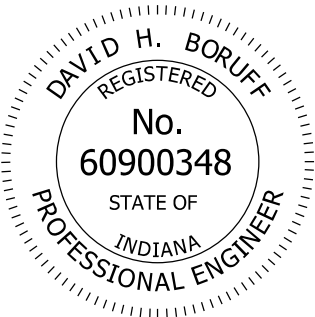




INDEX	
SHEET NO.	SUBJECT
1	Dynamic Message Sign Butterfly Cantilever Structure Index
2	Structure Plan, Elevation, Member Sizes, and Camber
3	Quadri-Chord and Flange Details
4	Upper Chords Connection Details
5	Lower Chords Connection Details
6	Base Plate, Anchor Bolt, and Metal Skirt Details
7	Handhole and I.D. Tag Details
8	Access Details
9	Walkway Details
10	Handrail Details
11	Ladder Details
12	Security Gate Details
13	Wiring Layout Details
14	Foundation at 33" Concrete Barrier
15	Foundation at 45" Concrete Barrier
16	Foundation 4'-0" Ø Drilled Shaft

- GENERAL NOTES:**
1. All butterfly tubular structure members shall be steel in accordance with ASTM A 53, Grade B.
 2. All anchor bolts shall be in accordance with ASTM F1554, Grade 36.
 3. Plates, bars and rolled shapes shall be in accordance with ASTM A36.
 4. Refer to the Standard Specifications for acceptable alternate materials.

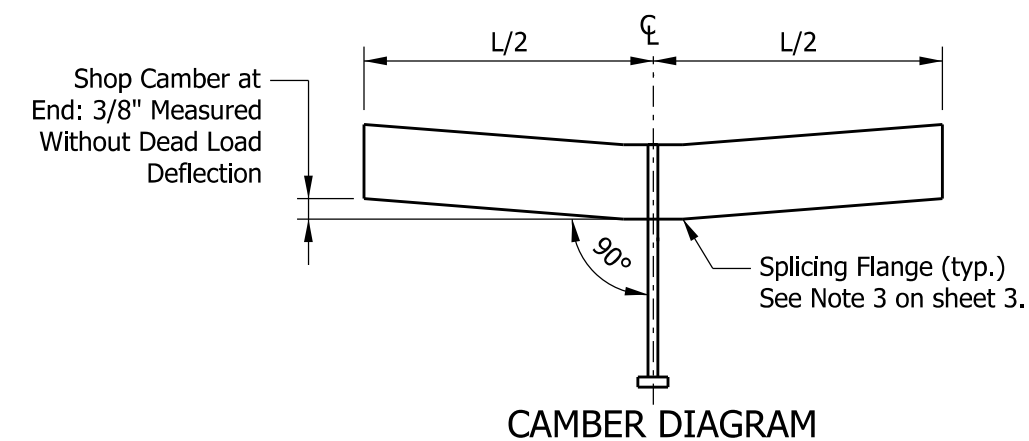
INDIANA DEPARTMENT OF TRANSPORTATION	
DYNAMIC MESSAGE SIGN BUTTERFLY CANTILEVER STRUCTURE INDEX SEPTEMBER 2025	
STANDARD DRAWING NO. E 802-DBCS-01	
	<div><div>4/8/25</div><div>DESIGN STANDARDS ENGINEER DATE</div></div> <div><div>04/16/2025</div><div>CHIEF ENGINEER DATE</div></div>

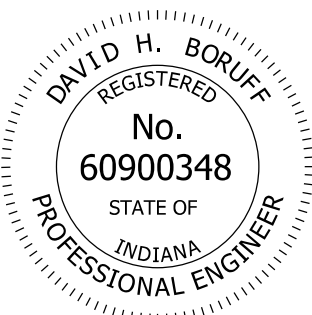




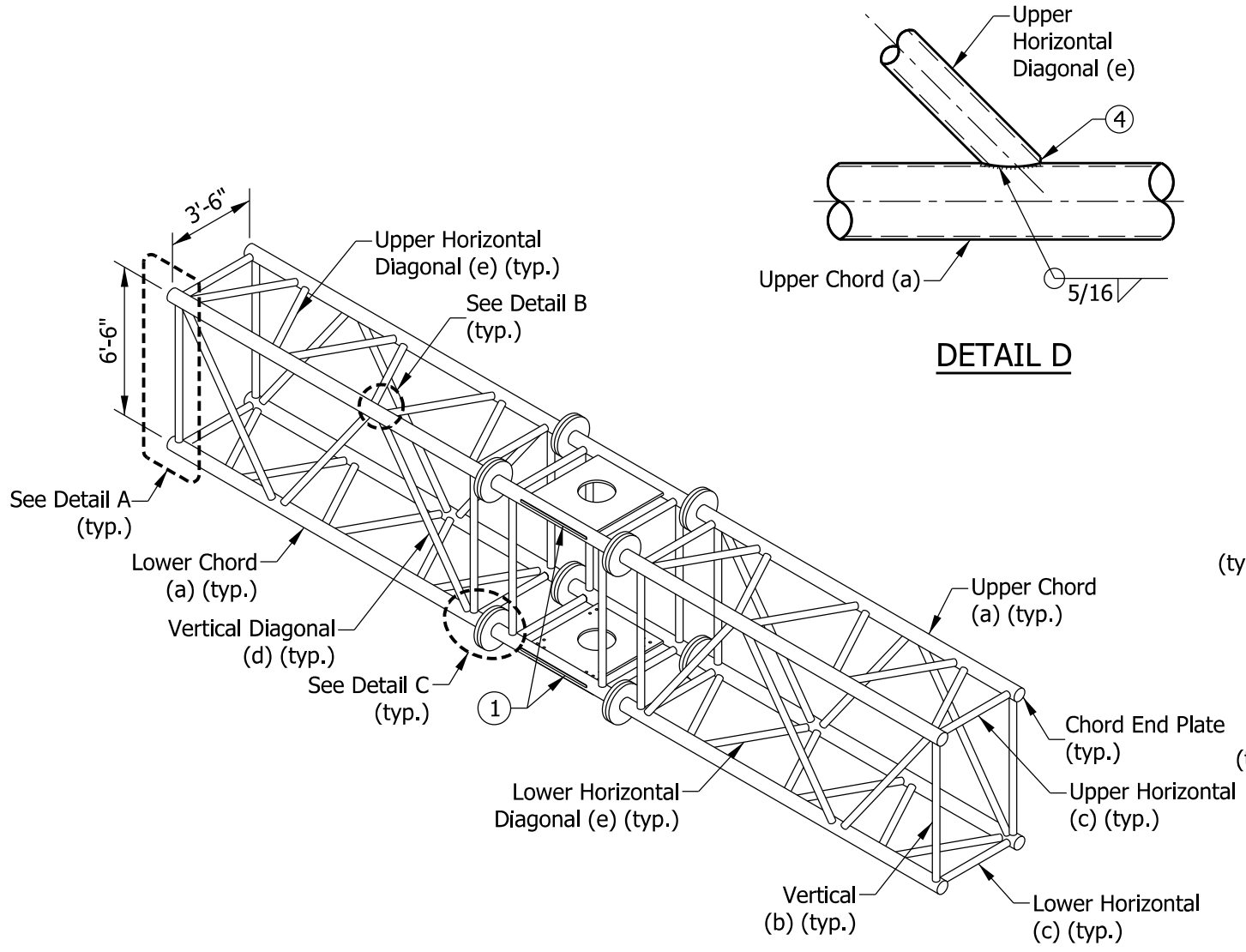
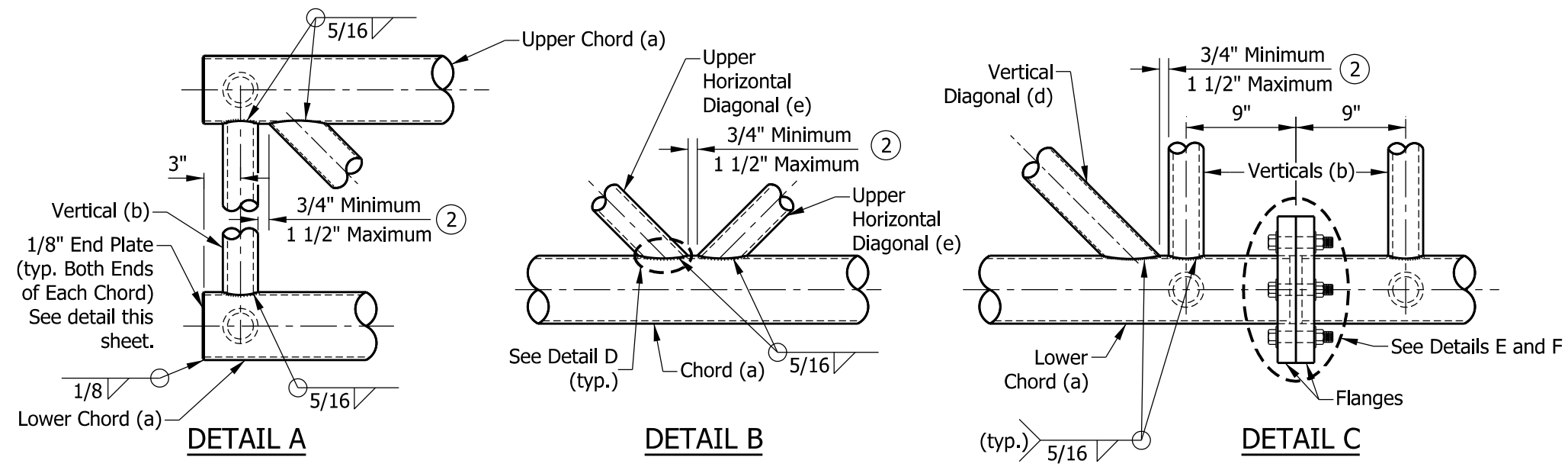
MEMBER SIZES



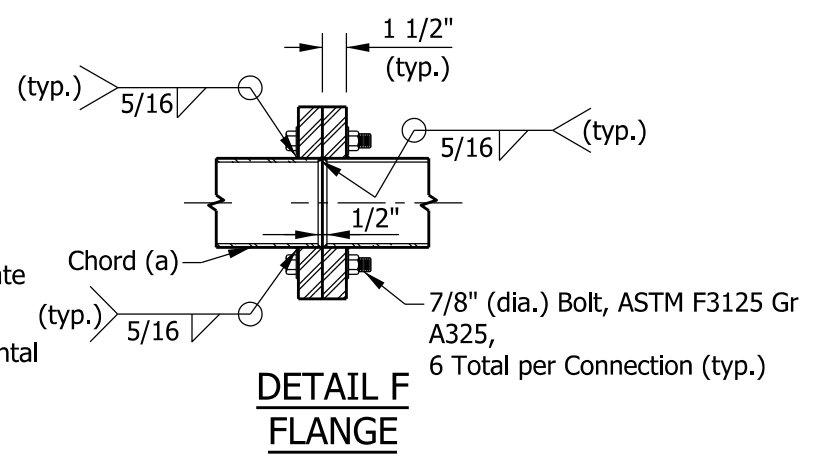
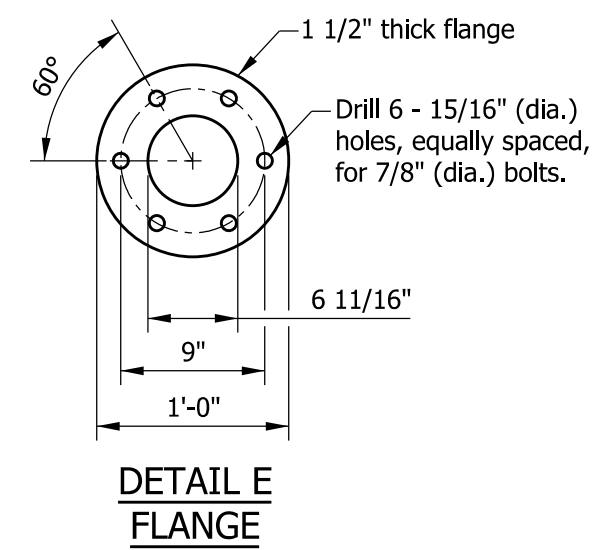
1. Maximum deviation of any chord from a straight line shall be $\frac{1}{8}$ in.
- ② See Standard Drawing E 802-DBCS-04 and 05 for upper and lower chord connection details.
- ③ See Standard Drawing E 802-DBCS-03 for quadri-chord and flange details
- ④ See Standard Drawing E 802-DBCS-13 for wiring layout and wire outlet details.
- ⑤ See Standard Drawing E 802-DBCS-14-16 for foundation details.
- ⑥ See Standard Drawing E 802-DBCS-07 for handhole and I.D. tag details.
- ⑦ See Standard Drawing E 802-DBCS-06 for base plate, anchor bolt, and metal skirt details.
8. Maximum dead load weight of DMS sign shall be 5,000 lbs.



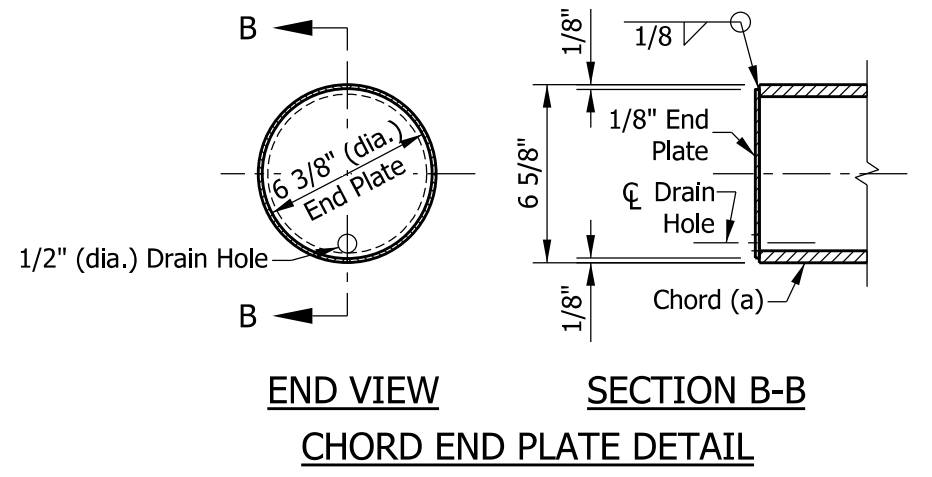
INDIANA DEPARTMENT OF TRANSPORTATION	
STRUCTURE PLAN, ELEVATION, MEMBER SIZES, AND CAMBER	
SEPTEMBER 2025	
STANDARD DRAWING NO. E 802-DBCS-02	
	 DESIGN STANDARDS ENGINEER 4/8/25 DATE
	 CHIEF ENGINEER 04/16/2025 DATE



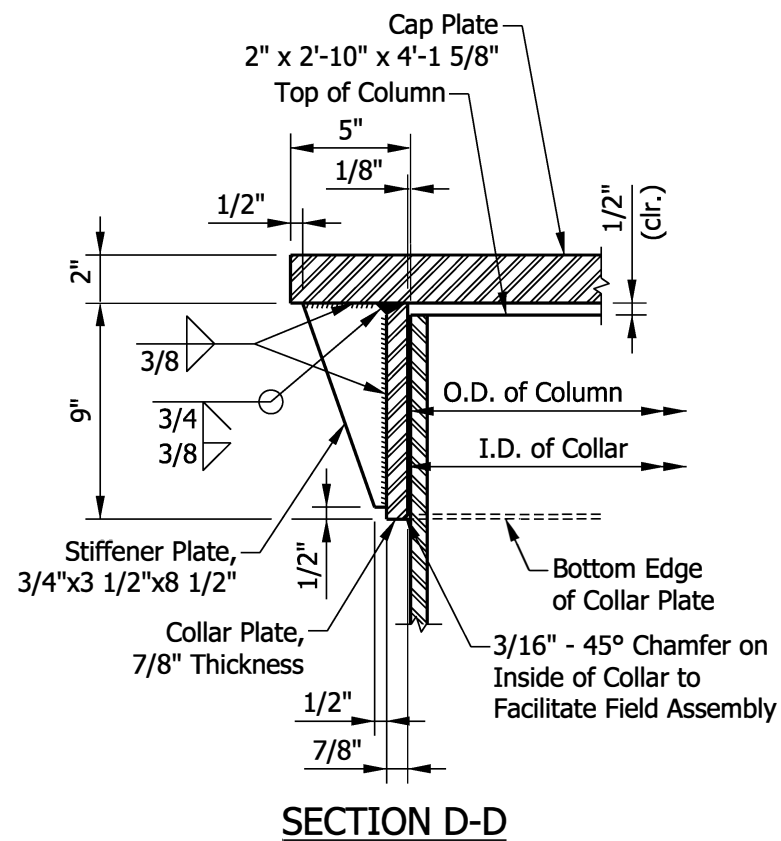
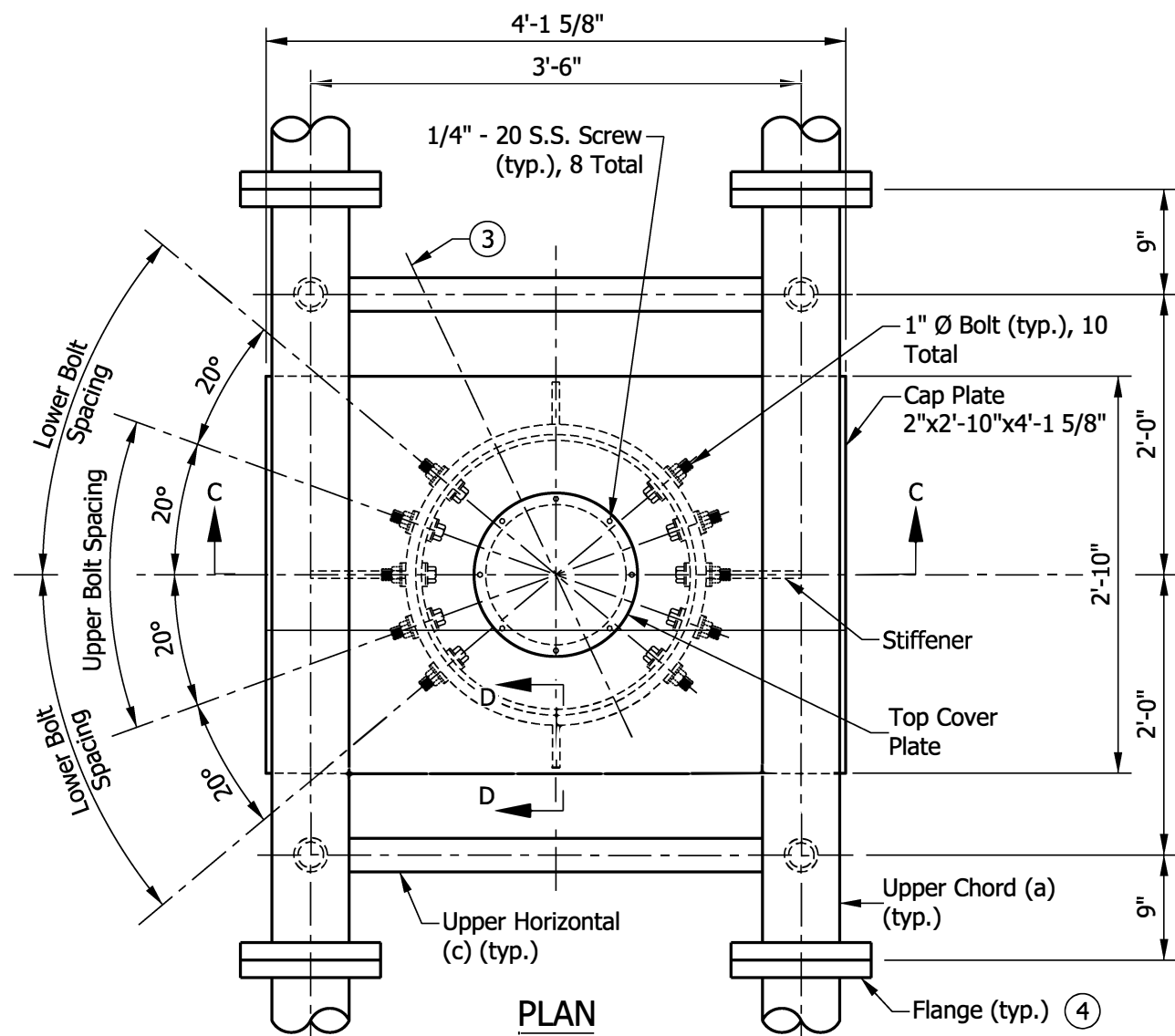
TYPICAL QUADRI-CHORD ARM PAIR



- NOTES:**
- See Standard Drawings E 802-DBCS-04 and 05 for upper and lower chords connection details.
 - Diagonals shall have a minimum offset from the panel point based on the following: Offset shall be such as to provide a 3/4 in. minimum to 1 1/2 in. maximum clearance between any diagonal and any vertical member, and to provide clearance for U-bolt connections of signs.
 - Splicing flanges shall be attached to each arm unit with the arm shop-assembled to camber shown. Arm units shall be in proper alignment and flange surfaces shall be shop-bolted into full contact before welding. Sufficient external welds or tacks shall be made to secure flanges until remaining welds are made after disassembly. Adjacent flanges shall be "match marked" to ensure proper field assembly.
 - Toe edge of diagonal member shall be cut back to facilitate throat thickness per AWS D1.1, Figure 3.2.

