**Lighting**

- High Bay Light Standard
- Flood or Floor Light

**Electrical**

- Electrical Feeder or Full Box
- Lighting Transformer
- Nine-Faced Generator
- Electrical Manhole
- Power Feed
- Transformer on Pole
- Switch Box
- Electrical Manhole
- Gruge Manhole
- Switch Box
- Telephone Manhole
- Combination Pole-Power
- Telephone Manhole
- Combination Guy Pole-Power

**Telephone**

- Free-Ward Eave
- Free-Ward Slate
- Free-Ward Weather Sensor
- Road-Other Signal
- Road-Other Weather Sensor

**Intelligent Transportation System**

- Center Yellow Solid Double
- Center Yellow Solid Beaten (No Paint)

**Traffic Control**

- Signal Flash Wire File
- Double Start Arm File
- Signal Face
- Signal pole with Start Arm
- Signal Controller and Cable (4 ft)
- Traffic Control

**Traffic Signal**

- Traffic Control

**Traffic Stripping**

- Boysen Strip
- Stare Strip
SECTION A-A

NOTES:
1. A FENCE PLACED CONTINUOUSLY TO SECTION BUT SHALL BE INSTALLED AROUND THE CONCRETE WASHOUT AREA EXCEPT AT THE OPENING.
2. THE CONCRETE WASHOUT SHALL HAVE LETTERS AT LEAST 3 INCHES HIGH AND CONTAIN:
   a. SUBSECTION 630.02.
3. ALL MATERIALS AND LABOR TO COMPLETE THE CONCRETE WASHOUT STRUCTURE SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID FOR SEPARATELY.
4. THE BOTTOM OF EXCAVATION SHALL BE A MINIMUM OF FIVE FEET ABOVE GROUND WATER. IF NOT, THE BOTTOM OF EXCAVATION SHALL BE IN ACCORDANCE WITH 208.02.3.
5. THE PAY ITEM NUMBER FOR CONCRETE WASHOUT STRUCTURE (EACH IS 208-0094).

CONCRETE WASHOUT STRUCTURE

SECTION B-B

NOTES:
1. AGGREGATE SHALL CONFORM TO SUBSECTION 308.02.6.
2. THE CONTRACTOR SHALL INSTALL CURB AND GUTTER THAT ENCLOSURES THE EXCAVATION FROM DAMAGE, WHILE NOT BLOCKING FLOW OF WATER AND STRUCTURAL PROTECTION IS IN THE CURB AND GUTTER SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID FOR SEPARATELY.
3. GUTTER INSTALLATION SHALL CONFORM TO SUBSECTION 302.6.
4. ALL MATERIALS AND LABOR TO COMPLETE THE VEHICLE TRACKING PAD SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID FOR SEPARATELY.
5. THE PAY ITEM NUMBER FOR VEHICLE TRACKING PAD (EACH IS 208-00970).

TEMPORARY EROSION CONTROL

STANDARD PLAN NO.
M-208-1

Sheet No. 1 of 11
SECTION A-A
TYPICAL STAKE INSTALLATION

OVERLAP JOINING DETAIL

JOINING EROSION LOG APPLICATIONS

EROSION LOG APPLICATIONS

NOTE: EROSION LOGS SHALL BE TIGHTLY ATTACHED FOR JOINING LOGS IN OTHER SITUATIONS SEE THE JOINING EROSION LOG APPLICATIONS.

USE TWO WOOD STAKES AT ALL EROSION LOG END OR JOINTS (TPN)

USE A WOOD STAKE EVERY 3 FT. TO PROVIDE COMPLETE PROTECTION ALONG THE LENGTH OF THE EROSION LOG.

TRENCH LOG END AT GRADE 2 IN. (TPN)

EROSION LOG FILTER AT DROP INLET

EROSION LOG CULVERT INLET PROTECTION

TABLE OF LOGS:

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>208-00015</td>
<td>TYPE 1 (64 IN)</td>
</tr>
<tr>
<td>208-00010</td>
<td>TYPE 1 (64 IN)</td>
</tr>
<tr>
<td>208-00014</td>
<td>TYPE 1 (64 IN)</td>
</tr>
<tr>
<td>208-00019</td>
<td>TYPE 1 (64 IN)</td>
</tr>
<tr>
<td>208-00018</td>
<td>TYPE 1 (64 IN)</td>
</tr>
<tr>
<td>208-00024</td>
<td>TYPE 1 (64 IN)</td>
</tr>
</tbody>
</table>

NOTE: TRENCH LOGS MUST BE 2 IN. (TPN)

SECTION B-B
NOTE: EROSION LOG SIZES 2 IN. (TPN)

EROSION LOG CULVERT OUTLET PROTECTION

EROSION LOGS SHOULD BE TIGHTLY ATTACHED IN OTHER SITUATIONS, SEE THE JOINING EROSION LOG APPLICATIONS.

USE TWO WOOD STAKES AT ALL EROSION LOG END OR JOINTS (TPN)

USE A WOOD STAKE EVERY 3 FT. TO PROVIDE COMPLETE PROTECTION ALONG THE LENGTH OF THE EROSION LOG.

TRENCH LOG END AT GRADE 2 IN. (TPN)

EROSION LOG FILTER AT DROP INLET

EROSION LOG CULVERT INLET PROTECTION

TRENCH LOG END AT GRADE 2 IN. (TPN)

EROSION LOG CULVERT OUTLET PROTECTION

PLAN VIEW

FLOW

FLOW

FLOW

FLOW

FLOW

FLOW

FLOW

FLOW
NOTES
1. Silt fence shall have a maximum drainage area of one-quarter acre.
2. Fence length: maximum slope length behind barrier is 250 feet.
3. Silt fence end at toe of slope shall be placed 5 to 10 feet beyond toe of slope to provide storage capacity.
4. Silt fence shall be placed parallel to the contour with ends flared up slope.
5. Maximum length of erosion loss on silt fences shall be 50 feet.

SECTION A-A

Erosion loss pay items

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>200-0001</td>
<td>TYPE 1 (250 FT)</td>
</tr>
<tr>
<td>200-0002</td>
<td>TYPE 1 (250 FT)</td>
</tr>
<tr>
<td>200-0003</td>
<td>TYPE 1 (250 FT)</td>
</tr>
<tr>
<td>200-0004</td>
<td>TYPE 1 (250 FT)</td>
</tr>
<tr>
<td>200-0005</td>
<td>TYPE 1 (250 FT)</td>
</tr>
<tr>
<td>200-0006</td>
<td>TYPE 1 (250 FT)</td>
</tr>
<tr>
<td>200-0007</td>
<td>TYPE 1 (250 FT)</td>
</tr>
<tr>
<td>200-0008</td>
<td>TYPE 1 (250 FT)</td>
</tr>
</tbody>
</table>

SECTION B-B

Silt fence toe of slope protection

Notes: The pay item number for silt fence is 200-0001.
AGGREGATE BAGS AT STORM DRAIN INLET (TYPE I)

PLAN VIEW

**NOTE:** Use aggregate bags only when there is a minimum clearance of 3 feet from the edge of the traveled way (including conditions during retreat) to the face of curb.

<table>
<thead>
<tr>
<th>LENGTH (R) OF INLET FT</th>
<th>NUMBER OF AGGREGATE BAGS UPSTREAM OF INLET</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5</td>
<td>1</td>
</tr>
<tr>
<td>6 - 10</td>
<td>2</td>
</tr>
<tr>
<td>L &gt; 10</td>
<td>3</td>
</tr>
</tbody>
</table>

AGGREGATE BAG APPLICATIONS

**NOTE:** The pay item number for aggregate bag (LT) is 208-60035

**PLAN VIEW**

**SECTION A-A**

AGGREGATE BAGS AT DROP INLET

**TEMPORARY EROSION CONTROL**

**STANDARD PLAN NO.**

M-208-1

Sheet No. 4 of 11
STORM DRAIN INLET PROTECTION (TYPE I)

NOTES:
1. INLET PROTECTION DEVICE SHALL EXTEND 12 INCHES PAST EACH END OF THE INLET.
2. THE PAY ITEM NUMBERS FOR STORM DRAIN INLET PROTECTION TYPE I ARE 200-00005-00, 200-00008-00 INCHES (EACH), 200-00008-104 INCHES (EACH),
   AND 200-00008-204 INCHES (EACH).
3. FOR STORM DRAIN INLET TYPES I AND II, IF THERE IS A MINIMUM CLEARANCE OF 3 FEET FROM THE Edge OF THE TRAVELER TO THE FACE OF CURB, USE THE AGGREGATE BAGS AT STORM DRAIN INLET TYPE I DETAIL ON SHEET 4 INSTEAD.

PLAN VIEW

SECTION A-A

STORM DRAIN INLET PROTECTION

STORM DRAIN INLET PROTECTION (TYPE II)

NOTES:
4. THE PAY ITEM NUMBERS FOR STORM DRAIN INLET PROTECTION TYPE II ARE 200-00008-00, 200-00008-104 INCHES (EACH), AND 200-00008-204 INCHES (EACH).
**NOTES:**

1. ** Berm should have a height of 10 inches side slopes of
   2:1 of flatter and a minimum base width of 4 ft. - 6 in.
2. ** Berm shall be used to intercept and divert drainage to a
   designated outlet.
3. ** Berm shall not be used where drainage area exceeds 10 acres.
4. ** Berm shall be constructed out of acceptable materials that can be
   compacted and excavated as a compacted material, and rolled compacted.
5. ** Berm shall be constructed out of embankment coverage and
   in no circumstance constructed out of surfacable topsoil.
6. ** The Pay Item Number for Temporary Berm (LI) is 208-0030.

