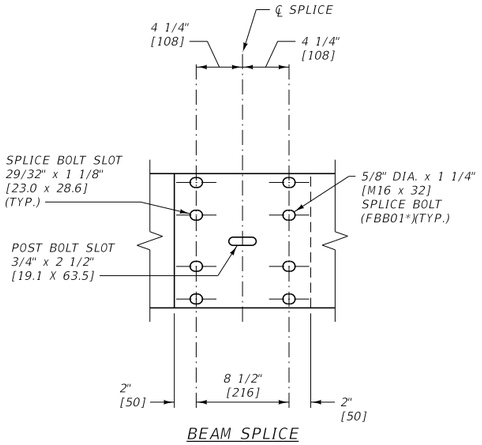
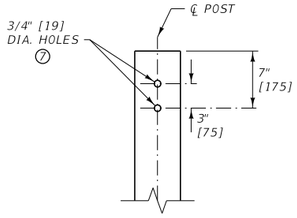
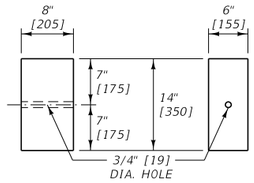


BEAM SPLICE

(LAP IN DIRECTION OF ADJACENT TRAFFIC)

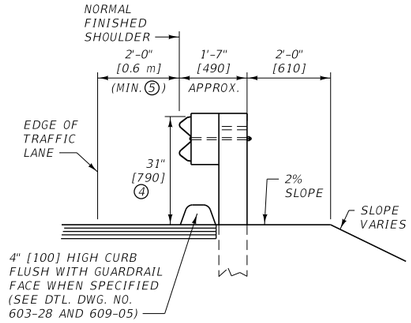


POST HOLE DETAIL

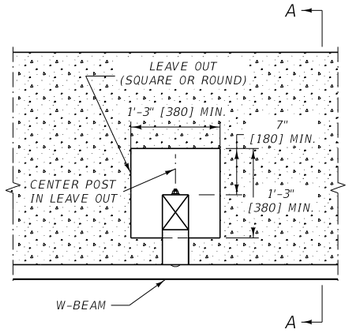


WOOD BLOCK

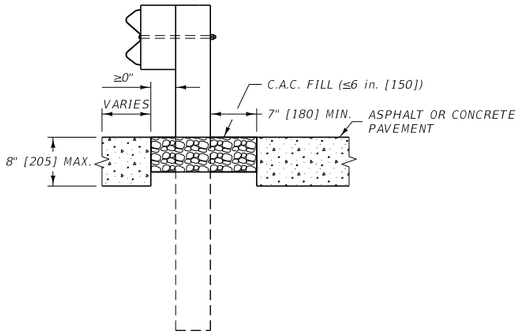
PDB01*



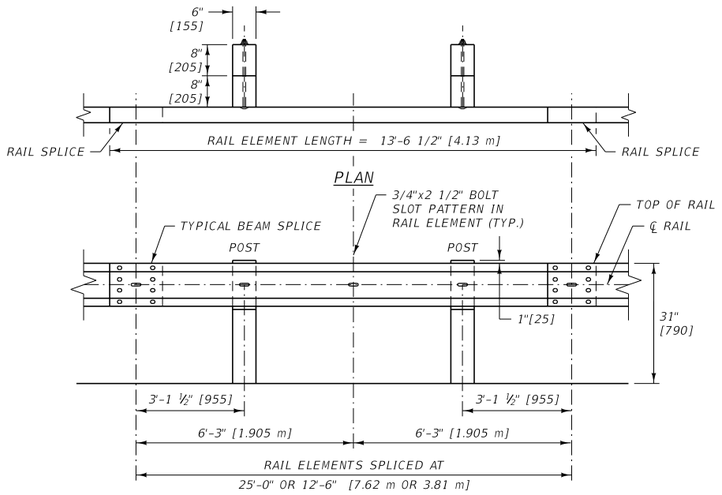
TYPICAL INSTALLATION



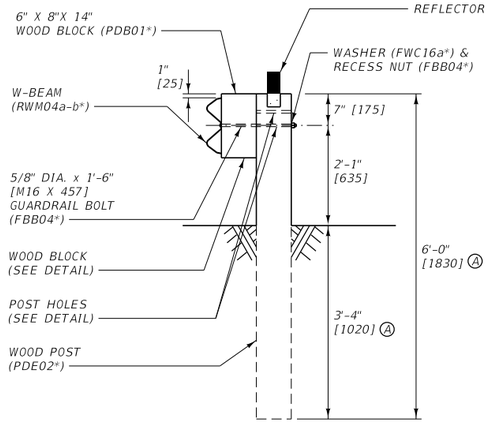
POST DETAIL IN PAVEMENT APPLICATIONS



SECTION A-A

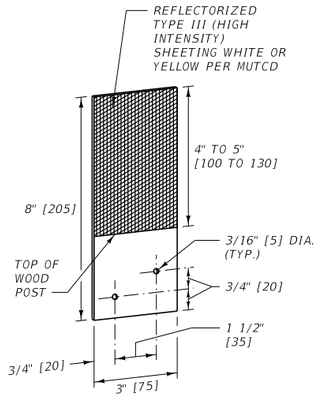


ELEVATION



WOOD POST AND MOUNTING DETAIL

Ⓐ STANDARD UNLESS SPECIFIED OTHERWISE IN PLANS.



REFLECTOR

(SEE NOTE 3)

NOTES:

① INSTALL ALL BOLTS WITH HEADS ON TRAFFIC SIDE OF INSTALLATION.

② USE WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS. AFFIX BLOCKS TO POSTS WITH TWO 16 PENNY GALV. NAILS OR 14 GAUGE WIRE WRAP.

③ ATTACH REFLECTORS TO POSTS EVERY 25 FEET [7.62 m], INCLUDING TERMINAL SECTIONS, WITH THE REFLECTORIZED SURFACE FACING ADJACENT TRAFFIC. FABRICATE REFLECTORS FROM 0.063" [1.6] THICK ALUMINUM ALLOY PER SECTION 704 OR PLASTIC REFLECTORS WITH A URETHANE HINGE. FASTEN REFLECTOR TO WOOD POST USING TWO 16 PENNY RING-SHANKED GALVANIZED NAILS AND TWO 3/16" [4.8] DIA. WASHERS IN PRE-DRILLED HOLES.

④ ON EXISTING GUARDRAIL INSTALLATIONS, THE MINIMUM RAIL HEIGHT IS 27 3/4" [705.]

⑤ WIDENING IS REQUIRED IF FINISHED SHOULDER IS LESS THAN 2'-0" [0.6 m] FROM THE TRAFFIC LANE.

⑥ DO NOT INSTALL W-BEAM GUARDRAIL FOR OBSTACLES WITHIN 5.3' [1.6 m] OF THE FACE OF THE RAIL.

⑦ USE LOWER HOLE ON NEW CONSTRUCTION INSTALLATIONS.

⑧ USE 6' [1830] POSTS FOR STANDARD INSTALLATIONS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

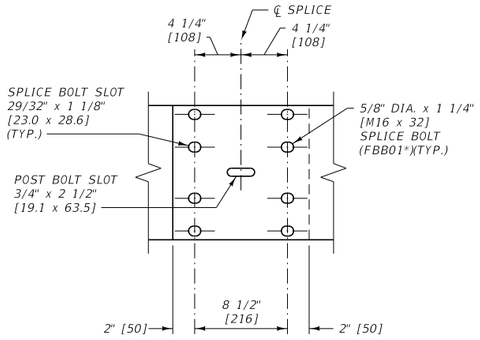
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606, 704

DWG. NO. 606-05A

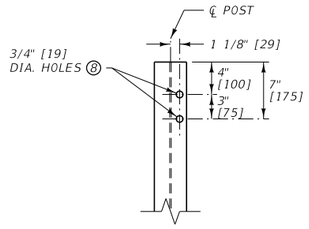
METAL GUARDRAIL - WOOD POSTS (MGS)

MDT MONTANA DEPARTMENT OF TRANSPORTATION

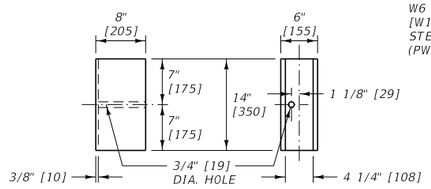


BEAM SPLICE

(LAP IN DIRECTION OF ADJACENT TRAFFIC)

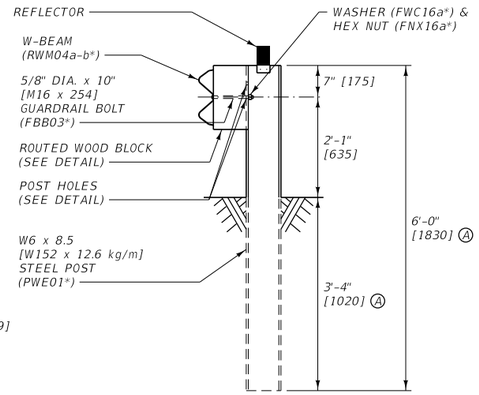


POST HOLE DETAIL



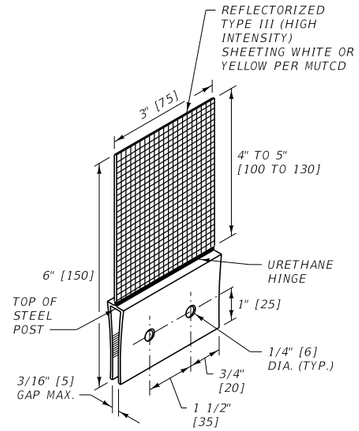
ROUTED WOOD BLOCK

PDB01*



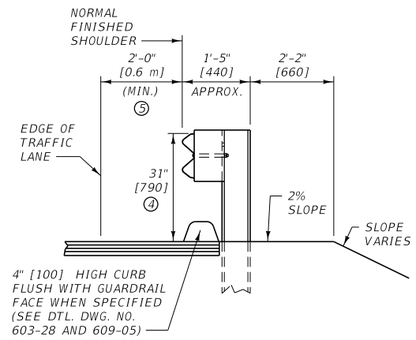
STEEL POST AND MOUNTING DETAIL

(A) STANDARD UNLESS SPECIFIED OTHERWISE IN PLANS.

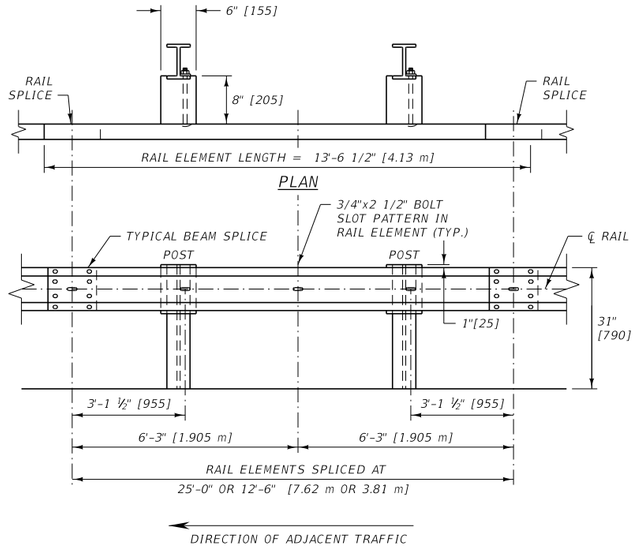


REFLECTOR

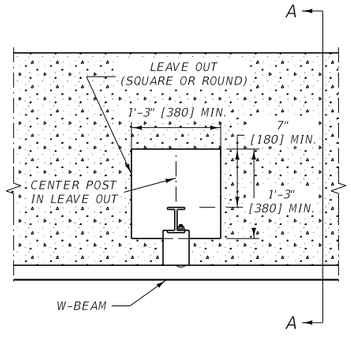
(SEE NOTE 3)



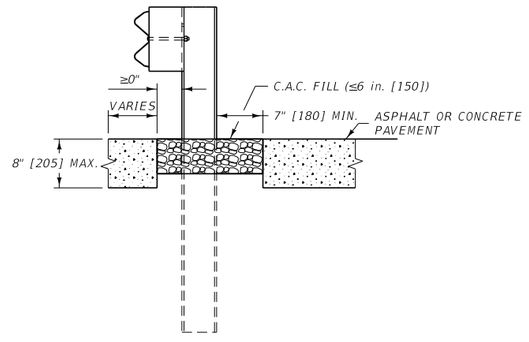
TYPICAL INSTALLATION



ELEVATION



POST DETAIL IN PAVEMENT APPLICATIONS



SECTION A-A

NOTES:

(1) INSTALL ALL BOLTS WITH HEADS ON TRAFFIC SIDE OF INSTALLATION.

(2) USE ROUTED WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS.

(3) ATTACH REFLECTORS TO POSTS EVERY 25 FEET [7.62 m], INCLUDING TERMINAL SECTIONS, WITH THE REFLECTORIZED SURFACE FACING ADJACENT TRAFFIC. FASTEN REFLECTOR TO STEEL POST USING AN APPROVED ADHESIVE. REFLECTORS MAY BE BOLTED TO POSTS PROVIDED HOLES IN POSTS ARE DRILLED BEFORE BEING GALVANIZED.

(4) ON EXISTING GUARDRAIL INSTALLATIONS, THE MINIMUM RAIL HEIGHT IS 27 3/4" [705].

(5) WIDENING IS REQUIRED IF FINISHED SHOULDER IS LESS THAN 2'-0" [0.6 m] FROM THE TRAFFIC LANE.

(6) STEEL POSTS WITH OTHER POST HOLE CONFIGURATIONS MAY BE ACCEPTED, PROVIDED THEY HAVE AT LEAST THE HOLES DETAILED ON THIS DRAWING AND THEY MEET AASHTO'S PUBLICATION, "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE" AND "MASH" REQUIREMENTS.

(7) DO NOT INSTALL W-BEAM GUARDRAIL FOR OBSTACLES WITHIN 5.3' [1.6 m] OF THE FACE OF THE RAIL.

(8) USE LOWER HOLE ON NEW CONSTRUCTION INSTALLATIONS.

(9) USE 6' [1830] POSTS FOR STANDARD INSTALLATIONS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

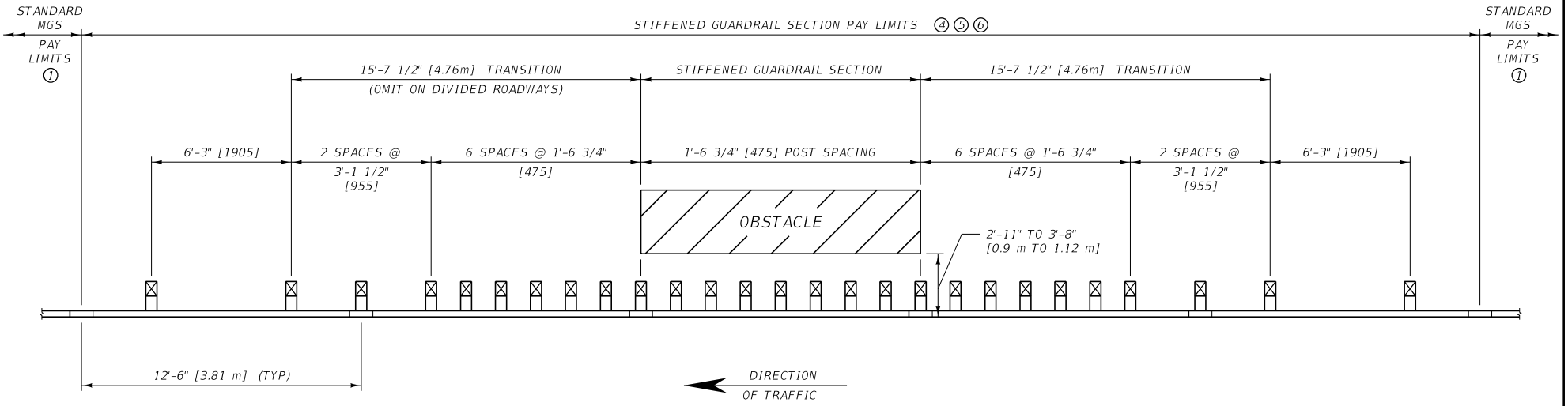
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

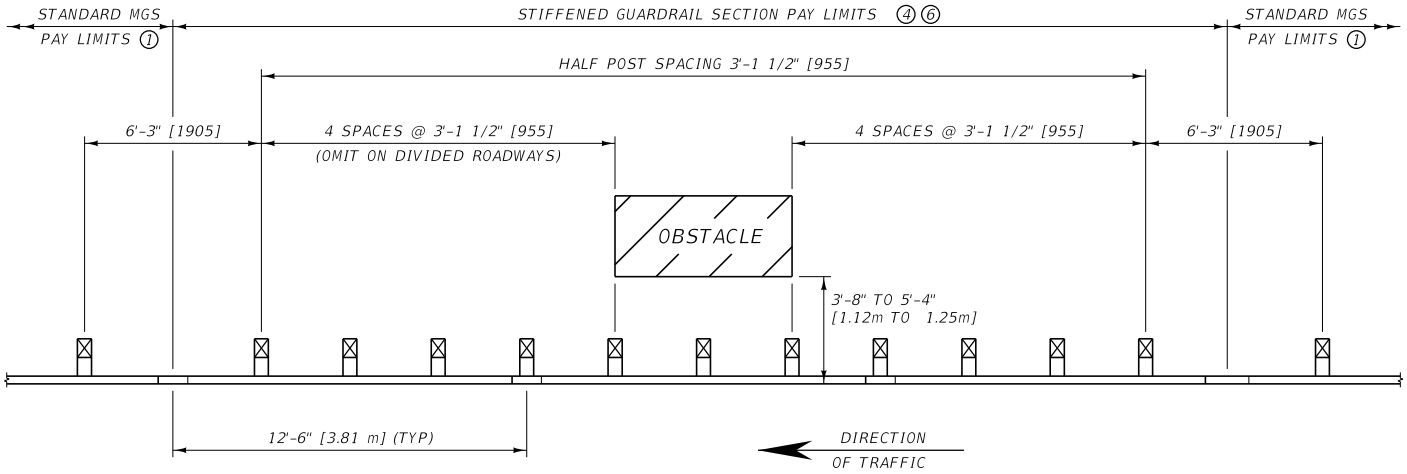
DWG. NO. 606-05B

METAL GUARDRAIL - STEEL POSTS (MGS)

MDT MONTANA DEPARTMENT OF TRANSPORTATION



QUARTER POST SPACING



HALF POST SPACING

NOTES:

① SEE DTL. DWG. NO. 606-05A AND 606-05B FOR STANDARD MGS GUARDRAIL AND ASSOCIATED HARDWARE.

② OBSTACLES CLOSER TO THE FACE OF RAIL THAN THE INDICATED LIMITS REQUIRE THE USE OF A RIGID BARRIER SYSTEM WITH LITTLE TO NO DYNAMIC DEFLECTION.

③ LAP ALL RAIL IN THE DIRECTION OF ADJACENT TRAFFIC.

④ ALL POSTS AND BLOCKS ARE STANDARD DIMENSIONS AS PER DETAILED DRAWING NO. 606-05A AND 606-05B.

⑤ RAIL IS RWM08a-b*.

⑥ PAY LIMIT DEFINED BY RAILS CONTAINING A SECTION OF REDUCED POST SPACING. LIMITS SHOWN ARE FOR EXAMPLE ONLY, ACTUAL PAY LIMITS WILL DIFFER DEPENDING UPON SPLICE LOCATIONS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

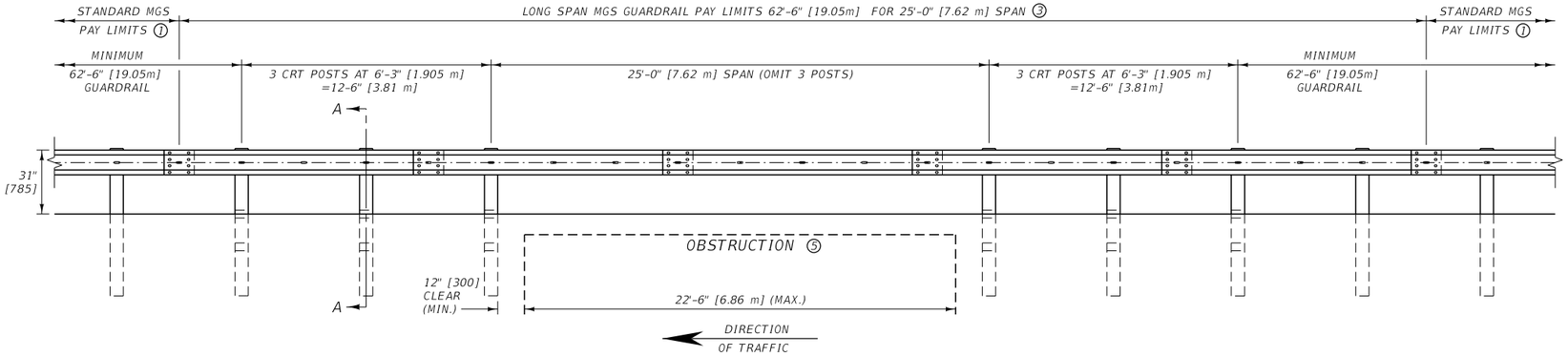
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING

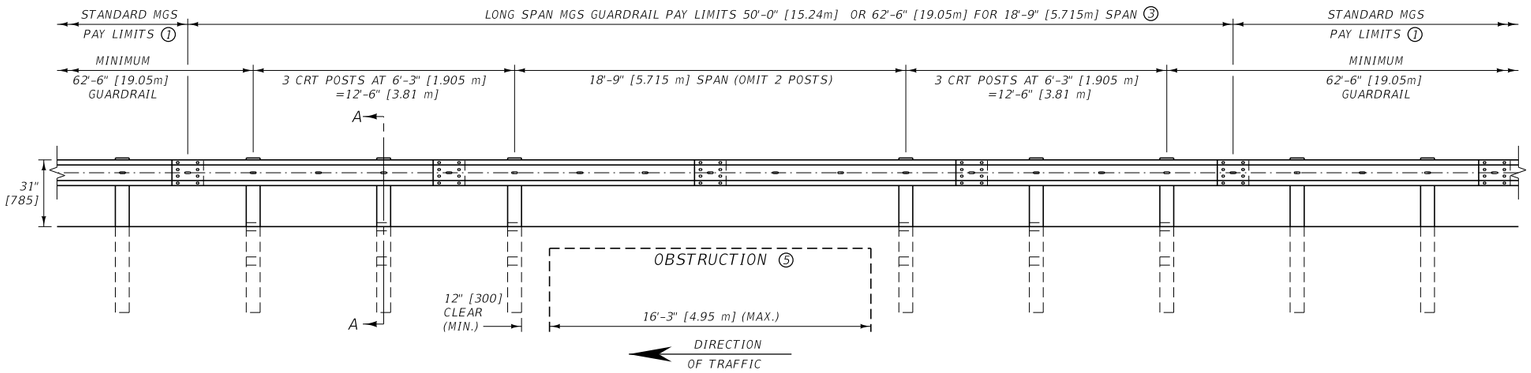
REFERENCE	DWG. NO.
STANDARD SPEC. SECTION 606	606-07

STIFFENED GUARDRAIL SECTIONS (MGS)

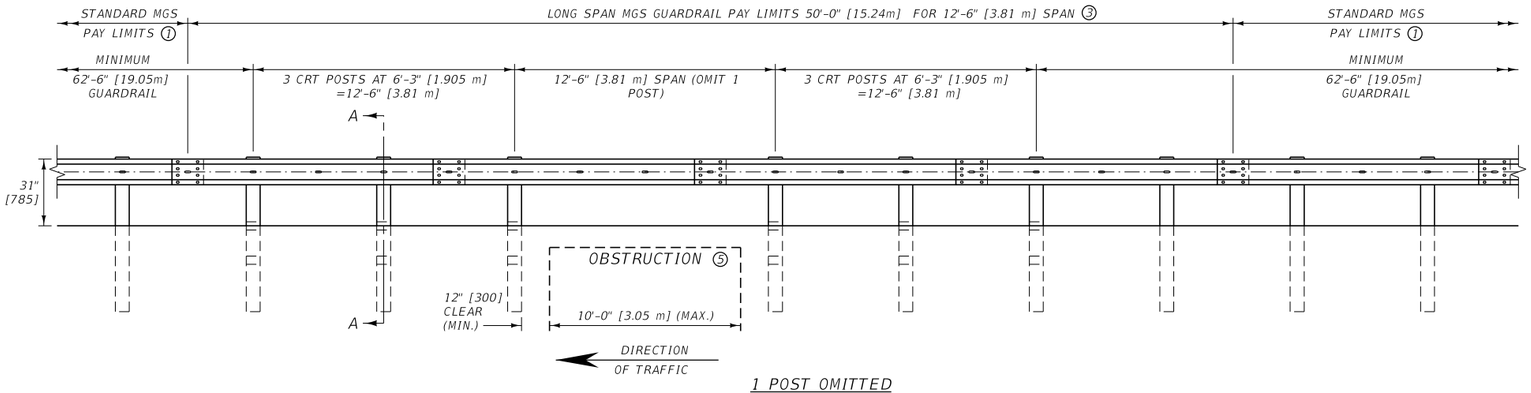
MDT MONTANA DEPARTMENT OF TRANSPORTATION



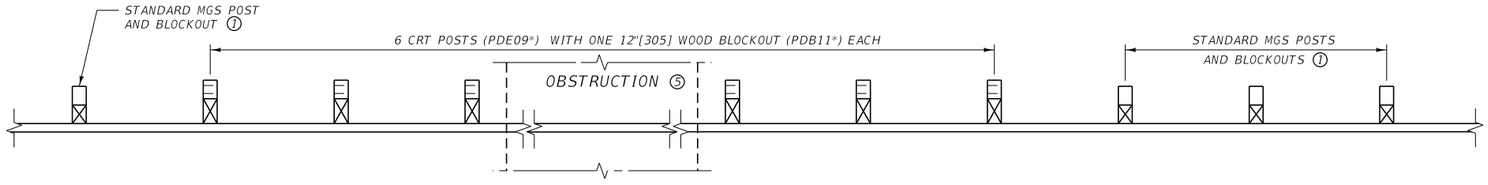
3 POSTS OMITTED



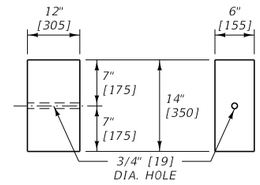
2 POSTS OMITTED



1 POST OMITTED

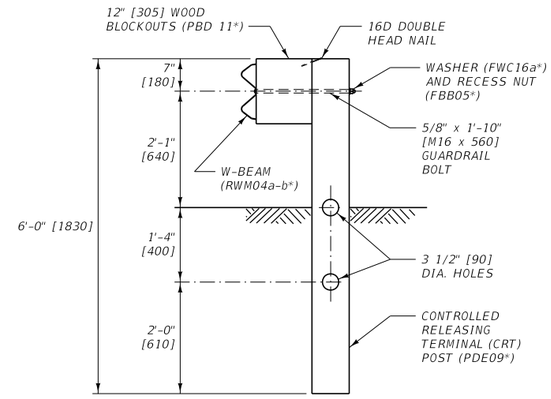


PLAN VIEW



12" WOOD BLOCK

PDB11*



SECTION A-A

NOTES:

(1) SEE DTL. DWG. NO. 606-05A AND 606-05B FOR STANDARD MGS GUARDRAIL AND ASSOCIATED HARDWARE.

(2) LAP ALL RAIL IN THE DIRECTION OF ADJACENT TRAFFIC.

(3) TYPICAL SPLICE LOCATIONS SHOWN, MAY VARY BASED ON ACTUAL RAIL SEGMENTS INSTALLED. PAY LIMITS NOT DEPENDENT ON SPLICE LOCATION.

(4) DO NOT INSTALL MGS LONG SPAN GUARDRAIL FOR ABOVE-GRADE OBSTACLES WITHIN 8' [2.4m] OF THE FACE OF THE RAIL.

(5) THE OBSTRUCTION (CULVERT OPENING OR EDGE OF BRIDGE DECK) MUST BE LOCATED AT OR BEYOND THE BACK OF THE CRT POSTS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

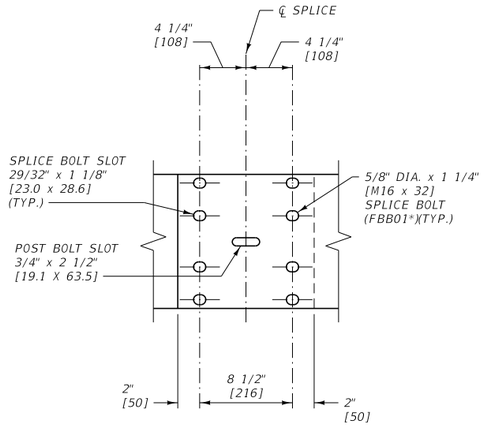
DETAILED DRAWING

REFERENCE
STANDARD SPEC.
SECTION 606

DWG. NO.
606-09

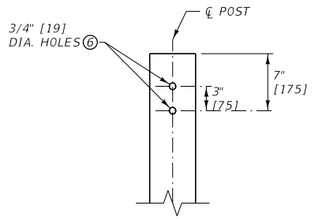
LONG SPAN GUARDRAIL (MGS)

MDT MONTANA DEPARTMENT OF TRANSPORTATION

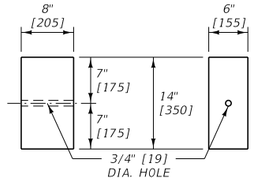


BEAM SPLICE

(LAP IN DIRECTION OF ADJACENT TRAFFIC)

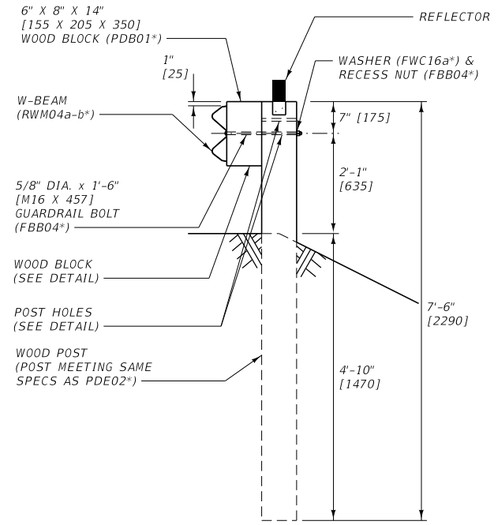


POST HOLE DETAIL

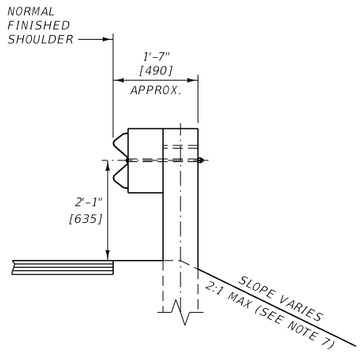


WOOD BLOCK

PDB01*

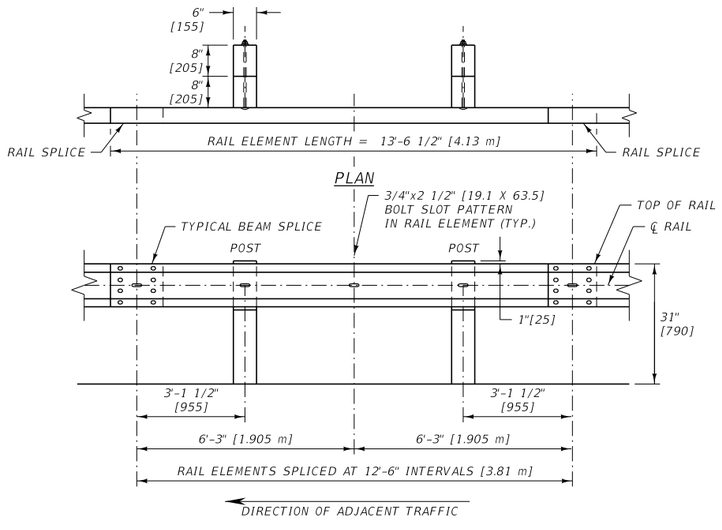


WOOD POST AND MOUNTING DETAIL



NOTE:
THIS GUARDRAIL SYSTEM IS USED WHEN THE 2'-0" [610] WIDENING BEHIND THE POSTS CANNOT BE PROVIDED, AS PER DTL. DWG. NO. 606-05A & 606-05B.

PROFILE

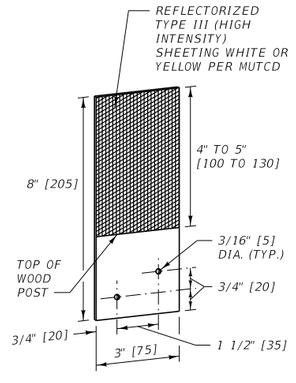


ELEVATION

NOTES:

1. INSTALL ALL BOLTS WITH HEADS ON TRAFFIC SIDE OF INSTALLATION.
2. USE WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS. AFFIX BLOCKS TO POSTS WITH TWO 16 PENNY GALV. NAILS OR 14 GAUGE WIRE WRAP.
3. ATTACH REFLECTORS TO POSTS EVERY 25' [7.62 m], INCLUDING TERMINAL SECTIONS, WITH THE REFLECTORIZED SURFACE FACING ADJACENT TRAFFIC. FABRICATE REFLECTORS FROM 0.063" [1.6] THICK ALUMINUM ALLOY PER SECTION 704 OR PLASTIC REFLECTORS WITH A URETHANE HINGE. FASTEN REFLECTOR TO WOOD POST USING TWO 16 PENNY RING-SHANKED GALVANIZED NAILS AND TWO 3/16" [4.8] DIA. WASHERS IN PRE-DRILLED HOLES.
4. ON EXISTING GUARDRAIL INSTALLATIONS, THE MINIMUM RAIL HEIGHT IS 27 3/4" [705].
5. DO NOT INSTALL LONG POST W-BEAM GUARDRAIL FOR OBSTACLES WITHIN 5'-6" [1.65 m] OF THE FACE OF THE RAIL.
6. USE LOWER HOLE ON NEW CONSTRUCTION INSTALLATIONS.
7. BEGIN INSLOPE BREAK AT CENTER OF POST.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.



