

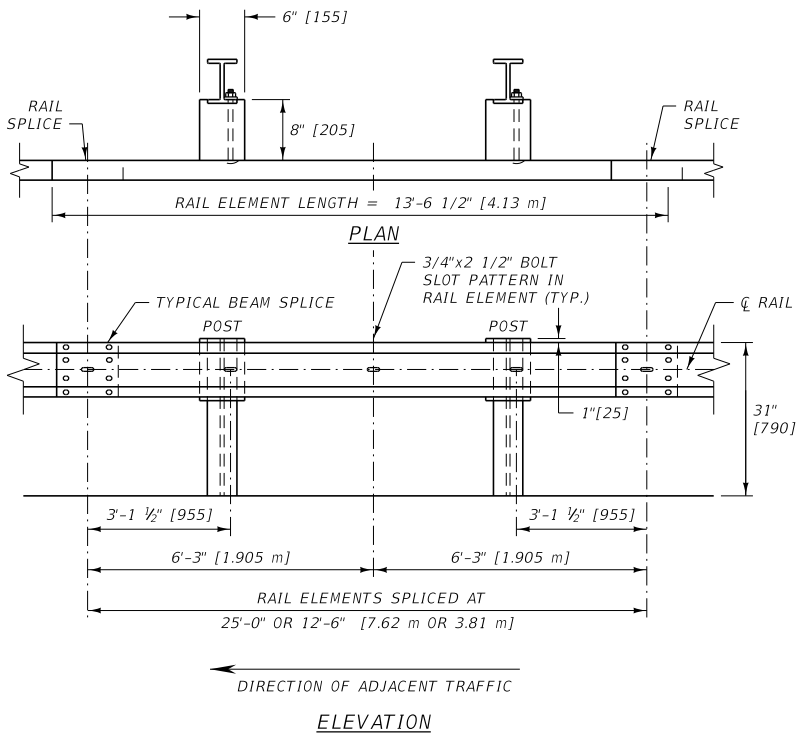
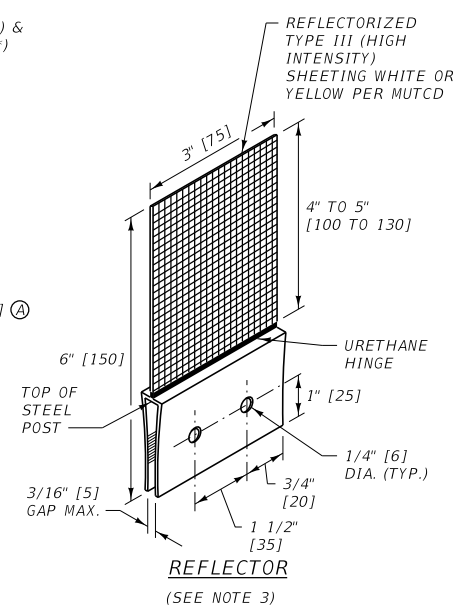
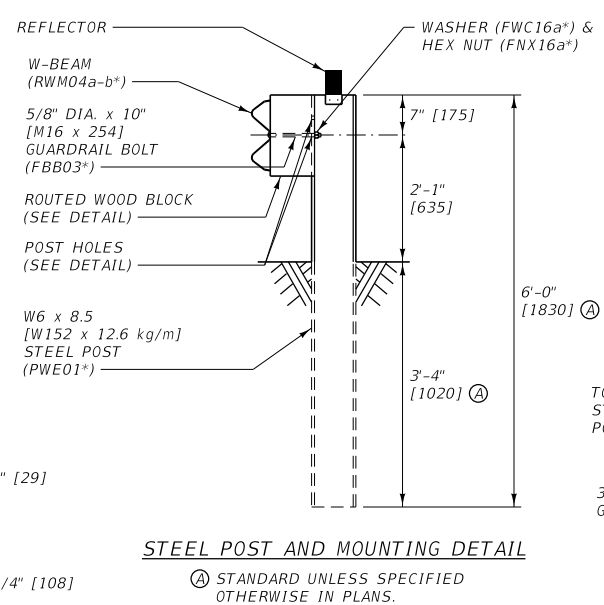
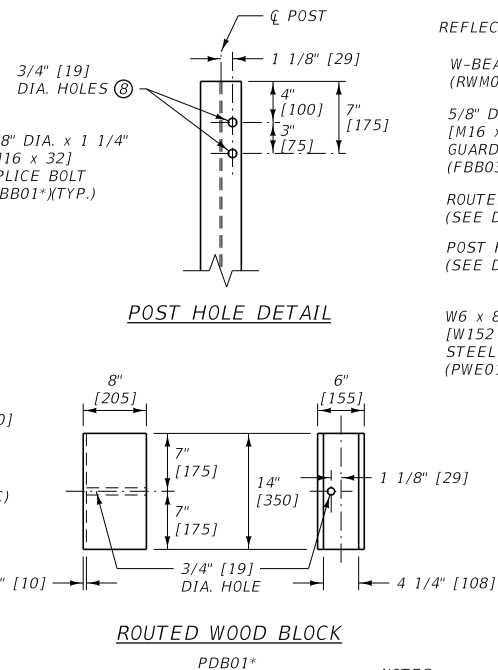
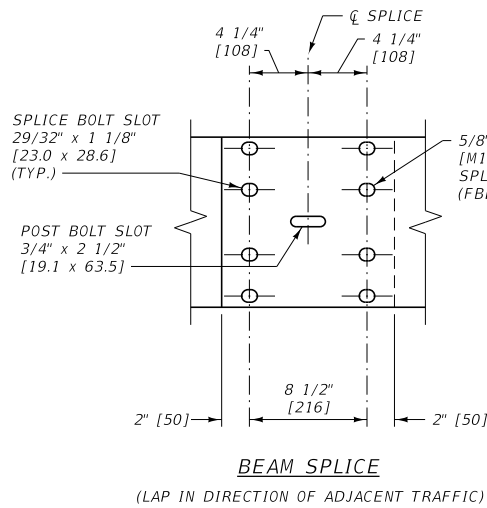
- NOTES:
- ① INSTALL ALL BOLTS WITH HEADS ON TRAFFIC SIDE OF INSTALLATION.
 - ② USE WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS. AFFIX BLOCKS TO POSTS WITH TWO 16 PENNY GALV. NAILS OR 14 GAUGE WIRE WRAP.
 - ③ ATTACH REFLECTORS TO POSTS EVERY 25 FEET [7.62 m], INCLUDING TERMINAL SECTIONS, WITH THE REFLECTORIZED 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.

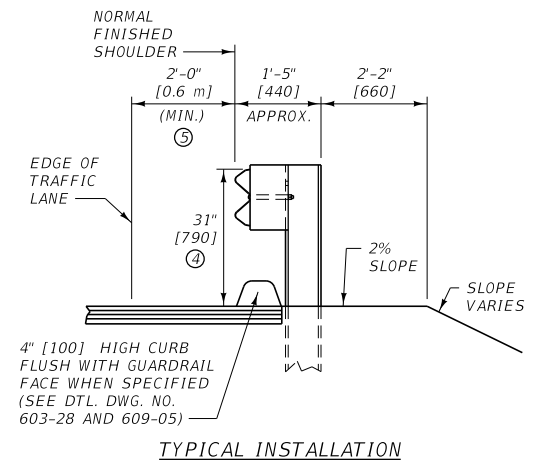
Ⓐ STANDARD UNLESS SPECIFIED OTHERWISE IN PLANS.

Ⓐ STANDARD UNLESS SPECIFIED OTHERWISE IN PLANS.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606, 704	DWG. NO. 606-05A
METAL GUARDRAIL - WOOD POSTS (MGS)	



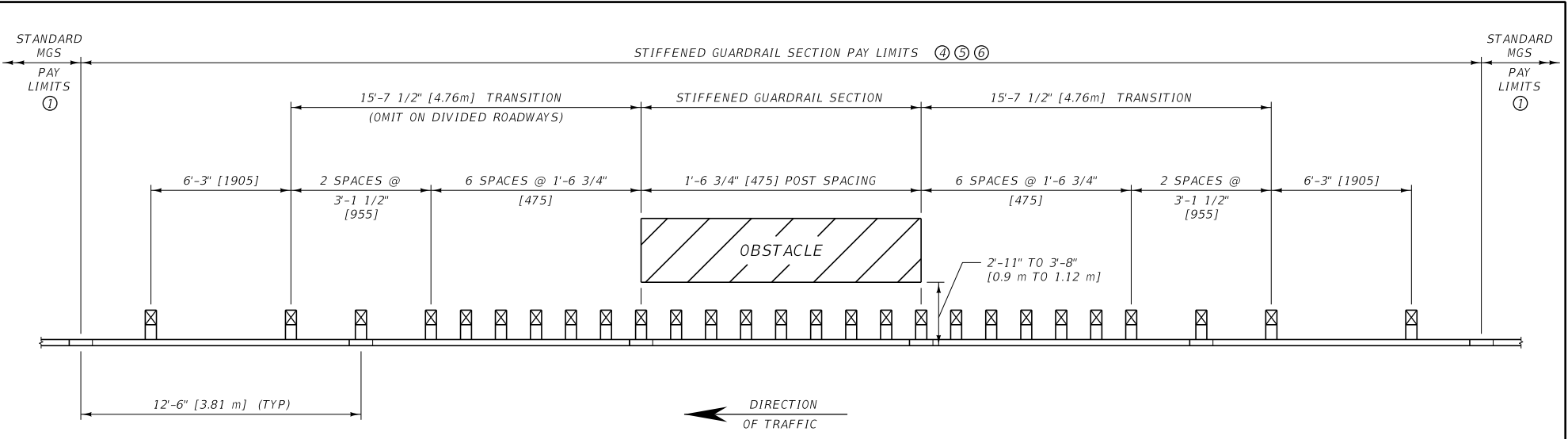
- NOTES:
- INSTALL ALL BOLTS WITH HEADS ON TRAFFIC SIDE OF INSTALLATION.
 - USE ROUTED WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS.
 - ATTACH REFLECTORS TO POSTS EVERY 25 FEET (7.62 m), INCLUDING TERMINAL SECTIONS, WITH THE REFLECTORIZED SURFACE FACING ADJACENT TRAFFIC. FASTEN REFLECTOR TO STEEL POST USING AN APPROVED ADHESIVE. REFLECTORS MAY BE BOLTED TO POSTS PROVIDED HOLES IN POSTS ARE DRILLED BEFORE BEING GALVANIZED.
 - ON EXISTING GUARDRAIL INSTALLATIONS, THE MINIMUM RAIL HEIGHT IS 27 3/4" [705].
 - WIDENING IS REQUIRED IF FINISHED SHOULDER IS LESS THAN 2'-0" [0.6 m] FROM THE TRAFFIC LANE.
 - 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.
 - DO NOT INSTALL W-BEAM GUARDRAIL FOR OBSTACLES WITHIN 5.3' [1.6 m] OF THE FACE OF THE RAIL.
 - USE LOWER HOLE ON NEW CONSTRUCTION INSTALLATIONS.
 - 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)	
EFFECTIVE: SEPTEMBER 2014	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	

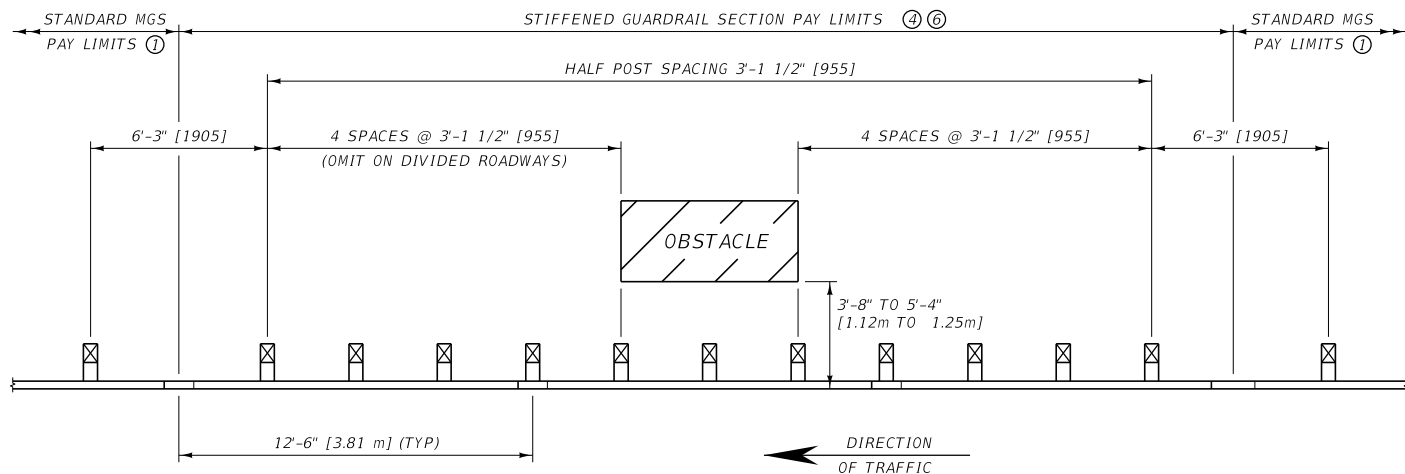
--REVISED--
JANUARY 2018

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



← DIRECTION OF TRAFFIC

QUARTER POST SPACING



← DIRECTION OF TRAFFIC

HALF POST SPACING

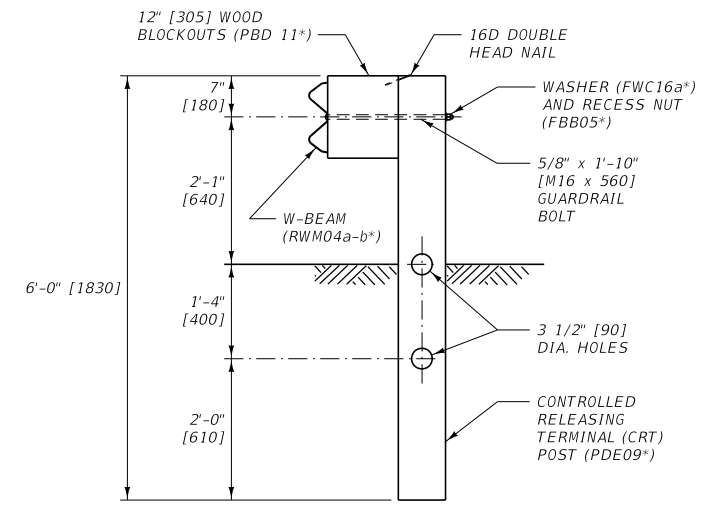
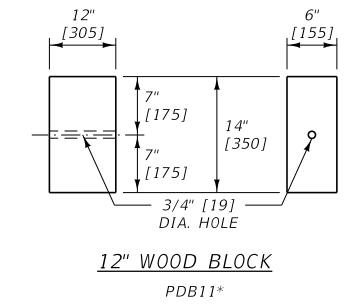
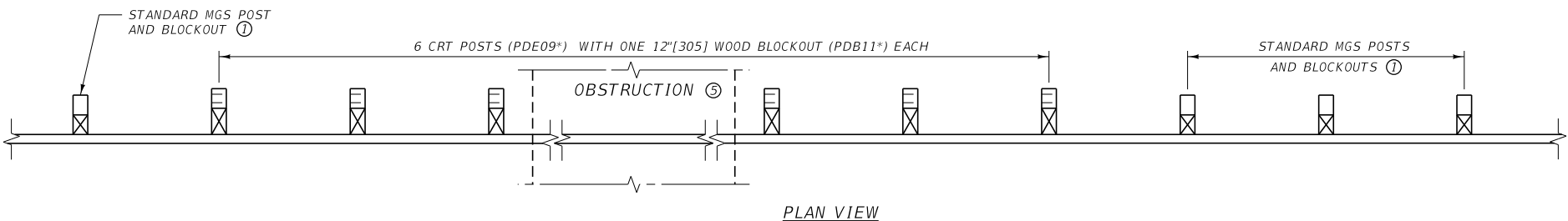
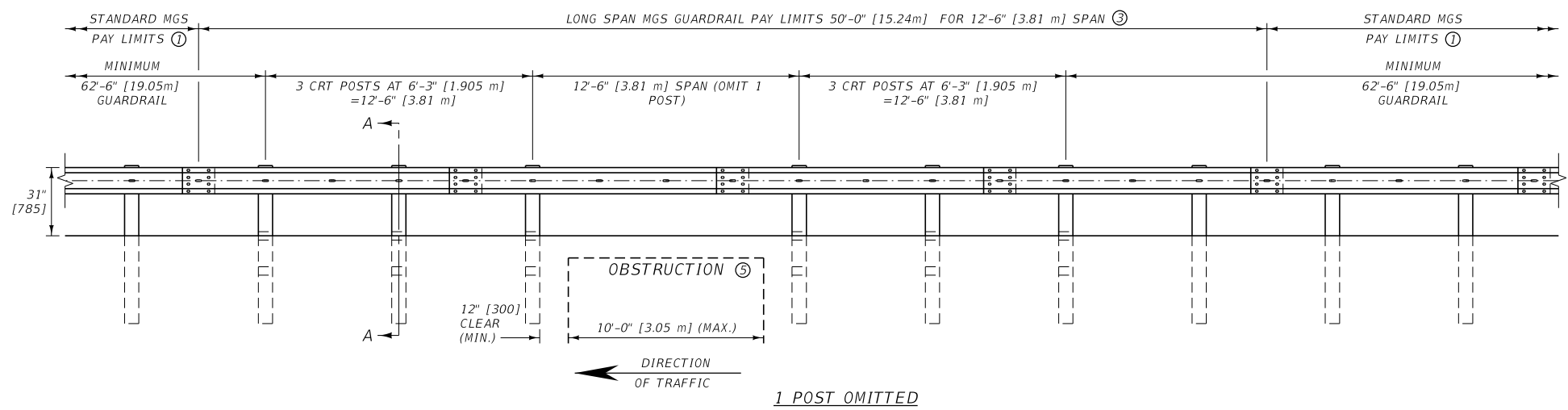
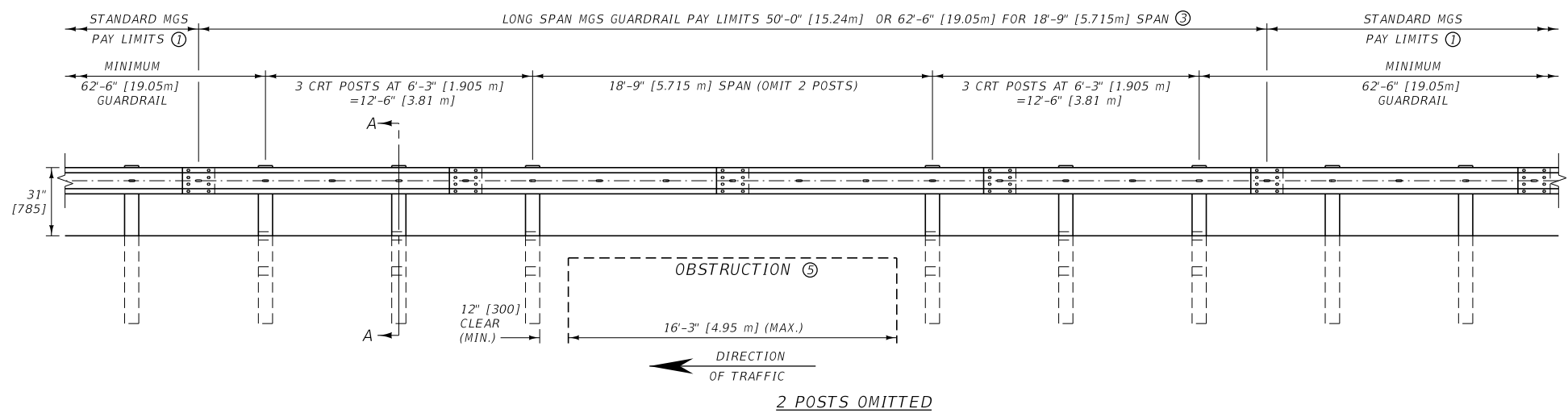
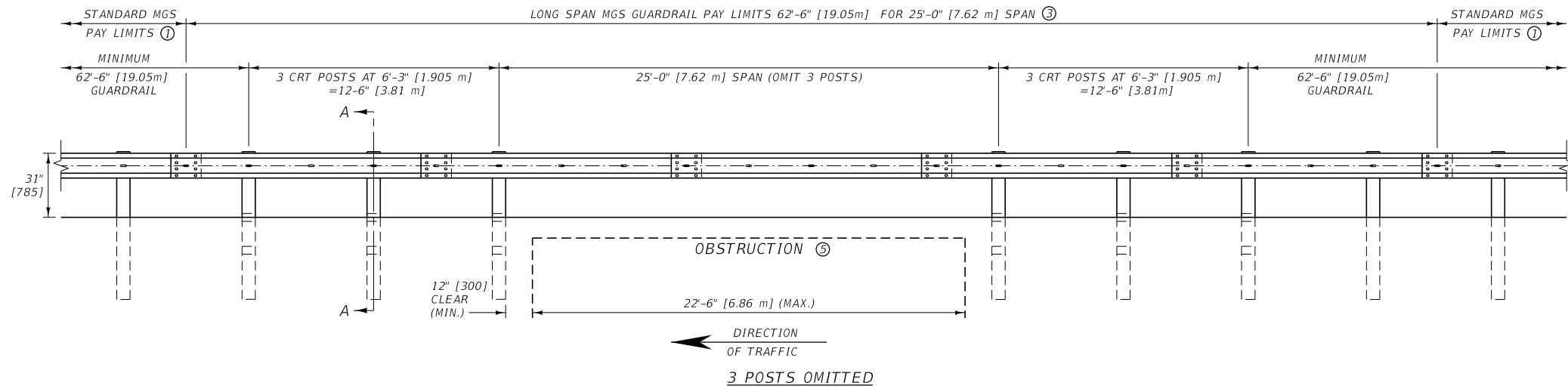
NOTES:

- 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.	606-07
STANDARD SPEC. SECTION 606	
STIFFENED GUARDRAIL SECTIONS (MGS)	
EFFECTIVE: SEPTEMBER 2014	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	

--REVISED--
JANUARY 2018

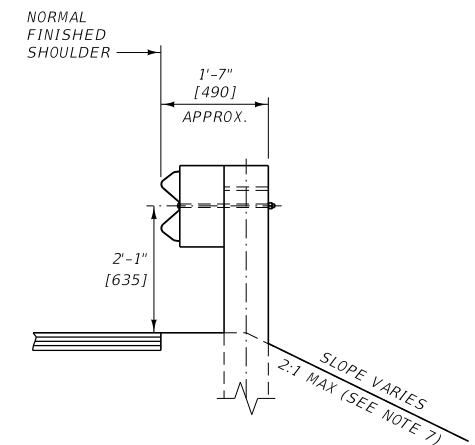
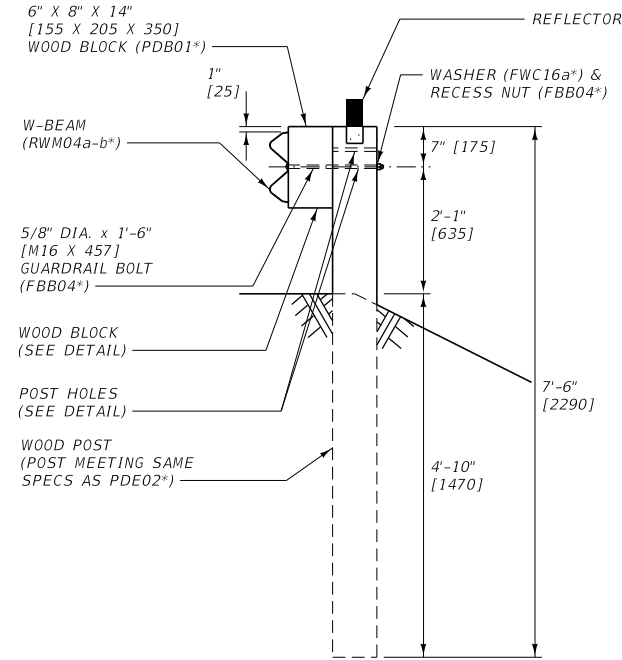
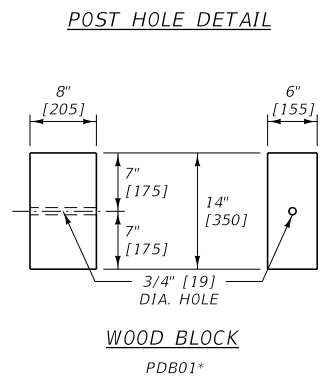
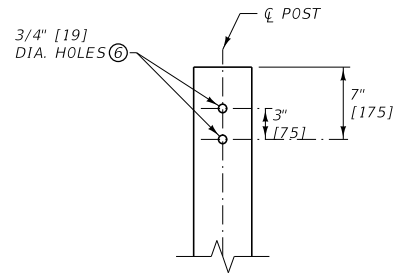
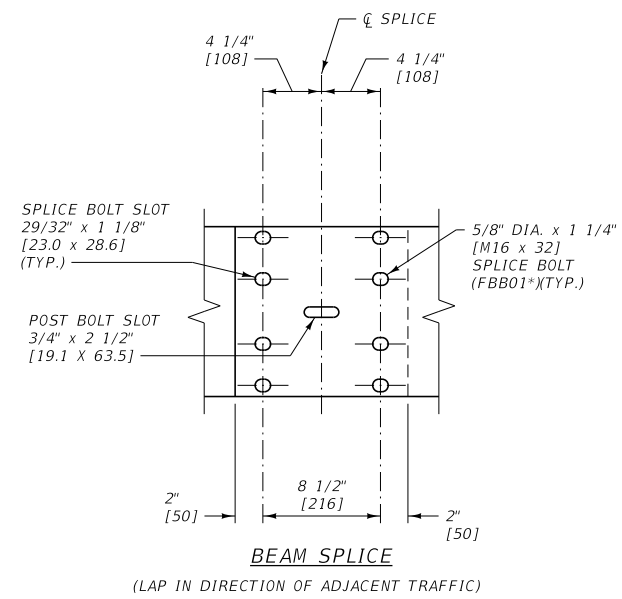


- NOTES:
- ① SEE DTL. DWG. NO. 606-05A AND 606-05B FOR STANDARD MGS GUARDRAIL AND ASSOCIATED HARDWARE.
 - ② LAP ALL RAIL IN THE DIRECTION OF ADJACENT TRAFFIC.
 - ③ TYPICAL SPLICE LOCATIONS SHOWN, MAY VARY BASED ON ACTUAL RAIL SEGMENTS INSTALLED. PAY LIMITS NOT DEPENDENT ON SPLICE LOCATION.
 - ④ DO NOT 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.

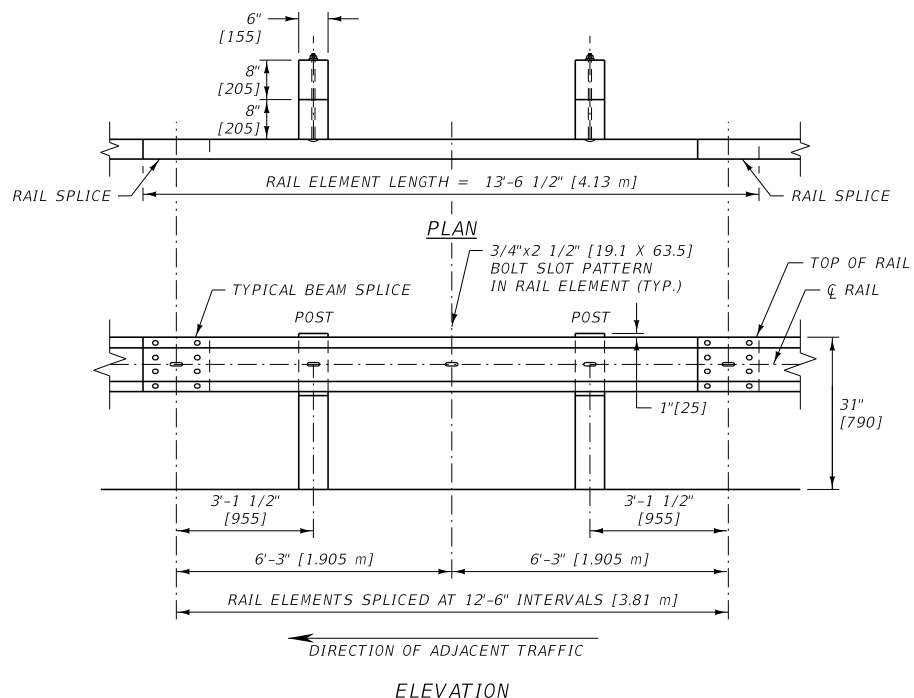
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-09
LONG SPAN GUARDRAIL (MGS)	
EFFECTIVE: SEPTEMBER 2014	
MONTANA DEPARTMENT OF TRANSPORTATION	

--REVISED--
 JANUARY 2018
 APRIL 2019

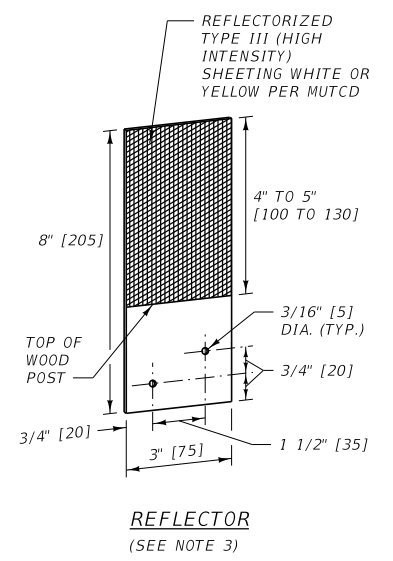


NOTE:
THIS GUARDRAIL SYSTEM IS USED WHEN THE 2'-0" [610] WIDENING BEHIND THE POSTS CANNOT BE PROVIDED, AS PER DTL. DWG. NO. 606-05A & 606-05B.



- NOTES:
- INSTALL ALL BOLTS WITH HEADS ON TRAFFIC SIDE OF INSTALLATION.
 - USE WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS. AFFIX BLOCKS TO POSTS WITH TWO 16 PENNY GALV. NAILS OR 14 GAUGE WIRE WRAP.
 - 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.
 - ON EXISTING GUARDRAIL INSTALLATIONS, THE MINIMUM RAIL HEIGHT IS 27 3/4" [705].

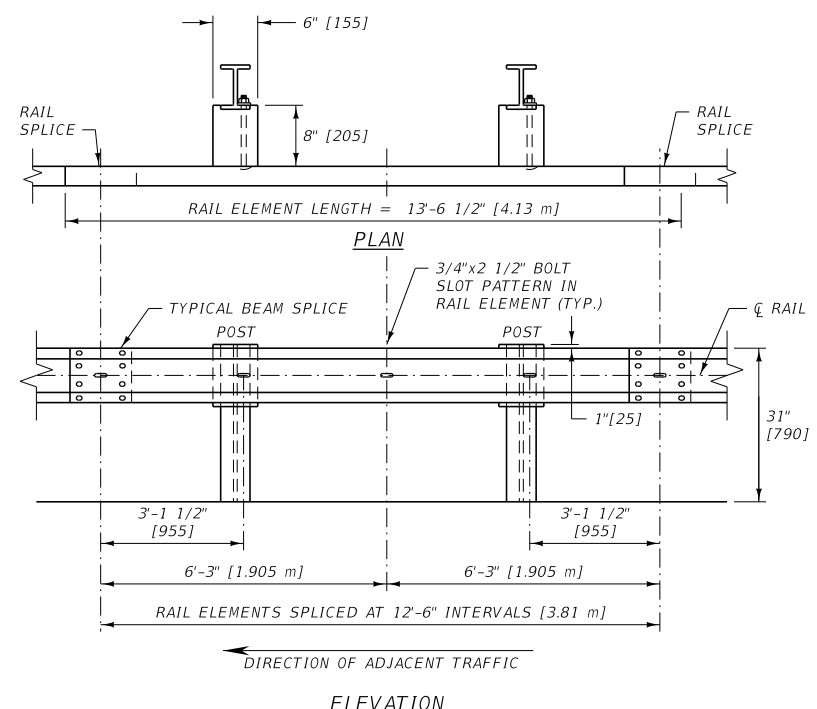
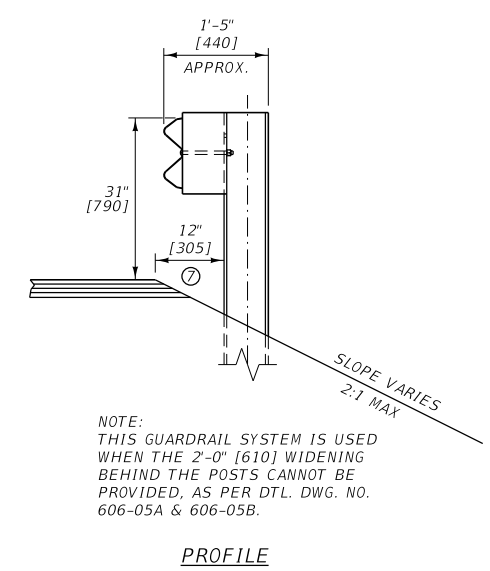
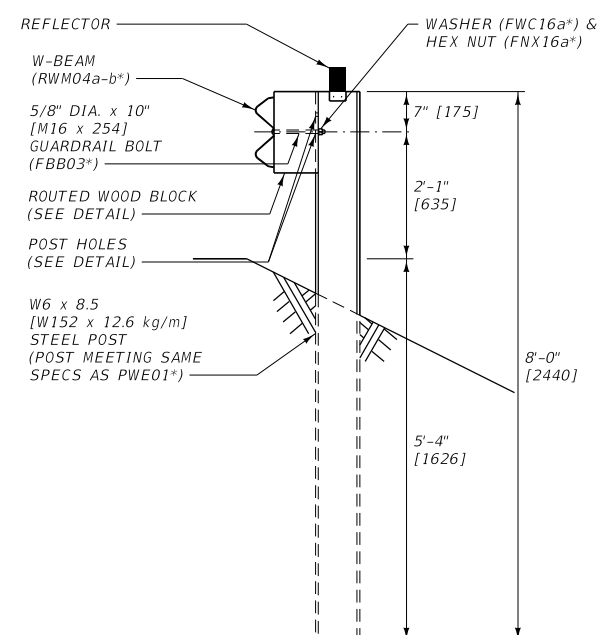
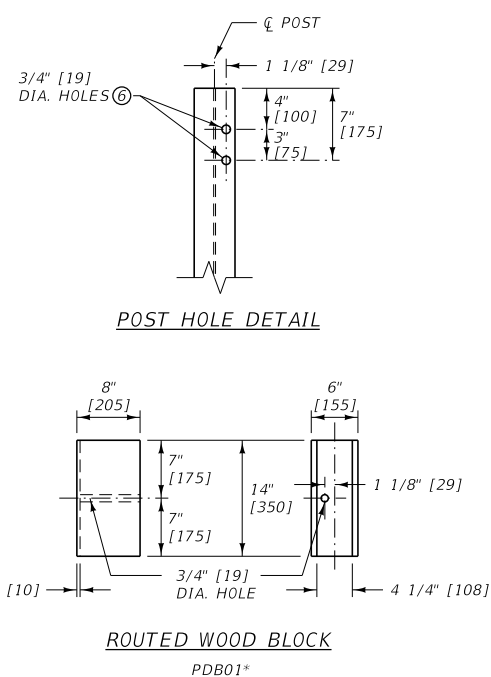
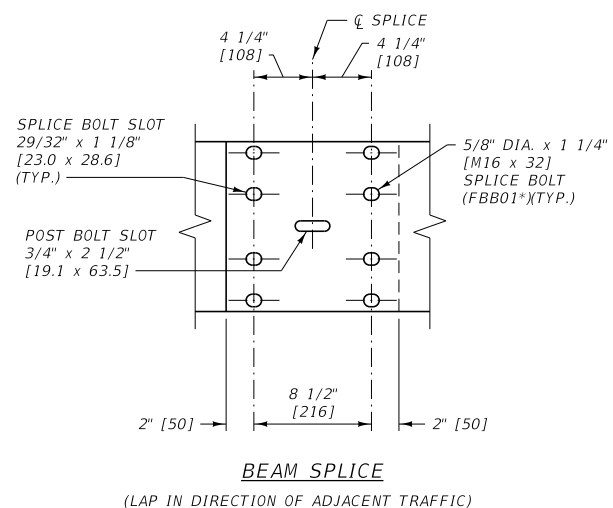
- DO NOT INSTALL LONG POST W-BEAM GUARDRAIL FOR OBSTACLES WITHIN 5'-6" [1.65 m] OF THE FACE OF THE RAIL.
 - USE LOWER HOLE ON NEW CONSTRUCTION INSTALLATIONS.
 - BEGIN INSLOPE BREAK AT CENTER OF POST.
- * SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.



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

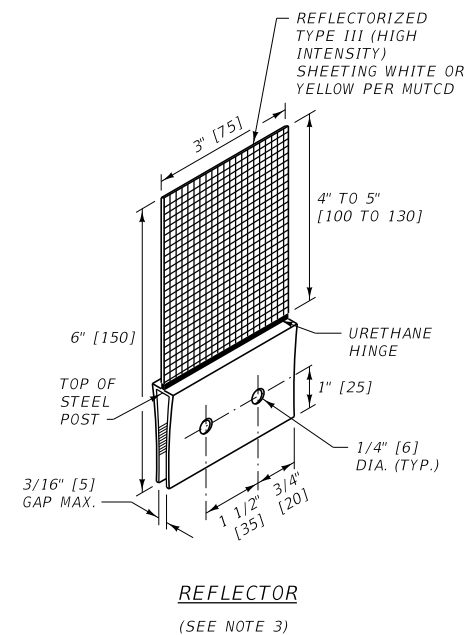
--REVISED--
JANUARY 2018

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606, 704	DWG. NO. 606-11A
METAL GUARDRAIL - LONG POSTS - WOOD (MGS)	
EFFECTIVE: SEPTEMBER 2014	
MONTANA DEPARTMENT OF TRANSPORTATION	



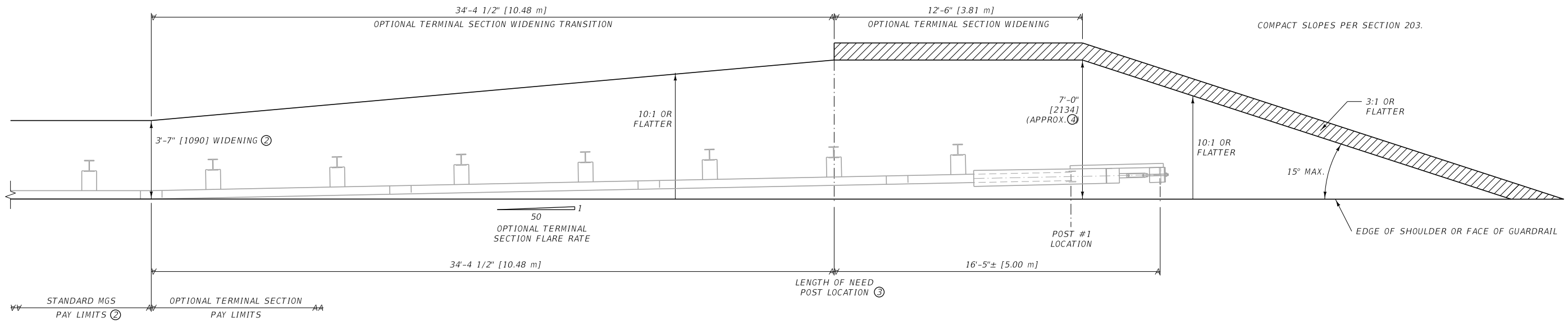
- NOTES:
- 1 INSTALL ALL BOLTS WITH HEADS ON TRAFFIC SIDE OF INSTALLATION.
 - 2 USE ROUTED WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS.
 - 3 ATTACH REFLECTORS TO POSTS EVERY 25' [7.62 m], INCLUDING TERMINAL SECTIONS, WITH THE REFLECTORIZED SURFACE FACING ADJACENT TRAFFIC. FASTEN REFLECTOR TO STEEL POST 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].

- 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.

