EXISTING METAL GUARDRAIL MOUNTING HEIGHT

GUARDRAIL MOUNTING HEIGHT TRANSITION

-5'-1"1/2"(1.563 m)

10'-1"1/2"(3.168 m)

13'-8"1/2"(4.181 m)

WDS GUARDRAIL MOUNTING HEIGHT

EXISTING POST

WDS SPAN SPICE

WDS SPAN SPICE

TRANSITION FROM 27'-3/4" (839 CM (OR GREATER)) TO 31" (785) GUARDRAIL MOUNTING HEIGHT

NOTES:

1. THE WDS TO METAL GUARDRAIL TRANSITION IS PAD FOR 2 LINEAR FEET OF WDS GUARDRAIL.

2. SEE CT., DMC NO. 606-00A, 606-00B, 606-11A, AND 606-11B FOR WDS GUARDRAIL AND ASSOCIATED HARDWARE.

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

UNITS SHOWN IN BRACKETS ARE METRIC AND ARE IN KILOMETERS (MH) UNLESS OTHER UNITS ARE SHOWN.
METAL GUARDRAIL - BRIDGE APPROACH SECTION TYPE 1
(FOR SKewed BRIDGES USING CONCRETE BARRIER RAIL)

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 CLADS.
(3) LAP GUARDRAIL IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.
(4) LAP W-BEAM TERMINAL CONNECTOR (RWE02c-b) IN THE DIRECTION OF THE ADJACENT TRAFFIC LANE.
(5) USE WOOD BLOCKS OR OTHER NCRRP 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. 606-05B FOR METAL GUARDRAIL (W-BEAM).

UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
TRACC BILL OF MATERIAL

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>17253410</td>
<td>1 TRACC UNIT (FULLY ASSEMBLED)</td>
</tr>
<tr>
<td>33100</td>
<td>4 W/S LOCK WASHER</td>
</tr>
<tr>
<td>2455/0</td>
<td>4 W/S x 132 RIDGE EXP. ANCHOR</td>
</tr>
<tr>
<td>68500</td>
<td>4 REFLECTIVE TAPE</td>
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<tr>
<td>69000</td>
<td>1 PLASTIC NOSEPIECE</td>
</tr>
<tr>
<td>32500</td>
<td>1 PLASTIC NOSEPIECE (FULL CONCRETE BASE)</td>
</tr>
<tr>
<td>32500</td>
<td>Z6 W/S X 175 ANCHOR STUD</td>
</tr>
<tr>
<td>33100</td>
<td>Z6 W/S LOCK WASHER</td>
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<tr>
<td>336/S</td>
<td>Z6 W/S HEX NUT</td>
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<tr>
<td>336/S</td>
<td>Z6 W/S FLAT WASHER</td>
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<tr>
<td>52068</td>
<td>3 ADHESIVE HT F 150 CARTRIDGE</td>
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<tr>
<td>63800</td>
<td>Z6 W/S X 457 ALL THREADED ROD</td>
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<tr>
<td>33100</td>
<td>Z6 W/S LOCK WASHER</td>
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<tr>
<td>336/S</td>
<td>Z6 W/S HEX NUT</td>
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<tr>
<td>336/S</td>
<td>Z6 W/S FLAT WASHER</td>
</tr>
<tr>
<td>52068</td>
<td>3 ADHESIVE HT F 150 CARTRIDGE</td>
</tr>
</tbody>
</table>

ANCHOR HARDWARE (CONCRETE BASE)

- SEE DET. NO. 660-308 AND PLASTIC NOSEPIECE (FULL CONCRETE BASE) ASSEMBLED (PLASTIC NOSE INSTALLED AFTER PLACEMENT)

NOTES:

1. ATTACHMENT SHOWN IS TO SHIPS WITH RECTANGULAR CROSS SECTIONS SUCH AS BRIDGE, PARAPETS, AND MODIFIED CONCRETE BARRIER PADS. TRAFFIC FLOW IS UNIDIRECTIONAL.
2. ATTACHMENTS AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE FROM THE MANUFACTURER.
3. A 150 mm REINFORCED CONCRETE PAD IS SHOWN. OTHER FOUNDATION OPTIONS ARE:
   - 100 mm Thick Unreinforced Concrete
   - 150 mm Thick Concrete
   - 75 mm Thick Asphalt Over 75 mm Thick Concrete
   - 150 mm Thick Concrete Over 150 mm Thick Unreinforced Concrete