REFLECTOR

(SEE NOTE 3)

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

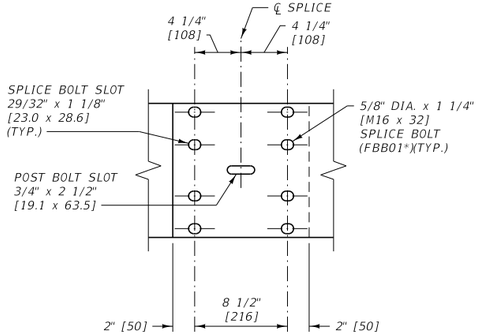
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606, 704

DWG. NO. 606-11A

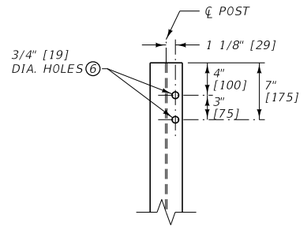
METAL GUARDRAIL - LONG POSTS - WOOD (MGS)

MDT MONTANA DEPARTMENT OF TRANSPORTATION

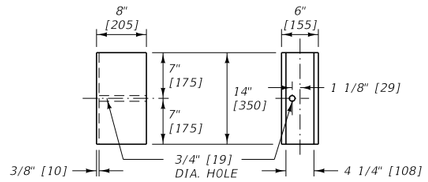


BEAM SPLICE

(LAP IN DIRECTION OF ADJACENT TRAFFIC)

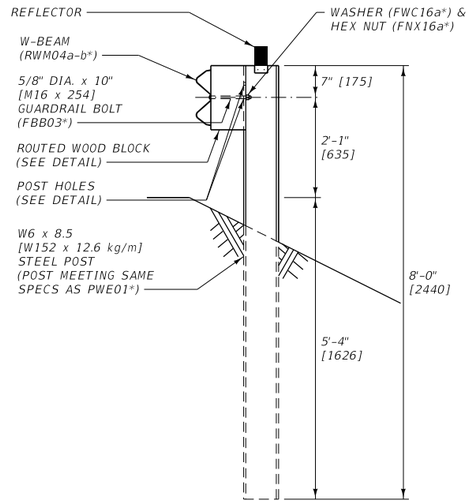


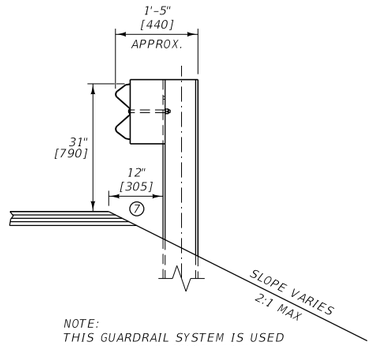
POST HOLE DETAIL



ROUTED WOOD BLOCK

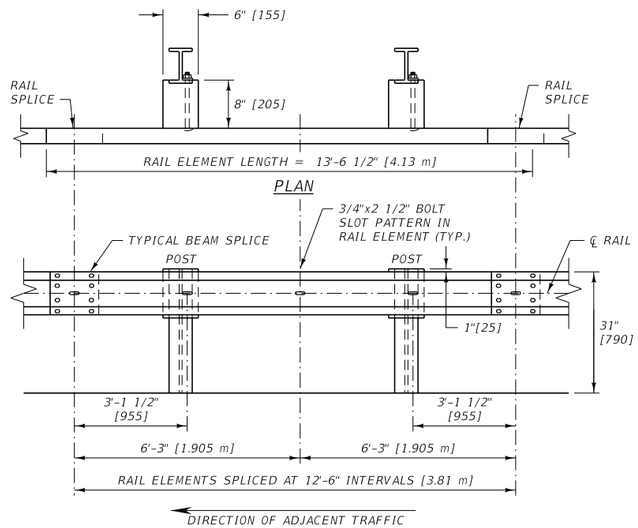
PDB01*





NOTE:
THIS GUARDRAIL SYSTEM IS USED WHEN THE 2'-0" [610] WIDENING BEHIND THE POSTS CANNOT BE PROVIDED, AS PER DTL. DWG. NO. 606-05A & 606-05B.

PROFILE



ELEVATION

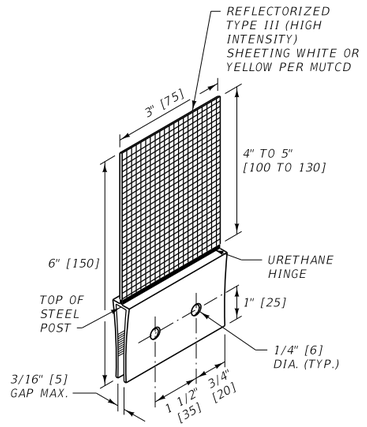
NOTES:

1. INSTALL ALL BOLTS WITH HEADS ON TRAFFIC SIDE OF INSTALLATION.
2. USE ROUTED WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS.
3. ATTACH REFLECTORS TO POSTS EVERY 25' [7.62 m], INCLUDING TERMINAL SECTIONS, WITH THE REFLECTORIZED SURFACE FACING ADJACENT TRAFFIC. FASTEN REFLECTOR TO STEEL POST USING AN APPROVED ADHESIVE. REFLECTORS MAY BE BOLTED TO POSTS PROVIDED HOLES IN POSTS ARE DRILLED BEFORE BEING GALVANIZED.
4. ON EXISTING GUARDRAIL INSTALLATIONS, THE MINIMUM RAIL HEIGHT IS 27 3/4" [705].

STEEL POST AND MOUNTING DETAIL

5. DO NOT INSTALL LONG POST W-BEAM GUARDRAIL FOR OBSTACLES WITHIN 5'-6" [1.65 m] OF THE FACE OF THE RAIL.
6. USE LOWER HOLE ON NEW CONSTRUCTION INSTALLATIONS.
7. LOCATE POST 12" [305] (MAXIMUM) FROM INSLOPE BREAK.
8. STEEL POSTS WITH OTHER POST HOLE CONFIGURATIONS MAY BE ACCEPTED, PROVIDED THEY HAVE AT LEAST THE HOLES DETAILED ON THIS DRAWING AND THEY MEET AASHTO'S PUBLICATION, "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE" AND "MASH" REQUIREMENTS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.



REFLECTOR

(SEE NOTE 3)

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

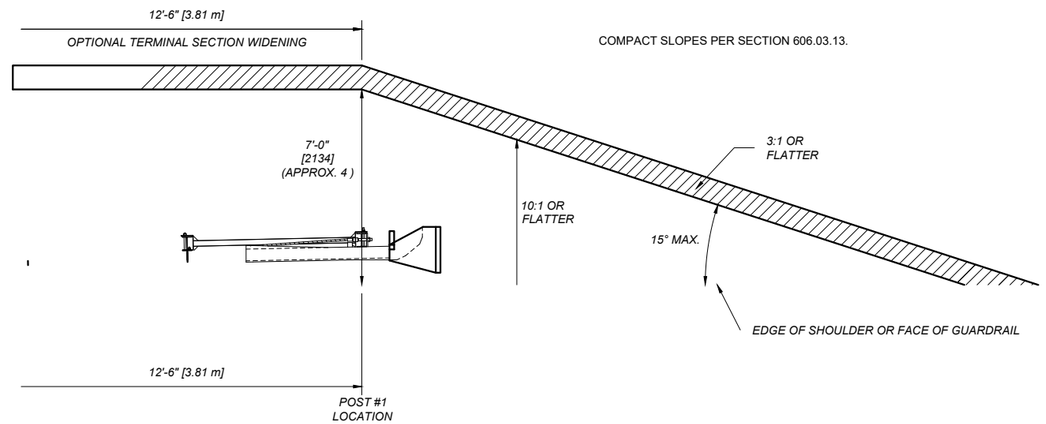
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-11B

METAL GUARDRAIL - LONG POSTS - STEEL (MGS)

MDT MONTANA DEPARTMENT OF TRANSPORTATION



COMPACT SLOPES PER SECTION 606.03.13.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

①

DETAILED DRAWINGS

REFERENCE	DWG. NO.
STANDARD SPEC. SECTION 606, 203	606-13

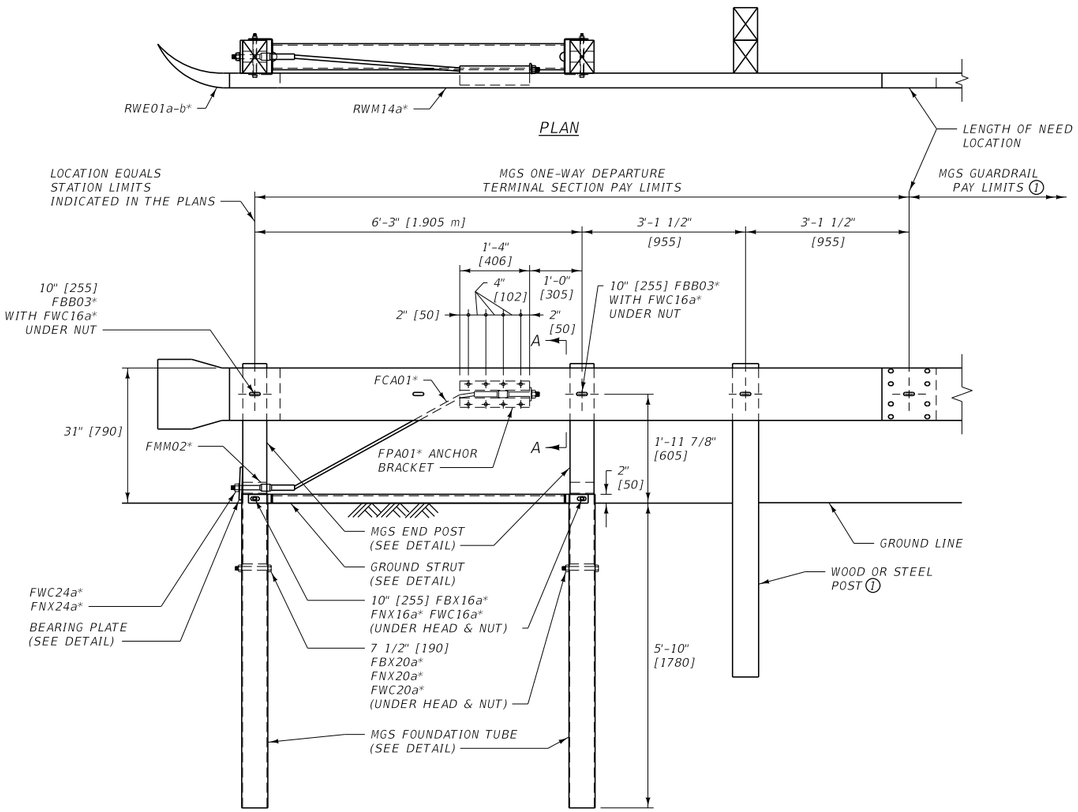
MASH OPTIONAL TERMINAL SECTIONS

EFFECTIVE: JAN 23, 2020

MONTANA
Department of Transportation

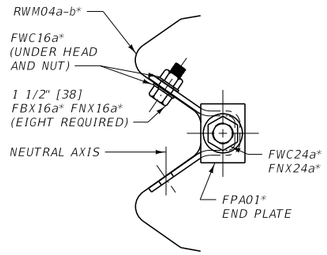
--REVISED--
JUN 27, 2024

5/24/2024 1:01 PM STDDRD606013.DWG

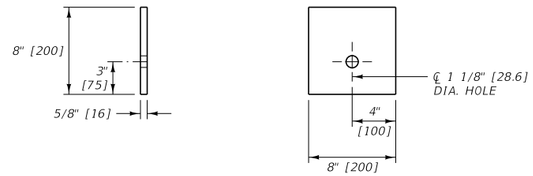


PLAN

ELEVATION

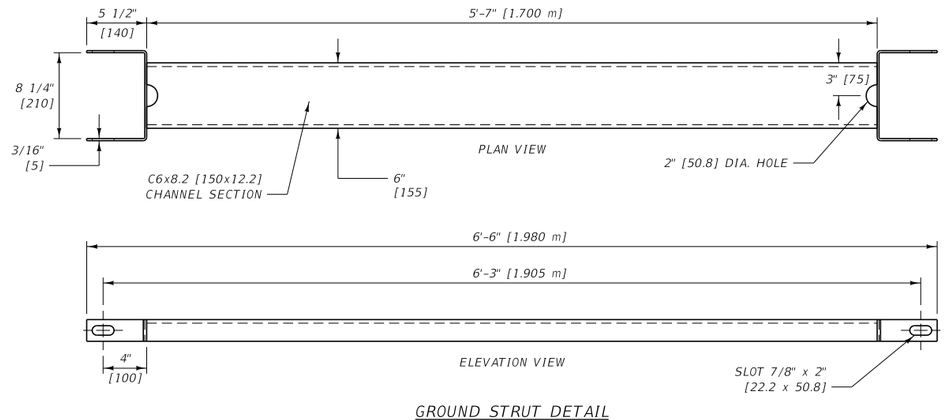


SECTION A-A



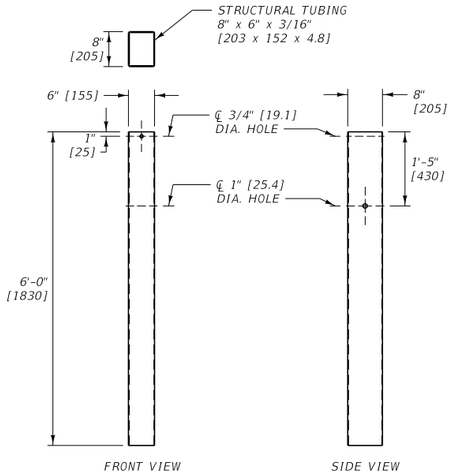
BEARING PLATE DETAIL

FPB01*



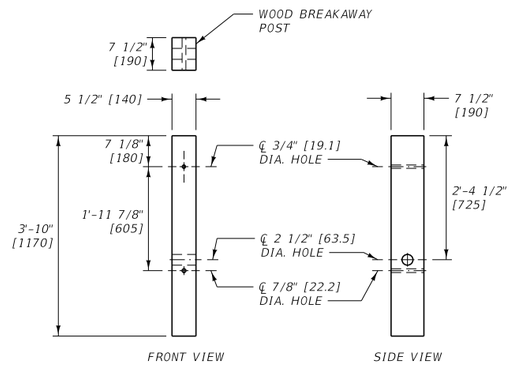
GROUND STRUT DETAIL

PFP01*



MGS FOUNDATION TUBE DETAILS

PTE06*



MGS END POST DETAILS

PDF01* - MGS HEIGHT

NOTES:

(1) SEE DTL. DWG. NO. 606-05A AND 606-05B FOR MGS GUARDRAIL.

(2) LAP GUARDRAIL IN THE DIRECTION OF ADJACENT TRAFFIC LANE.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

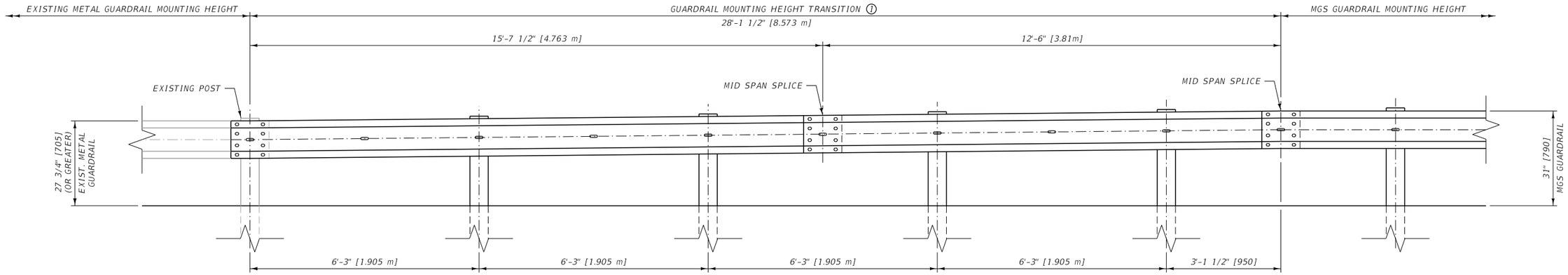
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-18

ONE-WAY DEPARTURE TERMINAL SECTION (MGS)

MDT MONTANA DEPARTMENT OF TRANSPORTATION



TRANSITION FROM 27 3/4" [705] (OR GREATER) TO 31" [775] GUARDRAIL MOUNTING HEIGHT

NOTES:

① THE MGS TO METAL GUARDRAIL TRANSITION IS PAID FOR AS LINEAR FEET OF MGS GUARDRAIL.

② SEE DTL. DWG. NO. 606-05A, 606-05B, 606-11A, AND 606-11B FOR MGS GUARDRAIL AND ASSOCIATED HARDWARE.

③ LAP ALL W-BEAM RAIL IN THE DIRECTION OF ADJACENT TRAFFIC.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

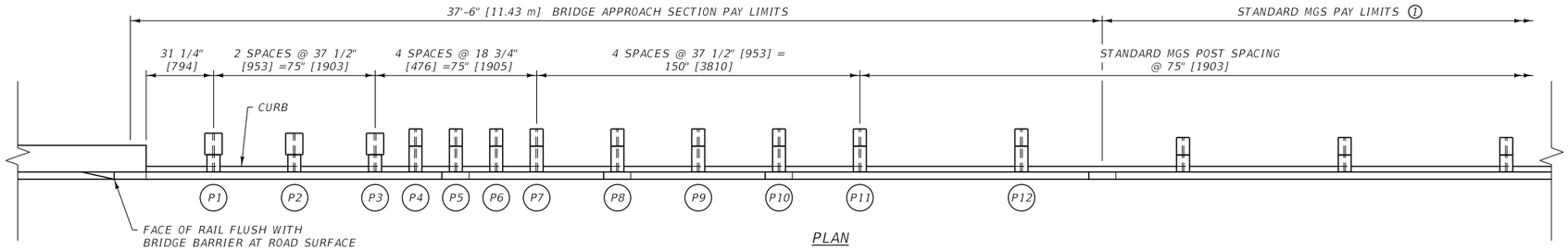
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

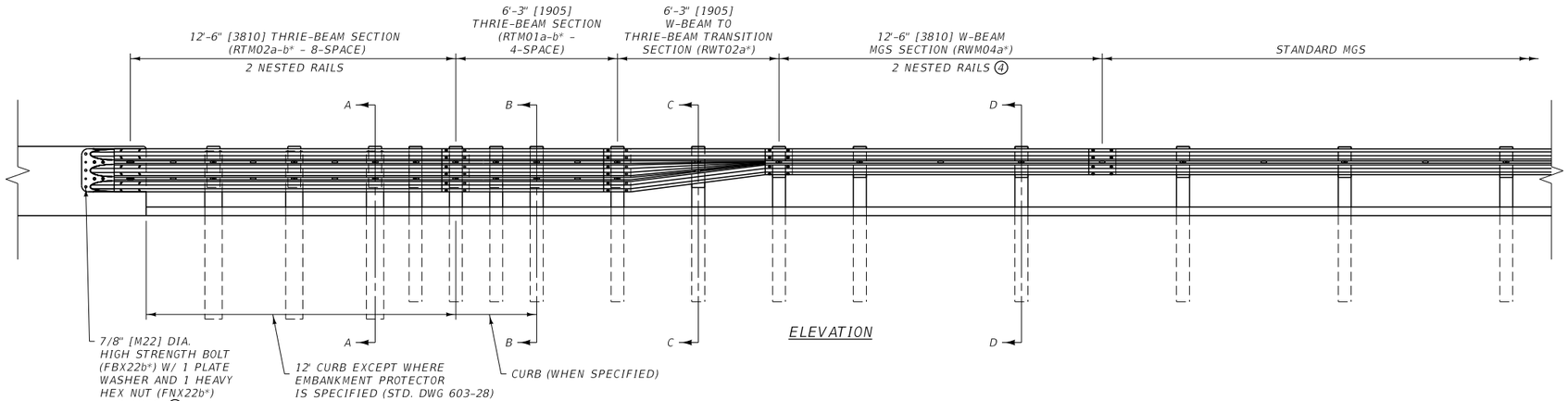
DWG. NO. 606-20

MGS TO METAL GUARDRAIL TRANSITION

MDT MONTANA DEPARTMENT OF TRANSPORTATION



PLAN



ELEVATION

NOTES:

(1) SEE DTL. DWG. NO. 606-05A FOR STANDARD MGS GUARDRAIL AND ASSOCIATED HARDWARE.

(2) LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.

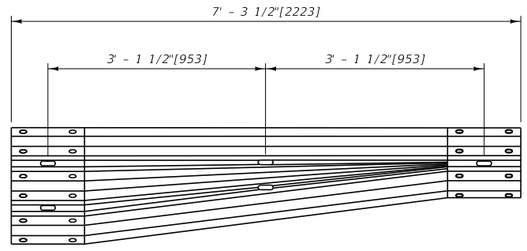
(3) DO NOT FLARE BRIDGE APPROACH SECTIONS.

(4) WHERE CURB EXTENDS UPSTREAM OF POST NO. 5, FURNISH 2 NESTED 12-GAUGE W-BEAM RAILS FOR THIS 12'-6" [3810] SECTION. INCLUDE THIS ADDITIONAL RAIL IN THE COST OF THE BRIDGE APPROACH SECTION.

(5) USE WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS. AFFIX BLOCKS TO POSTS WITH TWO 16 PENNY GALV. NAILS OR 14 GAUGE WIRE WRAP.

(6) SEE BRIDGE PLANS FOR CONNECTION DETAILS AND BOLT LOCATIONS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

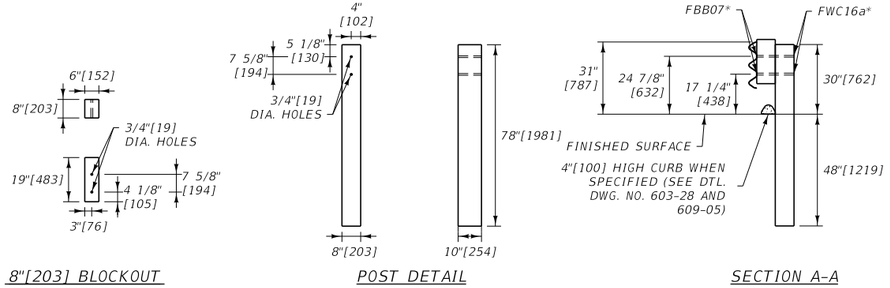


W-BEAM TO THRIE-BEAM TRANSITION SECTION

RWT02a*

(RWT02b* FOR OPPOSITE DIRECTION)

POSTS (P1) (P2) (P3)

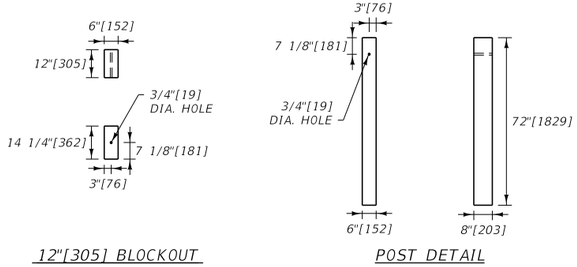


8"[203] BLOCKOUT

POST DETAIL

SECTION A-A

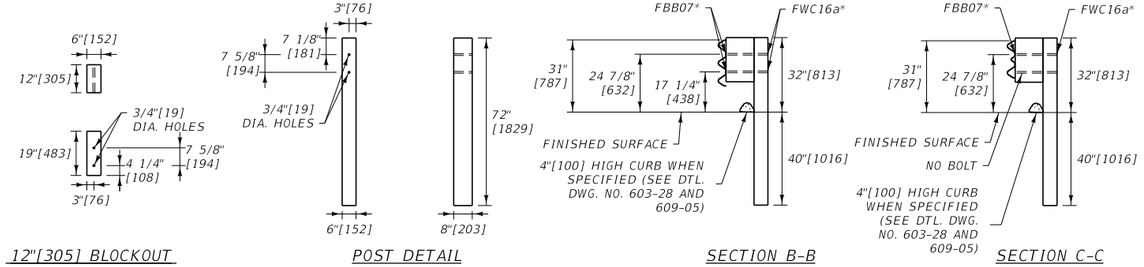
POSTS (P10) (P11) (P12)



12"[305] BLOCKOUT

POST DETAIL

POSTS (P4) (P5) (P6) (P7) (P8) (P9)

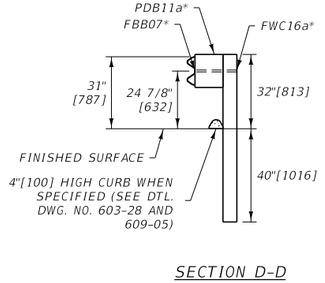


12"[305] BLOCKOUT

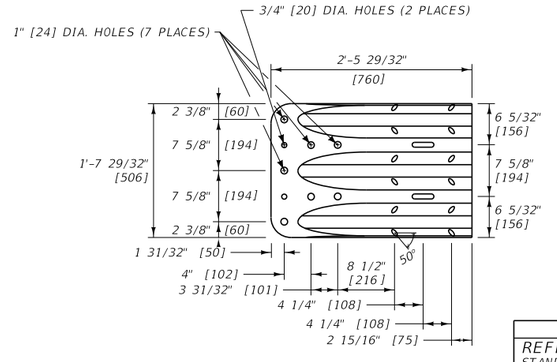
POST DETAIL

SECTION B-B

SECTION C-C



SECTION D-D



THRIE-BEAM TERMINAL CONNECTOR

RTE01b*

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

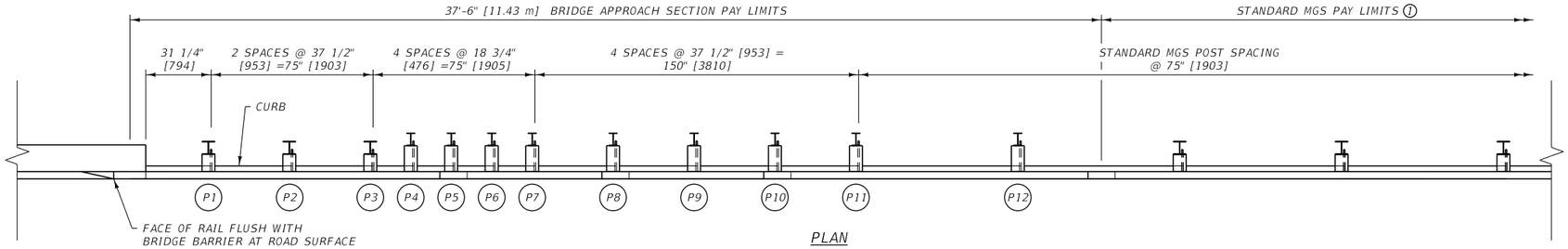
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

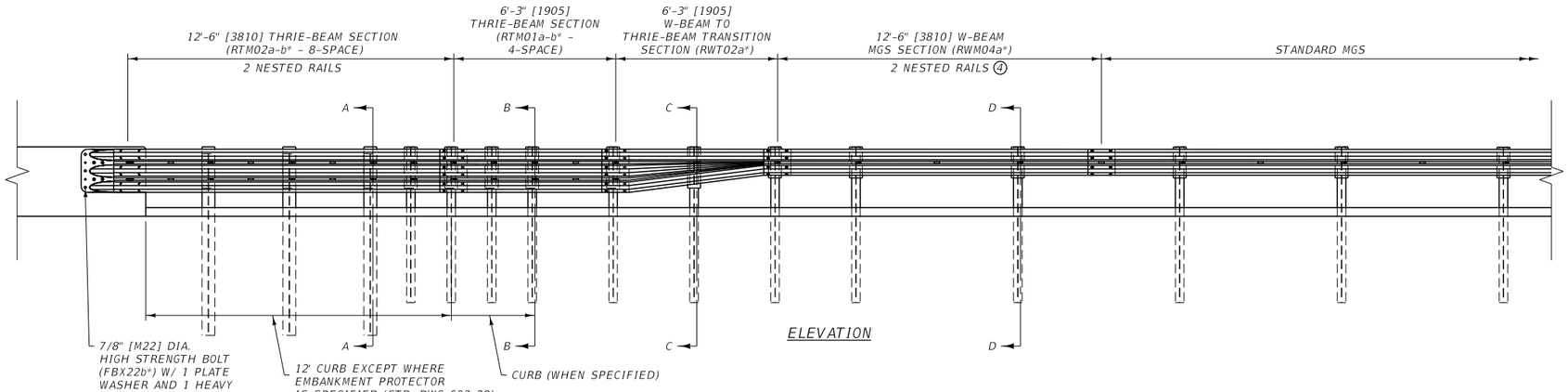
DWG. NO. 606-23A

MGS THRIE BEAM BRIDGE APPROACH SECTION -WOOD POSTS

MDT MONTANA DEPARTMENT OF TRANSPORTATION



PLAN

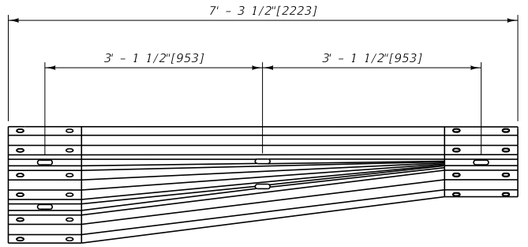


ELEVATION

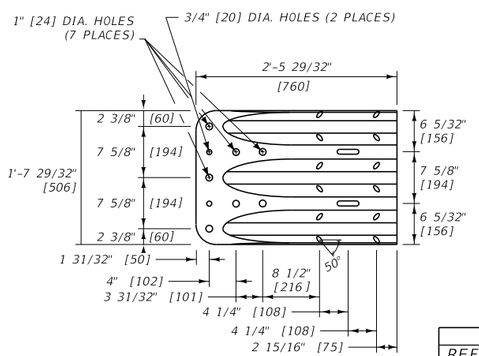
NOTES:

1. SEE DTL. DWG. NO. 606-05A FOR STANDARD MGS GUARDRAIL AND ASSOCIATED HARDWARE.
2. LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.
3. DO NOT FLARE BRIDGE APPROACH SECTIONS.
4. WHERE CURB EXTENDS UPSTREAM OF POST NO. 5, FURNISH 2 NESTED 12-GAUGE W-BEAM RAILS FOR THIS 12'-6" [3810] SECTION. INCLUDE THIS ADDITIONAL RAIL IN THE COST OF THE BRIDGE APPROACH SECTION.
5. USE WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS. AFFIX BLOCKS TO POSTS WITH TWO 16 PENNY GALV. NAILS OR 14 GAUGE WIRE WRAP.
6. SEE BRIDGE PLANS FOR CONNECTION DETAILS AND BOLT LOCATIONS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

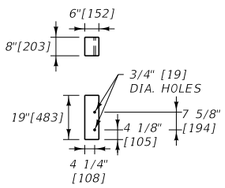


W-BEAM TO THRIE-BEAM TRANSITION SECTION
RWT02a*
(RWT02b* FOR OPPOSITE DIRECTION)

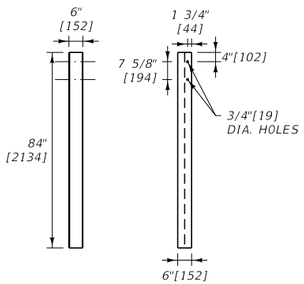


THRIE-BEAM TERMINAL CONNECTOR
RTE01b*

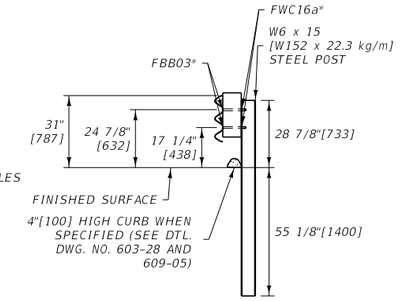
POSTS (P1) (P2) (P3)



8"[203] BLOCKOUT

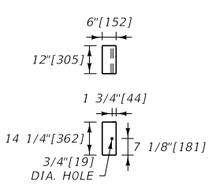


POST DETAIL

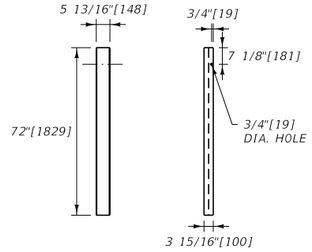


SECTION A-A

POSTS (P10) (P11) (P12)