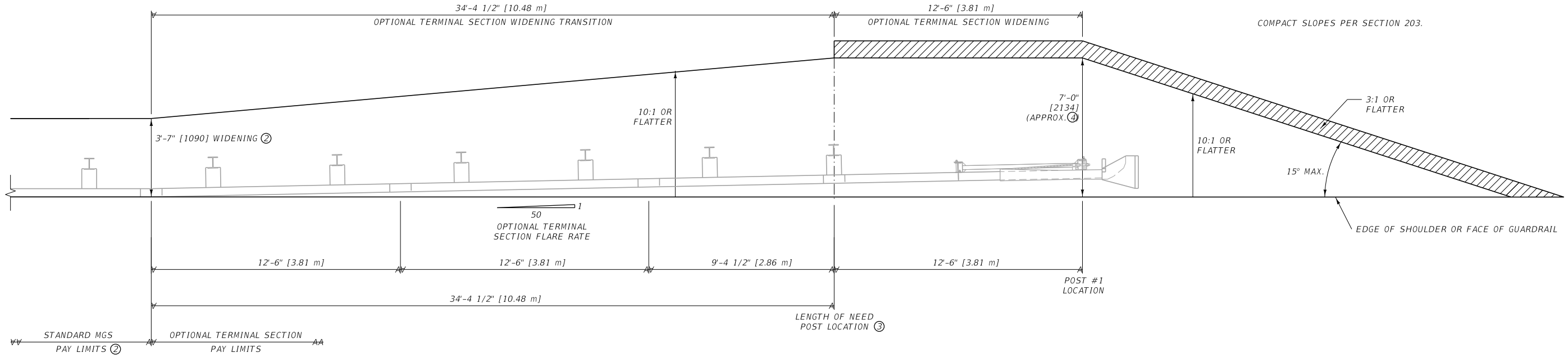


UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

--REVISED-- JANUARY 2018		EFFECTIVE: SEPTEMBER 2014	
REFERENCE STANDARD SPEC. SECTION 606		DWG. NO. 606-11B	
METAL GUARDRAIL - LONG POSTS - STEEL (MGS)		MDTA MONTANA DEPARTMENT OF TRANSPORTATION	



TRINITY SOFTSTOP ①



ROAD SYSTEMS MSKT WITH 9'-4 1/2" RAIL PANEL ①

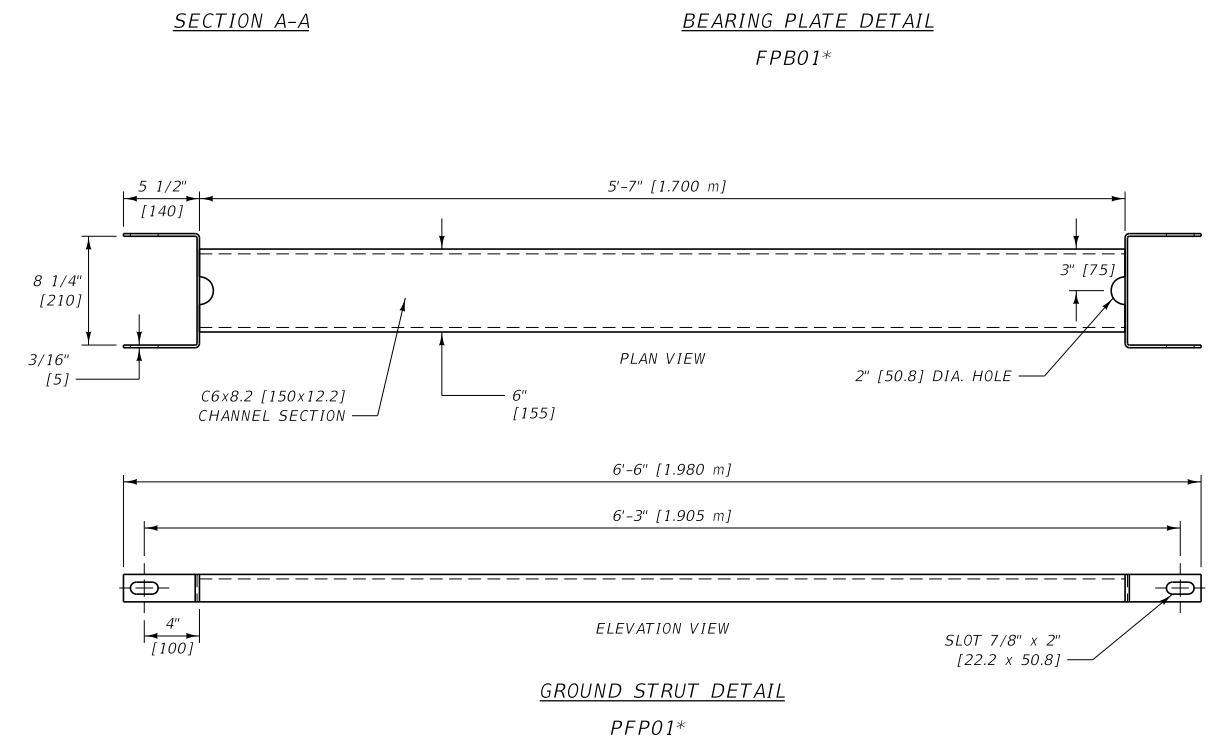
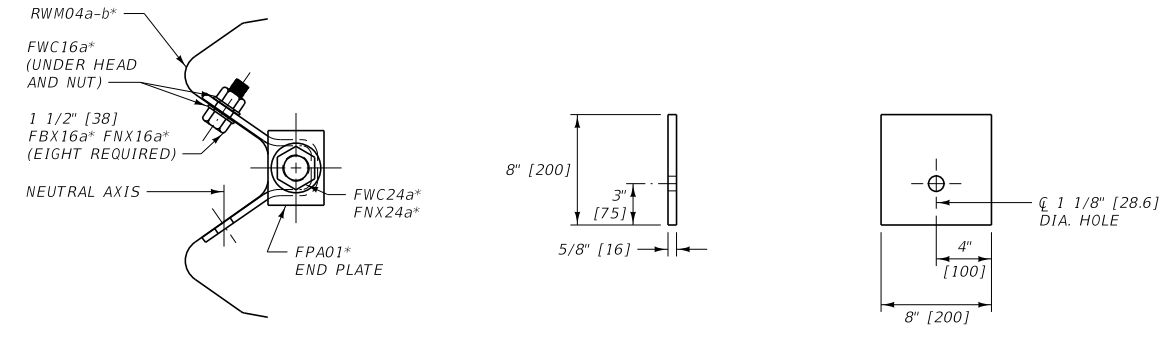
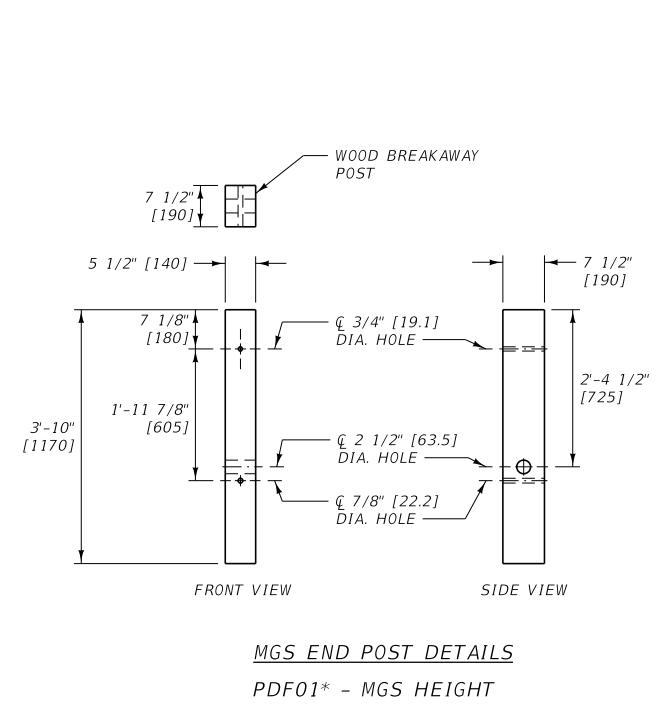
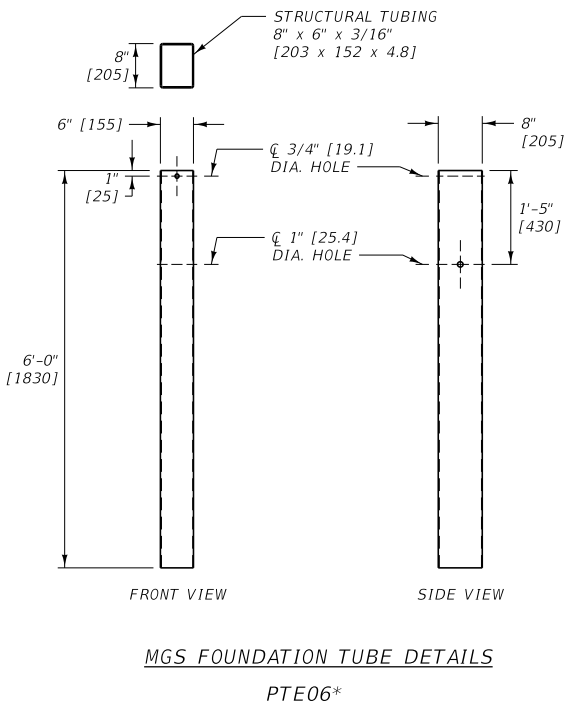
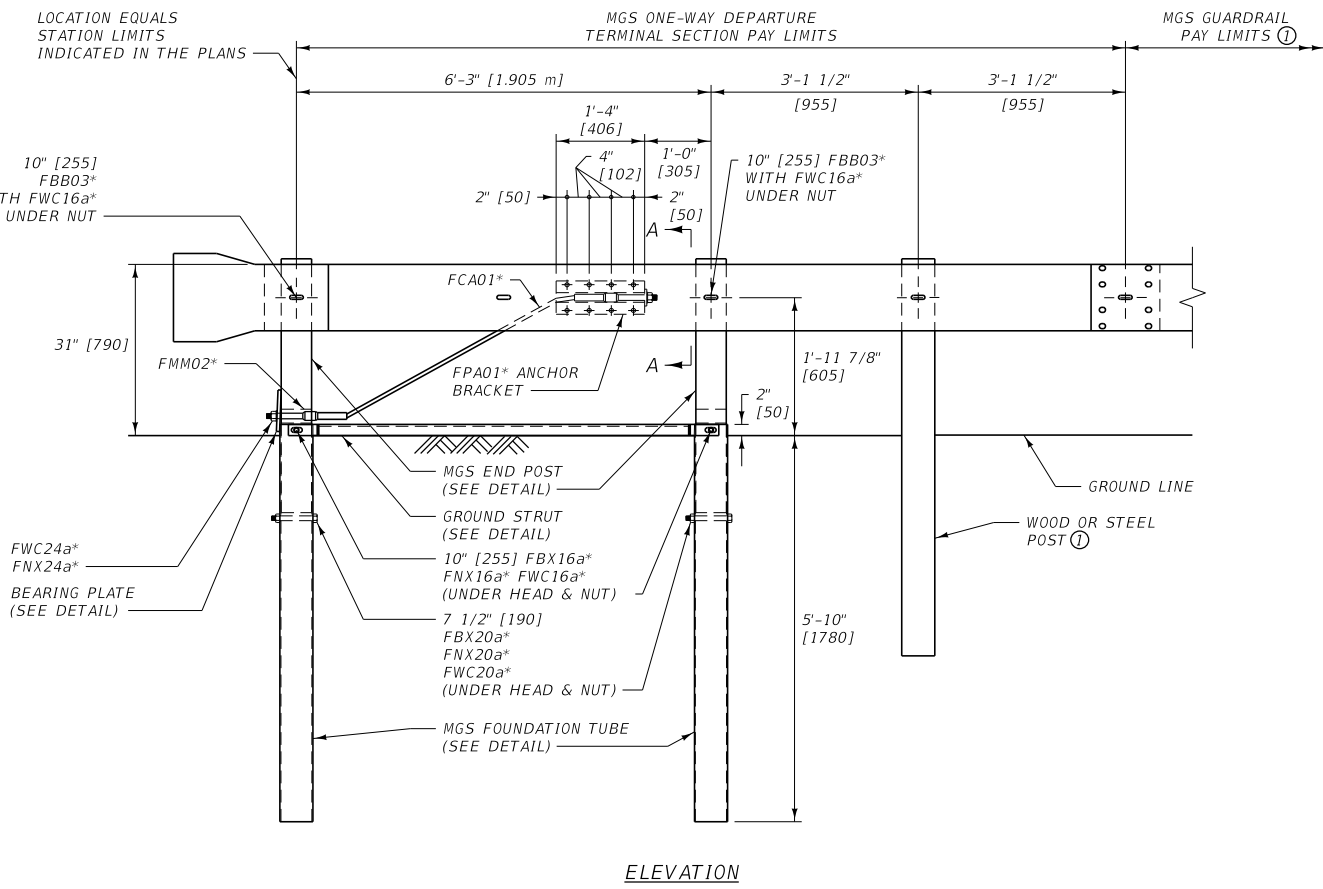
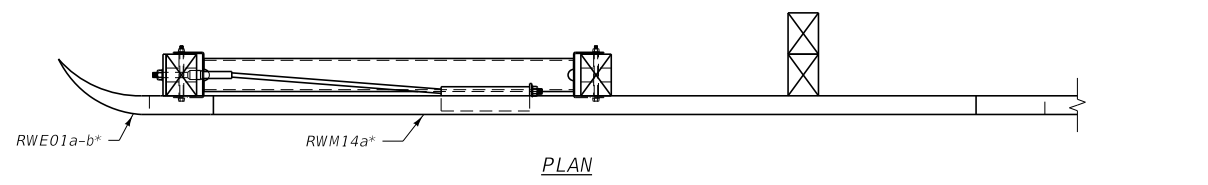
- ① OPTIONAL TERMINAL SECTION SYSTEMS VARY, REFER TO MANUFACTURER'S DETAIL AND ASSEMBLY INSTRUCTIONS.
- ② SEE DTL. DWG. NO. 606-05A AND 606-05B FOR MGS GUARDRAIL. SEE DTL. DWG. NO. 606-20 IF CONNECTING TO EXISTING RAIL THAT IS NOT WITHIN THE MANUFACTURER'S HEIGHT TOLERANCE.
- ③ LENGTH OF NEED POST LOCATION EQUALS STATION LIMITS INDICATED IN THE PLANS.
- ④ 7'-0" [2.13m] WIDENING DIMENSION ALLOWS FOR OPTIONAL TERMINAL SECTION FLARE AND SYSTEM WIDTH. A MINIMUM WIDENING DISTANCE OF 5'-0" [1.52m] IS REQUIRED BEHIND POST LOCATION #1.

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

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606, 203	DWG. NO. 606-13
MASH OPTIONAL TERMINAL SECTIONS	

EFFECTIVE: JANUARY 2018

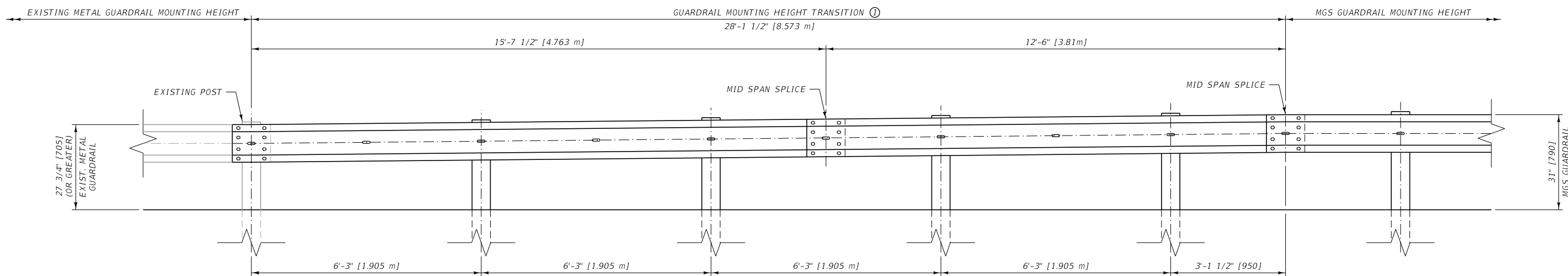




NOTE:
 ① SEE DTL. DWG. NO. 606-05A AND 606-05B FOR MGS GUARDRAIL.
 * SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

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)	
EFFECTIVE: SEPTEMBER 2014	



TRANSITION FROM $27\frac{3}{4}"$ [705] (OR GREATER) TO $31"$ [775] GUARDRAIL MOUNTING HEIGHT

NOTES:

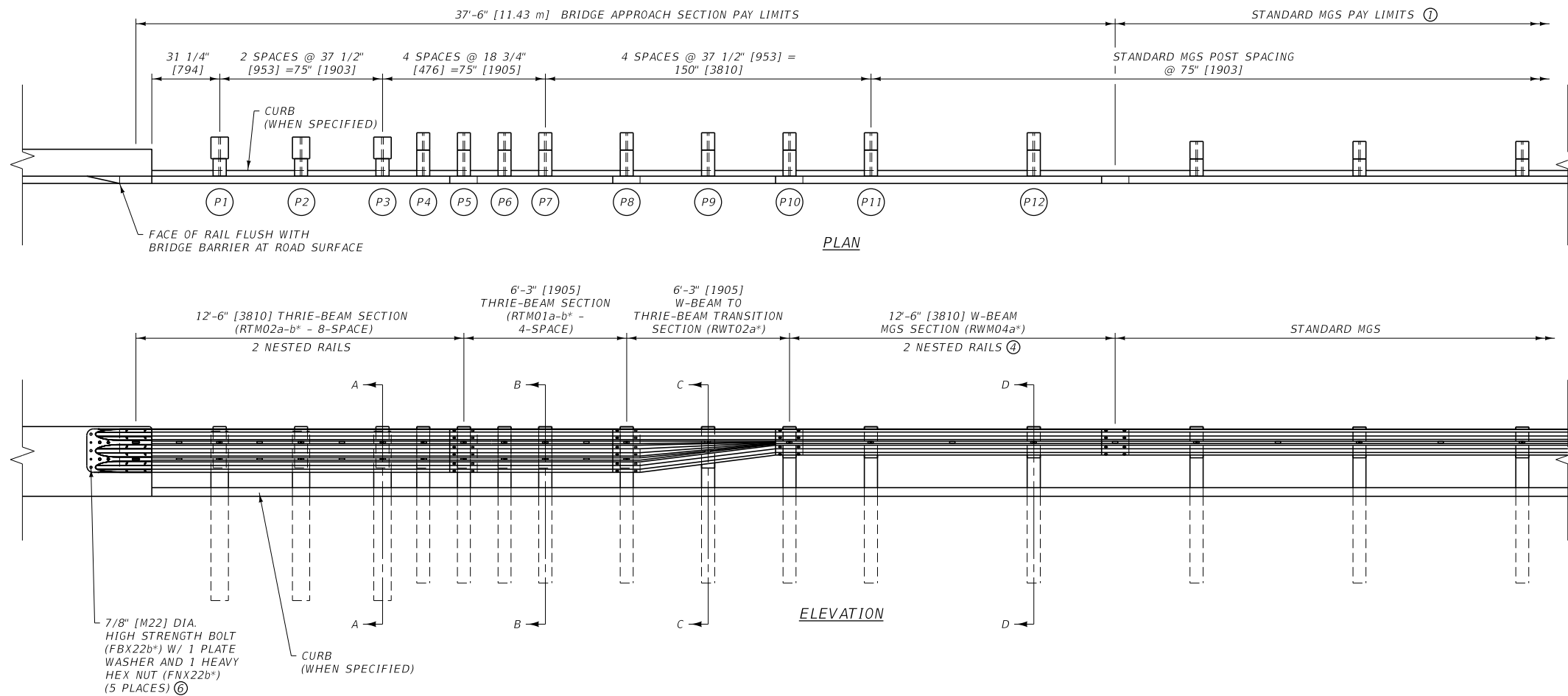
- ① THE MGS TO METAL GUARDRAIL TRANSITION IS PAID FOR AS LINEAR FEET OF MGS GUARDRAIL.
- ② SEE DTL DWG. NO. 606-05A, 606-05B, 606-11A, AND 606-11B FOR MGS GUARDRAIL AND ASSOCIATED HARDWARE.
- ③ LAP ALL W-BEAM RAIL IN THE DIRECTION OF ADJACENT TRAFFIC.

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

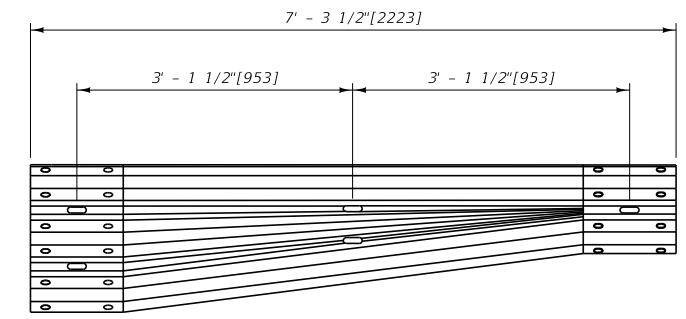
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-20

MGS TO METAL GUARDRAIL TRANSITION

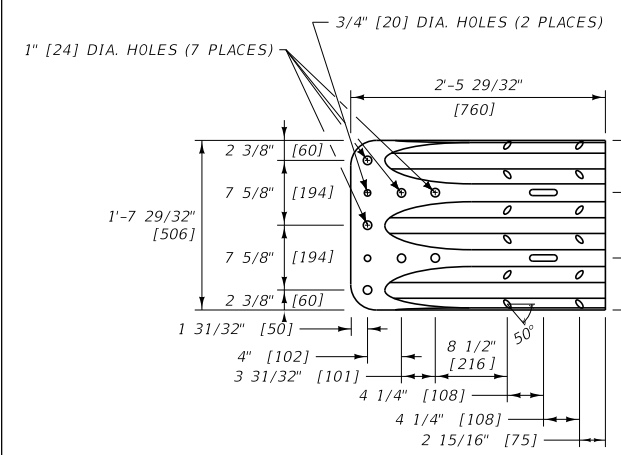
--REVISED-- APRIL 2019	EFFECTIVE: JANUARY 2018
 MDTA MONTANA DEPARTMENT OF TRANSPORTATION	



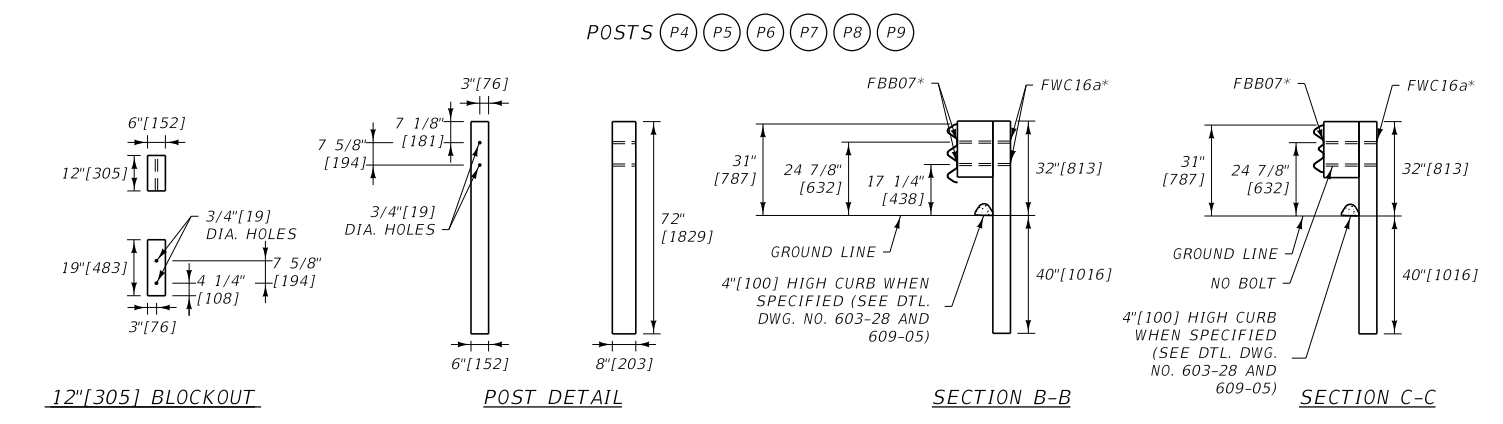
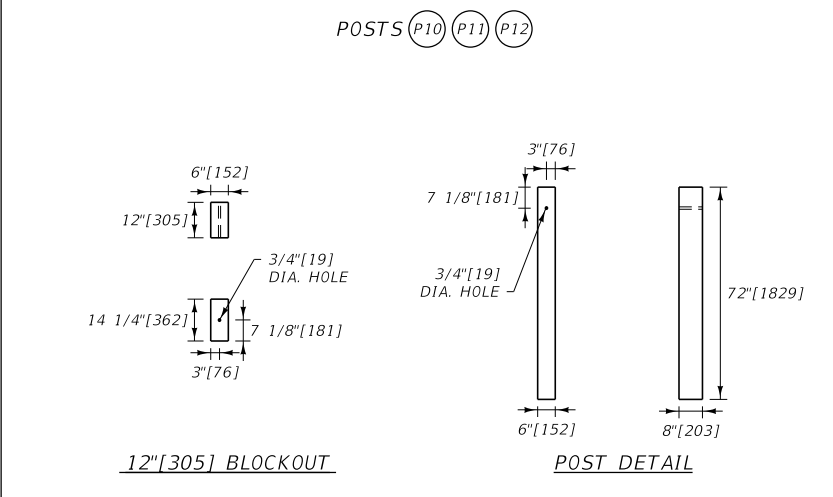
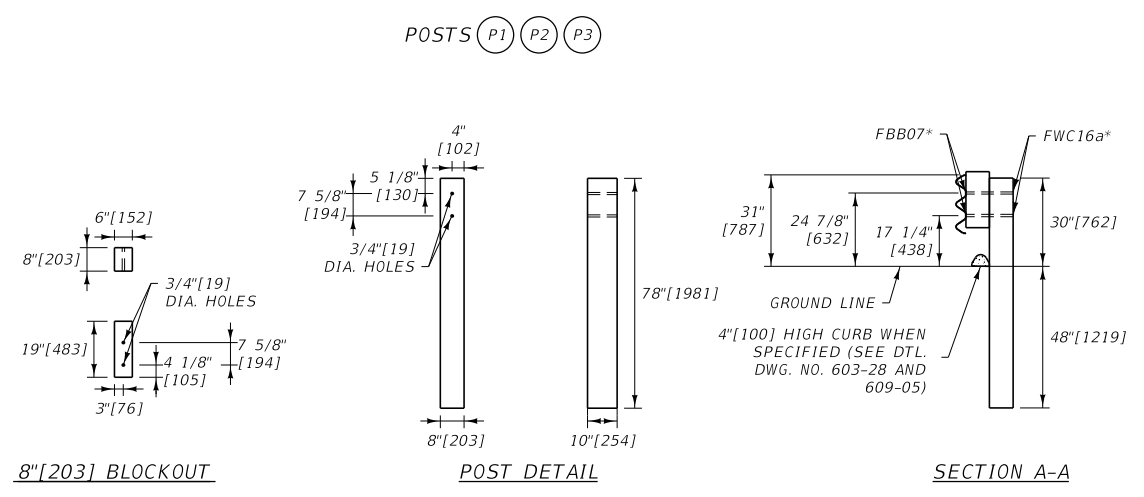
- NOTES:
- SEE DTL. DWG. NO. 606-05A FOR STANDARD MGS GUARDRAIL AND ASSOCIATED HARDWARE.
 - LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.
 - DO NOT FLARE BRIDGE APPROACH SECTIONS.
 - WHERE CURB EXTENDS UPSTREAM OF POST NO. 5, FURNISH 2 NESTED 12-GAUGE W-BEAM RAILS FOR THIS 12'-6" [3810]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

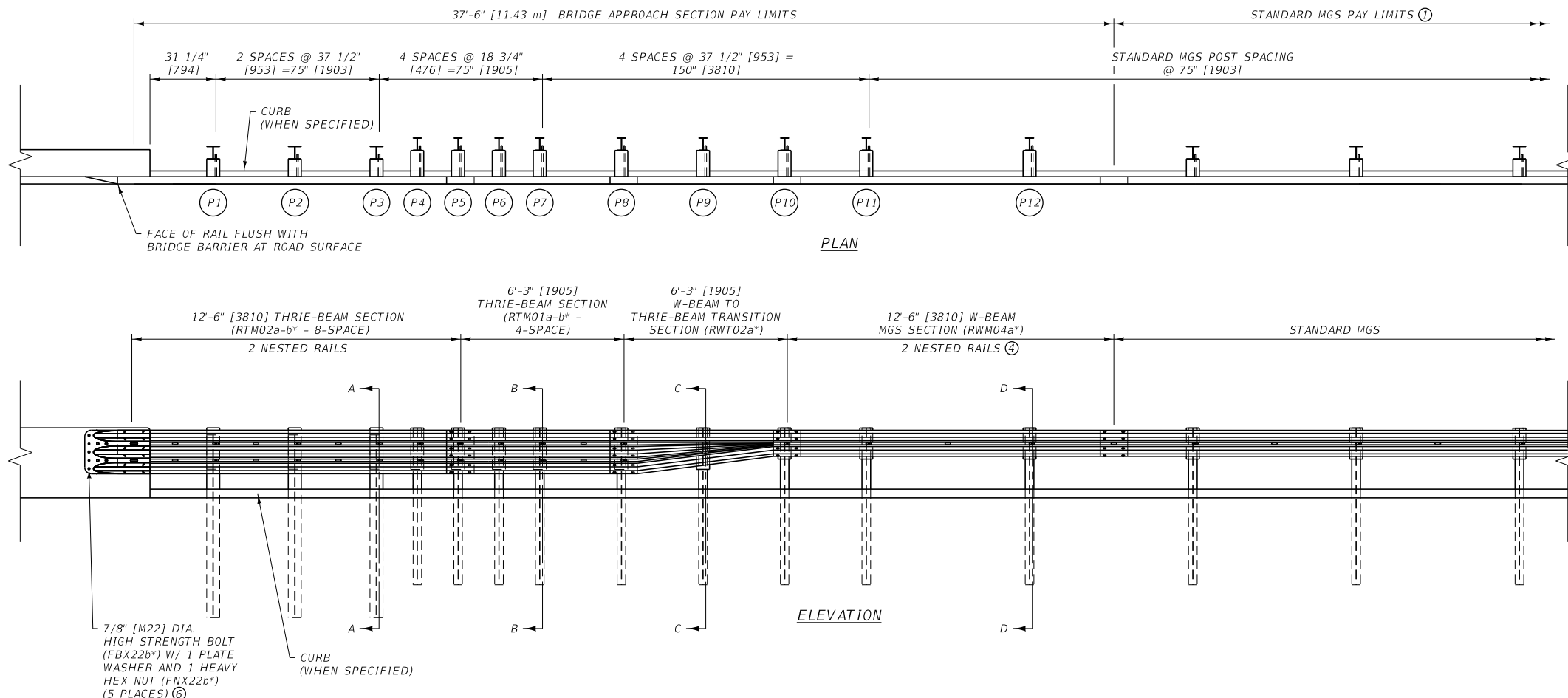


THRIE-BEAM TERMINAL CONNECTOR
RTE01b*

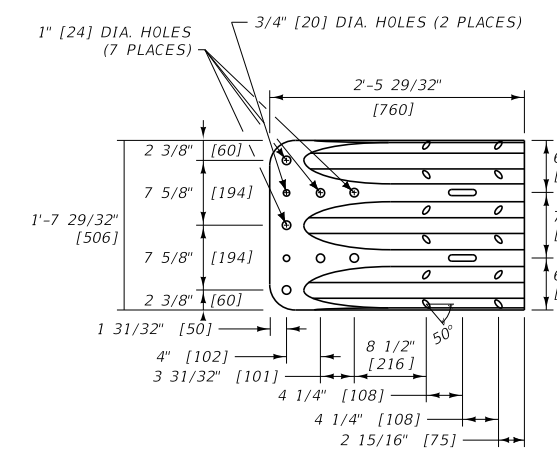
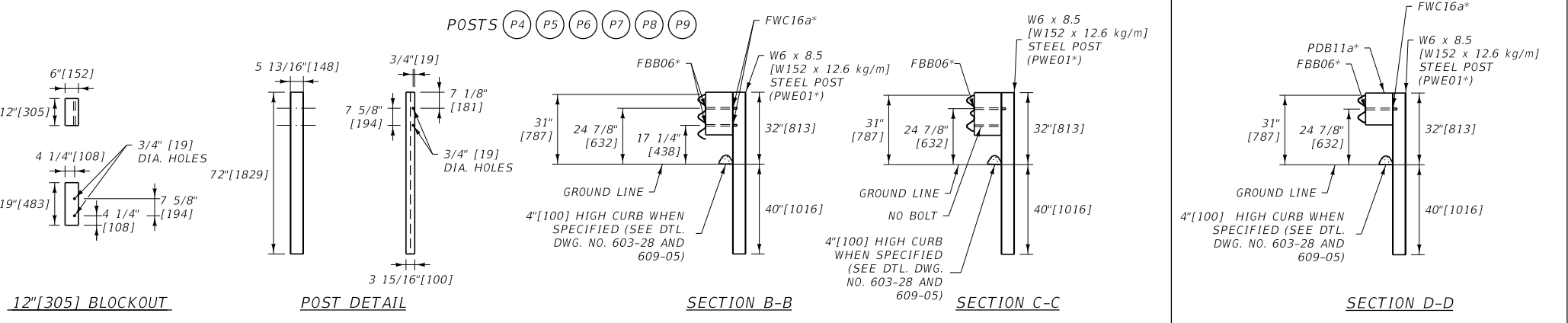
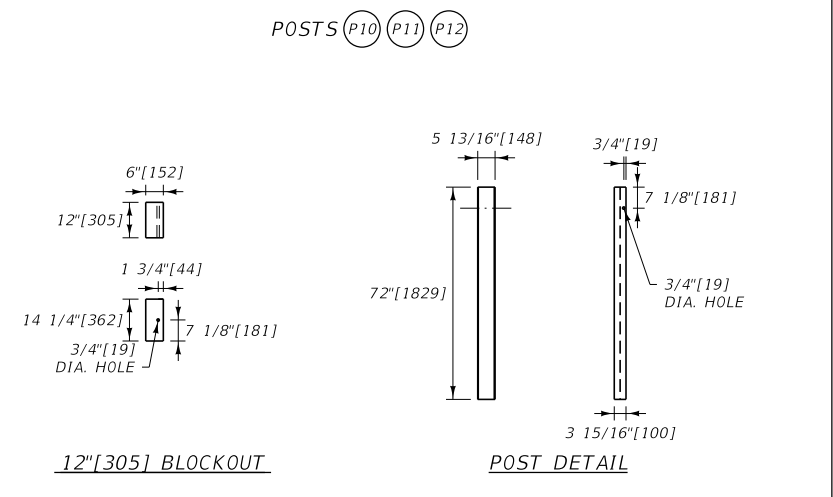
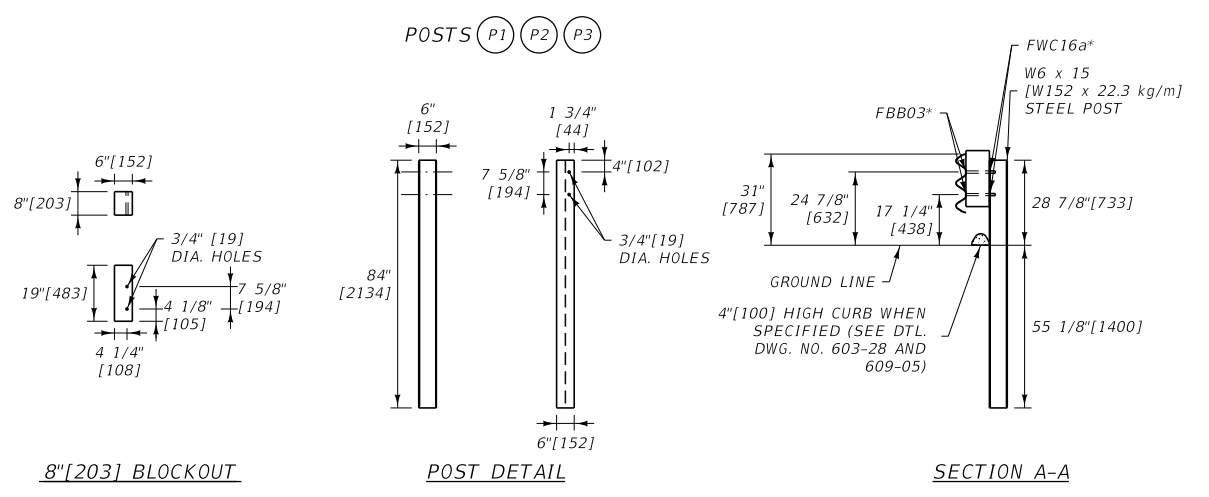
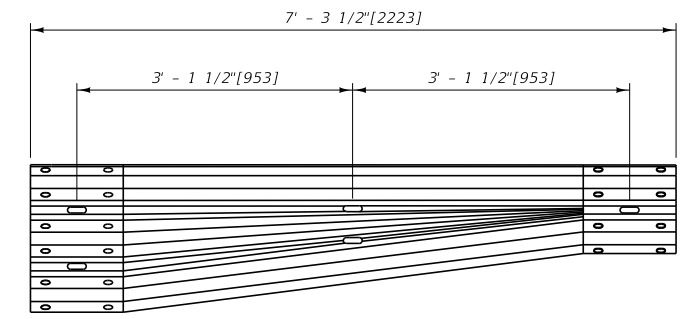


UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-23A
MGS THRIE BEAM BRIDGE APPROACH SECTION - WOOD POSTS	
---REVISED--- APRIL 2019	EFFECTIVE: JANUARY 2018
MONTANA DEPARTMENT OF TRANSPORTATION	

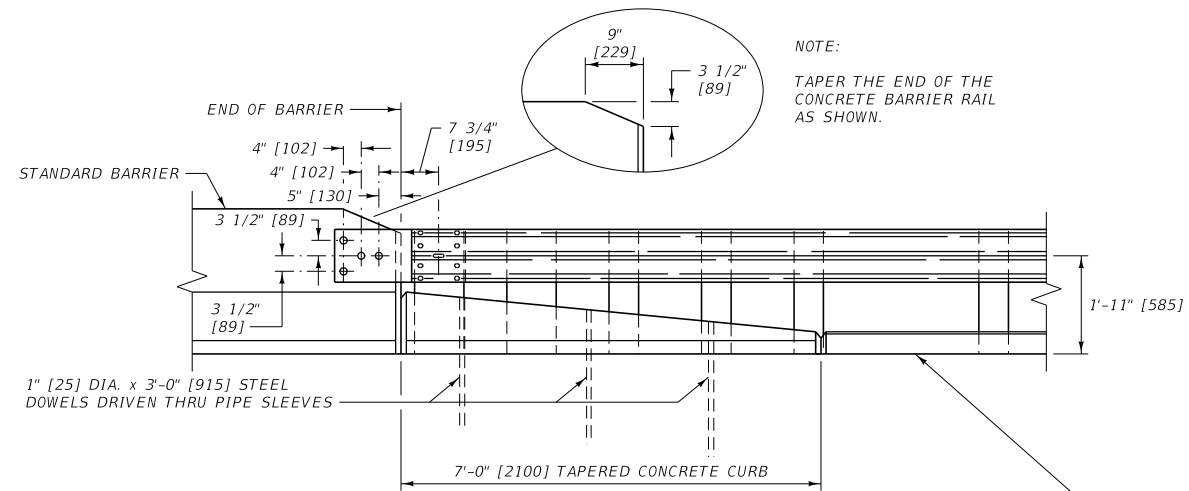


- NOTES:
- SEE DTL. DWG. NO. 606-05A FOR STANDARD MGS GUARDRAIL AND ASSOCIATED HARDWARE.
 - LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.
 - DO NOT FLARE BRIDGE APPROACH SECTIONS.
 - WHERE CURB EXTENDS UPSTREAM OF POST NO. 5, FURNISH 2 NESTED 12-GAUGE W-BEAM RAILS FOR THIS 12'-6" [3810] SECTION. INCLUDE THIS ADDITIONAL RAIL IN THE COST OF THE BRIDGE APPROACH SECTION.
 - USE WOOD BLOCKS OR OTHER "MASH" APPROVED BLOCKS. AFFIX BLOCKS TO POSTS WITH TWO 16 PENNY GALV. NAILS OR 14 GAUGE WIRE WRAP.
 - SEE BRIDGE PLANS FOR CONNECTION DETAILS AND BOLT LOCATIONS.
- * SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

