1'-0" [300]
VARIIES - SEE DTL.
DWG. NO. 603-32
2'-0" [600]
6" [150]
VARIIES - SEE DTL.
DWG. NO. 603-32

1'-0" [300]
VARIIES - SEE DTL.
DWG. NO. 603-32
2'-0" [600]
6" [150]
VARIIES - SEE DTL.
DWG. NO. 603-32

NOTE:
All concrete is Class
General or equal.

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

4'-0" [1200]
6" [150]

6" x 6" x W2.0
[152.4 x 152.4 x MW18.71]
WIRE MESH

6" [150]

3/4" DIA. [M20] ANCHOR BOLTS AT
APPROX. 18" [455] O.C. AROUND
ENTIRE PERIPHERY OF PIPE EMBEDDED
IN CONCRETE (TYP. ALL STRUCTURES
THIS SHEET), SEE DTL. DWG.
NO. 552-00

6" x 6" x W2.0
[152.4 x 152.4 x MW18.71]
WIRE MESH THROUGHOUT
ENTIRE STRUCTURE (TYPICAL
ALL STRUCTURES THIS SHEET)

CONCRETE CUTOFF WALL
INLET AND OR
OUTLET END
WHEN SPECIFIED
IN PLANS

4'-0" [1200]
6" [150]

CONCRETE CUTOFF WALL
INLET AND OR
OUTLET END
WHEN SPECIFIED
IN PLANS

CONCRETE CUTOFF WALL
(SEE DTL.DWG. NO. 552-00)

RIPRAAP AS
SPECIFIED

RIPRAAP AS
SPECIFIED

SIDE ELEVATION

ARCH PIPE

SIDE ELEVATION

FRONT ELEVATION MULTIPLE PIPES

FRONT ELEVATION MULTIPLE PIPES

SECTION A-A

SECTION B-B

FRONT ELEVATION

FRONT ELEVATION

FRONT ELEVATION

FRONT ELEVATION

CONCRETE CUTOFF WALL
(SEE DTL.DWG. NO. 552-00)

RIPRAAP AS
SPECIFIED

RIPRAAP AS
SPECIFIED

SIDE ELEVATION

ARCH PIPE

SIDE ELEVATION

FRONT ELEVATION MULTIPLE PIPES

FRONT ELEVATION MULTIPLE PIPES

NOTE:
GENERAL OR EQUAL.

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

613-06

CONCRETE EDGE PROTECTION
FOR METAL CULVERTS

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

DETAILED DRAWING
MONTANA DEPARTMENT
OF TRANSPORTATION

4'-0" [1200]
6" [150]

FOR ANCHOR BOLT
SPACING AND WIRE
MESH SEE NOTES
ABOVE

4'-0" [1200]
6" [150]

FOR ANCHOR BOLT
SPACING AND WIRE
MESH SEE NOTES
ABOVE

4'-0" [1200]
6" [150]

FOR ANCHOR BOLT
SPACING AND WIRE
MESH SEE NOTES
ABOVE

6" [150]
CAST-IN-PLACE CONCRETE:

Leak joints are indicated on the plans. If construction is stopped for over two hours, create a construction joint. Use class general concrete for all cast-in-place concrete.

Use a 1 1/2" expansion joint filler per section 707 whenever the cast-in-place concrete units are subject to any part of the beam structure.

Clear the embankment slope of all brush, debris and rubble. A cushion is not required for gravel embankment slopes. Finish all slopes to the slope indicated on the bridge plans. Compacted all loose material. Leave the adjacent slope area in a smooth, uniform condition.

REINFORCING STEEL:

(GRAB BUNCH OR 1/2" RADIUS OR 1/2" CHAMFER)


2. 6" x 6" x W2.9 [152.4 x 152.4 x MW18.71] WIRE MESH

All shear reinforcement required at construction joints for reinforcing steel and wire mesh.

CONSTRUCTION JOINTS:

Use as needed. If placing slab when beam is required, use in lieu of spacing as a dimension joint. Joints may be spaced, made with induced stress or removable wedge.