**TEMPORARY BERM**

![Diagram of Temporary Berm]

**NOTES:**

1. ** Temporary diversion ditches shall be constructed across the slope
   to intercept runoff and direct it to a stable outlet or sediment trap.
2. ** Use the temporary diversion ditch immediately after a new cut/fill slope,
   or around the perimeter of a disturbed area.
3. ** The gradient along the flow path shall have a positive grade to assure drainage,
   but shall not be so steep as to result in erosion due to high velocity.
4. ** The diversion canals shall always be located a minimum of 20 feet
   from the outside limits of disturbed area boundary.
5. ** The diversion canals shall be constructed out of embankment coverage and
   in no circumstance constructed out of surfacable topsoil.
6. ** The Pay Item Number for Temporary Diversion (LI) is 208-0030.

**GRADING APPLICATIONS**

**TEMPORARY DIVERSION**

**EROSION CONTROL**

**STANDARD PLAN NO.**

M-208-1

**Sheet No. 7 of 11**
SILT FENCE

NOTES:
1. GYOTEXTILE SHALL BE ATTACHED TO WOOD POSTS WITH THREE OF WIRE STAPLES PER POST. STAPLES SHALL BE HEAVY DUTY WIRE AND AT LEAST 1 INCH LONG.
2. WOOD POSTS SHALL BE 1 IN x 3 IN. UNIMAGICAL.
3. THE PVC COPPER NUMBER FOR SILT FENCE (CPC) IS 208-0020.

END SECTION DETAIL (PLAN VIEW)

NOTE:
1. THE END OF THE GYOTEXTILE FABRIC SHALL BE TRIMMED NEAR A HIDDEN POST: ALLOW THE POST TO FALL AND THEN SECURE ALONG THE POST WITH 3 HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG.

JOINING SECTION DETAIL (PLAN VIEW)

NOTE:
1. THE END OF THE SILT FENCE FABRIC SHALL BE ATTACHED TO WIRE POSTS USING 3 WIRE TIES. THE FABRIC IS ATTACHED ALONG THE POST WITH 3 HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG.
2. POSTS SHALL BE TIGHTLY ATTACHED WITH NO GAP TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT JOINT.

SILT FENCE APPLICATIONS

ELEVATION VIEW

SIDES VIEW

SILT FENCE (REINFORCED)
EROSION BALE APPLICATIONS
SECTION A-A

NOTES:
1. DITCH SIZE D = 10 ft or as shown on the plans.
2. THE DITCH EROSION CONTROL SHALL BE CLASS 2 AND CONFORM TO THE REQUIREMENTS OF SECTION 71220A.
3. THE END OF DITCH CHECK DAM SHALL BE A MINIMUM OF 6 IN. HIGHER THAN CENTER OF CHECK DAM.
4. FOR USE AS TEMPORARY CHECK DAM ONLY AND NOT FOR PERMANENT INSTALLATION.
5. THE PLANT SPECIFIED FOR ROCK CHECK DAM (BY 20A-0004L)

NOTE: ALL MATERIALS AND LABOR TO COMPLETE THE ROCK CHECK DAM SHALL BE INCLUDED IN THE COST OF WORK.

ROCK CHECK DAM
GENERAL NOTES
1. THIS STANDARD PLAN DOES NOT APPLY TO TARMAC PORTAL CONSTRUCTION.
2. TRANSVERSE CONSTRUCTION JOINTS SHALL BE LOCATED AT A JOINT.
3. THIS JOINT LAYOUT SHALL BE USED AS A STANDARD OF THE JOINT LAYOUT FOR THE PROJECT. IF THE CONTRACTOR PREFERENCES VARIATIONS FROM THIS STANDARD, THE CONTRACTOR MUST PREPARE A PAYMENT JOINT LAYOUT FOR APPROVAL BY THE ENGINEER. SLABS 20 FT. IN WIDTH SHALL BE CONSTRUCTED ONLY WHERE DESIGNED IN THE PLAN.
4. ON MULTIPLE LANE HIGHWAYS, THE MULTIPLE LANE TRANSVERSE, PAVEMENT AND ROAD SHOULDERS SHALL BE PLACED WITHIN THE LONGITUDINAL TAPER CONSTRUCTION JOINT.
5. ON MULTIPLE LANE HIGHWAYS SEPARATED BY A CONCRETE BARRIER, A (3) JOINT SHALL BE CONSTRUCTED AS ONE OF THE JOINER PLATES.
6. JOINTS SHALL BE CONSTRUCTED BETWEEN THE TWO OPPOSING DIRECTIONS OF TRAVEL ON A MULTIPLE LANE UNDIVIDED METERAGE WHERE ALL OF THE FOLLOWING APPLIES:
   A. PAYMENT IS CONNECTED ACROSS BOTH DIRECTIONS OF TRAVEL.
   B. THERE IS NO CENTER BARRIER.
   C. THE WIDTH OF THE PAYMENT IN ONE DIRECTION IS GREATER THAN 60 FEET.
7. ON MULTIPLE LANE SLABS, THE 2 FT. OR 4 FT. END OF THE SLAB WITHIN THE METERAGE MAY BE PLANTED.
8. JOINTS ARE TO BE USED WHEN A TRAFFIC LANE IS ADDED OR UTILIZED FOR SPEED LIMIT CHANGES. ALTERNATIVE LONGITUDINAL JOINERY AT SPEED LIMIT CHANGES MAY BE USED IF APPROVED.
9. WHERE JOINTS ARE SHOWN IN THE PAVEMENT, THE DOWEL BARS WILL BE PLACED AT 24 IN. CENTER STARTING 24 IN. FROM THE ROADWAY JOINTS.

TYPICAL JOINT LAYOUT FOR CONCRETE ROADWAY WITH CONCRETE SHOULDERS

DOWEL BAR DETAIL FOR JOINT WITH 13 FT. AND 12 FT. WIDE SLABS

RURAL TWO-LANE

MULTI-LANE WITH SPEED CHANGE LANE AND CONCRETE SHOULDERS

OPTIMAL LONGITUDINAL JOINT IN CENTER FOR SINGLE LANE SPEED CHANGE LANE

CONCRETE PAVEMENT JOINTS

STANDARD PLAN NO.
M-412-1
Sheet No. 1 of 5
RAMP "A" Dowel Bar Detail for C Joint with a 12 ft. lane

RAMP "B" Dowel Bar Detail for C Joint with center longitudinal split lane

Multi-lane with acceleration and deceleration lanes and concrete shoulders

Optional longitudinal joint in center for single lane acceleration and deceleration lane

Joint Legend
- Transfer Joint
- Longitudinal Joint
- Longitudinal Joint in Center

Computer File Information
Sheet Revisions
Colorado Department of Transportation
CONCRETE PAVEMENT JOINTS
STANDARD PLAN NO.

M-412-1
Sheet No. 2 of 5
NOTES
1. Longitudinal joints shall be placed adjacent to lane markings when possible and have a maximum spacing of 15 ft (5 m). Joint is permitted with flexible curb and gutter. 
2. Construct transverse joints perpendicular to the centerline of pavement and extend through the curb or 
curb and gutter. 
3. Place 1/3 in. non-expansion joint filler in top 1/2 in. of curb joint at intersection return radius points. 
4. The contractor shall, unless otherwise shown on the plans, select and use a bone breaker 
at inside corners and small size structures. Smaller structures such as valve and manhole boxes 
shall not require a bone breaker. 
5. Where a longitudinal joint passes less than 1 ft from a cast-in-place manhole or similar size 
structure, a typical 3 ft (1 m) radius joint, as shown in the details, shall be used. 
6. Transverse joints shall either intersect the center of circular manholes and belets or be at least 
3 ft away from the edge of circular manholes. See curb detail detail of detail on sheet 5. 
7. Transverse construction joints shall be located at a 3 joint. 
8. The engineer shall have an option to use individual details for the 3 joint on short run (2") P) 
to curb return details.

TYPICAL CURBED PAVEMENT JOINT LAYOUT
Notes:
1. Placement of joints shall be placed adjacent to lane markings when possible and have a minimum spacing of 50 ft. 50 ft is recommended with a minimum curb and gutter.
2. Construct transverse joints perpendicular to the centerline of pavement and extend through the curb or curb and gutter.
3. Place 6 in. expansion joint filler in the 6 in. curb joint at intersection return radial points.
4. The contractor shall ensure spacers shown on the plans are installed and use a bond breaker at joints. Manholes and similar line structures smaller than structures such as valve and manhole boxes do not require a bond breaker.
5. Where a longitudinal joint is placed less than 5 ft from a cast-in-place manhole or similar line structure, a typical 2 in. radial joint, as shown in the details, shall be used.
6. Transverse joints shall either intersect the center of circular manholes and plates or be at least 4 ft from the edge of circular manholes. See curb detail section on sheet 5.

Multi-Lane Intersection with Speed Change Lane and Concrete Shoulders
NOTE

Pavement thickness (T) shall be as shown on the plans.