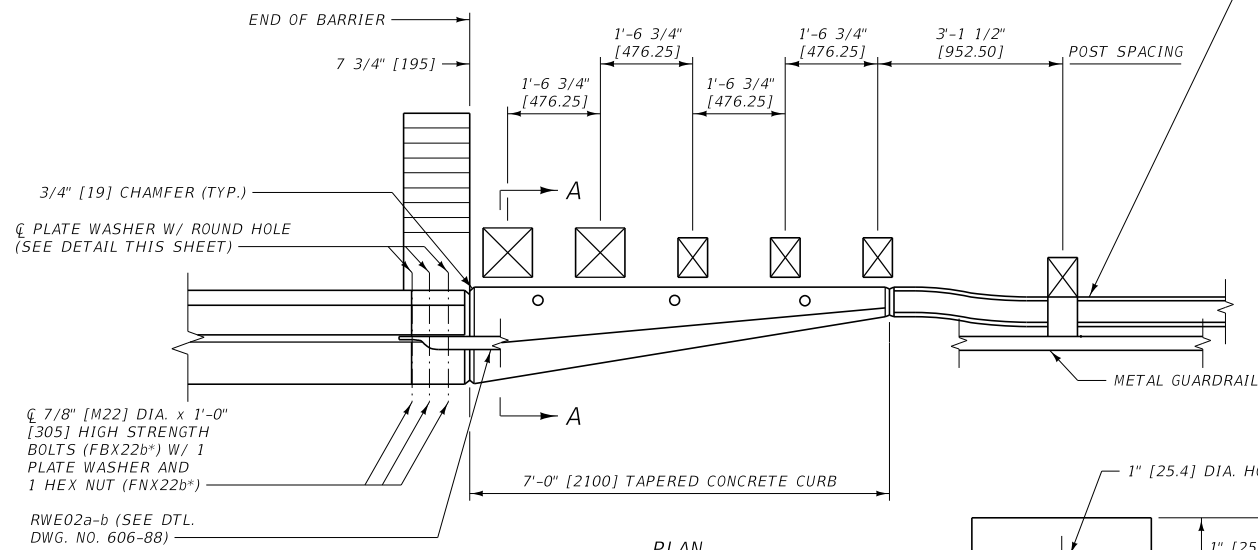


DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-23B
MGS THRIE BEAM BRIDGE APPROACH SECTION - STEEL POSTS	
EFFECTIVE: JANUARY 2018	
--REVISED-- APRIL 2019	
MDTA MONTANA DEPARTMENT OF TRANSPORTATION	

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



ELEVATION



PLAN

DETAIL "A"

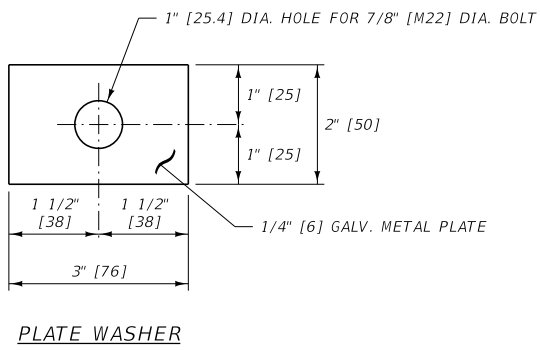
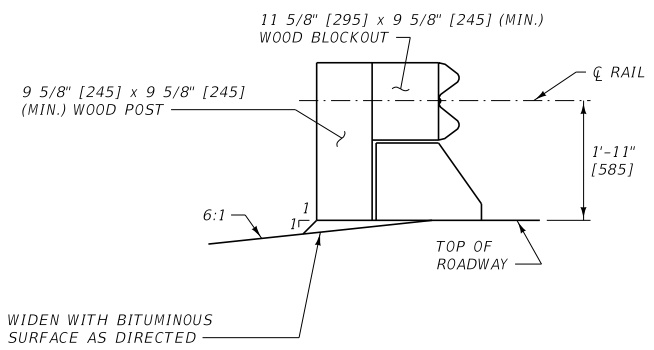


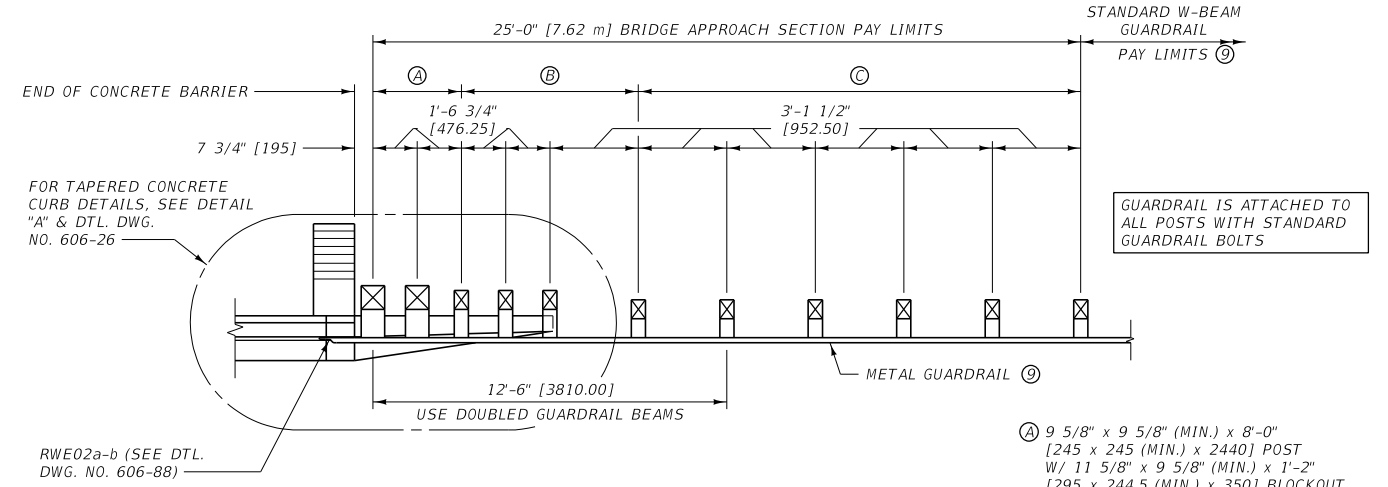
PLATE WASHER



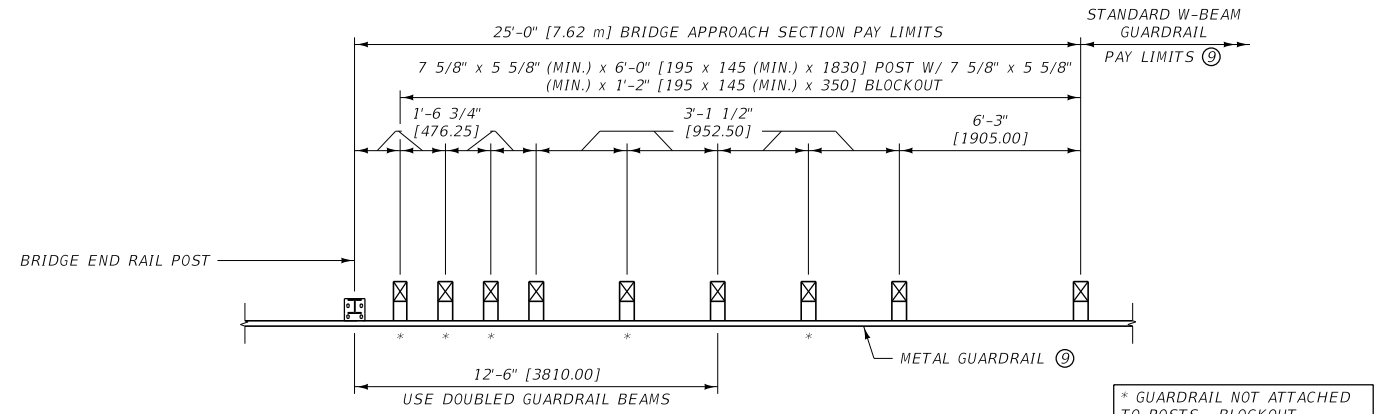
SECTION A-A

- 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. 606-05A).
 - 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).

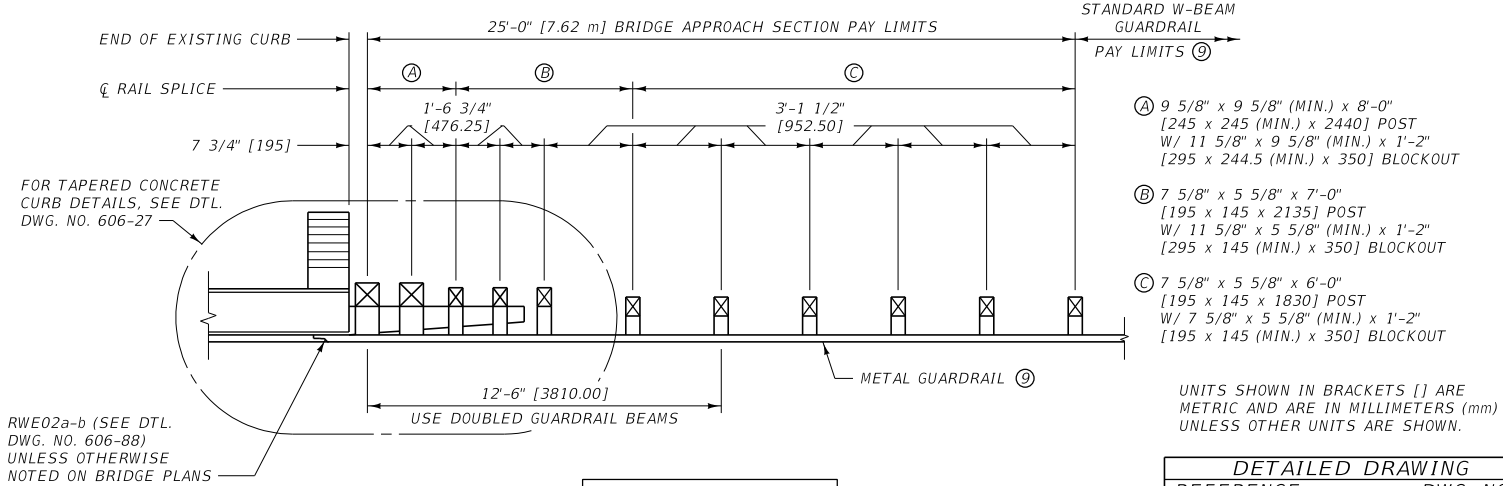
* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 1
(FOR BRIDGES USING CONCRETE BARRIER RAIL)



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 2
(FOR BRIDGES WITHOUT CURBS)



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 3
(FOR BRIDGES WITH EXISTING CONCRETE CURBS)

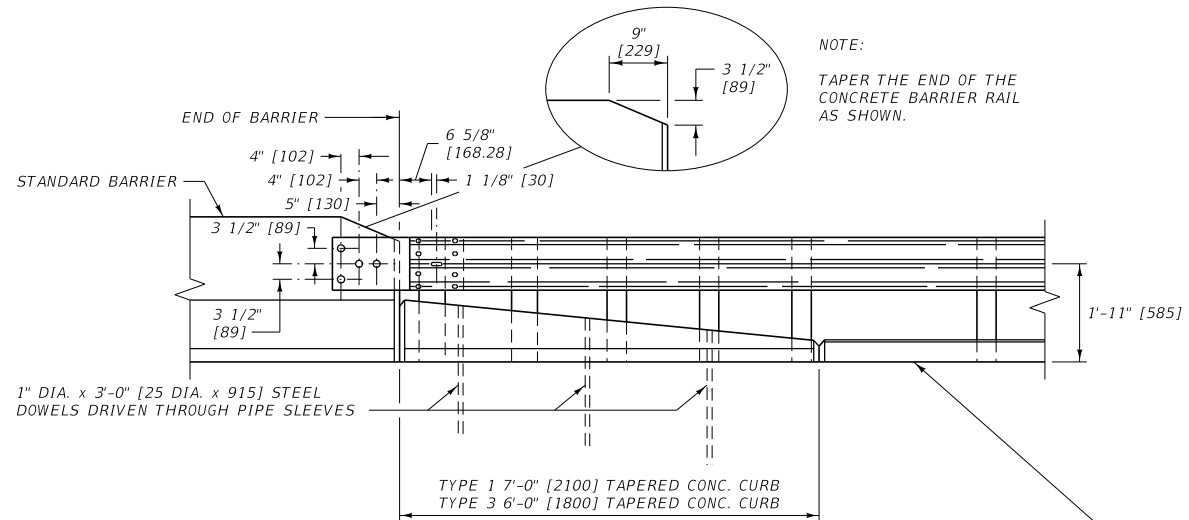
- Ⓐ 9 5/8" x 9 5/8" (MIN.) x 8'-0" [245 x 245 (MIN.) x 2440] POST W/ 11 5/8" x 9 5/8" (MIN.) x 1'-2" [295 x 244.5 (MIN.) x 350] BLOCKOUT
- Ⓑ 7 5/8" x 5 5/8" x 7'-0" [195 x 145 x 2135] POST W/ 11 5/8" x 5 5/8" (MIN.) x 1'-2" [295 x 145 (MIN.) x 350] BLOCKOUT
- Ⓒ 7 5/8" x 5 5/8" x 6'-0" [195 x 145 x 1830] POST W/ 7 5/8" x 5 5/8" (MIN.) x 1'-2" [195 x 145 (MIN.) x 350] BLOCKOUT

- Ⓐ 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

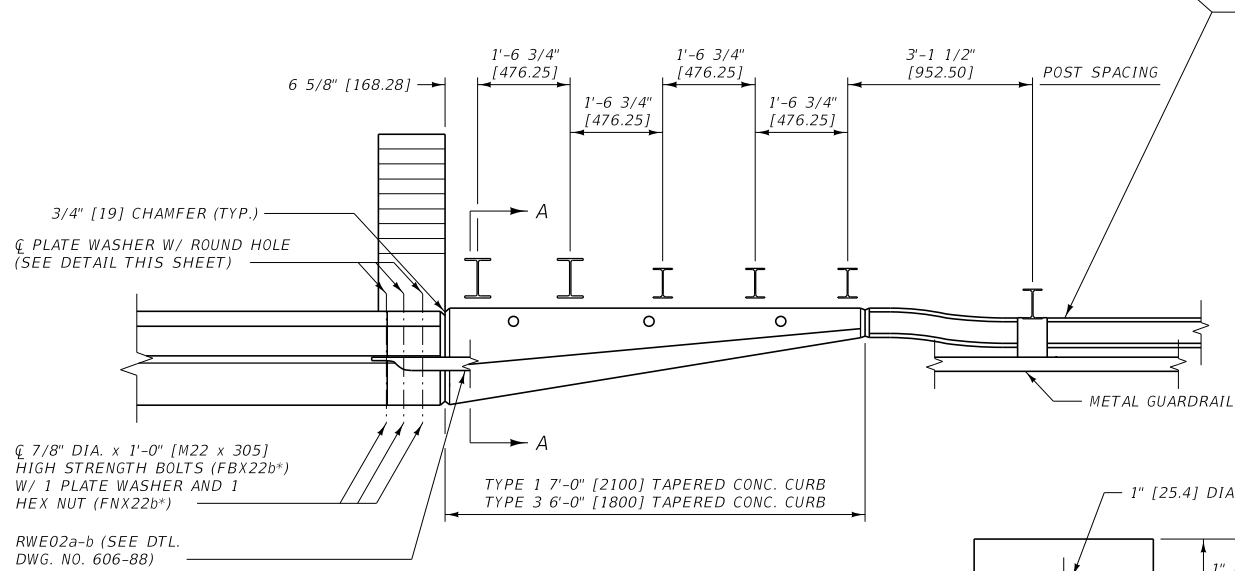
- Ⓐ 9 5/8" x 9 5/8" (MIN.) x 8'-0" [245 x 245 (MIN.) x 2440] POST W/ 11 5/8" x 9 5/8" (MIN.) x 1'-2" [295 x 244.5 (MIN.) x 350] BLOCKOUT
- Ⓑ 7 5/8" x 5 5/8" x 7'-0" [195 x 145 x 2135] POST W/ 11 5/8" x 5 5/8" (MIN.) x 1'-2" [295 x 145 (MIN.) x 350] BLOCKOUT
- Ⓒ 7 5/8" x 5 5/8" x 6'-0" [195 x 145 x 1830] 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.

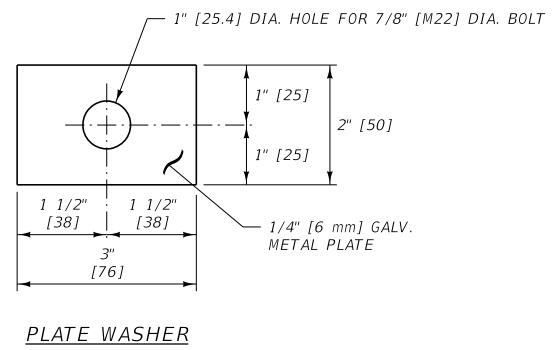
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-24A
BRIDGE APPROACH SECTIONS - WOOD POSTS	
---REVISED--- JULY 2016	EFFECTIVE: SEPTEMBER 2014
MONTANA DEPARTMENT OF TRANSPORTATION	



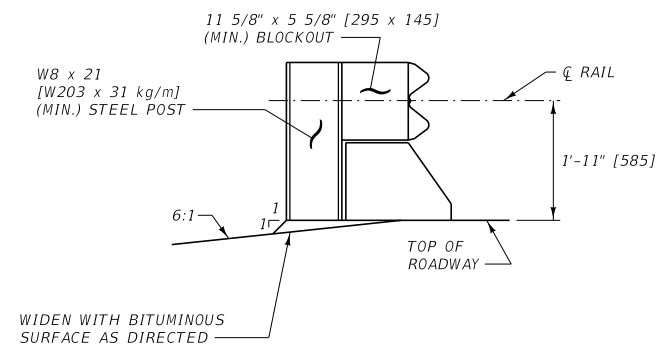
ELEVATION



PLAN

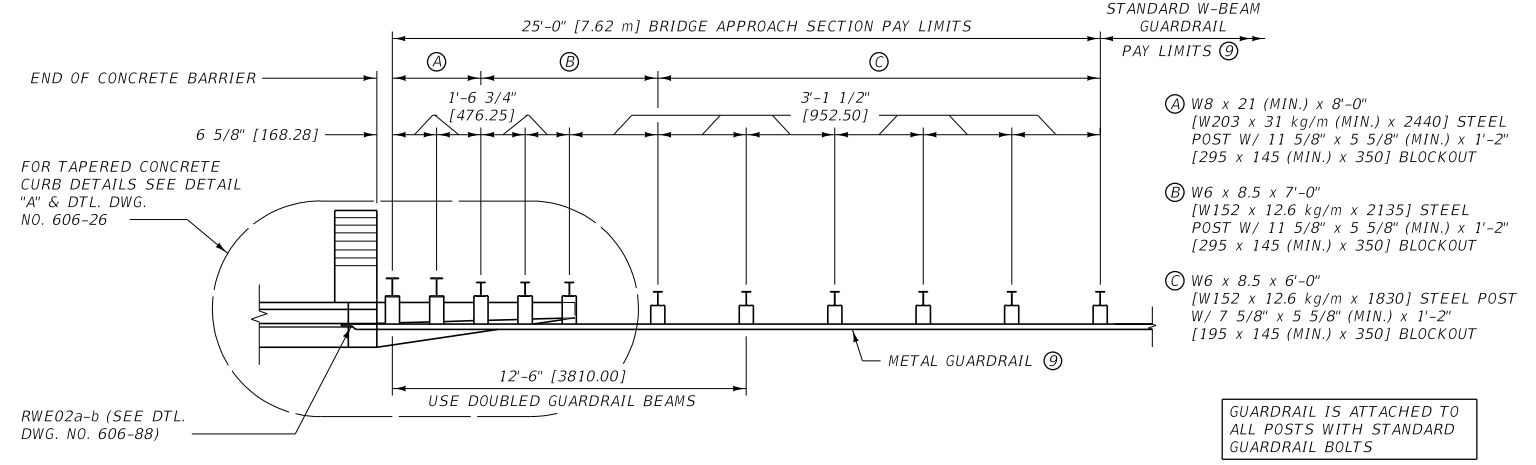


DETAIL "A"

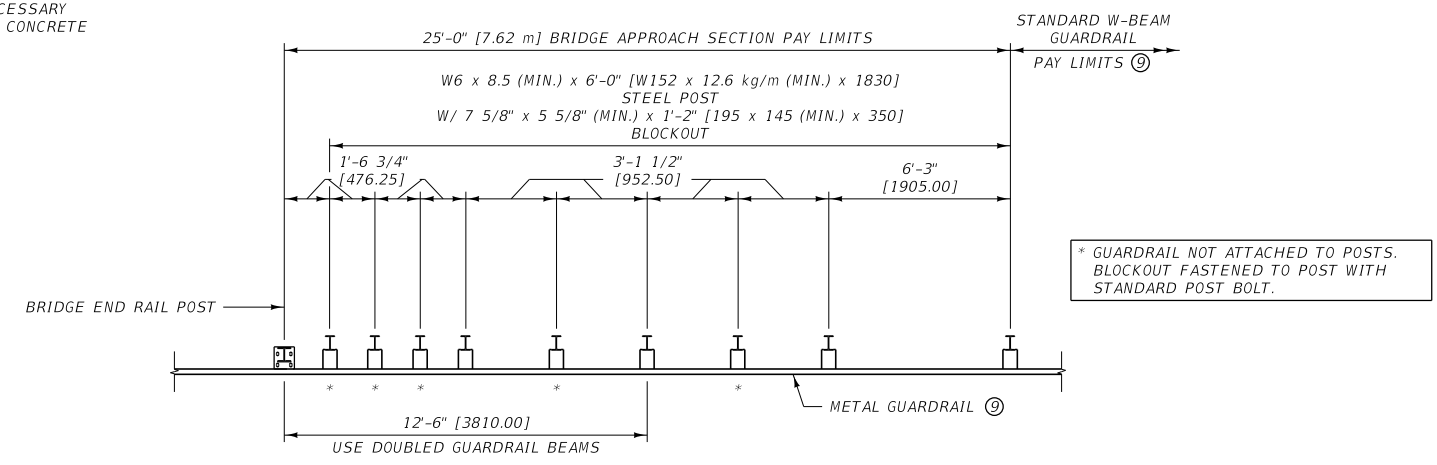


SECTION A-A

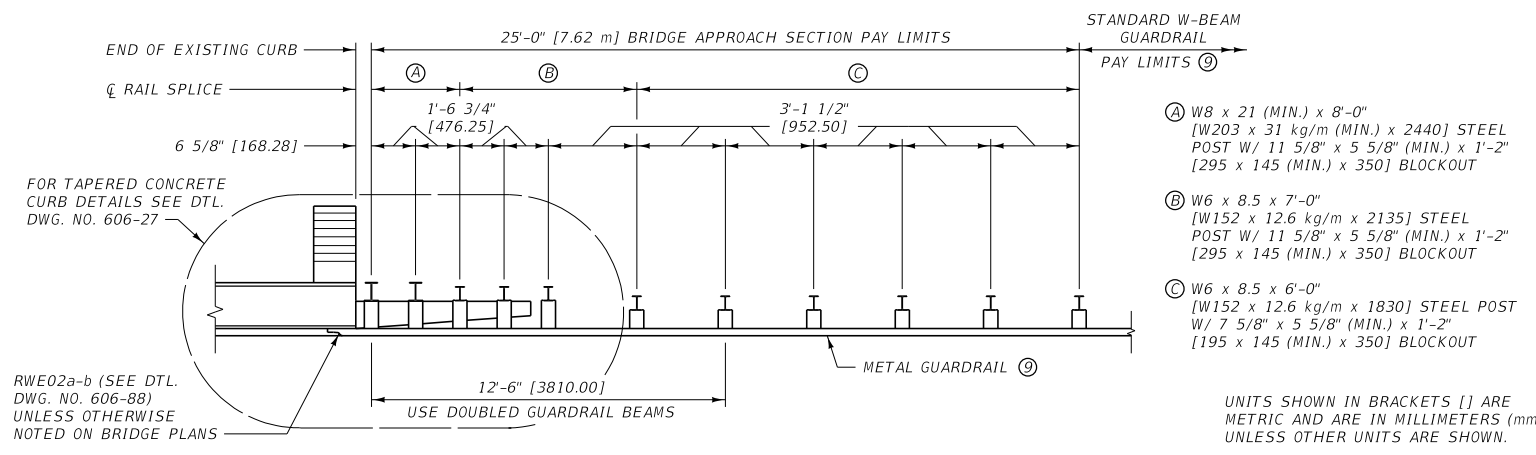
- NOTES:
- TAPERED CONCRETE CURBS: TYPE 1, SEE DTL. DWG. NO. 606-26; TYPE 3, SEE DTL. DWG. NO. 606-27
 - TAPERED CONCRETE CURBS ARE ALSO REQUIRED ON CONCRETE APPROACH SLABS.
 - PORTIONS OF GUARDRAIL & BLOCKOUTS ARE OMITTED FOR CLARITY.
 - LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE. (SEE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



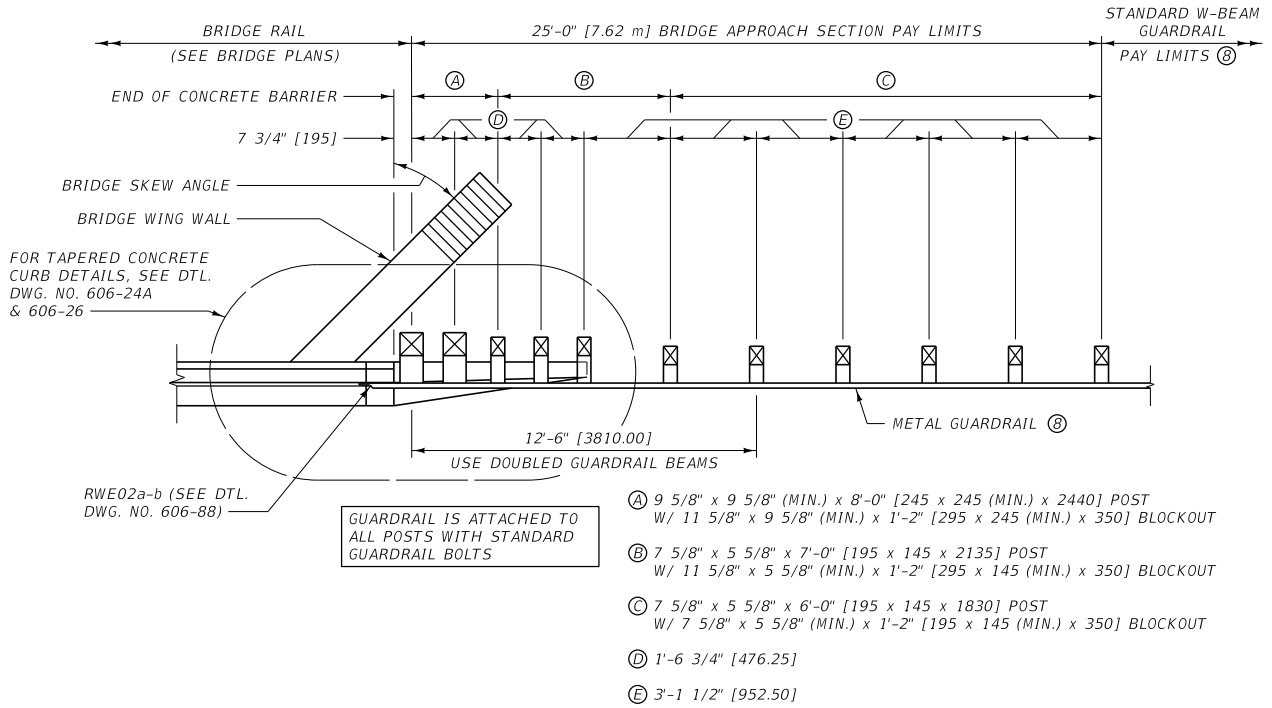
METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 2 (FOR BRIDGES WITHOUT CURBS)



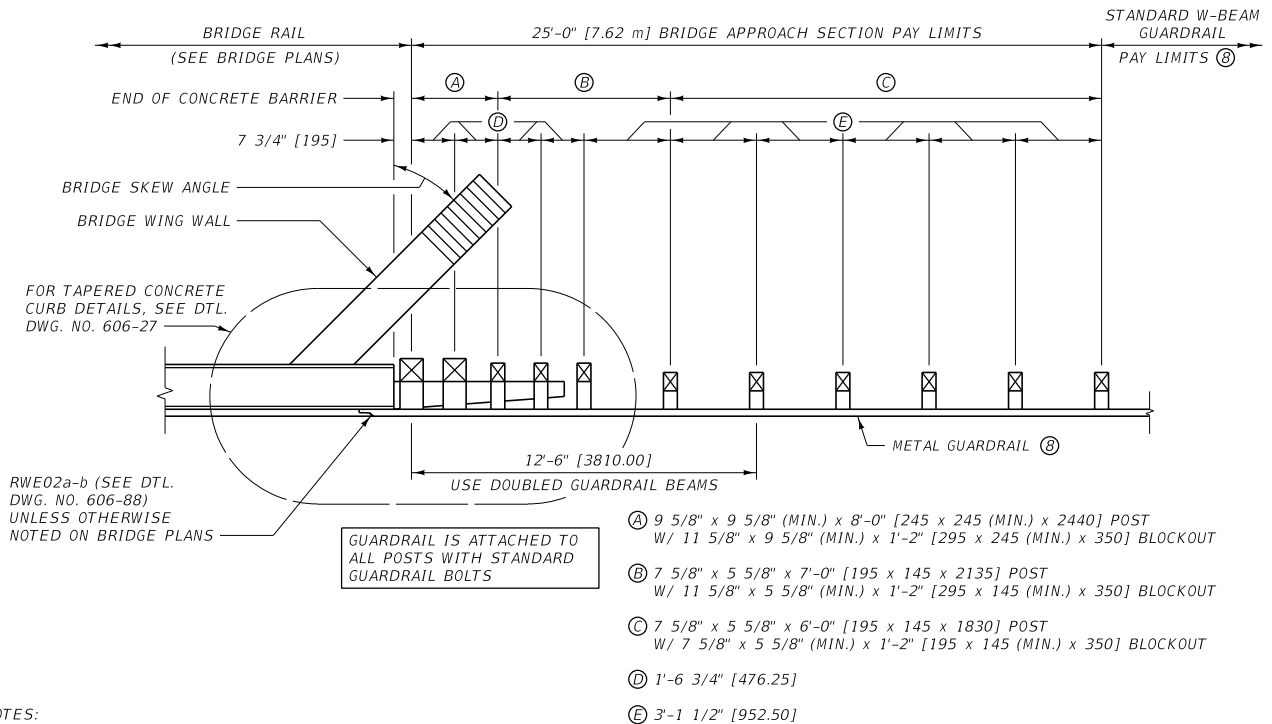
METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 3 (FOR BRIDGES WITH EXISTING CONCRETE CURBS)

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	



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 1
(FOR SKEWED BRIDGES USING CONCRETE BARRIER RAIL)



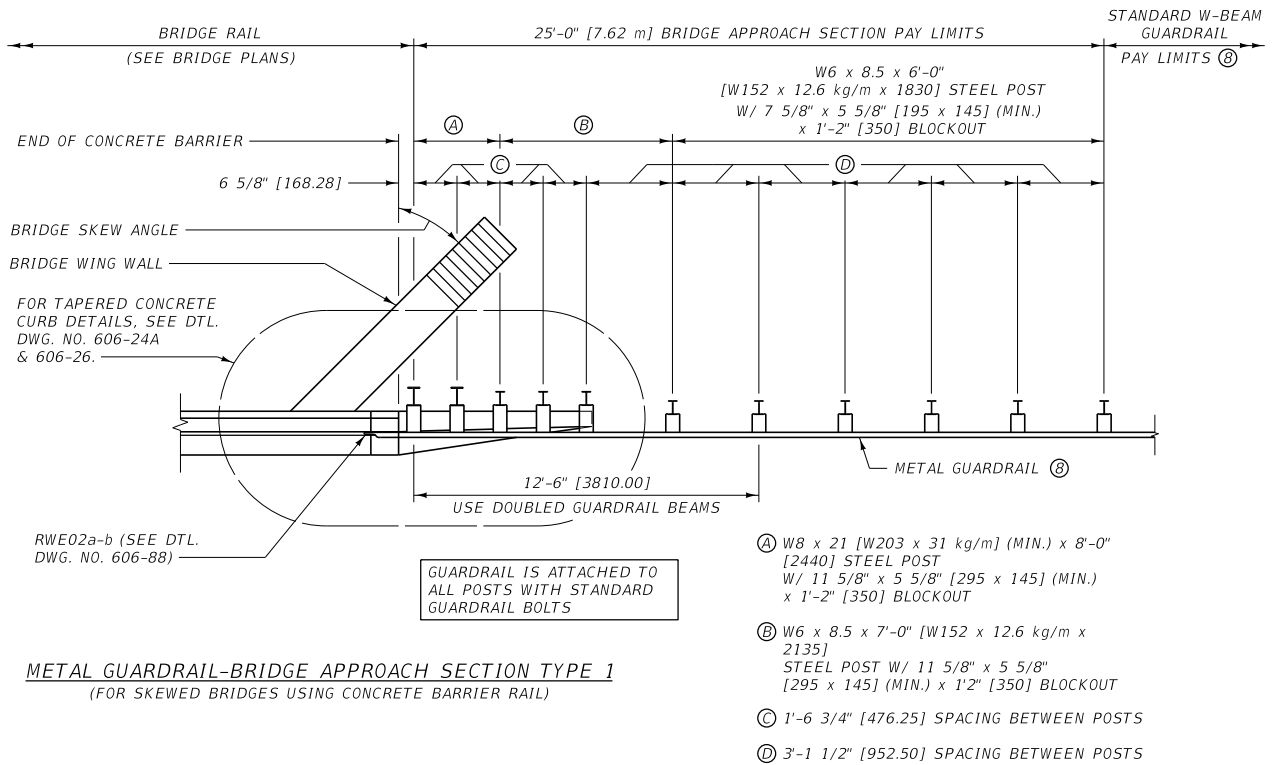
METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 3
(FOR SKEWED BRIDGES WITH EXISTING CONCRETE CURBS)

NOTES:

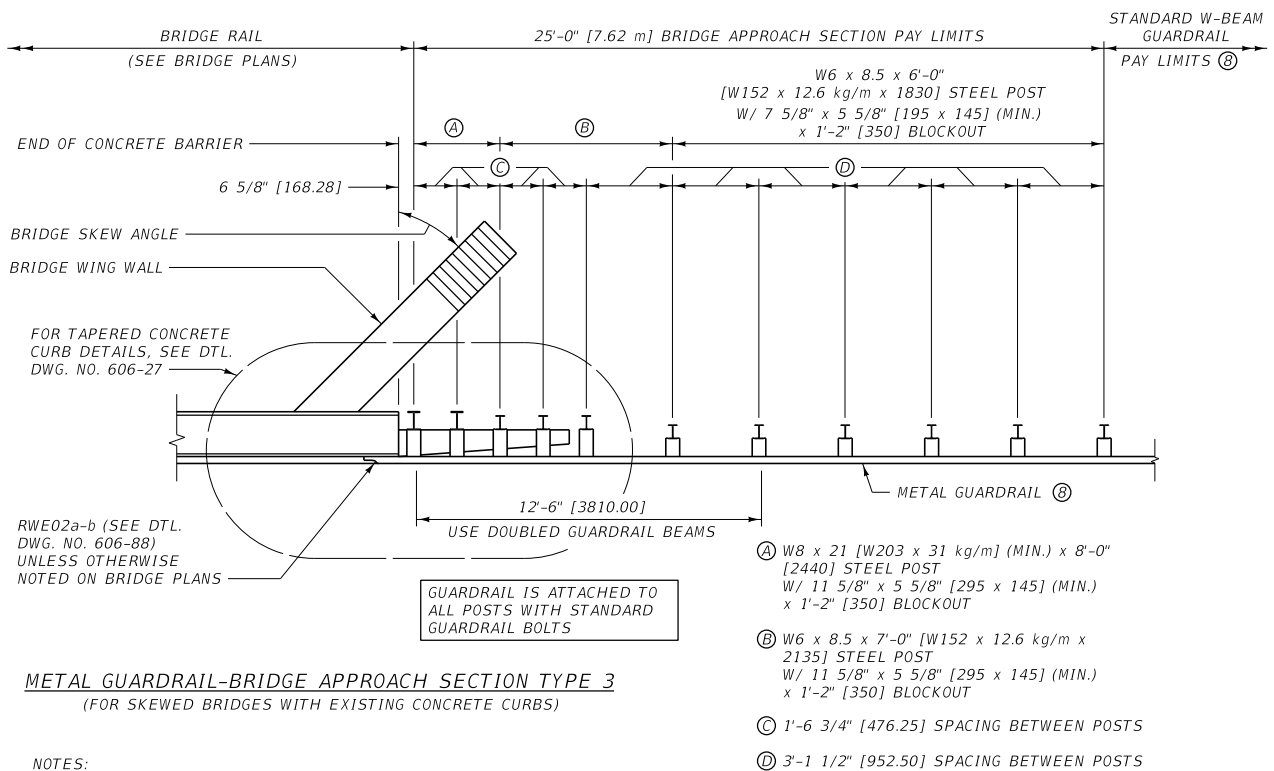
- ① TAPERED CONCRETE CURBS:
TYPE 1, SEE DTL. DWG. NO. 606-26
TYPE 3, SEE DTL. DWG. NO. 606-27
- ② TAPERED CONCRETE CURBS ARE ALSO REQUIRED ON CONCRETE APPROACH SLABS.
- ③ LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE. (SEE DTL. DWG. NO. 606-05A).
- ④ LAP W-BEAM TERMINAL CONNECTOR (RWE02a-b) 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	DWG. NO.
STANDARD SPEC.	606-25A
SECTION 606	
SKEWED BRIDGE APPROACH SECTIONS - WOOD POSTS	
EFFECTIVE: SEPTEMBER 2014	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 1
(FOR SKEWED BRIDGES USING CONCRETE BARRIER)



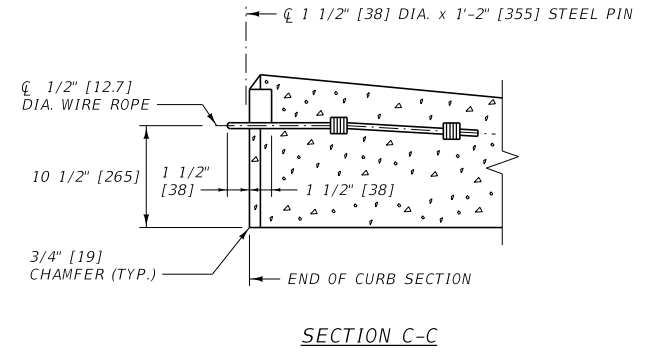
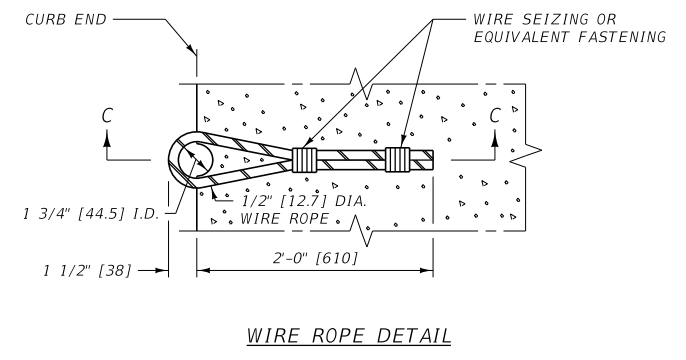
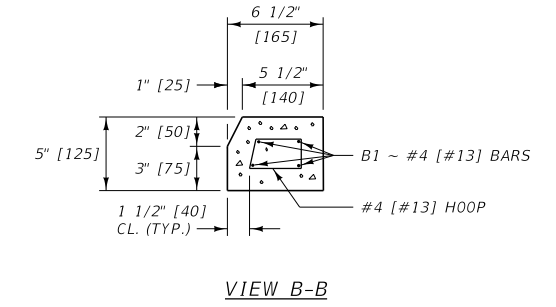
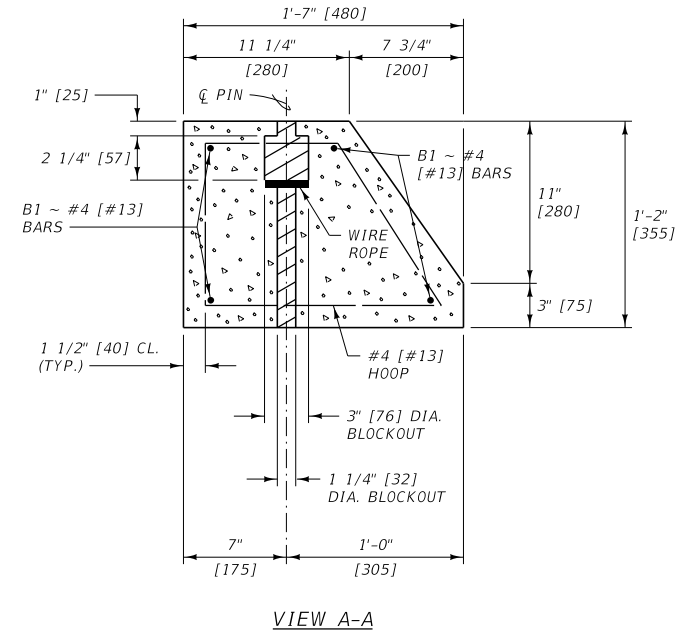
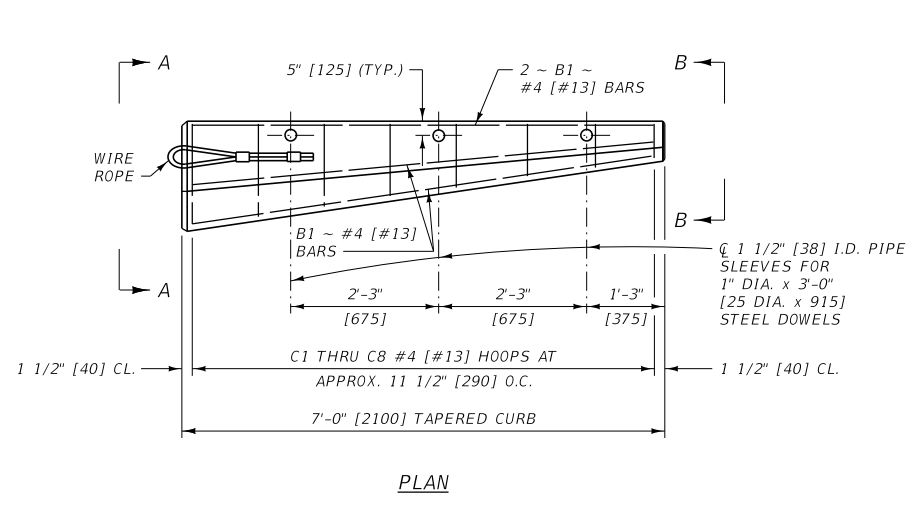
METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE 3
(FOR SKEWED BRIDGES WITH EXISTING CONCRETE CURBS)

