



Purchasing Division

### **ADDENDUM NO. 3**

**DATE:** December 14, 2020  
**FROM:** City of Grand Junction Purchasing Division  
**TO:** All Offerors  
**RE:** GRJM 21.5-G.95 Culvert Replacement IFB-4853-21-DH

Offerors responding to the above referenced solicitation are hereby instructed that the requirements have been clarified, modified, superseded and supplemented as to this date as hereinafter described.

Please make note of the following clarifications:

1. Q. Can a seed mix be supplied?

A. Yes, we would like to use Applewood Seed Western Native Grass Seed mix (WSGR) mixed with Intermountain Native Wildflower Seed mix (IMNA) combined and distributed at a rate as recommended by Applewood Seed mix ([www.applewoodseed.com](http://www.applewoodseed.com)). Contractor may substitute a similar seed mix as approved by the Engineer.

2. Q. Can a detail and specs. For the guardrail be supplied? As in state, county, or city specs.

A. See the attached Specifications (Section 606) and M-Standard Drawing (M-606-1) from CDOT to be used on this project.

3. Q. Details for the erosion control and tracking pad placement?

A. See the attached M-Standard Drawings (M-208-1) from CDOT for use on this project. Sheet 1 of 11 shows the Vehicle Tracking Pad, and sheet 10 of 11 shows the Erosion Bale Trenching and Staking details. Location of the tracking pad placement will depend upon the construction phasing, and if vehicles are driving between the disturbed areas and the 21 ½ Road pavement.

The original solicitation for the project noted above is amended as noted.

All other conditions of subject remain the same.

Respectfully,

A handwritten signature in black ink, appearing to read "Duane Hoff Jr.", written over a horizontal line.

Duane Hoff Jr., Senior Buyer  
City of Grand Junction, Colorado

**GENERAL NOTES** (CONTINUE ON SHEET 2)

- ALL GUARDRAILS SHOWN ARE MASH 2016 TL-3 COMPLIANT.
- RATE OF SLOPE DEPENDS ON GUARDRAIL LOCATION:
  - FOR GUARDRAIL FACE 2 FT. OR LESS FROM THE NORMAL EDGE OF PAVED SHOULDER, CONTINUE THE RATE OF SLOPE OF THE NORMAL PAVED SHOULDER TO THE BREAKPOINT.
  - FOR GUARDRAIL FACE MORE THAN 2 FT. FROM THE NORMAL EDGE OF THE PAVED SHOULDER, THE SLOPE SHALL BE 10:1 OR FLATTER.
- WHEN SPECIFIED ON THE PLANS, EXTEND A 2 IN. MINIMUM THICKNESS PAVED SURFACE TO 1 FT. BEHIND THE GUARDRAIL POSTS OR TO THE EROSION CONTROL CURB AS SHOWN ON PLANS. ASPHALT CUTTING & PATCHING OR OTHER APPROVED METHOD SHALL BE USED TO MINIMIZE DAMAGE TO ALL PAVED SURFACES UNDER GUARDRAIL INSTALLATIONS. ALL REPAIRS TO THE PAVED AREA WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK. A MINIMUM 3 IN. THICK FIBER REINFORCED CONCRETE PAVEMENT MAY ALSO BE USED FOR PAVING BENEATH THE GUARDRAIL. INSTALL THE POST IN A 1/2 IN. OVERSIZED FORMED HOLE FOR GUARDRAIL RUNS AND TERMINALS AS DIRECTED. PAYMENT FOR THIS PAVED SURFACE WILL BE MADE UNDER A PAVEMENT OR CONCRETE PAY ITEM WITH QUANTITIES SHOWN ON THE PLANS.
- THE MINIMUM GUARDRAIL OFFSET FROM PAVED SHOULDER EDGE SHALL BE:
  - 0 FT. FOR SHOULDERS 8 FT. OR WIDER
  - 2 FT. FOR SHOULDERS 6 FT. OR LESS

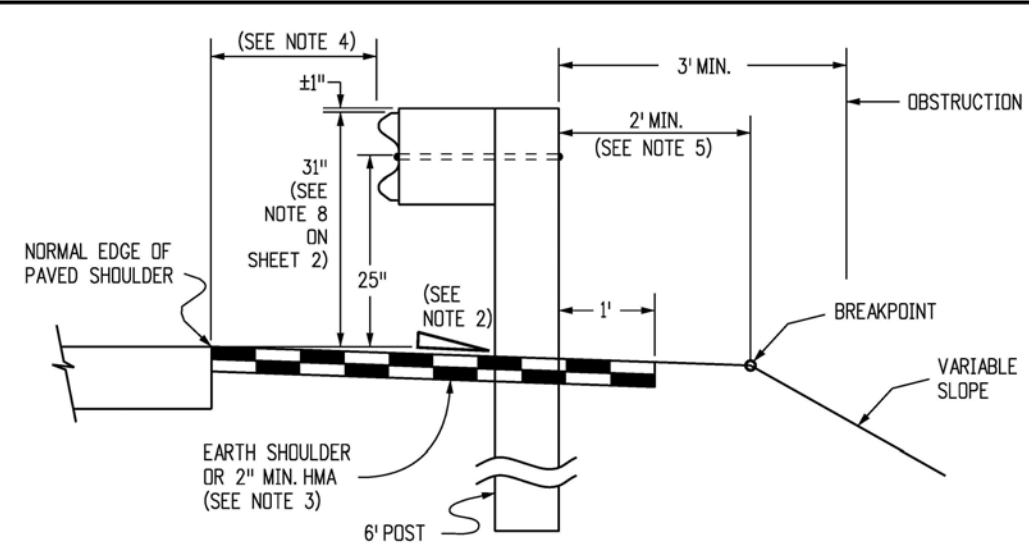
THE GUARDRAIL OFFSET FROM PAVED INSIDE SHOULDER EDGE OF A DIVIDED HIGHWAY SHALL BE:

  - 0 FT. MINIMUM FOR SHOULDERS 6 FT. OR WIDER
  - 2 FT. DESIRABLE FOR 4 FT. SHOULDERS

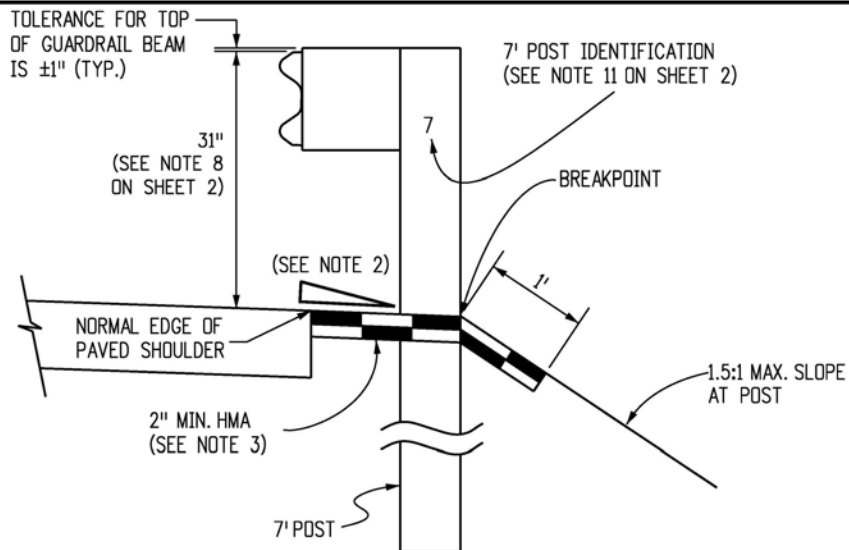
THE ABOVE 2 FT. GUARDRAIL TO SHOULDER OFFSET IS DESIRABLE BUT NOT REQUIRED FOR:

  - FOR AN EXISTING HIGHWAY WITH A DESIGN SPEED LESS THAN 50 MPH, THE MINIMUM OFFSET IS 4 FT. FROM THE TRAVELED WAY.
  - FOR A ONE-WAY ONE-LANE RAMP, AND WHERE ONE OR MORE OF THE FOLLOWING ARE TRUE:
    - THE NON-OFFSET GUARDRAIL BEGINS AT LEAST 100 FT. BEYOND RAMP NOSE.
    - THE NON-OFFSET GUARDRAIL IS NOT LOCATED ON THE RAMP EXIT OR ENTRANCE CURVE CONNECTION TO THE MAJOR HIGHWAY.
    - THE RAMP SHOULDERS ARE 4 FT. OR WIDER.

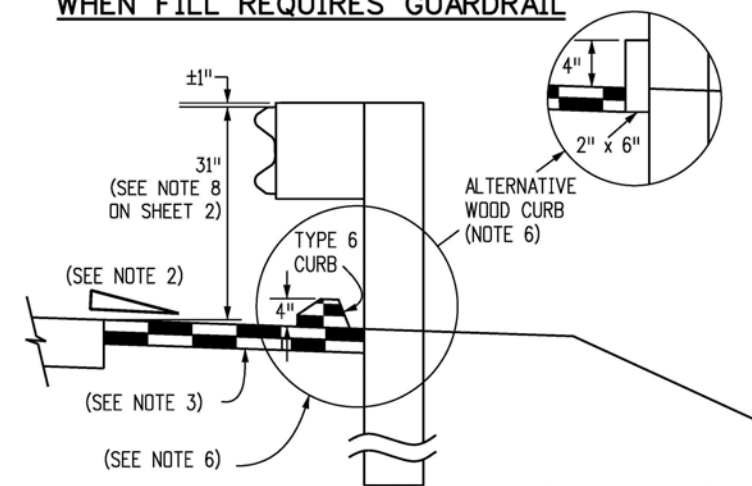
USE OF GREATER THAN MINIMUM OFFSET DIMENSIONS IS ENCOURAGED TO MEET THE DESIRABLE GOAL OF PLACING THE GUARDRAIL AS FAR AS POSSIBLE FROM THE TRAVEL WAY, EVEN FOR SHORT DISTANCES, WHILE PROVIDING A SMOOTH CHANGE IN GUARDRAIL ALIGNMENT.
- IF 2 FT. CANNOT BE PROVIDED BETWEEN THE BACK OF THE GUARDRAIL POST AND THE BREAKPOINT, USE 7 FT. GUARDRAIL POSTS. REFER TO THE "RESTRICTIVE ROADSIDE INSTALLATION" DETAIL.
- WHEN SPECIFIED ON THE PLANS, INSTALL 4 IN. HIGH TYPE 6 CURB WITH ITS FACE AT OR BEHIND THE RAIL FACE. AS AN ALTERNATIVE WHEN SPECIFIED ON THE PLANS, INSTALL A 2 IN. x 6 IN. TREATED (AASHTO M 133) WOOD CURB. FASTEN WITH A 4 IN. LAG BOLT AND WASHER AT EACH WOOD POST, OR WITH A 1#4 IN. DIA. BOLT WITH WASHER AND NUT AT EACH STEEL POST. IF THE 2 IN. x 6 IN. WOOD CURB IS SPECIFIED, IT WILL BE INCLUDED IN THE COST OF THE GUARDRAIL. IF APPROVED BY THE ENGINEER, A 2 IN. x 4 IN. TREATED WOOD CURB MAY BE SUBSTITUTED FOR THE 2 IN. x 6 IN. CURB AND SET ON TOP OF PAVEMENT SURFACE AND ATTACHED AS DESCRIBED ABOVE. NO SPLICING SHALL BE ALLOWED IN WOOD CURBS. ADJACENT BOARDS SHALL BE BUTTED TOGETHER AND BOLTED AT A POST LOCATION. JOINTS SHALL BE LOCATED AT THE POSTS.



**NORMAL ROADSIDE INSTALLATION WHEN FILL REQUIRES GUARDRAIL**

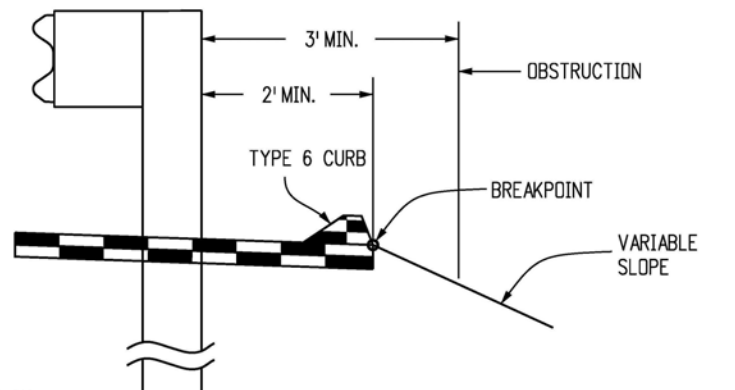


**RESTRICTIVE ROADSIDE INSTALLATION WITH 7 FOOT GUARDRAIL POSTS**

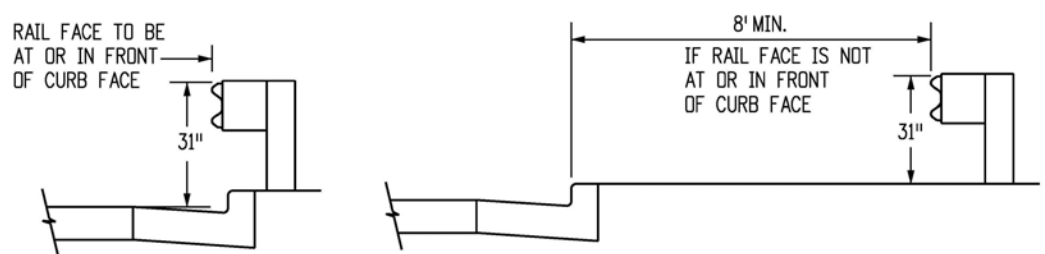


**OPTION A**

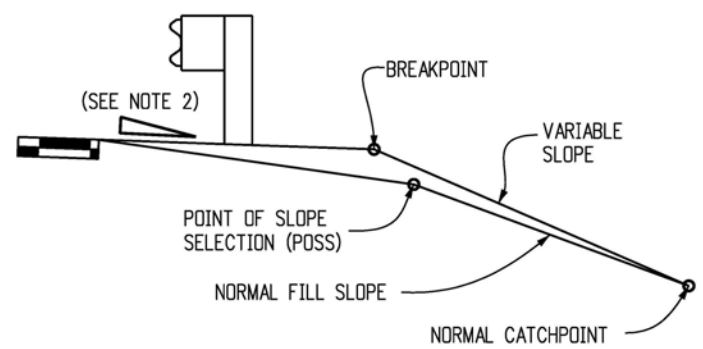
**ROADSIDE INSTALLATION WITH EROSION CONTROL CURB**



**OPTION B (PREFERRED)**

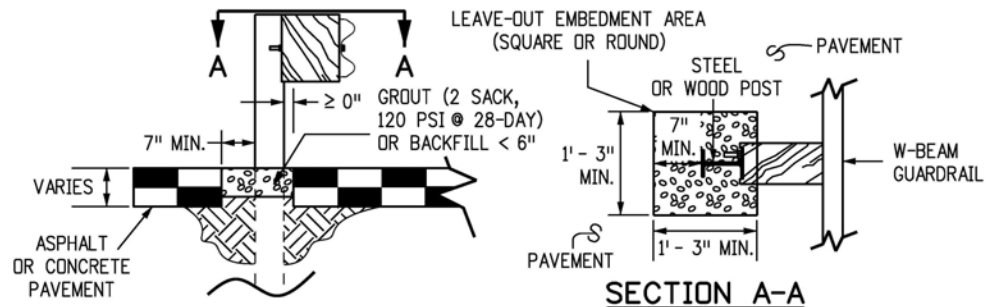


**URBAN ROADSIDE INSTALLATION WITH CURB AND GUTTER**



**EMBANKMENT WITH GUARDRAIL**

(NOTE: THE CATCHPOINT REMAINS THE SAME AS THAT FOR "NORMAL" FILL SLOPE. FOR THE WIDER "Z" DISTANCES, THE VARIABLE SLOPE MAY "CATCH" AT THE POSS.)



**SECTION A-A**

**LEAVE-OUT AREA FOR GUARDRAIL POSTS LOCATED IN PAVEMENT**

NOTE: LEAVE-OUT AREAS SHALL BE PROVIDED FOR ALL GUARDRAIL POSTS LOCATED IN PAVEMENT TO ALLOW THE POSTS TO ROTATE IN THEIR EMBEDMENT SUCH THAT VEHICLE IMPACT LOADS ARE DISTRIBUTED THROUGH THE POST INTO THE EMBEDMENT MATERIAL PRIOR TO THE POSTS BREAKING PREMATURELY.

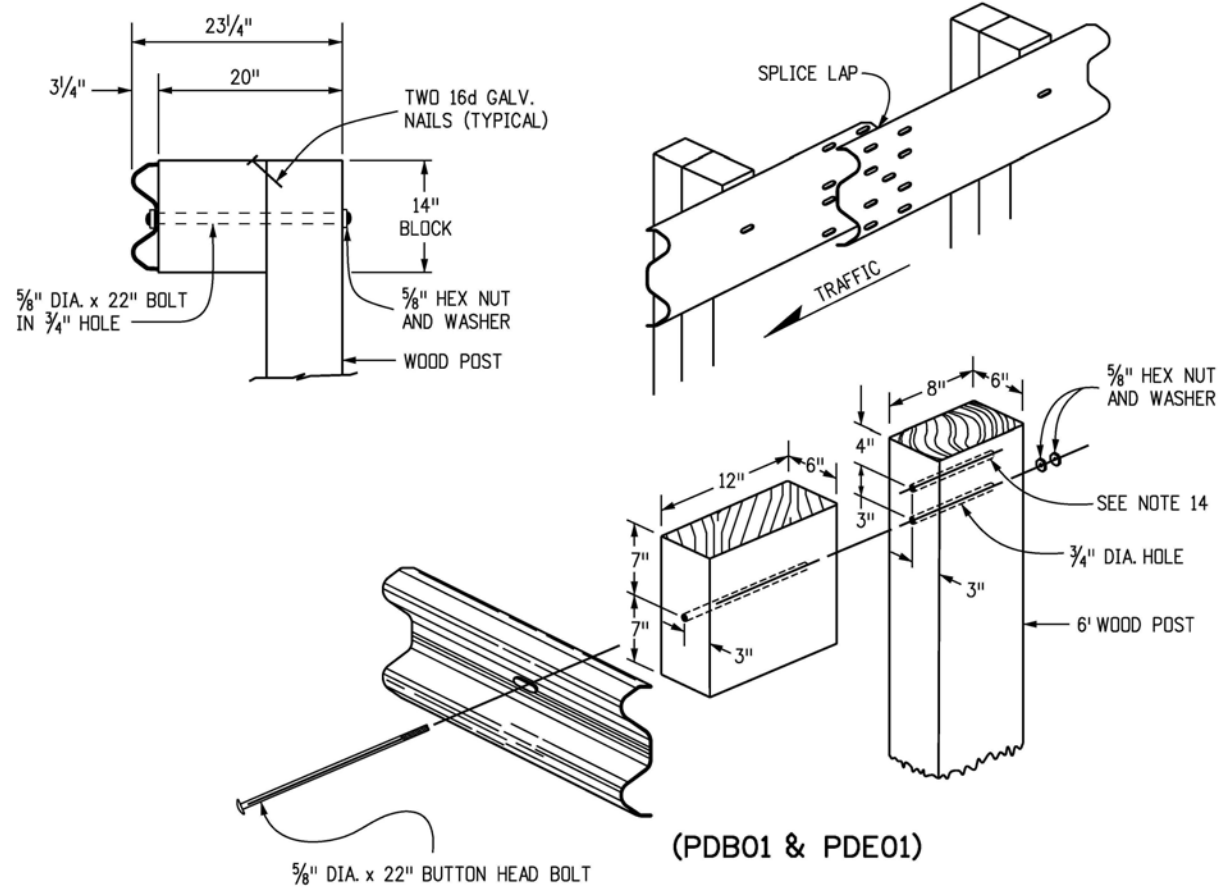
LOCATION	SPACING
ALL LOCATIONS EXCEPT BRIDGE RAIL LOCATIONS	6'-3"
BRIDGE OR STRUCTURE APPROACH	SEE SHEETS 11 & 19

**NORMAL CENTER-TO-CENTER POST SPACING**

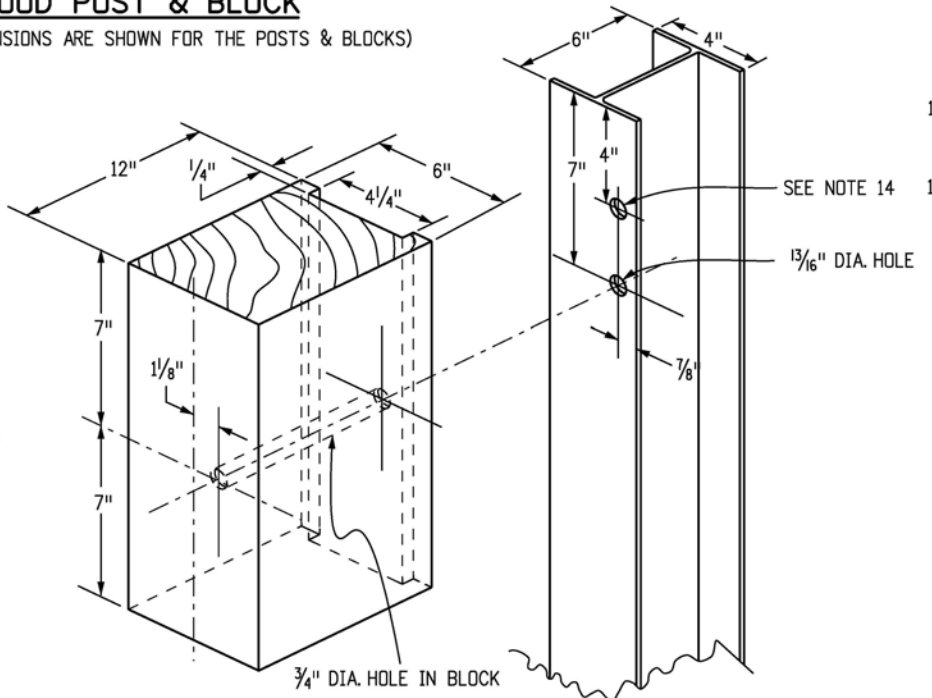
<b>Computer File Information</b> Creation Date: 07/31/19 Designer Initials: JBK Last Modification Date: 03/05/20 Detailer Initials: LTA CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		<b>Sheet Revisions</b> <table border="1"> <thead> <tr> <th>Date:</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>03/05/20</td> <td>Revised Gen. Note 1 to show MASH compliant.</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>		Date:	Comments	03/05/20	Revised Gen. Note 1 to show MASH compliant.							<b>Colorado Department of Transportation</b> 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>		<b>MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES</b> Issued by the Project Development Branch: July 31, 2019		<b>STANDARD PLAN NO. M-606-1</b> Standard Sheet No. 1 of 19 Project Sheet Number:	
Date:	Comments																		
03/05/20	Revised Gen. Note 1 to show MASH compliant.																		

**GENERAL NOTES** (CONTINUED FROM SHEET 1)

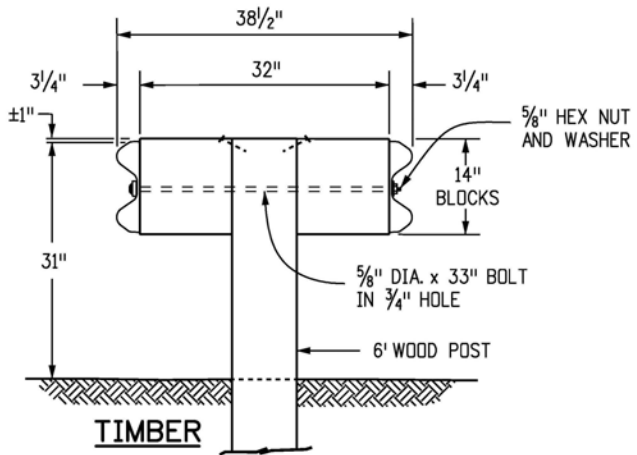
7. SEE SHEETS 7 AND 9 FOR CURB TREATMENTS AT GUARDRAIL TERMINALS.
8. IF THIS DIMENSION WILL BE LESS THAN 28 INCHES, RESET GUARDRAIL HEIGHT TO 28 INCHES OR ABOVE.
9. ALL W-BEAM SPLICES, AND SPLICES OF TERMINAL CONNECTORS TO W-BEAM SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC UNLESS OTHERWISE NOTED IN THE PLANS OR BY THE MANUFACTURER.
10. MATERIAL TYPE AND SHAPE OF POSTS AND BLOCKS SHALL BE THE SAME THROUGHOUT THE PROJECT EXCEPT WHEN SPECIFIC POSTS AND BLOCKS ARE SPECIFIED, I.E. AT END ANCHORAGES AND BOX CULVERTS.
11. WHEN SPECIFIED IN THE CONTRACT, 7 FT. POSTS SHALL BE INSTALLED INSTEAD OF THE STANDARD 6 FT. POSTS. THE 7 FT. POSTS SHALL BE MARKED WITH THE NUMBER 7 TO ENSURE PERMANENT IDENTIFICATION. STEEL POSTS SHALL BE STAMPED PRIOR TO GALVANIZING. THE NUMBER 7 SHALL BE A MINIMUM 2 IN. TALL AND LOCATED AS SHOWN ON THE ELEVATION VIEW ON SHEET 1.
12. THE STANDARD 3 IN. X 1 3/4 IN. X 3/8 IN. RECTANGULAR WASHER USED UNDER POST BOLT HEADS IN THE PAST MAY REMAIN IN EXISTING INSTALLATIONS BUT SHALL NOT BE USED IN NEW CONSTRUCTION, REPAIRS, OR RESETTING OF RAIL, EXCEPT WHEN SPECIFICALLY IDENTIFIED ON THE STANDARD PLAN.
13. STANDARD GALVANIZED ROUND STEEL WASHERS SHALL BE USED UNDER ALL NUTS IN CONTACT WITH WOOD POSTS.
14. AN ADDITIONAL HOLE SHALL BE PROVIDED IN THE POSTS TO FACILITATE FUTURE RAISING OF THE RAIL ELEMENTS AND BLOCKS FOR OVERLAYS. POSTS PROVIDED MAY ALSO HAVE ADDITIONAL HOLES (UP TO 4 PER FLANGE) FOR MEDIAN GUARDRAIL APPLICATION.
15. RETROREFLECTOR TABS SHALL BE INSTALLED AT 25 FT. INTERVALS (SEE SHEETS 6 AND 8 FOR EXCEPTIONS). RETROREFLECTOR TABS WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK. THE TABS SHALL BE INSTALLED ON SPLICE BOLTS, NOT ON POST BOLTS AND SHALL BE MOUNTED SO THE BOLT SLOT FACES AWAY FROM TRAFFIC, AND THE RETROREFLECTOR SURFACE FACES THE APPROACHING TRAFFIC FOR ONE-WAY ROADS. FOR TWO-WAY ROADS, BOTH SIDES OF THE TABS SHALL BE RETROREFLECTIVE, SO THAT DELINEATION IS PROVIDED FOR BOTH DIRECTIONS OF TRAVEL. THE RETROREFLECTIVE SHEETING COLOR SHALL MATCH THE COLOR OF THE ADJACENT TRAVEL WAY EDGE LINE. SEE THE RETROREFLECTOR TAB DETAIL ON SHEET 3.
16. AT THE TIME OF INSTALLATION, WOOD POSTS OR BLOCKS WITH SEASONING CHECKS GREATER THAN 1/4 IN. SHALL NOT BE USED WHEN THE CHECK EXTENDS THE FULL LENGTH OF THE PIECE.
17. WOOD BLOCKS SHALL BE CUT FROM THE SAME CROSS-SECTION, SPECIES, AND GRADE, AND SHALL RECEIVE THE SAME PRESERVATIVE TREATMENT AS THE POSTS WHEN WOOD POSTS ARE USED.
18. REFERENCES SUCH AS 00PDB01", 00PDE01", AND 00PWE01" IN THIS STANDARD PLAN SPECIFY HARDWARE DETAILS FROM 00A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE" PREPARED BY THE AASHTO-AGC-ARTBA JOINT COOPERATIVE COMMITTEE.
19. RAIL BLOCKS MANUFACTURED FROM SYNTHETIC MATERIAL WILL BE ACCEPTED AS ALTERNATIVES TO WOOD BLOCKS FOR USE WITH STEEL POSTS PROVIDED THAT THE BLOCKS HAVE RECEIVED FHWA APPROVAL.
20. WOOD POSTS SHALL BE MADE OF TIMBER WITH AN EXTREME FIBER STRESS IN BENDING OF 1200 PSI STRESS GRADING AND POST DIMENSIONS SHALL CONFORM WITH THE RULES OF THE WEST COAST INSPECTION BUREAU, OR THE SOUTHERN PINE BUREAU, OR THE WESTERN WOOD PRODUCTS ASSOCIATION. TIMBER FOR POSTS SHALL BE EITHER ROUGH SAWN (UNPLANED) OR S4S (SURFACED FOUR SIDES) WITH NOMINAL DIMENSIONS INDICATED. ONLY ONE TYPE OF SURFACE FINISH SHALL BE USED FOR POSTS AND BLOCKS IN ANY ONE CONTINUOUS LENGTH OF GUARDRAIL.
21. GLULAM POSTS AND BLOCKS WILL BE ACCEPTED AS ALTERNATIVES PROVIDED THAT THE SUPPLIED MATERIALS HAVE RECEIVED FHWA APPROVAL AND ARE CERTIFIED AS IDENTICAL TO THE SPECIMENS USED FOR TESTING AND APPROVAL.
22. PRESSURE TREATMENT OF POSTS AND BLOCKS SHALL CONFORM TO AASHTO M 133 EXCEPT THAT BLOCKS NEED NOT BE INCISED. PRESERVATION ASSAY RETENTION REPORTS SHALL BE SUBMITTED TO THE ENGINEER. THE CONTRACTOR SHALL CERTIFY THAT THE SPECIES AND GRADE MEET THE REQUIREMENTS OF THE CONTRACT.
23. W-BEAM AND THRIE-BEAM GUARDRAIL POSTS SHALL BE MANUFACTURED USING AASHTO M 270 (ASTM A 709) GRADE 36 STEEL UNLESS CORROSION RESISTANT STEEL IS REQUIRED, IN WHICH CASE THE POST SHALL BE MANUFACTURED FROM AASHTO M 270 (ASTM A 709) GRADE 50W STEEL. THE DIMENSIONS OF THE CROSS-SECTION SHALL CONFORM TO A W6 X 9 SECTION AS DEFINED IN AASHTO M 160 (ASTM A 6). W6 X 8.5 WIDE FLANGE STEEL POSTS ARE AN ACCEPTABLE ALTERNATIVE TO THE W6 X 9.
24. AFTER THE SECTION IS CUT AND ALL HOLES ARE DRILLED OR PUNCHED THE COMPONENT SHALL BE ZINC-COATED CONFORMING TO AASHTO M 111 (ASTM A 123) UNLESS CORROSION-RESISTANT STEEL IS USED. WHEN CORROSION-RESISTANT STEEL IS USED THE PORTION OF THE POST TO BE EMBEDDED IN SOIL SHALL BE ZINC-COATED CONFORMING TO AASHTO M 111 (ASTM A 123) AND THE PORTION ABOVE THE SOIL SHALL NOT BE ZINC-COATED, PAINTED OR OTHERWISE TREATED.
25. FIELD MODIFICATION TO RAIL ELEMENTS IS ALLOWED PER MANUFACTURER'S RECOMMENDATIONS, OR WITH THE APPROVAL OF THE STANDARDS AND SPECIFICATIONS UNIT. POSTS SHALL NOT BE MODIFIED. COMPONENTS ON WHICH THE SHELTER COATING HAS BEEN DAMAGED SHALL BE EITHER REGALVANIZED OR RECOATED IN CONFORMANCE WITH AASHTO M 36, OR PAINTED WITH ONE FULL BRUSH COAT OF ZINC RICH PAINT CONFORMING TO MILITARY SPECIFICATION DDD-P-21035A.



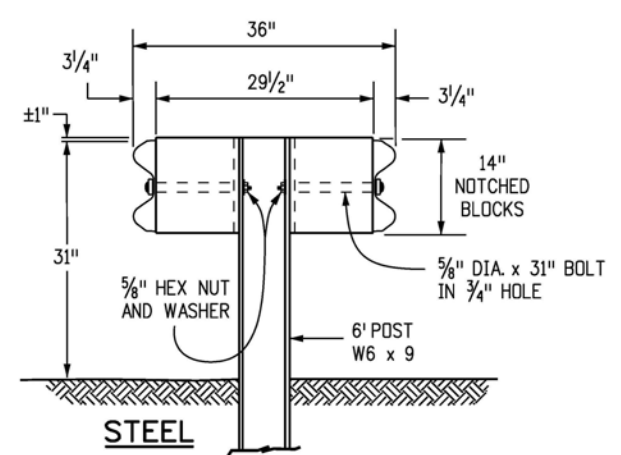
**WOOD POST & BLOCK**  
(NOMINAL DIMENSIONS ARE SHOWN FOR THE POSTS & BLOCKS)



**STEEL POST & NOTCHED BLOCK**  
(NOMINAL DIMENSIONS ARE SHOWN FOR THE POSTS & BLOCKS)

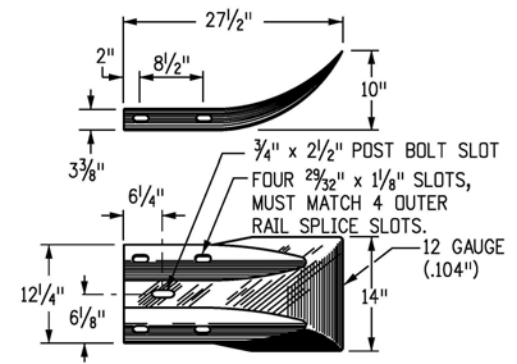


**TIMBER**  
**DOUBLE BLOCK AND GUARDRAIL TYPE 3 (DOUBLE) FOR MEDIAN BARRIER**

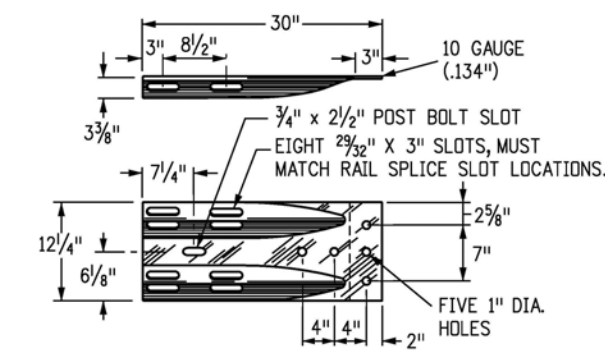


**STEEL**

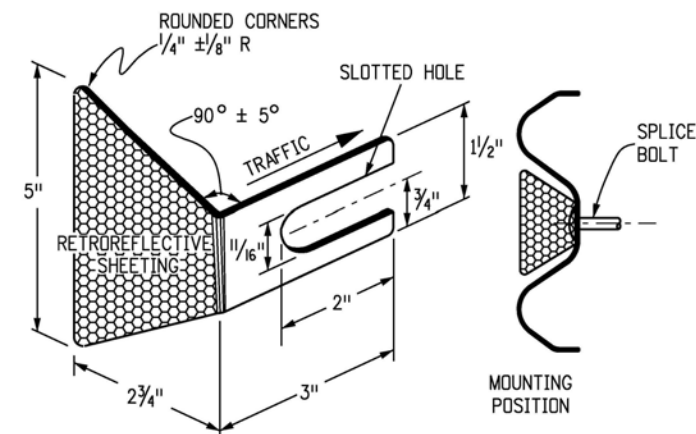
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Date:	Comments																		
(R-X)																			
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**TERMINAL SECTION (FLARED)**

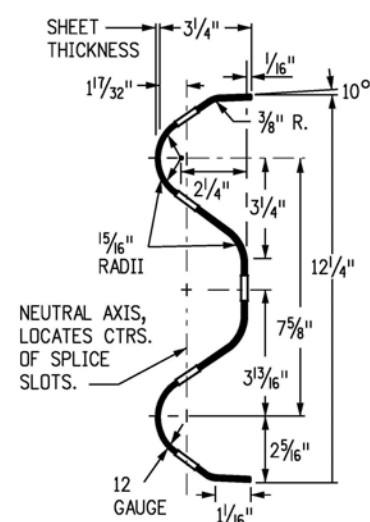


**TERMINAL SECTION (CONNECTOR)**

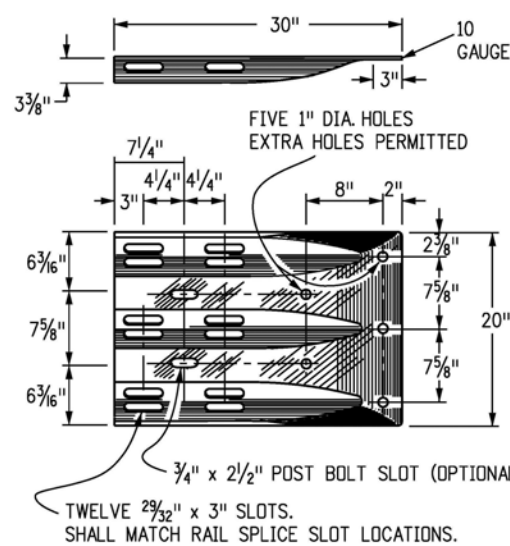


**RETROREFLECTOR TAB**

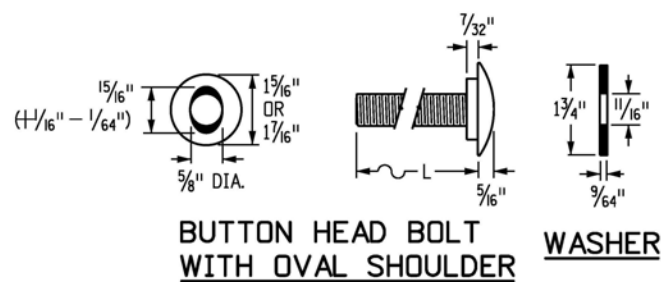
NOTE: RETROREFLECTOR TABS SHALL BE MANUFACTURED FROM 12 TO 14 GAUGE STEEL AND SHALL CONFORM TO THE REQUIREMENTS OF S STANDARD S-612-1.



