Standard Plan Book Holders:


The Michigan Department of Transportation has revised the subject standard plans as follows:


- Simplified dimensioning of the castings based on industry comments.

Standard Plan R-11-E
- Removed details of the split monument box.

Standard Plan R-28-I
- A note present on sheets one, two, three and four the cross slopes of 2% maximum were revised to 2.0% maximum to increase contractor accuracy in meeting ADA requirements. On sheet two, added the 2" maximum dimension to the detectable warning and added a slab thickness note to Section A-A. Revised the ramp slope on the Section Through Curb Cut. On sheet four, added a 2" maximum detectable warning border offset note to the Sidewalk Ramp Type D drawings and removed Detail A. On sheet six, removed the Sidewalk Ramp symbol and added symbols for Sloped Surface and for Detectable Warning to the Legend. Revised the slope below the grade break and added a slab thickness note to the detectable warning surface coverage area.

Standard Plan R-29-I
- Cross slopes of 2% maximum were revised to 2.0% maximum to increase contractor accuracy in meeting ADA requirements. On sheet one, revised cross slope on the 4" Concrete Sidewalk detail. On sheet four, revised sidewalk cross slope on the Low Volume Commercial or Residential Driveway Slopes detail and the note regarding transverse sidewalk slopes.

Standard Plan R-30-G
- On sheet one, the notes below the curb details were revised to, “omit reinforcement when tied to or cast integrally with pavement”. In the note section, obsolete notes regarding pavement reinforcement and the payment & use of neoprene joints for D curb were deleted.

Standard Plan R-41-H
- On sheet one removed pavement reinforcement and associated notes from the SYMBOL (D) and (S) detail. On sheet two removed note regarding steel reinforcement.

Standard Plan R-50-F
- On sheet four labeled washer thickness as ¼".

October 13, 2014
Standard Plan R-56-E
On sheets one, four and five revised the dimensions and notes for the guardrail approach terminal Type 3. Representation of Type 3 approach terminals was clarified to indicate the use of various product and transition options.

Standard Plan R-60-I
On sheet ten revised the note regarding placing guardrail with curb.

Standard Plan R-100-H
On sheet one revised the mulch blanket dimension from 6’ - 8’ to 8’ and removed the notes pertaining to the conditions of use for different size mulch blankets.

Standard Plan B-25-H
Updated weld symbol on sheet two. Revised exterior base plate dimensions on sheet six.

**Special Instructions**

For those choosing to maintain a loose leaf hard copy of the Standard Plans, the following assembly instructions are provided. In addition to removing and replacing the appropriate standard plans with the enclosed revisions remove Standard Plan R-19-B (obsolete) and Standard Plan R-112-G (superseded by a special detail).

*In some cases it may be necessary to retain the outdated plans until all projects using these superseded plans have been completed.*

Questions regarding revisions may be submitted by email to:

**MDOT-Road-Design-Standards@michigan.gov** for Road Standards

**MDOT-Bridge-Design-Standards@michigan.gov** for Bridge Standards

Enclosures

DD: WKP/st

cc: C. Libiran  
W. Pikka  
V. Zokvic
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**Note:** Former Standard Plans IV-87, IV-89, IV-90, and IV-91 Series, used for building cast-in-place concrete headwalls for elliptical and circular pipe culverts, are now being replaced with plans that detail each specific size. The Municipal Utilities Unit will provide special details for inclusion in construction plans for MDOT projects. To assure prompt delivery, request **must be made in advance.** Contact Steve Urda 517-373-0745.

Former Standard Plans IV-93 and IV-94 series are being replaced with precast concrete slab & box culverts, as per a frequently used special provision (for slab culverts) and the 2012 Standard Specifications for Construction (for box culverts).
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* SPECIAL DETAILS WILL BE INCLUDED IN THE CONSTRUCTION PLANS
### STEEL REINFORCEMENT QUANTITIES

#### CASE I (SIDE INLET 24" DIAMETER OR LESS)

<table>
<thead>
<tr>
<th>SEWER DIAMETER</th>
<th>48&quot; - 60&quot;</th>
<th>66&quot; - 78&quot;</th>
<th>84&quot; - 96&quot;</th>
<th>102&quot; - 108&quot;</th>
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</thead>
<tbody>
<tr>
<td>BAR</td>
<td>48&quot; - 60&quot;</td>
<td>66&quot; - 78&quot;</td>
<td>84&quot; - 96&quot;</td>
<td>102&quot; - 108&quot;</td>
</tr>
<tr>
<td>A1</td>
<td>#7</td>
<td>12</td>
<td>5' - 6&quot;</td>
<td>132</td>
</tr>
<tr>
<td>A2</td>
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<td>12</td>
<td>7' - 6&quot;</td>
<td>95</td>
</tr>
<tr>
<td>A3</td>
<td>#7</td>
<td>12</td>
<td>5' - 6&quot;</td>
<td>132</td>
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<td>#5</td>
<td>14</td>
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<tr>
<td>A7</td>
<td>#5</td>
<td>4</td>
<td>3' - 0&quot;</td>
<td>13</td>
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<td>A8</td>
<td>#7</td>
<td>12</td>
<td>7' - 6&quot;</td>
<td>180</td>
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<td>A9</td>
<td>#4</td>
<td>4</td>
<td>2' - 6&quot;</td>
<td>7</td>
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<tr>
<td>A10</td>
<td>#6</td>
<td>8</td>
<td>5' - 6&quot;</td>
<td>66</td>
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<tr>
<td>A12</td>
<td>#5</td>
<td>4</td>
<td>3' - 0&quot;</td>
<td>13</td>
</tr>
<tr>
<td>K1</td>
<td>#4</td>
<td>10</td>
<td>4' - 2&quot;</td>
<td>29</td>
</tr>
<tr>
<td><strong>TOTAL STEEL WEIGHT</strong></td>
<td></td>
<td></td>
<td></td>
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</table>

#### CASE I (27" DIAMETER THROUGH 60" DIAMETER SIDE INLET)

<table>
<thead>
<tr>
<th>SEWER DIAMETER</th>
<th>48&quot; - 60&quot;</th>
<th>66&quot; - 78&quot;</th>
<th>84&quot; - 96&quot;</th>
<th>102&quot; - 108&quot;</th>
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</thead>
<tbody>
<tr>
<td>BAR</td>
<td>48&quot; - 60&quot;</td>
<td>66&quot; - 78&quot;</td>
<td>84&quot; - 96&quot;</td>
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<tr>
<td>A1</td>
<td>#8</td>
<td>15</td>
<td>9' - 6&quot;</td>
<td>369</td>
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<tr>
<td>A2</td>
<td>#5</td>
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<td>7' - 6&quot;</td>
<td>127</td>
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<td>A3</td>
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<td>3' - 0&quot;</td>
<td>238</td>
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<td>A4</td>
<td>#7</td>
<td>42</td>
<td>3' - 0&quot;</td>
<td>253</td>
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<td>A11</td>
<td>#8</td>
<td>9</td>
<td>4' - 6&quot;</td>
<td>105</td>
</tr>
<tr>
<td>A12</td>
<td>#5</td>
<td>4</td>
<td>3' - 0&quot;</td>
<td>13</td>
</tr>
<tr>
<td>K1</td>
<td>#4</td>
<td>10</td>
<td>4' - 0&quot;</td>
<td>28</td>
</tr>
<tr>
<td><strong>TOTAL STEEL WEIGHT</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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**MICHIGAN DEPARTMENT OF TRANSPORTATION**

**BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR**

**MANHOLE BASE TYPE 2**

**9-14-2001**

**F.I.W.A. APPROVAL**

**3-26-2001**

**R-4-D**

**SHEET 3 OF 3**
DEPARTMENT DIRECTOR
MICHIGAN DEPARTMENT OF TRANSPORTATION

TOP VIEW OF FRAME

SECTION A - A

FOR USE ON MANHOLES

36" DIAMETER
NOTES:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE SEATING FACE OF THE LID AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GROUND OR MACHINED SO THAT THE LID WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THIS COVER IS DESIGNED TO FIT ON ANY MANHOLE OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.
PLAN VIEW OF FRAME

SIDE ELEVATION OF FRAME
NOTE:
BOLT CURB BOX FIRMLY TO FRAME AT FOUNDRY WITH THREE
3/4" DIAMETER x 2 1/2" GALVANIZED MACHINE BOLTS WITH
WASHERS AND NUT ENDS. (SEE NOTES)

SECTION D - D

FRONT ELEVATION OF CURB BOX

NOTE:
The castings shall meet the requirements of the current standard
specification for gray iron castings.

All castings shall be cleaned by current approved blasting
methods.

The seating face of the grate and the seat for the same on the
frame and the curb box shall be ground so that the grate will
have an even bearing on its seat to prevent rocking or tilting.

The castings shall be free of pouring faults, blow holes, cracks
and other imperfections. They shall be sound, true to form and
thickness, clean and neatly finished, and shall be coated with
coal tar pitch varnish.

The bearing surfaces between curb box and frame shall be ground
and seated so as to provide an even bearing throughout. The curb
box shall be firmly bolted in place on the frame before finishing
of the grate seats is done. Galvanized iron washers and shims
shall be placed between frame and ends of curb box so as breaking
of curb box when these bolts are tightened.

The curb box and both sections shall be shipped assembled.

This cover is designed to fit on any inlet, catch basin or on
any existing similar structure when so designated on the plans.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT

COVER C
FOR USE WITH
CONCRETE CURB & GUTTER, DETAIL D

9-30-2014
5-15-2014
R-8-D
3 OF 3
PLAN VIEW OF GRATE

SECTION B - B

COVER C ASSEMBLY

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

COVER CX
FOR USE WITH CONCRETE CURB & GUTTER,
DETAIL D (FREEWAYS ONLY)

9-30-2014  5-15-2014  R-8X-D
F.H.W.A. APPROVAL  PLAN DATE  SHEET
2 OF 3
NOTE:
BOLT CURB BOX FIRMLY TO FRAME AT FOUNDRY WITH THREE 
3/8" DIAMETER x 2-1/2" GALVANIZED MACHINE BOLTS WITH 
WASHERS AND NUT ENDS. (SEE NOTES)

PLAN VIEW OF CURB BOX

SECTION D - D

FRONT ELEVATION OF CURB BOX

NOTES:
THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD 
SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING 
METHODS.

THE SEATING FACE OF THE GRATE AND THE SEAT FOR THE SAME ON THE 
FRAME AND THE CURB BOX SHALL BE GROUND SO THAT THE GRATE WILL 
HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS 
AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND 
THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH 
COAL TAR PITCH VARNISH.

THE BEARING SURFACES BETWEEN CURB BOX AND FRAME SHALL BE GROUND 
AND SEATED SO AS TO PROVIDE AN EVEN BEARING THROUGHOUT. THE CURB 
BOX SHALL BE FIRMLY BOLTED IN PLACE ON THE FRAME BEFORE FINISHING 
OF THE GRATE SEATS IS DONE. GALVANIZED IRON WASHERS AND SHIMS 
SHALL BE PLACED BETWEEN FRAME AND ENDS OF CURB BOX SO AS BREAKING 
OF CURB BOX WHEN THESE BOLTS ARE TIGHTENED.

THE CURB BOX AND BOTH SECTIONS SHALL BE SHIPPED ASSEMBLED.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON 
ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.
NOTES:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE SEATING FACE OF THE GRATE AND THE SEAT FOR THE SAME ON THE FRAME AND THE CURB BOX SHALL BE GROUND SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO Designated ON THE PLANS.
DEPARTMENT DIRECTOR
MICHIGAN DEPARTMENT OF TRANSPORTATION

R-9X-E

COVER DX
FOR USE WITH
CONCRETE VALLEY GUTTER (FREeways ONLY)

PLAN VIEW OF FRAME

HALF SIDE ELEVATION  SECTION A - A

36" DIAMETER

22½"
20¾"

2¼"

36"
COVER DX
FOR USE WITH
CONCRETE VALLEY GUTTER (FREeways ONLY)

NOTES:
The castings shall meet the requirements of the current standard specification for gray iron castings.

All castings shall be cleaned by current approved blasting methods.

The seating face of the grate and the seat for the same on the frame and the curb box shall be ground so that the grate will have an even bearing on its seat to prevent rocking or tilting.

The castings shall be free of pouring faults, blow holes, cracks and other imperfections. They shall be sound, true to form and thickness, clean and neatly finished, and shall be coated with coal tar pitch varnish.

This cover is designed to fit on any inlet, catch basin or on any existing similar structure when so designated on the plans.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

PLAN VIEW OF GRATE

SECTION C - C
The castings shall meet the requirements of the current standard specification for gray iron castings.

All castings shall be cleaned by current approved blasting methods.

The castings shall be free of pouring faults, blow holes, cracks and other imperfections. They shall be sound, true to form and thickness, clean and neatly finished, and shall be coated with coal tar pitch varnish.

The casting shall be set in soft mortar bed to the elevation specified on the plans and in such a manner as to provide a firm and uniform bearing on the masonry wall.

This cover is designed to fit on any inlet, catch basin or on any existing similar structure when so designated on the plans.
MONUMENT BOXES

NOTES:

ALL MATERIALS AND WORKMANSHIP SHALL BE ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS.

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATIONS FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

ALL CASTINGS AND THEIR MATCHING SEATS SHALL BE GROUND OR MACHINED SO THAT AN EVEN BEARING IS ATTAINED, THIS PREVENTING ROCKING OR TILTING.

