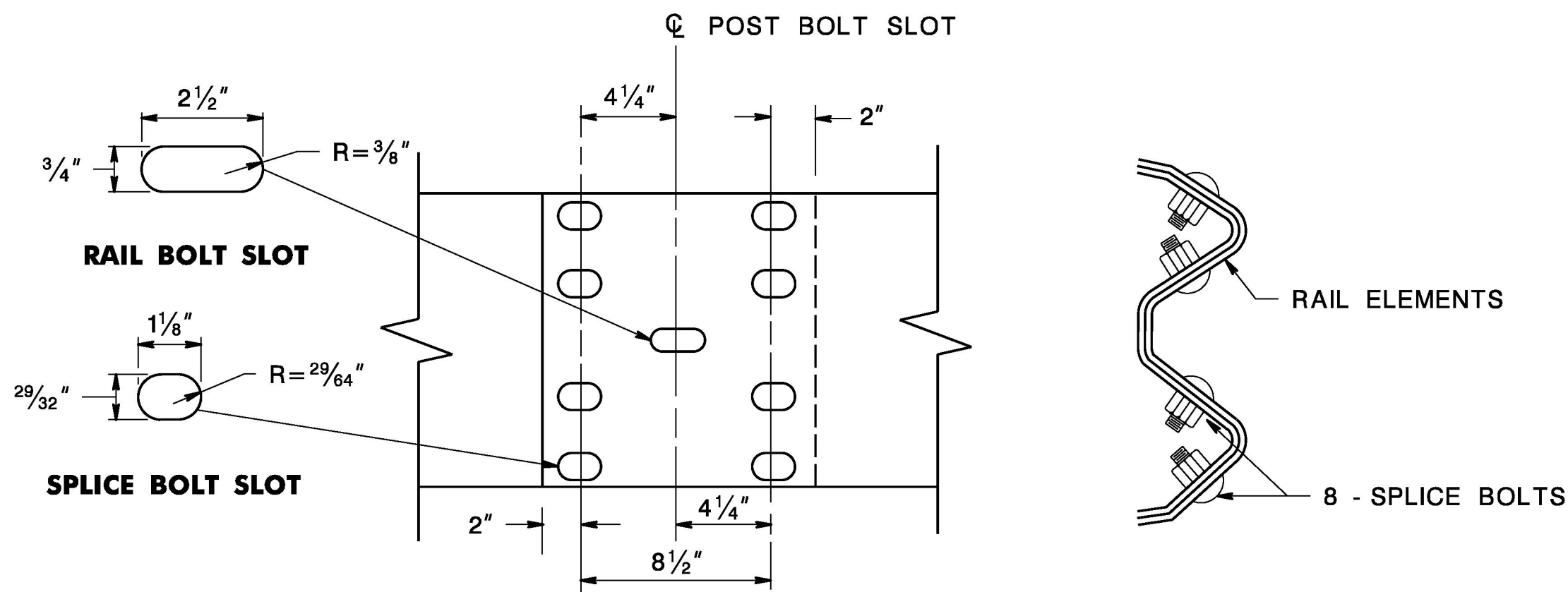
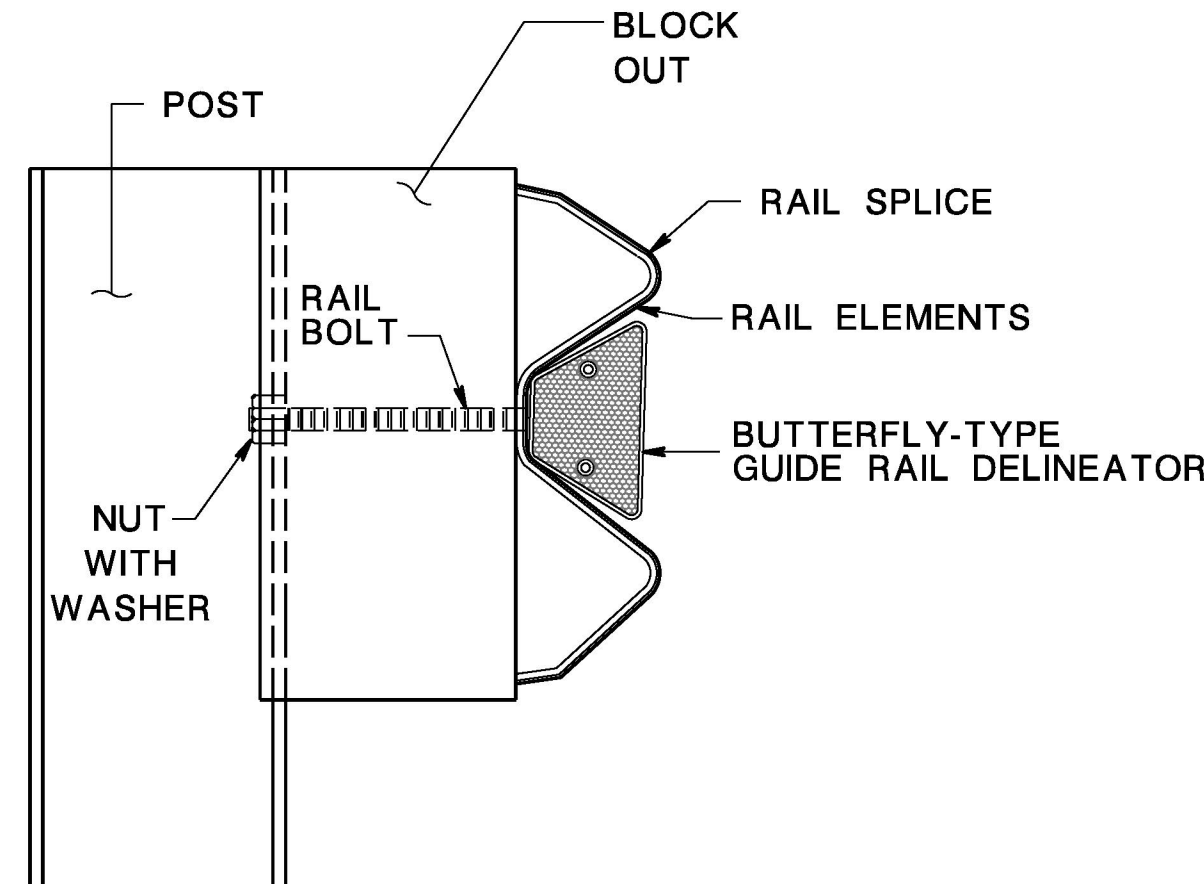


RAIL ELEMENT TO BE SUPPLIED IN LENGTHS OF 13'-6 1/2" OR 26'-0 1/2"

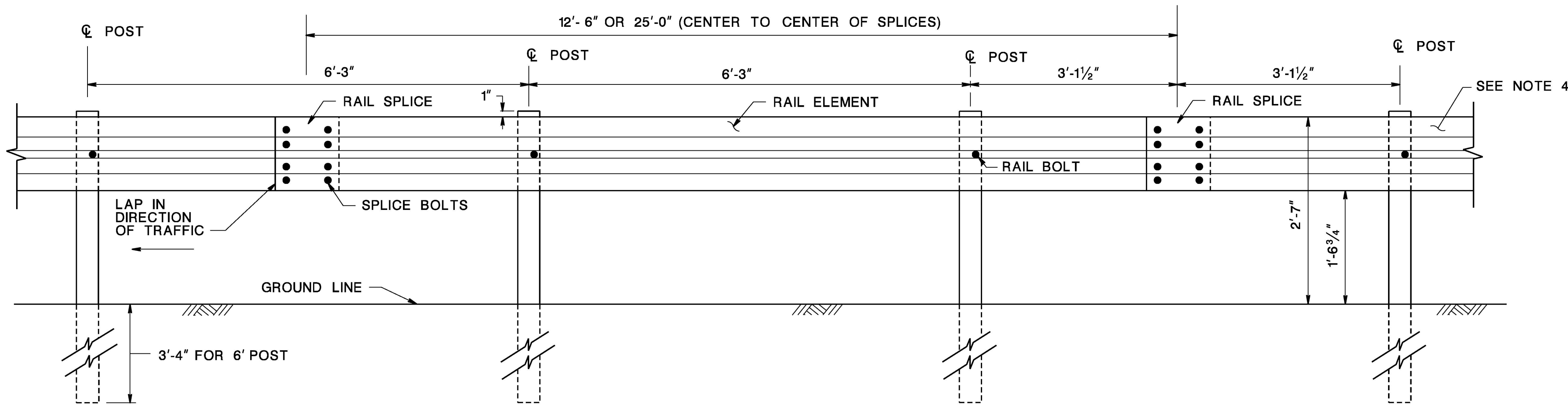
W-BEAM RAIL ELEMENT



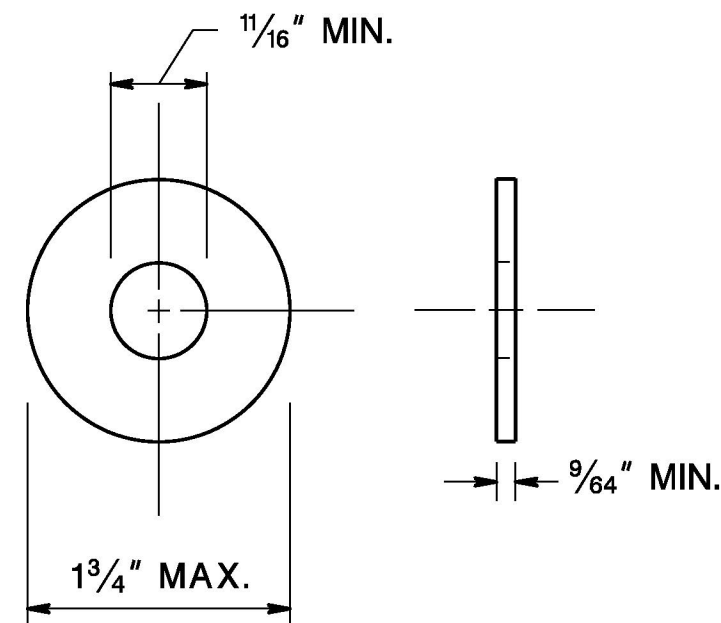
RAIL SPLICE



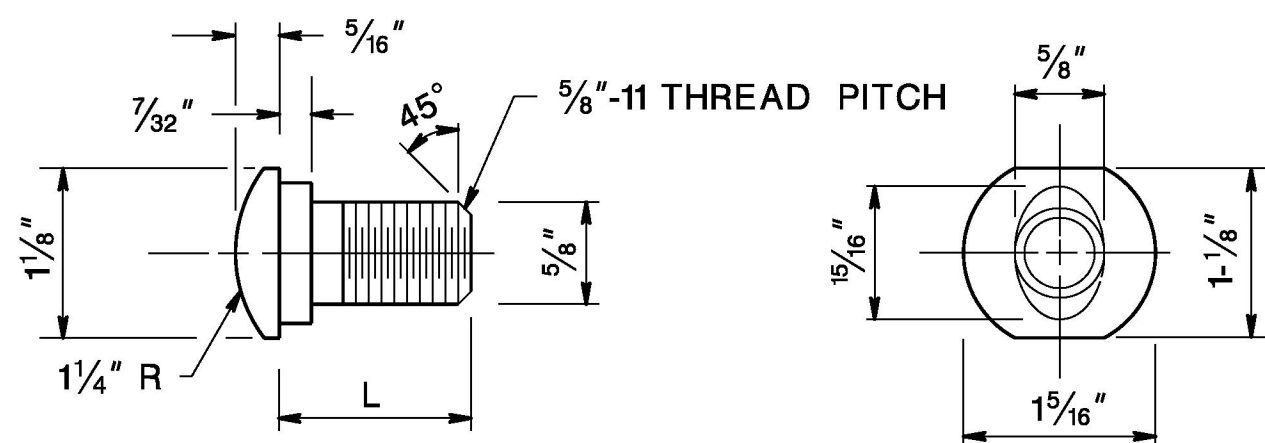
BEAM GUIDE RAIL POST ASSEMBLY



BEAM GUIDE RAIL

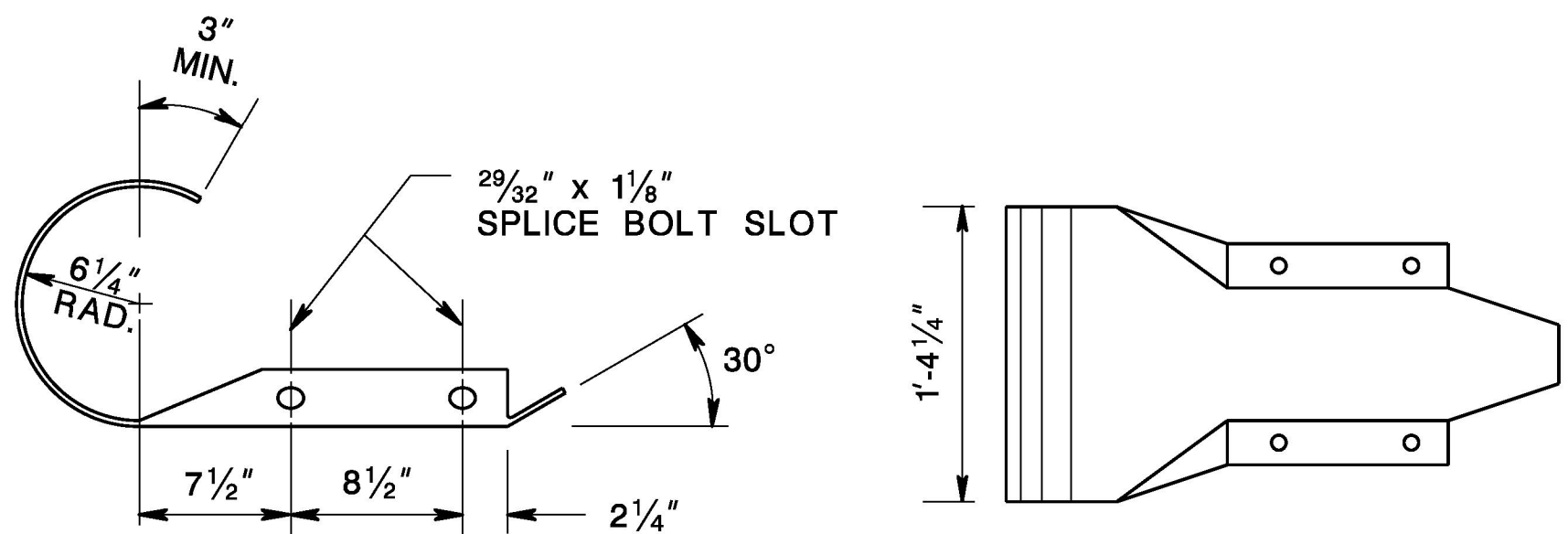


STEEL WASHER

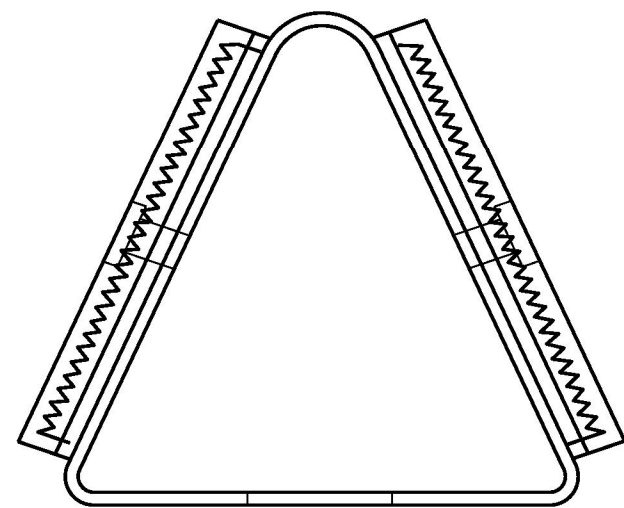


TYPE	L	MIN. THREAD LENGTH
SPLICE	1 1/4"	FULL LENGTH THREAD
RAIL	9 1/2"	1 3/4"

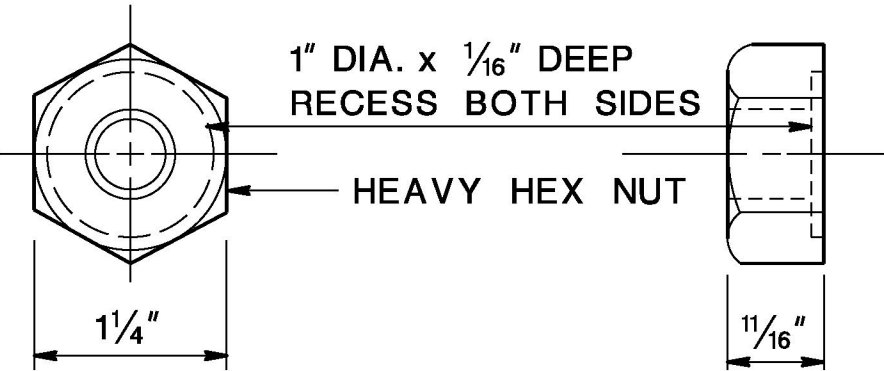
5/8" DIA. BUTTON HEAD BOLT



END SECTION (ROUNDED)

