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<th>DESCRIPTION</th>
<th>DATE APPROVED</th>
<th>DATE REVISED</th>
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<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>
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<tr>
<td>B201</td>
<td>Pile Splice (Cast-In-Place Concrete Piles)</td>
<td>Nov. 22, 2002</td>
<td>11-06-2013</td>
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<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>
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<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>
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<tr>
<td>B305</td>
<td>Elastomeric Bearing Pad (Prestressed Concrete Beams)</td>
<td>Oct. 22, 2019</td>
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<tr>
<td>B307</td>
<td>Bearing Pad Restraint</td>
<td>Nov. 02, 2019</td>
<td>12-20-2018</td>
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<tr>
<td>B309</td>
<td>Tapered Bearing Plate Assembly (For Integral Abutments or Piers with Continuity Diaphragms)</td>
<td>Dec. 20, 2018</td>
<td>10-22-2019</td>
</tr>
<tr>
<td>B310</td>
<td>Curved Plate Bearing Assembly (Prestressed Concrete Beams) (Fixed)</td>
<td>Dec. 20, 2018</td>
<td>10-22-2019</td>
</tr>
<tr>
<td>B311</td>
<td>Curved Plate Bearing Assembly (Prestressed Concrete Beams) (Expansion)</td>
<td>Dec. 20, 2018</td>
<td>10-22-2019</td>
</tr>
<tr>
<td>B312</td>
<td>Pot Type Bearing Assembly (Prestressed Concrete Beams) (Guided Expansion)</td>
<td>Nov. 22, 2002</td>
<td>02-27-2019</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>02-27-2019</td>
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<tr>
<td>B354</td>
<td>Curved Plate Bearing Assembly (Steel Beams) (Fixed)</td>
<td>Nov. 22, 2002</td>
<td>11-08-2018</td>
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<tr>
<td>B355</td>
<td>Curved Plate Bearing Assembly (Steel Beams) (Expansion)</td>
<td>Nov. 22, 2002</td>
<td>11-08-2018</td>
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<tr>
<td>B400</td>
<td>Splices For Steel Beams</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
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<tr>
<td>B402</td>
<td>Bolted Diaphragms (For Steel Beams)</td>
<td>Mar. 26, 2009</td>
<td>01-05-2017</td>
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<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>
<tr>
<td>B407</td>
<td>Cross Frame Intermediate Diaphragm (For Straight Steel Beams)</td>
<td>Mar. 26, 2009</td>
<td>06-12-2019</td>
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</tbody>
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* Refer to [http://www.dot.state.mn.us/bridge/] for current Bridge CADD Standards
<table>
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<td>B408</td>
<td>Cross Frame Intermediate Diaphragm (For Curved Steel Beams)</td>
<td>Mar. 26, 2009</td>
<td>06-12-2019</td>
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<tr>
<td>B410</td>
<td>Bolted Flange To Stiffener Detail</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
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<tr>
<td>B411</td>
<td>Stiffener Details (For Steel Beams)</td>
<td>Oct. 22, 2008</td>
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<tr>
<td>B412</td>
<td>Steel Intermediate Bolted Diaphragm (All MW Prestressed Concrete Beams)</td>
<td>Sept. 22, 2011</td>
<td>10-22-2019</td>
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<tr>
<td>B553</td>
<td>Protection Plate (For End Of Slab)</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
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<tr>
<td>B701</td>
<td>Bridge Floor Drain (Welded Box)</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
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<tr>
<td>B702</td>
<td>Bridge Floor Drain (Structural Tube)</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
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<tr>
<td>B705</td>
<td>Bridge Offset Floor Drain (Welded Box)</td>
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<tr>
<td>B706</td>
<td>Bridge Offset Floor Drain (Structural Tube)</td>
<td>Nov. 22, 2002</td>
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<tr>
<td>B801</td>
<td>Contraction Joint</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
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<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>
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<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>
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<tr>
<td>B830</td>
<td>Concrete Barrier or Parapet (Slipform Alternate)</td>
<td>Aug. 24, 2016</td>
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<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>
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<tr>
<td>B901</td>
<td>Median Sign Post Anchor</td>
<td>May 10, 2017</td>
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<tr>
<td>B905</td>
<td>Fence Post Anchorage (Type A)</td>
<td>Jan. 05, 2017</td>
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<td>B906</td>
<td>Fence Post Anchorage (Type B and C)</td>
<td>Jan. 05, 2017</td>
<td>05-10-2017</td>
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<tr>
<td>B910</td>
<td>Drainage System</td>
<td>Jan. 13, 2015</td>
<td>11-08-2018</td>
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<td>B920</td>
<td>Temporary Portable Precast Concrete Barrier Anchorage to Concrete (Temporary Usage In Limited Barrier Displacement Areas)</td>
<td>Dec. 21, 2011</td>
<td>01-30-2019</td>
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<tr>
<td>B935</td>
<td>Triple Beam Guardrail</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
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<tr>
<td>B942</td>
<td>Inspection Door (In Vertical Or Horizontal Position)</td>
<td>Nov. 22, 2002</td>
<td>01-05-2017</td>
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<tr>
<td>B950</td>
<td>Anchor Bolt Cluster for Light Poles</td>
<td>Aug. 24, 2016</td>
<td>02-22-2018</td>
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</tbody>
</table>