THE CASTING SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS, AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX RING

SECTION B - B

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE

MONUMENT BOX COVER

SECTION C - C

PLAN VIEW

DIMENSION TO FIT MONUMENT BOX FRAME

MONUMENT BOX FRAME

SECTION A - A

PLAN VIEW

HOLE CIRCLE

FOUR LOCATIONS

PICKHOLE
The castings shall meet the requirements of the current standard specification for gray iron castings.

All castings shall be cleaned by current approved blasting methods.

The castings shall be free of pouring faults, blow holes, cracks and other imperfections. They shall be sound, true to form and thickness, clean and neatly finished, and shall be coated with coal tar pitch varnish.

The casting shall be set in soft mortar bed to the elevation specified on the plans and in such a manner as to provide a firm and uniform bearing on the masonry wall.

This cover is designed to fit on any inlet, catch basin or on any existing similar structure when so designated on the plans.
PLAN VIEW OF FRAME

SIDE ELEVATION OF FRAME

Michigan Department of Transportation
Bureau of Highway Development Standard Plan for

COVER J
FOR USE WITH
CONCRETE CURB & GUTTER DETAIL B
MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF HIGHWAY DEVELOPMENT

STANDARD PLAN FOR

R-14-D

SECTION A - A

SECTION X - X

SECTION Y - Y

PLAN VIEW OF GRATE

SECTION B - B

NOTES:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE SEATING FACE OF THE GRATE AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GROUND OR MACHINED SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF HIGHWAY DEVELOPMENT

STANDARD PLAN FOR

COVER J

FOR USE WITH CONCRETE CURB & GUTTER DETAIL B

9-30-2014
F.H.W.A. APPROVAL

4-16-2014
PLAN DATE

R-14-D
SHEET
2 OF 2
**PLAN VIEW OF FRAME**

**SIDE ELEVATION OF FRAME**

**NOTE:**
BOLT CURB BOX TO FRAME WITH THREE 3/4" x 2 1/2" GALVANIZED MACHINE BOLTS.
ADJUST FOR HEIGHT AFTER FORMS FOR CURB ARE IN PLACE.
FRONT VIEW OF CURB BOX

SIDE VIEW

NOTES:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON OR DUCTILE IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE SEATING FACE OF THE GRATE AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GROUND OR MACHINED SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THE CURB BOX AND FRAME SHALL BE SHIPPED ASSEMBLED.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

COVER K
FOR USE WITH CONCRETE CURB & GUTTER
DETAILS C, E & F

F.H.W.A. APPROVAL  4-8-2014  R-15-F  SHEET 3 OF 3
DRILL AND TAP FOR 7/8" - 13 BOLTS ON DRILL DIMPLES PROVIDED. TYP. OR PROVIDE REPLACEABLE THREAD OPTION.

FOUR 3/8" DIAMETER HOLES ON 32 3/8" DIAMETER BOLT CIRCLE.

TOP VIEW OF FRAME

36" DIAMETER

23 3/8" DIA.

22 5/8" DIA.

FRAME SECTION

26 1/4"

24 3/4" INSIDE DIAMETER OF GROOVE

24"

28 3/16"

36" DIAMETER

Michigan Department of Transportation

BUREAU OF HIGHWAY DEVELOPMENT

STANDARD PLAN FOR

COVER Q

FOR USE ON MANHOLES OR SANITARY SEWERS WHERE VENT HOLES ARE NOT DESIRED

Kirk T. Sludie
DEPARTMENT DIRECTOR

Randall L. Pitzel
DIRECTOR, BUREAU OF FIELD SERVICES

Malcolm A. Van Pelt
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

T-186

SHEET 1 OF 2

9-30-2014
3-12-2014
F.H.W.A. APPROVAL
PLAN DATE

R-18-F
A NON-LOCKING COVER MAY BE USED WHEN APPROVED BY THE ENGINEER.
PLAN VIEW OF FRAME

SECTION B - B

SECTION A - A

THE TOP SURFACE OF THE FLANGE SHALL BE SLOPED TOWARDS THE CENTER OF THE CASTING FOR DRAINAGE.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

COVER R
**Plan View of Grate**

**Front Elevation of Grate**

**Section C - C**

**Section X - X**

**Section Y - Y**

**Notes:**

The castings shall meet the requirements of the current standard specification for gray iron castings.

All castings shall be cleaned by current approved blasting methods.

The seating face of the grate and the seat for the same on the frame shall be ground or machined so that the grate will have an even bearing on its seat to prevent rocking or tilting.

The castings shall be free of pouring faults, blow holes, cracks and other imperfections. They shall be sound, true to form and thickness, clean and neatly finished, and shall be coated with coal tar pitch varnish.

This cover is designed to fit on any inlet, catch basin or on any existing similar structure when so designated on the plans.
PLAN VIEW OF FRAME

THE TOP SURFACE OF THE FLANGE SHALL BE SLOPED TOWARDS THE CENTER OF THE CASTING FOR DRAINAGE.

SECTION B - B

SECTION A - A

FOR DRAINAGE.

CENTER OF THE CASTING SLOPED TOWARDS THE FLANGE SHALL BE SLOPED TOWARDS THE TOP SURFACE OF THE CASTING FOR DRAINAGE.

COVER RX
FOR USE ON MANHOLES

36" DIAMETER
THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE SEATING FACE OF THE GRATE AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GROUND OR MACHINED SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

COVER RX
FOR USE ON MANHOLES
NOTE:
FRAME MAY BE CAST MONOLITHICALLY OR IN TWO PIECES AS SHOWN. FRAMES CAST IN TWO PIECES SHALL BE TIGHTLY BOLTED TOGETHER WHEN DELIVERED.

PLAN OF FRAME

SECTION A - A

NOTE:
(2) 3/4" DIA. CORED HOLES FOR 7/8" DIA. BOLTS (BOTH SIDES OF FRAME WHEN CAST IN TWO PIECES)
SECTION B1 - B1
(CAST MONOLITHICALLY)

SECTION B2 - B2
(CAST IN TWO PIECES)
**COVER V**

**MICHIGAN DEPARTMENT OF TRANSPORTATION**

**BUREAU OF HIGHWAY DEVELOPMENT**

**STANDARD PLAN FOR**

**ALTERNATE PROFILES PERMITTED**

**PLAN OF GRATE**

**SECTION D - D**

**SECTION C - C**

**NOTES:**

The castings shall meet the requirements of the current standard specification for gray iron castings.

All castings shall be cleaned by current approved blasting methods.

The castings shall be free of pouring faults, blow holes, cracks and other imperfections. They shall be sound, true to form and thickness, clean and neatly finished, and shall be coated with coal tar pitch varnish.

The seating face of grate and the seat for the same on the frame shall be ground or machined so that the grate will have an even bearing on its seat to prevent rocking or tilting.

This cover is designed to fit on any inlet, catch basin or on any existing similar structure when so designated on the plans.

Grate may be provided with bolting capability.
NOTES:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THE SEATING FACE OF GRATE AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GROUND OR MACHINED SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

GRATE MAY BE PROVIDED WITH BOLTING CAPABILITY.

ALTERNATE PROFILES PERMITTED

SECTION C - C
PLAN OF FRAME

SECTION A - A

SECTION B - B

23\(^{1/4}\)"

46\(^{1/2}\)"

46\(^{1/2}\)"

24"

48"

3/8" DIAMETER CORED BOLT HOLES

Michigan Department of Transportation
Bureau of Highway Development

Standard Plan for Cover VG
For Use With Concrete Valley Gutter

Prepared by: B.L.T.
Drawn by: W.K.P.
Checked by: W.K.P.

Approved by: M. A. Vin Park Phifer
Director, Bureau of Highway Development

APPROVED BY:
Director, Bureau of Field Services

DEPARTMENT DIRECTOR
Kirk T. Strube

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

COVER VG
FOR USE WITH CONCRETE VALLEY GUTTER

F.H.W.A. APPROVAL
5-30-2014
5-22-2014
R-24-D

SHEET
1 OF 2

9-30-2014
5-22-2014
R-24-D

SHEET
1 OF 2
NOTES:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THE SEATING FACE OF GRATE AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GROUND OR MACHINED SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

GRATE MAY BE PROVIDED WITH BOLTING CAPABILITY.
NOTES:
FOR INSTALLATION OF BEAM GUARDRAIL, SEE STANDARD PLAN R-60-SERIES.
FOR INSTALLATION OF GUARDRAIL ANCHORAGE, BRIDGE, SEE STANDARD PLAN R-67-SERIES.
IF AN INTEGRAL OR SEMI-INTEGRAL ABUTMENT IS NOT USED SEE R-32-SERIES FOR ACCOMMODATING EXPANSION IN THE AREA OF THE PAVEMENT SEAT.

BRIDGE APPROACH CURB & GUTTER, DETAIL 4
(USING EXISTING CATCH BASIN)
PLAN

APPROX. 16'-6"

APPROX. 10'-0"

6'-6"

ELEVATION

WIDTH AS REQUIRED

SECTION X - X

SECTION Z - Z

BRIDGE APPROACH CURB & GUTTER, DETAIL 4A
(USING EXISTING CATCH BASIN)

NOTE: USE ONLY WHEN GUARDRAIL IS NOT NEEDED ON DEPARTING ENDS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

BRIDGE APPROACH CURB & GUTTER
(USING EXISTING CATCH BASIN)
**MAXIMUM TURNING SPACE SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.**

**MAXIMUM RAMP CROSS SLOPE IS 2.0%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.**

---

**SIDEWALK RAMP TYPE R**

(ROLLED SIDES)

* TURNING SPACE

**SIDEWALK RAMP TYPE F**

(FLARED SIDES, TWO RAMPS SHOWN)

DETECTABLE WARNING DETAILS

SIDEWALK RAMP AND DETECTABLE WARNING DETAILS
* Maximum turning space slope is 2.0% in each direction of travel. Minimum dimensions 5' x 5'. See notes.

** Maximum ramp cross slope is 2.0%. Running slope 5% - 7% (8.3% maximum). See notes.

---

**SECTION A-A**

- Transition adjacent gutter pan cross section to provide 5.0% maximum counter slope across the ramp opening.
- Pavement shall end flush with the gutter pan.
- Ramp slope
- Ramp shall end flush with back of curb

---

**SECTION THROUGH CURB CUT**

(Typical all ramp types)

---

**SIDEWALK RAMP TYPE RF**

(Rolled / flared sides)
SIDEWALK RAMP TYPE P
(PARALLEL RAMP)
DO NOT USE IN AREAS WHERE PONDING MAY OCCUR

SIDEWALK RAMP TYPE C
(COMBINATION RAMP)
USE 24" DEEP DETECTABLE WARNINGS IF MEDIAN WIDTH IS AT LEAST 6'-0". OTHERWISE NO DETECTABLE WARNING IS REQUIRED.

SIDEWALK RAMP TYPE M
(MEDIAN ISLAND)

- MAXIMUM TURNING SPACE SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.
- MAXIMUM RAMP CROSS SLOPE IS 2.0%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.
• Maximum turning space slope is 2.0% in each direction of travel. Minimum dimensions 5' x 5’. See notes.

** Maximum ramp cross slope is 2.0%, running slope 5% - 7% (8.3% maximum). See notes.

2" maximum detectable warning border offset measured from the ends of the radius. See notes

(RADIAL DETECTABLE WARNING ShOWN)

2" maximum detectable warning border offset measured from the ends of the radius. See notes

(TANGENT DETECTABLE WARNING ShOWN)

SIDewALK RAMP TYPE D

(DEPRESSED CORNER)

USE ONLY WHEN INDEPENDENT DIRECTIONAL RAMPS CAN NOT BE CONSTRUCTED FOR EACH CROSSING DIRECTION
* The Detectable Warning surface shall be located so that the edge nearest the rail crossing is 6' minimum and 15' maximum from the centerline of the nearest rail. Do not place detectable warning on railroad crossing material.

Detectable Warning at Railroad Crossing

Detectable Warning at Flush Shoulder or Roadway

Detectable Warning Details

Michigan Department of Transportation
Bureau of Highway Development Standard Plan for

Sidewalk Ramp and Detectable Warning Details

9-30-2014 F.H.W.A. Approval
7-1-2014 Plan Date
R-28-I Sheet 5 of 7
LEGEND

- SLOPED SURFACE
- DETECTABLE WARNING
- "NON-WALKING" AREA
- CROSSWALK MARKING
- PREFERRED LOCATION OF DRAINAGE INLET (TYP.)
- ALTERNATE LOCATION OF DRAINAGE INLET (TYP.)

SECTION B-B
SIDEWALK RAMP ORIENTATION

SIDEWALK RAMP LOCATED IN RADIUS (TYPE R SHOWN) (GRADE BREAK GREATER THAN 5')

SIDEWALK RAMP PERPENDICULAR TO RADIAL CURB (TYPE F SHOWN) (USE WITH RADIAL CURB WHEN THE CROSSWALK AND SIDEWALK RAMP ARE NOT ALIGNED)

WHERE EITHER END OF THE BOTTOM GRADE BREAK IS MORE THAN 5' FROM THE BACK OF CURB, THE DETECTABLE WARNING SHALL BE LOCATED AT THE BACK OF CURB. (DOME ORIENTATION IS NOT SIGNIFICANT ON RADIUS)

SIDEWALK RAMP LOCATED IN RADIUS (TYPE R SHOWN) (GRADE BREAK LESS THAN 5')

WHERE BOTH ENDS OF THE BOTTOM GRADE BREAK ARE WITHIN 5' OF THE BACK OF CURB, THE DETECTABLE WARNING SHALL BE LOCATED ON THE RAMP SURFACE AT THE BOTTOM GRADE BREAK.