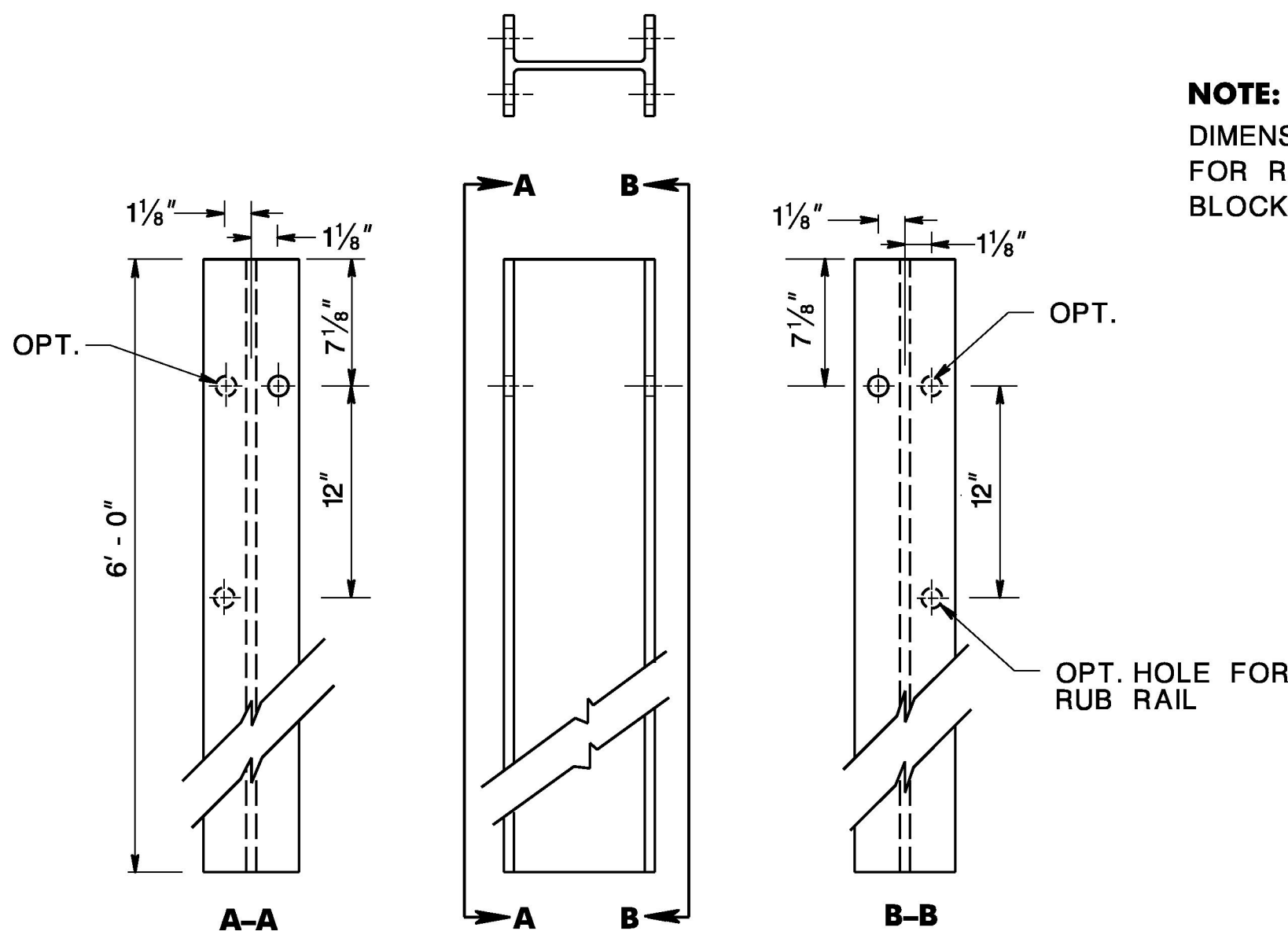


BUTTERFLY-TYPE GUIDE RAIL DELINEATOR



5/8" DIA. RECESS NUT

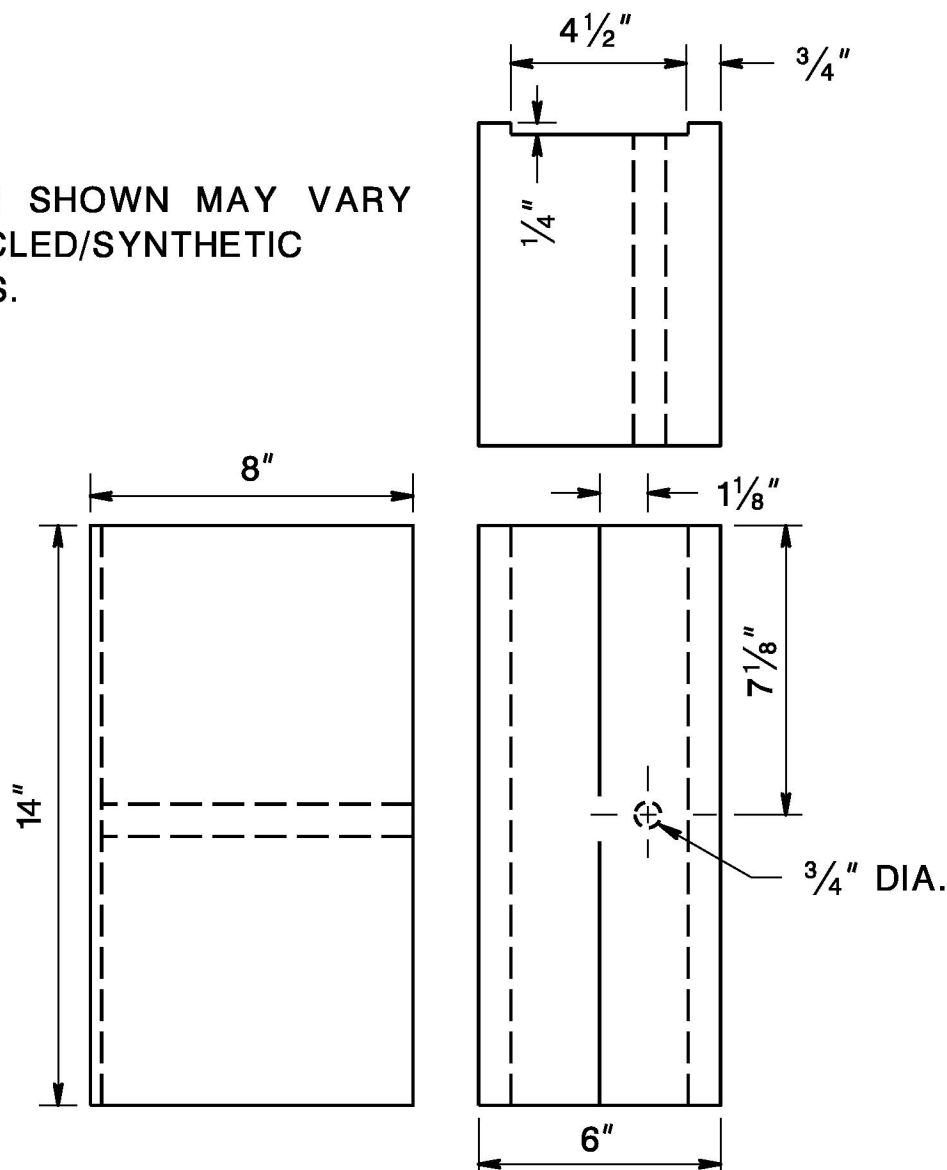
SPLICE & RAIL NUT & BOLT



W6x8.5 OR W6x9 STEEL POST

6' POST

NOTE:
DIMENSIONS SHOWN MAY VARY
FOR RECYCLED/SYNTHETIC
BLOCKOUTS.



APPROVED RECYCLED/
SYNTHETIC MATERIALS

6"x8"x14" BLOCKOUT

NOTES:

- ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
- FURNISH RAIL ELEMENTS SHOPCURVED, CONCAVE OR CONVEX, FOR RADII BETWEEN 20 AND 150 FEET.
- WHERE TRANSITIONING TO EXISTING GUIDE RAIL, AN END TERMINAL, OR A CRASH CUSHION MOUNTED AT A HEIGHT OTHER THAN 2'-7", THE VERTICAL TRANSITION TO BE ACCOMPLISHED IN A MINIMUM LENGTH OF 12'-6" FOR EACH 2" OF VERTICAL CHANGE. SEE CD-609-8.
- INSTALL AN END TERMINAL AS SHOWN ON THE PLANS. USE THE END SECTION (ROUNDED) ON THE END OF THE RAIL ELEMENT WHERE DUAL FACED BEAM GUIDE RAIL ENDS AND SINGLE FACED BEAM GUIDE RAIL BEGINS.

GENERAL NOTES:

- ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

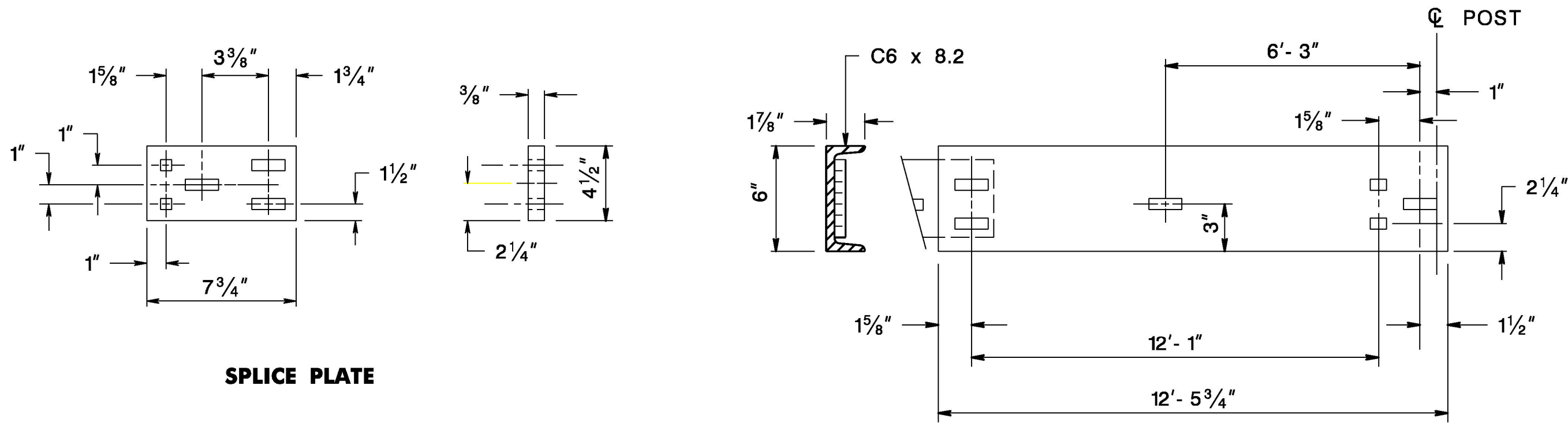
CD-609-1.1

BEAM GUIDE RAIL
(MASH TL-3) CD-609-1

N.T.S.

DATE	REVISIONS	BY	CHE.
CONSTRUCTION OF FROM TO *** TOWNSHIP			

FLD.BK. BK ** PG **	DATE MONTH YEAR	DESIGNED ***	CHECKED
SCALE AS SHOWN	DRAWN ***	APPROVED J.N.E.	
FILE NO.	** _ *** _ ****		SHEET * OF *

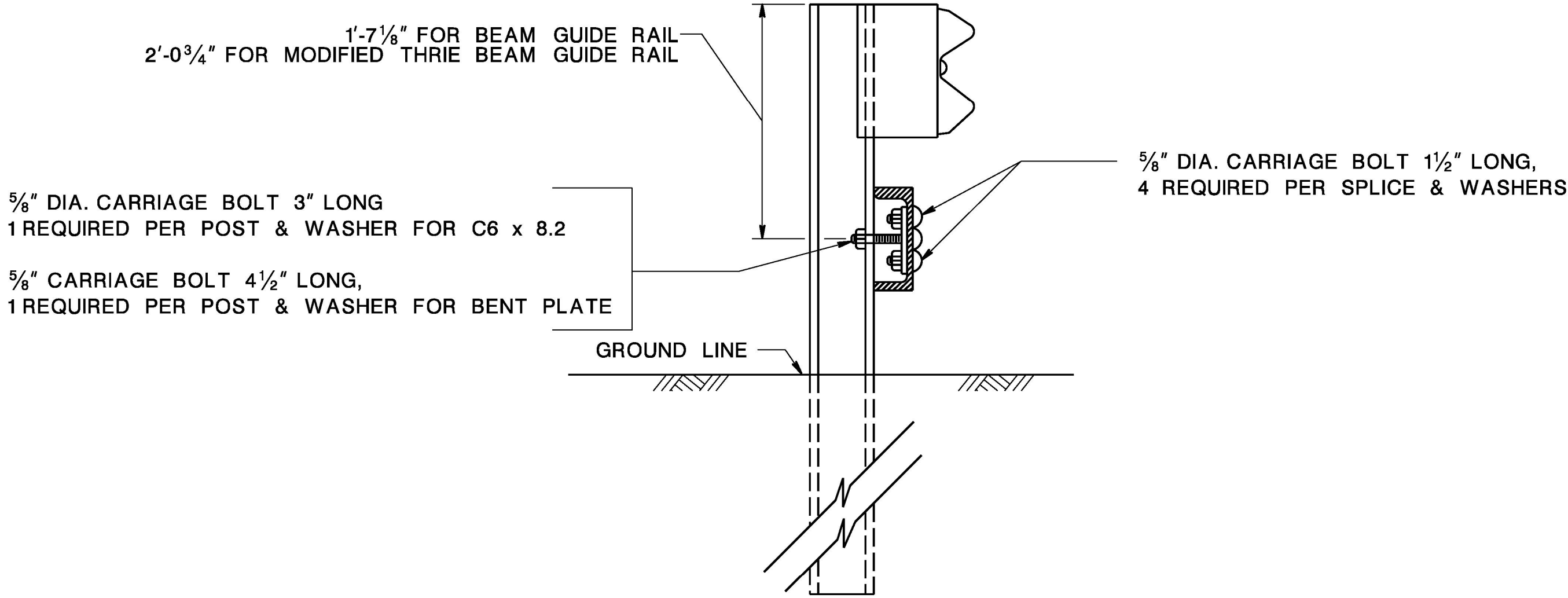


SPLICE PLATE

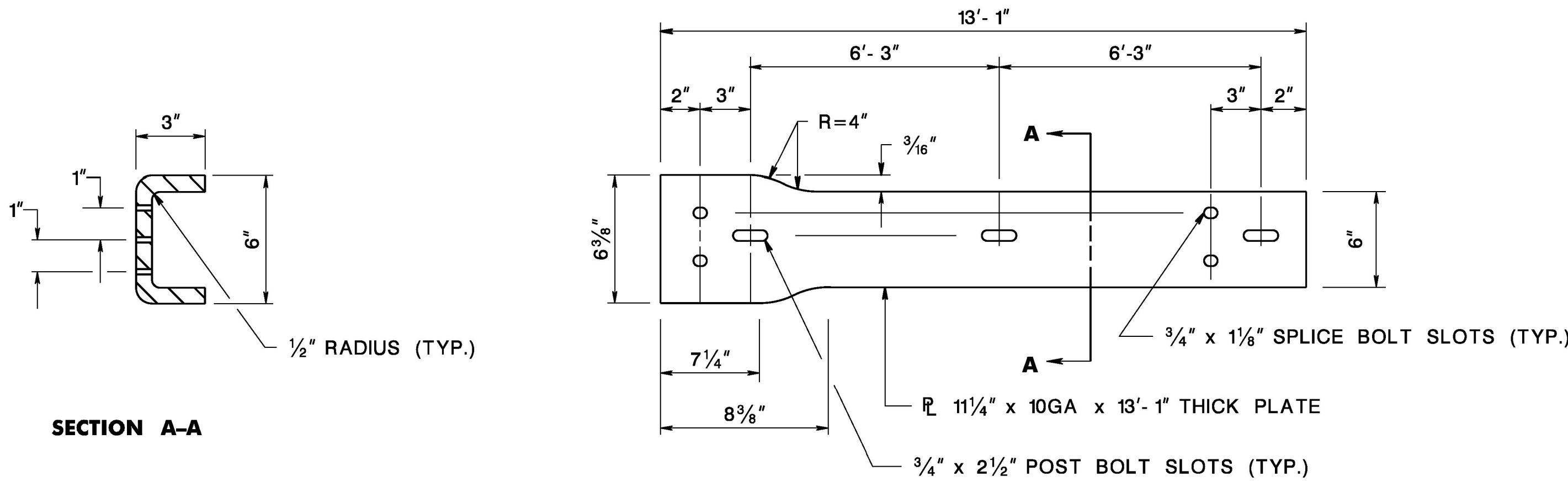
NOTES:

- RUB RAIL MAY BE SUPPLIED IN LENGTHS OF 12'-5 3/4" OR 24'-11 3/4"
- ALL RECTANGULAR SLOTS ARE 1 1/16" x 2", ALL SQUARE HOLES ARE 1 1/16"