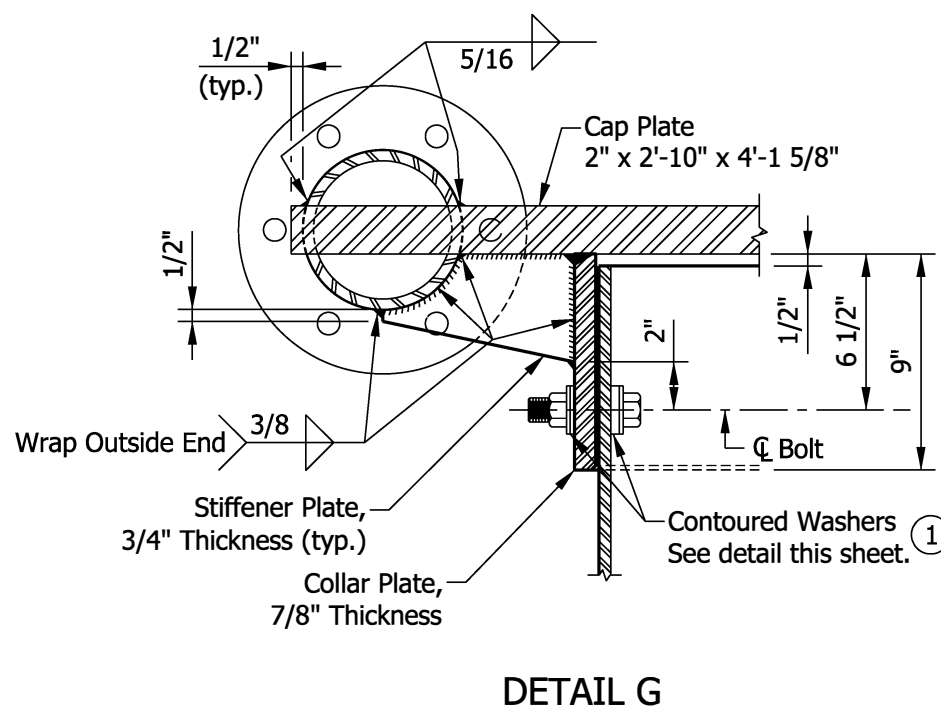
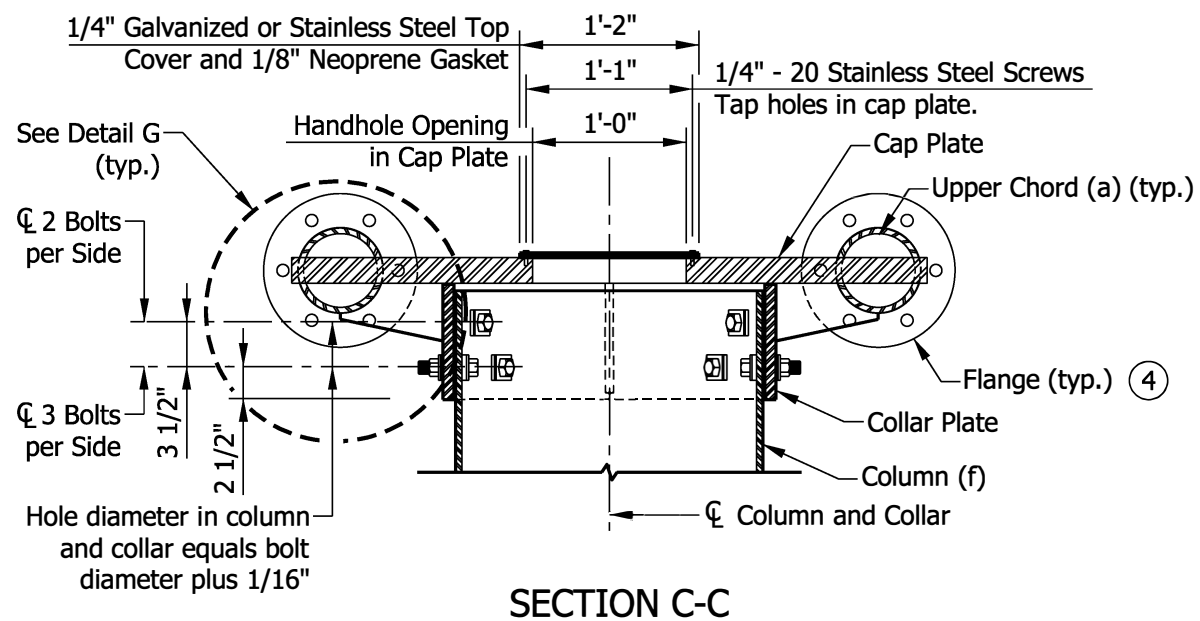
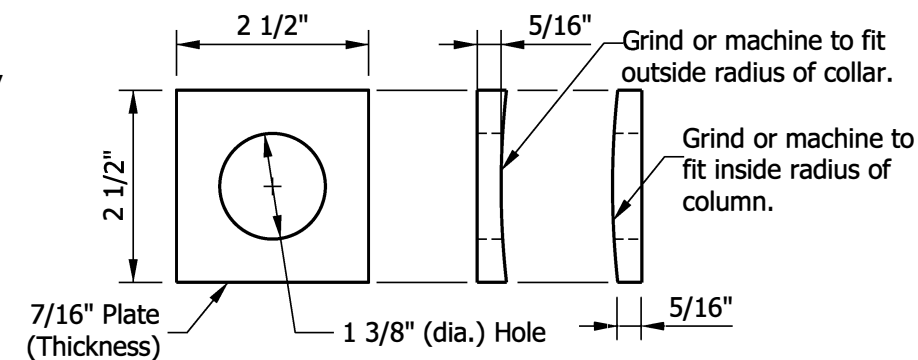


INDIANA DEPARTMENT OF TRANSPORTATION	
QUADRI-CHORD AND FLANGE DETAILS	
SEPTEMBER 2025	
STANDARD DRAWING NO.	E 802-DBCS-03
	4/8/25 DESIGN STANDARDS ENGINEER DATE 04/16/2025 CHIEF ENGINEER DATE



NOTES:

1. Connection bolts in collar and bolts at lower chord connection shall be high strength with matching locknuts. Connection bolts shall each have two (2) stainless steel flat washers. Bolts, contoured washers, and locknuts shall be galvanized.
2. After galvanizing, collar inside diameter shall equal outside diameter of galvanized column plus 1/8 in. ($\pm 1/16$ in.). Maximum gap between column and collar at any location shall be 1/8 in. before tightening bolts.
- ③ Optional full-penetration weld in collar may be made at two locations 180° apart. X-ray or UT 100%.
- ④ See Standard Drawing E 802-DBCS-03 for flange details.

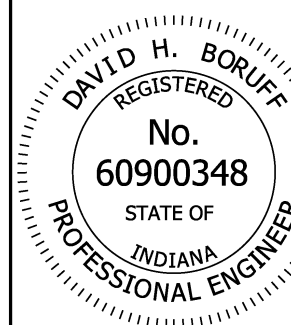


INDIANA DEPARTMENT OF TRANSPORTATION

UPPER CHORDS CONNECTION DETAILS

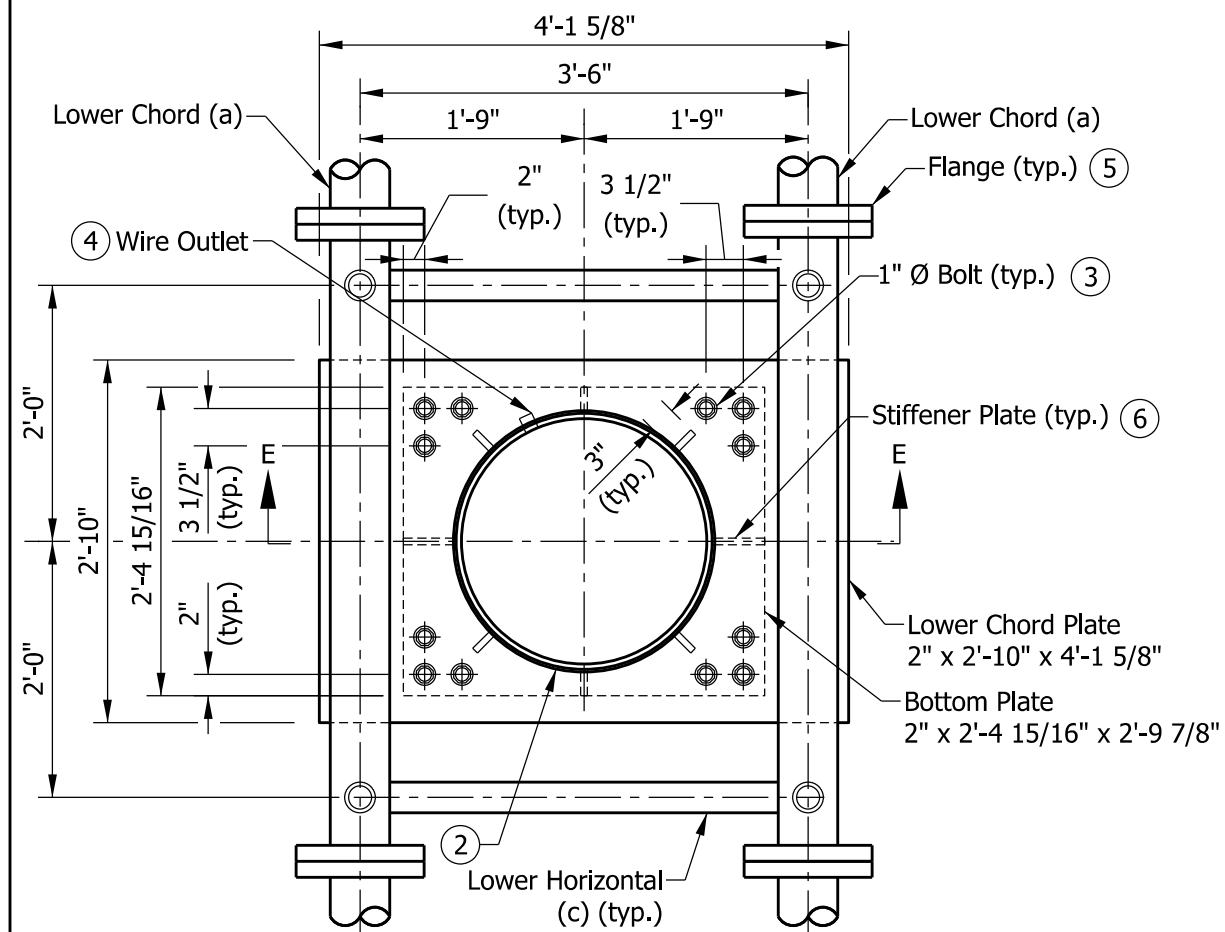
SEPTEMBER 2025

STANDARD DRAWING NO. E 802-DBCS-04

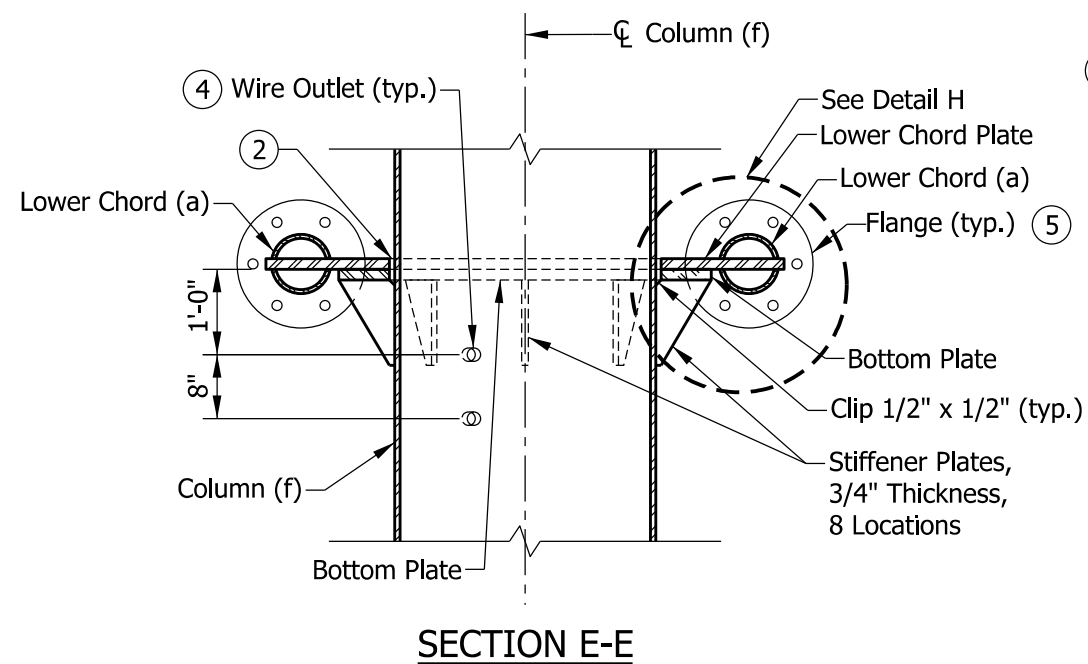


David H. Boruff 4/8/25
DESIGN STANDARDS ENGINEER DATE

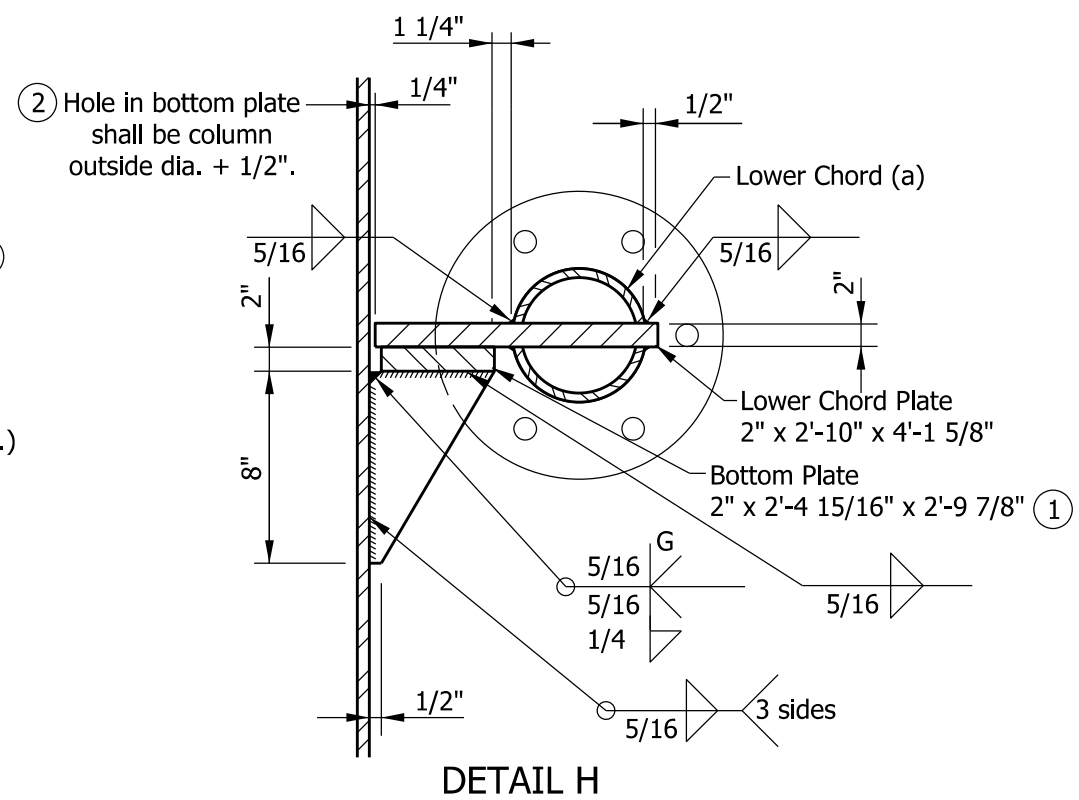
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CHIEF ENGINEER DATE



PLAN SECTION THROUGH COLUMN ABOVE LOWER CHORDS



SECTION E-E



DETAIL H

NOTES:

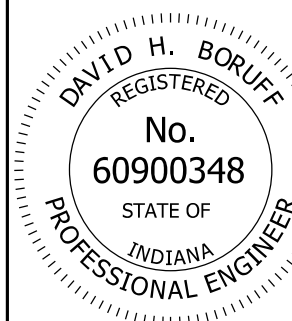
- ① Top of plate shall fully seat lower chord plate, any grinding damage of galvanizing shall be repaired before assembly.
- ② After tightening lower connection bolts, gaps shall be filled with non-hardening silicone caulk suitable for exterior exposure.
- ③ Connection bolts in collar and bolts at lower chord connection shall be high strength with matching locknuts. Each connection bolt shall have two stainless steel flat washers.
- ④ Pipe shall be oriented toward DMS, see detail on Standard Drawing E 802-DBCS-13.
- ⑤ See Standard Drawing E 802-DBCS-03 for flange details.
- ⑥ Stiffeners shall be extended to edge of bottom plate, unless noted otherwise.

