DETAILED DRAWINGS

SUPPLEMENTAL TO
THE STANDARD
SPECIFICATIONS FOR
ROAD AND BRIDGE
CONSTRUCTION

SUPPLEMENT TO THE SEPTEMBER 2014 EDITION
EFFECTIVE: JANUARY 2018

MONTANA DEPARTMENT
OF TRANSPORTATION
# DETAILED DRAWINGS

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TYPICAL SECTION WITHIN CLEAR ZONE
USE A PIPE AS NECESSARY FOR DRAINAGE, INSTALL CULVERTS OUTSIDE THE CLEAR ZONE OR PROVIDE END TREATMENT.

TYPICAL SECTION BEYOND CLEAR ZONE

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NOTES:

1. APPROACH GRADE BEYOND LANDING IS NOT TO EXCEED 10% UNLESS TRAFFIC VOLUMES AND COST INDICATE SUCH TO BE JUSTIFIABLE.
2. CONSTRUCT APPROACHES TO FIT LOCAL CONDITIONS.
3. SECURE WRITTEN PERMISSION FROM LANDOWNER FOR WORK BEYOND THE RIGHT-OF-WAY.

** CRITERIA SHOWN ARE FOR PRIVATE AND FARM FIELD APPROACHES. FOR COUNTY AND MAIN ROADS USE ESTABLISHED STANDARDS FOR APPLICABLE FUNCTIONAL CLASS.

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

DETAILED DRAWING
REFERENCE DWG. NO. STANDARD SPEC. 203-05
SECTION 203
APPROACHES
EFFECTIVE: SEPTEMBER 2014

MDT MONTANA DEPARTMENT OF TRANSPORTATION
FINISHED ROADWAY SHOULDER

DITCH BLOCK

10:1 OR FLATTER

1' (300) MIN. ①

2' (600) MIN. ②

10:1 OR FLATTER ①

CROSS DRAIN

DRAINAGE

NOTES:

① CONSTRUCT DITCH BLOCKS TO FIT LOCAL CONDITIONS. WHEN CONDITIONS DO NOT ALLOW 10:1 SLOPES, USE 6:1 SLOPES.

② HEIGHTS SHOWN ARE MINIMUMS. SET HEIGHT OF DITCH BLOCKS BASED ON THE CULVERT DIAMETER OR ON THE ELEVATION SHOWN IN THE PLANS.

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

DETAILED DRAWING

REFERENCE DWG. NO.
STANDARD SPEC. 203-20
SECTION 203

DITCH BLOCKS

EFFECTIVE: SEPTEMBER 2014

MONTANA DEPARTMENT OF TRANSPORTATION
TYPICAL ISOLATION JOINT GUIDELINES

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<tr>
<th>CONDITION</th>
<th>FEATURE</th>
<th>DISTANCE FROM NEAREST PAVEMENT JOINT</th>
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<tr>
<td>A</td>
<td>DROP OR CURB INLET</td>
<td>----</td>
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<tr>
<td>B</td>
<td>DROP OR CURB INLET</td>
<td>----</td>
</tr>
<tr>
<td>C</td>
<td>DROP OR CURB INLET</td>
<td>EDGE OF ISOLATION JOINT + 4 FT (1220) FROM JOINT</td>
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<tr>
<td>D</td>
<td>DROP OR CURB INLET</td>
<td>EDGE OF MILE + 2 FT (610) FROM JOINT</td>
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<tr>
<td>E</td>
<td>DROP OR CURB INLET</td>
<td>4 FT (1220) FROM JOINT</td>
</tr>
<tr>
<td>F</td>
<td>MISCILE</td>
<td>----</td>
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<tr>
<td>G</td>
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<td>----</td>
</tr>
<tr>
<td>H</td>
<td>MISCILE</td>
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<tr>
<td>I</td>
<td>MISCILE</td>
<td>CENTER OF MILE + 3 FT (915) FROM JOINT</td>
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<tr>
<td>J</td>
<td>MISCILE</td>
<td>CENTER OF MILE + 3 FT (915) FROM JOINT</td>
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</table>

UNITS SHOWN IN BRACKETS ARE METRIC AND ARE IN MILLIMETERS UNLESS OTHER UNITS ARE SHOWN.
MULTIPLE ARCH CULVERTS
(METAL CULVERTS SHOWN)

X: VARIABLE, FOR METAL CULV, SEE DTL. DWG. 603-32
(CIRCULAR) OR 603-34 (ARCH), AND FOR CONCRETE
CULV. WITH PETS SEE DTL. DWG. 603-08 (ROUND) OR
603-10 (ARCH), AND FOR CONCRETE CULV. WITH
SQUARE ENDS, THE "X" DIMENSIONS IS 0.4 OR X/3

Y: FOR METAL CULV. AND CULV. WITHOUT PETS: Y = 4'-0"
(1200) (OUTSIDE WALL TO Outside WALL)

NOTE: Y MAY BE INCREASED ON LARGE DIAMETER PIPE
UP TO A MAX. OF 8'-0" (2400) TO AID IN INSTALLATION
AND BACKFILL. THE QUANTITIES SHOWN IN 552-04, 06 & 08
WERE FIGURED USING Y = 4'-0" (1200). ADJUST QUANTITIES
AS NEEDED WHEN Y IS OTHER THAN 4'-0" (1200).

MULTIPLE ROUND CULVERTS
(METAL CULVERTS SHOWN)

SINGLE ROUND CULVERT
(Concrete Culvert Shown)

REINFORCING STEEL:
USE REBAR DOWELS MEETING THE REQUIREMENTS OF
AASHTO M 31 GRADE 60 (GRADE 420).

EPOXY RESIN BONDING ADHESIVE:
MEET THE REQUIREMENTS OF AASHTO M 235 TYPE 4.

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

NOTE:
① USE CLASS GENERAL CONCRETE OR EQUAL.
② SEE DTL. DWG. NO. 603-18 AND
603-19 FOR BEDDING UNDER CULVERTS.

CONCRETE CUTOFF WALLS
FOR CULVERTS

REFERENCE DWG. NO.
STANDARD SPEC.
SECTION 552, 603, 613
552-00

EFFECTIVE: SEPTEMBER 2014
JANUARY 2018
MONTANA DEPARTMENT OF TRANSPORTATION
<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>CUBIC YARDS OF CLASS GENERAL CONCRETE (EACH END)</th>
<th>CUBIC METERS OF CLASS GENERAL CONCRETE (EACH END)</th>
<th>CUBIC YARDS OF RIPRAP (EACH END)</th>
<th>CUBIC METERS OF RIPRAP (EACH END)</th>
<th>CUBIC YARDS OF GRAVEL-BEDDED SLEDDING</th>
<th>CUBIC METERS OF GRAVEL-BEDDED SLEDDING</th>
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<tr>
<td>D150 (1.5')</td>
<td>1.50</td>
<td>1.75</td>
<td>2.00</td>
<td>2.60</td>
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<td>D180 (2')</td>
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<td>D240 (3')</td>
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</tbody>
</table>

NOTES:

1. CONCRETE SLEDDING PROTECTION IS STANDARD FOR METAL CULVERTS. FOR CONCRETE AND CONCRETE CULVERTS WITH A DIA. OF 6.0' OR SMALLER, SLEDDING PROTECTION IS OPTIONAL. UNLESS OTHERWISE STATED, ALL QUANTITIES ARE BASED ON A THICKNESS OF 2 FT. BUT ARE ADJUSTED TO 2 FT. FOR USE ON 3FT. DIAMETER OR LARGER CULVERTS, AND TO 3FT. FOR USE ON 5FT. DIAMETER OR LARGER CULVERTS.

2. FOR CONCRETE SLEDDING PROTECTION, THE QUANTITIES SHOWN IN THE TABLE ARE BASED ON A 2 FT. THICKNESS AT THE SPREADSHEET FACING THE WATER OF A 6.0' DIAM. CULVERT. FOR CULVERTS WITH A DIA. OF 6.0' OR SMALLER, SLEDDING PROTECTION IS OPTIONAL. UNLESS OTHERWISE STATED, ALL QUANTITIES ARE BASED ON A THICKNESS OF 2 FT. BUT ARE ADJUSTED TO 2 FT. FOR USE ON 3FT. DIAMETER OR LARGER CULVERTS, AND TO 3FT. FOR USE ON 5FT. DIAMETER OR LARGER CULVERTS.

3. FOR METAL CULVERTS, THE QUANTITIES SHOWN IN THE TABLE ARE BASED ON A 2 FT. THICKNESS AT THE SPREADSHEET FACING THE WATER OF A 6.0' DIAM. CULVERT. FOR CULVERTS WITH A DIA. OF 6.0' OR SMALLER, SLEDDING PROTECTION IS OPTIONAL. UNLESS OTHERWISE STATED, ALL QUANTITIES ARE BASED ON A THICKNESS OF 2 FT. BUT ARE ADJUSTED TO 2 FT. FOR USE ON 3FT. DIAMETER OR LARGER CULVERTS, AND TO 3FT. FOR USE ON 5FT. DIAMETER OR LARGER CULVERTS.

4. FOR CONCRETE SLEDDING PROTECTION, THE QUANTITIES SHOWN IN THE TABLE ARE BASED ON A 2 FT. THICKNESS AT THE SPREADSHEET FACING THE WATER OF A 6.0' DIAM. CULVERT. FOR CULVERTS WITH A DIA. OF 6.0' OR SMALLER, SLEDDING PROTECTION IS OPTIONAL. UNLESS OTHERWISE STATED, ALL QUANTITIES ARE BASED ON A THICKNESS OF 2 FT. BUT ARE ADJUSTED TO 2 FT. FOR USE ON 3FT. DIAMETER OR LARGER CULVERTS, AND TO 3FT. FOR USE ON 5FT. DIAMETER OR LARGER CULVERTS.

5. FOR METAL CULVERTS, THE QUANTITIES SHOWN IN THE TABLE ARE BASED ON A 2 FT. THICKNESS AT THE SPREADSHEET FACING THE WATER OF A 6.0' DIAM. CULVERT. FOR CULVERTS WITH A DIA. OF 6.0' OR SMALLER, SLEDDING PROTECTION IS OPTIONAL. UNLESS OTHERWISE STATED, ALL QUANTITIES ARE BASED ON A THICKNESS OF 2 FT. BUT ARE ADJUSTED TO 2 FT. FOR USE ON 3FT. DIAMETER OR LARGER CULVERTS, AND TO 3FT. FOR USE ON 5FT. DIAMETER OR LARGER CULVERTS.
### Culvert Installation Quantities

#### Cubic Yards of Class General Concrete

<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>3'/0&quot; or 5'/0&quot; Cut-off Wall</th>
<th>7'/6&quot; Cutoff Wall</th>
<th>11'/6&quot; Cutoff Wall</th>
<th>15'/6&quot; Cutoff Wall</th>
<th>19'/6&quot; Cutoff Wall</th>
<th>23'/0&quot; Cutoff Wall</th>
<th>27'/0&quot; Cutoff Wall</th>
<th>31'/6&quot; Cutoff Wall</th>
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#### Cubic Yards of Riprap Protection

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<th>11'/6&quot; Cutoff Wall</th>
<th>15'/6&quot; Cutoff Wall</th>
<th>19'/6&quot; Cutoff Wall</th>
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#### Cubic Yards of BEDDING MATERIAL PER FOOT OF PIPE

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<th>11'/6&quot; Cutoff Wall</th>
<th>15'/6&quot; Cutoff Wall</th>
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</table>

### Concrete Edge Protection

- Standard for all concrete and masonry vaults.
- For pipe vaults, not to exceed 3 feet of edge protection.
- Cut-off walls must extend to 2 feet beyond the outer edge of the vault.
- Depth and height equal to 1/3 dust. X" = Corrosion depth. 1/3 dust = pipe depth. Cut-off walls must extend to 2 feet beyond the outer edge of the vault.

### Riprap Protection

- Standard for all concrete and masonry vaults.
- For pipe vaults, not to exceed 3 feet of riprap protection.
- Cut-off walls must extend to 2 feet beyond the outer edge of the vault.

### Bedding Material

- Standard for all concrete and masonry vaults.
- For pipe vaults, not to exceed 3 feet of bedding material.
- Cut-off walls must extend to 2 feet beyond the outer edge of the vault.
### ROAD APPROACH CULVERT END TREATMENT

**Quantities (for estimating only)**

<table>
<thead>
<tr>
<th>DIA. A</th>
<th>H PIPE LENGTH</th>
<th>&quot;64 1/2&quot; x 4 1/8&quot; FERRULE LOOP INSERT (EACH)</th>
<th>LENGTH 2 1/2&quot; DIA. SCHEDULE 40 GALV. PIPE</th>
<th>DIMENSIONS (FT.)</th>
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<tr>
<td>15&quot;</td>
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<td>18&quot;</td>
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<td>~</td>
<td>0.71  0.25  5.75  0.25  0.75</td>
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<td>24&quot;</td>
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<td>10</td>
<td>12.5'</td>
<td>0.5   2.0   0.75  0.21  9.25  0.25  0.75</td>
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</table>

**Metric Quantities (for estimating only)**

<table>
<thead>
<tr>
<th>DIA. A</th>
<th>H PIPE LENGTH</th>
<th>&quot;M12 x 105&quot; FERRULE LOOP INSERT, EACH</th>
<th>LENGTH 63 DIA. SCHEDULE 40 GALV. PIPE</th>
<th>DIMENSIONS (mm)</th>
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<td>3800</td>
<td>152  610  229  64  2819  76  229</td>
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</tbody>
</table>

### Plan View

**Schedule 40 Galvanized Steel Pipe (As Required)**

### Section A-A

**Ground Line**

**Schedule 40 Galvanized Steel Pipe (As Required)**

**RCP**

**Groove End On Outlet Tongue End On Inlet**

### End View

**27 1/2" (700) Long Pipe**

**30 1/2" (775) Long Pipe**

### View of Inserts

**27" (686)**

**25 1/2" (648)**

### Note:
Paint all non-galvanized parts per Section 710.

Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.

**Detailed Drawing**

Reference: DWG. NO. 603-12

Section: 603.710.711

RCP Road Approach Culvert End Treatment (RACET)

Effective: September 2014

*Montana Department of Transportation*
PLAN VIEW

- 2 1/2" x 9/16" x 1/4" (6.4 x 6.4 x 6.4) Galv. Structural Tubing Cross-Pipe per Section 711.
- 21" x 15 (530 x 380) CSPA
- 1"-0" (305)
- 3'-0" (914) Conn.

EXISTING OR NEW
CSP OR CSPA

ELEVATION

- 11" (279)
- 5" (127)
- 1'-5 3/8" (441)
- 1'-10 3/8" (568)

DETAIL A

NOTE:

- Paint all exposed metal parts with one coat of zinc rich paint and two coats of aluminum paint per Section 710.

- Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.

- PreCast Median U-Turn Cross Drain and Conc. Beveled End

EFFECTIVE: SEPTEMBER 2014
I- STANDARD BEDDING INSTALLATION

20 WKL

12" - 0" 156603max.

1 - 0" (365)mm

SIDE FILL

EXISTING GROUND

EXCAVATE AS NEEDED

DEPTH = 3/4 × 10 × 3" (75)

1 - 1" (75)

COMPACTED BEDDING MATERIAL

LOOSE BEDDING MATERIAL

EXCAVATION FOR BEDDING

25 WKL

12" - 0" 156603max.

1 - 0" (365)mm

SIDE FILL

EXISTING GROUND

EXCAVATE AS NEEDED

DEPTH = 3/4 × 10 × 3" (75)

1 - 1" (75)

COMPACTED BEDDING MATERIAL

LOOSE BEDDING MATERIAL

EXCAVATION FOR BEDDING

2- BOX

20 WKL

12" - 0" 156603max.

1 - 0" (365)mm

SIDE FILL

EXISTING GROUND

EXCAVATE AS NEEDED

DEPTH = 3/4 × 10 × 3" (75)

1 - 1" (75)

COMPACTED BEDDING MATERIAL

LOOSE BEDDING MATERIAL

EXCAVATION FOR BEDDING

25 WKL

12" - 0" 156603max.

1 - 0" (365)mm

SIDE FILL

EXISTING GROUND

EXCAVATE AS NEEDED

DEPTH = 3/4 × 10 × 3" (75)

1 - 1" (75)

COMPACTED BEDDING MATERIAL

LOOSE BEDDING MATERIAL

EXCAVATION FOR BEDDING

3- FOUNDATION STABILIZATION

20 WKL

12" - 0" 156603max.

1 - 0" (365)mm

SIDE FILL

EXISTING GROUND

EXCAVATE AS NEEDED

DEPTH = 3/4 × 10 × 3" (75)

1 - 1" (75)

COMPACTED BEDDING MATERIAL

LOOSE BEDDING MATERIAL

STABILIZATION GRANULATES

PER SECTION 116

25 WKL

12" - 0" 156603max.

1 - 0" (365)mm

SIDE FILL

EXISTING GROUND

EXCAVATE AS NEEDED

DEPTH = 3/4 × 10 × 3" (75)

1 - 1" (75)

COMPACTED BEDDING MATERIAL

LOOSE BEDDING MATERIAL

STABILIZATION GRANULATES

PER SECTION 116

NOTES:

1. DO NOT EXCEED BEDDING MATERIAL TO THE END OF THE PIPE. PLACE BEDDING MATERIAL AT EACH END UNLESS OTHERWISE NOTED IN PLANS. SEE PARTIAL DETAILS.

2. PLACE LOOSE BEDDING MATERIAL UNIFORMITY IN THE BOTTOM OF THE TRENCH AND SHAPED TO THE SYSTEM DESIGN. APPLY THE MAXIMUM THICKNESS BEFORE PLACING THE PIPE IN THE TRENCH. FOR 20 WKL, APPLY 6" MIN. THICKNESS AT PROPER DEPTH OF LOOSE BEDDING MATERIAL, TO ACCOMMODATE SILL TONGUING, AND AFTER LAUNCHING COULTER, COMPACT BEDDING MATERIAL AT HANMISTERS AND SITES OF IRC.

3. COMPACT AND PLACE SIDE FILL PER SECTION 913 AND 1005.

4. FINISH BEDDING AND FOUNDATION MATERIAL PER SECTION 913.

5. DIMENSIONS S, T, R, AND G ARE PIPE DIAMETER, SPAN AND SIDES. TOLERANCES FOR PIPE DIAMETER WALL THICKNESS, PIPE DIAMETER, SPAN AND SIDES. TOLERANCES ARE TWICE THE EQUIVALENT SIZE METAL, SILOTECTILE, AND SMALLER.

6. EXCAVATE A SUFFICIENT AMOUNT TO PROVIDE A SAFE WORKING ENVIRONMENT AND TO ALLOW ADJUSTMENT OF ALL COLLECTED INSTALLATION AND COMPACTED REQUIREMENTS. SEE PARTIAL DETAILS FOR EXCAVATION SCAFFOLDING FOR ALL EXCAVATIONS IN ACCORDANCE WITH THE U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.

7. BORROW WITH FULL MATERIAL AS NECESSARY TO CONTAIN THE BEDDING MATERIAL TO THE PROPER DEPTH.

UNITS SHOWN IN BRACKETS [ ] ARE BRIGHT AND ARE IN MILLIMETERS UNLESS OTHER UNITS ARE SHOWN.

REFERENCE:

SPEC. NO. 203-203-6030-10

MDT 1998 DEPARTMENT OF TRANSPORTATION

MCH 2000 DEPARTMENT OF TRANSPORTATION

JANUARY 1998

MDT DEPARTMENT OF TRANSPORTATION

SECT 4.0, APPROACH COLLAR

FOR 12" WKL & SMALLER

SECT 4.0, APPROACH COLLAR

FOR 12" WKL & SMALLER
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<th>DI</th>
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<th>L2</th>
<th>L1 W/ WALL</th>
<th>L1 W/ WALL &amp; C</th>
<th>R1</th>
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<th>Y1</th>
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**METRIC DIMENSION TABLE (mm)**

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<tr>
<th>DIA. D</th>
<th>APPROX. DIA. GASKET WIDTH</th>
<th>LENGTH OF JOINT</th>
<th>DI</th>
<th>D1</th>
<th>L2</th>
<th>L1 W/ WALL</th>
<th>L1 W/ WALL &amp; C</th>
<th>R1</th>
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**NOTES:**

- **TYPICAL:** FOR STORM DRAIN AND IRIGATION APPLICATIONS WHERE HEADS UP TO 20 FT (6.0 M) ARE TYPICAL.
- **USE EPDM GASKETS THAT MEET THE REQUIREMENTS OF SECTION 707.**
- **UNITS SHOWN IN BRACKETS ARE WIDTHS AND ARE TO BE USED IF MANDATED.**
- **UNLESS OTHER UNITS ARE SHOWN.**
**DIMENSION TABLE**

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<th>WATER AREA (IN)</th>
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<th>W. WALL THICKNESS</th>
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**METRIC DIMENSION TABLE**

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<th>F. LENGTH OF JOINT</th>
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**NOTE:** All dimensions are in millimeters unless otherwise noted.

---

**TYPICAL LONGITUDINAL SECTION**

6" (152 mm) DIAMETER PIPES AND LARGER

---

**TYPICAL LONGITUDINAL SECTION**

3 3/8" (86 mm) DIAMETER PIPES AND SMALLER

---

**JOINT DETAIL**

**REINFORCING AT ENDS OF PIPE**

**NOTES:**

- PRECAST MEMBERS ARE TO BE MEASURED AND ARE TO BE AT END OF JOINT.
- UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS.
- JOINTS FOR DRAINAGE APPLICATIONS.

---

**REFERENCE SHEET NO.** SHEET 60A, PG 26

**REINFORCED CONCRETE PIPE JOINT**

**SHEET 3/24**

**DEPARTMENT OF TRANSPORTATION**

**MDT - WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**
SECTION A-A

CONNECTION DETAILS

TYPICAL FIELD CAST CONCRETE BEND

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

DETAILED DRAWING
REFERENCE DWG. NO.
STANDARD SPEC. 603-26
SECTION 603.708

TYPICAL FIELD CAST CONCRETE CONNECTIONS

EFFECTIVE: SEPTEMBER 2014

MONTANA DEPARTMENT OF TRANSPORTATION
4" HIGH CURB (SEE DET. DWG. NO. 609-05)

5'-0" (1525) R

FINISHED SHOULDER

SLOPE FROM EDGE OF PAVEMENT AT 10%

PL. MIX. BIT. SURF. TO BE PLACED AND WARPED TO FIT GUTTER AND INLET GRADES *

1/2" (12.70) DIA. GALV. ROD WITH 2 GALV. HEX NUTS EACH END

30'-0" (9140) MINIMUM

NOTE: DASHED ARROWS DENOTE DIRECTION OF WATER FLOW.

PLAN VIEW OF INLET

OUTLET DETAIL

SECTION A-A

NOTES:

1. CORRUGATION MAY BE EITHER ANNULAR OR HELICAL. BEND ON ELBOW (10") IS AS SHOWN UNLESS OTHERWISE SPECIFIED IN THE PLANS OR BY THE PROJECT MANAGER.