* Refer to [http://www.dot.state.mn.us/bridge/] for current Bridge CADD Standards
### BRIDGE DETAILS MANUAL PART I *
(B-DETAILS)
(Archived – No Longer In Use)

#### August 24, 2016

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<tr>
<th>DETAIL NO.</th>
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<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>
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<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>
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<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>
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<tr>
<td>B341</td>
<td>Fixed Bearing Assembly (Rocker Type)</td>
<td>ARCHIVED 01-17-2000</td>
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<td>B342</td>
<td>Expansion Bearing Assembly (Rocker Type)</td>
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<tr>
<td>B351</td>
<td>Bearing Assembly (Steel Beams) (Fixed)</td>
<td>ARCHIVED 03-25-2004</td>
<td>Nov. 22, 2002</td>
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<tr>
<td>B352</td>
<td>Bearing Assembly (Steel Beams) (Expansion with Guide Bars)</td>
<td>ARCHIVED 01-17-2000</td>
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<td>B353</td>
<td>Bearing Assembly (Steel Beams) (Expansion without Guide Bars)</td>
<td>ARCHIVED 01-18-2000</td>
<td>July 30, 1999</td>
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<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>
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<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</td>
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<tr>
<td>B601</td>
<td>Expansion Hinge for Welded Beams (For Straight Bridges)</td>
<td>ARCHIVED 02-11-2000</td>
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<tr>
<td>B602</td>
<td>Expansion Hinge for Wide Flange Beams (For Straight Bridges)</td>
<td>ARCHIVED 02-11-2000</td>
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<tr>
<td>B704</td>
<td>Drain Extension</td>
<td>ARCHIVED 03-22-2002</td>
<td>July 30, 1999</td>
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<td>B710</td>
<td>Floor Drain For Tee Beams</td>
<td>ARCHIVED 10-22-2009</td>
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* Refer to  [http://www.dot.state.mn.us/bridge/]  for current Bridge CADD Standards
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<tr>
<td>B802</td>
<td>Concrete Intermediate Diaphragm (28M – 40” Prestressed Concrete Beam Spans)</td>
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<td><strong>ARCHIVED 09-17-1997</strong></td>
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<td>B803</td>
<td>Concrete End Diaphragm (28M – 40” Prestressed Concrete Beams) (Parapet Abutment)</td>
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<tr>
<td>B806</td>
<td>Concrete Intermediate Diaphragm (63” – 81” Prestressed Concrete Beam Spans)</td>
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<td><strong>ARCHIVED 09-17-1997</strong></td>
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<td>B807</td>
<td>Concrete End Diaphragm (For Double Tee Beams with Contraction Abutment)</td>
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<td><strong>ARCHIVED 12-17-2008</strong></td>
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<tr>
<td>B809</td>
<td>Concrete End Diaphragm (For Steel Beams With Contraction Abutment)</td>
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<td><strong>ARCHIVED 12-17-2008</strong></td>
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<tr>
<td>B810</td>
<td>Concrete End Diaphragm (28M – 40” Prestressed Concrete Beams) (Pile Bent Abutment)</td>
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<td><strong>ARCHIVED 03-22-2002</strong></td>
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<td>B811</td>
<td>Concrete End Diaphragm (27M – 81M, MN45 – MN63 Prestressed Concrete Beams) (Contraction Abutment)</td>
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<td><strong>ARCHIVED 12-17-2008</strong></td>
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<td>B812</td>
<td>Concrete End Diaphragm (63M – 81M Prestressed Concrete Beams) (Parapet Abutment)</td>
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<td>B813</td>
<td>Concrete Intermediate Diaphragm (45M – 54M Prestressed Concrete Beam Spans)</td>
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<td>B822</td>
<td>Concrete Pier Diaphragm (For Double Tee Beams)</td>
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<td>B831</td>
<td>Concrete Parapet Railing (Slipform Alternate)</td>
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<td><strong>ARCHIVED 08-24-2016</strong></td>
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<tr>
<td>B911</td>
<td>Drainage System (For Slab Over Parapet Abutments) (With No Approach Treatment)</td>
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<td><strong>ARCHIVED 01-13-2015</strong></td>
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* Refer to [http://www.dot.state.mn.us/bridge/](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 \(\frac{3}{4}\)" x 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.

