA CONCRETE					7.5 C.Y.																					
■ = D1 : 1'-0" E1 : 10"					▲ = D1 : 7'-9" E1 : 5'-6"	● = D3 : 1'-11" D4 : 1'-5"																				

■ = D1 : 1'-0"	▲ = D1 : 7'-9"	● = D3 : 1'-11"
E1 : 10"	E1 : 5'-6"	D4 : 1'-5"
E2 : 10"	E2 : 6'-5"	D5 : 1'-5"
E3 : 10"	E3 : 2'-5"	D6 : 3'-7"
E4 : 10"	E4 : 3'-3"	D7 : 3'-1"
E5 : 10"	E5 : 4'-1"	D8 : 3'-1"
E6 : 10"	E6 : 4'-10"	○ = D3 : 1'-0"
* = C1 : 5'-10"		D4 : 1'-9"
C2 : 6'-9"	□ = A1 : 7'-7"	D5 : 1'-5"
		D6 : 1'-0"
		D7 : 1'-9"
		D8 : 1'-5"



DRAWN BY :	M. CATER	DATE :	04/2026
CHECKED BY :	D. RITACCO	DATE :	04/2026
DESIGN ENGINEER OF RECORD:	A. VASUDEVAN	DATE :	04/2026

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

PROJECT NO. I-2513 AC
BUNCOMBE COUNTY

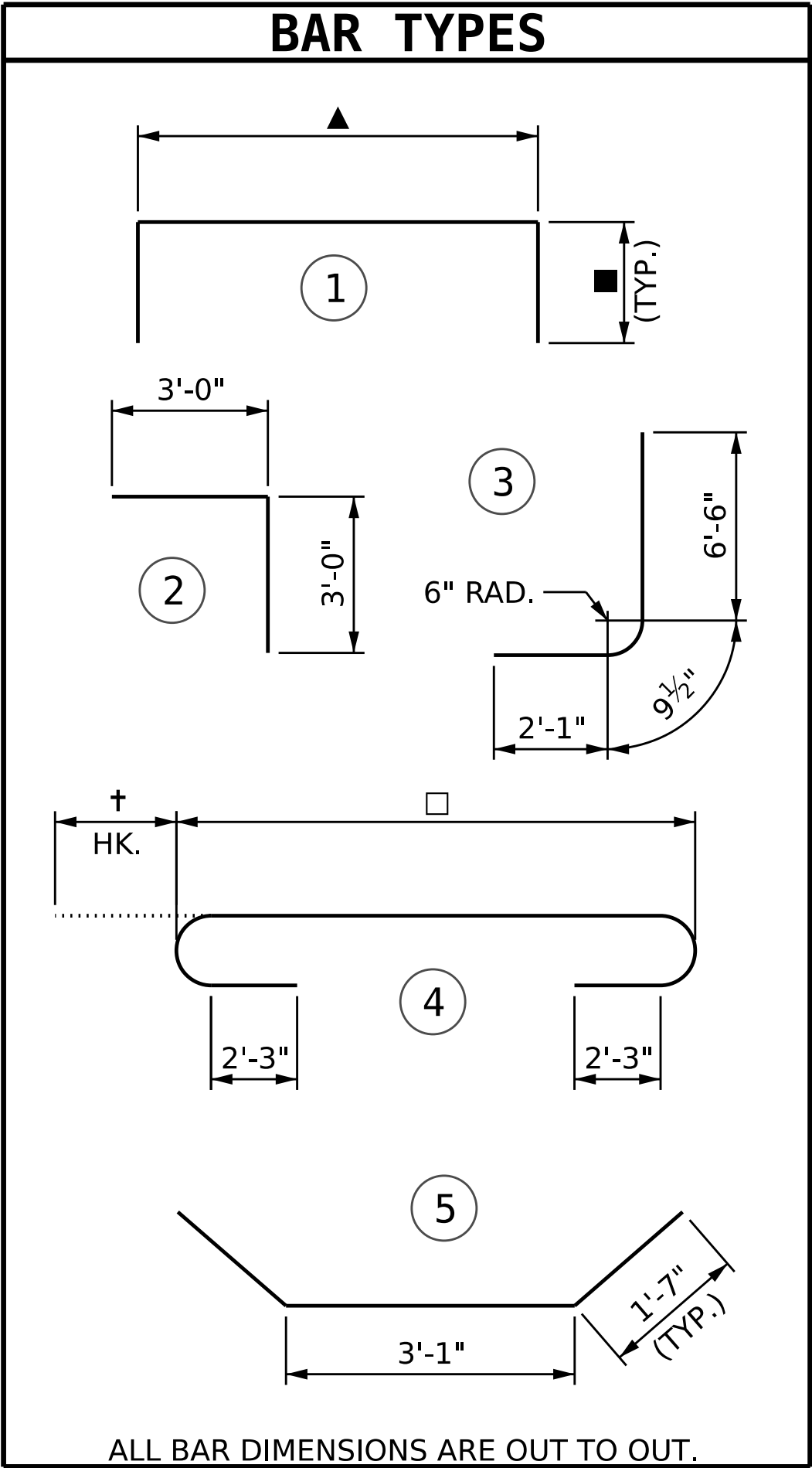
STATION: _____

SHEET 2 OF 4

AECOM AECOM TECHNICAL SERVICES OF NC, INC. 5438 WADE PARK BOULEVARD, SUITE 200 RALEIGH, NC 27607 (919) 854-6200 www.aecom.com AECOM License No. F62362	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SPECIAL DRAINAGE STRUCTURES	8/7/2026	SHEET NO. 2D-33 TOTAL SHEETS		
SEAL 05122 ENGINEER A. VASUDEVAN	REVISIONS				
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

0812						0831						1028						1030					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	50	6	4	18'-0"	1352	A1	32	7	4	13'-9"	899	A1	34	7	4	14'-8"	1019	A1	34	6	4	14'-0"	715
B1	78	5	STR	6'-0"	488	B1	44	5	STR	6'-0"	275	B1	48	5	STR	6'-0"	300	B1	48	5	STR	6'-0"	300
B2	78	5	STR	7'-4"	597	B2	44	5	STR	9'-11"	455	B2	48	5	STR	25'-5"	1272	B2	48	5	STR	12'-6"	626
C1	88	5	3	9'-5"	864	C1	52	5	3	9'-5"	511	C1	59	5	3	9'-5"	579	C1	56	5	3	9'-5"	550
C2	88	5	STR	7'-4"	673	C2	52	5	STR	9'-11"	538	C2	59	5	STR	25'-5"	1564	C2	56	5	STR	12'-6"	730
D1	46	8	1	13'-8"	1679	D1	28	7	1	8'-9"	501	D1	30	7	1	9'-8"	593	D1	30	6	1	9'-0"	406
D2	46	8	STR	11'-0"	1351	D2	28	7	STR	6'-5"	367	D2	30	7	STR	7'-4"	450	D2	30	6	STR	7'-0"	315
E1	64	5	STR	11'-0"	734	E1	88	5	1	7'-2"	658	E1	212	5	1	7'-9"	1714	E1	116	5	1	7'-9"	938
E2	64	5	STR	11'-0"	734	E2	88	5	1	8'-1"	742	E2	212	5	1	9'-0"	1990	E2	116	5	1	8'-8"	1049
E3	128	5	2	6'-0"	801																		
T1	8	4	STR	4'-6"	24	T1	8	4	STR	4'-6"	24	T1	8	4	STR	4'-6"	24	T1	8	4	STR	4'-6"	24
T2	16	4	STR	5'-8"	61	T2	32	4	STR	5'-1"	109	T2	16	4	STR	3'-11"	42	T2	32	4	STR	5'-8"	121
T3	16	4	STR	6'-3"	67	REINFORCING STEEL					5,079 LBS.	REINFORCING STEEL					9,668 LBS.	REINFORCING STEEL					5,774 LBS.
T4	28	4	5	6'-3"	117	CLASS AA CONCRETE					12.7 C.Y.	CLASS AA CONCRETE					31.9 C.Y.	CLASS AA CONCRETE					16.2 C.Y.
REINFORCING STEEL					9,542 LBS.																		
CLASS AA CONCRETE					24.5 C.Y.																		
† = A1 : 8" ▲ = D1 : 11'-0"						■ = D1 : 1'-2" ▲ = D1 : 6'-5"						■ = D1 : 1'-2" ▲ = D1 : 7'-4"						■ = D1 : 1'-2" ▲ = D1 : 7'-0"					
□ = A1 : 12'-2" ■ = D1 : 1'-4"						† = A1 : 10" E1 : 10" E1 : 5'-6"						† = A1 : 10" E1 : 10" E1 : 6'-1"						† = A1 : 8" E1 : 10" E1 : 6'-1"					
						□ = A1 : 7'-7" E2 : 10" E2 : 6'-5"						□ = A1 : 8'-6" E2 : 10" E2 : 7'-4"						□ = A1 : 8'-2" E2 : 10" E2 : 7'-0"					

6143						7068					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	28	5	4	12'-2"	355	A1	28	7	4	13'-2"	754
B1	35	5	STR	6'-0"	219	B1	39	5	STR	6'-0"	244
B2	35	5	STR	12'-4"	450	B2	39	5	STR	9'-6"	386
C1	43	5	3	9'-5"	422	C1	47	5	3	9'-5"	462
C2	43	5	STR	12'-4"	553	C2	47	5	STR	9'-6"	466
D1	24	7	1	7'-8"	376	D1	26	7	1	8'-2"	434
D2	24	7	STR	5'-4"	262	D2	26	7	STR	5'-10"	310
E1	112	5	1	6'-1"	711	E1	84	5	1	6'-7"	577
E2	112	5	1	7'-0"	818	E2	84	5	1	7'-6"	657
T1	8	4	STR	4'-6"	24	T1	40	4	STR	4'-6"	120
T2	32	4	STR	3'-11"	84	REINFORCING STEEL					4,410 LBS.
REINFORCING STEEL					4,274 LBS.	CLASS AA CONCRETE					11.0 C.Y.
CLASS AA CONCRETE					11.3 C.Y.						
■ = D1 : 1'-2" ▲ = D1 : 5'-4"						■ = D1 : 1'-2" ▲ = D1 : 5'-10"					
† = A1 : 7" E1 : 10" E1 : 4'-5"						† = A1 : 10" E1 : 10" E1 : 4'-11"					
□ = A1 : 6'-6" E2 : 10" E2 : 5'-4"						□ = A1 : 7'-0" E2 : 10" E2 : 5'-10"					



DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

PROJECT NO. I-2513 AC
BUNCOMBE COUNTY

STATION: _____

SHEET 3 OF 4

AECOM

AECOM TECHNICAL SERVICES OF NC, INC.
5438 WADE PARK BOULEVARD, SUITE 200
RALEIGH, NC 27607
(919) 854-6200www.aecom.com
AECOM License No. F62342

SEAL

054262

Signed by:

Arundhati K. Vasudevan

7/26/26

PROFESSIONAL ENGINEER

ARUNDHATI K. VASUDEVAN

8/7/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SPECIAL DRAINAGE STRUCTURES
BILL OF MATERIALS

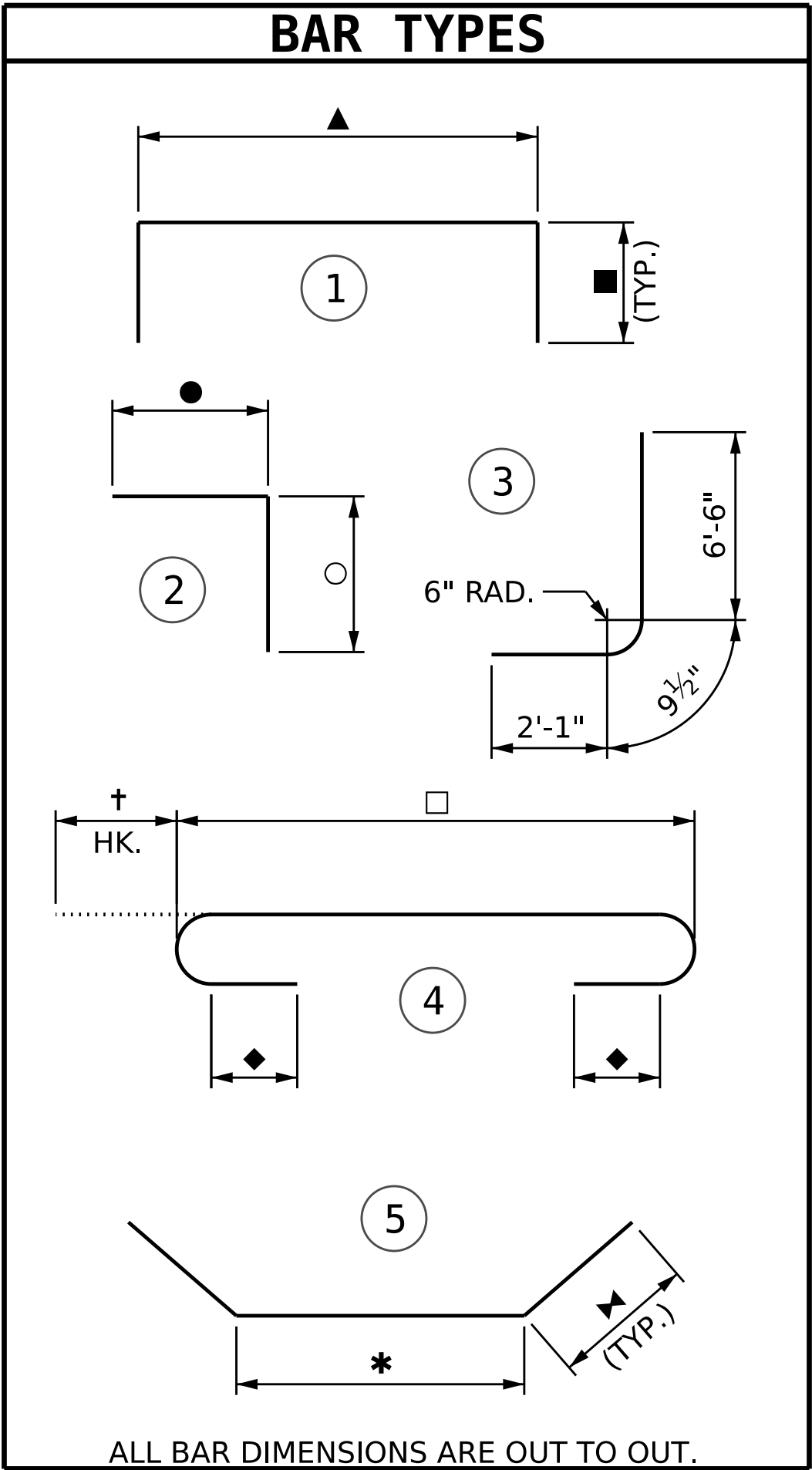
REVISIONS						SHEET NO. 2D-34
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

DRAWN BY : M. CATER DATE : 04/2026
CHECKED BY : D. RITACCO DATE : 04/2026
DESIGN ENGINEER OF RECORD: A. VASUDEVAN DATE : 04/2026

8/6/2026
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caterm

0840						0841						1011						6229					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	54	7	4	19'-4"	2134	A1	52	7	4	18'-8"	1984	A1	28	5	4	13'-1"	382	A1	52	7	4	18'-8"	1984
A2	54	7	STR	13'-2"	1453																		
						B1	78	5	STR	6'-0"	488	B1	27	5	STR	6'-0"	169	B1	78	5	STR	6'-0"	488
B1	78	6	STR	6'-0"	703	B2	78	5	STR	6'-7"	536	B2	27	5	STR	12'-5"	350	B2	78	5	STR	10'-2"	827
B2	78	6	STR	6'-7"	771																		
						C1	91	5	3	9'-5"	894	C1	35	5	3	9'-5"	344	C1	91	5	3	9'-5"	894
C1	96	6	3	9'-5"	1358	C2	91	5	STR	6'-7"	625	C2	35	5	STR	12'-5"	453	C2	91	5	STR	10'-2"	965
C2	96	6	STR	6'-7"	949																		
						D1	46	7	1	13'-8"	1285	D1	8	6	STR	4'-4"	52	D1	48	7	1	13'-8"	1341
D1	50	7	1	14'-4"	1465	D2	46	7	STR	11'-4"	1066	D2	9	6	2	2'-4"	32	D2	48	7	STR	11'-4"	1112
D2	50	7	STR	12'-0"	1226							D3	9	6	STR	1'-4"	18						
						E1	60	5	STR	11'-4"	709							E1	92	5	STR	11'-4"	1088
E1	60	5	STR	12'-0"	751	E2	60	5	STR	11'-4"	709	E1	118	5	1	5'-1"	626	E2	92	5	STR	11'-4"	1088
E2	60	5	STR	12'-0"	751	E7	120	5	2	6'-0"	751	E2	118	5	1	6'-0"	738	E7	184	5	2	6'-0"	1151
E7	120	5	2	6'-0"	751																		
						T1	28	5	5	6'-3"	183	T1	32	4	STR	3'-11"	84	T1	14	5	5	6'-3"	91
T1	28	5	5	6'-3"	183	REINFORCING STEEL					9,230 LBS.	REINFORCING STEEL					3,248 LBS.	T2	14	5	STR	9'-2"	134
REINFORCING STEEL					12,495 LBS.	CLASS AA CONCRETE					27.7 C.Y.	CLASS AA CONCRETE					9.2 C.Y.	REINFORCING STEEL					11,163 LBS.
CLASS AA CONCRETE					37.3 C.Y.	* = T1 : 3'-1" ⌛ = T1 : 1'-7"						■ = E1 : 10" E2 : 10" ▲ = E1 : 6'-5" E2 : 7'-4"						CLASS AA CONCRETE					33.5 C.Y.
* = T1 : 3'-1" ⌛ = T1 : 1'-7"						† = A1 : 10" ◆ = A1 : 2'-3" ○ = E7 : 3'-0" ▲ = D1 : 12'-0" □ = A1 : 13'-2" ● = E7 : 3'-0" ■ = D1 : 1'-4"						† = A1 : 7" ◆ = A1 : 2'-8" ○ = D2 : 1'-4" □ = A1 : 9'-10" ● = D2 : 1'-0"						† = A1 : 10" ◆ = A1 : 2'-3" ○ = E7 : 3'-0" ▲ = D1 : 11'-4" □ = A1 : 12'-6" ● = E7 : 3'-0" ■ = D1 : 1'-4"					

6274						7112						7116						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	54	7	4	18'-5"	2033	A1	54	6	4	19'-0"	1541	A1	42	7	4	16'-0"	1374	
A2	54	7	STR	12'-3"	1352													
						B1	86	5	STR	6'-0"	538	B1	59	5	STR	6'-0"	369	
B1	78	6	STR	6'-0"	703	B2	86	5	STR	5'-4"	478	B2	59	5	STR	26'-0"	1600	
B2	78	6	STR	6'-5"	752													
						C1	96	5	3	9'-5"	943	C1	70	5	3	9'-5"	688	
C1	89	6	3	9'-5"	1259	C2	96	5	STR	5'-4"	534	C2	70	5	STR	26'-0"	1898	
C2	89	6	STR	6'-5"	858													
						D1	48	8	1	14'-8"	1880	D1	38	7	1	11'-0"	854	
D1	50	7	1	13'-5"	1371	D2	48	8	STR	12'-0"	1538	D2	38	7	STR	8'-8"	673	
D2	50	7	STR	11'-1"	1133													
						E1	52	5	STR	12'-0"	651	E1	216	5	STR	8'-8"	1952	
E1	56	5	STR	11'-1"	647	E2	52	5	STR	12'-0"	651	E2	216	5	STR	8'-8"	1952	
E2	56	5	STR	11'-1"	647	E7	104	5	2	6'-0"	651	E7	432	5	2	6'-0"	2703	
E7	112	5	2	6'-0"	701													
						T1	8	4	STR	4'-6"	24	T1	32	4	STR	6'-10"	146	
T1	28	5	5	6'-3"	183	T2	16	4	STR	6'-3"	67	REINFORCING STEEL						14,209 LBS.
REINFORCING STEEL					11,639 LBS.	T3	14	4	5	5'-3"	49	CLASS AA CONCRETE						40.2 C.Y.
CLASS AA CONCRETE					27.6 C.Y.	T4	14	4	5	5'-9"	54							
* = T1 : 3'-1" ⌛ = T1 : 1'-7"					REINFORCING STEEL						9,599 LBS.							
					CLASS AA CONCRETE						25.4 C.Y.							
					* = T3 : 2'-7" ⌛ = T3 : 1'-4" T4 : 2'-10" T4 : 1'-5"													
† = A1 : 10" ◆ = A1 : 2'-3" ○ = E7 : 3'-0" ▲ = D1 : 11'-1" □ = A1 : 12'-3" ● = E7 : 3'-0" ■ = D1 : 1'-4"					† = A1 : 10" ◆ = A1 : 2'-3" ○ = E7 : 3'-0" ▲ = D1 : 12'-0" □ = A1 : 13'-2" ● = E7 : 3'-0" ■ = D1 : 1'-4"						† = A1 : 10" ◆ = A1 : 2'-3" ○ = E7 : 3'-0" ▲ = D1 : 8'-8" □ = A1 : 9'-10" ● = E7 : 3'-0" ■ = D1 : 1'-2"							



PROJECT NO. I-2513 AC
BUNCOMBE COUNTY

STATION:

SHEET 4 OF 4

AECOM
AECOM TECHNICAL SERVICES OF NC, INC.
5438 WADE PARK BOULEVARD, SUITE 200
RALEIGH, NC 27607
(919) 854-6200
www.aecom.com
AECOM License No. FC6342

SEAL
054262
ENGINEER
K. VASUDEVAN

Signed by:
K. VASUDEVAN
7/26/2026

8/7/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SPECIAL DRAINAGE STRUCTURES
BILL OF MATERIALS

REVISIONS

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

SHEET NO.
2D-35
TOTAL SHEETS

DRAWN BY : M. CATER DATE : 04/2026
CHECKED BY : D. RITACCO DATE : 04/2026
DESIGN ENGINEER OF RECORD: A. VASUDEVAN DATE : 04/2026

8/6/2026
c:\pwworking\oecom.ds21.no.2020\d0276869\BILL OF MATERIALS (SHEET 4 OF 4).dgn
caterm

DOCUMENT NOT CONSIDERED
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SIGNATURES COMPLETED



 AECOM TECHNICAL SERVICES OF NC, INC. 5438 WARD PARK BOULEVARD, SUITE 200 RALEIGH, NC 27607 (919) 854-6200 www.aecom.com AECOM License No. P-0342	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SPECIAL DRAINAGE STRUCTURE NOTES & TYPICAL DETAILS
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Sealed 10/1/2016
7/26/2016

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	2D-36
1			3			TOTAL SHEETS
2			4			

DRAWN BY :	K. LAXTON	DATE :	04/2026
CHECKED BY :	D. RITACCO	DATE :	04/2026
DESIGN ENGINEER OF RECORD:	A. VASUDEVAN	DATE :	04/2026

DOCUMENT NOT CONSIDERED
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SIGNATURES COMPLETED

A circular professional engineer seal for Kevin Fischer, North Carolina. The outer ring contains the text "NORTH CAROLINA" at the top and "KEVIN FISHER" at the bottom. Inside the ring, the word "PROFESSIONAL" is at the top, "SEAL" is in the center, and "ENGINEER" is at the bottom. The license number "030878" is printed in the middle of the seal.