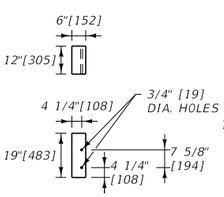


12"[305] BLOCKOUT

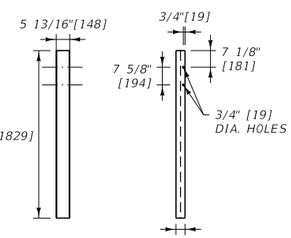


POST DETAIL

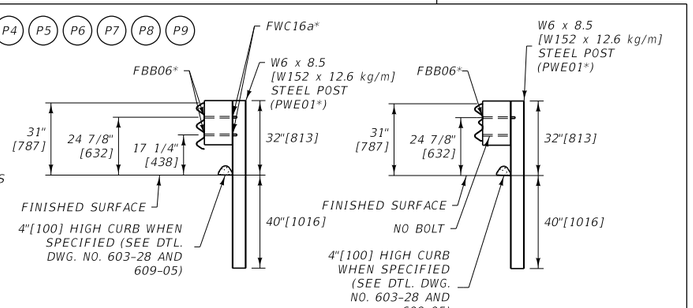
POSTS (P4) (P5) (P6) (P7) (P8) (P9)



12"[305] BLOCKOUT

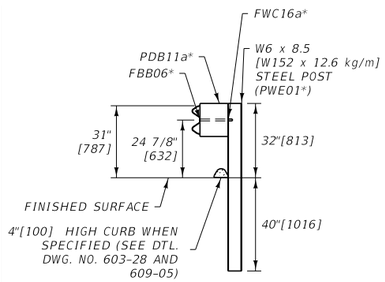


POST DETAIL



SECTION B-B

SECTION C-C



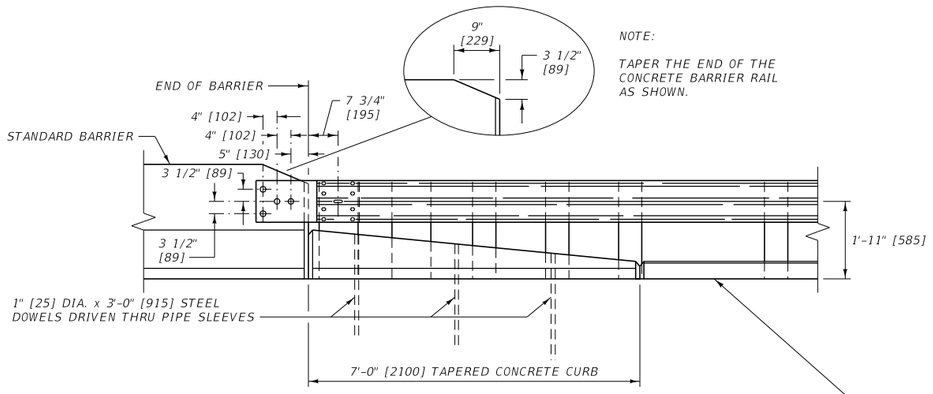
SECTION D-D

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING	
REFERENCE	DWG. NO.
STANDARD SPEC. SECTION 606	606-23B

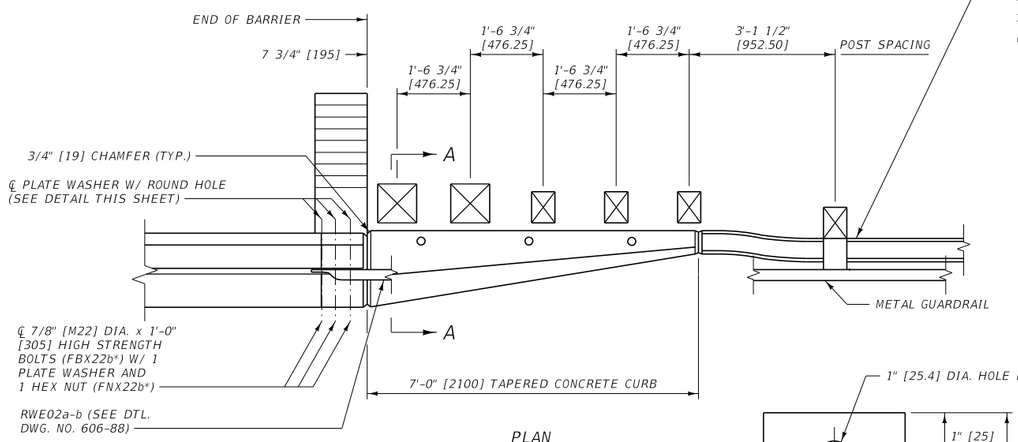
MGS THRIE BEAM BRIDGE APPROACH SECTION - STEEL POSTS

MDT MONTANA DEPARTMENT OF TRANSPORTATION

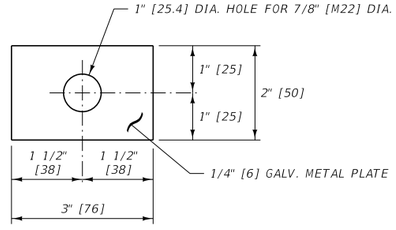


ELEVATION

STD. CONC. CURB (WHERE REQUIRED-SEE ROAD PLANS) (WARP AS NECESSARY TO MEET END OF THE TAPERED CONCRETE CURB)

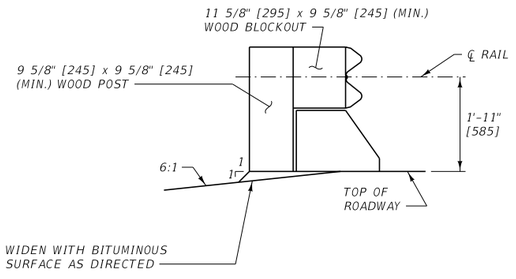


PLAN



DETAIL "A"

PLATE WASHER

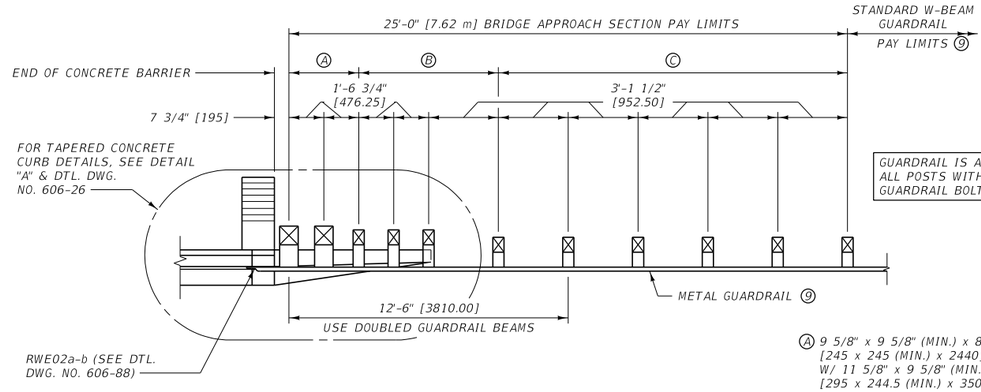


SECTION A-A

NOTES:

1. TAPERED CONCRETE CURBS:
   TYPE 1, SEE DTL. DWG. NO. 606-26
   TYPE 3, SEE DTL. DWG. NO. 606-27
2. TAPERED CONCRETE CURBS ARE ALSO REQUIRED ON CONCRETE APPROACH SLABS.
3. PORTIONS OF GUARDRAIL & BLOCKOUTS ARE OMITTED FOR CLARITY.
4. LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE. (SEE DTL. DWG. NO. 606-05A).
5. LAP W-BEAM TERMINAL CONNECTOR (RWE02a-b) IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.
6. USE WOOD BLOCKS OR OTHER NCHRP 350 APPROVED BLOCKS FOR BLOCKOUTS.
7. DO NOT FLARE BRIDGE APPROACH SECTIONS.
8. SEE DTL. DWG. NO. 606-25A FOR SKEWED BRIDGES.
9. SEE DTL. DWG. NO. 606-05A FOR METAL GUARDRAIL (W-BEAM).

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.



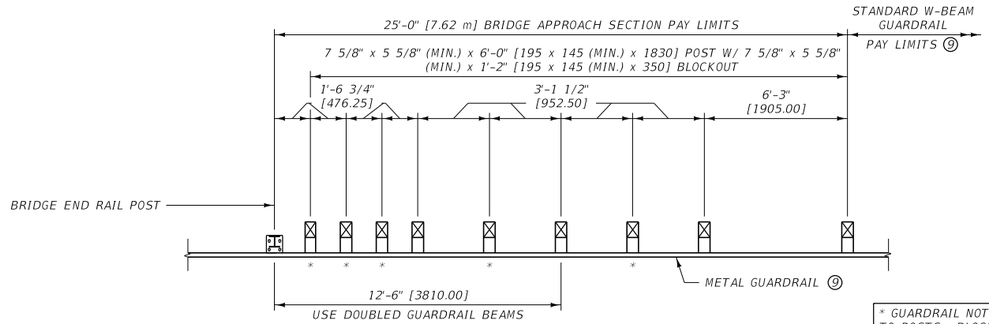
METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 1

(FOR BRIDGES USING CONCRETE BARRIER RAIL)

Ⓐ 9 5/8" x 9 5/8" (MIN.) x 8'-0"
[245 x 245 (MIN.) x 2440] POST
W/ 11 5/8" x 9 5/8" (MIN.) x 1'-2"
[295 x 244.5 (MIN.) x 350] BLOCKOUT

Ⓑ 7 5/8" x 5 5/8" x 7'-0"
[195 x 145 x 2135] POST
W/ 11 5/8" x 5 5/8" (MIN.) x 1'-2"
[295 x 145 (MIN.) x 350] BLOCKOUT

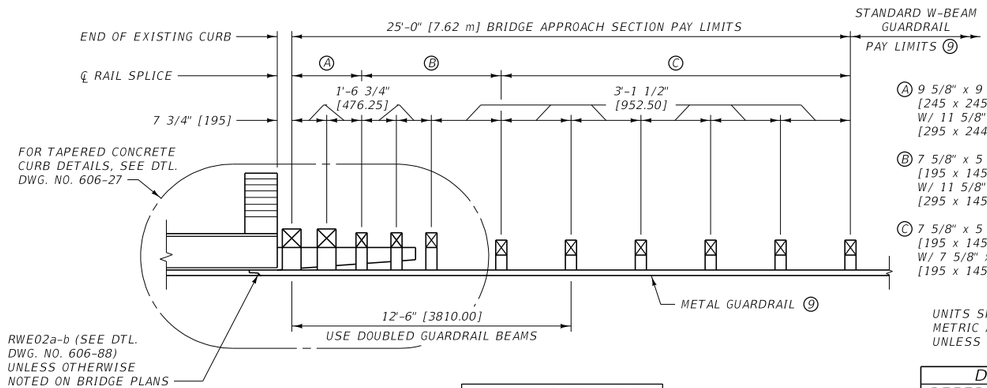
Ⓒ 7 5/8" x 5 5/8" x 6'-0"
[195 x 145 x 1830] POST
W/ 7 5/8" x 5 5/8" (MIN.) x 1'-2"
[195 x 145 (MIN.) x 350] BLOCKOUT



* GUARDRAIL NOT ATTACHED TO POSTS. BLOCKOUT FASTENED TO POST WITH STANDARD POST BOLT.

METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 2

(FOR BRIDGES WITHOUT CURBS)



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 3

(FOR BRIDGES WITH EXISTING CONCRETE CURBS)

Ⓐ 9 5/8" x 9 5/8" (MIN.) x 8'-0"
[245 x 245 (MIN.) x 2440] POST
W/ 11 5/8" x 9 5/8" (MIN.) x 1'-2"
[295 x 244.5 (MIN.) x 350] BLOCKOUT

Ⓑ 7 5/8" x 5 5/8" x 7'-0"
[195 x 145 x 2135] POST
W/ 11 5/8" x 5 5/8" (MIN.) x 1'-2"
[295 x 145 (MIN.) x 350] BLOCKOUT

Ⓒ 7 5/8" x 5 5/8" x 6'-0"
[195 x 145 x 1830] POST
W/ 7 5/8" x 5 5/8" (MIN.) x 1'-2"
[195 x 145 (MIN.) x 350] BLOCKOUT

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

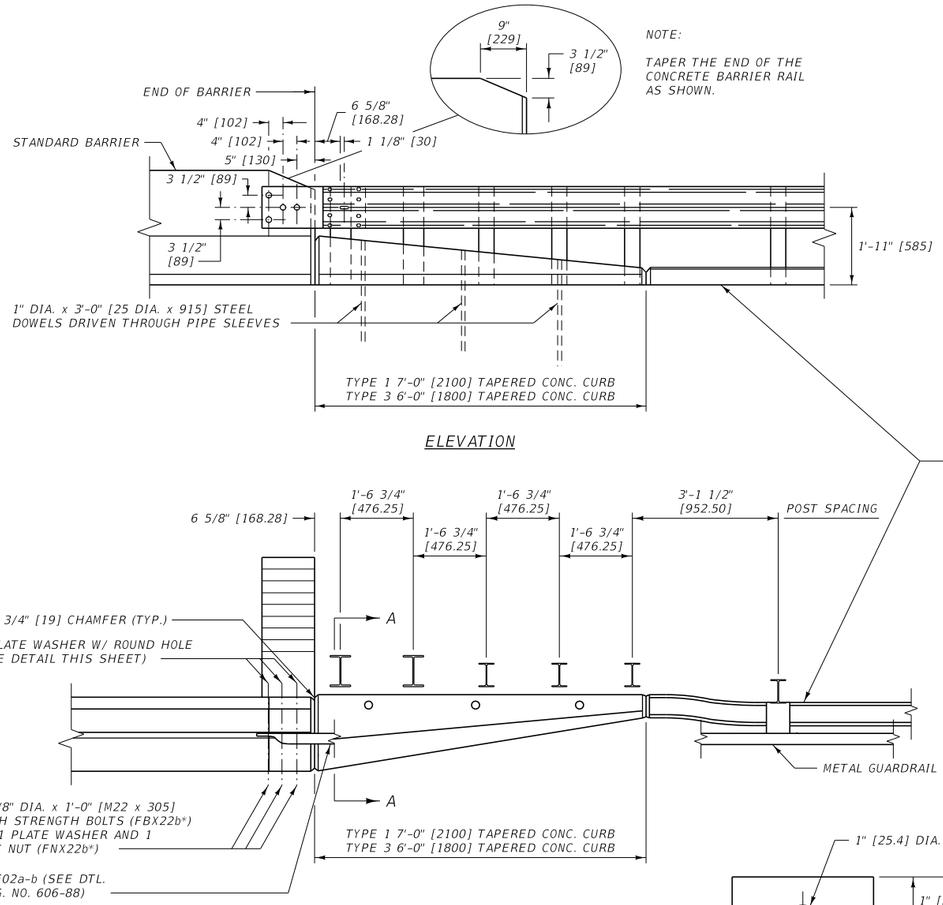
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-24A

BRIDGE APPROACH SECTIONS - WOOD POSTS

MONTANA DEPARTMENT OF TRANSPORTATION



ELEVATION

PLAN

DETAIL "A"

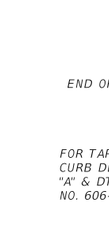
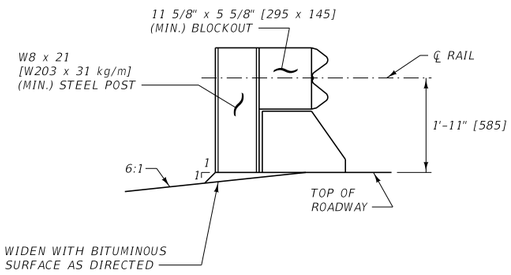


PLATE WASHER

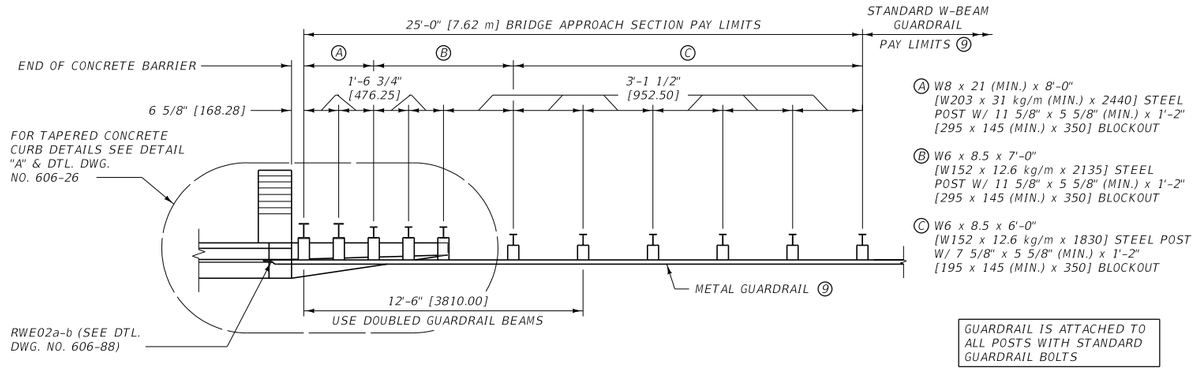


SECTION A-A

NOTES:

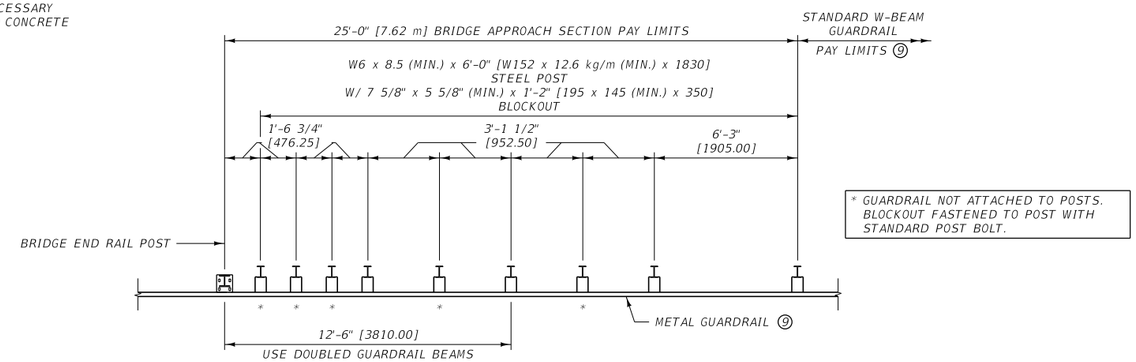
1. TAPERED CONCRETE CURBS:
   TYPE 1, SEE DTL. DWG. NO. 606-26
   TYPE 3, SEE DTL. DWG. NO. 606-27
2. TAPERED CONCRETE CURBS ARE ALSO REQUIRED ON CONCRETE APPROACH SLABS.
3. PORTIONS OF GUARDRAIL & BLOCKOUTS ARE OMITTED FOR CLARITY.
4. LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE. (SEE DTL. DWG. NO. 606-05B).
5. LAP W-BEAM TERMINAL CONNECTOR (RWE02a-b) IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.
6. USE ROUTED WOOD BLOCKS OR OTHER NCHRP 350 APPROVED BLOCKS FOR BLOCKOUTS.
7. DO NOT FLARE BRIDGE APPROACH SECTIONS.
8. SEE DTL. DWG. NO. 606-25B FOR SKEWED BRIDGES.
9. SEE DTL. DWG. NO. 606-05B FOR METAL GUARDRAIL (W-BEAM).

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 1

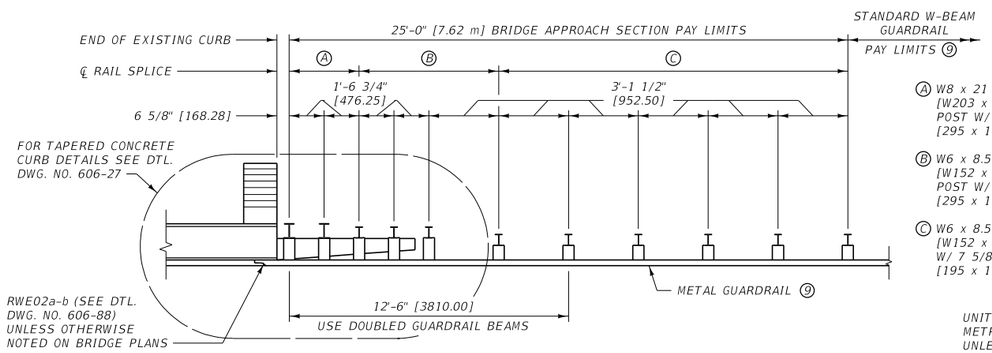
(FOR BRIDGES USING CONCRETE BARRIER RAIL)



* GUARDRAIL NOT ATTACHED TO POSTS. BLOCKOUT FASTENED TO POST WITH STANDARD POST BOLT.

METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 2

(FOR BRIDGES WITHOUT CURBS)



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 3

(FOR BRIDGES WITH EXISTING CONCRETE CURBS)

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

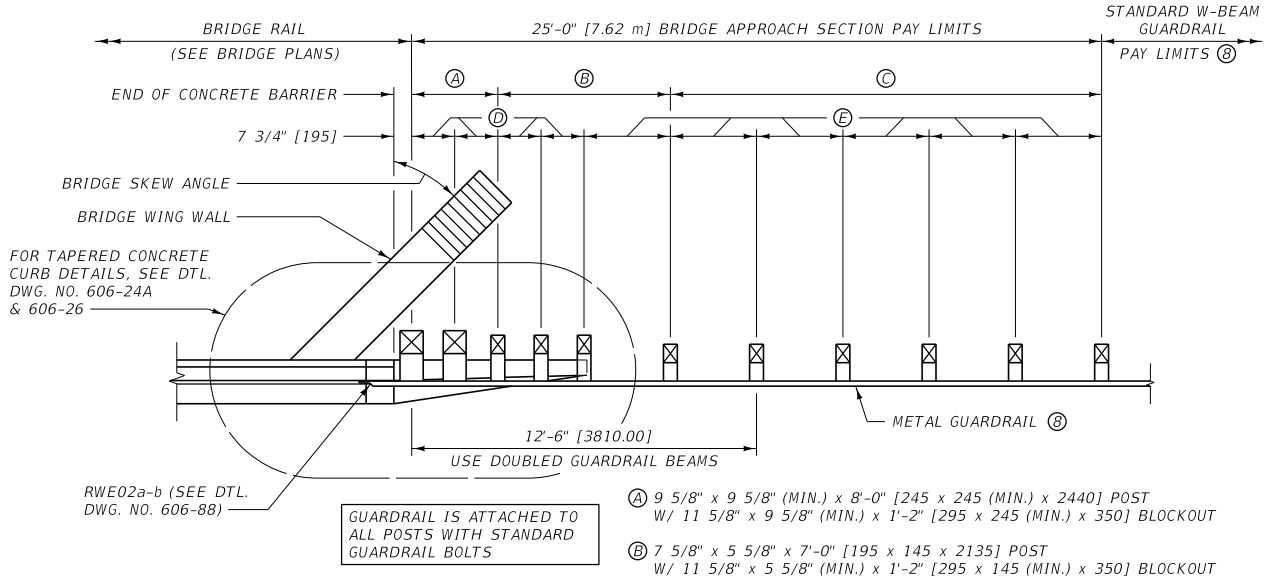
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-24B

BRIDGE APPROACH SECTIONS - STEEL POSTS

MDT MONTANA DEPARTMENT OF TRANSPORTATION



GUARDRAIL IS ATTACHED TO ALL POSTS WITH STANDARD GUARDRAIL BOLTS

(A) 9 5/8" x 9 5/8" (MIN.) x 8'-0" [245 x 245 (MIN.) x 2440] POST
W/ 11 5/8" x 9 5/8" (MIN.) x 1'-2" [295 x 245 (MIN.) x 350] BLOCKOUT

(B) 7 5/8" x 5 5/8" x 7'-0" [195 x 145 x 2135] POST
W/ 11 5/8" x 5 5/8" (MIN.) x 1'-2" [295 x 145 (MIN.) x 350] BLOCKOUT

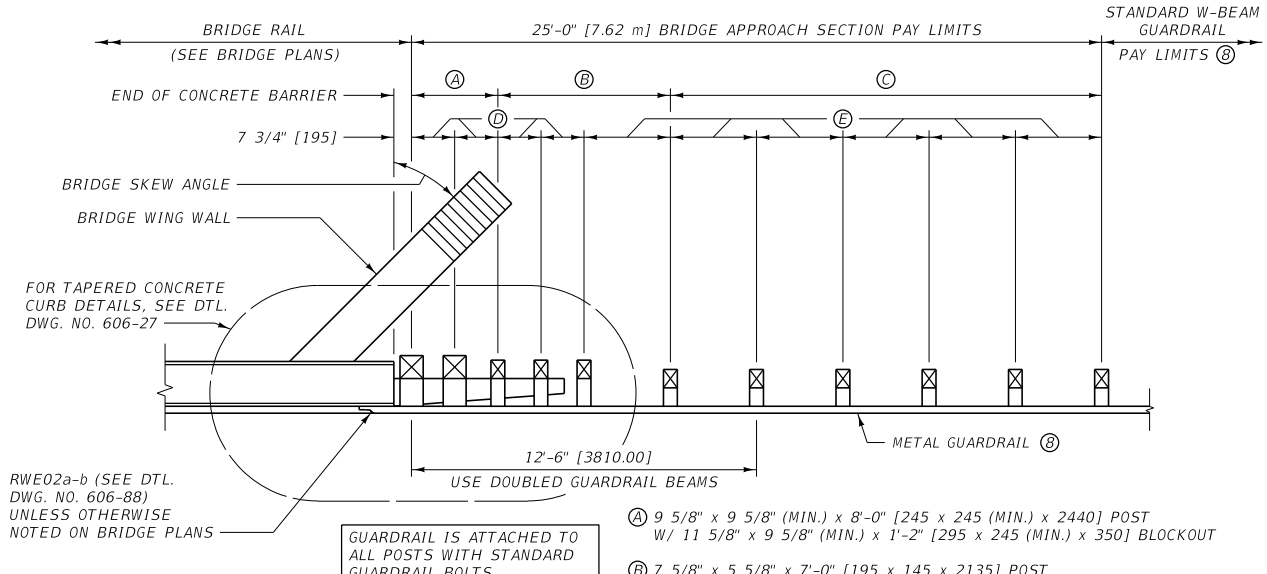
(C) 7 5/8" x 5 5/8" x 6'-0" [195 x 145 x 1830] POST
W/ 7 5/8" x 5 5/8" (MIN.) x 1'-2" [195 x 145 (MIN.) x 350] BLOCKOUT

(D) 1'-6 3/4" [476.25]

(E) 3'-1 1/2" [952.50]

METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 1

(FOR SKEWED BRIDGES USING CONCRETE BARRIER RAIL)



GUARDRAIL IS ATTACHED TO ALL POSTS WITH STANDARD GUARDRAIL BOLTS

(A) 9 5/8" x 9 5/8" (MIN.) x 8'-0" [245 x 245 (MIN.) x 2440] POST
W/ 11 5/8" x 9 5/8" (MIN.) x 1'-2" [295 x 245 (MIN.) x 350] BLOCKOUT

(B) 7 5/8" x 5 5/8" x 7'-0" [195 x 145 x 2135] POST
W/ 11 5/8" x 5 5/8" (MIN.) x 1'-2" [295 x 145 (MIN.) x 350] BLOCKOUT

(C) 7 5/8" x 5 5/8" x 6'-0" [195 x 145 x 1830] POST
W/ 7 5/8" x 5 5/8" (MIN.) x 1'-2" [195 x 145 (MIN.) x 350] BLOCKOUT

(D) 1'-6 3/4" [476.25]

(E) 3'-1 1/2" [952.50]

METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 3

(FOR SKEWED BRIDGES WITH EXISTING CONCRETE CURBS)

NOTES:

1. TAPERED CONCRETE CURBS:
   TYPE 1, SEE DTL. DWG. NO. 606-26
   TYPE 3, SEE DTL. DWG. NO. 606-27
2. TAPERED CONCRETE CURBS ARE ALSO REQUIRED ON CONCRETE APPROACH SLABS.
3. LAP GUARDRAIL IN THE DIRECTON OF THE ADJACENT TRAFFIC LANE. (SEE DTL. DWG. NO. 606-05A).
4. LAP W-BEAM TERMINAL CONNECTOR (RWE02a-b) IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.
5. USE WOOD BLOCKS OR OTHER NCHRP 350 APPROVED BLOCKS FOR BLOCKOUTS.
6. DO NOT FLARE BRIDGE APPROACH SECTIONS.
7. SEE DTL. DWG. NO. 606-24A FOR ADDITIONAL INFORMATION.
8. SEE DTL. DWG. NO. 606-05A FOR METAL GUARDRAIL (W-BEAM).

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

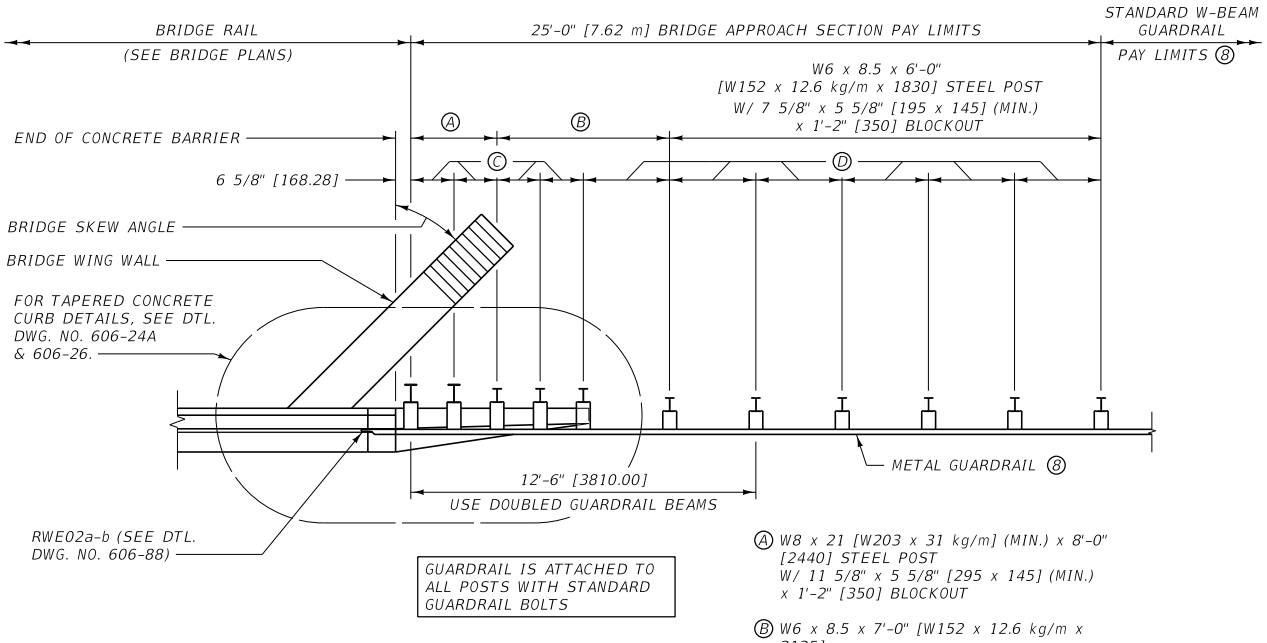
DETAILED DRAWING

REFERENCE
STANDARD SPEC.
SECTION 606

DWG. NO.
606-25A

SKEWED BRIDGE APPROACH SECTIONS - WOOD POSTS

MDT MONTANA DEPARTMENT OF TRANSPORTATION



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 1

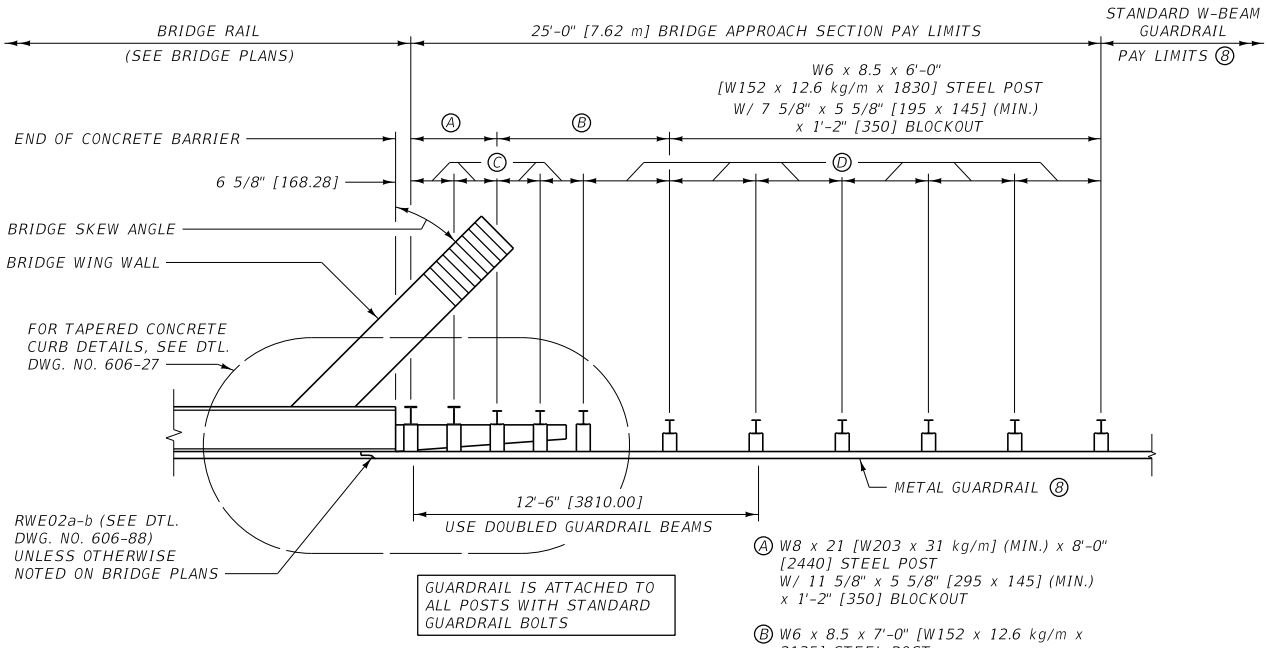
(FOR SKEWED BRIDGES USING CONCRETE BARRIER RAIL)

(A) W8 x 21 [W203 x 31 kg/m] (MIN.) x 8'-0" [2440] STEEL POST W/ 11 5/8" x 5 5/8" [295 x 145] (MIN.) x 1'-2" [350] BLOCKOUT

(B) W6 x 8.5 x 7'-0" [W152 x 12.6 kg/m x 2135] STEEL POST W/ 11 5/8" x 5 5/8" [295 x 145] (MIN.) x 1'2" [350] BLOCKOUT

(C) 1'-6 3/4" [476.25] SPACING BETWEEN POSTS

(D) 3'-1 1/2" [952.50] SPACING BETWEEN POSTS



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 3

(FOR SKEWED BRIDGES WITH EXISTING CONCRETE CURBS)

(A) W8 x 21 [W203 x 31 kg/m] (MIN.) x 8'-0" [2440] STEEL POST W/ 11 5/8" x 5 5/8" [295 x 145] (MIN.) x 1'-2" [350] BLOCKOUT

(B) W6 x 8.5 x 7'-0" [W152 x 12.6 kg/m x 2135] STEEL POST W/ 11 5/8" x 5 5/8" [295 x 145] (MIN.) x 1'-2" [350] BLOCKOUT

(C) 1'-6 3/4" [476.25] SPACING BETWEEN POSTS

(D) 3'-1 1/2" [952.50] SPACING BETWEEN POSTS

NOTES:

(1) TAPERED CONCRETE CURBS:
TYPE 1, SEE DTL. DWG. NO. 606-26
TYPE 3, SEE DTL. DWG. NO. 606-27

(2) TAPERED CONCRETE CURBS ARE ALSO REQUIRED ON CONCRETE APPROACH SLABS.