2. THE COST OF SS-1 FOG SEAL IS INCLUDED IN THE COST OF PLANT MIX SURFACING.

* INCLUDED WITH ROADWAY QUANTITIES.

UNITS SHOWN IN BRACKETS [ ] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
TRANSVERSE CONTRACTION JOINT (15' [4.5 m] O.C.)

17" (430) LONG x 1 1/4" (32) DIA. SMOOTH EPOXY-COATED DOWELS SPACED AT 12" (300) CENTERS

TRANSVERSE CONTRACTION JOINT (AS NEEDED)

17" (430) LONG x 1 1/4" (32) DIA. SMOOTH EPOXY-COATED DOWELS SPACED AT 12" (300) CENTERS

TYPICAL BOTH ENDS
REINFORCING STEEL FOR INLET
BACKFILL RETAINER & PCCP SLAB

11 ~ M4 [1/4] BAR CONNECTORS
1' - 4" (400) x 1' - 4" (400)
APPROX. 1' - 4" (400) CENTERS

SEALANT MATERIAL

SAWED JOINT FACE

BACKER ROD

1/8" [3] SAWED TRANSVERSE OR LONGITUDINAL JOINT WITH HOT Poured SEALANT

8" [200] PCCP

SEE DETAIL A

1 3/8" [33]

8" [200]

1" [25]

15° SLOPE

1/4" [6]

1 5/8" [41]

3 1/4" [83]

4" [100]

1 5/8" [41]

1/4" [6]

1 3/8" [33]

2" [50]
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<thead>
<tr>
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<th>METRIC DIMENSIONS</th>
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</tr>
<tr>
<td>120&quot;</td>
<td>3.000</td>
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**NOTES:**

1. **AREA "A"** is to the middle of the corrugations.
2. **AREA "A"** is to the middle of the corrugations.
3. **AREA "B"** is to the middle of the corrugations.
4. **AREA "B"** is to the middle of the corrugations.

**UNITS SHOWN IN BRAKETS (1) ARE METRIC AND ARE IN MILLIMETERS (1). UNLESS OTHER UNITS ARE SHOWN.**
### Dimensions

<table>
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<tr>
<th>SPAN</th>
<th>RISE</th>
<th>EQUV. (IN)</th>
<th>X</th>
<th>V</th>
<th>H (FT. FOR BEVEL)</th>
<th>AREA (SQ. FT)</th>
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<tr>
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<td>8' 6&quot;</td>
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<td>2.0</td>
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<td>7.4</td>
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<tr>
<td>12' 6&quot;</td>
<td>10′ 6&quot;</td>
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<td>5.0</td>
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<tr>
<td>16' 6&quot;</td>
<td>14′ 6&quot;</td>
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<tr>
<td>16' 6&quot;</td>
<td>13′ 11&quot;</td>
<td>168</td>
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<td>2.0</td>
<td>5.0</td>
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<tr>
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<td>16′ 6&quot;</td>
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<td>2.0</td>
<td>5.0</td>
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<td>2.0</td>
<td>5.0</td>
<td>7.4</td>
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**Concrete Cutoff Wall See DTL WML No. 550-06**

**Notes:**
1. Bevel to top of corner plate.
2. Pipe ends are square shoulder to center line of pipe and filled with concrete at cutoff. End unless specified otherwise on plans.
3. Table values based on nominal pipe dimensions. All 3-1/2 inch diameters subject to tolerance requirements of Section 109.

### Concrete Cutoff Wall

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<thead>
<tr>
<th>SPAN (FT)</th>
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<th>V</th>
<th>H (FOR BEVEL)</th>
<th>AREA (FT)</th>
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<td>7' - 3&quot;</td>
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<tr>
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<td>5' - 3&quot;</td>
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<td>4.3</td>
<td>4.3</td>
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<tr>
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<td>16′ 6&quot;</td>
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<td>15′ 11&quot;</td>
<td>200</td>
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**Bevel on Arch Metal Culvert**

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<th>AREA (FT)</th>
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<td>7' - 3&quot;</td>
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<tr>
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<td>15′ 11&quot;</td>
<td>200</td>
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<td>2.0</td>
</tr>
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**Notes:**
1. Bevel to top of corner plate.
2. Pipe ends are square shoulder to center line of pipe and filled with concrete at cutoff. End unless specified otherwise on plans.
3. Table values based on nominal pipe dimensions. All 3-1/2 inch diameters subject to tolerance requirements of Section 109.
**SECTION B-B**

**STANDARD UNLESS OTHERWISE NOTED ON THE PLANS.**

NOTES: ALL CONCRETE IS CLASS GENERAL OR APPROVED EQUAL.

* SEE QUALIFIED PRODUCTS LIST FOR APPROVED CRATES.

UNITS SHOWN IN BRACKETS ( ) ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
SEE SECTIONS FOR VANES

PLAN

DIRECTION OF INTAKE FLOW

SECTION A-A

SECTION B-B

NOTE:
ALL CONCRETE IS CLASS GENERAL OR APPROVED EQUAL.

* SEE QUALIFIED PRODUCTS LIST FOR APPROVED GRATES.

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

REFERENCE DWG. NO.
STANDARD SPEC. 604-02
SECTION 604, 70B 604-04

DROP INLET TYPE IV

EFFECTIVE SEPTEMBER 2014
PLAN

IN ADDITION TO THE CONTRACTION JOINT REQUIREMENTS IN DTL. DWG. NO. 609-05, INSTALL 1" (25 mm) MINIMUM DEPTH CONTRACTION JOINTS AT THESE LOCATIONS OR PROVIDE A BOND BREAKER FULL DEPTH OF THE CURB AND GUTTER. SEE CONCRETE PAVEMENT DETAILS FOR PROPER JOINT ALIGNMENT WITH ROADWAY.

SQUARE CONCRETE PLUG OR METAL CAP AS APPROVED BY THE PROJECT MANAGER.

TOP BACK OF CURB

CONNECT ELBOW TO SLOTTED DRAIN WITH MODIFIED HUGGER BAND AND SEAM SOLVENT OR APPROVED EQUAL.

ELEVATION

DEPRESS TOP OF SLOTTED DRAIN AND CATCH BASIN GRATE 1/2" (12.7 mm) BELOW THE GUTTER GRADE

MINIMUM EXCAVATION LEAN CONCRETE

CROSS BAR SPACER

CROSS BAR SPACER

SECTION C-C

SECTION D-D

SECTION A-A

9 1/2" (240)
1 1/4" (40)
6" (152.4) O.C.

6" (152.4) (TYP.)

D + 6" (152.4) TYP.

6" (152.4) (TYP.)

D + 6" (152.4) TYP.

6" (152.4) (TYP.)

D + 3" (76.2)

3 1/16" (6 mm)
1/16" (1.5 mm)
3 1/16" (6 mm)
3 1/16" (6 mm)
3 1/8" (25 mm)
3 1/4" (45.5)

NOTE:
PANT ALL WELDS AND OTHER NON-GALVANIZED PARTS WITH ONE COAT OF ZINC RICH PAINT AND TWO COATS OF ALUMINUM PAINT PER SECTION 710.
PLAN VIEW

SECTION A-A

SECTION A-A

CUBE TO GRADE

25" (63.5)

STRUCTURE & GRADE

W8/18" (46.4) M6/18" (46.4)

STOP GRATE

TOP BACK OF CURB (TYPICAL)

CENTER OF STRUCTURE & OPENING

OPENING IN ROOF SLAB

33" (838)

33 3/4" (857.5)

33 3/4" (857.5)

FLOW

D

FLOW

D

FLOW

D

33 3/4" (857.5)

SECTION B-B

STRAIGHT BAR GRADE TYPE I

48" (1219.2) TOP CLASS 2 (AVERAGE 1.5"

33 3/4" (857.5)

1 1/2" (38.1)

3/8" (9.5)

25" (63.5)

STRUCTURE & GRADE

IF NO APRON IS USED SOME
GRADE AS NECESSARY
TO MATCH ROOF CROSS SLOPE

CONCRETE ADJUSTING
PLATES ARE NECESSARY
(36" EQUIDISTANT - 2404.8 MAX)

SWITCH INLET APRON OR
POWDERY CROSS SLOPE

7" (178.2)

SECTION C-C

VAN SILE GRADE

TYPE I & II

SLOPE TO DRAIN

6" (152.4) WIDE X (176) M6/18" (46.4)

6" (152.4)

FLOW SLAB

6" (152.4) WIDE X (152.4) X NO.9

ROOF SLAB

OUTLET DIRECTION
OF PIPE VARIES

NOTE: ALL CONCRETE IS GENERAL OR APPROVED EQUAL.

SEE PLANS FOR LOCATIONS AND QUANTITIES.

SET ALL CEMENT INLET GRATE ELEMENTS TO ENSURE
THAT POISON DRAINAGE IS PROVIDED FROM THE
FLOWING OF THE CURB AND OUTER SECTION A-A
THROUGH THE INLET.

![Diagram](image-url)

- STANDARD UNLESS OTHERWISE NOTED ON PLANS
- PLANT STATION AND OFFSET IS TO THE CENTER OF THE
- STRUCTURE
- TYPE I AND II ARE CAST IN CONCRETE
- IF THE SAME MATERIAL IS TO BE
- PLANTED, 30 DEGREES IS A MAX STRUCTURE. INSTALL
- GRADE TO MATCH FLOW DIRECTION SHOWN
- PROVIDE SAFETY LUG ON STRAIGHT BAR GRADE
- BETWEEN EACH BAND.
- SEE QUALIFIED PRODUCTS LIST FOR APPROVED GRADES

UNIT SHOWN IN BRACKETS [ ] ARE
METRIC AND ARE IN MILLIMETERS [MM] UNLESS OTHER UNITS ARE SHOWN

REFERENCE: DPI, NO. 7-2000

STANDARD SPEC:

SECTION 604

DROP INLETS

TYPE I AND II

MDT: MONTANA DEPARTMENT OF TRANSPORTATION
TRANSITION FROM 27 3/4" (709 mm GREATER) TO 31" (787 mm) GUARDRAIL MOUNTING HEIGHT

NOTES:
1. THE MSG TO METAL GUARDRAIL TRANSITION IS PAVED FOR 10 LINEAR FEET OF MSG GUARDRAIL.
2. SEE DT: TMC No. 606-10A, 606-10B, 606-11A, AND 606-11B FOR MSG GUARDRAIL AND ASSOCIATED HARDWARE.
3. LAP ALL BLACK TAIL IN THE DIRECTION OF ADJACENT TRAFFIC.

UNITS SHOWN IN BRACKETS [ ] ARE METRIC AND ARE IN MILLIMETERS (MM) UNLESS OTHER UNITS ARE SHOWN.
NOTES:

1. TAPERED CONCRETE CURBS:
   TYPE 1, SEE DTL. DWG. NO. 606-26
   TYPE 3, SEE DTL. DWG. NO. 606-28

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 (RWE020-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.
BROOGE RAIIL  25'-0" [7.62 m] BRIDGE APPROACH SECTION PAY LIMITS

STANDARD W-BEAM GUARDRAIL

PAY LIMITS

W6 x 8.5 x 6'"-0"
(W152 x 12.6 kg/m x 1830) STEEL POST
W' 1 5/8" x 5 5/8" (195 x 145) (MIN. 1 x 1'-2" (350) BLOCKOUT

END OF CONCRETE BARRIER

6 5/8" (168.28)

BRIDGE SKEW ANGLE

BRIDGE WING WALL

FOR TAPERED CONCRETE CURB DETAILS, SEE DTL.

12'-6" (3810.00)

METAL GUARDRAIL

USE DOUBLED GUARDRAIL BEAMS

GUARDRAIL IS ATTACHED TO ALL POSTS WITH STANDARD GUARDRAIL BOLTS

METAL GUARDRAIL - BRIDGE APPROACH SECTION TYPE 1

( FOR SKEWED BRIDGES USING CONCRETE BARRIER RAIL)

W8 x 21 (W203 x 31 kg/m) (MIN. 1 x 8"-0"
(2440) STEEL POST
W' 1 5/8" x 5 5/8" (195 x 145) (MIN. 1 x 1'-2" (350) BLOCKOUT

W6 x 8.5 x 7'-0" (W152 x 12.6 kg/m x 2135)
STEEL POST W' 1 5/8" x 5 5/8" (195 x 145) (MIN. 1 x 1'-2" (350) BLOCKOUT

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

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

BROOGE RAIIL  25'-0" [7.62 m] BRIDGE APPROACH SECTION PAY LIMITS

STANDARD W-BEAM GUARDRAIL

PAY LIMITS

W6 x 8.5 x 6'"-0"
(W152 x 12.6 kg/m x 1830) STEEL POST
W' 1 5/8" x 5 5/8" (195 x 145) (MIN. 1 x 1'-2" (350) BLOCKOUT

END OF CONCRETE BARRIER

6 5/8" (168.28)

BRIDGE SKEW ANGLE

BRIDGE WING WALL

FOR TAPERED CONCRETE CURB DETAILS, SEE DTL.
DWG. NO. 606-27.

12'-6" (3810.00)

METAL GUARDRAIL

USE DOUBLED GUARDRAIL BEAMS

GUARDRAIL IS ATTACHED TO ALL POSTS WITH STANDARD GUARDRAIL BOLTS

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 GLADE.

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

4) LAP W-BEAM TERMINAL CONNECTOR (RWE02-c-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. 606-74B 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.

REFERENCES

REFERENCE DWG. NO.
STANDARD SPEC.
SECTION 606

SKewed BRIDGE
APPROACH SECTIONS -
STEEL POSTS

EFFECTIVE SEPTEMBER 2014

MDT MONTANA DEPARTMENT
OF TRANSPORTATION
### TRACE BILL OF MATERIAL

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<th>CONCRETE</th>
<th>DESCRIPTION</th>
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<tr>
<td>1/2 x 10</td>
<td>5/8&quot; DA, HEX NUT</td>
<td>LOCK-WASHER</td>
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<td>5/8&quot; DA, 8/16&quot; HEX CAP ANCHOR</td>
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<td>3/4&quot; DA, PLASTIC NUT</td>
<td>BACK-UP FRAME</td>
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<tr>
<td>40 20 x 10</td>
<td>3/4&quot; DA, PLASTIC NUT</td>
<td>PLASTIC NUTSHELL</td>
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**Anchor Hardware (All Concrete Base):**
- 250 SQ. STUB DA, 1" EYE ANCHOR STUD
- 250 SQ. DA, LOCK WASHER
- 150 SQ. 3/8" DA, HEX NUT
- 150 SQ. 3/8" DA, FLAT WASHER
- 5000 3" ADHESIVE METAL DISCARTRIDGE

**Anchor Hardware (Asphalt Base):**
- 250 SQ. 3/8" DA, 1" EYE ALL THREAD STUD ROD
- 150 SQ. 3/8" DA, LOCK WASHER
- 150 SQ. 3/8" DA, HEX NUT
- 150 SQ. 3/8" DA, FLAT WASHER
- 5000 3" ADHESIVE METAL DISCARTRIDGE

*Note:* Each unit comes 100% assembled. (Plastic nose installed after placement.)

---

### NOTES:
- Attachment shown is to shapes with rectangular cross sections such as pier, parapets, and modified concrete markers. Pad traffic flow's unobstructed. Reinforcement drawings for the reinforced concrete pad shown are available from the manufacturer.
- A 6" reinforced concrete pad is shown. Other foundation options are:
  - 3" thick unreinforced concrete
  - 6" thick asphalt
  - 3" thick asphalt over 3" thick concrete
  - 6" thick asphalt over 6" thick compacted subbase

---

**DETAILED DRAWING**

**REFERENCE:**
- SHEET NO.: 603
- SECTION 603

**IMPACT ATTENUATOR - TRACX**

**DATE/REVISION:**
- SEPTEMBER 2016

**MDT® WYOMING DEPARTMENT OF TRANSPORTATION**
TRACC BILL OF MATERIAL

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<td>PLASTIC NOISEPiece</td>
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<td>26</td>
<td>W.W. ANCHOR STUD</td>
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ANCHOR HARDWARE (FULL CONCRETE BASE)

ANCHOR HARDWARE (ASPHALT BASE)

ADHESIVE M/HY 150 CARTRIDGES

# SEE DET. SWG. NO. 606-310
# EACH UNIT SHIPS 1002 ASSEMBLED
# PLASTIC NOISE INSTALLED AFTER PLACEMENT

NOTES:
1. ATTACHMENT SHOWN IS TO SUITS WITH RECTANGULAR
   CROSS SECTIONS SUCH AS THE W. BARS, PARAPETS,tees CONCRETE BARRIER WALLS. TRAFFIC FLOW IS UNIDIRECTIONAL.
   ATTACHMENTS ARE TRANSFORMATIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND UNIDIRECTIONAL TRAFFIC FLOWS ARE
   AVAILABLE FROM THE MANUFACTURER.
2. A 150 mm REINFORCED CONCRETE PAD IS SHOWN. OTHER FOUNDATION
   OPTIONS ARE:
   01 200 mm Thick Unreinforced Concrete
   02 200 mm Thick Asbestos
   03 75 mm Thick Asbestos Over 200 mm Thick Concrete
   04 150 mm Thick Concrete Over 150 mm Thick Composite Surface
   REINFORCEMENT DETAILS FOR THE REINFORCED CONCRETE
   PAD ARE AVAILABLE FROM THE MANUFACTURER.
3. SEE MANUFACTURER FOR MORE INFORMATION ON SPECIFIC
   DESIGN, PRODUCT OFFERED, INSTALLATION AND MAINTENANCE
   OF THE TRAFFIC ATTENUATOR.

REFERENCE:
Dwg. No: 606-308
Section: 606
IMPACT ATTENUATOR - TRAFFIC (METRIC)

ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE NOTED.
7'-3" (2.17 m) BOX BEAM ONE-WAY DEPARTURE TERMINAL SECTION PAY LIMITS

STANDARD BOX BEAM GUARDRAIL PAY LIMITS

8'-0" (2440)

BOX BEAM TERMINAL RAIL (RBM05@)

TRAFFIC SIDE

4'-3" (1295)

3'-0" (915)

3'-6" (1068)

1'-6" (457)

REFLECTIVE TAB (TYP.)

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

2'-4" (710)

3'-11" (1194)

SEE DETAIL "A"

ELEVATION

1/2" (12.7) DIA. Holes for
3/8" DIA x 7 1/2" (190 x 191)
HEX BOLT (FBX10@) AND NUT (FNX10@) WITH
2 FLAT WASHERS (FWC10@)

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

BOX BEAM SUPPORT BRACKET
(FPP01@)

TYPE D BOX BEAM POST
(PSE05@)

SOIL PLATE
(PLS01@)

1/2" x 1 1/2" (MI2 x 38)
HEX BOLT (FBX12@) AND NUT (FNX12@) WITH 2 FLAT
WASHERS (FWC12@)

NOTES:

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

* 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.

DETAIL "A"

MDT® MONTANA DEPARTMENT OF TRANSPORTATION
1" (25.4) Dia. Holes in Box Beam Rail for 3/4" Dia. x 8" (200 x 203) High Strength Hex Bolt (FBX200#) and Nut (FNX200#) with Two Hardened Flat Washers (FWC200#)  

Connection Sleeve Attached to Bridge Rail (Typ. 1)  
(1/4" (6.4) Thick Steel Form Fit Tube to Receive T56 x 6 x 3/16 (T5152 x 152 x 4.8) Box Beam Rail)

Traffic Side

1" x 4" (25.4 x 101.6) Slots Required Top and Bottom of Connection Sleeve

Standard Box Beam Guardrail Pay Limits

Plan

3'-2" (965)

Standard Box Beam Rail (RBM0#)

2'-4" (710) or as required to match bridge rail height

4'-0" (122)

2 1/4" (57.2) STI Gap

6" (152)

4'-0" (122)

Standard Box Beam Post, Hardware and Widening

Elevation

Notes:

① See DL. DWG. NO. 606-50 for standard box beam guardrail and associated details.

② Use on exit end of one-way traffic bridges only.

* See DL. 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.
STANDARD BOX BEAM GUARDRAIL

30'-0" (9.15 m) STANDARD BOX BEAM GUARDRAIL

11'-6" (3.51 m) BEAT BOX BEAM TERMINAL SECTION

47'-6 1/2" (4.49 m) OPTIMAL BOX BEAM TERMINAL SECTION PAY LINES

NOTE:
1. PLACE A SELF-ADHESIVE REFLECTIVE MARKER ON THE FACE OF THE BEAM AND SPACING PLATES.
2. ELEVATION SHOWN IN FIGURES COMPLIES WITH ANSI A128.1-2009.
3. FLARES OF 500 FT - 1000 FT (50.88 m - 304.8 m) MAY ALSO BE USED.
4. SEE DIAGRAM NO. 604-55 FOR STANDARD BOX BEAM GUARDRAIL AND ASSOCIATED DETAILS.

UNIT SHOWN IN BRACKETS IS METRIC, ALL OTHER UNITS ARE SHOWN IN FEET.

REFERENCE: SPEC. NO. 606-55B
SECTION 606

MDT MONTANA DEPARTMENT OF TRANSPORTATION
NOTES:

1. FOR RELATED FASTENER HARDWARE SEE FMC24, FNX24 AND FPA01.

2. MACHINE THE SWAGED FITTING FROM HOT-ROLLED CARBON STEEL CONFORMING TO THE REQUIREMENTS OF ASTM A578 (A576 MG), GRADE 1035, AND ANNULS 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 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 (FNX24) MUST DEVELOP THE BREAKING STRENGTH OF THE WIRE ROPE.

CABLE ASSEMBLY

FCA01

ANCHOR BRACKET & END PLATE

FPA01

POST SLEEVE

FWM02

RECTANGULAR PLATE WASHER

FWR03

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

REFERENCE: DWG. NO. STANDARD SPEC. SECTION 606, 711
W-BEAM METAL GUARDRAIL HARDWARE

EFFECTIVE: SEPTEMBER 2014

MTDA® MONTANA DEPARTMENT OF TRANSPORTATION
**W-BEAM**

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

**W-BEAM END SECTION (BUFFER)**

RWE06a-b*

**W-BEAM TERMINAL CONNECTOR**

RWE02a-b*

**NOTES:**

- **DESTINATION SUFFIX** | **METAL THICKNESS**
  - a | 12 GAUGE (2.7 mm)
  - b | 10 GAUGE (3.5 mm)

*SEE DTL, DWG. NO. 606-B0 FOR SCHEDULE OF GUARDRAIL HARDWARE.*

**UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.**
COMPENSATING CABLE END ASSEMBLY

RCE01★

TURNCBuckle CABLE END ASSEMBLY

RCE03★

CABLE END ASSEMBLY

FM01★

RCM01★

NOTES:

1. Wire rope and connecting hardware are to conform to the requirements of AASHTO M164 (M500) Type I Class A, 3/4" [19.1] Rope. Connecting hardware must develop the full strength of a single cable (25,000 lb [11.2 kN]). Cast steel components are to conform to the requirements of AASHTO M103 (M130) (ASTM A27 [A27M]). Malleable iron castings are to conform to the requirements of ASTM A47 (A47M).

2. At all locations where the cable is connected to a cable socket with a wedge type connection, crimp one wire of the cable over the base of the wedge to hold it firmly in place.