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 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	DWG. NO.
STANDARD SPEC.	606-25B
SECTION 606	
SKEWED BRIDGE APPROACH SECTIONS - STEEL POSTS	
EFFECTIVE: SEPTEMBER 2014	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	



- NOTES:
- TAPERED CONCRETE CURB IS USED WITH BRIDGE APPROACH SECTION TYPE 1 (SEE DTL. DWG. NO. 606-24A AND 606-24B).
 - FURNISH WIRE ROPE MEETING SECTION 705.
 - FURNISH GRADE 60 [420] REINFORCING STEEL MEETING SECTION 711.
 - 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'-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	↑	↑	↑	415	50	90	60	55	40
B1	#13	4	STRAIGHT	2020	~	~	~	~	~

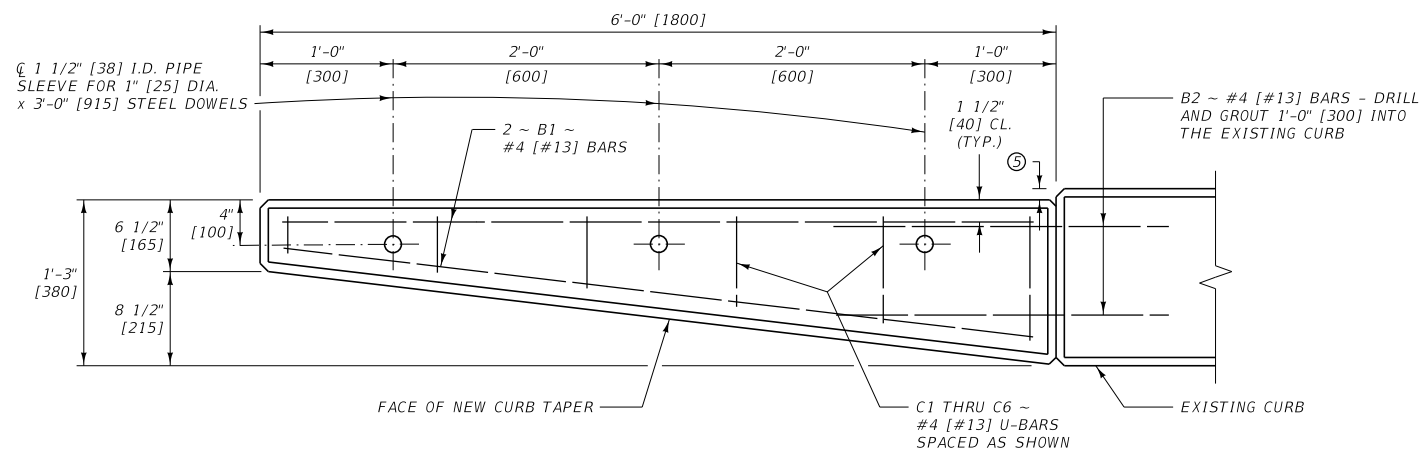
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING

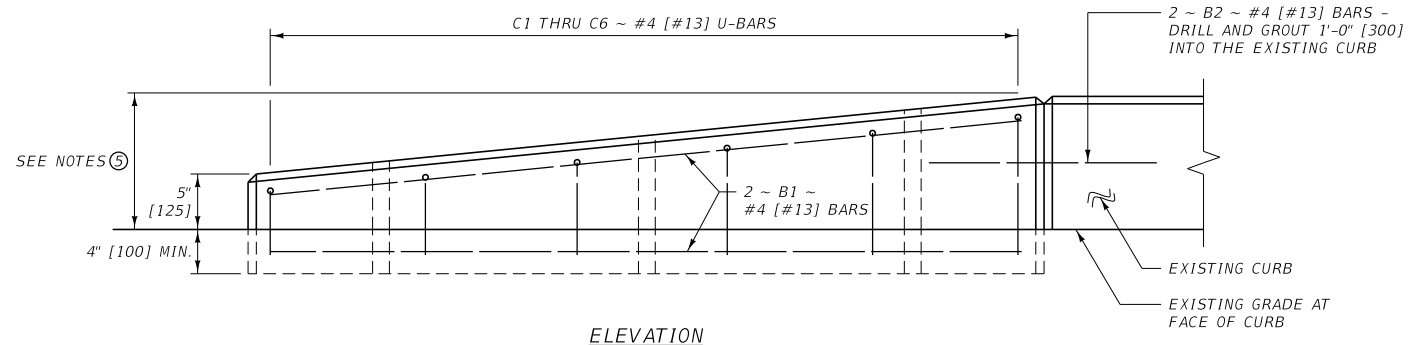
REFERENCE DWG. NO. 606-26

STANDARD SPEC. SECTION 606

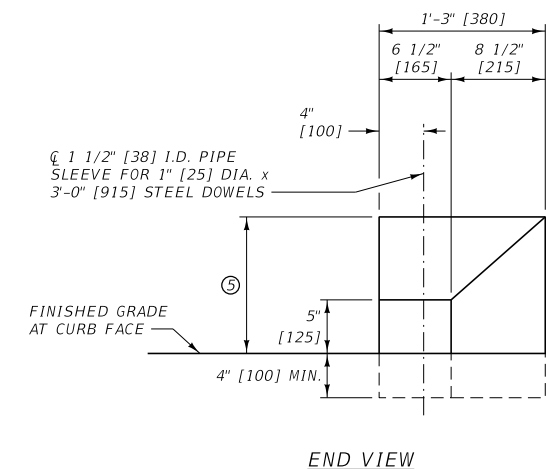
TAPERED CONCRETE CURB DETAIL



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 m³]
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.

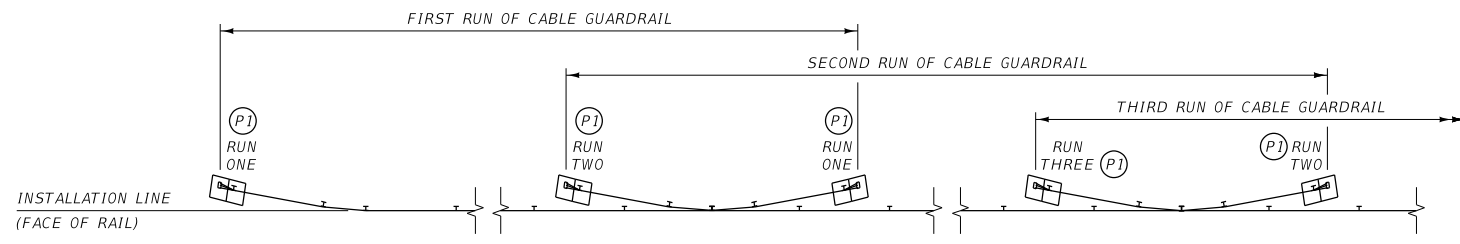
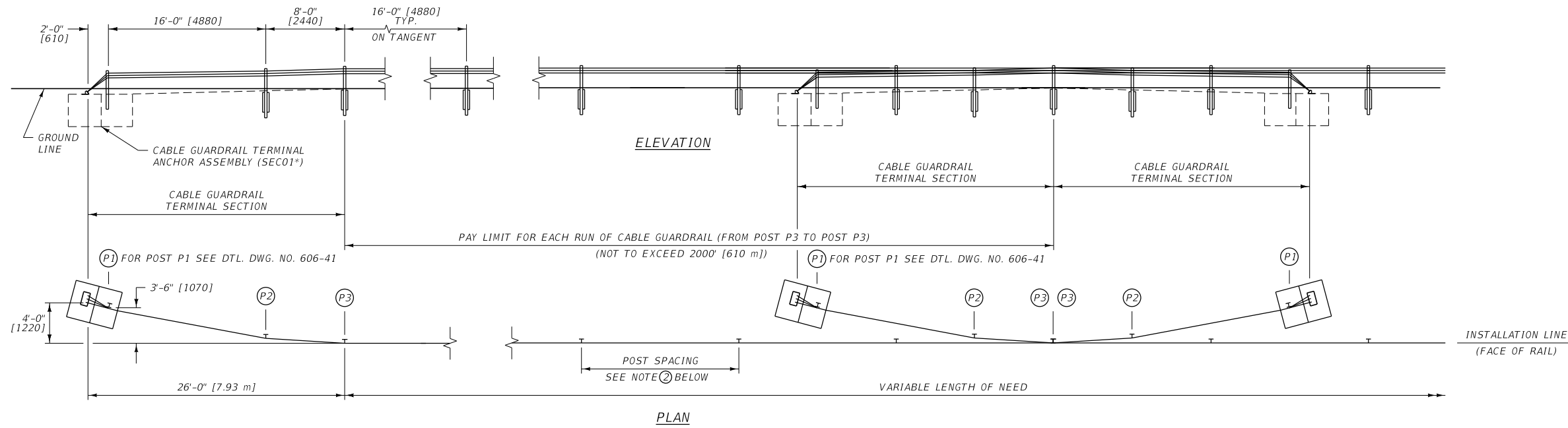
DETAILED DRAWING
REFERENCE DWG. NO.
STANDARD SPEC. 606-27
SECTION 606

TAPERED CONCRETE CURB DETAIL

--REVISED--
JULY 2016

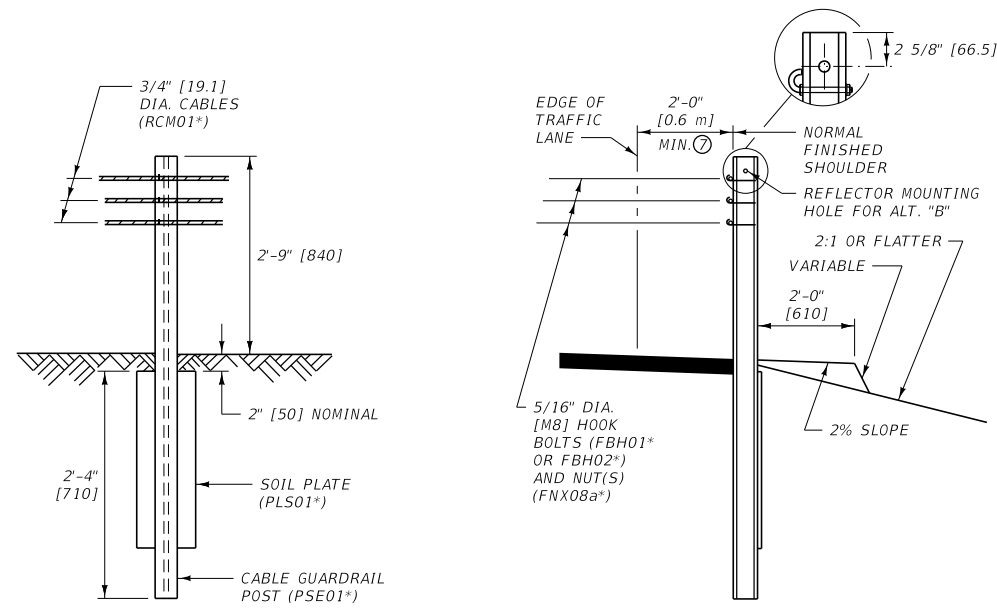
EFFECTIVE: SEPTEMBER 2014

MDT MONTANA DEPARTMENT OF TRANSPORTATION



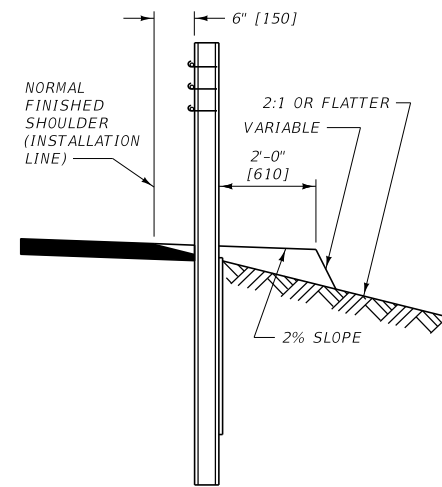
TYPICAL LAYOUT FOR MULTIPLE RUNS OF CABLE GUARDRAIL

EACH RUN OF CABLE GUARDRAIL CONTAINS TWO TERMINAL SECTIONS WITH ANCHOR ASSEMBLIES.



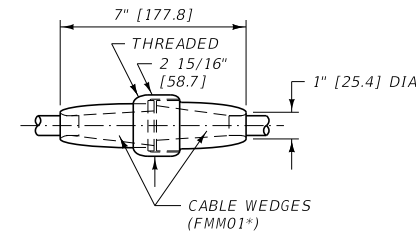
TYPICAL INSTALLATION DETAIL

LINE POST & POST P3



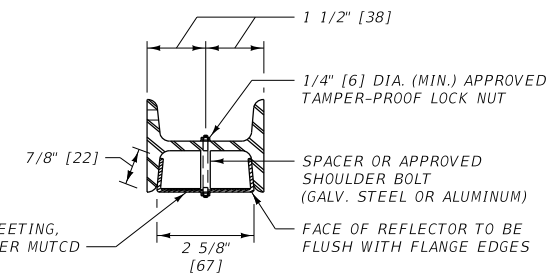
TYPICAL INSTALLATION DETAIL

POST P2

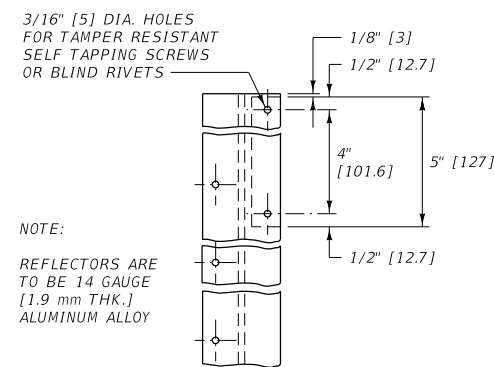


CABLE SPLICE

SPLICE CABLE USING A COUPLING DEVICE AS SHOWN, OR AN ALTERNATE METHOD APPROVED BY THE PROJECT MANAGER



REFLECTOR ALT. "B"



NOTE:

REFLECTORS ARE TO BE 14 GAUGE [1.9 mm THK.] ALUMINUM ALLOY

REFLECTOR ALT. "A"

NOTES:

- ① FOR CABLE GUARDRAIL RUNS OF:
 - 1044 FT. [318.42 m] OR LESS: USE COMPENSATING CABLE END ASSEMBLY (RCE01*) ON ONE END AND TURNBUCKLE CABLE END ASSEMBLY * ON THE OTHER END OF EACH CABLE.
 - GREATER THAN 1044 FT. [318.42 m], UP TO 2052 FT. [625.86 m] MAXIMUM: USE COMPENSATING CABLE END ASSEMBLY (RCE01*) ON BOTH ENDS OF EACH CABLE.
 - ② LINE POST SPACING:
 - TANGENTS AND CURVES WITH RADII 700 FT. [220 m] AND GREATER: 16 FT. [4880 mm].
 - CURVES WITH RADII LESS THAN 700 FT. [220 m] DOWN TO 440 FT. [135 m]: 12 FT. [3660 mm].
 - NOTE: DO NOT INSTALL CABLE GUARDRAIL ON THE INSIDE SHOULDER OF ANY CURVE.
 - ③ UNIFORMLY TENSION ALL CABLES TO COMPRESS SPRINGS BY 3 1/2" [90 mm].
 - ④ DO NOT INSTALL CABLE GUARDRAIL FOR OBSTACLES WITHIN 12 FT. [3.7 m] OF THE INSTALLATION LINE.
 - ⑤ DO NOT USE CABLE GUARDRAIL WITH FILL SLOPES STEEPER THAN 2:1, UNLESS THE DISTANCE BETWEEN THE BACK OF THE POSTS AND THE BREAK IN THE FILL SLOPE IS AT LEAST 8 FT. [2.5 m].
 - ⑥ ATTACH REFLECTORS TO EVERY OTHER LINE POST (32 FT. [9.76 m] TYP.), BEGINNING AT POST P3. DO NOT ATTACH REFLECTORS TO POSTS P1 AND P2.
 - ⑦ WIDENING IS REQUIRED IF FINISHED SHOULDER IS LESS THAN 2'-0" [0.6 m] FROM THE TRAFFIC LANE.
 - ⑧ GUIDANCE FOR TENSIONING CABLES USING THE TURNBUCKLES IS GIVEN IN CABLE TENSIONING TABLES. CABLE TENSIONING - NCHRP 230 TESTS HR 22-4 (1986) METRIC CABLE TENSIONING - NYDOT STD. M606-1R1 (1996)
- * SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

CABLE TENSIONING		METRIC CABLE TENSIONING	
TEMPERATURE	COMPR. #	TEMPERATURE	COMPR. #
(°F)	(INCHES)	(°C)	(mm)
120 TO 110	1.00"	50 TO 43	25
109 TO 100	1.25"	42 TO 38	32
99 TO 90	1.50"	37 TO 32	38
89 TO 80	1.75"	31 TO 27	45
79 TO 70	2.00"	26 TO 21	50
69 TO 60	2.25"	20 TO 16	57
59 TO 50	2.50"	15 TO 10	64
49 TO 40	2.75"	9 TO 5	70
39 TO 30	3.00"	4 TO -1	75
29 TO 20	3.25"	-2 TO -7	83
19 TO 10	3.50"	-8 TO -12	89
9 TO 0	3.75"	-13 TO -18	95
-1 TO -10	4.00"	-19 TO -23	100
-11 TO -20	4.25"	-24 TO -29	108

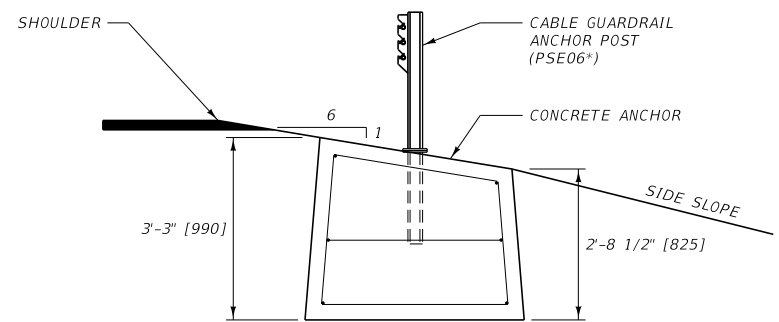
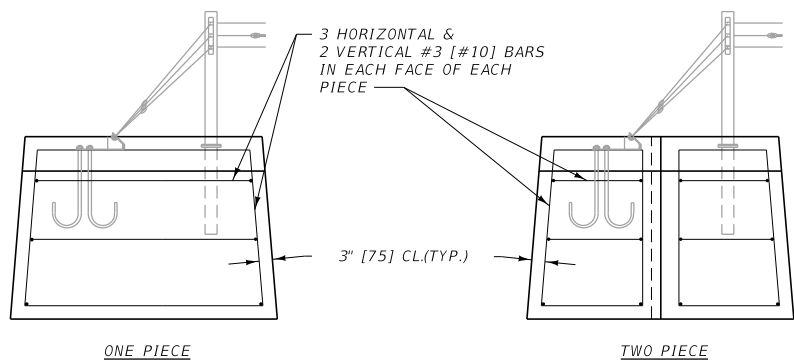
- SPRING COMPRESSION FROM UNLOADED POSITION

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

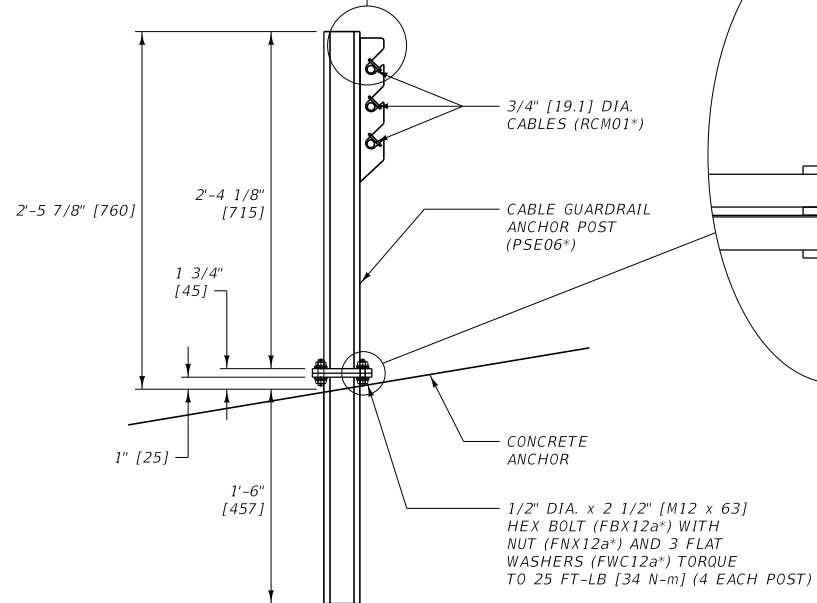
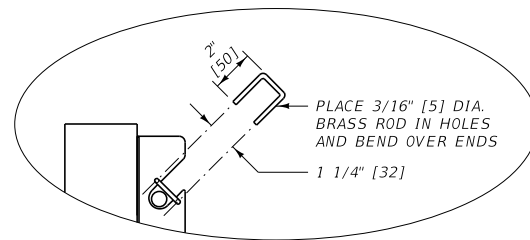
DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-40
LOW-TENSION CABLE GUARDRAIL	
EFFECTIVE: SEPTEMBER 2014	
MDTA MONTANA DEPARTMENT OF TRANSPORTATION	

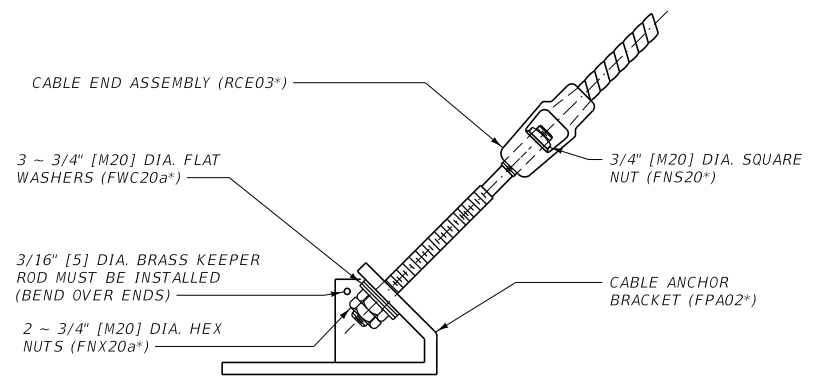
--REVISED--
JANUARY 2018



ANCHOR UNIT & REBAR INSTALLATION DETAILS



ANCHOR POST DETAIL



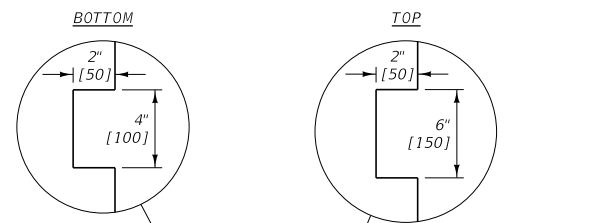
CABLE END ASSEMBLY TO ANCHOR BRACKET DETAIL

NOTE:
INSTALL ONE WASHER UNDER HEAD, ONE BETWEEN PLATES & ONE UNDER NUT. AN ADDITIONAL WASHER MAY BE PLACED BETWEEN PLATES TO PLUMB THE ANCHOR POST.

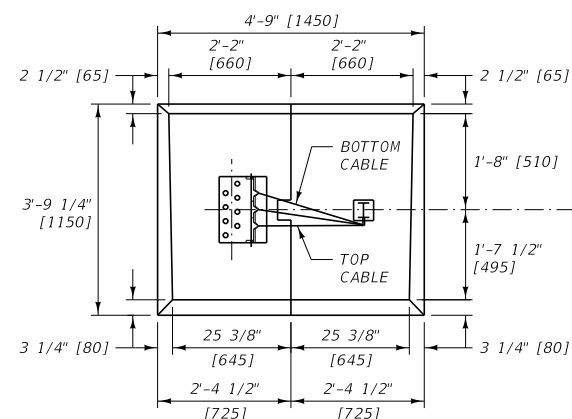
NOTES:

- ① INSTALL THE CONCRETE ANCHOR INTO THE EXCAVATION, AS DETAILED, SO THAT THE BOTTOM OF THE ANCHOR HAS A FULL AND EVEN BEARING ON THE SURFACE UNDER IT. BACKFILL AROUND THE CONCRETE ANCHOR PER SECTION 203.
- ② THE CONCRETE ANCHOR CAN BE PLACED AS ONE OR TWO PIECES. THIS DETAIL PRIMARILY SHOWS A TWO PIECE INSTALLATION. FOR ONE PIECE INSTALLATIONS, USE ALL THE SAME DIMENSIONS, LESS THE TAPERED KEYWAY AND THE ADDITIONAL REBAR, AS SHOWN.
- ③ IF LIFTING DEVICES ARE EMBEDDED INTO THE CONCRETE ANCHORS, ENSURE THAT THEY HAVE A SAFE WORKING LOAD OF 4 TONS [3.6 METRIC TONS] FOR THE ONE PIECE ANCHOR AND 2 TONS [1.8 METRIC TONS] EACH FOR EACH OF THE HALVES OF THE TWO PIECE ANCHOR UNIT.
- ④ USE CLASS GENERAL CONCRETE TO CONSTRUCT ANCHOR.
SEE DTL. DWG. NO. 606-80 FOR SCHEDULE * OF GUARDRAIL HARDWARE.

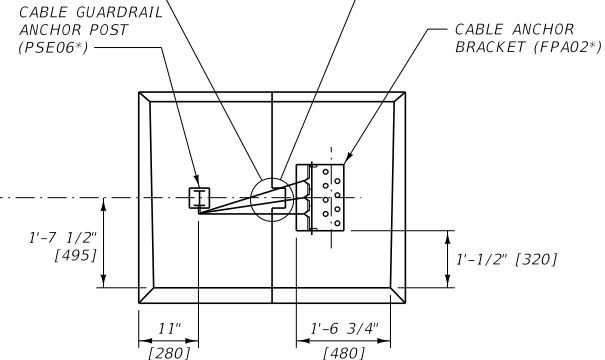
TAPERED KEYWAY DETAIL (TWO PIECE INSTALLATION)



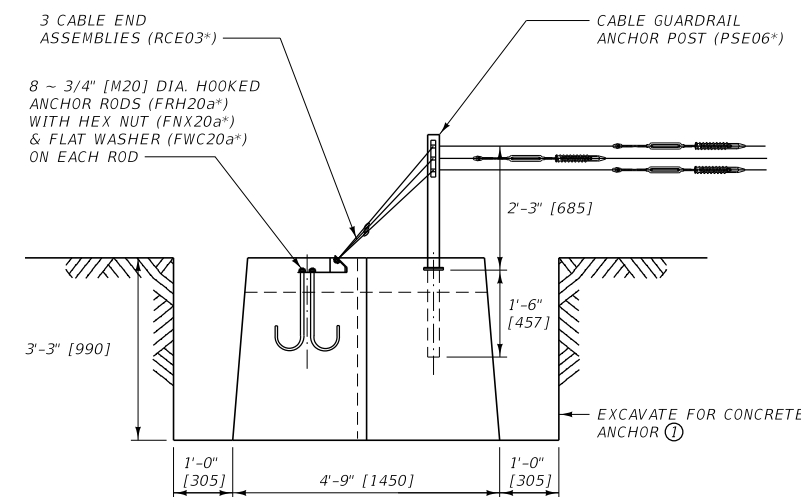
NOTE:
DIMENSIONS FOR LEFT AND RIGHT HAND ANCHOR UNITS ARE THE SAME, WITH THE POSITION OF THE ANCHOR POST AND ANCHOR BRACKET BEING THE ONLY DIFFERENCE.



PLAN (LEFT HAND ANCHOR UNIT)



PLAN (RIGHT HAND ANCHOR UNIT)



ELEVATION (LEFT HAND ANCHOR UNIT)

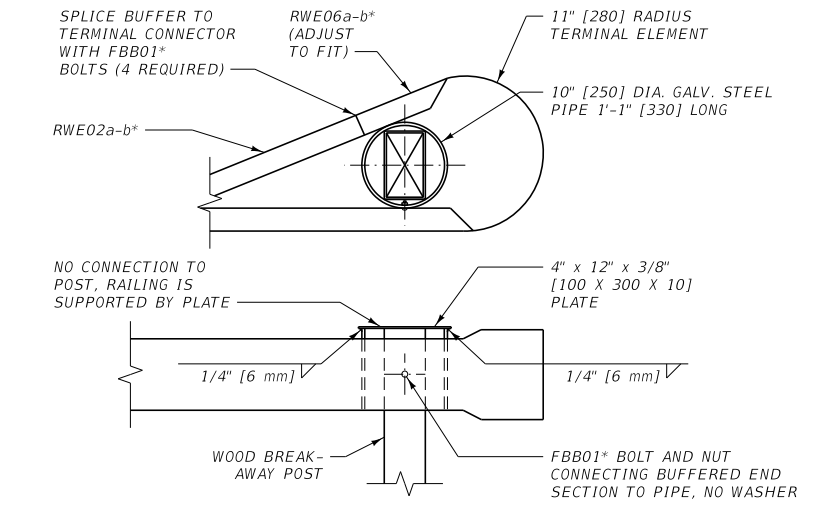
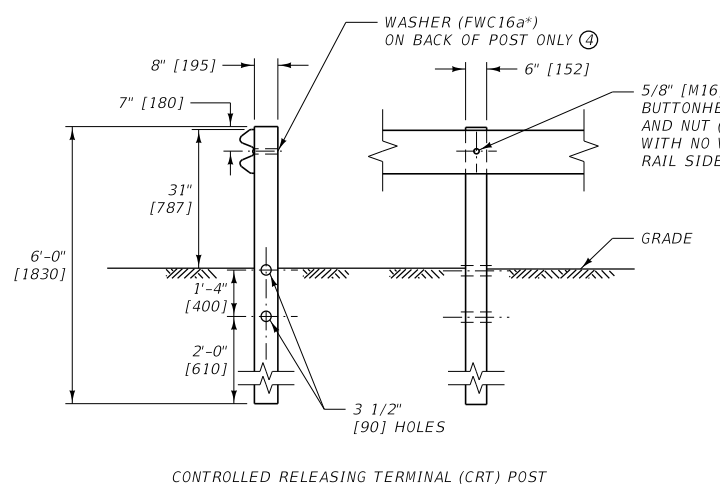
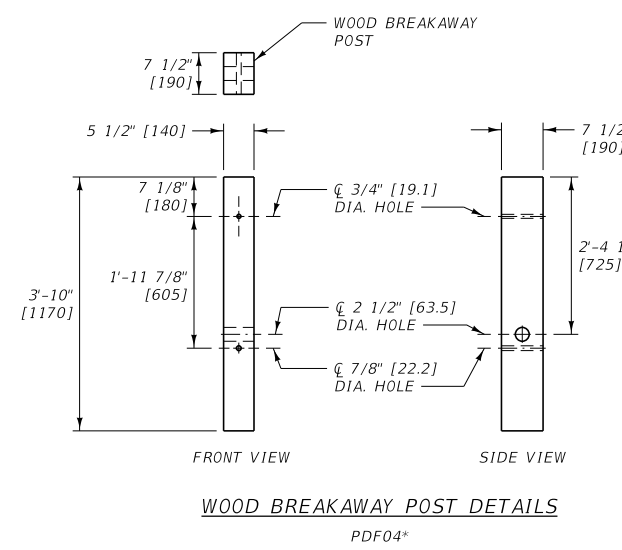
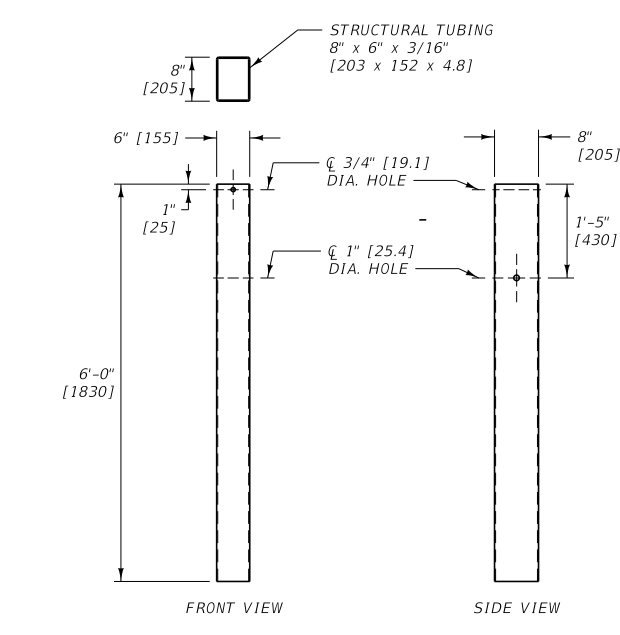
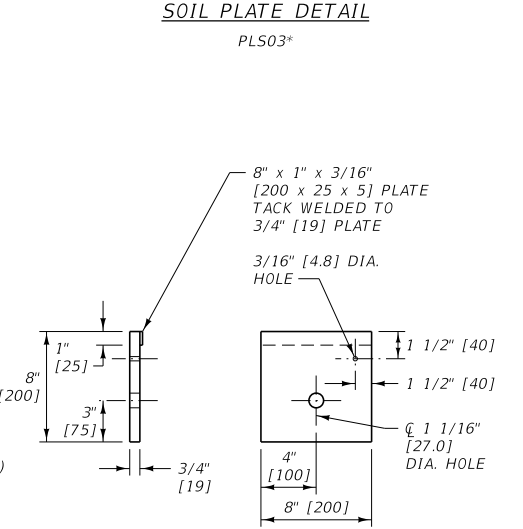
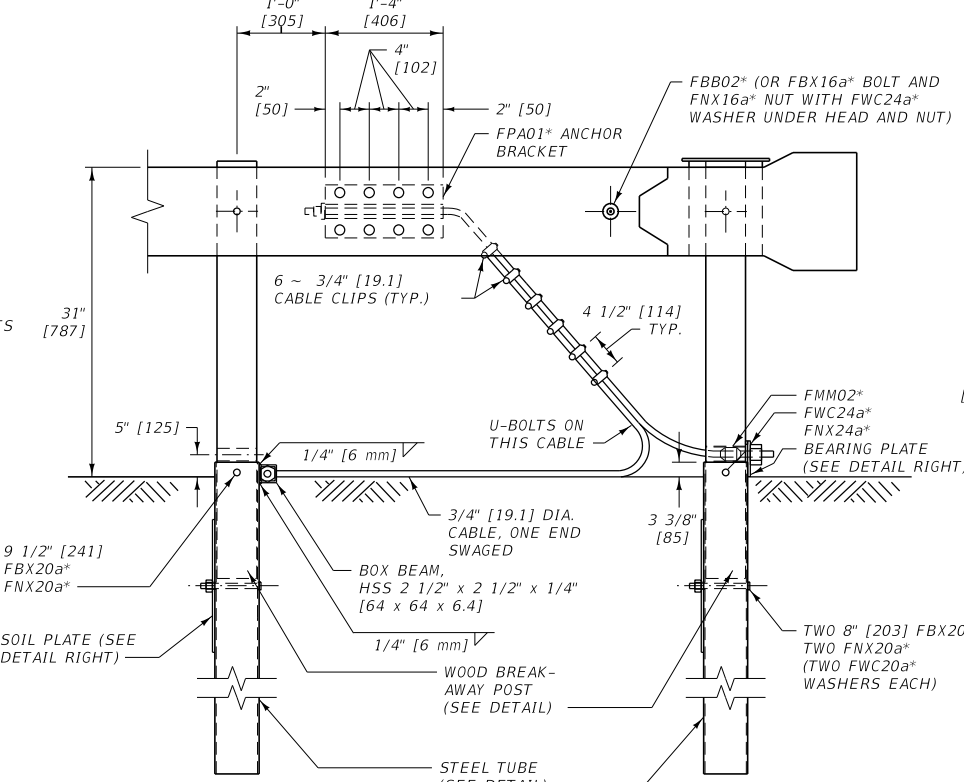
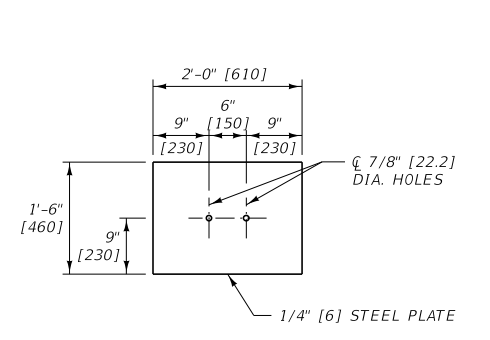
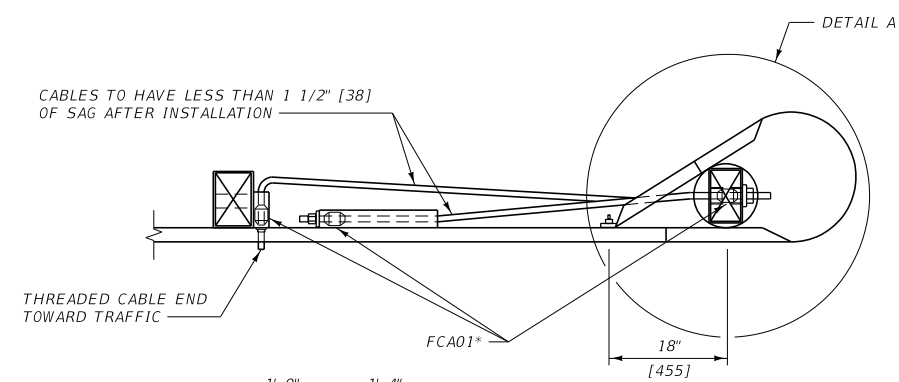
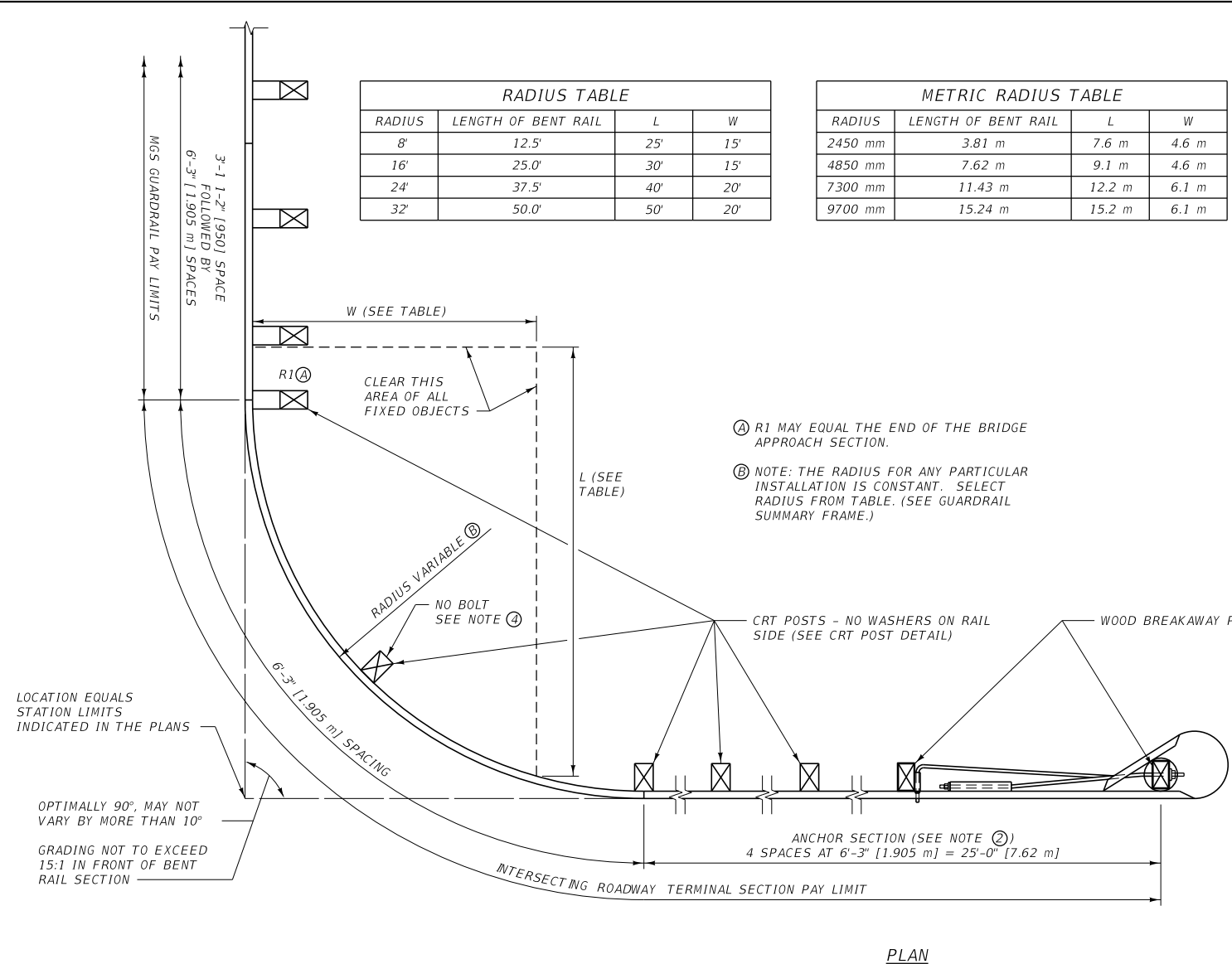
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-41
LOW-TENSION CABLE GUARDRAIL TERMINAL ANCHOR ASSEMBLY	

