June 22, 2016

Standard Plan Book Holders:

Subject: Standard Plans B-21-J, B-25-J, and B-26-E

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

Standard Plan B-21-J

The 100’ max expansion splice length has been recalculated to be 80’ due to increased bolt diameters and different slot lengths from previous versions of railing. Deleted inch (“) symbol from weld size and added contour weld symbol on pages 3 & 4. Added optional rounded corners on base plate details. Changed plate washer hole size to provide better washer stability.

Standard Plan B-25-J

The 100’ max expansion splice length has been recalculated to be 80’. Added weld size and contour weld symbol on pages 3 & 6. Added optional rounded corners on base plate details. Changed plate washer hole size to provide better washer stability.

Standard Plan B-26-E

The 100’ max expansion splice length has been recalculated to be 50’. Added weld size on page 5. Added weld size and contour weld symbol on page 7. Added optional rounded corners on base plate details.

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 Plans R-1-F, R-28-I, R-60-I, R-61-G, R-63-B, R-66-D, R-67-F, R-72-C, R-73-E, R-83-B, B-22-D, B-23-E, and B-101-F (a special detail has superseded these plans).

In some cases it may be necessary to retain the outdated plans until all projects using these superseded plans have been completed.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-Bridge-Design-Standards@michigan.gov

Sincerely,

Kelby Wallace for Engineer of Design

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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### MANHOLE BASE TYPE 1 FOR 48" DIAMETER PIPE

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<td>A2</td>
<td>3'-0&quot;</td>
<td></td>
<td>12</td>
<td>38</td>
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<td>A4</td>
<td>6'-0&quot;</td>
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<td>2</td>
<td>13</td>
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<tr>
<td></td>
<td>V1</td>
<td>14'-4&quot;</td>
<td>1'-8&quot;</td>
<td>16'-0&quot;</td>
<td>17</td>
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<td></td>
<td>V2</td>
<td>17'-6&quot;</td>
<td>1'-8&quot;</td>
<td>19'-2&quot;</td>
<td>20</td>
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</tbody>
</table>

2.6 CYD OF CONCRETE, TOTAL WEIGHT OF STEEL = 135

ALL STEEL REINFORCEMENT SHALL BE #5 BARS.
BRIDGE APPROACH CURB & GUTTER, DETAIL 4A
(USING Existing CATCH BASIN)

NOTE: USE ONLY WHEN GUARDRAIL IS NOT NEEDED ON DEPARTING ENDS
50'-0" maximum expansion joint spacing

1/2" expansion joint

1" expansion joint

1/2" expansion joint

4" sidewalk

Back of curb

Variable

RIGID STRUCTURE

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.

1/2" expansion joint

50'-0" maximum expansion joint spacing

4" sidewalk

Property line

1/2" expansion joint

Insofar as possible, sidewalk shall be divided into square unit areas, by means of cut joints not more than 36 ft or less than 16 ft.

LOCATION OF JOINTS IN CONCRETE SIDEWALK

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.

TYPICAL SIDEWALK JOINT LAYOUTS

Where a permanent structure is located in sidewalk, place expansion material around structure and adjust joint pattern to intersect structure as illustrated.

WALK WIDTH AS SPECIFIED ON PLANS

1/2" R

(1")

* 1.5% (2.0% maximum) toward street

* see notes

4" concrete sidewalk

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK

PREPARED BY
DESIGN DIVISION

DRAWN BY: B.L.T.
CHECKED BY: W.R.P.

APPROVED BY:
DEPARTMENT DIRECTOR
Kirk T. Staudt

APPROVED BY:
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY:
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

9-30-2014
7-1-2014
R-29-I
SHEET 1 OF 4
F.H.W.A. APPROVAL
PLAN DATE
GUARDRAIL AT EMBANKMENTS - FLARED INSTALLATIONS - b/o

<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>
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<tr>
<td>OVER TO</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>256</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.

---

**MICHIGAN DEPARTMENT OF TRANSPORTATION**
**BUREAU OF HIGHWAY DEVELOPMENT**

**GUARDRAIL AT BRIDGES AND EMBANKMENTS**

**11-14-2003**
**5-17-2002**
**R-59-E**
**SHEET 6 OF 6**
PLAN OF WIRE ROPE BARRIER DETAIL

CABLE BARRIER (TYP.) - SEE POST SPACING TABLE

2000' MAX. SPACING BETWEEN TERMINALS (TYP.)