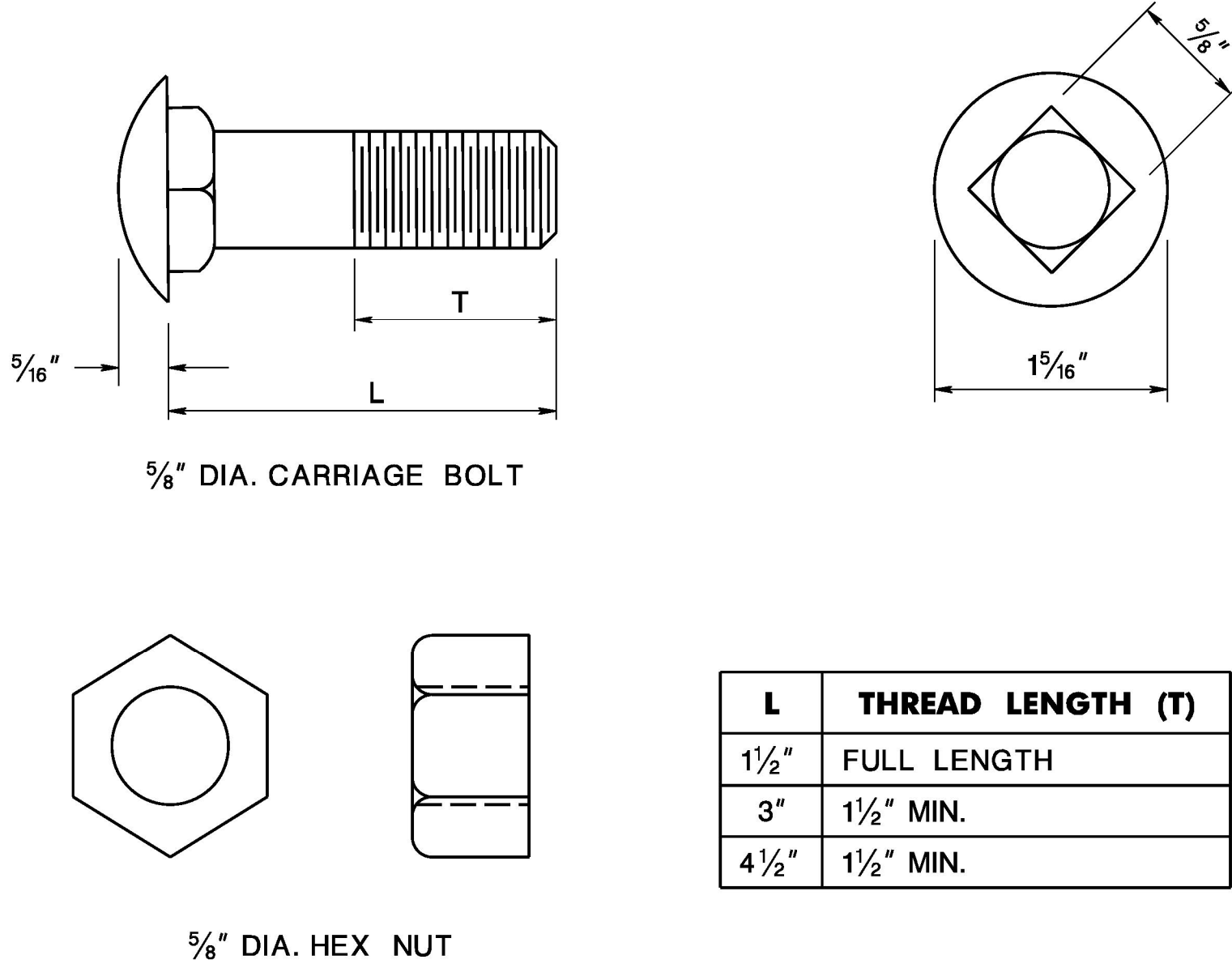
C6 x 8.2



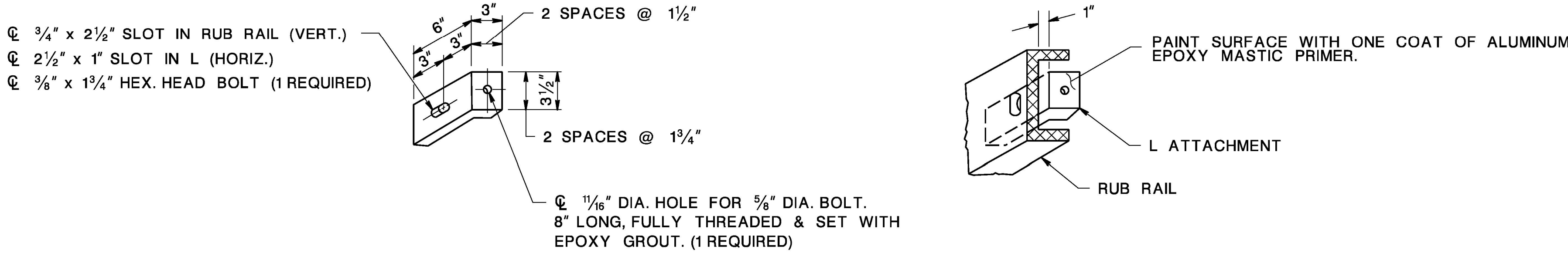
RUB RAIL SECTION



BENT PLATE



CARRIAGE BOLT DETAIL



RUB RAIL ANGLE ATTACHMENT

NOTES:

- USE EITHER C6 x 8.2 OR BENT PLATE FOR RUB RAIL.
- INSTALL RUB RAIL WHERE SHOWN ON THE PLANS.

RUB RAIL

N.T.S.

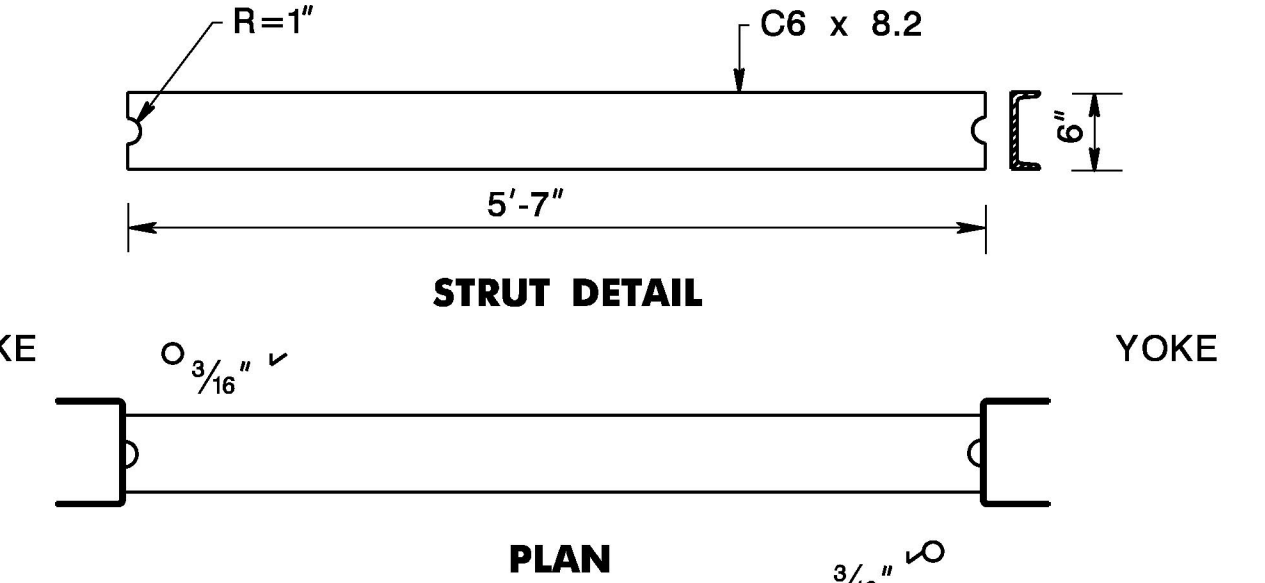
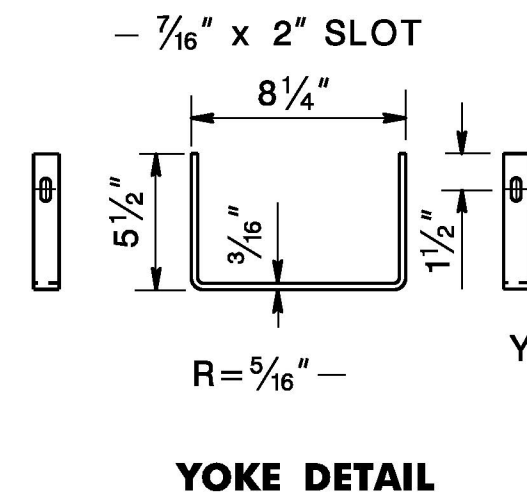
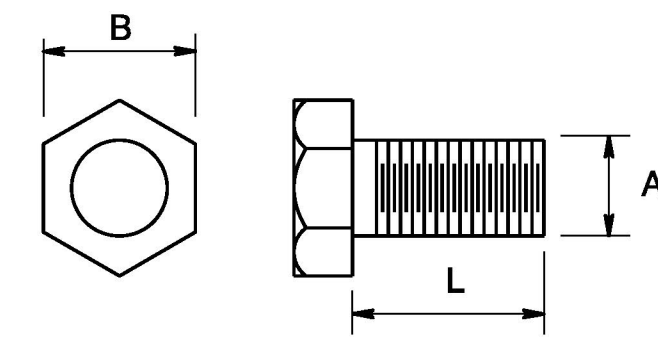
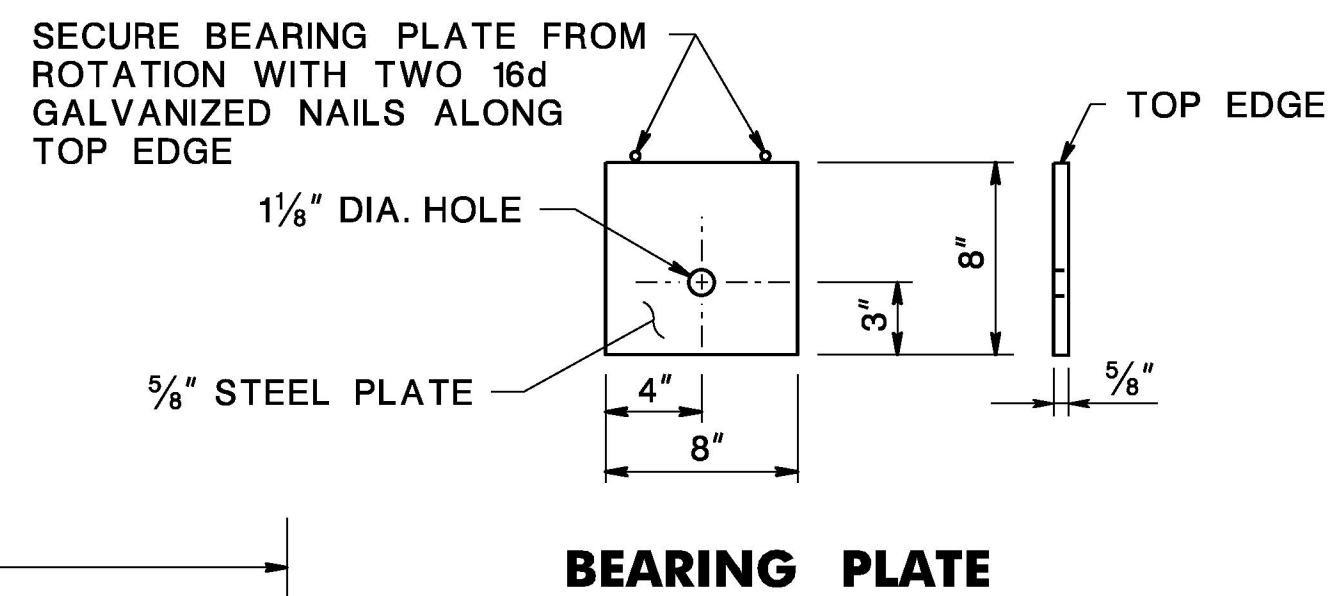
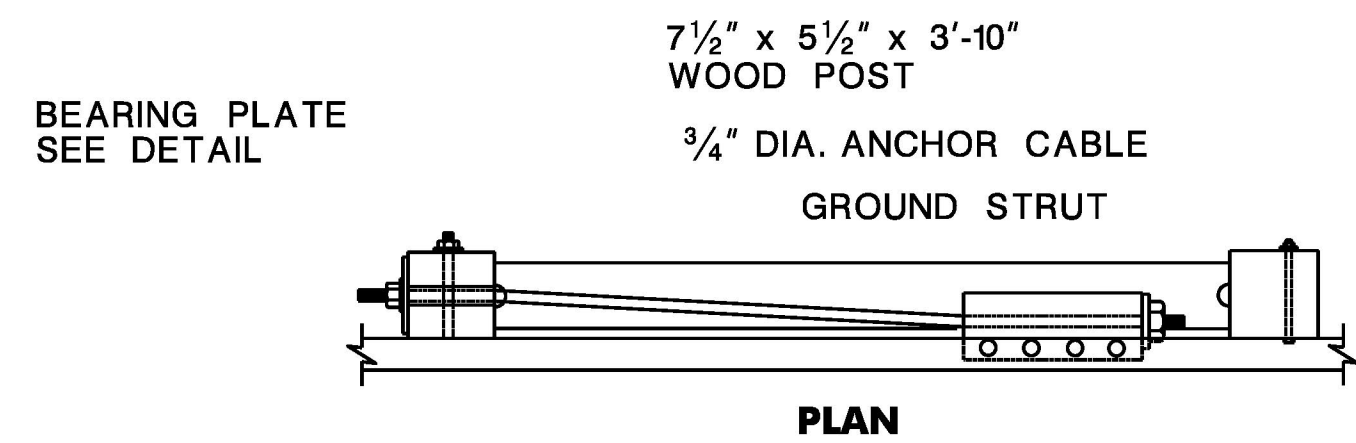
CD-609-3