--REVISED-- JANUARY 2018	EFFECTIVE: SEPTEMBER 2014
MDTA 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

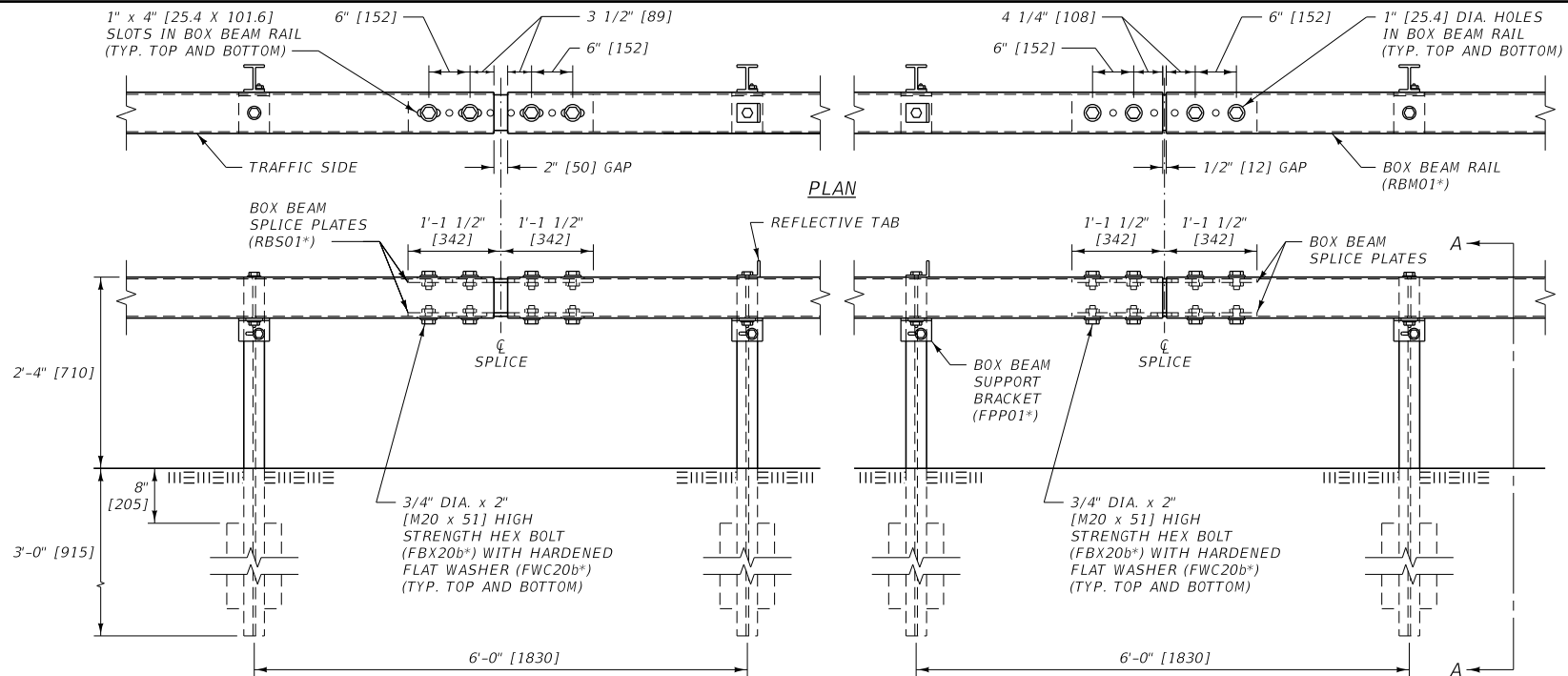


- NOTES:
- DO NOT INSTALL ON SLOPES STEEPER THAN 2:1.
 - DO NOT OMIT OR SHORTEN ANCHOR SECTION.
 - SEE DTL. DWG. NO. 606-05A FOR GUARDRAIL WIDENING REQUIREMENTS.
 - DO NOT BOLT THE RAIL TO THE CRT POST LOCATED AT THE CENTER OF THE BENT RAIL.
- * SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

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

--REVISED--	
JANUARY 2018	APRIL 2019
EFFECTIVE: SEPTEMBER 2014	
MDTA MONTANA DEPARTMENT OF TRANSPORTATION	

DETAILED DRAWING
 REFERENCE STANDARD SPEC. SECTION 606
 DWG. NO. 606-46
 INTERSECTING ROADWAY TERMINAL SECTION (MGS)

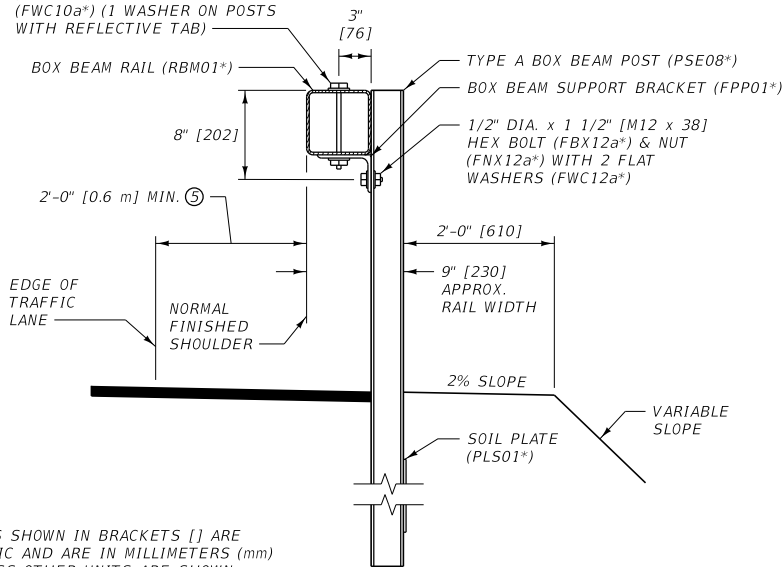


1/2" [12.7] DIA. HOLES FOR 3/8" DIA. x 7 1/2" [M10 x 191] HEX BOLT (FBX10a*) AND NUT (FNX10a*) WITH 2 FLAT WASHERS (FWC10a*) (1 WASHER ON POSTS WITH REFLECTIVE TAB)

EXPANSION JOINT

ELEVATION

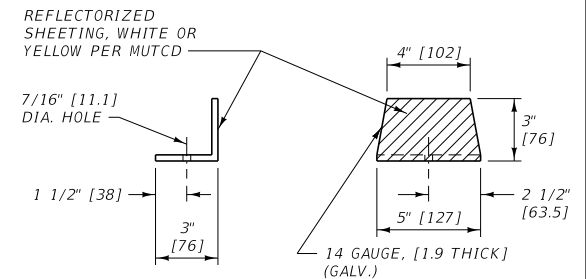
SPLICE DETAIL



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.

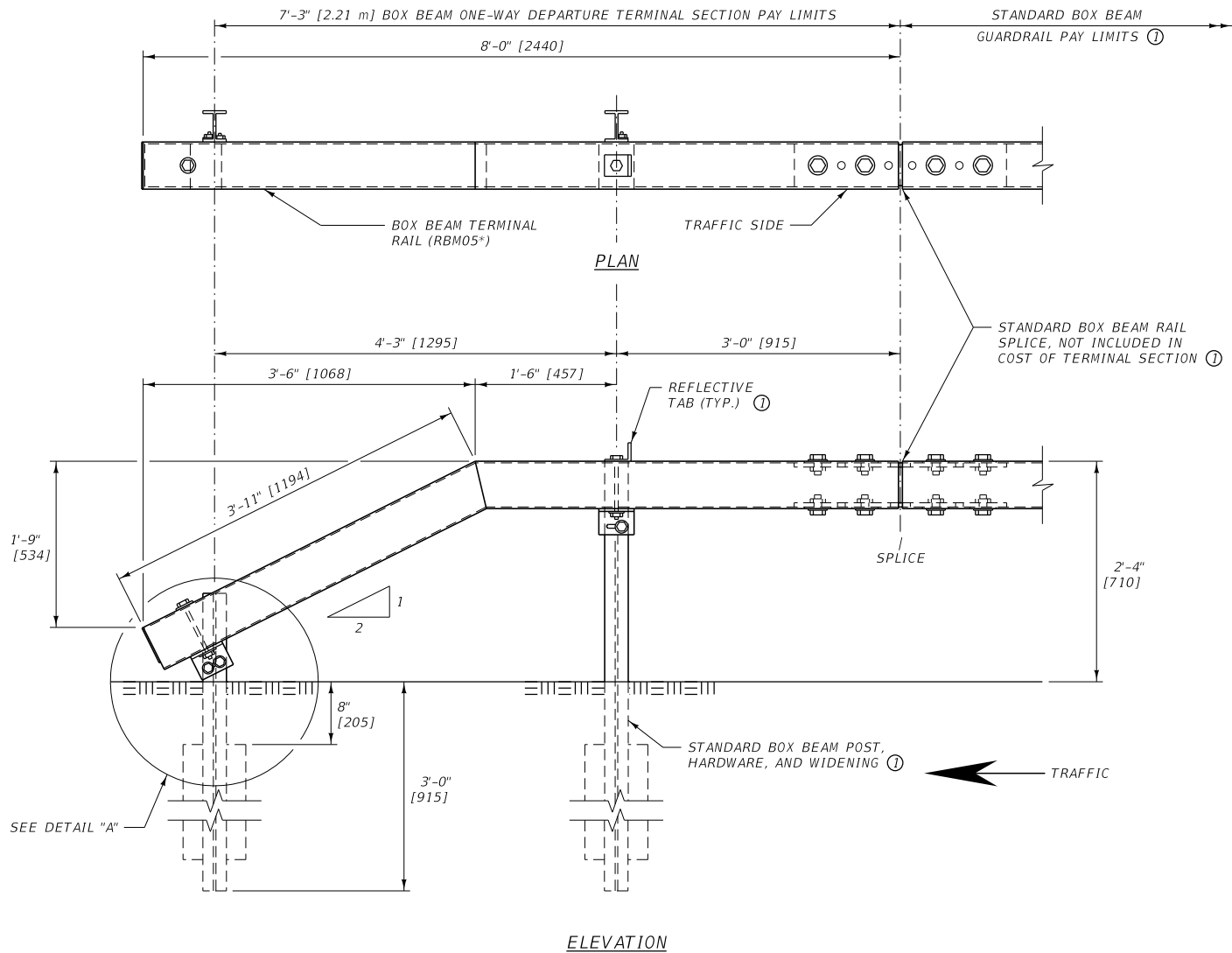


REFLECTIVE TAB

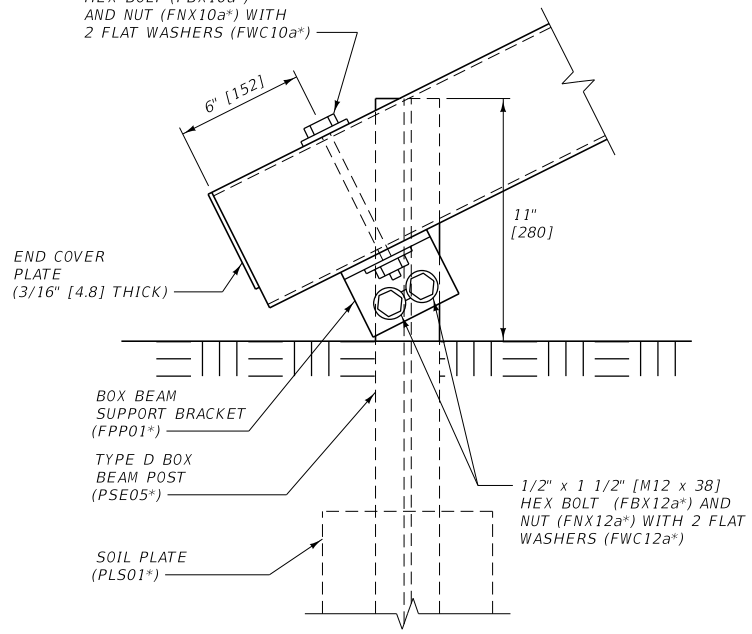
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

SECTION A-A

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-50
BOX BEAM GUARDRAIL	
EFFECTIVE: SEPTEMBER 2014	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	




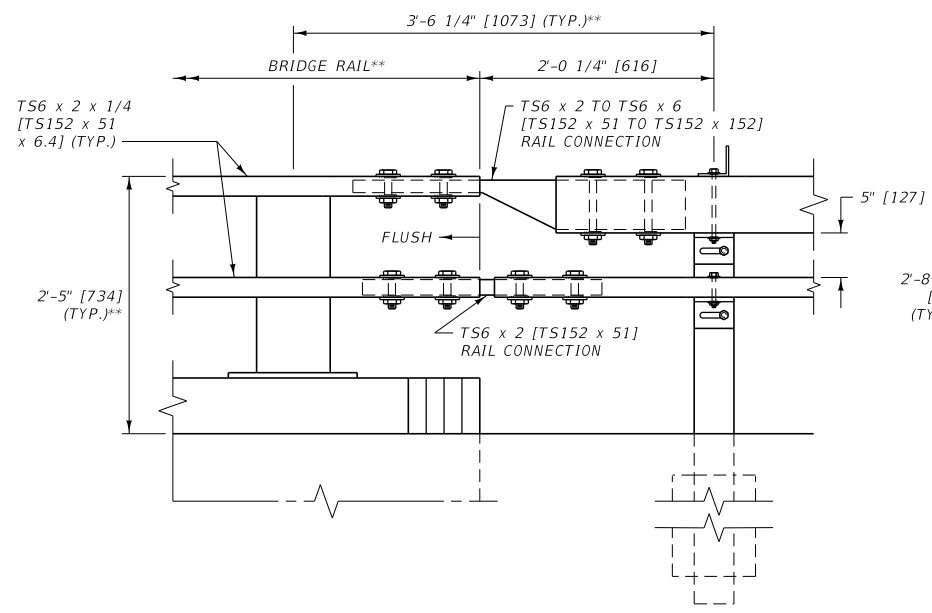
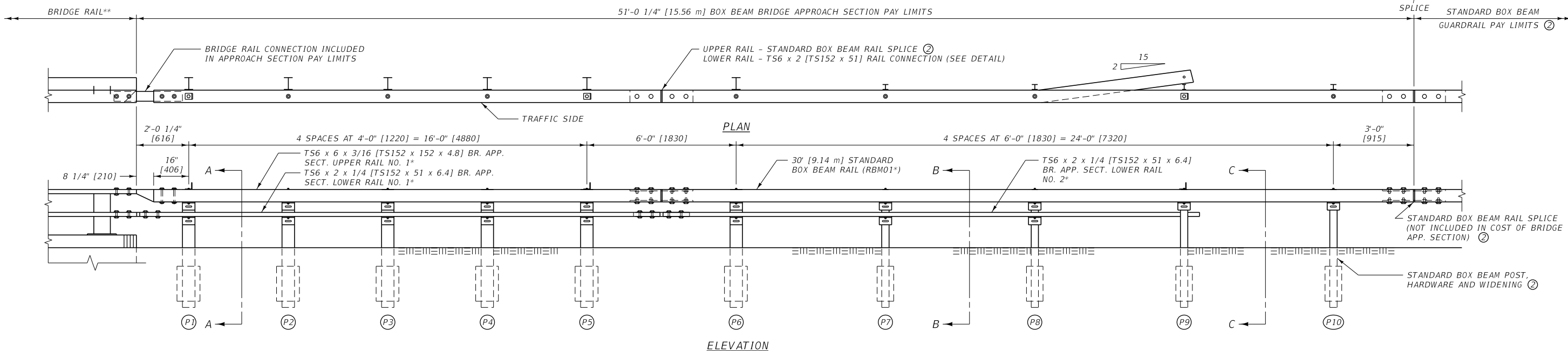
1/2" [12.7] DIA. HOLES FOR
 3/8" DIA. x 7 1/2" [M10 x 191]
 HEX BOLT (FBX10a*)
 AND NUT (FNX10a*) WITH
 2 FLAT WASHERS (FWC10a*)



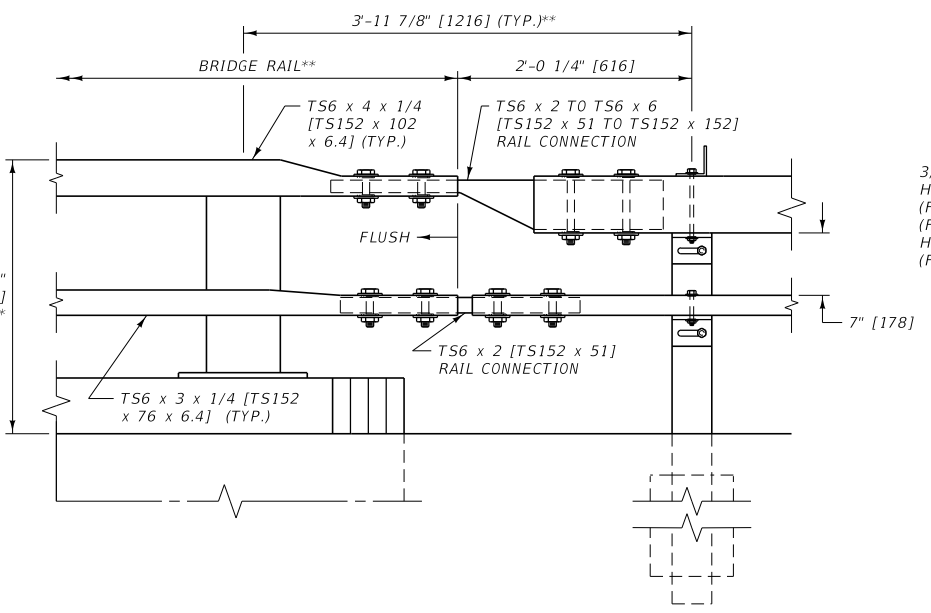
- NOTES:
- ① SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.
 - * SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS {} ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

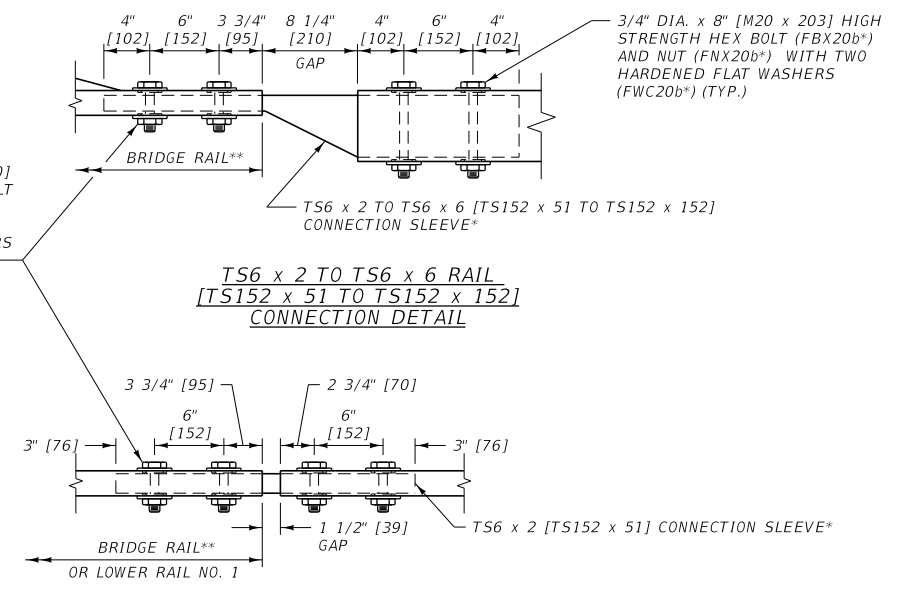
DETAILED DRAWING	
REFERENCE	DWG. NO.
STANDARD SPEC.	606-52
SECTION 606	
BOX BEAM ONE-WAY DEPARTURE TERMINAL SECTION	
EFFECTIVE: SEPTEMBER 2014	
 MONTANA DEPARTMENT OF TRANSPORTATION	



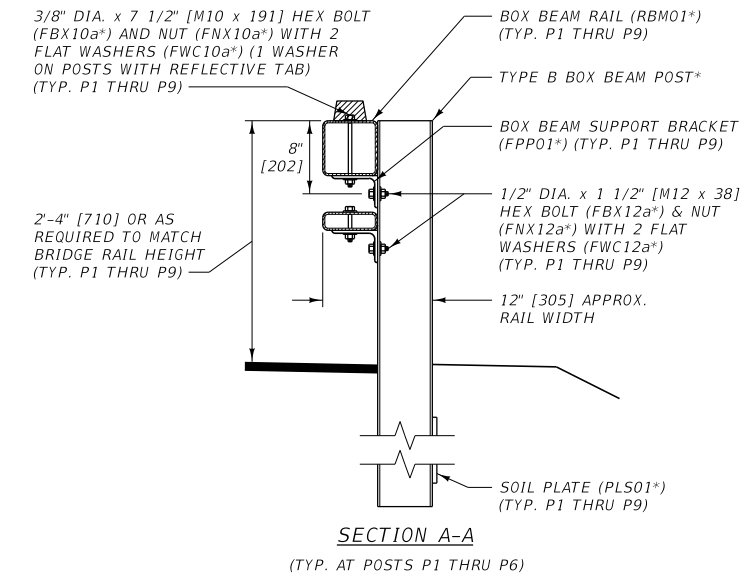
BOX BEAM - BRIDGE APPROACH SECTION TYPE 1



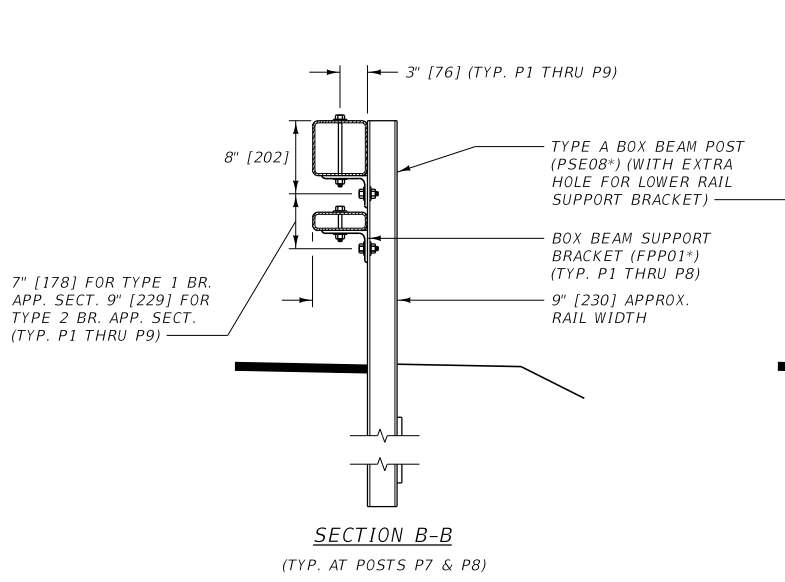
BOX BEAM - BRIDGE APPROACH SECTION TYPE 2



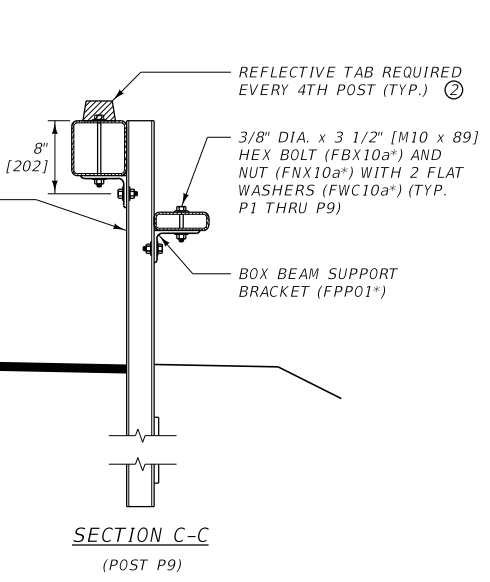
TS6 x 2 [TS152 x 51] RAIL CONNECTION DETAIL



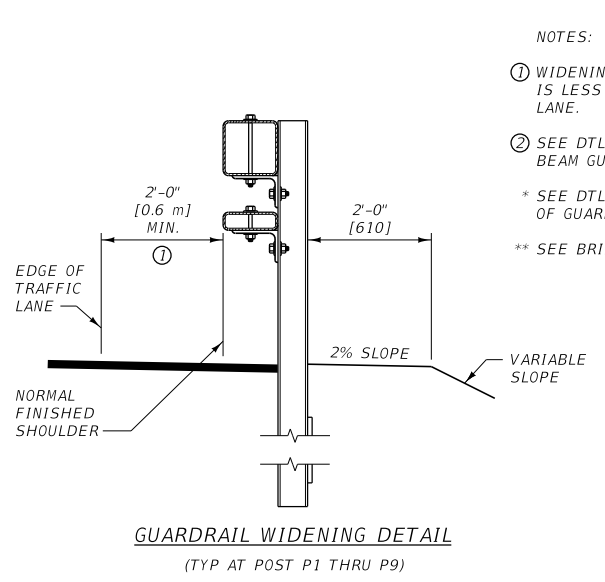
SECTION A-A
(TYP. AT POSTS P1 THRU P6)



SECTION B-B
(TYP. AT POSTS P7 & P8)



SECTION C-C
(POST P9)

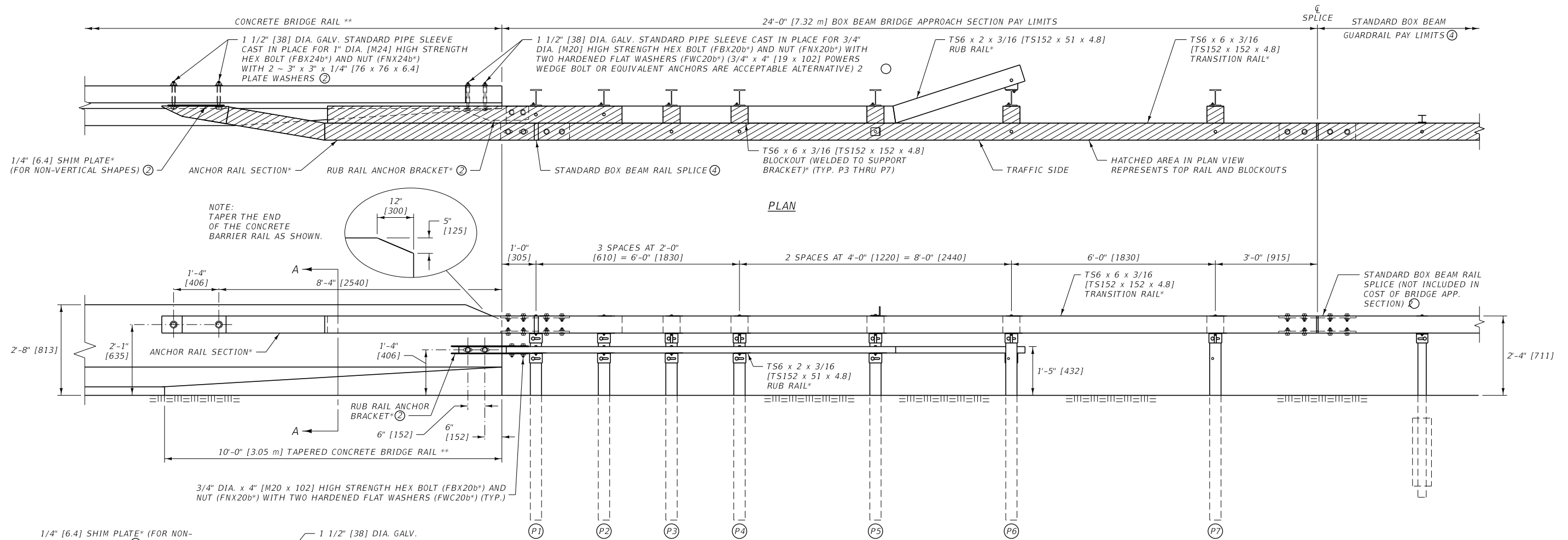


GUARDRAIL WIDENING DETAIL
(TYP AT POST P1 THRU P9)

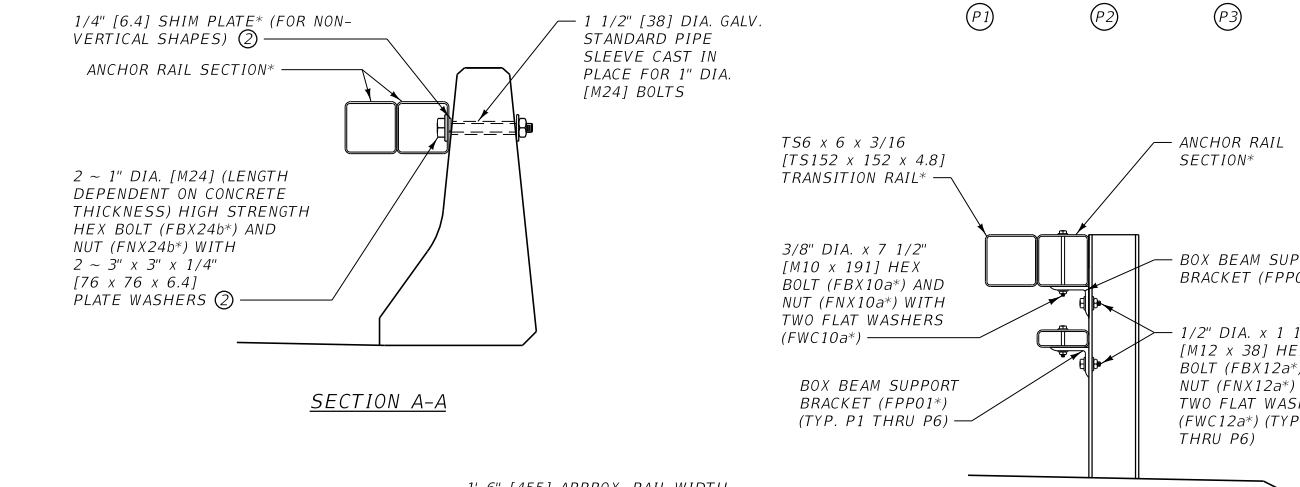
- NOTES:**
- ① WIDENING IS REQUIRED IF FINISHED SHOULDER IS LESS THAN 2'-0" [0.6 m] FROM THE TRAFFIC LANE.
 - ② SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.
 - * SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.
 - ** SEE BRIDGE PLANS.

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	
EFFECTIVE: SEPTEMBER 2014	
MDTA MONTANA DEPARTMENT OF TRANSPORTATION	

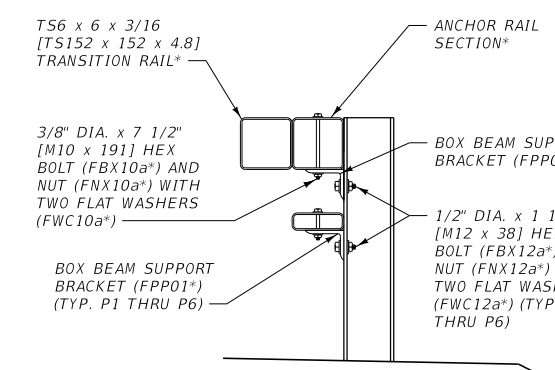


PLAN

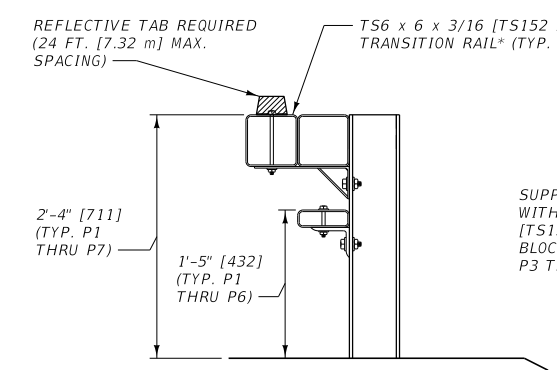


SECTION A-A

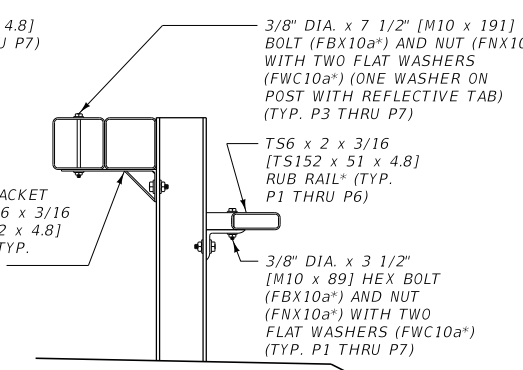
ELEVATION



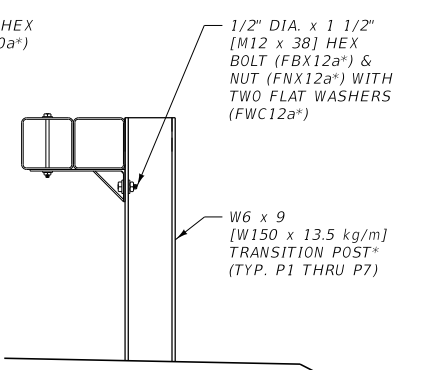
TYP. AT POSTS P1 & P2



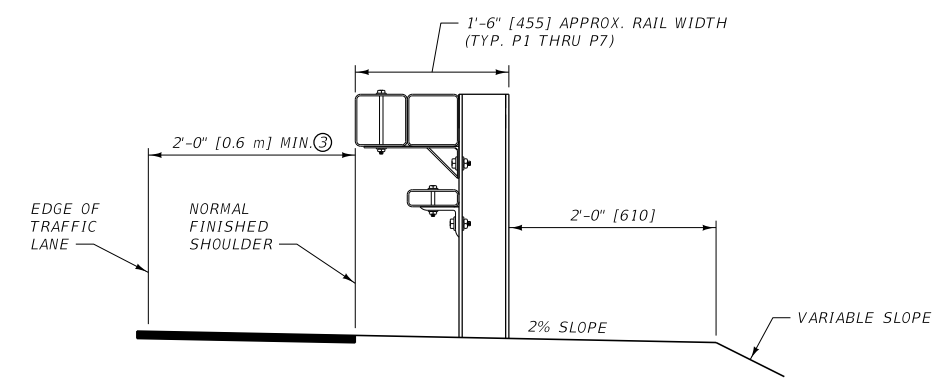
TYP. AT POSTS P3 THRU P5



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.

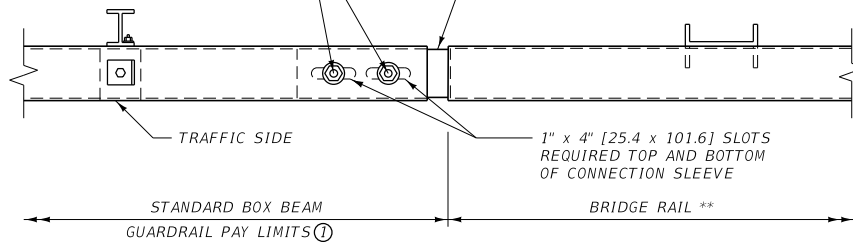
* SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.
 ** SEE BRIDGE PLANS.