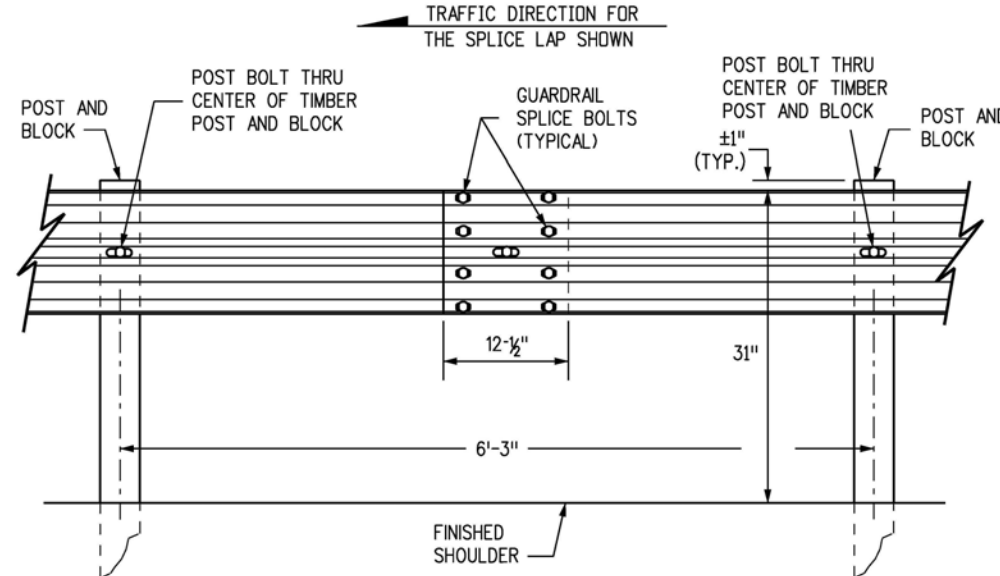
**W-BEAM RAIL SECTION**



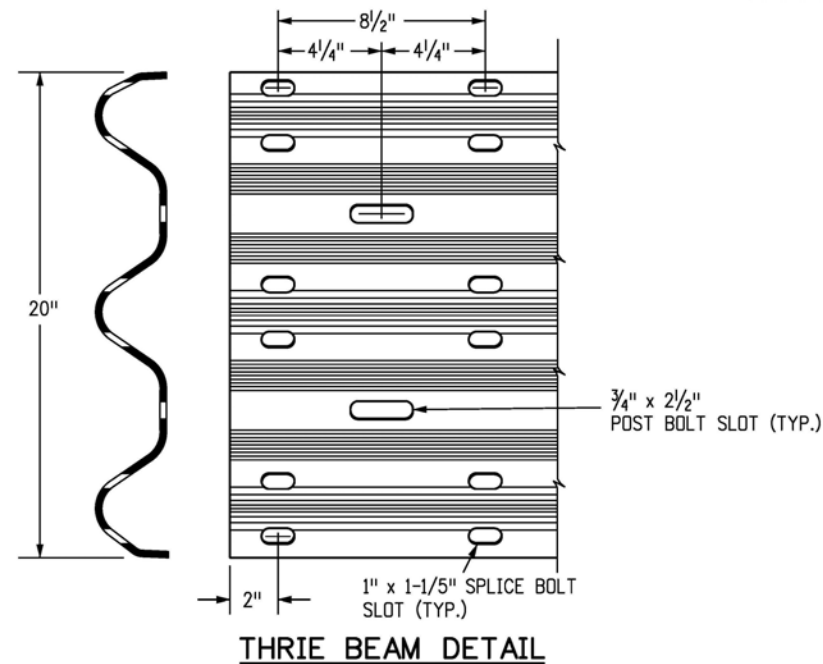
**THRIE BEAM TERMINAL SECTION (CONNECTOR)**



**BUTTON HEAD BOLT WITH OVAL SHOULDER WASHER HEX NUT**



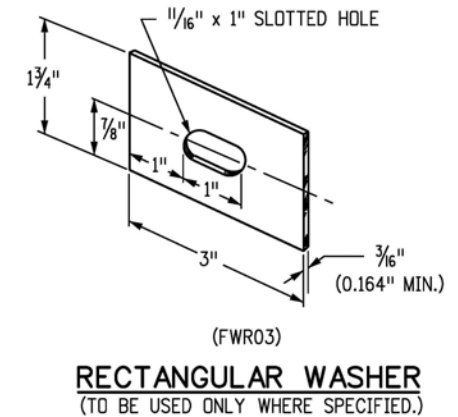
**W-BEAM RAIL SPLICE**



**THRIE BEAM DETAIL**

PART	MATERIAL SPEC.	GALVANIZING SPEC.	CORROSION-RESISTANT SPEC.
W-BEAM RAIL & TERMINAL SECTIONS	AASHTO M 180, CLASS A OR B	AASHTO M 180, TYPE 1 OR 2	AASHTO M 180, TYPE 4
BASE PLATE	ASTM A 36	AASHTO M 111	N.A.
NUTS, BOLTS & STUDS FOR GENERAL USE	ASTM A 307		
HIGH STRENGTH BOLTS & NUTS	ASTM A 325		AASHTO M 232, CLASS C
HIGH STRENGTH STUDS & NUTS	ASTM A 449		OR
ROUND STEEL WASHERS	ASTM F 436		ASTM B 695 CLASS 50 TYPE 1
RECTANGULAR WASHERS	AASHTO M 180		
OTHER FITTINGS	ASTM A 36	AASHTO M 111	

THE TABULATION OF GUARDRAIL WILL SPECIFY THE TYPE OF CORROSION PROTECTION: GALVANIZED OR CORROSION - RESISTANT STEEL.  
STEEL POSTS SHALL HAVE THE SAME CORROSION PROTECTION AS SPECIFIED FOR THE METAL BEAM RAIL. PUNCHING, DRILLING, CUTTING, OR WELDING OF POSTS WILL NOT BE PERMITTED AFTER GALVANIZING.



**RECTANGULAR WASHER (TO BE USED ONLY WHERE SPECIFIED.)**

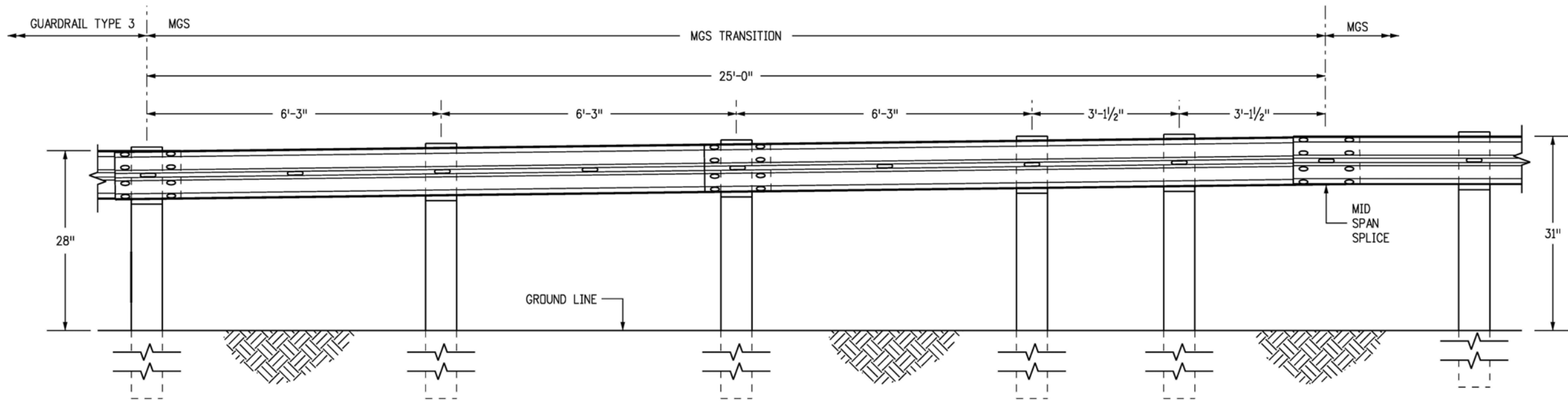
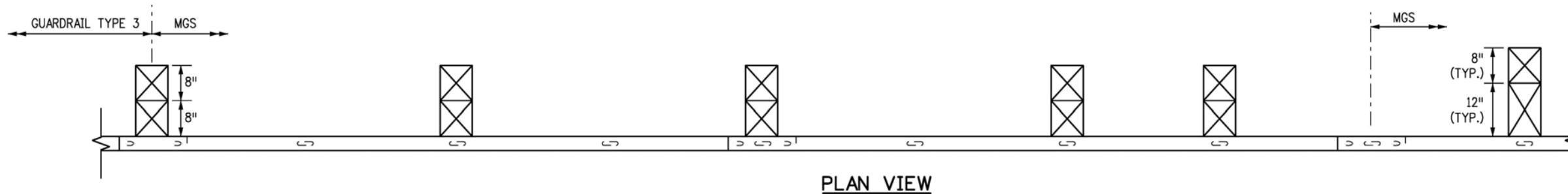
DIAMETER & TYPE (INCHES)	12" BLOCKS L = LENGTH (INCHES)	THREAD LENGTH (INCHES)	INTENDED USE	AASHTO-AGC-ARTBA STANDARD NUMBER	NO. BOLTS, NUTS & WASHERS
5/8"	1/4"	FULL (1 1/32)	ALL RAIL SPLICES	FBB01	8 PER SPLICE*
BUTTONHEAD OVAL SHLDR.	22	MIN. 2 1/2	SINGLE BLOCK & POST (TIMBER)	FBB04	1 PER POST
	33	MIN. 2	DOUBLE BLOCK & POST (TIMBER)	FBB05	1 PER POST
	14	MIN. 2	FASTEN NOTCHED BLOCK TO STEEL POST	FBB03	1 PER BLOCK

WASHERS NOT USED AT RAIL SPLICES

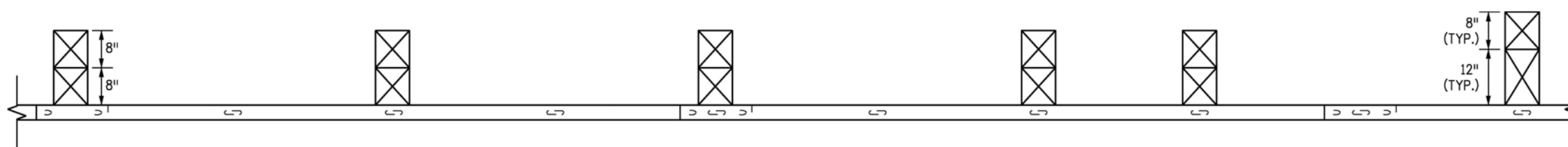
Computer File Information		Sheet Revisions		Colorado Department of Transportation		MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES		STANDARD PLAN NO. M-606-1	
Creation Date: 07/31/19		Date:	Comments:	2829 West Howard Place CDOT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868		Issued by the Project Development Branch: July 31, 2019		Standard Sheet No. 3 of 19	
Designer Initials: JBK	(R-X)			Project Development Branch				Project Sheet Number:	
Last Modification Date: 03/05/20	(R-X)			JBK					
Detailer Initials: LTA	(R-X)								
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)								

**NOTES**

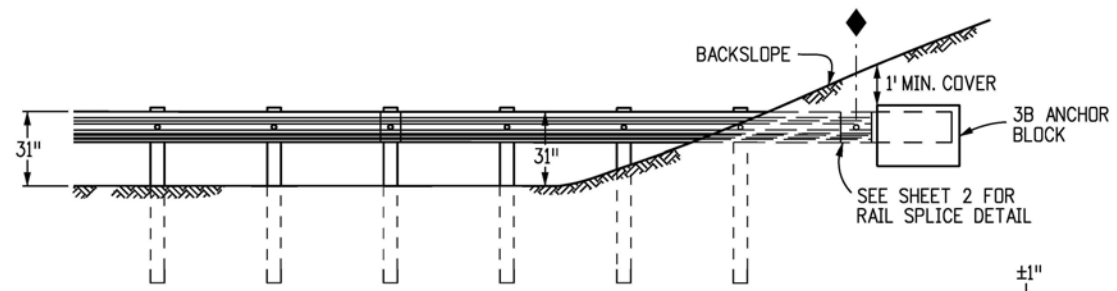
1. THE MGS TRANSITION FROM A TYPE 3 GUARDRAIL SHALL BE COMPLETED OUTSIDE THE MGS END ANCHORAGE LIMITS.



**TRANSITION FROM 28 INCH GUARDRAIL TO 31 INCH MGS**

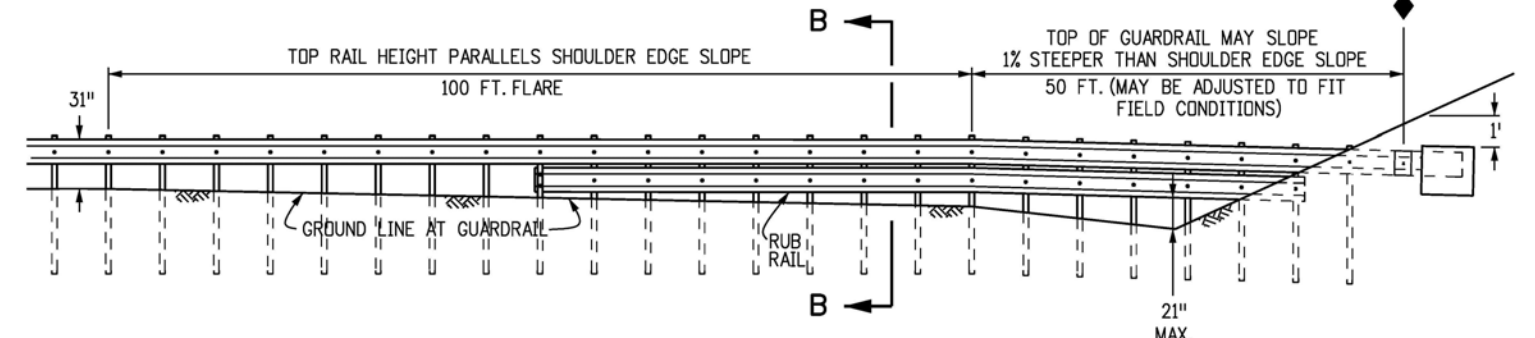


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Last Modification Date: 03/05/20		(R-X)				Project Sheet Number:	
Detailer Initials: LTA		(R-X)					
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		(R-X)		Project Development Branch <b>JBK</b>			

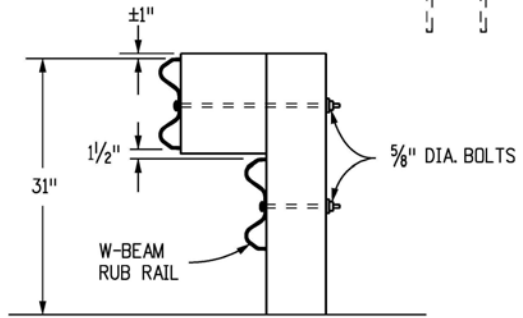


SEE TYPE 3B (RUB RAIL) PLAN VIEW FOR ALIGNMENT. THE 100 FT. FLARE LENGTH MAY BE SHORTENED IF THE SLOPE IS LESS THAN 8 FT. WIDE.

**END ANCHORAGE TYPE 3B**  
(WITHOUT ROADSIDE DITCH AT GUARDRAIL)

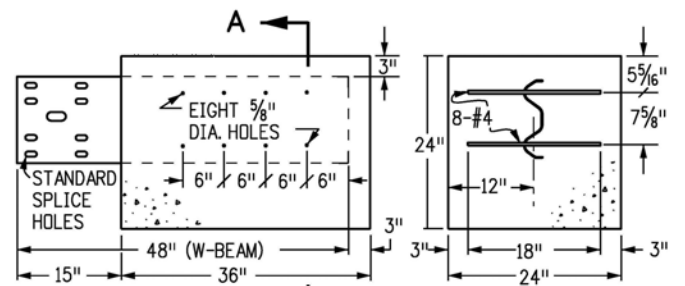


**ELEVATION VIEW**



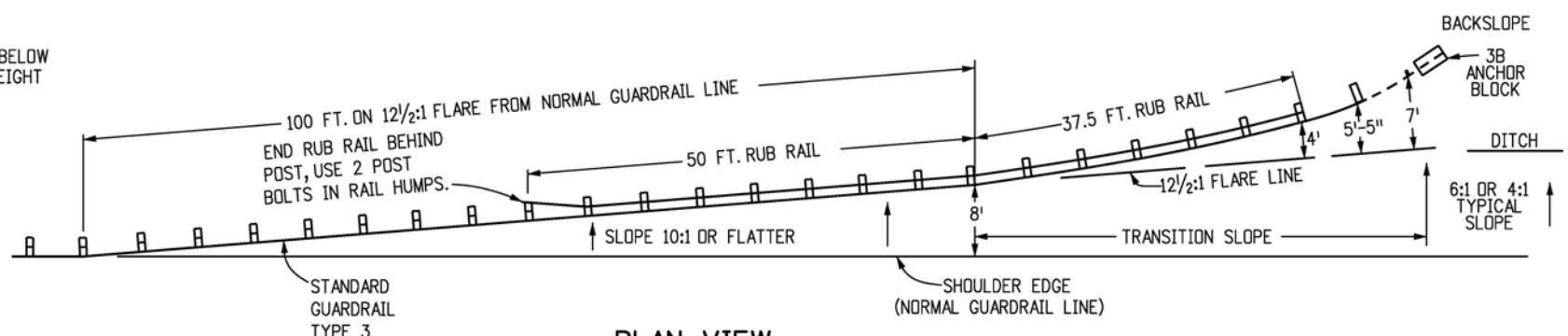
**SECTION B-B**

MOUNT A W-BEAM RUB RAIL 1-1/2 IN. BELOW THE TOP RAIL WHEN THE TOP RAIL HEIGHT EXCEEDS 33 IN. ABOVE THE GROUND



**SECTION A-A**

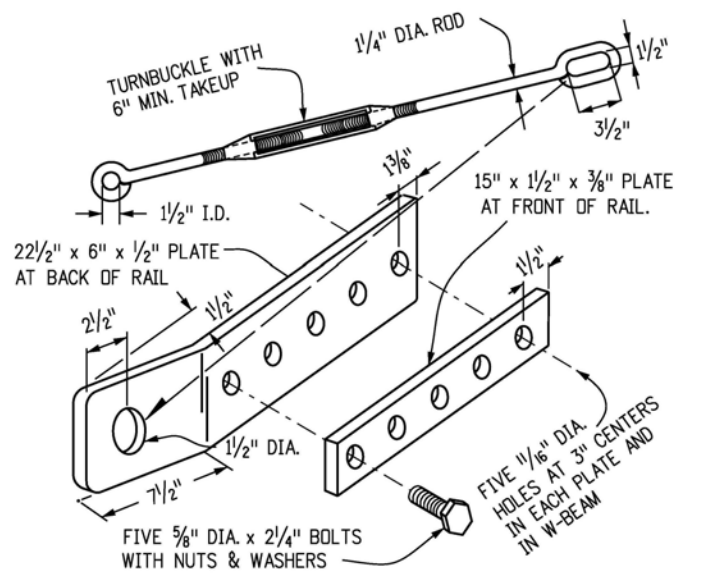
**TYPE 3B ANCHOR BLOCK DETAIL**



**PLAN VIEW**

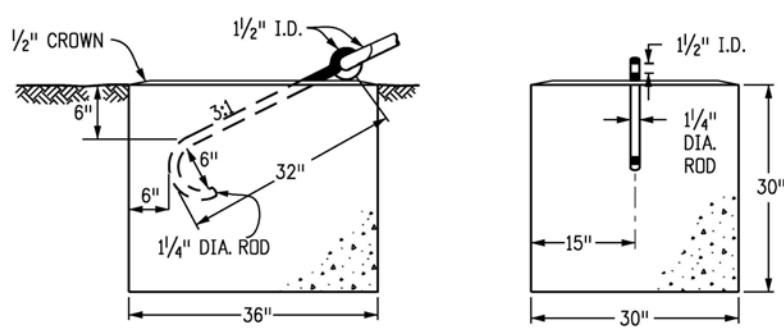
**END ANCHORAGE TYPE 3B (RUB RAIL)**

(WITH ROADSIDE DITCH AT GUARDRAIL)



**TYPE 3D HARDWARE DETAILS**

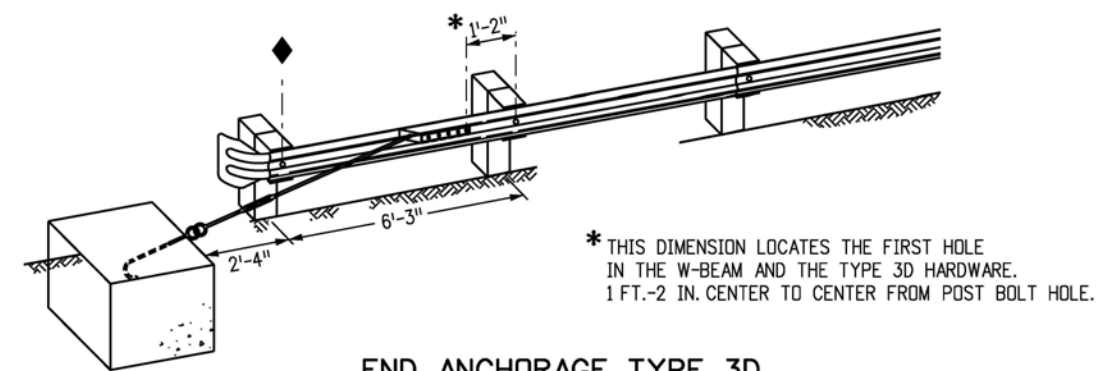
NOTE: ALL PARTS SHALL BE GALVANIZED



**FRONT**

**END**

**TYPE 3D ANCHOR BLOCK DETAIL**



**END ANCHORAGE TYPE 3D DEPARTURE TERMINAL**

\* THIS DIMENSION LOCATES THE FIRST HOLE IN THE W-BEAM AND THE TYPE 3D HARDWARE. 1 FT.-2 IN. CENTER TO CENTER FROM POST BOLT HOLE.

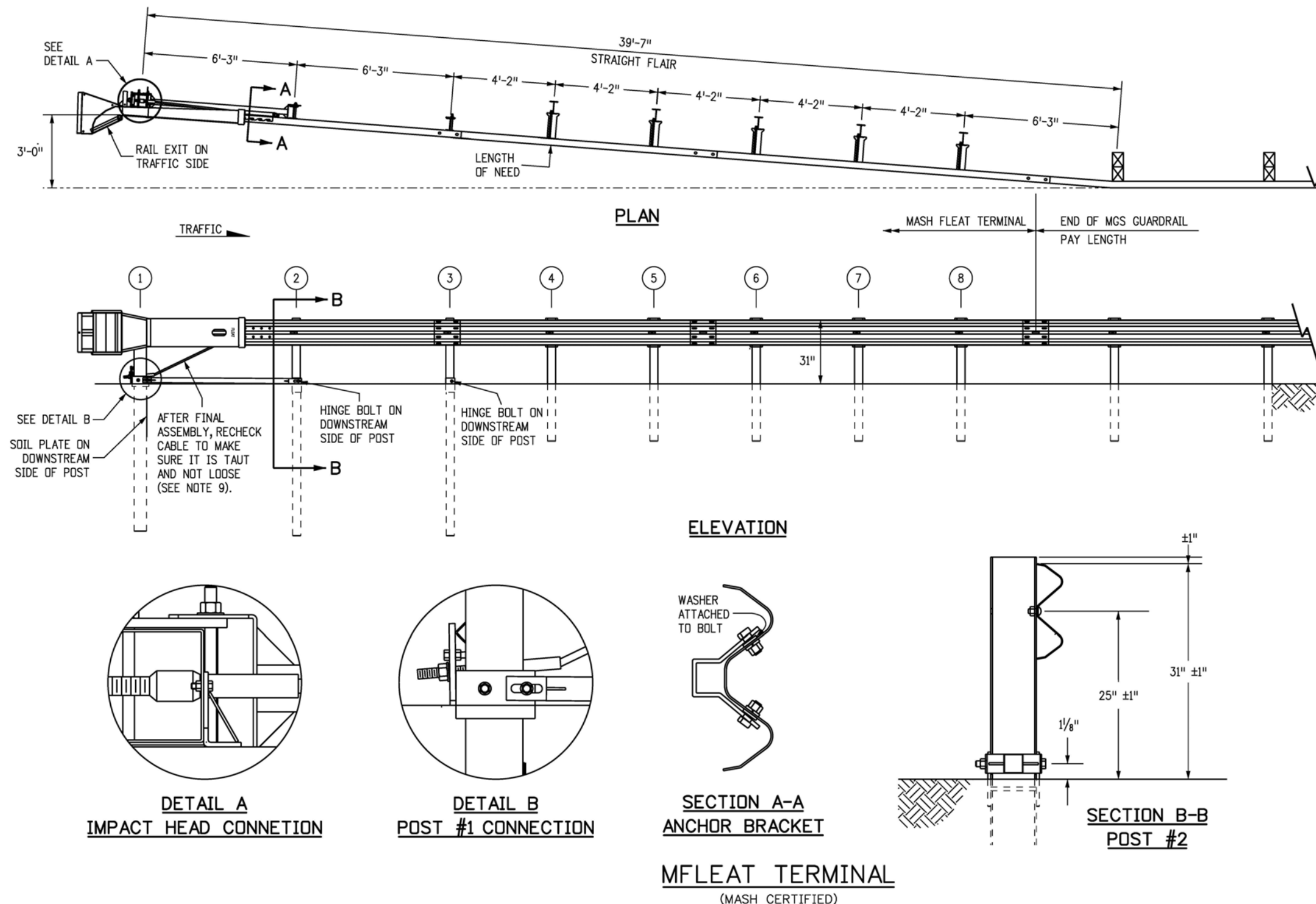
<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>MIDWEST</b> <b>GUARDRAIL SYSTEM (MGS)</b> <b>TYPE 3 W-BEAM 31 INCHES</b> Issued by the Project Development Branch: July 31, 2019	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19		Date:	Comments:			M-606-1	
Designer Initials: JBK		(R-X)				Standard Sheet No. 5 of 19	
Last Modification Date: 03/05/20		(R-X)				Project Sheet Number:	
Detailer Initials: LTA		(R-X)					
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		(R-X)		JBK			

**NOTES**

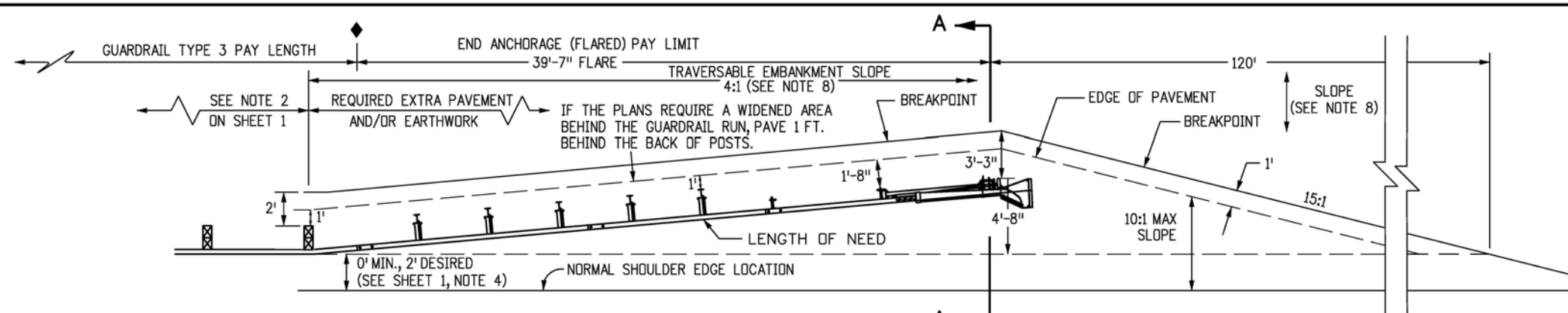
1. THE END ANCHORAGE (FLARED) SHALL BE THE MFLEAT TERMINAL, AS MANUFACTURED BY ROAD SYSTEMS INC. (TELEPHONE #: 432-263-2435). ONE END ANCHORAGE (FLARED) SHALL INCLUDE ALL POST, RAIL, AND ALL HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE END ANCHORAGE (FLARED) SHALL BE INSTALLED CONFORMING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LIST TO THE ENGINEER PRIOR TO INSTALLATION OF THE DEVICE.
2. RETROREFLECTOR TABS SHALL NOT BE USED ON END ANCHORAGE POSTS.
3. DELINEATION SHALL BE APPLIED TO THE END PIECE, AND SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
4. AESTHETIC TREATMENT OPTIONS MAY BE AVAILABLE WITH PRIOR APPROVAL OF THE PROJECT ENGINEER. CONTACT THE MANUFACTURER FOR APPROVED AESTHETIC TREATMENT OPTIONS.
5. ALL BOLTS, NUTS, CABLE ASSEMBLIES, CABLE ANCHORS AND BEARING PLATES SHALL BE GALVANIZED.
6. THE LOWER SECTIONS OF THE POSTS 1, 2, AND 3 SHALL NOT PROTRUDE MORE THAN 4 INCHES ABOVE THE GROUND (MEASURED ALONG A 5 FOOT CORD). SITE GRADING MAY BE NECESSARY TO MEET THIS REQUIREMENT.
7. THE LOWER SECTIONS OF THE HINGED POSTS SHOULD NOT BE DRIVEN WITH THE UPPER POST ATTACHED. IF THE POST IS PLACED IN A DRILLED HOLE, THE BACKFILL MATERIAL MUST BE SATISFACTORILY COMPACTED TO PREVENT SETTLEMENT.
8. WHEN COMPETENT ROCK IS ENCOUNTERED, A 12 INCH DIA. POST HOLE, DRILLED 20 INCHES DEEP INTO THE ROCK SURFACE SHALL BE USED IF APPROVED BY THE ENGINEER FOR POSTS 1 AND/OR 2. GRANULAR MATERIAL SHALL BE PLACED IN THE BOTTOM OF THE HOLE, APPROXIMATELY 2.5 INCHES DEEP TO PROVIDE DRAINAGE. THE FIRST AND/OR SECOND POST SHALL BE FIELD CUT TO LENGTH, PLACED IN THE HOLE AND BACKFILLED WITH SUITABLE BACKFILL. THE SOIL PLATE MAY BE TRIMMED IF REQUIRED.
9. THE BREAKAWAY CABLE ASSEMBLY SHALL BE TAUT. A LOCKING DEVICE (VICE GRIPS OR CHANNEL LOCK PLIERS) SHOULD BE USED TO PREVENT THE CABLE FROM TWISTING WHEN TIGHTENING NUTS.

**OFFSET NOTES**

1. POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF POSTS.
2. THE GUARDRAIL BETWEEN POST ① THRU ⑧ IS ON A STRAIGHT LINE FLARE.

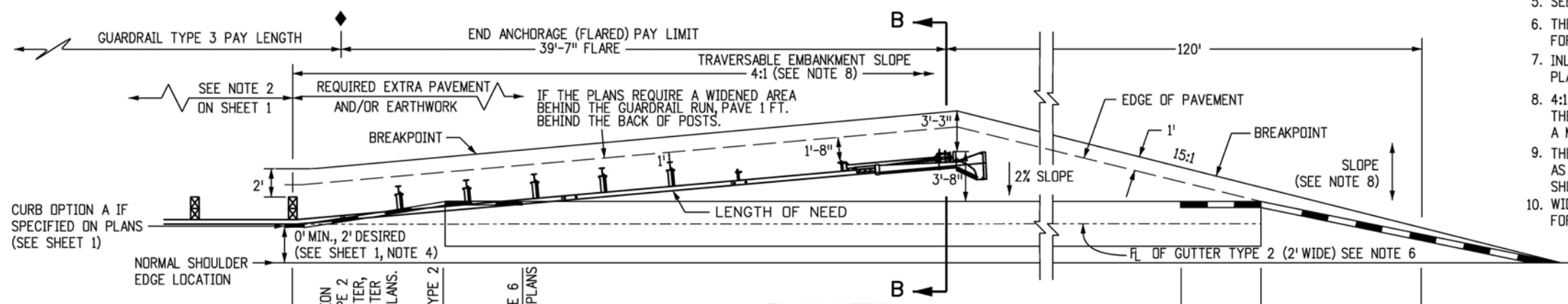


<b>Computer File Information</b>		<b>Sheet Revisions</b>		<b>Colorado Department of Transportation</b> 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>MIDWEST</b> <b>GUARDRAIL SYSTEM (MGS)</b> <b>TYPE 3 W-BEAM 31 INCHES</b> Issued by the Project Development Branch: July 31, 2019	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19	Designer Initials: JBK	Date: 03/05/20	Comments: Replaced the SRT-31 and FLEAT 350 flared terminals with the MFLEAT flared terminal to be MASH compliant.			M-606-1	
Last Modification Date: 03/05/20	Detailer Initials: LTA					Standard Sheet No. 6 of 19	
CAD Ver.: MicroStation V8	Scale: Not to Scale					Project Sheet Number:	
Units: English							

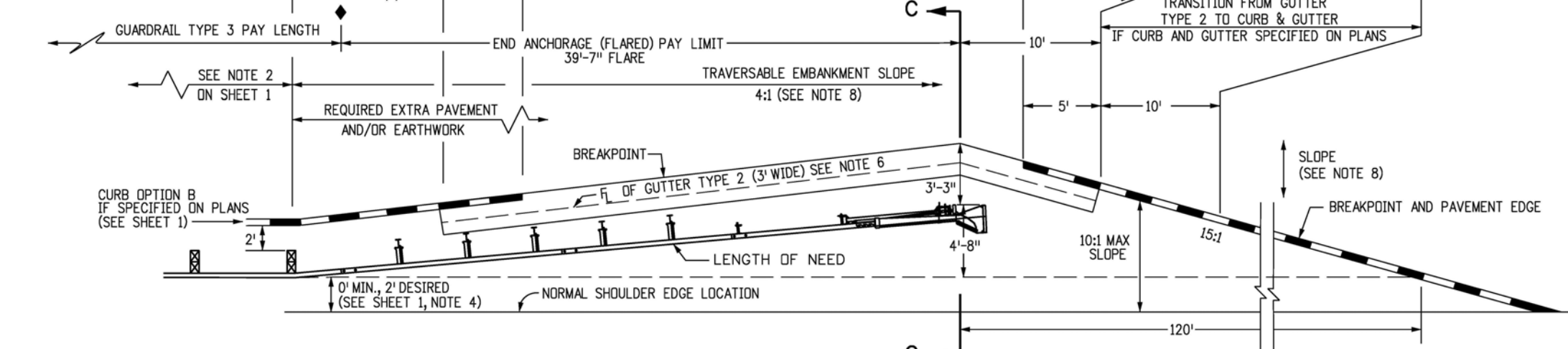


PLAN VIEW  
WIDENING FOR END ANCHORAGE (FLARED)\*

\* THIS PLAN VIEW SHOWS ONLY THE SRT-31. THE FLEAT-350 USES THE SAME WIDENING DETAILS.