3. 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).

4. Design socket baskets for use with the wedge detailed in this drawing.

5. 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.

6. See DTL. DWG. no. 606-80 for schedule of guardrail hardware.
### Wire Spacing Table

#### Combination Woven Wire & Barbed Wire Fence

<table>
<thead>
<tr>
<th>48&quot; (1200) FENCE HEIGHT</th>
<th>51&quot; (1280) FENCE HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>32&quot; (813) WW-2 BW *</td>
<td>32&quot; (813) WW-3 BW *</td>
</tr>
<tr>
<td>TYPE F2-32WW (813WW)</td>
<td>TYPE F3-32WW (813WW)</td>
</tr>
<tr>
<td>8&quot; (200)</td>
<td>6&quot; (150)</td>
</tr>
<tr>
<td>4&quot; (100)</td>
<td>3&quot; (80)</td>
</tr>
<tr>
<td>6&quot; (150)</td>
<td>3&quot; (80)</td>
</tr>
<tr>
<td>5 1/2&quot; (140)</td>
<td>5 1/2&quot; (140)</td>
</tr>
<tr>
<td>5&quot; (125)</td>
<td>5&quot; (125)</td>
</tr>
<tr>
<td>4 1/2&quot; (115)</td>
<td>4 1/2&quot; (115)</td>
</tr>
<tr>
<td>4&quot; (100)</td>
<td>4&quot; (100)</td>
</tr>
<tr>
<td>3 1/2&quot; (90)</td>
<td>3 1/2&quot; (90)</td>
</tr>
<tr>
<td>3&quot; (80)</td>
<td>3&quot; (80)</td>
</tr>
<tr>
<td>4&quot; (100)</td>
<td>4&quot; (100)</td>
</tr>
</tbody>
</table>

#### Barbed Wire Fence

<table>
<thead>
<tr>
<th>48&quot; (1200) FENCE HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 BW</td>
</tr>
<tr>
<td>TYPE F3</td>
</tr>
<tr>
<td>16&quot; (400)</td>
</tr>
<tr>
<td>12&quot; (300)</td>
</tr>
<tr>
<td>10&quot; (250)</td>
</tr>
<tr>
<td>8&quot; (200)</td>
</tr>
</tbody>
</table>

**Approximate Weight of 32" (813) Woven Wire Fabric (832-6-12 1/2) Per Roll is 150 lb. (68 kg) ± 10 lb. (5 kg). (Note: 12 1/2 Gauge).**

**Approximate Weight of 39" (990) Woven Wire Fabric (939-6-12 1/2) Per Roll is 110 lb. (50 kg) ± 10 lb. (5 kg). (Note: 12 1/2 Gauge).**

*Denotes staple and/or tie locations.

*Other woven wire heights and number of barbed wire combinations are available.

### Stays

1. Use wire stays on all fences unless wood stays are specified.
2. Locate stays halfway between line posts.
3. Wire stays for barbed wire fencing are 2" (50) longer than the distance between the top and bottom wires.
4. For woven wire fencing with barbed wire on top, extend wire stays 6" (150) minimum below the top of the woven wire.
5. When wood stays are specified, use either 2" (50) round, a rough dimension 2" x 2" (50 x 50), or a 1 1/2" x 3 1/2" (37.5 x 87.5) nominal 2" x 4" (50 x 100). The stay must be of sufficient length to be placed on the ground with the top of the stay extending 2" (50) above the top wire. Attach each wire to the wood stays using 1 3/4" (44) x 9 gauge staples. Wood stays do not need to be treated.

### Notes:

1. Staple the bottom, top, center and alternate wires of woven wire to wood line posts.
2. Tie the bottom, top, center and alternate wires of woven wire to steel line posts.
3. Staple all wires of woven wire to wood corner posts or posts used to tie-off wire.
4. "M" denotes metal posts, i.e., type F3M.
5. "W" denotes wood posts, i.e., type F4W.

### Detailed Drawing

- Reference: DWG. NO. 607-00
- Standard Spec.: 607
- Section: 607

### Farm Fence

Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.

**Effective: September 2014**

[MDT* Montana Department of Transportation]
WILDLIFE FRIENDLY FENCE

WIRE SPACING TABLE

<table>
<thead>
<tr>
<th>WILDLIFE-FRIENDLY FARM FENCE TYPE 1 &amp; 4</th>
<th>WILDLIFE-FRIENDLY FARM FENCE TYPE 2 &amp; 5</th>
<th>WILDLIFE-FRIENDLY FARM FENCE TYPE 3 &amp; 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>42&quot; (1050) FENCE HEIGHT</td>
<td>42&quot; (1050) FENCE HEIGHT</td>
<td>42&quot; (1050) FENCE HEIGHT</td>
</tr>
<tr>
<td>WT-2 BW/2 SW-16 &amp; WT-2 BW/2 SW-12</td>
<td>WT-3 BW/1 SW-16 &amp; WT-3 BW/1 SW-12</td>
<td>WT-4 DW-16 &amp; WT-4 DW-12</td>
</tr>
<tr>
<td>TYPE WF4-SBBS-16 &amp; TYPE WF4-SBBS-12</td>
<td>TYPE WF4-3B5-16 &amp; TYPE WF4-3B5-12</td>
<td>TYPE WF4-4B-16 &amp; TYPE WF4-4B-12</td>
</tr>
</tbody>
</table>

* DENOTES STAPLE AND/OR TIE LOCATIONS

BOTTOM WIRE HEIGHT

<table>
<thead>
<tr>
<th>WIRE SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 1</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
</tbody>
</table>

NOTES:

1. "M" DENOTES METAL POSTS, IE. TYPE WF4M.
2. "W" DENOTES WOOD POSTS, IE. TYPE WF4W.
3. SEE DETL. DWG. NO. 607-05, 607-10, AND 607-15 FOR ADDITIONAL FENCING DETAILS.

UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
WOOD FARM ENTRANCE GATE (TYPE G-1)

NOTE: USE 10d NAILS AND CLINCH FOR GATE CONSTRUCTION.

WIRE FARM ENTRANCE GATE (TYPE G-2)

NOTE: USE SAME WIRE SCHEME ON GATE AS THAT USED ON FENCE, UNLESS STATED OTHERWISE IN R/W AGREEMENT.

METAL FARM ENTRANCE GATE (TYPE G-3)

NOTES:

1. ALL GATES ARE 16'-0" (4800) WIDE UNLESS R/W AGREEMENT STATES OTHERWISE.
2. ALL GATES WILL HAVE A SINGLE OR DOUBLE PANEL AT EACH END.
3. TYPE G-3 GATES ARE AVAILABLE IN WIDTHS FROM 4' (1.2 m) TO 20' (6.0 m) IN 2' (0.6 m) INCREMENTS.

UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
### FENCE Panel Types

**Fence Type:**
- COMBINATION WOVEN/BARBED
- BARBED

<table>
<thead>
<tr>
<th>Fence Type</th>
<th>Run (m)</th>
<th>Panels Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMBINATION WOVEN/BARBED</td>
<td>LESS THAN 33'</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>33' - 330'</td>
<td>SINGLE</td>
</tr>
<tr>
<td></td>
<td>OVER 330' TO 660' MAX.</td>
<td>DOUBLE</td>
</tr>
<tr>
<td>BARBED</td>
<td>LESS THAN 66'</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>66' - 660'</td>
<td>SINGLE</td>
</tr>
<tr>
<td></td>
<td>OVER 660' TO 990' MAX.</td>
<td>DOUBLE</td>
</tr>
</tbody>
</table>

**Tie Off Point**
- Select panel type at fence corner or angle break based on fence run length.

**Fence Panel Types**
1. Limit run lengths in poor soil conditions to reduce resulting tension at corner or angle break panels.
2. Tie off on all cross hatched or shaded posts.

**Notes:**
1. Attach Barbed wires to posts by wrapping around the post at least two times, then wrapping around itself five times.
2. To attach woven wire to an end post, remove two or three vertical stay wires from the end of the fence. Place the first complete vertical stay wire against the post. Start at the middle of the horizontal line wires, wrapping around the end post at least two times and then wrapping around itself five times.
3. Place all fence wire on pasture side of post, except on curves. Then, place the wire on the outside of the curve.
4. In areas subject to high velocity winds and moving debris, wires may be placed on windward side of posts, except on curves.
5. Post spacing is generally measured parallel to ground.
6. Place wire stays per DTL, DWG. NO. 607-00 halfway between posts, do not place stays on panels.
7. Wood fence has one metal post in place of a wooden line post in each 500' [150 m] run for lightning protection.

**Detailed Drawing Reference**
- DWG. NO.
- STANDARD SPEC.
- SECTION 607

**Effective: September 2014**

**Montana Department of Transportation**
FENCE DETAILS

FENCE CONNECTION TO CATTLE GUARD
1. Place single or double panels at each end of all cattle guards.
2. Securely fasten fence wire to the wings and arrange so that animals cannot pass.

FENCE CONNECTION TO CROSS-FENCE CONNECTION

FENCE LAYOUT AT CROSS-FENCE CONNECTION

FENCE LAYOUT ON SHARP VERTICAL CURVES
To avoid tying to conform single wire to uneven terrain.

FENCE LAYOUT ON STEEP SLOPES
Slope must be steep enough to deter passage of trespassers.

FENCE LAYOUT AT LOCAL ROAD UNDER INTERSTATE

FENCE LAYOUT AT INTERSTATE FENCING ONLY

METAL LINE POSTS DRIVEN INTO GROUND AT LEAST THREE FEET DEEP
A STEEL WIRE MAY BE A PRECAST CONCRETE BLOCK, A CAST IN PLACE CONCRETE BLOCK, A ROLL OR OTHER APPROVED OBJECT WEIGHING AT LEAST 15 LBS. BURY THE STEEL WIRE IN THE GROUND AT LEAST 2' 6" OF COVER. ATTACH THE STEEL WIRE TO THREE STRANDS OF 9 GAUGE WIRE OR 6 STRANDS OF 12 1/2 GAUGE WIRE. A STEEL WIRE MAY BE A PRECAST CONCRETE BLOCK, A CAST IN PLACE CONCRETE BLOCK, A ROLL OR OTHER APPROVED OBJECT WEIGHING AT LEAST 15 LBS. BURY THE STEEL WIRE IN THE GROUND AT LEAST 2' 6" OF COVER. ATTACH THE STEEL WIRE TO THREE STRANDS OF 9 GAUGE WIRE OR 6 STRANDS OF 12 1/2 GAUGE WIRE. WHEN APPROVED BY THE PROJECT MANAGER THE ABOVE STEEL WIRE MAY BE USED.

FENCE UNDER STRUCTURE BEHIND BRIDGE RAMPS

FENCING DETAILS
SPAN TREATED 2X6'S (50 X 150) ACROSS GAP ON PASTURE SIDE OF POSTS. ATTACH TO PANEL POSTS WITH TWO 3" EXTERIOR GRADE SCREWS ON EACH END AND TRIM EDGES AT 45 DEGREE ANGLES.

NOTES:
1) INSTALL PANELS ACCORDING TO DETAIL DRAWING 607-05.
2) INSTALL NON-INTERSTATE FENCE ON THE RIGHT-OF-WAY LINE AS SHOWN.
3) OFFSET PANEL POSTS 18" (450mm) FROM STAKED R/W BREAKS AND R/W MONUMENTS AS SHOWN IN DETAIL.
4) DO NOT DISTURB SURVEY MONUMENTS.
5) INCLUDE COST OF 2 X 6 (50 X 150) CROSS RAILS IN THE COST OF ADJACENT PANELS.

UNITS SHOWN IN BRACKETS ( ) ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
**GENERAL NOTES**

1. **ANCHOR SYSTEM INSTALLATION:**
   - The anchor system is in four sides, and moisture conditions must be considered. These conditions will be specified by the project manager. Consult the detailed drawing for anchor system installation and moisture conditions, and no pumps are required.

2. **FASTENING:**
   - Fasten slats to the frame with 3-120 common barbed shank nails at each location.

3. **FRAME FASTENING:**
   - Fasten frames to each location with 4-80 common nails at each location and glass.

4. **ANCHOR SYSTEM INSTALLATION:**
   - Place the anchor posts at each end of each line of snow fence as shown. Posts are 2-6" dia. x 30" long, with a minimum diameter of 2-6" (150 mm) and a maximum diameter of 2-6" (150 mm). All nails are driven or driven with a pneumatic hammer.

5. **SLAT GAUGE:**
   - Use a gauge or a similar device to ensure the slats are properly spaced.

6. **SLOPE FASTENING:**
   - Fasten slope braces with 3-120 common barbed shank nails at each location.

**ILLUM. - B [0.4 m] SNOW FENCE W/ ANCHOR SYSTEM #1**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NO. OF PIECES</th>
<th>LENGTH</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>3</td>
<td>2&quot; x 6&quot; x 9'-0&quot; (50 x 150 x 2788.4)</td>
<td>FRAME (SLAT)</td>
</tr>
<tr>
<td>#</td>
<td>3</td>
<td>2&quot; x 6&quot; x 7'-0&quot; (50 x 150 x 2189.0)</td>
<td>FRAME (SLAT)</td>
</tr>
<tr>
<td>#</td>
<td>3</td>
<td>2&quot; x 6&quot; x 9'-0&quot; (50 x 150 x 2730.0)</td>
<td>FRAME (SLAT)</td>
</tr>
</tbody>
</table>

**HARDWARE - B [0.4 m] SNOW FENCE W/ ANCHOR SYSTEM #1**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>18</td>
<td>3/4&quot; DIA. x 5&quot; (19 x 127) HEX BOLT, THREADED FULL LENGTH AND NUT</td>
</tr>
<tr>
<td>#</td>
<td>36</td>
<td>PLAT WASHER FOR 3/4&quot; DIA. (19 x 127) BOLT</td>
</tr>
<tr>
<td>#</td>
<td>12</td>
<td>#6 PEERAR x 5'-0&quot; DIA. x 15243</td>
</tr>
<tr>
<td>#</td>
<td>6</td>
<td>#2 GAUGE RING x 5'-0&quot; (1524.0)</td>
</tr>
<tr>
<td>#</td>
<td>1/2&quot; (12.7 mm)</td>
<td>#6 COMMON NAILS</td>
</tr>
</tbody>
</table>

**UNIT SIZES:**
- All units are in millimeters unless otherwise specified.
- Units shown in brackets [ ] are approximate values.

**NOTES:**
- After 5/8" dia. (16) 80.7 threads are tightened using the thread ring directly behind the bolt to prevent eventual loosening of the nuts.

**REFERENCE DRAWING:**
- M.D.T.
- 067-30
- SECTION 067-30
- 8' (2.4 m) WOOD SNOW FENCE W/ ANCHOR SYSTEM #1

**DETAILED DRAWING:**
- M.D.T.
- 067-30
GENERAL NOTES

1. Anchor system details should be reviewed and approved by a qualified design professional. The use of this system must be in accordance with the provisions of the National Design Specification for Wood Construction (NDS) and other relevant codes and standards.

2. The anchor system is designed to be installed using a minimum of two anchor bolts per post. The anchor bolts should be of sufficient length to penetrate the concrete foundation and be fully supported by the concrete.

3. The anchor system is designed to withstand wind loads and snow loads as specified. The design criteria are based on the loads and conditions specified in the project documentation.

4. The anchor system is not intended for use in areas subject to ice loading or other severe weather conditions.

5. The anchor system is designed for use with standard framing materials. The use of non-standard materials may require additional design and testing.

6. The anchor system is designed for use with a minimum of two anchor bolts per post. The anchor bolts should be of sufficient length to penetrate the concrete foundation and be fully supported by the concrete.

LUMBER - 12" (3.6 m) Wood Fence with Anchor System

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NO. OF PIECES</th>
<th>LENGTH</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>2.5&quot; x 6&quot; x 12' (50 x 150 x 3657.6)</td>
<td>2 x 6&quot; x 12' (50 x 150 x 3657.6) board</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2.5&quot; x 6&quot; x 12' (50 x 150 x 3657.6)</td>
<td>2 x 6&quot; x 12' (50 x 150 x 3657.6) board</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>2&quot; x 6&quot; x 12' (50 x 150 x 3657.6)</td>
<td>2 x 6&quot; x 12' (50 x 150 x 3657.6) board</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>2&quot; x 6&quot; x 12' (50 x 150 x 3657.6)</td>
<td>2 x 6&quot; x 12' (50 x 150 x 3657.6) board</td>
</tr>
</tbody>
</table>

HARDWARE - 12" (3.6 m) Wood Fence with Anchor System

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/8&quot; x 5&quot; (10 x 127) threaded full length bolts</td>
</tr>
<tr>
<td>2</td>
<td>1/2&quot; lag screws</td>
</tr>
<tr>
<td>3</td>
<td>1/4&quot; lag screws</td>
</tr>
</tbody>
</table>

NOTE: All materials are listed for reference only. The actual materials may vary based on the specific project requirements.

END VIEW

DETAILED DRAWING

REFERENCE DRAWING: MDE. NO. 170-35, SECTION 507

12" (3.6 m) Wood Fence with Anchor System
NOTES:

1/2" (13) EXPANSION JOINTS ARE SHOWN AS DARK SOLID LINES FOR VISUAL PURPOSES.
BOND BREAKER IS SHOWN AS DARK DASHED LINES FOR VISUAL PURPOSES.

BOULEVARD CURB

PRIVATE SIDEWALK

CONCRETE FILLET
CONCRETE APRON
LAYDOWN CURB
BOULEVARD

CONCRETE APPROACH

CONTRACTION JOINT

BUILDING EDGE

CONCRETE BUILDING APPROACH

LAYDOWN CURB
CURB
GUTTER

PLAN

SLOPE 1.5% (1:66.7) TOWARD E OF ROADWAY *

1/4" [60] R
CRUSHED AGGREGATE COURSE

VARIABLE WIDTH

1 1/2" [60]

SECTION OF SIDEWALK

FLOW LINE ELEV. + 8" (200)

APPROACH GRADE
AS NEEDED
(10% MAXIMUM)

CUT

FILL

NOTE: CRUSHED AGGREGATE COURSE OMITTED FOR CLARITY.

SECTION A-A

4" [100] TYP. **

LOCATE EXPANSION JOINTS EVERY 100 FEET (30 M) AT INTERVALS EQUAL TO THE NEAREST MULTIPLE OF THE CONTRACTION JOINT INTERVAL.

USE A LONGITUDINAL CONTRACTION JOINT IN THE CENTERLINE OF ALL SIDEWALKS WIDER THAN 5 FEET [1525].

THE MAXIMUM CROSS SLOPE OF THE SIDEWALK IS 2% (1:50).

** THIS DEPTH IS STANDARD IN NEW CONSTRUCTION.
ALTERATIONS TO EXISTING FACILITIES MAY RESULT IN A LARGER DEPTH, WHICH WILL REQUIRE A GREATER RAMP LENGTH.

SEE DTL. DWG. NO. 608-15 AND 608-20 FOR GUIDELINES ON RAMP DESIGN WHEN RAMPS ARE REQUIRED FOR ADA ACCESSIBILITY.

DETAIL DRAWING

REFERENCE
DWG. NO.
STANDARD SPEC.
SECTION 608

CONCRETE SIDEWALK

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

--REVISED--
EFFECTIVE: SEPTEMBER 2014
JULY 2016

MDT
MONTANA DEPARTMENT OF TRANSPORTATION
Curb Ramp Types

General Notes:
1. In new construction, use public sidewalk curb ramps in the following order of preference:
   A. Perpendicular public sidewalk curb ramp.
   B. Parallel public sidewalk curb ramp.
   C. Combined (parallel/perpendicular) public sidewalk curb ramp.
   D. Diagonal perpendicular public sidewalk curb ramp.

2. Single diagonal or depressed corner public sidewalk curb ramps serving two street crossing directions are not recommended in new construction.

3. If possible, do not place drainage structures in conflict with public sidewalk curb ramps. Location of curb ramps takes precedence over location of drainage structures except where existing drainage structures are being utilized.

4. Use the flattest slopes possible for all curb ramps. Maximum slopes are shown for guidance at difficult sites.

5. Final field location of the curb ramps will be determined by the project manager.

6. If R/W does not permit landings for these ramps, use another ramp design.

7. Pedestrian access points at crosswalks are to be wholly contained within the crosswalk lines.

8. For additional information consult:
   - Draft Public Rights-Of-Way Accessibility Guidelines (Prowag)

Construction Requirements:
1. Obtain a surface texture on the ramp by coarse brooming, transverse to the ramp slope.

2. Take care during construction to assure uniform ramp grades, free of sags and sharp grade changes.

Detailed Drawing

Reference
Dwg. No.
Standard Spec.
Section 608

New Construction
Public Sidewalk Curb Ramps

Effective: September 2014

Montana Department of Transportation
CURB RAMP TYPES

A: PERPENDICULAR PUBLIC SIDEWALK CURB RAMP
(SEE DETAIL DRAWING NUMBER 608-25 FOR ADDITIONAL DETAILS)

B: PARALLEL PUBLIC SIDEWALK CURB RAMP
(SEE DETAIL DRAWING NUMBER 608-30 FOR ADDITIONAL DETAILS)

C: COMBINED (PARALLEL/PERPENDICULAR) PUB
SIDEWALK CURB RAMP (SEE DETAIL DRAWING
NUMBERS 608-25 AND 608-30 FOR ADDITIONAL
DETAILS)

D: DIAGONAL PERPENDICULAR PUBLIC
SIDEWALK CURB RAMP

E: SINGLE DIAGONAL PERPENDICULAR
PUBLIC SIDEWALK CURB RAMP

GENERAL NOTES:
1. WHEN ALTERING EXISTING FACILITIES,
   USE PUBLIC SIDEWALK CURB RAMPS IN
   THE FOLLOWING ORDER OF PREFERENCE:
   A. PERPENDICULAR PUBLIC SIDEWALK
      CURB RAMP
   B. PARALLEL PUBLIC SIDEWALK CURB
      RAMP
   C. COMBINED (PARALLEL/PERPENDICULAR)
      PUBLIC SIDEWALK CURB RAMP
   D. DIAGONAL PERPENDICULAR PUBLIC
      SIDEWALK CURB RAMP
   E. SINGLE DIAGONAL PERPENDICULAR
      PUBLIC SIDEWALK CURB RAMP

   NOTE: USE DIAGONAL PUBLIC SIDEWALK
   CURB RAMPS AS THE LAST OPTION AND
   CONSTRUCT TO COMPLY WITH ALL ADA
   SLOPE AND CONSTRUCTION CRITERIA TO
   THE GREATEST EXTENT POSSIBLE.

2. PLACE CURB RAMPS TO AVOID EXISTING
   DRAINAGE STRUCTURES AND OTHER
   OBSTRUCTIONS TO THE GREATEST EXTENT
   POSSIBLE.

3. USE THE FLATTENED SLOPE POSSIBLE
   FOR ALL CURB RAMPS, MAXIMUM SLOPE
   ARE SHOWN FOR GUIDANCE AT DIFFICULT
   SITES AND SHOULD BE AVOIDED IF POSSIBLE.