2% (5.0% MAX.) SLOPE BEYOND BOTTOM GRADE BREAK

SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

Michigan Department of Transportation
Bureau of Highway Development Standard Plan for PAVEMENT CURB & GUTTER RAMP

RAMP SLOPE 5% - 7% (8.3% MAXIMUM) SEE NOTES

1" EXPANSION JOINT
APPRAOCH AREA SHALL END FLUSH WITH BACK OF CURB

24" DEEP DETECTABLE WARNING, EXTENDING THE WIDTH OF THE RAMP.

9-30-2014 7-1-2014 R-28-I SHEET 6 OF 7
NOTES:

DETAILS SPECIFIED ON THIS PLAN APPLY TO ALL CONSTRUCTION, RECONSTRUCTION, OR ALTERATION OF STREETS, CURBS, OR SIDEWALKS IN THE PUBLIC RIGHT OF WAY.

SIDEWALK RAMP ARE TO BE LOCATED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

RAMPS SHALL BE PROVIDED AT ALL CORNERS OF AN INTERSECTION WHERE THERE IS EXISTING OR PROPOSED SIDEWALK AND CURB. RAMPS SHALL ALSO BE PROVIDED AT MARKED AND/OR SIGNALIZED MID-BLOCK CROSSINGS.

SURFACE TEXTURE OF THE RAMP SHALL BE THAT OBTAINED BY A COARSE BROOKING, TRANSVERSE TO THE RUNNING SLOPE.

SIDEWALK SHALL BE RAMPED WHERE THE DRIVEWAY CURB IS EXTENDED ACROSS THE WALK.

CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP, WHERE CONDITIONS PERMIT. IT IS DESIRABLE THAT THE SLOPE OF THE RAMP BE IN ONLY ONE DIRECTION, PARALLEL TO THE DIRECTION OF TRAVEL.

RAMP WIDTH SHALL BE INCREASED, IF NECESSARY, TO ACCOMMODATE SIDEWALK SNOW REMOVAL EQUIPMENT NORMALY USED BY THE MUNICIPALITY.

PROVIDE TURNING SPACES WHERE PEDESTRIAN TURNING MOVEMENTS ARE REQUIRED.

WHEN 5'-0" MINIMUM WIDTHS ARE NOT FEASIBLE, RAMP WIDTH MAY BE REDUCED TO NOT LESS THAN 4'-0" AND TURNING SPACES TO NOT LESS THAN 4'-0" x 4'-0".


FOR NEW ROADWAY CONSTRUCTION, THE RAMP CROSS SLOPE MAY NOT EXCEED 2.0%. FOR ALTERATIONS TO EXISTING ROADWAYS, THE CROSS SLOPE MAY BE TRANSITIONED TO MEET AN EXISTING ROADWAY GRADE. THE CROSS SLOPE TRANSITION SHALL BE APPLIED UNIFORMLY OVER THE FULL LENGTH OF THE RAMP.

THE MAXIMUM RUNNING SLOPE OF 8.3% IS RELATIVE TO A FLAT (0%) REFERENCE. HOWEVER, IT SHALL NOT REQUIRE ANY RAMP OR SERIES OF RAMPS TO EXCEED 15 FEET IN LENGTH.

DRAINAGE STRUCTURES SHOULD NOT BE PLACED IN LINE WITH RAMPS. THE LOCATION OF THE RAMP SHOULD TAKE PRECEDENCE OVER THE LOCATION OF THE DRAINAGE STRUCTURE. WHERE EXISTING DRAINAGE STRUCTURES ARE LOCATED IN THE RAMP PATH OF TRAVEL, USE A MANUFACTURER'S ADA COMPLIANT GRATE. OPENINGS SHALL NOT BE GREATER THAN 1/2". ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.

TRANSITION THE GUTTER PAN CROSS SECTION SUCH THAT THE COUNTER SLOPE IN THE DIRECTION OF RAMP TRAVEL IS NOT GREATER THAN 5.0%. MAINTAIN THE NORMAL GUTTER PAN CROSS SECTION ACROSS DRAINAGE STRUCTURES.

THE TOP OF THE JOINT FILLER FOR ALL RAMP TYPES SHALL BE FLUSH WITH THE ADJACENT CONCRETE.

CROSSWALK AND STOP LINE MARKINGS, IF USED, SHALL BE SO LOCATED AS TO STOP TRAFFIC SHORT OF RAMP CROSSINGS. SPECIFIC DETAILS FOR MARKING APPLICATIONS ARE GIVEN IN THE "MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES".

FLARED SIDES WITH A SLOPE OF 10% MAXIMUM, MEASURED ALONG THE ROADSIDE CURB LINE, SHALL BE PROVIDED WHERE AN UNOBSTRUCTED CIRCULATION PATH LATERALLY CROSSES THE SIDEWALK RAMP. FLARED SIDES ARE NOT REQUIRED WHERE THE RAMP IS BOTHERED BY LANDSCAPING, UNPAVED SURFACE OR PERMANENT FIXED OBJECTS. WHERE THEY ARE NOT REQUIRED, FLARED SIDES CAN BE CONSIDERED IN ORDER TO AVOID SHARP CURB RETURNS AT RAMP OPENINGS.

DETECTABLE WARNING PLATES MUST BE INSTALLED USING FABRICATED OR FIELD CUT UNITS CAST AND/OR ANCHORED IN THE PAVEMENT TO RESIST SHIFTING OR HEAVING.
LOCATION OF JOINTS IN CONCRETE SIDEWALK

WHERE A PERMANENT STRUCTURE IS LOCATED IN SIDEWALK, PLACE EXPANSION MATERIAL AROUND STRUCTURE AND ADJUST JOINT PATTERN TO INTERSECT STRUCTURE AS ILLUSTRATED.

TYPICAL SIDEWALK JOINT LAYOUTS

4" CONCRETE SIDEWALK

1" EXPANSION JOINT
1/2" EXPANSION JOINT

1/2" EXPANSION JOINT SHALL BE PLACED BETWEEN SIDEWALK AND RIGID STRUCTURE. WHEN DIRECTED BY THE ENGINEER THE JOINT SHALL BE PLACED 1'-0" FROM PROPERTY LINE.

50'-0" MAXIMUM EXPANSION JOINT SPACING

1" EXPANSION JOINT
1/2" EXPANSION JOINT

INSOFAR AS POSSIBLE, SIDEWALK SHALL BE DIVIDED INTO SQUARE UNIT AREAS BY MEANS OF CUT JOINTS NOT MORE THAN 36 SFT OR LESS THAN 16 SFT.

SIDEWALK INTERSECTIONS SHALL BE CAST MONOLITHICALLY WITH JOINT LINES PLACED AS NEAR TO PERPENDICULAR AS POSSIBLE WITH SIDEWALKS EDGE. TO AVOID NARROW OR POINTED PIECES OF CONCRETE.

WALK WIDTH AS SPECIFIED ON PLANS

1/2" R (TYP.)

* 1.5% (2.0% MAXIMUM) TOWARD STREET

* SEE NOTES

BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK

MICHIGAN DEPARTMENT OF TRANSPORTATION

DEPARTMENT DIRECTOR
Kirk T. Sboide

DIRECTOR, BUREAU OF FIELD SERVICES
Rand V. Portzel

DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT
Mark A. Van Pelt Jr.

9-30-2014
7-1-2014
R-29-I

1 OF 4
CONCRETE DRIVEWAY OPENING LAYOUT

ALIGN DRIVEWAY RETURN TO FIT OPENING IN CURB & GUTTER

CONTRACTION OR PLANE OF WEAKNESS JOINT

SECTION A - A
CONCRETE DRIVEWAY OPENING, DETAIL L

** TO FRONT EDGE OF GUTTER PAN

*** USE "W" JOINT IF THE DRIVEWAY AND CURB ARE POURED MONOLITHICALLY OR SYMBOL "B" JOINT IF THEY ARE POURED IN STAGES.

1" EXPANSION JOINT (FOR CURB & GUTTER NOT TIED TO CONCRETE PAVEMENT)

SECTION B - B
CONCRETE DRIVEWAY OPENING, DETAIL M

** 1'-6"

1" EXPANSION JOINT (FOR CURB & GUTTER NOT TIED TO CONCRETE PAVEMENT)

REINFORCEMENT AS IN ADJACENT CURB & GUTTER

NOTE:

FOR ROADWAYS WITH CONCRETE PAVEMENTS, LONGITUDINAL LANE TIES WILL BE CONTINUOUS THROUGH THE DRIVEWAY OPENING AND THE SPACING OF THE #5 BARS IN CONCRETE DRIVEWAYS SHALL BE ADJUSTED TO AVOID CONFLICT WITH THE LONGITUDINAL LANE TIES.
HMA DRIVEWAY APPROACH
(TO BE USED WITH DETAIL L)

CONCRETE DRIVEWAY APPROACH
(TO BE USED WITH DETAIL L OR M)

THICKENED CONCRETE SIDEWALK

REINFORCEMENT FOR CONCRETE DRIVEWAYS

<table>
<thead>
<tr>
<th>CONCRETE DRIVEWAY THICKNESS</th>
<th>WIRE SIZE (6&quot; x 6&quot; MESH)</th>
<th>AVERAGE WEIGHT (LBS/100 SQ FT)</th>
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<tbody>
<tr>
<td>LESS THAN 8&quot;</td>
<td>W1.4</td>
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</tr>
<tr>
<td>8&quot; OR GREATER</td>
<td>W2.9</td>
<td>42</td>
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MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT
STANDARD PLAN FOR
DRIVEWAY OPENINGS,
& APPROACHES,
AND CONCRETE SIDEWALK

INTERMEDIATE DRIVEWAY JOINT DETAILS

NOTES:
MONOLITHIC CURB IS INCLUDED IN THE CONCRETE DRIVEWAY APPROACH QUANTITY.
REINFORCEMENT IS NOT REQUIRED UNLESS SPECIFIED ON THE PLANS. WHEN REINFORCEMENT IS SPECIFIED, SEE CHART ON THIS SHEET.
LOW VOLUME COMMERCIAL OR RESIDENTIAL DRIVEWAY SLOPES

COMMERCIAL DRIVEWAY PROFILE FOR MAJOR TRAFFIC GENERATORS

NOTES:

FOR DRIVEWAY DESIGN REFER ALSO TO "ADMINISTRATIVE RULES REGULATING DRIVEWAYS, BANNERS, AND PARADES ON OR OVER HIGHWAYS" AND GEOMETRIC DESIGN G-680-SERIES, COMMERCIAL DRIVEWAYS.

FOR CURB AND GUTTER DETAILS, SEE STANDARD PLAN R-30-SERIES.

TRANSVERSE SIDEWALK SLOPES ARE TYPICALLY 1.5% (2.0% MAXIMUM). IN ORDER TO MEET SITE CONDITIONS, IF THE TRANSVERSE SLOPE IS REQUIRED TO BE LESS THAN 1.5%, LONGITUDINAL DRAINAGE MUST BE PROVIDED.

WHEN SETTING GRADES FOR COMMERCIAL DRIVES, THE TYPES OF VEHICLES USING THE DRIVE SHOULD BE CONSIDERED.
- Epoxy coated #4 bar - Omit when tied to or cast integral with pavement.

**CONCRETE CURB AND GUTTER PAN**

**CONCRETE CURB & GUTTER**

**DETAIL**

**DIMENSION**

**LANE TIES**

**CONCRETE CYD / LFT**

<table>
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<tr>
<th>DETAIL</th>
<th>M</th>
<th>N</th>
<th>LANE TIES</th>
<th>CONCRETE CYD / LFT</th>
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<tr>
<td>B2</td>
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**DETAIL**

**DIMENSION**

**LANE TIES**

**CONCRETE CYD / LFT**

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<tr>
<th>DETAIL</th>
<th>M</th>
<th>N</th>
<th>LANE TIES</th>
<th>CONCRETE CYD / LFT</th>
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**DETAIL**

**DIMENSION**

**LANE TIES**

**CONCRETE CYD / LFT**

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<th>DETAIL</th>
<th>M</th>
<th>N</th>
<th>LANE TIES</th>
<th>CONCRETE CYD / LFT</th>
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**DETAIL**

**DIMENSION**

**LANE TIES**

**CONCRETE CYD / LFT**

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<tr>
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<th>LANE TIES</th>
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<tr>
<td>E4</td>
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**NOTE:**

- Gutter Pan Width May Be Reduced When Approved by the Engineer.

