<table>
<thead>
<tr>
<th>DETAIL NO.</th>
<th>DESCRIPTION</th>
<th>DATE APPROVED</th>
<th>DATE REVISED</th>
</tr>
</thead>
<tbody>
<tr>
<td>B101</td>
<td>Bridge Nameplate (For New Bridges)</td>
<td>Nov. 22, 2002</td>
<td>09-11-2014</td>
</tr>
<tr>
<td>B102</td>
<td>Bridge Nameplate (For Bridge Reconstruction)</td>
<td>Nov. 22, 2002</td>
<td>11-08-2018</td>
</tr>
<tr>
<td>B201</td>
<td>Pile Splice (Cast-In-Place Concrete Piles)</td>
<td>Nov. 22, 2002</td>
<td>11-06-2013</td>
</tr>
<tr>
<td>B202</td>
<td>Pile Splice (Steel H Bearing Piles 10” To 14”)</td>
<td>Nov. 22, 2002</td>
<td>11-06-2013</td>
</tr>
<tr>
<td>B303</td>
<td>Sole Plate (Prestressed Concrete Beams) (For Bearings With Pintles)</td>
<td>Sept. 22, 2011</td>
<td>12-20-2018</td>
</tr>
<tr>
<td>B304</td>
<td>Elastomeric Fixed Bearing Assembly (Prestressed Concrete Beams) (For Replacement Of Inplace Bearings Only)</td>
<td>Nov. 22, 2002</td>
<td>11-08-2018</td>
</tr>
<tr>
<td>B305</td>
<td>Elastomeric Bearing Pad (Prestressed Concrete Beams)</td>
<td>Nov. 22, 2002</td>
<td>05-10-2017</td>
</tr>
<tr>
<td>B307</td>
<td>Bearing Pad Restraint</td>
<td>Nov. 02, 2017</td>
<td>12-20-2018</td>
</tr>
<tr>
<td>B309</td>
<td>Tapered Bearing Plate Assembly (For Integral Abutments or Piers with Continuity Diaphragms)</td>
<td>Dec. 20, 2018</td>
<td></td>
</tr>
<tr>
<td>B310</td>
<td>Curved Plate Bearing Assembly (Prestressed Concrete Beams) (Fixed)</td>
<td>Dec. 20, 2018</td>
<td></td>
</tr>
<tr>
<td>B311</td>
<td>Curved Plate Bearing Assembly (Prestressed Concrete Beams) (Expansion)</td>
<td>Dec. 20, 2018</td>
<td></td>
</tr>
<tr>
<td>B312</td>
<td>Pot Type Bearing Assembly (Prestressed Concrete Beams) (Guided Expansion)</td>
<td>Nov. 22, 2002</td>
<td>11-03-2015</td>
</tr>
<tr>
<td>B313</td>
<td>Pot Type Bearing Assembly (Prestressed Concrete Beams) (Non-Guided Expansion)</td>
<td>Nov. 22, 2002</td>
<td>11-03-2015</td>
</tr>
<tr>
<td>B314</td>
<td>Pot Bearing Assembly (Steel Beams) (Guided Expansion)</td>
<td>Sept. 18, 2007</td>
<td>11-03-2015</td>
</tr>
<tr>
<td>B315</td>
<td>Pot Bearing Assembly (Steel Beams) (Non-Guided Expansion)</td>
<td>Sept. 18, 2007</td>
<td>11-03-2015</td>
</tr>
<tr>
<td>B316</td>
<td>Pot Bearing Assembly (Steel Beams) (Fixed)</td>
<td>Sept. 18, 2007</td>
<td>11-03-2015</td>
</tr>
<tr>
<td>B354</td>
<td>Curved Plate Bearing Assembly (Steel Beams) (Fixed)</td>
<td>Nov. 22, 2002</td>
<td>11-08-2018</td>
</tr>
<tr>
<td>B355</td>
<td>Curved Plate Bearing Assembly (Steel Beams) (Expansion)</td>
<td>Nov. 22, 2002</td>
<td>11-08-2018</td>
</tr>
<tr>
<td>B400</td>
<td>Splices For Steel Beams</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B402</td>
<td>Bolted Diaphragms (For Steel Beams)</td>
<td>Mar. 26, 2009</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B403</td>
<td>Steel Intermediate Diaphragm (For 36M, 40MH, MN45 - MN63 Prestressed Concrete Beams)</td>
<td>Nov. 03, 2015</td>
<td>12-20-2018</td>
</tr>
</tbody>
</table>

* Refer to [http://www.dot.state.mn.us/bridge/] for current Bridge CADD Standards
<table>
<thead>
<tr>
<th>DETAIL NO.</th>
<th>DESCRIPTION</th>
<th>DATE APPROVED</th>
<th>DATE REVISED</th>
</tr>
</thead>
<tbody>
<tr>
<td>B408</td>
<td>Cross Frame Intermediate Diaphragm (For Curved Steel Beams)</td>
<td>Mar. 26, 2009</td>
<td>11-03-2015</td>
</tr>
<tr>
<td>B410</td>
<td>Bolted Flange To Stiffener Detail</td>
<td>ov. 22, 2002</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B411</td>
<td>Stiffener Details (For Steel Beams)</td>
<td>Oct. 22, 2008</td>
<td></td>
</tr>
<tr>
<td>B412</td>
<td>Steel Intermediate Bolted Diaphragm (All MW Prestressed Concrete Beams)</td>
<td>Sept. 22, 2011</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B553</td>
<td>Protection Plate (For End Of Slab)</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B701</td>
<td>Bridge Floor Drain (Welded Box)</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B702</td>
<td>Bridge Floor Drain (Structural Tube)</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B705</td>
<td>Bridge Offset Floor Drain (Welded Box)</td>
<td>Nov. 22, 2002</td>
<td></td>
</tr>
<tr>
<td>B706</td>
<td>Bridge Offset Floor Drain (Structural Tube)</td>
<td>Nov. 22, 2002</td>
<td></td>
</tr>
<tr>
<td>B801</td>
<td>Contraction Joint</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B814</td>
<td>Concrete End Diaphragm (27M, 30MH, 35MH, 36M, 40MH, MN45 - MN63, 82MW &amp; 96MW Prestressed Concrete Beams) (Parapet Abutment)</td>
<td>Sept. 22, 2011</td>
<td>12-20-2018</td>
</tr>
<tr>
<td>B816</td>
<td>Concrete End Diaphragm (14&quot;, 18&quot; &amp; 22&quot; Rectangular Prestressed Concrete Beams) (Integral Abutment)</td>
<td>May 24, 2012</td>
<td>11-08-2018</td>
</tr>
<tr>
<td>B830</td>
<td>Concrete Barrier or Parapet (Slipform Alternate)</td>
<td>Aug. 24, 2016</td>
<td></td>
</tr>
<tr>
<td>B850</td>
<td>Concrete Relief Joint Detail (Bridge Reconstruction On Trunk Highway Bridges)</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B901</td>
<td>Median Sign Post Anchor</td>
<td>May 10, 2017</td>
<td></td>
</tr>
<tr>
<td>B905</td>
<td>Fence Post Anchorage (Type A)</td>
<td>Jan. 05, 2017</td>
<td></td>
</tr>
<tr>
<td>B906</td>
<td>Fence Post Anchorage (Type B and C)</td>
<td>Jan. 05, 2017</td>
<td>05-10-2017</td>
</tr>
<tr>
<td>B910</td>
<td>Drainage System</td>
<td>Jan. 13, 2015</td>
<td>11-08-2018</td>
</tr>
<tr>
<td>B920</td>
<td>Temporary Portable Precast Concrete Barrier Anchorage (Temporary Usage In Limited Barrier Displacement Areas)</td>
<td>Dec. 21, 2011</td>
<td>11-08-2018</td>
</tr>
<tr>
<td>B935</td>
<td>Triple Beam Guardrail</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B942</td>
<td>Inspection Door (In Vertical Or Horizontal Position)</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
</tr>
<tr>
<td>B950</td>
<td>Anchor Bolt Cluster for Light Poles</td>
<td>Aug. 24, 2016</td>
<td>02-22-2018</td>
</tr>
</tbody>
</table>

* Refer to [http://www.dot.state.mn.us/bridge/] for current Bridge CADD Standards
<table>
<thead>
<tr>
<th>DETAIL NO.</th>
<th>DESCRIPTION</th>
<th>DATE APPROVED</th>
<th>DATE REVISED</th>
</tr>
</thead>
<tbody>
<tr>
<td>B308</td>
<td>Elastomeric Bearing Assembly (22” And 30” Concrete Double Tee Beams) (Fixed and Expansion)</td>
<td>ARCHIVED 10-22-2009</td>
<td>Nov. 22, 2002</td>
</tr>
<tr>
<td>B317</td>
<td>Curved Cast Bearing Assembly (Prestressed Concrete Beams) (Fixed)</td>
<td>ARCHIVED 11-10-2005</td>
<td>Nov. 22, 2002</td>
</tr>
<tr>
<td>B318</td>
<td>Curved Cast Bearing Assembly (Prestressed Concrete Beams) (Expansion)</td>
<td>ARCHIVED 11-10-2005</td>
<td>Nov. 22, 2002</td>
</tr>
<tr>
<td>B341</td>
<td>Fixed Bearing Assembly (Rocker Type)</td>
<td>ARCHIVED 01-17-2000</td>
<td>July 30, 1999</td>
</tr>
<tr>
<td>B342</td>
<td>Expansion Bearing Assembly (Rocker Type)</td>
<td>ARCHIVED 01-17-2000</td>
<td>July 30, 1999</td>
</tr>
<tr>
<td>B351</td>
<td>Bearing Assembly (Steel Beams) (Fixed)</td>
<td>ARCHIVED 03-25-2004</td>
<td>Nov. 22, 2002</td>
</tr>
<tr>
<td>B352</td>
<td>Bearing Assembly (Steel Beams) (Expansion with Guide Bars)</td>
<td>ARCHIVED 01-17-2000</td>
<td>July 30, 1999</td>
</tr>
<tr>
<td>B353</td>
<td>Bearing Assembly (Steel Beams) (Expansion without Guide Bars)</td>
<td>ARCHIVED 01-18-2000</td>
<td>July 30, 1999</td>
</tr>
<tr>
<td>B357</td>
<td>Curved Plate Bearing Assembly (Steel Beams) (Vulcanized Expansion)</td>
<td>ARCHIVED 08-25-2006</td>
<td>Nov. 22, 2002</td>
</tr>
<tr>
<td>B406</td>
<td>Steel Intermediate Bolted Diaphragm (For 63M – 81M Prestressed Concrete Beams)</td>
<td>ARCHIVED 09-22-2011</td>
<td>Nov. 22, 2002 10-22-2009</td>
</tr>
<tr>
<td>B601</td>
<td>Expansion Hinge for Welded Beams (For Straight Bridges)</td>
<td>ARCHIVED 02-11-2000</td>
<td>July 30, 1999</td>
</tr>
<tr>
<td>B602</td>
<td>Expansion Hinge for Wide Flange Beams (For Straight Bridges)</td>
<td>ARCHIVED 02-11-2000</td>
<td>July 30, 1999</td>
</tr>
<tr>
<td>B704</td>
<td>Drain Extension</td>
<td>ARCHIVED 03-22-2002</td>
<td>July 30, 1999</td>
</tr>
<tr>
<td>B710</td>
<td>Floor Drain For Tee Beams</td>
<td>ARCHIVED 10-22-2009</td>
<td>Nov. 22, 2002</td>
</tr>
</tbody>
</table>