4. FINAL FIELD LOCATION OF THE CURB
   RAMPS WILL BE DETERMINED BY THE
   PROJECT MANAGER.

5. IF R/W DOES NOT PERMIT LANDINGS
   FOR THESE RAMPS, USE ANOTHER
   RAMP DESIGN.

6. PEDESTRIAN ACCESS POINTS AT CROSSWALKS
   ARE TO BE WHOLLY CONTAINED WITHIN THE
   CROSSWALK LINES.

7. FOR ADDITIONAL INFORMATION CONSULT
   DRAFT PUBLIC RIGHTS-OF-WAY
   ACCESSIBILITY GUIDELINES (PROPAG)

CONSTRUCTION REQUIREMENTS:
1. OBTAIN A SURFACE LEVEL ON THE
   RAMP BY COARSE BROOMING, TRANSVERSE
   TO THE RAMP SLOPE.

2. PROVIDE UNIFORM RAMP GRADES FREE
   OF SAGS AND GRADE CHANGES.

UNITS SHOWN IN BRACKETS [ ] ARE
METRIC AND ARE IN MILLIMETERS (mm)
UNLESS OTHER UNITS ARE SHOWN.
NEW CONSTRUCTION REQUIREMENTS:
1. THE DESIRABLE WIDTH OF THE CURB RAMP (DIMENSION "W" ABOVE) IS 5 FEET (1525 mm) OR WIDER. THE MINIMUM WIDTH ("W") IS 4 FEET (1220 mm).
2. THE DESIRABLE LENGTH OF THE LANDING AT THE TOP OF THE CURB RAMP (DIMENSION "L" ABOVE) IS 5 FEET (1525 mm). THE MINIMUM LENGTH ("L") IS 4 FEET (1220 mm). THE LANDING WIDTH IS EQUAL TO THE RAMP WIDTH.
3. THE DESIRABLE SLOPE FOR THE CURB RAMP IS 5% (1:20) OR FLATTER. THE MAXIMUM CURB RAMP SLOPE IS 8.3% (1:12).
4. THE DESIRABLE SLOPE FOR THE FLARED SIDE OF THE CURB RAMP IS 8.3% (1:12) OR FLATTER. THE MAXIMUM FLARED SIDE SLOPE IS 10% (1:10).
5. THE DESIRABLE CROSS SLOPE OF THE SIDEWALK, RAMP, OR LANDING IS 1.5% (1:66.7). THE MAXIMUM CROSS SLOPE OF THE SIDEWALK, RAMP, OR LANDING IS 2% (1:50).
6. PROVIDE DETECTABLE WARNING DEVICES ON THE BOTTOM 2 FEET (610 mm) OF EACH RAMP AS SHOWN ABOVE. SEE DETAILED DRAWING NUMBER 608-40 FOR DETECTABLE WARNING DEVICES DETAILS.

REQUIREMENTS FOR ALTERATIONS TO EXISTING FACILITIES:
NOTE: WHEREVER POSSIBLE, ALTER EXISTING FACILITIES TO COMPLY WITH THE NEW CONSTRUCTION REQUIREMENTS.
1. THE MINIMUM WIDTH OF THE CURB RAMP (DIMENSION "W" ABOVE) IS 4 FEET (1220 mm).
2. WHERE RIGHT-OF-WAY WIDTH IS INSUFFICIENT TO ACCOMMODATE A TOP LANDING OF 5 FEET (1525 mm), PROVIDE A TOP LANDING OF 4 FEET (1220 mm). THE LANDING WIDTH IS EQUAL TO THE RAMP WIDTH.
3. THE MAXIMUM CURB RAMP SLOPE IS 10% (1:10), PROVIDED THE RISE (DIMENSION "Y" ABOVE) IS 6 INCHES (150 mm) OR LESS. AN 8.3% (1:12) OR FLATTER SLOPE IS DESIRABLE.
4. THE MAXIMUM FLARED SIDE SLOPE IS 10% (1:10).
5. THE DESIRABLE CROSS SLOPE OF THE SIDEWALK, RAMP, OR LANDING IS 1.5% (1:66.7). THE MAXIMUM CROSS SLOPE OF THE SIDEWALK, RAMP, OR LANDING IS 2% (1:50).
6. PROVIDE DETECTABLE WARNING DEVICES ON THE BOTTOM 2 FEET (610 mm) OF EACH RAMP AS SHOWN ABOVE. SEE DETAILED DRAWING NUMBER 608-40 FOR DETECTABLE WARNING DEVICES DETAILS.
7. WHERE EXISTING SITE DEVELOPMENT CONDITIONS PROHIBIT THE STRICT AND FULL COMPLIANCE OF ALL ADA CRITERIA, PROVIDE ACCESSIBILITY TO THE MAXIMUM EXTENT FEASIBLE.

GENERAL NOTES:
1. WHERE THE RIGHT-OF-WAY WILL NOT ACCOMMODATE A PERPENDICULAR PUBLIC SIDEWALK CURB RAMP AND LANING MELTING THESE REQUIREMENTS, USE A COMBINED (PARALLEL/PERPENDICULAR) OR PARALLEL PUBLIC SIDEWALK CURB RAMP.
2. COMBINED (PARALLEL/PERPENDICULAR) PUBLIC SIDEWALK CURB RAMPS ARE TO MEET THE CRITERIA FOR BOTH THE PARALLEL AND PERPENDICULAR PUBLIC SIDEWALK CURB RAMPS. (SEE DETAILED DRAWING NUMBER 608-30 AND THIS DRAWING.)
NEW CONSTRUCTION REQUIREMENTS:
1. THE MINIMUM LENGTH OF THE LANDING (DIMENSION "L" ABOVE) IS 5 FEET (1525 mm).
2. THE DESIRABLE SLOPE FOR THE CURB RAMPS IS 5% (1:20) OR FLATTER. THE MAXIMUM CURB RAMP SLOPE IS 8.3% (1:12).
3. THE DESIRABLE CROSS SLOPE OF THE SIDEWALK, RAMP, OR LANDING IS 1.5% (1:66.7). THE MAXIMUM CROSS SLOPE OF THE SIDEWALK, RAMP, OR LANDING IS 2% (1:50).
4. PROVIDE DETECTABLE WARNING DEVICES ON THE BOTTOM 2 FEET (610 mm) OF EACH LANDING AS SHOWN ABOVE. SEE DETAIL DRAWING NUMBER 608-40 FOR DETECTABLE WARNING DEVICES DETAILS.

REQUIREMENTS FOR ALTERATIONS TO EXISTING FACILITIES:
NOTE: WHEREVER POSSIBLE, ALTER EXISTING FACILITIES TO COMPLY WITH THE NEW CONSTRUCTION REQUIREMENTS.
1. THE DESIRABLE LENGTH OF THE LANDING (DIMENSION "L" ABOVE) IS 5 FEET (1525 mm). THE MINIMUM LANDING LENGTH IS 4 FEET (1220 mm).
2. THE MAXIMUM CURB RAMP SLOPE IS 10% (1:10), PROVIDED THE RISE (DIMENSION "Y" ABOVE) IS 6 INCHES (150 mm) OR LESS. AN 8.3% (1:12) OR FLATTER SLOPE IS DESIRABLE.
3. THE DESIRABLE CROSS SLOPE OF THE SIDEWALK, RAMP, OR LANDING IS 1.5% (1:66.7). THE MAXIMUM CROSS SLOPE OF THE SIDEWALK, RAMP, OR LANDING IS 2% (1:50).
4. PROVIDE DETECTABLE WARNING DEVICES ON THE BOTTOM 2 FEET (610 mm) OF EACH LANDING AS SHOWN ABOVE. SEE DETAILED DRAWING NUMBER 608-40 FOR DETECTABLE WARNING DEVICES DETAILS.
5. WHERE EXISTING SITE DEVELOPMENT CONDITIONS PROHIBIT THE STRICT AND FULL COMPLIANCE OF ALL ADA CRITERIA, PROVIDE ACCESSIBILITY TO THE MAXIMUM EXTENT FEASIBLE.

GENERAL NOTES:
1. THE COST OF THE RETAINING WALL IS INCLUDED IN THE UNIT PRICE BID FOR CONCRETE SIDEWALK.
2. COMBINED (PARALLEL/PERPENDICULAR) PUBLIC SIDEWALK CURB RAMPS ARE TO MEET THE CRITERIA FOR BOTH THE PARALLEL AND PERPENDICULAR PUBLIC SIDEWALK CURB RAMPS. (SEE DETAILED DRAWING NUMBER 608-25 AND THIS DRAWING.)

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

1. The desirable width of the curb ramp (dimension "w" above) is 5 feet (1524 mm) or more. The minimum width of 4 feet (1220 mm) for the maximum length of the landing is 4 feet (1220 mm). The landing width is equal to the ramp width.

2. The desirable length of the landing at the top of the curb ramp is 5 feet (1524 mm). The maximum length of the landing is 4 feet (1220 mm). The landing width is equal to the ramp width.

3. The desirable slope for the curb ramp is 3:1 (1:3) on flatter. The maximum curb ramp slope is 6:1 (1:6). This maximum curb ramp slope is 4:1 (1:4) on flat.

4. The desirable slope for the flared side of the curb ramp is 8:1 (1:8) for flatter. The maximum flared side slope is 10:1 (1:10).

5. The desirable cross slope of the sidewalk, ramp, or landing is 1:32 (16.67%). The maximum cross slope of the sidewalk, ramp, or landing is 1:48 (2.08%).

6. Provide detectable warning devices on both 2 feet (610 mm) wide side of each ramp as shown above. See detailed drawing number 405-40 for detectable warning devices details.

GENERAL NOTES:

1. Where the right-of-way will not accommodate a diagonal perpendicular public sidewalk curb ramp and landing, meeting these requirements, see another ramp design.

2. The present detectable warning device panels to fit on private approach sidewalk curb ramps as shown above.

NOTICE: Wherever possible, alter existing facilities to comply with the new construction requirements.

NOTICE: Once the existing sidewalk is replaced, a diagonal perpendicular public sidewalk curb ramp and landing will be provided.
CONSTRUCTION REQUIREMENTS:

1. INSTALL DETECTABLE WARNING DEVICES THAT EXTEND THE FULL WIDTH OF THE RAMP, 2 FEET (610 MM) IN DEPTH.

2. INSTALL THE DOME PANEL ADJACENT TO THE BACK OF CURB. IF THE PANEL IS DESIGNED, LOCATE THE EDGE OF THE PANEL AS CLOSE AS PRACTICABLE TO THE BACK OF CURB.

3. IF THE DETECTABLE WARNING DEVICES ARE EMBOSSED IN CONCRETE, INSTALL SO THE TOP OF THE PANEL IS FLUSH WITH THE ADJACENT CONCRETE AND THE DOMES WILL projects ABOve THE ADJACENT SURFACE.

4. ENSURE A UNIFORM GIAPON THE DETECTABLE WARNING DEVICES FREE OF NAILS AND EDGEOUS.

5. USE DETECTABLE WARNING DEVICES - TYPE II FOR NEW SIDEWALK CONSTRUCTION. DETECTABLE WARNING DEVICES - TYPE I FACE DIRECTIONS INTO AREAS USE DETECTABLE WARNING DEVICES - TYPE I WHERE DEACTIVATED ON EXISTING SIDEWALKS WHERE NEW CONCRETE IS NOT BEING PLACED. DETECTABLE WARNING DEVICES - TYPES I AND TYPE II ARE SURFACE APPLIED ON THE SIDEWALK MEET FOR DETECTABLE WARNING DEVICES - TYPE III FOR DETECTABLE WARNING DEVICES - TYPE II.

6. USE DETECTABLE WARNING DEVICES THAT VISIONARY CONTRAST WITH ADJACENT WALKWAY SURFACES.

7. ENSURE THE ALIGNMENT AND PATTERN OF THE DOMES IS CONTINUED ACROSS ANY JOINTS BETWEEN DETECTABLE WARNING DEVICE PANELS.

UNITS SHOWN IN BRACKETS IS AN INCREDIDLE OR MILLIMETERS, UNLESS OTHER UNITS ARE SHOWN.

DETECTABLE WARNING DEVICES

REFERENCE DRAWING

MDT* COLORADO DEPARTMENT OF TRANSPORTATION

ISSUED: SEPTEMBER 2019

DETAILED DRAWING

DETECTABLE WARNING DEVICES

SPEC. NO. 60B-40

DEPARTMENT OF TRANSPORTATION

DET. 60B

DEPARTMENT OF TRANSPORTATION

ENGINEERING

MDT* COLORADO DEPARTMENT OF PUBLIC WORKS
CURB RETURN FILLET REQUIRED FOR NEW CURB & GUTTER INSTALLATIONS (TYPICAL)

NOTE: INCLUDE COST OF CONCRETE FILLET IN VALLEY GUTTER.

VARIABLE RADIUS
BACK OF CURB

CONCRETE CURB RETURN FILLET
REINFORCE WITH 5 - 4# x 36" [100 x 900] EPOXY COATED DEFORMED REBARs EVENLY SPACED ON 6" [150] CENTERS WITH 5 1/2" [140] COVER

CONTRACTION JOINTS ARE REQUIRED APPROX. EVERY 10 FEET (3000)

PLAN

STREET SURFACE

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

NOTES:
① INDIVIDUAL LOCATIONS MAY REQUIRE MORE DETAILS FOR ELEVATIONS AND DIMENSIONS.
② INSTALL REINFORCEMENT AT ALL CONSTRUCTION JOINTS.
③ CONTRACTION JOINTS ARE 1/8" [3 mm] MIN. AND 3/8" [10 mm] MAX. IN WIDTH. FORM JOINTS BY SAWING OR SCORING TO A MINIMUM DEPTH OF 1" [25 mm]. FORM SCORED JOINTS BY A TOOL WHICH WILL LEAVE ROUNDED CORNERS AND DESTROY AGGREGATE INTERLOCK TO A MINIMUM DEPTH OF 1" [25 mm].
④ TO BE USED ON PLANT MIX SURFACING PROJECTS ONLY. PROVIDE PROJECT SPECIFIC DETAILS FOR PCCP PROJECTS.
CONCRETE CURBS

4" [100] AT APP. ENTRANCE
5" [125] AT CURB RAMP

6" [150] FACE OF CURB

P
9 1/2" [240]
2" [50]

12" [300]
LAYDOWN CURB
[[STRAIGHT LINE TRANSITION FROM FLOWLINE TO TOP BACK OF CURB]]

24" [600]

4 2X SLOPE

EDGE OF PAVEMENT

7 1/2" [190]
4 1/2" [115] R

6" [150] OR OTHERWISE AS REQUIRED

1" [25] DEEP CONTRACTION JOINT PLACED AT 10' [3000] MAXIMUM INTERVALS,
GROOVES ARE CONTINUOUS ON THE TOP EXPOSED SURFACE FOR THE WIDTH OF CURB AND GUTTER.

102 SQ. FT. PER 100 FT. OF CURB)
[30.7 m² PER 100 m OF CURB]

CURB & GUTTER SECTION
Q.048 C.Y. CONC. PER 1.0'
(D.) 110 CUBIC METERS CONC. PER METER)
OF CURB FOR 6" [150] GUTTER.

JOINTS:

(A) WHEN INTEGRAL WITH, TIED TO, OR PLACED AGAINST
PORTLAND CEMENT CONCRETE PAVEMENT (P.C.C.P) MATCH
TRANSVERSE CONTRACTION AND/OR EXPANSION JOINTS IN THE
ADJACENT P.C.C.P. SLAB. # REQUIRED, EXTEND 1/2" [13] MIN.
WIDTH PREFORM EXPANSION JOINTS COMPLETELY THROUGH
CURB AND GUTTER AT SAME WIDTH AS THE P.C.C.P. SLAB
JOINT. FILL CURB AND GUTTER EXPANSION JOINTS WITH
PREFORMED EXPANSION JOINT FILLER.

(B) ALL OTHER CASES:
SPACE CONTRACTION JOINTS IN CURB AND GUTTER AT 10 FOOT
[3000] INTERVALS OR LESS EXCEPT AS SPECIFIED IN (A) ABOVE.
EXTEND 1/2" [13] MIN. WIDTH EXPANSION JOINTS COMPLETELY
THROUGH CURB AND GUTTER EVERY 100 FEET (30 M) OR 30 FEET (10 M),
AT INTERVALS EQUAL TO THE NEAREST MULTIPLE OF THE CONTRACTION
JOINT INTERVAL, AND FILL WITH EXPANSION JOINT FILLER.

(C) CONTRACTION JOINTS:
FORM JOINTS BY SAWING OR SCORING TO A MINIMUM DEPTH
OF 1" [25]. FILL SCORED JOINTS WITH A TOOL WHICH WILL LEAVE
ROUNDED CORNERS AND DESTROY AGGREGATE INTERLOCK TO
A MINIMUM DEPTH OF 1" [25].

(D) OTHER JOINTS:
SEPARATE THE CURB AND GUTTER FROM ADJACENT SIDEWALK
AT POINTS SHOWN ON DET. DWG. NO. 608-05 WITH A BOND
BREAKER MATERIAL, EXCEPT AT APPROACH LAYDOWN CURB
LOCATIONS, WHICH REQUIRE SEPARATION USING 1/2" [13] MIN. WIDTH
PREFORMED EXPANSION JOINT MATERIAL. PLACE 1/2" [13] MIN. WIDTH
PREFORMED EXPANSION JOINT MATERIAL AT ALL CURB RETURNS,
BRIDGES, DROP INLETS, AND WHERE MEETING CURB AND GUTTER
IN PLACE.

EXPANSION JOINT FILLER MATERIAL:
USE PREFORMED Expansion JOINT FILLER MEETING THE
REQUIREMENTS OF SECTION 707.

BOND BREAKER MATERIAL:
USE A 15 OR 30 POUND [6.8 OR 13.6 KILOGRAM] PROOFING FELT
MATERIAL, OR OTHER PRODUCT AS APPROVED BY THE PROJECT
MANAGER. DO NOT USE EXPANSION JOINT MATERIAL.

RADIUS:
MINIMUM CURB RETURN RADIUS: 10' [3000], 15' [4500] RADIUS ARE
DESIRED FOR STREETS.

CONCRETE:
UNLESS OTHERWISE SPECIFIED, CONSTRUCT CONCRETE CURBS
AND CONCRETE INTEGRAL CURB AND GUTTER WITH CLASS
GENERAL CONCRETE OR APPROVED EQUAL.

* QUANTITIES FOR ESTIMATING PURPOSES ONLY.
** THE SLOPE OF THE BOTTOM OF THE CURB AND GUTTER
SHOULD MATCH THE SUPERELEVATION OF THE ROADWAY.

CONCRETE CURBS

6" [150]
4" [100]
2" [50]

CURB SECTION
1 CUBIC FOOT OF CONCRETE WILL MAKE
ABOUT 8 LINEAR FEET OF CURB.
[1 CUBIC METER OF CONCRETE WILL MAKE
ABOUT 69 METERS OF CURB]

NOTES:

① WHEN CURB IS USED IN CONJUNCTION WITH GUARDRAIL, USE
THE 4" [100] HIGH TYPE. OTHERWISE, THE CONTRACTOR MAY
USE EITHER SECTION.

② CONFORM ALL MATERIALS AND CONSTRUCTION PER SECTION 609.

③ PROVIDE CONTRACTION JOINTS IN CONCRETE CURBS AS
DESCRIBED IN NOTE (B) ABOVE.

DETAILED DRAWING
REFERENCE
DWG. NO.
STANDARD SPEC.
SECTION 609, 707
609-05

MISCELLANEOUS CURBS

EFFECTIVE: SEPTEMBER 2014

MONTANA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION:

1. CURBS MAY BE CONSTRUCTED USING ANY OF THE FOLLOWING THREE METHODS:
   (1) PRECAST
   (2) CAST IN PLACE
   (3) Constructed by the use of an approved curb forming or slip form machine.

2. WHEN USING EITHER METHOD (2) OR (3), REINFORCING STEEL IS NOT REQUIRED, WITH THE EXCEPTION OF THE PINS, SCORING OR SAW CUT CURBS TO A DEPTH OF 1" (25) TO FORM CONTRACTION JOINTS AT INTERVALS OF 10 FT. (3000) OR LESS. EXTEND 1/2" (13) MIN. WIDTH EXPANSION JOINTS COMPLETELY THROUGH CURB EVERY 100 FT. (30 M). (30 M = 10 M), AT INTERVALS EQUAL TO THE NEAREST MULTIPLE OF THE CONTRACTION JOINT INTERVAL AND FILL WITH PREFORMED EXPANSION JOINT FILLER MEETING SECTION TOT.

3. FORM PRECAST CURBS IN THEIR INVERTED POSITION, IN LENGTHS NOT LESS THAN 4 FT. (1220), OR MORE THAN 10 FT. (3050). MATERIAL:
   1. CONSTRUCT CURBS WITH CLASS GENERAL CONCRETE OR AN APPROVED EQUIVALENT MIX.
   2. EPOXY BINDER FOR GROUTING MUST MEET THE REQUIREMENTS OF AASHTO M 235 (235 M) T144M C 881 (881 M).

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

DETAILED DRAWING
REFERENCE
STD. SPEC. 609, 707
SECTION 609-10

MEDIAN CURBS

EFFECTIVE: SEPTEMBER 2014

MDT MONTANA DEPARTMENT OF TRANSPORTATION
NOTES:

1/2" (13) EXPANSION JOINTS ARE SHOWN AS DARK SOLID LINES FOR VISUAL PURPOSES.

BOND BREAKER IS SHOWN AS DASHED LINES FOR VISUAL PURPOSES.

SECTION A-A

NOTES:

1. INSTALL PREFORMED EXPANSION JOINT FILLER, PER SECTION 707, AT ALL EXPANSION JOINTS, FOR THE FULL THICKNESS OF THE CONCRETE MEDIAN CAP.

2. INSTALL A BOND BREAKER FOR THE FULL THICKNESS OF THE CONCRETE MEDIAN CAP BETWEEN THE CAP AND CURB. USE A 10 OR 35 POUND (6.0 OR 15.6 KG) ROOFING FELT MATERIAL, OR OTHER PRODUCT AS APPROVED BY THE PROJECT MANAGER, FOR THE BOND BREAKER. DO NOT USE EXPANSION JOINT MATERIAL AS A BOND BREAKER.

3. ALL JOINTS MUST BE STRAIGHT AND PERPENDICULAR TO THE CENTERLINE OF THE MEDIAN CAP, WHERE PRACTICAL, ALIGN ALL JOINTS WITH LIKE JOINTS IN ADJOINING WORK. USE JOINTS TO OUTLINE ALL PANELS IN THE MEDIAN CAP. USE SQUARE PANELS WHEN PRACTICAL. ON NARROW MEDIAN CAPS RECTANGULAR SHAPED PANELS ARE ACCEPTABLE.

4. PROVIDE CONTRACTION JOINTS NO LESS THAN 1/8" (3) WIDE AND NO MORE THAN 1/4" (6) WIDE AND NO LESS THAN 1 1/2" (25) IN DEPTH. CONTRACTION JOINTS MAY BE CUT BY A GROOVE FORMING TOOL.