<table>
<thead>
<tr>
<th>Pavement Thickness (T)</th>
<th>Tavel Bar Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 in. X 1 in.</td>
<td>1 in.</td>
</tr>
<tr>
<td>8 in. X 1 in.</td>
<td>1 1/8 in.</td>
</tr>
<tr>
<td>10 in. X 1 1/8 in.</td>
<td>1 1/4 in.</td>
</tr>
</tbody>
</table>

Reinforcing size table

The bar size is No. 5 when pavement is placed on unbound bases.

The bar size is No. 6 when pavement is placed on lime treated soil, asphalt or cement treated, vitrified asphalt or recycled asphalt bases.

CONCRETE

PAVEMENT JOINTS

STANDARD PLAN NO.

M-412-1

Sheet No. 5 of 5
**GENERAL NOTES**

1. ALL CONCRETE SHALL BE CURED OFF BOX CULVERT.
2. ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEARED BEFORE FRESH CONCRETE IS PLACED.
3. ALL CONSTRUCTION JOINTS NOT SHOWN ON THE PLANS SHALL BE CONSTRUCTED ONLY IF APPROVED BY THE ENGINEER.
4. THE CONTRACTOR SHALL MAINTAIN THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.
5. STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH STANDARD PLAN W-261.
6. ANY CULVERT SPANNED 20 FT. OR GREATER, A FOUNDATION INVESTIGATION AND REPORT ARE REQUIRED.
7. BACKFILL SHALL NOT BEGIN UNTIL TOP SLAB HAS REACHED DESIGNED STRENGTH.
8. SPLICE QUANTITIES FOR LONGTINUAL AND TRANSVERSE BARS ARE NOT INCLUDED.
9. REINFORCING STEEL SHALL BE GRADE 60.
10. THE MINIMUM LAP SPLECE LENGTH FOR DRY COATED REINFORCING BARS SHALL BE:

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>#</th>
<th>#</th>
<th>#</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>#4</td>
<td>2'</td>
<td>1'</td>
<td>0'</td>
<td>0'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>#</th>
<th>#</th>
<th>#</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6</td>
<td>3'</td>
<td>1'</td>
<td>0'</td>
<td>0'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>#</th>
<th>#</th>
<th>#</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>#8</td>
<td>5'</td>
<td>3'</td>
<td>1'</td>
<td>0'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>#</th>
<th>#</th>
<th>#</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>#10</td>
<td>7'</td>
<td>5'</td>
<td>3'</td>
<td>1'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>#</th>
<th>#</th>
<th>#</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>#12</td>
<td>9'</td>
<td>7'</td>
<td>5'</td>
<td>3'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>#</th>
<th>#</th>
<th>#</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>#14</td>
<td>11'</td>
<td>9'</td>
<td>7'</td>
<td>5'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>#</th>
<th>#</th>
<th>#</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>#16</td>
<td>13'</td>
<td>11'</td>
<td>9'</td>
<td>7'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>#</th>
<th>#</th>
<th>#</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>#18</td>
<td>15'</td>
<td>13'</td>
<td>11'</td>
<td>9'</td>
</tr>
</tbody>
</table>

11. ALL DIMENSIONS PERPENDICULAR TO THE CENTERLINE OF THE BOX.
12. MINDWALLS SHALL BE TIED TO CONCRETE BOX CULVERT IN ACCORDANCE WITH STANDARD PLAN W-605.
13. TRANSVERSE REINFORCING SHALL BE NORMAL TO THE CENTERLINE OF THE BOX.
14. (CONT.)
15. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 1/4".
16. FOR FILL HEIGHTS LESS THAN 2 FT. A WATERTIGHT MEMBRANE SHAL BE PROVIDED FOR THE TOP OF THE SLAB AND 18 INCHES DOWN FROM THE TOP OF THE EXTERIOR WALLS.
17. FOR FILL HEIGHTS LESS THAN 2 FT, THE #4 BARS FOR THE BOTTOM MAT OF THE TOP SLAB SHALL BE AS FOLLOWS:

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>#4</td>
<td>1'</td>
</tr>
</tbody>
</table>

18. SEE M-605-3 FOR PRECAST CONCRETE BOX CULVERT DETAILS.

---

**CONSTRUCTION JOINT DETAIL FOR STAGED CONSTRUCTION**

NOTE: THIS DETAIL IS FOR CONSTRUCTION JOINTS INSTALLED PERPENDICULAR TO THE BOX. THE CONTRACTOR CAN DESIGN AND INSTALL J BARS AT HIS EXPENSE TO SUPPORT TEMPORARY LIVE LOADS DURING STAGE 1 CONSTRUCTION. J BARS SHALL BE THE SAME SIZE AS THE TOP AND BOTTOM SLAB REINFORCEMENT WHEN THERE ARE NO TEMPORARY LIVE LOADS TO SUPPORT.

1. ANY CONSTRUCTION J JOINTS MOUNT GUARDRAILS (SEE STANDARD PLAN M-606-1, SHEET 20).
2. POST ANCHORS AND CONCRETE FOR HEADWALL MOUNT GUARDRAILS ARE MEASURED AND PAID SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
3. ANY SPECIAL DESIGN FOR STIRRUPS WILL NOT BE MEASURED AND PAID FOR OR INCLUDED IN THE WORK.
4. ALL REINFORCING STEEL SHALL BE ACCORDING TO STANDARD PLAN M-606-1, SHEET 20.
5. POST ANCHORS SHALL BE PROVIDED ACCORDING TO STANDARD PLAN M-606-1, SHEET 20.
6. POST ANCHORS AND CONCRETE FOR HEADWALL MOUNT GUARDRAILS SHALL CONFORM TO ASA Z35-1989 M-606-1.
7. POST ANCHORS WHEN REQUIRED AND INCORPORATED IN REINFORCING CONCRETE, SHALL CONFORM TO ASA Z35-1989 M-606-1.

---

**DRAWING INFORMATION**

- **Drawing File Name:** 601010102.dgn
- **Last Modification Date:** 04/05/19
- **Initials:** DDG/BRIDGE
- **Issue Date:** July 4, 2012
- **Issued By:** Project Development Branch

---

** компьютерная информация**

- **Creation Date:** 07/04/12
- **Initials:** DDG
- **Last Modification Date:** 04/05/19
- **Initials:** BRIDGE
- **Date:** 08/27/13
- **Comments:** LRPD Design
- **Function:** www.codot.gov/business/designsupport
- **Drawing Information:** M-601-1
- **Drawing File Name:** M-601-1.000
- **CAD Version:** Not Applicable
- **Scale:** Not to Scale
- **Language:** English
# Single Concrete Box Culvert Dimensions, Quantities & Rating Factors (Excluding Headwall & Toewall Quantities)

## Headwall and Toewall Quantities

<table>
<thead>
<tr>
<th>Section</th>
<th>90° to 75°</th>
<th>74° to 60°</th>
<th>59° to 45°</th>
<th>44° to 30°</th>
<th>30° to 15°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feet</td>
<td>Linear Feet</td>
<td>Linear Feet</td>
<td>Linear Feet</td>
<td>Linear Feet</td>
<td>Linear Feet</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

### NOTES

1. Six-inch spacing at each end of the span for a distance of 1/4 of the span length is four-inch spacing everywhere.
2. Quantities are given for the headwall and the toe wall and are based on per linear foot of headwall steel. Quantities include all reinforcing quantities shall be paid for as shown on the plans.
3. Shrink headwalls are not recommended for these spans. A special design is required.
4. For headwall and toe wall details see V-601-4, Sheet 1 of 2.
5. When the fill heights are less than or equal to 2 ft, all reinforcing bars in the headwall all reinforcing bars designated by an asterisk (*) and the 3 bars in the top mat of the top slab shall be epoxy coated.
6. Reinforcing quantities include both epoxy-coated and uncoated bars.
7. When a width of less than 6 ft is required, use the bar sizes and the slab sizes as determined for the 6 ft wide available on the table.
8. For size and spacing of the top mat bars in the top slab see Table 1-2 of 2. All other bars are 4 in at 14 in spacing. The number of bars required is listed on this sheet and includes both 4 in and those from the table.
9. Live load is neglected per ASHTO LRFD Section 8.6.1.2.5. For these structures, refer to the cost rating manual.
10. For all new culvert designs, a rating is required. The rating summary sheet should be prepared from the cost external website and submitted to the bridge rating unit or included as part of a larger design package. For additional information, see the cost rating manual.
### DOUBLE CONCRETE BOX CULVERT DIMENSIONS, QUANTITIES & RATING FACTORS (EXCLUDING HEADWALL & TOEWALL QUANTITIES)

<table>
<thead>
<tr>
<th>Box Size</th>
<th>Depth</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Concrete</th>
<th>Fill</th>
<th>Rating Factor</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>3</td>
<td>10</td>
<td>12</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td>1.2</td>
<td>20</td>
</tr>
<tr>
<td>B2</td>
<td>4</td>
<td>12</td>
<td>14</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>1.3</td>
<td>30</td>
</tr>
<tr>
<td>B3</td>
<td>5</td>
<td>14</td>
<td>16</td>
<td>12</td>
<td>5</td>
<td>3</td>
<td>1.4</td>
<td>40</td>
</tr>
</tbody>
</table>

### HEADWALL AND TOEWALL QUANTITIES

<table>
<thead>
<tr>
<th>Headwall</th>
<th>30' to 75'</th>
<th>75' to 100'</th>
<th>100' to 125'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>Height</td>
<td>Depth</td>
<td>Height</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

