Missouri Standard Plans
for Highway Construction

Missouri Department of Transportation

This set of standard plans has been approved by the Missouri Highways and Transportation Commission for highway construction projects and constitutes a contract document in accordance with Section 101.2 of the Standard Specifications for Highway Construction.

This set of Standard Plans is effective beginning with the July 2023 bid opening.

www.modot.org/business/standards_and_specs/standardplans.htm
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EXCAVATION PAY LIMITS

BACKSLOPES IN STABLE AND SEMI-STABLE MATERIAL

PARABOLIC ROUNDOING

INTERCEPTION DITCH AND/OR LEVEE

GENERAL NOTES:

SUBSURFACE LOGS OF MATERIALS OBTAINED DURING THE SOIL SURVEY FOR THE PURPOSE OF CUT CLASSIFICATION MAY BE ACQUIRED FROM THE DISTRICT OFFICE UPON REQUEST.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 West Capitol
Jefferson City, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

DATE EFFECTIVE: 08/01/1998
DATE PREPARED: 8/25/2009

203.00E SHEET NO. 1 OF 1
IN ROCK OVER ENTIRE WIDTH OF ROADBED WITH 18" ROCK BASE

SLOPE SAME AS SHOULDER EXCEPT FOR FLEXIBLE PAVEMENTS HAVING FULL WIDTH BITUMINOUS STABILIZED BASE COURSE WHERE THE SLOPE SHALL BE THE SAME AS BOTTOM OF BASE.

IN ROCK OVER ENTIRE WIDTH OF ROADBED WITH TYPE 5 AGGREGATE BASE

IN ROCK OVER PARTIAL WIDTH OF ROADBED

SLOPE SAME AS ABOVE
UNDERGRAADING LIMITS
(FLEXIBLE OR RIGID PAVEMENTS)

UNDERGRAADING LIMITS
(EARTH OR AGGREGATE TYPE SURFACE)

GENERAL NOTES:
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 W. CAPITOL
JEFFERSON CITY, MO 65102
1-888-455-MODOT (1-888-466-6636)

DATE EFFECTIVE: 01/01/2004
DATE PREPARED: 08/23/2009
SHEET NO. 2 OF 2
MULTILANE FACTORS FOR "L"

1.0 LANE ROTATED (2 LANE ROADBED) = 1.00
1.0 LANE ROTATED (3 LANE ROADBED) = 0.75
2.0 LANE ROTATED (4 LANE ROADBED) = 1.50
2.0 LANE ROTATED (5 LANE ROADBED) = 1.75
3.0 LANE ROTATED (6 LANE ROADBED) = 2.00
3.5 LANE ROTATED (7 LANE ROADBED) = 2.25

MAXIMUM RADIUS FOR USE OF A SPIRAL CURVE TRANSITION

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TABLE NOTE: THE EFFECT OF SPIRAL CURVE TRANSITION ON LATERAL ACCELERATION IS LIKELY TO BE NEGLIGIBLE FOR LARGER RADI.

GENERAL NOTES:

A PRACTICAL CONTROL FOR THE LENGTH OF SPIRAL "L" IS CONSIDERED TO BE THE SUPERELEVATION RUNOFF "L". SEE STANDARD PLANS 203.22 SHEET 1 OF 2.

"W" THE WIDENING FOR SURFACING AT INSIDE SHOULDERS. SEE STANDARD PLANS 203.22 SHEET 2 OF 2.

WIDENING TRANSITION VARIES IN DIRECT PROPORTION TO DISTANCE.

SPIRAL CURVES ARE USED ON ALL ROADS THAT HAVE DESIGN TRAFFIC GREATER THAN 400 VEHICLES PER DAY.
AND HAVE A RADIUS LESS THAN THE VALUES LISTED IN THE "MAXIMUM RADIUS FOR USE OF A SPIRAL CURVE TRANSITION" TABLE.

SUPERELEVATION SPIRALS AND WIDENING UNDIVIDED HIGHWAYS

STATE HIGHWAYS DEPARTMENT

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-488-HWYMO 1-888-499-6966

SUPERELEVATION SPIRALS AND WIDENING UNDIVIDED HIGHWAYS

DATE EFFECTIVE: 07/01/2017
DATE PREPARED: 07/01/2017

1 OF 4

203.20G SHEET NO.
Case Number 1

(1) Full S.L.E. for 2 Pavement Width if greater than crown slope.
(2) Full S.L.E. for 2 Pavement Width.
NOTE: CURVE VERTICAL CURVES MAY BE DETERMINED AT POINTS "C" BY EYE.
ADJUSTMENTS OF STYPLES OR FORMS IN THE FIELD.

SUPERELEVATION EQUATION: \( E = \frac{L}{4} \times \frac{1}{3} \)

OUTSIDE EDGE OF PAVEMENT

SECTION E-E

OUTSIDE EDGE OF PAVEMENT (REF. TO NO. 2, CURVE)

SECTION F-F

OUTSIDE EDGE OF PAVEMENT (REF. TO NO. 2, CURVE)

OUTSIDE EDGE OF PAVEMENT (REF. TO NO. 2, CURVE)

OUTSIDE EDGE OF PAVEMENT (REF. TO NO. 2, CURVE)

OUTSIDE EDGE OF PAVEMENT (REF. TO NO. 2, CURVE)

OUTSIDE EDGE OF PAVEMENT (REF. TO NO. 2, CURVE)

PLAN OF ALIGNMENT

FOR CASE NUMBER 2

CASE NUMBER 2

WHERE TRANSVERSE SLOPE OF TANGENT SECTION IS OFFSET TO SLOPE OF SUPERELEVATION.
NOTE: PAVEMENT PROFILE IS SET TO CURVE EDGE WITH REFERENCE TO THE HORIZONTAL CURVE WHICH IS BEING APPROACHED.

STRAIGHT LINE METHODS OF ATTAINING SUPERELEVATION
PLAN OF ALIGNMENT FOR CASE NUMBER 3

CASE NUMBER 3

SIX-TO-FIVE TRANSVERSE SLOPE OR TANGENT SECTION IS SAME DIRECTION AS SLOPE OF SUPERELEVATION.

NOTES:
- PAVEMENT REQUIRES AVOID ITS OUTSIDE EDGE WITH REFERENCE TO THE HORIZONTAL CURVE WHICH IT IS BEING APPROACHED.

SUPERELEVATION WIDENING
UNDIVIDED HIGHWAYS

STRAIGHT LINE METHOD OF ATTAINING SUPERELEVATION
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Table note: The effect of spiral curve transition on lateral acceleration is likely to be negligible for larger radii.

**General notes:**
A practical control for the length of spiral "Lk" is considered to be the super-elevation length "Ls." See Standard Plans 203.22 Sheet 2 of 2.

"Ls" is the widening for surcharging at inside shoulder. See Standard Plans 203.22 Sheet 2 of 2.

Widening transition varies in effect proportion to distance.

Spiral curves are used on all highways that have design traffic greater than 400 vehicles per day. They have a radius less than the smallest listed in the maximum radius for use of a spiral curve transition table.

**MULTILANE FACTORS FOR "L"**

<table>
<thead>
<tr>
<th>Lane Width</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1.00</td>
</tr>
<tr>
<td>1.5</td>
<td>1.00</td>
</tr>
<tr>
<td>2.0</td>
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</tr>
<tr>
<td>2.5</td>
<td>1.00</td>
</tr>
<tr>
<td>3.0</td>
<td>1.00</td>
</tr>
<tr>
<td>3.5</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Example: A six lane divided highway (3 lanes in each direction) would be treated separately about its median (Fig. 12). Where the lane separation equals 25 ft (7.5 m), lane widening highway factor from the centerline.

Both cases would use the 3 lane factor adjustment value of 2 times the value of one lane factor.
SECTION A-A

SECTION C-C
(CURVE TO RIGHT)

SECTION B-B
(CURVE TO RIGHT)

SECTION D-D
(CURVE TO RIGHT)

2-2 TO B-B (E-E TO I-I) IS THE TANGENT RUNWAY.

x = 1 x NC (L/3)

NOTE: SHORT VERTICAL CURVES MAY BE INSERTED AT
POINTS C TO E IN THE ADJUSTMENTS OF STAGES
OR BOXES IN THE FIELD.

SUPERELEVATION RUNOFF = L (SEE STANDARD PLANS 203.22, SHEET 2 OF 21)
### MINIMUM RADIi FOR DESIGN SUPERELEVATION RATES, DESIGN SPEEDS, AND $\gamma_{max} = 4\%$

<table>
<thead>
<tr>
<th>%</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RADIUS (ft)</strong></td>
<td><strong>L1</strong> (ft)</td>
<td><strong>L2</strong> (ft)</td>
<td><strong>L1</strong> (ft)</td>
<td><strong>L2</strong> (ft)</td>
<td><strong>L1</strong> (ft)</td>
<td><strong>L2</strong> (ft)</td>
<td><strong>L1</strong> (ft)</td>
<td><strong>L2</strong> (ft)</td>
<td><strong>L1</strong> (ft)</td>
</tr>
<tr>
<td>1-1.200</td>
<td>560</td>
<td>600</td>
<td>640</td>
<td>680</td>
<td>720</td>
<td>760</td>
<td>800</td>
<td>840</td>
<td>880</td>
</tr>
<tr>
<td>1.2-1.600</td>
<td>600</td>
<td>640</td>
<td>680</td>
<td>720</td>
<td>760</td>
<td>800</td>
<td>840</td>
<td>880</td>
<td>920</td>
</tr>
<tr>
<td>1.6-2.000</td>
<td>640</td>
<td>680</td>
<td>720</td>
<td>760</td>
<td>800</td>
<td>840</td>
<td>880</td>
<td>920</td>
<td>960</td>
</tr>
</tbody>
</table>

**TABLE NOTES:**

- "NC" denotes normal cross slope.
- "AC" denotes adverse cross slope.
- "S" denotes the super-elevation rate in percent (%).
- "L1" denotes the length of super-elevation runoff and Keeving transition in feet for a 2-lane highway.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

**SUPERELEVATION, SPIRAALS AND WIDENING**

**SITE EFFECTIVE:** OCTOBER 30, 1991

**SHEET No.:** 1 OF 2

**DATE MODIFIED:** 5/3/92

**SCALE:** 1/500

**INCHES TO FT:** 1/8"

**NOTES:**

1. The L1 column is for 1 lane traveled.
2. The L2 column is for 2 lanes traveled.
3. Lane traveled is typically for 2-lane highway.
4. Keeving transition is not necessary as the super-elevation rate should be determined from a radius equal to, or slightly smaller than, the radius furnished in the table. The result is a super-elevation rate that is increased up to the nearest 0.2 or 2 percent.

**EXAMPLE:** A 50 mm curb with a minimum super-elevation rate of 6 percent, and a radius of 1,150 ft. Should use the radius of 1,130 ft to obtain a super-elevation rate of 5.4 percent.
### Calculated and Design Values for Traveled Way Widening on Open Highway Curves (Two-Lane Highways, One-Way or Two-Way) [WE-67 Adjustment]

<table>
<thead>
<tr>
<th>Curve Radius (FT)</th>
<th>24' Roadway Width</th>
<th>22' Roadway Width</th>
<th>20' Roadway Width</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Design Speed (MPH)</td>
<td>Design Speed (MPH)</td>
<td>Design Speed (MPH)</td>
</tr>
<tr>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>7000</td>
<td>0.1</td>
<td>0.1</td>
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</tr>
<tr>
<td>100</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**Table Notes:**

- 'W' is the widening in feet for surfacing at inside shoulders.
- Values shown are for AB-67 design vehicle and peppered widening in feet.
- Values less than 2.0 feet may be disregarded.
- For 4-lane highways, multiply above values by 1.5.
- For 3-lane highways, multiply above values by 2.0.

**MoDOT Highways and Transportation**

**State Effective:** 07/01/2017

**Date Prepared:** 05/07/2017

**Sheet No.:** 2 OF 2
GENERAL NOTES:

IN NO CASE WILL "W" BE LESS THAN SHOULDER WIDTH. "W" WILL BE 8' UNLESS OTHERWISE NOTED ON THE PLANS.

WHEN ENTRANCES ARE ADJACENT TO MAILBOX TURNOUTS, THE AREA AND SURFACING OF THE ENTRANCE MAY BE USED FOR A PORTION OF THE MAILBOX TURNOUT.
TYPICAL DETAILS
ON AND OFF RAMPS
DIAMOND INTERCHANGES AND OUTER RAMPS OF CLOVERLEAF INTERCHANGES

GENERAL NOTES:
SEE OTHER DRAWINGS FOR JOINT LAYOUTS AND STRIPING DETAILS.
THIS DRAWING IS FOR GENERAL INFORMATION ONLY. FOR ACTUAL CONSTRUCTION DETAILS AND PAVEMENT TYPES, SEE OTHER DRAWINGS.

NOTE:
(1) FOR RAMP SHOULDER WIDTH, SEE TYPICAL SECTIONS.
(2) SEE ROADWAY PLANS.
PLAN VIEW "OFF" RAMPS

SECTION H-H

SECTION G-G

SECTION F-F

SECTION E-E

NOTES:
(1) FOR RAMP SHOULDER WIDTH, SEE TYPICAL SECTIONS.
(2) SEE ROADWAY PLANS.
DRIVEWAY VARIOUS SLOPES:

1. To 1700 VEHICLES PER DAY ON STATE ROUTE USE 3% SLOPE
   (OR 6% SLOPE WHERE PRACTICABLE).
2. OVER 1700 VEHICLES PER DAY ON STATE ROUTE USE 6% SLOPE
   (OR FLATTER WHERE PRACTICABLE).

NOTE: RECOMMENDED WIDTH OF DRIVEWAY = 20'

IN ORDER TO MINIMIZE THE USE OF 6% SLOPES THE PIPE SECTIONS
ON HIGHWAY CONSTRUCTION SHOULD BE USED ON EXISTING ROADS.
THE LOCATION OF PASSAGE PIPE SHOULD BE BEYOND THE CLEAR ZONE.
DISTANCE AS SHOWN IN TABLE 3.1 OF THE 1998 EDITION OF "ROADSIDE
DESIGN HANDBOOK".

GENERAL NOTES:

NO PART OF THE DRIVEWAY EXCLUDING TAPERS SHALL BE
CONSTRUCTED BEYOND THE PROPERTY界线.
SURFACING SHALL BE AS SHOWN ON THE PLANS OR PERMIT.
4 INCHES OF TYPE 1 OR 5 BASE SHALL BE PLACED AND
COMPACTED BEHIND THE APEX SURFACE OF CONCRETE
AND ASPHALT DRIVEWAYS.

LENGTH OF TYPE 1 SHALL BE DETERMINED BY DEPTH OF
LOCATION OF INLET - MINIMUM 2'-0" LENGTH OF INLET
1'-0" DIAMETER PIPE. SEE PLANS.

THIS DRAWING ILLUSTRATES DRIVEWAY DETAILS FOR MINIMUM
SITUATIONS. TRAFFIC VOLUMES, SAFETY CONSIDERATIONS,
LOCAL REQUIREMENTS, ETC., MAY DICTATE MORE VIRTUOUS EXPANSIONS THAN ILLUSTRATED.

MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION
105 WEST CAPITAL
JEFFERSON CITY, MO 65102
1-800-542-MODOT 1-800-542-6638

DRIVEWAY
TYPE 1

SIZE EFFECTIVE:
DATE PREPARED:
203.61B SHEET NO.
4/29/2010 1 OF 1
GENERAL NOTES:

RECOMMENDED WIDTH OF ROADWAY - 24' WITHOUT PARKING ON PIPE AND 32' WITH PARKING ON PIPE.

SURFACING SHALL BE AS SHOWN ON THE PLANS OR PERMIT.

4 INCHES OF TYPE 1 OR 2 BASE SHALL BE PLACED AND COMPACTED BELOW THE APEX SURFACE OF ASPHALT AND CONCRETE DRIVEWAYS.

LENGTH OF PIPE SHALL BE DETERMINED BY DEPTH AND LOCATION OF DITCH (SEE PLANS).

IF A PAVED APPROACH IS REQUIRED, REFER TO STANDARD PLANS 600.00 FOR CONSTRUCTION DETAILS ON CURB AND GUTTER (IF REQUIRED) TO MEET Curb OR PAVED APPROACH TRANSITION REQUIREMENTS FROM 4" CURB TO 6" CURB.

CURE OF CURB AND GUTTER BETWEEN RIGHT-OFF-HAIL LINE AND PIPE MAY MEET LOCAL AGENCY STANDARDS.

THIS DRAWING ILLUSTRATES DETAILS FOR MINIMUM SITUATIONS, TRAFFIC VOLUMES, SAFETY CONSIDERATIONS, DRAINAGE CONSIDERATIONS, LOCAL REQUIREMENTS, ETC., MAY DETELE MORE EXTENSIVE IMPROVEMENTS THAN ILLUSTRATED.

PIPE SIZE AND LOCATION TO BE DETERMINED BY GEOMETRIC AND TRAFFIC CONDITIONS (SEE PLANS).

A MINIMUM 20'-FOOT NO-STOP DISTANCE TRAVELER, MEASURED ALONG THE CENTERLINE OF THE INTERSECTING HIGHWAY, SHOULD BE PROVIDED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-4MO-MDOT (1-888-466-6368)

DRIVEWAY
TYPE II

SHEET NO. 1 OF 2

07/01/2002
DATE PRINTED: 4/29/2003

203.62E
PROFILE

DRIVEWAY TYPICAL SECTION

1 to 1700 Vehicles per Day on State Route use 5% slope (or flat if practicable).

Over 1700 Vehicles per Day on State Route use 6% slope (or flat if practicable).

In order to minimize the use of 6% slope and pipe sections on any construction of drainage pipe should be before the clear zone distance as shown in Table 5.1 of the "Roadside Design Guide".

DRIVEWAY

SECTION THRU CONCRETE CURB AND GUTTER

SECTION THRU 4" BARRIER CURB
NOTE:

SEE STANDARD PLAN 203.50 FOR DETAILS OF LOW PROFILE ISLAND.

WHERE MINIMUM ISLAND CANNOT BE

DETERMINED, OMIT ISLAND.

MINIMUM ISLAND DETAILS

<table>
<thead>
<tr>
<th>N</th>
<th>R</th>
<th>TOTAL TURN LANE</th>
<th>TAPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>15</td>
<td>24</td>
<td>511</td>
</tr>
<tr>
<td>30</td>
<td>95</td>
<td>22</td>
<td>511</td>
</tr>
</tbody>
</table>

NOTES:

THIS DRAWING SHALL BE USED IN CONJUNCTION WITH TYPES II AND III DRIVEWAYS WHEN TRAFFIC VOLUMES REQUIRE A VOLUME PRODUCT INTERSECTIONS AND TYPE IV WHEN A SINGLE APPROACH TRUCK DRIVEWAY IS DESIRED.

ALL CONTROLS PERTAINING TO GRADES, DRAINAGE, BASE, CURBING, ETC. SHALL BE AS SHOWN ON OTHER RESPECTIVE TYPE DRIVEWAY STANDARD PLANS.

THE "N" DIMENSIONS ARE RECOMMENDED WIDTH. OTHER ALLOWED WIDTHS MAY BE USED WITHIN TOLERANCES OF THE RESPECTIVE TYPE DRIVEWAY STANDARD PLANS.

GENERAL NOTES:

DETAILS SHOWN ON THIS SHEET ARE FOR RIGHT ANGLE APPROACHES.

TAPER LENGTHS ARE NOT APPROPRIATE WHEN DECELERATION LANES ARE PROVIDED.

SIGNALIZED INTERSECTIONS ARE INTERSECTIONS IN RE-ROUTE AREAS May BE MODIFIED TO MEET EXISTING CONDITIONS.

THIS DRAWING ILLUSTRATES DRIVEWAY DETAILS FOR HOCHMANN STRUCTURES. TRAFFIC VOLUMES, SAFETY CONSIDERATIONS, DRAINAGE REQUIREMENTS, ETC., MAY REQUIRE MORE EXTENSIVE IMPROVEMENTS THAN ILLUSTRATED.
EMBANKMENT CONTROL STAKE

2" X 4" SOUND LUMBER

2" X 4" SPLICE IF REQUIRED

GROUND LINE

2" X 4" SPLICE IF REQUIRED

GROUND SURFACE

ORDINARY BACKFILL

3" PORTLAND CEMENT MORTAR LEVELING COURSE

3" PORTLAND CEMENT MORTAR LEVELING COURSE

SETTLEMENT GAUGE

2" DIA. RISER PIPE

1-1/2" DIA. COVER PIPE

GROUND SURFACE

STEEL SETTLEMENT PLATE

3" X 12" X 12"

CONTINUOUS WELD

GROUND LINE

2" X 4" SOUND LUMBER

2" X 4" SOUND LUMBER (OR 3" ROUND WOOD POST)

GRADUATED SCALE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

EMBANKMENT CONTROL MEASURING DEVICES

DATE EFFECTIVE: 04/01/1983
DATE PREPARED: 08/23/2009
SHEET NO.: 1 OF 1
**Type A2 Shoulders**

**General Note:**

The final finish on concrete shoulders may be obtained by the use of a core consisting of a seamless strip of (lava, basalt, cotton, etc.) plastic, turf, or other suitable material capable of producing a uniform surface or deterrent texture.

The quantity for additional base material resulting from the variable thickness material of construction methods of Type A2 Shoulders will be considered incidental.

Incidental base shall consist of Type 1 or 2 aggregate for base, or an alternate material that meets the approval of the Engineer.

RCC (Roller Compacted Concrete) or PCC (Portland Cement Concrete) HMA (Hot Mix Asphalt)

- Use 12" RF-1 over 4" PCC unless otherwise specified on the plans.
TRANVERSE SHOULDERS
CONSTRUCTION JOINTS SHALL BE 3'-6" SPACING

OPTION 1

MAINLINE AGGREGATE
BASE
PAY LIMIT FOR MAINLINE BASE
INCIDENTAL
BASE (NO DIRECT
PAY)

MAINLINE AGGREGATE
BASE
PAY LIMIT FOR MAINLINE BASE
INCIDENTAL
BASE (NO DIRECT
PAY)

MAINLINE AGGREGATE
BASE
PAY LIMIT FOR MAINLINE BASE
INCIDENTAL
BASE (NO DIRECT
PAY)

OPTION 2

HMA PAVEMENT

SKEW JOINT

TOOL JOINT

F = SHOULDER THICKNESS

HMA PAVEMENT

GENERAL NOTE:
THE FINAL FINISH ON CONCRETE SHOULDERS MAY BE OBTAINED
BY THE USE OF A BROOM CONSTRUCTED OF A SEQUOSS STRIP
OF DEMP SHEET, COTTON FABRIC, PLASTIC TURF OR OTHER
SUITE MATERIAL CAPABLE OF PRODUCING A UNIFORM
SURFACE OF COTTY TEXTURE.

THE QUANTITY FOR ADDITIONAL BASE MATERIAL RESULTING
FROM THE VARIABLE THICKNESS MATERIAL OF CONSTRUCTION
METHOD OF TYPE A3 SHOULDERS WILL BE MEASURED INCIDENTAL.

INCIDENTAL BASE SHALL CONSIST OF TYPE 1 OR 2 AGGREGATE
FOR BASE, OR AN ALTERNATE MATERIAL THAT MEETS THE
APPROVAL OF THE ENGINEER.

RCC (ROLLER COMPACTED CONCRETE) OR
PCC (PORTLAND CEMENT CONCRETE)
HMA (HOT MIX ASPHALT)
BASE

++ JOINT DEPTH SHALL BE 3'-6" AND MAY
BE SAWED OR TOOLEED.

TYPE A3 SHOULDERS

MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65103
1-888-657-MODOT (1-888-657-6636)

STATE OF MISSOURI
DEPARTMENT OF TRANSPORTATION

DATE EFFECTIVE: 5/2/2016
STATE WIDE: 401.00C
DATE MODIFIED: 4/11/17
SHEET NO. 2 OF 3
GENERAL NOTES:


THE SAFETY EDGE™ SHALL BE CONSTRUCTED SIMULTANEOUSLY WITH THE SHOULDER OR PAVEMENT.

THE SAFETY EDGE™ SHALL BE BACKFILLED AS SHOWN.

REGARDLESS OF PAVEMENT TYPE, WHEN PAVERING FOR PAVEMENT OR SHOULDER IS MADE PER SOURCE USE, THE MATERIAL NEEDED TO CONSTRUCT THE SAFETY EDGE™ IS CONSIDERED INCIDENTAL TO THE PAVEMENT OR SHOULDER, NO MEASUREMENT WILL BE MADE FOR THE MATERIAL USED IN THE SAFETY EDGE™ EXCEPT WHEN PAVERING FOR PAVEMENT OR SHOULDER IS MADE IN VOLUME OR WEIGHT.

Missouri Highways and Transportation Commission
105 West Capitol
Jefferson City, MO 65102
1-888-657-MDOT (6368) 1-800-296-MDCR

SAFETY EDGE™

RCC (ROLLER COMPACTED CONCRETE) OR PCC (PORTLAND CEMENT CONCRETE)
HMA (HOT MIX ASPHALT)
BASE MATERIAL (IF APPLICABLE)
STREET BROOMS WITH NYLON BRISTLES

1" CHAIN WITH HOOKS

DATE EFFECTIVE: 07/01/2004
DATE PREPARED: 08/25/2009
SHEET NO. 1 OF 1
PART ELEVATION OF HEADER PLANK

HEADER SECTION

SAWED SECTION

THE HEADER BEAMS SHALL BE SUFFICIENTLY RIGID TO PREVENT EXTRUSION FROM THE TYPICAL SECTION AND SHALL BE STRAIGHT LINE FROM PAVEMENT EDGE TO PAVEMENT EDGE.

THE CONSTRUCTION JOINT MAY BE SAWED FULL DEPTH. HOLES FOR DOWEL BARS SHALL BE CORED AFTER THE CONCRETE HAS SUFFICIENT SET TO PREVENT CAUSE. DOWEL BARS SHALL BE BURIED INTO THE HOLES.

BAR SUPPORT

BAR SUPPORT

EXPERIENCE HOLE DIAMETER SHALL BE DIAMETER OF DOWEL BAR PLUS 1 INCH

THIN CIRCULAR DISK

DETAIL A

CONSTRUCTION JOINT C

CONSTRUCTION JOINT C

EXPANSION JOINT E

ALTERNATE EXPANSION JOINT E

CONTRACTOR MAY SELECT EITHER EXPANSION JOINT E

LONGITUDINAL CONSTRUCTION JOINT L

(Existing Pavement)

EXPERIENCE HOLE DIAMETER SHALL BE DIAMETER OF TIE BAR PLUS 1 INCH

TIE BARS SHALL BE EPOXY COATED, GEOMETRIAL REINFORCING BAR MEETING THE REQUIREMENTS OF SECTIONS 110 AND 605.

BONDING FOR TIE BARS SHALL BE EPOXY OR POLYESTER BONDING AGENTS AS SPECIFIED IN SECTION 105.

THE THICKNESS OF THE THROUGH PAVEMENT OR SHOULDER TO BE TIED TOGETHER.

INKFOURED JOINT SEALER

2" RACING

DOWEL BARS AT 12" CENTERS

EXPERIENCE GAP ON ALTERNATING ENDS OF DOWEL BARS

EXPANSION GAP ON ALTERNATING ENDS OF DOWEL BARS

10" LONG DOWEL BARS

SEALING SEE DETAIL A

SEALING SEE DETAIL A

CONCRETE MIXTURE

PRE-FORMED JOINT FILLER MATERIAL

PRE-FORMED JOINT FILLER MATERIAL

NAILS OF PLASTIC MATERIAL MINIMUM THICKNESS

DOWEL @ 4" O.C.

2" TIE BAR

THIN CIRCULAR DISK

DETAIL B

CONCRETE PAVEMENT AND BASE APPURTEANCES FOR 15' JOINT SPACING

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL

JEFFERSON CITY, MO 65102

1-888-456-MODOT (1-888-463-6638)

CONTRACTOR MAY SELECT EITHER EXPANSION JOINT E

LONGITUDINAL CONSTRUCTION JOINT L

EXISTING PAVEMENT

NEW PAVEMENT

EXPERIENCE HOLE DIAMETER SHALL BE DIAMETER OF DOWEL BAR PLUS 1 INCH

TIE BARS ARE NUMBER 2 OR 3, 10.6" IN. SAMPLE, 12" CENTERS, 1/2" THICKNESS, 10.6" O.C.

DATE REVISED: 4/1/2023

DATE PREPARED: 1/1/2023

502.05S SHEET NO. 4/4
Dowel Bars

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Dia.</th>
<th>Length</th>
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</thead>
<tbody>
<tr>
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<td>None</td>
</tr>
<tr>
<td>7&quot; to 9&quot;</td>
<td>1/4&quot;</td>
<td>18&quot;</td>
</tr>
<tr>
<td>Greater than 10&quot;</td>
<td>1/2&quot;</td>
<td>18&quot;</td>
</tr>
</tbody>
</table>

Section A-A

For pavements having thickness in 1/2" increments, dowel basket shall be thickness 1/2".

Cost with approved lubricant, do not lubricate, keep clean.

General Notes:

The dowel supporting units shall be factory assembled and capable of holding the dowels in their required positions. In the complete joint installation, dowels shall be positioned within 1/4" of the vertical and horizontal plane and in the longitudinal direction. The skew tolerance shall be 1/4".

The free end of each epoxy coated dowel shall be marked with a spot of paint at least the size in diameter and contrasting in color with the epoxy coating.

Wire sizes shown are minimum required.

Wires, bars, or clips shall be used as necessary to strengthen the assembly.

The diameter of the spacer wire shall not exceed 0.200".

Spacer wire may be cut or left intact.

Starting fins shall be fabricated from 0.306" diameter wire, with a suitable hole. Starting fins shall have a minimum length of 1" for dowel assemblies unless otherwise directed by the engineer.

Major variations in the configuration of the support units will be allowed.
SECTION B-B

GENERAL NOTES:

In the completed joint installation, dowels shall be positioned within 1/2" of the vertical and horizontal plane and in the longitudinal direction. The skew tolerance shall be 1/4°.
LIMITS OF CONCRETE APPROACH PAVEMENT

SECTION A-A

GENERAL NOTES:

SEE STANDARD DRAWING 605.10 FOR PIPE OUTLET DETAIL FROM SHOULDERS POINT TO STOP.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-MDOT-MO (1-888-636-8666)

CONCRETE APPROACH PAVEMENT
(MAJOR ROUTE)

SIZE EFFECTIVE: 10/04/2022
SIZE UPDATED: 3/18/2022
504.00L SHEET NO. 3 OF 3
LOCATION SURVEY RIGHT-OF-WAY MARKER

2" DIA. FLAT ALUMINUM CAP

PUNCH MARK (NOT NECESSARILY CENTERED)

2" X 24" REBAR

GROUND LINE

OFFSET POST LATERALLY
FROM PIPE OUTLET

IN EARTH

DRAIN MARKER

OFFSET ON MoDOT R/W LINE

LOCATION SURVEY R/W MARKER

SIDE VIEW

GENERAL NOTES:

WHEN STEEL AND LOCATION SURVEY R/W MARKERS ARE NOT SUITABLE DUE TO NATURAL GROUND FEATURES OR MAN-MADE STRUCTURES, ALTERNATIVE MONUMENTATION (IN COMPLIANCE WITH THE APPROVED MONUMENTATION, AS SPECIFIED BY THE MISSOURI MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS) MAY BE SET.
LEGEND

EXISTING NEW

STEEL R/W MARKER

LOCATION SURVEY R/W MARKER

CONCRETE R/W MARKER

DRAIN MARKER

TYPICAL LOCATIONS

WITNESS POSTS, WHEN USED, ARE TO BE SET ON MoDOT R/W LINE EITHER 11 IN FRONT OR BEHIND R/W MONUMENT.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

SHEET NO. 2 OF 2602.000

DATE EFFECTIVE: 01/01/2003
DATE PREPARED: 8/23/2009
SUBMITTED FOR APPROVAL PRIOR TO FIRST USE OF THE SKEW PIPE BY USING A BEVELED END OR ELBOW ON PIPE. IN SPECIAL CASES, HEADWALL MAY BE TURNED TO FIT PIPE SKEW AND 1-1/2 TO 2:1 SLOPE warped to fit headwall.
ALL CONCRETE SHALL BE CLASS "B."

THIS DRAWING AND THE CONCRETE QUANTITIES SHOWN ARE BASED ON THE USE OF CONCRETE PIPE. QUANTITIES OF CONCRETE SHOWN WILL BE USED FOR PAYMENT REGARDLESS OF ANY QUANTITY CHANGES NECESSARY DUE TO THE USE OF ANY OTHER TYPE PIPE SPECIFIED OR PERMITTED.

FLOOR LINE OF HEADWALL IS TO BE PLACED HORIZONTALLY.

PRECAST NOTES:
THE CONTRACTOR MAY, SUBJECT TO APPROVAL OF THE ENGINEER, FURNISH PRECAST UNITS IN LIEU OF CAST-IN-PLACE. IF A PRECAST UNIT IS FURNISHED, IT SHALL CONFORM IN ALL RESPECTS TO THE REQUIREMENTS FOR CAST-IN-PLACE UNITS INCLUDING DIMENSIONS AND REINFORCEMENT, EXCEPT THAT THE FORMS MAY BE TAPERED TO FACILITATE REMOVAL OF THE UNIT FROM THE FORMS. SHOP DRAWINGS OF THE PRECAST UNIT SHALL BE SUBMITTED FOR APPROVAL PRIOR TO FIRST USE OF THE PRECAST FORMS.

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PIECE CULVERT HEADWALLS
TYPE 5
12" TO 24" DIAMETERS - 1:16 SLOPES

DATE EFFECTIVE: 08/01/2006
DATE PREPARED: 9/3/2009

1 OF 2

GENERAL NOTES:

DATE PREPARED: 9/3/2009
DATE EFFECTIVE: 08/01/2006

TOTAL LENGTH = "L" + 5'-9"

C BARS AT APPROXIMATELY 16° CRS.

PLAN VIEW

END SECTION

SECTION A-A

SECTION B-B

SECTION C-C

BENDING DETAILS

REINFORCING

CONSTRUCTION JOINT PERMITTED

B2 BAR

B3 BAR

B2 BARS

B3 BARS

GRATE AND BEARING PLATE

CONSTRUCTION JOINT PERMITTED

B3 BAR

B1 BAR

CONCRETE SHOWN WILL BE USED FOR PAYMENT REGARDLESS OF ANY OTHER TYPE PIPE SPECIFIED OR PERMITTED.
### PIPE CULVERT HEADWALLS

#### TYPE S

- 27" TO 36" DIAMETERS
- 1V:6H SLOPES

#### GENERAL NOTES:

- SEE GENERAL NOTES ON SHEET 1.

### BENDING DETAILS

- B3 BARS
- B2 BARS

### PIPE SIZE DIMENSIONS QUANTITIES REINFORCING

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Dimensions</th>
<th>Quantities</th>
</tr>
</thead>
<tbody>
<tr>
<td>27&quot;</td>
<td>2'-0&quot; x 11'-3&quot; x 17'-0&quot;</td>
<td>2'-0&quot; x 11'-3&quot; x 17'-0&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>2'-9&quot; x 18'-6&quot;</td>
<td>5'-0&quot; x 170</td>
</tr>
<tr>
<td>36&quot;</td>
<td>2'-9&quot; x 21'-6&quot;</td>
<td>6.1 x 200</td>
</tr>
</tbody>
</table>

### CONSTRUCTION JOINT PERMITTED

- B2 BAR

### C BARS AT APPROXIMATELY 12" CTRS.

### MissourI HIGHWAYS AND TRANSPORTATION COMMISSION

**105 West Capitol
Jefferson City, MO 65102**

1-888-ASK-MODOT (1-888-275-6636)
GENERAL NOTES:

DESIGN UNIT STRESSES

CLASS B CONCRETE

REINFORCING STEEL:

- GRADE 60 (2-) = 3,000 psi
- GRADE 40 (2-) = 40,000 psi

REINFORCING STEEL:

- MINIMUM CLEARANCE TO REINFORCING STEEL
- SHALL BE 1 ½" UNLESS SHOWN OTHERWISE.

DIMENSIONS:

- DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS.

UPSTREAM ELEVATION

NOTE: BEND OR CUT AT BARS IN FIELD TO CLEAR PIPE.

SECTION A - A

GENERAL NOTES:

- COMPLETE BILL OF REINFORCING STEEL
- DIMENSIONS
- BENDING DIAGRAMS
- ESTIMATED QUANTITIES

ITEM

<table>
<thead>
<tr>
<th>CLASS B CONCRETE</th>
<th>CU. FT.</th>
<th>13.2</th>
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</thead>
<tbody>
<tr>
<td>REINFORCING STEEL</td>
<td>LBS.</td>
<td>1,170</td>
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HALF SECTION B-B

HALF ELEVATION

OF LOWER BAFFLE

AND WING

NOTE: BEND OR CUT AT BARS IN FIELD TO CLEAR NOTCH IN BAFFLE WALL.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
10 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

PIECE CULVERT HEADWALL
ENERGY DISSIPATOR (IMPACT TYPE)
FOR 30" CONCRETE PIPE

DATE EFFECTIVE: 03/09/2001
DATE PREPARED: 03/03/2009
SHEET NO. 604.12E 1 OF 1
NOTE: BEND OR CUT #1 AND #2 BARS IN FIELD TO CLEAR PIPE.

NOTE: BEND OR CUT A1 AND J1 BARS IN FIELD TO CLEAR PIPE.

PIPE CULVERT HEADWALL
ENERGY DISSIPATOR (IMPACT TYPE)
FOR 48" CONCRETE PIPE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

DATE EFFECTIVE: 03/15/2001
DATE PREPARED: 03/31/2009

POLICY No. 604.15E SHEET No. 1 OF 1

PIPE CULVERT HEADWALL
ENERGY DISSIPATOR (IMPACT TYPE)
FOR 48" CONCRETE PIPE

NOTE: BEND OR CUT #1 AND #2 BARS IN FIELD TO CLEAR PIPE.

NOTE: BEND OR CUT A1 AND J1 BARS IN FIELD TO CLEAR PIPE.

PIPE CULVERT HEADWALL
ENERGY DISSIPATOR (IMPACT TYPE)
FOR 48" CONCRETE PIPE

NOTE: BEND OR CUT #1 AND #2 BARS IN FIELD TO CLEAR PIPE.

NOTE: BEND OR CUT A1 AND J1 BARS IN FIELD TO CLEAR PIPE.

PIPE CULVERT HEADWALL
ENERGY DISSIPATOR (IMPACT TYPE)
FOR 48" CONCRETE PIPE

NOTE: BEND OR CUT #1 AND #2 BARS IN FIELD TO CLEAR PIPE.

NOTE: BEND OR CUT A1 AND J1 BARS IN FIELD TO CLEAR PIPE.

PIPE CULVERT HEADWALL
ENERGY DISSIPATOR (IMPACT TYPE)
FOR 48" CONCRETE PIPE

NOTE: BEND OR CUT #1 AND #2 BARS IN FIELD TO CLEAR PIPE.

NOTE: BEND OR CUT A1 AND J1 BARS IN FIELD TO CLEAR PIPE.

PIPE CULVERT HEADWALL
ENERGY DISSIPATOR (IMPACT TYPE)
FOR 48" CONCRETE PIPE

NOTE: BEND OR CUT #1 AND #2 BARS IN FIELD TO CLEAR PIPE.

NOTE: BEND OR CUT A1 AND J1 BARS IN FIELD TO CLEAR PIPE.

PIPE CULVERT HEADWALL
ENERGY DISSIPATOR (IMPACT TYPE)
FOR 48" CONCRETE PIPE

NOTE: BEND OR CUT #1 AND #2 BARS IN FIELD TO CLEAR PIPE.

NOTE: BEND OR CUT A1 AND J1 BARS IN FIELD TO CLEAR PIPE.

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PIPE CULVERT HEADWALL
ENERGY DISSIPATOR (IMPACT TYPE)
FOR 48" CONCRETE PIPE

NOTE: BEND OR CUT #1 AND #2 BARS IN FIELD TO CLEAR PIPE.

NOTE: BEND OR CUT A1 AND J1 BARS IN FIELD TO CLEAR PIPE.
NORMAL SLOPE OF 2' 3" GUTTER AT THIS POINT

E1-BARS

L-BARS

K-BARS

C-BARS

A-BARS

G-BARS

U-BARS

F-BARS

TRANSITION

SECTION A-A

SECTION C-C

TRANSITION SEE DETAILS ON LEFT

PLAN

GENERAL NOTES:

TOP OF DROP INLET WALLS SHALL BE LEVEL AND TO THE ELEVATION OF BOTTOM OF SLAB AT EDGE OF TRAVELED WAY OR BOTTOM OF CURB AND GUTTER AT DROP INLET.

ALL CONCRETE ABOVE THE TAR-PAPER SEPARATION JOINT IS TO BE CONSTRUCTED DURING PAVING OPERATIONS OR CURB AND GUTTER CONSTRUCTION AND WILL BE PAID FOR AS SQUARE YARDS OF CONCRETE PAVEMENT OR LINEAR FEET OF CURB AND GUTTER.

ALL CONCRETE BELOW THE TAR-PAPER SEPARATION JOINTS SHALL BE CLASS "B" CONCRETE. CONCRETE IN INVERTS SHALL BE PLACED AFTER DROP INLET HAS BEEN CONSTRUCTED.

REINFORCING BARS SHALL BE CUT AND OR BENT AT PIPE OPENINGS. ALL U AND F-BARS SHALL BE SECURELY TIED TOGETHER AND FASTENED TO SECURE AGAINST ANY POSSIBLE DISPLACEMENT DURING THE PLACING OF CONCRETE. THE REINFORCING STEEL SHOWN ON THIS DRAWING IS IN ADDITION TO ANY REINFORCING SHOWN ON DRAWINGS FOR CONCRETE PAVEMENT OR CURB AND GUTTER.

NO DIRECT PAYMENT WILL BE MADE FOR CUTTING PIPE NOR FOR CUTTING AND BENDING REINFORCING BARS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

DROP INLET
TYPE X

DATE EFFECTIVE: 06/01/1983
DATE PREPARED: 8/23/2009

604.29C SHEET NO. 1 OF 2
MANHOLE FRAME AND COVER IN PAVED AREAS USE TYPE 1, IN UNPAVED AREAS USE TYPE 1A OR 1B. NO CHANGE IN QUANTITIES REQUIRED FOR FRAME AND COVER DETAILS. SEE OTHER DRAWINGS.

SECTION A-A

THE MAXIMUM DEPTH OF MANHOLE USING #4 HORIZONTAL BARS AT 12" CENTERS IS 20".

OVER 20" DEPTH, HORIZONTAL BARS SHALL BE INCREASED TO #6 BARS AT 10" CENTERS TO A MAXIMUM DEPTH OF 30".

OVER 30" DEPTH WILL REQUIRE A SPECIAL DESIGN.

BOTTOM STEEL AT MORE THAN 20" DEPTH TO A MAXIMUM DEPTH OF 30" IS INCREASED TO #6 BARS AT 7" CENTERS.

GENERAL NOTES:

STEPS SHALL BE PLACED AT VERTICAL INTERVALS OF 16" MAXIMUM IN ALL MANHOLES HAVING A DEPTH OF MORE THAN 4"-0". STEPS SHALL BEGIN AT AN ELEVATION 6" ABOVE THE TOP OF THE OUTLET PIPE.

STEPS SHALL BE SET LEVEL AND IN VERTICAL ALIGNMENT.

NO DIRECT PAYMENT WILL BE MADE FOR MANHOLE STEPS.

VARIABLE DIMENSIONS

<table>
<thead>
<tr>
<th>SIZE OF PIPE</th>
<th>W</th>
<th>T</th>
<th>B</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>5&quot;-24&quot;</td>
<td></td>
<td></td>
<td>4'-0&quot;</td>
<td></td>
<td>7&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>3'-6&quot;</td>
<td>4'-8&quot;</td>
<td>7&quot;</td>
<td></td>
<td>7&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>4'-0&quot;</td>
<td>5'-2&quot;</td>
<td>7&quot;</td>
<td></td>
<td>7&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>4'-6&quot;</td>
<td>5'-8&quot;</td>
<td>7&quot;</td>
<td></td>
<td>7&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>5'-0&quot;</td>
<td>6'-2&quot;</td>
<td>7&quot;</td>
<td></td>
<td>7&quot;</td>
</tr>
</tbody>
</table>

NOTES:

- MINIMUM *W* "SHALL BE THE OUTSIDE DIAMETER OF LARGEST PIPE ENTERING MANHOLE PLUS 16" CARRIED TO THE NEAREST 1/2".