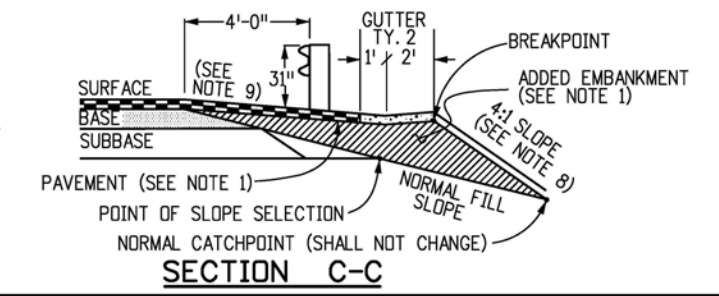
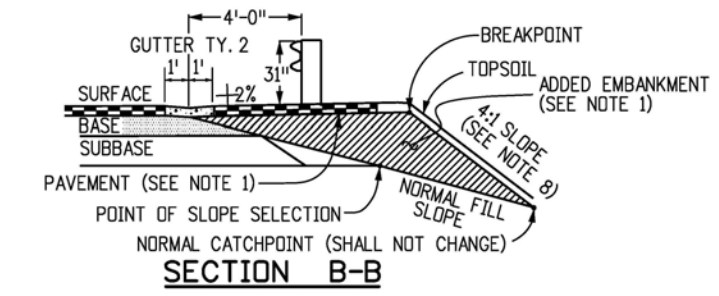
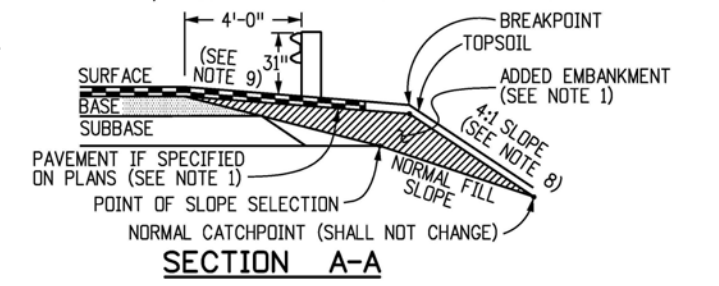


PLAN VIEW  
WIDENING FOR END ANCHORAGE (FLARED)  
WITH CURB OPTION A\*



PLAN VIEW  
WIDENING FOR END ANCHORAGE (FLARED) WITH CURB OPTION B\*

- NOTES**
- PAYMENT FOR THE ADDED EMBANKMENT (APPROXIMATELY 45 CU. YDS.) FOR THE FLARE SHALL BE AS FOLLOWS:  
A. UNDER PAY ITEM 203 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 203  
B. INCLUDED IN THE COST OF THE END ANCHORAGE (FLARED) WHEN THE CONTRACT PLANS DO NOT INCLUDE PAY ITEM 203. THE ADDED EMBANKMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH SUBSECTION 203.07, AASHTO T 99.
  - WHEN THE WIDENED AREA IS PAVED, PAYMENT FOR THE PAVEMENT (APPROX. 70 SQ. YDS.) SHALL BE AS FOLLOWS:  
A. UNDER PAY ITEM 403 OR 412 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 403 OR 412  
B. INCLUDED IN THE COST OF THE END ANCHORAGE (FLARED) WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 403 OR 412 (SEE SHEET 1, NOTE 2 FOR PAVEMENT TYPES)
  - CONCRETE PAVED AREAS SHALL HAVE THEIR TAPERED ENDS SQUARED OFF AS DIRECTED BY THE ENGINEER.
  - WHEN OVERLAY PAVING, THE FINISHED SURFACE AT EACH POST SHALL NOT BE ABOVE THE TOP BREAKAWAY HOLE OR STRUT ASSEMBLY. THE WIDENED AREA AT THE FLARED END ANCHORAGE SHOULD NOT BE OVERLAYED UNLESS PAVEMENT CONDITIONS WARRANT IT BEING OVERLAYED. ANY OVERLAY PAVEMENT ABUTTING THE FLARED END ANCHORAGE SHALL BE TAPERED TO PREVENT A DROP IN THE PAVED SURFACE BELOW THE RAIL.
  - SEE SHEETS 1, 2, 3, AND 5 FOR STANDARD TYPE 3 GUARDRAIL INSTALLATION DETAILS.
  - THE COST OF THE GUTTER WILL BE PAID FOR AS "GUTTER TYPE 2 (2 FT.)" FOR A LENGTH OF 134 FT. OR "GUTTER TY. 2 (3 FT.)" FOR A LENGTH OF 40 FT.
  - INLETS OR RUNDOWNS MAY BE USED INSTEAD OF THE GUTTER IF SPECIFIED ON THE PLANS. NO ADDITIONAL CURB SHALL BE ADDED IN THE VICINITY OF THE END ANCHORAGE.
  - 4:1 OR FLATTER SLOPES IN THE TRAVERSABLE AREA SHALL BE USED BEHIND THE END ANCHORAGE, AND IN ADVANCE OF POST (1) IF THIS IS NOT POSSIBLE, A MINIMUM 3:1 SLOPE MAY BE USED IF APPROVED BY THE ENGINEER.
  - THE WIDENED AREA, EXCEPT FOR CURB OPTION A, SHALL HAVE THE SAME GRADING AS THE ADJACENT GUARDRAIL: 10:1 OR FLATTER IF MORE THAN 2 FT. FROM SHOULDER OR SLOPE EQUAL TO ROADWAY SLOPE IF 2 FT. OR LESS FROM SHOULDER.
  - WIDENING FOR END ANCHORAGES SHALL BE PAVED ON INTERSTATES AND FREEWAYS. FOR OTHER HIGHWAYS, PAVING SHALL BE AS SHOWN ON THE PLANS.



Computer File Information	
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Last Modification Date:	03/05/20
Detailer Initials:	LTA
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
(R-X) 03/05/20	Replaced the old end anchorage drawings with the new FLEAT end anchorage drawing.
(R-X)	
(R-X)	
(R-X)	

Colorado Department of Transportation

2829 West Howard Place  
CDOT HQ, 3rd Floor  
Denver, CO 80204  
Phone: 303-757-9021 FAX: 303-757-9868

Project Development Branch JBK

MIDWEST  
GUARDRAIL SYSTEM (MGS)  
TYPE 3 W-BEAM 31 INCHES

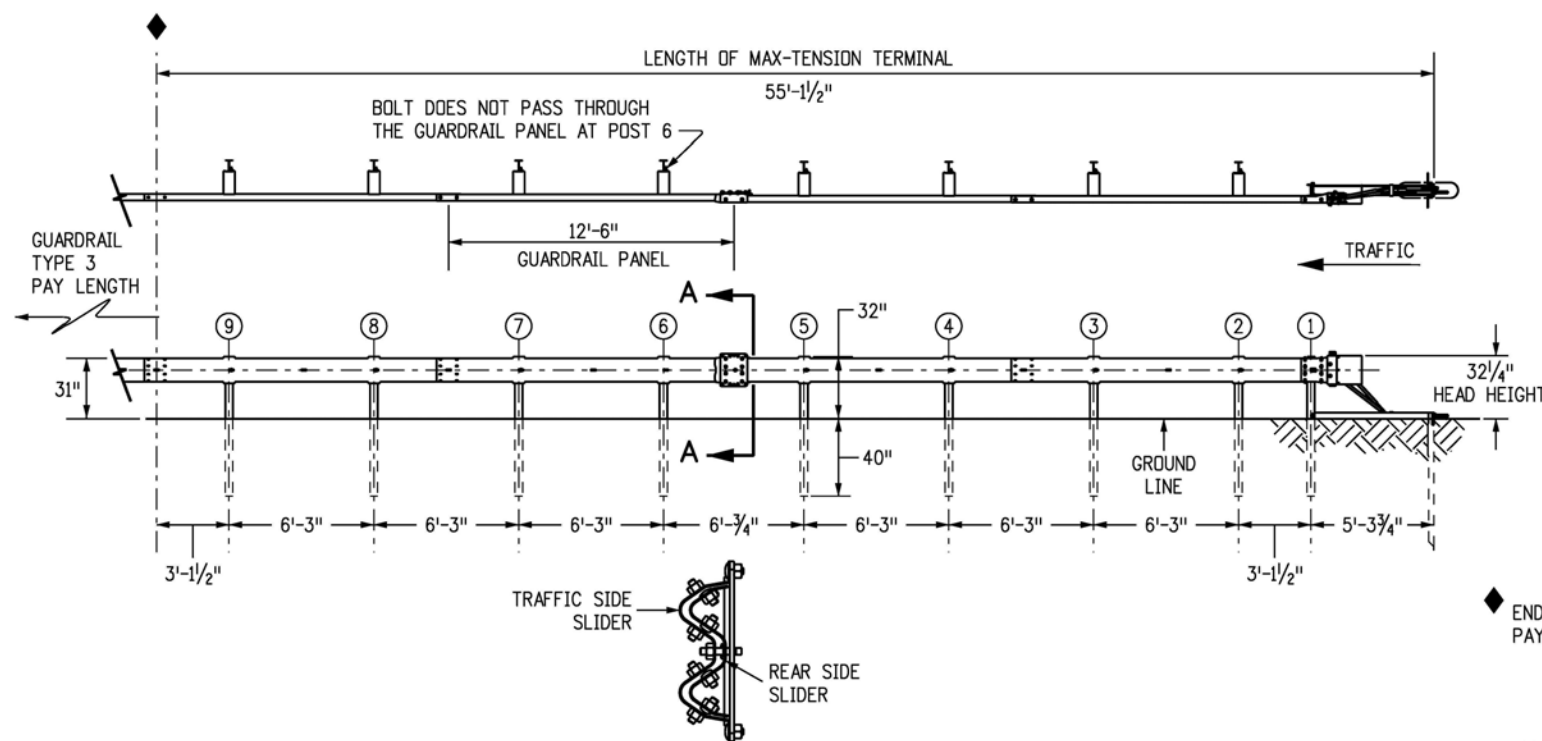
Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.  
M-606-1  
Standard Sheet No. 7 of 19  
Project Sheet Number:

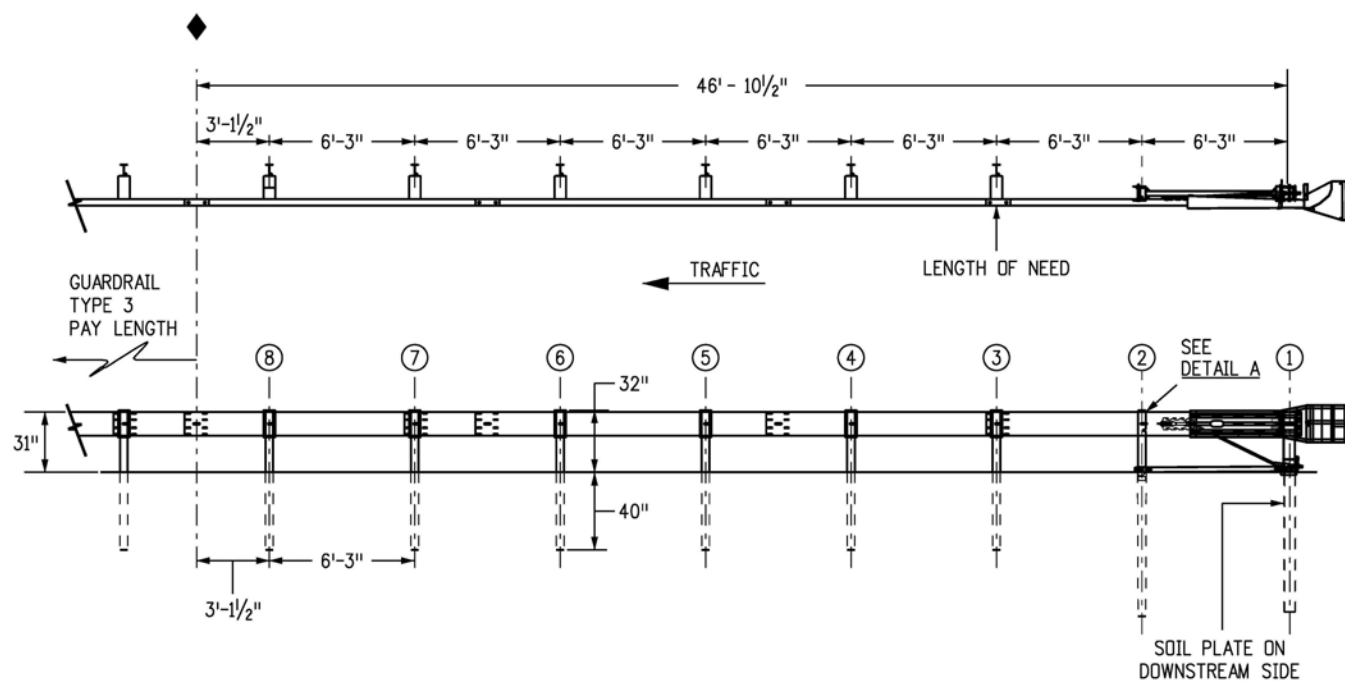


**NOTES FOR NONFLARED**

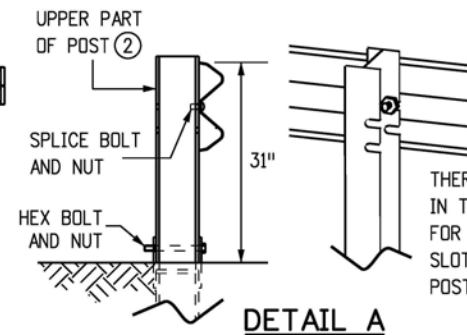
1. THE END ANCHORAGE (NONFLARED) SHALL EITHER BE THE SOFTSTOP AS MANUFACTURED BY TRINITY INDUSTRIES, INC. (TEL. #: 1-888-356-2363), OR THE MAX-TENSION AS MANUFACTURED BY LINDSAY TRANSPORTATION SOLUTIONS (TEL. #: 402-829-6800), OR THE MSKT AS MANUFACTURED BY ROAD SYSTEMS, INC. (TEL. #: 432-263-2435). THE END ANCHORAGE (NONFLARED) SHALL INCLUDE ALL POST, RAIL, AND HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE END ANCHORAGE (NONFLARED) SHALL BE INSTALLED CONFORMING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LIST TO THE ENGINEER PRIOR TO THE INSTALLATION OF THE DEVICE.
2. DO NOT ATTACH THESE END ANCHORAGES DIRECTLY TO A RIGID BARRIER (EX. CONCRETE BARRIER, STEEL BARRIER, CONCRETE STRUCTURE) WITHOUT A PROPER TRANSITION.
3. CONNECTIONS TO W-BEAMS WHERE THE SPLICE IS NOT AT MID-SPAN BUT AT A POST CAN BE MADE USING A 3'-1/2", 9'-4 1/2", OR 15'-7 1/2" W-BEAM PANEL DOWNSTREAM OF TRAFFIC.
4. FOR MSKT END ANCHORAGES (NONFLARED), USE THE MANUFACTURER'S SPECIFIED STEEL FOUNDATION TUBES FOR POSTS ① AND ②.
5. RETROREFLECTOR TABS SHALL NOT BE USED ON END ANCHORAGE POSTS.
6. DELINEATION SHALL BE APPLIED TO THE END PIECE AND SHALL NOT BE PAID FOR SEPARATELY BUT BE INCLUDED IN THE COST OF THE WORK. SEE STANDARD PLAN S-612-1.



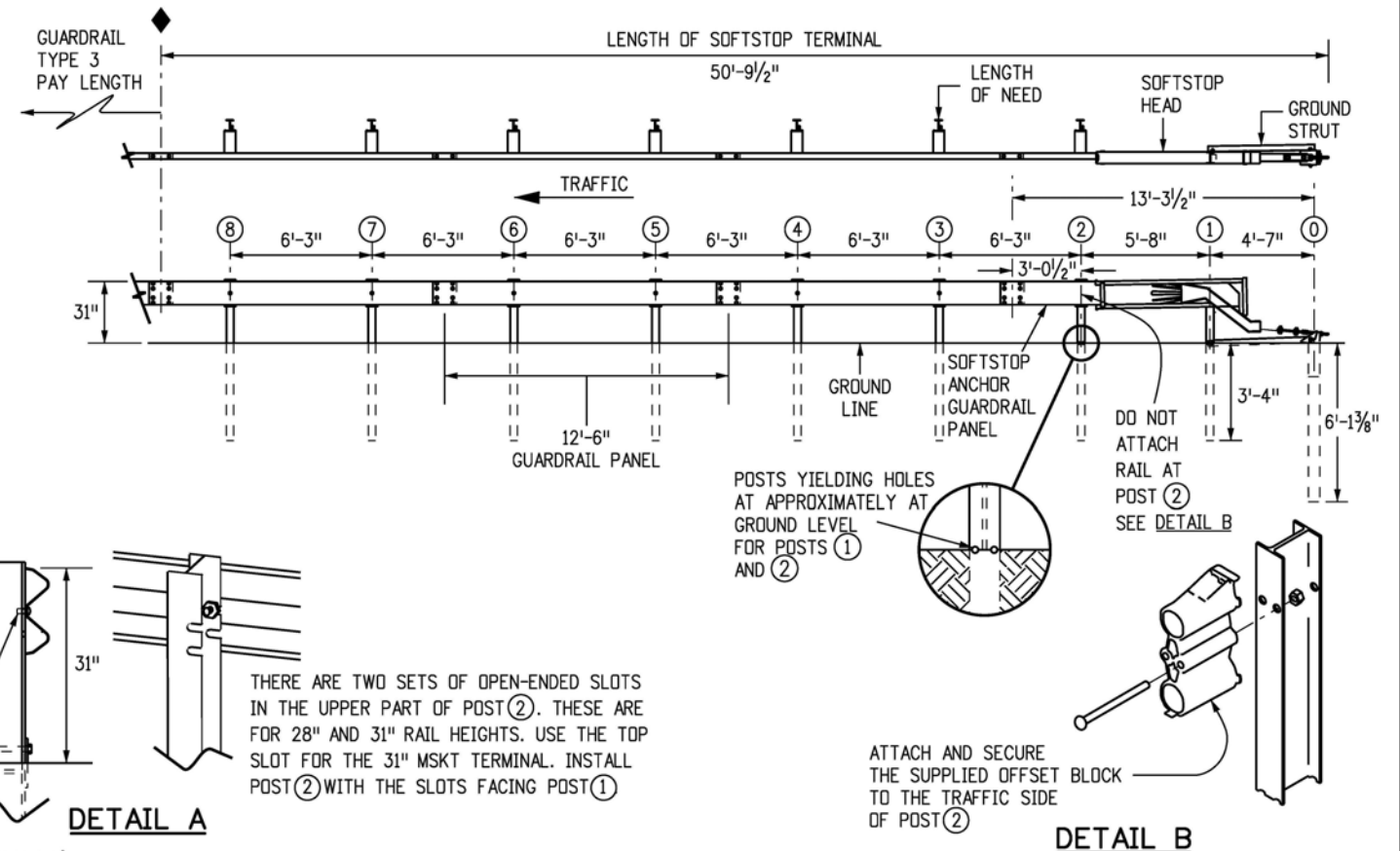
**SECTION A-A**  
**MAX-TENSION TERMINAL END ANCHORAGE (NONFLARED)**  
(MASH CERTIFIED)



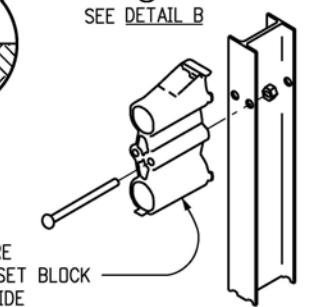
**MSKT TERMINAL END ANCHORAGE (NONFLARED)**  
(MASH CERTIFIED)



THERE ARE TWO SETS OF OPEN-ENDED SLOTS IN THE UPPER PART OF POST ②. THESE ARE FOR 28" AND 31" RAIL HEIGHTS. USE THE TOP SLOT FOR THE 31" MSKT TERMINAL. INSTALL POST ② WITH THE SLOTS FACING POST ①



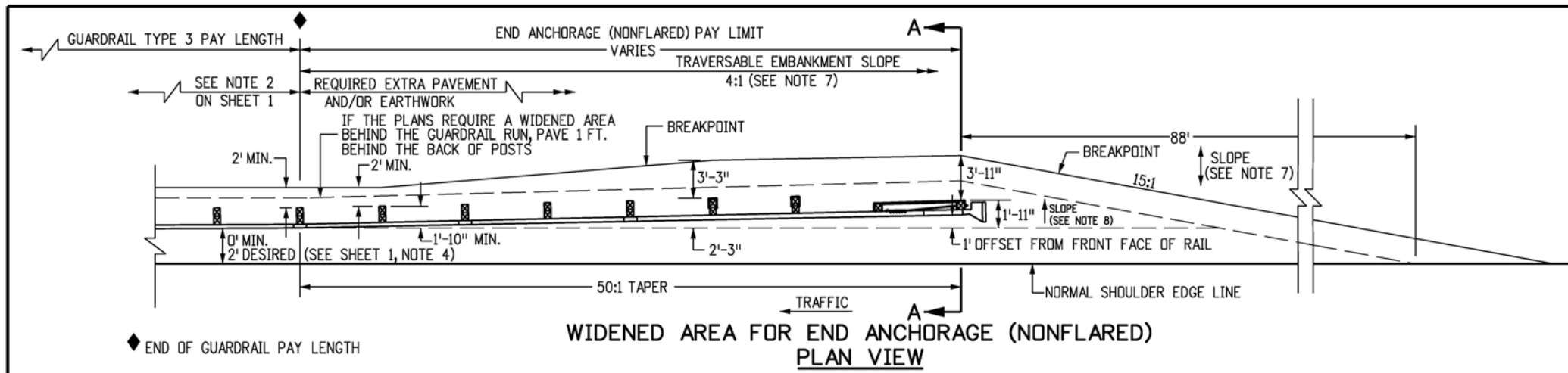
ATTACH AND SECURE THE SUPPLIED OFFSET BLOCK TO THE TRAFFIC SIDE OF POST ②



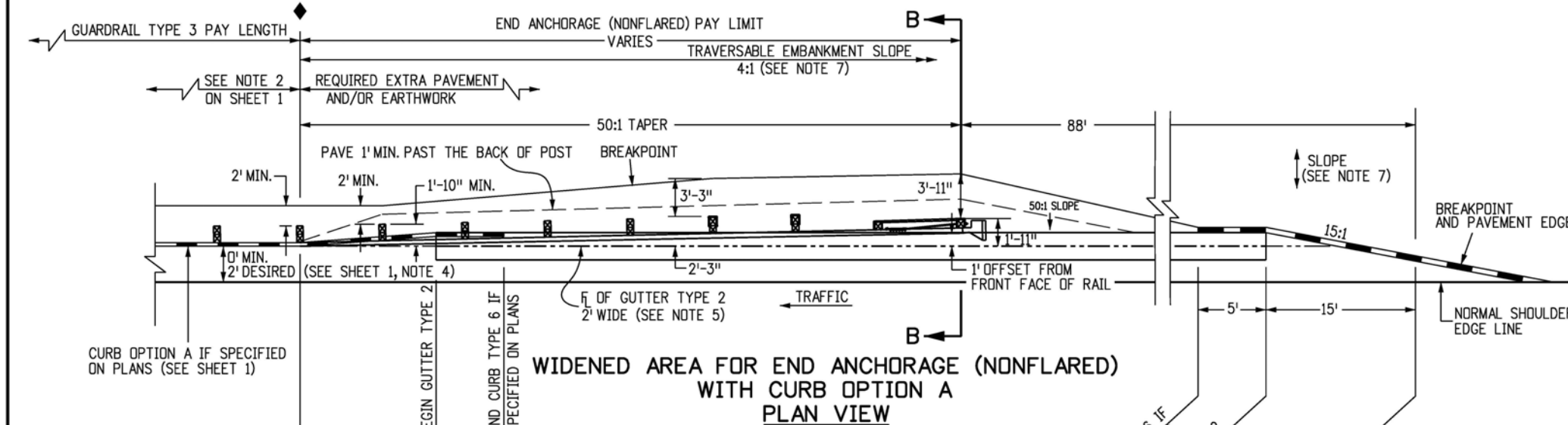
**SOFTSTOP TERMINAL END ANCHORAGE (NONFLARED)**  
(MASH CERTIFIED)

**END ANCHORAGES (NONFLARED)**

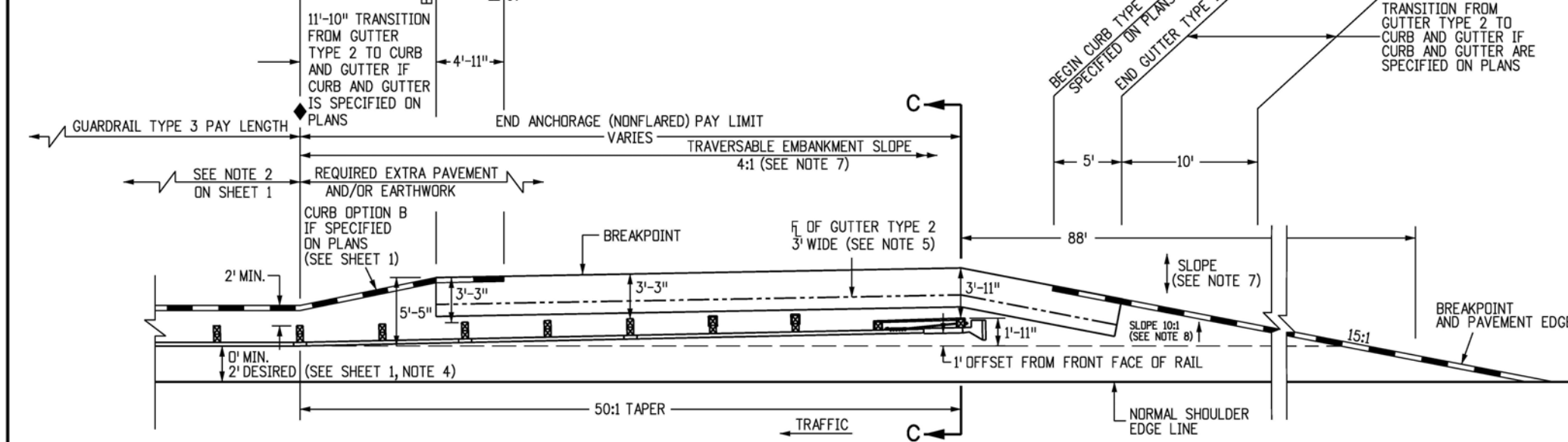
<b>Computer File Information</b>		<b>Sheet Revisions</b>		<b>Colorado Department of Transportation</b> 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>MIDWEST</b> <b>GUARDRAIL SYSTEM (MGS)</b> <b>TYPE 3 W-BEAM 31 INCHES</b> Issued by the Project Development Branch: July 31, 2019	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19		Date:	Comments:			<b>M-606-1</b>	
Designer Initials: JBK	(R-X)					<b>Standard Sheet No. 8 of 19</b>	
Last Modification Date: 03/05/20	(R-X)					Project Sheet Number:	
Detailer Initials: LTA	(R-X)						
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English				<b>JBK</b>			



**WIDENED AREA FOR END ANCHORAGE (NONFLARED)  
PLAN VIEW**

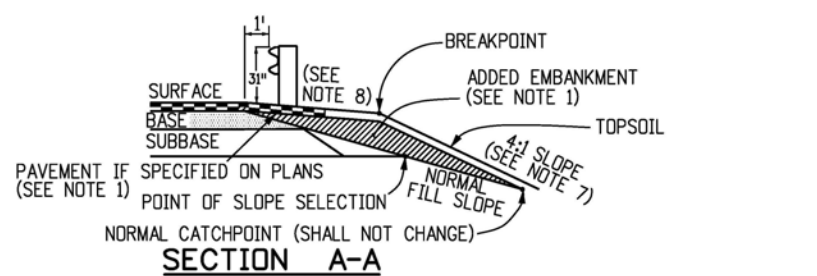


**WIDENED AREA FOR END ANCHORAGE (NONFLARED)  
WITH CURB OPTION A  
PLAN VIEW**

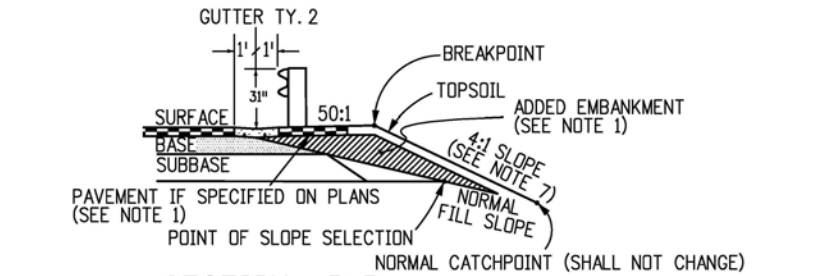


**WIDENED AREA FOR END ANCHORAGE (NONFLARED) WITH CURB OPTION B  
PLAN VIEW**

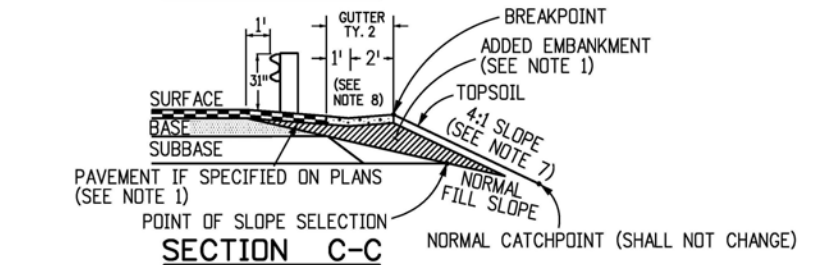
- NOTES**
- PAYMENT FOR THE ADDED EMBANKMENT (APPROXIMATELY 25 CU. YDS.) FOR THE FLARE SHALL BE AS FOLLOWS:  
A. UNDER PAY ITEM 203 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 203.  
B. INCLUDED IN THE COST OF THE END ANCHORAGE (NONFLARED) WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 203. THE ADDED EMBANKMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH SUBSECTION 203.07, AASHTO T 99.
  - WHEN THE WIDENED AREA IS PAVED, PAYMENT FOR THE PAVEMENT (APPROX. 39 SQ. YDS.) SHALL BE AS FOLLOWS:  
A. UNDER PAY ITEM 403 OR 412 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 403 OR 412.  
B. INCLUDED IN THE COST OF THE END ANCHORAGE (NONFLARED) WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 403 OR 412, (SEE SHEET 1, NOTE 2 FOR PAYMENT TYPES).
  - WHEN OVERLAY PAVING, THE FINISHED SURFACE AT EACH POST SHALL NOT BE ABOVE THE TOP BREAKWAY HOLE OR STRUT ASSEMBLY. THE WIDENED AREA AT THE END ANCHORAGE (NONFLARED) SHALL NOT BE OVERLAYED UNLESS PAVEMENT CONDITIONS WARRANT IT BEING OVERLAYED. ANY OVERLAY PAVEMENT ABUTTING THE END ANCHORAGE (NONFLARED) SHALL BE TAPERED TO PREVENT A DROP IN THE PAVED SURFACE BELOW THE RAIL.
  - SEE SHEETS 1, 2, 3, AND 5 FOR STANDARD TYPE 3 GUARDRAIL INSTALLATION DETAILS.
  - THE COST OF THE GUTTER WILL BE PAID FOR AS "GUTTER TYPE 2 (2 FT.)" FOR A LENGTH OF 111 FT., OR "GUTTER TY. 2 (3 FT.)" FOR A LENGTH OF 50 FT.
  - INLETS OR RUNDOWNS MAY BE USED INSTEAD OF THE GUTTER IF SPECIFIED ON THE PLANS. NO ADDITIONAL CURB SHALL BE ADDED IN THE VICINITY OF THE END TREATMENT.
  - 4:1 OR FLATTER SLOPES IN THE TRAVERSABLE AREA SHALL BE USED BEHIND THE END ANCHORAGE AREA, AND IN ADVANCE OF POST (1). IF THIS IS NOT POSSIBLE A MINIMUM 3:1 SLOPE MAY BE USED IF APPROVED BY THE ENGINEER.
  - THE WIDENED AREA, EXCEPT FOR CURB OPTION A, SHALL HAVE THE SAME GRADING AS BENEATH THE ADJACENT GUARDRAIL: 10:1 OR FLATTER IF MORE THAN 2 FT. FROM SHOULDER, OR SLOPE EQUAL TO ROADWAY SLOPE IF 2 FT. OR LESS FROM SHOULDER.
  - WIDENING FOR END ANCHORAGES SHALL BE PAVED ON INTERSTATES AND FREEWAYS. FOR OTHER HIGHWAYS, PAVING SHALL BE AS SHOWN ON THE PLANS.



**SECTION A-A**



**SECTION B-B**



**SECTION C-C**

Computer File Information	
Creation Date: 07/31/19	
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Last Modification Date: 03/05/20	(R-X)
Detailer Initials: LTA	(R-X)
CAD Ver.: MicroStation V8	(R-X)
Scale: Not to Scale	
Units: English	

Sheet Revisions	
Date:	Comments

Colorado Department of Transportation  
 2829 West Howard Place  
 CDDT HQ, 3rd Floor  
 Denver, CO 80204  
 Phone: 303-757-9021 FAX: 303-757-9868  
 Project Development Branch JBK

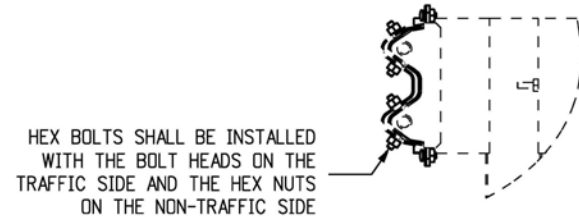
**MIDWEST  
 GUARDRAIL SYSTEM (MGS)  
 TYPE 3 W-BEAM 31 INCHES**  
 Issued by the Project Development Branch: July 31, 2019

**STANDARD PLAN NO.  
 M-606-1  
 Standard Sheet No. 9 of 19**  
 Project Sheet Number:

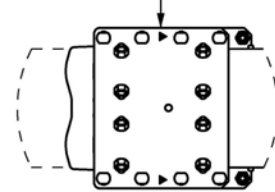
**MEDIAN TERMINAL NOTES**

1. THE MEDIAN TERMINAL SHALL BE THE MAX-TENSION MEDIAN AS MANUFACTURED BY BY BARRIER SYSTEM BY LINDSAY (LINDSAY TRANSPORTATION SOLUTIONS) (TEL #: 888 800-3691).
2. THE MAX-TENSION SHALL BE APPLIED DIRECTLY TO W-BEAM GUARDRAIL SYSTEMS AT, OR TRANSITIONED TO, 31 INCH WITH PANELS AND POST SPACING CONFIGURED AT MID-SPAN SPLICE. TRANSITIONS TO STRONG POST W-BEAM GUARDRAIL SYSTEMS OR OTHER BARRIERS WHERE THE SPLICE IS NOT MID-SPAN SHALL BE ACCOMPLISHED USING A 3 FT. 1-1/2 INCH, 9 FT. 4-1/2 INCH OR 15 FT. 7-1/2 INCH PANELS AFTER THE MAX-TENSION SYSTEM (MIN. OF 50 FT. DOWNSTREAM OF THE FIRST POST). TRANSITIONS TO OTHER BARRIER SYSTEMS SHALL ALSO BE AT A MIN. OF 50 FT. DOWNSTREAM FROM THE FIRST POST. SEE SHEET 4.
3. THE MAX-TENSION SHALL NOT BE ATTACHED DIRECTLY TO RIGID BARRIERS SUCH AS CONCRETE BARRIERS, STEEL BARRIERS OR CONCRETE STRUCTURES WITHOUT PROPER TRANSITION. IF ROCK OR STIFF SOIL IS ENCOUNTERED, THE POSTS AND SOIL ANCHOR MAY BE INSTALLED BY AUGURING AND BACKFILLING THE HOLE.
4. EITHER 8 INCH OR 12 INCH COMPOSITE OR TIMBER BLOCKOUTS SHALL BE USED PER MANUFACTURE'S RECOMMENDATIONS.
5. EITHER 12 FT.-6 INCH OR 25 FOOT PANELS SHALL BE USED DEPENDING ON SITE CONDITIONS OR CONNECTED BARRIER SYSTEMS.
6. RAIL PANELS SHALL BE LAPPED PER MANUFACTURER'S INSTALLATION MANUAL, REGARDLESS OF AN UPSTREAM OR DOWNSTREAM END SYSTEM POSITION.
7. ALL STEEL COMPONENTS SHALL BE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
8. ONE MEDIAN TERMINAL SHALL INCLUDE ALL POSTS, RAIL, AND HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE DEVICE SHALL BE INSTALLED IN CONFORMANCE WITH THE MANUFACTURER'S INSTRUCTIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LISTS TO THE ENGINEER PRIOR TO THE INSTALLATION OF THE DEVICE.
9. UNLESS OTHERWISE SPECIFIED ON THE PLANS, THE MEDIAN TERMINAL SHALL BE INSTALLED FOR BIDIRECTIONAL TRAFFIC APPLICATION.
10. EACH INSTALLATION SHALL BE SUPERVISED AND CERTIFIED AS CORRECT UPON COMPLETION BY A REPRESENTATIVE OF THE DEVICE MANUFACTURER OR BY AN EMPLOYEE OF THE CONTRACTOR WHO IS A CERTIFIED INSTALLER. THE CERTIFIED INSTALLER SHALL HAVE COMPLETED DEVICE TRAINING AND SHALL BE REGISTERED WITH THE MANUFACTURER AS A CERTIFIED INSTALLER.
11. DELINEATION, IF REQUIRED, SHALL BE APPLIED TO THE END PIECE AND WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK. SEE STANDARD PLAN S-612-1.