Figure 1 is a plan view of a rectangular slab. The overall dimensions are 12'0" wide by 12'0" deep. A 4'0" wide section is shown in detail, containing a 4'0" x 4'0" area with a grid of bars. The grid is labeled "C2" BAR @ 6" CTS. and "D1" BAR @ 6" CTS. The section is labeled "X-X" and "Y-Y".

Diagram illustrating the reinforcement layout for a rectangular slab. The grid shows 10 vertical bars and 8 horizontal bars. The top dimension line is labeled "SEE SECTION Y-Y FOR \"A\" BARS SPACING AND COUNT". The left dimension line is labeled "SEE SECTION X-X FOR \"A\" BARS SPACING AND COUNT".

Diagram illustrating the development length of a bottom slab bar. The bar is shown with hooks at both ends, labeled "6 1/4" HOOK". The bar is labeled "A" BOTTOM SLAB BARS". The development length is indicated as "12" CONC." (12 inches concrete). The bar is also labeled "2" RADIUS" at the ends of the hooks.

"G" VERTICAL BARS
 "C" & "E" & "F" HORIZONTAL BARS
STRAIGHT BARS

A cross-sectional diagram of the steel frame and grates assembly. It shows a horizontal section of a structure with a central rectangular opening. The opening is filled with a series of vertical bars or grates. The entire assembly is supported by a base. A dimension line above the opening indicates a length of 2'-4". The text "STEEL FRAME AND GRATES" is written above the dimension line.

A cross-sectional diagram of the steel frame and grates assembly. It shows a horizontal steel beam supported by three vertical supports. The beam is labeled "STEEL FRAME AND GRATES". Above the beam, a dimension line indicates a length of "4'-0\"". The beam is shown in cross-section, revealing internal components like bolts and washers. The supports are also shown in cross-section, with some having internal reinforcement or bolts. The entire assembly is shown in a perspective view, with the beam and supports extending into the background.

[illegible]

MIN. DIMENSIONS FOR TRAFFIC BEARING GRATED DROP INLET(MIN. HEIGHT, H)									
DIMENSIONS OF BOX AND PIPE									
STR#	PIPE	PIPE	SPAN	WIDTH	SPAN	WIDTH	HEIGHT	RISER HT	+/--ANGLE (DEG)
	D _x	D _y	J	K	L	M	H	h	
6260	36"	30"	3'-8"	2'-0"	4'-6"	4'-0"	4'-2"	1'-3"	90
6268		30"			3'-8"	4'-0"	3'-8"	0'-8"	90
7060	48"	48"			5'-8"	6'-0"	5'-4"	1'-3"	110
7061		48"			5'-4"	6'-0"	5'-4"	1'-5"	110
7067		48"			5'-4"	6'-0"	5'-4"	0'-6"	110
7069	24"	42"			4'-10"	5'-1"	4'-9"	0'-11"	90
7071		36"			4'-0"	4'-6"	4'-2"	0'-6"	90
7073		36"			4'-0"	4'-6"	4'-2"	0'-5"	90
7075		36"			4'-0"	4'-6"	4'-2"	0'-6"	90
7077	36"	30"			4'-6"	4'-0"	4'-2"	0'-6"	90
7078	36"	36"			4'-6"	4'-6"	4'-2"	0'-11"	95
7079	30"	30"			4'-0"	4'-0"	3'-8"	7'-4"	90
7080	30"	30"			4'-0"	4'-0"	3'-8"	1'-1"	90
7088	18"	30"			3'-8"	4'-0"	3'-8"	6'-7"	90
7092	30"	24"			4'-0"	3'-4"	3'-8"	2'-11"	95
7093	30"	30"			4'-0"	4'-0"	3'-8"	1'-0"	90
7094		24"			3'-8"	3'-4"	3'-2"	6'-2"	95
7097		30"			3'-8"	4'-0"	3'-8"	0'-10"	90
7103		30"			3'-8"	4'-0"	3'-8"	1'-0"	90
0802		24"	3'-8"	2'-0"	3'-8"	3'-4"	3'-2"	2'-11"	95

MIN. DIMENSIONS AND QUANTITIES FOR CONCRETE GRATED DROP INLET (BASED ON MIN. HEIGHT, H)																								
REINFORCING STEEL - NO. 5 BARS																			CU YDS CONC. IN BOX					
STR#	BARS A		BARS B		BARS C1		BARS C2		BARS D WALL		BARS D SLAB		BARS E		BARS F		BARS G		TOTAL LBS.	BOTTOM SLAB	H WALLS	TOP SLAB	RISER	TOTAL
	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH						
6260	11	8'-8"	44	5'-8"	14	1'-2"	10	2'-4"	78	5'-8"	18	5'-3"	4	4'-8"	4	3'-0"	30	1'-6"	1040	0.963	2.023	0.734	0.432	4.152
6268	10	8'-3"	40	5'-2"	—	—	10	2'-4"	70	5'-2"	12	4'-8"	2		2			0'-11"	812	0.840	1.630	0.597	0.231	3.298
7060	14	10'-3"	56	6'-10"	14	2'-4"	18	4'-4"	90	6'-10"	30	6'-10"	4		4			1'-6"	1595	1.514	3.423	1.358	0.432	6.727
7061	13	10'-1"	52	6'-10"	14	2'-0"	18	4'-4"	90	6'-10"	26	6'-8"	4		4			1'-8"	1528	1.449	3.336	1.282	0.490	6.557
7067	13	10'-1"	52	6'-10"	14	2'-0"	18	4'-4"	90	6'-10"	26	6'-8"	2		2			0'-9"	1480	1.449	3.336	1.282	0.173	6.240
7069	12	9'-5"	48	6'-3"	14	1'-6"	14	3'-5"	86	6'-3"	22	6'-0"	4		4			1'-2"	1270	1.198	2.643	0.994	0.317	5.152
7071	11	8'-8"	44	5'-8"	14	0'-8"	12	2'-10"	78	5'-8"	16	5'-3"	2		2			0'-9"	994	0.963	2.023	0.734	0.173	3.893
7073	11	8'-8"	44	5'-8"	14	0'-8"	12	2'-10"	78	5'-8"	16	5'-3"	2		2			0'-8"	991	0.963	2.023	0.734	0.144	3.864
7075	11	8'-8"	44	5'-8"	14	0'-8"	12	2'-10"	78	5'-8"	16	5'-3"	2		2			0'-9"	989	0.963	2.023	0.734	0.173	3.893
7077	11	8'-8"	44	5'-8"	14	1'-2"	10	2'-4"	78	5'-8"	16	5'-3"	2		2			0'-9"	969	0.963	2.023	0.734	0.173	3.893
7078	12	8'-11"	48	5'-8"	14	1'-2"	12	2'-10"	78	5'-8"	18	5'-6"	4		4			1'-2"	1081	1.043	2.126	0.824	0.317	4.310
7079	10	8'-5"	40	5'-2"	14	0'-8"	10	2'-4"	70	5'-2"	14	5'-0"	56		56			7'-7"	1475	0.889	1.690	0.652	2.535	5.766
7080	10	8'-5"	40	5'-2"	14	0'-8"	10	2'-4"	70	5'-2"	14	5'-0"	4		4			1'-4"	862	0.889	1.690	0.652	0.375	3.606
7088	10	8'-3"	40	5'-2"	—	—	10	2'-4"	70	5'-2"	12	4'-8"	50		50			6'-10"	1393	0.840	1.630	0.597	2.276	5.343
7092	10	8'-0"	40	5'-2"	—	—	8	1'-10"	60	4'-8"	10	4'-4"	20		20			3'-2"	877	0.791	1.267	0.541	1.016	3.615
7093	10	8'-5"	40	5'-2"	14	0'-8"	10	2'-4"	70	5'-2"	14	5'-0"	4		4			1'-3"	897	0.889	1.690	0.652	0.346	3.577
7094	10	8'-5"	34	4'-8"	—	—	8	1'-10"	60	4'-8"	10	4'-4"	46		46			6'-5"	1134	0.746	1.012	0.494	2.132	4.384
7097	10	8'-3"	40	5'-2"	—	—	10	2'-4"	70	5'-2"	12	4'-8"	4		4			1'-1"	862	0.840	1.630	0.597	0.288	3.355
7103	10	8'-3"	40	5'-2"	—	—	10	2'-4"	70	5'-2"	12	4'-8"	4		4			1'-3"	873	0.840	1.630	0.597	0.346	3.413
0802	10	7'-11"	34	4'-8"	—	—	8	1'-10"	60	4'-8"	10	4'-4"	20	4'-8"	20	3'-0"	30	3'-2"	828	0.746	1.012	0.494	1.016	3.268

GENERAL NOTES:

- CHAMFER ALL EXPOSED CONCRETE CORNERS 3".
- USE FORMS TO CONSTRUCT THE BOTTOM SLAB.
- IF PIPES ARE SET IN THE BASE, FOLLOW CONSTRUCTION PROCEDURES SHOWN BY STD. DWG. 840.00.
- PRECAST UNITS MADE OF CLASS "AA" CONCRETE MAY BE USED IN LIEU OF CAST IN PLACE CONCRETE. SEE STD. 840.46.
- REFERENCE STD. DWG. 840.25 FOR FRAME ANCHORAGE.
- FRAME AND GRATES SHALL BE SEPARATE CONTRACT ITEM. SEE DRAINAGE SUMMARY FOR SPECIFIC FRAME AND GRATE.
- PROVIDE DROP INLETS OVER 3'-6" DEEP WITH STEPS AS DIRECTED BY STD. DWG. 840.66.
- HORIZONTAL AND VERTICAL DIMENSIONS MAY BE ADJUSTED AS FIELD CONDITIONS AND/OR ALTERNATE DESIGN REQUIRE.
- ALL ADJUSTMENTS ARE TO BE MADE AS DIRECTED BY THE ENGINEER.
- D_x AND/OR D_y REPRESENT THE LARGEST DIAMETER INTO X-X OR Y-Y DIMENSION, RESPECTIVELY. SMALLER DIAMETER PIPES OR SAME LARGE SIZE PIPES THAT CONNECT INTO STRUCTURE ON OTHER SIDES ARE NOT NECESSARILY SHOWN IN DETAIL SKETCH IF THEY DO NOT CONTROL DIMENSIONS.
- PIPE WALL THICKNESS ASSUMES CLASS IV RCP.
- DIMENSIONS TAKE INTO ACCOUNT CHANGE IN PIPE SHAPE DUE TO ANGLE AT CONNECTION.
- THE CONTRACTOR SHALL DESIGN AND SUBMIT PE-SEALING WORKING DRAWINGS FOR EACH SPECIAL TRAFFIC BEARING GRADED DROP INLET SHOWN ON THIS DETAIL. SEE SPECIAL DRAINAGE STRUCTURES SPECIAL PROVISION.
- THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, AND PIPE SIZES/ORIENTATIONS SHOWN BEFORE SUBMITTING WORKING DRAWINGS.
- DIMENSIONS, REINFORCEMENT, AND OTHER DETAILS SHOWN ARE CONSIDERED A MINIMUM AND A SCHEMATIC.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