(3) LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE. (SEE DTL. DWG. NO. 606-05B).

(4) LAP W-BEAM TERMINAL CONNECTOR (RWE02a-b) IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.

(5) USE WOOD BLOCKS OR OTHER NCHRP 350 APPROVED BLOCKS FOR BLOCKOUTS.

(6) DO NOT FLARE BRIDGE APPROACH SECTIONS.

(7) SEE DTL. DWG. NO. 606-24B FOR ADDITIONAL INFORMATION.

(8) SEE DTL. DWG. NO. 606-05B FOR METAL GUARDRAIL (W-BEAM).

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

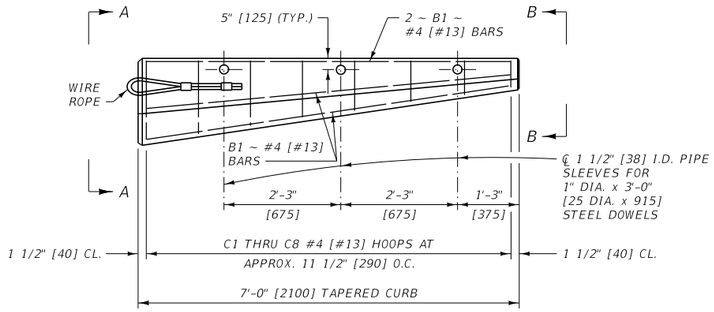
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

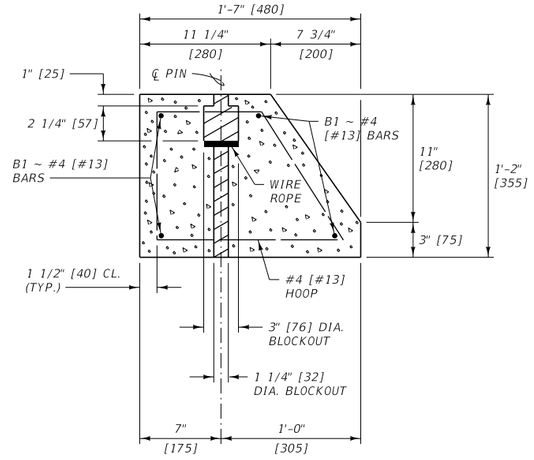
DWG. NO. 606-25B

SKEWED BRIDGE APPROACH SECTIONS - STEEL POSTS

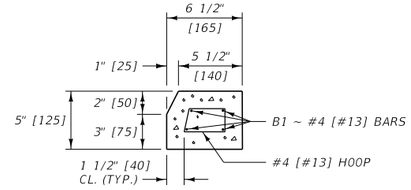
MDT MONTANA DEPARTMENT OF TRANSPORTATION



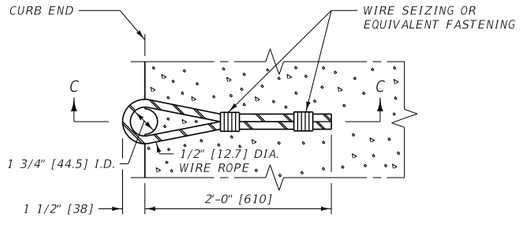
PLAN



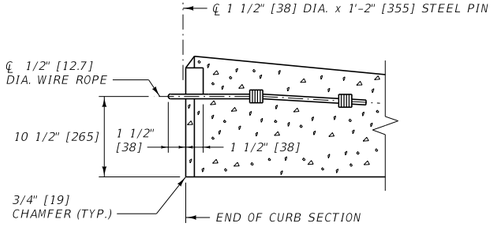
VIEW A-A



VIEW B-B



WIRE ROPE DETAIL

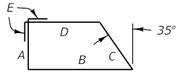


SECTION C-C

NOTES:

1. TAPERED CONCRETE CURB IS USED WITH BRIDGE APPROACH SECTION TYPE 1 (SEE DTL. DWG. NO. 606-24A AND 606-24B).
2. FURNISH WIRE ROPE MEETING SECTION 705.
3. FURNISH GRADE 60 [420] REINFORCING STEEL MEETING SECTION 711..
4. ALL CONCRETE IS CLASS GENERAL.
   TOTAL CONCRETE PER 7' [2100 mm] TAPERED CURB EST. = 0.2 C.Y. [0.17 m³]
   TOTAL REBAR WEIGHT PER 7' [2100 mm] TAPERED CURB EST. = 34 LB [15.1 kg].

BILL OF REINFORCING STEEL (ONE SECTION ONLY)

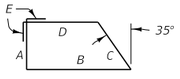


TYPE 1

BENT BARS (ALL DIMENSIONS ARE OUT TO OUT)

MARK	SIZE	NO.	TYPE	LENGTH	A	B	C	D	E
C1	#4	1	1	4'-8"	11"	1'-4"	1'-1"	9"	3 1/2"
C2	↑	↑	↑	4'-2"	9 1/2"	1'-2"	11 1/2"	8"	↑
C3	↓	↓	↓	3'-9"	8 1/2"	1'- 1/2"	10"	7"	↓
C4				3'-3"	7"	10 1/2"	8"	6 1/2"	
C5				2'-11"	6"	9"	7"	6"	
C6				2'-4"	4"	7"	5"	5"	↓
C7	↓	↓	↓	2'-0"	3 1/2"	5 1/2"	3 1/2"	4 1/2"	3 1/2"
C8		1	1	1'-6"	2"	3 1/2"	2"	3 1/2"	1 1/2"
B1	#4	4	STRAIGHT	6'-9"	~	~	~	~	~

METRIC BILL OF REINFORCING STEEL (ONE SECTION ONLY)



TYPE 1

BENT BARS (ALL DIMENSIONS ARE OUT TO OUT IN mm)

MARK	SIZE	NO.	TYPE	LENGTH	A	B	C	D	E
C1	#13	1	1	1360	270	395	330	205	80
C2	↑	↑	↑	1225	240	350	290	185	↑
C3				1090	205	310	255	160	
C4				955	175	265	215	140	
C5				820	145	220	175	120	
C6				695	115	180	140	100	↓
C7	↓	↓	↓	555	80	135	100	80	80
C8		1	1	415	50	90	60	55	40
B1	#13	4	STRAIGHT	2020	~	~	~	~	~

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

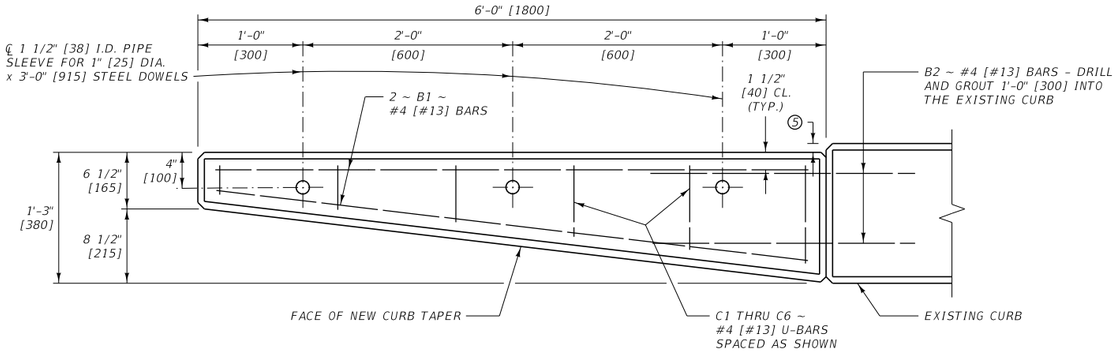
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

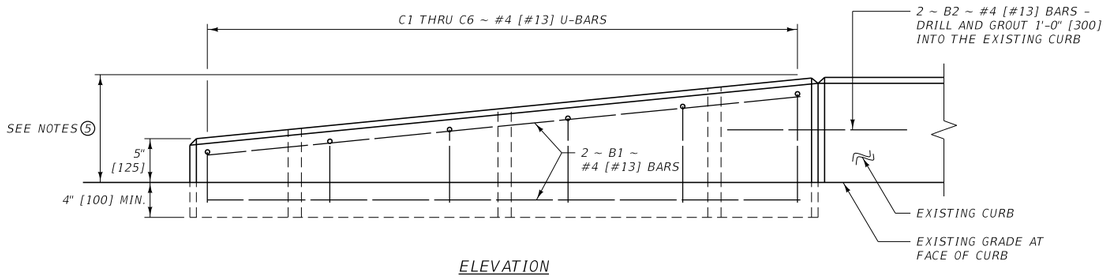
DWG. NO. 606-26

TAPERED CONCRETE CURB DETAIL

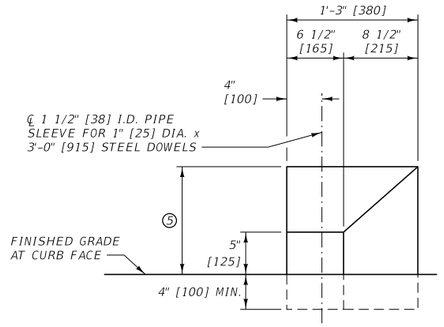
MDT MONTANA DEPARTMENT OF TRANSPORTATION



PLAN



ELEVATION



END VIEW

NOTES:

1. REMOVE THE EXISTING SURFACE UNDER THE NEW TAPERED CONCRETE CURB AS APPROVED BY THE PROJECT MANAGER. EMBED THE TAPERED CONCRETE CURB A MINIMUM OF 4" [100] BELOW THE GRADE MEASURED AT THE INSIDE FACE OF THE TAPER.
2. FURNISH GRADE 60 [420] REINFORCING STEEL MEETING SECTION 555 AND 711.
3. ALL CONCRETE IS CLASS GENERAL.
   TOTAL CONCRETE PER 6' [1800] TAPERED CURB EST. = 0.2 C.Y. [0.16 m^3]
   TOTAL REBAR WEIGHT PER 6' [1800] TAPERED CURB EST. = 27 LB. [11.7 kg]
4. TAPERED CONCRETE CURB IS USED WITH BRIDGE APPROACH SECTION TYPE 3 (SEE DTL. DWG. NO. 606-24A AND 606-24B).
5. ADJUST DIMENSION TO MATCH EXISTING CURB.

BILL OF REINFORCING STEEL (ONE SECTION ONLY)



TYPE 1

BENT BARS (ALL DIMENSIONS ARE OUT TO OUT)

MARK	SIZE	NO.	TYPE	LENGTH	A	B
C1	#4	1	1	1'-4"	6"	4"
C2	↑	↑	↑	1'-8"	7"	6"
C3	|	|	|	1'-11"	8"	7"
C4	|	|	|	2'-3"	9"	9"
C5	|	↓	↓	2'-6"	10"	10"
C6	|	1	1	2'-10"	11"	1'-0"
B1	↓	4	STRAIGHT	5'-8"	~	~
B2	#4	2	STRAIGHT	2'-0"	~	~

METRIC BILL OF REINFORCING STEEL (ONE SECTION ONLY)



TYPE 1

BENT BARS (ALL DIMENSIONS ARE OUT TO OUT)

MARK	SIZE	NO.	TYPE	LENGTH (mm)	A (mm)	B (mm)
C1	#13	1	1	390	150	90
C2	↑	↑	↑	480	175	130
C3	|	|	|	570	200	170
C4	|	|	|	665	225	215
C5	|	|	↓	755	250	255
C6	|	1	1	845	270	295
B1	↓	4	STRAIGHT	1720	~	~
B2	#13	2	STRAIGHT	600	~	~

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

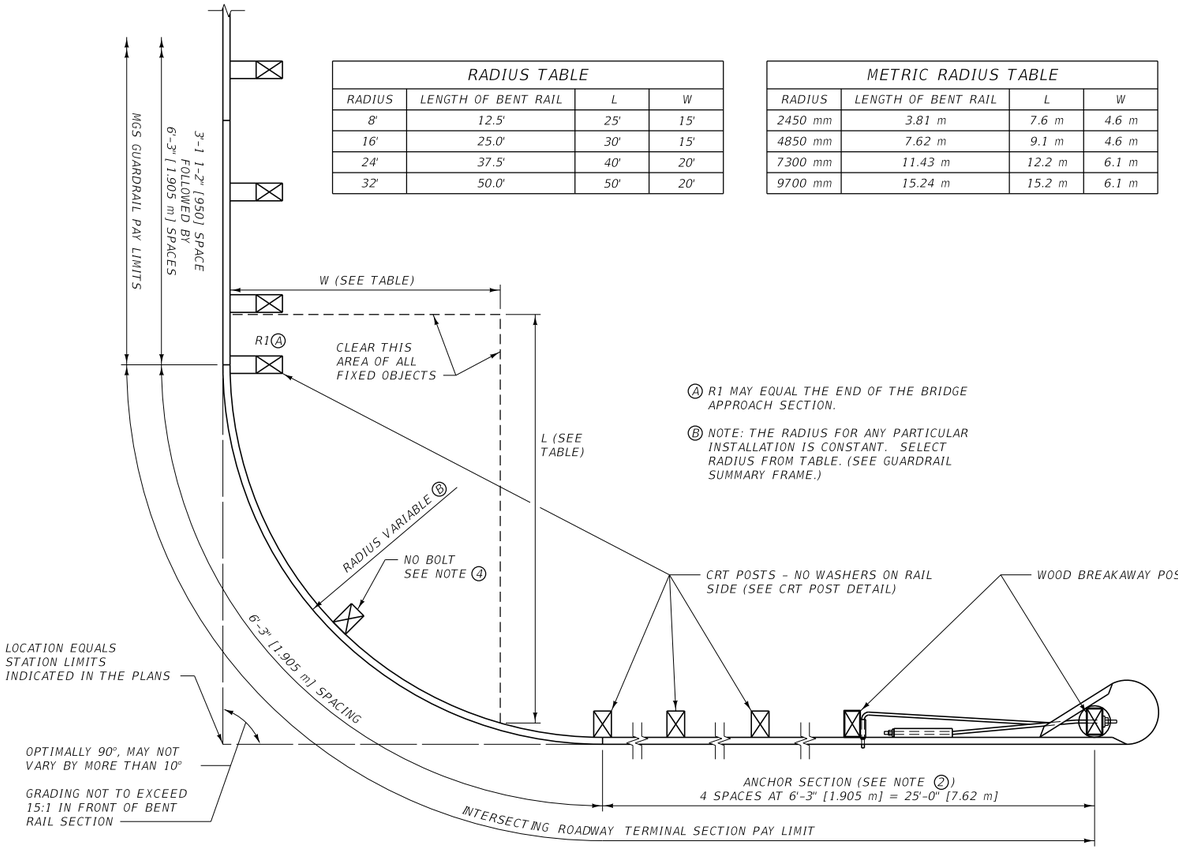
DWG. NO. 606-27

TAPERED CONCRETE CURB DETAIL

MDT MONTANA DEPARTMENT OF TRANSPORTATION

RADIUS TABLE			
RADIUS	LENGTH OF BENT RAIL	L	W
8'	12.5'	25'	15'
16'	25.0'	30'	15'
24'	37.5'	40'	20'
32'	50.0'	50'	20'

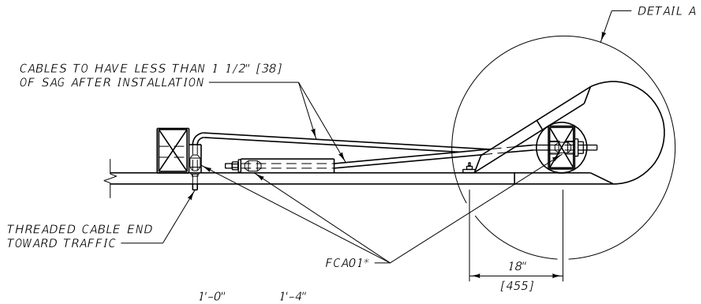
METRIC RADIUS TABLE			
RADIUS	LENGTH OF BENT RAIL	L	W
2450 mm	3.81 m	7.6 m	4.6 m
4850 mm	7.62 m	9.1 m	4.6 m
7300 mm	11.43 m	12.2 m	6.1 m
9700 mm	15.24 m	15.2 m	6.1 m

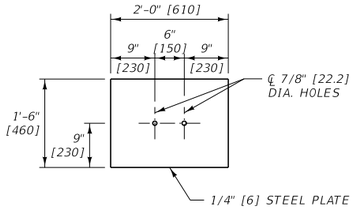


Ⓐ R1 MAY EQUAL THE END OF THE BRIDGE APPROACH SECTION.

Ⓑ NOTE: THE RADIUS FOR ANY PARTICULAR INSTALLATION IS CONSTANT. SELECT RADIUS FROM TABLE. (SEE GUARDRAIL SUMMARY FRAME.)

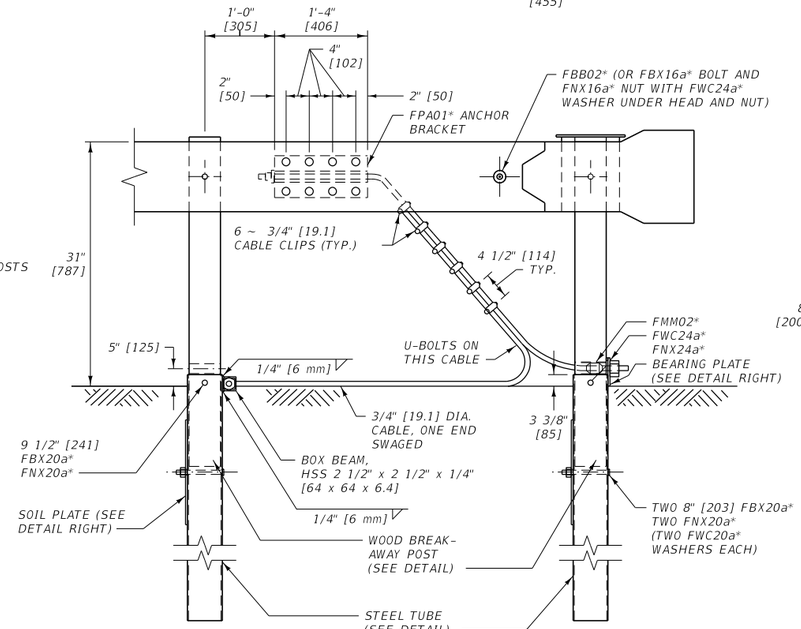
PLAN

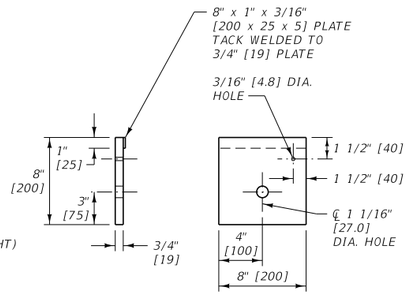




SOIL PLATE DETAIL

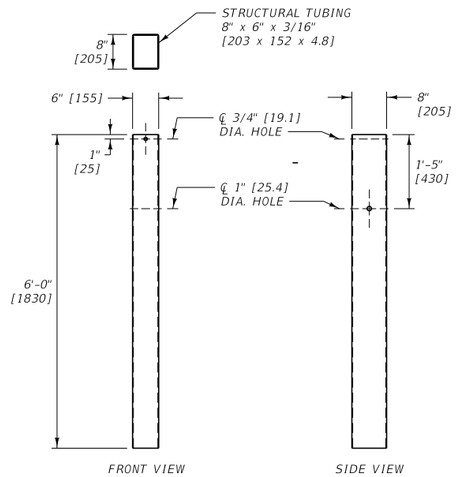
PLS03*





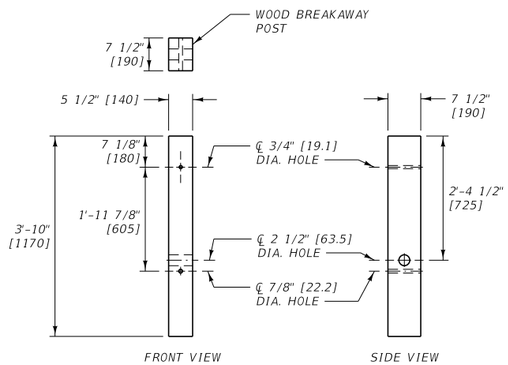
BEARING PLATE DETAIL

FPB01*



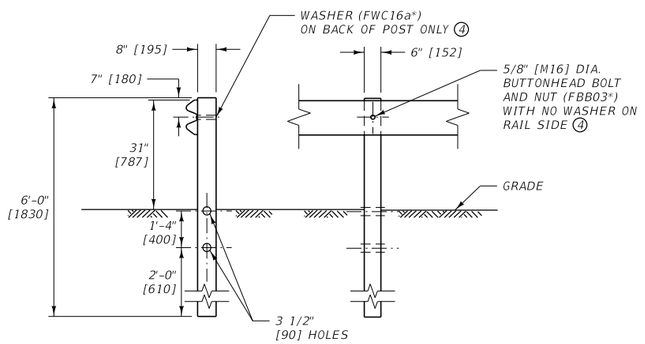
MGS FOUNDATION TUBE DETAILS

PTE06*



WOOD BREAKAWAY POST DETAILS

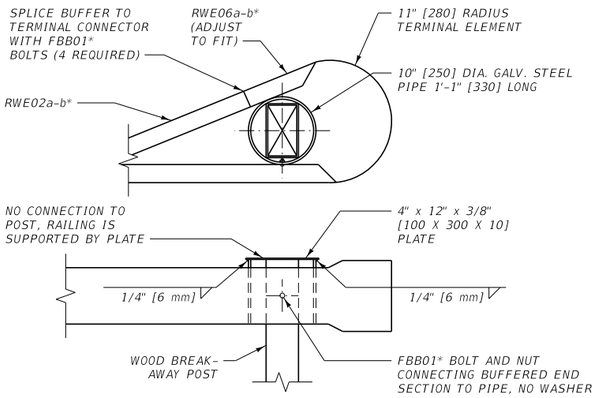
PDF04*



CONTROLLED RELEASING TERMINAL (CRT) POST

CRT POST DETAIL

PDE09*



DETAIL A

NOTES:

① DO NOT INSTALL ON SLOPES STEEPER THAN 2:1.

② DO NOT OMIT OR SHORTEN ANCHOR SECTION.

③ SEE DTL. DWG. NO. 606-05A FOR GUARDRAIL WIDENING REQUIREMENTS.

④ DO NOT BOLT THE RAIL TO THE CRT POST LOCATED AT THE CENTER OF THE BENT RAIL.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

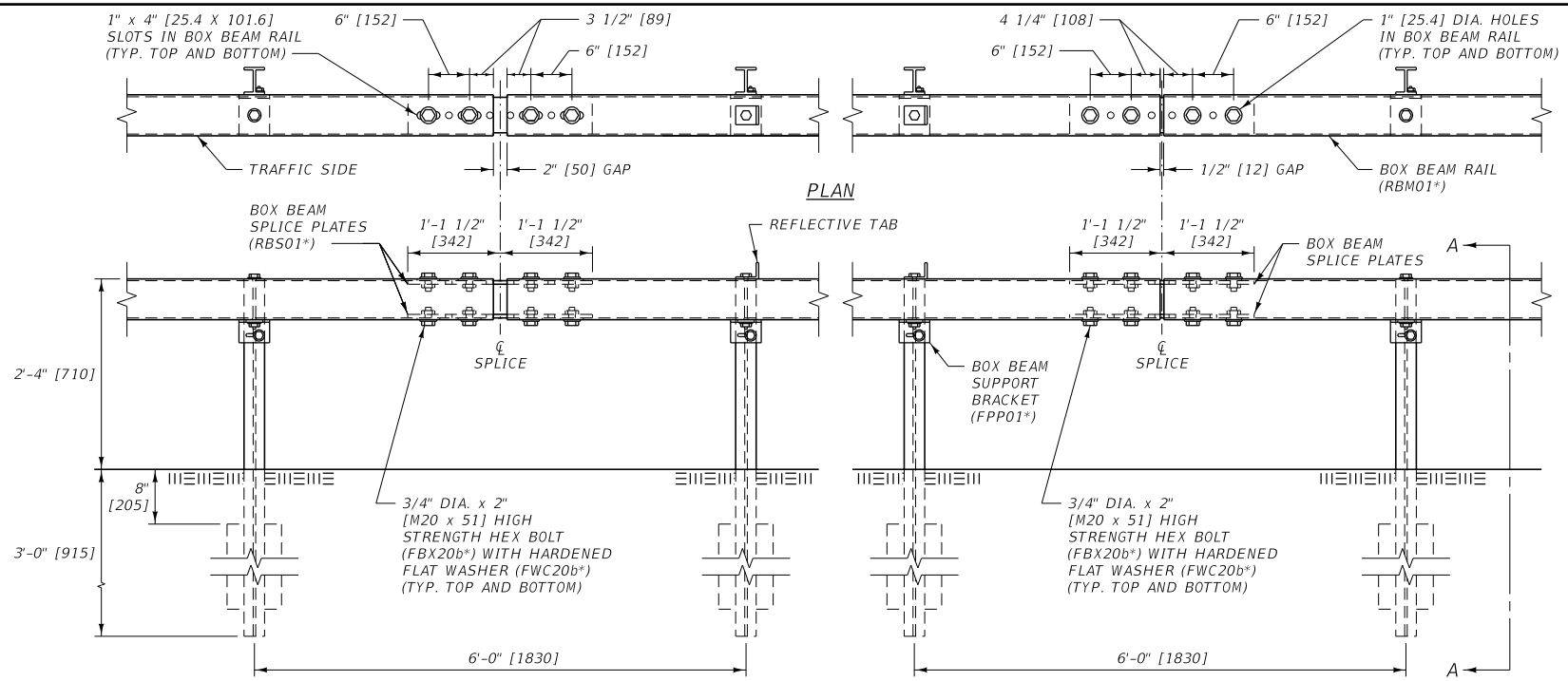
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

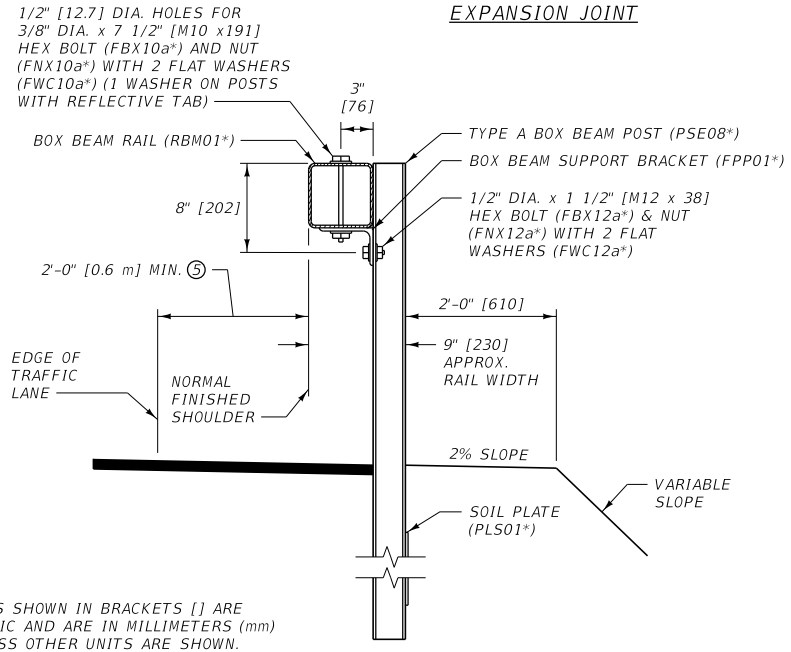
DWG. NO. 606-46

INTERSECTING ROADWAY TERMINAL SECTION (MGS)

MONTANA DEPARTMENT OF TRANSPORTATION



EXPANSION JOINT ELEVATION SPLICE DETAIL



UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

SECTION A-A

NOTES:

① USE BOX BEAM RAIL IN MINIMUM NOMINAL LENGTHS OF 18 FT. [5.49 m] UNLESS APPROVED BY THE PROJECT MANAGER.

② INSTALL EXPANSION JOINTS ON ALL BOX BEAM GUARDRAIL INSTALLATIONS GREATER THAN 300 FT. [90 m] IN LENGTH AT INTERVALS NOT TO EXCEED 500 FT. [150 m].

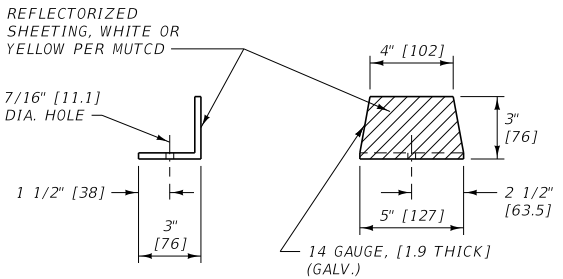
③ ATTACH REFLECTIVE TABS TO EVERY FOURTH POST (24 FT. [7.32 m] TYP.). ANGLE TABS SLIGHTLY TOWARDS TRAFFIC. DO NOT USE REFLECTIVE TABS ON WY-BET TERMINALS. WY-BET TERMINALS RECEIVE REFLECTIVE CHANNELS.

④ DO NOT INSTALL BOX BEAM GUARDRAIL FOR OBSTACLES WITHIN 5.8' [1.8 m] OF THE FACE OF THE RAIL.

⑤ WIDENING IS REQUIRED IF FINISHED SHOULDER IS LESS THAN 2'-0" [0.6 m] FROM THE TRAFFIC LANE.

⑥ PROVIDE SHOP BENT BOX BEAM RAIL FOR ROADWAY CURVATURE WITH RADII OF LESS THAN 715 FEET [218 m].

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.