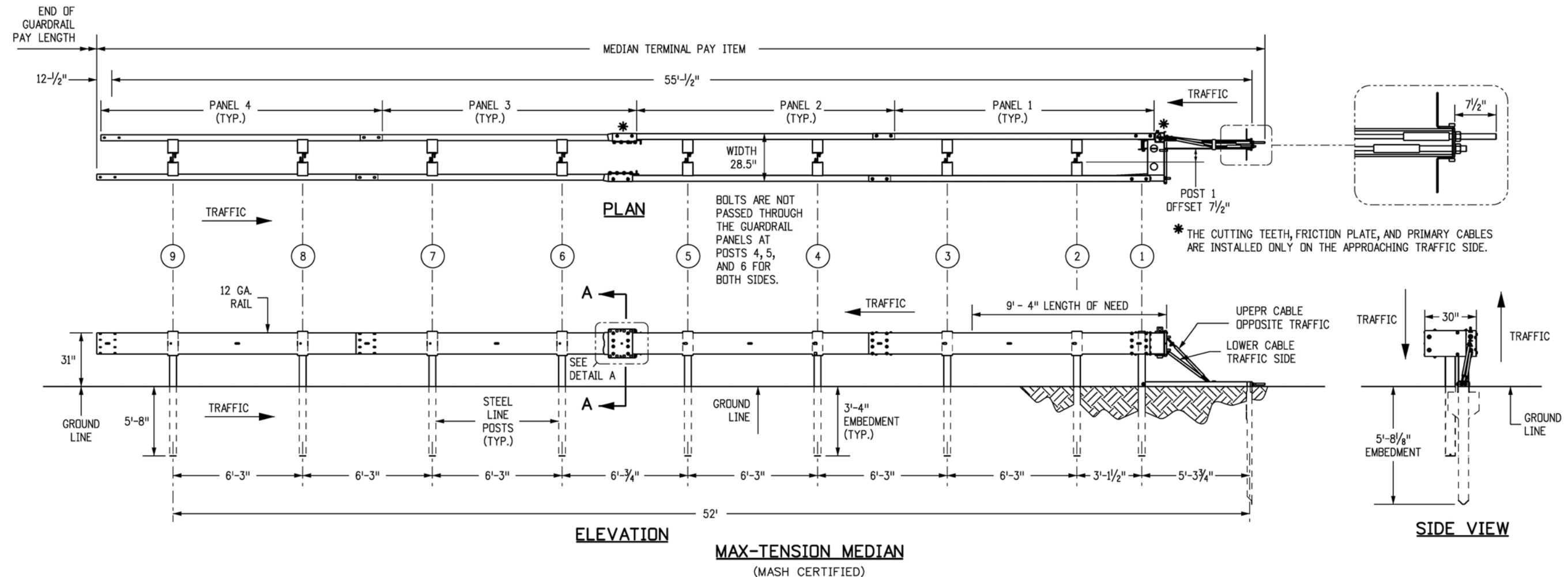
THE TRAFFIC SIDE SLIDER AND THE REAR SIDE SLIDER INSTALLED WITH ARROWS POINTING TOWARDS THE HEAD OF THE SYSTEM ON BOTH SIDES OF TRAFFIC



**SECTION A-A**



**DETAIL A**

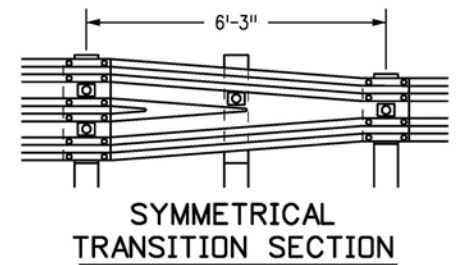
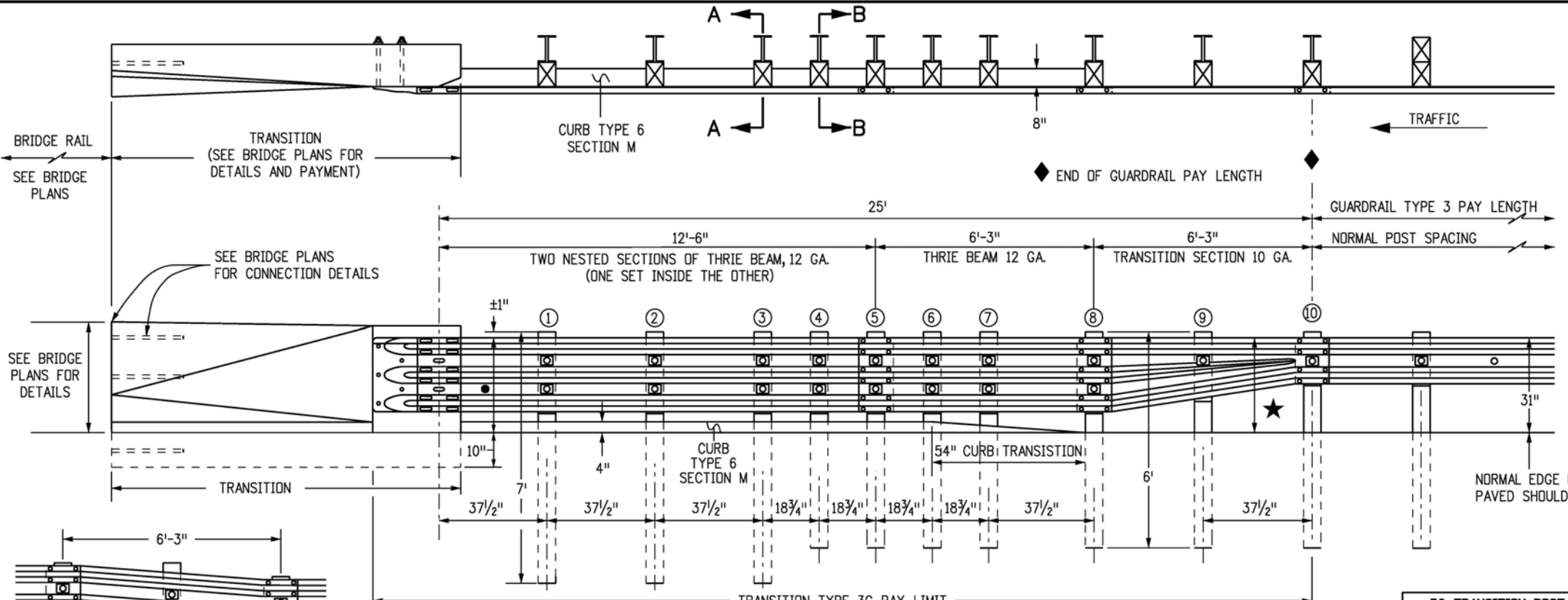


**ELEVATION**

**MAX-TENSION MEDIAN  
(MASH CERTIFIED)**

**SIDE VIEW**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES</b> Issued by the Project Development Branch: July 31, 2019	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19	Designer Initials: JBK	Date:	Comments:			M-606-1	
Last Modification Date: 03/05/20	Detailer Initials: LTA					Standard Sheet No. 10 of 19	
CAD Ver.: MicroStation V8	Scale: Not to Scale					Project Sheet Number:	
Units: English							



**TRANSITION TYPE 3G**  
ALL POSTS SHALL BE STEEL

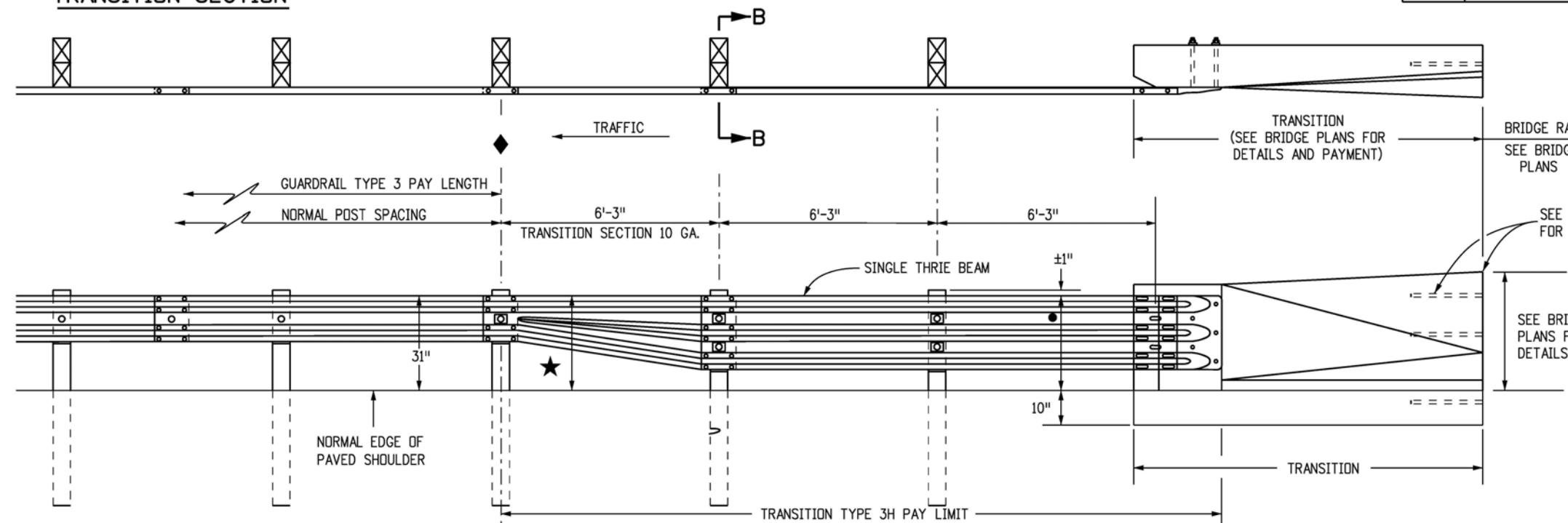
★ IF THE HEIGHT OF THE TRANSITION TYPES 3G OR 3H IS MORE THAN 31", THEN A SYMMETRICAL TRANSITION SECTION SHALL BE USED HERE.

● 31" FOR ASPHALT BRIDGE OVERLAY.  
33.25" FOR POLYMER CONCRETE BRIDGE OVERLAY.

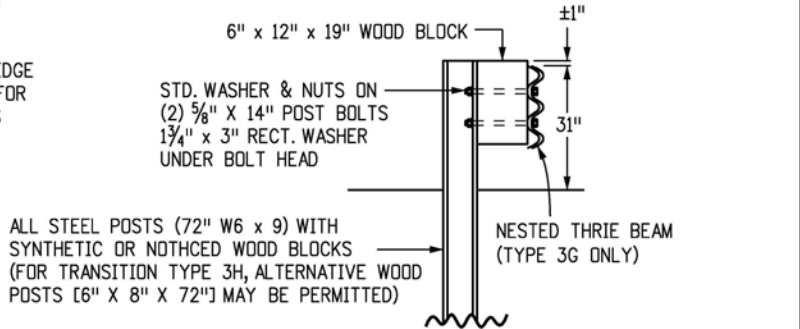
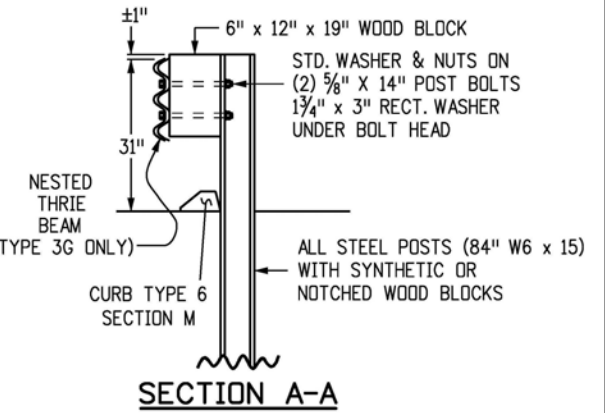
3G TRANSITION POST / BLOCK SIZING		
POST #	STEEL POST SIZE	BLOCKOUT SIZE
1 - 3	84" W6 X 15	6" X 12" X 19"
4 - 9	72" W6 X 9	6" X 12" X 19"
10	72" W6 X 9	6" X 12" X 14"

**NOTES**

1. TRANSITION TYPE 3G IS FOR USE AT BOTH ENDS OF BRIDGES ON TWO-WAY HIGHWAYS AND AT THE APPROACH END OF BRIDGES ON ONE-WAY HIGHWAYS.
2. TRANSITION TYPE 3H IS FOR USE AT THE TRAILING END OF BRIDGES ON ONE-WAY HIGHWAYS.
3. THE THRIE BEAM SECTION IN TRANSITION TYPES 3G AND 3H MAY BE SHOP BENT TO FIT CORRESPONDING RADIUS CURVES. HOWEVER, THE 6 FT.-3 IN. TRANSITION SECTION SHALL NOT BE BENT.
4. A TRANSITION SHALL BE REQUIRED BETWEEN TYPES 3G OR 3H AND THE BRIDGE RAILS. SEE STANDARD PLAN M-606-15 FOR THE TRANSITION TO TYPE 9 GUARDRAIL BARRIER.
5. TRANSITION TYPES 3G AND 3H ARE BOTH MASH COMPLIANT.
6. BACKUP PLATE IS NOT REQUIRED AT POSTS ON TYPE 3G AND 3H.
7. [Symbol] THIS SYMBOL IN THE ELEVATION DRAWINGS SHOWS THE LOCATIONS WHERE A RECTANGULAR WASHER IS REQUIRED UNDER THE POST BOLT HEAD.
8. CURB TYPE 6 SECTION M, MAY BE ASPHALT OR CONCRETE. THE COST OF CURB IS INCLUDED IN THE WORK, UNLESS A SEPARATE PAY ITEM IS INCLUDED IN THE BID SCHEDULE.
9. FOR TYPE 3G, POSTS ① THRU ③ ARE 7 FT. LONG. ALL OTHER POSTS SHALL BE A STANDARD 6 FT. LONG UNLESS OTHERWISE SPECIFIED IN THE CONTRACT.
10. NOTCHED RAIL BLOCKS MANUFACTURED FROM SYNTHETIC MATERIAL WILL BE ACCEPTED AS ALTERNATIVES TO WOOD NOTCHED BLOCKS FOR USE WITH STEEL POSTS PROVIDED THAT THE BLOCKS HAVE RECEIVED FHWA APPROVAL AND ARE CERTIFIED AS IDENTICAL TO THE SPECIMENS USED FOR TESTING AND APPROVAL. STEEL BLOCKS ARE NOT ALLOWED.



**TRANSITION TYPE 3H**



Computer File Information	
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Designer Initials:	JBK
Last Modification Date:	03/05/20
Detailer Initials:	LTA
CAD Ver.:	MicroStation V8
Scale:	Not to Scale
Units:	English

Sheet Revisions	
Date:	Comments
03/05/20	Revised Gen. Notes 3 & 5. Revised transition sections notes to see the "Bridge Plans" and deleted their x-sections details. Revised the ★ note.
(R-X)	
(R-X)	
(R-X)	
(R-X)	

Colorado Department of Transportation  
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 CDDT HQ, 3rd Floor  
 Denver, CO 80204  
 Phone: 303-757-9021 FAX: 303-757-9868

Project Development Branch JBK

**MIDWEST**  
**GUARDRAIL SYSTEM (MGS)**  
**TYPE 3 W-BEAM 31 INCHES**

Issued by the Project Development Branch: July 31, 2019

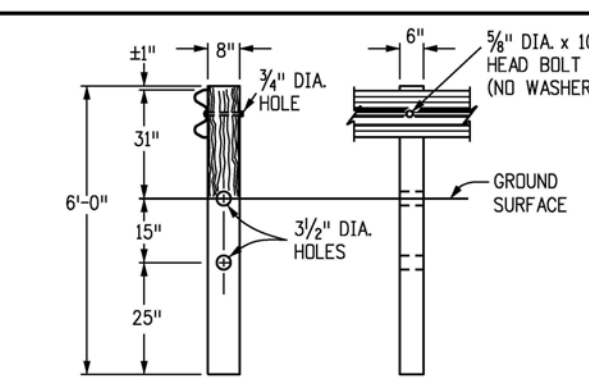
**STANDARD PLAN NO.**  
**M-606-1**  
**Standard Sheet No. 11 of 19**

Project Sheet Number:

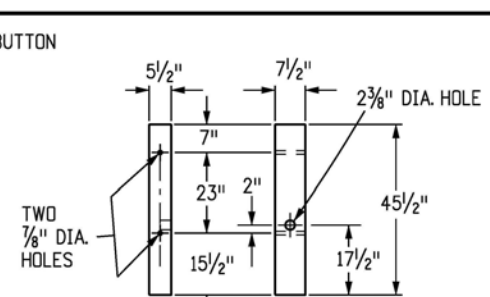
**NOTES**

- APPLICATION: THE TRANSITION TYPE 3J MAY BE USED TO SHIELD HAZARDS AT THE INTERSECTION OF TWO ROADWAYS. TYPICAL APPLICATIONS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
  - CANAL SERVICE ROADS AT BRIDGE ENDS.
  - INTERRUPTIONS IN GUARDRAIL RUNS BY INTERSECTING ROADWAYS, ETC..

THE LOW SPEED (<45 MPH) END ANCHORAGE TYPE 3K SHALL BE USED ONLY ON DRIVEWAYS AND LOW SPEED SERVICE ROADS. WHEN AN APPROVED CRASH-TESTED END TREATMENT IS REQUIRED USE THE END ANCHORAGE (FLARED) OR (NONFLARED) WITH 37 FT.-6 IN. LENGTH.
- GRADING AND PAVING FOR THE 3J & 3K SHALL MATCH THE GRADING AND PAVING OF THE GUARDRAIL TO WHICH THEY ARE ATTACHED, AND SHALL BE IN ACCORDANCE WITH SHEET ONE OF THIS STANDARD. MAXIMUM FILL SLOPE SHALL BE 2:1.
- THE RAIL IS NOT BOLTED TO THE CRT POST AT THE CENTER OF THE CURVE FOR THE 8 FT.-6 IN., 17 FT., AND 25 FT.-6 IN. RADII. PLATES SHALL CONFORM TO ASTM A 36, AND THE STRUCTURAL TUBING TO ASTM A 500.
- THE 3/4 IN. GALVANIZED WIRE ROPE (CABLE) SHALL CONFORM TO AASHTO M 30 TYPE II.
- PLATES SHALL CONFORM TO ASTM A 36, AND STRUCTURAL TUBING TO ASTM A 500. WELDING SHALL MEET ALL REQUIREMENTS OF THE AMERICAN WELDING SOCIETY.
- ALL STRUCTURAL STEEL SHALL BE GALVANIZED IN CONFORMANCE WITH ASTM A 123. POSTS SHALL NOT BE PUNCHED, DRILLED, CUT, OR WELDED AFTER GALVANIZING.
- WHEN THE SOIL PLATE WELDED OPTION IS SELECTED, SOIL PLATE CONNECTION BOLT HOLES ARE NOT REQUIRED.
- OUTSIDE NUT SHALL BE TORQUED AGAINST INSIDE NUT WITH THE CABLE INSTALLED TAUT BETWEEN THE ANCHOR PLATE AND FIRST POST.
- ALL CURVED GUARDRAIL SHALL BE SHOP BENT.
- SEE SHEET 5 FOR ANCHOR PLATE AND OTHER DETAILS.
- THE STEEL TUBE MAY BE DRIVEN WITH WOOD POST INSERTED IF NO DAMAGE OCCURS TO THE POST OR BOLTS.



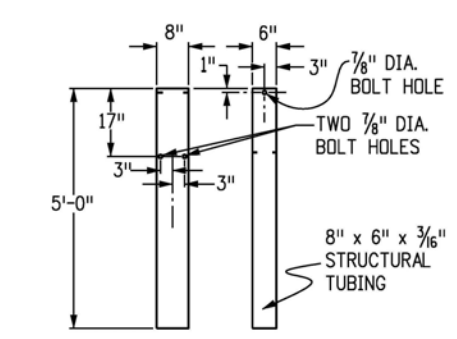
**CONTROLLED RELEASING TERMINAL (CRT) POST ①**



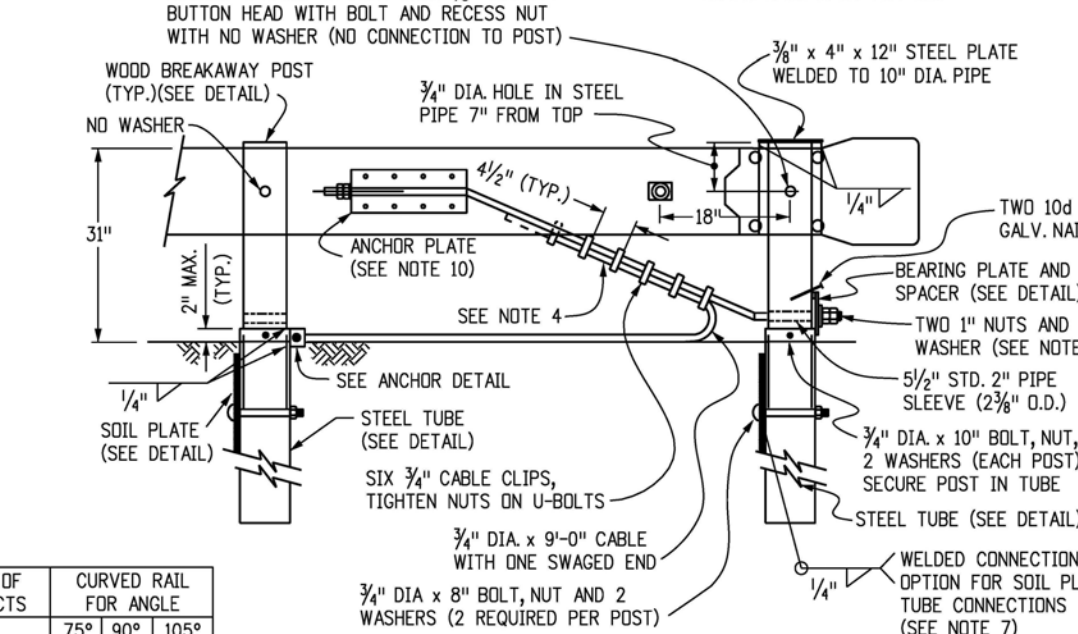
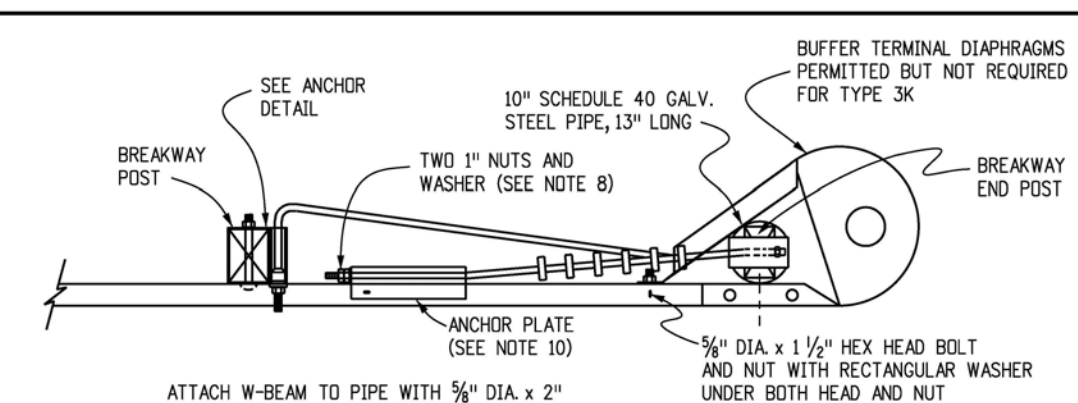
**WOOD BREAKAWAY POST ②**

POST	DIMENSIONS	TYPE
①	6" x 8" x 6'	CRT
②	5 1/2" x 7 1/2" x 45 1/2"	BREAKAWAY

**POSTS**



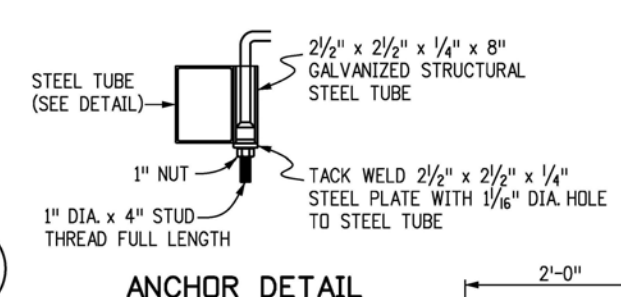
**STEEL TUBE**



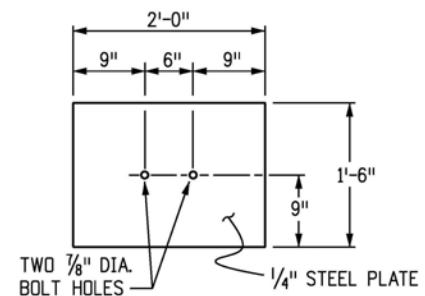
**LOW SPEED END ANCHORAGE - TYPE 3K**

RADIUS	ANGLE	NO. CRT POSTS	AREA FREE OF FIXED OBJECTS		CURVED RAIL FOR ANGLE		
			L	W	75°	90°	105°
8'-6"	75°-105°	5	25'	15'	11'	13'	15'
			30'	15'	22'	27'	31'
17'	75°-90°	6					
	91°-105°	7					
	75°-85°	7					
25'-6"	86°-95°	8	40'	20'	33'	40'	47'
	96°-105°	9					
	75°-85°	9					
35'	86°-95°	10	50'	20'	46'	55'	64'
	96°-105°	11					

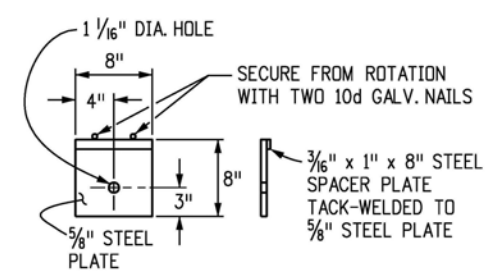
**TRANSITION TYPE 3J APPLICATION**



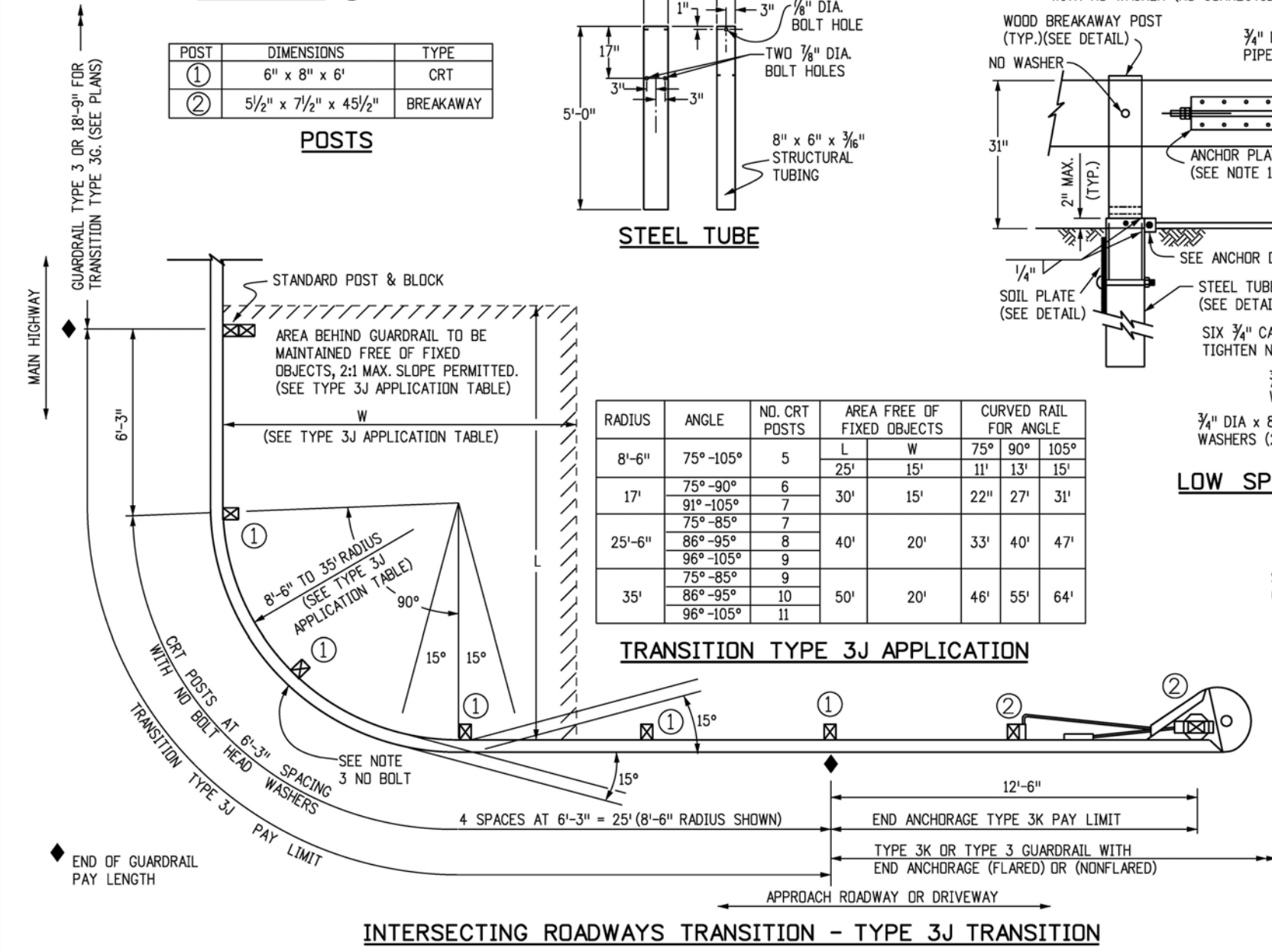
**ANCHOR DETAIL**



**SOIL PLATE**



**BEARING PLATE FOR STEEL TUBE**



**INTERSECTING ROADWAYS TRANSITION - TYPE 3J TRANSITION**

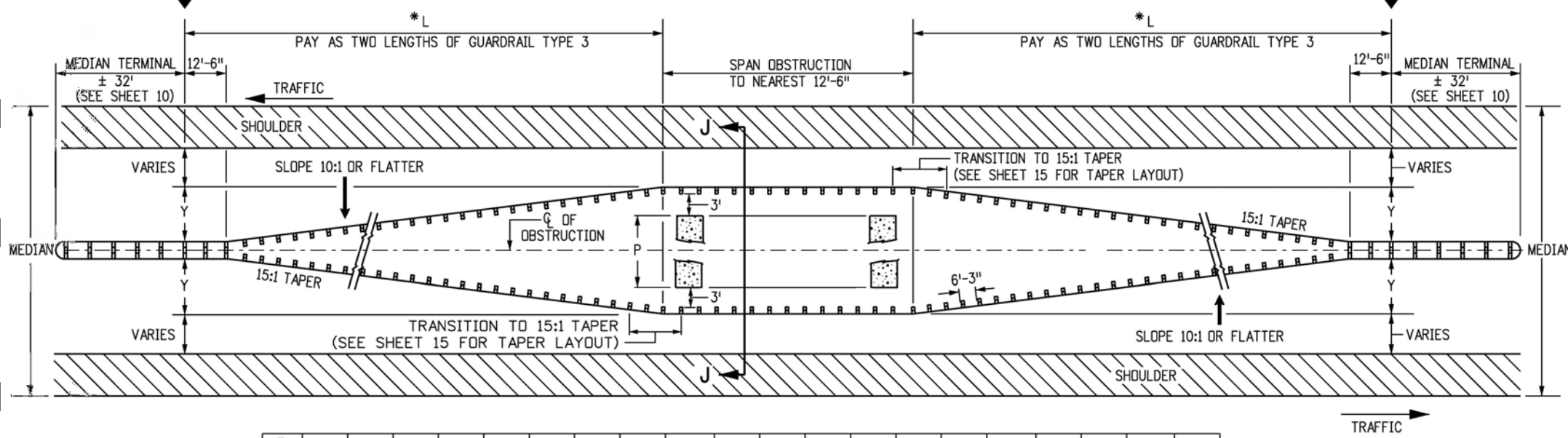
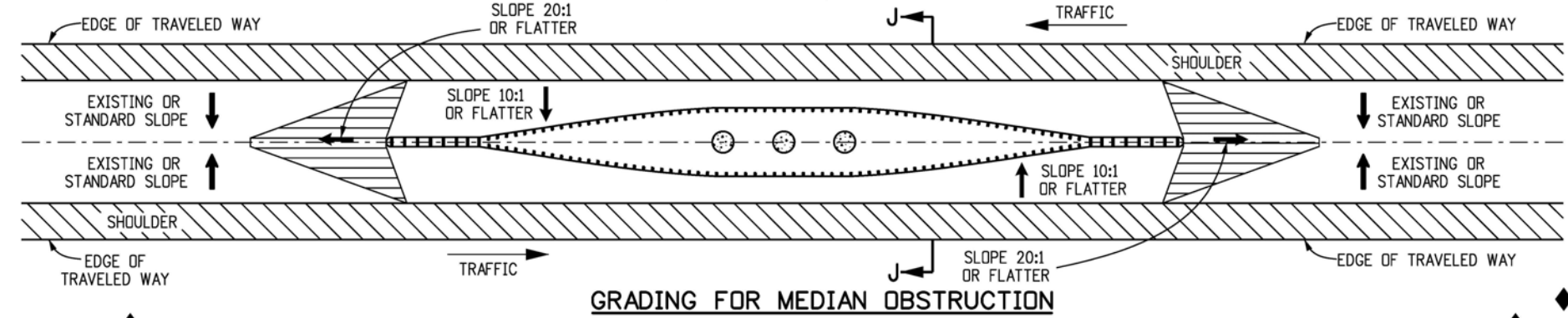
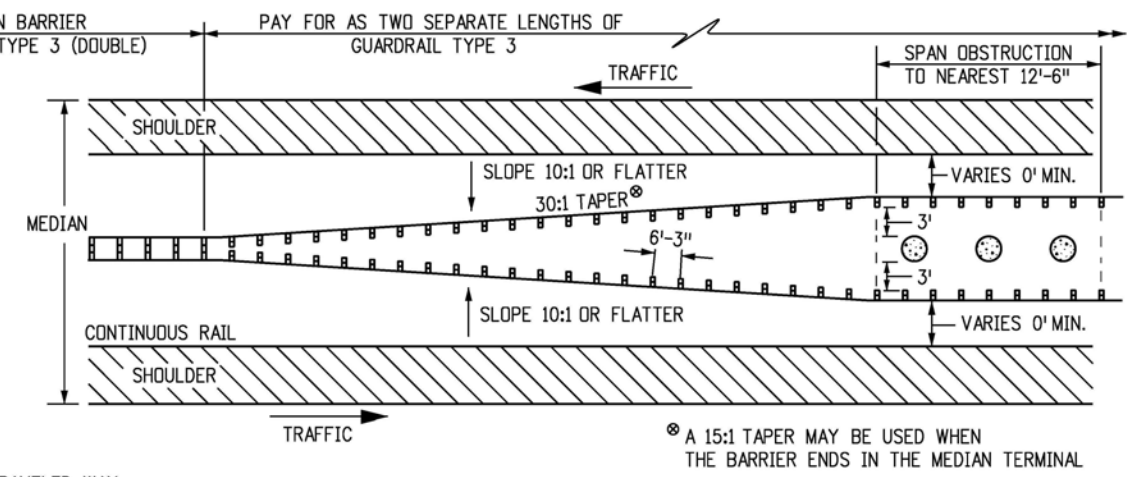
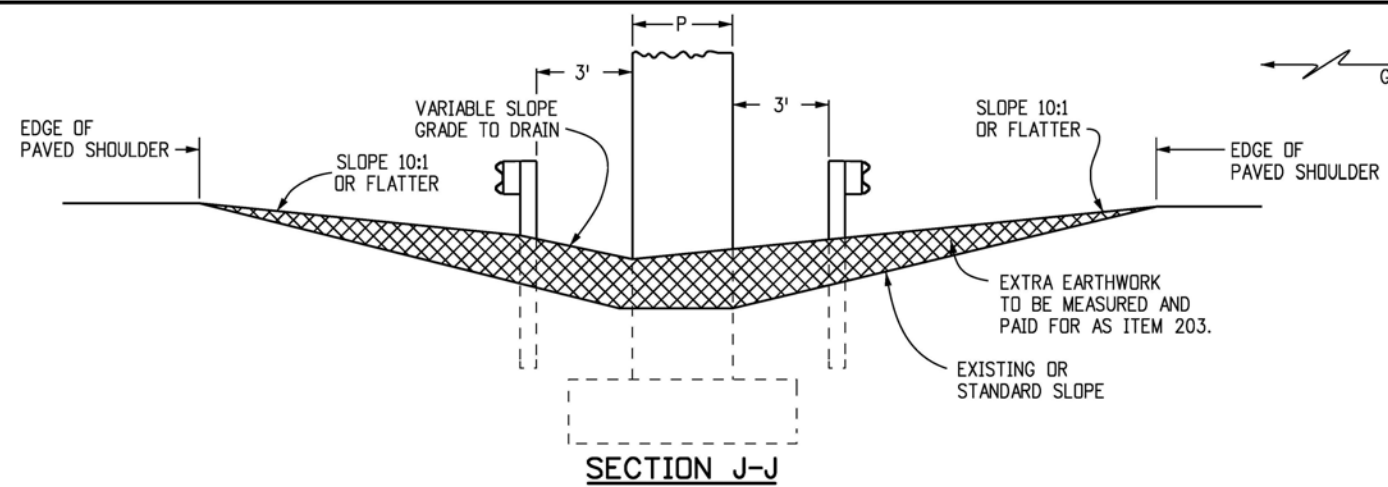
Computer File Information	
Creation Date:	07/31/19
Designer Initials:	JBK
Last Modification Date:	03/05/20
Detailer Initials:	LTA
CAD Ver.:	MicroStation V8
Scale:	Not to Scale
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Sheet Revisions	
Date:	Comments
(R-X)	
(R-X)	
(R-X)	
(R-X)	

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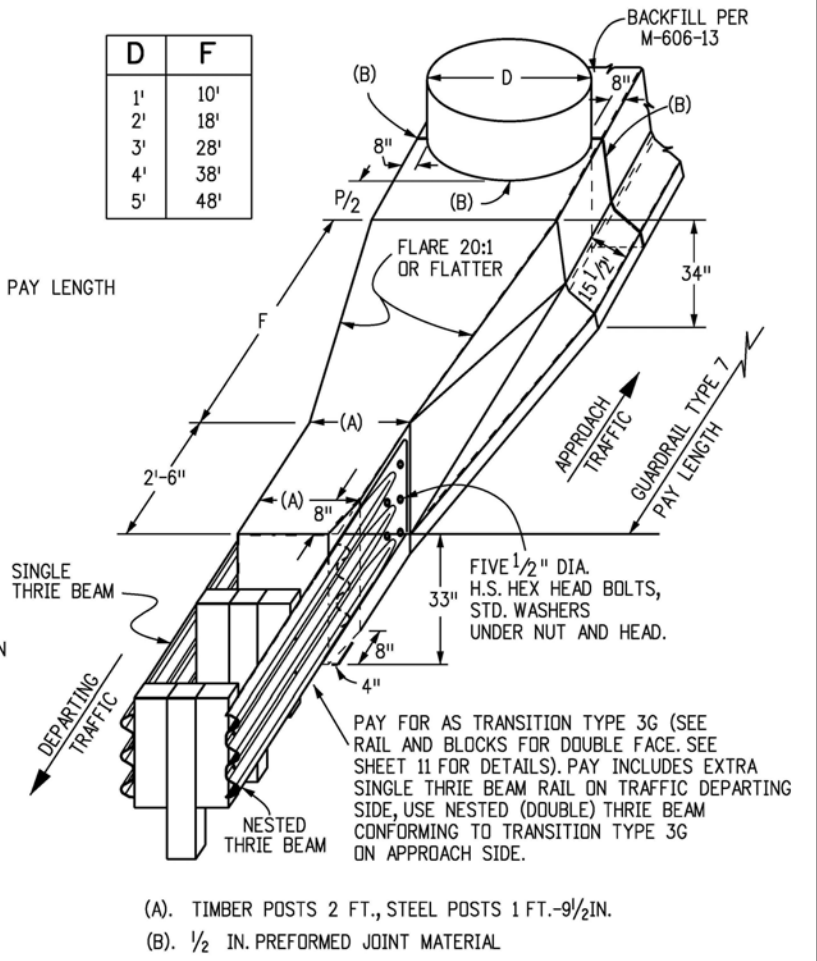
MIDWEST  
 GUARDRAIL SYSTEM (MGS)  
 TYPE 3 W-BEAM 31 INCHES  
 Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.  
 M-606-1  
 Standard Sheet No. 12 of 19  
 Project Sheet Number:



P	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
Y	4'-1"	4'-7"	5'-1"	5'-7"	6'-1"	6'-7"	7'-1"	7'-7"	8'-1"	8'-7"	9'-1"	9'-7"	10'-1"	10'-7"	11'-1"	11'-7"	12'-1"	12'-7"	13'-1"	13'-7"
L	75'	87'-6"	100'	112'-6"	125'	137'-6"	150'	162'-6"	175'	187'-6"	200'	212'-6"	225'							

**GUARDRAIL FOR OBSTRUCTION IN MEDIANS WIDER THAN 30 FT.**  
NOTE: FOR OBSTRUCTIONS (P) THAT ARE WIDER THAN 20 FT. IN MEDIANS USE SHEET 16.