CABLE BARRIER TERMINAL SECTION
SEE DETAIL ON SHEET 2

INTERMEDIATE TERMINAL SECTION
SEE DETAIL ON SHEET 2

CABLE BARRIER TERMINAL SECTION
SEE DETAIL ON SHEET 2

ANCHOR POST (TYP.)

LINE POST (TYP.)

POST SPACING TABLE

<table>
<thead>
<tr>
<th>RADIUS OF CURVE</th>
<th>POST SPACING</th>
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<tr>
<td>LESS THAN 110'</td>
<td>USE NOT RECOMMENDED</td>
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<tr>
<td>110' TO 219'</td>
<td>6'</td>
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<tr>
<td>220' TO 699'</td>
<td>12'</td>
</tr>
<tr>
<td>700' OR MORE AND TANGENT SECTIONS</td>
<td>16'</td>
</tr>
</tbody>
</table>
CONCRETE BARRIER, DOUBLE FACE TRANSITION SECTION 12'-0"

8'-0"

4'-0"

A

B

C

PLAN VIEW

GUARDRAIL ANCHORAGE, MEDIAN

6'-0" FIRST SPACING

25'-0"

1'-0"

15'-0"

POST SPACING

(4 SPACES)

(3 SPACES)

POST SPACING

(11 SPACE)

THREE BEAM TERMINAL CONNECTOR

(SEE STANDARD PLAN R-67-SERIES)

THREE BEAM EXPANSION SECTION

(SEE STANDARD PLAN R-67-SERIES)

ELEVATION VIEW

UNIFORMLY TRANSITION THE BARRIER FACES FROM BARRIER SHAPE TO VERTICAL WALL

SECTION A - A

SHOULDER SURFACE

VARYS

SECTION B - B

SHOULDER SURFACE

VARYS

SECTION C - C

SHOULDER SURFACE

HIGH STRENGTH 1/4" DIAMETER x 26" LONG HEX HEAD BOLTS WITH 2" MINIMUM THREAD LENGTH AND NUTS WITH ROUNDED RINGERS FRONT AND BACK SHALL BE USED TO CONNECT GUARDRAIL TO CONCRETE BARRIER, DOUBLE FACE TRANSITION SECTION.

NOTES:

SEE STANDARD PLANS R-60-SERIES AND R-67-SERIES. FOR DETAILS OF CURRENT GUARDRAIL HARDWARE, AND STANDARD PLAN R-49-SERIES FOR CONCRETE BARRIER.

CONCRETE BARRIER, DOUBLE FACE TRANSITION SECTION SHALL BE INCLUDED IN THE PAY ITEM "CONCRETE BARRIER, DOUBLE FACE, TYPE ___."

DETAILS FOR CONNECTING GUARDRAIL TO CONCRETE BARRIER, DOUBLE FACE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY TECHNICAL SERVICES
STANDARD PLAN FOR

GUARDRAIL ANCHORAGE, MEDIAN

PREPARED BY ENGINEER OF CONSTRUCTION & TECHNOLOGY

DESIGN DIVISION

B.L.T.

ENGINEER OF MAINTENANCE

E.H.H.

D.D.

BUREAU OF HIGHWAY TECHNICAL SERVICES

12-21-2001

10-25-2000

R-71-B

SHEET

1 OF 1
WOODEN BUMPER RAIL
(FOR ANGLE PARKING)

CONCRETE PARKING RAIL

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR
BUMPER & PARKING RAILS, AND MISC. WOOD POSTS

PREPARED BY DESIGN DIVISION
DRAWN BY W.L.T.
CHECKED BY W.L.P.

ENGINEER - ROAD DESIGN
ENGINEER OF CONSTRUCTION & TECHNOLOGY
ENGINEER OF DESIGN
DEPARTMENT DIRECTOR
BUREAU OF HIGHWAY TECHNICAL SERVICES

9-14-2001 2-26-2001 R-74-D SHEET 1 OF 2
EMBANKMENT BETWEEN GROUND LINE AND 2'-0" MINIMUM ABOVE TOP OF PIPE.