INDIANA DEPARTMENT OF TRANSPORTATION

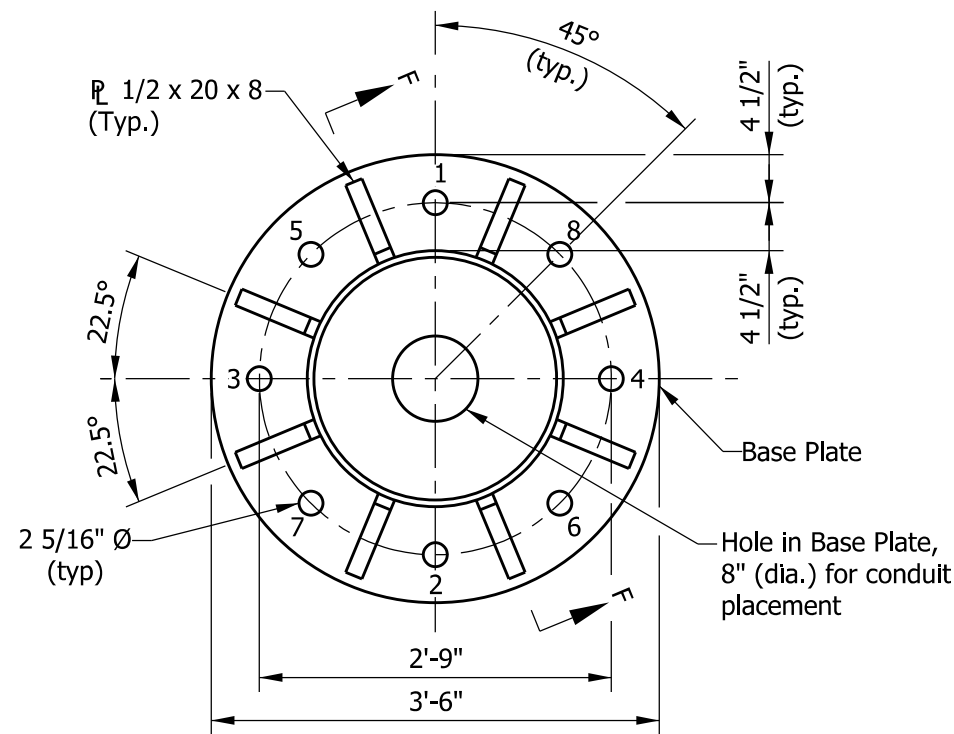
LOWER CHORDS CONNECTION DETAILS

SEPTEMBER 2025

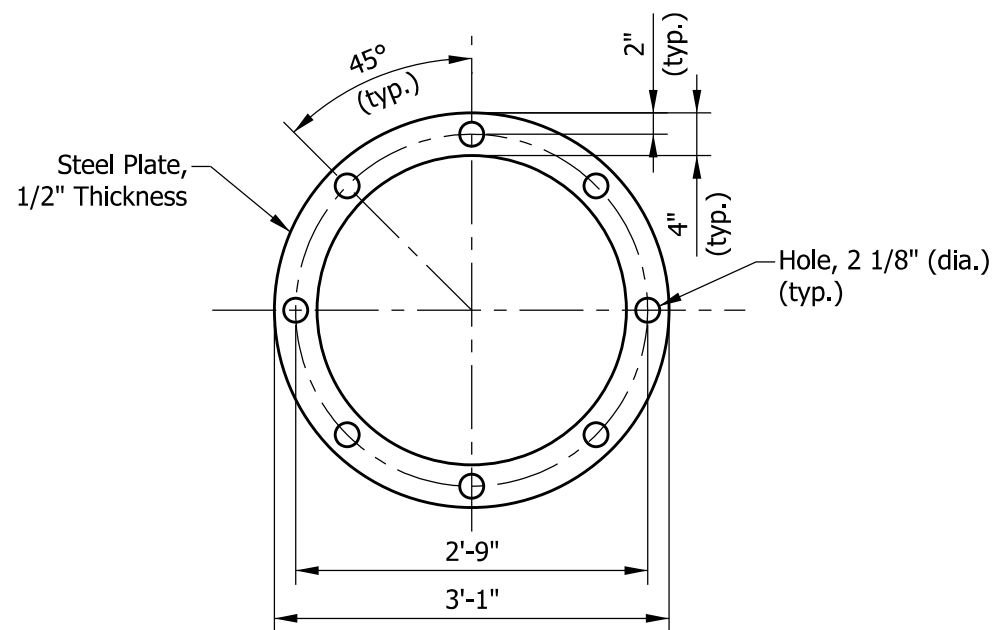
STANDARD DRAWING NO. E 802-DBCS-05



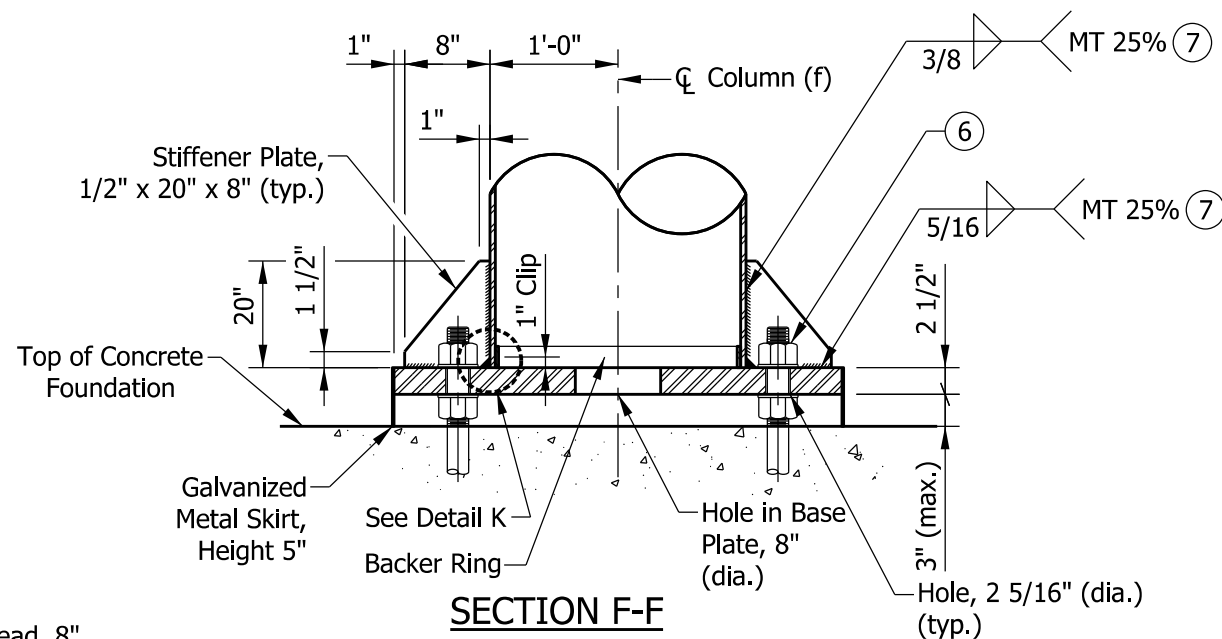
<i>David H. Boruff</i>	4/8/25
DESIGN STANDARDS ENGINEER	DATE
<i>[Signature]</i>	04/16/2025
CHIEF ENGINEER	DATE



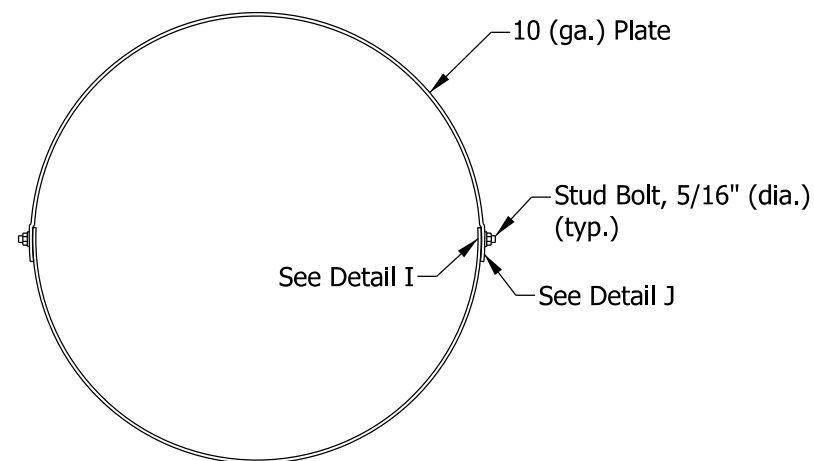
PLAN 6



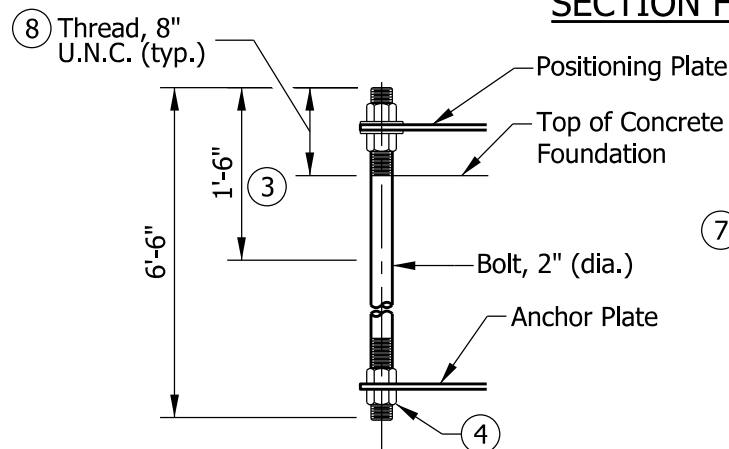
ANCHOR AND POSITIONING PLATE



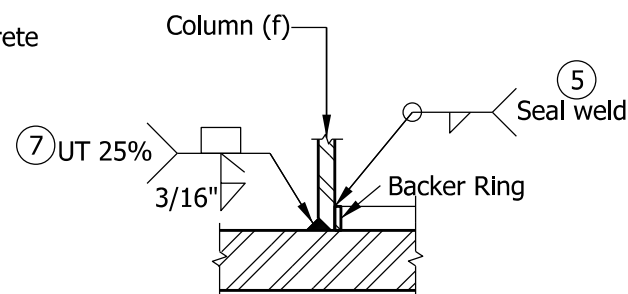
SECTION F-F



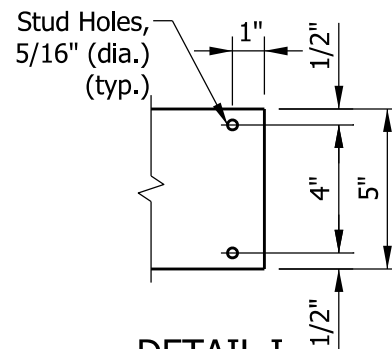
METAL SKIRT DETAIL



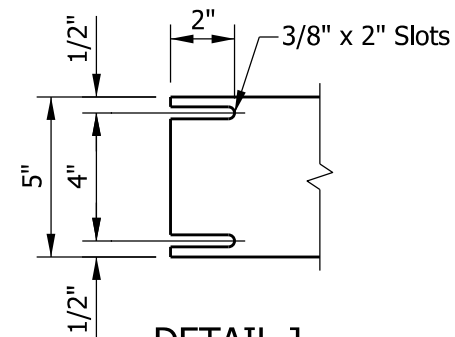
ANCHOR BOLT DETAIL



DETAIL K
BASE PLATE WELD



DETAIL I



DETAIL J

NOTES:

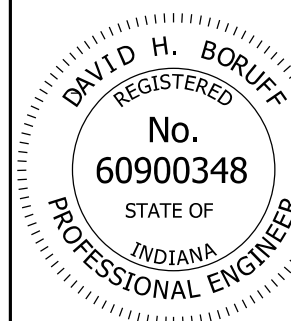
1. Temporary positioning plate and leveling nuts or other engineer-approved methods shall be used to maintain anchor bolt alignment during concrete placement. Positioning plate and associated nuts shall be removed upon completion of the foundation.
2. Threads shall be protected during concrete placement with tape, sleeves, or other means.
3. Minimum length of galvanizing shall be 1 ft - 6 in. Entire bolt may be galvanized at contractor's option.
4. Uncoated nut shall be provided at bottom of anchor plate. A deformed thread or chemical thread lock shall be used to secure.
5. Continuous backer ring shall be used, 1/4 in. x 3 in. minimum. Tack welds shall be used only in the root area of final weld.
6. Anchor bolt nuts shall be tightened in numeral order in accordance with the procedure given on Standard Drawing E 802-SBTs-17.
7. UT - Ultrasonic Testing, 25% of entire column to base plate weld. MT - Magnetic Particle Testing, 25% or 1 side of 4 stiffeners.
8. The clear distance between the concrete surface and the bottom of the leveling nut shall be equal to or less than one anchor bolt diameter. The threads of the anchor bolts shall be Unified National Coarse (U.N.C.).

INDIANA DEPARTMENT OF TRANSPORTATION

BASE PLATE, ANCHOR BOLT, AND METAL SKIRT DETAILS

SEPTEMBER 2025

STANDARD DRAWING NO. E 802-DBCS-06



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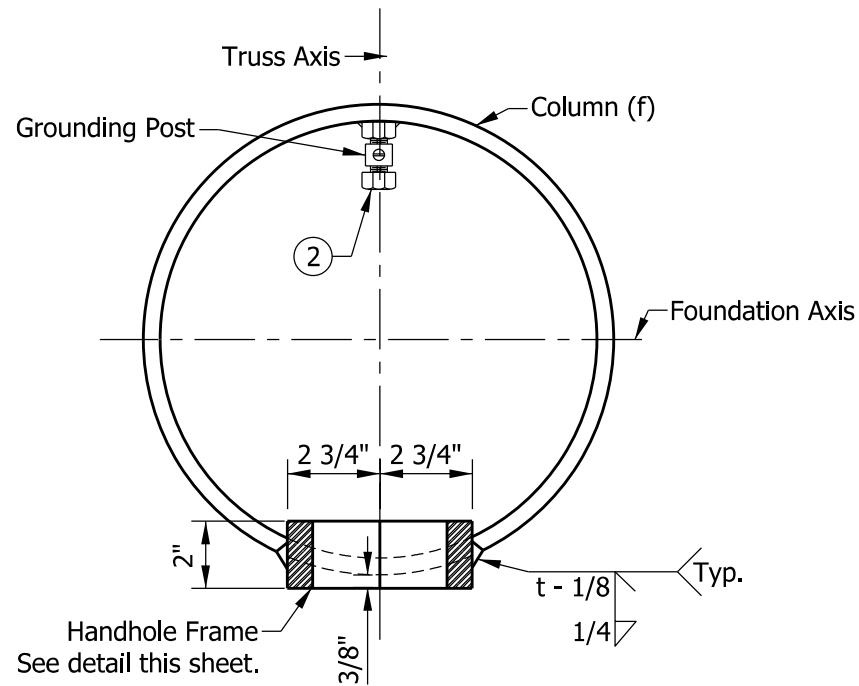
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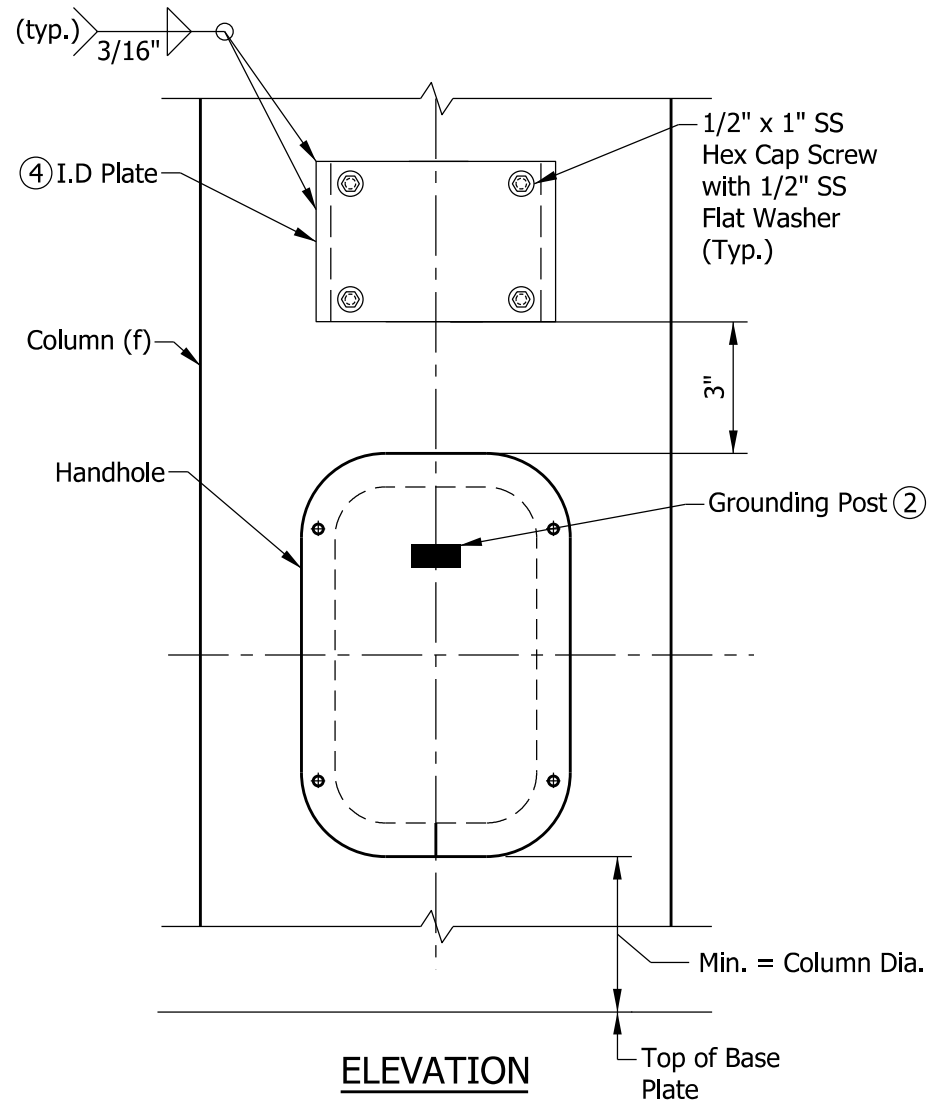
CHIEF ENGINEER

04/16/2025

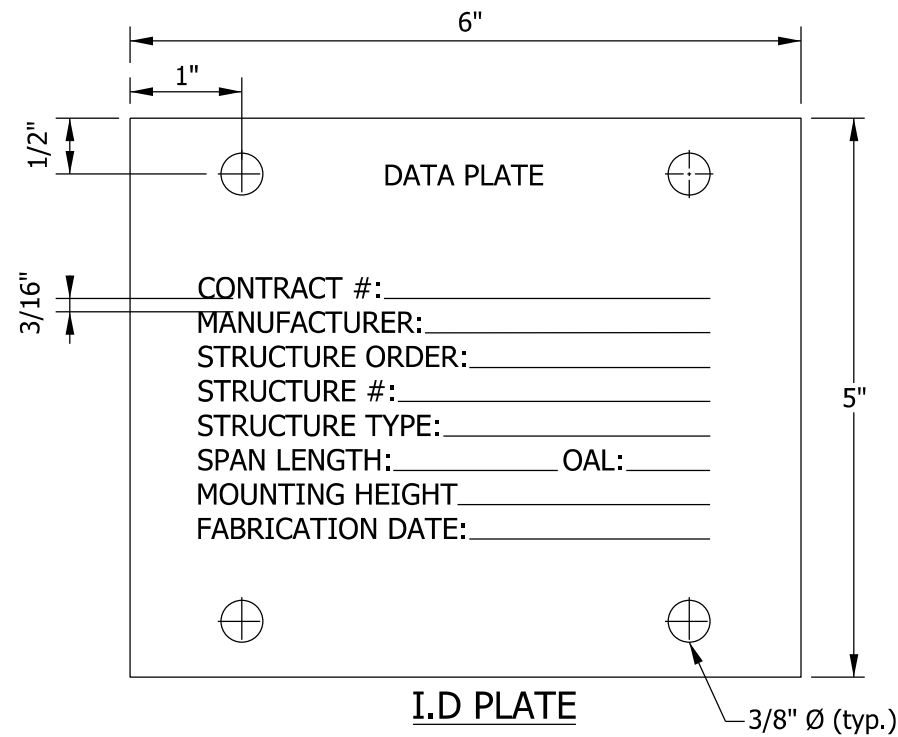
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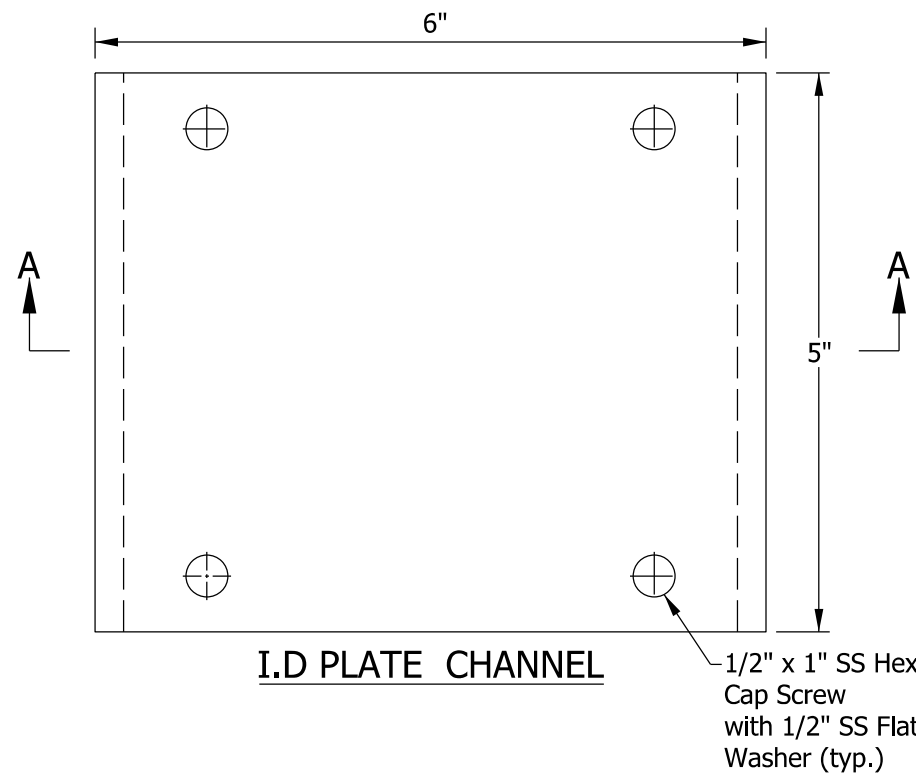
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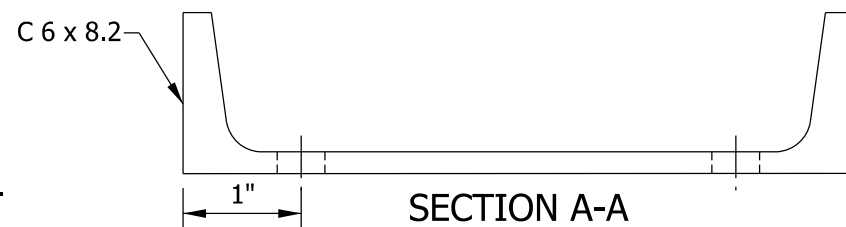
ELEVATION