- HORIZONTAL AND VERTICAL BARS HORIZONTAL AND VERTICAL BARS AROUND PIPES.
## FOR PIPE OPENINGS

### PIPE SIZES

<table>
<thead>
<tr>
<th>Size</th>
<th>Cubic Yards Concrete to Deduct</th>
<th>Additional Steel Required for Pipe Opening</th>
<th>Width of Wall Required for Pipe</th>
<th>Length of #6 Bar Required</th>
<th>Weight of #6 Bar Lbs.</th>
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<tbody>
<tr>
<td>12&quot;</td>
<td>0.03</td>
<td>0.04</td>
<td>3'-0&quot;</td>
<td>4'-0&quot;</td>
<td>6.6</td>
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<tr>
<td>15&quot;</td>
<td>0.04</td>
<td>0.06</td>
<td>3'-6&quot;</td>
<td>4'-4&quot;</td>
<td>7.5</td>
</tr>
<tr>
<td>18&quot;</td>
<td>0.06</td>
<td>0.11</td>
<td>4'-0&quot;</td>
<td>5'-0&quot;</td>
<td>8.3</td>
</tr>
<tr>
<td>24&quot;</td>
<td>0.16</td>
<td>0.23</td>
<td>4'-6&quot;</td>
<td>5'-6&quot;</td>
<td>9.0</td>
</tr>
<tr>
<td>30&quot;</td>
<td>0.23</td>
<td>0.31</td>
<td>5'-0&quot;</td>
<td>6'-0&quot;</td>
<td>9.6</td>
</tr>
<tr>
<td>36&quot;</td>
<td>0.31</td>
<td>0.40</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
<td>10.8</td>
</tr>
<tr>
<td>42&quot;</td>
<td></td>
<td></td>
<td>7'-0&quot;</td>
<td>7'-6&quot;</td>
<td>12.0</td>
</tr>
<tr>
<td>48&quot;</td>
<td></td>
<td></td>
<td>7'-6&quot;</td>
<td>8'-0&quot;</td>
<td>13.2</td>
</tr>
</tbody>
</table>

**Note:**
Concrete quantities in Table include invert. The quantity of steel for 3" of "D" is not 4 of that for 1 foot of "D," neither is the quantity for 6" of "D" equal to 3 that for 1 foot of "D." So use quantity in 1-foot column for full feet and in 3" column for fractional feet.

## QUANTITIES

### TO AND INCLUDING 20'-0" DEPTH

<table>
<thead>
<tr>
<th>Size (W)</th>
<th>D= 3'-3&quot;</th>
<th>D= 4'-3&quot;</th>
<th>Add or Subtract for Each</th>
<th>Add or Subtract for Each</th>
<th>Additional Steel in Bottom Difference in #6 and #8 Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot; X 3'-0&quot;</td>
<td>C 1.62</td>
<td>1.93</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>C 157.80</td>
<td>176.80</td>
<td>18.60</td>
<td>30.00</td>
<td></td>
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<tr>
<td>C 1.77</td>
<td>2.11</td>
<td>0.33</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
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<tr>
<td>C 173.80</td>
<td>194.60</td>
<td>20.60</td>
<td>30.00</td>
<td>0.08</td>
<td>0.08</td>
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<tr>
<td>C 1.93</td>
<td>2.28</td>
<td>0.35</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>C 187.10</td>
<td>209.60</td>
<td>21.30</td>
<td>30.07</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>C 2.16</td>
<td>2.53</td>
<td>0.38</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>C 211.20</td>
<td>234.70</td>
<td>23.30</td>
<td>26.75</td>
<td>0.69</td>
<td>44.26</td>
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<td>C 2.32</td>
<td>2.71</td>
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<td>0.10</td>
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<td>0.10</td>
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<td>243.80</td>
<td>23.00</td>
<td>27.90</td>
<td>0.87</td>
<td>48.97</td>
</tr>
<tr>
<td>C 1.94</td>
<td>2.29</td>
<td>0.35</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
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<tr>
<td>C 192.40</td>
<td>215.10</td>
<td>22.70</td>
<td>25.60</td>
<td>0.60</td>
<td>40.27</td>
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<td>2.48</td>
<td>0.38</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
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<tr>
<td>C 204.30</td>
<td>227.70</td>
<td>23.40</td>
<td>26.75</td>
<td>0.69</td>
<td>45.69</td>
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<td>2.75</td>
<td>0.40</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
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<tr>
<td>C 230.00</td>
<td>255.50</td>
<td>25.30</td>
<td>29.23</td>
<td>0.71</td>
<td>51.11</td>
</tr>
<tr>
<td>C 2.53</td>
<td>2.95</td>
<td>0.42</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>C 240.80</td>
<td>267.10</td>
<td>26.00</td>
<td>30.38</td>
<td>0.68</td>
<td>56.53</td>
</tr>
<tr>
<td>C 2.28</td>
<td>2.68</td>
<td>0.40</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>C 216.70</td>
<td>240.80</td>
<td>23.10</td>
<td>27.90</td>
<td>0.97</td>
<td>51.83</td>
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<tr>
<td>C 2.25</td>
<td>2.67</td>
<td>0.42</td>
<td>0.10</td>
<td>0.10</td>
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<tr>
<td>C 246.40</td>
<td>272.70</td>
<td>26.00</td>
<td>30.38</td>
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<td>57.96</td>
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<td>C 2.74</td>
<td>3.18</td>
<td>0.44</td>
<td>0.11</td>
<td>0.11</td>
<td>0.11</td>
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<tr>
<td>C 255.60</td>
<td>282.50</td>
<td>26.70</td>
<td>31.53</td>
<td>0.88</td>
<td>64.10</td>
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<tr>
<td>C 2.75</td>
<td>3.19</td>
<td>0.44</td>
<td>0.11</td>
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<tr>
<td>C 216.80</td>
<td>240.90</td>
<td>28.00</td>
<td>32.86</td>
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<td>64.81</td>
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<td>0.46</td>
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<td>C 289.40</td>
<td>318.20</td>
<td>28.70</td>
<td>34.01</td>
<td>0.85</td>
<td>71.66</td>
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<td>C 3.15</td>
<td>3.64</td>
<td>0.48</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
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<tr>
<td>C 299.80</td>
<td>329.30</td>
<td>29.40</td>
<td>35.16</td>
<td>0.87</td>
<td>75.23</td>
</tr>
</tbody>
</table>

**TO AND INCLUDING 20'-0" DEPTH**

Note:
To compute the quantities for depths ("D") not shown, refer to the table for the size of manhole required. Subtract the "D" value from the table and the "D" value from the plans. Multiply the values shown in the 1-foot column from the table with the full 20-foot increments from the difference between the "D" from the plans and the "D" from the table. Multiply the values shown in the 3" column from the table with the remaining fractional foot values per 3" increments. Follow this same process for the steel calculations. See the example below.

**For example:** quantities for 3'-0" X 4'-0" manhole with 6'-0" "D" having one 18", one 24" and one 36" pipe openings are determined as follows:

- "D" required = 6'-0"
- "D" given in table = 4'-3"
- "D" additional = 2'-6"

**Concrete Steel**

<table>
<thead>
<tr>
<th>Size</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>2'-6&quot;</td>
<td>2.28</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>2.28</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2.28</td>
</tr>
</tbody>
</table>

*Use 2" 800.0*

More than 20'-0" to and including 30'-0" depth

First, compute quantities for 20'-0" depth from the table "TO AND INCLUDING 20'-0" DEPTH."

Second, compute quantities for 30'-0" X 4'-0" manhole with 20'-0", "D" having one 18", one 24" and one 36" pipe openings are determined as follows:

- "D" Required = 20'-0"
- "D" Given in Table = 4'-3"
- "D" Additional = 15'-9"

**Concrete Steel**

<table>
<thead>
<tr>
<th>Size</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-6&quot;</td>
<td>2.28</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>2.28</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2.28</td>
</tr>
</tbody>
</table>

*Use 2" 800.0*

Second, compute quantities for the depths beyond 20 feet to a maximum of 30 feet, using the table "20'-0" TO AND INCLUDING 30'-0" DEPTH", and add to the quantities for 20'-0" depth. Also, add the difference in steel in the bottom due to increase in size of bars from #6 to #8 bars in 7-inch centers.

**For example:**

- "D" Required = 30'-0"
- "D" Computed = 20'-0"
- "D" Additional = 10'-0"

**Concrete Steel**

<table>
<thead>
<tr>
<th>Size</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>3.50</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>4.40</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>5.30</td>
</tr>
</tbody>
</table>

*Use 7" 840.0*
# TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>SIZE OF PIPE</th>
<th>LENGTH OF BARS</th>
<th>QUANTITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LARGE (IN.)</td>
<td>SMALL (IN.)</td>
</tr>
<tr>
<td>D x A x B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>36</td>
<td>36</td>
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</tr>
<tr>
<td>42</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>48</td>
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<td>54</td>
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<td>54</td>
</tr>
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<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>66</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**

For pipe extensions that are 5 feet in length or shorter, a smooth tapered sleeve may be used in lieu of 4 type A collars. If approved by the Engineer, see smooth tapered sleeve detail in Standard Plan 732-05.

**PIPE COLLARS TYPE A**

**A ELEVATION**

**SECTION A-A**

**BENDING DIAGRAM FOR B-BARS**

(1) ONE LAYER COMMERCIAL AVAILABLE 55-POUND ROLL BENDING.
TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>BOX SIZE (FT)</th>
<th>FIRE</th>
<th>DIMENSIONS</th>
<th>LENGTH OF EARS</th>
<th>QUANTITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A (FT. -IN)</td>
<td>B (FT. -IN)</td>
<td>C (FT. -IN)</td>
</tr>
<tr>
<td>2 x 1 1/2</td>
<td>24</td>
<td>5-1</td>
<td>4-9</td>
<td>1-0</td>
</tr>
<tr>
<td>2 x 2</td>
<td>30</td>
<td>5-3</td>
<td>5-3</td>
<td>1-4</td>
</tr>
<tr>
<td>3 x 2</td>
<td>36</td>
<td>6-1</td>
<td>5-10</td>
<td>1-6</td>
</tr>
<tr>
<td>3 x 3</td>
<td>42</td>
<td>6-5</td>
<td>6-5</td>
<td>1-8</td>
</tr>
</tbody>
</table>

BENDING DIAMON FOR B-BARS

SECTION B-B

TYPE C COLLAR

PIPE COLLARS

TYPE C
3.50"  
SECTION 8-8  
604.70  
SLOTTED DRAIN  
TYPE A  
PLAN  
LOCKING PLATE DETAIL  

"a" SEAM TO BEGIN AT TOP END OF PIPE  

SLOTTED PIPE DETAIL  

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>B</th>
<th>D</th>
<th>E</th>
<th>10 FT.</th>
<th>20 FT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>31/8&quot;</td>
<td>23/8&quot;</td>
<td>22/8&quot;</td>
<td>18 1/2&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>15&quot;</td>
<td>41/8&quot;</td>
<td>33/8&quot;</td>
<td>22/8&quot;</td>
<td>18 1/2&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>47/8&quot;</td>
<td>39/8&quot;</td>
<td>22/8&quot;</td>
<td>18 1/2&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>57/8&quot;</td>
<td>49/8&quot;</td>
<td>22/8&quot;</td>
<td>18 1/2&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>67/8&quot;</td>
<td>59/8&quot;</td>
<td>22/8&quot;</td>
<td>18 1/2&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>77/8&quot;</td>
<td>69/8&quot;</td>
<td>22/8&quot;</td>
<td>18 1/2&quot;</td>
<td>16 1/2&quot;</td>
</tr>
</tbody>
</table>

DRAIN GUIDE CAN BE USED WITH TYPICAL DRAIN GUIDE STEEL WALLS.  

PORTION OF END COVER PLATE IS NOT SHOWN FOR CLARITY ONLY  

DRAIN GUIDE STEEL WALLS  
LOCKING PLATE (2)  
DIAMETER OF CORRUGATED METAL PIPE VARIES  

JOINT CONNECTION SECTION  
(TYPICAL FOR JOINT CONNECTION SECTION TYPE "A" AND TYPE "B")  

JOINT CONNECTION SECTION  

TYPE "A"  
JOINT CONNECTION SECTION  

SECTION A-A  
END COVER PLATE DETAIL  
SIDE ELEVATION  

SLOTTED DRAIN  
TYPE A  

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION  
105 WEST CAPITOL  
JEFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)  

DATE EFFECTIVE: 03/01/1994  
DATE PREPARED: 8/12/2009  

-14 GA. SHEET METAL  

SECTION B-B  
PLAN  
LOCKING PLATE DETAIL  

ANGLE 1/2" X 1/8"  
1/8" DIA. CARRIAGE BOLT  

DRAIN GUIDE ASSEMBLY  

COUPLING BAND  

LOCKING PLATE  

DRAIN GUIDE STEEL WALL  

LOCKING PLATE DETAIL  

SLOT OPENING RIVET FASTENER  

DRAIN GUIDE ASSEMBLY  

SECTION B-B  
PLAN  
LOCKING PLATE DETAIL  

A  
B  

END COVER PLATE DETAIL  

SECTION A-A  
END COVER PLATE DETAIL  
SIDE ELEVATION  

TYPE A SLOTTED DRAIN  
(FORMED SHEET)  

CUT OUT SLOT FOR DRAIN GUIDE WALLS TO FIT OVER CORRUGATED METAL PIPE SEAMS (TYPICAL).  

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)  

DATE EFFECTIVE: 03/01/1994  
DATE PREPARED: 8/12/2009  

-14 GA. SHEET METAL  

SECTION B-B  
PLAN  
LOCKING PLATE DETAIL  

A  
B  

END COVER PLATE DETAIL  

SECTION A-A  
END COVER PLATE DETAIL  
SIDE ELEVATION  

TYPE A SLOTTED DRAIN  
(FORMED SHEET)  

CUT OUT SLOT FOR DRAIN GUIDE WALLS TO FIT OVER CORRUGATED METAL PIPE SEAMS (TYPICAL).  

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)  

DATE EFFECTIVE: 03/01/1994  
DATE PREPARED: 8/12/2009  

-14 GA. SHEET METAL  

SECTION B-B  
PLAN  
LOCKING PLATE DETAIL  

A  
B  

END COVER PLATE DETAIL  

SECTION A-A  
END COVER PLATE DETAIL  
SIDE ELEVATION  

TYPE A SLOTTED DRAIN  
(FORMED SHEET)  

CUT OUT SLOT FOR DRAIN GUIDE WALLS TO FIT OVER CORRUGATED METAL PIPE SEAMS (TYPICAL).
**SLOTTED DRAIN**

**TYPE B AND TYPE C**

**DATE EFFECTIVE:** 03/01/1994

**DATE PREPARED:** 8/23/2009

**SHEET NO.** 2 OF 2

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

**STRUCTURAL STEEL SLOTTED DRAIN**

**TYPE B**

**SECTION A-A**

**SECTION D-D**

**SECTION F-F**

**SECTION G-G**

**TOP VIEW**

**SIDE VIEW**

**SIDE VIEW**

**TYPICAL COUPLING BAND**

**TYPICAL PIPE SECTION**

**TYPICAL PIPE SECTION**

**GRADE WELDING DETAIL**

**GRADE WELDING DETAIL**

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

**SHEET NO.** 2 OF 2

**DATE EFFECTIVE:** 03/01/1994

**DATE PREPARED:** 8/23/2009

**SLOTTED DRAIN**

**TYPE B AND TYPE C**

**DATE EFFECTIVE:** 03/01/1994

**DATE PREPARED:** 8/23/2009

**SHEET NO.** 2 OF 2

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

**SHEET NO.** 2 OF 2

**DATE EFFECTIVE:** 03/01/1994

**DATE PREPARED:** 8/23/2009

**SLOTTED DRAIN**

**TYPE B AND TYPE C**

**DATE EFFECTIVE:** 03/01/1994

**DATE PREPARED:** 8/23/2009

**SHEET NO.** 2 OF 2

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)
GENERAL NOTES:
ON SUPERELEVATED CURVES PLACE LONGITUDINAL UNDERDRAIN ON LOW SIDE ONLY.
CONSTRUCT OUTLETS AT LOW POINT OF SAG CURVE.

DETAIL OF PIPE AGGREGATE DRAIN OUTLETS

FLOW

4" PIPE UNDERDRAIN
PVC SCHEDULE 40 LONG SWEEP 90° ELBOW OR EQUAL (TYPICAL)

4" PIPE LATERAL (NON-PERFORATED)
GLUED CONNECTION (TYPICAL)

ON GRADIENT

EDGE OF PAVEMENT

COUPLING OR EQUAL WITH 2 CLAMPS (TYPICAL)

4" PIPE UNDERDRAIN
PVC SCHEDULE 40 LONG SWEEP 90° ELBOW OR EQUAL (TYPICAL)

4" PIPE LATERAL (NON-PERFORATED)
GLUED CONNECTION (TYPICAL)

AT SAGS

EDGE OF PAVEMENT

FLOW

4" PIPE UNDERDRAIN
PVC SCHEDULE 40 LONG SWEEP 90° ELBOW OR EQUAL (TYPICAL)

4" PIPE LATERAL (NON-PERFORATED)
GLUED CONNECTION (TYPICAL)

MAXIMUM ALLOWABLE DRAINAGE DISTANCE TO OUTLET OR SEPARATION DISTANCE BETWEEN OUTLETS

<table>
<thead>
<tr>
<th>ROADWAY PROFILE GRADIENT (%)</th>
<th>DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1</td>
<td>250 FT.</td>
</tr>
<tr>
<td>&gt; 1 AND ≤ 2</td>
<td>375 FT.</td>
</tr>
<tr>
<td>&gt; 2</td>
<td>500 FT.</td>
</tr>
</tbody>
</table>
RIGID PAVEMENT WITH PERMEABLE BASE

FLEXIBLE PAVEMENT WITH PERMEABLE BASE

**General Notes:**

See detail of pipe aggregate drain outlets on sheet 1.

**DATE EFFECTIVE:** 06/01/2013

**DATE PREPARED:** 04/11/2013

**SHEET NO.:** 2 OF 4
GENERAL NOTES:

PRECAST CONCRETE SPLASH PADS MAY BE INSTALLED AS APPROVED BY THE ENGINEER.

TOP OF SPLASH PAD SHALL MATCH EXISTING CROSS SLOPE. CONSTRUCT BEND IN SPLASH PAD WHERE CROSS SLOPE CHANGES.

DIMENSIONS ARE APPROXIMATE AND CAN BE ADJUSTED AS DIRECTED BY THE ENGINEER.

ITEM 2: 13: 18: 16: 1 5.48' 6.19' 6.95' 8.58'
B 2.70' 3.07' 3.66' 4.28'
C 0.78' 1.12' 1.69' 2.30'
D 2.00' 2.00' 2.00' 2.00'
E 2.00' 2.00' 2.00' 2.00'
F 0.46' 0.61' 0.78' 1.18'
G 0.71' 1.07' 1.69' 2.27'
H 2.31' 2.51' 2.71' 3.13'

CONC. 0.15 C.Y. 0.17 C.Y. 0.20 C.Y. 0.25 C.Y.
GENERAL NOTES:

AGGREGATE UNDERDRAIN TO BE USED ONLY WHERE DESIGNATED ON PLANS.

AGGREGATE UNDERDRAIN SHALL BE PLACED AT THE LOW POINT OF THE SAG AND THE SPACING OF AGGREGATE UNDERDRAIN SHALL BE APPROX. 500'. AGGREGATE UNDERDRAINS WILL BE OMITTED ON THE CREST VERTICAL CURVES AND ON THE HIGH SIDE OF SUPERELEVATION. THE LOW SIDE OF SUPER-ELEVATION SPACING MAY BE DECREASED AS DIRECTED BY ENGINEER.

PART SECTION SHOWING TYPE E TO TYPE A GUARDRAIL TRANSITION

THE OVERALL NOMINAL DIMENSIONS SHOWN SHALL BE NET. ALTHOUGH THE SHAPE OF THE PLASTIC BLOCK MAY VARY FROM THE SHAPE SHOWN, EXCEPT THE 3/4x 3/4 PLFCE AND THE OVERALL WIDTH DIMENSIONS MAY BE ALTERED IF APPROVED BY PROJECT OPERATOR.

GENERAL NOTES:
TYPE E GUARDRAIL SHALL USE 6x8" FOOT SPACING UNLESS 3-1/2" FOOT IS SPECIFIED.
THE THREADED BEAM РФL FOR THE TYPE E GUARDRAIL AND THE TRANSITION SECTION SHALL BE MADE OF STEEL AND SHALL BE IN COATS.
FOR PROTECTIVE COATING AND MATERIAL REQUIREMENTS, SEE SECTION 1000 OF THE STANDARD SPECIFICATIONS.
SEE SHEET 7 OF 7 FOR REQUIREMENTS FOR SPECIAL INSTALLATIONS.
ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES EXCEPT WHERE ALTERNATE TOLERANCES ARE SHOWN.
FOR DETAILS NOT SHOWN, SEE OTHER SHEETS OF THIS DRAWING.

SECTION B-B

SECTION C-C
(1) Shoulder widening shall consist of embankment material compacted in accordance with Sec 205.4 of the standard specifications.
(2) Post shall be spaced at 3'-6" on center.
(3) When guardrail is constructed over curbs, the curbs shall be constructed as shown.

**Typical Section**

**Alternate Typical Section at Slope Breakpoint**

**Detail for Transitioning Between Type A and Type B Guardrail**

**Plan**

**Elevation**

**Guardrail at Curbs (3)**

**Location Other Than & Median Lateral Placement of Guardrail for Shoulder Installation**

**Guardrail Layout**
THE OVERALL NOMINAL DIMENSIONS SHOWN SHALL BE NET, ALTHOUGH THE SHAPE OF THE PLASTIC BLOCK MAY VARY FROM THE SHAPE SHOWN EXCEPT THE #6 FLANGE ARE THE OVERALL WIDTH DIMENSIONS MAY BE ALTERED IF APPROVED BY PROJECT OPERATIONS.

DELINERATORS ON NEW GUARDRAIL

GENERAL NOTES:

FOR GUARDRAIL DELINERATION DETAILS SEE
SDG PLAN 903.03.
TOP VIEW

FRONT VIEW

END VIEW

SECTION THROUGH THRIE BEAM RAIL

TERMINAL CONNECTOR

SECTION THROUGH W-BEAM RAIL

THREE-BEAM SPLICE AT POST

ELEVATION OF ASYMMETRICAL TRANSITION SECTION

W-BEAM RAIL SPLICE AT POST

GUARDRAIL RAIL ELEMENTS

NOTE: PORTIONS OF BEAMS WITH HAT型 BOLT SLOTS TO BE LEFT REMAINING.

REVIEW EPOXY SLOPING LOCATION OF SECTIONAL BOLT SLOTS (NECESSARY TO RETAIN CURVATURE).
SECTION A-A
ROCK ENCOUNTERED
UP TO 6" BENEATH SURFACE

SECTION B-B
ROCK ENCOUNTERED
6" TO 18" BENEATH SURFACE

SECTION C-C
ROCK ENCOUNTERED MORE
THAN 18" BENEATH SURFACE

SECTION D-D
SETTING POST THROUGH PAVEMENT
(Concrete or Asphalt > 2" Thick)

GENERAL NOTES:

NOTES IN SOLID ROCK SHALL PROVIDE A DIAMETER OF NOT
LESS THAN 1 INCH GREATER THAN THE MAXIMUM
TRANSVERSE DIAMETER OF THE POST SECTION.

POST MAY BE SHORTER WHERE PLACED IN A MINIMUM 2 FEET
OF SOLID ROCK. STEEL POSTS MAY BE PLACED IN SOIL CON-
SIDERED OR USE THE MINIMUM POST INSERT DEPTH AS DESCRIBED IN THE STANDARD SPECIFICATIONS.

GUARDRAIL SPECIAL INSTALLATIONS

SETTING POST THROUGH ASPHALT ≤ 2" THICK
EDGE OF TRAVELED WAY

LOCATION OF OBJECT PROMPTING POST PLACEMENT:

PLAN

ELEVATION

1. IF LOCATED WITHIN THE CLEAR Zone OF A TWO-LANE ROADWAY, THE MINIMUM LENGTH IS 87' - 6".
2. ADDITIONAL END TREATMENT AS REQUIRED INCLUDING END TREATMENT.
3. THE POST MAY BE SHIPPED DUE TO THE PRESENCE OF AN OBSTACLE SUCH AS A CURVET.
4. PLACE END TREATMENT SO CLOSER TO THE SHIPPED POST THAN POSTS 5 AND 22.

SECTION A-A

W6 X 9 STEEL POSTS, 6' OR 7' LONG WITH 8" X 6" X 14" FOOTED WOOD BLOCKOUTS
POSTS 1 THROUGH 12 AND 19 THROUGH 24.

SECTION B-B

SET WOOD POSTS, 6' OR 7' LONG WITH 8" X 6" X 14" WOOD BLOCKOUTS
POSTS 13 THROUGH 18.
GENERAL NOTES:

WOOD POSTS AND WOOD BLOCKS MAY BE USED ON TYPE E GUARDRAIL.

THE BULLNOSE GUARDRAIL PAY ITEM INCLUDES THE STRUCTURE BETWEEN POST 10 AND THE NOSE. THE REMAINING GUARDRAIL WILL BE PAID FOR AS STANDARD GUARDRAIL ITEMS.

SUITABLE DRAINAGE MUST BE PROVIDED WHEN MEDIAN GRADING IMPEDES NORMAL FLOW.
THRIE BEAM ANCHOR POSTS

THRIE BEAM CRT POSTS

POSTS 2 THROUGH 8 STANDARD BLOCKS

BLOCKS FOR POSTS 9 AND 10 STANDARD BLOCKS

TAPERED BLOCK

DATE EFFECTIVE: 08/01/2012
DATE PREPARED: 7/27/2012

MEDIAN PIER PROTECTION
BULLNOSE GUARDRAIL SYSTEM
POST AND BLOCKS

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-MODOT (1-888-663-6868)
STEEL PLATE, A306
12 1\(\frac{1}{8}\)" x 5 3\(\frac{1}{8}\)" x 1/4"

(1) STUD, THREADED ENTIRE LENGTH.

DETAIL OF CABLE ASSEMBLY

DETAIL OF STEEL BEARING PLATE
GENERAL NOTES:

(1) TYPE E GUARDRAIL 12'-5" IN LENGTH AND FACTORY FORMED TO THE REQUIRED RADIUS.

(2) PAYMENT FOR THE END TERMINAL WILL BE CONSIDERED FULL COMPENSATION FOR ANY TRANSITION SECTIONS, BACKUP ASSEMBLIES, OR OTHER ITEMS NECESSARY FOR PROPER INSTALLATION AS REQUIRED BY THE MANUFACTURER.

* VARY SLOPE NO STEEPER THAN 15:1 TO UTILIZE A FULL 12.5' LENGTH OF GUARDRAIL WHEN ATTACHING TO THE CRASHWORTHY END TERMINAL.
PIER AT \& OF MEDIAN

1) TYPE E GUARDRAIL IN THIS REGION SHALL BE 12'6" IN LENGTH AND FACTORY FORMED TO A 75' RADIUS.
2) TYPE A NON-FLARED CRASHWORTHY END TREATMENT.

GENERAL NOTES:

WOOD POSTS AND WOOD BLOCKS MAY BE USED ON TYPE E GUARDRAIL. END ANCHOR SECTION TO BE USED ON TERMINAL END OF TYPE E GUARDRAIL. END ANCHOR TO BE LOCATED BEYOND THE LONGITUDINAL LIMITS OF TYPE A NON-FLARED CRASHWORTHY END TERMINAL.

TYPE A NON-FLARED CRASHWORTHY END TERMINAL SHALL BE THE LATEST VERSION AND SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

DATE EFFECTIVE: 08/01/2012
DATE PREPARED: 07/27/2012

Sheets 606-01F
STRUCTURAL STEEL TUBING BLOCK DETAIL

21 1/2" WOOD BLOCK DETAIL

19" WOOD BLOCK DETAIL

14" WOOD BLOCK DETAIL

ALL HOLES DRILLED OR PUNCHED 1/4" CID.
THRICE BEAM RAIL SPLICE AT POST

The contractor may, at his option, provide equivalent sections fabricated from material meeting and in accordance with the requirements of ASTM A 763 Grade 36 or 40. The sections shall be galvanized after fabrication in accordance with requirements of ASTM A 117.

SECTION THROUGH THRICE BEAM RAIL

GENERAL NOTES:

Design based on NCHRP Report 550 test level 3.

The thrice beam rail, terminal connector and the transition section for the bridge anchor section shall be made of steel and shall be 12 gauge.

For protective coating and material requirements, see section 1040 of the standard specifications.

Rail posts shall be set perpendicular to the roadway profile grade and vertically in cross section.

Washers shall be used at all post bolts.

Structural threading block shall be fabricated from ASTM A 325 Grade B steel and galvanized.

Use 1 1/4" button-head oval shoulder bolts with hex nuts at all slits (thickness of hex nuts = 1 1/4"

The bearing plate shall be fabricated from grade A 325 steel and galvanized.

All lap splice, including end shoes, shall be made in the direction of traffic.

See standard plan 606.00 for details not shown.

The cost of furnishing, fabricating and installing transition section complete in place, will be paid for at the contract unit price per each.

The cost of furnishing, fabricating and installing bridge anchor section (safety barrier curb), complete in place, will be paid for at the contract unit price per each.

STATE OF MINNESOTA

BRIDGE ANCHOR SECTION

SAFETY BARRIER CURB ON BRIDGE

606.22U

Sheet No. 3 of 6
WELDING INSTRUCTION

4 ALL FILLET WELDS SHALL BE 1" LONG SPACED AT 2".

GENERAL NOTES:
COVER PLATE PANELS ARE 0.5" THICK.
ALL STIFFENERS ARE 1" THICK.
CONNECTOR PLATE SHALL BE FABRICATED FROM ASTM GRADE
A285 STEEL AND GALVANIZED.
FOR GALVANIZED REQUIREMENTS, SEE SECTION 1040 OF THE
STANDARD SPECIFICATIONS.
ALL HOLE DIAMETERS SHALL BE 1".

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION
BRIDGE ANCHOR SECTION
SAFETY BARRIER CURB ON BRIDGE
(CONNECTOR PLATE DETAIL)

606.22U  4 OF 6

DATE EFFECTIVE: 07/01/2014
DATE PREPARED: 07/03/2014
WELDING INSTRUCTION

1) STIFFENERS LOCATED AT THE OUTSIDE EDGES OF THE COVER PLATES SHALL BE WELDED AS FOLLOWS:
   SINGLE BEVEL FROSTED WELD ON EXTERNAL SIDES AND E' FILLET WELD BY 3" LONG SPACED AT 2" ON INTERNAL SIDES.

2) STIFFENERS LOCATED ON THE INSIDE OF THE COVER PLATE SHALL BE WELDED AS FOLLOWS:
   E' FILLET WELD BY 3" LONG SPACED AT 2".

CONNECTOR PLATE DIMENSION (PER ASSEMBLY):

<table>
<thead>
<tr>
<th>PLATE</th>
<th>CONFIGURATION</th>
<th>SIZE (L x W x C x D1)</th>
<th>THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>1</td>
<td>20&quot; x 20&quot;</td>
<td>3/16&quot;</td>
</tr>
<tr>
<td>F2</td>
<td>1</td>
<td>20&quot; x 20&quot; x 28&quot;</td>
<td>3/16&quot;</td>
</tr>
<tr>
<td>F3</td>
<td>1</td>
<td>39&quot; x 20&quot; x 20&quot; x 16&quot;</td>
<td>3/16&quot;</td>
</tr>
<tr>
<td>S1</td>
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</tbody>
</table>

GENERAL NOTES:

COVER PLATE PANELS ARE 3/16" THICK.
ALL STIFFENERS ARE 3/16" THICK.

CONNECTOR PLATE SHALL BE FABRICATED FROM 45TH GRADE 4340 STEEL AND GALLERIZED.
FOR MATERIAL REQUIREMENTS SEE SEC 1040 OF THE STANDARD SPECIFICATIONS.

ALL HOLE DIAMETERS SHALL BE 1/2".

BRIDGE ANCHOR SECTION
SAFETY BARRIER CURB ON BRIDGE
CONNECTOR PLATE DETAIL
SINGLE SLOPE BARRIERS
SECTION F-F
SIDE VIEW
STEEL POST AND WOOD BLOCKOUT

SECTION G-G
SIDE VIEW
STEEL POST AND WOOD BLOCKOUT

SECTION H-H
THROUGH THRIE BEAM RAIL

OPTIONAL 8" EYE HOLE FOR HANDLING DURING SAWCUTTING, 1/E PERMITTED

POST 12" (12) VERTIAL EYE BOLT TRANSITION PROCTOR (SEE FRONT SHEET) POST 0" - ONLY 1 HOLE REQUIRED
ALL HOLES 1/4" DIAMETER EXCEPT AS NOTED

HOLE PUNCHING DETAIL
FOR STEEL POST & WOOD BLOCKS (6" AND 8"

THRIE BEAM RAIL SPLICE AT POST

ASYMMETRICAL TRANSITION SECTION

BRIDGE ANCHOR SECTION
(THRIE BEAM RAIL ON BRIDGE)
SECTION A-A
EXPANDED POLYSTYRENE FOAM
INSTALLATION DETAIL

SOIL PLATE

WOOD BREAKAWAY POST
SEE SECTION 1050

GENERAL NOTES:
THE CONTRACTOR HAS THE OPTION TO INSTALL WOOD POST 1 AND 2 IN STEEL TUBE OR CONCRETE FOUNDATION.

STEEL TUBE FOUNDATIONS SHALL BE FILLED WITH A SUITABLE MATERIAL, WHEN THE SOIL PLATE IS FILLED AND BOLTED TO THE STEEL TUBE. STEEL TUBE FOUNDATIONS MAY BE DRIVEN WHEN THE SOIL PLATE IS 6" X 6" X 8" STRUCTURAL STEEL TEEING.

STEEL TUBE FOUNDATION neutrally with their materials.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

GUARDRAIL
TERMINAL ANCHOR ENDS

DATE: 06/24/2021

606.30L SHEET NO. 3 OF 7
3 - 1" Ø holes to be field drilled in W-beam element and countersunk with 5/8" hex head bolts 1½" long each with one square washer and hex nut.

1" Ø hole to be field drilled through W-beam element and countersunk with 5/8" hex head bolt 1½" long with one square washer and hex nut.

EQUIPPED STEEL POST

3 - 1" Ø holes to be field drilled in W-beam element and countersunk with 5/8" hex head bolts 1½" long each with one square washer and hex nut.

1" Ø hole to be field drilled through W-beam element and countersunk with 5/8" hex head bolt 1½" long with one square washer and hex nut.

SPECIAL RUBRAIL TO POST CONNECTION AT POST A
CONCRETE BLOCK ANCHOR
ANCHOR ASSEMBLY

ANCHOR ASSEMBLY FOR THREADED INSERTS (SEE DETAIL ON THIS SHEET)

TOP VIEW
TERMINAL CONNECTOR

ELEVATION
CONCRETE BLOCK ANCHOR
(24" X 24" X 36")

3 - #10 WOOPS 30" X 18"

ELEVATION OF 6' POST
STEEL POST AND BLOCK DETAIL

FOR ADDITIONAL POST AND BLOCK DETAILS SEE SHEET 606.30.

ELEVATION 8' POST

GARLDRAIL
EMBEDDED TERMINAL ENDS
GENERAL DETAILS

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITAL
JEFFERSON CITY, MO 65102
1-888-601-MODOT (6636) 1-800-292-4682

GUARDRAIL
EMBEDDED TERMINAL ENDS
GENERAL DETAILS

DATE effective: 04/04/2021
DATE Effective: 04/04/2021

606.30L SHEET No. 7 OF 7
GRADING LIMITS FOR FLARED CRASHWORTHY END TERMINALS

STANDARD GRADING LIMITS FOR CRASHWORTHY END TERMINALS

ALTERNATE GRADING LIMITS FOR CRASHWORTHY END TERMINALS

(1) APPROVED CRASHWORTHY END TERMINAL

GENERAL NOTES:
STANDARD GRADING LIMITS SHALL BE USED WHEN CONSTRUCTING A NEW PINWHEEL. ALTERNATE GRADING LIMITS ARE ALLOWABLE ON EXISTING ROADS EXCEPT WHEN STANDARD GRADING IS INDICATED ON THE PLAN.

THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH APPROVED SHOP DRAWINGS OF THE APPROVED CRASHWORTHY END TERMINAL.

END ANCHORS SHALL BE INSTALLED ON ENDS OF GUARDRAIL RUNS WHERE CRASHWORTHY END TERMINALS ARE NOT REQUIRED.
ANCHOR ASSEMBLY

EXPANDABLE OR SCREW TYPE ANCHOR

GROUND LINE OR SHOULDER ELEVATION

300' MAX. (BETWEEN ANCHORS)

PLAN

12'-6"

CABLE END

\" Cable

\" Cable

ANCHOR ASSEMBLY

END ANCHOR

LINE POST

ELEVATION

INTERMEDIATE ANCHOR

12'-6"

12'-6"

12'-6"

STEEL POST

(W3 X 5.7 STD. BEAM)

POST DETAILS

1\" X 3\" CLAMP

1\" BOLT AND WASHER

1\" HOLE

WOOD POST

(W4 X 4\" SQUARE

OR 4\" ROUND)

1\" X 3\" CLAMP

1\" DIA.

NOT REQUIRED

FOR LINE POST

1\" DIA.

NOT REQUIRED

FOR LINE POST

\" X 2\"

LAG SCREW

DATE EFFECTIVE: 07/01/2004

DATE PREPARED: 08/21/2009

606.40D

SHEET NO. 1 OF 2
ACCESS-RESTRAINT CABLE GREATER THAN 300 FEET IN LENGTH REQUIRE AN INTERMEDIATE ANCHOR AS SHOWN.

SPICE DETAIL

ANCHOR ROD ASSEMBLY

CABLE END

TYPICAL LOCATION
SHOULDER INSTALLATION

ONE-STRAND ACCESS RESTRAINT CABLE

DATE EFFECTIVE: 07/01/2004
DATE PREPARED: 08/23/2009
606.40D SHEET NO. 2 OF 2
TYPICAL TERMINAL SECTION

TYPICAL INTERMEDIATE TERMINAL SECTIONS

MEDIAN INSTALLATION PLAN

GENERAL NOTES:

1. The width of the guard cable shall be in accordance with the standards prescribed by the Missouri Highways and Transportation Commission.

2. All details shall be in accordance with the specifications provided by the Missouri Highways and Transportation Commission.

MEDIAN ELEVATION

THREE-STRAND GUARD CABLE

MEDIAN APPLICATION

FOR GUARD CABLE DESIGN DETAILS SEE SHEET 6 OF 7.

FOR GUARD CABLE DESIGN DETAILS SEE SHEET 7 OF 7.
GUARD CABLE TO GUARDRAIL TRANSITION AT MEDIAN BRIDGE END

GENERAL NOTES:

WHEN GUARD CABLE IS LOCATED ALONG THE MEDIAN CENTER-LINE NEAR A BRIDGE END OR CONCRETE CURB, IT SHALL BE SHOEHORNED BENEATH THE GUARDRAIL ASSEMBLY WITH THE GUARD CABLE ANCHOR ASSEMBLY. THE GUARD CABLE ANCHOR SHALL BE CONSTRUCTED SO THAT IT IS PROJECTED BY THE GUARDRAIL.

THIS DRAWING EFFECTS OPTIONS FOR THE ATTACHMENT OF GUARD CABLE TO GUARDRAIL. IT DOES NOT INDICATE THAT TWO RINGS OF CABLE ARE REQUIRED.

SUITABLE DRAINAGE MUST BE PROVIDED WHEN MEDIAN GRADE EXCEEDS NORMAL FLOW.

TYPICAL GUARD CABLE TO GUARDRAIL TRANSITION ELEVATION
U-BOLT CABLE CLIPS

CABLE HOOK BOLT AND NUT

25" HOOKED ANCHOR BOLT AND NUT

CABLE ANCHOR WEDGE

CABLE SPLICE

PLAN VIEW

1. (a) Minimum clearance to the face of obstacle with 6'-3" post spacing, or
(b) Minimum clearance to the face of obstacle with 1'-6" post spacing, of
1'-0" minimum clearance to the face of obstacle with 1'-6" post spacing. See Sheet 4 of 5 for post spacing details.

2. When site constraints prohibit or enforcement cannot be constructed to provide a minimum of 2 feet between the ends of the guardrail posts and slope break point, 8 foot posts shall be used (see sheet 6 of 8).

GENERAL NOTES:

For initial installation, construct the guardrail within 3" of the standard 3" height to the top of the rail. When subsequent projects, such as resurfacing, affect the height of existing guardrail, adjustment is not required if finished height is within 3" of the standard height.

The standard post length is 6'-6" (±1") tolerance.

The substitution of 8 foot posts in lieu of required guarding, to construct less than the designed typical section, shall not be allowed.

Refer to Section 101 for dimensional details of W-beam, H-beam, etc. bridge and evidentiary sections. Beam splice, post and splice bolts, nuts, and tite-i-W-beam to thrie beam transition sections.

Beam washers are not to be used. Bolt shall be ASTM A325.

Unless otherwise specified, W-beam rail is 12 gauge steel with an effective length of 10'-0" or 25'-0", with 1/2" x 1/4" splice bolt slots, and 2 x 6" post bolt slots on 3'-0" centers regardless of post spacing.

For protective coating and material requirements, see Section of the Standard Specifications.

Lap splice between rail of between rail and terminal connectors in the direction of traffic. Lap the flared end sections in the direction of traffic.

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105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-MO-ROAD (1-888-667-6233) 1-800-MO-TRAN (1-800-668-7272)

MIDWEST GUARDRAIL SYSTEM
(MGS)
GUARDRAIL

DATE EFFECTIVE: 06/04/2021
DATE REVISED: 10/17/2021
606.50E SHEET NO. 1 OF 8
PLAN VIEW

FACE OF CURBAIL ALIGNED WITH FACE OF CURB.

L.F. SPLICES SHALL BE IN THE DIRECTION OF TRAFFIC.

FACE OF CURBAIL ALIGNED WITH EDGE OF SHALOWER OR FACE OF CURB.

SECTION A-A

ELEVATION VIEW

TYP. A AND B. OR S CURB
(SEE PLANS)

SURFACE

6' - 3"
MGS GUARDRAIL AT CURB

MAX. DISTANCE FACE OF RAIL CAN BE IN FRONT OF FACE OF CURB

ALTERNATE MGS AT CURB

FACE OF GUARDRAIL FLUSH WITH FACE OF CURB

FOR STEEL POST AND NOTCHED WOOD OR PLASTIC BLOCK
HOLE PUNCHING DETAIL
(4) TWO HOLES CAN BE PROVIDED ON EACH FLANGE OF POST. ONLY ONE IS REQUIRED
FOR FLANGE OF POST THAT HAS A BOLT ATTACHMENT.

OPTIONAL - 1/2" DIAMETER HOLE
2" FROM THE TOP FOR GALVANIZING.
(ONE PERmitted)

1/4" x 1" SLEEVE BOLT SLOT
(1) 1" TOLERANCE +1/16", -1/16"

RAIL ELEMENT SPLICe DETAIL

DELINeATORS ON GUARDRAIL

GENERAL NOTES:
FOR GUARDRAIL DELINeATION DETAILS SEE
STO PLAN 903.03.
MGS GUARDRAIL WITH 3'-11⁄2"
POST SPACING

MGS GUARDRAIL WITH 1'-61⁄2"
POST SPACING

111 25 FEET OF MGS 3'-11⁄2" POST SPACING GUARDRAIL
11.5 REQUIRES ON-APPROACH AND OFF-APPROACH EYES OF
1'-61⁄2" POST SPACING MGS GUARDRAIL.

112 USE AS MANY SEGMENTS AS NECESSARY TO SHIELD
THE AREA OF CONCERN.

113 REDUCED POST SPACING SHALL USE 6'-0" POSTS.
MAX. ANY DELETION OF 6'-0" POSTS WILL ONLY
BE ALLOWED IN ACCORDANCE WITH SPECIAL INSTALLATIONS
AS SHOWN ON SHEET 5 OF 6.

GENERAL NOTES:
- MGS GUARDRAIL CANNOT BE USED WITH:
  - POST SPACING LESS THAN 6'-0".
  - WITHIN Crossover PH ENCRONOMS
  - SEE MANUFACTURER'S DRAWINGS
  - WITHIN VERTICAL BARIER TRANSITIONS (606.40)
  - WITHIN BRIDGE APPROACH TRANSITIONS (606.70)
SETTING POST IN SOLID ROCK

SECTION A-A
Rock encountered up to 6" beneath surface

SECTION B-B
Rock encountered 6" to 18" beneath surface

SECTION C-C
Rock encountered more than 18" beneath surface

SECTION D-D
Setting post through pavement (concrete or asphalt > 2" thick)

GENERAL NOTES:

Holes in solid rock shall provide a diameter of not less than 4 inches greater than the maximum transverse dimension of the post section.

Post may be shorter where placed in 2 feet of solid rock. Steel posts may be flare or fan cut. Repair of cut shall be in accordance with specs of the standard specifications.

No additional payment will be made for cutting the oversized holes or placing aggregate in the holes, as indicated in this plan.
**SECTION A-A**

**8' STEEL POST**

**ELEVATION VIEW**

**PLAN VIEW**

**ALTERNATE SECTION A-A**

**MAXIMUM LATERAL PLACEMENT OF 8' STEEL POSTS ADJACENT TO SLOPES**

**GENERAL NOTES:**

See Std. Plan 606.81 for site grading requirements for crashworthy end terminals.

8' Post Posts shall be used when less than 2 feet of embankment is present between the back of the guardrail post and the slope break point. The substitution of a foot post in lieu of required grading to construct less than the designed typical section shall not be allowed.

**MISSOURI HIGHWAYS AND TRANSPORTATION**

**COMMISSION**

**MO DOT**

**JEFFERSON CITY, MO 65102**

**1-888-MO-DOT-Help (1-888-663-6835)**

**MIDWEST GUARDRAIL SYSTEM (MGS)**

**8 FT. POST**

**DATE EFFECTIVE:** 02/15/2023

**DATE REvised:** 10/27/2023

**SHEET NO:** 606.50E

**6 OF 8**
PLAN VIEW

FACE OF GUARDRAIL ALIGNED WITH EDGE OF SHOULDER

MGS BLOCK AND HEIGHT TRANSITION FROM TYPE A GUARDRAIL TO MGS GUARDRAIL

ALTERNATE PLAN VIEW - ALIGNMENT TAPER

SEE NOTE 11

NOTES:
1. WHERE FOOT OFFSET IS CONstrained, AND WHEN THE EXISTING SHOULDERS ARE WIDER THAN 6 FEET, THE EXISTING SHOULDERS MAY BE MODIFIED UP TO 4 INCHES TO ACCOMMODATE THE 10 INCH BLOCKS OF THE MGS GUARDRAIL.