CULVERT SHALL CONSIST OF GRANULAR MATERIAL CLASS IIIA COMPACTED TO
95% OF ITS MAXIMUM UNIT WEIGHT. THE MATERIAL SHALL BE DEPOSITED
AND COMPACTED IN LAYERS NOT MORE THAN 10" IN THICKNESS.

TABLE OF QUANTITIES

<table>
<thead>
<tr>
<th>INSIDE DIA.</th>
<th>OUTSIDE DIA.</th>
<th>CYD CONCRETE</th>
<th>LBS STEEL</th>
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<tr>
<td>18&quot;</td>
<td>1.916&quot;</td>
<td>0.061</td>
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<td>24&quot;</td>
<td>2.500&quot;</td>
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<td>11.6</td>
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<td>42&quot;</td>
<td>4.250&quot;</td>
<td>0.250</td>
<td>12.3</td>
</tr>
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</table>

ALL CONCRETE SHALL BE GRADE M.

ALL EXCAVATION AND FORMS NECESSARY TO CONSTRUCT THE CONCRETE CRADLE
SHALL BE INCLUDED IN THE UNIT PRICE PER CYD FOR CONCRETE.

THE CONCRETE CRADLE SHALL BE CONTINUOUS THROUGH THE ENTIRE LENGTH
OF THE PIPE CULVERT.

LAP LONGITUDINAL BARS 2'-0" MINIMUM AT ALL SPILLES.

CULVERT INSTALLATION WITH CONCRETE CRADLE

NOTE:
THE TRENCH FOR THE CURTAIN WALL SHALL BE
EXCAVATED AFTER THE GRANULAR MATERIAL
CLASS II IS PLACED AND COMPACTED TO THE
ELEVATION OF THE TOP OF THE CURTAIN WALL.

CULVERT HEADWALL INSTALLATION IN UNSTABLE SOIL

BACKFILL SHALL CONSIST OF GRANULAR MATERIAL
CLASS IIIB THOROUGHLY COMPACTED. THE MATERIAL
SHALL BE DEPOSITED AND COMPACTED IN LAYERS NOT
MORE THAN 10" IN THICKNESS.
OUTLET HEADWALL (SHOWN WITH BAFFLE)

NOTES:

ALL STEEL REINFORCEMENT SHALL BE #4 BARS.

EXPOSED EDGES OF THE HEADWALL SHALL BE CHAMFERED 1/2".

OUTFALL LABEL TO BE USED ONLY WHERE STORMWATER WILL DISCHARGE DIRECTLY TO THE WATERS OF THE STATE.

OUTFALL LABEL (INScribed INTO CONCRETE (LETTERING: 1/2" HIGH X 1" WIDE X 1/4" DEEP)
SEE NOTES

CENTER THE BAFFLE WHEN HEADWALL DIMENSION "A" IS LESS THAN 2'-4"

RIPRAP AS SPECIFIED ON PLANS

3" x 1/2" KEYWAY (TYP.)
BRIDGE BARRIER RAILING, TYPE 5
OUTSIDE ELEVATION

SECTION A-A

BRIDGE BARRIER RAILING, TYPE 5
ELEVATION VIEW

SECTION B-B
LIGHT STANDARD DETAILS

PLAN VIEW

LOCATION OF NAME PLATE
AND GUARDRAIL ANCHORAGE

NOTES:

DETAILS SHOWN ARE IN ACCORDANCE WITH CURRENT AASHTO SPECIFICATIONS.

FOR LIGHT STANDARD ANCHOR BOLT ASSEMBLY DETAILS, SEE STANDARD PLAN B-103-SERIES. THE LIGHT STANDARD ANCHOR BOLT ASSEMBLY IS INCLUDED IN THE BID ITEM "BRIDGE BARRIER RAILING, TYPE 5".

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

* BRIDGE BARRIER ORIENTATION:

PERPENDICULAR TO PLANE OF SLAB ON NORMAL CROWN SECTION AND HIGH SIDE OF SUPERELEVATION SECTION.

VERTICAL ON LOW SIDE OF SUPERELEVATED SECTION.
SECTION THROUGH BRUSH BLOCK AND RAILING

Q 5/8" DIA. HOLE IN RAIL
Q THREADED 5/8" DIA. x 7" SLOTTED ROUND HEAD BOLT, WITH PLATE WASHER, (SEE DETAIL A), LOCK WASHER, AND HEX NUT (TYP.)