I.D. PLATE



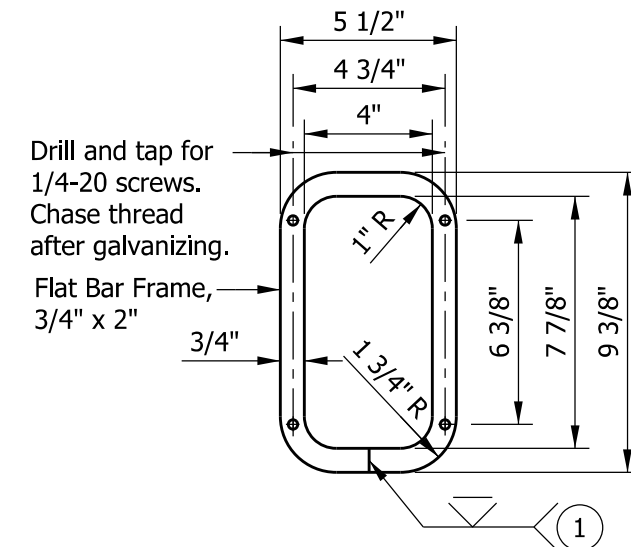
I.D. PLATE CHANNEL



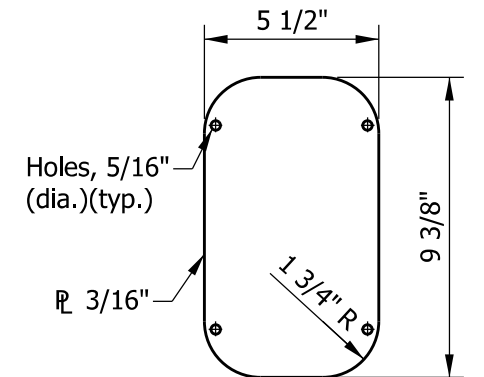
SECTION A-A

NOTES:

- ① In lieu of fabricated handhole frame as shown, frame may be cut from 2 in. plate with rolling direction vertical.
- ② See Standard Drawing E 802-SNWR-03 for grounding post details. Grounding post shall be placed on far side of support directly opposite center of handhole.
3. See Standard Drawing E 802-DBCS-02 for handhole location.
- ④ I.D. plate shall be a 1/8 in. stainless steel plate with stamped in 3/16 in. black letters.



HANDHOLE FRAME



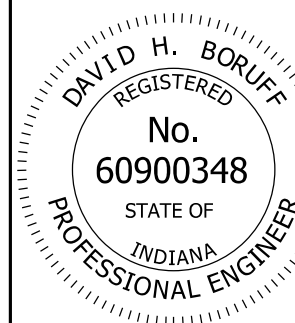
HANDHOLE COVER

INDIANA DEPARTMENT OF TRANSPORTATION

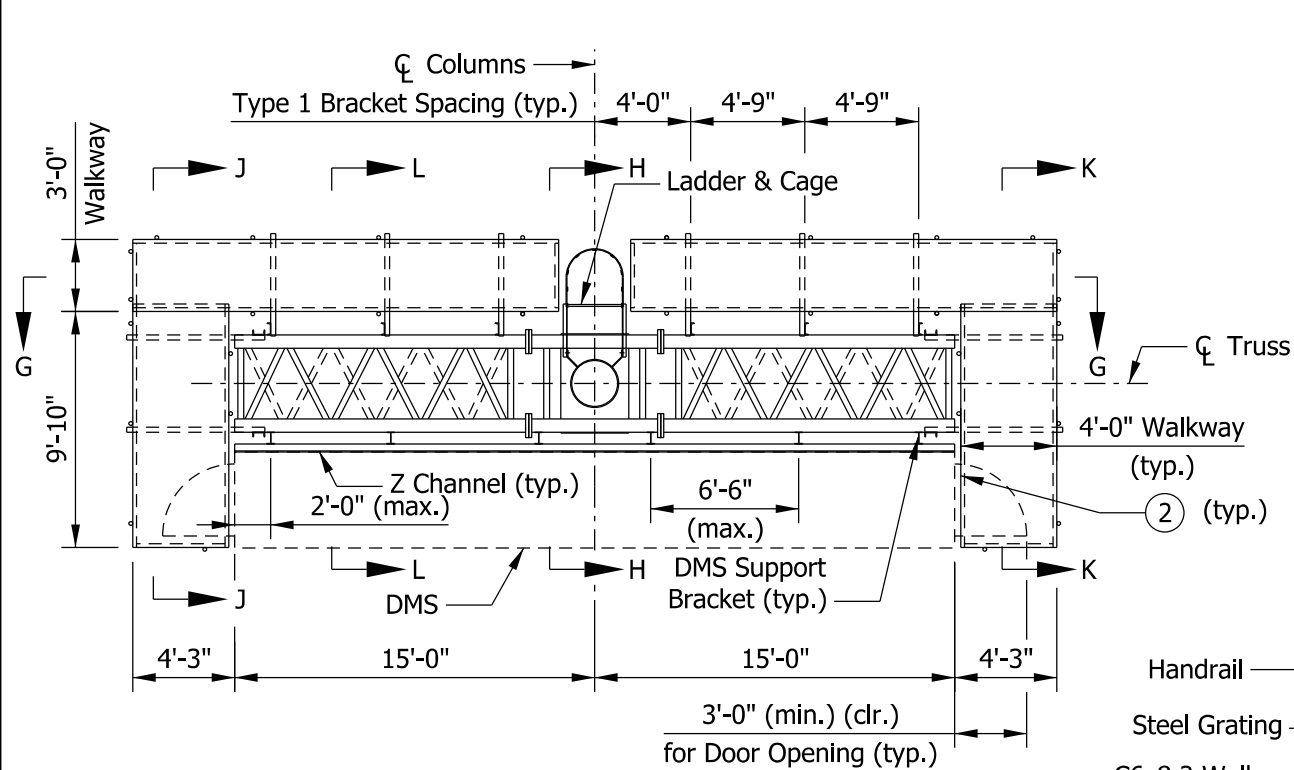
HANDHOLE AND I.D. TAG DETAILS

SEPTEMBER 2025

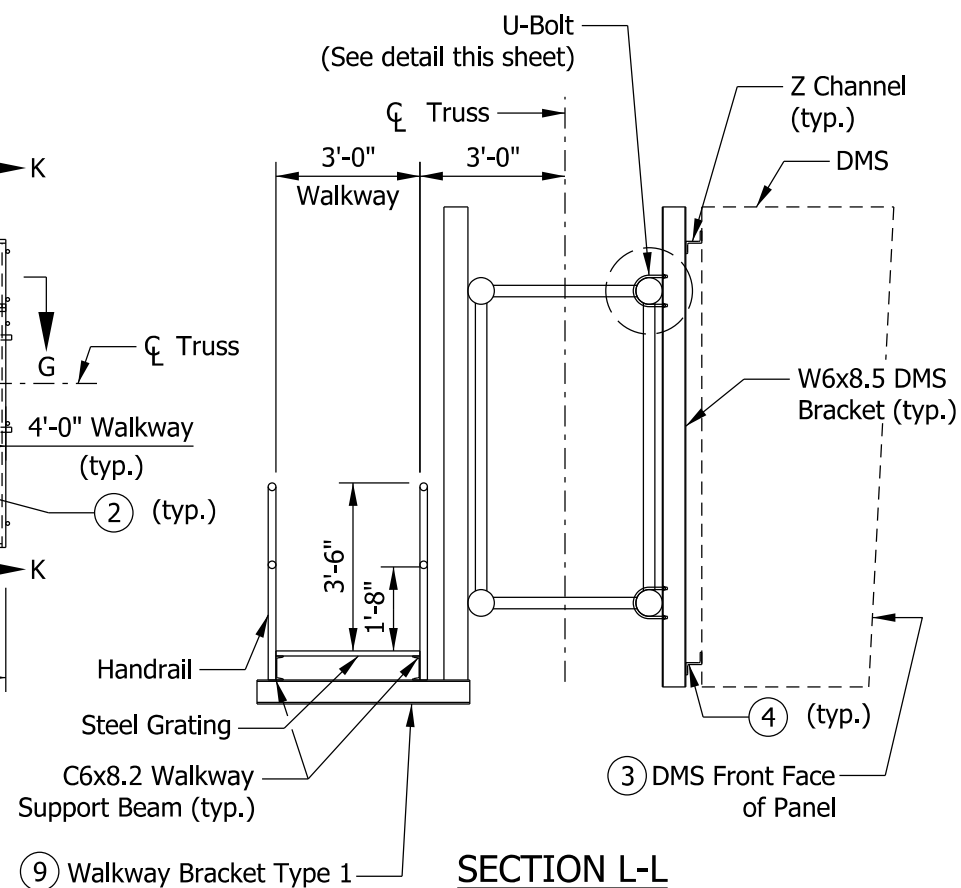
STANDARD DRAWING NO. E 802-DBCS-07



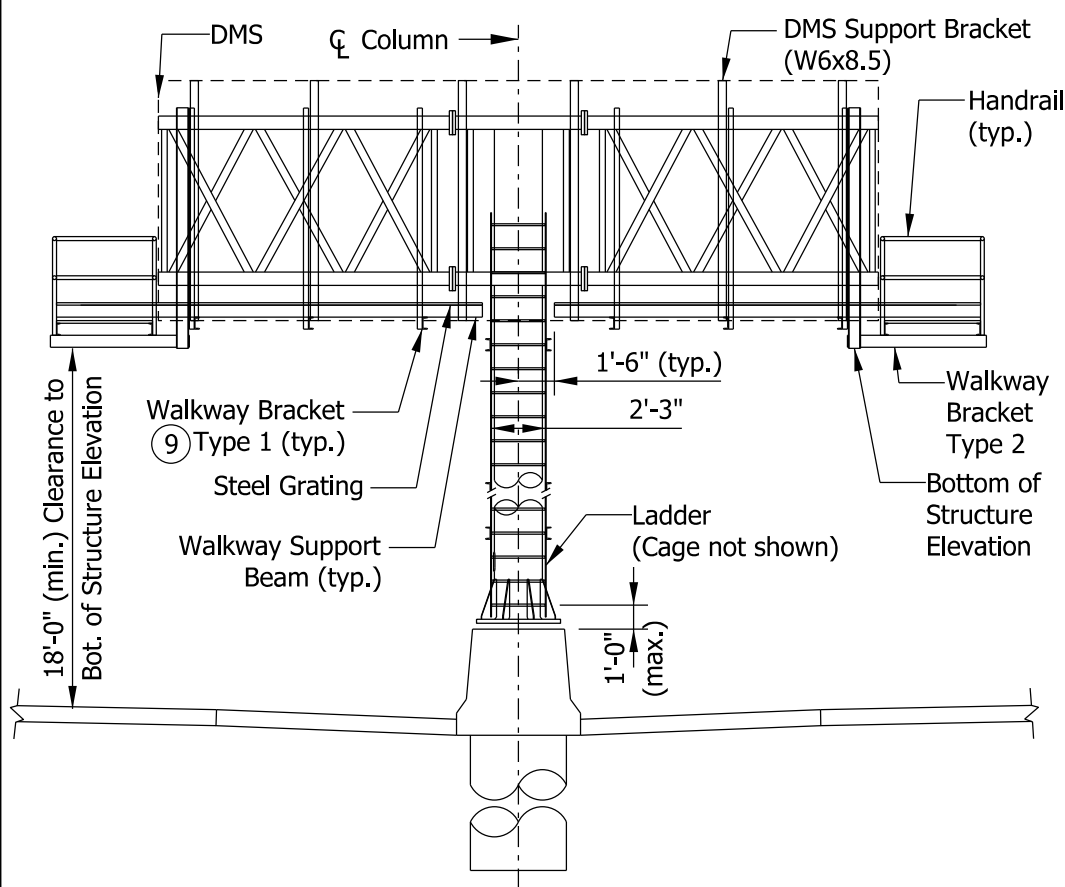
David H. Boruff 4/8/25
DESIGN STANDARDS ENGINEER DATE
[Signature] 04/16/2025
CHIEF ENGINEER DATE



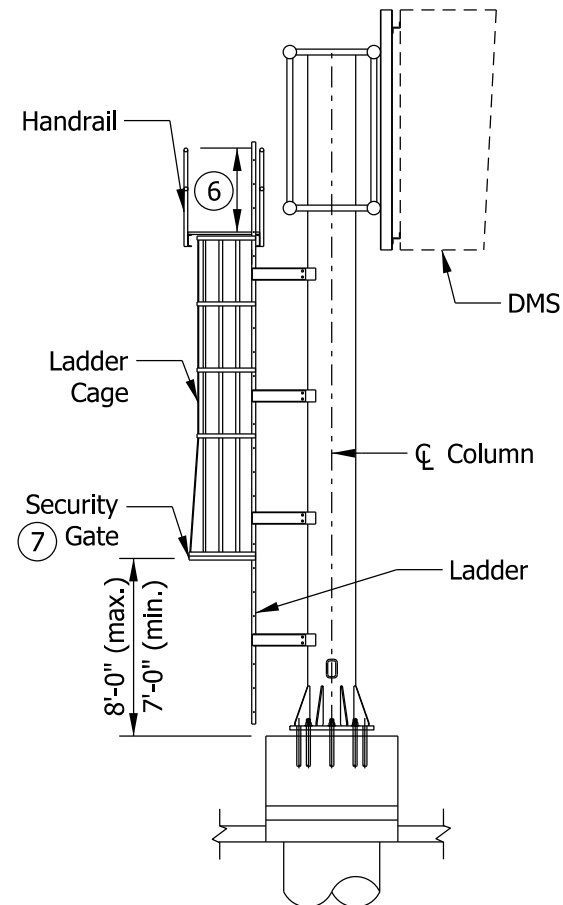
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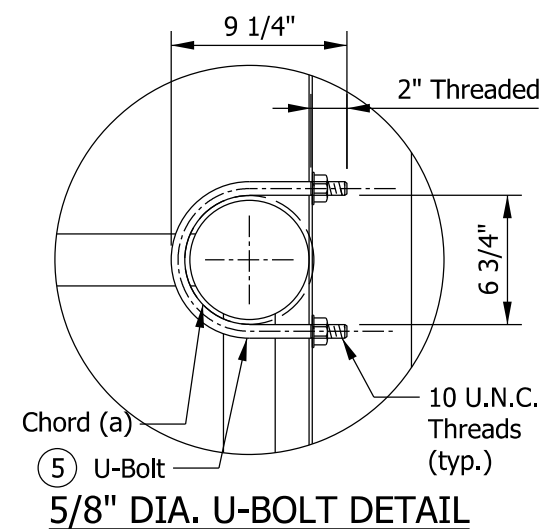
SECTION L-L



SECTION G-G



SECTION H-H



NOTES:

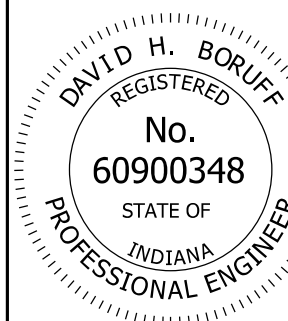
- Walkway gratings shall consist of galvanized steel 19W4 - 1 1/4 in. x 3/16 in. bar grating. Crossbar shall have a maximum gap of 4 in. Moment of inertia $I_x = 0.308$ in 4ft. A different grating of equal strength may be used upon approval. Attachment shall be clip type or welded to supports per manufacturer's recommendations.
- The Contractor shall coordinate with the sign manufacturer so floor inside DMS is 3 in. max up or down to the side of grating. The bottom of the DMS door shall open without obstruction from the grating.
- The front face of the DMS shall be tilted at 3° toward approaching traffic. If the DMS is not built with the front face tilted appropriately, a block shall be placed on the top of the back face to obtain the 3° tilt.
- One ASTM F3125 Grade A325 bolt 1/2 in. x 2 in. on each side of the W6x8.5 steel bracket web with one flat washer and one lock nut.
- ASTM A449 or A193 Grade B8 U-Bolts. two flat washers, two lock washers, and two lock nuts per U-bolt; 4 required per DMS bracket.
- Ladder shall extend 3 ft-6 in. minimum above top of grating.
- See Standard Drawing E 802-DBCS-12 for security gate details.
- See Standard Drawing E 802-DBCS-09 for Section J-J and K-K.
- Maximum walkway support bracket spacing shall be 4'-9".