* Refer to [http://www.dot.state.mn.us/bridge/](http://www.dot.state.mn.us/bridge/) for current Bridge CADD Standards
<table>
<thead>
<tr>
<th>DETAIL NO.</th>
<th>DESCRIPTION</th>
<th>DATE APPROVED</th>
<th>DATE REVISED</th>
</tr>
</thead>
<tbody>
<tr>
<td>B802</td>
<td>Concrete Intermediate Diaphragm (28M – 40” Prestressed Concrete Beam Spans)</td>
<td>May 23, 1995</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 09-17-1997</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B803</td>
<td>Concrete End Diaphragm (28M – 40” Prestressed Concrete Beams) (Parapet Abutment)</td>
<td>July 30, 1999</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 03-22-2002</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B806</td>
<td>Concrete Intermediate Diaphragm (63” – 81” Prestressed Concrete Beam Spans)</td>
<td>May 23, 1995</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 09-17-1997</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B807</td>
<td>Concrete End Diaphragm (For Double Tee Beams with Contraction Abutment)</td>
<td>Nov. 22, 2002</td>
<td>12-17-2008</td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 12-17-2008</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B809</td>
<td>Concrete End Diaphragm (For Steel Beams With Contraction Abutment)</td>
<td>Nov. 22, 2002</td>
<td>12-17-2008</td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 12-17-2008</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B810</td>
<td>Concrete End Diaphragm (28M – 40” Prestressed Concrete Beams) (Pile Bent Abutment)</td>
<td>July 30, 1999</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 03-22-2002</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B811</td>
<td>Concrete End Diaphragm (27M – 81M, MN45 – MN63 Prestressed Concrete Beams) (Contraction Abutment)</td>
<td>Oct. 26, 2005</td>
<td>12-17-2008</td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 12-17-2008</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B812</td>
<td>Concrete End Diaphragm (63M – 81M Prestressed Concrete Beams) (Parapet Abutment)</td>
<td>Nov. 22, 2002</td>
<td>05-24-2012</td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 05-24-2012</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B813</td>
<td>Concrete Intermediate Diaphragm (45M – 54M Prestressed Concrete Beam Spans)</td>
<td>May 23, 1995</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 09-17-1997</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B822</td>
<td>Concrete Pier Diaphragm (For Double Tee Beams)</td>
<td>Nov. 22, 2002</td>
<td>12-17-2008</td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 12-17-2008</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B831</td>
<td>Concrete Parapet Railing (Slipform Alternate)</td>
<td>Nov. 22, 2002</td>
<td>08-24-2016</td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 08-24-2016</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B911</td>
<td>Drainage System (For Slab Over Parapet Abutments) (With No Approach Treatment)</td>
<td>Nov. 22, 2002</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>ARCHIVED 01-13-2015</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Refer to [http://www.dot.state.mn.us/bridge/] for current Bridge CADD Standards
| B922 | Portable Precast Barrier Anchorage (Temporary Usage On Roadways) | ARCHIVED 05-24-2011 | Nov. 22, 2002 |

* Refer to [http://www.dot.state.mn.us/bridge/] for current Bridge CADD Standards
LETTERS AND NUMBERS SHALL CONFORM TO THOSE SHOWN.

FURNISH 2 STEEL BOLTS ... DIA. X 3" LONG WITH EACH PLATE.

TOP SURFACE OF LETTERS, NUMBERS AND FRAMES SHALL BE BURNISHED.

THE DASHED NUMBERS SHOWN ABOVE ARE FOR ILLUSTRATION.
DATA TO BE SHOWN ON NAMEPLATE IS AS FOLLOWS:

BRIDGE

YEAR

1234567890

NUMBERS FOR NAMEPLATE

NOTES:
MATERIAL SHALL COMPLY WITH SPEC. 3327.
LETTERS AND NUMBERS SHALL CONFORM TO THOSE SHOWN.
DRAFT ON LETTERS AND NUMBERS SHALL NOT BE MORE THAN 3" IN 12".
HORIZONTAL SPACING OF LETTERS AND NUMBERS SHALL PRODUCE A
BALANCED LAYOUT IN PROPORTION TO SPACING SHOWN.
TOP SURFACE OF LETTERS, NUMBERS AND FRAMES SHALL BE BURNISHED.
FURNISH 2 STEEL BOLTS \( \frac{3}{4} \)" DIA. X 3" LONG WITH EACH PLATE.
ALL DIMENSIONS FOR \( \frac{3}{4} \)" HIGH LETTERS AND NUMBERS SHALL BE
IN DIRECT PROPORTION TO THOSE SHOWN FOR THE 1" HIGH
LETTERS AND NUMBERS.
NO SHOP DRAWING REQUIRED.
LETTERS AND NUMBERS SHALL CONFORM TO THOSE SHOWN.
FURNISH 2 STEEL BOLTS \( \frac{3}{8} \)" Dia. \( \times \) 3" Long WITH EACH PLATE.

DRAFT ON LETTERS AND NUMBERS SHALL NOT BE MORE THAN 3" IN 12".
TOP SURFACE OF LETTERS, NUMBERS AND FRAMES SHALL BE BURNISHED.
BALANCED LAYOUT IN PROPORTION TO SPACING SHOWN.
IN DIRECT PROPORTION TO THOSE SHOWN FOR THE 1" HIGH LETTERS AND NUMBERS.

NOTES:

- NO SHOP DRAWING REQUIRED.
- MATERIAL SHALL COMPLY WITH SPEC. 3327.
- LETTERS AND NUMBERS SHALL CONFORM TO THOSE SHOWN.
- DRAFT ON LETTERS AND NUMBERS SHALL NOT BE MORE THAN 3" IN 12".
- HORIZONTAL SPACING OF LETTERS AND NUMBERS SHALL PRODUCE A BALANCED LAYOUT IN PROPORTION TO SPACING SHOWN.
- BALANCED LAYOUT IN PROPORTION TO SPACING SHOWN.
- TOP SURFACE OF LETTERS, NUMBERS AND FRAMES SHALL BE BURNISHED.
- FURNISH 2 STEEL BOLTS \( \frac{3}{8} \)" Dia. \( \times \) 3" Long WITH EACH PLATE.
- ALL DIMENSIONS FOR \( \frac{3}{4} \)" HIGH LETTERS AND NUMBERS SHALL BE IN DIRECT PROPORTION TO THOSE SHOWN FOR THE 1" HIGH LETTERS AND NUMBERS.
NOTES:

1. FOR PILE SHELL THICKNESSES GREATER THAN 1/4", USE A B-U4a WELD CONFIGURATION. SEE DETAIL "A".

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

PILE SPlice
(CAST-IN-PLACE CONCRETE PILES)

APPRIoVEO: NOVEMBER 22, 2002
STATE BRIDGE ENGINEER

REVISED: 11-06-2013
DETAIL NO. B201
SECTION AT SPLICE

SECTION A-A

100% BUTT WELDED PILE SPLICE

NOTES:

CELLULOSIC TYPE ELECTRODES E-6010 OR E-6011 SHALL BE USED FOR 100% BUTT WELDED SPLICES.

ELECTRODES WHICH HAVE BECOME WET, SOILED OR DAMAGED SHALL NOT BE USED.

WELDING SHALL NOT BE DONE WHEN THE AMBIENT TEMPERATURE IS LOWER THAN 0°F, OR WHEN THE PILE IS WET OR EXPOSED TO FALLING RAIN OR SNOW. WHEN THE PILE METAL TEMPERATURE IS BELOW 32°F, THE PILE METAL IN THE AREA OF THE WELD SHALL BE HEATED TO A MINIMUM TEMPERATURE OF 70°F, AND MAINTAINED AT THIS TEMPERATURE DURING WELDING.

APPROVED: NOVEMBER 22, 2002

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

PILE SPLICE
(STEEL H BEARING PILES 10" TO 14")
DEPARTMENT OF TRANSPORTATION
STATE OF MINNESOTA
SOLE PLATE
(FOR BEARINGS WITH PINTLES)
PRESTRESSED CONCRETE BEAMS
B303

STATE BRIDGE ENGINEER

PINTLE HOLE DETAIL

ALL AROUND 

BEVEL

SOLE PLATE

2½" LONG X 1¾" DIA. POLYSTYRENE,
TYPE B, PLUG, REMOVE PLUG PRIOR TO BEAM INSTALLATION.

1¼" DIA.

¼" BEVEL ALL AROUND

SECTION A-A

NOTES:

PROVIDE STRUCTURAL STEEL PER SPEC. 3306.

PROVIDE WELDED STUDS OF WELDABLE CARBON STEEL PER SPEC. 3391.20.

GALVANIZE SOLE PLATE FOR BEARING ASSEMBLY
PER SPEC. 3394 AFTER FABRICATION.

ENSURE PINTLE HOLES ARE FREE OF ZINC BUILD UP FROM
GALVANIZING.

SOLE PLATES ARE INCIDENTAL TO PRESTRESSED CONCRETE
BEAMS.

1 FOR ½" DIA. PINTLES.

2 THESE DIMENSIONS MAY BE MODIFIED TO CLEAR
PRESTRESSED STRANDS, HOWEVER, CHANGES
MUST BE APPROVED BY THE ENGINEER.

3 STUD WELDING PER AWS D1.1.

APPROVED: SEPTEMBER 22, 2011

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
SOLE PLATE
(PRESTRESSED CONCRETE BEAMS)
(IF BEARINGS WITH PINTLES)

PROCEDURE
01-05-2017
12-20-2018
DETAIL NO.
B303
**ELASTOMERIC FIXED BEARING ASSEMBLY**

*Prestressed Concrete Beams*

(for replacement of inplace bearings only)

**NOTES:**

Provide elastomeric materials and pad construction per Spec. 3741.

Provide steel plates per Spec. 3306.

Provide anchor rods per Spec. 3306, galvanize per Spec. 3394.

Provide pintles per Spec. 3309.

Galvanize structural steel bearing assembly after fabrication per Spec. 3394, except as noted.

Payment for bearing assembly includes all material on this detail.

1. The total thickness shown includes the steel plates.
2. Do not galvanize these plates.
3. Refer to bearing pad restraint B-detail for additional information and details.

**DESIGN DATA:**

Max. factored shear resistance:
- 50.3 kips per 1/2" dia. pintle
- 36.2 kips per 1/2" dia. anchor rod

**STATE OF MINNESOTA**

**DEPARTMENT OF TRANSPORTATION**

**ELASTOMERIC FIXED BEARING ASSEMBLY**

(for replacement of inplace bearings only)

---

### TABLE

<table>
<thead>
<tr>
<th>ASSEMBLY TYPE</th>
<th>LOCATION</th>
<th>BEARING PAD SIZE</th>
<th>STEEL PLATES</th>
<th>LAMINATES</th>
<th>SHAPE FACTOR</th>
<th>BEARING PLATE SIZE</th>
<th>PINTLE DISTANCE</th>
<th>ASSY. HEIGHT</th>
<th>RESTRAINT PATTERN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A     B    D  NO. THICK.</td>
<td>C  E  F</td>
<td>K</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**DESIGNER NOTE (REMOVE PRIOR TO PLOTTING FINAL PLAN):**

For parapet and semi-integral abutment bridges on grades exceeding 3%, modify this detail to provide a tapered bearing plate per detail B309.