2. WHERE SITE CONSTRAINTS PROHIBIT OR ENHANCEMENT CANNOT BE CONSTRUCTED TO PROVIDE A MINIMUM OF 2 FEET BETWEEN THE EDGE OF THE GUARDRAIL FOOT AND SLOPE BASE FOOT, 2 FOOT FOOTPLATES SHALL BE USED (SEE SHEET 6 OF 8), THE SUBSTITUTION OF 4 FOOT FOOTPLATES FOR REQUIRED GRADING SHALL NOT BE ALLOWED.

3. MGS TRANSITION FROM TYPE A GUARDRAIL SHALL BE COMPLETED INSIDE THE 50 FT MGS EDGE TERMINAL LIMITS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MISSOURI GUARDRAIL SYSTEM (MGS)
BLOCK AND HEIGHT TRANSITION

SHEET NO. 8 OF 8
PIER AT MEDIAN

1. 2-6" MINIMUM CLEARANCE TO THE FACE OF OBSTACLE WITH 6'-3" FOOT SPACING IS PREFERRED. 2-6" MINIMUM CLEARANCE USE 3'-6" FOOT SPACING. 1-6" MINIMUM CLEARANCE USE 1'-6" FOOT SPACING.

2. TRANSITION CURVE FORCE CRUSHABLE HEIGHT AND WIDTH IF NECESSARY FOR TYPE B CRASHWORTHY END TERMINAL PER MANUFACTURER'S REQUIREMENTS. SEE STD. PLANS 606.38 FOR FOOT SPACING DETAILS.

3. CONTINUE 10% SLOPE TO OBSTACLE OR A MINIMUM OF 2' FAST THE EDGE OF THE CRASHRAIL FOOT.

4. 10% FLARE RATE OR AS RECOMMENDED BY TABLE 5-9 OF THE LATEST VERSION OF THE "ROADSIDE DESIGN GUIDE".

MEDIAN WIDTH LESS THAN 60'

SECTION A-A

DETAIL A

GRADING LIMITS

GENERAL NOTE:

TYPE B CRASHWORTHY END TERMINAL SHALL BE MGS COMPATIBLE. LATEST VERSION AND SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

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"T" MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION

MISSOURI CRASHWORTHY END TERMINAL MGS GUARDRAIL MEDIAN PIER PROTECTION MEDIAN LESS THAN 60'

DATE有效: 06.01.2021
DATE PREPARED: 03.07.2021
SHEET #: 606.51
1 OF 2
PIER AT 6' MEDIAN

1. 24" MINIMUM CLEARANCE TO THE FACE OF OBSTACLE WITH 6' TO 3' POST SPACING IS PREFERRED. 3' TO 6' MINIMUM CLEARANCE USE 1' - 611/2" POST SPACING. SEE ST. PLS. 606.50 FOR POST SPACING DETAILS.

2. FOR LENGTH-OF-DELETE, SEE THE LATEST VERSION OF THE "PRESSESIDE DESIGN GUIDE 5 - 6' LENGTH-OF-DELETE".

3. CONTINUE TO slope TO OBSTACLE OR A MINIMUM OF 2' FROM THE BACK OF THE CHAFLAIL POST.

GENERAL NOTE:
MEDIAN WIDTHS GREATER THAN 60' THAT THE PIER OBSTACLES ARE BEYOND THE CLEAR-ZONE DO NOT REQUIRE MEDIAN PIER PROTECTION. FOR CLEAR-ZONE DISTANCES, SEE THE LATEST VERSION OF THE "PRESSESIDE DESIGN GUIDE 5 - THE CLEAR-ZONE CONCEPT".

TYPE A NON-FLARED CRASHPROOF END TERMINAL SHALL BE THE LATEST VERSION AND SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

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1000 WEST CAPITAL AVENUE
JEFFERSON CITY, MO 65103
1-800-392-MODOT (663-6683)

MO GUARDRAIL MEDIAN PIER PROTECTION
60' MEDIAN OR GREATER

DATE EFFECTIVE: 06.24.2021
DATE UPDATED: 03.27.2021
SHEET NO.: 2 OF 2
BRIDGE APPROACH TRANSITION (WITH REGULAR LENGTH CURB OR NO CURB) (1)

GENERAL NOTES:
SEE SHEET 1 FOR ADDITIONAL NOTES NOT INCLUDED ON THIS SHEET.

THE COST OF FURNISHING, FABRICATING AND INSTALLING
BRIDGE APPROACH TRANSITION (REGULAR LENGTH CURB OR NO CURB) COMPLETE
IN PLACE WILL BE PAID FOR AT THE CONTRACT UNIT
PRICE PER EACH.

(1) WHERE CURB EXTENDS UPTREAM OF POST NO. 14 FOR DRAINAGE PURPOSES,
A STIFFNESS TRANSITION CONSISTING OF AN EXTRA 12'-0" BEAM OF 12
GAUGE A-BEAM MUST BE INSTALLED TO THE TRANSITION SECTION
UPSTREAM OF POST NO. 14. THE CURE WILL BE EXTENDED TO THE END
OF THE 12'-0" 12 GAUGE A-BEAM STIFFNESS TRANSITION SEE DETAIL PLAN
SHEET 606.60B FOR DETAILS. IF CURB EXTENDS BELOW POST NO. 14 PAINT FOR
A BRIDGE APPROACH TRANSITION (EXTENDED CURB).
WELDING INSTRUCTION

4 ALL FILLET WELDS SHALL BE 1/8" LONG SPACED AT 2".

GENERAL NOTES:
COVER PLATE PANELS ARE 1/8" THICK.
ALL STIFFENERS ARE 1/8" THICK.
CONNECTOR PLATE SHALL BE FABRICATED FROM 45TH GRADE STEEL AND QUENCHED.
FOR QUENCHED REQUIREMENTS, SEE SECTION 1040 OF THE STANDARD SPECIFICATIONS.
ALL HOLE DIAMETERS SHALL BE 1/8".
PLATE AND STIFFENER IDENTIFICATION
(VIEWED FROM BACK SIDE OF PLATE)

CONNECTOR PLATE DIMENSION
(OUTSIDE ASSEMBLY)

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<tr>
<th>PLATE</th>
<th>QUANTITY</th>
<th>SHAPE</th>
<th>SIZE (A X B X C X D)</th>
<th>THICKNESS</th>
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<tr>
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</tr>
<tr>
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<tr>
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<td>1</td>
<td>D</td>
<td>10&quot; x 10&quot; x 10&quot;</td>
<td>1/2&quot;</td>
</tr>
</tbody>
</table>

GENERAL NOTES:
COVER PLATE PANELS ARE 1/2" THICK.
ALL STIFFENERS ARE 1/2" THICK.
CONNECTOR PLATE SHALL BE FABRICATED FROM CRANE 450 250 STEEL AND GALVANIZED.
FOR GALVANIZED REQUIREMENTS, SEE SECTION 10 OF THE STANDARD SPECIFICATIONS.
ALL WIRE DIAMETERS SHALL BE 1/8".

WELDING INSTRUCTION
(VIEWED FROM BACK SIDE OF PLATE)

(1) STIFFENERS LOCATED AT THE OUTSIDE EDGES OF THE COVER PLATE SHALL BE WELDED AS FOLLOWS:
- SINGLE BEVEL GROOVE WELD ON EXTERNAL SIDES AND 1/2" FILLET WELD BY 1" LONG SPACING AT 2" ON INTERNAL SIDES.

(2) STIFFENERS LOCATED ON THE INSIDE OF THE COVER PLATE SHALL BE WELDED AS FOLLOWS:
- 1/2" FILLET WELD BY 1" LONG SPACING AT 2".

MIDWEST GUARDRAIL SYSTEM (MGS)
VERTICAL BARRIER TRANSITIONS
CONNECTOR PLATE DETAIL
SINGLE SLOPE BARRIERS
TYPE 2 BREAKAWAY WOOD POST

STEEL GROUND FOUNDATION TUBE

STRUT AND YOKE ASSEMBLY
PLAN VIEW

HEIGHT OF GUARDRAIL IS PARALLEL TO RIDGEWAY

ELEVATION
ANCHORED IN BACKSLOPE GUARDRAIL

COST OF SHAPING ROCK FACE FOR PLACING OF TERMINAL CONNECTOR, DRILLING HOLES, FURNISHING AND PLACING BOLTS, WASHERS, ETC.; ANCHORS AND CAP SHOE TO BE INCLUDED IN THE PRICE OF GUARDRAIL ANCHOR, ROCK FACE.

(1) HEIGHT ABOVE DITCH IS
EQUAL TO FAIL ELEVATION AT THE DITCH CROSSING.

ANCHOR TERMINAL CONNECTOR TO FACE OF ROCK CUT

ANCHOR TERMINAL CONNECTOR TO FACE OF ROCK CUT

GENERAL NOTES:
FOR END ANCHOR DETAILS, SEE SHEET 1 OF 7.
RIDGEWAY begin when the distance between the guardrail and the grade is 10 ft and increasing.
END ANCHOR FOOT 1 AND 2 SHALL HAVE FOUNDATION TYPE AS SHOWN ON SHEET 3 OF 7.
THE CONTRACT UNIT PRICE FOR EMBEDDED GUARDRAIL ANCHOR SHALL INCLUDE THE CONCRETE ANCHOR, ELEVATION AND REFILLING OF TERMINAL CONNECTOR AND ALL INCIDENTAL HARDWARE AND WORK NECESSARY TO COMPLETE THE INSTALLATION.
THE EMBEDDED GUARDRAIL TRANSITION SHALL EXTEND 50 IN BEYOND THE DITCH LINE AND TERMINATE A MINIMUM OF 12 INCHES BELOW GRADE ELEVATION OF THE BACKSLOPE.
BLOXOUTS WILL NOT BE REQUIRED FOR ANY FOOT WHICH WILL BE COMPLETELY BELOW GRADE. THE ALIGNMENT OF SUCH FOOT SHALL BE APPROVED BY THE ENGINEER.
SEE OTHER DRAWINGS AND STANDARD SPECIFICATIONS FOR MATERIAL AND CONSTRUCTION REQUIREMENTS NOT SHOWN.

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105 N.E. CAPITOL
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1-888-654-4687 (1-888-MODOT-4687)

MIDWEST GUARDRAIL SYSTEM
(MGS)
TERMINAL ENDS
EMBEDDED AND ROCK FACE
(V-DITCH STEEPER THAN 10:1
1:4 MAX. FORESLOPE)

SURFACE DATE:
02/24/2023
606.80C
SHEET NO. 4
EMBEDDED STEEL POST

2 - 1½" holes to be field drilled in V-beam element and attached with 2 1/2" hex head bolts 1½" long each with one square washer and hex nut.

1½" hole to be field drilled through V-beam element and through post flange. Attached V-beam with 2 1/2" hex head bolt 3" long with one square washer and hex nut.

EMBEDDED ANCHOR SYSTEM (MGS) EMBEDDED ANCHOR TERMINAL ENDS (STEEL POST OPTION)

SPECIAL RUBRAIL TO POST CONNECTION AT POST A
GENERAL NOTES:

STANDARD GRADING LIMITS SHALL BE USED WHEN CONSTRUCTING A NEW FENCING. ALTERNATE GRADING LIMITS ARE ALLOWABLE ON EXISTING ROADSIDES EXCEPT WHEN STANDARD GRADING IS INDICATED ON THE PLANS.

THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH APPROVED SHOP DRAWINGS OF THE MASH APPROVED CRASHWORTHY END TERMINAL.

END ANCHORS SHALL BE INSTALLED ON ENDS OF GUARDRAIL RUNS WHERE CRASHWORTHY END TERMINALS ARE NOT REQUIRED.
WIRE SIZE AND HEIGHT OF FABRIC

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<th>SPECIFIED DIAMETER</th>
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DATE EFFECTIVE: 02/10/2007
DATE PREPARED: 8/21/2009

GENERAL NOTES:

WEIGHTS OF MATERIALS SHOWN IN TABLE ARE FOR ASTM F 1043 GROUP IA. SIZES SHOWN ARE FOR STEEL AND ALUMINUM. EQUIVALENT ASTM F 1043 ALTERNATIVES MAY BE USED.

PULL POSTS SHALL BE USED AT SHARP BREAKS IN VERTICAL GRADE OR AT APPROXIMATE 500' CENTERS ON STRAIGHT RUNS OR AS DIRECTED BY THE ENGINEER.

DRILLED HOLES IN SOLID ROCK SHALL PROVIDE A DIAMETER OF NOT LESS THAN 2" GREATER THAN THE MAXIMUM TRANSVERSE DIMENSION OF THE POST SECTION.

ALL POSTS SHALL HAVE PROVISIONS TO SECURELY HOLD THE TOP TENSION WIRE IN POSITION AND ALLOW FOR REMOVAL AND REPLACEMENT OF A POST WITHOUT DAMAGING THE TOP TENSION WIRE.

THE MESH SIZE SHALL BE 2 INCHES ± IN. MEASURED IN EITHER DIRECTION AS THE MINIMUM CLEAR DISTANCE BETWEEN THE WIRES FORMING THE PARALLEL SIDES OF THE MESH.
**General Notes:**

Payment for U-bolts with nuts, washers, and #4 bars will be considered completely covered by the contract unit price for chain-link fence (retaining walls).

Pull post shall be used at sharp breaks in vertical grade or at approximate 100'-0" centers on straight runs.

The chain-link fence shall be in accordance with applicable parts of Sec. 607.

Maximum post spacing in horizontal direction shall be 10'-0".

**U-BoLT (Typ. 2") Diameter**

- Fabric tie at abt. 12 centers (Typ.)
- #4 gage wire mesh (Typ.)

**Terminal Post**

* Place expansion sleeve at about 30'-0" centers with at least one expansion sleeve between pull posts.

**Line Post**

- 2-#4 bars

**Pull Post**

- 2-#4 bars
- Tension wire (Typ.)
- Grount (3" Min.) (Typ.)
- #4 gage pipe for fence

**Part Elevation (Typical)**

- See plans for slope details

**Alternate Section A-A for MSE Walls**

- 3" #4 bars
- 2" or 2-1/2" diameter pipe

**Plan of Floor Plate**

- 4-1/2" bars at equal spaces
- 3'-0" spread
- 2"-0"

**Fence Connection for MSE Walls**

**Modified Type A Gutter**

- 1-1/2" diameter pipe
- 2" or 2-1/2" diameter pipe

**Modified Type B Gutter**

- 1" 1/2" diameter pipe
- 2" or 2-1/2" diameter pipe

**Typical Fence Post Connection**

- 7" x 6" x 1/2" floor plate (Typ.)
- 2" or 2-1/2" diameter pipe
- Tension wire (Typ.)
- Grount (3" Min.) for galvanized steel post of Insulation pad for aluminum post

**U-Bolt**

- 1-1/2" diameter
- #4 bars at equal spaces
- 2"-0"

**Terminal Post**

- 1-1/2" diameter pipe
- Fabric tie at abt. 12 centers (Typ.)

**Line Post**

- 2-#4 bars

**Pull Post**

- 2-#4 bars
- Tension wire (Typ.)
- Grount (3" Min.) (Typ.)
- #4 gage pipe for fence

**Part Elevation (Typical)**

- See plans for slope details

**Alternate Section A-A for MSE Walls**

- 3" #4 bars
- 2" or 2-1/2" diameter pipe

**Plan of Floor Plate**

- 4-1/2" bars at equal spaces
- 3'-0" spread
- 2"-0"

**Fence Connection for MSE Walls**

**Modified Type A Gutter**

- 1-1/2" diameter pipe
- 2" or 2-1/2" diameter pipe

**Modified Type B Gutter**

- 1" 1/2" diameter pipe
- 2" or 2-1/2" diameter pipe

**Typical Fence Post Connection**

- 7" x 6" x 1/2" floor plate (Typ.)
- 2" or 2-1/2" diameter pipe
- Tension wire (Typ.)
- Grount (3" Min.) for galvanized steel post of Insulation pad for aluminum post

**U-Bolt**

- 1-1/2" diameter
- #4 bars at equal spaces
- 2"-0"
END POST ASSEMBLY

STEEL POST

CORNER OR PULL POST ASSEMBLY

ROADWAY DITCHES OR SMALL SHALLOW CHANNELS (SPAN WITH NORMAL LINE POST SPACING)

POORLY DEFINED CHANNELS (SMALL DRAINAGE AREAS)

TYPICAL WATER CROSSING GATE

WELL DEFINED CHANNELS (LARGE DRAINAGE AREAS)

TYPICAL FENCING AT CHANNEL CROSSING
GENERAL NOTES:

ALL AREAS OF THE PEDESTRIAN ACCESS ROUTE MUST BE COMPLIANT WITH THE AMERICANS WITH DISABILITIES ACT - GUIDELINES FOR ACCESSIBLE PUBLIC RIGHTS OF WAY. EXCEPTIONS MUST BE APPROVED BY THE ENGINEER. ALL OTHER AREAS OF NON-COMPLIANCE SHALL BE REMOVED AND CORRECTED AT THE CONTRACTOR'S EXPENSE.

THE SURFACES OF PEDESTRIAN ACCESS ROUTES AND ELEMENTS, AND SPACES REQUIRED TO CONNECT TO PEDESTRIAN ACCESS ROUTES, SHALL BE FIRM, STABLE, SLIP RESISTANT, AND SHALL NOT POND WATER.

WHERE SIDEWALKS ARE LESS THAN 5 FT. X 5 FT. PASSING SPACES EVERY 200 FT. SHALL BE PROVIDED AND ARE PERMITTED TO OVERLAP PEDESTRIAN ACCESS ROUTES.

THE CROSS SLOPE OF THE CONTINUOUS PEDESTRIAN ACCESS ROUTE THROUGH ENTRANCES, ALLEYS, AND SIDEWALK CONNECTIONS WITH STOP OR YIELD CONTROL SHALL BE 1.00% TO FACILITATE DRAINAGE (2.00% MAX.).

WHERE PEDESTRIAN ACCESS ROUTES ARE CONTAINED WITHIN PEDESTRIAN STREET CROSSINGS WITHOUT YIELD OR STOP CONTROL, THE CROSS SLOPE OF THE PEDESTRIAN ACCESS ROUTE SHALL BE 5.00% MAXIMUM.

WHERE PEDESTRIAN ACCESS ROUTES ARE CONTAINED WITHIN MIDBLOCK PEDESTRIAN STREET CROSSINGS, THE CROSS SLOPE OF THE PEDESTRIAN ACCESS ROUTE SHALL BE PERMITTED TO EQUAL THE STREET OR HIGHWAY GRADE.

STORMWATER INLETS, SIGNS, POSTS, MANHOLE COVERS, PULL BOXES AND OTHER ACCESS LIDS SHOULD BE AVOIDED WITHIN THE SIDEWALK. IF SUCH A LOCATION IS NECESSARY, THE FEATURE MUST MEET ADA STANDARDS.

THE RUNNING GRADE OF A SIDEWALK SHALL NOT EXCEED 5.0% UNLESS IT IS MATCHING THE GRADE OF THE ADJACENT ROADWAY.

PEDESTRIAN ACCESS ROUTE SHALL CONTINUE ACROSS RESIDENTIAL AND COMMERCIAL ENTRANCES, ALLEYS, AND SIDEWALK CONNECTIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-800-ASK-MODOT (1-888-275-6636)

DATE EFFECTIVE: 04/01/2015
DATE PREPARED: 02/20/2011

CONCRETE SIDEWALK

SEE PLANS FOR WIDTH
SEE STANDARD 608.00
CURB TO BE MONOLITHIC WITH PPC MAINLINE PAVEMENT. CURB TO BE TYPE 5 WITH ASPHALT CONCRETE MAINLINE PAVEMENT. SEE STANDARD PLAN 609.00.
MIN. 1" DEPTH JOINT.
SEE TYPICAL PAVEMENT SECTION
SLOPE 1.0% (2.0% MAX.)
SPACING EQUAL TO WIDTH OF WALK

DATE EFFECTIVE: 04/01/2015
DATE PREPARED: 02/20/2011

SHEET NO. 1 OF 1
STAIRWAY STEP DETAILS

SAFETY RAIL DETAILS

RAILING & POST SPECIFICATIONS

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<td>SQUARE</td>
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STEP DIMENSIONS

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<td>4 1/2</td>
<td>6&quot;</td>
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GENERAL NOTES:

STAIRWAY SHALL HAVE SAFETY RAILS AT BOTH SIDES OF ALL STEPS.

RAILINGS AND POSTS MAY BE EITHER ROUND OR SQUARE STEEL OF GOOD COMMERCIAL WELDABLE QUALITY OR ALUMINUM ALLOY 6061-T6 OR 6063-T6.

STEEL RAILINGS AND POSTS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTOM111.

ALL JOINTS SHALL BE CONTINUOUS WELDED AND GROUND SMOOTH.

ALL RAILING SHALL HAVE 1/4" WEEP HOLE NEAR ALL INTERSECTING RAILING CONNECTIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

CONCRETE STAIRS

DATE EFFECTIVE: 04/01/2015
DATE PREPARED: 03/25/2015

608.20E SHEET NO. 1 OF 2
### Quantities for Concrete Steps

**Concrete C.Y. Steel**

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<th>Tread</th>
<th>1:5 Slope</th>
<th>7° Rise</th>
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<tr>
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<tr>
<td>STEEL</td>
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<td>3' CONC.</td>
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**Concrete Stairs**

**Date Effective:** 04/01/2015

**Date Prepared:** 02/20/2015

**Sheet No.:** 2 of 2
CONCRETE MEDIAN STRIP

TIE BAR LOCATIONS FOR CONCRETE MEDIAN STRIP

TIE BAR LOCATIONS FOR CONCRETE MEDIAN STRIP (ISLAND)

GENERAL NOTES:

1. TIE BARS SHALL BE EPOXY COATED, DEFORMED REINFORCING BARS MEETING THE REQUIREMENTS OF SECTION 710 AND 1057.

2. BONDING FOR TIE BARS SHALL BE EPOXY OR POLYESTER BONDING AGENTS AS SPECIFIED IN SECTION 1039.

3. THE FACE OF THE MEDIAN MAY BE CONSTRUCTED WITHOUT BATTER WHEN CONSTRUCTED ON A RADIUS OF 6' OR LESS.

4. WHEN CONCRETE MEDIANS ARE CONSTRUCTED DIRECTLY BENEATH GUARDRAIL, THE MEDIAN HEIGHT WILL BE 4".

CONCRETE MEDIAN STRIP JOIN LOCATION

(1) WHEN THERE ARE NO VISIBLE JOINTS IN THE ADJACENT PAVEMENT, THE JOINT SPACING WILL BE EQUAL TO THE MEDIAN STRIP WIDTH, WITH A MINIMUM SPACING OF 10'.

(2) SEE STANDARD PLAN 203.50 FOR DETAILS OF LOW PROFILE ISLAND
DETAIL A - HANDRAIL

HANDRAIL AND EXTENSION CONNECTION

HANDRAIL GRIPPING SURFACES

- Handrail shall be steel of pronounced structural quality or aluminum alloy coated.
- Handrails shall be galvanized after fabrication in accordance with standard practice.
- Handrail shall be at a consistent height and shall be finished to conform to their type of use.
- The gripping surfaces shall be continuous along their length and shall not be interrupted along their tops or sides.

Handrail Notes:

- Handrails shall be free of sharp or abrasive elements. Handrails shall not damage or degrade.
- Handrails shall be free of sharp or abrasive elements.

Missouri Highways and Transportation Commission
105 West Capital
Jefferson City, MO 65102
1-888-MOT-ROAD 1-452-4657
1-573-751-3600 1-888-647-6606

Handrail Designation: 608.40A

Date Effective: 03/31/2020
Date Printed: 03/31/2020
Page 4 of 4
CURB RAMP DETAIL

GENERAL NOTES:

ALL ASPECTS OF THE PEDESTRIAN ACCESS ROUTE MUST BE COMPLIANT WITH THE AMERICAN WITH DISABILITIES ACT - GUIDELINES FOR ACCESSIBLE PUBLIC ROUTES, IF ANY. THE DETAILING MUST BE APPROVED IN WRITING BY THE ENGINEER. ALL OTHER ASPECTS OF NON-COMPLIANCE SHALL BE REMOVED AND CORRECTED AT THE CONTRACTOR’S EXPENSE.

THE SURFACES OF PEDESTRIAN ACCESS ROUTE ELEMENTS AND SPACES REQUIRED TO CONNECT TO PEDESTRIAN ACCESS ROUTES, SHALL BE SMOOTH, SLEEK, SLIP RESISTANT, AND SHALL NOT HAVE RIVETS.

SIDEWALK, RAMP AND LANDING CROSS SLOpes SHALL BE 1.00% TO FACILITATE DRAINAGE (1.00% MAX.).

THE CROSS SLOPE OF THE CONTINUOUS PEDESTRIAN ACCESS ROUTE THROUGH ENTRANCES, ALLEYS, AND SIDE ROAD CONNECTIONS WITH STOP OR YIELD CONTROL SHALL BE 1.00% TO FACILITATE DRAINAGE (1.00% MAX.).

WHERE PEDESTRIAN ACCESS ROUTES ARE CONTAINED WITHIN PEDESTRIAN STREET CROSSINGS, OR WITHOUT YIELD OR STOP CONTROL, THE CROSS SLOPE OF THE PEDESTRIAN ACCESS ROUTE SHALL BE 5.00% MAXIMUM.

WHERE PEDESTRIAN ACCESS ROUTES ARE CONTAINED WITHIN MIDDLE OF PEDESTRIAN STREET CROSSINGS, THE CROSS SLOPE OF THE PEDESTRIAN ACCESS ROUTE SHALL BE PERMITTED TO EQUAL THE STREET OR HORIZONTAL CLEAR.

SOX. 48” CLEAR SPACE SHALL BE PROVIDED CENTERED ON THE PEDESTRIAN PUSH BUTTON.

BEFORE THE BOTTOM EDGE OF A Curb RAMP AND CLEAR SPACE ISolation (where applicable) shall be provided within the width of the pedestrian street crossing and shall not obstruct the parallel vehicle travel lane.

SIDE FLIES OF CURB RAMPS, IN THE PATH OF PEDESTRIAN TRAVEL, TRUNCATED DOMES SHALL NOT EXCEED A SLOPE OF 1:5. SIMILARLY, THE PEDESTRIAN PATH (TRUNCATED) MAY BE VERTICAL.

TRANSITION FROM SIDEWALK OR CURB RAMP TO CURBWAY SHALL BE FLUSH.

DETECTABLE WARNING SURFACES (TRUNCATED DOMES) SHALL BE PROVIDEED AND INSTALLED PER MANUFACTURER’S RECOMMENDATIONS. STAINED CONCRETE WILL NOT BE ACCEPTED.

THE DETECTABLE WARNING SURFACE CONTRACTS VISIBILY WITH THE FLOOR SURFACE. EITHER LIGHT-OF-LIGHT OR LIGHT-OFF-LIGHT, TRUNCATED DOMES SHALL OPEN THE FULL WIDTH OF THE RAMP OR LANDING 24 DEEP.

DETECTABLE WARNING SURFACES SHALL BE ALLOWED PERPENDICULARLY OF FASCIA TO THE PLAN OF THE RAMP, LANDING, OR ELEVATED TRANSITION, AND THE STREET.

WHERE THE BOTTOM EDGE OF A CURB RAMP IS LESS THAN 0.5‘ FROM THE EDGE OF CURB, DETECTABLE WARNING PLATE SHALL BE LOCATED IN THE RAMP SURFACE AT THE EDGE OF CURB. WHERE THE EDGE IS GREATER THAN 0.5’, THE CURB WARNING PLATE SHALL BE LOCATED IN THE LOWER LANDING.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 N E ST COLUMBIA, MO 65201
1-855-ask-mitoh 1-573-886-5565

CURB RAMPS

DETAIL A

SECTION A-A

+ SOME DETECTABLE WARNING PRODUCTS REQUIRE A CONCRETE BUFFER FOR PROPER INSTALLATION. THE CONCRETE BUFFER SHALL NOT EXCEED 2” PER SIDE.
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 N.E. CAPITOL
JEFFERSON CITY, MO 65102
1-888-MODOT-WD (663-6893)

CURB RAMPS

TYPE 1 PARALLEL

VARIABLE HEIGHT TYPE 2 BARRIER CUBE (5)

EXISTING CURVE

6' WIDTH NEXT TO CURVE OR 5' WIDTH AT MIN. 2' LANE SPACE

RAMP

5' MIN. LANDING

RAMP

4 - OCT 3'-6" X 5' LANDING
IF NO PEDESTRIAN FISH BUTTON

PEDESTRIAN FISH BUTTON (5)

TYPE 2 PARALLEL

VARIABLE HEIGHT TYPE 2 BARRIER CUBE (3)

EXISTING CURVE

6' WIDTH NEXT TO CURVE OR 5' WIDTH AT MIN. 2' LANE SPACE

RAMP

5' MIN. LANDING

RAMP

1' V/12H MAX.

RAMP

1' V/12H MAX.

VARIABLE HEIGHT CURB TIE INTO EXISTING CURVE FLUSH WITH RAMP

PEDESTRIAN FISH BUTTON (5)

TYPE 3 PARALLEL

VARIABLE HEIGHT CURB TIE INTO EXISTING CURVE

EXISTING CURVE

6' WIDTH NEXT TO CURVE OR 5' WIDTH AT MIN. 2' LANE SPACE

RAMP

5' MIN. LANDING

RAMP

1' V/12H MAX.

RAMP

1' V/12H MAX.

VARIABLE HEIGHT CURB FLUSH WITH RAMP

PEDESTRIAN FISH BUTTON (5)

SECTION B-B

VARIABLE HEIGHT TYPE 2 BARRIER CUBE (3)

EXISTING CURVE

1% (2%) MAX. 1

STREET

COMPOUND PERPENDICULAR

GENERAL NOTES:

111 1.0% (2.0%) MAX. CROSS SLOPE OF ROAD SPACE EXCEPTION

122 VARIABLE HEIGHT CURB, VERTICAL CURVE, IF TRAVERSED USE A MAXIMUM 1'-V/12H FLARE PLANE PERPENDICULAR TO THE CURB LINE.

135 PEDESTRIAN FISH BUTTONS TO MEET EXISTING REQUIREMENTS.

137 THE CURB TO MEET THE CURB OR STREET AT THE FACE OF CURB RAMP RINGS, ELBOWS TRANSITIONS, AND TURNING SPACES SHALL BE 5% MAXIMUM.

151 THE FACE OF PEDESTRIAN FISH BUTTONS SHALL BE OFFSET 3" FOR SIDE APPROACH OR 5" MAX. FOR END APPROACH TO THE CURB FACE.

152 ENSURE THAT THE DECK EDGE OF CURVE RAMPS MAINTAIN AN 85% TO 100% MAXIMUM SLOPE.
SECTION A-A
ISLAND CUT THROUGH TYPICAL

RAISED OR CUT-THROUGH DEPENDING ON ISLAND WIDTH. IF RAISED,
PROVIDE 2" MINIMUM LENING AND SLOPE RAMPS AT 1:12 MAX.

RAISED MUST BE CONSTRUCTED TO (R431) TO THE OUTSIDE.

1. DETECTABLE WARNING SURFACES SHALL BE PLACED AT THE EDGES OF THE PEDESTRIAN ISLAND AND SHALL BE SEPARATED BY 3" MIN. LENGTH OF SURFACE WITHOUT DETECTABLE WARNINGS.
2. PEDESTRIAN PUSH BUTTONS SHALL BE OFFSET 0" FOR FRONT APPROACH AND 3" OFF SIDE APPROACH TO THE CURB FACE.
3. DETECTABLE WARNING SURFACES SHALL BE OMITTED IF LENGTH IS < 6", BECAUSE DETECTIBLE SPACE IS DEEMED TOO SMALL.
ROCK LINING FOR CULVERT OUTLETS

<table>
<thead>
<tr>
<th>CULVERT SIZE</th>
<th>MIN/MIN DEPTH AND WIDTH (FT.)</th>
<th>MINIMUM LENGTH (FT.)</th>
<th>ROCK LINING CULVERT (CU.YD.)</th>
<th>EQUIVALENT PIPE ARCH CULVERT (APPROX.)</th>
<th>EQUIVALENT CONCRETE BOX CULVERT (APPROX.)</th>
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GENERAL NOTES:
The dimensions shown in the table can be applied to box or arch culverts of equivalent waterway area.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-458-MODOT (1-888-458-6636)

ROCK LINING FOR CULVERT OUTLETS

DATE EFFECTIVE: 10/01/1981
DATE PREPARED: 8/23/2009
SHEET NO.: 609.70C
ELEVATION (STRAIGHT SLOPE TYPE)

(1) SLOPE \( \frac{1}{2} \) IN PER FOOT MINIMUM.

(2) PROTECTION SHALL BE PLACED IN CONTINUOUS PANELS FROM TOE OF THE SLOPE TO THE TOP OF THE SLOPE.

(3) SLOPE PROTECTION SHALL FOLLOW THE CONTOUR OF THE FINAL ROADWAY FILL.

RAISE EDGE 3" IN 2'-0" TO 12" ± FROM FINISHED GROUND LINE (TYP.).

LIMIT OF SLOPE PROTECTION (3)

APRON (1)

SQUARE

PART PLAN

SKewed

GENERAL NOTES:

SLOPE PROTECTION SHALL BE MADE CONTINUOUS BETWEEN STRUCTURES WHEN MEDIAN IS 60' OR LESS.

CONCRETE SLOPE PROTECTION SHALL BE FORMED AROUND ANY UNDISTURBED ROCK THAT IS PERMITTED TO REMAIN WITHIN THE SLOPE PROTECTION AREA.

NOTE:

IF SLOPE PROTECTION FOOTING FALLS ON OR AROUND OTHER FOOTINGS, ONE LAYER OF 50# ROOFING FELT SHALL BE PLACED BETWEEN CONTACT SURFACES OF FOOTINGS.

DATE EFFECTIVE: 07/01/2015

DATE PREPARED: 5/29/2015

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

CONCRETE SLOPE PROTECTION

SHEET NO. 1 OF 1
ATTENUATOR LAYOUT:

ALL SAND FILLED ATTENUATORS SHOULD MEET MANUFACTURER'S RECOMMENDATIONS FOR THE ARRAY AND SAND WEIGHT.

TRAFFIC PASSING TO BOTH LEFT AND RIGHT

LOCATION OF OBJECT MARKER

10" X 10" TYPE 3 OBJECT MARKER WITH MIDDLE TYPE 3 YELLOW SHEETING

TYPE 3 OBJECT MARKER PLACEMENT FOR PERMANENT INSTALLATIONS

TRAFFIC PASSING TO LEFT
FLIP FOR TRAFFIC TO RIGHT

10" X 10" TYPE 1 OBJECT MARKER WITH MIDDLE FLUORESCENT ORANGE SHEETING

TYPE 1 OBJECT MARKER PLACEMENT FOR TEMPORARY INSTALLATIONS

GENERAL NOTES:

OBJECT MARKERS SHALL BE CENTERED VERTICALLY OR PLACED AS DIRECTED BY THE ENGINEER.
1. Remove all concrete to lines shown to max. of 3/4" the pavement depth at top of dowel by milling.

2. Place compressible insert in joint or crack. Insert shall be thickness of joint or crack width, but not less than 3/4".

3. Chip vertical repair edges at approximately 1:1 slope.

4. Place 4" min. compressible insert adjacent to longitudinal lane or shoulder joint.

5. Exposed surface shall be cleaned by sandblasting or shotblasting.

6. Exposed surface of dowel bars shall be coated with an approved bindersealer.

PLAN VIEW

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

SECTION E-E

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

PAVEMENT REPAIR

PARTIAL DEPTH

CLASS A

SHEET NO. 2 OF 4
GENERAL NOTES:

1. AT EACH REPAIR LOCATION, HOLES SHALL BE DRILLED AT 30° ANGLES TO THE PAVEMENT SURFACE, PERPENDICULAR TO THE CRACK. THE DRILL BIT DIAMETER SHALL NOT EXCEED 1/2 IN.

2. DRILLING SHALL ALTERNATE EACH SIDE FORTH OR ON EITHER SIDE OF THE LATERAL JUNCTURE FROM HOLE TO HOLE.

3. DRILLED HOLES SHALL NOT PENETRATE THROUGH THE SLAB BOTTOM.

4. EPOXY HOLES SHALL BE CLEANED OF LOOSE DEBRIS AND DUST. EPOXY OR POLYESTER BONDING AGENTS FOR CONCRETE MEETING THE MATERIAL REQUIREMENTS OF SECTION 1036 SHALL BE INJECTED OR PUMPED INTO EACH HOLE. A PRESTRESS BAR SHALL BE INJECTED OR PUMPED INTO EACH HOLE SUCH THAT THE EPOXY MATERIAL IS EQUALLY DISTRIBUTED AROUND THE BAR AND EXTRUDED FROM THE SURFACE (REINFORCING) EACH BAR SHALL BE INJECTED OR PUMPED ENOUGH TO ALLOW 1/8 IN. COVER AS SHOWN IN THE PROFILE DETAIL.

5. THE SURFACE SHALL HAVE ALL EXCESS EPOXY REMOVED AND HAVE A FLUSH FINISH.

GENERAL NOTES:

PAVEMENT REPAIR
CROSS STITCHING

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MISSOURI 65103
1-888-650-MODOT (650-6636)

DATE EFFECTIVE: 08/01/2022
613.00T
SHEET NO.: 3 OF 4

SECTION A-A

<table>
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<tr>
<th>T (EPOXY THICKNESS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
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</table>

<table>
<thead>
<tr>
<th>C (DISTANCE TO HOLE)</th>
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</thead>
<tbody>
<tr>
<td>54</td>
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</table>

<table>
<thead>
<tr>
<th>L (LENGTH OF BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>84</td>
</tr>
</tbody>
</table>
1. 1/2" DIAMETER DOWEL BAR X 18" LENGTH.
2. DOWEL BAR SLOTS SHALL BE PARALLEL TO FLOWWAY.
3. TIP OF COMPRRESSIBLE INSERT SHALL BE FLUSH WITH PAVEMENT SURFACE.
4. CRACK PERIMETER IN SLOT SHALL BE SEALLED WITH SILICONE.
5. COMPRRESSIBLE INSERT SHALL BE PLACED AT MIDDLE OF DOWEL BAR.

PLAN VIEW

SECTION A-A

SECTION B-B

SECTION C-C
GENERAL NOTES:

TYPE 1A:
When "p" (Pavement Thickness) is 8" use Manhole Frame with 9" height (f) Approximate weight of frame and cover 540 Lbs., Class 35 Casting.

TYPE 1B:
When "p" (Pavement Thickness) is 9" or 10", use Manhole frame with 10" height (f) Approximate weight of frame and cover 570 Lbs., Class 35 Casting.

TYPE 1C:
Type 1C Manhole Frame and Cover will be accepted as an alternate to Type 1A or Type 1B. Approximate weight of frame and cover 290 LBS.

For "p" greater than 10" adjusting rings combined with manhole frames with "f" equal to 9" or 10" shall be used to match the pavement thickness.

The price bid for Manhole Frame and Cover shall include the number of adjusting rings required to match pavement thickness.

When specified, use a lock type frame and cover with a minimum of 3 lock blocks and bolts.

Manhole adjusting rings shall be secured to either the frame or pavement to prevent movement under traffic.

A checkered design top shall be furnished.

ELEVATION

TYPE 1A AND 1B
Approximate weight of frame and cover Type 1A 540 Lbs., Type 1B 570 Lbs.

ELEVATION

TYPE 1C
Approximate weight of frame and cover 290 LBS.

ELEVATION

TYPE 2
Approximate weight of frame and cover 250 LBS.

ELEVATION

TYPE 3
Approximate weight of frame and cover 115 LBS.

ELEVATION

TYPE 4
Approximate weight of frame and cover 160 LBS.
ADJUSTING RING
SOLID OR ADJUSTABLE

SECTION B-B

COVER

SECTION A-A

FRAME

APPROXIMATE WEIGHT OF FRAME AND COVER 150 LBS.

ALTERNATE TYPE 4 COVER

INSTALLATION DETAILS
### TABLE A
WORK ZONE SIGN MOUNTING REQUIREMENTS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SIGN SUPPORT</th>
<th>SIGN SUBSTRATE</th>
<th>MINIMUM MOUNTING HEIGHT</th>
<th>USAGE LIMITATIONS</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>POST</td>
<td>PERFORATED SQUARE STEEL TUBE WITH BASE</td>
<td>RIGID 12&quot;</td>
<td>5'</td>
<td>FINAL UNDIVIDED HIGHWAYS 7'</td>
<td>FINAL DIVIDED HIGHWAYS 7'</td>
</tr>
<tr>
<td>TYPE 1 CORE</td>
<td>FELLER 12&quot;</td>
<td>FLEXIBLE 7.5&quot;</td>
<td>5'</td>
<td>FINAL UNDIVIDED HIGHWAYS 7'</td>
<td>FINAL DIVIDED HIGHWAYS 7'</td>
</tr>
<tr>
<td>TYPE 2 CORE</td>
<td>FELLER 12&quot;</td>
<td>FLEXIBLE 7.5&quot;</td>
<td>5'</td>
<td>FINAL UNDIVIDED HIGHWAYS 7'</td>
<td>FINAL DIVIDED HIGHWAYS 7'</td>
</tr>
<tr>
<td>BARRIER</td>
<td>CONCRETE TRAFFIC BARRIER</td>
<td>FLEXIBLE 7.5&quot;</td>
<td>5'</td>
<td>FINAL UNDIVIDED HIGHWAYS 7'</td>
<td>FINAL DIVIDED HIGHWAYS 7'</td>
</tr>
<tr>
<td>VEHICLE</td>
<td>PAYMENT MOUNTING EQUIPMENT</td>
<td>FLEXIBLE 7.5&quot;</td>
<td>48&quot;</td>
<td>FINAL UNDIVIDED HIGHWAYS 7'</td>
<td>FINAL DIVIDED HIGHWAYS 7'</td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**

LONGITUDINAL SPACING OF SIGNS SHOWN IN THE PLANS ARE PREPARED WITH APPROVAL FROM THE ENGINEER. SIGNS SHALL NOT BE MOUNTED IN OR ON CHANNELIZERS. ALL POSTS AND SIGNS SHALL BE INSTALLED AND MAINTAINED IN A FLUSH POSITION. CONSTRUCTION SIGNS SHALL NOT BE LOCATED ON SIDEWALKS, ELEVEN LINES, OR AREAS DESIGNATED FOR GATHERING OR BICYCLE TRAFFIC.

---

**HEIGHT AND LATERAL LOCATIONS FOR POST AND PORTABLE SIGN MOUNTING**

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**Missouri Highways and Transportation Commission**

155 West Capitol
Jefferson City, MO 65102
1-888-ASK-MODOT (1-888-275-6638)

TEMPORARY TRAFFIC CONTROL DEVICES SIGN MOUNTING REQUIREMENTS

DATA PREPARED: 1/12/2023
DATE ISSUED: 616.108B SHEET NO. 1 OF 9
USE OF SPICE IS OPTIONAL.
SPLICE OVERLAP SHALL BE POSITIONED ENTIRELY BETWEEN GROUND LINE AND 18" ABOVE GROUND LINE.
+ IF A PLACARD IS USED: NEITHER THE SIGN NOR PLACARD SHALL BE POSITIONED WITHIN THE SPLICE OVERLAP AREA.
ONLY ONE SPLICE WILL BE ALLOWED PER POST.

POST TYPE

<table>
<thead>
<tr>
<th>SIGN AREA</th>
<th>U-CHANNEL</th>
<th>WOOD</th>
<th>PERFORATED SQUARE STEEL TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 10</td>
<td>1 - 3.0 LB/FT</td>
<td>1 - 4&quot; x 4&quot;</td>
<td>1 - 2&quot; x 12 GA</td>
</tr>
<tr>
<td>&gt; 10 - 20</td>
<td>2 - 5.0 LB/FT</td>
<td>2 - 4&quot; x 4&quot;</td>
<td>2 - 2&quot; x 12 GA</td>
</tr>
<tr>
<td>&gt; 20 - 24</td>
<td>2 - 5.0 LB/FT</td>
<td>2 - 4&quot; x 6&quot;</td>
<td>2 - 2&quot; x 12 GA</td>
</tr>
<tr>
<td>&gt; 24 - 32</td>
<td>2 - 5.0 LB/FT</td>
<td>2 - 4&quot; x 6&quot;</td>
<td>N/4</td>
</tr>
<tr>
<td>&gt; 32 - 50</td>
<td>N/4</td>
<td>2 - 6&quot; x 6&quot;</td>
<td>N/4</td>
</tr>
</tbody>
</table>

+ SIGNS GREATER THAN 4 FEET IN WIDTH, EXCEPT DIAMOND SHAPE SIGNS, REQUIRE THE POST.
++ REQUIRES SLIP BASE PER MANUFACTURER'S RECOMMENDATION.

U-CHANNEL POST DETAIL

WOOD POST DETAIL

PERFORATED SQUARE STEEL TUBE POST DETAIL

POST SPACING

THE SIGN POST MAY BE ATTACHED TO THE ANCHOR WITH A CORNER BOLT OR STRAIGHT BOLT PER MANUFACTURER'S SPECIFICATION.