5. LOCATE EXPANSION JOINTS AT ALL JOINTS BETWEEN THE MEDIAN CAP AND STRUCTURES IN PLACE AND EVERY 100 FT. (30 M) AT INTERVALS EQUAL TO THE NEAREST MULTIPLE OF THE CONTRACTION JOINT INTERVAL. USE A MEDIAN CAP WIDER THAN 12 FT. (3660).

6. USE MEDIAN CAPS WIDER THAN 6 FT. (1830), WITH SPACING NOT TO EXCEED 6 FT. (1830). SPACE TRANSVERSE CONTRACTION JOINTS EQUAL TO THE LONGITUDINAL SPACING ON MEDIAN CAPS WIDER THAN 6 FT. (1830), FOR MEDIAN CAPS NARROWER THAN 6 FT. (1830), SPACE TRANSVERSE CONTRACTION JOINTS 10 FT. (3000) OR LESS.

7. CONSTRUCT CONCRETE MEDIAN CURB AND CAP WITH CLASS GENERAL CONCRETE OR APPROVED EQUIVALENT.

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

DETAILED DRAWING
REFERENCE DWG. NO. 609-12
SECTION 609, 707
CONCRETE MEDIAN CAPS

EFFECTIVE: SEPTEMBER 2014

MONTANA DEPARTMENT OF TRANSPORTATION
SEEDING

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<th>DEFINITION</th>
<th>TREATMENT</th>
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<td>1</td>
<td>3:1 OR FLATTER SLOPES</td>
<td>CONDITION SEEDBED, SEED &amp; FERTILIZE</td>
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<td>2</td>
<td>STEEPER THAN 3:1 SLOPES</td>
<td>SEED, FERTILIZE &amp; MULCH</td>
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<td>3</td>
<td>15' (4.5 m) OR TO THE EDGE OF THE SURFACING INSLOPE, WHICHEVER IS GREATER</td>
<td>CONDITION SEEDBED &amp; SEED</td>
</tr>
</tbody>
</table>

NOTES:

1. PLACE TOPSOIL ON THE SURFACING INSLOPE TO A DEPTH OF 4" (100mm) NOT LESS THAN 2'-0" (0.6 m) FROM THE EDGE OF PAVEMENT, FEATHER TOPSOIL TO THE EDGE OF PAVEMENT.

2. SEED AREAS BEYOND THE CONSTRUCTION LIMITS WITHIN THE RIGHT-OF-WAY OR PERMIT BOUNDARIES THAT HAVE BEEN DISTURBED (i.e., STAGING AREAS, TOPSOIL PILES, EQUIPMENT TRAILS, etc.).

3. SALVAGE SUFFICIENT AMOUNTS OF TOPSOIL TO ASSURE QUANTITIES ARE AVAILABLE TO COVER ALL CLEARED AND GRUBBED AREAS WITH 4" (100mm) OF TOPSOIL. IF QUANTITIES ARE NOT AVAILABLE, RE-SPREAD TOPSOIL TO AN EVEN DEPTH ACROSS ALL DISTURBED GROUND.

UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
**Bill of Reinforcing Steel**

<table>
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<tr>
<th>Length</th>
<th>16 FT. C.C.</th>
<th>20 FT. C.C.</th>
<th>24 FT. C.C.</th>
<th>30 FT. C.C.</th>
<th>40 FT. C.C.</th>
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<tbody>
<tr>
<td>TYPE 1</td>
<td>TYPE 2</td>
<td>TYPE 3</td>
<td>TYPE 4</td>
<td>TYPE 5</td>
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**Metric Bill of Reinforcing Steel**

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<th>Length</th>
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<th>4.8 m C.C.</th>
<th>10.0 m C.C.</th>
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<td>TYPE 2</td>
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**Notes:**
1. Concrete quantities were figured without a crown, increase when a crown installation is used.
2. All reinforcing steel is of the desired type meeting the requirements of ASTM A615, Grade 40.
3. For est. SM, No. 611-00 for cast-in-place cattle guard details.

**Bear Details**

- 2/3 straight
- 2 straight

**Metric Bear Details**

- 2 straight
- 6 straight

**Metric Bear Details**

- 2/3 straight
- 2 straight

**References:**

- SM No. 611-00 for cast-in-place cattle guard details.

**MDT**

**Department of Transportation**

**All Dimensions are Millimeters**

**All Dimensions are Millimeters**

**All Dimensions are Millimeters**
**NOTES:**

1. ALL CONCRETE IS CLASS GENERAL CONCRETE OR EQUAL.
2. SEE DTL. DWG. NO. 603-08 AND 603-10 FOR RCP AND RCRA CULVERTS WITH FETS.
   FOR RCP AND RCRA CULVERTS WITH SQUARE ENDS, THE "X" DIMENSION IS D/4 OR R/3.
NOTES:

① CULVERT RIPRAP IS ONLY USED IN SPECIAL CIRCUMSTANCES.
② KEY ENDS OF RIPRAP WALLS INTO THE EMBANKMENT SLOPES A MINIMUM OF 2 FEET (600 mm) FROM OUTER FACE OF THE RIPRAP FOR THE FULL HEIGHT OF THE RIPRAP WALL.

UNITS SHOWN IN BRACKETS [ ] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
RANDOM RIPRAP CLASS I, II, OR III

PLACE RIPRAP UP SLOPE

1' [300] MIN. DEPTH
RIPRAP PLACED ON TOP
OF PERMANENT EROSION
CONTROL GEOTEXTILE
KEYED INTO RIPRAP

T + 0.5' [150]
12.0' [3600] MIN. T

T + 1.0' [300]

PERMANENT EROSION
CONTROL GEOTEXTILE
PER SECTION 716

ENSURE INTIMATE CONTACT OF
PERMANENT EROSION CONTROL
GEOTEXTILE TO SUBGRADE SOIL

EMBANKMENT PROTECTION

MINIMUM T FOR:
CLASS I RIPRAP = 1.5' [450]
CLASS II RIPRAP = 2.5' [750]
CLASS III RIPRAP = 3.0' [900]

SECTIONS A-A

TOP OF STREAM BANK

1' [300] MIN. OVERLAP

DIRECTION OF
STREAM CURRENT

MACHINE DIRECTION
OF GEOTEXTILE

5' [150] MIN.
OFFSET BETWEEN
ADJACENT ROLL ENDS

GEOTEXTILE PLACEMENT DETAIL

METHOD FOR PLACING PERMANENT
EROSION CONTROL GEOTEXTILE FOR
PROTECTION OF STREAM BANKS

NOTES:

1. INSTALL PERMANENT EROSION CONTROL
GEOTEXTILE PER SECTION 622.

CROSS MACHINE DIRECTION
OF GEOTEXTILE

TOP OF SLOPE

1' [300] MIN. OVERLAP

MACHINE DIRECTION
OF GEOTEXTILE

5' [150] MIN.
OFFSET BETWEEN
ADJACENT ROLL ENDS

GEOTEXTILE PLACEMENT DETAIL

METHOD FOR PLACING PERMANENT
EROSION CONTROL GEOTEXTILE FOR
PROTECTION OF CUT AND FILL SLOPES

DETAIL DRAWING

REFERENCE: DWG. NO.
STANDARD SPEC. SECTION 613, 622

RIPRAP SLOPE PROTECTION

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

MDT® - MONTANA DEPARTMENT OF TRANSPORTATION

-REVISED- EFFECTIVE: SEPTEMBER 2014
JULY 2016
TYPE 2 OBJECT MARKER

1. Use TYPE 2 OBJECT MARKERS TO DELINEATE ROADSIDE CONSTRUCTIONS OR THE CLEAR ZONE. DEVIATE DROP-OFFS, OBSTACLES, ABDUCTIONS, IN ROADWAY ALIGNMENTS, ETC.
2. Do not use TYPE 2 OBJECT MARKERS AS CHANNELIZING DEVICES.
3. Attach PANELS TO POSTS AT BOTH TOP AND BOTTOM HOLE LOCATIONS.
4. Use RETRO-REFLECTIVE SHEETING AS PER THE CONTRACT.
5. Reduce on eliminate the 2'-0" (0.61 m) distance when obstacle or hazard is less than 3'-0" (0.91 m) from the edge of the driving lane.

FLEXIBLE GUIDE POST (FLEXIBLE MARKER)

1. Use FLEXIBLE GUIDE POSTS AND PLASTIC DRUMS AS CHANNELIZING DEVICES.
2. Use ASM TYPE I RETRO-REFLECTIVE SHEETING ON ALL, PLASTIC DRUMS AND FLEXIBLE GUIDE POSTS.
3. Use ONE SIZE GUIDE POST FOR CONTINUOUS RUN.

PORTABLE VERTICAL PANEL (Vp-13 SHOW, Reverse for Vp-11)

1. Use PORTABLE PANELS AS CHANNELIZING DEVICES ONLY. DO NOT USE PORTABLE PANELS TO DELINEATE ROADSIDE CONSTRUCTIONS OR THE CLEAR ZONE. DEVIATE DROP-OFFS, OBSTACLES, ABDUCTIONS, IN ROADWAY ALIGNMENTS, ETC.
2. VERTICAL PANELS DESIGNATED "A" ARE PLACED TO THE RIGHT SIDE OF APPROACHING TRAFFIC. THOSE DESIGNATED "B" ARE PLACED TO THE LEFT SIDE.
3. Use RETRO-REFLECTIVE SHEETING AS PER THE CONTRACT.
NOTES:

1. The maximum weight of this assembly is 250 pounds (115 kg).
2. Use a 14" (355 mm) wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCARP 350 crash tested assemblies are acceptable.

**Front**
- 3" x 1/8" x 12" (76 x 3.2 x 305) square tube
- 1 1/2" x 1/4" x 12" (40 x 6.4 x 305) PL.
- 1" (25) dia. x 3" (75) pipe at 10° offset

**Right**
- 1 1/2" x 1/4" x 12" (40 x 6.4 x 305) PL.

**Top**
- 3/4" (19.1) dia.

**Trailer**
- 3" x 1/8" x 71" (76 x 3.2 x 1805) square tube
- Outside edges of angles (1/4" [6])
- 1/4" (6)

Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.

**Detailed Drawing**

**Reference**
- DWG. NO.
- Section 618.715
- Portable sign support assembly

**Effective**
- September 2014

**MTD**
- Montana Department of Transportation
NOTES:

1. THIS SIGN LAYOUT IS INTENDED TO BE A PERMANENT INSTALLATION FOR THE DURATION OF THE CONSTRUCTION PROJECT, AS APPROVED BY THE PROJECT MANAGER. COVER OR REMOVE ANY SIGNS WHEN NOT IN USE, INCLUDING SPEED LIMIT SIGNS NOT WARRANTED, REMOVE ANY SIGN SUPPORTS IF THEY WILL NOT BE NEEDED WITHIN 90 DAYS.

2. POST THE END OF WORK ZONE SPEED LIMIT CONSISTING OF ONE SIGN WHEN THE NORMAL POSTED SPEED LIMIT FOR ALL VEHICLES IS THE SAME. USE TWO SIGNS WHEN CAR, TRUCK AND NIGHTTIME SPEED LIMITS ARE DIFFERENT.

3. INCLUDE REGULATORY SIGNING ONLY IF A WORK ZONE OR ROADWAY HAS CONDITIONS THAT WARRANT SPEED LIMITS.

4. IN ADDITION TO THE SIGNS SHOWN, INCLUDE THE APPROPRIATE TWO-LANE WORK AREA SIGNS (DRL. DWG. 618-08) WHEN A WORK AREA IS LOCATED AT THE BEGINNING OR END OF THE WORK ZONE.

5. SET UP THIS SIGN LAYOUT IN EACH TRAFFIC DIRECTION.

6. POST THE SPEED LIMIT APPROPRIATE FOR ALL VEHICLES FOR THE REMAINDER OF THE WORK ZONE BEFORE RESUMING TO NORMAL POSTED SPEED LIMITS AT THE END OF THE WORK ZONE.

* DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.
WORK ZONE SIGNING  
(SEE DTL. DWG. 618-04)

WORK AREA WITH NO FLAGGER

WORK ZONE SIGNING  
(SEE DTL. DWG. 618-04)

WORK AREA WITH FLAGGER

NOTES:

1. THESE SIGN LAYOUTS ALSO USED IN CONJUNCTION WITH THE PERMANENT LAYOUT ILLUSTRATED ON DTL. DWG. 618-04 FOR WORK AREAS LOCATED AT THE BEGIN AND END OF THE WORK ZONES.

2. XX = SPEED DETERMINED BY THE PROJECT MANAGER.

3. INCLUDE REGULATORY SIGNING ONLY IF THERE IS REASON TO RESTRICT SPEED WITHIN THE WORK ZONE. REMOVE OR COVER EXISTING REGULATORY SIGNS TO MATCH ADJACENT REGULATIONS.

4. SET UP THIS SIGN LAYOUT IN EACH TRAFFIC DIRECTION. COMBINE SUCCESSIVE WORK AREAS WHEN LESS THAN 1.0 MILE (1.6 KM) APART.

5. THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.

6. PROVIDE A SECOND FLAGGER WHEN REQUIRED PER SECTION 618.

7. POST THE SPEED LIMIT APPROPRIATE FOR ALL VEHICLES FOR THE REMAINDER OF THE WORK ZONE BEFORE RESUMING TO NORMAL POSTED SPEED LIMITS AT THE END OF THE WORK ZONE.

8. ENSURE THE AMBER LED FLASHERS MEET REQUIREMENTS OF STANDARD SPECIFICATION T15 AND DTL. DWG. 618-01.

9. INCLUDE THESE SIGNS WITH ALL FLAGGERS. INCLUDE THESE SIGNS WITHIN WORK ZONES WHEN STEP DOWN IS 20 M.P.H. OR GREATER.

10. DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.

UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
NOTES:

1. THIS SIGN LAYOUT USED IN CONJUNCTION WITH THE PERMANENT LAYOUT ILLUSTRATED ON DTL. DWG. 618-04. COVER OR REMOVE SIGNS WHEN NOT IN USE, INCLUDING SPEED LIMIT SIGNS NOT WARRANTED.

2. INCLUDE REGULATORY SIGNING ONLY IF THERE IS REASON TO RESTRICT SPEED WITHIN THE WORK ZONE. REMOVE OR COVER REGULATORY SIGNS TO MATCH ADJACENT REGULATIONS.

3. FOR SEAL COATING WORK ZONE ACTIVITIES, USE THE FLAGGER APPLICATION OF THE WORK AREA LAYOUT FROM DTL. DWG. 618-08.

4. SET UP THIS SIGN LAYOUT IN EACH TRAFFIC DIRECTION.

5. PLACE THE W8-7, THE R4-1, AND R2-1 SIGNS AT 2,000 FEET (2,134 m) INTERVALS WITHIN THE WORK AREA FOR EACH DIRECTION OF TRAVEL ACCORDING TO STANDARD SPECIFICATION 618.03.1.A.

6. POST THE END OF WORK ZONE SPEED LIMIT CONSISTING OF ONE SIGN WHEN THE NORMAL POSTED SPEED LIMIT FOR ALL VEHICLES IS THE SAME. USE TWO SIGNS WHEN CAR, TRUCK AND NIGHT TIME SPEED LIMITS ARE DIFFERENT.

7. MINIMUM REGULATORY SIGN SIZE IS 24" x 30" (600 x 750) ON TWO-LANE ROADS.

8. POST THE SPEED LIMIT APPROPRIATE FOR ALL VEHICLES FOR THE REMAINDER OF THE WORK ZONE BEFORE RESUMING TO NORMAL POSTED SPEED LIMITS AT THE END OF THE WORK ZONE.

* DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.

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

DETAILED DRAWING

REFERENCE DWG. NO.
STANDARD SPEC. 618-10
SECTION 618

TWO-LANE WORK ZONE SEAL COAT

--REVISED--
OCTOBER 2017

MONTANA DEPARTMENT OF TRANSPORTATION
NOTES:

1. MODIFY REGULATORY SIGNS TO MATCH ADJACENT REGULATIONS.
2. SET UP THIS SIGN LAYOUT IN EACH TRAFFIC DIRECTION.
3. THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.
4. PROVIDE A SECOND FLAGGER WHEN REQUIRED BY SECTION 618.03.14.
5. XX = SPEED DETERMINED BY THE PROJECT MANAGER.
6. POST THE SPEED LIMIT APPROPRIATE FOR ALL VEHICLES FOR THE REMAINDER OF THE WORK ZONE BEFORE RESUMING TO NORMAL POSTED SPEED LIMITS AT THE END OF THE WORK ZONE.
7. ENSURE THE AMBER LED FLASHERS MEET REQUIREMENTS OF STANDARD SPECIFICATION T15 AND DTL. DWG. 618-01.
8. INCLUDE THESE SIGNS WITH ALL FLAGGERS. INCLUDE THESE SIGNS WITHIN WORK ZONES WHEN STEP DOWN IS 20 M.P.H. OR GREATER.
9. * DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.

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

DETAILED DRAWING

REFERENCE DWG. NO. 618-12
STANDARD SPEC. 618-75
SECTION 618.75

TWO-LANE WORK AREA LANE CLOSURE - FLAGGER CONTROLLED

WORK ZONE SIGNING (SEE DTL. DWG. 618-04)
NOTES:

1. MODIFY REGULATORY SIGNS TO MATCH ADJACENT REGULATIONS.
2. SET UP THIS SIGN LAYOUT IN EACH TRAFFIC DIRECTION.
3. THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.
4. XX + SPEED DETERMINED BY THE PROJECT MANAGER.
5. POST THE SPEED LIMIT APPLICABLE FOR ALL VEHICLES FOR THE REMAINDER OF THE WORK ZONE BEFORE RESUMING TO NORMAL SPEED LIMITS AT THE END OF THE WORK ZONE.
6. REMOVE ANY CONFLICTING PAVEMENT MARKINGS BETWEEN THE STOP LINE AND WORK ZONE BOUNDARY.
7. PLACE TEMPORARY PAVEMENT MARKINGS AS SHOWN WHEN ROADWAY SURFACE IS PAVED. REMOVABLE PAVEMENT MARKINGS MAY BE USED. UPON REMOVAL OF THE TEMPORARY TRAFFIC CONTROL SIGNALS, REMOVE ALL TEMPORARY PAVEMENT MARKINGS AND RESTORE PERMANENT OR INTERIM PAVEMENT MARKINGS.
8. TEMPORARY TRAFFIC CONTROL SIGNALS ARE TO MEET THE PHYSICAL DISPLAY AND OPERATIONAL REQUIREMENTS OF PERMANENT TRAFFIC CONTROL SIGNALS.
9. ESTABLISH TEMPORARY TRAFFIC CONTROL SIGNAL TIMING BY CONSULTING WITH AN AUTHORIZED TRAFFIC ENGINEER. ENSURE THAT THE DURATIONS OF RED CLEARANCE INTERVALS ARE ADEQUATE TO CLEAR THE ONE-LANE SECTION OF THE ROADWAY. INCORPORATE SAFEGUARDS TO AVOID THE POSSIBILITY OF CONFLICTING SIGNAL INDICATIONS AT EACH END OF THE WORK ZONE.
10. INCORPORATE ANY SIDE APPROACH TRAFFIC THAT OCCURS WITHIN THE WORK ZONE AREAS INTO THE MAINLINE SIGNAL CONTROLLED OPERATIONS VIA THE USE OF TEMPORARY TRAFFIC CONTROL SIGNALS, DEVICES, ETC.

INCLUDE THESE SIGNS WITH ALL FLAGGERS. INCLUDE THESE SIGNS WITHIN WORK ZONES WHEN STEP DOWN IS 20 M.P.H. OR GREATER.

INSURE THE AMBER LED FLASHERS MEET REQUIREMENTS OF STANDARD SPECIFICATION T15 AND DTL Dwg. 618-01.
* DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.

### TEMPORARY TRAFFIC CONTROL SIGNAL DETAIL

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

---

**DETAILED DRAWING**

**REFERENCE** Dwg. NO. 618-13

**SECTION** 1B

**TWO-LANE WORK ZONE LANE CLOSURE - SIGNAL CONTROLLED**

---

**MODIFIED** SEPTEMBER 2014

**EFFECTIVE** OCTOBER 2017

**MDT® MONTANA DEPARTMENT OF TRANSPORTATION**
NOTES:

1. USE THIS SIGN LAYOUT WHEN APPROPRIATE. OTHERWISE REFER TO STL. DWG. 618-16 WHEN A FLAGGER IS NEEDED.

2. SET UP THIS SIGN LAYOUT IN EACH TRAFFIC DIRECTION, AS NEEDED.

* DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.
NOTES:

1. SET UP THIS SIGN LAYOUT IN EACH TRAFFIC DIRECTION, AS NEEDED.

2. THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.

3. XX = SPEED DETERMINED BY THE PROJECT MANAGER.

4. WHEN THIS OCCURS OUTSIDE OF A CONSTRUCTION PROJECT INCLUDE THE W20-1 AND R2-15+ SIGNS.

5. POST THE SPEED LIMIT APPROPRIATE FOR ALL VEHICLES FOR THE REMAINDER OF THE WORK ZONE BEFORE RESUMING TO NORMAL POSTED SPEED LIMITS AT THE END OF THE WORK ZONE.

6. WHEN OUTSIDE OF A CONSTRUCTION PROJECT, POST THE SPEED LIMIT CONSISTING OF ONE SIGN WHEN THE NORMAL POSTED SPEED LIMIT FOR ALL VEHICLES IS THE SAME. USE TWO SIGNS WHEN CAR, TRUCK AND NIGHTTIME SPEED LIMITS ARE DIFFERENT.

7. ENSURE THE AMBER LED FLASHERS MEET REQUIREMENTS OF SECTION 715 AND DTL. DWG. 618-01.

8. INCLUDE THESE SIGNS WITH ALL FLAGGERS, INCLUDE THESE SIGNS WITHIN WORK ZONES WHEN STEP DOWN IS 20 M.P.H. OR GREATER.

* DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.

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

**DRAFTED AS: SEPTEMBER 2014**

**REVISED: OCTOBER 2017**

**EFFECTIVE: SEPTEMBER 2014**

MONTANA DEPARTMENT OF TRANSPORTATION
NOTES:
1. THIS SIGN LAYOUT IS INTENDED TO BE A PERMANENT INSTALLATION FOR THE DURATION OF THE CONSTRUCTION PROJECT, AS APPROVED BY THE PROJECT MANAGER. COVER OR REMOVE SIGNS WHEN NOT IN USE, INCLUDING SPEED LIMIT SIGNS NOT WARRANTED. REMOVE ANY SIGN SUPPORTS IF THEY WILL NOT BE NEEDED WITHIN 90 DAYS.
2. POST THE END OF WORK ZONE SPEED LIMIT CONSISTING OF ONE LIMIT WHEN THE NORMAL POSTED SPEED LIMIT FOR ALL VEHICLES IS THE SAME. WHEN CAR AND TRUCK SPEED LIMITS DIFFER, POST BOTH LIMITS ON A SINGLE SIGN.
3. INCLUDE REGULATORY SIGNING ONLY IF A WORK ZONE OR ROADWAY HAS CONDITIONS THAT WARRANT SPEED RESTRICTIONS. MODIFY REGULATORY SIGNS TO MATCH ADJACENT REGULATIONS.
4. SET UP THIS SIGN LAYOUT IN EACH TRAFFIC DIRECTION.
5. IN ADDITION TO THE SIGNS SHOWN, INCLUDE THE APPROPRIATE FOUR-LANE WORK ZONE SIGNS (DWG. 618-241) WHEN A WORK AREA FALLS AT THE BEGIN OR END OF THE WORK ZONE.
6. DIVIDED FOUR-LANE IS SHOWN. FOR UN-DIVIDED FOUR-LANE, PLACE SIGNS ON RIGHT SIDE ONLY.
* DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.
NOTES:

1. SHORT DURATION ACTIVITIES ARE DEFINED AS THOSE LASTING UP TO ONE HOUR.

2. SHORT-TERM STATIONARY ACTIVITIES ARE DEFINED AS THOSE LASTING GREATER THAN ONE HOUR, UP TO A FULL SHIFT.

3. THE WORK ZONE REFERS TO THE GENERAL AREA THAT IS REQUIRED TO PROVIDE TEMPORARY WORK ZONE TRAFFIC CONTROL. IT SHOULD NOT EXCEED 3 MILES (4.8 KM) IN LENGTH.