CONSTRUCTION OF
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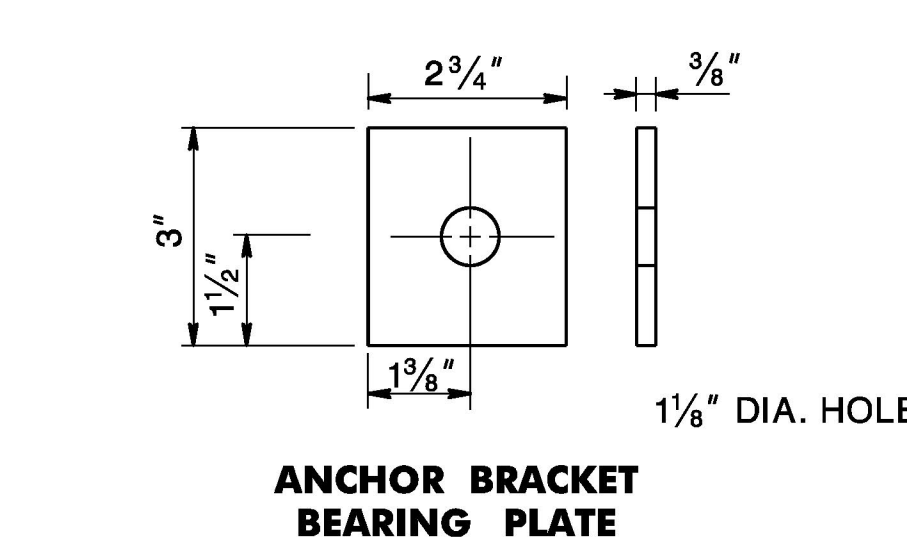
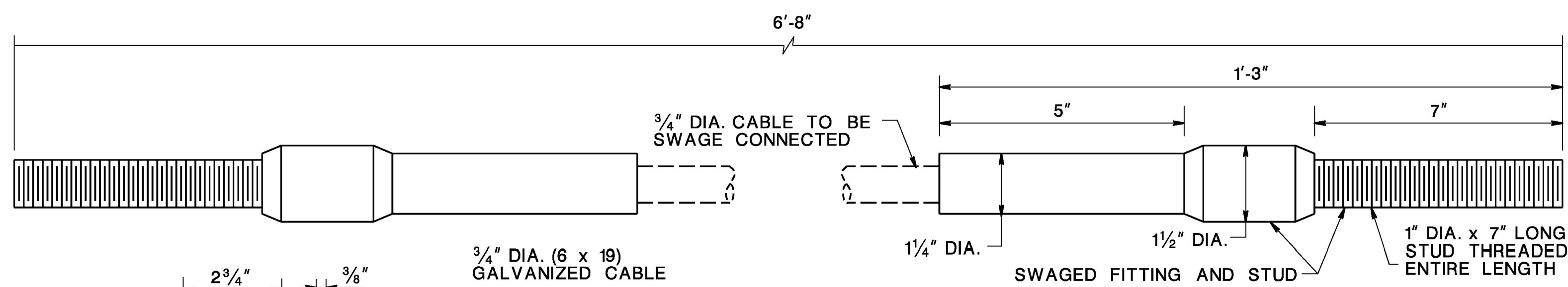
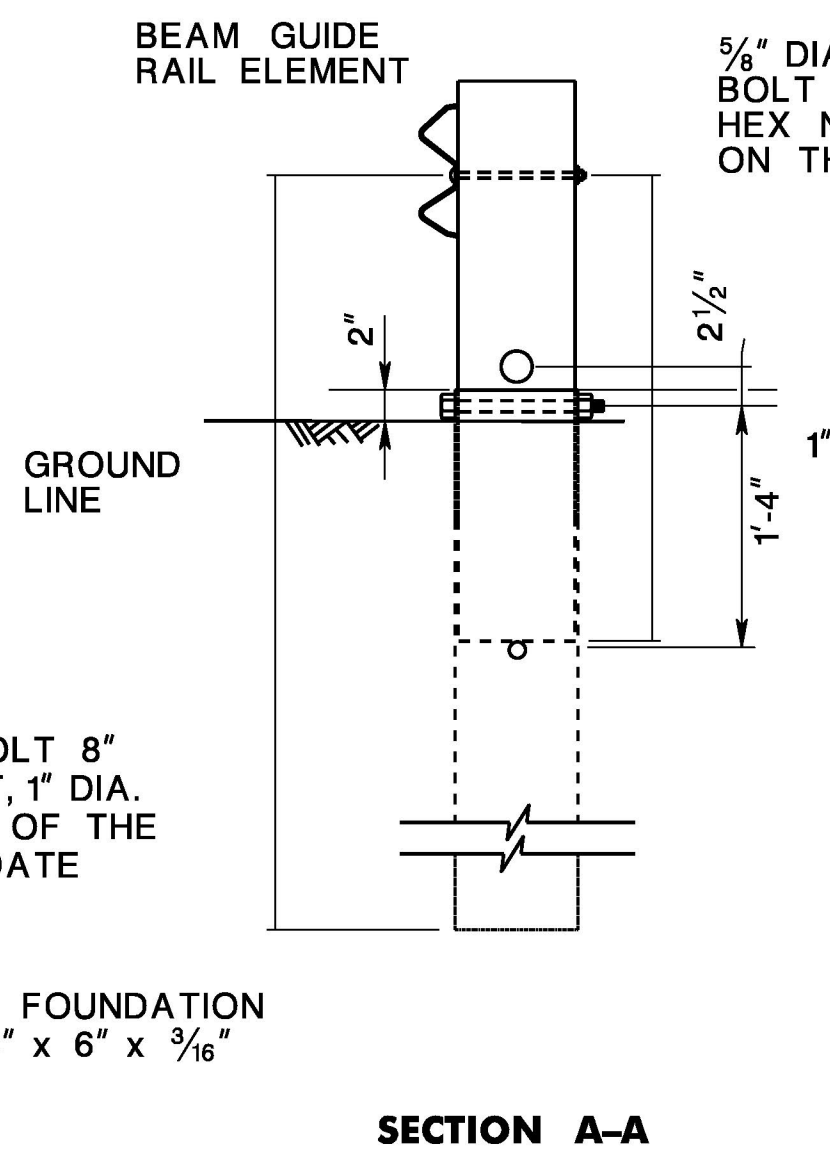
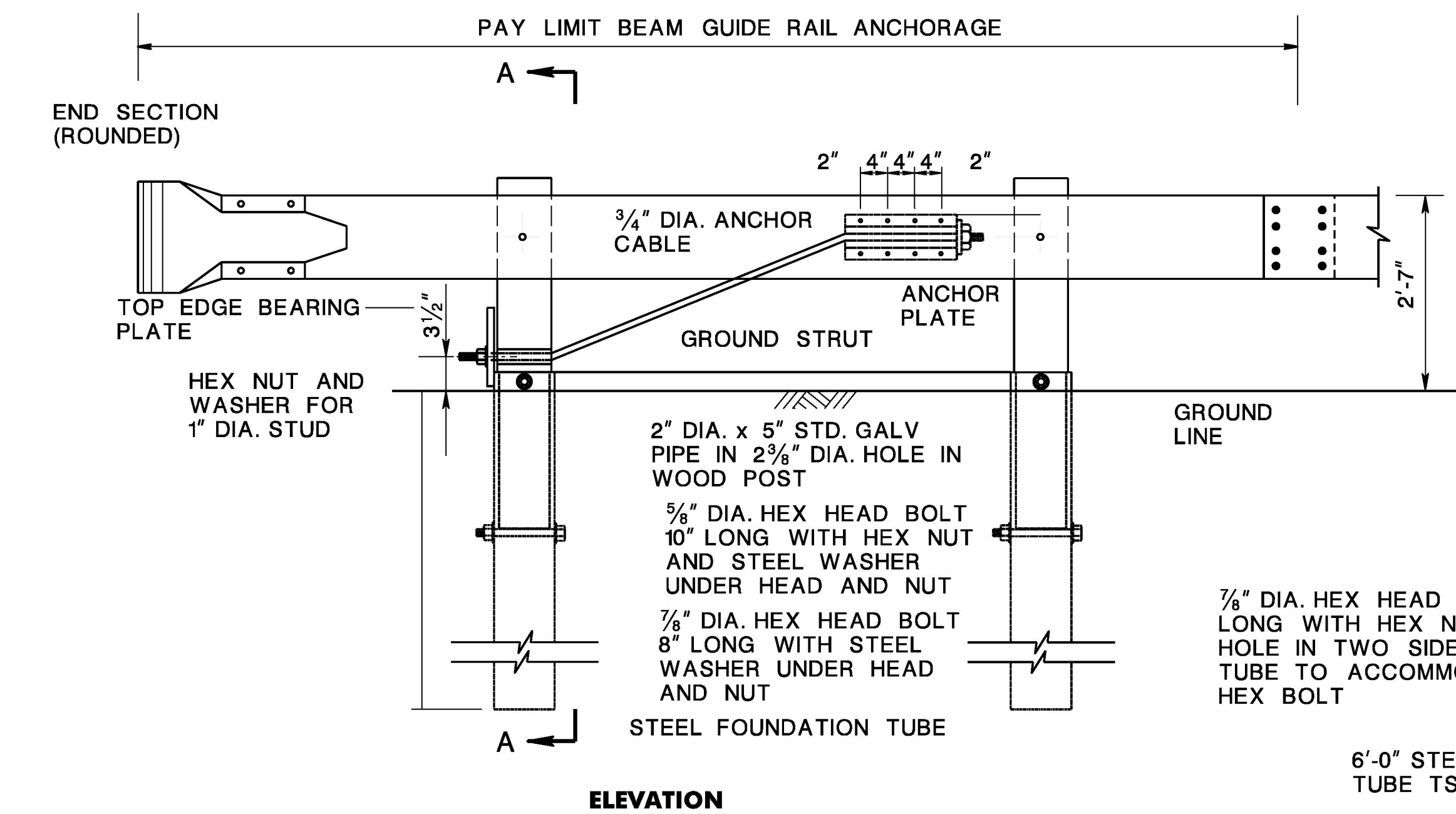
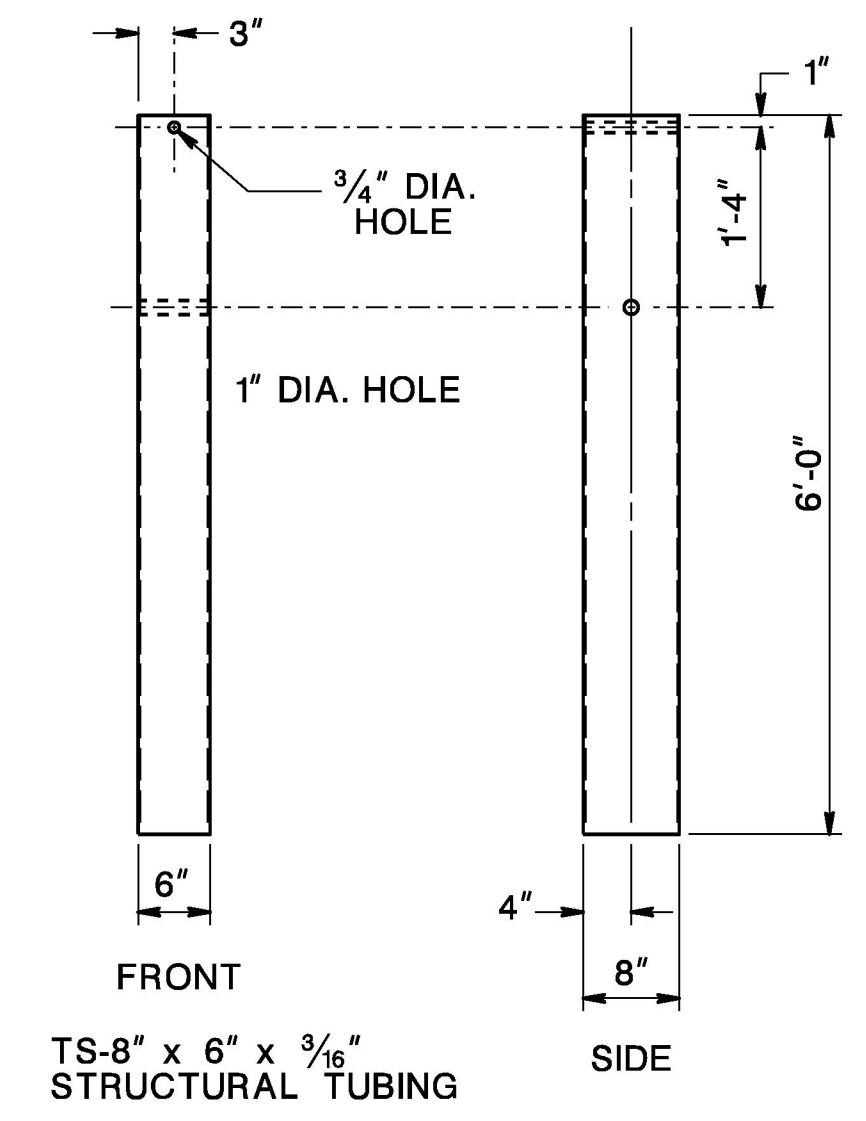
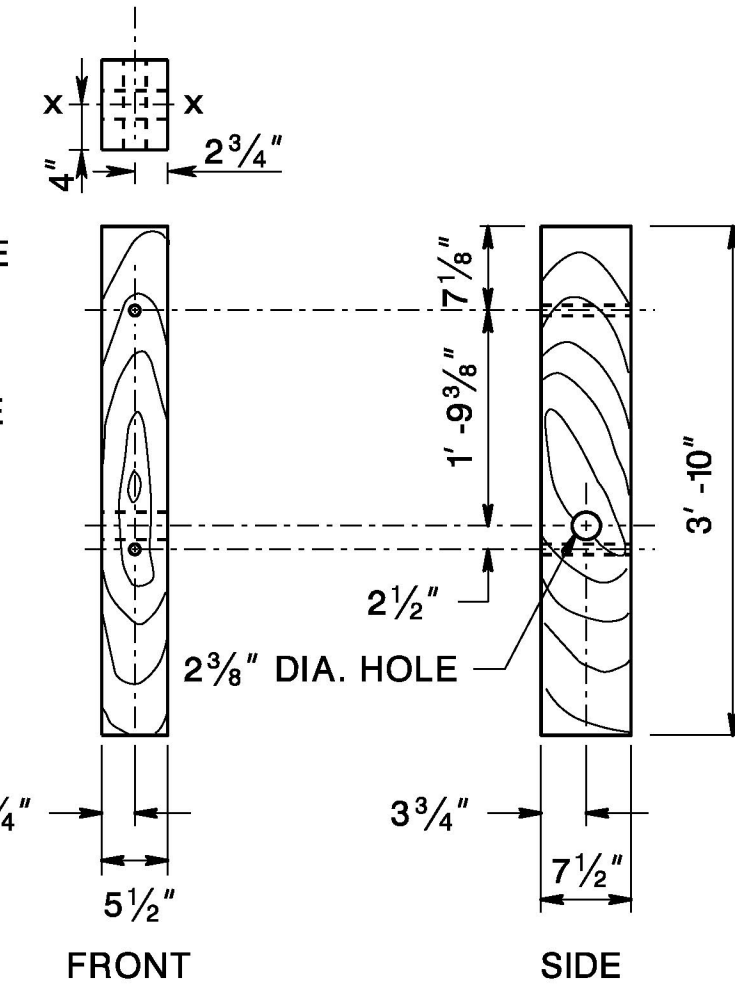
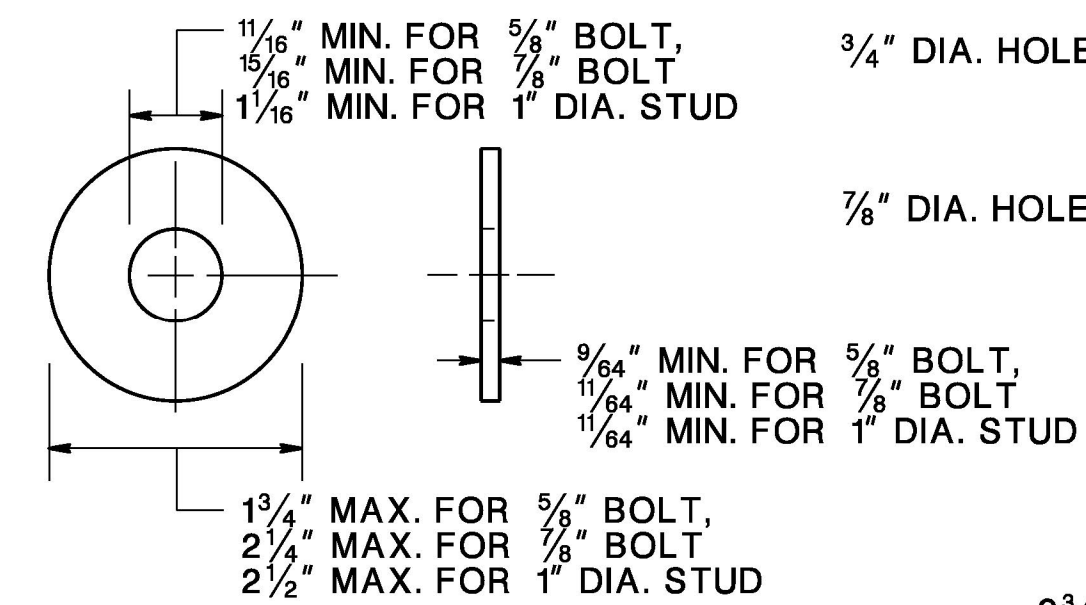
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FLD.BK.	BK ** PG **	DATE MONTH YEAR	DESIGNED ***	CHECKED
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CD-609-3.1

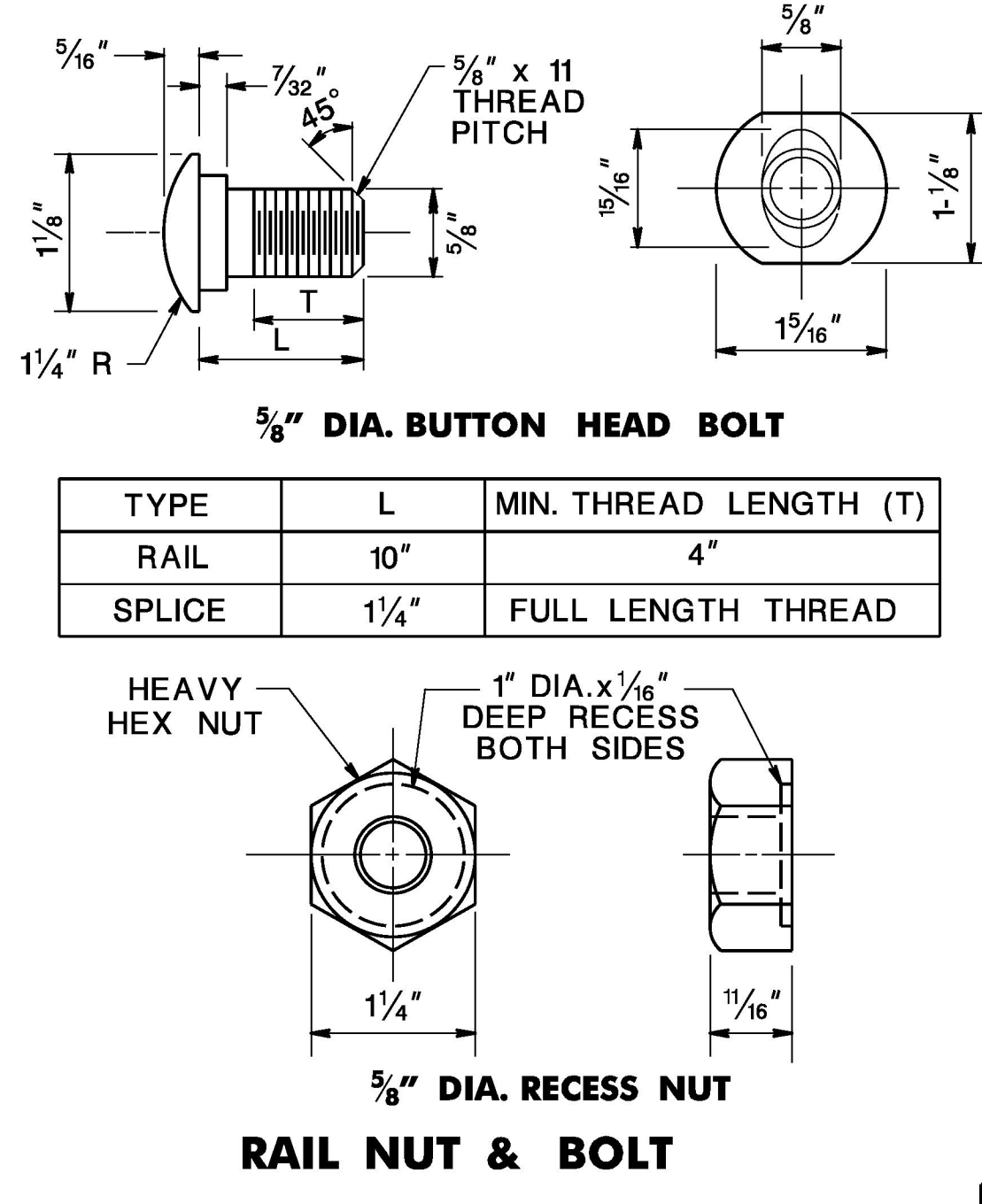
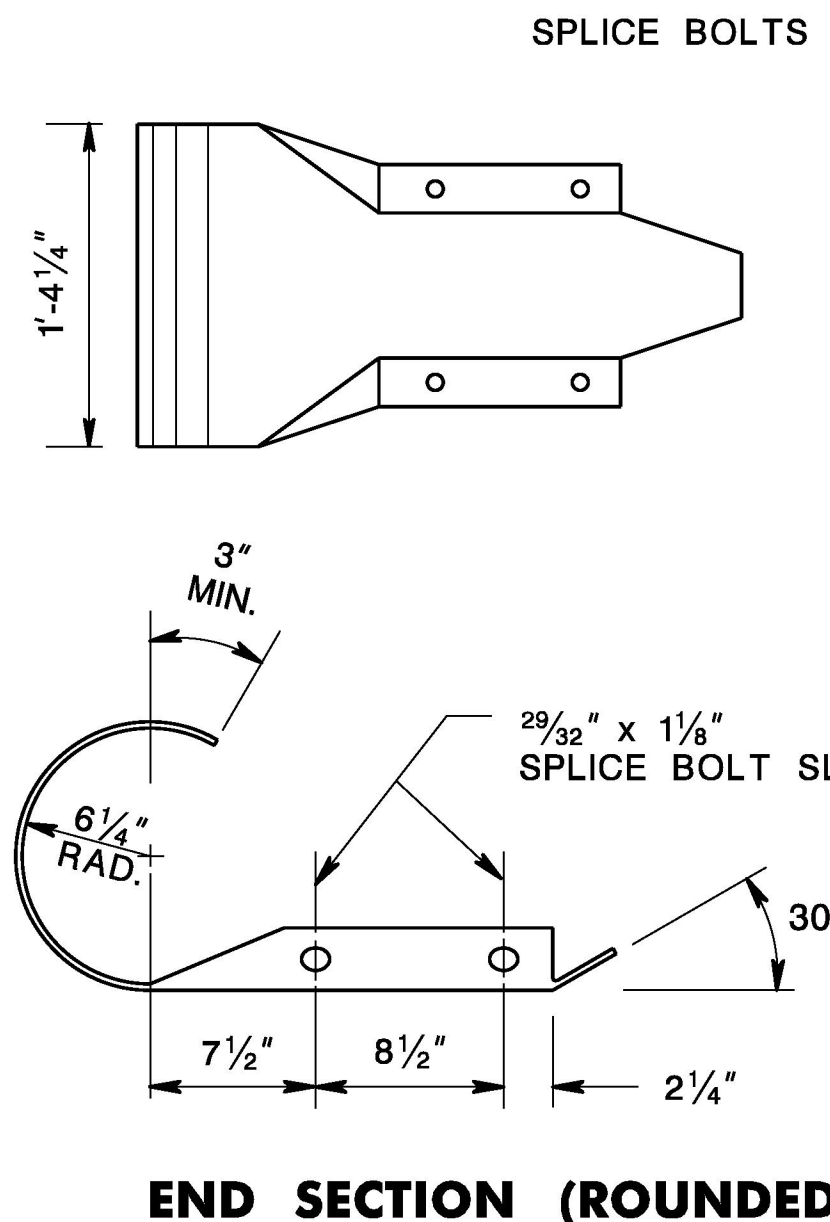
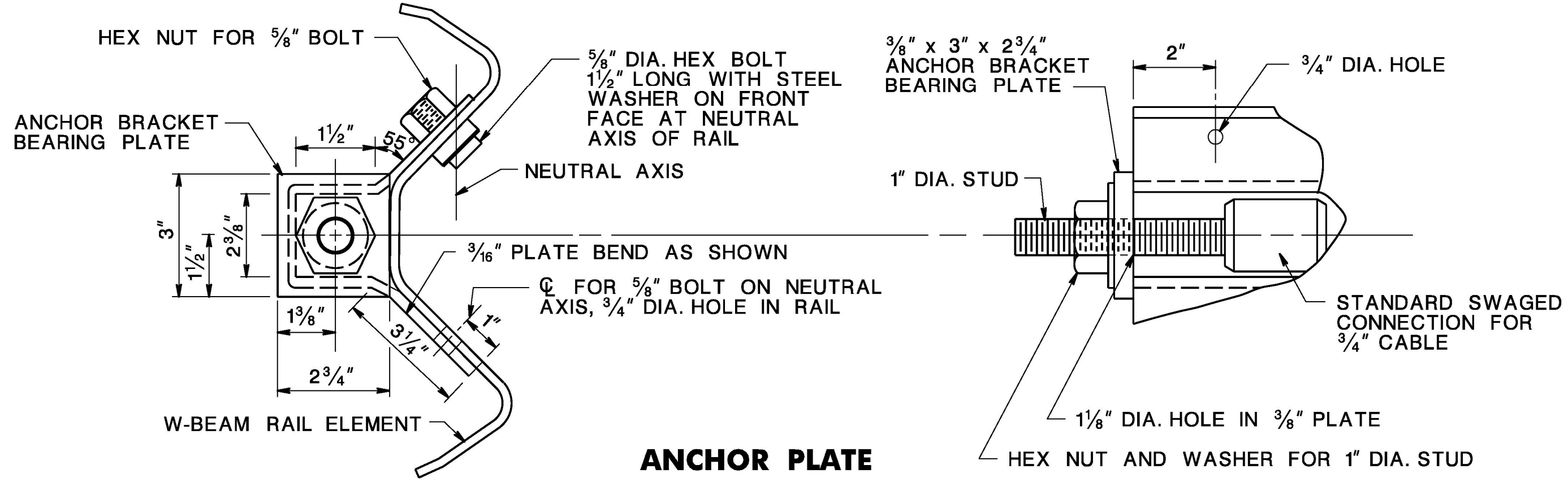