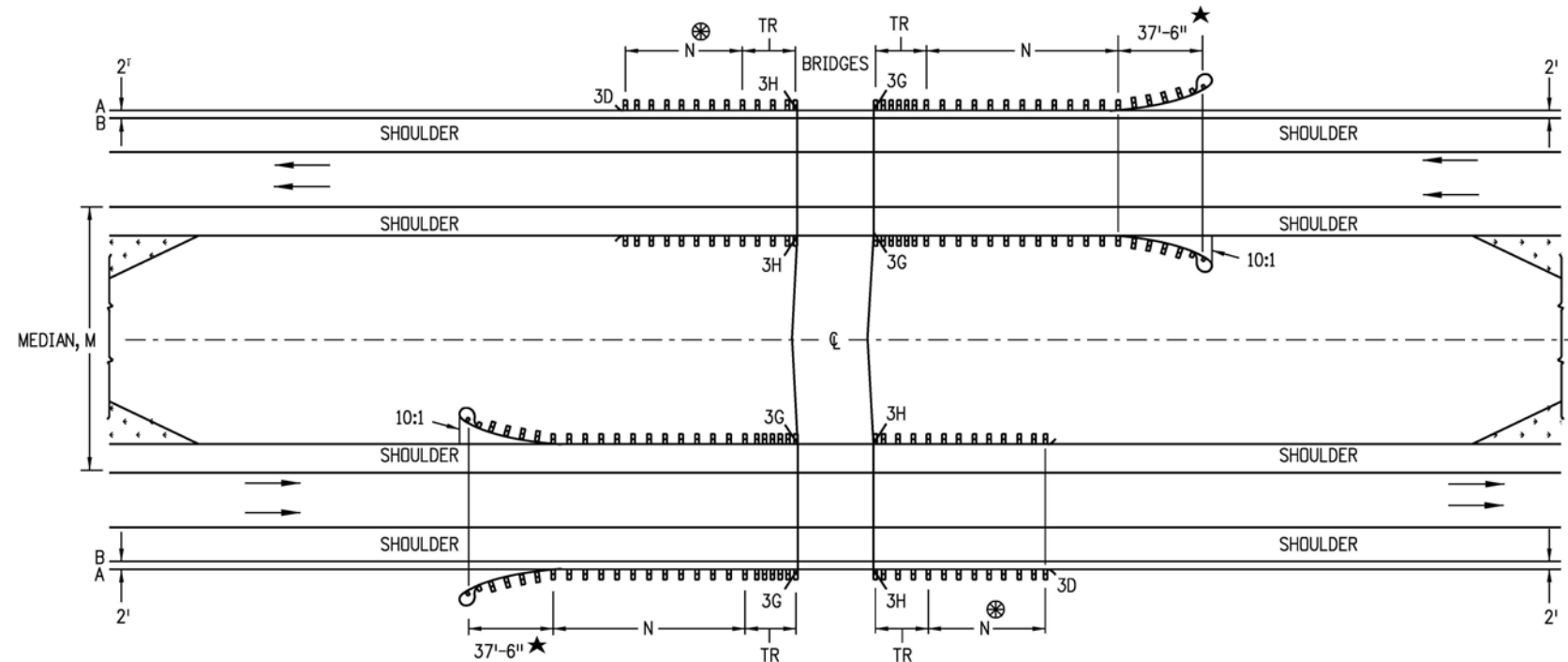


- (A). TIMBER POSTS 2 FT., STEEL POSTS 1 FT.-9/2 IN.
- (B). 1/2 IN. PREFORMED JOINT MATERIAL

**NARROW MEDIAN DETAIL**  
USUALLY LESS THAN 30 FT. WIDE MEDIAN WITH ALL PAVED SURFACE

**OBSTRUCTIONS IN MEDIANS**

<p><b>Computer File Information</b></p> <p>Creation Date: 07/31/19</p> <p>Designer Initials: JBK</p> <p>Last Modification Date: 03/05/20</p> <p>Detailer Initials: LTA</p> <p>CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English</p>	<p><b>Sheet Revisions</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Date:</th> <th>Comments</th> </tr> <tr> <td>(R-X)</td> <td></td> </tr> <tr> <td>(R-X)</td> <td></td> </tr> <tr> <td>(R-X)</td> <td></td> </tr> <tr> <td>(R-X)</td> <td></td> </tr> </table>	Date:	Comments	(R-X)		(R-X)		(R-X)		(R-X)		<p><b>Colorado Department of Transportation</b></p> <p>2829 West Howard Place CDOT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868</p> <p><b>Project Development Branch</b>      <b>JBK</b></p>	<p style="text-align: center;"><b>MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES</b></p> <p style="text-align: center;">Issued by the Project Development Branch: July 31, 2019</p>	<p style="text-align: center;"><b>STANDARD PLAN NO. M-606-1</b></p> <p style="text-align: center;">Standard Sheet No. 13 of 19</p> <p style="text-align: center;">Project Sheet Number:</p>
Date:	Comments													
(R-X)														
(R-X)														
(R-X)														
(R-X)														



MULTILANE DIVIDED HIGHWAYS FOR STEEP EMBANKMENTS IN MEDIAN

### NOTES

1. MEDIAN BARRIERS TANGENT TO THE ROADWAY MAY BE USED WHERE THE SHOULDER SLOPES IN THE MEDIAN ARE STEEP.
2. BARRIER LENGTHS SHALL BE INCREASED TO ACCOUNT FOR STEEP EMBANKMENTS OR OTHER HAZARDS WITHIN CLOSE PROXIMITY OF BRIDGES.

⊗ - DO NOT CONSTRUCT THE TR AND GUARDRAIL ON THE TRAILING BRIDGE ENDS IF SITE CONDITIONS DO NOT WARRANT THE USE OF GUARDRAIL.

N - SHOWN ON PLANS. LENGTH TO SHIELD ALL HAZARDS IS BASED ON GUARDRAIL'S LENGTH OF NEED COMPUTATION. SEE AASHTO ROADWAY DESIGN GUIDE. THE MINIMUM SHALL BE 12 FT. - 6 IN., WHERE SITE CONDITIONS ALLOW. THE TOTAL LENGTH OF NEED WILL INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.

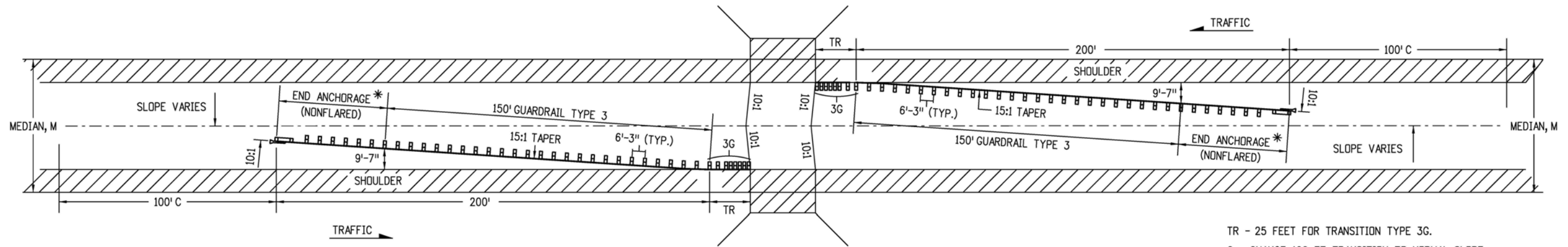
TR - 25 FEET FOR TRANSITION TYPES 3G AND 3H.

A - EDGE OF 8 FT. OR 10 FT. SHOULDER.

B - EDGE OF 6 FT. OR LESS SHOULDER.

★ - END ANCHORAGE CAN BE FLARED OR NONFLARED.

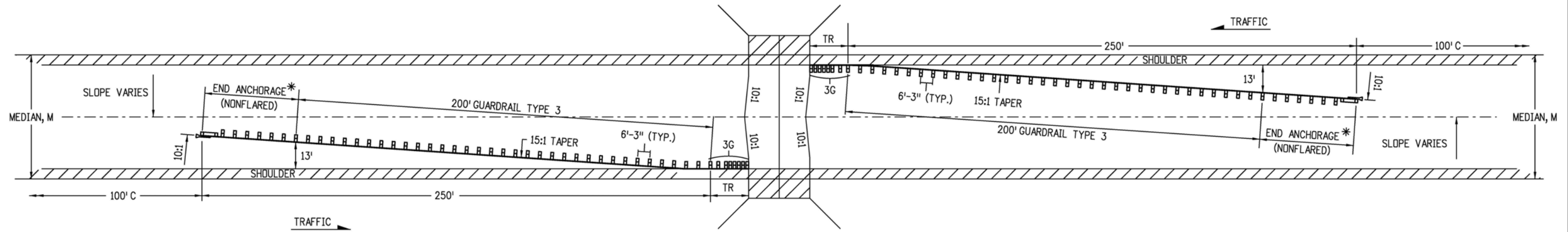
<b>Computer File Information</b>		<b>Sheet Revisions</b>		<b>Colorado Department of Transportation</b>  2829 West Howard Place CDOT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>MIDWEST</b> <b>GUARDRAIL SYSTEM (MGS)</b> <b>TYPE 3 W-BEAM 31 INCHES</b>	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19		Date:	Comments:			M-606-1	
Designer Initials: JBK	(R-X)					Standard Sheet No. 14 of 19	
Last Modification Date: 03/05/20	(R-X)						
Detailer Initials: LTA	(R-X)						
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)			<b>Project Development Branch</b> <b>JBK</b>	Issued by the Project Development Branch: July 31, 2019		
						Project Sheet Number:	



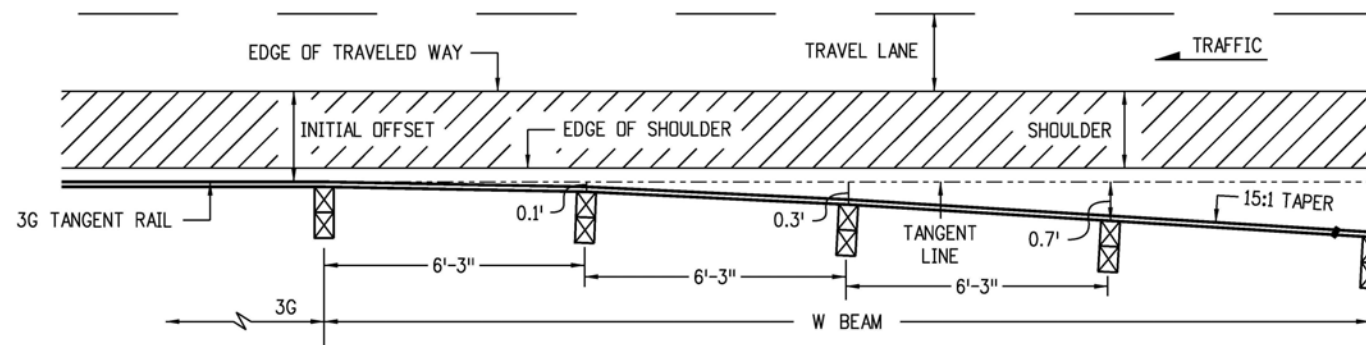
**MEDIANS 60 FT. AND OVER WITH 10 FT. OR WIDER SHOULDERS.**

\* END ANCHORAGE LENGTH AND FLARE RATES VARY BY DEVICE. SEE MANUFACTURER/SUPPLIER FOR INSTALLATION REQUIREMENTS.

TR - 25 FEET FOR TRANSITION TYPE 3G.  
 C - CHANGE: 100 FT. TRANSITION TO NORMAL SLOPE.  
 M - WIDTH OF MEDIAN.



**MEDIANS 60 FT. AND OVER WITH 4 to 8 FT. SHOULDERS.**



**TRANSITION TO TYPICAL 15:1 TAPER**

**NOTES**

1. GUARDRAIL TRANSITIONS FROM PARALLEL TO ROADWAY SHOULDER AT 3G SEGMENT TO 15:1 TAPER WITHIN 25 FEET BASED ON POST OFFSET DIMENSIONS SHOWN.
2. SEE SHEET 14 FOR THE RIGHT SHOULDER GUARDRAIL LAYOUT.

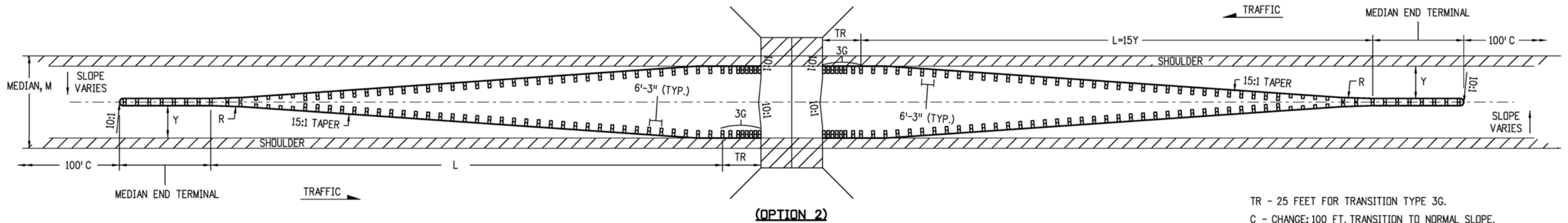
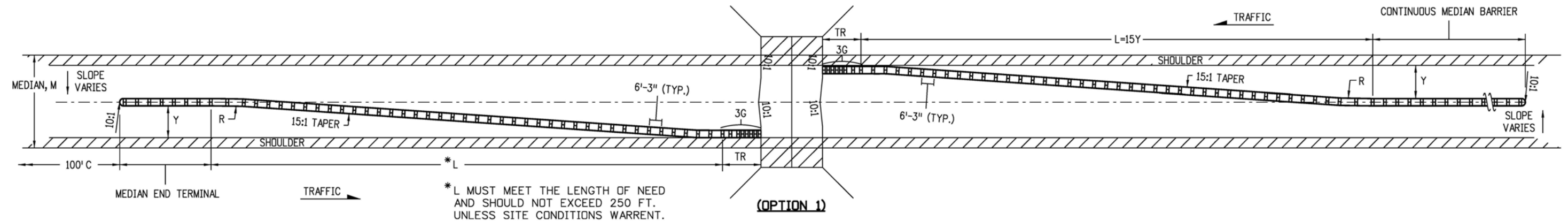
**MULTILANE DIVIDED HIGHWAYS - (DEPRESSED MEDIANS, 60 FT. AND OVER WITH OPEN HAZARDS OR OBSTRUCTIONS)**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDOT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>MIDWEST</b> <b>GUARDRAIL SYSTEM (MGS)</b> <b>TYPE 3 W-BEAM 31 INCHES</b> Issued by the Project Development Branch: July 31, 2019	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19		Date:	Comments:			M-606-1	
Designer Initials: JBK	(R-X)					Standard Sheet No. 15 of 19	
Last Modification Date: 03/05/20	(R-X)					Project Sheet Number:	
Detailer Initials: LTA	(R-X)						
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English				Project Development Branch <b>JBK</b>			

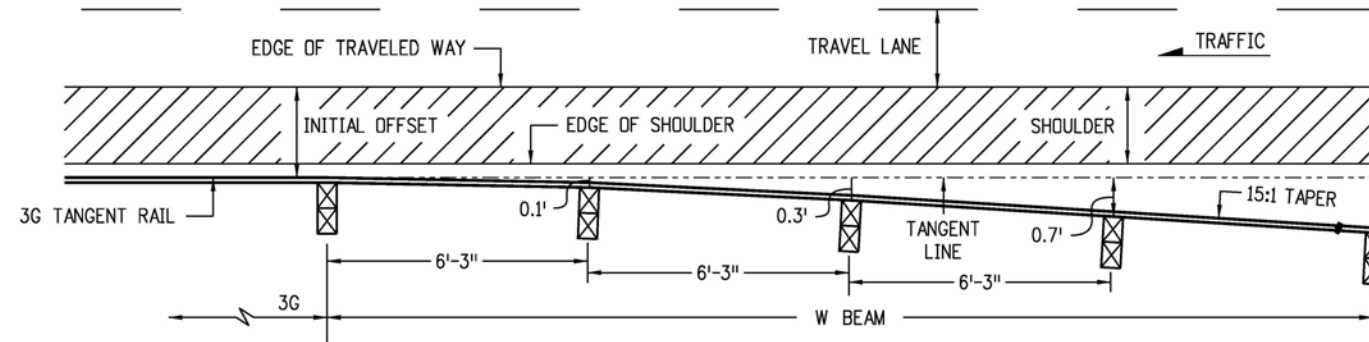


**NOTES**

- GUARDRAIL TRANSITIONS FROM PARALLEL TO ROADWAY SHOULDER AT 3G SEGMENT TO 15:1 TAPER WITHIN 25 FEET BASED ON POST OFFSET DIMENSIONS SHOWN.
- THE OPTION 1 LAYOUT SHALL BE USED WHEN "Y" EXCEEDS 16 FEET OR WHEN MEDIAN BARRIER IS CONTINUOUS.
- THE OPTION 2 LAYOUT SHALL BE USED WHEN "Y" IS 16 FEET OR LESS.
- SEE SHEET 14 FOR RIGHT SHOULDER GUARDRAIL LAYOUT.



TR - 25 FEET FOR TRANSITION TYPE 3G.  
 C - CHANGE: 100 FT. TRANSITION TO NORMAL SLOPE.  
 M - WIDTH OF MEDIAN.  
 L - TOTAL LENGTH PAID AS GUARDRAIL TYPE 3.  
 Y - FINAL OFFSET AT END.



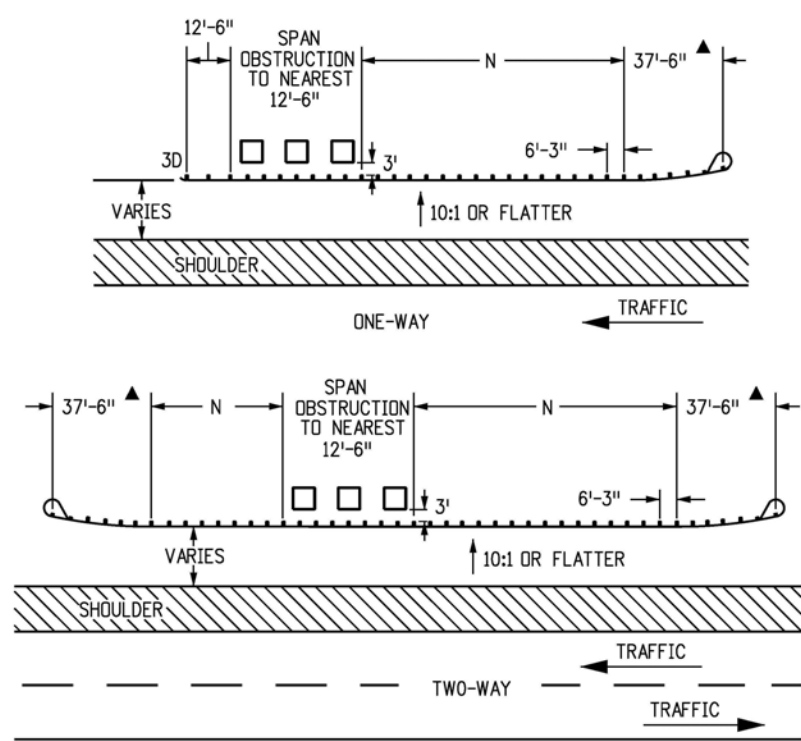
**MULTILANE DIVIDED HIGHWAYS - (DEPRESSED MEDIANS, 21 - 59 FT. WITH OPEN HAZARDS OR OBSTRUCTIONS)**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDOT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>MIDWEST</b> <b>GUARDRAIL SYSTEM (MGS)</b> <b>TYPE 3 W-BEAM 31 INCHES</b> Issued by the Project Development Branch: July 31, 2019	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19		Date:	Comments			M-606-1	
Designer Initials: JBK		(R-X)				Standard Sheet No. 16 of 19	
Last Modification Date: 03/05/20		(R-X)				Project Sheet Number:	
Detailer Initials: LTA		(R-X)					
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		(R-X)		Project Development Branch <b>JBK</b>			

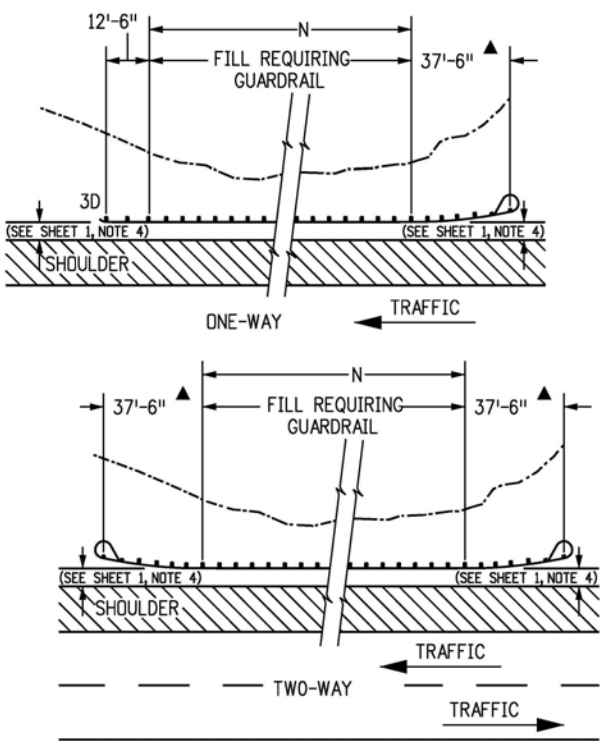
**NOTES**

1. A TYPE 3G OR 3H TRANSITION (SEE SHEET 11) SHALL BE USED TO CONNECT THE TYPE 3 W-BEAM TO A TYPE 9 CONCRETE BARRIER (SEE M-606-15) OR TO A TYPE 8 OR 10 BRIDGE RAIL.
2. "TR" SHALL BE 25 FEET FOR THE TRANSITION TYPES 3G AND 3H.
3. THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND IS SHOWN ON THE PLANS. THE MINIMUM IS 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW. THE OVERALL REQUIRED LENGTH OF NEED CAN INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT. A TRAVERSABLE SLOPE SHALL BE PROVIDED BEHIND THE TERMINAL TO DIMENSION "N" PRIOR TO THE OBSTRUCTION UNLESS OTHERWISE APPROVED BY THE ENGINEER.

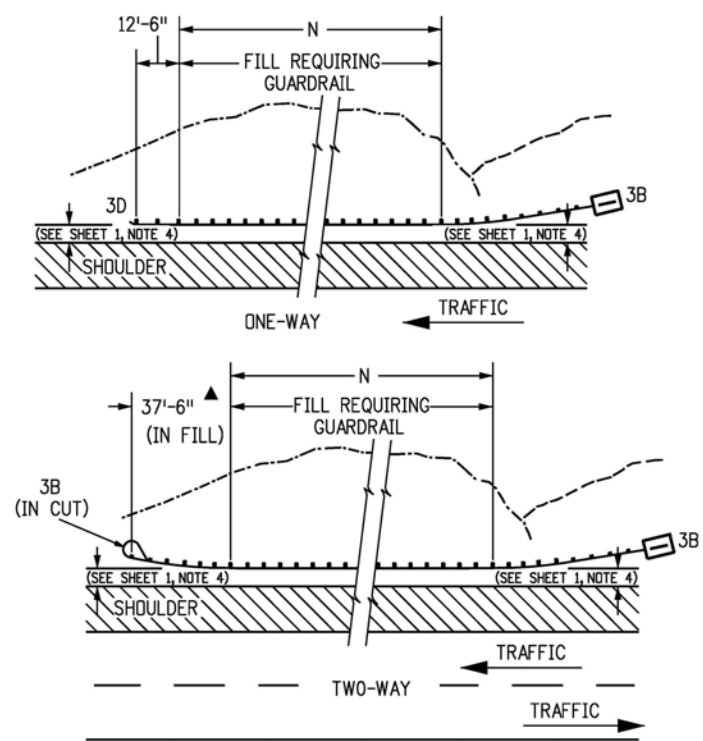
▲ END ANCHORAGE CAN BE FLARED OR NONFLARED



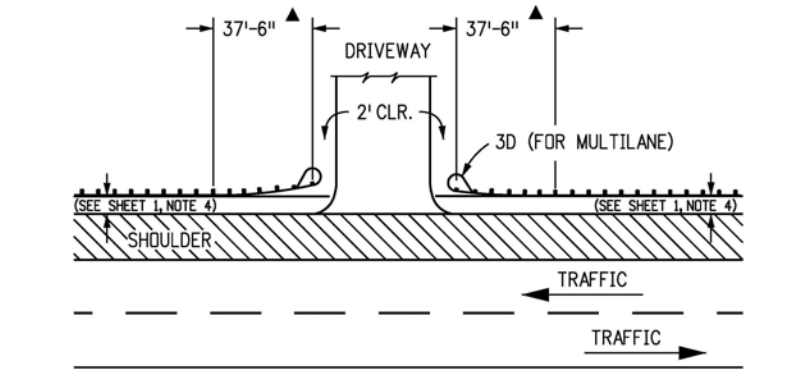
**GUARDRAIL FOR ROADSIDE OBSTRUCTIONS**



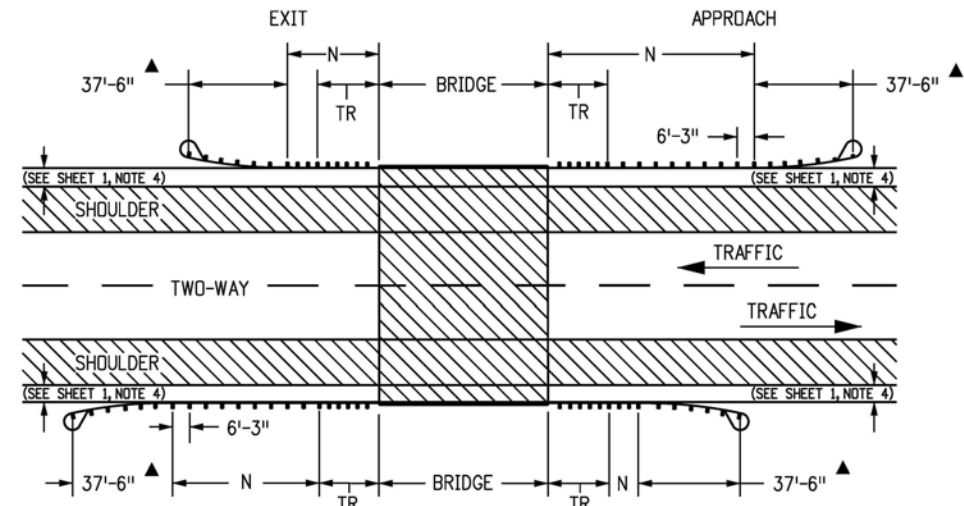
**GUARDRAIL FOR ROADSIDE FILL CONSTRUCTION**



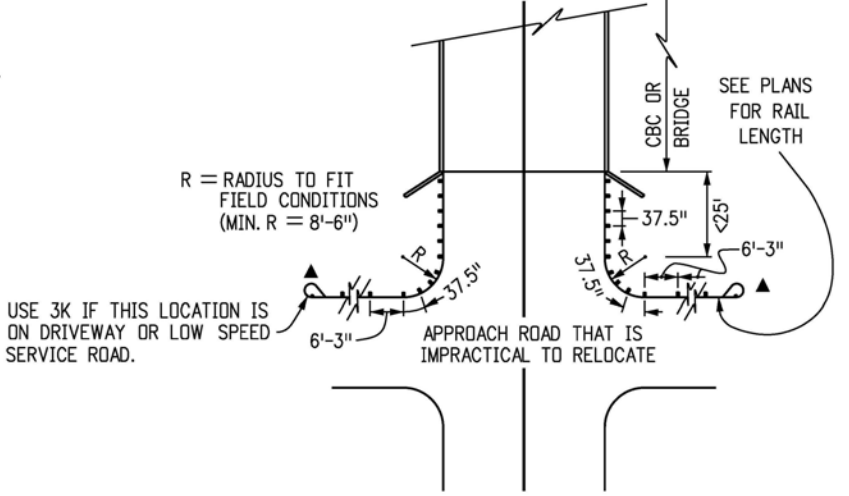
**GUARDRAIL FOR ROADSIDE CUT-TO-FILL CONDITION**



**LAYOUT FOR DRIVEWAY APPROACH**



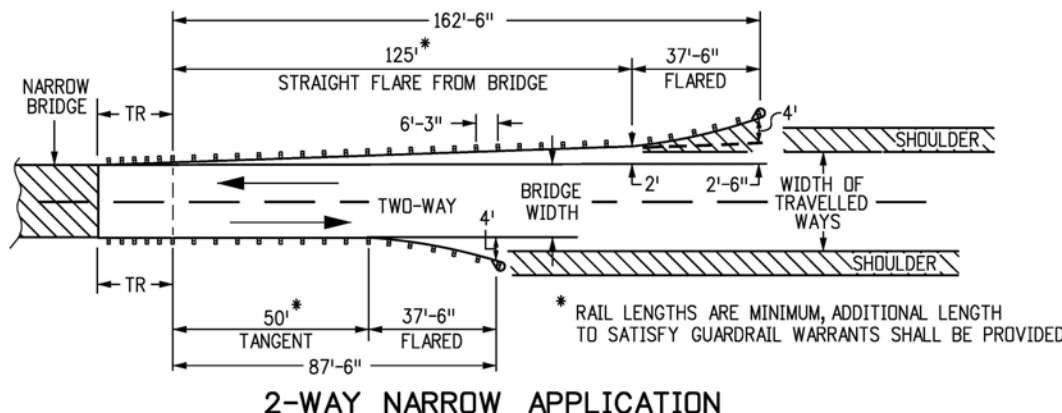
**2-WAY NORMAL BRIDGE APPLICATION**



GUARDRAIL TYPE 3 WITH BLOCKED OUT POSTS SPACED AT 3'-1/2" FROM STRUCTURE AROUND CURVE.

**INTERRUPTED STRUCTURE APPROACH**

(USE TYPE 3J ON SHEET 12 WHEN PRACTICAL)

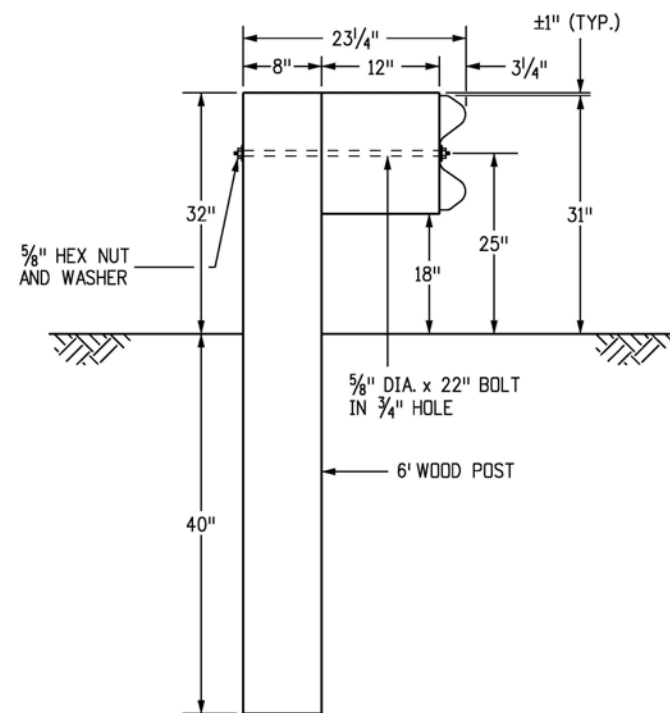
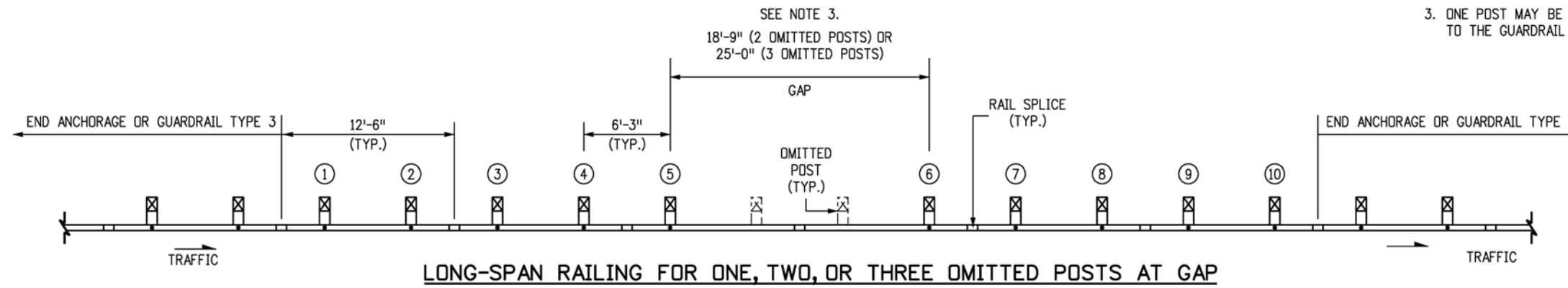


**2-WAY NARROW APPLICATION**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		<b>Colorado Department of Transportation</b>		<b>MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES</b>		<b>STANDARD PLAN NO. M-606-1</b>	
Creation Date: 07/31/19		Date: _____		2829 West Howard Place		Issued by the Project Development Branch: July 31, 2019		Standard Sheet No. 17 of 19	
Designer Initials: JBK		Comments: _____		CDOT HQ, 3rd Floor					
Last Modification Date: 03/05/20		(R-X)		Denver, CO 80204		Project Sheet Number: _____			
Detailer Initials: LTA		(R-X)		Phone: 303-757-9021 FAX: 303-757-9868					
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		(R-X)		<b>Project Development Branch</b>		<b>JBK</b>			

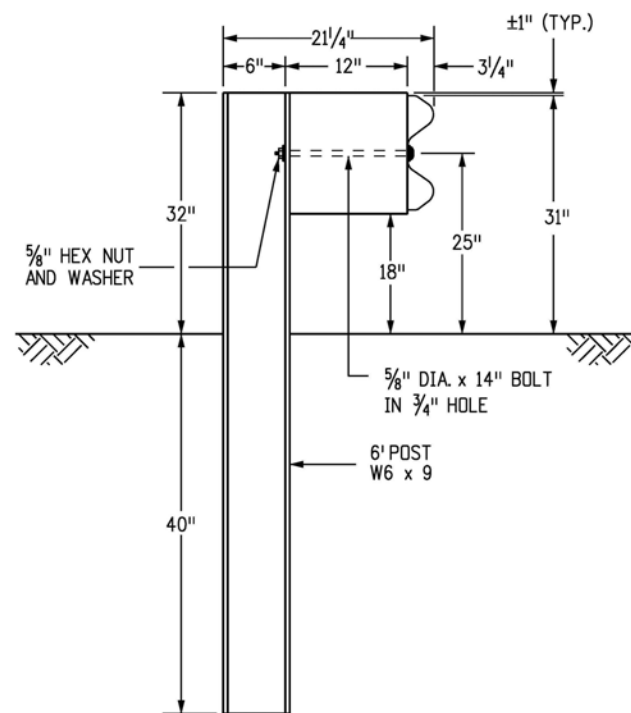
**NOTES**

1. POSTS ①, ②, ⑨, and ⑩ MAY BE TIMBER OR STEEL.
2. THE NUMBER OF OMITTED POSTS IS DEPENDENT ON THE LENGTH OF THE GAP.
3. ONE POST MAY BE OMITTED WITHOUT ANY MODIFICATION TO THE GUARDRAIL RUN.