4. THE REGULATORY SPEED SIGNS MUST MOVE AS NECESSARY WITHIN THE WORK ZONE TO REMAIN WITHIN 500 FEET (150 m) OF THE WORK AREA.

5. SIGN BOTH TRAVEL DIRECTIONS ON TWO-LANE, TWO-WAY ROADWAYS OR BOTH SHOULDERS ON TWO-LANE, ONE-WAY ROADWAYS.

6. PROVIDE AT LEAST THE DISTANCE SHOWN FOR DELINEATOR MOUNTED SIGNS.

7. USE REFLECTIVE DEVICES.

8. **XX = NORMAL POSTED SPEED LIMIT (SI).**

   * DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.
NOTES:

1. MINIMUM REGULATORY SIGN SIZE IS 24" X 30" (600 X 750) ON TWO-LANE ROADS.

2. ON ROADWAYS WITH HIGH TRAFFIC VOLUMES OR VISIBILITY RESTRICTIONS, A 500' (150 m) SPACING FOR ALL SIGNS IS RECOMMENDED.

3. SPACE CHANNELIZING DEVICES AT INTERVALS IN FEET (METERS EQUAL TO TWICE (0.6 TIMES) THE SPEED LIMIT IN M.P.H. THROUGH THE BUFFER AND WORK AREA.

4. IF A NEED ARISES TO INCREASE VEHICLE STORAGE, ADD AN ADDITIONAL W20-7a "FLAGGER AHEAD" SIGN BETWEEN THE R2-4 and W3-4 SIGNS AND/OR CONSIDER AN ADDITIONAL ADVANCE FLAGGER.

5. A MIRROR IMAGE OF THIS SIGN SEQUENCE IS REQUIRED FOR THE TRAFFIC FROM THE OPPOSITE DIRECTION.

6. FOR MORE INFORMATION OR Clarification CONTACT THE DISTRICT TRAFFIC ENGINEER. FOR EXAMPLE, IF WORK ZONE IS CLOSE TO A HORIZONTAL CURVE, A

7. A VERTICAL CURVE, A BRIDGE, INTERCHANGE, POOR SIGHT DISTANCE, OR OTHER SPECIAL CONDITION.

8. COVER ANY CONFLICTING SIGNS IN THE WORK ZONE.

9. SHORT-TERM WORK ZONE SIGNING IS NOT REQUIRED TO BE POST MOUNTED.

10. THE BUFFER SPACE CAN BE LATERAL AND LONGITUDINAL AND MAY BE INCREASED FOR DOMINANT AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.

11. TYPICALLY 2 MILES (3.2 km) IS THE MAX. WORK AREA. HOWEVER, WHEN SIGHT DISTANCE, BUFFER ZONES OR ACCOMPLISHMENT RATES FOR EQUIPMENT ARE CONSIDERED, SOME MINOR ADJUSTMENTS TO THIS MAX. MAY BE CONSIDERED.

12. XX = NORMAL POSTED SPEED LIMIT(S).

DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.

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

DETAILED DRAWING
REFERENCE DWG. NO.
STANDARD SPEC. 618-M1
SECTION 618

MAINTENANCE GUIDELINE FOR SHORT-TERM TWO-LANE CRACK SEALING WORK ZONE

---REVISED--- OCTOBER 2017

MONTANA DEPARTMENT OF TRANSPORTATION

EFFECTIVE SEPTEMBER 2014
NOTES:
1. Use a minimum 320' (100 m) shoulder taper.
2. Use thirteen approved channelizing devices for a 12' (3.6 m) lane closure taper (80 MPH, spaced at 80' (25 m).) Assume that the taper is a minimum length of 960' (300 m).
3. Space channelizing devices at intervals in feet (meters) equal to twice (50% times) the speed limit in MPH through the buffer and work area.
4. Place the arrow board on the shoulder at the start of the travel lane closure taper.
5. The buffer space can be lateral and longitudinal. Keep the buffer space clear of equipment and personnel.
6. For more information or clarification, contact the district traffic engineer. For example, if the work area is close to a horizontal curve, a vertical curve, a bridge, interchange, poor sight distance or other special condition.
7. Cover any conflicting signs in the work area.
8. Short-term work zone signing is not required to be post-mounted.
9. When the work area changes within the work zone, these signs should be moved to reflect the actual work area.
10. Typically 2 miles (3.2 km) is the max. work area, however, when sight distance, buffer zones or accomplishment rates for equipment are considered, some minor adjustments to this max. may be considered.

XX = Normal posted speed limit(s).
* Denotes signs that are unique to Montana.
MOBILE OPERATIONS ON MULTI-LANE ROAD

NOTES
1. Place appropriate lane closure sign on Shadow Vehicle 2 so as not to obscure the arrow board.
2. Follow the work operations with Shadow Vehicle 2 so as to provide adequate sight distance for vehicular traffic approaching from the rear.
3. Cover or turn the sign, legends, or vehicle-mounted signs from view when work is not in progress.
4. When the work vehicle occupies an interior lane of a directional roadway having a right shoulder of 75' or less, work in progress, Shadow Vehicle 2 may also be placed in the interior lane.
5. On high-speed roadways, a third Shadow Vehicle, May be used with Shadow Vehicle 1 in the closed lane. Shadow Vehicle 2 stands up the side lane and Arrow Vehicle 1 on the shoulder, where adequate shoulder width is not available, Shadow Vehicle 2 may also straddle the edge line.
6. The minimum arrow board size is Type A, 60 inches x 90 inches (1524 x 2286).
7. Validate the distance between the work location and Shadow Vehicle 2 to provide adequate sight distance for vehicular traffic approaching from the rear.
8. Maintain a maximum spacing between the work vehicle and Shadow Vehicles, and between each Shadow Vehicle to allow road users to make room in both lanes.

MOBILE OPERATIONS ON TWO-LANE ROAD

NOTES
1. Truck-mounted attenuator is required for Shadow Vehicle.
2. Red light, Shadow Vehicle with vehicle mounted sign. Use sign shape and legends appropriate to the type of work.
3. Mount vehicle-mounted sign in a manner so equipment or supplies do not obscure the sign.
4. Cover or turn the sign, legends, or vehicle-mounted signs from view when work is not in progress.
5. Be prepared to stop, maintain a minimum distance from the work vehicle with shadow vehicle and proceed at the same speed.
6. Slow down the shadow vehicle in advance of vertical or horizontal curves that restrict sight distance.
NOTES:
(1) USE THIS SIGN LAYOUT IN URBAN APPLICATIONS ONLY. USE THE RURAL, OPEN ROADWAY SIGNING DETAILS WHEN HIGHER SPEED LIMITS ARE USED.
(2) INCLUDE SPEED LIMIT SIGNS ONLY IF THERE IS A REASON TO RESTRICT SPEED, COVER CONFLICTING EXISTING SPEED LIMIT SIGNS.
(3) THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.
(4) LARGER SIGN SIZES MAY BE APPROVED BY THE PROJECT MANAGER.
(5) PLACE END ROADWORK SIGN AT END OF PROJECT LIMITS.
(6) POST EXISTING SPEED LIMIT IF CHANGED BY WORK ZONE.
(7) ENSURE THE AMBER LED FLASHERS MEET REQUIREMENTS OF SECTION T15 AND DTL. DWG. 618-01.

LEGEND
*=FLEXIBLE GUIDE POSTS
●=PLASTIC DRUMS
X=DETONATES SIGNS THAT ARE UNIQUE TO MONTANA.
XX=SPEED DETERMINED BY THE PROJECT MANAGER. (25 MPH OR 35 MPH.)

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

REFERENCE DWG. NO.
STANDARD SPEC.
SECTION 618
LANCE CLOSURE-FLAGGER
CONTROLLED (URBAN TWO
LANE, TWO WAY ROAD)

---REVISED---
EFFECTIVE: SEPTEMBER 2014
OCTOBER 2017

MTA MONTANA DEPARTMENT OF TRANSPORTATION
**NOTES:**

1. **USE THIS SIGN LAYOUT IN URBAN APPLICATIONS** only. Use the rural, open roadway signing details when higher speed limits are used.

2. **INCLUDE SPEED LIMIT SIGNS ONLY IF THERE IS A REASON TO RESTRICT SPEED. COVER CONFLICTING EXISTING SPEED LIMIT SIGNS.**

3. The buffer space may be increased for downgrades and other conditions that affect stopping distance.

4. This layout should only be used when there is at least 10' (3 m) in width between the channelizing devices and the edge of pavement. Provide no parking signs when appropriate.

5. Larger signs may be approved by the project manager.

6. Place end road work signs at end of project limits.

7. Post existing speed limit if changed by work zone.

8. See DTL. DWG. 608-03.

**LEGEND:**

- F - Flexible guide posts
- P - Plastic drums
- D - Denotes signs that are unique to Montana.

**XX** - Speed determined by project manager. (25 M.P.H. or 35 M.P.H.)

Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.

**DETAILED DRAWING**

**REFERENCE DWG. NO.**

**STANDARD SPEC.**

**SECTION 618**

**WORK ZONE IN CENTER OF ROAD (URBAN TWO-LANE, TWO-WAY ROAD)**

---REVISED---

EFFECTIVE: SEPTEMBER 2014

OCTOBER 2017

MDT MONTANA DEPARTMENT OF TRANSPORTATION
1. Minimal traffic control devices controlling pedestrian flows are shown. Other devices may be needed to control traffic on the streets. Use the appropriate parking lane closure when needed.

2. Do not direct pedestrians into a lane of moving traffic.

3. Where speeds exceed 25 M.P.H., physical barriers should be used to separate the temporary walkway from vehicular traffic. Flexible guide posts with detectable edging is the minimum requirement for separation. Provide larger physical barriers, as determined by the project manager, on a case-by-case basis.

4. See DTL. DWG. 618-03.

5. Provide a physical barrier, with a minimum 6 inch (150 mm) height detectable edging, between the pedestrian detour walkway and the work area. Provide larger physical barriers to protect pedestrians from hazards in the work area, as determined by the project manager.

6. Ensure that entire walkway meets ADA requirements. Provide a minimum walkway width of 5 feet (1525 mm) and a firm, stable, slip resistant walking surface along entire walkway.

7. Provide temporary ramps and detectable edging (minimum 6 inch height (150 mm) on both sides of walkway) along temporary pedestrian detour route. See note 4 for additional guidance.

8. Place R-9-11 on sign posts (as shown below) if business access is required. Place Type I barricade on sidewalk with R-9-11 sign if business access is not required. Place Type I barricade on sidewalk with R-9-9 sign.

9. Bypass walkway provided through work zone.

Legend:
- Flexible guide posts

Units shown in brackets () are metric and are in millimeters (mm) unless other units are shown.
NOTES:
1. COVER PEDESTRIAN TRAFFIC SIGNAL DISPLAYS CONTROLLING CLOSED CROSSWALKS.
2. ONLY TRAFFIC CONTROL DEVICES CONTROLLING PEDESTRIAN FLOWS ARE SHOWN. OTHER DEVICES MAY BE NEEDED TO CONTROL TRAFFIC ON THE STREETS.
3. SEE DTL. DWG. 618-03.
4. WHEN POSSIBLE, USE THE EXISTING INTERSECTION CROSSWALKS FOR PEDESTRIAN DETOURS. AS A LAST OPTION, USE THE MID-BLOCK TEMPORARY PEDESTRIAN CROSSING SHOWN BELOW. FOR LONG-TERM STATIONARY WORK, THE DOUBLE YELLOW CENTERLINE AND/OR LANE LINES ARE REMOVED BETWEEN CROSSWALK LINES. PROVIDE A MINIMUM WALKWAY WIDTH OF 5 FEET (+1525 mm) AND A FIRM, STABLE, SLIP RESISTANT WALKING SURFACE ACROSS BOULEVARDS AND OTHER AREAS ALONG THE TEMPORARY PEDESTRIAN WALKWAY. PROVIDE YIELD PAVEMENT MARKINGS AS SHOWN BELOW.
5. PLACE R9-9 AND R9-10 SIGNS ON TYPE I BARRIQUES ON SIDEWALK.
6. PROVIDE TEMPORARY RAMPS FOR PEDESTRIAN CROSSWALK WHEN REQUIRED.
7. PLACE R9-11, R9-11a, AND R9-11b ON SIGN POSTS (AS SHOWN BELOW) IF BUSINESS ACCESS IS REQUIRED. PLACE TYPE I BARRICADE ON SIDEWALK WITH R9-11 OR R9-11a SIGN IF BUSINESS ACCESS IS NOT REQUIRED.

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

DETAILED DRAWING
REFERENCE DWG. NO.
STANDARD SPEC. 618-U10
SECTION 618
CROSSWALK CLOSURES AND PEDESTRIAN DETOURS

--REVISED-- EFFECTIVE: SEPTEMBER 2014
OCTOBER 2017
MONTANA DEPARTMENT OF TRANSPORTATION
<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT FOR WORK ZONE</th>
<th>SIGN SPACING (A)</th>
<th>TAPER LENGTH (L)</th>
<th>SPACING OF CHANNELIZING DEVICES (MAX. 1)</th>
<th>BUFFER SPACE (B)</th>
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<td>(M.P.H.)</td>
<td>FEET (m)</td>
<td>FEET (m)</td>
<td>FEET (m)</td>
<td>FEET (m)</td>
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<td>100 (30)</td>
<td>245 (84)</td>
<td>35 (12)</td>
<td>100 (30)</td>
</tr>
</tbody>
</table>

**SPACE ALL CHANNELIZING DEVICES AT "C" UNLESS OTHERWISE NOTED.**

**NOTES:**
1. USE THIS SIGN LAYOUT IN URBAN APPLICATIONS ONLY. USE THE RURAL, OPEN ROADWAY SIGNING DETAILS WHEN HIGHER SPEED LIMITS ARE USED.
2. INCLUDE SPEED LIMIT SIGNS ONLY IF THERE IS A REASON TO RESTRICT SPEED. COVER OR REMOVE EXISTING CONFLICTING SIGNS.
3. THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.
4. THE SIDEWALK TAPER MAY BE OMITTED WHEN THE SIDEWALK SHOULD BE LESS THAN 36" (914 mm) WIDE.
5. IF PEDESTRIAN TRAFFIC IS IMPACTED SEE DET. DWG. 618-005.
6. LARGER SIGN SIZES MAY BE APPROVED BY THE PROJECT MANAGER.
7. PLACE END ROAD WORK SIGNS AT END OF PROJECT LIMITS.
8. POST EXISTING SPEED LIMIT IF CHANGED BY WORK ZONE.
9. SEE DETL. DWG. 618-03.

**LEGEND**
- FLEXIBLE GUIDE POSTS
- PLASTIC DRUMS
- DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.
- SPEED DETERMINED BY THE PROJECT MANAGER (150 M.P.H. OR 35 M.P.H.)
- OMNIBUS CONFLICTING PAVEMENT MARKINGS WHEN WORK OPERATIONS IS LONGER THAN 3 DAYS.

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

**DETAILED DRAWING**
REFERENCE: DWG. NO. 618-U15
STANDARD SPEC. 618-015
SECTION 618

LANE CLOSURE (URBAN TWO-LANE, TWO-WAY ROAD WITH TWO-WAY LEFT TURN LANE.)

- REVISED -
OCTOBER 2017
EFFECTIVE SEPTEMBER 2014

MDT® MONTANA DEPARTMENT OF TRANSPORTATION
NOTES:
1. USE THIS SIGN LAYOUT IN URBAN APPLICATIONS ONLY. USE THE RURAL, OPEN ROADWAY SIGNING DETAILS WHEN HIGHER SPEED LIMITS ARE USED.
2. INCLUDE SPEED LIMIT SIGNS ONLY IF THERE IS A REASON TO RESTRAIN SPEED. COVER OR REMOVE CONFLICTING EXISTING SPEED LIMIT SIGNS.
3. THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.
4. LARGER SIGN SIZES MAY BE APPROVED BY THE PROJECT MANAGER.
5. PLACE END ROAD WORK SIGNS AT END OF PROJECT LIMITS.
6. POST EXISTING SPEED LIMIT IF CHANGED BY WORK ZONE.
7. SEE DTL. DWG. 618-03.

LEGEND
- FLEXIBLE GUIDE POSTS
- PLASTIC DRUMS
* - DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.
XX - SPEED DETERMINED BY THE PROJECT MANAGER.
(25 M.P.H. OR 35 M.P.H.)

UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
NOTES:

1. USE THIS SIGN LAYOUT IN URBAN APPLICATIONS ONLY. USE THE RURAL, OPEN ROADWAY SIGNING DETAILS WHEN HIGHER SPEED LIMITS ARE USED.

2. INCLUDE SPEED LIMIT SIGNS ONLY IF THERE IS A REASON TO RESTRICT SPEED. COVER OR REMOVE CONFLICTING EXISTING SPEED LIMIT SIGNS.

3. THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.

4. THE SHOULDER TAPER MAY BE OMITTED WHEN PAVED SHOULDER IS LESS THAN 8' (2.4 m) IN WIDTH.

5. LARGER SIGN SIZES MAY BE APPROVED BY THE PROJECT MANAGER.

6. PLACE END ROAD WORK SIGNS AT END OF PROJECT LIMITS.

7. POST EXISTING SPEED LIMIT IF CHANGED BY WORK ZONE.

8. SEE DTL. DWG. 618-U05.

LEGEND

- FLEXIBLE GUIDE POSTS
- PLASTIC DRUMS
- DENOTES SIGNS THAT ARE UNIQUE TO MONTANA.

XX = SPEED DETERMINED BY THE PROJECT MANAGER. (25 M.P.H. OR 35 M.P.H.)

UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
**SPACE ALL CHANNELIZING DEVICES AT "C" UNLESS OTHERWISE NOTED.**

**NOTES:**
1. USE THIS SIGN LAYOUT IN URBAN APPLICATIONS ONLY. USE THE RURAL, OPEN ROADWAY SIGNING DETAILS WHEN HIGHER SPEED LIMITS ARE USED.
2. INCLUDE SPEED LIMIT SIGNS ONLY IF THERE IS A REASON TO RESTRICT SPEED. COVER OR REMOVE CONFLICTING EXISTING SPEED LIMIT SIGNS.
3. THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.
4. LARGER SIGN SIZES MAY BE APPROVED BY THE PROJECT MANAGER.
5. PLACE END ROAD WORK SIGN AT END OF PROJECT LIMITS.
6. POST EXISTING SPEED LIMIT IF CHANGED BY WORK ZONE.

LEGEND

- FLEXIBLE GUIDE POSTS
- PLASTIC DRUMS
- DENOTES SIGNS THAT ARE UNIQUE TO MONTANA,

**XX** - SPEED DETERMINED BY THE PROJECT MANAGER. (25 M.P.H., OR 35 M.P.H.)

UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
### Detailed Drawing

**Reference**: DWG. NO. 618-U40

**Section**: 618

**Right Lane Closure-Work Area Beyond Intersection-Urban Multi-Lane, Undivided Road**

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**Legend**

- Flexible Guide Posts
- Plastic Drums
- Denotes signs that are unique to Montana.

**XX**: Speed determined by the Project Manager. (25 M.P.H. or 35 M.P.H.)

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**Units Shown in Brackets ( ) Are Metric and Are in Millimeters (mm)**

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**Notes:**

1. Use this sign layout in urban applications only. Use the rural, open roadway signing details when higher speed limits are used.
2. Include speed limit signs only if there is a reason to restrict speed. Cover or remove conflicting existing speed limit signs.
3. If pedestrian traffic is impacted, see Note 4.
4. Left turning movements may be prohibited to maintain capacity for through vehicular traffic (unless controlled by traffic signal).
5. Include a shoulder taper when paved shoulder is 8" (200 mm) or greater in width or when a parking lane is present.
6. If limited sight distance from this approach, consider right turn only or closing the approach.
7. Larger sign sizes may be approved by the Project Manager.
8. Place end work signs at end of project limits.
9. Post existing speed limit if changed by work zone.
10. See DTL. DWG. 618-03.
11. The buffer space may be increased for downgrades and other conditions that affect stopping distance.

---

**Detailed Table**

<table>
<thead>
<tr>
<th>Posted Speed Limit For Work Zone</th>
<th>Sign Spacing (A)</th>
<th>Taper Length (L)</th>
<th>Spacing of Channelizing Devices (Max.) (G) **</th>
<th>Buffer Space (B)</th>
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<td>35</td>
<td>100 (30)</td>
<td>245 (84)</td>
<td>35 (12)</td>
<td>100 (30)</td>
</tr>
</tbody>
</table>

**Notes:**

- **A** Varies
- **B** Varies
- **G** Space all channelizing devices at "C" unless otherwise noted.

---

**Units Shown in Brackets [ ] Are Metric and Are in Millimeters (mm)**

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**Revised: September 2014**

**Effective: October 2017**

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**Montana Department of Transportation**
NOTES:

1. USE THIS SIGN LAYOUT IN URBAN APPLICATIONS ONLY. USE THE RURAL, OPEN ROADWAY SIGNING DETAILS WHEN HIGHER SPEED LIMITS ARE USED.

2. INCLUDE SPEED LIMIT SIGNS ONLY IF THERE IS A REASON TO RESTRICT SPEED, COVER OR REMOVE CONFLICTING SPEED LIMIT SIGNS.

3. THE BUFFER SPACE MAY BE INCREASED FOR DOWNGRADES AND OTHER CONDITIONS THAT AFFECT STOPPING DISTANCE.

4. LARGER SIGN SIZES MAY BE APPROVED BY THE PROJECT MANAGER.

5. PLACE END ROAD WORK SIGNS AT END OF PROJECT LIMITS.

6. POST EXISTING SPEED LIMIT IF CHANGED BY WORK ZONE.

7. SEE OTL. DWG. 618-03.

** FLEXIBLE GUIDE POSTS

• PLASTIC DRUMS

= ODETTES SIGNS THAT ARE UNIQUE TO MONTANA.