- When other than 7" (4" min. to 9" max.), face exposure is specified on plans. Vary total curb height and batter accordingly.
NOTES:
CURB AND GUTTER RADII SHALL BE DIMENSIONED TO THE FRONT EDGE OF THE GUTTER PAN OR EDGE OF PAVEMENT.
CONCRETE CURB AND GUTTER ENDINGS WILL BE PAID FOR IN LINEAR FEET OF THE ADJACENT CURB DETAIL.
JOINTS SHALL BE PLACED AT RIGHT ANGLES TO THE EDGE OF CONCRETE CURB AND GUTTER.
JOINTS DETAILED ON THE PLANS SHALL SUPERSEDE THOSE SPECIFIED ON THIS STANDARD PLAN.
BOTTOM SLOPE OF CURB AND GUTTER STRUCTURE MAY BE THE SAME SLOPE AS BOTTOM OF PAVEMENT. BACK OF CURB AND VERTICAL EDGE OF GUTTER PAN MAY HAVE A MAXIMUM \( \frac{1}{2} \) BATTER TO FACILITATE FORMING.
WHEN CURB AND GUTTER IS CAST INTEGRALLY, SEE CURRENT STANDARD PLAN R-31-SERIES.
ALL JOINTS FOR CURB OR CURB AND GUTTER ARE INCLUDED IN THE PAY ITEM FOR THE CURB OR CURB AND GUTTER.

JOINTS IN CURB OR CURB AND GUTTER NOT TIED TO CONCRETE PAVEMENT; ADJACENT TO CONCRETE BASE COURSE; OR ADJACENT TO HMA PAVEMENT:
A. PLACE 1" FIBER JOINT FILLER AT 400' MAXIMUM INTERVALS.
B. PLACE 1" FIBER JOINT FILLER AT SPRING POINTS OF INTERSECTING STREETS.
C. PLACE \( \frac{1}{16} \) ISOLATION JOINT AT CATCH BASINS PER STANDARD PLAN R-37-SERIES.
D. PLACE CONTRACTION JOINTS AT 40' MAXIMUM INTERVALS.

JOINTS IN CURB OR CURB AND GUTTER TIED TO JOINTED PAVEMENT:
A. PLACE 1" FIBER JOINT FILLER OPPOSITE ALL TRANSVERSE EXPANSION JOINTS IN PAVEMENT.
B. PLACE \( \frac{1}{16} \) ISOLATION JOINT AT CATCH BASINS PER STANDARD PLAN R-37-SERIES.
C. PLACE CONTRACTION JOINTS OPPOSITE ALL TRANSVERSE CONTRACTION JOINTS IN PAVEMENT.
D. A SYMBOL (B) JOINT SHALL BE PLACED BETWEEN CURB OR CURB AND GUTTER AND ADJACENT CONCRETE PAVEMENT AS SPECIFIED ON STANDARD PLAN R-41-SERIES.
INTEGRAL CURB & GUTTER, DETAIL B

SECTION A - A

INTEGRAL CURB & GUTTER, DETAIL C

SECTION A - A

INTEGRAL CURB & GUTTER, DETAIL D

SECTION A - A

INTEGRAL CURB & GUTTER, DETAIL F
SIDE SUPPORT WIRE DETAIL

U - LEG OPTION

SIDE SUPPORT WIRE DETAIL

J - LEG OPTION

SIDE SUPPORT WIRE DETAIL

V - LEG OPTION

NOTES:

LOAD TRANSFER ASSEMBLIES SHALL BE PLACED AT RIGHT ANGLES TO THE PAVEMENT CENTERLINE.

THE SIDE SUPPORT WIRE (U-LEG, J-LEG OR V-LEG) MAY BE INSTALLED ON EITHER THE INSIDE OR THE OUTSIDE OF THE LONGITUDINAL SPACER WIRES. THE DIMENSION FROM THE END OF THE DOWEL BAR TO THE CENTER OF THE TOP LONGITUDINAL SPACER WIRE SHALL BE A MINIMUM OF 1.5". THIS DIMENSION APPLIES TO SIDE SUPPORT WIRE INSTALLED ON EITHER THE INSIDE OR THE OUTSIDE OF THE LONGITUDINAL SPACER WIRES.

WIRE:

ALL WIRES SPECIFIED (EXCEPT SHIPPING TIE WIRES) ARE MINIMUM NOMINAL SIZES ALLOWED. DO NOT EXCEED THE MAXIMUM NOMINAL DIAMETER OF 0.177" FOR SHIPPING TIE WIRES.

ALL WIRES SHALL CONFORM TO THE CURRENT SPECIFICATIONS FOR CARBON STEEL WIRE FOR GENERAL USE, A.S.T.M. DESIGNATION A-853, GRADE 1008 OR GREATER. UNLESS OTHERWISE SPECIFIED, MINIMUM TENSILE STRENGTH REQUIREMENTS SHALL BE 60 ksi.

STAKES TYPICALLY APPLIED AT WORKING ENDS OF DOWELS WITH SUFFICIENT INSTALLATIONS TO PREVENT UNIT FROM OVERTURNING UNDER LOAD.

DO NOT CUT FILLER SPACER WIRES AFTER THE LOAD TRANSFER ASSEMBLY IS SET IN PLACE.

DOWEL BARS:

DOWEL BARS ARE TO BE ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

EPOXY COATED DOWEL BARS ARE TO BE FACTORY COATED WITH A VISIBLE COATING OF AN APPROVED BOND RELEASE AGENT, UNIFORMLY APPLIED BY DIPPING AND WITHOUT EXCESSIVE GRIPS OR THICKNESS IN SUCH A THICKNESS THAT ITS PRESENCE CAN BE READILY IDENTIFIED.

METAL EXPANSION CAPS MUST BE ENTIRELY CLOSED AT ENDS BY CRIMPING. PLASTIC CAPS MUST HAVE A POSITIVE STOP. DO NOT DRIVE CAPS BEYOND THEIR STOP. EXPANSION CAPS MUST HAVE A SUITABLE STOP TO ENSURE THAT THE END OF THE CAP MAINTAINS A DISTANCE OF 1" (EXPANSION) FROM THE END OF THE DOWEL DURING CONCRETE PLACEMENT.

DOWEL BARS SHALL BE PLACED AT MID DEPTH OF THE SLAB UNIFORMLY ALIGNED WITHIN 1/4" FOR THE ENTIRE LENGTH OF THE BAR.

FOR PAVEMENTS WITH VARIABLE THICKNESS TRANSVERSELY ACROSS THE SLAB, THE TOP AND BOTTOM SURFACES OF THE DOWEL BAR SHALL BE WITHIN THE MIDDLE 1/3 OF THE PAVEMENT THICKNESS, AS APPROVED BY THE ENGINEER.
LONGITUDINAL BULKHEAD JOINT - SYMBOL (B)

All Symbol (B) joints shall be sawed and sealed except joints without lane ties and joints adjacent to vertical faces which would prohibit sawing.

symbol (d) and (s)

LONGITUDINAL SMOOTH LANE TIE JOINT - SYMBOL (S)

Symbol (D) and Symbol (S) tie bars shall be placed at the proper spacing longitudinally, and transversely at 90° with the joint.

MAXIMUM ALLOWABLE LANE TIE SPACING

<table>
<thead>
<tr>
<th>Maximum Allowable Lane Tie Spacing</th>
<th>* Total Distance of Tied Joint From Nearest Free Edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol (B), (D), (L2), and (S)</td>
<td></td>
</tr>
<tr>
<td>(B) Grade 40, (D), (L2), and (S)</td>
<td></td>
</tr>
<tr>
<td>2'-10&quot;</td>
<td>1'-3&quot; ± 2&quot;</td>
</tr>
<tr>
<td>1'-11&quot;</td>
<td>1'-11&quot;</td>
</tr>
<tr>
<td>1'-2&quot;</td>
<td>1'-4&quot;</td>
</tr>
<tr>
<td>1'-1&quot;</td>
<td></td>
</tr>
</tbody>
</table>

* Includes any tied combination of lane width, valley gutter, curb & gutter, or shoulder

** For widths greater than 48' use #6 deformed bars at 1'-2" spacing.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
LONGITUDINAL PAVEMENT JOINTS

F.H.W.A. APPROVAL 4-22-2013
9-30-2014 R-41-H PLAN DATE

Kirk T. Steudle
DIRECTOR, BUREAU OF FIELD SERVICES
PREPARED BY: R.L.T.
DEPARTMENT DIRECTOR
Kirk T. Steudle
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT
APPROVED BY: R.L.T.
CHECKED BY: H.H.P.
**METHOD OF EDGING**

**SYMBOL (L2)**

**EXISTING HMA SURFACED PAVEMENT**

PROPOSED PAVEMENT WIDENING TO BE CAST AFTER LANE TIE HAS BEEN GROUTED INTO EXISTING PAVEMENT

TOP OF PAVEMENT WHERE NO HMA OVERLAY IS USED

BOTTOM OF CONTRACTION JOINT OR TOP OF 1" EXPANSION JOINT FILLER. WHEN EXPANSION JOINT FILLER IS USED (JOINT FILLER SHALL EXTEND TO BOTTOM OF PAVEMENT GRADE)

LOAD TRANSFER ASSEMBLY (SEE STANDARD PLAN R-40-SERIES)

MINIMUM DEPTH OF RELIEF CUT IN CONTRACTION JOINTS IS 1/2" PAVEMENT THICKNESS. CARE MUST BE TAKEN TO AVOID CUTTING DOWEL BARS.

**NOTE:**

SYMBOL (L2) JOINT USED FOR WIDENING CONCRETE PAVEMENTS WITHOUT HMA OVERLAYS SHALL BE SAWED AND SEALED ACCORDING TO THE SYMBOL (B) JOINT.

**LONGITUDINAL BULKHEAD JOINT**

FOR WIDENING EXISTING CONCRETE PAVEMENT OR CONCRETE BASE COURSE (USING EPOXY ANCHORED LANE TIES)

THE FIRST SLAB SHALL BE EDGED WITH AN EDGER HAVING A 3/8" LIP AND SHALL HAVE A 1" LIP WITH A RADIUS OF 3/8" TO 1/4"

EDGING TOOL SHALL BE 6" x 12" LONG, SPACED ACCORDING TO THE SYMBOL (D) JOINT.

**METHOD OF EDGING**

**NOTES:**

ALL LANE TIE BARS SHALL BE DEFORMED EXCEPT SYMBOL (S) WHICH WILL BE SMOOTH.

THE EPOXY COATED S BARS ARE TO BE FACTORY COATED WITH AN APPROVED BOND RELEASE AGENT, UNIFORMLY APPLIED BY DIPPING AND WITHOUT EXCESSIVE Drips OR THICKNESS.

THE INSTALLATION OF LANE TIE BARS AND THE SAWING OF LONGITUDINAL JOINTS WILL NOT BE REQUIRED FOR TEMPORARY CONCRETE PAVEMENT UNLESS SPECIFIED ON PLANS OR IN THE PROPOSAL. THE EDGING OF TEMPORARY CONCRETE PAVEMENT WILL NOT BE REQUIRED.

FOR JOINT LAYOUT DETAILS, SEE STANDARD PLAN R-42-SERIES.

SAWING PROCEDURES AND RELATED OPERATIONS ARE DESCRIBED IN THE CURRENT STANDARD SPECIFICATIONS.

NO SAWED OR SEALED JOINT SHALL BE CONSTRUCTED BETWEEN THE PAVEMENT AND CURB OR PAVEMENT AND CURB AND GUTTER, WHERE THESE ITEMS ARE CAST INTEGRALLY.

WHEN JOINTED PLAIN CONCRETE IS SPECIFIED AT INTERSECTIONS SYMBOL (S) JOINTS ARE TO BE USED FOR THE LONGITUDINAL JOINT BETWEEN THE THE E2 JOINT AT THE SPRINGPOINT OF THE SIDE STREET AND THE THROUGH LANE GUTTER PAN LINE. WHEN THE E2 JOINT IS MOVED TO THE THROUGH LANE GUTTER PAN LINE USE SYMBOL (D) JOINT AS NORMALLY REQUIRED.

ALL STRAIGHT TIE BARS SHALL BE EPOXY COATED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR EPOXY COATED STEEL REINFORCEMENT FOR STRUCTURES.

WHEN LANE TIES ARE GROUTED INTO AN EXISTING PAVEMENT, THE GROUT SHALL BE SELECTED FROM THE PREQUALIFIED MATERIALS LISTED IN THE DEPARTMENT’S “MATERIALS SAMPLING GUIDE” FOR LANE TIES.

IN ORDER TO AVOID CONFLICT WITH THE LOAD TRANSFER ASSEMBLY, THE PLACEMENT OF THE END LANE TIE ADJACENT TO ANY TRANSVERSE JOINT SHALL BE AS FOLLOWS:

1. WHEN MAXIMUM ALLOWABLE LANE TIE SPACING EXCEEDS 3'-4", PLACE FIRST AND LAST LANE TIE HALF THE MAXIMUM ALLOWABLE LANE TIE SPACING FROM JOINT.

2. WHEN MAXIMUM ALLOWABLE LANE TIE SPACING IS LESS THAN 3'-4", PLACE FIRST AND LAST LANE TIE A MINIMUM OF 1'-6" FROM JOINT.