HEX NUT AND BOLT

BOLT SIZE	THREAD PITCH	A	B	C	L
5/8"	5/8-11	5/8"	15/16"	35/64"	1 1/2", 10"
7/8"	7/8-9	7/8"	1 5/16"	3/4"	8"



NOTE:
OTHER ANCHOR CABLE ASSEMBLIES MAY BE USED. MINIMUM
BREAKING STRENGTH OF ASSEMBLY TO BE 40,000 LBS.



TYPE	L	MIN. THREAD LENGTH (T)
RAIL	10"	4"
SPLICE	1 1/4"	FULL LENGTH THREAD

BEAM GUIDE RAIL ANCHORAGE (MASH TL-3) N.T.S.

CD-609-4

DATE _____ BY _____ CHK. _____

REVISIONS

CONSTRUCTION OF

FROM

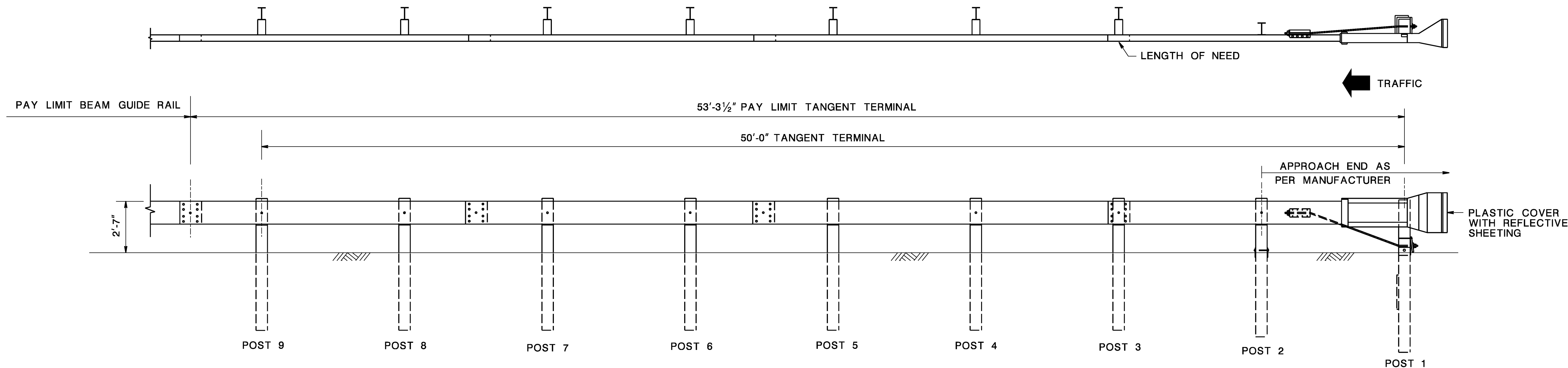
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*** TOWNSHIP

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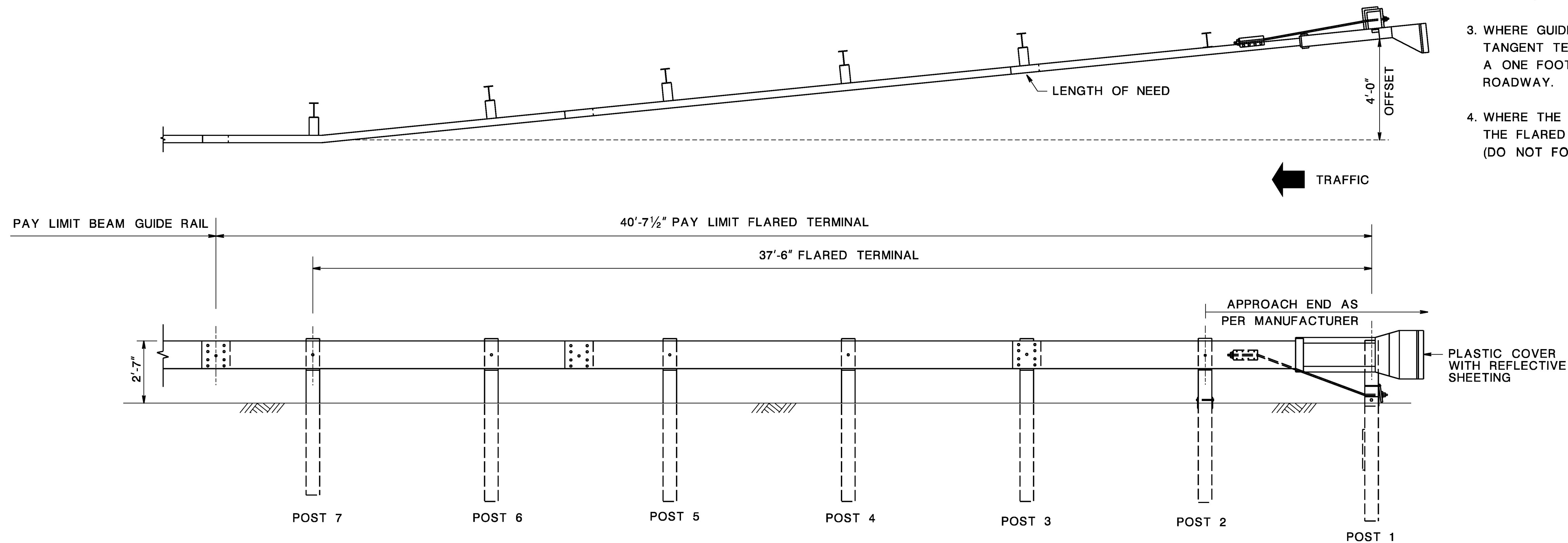
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TANGENT GUIDE RAIL TERMINAL

NOTES:

1. NUMBER OF POSTS, TYPE OF POST, POST SPACING, FLARE RATE, AND MATERIALS TO BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND THE DEPARTMENT'S QUALIFIED PRODUCTS LIST.
2. RAIL SPLICE LOCATIONS MAY VARY. SEE MANUFACTURER'S OPTIONAL PANEL CONFIGURATIONS.
3. WHERE GUIDE RAIL IS INSTALLED FLUSH WITH THE GUTTER LINE, CONSTRUCT THE TANGENT TERMINAL WITH A STRAIGHT FLARE FOR ITS ENTIRE LENGTH TO PROVIDE A ONE FOOT OFFSET SO THAT THE EXTRUDER HEAD DOES NOT PROTRUDE INTO THE ROADWAY.
4. WHERE THE DOWNSTREAM GUIDE RAIL IS ON A HORIZONTAL CURVE, CONSTRUCT THE FLARED OR TANGENT TERMINAL IN A STRAIGHT LINE AS SHOWN ON THIS DETAIL (DO NOT FOLLOW THE HORIZONTAL CURVE).



FLARED GUIDE RAIL TERMINAL

FLARED GUIDE RAIL TERMINAL
AND
TANGENT GUIDE RAIL TERMINAL
(MASH TL-3)