XX = SPEED DETERMINED BY THE PROJECT MANAGER. (25 M.P.H. OR 35 M.P.H.)
NOTES:

1. 6' (1.8 m) MINIMUM, 50' (15.2 m) MAXIMUM.
2. PLACE R1-1 SIGN AT THE BEGINNING OF CURB RADIUS OR SHOULDER RADIUS, OR 4 FEET (1.2 m) IN ADVANCE OF THE MARKED OR UNMARKED CROSSWALK.
3. SEE PLANS FOR FINAL SIGNING AND PAVEMENT MARKING LOCATIONS.
4. USE HARDWARE MEETING THE REQUIREMENTS OF SECTION 704.

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

DETAILED DRAWING
REFERENCE DWG. NO. STANDARD SPEC. 619-02
SECTION 619, 704
TYPICAL RURAL AND URBAN APPROACHES
EFFECTIVE: SEPTEMBER 2014

MDT MONTANA DEPARTMENT OF TRANSPORTATION
ALUMINUM CLIP PLACEMENT

BACKBRACING TABLE - PLYWOOD SIGNS

<table>
<thead>
<tr>
<th>SPACING &quot;A&quot;</th>
<th>MAX. WIDTH &quot;B&quot;</th>
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METRIC DIMENSIONS

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<td>5100</td>
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</tr>
<tr>
<td>710</td>
<td>6600</td>
</tr>
<tr>
<td>800</td>
<td>7400</td>
</tr>
</tbody>
</table>

NOTES:

1. CONFORM ALL PLYWOOD SIGNS TO SECTIONS 6.8 AND 7.0.
2. ON SIGNS 4'-0" (1200mm) AND GREATER, DO NOT USE ANY PANELS LESS THAN 4'-0" (1200mm) IN HEIGHT.
3. DO NOT USE HORIZONTAL JOINTS ON SIGNS LESS THAN 4'-0" (1200mm) IN HEIGHT.
4. FOR SIGNS WITH WIDTHS THAT ARE NOT IN MULTIPLES OF 4'-0" (1200mm), PLACE THE ODD LENGTH PANEL ON THE WIDE EDGE.
5. FOR SIGNS OVER 1'-6" (300mm) IN WIDTH, THE FULL WIDTH MAY BE OBTAINED WITH PANELS HAVING A FACTORY SCAFFOLD JOINT IN LIEU OF USING STANDARD LENGTH PANELS AS SHOWN.
6. THE MAXIMUM SIZE PANEL IS 1'-6" (450mm) BY 4'-0" (1200mm) HIGH.
7. CONSTRUCT PLYWOOD SIGNS ON ONE PIECE OF PLYWOOD UNLESS THE PLANS SPECIFY OTHERWISE FOR SPECIAL DESIGN SIGNS.
8. USE HARDWARE MEETING THE REQUIREMENTS OF SECTION 7.0.

Plywood Sheet Increment

Construction Details

Department of Transportation
NOTES:

1. REMOVE ALL RAISED LETTERS, NUMERALS, SYMBOLS, BORDERS AND PREVIOUS SIGN OVERLAYS TO BE REPLACED, AND CLEAN SIGN FACE TO A SMOOTH SURFACE BEFORE OVERLAYING.

2. ALL LETTERS, NUMERALS, SYMBOLS AND BORDERS ARE TYPE "C" CUTOUT UNLESS OTHERWISE SPECIFIED, AND APPLIED TO THE BACKGROUND SHEETING PRIOR TO FIELD APPLICATION OF THE SIGN.

3. THE SIZE OF ALL GUIDE SIGN OVERLAYS AND LEGENDS MUST BE VERIFIED BY THE PROJECT MANAGER PRIOR TO FABRICATION.

4. AN ADHESIVE-BACKED SHEETING MAY BE USED AS AN ALTERNATIVE ON SIGN WIDTHS OF 6'-0" (1800) OR LESS IF IT IS PREFABRICATED TO A MINIMUM THICKNESS OF 0.005 " (0.13) AND CONSTRUCTED OF PREAPPLIED REFLECTIVE SHEETING ON ADHESIVE-BACKED ALUMINUM. APPLY ADHESIVE-BACKED OVERLAY SHEETING WHEN AIR AND SURFACE TEMPERATURES ARE ABOVE 50°F (10°C). DO NOT USE THIS TYPE OF OVERLAY MATERIAL ON OVERHEAD SIGNS.

5. PROVIDE A MINIMUM REFLECTIVE SHEETING INTENSITY OF TYPE 4, MEETING THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS, UNLESS SPECIFIED OTHERWISE.

6. APPLY ALL MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.

7. USE ALUMINUM ALLOY TYPE 6061-T6 OR AA5052-H38. CONVERSION COAT ALL ALUMINUM WITH A PROCESS SUCH AS ALDOME 1200 OR EQUIVALENT, AND RINSE AND DRY THOROUGHLY. PROTECT IT FROM SOIL BY ACCEPTABLE METHODS.

8. SIGN OVERLAYS MAY REQUIRE REMOVAL OF THE SIGN FROM THE POSTS TO AVOID PROJECTING BOLT HEADS. DO NOT LEAVE WARNING AND REGULATORY SIGNS TO BE OVERLAYERED UNDISPLAYED FOR MORE THAN ONE (1) HOUR DURING DAYLIGHT. DO NOT LEAVE GUIDE SIGNS UNDISPLAYED FOR MORE THAN TEN (10) HOURS DURING DAYLIGHT. INSURE SIGNS TO BE OVERLAYERED ARE OPERATIONAL PRIOR TO DARKNESS.

9. OVERLAY SIGNS SMALLER THAN 4'-0" x 6'-0" (1200 x 1800) WITH ONE PANEL OF MATERIAL. FOR SEAMS IN LARGE OVERLAYS, USE RIVETS OR BOLTS SPACED AS SHOWN ON THIS DRAWING AND PLACE PARALLEL TO AND NO MORE THAN 3" (15) LATERALLY FROM THE SEAM.

10. USE HARDWARE MEETING THE REQUIREMENTS OF SECTION 704.

DETAILED DRAWING
REFERENCE DWG. NO. STANDARD SPEC. 619-10
SECTION 619, 704

SHEET ALUMINUM OVERLAY

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

EFFECTIVE: SEPTEMBER 2014

MDT® MONTANA DEPARTMENT OF TRANSPORTATION
### Procedure for Base Connection Assembly

1. Assemble post to stub with bolts and two flat washers between plates.
2. Saw as required to size post.
3. Tighten bolts in a systematic order to the specified torque (see Table B2).
4. Check each bolt and return to field for tightness in the field, tightening to the specified torque.
5. Drive bolts at junction with nuts using a center punch to prevent nut loosening.

### Foundation Shaft Details

- **Nominal Pipe Dia.**: 3" (76.2 mm)
- **Bolt Size**: 5/8" (15.9 mm)
- **Bolt Torque**: 55 ft-lbs (74.8 Nm)
- **Depth to Bottom of Post**: 29" (736.6 mm)
- **Height of Foundation Shaft**: 3" (76.2 mm)
- **Foundation Depth**: 5" (127 mm)

### Base Connection Data

<table>
<thead>
<tr>
<th>Nominal Pipe Dia.</th>
<th>Post Dia.</th>
<th>E</th>
<th>D</th>
<th>F</th>
<th>Y</th>
<th>Z</th>
<th>Footing Diameter</th>
<th>Footing Depth</th>
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<td>3&quot; (76.2 mm)</td>
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<td>1 1/2&quot; (40 mm)</td>
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<td>5&quot; (127 mm)</td>
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### Metric Base Connection Data

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<th>Z</th>
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### Metric Foundation Details

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<td>5/8&quot;</td>
<td>6&quot; (152 mm)</td>
<td>6&quot; (152 mm)</td>
</tr>
<tr>
<td>120 mm</td>
<td>152.4</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>6&quot; (152 mm)</td>
<td>6&quot; (152 mm)</td>
</tr>
<tr>
<td>150 mm</td>
<td>190.5</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>6&quot; (152 mm)</td>
<td>6&quot; (152 mm)</td>
</tr>
</tbody>
</table>

### Metric Table of Weights

<table>
<thead>
<tr>
<th>Nominal Pipe Dia.</th>
<th>Pipe Dia.</th>
<th>E</th>
<th>D</th>
<th>F</th>
<th>Y</th>
<th>Z</th>
<th>Footing Diameter</th>
<th>Footing Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 mm</td>
<td>114.3</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>6&quot; (152 mm)</td>
<td>6&quot; (152 mm)</td>
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<tr>
<td>90 mm</td>
<td>127.0</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>6&quot; (152 mm)</td>
<td>6&quot; (152 mm)</td>
</tr>
<tr>
<td>120 mm</td>
<td>152.4</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>6&quot; (152 mm)</td>
<td>6&quot; (152 mm)</td>
</tr>
<tr>
<td>150 mm</td>
<td>190.5</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>6&quot; (152 mm)</td>
<td>6&quot; (152 mm)</td>
</tr>
</tbody>
</table>

### Notes
- Use steel pipe conforming to the requirements of ASTM A 53, Type E or F, Grade B or B 50, Type E or F, Grade B.
- Use Class C200 concrete with a minimum size of 10", 12" or 16" in accordance with the specified requirements.
- Use shop drawings for all installations shown on the detail section.
- Use steel pipe per Section 711.
- Use hardware meeting the requirements of Section 704.

### Diagram

![Diagram of tubular sign post assembly](image-url)
SEE RIVET SPACING DTL. RIGHT

SIGN FACE
36" x 48" (900 x 1200)

STRUCTURAL STEEL POST

2 3/4" x 2 3/8" x 28" (69.9 x 60.4 x 700)
EXTRUDED "T"-SECTION BACKBRACE (SEE DTL.
DWG. NO. 619-04)

SEE RIVET SPACING DTL. RIGHT

SIGN FACE
48" x 60" (1200 x 1500)

STRUCTURAL STEEL POST

2 3/4" x 2 3/8" x 34"
(69.9 x 60.4 x 850)
EXTRUDED "T"-SECTION BACKBRACE (SEE DTL.
DWG. NO. 619-04)

NOTES:

1. SEE THE PLANS FOR BACKBRACING REQUIREMENTS.
2. USE HARDWARE MEETING THE REQUIREMENTS OF SECTION 704.

UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
NOTE:

1. Signs of these sizes and larger require wood backbracing.

2. Smaller signs may require backbracing if the conditions warrant (see signing plans). In this case, the contractor has the option of using wood or steel backbracing (see DTL. DWG. NO. 619-22).

WOOD BACKBRACE INSTALLATIONS

SIGN MOUNTING DETAIL

NOTES:

1. Conform all wood poles to the requirements of Section 704.

2. Gain all poles on the sign side the minimum width shown in the table on DTL. DWG. NO. 619-20, for half the length of each pole.

3. Use treated 2" x 4" (50 x 100) lumber for all wood backbracing, conforming to the requirements of Section 704.

4. Use hardware meeting the requirements of Section 704.

5. See DTL. DWG. NO. 619-20 for breakaway and support details.

GAIN DETAIL TOP END TREATMENT

UNITS SHOWN IN BRACKETS ("") ARE METRIC AND ARE IN MILLIMETERS ("mm") UNLESS OTHER UNITS ARE SHOWN.
**Plan View**

**Dimensions**

<table>
<thead>
<tr>
<th>Sign Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot; x 24&quot;</td>
<td>1/4&quot; x 2&quot;</td>
<td>1'-11&quot;</td>
<td>15&quot;</td>
<td>9&quot;</td>
<td>18&quot;</td>
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<tr>
<td>24&quot; x 30&quot;</td>
<td>1/4&quot; x 2&quot;</td>
<td>2'-2&quot;</td>
<td>18&quot;</td>
<td>12&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>30&quot; x 36&quot;</td>
<td>1/4&quot; x 2&quot;</td>
<td>2'-5&quot;</td>
<td>21&quot;</td>
<td>15&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>36&quot; x 48&quot;</td>
<td>1/4&quot; x 2&quot;</td>
<td>2'-8&quot;</td>
<td>24&quot;</td>
<td>18&quot;</td>
<td>36&quot;</td>
</tr>
</tbody>
</table>

**Metric Dimensions (mm)**

<table>
<thead>
<tr>
<th>Sign Size (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>450 x 600</td>
<td>6 x 50</td>
<td>580</td>
<td>380</td>
<td>225</td>
<td>450</td>
</tr>
<tr>
<td>600 x 750</td>
<td>6 x 50</td>
<td>655</td>
<td>455</td>
<td>300</td>
<td>600</td>
</tr>
<tr>
<td>750 x 900</td>
<td>6 x 50</td>
<td>735</td>
<td>535</td>
<td>375</td>
<td>750</td>
</tr>
<tr>
<td>900 x 1200</td>
<td>6 x 50</td>
<td>810</td>
<td>610</td>
<td>450</td>
<td>900</td>
</tr>
</tbody>
</table>

**Wood Post Mounting**

Mount 2 Chevron signs on each post with each panel adjusted to approximate right angle to roadway centerline, exact location and angle to be determined by the project manager.

**Steel Pipe Mounting**

Threaded or welded miter tight cap.

2" x 2" x 1/4" [51 x 6.4] mounting angle with 5/16" dia. [8] bolt, washer and nut at sign face.

3/16" (5 mm) x 1/2" (25 mm - 50 mm) pipe sign post.

Notes:

1. Install chevrons with a minimum 10'-0" [3.1 m] horizontal clearance and a 5'-0" [1.5 m] vertical mounting height.
2. Spacing for design purposes is double the spacing shown in the table on DTL, DWG. No. 619-36, up to a maximum Chevron spacing of 200' (60 m). A minimum of 3 visible chevrons are required through a curve.
3. Field inspect the chevrons at night and adjust their locations to achieve 500' (150 m) of visibility.
4. Use hardware meeting the requirements of Section 704.

Units shown in brackets (mm) are metric and are in millimeters (mm) unless other units are shown.

**Detailed Drawing**

Reference: DWG. No. 619-24

Section: 619, 704

Chevron Mounting Details

Effective: September 2014

Montana Department of Transportation
ALUMINUM SHEET MOUNTING

HASP KEEPER

DRIVE RIVET

PLAFOOD MOUNTING

HASP KEEPER

ALUMINUM SLEEVE NUT

MACHINE SCREW

DETAILS DRAWING

REFERENCE: REC-1155

STANDARD SPEC: 615-93

SECTION 615-93

SIGN HINGE

DETAILS

UNIT NUMBER: 00

15'-0" x 4'-0" (1800 x 1200) DB-2A HIGH STATION SIGN SHOWN

0.06" (1.524) ALUMINUM SHEET MOUNTING AS SPECIFIED ON THE PLAN. THE PANEL PANEL CONSISTS OF 0.100" (2.540) ALUMINUM.

CONTINUOUS HINGE

PULL-THRU RIVET

NOTES:

1. SEE SIGN AND SIGNING MATERIALS CATALOG FOR COMPLETE LISTING OF SIGNS AND SIGN SIZES. DESIGNS ARE PAVED AT THE TRAFFIC ENGINEERING DIVISION UNIT FOR SIGNS UNIQUE TO MONTANA.

2. THE SIGN PANEL CONSISTS OF 0.125" (3.175) DENSITY PLYWOOD OR 0.250" (6.350) ALUMINUM SHEET MOUNTING AS SPECIFIED ON THE PLAN. THE PANEL PANEL CONSISTS OF 0.100" (2.540) ALUMINUM.

3. PAINT ALL HARDWARE ITEMS ON THE SIGN FACE OR COVER WITH RETRO-REFLECTIVE SHEETING THE SAME COLOR AS THE SIGN.

4. SUBMIT SHOP DRAWINGS FOR APPROVAL PRIOR TO FABRICATION.

5. SUPPLEMENTAL SIGN PANEL DEVIATIONS IN THE SIGN PANEL MUST HAVE RETRO-REFLECTIVE SHEETING AND MATCHING COLORS OF THE PRIMARY PANEL.

6. THE MINIMUM MOUNTING HEIGHT TO THE BOTTOM OF THE PANEL IS 5'-0" (1.524m).

7. USE HARDWARE MEETING THE REQUIREMENTS OF SECTION 704.
**HORIZONTAL CURVE SPACING TABLE**

<table>
<thead>
<tr>
<th>RADIUS</th>
<th>SPACING ON CURVE</th>
<th>SPACING ON BOTH APPROACH TANGENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>5730' &amp; UP</td>
<td>300'</td>
<td>400'</td>
</tr>
<tr>
<td>2805 - 5729</td>
<td>225'</td>
<td>400'</td>
</tr>
<tr>
<td>1910 - 2864</td>
<td>160'</td>
<td>225'</td>
</tr>
<tr>
<td>1433 - 1900</td>
<td>120'</td>
<td>200'</td>
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<tr>
<td>955 - 1433</td>
<td>110'</td>
<td>190'</td>
</tr>
<tr>
<td>716 - 954</td>
<td>90'</td>
<td>185'</td>
</tr>
<tr>
<td>478 - 715</td>
<td>75'</td>
<td>150'</td>
</tr>
<tr>
<td>287 - 477</td>
<td>60'</td>
<td>125'</td>
</tr>
<tr>
<td>0' - 286</td>
<td>45'</td>
<td>90'</td>
</tr>
</tbody>
</table>

**METRIC HORIZONTAL CURVE SPACING TABLE**

<table>
<thead>
<tr>
<th>RADIUS (m)</th>
<th>SPACING ON CURVE (m)</th>
<th>SPACING ON BOTH APPROACH TANGENTS (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>1750</td>
<td>90</td>
<td>120</td>
</tr>
<tr>
<td>900 - 1749</td>
<td>65</td>
<td>120</td>
</tr>
<tr>
<td>600 - 899</td>
<td>50</td>
<td>95</td>
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<td>450 - 599</td>
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<td>300 - 449</td>
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<td>65</td>
</tr>
<tr>
<td>200 - 299</td>
<td>25</td>
<td>55</td>
</tr>
<tr>
<td>150 - 199</td>
<td>20</td>
<td>45</td>
</tr>
<tr>
<td>100 - 149</td>
<td>20</td>
<td>35</td>
</tr>
<tr>
<td>0 - 99</td>
<td>15</td>
<td>25</td>
</tr>
</tbody>
</table>

NOTES:

1. FURNISH RETRO-REFLECTIVE SHEETING ACCORDING TO THE STANDARD SPECIFICATIONS FOR RETRO-REFLECTIVE SHEETING B (HIGH INTENSITY), POSITION DELINEATOR FACES PERPENDICULAR TO THE TANGENT TO CURVE CENTERLINE AS SHOWN IN FIGURE B.

2. MOUNT DELINEATORS ON METAL U-POSTS 1.12 lb./ft. (1.7 kg/m) MIN. AND 2 Lb./ft. (3 kg/m MAX.) WITH 3/16" (5 mil) CADMIUM PLATED BOLT(5). DRILL OR PUNCH A MINIMUM OF TWELVE 3/8" (9.5) MAXIMUM DIAMETER HOLES ON 1 INCH (25) CENTERS FROM THE TOP OF THE POST. 1/4" (6.4) SQUARE HOLES MAY BE USED. IF SQUARE HOLES ARE USED, USE A LARGE HEADED BOLT OR AN APPROPRIATE WASHER. JAM THREADS AFTER TIGHTENING THE NUT TO PREVENT REMOVAL.

3. PLACE DELINEATORS AT A CONSTANT CLEARANCE DISTANCE FROM THE EDGE OF THE PAVEMENT EXCEPT WHERE CURBRAIL OR OTHER OBSTRUCTIONS INTERFERE. ALIGN THE DELINEATORS WITH THE INSIDE EDGE OF THE OBSTRUCTION. CLEARANCE FOR DELINEATORS IS 6'-0" (1.8 m) ON INTERSTATE HIGHWAYS, 2'-0" TO 6'-0" (0.6 m TO 1.8 m) ON PRIMARY AND SECONDARY HIGHWAYS OR AS DETERMINED BY THE PROJECT MANAGER. THE STANDARD MOUNTING HEIGHT IS 4'-0" (1.2 m) TO THE TOP OF THE POST. SUPPLY POST LENGTHS TO MAINTAIN THE PROPER MOUNTING HEIGHT AND A MINIMUM OF 18" (0.45 m) EMBEDMENT.

4. SPACE DELINEATORS ACCORDING TO THE DISTANCES FOUND IN THE TABLE ABOVE OR AS SPECIFIED IN THE PLANS. IN FIGURE A, IF "F" IS GREATER THAN 20' (6 m) ADD ONE REGULAR DELINEATOR IN AT "A" SPACING, UNDER NORMAL SPACING, IT MAY BE MOVED IN EITHER DIRECTION A DISTANCE NOT TO EXCEED ONE QUARTER OF THE NORMAL SPACING. ELIMINATE DELINEATORS STILL FALLING IN SUCH AREAS.

5. ALL DELINEATOR REFLECTORS HAVE 3/4" (18.75) CORNER RADIUS EXCEPT DESIGN "E".

6. MOUNT THE DELINEATOR REFLECTOR 1" (25) BELOW THE TOP OF THE METAL U-POST.

7. USE HARDWARE MEETING THE REQUIREMENTS OF SECTION 704.

**DETAILED DRAWING**

**REFERENCE**

- DWG. NO.
- STANDARD SPEC.
- SECTION 619.704

**DELINEATOR PLACEMENT DETAILS**

- EFFECTIVE: SEPTEMBER 2014

**MTD★ MONTANA DEPARTMENT OF TRANSPORTATION**

- UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
**TYPE 1**

**K3-2**

- 9 = 3" (76) Dia. Reflectors
- See note for colors

**NOTE:**
- Object markers have yellow reflectors on a yellow or black background or an all-yellow retro-reflective Prism or Diamond with a reflective series. Type 1 markers are retro-reflective red or have red reflectors on a red or black background.

**TYPE 2**

**K3-5**

- 1/2" (12.7)
- 1/2" (12.7), 4" (100)
- 2" (51)
- 1/2" (12.7), 4" (100)
- 3" (76)
- 6" (150)
- 1/2" (12.7), 4" (100)
- Yellow background (non-reflective)
- 2 1/2" (64.5)
- 2 1/2" (64.5)
- 2 1/2" (64.5)
- 3 1/2" (89.5) Dia. Yellow Reflectors

**STEEL U-POST**

- Type U-Post, 10" (254) in length, made of 1 1/8" (28.6) pipe, 5/8" (15.9) wall thickness, and 3 1/2" (89.5) dia.

**SIGN PANEL**

- 4" (100)

**SIDE MOUNTING**

- 1/2" (12.7), 4" (100)

**GENERAL NOTES**

- 1" (25.4)

**TYPICAL USE AND PLACEMENT**

- Placement of K3-1 is used only as an option to eliminate target value when needed.

**DETAIL DIAVING**

- *K3-5 shown* (see note for colors)
- Type of construction: Class I (Fig. 18-2A)
- Type of construction: Class II (Fig. 18-2A)

**OBJECT MARKER DESIGN AND PLACEMENT**

- Design and placement details for objects are shown and are in parenthesis unless otherwise shown.