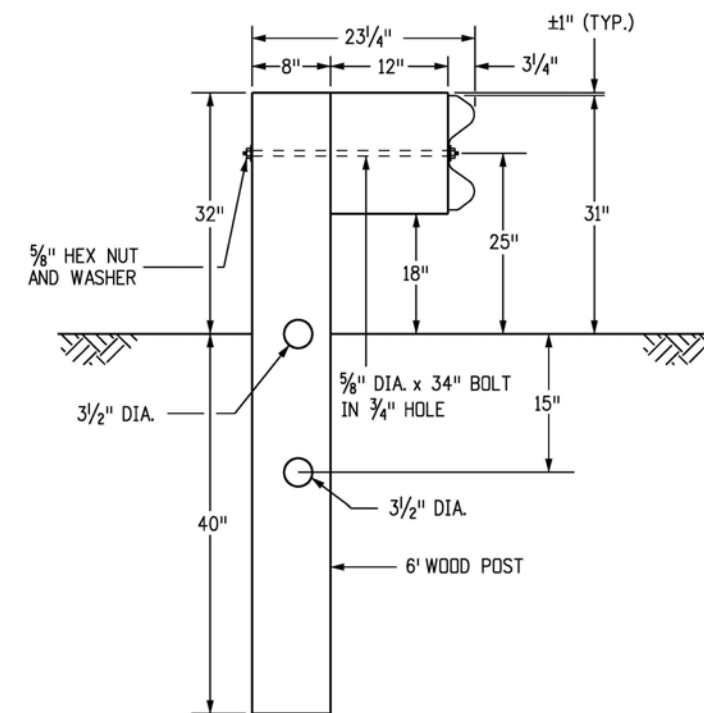
**TIMBER POST**

POSTS ①-② AND ⑨-⑩  
(SEE NOTE 1)



**STEEL POST**

POSTS ①-② AND ⑨-⑩  
(SEE NOTE 1)



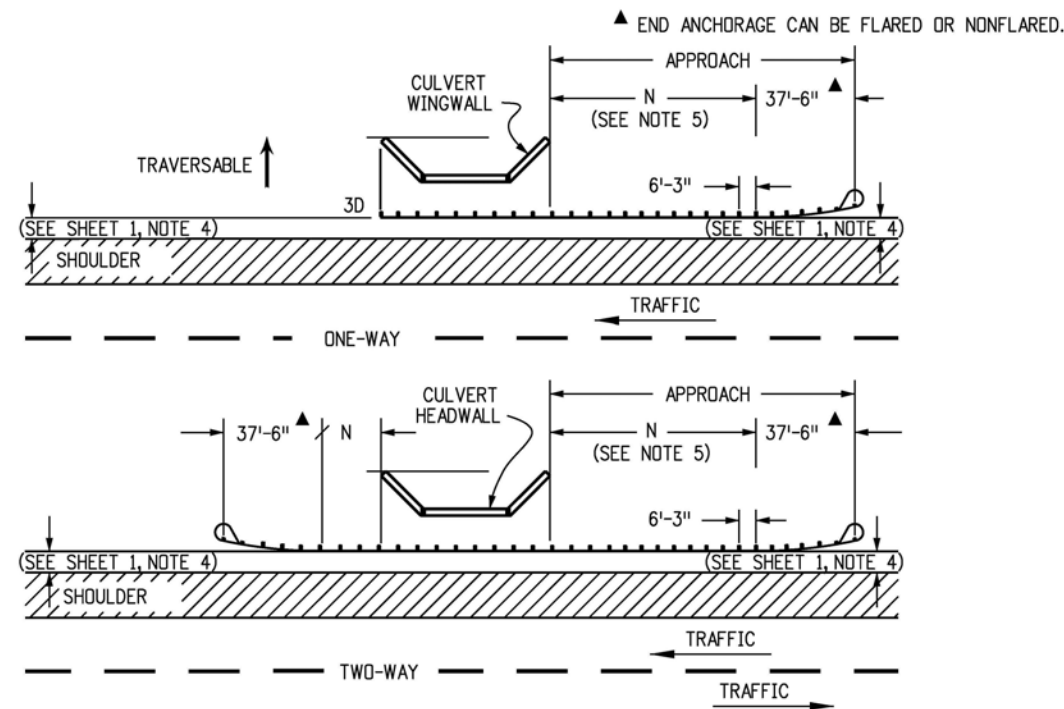
**BREAKWAY TIMBER POST**

POSTS ③ - ⑧

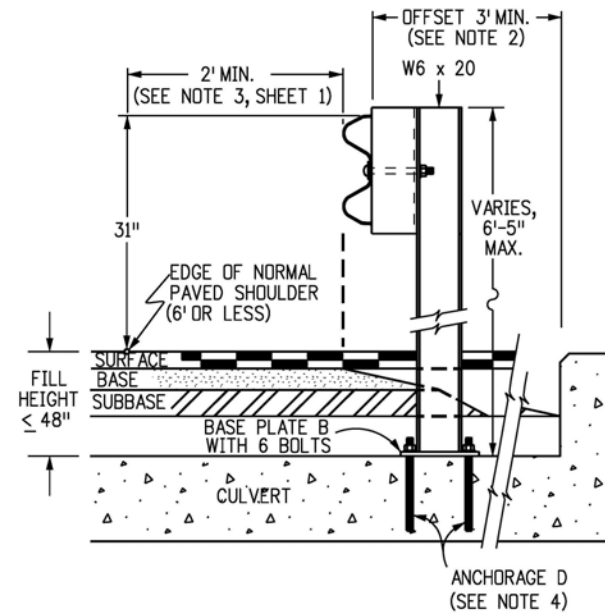
<b>Computer File Information</b>		<b>Sheet Revisions</b>	<b>Colorado Department of Transportation</b>	<b>MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES</b>	<b>STANDARD PLAN NO. M-606-1</b>
Creation Date: 07/31/19		Date: _____	2829 West Howard Place	Issued by the Project Development Branch: July 31, 2019	Standard Sheet No. 18 of 19
Designer Initials: JBK	(R-X)	Comments: _____	CDOT HQ, 3rd Floor		
Last Modification Date: 03/05/20	(R-X)		Denver, CO 80204		
Detailer Initials: LTA	(R-X)		Phone: 303-757-9021 FAX: 303-757-9868		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		<b>Project Development Branch</b>	<b>JBK</b>	Project Sheet Number: _____

**NOTES**

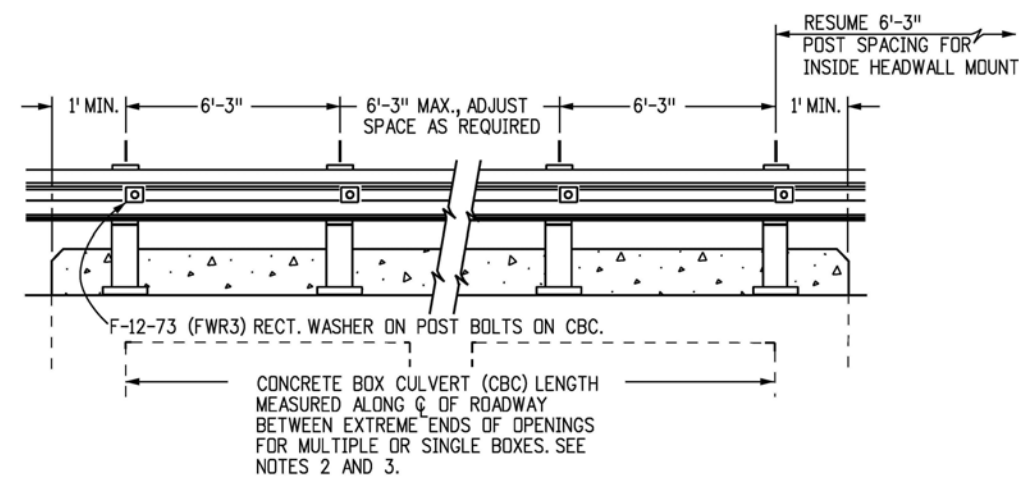
1. LOCATION AND LENGTH OF MEDIAN GUARDRAIL APPROACHES TO CULVERTS WITH FULL HEADWALL AND WINGWALLS SHALL BE AS SHOWN FOR BRIDGES ON SHEET 15. THE GUARDRAIL TYPE 3 SHALL CONTINUE ACROSS THE CULVERT AS SHOWN ON THIS SHEET.
2. RIGHT SHOULDER BOX CULVERT TREATMENT IS SHOWN ON THIS SHEET FOR CULVERTS 20 FT. OR LESS IN LENGTH.
3. CONSTRUCTION AND PAYMENT FOR FILL HEIGHTS SHALL BE INCLUDED IN THE COST OF THE GUARDRAIL TYPE 3.
4. ANCHORAGE D: SIX BOLTS FOR BASE PLATE "B" WITH INSIDE MOUNT. THE BOLTS SHALL BE 7/8 IN. DIA X 10 IN. HIGH STRENGTH RODS THREADED FULL LENGTH AND ALL GALVANIZED. RODS SHALL BE CAST-IN-PLACE FOR NEW STRUCTURES. FOR EXISTING STRUCTURES, THE RODS SHALL BE INSTALLED IN 1-1/4 IN. DIA HOLES WITH NON-SHRINK GROUT OR EPOXY CONFORMING TO ASTM C 881. IF THE THICKNESS OF A CULVERT'S TOP PANEL REQUIRES BOLTS TO BE LESS THAN 10 IN. HIGH, THE BOLTS SHALL BE APPROVED BY THE ENGINEER.
5. THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND IS SHOWN ON THE PLANS. THE MINIMUM IS 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW. THE OVERALL REQUIRED LENGTH OF NEED CAN INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.
6. ALL POSTS, BASE PLATES, AND ANCHOR BOLTS SHALL BE FABRICATED FROM ASTM A 36 STEEL. THE ABOVE MATERIAL, W-BEAM, AND ALL ANCHOR BOLTS AND MISCELLANEOUS BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 509. CONCRETE, REINFORCING STEEL, AND STRUCTURAL STEEL ELEMENTS SHALL BE IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.
7. POST ANCHORS, ENCASED IN CONCRETE, SHALL BE ASTM A 36 STEEL, AND NEED NOT BE GALVANIZED.
8. PRIOR TO INSTALLATION OF GUARDRAIL ON CULVERTS, THREE SETS OF WORKING DRAWINGS WHICH COMPLY WITH THE REQUIREMENTS OF SECTION 105 SHALL BE SUBMITTED TO THE ENGINEER FOR INFORMATION ONLY.



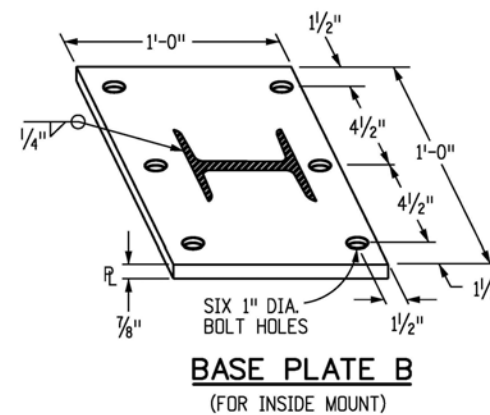
**GUARDRAIL FOR CULVERTS**



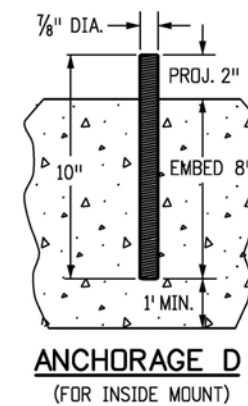
**INSIDE MOUNT ON CBC**



**RAIL PLACEMENT FOR INSIDE MOUNT**



**BASE PLATE B  
(FOR INSIDE MOUNT)**



**ANCHORAGE D  
(FOR INSIDE MOUNT)**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		<b>Colorado Department of Transportation</b> 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES</b> Issued by the Project Development Branch: July 31, 2019	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19	Designer Initials: JBK	Date:	Comments:			<b>M-606-1</b>	
Last Modification Date: 03/05/20	Detailer Initials: LTA						
CAD Ver.: MicroStation V8	Scale: Not to Scale					<b>Standard Sheet No. 19 of 19</b>	
Units: English							

## SECTION 606 GUARDRAIL

### DESCRIPTION

**606.01** This work consists of the construction of guardrail in accordance with these specifications and in conformity with the lines and grades shown on the plans or established.

The construction of the various types of guardrail shall include the assembly and erection of all component parts and materials complete at the locations shown on the plans or as directed.

The types of guardrail are designated as follows:

Type 3 Guardrail – Midwest Guardrail System (MGS) W Beam 31 Inches

Type 6 Guardrail – Thrie Beam

Type 7 Guardrail – F-Shape Concrete Barrier (Precast) (Temporary)

Type 9 Guardrail – Single Slope Concrete Barrier

Use of Type 4 Precast Concrete Barrier is not permitted.

### MATERIALS

**606.02** Materials shall meet the requirements specified in the following subsections:

“W” Beam Rail and Thrie Beam Rail	710.05
Guardrail Hardware	710.09
Guardrail Posts	710.08

Paint for field painting of guardrail shall conform to subsection 708.03, Structural Steel Bridge Paint.

Concrete for precast or cast-in-place barrier shall conform to the requirements of Section 601. Reinforcing steel, unless otherwise noted, shall conform to the requirements of Section 602.

Concrete for bridge rail shall be Macro Fiber-Reinforced Class D Concrete and conform to the requirements of Section 601.

The Contractor may furnish either wood or steel posts and wood or FHWA approved synthetic material blocks for guardrail as shown on the plans. Except as designated on the plans, only one type of posts and blocks shall be furnished for the project.

Components on which the spelter coating has been burned by welding or otherwise damaged shall be regalvanized, recoated in accordance with AASHTO M 36, or painted with one full brush coat of zinc rich paint meeting Military Specification DOD-P-21035A.

### CONSTRUCTION REQUIREMENTS

**606.03** Post and Rail Elements.

- (a) *Posts.* Posts shall be set firm and aligned with a tolerance of plus or minus ¼ inch from plumb, grades and lines as staked. All fittings and metal plates shall be placed securely in position to conform to designated dimensions and requirements.

Posts shall be set by one of the following methods:

- (1) Driven in place.
- (2) Set in dug holes.
- (3) Set in concrete base.
- (4) Posts on bridges shall be as shown on the plans.

Driving of posts shall be accomplished by methods and equipment that will leave the posts in their final position free from any distortion, burring or any other damage.

Excavated post holes shall have a firm bottom and be backfilled with acceptable material placed in layers and thoroughly compacted.

Dissimilar metal-to-metal or aluminum-to-concrete post or rail installations shall have contact surfaces separated by an approved protective coating.

Wood posts cut in the field shall have the cut surfaces protected with two coats of an approved preservative. When the cut surface is above ground, the treating solution to be used shall be the same type as was used in the original treatment.

- (b) *Rail.* Rail elements shall be erected in a manner resulting in a smooth, continuous installation. All bolts in the finished rail shall be drawn tight. Bolts shall be of sufficient length to extend beyond the nuts. Rail shall be shop bent for installations on horizontal curves having a radius of 150 feet or less.
- (c) *Temporary End Treatment.* In construction zones not closed to traffic, installation of rail element shall closely follow the setting of posts to keep the number of posts without rail at a minimum. When necessary to minimize potential hazards, the Engineer will specify the direction in which the rail installation is to advance and the number of posts installed ahead of rail installation. At the end of the Contractor's work day, the Contractor shall treat the ends of installed guardrail as follows:
  - (1) If the end is at the location of a planned end section, install the end section.
  - (2) If the end is not at the location of a planned end section, the last rail section shall be installed with one end attached to the rail already in place and the free end resting on the ground. The free end on the ground shall be restrained by tying the rail to the posts by ropes or cables. Guardrail shall not be left in this configuration for more than 24 hours unless protected by an approved attenuating device.

**606.04 Concrete.** Where paving is removed or damaged due to the Contractor's operations, the Contractor shall furnish an approved mix and shall repair the paving as required, at the Contractor's expense.

In construction zones not closed to traffic, the Contractor shall treat the ends of installed concrete guardrail at the end of the work day as follows:

- (1) If the end is at the location of a planned end section, install the end section.
  - (2) If the end is not at the location of a planned end section, install a temporary impact attenuator or provide treatment as shown in the Contract.
- (a) *Permanent Concrete Barrier.* Permanent concrete barrier shall be Type 9 constructed by cast-in-place or slipform methods. The trench for the base of the cast-in-place reinforced barrier end anchorages shall be excavated to the lines and grades shown on the plans or established. The bottom of the trench shall be compacted to the density specified in subsection 203.07(a). The compacted trench bottom shall be watered and approved before placing concrete.

Concrete finish for all cast-in-place barriers shall be Class 1 in accordance with subsection 601.14. Slipform barriers shall not receive additional finishing unless permitted by the Engineer. Exposed vertical surfaces of slipformed barrier shall receive a vertical broom finish. When hand finishing is allowed, it shall be performed in conformance with subsection 601.12(a).

The Engineer may determine that the exposed surfaces of the guardrail shall be tested with a 10 foot straightedge laid along the exposed surface in a longitudinal direction. The Contractor shall furnish an approved 10 foot straightedge and provide an operator to aid the Engineer in testing the exposed surfaces. All surface tolerances shall be measured in a longitudinal direction. Deviation of any exposed surface in excess of the tolerance specified shall be corrected at the Contractor's expense.

Longitudinal surface tolerances for the top of the barrier and the sides of the barrier from the top to a line 7 inches below the top of the barrier are:

- (1) On tangent roadway alignments and curves with radius greater than 1000 feet: 0.25 inch from the edge of the straightedge.
- (2) On sharp vertical curves and horizontal curves with radius of 1000 feet or less: 0.25 inch from the edge of the straightedge with allowance made for curve deflection.

Longitudinal surface tolerances for the remaining surfaces of the barrier are:

- (1) On tangent roadway alignments and curves with radius greater than 1000 feet: 0.75 inch from the edge of the straightedge.
- (2) On sharp vertical curves and horizontal curves with radius of 1000 feet or less: 0.75 inch from the edge of the straightedge with allowance made for curve deflection.

The Contractor will be allowed a maximum of three days of slipform production if barrier being placed does not meet the

specified tolerances. After the third day of placement of out of tolerance slipform barrier the Contractor shall stop production. The Contractor shall submit a corrective action plan to the Engineer for review. The plan shall address corrective actions to the equipment and materials and a time frame for completion of the corrective actions. The plan shall address methods and materials to be used to correct out of tolerance barrier. Patching will not be allowed to correct out of tolerance barrier. Further placement of barrier will not be allowed until all previously placed barrier which failed to meet tolerances is corrected or removed. Each occurrence of out of tolerance slipform barrier shall be subject to the same corrective cycle.

- (b) *Temporary Precast Type 7 Concrete Barrier.* Precast Type 7 Concrete Barrier (conforming to Standard Plan M-606-14) may be formed upside down to minimize air pockets and improve surface finish. Concrete finish for precast barriers shall be Class 1 in accordance with subsection 601.14. Each segment of the precast barrier shall not have spalls, corner breaks, and bottom spalls totaling more than 5 square feet of surface area which includes the base. All required hand finishing shall be performed in conformance with subsection 601.12(a).

Connecting loops shall not be frayed, stretched, or deformed. Gaps between units shall not exceed the dimensions shown on the plans. Precast barrier units shall not be lifted or stressed in any way before they have developed the strength of the concrete specified. Units shall be supported at designated pickup points. Connecting loops shall not be used as pickup points. Care shall be taken during fabrication, storage, handling and transporting to prevent cracking, twisting, or other damage. Minor chips on edges may be patched with the approval of the Engineer. Breakage and chipping may be cause for rejection. Units damaged in such a way as to impair their appearance or suitability, in the opinion of the Engineer, shall be replaced at the Contractor's expense. Units rejected by the Engineer shall be marked on both sides with an orange painted "R" approximately 12 inches high and 6 inches wide.

The base for placing precast barrier shall be prepared to the lines and grades shown on the plans or established. When it becomes necessary to connect cast-in-place barrier sections to precast barrier installations during construction, the cast-in-place sections shall be constructed complete with connecting hardware in accordance with Standard Plan M-606-14 to join the cast-in-place sections to the abutting precast sections. A fifteen-foot transition section shall be provided when attaching barriers of differing shapes.

## METHOD OF MEASUREMENT

**606.05** Guardrail will be measured by the linear foot along the centerline of the rail from end to end of completed and accepted rail as shown on the plans, excluding end anchorages, median terminals, and transitions.

End anchorages, median terminals and transitions will be measured by the actual number placed and accepted. Each end anchorage, median terminal, or transition shall include all concrete, reinforcing steel, anchor bolts, cable, rods, turnbuckles, backing rail, plates, bolts, nuts, washers and all other work and material necessary to complete the item.

Posts will be included in the quantities of guardrail of the specified type and not measured separately. Additional posts required for guardrail adjacent to bridges and obstructions, as shown on the plans, will not be measured and paid for separately but shall be included in the work.

## BASIS OF PAYMENT

**606.06** The accepted quantities of guardrail will be paid for at the contract unit price for the type specified.

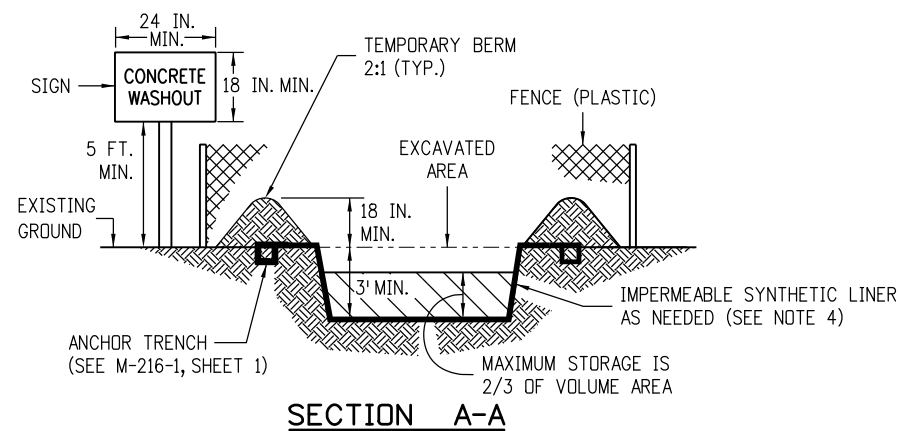
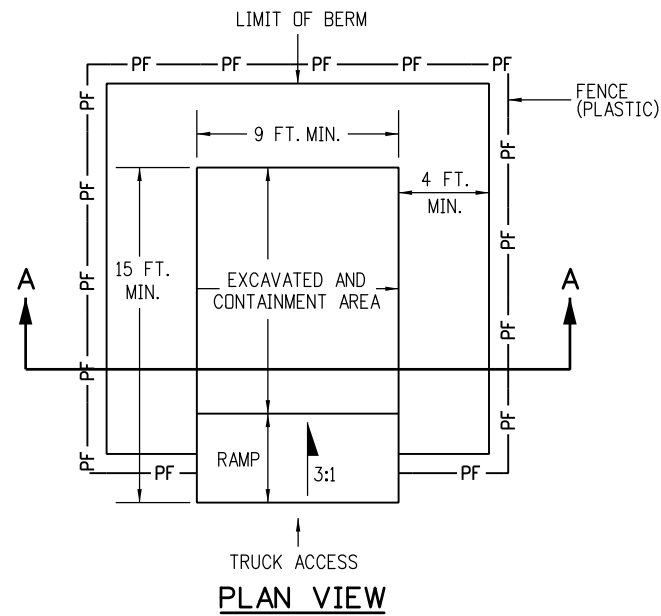
Payment will be made under:

Pay Item	Pay Unit
Guardrail, Type ____	Linear Foot
End Anchorage, Type ____	Each
Guardrail, Type ____ (____ Post Spacing)	Linear Foot
Median Terminal	Each
End Anchorage (____)	Each
Transition, Type ____	Each

All work and materials necessary and incidental to the temporary treatment of guardrail ends will not be measured and paid for separately but shall be included in the work.

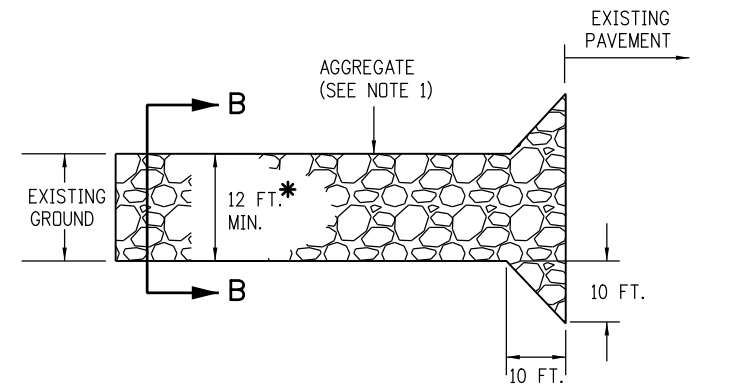
Partial payments will not be made for partially completed guardrail runs that do not conform to the end treatments specified in subsections 606.03(c) or 606.04.

Polyolefin fiber reinforcement will not be measured and paid for separately, but shall be included in the work.

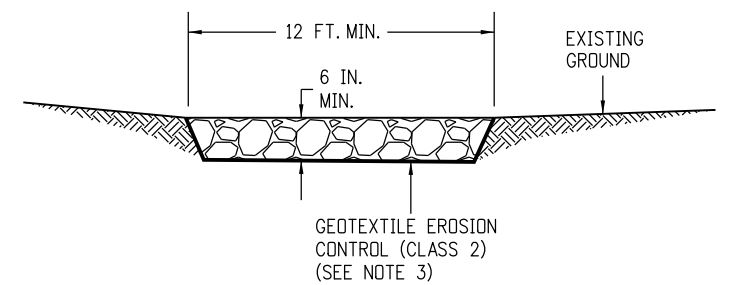
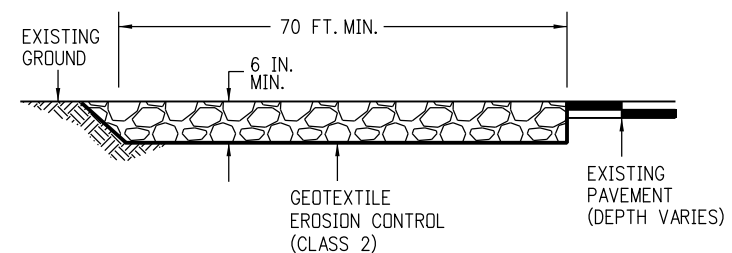


- NOTES:
1. A FENCE (PLASTIC) CONFORMING TO SECTION 607 SHALL BE INSTALLED AROUND THE CONCRETE WASHOUT AREA, EXCEPT AT THE OPENING.
  2. THE CONCRETE WASHOUT SIGN SHALL HAVE LETTERS AT LEAST 3 INCHES HIGH AND CONFORM TO SUBSECTION 630.02.
  3. ALL MATERIALS AND LABOR TO COMPLETE THE CONCRETE WASHOUT STRUCTURE SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID FOR SEPARATELY.
  4. THE BOTTOM OF EXCAVATION SHALL BE A MINIMUM OF FIVE FEET ABOVE GROUND WATER. IF NOT, THE BOTTOM OF EXCAVATION SHALL BE IN ACCORDANCE WITH 208.02 (j).
  5. THE PAY ITEM NUMBER FOR CONCRETE WASHOUT STRUCTURE (EACH) IS 208-00045.

**CONCRETE WASHOUT STRUCTURE**



\* SHALL EXTEND FULL WIDTH OF INGRESS AND EGRESS OPERATION.



- NOTES:
1. AGGREGATE SHALL CONFORM TO SUBSECTION 208.02 (i).
  2. THE CONTRACTOR SHALL PROTECT CURB AND GUTTER THAT CROSSES THE ENTRANCE FROM DAMAGE, WHILE NOT BLOCKING FLOW OF WATER THRU STRUCTURE. PROTECTION OF THE CURB AND GUTTER SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID FOR SEPARATELY.
  3. GEOTEXTILE SHALL CONFORM TO SUBSECTION 712.08.
  4. ALL MATERIALS AND LABOR TO COMPLETE THE VEHICLE TRACKING PAD SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID FOR SEPARATELY.
  5. THE PAY ITEM NUMBER FOR VEHICLE TRACKING PAD (EACH) IS 208-00070.

**VEHICLE TRACKING PAD**

Computer File Information	
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CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)

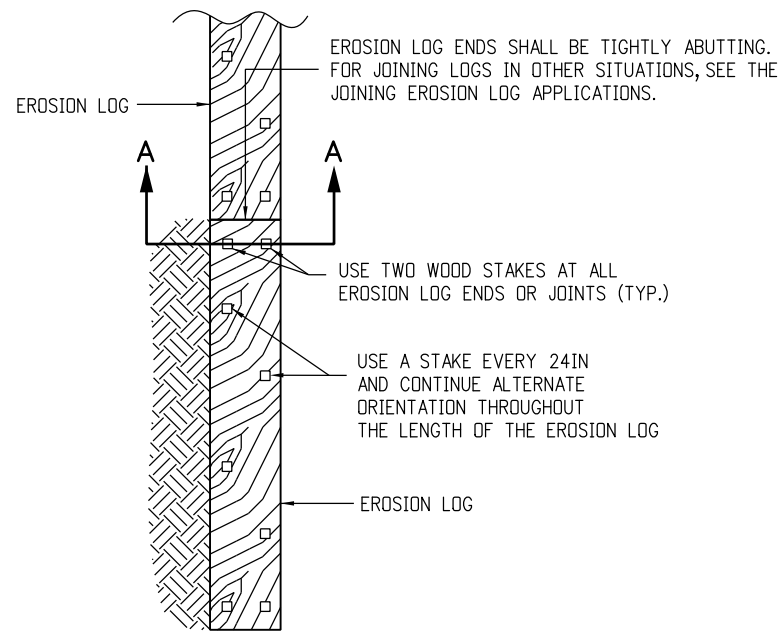
Sheet Revisions	
Date:	Comments

Colorado Department of Transportation  
 2829 West Howard Place  
 CDDT HQ, 3rd Floor  
 Denver, CO 80204  
 Phone: 303-757-9021 FAX: 303-757-9868  
 Project Development Branch JBK

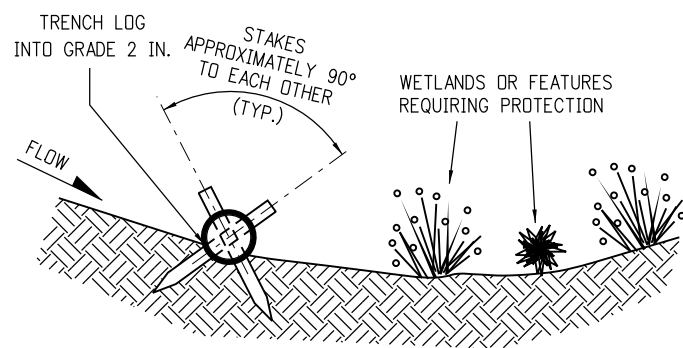
**TEMPORARY  
 EROSION CONTROL**  
 Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-208-1
Standard Sheet No. 1 of 11
Project Sheet Number:





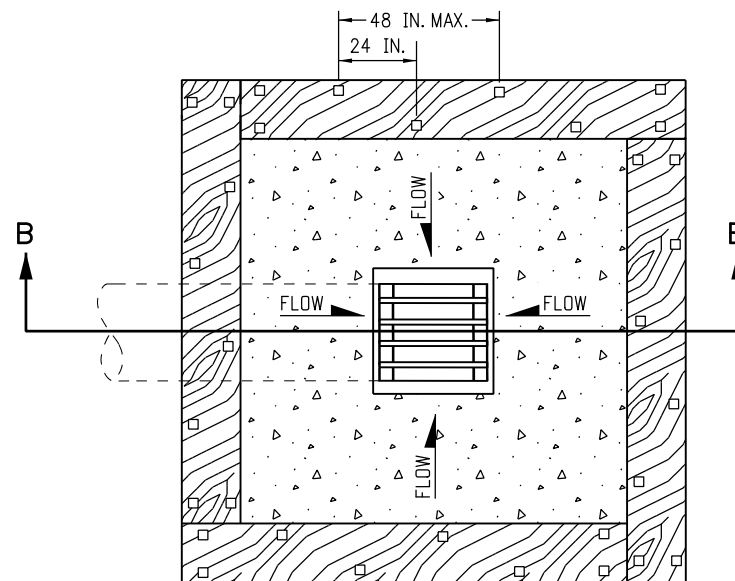
**PLAN VIEW**



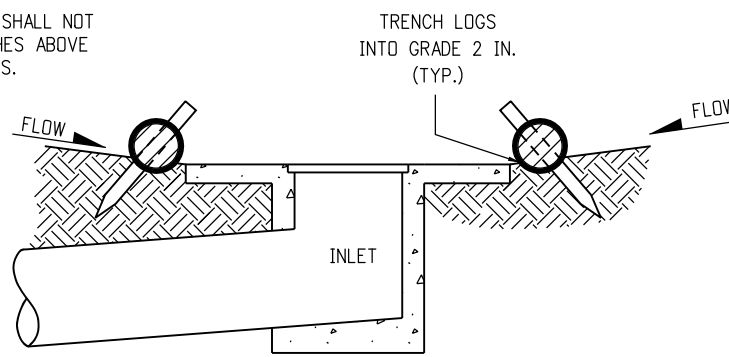
**SECTION A-A**

**TYPICAL STAKE INSTALLATION**

EROSION LOGS PAY ITEMS	
NUMBER	DESCRIPTION
208-00012	TYPE 1 (9 IN.)
208-00002	TYPE 1 (12 IN.)
208-00013	TYPE 1 (20 IN.)
208-00007	TYPE 2 (8 IN.)
208-00008	TYPE 2 (12 IN.)
208-00009	TYPE 2 (18 IN.)
208-00022	TYPE 3 (9 IN.)
208-00023	TYPE 3 (12 IN.)
208-00024	TYPE 3 (20 IN.)



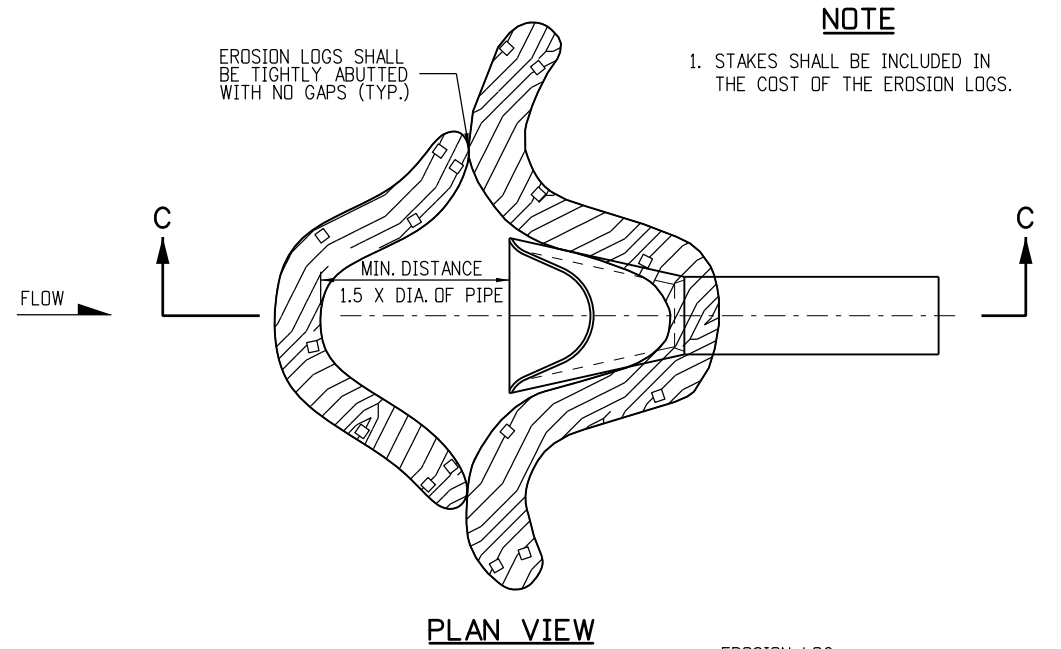
**PLAN VIEW**



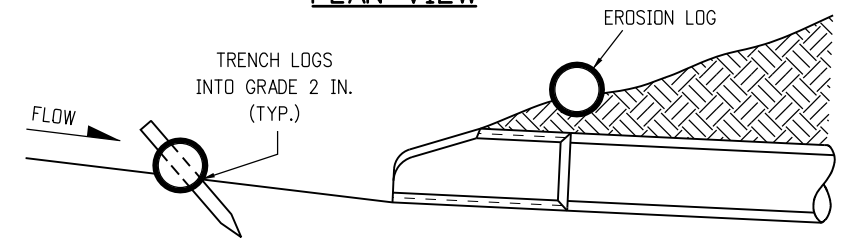
**SECTION B-B**

**EROSION LOG FILTER AT DROP INLET**

NOTE: LOCATE EROSION LOGS AT THE OUTSIDE EDGE OF THE CONCRETE APRON.