REFERENCES:

- DET. NO.
- SECTION 600
- 606-308

IMPACT ATTENUATOR - TRACC (METRIC)

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
NOTE:
- ATTACHMENT SHOWS IS TO SHAPES WITH RECTANGULAR LUNSHE TILES ON 6.0 X 4.0 M, 27.2CM X 15.2CM, AND 6.0 X 6.0 M, 24.0CM X 24.0CM, SQUARE TILES. MEDIAN DIVIDER IS UNDERGROUND. ATTACHMENTS AND TRANSITIONS TO
- OTHER SHAPES, SERRA LINES AND ELEVATIONS.
- TRAFFIC FLOWS ARE AVAILABLE FROM THE MANUFACTURER.
- INSTALL 160 MM REINFORCED CONCRETE PAD. OTHER
- FOUNDATION OPTIONS ARE:
  - a) 200 mm thick unreinforced concrete
  - b) 200 mm thick asphalt
  - c) 190 mm thick asphalt, 190 mm thick concrete
  - d) 190 mm thick asphalt, 190 mm thick compacted
  - e) 190 mm thick, compacted, 180 mm thick reinforced
  - REINFORCED DIAMETRAL STRUCTURE
  - SEE MANUFACTURERS FOR REINFORCEMENT DRAWINGS AND
  - POURING REQUIREMENTS FOR ALL FOUNDATION OPTIONS.
- INSTALL 160 MM REINFORCED CONCRETE PAD. OTHER
- FOUNDATION OPTIONS ARE:
  - a) 200 mm thick unreinforced concrete
  - b) 200 mm thick asphalt
  - c) 190 mm thick asphalt, 190 mm thick concrete
  - d) 190 mm thick asphalt, 190 mm thick compacted
  - e) 190 mm thick, compacted, 180 mm thick reinforced
  - REINFORCED DIAMETRAL STRUCTURE
  - SEE MANUFACTURERS FOR REINFORCEMENT DRAWINGS AND
  - POURING REQUIREMENTS FOR ALL FOUNDATION OPTIONS.
- INSTALL 160 MM REINFORCED CONCRETE PAD. OTHER
- FOUNDATION OPTIONS ARE:
  - a) 200 mm thick unreinforced concrete
  - b) 200 mm thick asphalt
  - c) 190 mm thick asphalt, 190 mm thick concrete
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  - e) 190 mm thick, compacted, 180 mm thick reinforced
  - REINFORCED DIAMETRAL STRUCTURE
  - SEE MANUFACTURERS FOR REINFORCEMENT DRAWINGS AND
  - POURING REQUIREMENTS FOR ALL FOUNDATION OPTIONS.
- INSTALL 160 MM REINFORCED CONCRETE PAD. OTHER
- FOUNDATION OPTIONS ARE:
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  - b) 200 mm thick asphalt
  - c) 190 mm thick asphalt, 190 mm thick concrete
  - d) 190 mm thick asphalt, 190 mm thick compacted
  - e) 190 mm thick, compacted, 180 mm thick reinforced
  - REINFORCED DIAMETRAL STRUCTURE
  - SEE MANUFACTURERS FOR REINFORCEMENT DRAWINGS AND
  - POURING REQUIREMENTS FOR ALL FOUNDATION OPTIONS.
1/2" (12.7) Dia. Holes for
3/8" Dia. x 7 1/2" (M10 x 91)
Hex Bolt (F8X100#) and Nut
(FNX100#) with 2 Flat Washers
(FMC200#) 11 Washer on Posts
with Reflective Tab

3/4" Dia. x 2"
(M20 x 51) High
Strength Hex Bolt
(FB20#) with Hardened
Flat Washer (FMC200#)
(Typ. Top and Bottom)

3/4" Dia. x 2"
(M20 x 51) High
Strength Hex Bolt
(FB20#) with Hardened
Flat Washer (FMC200#)
(Typ. Top and Bottom)

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 (94 ft. (29.32 m) Type II 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" (1.47 m) of the Face
of the Rail.
5. Grading is Required if Finishing Shoulder
is Less than 2'-0" (610) from the
Traffic Lane.
6. Provide Shop Bent Box Beam Rail for
Roadway Curvature with Radii of Less
than 150 Feet (45.7 m).
* See DTL, DWG. No. 606-80 for Schedule
of Guardrail Hardware.