IT MAY BE NECESSARY TO ADJUST THE LAST THREE LANE TIE SPACINGS TO ENSURE UNIFORM LOADING RESISTANCE ALONG THE LONGITUDINAL JOINT.
JOINT LEGEND (ALL SHEETS)

- B: LONGITUDINAL BULKHEAD JOINT.
- B1: LONGITUDINAL BULKHEAD JOINT, EXCEPT OMIT SEALS AND LANE TIES, APPLY TWO ADDITIONAL COATS OF CURING COMPOUND, AS A BOND BREAKER, AT THE RATE OF 1 GALLON PER 100 SFT PER COAT.
- B0: OPTIONAL B OR D JOINT.
- CD: TRANSVERSE CONTRACTION JOINT WITH LOAD TRANSFER DEVICE.
- C3o: TRANSVERSE CONTRACTION JOINT WITHOUT LOAD TRANSFER DEVICE. (SHOULDERS)
- D: LONGITUDINAL LANE TIE JOINT.
- W: PLANE OF WEAKNESS JOINT.
- E2: 1" TRANSVERSE EXPANSION JOINT WITH LOAD TRANSFER DEVICE.
- E3: 1" TRANSVERSE EXPANSION JOINT WITHOUT LOAD TRANSFER DEVICE.
- E4: 1" TRANSVERSE EXPANSION JOINT WITHOUT LOAD TRANSFER DEVICE. (SHOULDERS)
- E5: 1" TRANSVERSE SEALED EXPANSION JOINT (SEE STANDARD PLAN R-49-SERIES)
- L2: 1" LONGITUDINAL SEALED EXPANSION JOINT (SEE STANDARD PLAN R-49-SERIES)
- L1: 1" LONGITUDINAL SEALED EXPANSION JOINT FOR CONCRETE BASE COURSE.

SHOULDER

EXISTING CONCRETE PAVEMENT

C & G. = CURB & GUTTER
E.O.M. = EDGE OF METAL
E.O.B. = FACE OF BARRIER
S.F.B. = SINGLE FACE BARRIER
V.G. = VALLEY GUTTER

* END GORE AND RAMP TAPERS SO THAT THE LAST SECTION ENDS WITH A MINIMUM 2'-0" CUT-OFF AND IT ALIGNS WITH A TRANSVERSE PAVEMENT JOINT. EXPANSION JOINTS SHALL BE PLACED AT THE END OF PAVED GORES AS SPECIFIED ON THIS PLAN.

JOINTS IN URBAN FREEWAY

12′, 14′, OR 16′ JOINT SPACING FOR JOINTED PLAIN CONCRETE PAVEMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

DEPARTMENT DIRECTOR

APPROVED BY:

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

1-25-2013  12-6-2010  1 OF 6
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT
STANDARD PLAN FOR
LIGHT STANDARD FOUNDATION
(CONCRETE BARRIER, DOUBLE FACE)

PLAN
(SHOWING STEEL REINFORCEMENT)

ELEVATION
(SHOWING STEEL REINFORCEMENT)
Light Standard Foundation

Concrete Barrier, Double Face

**Section A-A**

- A1 Bar (Typ.)
- B Bars at 1'-3" spacing
- Z Bars at 1'-3" spacing
- A2 Bars at 1'-3" spacing

- Anchor Bolt (Typ.)
- % of anchor bolt ties

3" Diameter Conduit

3" Conduit

Grounding Rod

Connect the grounding cable to the grounding rod as specified in the standard specifications. Leave 1'-6" slack above top of barrier.

**Section B-B**

- B Bars at 1'-3" spacing
- Rotate B bars to maintain 3" minimum except at anchor bolts.

- A1 Bar (Typ.)
- A2 Bars at 1'-3" spacing
- Z Bars at 1'-3" spacing

- 4'-0"
- 1'-0"
- 1'-1/2"
- 6" 6" 6" 1'-1/2" 1'-0" 4'-0"

A1 Bar spacing for footing
Notes:

The side configuration specified on this plan conforms to the "New Jersey" shape.

All exposed edges on the barrier shall have a 1/2" bevel on 1" radius.

Nuts, washers, and anchor bolts shall be galvanized according to the current standard specifications.

Prior to being approved for shipment, each set of four anchor bolts shall be tied together into a basket by welding #6 bar circles (or approved equal) along with securing a ½" plywood (or approved equal) template. The anchor bolt basket shall be carefully set and held vertical at the correct location and at the proper height with the ½" plywood (or approved equal) template.

The concrete valley gutter used in conjunction with the light standard foundation shall be constructed as detailed on this plan.

A 1" expansion joint shall be placed on each end of the light standard foundation.

Work this standard with standard plan R-49-series and when applicable R-33-series.

Materials for the electrical grounding system shall be according to the standard specifications unless otherwise specified on this plan.

### Concrete Quantities

<table>
<thead>
<tr>
<th>Footing (CYD)</th>
<th>Barrier Section (CYD)</th>
<th>Total (CYD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7</td>
<td>3.1</td>
<td>5.8</td>
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</tbody>
</table>

### Steel Reinforcement (Epoxy Coated)

<table>
<thead>
<tr>
<th>BAR</th>
<th>BAR SIZE</th>
<th>LENGTH</th>
<th>NUMBER REQUIRED</th>
<th>WEIGHT (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>#4</td>
<td>11'-6&quot;</td>
<td>20</td>
<td>154</td>
</tr>
<tr>
<td>A2</td>
<td>#4</td>
<td>5'-4&quot;</td>
<td>20</td>
<td>72</td>
</tr>
<tr>
<td>B</td>
<td>#6</td>
<td>4'-9&quot;</td>
<td>20</td>
<td>143</td>
</tr>
<tr>
<td>Z</td>
<td>#6</td>
<td>8'-0&quot;</td>
<td>10</td>
<td>121</td>
</tr>
</tbody>
</table>

Total weight of steel = 490 LBS

### Anchor Bolt Detail

- 1¼" Diameter Stud
- Heavy Hex Nut (Typ.)
- ½" Thick Washer (Typ.)
- Flush with top of barrier

COUPLING MADE FROM SQUARE, HEX, OR OCTAGONAL BAR STOCK WITH STRUCTURAL CAPACITY EQUAL TO THE ANCHOR BOLT AND STUD USED.

R = 1" MIN, 3" MAX; HEAT BEND 90° ± 5°
PLAN

ONLY STEEL IN FOOTING SHOWN

L = LENGTH OF SIGN SUPPORT FOUNDATION

WHERE CONCRETE GLARE SCREEN IS SPECIFIED ON THE PLANS, END THE GLARE SCREEN AT THE 1st EXPANSION JOINT.

CONCRETE VALLEY GUTTER

DIMENSIONS FOR SIGN SUPPORT FOUNDATIONS

<table>
<thead>
<tr>
<th>SUPPORT TYPE</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>2'-6&quot;</td>
<td>10&quot;</td>
<td>6'-11&quot;</td>
<td>5'-6-1/2&quot;</td>
<td>58'-2&quot;</td>
<td>18'-0&quot;</td>
<td>20'-0&quot;</td>
</tr>
<tr>
<td>D</td>
<td>2'-6&quot;</td>
<td>10&quot;</td>
<td>6'-8&quot;</td>
<td>6'-8&quot;</td>
<td>62'-2&quot;</td>
<td>22'-0&quot;</td>
<td>20'-0&quot;</td>
</tr>
</tbody>
</table>
FILLER WALL EXTENSION

For additional height

**Notes:**

- The area between the filler walls at the median piers may be filled with concrete at the contractor's option, with no increase in cost to the department.
- Care shall be taken to ensure that filler walls do not entrap water, drainage must be provided by use of weep holes and drain holes and/or reshaping slopes.
- Top of filler wall shall be parallel with the pavement grade.
- Materials and labor required to construct filler wall end blocks shall be paid for as filler wall concrete and adhesive anchoring by horizontal/vertical bars, and shall be according to the current standard specifications.
- See current standard plan R-67-series when attaching guardrail to filler walls.
- Alternate methods may be used to anchor the bars if approved by the engineer.
- All steel reinforcement bars and adhesive anchored horizontal/vertical bars shall be epoxy coated and paid for separately.
- Adhesive anchors shall be installed as per manufacturers recommendation except as modified on this standard.

**Existing Filler Wall**

- **Thickness may vary**
- #4 bars at 1'-6" spacings, both sides
- ½" bevel (Typ.)

**Existing Pier Footing**

- #4 bars, near and far
- 1" dia. holes for attaching thrie beam terminal connector

**Proposed Filler Wall Extension**

- 1'-0" minimum
- ½" bevel (Typ.)

- #4 bars, top and bottom
- Adhesive anchored horizontal bar

- Traffic side faces flush
- #4 bars spaced at 1'-6" both sides
- Adhesive anchored vertical bars, do not place within 1'-0" of pier columns

**Section D - D**

**Notes:**

- Reinforcing steel shall be tested according to the current specifications prior to bending. The reinforcing steel then be field bent radially to circular piers and parallel to the filler wall. Field bending shall be according to the current specifications. Any damage to the epoxy coating during testing or bending shall be repaired at the contractor's expense.

- Adhesive anchors shall be installed as per manufacturer's recommendations except as modified on this standard.
TYPICAL LAYOUT AT PIERS AND SIGN SUPPORTS

- The 12" dimension is centered on the pier or median from back of guardrail to back of guardrail. For piers greater than 4" in width/diameter, increase the 12" dimension to pier width/diameter + 8'.

** Increase length by 7.5' for each foot of pier width/diameter above 4'.

MEDIAN WIDTH

** 124' MIN. **

OFFSET BLOCKS 6" x 11" x 1'-3"

2'-8" POST BOLT LENGTH

15 15 15

6'-3" POST SPACING (TYP.)

FIELD BEND

THREE BEAM TRANSITION ON FLARE

BEGIN FLARE BEYOND END OF PIER OR SIGN SUPPORT (TYP.)

118' MIN. **

12'-8" POST BOLT LENGTH

15 15 15

OFFSET BLOCKS 6" x 11" x 1'-3"

MEDIAN WIDTH

** 124' MIN. **

OFFSET BLOCKS 6" x 11" x 1'-3"

2'-8" POST BOLT LENGTH

15 15 15

6'-3" POST SPACING (TYP.)

FIELD BEND

THREE BEAM TRANSITION ON FLARE

BEGIN FLARE BEYOND END OF PIER OR SIGN SUPPORT (TYP.)

118' MIN. **

12'-8" POST BOLT LENGTH

15 15 15

OFFSET BLOCKS 6" x 11" x 1'-3"

MEDIAN WIDTH

** 124' MIN. **

OFFSET BLOCKS 6" x 11" x 1'-3"

2'-8" POST BOLT LENGTH

15 15 15

6'-3" POST SPACING (TYP.)

FIELD BEND

THREE BEAM TRANSITION ON FLARE

BEGIN FLARE BEYOND END OF PIER OR SIGN SUPPORT (TYP.)

118' MIN. **

12'-8" POST BOLT LENGTH

15 15 15

OFFSET BLOCKS 6" x 11" x 1'-3"
GRADING OF SLOPES AT PIERS

MEDIAN OBJECT PROTECTION

MEDIAN Width

SECTION A-A

MEDIANS FROM 36' TO LESS THAN 70' IN WIDTH
TWIN PARALLEL GUARDRAIL RUNS

MEDIAN OBJECT PROTECTION

SECTION B-B

MEDIANS 70' IN WIDTH
GUARDRAIL AT TWIN BRIDGE APPROACH

NOTES:

1. All 1:10 or flatter slopes shall be graded to class A slope tolerances.
2. Guardrail anchorage, bridge shall be constructed according to standard plan R-67-series.
3. Unless indicated by a radius, all curved guardrail shall be field bent.
4. Any existing curb over 4" in height shall be removed 150' in advance of the guardrail approach terminal of the median guardrail installation. When it becomes necessary to use curb and gutter in conjunction with median guardrail installations, contact the geometric unit of the traffic and safety support area.

Slopes specified on this plan are for typical median guardrail installations. The placement of drainage culverts and end sections, when required, shall be as detailed on plans or as directed by the engineer.

No part of the guardrail system should be closer than 4'-0" to the bridge pier columns. If this minimum is impossible to obtain, stiffen the rail system as directed by the engineer, so its theoretical deflection will not exceed the available clearance. If additional guidance is needed, contact the road standards unit of the design support area.

Median guardrail installations are not required in medians that are greater than 70' in width, unless the object being protected is in the target path of a curve.

When median guardrail installations are to be placed on curves, contact the geometric unit of the traffic and safety support area.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL
MEDIUM OBJECT PROTECTION

9-30-2014
F.R.W.L. APPROVAL
3-21-2013
PLAN DATE
R-56-E SHEET
4 OF 6
MICHIGAN DEPARTMENT OF TRANSPORTATION

PLANNED DATE

F.H.W.A. APPROVAL

BUREAU OF HIGHWAY DEVELOPMENT

STANDARD PLAN FOR 3-21-2013

R-56-E

GUARDRAIL APPROACH TERMINAL TYPE 3B OPTION 1 ILLUSTRATED
(SEE STANDARD PLAN R-63-SERIES)

SEE DETAIL BELOW

GUARDRAIL APPROACH TERMINAL TYPE 3B OPTION 2 ILLUSTRATED
(SEE STANDARD PLAN R-63-SERIES)

SEE DETAIL BELOW

TYPICAL LAYOUT

PAID FOR AS GUARDRAIL ANCHORAGE BRIDGE, DETAIL T-5 (EACH SIDE)

THREE BEAM TERMINAL CONNECTOR & THREE BEAM EXPANSION SECTION
(SEE STANDARD PLAN R-67-SERIES)

VARIABLE WIDTH ELEVATION VIEW

GUARDRAIL WITH DIRECT CONNECTION TO PIER

SEE DETAIL BELOW

PLAN VIEW

PAID FOR AS GUARDRAIL ANCHORAGE BRIDGE, DETAIL T-5 (EACH SIDE)

FOR POST SPACING SEE STANDARD PLAN R-67-SERIES (APPROACH POST SPACING REQUIREMENTS CHART)

1'-6" POST SPACING (3 OR 4 SPACES)

6'-3"

3'-1½" POST SPACING

1'-6½" POST SPACING (4 OR 5 SPACES)

43'-9"

FILLER WALL AND FILLER WALL END BLOCK
(SEE STANDARD PLAN R-55-SERIES)

PLAN VIEW

FOR POST SPACING SEE STANDARD PLAN R-67-SERIES (APPROACH POST SPACING REQUIREMENTS CHART)

1'-6" POST SPACING (3 OR 4 SPACES)

6'-3"

3'-1½" POST SPACING

1'-6½" POST SPACING (4 OR 5 SPACES)

43'-9"

FILLER WALL AND FILLER WALL END BLOCK
(SEE STANDARD PLAN R-55-SERIES)

PLAN VIEW

PAID FOR AS GUARDRAIL ANCHORAGE BRIDGE, DETAIL T-5 (EACH SIDE)

FOR POST SPACING SEE STANDARD PLAN R-67-SERIES (APPROACH POST SPACING REQUIREMENTS CHART)

1'-6" POST SPACING (3 OR 4 SPACES)

6'-3"

3'-1½" POST SPACING

1'-6½" POST SPACING (4 OR 5 SPACES)

43'-9"

FILLER WALL AND FILLER WALL END BLOCK
(SEE STANDARD PLAN R-55-SERIES)
GUARDRAIL CONNECTION AT FILLER WALL
FOR FILLER WALL DETAILS SEE STANDARD PLAN R-55-SERIES

VARIABLE WIDTH AS REQUIRED

THREE BEAM ELEMENT (TYP.)