GENERAL NOTES:
ALL POSTS SHALL BE EMBEDDED A MINIMUM OF 5 FEET.
SIGN INSTALLATION DETAILS SHOWN SHALL APPLY TO ALL POSTS IN A MULTI-POST INSTALLATION.
A THE ENGINEER'S DISCRETION: A FLUORESCENT PAINT SHALL BE APPLIED HEAVILY TO BOTH SIDES OF U-CHANNEL POST FOR A LENGTH OF AT LEAST 6 INCHES BELOW THE TOP OF THE SIGN.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

TEMPORARY TRAFFIC CONTROL DEVICES
POST INSTALLATION DETAILS

DATE PREPARED: 1/23/2023
DATA PREPARED: 616.10BB
SHEET NO. 2 OF 9
VERTICAL DIMENSIONS DO NOT INCLUDE PROJECTIONS DESIGNED FOR EASE OF MANEUVERING.

DIRECTION INDICATOR BARRICADE

THE PANELS SHALL BE SECURELY ATTACHED TO A SUPPORT THAT IS PORTABLE, CAPABLE OF REMOVING UPHILL AND ENTIRELY FREE STANDING.

GENERAL NOTES:
WHITE, ORANGE, AND FLUORESCENT ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC. 1042.3.7.
SIGNAGE FOR TRAFFIC CONTROL DEVICES SHALL CONFORM TO MO DOT'S RECOMMENDATION FOR FIELD CONDITIONS WHEN APPLICABLE.

SEQUENTIAL FLASHER WARNING LIGHTS SHALL BE IN ACCORDANCE WITH SEC. 1055.5.

UPON APPROVAL OF THE ENGINEER, THE CONTRACTOR MAY, AT NO ADDITIONAL COST, USE TRIM-LINE CHANNELIZERS IN LIEU OF TRAFFIC DIVIDE CHANNELIZERS TO PROVIDE LONGITUDINAL CHANNELIZING WITHIN THE ACTIVITY AREA WHERE NO RAMP INTERSECTIONS OR LIMITED LATERAL CLEARANCE EXIST.

UPON APPROVAL OF THE ENGINEER, THE CONTRACTOR MAY, AT NO ADDITIONAL COST, USE DIRECTION INDICATOR BARRICADE PANELS IN LIEU OF TRAFFIC DIVIDE CHANNELIZERS IN Merging Traffic.

UPON APPROVAL OF THE ENGINEER, THE CONTRACTOR MAY, AT NO ADDITIONAL COST, USE VERTICAL PANELS IN LIEU OF TRIM-LINE CHANNELIZERS TO PROVIDE LONGITUDINAL CHANNELIZING WITHIN THE ACTIVITY AREA.

UPON APPROVAL OF THE ENGINEER, THE CONTRACTOR MAY, AT NO ADDITIONAL COST, USE VERTICAL PANELS IN LIEU OF TRIM-LINE CHANNELIZERS DURING DAYTIME OPERATIONS ON MAJOR ROUTES.

TRIM-LINE CHANNELIZERS
WHITE, ORANGE, AND FLUORESCENT ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC. 1042.3.7.

DRUM-LIKE CHANNELIZERS
WHITE, ORANGE, AND FLUORESCENT ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC. 1042.3.7.

COVES SHALL MAINTAIN THEIR SHAPE UNTIL EXPOSURE TO NORMAL WEAR CONDITIONS.
COVES SHALL BE USED DURING DAYTIME HOURS ONLY.

VERTICAL PANELS SHALL BE SECURELY ATTACHED TO A SUPPORT THAT IS PORTABLE, CAPABLE OF REMOVING UPHILL AND ENTIRELY FREE STANDING.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOLO, JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

TEMPORARY TRAFFIC CONTROL DEVICES
CHANNELIZERS AND DIRECTION INDICATOR BARRICADE

DATE REVISED: 4/23/2023
DATE PREPARED: 12/16/2022
616.1088 SHEET NO. 3 OF 9
RETRACTABLE MARKING ON TYPE 3 BARRIENCES SHALL BE ON BOTH SIDES OF EACH RAIL AND DIRECT TRAFFIC MOVEMENT APPROPRIATELY TO ALLOW VEHICLES TO PASS THROUGH.

EXAMPLE 1 - ONE TYPE 3 MOBILE BARRIERS WILL BE REQUIRED TO COMPLETELY CLOSE EACH 8' OF PREVENTION. PACED SHOULDERS SHALL BE INCLUDED IN THE AREA TO BE CLOSED.

EXAMPLE 2 - SIGNS SHALL BE LIGHTWEIGHT (FOLIAGE OR PLASTIC) AND SHALL NOT BECOME MORE THAN 30 PERCENT OF THE TOP 2 FEET OR 35 PERCENT OF ALL THREE FEET.

EXAMPLE 3 - IF SIGNS CANNOT MEET THE ABOVE REQUIREMENTS, THEY SHALL BE MOUNTED ON SEPARATE NATEVENT DEVICES AND HEAVY SPECIFIED FOR POST-MOUNTED SIGNS LOCATED IN TABLE 5 ON SHEET 1. THE BARRIERS SHALL BE LOCATED IN FRONT OF THE SIGNS WITH 7 TO 10 FEET SEPARATING THE DEVICES.

EXAMPLE 4 - TYPE 3 MOBILE BARRIERS SHALL BE EXTREMELY FLEXIBLE AND PORTABLE, MAKING THEM ONLY APPLICABLE TO THE FRONT OF EACH RAIL OR MAY BE APPLIED TO BOTH THE FRONT AND THE BACK OF EACH RAIL. THE MARKING ON THE BACK DOES NOT CONFLICT WITH INTERSECTIONS OR FLOAT TRAFFIC MOVEMENT.

EXAMPLE 5 - WHITE AND ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC. 306.2.7.4.

EXAMPLE 6 - FOR BARRIERS WITHOUT A WIDTH OF 20 FEET OR LESS AND WITHOUT PACED SHOULDERS, TWO BARRIERS ARE ACCEPTABLE.

EXAMPLE 7 - THEREWHERE BARRIERS EXTEND ENTIRELY ACROSS A ROADWAY, STRIPES COULD BE PLACED DIRECTLY TO THE CENTER OF THE ROAD, DIRECTING TRAFFIC TO THE CENTER OF THE ROADWAY.

EXAMPLE 8 - BARRIERS ARE PROVIDED. STRIPES COULD BE PLACED DIRECTLY FROM THE CENTER OF THE ROADWAY OF BARRIERS.

EXAMPLE 9 - WHERE 10 FEET OR LESS ARE PROVIDED, STRIPES COULD BE PLACED DIRECTLY TO THE CENTER OF THE ROADWAY OF BARRIERS.

EXAMPLE 10 - WHERE NO TURN ARE INTENDED, STRIPES POSITIONED TO ALLOW CENTER TO THE CENTER OF THE ROADWAY OF BARRIERS.
TWO LANE / TWO WAY TRAFFIC DELINEATION PLAN
FOR DIVIDED HIGHWAY

IF RAISED PAVEMENT MARKERS ARE PRESENT, THE LENSES SHALL BE REMOVED OR COVERED TO THE SATISFACTION OF THE ENGINEER.

SECTION A-A
TUBULAR DELINEATOR DETAIL

AN ADHESIVE, IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, SHALL BE USED TO APPLY THE TUBULAR DELINEATOR TO THE ROADWAY SURFACE. THE ADHESIVE SHALL PERMIT EASY REMOVAL OF THE TUBULAR DELINEATOR WITHOUT DAMAGE TO THE ROADWAY SURFACE.

REFLECTIVE SHEETING APPLIED TO TUBULAR DELINEATORS SHALL BE IN ACCORDANCE WITH SEC 1042.7.F.5.

CHANGEABLE MESSAGE SIGN

TYPE 3 OBJECT MARKERS
FLUORESCENT ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC 1042.7.1.

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1155 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-800-456-MODOT (1-800-266-6638)

TEMPORARY TRAFFIC CONTROL DEVICES

MoDOT

DATA PREPARED: 1/19/2023
616.10BB SHEET NO. 5 OF 9
<table>
<thead>
<tr>
<th>SIGN</th>
<th>SIZE</th>
<th>AREA</th>
<th>SHEETING</th>
<th>CODE</th>
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<tr>
<td>MD-1-1</td>
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<td>16.00</td>
<td>ASTM 1 of 11</td>
<td>UL FL OR SH</td>
<td>TURN SIGN LEFT ARROW</td>
<td>WARNING SIGNS</td>
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<tr>
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<td>UL FL OR SH</td>
<td>TURN SIGN RIGHT ARROW</td>
<td>WARNING SIGNS</td>
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<tr>
<td>MD-1-3</td>
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<td>UL FL OR SH</td>
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<td>WARNING SIGNS</td>
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<td>REVERSE V ORN RIGHT ARROW</td>
<td>WARNING SIGNS</td>
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<td>ASTM 1 of 11</td>
<td>UL FL OR SH</td>
<td>DOUBLE ORN (EUR ORN) RIGHT ARROWS</td>
<td>EXP</td>
</tr>
<tr>
<td>MD-1-9</td>
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<td>ASTM 1 of 11</td>
<td>UL FL OR SH</td>
<td>TRAFFIC SIGN LEFT ARROW</td>
<td>EXP</td>
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<tr>
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<td>16.00</td>
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<td>UL FL OR SH</td>
<td>TRAFFIC SIGN RIGHT ARROW</td>
<td>EXP</td>
</tr>
<tr>
<td>MD-1-11</td>
<td>48X48</td>
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<td>ASTM 1 of 11</td>
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</tr>
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<tr>
<td>MD-1-14</td>
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<tr>
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<td>ASTM 1 of 11</td>
<td>UL FL OR SH</td>
<td>TRAFFIC SIGN CENTER</td>
<td>EXP</td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**
- SIGN LAYOUTS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF "STANDARD HIGHWAY SIGNS" BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA. UNLESS SPECIFIED OTHERWISE.
- SIGN DIMENSIONS SHOWN ARE MINIMUMS. NO ADDITIONAL PAINT WILL BE MADE OF CONTRACTORS USE LARGER SIGNS. NO ADDITIONAL PAINT WILL BE MADE OF SIGNS.
- ALL SIGNS SHALL BE /
- BORN. SIGNS SHALL NOT HAVE BORN.
NOT TO SCALE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-855-MODOT-WEB (1-855-663-6893)

TEMPORARY TRAFFIC CONTROL PLANS
PAVEMENT TREATMENTS FOR TWO-LANE ROADWAYS

DATE EFFECTIVE: 02/24/2021
DATE REVISED: 04/29/2021
SHEET NO.: 1 OF 5

THIS TEMPORARY TRAFFIC CONTROL IS FOR USE ON THE FOLLOWING PAVEMENT TREATMENT PROJECTS AND IS NOT INTENDED FOR USE WHEN ADDITIONAL CONSTRUCTION ITEMS SUCH AS SHOULDER WIDENING, PIPE REPLACEMENT OR EXTENSIONS, CULVERT FAILURE, CONSTRUCTION OR REPAIR AND/OR SIGN INSTALLATIONS ARE PART OF THE PROJECT:
- ASPHALTIC RESURFACING SECTIONS 401 AND 4021
- SEAL COAT
- SCRUB SEAL/SAND SEAL

NOTES:

SIGN 1 AND 2 ARE ONLY USED ON PROJECT LENGTH OF 1 MILE OR GREATER.

PHONE SIGNS IN ELM DIRECTION ON TOWNHALL HIGHWAY.

DISTANCE MAY BE ADJUSTED ACCORDING TO FIELD CONDITIONS.
NOT TO SCALE
TYPICAL VIEW
TYPE B - ONE TRAFFIC FACE

TYPICAL VIEW
TYPE A - TWO TRAFFIC FACES

HEIGHT TRANSITION

PLAN

ELEVATION
BARRIER HEIGHT TRANSITION

GENERAL NOTES:
HEIGHT TRANSITIONS SHALL NOT BE USED IN LOCATIONS WHERE THE POSTED SPEED IS GREATER THAN 35 MPH.
ALL TOP AND END EDGES SHALL BE CHAMFERED 1/4 INCH.
EXPANSION JOINTS SHALL BE PROVIDED IN THE BARRIER TO MATCH EXPANSION JOINTS IN PAVEMENT.

FOR CONCRETE TRAFFIC BARRIER DEFORMATIONS DETAILS SEE STD PLAN 905-02.
REPLACING BARS WITH AN EPOXY ANCHOR SYSTEM MAY NOT BE SUBSTITUTED FOR SMOOTH 1 INCH DIAMETER ROUNDED STEEL DOWELS.

PERMANENT CONCRETE TRAFFIC BARRIER
TYPE A AND B

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITAL
JEFFERSON CITY, MO 65101
1-800-452-MODOT (663-6683) 1-888-600-MODOT (663-6683)

SHEET NO. 1 OF 11
DATE PREPARED: 7/29/2020
SHEET EDITION: 10/24/2020
617.10M
TABLE 2: TRANSVERSE REINFORCEMENT

<table>
<thead>
<tr>
<th>Depth from</th>
<th>Transverse Bars</th>
<th>Bar Diameter</th>
<th>Bar Spacing</th>
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</thead>
<tbody>
<tr>
<td>0 ft</td>
<td>M20</td>
<td>10 mm</td>
<td>100 mm</td>
</tr>
<tr>
<td>10 ft</td>
<td>M20</td>
<td>10 mm</td>
<td>100 mm</td>
</tr>
<tr>
<td>20 ft</td>
<td>M20</td>
<td>10 mm</td>
<td>100 mm</td>
</tr>
</tbody>
</table>

NOTES:

ALL REINFORCEMENT SHALL BE GRADE 80 EPOXY COATED.

NO DIRECT PAVEMENT WILL BE USED FOR REINFORCING STEEL.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1/2", UNLESS OTHERWISE SHOWN.

TYPE B MODIFIED SHALL BE USED ONLY AT LOCATIONS SHOWN IN PLAN.

FOR CONCRETE TRAFFIC BARRIER CLEarence DETAILS SEE STG. PLAN BSCHEM.

REINFORCING BARS WITH AN EPOXY JACKET SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER STEEL BARS.

1° HOOK TRANSVERSE REINFORCEMENT HOOKS FROM VERTICAL ALIGNMENT TO MAINTAIN 1/2" MINIMUM CLEARANCE.

SEE ROADWAY PAVEMENT DESIGN.
SECTION A-A
SEE SECTION C-C FOR DIMENSIONS
SECTION B-B
SECTION C-C

PLAN
TRANSITION DETAILS FOR PIER PROTECTION

1. 1 IN. JOINT WITH JOINT FILLER AND SEALER

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-457-MODOT (663-6868)

PERMANENT CONCRETE TRAFFIC BARRIER
TYPE C

SHEET NO. 5 OF 11

9/1/2020 7/27/2020 617.10M
NOTES:

ALL REINFORCEMENT SHALL BE Grade 60 EPOXY COATED. BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE Nominal DIAMETER OF THE BAR.

ANY METHOD DEEMED BY the CONTRACTOR AND APPROVED BY the ENGINEER THAT WILL ASSURE THE LONGITUDINAL REINFORCING STEEL WILL BE FICTIONED 2 1/2 INCH AS DIRECTED WILL BE SATISFACTORY.

the CONTRACTOR HAS THE OPTION TO SLIP-FORM the BARRIER, IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BONDING.

This BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING PILES.

This BARRIER SHALL NOT BE USED FOR BRIDGE POULTRY APPLICATIONS.

SAME JOINTS SHALL BE LOCATED AT PAVEMENT TRANSVERSE JOINTS.

Type D SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLAN.

Reinforcing BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER ROUND STEEL BARS.

For concrete traffic barrier delineation details see Std. Plan 735.05.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-888-MODOT (1-888-888-6636)

PERMANENT CONCRETE TRAFFIC BARRIER TYPE D

SHEET NO. 7 OF 11
NOTES:

- All reinforcement shall be Grade 60 epoxy coated.
- Bar splices shall be made at not less than 24 times the uniform diameter of the bar.
- Minimum clearance to reinforcing steel shall be 1/2 inch, unless otherwise shown.

Any method approved by the contractor and approved by the engineer shall be acceptable. If the engineer determines that the longitudinal reinforcing steel will not be positioned as shown, additional reinforcement may be added to the outside one-third of the reinforcing cage to provide savings on the support structures.

This barrier shall not be used to support highway lighting fixtures.

This barrier shall not be used for bridge roadway applications.

Joint detail shall be spaced at 15° - 0'. See standard plans for joint detail. Type D barrier shall be used at locations shown on plans.

Reinforcing bars with an epoxy anchor system may be substituted for smooth 1/2-inch diameter round steel dowels.

For concrete traffic barrier delineation details see Standard Plan 903.03.
CONCRETE BARRIER END ANCHORAGE ON GRADE

GENERAL NOTES:
ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.
MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1/2", UNLESS OTHERWISE SHOWN.
A 1/2" BUFFER REQUIRED WITHIN THE LIMITS OF THE TRAFFIC BARRIER EXCLUDING THE ENTRANCE/EXIT SECTIONS.
FOR CONCRETE TRAFFIC BARRIER DETAIL/DETAIL EXACTLY SEE STD PLAN 903-05.
PAVEMENT SURFACE/LEVEL SHOWN IS 1/4".
BAR SPLICES SHALL BE A MINIMUM OF 2 TIMES THE MINIMUM DIAMETER OF THE BAR.

TRAFFIC BARRIER ON TOP OF MSE WALL

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITAL
JEFFERSON CITY, MO 65102
1-800-392-MO DOT (1-800-392-6668)

PERMANENT CONCRETE TRAFFIC BARRIER
TYPE E ATOP MSE WALL

SHEET NO. 110F11
#6 B BAR ELEVATION

#6 B BAR PLAN

#6 A BARS

#6 E BAR

Reinforcing Bars

<table>
<thead>
<tr>
<th>Bar Size</th>
<th>No. of Bars</th>
<th>Length Each</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
<td>5.0 ft</td>
<td>40.9 lbs</td>
</tr>
<tr>
<td>B</td>
<td>10</td>
<td>5.0 ft</td>
<td>40.9 lbs</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>5.0 ft</td>
<td>18.4 lbs</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>5.0 ft</td>
<td>18.4 lbs</td>
</tr>
<tr>
<td>E</td>
<td>6</td>
<td>2.0 ft</td>
<td>26.3 lbs</td>
</tr>
</tbody>
</table>

Concrete Volume: 1.3 cu yds, approximate weight: 5601 lbs.

General Note:
Dimensions are O.D. to O.D. of bars unless otherwise noted.
PRECAST BARRIER HEIGHT TRANSITION
(Temporary installations only)

1. Optimal 4 inch diameter, 1/2-inch steel rod mechanical
thread sleeve for lift hole allowed. The location of the
hole necessary to accommodate the differing height
DISTRIBUTIONS OF TRANSITION SECTIONS.

2. 3" x 4" slots for lifting - two per section,
location to be determined by contractor.

GENERAL NOTES:

REINFORCING STEEL CLEARANCE TO EDGE OF CONCRETE SHALL
BE 1/4" UNLESS OTHERWISE SHOWN.

HEIGHT TRANSITIONS SHALL NOT BE USED IN INTERSTATE
ORTHOFRAMES OR IN LOCATIONS WHERE THE FROZEN STEEL
PRIOR TO CONSTRUCTION IS GREATER THAN 35 MPH.

ATTACH BOLT AND NUT MUST BE USED WITH TRANSITION
BARRIERS.

THE OPTION OF THE CONTRACTOR, HEIGHT TRANSITIONS
MAY BE MANUFACTURED IN ONE SECTION. THE PLANS FOR
REINFORCEMENT ACROSS JOINT SHALL BE APPROVED BY
THE ENGINEER PRIOR TO MANUFACTURE.

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TEMPORARY CONCRETE TRAFFIC BARRIER
TYPE F HEIGHT TRANSITIONS

NOTE: Sections to be connected with two 1/2" E14 bars
or as reinforcing bars 3/4" long in 1 1/4" holes
as shown.
PLAN OF TIE-DOWN STRAP

SIDE VIEW

DETAILS OF TYPE F TEMPORARY BARRIER TIE-DOWN STRAP

DETAIL SHOWING SEALING OF HOLES AFTER REMOVAL OF TIE-DOWN BOLTS

GENERAL NOTES:
TIE-DOWN STRAP SYSTEMS ARE ONLY APPLICABLE ON RIGID PAVEMENTS.
CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN FIELD BEFORE ORDERING NEW MATERIAL.
SEE OTHER SHEETS FOR DETAILS NOT SHOWN.

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1-888-MO-DOT-HELP (663-6678)

TEMPORARY CONCRETE TRAFFIC BARRIER ANCHORED
(TIE-DOWN STRAP SYSTEM)
**Temporary Concrete Traffic Barriers**

**Type F Barrier**
- Should be installed with three driven anchor pins (typ.), except in stiffness transition areas.

**Elevation of Barrier with Anchor Pins**

**Details**
- Driven Anchor Pin (A36)
- Flexible, rigid, or composite pavements

**General Notes**
- Contractor shall verify all dimensions in the field before preparing the material.
- Where existing flexible pavement or rigid pavement is not present, a 3" thick x 30" wide minimum asphalt pad shall be constructed.
- Cost of furnishing and installing the asphalt pad complete-in-place will be considered incidental to other contract items.
- See other sheets for details not shown.
- After removal of anchor pins holes shall be filled with qualified special mortar in accordance with Sec. 704.

**Details**
- 4 x 6 Plate
- 3" x 3" x 3"
- Drop off

**Section A-A**

**References**

**Missouri Highways and Transportation Commission**
- 105 West Capitol
- Jefferson City, MO 65102
- 1-888-MO-MODOT (662-6368)

**Sheet No.**
- 617.20F

**Date Effective**
- 03/04/2021

**Date Revised**
- 10/14/2020

**Page**
- 7 of 8
GENERAL NOTES:

INTERMITTENT LINES SHALL BE 10 FEET IN LENGTH SEPARATED BY 50 FOOT GAPS.

RIGHT SIDE EDGELINES SHALL BE SOLID WHITE; EDGELINES SHALL BE CONTINUOUS ACROSS INTERSECTIONS AND OTHER INTERSECTING ROADS.

CENTRAL LINE RUMBLE STRIPS ON PASSING RIBBONS SHALL BE YELLOW RUMBLE STRIPING THROUGH TRANSITIONS. SEE CONTRACT PLANS FOR STRIPING DETAILS.

RUMBLE STRIPS SHALL NOT BE PLACED ON BRIDGES.

ALL RUMBLE STRIPS SHALL BE MELTED.

CENTRAL LINE RUMBLE STRIPS SHALL BE CONTINUOUS THROUGH CONNECTING OR OFF RAMP LANE, INCLUDING ANY LANE TAPER SECTIONS.

DISCONTINUE CENTERLINE RUMBLE STRIPS THROUGH THE LIMIT OF ALL LEFT TURN LANES, INCLUDING ANY LANE TAPER SECTIONS.

L = S × V WHEN POSTED SPEED IS 45 MPH OR GREATER OR 55 MPH WHEN POSTED SPEED IS 45 MPH OR LESS.
EXTENT DISTANCE IS AS REQUIRED BY SIGHT DISTANCE CONDITIONS.

L = LENGTH OF TAPER IN FEET.
S = POSTED OR 85 PERCENTILE SPEED IN MPH.
V = OFFSET DISTANCE IN FEET.
D = HORIZONTAL SPACING MEASURED FROM END OF THE TAPER TO WARNING SIGN "LINE ENDS MELT RIGHT".
DIVIDED PAVEMENT

TWO-LANE TWO-WAY
TYPICAL STRIPING OFFSETS
WITHOUT RUMBLE STRIPES

TWO-LANE TWO-WAY
TYPICAL STRIPING OFFSETS
FOR RUMBLE STRIPES

LEGEND
WHITE LINE
YELLOW LINE

1) OFFSET FROM EDGE OF TRAVELED WAY (TYP.)
2) OFFSET FROM JOINT (TYP.)
3) OFFSET FROM CENTERLINE (TYP.)

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PAVEMENT MARKING
620.00N SHEET No.
1/26/2023 3 OF 6
FOR SHOULDERS

EDGE OF TRAVELED WAY

AS SHOWN ON PLANS

2 WAY 2 LANE
(SEE TYPICAL STRIPING FOR RUMBLE STRIPS)

LATERAL DEVIATION SHALL NOT EXCEED ONE INCH IN 100 FEET.
ARROW MARKINGS

This lane use control arrows for first 200 feet with one additional arrow every 400 feet of
mandatory movement lane. First arrow 75 feet from stop line.

FISH-HOOK ARROW
ROUNDABOUT APPROACH MARKINGS

WORD MARKING
ELONGATED WORD & SYMBOL

BICYCLE SYMBOL

WORD MARKING
ELONGATED WORD & SYMBOL
1. Stop lines shall be placed 90° to the roadway.
2. If railroad gate is present the stop line shall be 8' from gate.

**Pavement Detail**

1.1 The distance from the railroad crossing warning to the nearest track will vary according to the approach speed and the sight distance of the vehicular traffic approaching, but shall be no less than 50 feet.
1.2 Three-line railroad shall be marked with a centerline for two-line approach operation or the approach to a crossing, or multi-line railroad, the transverse bands shall extend across all approach lanes, and individual stop symbols shall be used in each approach lane.
1.3 Placement of stop-to-sign by others.

**Railroad Grade Crossing**

**Edge of Intersection of Crosswalk**

**Direction of Travel**

**White Yield Line Triangles**

**Pedestrian Crosswalks**

**White Midblock Crosswalk (Continental)**

**Letter Detail**

**Symbol Detail**

**2" White Bands Included in Symbol for Item**

**2" White Bands to Sign (1)"**

**VARIABLE (1)"**

**VARIABLE (1)"**

**6" White Bar (3)"**

**24" MAX. White Stop Bar**

**6" White Bar (2)"**

**6" White Bar (3)"**

**6" White Bar (2)"**

**6" White Bar (3)"**

**6" White Bar (2)"**

**6" Cross Walk Line Shall Extend to the Edge of the Road**

**A VARIABLE BASED ON THE ACTUAL ROAD WIDTH**

**B VARYING BASED ON DISTANCE TO THE CURVE BUT SHALL NOT EXCEED 50' IF SHOULDER EFFECTS THE SIGN WALL LINE SHALL BE EXTENDED TO THE CURVE FACE ADDED BLOCKS IF NEEDED**

**Pavement Marking**

**Missouri Highways and Transportation Commission**

**50 West Capitol**

**Jefferson City, MO 65102**

**1-888-665-MoDOT 1-888-665-6636**

**Date Effective:**

**620.00N**

**Sheet 4 of 6**
PLAN VIEW

GENERAL NOTES:

TEMPORARY STOP BAR AND STOP BAR STRIPES ARE RECOMMENDED WHEN JUSTICE REQUIREMENTS FOR STOP CONSTRUCTION CREATE LINES CONFLICTING WITH THE EXISTING LANE MARKINGS IN THE INTERSECTION.

YELLOW AND WHITE TEMPORARY MARKING IS USED IN LANE AND IN distinction FROM EXISTING LANE MARKING.

TEMPORARY MARKING IN INTERSECTION MUST BE CLEAR AND EASY TO VIEW.

RAISED MEDIAN ISLAND

RAISED DIVISIONAL ISLAND

RAISED CHANNELIZING ISLAND

TEMPORARY STOP BAR DETAIL (WHITE)

TEMPORARY ARROW DETAIL (WHITE)
* This hole should only be used on patches existing prior to construction. The hole should be located close to the center of the patch. By using this hole, the two holes located at the shoulder could be eliminated.
GENERAL NOTES:

SEE STANDARD PLAN 620.00 FOR PAVEMENT MARKING.
RUMBLE STRIPS SHALL NOT BE PLACED ON BRIDGES.
ALL RUMBLE STRIPS SHALL BE MILL ED.
CENTERLINE RUMBLE STRIPS SHALL BE CONTINUOUS
THROUGH CONNECTIONS OF SIDEROADS WITH NO LEFT
TURN LANES.

DISCONTINUE CENTERLINE RUMBLE STRIPS THROUGH THE
LIMITS OF ALL LEFT TURN LANES, INCLUDING ANY LANE
TAPER SECTIONS.

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COMMISSION
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JEFFERSON CITY, MO 65102
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RUMBLE STRIPS
CENTERLINE

DATE EFFECTIVE: 04/01/2009
DATE PREPARED: 02/20/2009
SHEET NO.: 2 OF 2
626.00H
CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY. SEE SHEET 3 OF 3 FOR DETAILS.

IF UNSUITABLE MATERIAL IS ENCOUNTERED, EXCAVATION OF UNSUITABLE MATERIAL AND FURNISHING AND PLACING OF GRANULAR BACKFILL SHALL BE IN ACCORDANCE WITH SHEET 206.

EXCAVATION OF UNSUITABLE MATERIAL AND BACKFILL SHALL BE IN ACCORDANCE WITH FURNISHING AND PLACING OF GRANULAR CLARITY. SEE SHEET 3 OF 3 FOR DETAILS.

IF UNSUITABLE MATERIAL IS ENCOUNTERED, JOINTS ARE TO BE KEYED.

A LGRANULAR BACKFILL

V/////////////////////////////////////:;)///////////////

JOINT: I

A TIE STATION

G 2V

E G + 23" 

B SEE EQUATIONS

F = S + 2TX

D 2Y

V HT + TS - 12"

W = 2A + B + C + 2C

TW MAX (3") OR (BS + 12")

ELEV. 1

G 2V

E G + 23" 

B SEE EQUATIONS

F = S + 2TX

D 2Y

V HT + TS - 12"

W = 2A + B + C + 2C

TW MAX (3") OR (BS + 12")

GENERAL ELEVATION A-A

CHANNEL BOTTOM SHALL BE GRADED WITHIN RIGHT OF WAY FOR TRANSITION OF CHANNEL BED TO Culvert Openings. CHANNEL BANKS SHALL BE TAPERED TO MATCH Culvert Openings.

BARREL LENGTH

A

W = TOTAL LENGTH NORMAL TO E ROADWAY OR E MEDIAN

E A = B

A = C

E

A

PLAN OF LAYOUT DIMENSIONS

A

W1 = TOTAL LENGTH NORMAL TO E ROADWAY OR E MEDIAN

E A = B

A = C

E

A

ELEV. 1

G 8V

E G + 23" 

B SEE EQUATIONS

F = S + 2TX

D 2Y

V HT + TS - 12"

W = 2A + B + C + 2C

TW MAX (3") OR (BS + 12")

GENERAL NOTES:

DESIGN SPECIFICATIONS:

2010 MISSOURI LOAD AND BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

DESIGN LOADINGS:

VEHICLE - 2.93 LBS LANE LOAD, EARTH - 120 LB/CF
EQUIVALENT FLUID PRESSURE - 50 LB/CF (MIN.), 60 LB/CF (MAX.1

DESIGN UNIT STRESSES:

CLASS 1-1, CONCRETE BOX CULVERT Fy = 4,000 PSI
REINFORCING STEEL (GRADE 60) Fy = 60,000 PSI

MISCELLANEOUS:

FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3. FOR SECTION DETAILS, SEE SHEET 3 OF 3. FOR MEMBER THICKNESS, SEE TD-317.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

WHEN ALTERNATE PRECAST CONCRETE BOX CULVERT SECTIONS ARE USED, THE MINIMUM DISTANCE FROM INSIDE FACE OF HEADWALLS TO PRECAST DRAINAGE UNIT SHALL BE ADJUSTED TO ACCOUNT FOR THE MINIMUM ELEVATION ABOVE THE NATURAL STREAM BOTTOM DUE TO ENVIRONMENTAL REQUIREMENTS.

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CONCRETE

SINGLE BOX CULVERT

SKEW: SQUARE

WINGS: STRAIGHT

LAYOUT

DATE PREPARED: 07/01/2015
DATE EFFECTIVE: 07/31/2015

703-10J SHEET NO. 1 OF 3
GENERAL NOTES:

1. For sections thru barrel, wings and headwalls, see sheet 3 of 3. For Bar sizes, spacing and dimensions of all reinforcement except J5 bars, see 703-17. For J5 bars, see 703-17.

2. Construction joint key not shown for clarity in half plans and elevation. See sheet 3 of 3 for details.

3. Drawing not to scale. Follow dimensions.

4. Minimum clearance to reinforcing steel shall be 1'/2".

5. Lap longitudinal bars a minimum of 23" at splices.

6. Beveled headwall shall be located at upstream end.

7. Same size and spacing as B2 bars.

8. Varies - 12" maximum.


10. Not specified on this sheet.

11. Not specified on this sheet.

12. Not specified on this sheet.

13. For design fills over 2'-0".

14. For design fills 2'-0" or less.

15. For design fills 2'-0" or less.

Laying Out Transverse Joints

Use a transverse joint when barrel length is over 80 feet. Use additional joints to limit cut section length and end section barrel length measured along centerline of culvert to 90 feet.

Minimum end section length shall be 3 feet measured along the shortest wall from the inside face of headwall to the transverse joint.

To avoid locating transverse joints under a traveled way with design fills 2'-0" or less, the joints shall be located to minimize the length of joint under a traveled way.

Traveled way is the roadway width minus wings shoulder widths.

For cut section details, see 703-16.

Minimum end section length shall be 3 feet measured along the shortest wall from the inside face of headwall to the transverse joint.

To avoid locating transverse joints under a traveled way with design fills 2'-0" or less, the joints shall be located to minimize the length of joint under a traveled way.

Traveled way is the roadway width minus wings shoulder widths.

For cut section details, see 703-16.
GENERAL ELEVATION A-A

CHANNEL BOTTOM SHALL BE GRADED WITHIN RIGHT OF WAY FOR TRANSITION OF CHANNEL BED TO CULVERT OPENINGS. CHANNEL BANKS SHALL BE TAPERED TO MATCH CULVERT OPENINGS.

GENERAL NOTES:

DESIGN SPECIFICATIONS:
2010 AMEND LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

DESIGN LOADINGS:
DESIGN HL-93 WINGS LANE LOAD. EARTH = 120 LB/FT. EQUIVALENT FLUID PRESSURE = 50 LB/FT. MIN. 40 LB/FT MAX 1

DESIGN UNIT STRESSES:
CLASS B 1 CONCRETE BOX CULVERT F" = 4,000 PSI
REINFORCING STEEL (GRADE 60) fy = 60,000 PSI

MISCELLANEOUS:
FOR REINFORCEMENT DETAILS SEE SHEET 2 OF 3, FOR SECTION DETAILS SEE SHEET 3 OF 3, FOR MEMBER THICKNESS SEE 703.17.
DRAWING NOT TO SCALE, FOLLOW DIMENSIONS.
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

WHEN ALTERNATE PRECAST CONCRETE BOX CULVERT SEGMENTS ARE USED, THE MINIMUM DISTANCE FROM INSIDE LINES OF HEMSHELLS TO PRECAST SEGMENT CROWN SHALL BE MAXIMUM VALUES FOR B AND C.

REINFORCEMENT AND DIMENSIONS FOR WINGS AND HEADWALLS SHALL BE IN ACCORDANCE WITH MISSOURI STANDARD PLANS.

LAYOUT DIMENSIONS

VARIABLE | DIMENSION | VARIABLE | DIMENSION |
--- | --- | --- | --- |
\( a \) | SEE EQUATIONS | \( B \) | \( \frac{2V\sec 20\degree}{2} \) |
\( A \) | SEE EQUATIONS | \( C \) | \( \frac{T\sin 20\degree}{2} \) |
\( D \) | \( R + W + N + 20\degree \) | \( E \) | \( 0 + 23\degree \) |
\( F \) | \( S + 2T \) | \( G \) | \( (1.5 + U) \) |
\( M \) | \( \frac{N}{(\cos 20\degree)} \) | \( N \) | \( 3\degree \times \tan 10\degree \) |

EQUATIONS FOR COMPUTING \( a, B, B \) AND \( C \):

\[ a = \text{ANGLE OF BARREL SLOPE WITH HORIZONTAL NORMAL TO E ROADWAY OR \( E \) MEDIUM = ARC TAN (ELEV. 1 - ELEV. 2)} \]

\[ B = \text{ANGLE OF FILL SLOPE WITH HORIZONTAL NORMAL TO E ROADWAY OR \( E \) MEDIUM = ARC TAN (D) } \]

\[ C = \text{HORIZONTAL DISTANCE FROM UPSTREAM EDGE OF SHOULDER TO \( E \) ROADWAY OR \( E \) MEDIUM = } \]

\[ D = \text{HORIZONTAL DISTANCE FROM DOWNSTREAM EDGE OF SHOULDER TO \( E \) ROADWAY OR \( E \) MEDIUM = } \]

\[ E = \text{GROSS SLOPE OF EACH PART OF ROADWAY INCLUDING CROWN, LANES AND SHOULDER. \( E \) IS POSITIVE IF RISING AND NEGATIVE IF FALLING AWAY FROM \( E \) ROADWAY OR \( E \) MEDIUM.} \]

\[ F = \text{THE TERM "ACCS" IS THE DIFFERENCE IN ELEVATION BETWEEN \( E \) ROADWAY OR \( E \) MEDIUM AND THE TOP OF THE FILL SLOPE NORMAL TO \( E \) ROADWAY OR \( E \) MEDIUM. THIS TERM SHALL BE ADJUSTED FOR UNIFORM TYPICAL AND NONSTANDARD ROADWAYS. TO ACCOUNT FOR A VARYING PROFILE GRADE THE \( E \) ROADWAY FILL SHALL BE BASED ON STATIONS THAT CORRESPOND TO THE CORNERS OF THE INSIDE FACE OF THE HEADWALLS THAT PRODUCE MAXIMUM VALUES FOR \( B \) AND \( C \).} \]

\[ G = \text{SEE ROADWAY PLANS FOR SLOPES.} \]

\[ H = \text{NORMAL TO \( E \) ROADWAY OR MEDIAN} \]

\[ J = \text{MEDIAN} \]

\[ K = \text{MEDIAN AND THE TOP OF THE FILL SLOPE \( E \) ROADWAY OR \( E \) MEDIUM \( \text{SEE EQUATIONS} \)} \]

\[ L = \text{ARCTAN( ELEV. 1 - ELEV. 2) \text{ See EQUATIONS}} \]

\[ M = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ N = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ O = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ P = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ Q = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ R = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ S = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ T = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ U = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ V = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ W = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ X = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ Y = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ Z = \text{ARCTAN( ELEV. 1 - ELEV. 2)} \]

\[ A = 0 + 23\degree \]

\[ B = \text{SEE EQUATIONS} \]

\[ C = \text{SEE EQUATIONS} \]

\[ D = \text{SEE EQUATIONS} \]

\[ E = \text{SEE EQUATIONS} \]

\[ F = \text{SEE EQUATIONS} \]

\[ G = \text{SEE EQUATIONS} \]

\[ H = \text{SEE EQUATIONS} \]

\[ I = \text{SEE EQUATIONS} \]

\[ J = \text{SEE EQUATIONS} \]

\[ K = \text{SEE EQUATIONS} \]

\[ L = \text{SEE EQUATIONS} \]

\[ M = \text{SEE EQUATIONS} \]

\[ N = \text{SEE EQUATIONS} \]

\[ O = \text{SEE EQUATIONS} \]

\[ P = \text{SEE EQUATIONS} \]

\[ Q = \text{SEE EQUATIONS} \]

\[ R = \text{SEE EQUATIONS} \]

\[ S = \text{SEE EQUATIONS} \]

\[ T = \text{SEE EQUATIONS} \]

\[ U = \text{SEE EQUATIONS} \]

\[ V = \text{SEE EQUATIONS} \]

\[ W = \text{SEE EQUATIONS} \]

\[ X = \text{SEE EQUATIONS} \]

\[ Y = \text{SEE EQUATIONS} \]

\[ Z = \text{SEE EQUATIONS} \]

\[ A = \text{SEE EQUATIONS} \]

\[ B = \text{SEE EQUATIONS} \]

\[ C = \text{SEE EQUATIONS} \]

\[ D = \text{SEE EQUATIONS} \]

\[ E = \text{SEE EQUATIONS} \]

\[ F = \text{SEE EQUATIONS} \]

\[ G = \text{SEE EQUATIONS} \]

\[ H = \text{SEE EQUATIONS} \]

\[ I = \text{SEE EQUATIONS} \]

\[ J = \text{SEE EQUATIONS} \]

\[ K = \text{SEE EQUATIONS} \]

\[ L = \text{SEE EQUATIONS} \]

\[ M = \text{SEE EQUATIONS} \]

\[ N = \text{SEE EQUATIONS} \]

\[ O = \text{SEE EQUATIONS} \]

\[ P = \text{SEE EQUATIONS} \]

\[ Q = \text{SEE EQUATIONS} \]

\[ R = \text{SEE EQUATIONS} \]

\[ S = \text{SEE EQUATIONS} \]

\[ T = \text{SEE EQUATIONS} \]

\[ U = \text{SEE EQUATIONS} \]

\[ V = \text{SEE EQUATIONS} \]

\[ W = \text{SEE EQUATIONS} \]

\[ X = \text{SEE EQUATIONS} \]

\[ Y = \text{SEE EQUATIONS} \]

\[ Z = \text{SEE EQUATIONS} \]
LAYING OUT TRANVERSE JOINTS
UNLESS SHOWN ON ROADWAY OR BRIDGE PLANS

USE A TRANVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANVERSE JOINT.

TO AVOID LOCATING TRANVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

- BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT
- CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.16.

GENERAL NOTES:
FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.17. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN HALF PLANS AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS B2 BARS
(b) VARIIES. 12" MAXIMUM
(c) J4 BAR SPACING
(d) SAME SIZE AND SPACING AS A2 BARS
(e) A2 BAR SPACING
(f) SAME SIZE AND SPACING AS A1 BARS
(g) AT BAR SPACING
(h) FOR DESIGN FILLS OVER 2'-0" OR LESS

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JEFFERSON CITY, MO 65102
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CONCRETE SINGLE BOX CULVERT
SKEW: LEFT ADVANCE
WINGS: STRAIGHT
REINFORCEMENT

DATE EFFECTIVE:
DATE PREPARED:
07/01/2015
5/13/2015

703.12J SHEET NO. 2 OF 3
GENERAL ELEVATION A-A

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY. SEE SHEET 3 OF 3 FOR DETAILS.

1. Shoulder to shoulder (see roadway plans) shall be graded within right of way for transition of channel bed backfill. Shall be in accordance with Sec 208.

2. Granular backfill shall be placed in accordance with furnishing and placing of granular clarity. See sheet 3 of 3 for details.

3. Construction joint key not shown for excavation of unsuitable material and for any part of the barrel is exposed, the roadway fill shall provide 12 inches minimum cover.

4. Channel bottom shall be graded within right of way for transition of channel bed to culvert openings. Channel banks shall be tapered to match culvert openings.

PLAN OF LAYOUT DIMENSIONS

(A) Ahead station where stream flows left to right. (B) Ahead station where stream flows right to left.

LAYOUT DIMENSIONS

Variable | Dimension | Variable | Dimension |
---------|-----------|---------|-----------|
A        | SEE EQUATIONS | N  | 3") + SIN(10") |
B        | SEE EQUATIONS | O  | 1") + YY |
C        | SEE EQUATIONS | P  | 2"(SEC(20") + 2") |
D        | SEE EQUATIONS | Q  | 2"(SEC(20") + 2") |
E        | SEE EQUATIONS | R  | TAN(70") |
F        | SEE EQUATIONS | S  | TAN(70") |
G        | SEE EQUATIONS | T  | TAN(70") |
H        | SEE EQUATIONS | U  | TAN(70") |
I        | SEE EQUATIONS | V  | TAN(70") |
J        | SEE EQUATIONS | W  | TAN(70") |
K        | SEE EQUATIONS | X  | TAN(70") |
L        | SEE EQUATIONS | Y  | TAN(70") |
M        | SEE EQUATIONS | Z  | TAN(70") |

GENERAL NOTES:

1. DESIGN SPECIFICATIONS:
   - 2010 MISSOURI BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

2. DESIGN LOADING:
   - Deck unit: 4.000 PSI. 60.000 PSI (Max.)
   - Equivalent Fluid Pressure = 30.000 PSI (Mini. 1.000.000 PSI (Max. 1.400.000 PSI)

3. DESIGN UNIT STRESSES:
   - CLASS 1: CONCRETE BOX CULVERT (F'D = 4000 PSI)
   - REINFORCING STEEL (GRADE 60) (Y'D = 60000 PSI)

4. MISCELLANEOUS:
   - FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3. FOR SECTION DETAILS SEE SHEET 3 OF 3. FOR MEMBER THICKNESS SEE Sec. 703.17.
   - DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

5. DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

6. WHEN ALTERNATE PRECAST CONCRETE BOX CULVERT SECTIONS ARE USED, THE MINIMUM DISTANCE FROM INSIDE FACE OF HEADWALLS TO PRECAST BOX CULVERT SECTIONS SHALL BE 3 FEET.

7. The minimum distance from inside face of headwalls to precast box culvert sections shall be 3 feet.

8. The minimum distance from inside face of headwalls to precast box culvert sections shall be 3 feet.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636)

JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636)

CONCRETE SINGLE BOX CULVERT

SKEW: LEFT ADVANCE
WINGS: FLARED

LAYOUT

DATE EFFECTIVE: 07/01/2015
DATE PREPARED: 07/01/2015

703.13-J SHEET NO. 1 OF 3
GENERAL NOTES:

FOR SECTIONS THROUGH BARRELS, WINGS AND HEADWALLS, SEE SHEET 7 OF 7. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT A1 BARS, SEE 703-17, FOR A2 BARS, SEE 703-18.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN HALF PLANS AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½". LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.
(a) SAME SIZE AND SPACING AS A2 BARS
(b) VARIOUS - 12" MAXIMUM
(c) J3 BAR SPACING
(d) SAME SIZE AND SPACING AS A2 BARS
(e) A2 BAR SPACING
(f) SAME SIZE AND SPACING AS A1 BARS
(g) A1 BAR SPACING
(h) FOR DESIGN FILLS OVER 2½' (h) FOR DESIGN FILLS OVER 2½" OR LESS

DATE PREPARED: 03/01/2016
DATE EFFECTIVE: 07/01/2016

SHEET NO.