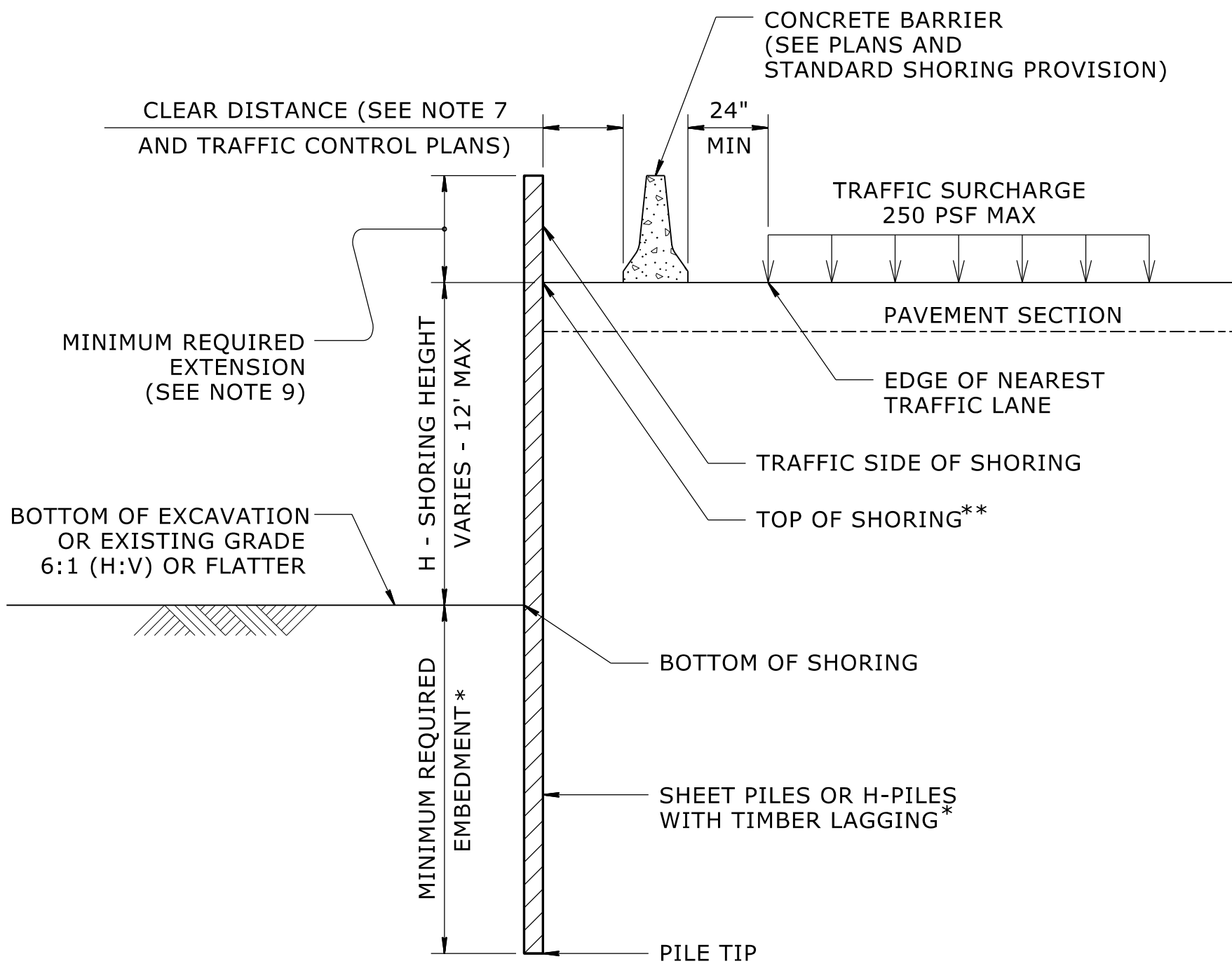
SPECIAL TRAFFIC BEARING
GRATED DROP INLET
I-2513AC BUNCOMBE COUNTY

ORIGINAL BY:_____ DATE: _____
MODIFIED BY:_____ DATE: _____
CHECKED BY:_____ DATE: _____
FILE SPEC.:_____

GROUNDWATER CONDITION (SEE NOTE 6)	H SHORING HEIGHT (FT)	SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT					SURCHARGE CASE WITH TRAFFIC IMPACT				
		SHEET PILES		H-PILES WITH TIMBER LAGGING			SHEET PILES		H-PILES WITH TIMBER LAGGING		
		MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN ⁴ /FT)	MINIMUM REQUIRED EMBEDMENT * (FT) (SEE NOTE 10)			MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN ⁴ /FT)	MINIMUM REQUIRED EMBEDMENT * (FT) (SEE NOTE 10)		
GROUNDWATER ELEVATION BETWEEN BOTTOM OF SHORING AND PILE TIP	< 6			HP 10x42	HP 12x53	HP 14x73			HP 10x42	HP 12x53	HP 14x73
	7	13.0	7.0	13.0	13.0	13.0	17.0	14.5	14.5	14.5	14.5
	8	15.0	10.0	--	15.0	15.0	18.0	17.0	--	15.5	15.5
	9	17.0	14.0	--	17.0	17.0	19.0	20.0	--	17.0	17.0
	10	18.5	19.5	--	--	18.5	20.0	23.5	--	--	18.5
	11	20.5	26.0	--	--	--	21.0	28.0	--	--	20.0
	12	22.5	33.0	--	--	--	22.0	33.0	--	--	21.5
GROUNDWATER ELEVATION BELOW PILE TIP	< 6	7.5	3.0	8.0	8.0	8.0	11.0	10.0	9.5	9.5	9.5
	7	8.5	4.5	9.5	9.5	9.5	12.0	12.0	10.5	10.5	10.5
	8	10.0	6.5	10.5	10.5	10.5	12.5	14.0	11.5	11.5	11.5
	9	11.0	9.5	--	12.0	12.0	13.5	16.5	--	12.5	12.5
	10	12.5	13.0	--	--	13.5	14.0	19.5	--	13.5	13.5
	11	13.5	17.0	--	--	14.5	15.0	22.5	--	--	14.5
	12	15.0	21.5	--	--	16.0	16.0	25.5	--	--	15.5

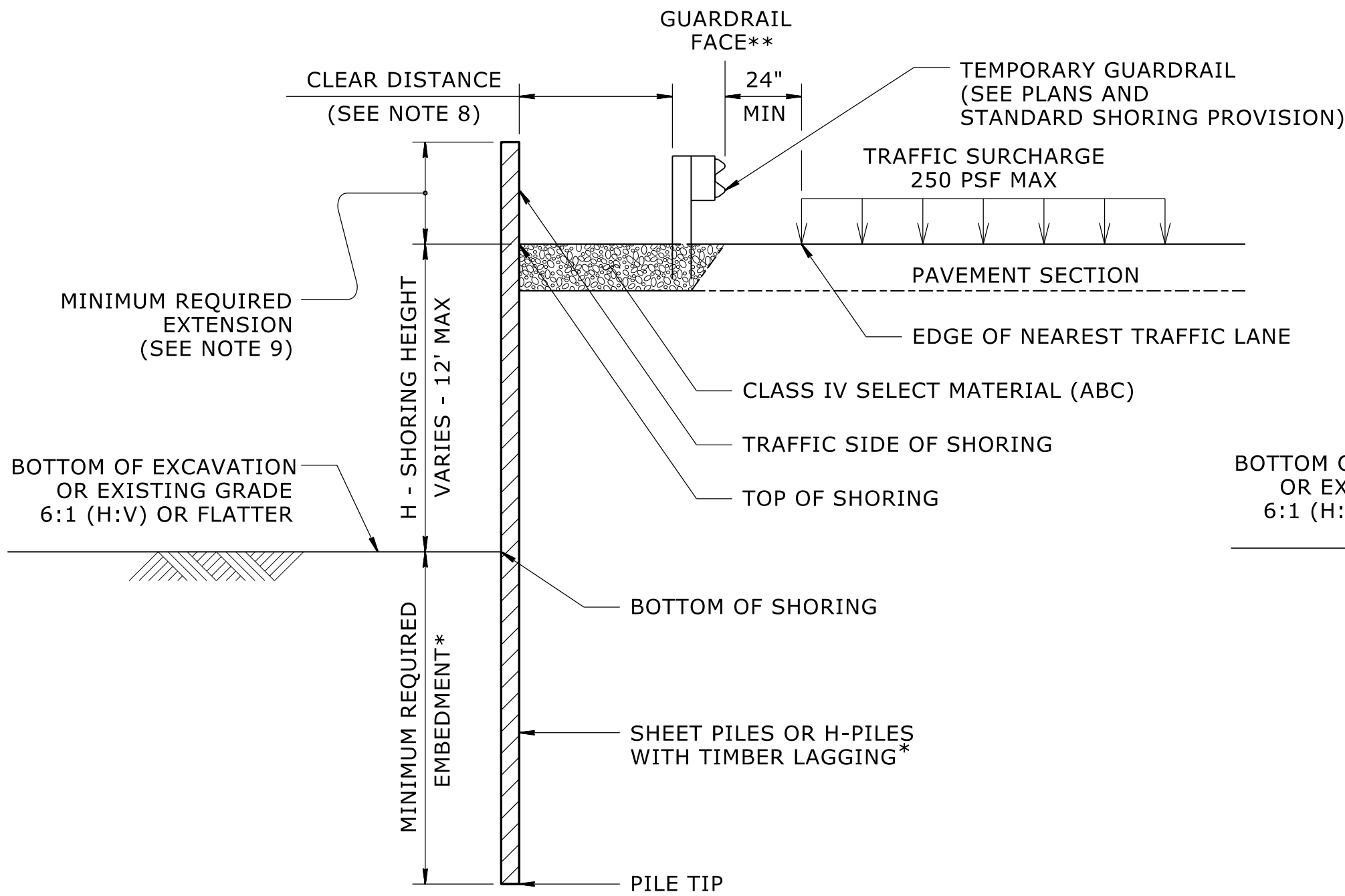
MINIMUM REQUIRED EMBEDMENT AND SECTION MODULUS

*DO NOT USE H-PILES WITH TIMBER LAGGING FOR GROUNDWATER CONDITION, SHORING HEIGHT AND H-PILE SIZE SHOWN IF MINIMUM REQUIRED EMBEDMENT IS "---".