INDIANA DEPARTMENT OF TRANSPORTATION

ACCESS DETAILS

SEPTEMBER 2025

STANDARD DRAWING NO. E 802-DBCS-08



David H. Boruff

DESIGN STANDARDS ENGINEER

4/8/25

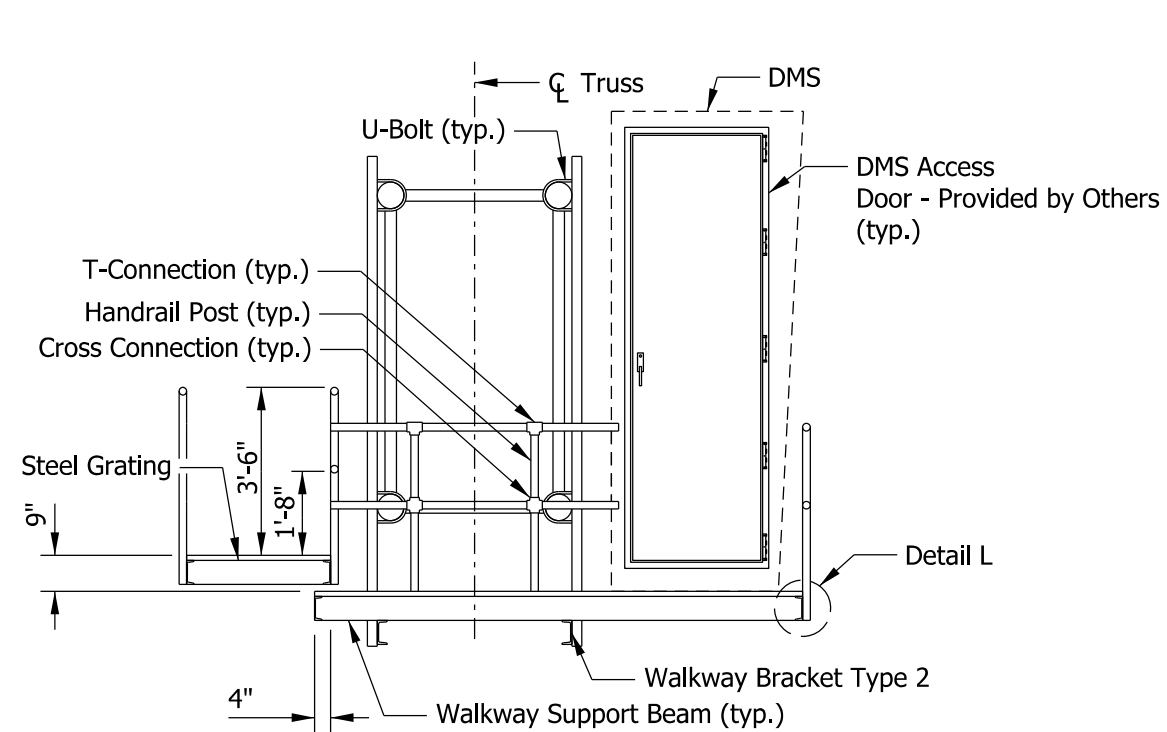
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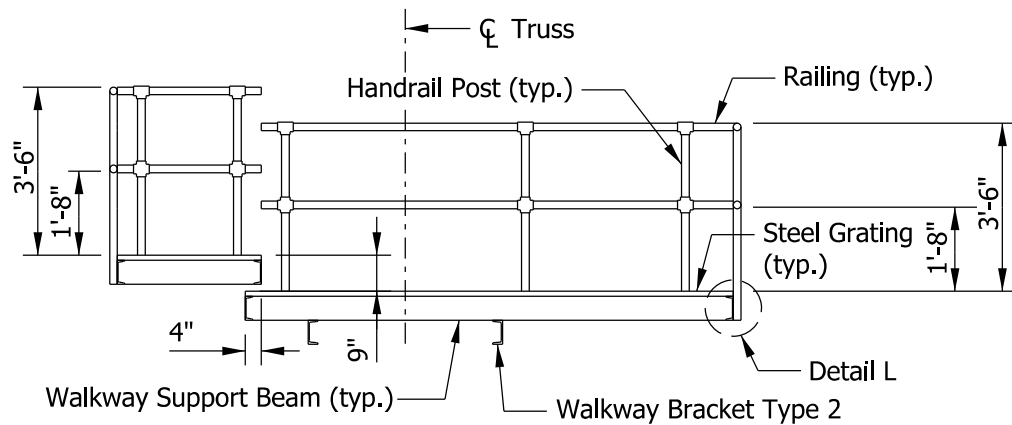
CHIEF ENGINEER

04/16/2025

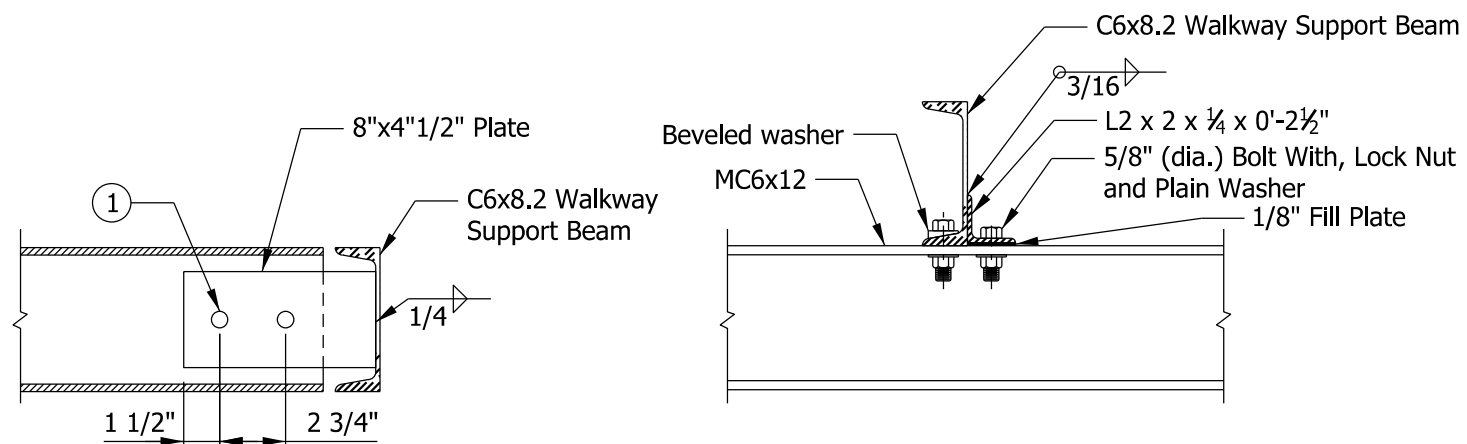
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SECTION J-J

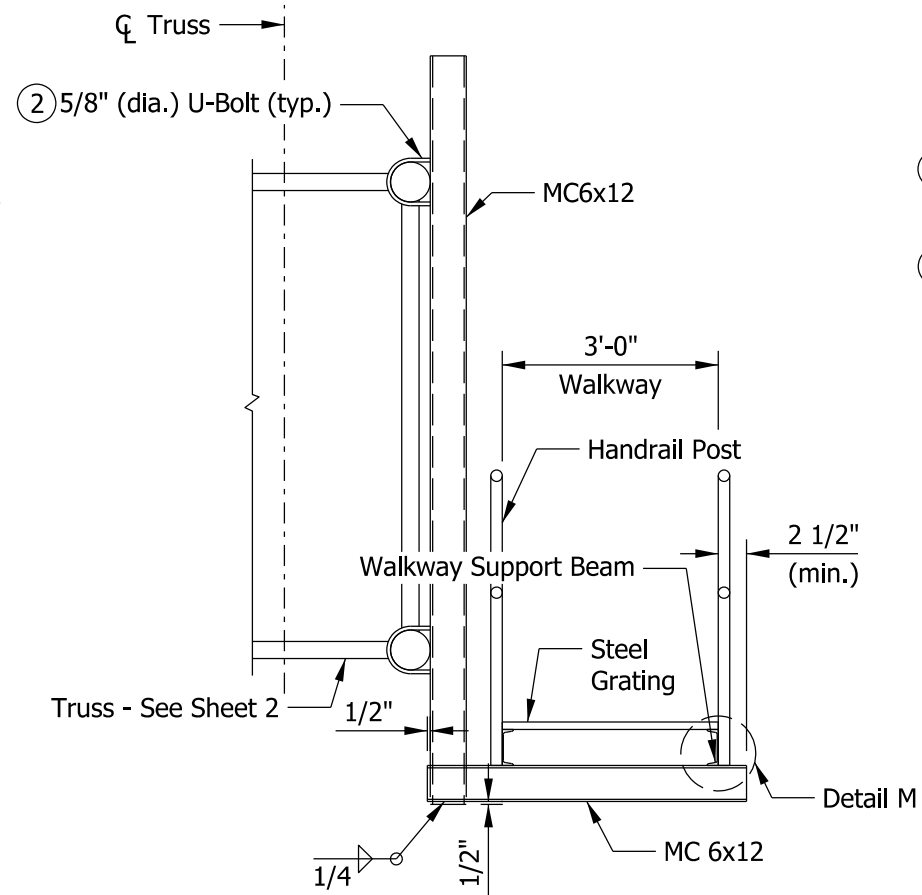


SECTION K-K

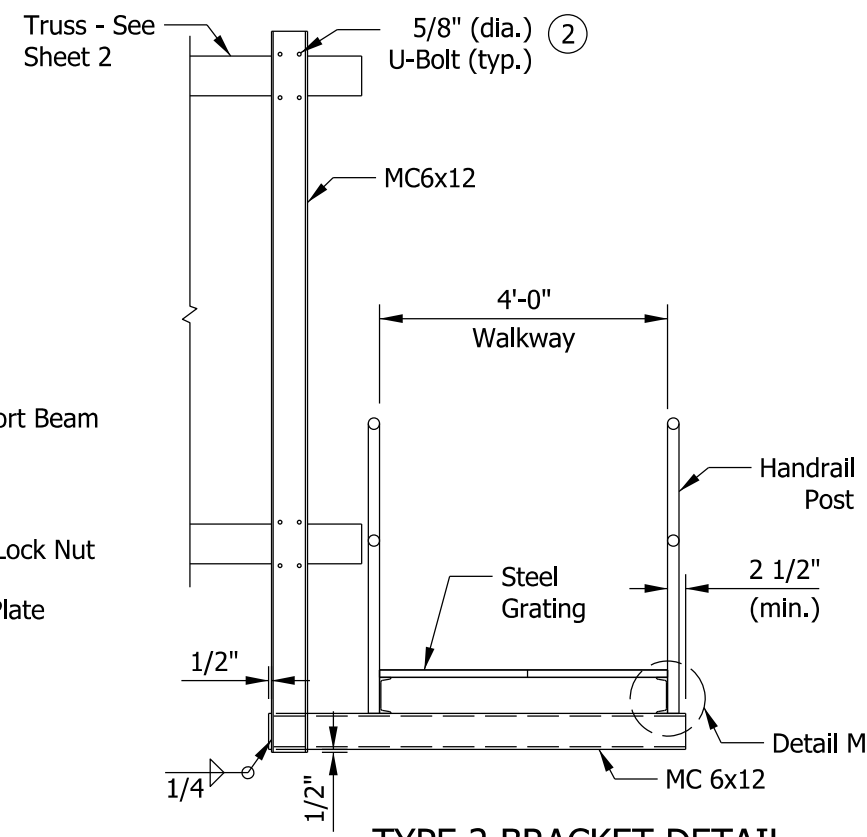


DETAIL L

DETAIL U



TYPE 1 BRACKET DETAIL



TYPE 2 BRACKET DETAIL

NOTES:

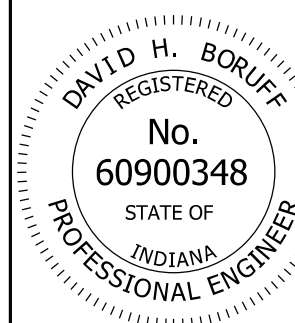
- ① Two 5/8 in. diameter ASTM F3125 Grade A325 bolts with one flat washer and one lock nut each shall be provided per connection
- ② Two flat washers, two lock washers, and two lock nuts are required per U-bolt. Two U-Bolts are required per Type 1 bracket; 4 required per Type 2 bracket. See U-bolt detail on Standard Drawing E 802-DBCS-08.
3. Walkway members shall be ASTM A36 and the handrail supports shall be ASTM A53 Grade B.

INDIANA DEPARTMENT OF TRANSPORTATION

WALKWAY DETAILS

SEPTEMBER 2025

STANDARD DRAWING NO. E 802-DBCS-09



David H. Boruff
DESIGN STANDARDS ENGINEER

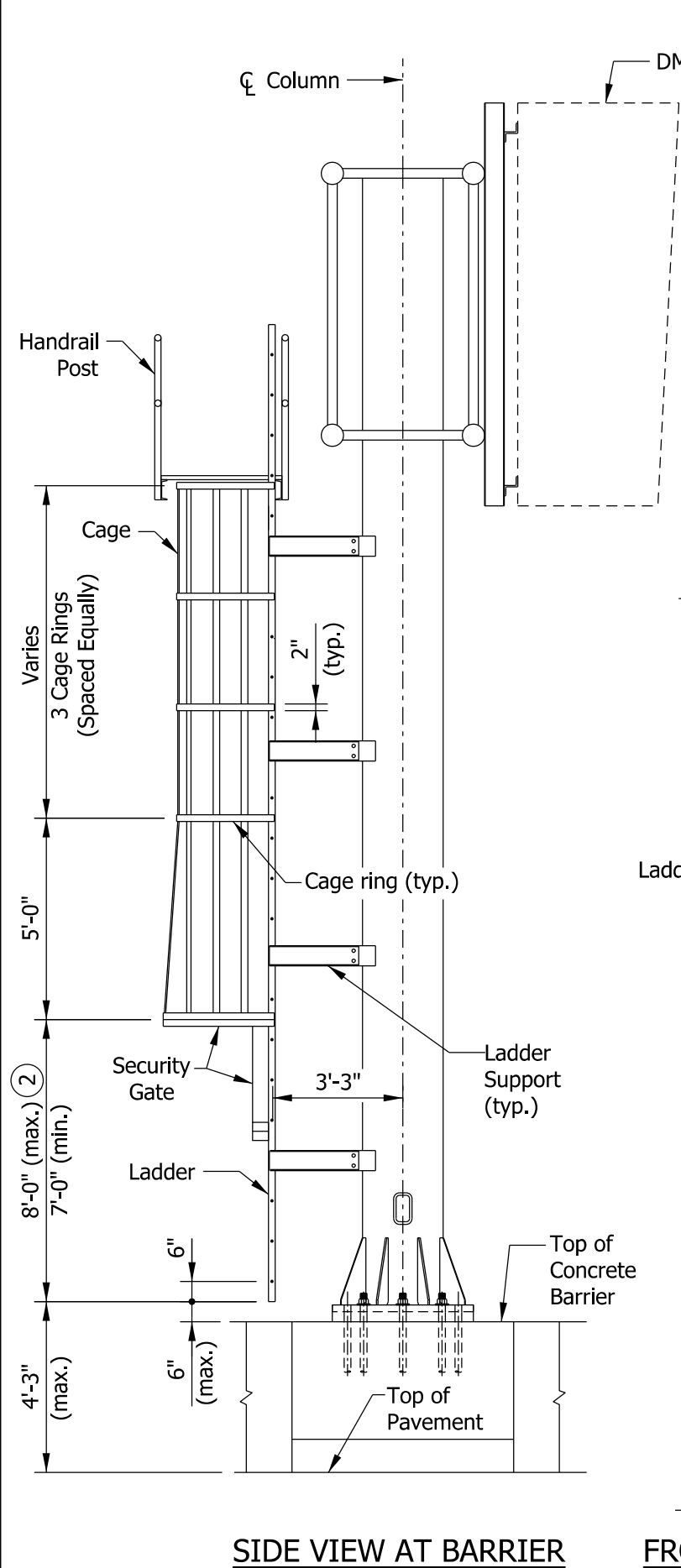
4/8/25

DATE

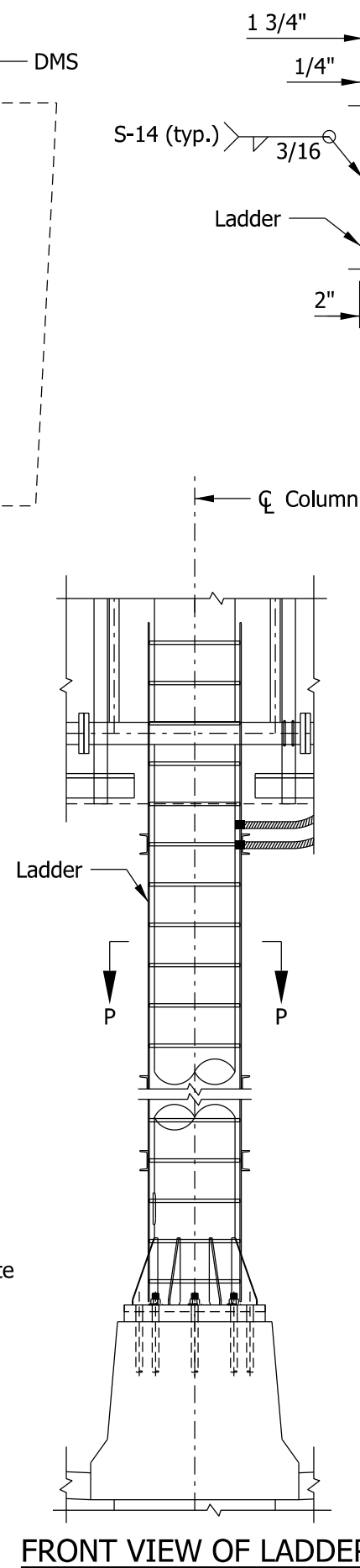
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CHIEF ENGINEER

04/16/2025

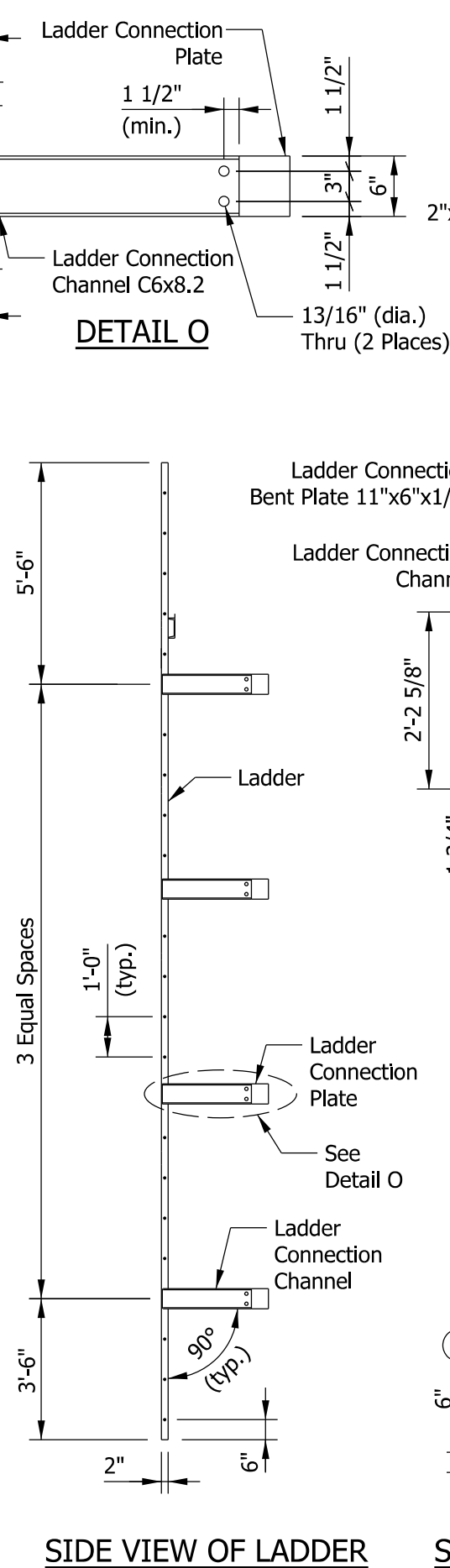
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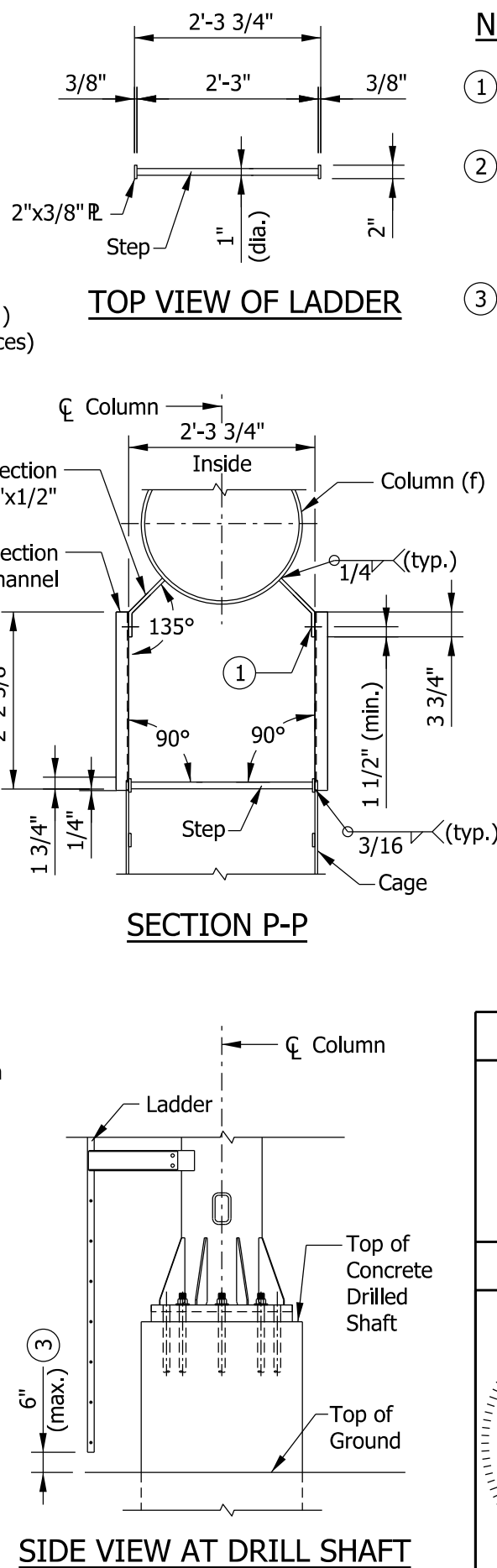
SIDE VIEW AT BARRIER