2 OF 3

CONCRETE SINGLE BOX CULVERT
SKEW: LEFT ADVANCE
WINGS: FLARED
REINFORCEMENT

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-656-MDOT (1-888-656-6368)

703.13J
**Concrete Single Box Culvert**

**Skew:** Left Advance

**Wings:** Flared

**General Notes:**
- For concrete thicknesses and pipe sizes, please see the Missouri DOT's Specifications for Bridge Structures, Section 1000.
- All dimensions are shown in feet and inches unless otherwise noted.
- Steel reinforcement is included in the design.
- Drawings not to scale; follow plans.

**Sections:**

```
DOWNSWING REINFORCEMENT

UPSWING REINFORCEMENT

UPSTREAM HEADWALL REINFORCEMENT

DOWNSTREAM HEADWALL REINFORCEMENT

GRANULAR BACKFILL LIMITS AND MEMBER DIMENSIONS

TRANSVERSE JOINT THRU BARREL

BARREL REINFORCEMENT
```

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-425-MODOT (6636)

**CONCRETE SINGLE BOX CULVERT**

**SKEW:** Left Advance

**WINGS:** Flared
GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS, AND HEADWALLS, SEE SHEET 2 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.16. FOR J5 BARS, SEE 703.17.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN HALF PLANS AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1/2".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS B2 BARS
(b) VARIES. 12" MAXIMUM
(c) J4 BAR SPACING
(d) SAME SIZE AND SPACING AS A2 BARS
(e) A2 BAR SPACING
(f) SAME SIZE AND SPACING AS A1 BARS
(g) AT BAR SPACING
(h) FOR DESIGN FILLS OVER 2'-0"
(i) FOR DESIGN FILLS 2'-0" OR LESS

CONCRETE SINGLE BOX CULVERT

SKEW: RIGHT ADVANCE WINGS; STRAIGHT REINFORCEMENT

LAYING OUT TRANVERSE JOINTS

USE A TRANVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 90 FEET. MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANVERSE JOINT.

TO AVOID LOCATING TRANVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED MINIMUM 12" FROM ALL WALLS.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE TOC-16.

DATE EFFECTIVE:

5/13/2015

DATE PREPARED:

5/13/2015
CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY. SEE SHEET 3 OF 3 FOR DETAILS.

SEC 206.

CHANNEL BOTTOM SHALL BE GRADED WITHIN RIGHT OF WAY FOR TRANSITION OF CHANNEL BED EXCAVATION OF UNSUITABLE MATERIAL AND FURNISHING AND PLACING OF GRANULAR BACK FILL SUCH THAT THEY PROVIDE 12 INCHES MINIMUM COVER.

ELEVATION OF UNSUITABLE MATERIAL AND FURNISHING AND PLACING OF GRANULAR CLARITY. SEE SHEET 3 OF 3 FOR DETAILS.

CONSTRUCTION JOINT KEY NOT SHOWN FOR TO CULVERT OPENINGS. CHANNEL BANKS SHALL BE TAPERED TO MATCH CULVERT OPENINGS.

IF UNSUITABLE MATERIAL IS ENCOUNTERED, LAYER THROUGH TIE STATION. CHANNEL BANKS WILL BE TAPERED TO MATCH CULVERT OPENINGS.

TOTAL LENGTH NORMAL TO ROADWAY OR MEDIAN.

LAYOUT DIMENSIONS

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<tr>
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<tr>
<td>M</td>
<td>SEE EQUATIONS</td>
</tr>
</tbody>
</table>

GENERAL NOTES:

DESIGN SPECIFICATIONS: 2010 AMEND LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS.

DESIGN LOADS:

DESIGN UNIT STRESSES:

REINFORCING STEEL (GRADE 60) FY = 60,000 PSI

WINGs: FLARED

MIZURS HWY AND TRANSPORTATION
COMMISSION
JEFFERSON CITY, MO 65101
1-888-ASK-MODOT 1-888-275-6636

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636

CONCRETE SINGLE BOX CULVERT
SKEW: RIGHT ADVANCE
WINGS: FLARED

LAYOUT

DATE EFFECTIVE: 07/01/2015
DATE PREPARED: 07/01/2015
0703.15E SHEET NO. 1 OF 3
LAYING OUT TRAVERSE JOINTS

UNLESS SHOWN ON ROADWAY OR BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET. MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWAY TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELLED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELLED WAY WITH DESIGN FILLS OVER 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED MINIMUM LENGTH OF JOINT UNDER A TRAVELLED WAY.

TRAVERSED WAY IS THE ROADWAY WIDTH WINGS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS SEE TO5-16.

GENERAL NOTES:

FOR SECTIONS THROUGH BARREL, WINGS AND HEADWALLS, SEE SHEET 2 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT A1 BARS, SEE TO5-17. FOR A1 BARS, SEE TO5-18.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN HALF PLANS AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1/2".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWAY SHALL BE LOCATED AT UPSTREAM END.

1) SAME SIZE AND SPACING AS A1 BARS
2) SAME SIZE AND SPACING AS A2 BARS
3) SAME SIZE AND SPACING AS A1 BARS
4) SAME SIZE AND SPACING AS A2 BARS
5) SAME SIZE AND SPACING AS A1 BARS
6) SAME SIZE AND SPACING AS A2 BARS
7) SAME SIZE AND SPACING AS A1 BARS
8) SAME SIZE AND SPACING AS A2 BARS
9) SAME SIZE AND SPACING AS A1 BARS
10) SAME SIZE AND SPACING AS A2 BARS
11) SAME SIZE AND SPACING AS A1 BARS
12) SAME SIZE AND SPACING AS A2 BARS
13) SAME SIZE AND SPACING AS A1 BARS
14) SAME SIZE AND SPACING AS A2 BARS
15) SAME SIZE AND SPACING AS A1 BARS
16) SAME SIZE AND SPACING AS A2 BARS
17) SAME SIZE AND SPACING AS A1 BARS
18) SAME SIZE AND SPACING AS A2 BARS
19) SAME SIZE AND SPACING AS A1 BARS
20) SAME SIZE AND SPACING AS A2 BARS
21) SAME SIZE AND SPACING AS A1 BARS
22) SAME SIZE AND SPACING AS A2 BARS
23) SAME SIZE AND SPACING AS A1 BARS
24) SAME SIZE AND SPACING AS A2 BARS
25) SAME SIZE AND SPACING AS A1 BARS
26) SAME SIZE AND SPACING AS A2 BARS
27) SAME SIZE AND SPACING AS A1 BARS
28) SAME SIZE AND SPACING AS A2 BARS
29) SAME SIZE AND SPACING AS A1 BARS
30) SAME SIZE AND SPACING AS A2 BARS

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636
JEFFERSON CITY, MO 65102

REINFORCEMENT

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636
JEFFERSON CITY, MO 65102

REINFORCEMENT

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JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636
JEFFERSON CITY, MO 65102

REINFORCEMENT
### Concrete Single Box Culvert

#### Member Thickness

<table>
<thead>
<tr>
<th>Bar Size</th>
<th>Top Steel Bars</th>
<th>Bottom Slab Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 Bars</td>
<td>A2 Bars</td>
<td>A3 Bars</td>
</tr>
<tr>
<td>B1 Bars</td>
<td>B2 Bars</td>
<td>B3 Bars</td>
</tr>
</tbody>
</table>

**Design Fill (SF):**

- **Top Steel Bars:**
  - A1: 4 bars
  - A2: 4 bars
  - A3: 4 bars
  - B1: 4 bars
  - B2: 4 bars
  - B3: 4 bars

**Bottom Slab Bars:**

- A1: 4 bars
- A2: 4 bars
- A3: 4 bars
- B1: 4 bars
- B2: 4 bars
- B3: 4 bars

**Bar Dimensions Diagram:**

- **13 Bar:** Used in the middle of the culvert.
- **P1 Bar:** End bars.

**Alternate 13 Bar:**

- The alternate 13 bars may be used when the distance between two cells is less than 2.5 feet. Dimension 1 (D1) shall be used with a bar size of A1, A2, A3, B1, B2, or B3, except for A2 and B2 bars where 1 is equal to 2.5 feet in both directions. A1 and B1 bars are required with alternate 13 bars with a length equal to A1 bars and size and spacing equal to 13 bars. Additional payment will be made for this substitution.

**General Notes:**

- If design fill is between tabulated design fills, use the next larger design fill. Design fill is increased for design fills between 2 feet and 4 feet. Special designs are required for culverts over 2 feet and 4 feet deep. The member thickness, area of reinforcement, and bar dimensions from the 2 to 4 tabulated design fill.

**Culverts Meet Strength and Serviceability Requirements for the Selection of Culvert Volumes:**

- Missoula, Montana

---

**Missouri Highways and Transportation Commission**

- Jefferson City, MO 65102
- 1-888-456-MO (463)
- (509) 275-8081

**Sheet No.:** 703.17A

**Date Prepared:** 3/22/2023

**Sheet No.:** 1 of 14
### CONCRETE SINGLE BOX CULVERT

**Member Thickness, Bar Size, Spacing & Dimensions**

**Bar Size: 5 Feet, Height (HT): 3 thru 8 Feet**

<table>
<thead>
<tr>
<th>SPAN (S)</th>
<th>5FT</th>
<th>HEIGHT (HT)</th>
<th>3FT OR 6FT</th>
<th>WALL BARS</th>
<th>4 BARS</th>
<th>5 BARS</th>
<th>6 BARS</th>
<th>7 BARS</th>
<th>8 BARS</th>
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</table>

**General Notes:**
- If design fill is less than 1 foot, use the next smaller size for design fill. Use the next larger size for design fill of 2 feet or more.
- If design fill is between 1 and 2 feet, use the next larger size for design fill of 2 feet or more.
- The table includes design bars, not reinforcement bars.
- Dimensions are in inches unless otherwise specified.
- Design fills are measured from the top of the top slab to the top of the earth fill or roadway.

**Concrete Single Box Culvert:**

- **At Contractor's Option:** Alternate 13 bars may be used when the distance between the ends of 13 bars in the top slab is less than 2 feet. Design dimensions 1 13 bars spaced 2 feet or less, and dimensions 2 13 bars spaced 4 feet or more, respectively. Positions 1 bars may be required with alternate 13 bars with a length equal to 13 bars and size and spacing equal to 2 Substitution.

**Contractor:**

- Missouri Highways and Transportation Commission
- [Missouri Highways and Transportation Commission](http://www.modot.mo.gov)

**Task Number:**

- 703.17A

**Sheet Number:**

- 3 of 14
<table>
<thead>
<tr>
<th>SPAN (S)</th>
<th>6 FT</th>
<th>HEIGHT (H)</th>
<th>3 FT OR 4 FT OR 5 FT</th>
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<tbody>
<tr>
<td>MEMBERS</td>
<td>THICKNESS</td>
<td></td>
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<tr>
<td>T5</td>
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<td>T6</td>
<td>B6</td>
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<td>1.5</td>
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</table>

GENERAL NOTES:
1. If design fill is between tabulated design fills, use the next larger fill. For design fills between 2 feet and 3 feet use the member thickness area of reinforcement and bar dimensions from the 2-foot tabulated design fill.

SPECIAL DESIGN NOTES:
- Dimensions are measured from the top of top slab to the top of the culvert.
- Culverts meet strength and serviceability requirements for the design vehicle speed. Load Live: 90 mph.

CONCRETE SINGLE BOX CULVERT

MEMBER THICKNESS

BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 6 FEET
HEIGHT (H): 3 THRU 9 FEET
### SPAN (S) = 8 FT  
#### HEIGHT (H) = 4 FT OR 5 FT OR 6 FT

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<th>THICKEN.</th>
<th>MEMBERS</th>
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<th>B6</th>
<th>B7</th>
<th>WALLS</th>
<th>WALL SABS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BOTTOM SLAB</td>
<td>BARS</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>T5</td>
<td>B5</td>
<td>SIZE SPA</td>
<td>SIZE SPA</td>
<td>C1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
<td>5</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>B4</td>
<td>SIZE SPA</td>
<td>SIZE SPA</td>
<td>C1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B3</td>
<td>SIZE SPA</td>
<td>SIZE SPA</td>
<td>C1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
<td>5</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>SIZE SPA</td>
<td>SIZE SPA</td>
<td>C1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>A1</td>
<td>SIZE SPA</td>
<td>SIZE SPA</td>
<td>C1</td>
<td></td>
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</tr>
<tr>
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<td>SIZE SPA</td>
<td>C1</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>A3</td>
<td>SIZE SPA</td>
<td>SIZE SPA</td>
<td>C1</td>
<td></td>
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<td></td>
<td>7</td>
<td>7</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### GENERAL NOTES:
- If design fill is between tabulated design fills, use the next lower design fill for earth fill between 2 ft and 4 ft 
- For design fills between 2 ft and 4 ft, use the member thickness and bar dimensions from the "2 ft. tabulated design fill.
- Special design fills are rendered when the design fill is LESS than 2 ft or Greater than 4 ft. 
- Design fills are measured from the top of the top slab to the top of earth fill or roadway. 
- Culverts meet strength and serviceability requirements for the design level of live load. 
- Culverts meet strength and serviceability requirements for the design level of live load. 

### CONCRETE SINGLE BOX CULVERT
- **MEMBER THICKNESS**
  - **BAR SIZE, SPACING & DIMENSIONS**
  - **SPAN (S): 8 FT**
  - **HEIGHT (H): 4 FT THROUGH 11 FT**

---

**DATE REVIEWED:** 2/13/2023  
**DATE PRINTED:** 2/22/2023  
**SHEET NO.:** 703.17A  
**6 OF 14**
### Table: Steel Bar Details

<table>
<thead>
<tr>
<th>Span (ft)</th>
<th>Height (ft)</th>
<th>Member Thickness</th>
</tr>
</thead>
</table>
| 13 | 8 | Bar 13
| 13 | 10 | Bar 13

### General Notes:
- **Steel Bar Dimensions:**
  - For the 13 ft span, the steel bar dimensions are as follows:
  - **Top Slab:** 13 bars
  - **Wall:** 13 bars

### Diagram:

- **ALTERNATE 13 BAR**
  - At contractor’s option, alternate 13 bars may be used when the distance between the ends of 13 bars is greater than the specified dimension.
  - Bars 13 shall not be used with alternate 13 bars.

### Bar Dimensions Diagram:

- **X1 Bar:** 13
- **PL Bar:** 13
- **Suit:** 13

---

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

**CONCRETE SINGLE BOX CULVERT**

**Member Thickness**

**Bar Size, Spacing & Dimensions**

**Span:** 13 ft
**Height:** 7 ft to 16 ft

**Sheet No.:** 703.17A
**Date Prepared:** 2/22/2022
**Page:** 11 of 14
### Table 1: Span (s) = 14 FT

<table>
<thead>
<tr>
<th>Height (H)</th>
<th>Top Slab Bars</th>
<th>Bottom Slab Bars</th>
<th>Wall Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 FT</td>
<td>A1 BARS</td>
<td>A2 BARS</td>
<td>A1 BARS</td>
</tr>
<tr>
<td>8 FT</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>9 FT</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>10 FT</td>
<td>7</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>11 FT</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>12 FT</td>
<td>9</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>13 FT</td>
<td>10</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>14 FT</td>
<td>11</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>15 FT</td>
<td>12</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>16 FT</td>
<td>13</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

### Table 2: Span (s) = 15 FT

<table>
<thead>
<tr>
<th>Height (H)</th>
<th>Top Slab Bars</th>
<th>Bottom Slab Bars</th>
<th>Wall Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 FT</td>
<td>A1 BARS</td>
<td>A2 BARS</td>
<td>A1 BARS</td>
</tr>
<tr>
<td>15 FT</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>16 FT</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>17 FT</td>
<td>7</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>18 FT</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>19 FT</td>
<td>9</td>
<td>10</td>
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</tr>
<tr>
<td>20 FT</td>
<td>10</td>
<td>11</td>
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</tr>
<tr>
<td>21 FT</td>
<td>11</td>
<td>12</td>
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</tr>
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<td>22 FT</td>
<td>12</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>23 FT</td>
<td>13</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

### Table 3: Span (s) = 16 FT

<table>
<thead>
<tr>
<th>Height (H)</th>
<th>Top Slab Bars</th>
<th>Bottom Slab Bars</th>
<th>Wall Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 FT</td>
<td>A1 BARS</td>
<td>A2 BARS</td>
<td>A1 BARS</td>
</tr>
<tr>
<td>16 FT</td>
<td>5</td>
<td>6</td>
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<td>17 FT</td>
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<tr>
<td>20 FT</td>
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<td>10</td>
<td>9</td>
</tr>
<tr>
<td>21 FT</td>
<td>10</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>22 FT</td>
<td>11</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>23 FT</td>
<td>12</td>
<td>13</td>
<td>12</td>
</tr>
</tbody>
</table>

### General Notes:
- If design fills are between 0 and 10 ft, special design fill is required for design fills between 2 and 4 ft. Bar dimensions are in inches unless otherwise specified.
- Design fill is measured from the top of top slab to the top of earth fill or runway fill.
- Culvert live load is 140 kips. Live load requirements for the design vehicle, live load in excess of the load limit.

**Missouri Highways and Transportation Commission**

**Concrete Single Box Culvert**

**Member Thickness**

**Bar Size, Spacing & Dimensions**

**Span (s):** 14 FT  
**Height (H):** 7 thru 16 FEET

**Design:**

- **A1 Bar**
- **A2 Bar**
- **A1 Bar**
- **A2 Bar**

**Bar Dimensions Diagram**

**Symmetrical about Culvert.**

**Alternate 13 Bar**

As contractor's option, alternate 13 bars may be used when the distance between the ends of 13 bars in the top slab exceeds 7 ft. An alternate 13 slab shall be used with alternate 13 bars.
### AREA OF STEEL REQUIRED FOR J5 BARS IN WINGS (SQ. IN./FT.)

**WALL HEIGHT VS. WALL THICKNESS**

<table>
<thead>
<tr>
<th>Wall Thickness (Ft.)</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
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<tr>
<td>6</td>
<td>0.008</td>
<td>0.016</td>
<td>0.024</td>
<td>0.032</td>
<td>0.040</td>
<td>0.048</td>
<td>0.056</td>
<td>0.064</td>
<td>0.072</td>
<td>0.080</td>
<td>0.088</td>
<td>0.096</td>
<td>0.104</td>
<td>0.112</td>
<td>0.120</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.016</td>
<td>0.032</td>
<td>0.048</td>
<td>0.064</td>
<td>0.080</td>
<td>0.096</td>
<td>0.112</td>
<td>0.128</td>
<td>0.144</td>
<td>0.160</td>
<td>0.176</td>
<td>0.192</td>
<td>0.208</td>
<td>0.224</td>
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<tr>
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<td>0.024</td>
<td>0.048</td>
<td>0.072</td>
<td>0.096</td>
<td>0.120</td>
<td>0.144</td>
<td>0.168</td>
<td>0.192</td>
<td>0.216</td>
<td>0.240</td>
<td>0.264</td>
<td>0.288</td>
<td>0.312</td>
<td>0.336</td>
<td>0.360</td>
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<tr>
<td>9</td>
<td>0.032</td>
<td>0.064</td>
<td>0.096</td>
<td>0.128</td>
<td>0.160</td>
<td>0.192</td>
<td>0.224</td>
<td>0.256</td>
<td>0.288</td>
<td>0.320</td>
<td>0.352</td>
<td>0.384</td>
<td>0.416</td>
<td>0.448</td>
<td>0.480</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.040</td>
<td>0.080</td>
<td>0.120</td>
<td>0.160</td>
<td>0.200</td>
<td>0.240</td>
<td>0.280</td>
<td>0.320</td>
<td>0.360</td>
<td>0.400</td>
<td>0.440</td>
<td>0.480</td>
<td>0.520</td>
<td>0.560</td>
<td>0.600</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>0.048</td>
<td>0.096</td>
<td>0.144</td>
<td>0.192</td>
<td>0.240</td>
<td>0.288</td>
<td>0.336</td>
<td>0.384</td>
<td>0.432</td>
<td>0.480</td>
<td>0.528</td>
<td>0.576</td>
<td>0.624</td>
<td>0.672</td>
<td>0.720</td>
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<td>12</td>
<td>0.056</td>
<td>0.112</td>
<td>0.168</td>
<td>0.224</td>
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<td>0.336</td>
<td>0.392</td>
<td>0.448</td>
<td>0.504</td>
<td>0.560</td>
<td>0.616</td>
<td>0.672</td>
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<tr>
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<td>0.128</td>
<td>0.192</td>
<td>0.256</td>
<td>0.320</td>
<td>0.384</td>
<td>0.448</td>
<td>0.512</td>
<td>0.576</td>
<td>0.640</td>
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<tr>
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<td>0.072</td>
<td>0.144</td>
<td>0.216</td>
<td>0.288</td>
<td>0.360</td>
<td>0.432</td>
<td>0.504</td>
<td>0.576</td>
<td>0.648</td>
<td>0.720</td>
<td>0.792</td>
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<td>0.160</td>
<td>0.240</td>
<td>0.320</td>
<td>0.400</td>
<td>0.480</td>
<td>0.560</td>
<td>0.640</td>
<td>0.720</td>
<td>0.800</td>
<td>0.880</td>
<td>0.960</td>
<td>1.040</td>
<td>1.120</td>
<td>1.200</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**

- The wall height is equal to the barrel height (HT) plus the top slab thickness (TS). When wall height is in between or outside tabulated wall heights, the area of steel required should be interpolated between or extrapolated from adjacent areas of steel using the actual wall height.
- If area of steel in the wall of the culvert (J4 bars) is greater than that indicated in the table, use the same size and spacing for the J5 bars in the wings. However, if the area of steel provided by matching size and spacing of the J4 bars is insufficient, increase the size of the J4 bars (3/8 in.) and/or decrease the spacing of the J5 bars (6 in.). Use smallest bar size possible based on minimum spacing.
- Minimum steel to be used in the wings for J5 bars is #4 bars at 14 in. centers (area of steel = 0.1683 sq. in./ft.).

**See standard plan 703.37C, sheet 2 of 2 for backfill slope to be used based on skew.**
NOTE: USE 65° FOR ANGLE E FOR ALL WINGS WHICH MAKE AN ANGLE D GREATER THAN 90°.

WING BACKFILL TABLE

<table>
<thead>
<tr>
<th>WING SKEW (DEGREES)</th>
<th>A (DEGREES)</th>
<th>B TRANSITION ANGLE (DEGREES)</th>
<th>C BACKFILL SLOPE (H:V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>≥90</td>
<td>65</td>
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</tr>
<tr>
<td>0</td>
<td>90</td>
<td>65</td>
<td>3:1</td>
</tr>
<tr>
<td>5</td>
<td>85</td>
<td>58</td>
<td>3:1</td>
</tr>
<tr>
<td>10</td>
<td>80</td>
<td>51</td>
<td>3:1</td>
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<tr>
<td>15</td>
<td>75</td>
<td>43</td>
<td>3:1</td>
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<td>25</td>
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<td>2:1</td>
</tr>
<tr>
<td>60</td>
<td>30</td>
<td>10</td>
<td>2:1</td>
</tr>
</tbody>
</table>

PLAN OF WINGS AND SLOPE TRANSITION LINES

NOTE: BACKFILL TRANSITION ANGLE AND BACKFILL SLOPE SHALL APPLY TO ALL BOX CULVERTS REGARDLESS OF TYPE - SINGLE, DOUBLE, OR TRIPLE.
GENERAL NOTES:

THE HATCHED PARTS OF THESE DRAWINGS INDICATE THOSE PORTIONS OF THE EXISTING CULVERT WHICH ARE TO BE REMOVED.

ALL REINFORCING BARS WITHIN AREAS SHOWN TO BE REMOVED, THAT ARE BONDED IN UNDISTURBED OLD CONCRETE, SHALL BE CLEANLY STRIPPED, STRAIGHTENED, AND EXTENDED INTO NEW CONCRETE.

SEE STANDARD SPECIFICATIONS FOR REQUIRED BUSHHAMMERING AND TREATING OF OLD CONCRETE SURFACES WHICH ARE TO RECEIVE NEW CONCRETE.

A CONTINUOUS V-GROOVE AT LEAST 1" IN DEPTH SHALL BE CUT ON THE FACE OF THE CONCRETE AS A GUIDE FOR THE LINE OF BREAK AND TO PREVENT SPALLING.

THE BOX EXTENSION OPENING SHALL BE BUILT TO MATCH THE EXISTING BOX OPENING. WHEN THE EXISTING OPENING DOES NOT MATCH A SIZE FROM THE TABLES, THE NEXT LARGER SIZE SHALL BE USED FOR DETERMINING THE MEMBER SIZES AND REINFORCEMENT.
GENERAL NOTES:

THE HATCHED PORTIONS OF THESE DRAWINGS INDICATE THOSE PORTIONS OF THE EXISTING CULVERT WHICH ARE TO BE REMOVED.

ALL REINFORCING BARS WITHIN AREAS SHOWN TO BE REMOVED, THAT ARE BONDED IN UNDISTURBED OLD CONCRETE, SHALL BE CLEANLY STRIPPED, STRAIGHTENED, AND EXTENDED INTO NEW CONCRETE.

SEE STANDARD SPECIFICATIONS FOR REQUIRED BUSHHAMMERING AND TREATING OF OLD CONCRETE SURFACES WHICH ARE TO RECEIVE NEW CONCRETE.

A CONTINUOUS Y-GROOVE AT LEAST 1/2" IN DEPTH SHALL BE CUT ON THE FACE OF THE CONCRETE AS A GUIDE FOR THE LINE OF BREAK AND TO PREVENT SPALLING.

THE BOX EXTENSION OPENING SHALL BE BUILT TO MATCH THE EXISTING BOX OPENING. WHEN THE EXISTING OPENING DOES NOT MATCH A SIZE FROM THE TABLES, THE NEXT LARGER SIZE SHALL BE USED FOR DETERMINING THE MEMBER SIZES AND REINFORCEMENT.

DATE EFFECTIVE: 10-01-2009

DATE PREPARED: 8/18/2009
**GENERAL NOTES:**

- For sections thru barrel, J5 bars and headwalls, see sheet 3 of 3. For bar sizes, spacing and dimensions of all reinforcement except J5 bars, see 703-41. For J5 bars, see 703-27.
- Construction joint key not shown for clarity in plan and elevation; see sheet 3 of 3 for details.
- Drawing not to scale. Follow dimensions. Minimum clearance to reinforcing steel shall be 1/2'.
- Lap longitudinal bars a minimum of 23" at splices.
- Beveled headwall shall be located at upstream end.
- (a) Same size and spacing as adjacent B bars
- (b) Varies. 12" maximum
- (c) J4 bar spacing

**ELEVATION OF EXTERIOR WALL**

J5 bars may be bent in field or shop.
GENERAL NOTES:

1. FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BARS SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT JS BARS, SEE 703.4T. FOR JS BARS, SEE 703.37.

2. CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION. SEE SHEET 3 OF 3 FOR DETAILS.

3. DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

4. MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1/2''.

5. LAP LONGITUDINAL BARS A MINIMUM OF 23'' AT SPLICES.

6. BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

7. (a) SAME SIZE AND SPACING AS ADJACENT B BARS

8. (b) VARIES, 12'' MAXIMUM

9. (c) NOT SPECIFIED ON THIS SHEET

10. (d) NOT SPECIFIED ON THIS SHEET

11. (e) NOT SPECIFIED ON THIS SHEET

12. (f) NOT SPECIFIED ON THIS SHEET

13. (g) NOT SPECIFIED ON THIS SHEET

14. (h) FOR DESIGN FILLS OVER 2'-0''

15. (i) FOR DESIGN FILLS 2'-0'' OR LESS

16. (j) NOT REQUIRED FOR CLEAR SPANS 5'-0''-0''

17. (k) FOR CLEAR SPAN 3'-10''-0''

18. (l) FOR CLEAR SPAN 3'-13''-0''

19. IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR A CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-452-MODOT 1-888-275-6631

CONCRETE DOUBLE BOX CULVERT

SKEW: SQUARED
WINGS: STRAIGHT

REINFORCEMENT

DATE EFFECTIVE: 10/01/2011
DATE PREPARED: 3/13/2010

10/01/2011
5/13/2015
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

J1 BARS MAY BE BENT IN FIELD OR SHOP.
GENERAL NOTES:

FOR SECTION (b) BAR SPACING, SEE SHEET 3 OF 3 FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS. SEE SHEET 2 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".

LAPEL LONGITUDINAL BARS A MINIMUM OF 23" AT SPACERS.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) 14 BAR SPACING

ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH TO LESS THAN 2 FEET ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILL UP TO 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER A TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH WITH EIGHTS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE TO 3-46.

PLAN OF BOTTOM SLAB

DEVELOPED ELEVATION OF EXTERIOR WALL

J4 AND J6 BARS MAY BE BENT IN FIELD OR SHOP.
GENERAL NOTES:
For sections thru barrel, wings and headwalls, see Sheet 3 of 3. For bar sizes, spacing and dimensions of all reinforcement except J3 bars, see Sheet 3.
Construction joint key not shown for clarity in Plan and Section. See Sheet 3 of 3 for details.
Drawing not to scale. Follow dimensions.
Minimum clearance to reinforcing steel shall be 1/2".
Lap longitudinal bars a minimum of 23" at splices.
Beveled headwall shall be located at upstream end:
(a) Same size and spacing as adjacent J bars
(b) Varies, 12" max
(c) Not specified on this sheet
(d) Same size and spacing as A2 bars
(e) A2 bar spacing
(f) Not specified on this sheet
(g) Not specified on this sheet
(h) For design fills over 2'-0"
(i) For design fills 2'-0" or less
(j) Not required for clear spans > 10'-0"
(k) For clear spans > 10'-0"
(l) For clear spans > 13'-0"
If required, the minimum length each side of a wall shall be the greater of 48 bar diameters or a 5' clear span.
The clear span is parallel to long direction of headwall.

DATE EFFECTIVE: 3/31/2015
DATE PREPARED: 3/13/2015
703.41H SHEET NO. 2 OF 3
CONCRETE DOUBLE BOX CULVERT
SKEW: SQUARED
WINGS: FLARED
REINFORCEMENT
LAYERING OUT TRANVERSE JOINTS
UNLESS SHOWN ON BRIDGE PLAN

USE A TRANVERSE JOINT WHEN BARREL LENGTH IS 50 FEET OR LESS. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH TO 50 FEET. MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE CENTERLINES OF THE WING JOINTS UNDER THE TRAVELED WAY. MINIMUM JOINT LENGTH UNDER THE TRAVELED WAY SHALL BE 5 FEET. JOINTS SHALL BE LOCATED TO MINIMIZE LENGTH OF JOINT UNDER THE TRAVELED WAY. JOINTS SHALL BE 5 FEET OR LESS.

GENERAL NOTES:
FOR SECTIONS THROUGH CURVE, BARREL, WINGS, AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

CEDING JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1/2 INCH.

CONSTRUCTION JOINT KEY SHOWN FOR CLEARITY IN PLAN AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DATE PREPARED: 5/13/2015
DATE EFFECTIVE: 5/13/2015

REINFORCEMENT:
CONCRETE DOUBLE BOX CULVERT
SKEW: LEFT ADVANCE WINGS: STRAIGHT
GENERAL NOTES:

1. FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

2. CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION. SEE SHEET 5 OF 3 FOR DETAILS.

3. DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

4. MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½".

5. LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPlices.

6. BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

7. (a) SAME SIZE AND SPACING AS ADJACENT 8 BARS

8. (b) VARIES: 12" MAXIMUM

9. (c) NOT SPECIFIED ON THIS SHEET

10. (d) SAME SIZE AND SPACING AS A2 BARS

11. (e) A2 BAR SPACING

12. (f) SAME SIZE AND SPACING AS A1 BARS

13. (g) A1 BAR SPACING

14. (h) FOR DESIGN FILLS OVER 2'-0" (1) FOR DESIGN FILLS OVER 2'-0" OR LESS

15. (i) PERmitted FOR CLEAR SPAN > 10'-0"

16. (j) FOR CLEAR SPAN > 15'-0"

17. (k) VARIED A BAR SPACING

18. IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF & BARS SHALL BE THE GREATER OF 8 BAR DIAMETERS OR A CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

19. (l) J1 BARS AS REQUIRED: QUANTITY OF BARS VARIES WITH SKEW.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

CONCRETE DOUBLE BOX CULVERT

SKEW: LEFT ADVANCE
WINGS: STRAIGHT

REINFORCEMENT

DATE EFFECTIVE: 3/13/1995
DATE PREPARED: 3/13/1995

703.42H SHEET NO. 2 OF 3
GENERAL NOTES:

- FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.
- CONSTRUCTION KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION, SEE SHEET 5 OR 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1/4".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS
(b) VARIES, 12" MAXIMUM
(c) NOT SPECIFIED ON THIS SHEET
(d) SAME SIZE AND SPACING AS A2 BARS
(e) A2 BAR SPACING
(f) SAME SIZE AND SPACING AS A1 BARS
(g) A1 BAR SPACING
(h) FOR DESIGN FILLS OVER 2'-0" CLEAR SPAN.
(i) FOR CLEAR SPANS 5'-10"-0".
(j) FOR CLEAR SPAN 13'-0".
(k) J5 BARS AS REQUIRED. QUANTITY OF BARS VARIES WITH SKEW.

IF REQUIRED: THE MINIMUM LENGTH EACH SIDE OF A J5 BAR SHALL BE THE GREATER OF 48 BAR DIAMETERS OR IF CLEAR SPAN THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636

CONCRETE
DOUBLE BOX CULVERT
SKEW: LEFT ADVANCE
WINGS: FLARED
REINFORCEMENT

DATE EFFECTIVE: 10/31/2011
DATE PREPARED: 9/13/2011

703.43H SHEET NO. 2 OF 3
**LAYING OUT TRANVERSE JOINTS**

Use a Transverse Joint when Barrel Length is over 80 feet. Use additional joints to limit cut section length and end section barrel length measured along centerline of culvert to 50 feet.

Minimum end section length shall be 3 feet measured along the shortest wall from the inside face of headwall to the Transverse Joint.

To avoid locating Transverse Joints under a traveled way with design fills 2 feet or less, the following shall apply:

- Barrel length up to 90 feet without a Transverse Joint.
- Cut section lengths up to 60 feet when barrel and cut section length restrictions require Transverse Joints to be located under a traveled way with design fills 2 feet or less. One Joint shall be located to minimize the length of Joint under the Traveled Way.
- The Traveled Way is the roadway width minus shoulder widths.

For cut section details, see T03-46.

**GENERAL NOTES:**

- For sections thru barrel, wings and headwalls, see Sheet 3 of 3 for bar sizes, spacing and dimensions of all reinforcement except J5 Bars. See T03-47 for J5 Bars. See T03-37.
- Drawing not to scale. Follow dimensions.
- Minimum clearance to reinforcing steel shall be 1 ½".
- Lap longitudinal bars a minimum of 23" at splices.
- Beveled headwall shall be located at upstream end.
  - (a) Same size and spacing as adjacent B Bars
  - (b) Varies, 12" max
  - (c) J4 Bar spacing
  - (d) Same size and spacing as adjacent B Bars
  - (e) A2 Bar spacing
  - (f) Same size and spacing as A1 Bars
  - (g) At bar spacing

---
GENERAL NOTES:

- For sections thru barrel, wings and headwalls, see Sheet 3 of 3. For bar sizes, spacing and dimensions of all reinforcement except J5 bars, see 703.44H. For J5 bars, see 703.47.
- Construction joint key not shown for clarity in plan and section. See Sheet 5 of 3 for details.
- Drawing not to scale. Follow dimensions.
- Minimum clearance to reinforcing steel shall be 1/2".
- Lap longitudinal bars a minimum of 23" at splices.
- Beveled headwall shall be located at upstream end.
  - (a) Same size and spacing as adjacent #2 bars
  - (b) Varies, 12" maximum
  - (c) Not specified on this sheet
  - (d) Same size and spacing as A2 bars
  - (e) A2 bar spacing
  - (f) Same size and spacing as A1 bars
  - (g) A1 bar spacing
  - (h) For design fills over 2'-0".
  - (i) For design fills 2'-0" or less
  - (j) Not required for clear spans ≤ 10'-0".
  - (k) For clear spans > 10'-0".
  - (l) For clear span ≤ 15'-0".

If required, the minimum length each side of J5 bars shall be the greater of 48 diameters or 3 clear spans. The clear span is parallel to long direction of headwall.

- H2 bars as required. Quantity of bars varies with skew.

 datedPrep: 10/01/2011
dateEffective: 11/01/2011

MoDOT REINFORCEMENT

sheetNo: 703.44H

SKEW: RIGHT ADVANCE
WINGS: STRAIGHT

Missouri Highways and Transportation Commission
105 West Capitol
Jefferson City, MO 65102
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Concrete Double Box Culvert
GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES. 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS J2 BARS

(e) J2 BAR SPACING

Laying Out Transverse Joints

Use a Transverse Joint when Barrel Length is over 80 feet. Use additional joints to limit cut section length and end section barrel length measured along centerline of culvert to 50 feet. Minimum end section length shall be 3 feet measured along the shortest wall from the inside face of headwall to the transverse joint.

To avoid locating transverse joints under a traveled way with design fill 2 feet or less, the joints shall be located to minimize the length of joint under a traveled way.

Traveled way is the roadway width plus wings shoulder widths.

For cut section details, see 703.46.

DATE PREPARED: 3/10/2011
DATE EFFECTIVE: 5/13/2011
DATE REVISED: 3/10/2011

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636)

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JEFFERSON CITY, MO 65102
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REINFORCEMENT

703.45C SHEET NO. 1 OF 3
GENERAL NOTES:
FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.17.
CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION. SEE SHEET 5 OF 3 FOR DETAILS.
DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.
MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½".
LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.
BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.  
(a) SAME SIZE AND SPACING AS ADJACENT BARS 
(b) VARIES; 12" MAXIMUM  
(c) NOT SPECIFIED ON THIS SHEET  
(d) SAME SIZE AND SPACING AS A2 BARS  
(e) A2 BAR SPACING  
(f) SAME SIZE AND SPACING AS AT BARS  
(g) AT BAR SPACING  
(h) FOR DESIGN FILLS OVER 2'-0"  
(i) FOR DESIGN FILLS 2'-0" OR LESS  
(j) NOT REQUIRED FOR CLEAR SPANS > 10'-0"  
(k) FOR CLEAR SPAN > 10'-0"  
(l) FOR CLEAR SPAN > 15'-0"  

IF REQUIRED: THE MINIMUM LENGTH EACH SIDE OF J5 BARS SHALL BE THE GREATER OF 48 BARS DIAMETERS OR 1½ CLEAR SPAN.
THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.  
(m) J5 BARS AS REQUIRED. QUANTITY OF BARS VARIES WITH SKEW.

REINFORCEMENT
CONCRETE DOUBLE BOX CULVERT
SKEW: RIGHT ADVANCE
WINGS: FLARED

MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION
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JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636

CONCRETE
DOUBLE BOX CULVERT
SKEW: RIGHT ADVANCE
WINGS: FLARED
REINFORCEMENT

DATE PREPARED: 5/13/2015
DATE EFFECTIVE: 6/1/2015

703.45C SHEET NO. 2 OF 3
### CONCRETE DOUBLE BOX Culvert

**Member Thickness, Bar Size, Spacing & Dimensions**

**SPAN (S): 7 FT**

**HEIGHT (HT): 4 FT OR 5 FT OR 6 FT**

<table>
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<th>DESIGN SIZE</th>
<th>SPAN (S)</th>
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<td>100</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>125</td>
<td>7</td>
<td>6</td>
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**GENERAL NOTES:**

If the design fill is between tabulated design fills, use the next smaller design fill. Keep the design fill between 2 feet and 4 feet. For design fills between 2 feet and 4 feet, use the member thickness, area of reinforcement and bar dimensions from the 2' - 4' tabulated design fill.

Special designs are required when the design fill is less than 2 feet or greater than 4 feet.

Dimensions are in inches unless otherwise specified.

Design fills are measured from the top of the top slab to the top of earth fill or aggregate.

Culverts meet strength and serviceability requirements for the design vertical live load fills, and nominal live loads.

**REV: 2/23/2023**

**DATE REVIEWED:** 3/22/2023

**DATE PREPARED:** 3/22/2023

**SHEET NO.:** 703.47A

**8 OF 27**
<table>
<thead>
<tr>
<th>SPAN (S)</th>
<th>7 FT</th>
<th>HEIGHT (H)</th>
<th>9 FT OR 10 FT</th>
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<tr>
<td>T5</td>
<td>B5</td>
<td>T7</td>
<td>SIZE SPA 1/4</td>
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<tr>
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<td>4</td>
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</table>

**GENERAL NOTES:**

1. If design fill is between tabulated design fills, use the next lower design fill. Except for design fill between 7 feet and 1 foot, use the member thickness, area of reinforcement, and bar dimensions from the 7'-4" tabulated design fill.

2. Special designs are required when the design fill is less than 1 foot or greater than 3 feet.

3. Dimensions are in inches unless otherwise specified.

4. Design fills are measured from the top of the top slab to the top of earth fill or roadway.

5. Culverts meet strength and serviceability requirements for the design vertical live load fill, 92 psi minus the live load.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

**CONCRETE DOUBLE BOX CULVET**

**MEMBER THICKNESS**

**BAR SIZE, SPACING & DIMENSIONS**

**SPAN (S): 7 FEET**

**HEIGHT (H): 9 THRU 10 FEET**
### ConcreTE DOUBLE BOX CULVERT

**Member Thickness**
- **Bar Size, Spacing & Dimensions**
- **Span (S): 11 Feet**
- **Height (Ht): 12 Through 14 Feet**

**General Notes:**
- If design fill is between tabulated design fills, use the next larger tabulated design fill. If design fill is less than fill between 2 feet and 4 feet, use the member thickness, area of reinforcement and bar dimensions from the 2' to 4' tabulated design fill.

**Special Design:**
- Special designs are modified when the design fill is less than 3 feet or greater than 15 feet.

**Dimensions:**
- Dimensions are in inches unless otherwise specified.

**Culverts meet strength and serviceability requirements for design vertical load load fill of 93 pounds per linear foot.**

---

**Concerto Double Box Culvert**

**Member Thickness**

<table>
<thead>
<tr>
<th>SPAN (S)</th>
<th>HEIGHT (Ht)</th>
<th>BAR DIMENSIONS</th>
<th>DIAGRAM</th>
<th>BAR DIMENSIONS</th>
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</thead>
<tbody>
<tr>
<td>12 FT</td>
<td>12 FT OR 13 FT OR 14 FT</td>
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</tr>
</tbody>
</table>

**Diagram & Table Details:**

- **Table:** Contains detailed specifications for various spans and heights.
- **Diagram:** Shows the layout and dimensions for the double box culvert.

---

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

**Jefferson City, Mo. 65102**

**1-888-MOD-MODEL 1-888-663-6635**

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**Sheet No.: 703.47A**

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**Date Prepared:** 3/22/2022
## Concreting Schedule

### Design Parameters
- **Span (S):** 13 ft
- **Height (H):** 13 ft or 14 ft

### Dimensions
- **Bar Size:**
  - A1 Bars: 2 in.
  - A3 Bars: 2 in.
  - A6 Bars: 3/4 in.
  - A8 Bars: 5/8 in.
- **Spacing:**
  - Top Slab: 15 in.
  - Bottom Slab: 20 in.
- **Thickness:**
  - A1 Bars: 1 in.
  - A3 Bars: 1 in.
  - A6 Bars: 3/4 in.
  - A8 Bars: 2 in.

### Material Requirements

#### General Notes:
- **Design Fill:** For Design Fill, use the next larger size of pipe for intermediate slabs between 2 and 4 ft. For Design Fill between 2 and 4 ft, use the larger thickness, area of reinforcement and bar dimensions from the 2.4 tabulated design fill.

### Bar Details

#### Design Fill
- **Spans:**
  - A1 Bars: 3 in.
  - A3 Bars: 3 in.
  - A6 Bars: 3 in.
  - A8 Bars: 3 in.

#### Design Fill
- **Spans:**
  - A1 Bars: 3 in.
  - A3 Bars: 3 in.
  - A6 Bars: 3 in.
  - A8 Bars: 3 in.

### Bar Dimensions
- **Top Slab:**
  - 2 in. dia.
- **Bottom Slab:**
  - 2 in. dia.

### Culvert
- **Type:** Double Box
- **Bar Size:**
  - A1 Bars: 2 in.
  - A3 Bars: 2 in.
  - A6 Bars: 2 in.
  - A8 Bars: 2 in.