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
MONTANA DEPARTMENT
OF TRANSPORTATION

DETAILED DRAWING
REFERENCE DWG. NO.
SECTION 606
606-50

BOX BEAM
GUARDRAIL
EFFECTIVE: SEPTEMBER 2014

4" (102)
3" (76)
2 1/2" (63.5)
1/16" (1.1)
1 1/2" (38)
5" (127)
2 1/2" (63.5)

4 GAUGE, (1/8) THICK
(GALV.)
7' - 3" (2.1 m) BOX BEAM ONE-WAY DEPARTURE TERMINAL SECTION PAY LIMITS
8' - 0" (2440)

PLAN

4' - 3" (1295)
3' - 6" (1068)
1' - 6" (457)

TRAFFIC SIDE

3' - 0" (915)

REFLECTIVE TAB (TYP.) ①

STANDARD BOX BEAM RAIL SPICE, NOT INCLUDED IN COST OF TERMINAL SECTION ①

STANDARD BOX BEAM GUARDRAIL PAY LIMITS ①

SEE DETAIL "A"

ELEVATION

1/2" (12.7) DIA. HOLES FOR
3/8" DIA. x 7 1/2" (M10 x 191)
HEX BOLT (FBX10.*)
AND NUT (FNX10.*) WITH
2 FLAT WASHERS (FWC10.*)

END COVER PLATE
(3/16" (4.8) THICK)

6" (152)

11" (280)

NOTE:
① SEE DETL. DWG. NO. 606-50 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.
② SEE DETL. 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. 606-52
STANDARD SPEC. 606-52
SECTION 606
EFFECTIVE: SEPTEMBER 2014

MDT 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 (FBX20d#) and nut (FNX20d#) with two hardened flat washers (FWC20d#)

Connection sleeve attached to bridge rail (Typ.): 1/4" (6.4) thick steel form fit tube to receive TS6 x 6 x 3/16 (TS152 x 152 x 4.8) box beam rail.

Traffic side

1" (25.4 x 101.6) slots required top and bottom of connection sleeve

Standard box beam guardrail pay limits

Plan

3'-2" (965)

4 1/4" (108)

4" (102)

2 1/4" (51.6) gap

Standard box beam post, hardware and widening

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.
GUARDRAIL HARDWARE

HEX BOLTS

BOLT SIZE

DESIGNATION

\( \frac{3}{4} \) DIA.
\( \frac{1}{2} \) DIA.
\( \frac{1}{2} \) DIA.
\( \frac{1}{4} \) DIA.
\( \frac{1}{4} \) DIA.
\( \frac{1}{4} \) DIA.
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\( \frac{1}{4} \) DIA.
\( \frac{1}{4} \) DIA.
\( \frac{1}{4} \) DIA.
\( \frac{1}{4} \) DIA.

NUT SIZE

\( \frac{3}{4} \) DIA.
\( \frac{1}{2} \) DIA.
\( \frac{1}{2} \) DIA.
\( \frac{1}{4} \) DIA.
\( \frac{1}{4} \) DIA.
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FLAT WASHERS

DESIGNATION

\( \frac{3}{4} \) DIA.
\( \frac{1}{2} \) DIA.
\( \frac{1}{2} \) DIA.
\( \frac{1}{4} \) DIA.
\( \frac{1}{4} \) DIA.
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HEX NUT

DESIGNATION

\( \frac{3}{4} \) DIA.
\( \frac{1}{2} \) DIA.
\( \frac{1}{2} \) DIA.
\( \frac{1}{4} \) DIA.
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\( \frac{1}{4} \) DIA.
\( \frac{1}{4} \) DIA.
\( \frac{1}{4} \) DIA.

METRIC GUARDRAIL HARDWARE

HEX BOLTS

BOLT SIZE

DESIGNATION

W10
W10
W10
W8
W6
W8
W8
W8
W6
W6
W6
W8
W8
W8
W8
W8
W8

NUT SIZE

W10
W10
W10
W8
W6
W8
W8
W8
W6
W6
W6
W8
W8
W8
W8
W8
W8

FLAT WASHERS

DESIGNATION

W10
W10
W10
W8
W6
W8
W8
W8
W6
W6
W6
W8
W8
W8
W8
W8
W8

HEX NUT

DESIGNATION

W10
W10
W10
W8
W6
W8
W8
W8
W6
W6
W6
W8
W8
W8
W8
W8
W8

NOTE:
1. Furnish bolts and anchor rods meeting the requirements of Subsection 705.01.1.
2. Furnish high strength bolts meeting the requirements of Subsection 705.11.1.
3. Furnish bolts, nuts and washers in accordance with Subsection 705.01.1.