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. x 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.

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

BRIDGE: ____
YEAR: ____
YEAR: ____

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. 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.
PLAN VIEW - SPLICE BACK-UP RING

NOTES:

APPROVED COMMERCIAL PILE SPLICE BACK-UP RING MAY BE USED IN LIEU OF THE TYPE DETAILED, PROVIDED THAT 1/4" ROOT IS MAINTAINED. BACK-UP RING SHALL HAVE A TIGHT FIT.

WELDING ELECTRODES SHALL BE CELLULOSIC TYPE ELECTRODES E-6010 OR E-6011.

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.

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)

APPROVED: NOVEMBER 22, 2002
STATE BRIDGE ENGINEER

REVISION: 11-06-2013
DETAIL NO. B201
SECTIONS AT SPlice

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.
DESIGNER NOTE (REMOVE PRIOR TO PLOTTING FINAL PLAN): ADJUST THIS DIMENSION FOR LARGE MOVEMENT BEARINGS AND CONSIDER THE EFFECTS ON THE BEARINGS AND PORTION OF THE BEAM THAT CANTILEVERS BEYOND THE BEARING.

IF THIS SHEET IS MODIFIED, ADD A NOTE ON THE BEAM SHEET INDICATING THAT THE SOLE PLATE HAS BEEN MODIFIED. REFER TO B303.

NOTES:

PROVIDE STRUCTURAL STEEL PER SPEC. 3306.

PROVIDE WELDED STUDS OF WELDABLE CARBON STEEL PER SPEC. 3391.2D.

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 1½" 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.
**BEAM NOT SHOWN**

**PER SPEC. 3394, EXCEPT AS NOTED.**

**GALVANIZE STRUCTURAL STEEL BEARING ASSEMBLY AFTER FABRICATION**

**PER SPEC. 3741.**

**PROVIDE ELASTOMERIC MATERIALS AND PAD CONSTRUCTION PER SPEC. 3306.**

**PROVIDE STEEL PLATES 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.**

**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 TOTAL THICKNESS SHOWN INCLUDES THE STEEL PLATES.**

**DO NOT GALVANIZE THESE PLATES.**

**REFER TO BEARING PAD RESTRAINT B-Detail FOR ADDITIONAL INFORMATION AND DETAILS.**

**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.**

---

**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**

**(PRESTRESSED CONCRETE BEAMS)**

**(FOR REPLACEMENT OF INPLACE BEARINGS ONLY)**

**APPROVED: NOVEMBER 22, 2002**

**STATE BRIDGE ENGINEER**

**REVISION**

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

**DETAIL NO.**

B304
PRESTRESSED CONCRETE BEAMS

DEPARTMENT OF TRANSPORTATION
STATE OF MINNESOTA

BRIDGE SEAT

(X BEAM NOT SHOWN)

NOTES:

< BEAM PLAN < BEARING PAD BEAM BEARING PAD ELASTOMERIC SIDE ELEVATION SECTION X-X

TABLE

<table>
<thead>
<tr>
<th>PAD TYPE</th>
<th>LOCATION</th>
<th>BEAM SIZE</th>
<th>BEARING PAD SIZE</th>
<th>SHAPE FACTOR</th>
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<tr>
<td></td>
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<td>A   B   D(1)</td>
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<tr>
<td>.RB, .M, MN,</td>
<td>12 24 1/2</td>
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<td></td>
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<tr>
<td>.MN</td>
<td>12 30 1/2</td>
<td>8.6</td>
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NOTES:

USE NEOPRENE OR NATURAL RUBBER AND FABRICATE PAD IN ACCORDANCE WITH 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;

INSERT TABLE VALUES AS NEEDED AND DELETE UNUSED DATA.