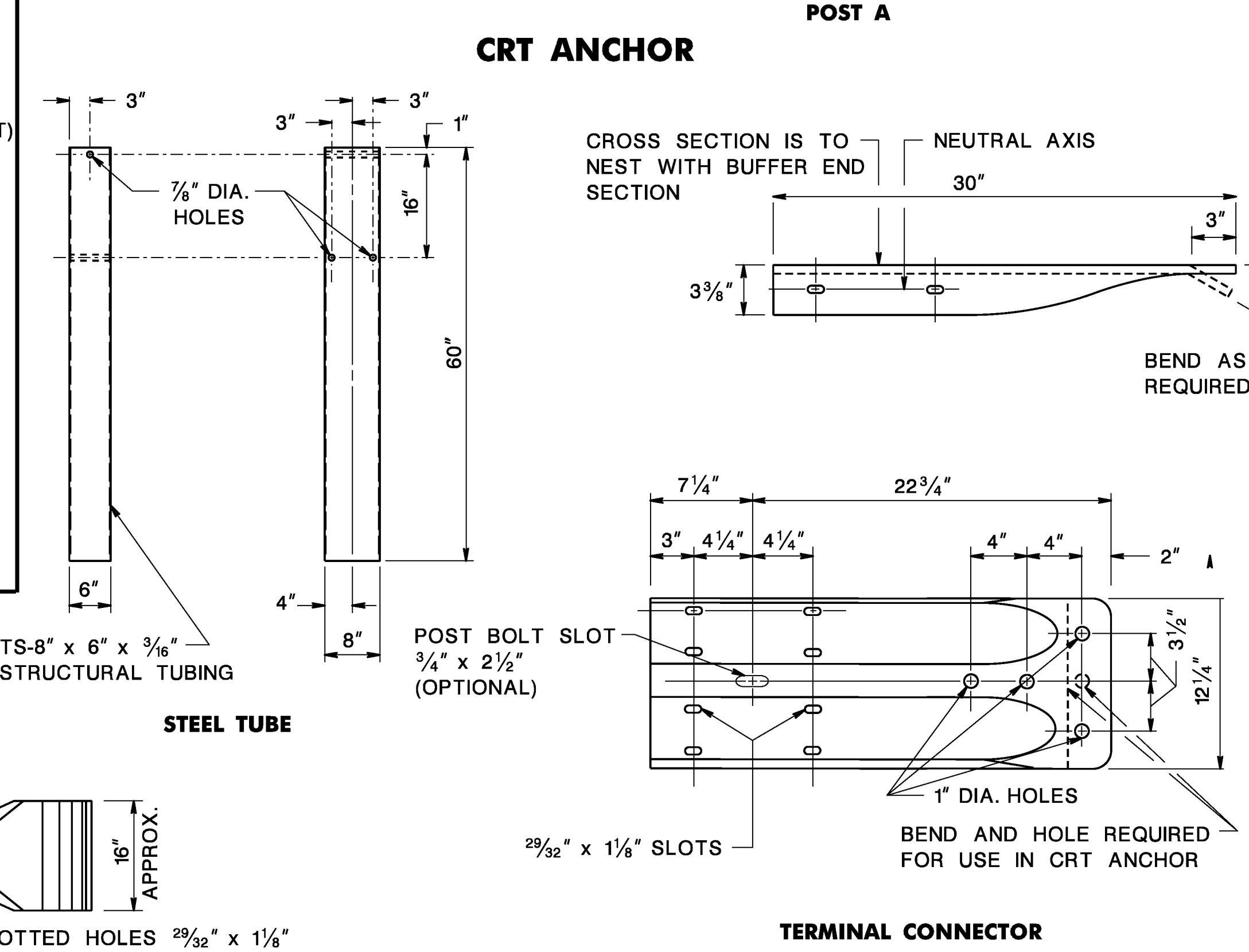
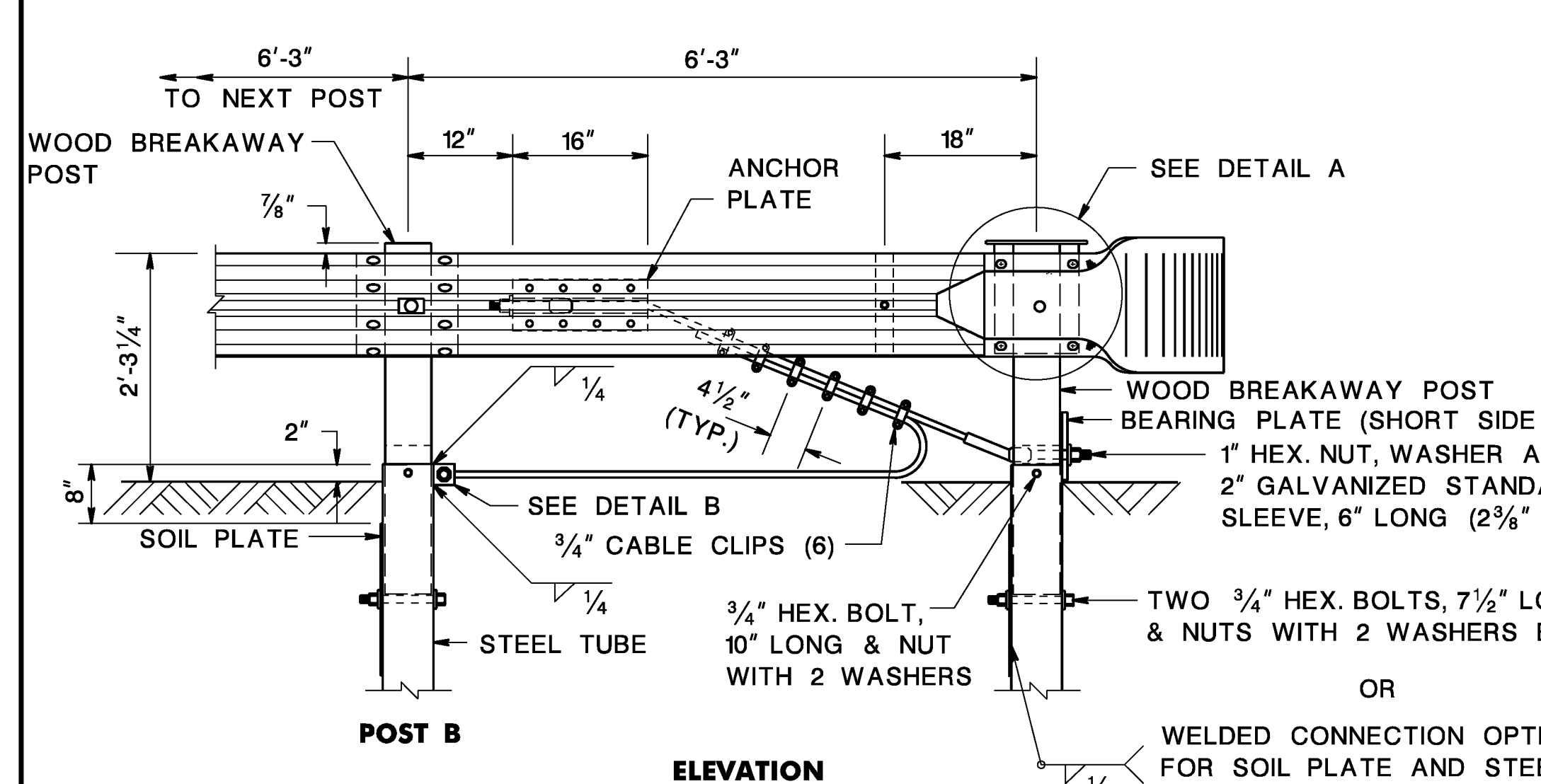
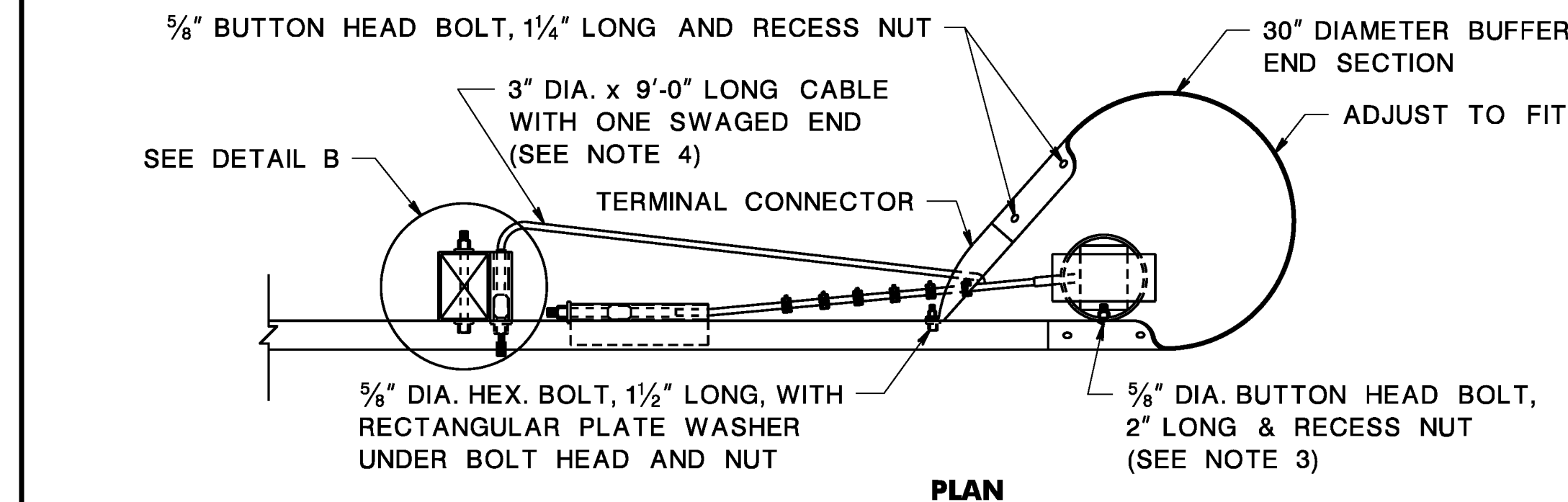
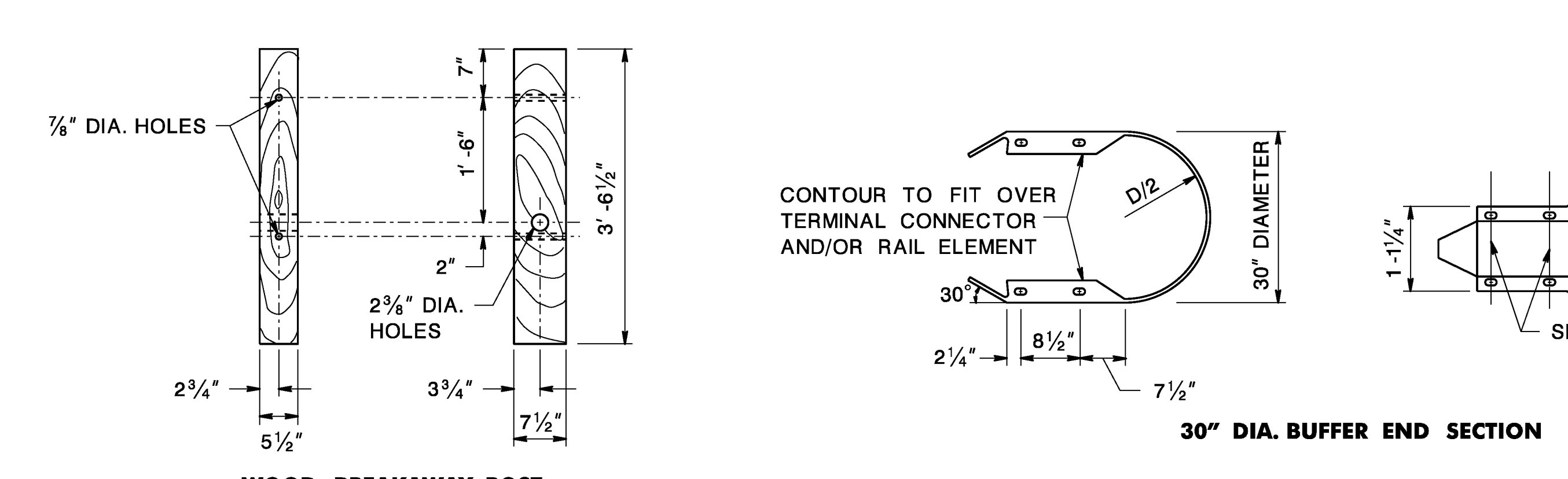
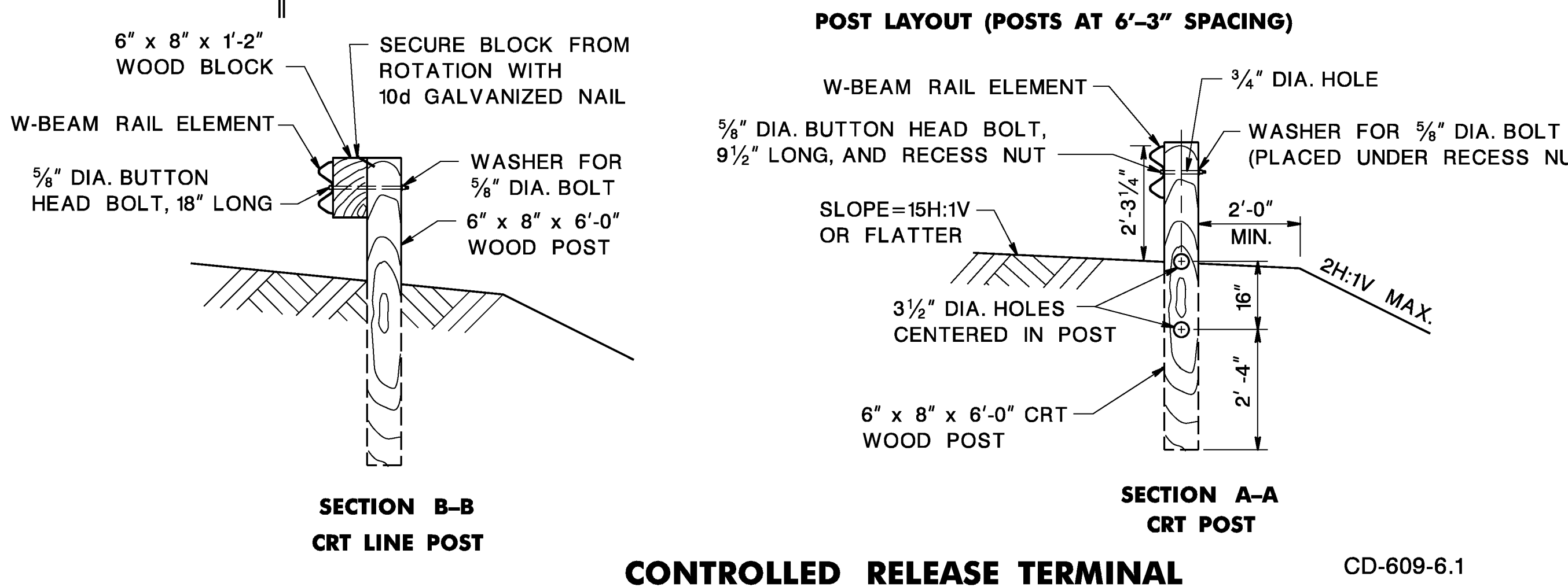
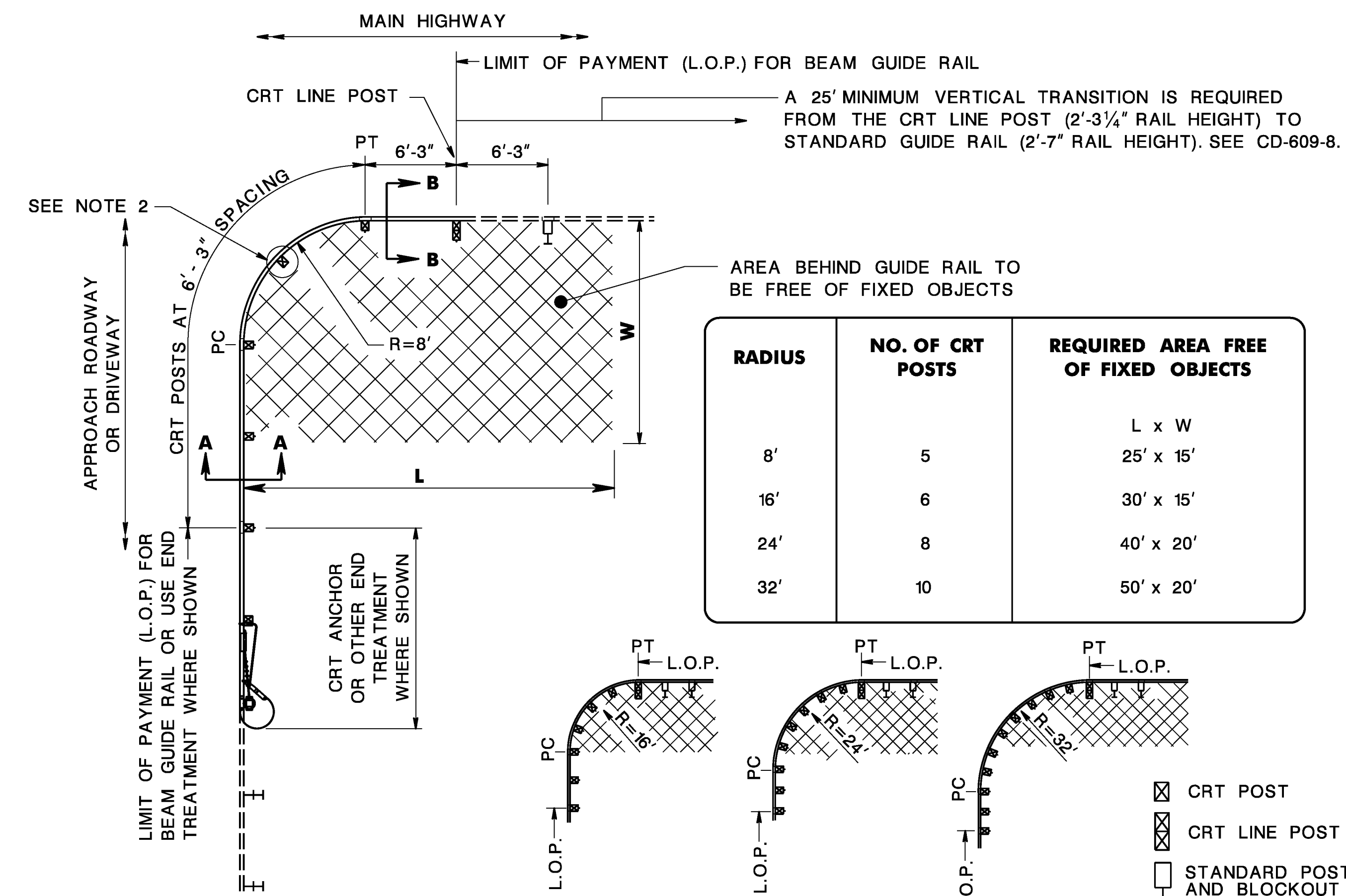
N.T.S.

CD-609-5

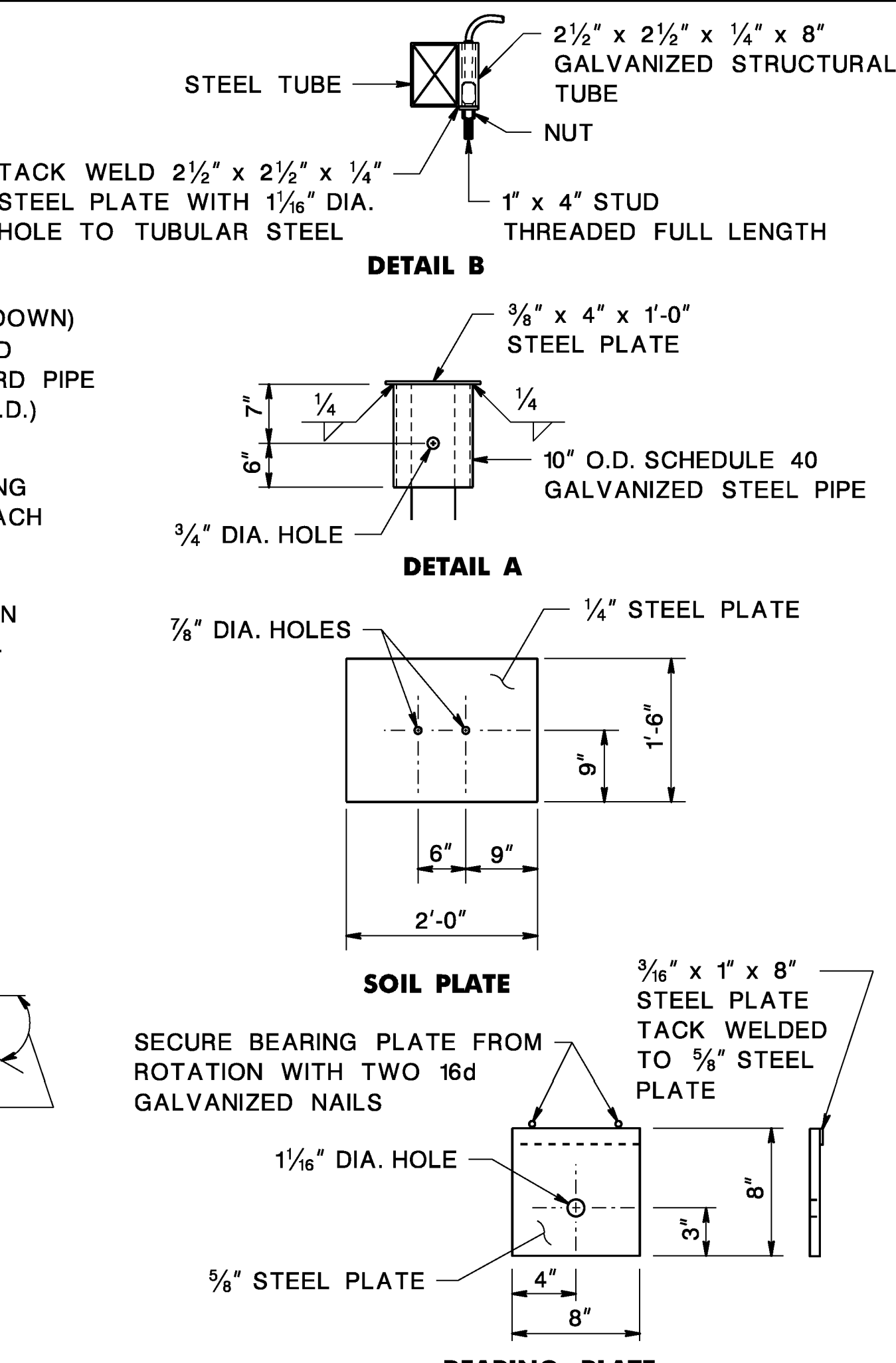
DATE	REVISIONS	BY	CHE.
CONSTRUCTION OF			
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TO			
*** TOWNSHIP			

FLD.BK.	DATE	DESIGNED	CHECKED
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AS SHOWN	***		
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CD-609-5.1



- GENERAL NOTES**
- NO WASHERS ARE USED ON THE 5/8" DIA. BUTTON HEAD BOLTS CONNECTING THE RAIL TO THE CONTROLLED RELEASE TERMINAL (CRT) POSTS.
 - FOR 8 FOOT RADIUS, THE RAIL ELEMENT NOT TO BE BOLTED TO THE CRT POST AT THE CENTER OF THE NOSE AS SHOWN.
 - ATTACH W-BEAM TO STEEL PIPE WITH BUTTON HEAD BOLT WITH NO WASHER. NO CONNECTION TO POST IS REQUIRED.
 - WIRE ROPE CABLE TO CONFORM TO THE REQUIREMENTS OF AASHTO M30 AND BE 3/4" DIAMETER PREFORMED, 6 x 19, WIRE STRAND CORE OR INDEPENDENT WIRE ROPE CORE, GALVANIZED, RIGHT REGULAR LAY, MANUFACTURED OF IMPROVED PLOW STEEL WITH A MINIMUM BREAKING STRENGTH OF 42,800 POUNDS.
 - STRUCTURAL TUBING TO CONFORM TO ASTM A500.
- CD-609-6.3**



CONTROLLED RELEASE TERMINAL (NCHRP 230 TL-3)

N.T.S.