Per Note 3 include B307 and modify as necessary.

---

**APPROVED: NOVEMBER 22, 2002**

STATE BRIDGE ENGINEER

---

**REVISIONS:**

- 01-05-2017
- 11-02-2017
- 11-08-2018

**DETAIL NO.:** B304
DIAPHRAGMS OR INTEGRAL ABUTMENTS

USE UNREINFORCED PAD WITH CONTINUITY (PRESTRESSED CONCRETE BEAMS)

DEPARTMENT OF TRANSPORTATION
STATE OF MINNESOTA

BRIDGE SEAT
BEARING PAD
ELASTOMERIC BEARING PAD
BRIDGE SEAT

SECTION X-X
SIDE ELEVATION

PLAN
(BEAM NOT SHOWN)

TABLE

<table>
<thead>
<tr>
<th>ROLL</th>
<th>LOCATION</th>
<th>BEAM SIZE</th>
<th>BEARING PAD SIZE</th>
<th>SHAPE FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>d (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>24</td>
<td>1/2</td>
</tr>
</tbody>
</table>

NOTES:

USE NEOPRENE OR NATURAL RUBBER AND FABRICATE PAD PER SPEC. 3741.

PAYMENT FOR ELASTOMERIC BEARING PAD INCLUDED IN ITEM "ELASTOMERIC BEARING PAD" PER EACH.

1 "d" INDICATES THE THICKNESS OF THE BEARING PAD.

DESIGNER NOTE
(REMOVE DESIGNER NOTE PRIOR TO PLOTTING FINAL PLAN)
USE 1/2" UNREINFORCED PAD WITH CONTINUITY DIAPHRAGMS OR INTEGRAL ABUTMENTS.

APPROVED: NOVEMBER 22, 2002

STATE BRIDGE ENGINEER

STATE BRIDGE ENGINEER

B305
BEARING PAD RESTRAINT

**Pattern A-1**
(View at bottom of bearing plate)

- Elastomeric bearing pad
- TYP. on ends: 12" x 24"
- TYP. on long sides: 1/2" x 1/2" x 10"
- TYP.

**Pattern A-2**
(View at bottom of bearing plate)

- Elastomeric bearing pad
- TYP. on ends: 1/2" x 1/2" x 6"
- TYP. on long sides: 1/2" x 1/2" x 10"
- TYP.

**Pattern A-3**
(View at bottom of bearing plate)

- Elastomeric bearing pad
- TYP. on ends: 1/2" x 1/2" x 8"
- TYP. on long sides: 1/2" x 1/2" x 10"
- TYP.

**Notes:**
- Install 1/2" x 1/2" solid restraint bars symmetric to center of bearing plate with clear distance of 1/4" from edge of bearing pad to inside face of restraint bar.
- Restraint bars included in payment for bearing assembly.

**Design Note:**
Include this detail when using bearing assembly details B304, B309, B310, B311, B354, or B355.

For custom bearing pad sizes, modify pattern A-4 using the following design criteria:
- Min. bar length of 6", Max. length 10", Max. gap between bars of 2", Max. distance from end of bar to corner of bearing pad of 1".

**Designer Note:**
Remove prior to plotting final plans.

**Approval:**
November 02, 2017

State Bridge Engineer

State of Minnesota Department of Transportation

Revision:
11-08-2018
12-20-2018

Detail No.
B307
**Notes:**

- Provide elastomeric materials and pad construction per Spec. 3741.
- Provide steel plates per Spec. 3306.
- Provide pintles per Spec. 3309.
- Galvanize structural steel bearing assembly after fabrication per Spec. 3594.
- Payment for tapered bearing plate assembly includes all material on this detail.

**Table:**

<table>
<thead>
<tr>
<th>Assembly Type</th>
<th>Location</th>
<th>Beam Size</th>
<th>Bearing Pad Size</th>
<th>Shape Factor</th>
<th>Bearing Plate Size</th>
<th>Assembly Height</th>
<th>Restraint Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>D</td>
<td>C</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>RB, M &amp; MN</td>
<td></td>
<td>12</td>
<td>24</td>
<td>½</td>
<td>8.0</td>
<td>14&quot;</td>
<td>26&quot;</td>
</tr>
<tr>
<td>MH</td>
<td></td>
<td>12</td>
<td>30</td>
<td>½</td>
<td>8.6</td>
<td>14&quot;</td>
<td>32&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Design Data:**

- Max. factored shear resistance: - 50.3 kips per ½" dia. pintle

---

*Approved: December 20, 2018*

**State Bridge Engineer**

**State of Minnesota Department of Transportation**

**Tapered Bearing Plate Assembly**

*(For integral abutments or piers with continuity diaphragms)*
**Design Data:**

Max, factored shear resistance:
- 50.3 kips per 1½" dia. pintle
- 36.2 kips per 1½" dia. anchor rod

**Table**

<table>
<thead>
<tr>
<th>Assembly Size</th>
<th>Beam Size</th>
<th>Bearing Pad Size</th>
<th>Bearing Plate Size</th>
<th>Curved Plate Size</th>
<th>Anchor Rod Offset</th>
<th>Assy. Height</th>
<th>Restraint Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB, M, &amp; MN</td>
<td>12&quot; x 24&quot; x ½&quot;</td>
<td>8.0</td>
<td>14&quot;</td>
<td>1½&quot;</td>
<td>4½&quot;</td>
<td>26&quot;</td>
<td>1½&quot;</td>
</tr>
<tr>
<td>MW</td>
<td>16&quot; x 36&quot; x ½&quot;</td>
<td>11.1</td>
<td>18&quot;</td>
<td>4½&quot;</td>
<td>26&quot;</td>
<td>1½&quot;</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>MH</td>
<td>12&quot; x 30&quot; x ½&quot;</td>
<td>8.6</td>
<td>14&quot;</td>
<td>4½&quot;</td>
<td>30&quot;</td>
<td>1½&quot;</td>
<td>3/8&quot;</td>
</tr>
</tbody>
</table>

**Notes:**

- Provide elastomeric materials and pad construction per Spec. 3741.
- Provide steel plates per Spec. 3306.
- Provide anchor rods per Spec. 3306. Galvanize per Spec. 3394.
- Provide pintles per Spec. 3309.
- Galvanize structural steel bearing assembly after fabrication per Spec. 3394, except as noted.
- Payment for bearing assembly includes all material on this detail.

1. The min. radius is 16" unless otherwise specified in the table. The max. radius is 24". Finish to 250 micro. The finished thickness of the plate may be ¼" less than shown.

2. "±" denotes offset as shown. "−" denotes offset opposite of shown.

3. Refer to bearing pad restraint B-detail for additional information and details.

**Designer Note:**
Remove prior to plotting final plans. Minimum size of bearing pad:
- 12" x 24" x ½" for RB, M, & MN shapes
- 16" x 36" x ½" for MW shapes
- 12" x 30" x ½" for MH shapes

Use bearing plate size dimension "E" of 34" for RB and M shape, 38" for MH shape.

For parapet and semi-integral abutment bridges on grades exceeding 3%, modify this detail to provide a tapered bearing plate per detail B309.

Per note 3 include B307 and modify as necessary.

---

**State Bridge Engineer**

**Approved:** December 20, 2018

**State of Minnesota**

**Department of Transportation**

**Curved Plate Bearing Assembly**

(Prestressed Concrete Beams) (Fixed)
**DEPARTMENT OF TRANSPORTATION**  
**STATE OF MINNESOTA**

**CURVED PLATE BEARING ASSEMBLY**

**NOTES:**

- **DETAIL NO.**
- **A**
- **B**
- **D**
- **C**
- **E**
- **F**
- **G**
- **H**
- **J**

**SIZE**

- **CURVED PLATE**
- **LOCATION**
- **TABLE**
- **TYPE**
- **ASSEMBLY**
- **BEAM**
- **BEARING PAD**
- **FACTOR**
- **SHAPE**
- **BEARING PLATE**
- **12"**
- **24"**
- **14"**
- **27"**
- **1"**
- **4"**
- **26"**
- **1°**

**PLATES**

- **STEEL**
- **LAMINATES**
- **THICK.**
- **NO.**
- "$"  
- "$\"$  

**BEARING PAD**

- **ELASTOMERIC**
- **SEAT**
- **BRIDGE**
- **TOP OF**

**SECTION Y-Y**

**SIDE ELEVATION**

**SECTION THROUGH ELASTOMERIC BEARING PAD**

**TABLE**

<table>
<thead>
<tr>
<th>ASSORT TYPE</th>
<th>LOCATION</th>
<th>BEAM SIZE</th>
<th>BEARING PAD SIZE</th>
<th>STEEL PLATES</th>
<th>LAMINATES</th>
<th>SHAPE FACTOR</th>
<th>BEARING PLATE SIZE</th>
<th>CURVED PLATE SIZE</th>
<th>ASSY. HEIGHT</th>
<th>RESTRAINT PATTERN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>D</td>
<td>NO.</td>
<td>THICK.</td>
<td>NO.</td>
<td>THICK.</td>
</tr>
<tr>
<td>RB, M, &amp; MN</td>
<td>12&quot; x 24&quot;</td>
<td>$\frac{1}{4}&quot;$</td>
<td>$\frac{1}{4}&quot;$</td>
<td>8.0</td>
<td>14&quot;</td>
<td>27&quot;</td>
<td>$\frac{1}{2}&quot;$</td>
<td>26&quot;</td>
<td>$\frac{1}{2}&quot;$</td>
<td>A-1</td>
</tr>
<tr>
<td>MW</td>
<td>16&quot; x 36&quot;</td>
<td>$\frac{1}{4}&quot;$</td>
<td>$\frac{1}{4}&quot;$</td>
<td>7.4</td>
<td>18&quot;</td>
<td>39&quot;</td>
<td>$\frac{1}{2}&quot;$</td>
<td>38&quot;</td>
<td>$\frac{1}{2}&quot;$</td>
<td>A-2</td>
</tr>
<tr>
<td>WH</td>
<td>12&quot; x 30&quot;</td>
<td>$\frac{1}{4}&quot;$</td>
<td>$\frac{1}{4}&quot;$</td>
<td>8.6</td>
<td>14&quot;</td>
<td>33&quot;</td>
<td>$\frac{1}{2}&quot;$</td>
<td>32&quot;</td>
<td>$\frac{1}{2}&quot;$</td>
<td>A-3</td>
</tr>
</tbody>
</table>

**NOTES:**

- PROVIDE ELASTOMERIC MATERIALS AND PAD CONSTRUCTION PER SPEC. 3741.
- PROVIDE STEEL PLATES PER SPEC. 3306.
- PROVIDE PINTLES PER SPEC. 3309.
- GALVANIZE STRUCTURAL STEEL BEARING ASSEMBLY AFTER FABRICATION PER SPEC. 3394, EXCEPT AS NOTED.
- PAYMENT FOR BEARING ASSEMBLY INCLUDES ALL MATERIAL ON THIS DETAIL.
- THE MIN. RADIUS IS 18" UNLESS OTHERWISE SPECIFIED IN THE TABLE. THE MAX. RADIUS IS 24", FINISH TO 250 MICRO. THE FINISHED THICKNESS OF THE PLATE MAY BE $\frac{1}{16}"$ LESS THAN SHOWN.
- DO NOT GALVANIZE THESE PLATES.
- THE TOTAL THICKNESS SHOWN INCLUDES THE STEEL PLATES.