### Miscellaneous
- **Date:** 2/22/2023

---

**Missouri Highways and Transportation Commission**

**Concrete Double Box Culvert**

**Member Thickness:**

**Bar Size, Spacing & Dimensions:**

**Span (S):** 13 feet

**Height (H):** 13 thru 16 feet

---

**CONCRETE DOUBLE BOX CULVERT**

**MEMBER THICKNESS BAR SIZE, SPACING & DIMENSIONS**

**SPAN (S):** 13 FEET

**HEIGHT (H):** 13 THRU 16 FEET

---

**Data Approval:**

**Date Prepared:** 2/22/2023

**Sheet No.:** 703.47A

**Page:** 1 of 27
## General Notes:

- **SPAN:** 14 FT
- **HEIGHT (HT):** 13 FT OR 14 FT

### Design Fill

<table>
<thead>
<tr>
<th>Design Thickness</th>
<th>B1 Bars</th>
<th>B2 Bars</th>
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<tbody>
<tr>
<td>Size SPA</td>
<td>Size SPA</td>
<td>Size SPA</td>
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### Top Slab Dimensions

<table>
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<tr>
<th>Design Thickness</th>
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<th>B2 Bars</th>
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</thead>
<tbody>
<tr>
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<td>Size SPA</td>
<td>Size SPA</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>15</td>
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</tbody>
</table>

### Culvert Dimensions

- **SPAN (S):** 14 FT
- **HEIGHT (HT):** 13 FT OR 14 FT

#### Culvert Bar Dimensions

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<thead>
<tr>
<th>Design Thickness</th>
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<td>Size SPA</td>
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</tr>
<tr>
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<td>14</td>
<td>15</td>
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</table>

**Concurrent Double Box Culvert**

- Member Thickness
- Bar Size, Spacing & Dimensions

---

**Missouri Highways and Transportation Commission**

**Jefferson City, MO 65102**

**1-800-ASK-MODOT (1-800-275-6668)**

---

**Sheet No.:** 703.47A 23 of 27

---

**Date Prepared:** 1/22/2023
CONCRETE DOUBLE BOX CULVERT

MEMBER THICKNESS
BAR SIZE, SPACING & DIMENSIONS
SPAN (S): 16 FT
HEIGHT (H): 14 THRU 16 FT

GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT LOWER DESIGN FILL. FOR DESIGN FILLS BELOW 2 FEET, USE DESIGN FILL OF 2 FEET AND A FOOT. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND MEMBER DIMENSIONS FROM THE 2'-4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE ADVISED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 10 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF THE TOP SLAB TO THE TOP OF THE EARTH FILL OR GROUNDWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VERTICAL LOAD. LONG FILLS, LONGER THAN THE LOCAL LOAD.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
115 WEST CAPITOL
JEFFERSON CITY, MO 65102
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DATE ISSUED: 03/21/2003
DATE PREPARED: 03/22/2003
703.47A 27 OF 27
PART ELEVATION OF EXTERIOR WALL
(PIPE DIAMETER = 24" OR MORE)
(WALL THICKNESS = 8" TO 12")

NOTE:
OUTLINE REINFORCING BARS TO CLEAR PIPE BLOCK-OUT.

INTO PIPE BLOCK-OUT AS SHOWN.

NOTE:
SOLID BARS INDICATE ADDITIONAL REINFORCING.
BAR COVER FROM FACE OF CONCRETE = 1-1/2" CLEARK.
SEE ROAD PLANS FOR LOCATION, SIZE AND TYPE OF PIPE.
PLACE 5/16" JOINT FILLER AROUND REINFORCED CONCRETE PIPES AND EMBOSSED ASHLAR AROUND CORRUGATED METAL PIPE AT PIPE INLET.
THE BLOCK-OUT MAY BE ELIMINATED AT CONTRACTORS ELECTION. BLOCK-OUT IS ELIMINATED. REINFORCEMENT SHALL BE AS SHOWN EXCEPT PLAN REINFORCEMENT MAY BE BENT TO CLEAR PIPE.
ADDITIONAL REINFORCEMENT REQUIRED FOR BLOCK-OUT IS NOT INCLUDED IN ESTIMATED QUANTITIES. NO SEPARATE PAYMENT WILL BE MADE FOR ADDITIONAL REINFORCING REQUIRED.

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105 WEST CAPITOL
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CONCRETE BOX STRUCTURE PIPE INLET

DATE EFFECTIVE: 07/01/2001
DATE PREPARED: 06/12/2002
703.60E SHEET NO. 1 OF 1
GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J3 BARS, SEE TO 3.71. FOR J3 BARS, SEE TO 3.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES. 12" MAXIMUM

(c) NOT SPECIFIED ON THIS SHEET

(d) NOT SPECIFIED ON THIS SHEET

(e) NOT SPECIFIED ON THIS SHEET

(f) NOT SPECIFIED ON THIS SHEET

(g) NOT SPECIFIED ON THIS SHEET

(h) FOR DESIGN FILLS OVER 2'-0" (j) FOR DESIGN FILLS 2'-0" OR LESS

(j) NOT REQUIRED FOR CLEAR SPANS < 10'-0"

(k) M FOR CLEAR SPAN > 10'-0"

(l) M FOR CLEAR SPAN > 15'-0"

IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF A WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR A CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.
LAYING OUT TRANSVERSE JOINTS
UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET.
USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END
SECTIONS. BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO
MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE
SHORTEST PATH FROM THE INSIDE FACE OF HEADWALL TO THE
TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY
WITH DESIGN FILLS 3 FEET OR LESS THE FOLLOWING SHALL APPLY:
BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT
CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE
TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH
DESIGN FILLS 3 FEET OR LESS THE JOINTS SHALL BE LOCATED TO
MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.
TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.
FOR CUT SECTION DETAILS, SEE 703.46.

GENERAL NOTES:
FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF
3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT
EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.
CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND
ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.
DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.
MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".
LAP LONGITUDINAL BARS A MINIMUM OF 23 AT SPLICES.
BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.
(a) SAME SIZE AND SPACING AS ADJACENT B BARS
(b) VARIES 12" MAXIMUM
(c) J4 BAR SPACING
(d) SAME SIZE AND SPACING AS A2 BARS
(e) A2 BAR SPACING.

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COMMISSION
JEFFERSON CITY, MO 65102
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REINFORCEMENT
CONCRETE
TRIPLE BOX CULVERT
SKEW: SQUARED
WINGS: FLARED
DATE PREPARED: 01/11/2011
DATE AMENDED: 01/10/2011
SHEET NO: 1 OF 3
703.81H
PLAN OF TOP SLAB
BARS AT EACH FACE

GENERAL NOTES:
1. FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1¾".

1. LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

2. BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

3. SAME SIZE AND SPACING AS ADJACENT BARS

4. VARIES. 12" MAXIMUM

5. NOT SPECIFIED ON THIS SHEET

6. SAME SIZE AND SPACING AS A2 BARS

7. A2 BAR SPACING

8. NOT SPECIFIED ON THIS SHEET

9. NOT SPECIFIED ON THIS SHEET

10. FOR DESIGN FILLS OVER A2 BAR SPACING

11. NOT REQUIRED FOR CLEAR SPANS > 10'-0"

12. FOR CLEAR SPAN > 10'-0" #8 FOR CLEAR SPAN > 13'-0"

IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF A WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR A CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

1. BARS AT EACH FACE

2. BARS AT EACH FACE

3. BARS AT EACH FACE

4. BARS AT EACH FACE

5. BARS AT EACH FACE

DATE PREPARED: 3/13/2015

DATE EFFECTIVE: 3/13/2015

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102

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2 OF 3

105 WEST CAPITOL

2101 W. LEGTOWNE BLVD.

CONCRETE
TRIPLE BOX CULVERT
SKEW: SQUARED
WINGS: FLARED

REINFORCEMENT

DATE PREPARED: 3/13/2015

DATE EFFECTIVE: 3/13/2015

703.81H

SHEET NO.
GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1/2".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

1) SAME SIZE AND SPACING AS ADJACENT B BARS
2) VARIES. 12" MAXIMUM
3) NOT SPECIFIED ON THIS SHEET
4) SAME SIZE AND SPACING AS A2 BARS
5) AT BAR SPACING
6) SAME SIZE AND SPACING AS A1 BARS
7) AT BAR SPACING
8) FOR DESIGN FILLS OVER 2'-0" CTS.
9) FOR DESIGN FILLS 2'-0" OR LESS
10) NOT REQUIRED FOR CLEAR SPANS < 10'-0"
11) FOR CLEAR SPAN > 10'-0"
12) FOR CLEAR SPAN > 13'-0"

IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF E WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR 3'-0" CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

13) H2 BARS AS REQUIRED. QUANTITY OF BARS VARY WITH SKEW.
14) 4-#8-H BARS AT EACH FACE
15) 0 BARS AT EACH FACE
16) B1 BARS AT EACH FACE
17) A2 BARS
18) VARIOUS A BARS
19) H3 BARS
20) IF REQUIRED.

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CONCRETE TRIPLE BOX CULVERT
SKEW: LEFT ADVANCE
WINGS: STRAIGHT
REINFORCEMENT

DATE EFFECTIVE: 02/01/2015
DATE PREPARED: 03/13/2015

703.82H SHEET NO. 2 OF 3
KEYED CONSTRUCTION JOINT
MUST EXTEND INTO THICKNESS

TRANVERSE JOINT THRU BARREL
PRECAST CONCRETE JOINT MATERIAL IS PREFERRED; DRY JOINT OR SAND JELL JOINT MATERIAL CAN BE USED.

GRANULAR BACKFILL LIMITS
AND MEMBER DIMENSIONS

UPSTREAM AND DOWNSTREAM WINGS REINFORCEMENT

BARREL REINFORCEMENT
FOR DESIGN FILLS 2'-0" OR LESS

BARREL REINFORCEMENT
FOR DESIGN FILLS 2'-0" OR LESS

GENERAL NOTES:

1. ALL BARS ARE REINFORCING STEEL.
2. ALL BARS ARE REINFORCING STEEL.
3. ALL BARS ARE REINFORCING STEEL.
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99. ALL BARS ARE REINFORCING STEEL.
100. ALL BARS ARE REINFORCING STEEL.

MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION
1-800-MO-DOT (1-800-663-6686)

CONCRETE TRIPLE BOX CULVERT
SKEW: LEFT ADVANCE
WINGS: STRAIGHT

SECTIONS

DATE EFFECTIVE: 04/04/2020
DATE REPRINTED: 04/04/2020

SHEET NO. 3 OF 3
GENERAL NOTES:

- FOR SECTIONS THRU BARRER, WINDS AND HEADWALLS, SEE SHEET 5 OF 7. ALL BARS, SIZES, SPACING AND DIMENSIONS EXCEPT J5 BARS. SEE INSTRUCTIONS. FOR J5 BARS, SEE HOT 3-87.
- CONSTRUCTION DETAILS FOR ELEVATION OF EXTERIOR WALL.
- DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.
- MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1.5".
- LATERAL LONGITUDINAL BARS A MINIMUM OF 23" AT SPACES.
- BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.
- VARIOUS 12" MAXIMUM
- KEYED BAR SPACING
- SAME SIZE AND SPACING AS A2 BARS
- VARIOUS BAR SPACING
- SAME SIZE AND SPACING AS A1 BARS
- AT BARRER SPACING

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
JEFFERSON CITY, MO 65102
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CONCRETE TRIPLE BOX CULVERT
SKEW: LEFT ARCHED WINGS: FLARED

REINFORCEMENT

DATE PREPARED: 8/12/2011
DATE REVISED: 11/10/2010
703-83H SHEET NO. 1 OF 3
GENERAL NOTES:

- For sections thru barrel, rings and headwalls, see Sheet 3 of 3. For bar sizes, spacing and dimensions of all reinforcement except J5 bars, see 703.87. For J5 bars, see 703.37.
- Construction joint key not shown for clarity in plan and section. See Sheet 3 of 3 for details.
- Drawing not to scale. Follow dimensions.
- Minimum clearance to reinforcing steel shall be 1½".
- Lap longitudinal bars a minimum of 23" at splices.
- Beveled headwall shall be located at upstream end.
- (a) Same size and spacing as adjacent B bars
- (b) Varies. 12" maximum
- (c) Not specified on this sheet
- (d) Same size and spacing as A1 bars
- (e) A1 bar spacing
- (f) Same size and spacing as A2 bars
- (g) A2 bar spacing
- (h) For design fills over 2'-0".
- (i) For design fills 2'-0" or less.
- (j) Not required for clear spans 5'-0"-0".
- #1 for clear span 5'-0"-0".
- #2 for clear span 5'-0"-0".
- If required, the minimum length each side of & wall shall be the greater of 48 bar diameters or a clean span. The clean span is parallel to long direction of headwall.
- (k) J5 bars as required. Quantity of bars varies with skew.

PLAN OF TOP SLAB

B bars in walls are not shown for clarity. For placement, see Sheet 1 of 3.

SECTION NEAR INTERIOR WALL

J1 bars may be bent in field or shop.
GENERAL NOTES:

1. For Sections thru Barrel, Wings and Headwalls, see Sheet 5 of 7.03.84H. For Bar Sizes, Spacing and Dimensions of all Reinforcement except J5 Bars, see 703.87. For J5 Bars, see 703.37.

2. Minimum clearance to reinforcing steel shall be 1 1/2".

3. Use additional joints to limit cut section length and end section length measured along centerline of culvert to 50 feet.

4. Minimum end section length shall be 3 feet measured along the shortest wall from the inside face of headwall to the transverse joint.

5. To avoid locating transverse joints under a traveled way with design fills 3 feet or less, the following shall apply:

   a. Barrels length up to 90 feet without a transverse joint.
   b. Barrels length up to 60 feet when barrel and cut section length restrictions require transverse joints to be located under a traveled way with design fills 3 feet or less. The joints shall be located to minimize the length of joint under the traveled way. Traveled way is the roadway width minus shoulder widths.

6. Design fills 2 feet or less. The joints shall be located to minimize the length of joint under the traveled way.

7. For details, see 703.86.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

DATE PREPARED: 12/01/2011
DATE EFFECTIVE: 1/1/2012

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-365-MODOT 1-888-275-6636

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE
WINGS: STRAIGHT

DATE EFFECTIVE: 1/1/2012
DATE PREPARED: 12/01/2011

703.84H SHEET NO. 1 OF 3
GENERAL NOTES:

FOR SECTIONS THRU BARREL, RINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION. SEE SHEET 2 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

1. SAME SIZE AND SPACING AS ADJACENT B BARS
2. VARIES. 12" MAXIMUM
3. NOT SPECIFIED ON THIS SHEET
4. SAME SIZE AND SPACING AS A2 BARS
5. A2 BAR SPACING
6. SAME SIZE AND SPACING AS A1 BARS
7. A1 BAR SPACING
8. FOR DESIGN FILLS OVER 2'-0" OR LESS
9. NOT REQUIRED FOR CLEAN SPANS 5'-0" OR LESS
10. FOR CLEAN SPANS 5'-10" OR LESS
11. FOR CLEAN SPANS 15'-0" OR LESS
12. IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF A WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR A CLEAN SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.
13. HZ BARS AS REQUIRED. QUANTITY OF BARS VARIES WITH SKEW.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

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1-888-ASK-MODOT 1-888-275-6636

REINFORCEMENT

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE, WINGS: STRAIGHT

DATE EFFECTIVE: 5/13/2015
DATE PREPARED: 3/10/2015

DATE: 12/01/2011

SHEET NO. 2 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636

REINFORCEMENT

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE, WINGS: STRAIGHT

DATE EFFECTIVE: 5/13/2015
DATE PREPARED: 3/10/2015

DATE: 12/01/2011

SHEET NO. 2 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636

REINFORCEMENT

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE, WINGS: STRAIGHT

DATE EFFECTIVE: 5/13/2015
DATE PREPARED: 3/10/2015

DATE: 12/01/2011

SHEET NO. 2 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636

REINFORCEMENT

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE, WINGS: STRAIGHT

DATE EFFECTIVE: 5/13/2015
DATE PREPARED: 3/10/2015

DATE: 12/01/2011

SHEET NO. 2 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
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REINFORCEMENT

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE, WINGS: STRAIGHT

DATE EFFECTIVE: 5/13/2015
DATE PREPARED: 3/10/2015

DATE: 12/01/2011

SHEET NO. 2 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
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REINFORCEMENT

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE, WINGS: STRAIGHT

DATE EFFECTIVE: 5/13/2015
DATE PREPARED: 3/10/2015

DATE: 12/01/2011

SHEET NO. 2 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
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REINFORCEMENT

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE, WINGS: STRAIGHT

DATE EFFECTIVE: 5/13/2015
DATE PREPARED: 3/10/2015

DATE: 12/01/2011

SHEET NO. 2 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636

REINFORCEMENT

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE, WINGS: STRAIGHT

DATE EFFECTIVE: 5/13/2015
DATE PREPARED: 3/10/2015

DATE: 12/01/2011

SHEET NO. 2 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
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REINFORCEMENT

CONCRETE TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE, WINGS: STRAIGHT

DATE EFFECTIVE: 5/13/2015
DATE PREPARED: 3/10/2015

DATE: 12/01/2011

SHEET NO. 2 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

JEFFERSON CITY, MO 65102
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REINFORCEMENT
LAYING OUT TRANVERSE JOINTS
UNLESS SHOWN ON BRIDGE PLANS

USE A TRANVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET.
USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END
SECTORS. BARREL LENGTH MEASURED ALONG CENTERLINE OF CURVATURE TO
MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE
SHORTEST PATH FROM THE INSIDE FACE OF HEADWALL TO THE
TRANVERSE JOINT.

TO AVOID LOCATING TRANVERSE JOINTS UNDER A TRAVELED WAY WITH
DESIGN LENGTH 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO
MINIMIZE THE LENGTH UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR DETAIL SECTIONS, SEE 703.66.

GENERAL NOTES:
FOR SECTIONS 703.84 - 703.87, FOR BARRELS, PLACING AND DIMENSIONS OF ALL REINFORCEMENT
EXCEPT 25 BARS, SEE 703.87, FOR 25 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND
ELEVATION. SEE SHEET 5 OF 5 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1/2".

LAPEL AND GIRDLE JOINTS TO BE LOCATED UNDER A TRAVELED WAY.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT BARS
(b) VARY 12" MAXIMUM
(c) 24 BAR SPACING
(d) SAME SIZE AND SPACING AS 24 BARS
(e) 32 BAR SPACING

CONCRETE
TRIPLE BOX CULVERT
SKEW: RIGHT ADVANCE
WINGS: FLARED
REINFORCEMENT

MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION
106 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-650-MODOT 1-888-273-6638

DATE PREPARED: 09/10/2008
DATE APPROVED: 09/10/2008
703.85C SHEET # 1 OF 3
GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3.
FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION; SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".
LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.
BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS
(b) VARIES. 12" MAXIMUM
(c) NOT SPECIFIED ON THIS SHEET
(d) SAME SIZE AND SPACING AS AZ BARS
(e) A2 BAR SPACING
(f) SAME SIZE AND SPACING AS A1 BARS
(g) A1 BAR SPACING
(h) FOR DESIGN FILLS OVER 2'-0"
(i) FOR DESIGN FILLS 2'-0" OR LESS
(j) NOT REQUIRED FOR CLEAR SPANS 5'-0" - 0"
(k) FOR CLEAR SPAN 3' - 0"
(l) FOR CLEAR SPAN 3' - 0"

IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF 4" WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR A CLEAN SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

H2 BARS AS REQUIRED. QUANTITY OF BARS VARIES WITH SKEW.

Missouri Highways and Transportation Commission

105 West Capitol
Jefferson City, MO 65102
1-888-ASK-MODOT 11-888-275-6636

Date Effective: 12/01/2015
Date Prepared: 5/13/2005

703.85C SHEET NO. 2 OF 3

Concrete Triple Box Culvert
Skew: Right Advance
Wings: Flared

Reinforcement
CONCRETE
TRIPLE BOX CULVERT

MEMBER THICKNESS
BAR SIZE, SPACING & DIMENSIONS
SPAN (S): 4 FEET
HEIGHT (H): 2 FEET OR 3 FEET

GENERAL NOTES:
If design fill is between tabulated design fills, use the next higher design fill. Except for design fill between 2 feet and 4 feet, use the member thickness, area of reinforcement and bar dimensions from the 2.5" tabulated design fill.

Special designs are approved when the design fill is less than 3 feet or greater than 5 feet.

Dimensions are in inches unless otherwise specified.

Design fills are measured from the top of top slab to the top of earth fill or roadway.

Culverts meet strength and serviceability requirements for the design vertical level. Long fills, bends or slopes may require increased strength.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

BAR DIMENSIONS DIAGRAM
SYMMETRICAL ABOUT 4" CULVERT.
GENERAL NOTES:

1. DESIGN FILL IS BETWEEN TABULATED DESIGN FILL. USE THE NEXT LARGER DESIGN FILL. FOR DESIGN FILLS BETWEEN 2 FEET AND 6 INCHES, USE THE MEMBER THICKNESS AS AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2" TYPICAL DESIGN FILL.

2. SPECIAL DESIGNS ARE SHOWN WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 3 FEET.

3. Dimensions ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

4. DESIGN FILLS ARE MEASURED FROM THE TOP OF THE TOP SLAB TO THE TOP OF THE EARTH FILL OR ROADWAY.

5. CURVATURE MEET STRENGTH AND SERVICABILITY REQUIREMENTS FOR THE DESIGN VERTICAL LEVEL. LOAD HL-93 MEANS THE LEVEL LOAD.

CONCRETE TRIPLE BOX CULVERT

MEMBER THICKNESS
BAR SIZE, SPACING & DIMENSIONS
SPAN (S): 4 FEET
HEIGHT (HT): 6 FEET TO 7 FEET

DATE APPROVED: 2/21/2023
DATE PREPARED: 3/22/2023
703.87A 3 OF 27

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

115 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)
### Table: Design Fill

<table>
<thead>
<tr>
<th>Design Fill</th>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>B4</th>
<th>B5</th>
<th>B6</th>
<th>B7</th>
<th>B8</th>
<th>B9</th>
<th>B10</th>
<th>B11</th>
<th>B12</th>
<th>B13</th>
<th>B14</th>
<th>B15</th>
<th>B16</th>
<th>B17</th>
<th>B18</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAN (S) = 5 FT</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<td>12</td>
</tr>
<tr>
<td>SPAN (S) = 7 PT OR 8 FT</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<td>12</td>
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<td>12</td>
</tr>
</tbody>
</table>

### Diagram: Bar Dimensions Diagram

#### General Notes:

- If Design Fill is between tabulated Design Fill, use the next smaller tabulated Design Fill. Except for Design Fill between 2 feet and 1 foot, use the member thickness, area of reinforcement, and bar dimensions from the 2" - 4" tabulated Design Fill.

- Special designs are modified when the Design Fill is less than 3 feet or greater than 20 feet.

- Dimensions are in inches unless otherwise specified.

- Design Fill is measured from the top of the top slab to the top of the earth fill or roadway.

- Culverts meet strength and serviceability requirements for the design.
## General Notes:

1. If design fill is between tabulated design fill, use the next larger tabulated fill. For design fill greater than 2 feet and a half feet, use the member thickness, area of reinforcement, and bar dimensions from the 3'-4" tabulated design fill.
2. Special designs are required when the design fill is less than 2 feet or greater than 12 feet.
3. Dimensions are in inches unless otherwise specified.
4. Design fills are measured from the top of the top slab to the top of the ground.

## Culverts Meet Strength and Serviceability Requirements for the Design Vertical Load, Longitudinal Load, and the Level Load.

---

**Concrete Triple Box Culvert**

**Member Thickness**

**Bar Size, Spacing & Dimensions**

**Span (s): 6 Feet**

**Height (ht): 8 Through 9 Feet**

---

**Data Prepared:** 3/22/2023  
**Plan No.:** 703.87A  
**Sheet No.:** 7 of 27

---

**Design Fill**

| Span (S) | Height (Ht) | Design Fill | A1 Bars | A2 Bars | A3 Bars | A4 Bars | B1 Bars | B2 Bars | B3 Bars | B4 Bars | C1 Bars | C2 Bars | C3 Bars | C4 Bars | C5 Bars | C6 Bars | C7 Bars | C8 Bars | C9 Bars |
|----------|-------------|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 6 ft     | 8 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft| 6 ft to 9 ft|

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**Diagrams and Tables:**

- **Bar Dimensions Diagram:** Symmetrical about the culvert.
- **Table:** Details of design fill and bar sizes for various spans and heights.

---

**Missouri Highways and Transportation Commission**

115 West Capitol  
Jefferson City, MO 65102  
1-888-454-MODOT (1-888-463-6668)
### General Notes:
- The design fill is between tabulated design fills. Use the next smaller fill for fills between 7 feet and 8 feet.
- For design fills between 2 feet and 4 feet, see the member thickness, area of reinforcement, and bar dimensions from the "2' - 4' tabulated design fill.
- Design fills are rounded when the design fill is less than 1 foot or greater than 10 feet.
- D-mensurations are in inches unless otherwise specified.
- Design fills are measured from the top of top slab to the top of earth fill or roadway.
- Culverts meet strength and serviceability requirements for the design vertical live load, live load, and the live load.

### Missouri Highways and Transportation Commission

**Concrete Triple Box Culvert**

**Member Thickness, Bar Size, Spacing & Dimensions**

<table>
<thead>
<tr>
<th>SPAN (S)</th>
<th>HEIGHT (H)</th>
<th>4 FT OR 5 FT OR 6 FT</th>
<th>8 FT</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DESIGN FILL</th>
<th>MEMBER THICKNESS</th>
<th>A1 BARS</th>
<th>A2 BARS</th>
<th>A3 BARS</th>
<th>A4 BARS</th>
<th>B1 BARS</th>
<th>B2 BARS</th>
<th>WALL BARS</th>
</tr>
</thead>
</table>

### Bar Dimensions Diagram

Symmetrical about each culvert.
<table>
<thead>
<tr>
<th>SPAN (S)</th>
<th>HEIGHT (HT)</th>
<th>BAR SIZE</th>
<th>SPACING</th>
<th>BAR DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 FT</td>
<td>10 FT OR 11 FT</td>
<td>3/8 in.</td>
<td>4 in.</td>
<td>3/8 in.</td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**

1. **Design Fill is between tabulated design fills, use the next greater tabulated design fill if desired.**

2. **The culvert crossover design filling is determined by the top of the top slab to the top of earth fill or highway.

3. **Design fills are reduced from the top of top slab to the top of earth fill or highway.**

4. **Culverts meet strength and serviceability requirements for the design vehicle live load H-20 minus the lane load.**

---

**Missouri Highways and Transportation Commission**

1155 West Capitol
Jefferson City, MO 65102
1-888-454-MODOT (6636)
1-888-275-6901

**Concrete Triple Box Culvert**

**Member Thickness**

**Bar Size, Spacing & Dimensions**

**Span (S): 8 Feet**

**Height (HT): 10 thru 11 Feet**

**Date Approved:** 2/13/2023

**Date Prepared:** 3/22/2023

**Sheet No.:** 703.87A

**Page No.:** 11 of 27
<table>
<thead>
<tr>
<th>SPAN (S)</th>
<th>9 FT</th>
<th>HEIGHT (HT)</th>
<th>11 FT OR 12 FT</th>
</tr>
</thead>
<tbody>
<tr>
<td>T5</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>B5</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>T1</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>D1</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>C1</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>A2</td>
<td>16</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>B2</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>T2</td>
<td>22</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>D2</td>
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<td>26</td>
<td>27</td>
</tr>
<tr>
<td>C2</td>
<td>28</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>A1</td>
<td>31</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>B1</td>
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<td>35</td>
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</tr>
<tr>
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<td>37</td>
<td>38</td>
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</tr>
<tr>
<td>D1</td>
<td>40</td>
<td>41</td>
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<tr>
<td>C1</td>
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<tr>
<td>A2</td>
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<td>47</td>
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<tr>
<td>B2</td>
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<td>51</td>
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<tr>
<td>T2</td>
<td>52</td>
<td>53</td>
<td>54</td>
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<tr>
<td>D2</td>
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<tr>
<td>C2</td>
<td>58</td>
<td>59</td>
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</tr>
<tr>
<td>A1</td>
<td>61</td>
<td>62</td>
<td>63</td>
</tr>
<tr>
<td>B1</td>
<td>64</td>
<td>65</td>
<td>66</td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**

- If Design Fill is between tabulated Design Fill, use the next higher value. Design Fill is required for Design Fill between 0 feet and 1 foot. For Design Fills between 1 foot and 2 feet, use the Member Thickness, Area of Reinforcement and Bar Dimensions from the 2' - 4' Tabulated Design Fill.
- Specific Designs are shown when the Design Fill is less than 1 foot or greater than 12 feet.
- Dimensions are in inches unless otherwise specified.
- Design Fills are measured from the top of the top slab to the top of earth fill or roadway.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

**CONCRETE TRIPLE BOX CULVERT**

**BAR SIZE, SPACING & DIMENSIONS**

**SPAN (S): 9 FEET**

**HEIGHT (HT): 11 THRU 12 FEET**

**DATE APPROVED: 7/11/2022**

**DATE PREPARED: 7/22/2022**

**SHEET NO: 703.87A**

**PAGE: 13 OF 27**
GENERAL NOTES:

1. DESIGN FILL IS BETWEEN TABULATED DESIGN FILL, USE THE NEXT SMALLER DESIGN FILL. KEEP THE INSIDE FILL BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'-4' TABULATED DESIGN FILL.

2. SPECIAL DESIGNS ARE MODIFIED WHEN THE DESIGN FILL IS LESS THAN 3 FEET ONCE GREATER THAN 5 FEET.

3. DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

4. DESIGN FILLS ARE MEASURED FROM THE TOP OF THE TOP SLAB TO THE TOP OF THE CULVERT.

5. CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VERTICAL LOAD, LOAD PLAN AND THE LOADS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
115 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

CONCRETE TRIPLE BOX CULVERT
MEMBER THICKNESS
BAR SIZE, SPACING & DIMENSIONS
SPAN (S): 10 FEET
HEIGHT (HT): 11 FT OR 12 FT OR 13 FT

DATE APPROVED: 3/21/2022
DATE PREPARED: 3/22/2022
703.87A
15 OF 27

BAR DIMENSIONS DIAGRAM
SYMETRICAL ABOUT CULVERT.
### CONCRETE TRIPLE BOX CULVERT

**Member Thickness**

<table>
<thead>
<tr>
<th>Span (S)</th>
<th>15 FT</th>
<th>Height (Ht)</th>
<th>8 FT OR 9 FT OR 10 FT</th>
<th>11 FT OR 12 FT OR 13 FT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design Fill</strong></td>
<td><strong>Member Thickness</strong></td>
<td><strong>A1 Bars</strong></td>
<td><strong>A2 Bars</strong></td>
<td><strong>A3 Bars</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 Bars</td>
<td>13 Bars</td>
<td>14 Bars</td>
</tr>
<tr>
<td><strong>Design Fill</strong></td>
<td><strong>Member Thickness</strong></td>
<td><strong>A1 Bars</strong></td>
<td><strong>A2 Bars</strong></td>
<td><strong>A3 Bars</strong></td>
</tr>
<tr>
<td>1 FT</td>
<td>11 FT</td>
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<td>5</td>
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<td>4 FT</td>
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<td>5 FT</td>
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<tr>
<td>15 FT</td>
<td>25 FT</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

**General Notes:**
- The design fill is between tabulated design fills. Use the next greater design fill. Keep the culvert fill between 9 feet and 1 foot. For design fills between 9 feet and 1 foot, use member thickness, area of reinforcement, and bar dimensions from the 1st tabulated design fill.
- Special designs are reviewed when the design fill is less than 9 feet or greater than 18 feet.
- Dimensions are in inches unless otherwise specified.
- Culverts meet strength and serviceability requirements for the design. "V"-type culverts for the culvert."
### CONCRETE TRIPLE BOX CULVERT

**Member Thickness**
- **Bar Size, Spacing & Dimensions**

**SPAN (S): 16 FEET**
- **HEIGHT (H): 8 FT OR 9 FT OR 10 FT**

#### Design Fill

| Design Fill | A1 Bars | A2 Bars | A3 Bars | A4 Bars | A5 Bars | A6 Bars | A7 Bars | A8 Bars | B1 Bars | B2 Bars | B3 Bars | B4 Bars | B5 Bars | B6 Bars | B7 Bars | B8 Bars | C1 Bars | C2 Bars | C3 Bars | C4 Bars | C5 Bars | C6 Bars | C7 Bars | C8 Bars | C9 Bars | C10 Bars | C11 Bars | C12 Bars |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| T5 | B5 | T6 | B6 | T7 | B7 | T8 | B8 | T9 | B9 | T10 | B10 | T11 | B11 | T12 | B12 | T13 | B13 | T14 | B14 | T15 | B15 |

#### General Notes:
- Design fill is between tabulated design fill. Use the next greater fill if the design fill between 2 feet and 4 feet. For design fill below 2 feet, use the member thickness, area of reinforcement, and bar dimensions from the 2"-4" tabulated design fill.
- Special designs are provided when the design fill is less than 3 feet or greater than 10 feet.
- Design fills are measured from the top of top slab to the top of earth fill or overburden.
- Culverts meet strength and serviceability requirements for the design vehicle load. Loads are the same as the culvert loads.

**Bar Dimensions Diagram**

- Symmetrical about the culvert.

---

**Missouri Highways and Transportation Commission**

**Data Effective: 2/11/2023**
**Data Prepared: 3/22/2023**

**Sheet No.: 703.87A**
**26 of 27**
### Table: Design Fill

| Design Fill | T5 | B5 | T1 | S1 Bar | S2 Bar | T1 Bar | C1 | C2 | S3 Bar | S4 Bar | C4 Bar | C5 Bar | B6 | B2 Bar | B3 Bar | B4 Bar | B1 Bar | C3 Bar | C6 Bar | C7 Bar | C8 Bar | C9 Bar | B7 Bar | B5 Bar | B4 Bar | B3 Bar | B2 Bar | B1 Bar | B6 Bar | B5 Bar | B4 Bar | B3 Bar | B2 Bar | B1 Bar | B6 Bar | B5 Bar | B4 Bar | B3 Bar | B2 Bar | B1 Bar |
|-------------|----|----|----|--------|--------|--------|----|----|--------|--------|--------|--------|----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.00-2.00  | 3  | 5  | 7   | 7     | 7      | 7      | 7  | 7  | 7      | 7      | 7      | 7      | 7  | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      |
| 2.00-4.00  | 3  | 5  | 7   | 7     | 7      | 7      | 7  | 7  | 7      | 7      | 7      | 7      | 7  | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      |
| 4.00-6.00  | 3  | 5  | 7   | 7     | 7      | 7      | 7  | 7  | 7      | 7      | 7      | 7      | 7  | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      |
| 6.00-8.00  | 3  | 5  | 7   | 7     | 7      | 7      | 7  | 7  | 7      | 7      | 7      | 7      | 7  | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      |
| 8.00-10.0  | 3  | 5  | 7   | 7     | 7      | 7      | 7  | 7  | 7      | 7      | 7      | 7      | 7  | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      |
| 10.00-12.0 | 3  | 5  | 7   | 7     | 7      | 7      | 7  | 7  | 7      | 7      | 7      | 7      | 7  | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      |
| 12.00-14.0 | 3  | 5  | 7   | 7     | 7      | 7      | 7  | 7  | 7      | 7      | 7      | 7      | 7  | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      |
| 14.00-16.0 | 3  | 5  | 7   | 7     | 7      | 7      | 7  | 7  | 7      | 7      | 7      | 7      | 7  | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      |

### General Notes:

- If Design Fill is between tabulated Design Fill, use the next lower Design Fill. For Design Fill between 2 feet and 4 feet, use the member thickness, area of reinforcement, and bar dimensions from the 2'-4' tabulated Design Fill.
- Special designs are modified when Design Fill is less than 2 feet or greater than 20 feet.
- Dimensions are in inches unless otherwise specified.
- Design Fill is measured from the top of top slab to the top of earth fill or roadway.

**Culverts meet strength and serviceability requirements for the design vential level load fill, 93% minus the live load.**

---

**Concrete Triple Box Culvert**

**Member Thickness:**

- **Bar Size, Spacing & Dimensions:**
  - **Span (S):** 16 Feet
  - **Height (H):** 14 Feet to 16 Feet

---

**Diagram:**

- **Bar Dimensions Diagram:** Symmetrical about the culvert.

---

**Data:**

- **Data Effective:** 2/12/2023
- **Data Prepared:** 3/22/2023

**Sheet No.:** 27 of 27

**Commission:**

**Missouri Highways and Transportation Commission**
PIPE INSTALLATION AND BEDDING

TYPICAL TRENCH DETAIL

NOTE:

A) MINIMUM STRUCTURAL BACKFILL OVER TOP OF PIPE SHALL BE ONE-EIGHTH DIAMETER OR SPAN OF PIPE OR ONE FOOT WHICHEVER IS GREATER.

B) BEDDING BLANKET OF LOOSE FILL SHALL BE ROUGHLY SHAPED TO FIT BOTTOM OF PIPE. MINIMUM THICKNESS BEFORE PLACING PIPE SHALL BE AS FOLLOWS:

<table>
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<tr>
<th>DEPTH OF CORRUGATION</th>
<th>MIN. BEDDING</th>
<th>INCHES</th>
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C) TRENCH INSTALLATIONS - 2 FEET MINIMUM EACH SIDE OF CULVERT. THIS RECOMMENDED LIMIT SHOULD BE MODIFIED AS NECESSARY TO ACCOUNT FOR VARIABLES SUCH AS POOR IN-SITU SOILS. EMBANKMENT INSTALLATIONS - ONE DIAMETER OR SPAN EACH SIDE OF CULVERT.

MULTIPLE STRUCTURE SPACING

PIPE

<table>
<thead>
<tr>
<th>DIAMETER</th>
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<td>1 PIPE DIA</td>
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<td>72&quot; AND OVER</td>
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PIPE-ARCHES

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<tr>
<td>UP TO 36&quot;</td>
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<td>108&quot; TO 189&quot;</td>
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TYPICAL CAMBERED FLOW LINE

NOTE:

ON YIELDING SOIL, PIPE CULVERTS SHALL BE PLACED ON A CAMBERED FLOW LINE. THE AMOUNT OF CAMBER WILL VARY WITH SOIL CONDITIONS AND WILL BE SPECIFIED ON THE DESIGN PLANS.
# Corrugated Metallic-Coated Steel Circular Pipe Lock Seam

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<th>Specified Diameter of Pipe</th>
<th>Maximum Allowable Overfill Heights (1)</th>
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(1) Maximum overfill required from the top of pipe to surface.

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# Corrugated Metallic-Coated Steel Circular Pipe Riveted Seam

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(1) Maximum overfill required from the top of pipe to surface.

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**Notes:**
- A = 2-1/2" x 1/2" Corrugations
- B = 3" x 1" Corrugations
- C = 3" x 1/2" Corrugations
- D = 5/4" x 5/4" x 7-1/2" Spiral Rib

---

**Missouri Highways and Transportation Commission**

**Corrugated Metal Pipe Installation Methods**

---

**Sheet No.:** 2 of 5

**Date Effective:** 04/01/2011

**Date Prepared:** 03/23/2012

**725.00C**
## Corrugated H32 Aluminum Circular Pipe Lock Seam

### Maximum Allowable Overfill Heights (1)

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<tr>
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<tr>
<td>Specified Diameter of Pipe</td>
<td>Minimum Overfill (ft)</td>
<td>Specified Thickness of Water Sheet (in.)</td>
<td>Maximum Allowable Overfill Heights (1)</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------</td>
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<td>IN. FT.</td>
<td>A B C D</td>
<td>E F G</td>
<td>H I J</td>
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<td>0.06</td>
<td>0.075</td>
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<tr>
<td>H34 Aluminum Circular Pipe Lock Seam</td>
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</tr>
<tr>
<td>12</td>
<td>1 1 119.15 135.25</td>
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<td>117 278.3 320.5</td>
<td>187 358.4 428.6</td>
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<td>15</td>
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<td>88 159.1 187.2</td>
<td>93 232.3 256.5</td>
<td>150 286.2 341.4</td>
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<td>36</td>
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<td>254 66 76.1</td>
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<tr>
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<td></td>
<td>84 1 3</td>
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<td>108 2 4</td>
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<td>114 2 4</td>
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<td>120 2 4</td>
<td>41</td>
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<td>39 87 122</td>
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<tr>
<td></td>
<td>126 2 4</td>
<td>41</td>
<td>49</td>
<td>39 87 122</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specified Diameter of Pipe</th>
<th>Minimum Overfill (ft)</th>
<th>Specified Thickness of Water Sheet (in.)</th>
<th>Maximum Allowable Overfill Heights (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.06</td>
<td>0.075</td>
<td>0.125</td>
</tr>
<tr>
<td>H34 Aluminum Circular Pipe Riveted Seam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Maximum Overfill Required from the Top of Pipe to Surface.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL JEFFERSON CITY, MO 65102
1-888-658-MODOT (1-888-658-6636)
CORRUGATED METAL PIPE INSTALLATION METHODS
SHEET DATE: 4/23/2022
SHEET: 725.00C
WIDTH: 4 OF 5

FOR TRENCH INSTALLATION ONLY

A = 2-1/2" X 1/2" CORRUGATIONS
B = 3" X 1" CORRUGATIONS
C = 3-1/4" X 3-3/8" SPIRAL RIB
D = 3-1/4" X 3-3/8" X 1/2" SPIRAL RIB
### Minimum Cover for Construction Loads (Round and Pipe-Arch)

<table>
<thead>
<tr>
<th>Diameter or Pipe Span</th>
<th>Minimum Cover (ft.) for Indicated Axle Loads (1,2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18K lbs.</td>
<td>50K lbs.</td>
</tr>
<tr>
<td>30K lbs.</td>
<td>75K lbs.</td>
</tr>
<tr>
<td>50K lbs.</td>
<td>110K lbs.</td>
</tr>
<tr>
<td>75K lbs.</td>
<td>150K lbs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>18-42</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>3.0</th>
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<tbody>
<tr>
<td>48-72</td>
<td>3.0</td>
<td>3.0</td>
<td>3.5</td>
<td>4.0</td>
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</tr>
<tr>
<td>78-120</td>
<td>3.0</td>
<td>3.5</td>
<td>4.0</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>126-144</td>
<td>3.5</td>
<td>4.0</td>
<td>4.5</td>
<td>4.5</td>
<td></td>
</tr>
</tbody>
</table>

The contractor shall provide minimum cover plus any additional cover required to avoid damage to the pipe. In unpaved situations, the surface must be maintained to a level and non-rutted condition.

---

### Pipe-Arch Requirements 2-2/3" x 1/2" Corrugations

<table>
<thead>
<tr>
<th>Type</th>
<th>Span (3)</th>
<th>Rise (3)</th>
<th>Galvanized Sheet Thickness (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 in.</td>
<td>1 in.</td>
<td>0.064</td>
</tr>
<tr>
<td>B1</td>
<td>17</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>B2</td>
<td>21</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>B3</td>
<td>24</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>B4</td>
<td>28</td>
<td>20</td>
<td>16</td>
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<tr>
<td>B5</td>
<td>35</td>
<td>24</td>
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<td>B6</td>
<td>42</td>
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<td>B7</td>
<td>49</td>
<td>33</td>
<td>10</td>
</tr>
<tr>
<td>B8</td>
<td>57</td>
<td>38</td>
<td>10</td>
</tr>
</tbody>
</table>

**Notes:**

1. Minimum cover measured from top of pipe to bottom of flexible pavement or top of rigid pavement.
2. A tolerance of plus or minus one inch or 2 percent of equivalent circular diameter, whichever is greater, will be permissible in span and rise.
3. Tolerances in parentheses. No tolerance in opposite direction.
FABRICATE CURTAIN WALL WITH CORRUGATIONS VERTICAL

METAL CURTAIN WALL

TABLE FOR METAL CURTAIN WALL

<table>
<thead>
<tr>
<th>FOR ROUND OR ELLIPTICAL PIPE</th>
<th>DIA IN</th>
<th>GALV. SHL. THICK IN.</th>
<th>N</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>0.064</td>
<td>12</td>
<td>35</td>
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<td>21</td>
<td>0.064</td>
<td>12</td>
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<td></td>
</tr>
<tr>
<td>24</td>
<td>0.064</td>
<td>12</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>0.079</td>
<td>84</td>
<td>49</td>
<td></td>
</tr>
<tr>
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<td>0.079</td>
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<td></td>
</tr>
<tr>
<td>48</td>
<td>0.079</td>
<td>96</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>0.079</td>
<td>96</td>
<td>68-1/2</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>0.109</td>
<td>120</td>
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</tr>
<tr>
<td>66</td>
<td>0.109</td>
<td>132</td>
<td>68-1/2</td>
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</tr>
<tr>
<td>72</td>
<td>0.109</td>
<td>132</td>
<td>68-1/2</td>
<td></td>
</tr>
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<td>78</td>
<td>0.138</td>
<td>132</td>
<td>68-1/2</td>
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</tr>
<tr>
<td>84</td>
<td>0.138</td>
<td>144</td>
<td>68-1/2</td>
<td></td>
</tr>
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</table>

FOR PIPE ARCH

<table>
<thead>
<tr>
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<th>N</th>
<th>H</th>
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</thead>
<tbody>
<tr>
<td>8-2</td>
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<td>72</td>
<td>30</td>
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<tr>
<td>8-3</td>
<td>0.064</td>
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<td>30</td>
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<tr>
<td>8-4</td>
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<td>84</td>
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<tr>
<td>8-5</td>
<td>0.079</td>
<td>84</td>
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</tr>
<tr>
<td>8-6</td>
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<td>35</td>
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<tr>
<td>8-7</td>
<td>0.109</td>
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<td>35</td>
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<tr>
<td>8-8</td>
<td>0.109</td>
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<td>35</td>
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<td>8-9</td>
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<td>8-11</td>
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<td>50</td>
</tr>
<tr>
<td>8-12</td>
<td>0.168</td>
<td>131</td>
<td>54</td>
</tr>
</tbody>
</table>

GENERAL NOTES:

BAND SHALL BE SAME THICKNESS AS CURTAIN WALL MATERIAL

METAL CURTAIN WALL AND METAL INLETS

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

DATE EFFECTIVE: 07/01/2004
DATE PREPARED: 08/25/2009

725.31C SHEET NO. 1 OF 1
**RIGID CULVERT INSTALLATION METHODS**

**REINFORCED CONCRETE PIPE CULVERTS**

**LEGEND**

- **Dp** = NORMAL INSIDE DIAMETER OF PIPE
- **Dp** = OUTSIDE DIAMETER OF PIPE
- **H** = FILL COVER HEIGHT OVER PIPE (FEET)
- **MIN.** = MINIMUM
- **=** = UNDISTURBED SOIL

**GENERAL NOTES:**

MULTIPLE PIPE CULVERTS SHALL BE INSTALLED WITH A MINIMUM CLEARANCE BETWEEN PIPES OF 3 Do OR 12", WHICHEVER IS GREATER, BUT NOT TO EXCEED 36".