POST BOLT WITH ROUND WASHER UNDER NUT (TYP.)

WOOD Offset BLOCK (TYP.)

GROUND LINE

6" x 8" x 7'-0"
WOOD POST (TYP.)

POST DETAIL
WHEN WIDTH CAN ACCOMMODATE TWO GUARDRAIL POSTS

VARIABLE WIDTH AS REQUIRED

THREE BEAM ELEMENT (TYP.)

1/4" DIA. THREADED STUD WITH ROUND WASHER UNDER NUT (TYP.)

WOOD Offset BLOCK

GROUND LINE

6" x 8" x 7'-0"
WOOD POST

WOOD Offset BLOCK MAY BE MADE FROM A COMBINATION OF SEPARATE BLOCKS

POST DETAIL
WHEN WIDTH CAN ACCOMMODATE ONLY ONE GUARDRAIL POST

7/8" DIA. THREADED STUD

NUT SHALL FULLY ENGAGE THREADS AND BE WELDED FLUSH TO END OF THREADED STUD PRIOR TO BEING GALVANIZED

LENGTH AS REQUIRED

3" MIN.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
GUARDRAIL
MEDIAN OBJECT PROTECTION

9-30-2014
3-21-2013
F.H.W.A. APPROVAL
PLAN DATE
R-56-E SHEET
6 OF 6
**Beam Guardrail at Bridges - Dual Roadways**

1. Use bulkhead within the limits specified on standard plan P-56-series.
2. Install guardrail with less flare rate as determined by backside minimum clear zone.

**Beam Guardrail at Bridges - Two-Way Roadways**

**Legend**
- 1:10 slope between shoulder line and 2'-0" behind face of post.
- $L_s =$ tangent length of barrier upstream from the hazard. 125' min. 1
- $L_s$ & $Z =$ lateral distances measured from face of guardrail (as shown).

---

**Michigan Department of Transportation**

**Beam Guardrail at Bridges and Embankments**

---

**Prepared by Design Support Area**

**Drawn by:** C.J.B. **Checked by:** W.P.P.

**Engineer of Construction & Technology**
**Engineer of Design Support Area**
**Engineer of Maintenance**

**Department Director**
**Engineer of Development**

**F.H.W.A. Approval**
**Plan Date**

**Sheet 1 of 6**
<table>
<thead>
<tr>
<th>HEIGHT OF FILL AT 1:3 SLOPE (FEET)</th>
<th>70 MPH FLARE 1:15</th>
<th>60 MPH FLARE 1:14</th>
<th>50 MPH FLARE 1:11</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIVER TO X</td>
<td>K</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>37.5</td>
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<td>24</td>
<td>25</td>
<td>-118.5</td>
<td>235</td>
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</table>

**NOTES:**

The construction of guardrail shall be according to the current standard plans. Appropriate approach curb and gutter details and downspout header details, when used, are specified on the current standard plan R-32-series.

All post numbers are referenced according to those specified on the specific guardrail ending standard.

A 1:10 slope shall be maintained in front of and 2'-0" behind the guardrail beam outside the designated shoulder area. Slope beyond the 2'-0" hinge line behind the guardrail beam area may be 1:2 or flatter and shall be transitioned to normal graded slopes in such a way as to give a pleasing appearance.

Guardrail will not be required on departing end of structures on dual roadways which have continuous abutments or when fill slopes are 1:4 or flatter. If a downspout header is required on the departing ends of structures, it will be necessary to shield it with guardrail.

This standard plan applies only to new construction unless specifically called for in upgrading projects.

Area behind the guardrail departing end terminal shall have a 1:3 slope or flatter.

Area behind the guardrail approach terminal shall have a 1:4 slope or flatter unless the ending cannot be placed in a 1:4 because the predominate slope preceding the approach terminal is a 1:3. In this case, the ending may be placed in the 1:3 slope.

Guardrail anchorage, bridge is included in the guardrail lengths specified. (See current standard plan R-67-series).

All 1:10 slopes shall be graded to "class a" slope tolerances.

**SHOULDER**

For positive "k" distances, begin flare point beyond the 1:3 slope.

**SHOULDER**

For negative "k" distances, begin flare point in advance of the 1:3 slope.
WOOD POST

STEEL POST

ELEVATION SHOWING POST SPACING

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

GUARDRAIL, TYPE A

NORMAL SHOULDER

** 5'-0" OR AS SPECIFIED ON PLANS

8" 8"

TIE NAIL WOOD BLOCK TO WOOD POST WITH A MINIMUM 3" LONG HOT-DIP ZINC COATED NAIL

POST BOLT WITH ROUND WASHER UNDER NUT

6" x 8" WOOD LINE POST

** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

GUARDRAIL, TYPE B

( WOOD POST )

ELEVATION SHOWING POST SPACING

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

6'-3" TYPICAL POST SPACING

12'-6" EFFECTIVE BEAM ELEMENT LENGTH

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL,
TYPES A, B, BD, T, & TD

DEPARTMENT DIRECTOR
Kirk T. Staudie

APPROVED BY:
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY:
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

CHECKED BY:

PREPARED BY:

DRAWN BY:

CHECKED BY:

F.H.W.A. APPROVAL
7-5-2013
9-30-2014

R-60-I
1 OF 10
GUARDRAIL, TYPE BD
(WOOD POST)

GUARDRAIL, TYPE B (OR BD)
(STEEL POST)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT
STANDARD PLAN FOR
GUARDRAIL,
TYPES A, B, BD, T, & TD

9-30-2014 7-5-2013 R-60-I SHEET 2 OF 10
WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE B AND TYPE BD

WOOD POST

STEEL POST

BEAM ELEMENT SPLICE DETAILS

FOR USE ON STEEL POSTS

FOR USE ON WOOD POSTS

(SEEN NOTES ON SHEET 10 OF 10)
GUARDRAIL, TYPE T
(WOOD POST)

GUARDRAIL, TYPE TD
(WOOD POST)
GUARDRAIL, TYPE T OR TD
(STEEL POST)

ELEVATION SHOWING POST SPACING
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

GUARDRAIL, TYPE B
WOOD POST

GUARDRAIL, TYPE B
STEEL POST

GUARDRAIL, TYPE T
WOOD POST

GUARDRAIL, TYPE T
STEEL POST

BLOCK AND POST CONNECTION DETAILS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
GUARDRAIL, TYPES A, B, BD, T, & TD

9-30-2014 7-5-2013 R-60-I SHEET 6 OF 10
FRONT ELEVATION OF THRIE BEAM ELEMENT

SECTION THROUGH THRIE BEAM ELEMENT

FOR GUARDRAIL, TYPE T AND TD

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
GUARDRAIL,
TYPES A, B, BD, T, & TD

7-5-2013
R-60-I
WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE T AND TYPE TD

WOOD POST

STEEL POST

THRIE BEAM ELEMENT SPLICE DETAILS

FOR USE ON WOOD POSTS

(SEE NOTES ON SHEET 10 OF 10)

WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE T AND TYPE TD
DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE B (OR TYPE T) TO GUARDRAIL, TYPE BD (OR TYPE TD)

<table>
<thead>
<tr>
<th>GUARDRAIL</th>
<th>POST</th>
<th>OFFSET BLOCK</th>
<th>POST BOLTS</th>
<th>SPLICE BOLTS</th>
<th>WASHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>NO.</td>
<td>LENGTH</td>
<td>(ROUND)</td>
</tr>
<tr>
<td>A</td>
<td>WOOD</td>
<td>N/A</td>
<td>1</td>
<td>9 1/2&quot;</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>STEEL</td>
<td>N/A</td>
<td>1</td>
<td>2&quot;</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>WOOD</td>
<td>WOOD</td>
<td>1</td>
<td>18&quot;</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>STEEL</td>
<td>WOOD</td>
<td>1</td>
<td>9 1/2&quot;</td>
<td>1</td>
</tr>
<tr>
<td>BD</td>
<td>WOOD</td>
<td>WOOD</td>
<td>1</td>
<td>26 1/2&quot;</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>STEEL</td>
<td>WOOD</td>
<td>2</td>
<td>9 1/2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>T</td>
<td>WOOD</td>
<td>WOOD</td>
<td>2</td>
<td>18&quot;</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>STEEL</td>
<td>WOOD</td>
<td>2</td>
<td>9 1/2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>TD</td>
<td>WOOD</td>
<td>WOOD</td>
<td>2</td>
<td>26 1/2&quot;</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>STEEL</td>
<td>WOOD</td>
<td>4</td>
<td>9 1/2&quot;</td>
<td>4</td>
</tr>
</tbody>
</table>

Three beam transitions require 20 splice bolts each (12 on Type T end and 8 on Type B end).

* Except as specified on detail showing transition from Guardrail, Type B (or Type T) to Guardrail, Type BD (or Type TD). Post bolts shall not extend more than 1/2" beyond nut.

SPLICE BOLT AND POST BOLT

ROUND WASHER

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT
STANDARD PLAN FOR GUARDRAIL,
TYPES A, B, BD, T, & TD

METAL TAG
FOR CURVED GUARDRAIL WITH RADIUS OF 150' OR LESS

7-30-2014  F.H.W.A. APPROVAL
R-60-I  SHEET  9 OF 10
NOTES GOVERNING THE USE OF GUARDRAIL REFLECTORS

1. GUARDRAIL REFLECTORS SHALL BE USED ON ALL STANDARD GUARDRAIL RUNS, REGARDLESS OF ROADWAY LIGHTING.

2. GUARDRAIL REFLECTORS ARE TO BE SPACED AT THE FOLLOWING INTERVALS:
   a) 50'-0" ON TANGENT SECTIONS AND CURVES WITH A RADIUS OF 1150' OR MORE.
   b) 25'-0" ON CURVES WITH A RADIUS LESS THAN 1150'.

3. FOR GUARDRAIL REFLECTOR PLACEMENT ON APPROACH TERMINALS, SEE THE APPROPRIATE GUARDRAIL APPROACH TERMINAL STANDARD PLAN.

4. A GUARDRAIL REFLECTOR IS TO BE PLACED ON THE SECOND POST FROM THE GUARDRAIL DEPARTING TERMINAL.

5. ON GUARDRAIL, TYPE T AND TYPE TD GUARDRAIL REFLECTORS ARE TO BE PLACED ON THE UPPER POST BOLT.

6. GUARDRAIL REFLECTORS SHALL MATCH COLOR OF EDGE LINE.

BARREL REFLECTOR

SEE NOTES BELOW

GUARDRAIL REFLECTOR

SEE NOTES BELOW

TWO-WAY TRAFFIC

PLACEMENT OF GUARDRAIL REFLECTORS

NOTES:

DETAILS SPECIFIED ON THIS STANDARD ARE ACCORDING TO THE JOINT AASHTO - ARA TECHNICAL BULLETIN NO. 268. "A GUIDE TO STANDARDIZED HIGHWAY BARRIER RAIL HARDWARE".

BEAM ELEMENTS SHALL BE SHOP BENT TO PLAN RADIUS FOR CURVE RADIUS 150' OR LESS. A TAG IDENTIFYING THE CURVATURE OF THE SHOP BENT SECTION WILL BE REQUIRED FOR EACH CURVED ELEMENT.

POST BOLT SLOTS AT 6'-3" INTERVALS WILL BE ALLOWED IN BEAM ELEMENTS USED TO CONSTRUCT GUARDRAIL, TYPE A.

SEE STANDARD PLAN R-61-SERIES, R-62-SERIES OR R-63-SERIES FOR GUARDRAIL APPROACH TERMINALS. STANDARD PLAN R-66-SERIES FOR GUARDRAIL DEPARTING TERMINALS, AND STANDARD PLAN R-67-SERIES FOR GUARDRAIL ANCHORAGE, BRIDGE.