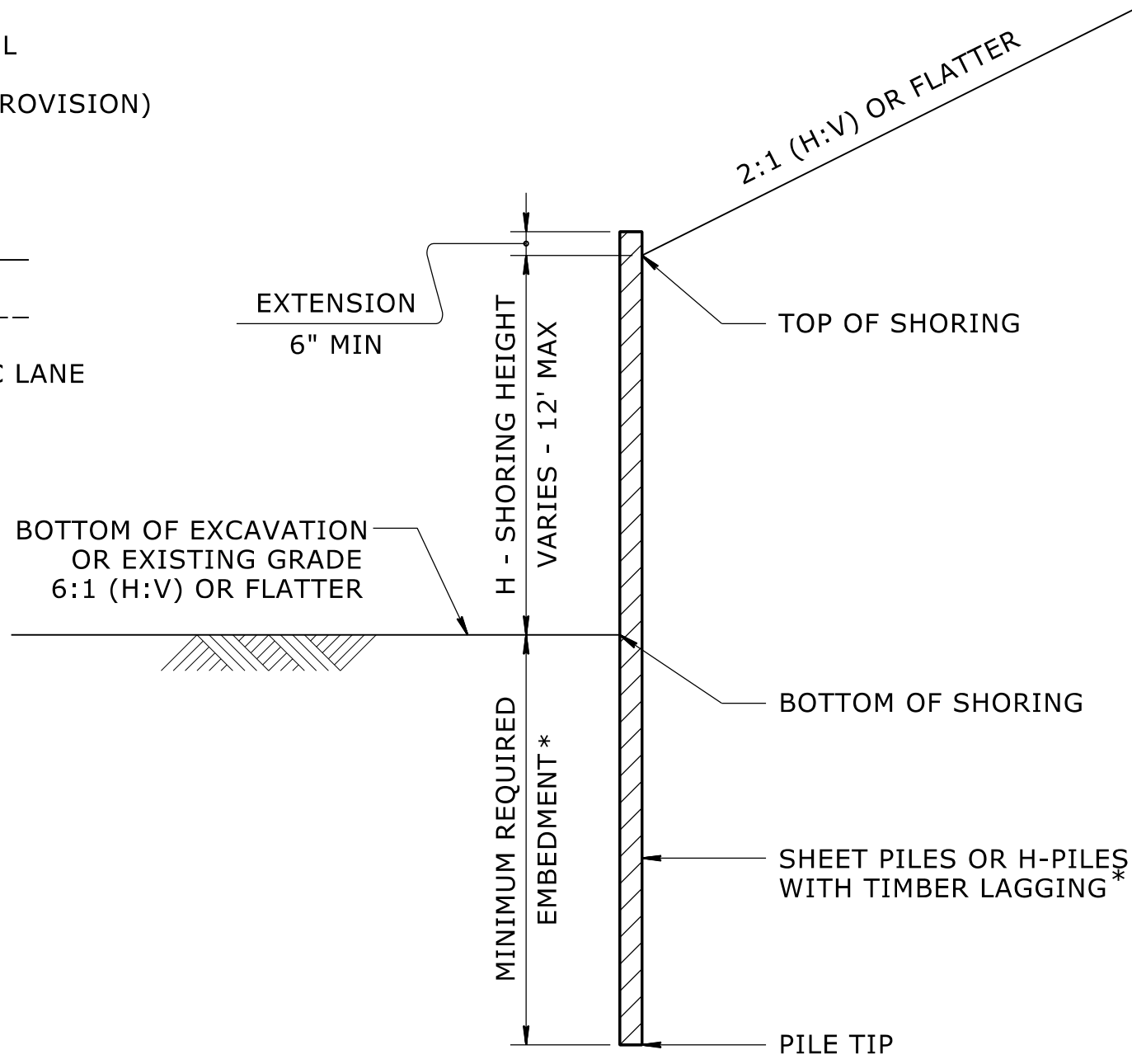
CONCRETE BARRIER

**TOP OF SHORING =
EDGE OF PAVEMENT



TEMPORARY GUARDRAIL

**GUARDRAIL FACE =
EDGE OF PAVEMENT



STANDARD TEMPORARY SHORING

(SLOPE CASE)
*SEE TABLE ABOVE.

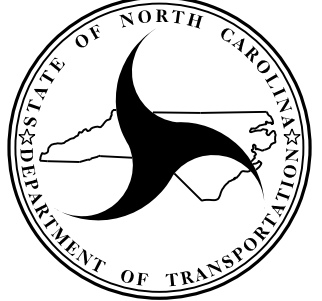
NOTES:

1. AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING AS NOTED IN THE PLANS.
2. FOR STANDARD TEMPORARY SHORING, SEE STANDARD SHORING PROVISION.
3. STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
UNIT WEIGHT, γ = 120 PCF
FRICTION ANGLE, ϕ = 30 DEGREES
COHESION, c = 0 PSF
4. DO NOT USE STANDARD TEMPORARY SHORING IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
5. DO NOT USE STANDARD TEMPORARY SHORING WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS WITHIN THE EMBEDMENT DEPTH.
6. USE GROUNDWATER ELEVATION NOTED IN THE PLANS. IF NO GROUNDWATER ELEVATION IS SHOWN IN THE PLANS, USE "GROUNDWATER ELEVATION BETWEEN BOTTOM OF SHORING AND PILE TIP" FOR GROUNDWATER CONDITION. DO NOT USE STANDARD TEMPORARY SHORING IF GROUNDWATER IS ABOVE BOTTOM OF SHORING.
7. AT THE CONTRACTOR'S OPTION OR IF AVAILABLE CLEAR DISTANCE IS LESS THAN THE MINIMUM REQUIRED FOR CONCRETE BARRIER, SET BARRIER NEXT TO AND UP AGAINST TRAFFIC SIDE OF PILES AND USE "SURCHARGE CASE WITH TRAFFIC IMPACT".
8. AT THE CONTRACTOR'S OPTION OR IF AVAILABLE CLEAR DISTANCE IS LESS THAN 4' FOR TEMPORARY GUARDRAIL, ATTACH GUARDRAIL TO TRAFFIC SIDE OF PILES AS SHOWN IN THE PLANS AND USE "SURCHARGE CASE WITH TRAFFIC IMPACT".
9. MINIMUM REQUIRED EXTENSION IS 6" FOR "SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT" AND 32" FOR "SURCHARGE CASE WITH TRAFFIC IMPACT".
10. MINIMUM REQUIRED EMBEDMENT FOR H-PILES WITH TIMBER LAGGING IS BASED ON DRIVEN H-PILES AT MAXIMUM 6' SPACING. AT THE CONTRACTOR'S OPTION, EMBEDMENT DEPTHS MAY BE REDUCED BY 25% FOR DRILLED-IN H-PILES.
11. SUBMIT A "STANDARD TEMPORARY SHORING SELECTION FORM" AT LEAST 7 DAYS BEFORE STARTING TEMPORARY SHORING CONSTRUCTION. UP TO 3 SHORING LOCATIONS MAY BE INCLUDED ON EACH FORM. STANDARD SHORING SELECTION FORMS ARE AVAILABLE FROM:
connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
12. CONTACT THE ENGINEER IF PILES DO NOT ATTAIN THE MINIMUM REQUIRED EMBEDMENT.

I-2513AC

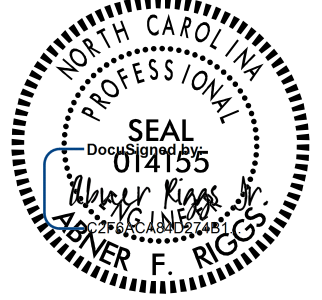
- 2G-1

NORTH CAROLINA
DEPARTMENT
OF TRANSPORTATION

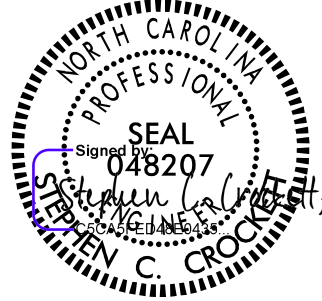


GEOTECHNICAL
ENGINEERING UNIT

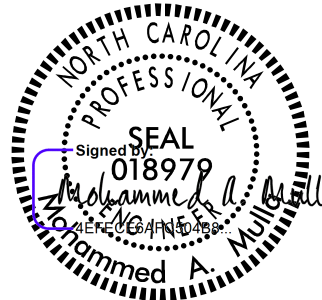
GEOTECHNICAL
ENGINEER
8/7/2026



GEOTECHNICAL
ENGINEER
8/10/2026



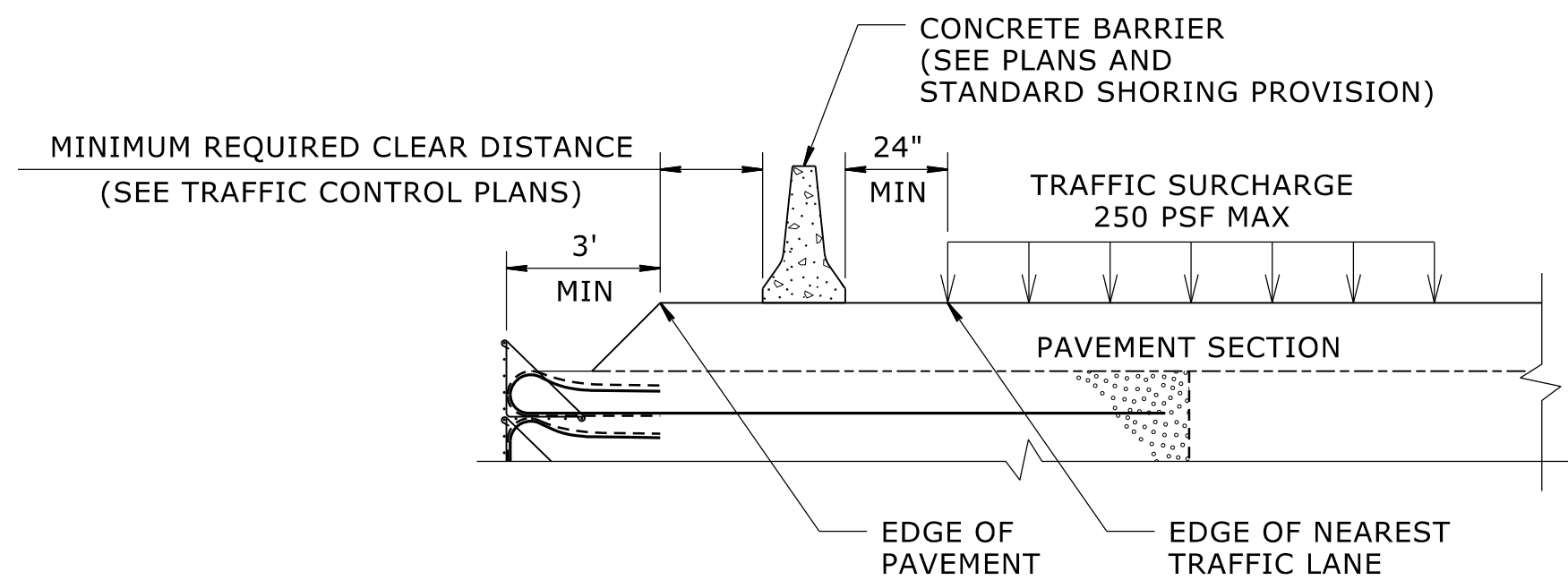
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ENGINEER
8/7/2026



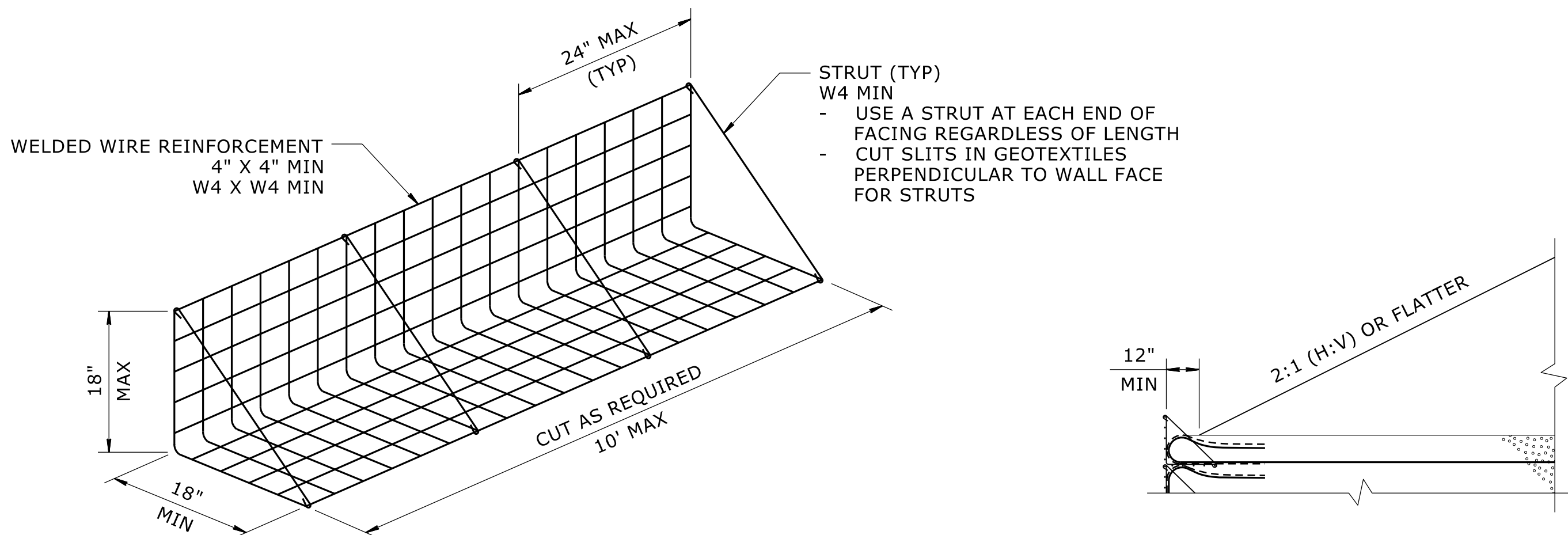
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STANDARD
DETAIL NO. 1801.01