HSS 5" x 5" x 5/8" (TYP.)
M8 x 24

BASE PLATE
1"-0/4" x 1"-0/4" x 1"

1/2" ELASTOMERIC BOUND FABRIC PAD

1/8" DIA. POST ANCHOR STUD WITH 1 FLAT WASHER, 1 LOCK WASHER, AND NUTS (TYP.)

SLAB FASCIA

POST ELEVATION

HSS 5" x 5" x 5/8" (TYP.)

BASE PLATE
1"-0/4" x 1"-0/4" x 1"

1/2" ELASTOMERIC BOUND FABRIC PAD

1/8" DIA. POST ANCHOR STUD WITH 1 FLAT WASHER, 1 LOCK WASHER, AND NUTS (TYP.)

SLAB FASCIA

RAILING ELEVATION

Q RAIL SPlice
80' MAX. EXPANSION SPlice SPACING

10' MAX. POST SPACING

2'-9"
MIN.

2'-9"
MIN.

Q EXPANSION JOINT

1'-4"
MIN.

HANdHOLE

10" FOR 11" BOLT CIRCLE
10" FOR 1"-1" BOLT CIRCLE

3" DIA. CONDUIT

HANdHOLE WITH FRAME AND LID

3 1/2" MIN. COVER

SLAB FASCIA

SECTION A-A

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

BRIDGE RAILING, 2 TUBE
END WALL ELEVATION

PLAN VIEW AT LIGHT STANDARD

SECTION C-C

SECTION B-B

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

BRIDGE RAILING, 2 TUBE
SECTION D-D
FIXED SPLICE DETAILS

SECTION E-E
EXPANSION SPLICE DETAILS

SECTION F-F

A36 STEEL SPLICE ELEMENT
(\frac{3}{8}" PLATE)

HSS 5" x 5" x \frac{5}{8}"
BRIDGE RAILING, 2 TUBE

Details shown are in accordance with current AASHTO specifications. All work and material shall be in accordance with the standard specifications.

This railing shall be used only with the brush block shown on this sheet.

Fencing may be attached to the non-traffic side of the 2 tube railing to protect pedestrians.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT
STANDARD PLAN FOR
BRIDGE RAILING, 2 TUBE

5-20-2016  11-20-2015  B-21-J  SHEET 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 1/4" RAIL, SLOTTED HOLE, AND 1/2" BOLT ARE NOT REQUIRED WHEN RAILING IS USED IN COMBINATION WITH PEDESTRIAN FENCING (SEE STANDARD PLAN B-45-SERIES).
BRIDGE RAILING WITH SIDEWALK

1\textsuperscript{st} R
1"

BEGIN ROADWAY CROWN

LEVEL UNDER SIDEWALK

SIDEWALK (15'-2" MIN.)

5'-0" MIN. @ 2% SLOPE

1'-0"

HSS 4\textfrac{1}{4}" x 3\textfrac{1}{4}" x \frac{3}{16}" x \frac{3}{16}" A500 GRADE B

3\textfrac{1}{8}" x 3\textfrac{1}{8}" x \frac{3}{16}" PLATE

HSS 4\textfrac{1}{4}" x 4\textfrac{1}{4}" x \frac{3}{16}" A500 GRADE B

AT 6'-8" MAX. POST SPACING

\frac{1}{4}" Ø x 8\textfrac{1}{4}" SLOTTED ROUND HEAD A307 BOLTS, WITH 1 PLATE WASHER (SEE DETAIL A), 1 LOCK WASHER AND HEX. NUT (TYP.)

\frac{1}{4}" Ø x 2" SLOTTED HOLE IN VERTICAL TUBE AND \frac{1}{4}" Ø HOLE IN HORIZONTAL TUBE FOR \frac{1}{4}" Ø BOLTS

\frac{1}{2}" Ø x 7\textfrac{1}{8}" SLOTTED ROUND HEAD BOLTS, WITH 1 FLAT WASHER, 1 LOCK WASHER AND HEX NUT (TYP.)

\frac{1}{4}" Ø x 1\textfrac{1}{8}" SLOTTED HOLE IN VERTICAL TUBE AND \frac{1}{4}" Ø HOLE IN HORIZONTAL TUBE FOR \frac{1}{4}" Ø BOLTS

HSS 2\textfrac{1}{4}" x 2\textfrac{1}{4}" x \frac{3}{16}" (TYP.)