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

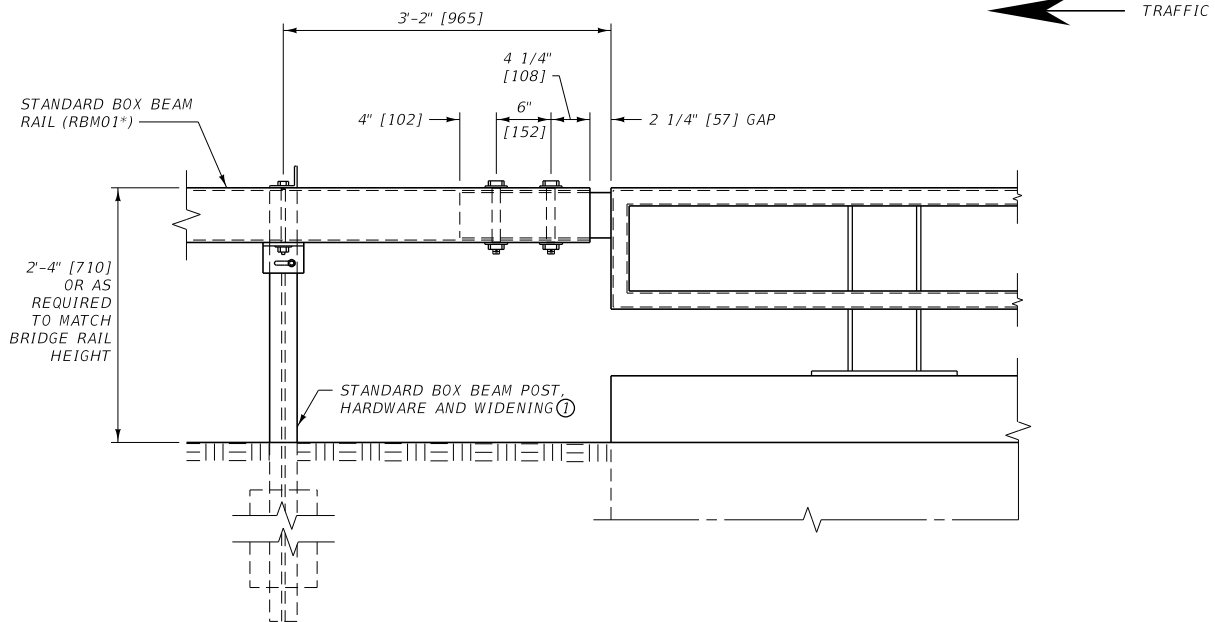
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-53A
BOX BEAM BRIDGE APPROACH SECTION-TYPE 3	
EFFECTIVE: SEPTEMBER 2014	
MONTANA DEPARTMENT OF TRANSPORTATION	

1" [25.4] DIA. HOLES IN BOX BEAM RAIL FOR 3/4" DIA. x 8" [M20 x 203] HIGH STRENGTH HEX BOLT (FBX20b*) AND NUT (FNX20b*) WITH TWO HARDENED FLAT WASHERS (FWC20b*)

CONNECTION SLEEVE ATTACHED TO BRIDGE RAIL (TYP.)** (1/4" [6.4] THICK STEEL FORM FIT TUBE TO RECEIVE T56 x 6 x 3/16 [TS152 x 152 x 4.8] BOX BEAM RAIL)



PLAN



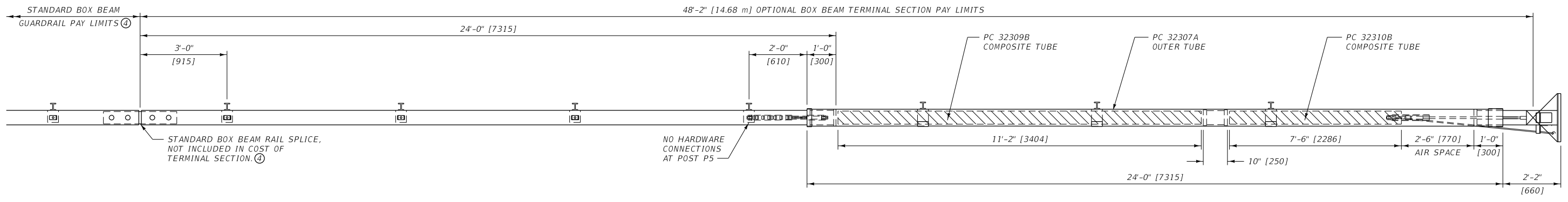
ELEVATION

NOTES:

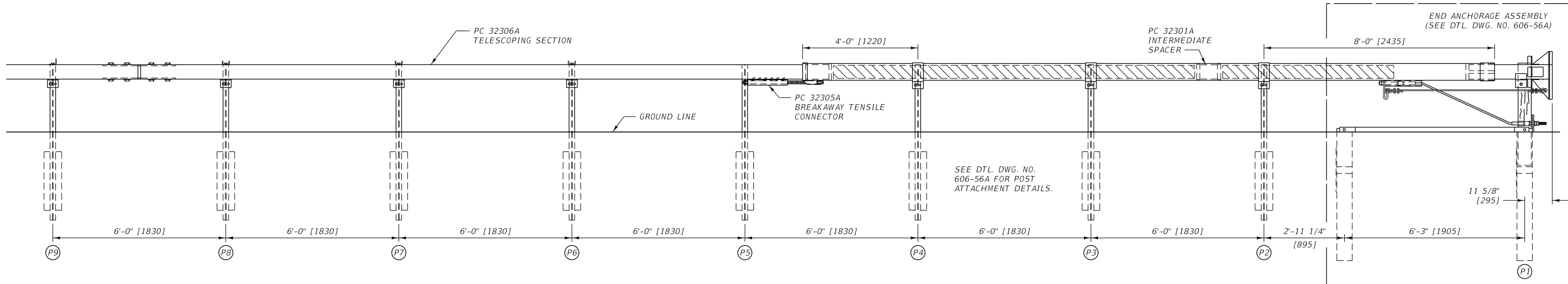
- ① SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.
- ② USE ON EXIT END OF ONE-WAY TRAFFIC BRIDGES ONLY.
- * SEE DTL. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.
- ** SEE BRIDGE PLANS FOR MORE DETAILED INFORMATION ON BRIDGE RAIL AND CONNECTION DETAILS.

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

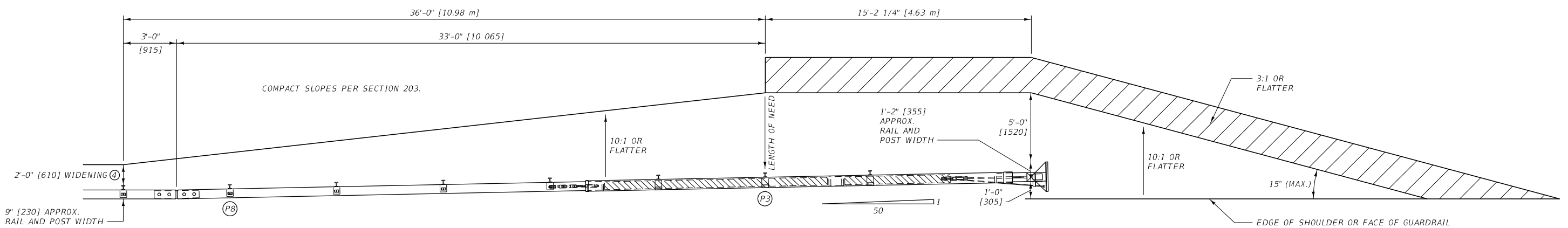
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-54
BOX BEAM ONE-WAY BRIDGE DEPARTURE SECTION	
EFFECTIVE: SEPTEMBER 2014	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	



PLAN



ELEVATION



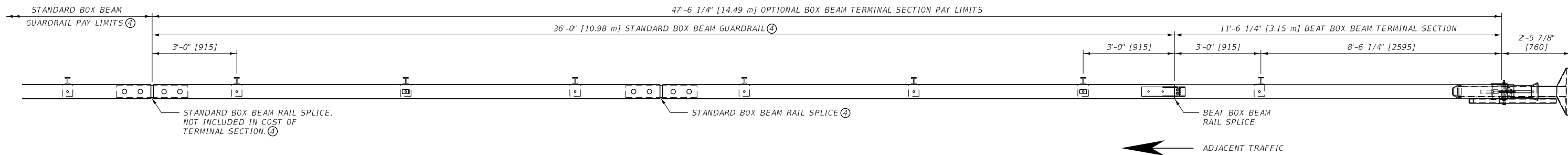
GUARDRAIL WIDENING

NOTES:

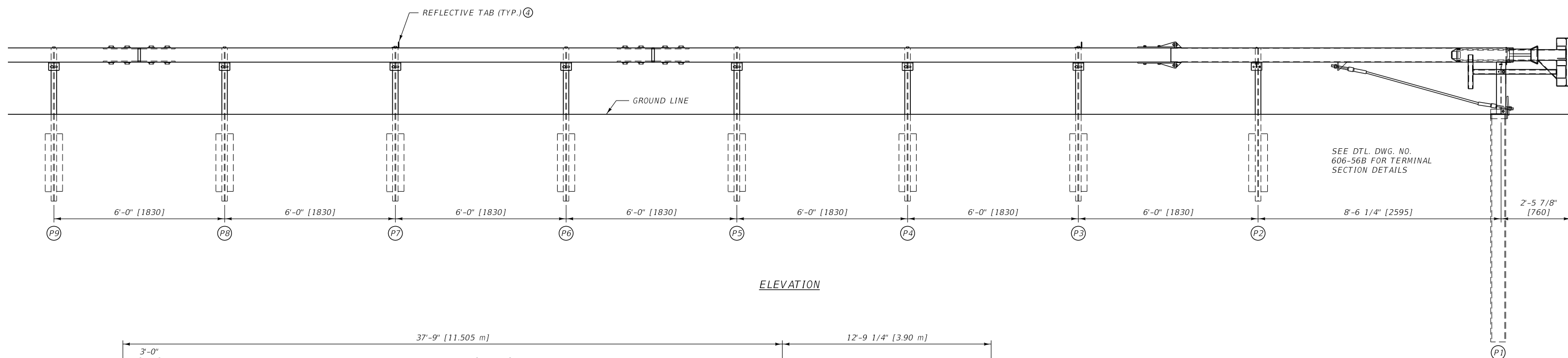
- ① PLACE A SELF-ADHESIVE OBJECT MARKER ON THE FACE OF THE NOSE ASSEMBLY, HAVING ALTERNATING RETRO-REFLECTIVE BLACK AND YELLOW STRIPES SLOPED DOWNWARD AT AN ANGLE OF 45° TOWARDS THE SIDE ON WHICH TRAFFIC IS TO PASS.
- ② FLARE THE END SECTION AWAY FROM TRAFFIC AT A RATE OF 50:1 FOR 50 FEET [15.24 m] (ILLUSTRATED). FLARES OF 50:1 FOR 100 FEET [30.48 m] MAY ALSO BE USED. THE FLARE MAY BE OMITTED ON ROADS WITH SHOULDERS GREATER THAN 2 FEET [0.6 m] IN WIDTH.
- ③ OBTAIN PROJECT MANAGER'S APPROVAL OF MANUFACTURER INSTALLATION OPTIONS WHEN SITE CONDITIONS PREVENT THE USE OF THE OPTION SHOWN ON THIS DETAIL.
- ④ SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.
- ⑤ USE WOOD OR OTHER NCHRP 350/MASH APPROVED BLOCKS.

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

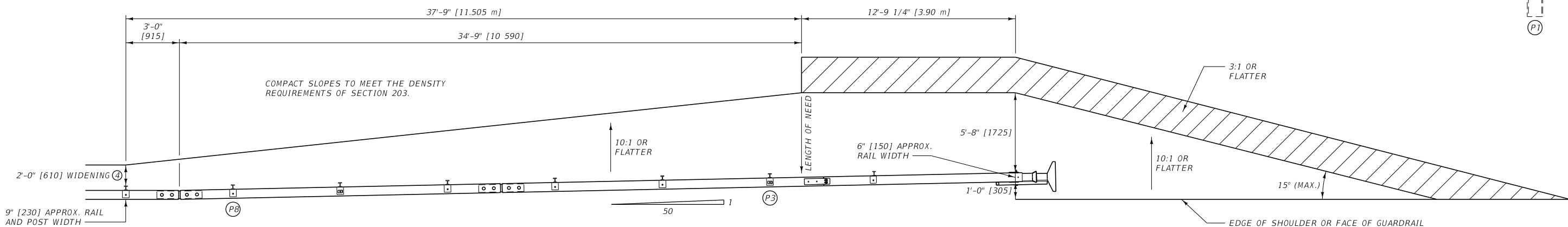
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-55A
OPTIONAL BOX BEAM TERMINAL SECTION - WY-BET	
---REVISED--- JULY 2016	EFFECTIVE: SEPTEMBER 2014
MONTANA DEPARTMENT OF TRANSPORTATION	



PLAN



ELEVATION



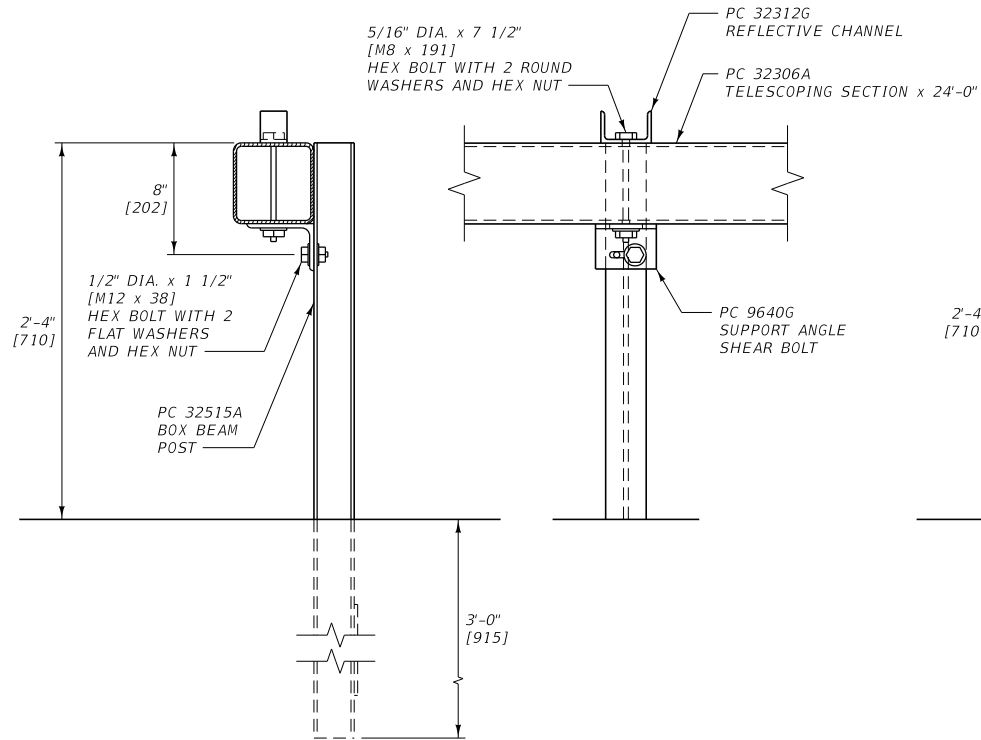
GUARDRAIL WIDENING

NOTES:

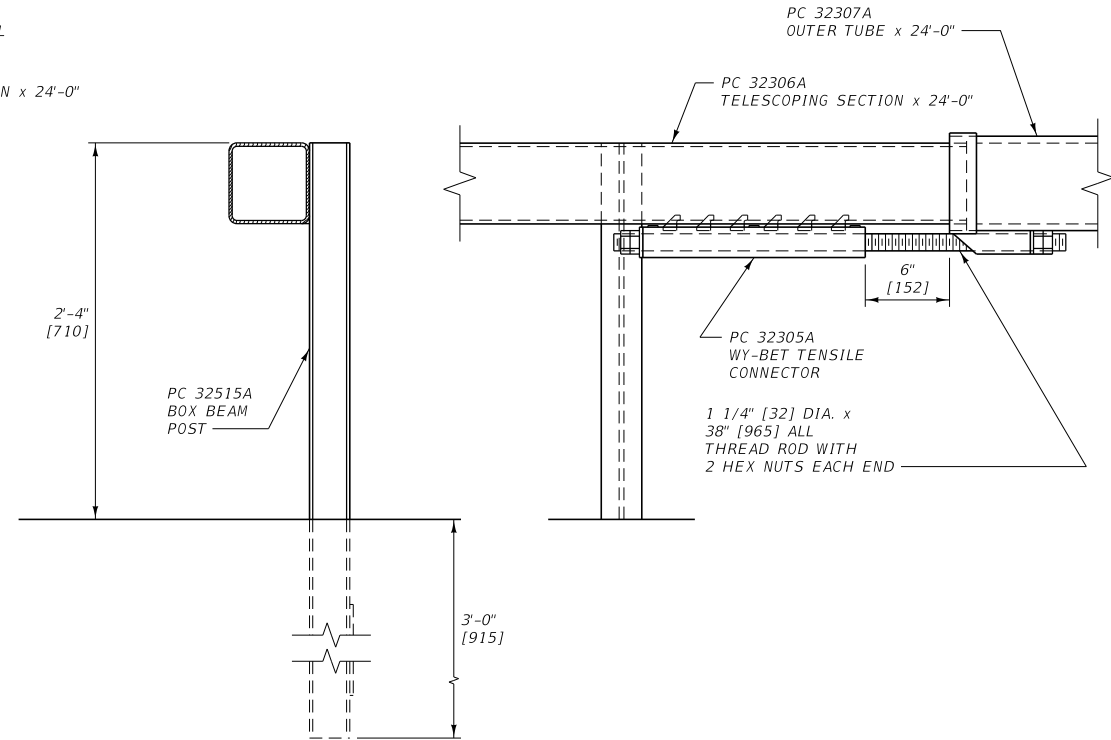
- ① PLACE A SELF-ADHESIVE OBJECT MARKER ON THE FACE OF THE NOSE ASSEMBLY, HAVING ALTERNATING RETRO-REFLECTIVE BLACK AND YELLOW STRIPES SLOPED DOWNWARD AT AN ANGLE OF 45° TOWARDS THE SIDE ON WHICH TRAFFIC IS TO PASS.
- ② FLARE THE END SECTION AWAY FROM TRAFFIC AT A RATE OF 50:1 FOR 50 FEET [15.24 m] (ILLUSTRATED). FLARES OF 50:1 FOR 100 FEET [30.48 m] MAY ALSO BE USED. THE FLARE MAY BE OMITTED ON ROADS WITH SHOULDERS GREATER THAN 2 FEET [0.6 m] IN WIDTH.
- ③ OBTAIN PROJECT MANAGER'S APPROVAL OF MANUFACTURER INSTALLATION OPTIONS WHEN SITE CONDITIONS PREVENT THE USE OF THE OPTION SHOWN ON THIS DETAIL.
- ④ SEE DTL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.

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

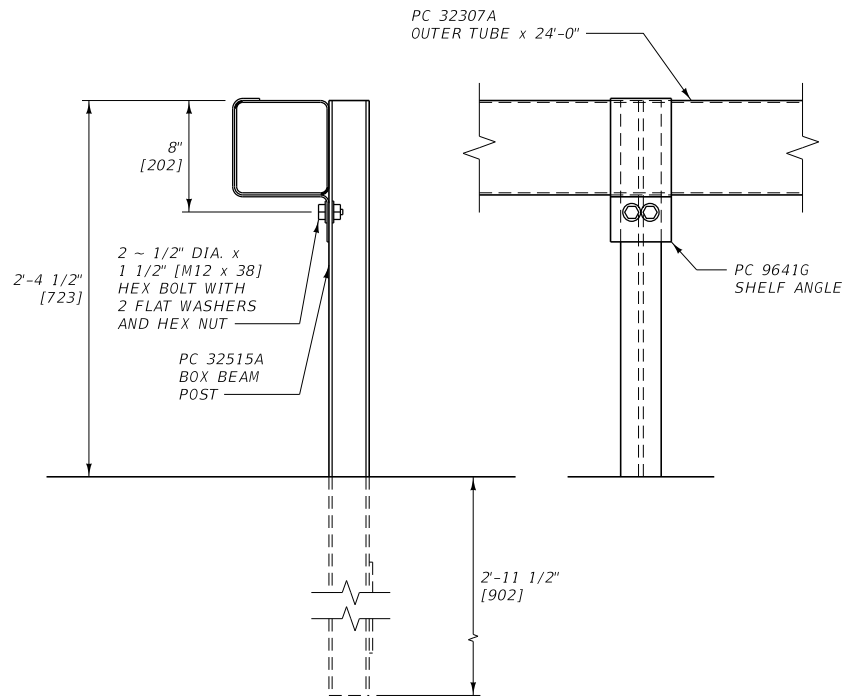
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-55B
OPTIONAL BOX BEAM TERMINAL SECTION - BEAT	
EFFECTIVE: SEPTEMBER 2014	
MONTANA DEPARTMENT OF TRANSPORTATION	



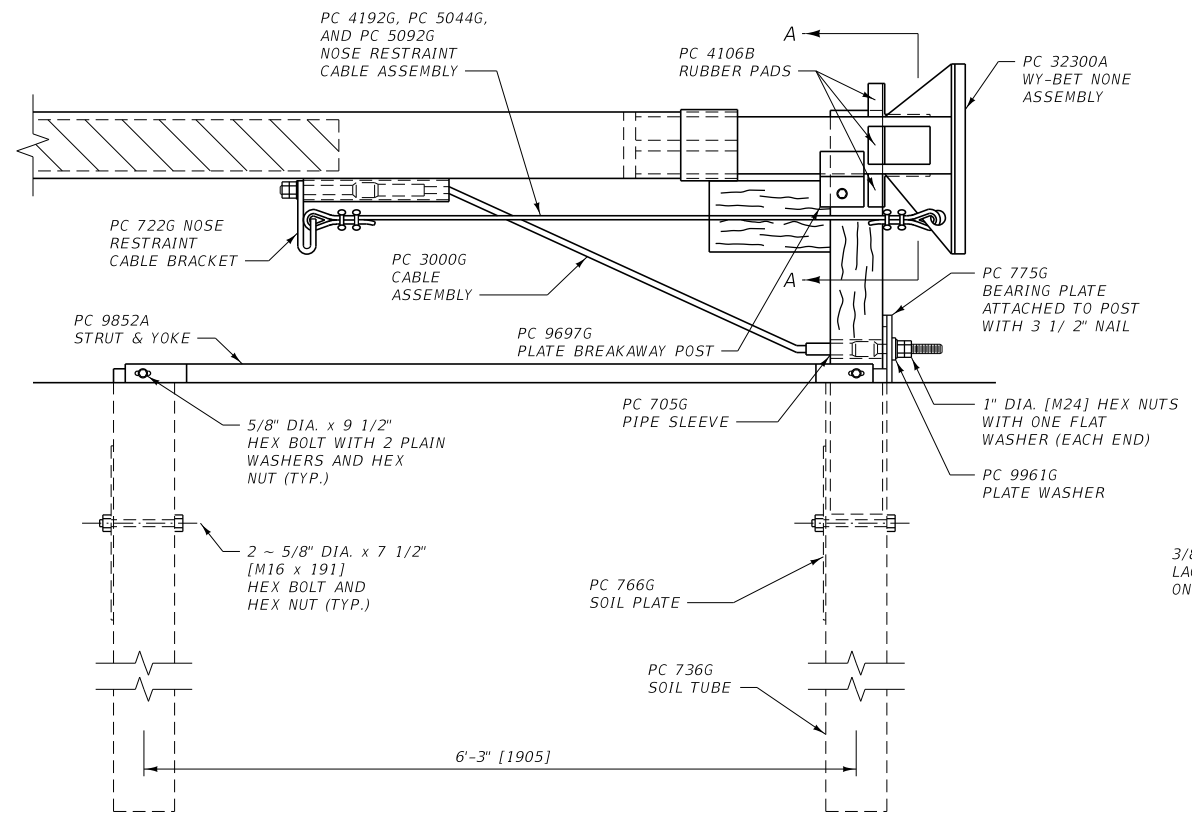
POST ATTACHMENT DETAIL
(TYP. AT POSTS P6, P7 AND P8)



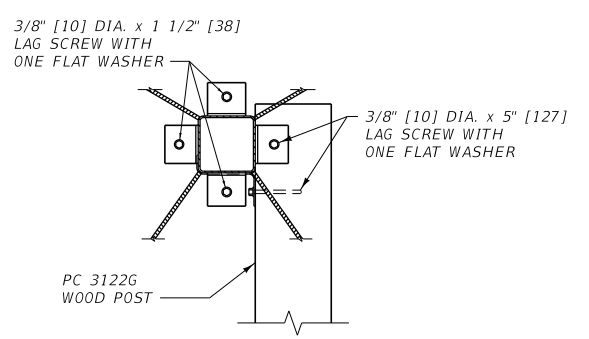
POST ATTACHMENT DETAIL
(POST P5)



POST ATTACHMENT DETAIL
(TYP. AT POSTS P2, P3 AND P4)



END ANCHORAGE ASSEMBLY



SECTION A-A

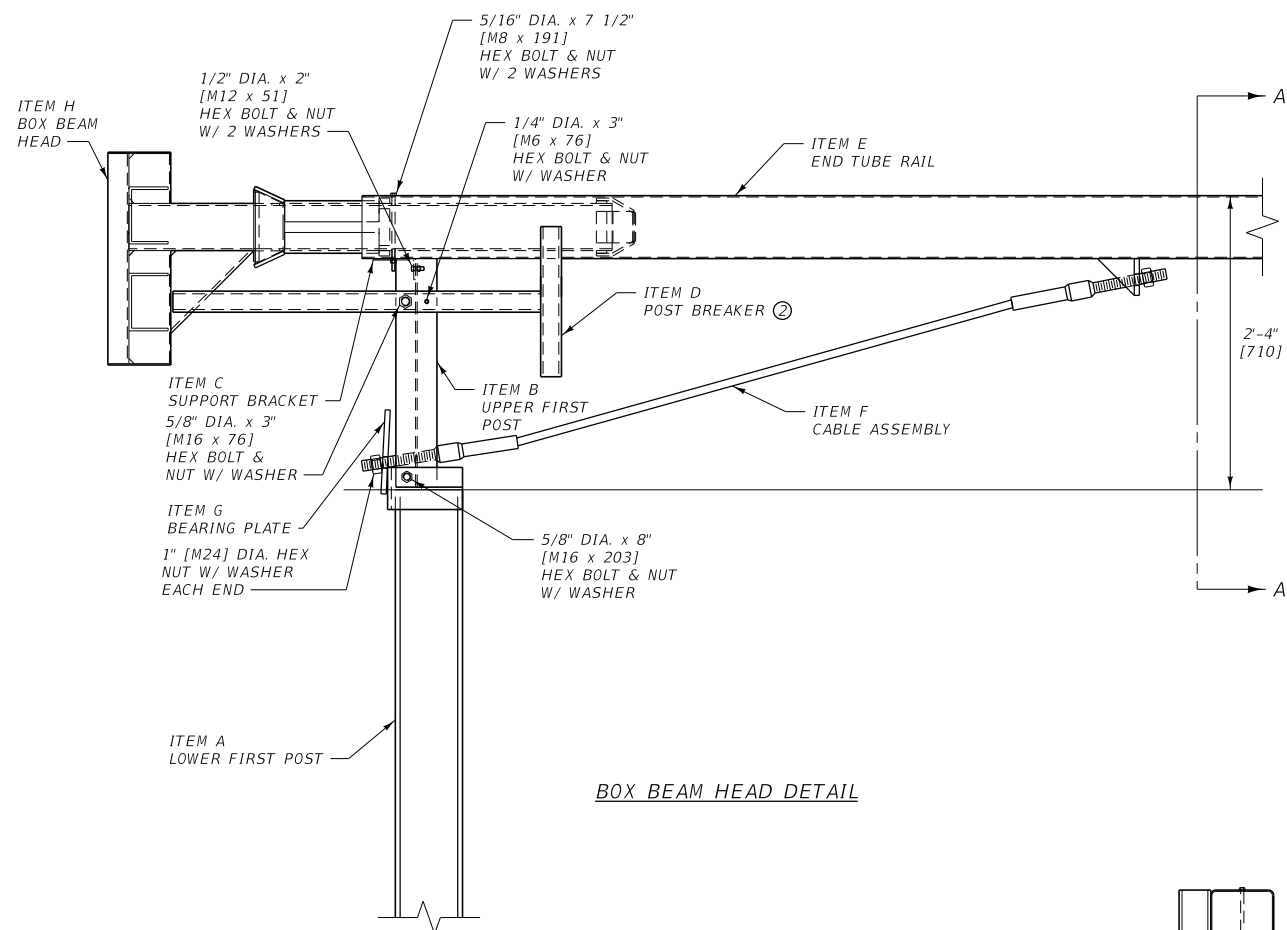
BILL OF MATERIAL			
PC	QTY	DESCRIPTION	METRIC DESCRIPTION (mm)
705G	1	PIPE SLEEVE - WOOD POST	PIPE SLEEVE- WOOD POST
722G	1	NOSE RESTRAINT CABLE BRACKET	NOSE RESTRAINT CABLE BRACKET
736G	2	SOIL TUBE	SOIL TUBE
766G	2	SOIL PLATE	SOIL PLATE
775G	1	BEARING PLATE	BEARING PLATE
3000G	1	3/4" DIA. CABLE ASSEMBLY X 6'-6"	CABLE ASSEMBLY
3042B	6	DELINEATOR TAPE-AMBER 1.25" X 1.75"	DELINEATOR TAPE-AMBER
3121G	1	WOOD BLOCK	WOOD BLOCK
3122G	1	WOOD POST	WOOD POST
3177G	1	ET REFLECTOR 18" X 18" YELLOW/BLACK	ET REFLECTOR
3240G	6	5/16" DIA. ROUND WASHER WIDE (F844)	M8 ROUND WASHER
3245G	3	5/16" DIA. HEX NUT (A563)	M8 HEX NUT
3254G	3	3/8" DIA. x 1 1/2" LAG SCREW (A307)	10 DIA. x 38 LAG SCREW
3255G	3	3/8" DIA. FLAT WASHER (F844)	M10 FLAT WASHER
3300G	4	5/8" PLAIN WASHER TYPE A WIDE (F844)	M10 PLAIN WASHER
3350G	6	5/8" DIA. HEX NUT (A563)	M16 HEX NUT
3478G	4	5/8" DIA. x 7 1/2" HEX BOLT (A307)	M16 x 191 HEX BOLT
3497G	2	5/8" DIA. x 9 1/2" HEX BOLT (A307)	HEX BOLT
4044G	4	1 1/4" DIA. HEX NUT (A194 2H)	32 DIA. HEX NUT
4106B	3	RUBBER PAD	RUBBER PAD
4192G	4	1/4" CABLE CLAMP	6.4 CABLE CLAMP
4300G	26	1/2" DIA. FLAT WASHER (F844)	M12 FLAT WASHER
4303G	13	1/2" DIA. HEX NUT (A563)	M12 HEX NUT
4308G	9	1/2" DIA. x 1 1/2" HEX BOLT (A307)	M12 x 38 HEX BOLT
4902G	2	1" DIA. FLAT WASHER (F436)	M24 FLAT WASHER
4903G	4	1" DIA. HEX NUT (A194 2H)	M24 HEX NUT
5044G	1	AIRCRAFT CABLE, 1/4" DIA. x 6'-10"	AIRCRAFT CABLE, 6.4 DIA. x 2080
5092G	2	1/4" AIRCRAFT CABLE THIMBLE	6.4 AIRCRAFT CABLE THIMBLE
5107G	1	ROD, ALL THREAD 1 1/4" DIA. X 38"	ROD
5188G	3	5/16" DIA. x 7 1/2" HEX BOLT (A307)	M8 x 191 HEX BOLT
5299G	4	1/2" DIA. x 9 1/2" HEX BOLT (A307)	HEX BOLT
5968G	2	NAIL 16d (3 1/2")	NAIL
6260G	1	COMPRESSION SPRING	COMPRESSION SPRING
9640G	3	SUPPORT ANGLE SHEAR BOLT	SUPPORT ANGLE SHEAR BOLT
9641G	3	SHELF ANGLE	SHELF ANGLE
9697G	2	PLATE BREAKAWAY POST	PLATE BREAKAWAY POST
9852A	1	STRUT AND YOKE ASSEMBLY	STRUT AND YOKE ASSEMBLY
9961G	1	PLATE WASHER (A36)	PLATE WASHER
32300A	1	WY-BET NOSE ASSEMBLY	WY-BET NOSE ASSEMBLY
32301A	1	INTERMEDIATE SPACER x 10"	INTERMEDIATE SPACER
32305A	1	WY-BET TENSILE CONNECTOR	WY-BET TENSILE CONNECTOR
32306A	1	TELESCOPING SECTION x 24'-0"	TELESCOPING SECTION
32307A	1	OUTER TUBE x 24'-0"	OUTER TUBE
32309B	1	COMPOSITE TUBE x 11'-2" WITH CAP	COMPOSITE TUBE
32310B	1	COMPOSITE TUBE x 7'-6" WITH CAP	COMPOSITE TUBE
32312G	3	REFLECTOR CHANNEL	REFLECTOR CHANNEL
32515A	7	BOX BEAM POST	BOX BEAM POST

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

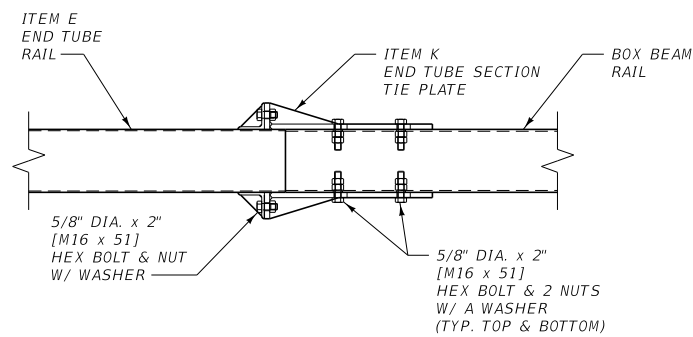
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-56A
WY-BET BOX BEAM TERMINAL SECTION DETAILS	

EFFECTIVE: SEPTEMBER 2014

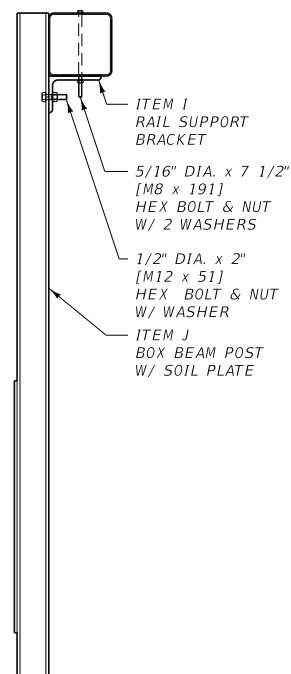




BOX BEAM HEAD DETAIL



FIRST RAIL TIE DETAIL



SECTION "A-A"

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	METRIC DESCRIPTION
A	1	LOWER FIRST POST, W6x15, 8'-0" LG.	LOWER FIRST POST, W152 x 22.3 kg/m, 2440 LG.
B	1	UPPER FIRST POST, W6x9, 1'-9 1/2" LG.	UPPER FIRST POST, W152 x 13.4 kg/m, 546 LG.
C	1	SUPPORT BRACKET, 10 GAUGE BENT PLATE	SUPPORT BRACKET, 10 GA. (3.5 THK.) BENT PLATE
D	1	POST BREAKER	POST BREAKER
E	1	END TUBE RAIL, TS 6" x 6" x 1/8" x 12'-0"	END TUBE RAIL, TS 152 x 152 x 3.2 x 3660
F	1	CABLE ASSEMBLY	CABLE ASSEMBLY
G	1	BEARING PLATE	BEARING PLATE
H	1	BOX BEAM HEAD	BOX BEAM HEAD
I	1	RAIL SUPPORT BRACKET, L 5" x 3 1/2" x 3/8" x 4 1/2"	RAIL SUPPORT BRACKET, L 127 x 89 x 9.5 x 115
J	1	BOX BEAM POST W/ SOIL PLATE	BOX BEAM POST W/ SOIL PLATE
K	2	END TUBE SECTION TIE PLATE	END TUBE SECTION TIE PLATE
a	2	5/16" DIA. x 7 1/2" HEX BOLT (GRADE 5)	M8 x 191 HEX BOLT (GRADE 5)
b	1	1/4" DIA. x 3" HEX BOLT (GRADE 2)	M6 x 76 HEX BOLT (GRADE 2)
c	2	1/2" DIA. x 2" HEX BOLT (GRADE 2)	M12 x 51 HEX BOLT (GRADE 2)
d	8	5/8" DIA. x 2" HEX BOLT (GRADE 5)	M16 x 51 HEX BOLT (GRADE 5)
e	1	5/8" DIA. x 8" HEX BOLT (GRADE 5)	M16 x 203 HEX BOLT (GRADE 5)
f	1	5/8" DIA. x 3" HEX BOLT (GRADE 5)	M16 x 76 HEX BOLT (GRADE 5)
g	2	5/16" DIA. HEX NUT	M8 HEX NUT
h	1	1/4" DIA. HEX NUT	M6 HEX NUT
j	2	1/2" DIA. HEX NUT	M12 HEX NUT
k	14	5/8" DIA. HEX NUT	M16 HEX NUT
n	2	1" DIA. ANCHOR CABLE HEX NUT	M24 ANCHOR CABLE HEX NUT
p	4	5/16" DIA. WASHER	M8 WASHER
q	1	1/4" DIA. WASHER	M6 WASHER
r	3	1/2" DIA. WASHER	M12 WASHER
s	10	5/8" DIA. WASHER	M16 WASHER
u	2	1" DIA. ANCHOR CABLE WASHER	M24 ANCHOR CABLE WASHER

NOTES:

- ① BEAT TERMINAL SECTION TO INCLUDE 36'-0" (10.98 m) OF BOX BEAM GUARDRAIL AS SHOWN ON DTL. DWG. NO. 606-55B.
- ② PLACE POST BREAKER ON TRAFFIC SIDE OF FIRST POST.