REFLECTIVE TAB

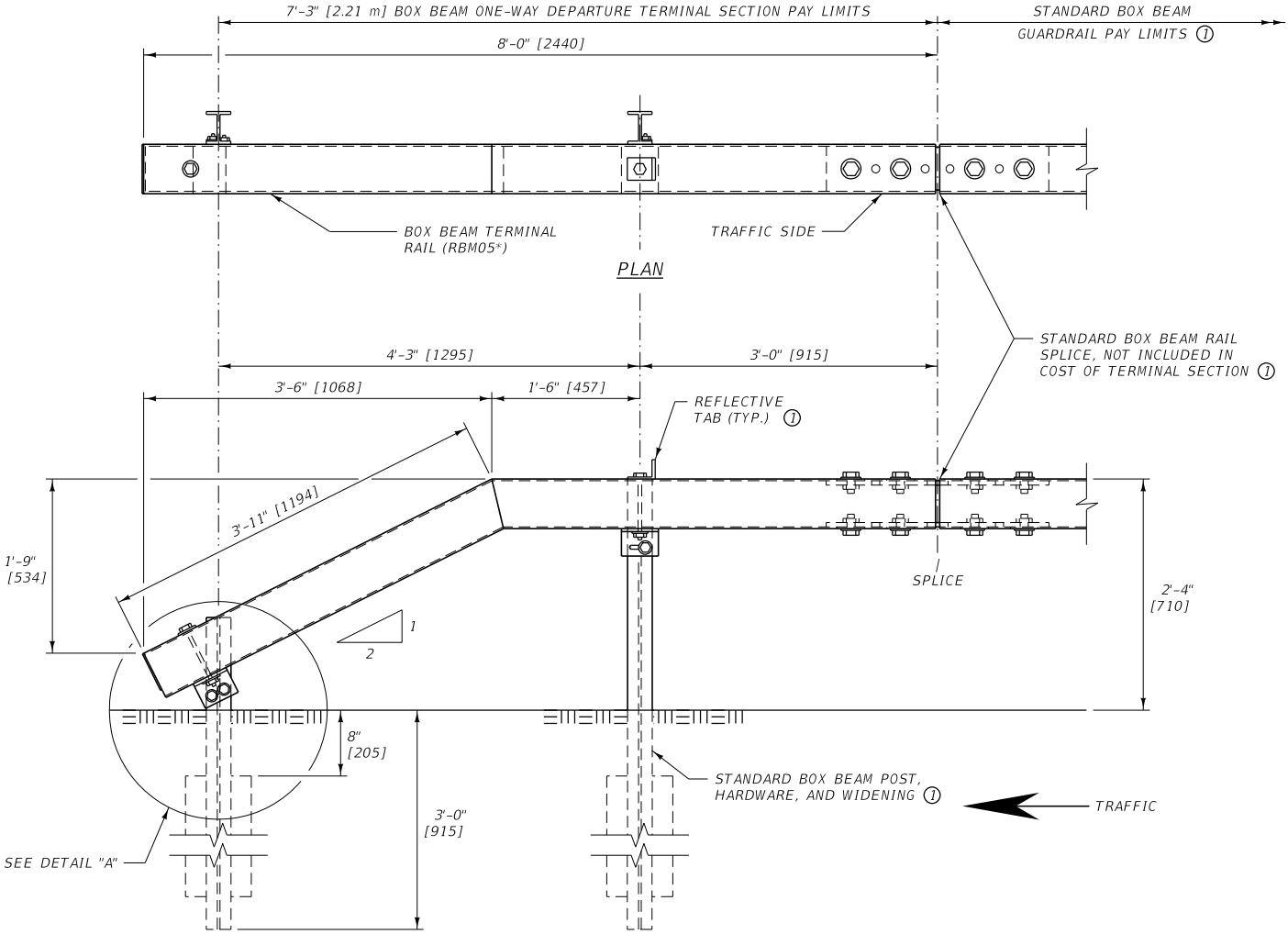
DETAILED DRAWING

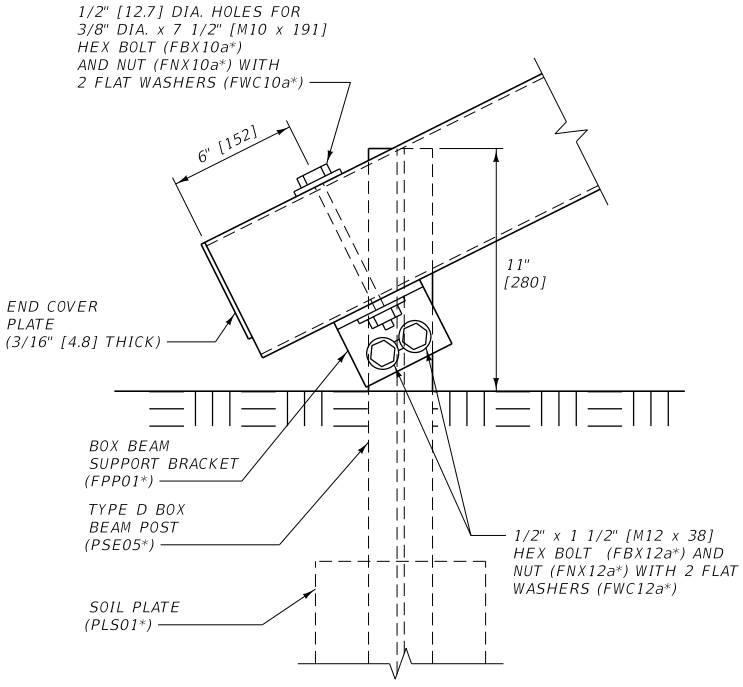
REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-50

BOX BEAM GUARDRAIL

MDT MONTANA DEPARTMENT OF TRANSPORTATION





NOTES:

(1) SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

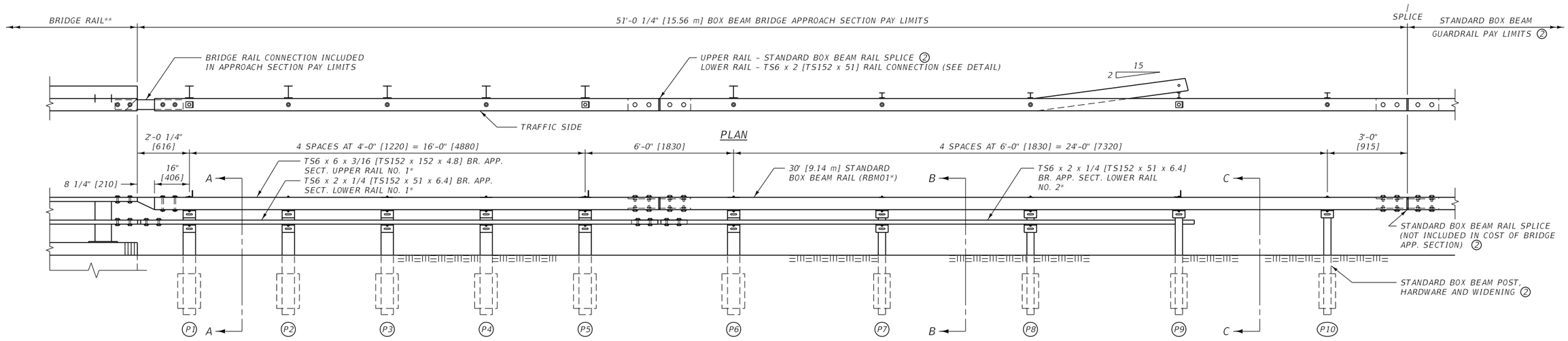
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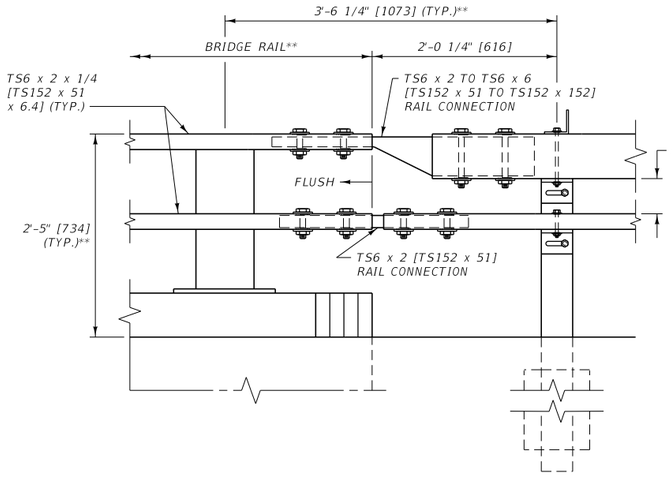
REFERENCE
STANDARD SPEC.
SECTION 606

DWG. NO.
606-52

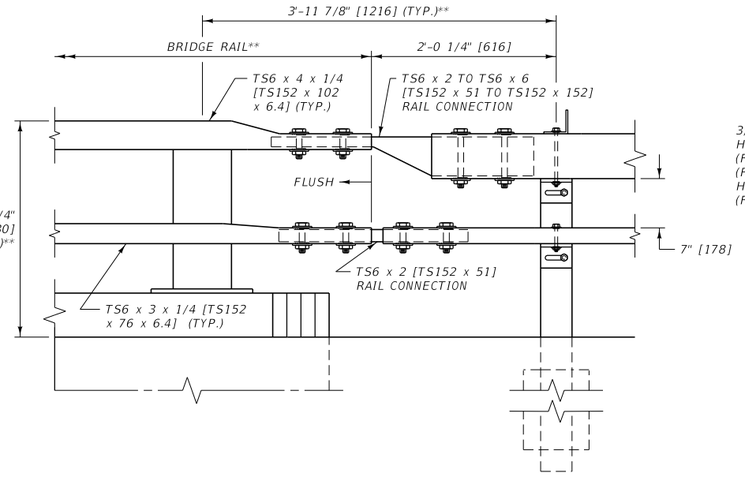
BOX BEAM ONE-WAY DEPARTURE TERMINAL SECTION

MDT MONTANA DEPARTMENT OF TRANSPORTATION

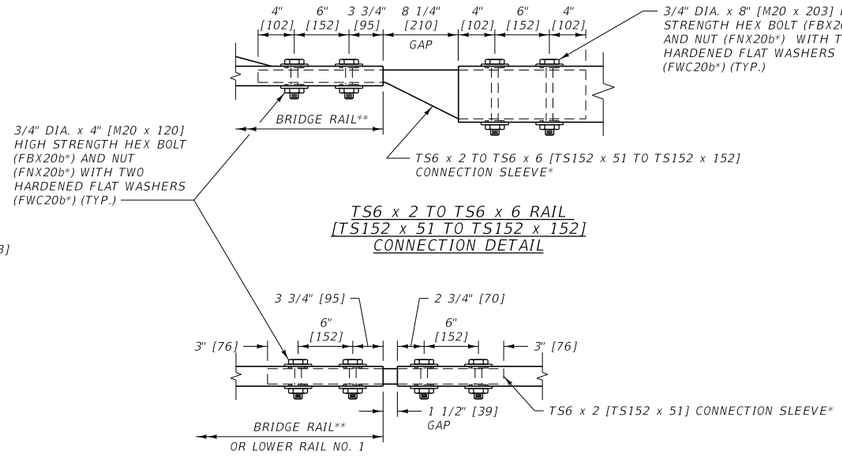




BOX BEAM - BRIDGE APPROACH SECTION TYPE 1

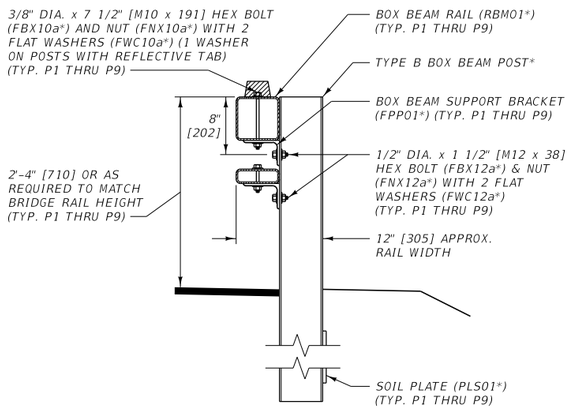


BOX BEAM - BRIDGE APPROACH SECTION TYPE 2



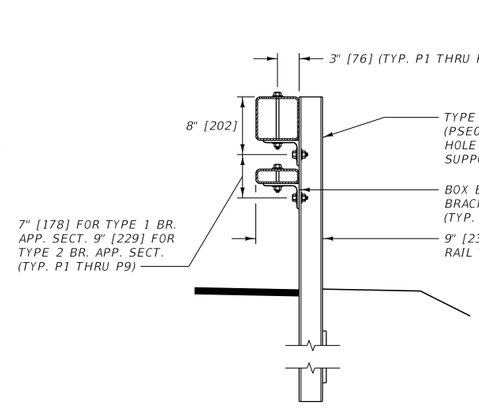
TS6 x 2 TO TS6 x 6 RAIL [TS152 x 51 TO TS152 x 152] CONNECTION DETAIL

TS6 x 2 [TS152 x 51] RAIL CONNECTION DETAIL



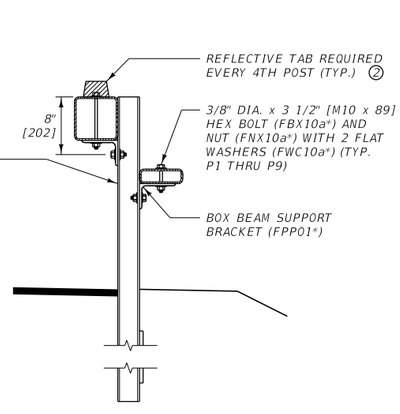
SECTION A-A

(TYP. AT POSTS P1 THRU P6)



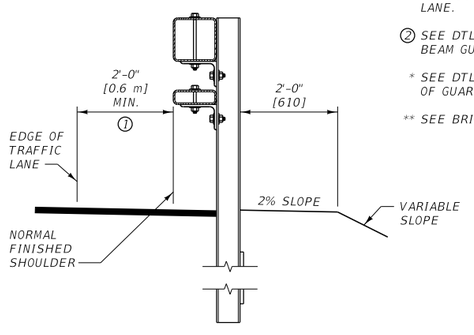
SECTION B-B

(TYP. AT POSTS P7 & P8)



SECTION C-C

(POST P9)



GUARDRAIL WIDENING DETAIL

(TYP AT POST P1 THRU P9)

NOTES:

1. WIDENING IS REQUIRED IF FINISHED SHOULDER IS LESS THAN 2'-0" [0.6 m] FROM THE TRAFFIC LANE.
2. SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

** SEE BRIDGE PLANS.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

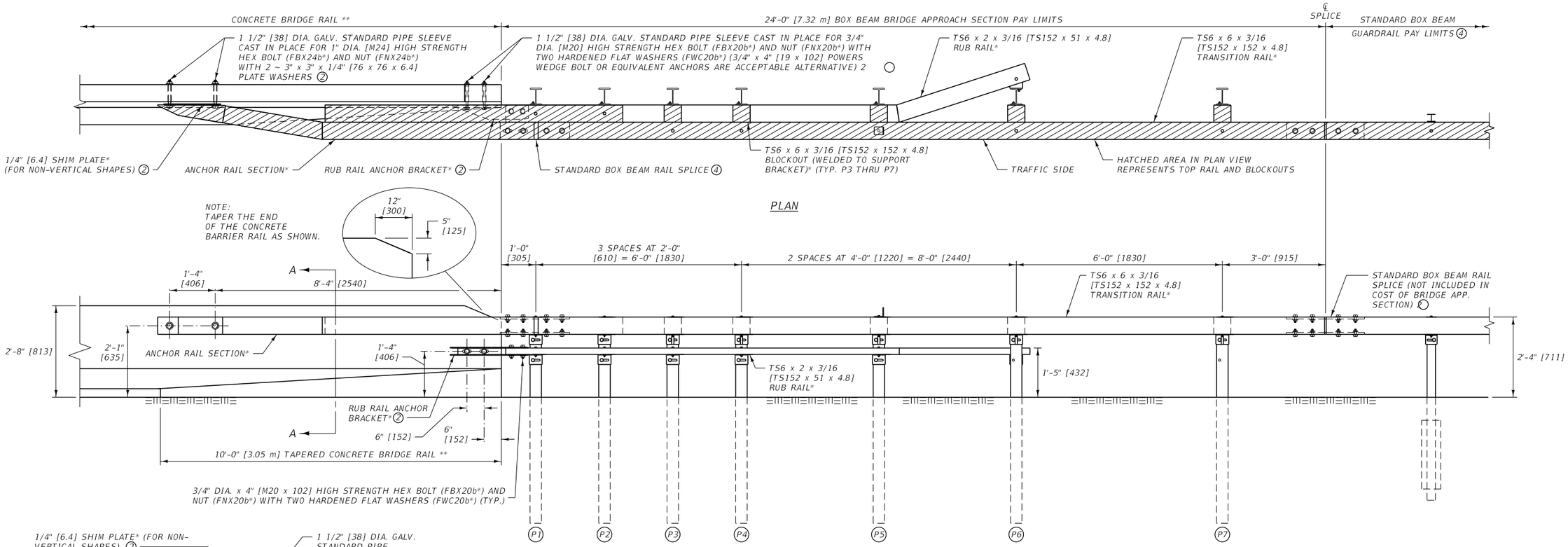
DETAILED DRAWING

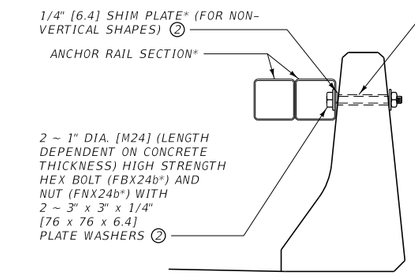
REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-53

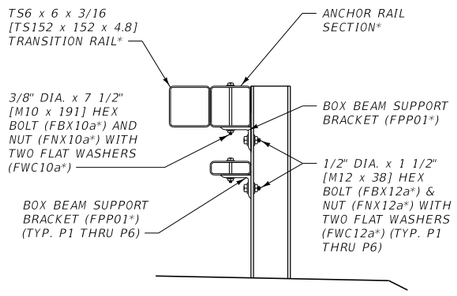
BOX BEAM BRIDGE APPROACH SECTION - TYPES 1 & 2

MDT MONTANA DEPARTMENT OF TRANSPORTATION

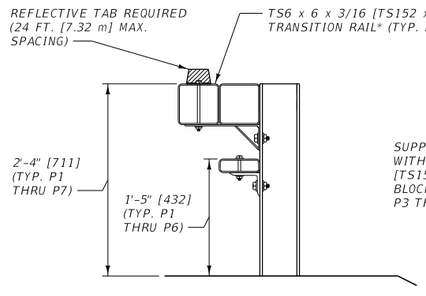




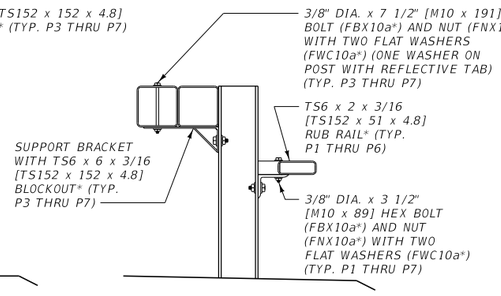
SECTION A-A



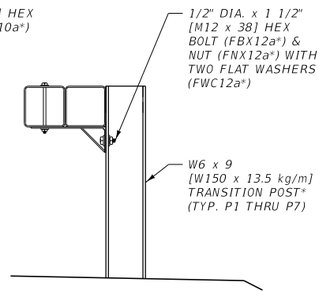
TYP. AT POSTS P1 & P2



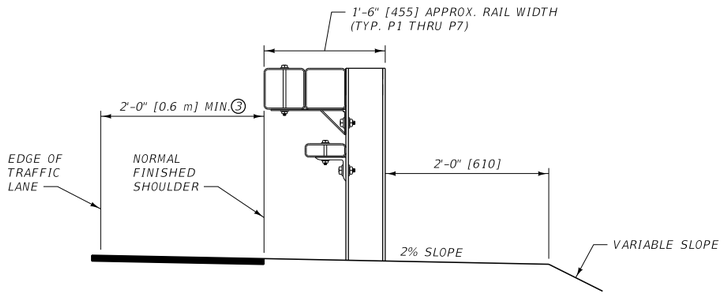
TYP. AT POSTS P3 THRU P5



POST P6



POST P7



GUARDRAIL WIDENING DETAIL

NOTES:

(1) INCLUDE COST OF ENTIRE ANCHOR RAIL SECTION, ALONG WITH ALL HARDWARE NECESSARY FOR ATTACHMENT TO CONCRETE BRIDGE RAIL, IN COST OF BRIDGE APPROACH SECTION.

(2) THE LENGTHS OF CONCRETE ANCHOR BOLTS, TYPE OF RUB RAIL ANCHOR BRACKET AND THE NEED FOR THE 1/4" [6.4] SHIM PLATE IS DEPENDENT UPON THE SHAPE AND THE THICKNESS OF THE CONCRETE BRIDGE RAIL.

(3) WIDENING IS REQUIRED IF FINISHED SHOULDER IS LESS THAN 2'-0" [0.6 m] FROM THE TRAFFIC LANE.

(4) SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

** SEE BRIDGE PLANS.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLMETERS (mm) UNLESS OTHER UNITS ARE SHOWN

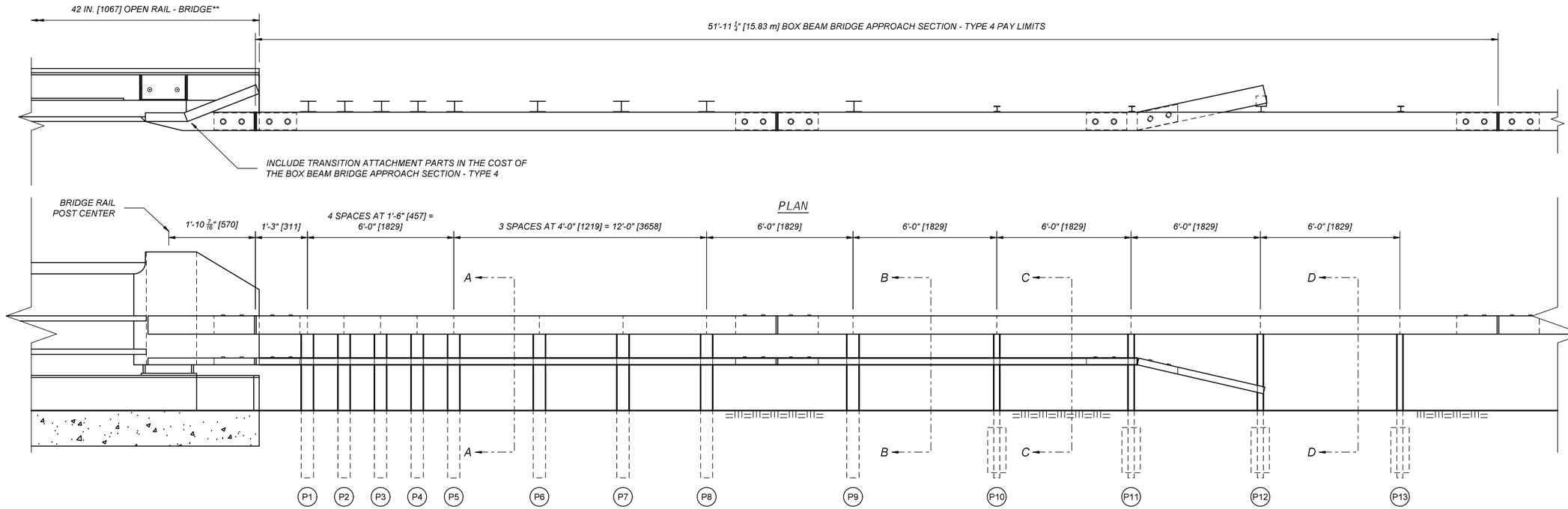
DETAILED DRAWING

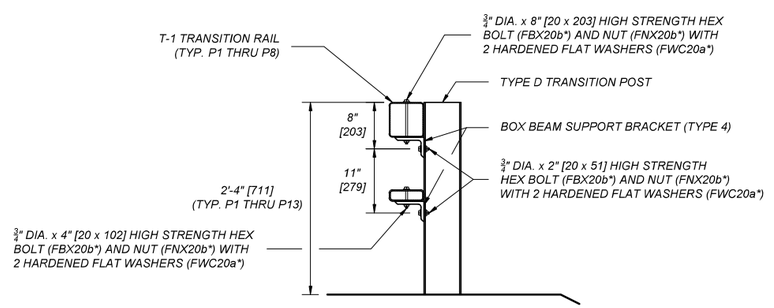
REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-53A

BOX BEAM BRIDGE APPROACH SECTION-TYPE 3

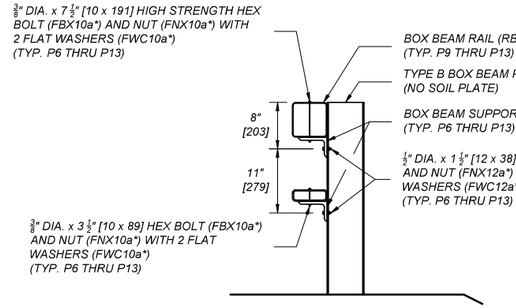
MDT MONTANA DEPARTMENT OF TRANSPORTATION





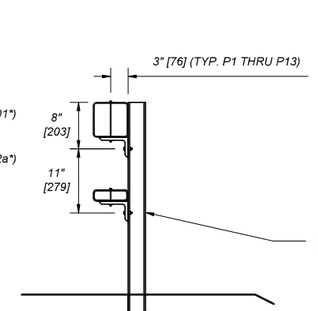
SECTION A-A

(TYP. AT POSTS P1 - P5)



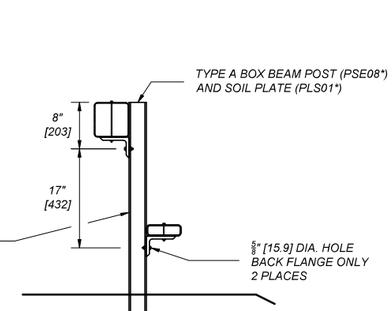
SECTION B-B

(TYP. AT POSTS P6 - P9)



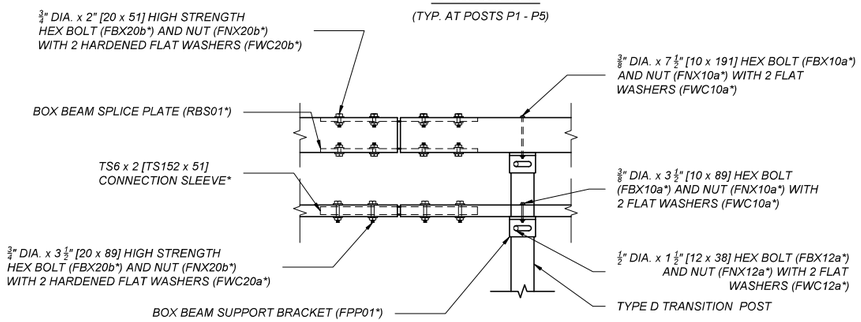
SECTION C-C

(TYP. AT POSTS P10 & P11)



SECTION D-D

(TYP. AT POST P12)



T-1 RAIL CONNECTION DETAIL

NOTES:

*SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

**SEE BRIDGE PLANS

UNITS SHOWN IN BRACKETS [ ] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWINGS

REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-53B

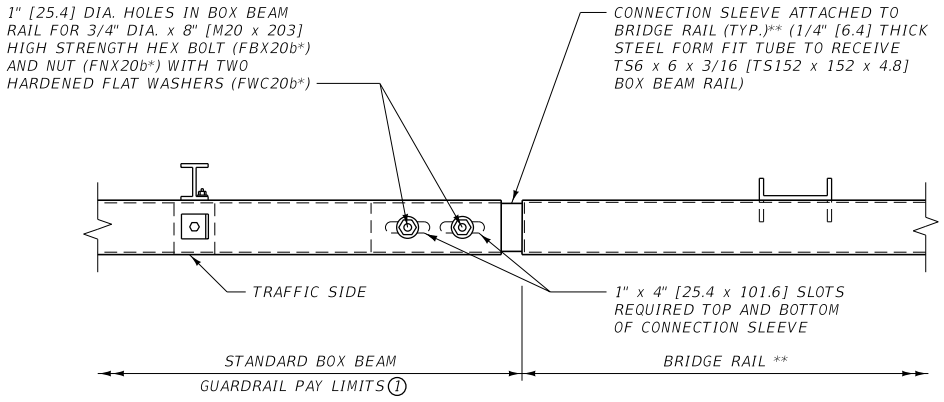
BOX BEAM BRIDGE APPROACH SECTION - TYPE 4

EFFECTIVE: JUN 27, 2024

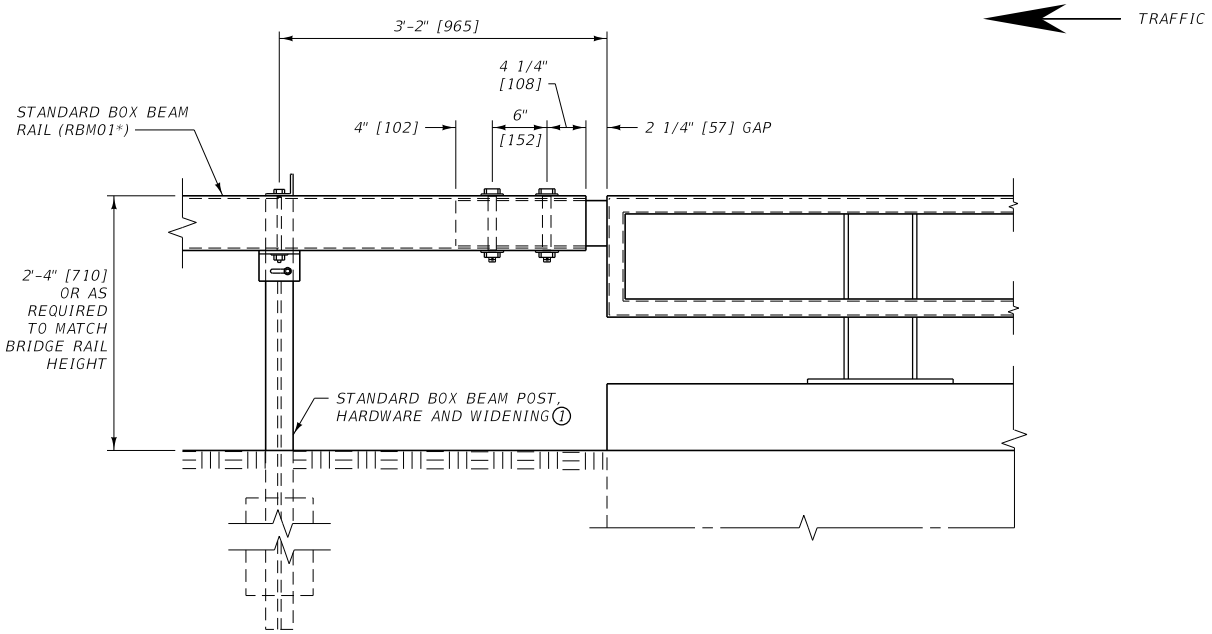
--REVISED--

MONTANA Department of Transportation

5/13/2024 1:21 PM STDDRD606053B.DWG



PLAN



ELEVATION

NOTES:

(1) SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.

(2) USE ON EXIT END OF ONE-WAY TRAFFIC BRIDGES ONLY.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

** SEE BRIDGE PLANS FOR MORE DETAILED INFORMATION ON BRIDGE RAIL AND CONNECTION DETAILS.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

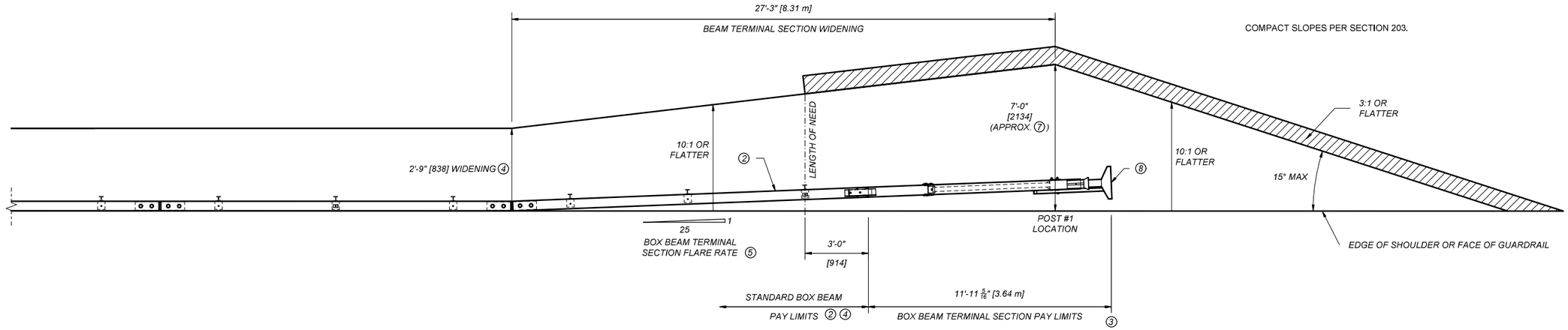
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606

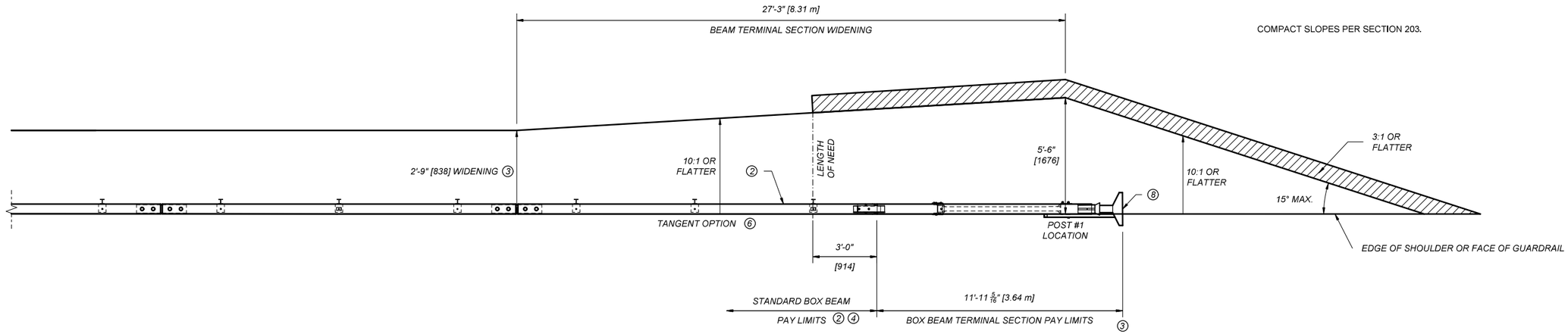
DWG. NO. 606-54

BOX BEAM ONE-WAY BRIDGE DEPARTURE SECTION

MONTANA DEPARTMENT OF TRANSPORTATION



ROAD SYSTEMS MBEAT TERMINAL (FLARED) ①



ROAD SYSTEMS MBEAT TERMINAL (TANGENT) ①

① REFER TO MANUFACTURER'S DETAIL AND ASSEMBLY INSTRUCTIONS.