\frac{1}{2}" ANCHOR STUDS, EACH WITH 1 FLAT WASHER, 1 LOCK WASHER AND HEX NUT (TYP.) EMBLEDDED 10\frac{1}{16}" IN CONCRETE PARAPET

10\textfrac{1}{4}" x 8\textfrac{1}{4}" x \frac{3}{16}" A36 BASE PLATE

\frac{1}{2}" ELASTOMERIC BOUND FABRIC PAD

(2) 2\textfrac{1}{4}" x 7\textfrac{1}{8}" x \frac{3}{16}" A36 PLATES

SEE NOTES REGARDING AESTHETIC TREATMENT ON FASCIA SIDE OF RAILING

EL#4 BARS @ 8" C-C

(6) EA#4 LONGITUDINAL BARS

WATER STOP (FORMING NOT REQUIRED)
FIXED SPLICE DETAILS

SECTION E-E
HSS 4" x 3" x 1/4"

SECTION F-F
HSS 2" x 2" x 1/4"

SECTION J-J
HSS 4" x 3" x 1/4"

SECTION K-K
HSS 2" x 2" x 1/4"

EXPANSION SPLICE DETAILS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
BRIDGE RAILING,
AESTHETIC PARAPET TUBE
PEDESTRIAN BRIDGE RAILING

BICYCLE BRIDGE RAILING

NOTE:
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
BICYCLE BRIDGE RAILING
WITH SIDEWALK

POST DETAILS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

BRIDGE RAILING, 4 TUBE
SECTION A-A
BICYCLE RAILING SHOWN
PEDESTRIAN RAILING SIMILAR

SECTION B-B

SECTION C-C
BICYCLE RAILING

PLAN VIEW AT LIGHT STANDARD
BICYCLE RAILING

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT SPECIAL DETAIL FOR

BRIDGE RAILING, 4 TUBE

5-20-2016 11-20-2015 B-26-E SHEET 4 OF 8
SECTION D-D
PEDESTRIAN RAILING

HANDHOLE WITH FRAME AND LID
BOLTED TO FRAME. FRAME AND LID SHALL
BE R-6681-41 NEENAH FOUNDRY COMPANY,
BILL EAST JORDAN IRON WORKS; OR
APPROVED EQUAL.

PLAN VIEW AT LIGHT STANDARD
PEDESTRIAN RAILING

BASE WELD DETAIL

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT SPECIAL DETAIL FOR

BRIDGE RAILING, 4 TUBE

5-20-2016 11-20-2015 B-26-E SHEET 5 OF 8
PLAN
HSS 2" x 2" x 1/8"

SECTION G-G
HSS 2" x 2" x 1/8"

FIXED SPLICE DETAILS

SECTION N-N
HSS 2" x 2" x 1/8"

EXPANSION SPLICE DETAILS

SECTION H-H

SECTION J-J

SECTION K-K

END OF RAIL

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT SPECIAL DETAIL FOR

BRIDGE RAILING, 4 TUBE
5/8" Ø ROUND HEAD BOLT
WITH PLATE WASHER (SEE DETAIL A),
LOCK WASHER AND HEX NUT

SPACER PLATE PLAN

POST & BASE PLATE PLAN

DETAIL A

POST STUD ANCHORAGE

ANCHOR STUD LAYOUT
NOTE: SURFACE UNDER POST IS TO BE FINISHED LEVEL

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT SPECIAL DETAIL FOR

BRIDGE RAILING, 4 TUBE

5-20-2016
11-20-2015
B-26-E
8 OF 8
PEDESTRIAN STRUCTURE
FENCING FOR EXISTING OPEN PARAPET

**TYPICAL ELEVATIONS**

**SECTION A-A**

**PIPE CONNECTOR DETAIL**

USE AT ANTI-CLIMB SHIELD ONLY

**NOTE:**
USE THIS DETAIL ONLY WHEN LOCATION OF THE WINGWALL PRECLUDES A STANDARD CONNECTION.
OTHERWISE, PLACE THE END FENCE POST IN THE CENTER OF THE END
CONCRETE POST WITH STANDARD POST CONNECTION CLIPS.