CLASS I AND CLASS II REINFORCED CONCRETE PIPE SHALL ONLY BE USED FOR SEWERS IN TRENCHES OUTSIDE ROADBED AND STREET LIMITS.

**NOTE:** ON YIELDING SOIL, PIPE CULVERTS SHALL BE PLACED ON A CAMBERED FLOW LINE. THE AMOUNT OF CAMBER WILL VARY WITH SOIL CONDITION AND SHALL BE SPECIFIED ON THE DESIGN PLANS.

**TYPICAL CAMBERED FLOW LINE**

**CONSTRUCTION SEQUENCE**

1. PLACE BEDDING MATERIAL TO GRADE. DO NOT COMPACT.
2. INSTALL PIPE TO GRADE.
3. COMPACT BEDDING OUTSIDE THE MIDDLE THIRD OF THE PIPE.
4. PLACE AND COMPACT THE HAUNCH AREA UP TO THE SPRINGLINE.
5. COMPLETE BACKFILL ACCORDING TO SPECIFICATIONS.

**INSTALLATION IN SUITABLE MATERIAL**

**EXCAVATION LINE AS REQUIRED**

**INSTALLATION IN UNSUITABLE MATERIAL**

**MIDDLE BEDDING LOOSELY PLACED UNCOMPACTED.**

**INSTALLATION ON OR ABOVE EXISTING GROUND**

**INSTALLATION PARTIALLY BELOW EXISTING GROUND**

**INSTALLATION IN TRENCH**

**OUTER BEDDING**

**BEDDING AND COMPACTION REQUIREMENTS**

<table>
<thead>
<tr>
<th>INSTALLATION TYPE</th>
<th>BEDDING THICKNESS</th>
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<tbody>
<tr>
<td>Category 1</td>
<td>Category 2</td>
</tr>
<tr>
<td>SOIL (A)</td>
<td>SOIL (B)</td>
</tr>
<tr>
<td>Dp/24 MINIMUM, NOT LESS THAN 3&quot;, IF ROCK FOUNDATION, USE Dp/12 MINIMUM, NOT LESS THAN 6&quot;, OVERFILL</td>
<td>95</td>
</tr>
<tr>
<td>Dp/24 MINIMUM, NOT LESS THAN 3&quot;, IF ROCK FOUNDATION, USE Dp/12 MINIMUM, NOT LESS THAN 6&quot;, OVERFILL</td>
<td>90</td>
</tr>
<tr>
<td>Dp/24 MINIMUM, NOT LESS THAN 3&quot;, IF ROCK FOUNDATION, USE Dp/12 MINIMUM, NOT LESS THAN 6&quot;, OVERFILL</td>
<td>85</td>
</tr>
<tr>
<td>Dp/24 MINIMUM, NOT LESS THAN 3&quot;, IF ROCK FOUNDATION, USE Dp/12 MINIMUM, NOT LESS THAN 6&quot;, OVERFILL</td>
<td>NO</td>
</tr>
</tbody>
</table>

**FILL TYPES**

- **(A)** GRAVELLY SAND
- **(B)** SANDY-SILT
- **(C)** SILTY CLAY

**DATE EFFECTIVE:**

04/01/2015

**DATE PREPARED:**

02/28/2019

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

**SHEET NO.**

726. 30J

1 OF 2
**SEEN TABLE II (SEC. 726) FOR WIDTH OF TRENCH**

**EXTRA STRENGTH**

**STANDARD STRENGTH**

---

**HEIGHT OF FILL OVER V.C. PIPE CULVERTS**

<table>
<thead>
<tr>
<th>Nominal Pipe Diameter (Inches)</th>
<th>Standard Strength</th>
<th>Extra Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum Trench Width at One Foot Above Top of Pipe (Feet)</td>
<td>Maximum Fill Height (Feet)</td>
</tr>
<tr>
<td>6</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>8</td>
<td>2.0</td>
<td>1.0</td>
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<td>10</td>
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<td>1.0</td>
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<tr>
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<td>18</td>
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<td>1.0</td>
</tr>
<tr>
<td>21</td>
<td>4.0</td>
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</tr>
<tr>
<td>24</td>
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<td>30</td>
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<td>1.0</td>
</tr>
<tr>
<td>36</td>
<td>5.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

See Table II (Sec. 726) for width of trench.

**Legend**

- Compacted Roadway Embankment
- Suitable Backfill
- Loose Dry Material
- Compacted Sand

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 West Capitol
Jefferson City, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

**RIGID CULVERT INSTALLATION METHODS**

**VITRIFIED CLAY PIPE CULVERTS**

**DATE EFFECTIVE:** 04/01/2015

**DATE PREPARED:** 02/26/2015

**SHEET NO.:** 2 OF 2
OUTSIDE DIAMETER OF PIPE.

3. INSTALL PIPE TO GRADE.

1. PLACE BEDDING MATERIAL TO GRADE.

OJ

W

D...

Z

W

W

W

ADDITIONAL BACKFILL

Backfill Installation

MINIMUM COVER FOR CONSTRUCTION LOADS

MINIMUM COVER (IN) FOR INDICATED AXLE LOADS (THOUSANDS OF POUNDS)

SPD = STANDARD PROCTOR DENSITY.
FILL HEIGHT MEASURED FROM THE TOP OF PIPE TO SURFACE.
LIMITS ACCOUNT FOR SHORT-TERM TEMPORARY WATER TABLE DEPTHS OF FIVE FEET ABOVE SPRINGLINE.
TABLES ARE NOT APPLICABLE FOR LONG-TERM PERMANENT WATER TABLE DEPTHS ABOVE SPRINGLINE.
WHEN PIPES ARE USED AS GROUP A, FILL HEIGHTS ARE LIMITED TO SHARED VALUES.

NOTE:
SPD = STANDARD PROCTOR DENSITY.
FILL HEIGHT MEASURED FROM THE TOP OF PIPE TO SURFACE.
LIMITS ACCOUNT FOR SHORT-TERM TEMPORARY WATER TABLE DEPTHS OF FIVE FEET ABOVE SPRINGLINE.
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WHEN PIPES ARE USED AS GROUP A, FILL HEIGHTS ARE LIMITED TO SHARED VALUES.
### END SECTIONS FOR ARCH PIPE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DIMENSIONS</th>
<th>GALVANIZED SHEET THICKNESS (IN.)</th>
<th>CALIBERIZED SHEET THICKNESS (IN.)</th>
<th>DIMENSIONS (IN.)</th>
<th>APPROXIMATE SLOPE (1/30)</th>
<th>THE PLATE IF SPECIFIED P. (IN.)</th>
</tr>
</thead>
<tbody>
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### END SECTIONS FOR ROUND PIPE

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<th>CALIBERIZED SHEET THICKNESS (IN.)</th>
<th>DIMENSIONS (IN.)</th>
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**General Notes:**

Minor variations of detail and dimensions will be accepted to permit the use of a manufacturer's standard methods of fabrication.

End sections fabricated from thicker metal than indicated will be accepted.

All bolts shall be 3/4 diameter and galvanized, unless otherwise shown.

The plate extensions, if specified, shall have holes to match holes in the plate.

The skirt section is defined as the flared portion of the end section including side and bottom (center) panels and apron.

The skirt section for 12" through 24" pipes shall be made in one piece.

The skirt sections for 30" and larger pipes and BS and larger pipe arches may be made from up to 2 sheets joined by riveting or bolting on centerline.

The skirt sections from 48" and larger pipes and BS or larger pipe arches may be made from up to 3 sheets joined by riveting or bolting equal distance from centerline.

The skirt sections for 72" and larger pipes may be made from up to 4 sheets joined by riveting and bolting. The bottom panel shall be 2 equal width sheets joined on centerline.

All 3 piece and 4 piece skirts for 60" or larger pipes and BS and larger pipe arches shall have 0.109" thick sides and 0.138" thick bottom (center) panels. Width of bottom panels shall be greater than 20% of the pipe periphery connector sections. Corner plates and toe plates shall be galvanized and of the same or greater thickness as the skirt.

See sheet 3 of 3 for connection details.

**Flared End Section**

DATE: 06/30/2005

MOBETTE CHAMPS AND TRANSPORTATION

732.005 SHEET NO. 2 OF 3
**Connection Requirements**

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**Tapered Sleeve Connection for Concrete and Thermoplastic Pipe**

Tapered sleeve shall be firmly wiggled into pipe end before backfilling pipe pay length.

1 inch wide, 0.109" thick connector strap of commercial quality steel, galvanized with same thickness coating as pipe; and 6" x 4" galvanized steel bolt and nut. Use as alternate on Type 1 connection only.

**General Notes**

Minor variations of detail and dimensions will be accepted to permit the use of a manufacturer's standard methods of fabrication.

Tapered sleeves shall be fabricated from smooth 12 gauge steel coated in accordance with ASTM A515.

The length of tapered sleeve shall be sized to protect the sensitive pipe materials from sunlight, the entire out of the tapered sleeve, hardware, and installation shall be included in the cost of the pipe.

Tapered sleeves shall have a minimum half corrugation or lip designed to provide a secure connection with the end section.

Any rod or strap used for making a connection shall be securely seated into a valley of the pipe corrosion. The valley chosen to hold the rod or strap shall leave at least one full intact corrugation before the end of the pipe. The female portion of a bell end shall not contain a full intact corrugation.

**End Section for Pipe and Pipe Arch**

**FLARED END SECTION**

**METAL**

**732.00S**

**DATE REVISED:** 02/04/2021

**DATE ISSUED:** 04/23/2021

**SHEET NO.:** 3 OF 3
PIPE END DETAILS FOR PARALLEL DRAINAGE STRUCTURES FOR DRIVEWAYS
(SINGLE PIPE INSTALLATION)

NOTE:
FOR MULTIPLE PIPE INSTALLATIONS, THE SECTIONS WITH SAFETY EDGE SYSTEM OR OPTIONAL BAR RAKE SYSTEM SHALL BE PROVISIONED. SEE STANDARD PLAN 732-10.
SEE DRIVEWAY STANDARD PLANS FOR BEVELED END SECTION REQUIREMENTS.

GENERAL NOTES:
CONCRETE USED IN CONSTRUCTION OF THE BEVELED PIPE ENCASING SHALL BE CLASS B CONCRETE OR AN APPROVED COMMERCIAL MIX MEETING REQUIREMENTS OF SECTION 301 OF THE STANDARD SPECIFICATIONS.
REINFORCING STEEL USED IN CONSTRUCTION OF THE BEVELED PIPE ENCASING SHALL MEET THE REQUIREMENTS OF SECTION 1038 OF THE STANDARD SPECIFICATIONS.
BEVELED PIPE ENCASING MAY BE MADE WITH EITHER POLYETHYLENE OR CORRUGATED METALLIC COATED STEEL PIPE.
The price bid per each for "beveled pipe end treatment" shall be considered full compensation for furnishing all materials and installation of the beveled pipe section and beveled pipe encasement as shown or as directed by the engineer.

THE 3/4 x 6" BOLT AND NUTS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTMA 1532 (ASTM A1532) CLASS C SPECIFICATIONS. LOW CARBON STEEL ANCHOR BOLTS SHALL BE ASTMA 1554, GRADE 36.

BEVELED PIPE SHALL BE DRILLED AT LOCATIONS SHOWN ON PLANS FOR PLACEMENT OF 3/4 x 6" GALVANIZED BOLTS. THE 3/4 x 6" GALVANIZED BOLTS SHALL BE "DOUBLE NUTTED" AS SHOWN AND PLACED IN THE VALLEY OF PIPE CORRUGATIONS.
GENERAL NOTES:

END SECTIONS, INCLUDING ALL BOLTS, NUTS, RODS AND STRAPS, SHALL BE FABRICATED FROM CARBURIZED STEEL MEETING THE REQUIREMENTS OF SECTION 1020.

ALL BOLTS UNLESS OTHERWISE SHOWN SHALL BE ASTM A572 BOLTS.

WHEN REQUIRED, OPTIONAL THE PLATE EXTENSION SHALL BE PUNCHED OR CHASED AND BOLTED TO END SECTION.

THE PLATE STEEL FOR THE PLATE EXTENSION SHALL BE SAME GAUGE AS END SECTION. EXTENSIONS SHALL BE OVERALL WIDTH LESS 6" BY 8" HIGH.

ATTACHMENT TO CIRCULAR PIPES 15" THROUGH 24" DIAMETER SHALL BE MADE ASTM TYPE 316 STRAPS. ALL OTHER SIZES SHALL BE ATTACHED WITH TYPE NO CONNECTORS.

SAFETY BARS AND LONGITUDINAL BARS SHALL BE FABRICATED FROM STEEL PIPE MEETING THE REQUIREMENTS OF ASTM A514 SCHEMES 50 SPECIFICATIONS. SAFETY BARS AND LONGITUDINAL BARS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 1020 STANDARD SPECIFICATIONS.

INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 5420.152 OF THE STANDARD SPECIFICATIONS.

SLOTTED HOLES FOR SAFETY BAR ATTACHMENT SHALL BE PROVIDED FOR ALL END SECTIONS.

MISCELLANEOUS DETAILS WERE NOTED TO ALLOW THE USE OF A MANUFACTURER'S STANDARD METHODS OF FABRICATION.

END SECTIONS FABRICATED FROM THICKER METAL THAN INDICATED WILL BE ACCEPTED.

ALL BOLTS SHALL BE 1/2 DIAMETER AND GALVANIZED.

SLEEVE LENGTH SHALL BE THE LENGTH OF THE END SECTION INCLUDING SIDE AND BOTTOM CENTER PANELS AND AARON.

SLEEVE SECTION FOR 12" THROUGH 24" PIPES SHALL BE MADE IN ONE PIECE.

SLEEVE SECTIONS FOR 10" AND LARGER PIPES MAY BE MADE FROM UP TO 2 SHEETS JOINED BY WELDING OR BOLTING ON CENTERLINE.

SLEEVE SECTIONS FROM 10" AND LARGER PIPES MAY BE MADE FROM UP TO 3 SHEETS JOINED BY WELDING OR BOLTING END PANEL EDGE FROM CENTERLINE.

ALL 1/4" THICKNESS FOR 60" PIPES SHALL BE 0.109" THICKNESS AND 0.138" THICKNESS CENTER PANELS.

KNOT OR BENT PANELS SHALL BE GREATER THAN 50% OF THE PIPE PERIMETER CONNECTOR SECTION. CORNER PLATES AND THE PLATE SHALL BE GALVANIZED OF THE SAME OR GREATER THICKNESS AS THE SHEET.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

1-800-457-MADOT (6236) 1-800-542-7338 1-800-483-6608

SAFETY SLOPE END SECTION

DATE MODIFIED: 01/04/2003
DATE REVIEWED: 01/04/2003

732.10H SHEET NO. 1 OF 3
### Pipe End Details for Drainage Structures

**SINGLE PIPE INSTALLATION**

**NOTE:**
- See Driveway Standard Plans for Beveled End Section Requirement.
- For Connection Details, see Sheet 3 of 3.

**Edge of Shoulder**

**For Details of Optional Bar Grate** see Sheet 3 of 3

---

**Metal End Sections for Circular Pipes**

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<th>Pipe Dia. (in.)</th>
<th>Min. Gauge Ends (in.)</th>
<th>Min. Gauge Ends (in.)</th>
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<td>A B C D E F' BARS</td>
<td>G H J</td>
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**GENERAL NOTES:**

- All steel material for bar grate system shall be in accordance with ASTM A516 Grade 1020 steel.
- All material in grate system shall be galvanized.
- Galvanizing shall be done in accordance with ASTM A123.

**OPTIONAL BAR GRATE SYSTEM**

- Bar grate system is not required for drain pipe diameter of 21" or less for single pipe installations.

**PLAN**

- Section D-D

**ELEVATION**

- Detail A

**DETAIL A**

- Bent plate anchor

**DETAIL B**

- U-bolt anchor

**DETAIL C**

- Reinforced edge of end section

**REMARKS:**

- Drain pipe size:
  - 24" - 30" diameter pipes
  - 36" - 48" diameter pipes
  - 56" - 6" diameter pipes

**DATE EFFECTIVE:**

06/01/2013

**DATE PREPARED:**

4/1/2013

**SHEET NO:**

3 OF 3

**OPTIONAL BAR GRATE SYSTEM FOR SAFETY SLOPE END SECTION**

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

**OPTIONAL BAR GRATE SYSTEM FOR SAFETY SLOPE END SECTION**

**DATE EFFECTIVE:**

06/01/2013

**DATE PREPARED:**

4/1/2013

**SHEET NO:**

3 OF 3
ROCK DITCH CHECK

END VIEW

SECTION A-A

# GEOTEXTILE LINING MAY BE INSTALLED AS REQUIRED BY THE ENGINEER.

NOTE:

ROCK DITCH CHECK IN THE CLEAR ZONE SHALL BE REMOVED OR LEVELLED IF ALLOWABLE AFTER THE VEGETATION HAS SUFFICIENTLY GROWN TO PROTECT THE DITCH OR SMALL.

EXAMPLE

DITCH CHECK SPACING FOR STANDARD HEIGHTS (Ft.)

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MINIMUM DITCH CHECK SPACING

ALTERNATE DITCH CHECK

FLOW

SECTION B-B

PLAN VIEW

TYPICAL SECTION

VEE DITCH

NOTES:

USE MINIMUM 12 IN. DIAMETER LOG/SOCK.

USE 2 FT. WOODEN STAKES WITH A 2 1/2 IN. BY 2 IN. MINIMUM CROSS SECTION.

INSTALL LOG/SOCK AT BEGINNING OF DITCH AND ALONG THE CURVE WITHIN THE footer OF EROSION SLOPE OR AS DIRECTED BY THE ENGINEER.

INSTALL A MINIMUM OF 2 UPHILL STAKES AND 4 DOWNHILL STAKES AT AN ANGLE TO WEDGE LOG/SOCK TO BOTTOM OF DITCH.

EROSION CONTROL BLANKET SHALL BE ENCLOSED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

GENERAL NOTES:

OTHER PROPRIETARY DITCH CHECKS MAY BE SUBSTITUTED IN ACCORDANCE WITH SEC. 805 OR AS DIRECTED BY THE ENGINEER.

INSTALLATION OF PROPRIETARY DITCH CHECKS SHALL BE ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

TEMPORARY DITCH CHECKS

TEMPORARY EROSION CONTROL MEASURES

SHEET NO. 1 OF 6

GENERAL NOTES:

OTHER PROPRIETARY DITCH CHECKS MAY BE SUBSTITUTED IN ACCORDANCE WITH SEC. 805 OR AS DIRECTED BY THE ENGINEER.

INSTALLATION OF PROPRIETARY DITCH CHECKS SHALL BE ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

TEMPORARY DITCH CHECKS

TEMPORARY EROSION CONTROL MEASURES
Sediment Trap

Sediment trap in the clear zone shall be reduced or leveled if allowable after the vegetation has sufficiently matured to protect the ditch or wall.

Elevation Detail

Rock/mesh sediment control fence may be necessary, as determined by the engineer, in isolated areas where perimeter silt fence is deemed insufficient to withstand sheet flow. It shall be placed per linear foot as rock ditch check. Aggregate for drainage shall be in accordance with Sec. 109, Grade 4 or Grade 5.

Use hardware cloth 24 gauge wire mesh with 1/4 inch mesh openings.

Install 5 ft. t-foot with a 2 foot embedded depth (min.);

Attach hardware cloth to post with wire staple or other acceptable method;

Space post a maximum of 3 ft.

For installation between sections of silt fence, ensure aggregate for drainage a minimum of 12 inches on each side of special sediment control fence section.

Rock/mesh sediment control fence may be used in lieu of rock ditch check to surround an inlet, at no additional cost to the connection.

Curb Inlet Protection

Prior to placement all debris, rocks, large sticks and large vegetation shall be cleared.

Lock/sock placed on pavement shall be re Deputy with gravel/deballast.

General Notes:

Other proprietary inlet protection may be substituted in accordance with Sec 806 or 45 directed by the Engineer.

For sediment control spacing see Sheet 1 of 6.
TEMPORARY SLOPE DRAIN INLET TREATMENT

PLAN VIEW

SECTION VIEW

SECTION A-A

TEMPORARY BERM
(METAL, FLEXIBLE PIPE OR PLASTIC PIPE)

NOTE: MAXIMUM LENGTH BETWEEN SLOPE DRAINS SHALL BE APPROXIMATELY 500 FEET.
PERIMETER SILT FENCE
FOR TRANSVERSE FLOW

GENERAL NOTES:
USE SILT FENCE FOR HILLS HEIGHTS GREATER OR EQUAL TO 10 FEET. ON ALL HILLS HIGHER THAN 10 FEET HILLSIDE FENCE SHALL BE CONSIDERED.

FOR FABRIC SILT FENCE:
MINIMUM LONGITUDINAL SPlice OVERLAP SHALL BE 24 INCHES. SPlices SHALL BE SEcURE WITH A POST AT EACH END.

ELEVATION DETAIL
FABRIC SILT FENCE

MINIMUM J-HOOK SPACING
SECTION A-A
TYPE C BERM

1. TYPE C BERM SHALL BE PLACED ABOVE THE MINIMUM HIGH WATER (O.H.W.) OR AT AN ELEVATION AS DIRECTED BY THE ENGINEER.

VEGETATIVE MULCH COVERED TO 2" OR EQUIVALENT EROSION CONTROL BLANKET OR CONTINUOUS FABRIC, IF REQUIRED BY THE ENGINEER.

SECTION B-B
Method of supporting deciduous trees

3" caliber or larger

Method of supporting evergreen trees

3' or more in height

Notes:
Tree wrap shall be installed before bracing.
Brace shall be nailed securely to post and brace block.
Banding shall be done with a commercial banding machine.

General note:
All number measurements are nominal.
MEASUREMENT OF SMALL TREES

- 24" branches on any stem may be counted

MEASUREMENT OF LARGE TREES

- Measure caliber for trees 4" or less.
- Measure caliber for trees more than 4".

MEASUREMENT OF EVERGREEN TREES

- Base width measured not more than 10" above the ground line

MEASUREMENT OF DECIDUOUS SHRUBS

- Measure tip to tip

PRUNING CUTS

- Thinning cut
- Heading cut
LOCATION OF SHRUBS IN A TYPICAL PLANT BED

VINES AND SEEDLINGS

DECIDUOUS SHRUB SLOPE PLANTING

EVERGREEN SHRUB SLOPE PLANTING

MINIMUM DISTANCE FOR PLANTING ON TYPICAL CROSS SECTION

SPREAD MEASURED NO MORE THAN 10" ABOVE THE GROUND LINE.

MINIMUM CLEAR DISTANCE AS SPECIFIED IN THE PLANS

EVERGREEN AND DECIDUOUS TREES

LOCATION AND SLOPE PLANTING

DATE EFFECTIVE: 07/01/2004
DATE PREPARED: 08/28/2009
ELEVATION DETAILS OF CIRCULAR STEEL PILE FOUNDATION

1. INDICATOR OF CABLE ENTRANCE
2. 15" DIAMETER HOLE FOR 1" DIAM. HIGH STRENGTH ANCHOR BOLTS (TYP.)
3. 15" DIAM. BOLT CIRCLE
4. MINIMUM 15" DEPTH OF CEMENT
5. MINIMUM 15" DEPTH OF CEMENT IN CABLE ENTRANCE
6. CONNECTOR PLATE INSTALLATION LOCATION (ALL STEEL CONNECTION)
7. TYPICAL CONNECTOR PLATE (L32" RLAGED Bolt CIRCLE)
8. 2" DIA. HOLE
9. MIN. CIRCULAR OR SQUARE CLOSURE PLATE
10. MIN. CIRCULAR OR SQUARE CLOSURE PLATE TO INSIDE OF EACH PLANE

DETAILS OF STEEL "H" PILE FOUNDATION

1. INDICATOR OF CABLE ENTRANCE
2. 15" DIAMETER HOLE FOR 1" DIAM. HIGH STRENGTH ANCHOR BOLTS (TYP.)
3. 15" DIAM. BOLT CIRCLE
4. MINIMUM 15" DEPTH OF CEMENT
5. MINIMUM 15" DEPTH OF CEMENT IN CABLE ENTRANCE
6. CONNECTOR PLATE INSTALLATION LOCATION (ALL STEEL CONNECTION)
7. TYPICAL CONNECTOR PLATE (L32" RLAGED Bolt CIRCLE)
8. 2" DIA. HOLE
9. MIN. CIRCULAR OR SQUARE CLOSURE PLATE
10. MIN. CIRCULAR OR SQUARE CLOSURE PLATE TO INSIDE OF EACH PLANE

NOTES:
1. GRIND WELD AS NEEDED TO CLEAR BOLT HEAD.
2. CONNECTOR PLATES ARE LEVEL PERPENDICULAR TO THE BRACKET ARM AND SLOPED FOR POLE RISING PARALLEL TO THE BRACKET ARM.

GENERAL NOTES:
ALL CLASSIFICATIONS ARE 40TH UNLESS OTHERWISE NOTED.
SEE STANDARD SPECIFICATIONS FOR CLASSIFICATIONS NOT SHOWN.
ALL CONNECTOR PLATE AND CLOSURE PLATE THICKNESSES SHOWN ARE NOMINAL EMBRASIONS.
ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED 1" DIAM. HIGH STRENGTH ANCHOR BOLTS.
ALL STEEL COMPONENTS SHALL BE HOT DIP GALVANIZED.
GENERAL NOTES:

1. THE CORRECT MOUNTING HEIGHT WILL BE OBTAINED BY ADJUSTING COMPARISON FROM THE EYE TO THE CLEARANCE BETWEEN THE POLE CAP AND THE TOP OF THE BRACKET ARM MOUNT.

2. HOLES SHALL BE PUNCHED ONLY FOR SPECIFIED BOLT SIZE.

3. TRANSFORMER BASE SHALL BE CERTIFIED AS MEETING THE REQUIREMENTS SET OUT AS APPROPRIATE FOR THE SPECIFICATIONS FOR THE TRANSFORMER SPECIFICATIONS FOR TRANSFORMER SUPPORTS FOR HIGHWAY LIGHTING APPARATUS AND TRANSFORMER BASES. ALL TRANSFORMER BASES AND TRANSFORMER SUPPORTS ARE TO MEET THE REQUIREMENTS OF MICH. ST. 3500.

4. THE TRANSFORMER BASE SHALL BE SECURED WITH 4" X 6" X 1/2"-THICK RADIUS BRACKETS OR EQUIVALENT DEVICES WITH A MINIMUM OF THREE BOLTS PER BRACKET.

5. ALL TRANSFORMER BASES SHALL BE EQUIPPED WITH THE GROUNDING LUGS INSIDE THE TRANSFORMER BASE, TYPE B BASE MOUNTING HOLES SHALL BE EQUIPPED WITH A GROUNDING LUG INSIDE THE HOLES.

6. THE POLE CAP SHALL BE EQUIPPED WITH A 9" X 1/2" BOLT CIRCLE, TYPE B.

7. THE CABLE ENTRANCE AT THE BRACKET ARM SHALL BE EQUIPPED WITH 1 1/8" X 1/2" BOLT CIRCLE.

8. THE DESIGN OF THE TRANSFORMER SUPPORTS SHALL COMPLY WITH GROUNDING REQUIREMENTS SET OUT AS APPROPRIATE FOR THE TRANSFORMER SUPPORTS FOR HIGHWAY LIGHTING APPARATUS AND TRANSFORMER SUPPORTS. ALL TRANSFORMER BASES AND TRANSFORMER SUPPORTS ARE TO MEET THE REQUIREMENTS OF MICH. ST. 3500.

9. SIGNS SHALL NOT BE MOUNTED ON LIGHTING POLES.
### TYPE AT POLE

<table>
<thead>
<tr>
<th>BRACKET SPEC</th>
<th>X</th>
<th>L</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>6' or 10'</td>
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**MAX. LUMINARIE WEIGHT**
60 LB

**MAX. PROJECTED SPEE**
3.3 SQ. FT.

**LED LUMINARIES**

<table>
<thead>
<tr>
<th>POLE HEIGHT</th>
<th>DESIGNATION</th>
<th>MAX. WATT</th>
<th>LIGHTING SITE</th>
<th>INSTALLATION</th>
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<tr>
<td>3 A</td>
<td>LED-3</td>
<td>110</td>
<td>III</td>
<td>E-10-00</td>
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<td>LED-1</td>
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<tr>
<td>7 A</td>
<td>LED-7</td>
<td>275</td>
<td>III</td>
<td>E-10-00</td>
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**GENERAL NOTES**

*The minimum alternate diameter shall be 10" for a 60' pole, 9" for a 48' pole, 8" for a 40' pole, 7" for a 35' pole and 6" for a 30' pole.*

**TYPE B POLE**

<table>
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**MAX. LUMINARIE WEIGHT**
60 LB

**MAX. PROJECTED SPEE**
3.3 SQ. FT.

**SINGLE BRACKET ARM**

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>BRACKET SPEC</th>
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<th>ANCHOR BOLT Dia.</th>
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<tbody>
<tr>
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**TROUBLE BRACKET ARM**

<table>
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<tr>
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<tr>
<td></td>
<td>15&quot;</td>
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**TYPE MB POLE**

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<td>6' or 10'</td>
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**MAX. LUMINARIE WEIGHT**
60 LB

**MAX. PROJECTED SPEE**
3.3 SQ. FT.

**DOUBLE BRACKET ARM**

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<th>LOCATION</th>
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<th>ANCHOR BOLT Dia.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1 1/4&quot;</td>
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**MECHANICAL CABLE CONDUIT**

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<th>LOCATION</th>
<th>BRACKET SPEC</th>
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<th>ANCHOR BOLT Dia.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>15&quot;</td>
<td>10&quot;</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>

**PILE**

The pile shall be extended from the ground using a 12" pipe. The pile shall be extended from the ground using a 12" pipe. The pile shall be extended from the ground using a 12" pipe.
1. Square hole as necessary to clear bolt head.
2. Pile lengths shall be installed so that connector plates are level perpendicular to the plate arm and slotted for file running parallel to the plate arm.
3. Pile lengths for steel pile foundations:

<table>
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<tr>
<th>Design No.</th>
<th>File Length</th>
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<tr>
<td>4 x 5</td>
<td>8'-0&quot;</td>
</tr>
<tr>
<td>2 x 5</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>2 x 4</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>1 x 4</td>
<td>10'-0&quot;</td>
</tr>
</tbody>
</table>

General notes:

All classifications are with less otherwise noted. See standards specifications for classifications not shown.

All bolt circles for 45' mounting height shall be 17'-0".
All connector plate and closure plate thicknesses shown are minimum dimensions.
All anchor bolts shall be fully galvanized 14" diameter high strength anchor bolts.
All steel components shall be hot dip galvanized.
ANCHOR BOLTS SHALL BE PLACED ONLY FOR 11/2" WOULC CIRCLE

4 AT THE OPTION OF THE CONTRACTOR THE CONCRETE FOUNDATION MAY BE PRECAST. IF PRESENT, THEY SHALL BE SET IN DRILLED HOLE 5 FEET IN DIAMETER AND 6 INCHES DEEPER THAN THE BOTTOM OF THE CONCRETE FOUNDATION. THE BOTTOM 6 INCHES OF THE HOLE ARE THE REUSING SPACE AND THE FOUNDATION SHALL BE BACKSTUFFED WITH NET TAPPED LIVESTOCK SCREENINGS IN LAYERS NOT EXCEEDING 4 INCHES.

GENERAL NOTES:

4 ALL CLASSIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED. SEE STANDARD SPECIFICATIONS FOR CLASSIFICATIONS NOT SHOWN.

4 ALL BOLT CIRCLES FOR 45' MOUNTING HEIGHT SHALL BE 11/2".

4 ALL CONNECTOR PLATE AND CLOSURE PLATE THICKNESSES SHOWN ARE STANDARD EXEPTIONS.

4 ALL ANCHOR BOLTS SHALL BE FULLY EXAMINATED TO DETERMINE MEETING STRENGTH ANCHOR BOLTS.

4 ALL STEEL COMPONENTS SHALL BE HOT DIP GALVANIZED.
COIL ENDS OF CABLE-CONDUIT DITCH LINE AND COVER WITH PLANKS. IF WIRING IS INSTALLED PRIOR TO POLE INSTALLATION.

CURB SAME LOCATION BARRIER OR CABLE-CONDUIT RIGID CONDUIT TRAVELED WAY EDGE OF TRAVELED WAY TRENCH LOCATION - INSIDE SHOULDER TRENCH LOCATION - OUTSIDE SHOULDER

-edge of traveled way-

CONCRETE PULL BOX
-~-

POLE FOUNDATION

RIGID CONDUIT

Pole Foundation

RIGID CONDUIT

RIGID CONDUIT

RIGID CONDUIT (AS SPECIFIED)

POLE FOUNDATION

RIGID CONDUIT UNDER PAVEMENT AND SHOULDER, TERMINATE RIGID CONDUIT IN PULL BOX.

CABLE-CONDUIT

2" DRain PIPE

RIGID CONDUIT (AS SPECIFIED)

POLE FOUNDATION

CABLE-CONDUIT

PREFORMED OR CONCRETE PULL BOX

POLE FOUNDATION

CABLE-CONDUIT

RIGID CONDUIT

SEAL WITH PRE-MOLDED FITTING OR SEALING COMPOUND.

CABLE-CONDUIT

RIGID CONDUIT

FUSING SLIP CONNECTOR ASSEMBLY

CABLES

CABLES

CABLE-CONDUIT FROM FOUNDATION TO BE INSERTED INTO CABLE ENTRANCE CABLES TO BE INSERTED THROUGH THE HANDHOLE AND MUST EXTEND BEYOND THE HANDHOLE A MINIMUM DISTANCE OF 18".

GENERAL NOTES:

1. SEE DRAWING 902.20 FOR PULL BOXES.
2. CONDUIT MAY BE REMOVED FROM CABLES IN RIGID CONDUIT, SPLICES SHALL NOT BE MADE UNLESS SHOWN ON PLANS.
3. BRAND AND MODEL OF FUSE HOLDER SHALL BE APPROVED BY THE ENGINEER.
4. CABLES SHALL BE CONTINUOUS TO THE FIRST LIGHT POLE, SPLICES SHALL NOT BE MADE FOR THE PURPOSE OF TERMINATING CABLE-CONDUIT.

THE CONDUIT OF THE CABLE-CONDUIT SHALL BE CUT AWAY FROM THE CABLES WHERE THEY ENTER THE RIGID CONDUIT INSIDE A CONCRETE BARRIER OR STRUCTURE.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL, JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

HIGHWAY LIGHTING CABLE, CONDUIT AND TRENCHING
ON BRACKET

EQUIPMENT LAYOUT WIRING DIAGRAM

SHEET NO.

LIST OF MATERIALS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>RIDG CONDUIT</td>
</tr>
<tr>
<td>4</td>
<td>NEMA 4, DUST-TIGHT, WATER-TIGHT CABINET</td>
</tr>
<tr>
<td>5</td>
<td>GROUND ROD, 1/2&quot; DIA. X 8' MIN.</td>
</tr>
<tr>
<td>6</td>
<td>PHOTOELECTRIC SWITCH AND SOCKET, 105/285 V. - 1000 WATT</td>
</tr>
<tr>
<td>7</td>
<td>TRANSLUCENT, PLEXIGLASS FILTER #2067, 6&quot; THICK</td>
</tr>
<tr>
<td>8</td>
<td>CLEAR LEXAN #1034 WINDOW, 6&quot; THICK MIN.</td>
</tr>
<tr>
<td>9</td>
<td>MOUNTING PAN, 315&quot; x 12&quot; x 6&quot; ALUMINUM OR STAINLESS STEEL</td>
</tr>
<tr>
<td>10</td>
<td>PLIABLE SEALANT</td>
</tr>
<tr>
<td>11</td>
<td>LIFETIME SILICONE Caulk</td>
</tr>
<tr>
<td>14</td>
<td>INSULATED TERMINAL BLOCK, FOR GREATER THAN 4/0 CABLE</td>
</tr>
</tbody>
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HIGHWAY LIGHTING
BASE MOUNTED
CONTROL STATION
240 V OR 480 V - 4 CIRCUIT

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CONTROL STATION
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<th>ITEM</th>
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<tr>
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<td>SERVICE POLE 30' MIN., CLASS 4 MOD. CONTRACTOR PROVIDED, MODOT OWNED*</td>
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<tr>
<td>2</td>
<td>#2 AWG MIN. CABLE, 600 VOLT *</td>
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<tr>
<td>3</td>
<td>SERVICE ENTRANCE HEAD</td>
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<tr>
<td>4</td>
<td>CABLE, AS REQUIRED</td>
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<tr>
<td>5</td>
<td>RIGID CONDUIT, 2&quot; MIN., WITH PREFORMED ELBOWS</td>
</tr>
<tr>
<td>6</td>
<td>LIGHTING ARRESTER, VALVE TYPE, 2 POLE, 650 VOLT</td>
</tr>
<tr>
<td>7</td>
<td>METER SOCKET, 200 AMP, FOR SIGNALS</td>
</tr>
<tr>
<td>8</td>
<td>METER SOCKET, 200 AMP, FOR LIGHTING</td>
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<tr>
<td>9</td>
<td>LOCKING, RAINLIGHT, NEMA 4 SERVICE DISCONNECT BOX</td>
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<td>10</td>
<td>THREADED CONDUIT HUB WITH SEALING WASHERS</td>
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<tr>
<td>11</td>
<td>GROUND ROD</td>
</tr>
<tr>
<td>12</td>
<td>1/2&quot; METAL CONDUIT</td>
</tr>
<tr>
<td>13</td>
<td>#2 AWG MIN. GROUND WIRE</td>
</tr>
<tr>
<td>14</td>
<td>GROUND ROD, 3/4&quot; X 8&quot; MIN.</td>
</tr>
<tr>
<td>15</td>
<td>#8 AWG MIN. CABLE, 600 VOLT *</td>
</tr>
<tr>
<td>16</td>
<td>CLASS B CONCRETE, 0.92 C.Y.</td>
</tr>
<tr>
<td>17</td>
<td>THREADED CONDUIT HUB WITH SEALING WASHERS</td>
</tr>
<tr>
<td>18</td>
<td>WEATHERPROOF ADHESIVE LABEL (LIGHTING), VINYL RAISED LETTERING (OR EQUIVALENT, SEE DETAIL)</td>
</tr>
<tr>
<td>19</td>
<td>WEATHERPROOF ADHESIVE LABEL (SIGNALS), VINYL RAISED LETTERING (OR EQUIVALENT, SEE DETAIL)</td>
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<tr>
<td>20</td>
<td>#2 AWG MIN. CABLE, 600 VOLT</td>
</tr>
<tr>
<td>21</td>
<td>RIGID CONDUIT, 2&quot; MINIMUM</td>
</tr>
</tbody>
</table>

* SEE PLANS

WIRING DIAGRAM

LIGHTING AND/OR SIGNALS

NOTES:

A SERVICE POLE SHALL BE GUARDED WHEN SPAN OF OVERHEAD SERVICE WIRE EXCEEDS 50 FEET.
B INCREASE 1 FOOT FOR EACH 5 FEET ABOVE 30 FEET.
C SERVICE DISCONNECT BOXES AND METER BOXES SHALL BE ALUMINUM OR STAINLESS STEEL. ALL HARDWARE, HINGES, CATCHES, ETC., SHALL BE STAINLESS STEEL. METER SOCKET FOR SIGNALS OR LIGHTING AND OTHER EQUIPMENT AND MATERIALS SHALL BE U.L. APPROVED, AND CONFORM TO THE REQUIREMENTS OF THE UTILITY COMPANY OR MUNICIPALITY PROVIDING POWER.
D SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF CABINET DOOR.
E UTILITY COMPANY SHALL DECIDE IF LIGHTNING ARRESTERS ARE TO BE CONNECTED ON THE LOAD OR LINE SIDE OF THE METER. THE UTILITY COMPANY SHALL ALSO DECIDE IF THE LIGHTNING ARRESTER IS TERMINATED IN THE METER OR DISCONNECT CABINET. IF TERMINATED IN THE DISCONNECT CABINET, IT SHALL BE INSTALLED ON THE DISCONNECT CABINET.
F LIGHTING SYSTEM VOLTAGE OF 240 VOLTS OR 480 VOLTS AS SHOWN ON THE PLANS.
G BREAKERS SHALL CONFORM TO SEC. 901.4 OF THE STANDARD SPECIFICATIONS.
H IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE Placement OF THE GROUND ROD IN A VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CAMELED.
I IMPORTANT FOR CABLE TYPES AND INSTALLATION, SEE STANDARD SPECIFICATIONS.
J THE POWER SUPPLY ASSEMBLY TYPE IS SHOWN ON THE PLANS OR IS DESIGNATED IN THE CONTRACT.
K THE UTILITY COMPANY SHALL BE NOTIFIED IN WRITING 30 DAYS PRIOR TO DATE SERVICE WILL BE REQUIRED.
L WHERE SIGNAL OR LIGHTING POWER ONLY IS DESIGNATED, Omit ITEMS NOT REQUIRED.
M ALL MATERIALS REQUIRED AS SHOWN ON DRAWING, INCLUDING CABLE AND CONDUIT FROM POWER SUPPLY ASSEMBLY TO UTILITY COMPANY FACILITIES, SHALL BE INCLUDED IN UNIT BID PRICE FOR POWER SUPPLY ASSEMBLY.
N MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

HIGHWAY LIGHTING
POWER SUPPLY ASSEMBLY
SECONDARY SERVICE

DATE EFFECTIVE: 04/01/2002
DATE PREPARED: 06/21/2002
901.800 SHEET NO. 1 OF 2
NOTE:
CABLE AND CONDUIT FROM POWER SUPPLY ASSEMBLY TO UTILITY COMPANY FACILITIES SHALL BE INCLUDED IN PRICE BID FOR POWER SUPPLY ASSEMBLY.

CABLE AND CONDUIT FROM POWER SUPPLY ASSEMBLY TO UTILITY COMPANY FACILITIES SHALL BE INCLUDED IN PRICE BID FOR POWER SUPPLY ASSEMBLY.
GENERAL NOTES:
ALL POST WIRE OUTLETS SHALL BE DERRIVED AND EQUIPPED WITH DIAPHERGMS.
BACKPLATES NOT SHOWN IN MOUNTING DIAGRAMS FOR CLARITY.
POSTS SHALL BE GROUND WITH PRE-AND BARE COPPER WIRE FROM GROUNDING BANISH OR CONNECT TO GROUNDING LUGS IN POST BASE IF STEEL CONDUIT IS USED. IF PVC CONDUIT IS USED, PROVIDE PRE-AND BARE COPPER WIRE FROM GROUNDING LUG IN POST TO POWER SUPPLY GROUND BUS IN CONTROLLER CABINET.
LEGS FROM PEDESTRIAN SIGNAL LAMPS ARE CONNECTED TO THE SIGNAL HEAD TERMINAL COMPARTMENT.
TYPE 1 MOUNTED SIGNALS SHALL HAVE A DISCONNECT MANGER.
TYPE 1 MOUNTED SIGNALS SHALL HAVE A TERMINAL COMPARTMENT.
ONE FACE, TOP-MOUNTED (TYPE 5), OR SIDE-MOUNTED (TYPE 5) SIGNALS SHALL HAVE NO TERMINAL COMPARTMENT.
TWO FACE, TOP-MOUNTED (TYPE 1) OR SIDE-MOUNTED (TYPE 5) SIGNALS SHALL HAVE A HORIZONTAL TERMINAL COMPARTMENT.
SIDE-MOUNTED OPTICALLY LITTING HEADS SHALL HAVE A MINIMUM POST CLEARANCE OF 54".
SIGNAL APPURTEMENTS SHALL HAVE A HORIZONTAL CLEARANCE NO LESS THAN 7' FROM THE FACE OF A VERTICAL CURVE OR FROM THE OUTSIDE EDGE OF A SHÅLEEUR.-EXCEPT SIGNALS LOCATED IN A MEDIAN ISLAND.
SEE STANDARD PLAN 902.30 FOR BASE DETAILS AND CONDUIT LOCATIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISION
215 WEST CAPITOL
Jefferson City, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

TRAFFIC SIGNALS
SIGN HEAD MOUNTING

M&DOT

DATE REVISED: 1/1/2023
DATE PREPARED: 9/20/2023
902.000 SHEET NO. 1 OF 2
ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY

GENERAL NOTES:
ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY MAY BE MONOBLITHIC OR A SEPARATE ACTUATOR AND SIGN.

SIGNS FOR SIGNAL INSTALLATIONS, INCLUDING ALL MATERIAL REQUIRED FOR SIGN MOUNTING, SHALL BE FurnISHED BY THE CONTRACTOR. SIGNS SHALL BE MANUFACTURED IN ACCORDANCE WITH SEC 903. AND MOUNTED AS SHOWN ON THE PLANS.

ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY CAN BE MOUNTED TO SIGNAL POLE PEDESTRIAN FROCE OR PEDESTRIAN FROCE POLE.

INCLUDE A 9" X 15" FIG 3-16 SIGNS WITH EACH ASSEMBLY.

REQUIRES ACTUATOR AND MOUNTING FOR UNITS ON THE SAME PEDESTRIAN FROCE. ADDITIONAL MOUNTING EXTENSION BRACKET SHALL BE PROVIDED IF A 3/4" MOUNTING REACH FROM AN ACCESSIBLE SIDEWALK CANNOT BE ACHIEVED.