CD-609-6

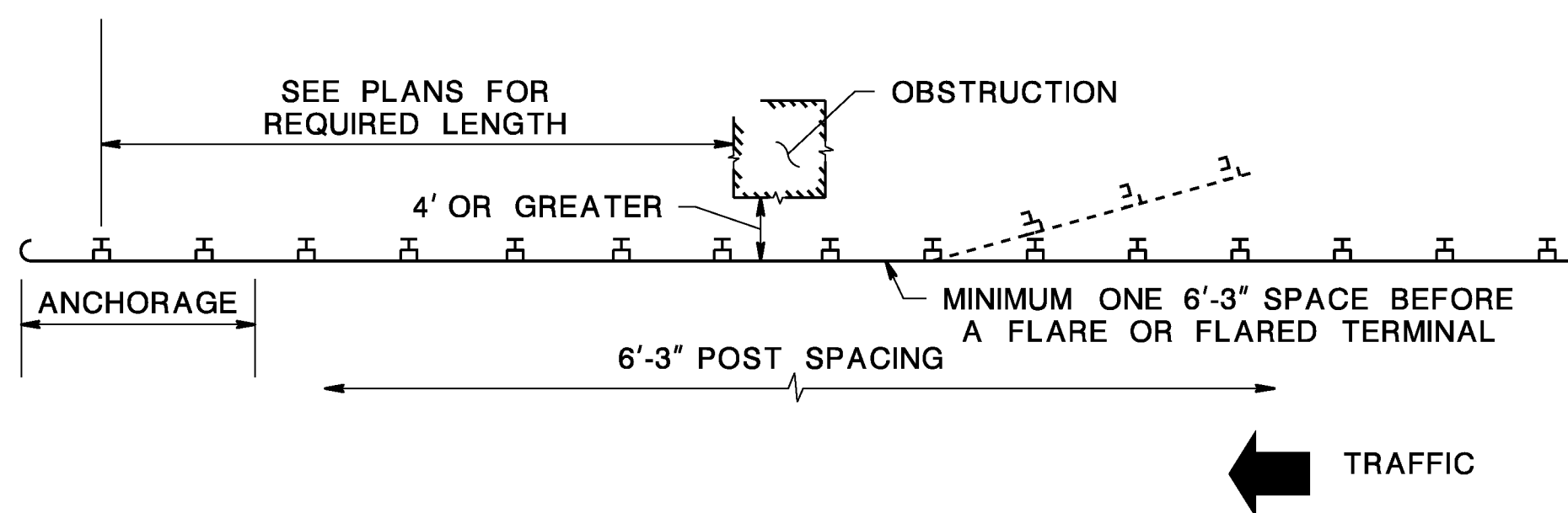
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CONSTRUCTION OF FROM TO *** TOWNSHIP

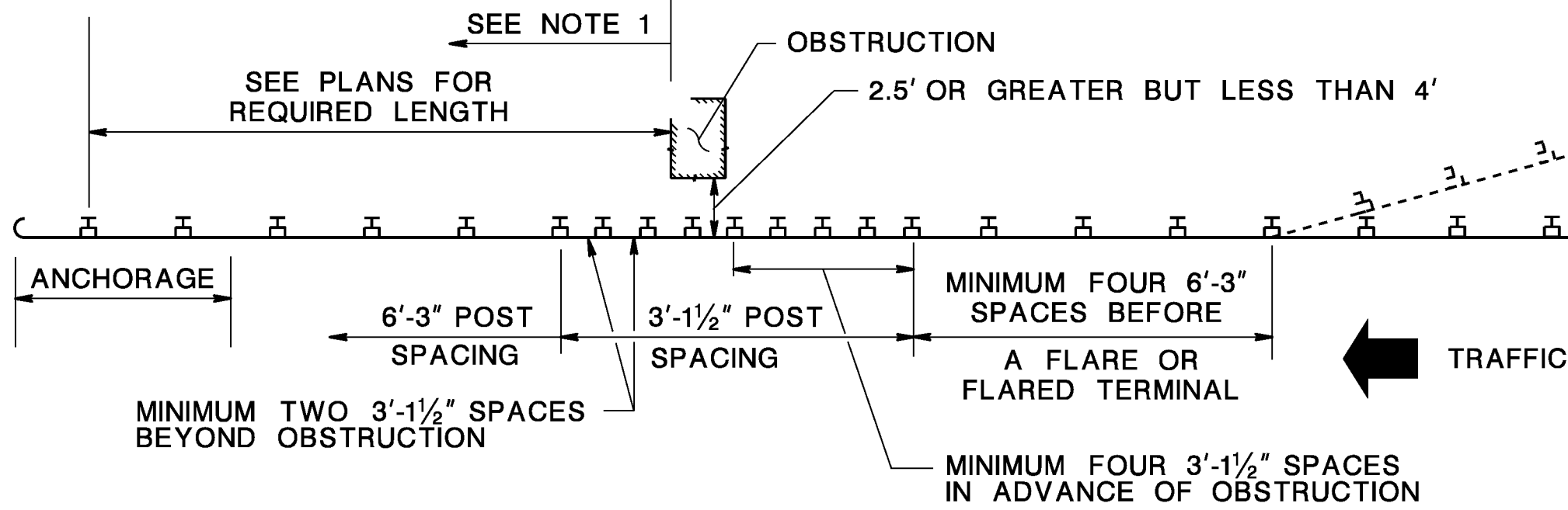
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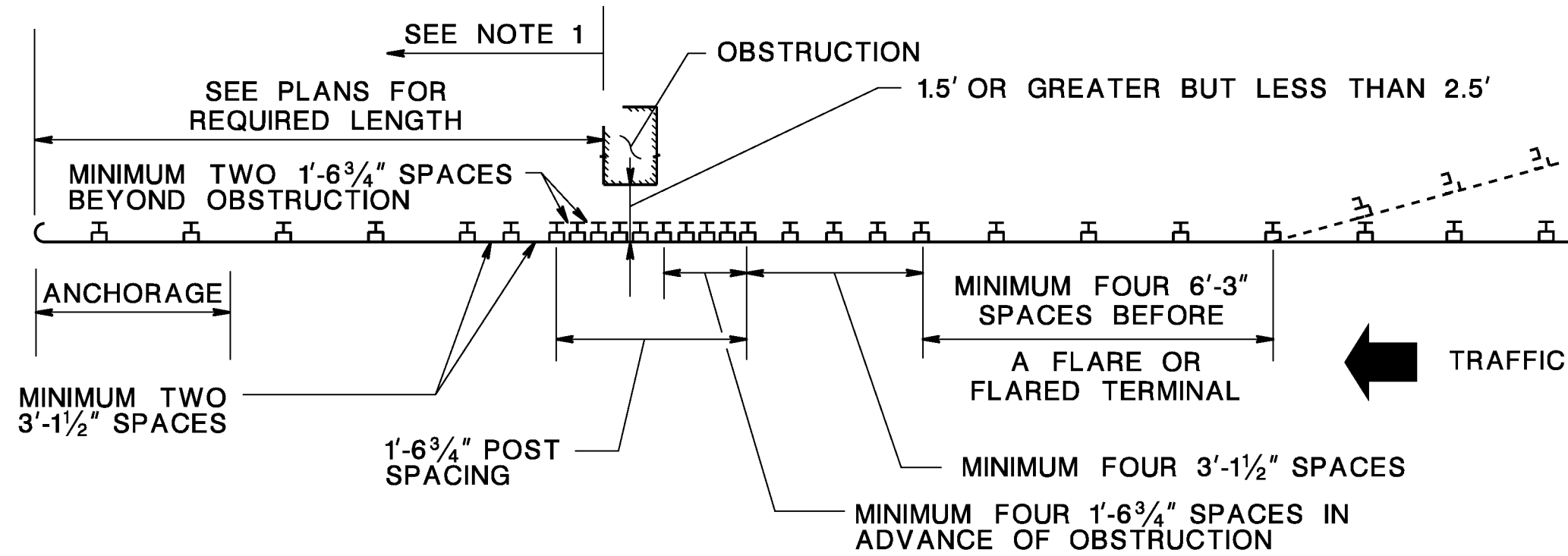
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WHERE CLEARANCE FROM FACE OF RAIL TO OBSTRUCTION IS 4' OR GREATER (SEE NOTE 2)



WHERE CLEARANCE FROM FACE OF RAIL TO OBSTRUCTION IS 2.5' OR GREATER BUT LESS THAN 4' (SEE NOTE 2)

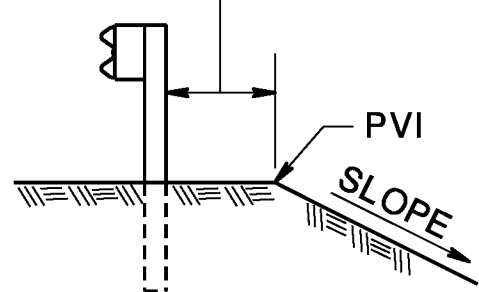


WHERE CLEARANCE FROM FACE OF RAIL TO OBSTRUCTION IS 1.5' OR GREATER BUT LESS THAN 2.5' (SEE NOTE 2)

- NOTES:**
1. WHERE AN APPROACH END TREATMENT AT THE TRAILING END OF GUIDE RAIL IS SHOWN ON THE PLANS, THE POST SPACING REQUIREMENTS SHALL BE THE SAME AS THE APPROACH END.
 2. IN A FILL SECTION WHERE THE DISTANCE FROM THE BACK OF THE POST TO THE PVI IS LESS THAN 1' AND THE SLOPE IS STEEPER THAN 3:1, THE MINIMUM CLEARANCE FROM THE FACE OF THE RAIL TO AN OBSTRUCTION IS INCREASED BY 1' DUE TO INCREASED POST DEFLECTION.
 3. ADDITIONAL POSTS AND BLOCKOUTS WILL BE PAID FOR UNDER PAY ITEM "BEAM GUIDE RAIL POST".

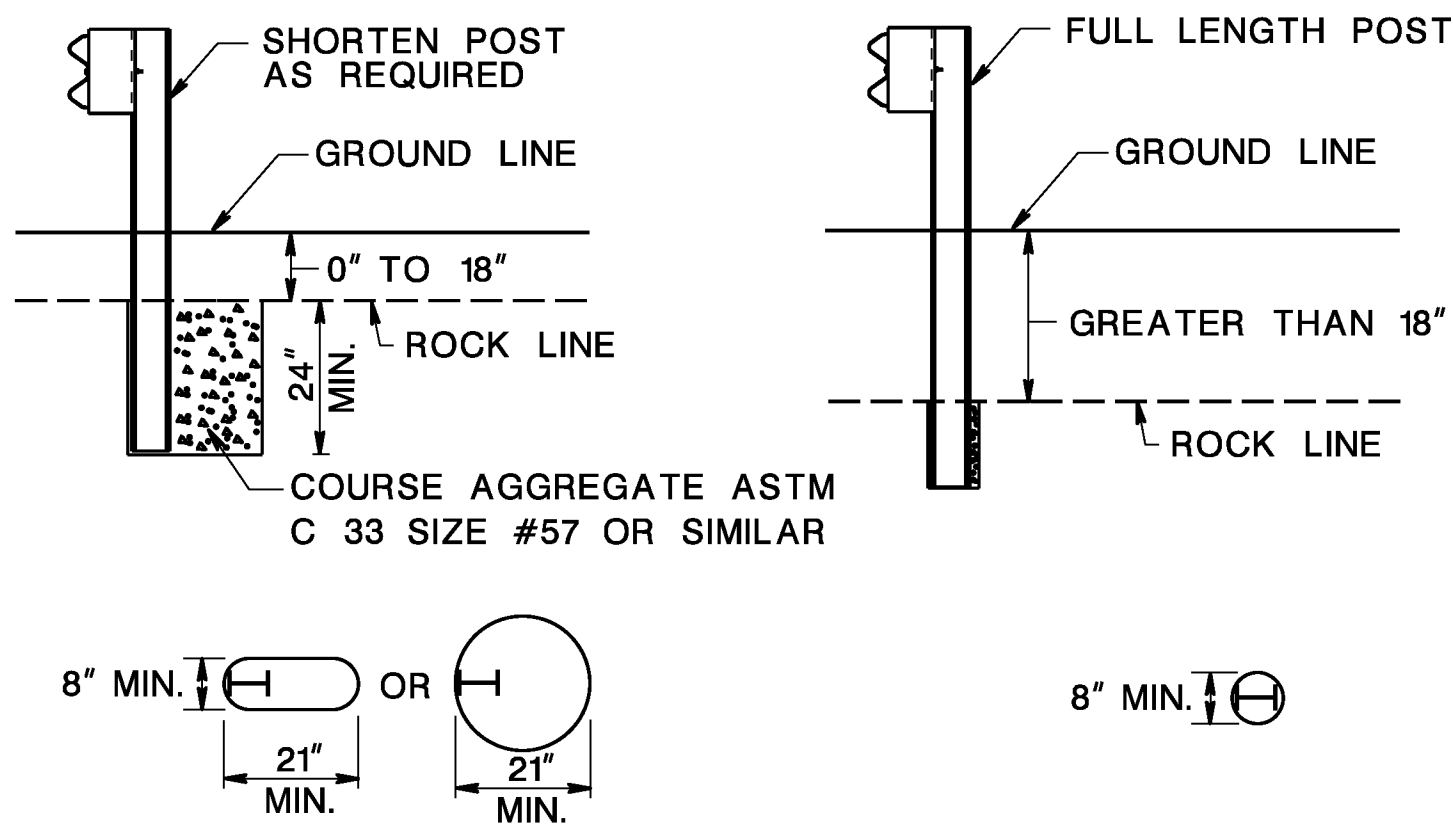
CLEARANCE FROM FACE OF RAIL TO OBSTRUCTION

DISTANCE FROM BACK OF POST TO PVI	SLOPE	ADDITIONAL POST LENGTH
IF LESS THAN 2' BUT GREATER OR EQUAL TO 1'	6:1 OR FLATTER STEEPER THAN 6:1 TO 3:1 STEEPER THAN 3:1 TO 2:1	NO CHANGE 1' 2'
IF LESS THAN 1'	6:1 OR FLATTER STEEPER THAN 6:1 TO 3:1 STEEPER THAN 3:1 TO 2:1	1' 2' 3'



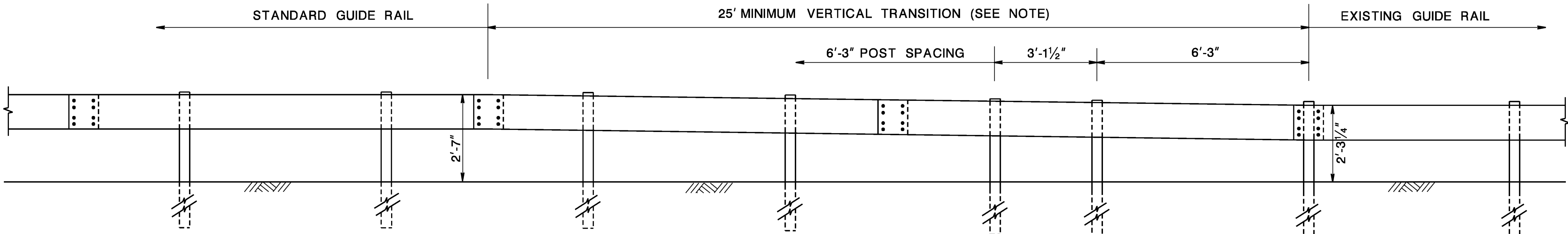
ADDITIONAL LENGTH BEAM GUIDE RAIL POSTS

CD-609-8.2



GUIDE RAIL POST INSTALLATION IN ROCK

CD-609-8.3




NOTE:
WHERE TRANSITIONING TO EXISTING GUIDE RAIL, AN END TERMINAL, OR A CRASH CUSHION MOUNTED AT A HEIGHT OTHER THAN 2'-7", THE VERTICAL TRANSITION SHALL BE ACCOMPLISHED IN A MINIMUM LENGTH OF 12'-6" FOR EACH 2" OF VERTICAL CHANGE.

VERTICAL TRANSITION TO EXISTING 27 1/4" HIGH GUIDE RAIL

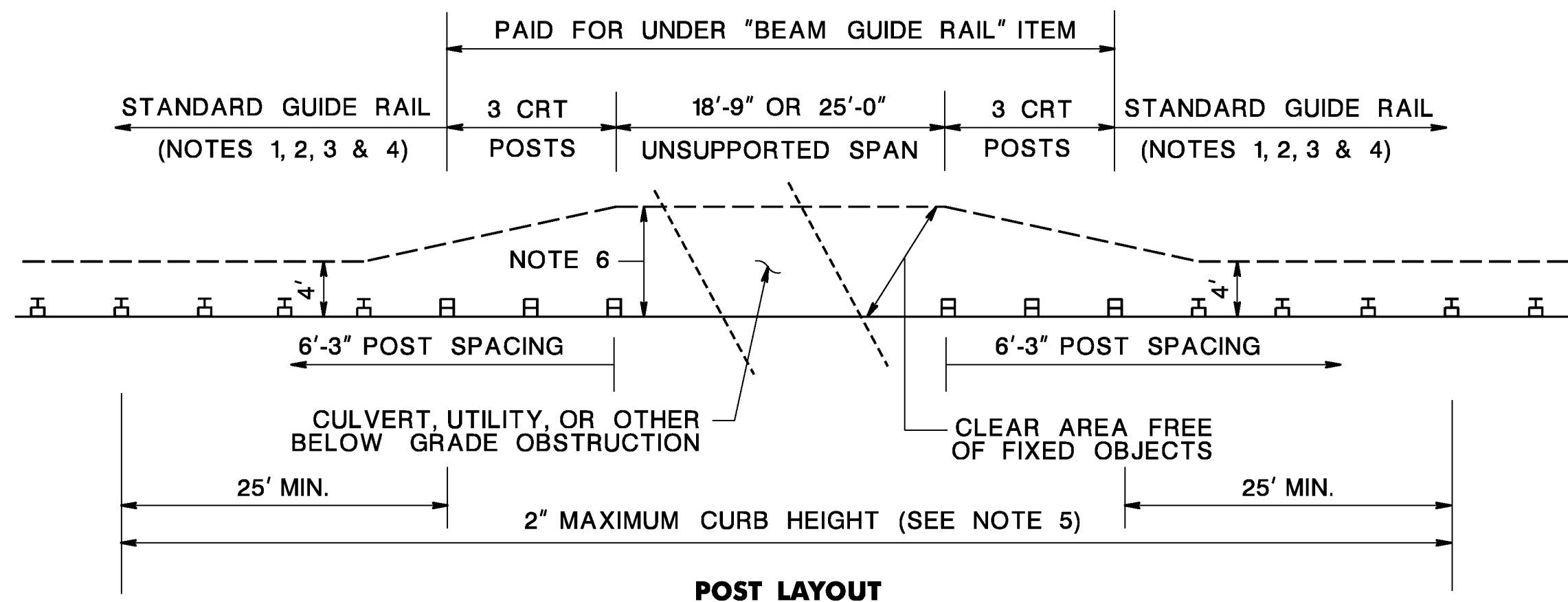
BEAM GUIDE RAIL TREATMENTS

N.T.S.