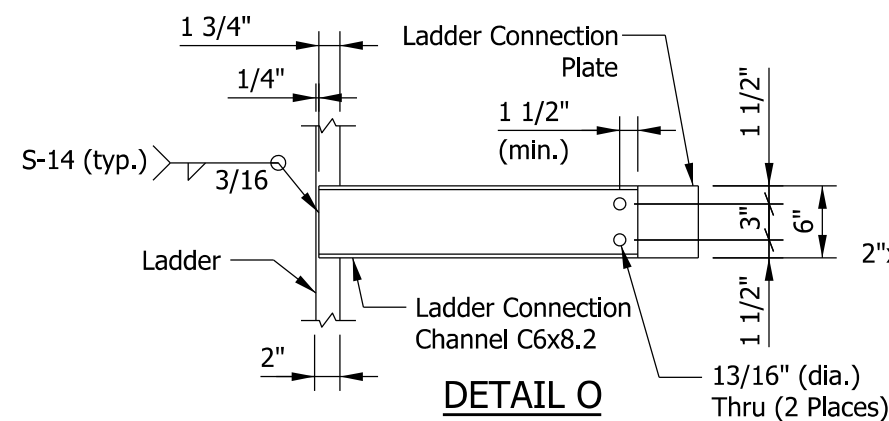
FRONT VIEW OF LADDER



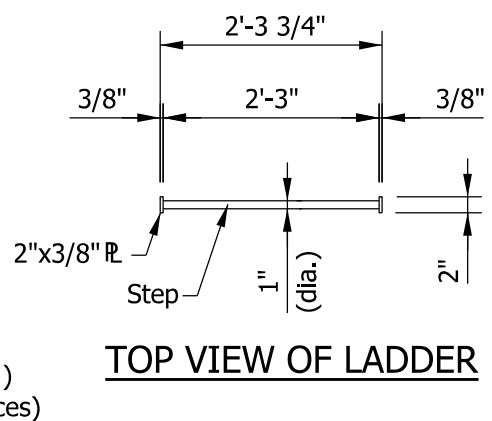
SIDE VIEW OF LADDER



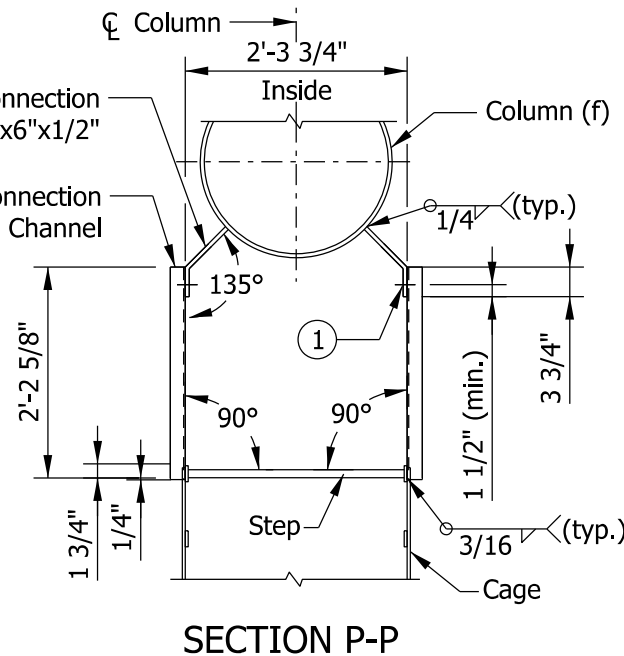
SIDE VIEW AT DRILL SHAFT



DETAIL O

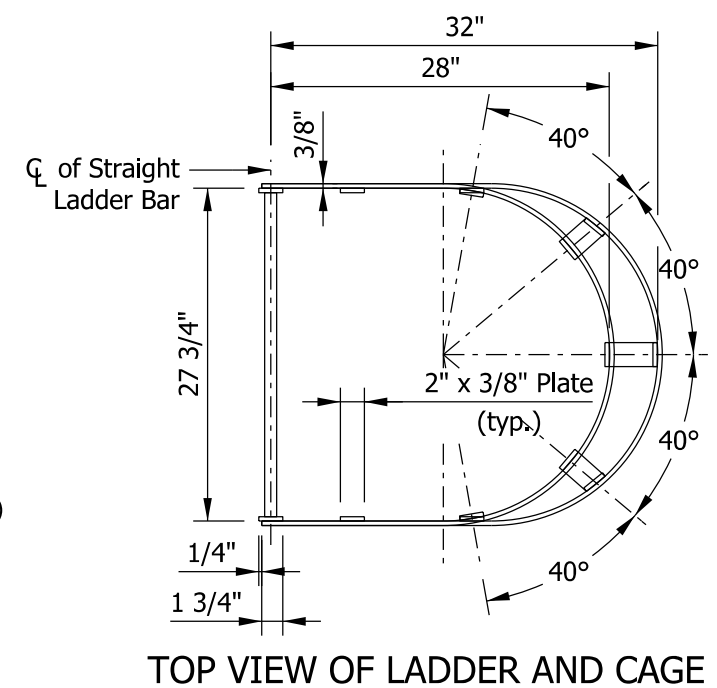


TOP VIEW OF LADDER



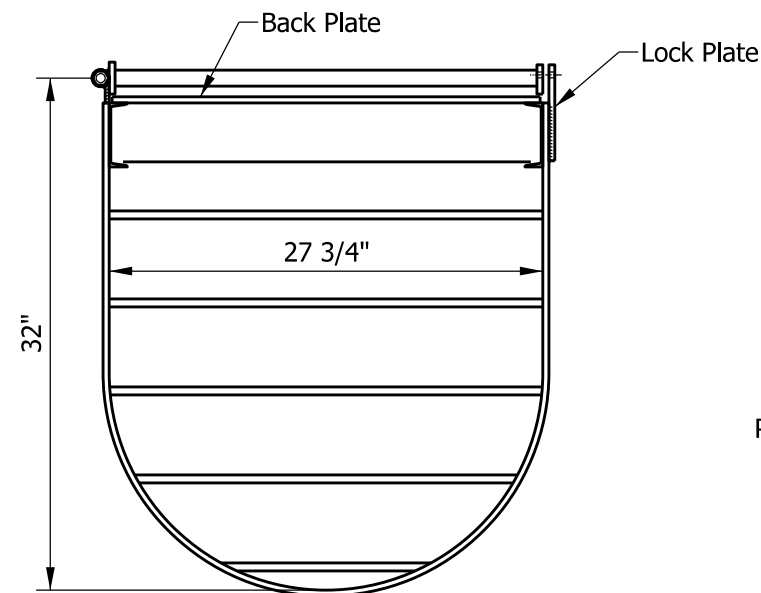
SECTION P-P

- NOTES:**
- Two 3/4 in. diameter ASTM F3125 grade A325 bolts with one flat washer and one lock nut each shall be provided for each connection.
 - For the concrete barrier installations the elevation of the bottom of the ladder shall be a maximum of 6 in. above the top of concrete barrier. The cage shall be extended to maintain the 7 ft - 0 in. minimum clearance from end of ladder.
 - For the roadside drilled shaft foundation installations the elevation of the bottom of the ladder shall be a maximum of 6 in. above the ground. The cage shall be extended to maintain the 7 ft - 0 in. minimum clearance from end of ladder.

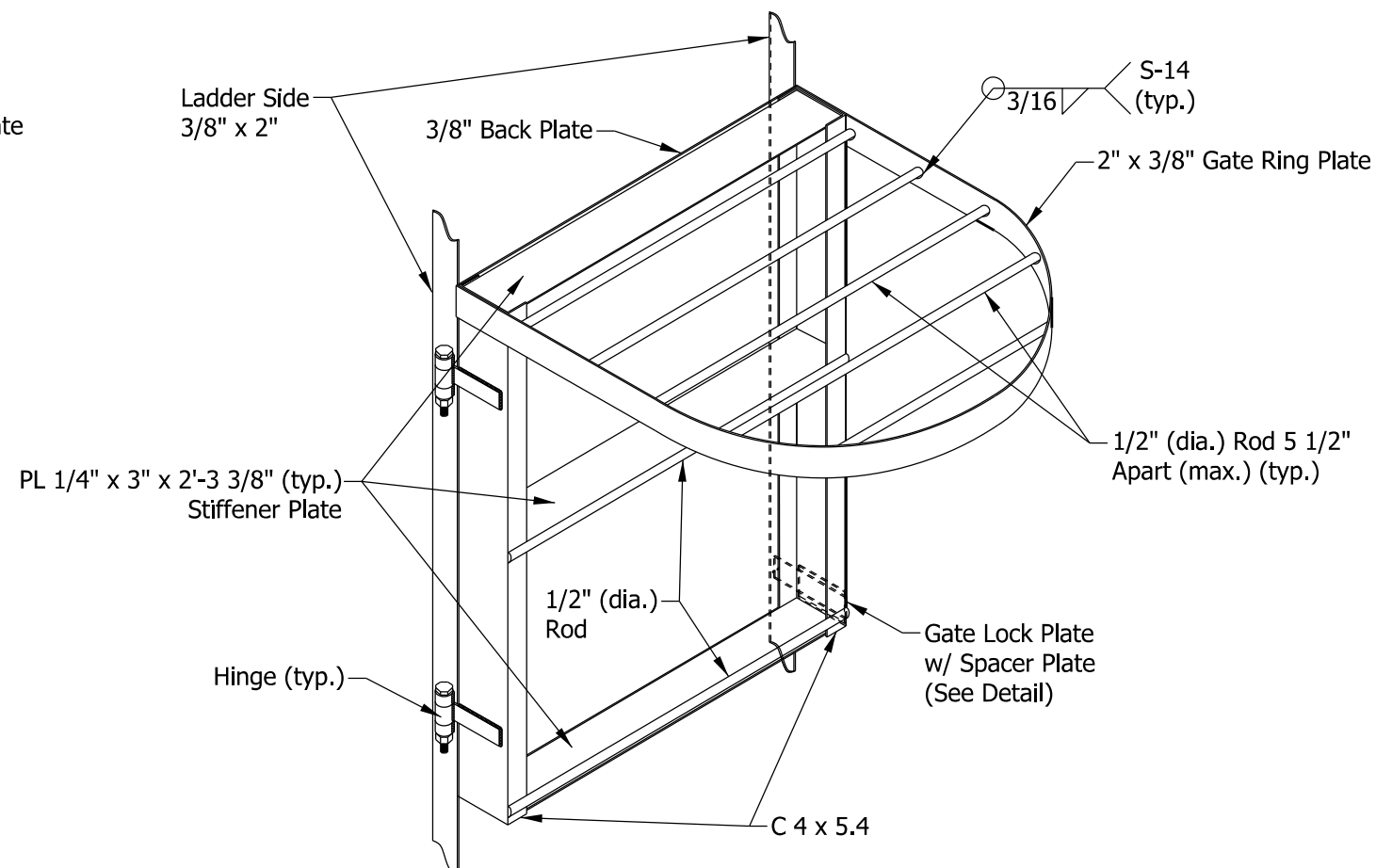


TOP VIEW OF LADDER AND CAGE

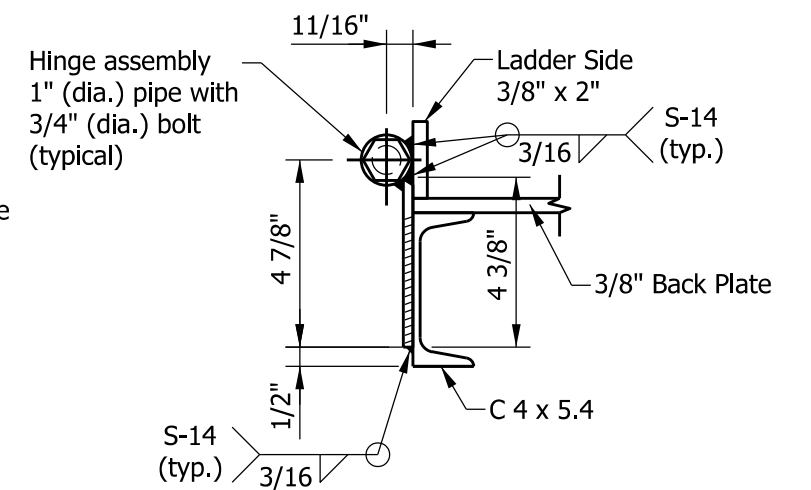
INDIANA DEPARTMENT OF TRANSPORTATION	
LADDER DETAILS	
SEPTEMBER 2025	
STANDARD DRAWING NO. E 802-DBCS-11	
<p>DAVID H. BORUFF REGISTERED No. 60900348 STATE OF INDIANA PROFESSIONAL ENGINEER</p>	<p>4/8/25 DESIGN STANDARDS ENGINEER DATE</p> <p>04/16/2025 CHIEF ENGINEER DATE</p>