**NOTES**

1. SIX INCH SPACING AT EACH END OF THE SPAN FOR A DISTANCE OF 1/4 OF THE SPAN LENGTH. 6 INCH SPACING ELSEWHERE.
2. QUANTITIES ARE GIVEN FOR THE HEADWALL AND TOEWALL AND ARE BASED ON PER LINEAL FOOT. NOTE: HEADING STONE QUANTITIES INCLUDE ALL REINFORCING QUANTITIES SHALL BE PAID FOR AS SHOWN ON THE PLAN.
3. SHEETED HEADWALLS ARE NOT RECOMMENDED FOR THESE SPANS. A SPECIAL DESIGN IS REQUIRED.
4. FOR HEADWALL AND TOEWALL DETAILS SEE W-40-2, SHEET 1 OF 2.
5. WHEN THE TOTAL HEIGHTS ARE LESS THAN OR EQUAL TO 2 FT, ALL REINFORCING BARS IN THE HEADWALL, ALL REINFORCING BARS DESIGNATED BY AN ASTERISK * AND THE #1 BAR IN THE TOP YOKE OF THE TOP YOKE SHALL BE EPOXY COATED.
6. REINFORCING QUANTITIES INCLUDE BOTH EPOXY-COATED AND UNGUARDED BARS.
7. WHEN A CLEAR OF LESS THAN 6 FT IS REQUIRED, USE THE BAR SITES AND THE CLEAR WALL THICKNESSES FOR THE 6 FT DECK OF AVAILABLE ON THE TABLE.
8. FOR SLEEVING BOX AND SPACING OF THE BOTTOM WALLS IN THE TOP YOKE SEE TABLE ON W-40-2, SHEET 1 OF 2. ALL OTHER BARS ARE PART OF THE 2'-4" SPACING THE NUMBER OF BARS REQUIRED TO BE LINED ON THIS SHEET AND INCLUDES BOTH #4 BARS AND THOSE FROM THE TABLE.
9. live LOAD IS INCLUDED AS PER ASPH 100-16, SECTION 5.6.1.2.8 FOR THESE STRUCTURES REFER TO THE LOAD RATING MANUAL.
10. FOR ALL NEW CULVERT DESIGNS, A RATING IS REQUIRED. THE RATING SUMMARY SHEET SHOULD BE USED TO DETERMINE THE LOAD Rating UNITS AS PART OF A LARGER DESIGN PACKAGE. FOR ADDITIONAL INFORMATION, SEE THE LOAD RATING MANUAL.

**CONCRETE QUANTITY** = 0.086 CY/FT
# TRIPLE CONCRETE BOX CULVERT DIMENSIONS, QUANTITIES & RATING FACTORS (EXCLUDING HEADWALL & TOEWALL QUANTITIES)

<table>
<thead>
<tr>
<th>Span</th>
<th>90° To 75°</th>
<th>74° To 60°</th>
<th>59° To 45°</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>6</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>7</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>8</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>9</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>10</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>11</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>12</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>13</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>14</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>15</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>16</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>17</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>18</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>19</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>20</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
</tbody>
</table>

## HEADWALL AND TOEWALL QUANTITIES

<table>
<thead>
<tr>
<th>Span</th>
<th>90° To 75°</th>
<th>74° To 60°</th>
<th>59° To 45°</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>6</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>7</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>8</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>9</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>10</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>11</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>12</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>13</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>14</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>15</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>16</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>17</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>18</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>19</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
<tr>
<td>20</td>
<td>4 4 4</td>
<td>4 4 4</td>
<td>4 4 4</td>
</tr>
</tbody>
</table>

### NOTES

1. 5'-0" inch spacing at each end of the span for a distance of 1/4 of the span length, 12" inch spacing elsewhere.
2. Quantities given for one headwall and one toe wall, and are based on per linear foot of headwall. Steel quantities include all reinforcing; quantities shall be paid for as shown on the plans.
3. Sheared headwalls are not recommended for these spans, a special design is required.
4. For headwall and toe wall details see M-601-1, sheet 1 of 2.
5. When the fill distance is less than or equal to 2 ft, all reinforcing bars in the headwall and toe wall are designated by an asterisk (*) and, in the top way of the top slab, shall be epoxy coated.
6. Reinforcing quantities include both epoxy-coated and uncoated bars.
7. When 4 bars of less than 6 ft is required, use the bar sizes and the slab will be multiplied by the 6 ft size available on the table.
8. For side and spacing of the bottom way bars in the top slab see Table on M-601-1, sheet 2. All other A bars are bars at 12" spacing. The number of bars required is listed in this sheet and includes both 4 bars and those from the table.
9. Live load is neglected as per AASHTO LRFD Section 3.6.1.26. For these structures refer to the cost rating manual.
10. For all new culvert designs a rating is required. The rating summary sheet should be signed from the cost external website and submitted to the bridge rating unit or included as part of a larger design package for additional information, see the cost rating manual.
<table>
<thead>
<tr>
<th>Diameter (in.)</th>
<th>H Minimum Cover (in.)</th>
<th>H Maximum if Cover (ft.)</th>
<th>Pipe gage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>24</td>
<td>36</td>
<td>60</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>24</td>
<td>60</td>
<td>120</td>
</tr>
</tbody>
</table>

**2-1/2" x 1/2" CORRUGATIONS**
CORRUGATED STEEL PIPE

**2-3/4" x 1/2" CORRUGATIONS**
CORRUGATED STEEL PIPE ARCH

**3" x 1" CORRUGATIONS**
CORRUGATED STEEL PIPE

**3.5" x 1" CORRUGATIONS**
CORRUGATED STEEL PIPE ARCH

<table>
<thead>
<tr>
<th>Diameter (in.)</th>
<th>H Minimum Cover (in.)</th>
<th>H Maximum if Cover (ft.)</th>
<th>Pipe gage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>24</td>
<td>36</td>
<td>60</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>24</td>
<td>60</td>
<td>120</td>
</tr>
</tbody>
</table>

**2-1/2" x 1/2" CORRUGATIONS**
CORRUGATED STEEL PIPE

**2-3/4" x 1/2" CORRUGATIONS**
CORRUGATED STEEL PIPE ARCH

**3" x 1" CORRUGATIONS**
CORRUGATED STEEL PIPE

**3.5" x 1" CORRUGATIONS**
CORRUGATED STEEL PIPE ARCH
### 5" x 1" Corrugations
**Corrugated Steel Pipe**

<table>
<thead>
<tr>
<th>Diameter (in)</th>
<th>H Minimum Cover (ft)</th>
<th>H Maximum Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>30</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>36</td>
<td>30</td>
<td>18</td>
</tr>
</tbody>
</table>

**5" x 1" Corrugations**

**Corrugated Steel Pipe Arch**

- Corner bearing pressure of 2 tons per 50 ft.

---

### 3/4" x 3/4" 7/8" Corrugations
**Corrugated Steel Pipe**

<table>
<thead>
<tr>
<th>Diameter (in.)</th>
<th>H Minimum Cover (in.)</th>
<th>H Maximum Cover (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

**3/4" x 3/4" 7/8" Corrugations**

**Corrugated Steel Pipe Arch**

- Corner bearing pressure of 2 tons per 50 ft.
### 1-1/4" x 1/4" Corrugations

<table>
<thead>
<tr>
<th>Diameter (DIN)</th>
<th>Minimum Cover (in)</th>
<th>H Maximum Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>12</td>
</tr>
</tbody>
</table>

**Corrugated Aluminum Pipe**

### 3/4" x 3/4" 7-1/4ʹ Corrugations

<table>
<thead>
<tr>
<th>Diameter (DIN)</th>
<th>Minimum Cover (in)</th>
<th>H Maximum Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>12</td>
</tr>
</tbody>
</table>

**Corrugated Aluminum Pipe**

### 2-1/4" x 3/4" Corrugations

**Corrugated Aluminum Pipe Arch**

<table>
<thead>
<tr>
<th>Span (in)</th>
<th>Round Equivalent (in)</th>
<th>H Minimum Cover (in)</th>
<th>Pipe Gage</th>
<th>H Maximum Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

**Corrugated Aluminum Pipe Arch**

### 3" x 1" Corrugations

**Corrugated Aluminum Pipe**

### Standard Plan No.

**Metal Pipe**

<table>
<thead>
<tr>
<th>Diameter (DIN)</th>
<th>Minimum Cover (in)</th>
<th>H Maximum Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>12</td>
</tr>
</tbody>
</table>

**Corrugated Aluminum Pipe Arch**

**Corrugated Aluminum Pipe Arch**

---

* Corner bearing pressure of 2 tons per 50 ft.
NOTES
1. THE MGS TRANSITION FROM A TYPE 3 GUARDRAIL SHALL BE COMPLETED OUTSIDE THE MGS END AVERAGE LIMITS.

PLAN VIEW

ELEVATION VIEW

TRANSITION FROM 28 INCH GUARDRAIL TO 31 INCH MGS

ALTERNATE PLAN VIEW - ALIGNMENT TAPER
NOTES


2. IN HEAVY SNOT LOCATION, POSTS 1 AND 2 AT THE END OF THE GUARDRAIL SHALL BE MODIFIED TO INCLUDE A FLANGE BRACE TO IMPROVE ITS STABILITY.