**UNITS SHOWN IN BRACKETS**

- All units are in millimeters unless otherwise shown.
FLEXIBLE SURFACE-MOUNTED DELINEATORS

DETAILS ARE REPRESENTATIVE ONLY; ACTUAL DESIGN USED/SPECIFIED MAY VARY (SEE PLANS).

FLEXIBLE DRIVABLE DELINEATORS

DETAILS ARE REPRESENTATIVE ONLY; ACTUAL DESIGN USED/SPECIFIED MAY VARY (SEE PLANS).

NOTES:
① MOUNT OR DRIVE FLEXIBLE DELINEATORS TO THE MANUFACTURER’S SPECIFICATIONS.
② THE EXACT LOCATION AND PLACEMENT OF THE FLEXIBLE DELINEATORS ARE SHOWN IN THE SIGNING PLANS.
③ USE HARDWARE MEETING THE REQUIREMENTS OF SECTION 704.

UNITS SHOWN IN BRACKETS () ARE METRES AND ARE IN MILLimetRES (mm) UNLESS OTHER UNITS ARE SHOWN.
UP TO $250 FINE AND /OR 60 DAYS IMPRISONMENT FOR INJURY TO OR POSSESSION OF THIS SIGN

INSTALLED 2010
SIGN FABRICATOR'S NAME HERE

DATE TAG DETAIL

DATE TAG COLOR SEQUENCE
DATE TAG COLOR CORRESPONDS TO THE LAST DIGIT OF THE INSTALLATION YEAR AS FOLLOWS:
0 - YELLOW
1 - WHITE
2 - LIGHT BLUE
3 - GOLD
4 - LIGHT GREEN
5 - RED
6 - PURPLE
7 - ORANGE
8 - BLUE
9 - GREEN

PLACEMENT DETAILS

6" [150]
3/16" [5] MIN.
3/4" [19]
1/8" [3]
1 7/16" [36]
3" [75]
1" [25]
7/16" [11]

NOTES:
(1) FURNISH AND PLACE INSTALLATION DATE TAGS ON ALL SIGNS PRIOR TO FINAL ACCEPTANCE OF THE PROJECT.
(2) THE TAGS DISPLAY THE YEARS IN WHICH THE SIGNS WERE INSTALLED. SEE THE COLOR SEQUENCE TABLE SHOWN ON THIS DRAWING FOR THE APPROPRIATE COLORS. DATE TAGS ARE TO BE RETRO-REFLECTIVE.
(3) PLACE A TAG ON THE BACK OF EACH SIGN, LOCATED NEAR THE LOWER CORNER OF THE SIGN NEAREST THE EDGE OF ROADWAY, TO BE VISIBLE FROM THE ROADWAY AS SHOWN IN THE EXAMPLES ABOVE.
(4) PLACE TAGS ON ANY NEW SIGN INSTALLED IN THE FIELD AS ROUTINE MAINTENANCE BY MDT FORCES. MAINTENANCE DESIGN DATE TAGS CAN BE ORDERED FROM THE SIGN SHOP IN HELENA.
(5) USE HARDWARE MEETING THE REQUIREMENTS OF SECTION 704.
NOTES:

- EACH SQUARE EQUALS 8 INCHES (203 MM)
- ALL PAINT MARKINGS ARE TO CONFORM TO THE REQUIREMENTS OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND "STANDARD HIGHWAY SIGNS" PUBLICATIONS, PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION.
- ALL LETTERS ARE TO BE WHITE.
- USE THE SIZES OF LETTERS SHOWN UNLESS SMALLER OR LARGER SIZES ARE NEEDED. THE SIZE OF LETTERS MAY BE DECREASED PROPORTIONALLY DOWN TO 20% OF THE NOMINAL SIZE SPECIFIED, BUT THE HEIGHT OF ANY LETTER UP TO 6 INCHES (150 MM) LARGER SIZES MAY BE USED FOR AVERAGE SPEED LIMITS AND OTHER CRITICAL LOCATION.
- DO NOT EXCEED MORE THAN ONE LINE IN WIDTH FOR ANY PAINT MARKINGS EXCEPT IN THE CASE OF THE WORD "SCHOOL," SEE DL, SMG NO. 629-10 FOR MORE INFORMATION.
- FOR MULTIPLE LINES OF INFORMATION, PLACE THE INFORMATION SO IT READS IN THE DIRECTION OF TRAVEL. DO NOT EXCEED THREE LINES OF INFORMATION AT ANY LOCATION.
- WHEN WORDS AND SYMBOLS ARE USED IN COMBINATION, SPACE THEM AT LEAST FOUR TIMES THE HEIGHT OF CHARACTERS FOR LOW-SPEED SIGNS, BUT NOT MORE THAN TEN TIMES THE HEIGHT OF THE CHARACTERS UNDER ANY CONDITIONS.
- ON HIGHWAY, LOW SPEED TRAFFIC PATHS, SIZES OF LETTERS MAY BE SMALLER THAN SUGGESTED, BUT TO THE RELATIVE SCALE.
- QUANTITIES ARE BASED ON THE SIZES OF PAINT MARKINGS SHOWN AND ARE FOR ESTIMATING PURPOSES ONLY.
- PAINT VOLUMES ASSUME A 17 Wt. % 0.432 THICKNESS. EPoxy VOLUMES ASSUME A 22 Wt. % 0.559 THICKNESS.

UNITS SHOWN IN BRACKETS ARE METRIC AND ARE IN MILLIMETERS (MM) UNLESS OTHER UNITS ARE SHOWN.

PEDESTRIAN CROSSING

Pavement Markings

LETTERS:

DEPARTMENT OF TRANSPORTATION

S620-00

STANDARD DIAMETER: 24" (600 MM)
1. Each square equals 4 inches (100).
2. All pavement markings are to conform to the requirements of the "Manual on Uniform Traffic Control Devices" and "Standard Highway Signs" publications, from the Federal Highway Administration.
3. All numbers are to be white.
4. Use the sizes of numbers shown unless smaller or larger sizes are needed. The size of numbers may be scaled proportionately down by approximately one-third for low-speed, urban conditions. The minimum height of any number is 6 feet (1.8 m). Larger sizes may be used for above average speeds and other critical locations.
5. Do not exceed more than one lane in width for any pavement markings except in the case of the word "school." See DTL. DWG. NO. 620-10 for more information.
6. For multiple lines of information, place the information so it reads in the direction of travel. Do not exceed three lines of information at any location.
7. When words and symbols are used in combination, space them at least four times the height of characters for low-speed roads, but not more than ten times the height of the characters under any condition.
8. On narrow, low-speed bicycle paths, sizes of numbers may be smaller than suggested, but to the relative scale.
9. Quantities are based on the sizes of pavement markings shown and are for estimating purposes only.
10. Paint volumes assume a 17 mil (0.432 mm) thickness, epoxy volumes assume a 22 mil (0.559 mm) thickness.

### Quantities

<table>
<thead>
<tr>
<th>#</th>
<th>Area (ft²)</th>
<th>Paint (gal.)</th>
<th>Epoxy (gal.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.78</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>2</td>
<td>6.76</td>
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<td>0.09</td>
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<tr>
<td>3</td>
<td>5.97</td>
<td>0.06</td>
<td>0.08</td>
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<td>4</td>
<td>5.54</td>
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<td>6</td>
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</tr>
<tr>
<td>7</td>
<td>4.11</td>
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<td>8</td>
<td>7.74</td>
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<td>0.11</td>
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<tr>
<td>9</td>
<td>6.94</td>
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<td>0.10</td>
</tr>
<tr>
<td>0</td>
<td>7.11</td>
<td>0.08</td>
<td>0.10</td>
</tr>
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### Metric Quantities

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<thead>
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<th>Area (m²)</th>
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<th>Epoxy (liters)</th>
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<td>0.62</td>
<td>0.27</td>
<td>0.35</td>
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</tbody>
</table>

Units shown in brackets (1) are metric and are in millimeters (mm). Unless other units are shown.

**Details Drawing**

Reference: DWG. NO. 620-05

**Pavement Markings (numbers)**

Effective: September 2014

**Montana Department of Transportation**
**NOTES:**

1. **UNLESS OTHERWISE NOTED EACH SQUARE EQUALS 4 (100) INCHES.**

2. **ALL PAVEMENT MARKINGS ARE TO CONFORM TO THE REQUIREMENTS OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND "STANDARD HIGHWAY SIGNS" PUBLICATIONS, FROM THE FEDERAL HIGHWAY ADMINISTRATION.**

3. **ALL WORDS TO BE WHITE.**

4. **USE THE SIZES OF WORDS SHOWN UNLESS SMALLER OR LARGER SIZES ARE NEEDED.** The size of words may be scaled proportionately down by approximately one-third for low-speed, urban conditions. The minimum height of any word is 6 FEET (.18 m). Larger sizes may be used for above average speeds and other critical locations.

5. **DO NOT EXCEED MORE THAN ONE LANE IN WIDTH FOR ANY PAVEMENT MARKINGS, EXCEPT IN THE CASE OF THE WORD "SCHOOL." When "SCHOOL" is extended to the width of two lanes, scale the word up proportionately to fit the application width.**

6. **FOR MULTIPLE LINES OF INFORMATION, PLACE THE INFORMATION so it reads in the direction of travel. DO NOT EXCEED THREE LINES OF INFORMATION AT ANY LOCATION.**

7. **WHEN WORDS AND SYMBOLS ARE USED IN COMBINATION, SPACE THEM AT LEAST FOUR TIMES THE HEIGHT OF CHARACTERS FOR LOW-SPEED ROADS, BUT NOT MORE THAN TEN TIMES THE HEIGHT OF THE CHARACTERS UNDER ANY CONDITION.**

8. **ON NARROW, LOW-SPEED BICYCLE PATHS, SIZES OF LETTERS MAY BE SMALLER THAN SUGGESTED, BUT TO THE RELATIVE SCALE.**

9. **QUANTITIES ARE BASED ON THE SIZES OF PAVEMENT MARKINGS SHOWN AND ARE FOR ESTIMATING PURPOSES ONLY.**

10. **PAINT VOLUMES ASSUME A 17 ML (.432) THICKNESS.** EPOXY VOLUMES ASSUME A 22 ML (.559) THICKNESS.

---

**QUANTITIES**

<table>
<thead>
<tr>
<th>WORD</th>
<th>AREA (FT²)</th>
<th>PAINT (GAL.)</th>
<th>EPOXY (GAL.)</th>
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<tbody>
<tr>
<td>STOP</td>
<td>22.77</td>
<td>0.24</td>
<td>0.31</td>
</tr>
<tr>
<td>ONLY</td>
<td>21.89</td>
<td>0.23</td>
<td>0.30</td>
</tr>
<tr>
<td>RIGHT</td>
<td>26.05</td>
<td>0.28</td>
<td>0.36</td>
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<tr>
<td>LANE</td>
<td>23.94</td>
<td>0.25</td>
<td>0.33</td>
</tr>
<tr>
<td>LEFT</td>
<td>20.00</td>
<td>0.21</td>
<td>0.27</td>
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<tr>
<td>TURN</td>
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</tr>
<tr>
<td>SCHOOL</td>
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<td>0.51</td>
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**METRIC QUANTITIES**

<table>
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<tr>
<th>WORD</th>
<th>AREA (m²)</th>
<th>PAINT (liters)</th>
<th>EPOXY (liters)</th>
</tr>
</thead>
<tbody>
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<td>STOP</td>
<td>2.05</td>
<td>0.89</td>
<td>1.15</td>
</tr>
<tr>
<td>ONLY</td>
<td>1.98</td>
<td>0.85</td>
<td>1.11</td>
</tr>
<tr>
<td>RIGHT</td>
<td>2.34</td>
<td>1.01</td>
<td>1.31</td>
</tr>
<tr>
<td>LANE</td>
<td>2.16</td>
<td>0.93</td>
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</tr>
<tr>
<td>LEFT</td>
<td>1.80</td>
<td>0.78</td>
<td>1.01</td>
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<tr>
<td>TURN</td>
<td>2.16</td>
<td>0.93</td>
<td>1.21</td>
</tr>
<tr>
<td>SCHOOL</td>
<td>4.54</td>
<td>1.96</td>
<td>2.54</td>
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</tbody>
</table>

---

**DETAIL DRAWING**

**REFERENCE**

DWG. NO. 620-10

**STANDARD SPEC.**

SECTION 620

**PAVEMENT MARKINGS**

**WORDS**

**EFFECTIVE:** SEPTEMBER 2014

**MTD MONTANA DEPARTMENT OF TRANSPORTATION**

**UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.**
**SHADOW SYMBOL**
area = 0.028 ft² (0.26 m²)
E = 0.3 ft (0.09 m)
F = 0.17 ft (0.05 m)
G = 0.79 ft (0.24 m)
I = 0.3 ft (0.09 m)

**BIKE LANE SYMBOL**
area = 0.043 ft² (0.04 m²)
E = 0.29 ft (0.09 m)
F = 0.1 ft (0.03 m)
G = 0.6 ft (0.18 m)
I = 0.3 ft (0.09 m)

**PREFERENTIAL LANE SYMBOL**
area = 0.006 ft² (0.01 m²)
E = 0.05 ft (0.01 m)
F = 0.32 ft (0.09 m)
G = 0.6 ft (0.18 m)
I = 0.15 ft (0.04 m)

**NOTES:**
1. ALL PAVEMENT MARKINGS ARE TO CONFORM TO THE REQUIREMENTS OF THE AASHTO, OR UNIFORM TRAFFIC CONTROL DEVICES AND REQUIREMENTS SHOWN IN THE RIGHT-OF-WAY.
2. ALL SYMBOLS ARE TO BE WHITE EXCEPT FOR THE ACCESSIBILITY PARKING SPACE SYMBOL, WHICH HAS A BLUE BACKGROUND AND WHITE BORDER OPTIONS.
3. AREA NOT EXCEEDED MORE THAN ONE LANE IN WIDEN FOR ANY PAVEMENT MARKINGS EXCEPT IN THE CASE OF THE WORD "SCHOOL" SEE DETAIL.
4. WHEN WORDS AND SYMBOLS ARE USED IN COMBINATION, SPACE THEM AT LEAST EIGHT TIMES THE HEIGHT OF CHARACTERS FOR CORRECT PENS, BUT NOT MORE THAN TEN TIMES THE HEIGHT OF THE CHARACTERS UNDER ANY CONDITION.
5. QUANTITIES ARE BASED ON THE SIZES OF PAVEMENT MARKINGS SHOWN AND ARE FOR ESTIMATING PURPOSES ONLY.
6. (IP) = PAINT VOLUMES ASSUME A 1 FT (0.3048 M) THICKNESS.
7. (ES) = EPOXY VOLUMES ASSUME A 2 FT (0.597 M) THICKNESS.

**REFERENCE:**
MDU NO.
STANDARD EOC
SECTION 620-25

**MDOT:**
MDT DEPARTMENT OF TRANSPORTATION
NOTES:

1. ADJUST MANHOLES UPWARD WITH ADJUSTING RINGS UNDER FRAME.
2. ADJUST MANHOLES DOWNWARD BY REMOVING CONE AND BARREL
   SECTIONS AS NECESSARY AND REPLACING WITH SECTIONS OF
   LENGTH REQUIRED TO MATCH GRADE.
3. SLOPE MANHOLE FRAME AS REQUIRED TO MATCH SLOPE OF STREET.
4. MAKE FINAL MANHOLE ADJUSTMENTS BEFORE PAVING.

MANHOLE ADJUSTMENT DETAIL

NOTES:

1. ADJUST WATER VALVES UPWARD OR DOWNWARD AS REQUIRED.
2. MAKE FINAL ADJUSTMENT BEFORE PAVING.

VALVE BOX ADJUSTMENT DETAIL

UNITS SHOWN IN BRACKETS ("") ARE
METRIC AND ARE IN MILLIMETERS ("mm")
UNLESS OTHER UNITS ARE SHOWN.
NOTES:
1. ADJUST MANHOLES UPWARD OR DOWNWARD AS REQUIRED.
2. CONSTRUCT CONCRETE APRON OF CLASS GENERAL CONCRETE OR APPROVED EQUAL.

MANHOLE ADJUSTMENT DETAIL

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DIMENSIONS</th>
<th>CONCRETE APRON QUANTITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANHOLE</td>
<td>D - 12 (ENG)</td>
<td>0 - C - Y - (ID ENG)</td>
</tr>
<tr>
<td>VALVE</td>
<td>D - 12 (ENG)</td>
<td>0 - C - Y - (ID ENG)</td>
</tr>
</tbody>
</table>

CONCRETE APRON DETAIL
The minimum distance from the edge of driving lane to the first mailbox should be the clear zone distance plus 6'-0" (1.8 m). The width of the approach and mailbox turnout combined should not exceed 40'-0" (12.0 m). If more than 40'-0" (12.0 m), the mailbox turnout widening is not required.

The minimum spacing between mailboxes is equal to three-fourths of their height above the ground. See DD. DWG. NO. 623-20 and 623-25 for mailbox details.

Locate new installations, if possible, on the right side of the public road or private approach.

Approach quantities are not included in mailbox turnout quantities.

Provide adequate approach radius for this turnout. Adjust the radius based on field conditions and document reasons during the field review.

See detailed drawing number 203-05 for additional guidance.

Units shown in brackets ( ) are metric and are in millimeters (mm) unless other units are shown.
TURNOUT WITHOUT APPROACH

NOTE:
ACTUAL SIZE AND LOCATION TO BE DETERMINED BY THE PROJECT MANAGER.

TURNOUT WITH APPROACH

NOTE:
1. LOCATE NEW INSTALLATIONS, IF POSSIBLE, ON THE FAR RIGHT SIDE OF AN INTERSECTION WITH A PUBLIC ROAD OR PRIVATE DRIVEWAY.
2. APPROACH QUANTITIES ARE NOT INCLUDED IN TURNOUT QUANTITIES.

MAILBOX LOCATION DETAIL

NOTES:
- THE MINIMUM SPACING BETWEEN MAILBOXES IS EQUAL TO THREE-FOURTHS OF THEIR HEIGHT ABOVE THE GROUND. SEE DTL. DWG. NO. 623-20 AND 623-25 FOR MAILBOX DETAILS.
- UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.
NOTES:

(1) GALVANIZE ALL MATERIALS MEETING SECTION 711.

(2) STAKE MAILBOX LOCATIONS BEFORE INSTALLATION FOR PROPER HEIGHT AND DISTANCE FROM THE ROADWAY. ONCE STAKED, NOTIFY THE PROJECT MANAGER AND THE POST OFFICE. THE PROJECT MANAGER AND POSTMASTER/MAIL CARRIER ARE ALLOWED 48 HOURS TO REVIEW AND MODIFY THE STAKED LOCATIONS PRIOR TO FINAL INSTALLATION.

(3) OTHER NCHRP 350 OR MASH CRASH TESTED MAILBOX SUPPORTS AND ASSEMBLIES MAY ALSO BE USED.

(4) LOCATE THE MAILBOX 8" TO 12" (0.2 TO 0.3 METERS) OUTSIDE THE EDGE OF THE SHOULDER OR 6" TO 12" (0.15 TO 0.3 METERS) FROM THE FACE OF CURB.

(5) SEE "A GUIDE TO MAILBOX SAFETY IN MONTANA", FOR ADDITIONAL INFORMATION.
ELEVATION VIEW

2 ~ 3/8" DIA. (M10) BOLTS

SANDBAGS (25 LB. (11 kg) MAX./SACK) (AS NEEDED)

1 ~ 4" x 4" x 3.8" (100 x 100 x 1160)
2 ~ 3/8" x 3" (10 x 75)
LAG SCREWS
1 ~ 2" x 4" x 35" (50 x 100 x 890)
AT 45° ANGLE
1 ~ 2" x 4" x 6" (150 x 100 x 150)
2 ~ 3/8" x 3" (10 x 75)
LAG SCREWS
4 ~ 3/8" x 4" (10 x 100)
LAG SCREWS
1 ~ 3/8" DIA. (M10) BOLT
1 ~ 3/8" DIA. (M10) BOLT
2 ~ 3/8" DIA. (M10) BOLTS
1 ~ 3/8" DIA. (M10) BOLT

FRONT VIEW

NOTES:

1. THIS MOUNTING DEVICE IS INTENDED FOR USE IN CONSTRUCTION ZONES.
2. BOLT PLACEMENT IS SYMMETRICAL THROUGHOUT MOUNTING BRACKET.
3. ALL BOLT CONNECTIONS ARE FINISHED WITH A WASHER AND NUT.
4. FOR THE POST USE EITHER DOUGLAS FIR OR HEM FIR, WHICH IS SURFACED FOUR SIDES (5AS) AND FREE OF HEART CENTER (FDHC).

PLAN VIEW

1 ~ 2" x 4" (50 x 100)
40" (1016)
1 ~ 4" x 4" x 4" (100 x 100 x 100)
2 ~ 2" x 4" (50 x 100)
1 ~ 4" x 4" x 4" (100 x 100 x 100)
1 ~ 2" x 4" (50 x 100)
60" (1524)

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

NOTES:
1. THIS MOUNTING DEVICE IS INTENDED FOR USE IN CONSTRUCTION ZONES.
2. BOLT PLACEMENT IS SYMMETRICAL THROUGHOUT MOUNTING BRACKET.
3. ALL BOLT CONNECTIONS ARE FINISHED WITH A WASHER AND NUT.

ATTACHMENT DETAILS

ATTACH TO ELBOW BRACKETS WITH 3/8" DIA. [M10] BOLTS

ATTACH TO MAILBOX WITH 5/16" DIA. [M8] BOLTS ON EACH SIDE

ATTACH TO BRACKET PLATE WITH 1/4" DIA. [M6] BOLTS ON EACH SIDE

ATTACH TO POST WITH 3/8" DIA. [M10] BOLTS GOING THROUGH THE WOODEN MEMBER

ATTACH TO BRACKET PLATE WITH 3/8" DIA. [M10] BOLTS

3 3/4" [95.25]

14" [355]

6" [150]

3" [75]

3" [75]

2" [50]

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

DETAILED DRAWING
REFERENCE
STANDARD SPEC.
SECTION
TEMPORARY MAILBOX SUPPORT BRACKET DETAILS
EFFECTIVE SEPTEMBER 2014
MDT* MONTANA DEPARTMENT OF TRANSPORTATION

623-35
MEDIAN WIDTHS 36' (10.8 m) TO 76' (22.8 m)
LOCATE AND CONSTRUCT TURNOUTS ABOVE IN CONJUNCTION WITH DITCH
BLOCKS IF AT ALL POSSIBLE. PROVIDE DRAINAGE WHEN NECESSARY.

STANDARD U-TURN FOR NARROW MEDIANS

NOTES:
1. NARROW MEDIANS, MEDIAN WIDTHS GREATER THAN 76' (22.8 m)
   AND INDEPENDENT ROADWAYS REQUIRE SPECIAL DESIGN.
2. GRADES: UNIFORM BETWEEN INSIDE SHOULDERS OF MAIN
   TRAVELED WAY EXCEPT FOR SPECIAL DESIGN.
3. SURFACING: SEE PLANS FOR QUANTITIES.
4. DRAINAGE: USE 18" (450mm) OR 24" (600mm) CULVERTS IF REQUIRED.