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

W10 GUARDRAIL BOLT & RECESSED NUT
F86100-05*

W8 GUARDRAIL BOLT & RECESSED NUT
F86100-05*

8-1/2" DIA. SQUARE NUT
FN520*

8-1/2" DIA. SQUARE NUT
FN520*

3/4" DIA. SQUARE NUT
FRH200*

3/4" DIA. SQUARE NUT
FRH200*

NOTES:
1. Furnish bolts and anchor rods meeting the requirements of Subsection 705.01.1.
2. Furnish high strength bolts meeting the requirements of Subsection 705.11.1.
3. Furnish bolts, nuts and washers in accordance with Subsection 705.01.1.

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

GUARDRAIL HARDWARE

September 2014

MDT®
MDT CHIEF ENGINEER OF TRANSPORTATION
CABLE ASSEMBLY

ANCHOR BRACKET & END PLATE

POST SLEEVE

REMARKS:

① ANCHOR BRACKETS, END PLATES AND RECTANGULAR PLATE WASHERS ARE TO CONFORM TO THE REQUIREMENTS OF AASHTO M270 (M270) ASTM A709 (A709M) GRADE 36 (250) STEEL PLATE. POST SLEEVES ARE TO CONFORM TO THE REQUIREMENTS OF ASTM A53 (A53M) GRADE B.

② GALVANIZE FABRICATED PARTS IN ACCORDANCE WITH SUBSECTION 711.08. DO NOT PUNCH, DRILL, OR CUT AFTER GALVANIZING.

* SEE DET. DWG. NO. 606-80 FOR SCHEDULE OF GUARDRAIL HARDWARE.
W-BEAM END SECTION (BUFFER)
RWE06a-b*
(12'-6" (3.81 m) LENGTH)

W-BEAM TERMINAL CONNECTOR
RWE02a-b*
(25'-0" (7.62 m) LENGTH)

NOTES:

<table>
<thead>
<tr>
<th>DESTINATION SUFFIX</th>
<th>METAL THICKNESS</th>
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<tbody>
<tr>
<td>a</td>
<td>12 GAUGE (2.7 mm)</td>
</tr>
<tr>
<td>b</td>
<td>10 GAUGE (3.5 mm)</td>
</tr>
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</table>

* SEE DTL, DWG. NO. 606-B8 FOR SCHEDULE OF GUARDRAIL HARDWARE.

UNITS SHOWN IN BRACKETS ( ) ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
CABLE GUARDRAIL POST AND SOIL PLATE

PSE01* AND PLS01*

5/16" DIA. [M8] HEX NUT (FNX08080*)

5/16" DIA. (M8) ROUND BEND HOOK BOLT

5/16" DIA. (M8) HEX BACKING NUT (FNX08080*)
OR APPROVED SHOULDER

1" [25]

1/16" TO 1/8"
(1.5 TO 3.0)

5/16" DIA. (M8) ALTERNATE TYPE ROUND BEND HOOK BOLT, NO BACKING NUT REQUIRED

1" [25]

5/16" DIA. (M8) HOOK BOLT

5/16" DIA. (M8) ALTERNATE HOOK BOLT

5/16" [7.9] DIAM., (TYP.)

3/8" [9.5] " (900)

2'-11" [890]

1/4" [6 mm]

3 1/2" [89]

1/4" [6 mm]

S3 x 5.7
[575 x 8 kg/m]

8" x 2'-0" x 1/4"
[200 x 610 x 6] PL.
SOIL PLATE

2'-11" [890]
[610]

2'-11" [890]
[50-280 mm] 1/4" [6 mm]

2'-11" [890]
[50-280 mm] 1/4" [6 mm]

BOTH CORNERS MAY BE CLIPPED 2" x 2"
[50 x 50] TO AID DRIVING

3/4" [19.1] DIA. HOLE, OPTIONAL FOR HANDLING DURING GALVANIZING

3" [76.2]

2 3/8" [59.2]

3" [76.2]

5'-3" [1600]

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 [A709M])
GRADE 36 (250) STEEL. ALL WELDING IS TO
CONFORM TO THE APPLICABLE AWS CODE.

(3) HOOK BOLTS ARE TO CONFORM TO THE
REQUIREMENTS OF ASTM 558 (558M) 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 T11.0B. 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.