② THE MBEAT REQUIRES AN 18'-0" [5,49 m] LONG (MINIMUM) SECTION OF STANDARD BOX BEAM RAIL FOR MASH TEST LEVEL 3 APPLICATIONS.

③ LOCATION EQUALS STATION LIMITS INDICATED IN THE PLANS.

④ SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.

⑤ FLARE THE END SECTION AWAY FROM TRAFFIC AT A RATE OF 25:1 FOR 30 FEET [9,14 m] (ILLUSTRATED). FLARES OF 25:1 FOR 48 FEET [14,63 m] MAY ALSO BE USED.

⑥ THE FLARE MAY BE OMITTED ON ROADS WITH SHOULDERS GREATER THAN 2 FEET [0,6 m] IN WIDTH. DO NOT FLARE THE END SECTION ON INTERSTATE APPLICATIONS.

⑦ 7'-0" [2134] WIDENING DIMENSION ALLOWS FOR BOX BEAM TERMINAL SECTION FLARE AND SYSTEM WIDTH. A MINIMUM WIDENING DISTANCE OF 5'-0" [1524] IS REQUIRED BEHIND POST LOCATION #1.

⑧ PLACE A SELF-ADHESIVE OBJECT MARKER ON THE FACE OF THE NOSE ASSEMBLY, HAVING ALTERNATING RETRO-REFLECTIVE BLACK AND YELLOW STRIPES SLOPED DOWNWARD AT AN ANGLE OF 45° TOWARDS THE SIDE ON WHICH TRAFFIC IS TO PASS.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWINGS

REFERENCE	DWG. NO.
STANDARD SPEC. SECTION 606	606-55

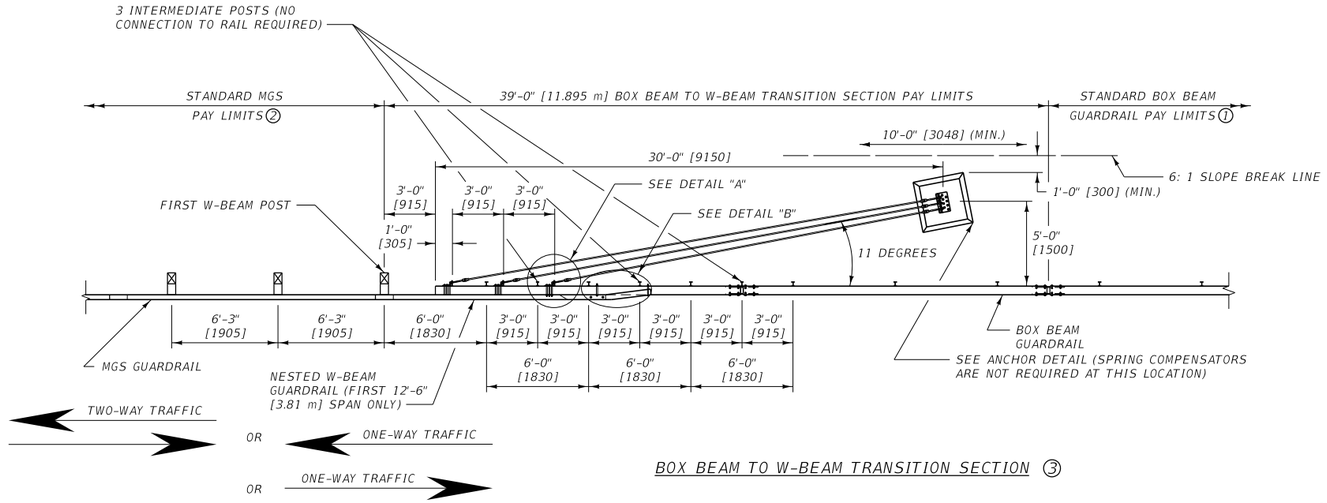
BOX BEAM TERMINAL SECTION - MBEAT

EFFECTIVE: APR 28, 2022

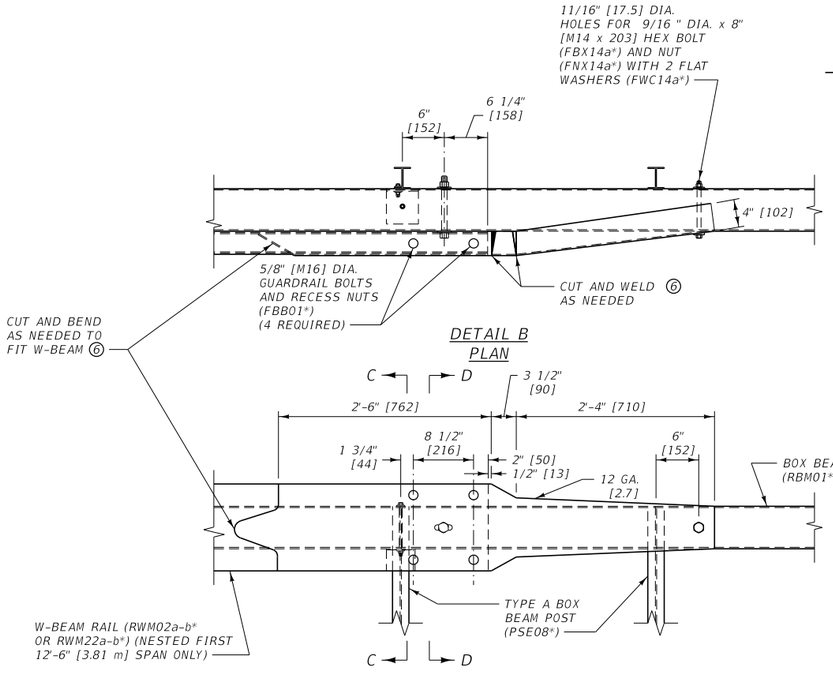
--REVISED--
JUN 27, 2024

MONTANA
Department of Transportation

5/13/2024 1:37 PM STDDRD606055.DWG

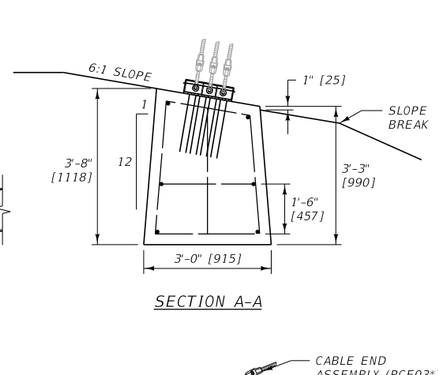


BOX BEAM TO W-BEAM TRANSITION SECTION ③

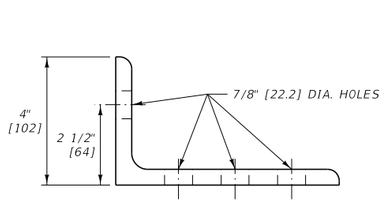


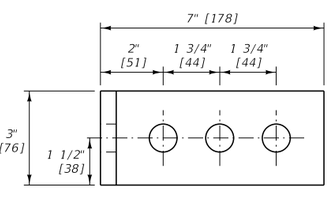
DETAIL B PLAN

DETAIL B ELEVATION

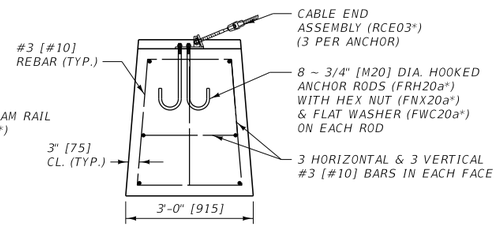


SECTION A-A

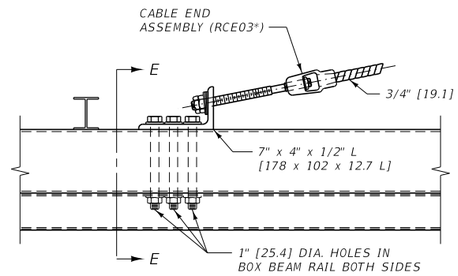




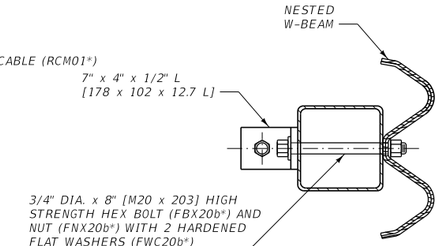
7" x 4" x 1/2" L [178 x 102 x 12.7] DETAIL



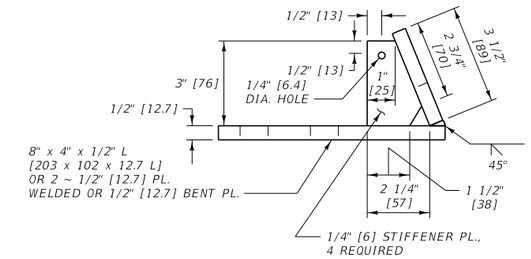
SECTION B-B



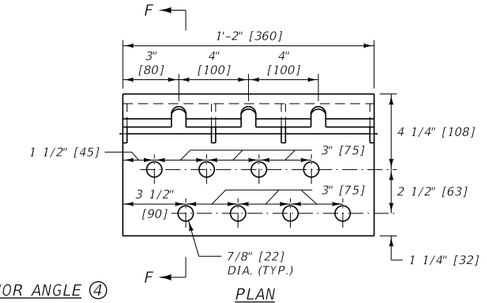
DETAIL A PLAN



SECTION E-E

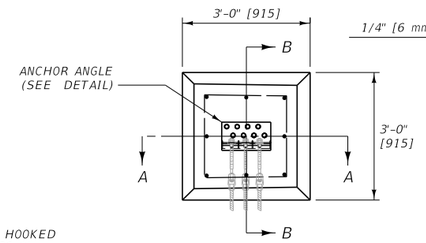


SECTION F-F

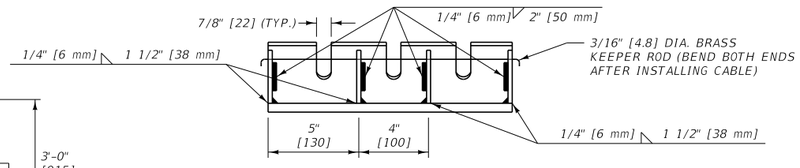


PLAN

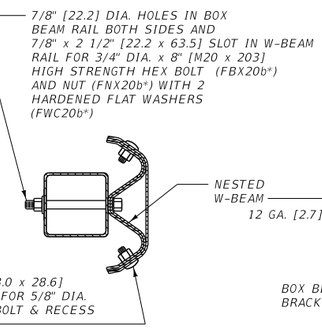
ANCHOR ANGLE ④ DETAIL



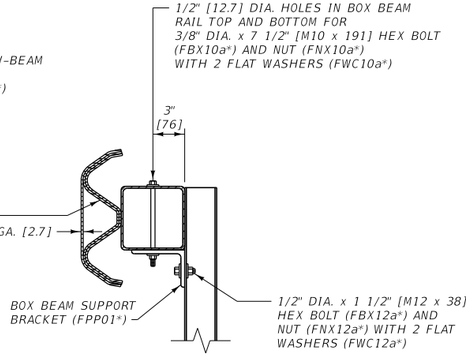
ANCHOR DETAIL ⑤ PLAN



ELEVATION



SECTION D-D



SECTION C-C

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

NOTES:

① SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.

② SEE DTL. DWG. NO. 606-05A AND 606-05B FOR STANDARD MGS GUARDRAIL AND ASSOCIATED DETAILS. SEE DTL. DWG. NO. 606-20 FOR HEIGHT AND SPLICE TRANSITION DETAILS.

③ MANUFACTURE ANCHOR ANGLES USING AASHTO M 270 [270M] GRADE 36 [250] STEEL MEETING SECTION 711. WELD PER SECTION 711.

④ GALVANIZE ANCHOR ANGLES PER SECTION 711. NO PUNCHING, DRILLING,WELDING OR CUTTING IS PERMITTED ON COMPONENTS AFTER GALVANIZING.

⑤ USE CLASS GENERAL CONCRETE TO CONSTRUCT ANCHOR.

⑥ PAINT ANY AREAS WHERE GALVANIZING IS BROKEN OR METAL IS BARE ON W-BEAM OR BOX BEAM RAIL WITH ONE COAT OF ZINC RICH PAINT AND TWO COATS OF ALUMINUM PAINT PER SECTION 710.

⑦ LAP ALL W-BEAM SPLICES IN THE DIRECTION OF ADJACENT TRAFFIC.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606,710,711

DWG. NO. 606-58

BOX BEAM TO MGS TRANSITION SECTION

MDT MONTANA DEPARTMENT OF TRANSPORTATION

SCHEDULE OF GUARDRAIL HARDWARE

DESIGNATION ①	DESCRIPTION	METRIC DESCRIPTION	DTL.DWG.NO. (606-###)	GUARDRAIL TYPE②	DTL. DWGS. WHERE PARTS USED																			
					606-05A	606-05B	606-07	606-09	606-11A	606-11B	606-18	606-23A	606-23B	606-24A	606-24B	606-25A	606-25B	606-46	606-50	606-52	606-53	606-53A	606-53B	606-54	606-58
FBB01-05	5/8" DIA. GUARDRAIL BOLT & RECESS NUT	M16 GUARDRAIL BOLT & RECESS NUT	82	W	X			X	X		X		X					X							X
FBB01-05	5/8" DIA. GUARDRAIL BOLT	M16 GUARDRAIL BOLT	82	W		X				X															
FBB06-07	5/8" DIA. GUARDRAIL BOLT & RECESS NUT	M16 GUARDRAIL BOLT & RECESS NUT	82	W								X	X												
FBX10a	3/8" DIA. HEX BOLT	M10 HEX BOLT	82	B															X	X	X	X	X		X
FBX12a	1/2" DIA. HEX BOLT	M12 HEX BOLT	82	B															X	X	X	X	X		X
FBX14a	9/16" DIA. HEX BOLT	M14 HEX BOLT	82	B																					X
FBX16a	5/8" DIA. HEX BOLT	M16 HEX BOLT	82	W							X							X							
FBX20a	3/4" DIA. HEX BOLT	M20 HEX BOLT	82	W														X							
FBX20b	3/4" DIA. HIGH STRENGTH HEX BOLT*	M20 HIGH STRENGTH HEX BOLT*	82	B															X		X	X	X	X	X
FBX22a	7/8" DIA. HEX BOLT	M22 HEX BOLT	82	W							X														
FBX22b	7/8" DIA. HIGH STRENGTH HEX BOLT*	M22 HIGH STRENGTH HEX BOLT*	82	W								X	X	X	X										
FBX24b	1" DIA. HIGH STRENGTH HEX BOLT*	M24 HIGH STRENGTH HEX BOLT*	82	B																		X			
FCA01	CABLE ASSEMBLY	CABLE ASSEMBLY	84	W							X							X							
FMM01	CABLE WEDGE	CABLE WEDGE	94	C																					X
FMM02	POST SLEEVE	POST SLEEVE	84	W							X							X							
FNS20	3/4" DIA. SQUARE NUT	M20 SQUARE NUT	82	C																					X
FNX10a	3/8" DIA. HEX NUT	M10 HEX NUT	82	B															X	X	X	X	X		X
FNX12a	1/2" DIA. HEX NUT	M12 HEX NUT	82	B															X	X	X	X	X		X
FNX14a	9/16" DIA. HEX NUT	M14 HEX NUT	82	B																					X
FNX16a	5/8" DIA. HEX NUT	M16 HEX NUT	82	W		X				X	X							X							
FNX20a	3/4" DIA. HEX NUT	M20 HEX NUT	82	C,W														X					X		X
FNX20b	3/4" DIA. HIGH STRENGTH HEX NUT	M20 HIGH STRENGTH HEX NUT	82	B																	X	X	X	X	X
FNX22b	7/8" DIA. HIGH STRENGTH HEX NUT	M22 HIGH STRENGTH HEX NUT	82	B								X	X	X	X										
FNX24a	1" DIA. HEX NUT	M24 HEX NUT	82	W							X							X							
FNX24b	1" DIA. HIGH STRENGTH HEX NUT	M24 HIGH STRENGTH HEX NUT	82	B																		X			
FPA01	GUARDRAIL ANCHOR BRACKET & END PLATE	GUARDRAIL ANCHOR BRACKET & END PLATE	84	W							X							X							
FPB01	BEARING PLATE	BEARING PLATE	18 & 46	W							X							X							
FPP01	BOX BEAM SUPPORT BRACKET	BOX BEAM SUPPORT BRACKET	97	B															X	X	X	X	X		X
FRH20a	3/4" DIA. HOOKED ANCHOR ROD	M20 HOOKED ANCHOR ROD	82	C																					X
FWC10a	3/8" DIA. FLAT WASHER	M10 FLAT WASHER	82	B															X	X	X	X	X		X
FWC12a	1/2" DIA. FLAT WASHER	M12 FLAT WASHER	82	B															X	X	X	X	X		X
FWC14a	9/16" DIA. FLAT WASHER	M14 FLAT WASHER	82	B																					X
FWC16a	5/8" DIA. FLAT WASHER	M16 FLAT WASHER	82	W	X	X		X	X	X	X	X	X					X							
FWC20a	3/4" DIA. FLAT WASHER	M20 FLAT WASHER	82	C,W														X					X		X
FWC20b	3/4" DIA. HARDENED FLAT WASHER	M20 HARDENED FLAT WASHER	82	B															X		X	X	X	X	X
FWC24a	1" DIA. FLAT WASHER	M24 FLAT WASHER	82	W							X							X							
FWR03	RECTANGULAR PLATE WASHER	RECTANGULAR PLATE WASHER	84	W							X														
PDB01	8" WOOD BLOCKOUT	8" WOOD BLOCKOUT	05A & 05B, 11A & 11B	W	X	X			X	X															
PDB11	12" WOOD BLOCKOUT	12" WOOD BLOCKOUT	09, 23A & 23B	W				X				X	X												
PDE02	WOOD GUARDRAIL POST	WOOD GUARDRAIL POST	05A & 11A	W	X				X																
PDE09	CRT POST	CRT POST	46	W				X										X							
PDF01	WOOD BREAKAWAY POST	WOOD BREAKAWAY POST	46	W							X							X							
PFP01	STRUT AND YOKE ASSEMBLY	STRUT AND YOKE ASSEMBLY	18	W							X														
PLS01	SOIL PLATE	SOIL PLATE	92 & 97	B															X	X	X		X		
PLS03	SOIL PLATE	SOIL PLATE	46	W														X							
PSE05	TYPE D BOX BEAM POST	TYPE D BOX BEAM POST	97	B																X					
PSE08	TYPE A BOX BEAM POST	TYPE A BOX BEAM POST	97	B															X		X		X		X
PTE05	STEEL TUBE	STEEL TUBE	46	W														X							
PTE06	STEEL TUBE	STEEL TUBE	18	W							X														
PWE01	STEEL GUARDRAIL POST	STEEL GUARDRAIL POST	05B	W		X			X						X										
RBM01	BOX BEAM RAIL	BOX BEAM RAIL	98	B															X		X		X	X	X
RBM05	BOX BEAM TERMINAL RAIL	BOX BEAM TERMINAL RAIL	98	B																X					
RBS01	BOX BEAM SPLICE PLATE	BOX BEAM SPLICE PLATE	98	B															X				X		
RCE03	CABLE END ASSEMBLY	CABLE END ASSEMBLY	94	C																					X
RCM01	3/4" DIA. CABLE	19.1 DIA. CABLE	94	C																					X
RTE01b	THRIE-BEAM TERMINAL CONNECTOR	THRIE-BEAM TERMINAL CONNECTOR	23A & 23B	W								X	X												
RTM01a-b	4-SPACE THRIE-BEAM (6'-3" LENGTH)	4-SPACE THRIE-BEAM (1.905 m LENGTH)	23A & 23B	W								X	X												
RTM02a-b	8-SPACE THRIE-BEAM (12'-6" LENGTH)	8-SPACE THRIE-BEAM (3.81 m LENGTH)	23A & 23B	W								X	X												
RWE01a-b	W-BEAM END SECTION (FLARED)	W-BEAM END SECTION (FLARED)	88	W							X														
RWE02a-b	W-BEAM TERMINAL CONNECTOR	W-BEAM TERMINAL CONNECTOR	88	W										X	X	X	X	X							
RWE06a-b	W-BEAM END SECTION (BUFFER)	W-BEAM END SECTION (BUFFER)	88	W														X							
RWM02a-b	2-SPACE W-BEAM (12'-6" LENGTH)	2-SPACE W-BEAM (3.81 m LENGTH)	88	W																					X
RWM04a-b	4-SPACE W-BEAM (12'-6" LENGTH)	4-SPACE W-BEAM (3.81 m LENGTH)	88	W	X	X		X	X	X	X	X	X												
RWM08a-b	8-SPACE W-BEAM (12'-6" LENGTH)	8-SPACE W-BEAM (3.81 m LENGTH)	88	W			X																		
RWM14a	BCT TERMINAL RAIL SECTION	BCT TERMINAL RAIL SECTION	18	W							X														
RWM22a-b	W-BEAM (25'-0" LENGTH)	W-BEAM (7.62 m LENGTH)	88	W	X	X		X	X	X	X														
RWT02a-b	W-BEAM TO THRIE-BEAM TRANSITION SECTION (7'-3 1/2" LENGTH)	W-BEAM TO THRIE-BEAM TRANSITION SECTION (2.223 m LENGTH)	23A & 23B	W								X	X												

* FURNISH HIGH STRENGTH BOLTS IN ACCORDANCE WITH ASTM F3125 GRADE A325

NOTES:

① SEE AASHTO-AGC-ARTBA JOINT COMMITTEE TASK FORCE 13 REPORT "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE" PUBLICATION FOR ADDITIONAL AND DETAILED HARDWARE SPECIFICATIONS.

② GUARDRAIL TYPE CODES:

W = W-BEAM METAL GUARDRAIL
C = CABLE GUARDRAIL
B = BOX BEAM GUARDRAIL

ALL METRIC DESCRIPTION DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

--REVISED--
JUN 27, 2024

DETAILED DRAWINGS

REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-80

SCHEDULE OF GUARDRAIL HARDWARE

EFFECTIVE: JAN 23, 2020

MONTANA Department of Transportation

5/13/2024 4:43 PM STDDRD606080.DWG

SCHEDULE OF GUARDRAIL HARDWARE

DESIGNATION ①	DESCRIPTION	METRIC DESCRIPTION	DTL.DWG.NO. (606-###)	GUARDRAIL TYPE ②	DTL. DWGS. WHERE PARTS USED																				
					606-05A	606-05B	606-07	606-09	606-11A	606-11B	606-18	606-23A	606-23B	606-24A	606-24B	606-25A	606-25B	606-46	606-50	606-52	606-53	606-53A	606-53B	606-54	606-58
N/A	TYPE B BOX BEAM POST	TYPE B BOX BEAM POST	97	B																	X		X		
N/A	TYPE F SUPPORT BRACKET	TYPE F SUPPORT BRACKET	97	B																			X		
N/A	SUPPORT BRACKET WITH TS6 x 6 x 3/16 BLOCKOUT	SUPPORT BRACKET WITH TS152 x 152 x 4.8 BLOCKOUT	97	B																		X			
N/A	TRANSITION POST	TRANSITION POST	97	B																		X			
N/A	TYPE D TRANSITION POST	TYPE D TRANSITION POST	97	B																			X		
N/A	TS6 x 6 x 3/16 BR. APP. SECT. UPPER RAIL NO. 1	TS152 x 152 x 4.8 BR. APP. SECT. UPPER RAIL NO. 1	98A	B																	X		X		
N/A	TS6 x 2 x 1/4 BR. APP. SECT. LOWER RAIL NO. 1	TS152 x 51 x 6.4 BR. APP. SECT. LOWER RAIL NO. 1	98A	B																	X		X		
N/A	TS6 x 2 x 1/4 BR. APP. SECT. LOWER RAIL NO. 2	TS152 x 51 x 6.4 BR. APP. SECT. LOWER RAIL NO. 2	98A	B																	X				
N/A	TS6 x 2 TO TS6 x 6 CONNECTION SLEEVE	TS152 x 51 TO TS152 x 152 CONNECTION SLEEVE	98A	B																	X				
N/A	TS6 x 6 CONNECTION SLEEVE	TS152 x 152 CONNECTION SLEEVE	98A	B																			X		
N/A	TS6 x 2 CONNECTION SLEEVE	TS152 x 51 CONNECTION SLEEVE	98A	B																	X		X		
N/A	TS6 x 6 x 3/16 TRANSITION RAIL	TS152 x 152 x 4.8 TRANSITION RAIL	98	B																		X			
N/A	1/4" SHIM PLATE	6.4 SHIM PLATE	99	B																		X			
N/A	ANCHOR RAIL SECTION	ANCHOR RAIL SECTION	99	B																		X			
N/A	RUB RAIL ANCHOR BRACKET (JERSEY RAIL)	RUB RAIL ANCHOR BRACKET (JERSEY RAIL)	99	B																		X			
N/A	RUB RAIL ANCHOR BRACKET (VERTICAL BRIDGE RAIL)	RUB RAIL ANCHOR BRACKET (VERTICAL BRIDGE RAIL)	99	B																		X			
N/A	TS6 x 2 x 3/16 RUB RAIL	TS152 x 51 x 4.8 RUB RAIL	99	B																		X			
N/A	RUB RAIL FLARE SLEEVE	RUB RAIL FLARE SLEEVE	98A	B																			X		
N/A	TYPE 4 TRANSITION ATTACHMENT (BENT PLATE)	TYPE 4 TRANSITION ATTACHMENT (BENT PLATE)	99A	B																			X		
N/A	TYPE 4 TRANSITION ATTACHMENT (TOP STIFFENER)	TYPE 4 TRANSITION ATTACHMENT (TOP STIFFENER)	99A	B																			X		
N/A	TYPE 4 TRANSITION ATTACHMENT (SIDE STIFFENER)	TYPE 4 TRANSITION ATTACHMENT (SIDE STIFFENER)	99A	B																			X		
N/A	TYPE 4 TRANSITION ATTACHMENT (BOTTOM STIFFENER)	TYPE 4 TRANSITION ATTACHMENT (BOTTOM STIFFENER)	99A	B																			X		
N/A	TYPE 4 TRANSITION ATTACHMENT (UPPER RAIL ATTACHMENT)	TYPE 4 TRANSITION ATTACHMENT (UPPER RAIL ATTACHMENT)	99A	B																			X		
N/A	TYPE 4 TRANSITION ATTACHMENT (RUB RAIL ATTACHMENT)	TYPE 4 TRANSITION ATTACHMENT (RUB RAIL ATTACHMENT)	99A	B																			X		
N/A	TYPE 4 TRANSITION ATTACHMENT (MOUNTING TAB)	TYPE 4 TRANSITION ATTACHMENT (MOUNTING TAB)	99A	B																			X		
N/A	TYPE 4 TRANSITION ATTACHMENT (GUSSET)	TYPE 4 TRANSITION ATTACHMENT (GUSSET)	99A	B																			X		

* FURNISH HIGH STRENGTH BOLTS IN ACCORDANCE WITH ASTM F3125 GRADE A325

NOTES:

① SEE AASHTO-AGC-ARTBA JOINT COMMITTEE TASK FORCE 13 REPORT "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE" PUBLICATION FOR ADDITIONAL AND DETAILED HARDWARE SPECIFICATIONS.

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--REVISED--

DETAILED DRAWINGS

REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-80A

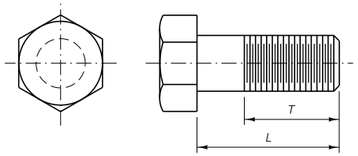
SCHEDULE OF GUARDRAIL HARDWARE

EFFECTIVE: JUN 27, 2024

MONTANA Department of Transportation

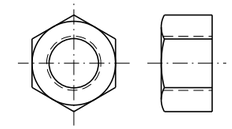
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GUARDRAIL HARDWARE



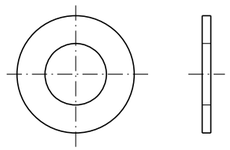
HEX BOLTS

BOLT SIZE	DESIGNATION *	L	T (MIN.)
REGULAR HEX BOLTS			
3/8" DIA.	FBX10a	3 1/2"	1 1/2"
3/8" DIA.	FBX10a	7 1/2"	1 1/2"
1/2" DIA.	FBX12a	1 1/2"	FULL
1/2" DIA.	FBX12a	2 1/2"	1 3/4"
9/16" DIA.	FBX14a	8"	2"
5/8" DIA.	FBX16a	1 1/2"	FULL
3/4" DIA.	FBX20a	8"	2"
3/4" DIA.	FBX20a	9 1/2"	2"
HIGH STRENGTH HEX BOLTS			
3/4" DIA.	FBX20b	2"	1 1/2"
3/4" DIA.	FBX20b	4"	2"
3/4" DIA.	FBX20b	8"	2"
7/8" DIA.	FBX22b	1'-0"	AS REQUIRED
1" DIA.	FBX24b	AS REQUIRED	AS REQUIRED



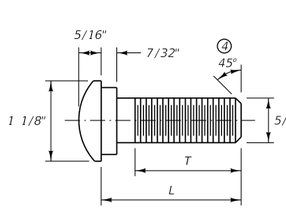
HEX NUT

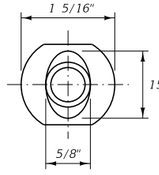
NUT SIZE	DESIGNATION *
REGULAR HEX NUTS	
3/8" DIA.	FNX10a
1/2" DIA.	FNX12a
9/16" DIA.	FNX14a
5/8" DIA.	FNX16a
3/4" DIA.	FNX20a
1" DIA.	FNX24a
HIGH STRENGTH HEX NUTS	
3/4" DIA.	FNX20b
7/8" DIA.	FNX22b
1" DIA.	FNX24b

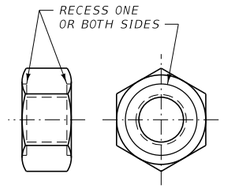


FLAT WASHERS

WASHER SIZE	DESIGNATION *
REGULAR FLAT WASHERS	
3/8" DIA.	FWC10a
1/2" DIA.	FWC12a
9/16" DIA.	FWC14a
5/8" DIA.	FWC16a
3/4" DIA.	FWC20a
1" DIA.	FWC24a
HARDENED FLAT WASHERS	
3/4" DIA.	FWC20b



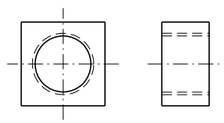




DESIGNATION *	L	T (MIN.)
FBB01	1 1/4"	1 1/8"
FBB02	2"	1 3/4"
FBB03	10"	4"
FBB04	1'-6"	4"
FBB05	2'-1"	4"
FBB06	1'-2"	4 1/16"
FBB07	1'-9"	4 1/16"

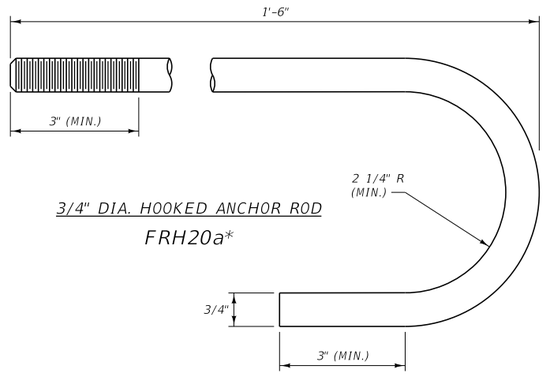
5/8" DIA. GUARDRAIL BOLT & RECESSED NUT

FBB01-07*



3/4" DIA. SQUARE NUT

FNS20*



3/4" DIA. HOOKED ANCHOR ROD

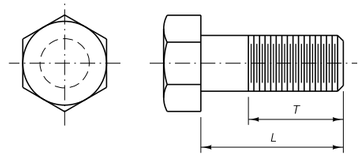
FRH20a*

NOTES:

1. FURNISH BOLTS AND ANCHOR RODS MEETING THE REQUIREMENTS OF SUBSECTION 705.01.1.
2. FURNISH HIGH STRENGTH BOLTS MEETING THE REQUIREMENTS OF SUBSECTION 711.06.
3. GALVANIZE BOLTS, NUTS AND WASHERS IN ACCORDANCE WITH SUBSECTION 705.01.1.
4. 35° THREAD ANGLE FOR BOLTS FBB06-07.