IF THE CURB RAMP IS NOT ALIGNED WITH THE CROSSWALK, THE ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY SMALL POINT IS IN THE DIRECTION OF TRAVEL, NOT IN THE DIRECTION OF THE CURB RAMP ORIENTATION.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

TRAFFIC SIGNALS
ACCESSIBLE PEDESTRIAN SIGNALS

DATE EFFECTIVE: 04/01/2021
DATE REVISED: 07/12/2021
902.05 1 OF 2
CONDUIT LOCATIONS

FOR CONTROLLER CABINETS WITH HEIGHTS FROM 4'-4" TO 6'-0"
TYPE E

FOR TYPE 170 CONTROLLER CABINETS
TYPE 332

NOTE:
1. DIMENSION VARIES ACCORDING TO CABINET HEIGHT.
2. GROUND ROD: 3/4" DIA. x 8" MIN. IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN A VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN ANGLE NOT TO EXCEED 30 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD MUST BE MADE.
3. LIFETIME SILICONE CAULK BETWEEN CABINET AND BASE.
4. #2 CORBIN LOCK
5. ANCHOR BOLTS USE BOLT HEAD OR TACK WELDED NUT ON EMBEDDED END AND SIZE AS SPECIFIED BY CABINET MANUFACTURER.

TRAFFIC SIGNALS
CONTROLLERS
CONDUIT LOCATION

DATE PREPARED: 04/01/2005
DATE APPROVED: 08/28/2005

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-800-444-MCOT (6268) 1-800-444-6268

TRAFFIC SIGNALS
CONTROLLERS
CONDUIT LOCATION

DATE EFFECTIVE: 06/01/2005
DATE PREPARED: 08/28/2000
902.100 SHEET NO. 1 OF 1
PEDESTAL OR NEW STATE-OWNED POLE TO BE SET WITHIN 2' TO 4' OF RIGHT-OF-WAY LINE. ALL SERVICE POWER SUPPLY ASSEMBLIES ARE TO BE LOCATED ON STATE PROPERTY.

SERVICE POLE SHALL BE GUYED WHEN SPAN OF OVERHEAD SERVICE WIRE EXCEEDS 50'.

SERVICE DISCONNECT BOXES AND METER BOXES SHALL BE ALUMINUM OR STAINLESS STEEL. ALL HARDWARE, HINGES, CATCHES, ETC. SHALL BE STAIN-LESS STEEL.

METER SOCKET AND OTHER EQUIPMENT AND MATERIALS SHALL BE U.L. APPROVED. AND CONFORM TO THE REQUIREMENTS OF THE UTILITY COMPANY OR MUNICIPALITY PROVIDING POWER.

SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF DOOR.

UTILITY COMPANY SHALL DECIDE IF LIGHTNING ARRESTERS ARE TO BE CONNECTED ON THE LOAD OR LINE SIDE OF THE METER. THE UTILITY COMPANY SHALL ALSO DECIDE IF THE LIGHTNING ARRESTER IS TERMINATED IN THE METER OR DISCONNECT CABINET. IF TERMINATED IN THE DISCONNECT CABINET, IT SHALL BE INSTALLED ON THE CONNECT CABINET. IF LIGHTING IS SPECIFIED, INSTALL LIGHTING CONTROL ON POWER SUPPLY.

BREAKERS SHALL CONFORM TO SEC. 901.4 OF THE STANDARD SPECIFICATIONS.

IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CAGED WELDED.

GENERAL NOTES:
FOR CABLE TYPES AND INSTALLATION, SEE STANDARD SPECIFICATIONS.

THE TYPE POWER SUPPLY ASSEMBLY IS SHOWN ON THE PLANS OR IS DESIGNATED IN THE CONTRACT.

WHERE SIGNAL OR LIGHTING POWER ONLY IS DESIGNATED, OMIT ITEMS NOT REQUIRED.

ALL OPENINGS IN ANY SERVICE BOX OR METER BOX SHALL BE COVERED AND SEALED WITH LIFETIME SILICONE CAULK.

ALL MATERIALS REQUIRED EXCLUDING REFERENCE ITEMS AS SHOWN ON DRAWING SHALL BE INCLUDED IN PRICE BID FOR POWER SUPPLY ASSEMBLY.

FOR WIRING DIAGRAM AND LABEL DETAIL SEE SHEET 2 OF 4.
TRAFFIC SIGNALS
POWER SUPPLY ASSEMBLY
240/120 VOLT SERVICE

MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

FOR CABLE TYPES AND INSTALLATION. SEE STANDARD SPECIFICATIONS.

THE TYPE POWER SUPPLY ASSEMBLY IS SHOWN ON THE PLANS OR IS DESIGNATED IN THE CONTRACT.

THE UTILITY COMPANY SHALL BE NOTIFIED IN WRITING 30 DAYS PRIOR TO DATE SERVICE WILL BE REQUIRED.

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GENERAL NOTES:

SERVICE POLE SHALL BE GUIED WHEN SPAN OF OVERHEAD SERVICE WIRE EXCEEDS 50'.

INCREASE 1 FOOT FOR EACH 5 FEET ABOVE 50 FEET.

SERVICE DISCONNECT BOXES AND METER BOXES SHALL BE ALUMINUM OR STAINLESS STEEL. ALL HARDWARE, HINGES, CATCHES, ETC. SHALL BE STAIN-LESS STEEL.

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UTILITY COMPANY SHALL DECIDE IF LIGHTNING ARRESTERS ARE TO BE CONNECTED ON THE LOAD OR LINE SIDE OF THE METER. THE UTILITY COMPANY SHALL ALSO DECIDE IF THE LIGHTNING ARRESTER IS TERMINATED IN THE METER OR DISCONNECT CABINET. IF TERMINATED IN THE DISCONNECT CABINET, IT SHALL BE INSTALLED ON THE CONNECT CABINET.

IF LIGHTING IS SPECIFIED. INSTALL LIGHTING CONTROL ON POWER SUPPLY.

BREAKERS SHALL CONFORM TO SEC. 901-4 OF THE STANDARD SPECIFICATIONS.

IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN VERTICAL POSITION. THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CAD WELDED.

SERVICE POLE 30' MIN. - CLASS IV WOOD. CONTRACTOR PROVIDED. MODOT OWNED.

SERVICE ENTRANCE HEAD

#8 AWG MIN. CABLE, 600 VOLT MIN.

SERVICE DISCONNECT BOX. LOCKING. RAIN TIGHT. NEMA 4

METER SOCKET, 200 AMP, FOR SIGNALS

GROUND WIRE. #2 AWG MIN.

GUY CABLE. AS REQUIRED

LIGHTING ARRESTER. VALVE TYPE. 2 POLE. 650 VOLT

Rigid Conduit and Terminals

SERVICE POLE 30' MIN. - CLASS IV WOOD. CONTRACTOR PROVIDED. MODOT OWNED.

SERVICE ENTRANCE HEAD

#8 AWG MIN. CABLE, 600 VOLT MIN.

SERVICE DISCONNECT BOX. LOCKING. RAIN TIGHT. NEMA 4

METER SOCKET, 200 AMP, FOR SIGNALS

GROUND WIRE. #2 AWG MIN.

GUY CABLE. AS REQUIRED

LIGHTING ARRESTER. VALVE TYPE. 2 POLE. 650 VOLT

Rigid Conduit and Terminals

POWER SUPPLY SIGNAL CABINET POWER PANEL

WIRING DIAGRAM SIGNALS AND/OR LIGHTING

LIST OF MATERIALS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SERVICE POLE 30' MIN. - CLASS IV WOOD. CONTRACTOR PROVIDED. MODOT OWNED.</td>
</tr>
<tr>
<td>2</td>
<td>#8 AWG MIN. CABLE. 600 VOLT</td>
</tr>
<tr>
<td>3</td>
<td>SERVICE ENTRANCE HEAD</td>
</tr>
<tr>
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<td>#8 AWG MIN. CABLE, 600 VOLT</td>
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<tr>
<td>23</td>
<td>SERVICE DISCONNECT BOX. LOCKING. RAIN TIGHT. NEMA 4</td>
</tr>
<tr>
<td>24</td>
<td>#8 AWG MIN. CABLE, 600 VOLT</td>
</tr>
</tbody>
</table>

NOTES

A. SERVICE POLE SHALL BE GUIED WHEN SPAN OF OVERHEAD SERVICE WIRE EXCEEDS 50'.

B. INCREASE 1 FOOT FOR EACH 5 FEET ABOVE 50 FEET.

C. SERVICE DISCONNECT BOXES AND METER BOXES SHALL BE ALUMINUM OR STAINLESS STEEL. ALL HARDWARE, HINGES, CATCHES, ETC. SHALL BE STAIN-LESS STEEL.

D. METER SOCKET AND OTHER EQUIPMENT AND MATERIALS SHALL BE U.L. APPROVED. AND CONFORM TO THE REQUIREMENTS OF THE UTILITY COMPANY OR MUNICIPALITY PROVIDING POWER.

E. SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF DOOR.

F. UTILITY COMPANY SHALL DECIDE IF LIGHTNING ARRESTERS ARE TO BE CONNECTED ON THE LOAD OR LINE SIDE OF THE METER. THE UTILITY COMPANY SHALL ALSO DECIDE IF THE LIGHTNING ARRESTER IS TERMINATED IN THE METER OR DISCONNECT CABINET. IF TERMINATED IN THE DISCONNECT CABINET, IT SHALL BE INSTALLED ON THE CONNECT CABINET.

G. IF LIGHTING IS SPECIFIED. INSTALL LIGHTING CONTROL ON POWER SUPPLY.

H. BREAKERS SHALL CONFORM TO SEC. 901-4 OF THE STANDARD SPECIFICATIONS.

I. IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN VERTICAL POSITION. THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CAD WELDED.

J. SERVICE POLE SHALL BE GUIED WHEN SPAN OF OVERHEAD SERVICE WIRE EXCEEDS 50'.

K. INCREASE 1 FOOT FOR EACH 5 FEET ABOVE 50 FEET.

L. SERVICE DISCONNECT BOXES AND METER BOXES SHALL BE ALUMINUM OR STAINLESS STEEL. ALL HARDWARE, HINGES, CATCHES, ETC. SHALL BE STAIN-LESS STEEL.

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V. METER SOCKET AND OTHER EQUIPMENT AND MATERIALS SHALL BE U.L. APPROVED. AND CONFORM TO THE REQUIREMENTS OF THE UTILITY COMPANY OR MUNICIPALITY PROVIDING POWER.

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Y. IF LIGHTING IS SPECIFIED. INSTALL LIGHTING CONTROL ON POWER SUPPLY.

Z. BREAKERS SHALL CONFORM TO SEC. 901-4 OF THE STANDARD SPECIFICATIONS.

AA. IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN VERTICAL POSITION. THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CAD WELDED.
TO FORM AIR GAP BETWEEN FILTER HOLE IN CABINET AND INSIDE CABINET

INSERT WAS~ ~x SEAL BETWEEN & AROUND LEXAN WINDOW

BOLTS 16 AND CABINET

FRONT VIEW

TOP VIEW

PHOTOELECTRIC SWITCH (14) 4" x 4" x 1-"

WINDOW DETAIL

WINDOW SECTION A-A

12" MIN.

CHAMFER

Drip Pocket

PRINT POCKET

PADLOCK HASP

SIDE VIEW

TO DISCONNECT GROUND

TO LIGHTS

WIRING DIAGRAM

120 VOLTS

LABEL DETAIL

EQUIPMENT LAYOUT

AWG SIZE

LIST OF MATERIALS

ITEM DESCRIPTION

1 CABINET. WATERPROOF, NEMA 4, 14 GA MINIMUM THICKNESS

2 PANEL. 19 OR MINIMUM THICKNESS: ALUMINUM OR STAINLESS STEEL

3 CONTINUOUS STAINLESS STEEL HINGE

4 NEOPRENE Gasket DOOR

5 3/8" - 16 COLLAR STUD

6 PHOTOELECTRIC SWITCH AND SOCKET. 105/285 V., 1000 WATT

7 15 AMP CONTROL BREAKER. SINGLE POLE, TYPE B

8 15 AMP AUTO-MANUAL SWITCH. SINGLE POLE BREAKER, TYPE B WITH LABEL

9 MAIN BREAKER. SINGLE POLE, TYPE B

10 NEUTRAL TERMINAL STRIP

11 LIGHTING TERMINAL BLOCK, INSULATED FROM BACK PANEL. 12 POSITION.

12 POWER, CABLE. #8 AWG MIN. 600 V.

13 FILTER. TRANSLUCENT. PLEXIGLASS 1/4" THICK MIN.

14 CLEAR, LEXAN #9034 WINDOW. 1/4" THICK MIN. EXCEPT FOR 15A BREAKER MIN. WIRE SIZE 10 AWG.

15 CABILE, LIGHTING

16 LIFETIME SILICONE CAULK

17 PLASTIC DUCT SEALANT

18 LABEL-WEATHERPROOF ADHESIVE-VINYL RAISED LETTERING (OR EQUIV.)

19 CONDUIT, RIGID, 2" MIN.

20 CONDUIT, RIGID, 1" MIN.

21 LIGHTING CONTACTOR. 2 POLE. 30 AMP. 600 VOLT. 120 VOLT COIL

22 #2 CORBIN LOCK

23 THREADED CONDUIT HUB WITH SEALING WASHERS

** SEE PLANS

NOTES:

A SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF CABINET DOOR.

B PHOTOELECTRIC SWITCH BARRETS MAY VARY. LOCATE CENTER OF WINDOW OVER CENTER OF PHOTOELECTRIC SWITCH.

C MAIN BREAKER SIZE:

TOTAL LUMINAIRE BREAKER SIZE MIN. AWG LOAD (WATTS)

DC-24V

15 10

930-1260 20 8

1270-1600 25 8

1610-1930 30 8

D TERMINAL BLOCK SHALL BE RATED AT 600V. SHALL ACCEPT WIRES UP TO 8 AWG AND SHALL HAVE A BARRIER BETWEEN EACH TERMINAL AND ON EACH END.

GENERAL NOTES:

A ALL OPENINGS IN CABINET SHALL BE COVERED AND SEALED WITH LIFETIME SILICONE CAULK.

B ALL CIRCUIT BREAKERS SHALL CONFORM TO SECTION 901.4 OF THE STANDARD SPECIFICATIONS.

C PLACEMENT OF ALL ITEMS SHALL BE APPROVED BY THE ENGINEER.

D CABINET SHALL BE LOCATED AWAY FROM TRAFFIC. TOP MOUNT PHOTO CONTROL SHALL FACE AN OPEN SKY. SIDE MOUNT PHOTO CONTROL SHALL FACE NORTH.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

TRAFFIC SIGNALS

POWER SUPPLY ASSEMBLY

240/120 VOLT SERVICE

DATE EFFECTIVE: 07/01/2004

DATE PREPARED: 08/28/2004

902.15K

3 OF 3
GENERAL NOTES:

4. Conduit shall be electrically bonded by a ground bushing and #6 AWG bare copper wire for PVC conduit. All ground wires shall be connected.

5. Signal pull boxes shall be embossed "State Signals" and lighting pull boxes "State Lighting."

6. Pull box frames and covers shall be cast iron and the following minimum dimensions:

<table>
<thead>
<tr>
<th>Number of Entering Conductors</th>
<th>Class A</th>
<th>Class B</th>
<th>Class C</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 - 35</td>
<td>1&quot;</td>
<td>1 3/4&quot;</td>
<td>2 1/2&quot;</td>
</tr>
<tr>
<td>35 - 45</td>
<td>1 1/4&quot;</td>
<td>2</td>
<td>3 1/4&quot;</td>
</tr>
<tr>
<td>50 - 60</td>
<td>1 5/8&quot;</td>
<td>2 3/4&quot;</td>
<td>4</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>2&quot;</td>
<td>3&quot;</td>
<td>4 3/4&quot;</td>
</tr>
</tbody>
</table>

7. If an extension is used with a preformed box, the lip of the extension may be interior or exterior. The extension shall be compatible and from the same manufacturer.

8. If preformed pull boxes are specified, the contractor may use the standard concrete pull box in lieu of the Class 1 or 2 preformed pull box or the double concrete pull box, Type A, in lieu of the Class 3 preformed pull boxes.
GENERAL NOTES:

1. AGGREGATE SHALL BE TYPE 1 CONFORMING TO SEC 1007.
2. BOX SHALL BE OF A FLARE DESIGN AND HAVE A LIP FOR STABILIZATION.

A MINIMUM OF NINE HOOKS, INSTALLED IN THREE LEVELS, SHALL BE INCLUDED WITH EACH PULL BOX.

IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN A VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CADWELDED.

THE CIRCULAR PULL BOX COVER SHOULD BE SIZED TO FIT A BOX WITH A CLEAR OPENING OF 25".

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

TRAFFIC SIGNALS
CONCRETE AND PREFORMED PULL BOXES

DATE EFFECTIVE: 11/01/2010
DATE PREPARED: 9/3/2010
SHEET NO. 302.20G 3 OF 3

TYPE I DRAIN TYPE

TYPE II DRAIN TYPE

(SEE DRAIN OUTLET DETAILS)

(SECTION ABOVE BREAK APPLICABLE TO TYPE I DRAIN.)
NOTE: Wiring from telephone company pedestal or manhole will be furnished and installed by telephone company.

Underground Telephone Connection

Typical buried telephone cable to signal controller.

Flexible steel conduit to be grounded to the ground rod and power company ground.

Separate conduit and cable from telephone manhole or pedestal.

12" x 12" x 6" junction box with 1" to 1½" knock-out in bottom.
2" minimum metal conduit containing 1-2c #12 AWG and 1c #12 AWG.
3" minimum flexible conduit containing 1-2c #12 AWG and 1c #12 AWG.

All items contractor furnished and installed.

Date Effective: 03/01/1996
Date Prepared: 8/26/2000
### DETAIL A

<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
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<tr>
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<td>1.750</td>
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<tr>
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<td>115</td>
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<tr>
<td>146</td>
<td>140</td>
<td>9.50</td>
<td>2.500</td>
</tr>
</tbody>
</table>

**DATE EFFECTIVE:** 02/01/2008

**DATE PREPARED:** 08/26/2009

---

**NOTE:**
- All anchor bolts shall be fully galvanized.
- BOLT, THREAD, and DIA. C should be measured in inches.

---

**SIDE VIEW**
- Two bolts per plate
- Hex nut or 1/4" fillet weld all around both sides

**END VIEW**
- Four bolts per plate
- Hex nut or 1/4" fillet weld all around both sides

---

**OPTIONAL STEEL PLATE FOR ANCHOR BOLTS**
Details of the drawing include:

- Loop Slot Detail
- Alternate Section D-D Median or Island Detail
- Section B-B Lead Slot
- Details of an "E" Joint or Other Full Depth Joint Crossing

General Notes:
- Sensor unit shall be housed in controller cabinet unless specified otherwise.
- Loops to be installed when existing Portland cement concrete or asphaltic concrete pavement is being resurfaced. Loops shall not be placed in surface course of the asphaltic concrete.
- The conduit slot may be rewire if normally constructed, any forming needed to secure conduit in slot shall be removed.
- A separate conduit shall be installed between the shaded loop slot and the first pull box for each loop. The conduit opening at the end of the lead-in slot shall be at the bottom of the same slot.
- After cable installation, the conduit opening at the loop lead entrance shall be sealed.
- Loop "E" joints or other full depth joints. Minor adjustments to loop location may be made.

Use typical dimensions unless otherwise shown on plans.
LOOP SHALL BE #18 AND STRANDED WIRE IN PROPER WAVE UP OF 2 NON-TWISTED THREADS IN SINGLE SLOTTED PLUG AS RECOMMENDED BY MANUFACTURER OF THE DETECTOR AMPLIFIER. LOOP SHALL BE PLACED IN SADDLE SLOTTED IN FIGURE EIGHT MANNER.

TO FILL BOX

2 WIRES
2 WIRES
2 WIRES

3 WIRES

TO FILL BOX

VEHICLE FLOW

ABANDONED LOOPS

IF EXISTING LOOPS ARE TO BE ABANDONED AND NEW LOOP INSTALLED, ABANDONED LOOP WIRES SHALL BE REMOVED OR CUT COMPLETELY THROUGH.

TRAFFIC SIGNALS
INDUCTION LOOP DETECTORS

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-637-MODOT (637-6636)
1-888-638-6636

G.R. 10/24/2015
902.50M
2 OF 2
PLUMB LINE

LUMINAIRE WHERE REQUIRED

POLE CAP

SEPARATE CLAMP SHALL BE USED FOR MESSANGER WIRE IF SPAN WIRE EXTENDS TWO DIRECTIONS FROM THE SAME POLE.

ALL CONDUCTOR CABLE INSIDE POLE (AS REQUIRED) 12' X 7.5" X 32'

ZERO GAGE STEEL POST

LUMINAIRE AND BRACKET ARE AS SPECIFIED ON PLANS. SEE STANDARD 901.00 FOR MOUNTING DETAILS.

STEEL PLATE

CONDUIT AS REQUIRED

GROUND LUG

CONTINUOUS WELD

THIMBLE CLEVIS

PIN

HEAVY HEX NUT AND WASHER

SCREEN

STEEL PLATE ANCHOR BASE

GENERAL NOTES:
DESIGN OF STRUCTURAL SUPPORTS SHALL COMPLY WITH AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS 2001 AND CURRENT INTERMS.

MAXIMUM SPAN LENGTH:
160' FOR ONE OR TWO SPANS OFF POST, WITH GUY WIRE, ONE 5-SECTION HEAD SIGNAL, TWO 3-SECTION HEAD SIGNALS AND TWO SIGNS PER SPAN.
100' FOR ONE SPAN OFF POST, WITHOUT GUY WIRE, WITH THREE 3-SECTION HEAD SIGNALS AND TWO SIGNS PER SPAN.
100' FOR TWO SPANS OFF POST, WITHOUT GUY WIRE, WITH TWO 3-SECTION HEAD SIGNALS AND ONE SIGN PER SPAN.

CONCRETE POLE EMBEDMENT SHALL BE CLASS B CONCRETE. SEE SHEET 1 FOR DOWN GUY INFORMATION WHEN DOWN GUY IS SPECIFIED ON PLANS.

EXPANSIVE GROUT SHALL BE USED BETWEEN THE POLE BASE PLATE AND THE CONCRETE BASE WHEN INDIVIDUAL NUT COVERS ARE USED. SEE STANDARD 902.40 FOR SCREEN DETAILS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)
TRAFFIC SIGNALS
RIGID SPAN WIRE DETAILS

DATE EFFECTIVE: 04/01/2021
DATE PREPARED: 1/27/2021
902.70Q
SHEET NO.
2 OF 3
SPAN WIRE CLAMP

DETAIL A

CUTTER FIN
SPLINTER AFTER
INSERTION

BACKING BAR

DETAIL B

TEETHER
CLIP

DETAIL B

BACKING BAR

DETAIL A

GENERAL NOTES:
SIGNS UP TO 5FT IN WIDTH SHALL BE INSTALLED ON ONE VERTICAL BACKING BAR. SIGNS 5FT TO 9FT IN WIDTH SHALL BE INSTALLED ON TWO VERTICAL BACKING BARS. SIGNS WIDER THAN 9FT SHALL BE INSTALLED ON THREE VERTICAL BACKING BARS.

SPAN WIRE SIGNING
### Type A Arrow Dimensions

<table>
<thead>
<tr>
<th>Letter Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; H.C.</td>
<td>5&quot;</td>
<td>25&quot;</td>
<td>34&quot;</td>
<td>14&quot;</td>
<td>16&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>10.55&quot; &amp; 15.55&quot; H.C.</td>
<td>5.5&quot;</td>
<td>30&quot;</td>
<td>42&quot;</td>
<td>16&quot;</td>
<td>18&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>10&quot; H.C.</td>
<td>4.5&quot;</td>
<td>35&quot;</td>
<td>48&quot;</td>
<td>17&quot;</td>
<td>19&quot;</td>
<td>6&quot;</td>
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</tbody>
</table>

### Type B Arrow Dimensions

<table>
<thead>
<tr>
<th>Letter Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; - 10.55&quot; H.C.</td>
<td>5&quot;</td>
<td>25&quot;</td>
<td>34&quot;</td>
<td>14&quot;</td>
<td>16&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>15.55&quot; H.C.</td>
<td>6&quot;</td>
<td>30&quot;</td>
<td>44&quot;</td>
<td>16&quot;</td>
<td>18&quot;</td>
<td>5&quot;</td>
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<tr>
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<td>4.5&quot;</td>
<td>35&quot;</td>
<td>48&quot;</td>
<td>17&quot;</td>
<td>19&quot;</td>
<td>6&quot;</td>
</tr>
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</table>

### Type C Arrow Dimensions

<table>
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<tr>
<th>Letter Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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<tbody>
<tr>
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<td>5&quot;</td>
<td>25&quot;</td>
<td>34&quot;</td>
<td>14&quot;</td>
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<td>3&quot;</td>
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<tr>
<td>10.55&quot; &amp; 15.55&quot; H.C.</td>
<td>5.5&quot;</td>
<td>30&quot;</td>
<td>42&quot;</td>
<td>16&quot;</td>
<td>18&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>10&quot; H.C.</td>
<td>4.5&quot;</td>
<td>35&quot;</td>
<td>48&quot;</td>
<td>17&quot;</td>
<td>19&quot;</td>
<td>6&quot;</td>
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</table>

### Type D Arrow Dimensions

<table>
<thead>
<tr>
<th>Letter Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; H.C.</td>
<td>5&quot;</td>
<td>25&quot;</td>
<td>34&quot;</td>
<td>14&quot;</td>
<td>16&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>10.55&quot; &amp; 15.55&quot; H.C.</td>
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<td>30&quot;</td>
<td>44&quot;</td>
<td>16&quot;</td>
<td>18&quot;</td>
<td>5&quot;</td>
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<tr>
<td>10&quot; H.C.</td>
<td>4.5&quot;</td>
<td>35&quot;</td>
<td>48&quot;</td>
<td>17&quot;</td>
<td>19&quot;</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

**General Notes:**

- Errors for reference only.
- Arrow details available from Traffic and Highway Safety Division.

---

**STANDARD ARROW DETAILS**

- For horizontal placement under legend, dimension "E" will be increased as 1 foot horizontal to approximately 10% of the maximum legend width.
- For use on signs with type L-1 or L-2 legends.

---

**Type C Overhead Arrow Dimensions**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>27&quot;</td>
<td>16&quot;</td>
<td>10&quot;</td>
<td>5&quot;</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>

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**MODOT**

105 West Capitol
Jefferson City, MO 65102
1-888-888-6600
1101 Missouri 756-688-8888
### STRUCTURAL SIGN DATA

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>COLOR SCHEME</th>
<th>SHEETING</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>LEGEND</td>
<td>BACKGROUND</td>
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<tr>
<td></td>
<td>WHITE</td>
<td>WHITE</td>
</tr>
<tr>
<td></td>
<td>RED</td>
<td>B/WH TYPE 8 OR 10</td>
</tr>
<tr>
<td></td>
<td>BLUE</td>
<td>B/WH TYPE 8 OR 10</td>
</tr>
<tr>
<td></td>
<td>GREEN</td>
<td>B/WH TYPE 8 OR 10</td>
</tr>
<tr>
<td></td>
<td>BLACK</td>
<td>B/WH TYPE 8 OR 10</td>
</tr>
<tr>
<td></td>
<td>FL FLUORESCENT</td>
<td>B/WH BLACK FILM</td>
</tr>
<tr>
<td></td>
<td>FL ORANGE</td>
<td>B/WH BLACK FILM</td>
</tr>
</tbody>
</table>

**NOTE:** WHITE LEGEND IS DIRECT APPLIED UNLESS SPECIFIED OTHERWISE.

### FLAT SHEET SIGN DATA

<table>
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<th>DESIGNATION</th>
<th>COLOR SCHEME</th>
<th>SHEETING</th>
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<tr>
<td></td>
<td>RED</td>
<td>RED</td>
</tr>
<tr>
<td></td>
<td>FL FLUORESCENT</td>
<td>FL BLACK FILM</td>
</tr>
<tr>
<td></td>
<td>FL ORANGE</td>
<td>ORANGE</td>
</tr>
</tbody>
</table>

**NOTE:** LEGEND AND BACKGROUND COLORS ARE ACHIEVED THROUGH TRANSPARENCY AND FILMS.

### FLAT SHEET THICKNESS

<table>
<thead>
<tr>
<th>SIGN SIZE</th>
<th>THICKNESS</th>
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<tbody>
<tr>
<td>1/4 IN.</td>
<td>0.001 IN.</td>
</tr>
<tr>
<td>1/8 IN.</td>
<td>0.008 IN.</td>
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</table>

**GENERAL NOTES:**
- ALL SIGN MOUNTED SIGNS GREATER THAN 8 FEET HIGH OR SIGNS GREATER THAN 20 SQUARE FEET SHALL BE STRUCTURAL.
- ALL SIGN MOUNTED SIGNS NOT FOUND IN THE MMSC MANUAL SHALL BE DETAILLED BY THE TRAFFIC AND HIGHWAY SAFETY DIVISION OFFICE.
- REFER TO STANDARD SPECIFICATION (SEC 1042) FOR SHEETING, SUBSTRATE, AND FABRICATION DETAILS.
- FOR MOUNTING DETAILS, SEE STANDARD FLANS 903.02.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITAL
JEFFERSON CITY, MO 65102
1-888-687-MODOT 1-888-687-6636

**HIGHWAY SIGNING**

**GENERAL SIGN DATA**

**DATE EFFECTIVE:** 9/2020

**DATE ISSUED:** 7/18/2010

**SHEET #:** 1 OF 8
**General Notes:**

All backing bars shall be 2\% 4" steel galvanized after painting. Depth = 3/8" less per foot. Holes in bars shall be 4" and shall be finished as shown on this drawing.

**Detail A** - The end of the horizontal backing bars shall extend a minimum of 5 inches past the sign bolt, but shall not extend past the edge of the sign.

**Detail B** - For signs installed on a parallel horizontal backing bars, the additional bolt shall be spaced to the left sign to keep assembly square.

When using optional backing bar layout, vertical bars shall be mounted behind horizontal bars.

Backing bars shall meet Missouri standard plans or approved product list.

Backing bars paid for as structural steel per fence.

All signs to be installed along vertical centerline for post and footing data and details of shields on flanges. See other drawings.

**Non-Mandatory Vertical Spacing:**
Indicated between signs to be achieved by using the closest available hole when using post.

---

**Missouri Highways and Transportation Commission**

105 West Capitol
Jefferson City, MO 65102
1-800-442-MODOT (663-6888)

**Highway Signing**

**Back-Up Bars**

**Sheet B**

**Mounting Route Shield and Marker Assemblies**

**Effective Date:**

**Sheet 903.02AP**

**4 OF 8**
CLAMP TYPE SIGN SUPPORT FOR PIPE POST

<table>
<thead>
<tr>
<th>WIDTH OF PIPE POST CLAMP</th>
<th>SIGN TYPE</th>
<th>MINIMUM &quot;</th>
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</thead>
<tbody>
<tr>
<td>FLAT</td>
<td>1-1/2</td>
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<tr>
<td>STRUCTURAL</td>
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MOUNTING DETAILS FOR FLAT SHEET ON PIPE POST

MOUNTING DETAILS FOR FLAT SHEET SIGNS ON ROUND STRUCTURES >4" PIPE POST

NOTES:
FOR GENERAL NOTES, SHEET 1 OF 16.
FOR MOUNTING WEIGHT AND OFFSET DETAIL, SEE SHEET 16 OF 16.
FOR DETAILS OF EXTRUDED ALUMINUM PANEL AND POST CLIP DETAILS, SEE STANDARD PLANS 903.02 SHEET 1 OF 7.
ANCHOR BOLT DETAIL

12-GAUGE ANCHOR

7-GAUGE ANCHOR

FOR 2 FT x 2 FT POST
BOLT HOLE DIAMETER = 3/4"
2 PER SIDE ON ALL 4 SIDES

7-GAUGE ANCHOR
FABRICATION DETAIL

2.5" x 2.25" FOOT (COMPR) OF 2.25" POST WITH 1/4" INSERT OF 2.25" POST THAT RISE UP FROM THE BREAKAWAY DEVICE

THE BREAKAWAY DEVICE PORTION FIXED TO THE BARRIER ANCHOR SHALL BE NO HIGHER THAN 4" ABOVE THE FINISHED GRADE

BARRIER WALL MOUNTING DETAIL

ANCHOR TUBE SHALL BE T-GAUGE
1/2" x 4 1/4" GALVANIZED MECHANICAL FASTENERS SHALL BE USED TO ATTACH ANCHOR TO BARRIER WALL
SHOULDER BOLTS SHALL BE USED TO ATTACH 3/4" POST TO ANCHOR (SEE ANCHOR BOLT DETAIL)
ANCHOR SHALL BE NOT GALLERIZED AFTER FABRICATION PER SECTION 10850
FINISHING AND INSTALLATION OF BARRIER WALL POST ANCHOR FOR POST SHALL BE PER PER EACH AS CONCRETE POST ANCHOR

OMNIDIRECTIONAL/STABILIZED DRIVEN ANCHOR DETAIL

12-GAUGE (NOT SHOWN) OR 7-GAUGE

BREAKAWAY AND 2.5" + 2.25" POST DETAIL

THE ANCHOR SHOULD BE A MAXIMUM OF 2.5" ABOVE THE GROUND LEVEL

DRIVEN ANCHOR INSTALLATION DETAIL

TOP OF FOOTING: FLUSH WITH FINISHED GRADE

CONCRETE FOOTING DETAIL

7-GAUGE ANCHOR

4" CLEAN AGGREGATE

POLYURETHANE FOAM FOOTING DETAIL

12-GAUGE ANCHOR

7-GAUGE ANCHOR

NOTE:
FOR GENERAL NOTES, SEE SHEET 1 OF 16.
FOR MOUNTING WIDTH AND OFFSET DETAILS, SEE SHEET 10 OF 16.
ALL BREAKAWAY DEVICES USED IN AN INSTALLATION SHALL BE CERTIFIED WSHC 100-COMPLIANT.
NOTE:
- SQUARE BOLT HEAD SHOWN MAY BE REPLACED WITH RECTANGULAR BOLT HEAD WITH THE NARROW DIMENSION EQUAL TO 0.177".

T-BOLT DETAIL

NOTES:
- ALUMINUM BOLTS SHALL BE ASTM B 211, 2024-T6 OR D6061-T6.
- ALUMINUM LOCK NUTS (NYLON INSERT) SHALL BE ASTM B 211 OR 2017-T4.

FOR THE GENERAL NOTES, SEE SHEET 1 OF 16.
FOR MOUNTING HEIGHT AND OFFSET DETAILS, SEE SHEET 10 OF 16.
FOR POST CLIP DETAILS, SEE STANDARD PLANS 905.02 SHEET 6 OF 7.
ALTERNATE POST MOUNTING HARDWARE USE SHALL BE ON APPROVED LIST.
CHANNEL POST DELINEATOR AND FASTENER DETAILS

GROUND MOUNT U-CHANNEL

36 INCH SURFACE-MOUNT DELINEATOR POST
TUBULAR DELINEATOR DETAIL
COLOR OF TUBULAR DELINEATOR AND REFLECTIVE SHEETING SHALL MATCH THE COLOR OF THE CLOSEST PAVEMENT MARKING OR THE MARKING.
TUBULAR DELINEATOR SHAPE MAY BE ROUND OR T-SHAPED.
TUBULAR DELINEATOR SHALL BE PERMANENTLY MOUNTED TO THE PAVEMENT SURFACE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

CHANNEL POST DELINEATOR

LIMITS
<table>
<thead>
<tr>
<th>NOMINAL</th>
<th>TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2</td>
<td>±1/8</td>
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</tbody>
</table>

CHANNEL POST DELINEATOR MOUNTING DETAILS

SHOULDER MOUNTED

OUTSIDE BARRIER CURB

NARROW PAVED MEDIAN

CHANNEL POST DELINEATOR REFLECTOR

NOTE:
RETROREFLECTIVE YELLOW, WHITE, OR RED SHEETING IN ACCORDANCE WITH SEC 1092.2.1.5 SHALL BE APPLIED TO ONLY ONE SIDE OF THE DELINEATOR REFLECTOR BODY.
THE COLOR OF THE SHEETING SHALL CORRESPOND TO THE CLOSEST PAVEMENT MARKING.
3" X 6" DELINEATOR BODY SHALL BE MADE FROM 0.080 INCH ALUMINUM.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
1105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

SIGN MOUNTING DETAILS DELINEATORS

DATE APPROVED: 7/23/2013
DATE PREPARED: 6/21/2013
903.03BR
11 OF 16
DELINEATORS ON CONCRETE TRAFFIC BARRIER
FOR CONCRETE BARRIER DETAILS:
SEE SHEET 637.10 OR BRIDGE PLANS.

DELINEATOR CONNECTION ON CONCRETE TRAFFIC BARRIER DETAIL

NOTES:
FOR GENERAL NOTES: SEE SHEET 1 OF 16.
REFLECTIVE/YELLOW, WHITE OR RED SHEETING IN
ACCORDANCE WITH MO 992:2.7.5 SHALL BE APPLIED TO
ONLY ONE SIDE OF THE DELINEATOR REFLECTOR BODY.
THE COLOR OF THE SHEETING SHALL CORRESPOND TO THE
CLOSEST ADJACENT PAVEMENT MARKING.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
1105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT 1-888-275-6636

SIGN MOUNTING DETAILS
CONCRETE BARRIER DELINEATORS

ROADWAY OR BRIDGE CONCRETE TRAFFIC BARRIER DELINEATION
DELINEATORS ON GUARDRAIL
FOR GUARDRAIL DETAILS, SEE STP PLANS 606.00 AND 606.50.

(1) A SECONDARY DELINEATOR WITH RED SHEETING SHALL BE ATTACHED TO THE BACK SIDE OF THE CHANNEL WHEN THE
DELINEATION IS PLACED ALONG AN INTERCHANGE RAMP AND SHALL BE VISIBLE BY AVOIDING TRAFFIC.

DELINEATORS ON THREE-STRAND MEDIAN GUARD CABLE
FOR THREE-STRAND GUARD CABLE DETAILS
SEE STP PLANS 606.41.

NOTES:

FOR GENERAL NOTES, SEE SHEET 1 OF 16.

RETROREFLECTIVE YELLOW, WHITE OR RED SHEETING IN
ACCORDANCE WITH SEC 1042.2.1.5 SHALL BE APPLIED TO
ONLY ONE SIDE OF THE DELINEATOR REFLECTOR BICY.

THE COLOR OF THE SHEETING SHALL CORRESPOND TO THE
CLOSEST ADJACENT PAVEMENT MARKING.
Type 4 Object Marker Installation

Typical Road Closure

Length of U-Beam Rail = 12'-6"
WEIGH STATION

RIGHT LANE

1 MILE

WEIGH STATION

ISOMETRIC VIEW

BUSES WEIGH MOUNTING ASSEMBLY

OPEN CLOSED

FOR OPEN AND CLOSED SIGN SEE SPECIAL PROVISIONS

GENERAL SIGN DATA

SHR1-1 TYPE REFLECTIVE SHEETING TYPE COLOR LETTER SERIES

BACKGROUND L-1 BLACK C

SYMBOLS L-1 BLACK C

BORDER L-1 BLACK C

SUBSTRATE SHEET BLACK C

CHANGEABLE SIGN DETAIL

SUBSTRATE LEGEND, SYMBOLS, & BORDER

L-1 SCREEN PRINT

L-3 DIRECT APPLIED (CUT FROM MATERIAL SHOWN ON PLANS)

REFLECTIVE SHEETING

R4 PRISMATIC IN ACCORDANCE WITH SEC 1042.2.7.3

PERMIT SIGN DETAIL

MATERIAL LIST

NO. DESCRIPTION LB.

1 STEEL PLATE 2.26

2 3/8 STANDARD PIPE 32.44

2 2-1/2" STANDARD PIPE 3.89

8 1/2 GALV. MACH. BOLT 12.9

8 GALV. WASHER 7.2

GENERAL NOTES:

DESIGN SPEC: AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS - 1975.

MATERIALS AND FABRICATION SHALL CONFORM TO THE REQUIREMENTS OF THE STATE HIGHWAY AND TRANSPORTATION COMMISSION STANDARD SPECIFICATIONS AND PROVISIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL

JEFFERSON CITY, MO 65102

1-888-ASK-MODOT (1-888-275-6636)

DATE EFFECTIVE: 12/31/2011

903.04F SHEET NO. 1 OF 1

WEIGH STATION

LICENSE FUEL

MoDOT PERMITS AVAILABLE HERE

LRI-15'6" 6'6" 15'3" 15'7" 8'7" 8'6" 8'5" 7' 6' 3' 3'
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## FOOTINGS

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## TRUSS STRUCTURE

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## POSTS FOR MAXIMUM AREA

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## BEAM CLAMP DETAIL

- **BEAM CLAMP DETAIL**
  - **1/4" FIN WITH COUNTER**
  - **8" x 8" HIGH STRENGTH STEEL CLIPS**
  - **HEAVY HEX NUTS AND WASHER**

## ELEVATION

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## POST BASE DETAIL

**GALVANIZING SIGN BRACKET ASSEMBLY**

**GALVANIZING SIGN BRACKET ASSEMBLY**
SIMULATED WIND-SHOP TEST LOADING

NOTE: FOR SIZE OF CHORD MEMBERS, SEE DATA SHEET. SHOP SPANS MAY BE PERPENDICULAR OR STRAIGHT, BUT SHALL BE SIMULTANEOUSLY AT HORIZONL OF SPAN.

GENERAL NOTES:
ALL STRUCTURAL STEEL AND COLUMN BASE PLATES ASTM A36.
ALL ANCHOR BOLTS SHALL BE ASTM F594, GRADE 5.
FIELD FITTED FIELD SPLICES SHALL BE SHOWN ON SHOP DRAWINGS FOR APPROVAL OF THE ENGINEER.
TRUSSES SHALL BE MANUFACTURED WITH A MINIMUM OF 0.002" SPACING ON TRUSSES.
FIELD FITTING WILL NOT BE PERMITTED WITHIN THE WIND LOAD SPANS OF SPAN.

FOR ADDITIONAL INFORMATION SEE DATA SHEET.
PART ELEVATION OF BUTTERFLY TRUSS

SECTION C-C

SECTION B-B

SECTION D-D

SECTION E-E

SECTION F-F

NOTE: 5/8" DIA. BOLTS SHALL BE REMOVED AFTER WELDING IS COMPLETE. BOLT HOLES SHALL BE FLUSHED AND THE OUTSIDE FACE GROUND SMOOTH.

DETAIL 1

DETAIL 2

DETAIL 3

DETAIL 4

DETAIL 5

LOCATION OF FIELD SPLICE

NOTE: 1) SPLICE CANNOT BE FIELD SPlice IN THIS SHEET. ALL FIELD SPLICE SHALL BE LOCATED AT CENTER LINE OF MAIN PANEL FOR DETAIL TO COLUMN.

OVERHEAD SIGN TRUSSES
BUTTERFLY & CANTILEVER STRUCTURAL STEEL

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-627-MODOT (1-888-627-6636)

DATE REVIEWED: 10/14/2020
DATE DRAWN: 9/24/2021

903.12AA SHEET NO. 2 OF 7
### Drilled Shaft Option

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### Alternate Pedestals

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### Spread Footing Option

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### Spread Footing Option with Alternate Pedestals

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### Notes

* Base plates, pedestal and footings, longer side shall be normal to axis of sign.
* Base plates, pedestal and footings, longer side shall be normal to axis of sign.

---

**Missouri Highways and Transportation Commission**

105 West Capitol
Jefferson City, MO 65102
1-800-365-MODOT (1-800-365-6636)

**Overhead Sign Trusses**

Optional Substructure Data

Sheet No.: 903.12AA

Date: 05/04/2021

4 OF 7
SECTION A-A
(TYPICAL SECTION SHOWING REINFORCING STEEL)
4.5" CLEAR FOR FE = 4'-6"
6" CLEAR FOR FE > 4'-6"
VERTICAL LEGS OF C3 SHALL BE PLACED INSIDE SHAFT C3 BARS.

2" CONDUIT
PVC SCHEDULE 40

(CIRCULAR)

COLLAR
C3 BARS

OPTIMAL CONSTRUCTION JOINT

SHAFT (CIRCULAR)

ST BARS

ELEVATION

SECTION B-B

TOP OF SHIELD
BETWEEN PLATE
OPTIONAL CONSTRUCTION JOINT

ELEVATION

DETAILED OF ALTERNATE PEDESTAL
(TO BE USED AS PART OF TYPE A OR TYPE C MEDIAN BARRIER)
MINIMUM CLEARANCE TO REINFORCEMENT IS 3" EXCEPT AS SHOWN.

WHEN ROCK IS ENCOUNTERED AT A DEPTH NOT EXCEEDING "H/2 FOR FE = 4'-6" OR "H/4 FOR FE > 4'-6"
THE ELEVATION MAY BE ADJUSTED TO A MINIMUM OF 3 X "H/2". SUBJECT TO APPROVAL BY THE ENGINEER.

CONTACT THE ENGINEER IF WATER TABLE IS ENCOUNTERED DURING EXCAVATION.

TOTAL COLUMN EASE PLATE AND ANCHOR BOLTS AND HINGE DETAILS RELATING TO THESE ITEMS HAVE BEEN OMITTED FOR CLARITY. REFER TO SHEET 3 OF 7 FOR DETAILS OF THESE ITEMS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CREST, MO 65063
1-888-661-MODOT (661-6686)

OVERHEAD SIGN TRUSSES
DRILLED SHAFT OPTION

DATE EFFECTIVE: 03/02/2020
DATE FINISHED: 03/04/2020
903.12AA 5 OF 7 SHEET