**DESIGN DATA:**

**MINIMUM SIZE OF BEARING PAD:**

- 12" x 24" FOR RB, M, & MN SHAPES
- 16" x 36" FOR MW SHAPES
- 12" x 30" FOR MH SHAPES

**FOR PARAPET AND SEMI-INTEGRAL ABUTMENT BRIDGES ON GRADES EXCEEDING 3%, MODIFY THIS DETAIL TO PROVIDE A TAPERED BEARING PLATE PER DETAIL B309.**

**PER NOTE 4 INCLUDE B307 AND MODIFY AS NECESSARY.**

**CURVED PLATE BEARING ASSEMBLY**

**PRESSTEMED CONCRETE BEAMS**

**EXPANSION**

**STATE BRIDGE ENGINEER**

**APPROVED: DECEMBER 20, 2018**
SECTION Y-Y

(ALL PLATES & MATERIALS BELOW PLATE "A" NOT SHOWN)

SECTION X-X

NOTES:

PROVIDE MATERIALS, DESIGN AND FABRICATION PER SPECIAL PROVISIONS.

PROVIDE STEEL PLATES AND PINTLES PER SPEC. 3309.

Galvanize PLATES "A", "D" AND PINTLES PER SPEC. 3394.

METALIZE PLATES "B" & "C" PER SPEC. 2471.3.1.2.

PROVIDE ANCHOR RODS PER SPEC. 3385, TYPE B.

Galvanize PER SPEC. 3392.

PERFORM SHIMMING UNDER PLATE "D" WITH FABRIC PADS PER AASHTO LRFD BRIDGE CONSTRUCTION SPEC. SECTION 18.10.

MANUFACTURER TO SUBMIT ANY BEARING ASSEMBLY DIMENSIONS, DETAILS, OR MATERIALS NOT SHOWN TO THE ENGINEER FOR APPROVAL.

ALL MATERIAL SHOWN IS INCLUDED IN THE PRICE BID FOR EACH BEARING ASSEMBLY, EXCEPT AS NOTED.

1) MINIMUM ROTATION OF .02 RADIANS

2) MARK θ OF BRG. PLATES "A" AND "B" TO FACILITATE PLACEMENT.

3) HEIGHT IS MINIMUM DIMENSION IF PLATE IS TAPERED.

BEARING ASSEMBLY DIMENSIONS

<table>
<thead>
<tr>
<th>ASSEMBLY TYPE</th>
<th>ROTATION</th>
<th>TOTAL LOAD (KIPS)</th>
<th>TOTAL MOVEMENT (INCHES)</th>
<th>PLATE &quot;A&quot;</th>
<th>PLATE &quot;B&quot; (DIAMETER)</th>
<th>PLATE &quot;C&quot; (DIAMETER)</th>
<th>PLATE &quot;D&quot; (MAXIMUM)</th>
<th>DIMENSION &quot;L&quot;</th>
<th>DIMENSION &quot;H&quot;</th>
<th>DIMENSION &quot;N&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DIMENSION "N" = BOTTOM FLANGE WIDTH OF BEAMS MINUS 1/2"
BEARING ASSEMBLY DIMENSIONS

<table>
<thead>
<tr>
<th>ASSEMBLY TYPE</th>
<th>ROTATION</th>
<th>TOTAL LOAD (KIPS)</th>
<th>TOTAL MOVEMENT (INCHES)</th>
<th>PLATE &quot;A&quot;</th>
<th>PLATE &quot;B&quot; (DIAM)</th>
<th>PLATE &quot;C&quot; (DIAMETER)</th>
<th>PLATE &quot;D&quot; (MAXIMUM)</th>
<th>DIMENSION &quot;L&quot;</th>
<th>DIMENSION &quot;H&quot;</th>
<th>DIMENSION &quot;N&quot;</th>
</tr>
</thead>
</table>

DIMENSION "N" = BOTTOM FLANGE WIDTH OF BEAMS MINUS 1/2"
**NOTES:**

- PROVIDE MATERIALS, DESIGN AND FABRICATION PER SPECIAL PROVISIONS.
- PROVIDE STEEL PLATES AND PINTLES PER SPEC. 3309.
- GALVANIZE SOLE PLATE, MASONRY PLATE AND PINTLE PLATE PER SPEC. 3394.
- PROVIDE ANCHOR RODS PER SPEC. 3385, TYPE B. GALVANIZE PER SPEC. 3392.
- PERFORM SHRIMPING UNDER MASONRY PLATE WITH PREFORMED FABRIC PADS PER AASHTO LRFD BRIDGE CONSTRUCTION SPEC. SECTION 18.10.
- MANUFACTURER TO SUBMIT ANY BEARING ASSEMBLY DIMENSIONS, DETAILS, OR MATERIALS NOT SHOWN TO THE ENGINEER FOR APPROVAL.
- ALL MATERIAL SHOWN IS INCLUDED IN THE PRICE BID FOR EACH BEARING ASSEMBLY, EXCEPT AS NOTED.
- METALIZE PISTON AND POT PER SPEC. 2471.3.2.

1. FACTORED LIVE LOAD (LL) ROTATION OR 0.02 RADIAN WHICHEVER IS GREATER.
2. THE SOLE PLATE IS INCLUDED IN THE POT BEARING ASSEMBLY QUANTITY. 1/8" MIN. THICKNESS IS REQUIRED. TAPER SOLE PLATE TO FINISHED GRADE INCLUDING TRANSVERSE TAPER FOR SKewed BRIDGES.
3. POT BEARING MANUFACTURER TO DETERMINE THE FINAL DIMENSIONS AND NUMBER OF ALL BEARING COMPONENTS INCLUDING PISTON, POT, MASONRY PLATE, SOLE PLATE, THREADED FASTENERS, BOLTED FLANGE CONNECTIONS, PINTLES AND OVERALL HEIGHT, AND COORDINATE SHARING THIS INFORMATION WITH THE BEAM FABRICATOR AND CONTRACTOR. MINIMUM PINTLE SIZE IS 1/2" DIAMETER.
4. FACTORED HORIZONTAL RESISTANCE IS A MINIMUM OF 15% OF THE STRENGTH LIMIT STATE VERTICAL LOAD UNLESS STATED OTHERWISE.
5. SEE FRAMING PLAN
6. "+-" DENOTES OFFSET AS SHOWN.
7. "-" DENOTES OFFSET OPPOSITE OF SHOWN.

**DESIGNER NOTE (REMOVE DESIGNER NOTE PRIOR TO PLOTTING FINAL PLANS):**

TWO 1 1/2" DIAMETER ANCHOR RODS HAVE A FACTORED HORIZONTAL RESISTANCE OF 95 KIPS. DESIGNER SHALL INCREASE DIAMETER NUMBER OF RODS OR BOTH WHEN NEEDED.

**WHEN SPECIFYING OFFSET DIMENSION "M," CONSIDER THE SIZE AND PROXIMITY OF THE DIAPHRAGM AND LONGITUDINAL PIER REINFORCEMENT TO ALLOW ADEQUATE ROOM FOR INSTALLATION OF ANCHOR RODS.**

---

**BEARING ASSEMBLY TABLE**

<table>
<thead>
<tr>
<th>ASSEMBLY TYPE</th>
<th>LOCATION</th>
<th>FACTORED LL (RAD)</th>
<th>TOTAL MOVEMENT (INCHES)</th>
<th>MASONRY PLATE</th>
<th>ANCHOR ROD OFFSET</th>
<th>ASSUMED HEIGHT &quot;H&quot;</th>
<th>BOTTOM FLANGE WIDTH</th>
<th>DESIGN LOADS (KIPS)</th>
<th>SERVICE LIMIT STATE</th>
<th>STRENGTH LIMIT STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**APPROVED: SEPTEMBER 18, 2007**

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
POT BEARING ASSEMBLY
(Steel Beams) (Guided Expansion)

REVISION 12-17-2008
11-03-2015

DETAIL NO. B314
**BEARING SEAT**

**SOLE PLATE**

**PISTON**

**FLAT BRASS SEALING RINGS**

**STAINLESS STEEL PLATE**

**BEARING ASSEMBLY**

**SECTION X-X**

**SECTION Y-Y**

**NOTES:**

- PROVIDE MATERIALS, DESIGN AND FABRICATION PER SPECIAL PROVISIONS.
- PROVIDE STEEL PLATES AND PINTLES PER SPEC. 3309.
- GALVANIZE SOLE PLATE, MASONRY PLATE AND PINTLE PLATE PER SPEC. 3394.
- PROVIDE ANCHOR RODS PER SPEC. 3385, TYPE B. GALVANIZE PER SPEC. 3392.
- PERFORM SHIMMING UNDER MASONRY PLATE WITH PREFORMED FABRIC PADS PER AASHTO LRFD BRIDGE CONSTRUCTION SPEC. SECTION 18.10.
- MANUFACTURER TO SUBMIT ANY BEARING ASSEMBLY DIMENSIONS, DETAILS, OR MATERIALS NOT SHOWN TO THE ENGINEER FOR APPROVAL.
- ALL MATERIAL SHOWN IS INCLUDED IN THE PRICE BID FOR EACH BEARING ASSEMBLY, EXCEPT AS NOTED.
- METALIZE PISTON AND POT PER SPEC. 2471.3.1.2.

- FACTORED LIVE LOAD (LL) ROTATION OR 0.02 RADIANS WHICHEVER IS GREATER.
- THE SOLE PLATE IS INCLUDED IN THE POT BEARING ASSEMBLY QUANTITY. 1 1/2" THICK, HEAVY JACKETED TAPER SOLE PLATE TO FINISHED GRADE INCLUDING TRANSVERSE TAPER FOR SKEWED BRIDGES.
- POT BEARING MANUFACTURER TO DETERMINE THE FINAL DIMENSIONS AND NUMBER OF ALL BEARING COMPONENTS INCLUDING PISTON, POT, MASONRY PLATE, SOLE PLATE, THREAD FASTENERS, BOLTED FLANGE CONNECTIONS, PINTLES AND OVERALL HEIGHT, AND COORDINATE SHARING THIS INFORMATION WITH THE BEAM FABRICATOR AND CONTRACTOR. MINIMUM PINTLE SIZE 1 1/4" DIAMETER.
- FACTORED HORIZONTAL RESISTANCE IS A MINIMUM OF 10% OF THE MAXIMUM RESISTANCE LOAD STATE VERTICAL LOAD UNLESS STATED OTHERWISE.
- SEE FRAMING PLAN
- "**" DENOTES OFFSET AS SHOWN.
- "***" DENOTES OFFSET OPPOSITE OF SHOWN.