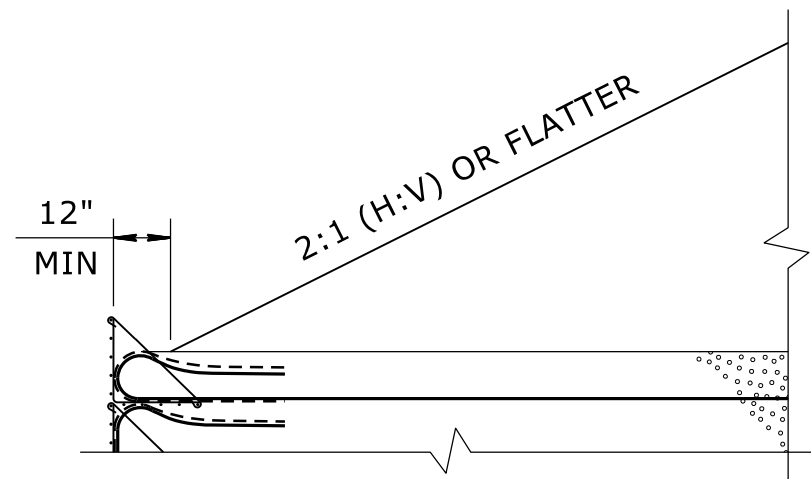
GEOTECHNICAL STANDARD DETAIL FOR
TEMPORARY SHORING



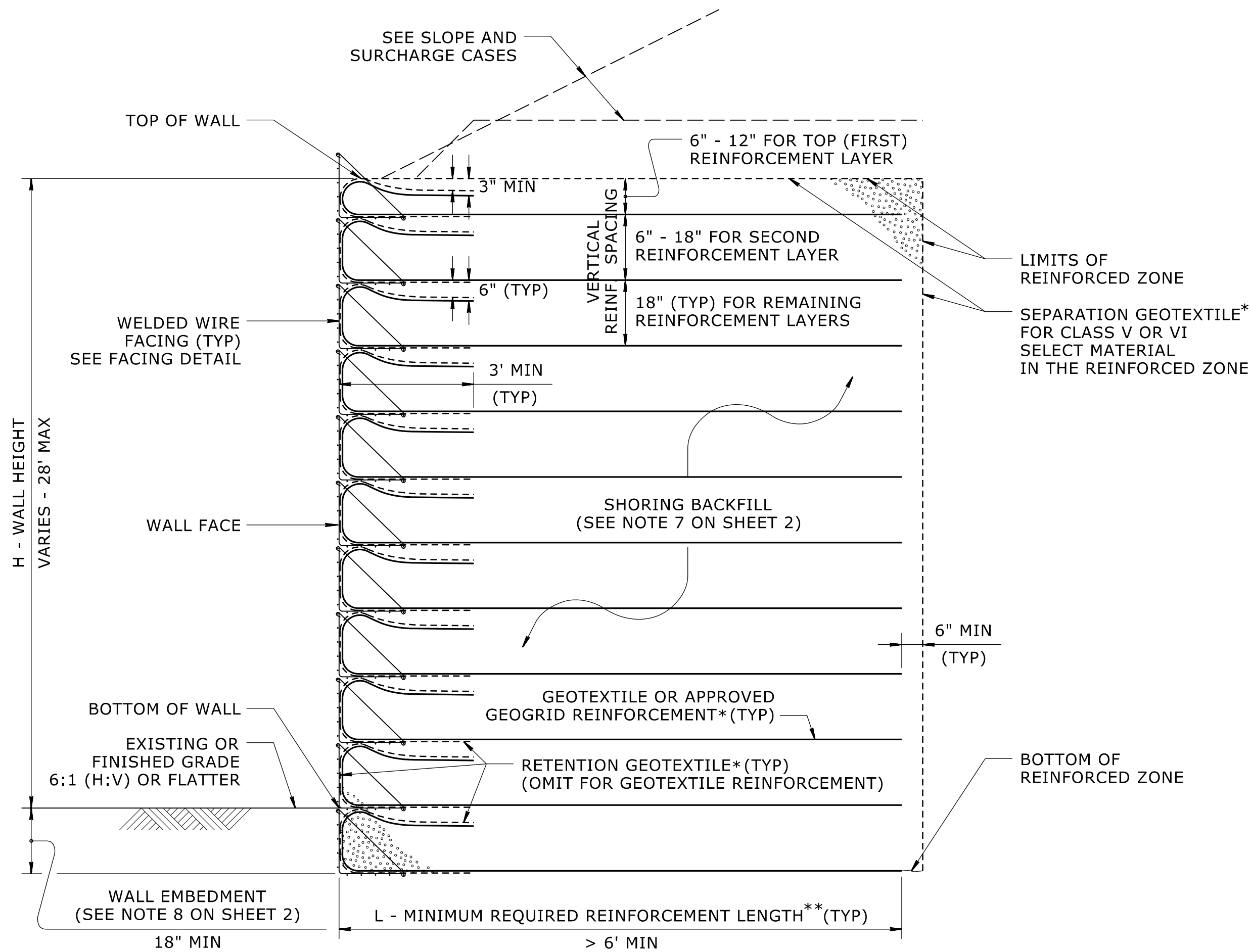
SURCHARGE CASE



FACING DETAIL

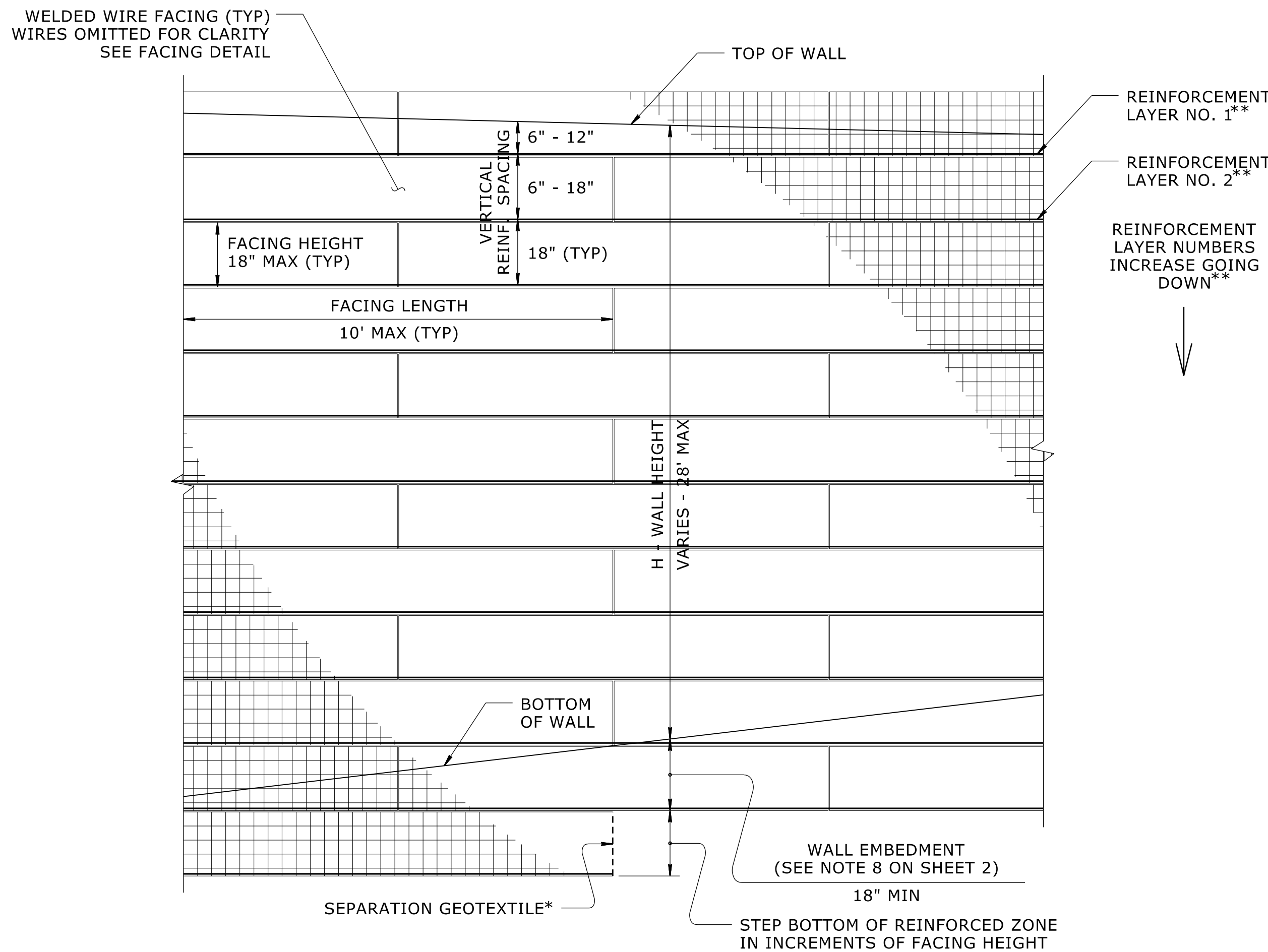


SLOPE CASE



STANDARD TEMPORARY WALL

(FOR STANDARD TEMPORARY WALLS ON STRUCTURES, SEE TEMPORARY WALL ON STRUCTURE DETAIL ON SHEET 2.)
*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.
**SEE REINFORCEMENT TABLES ON SHEET 3.



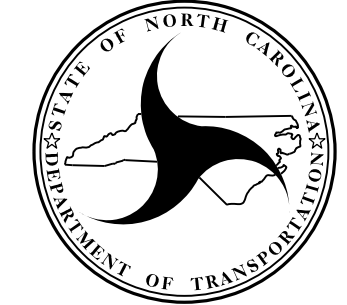
STANDARD TEMPORARY WALL - PARTIAL ELEVATION

*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.
**SEE REINFORCEMENT TABLES ON SHEET 3.