WHEN THE PLANS SPECIFY GUARDRAIL IS TO BE PLACED ON THE SHOULDER HINGE POINT, RATHER THAN AS SPECIFIED ON THIS PLAN, 8'-0" POSTS SHALL BE PROVIDED, WITH THE ADDITIONAL LENGTH EMBEDDED FOR ADDED STABILITY. (NOT NECESSARY WHEN THE SLOPE IS REASONABLY LEVEL BEYOND THE SHOULDER HINGE POINT, AS DETERMINED BY THE ENGINEER.)

WOOD POSTS WITH 4" BEVELS AT THE TOP MAY BE USED IN LIEU OF WOOD POSTS WITHOUT BEVELS SPECIFIED, THE LENGTH, WIDTH AND DEPTH OF THE POST SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT.

WOOD OFFSET BLOCKS WITH 4" BEVELS AT THE TOP AND BOTTOM OR A 1" BEVELED TOP MAY BE USED IN LIEU OF WOOD BLOCKS WITHOUT BEVELS SPECIFIED, THE LENGTH (FRONT AND BACK FACE), WIDTH AND DEPTH OF THE BLOCK SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT AND COMPATIBILITY WITH POST HOLES.

PIPE SIZE REQUIREMENTS FOR CHAIN LINK FENCE GATE POSTS AND FRAMES

<table>
<thead>
<tr>
<th>USE FOR</th>
<th>GATE WIDTH (FEET)</th>
<th>SHAPE</th>
<th>* SIZE, INCHES NOMINAL (ACTUAL D.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GATE POSTS</td>
<td>6 OR LESS</td>
<td>PIPE</td>
<td>2 3/4 (2.875)</td>
</tr>
<tr>
<td></td>
<td>7 TO 13</td>
<td>PIPE</td>
<td>3 1/2 (4.000)</td>
</tr>
<tr>
<td></td>
<td>14 TO 18</td>
<td>PIPE</td>
<td>6 (1.660)</td>
</tr>
<tr>
<td>GATE FRAMES</td>
<td>6 OR LESS</td>
<td>PIPE</td>
<td>1 1/8 (1.875)</td>
</tr>
<tr>
<td></td>
<td>7 TO 18</td>
<td>PIPE</td>
<td>1 1/2 (1.900)</td>
</tr>
</tbody>
</table>

Notes:
- All chain link fencing materials shall be of an approved design, manufactured of steel, and conform to the requirements of the current standard specifications.
- Intermediate braced posts shall be placed at 660’ intervals or midway between end or corner posts when distance is less than 1200’ and more than 660’.
- Fence fabric shall be securely fastened to top tension wire with fasteners spaced not more than 1-3” apart. If hog rings are used for fabric fasteners, they shall be 12-gage tightly crimped about both the tension wire and the fabric wire or 11-gage if uncrimped. Fence fabric shall be fastened to the posts using metal bands or wires spaced not more than 1-1/2” apart. The wire shall not be less than 12-gage.
- Tension wire shall be stretched taut.
- Top and bottom salvages of fence fabric shall have a knuckled finish.
- Alternate post sections may be submitted for approval by the Engineer.
- Intermediate lengths of fencing less than (660’) with variable heights should be avoided if possible.

SIZE AND SHAPE REQUIREMENTS FOR CHAIN LINK FENCE POSTS

<table>
<thead>
<tr>
<th>USE FOR</th>
<th>FABRIC HEIGHT INCHES</th>
<th>SHAPE</th>
<th>* SIZE, INCHES NOMINAL (ACTUAL D.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>END, CORNER, ANGLE, INTERSECTION, AND INTERMEDIATE BRACED POSTS</td>
<td>120 OR LESS</td>
<td>PIPE</td>
<td>2 3/4 (2.875)</td>
</tr>
<tr>
<td></td>
<td>ROLL-FORMED CORNER</td>
<td>3 1/2 X 3 1/2</td>
<td></td>
</tr>
<tr>
<td>LINE POSTS</td>
<td>120 OR LESS</td>
<td>PIPE</td>
<td>2 (2.375)</td>
</tr>
<tr>
<td></td>
<td>H-SECTION</td>
<td>1 1/8 X 1 1/8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H-SECTION</td>
<td>2 1/2 X 1 3/4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C-SECTION ROLL-FORMED</td>
<td>2 1/2 X 1 1/8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>72 OR LESS</td>
<td>C-SECTION ROLL-FORMED</td>
<td>1 1/8 X 1 1/8</td>
</tr>
<tr>
<td></td>
<td>60 OR LESS</td>
<td>PIPE</td>
<td>1 1/2 (1.900)</td>
</tr>
</tbody>
</table>
Pavement

4% SEED, FERTILIZE, AND MULCH AS SPECIFIED ON PLANS

TYPICAL SLOPE AND DITCH PROTECTION

MULCH BLANKET ON GUARDRAIL FILL SLOPE

DETAIL A

MULCH BLANKET
ON GUARDRAIL FILL SLOPE

DETAIL A

TYPICAL SLOPE AND DITCH PROTECTION

MULCH BLANKET SPILLWAY DITCH

* NOTE:
MULCH BLANKET SHALL BE USED ON BOTH SIDES OF NORMAL SECTIONS. HIGH SIDES OF ALL SUPERELEVATED SECTIONS, AND LOW SIDES OF PAVEMENTS HAVING A SUPERELEVATION OF 5% OR LESS. HIGH VELOCITY MULCH BLANKET SHALL BE USED ON THE LOW SIDE OF PAVEMENTS HAVING A RATE OF SUPERELEVATION GREATER THAN 5%.
BRACING DETAIL

BRACE DECIDUOUS TREES 2" TO 4" IN CALIPER OR 8' OR MORE IN HEIGHT WITH TWO STAKES.

BRACE DECIDUOUS TREES LESS THAN 2" IN CALIPER OR 8' IN HEIGHT WITH ONE STAKE ON THE WESTERLY SIDE OF THE PLANT.

STEP 1

1. Prepare soil and loosen subsoil.
2. Spaced to avoid root ball.
3. Steel T-posts, staple.
4. #11 galvanized wire wrapped one revolution and between outside ridges of the T-post.
5. Top of root ball should be set at or slightly higher than surrounding grade.

STEP 2

1. Prepared soil.
2. Prepared soil.
3. Loose subsoil.
4. Steel T-posts spaced to avoid root ball.
5. Rubber hose, interlock new 1/2" x 12" (min. length) rubber hoses.
6. 2" x 4" stakes.

STEP 3

1. Kraft tree wrap.
2. #11 galvanized wire wrapped one revolution and between outside ridges of the T-post.
3. Tree trunk.
4. Rubber hose, interlock new 1/2" x 12" (min. length) rubber hoses.
5. 2" x 4" stakes.

STEP 4

1. #11 galvanized wire.
2. Wire shall be semi-taut.
3. Allowing 1/2" movement of tree in all directions.

STEP 5

1. 5" - 6" mulch to cover entire planting hole.
2. Taper mulch to trunk.
5. Loose subsoil.
6. Steel T-posts spaced to avoid root ball.

STEP 6

1. 5" - 6" mulch to cover entire planting hole.
2. Taper mulch to trunk.
3. 18" min.
4. 1/3 total height of evergreen

TRIPOD GUYING DETAIL

1. GUY EVERGREENS OVER 4" IN CALIPER OR 6' IN HEIGHT WITH THE TRIPOD METHOD AND UNDER 6' IN HEIGHT WITH TWO STAKES.
2. 5" - 6" mulch to cover entire planting hole.
3. Taper mulch to trunk.
5. Prepared soil.
7. Steel T-posts spaced to avoid root ball.
8. 18" min.
9. 1/3 total height of evergreen

SLOPE PLANTING

1. Prepared soil.
2. Loose subsoil.
3. Steel T-posts spaced to avoid root ball.
4. 18" min.
5. 5" - 6" mulch to cover entire planting hole.
6. Taper mulch to trunk.

GUYING - TRIPOD METHOD

1. 5" - 6" mulch to cover entire planting hole.
2. Taper mulch to trunk.
4. Loose subsoil.
5. Steel T-posts spaced to avoid root ball.
6. 18" min.
7. 2/3 total height of evergreen

SEEDING AND TREE PLANTING
PLANTING NOTES:

ALL EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE IMMEDIATELY.

LOOSEN SUBSOIL TO A DEPTH OF 4", LOOSEN EARTH ON SIDES OF PLANT POCKET TO BREAK ANY GLAZING CAUSED BY DIGGING.

FILL PREPARED SOIL TO 1/2 THE DEPTH OF THE ROOT BALL, PACK FIRMLY, AND PUDDLE WITH WATER.

BACKFILL WITH PREPARED SOIL WHICH, AFTER COMPACTION, IS FLUSH WITH SURROUNDING GROUND LEVEL.

COVER ENTIRE PLANT POCKET AREA WITH 5"-6" MULCH. PRUNE, WRAP, AND BRACE AND Guy.

WHEN PLANTS ARE FURNISHED IN CONTAINERS, CONTAINERS SHALL BE COMPLETELY REMOVED AT THE TIME OF PLANTING.

TREE HEIGHTS ARE SHOWN BEFORE PRUNING. TREE PLANTING DEPTHS ARE SHOWN AFTER SETTLING.

TREES AND SHRUBS SHALL NOT BE PLANTED WITHIN 50' AND 30' RESPECTIVELY OF THE NEAREST EDGES OF METAL -- EXCEPT WHERE INACCESSIBLE TO VEHICLES.

FIRST AND SECOND WATERING AND CULTIVATION SHALL INCLUDE SHRUB BEDS.

CUT 6" X 12" (MIN.) EDGING AROUND THE PERIMETER OF ALL SHRUB BEDS SHOWN ON THE PLANS. SPRAY A NON-PERSISTANT Glyphosate HERBICIDE TO ENTIRE SHRUB BEDS PRIOR TO PLANTING AND BARK PLACEMENT.

SHRUB BEDS ARE TO BE PAID FOR BY THE PAY ITEM 'SITE PREPARATION'.

ALL PLANTS SHALL BE SET PLUMB AND HAVE THE BEST SIDE OF PLANT FACING THE MAIN VIEWING DIRECTION.
BARE ROOT PLANTS

PLANTING BARE ROOT PLANT MATERIAL

REFER TO THE "SPECIAL PROVISIONS FOR BARE ROOT PLANTING" FOR SHIPPING, STORAGE AND HANDLING REQUIREMENTS.

MAINTAIN ROOT MOISTURE BY KEEPING ROOTS IMMERSED IN WATER PRIOR TO PLANTING.

ROOT PRUNE AS NECESSARY TO REMOVE ALL DAMAGED OR BROKEN ROOTS, AND AS REQUIRED BY THE DISTRICT FORESTER OR RESOURCE SPECIALIST.

DIG PLANTING HOLES AT LEAST 12" WIDE AND 12" DEEP TO ACCOMODATE ROOT MASS.

SET PLANTS PLUMB WITH THE ROOTS SPREAD OUT IN A NATURAL POSITION AT A DEPTH EQUAL TO THE DEPTH AT THE NURSERY.

HOLD PLANT FIRMLY AND Puddle (Not Tamp) THE BACKFILL AROUND THE ROOTS WITH WATER. SUFFICIENT WATER SHALL BE USED TO ENSURE SATURATION OF THE BACKFILL, BUT CARE SHOULD BE TAKEN NOT TO OVERWATER, CAUSING A FLOATING SOIL MASS THAT PREVENTS COMPACTION AND MAY RESULT IN AIR POCKETS ADJACENT TO THE ROOTS. BACKFILL SHOULD BE FLUSH WITH THE GROUND AFTER COMPACTION.

COVER COMPLETE PLANT POCKET AREA WITH 5" - 6" MULCH AS SHOWN.

PERENNIAL PLANTS

FIRST AND SECOND WATERING AND CULTIVATION SHALL INCLUDE PERENNIAL BEDS.

PERENNIALS ARE TO BE FULLY DEVELOPED TWO YEAR #2 CONTAINER PLANTS.

ENTIRE PERENNIAL BED SHALL BE EXCAVATED DOWN 12" AND REPLACED WITH 12" OF PREPARED SOIL.

PERENNIAL BEDS ARE TO BE PAID FOR BY THE PAY ITEM 'SITE PREPARATION'.

SEEDING NOTES:

THIS STANDARD ILLUSTRATES THE TYPICAL USE OF SEEDING WITH MULCH, AS THESE ITEMS RELATE TO ROADWAY CONSTRUCTION. THE ACTUAL DESIGN AND MATERIALS USED TO CONSTRUCT THE COMPLETE SECTION, WHICH INCLUDES SEEDING WITH MULCHING, WILL BE ACCORDING TO THE PLANS AND CURRENT SPECIFICATIONS.

ITEMS CALLED FOR ON THIS STANDARD MAY ALSO BE USED DURING CONSTRUCTION AS AN EROSION CONTROL MEASURE. SEE STANDARD PLAN R-96-SERIES.

ALL DITCHES SHOULD HAVE HIGH VELOCITY MULCH BLANKET FOR EROSION CONTROL.

THE FIRST 6' BEHIND THE CURB OR SHOULDER IN URBAN MEDIAN AREAS WILL BE SEED, FERTILIZED, AND MULCHED WITH MULCH BLANKET. THE REMAINING AREAS WILL BE SEED, FERTILIZED, AND MULCHED WITH MULCH BLANKET OR STANDARD MULCH ANCHORED IN PLACE WITH A MULCH ADHESIVE OR WITH A MULCH NET.