**DESIGNER NOTE (REMOVE DESIGNER NOTE PRIOR TO PLOTTING FINAL PLANS):**

TWO 1 1/2" DIAMETER ANCHOR RODS HAVE A FACTORED HORIZONTAL RESISTANCE OF 95 KIPS. DESIGNER SHALL INCREASE DIAMETER, NUMBER OF RODS OR BOTH WHEN NEEDED.

**WHEN SPECIFYING OFFSET DIMENSION "**", CONSIDER THE SIZE AND PROXIMITY OF THE DIAPHRAGM AND LONGITUDINAL PIER REINFORCEMENT TO ALLOW ADEQUATE ROOM FOR INSTALLATION OF ANCHOR RODS.**
### Details of Curved Plate Bearing Assembly

**Table**

<table>
<thead>
<tr>
<th>ASSEMBLY TYPE</th>
<th>LOCATION</th>
<th>BEAM FLANGE WIDTH</th>
<th>BEARING PAD SIZE</th>
<th>BEARING PLATE SIZE</th>
<th>CURVED PLATE SIZE</th>
<th>SOLE PLATE SIZE</th>
<th>PINTLE DIAM.</th>
<th>ASSY. HEIGHT</th>
<th>ANCHOR ROD OFFSET</th>
<th>RESTRAINT PATTERN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Provide elastomeric materials and pad construction per Spec. 3741.
- Provide steel plates per Spec. 3306 except the sole plate. Provide sole plate with the same material specification as the steel beams.
- Provide anchor rods per Spec. 3385, Type A, galvanize per Spec. 3392.
- For spans up to 150 feet, use 1½” diameter anchor rods. Above 150 foot spans, design anchor rods per AASHTO design criteria.
- Provide pintles per Spec. 3309.
- Galvanize structural steel bearing assembly after fabrication per Spec. 3394, except as noted.
- Payment for bearing assembly includes all material on this detail except the sole plate. The sole plate is included in the weight of structural steel.

**Design Data:**
- Max. factored shear resistance: - 50.3 kips per 1½” dia. pintle
- 36.2 kips per 1½” dia. anchor rod

**Designer Note:** Remove prior to plotting final plans per note 5. Include B307 and modify as necessary. When specifying offset dimension “M”, consider the size and proximity of the diaphragm and longitudinal pier reinforcement to allow adequate room for installation of anchor rods.

**Approved:** November 22, 2002

**State Bridge Engineer:**

**State of Minnesota Department of Transportation**

**Detail No.** B354
### Plan

- FULL BEARING STIFFENERS ARE REQUIRED
- BOTTOM FLANGE OF BEAM
- SOLE PLATE
- CURVED PLATE
- BEARING PLATE
- BEARING PAD

### Section X-X

- BEAM FLANGE WIDTH
- BEARING ASSEMBLY
- CURVED PLATE
- BEARING PLATE
- BEARING PAD

### Section Y-Y

- ENLARGED BEARING ASSEMBLY
- STEEL PLATES

### Side Elevation

- BEAM
- BRIDGE SEAT
- CURVED PLATE
- BEARING PLATE

### Table

<table>
<thead>
<tr>
<th>ASSEMBLY LOCATION</th>
<th>BEAM FLANGE WIDTH</th>
<th>BEARING PAD SIZE</th>
<th>STEEL PLATES</th>
<th>LAMINATES</th>
<th>SHAPE FACTOR</th>
<th>BEARING PLATE SIZE</th>
<th>CURVED PLATE SIZE</th>
<th>SOLE PLATE SIZE</th>
<th>PINTLE DIAMETER</th>
<th>ASSY. HEIGHT</th>
<th>RESTRAINT PATTERN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

- PROVIDE ELASTOMERIC MATERIALS AND PAD CONSTRUCTION PER SPEC. 3741.
- PROVIDE STEEL PLATES PER SPEC. 3306 EXCEPT THE SOLE PLATE.
- PROVIDE SOLE PLATE WITH THE SAME MATERIAL SPECIFICATION AS THE STEEL BEAMS.
- PROVIDE PINTLES PER SPEC. 3309.
- GALVANIZE STRUCTURAL STEEL BEARING ASSEMBLY AFTER FABRICATION PER SPEC. 3394, EXCEPT AS NOTED.
- PAYMENT FOR BEARING ASSEMBLY INCLUDES ALL MATERIAL ON THIS DETAIL EXCEPT THE SOLE PLATE. THE SOLE PLATE IS INCLUDED IN THE WEIGHT OF STRUCTURAL STEEL.

1. THE MIN. RADIUS IS 16" UNLESS OTHERWISE SPECIFIED IN THE TABLE. THE MAX. RADIUS IS 24". FINISH TO 250 MICRO. THE FINISHED THICKNESS OF THE PLATE MAY BE 1/8" LESS THAN SHOWN.
2. WHEN THE SOLE PLATE IS TAPERED, DIMENSIONS "J" AND "L" ARE THICKNESS OF SOLE PLATE AND BEARING ASSEMBLY AT CENTERLINE OF BEARING.
3. THE TOTAL THICKNESS SHOWN INCLUDES THE STEEL PLATES.
4. DO NOT GALVANIZE THIS PLATE.
5. REFER TO BEARING PAD RESTRAINT B-DETAIL FOR ADDITIONAL INFORMATION AND DETAILS.

### Design Data:

MAX. FACTORED SHEAR RESISTANCE: - 50.3 KIPS PER 1/2" DIA. PINTLE

### Revsied Information and Details.

- 11-08-2018
- 11-02-2017
- 11-03-2015
- 12-17-2008
- 08-10-2006

### Approved:

- NOVEMBER 22, 2002

### State Bridge Engineer:

- Daniel Johnson

### Detail No.:

- B355
NOTES:

USE FILL PLATES WHERE THE DIFFERENCE IN WEB THICKNESS IS 
1/8" OR GREATER. FILL PLATES SHALL BE STRUCTURAL STEEL WITH 
MINIMUM THICKNESS OF 1/8". WHEN THE DIFFERENCE IN WEB 
THICKNESS IS 1/8" OR MORE, PLACE FILL PLATES OF THE SAME 
THICKNESS ON BOTH SIDES OF THE THINNER WEB.

SYMMETRICAL ABOUT Z OF SPLICE

FILL PLATE AS REQUIRED

ELEVATION

SECTION Z-Z

TABLE

<table>
<thead>
<tr>
<th>BEAM SIZE</th>
<th>PLATE A (IN.)</th>
<th>PLATE B (IN.)</th>
<th>PLATE C (IN.)</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>FLANGE FILL PLATE</th>
<th>WEB FILL PLATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

APPROVED: NOVEMBER 22, 2002
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
SPLICES FOR STEEL BEAMS

STATE BRIDGE ENGINEER

REVISION
10-22-2009
05-24-2012
01-05-2017
DETAIL NO.
B400
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

STEEL INTERMEDIATE DIAPHRAGM
FOR 36M, 40MH, MN45 - MN63 PRESTRESSED CONCRETE BEAMS

PAYMENT LENGTH FOR DIAPHRAGMS

PART TRANSVERSE SECTION AT DIAPHRAGM

DIAPHRAGM CONNECTION
FOR 36M, 40MH AND MN45 BEAMS

DIAPHRAGM CONNECTION
FOR MN54 AND MN63 BEAMS

NOTES:
PROVIDE STEEL PER SPEC. 3306.
INSTALL PER SPEC. 2405.3.K.
TORQUE ALL BOLTS, INCLUDING ANCHOR BOLTS TO 80 FT.-LBS.
SHOP BEND THE LEG OF THE 12" PLATE TO CONFORM TO THE DIAPHRAGM. A ¾" x 6" x 6" ANGLE MAY BE USED FOR DIAPHRAGMS PERPENDICULAR TO BEAMS.
INCLUDE ALL STRUCTURAL STEEL SHOWN ON THIS DETAIL, INCLUDING BOLTS AND WASHERS, IN UNIT PRICE BID FOR DIAPHRAGMS FOR PRESTRESSED BEAMS.
BENT PLATES MAY BE USED IN PLACE OF CHANNELS IF THE BENT PLATES HAVE THE SAME HEIGHT AS THE CHANNELS THEY REPLACE, ARE ¾" IN THICKNESS, AND HAVE LEGS 5" LONG.
GALVANIZE STEEL PLATES AND SHAPES PER SPEC. 3394.
GALVANIZE BOLTS, NUTS AND WASHERS PER SPEC. 3392.
1 FOR SKEW ANGLES UNDER 20°, USE 90° LESS THE SKEW ANGLE. FOR SKEW ANGLES OVER 20°, USE 90°.

STATE BRIDGE ENGINEER
APPROVED: NOVEMBER 03, 2015

B403

DETAIL NO.

REVISION
01-05-2017
12-20-2018

12-20-2018
01-05-2017

FOR 36M, 40MH, MN45 - MN63 PRESTRESSED CONCRETE BEAMS

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

STEEL INTERMEDIATE DIAPHRAGM
FOR 36M, 40MH, MN45 - MN63 PRESTRESSED CONCRETE BEAMS
DESIGNER NOTE
(REMOVE PRIOR TO PLOTTING FINAL PLANS)
DESIGNER TO CHOOSE ONE OF THE FOLLOWING:
NOTES PER MDOT LRFD DESIGN MANUAL:
TIGHT FIT, USE BOLTED CONNECTIONS
SEE DETAIL B410) IN AREA "A" ON PLANS.
WELD BOTH SIDES AT ALL OTHER LOCATIONS.
TIGHT FIT, WELD BOTH SIDES

1. DIAPHRAGM
   CONNECTION STIFFENER

2. BEAM SPACING

3. USE OUTSIDE STIFFENER
   ONLY WHEN DIAPHRAGM IS ON % BEARING OR WHEN
   SHOWN IN PLAN 2

4. INTERIOR BEAM

ELEVATION

5. BOTTOM BEAM FLANGE

SECTION C-C

6. DIAPHRAGM
   CONNECTION STIFFENER

7. GUSSET PLATE (TYP.)

8. TYP. 4

NOTES:

1. PROVIDE STEEL PER SPEC. 3309.
   DIAPHRAGMS MAY BE PLACED LEVEL PROVIDED MINIMUM CLEARANCES
   ARE MET. FOR DIAPHRAGMS LOCATED BENEATH DECK JOINT, ORIENT
   FLANGES OF CROSS FRAME MEMBERS AWAY FROM THE DECK JOINT.

2. SEE BRIDGE FRAMING PLAN AND CIRCLE ELEVATIONS FOR
   ADDITIONAL INFORMATION.

3. MILL TO BEAR AT BEARING STIFFENERS.

4. MINIMUM TOTAL WELD LENGTH EQUAL TO 4 TIMES NOMINAL
   ANGLE SIZE.

DETAIL "B"

DETAIL "A"

APPROVED: MARCH 26, 2009
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
CROSS FRAME INTERMEDIATE DIAPHRAGM
(FOREIGHT STEEL BEAMS)
Show in Plan.