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. 606-56B
BEAT BOX BEAM TERMINAL SECTION DETAILS	

--REVISED-- JANUARY 2018	EFFECTIVE: SEPTEMBER 2014
MONTANA DEPARTMENT OF TRANSPORTATION	

DTL DWGS. WHERE PARTS USED

SCHEDULE OF GUARDRAIL HARDWARE

DESIGNATION	DESCRIPTION	METRIC DESCRIPTION	DTL DWG. NO. (606-##)	GUARDRAIL TYPE
FBB01-05	5/8" DIA. GUARDRAIL BOLT & RECESS NUT	M16 GUARDRAIL BOLT & RECESS NUT	82	W
FBB01-05	5/8" DIA. GUARDRAIL BOLT	M16 GUARDRAIL BOLT	82	W
FBB06-07	5/8" DIA. GUARDRAIL BOLT & RECESS NUT	M16 GUARDRAIL BOLT & RECESS NUT	82	W
FBH01	5/16" DIA. HOOK BOLT	M8 HOOK BOLT	92	C
FBH02	5/16" DIA. ALTERNATE HOOK BOLT	M8 ALTERNATE HOOK BOLT	92	C
FBX10a	3/8" DIA. HEX BOLT	M10 HEX BOLT	82	B
FBX12a	1/2" DIA. HEX BOLT	M12 HEX BOLT	82	B,C
FBX14a	9/16" DIA. HEX BOLT	M14 HEX BOLT	82	B
FBX16a	5/8" DIA. HEX BOLT	M16 HEX BOLT	82	W
FBX20a	3/4" DIA. HEX BOLT	M20 HEX BOLT	82	W
FBX20b	3/4" DIA. HIGH STRENGTH HEX BOLT*	M20 HIGH STRENGTH HEX BOLT*	82	B
FBX22a	7/8" DIA. HEX BOLT	M22 HEX BOLT	82	W
FBX22b	7/8" DIA. HIGH STRENGTH HEX BOLT*	M22 HIGH STRENGTH HEX BOLT*	82	W
FBX24b	1" DIA. HIGH STRENGTH HEX BOLT*	M24 HIGH STRENGTH HEX BOLT*	82	B
FCA01	CABLE ASSEMBLY	M24 HIGH STRENGTH HEX BOLT*	82	W
FCM01	CABLE WEDGE	CABLE ASSEMBLY	84	W
FCM02	POST SLEEVE	CABLE WEDGE	94	C
FMS20	3/4" DIA. SQUARE NUT	POST SLEEVE	84	W
FNX08a	5/16" DIA. HEX NUT	M20 SQUARE NUT	82	C
FNX10a	3/8" DIA. HEX NUT	M8 HEX NUT	82	B
FNX12a	1/2" DIA. HEX NUT	M10 HEX NUT	82	B,C
FNX14a	9/16" DIA. HEX NUT	M12 HEX NUT	82	B
FNX16a	5/8" DIA. HEX NUT	M14 HEX NUT	82	W
FNX20a	3/4" DIA. HEX NUT	M16 HEX NUT	82	W
FNX20b	3/4" DIA. HIGH STRENGTH HEX NUT	M20 HIGH STRENGTH HEX NUT	82	B
FNX22a	7/8" DIA. HEX NUT	M20 HIGH STRENGTH HEX NUT	82	B
FNX22b	7/8" DIA. HIGH STRENGTH HEX NUT	M22 HIGH STRENGTH HEX NUT	82	B
FNX24a	1" DIA. HEX NUT	M24 HIGH STRENGTH HEX NUT	82	W
FNX24b	1" DIA. HIGH STRENGTH HEX NUT	M24 HIGH STRENGTH HEX NUT	82	B
FPA01	GUARDRAIL ANCHOR BRACKET & END PLATE	GUARDRAIL ANCHOR BRACKET & END PLATE	84	W
FPA02	CABLE ANCHOR BRACKET	CABLE ANCHOR BRACKET	95	C
FPB01	BEARING PLATE	CABLE ANCHOR BRACKET	18 & 46	W
FPF01	BOX BEAM SUPPORT BRACKET	BOX BEAM SUPPORT BRACKET	97	B
FRH20a	3/4" DIA. HOOKED ANCHOR ROD	BOX BEAM SUPPORT BRACKET	82	C
FWC10a	3/8" DIA. FLAT WASHER	M20 HOOKED ANCHOR ROD	82	B
FWC12a	1/2" DIA. FLAT WASHER	M10 FLAT WASHER	82	B,C
FWC14a	9/16" DIA. FLAT WASHER	M12 FLAT WASHER	82	B
FWC16a	5/8" DIA. FLAT WASHER	M14 FLAT WASHER	82	W
FWC20a	3/4" DIA. FLAT WASHER	M16 FLAT WASHER	82	W
FWC20b	3/4" DIA. HARDENED FLAT WASHER	M20 FLAT WASHER	82	C,W
FWC24a	1" DIA. FLAT WASHER	M20 HARDENED FLAT WASHER	82	B
FWR03	RECTANGULAR PLATE WASHER	M24 FLAT WASHER	82	W
PDB01	8" WOOD BLOCKOUT	RECTANGULAR PLATE WASHER	84	W
PDB11	12" WOOD BLOCKOUT	205 WOOD BLOCKOUT	05A & 05B, 11A & 11B	W
PDE02	WOOD GUARDRAIL POST	305 WOOD BLOCKOUT	09, 23A & 23B	W
PDE09	CRT POST	WOOD GUARDRAIL POST	05A & 11A	W
PDF01	WOOD BREAKAWAY POST	CRT POST	46	W
PF01	STRUT AND YOKE ASSEMBLY	WOOD BREAKAWAY POST	46	W
PLS01	SOIL PLATE	STRUT AND YOKE ASSEMBLY	18	W
PLS03	SOIL PLATE	SOIL PLATE	92 & 97	B,C
PSE01	CABLE GUARDRAIL LINE POST	SOIL PLATE	46	W
PSE05	TYPE D BOX BEAM POST	CABLE GUARDRAIL LINE POST	92	C
PSE06	CABLE GUARDRAIL ANCHOR POST	TYPE D BOX BEAM POST	97	B
PSE08	TYPE A BOX BEAM POST	CABLE GUARDRAIL ANCHOR POST	95	C
PTE05	STEEL TUBE	TYPE A BOX BEAM POST	97	B
PTE06	STEEL TUBE	STEEL TUBE	46	W
RBM01	BOX BEAM RAIL	STEEL TUBE	18	W
RBM05	BOX BEAM TERMINAL RAIL	STEEL GUARDRAIL POST	05B	W
RCE01	COMPENSATING CABLE END ASSEMBLY	BOX BEAM RAIL	98	B
RCE03	CABLE END ASSEMBLY	BOX BEAM TERMINAL RAIL	98	B
RCM01	3/4" DIA. CABLE	BOX BEAM SPLICE PLATE	98	B
RTE01a-b	THRIE-BEAM TERMINAL CONNECTOR	COMPENSATING CABLE END ASSEMBLY	94	C
RTM01a-b	4-SPACE THRIE-BEAM (6'-3" LENGTH)	CABLE END ASSEMBLY	94	C
RTM02a-b	8-SPACE THRIE-BEAM (12'-6" LENGTH)	19.1 DIA. CABLE	94	C
RWE02a-b	W-BEAM TERMINAL CONNECTOR	THRIE-BEAM TERMINAL CONNECTOR	23A & 23B	W
RWM04a-b	2-SPACE W-BEAM (12'-6" LENGTH)	4-SPACE THRIE-BEAM (1,905 m LENGTH)	23A & 23B	W
RWM08a-b	8-SPACE W-BEAM (12'-6" LENGTH)	8-SPACE THRIE-BEAM (3,81 m LENGTH)	23A & 23B	W
RWM14a	BCT TERMINAL RAIL SECTION	W-BEAM END SECTION (FLARED)	88	W
RWM22a-b	W-BEAM (25'-0" LENGTH)	W-BEAM TERMINAL CONNECTOR	88	W
RWT02a-b	W-BEAM TO THRIE-BEAM TRANSITION SECTION (7'-3" TO 12'-6" LENGTH)	W-BEAM END SECTION (BUFFER)	88	W
SEC01	CABLE GUARDRAIL TERMINAL ANCHOR ASSEMBLY	W-BEAM TERMINAL CONNECTOR	88	W
N/A	TURNBUCKLE CABLE END ASSEMBLY	2-SPACE W-BEAM (3.81 m LENGTH)	88	W
N/A	KEEPER PLATE	4-SPACE W-BEAM (3.81 m LENGTH)	88	W
N/A	TYPE B BOX BEAM POST	8-SPACE W-BEAM (3.81 m LENGTH)	88	W
N/A	SUPPORT BRACKET WITH T56 x 6 x 3/16 BLOCKOUT	BCT TERMINAL RAIL SECTION	18	W
N/A	TRANSITION POST	W-BEAM (7.62 m LENGTH)	88	W
N/A	T56 x 6 x 3/16 BR. APP. SECT. UPPER RAIL NO. 1	W-BEAM TO THRIE-BEAM TRANSITION SECTION (2,223 m LENGTH)	23A & 23B	W
N/A	T56 x 2 x 1/4 BR. APP. SECT. LOWER RAIL NO. 1	CABLE GUARDRAIL TERMINAL ANCHOR ASSEMBLY	41	C
N/A	T56 x 2 x 1/4 BR. APP. SECT. LOWER RAIL NO. 2	TURNBUCKLE CABLE END ASSEMBLY	94	C
N/A	T56 x 2 TO T56 x 6 CONNECTION SLEEVE	KEEPER PLATE	95	C
N/A	T56 x 6 x 3/16 TRANSITION RAIL	TYPE B BOX BEAM POST	97	B
N/A	1/4" SHIM PLATE	SUPPORT BRACKET WITH T56 x 6 x 3/16 BLOCKOUT	97	B
N/A	ANCHOR RAIL SECTION	TRANSITION POST	97	B
N/A	RUB RAIL ANCHOR BRACKET (JERSEY RAIL)	T56 x 6 x 3/16 BR. APP. SECT. UPPER RAIL NO. 1	98	B
N/A	RUB RAIL ANCHOR BRACKET (VERTICAL BRIDGE RAIL)	T56 x 2 x 1/4 BR. APP. SECT. LOWER RAIL NO. 1	98	B
N/A	T56 x 2 x 3/16 RUB RAIL	T56 x 2 x 1/4 BR. APP. SECT. LOWER RAIL NO. 2	98	B
N/A	T56 x 2 x 3/16 RUB RAIL	T56 x 2 TO T56 x 6 CONNECTION SLEEVE	98	B
N/A	T56 x 2 x 3/16 RUB RAIL	T56 x 6 x 3/16 TRANSITION RAIL	98	B
N/A	T56 x 2 x 3/16 RUB RAIL	1/4" SHIM PLATE	99	B
N/A	T56 x 2 x 3/16 RUB RAIL	ANCHOR RAIL SECTION	99	B
N/A	T56 x 2 x 3/16 RUB RAIL	RUB RAIL ANCHOR BRACKET (JERSEY RAIL)	99	B
N/A	T56 x 2 x 3/16 RUB RAIL	RUB RAIL ANCHOR BRACKET (VERTICAL BRIDGE RAIL)	99	B
N/A	T56 x 2 x 3/16 RUB RAIL	T56 x 2 x 3/16 RUB RAIL	99	B

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

NOTES:
 ① SEE ASHTO-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.

DETAILED DRAWING
 REFERENCE DWG. NO.
 STANDARD SPEC. 606-80
 SECTION 606

SCHEDULE OF GUARDRAIL HARDWARE

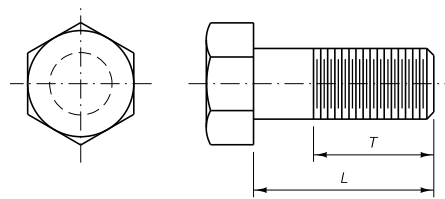
EFFECTIVE: SEPTEMBER 2014

MDTA MONTANA DEPARTMENT OF TRANSPORTATION

--REVISED--
 JANUARY 2018

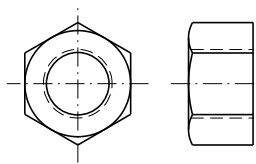
GUARDRAIL HARDWARE

METRIC GUARDRAIL HARDWARE



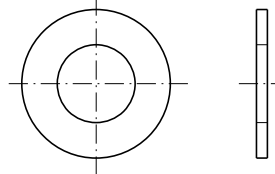
HEX BOLTS

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



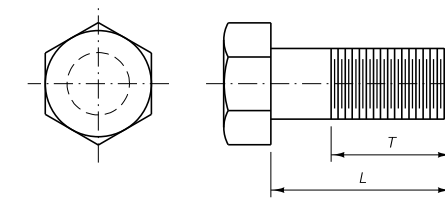
HEX NUT

NUT SIZE	DESIGNATION *
REGULAR HEX NUTS	
5/16" DIA.	FNX08a
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



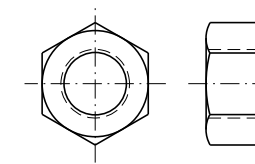
FLAT WASHERS

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



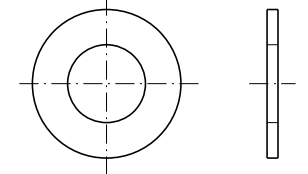
HEX BOLTS

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



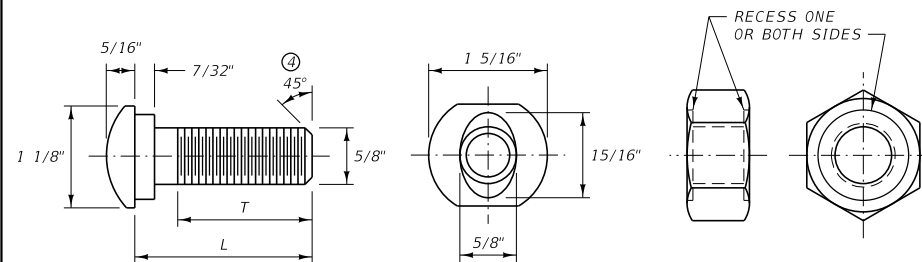
HEX NUT

NUT SIZE	DESIGNATION *
REGULAR HEX NUTS	
M8	FNX08a
M10	FNX10a
M12	FNX12a
M14	FNX14a
M16	FNX16a
M20	FNX20a
M24	FNX24a
HIGH STRENGTH HEX NUTS	
M20	FNX20b
M22	FNX22b
M24	FNX24b



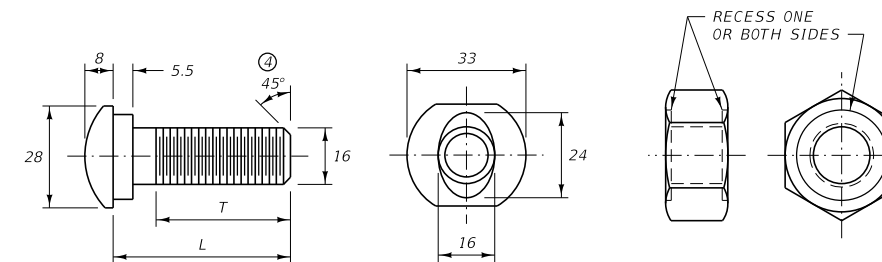
FLAT WASHERS

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



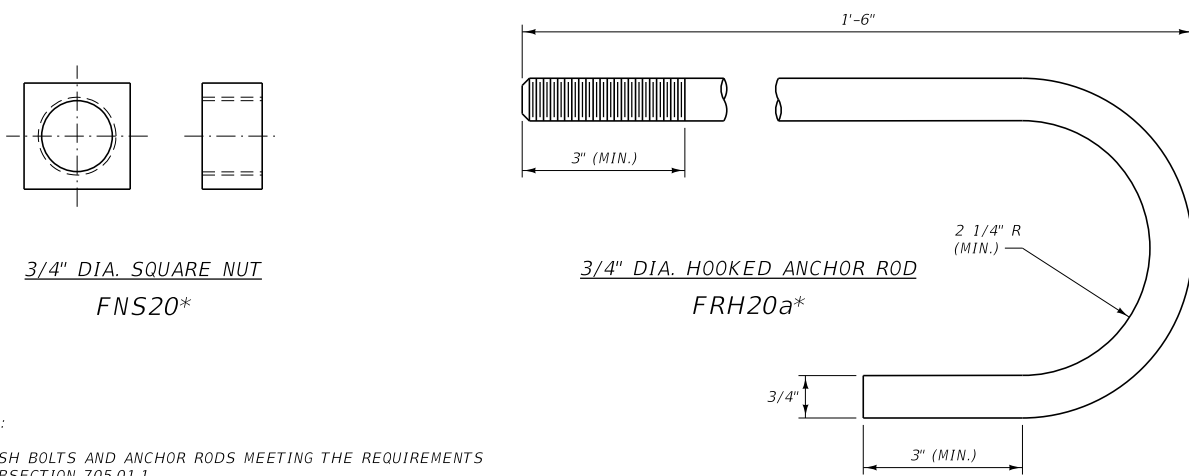
5/8" DIA. GUARDRAIL BOLT & RECESSED NUT
FBB01-07*

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"



M16 GUARDRAIL BOLT & RECESSED NUT
FBB01-07*

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

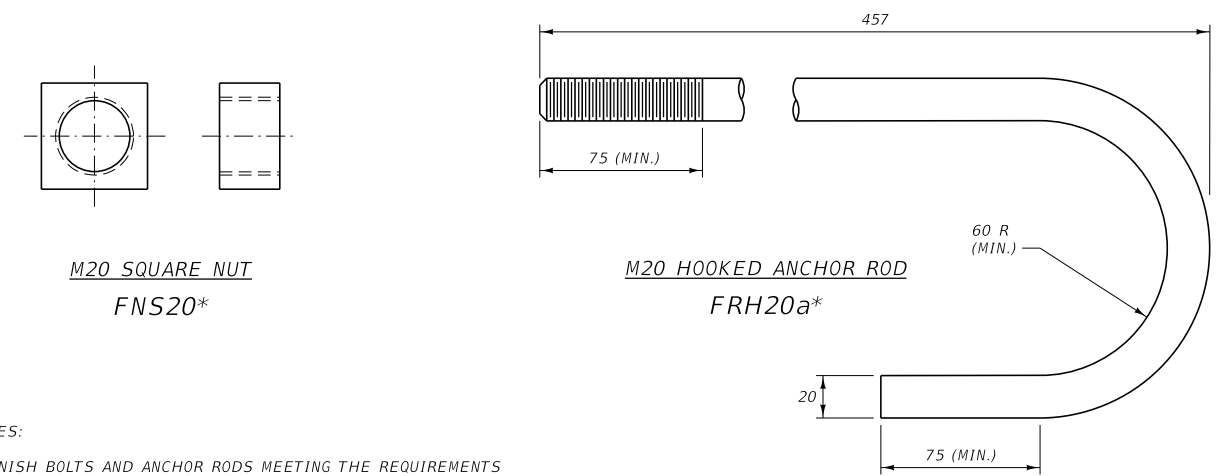


3/4" DIA. SQUARE NUT
FNS20*

3/4" DIA. HOOKED ANCHOR ROD
FRH20a*

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

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



M20 SQUARE NUT
FNS20*

M20 HOOKED ANCHOR ROD
FRH20a*

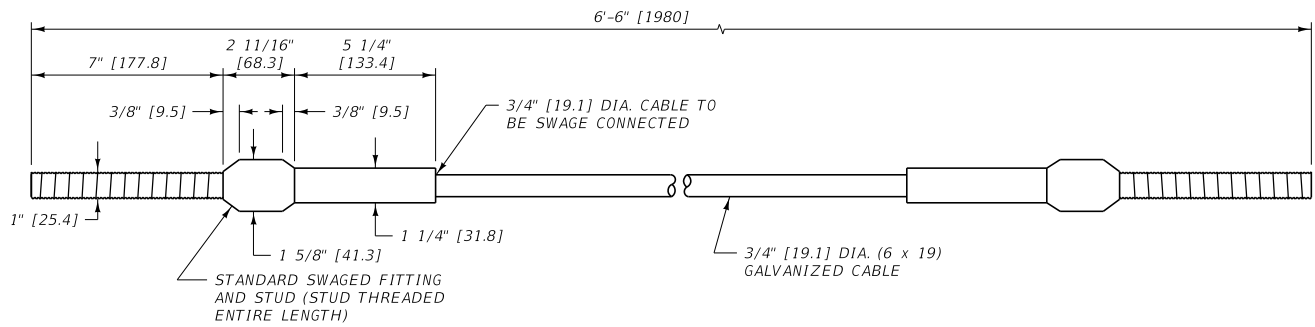
- NOTES:
- FURNISH BOLTS AND ANCHOR RODS MEETING THE REQUIREMENTS OF SUBSECTION 705.01.1.
 - FURNISH HIGH STRENGTH BOLTS MEETING THE REQUIREMENTS OF SUBSECTION 711.06.
 - GALVANIZE BOLTS, NUTS AND WASHERS IN ACCORDANCE WITH SUBSECTION 705.01.1.
 - 35° THREAD ANGLE FOR BOLTS FBB06-07.

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

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

--REVISED--
JANUARY 2018

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606, 705, 711	DWG. NO. 606-82
GUARDRAIL HARDWARE	
EFFECTIVE: SEPTEMBER 2014	

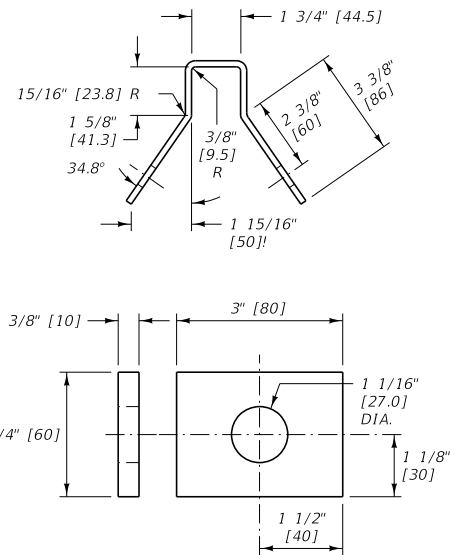
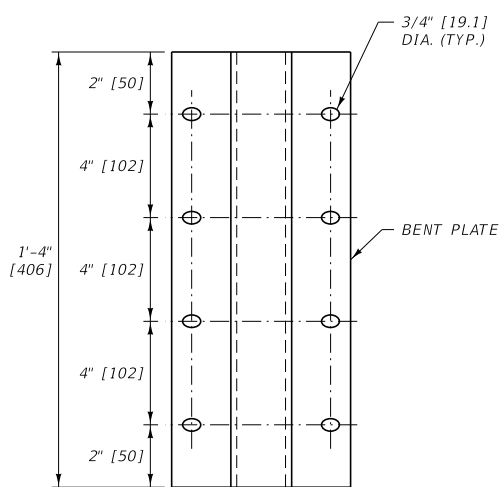


NOTES:

- 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*

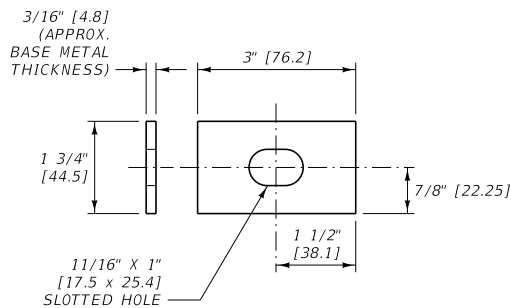


ANCHOR BRACKET & END PLATE

FPA01*

POST SLEEVE

FMM02*



RECTANGULAR PLATE WASHER

FWR03*

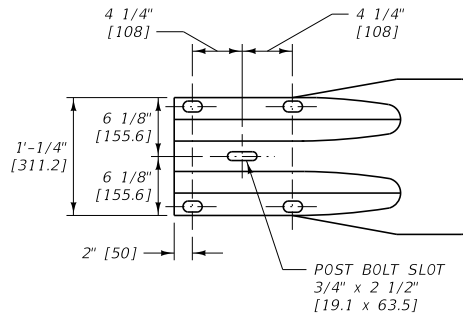
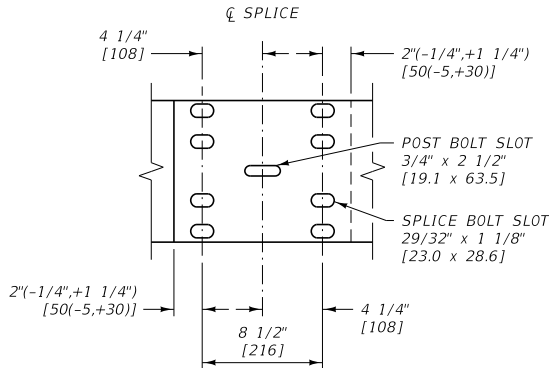
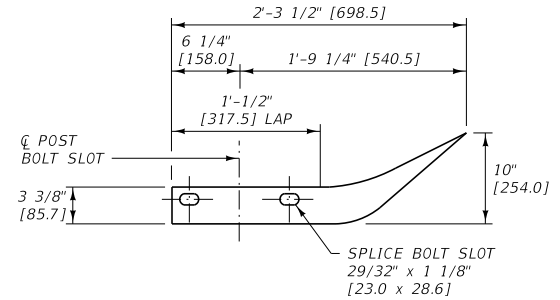
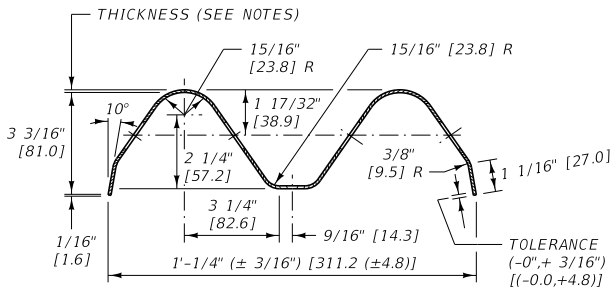
NOTES:

- 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	
EFFECTIVE: SEPTEMBER 2014	
MONTANA DEPARTMENT OF TRANSPORTATION	

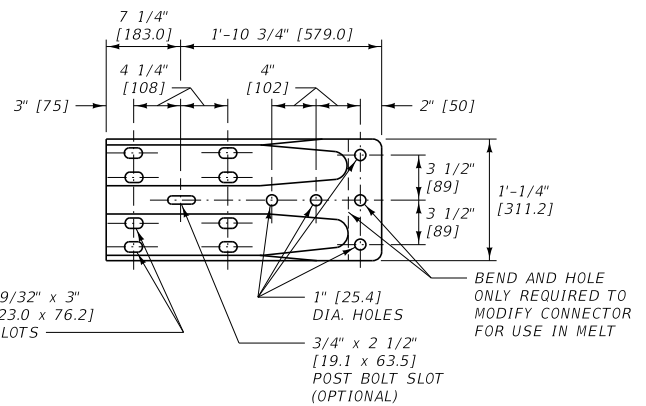
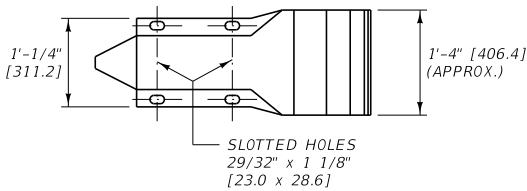
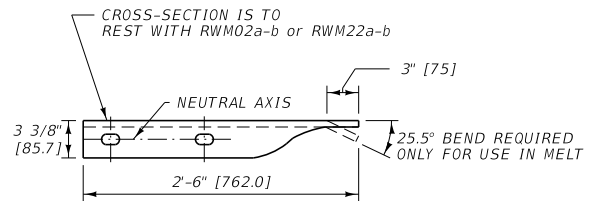
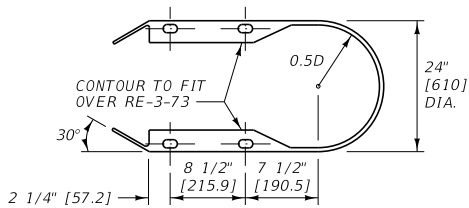


W-BEAM

W-BEAM END SECTION (FLARED)

RWM02a-b*
RWM04a-b* OR RWM22a-b*
RWM08a-b*
(12'-6" [3.81 m] LENGTH) (25'-0" [7.62 m] LENGTH)

RWE01a-b*



W-BEAM END SECTION (BUFFER)

W-BEAM TERMINAL CONNECTOR

RWE06a-b*

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.

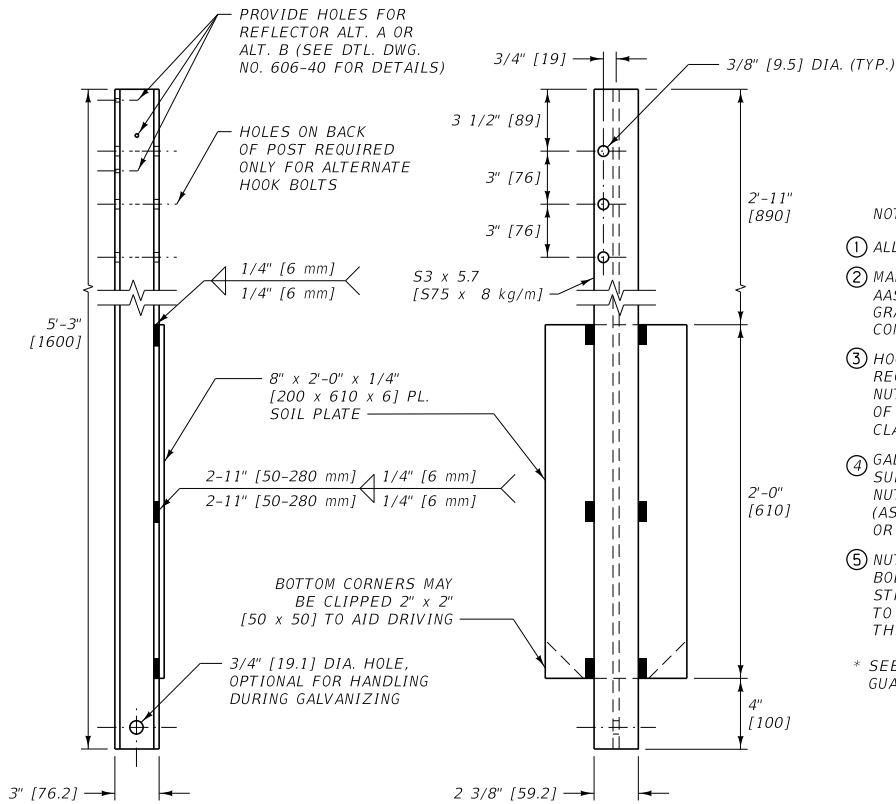
DETAILED DRAWING	
REFERENCE	DWG. NO.
STANDARD SPEC.	606-88
SECTION 606	

W-BEAM METAL GUARDRAIL HARDWARE

--REVISED--
APRIL 2019

EFFECTIVE: SEPTEMBER 2014

MDT MONTANA DEPARTMENT OF TRANSPORTATION



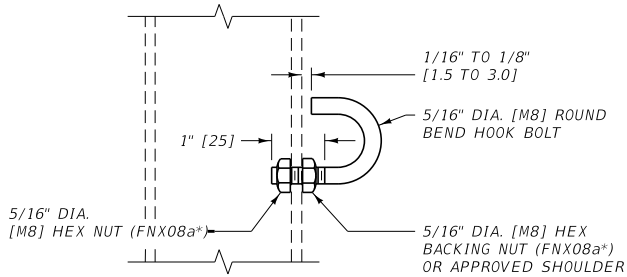
NOTES:

- ① ALL HOLES ARE 3/8" [9.5] DIA. EXCEPT AS NOTED.
- ② MANUFACTURE POSTS AND SOIL PLATES USING AASHTO M 270 [270M] (ASTM A 709 [A709]) GRADE 36 [250] STEEL. ALL WELDINGS IS TO CONFORM TO THE APPLICABLE AWS CODE.
- ③ HOOK BOLTS ARE TO CONFORM TO THE REQUIREMENTS OF ASTM 568 [568M] CLASS 4.6. NUTS ARE TO CONFORM TO THE REQUIREMENTS OF AASHTO M 291 [291M] (ASTM A 563 [A563M]) CLASS 5.
- ④ GALVANIZE FABRICATED PARTS IN ACCORDANCE WITH SUBSECTION 711.08. GALVANIZE HOOK BOLTS AND NUTS IN ACCORDANCE WITH AASHTO M 232 [232M] (ASTM A 153 [A153M]). DO NOT PUNCH, DRILL, OR CUT AFTER GALVANIZING.
- ⑤ NUTS ARE OF THE HEAVY HEX TYPES. INSTALL BOLTS TO DEVELOP AN ULTIMATE PULL OPEN STRENGTH FROM 500 LB. TO 1000 LB. [2225 N TO 4450 N] APPLIED IN A DIRECTION NORMAL TO THE LONGITUDINAL AXIS OF THE POST.

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

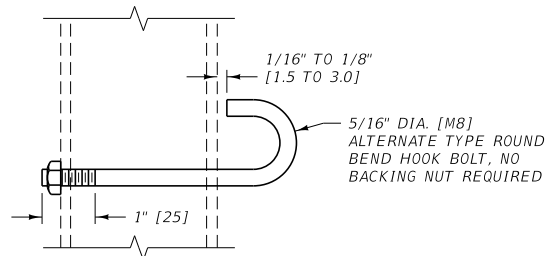
CABLE GUARDRAIL POST AND SOIL PLATE

PSE01* AND PLS01*



5/16" DIA. [M8] HOOK BOLT

FBH01*



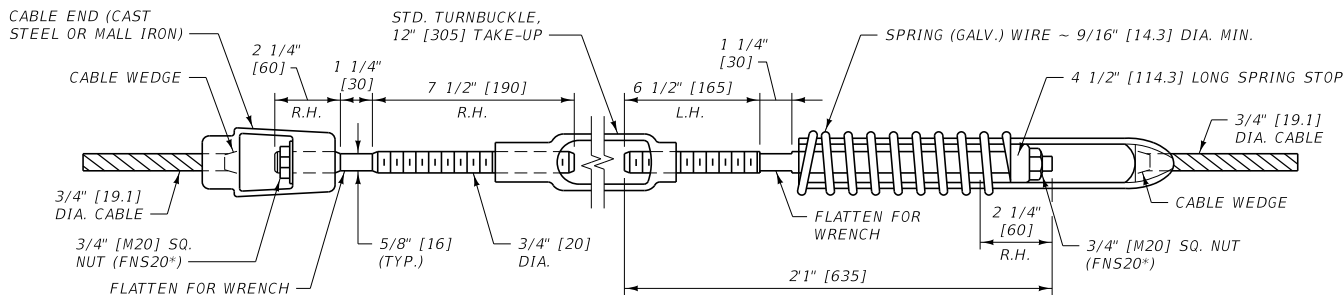
ALTERNATE 5/16" DIA. [M8] HOOK BOLT

FBH02*

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

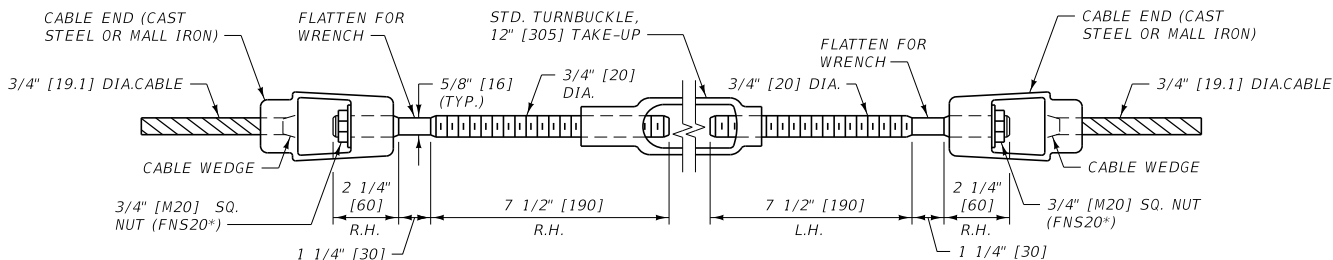
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-92
LOW-TENSION CABLE GUARDRAIL HARDWARE	
EFFECTIVE: SEPTEMBER 2014	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	

--REVISED--
JANUARY 2018

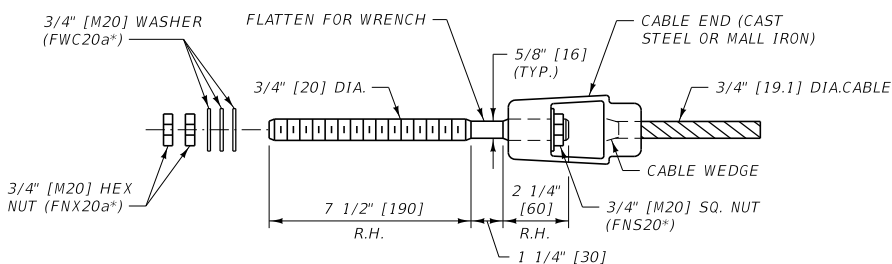


COMPENSATING CABLE END ASSEMBLY

RCE01*



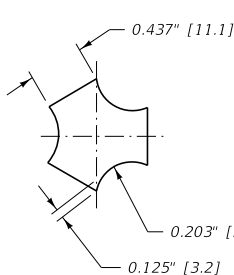
TURNBUCKLE CABLE END ASSEMBLY



CABLE END ASSEMBLY

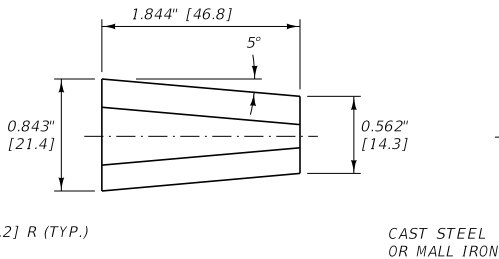
RCE03*

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

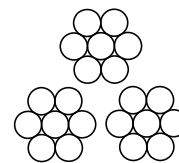


CABLE WEDGE

FMM01*



CAST STEEL OR MALL IRON



3/4" [19.1] DIA. - 3 x 7 WIRE ROPE

3/4" [19.1] DIA. CABLE

RCM01*

NOTES:

- 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].
- 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.
- COMPENSATING DEVICES ARE TO HAVE SPRING CONSTANTS OF 450 POUNDS PER INCH [78.8 N/mm], PLUS OR MINUS 50 POUNDS PER INCH [8.8 N/mm], AND PERMIT A TRAVEL OF 6 INCHES [150] PLUS OR MINUS 1 INCH [25].
- DESIGN SOCKET BASKETS FOR USE WITH THE WEDGE DETAILED IN THIS DRAWING.
- 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.

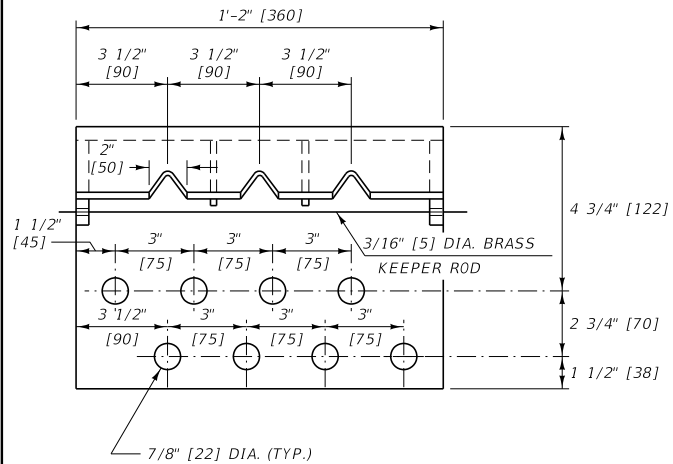
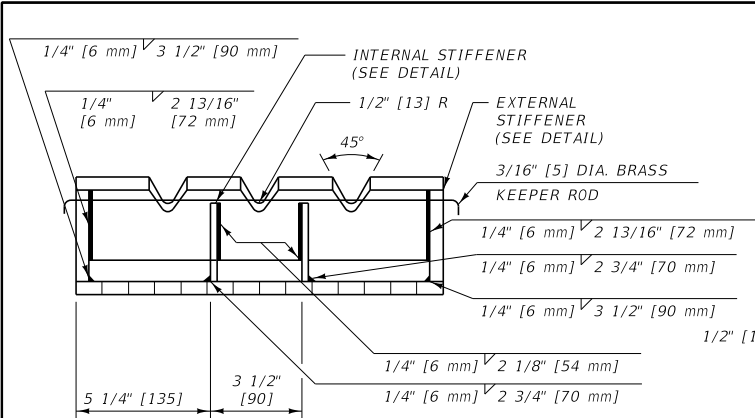
DETAILED DRAWING	
REFERENCE	DWG. NO.
STANDARD SPEC.	606-94
SECTION 606	

LOW-TENSION CABLE
GUARDRAIL HARDWARE

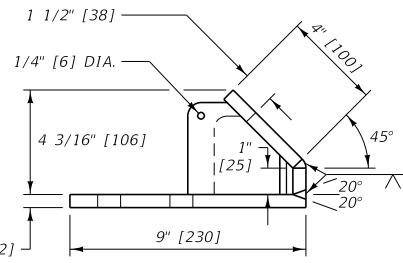
EFFECTIVE: SEPTEMBER 2014

--REVISED--
JANUARY 2018

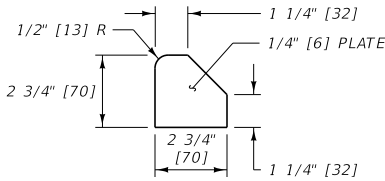
MDT MONTANA DEPARTMENT OF TRANSPORTATION



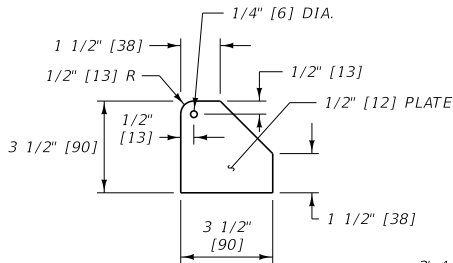
CABLE ANCHOR BRACKET
FPA02*



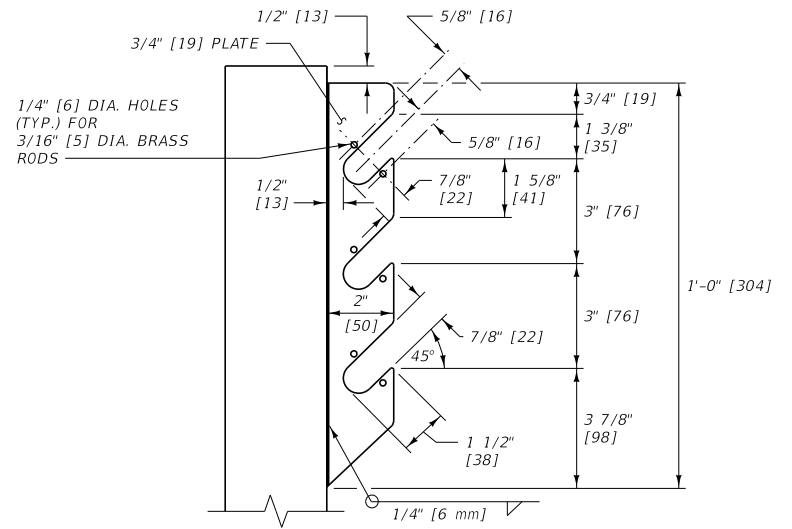
INTERNAL STIFFENER



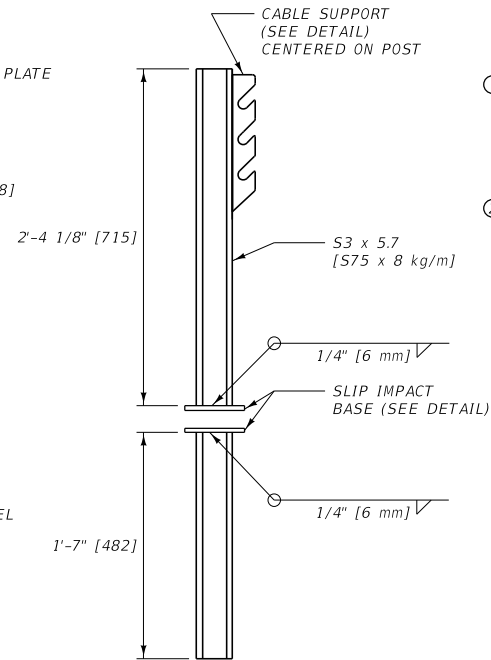
EXTERNAL STIFFENER



KEEPER PLATE



CABLE SUPPORT DETAIL



CABLE GUARDRAIL ANCHOR POST

PSE06*

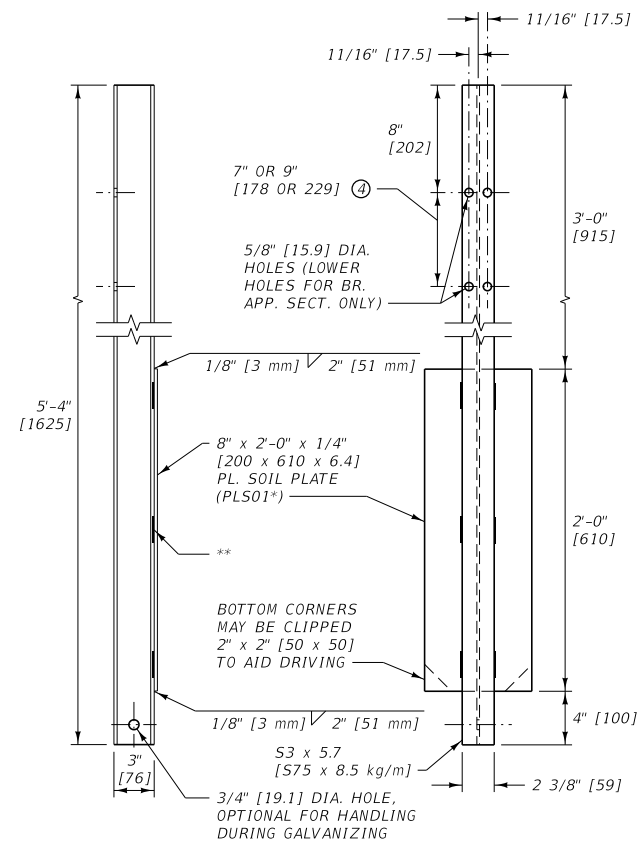
NOTES:

- MANUFACTURE ANCHOR POSTS AND BRACKETS USING AASHTO M 270 [270M] (ASTM A709 [A709M]) GRADE 36 [250] STEEL. ALL WELDING IS TO CONFORM TO THE APPLICABLE AWS CODE.
 - 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.