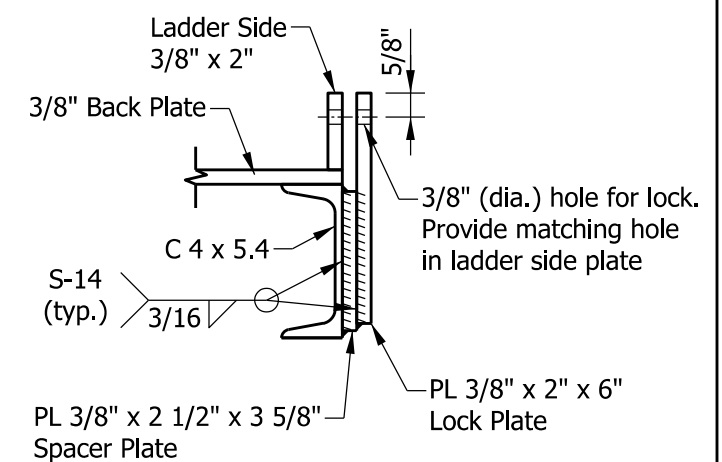
TOP VIEW



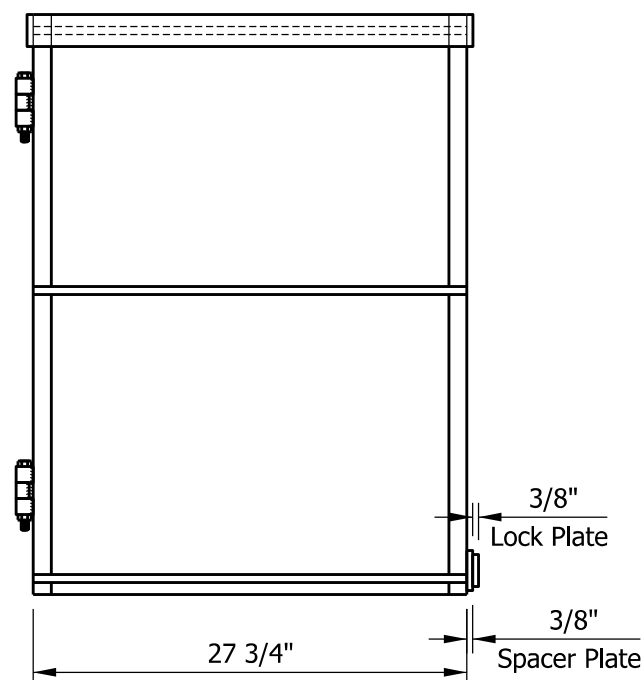
SECURITY GATE



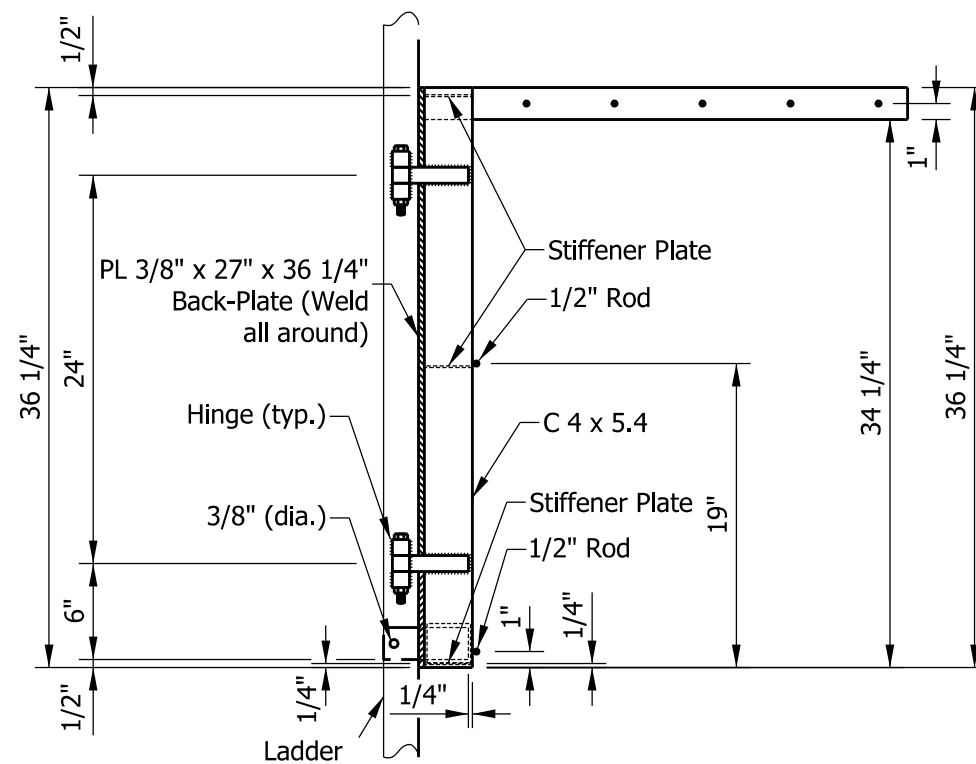
HINGE DETAIL



GATE LOCK DETAIL



FRONT VIEW



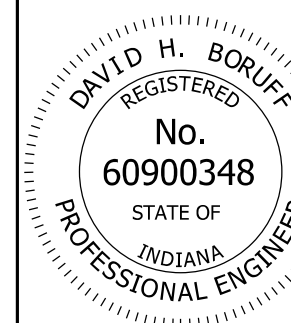
SIDE VIEW

INDIANA DEPARTMENT OF TRANSPORTATION

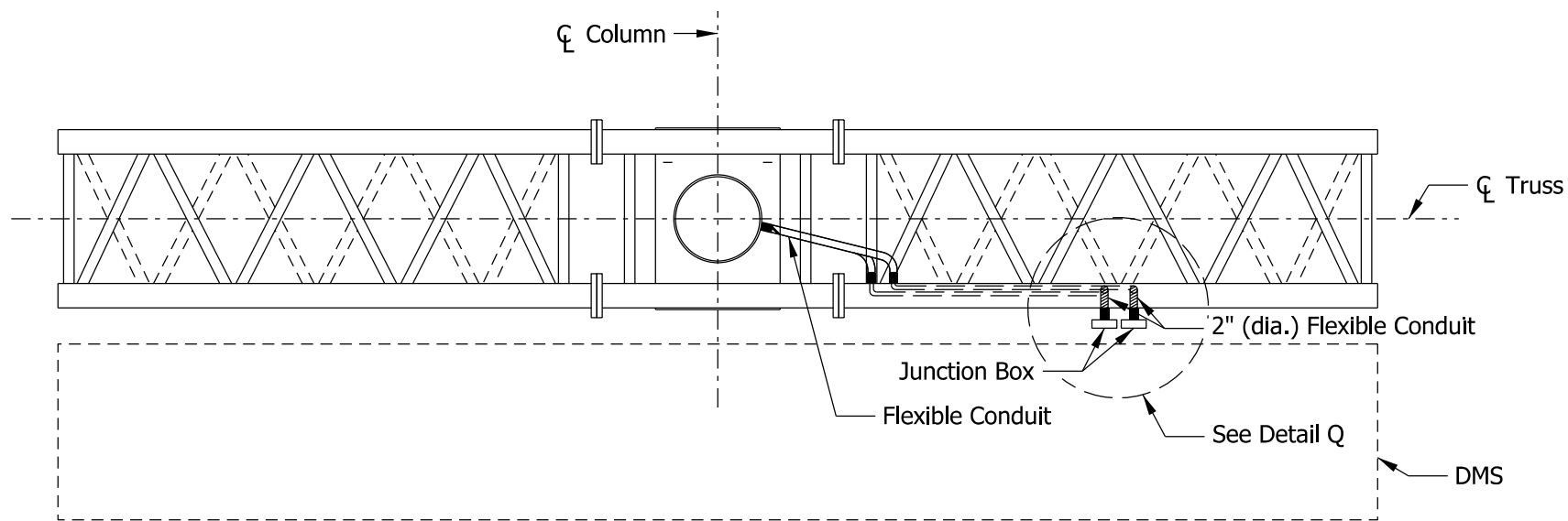
SECURITY GATE DETAILS

SEPTEMBER 2025

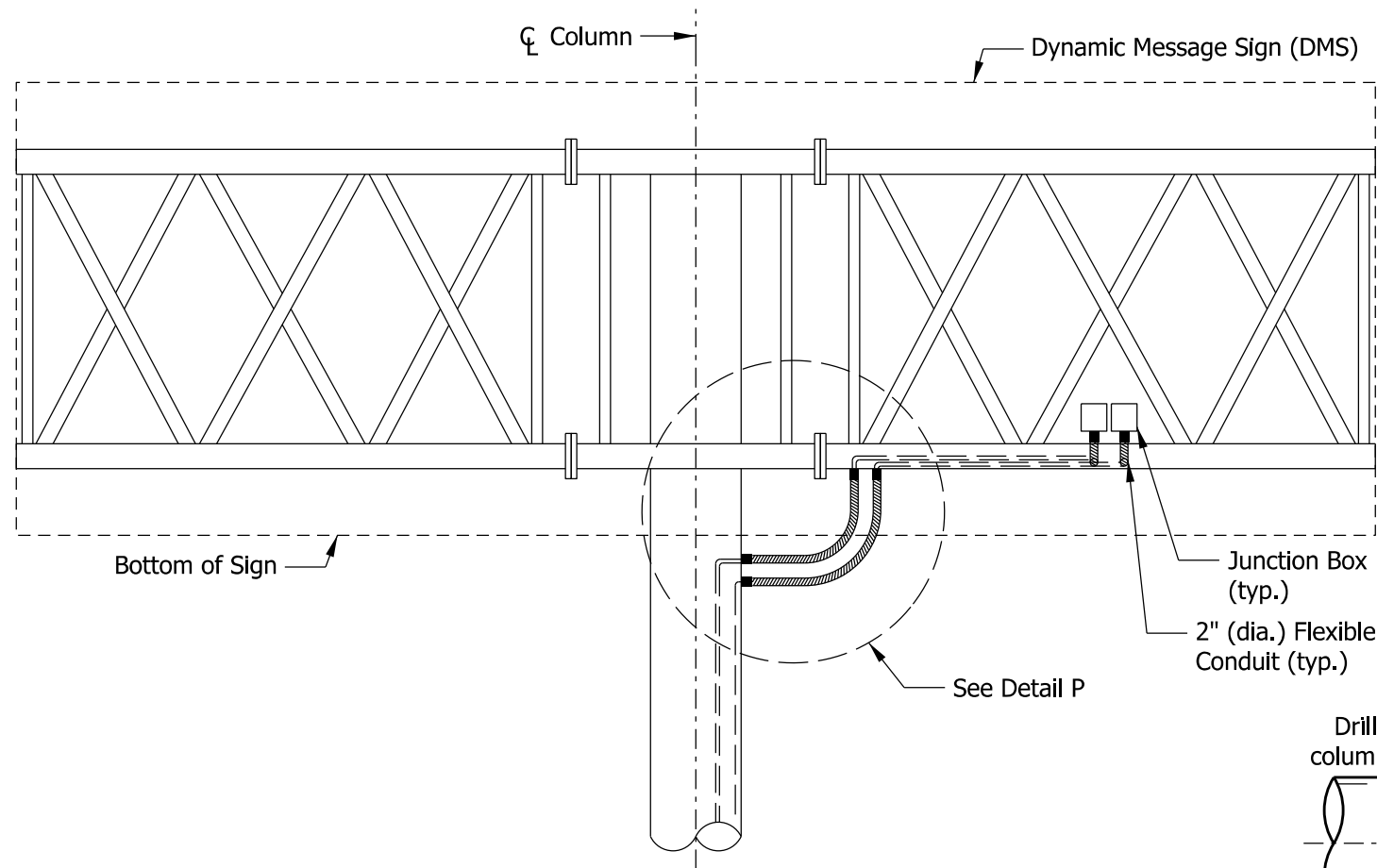
STANDARD DRAWING NO. E 802-DBCS-12



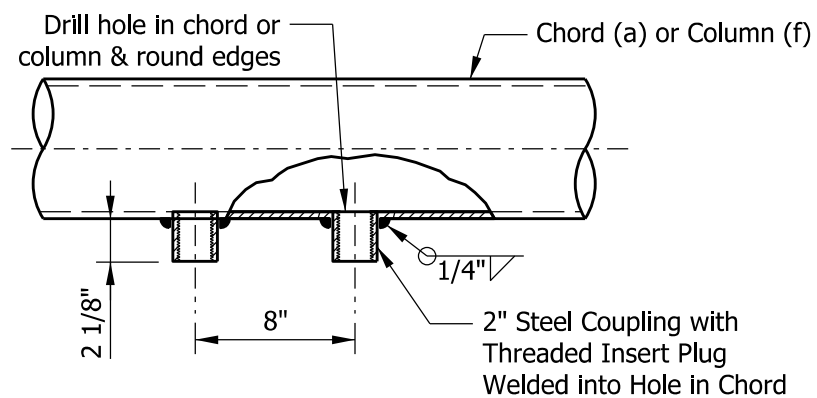
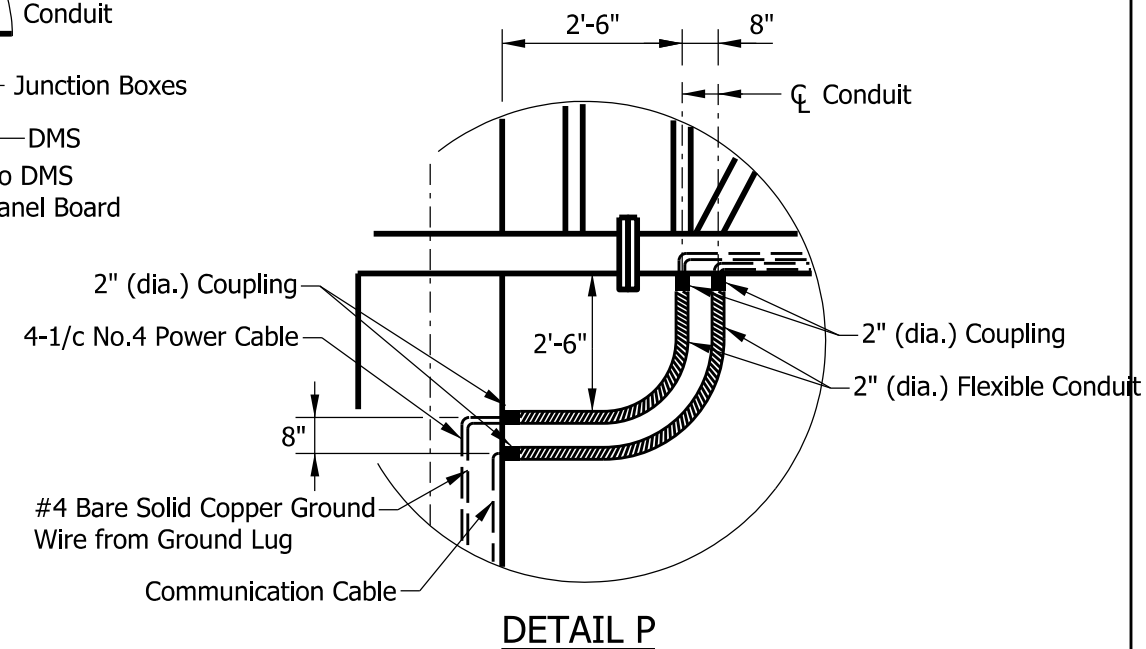
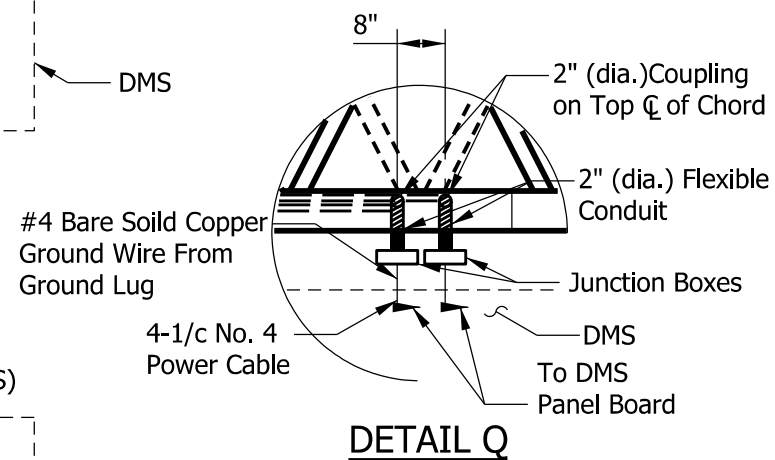
Signature of David H. Boruff, 4/8/25, DESIGN STANDARDS ENGINEER, DATE. Signature of Chief Engineer, 04/16/2025, CHIEF ENGINEER, DATE.



PLAN
(Ladder, Walkway and Handrail not shown for clarity)



ELEVATION
(Ladder, Walkway and Handrail not shown for clarity)



WIRE OUTLET DETAIL

NOTES:

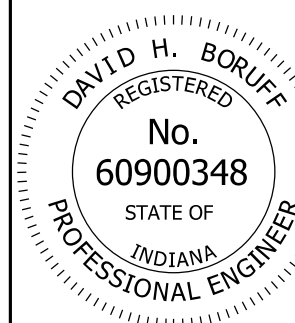
1. Cables shall be laid out as shown or as otherwise directed.
2. The Contractor shall coordinate locations of cable access with manufacturers.
3. Wire outlets shall be steel and shall have threaded-insert plug.
4. Junction boxes shall be mounted to back of DMS.

INDIANA DEPARTMENT OF TRANSPORTATION

WIRING LAYOUT DETAILS

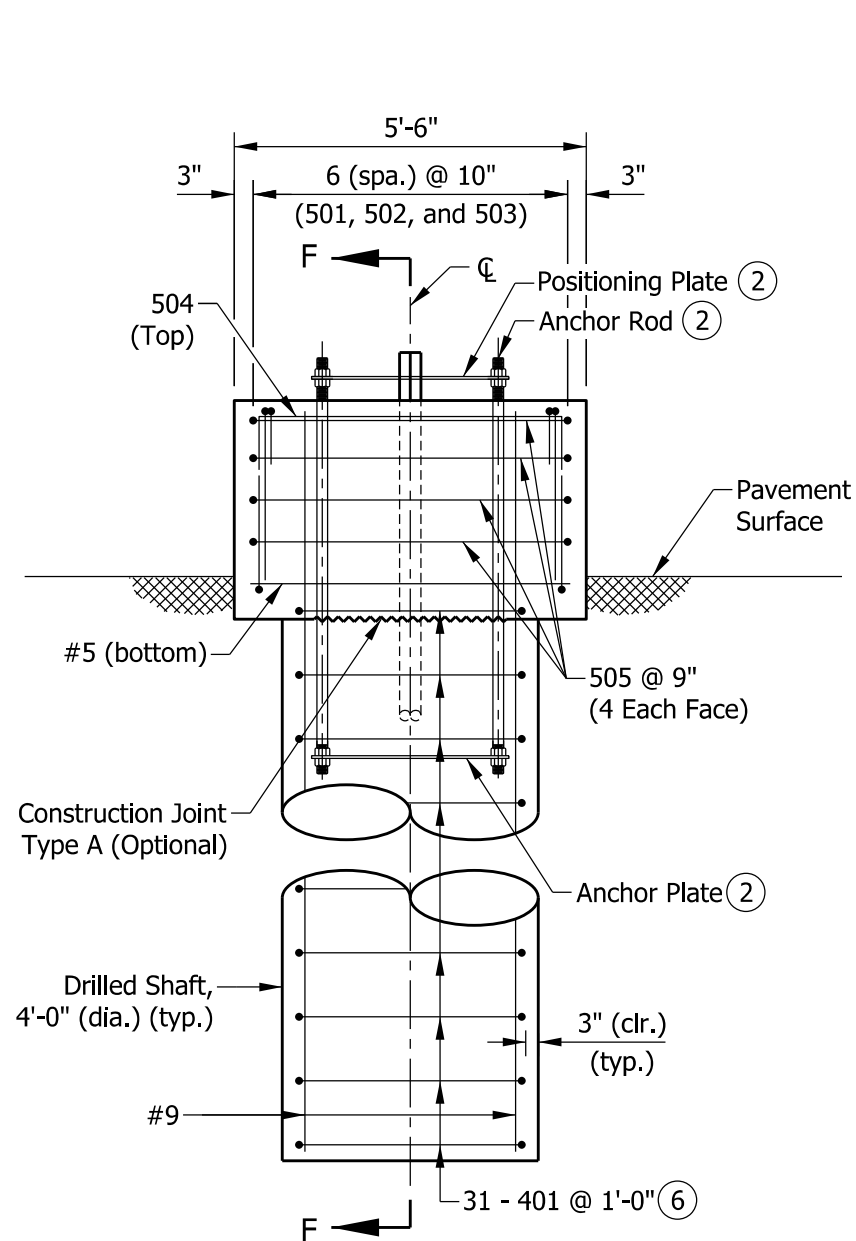
SEPTEMBER 2025

STANDARD DRAWING NO. E 802-DBCS-13

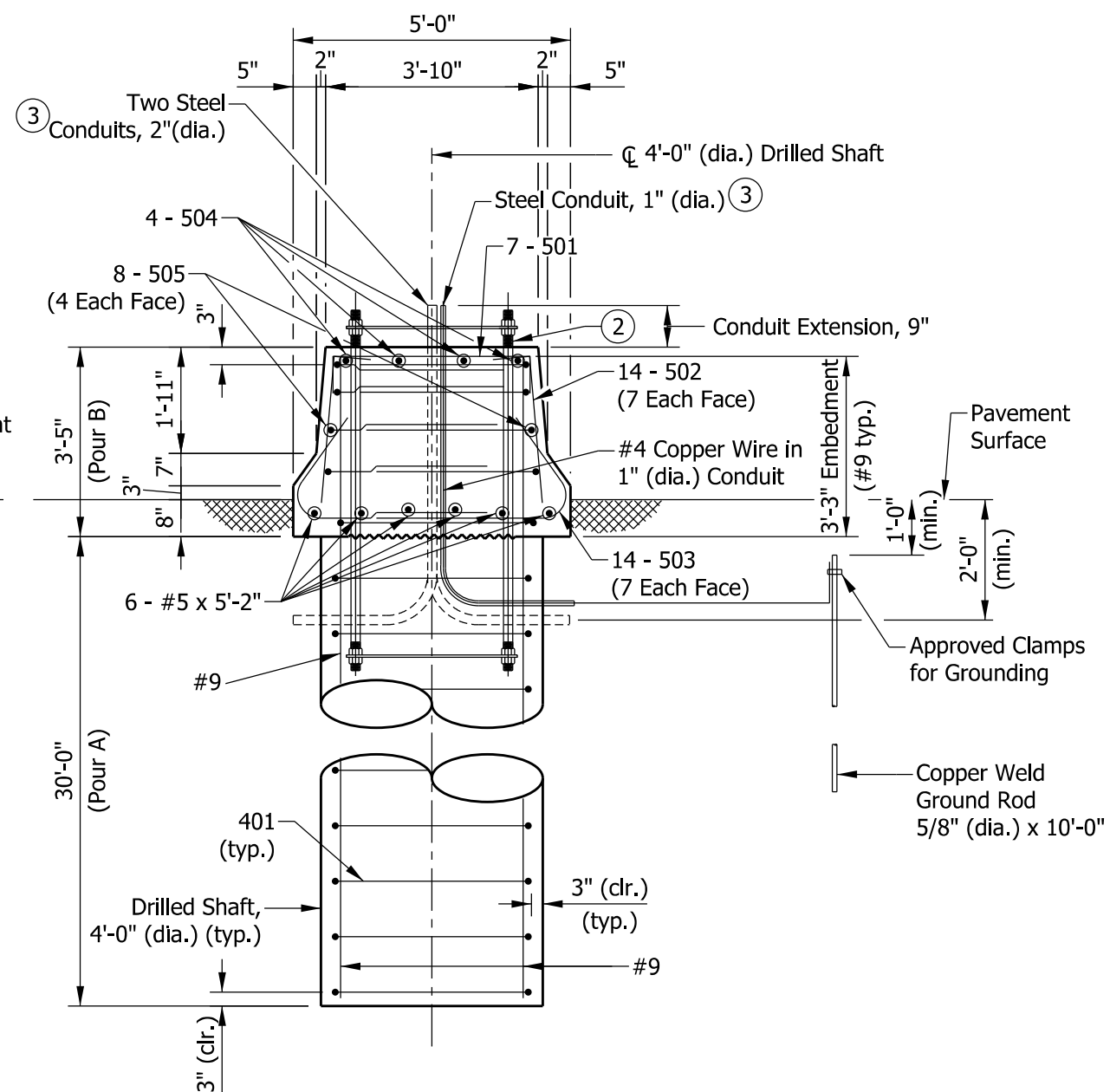


David H. Boruff 4/8/25
DESIGN STANDARDS ENGINEER DATE

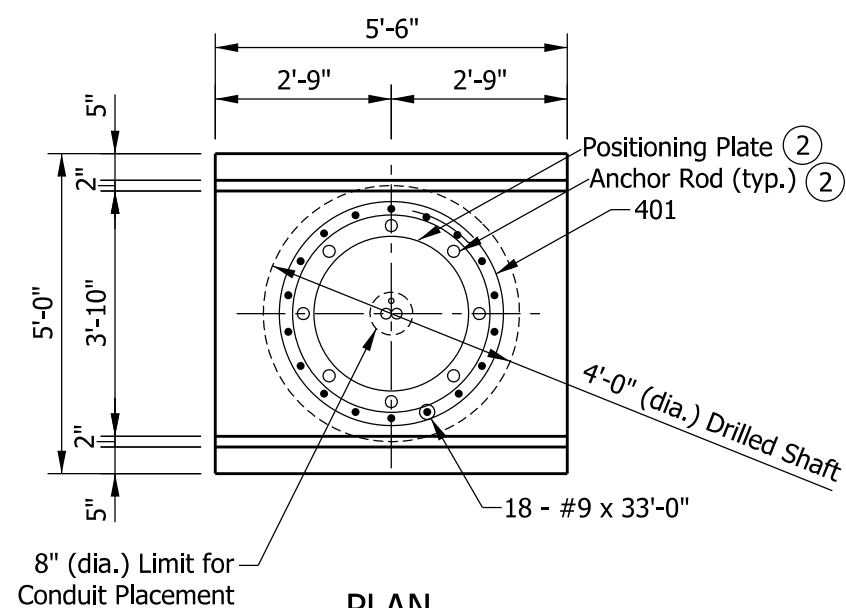
[Signature] 04/16/2025
CHIEF ENGINEER DATE