ON BEARING OR WHEN
ONLy WHEN DIAPHRAGM IS
USE OUTSIDE STIFFENER
ONLY WHEN DIAPHRAGM IS
ON & BEARING OR WHEN
SHOWN IN PLAN. 2

tight fit, use bolted connections
(see detail B410) in area "A" on plans. weld both sides at all
other locations.

2 diaphragm
connection stiffener

Tight fit 3. weld both sides in
area "A" on plans. use bolted
connections (see detail B410) at
all other locations.

INTERIOR BEAM

ELEVATION

FASCIA BEAM

1" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1 1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.

1/2" MIN.
**SECTION A-A**
Connection with 2 bolts at interior beams

**SECTION B-B**
Connection with 2 bolts

**SECTION C-C**
Connection with 4 bolts

**NOTES:**
- PROVIDE STRUCTURAL STEEL PER SPEC. 3309.
- SEE DETAIL B411.
- MINIMUM PLATE THICKNESS IS $\frac{3}{4}"$.
- BOLT PLATE TO BEAM FLANGE PRIOR TO WELDING PLATE TO DIAPHRAGM STIFFENER.
- REMOVE LOOSE SCALE AND RUST FROM CONTACT AREA AT DIAPHRAGM CONNECTION. PROVIDE FLAT AND PRIMED SURFACE.
- BENT PLATE DIAPHRAGMS SHOWN FOR CROSS FRAME DIAPHRAGM SEE DETAIL B407 FOR STRAIGHT BEAMS AND DETAIL B408 FOR CURVED BEAMS.

**DESIGNER NOTE**
REMOVE PRIOR TO PLOTTING FINAL PLAN

DETAILS SHOWN ARE FOR STRAIGHT BEAMS ONLY. DESIGNER MUST MODIFY THE NUMBER OF BOLTS AS NECESSARY FOR CURVED BEAMS.

**PLAN VIEW**
At interior beams (up to 20° skew)

**PLAN VIEW**
At interior beams
DO NOT WELD IN THIS AREA.
SEE B410 FOR CONNECTION DETAILS.

NOTES:

STATE BRIDGE ENGINEER
APPROVED: OCTOBER 22, 2008

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

STIFFENER DETAILS
(FOR STEEL BEAMS)

REVISION
DETAIL NO.

B411
PART TRANSVERSE SECTION

SECTION C-C

FASCIA BEAM

HOLDS FOR 5/8" DIA. BOLTS (TYP)

1/4" PLATE

DIAPHRAGM SUPPORT

11" ±

1/2" MIN.

DIAPHRAGM SUPPORT

SECTION B-B

TYPICAL SECTION AT FASCIA BEAM

L6 X 6 X 1/2

1/2" MIN.

3/4" MIN.

2/4" MIN.

DIAPHRAGM SUPPORT

HOLDS FOR 5/8" DIA. BOLTS (TYP)

1/4" PLATE

1/2" MIN.

3/4" MIN.

1/2" X 2 1/2" LONG SLOTTED HOLE FOR 5/8" DIA. BOLT (4 REQUIRED)

NOTES:

PROVIDE STEEL PER SPEC. 3306.

INCLUDE ALL STRUCTURAL STEEL SHOWN ON THIS DETAIL, INCLUDING BOLTS AND WASHERS, IN THE PAYMENT FOR DIAPHRAGMS FOR Prestressed BEAMS.

INSTALLATION PER SPEC. 2405.3.K

TORQUE ALL BOLTS, INCLUDING ANCHOR BOLTS TO 80 FT. LBS.

GALVANIZE STEEL PLATES AND SHAPES PER SPEC. 3394.

GALVANIZE BOLTS, NUTS AND WASHERS PER SPEC. 3392.

1 FOR SKEW ANGLES UNDER 20° USE 90° LESS THE SKEW ANGLE. FOR SKEW ANGLES OVER 20° USE 90°.

2 SPACE BOLT HOLES SO AS TO MISS PRESTRESSED STRANDS IN CONCRETE BEAMS. SEE PRESTRESSED CONCRETE BEAM SHEETS FOR MORE INFORMATION.

3 DIAPHRAGM SHOWN DESIGNED FOR BEAM SPACING UP TO 13'-0".

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

STEEL INTERMEDIATE BOLTED DIAPHRAGM
(ALL MW PRESTRESSED CONCRETE BEAMS)

APPROVED: SEPTEMBER 22, 2011

STATE BRIDGE ENGINEER

REVISED
09-11-2014
11-03-2015
01-05-2017

DETAIL NO.
B412
ELEVATION
CONCRETE NOT SHOWN

SECTION A-A

NOTES:

EXTEND PLATES FULL WIDTH OF ROADWAY
BETWEEN GUTTER LINES WITH A 1/2" OPEN JOINT AT EACH BREAK IN CROWN PROFILE. MAX. LENGTH 22 FT.

PROVIDE STRUCTURAL STEEL PER SPEC. 3306.
GALVANIZE AFTER FABRICATION PER SPEC. 3394
SET PLATE TO PROPER GRADE AND CROWN.

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
PROTECTION PLATE
(FOR END OF SLAB)

REVISION
01-05-2017
DETAIL NO.
B553
Provide structural steel plates per Spec. 3306. Cast iron may be used as an alternate. Fabricate grate using automatically controlled cutting torch.

Cast iron grate, per Spec. 3321, Class 35B, may be used as an alternate.

Workmanship and fabrication per Spec. 2471.

Blast clean scupper and grate after fabrication. Galvanize, except cast iron, per Spec. 3394.

Galvanize hardware per Spec. 3392.

Install grate with arrow on curb side and in direction of flow.

Payment for floor drain, type ___ includes all material on this detail.

Grate opening area is 106 sq.in.

1. Attach to beam with 3/8" dia. bolt, lockwasher and nut as required. See special provisions for approved anchorage required for concrete beams. Anchorage to miss draped strands.

**STATE BRIDGE ENGINEER**

**STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION**

**BRIDGE FLOOR DRAIN (WELDED BOX)**

**APPROVED: NOVEMBER 22, 2002**

**REVISION: 01-05-2017**

**DETAIL NO:** B701
**PLAN VIEW**

- $\frac{3}{4}'' \times \frac{3}{4}'' \times 3''$ bar
- $\frac{1}{2}'' \times 1\frac{1}{2}''$ bar
- $3'' \times \frac{1}{2}''$ bar for beam depths over 5'-0'' only, not needed for slabs.

**SECTION A-A**

- Provide shims as required.
- 3'' square plates with 1/4'' dia. holes.
- Bottom of beam flange or slab.
- Mid-height of beam.
- Face of beam web.
- 1/4'' nom.

**NOTES:**

- Provide structural steel per Spec. 3306.
- Galvanize bolts and washer per Spec. 3392.
- Galvanize other materials per Spec. 3394 after fabrication.
- Payment for floor drain type shall include all material shown on this detail.

---

**STATE OF MINNESOTA**

**DEPARTMENT OF TRANSPORTATION**

**BRIDGE FLOOR DRAIN**

(STRUCTURAL TUBE)

**DETAIL NO.**

B702

**APPROVED:** NOVEMBER 22, 2002

**STATE BRIDGE ENGINEER:**

**REVISED:**
- 01-13-2004
- 01-05-2017
SLOPE TO DRAIN FOR 1'-0" ALL AROUND.

1/4" DIA. ADJUSTING BOLT & 2 HEX NUTS AT 4 CORNERS.

PROVIDE SHIMS AS REQUIRED. 3" SQ. PLATES WITH 1/8" DIA. HOLES.

3" X 1/2" BRACE FOR BEAMS 4'-0" AND OVER.

BOTTOM OF BEAM (CONCRETE BEAM SHOWN).

SECTION A-A

GUTTER LINE
WHEN NECESSARY, RECESS DRAIN INTO CURB TO CLEAR BEAM FLANGE.

6" X 10" X 3/8" VERTICAL RECTANGULAR TUBING

SECTION B-B

DRILL AND TAP FOR 5/16" DIA. CAP SCREW, MAY BE DRILLED AND TAPPED AFTER GALVANIZING.

1/8" CHAMFER 2 SIDES

TOP VIEW (SCUPPER)

GUTTER LINE
TOP OF CURB

1/8" DIA. HOLE AND COUNTERSINK FOR 5/8" DIA. FLATHEAD CAP SCREW.

IDRILL 1/16" DIA. HOLE AND COUNTERSINK FOR 3/16" DIA. FLATHEAD CAP SCREW.

SLOPE TO DRAIN FOR 1'-0" ALL AROUND.

1/4" DIA. ADJUSTING BOLT & 2 HEX NUTS AT 4 CORNERS.

PROVIDE SHIMS AS REQUIRED. 3" SQ. PLATES WITH 1/8" DIA. HOLES.

3" X 1/2" BRACE FOR BEAMS 4'-0" AND OVER

BOTTOM OF BEAM (CONCRETE BEAM SHOWN).

SECTION A-A

GUTTER LINE
WHEN NECESSARY, RECESS DRAIN INTO CURB TO CLEAR BEAM FLANGE.

6" X 10" X 3/8" VERTICAL RECTANGULAR TUBING

SECTION B-B

DRILL AND TAP FOR 5/16" DIA. CAP SCREW, MAY BE DRILLED AND TAPPED AFTER GALVANIZING.

1/8" CHAMFER 2 SIDES

TOP VIEW (GRATE)

GUTTER LINE
TOP OF CURB

1/8" DIA. HOLE AND COUNTERSINK FOR 5/8" DIA. FLATHEAD CAP SCREW.

IDRILL 1/16" DIA. HOLE AND COUNTERSINK FOR 3/16" DIA. FLATHEAD CAP SCREW.

SLOPE TO DRAIN FOR 1'-0" ALL AROUND.

1/4" DIA. ADJUSTING BOLT & 2 HEX NUTS AT 4 CORNERS.

PROVIDE SHIMS AS REQUIRED. 3" SQ. PLATES WITH 1/8" DIA. HOLES.

3" X 1/2" BRACE FOR BEAMS 4'-0" AND OVER

BOTTOM OF BEAM (CONCRETE BEAM SHOWN).

SECTION A-A

GUTTER LINE
WHEN NECESSARY, RECESS DRAIN INTO CURB TO CLEAR BEAM FLANGE.

6" X 10" X 3/8" VERTICAL RECTANGULAR TUBING

SECTION B-B

DRILL AND TAP FOR 5/16" DIA. CAP SCREW, MAY BE DRILLED AND TAPPED AFTER GALVANIZING.

1/8" CHAMFER 2 SIDES

TOP VIEW (SCUPPER)

GUTTER LINE
TOP OF CURB

1/8" DIA. HOLE AND COUNTERSINK FOR 5/8" DIA. FLATHEAD CAP SCREW.

IDRILL 1/16" DIA. HOLE AND COUNTERSINK FOR 3/16" DIA. FLATHEAD CAP SCREW.

SLOPE TO DRAIN FOR 1'-0" ALL AROUND.

1/4" DIA. ADJUSTING BOLT & 2 HEX NUTS AT 4 CORNERS.