I-2513AC

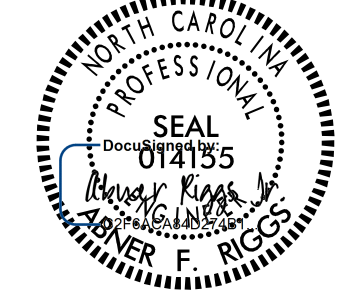
- 2G-2

NORTH CAROLINA
DEPARTMENT
OF TRANSPORTATION



GEOTECHNICAL
ENGINEERING UNIT

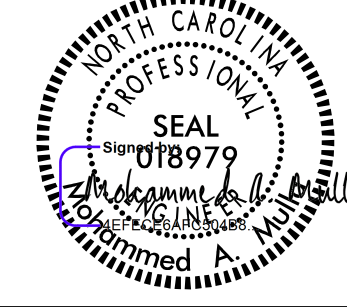
GEOTECHNICAL
ENGINEER
8/7/2026



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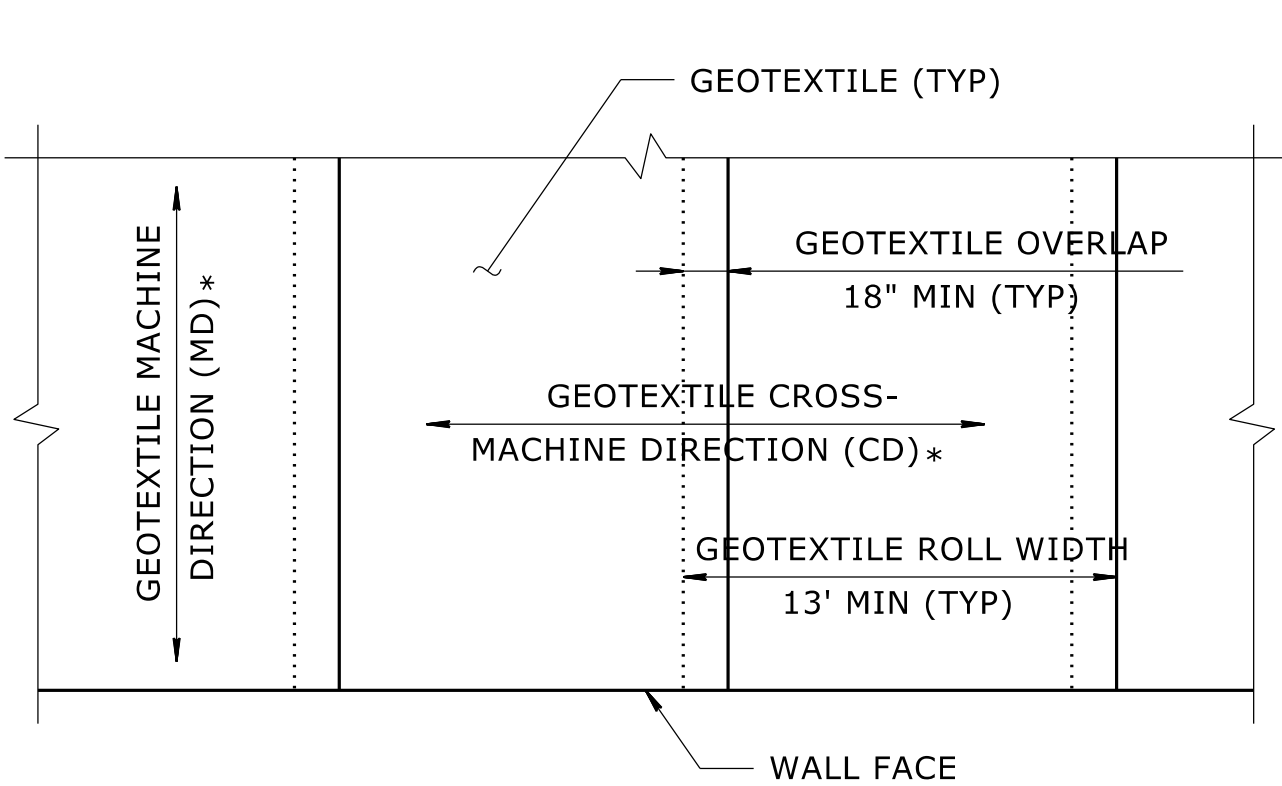
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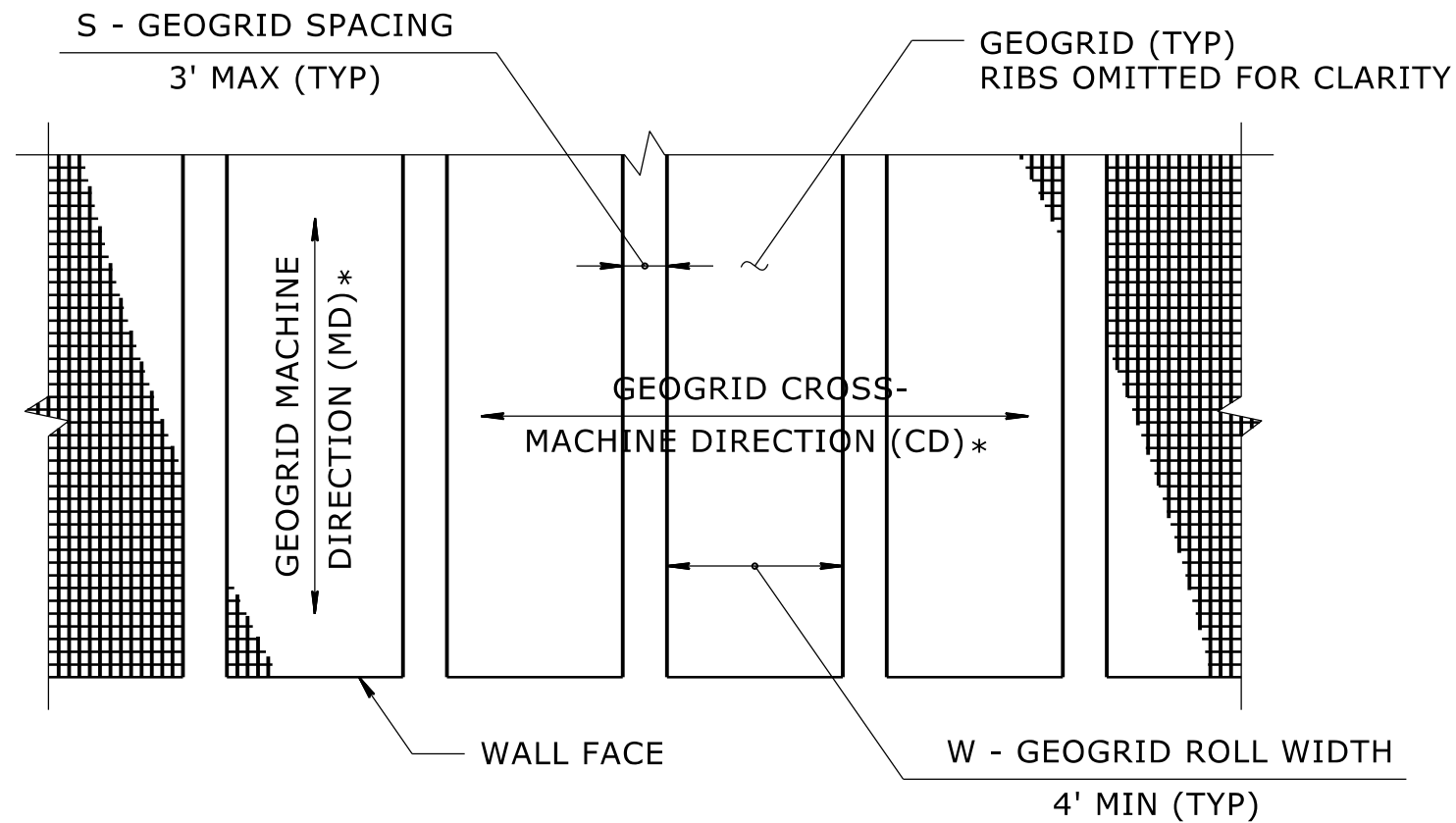
STANDARD
DETAIL NO. 1801.02

GEOTECHNICAL STANDARD DETAIL FOR
TEMPORARY WALL (SHEET 1 OF 3)



GEOTEXTILE PLACEMENT

(100% COVERAGE MIN FOR
GEOTEXTILE REINFORCEMENT)

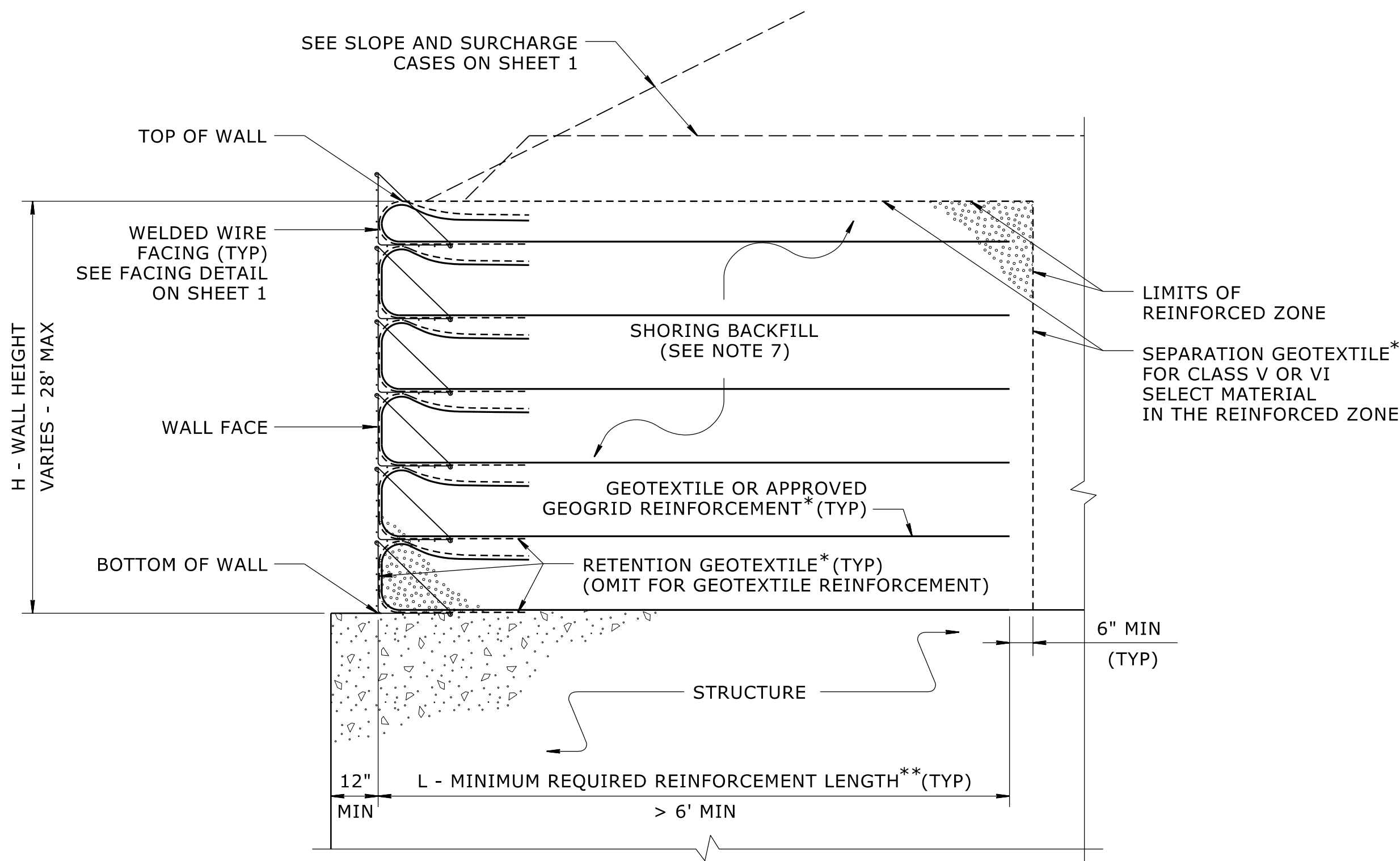


GEOGRID PLACEMENT

(80% COVERAGE MIN FOR
GEOGRID REINFORCEMENT -
 $\frac{W}{W+S} \times 100 \geq 80\%$,
SEE NOTE 11)

GEOSYNTHETIC PLACEMENT DETAILS

(PLAN VIEW)
*SEE NOTE 12.