3. POSTS SHALL BE FERRED FOR BREAKAWAY ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

4. SEE SHEETS 1, 2, AND 3 FOR STANDARD GUARDRAIL TYPE 3 INSTALLATION DETAILS.

5. REFLECTOR PROTECTORS SHALL NOT BE USED ON THE GUARDRAIL POSTS.

6. REFLECTOR PROTECTORS SHALL BE ADDED TO THE END PIECE, AND MUST NOT BE RAPID FOR SEPARATION, BUT SHALL BE INCLUDED IN THE HOOK.

END ANCHORAGES (FLARED)
GUARDRAIL • LENGTH OF SOFTSTOP TERMINAL TYPE 3

MAX-TENSION TERMINAL END ANCHORAGE (NONFLARED)
(MASH CERTIFIED)

SECTION A-A

END ANCHORAGES (NONFLARED)
(MASH CERTIFIED)

NOTES FOR NONFLARED


2. DO NOT ATTACH THESE END ANCHORAGES DIRECTLY TO A RIGID BARRIER (EX. CONCRETE BARRIER, STEEL BARRIER, CONCRETE STRUCTURE) WITHOUT A PROPER TRANSITION.

3. CONNECTIONS TO W-BEAM WHERE THE SPLICE IS NOT AT MID-SPAN BUT AT A POST CAN BE MADE USING A 3'-6" x 2", OR 15'-7" W-BEAM PANEL DOWNSTREAM OF TRAFFIC.

4. FOR MSKT END ANCHORAGES (NONFLARED), USE THE MANUFACTURER’S SPECIFIED STEEL FOUNDATION TUBE FDR POSTS CD AND ®.

5. HINGED BREAK AWAY (HBA) STEEL POSTS MAY BE USED CONFORMING TO THE MANUFACTURER’S INSTRUCTIONS.

6. RETROREFLECTOR TABS SHALL NOT BE USED ON END ANCHORAGE POSTS.

7. DELINEATION SHALL BE APPLIED TD THE END PIECE AND SHALL NOT BE PAID FDR SEPARATELY BUT BE INCLUDED IN THE COST OF THE WORK. SEE STANDARD PLAN 5-612-1.

DETAIL B

SOFTSTOP TERMINAL END ANCHORAGE (NONFLARED)
(MASH CERTIFIED)
1. MEDIAN BARRIERS TANGENT TO THE CURBWAY MAY BE USED WHERE THE SHOULDER PLATER IN THE MEDIAN ARE STEEP.

2. SHOULDER LENGTHS SHALL BE INCREASED TO ACCOUNT FOR STEEP EMBANKMENTS OR OTHER HAZARDS WITHIN CLOSE PROXIMITY OF BRIDGES.

- DO NOT CONSTRUCT THE TR AND GUARDRAIL ON THE RAIL END TREATMENT. DO NOT RECORD THE USE OF GUARDRAIL.

- SHOWN ON PLANS LENGTH TO SHIELD ALL HAZARDS IS BASED ON GUARDRAIL'S LENGTH OF NEED COMPUTATION. SEE AASHTO ROADWAY DESIGN GUIDE. THE MINIMUM SHALL BE 12 FT. - 6 IN., WHERE SITE CONDITIONS ALLOW. THE TOTAL LENGTH OF MEDIAN WILL INCLUDE THE LENGTH OF TRANSITION TO SHIELD THE MEDIAN.

1. EDGE OF 8 FT. OR 10 FT. SHOULDER.
2. EDGE OF 6 FT, OR LESS SHOULDER.

- END OF MEDIAN CAN BE PLANNED OR NONPLANNED.
**NOTES**

1. GUARDRAIL TRANSITION FROM PARALLEL TO ROADWAY SHOULDER AT 3G SEGMENT TO 15:1 TAPER WITHIN 18'-9" BASED ON POST OFFSET DIMENSIONS SHOWN.

2. SEE SHEET 14 FOR THE RIGHT SHOULDER GUARDRAIL LAYOUT.
**NOTES**

1. GUARDRAIL TRANSITIONS FROM PARALLEL TO HIGHWAY SHOULDER AT 30 SEGMENT TO 15:1 TAPER WITHIN 18'-9" BASED ON POST OFFSET DIMENSIONS SHOWN.

2. THE OPTION 3 LAYOUT SHALL BE USED WHEN "Y" EXCEEDS 15 FEET OR WHEN MEDIAN BARRIER IS CONTINUOUS.

3. THE OPTION 1 LAYOUT SHALL BE USED WHEN "Y" IS 16 FEET OR LESS.

4. SEE SHEET 14 FOR RIGHT SHOULDER GUARDRAIL LAYOUT.

---

**MULTILINE DIVIDED HIGHWAYS - (DEPRESSED MEDIANS, 21 - 59 FT. WITH OPEN HAZARDS OR OBSTRUCTIONS)**

---

**Computer File Information**

- Creation Date: 11/29/18
- Revised: JJP
- Last Modification Date: 12/29/18
- Revised: LTA
- Full Path: www.codot.gov/business/designsupport
- Drawing File Name: 6060060360.dgn
- CADD Version: 3.6 Scale: Not to Scale

---

**Sheet Revisions**

- Date: 12/21/18
- Comments: JJP/LTA
- Sheet No.: 16 of 19

---

**Colorado Department of Transportation**

- Division of Project Support: JJP/LTA
- Phone: 303-757-9021
- Fax: 303-757-9868
- 2829 West Howard Place
- CDOT HQ, 3rd Floor
- Denver, CO 80204

---

**STANDARD PLAN NO.**

- M-606-1

---

**Issued By:** Project Development Branch November 1, 2018

---

**MIDWEST GUARDRAIL SYSTEM (MGS)**

- **TYPE 3 W-BEAM 31 INCHES**
NOTES

1. POSTS 1, 2, 9, and 10 MAY BE TIMBER OR STEEL.

2. THE NUMBER OF OMITTED POSTS IS DEPENDENT ON THE LENGTH OF THE GAP.

LONG-SPAN RAILING FOR ONE, TWO, OR THREE OMITTED POSTS AT GAP

POSTS 1-2 AND 9-10
(SEE NOTE 1)

TIMBER POST

STEEL POST

BREAKWAY TIMBER POST

POST REVISIONS

Issue Date: 11/01/18

Issued By: Project Development Branch

November 1, 2018

JJP/LTA

Sheet No. 18 of 19
**NOTES**

1. LOCATION AND LENGTH OF MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE AS SHOWN FOR BOXES ON SHEET 15. THE GUARDRAIL TYPE 3 SHALL CONTINUE FOR MULTIPLE INPUT BOXES SHOWN ON SHEET 18.

2. GUARDRAIL ACROSS CULVERTS WITH LENGTH LESS THAN 20 FT. SHALL BE AS SHOWN ON THIS SHEET.

3. GUARDRAIL ACROSS CULVERTS WITH LENGTH BETWEEN 20 FT. AND 60 FT. SHALL BE AS SHOWN ON THIS SHEET.

4. GUARDRAIL ACROSS CULVERTS WITH LENGTH GREATER THAN 60 FT. SHALL BE AS SHOWN ON THIS SHEET.

5. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

6. ALL GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

7. ALL GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

8. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

9. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

10. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

11. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

12. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

13. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

14. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

15. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

16. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

17. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

18. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

19. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

20. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

21. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

22. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

23. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

24. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

25. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

26. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

27. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

28. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

29. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.

30. GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES SHALL BE INSTALLED IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.
NOTES FOR FLARED

1. The end anchorage flared shall either be the SRT (Slotted Rail Terminal), SRT-600, as manufactured by TRW, Inc. (Telephone: 1-800-755-3601) or the EFT-500, as manufactured by Road System Inc. (Telephone: 1-800-220-2220). The EFT-500 shall include all post, rail, and all hardware. It is required for complete installation of the end anchorage flared. The contractor shall provide a copy of the manufacturer's installation instructions and parts list to the engineer prior to installation of the device.

2. In heavy snow locations, the SRT posts #1 through #3 should be flush with the rail and concrete extending into the snow, in accordance with ODOT M 322.

3. The end offset extensions are designed to be centered on the center line of the posts, with the extension at the center of the track. The center of the track shall be located by GPS measurements. The center line of the track shall be located at the center of the posts. The post offset extension shall be placed adjacent to the visual post extensions shown. The offset posts may be used to extend the SRT post 4 or 5 feet from the top of the SRT post 4 or 5 feet from the top of the SRT post 4 or 5 feet from the top of the SRT post.

4. The SRT slotted bearing plate shall be installed between the top of the SRT post and the post set.

5. The SRT shall be fixed in position according to the manufacturer's instructions.

6. See Sheet 2 and 3 for standard guardrail type 5 and installation details.

7. Retroreflective tape shall not be used on posts #1 through #3.

8. SRT panels shall be supplied in either 32 ft. 6 in. or 24 ft. 8 in. in rail panels, or 36 ft. 6 in. and 24 ft. 8 in. in rail panels.

9. SRT - SRT Flared option (See manufacturer's details).

10. Guard rail breakaway steel posts may be used as an alternative on the SRT for posts #1 through #3. (See manufacturer's details.)

11. Guard rail breakaway steel posts in welded posts may be used as an alternative on the SRT for posts #1 through #3. (See manufacturer's details.)

12. Use manufacturer's supplied posts for SRT end anchorage as follows: Post #1 - single continuous post galvanized; Post #2 - single continuous post galvanized; Post #3 through #5 - 4 x 4, crimped post holes galvanized; Post #5 - single continuous post galvanized.