USE 1/2" UNREINFORCED PAD WITH CONTINUITY DIAPHRAGMS OR INTEGRAL ABUTMENTS.
**NOTES:**

1. **INSTALL 3/8" X 3/8" SOLID RESTRAINT BARS SYMMETRIC TO CENTER OF BEARING PLATE WITH CLEAR DISTANCE OF 3/8" FROM EDGE OF BEARING PAD TO INSIDE FACE OF RESTRAINT BAR.**

2. **RESTRAN BARS INCLUDED IN PAYMENT FOR BEARING ASSEMBLY.**

---

**PATTERN A-1**

(View at bottom of bearing plate)

- Beam (Symm. Abt. <)
- Bearing Assembly
- 3/8" x 3/8" x 10" Solid Bar (TYP.)
- 3/8" Clear (TYP.)
- 12" x 24" Elastomeric Bearing Pad

**PATTERN A-2**

(View at bottom of bearing plate)

- Beam (Symm. Abt. <)
- Bearing Assembly
- 3/8" x 3/8" x 6" Solid Bar (TYP.)
- 3/8" Clear (TYP.)
- 16" x 36" Elastomeric Bearing Pad

**PATTERN A-3**

(View at bottom of bearing plate)

- Beam (Symm. Abt. <)
- Bearing Assembly
- 3/8" x 3/8" x 8" Solid Bar (TYP.)
- 3/8" Clear (TYP.)
- 12" x 30" Elastomeric Bearing Pad

**PATTERN A-4**

(View at bottom of bearing plate)

- Beam (Symm. Abt. <)
- Bearing Assembly
- 3/8" x 3/8" x 10" Solid Bar (TYP.)
- 3/8" Clear (TYP.)
- Restraint Bars Included in Payment for Bearing Assembly
**TAPERED BEARING PLATE ASSEMBLY**

For Integral Abutments or Piers with Continuity Diaphragms

**BEARING PLATE DETAIL**

**SIDE ELEVATION**

**SECTION X-X**

**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>
</table>
|               | ___RB, ___M, MN___ | 12 24 ½ | 8.0 | 14" 26"
|               | ___MH     | 12 30 ½  | 8.6 | 14" 32"

**NOTES:**

- Provide Elastomeric materials and pad construction in accordance with Spec. 3741.
- Provide steel plates in accordance with Spec. 3306.
- Provide pintles in accordance with Spec. 3309.
- Galvanize structural steel bearing assembly after fabrication in accordance with Spec. 3394.
- Payment for tapered bearing plate assembly includes all material on this detail.

**DESIGN DATA:**

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

---

**STATE BRIDGE ENGINEER**

**STATE OF MINNESOTA**

DEPARTMENT OF TRANSPORTATION

**REVISED:** 10-22-2019

**DETAIL NO.** B309

---

**APPROVED: DECEMBER 20, 2018**

---
**TABLE**

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<th>BEAM SIZE</th>
<th>BEARING PAD SIZE</th>
<th>SHAPE FACTOR</th>
<th>BEARING PLATE SIZE</th>
<th>CURVED PLATE SIZE</th>
<th>ANCHOR ROD OFFSET</th>
<th>ASSY. HEIGHT</th>
<th>RESTRAINT PATTERN</th>
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<td>___RB, ___M, <em><strong>MN</strong></em></td>
<td>12&quot; 24&quot; 1/2&quot;</td>
<td>8.0</td>
<td>14&quot;</td>
<td>1/2&quot; 26&quot; 1/4&quot;</td>
<td>1/2&quot; 32&quot; 1/4&quot;</td>
<td>+/- (2)</td>
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<td><em><strong>MW</strong></em></td>
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<td>11.1</td>
<td>18&quot;</td>
<td>1/2&quot; 38&quot; 1/4&quot;</td>
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<td>3/4&quot;</td>
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<tr>
<td></td>
<td><em><strong>MH</strong></em></td>
<td>12&quot; 30&quot; 1/2&quot;</td>
<td>8.6</td>
<td>14&quot;</td>
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<td>1/2&quot; 47&quot; 1/4&quot;</td>
<td>+/- (2)</td>
<td>3/4&quot;</td>
<td>A-3</td>
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</table>

**NOTES:**

- PROVIDE ELASTOMERIC MATERIALS AND PAD CONSTRUCTION IN ACCORDANCE WITH SPEC. 3741.
- PROVIDE STEEL PLATES IN ACCORDANCE WITH SPEC. 3306.
- PROVIDE ANCHOR RODS IN ACCORDANCE WITH SPEC. 3306, GALVANIZE IN ACCORDANCE WITH SPEC. 3394.
- PROVIDE PINTLES IN ACCORDANCE WITH SPEC. 3309.
- GALVANIZE STRUCTURAL STEEL BEARING ASSEMBLY AFTER FABRICATION IN ACCORDANCE WITH 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 1/8" 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.