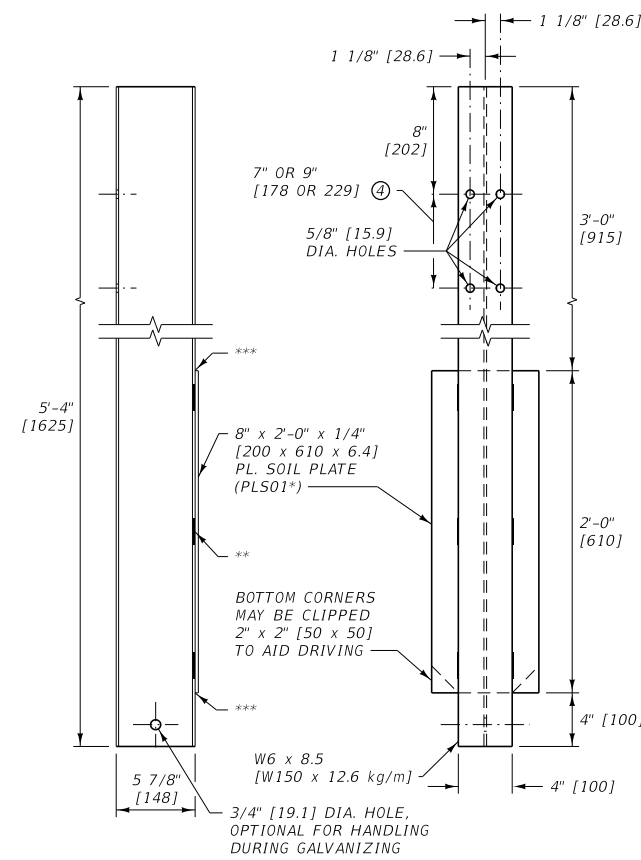
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING	
REFERENCE	DWG. NO.
STANDARD SPEC.	606-95
SECTION 606	
LOW-TENSION CABLE GUARDRAIL HARDWARE	
EFFECTIVE: SEPTEMBER 2014	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	

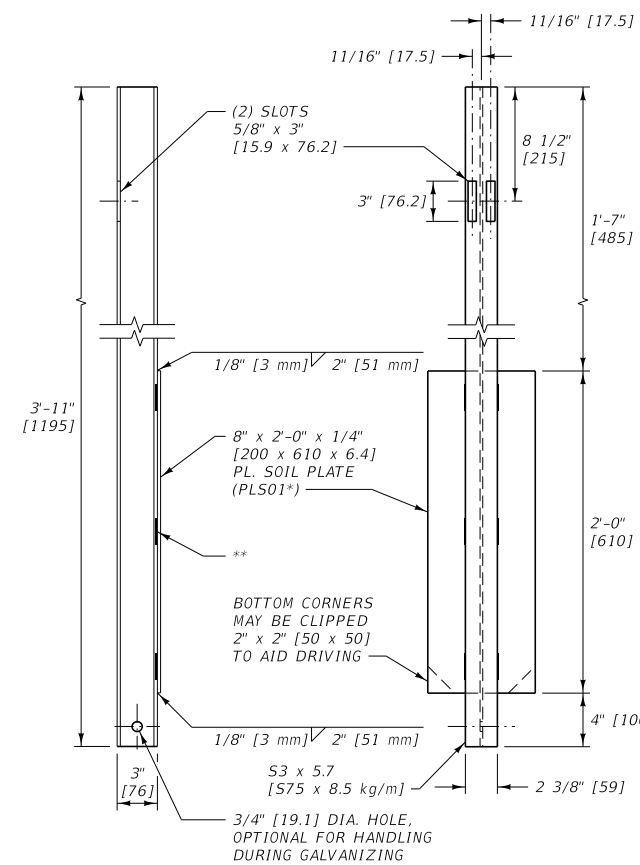
--REVISED--
JANUARY 2018



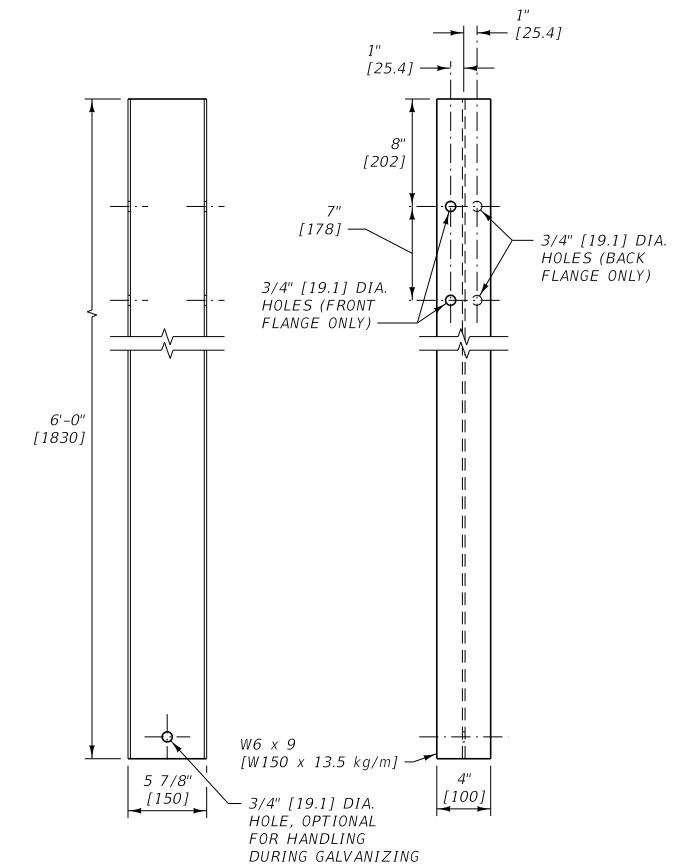
TYPE A BOX BEAM POST AND SOIL PLATE
PSE08* AND PLS01*



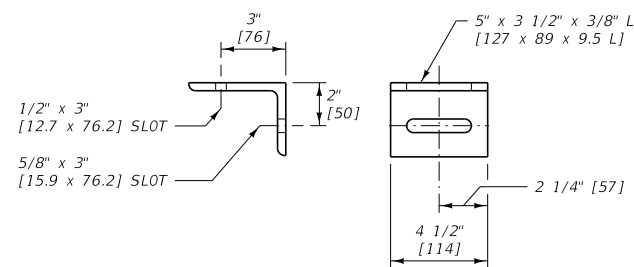
TYPE B BOX BEAM POST AND SOIL PLATE
PLS01*



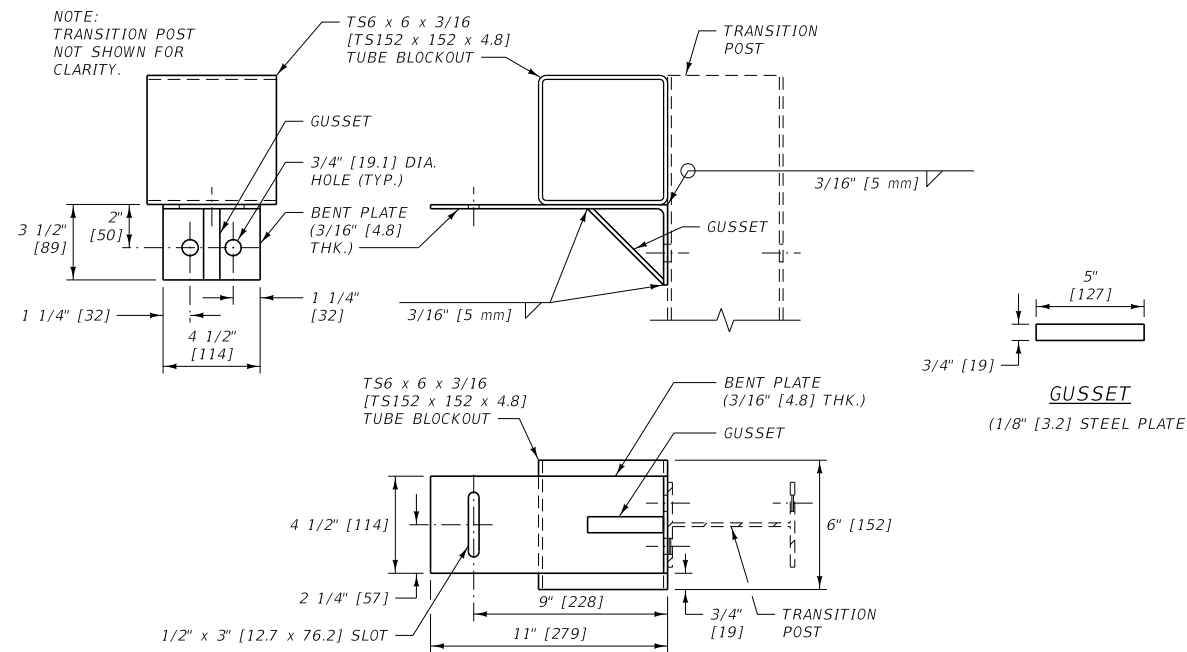
TYPE D BOX BEAM POST AND SOIL PLATE
PSE05* AND PLS01*



TRANSITION POST



BOX BEAM SUPPORT BRACKET
FPP01*



SUPPORT BRACKET W/BLOCKOUT

NOTES:

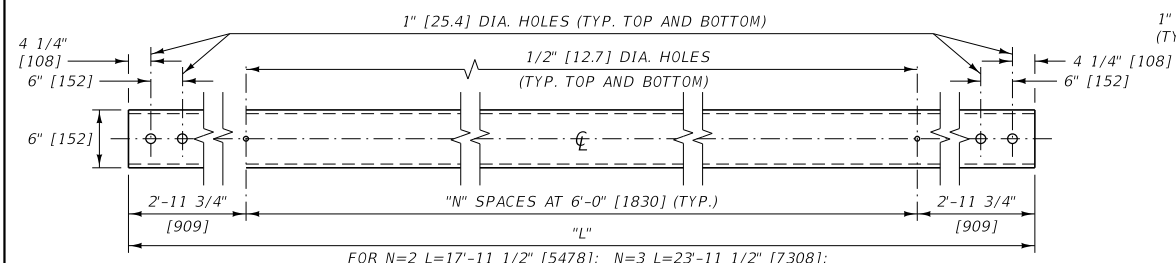
- ① MANUFACTURE POSTS USING STEEL CONFORMING TO AASHTO M 183 [183M] (ASTM A 36 [36M]). MANUFACTURE SOIL PLATES, SUPPORT BRACKETS AND MISC. COMPONENTS USING AASHTO M 270 [270M] (ASTM A 709 [709M]) GRADE 36 [250] STEEL. ALL WELDING IS TO CONFORM TO THE APPLICABLE AWS CODE.
 - ② MANUFACTURE BLOCKOUTS FROM 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 (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 mm] 2-10" [254 mm]
1/8" [3 mm] 2-10" [254 mm]

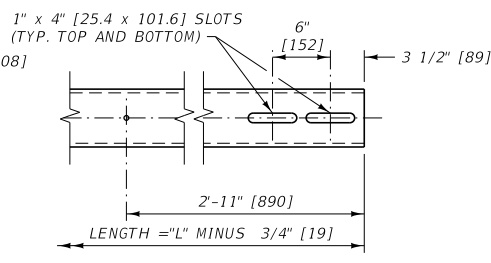
*** 1/8" [3 mm] 3 1/2" [89 mm]

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

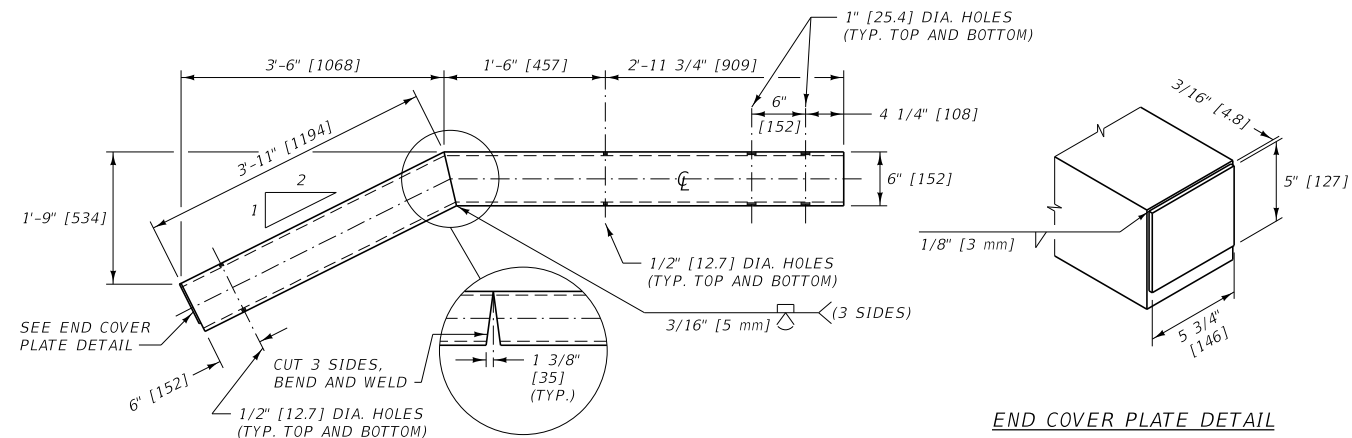
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606	DWG. NO. 606-97
BOX BEAM GUARDRAIL HARDWARE	
EFFECTIVE: SEPTEMBER 2014	
MDTA MONTANA DEPARTMENT OF TRANSPORTATION	



BOX BEAM RAIL (TS6 x 6 x 3/16 [TS152 x 152 x 4.8])
RBM01*

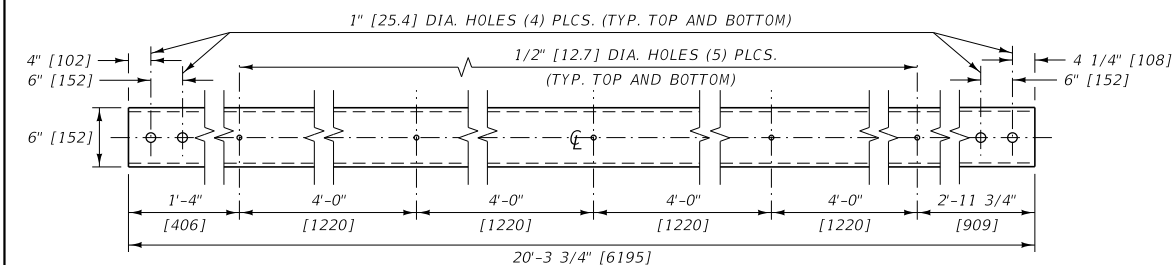


BOX BEAM EXPANSION SPLICE END
ONE END OF BOX BEAM RAIL ONLY. REQUIRED FOR BOTH RAILS AT THE EXPANSION SPLICE.

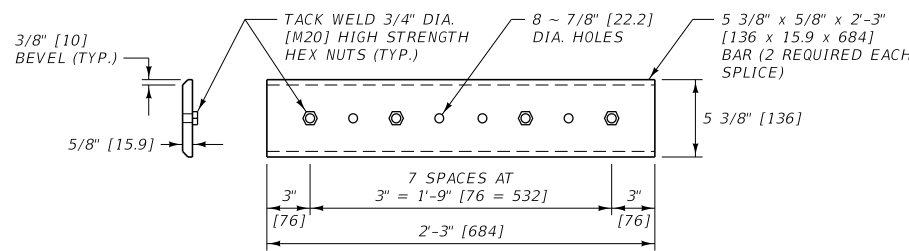


BOX BEAM TERMINAL RAIL (TS6 x 6 x 3/16 [TS152 x 152 x 4.8])
RBM05*

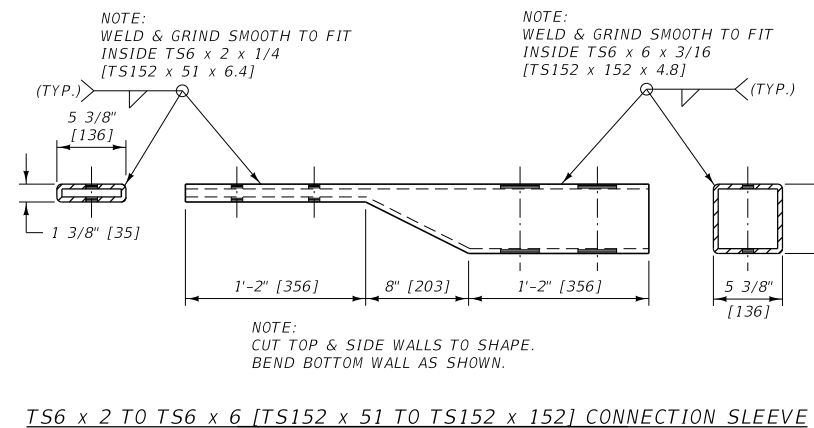
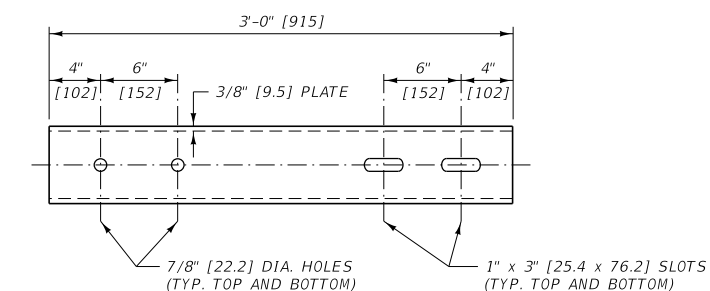
END COVER PLATE DETAIL
(BAR 5" x 3/16" x 0'-5 3/4" [127 x 4.8 x 146])



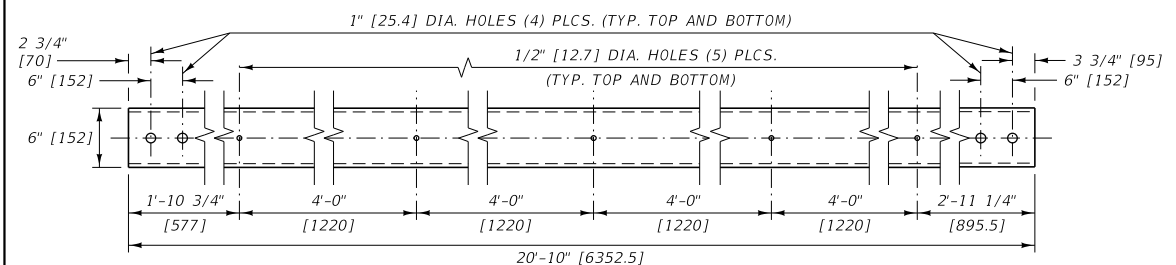
TS6 x 6 x 3/16 [TS152 x 152 x 4.8] BR. APP. SECT. UPPER RAIL NO. 1



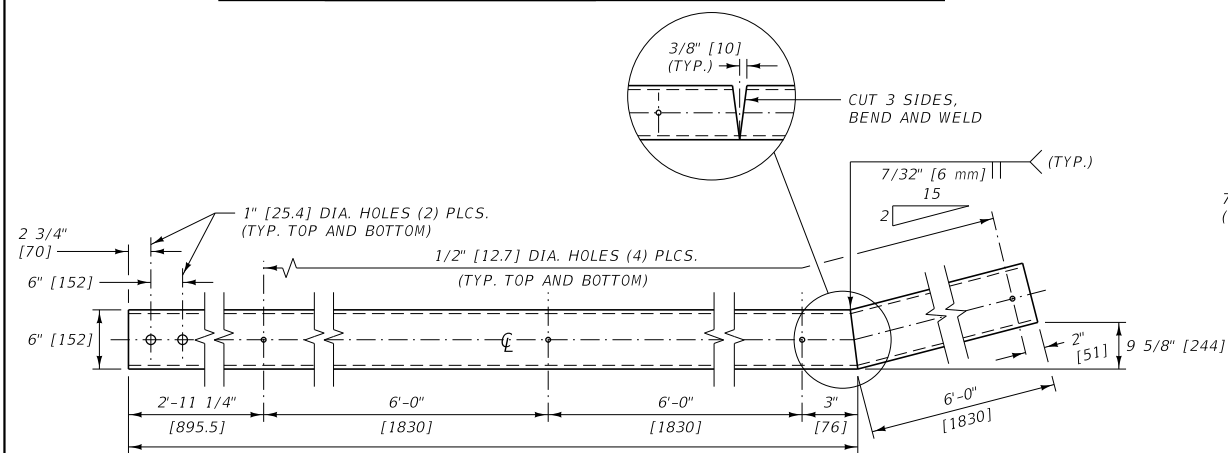
BOX BEAM SPLICE PLATE
RBS01*



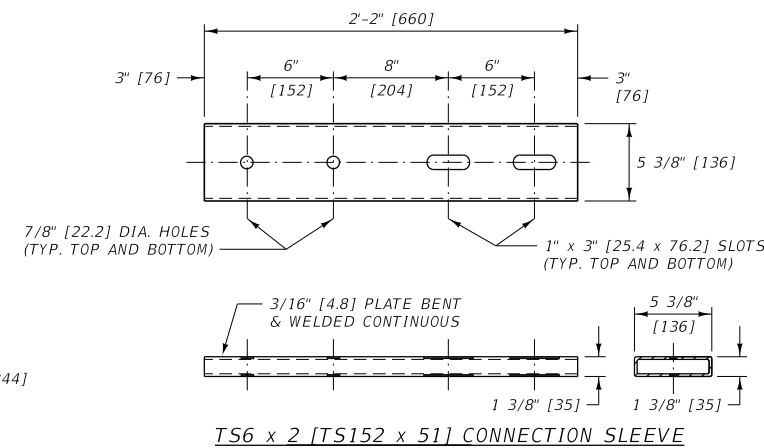
TS6 x 2 TO TS6 x 6 [TS152 x 51 TO TS152 x 152] CONNECTION SLEEVE



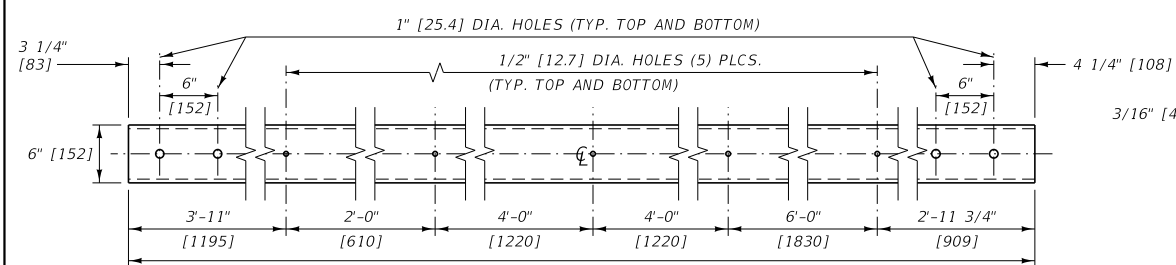
TS6 x 2 x 1/4 [TS152 x 51 x 6.4] BR. APP. SECT. LOWER RAIL NO. 1



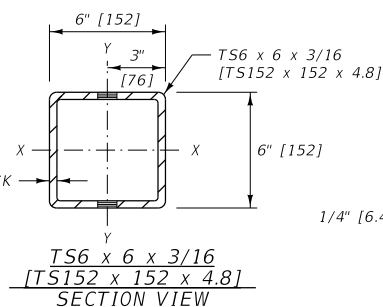
TS6 x 2 x 1/4 [TS152 x 51 x 6.4] BR. APP. SECT. LOWER RAIL NO. 2



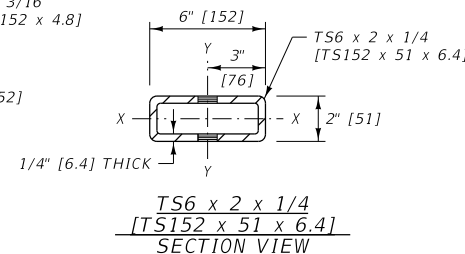
TS6 x 2 [TS152 x 51] CONNECTION SLEEVE



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



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:

- 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.
- 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.
- 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.

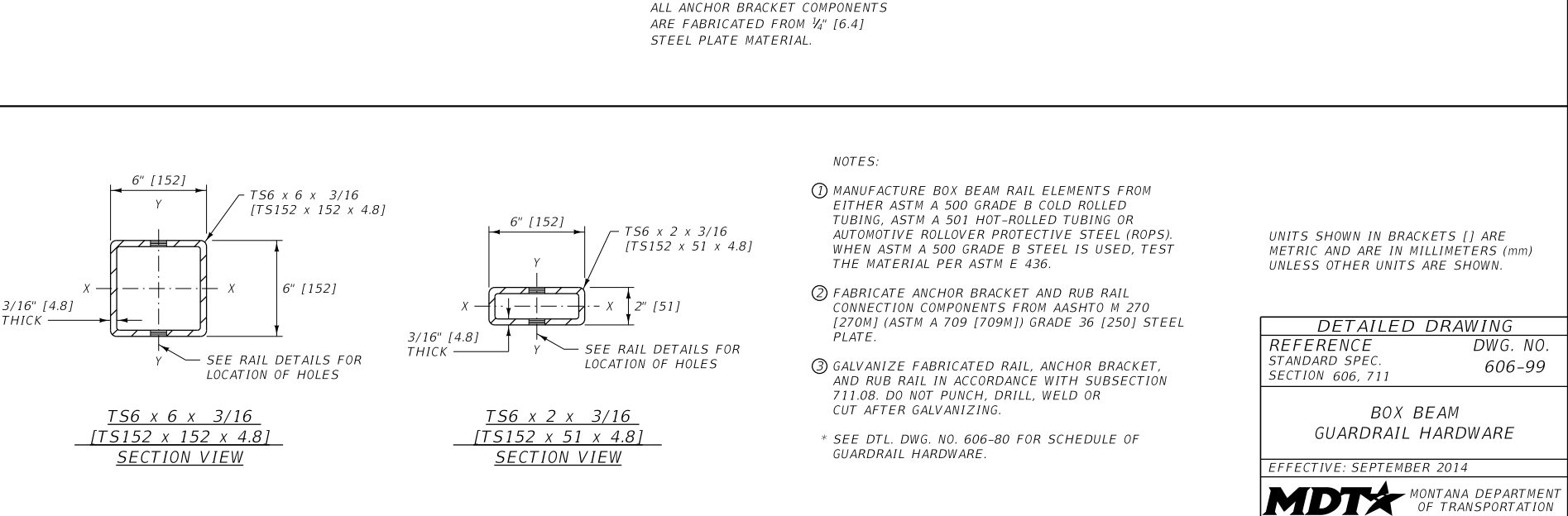
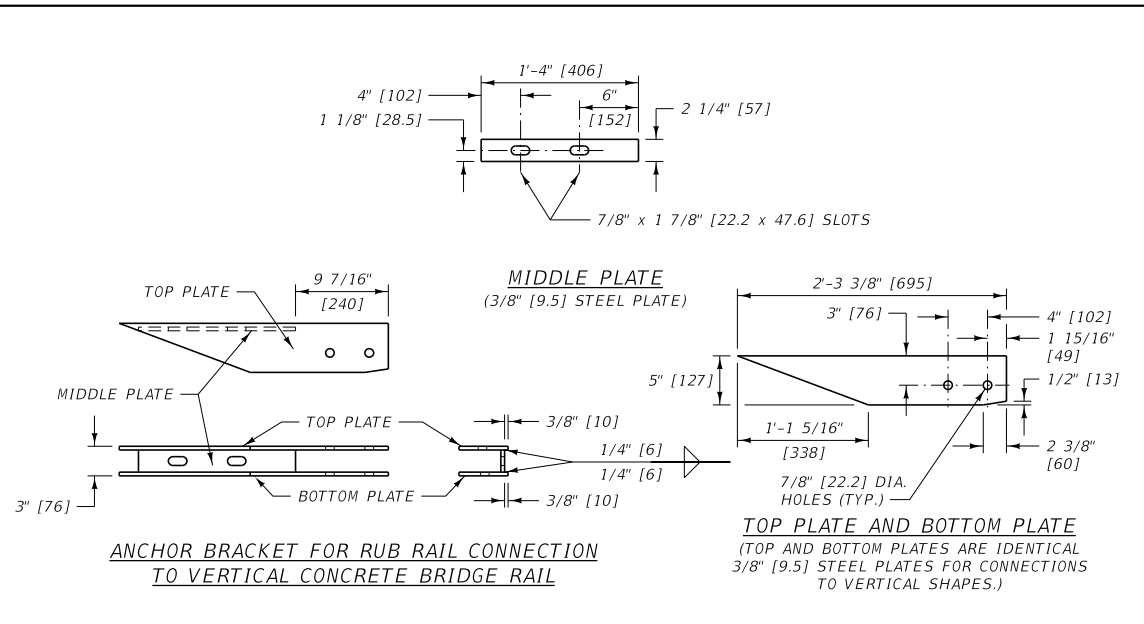
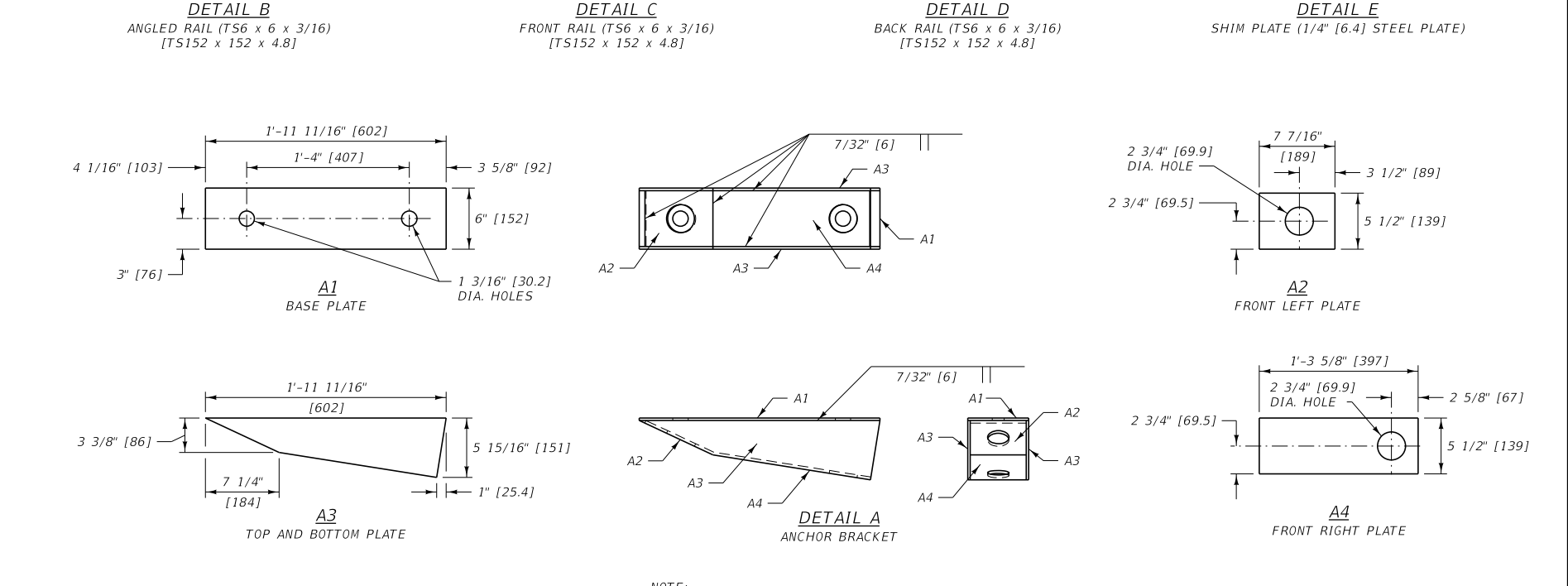
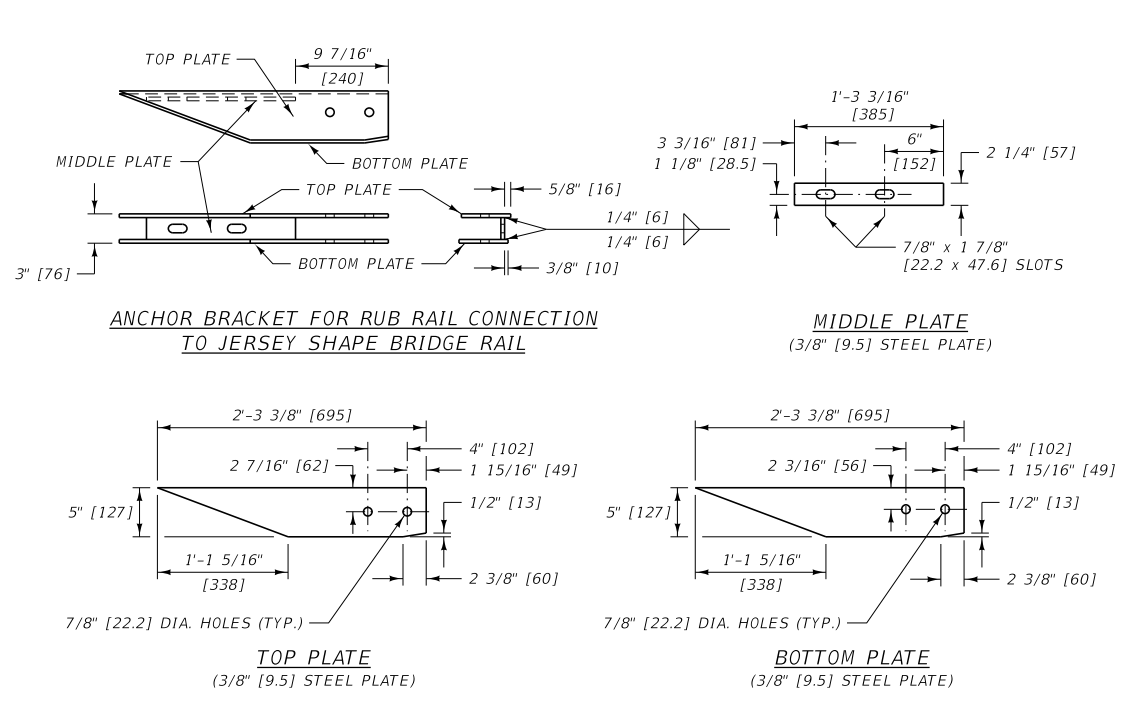
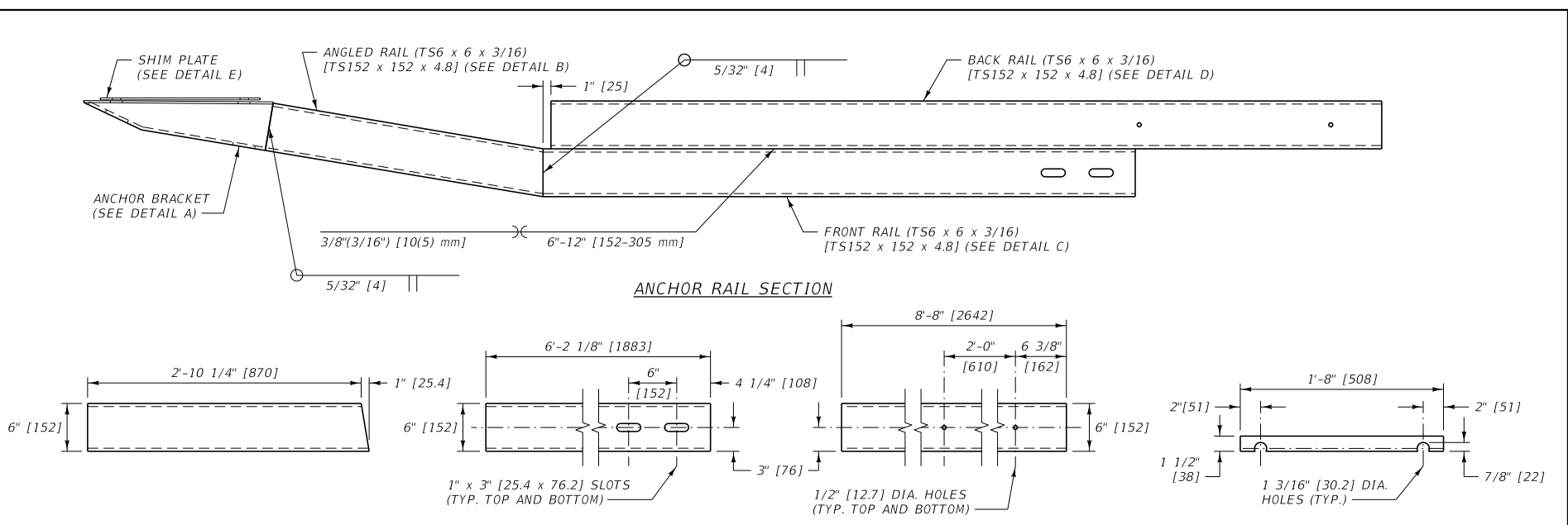
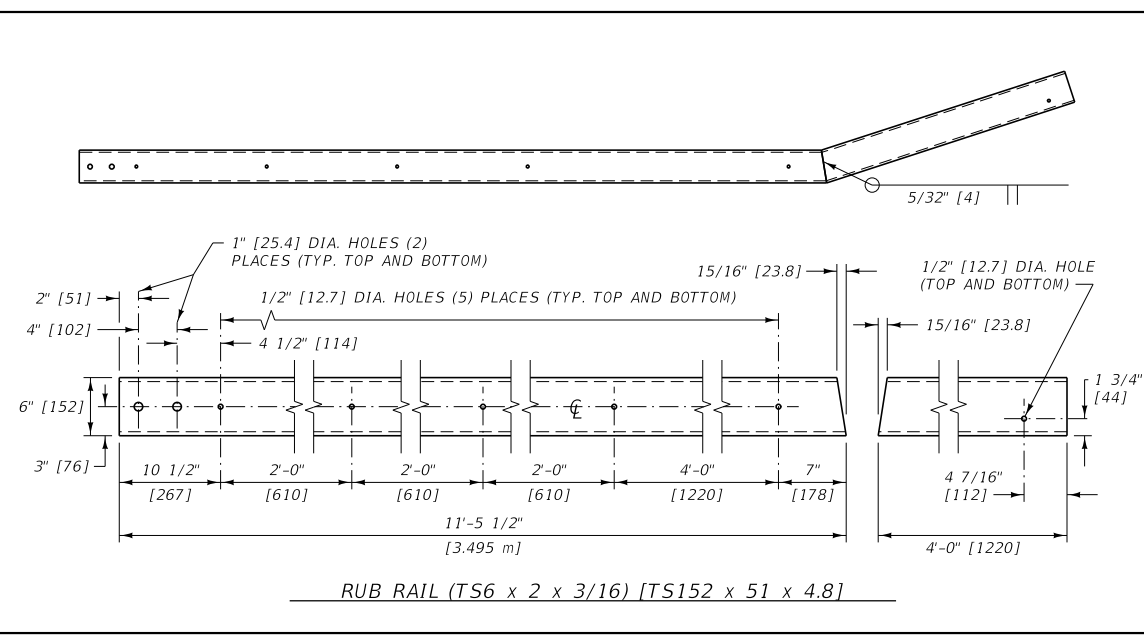
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 606.711	DWG. NO. 606-98

BOX BEAM GUARDRAIL HARDWARE

EFFECTIVE: SEPTEMBER 2014





NOTE:
ALL ANCHOR BRACKET COMPONENTS ARE FABRICATED FROM 1/2" [6.4] STEEL PLATE MATERIAL.

- NOTES:
- 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.
 - FABRICATE ANCHOR BRACKET AND RUB RAIL CONNECTION COMPONENTS FROM AASHTO M 270 [270M] (ASTM A 709 [709M]) GRADE 36 [250] STEEL PLATE.
 - 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	
EFFECTIVE: SEPTEMBER 2014	
MDTA MONTANA DEPARTMENT OF TRANSPORTATION	