If joints are to be sawed, saw joints just after concrete has set but before undulated cracking occurs.

VERTICAL AND HORIZONTAL CONSTRUCTION JOINT

Use as needed. If placing slab when beam is required, use in lieu of spacing as a dimension joint. Joints may be spaced, made with induced stress or removable wedge.

If joints are to be sawed, saw joints just after concrete has set but before undulated cracking occurs.

VERTICAL REINFORCING STEEL

In addition to reinforcing required, use as needed in lieu of other units required in placing slab.

LEAK JOINTS:

Units shown on brackets [] are metric and are in millimeters. Use as needed unless other units are shown.
CULVERT RIPRAP

613-14

2'-0" [600]

4'-0"

[1200]

4'-0"

[1200]

CUTOFF WALL

CLASS 1 RIPRAP UNLESS OTHERWISE SPECIFIED

CUTOFF WALL

2'-0" [600]

4'-0"

[1200]

2'-0" [600]

4'-0"

[1200]

ROADWAY

FILL SLOPE

SUBGRADE SHOULDER OF ROADWAY

HEIGHT OF PIPE

FLOW LINE

CONCRETE CUTOFF WALL
(SEE DTL. DWG. NO. 552-00)

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.

DIALED DRAWING
REFERENCE DWG. NO.
STANDARD SPEC.
SECTION 613

MTS MONTANA DEPARTMENT OF TRANSPORTATION
**EMBANKMENT PROTECTION**

**MINIMUM T FOR:**
- **CLASS I RIPRAP = 1.0' [300]**
- **CLASS II RIPRAP = 1.5' [450]**
- **CLASS III RIPRAP = 2.0' [600]**

**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.

**SECTION A-A**

**GEOTEXTILE PLACEMENT DETAIL**

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

**DETAILS:**
- **TOP OF STREAM BANK**
- **TOP OF SLOPE**
- **DIRECTION OF STREAM CURRENT**
- **MACHINE DIRECTION OF GEOTEXTILE**
- **1' [300] MIN. OVERLAP**
- **5' [1.5 m] MIN. OFFSET BETWEEN ADJACENT ROLL ENDS**
- **CROSS MACHINE DIRECTION OF GEOTEXTILE**
- **1.5:1 MAX.**

**INSTALL PERMANENT EROSION CONTROL GEOTEXTILE PER SECTION 622.**

**UNITS SHOWN IN BRACKETS () ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.**
**RIPRAP & GROUTED RIPRAP DRAINAGE CHUTE**

**SECTION A-A**

- **RIPRAP & GROUTED RIPRAP CHUTE**
- **USE RANDOM RIPRAP CONFORMING TO SECTION 713.04 OF THE STANDARD SPECIFICATIONS.**
- **USE CEMENT GROUT CONFORMING TO SECTION 701.06 OF THE STANDARD SPECIFICATIONS.**

**SECTION B-B**

- **RIPRAP & GROUTED RIPRAP CHUTE**
- **USE TURF REINFORCEMENT MAT (TRM) CONFORMING TO SECTION 713.12 OF THE STANDARD SPECIFICATIONS.**
- **USE TURF REINFORCEMENT MAT (TRM) CONFORMING TO SECTION 713.04 OF THE STANDARD SPECIFICATIONS.**

**QUANTITIES**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DIMENSIONS</th>
<th>RIPRAP</th>
<th>QUANTITIES</th>
<th>TURF REINFORCEMENT MAT</th>
<th>ADD. RIPRAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2'-0&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
<td>1.5 C.Y.</td>
<td>2.2 C.Y.</td>
</tr>
<tr>
<td>2</td>
<td>3'-0&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
<td>9.8 C.Y.</td>
<td>13.0 C.Y.</td>
</tr>
<tr>
<td>3</td>
<td>3'-0&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
<td>10.0 m³</td>
<td>10.0 m³</td>
</tr>
</tbody>
</table>