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CONSTRUCTION OF					
FROM					
TO					
*** TOWNSHIP					

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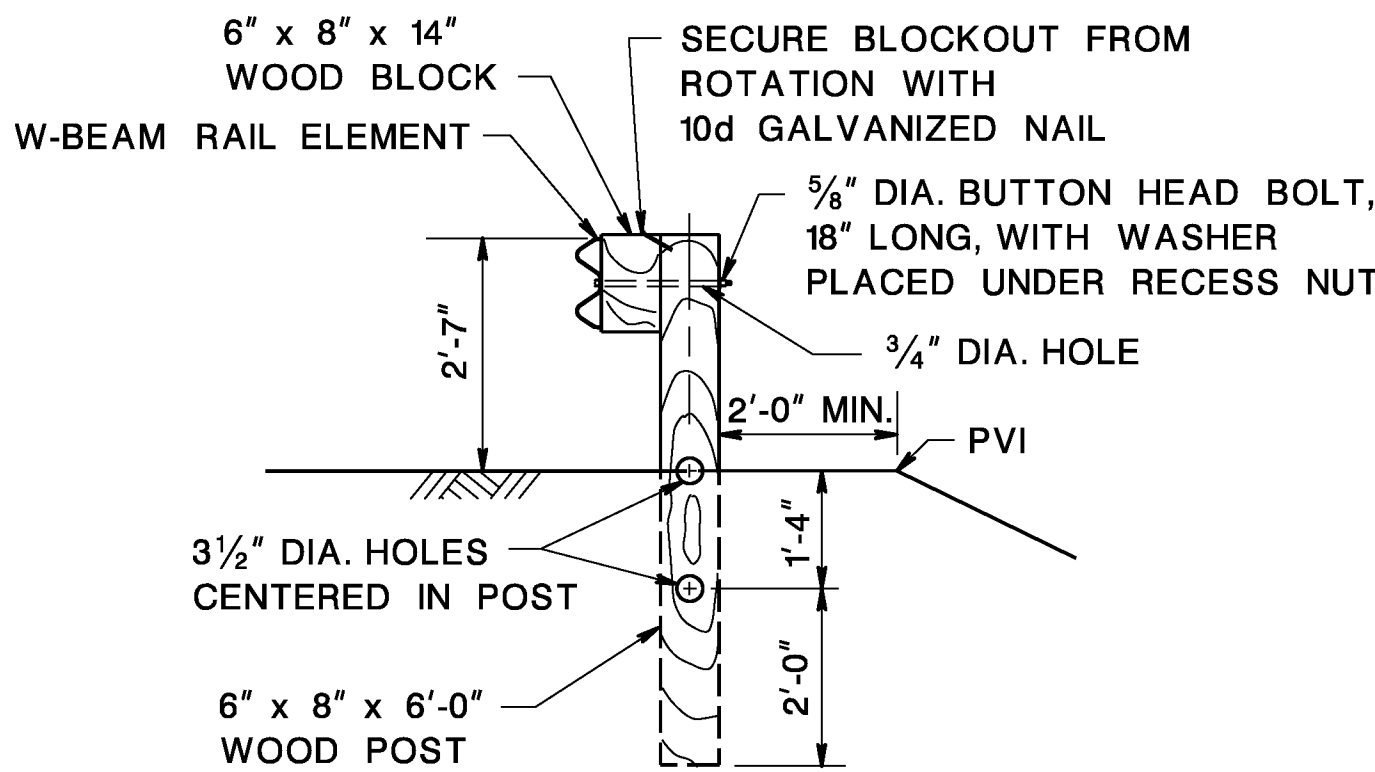
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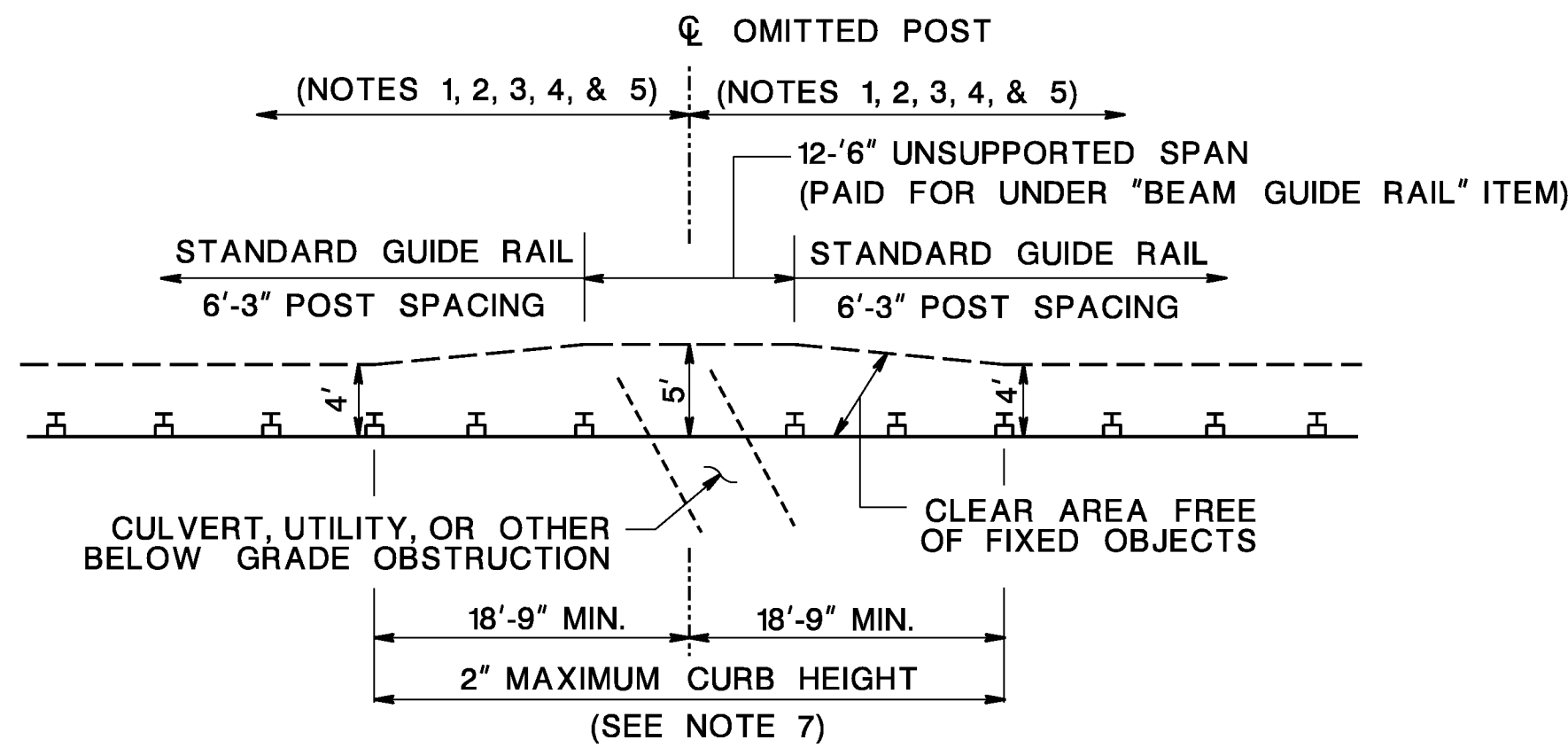
NOTES:

1. A MINIMUM OF TEN 6'-3" POST SPACES OF TANGENT GUIDE RAIL ARE REQUIRED BETWEEN THE OUTER CRT POSTS OF CONSECUTIVE 18-9" OR 25'-0" UNSUPPORTED SPANS.
2. THE OUTER CRT POSTS MUST BE A MINIMUM OF TEN 6'-3" POST SPACES FROM THE APPROACH END OF A TANGENT TERMINAL, FOURTEEN 6'-3" POST SPACES FROM THE APPROACH END OF A FLARED TERMINAL, AND EIGHT 6'-3" POST SPACES FROM THE BEGINNING OF A FLARE OR REDUCED POST SPACING.
3. THE OUTER CRT POSTS MUST BE A MINIMUM OF TEN 6'-3" POST SPACES FROM THE LAST POST OF AN END ANCHORAGE.
4. THE OUTER CRT POSTS MUST BE A MINIMUM OF SIX 6'-3" POST SPACES FROM A THRIE BEAM TO W-BEAM ASYMMETRICAL TRANSITION SECTION.
5. WHERE THERE IS CURB, THE MAXIMUM CURB HEIGHT IS 2" FROM 25' IN ADVANCE OF THE FIRST CRT POST ON THE APPROACH END TO 25' PAST THE LAST CRT POST ON THE TRAILING END.
6. THE REQUIRED CLEAR AREA FREE OF FIXED OBJECTS IS 7' FOR AN 18'-9" UNSUPPORTED SPAN AND 8' FOR A 25'-0" UNSUPPORTED SPAN.
7. IF THERE IS A VERTICAL DROPOFF BEHIND THE UNSUPPORTED SPAN, THE FACE OF RAIL MUST BE A MINIMUM OF 3' FROM THE DROPOFF.

18'-9" OR 25'-0" UNSUPPORTED SPAN



CRT POST FOR UNSUPPORTED SPAN



NOTES:

1. A MINIMUM OF NINE 6'-3" POST SPACES OF TANGENT GUIDE RAIL ARE REQUIRED BETWEEN TWO CONSECUTIVE SINGLE POST OMISSIONS.
2. THE OMITTED POST MUST BE A MINIMUM OF TEN 6'-3" POST SPACES FROM THE APPROACH END OF A TANGENT TERMINAL, ELEVEN 6'-3" POST SPACES FROM THE APPROACH END OF A FLARED TERMINAL, AND FIVE 6'-3" POST SPACES FROM THE BEGINNING OF A FLARE OR REDUCED POST SPACING.
3. THE OMITTED POST MUST BE A MINIMUM OF TEN 6'-3" POST SPACES FROM THE LAST POST OF AN END ANCHORAGE.
4. THE OMITTED POST MUST BE A MINIMUM OF SIX 6'-3" POST SPACES FROM A THRIE BEAM TO W-BEAM ASYMMETRICAL TRANSITION SECTION.
5. THE OMITTED POST MUST BE A MINIMUM OF SEVEN 6'-3" POST SPACES FROM AN OUTER CRT POST OF AN 18'-9" OR 25'-0" UNSUPPORTED SPAN.
6. THE REQUIRED CLEAR AREA FREE OF FIXED OBJECTS IS 5' BEHIND A 12'-6" UNSUPPORTED SPAN.
7. WHERE THERE IS CURB, THE MAXIMUM CURB HEIGHT IS 2" FOR A MINIMUM LENGTH OF 18'-9" IN ADVANCE OF AND ON THE TRAILING END OF THE OMITTED POST.

12'-6" UNSUPPORTED SPAN

CD-609-8A.2

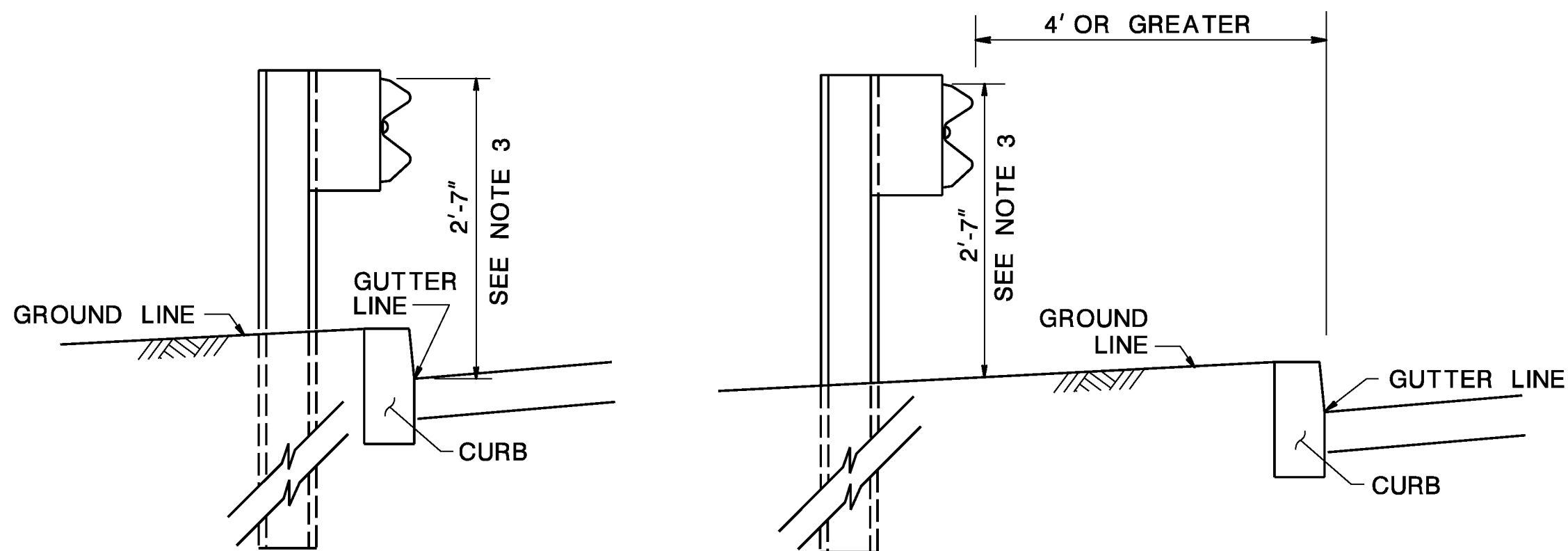
NOTES:

1. WHERE GUIDERAIL ADJACENT TO CURB IS FLUSH WITH THE GUTTERLINE (6" OFFSET FOR SLOPING CURB) AND IS TAPERED TO AN OFFSET OF 4' OR GREATER, A VERTICAL TRANSITION IS REQUIRED. THE VERTICAL TRANSITION SHALL BE ACCOMPLISHED IN A MINIMUM LENGTH OF 12'-6" FOR EACH 2" OF VERTICAL CHANGE.
2. SEE PLANS FOR GUIDE RAIL OFFSET.
3. 2'-10" FOR MODIFIED THRIE BEAM GUIDE RAIL.
4. FOR SLOPING CURB, FACE OF RAIL IS OFFSET 6" FROM GUTTER LINE.

BEAM GUIDE RAIL TREATMENTS (MASH TL-3)

N.T.S.

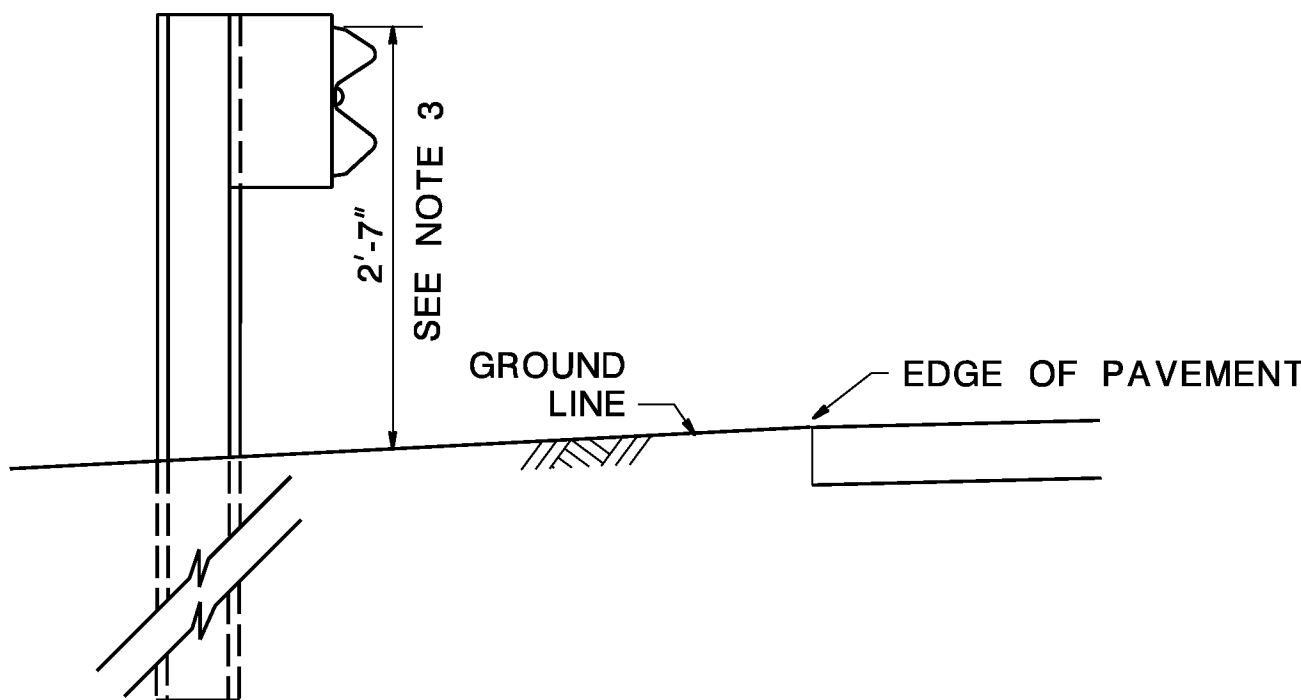
CD-609-8A



GUIDE RAIL FLUSH WITH GUTTERLINE (SEE NOTE 4)

GUIDE RAIL OFFSET 4' OR GREATER FROM GUTTERLINE


RAIL HEIGHT DETERMINATION WITH CURB



RAIL HEIGHT DETERMINATION WITHOUT CURB

RAIL HEIGHT DETERMINATION

CD-609-8A.3

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