TEMPORARY WALL ON STRUCTURE DETAIL

*SEE GEOSYNTHETIC PLACEMENT DETAILS.
**SEE REINFORCEMENT TABLES ON SHEET 3.

NOTES:

- AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY WALLS AS NOTED IN THE PLANS.
- FOR STANDARD TEMPORARY WALLS, SEE STANDARD SHORING PROVISION.
- STANDARD TEMPORARY WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
UNIT WEIGHT, $\gamma = 120$ PCF
FRICTION ANGLE, $\phi = 30$ DEGREES
COHESION, $c = 0$ PSF
- DO NOT USE STANDARD TEMPORARY WALLS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
- DO NOT USE STANDARD TEMPORARY WALLS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW TEMPORARY WALLS.
- USE GROUNDWATER ELEVATION NOTED IN THE PLANS. IF NO GROUNDWATER ELEVATION IS SHOWN IN THE PLANS, ASSUME GROUNDWATER DEPTH IS LESS THAN 7' BELOW BOTTOM OF REINFORCED ZONE. DO NOT USE STANDARD TEMPORARY WALLS IF GROUNDWATER OR FLOOD ELEVATION IS ABOVE BOTTOM OF REINFORCED ZONE.
- DO NOT USE A-2-4 SOIL FOR STANDARD TEMPORARY WALLS AROUND CULVERTS OR IN THE REINFORCED ZONE OF STANDARD TEMPORARY WALLS FOR SLOPE CASES. DO NOT USE CLASS VI SELECT MATERIAL IN THE REINFORCED ZONE OF STANDARD TEMPORARY WALLS WITH GEOTEXTILE REINFORCEMENT.
- WALL EMBEDMENT IS NOT REQUIRED FOR STANDARD TEMPORARY WALLS ON STRUCTURES OR ROCK AS DETERMINED BY THE ENGINEER.
- DO NOT USE MORE THAN 4 DIFFERENT REINFORCEMENT STRENGTHS FOR EACH STANDARD TEMPORARY WALL.
- GEOGRIDS FOR GEOGRID REINFORCEMENT ARE APPROVED FOR SHORT TERM DESIGN STRENGTHS (3-YEAR DESIGN LIFE) IN THE MD AND CD BASED ON MATERIAL TYPE. THE LIST OF APPROVED GEOGRIDS WITH DESIGN STRENGTHS IS AVAILABLE FROM: connect.ncdot.gov/resources/Geological/Pages/Products.aspx
DEFINE MATERIAL TYPE FROM THE WEBSITE ABOVE FOR SHORING BACKFILL AS FOLLOWS:

MATERIAL TYPE	SHORING BACKFILL
BORROW	A-2-4 SOIL
FINE AGGREGATE	CLASS II, TYPE 1 OR CLASS III SELECT MATERIAL
COARSE AGGREGATE	CLASS V OR VI SELECT MATERIAL

- FOR GEOGRID REINFORCEMENT WITH LESS THAN 100% COVERAGE, STAGGER REINFORCEMENT SO GEOGRIDS ARE CENTERED OVER GAPS IN THE REINFORCEMENT LAYER BELOW.
- AT THE CONTRACTOR'S OPTION, REINFORCEMENT MAY BE INSTALLED WITH THE MD PARALLEL TO THE WALL FACE IF BOTH OF THE FOLLOWING CONDITIONS OCCUR:
- W (REINFORCEMENT ROLL WIDTH) > (MINIMUM REQUIRED REINFORCEMENT LENGTH) + 4.5' AND
- REINFORCEMENT STRENGTH IN CD > MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD.
- SUBMIT A "STANDARD TEMPORARY WALL SELECTION FORM" AT LEAST 7 DAYS BEFORE STARTING TEMPORARY WALL CONSTRUCTION. STANDARD SHORING SELECTION FORMS ARE AVAILABLE FROM: connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
- DO NOT PLACE SHORING BACKFILL OR REINFORCEMENT UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
- FOR STANDARD TEMPORARY WALLS WITH PILE FOUNDATIONS IN THE REINFORCED ZONE, DRIVE PILES THROUGH REINFORCEMENT AFTER CONSTRUCTING TEMPORARY WALLS.
- DO NOT SPLICE OR OVERLAP REINFORCEMENT SO SEAMS ARE PARALLEL TO THE WALL FACE.
- CONTACT THE ENGINEER WHEN EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH REINFORCEMENT.
- FOR STANDARD TEMPORARY WALLS WITH INTERIOR ANGLES LESS THAN 90 DEGREES, WRAP GEOSYNTHETICS AT ACUTE CORNERS AS DIRECTED BY THE ENGINEER.
- FOR STANDARD TEMPORARY WALLS WITH TOP OF WALL WITHIN 5' OF FINISHED GRADE, REMOVE TOP FACING AND INCORPORATE TOP REINFORCEMENT LAYER INTO FILL WHEN PLACING FILL IN FRONT OF WALL.

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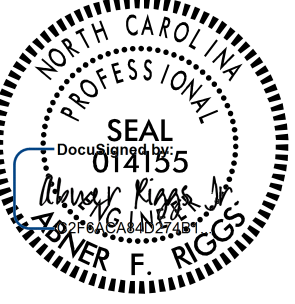
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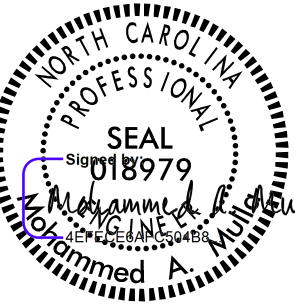
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STANDARD
DETAIL NO. 1801.02

GEOTECHNICAL STANDARD DETAIL FOR
TEMPORARY WALL (SHEET 2 OF 3)

SLOPE OR SURCHARGE CASE	GROUNDWATER DEPTH BELOW BOTTOM OF REINFORCED ZONE (SEE NOTE 6 ON SHEET 2) (FT)	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)	H - WALL HEIGHT (FT)																											
			< 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			
SLOPE CASE	> 0	CLASS II, TYPE 1, CLASS III, CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	8	9	11	12	13	13	14	15	16	17	18	19	20	21	22	23	24	24	25	26	27	27			
SURCHARGE CASE	> 0 TO 7 FOR H < 20' > 0 TO 10 FOR H > 20'	ALL SHORING BACKFILL TYPES	6	7	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	17	17	18	19	19	20	21	22			
	> 7 FOR H < 20' > 10 FOR H > 20'	A-2-4 SOIL	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20	21			
		CLASS II, TYPE 1 OR CLASS III SELECT MATERIAL	6	6	7	7	8	8	9	10	10	11	11	12	12	13	14	15	15	16	16	17	17	18	18	19	20			
		CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	7	7	8	8	9	9	10	10	10	11	12	13	13	14	14	15	15	16	17	17	18	19	19		

L - MINIMUM REQUIRED REINFORCEMENT LENGTH (FT)

(FOR ALL REINFORCEMENT TYPES)

REINFORCEMENT LAYER NUMBER *	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II, TYPE 1 OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL	A-2-4 SOIL	CLASS II, TYPE 1 OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL
1	2400	2400	2400	2400	2400
2	2400	2400	2400	2400	2400
3	2400	2400	2400	2400	2400
4	2400	2400	2500	2400	2400
5	2500	2400	3000	2400	2400
6	3000	2400	3500	2800	2400
7	3500	2700	4000	3200	2600
8	4000	3100	4500	3600	2900
9	4500	3500	5000	4000	3200
10	5000	3900	5500	4400	3500
11	5500	4300	6000	4800	3800
12	6000	4700	6500	5200	4100
13	6500	5100	7000	5600	4400
14	7000	5400	7500	6000	4700
15	7500	5800	8000	6400	5000
16	8000	6200	8500	6800	5300
17	8500	6600	9000	7200	5600
18	9000	7000	9500	7600	5900
19	9500	7400	10000	8000	6200
20	10000	7800	10500	8400	6500

GEOTEXTILE REINFORCEMENT

ULTIMATE TENSILE STRENGTH (LB/FT)

MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD

(SEE NOTE 9 ON SHEET 2.)

*SEE PARTIAL ELEVATION ON SHEET 1 FOR REINFORCEMENT LAYER NUMBERING.

WALL HEIGHT (H) + WALL EMBEDMENT (FT)	NUMBER OF REINFORCEMENT LAYERS*
2.5 - 4	3
4 - 5.5	4
5.5 - 7	5
7 - 8.5	6
8.5 - 10	7
10 - 11.5	8
11.5 - 13	9
13 - 14.5	10
14.5 - 16	11
16 - 17.5	12
17.5 - 19	13
19 - 20.5	14
20.5 - 22	15
22 - 23.5	16
23.5 - 25	17
25 - 26.5	18
26.5 - 28	19
28 - 29.5	20

*BASED ON VERTICAL REINFORCEMENT SPACING SHOWN ON SHEET 1.

REINFORCEMENT LAYER NUMBER *	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II, TYPE 1 OR CLASS III SELECT MATERIAL	CLASS V OR CLASS VI SELECT MATERIAL	A-2-4 SOIL	CLASS II, TYPE 1 OR CLASS III SELECT MATERIAL	CLASS V OR CLASS VI SELECT MATERIAL
1	240	200	340	290	240
2	380	310	520	430	350
3	530	420	700	570	460
4	690	550	870	720	570
5	860	690	1050	860	680
6	1030	830	1220	1000	790
7	1200	970	1400	1150	900
8	1370	1110	1580	1290	1010
9	1550	1240	1750	1430	1120
10	1720	1380	1930	1580	1230
11	1890	1520	2100	1720	1340
12	2060	1660	2280	1860	1450
13	2240	1800	2450	2010	1560
14	2410	1940	2630	2150	1670
15	2580	2080	2800	2290	1780
16	2750	2220	2980	2440	1890
17	2930	2360	3160	2580	2000
18	3100	2500	3330	2720	2110
19	3270	2640	3510	2860	2220
20	3440	2780	3690	3000	2330

GEOGRID REINFORCEMENT

SHORT-TERM DESIGN STRENGTH (LB/FT)

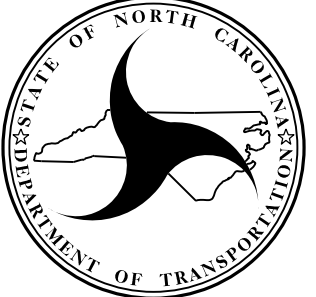
(SEE NOTE 10 ON SHEET 2.)

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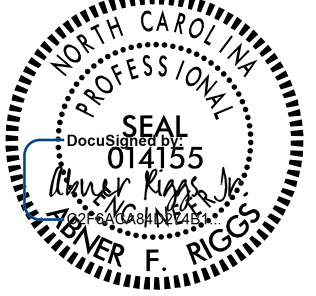
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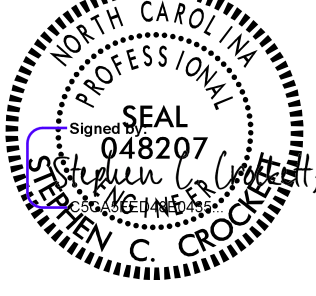
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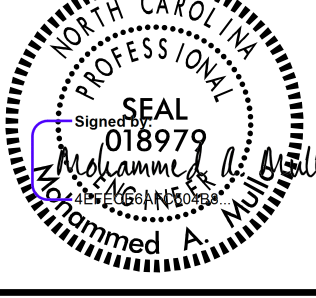
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STANDARD
DETAIL NO. 1801.02

GEOTECHNICAL STANDARD DETAIL FOR

TEMPORARY WALL (SHEET 3 OF 3)

DATE: 02-18-2025