**METRIC QUANTITIES**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>METRIC DIMENSIONS</th>
<th>RIPRAP</th>
<th>QUANTITIES</th>
<th>TURF REINFORCEMENT MAT</th>
<th>ADD. RIPRAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>600 1000 300</td>
<td>1.54 m³</td>
<td>2.2 m³</td>
<td>10.0 m³</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>900 1200 450</td>
<td>3.87 m³</td>
<td>5.30 m³</td>
<td>10.0 m³</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1200 2400 900</td>
<td>10.0 m³</td>
<td>10.0 m³</td>
<td>10.0 m³</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

- *USE CLASS-I RIPRAP FOR ALL GROUTED RIPRAP TYPES & TRM CHUTES*
- *7.84 S.Y. + (N x 0.759) S.Y./L.F.*
- *8.13 S.Y. + (N x 0.845) S.Y./L.F.*
- *23.80 S.Y. + (N x 1.222) S.Y./L.F.*
- *24.27 S.Y. + (N x 1.295) S.Y./L.F.*
- *6.35 m² + (N x 2.049) m²/m*
- *6.59 m² + (N x 2.282) m²/m*
- *19.28 m² + (N x 3.300) m²/m*
- *19.66 m² + (N x 3.497) m²/m*

**TABLE**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>METRIC DIMENSIONS</th>
<th>RIPRAP</th>
<th>QUANTITIES</th>
<th>TURF REINFORCEMENT MAT</th>
<th>ADD. RIPRAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>600 1000 300</td>
<td>1.54 m³</td>
<td>2.2 m³</td>
<td>10.0 m³</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>900 1200 450</td>
<td>3.87 m³</td>
<td>5.30 m³</td>
<td>10.0 m³</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1200 2400 900</td>
<td>10.0 m³</td>
<td>10.0 m³</td>
<td>10.0 m³</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION A-A**

- **TURF REINFORCEMENT MAT CHUTE**
- **USE TURF REINFORCEMENT MAT (TRM) CONFORMING TO SECTION 713.12 OF THE STANDARD SPECIFICATIONS.**
- **USE TURF REINFORCEMENT MAT (TRM) CONFORMING TO SECTION 713.04 OF THE STANDARD SPECIFICATIONS.**

**SECTION B-B**

- **TURF REINFORCEMENT MAT CHUTE**
- **USE TURF REINFORCEMENT MAT (TRM) CONFORMING TO SECTION 713.12 OF THE STANDARD SPECIFICATIONS.**
- **USE TURF REINFORCEMENT MAT (TRM) CONFORMING TO SECTION 713.04 OF THE STANDARD SPECIFICATIONS.**

**QUANTITIES**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DIMENSIONS</th>
<th>TURF REINFORCEMENT MAT</th>
<th>ADD. RIPRAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2'-0&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>2</td>
<td>3'-0&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>3</td>
<td>3'-0&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
</tr>
</tbody>
</table>

**METRIC QUANTITIES**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>METRIC DIMENSIONS</th>
<th>TURF REINFORCEMENT MAT</th>
<th>ADD. RIPRAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>600 1000 300</td>
<td>1.54 m³</td>
<td>2.2 m³</td>
</tr>
<tr>
<td>2</td>
<td>900 1200 450</td>
<td>3.87 m³</td>
<td>5.30 m³</td>
</tr>
<tr>
<td>3</td>
<td>1200 2400 900</td>
<td>10.0 m³</td>
<td>10.0 m³</td>
</tr>
</tbody>
</table>

**NOTES**

- *USE CLASS-I RIPRAP FOR ALL GROUTED RIPRAP TYPES & TRM CHUTES*
- *7.84 S.Y. + (N x 0.759) S.Y./L.F.*
- *8.13 S.Y. + (N x 0.845) S.Y./L.F.*
- *23.80 S.Y. + (N x 1.222) S.Y./L.F.*
- *24.27 S.Y. + (N x 1.295) S.Y./L.F.*
- *6.35 m² + (N x 2.049) m²/m*
- *6.59 m² + (N x 2.282) m²/m*
- *19.28 m² + (N x 3.300) m²/m*
- *19.66 m² + (N x 3.497) m²/m*