13. The SRT shall be applied to the end rail, and there shall be no fire, spark, or noise detected in the work.

END ANCHORAGE (FLARED)

GUARDRAIL TYPE 3

STANDARD PLAN NO.

M-606-1

Sheet No. 5 of 20
NOTES FOR NONFLARED

1. THE END ANCHORAGE NONFLARED SHALL EITHER BE THE SPLIT GUARDRAIL AS MANUFACTURED BY ROAD SYSTEMS, INC. OR THE GUARDRAILS AS MANUFACTURED BY HAZED SYSTEMS, INC. A GUARDRAIL NONFLARED END ANCHORAGE NONFLARED SHALL INCLUDE ALL POSTS AND GUARDRAILS NEEDED FOR A COMPLETE UNIT. THE GUARDRAIL NONFLARED END ANCHORAGE NONFLARED SHALL BE INSTALLED CONFORMING TO THE MANUFACTURER'S SPECIFICATIONS. FOR GUARDRAIL NONFLARED END ANCHORAGES NONFLARED SHALL BE INSTALLATION INSTRUCTIONS AND PARTS LISTS TO THE CONTRACTOR PRIOR TO THE INSTALLATION OF THE DEVICE.

2. SIDE POSTS SHALL BE SECURED TO THE MANUFACTURER'S INSTRUCTIONS.

3. MIG/WRAP IRON STEEL POSTS MAY BE USED CONFORMING TO THE MANUFACTURER'S INSTRUCTIONS.

4. RETROREFLECTORS SHALL NOT BE USED ON THE LAST SEVEN POSTS OF THE END ANCHORAGE NONFLARED.

5. USE THE MANUFACTURER SPECIFIED STEEL EXTENSION TUBE FOR POSTS 1 AND 4 FOR END ANCHORAGES NONFLARED.

6. USE THE MANUFACTURER SUPPLIED POSTS FOR NONFLARED END ANCHORAGES AS FOLLOWS:
   POST 1 - SOLID, CENTER POST HEAVY GUARDRAIL.
   POST 2 - SOLID, CENTER POST HEAVY GUARDRAIL.
   POST 3 - SOLID, CENTER POST HELD CUSHIONED.
   FOR POSTS 4 THROUGH 7 - USE STANDARD LITE POST, GUARDRAIL.

7. DELINEATION SHALL BE APPLIED TO THE END PIECE AND SHALL NOT BE PAINT SEPARATELY BUT BE INFLUENCED IN THE COST OF THE WORK. SEE STANDARD PLAN 5-S20-5.

SKT END ANCHORAGE (NONFLARED)

X-LITE TERMINAL END ANCHORAGE (NONFLARED)

END ANCHORAGES (NONFLARED)
MEDIAN TERMINAL NOTES

1. THE MEDIAN TERMINAL SHALL BE THE CAT 300 AS MANUFACTURED BY
R&D ENTERPRISES INC. (DRILL, S. 201 7-759-7768), OR THE HYDRAULIC
AS MANUFACTURED BY DRY DRAINAGE SYSTEMS INC. AS DISTRIBUTED
BY INNOVATION SAFETY SUPPLY (TOLL-FREE 1-800-226-8003), OR THE CAT-300
MEDIAN TERMINAL AS MANUFACTURED BY ROAD SYSTEM INC. (TOLL-FREE 1-800-226-8003).

2. THE MEDIAN TERMINAL SHALL INCLUDE ALL POSTS, RAIL, AND HARDWARE
ITEMS REQUIRED FOR A COMPLETE UNIT. THE DEVICE SHALL BE INSTALLED
IN CONFORMANCE WITH THE MANUFACTURER'S INSTRUCTIONS. THE CONTRACTOR
SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS
AND PARTS LISTS TO THE ENGINEER PRIOR TO THE INSTALLATION OF THE
DEVICE.

3. UNLESS OTHERWISE SPECIFIED ON THE PLAN, THE MEDIAN TERMINAL SHALL
BE INSTALLED FOR IN-SECTIONAL TRAFFIC APPLICATIONS.

4. MEDIAN GUARDRAIL POSTS MAY BE STEEL OR WOOD.

5. GUARDRAIL INSTALLATION SHALL BE SUPERVISED AND CERTIFIED BY A
REPRESENTATIVE OF THE DEVICE MANUFACTURER OR BY AN EMPLOYEE OF THE
CONTRACTOR WHO IS A CERTIFIED INSTALLER. THE CERTIFIED INSTALLER SHALL
COMPLETE DEVICE TRAINING AND SHALL BE CERTIFIED BY THE MANUFACTURER AS A
CERTIFIED INSTALLER. IF NO CERTIFICATION IS AVAILABLE, THE PROJECT ENGINEER OF RECORD
MAY INSPECT AND CERTIFY INSTALLATION.

6. INSTALLATION OF GUARDRAILS SHALL BE APPLIED TO THE END PIECE AND
SHALL NOT BE PAIRED SEPARATELY. THE GUARDRAIL END PIECE SHALL BE
INCLUDED IN THE COST OF THE WORK (SEE STANDARD PLAN 5-106-4).

GUARDRAIL TYPE 3
W-BEAM

STANDARD PLAN NO. M-606-1

Sheet No. 10 of 20
**FLOAT-MT NOTES**

1. **THE FLOAT-MT MAY BE SELECTED AS A MEDIUM TERMINAL UNLESS OTHERWISE SHOWN IN THE PLAN.**

2. **INTERGRATED F roots are required with the float-MT.**

3. **THE SOIL TUBES SHALL NOT EXTEND MORE THAN 2 INCHES ABOVE GRADE ALONG A 3 FT SPACE IN THE GRADE.**

4. **THE SOIL TUBES SHALL BE CONNECTED TO AN IN-PLACE FANDING HEAT AND NOT BE LEFT ON THE FLOOR IF THE TUBES ARE PLACED IN FILLED HOLE. THE FANDING MATERIAL MUST BE SATISFACTORY TO PREVENT SETTLEMENT.**

5. **WHEN ROCK IS ENCOUNTERED DURING EXCAVATION, A 12 INCH FLOOR METER TO DEEP MAY BE STAYED IN THE METER.**

6. **THE CEMENTY CABLE ASSEMBLY MUST BE TIGHT ON THE CABLE WHEN CONNECTING THE W-BEAM TO THE CABLE WHEN CONNECTING THE W-BEAM.**
GUARDRAIL FOR OBSTRUCTION IN MEDIANS WIDER THAN 30 FT.

NOTE FOR OBSTRUCTIONS IN MEDIANS WIDER THAN 30 FT.

NARROW MEDIAN DETAIL

GUARDRAIL TYPE 3

W-BEAM

STANDARD PLAN NO.
M-606-1
MULTILANE DIVIDED HIGHWAYS FOR STEEP EMBANKMENTS IN MEDIAN
MULTILANE DIVIDED HIGHWAYS - (DEPRESSED MEDIANs, 60 FT. AND OVER WITH OPEN HAZARDS OR OBSTRUCTIONS)

TRANSITION TO TYPICAL 135° TAPER

SLOPE VARIES

MEDIANS 60 FT. AND OVER WITH 10 FT. OR WIDER SHOULDERS.

SLOPE VARIES

MEDIANS 60 FT. AND OVER WITH 4 TO 8 FT. SHOULDERS.

TRAFFIC

TRAFFIC

EDGEOF TRAVELLED WAY

TRAFFIC

TRAFFIC

TAKE-OFF LINE

TRAFFIC

NOTE:
1. GUARDRAIL TRANSPONENTIAL TO ROADWAY SHORELINE AT 30° TO 135° TAPER WITHIN 200' BASED ON HOT SPOT DESIGNS SHOWN.
2. SEE SHEET 13 FOR THE RIGHT SHORELINE GUARDRAIL LAYOUT.

Computer File Information

Sheet Revisions

Colorado Department of Transportation

GUARDRAIL TYPE 3

W-BEAM

STANDARD PLAN NO.

M-606-1

Sheet No. 16 of 20
NOTES
1. GUARDRAIL TRANSITIONS FROM PARALLEL TO HIGHWAY SHOULD BE AT 30' DEGREE TO TAPER TAPER 10'-10'-10'-10' BASE ON POST OFFSET DIMENSIONS SHOWN.
2. THE OPTION 2 LAYOUT SHALL BE USED WHEN *** EXCEEDS 15 FEET OR WHEN MEDIAN BARRIER IS CONTINUOUS.
3. THE OPTION 3 LAYOUT SHALL BE USED WHEN *** IS 25 FEET OR LESS.
4. SEE SHEET 5 FOR MEDIAN BARRIER GUARDRAIL LAYOUT.

* L MUST MEET THE LENGTH OF NEED AND SHOULD NOT EXCEED 150 FT. UNLESS SITE CONDITIONS WARRANT.