ELEVATION



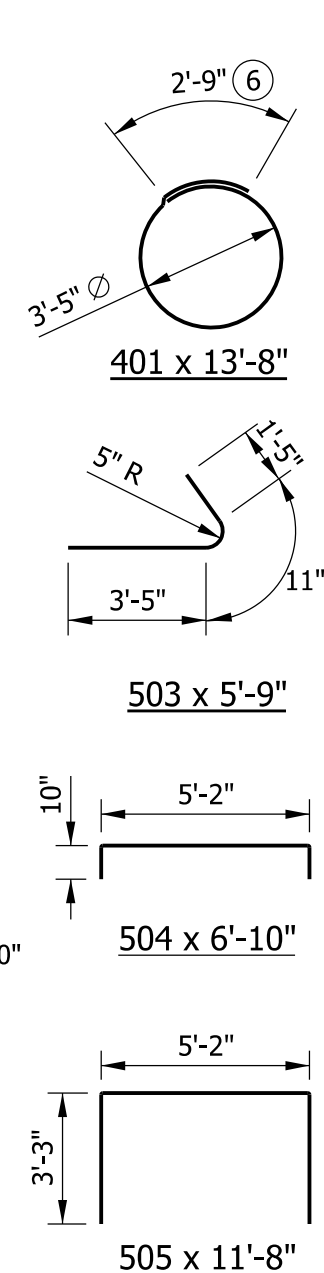
SECTION F-F



PLAN

- NOTES:

1. See Standard Drawing E 602-CCMB-03 for barrier wall width transition.
- ② See Standard Drawing E 802-DBCS-06 for anchor and positioning plate and anchor bolt details.
- ③ Both ends of steel conduit shall be threaded and capped.
4. Top and sides of barrier railing to the pavement surface shall be surface sealed.
5. Minimum concrete strength $f'_c = 3500$ psi.
- ⑥ Each tie shall be rotated 90 degrees from previous tie to stagger lap locations.



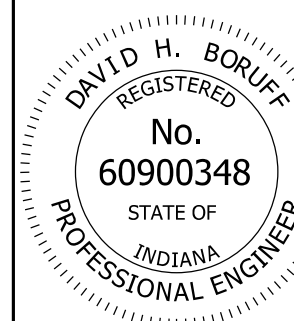
BILL OF MATERIALS			
EPOXY-COATED REINFORCING BARS			
MARK OR SIZE	NO. OF BARS	LENGTH	WEIGHT
#9	18	33'-0"	
Total #9			2020 LBS
501	7	5'-6"	40.16
502	14	3'-4"	48.67
503	14	5'-9"	83.96
504	4	6'-10"	28.59
505	8	11'-8"	97.63
#5	6	5'-2"	32.43
Total #5			331 LBS
401	31	13'-8"	
Total #4			283 LBS
Total Epoxy-Coated Reinforcing Bars			2634 LBS
CONCRETE, CLASS A			
Pour A			14.0 CYS
Pour B			3.1 CYS
Total Concrete, Class A			17.1 CYS
MISCELLANEOUS			
Surface Seal			6.6 SYS

INDIANA DEPARTMENT OF TRANSPORTATION

FOUNDATION AT 33" CONCRETE BARRIER

SEPTEMBER 2025

STANDARD DRAWING NO.	E 802-DBCS-14
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DESIGN STANDARDS ENGINEER

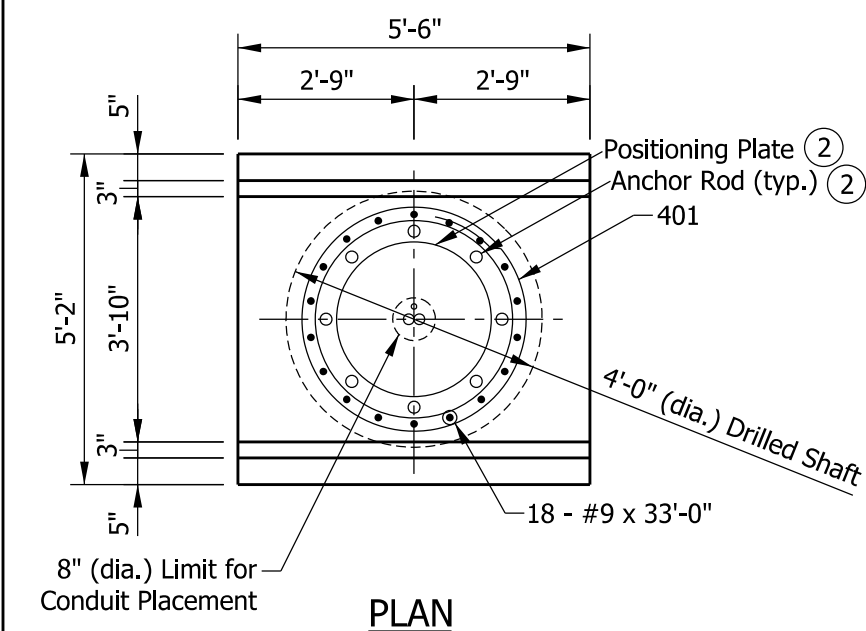
4/8/25

DATE _____


CHIEF ENGINEER

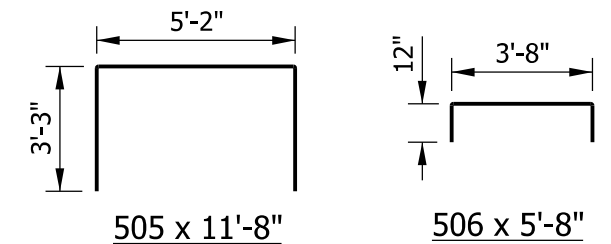
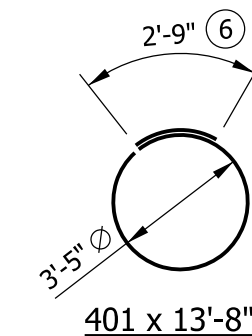
04/15/2025

DATE _____

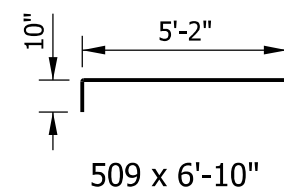
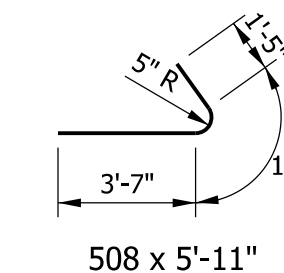
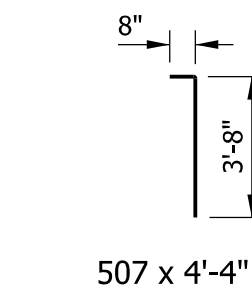
ELEVATION

NOTES:

1. See Standard Drawing E 602-CCMB-03 for barrier wall width transition.
- ② See Standard Drawing E 802-DBCS-06 for anchor and positioning plate and anchor bolt details.
- ③ Both ends of steel conduit shall be threaded and capped.
4. Top and sides of barrier railing to the pavement surface shall be surface sealed.
5. Minimum concrete strength $f'c = 3500$ psi.
- ⑥ Each tie shall be rotated 90 degrees from previous tie to stagger lap locations.



BILL OF MATERIALS			
EPOXY-COATED REINFORCING BARS			
MARK OR SIZE	NO. OF BARS	LENGTH	WEIGHT
#9	18	33'-0"	
Total #9			2020 LBS
505	10	11'-8"	121.68
506	7	5'-6"	41.37
507	14	4'-4"	63.46
508	14	5'-11"	86.40
509	4	6'-10"	28.51
#5	6	5'-2"	32.33
Total #5			372 LBS
401	31	13'-8"	
Total #4			283 LBS
Total Epoxy-Coated Reinforcing Bars			2675 LBS
CONCRETE, CLASS A			
Pour A			14.0 CYS
Pour B			4.0 CYS
Total Concrete, Class A			18.0 CYS
MISCELLANEOUS			
Surface Seal			7.3 SYS

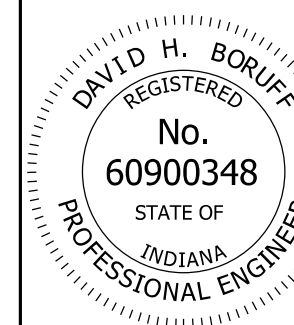


INDIANA DEPARTMENT OF TRANSPORTATION

FOUNDATION AT 45" CONCRETE BARRIER

SEPTEMBER 2025

STANDARD DRAWING NO.	E 802-DBCS-15
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David H. Boeff
DESIGN STANDARDS ENGINEER

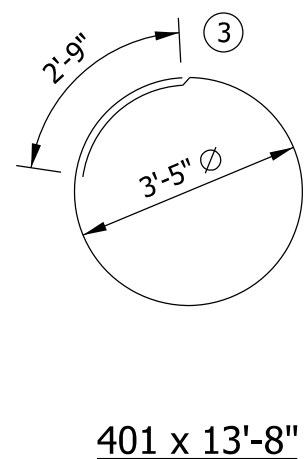
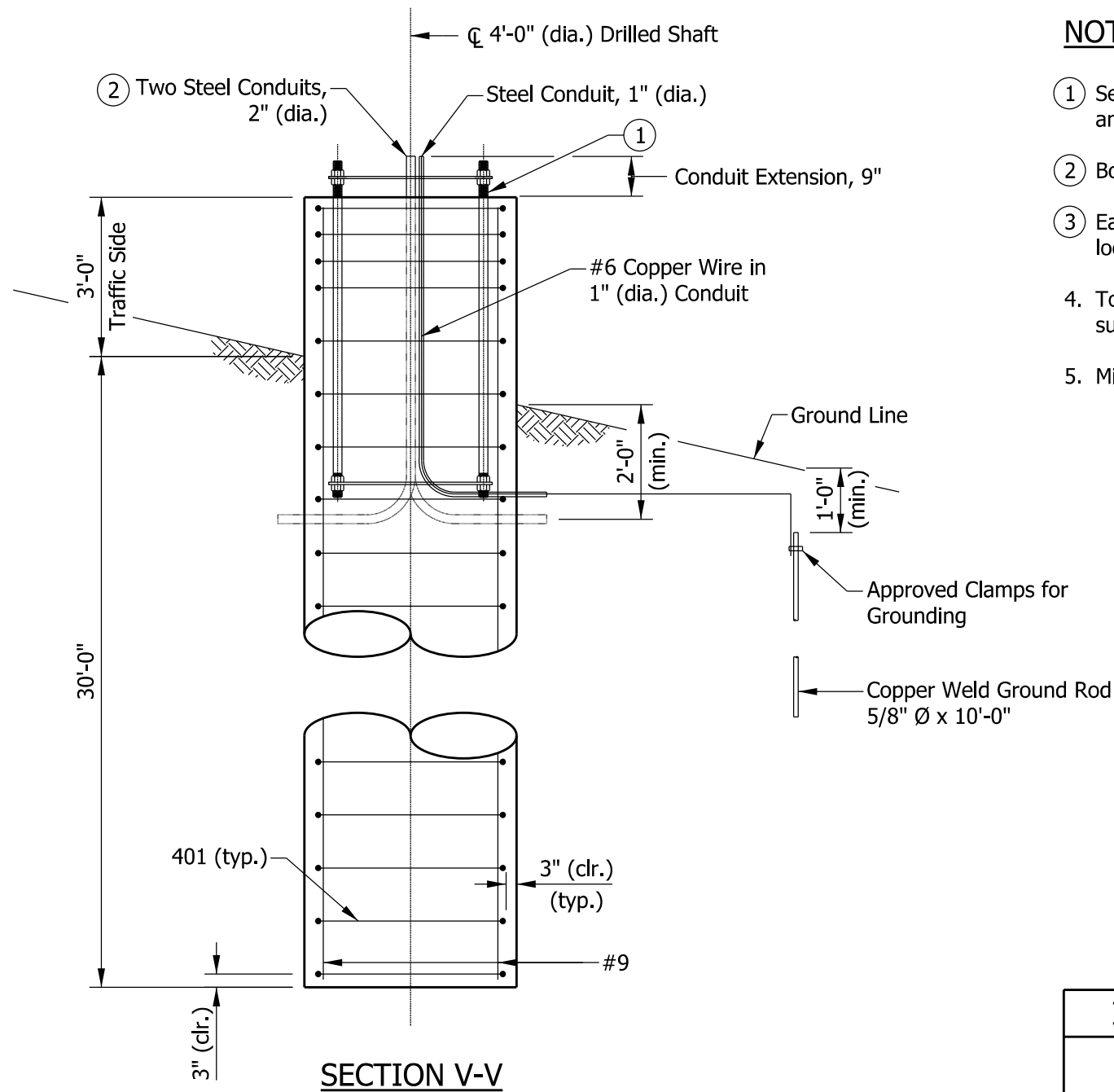
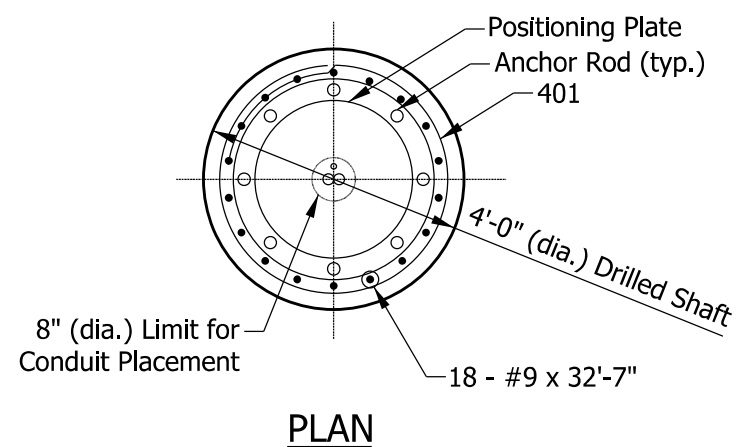
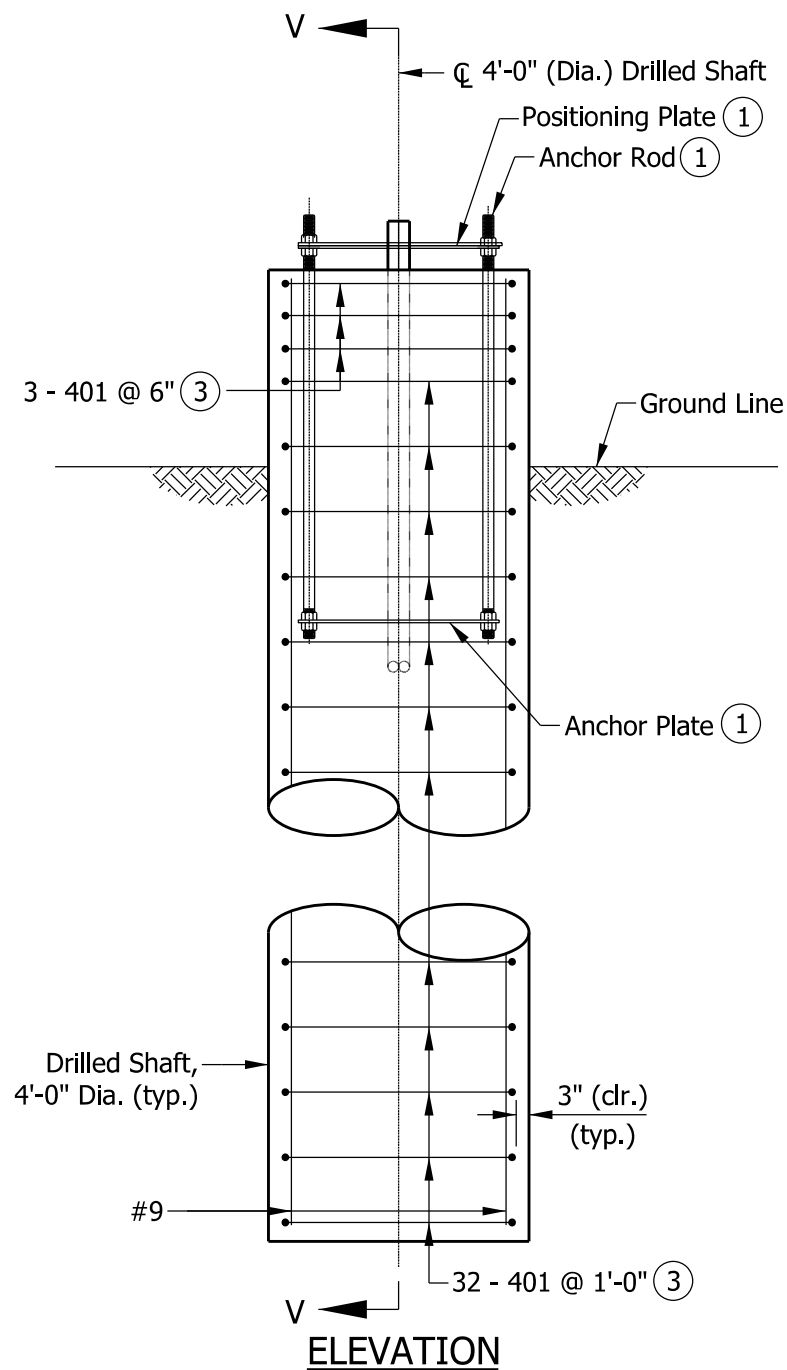
4/8/25

DATE _____


CHIEF ENGINEER

04/16/2025

DATE _____



NOTES:

- See Standard Drawing E 802-DBCS-06 for anchor and positioning plate and anchor bolt details.
- Both ends of steel conduit shall be threaded and capped.
- Each tie shall be rotated 90 degrees from previous tie to stagger lap locations.
- Top and sides of barrier railing to the pavement surface shall be surface sealed.
- Minimum concrete strength $f'_c = 3500$ psi.

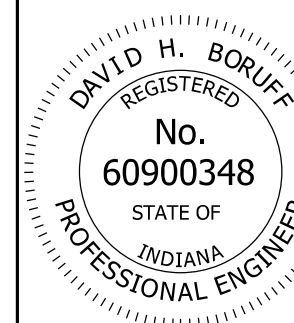
BILL OF MATERIALS			
EPOXY-COATED REINFORCING BARS			
MARK OR SIZE	NO. OF BARS	LENGTH	WEIGHT
#9	18	32'-7"	
Total #9			1994 LBS
401	35	13'-8"	
Total #4			320 LBS
Total Epoxy-Coated Reinforcing Bars			2314 LBS
MISCELLANEOUS			
Concrete, Class A			15.4 CYS
Surface Seal			6.3 SYS

INDIANA DEPARTMENT OF TRANSPORTATION

FOUNDATION 4'-0" Ø DRILLED SHAFT

SEPTEMBER 2025

STANDARD DRAWING NO. E 802-DBCS-16



DESIGN STANDARDS ENGINEER

4/8/25

DATE

CHIEF ENGINEER

04/16/2025

DATE