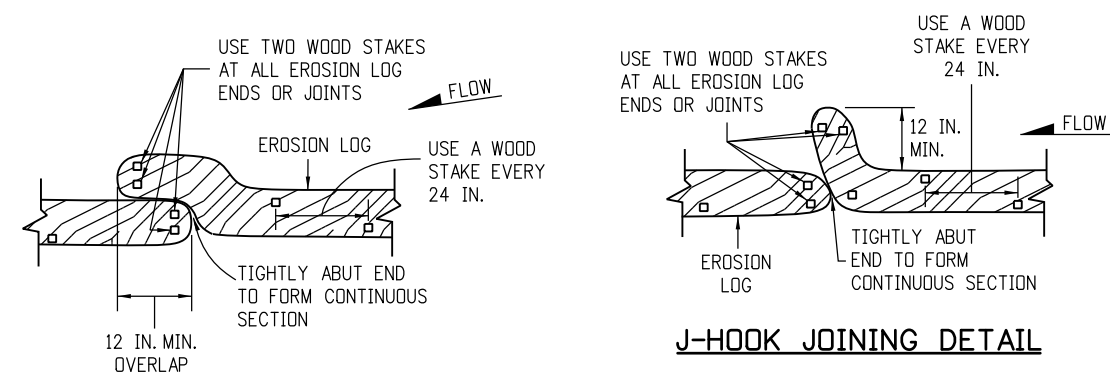
**PLAN VIEW**



**SECTION C-C**  
(NOT ALL LOGS SHOWN)

NOTE: TOP OF STAKE SHALL NOT EXTEND PAST TOP OF EROSION LOG MORE THAN 2 IN.

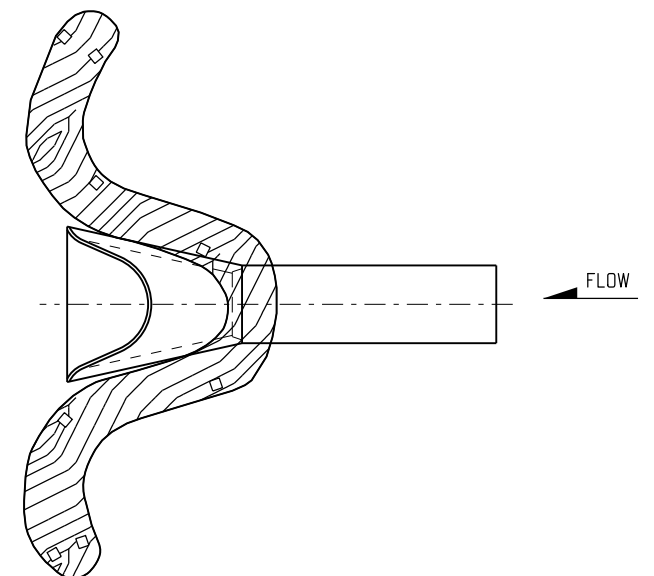
**EROSION LOG CULVERT INLET PROTECTION**



**OVERLAP JOINING DETAIL**

**J-HOOK JOINING DETAIL**

**JOINING EROSION LOG APPLICATIONS**



**EROSION LOG CULVERT OUTLET PROTECTION**

**EROSION LOG APPLICATIONS**

**NOTE**

1. STAKES SHALL BE INCLUDED IN THE COST OF THE EROSION LOGS.

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Sheet Revisions	
Date:	Comments

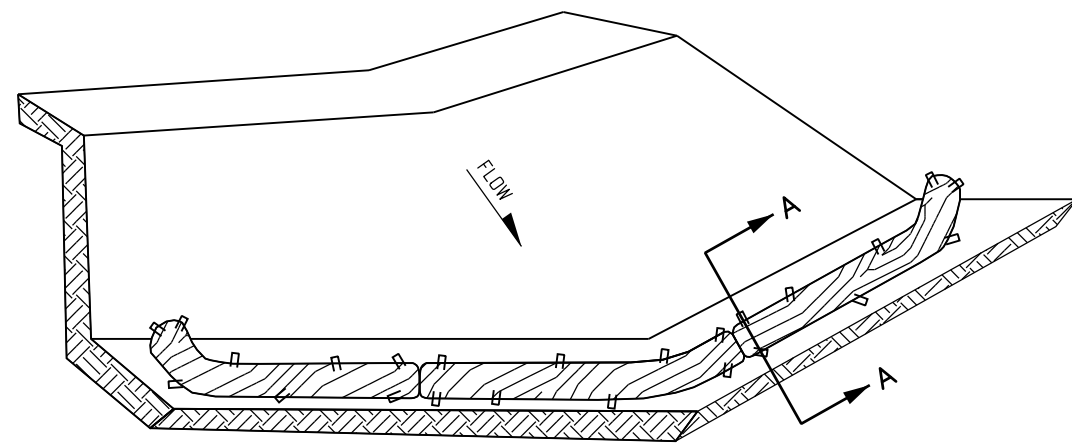
Colorado Department of Transportation  
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 Project Development Branch **JBK**

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 EROSION CONTROL**  
 Issued by the Project Development Branch: July 31, 2019

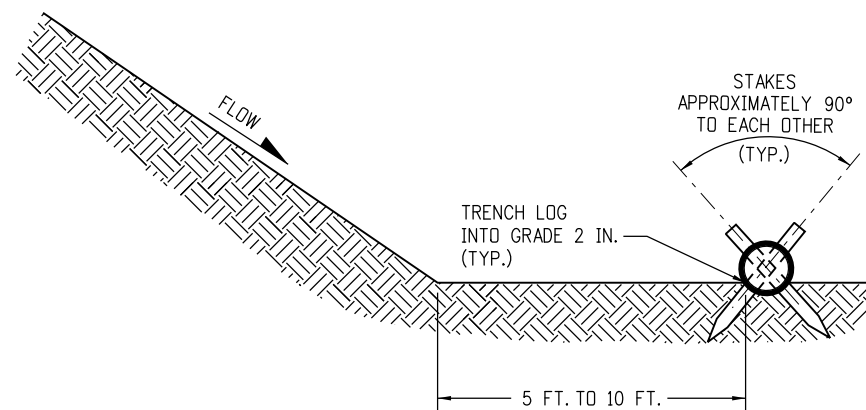
**STANDARD PLAN NO.  
 M-208-1**  
**Standard Sheet No. 2 of 11**  
 Project Sheet Number:

**NOTES**

1. SILT FENCE SHALL HAVE A MAXIMUM DRAINAGE AREA OF ONE-QUARTER ACRE PER 100 FEET OF SILT FENCE LENGTH; MAXIMUM SLOPE LENGTH BEHIND BARRIER IS 100 FEET.
2. SILT FENCE USED AT TOE OF SLOPE SHALL BE PLACED 5 TO 10 FEET BEYOND TOE OF SLOPE TO PROVIDE STORAGE CAPACITY.
3. SILT FENCE SHALL BE PLACED PARALLEL TO THE CONTOUR WITH ENDS FLARED UP SLOPE.
4. THE MAXIMUM LENGTH OF EROSION LOGS OR SILT FENCES WITHOUT A FLARED END TURNING UPSLOPE IS 150 FEET.



**ISOMETRIC VIEW**



**SECTION A-A**

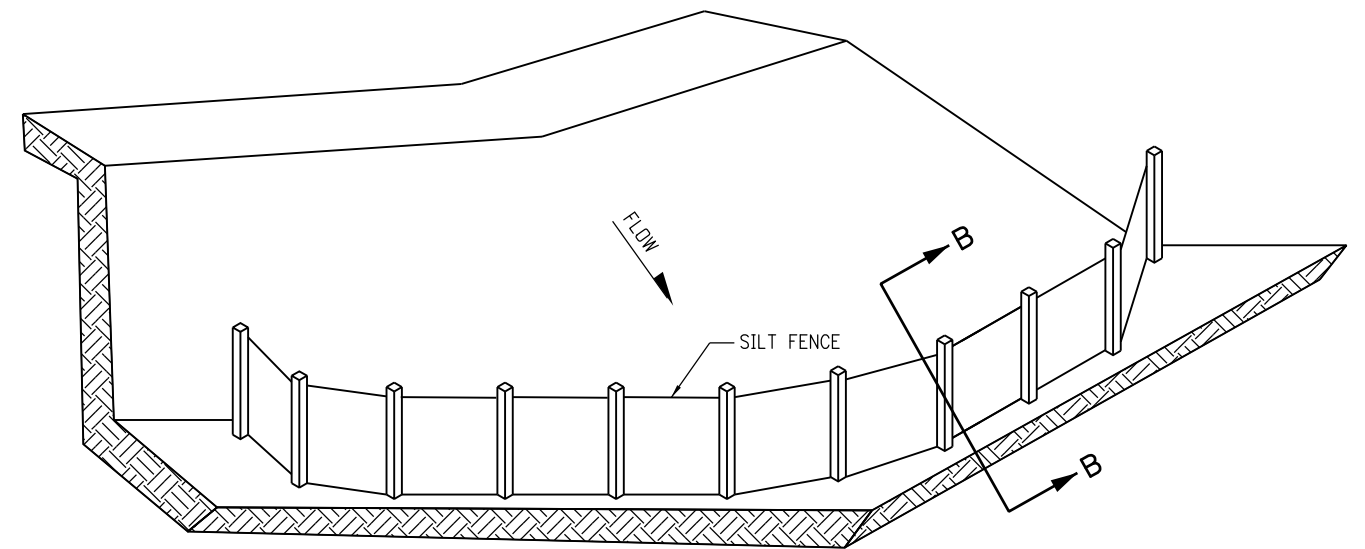
NOTE: THE TOPS OF ALL STAKES SHALL NOT EXTEND MORE THAN 2 INCHES ABOVE THE TOPS OF EROSION LOGS.

EROSION LOGS PAY ITEMS	
NUMBER	DESCRIPTION
208-00012	TYPE 1 (9 IN.)
208-00002	TYPE 1 (12 IN.)
208-00013	TYPE 1 (20 IN.)
208-00007	TYPE 2 (8 IN.)
208-00008	TYPE 2 (12 IN.)
208-00009	TYPE 2 (18 IN.)
208-00022	TYPE 3 (9 IN.)
208-00023	TYPE 3 (12 IN.)
208-00024	TYPE 3 (20 IN.)

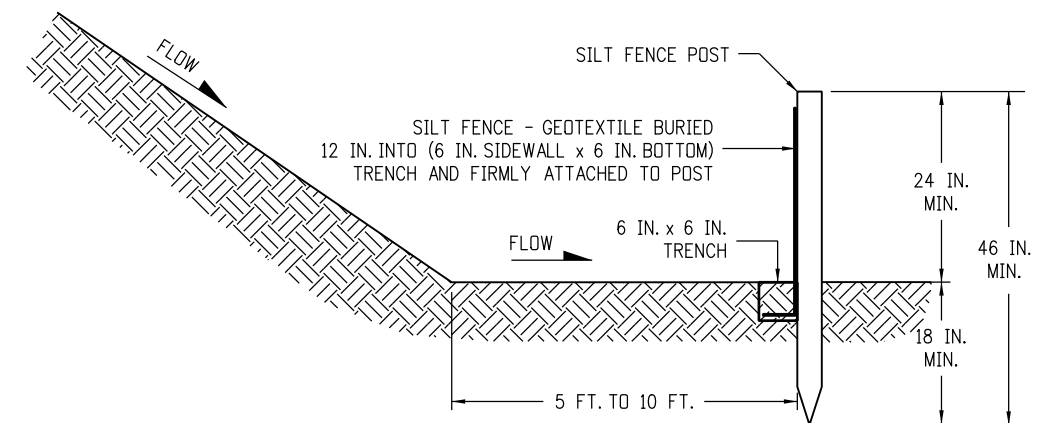
**NOTES:**

1. EROSION LOGS USED AT TOE OF SLOPE SHALL BE PLACED 5 TO 10 FEET BEYOND TOE OF SLOPE TO PROVIDE STORAGE CAPACITY.
2. EROSION LOGS SHALL BE PLACED ON THE CONTOUR WITH ENDS FLARED UP SLOPE.
3. SEE SHEET 2 OF 11 FOR JOINING LOGS DETAIL.

**EROSION LOG TOE OF SLOPE PROTECTION**



**ISOMETRIC VIEW**



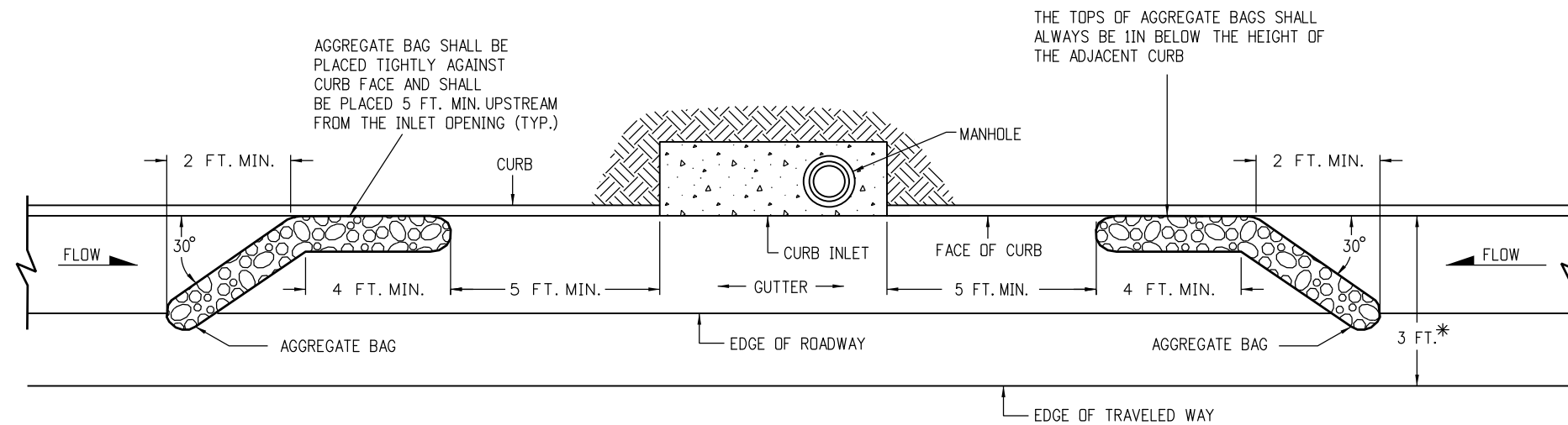
**SECTION B-B**

**SILT FENCE TOE OF SLOPE PROTECTION**

NOTE: THE PAY ITEM NUMBER FOR SILT FENCE (LF) IS 208-00020.

**TOE OF SLOPE PROTECTION APPLICATIONS**

Computer File Information		Sheet Revisions		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 Project Development Branch	TEMPORARY EROSION CONTROL	STANDARD PLAN NO.	
Creation Date: 07/31/19	(R-X)	Date:	Comments			Issued by the Project Development Branch: July 31, 2019	M-208-1
Designer Initials: JBK	(R-X)						
Last Modification Date: 07/31/19	(R-X)						
Detailer Initials: LTA	(R-X)						
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)					Project Sheet Number:	



AGGREGATE BAG SHALL BE PLACED TIGHTLY AGAINST CURB FACE AND SHALL BE PLACED 5 FT. MIN. UPSTREAM FROM THE INLET OPENING (TYP.)

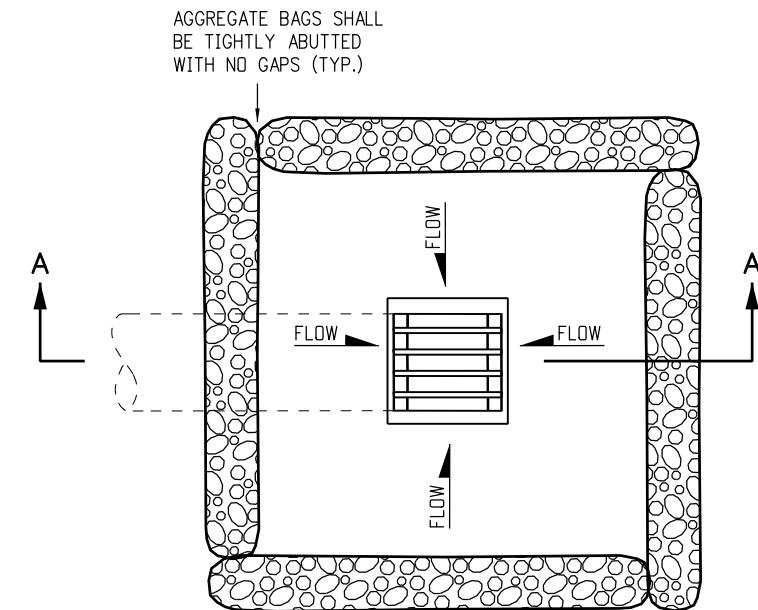
THE TOPS OF AGGREGATE BAGS SHALL ALWAYS BE 1IN BELOW THE HEIGHT OF THE ADJACENT CURB

**PLAN VIEW**

\* NOTE: USE AGGREGATE BAGS ONLY WHEN THERE IS A MINIMUM CLEARANCE OF 3 FEET FROM THE EDGE OF THE TRAVELED WAY (INCLUDING CONDITIONS DURING DETOURS) TO THE FACE OF CURB.

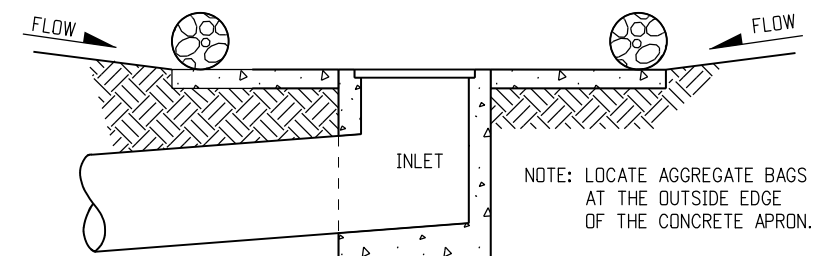
LENGTH (L) OF INLET FT.	NUMBER OF AGGREGATE BAGS UPSTREAM OF INLET
0 - 5	1
6 - 10	2
L > 10	3

**AGGREGATE BAGS AT STORM DRAIN INLET (TYPE I)**



AGGREGATE BAGS SHALL BE TIGHTLY ABUTTED WITH NO GAPS (TYP.)

**PLAN VIEW**



NOTE: LOCATE AGGREGATE BAGS AT THE OUTSIDE EDGE OF THE CONCRETE APRON.

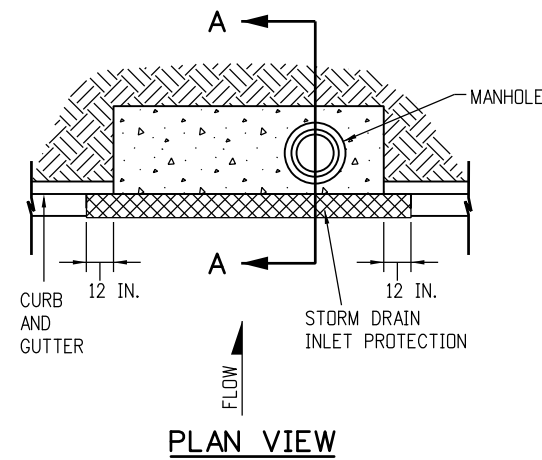
**SECTION A-A**

**AGGREGATE BAGS AT DROP INLET**

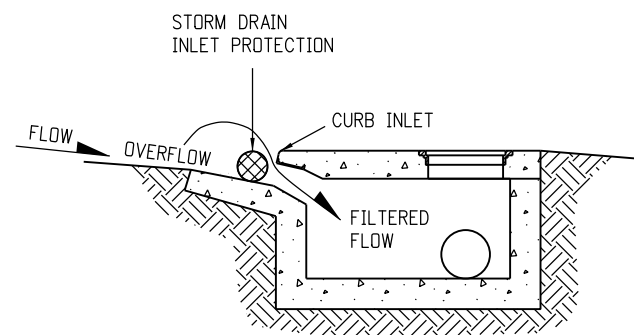
**AGGREGATE BAG APPLICATIONS**

NOTE: THE PAY ITEM NUMBER FOR AGGREGATE BAG (LF) IS 208-00035

Computer File Information		Sheet Revisions		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 Project Development Branch	TEMPORARY EROSION CONTROL	STANDARD PLAN NO.	
Creation Date: 07/31/19	(R-X)	Date:	Comments			Issued by the Project Development Branch: July 31, 2019	M-208-1
Designer Initials: JBK	(R-X)						
Last Modification Date: 07/31/19	(R-X)						
Detailer Initials: LTA	(R-X)						
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)					Project Sheet Number:	



**PLAN VIEW**

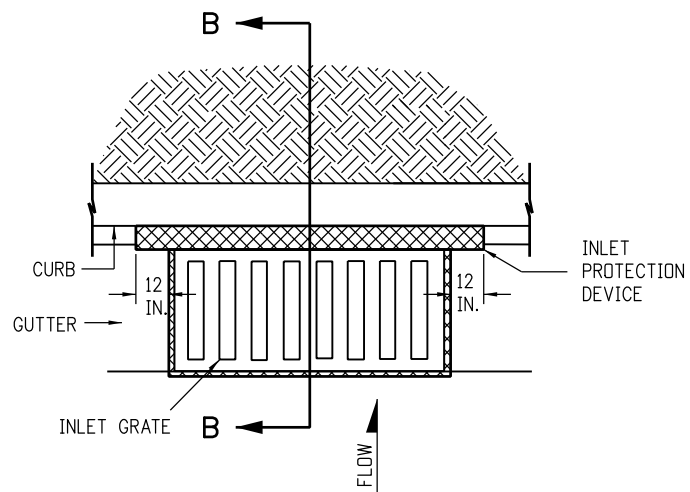


**SECTION A-A**

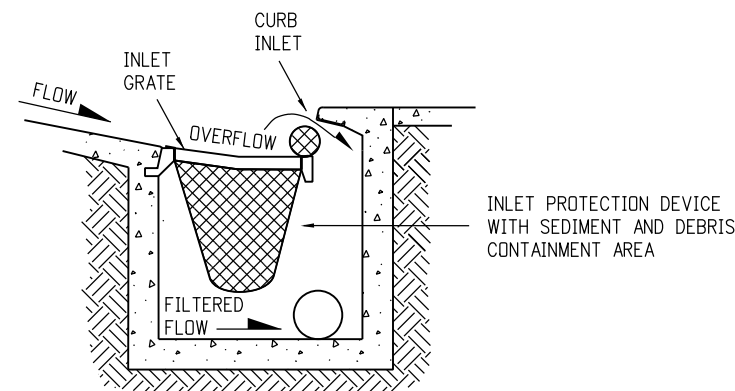
**STORM DRAIN INLET PROTECTION (TYPE I)**

**NOTES:**

1. INLET PROTECTION DEVICE SHALL EXTEND 12 INCHES PAST EACH END OF THE INLET.
2. THE PAY ITEM NUMBERS FOR STORM DRAIN INLET PROTECTION (TYPE I) ARE 208-00051 (LF), 208-00053 84 INCHES (EACH), 208-00057 144 INCHES (EACH), AND 208-00058 204 INCHES (EACH).
3. FOR STORM DRAIN INLET TYPES I AND II, IF THERE IS A MINIMUM CLEARANCE OF 3 FEET FROM THE EDGE OF THE TRAVELED WAY TO THE FACE OF CURB, USE THE AGGREGATE BAGS AT STORM DRAIN INLET (TYPE I) DETAIL ON SHEET 4 INSTEAD.



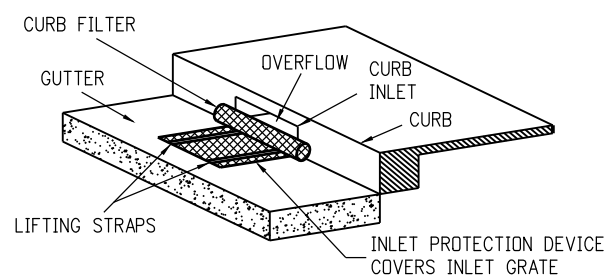
**PLAN VIEW**



**SECTION B-B**

**OPTION A**

**STORM DRAIN INLET PROTECTION (TYPE II)**

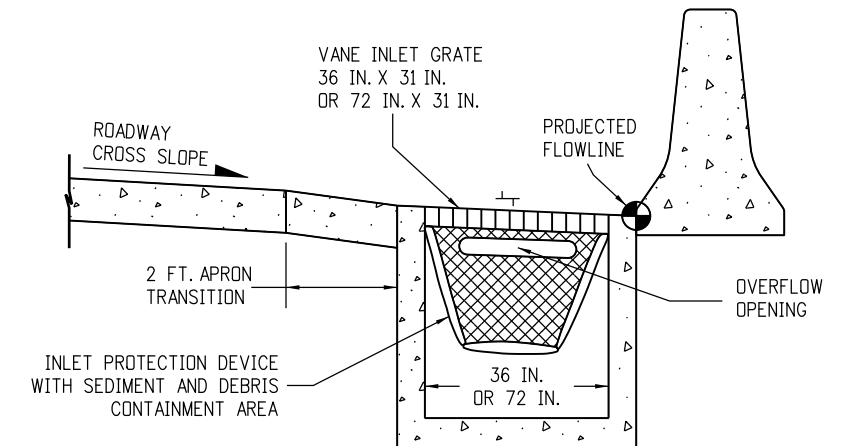


**ISOMETRIC VIEW**

**OPTION B**

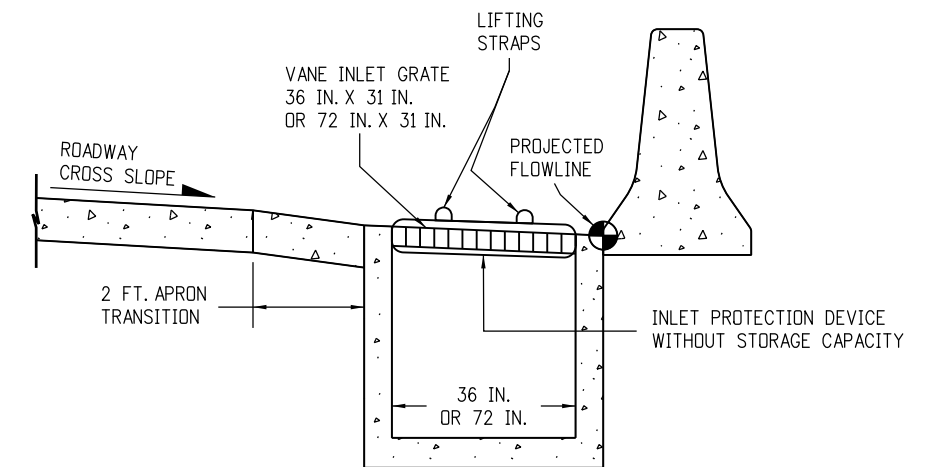
**STORM DRAIN INLET PROTECTION (TYPE II)**

NOTE: THE PAY ITEM NUMBERS FOR STORM DRAIN INLET PROTECTION (TYPE II) ARE 208-00054 (EACH).



**OPTION A**

**STORM DRAIN INLET PROTECTION (TYPE III)**



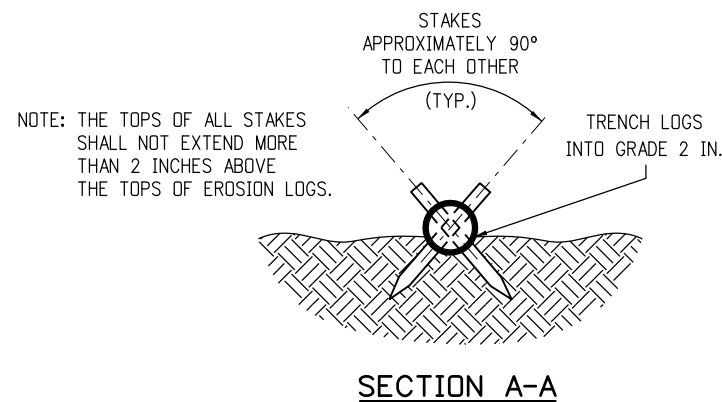
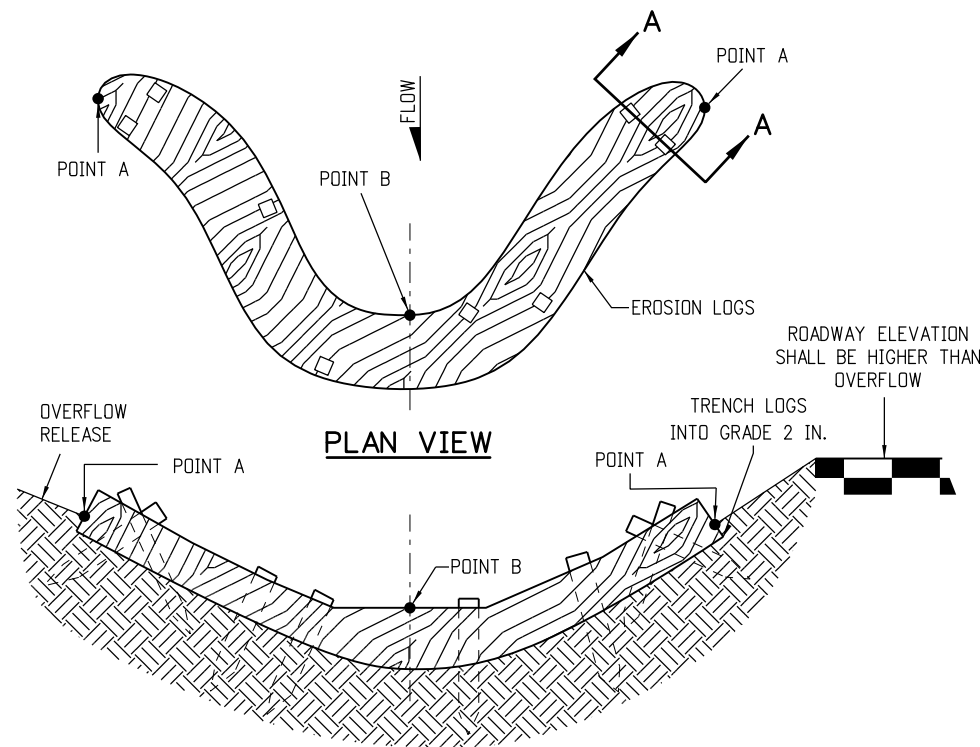
**OPTION B**

**STORM DRAIN INLET PROTECTION (TYPE III)**

NOTE: THE PAY ITEM NUMBER FOR STORM DRAIN INLET PROTECTION (TYPE III) (EACH) IS 208-00056.

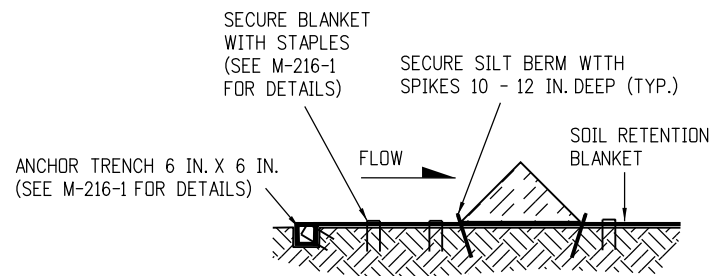
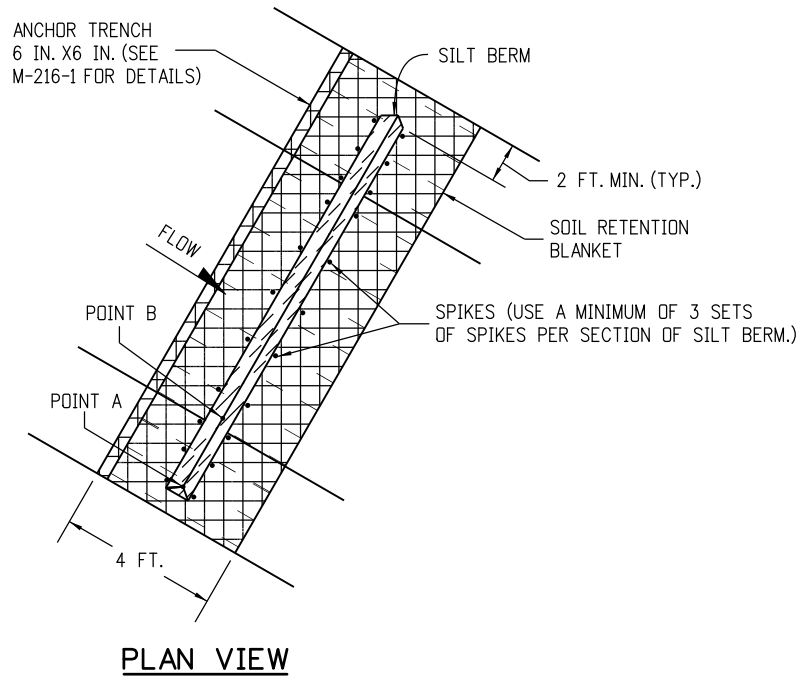
**STORM DRAIN INLET PROTECTION TYPES**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>TEMPORARY EROSION CONTROL</b>	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19		Date:	Comments			M-208-1	
Designer Initials: JBK	(R-X)					Standard Sheet No. 5 of 11	
Last Modification Date: 07/31/19	(R-X)						
Detailer Initials: LTA	(R-X)						
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)			Project Development Branch	JBK	Issued by the Project Development Branch: July 31, 2019	
						Project Sheet Number:	

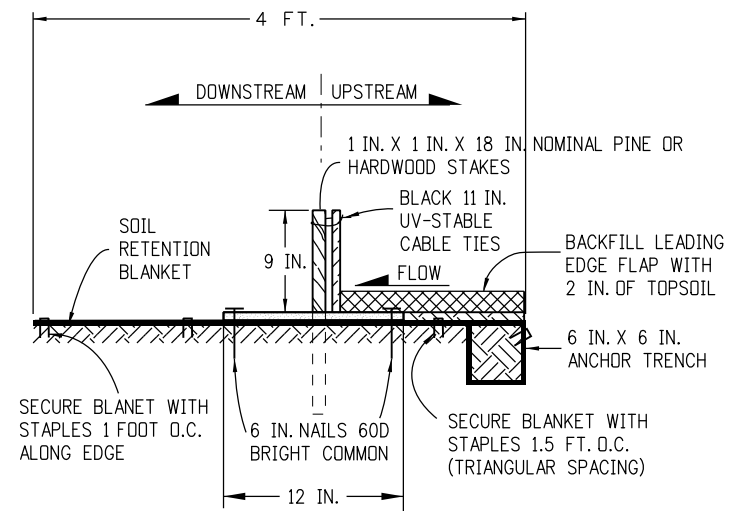


- NOTES:
1. EROSION LOGS SHALL BE EMBEDDED 2 INCHES INTO THE SOIL.
  2. EROSION LOGS SHALL BE TIGHTLY ABUTTED WITH NO GAPS.
  3. V-SHAPED TEMPORARY DITCHES SHALL NOT BE USED. DITCHES SHALL BE GRADED IN A PARABOLIC OR TRAPEZOIDAL SHAPE.

**EROSION LOG INSTALLATION**

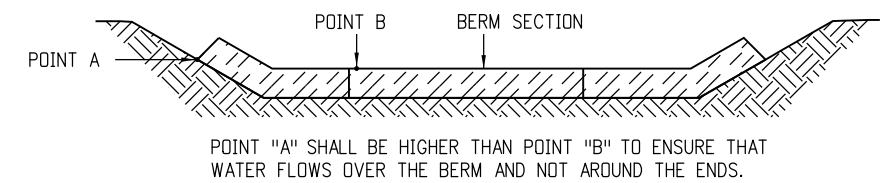


**SILT BERM (1) SECTION VIEW**



- NOTES:
1. MINIMUM 4 NAILS PER SEGMENT (UPSTREAM).
  2. MINIMUM 2 NAILS PER SEGMENT (DOWNSTREAM).
  3. MINIMUM 2 WOOD STAKES PER SEGMENT.

**SILT BERM (2) SECTION VIEW**

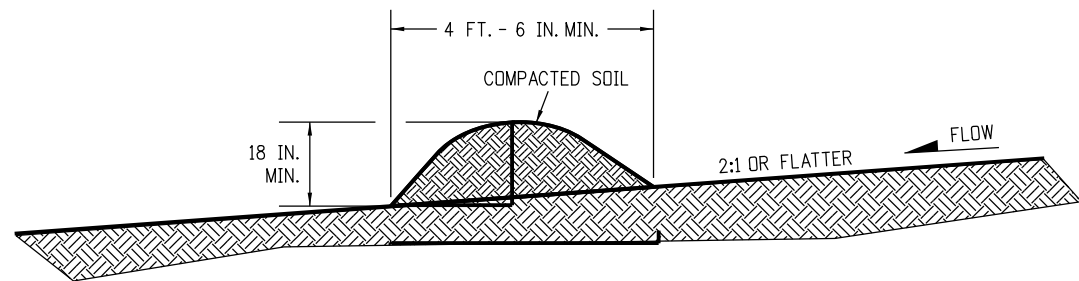


- NOTES
1. ANCHOR SOIL RETENTION BLANKET INTO TRENCH WITH 8 INCHES MIN. STAPLES PLACED AT 1 FOOT INTERVALS ALONG EDGE.
  2. FILL AND COMPACT TRENCH.
  3. SECTIONS OF THE SILT BERM SHALL BE OVERLAPPED WITH NO GAPS.
  4. FOR SLOPE AND CHANNEL SPACING SEE THE "SECTION VIEW ALONG DITCH FLOWLINE" DETAIL ON SHEET 11 OF 11.
  5. SOIL RETENTION BLANKET SHALL ALWAYS BE REQUIRED.
  6. THE PAY ITEM NUMBER FOR SILT BERM (LF) IS 208-00004.