MULTILINE DIVIDED HIGHWAYS - (DEPRESSED MEDIANS, 21 - 59 FT. WITH OPEN HAZARDS OR OBSTRUCTIONS)

TRANSITION TO TYPICAL 15^-TAPER

GUARDRAIL TYPE 3
W-BEAM

STANDARD PLAN NO. M-606-1
Sheet No. 17 of 20
NOTES


3. POSTS REQUIRED WHEN TWO POSTS ARE OMITTED FOR THE 18 FT. LENGTH.

4. ONLY TIMBER POSTS ARE BOLTED OR WELDED ALLOWED FOR OMITTED POSTS 5 THROUGH 10.

NESTED RAIL AT ONE OMITTED POST

NESTED RAIL AT TWO OR THREE OMITTED POSTS

TIMBER

STANDARD PLAN NO.
M-606-1

Sheet No. 19 of 20
NOTES

1. TWO FT IS DESIRABLE FOR THIS DIMENSION WITH A 4 FT LEFT SHOULDER; THE SWEEP IS 0 FT, WHICH IS ACCEPTABLE FOR 6 FT OR MORE SHOULDER.

2. RATE OF SLOPE DEPENDS ON GUARDRAIL LOCATION:
   A. FOR GUARDRAIL FACE 2 FT OR LESS FROM THE NORMAL EDGE OF PAVED SHOULDER, CONTROL THE RATE OF SLOPE OF THE NORMAL PAVED SHOULDER TO THE IMPACT POINT.
   B. FOR GUARDRAIL face MORE THAN 2 FT FROM THE NORMAL EDGE OF THE PAVED SHOULDER, THE SLOPE SHALL BE 1:5 OR FLAT.


4. STYLE OF BARRIERS ARE SHOWN STYLE C MAY BE USED AS APPROPRIATE. SEE SHEET 3 FOR TYPE 7 TO TYPE 3 TRANSITION.

5. THE AREA BETWEEN SHOULDER AND THE TYPE 7 SHALL BE PAIRED. PAYMENT FOR PAVED SURFACE WILL BE MADE UNDER A PAYMENT PLAN FOR PAVEMENT OR CONCRETE WITH QUANTITIES SHOWN ON THE PLAN.


7. GUARDRAIL TYPE 7 F-SHAPE BARRIER

STANDARD PLAN NO. M-606-13

Sheet No. 4 of 4
NOTES:

1. See sheet 3 for end anchorage requirements. At a minimum, the barrier shall be anchored at the ends and at 23-foot intervals with the 42-foot anchor Steel anchor shall be welded to 24 x 8 x 2-inch angle.

2. See sheet 3 for concrete barrier style CA and Style CO.

3. Transition to existing concrete barrier installations of different style shall be accomplished by one 25-foot long segment of barrier.

4. See sheet 3 for concrete barrier style CA transitions at bridge columns and sign pedestals in medians.

5. For style CA connections to structures, see the bridge plans.

TRANSITION: CONCRETE BARRIER TYPE 9 TO CONCRETE BARRIER TYPE 7 OR EXISTING
NOTES
1. SEE SHEET 9 FOR DETAILS OF CONCRETE BARRIER STYLE CGG AND ANCHORS
   CONNECTED TO STRUCTURES AND TRANSFERS TO GUARDRAIL TYPE T.
2. WHERE BARRIER OFFSET IS GREATER THAN 3½ INCH SEE CONCRETE BARRIER TYPE CGG
3. BARRIER FOUNDATIONS SHALL BE FAINTED, OR CONTAINED AGRICULTURAL BOUNDARY, OR
   CEMENTED CONCRETE MATERIAL.
4. REFLECTORIZATION IS REQUIRED ON ALL BARRIER TYPES. SEE THE BARRIER
   REFLECTORIZATION NOTES ON STANDARD PLAN T-6224.

CONCRETE BARRIER STYLE CG (56°)
SLOW-MOULDED CONCRETE GUARD RAILING/BEER

CONCRETE BARRIER STYLE CGG
REAR VIEW

CONCRETE BARRIER STYLE CGG
DETAILS SIMILAR TO STYLE CG EXCEPT AS NOTED.
IN ORDER TO BE ENSURE THE SAFETY OF ALL PERSONS IN THE ROADWAY,
THE LOWER LAYER OF THE GUARDRAIL IS RENEWED WITH XX INDIVIDUALS
FOR EASE-AND-PLACE GUARDRAIL.

CONCRETE BARRIER STYLE CGG
DETAILS SIMILAR TO STYLE CGG EXCEPT AS NOTED.
IN ORDER TO BE ENSURE THE SAFETY OF ALL PERSONS IN THE ROADWAY,
THE LOWER LAYER OF THE GUARDRAIL IS RENEWED WITH XX INDIVIDUALS
FOR EASE-AND-PLACE GUARDRAIL.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.

FOR SURFACES OFFSETS LESS THAN OR EQUAL TO
3 INCHES, NO ADDITIONAL REINFORCEMENT IS REQUIRED.
SURFACE OFFSETS GREATER THAN 3 INCHES WILL
REQUIRE ADDITIONAL REINFORCEMENT AS SHOWN.
ANCHORAGE
BARRIER ELEVATION VIEW INCLUDING REINFORCED ANCHORAGE AT ENDS.

CONCRETE BARRIER
STYLE CEG/CG

35°-4° CONCRETE BARRIER TRANSITION

CONCRETE BARRIER
TYPE 7 OTHER

SECTION B-B

NOTES
1. SEE SHEET 3 FOR THE ANCHORAGE REQUIREMENTS AT A MINIMUM.
   THE BARRIER SHALL BE ANCHORED AT THE ENDS AND AT INTERMITTENT
   SPACES WITH THE 10 FOOT ANCHORAGE ANCHORAGE SHALL BE MONOPED OR
   CONNECTED WITH 2-6/8 X 6/8 X 2-6/8 BARS.
2. SEE SHEET 4 FOR CONCRETE BARRIER STYLE CEG AND STYLE CG.
3. SEE SHEET 5 FOR TRANSITION TO THICK BARS.
4. TRANSITION TO EXISTING CONCRETE BARRIER INSTALLATION OF ERECTORAL
   SPACE SHALL BE ACCOMPLISHED IN ONE 10 FOOT LONG SEGMENT OF BARRIER.
5. SEE SHEET 6 FOR CONCRETE BARRIER STYLE 9 TRANSITIONS
   AT BRIDGE COLLOMS AND SIGN PEDESTALS IN MEDIAN.
6. FOR STYLE CG CONNECTIONS TO STRUCTURES, SEE THE BRIDGE PLANS.

TRANSITION CONCRETE BARRIER STYLE CEG/CG TO CONCRETE BARRIER TYPE 7 OR EXISTING
CONCRETE BARRIER TRANSITION AT BRIDGE COLUMNS

SECTION A-A

SECTION B-B

SECTION C-C

CONCRETE BARRIER TRANSITION AT SIGN PEDESTAL

NOTES

1. THE CONTRACTOR'S OPTIONS FOR FILL BETWEEN CONCRETE BARRIER WALLS.
   a. Place 4 inches of polystyrene or base between concrete barrier walls.
   b. Place 4 inches of granular material at base between walls.
   c. Place granular material from base to bottom of a base cap.
   d. Non-concrete concrete from base to bottom is not permitted.

2. REINFORCING STEEL SHALL EXTEND CONTINUOUSLY THROUGH CONSTRUCTION JOINT.

3. SEE OVERHEAD SHEETS FOR FAR PIER FEETINGS ELEVATIONS FOR NEW CONSTRUCTION.

4. ADJUST HEIGHT OF CONCRETE BARRIER WALL ON LOW SIDE OF ELEVATED OR SUPER-ELEVATED HIGHWAY TO PROVIDE LINEAR GRADE ACROSS TOP OF CONCRETE BARRIER CAP.

5. FOR OVERHEAD SHEETS, SEE STANDARD PLAN 5-604-60.

Computer File Information

Creation Date: 06/29/15
Editor: JMK

Last Modification Date: 07/26/15
Editor: LTA

Division of Project Support
JMK/LTA

Colorado Department of Transportation
520 West Broadway Place
Denver, CO 80204
Phone: 303-757-5000 Fax: 303-757-3868

GUARDRAIL TYPE 9
SINGLE SLOPE BARRIER

STANDARD PLAN NO.
M-606-15
Sheet No. 7 of 11
TYPE 9 TO SINGLE TYPE 3G TRANSITION AND ANCHORAGE OPTION

See Sheet 1 for reinforcement information and Sheet 3 for anchorage details.
LEGEND

1. Revere three beam elements
   ONE 15GA STEEL ELEMENT, SEE DETAIL A.
   ONE 20GA STEEL ELEMENT, SEE DETAIL A.
   TWO 20GA STEEL ELEMENTS, SEE DETAIL A.

2. Plate A

NOTES

1. Where Revelor metal box spacers are installed
   place 2 in. 3/8 inch 4 in. 3/8 inch and 4 1/2 inch
   pipe spacers on 1 inch HD bolts passing through the interior of box.

2. All metal boxes shall be galvanized.
OBSTRUCTION WIDER THAN 3 FT.

- ½" THICKNESS GYT MATERIAL
- FIER COLUMN, BUS SUPPORT POST, CONCRETE HALF WALL, OR SIMILAR OBSTRUCTIONS.

OBSTRUCTION 3 FT. WIDE OR LESS

HAZARDS IN NARROW MEDIANS

CALIFORNIA DEPARTMENT OF TRANSPORTATION
501 E. 11TH STREET
SACRAMENTO, CA 95814
PHONE: 916-322-1354 FAX: 916-323-5450

GUARDRAIL TYPE 9
SINGLE SLOPE BARRIER

STANDARD PLAN NO.
M-606-15

Sheet No. 11 of 11
**NOTES**

1. Geotextile reinforcement shall be woven fabric with a minimum average tensile strength of 1000 lbs. per linear foot for installations with a gap and 2400 lbs. per linear foot for installations without a gap based on AASHTO specifications.