PROVIDE SHIMS AS REQUIRED. 3" SQ. PLATES WITH 1/8" DIA. HOLES.

3" X 1/2" BRACE FOR BEAMS 4'-0" AND OVER

BOTTOM OF BEAM (CONCRETE BEAM SHOWN).

SECTION A-A

GUTTER LINE
WHEN NECESSARY, RECESS DRAIN INTO CURB TO CLEAR BEAM FLANGE.

6" X 10" X 3/8" VERTICAL RECTANGULAR TUBING

SECTION B-B

DRILL AND TAP FOR 5/16" DIA. CAP SCREW, MAY BE DRILLED AND TAPPED AFTER GALVANIZING.

1/8" CHAMFER 2 SIDES

TOP VIEW (GRATE)

GUTTER LINE
TOP OF CURB

1/8" DIA. HOLE AND COUNTERSINK FOR 5/8" DIA. FLATHEAD CAP SCREW.

IDRILL 1/16" DIA. HOLE AND COUNTERSINK FOR 3/16" DIA. FLATHEAD CAP SCREW.
**PLAN**

4" CLEAR (MAX.) OPENING BETWEEN BARS (TYP.)

$\frac{1}{2}" \times \frac{1}{2}" \times 3"$ BAR
FABRICATE FROM $\frac{1}{4}"$ PLATE OR STRUCTURAL TUBING

$\frac{1}{2}" \times 1\frac{1}{2}"$ BARS (TYP.)

**FLOOR DRAIN PLACEMENT DIAGRAM**

SLOPE 1'-0" ALL AROUND DRAIN
TOP OF SLAB $\frac{1}{2}"$

**SECTION A-A**

PROVIDE SHIMS AS REQUIRED.
3" SQ. PLATES WITH $\frac{1}{8}"$ DIA. HOLES.

3" x $\frac{1}{2}"$ BRACE FOR BEAMS 4'-0" AND OVER

$\frac{3}{8}"$ x $\frac{1}{2}"$ SLOT HOLES

$\frac{3}{8}"$ x 2"

ELEVATION

$\frac{1}{2}"$ NOM.

TS $6 \times 4 \times \frac{1}{4}$

**NOTES:**

MATERIAL TO BE STRUCTURAL STEEL PER Mn/DOT SPEC. 3306.

GALVANIZE MATERIAL PER Mn/DOT SPEC. 3394 AFTER FABRICATION.

PAYMENT FOR FLOOR DRAIN, TYPE ___, SHALL INCLUDE ALL MATERIAL SHOWN ON THIS DETAIL.

1. 1" BELOW BOTTOM OF BEAM EXCEPT ON RURAL STREAM CROSSINGS WHERE DRAIN SHOULD BE EVEN TO BOTTOM OF BEAM.

2. ATTACH TO BEAM WITH $\frac{3}{8}"$ DIA. BOLT, LOCK WASHER AND NUT AS REQUIRED. SEE SPECIAL PROVISIONS FOR APPROVED ANCHORAGE REQUIRED FOR CONCRETE BEAMS, ANCHORAGE TO MISS DRAPE STRANDS.

**STATE OF MINNESOTA**
DEPARTMENT OF TRANSPORTATION

BRIDGE OFFSET FLOOR DRAIN
(STRUCTURAL TUBE)

REVISION DETAIL NO.

B706
PART SECTION THROUGH ABUTMENT AT JOINT

SECTION A-A

NOTES:


THE BACK STRIP MAY BE GALVANIZED METAL, A SUITABLE PLASTIC, OR OTHER DURABLE MATERIAL SATISFACTORY TO THE ENGINEER. THE BACK STRIP REMAINS IN PLACE AFTER THE FORMS ARE REMOVED.

THE COST OF FORMING THE JOINT IS INCLUDED IN THE PRICE BID FOR OTHER ITEMS.
CONCRETE END DIAPHRAGM

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
PRESTRESSED CONCRETE BEAMS (PARAPET ABUTMENT)

BILL OF REINFORCEMENT
FOR END DIAPHRAGM

<table>
<thead>
<tr>
<th>BAR</th>
<th>LENGTH</th>
<th>SHAPE</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD401E</td>
<td>4'-0&quot;</td>
<td></td>
<td>VERTICAL TIE</td>
</tr>
<tr>
<td>SD702E</td>
<td>5'-0&quot;</td>
<td></td>
<td>LONG, THRU BEAM</td>
</tr>
<tr>
<td>SD403E</td>
<td>6'-0&quot;</td>
<td></td>
<td>LONG, TOP</td>
</tr>
<tr>
<td>SD0.05E</td>
<td>6'-0&quot;</td>
<td></td>
<td>LONGITUDINAL</td>
</tr>
<tr>
<td>SD506E</td>
<td>9'-0&quot;</td>
<td></td>
<td>LONGITUDINAL</td>
</tr>
<tr>
<td>SD507E</td>
<td>9'-0&quot;</td>
<td></td>
<td>LONGITUDINAL</td>
</tr>
<tr>
<td>SD508E</td>
<td>1'-0&quot;</td>
<td></td>
<td>VERTICAL TIE</td>
</tr>
</tbody>
</table>

NOTES:

1. CONCRETE FOR END DIAPHRAGMS SHALL BE THE SAME MIX AS USED IN DECK.
2. QUANTITIES FOR END DIAPHRAGM CONCRETE AND REINFORCEMENT SHOWN ON THIS DETAIL SHALL BE LISTED IN SUPERSTRUCTURE QUANTITIES.
3. THREAD RODS ARE INCIDENTAL TO PRESTRESSED CONCRETE BEAMS.
4. USE OF CONSTRUCTION JOINT REQUIRE CLEARANCE FOR EXPANSION DEVICE. WHEN CONSTRUCTION JOINT IS USED AT THIS LOCATION, DIAPHRAGM FALSEWORK SHALL REMAIN IN PLACE UNTIL COMPLETION OF SLAB CURING PERIOD.
5. PERPENDICULAR TO CENTERLINE OF DIAPHRAGM.
6. 1'-11" (27M & 30MH); 2'-0" (35MH, 36M, 40MH AND MN45); 2'-5" (MN54 AND MN63); 3'-1" (82MW AND 96MW). BASED ON 3" STOOL AND 9" DECK.
7. 1'-10" (27M, 30MH); 2'-0" (35MH, 36M, 40MH AND MN45); 2'-4" (MN54 AND MN63); 3'-0" (82MW AND 96MW). BASED ON NOTE 5.
8. ADD SD507 AND SD508 ONLY IF NO. OF BARS AND LENGTHS ARE INCLUDED IN BILL OF REINFORCEMENT. SPACE SD508 AT 1'-6" MAX. FOR ENTIRE LENGTH OF DIAPHRAGM. REFER TO "PART TRANSVERSE SECTION" ABOVE.

APPROVED: SEPTEMBER 22, 2011

Nancy Deckerberger, P.E.
STATE BRIDGE ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
PRESTRESSED CONCRETE BEAMS (PARAPET ABUTMENT)

CONCRETE END DIAPHRAGM

(27M, 30MH, 35MH, 36M, 40MH, MN45 - MN63, 82MW & 96MW)

REVISED
04-17-2013
11-06-2013
12-20-2018

DETAIL NO. B814
CONCRETE END DIAPHRAGM

14", 18" AND 22" RECTANGULAR PRESTRESSED CONCRETE BEAMS
(INTEGRAL ABUTMENT)

BILL OF REINFORCEMENT
FOR END DIAPHRAGM

<table>
<thead>
<tr>
<th>BAR</th>
<th>NO.</th>
<th>LENGTH</th>
<th>SHAPE</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD501E</td>
<td>-</td>
<td>-</td>
<td>HORIZONTAL END TIE</td>
<td></td>
</tr>
<tr>
<td>SD602E</td>
<td>-</td>
<td>-</td>
<td>HORIZONTAL FF</td>
<td></td>
</tr>
<tr>
<td>SD603E</td>
<td>-</td>
<td>-</td>
<td>HORIZONTAL BF</td>
<td></td>
</tr>
<tr>
<td>SD604E</td>
<td>-</td>
<td>-</td>
<td>DIAPH./FILLET TIE</td>
<td></td>
</tr>
<tr>
<td>SD605E</td>
<td>-</td>
<td>-</td>
<td>DIAPH./DECK TIE</td>
<td></td>
</tr>
<tr>
<td>SD606E</td>
<td>-</td>
<td>-</td>
<td>DIAPH./APPROACH TIE</td>
<td></td>
</tr>
<tr>
<td>SD509E</td>
<td>-</td>
<td>-</td>
<td>HORIZONTAL</td>
<td></td>
</tr>
<tr>
<td>SD507E</td>
<td>-</td>
<td>-</td>
<td>FILLET HORIZONTAL</td>
<td></td>
</tr>
<tr>
<td>SD508E</td>
<td>-</td>
<td>-</td>
<td>DIAPHRAM TIE</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
DIAPHRAGM CONCRETE AND REINFORCEMENT QUANTITIES ARE INCLUDED IN SUPERSTRUCTURE QUANTITIES.

USE SAME CONCRETE MIX FOR END DIAPHRAGMS AS USED IN DECK.

BF DENOTES BACK FACE, FF DENOTES FRONT FACE.

1. SD501E END TIE
2. 2" x 12" KEYWAY (BETWEEN BEAMS ONLY)
3. 12" x 24" x 1/2" ELASTOMERIC BEARING PAD
4. SEE BEAM DETAIL SHEETS FOR DIMENSION.
5. SD603E BF & SD602E FF HORIZONTAL
6. 1/2" MIN. TYPE B POLYSTYRENE UNDER COMPLETE FLANGE
7. SPACE WITH THREADED RODS.
8. TIE BAR TO TOP MAT.
9. MEMBRANE WATERPROOFING SYSTEM PER SPEC. 2481.3.B.

PARTIAL ELEVATION

SPACE WITH ABUTMENT DOWELS

SECTION A-A

SPACE WITH ABUTMENT DOWELS

SECTION B-B

NOTES IN ITALICS ARE DESIGNER NOTES.

STATE BRIDGE ENGINEER

APPROVED: MAY 24, 2012

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

CONCRETE END DIAPHRAGM
(14", 18" AND 22" RECTANGULAR PRESTRESSED CONCRETE BEAMS)
(INTEGRAL ABUTMENT)
INSIDE ELEVATION OF BARRIER OR PARAPET

INSIDE ELEVATION OF F BARRIER
AT END OF BARRIER

INSIDE ELEVATION OF S BARRIER
AT END OF BARRIER

INSIDE ELEVATION OF PARAPET
AT END OF PARAPET

CHECK BARRIER SHEETS FOR BAR SIZE AND SHAPE

DIAGONAL ROD OR WIRE

CHECK BARRIER SHEETS FOR BAR SIZE AND SHAPE

DIAGONAL ROD OR WIRE

CHECK PARAPET SHEETS FOR BAR SIZE AND SHAPE

DIAGONAL ROD OR WIRE

NOTES:

FOR ADDITIONAL DIMENSIONS, DETAILS, REINFORCEMENT, NOTES, AND CONTROL JOINT SPACING SEE BARRIER OR PARAPET SHEET.