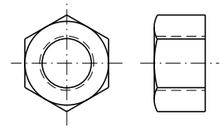
* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

METRIC GUARDRAIL HARDWARE



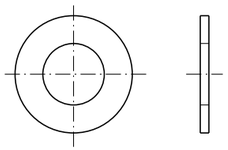
HEX BOLTS

BOLT SIZE	DESIGNATION *	L	T (MIN.)
REGULAR HEX BOLTS			
M10	FBX10a	89	38
M10	FBX10a	191	38
M12	FBX12a	38	FULL
M12	FBX12a	63	44
M14	FBX14a	203	51
M16	FBX16a	38	FULL
M20	FBX20a	203	51
M20	FBX20a	241	51
HIGH STRENGTH HEX BOLTS			
M20	FBX20b	51	38
M20	FBX20b	102	51
M20	FBX20b	203	51
M22	FBX22b	305	AS REQUIRED
M24	FBX24b	AS REQUIRED	AS REQUIRED



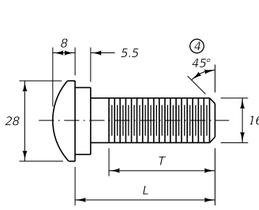
HEX NUT

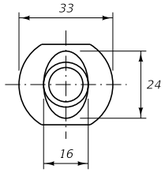
NUT SIZE	DESIGNATION *
REGULAR HEX NUTS	
M10	FNX10a
M12	FNX12a
M14	FNX14a
M16	FNX16a
M20	FNX20a
M24	FNX24a
HIGH STRENGTH HEX NUTS	
M20	FNX20b
M22	FNX22b
M24	FNX24b

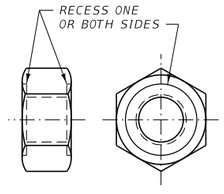


FLAT WASHERS

WASHER SIZE	DESIGNATION *
REGULAR FLAT WASHERS	
M10	FWC10a
M12	FWC12a
M14	FWC14a
M16	FWC16a
M20	FWC20a
M24	FWC24a
HARDENED FLAT WASHERS	
M20	FWC20b



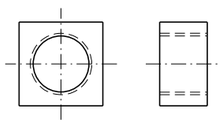




DESIGNATION *	L	T (MIN.)
FBB01	32	29
FBB02	51	44
FBB03	254	102
FBB04	457	102
FBB05	635	102
FBB06	356	103
FBB07	533	103

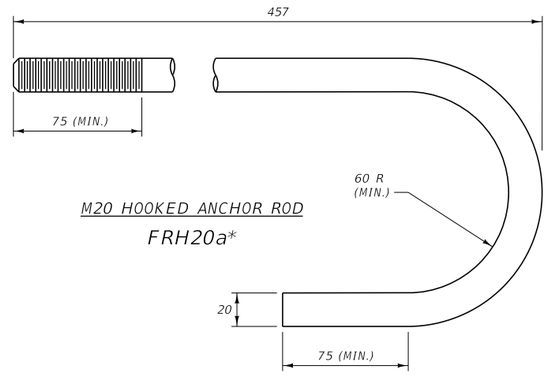
M16 GUARDRAIL BOLT & RECESSED NUT

FBB01-07*



M20 SQUARE NUT

FNS20*



M20 HOOKED ANCHOR ROD

FRH20a*

NOTES:

1. FURNISH BOLTS AND ANCHOR RODS MEETING THE REQUIREMENTS OF SUBSECTION 705.01.1.
2. FURNISH HIGH STRENGTH BOLTS MEETING THE REQUIREMENTS OF SUBSECTION 711.06.
3. GALVANIZE BOLTS, NUTS AND WASHERS IN ACCORDANCE WITH SUBSECTION 705.01.1.
4. 35° THREAD ANGLE FOR BOLTS FBB06-07.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

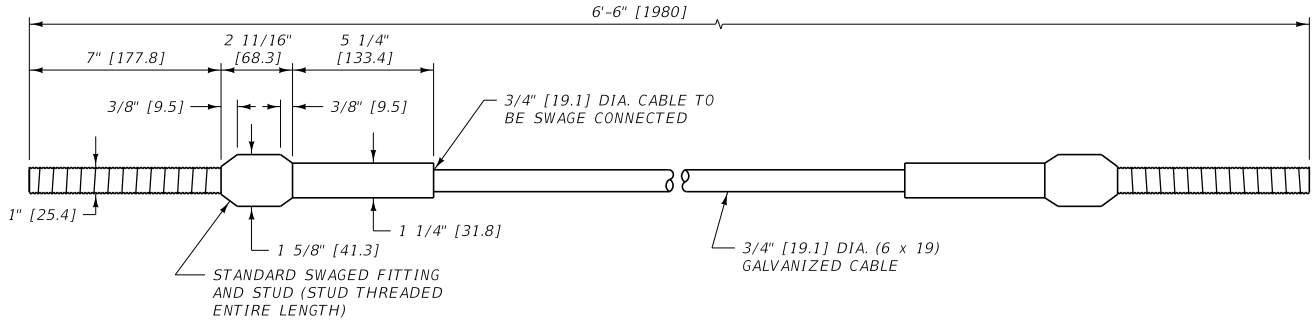
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606, 705, 711

DWG. NO. 606-82

GUARDRAIL HARDWARE

MDT MONTANA DEPARTMENT OF TRANSPORTATION

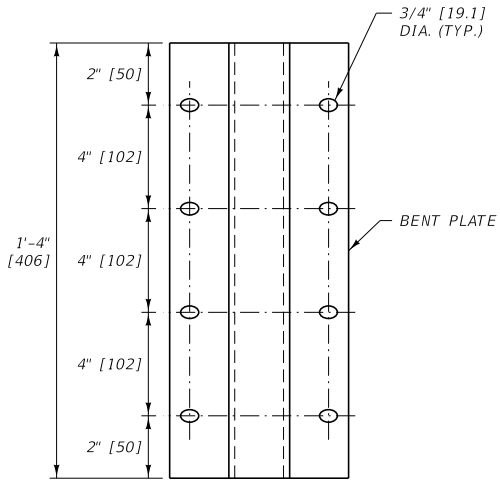


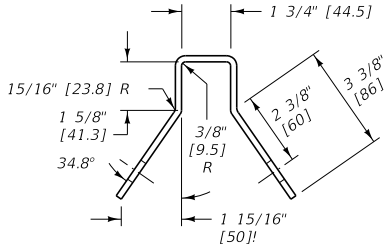
NOTES:

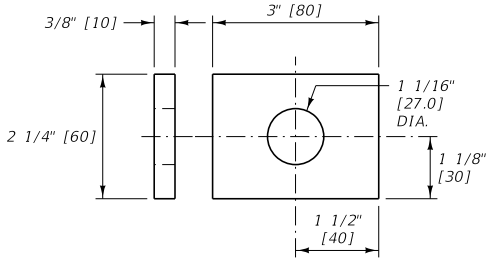
1. FOR RELATED FASTENER HARDWARE SEE FWC24a*, FNX24a* AND FPA01*.
2. MACHINE THE SWAGED FITTING FROM HOT-ROLLED CARBON STEEL CONFORMING TO THE REQUIREMENTS OF ASTM A576 [A576 M], GRADE 1035, AND ANNEAL SUITABLE FOR COLD SWAGING. GALVANIZE THE SWAGED FITTING IN ACCORDANCE WITH SUBSECTION 711.08 BEFORE SWAGING. DRILL A LOCK PIN HOLE TO ACCOMMODATE A 1/4" [6.4 mm], PLATED SPRING STEEL PIN THROUGH THE HEAD OF THE SWAGED FITTING TO RETAIN THE STUD IN THE PROPER POSITION.
3. THE SWAGED FITTING, STUD AND NUT (FNX24a*) MUST DEVELOP THE BREAKING STRENGTH OF THE WIRE ROPE.
4. WIRE ROPE IS TO CONFORM TO THE REQUIREMENTS OF AASHTO M30 [M30M] AND BE 3/4" [19.1 mm] PREFORMED, 6 x 19, WIRE STRAND CORE OR INDEPENDENT WIRE ROPE CORE (IWRC), GALVANIZED, RIGHT REGULAR LAY, MANUFACTURED OF IMPROVED PLOW STEEL WITH A MINIMUM BREAKING STRENGTH OF 42,800 POUNDS [190.4 kN].
5. THE STUD IS TO CONFORM TO THE REQUIREMENTS OF ASTM F568 [F568M] CLASS 8.8 AND BE GALVANIZED IN ACCORDANCE WITH AASHTO M232 [M232M] (ASTM A153 [153M]). PRIOR TO GALVANIZING, MILL A 3/8" [9.5 mm] SLOT INTO THE STUD END FOR THE LOCKING PIN.

CABLE ASSEMBLY

FCA01*

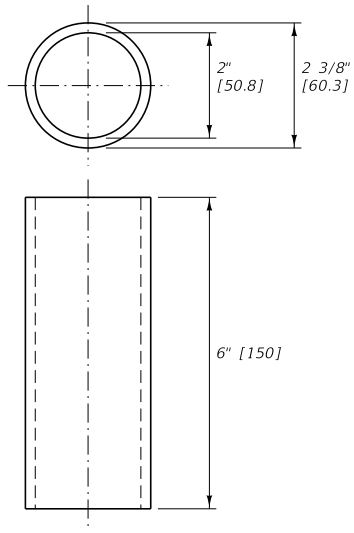






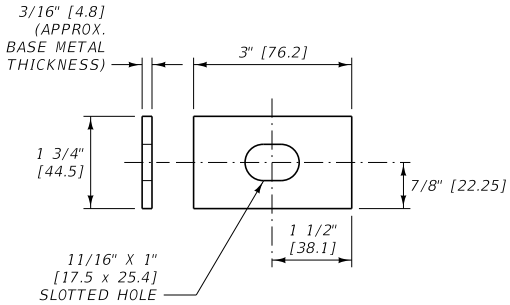
ANCHOR BRACKET & END PLATE

FPA01*



POST SLEEVE

FMM02*



RECTANGULAR PLATE WASHER

FWR03*

NOTES:

6. ANCHOR BRACKETS, END PLATES AND RECTANGULAR PLATE WASHERS ARE TO CONFORM TO THE REQUIREMENTS OF AASHTO M270 [M270M] (ASTM A709 [A709M]) GRADE 36 [250] STEEL PLATE. POST SLEEVES ARE TO CONFORM TO THE REQUIREMENTS OF ASTM A53 [A53M] GRADE B.
7. GALVANIZE FABRICATED PARTS IN ACCORDANCE WITH SUBSECTION 711.08. DO NOT PUNCH, DRILL, OR CUT AFTER GALVANIZING.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

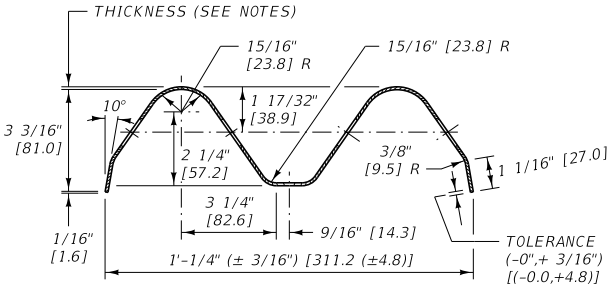
DETAILED DRAWING

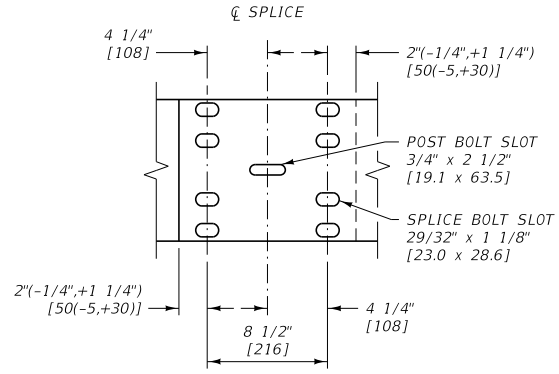
REFERENCE
STANDARD SPEC.
SECTION 606, 711

DWG. NO.
606-84

W-BEAM METAL GUARDRAIL HARDWARE

MDT MONTANA DEPARTMENT OF TRANSPORTATION





W-BEAM

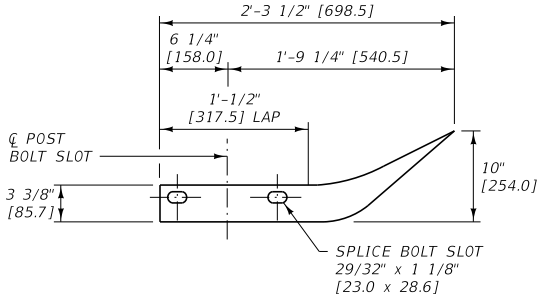
RWM02a-b*
RWM04a-b*
RWM08a-b*

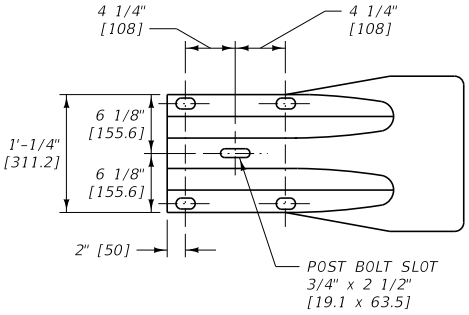
(12'-6" [3.81 m] LENGTH)

OR

RWM22a-b*

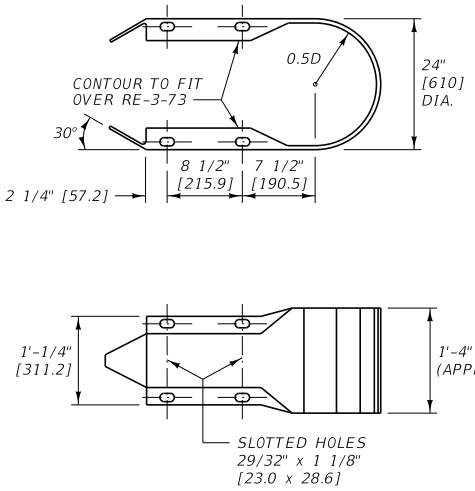
(25'-0" [7.62 m] LENGTH)





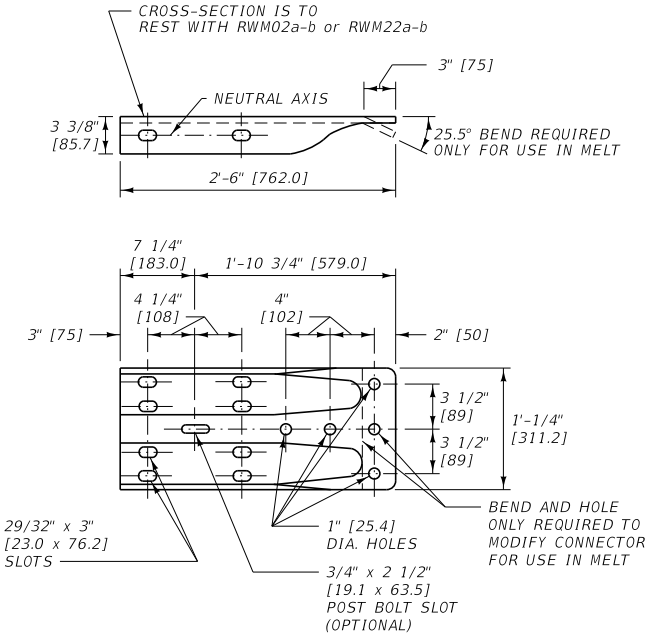
W-BEAM END SECTION (FLARED)

RWE01a-b*



W-BEAM END SECTION (BUFFER)

RWE06a-b*



W-BEAM TERMINAL CONNECTOR

RWE02a-b*

NOTES:

* DESTINATION SUFFIX	METAL THICKNESS
a	12 GAUGE [2.7 mm]
b	10 GAUGE [3.5 mm]

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING

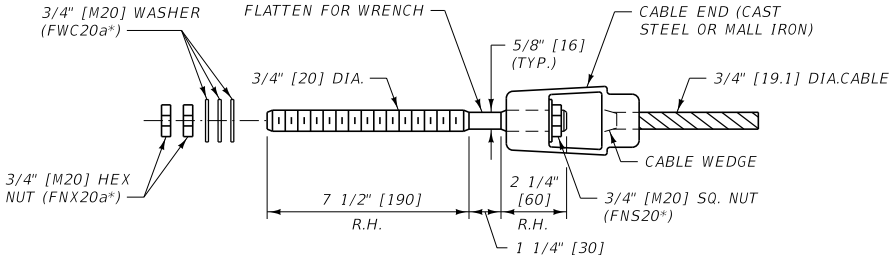
REFERENCE STANDARD SPEC. SECTION 606

DWG. NO. 606-88

W-BEAM METAL GUARDRAIL HARDWARE

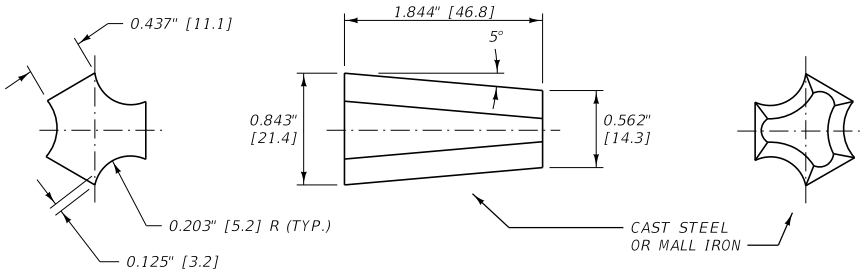
MDT MONTANA DEPARTMENT OF TRANSPORTATION

R.H. = RIGHT HAND
L.H. = LEFT HAND



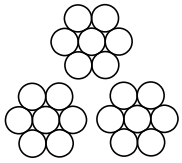
CABLE END ASSEMBLY

RCE03*



CABLE WEDGE

FMM01*



3/4" [19.1] DIA. – 3 x 7 WIRE ROPE

3/4" [19.1] DIA. CABLE

RCM01*

NOTES:

1. WIRE ROPE AND CONNECTING HARDWARE ARE TO CONFORM TO THE REQUIREMENTS OF AASHTO M30 [M30M] TYPE 1 CLASS A, 3/4" [19.1] ROPE. CONNECTING HARDWARE MUST DEVELOP THE FULL STRENGTH OF A SINGLE CABLE (25,000 LB [111.2 kN]). CAST STEEL COMPONENTS ARE TO CONFORM TO THE REQUIREMENTS OF AASHTO M103 [M103M] (ASTM A27 [A27M]). MALLEABLE IRON CASTINGS ARE TO CONFORM TO THE REQUIREMENTS OF ASTM A47 [A47M].

2. AT ALL LOCATIONS WHERE THE CABLE IS CONNECTED TO A CABLE SOCKET WITH A WEDGE TYPE CONNECTION, CRIMP ONE WIRE OF THE CABLE OVER THE BASE OF THE WEDGE TO HOLD IT FIRMLY IN PLACE.

3. DESIGN SOCKET BASKETS FOR USE WITH THE WEDGE DETAILED IN THIS DRAWING.

4. ALTERNATE HARDWARE DESIGNS WILL BE CONSIDERED FOR APPROVAL PROVIDED THEIR CONNECTION DETAILS, FOR THE PURPOSE OF MAINTENANCE SUBSTITUTIONS, ARE COMPATIBLE WITH THE DETAILS OF THIS DRAWING AND THEIR OPERATING CHARACTERISTICS ARE SIMILAR TO THOSE OF THE HARDWARE IN THIS DRAWING.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

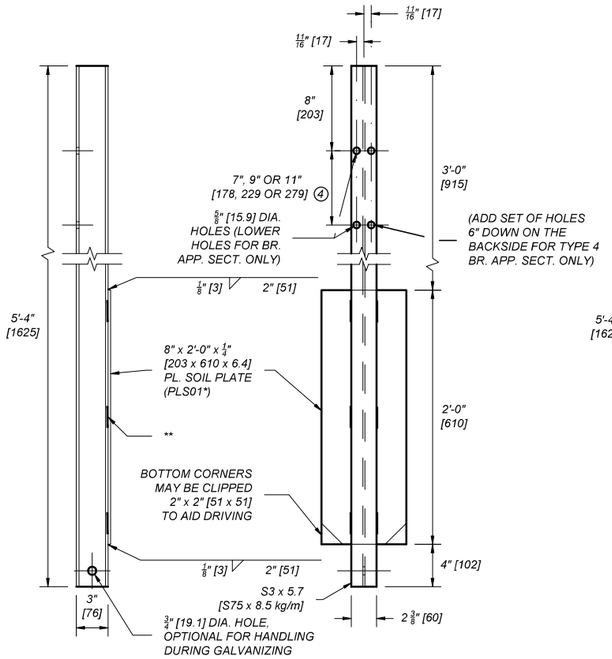
DETAILED DRAWING

REFERENCE
STANDARD SPEC.
SECTION 606

DWG. NO.
606-94

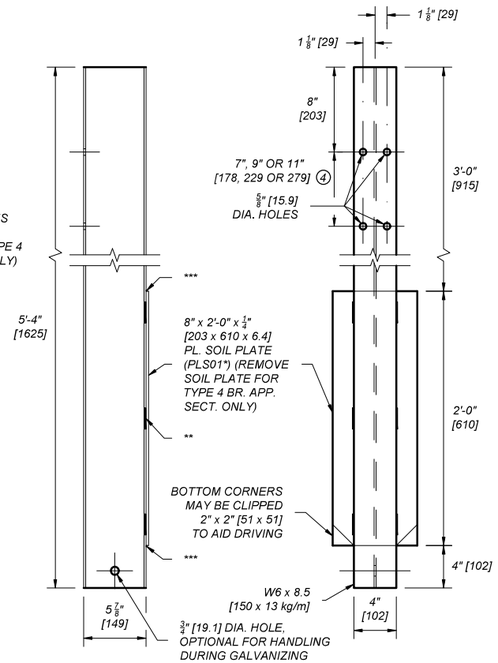
LOW-TENSION CABLE
GUARDRAIL HARDWARE

MDT MONTANA DEPARTMENT OF TRANSPORTATION



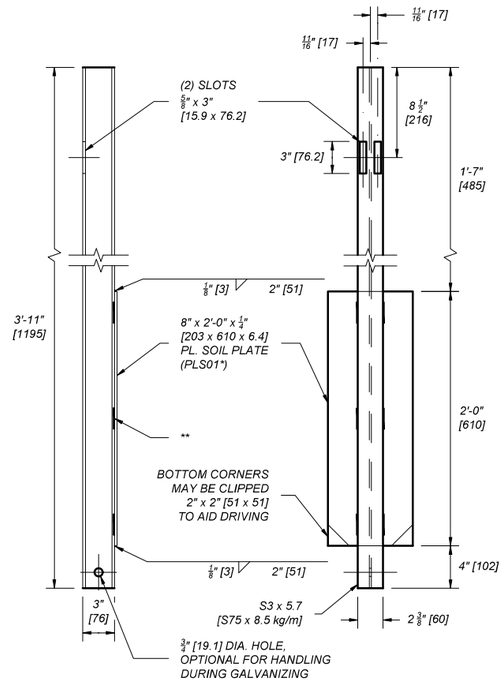
TYPE A BOX BEAM POST AND SOIL PLATE

PSE08* AND PLS01*



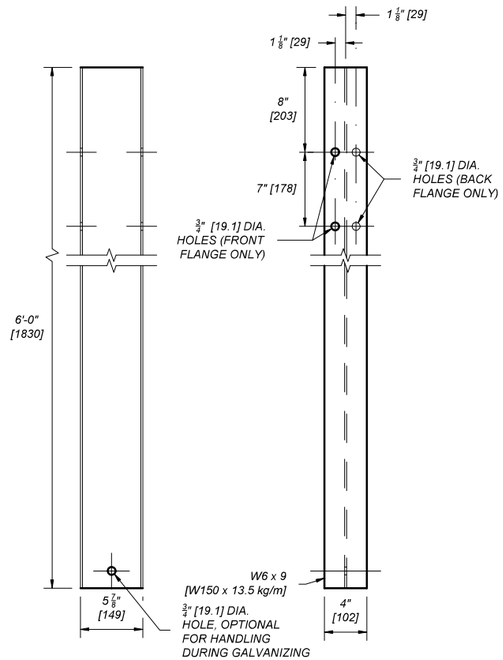
TYPE B BOX BEAM POST AND SOIL PLATE

PLS01*

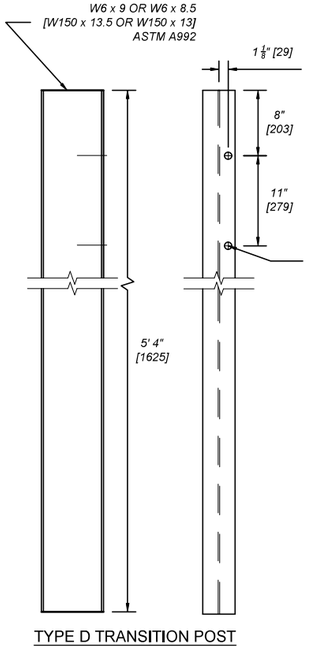


TYPE D BOX BEAM POST AND SOIL PLATE

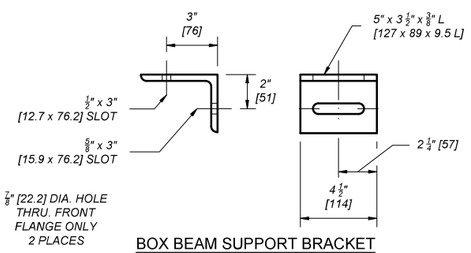
PSE05* AND PLS01*



TRANSITION POST

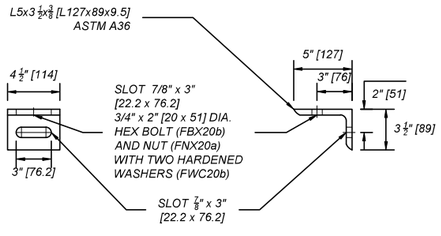


TYPE D TRANSITION POST

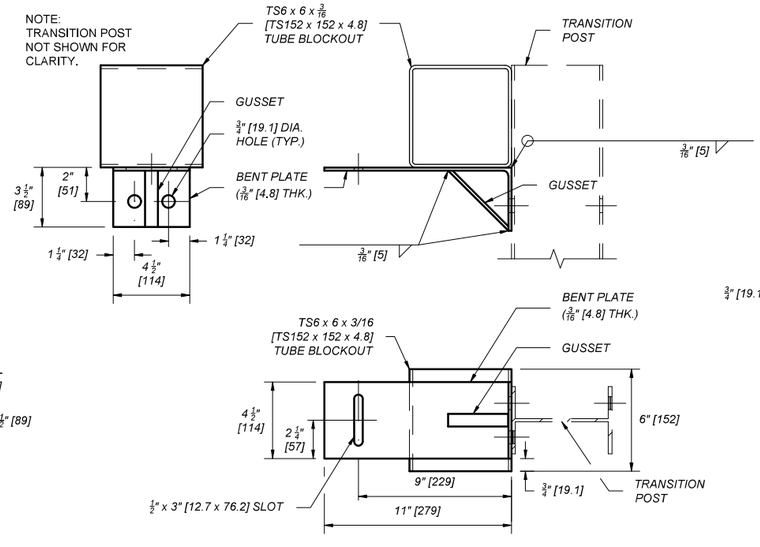


BOX BEAM SUPPORT BRACKET

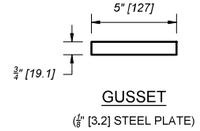
FPP01*



TRANSITION F SUPPORT BRACKET



SUPPORT BRACKET W/BLOCKOUT



GUSSET

(3/8" [3.2] STEEL PLATE)

NOTES:

1. MANUFACTURE POSTS USING STEEL CONFORMING TO AASHTO M 183 [183M] (ASTM A 36 [36M]). MANUFACTURE SOIL PLATES, SUPPORT BRACKETS AND MISC. COMPONENTS USING AASHTO M 270 [270M] (ASTM A 709 [709M]) GRADE 36 [250] STEEL. ALL WELDING IS TO CONFORM TO THE APPLICABLE AWS CODE.
2. MANUFACTURE BLOCKOUTS FROM EITHER ASTM A 500 GRADE B COLD-ROLLED TUBING, ASTM A 501 HOT-ROLLED TUBING OR AUTOMOTIVE ROLLOVER PROTECTIVE STEEL (ROPS). WHEN ASTM A 500 GRADE B STEEL IS USED, TEST THE MATERIAL PER ASTM E 436.
3. GALVANIZE FABRICATED POSTS, BLOCKOUTS, BRACKETS AND MISC. COMPONENTS IN ACCORDANCE WITH SUBSECTION 711.08. DO NOT PUNCH, DRILL, OR CUT AFTER GALVANIZING.
4. SEE DTL. DWG. NO. 606-53 OR 606-53B (BOX BEAM BR. APP. SECT.) FOR REQUIRED LOCATION OF LOWER HOLES IN TYPE A AND B POSTS.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

** 1/8" [3] 2-10" [51-254] / 1/8" [3] 2-10" [51-254]

*** 1/8" [3] 3 1/2" [89]

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWINGS

REFERENCE	DWG. NO.
STANDARD SPEC.	606-97
SECTION 606	

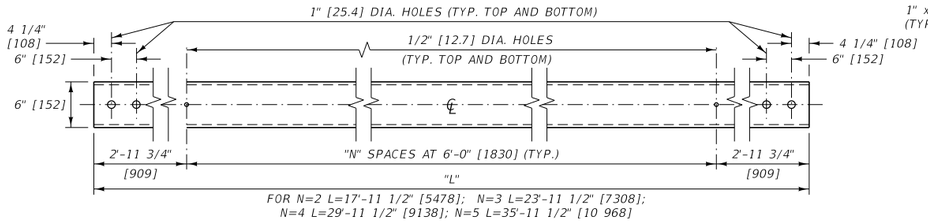
BOX BEAM GUARDRAIL HARDWARE

EFFECTIVE: JAN 23, 2020

--REVISED--
JUN 27, 2024

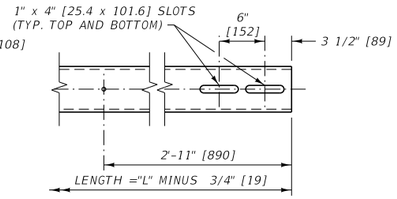
MONTANA Department of Transportation

5/13/2024 4:48 PM STDDRD606097.DWG



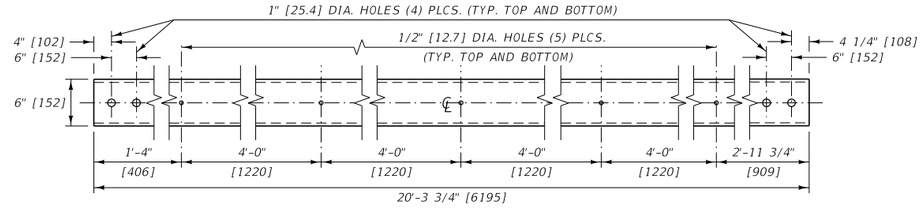
BOX BEAM RAIL (TS6 x 6 x 3/16 [TS152 x 152 x 4.8])

RBM01*

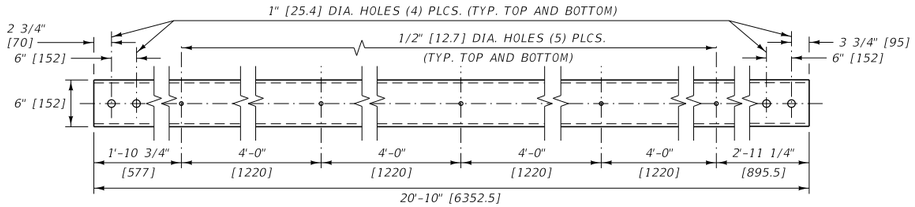


BOX BEAM EXPANSION SPLICE END

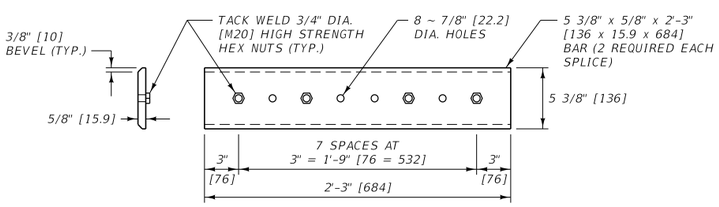
ONE END OF BOX BEAM RAIL ONLY. REQUIRED FOR BOTH RAILS AT THE EXPANSION SPLICE.