2. Geotextile reinforcement shall be placed by alternating machine direction (MD) with cross machine direction (CD) from layer to layer.

3. The geotextile reinforcement wrap at the back face of game ramp shall be pulled back 12" free with its end secured to soil underlamina with staples or ties.

4. Minimum space of all geotextile shall consist of 2 feet of overlap.

**Gap Detail Step 1**

- Geotextile reinforcement wrap at back face of game ramp shall be temporarily secured with a spaced board and each step after reaching a total of 24" compacted lift.
- Face shall be secured and geotextile reinforcement shall be pulled back 12" free with its end secured to soil underlamina with staple or ties before the second board is placed.

- Do not use spacer for the top lift (final lift). Top lift shall butt the game ramp wall.
CURB RAMPS GENERAL NOTES:

1. In new construction or full-depth reconstruction, provide a separate curb ramp for each variable or guaranteed pedestrian street crossing. Curb ramps shall be contained entirely within the width of the pedestrian street crossing or crosswalk they serve, or as shown on the contract plans.

2. Alternations are defined as changes to an existing roadway that affect pedestrian access, circulation, or use. Alternations include, but are not limited to, reconfiguration, realignment, reconstruction, curb ramp relocations, historic restoration, or changes or additions to structural elements or features of a pedestrian facility.

3. A walkway surface that is defined as a paved surface adjacent to a curb ramp or turning space, without raised obstacles, that could be inadvertently traversed by a user is visually defined.

4. Alternations, where an existing physical condition prevents providing a separate curb ramp for each pedestrian street crossing, a single pedestrian ramp shall be permitted to serve two pedestrian street crossings. The use of a single pedestrian ramp shall be approved by the Engineer prior to construction.

5. Where required, expansion joint material shall be used to clear the pedestrian access route. Each expansion joint shall be constructed as the width and thickness of curb ramps is sufficient to accommodate such elements.

6. Provide expansion joint material. If structure the top of the joint filler material shall be flush with adjoining concrete or curb. The expansion joint material shall extend for the full length of the concrete surface.

7. Provide the ramp retaining elements that protect concrete curb ramps or turning spaces and curb and gutter, where necessary, to meet ADA requirements. Where necessary, curb ramps or turning spaces shall be provided at 30 inches center to center minimum.

CURB RAMPS PAY AREAS

GENERAL NOTES & PAY AREAS

<table>
<thead>
<tr>
<th>Percent Slope</th>
<th>Left</th>
<th>Left</th>
<th>Right</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Type 2 - Mid Ramps</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Type 2 - Die Ramp</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
</tbody>
</table>

SLOPE TABLE

CURB RAMPS

STANDARD PLAN NO.

M-608-1

Sheet No. 1 of 10
TYPE 1 RAMPS FOR WIDE SIDEWALK

TYPE 1 RAMP

TYPE 1 RAMPS FOR WIDE SIDEWALK

TYPE 1 PERPENDICULAR RAMPS

TYPE 1 DIRECTIONAL RAMPS

TYPE 1 CURB RAMPS TYPICAL CONFIGURATIONS
COMBINATION CURB RAMP NOTES:

1. THE CURB RAMP PLACEMENT SHEETS ARE TYPICAL CONFIGURATIONS ONLY AND NOT INDICATIVE OF ALL OPTIONS OTHER CURB RAMP CONFIGURATIONS MAY BE ACCEPTABLE AS LONG AS THEY COMPLY TO THE CRITERIA IN THESE STANDARDS, AND ARE APPROVED BY THE ENGINEER.

2. RAMP AND TURNING SPACE CROSS SLOPE - 2% TYPICAL AT CROSSINGS WITHOUT FIELD OF STOP CONTROL OR ZONE 4 SIGNAL WHERE VEHICLES CAN PROCEED THROUGH THE INTERSECTION WITHOUT SLOWING OR STOPPING THE CROSS SLOPE OF THE RAMP AND TURNING SPACE MAY EQUAL THE ROADWAY GRADE AT INTERSECTION STREET CROSSING THE RAMP AND TURNING SPACE CROSS SLOPE MAY EQUAL THE ROADWAY GRADE.

3. WHERE IT IS ACCEPTABLE FOR A RAMP OR TURNING SPACE CROSS SLOPE TO EXCEED 2% AND MATCH THE ROADWAY GRADE, THE RAMP ABOVE THE TURNING SPACE MAY BE USED TO THE EXTENT THE ADJACENT CURB RAMP CROSS SLOPE SHALL BE SLOPED EQUALLY OVER THE LENGTH OF THE RAMP TO WIKSIDE WALKING, THE RATE OF CHANGE IN CROSS SLOPE MAY NOT EXCEED 2% PER LINEAR FOOT.

COMBINATION CURB RAMPS TYPICAL CONFIGURATIONS
DETECTABLE WARNING SURFACE NOTES:

1. Detectable warning surfaces (DWS) shall be installed at shared use path to street transitions, and shall consist of truncated dome surfaces. Any truncated dome panels or panels which are used must be in the DOT approved projects list.

2. The detectable warning surface shall span the full width of the curb ramp, shared use path, or other pedestrian entrance as applicable, a gap of 2 inches from the edge of the detectable warning surface to the edge of the curb ramp or shared use path is permitted.

3. When detectable warning surfaces are placed in a slope greater than 10%, truncated domes shall be aligned in the direction of the ramp movement. Domes are not required to be aligned. Truncated domes shall be in a square form or radial pattern when placed radially. Place adjacent domes equal distance edge to edge of cut plates shall be staggered.

4. Locate one corner of the dom leading edge at the back of curb. No point on the leading edge of the dom shall be more than 1/2 ft from the back of curb, and any point of the leading edge of the dom will be greater than 1/4 ft from the back of curb, place the dom radially at the back of curb.

5. Where perpendicular directional ramps are at a visible surface, the leading edge of the dom shall not be placed rather than 2 ft from the back of curb. If the radius of a corner makes this impossible, design the curb ramp perpendicular to the curb and cutters.

6. If the detectable warning surface is cut, close off the remaining portion of any cut truncated domes. Seal all cut panel edges with an appropriate sealant to prevent water damage.

7. Truncated dome plates shall be embedded in the concrete curb ramp while the concrete is plastic.

8. DWS shall not be placed over grade breaks.

DETECTABLE WARNING SURFACE PLACEMENT

Type 1 Curb Ramp

Type 2 Curb Ramp

Type 1 Curb Ramp (Perpendicular on radius)

Type 2 - Directional Ramp

Shared Use Path Crossing

Detectable Warning Surface Notes:

1. Detectable warning surfaces (DWS) shall be installed at shared use path to street transitions, and shall consist of truncated dome surfaces. Any truncated dome panels or panels which are used must be in the DOT approved projects list.

2. The detectable warning surface shall span the full width of the curb ramp, shared use path, or other pedestrian entrance as applicable, a gap of 2 inches from the edge of the detectable warning surface to the edge of the curb ramp or shared use path is permitted.

3. When detectable warning surfaces are placed in a slope greater than 10%, truncated domes shall be aligned in the direction of the ramp movement. Domes are not required to be aligned. Truncated domes shall be in a square form or radial pattern when placed radially. Place adjacent domes equal distance edge to edge of cut plates shall be staggered.

4. Locate one corner of the dom leading edge at the back of curb. No point on the leading edge of the dom shall be more than 1/2 ft from the back of curb, and any point of the leading edge of the dom will be greater than 1/4 ft from the back of curb, place the dom radially at the back of curb.

5. Where perpendicular directional ramps are at a visible surface, the leading edge of the dom shall not be placed rather than 2 ft from the back of curb. If the radius of a corner makes this impossible, design the curb ramp perpendicular to the curb and cutters.

6. If the detectable warning surface is cut, close off the remaining portion of any cut truncated domes. Seal all cut panel edges with an appropriate sealant to prevent water damage.

7. Truncated dome plates shall be embedded in the concrete curb ramp while the concrete is plastic.

8. DWS shall not be placed over grade breaks.

Detectable Warning Surface Placement

Computer File Information

Creation Date: 07/24/02
Original File Name: J608020000.dwg

Last Modification Date: 03/03/02

Last Modification By: LTA

Date: 03/03/02

Comments: Completely revised every sheet

Exported File Name: 608020000.dwg

Object: 608020000.dwg

Scale: Not to Scale

Client: J608020000.dwg

Scale: Not to Scale

Client: J608020000.dwg

Sheet Revisions

Colorado Department of Transportation

Division of Project Support

J608020000.dwg

Sheet No. 9 of 10

M-608-1

STANDARD PLAN NO.

Issued By: Project Development Branch
July 4, 2002

CURB RAMPS

J608020000.dwg
CONCRETE DRIVEWAY ENTRANCE TYPE 3

SECTION A-A

SECTION B-B

NOTES
1. DRAINAGE STRUCTURES, TRAFFIC SIGNAL EQUIPMENT, AND OTHER STRUCTURES SHOWN ON PLANS SHOULD NOT BE PLACED IN FRONT OF THE DRIVEWAY PAVEMENT MATERIAL.
2. FOR THE CURB AND GUTTER SHOWN, SEE PLANS FOR CURB TYPE.
3. RAISED GUTTERS SHALL BE BLED IN FLAT.