SEEDING NOTES:

THIS STANDARD ILLUSTRATES THE TYPICAL USE OF SEEDING WITH MULCH, AS THESE ITEMS RELATE TO ROADWAY CONSTRUCTION. THE ACTUAL DESIGN AND MATERIALS USED TO CONSTRUCT THE COMPLETE SECTION, WHICH INCLUDES SEEDING WITH MULCHING, WILL BE ACCORDING TO THE PLANS AND CURRENT SPECIFICATIONS.

ITEMS CALLED FOR ON THIS STANDARD MAY ALSO BE USED DURING CONSTRUCTION AS AN EROSION CONTROL MEASURE. SEE STANDARD PLAN R-96-SERIES.

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ALL AREAS WHERE MULCH BLANKET IS CALLED FOR SHALL BE SEED, FERTILIZED, AND TOPSOILED AS SPECIFIED ON PLANS. NO MULCH OR ANCHORING MULCH IS REQUIRED WHERE MULCH BLANKET IS INSTALLED.

BACKSLOPE RESTORATION TREATMENT SHALL BE THE SAME AS THE FRONT SLOPE.
ANCHORING AND BRACING DETAILS FOR END, ANGLE AND CORNER POSTS

ANCHORING AND BRACING DETAILS FOR INTERMEDIATE BRACED, INTERSECTION AND ANGLE POSTS

ANCHORING AND BRACING DETAILS FOR GATE POSTS

WOVEN WIRE FENCE - STEEL POSTS
Z VALUES FOR UNSPIRALED TWO WAY ROADWAYS WITH AN ODD NUMBER OF LANES

<table>
<thead>
<tr>
<th>NUMBER OF LANES</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>( \frac{1}{2} )</td>
</tr>
<tr>
<td>5</td>
<td>( z_3 )</td>
</tr>
<tr>
<td>7</td>
<td>( z_5 )</td>
</tr>
</tbody>
</table>

UNSPIRALED TWO WAY ROADWAY WITH ODD NUMBER OF LANES (FARTHEST EDGE ON LOW SIDE)

UNSPIRALED TWO WAY ROADWAY WITH ODD NUMBER OF LANES (FARTHEST EDGE ON HIGH SIDE)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT
STANDARD PLAN FOR SUPERELEVATION AND PAVEMENT CROWNS

10-19-2009
9-10-2010
R-107-H SHEET 7 OF 7
ONE LANE Crossover

TWO LANE, TWO-WAY Crossover

NOTES:

- Crossovers shall be located to provide the maximum advance warning to the driver based on the vertical and horizontal alignments at the site.
- Vehicles must be protected from the blunt end of barriers, preferably connect the temporary concrete barrier to the existing median barrier or place as specified on standard plan R-126-SERIES.
- On a two-way crossover, a taper flatter than specified in the table is to be used if practical.
- The maximum deflection (taper) shall be determined from the table as a function of speed.
- Super-elevation is not required for the speeds and radii of the curves given.

For wide medians, alignment may be shifted into the crossover to shorten its length subject to the minimum radius specified. With the approval of the engineer, any proposed radius which is less than that specified in the table shall be reviewed by the traffic and safety support area. For design features such as super-elevation, deflection, and reverse alignment, plastic drums shall be offset from the line of travel 2'-6" minimum. They may be aligned by eye.

Traffic control devices and pavement markings shall be according to the "Michigan Manual of Uniform Traffic Control Devices".


For specific channelization treatments, see the traffic and safety support area.

The minimum design speed for crossovers should be 10 MPH below the posted speed prior to construction, unless unusual site conditions require that a lower design speed be used.

CROSSOVER TAPER GEOMETRY

<table>
<thead>
<tr>
<th>Design Speed (MPH)</th>
<th>Maximum Deflection (Taper)</th>
<th>Minimum Radius (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>8 : 1</td>
<td>955</td>
</tr>
<tr>
<td>40</td>
<td>11 : 1</td>
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MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
TEMPORARY CROSSES FOR DIVIDED ROADWAYS

PREPARED BY
ENGINEER OF CONSTRUCTION & TECHNOLOGY

DRAWN BY:
COPIED BY:

ENGINEER OF DESIGN SUPPORT AREA

CHECKED BY:
ENGINEER OF TRAFFIC & SAFETY

ENGINEER OF DEVELOPMENT

MICHAEL A. VAN WART
DEPARTMENT DIRECTOR

MARCH 24, 2004

10-27-2004 4-16-2004 R-113-C SHEET 1 OF 2
MICHIGAN DEPARTMENT OF TRANSPORTATION

OF

SHEET

PLAN DATE

FLUSH WITH CURB

DEPTH AS NEEDED

SEE WOOD BLOCKOUT DETAIL

DEPTH AS NEEDED

SEE WOOD BLOCKOUT DETAIL

MAY BE ANGLED TO AVOID REINFORCEMENT

WOOD BLOCKOUT DETAIL

WOOD BLOCKOUTS MAY BE MADE FROM A COMBINATION OF SEPARATE BLOCKS

PLAN OF ADDITIONAL POST DETAIL

NOTES:

THIS STANDARD IS INTENDED FOR USE IN UPGRADING OF EXISTING OPEN-PARAPET TYPE BRIDGE RAILINGS AND APPROACH GUARDRAIL.

BRIDGE RAILING, THRIE BEAM RETROFIT AND GUARDRAIL ANCHORAGES SHALL CONFORM TO THE CURRENT STANDARD PLAN R-60 SERIES, WHERE APPLICABLE, EXCEPT AS SHOWN ON THIS PLAN.

ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH SECTIONS 807 & 908 OF THE STANDARD SPECIFICATIONS.

REFLECTORIZED WASHERS SHALL BE SPACED AT 25'-0" INTERVALS AT BEAM ELEMENT SPACES. THEY SHALL BE ATTACHED AT UPPER POST BOLT SLOTS WITH STANDARD SPLICE BOLTS.

FOR PRECAST THREE SIDED OR ARCH CULVERTS SPACE BLOCKOUTS FOR THRIE BEAM GUARDRAIL AT A DISTANCE OF 10'-1" OR LESS CENTER TO CENTER. PLACE FIRST AND LAST BLOCK ON HEADWALL AS DETAILLED ON THIS STANDARD.

WOOD BLOCKOUT DETAIL

THRIE BEAM EXPANSION SECTION

1'-10" HIGH PARAPET RAILING

BEHIND 6" OR 9" WIDE BRUSHBLOCK

SECTION THRU PARAPET RAILING

FOR BRIDGES SKewed IN DIRECTION SHOWN, IT MAY BE NECESSARY TO INCREASE THE 8" OFFSET BLOCK WIDTH TO LOCATE POST WHILE MAINTAINING REQUIRED POST SPACING.

ADDED GUARDRAIL POST

1'-6" ± TYP. POST SPACING (4 SPACES MIN.)

FIRST SET OF POST BOLT SLOTS FOR 1'-6" POST SPACING BEYOND STRUCTURE REFERENCE LINE

FRONT FACE OF APPROACH CURB

WOOD BLOCKOUT DETAIL

WOOD BLOCKOUTS MAY BE MADE FROM A COMBINATION OF SEPARATE BLOCKS

THRIE BEAM EXPANSION SECTION

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

BRIDGE RAILING,

THRIE BEAM RETROFIT

(OPEN PARAPET TYPE BRIDGE RAILING)

1-25-2013

F.H.W.A. APPROVAL

10-19-2009

PLAN DATE

B-23-E

4 OF 4
FLUSH MOUNT BRIDGE RAILING

NOTES:

ALL WORK AND MATERIAL SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

DETAILS SHOWN ARE IN ACCORDANCE WITH CURRENT AASHTO SPECIFICATIONS.

BRIDGE RAILING USED WITH SIDEWALK SHALL BE USED ONLY WITH THE SIDEWALK CONFIGURATION (PROFILE) SHOWN ON THIS STANDARD PLAN.

NO SLIP FORMING OF "BRIDGE RAILING, AESTHETIC PARAPET TUBE" SHALL BE ALLOWED. RAILING SHALL BE CAST IN PLACE.

THE LIGHT STANDARD ANCHOR BOLT ASSEMBLY IS INCLUDED IN THE BID ITEM "BRIDGE RAILING, AESTHETIC PARAPET TUBE". SEE STANDARD PLAN B-103-SERIES.

FOR LIGHT STANDARD ANCHOR BOLT ASSEMBLY DETAILS, IF BRIDGE RAILING, AESTHETIC PARAPET TUBE IS PLACED FLUSH ON THE BRIDGE DECK (WITHOUT SIDEWALK), THE LIGHTING CONDUIT SHALL NOT BE PLACED IN THE RAILING.

A RUBBED FINISH ON THE VERTICAL AND TOP CONCRETE SURFACES OF THE PARAPET RAILING IS REQUIRED.

AESTHETIC TREATMENT AS DETAILED ON THIS SHEET SHALL BE ADDED TO THE FASCIA SIDE OF RAILING IF NO AESTHETIC TREATMENT IS DETAILED ON THE PLAN SHEETS AND SHALL BE INCLUDED IN THE BID ITEM "BRIDGE RAILING, AESTHETIC PARAPET TUBE". AESTHETIC TREATMENT DETAILED ON THE PLAN SHEETS MAY BE UP TO 1" IN CONCRETE DEPTH WITHOUT MODIFICATION TO THE RAILING WIDTH AND SHALL BE INCLUDED IN THE BID ITEM "BRIDGE RAILING, AESTHETIC PARAPET TUBE". AESTHETIC TREATMENT REQUIRING ADDITIONAL RAILING WIDTH OR THE USE OF ELASTOMERIC FORM LINERS SHALL BE PAID FOR SEPARATELY.

* THE HSS 2" x 2" x 1/8" RAIL, SLOTTED HOLE, AND 5/8" BOLT ARE NOT REQUIRED WHEN RAILING IS USED IN COMBINATION WITH PEDESTRIAN FENCING (SEE STANDARD PLAN B-41-SERIES).

AESTHETIC TREATMENT DETAIL
BRIDGE RAILING WITH SIDEWALK

- **HSS 4" x 3" x ½"**, A500 GRADE B
- **3½" x 3½" x ½" PLATE**
- **HSS 4" x 4" x 5½"**, A500 GRADE B
  at 6'-8" Max. Post Spacing

- **2½" x 2½"** HOLE IN HORIZONTAL TUBE FOR ⅛" BOLTS
- **⅛" x 2½"** SLOTTED HOLE IN VERTICAL TUBE AND
  **⅛" Ø HOLE IN HORIZONTAL TUBE FOR ⅛" Ø BOLTS**

- **⅛" Ø ANCHOR STUDS, EACH WITH 1 FLAT WASHER, 1 LOCK WASHER
  AND HEX NUT (TYP.)**
  EMBEDDED 10½" IN CONCRETE PARAPET

- **10½" x 8½" x ⅛" A36 BASE PLATE**
- **⅛" ELASTOMERIC BOUND FABRIC PAD**

- **(2) 2½" x 7½" x ½" A36 PLATES**

- **EL#4 BARS @ 8" C-C**

- **(6) EA#4 LONGITUDINAL BARS**

- WATER STOP (FORMING NOT REQUIRED)

**BRIDGE RAILING, AESTHETIC PARAPET TUBE**
RAILING ELEVATION

PAY LIMITS OF BRIDGE RAILING

6'-8" MAX. POST SPACING 5'-0" MAX. POST SPACING 1'-0"

END WALL ELEVATION

VERTICAL TUBE DETAIL

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

BRIDGE RAILING, AESTHETIC PARAPET TUBE
ELEVATION VIEW

SECTION B-B

PLAN VIEW

LIGHT STANDARD DETAILS

THREADS SHALL BE EXCLUDED FROM SHEAR PLANE (TYP.)

HSS 4" x 3" x 1/4"
AS00 GRADE B

Q 3/8" x 1 1/2" SLOTTED HOLE IN RAIL.
Q 1/4" x 1 1/2" SLOTTED ROUND HEAD BOLTS WITH HEX. NUT, 1 FLAT WASHER, 1 LOCK WASHER (TYP.)

SECTION A-A

SECTION C-C

SECTION D-D

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT

BRIDGE RAILING,
AESTHETIC PARAPET TUBE

5-30-2014 9-30-2014 6-2-2014 B-25-H SHEET 4 OF 6
PEDESTRIAN BRIDGE RAILING

BICYCLE BRIDGE RAILING

NOTES:

- DETAILS SHOWN ARE ACCORDING TO CURRENT AASHTO SPECIFICATIONS.
- ALL WORK AND MATERIALS SHALL BE ACCORDING TO THE STANDARD SPECIFICATIONS.
- THE BICYCLE BRIDGE RAILING SHALL BE USED ONLY WITH THE BRUSH BLOCK SHOWN ON THIS SHEET.
- FOR LIGHT STANDARD ANCHOR BOLT ASSEMBLY DETAILS, SEE STANDARD PLAN B-103-SERIES.
- USE THE HSS 2" x 2" x 1/4" RAIL AND CORRESPONDING DETAILS ONLY WHEN A SIDEWALK IS LOCATED BEHIND THE 4 TUBE RAILING. SEE SHEETS 2, 3 AND 4.
- ALL LABOR, MATERIALS AND EQUIPMENT REQUIRED TO INSTALL THE HSS 2" x 2" x 1/4" RAIL SHALL BE INCLUDED IN THE BID ITEM "BRIDGE RAILING, 4 TUBE".

POST DETAILS