**USE AT ANTI-CLIMB SHIELD ONLY**

**TYPICAL ELEVATIONS**
BASE PLATE DETAILS

SECTION A - A

EXPANSION SLEEVE DETAIL

NOTES:

ALL FENCE POSTS SHALL BE 2½" NOMINAL (2.875" O.D.) PIPE AND ANTI-CLIMB SHIELD PIPE FRAMES SHALL BE 1¼" NOMINAL (1.66" O.D.) PIPE, IN CONFORMITY WITH ASTM F669, CLASS 1C.

HORIZONTAL RAILS SHALL BE 1¼" NOMINAL (1.66" O.D.) PIPE IN CONFORMITY WITH ASTM F669, CLASS 1C OR ASTM F1083.

ALL FENCE COMPONENTS, UNLESS OTHERWISE INDICATED, SHALL BE GALVANIZED ACCORDING TO MDOT'S CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

ALL POSTS, ANTI-CLIMB SHIELDS OR OTHER COMPONENTS TO BE FABRICATED SHALL BE FURNISHED "BLACK" AND THEN GALVANIZED AFTER FABRICATION.

DAMAGED GALVANIZED SURFACES (NEW AND EXISTING) SHALL BE REPAIRED IN CONFORMITY WITH MDOT'S CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

FENCE FABRIC SHALL BE #9 GAGE MESH AND BE GALVANIZED OR ALUMINUM COATED IN CONFORMITY WITH MDOT'S CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION. MESH SIZE OPENING SHALL BE 2" UNLESS 1" MESH SIZE OPENING IS APPROVED BY THE TRAFFIC AND SAFETY DIVISION AND NOTED ON DESIGN PLANS. ALL DETAILS ON STANDARD PLAN SHALL APPLY REGARDLESS OF MESH SIZE OPENINGS.

GALVANIZED ¾" DIAMETER TRUSS RODS SHALL EXTEND DIAGONALLY FROM THE TOP CONNECTION CLIP AT EACH TENSION BAR TO THE ADJACENT POST, EXCEPT ACROSS EXPANSION JOINTS AND AT LIGHT STANDARDS WITH A CURVED FENCE DETAIL, WHEN THERE ARE TWO OR MORE CONTINUOUS PANELS OF FABRIC.

PIPE CONNECTION DETAIL

USE AT ANTI-CLIMB SHIELD ONLY

ALL POSTS SHALL BE INSTALLED PLUMB AND MAY BE SHIMMED WITH NON-METALLIC SHIMS, APPROVED BY THE ENGINEER. COSTS FOR SHIMMING SHALL BE INCLUDED IN THE PAY ITEM "FENCE, STRUCTURE".

THE GROUNDING CABLE SHALL BE PLACED IN A NON-METALLIC CONDUIT FROM THE END POST CONNECTION TO THE GROUND ROOD CONNECTION. THE CONDUIT SHALL BE SECURED TO THE STRUCTURE USING EITHER EXPANSION BOLTS OR ADHESIVE ANCHORED BOLTS WITH GALVANIZED METAL STRIPS, AS APPROVED BY THE ENGINEER.

IN THE EVENT THAT THE INSTALLATION OF A GROUND ROOD IS IMPrACTICAL, THE GROUNDING CABLE SHALL BE CONNECTED TO THE NEAREST LIGHT STANDARD USING A MECHANICAL CLIP, ONLY AFTER OBTAINING PERMISSION FROM THE LOCAL PUBLIC LIGHTING AUTHORITY.

EXPANSION JOINT SLEEVES, FOR HORIZONTAL RAILS, SHALL BE THE MANUFACTURER'S STANDARD OVERSIZED SLEEVES, CRIMPED IN THE MIDDLE.

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

THE U-BOLTS FOR FENCING BASE PLATES SHALL BE ACCURATELY POSITIONED ACCORDING TO THE PLANS AND FIRMLY HELD BY MEANS OF A TEMPLATE.

THE RSS 2" X 2" X ½" RAIL SHALL NOT BE REQUIRED ON THE BRIDGE RAILING. AESTHETIC PARAPET TUBE USED IN COMBINATION WITH PEDESTRIAN FENCING.

ALL LABOR, MATERIAL AND EQUIPMENT REQUIRED TO INSTALL PEDESTRIAN FENCING SHALL BE INCLUDED IN PAY ITEM "FENCE, STRUCTURE".

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

FENCING FOR BRIDGE RAILING, AESTHETIC PARAPET TUBE

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