PAY QUANTITIES WILL NOT BE ADJUSTED AS A RESULT OF SELECTING SLIPFORM ALTERNATE.

USE A SIMILAR METHOD FOR TALLER BARRIERS OR MODIFIED VERSIONS OF THIS BARRIER.
**SECTION A-A**

1. Place top of filler 3/4" to 1" below top of pavement. Place joint sealer per Spec. 3720 above filler 3/8" to 1/4" below top of pavement.

2. Clean exposed face by sand blasting and air blasting. Apply approved bonding grout immediately prior to concrete placement. Concrete to be mix No. 3X33.

3. Place rebars parallel to Q of roadway on skews and tangent to Q on curved roadways.

4. 2" nominal dia. thermoplastic perforated pipe per Spec. 3245, wrap pipe with geotextile per Spec. 3733. Slope pipe to ditch on low side, 1/4" per foot. Minimum slope. Furnishing and installing drain system is incidental with no direct payment.

5. Backfill with fine aggregate per Spec. 3149, modified to 0-3" passing a No. 200 sieve.

**NOTES:**
- Designer note: Remove prior to plotting final plans. Define type A or B for Polystyrene.
- Fill any voids beneath preformed filler with polystyrene, type ..., as directed by the engineer.

**APPENDIX:**
- POLYSTYRENE. Define TYPE A OR B FOR POLYSTYRENE.
- DESIGNER NOTE: REMOVE PRIOR TO PLOTTING FINAL PLANS: DEFINE TYPE A OR B FOR POLYSTYRENE.
- FILL ANY VOIDS BENEATH PREFORMED FILLER WITH POLYSTYRENE, TYPE ... AS DIRECTED BY THE ENGINEER.
**NOTES:**

Galvanize sign anchor including threaded rod after fabrication per Spec. 3394

Provide structural steel tubing per Spec. 3361, Type A, except as noted.
ADHESIVE ANCHORAGE WITH 3/8" DIA. ANCHOR ROD PER SPEC. 3385, TYPE A WITH HEX NUT AND WASHER. PROVIDE AN ADHESIVE WITH A MINIMUM CHARACTERISTIC BOND STRENGTH IN UNCRACKED CONCRETE OF 1.5 KSI. EMBED THE ANCHORAGE NO LESS THAN 9" REGARDLESS OF CHARACTERISTIC BOND STRENGTH. DRILL THROUGH REINFORCEMENT (IF ENCOUNTERED) TO ACHIEVE MINIMUM EMBEDMENT. ENSURE HEX NUT IS IN CONTACT WITH THE ADJACENT SURFACE AND TORQUE TO 60 FT-LBS UNLESS A HIGHER TORQUE IS RECOMMENDED BY THE MANUFACTURER. PROOF LOAD TO 7.8 KIPS. SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.

ETOX ELECTRODES FOR 3/8" POST TO BASE PLATE WELD.

DOUBLE EXTRA STRONG PIPE WEIGHTS:
2" NOMINAL DIA. = 9.03 LBS./FT.

NOTES:
ALL PIPE DIAMETERS ARE NOMINAL.

SEE SPECIAL PROVISIONS FOR REQUIREMENTS NOT INCLUDED ON THIS SHEET.

STRUCTURAL STEEL PER SPEC. 3306
STRUCTURAL PIPE PER SPEC. 3362

GALVANIZE THE FENCE POST ANCHORAGE AFTER FABRICATION PER SPEC. 3394.
GALVANIZE THE FASTENERS PER SPEC. 3392.

FURNISHING AND INSTALLING FENCE POST ANCHORAGES IS INCIDENTAL TO THE WIRE FENCE.
ESTIMATED WEIGHT = 24 LBS.

PLAN VIEW - TYPE B

ESTIMATED WEIGHT = 23 LBS.

PLAN VIEW - TYPE C

NOTES:

ALL PIPE DIAMETERS ARE NOMINAL.

SEE SPECIAL PROVISIONS FOR REQUIREMENTS NOT INCLUDED ON THIS SHEET.

STRUCTURAL STEEL PER SPEC. 3306

STRUCTURAL PIPE PER SPEC. 3362

GALVANIZE THE FENCE POST ANCHORAGE AFTER FABRICATION PER SPEC. 3396.

GALVANIZE THE FASTENERS PER SPEC. 3392.

FURNISHING AND INSTALLING FENCE POST ANCHORAGES IS INCIDENTAL TO THE WIRE FENCE.

ADHESIVE ANCHORAGE WITH 1\(\frac{1}{4}\)" DIA. ANCHOR ROD PER SPEC. 3385, TYPE A WITH HEX NUT AND WASHER PROVIDE AN ADHESIVE WITH A MINIMUM CHARACTERISTIC BOND STRENGTH IN UNCRACKED CONCRETE OF 1.5 KSI. EMBED THE ANCHORAGE NO LESS THAN 8" REGARDLESS OF CHARACTERISTIC BOND STRENGTH. DRILL THROUGH REINFORCEMENT (IF ENCOUNTERED) TO ACHIEVE MINIMUM EMBEDEDMENT. ENSURE HEX NUT IS IN CONTACT WITH THE ADJACENT SURFACE AND TORQUE TO 60 FT-LBS UNLESS A HIGHER TORQUE IS RECOMMENDED BY THE MANUFACTURER. PROOF LOAD TO 5.8 KIPS. SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.

E70X ELECTRODES FOR 3/4" POST TO BASE PLATE WELD.

DOUBLE EXTRA STRONG PIPE WEIGHTS:

2\(\frac{1}{2}\)" NOMINAL DIA. = 13.69 LBS./FT.

FENCE POST ANCHORAGE (TYPE B AND C)
SECTION THROUGH PARAPET AND SEMI-INTEGRAL ABUTMENTS

SECTION THROUGH INTEGRAL ABUTMENT

NOTES:
PAYMENT WILL BE INCLUDED IN THE SINGLE LUMP SUM PRICE FOR "DRAINAGE SYSTEM TYPE (B910)" INCLUDES BUT IS NOT LIMITED TO 4" DIAMETER PERFORATED AND UNPERFORATED PIPE, ELBOWS, END CAPS, COUPLINGS, SLEEVES AND PRECAST CONCRETE HEADWALLS.
ALL PIPE TO COMPLY WITH SPECIAL PROVISION 3245.26).
SLEEVE PERFORATED PIPE WITH GEOTEXTILE KNIT SOCK PER SPEC. 3733, TYPE 1. ATTACH TO PIPE PER SPEC. 2502.3.B.

1 AT CONTRACTOR'S OPTION, TIE APPROACH PANEL DRAINAGE SYSTEM AND ABUTMENT DRAINAGE SYSTEM INTO A SINGLE PRECAST CONCRETE HEADWALL OR INTO A CATCH BASIN AS LONG AS A MINIMUM OF 1% POSITIVE SLOPE CAN BE MAINTAINED.
USE PRECAST CONCRETE HEADWALL WITH RODENT SCREEN. SEE STANDARD PLATE 3131 FOR DETAILS.

2 1/2" PER FT. MINIMUM SLOPE.

3 REFER TO GRADING PLANS FOR ABUTMENT BACKFILL REQUIREMENTS.

APPROVED: JANUARY 13, 2015
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
DRAINAGE SYSTEM
REVISED 12-02-2015
02-22-2018
11-08-2018
DETAIL NO. B910
TEMPORARY PORTABLE PRECAST CONCRETE BARRIER ANCHORAGE TO CONCRETE
(TEMPORARY USAGE IN LIMITED BARRIER DISPLACEMENT AREAS)
TRANSITION BEAM SECTION

STANDARD BRIDGE BEAM SECTION (OVERLAPPING SPLICE)

STANDARD BRIDGE BEAM SECTION (FOR USE WITH TUBULAR SLEEVE SPLICE)

CUSTOM BRIDGE BEAM SECTION

NOTES:

- FABRICATE TUBULAR TRIPLE BEAM RAIL SECTIONS BY WELDING TWO 0210 GAGE TRIPLE BEAM RAIL ELEMENTS AS SHOWN.
- CONSTRUCT TRAFFIC BARRIER PER SPEC. 2554, EXCEPT AS NOTED.
- GALV. RAIL COMPONENTS PER SPEC. 3394 AFTER FABRICATION.
- PROVIDE TRIPLE AND PLATE BEAM GUARDRAIL HARDWARE DIMENSIONS AND BOLT SPACING PER AASHTO M180.
- FOR ADDITIONAL BOLT HOLE SPACING FOR CONNECTION TO TRANSITION BEAM SECTION, SEE TRANSITION BEAM SECTION.
- TYPICAL POST SPACING, EXCEPT AS NOTED.
- 60% MIN. WELD PENETRATION TOP AND BOTTOM.
DEPARTMENT OF TRANSPORTATION
STATE OF MINNESOTA

SECTION A-A
ANCHOR BAR ALTERNATE

MECHANICAL CAGE ALTERNATE

MECHANICAL CAGE, DESIGN VARIES WITH FABRICATOR

SECTION A-A
MECHANICAL CAGE ALTERNATE

ANCHOR PLATE ALTERNATE

ANCHOR PLATE ALTERNATE SHOWN

LIGHT POLE BASE PLATE

SEE DETAIL "A"—

ELEVATION
(ANCHOR PLATE ALTERNATE SHOWN)

NOTES:

Provide heavy hex nuts, jam nuts, and flat washers per Spec. 3391.2.A for 1" dia. threaded rods. Tap nuts 1/4" oversized prior to galvanizing, and retap to standard size after galvanizing.

Wrap the threads of the top 5-6 inches of each anchor rod with three layers of plastic electrical tape to avoid contamination by concrete during placement.

Use a brush to apply anti-size compound per MIL-PRF-907E to the threads of anchor rods and the face of nuts against flat washers.

Galvanize threaded rods, washers, and nuts after fabrication per Spec. 3392.

Galvanize plates, bars, and cages per Spec. 3394.

Tack welding of any components is prohibited.

Substitute materials allowed per Spec. 1605.

1. Provide 1" nominal dia. anchor rods with 1-BUNC-2A threads. Use type C high strength anchor rods per ASTM F1554 GR. 105 per Spec. 3385.2.C for 49' light standards with twin arms 10' or longer. Use type B (intermediate) strength anchor rods per ASTM F1554 GR. 101 within Spec. 3385.2.B for all other installations (6 required).

2. Provide a plate, bar, or mechanical cage for rod alignment, steel per Spec. 3306 (2 required per assembly).

3. Heavy hex nuts for 1" dia. rods (12 required per assembly).

4. Flat washers for 1" dia. rods (12 required per assembly).

5. Lock nuts (6 required per assembly) or jam nuts (12 required per assembly) for 1" dia. anchor rods.

6. Install top of the lower nuts flush with top of concrete parapet or barrier.

ANCHOR ROD CLUSTER FOR LIGHT POLES

ANCHOR ROD LENGTH

ANCHOR ROD CLUSTER FOR LIGHT POLES

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

APPROVED: AUGUST 24, 2016

KEVIN WESTON
STATE BRIDGE ENGINEER

REVISION 02-22-2018

DETAIL NO.

B950