TS6 x 6 x 3/16 [TS152 x 152 x 4.8] BR. APP. SECT. UPPER RAIL N0.1

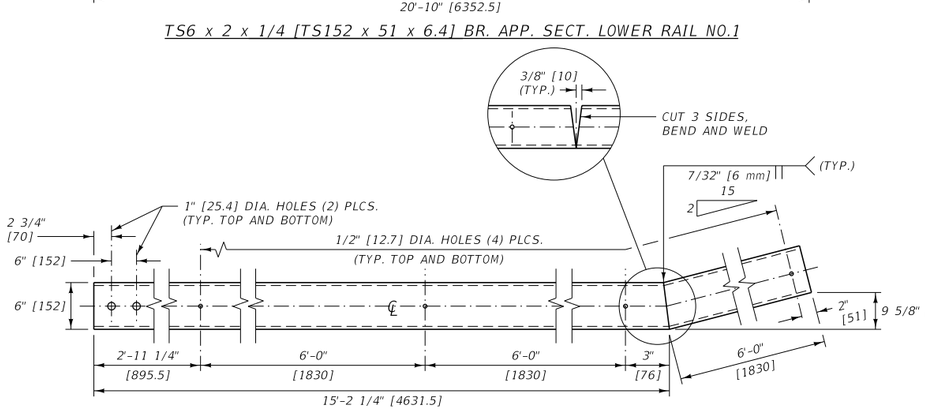


TS6 x 2 x 1/4 [TS152 x 51 x 6.4] BR. APP. SECT. LOWER RAIL NO.1

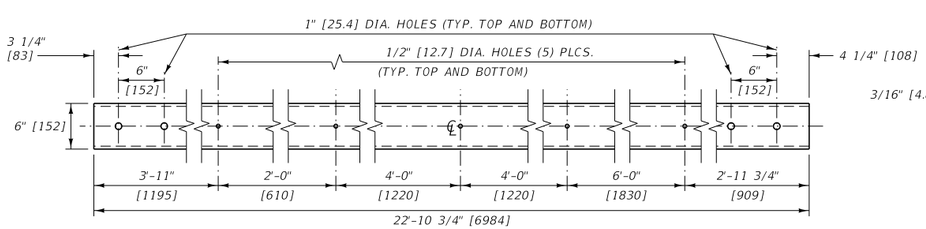


BOX BEAM SPLICE PLATE

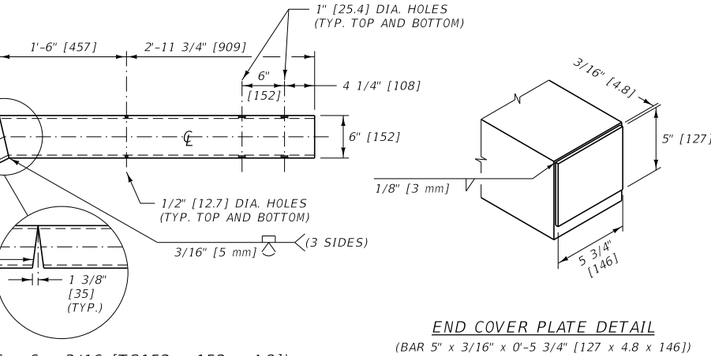
RBS01*



TS6 x 2 x 1/4 [TS152 x 51 x 6.4] BR. APP. SECT. LOWER RAIL NO. 2



TRANSITION RAIL (TS6 x 6 x 3/16 [TS152 x 152 x 4.8])

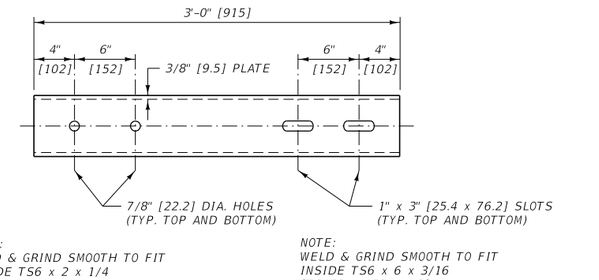


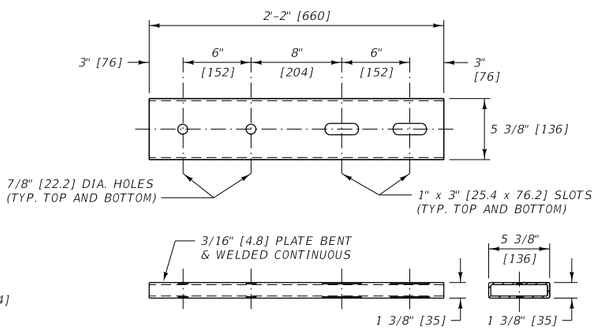
BOX BEAM TERMINAL RAIL (TS6 x 6 x 3/16 [TS152 x 152 x 4.8])

RBM05*

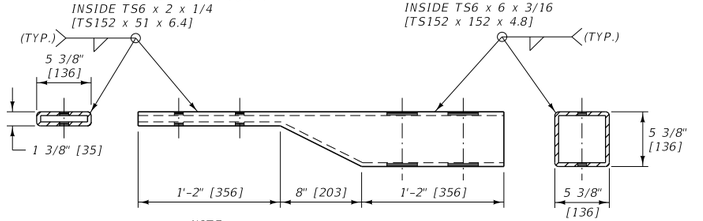
END COVER PLATE DETAIL

(BAR 5" x 3/16" x 0'-5 3/4" [127 x 4.8 x 146])

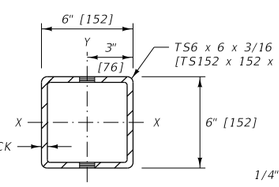




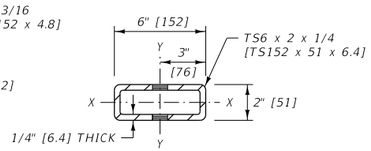
TS6 x 2 [TS152 x 51] CONNECTION SLEEVE



TS6 x 2 TO TS6 x 6 [TS152 x 51 TO TS152 x 152] CONNECTION SLEEVE



TS6 x 6 x 3/16
[TS152 x 152 x 4.8]
SECTION VIEW



TS6 x 2 x 1/4
[TS152 x 51 x 6.4]
SECTION VIEW

NOTES:

1. MANUFACTURE BOX BEAM RAIL ELEMENTS FROM EITHER ASTM A 500 GRADE B COLD ROLLED TUBING, ASTM A 501 HOT-ROLLED TUBING OR AUTOMOTIVE ROLLOVER PROTECTIVE STEEL (ROPS). WHEN ASTM A 500 GRADE B STEEL IS USED, TEST THE MATERIAL PER ASTM E 436.
2. FABRICATE SPLICE PLATES AND CONNECTION SLEEVES FROM AASHTO M 270 [270M] (ASTM A 709 [709M]) GRADE 36 [250] STEEL PLATE. THE NUTS ARE TO BE PLAIN UN-COATED 3/4" DIA. [M20] HIGH STRENGTH HEX NUTS. WELD THE NUTS TO THE PLATES IN ACCORDANCE WITH THE APPLICABLE AWS CODE.
3. GALVANIZE FABRICATED RAIL, CONNECTION SLEEVES, AND SPLICE PLATES IN ACCORDANCE WITH SUBSECTION 711.08. DO NOT PUNCH, DRILL, OR CUT AFTER GALVANIZING.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

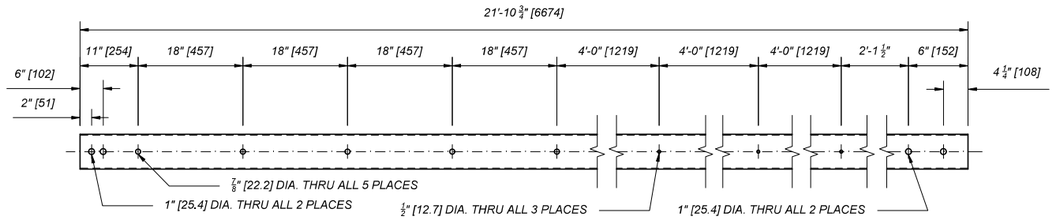
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606, 711

DWG. NO. 606-98

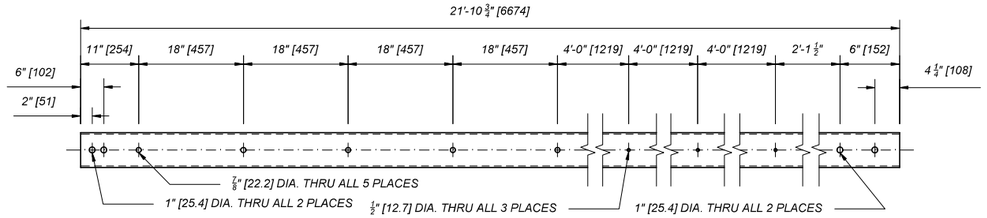
BOX BEAM GUARDRAIL HARDWARE

MDT MONTANA DEPARTMENT OF TRANSPORTATION



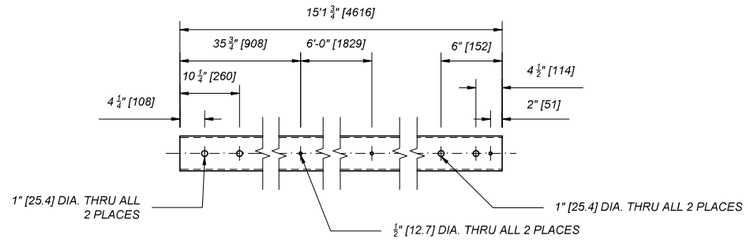
T-1 TRANSITION RAIL

HSS 6x6x$\frac{3}{16}$ [HSS 152x152x4.8]
ASTM A500 GRADE B



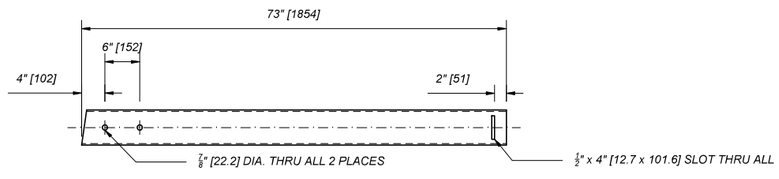
R-1 TRANSITION RUB RAIL

HSS 6x2x$\frac{1}{4}$ [HSS 152x51x6.4]
ASTM A500 GRADE B



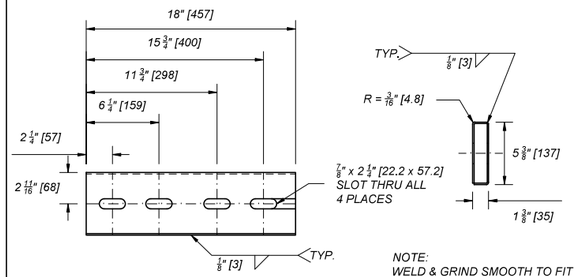
R-2 TRANSITION RUB RAIL

HSS 6x2x$\frac{1}{4}$ [HSS 152x51x6.4]
ASTM A500 GRADE B



R-3 TRANSITION RUB RAIL

HSS 6x2x$\frac{1}{4}$ [HSS 152x51x6.4]
ASTM A500 GRADE B

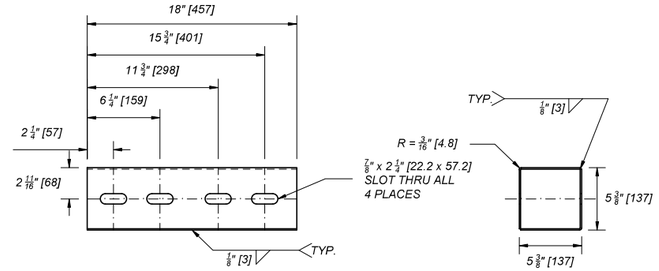


NOTE:
WELD & GRIND SMOOTH TO FIT INSIDE 6" x 2" x $\frac{1}{4}$" [152 x 51 x 6.4]

LOWER BRIDGE RAIL CONNECTION SLEEVE

ASTM A36 PLATE, 18" x $\frac{3}{16}$" [457 x 4.8]
$\frac{3}{4}$" DIA. x 3 $\frac{1}{2}$" [20 x 89] HIGH STRENGTH HEX BOLT (FBX20b*) AND NUT (FNX20b*) WITH 2 HARDENED FLAT WASHERS (FWC20a*)

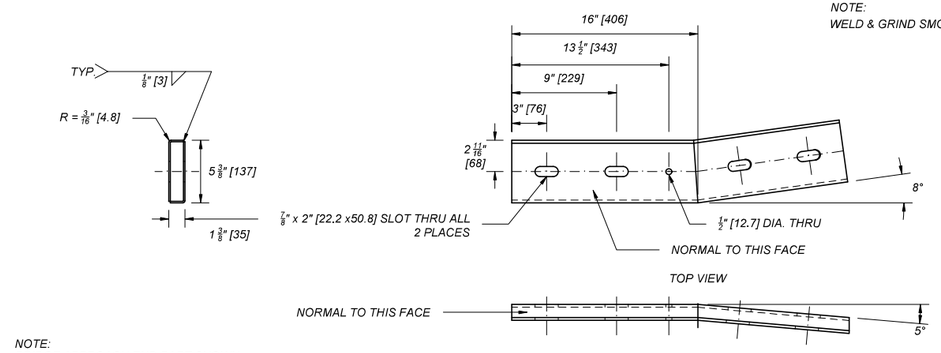
NOTE:
WELD & GRIND SMOOTH TO FIT INSIDE 6" x 6" x $\frac{3}{16}$" [152, 152, 4.8]



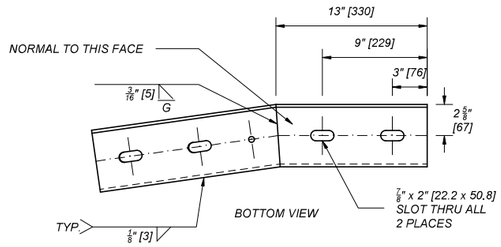
UPPER BRIDGE RAIL CONNECTION SLEEVE

ASTM A36 PLATE, 18" x $\frac{3}{16}$" [457 x 4.8]
$\frac{3}{4}$" DIA. x 7 $\frac{1}{2}$" [20 x 191] HIGH STRENGTH HEX BOLT (FBX20b*) AND NUT (FNX20b*) WITH 2 HARDENED FLAT WASHERS (FWC20a*)

NOTE:
WELD & GRIND SMOOTH TO FIT INSIDE 6" x 2" x $\frac{1}{4}$" [152 x 51 x 6.4]



NOTE:
BRIDGE APPROACH END PART SHOWN.
MIRROR FOR BRIDGE DEPARTURE END.



RUB RAIL FLARE SLEEVE

3/16" [4.8] ASTM A36 PLATE
$\frac{3}{4}$" DIA. x 3 $\frac{1}{2}$" [20 x 89] HIGH STRENGTH HEX BOLT (FBX20b*) AND NUT (FNX20b*) WITH 2 HARDENED FLAT WASHERS (FWX20a*)

NOTES:

*SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

--REVISED--

DETAILED DRAWINGS

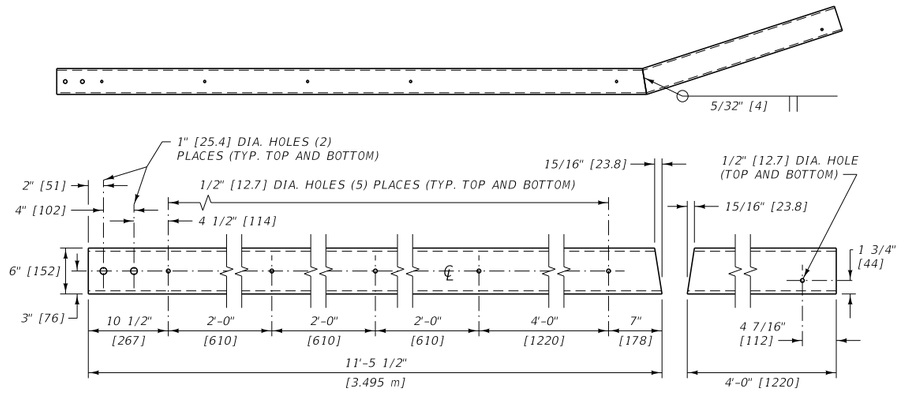
REFERENCE	DWG. NO.
STANDARD SPEC.	606-98A
SECTION 606	

BOX BEAM GUARDRAIL HARDWARE

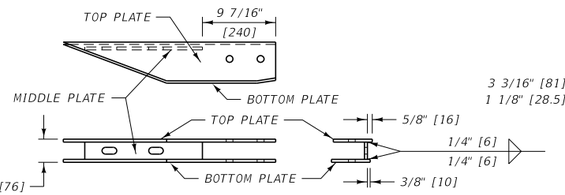
EFFECTIVE: JUN 27, 2024

MONTANA
Department of Transportation

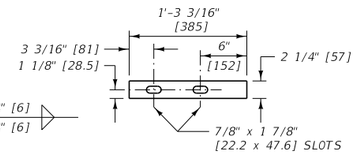
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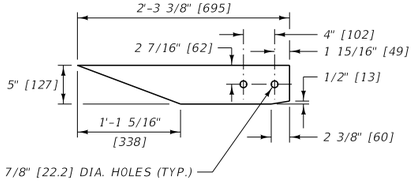
RUB RAIL (TS6 x 2 x 3/16) [TS152 x 51 x 4.8]



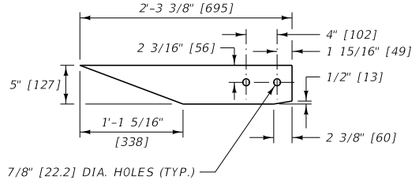
ANCHOR BRACKET FOR RUB RAIL CONNECTION TO JERSEY SHAPE BRIDGE RAIL



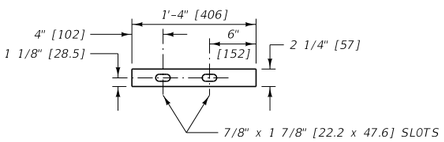
MIDDLE PLATE
(3/8" [9.5] STEEL PLATE)



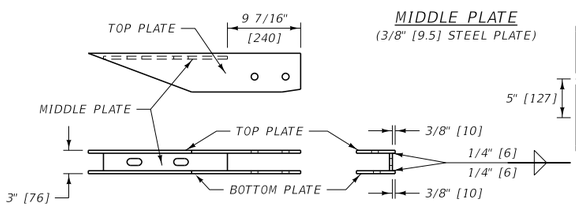
TOP PLATE
(3/8" [9.5] STEEL PLATE)



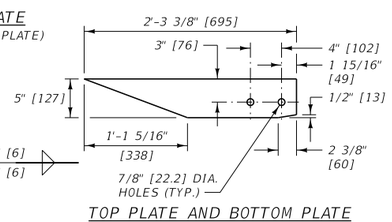
BOTTOM PLATE
(3/8" [9.5] STEEL PLATE)



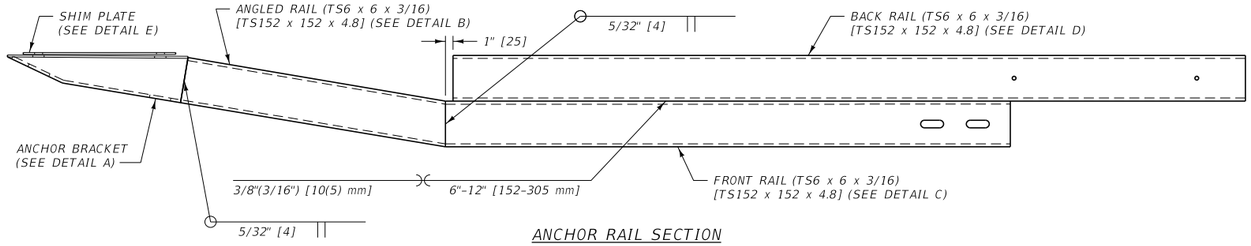
MIDDLE PLATE
(3/8" [9.5] STEEL PLATE)



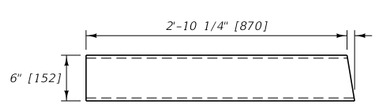
ANCHOR BRACKET FOR RUB RAIL CONNECTION TO VERTICAL CONCRETE BRIDGE RAIL



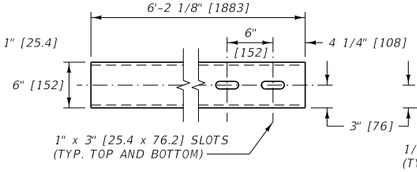
TOP PLATE AND BOTTOM PLATE
(TOP AND BOTTOM PLATES ARE IDENTICAL 3/8" [9.5] STEEL PLATES FOR CONNECTIONS TO VERTICAL SHAPES.)



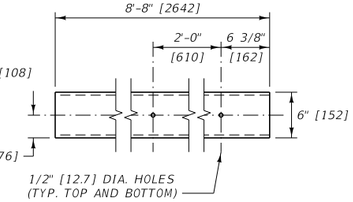
ANCHOR RAIL SECTION



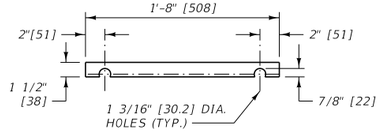
DETAIL B
ANGLED RAIL (TS6 x 6 x 3/16) [TS152 x 152 x 4.8]



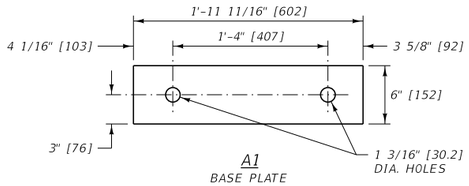
DETAIL C
FRONT RAIL (TS6 x 6 x 3/16) [TS152 x 152 x 4.8]



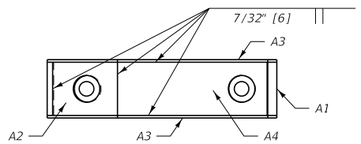
DETAIL D
BACK RAIL (TS6 x 6 x 3/16) [TS152 x 152 x 4.8]

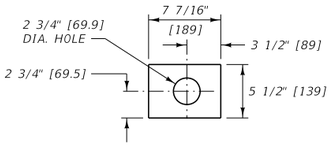


DETAIL E
SHIM PLATE (1/4" [6.4] STEEL PLATE)

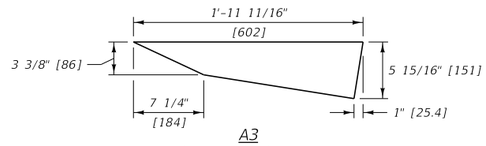


A1
BASE PLATE

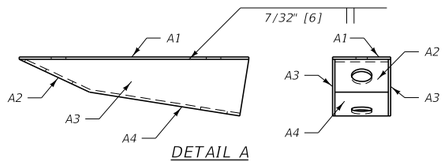




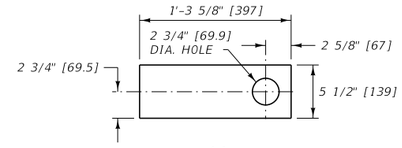
A2
FRONT LEFT PLATE



A3
TOP AND BOTTOM PLATE

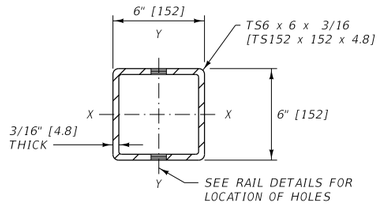


DETAIL A
ANCHOR BRACKET

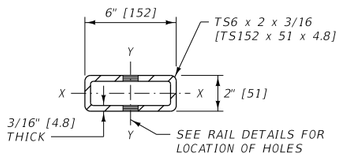


A4
FRONT RIGHT PLATE

NOTE:
ALL ANCHOR BRACKET COMPONENTS ARE FABRICATED FROM ¼" [6.4] STEEL PLATE MATERIAL.



TS6 x 6 x 3/16
[TS152 x 152 x 4.8]
SECTION VIEW



TS6 x 2 x 3/16
[TS152 x 51 x 4.8]
SECTION VIEW

NOTES:

1. MANUFACTURE BOX BEAM RAIL ELEMENTS FROM EITHER ASTM A 500 GRADE B COLD ROLLED TUBING, ASTM A 501 HOT-ROLLED TUBING OR AUTOMOTIVE ROLLOVER PROTECTIVE STEEL (ROPS). WHEN ASTM A 500 GRADE B STEEL IS USED, TEST THE MATERIAL PER ASTM E 436.
2. FABRICATE ANCHOR BRACKET AND RUB RAIL CONNECTION COMPONENTS FROM AASHTO M 270 [270M] (ASTM A 709 [709M]) GRADE 36 [250] STEEL PLATE.
3. GALVANIZE FABRICATED RAIL, ANCHOR BRACKET, AND RUB RAIL IN ACCORDANCE WITH SUBSECTION 711.08. DO NOT PUNCH, DRILL, WELD OR CUT AFTER GALVANIZING.

* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

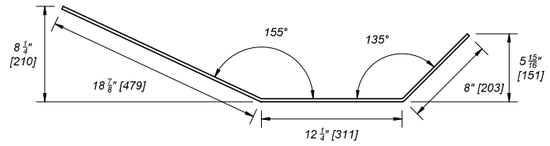
DETAILED DRAWING

REFERENCE
STANDARD SPEC.
SECTION 606, 711

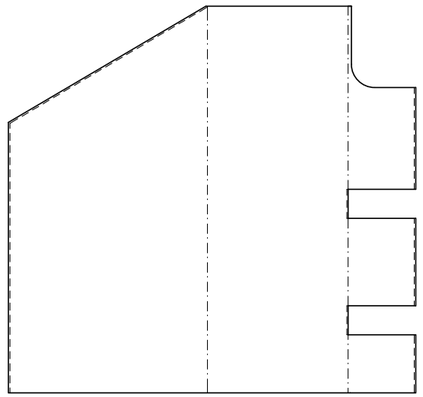
DWG. NO.
606-99

BOX BEAM GUARDRAIL HARDWARE

MDT MONTANA DEPARTMENT OF TRANSPORTATION



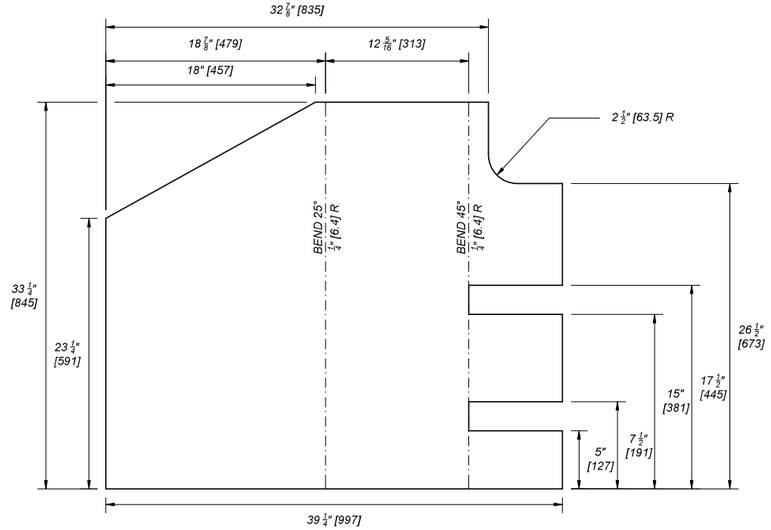
TOP VIEW
BENT



FRONT VIEW
BENT

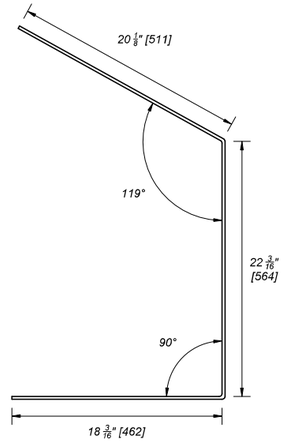
PLATE, 33 1/4" x 1/4" x 39 1/4"
[845 x 6.4 x 997]
ASTM A572 GRADE 50

NOTE:
MAIN PLATE DETAILS SHOWN ARE FOR LEFT SIDE TRANSITION ATTACHMENT PART.
MAIN PLATE FOR RIGHT SIDE IS A MIRROR IMAGE OF THIS ONE (PRE-BEND DETAILS ARE IDENTICAL, BUT BENT IN OPPOSITE DIRECTIONS).



FLAT PATTERN

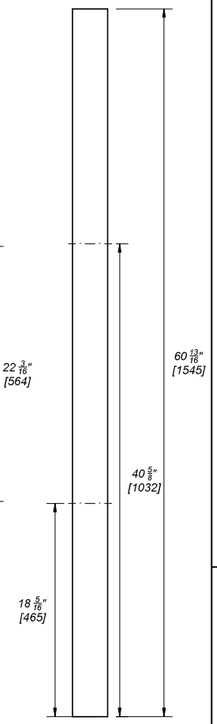
BENT PLATE



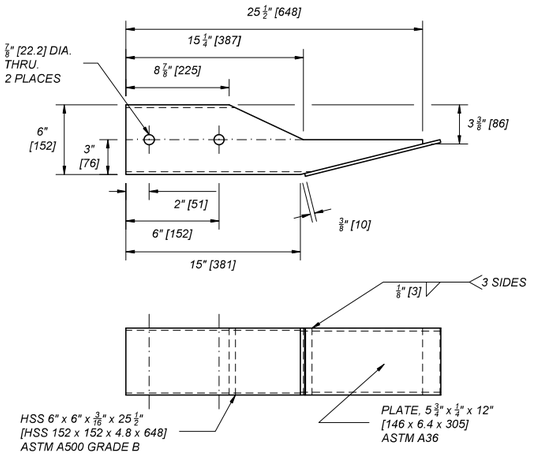
BENT

PLATE, 3" x 1/4" x 60 13/16"
[76 x 6.4 x 1545]
ASTM A572 GRADE 50

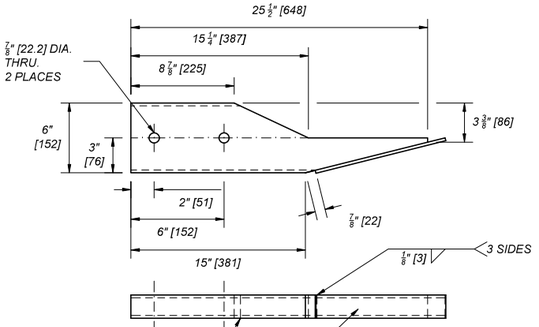
SIDE STIFFENER



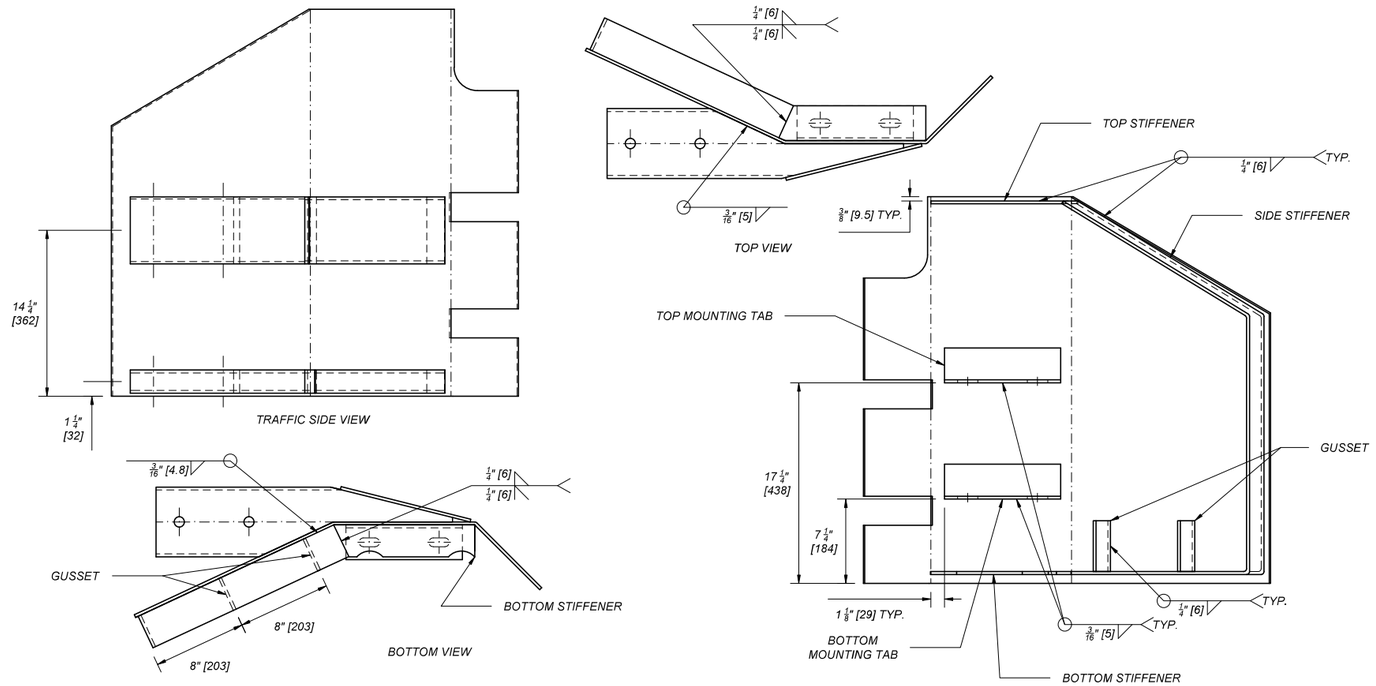
FLAT PATTERN



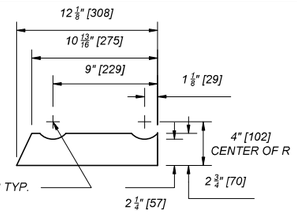
UPPER RAIL ATTACHMENT



RUB RAIL ATTACHMENT

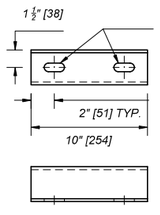


TRANSITION ATTACHMENT



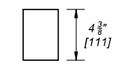
PLATE, 2 3/4" x 1/4" x 12 1/8"
[70 x 6.4 x 308]
ASTM A572 GRADE 50

BOTTOM STIFFENER



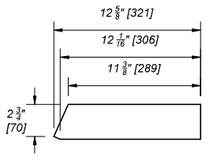
L3" x 3" x 1/4" x10"
[L76 x 76 x 6.4 x 254]
ASTM A572 GRADE 50
(2 REQUIRED)

MOUNTING TAB



PLATE, 3" x 1/4" x 4 3/8"
[76 x 6.4 x 111]
ASTM A572 GRADE 50
(2 REQUIRED)

GUSSET



PLATE, 3" x 1/4" x 12 5/8"
[76 x 6.4 x 321]
ASTM A572 GRADE 50

TOP STIFFENER

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWINGS

REFERENCE	DWG. NO.
STANDARD SPEC.	606-99A
SECTION 606	

BOX BEAM GUARDRAIL HARDWARE

EFFECTIVE: JUN 27, 2024

--REVISED--

MONTANA
Department of Transportation

5/14/2024 8:56 AM STDDRD606099A.DWG