**SILT BERM INSTALLATION**

**DRAINAGE DITCH APPLICATIONS**

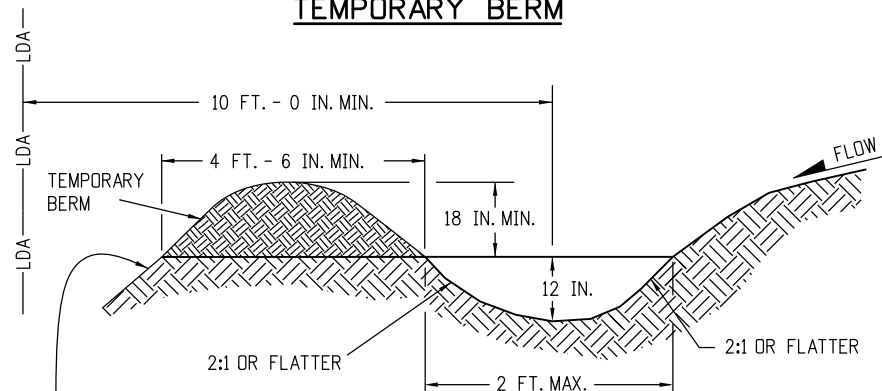
<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 	<h1>TEMPORARY EROSION CONTROL</h1>	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19	Designer Initials: JBK	Date:	Comments:			M-208-1	
Last Modification Date: 07/31/19	Detailer Initials: LTA			Standard Sheet No. 6 of 11			
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English				Project Development Branch <b>JBK</b>		Project Sheet Number:	
				Issued by the Project Development Branch: July 31, 2019			



**NOTES:**

1. BERMS SHALL HAVE A HEIGHT OF 18 INCHES, SIDE SLOPES OF 2:1 OR FLATTER AND A MINIMUM BASE WIDTH OF 4 FT. -6 IN.
2. BERMS SHALL BE USED TO INTERCEPT AND DIVERT DRAINAGE TO A DESIGNATED OUTLET.
3. BERMS SHALL NOT BE USED WHERE DRAINAGE AREA EXCEEDS 10 ACRES.
4. BERMS SHALL BE CONSTRUCTED OUT OF ACCEPTABLE MATERIAL THAT CAN BE COMPACTED AND RECEIVE AT A MINIMUM HEAVY EQUIPMENT WHEEL ROLLED COMPACTION.
5. TEMPORARY BERMS SHALL BE CONSTRUCTED OUT OF EMBANKMENT (SUBSOIL) AND IN NO CIRCUMSTANCE CONSTRUCTED OUT OF SALVAGED TOPSOIL.
6. THE PAY ITEM NUMBER FOR TEMPORARY BERM (LF) IS 208-00300.

**TEMPORARY BERM**

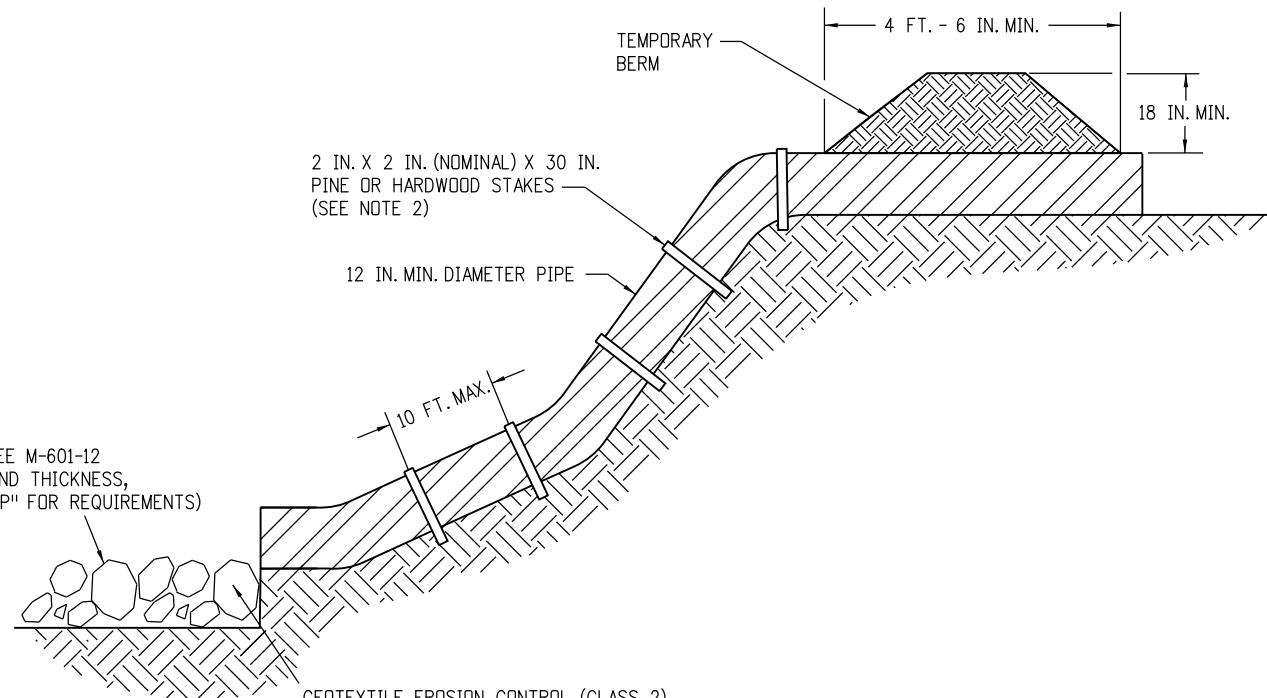


FOR BERMS TALLER THAN 2 FT.,  
INSTALL TOE OF SLOPE CONTROL MEASURES.  
SEE SHEET 3 OF 11 FOR DETAILS.

**NOTES:**

1. TEMPORARY DIVERSION DITCHES SHALL BE CONSTRUCTED ACROSS THE SLOPE TO INTERCEPT RUNOFF AND DIRECT IT TO A STABLE OUTLET OR SEDIMENT TRAP.
2. USE THE TEMPORARY DIVERSION DITCH IMMEDIATELY ABOVE A NEW CUT, FILL SLOPE, OR AROUND THE PERIMETER OF A DISTURBED AREA.
3. THE GRADIENT ALONG THE FLOW PATH SHALL HAVE A POSITIVE GRADE TO ASSURE DRAINAGE, BUT SHALL NOT BE SO STEEP AS TO RESULT IN EROSION DUE TO HIGH VELOCITY.
4. THE DIVERSION FLOWLINE SHALL ALWAYS BE LOCATED A MINIMUM 10 FEET FROM THE OUTSIDE LIMITS OF DISTURBED AREA BOUNDARY.
5. THE PAY ITEM NUMBER FOR TEMPORARY DIVERSION (LF) IS 208-00301.

**TEMPORARY DIVERSION**



\* RIPRAP OUTLET PROTECTION (SEE M-601-12 FOR MIN. HORIZONTAL LAYOUT AND THICKNESS, AND SPECIFICATION 506 "RIPRAP" FOR REQUIREMENTS)

\* RIPRAP SIZE  $D_{50} = 6$  IN. OR AS SHOWN ON THE PLANS.

GEOTEXTILE EROSION CONTROL (CLASS 2) SHALL ALWAYS BE REQUIRED

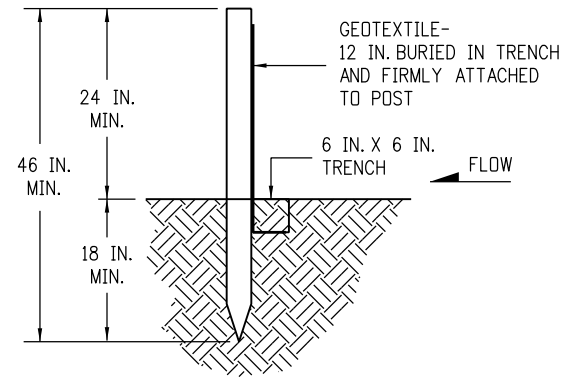
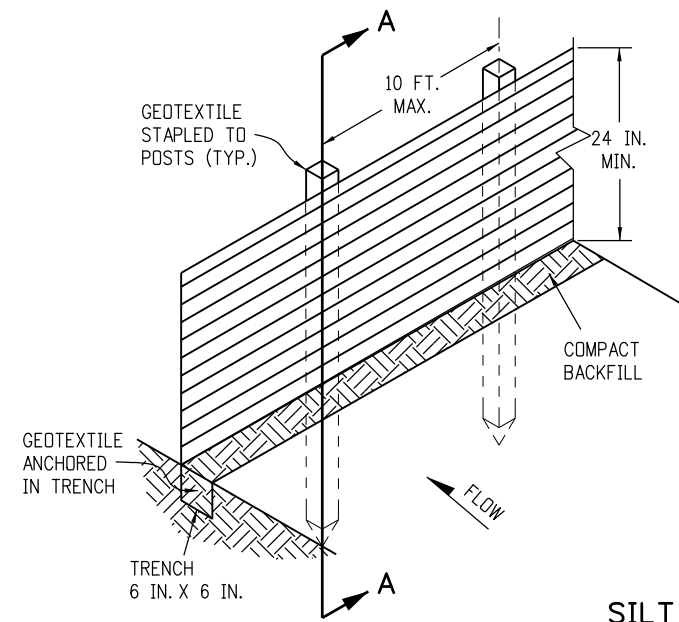
**NOTES:**

1. ANCHOR SIZE VARIES ACCORDING TO PIPE SIZE
2. TO SECURE THE PIPE, DRIVE STAKES INTO GROUND, THEN TIE A 12 GAUGE WIRE BETWEEN THEM ABOVE AND ACROSS THE PIPE'S WIDTH.
3. THE OUTLET SHALL BE ALIGNED WITH THE FLOW DIRECTION OF THE EXISTING GRADE. PERPENDICULAR DISCHARGE TO A CHANNEL SHALL NOT BE ACCEPTABLE.
4. THE GRADE AROUND THE INLET TO THE PIPE SHALL BE COMPACTED.
5. THE PAY ITEM NUMBER FOR TEMPORARY SLOPE DRAINS (LF) IS 208-00060.

**TEMPORARY SLOPE DRAINS**

**GRADING APPLICATIONS**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b> <b>JBK</b>	<h1>TEMPORARY EROSION CONTROL</h1>	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19		Date:	Comments:			M-208-1	
Designer Initials: JBK		(R-X)				Standard Sheet No. 7 of 11	
Last Modification Date: 07/31/19		(R-X)					
Detailer Initials: LTA		(R-X)					
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		(R-X)		Project Sheet Number:			

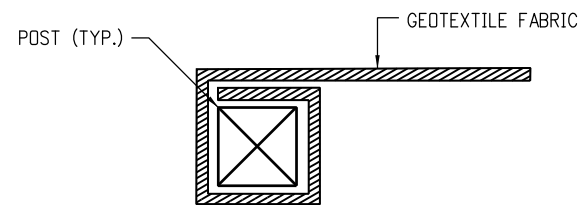


**SECTION A-A**

**SILT FENCE**

**NOTES:**

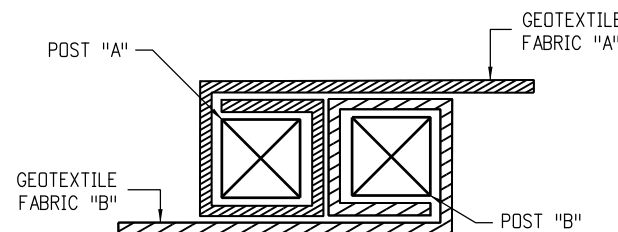
1. GEOTEXTILE SHALL BE ATTACHED TO WOOD POSTS WITH THREE OR MORE STAPLES PER POST. STAPLES SHALL BE HEAVY DUTY WIRE AND AT LEAST 1 INCH LONG.
2. WOOD POST SHALL BE 1 IN. X 1 IN. NOMINAL.
3. THE PAY ITEM NUMBER FOR SILT FENCE (LF) IS 208-00020.
4. THE SILT FENCE SHALL BE PLACED ON THE CONTOUR (AT THE SAME ELEVATION ±6 IN.). THE ENDS SHALL BE FLARED UP SLOPE (MINIMUM ELEVATION GAIN OF 18 IN.).



**END SECTION DETAIL (PLAN VIEW)**

**NOTE:**

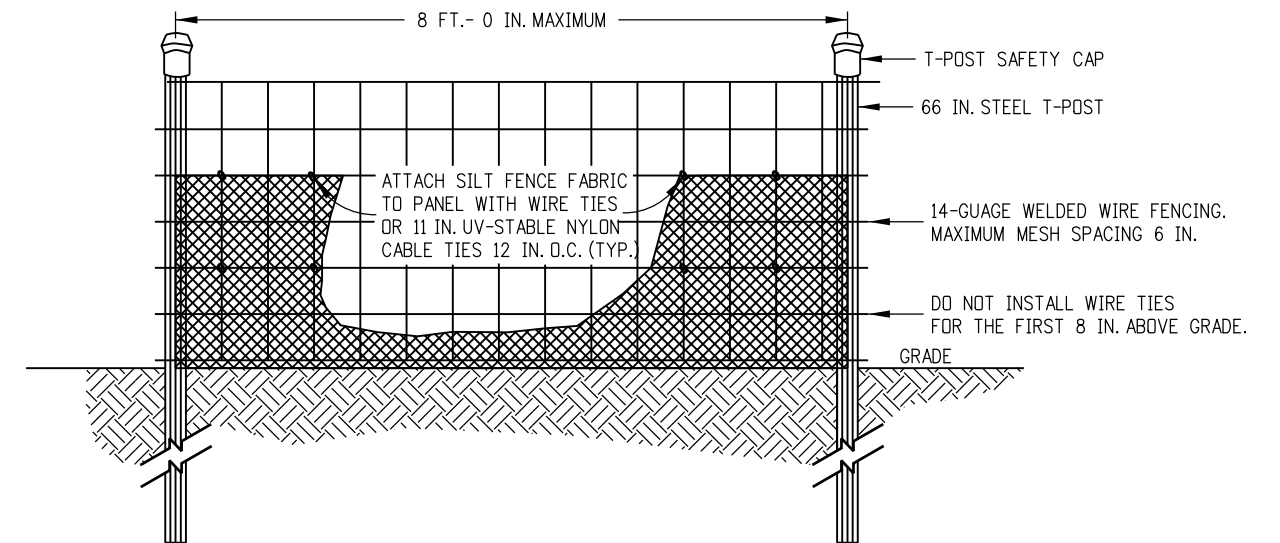
1. THE END OF THE SILT FENCE FABRIC SHALL BE WRAPPED APPROX. 6 INCHES AROUND A WOODEN POST ONE FULL TURN, THEN SECURED ALONG THE POST WITH 6 HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG.



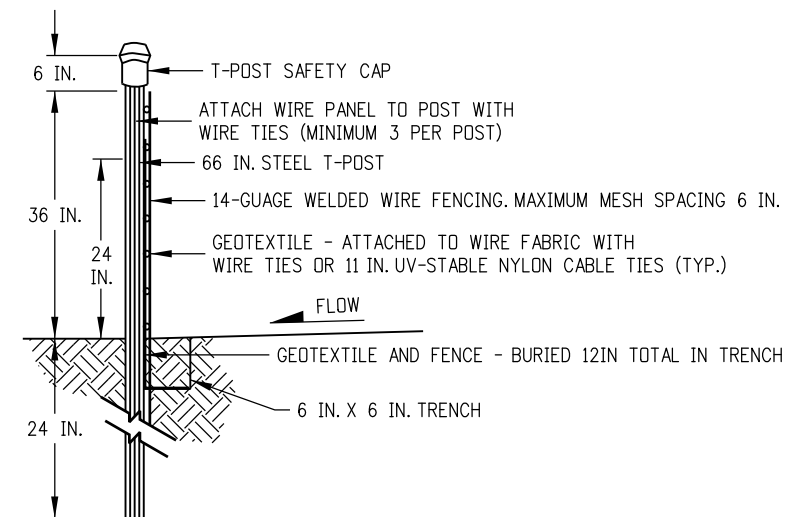
**JOINING SECTION DETAIL (PLAN VIEW)**

**NOTES:**

1. THE ENDS OF THE SILT FENCE FABRIC SHALL BE JOINED TOGETHER BY WRAPPING APPROX. 6 INCHES OF EACH END AROUND A WOODEN POST ONE FULL TURN, THEN SECURED ALONG THE POST WITH 6 HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG.
2. POSTS SHALL BE TIGHTLY ABUTTED WITH NO GAPS TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT JOINT.



**ELEVATION VIEW**



**SIDE VIEW**

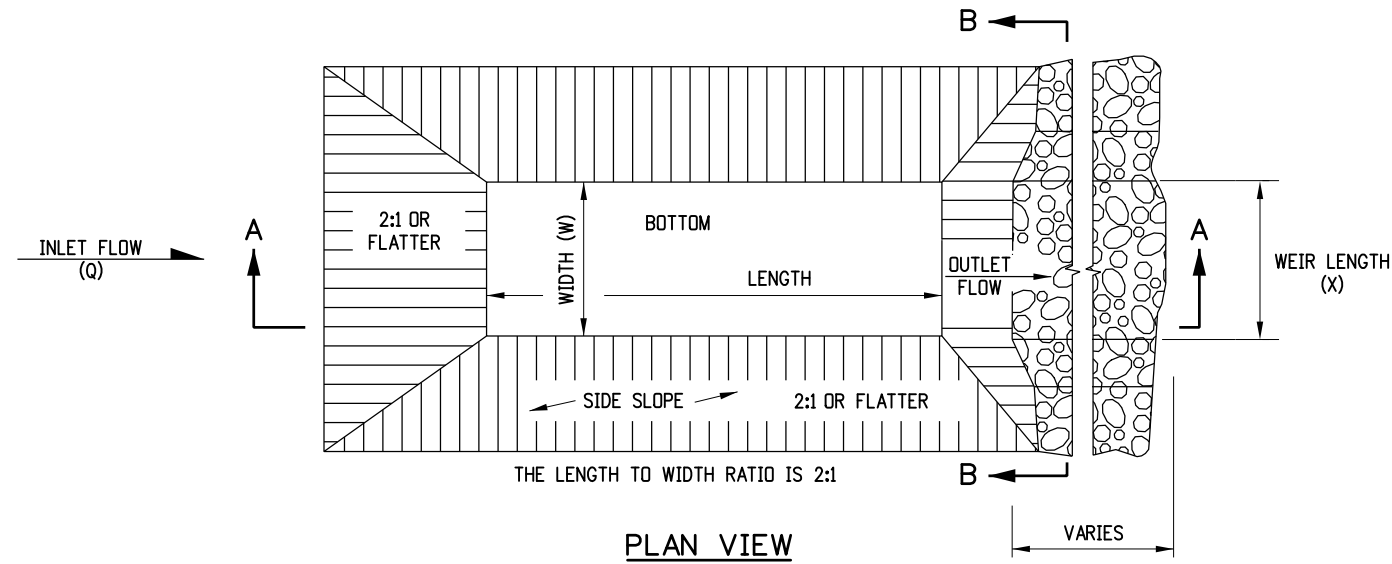
**NOTES:**

1. THE ENDS OF THE SILT FENCE FABRIC SHALL BE JOINED TOGETHER BY WRAPPING APPROX. 6 INCHES OF EACH END AROUND A STEEL T-POST, THEN SECURED ALONG THE POST WITH WIRE TIES (MINIMUM 3 PER POST).
2. POSTS SHALL BE TIGHTLY ABUTTED WITH NO GAPS TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT JOINT.
3. SILT FENCES SHALL NOT BE USED FOR CHECK DAMS.
4. THE PAY ITEM NUMBER FOR SILT FENCE (REINFORCED) (LF) IS 208-00021.

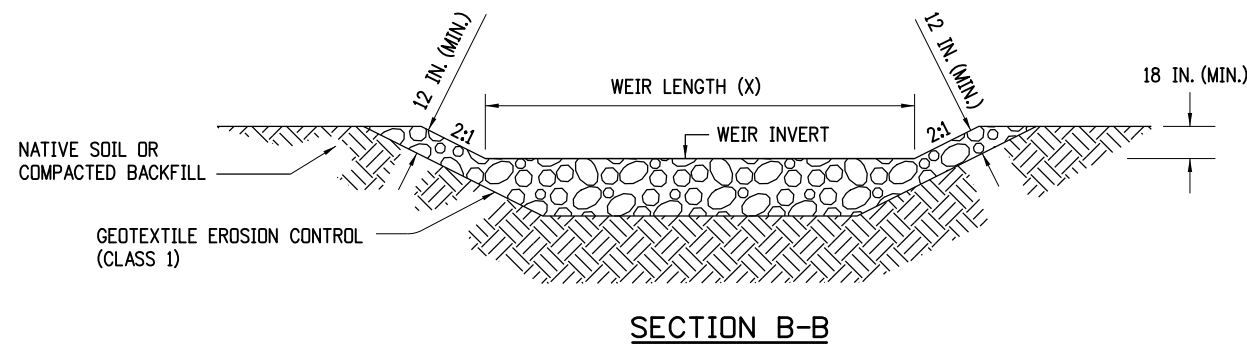
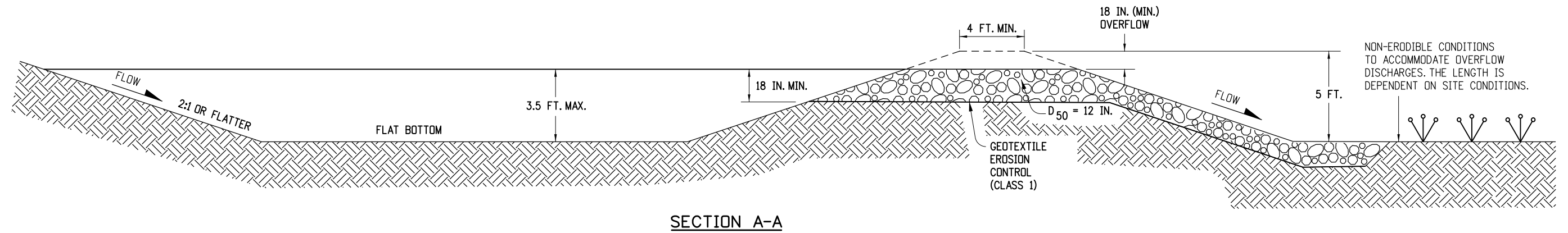
**SILT FENCE (REINFORCED)**

**SILT FENCE APPLICATIONS**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>TEMPORARY EROSION CONTROL</b>	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19	(R-X)	Date:	Comments:			M-208-1	
Designer Initials: JBK	(R-X)					Standard Sheet No. 8 of 11	
Last Modification Date: 07/31/19	(R-X)					Project Sheet Number:	
Detailer Initials: LTA	(R-X)						
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English				<b>JBK</b>	Issued by the Project Development Branch: July 31, 2019		



- NOTES**
1. THE MAXIMUM DRAINAGE AREA IS 5 ACRES.
  2. THE MAXIMUM STRUCTURE LIFE IS 2 YEARS.
  3. THE STORAGE AREA IS 1800 CUBIC FEET PER ACRE.
  4. THE MAXIMUM EMBANKMENT HEIGHT SHALL BE 5 FT. MEASURED ON THE DOWNSTREAM SIDE.
  5. THE LENGTH/WIDTH RATIO MAY BE ADJUSTED TO MEET SITE CONDITIONS WHEN APPROVED BY THE ENGINEER.
  6. WIDTH (W) OF SEDIMENT TRAP IS APPROXIMATELY EQUAL TO THE WEIR LENGTH (X).
  7. SEDIMENT TRAP DESIGN SHALL BE APPROVED BY THE ENGINEER.
  8. THE DOWN GRADE FROM WEIR SHALL BE STABLE AND NON-ERODIBLE.
  9. THE PAY ITEM NUMBER FOR SEDIMENT TRAP (LF) IS 208-00033.



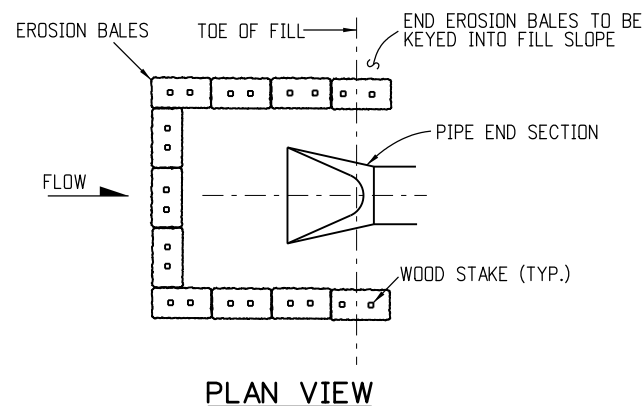
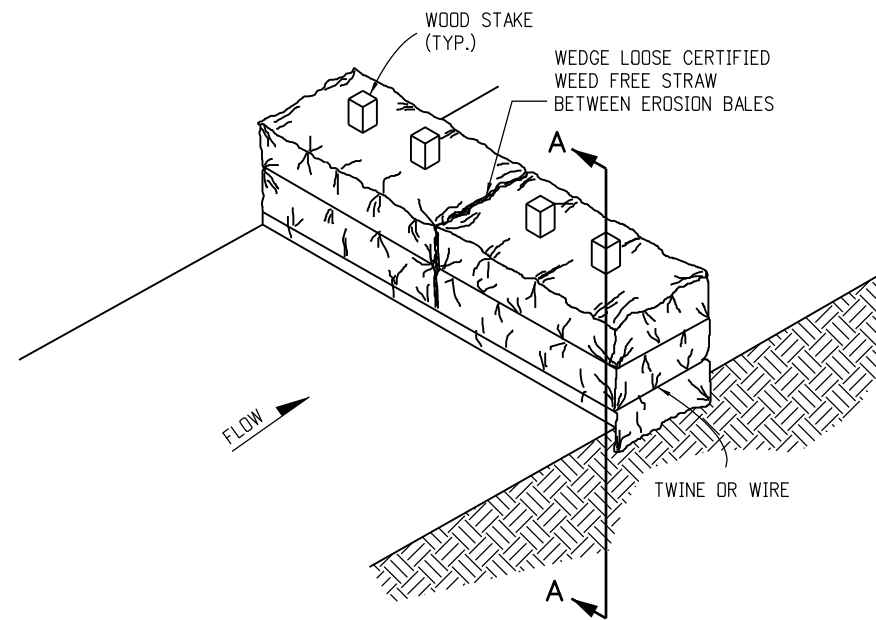
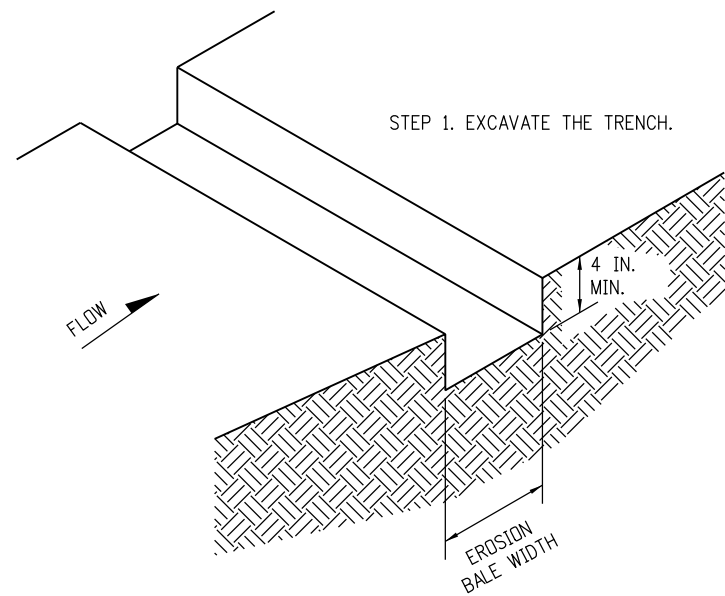
**WEIR LENGTH TABLE**

DRAINAGE AREA (ACRES)	WEIR LENGTH (FEET)
1	4
2	6
3	8
4	10
5	12

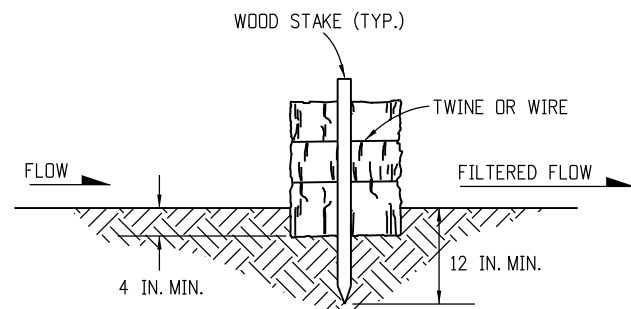
**SEDIMENT TRAP**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		<b>Colorado Department of Transportation</b>		<b>TEMPORARY EROSION CONTROL</b>		<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19		Date: _____		2829 West Howard Place				M-208-1	
Designer Initials: JBK		Comments: _____		CDOT HQ, 3rd Floor		<b>Standard Sheet No. 9 of 11</b>		Project Sheet Number: _____	
Last Modification Date: 07/31/19		_____		Denver, CO 80204					
Detailer Initials: LTA		_____		Phone: 303-757-9021 FAX: 303-757-9868					
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		_____		<b>Project Development Branch</b>		<b>JBK</b>		Issued by the Project Development Branch: July 31, 2019	



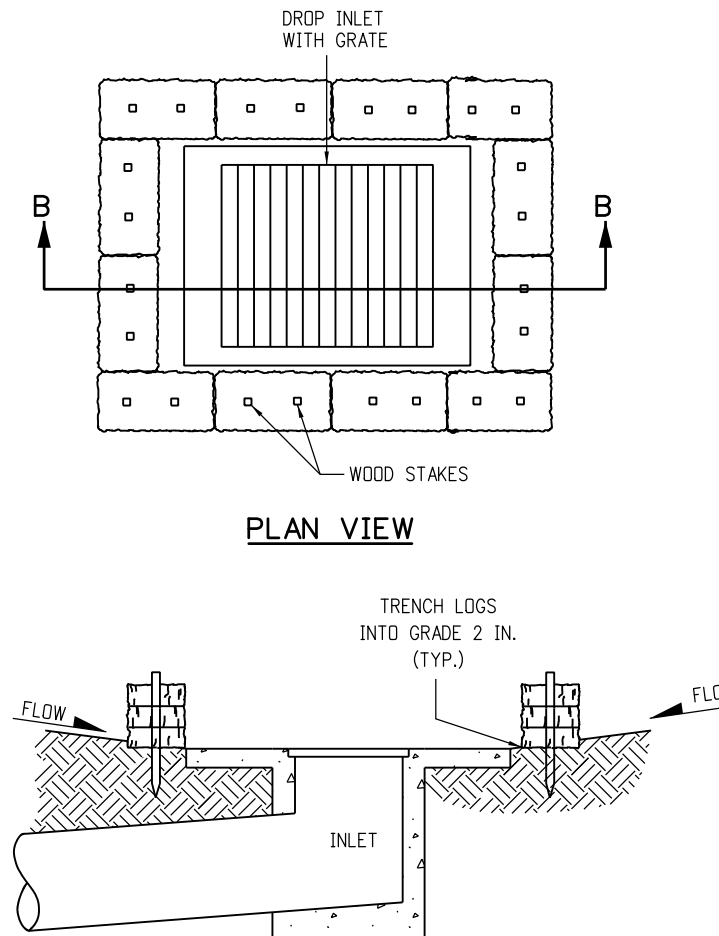


**EROSION BALES CULVERT INLET PROTECTION**



**SECTION A-A**

**EROSION BALES TRENCHING AND STAKING**



**PLAN VIEW**

**SECTION B-B**

NOTE: LOCATE EROSION BALES AT THE OUTSIDE EDGE OF THE CONCRETE APRON.

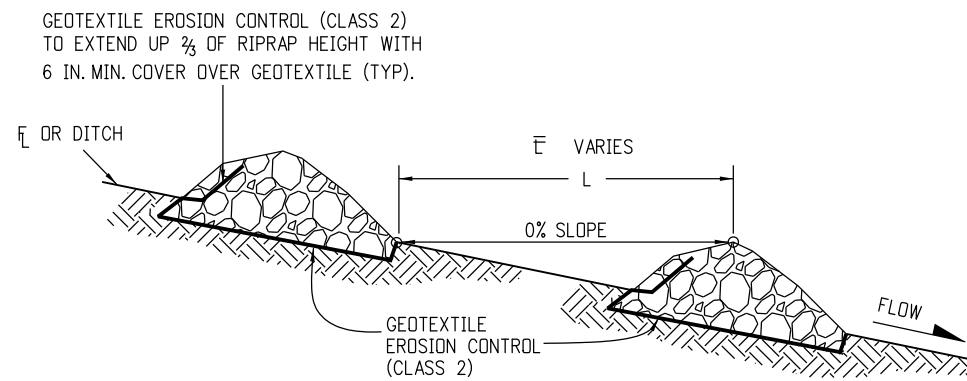
**EROSION LOG FILTER AT DROP INLET**

**NOTES**

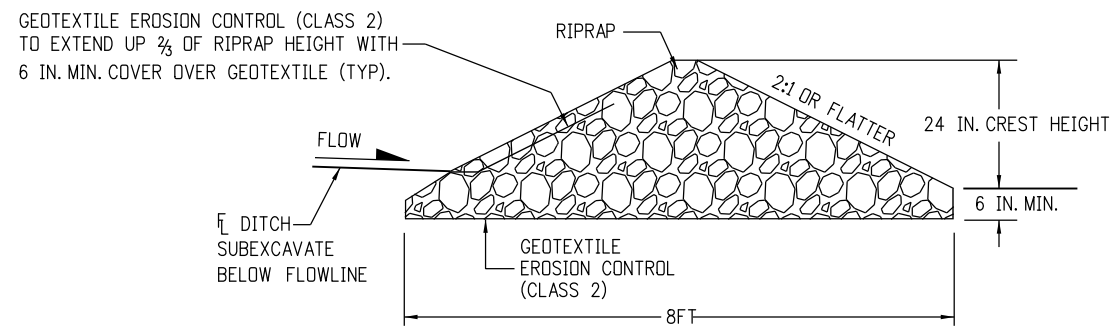
1. STAKES SHALL BE WOOD AND SHALL BE 2 IN. X 2 IN. X 30 IN. NOMINAL.
2. EROSION BALES SHALL BE 18 IN. X 18 IN. X 36 IN.
3. EROSION BALES SHALL BE ENTRENCHED 4 IN. MINIMUM INTO THE SOIL, TIGHTLY ABUTTED WITH NO GAPS, STAKED, AND BACKFILLED AROUND THE ENTIRE OUTSIDE PERIMETER.
4. EROSION BALES CANNOT BE USED FOR CHECK DAMS.
5. EROSION BALE FILTER SHALL BE LOWER THAN BERM ELEVATION OR USED IN A SUMP CONDITION.
6. THE PAY ITEM NUMBER FOR EROSION BALES (WEED FREE) (EA) IS 208-00011.

**EROSION BALES APPLICATIONS**

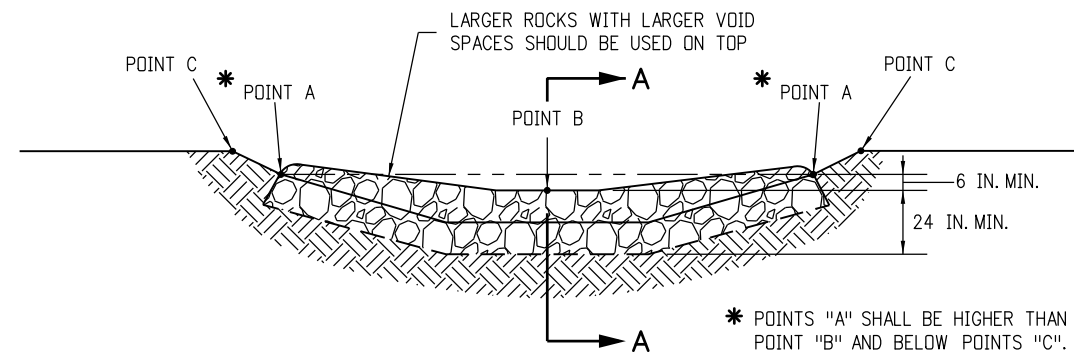
<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>TEMPORARY EROSION CONTROL</b>	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19		Date:	Comments:			M-208-1	
Designer Initials: JBK		(R-X)				Standard Sheet No. 10 of 11	
Last Modification Date: 07/31/19		(R-X)					
Detailer Initials: LTA		(R-X)					
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		(R-X)		Project Sheet Number:			



**SECTION VIEW ALONG DITCH FLOWLINE**



**SECTION A-A**



**TYPICAL SECTION VIEW**

**NOTES:**

1. RIPRAP SIZE  $D_{50}$  = 6IN OR AS SHOWN ON THE PLANS.
2. THE GEOTEXTILE EROSION CONTROL SHALL BE CLASS 2 AND CONFORM TO THE REQUIREMENTS OF SUBSECTION 712.08.
3. THE ENDS OF RIPRAP CHECK DAM SHALL BE A MINIMUM OF 6 IN. HIGHER THAN CENTER OF CHECK DAM.
4. FOR USE AS TEMPORARY CHECK DAMS ONLY AND NOT FOR PERMANENT INSTALLATIONS.
5. THE PAY ITEM NUMBER FOR ROCK CHECK DAM (EA) IS 208-00041.

NOTE: ALL MATERIALS AND LABOR TO COMPLETE THE ROCK CHECK DAM SHALL BE INCLUDED IN THE COST OF WORK.

**ROCK CHECK DAM**

<b>Computer File Information</b>		<b>Sheet Revisions</b>		Colorado Department of Transportation 2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 <b>Project Development Branch</b>	<b>TEMPORARY EROSION CONTROL</b>	<b>STANDARD PLAN NO.</b>	
Creation Date: 07/31/19	(R-X)	Date:	Comments:			M-208-1	
Designer Initials: JBK	(R-X)					Standard Sheet No. 11 of 11	
Last Modification Date: 07/31/19	(R-X)					Project Sheet Number:	
Detailer Initials: LTA	(R-X)						
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		(R-X)		Project Development Branch <b>JBK</b> Issued by the Project Development Branch: July 31, 2019			