**DESIGN DATA:**

- MAX. FACTORED SHEAR RESISTANCE:
  - 50.3 KIPS PER 1/2" DIAM. PINTLE
  - 36.2 KIPS PER 1/2" DIAM. ANCHOR ROD

**STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION**

**STATE BRIDGE ENGINEER**

**APPROVED:** DECEMBER 20, 2018

**REVISED:** 10-22-2019

**DETAIL NO.:** B310

**CURVED PLATE BEARING ASSEMBLY (PRESTRESSED CONCRETE BEAMS) (FIXED)**

**DESIGNER NOTE:** REMOVE PRIOR TO PLOTTING FINAL PLAN. INSERT TABLE VALUES AS NEEDED AND DELETE UNUSED DATA.

**MINIMUM SIZE OF BEARING PAD,**

- 12" x 24" x 1/2", FOR RB, M & MN SHAPES
- 16" x 36" x 1/2", FOR MW SHAPES
- 12" x 30" x 1/2", 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 3 INCLUDE B307 AND MODIFY AS NECESSARY.**
TABLE

<table>
<thead>
<tr>
<th>ASSEMBLY</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>
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<th>ASSY. HEIGHT</th>
<th>RESTRAINT PATTERN</th>
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<td>_RB, _M, <em>MN</em></td>
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<td><em>MH</em></td>
<td>12&quot; x 30&quot;</td>
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<td>1/2&quot;</td>
<td>8.6</td>
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<td>33&quot;</td>
<td>4/5&quot;</td>
<td>32&quot;</td>
<td>1/2&quot;</td>
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NOTES:

1. PROVIDE ELASTOMERIC MATERIALS AND PAD CONSTRUCTION IN ACCORDANCE WITH SPEC. 3741.
2. PROVIDE STEEL PLATES IN ACCORDANCE WITH SPEC. 3306.
3. PROVIDE PINTLES IN ACCORDANCE WITH SPEC. 3309.
4. GALVANIZE STRUCTURAL STEEL BEARING ASSEMBLY AFTER FABRICATION IN ACCORDANCE WITH SPEC. 3394, EXCEPT AS NOTED.

PAYMENT FOR BEARING ASSEMBLY INCLUDES ALL MATERIAL ON THIS DETAIL.

DESIGNER NOTE: REMOVE PRIOR TO PLOTTING FINAL PLAN.

- INSERT TABLE VALUES AS NEEDED AND DELETE UNUSED DATA.

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

- 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 1/4" LESS THAN SHOWN.

- DO NOT GALVANIZE THESE PLATES.

- THE TOTAL THICKNESS SHOWN INCLUDES THE STEEL PLATES.

- REFER TO BEARING PAD RESTRAINT B-DETAIL FOR ADDITIONAL INFORMATION AND DETAILS.

- 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.
BEARING ASSEMBLY DIMENSIONS

<table>
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<th>ASSEMBLY TYPE</th>
<th>ROTATION</th>
<th>TOTAL LOAD (KIPS)</th>
<th>TOTAL MOVEMENT (INCHES)</th>
<th>PLATE &quot;A&quot; (DIA.)</th>
<th>PLATE &quot;B&quot; (DIA.)</th>
<th>PLATE &quot;C&quot; (DIA.) (MAXIMUM)</th>
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<th>DIMENSION &quot;N&quot;</th>
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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 PLATES "A", "D" AND PINTLES PER SPEC. 3394.
- METALIZE PLATES "B" & "C" PER SPEC. 2471.3L.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. SHIP UPPER AND LOWER COMPONENTS TOGETHER AS A COMPLETE ASSEMBLY.
- ALL MATERIAL SHOWN IS INCLUDED IN THE PRICE BID FOR EACH BEARING ASSEMBLY, EXCEPT AS NOTED.

1. MINIMUM ROTATION OF .02 RADIANS
2. MARK < OF BRG. PLATES "A" AND "B" TO FACILITATE PLACEMENT.
3. HEIGHT IS MINIMUM DIMENSION IF PLATE IS TAPERED.

DESIGN DATA:
- MAXIMUM HORIZONTAL LOAD IS 70 KIPS FOR 1/2" PINTLES.

APPROVED: NOVEMBER 22, 2002
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
POT TYPE BEARING ASSEMBLY
(PRESTRESSED CONCRETE BEAMS)
(GUIDED EXPANSION)
NOTES:

1. FACTORED LIVE LOAD (LL) ROTATION OR 0.02 RADIANS WHICHEVER IS GREATER.
2. THE SOLE PLATE IS INCLUDED IN THE POT BEARING ASSEMBLY QUANTITY. 1/4" 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 1/4" 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. "M" DENOTES OFFSET AS SHOWN.
   "-" DENOTES OFFSET OPPOSITE OF SHOWN.

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

TWO 1/4" 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>
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<tr>
<th>ASSEMBLY TYPE</th>
<th>LOCATION</th>
<th>FACTORED LL ROTATION (RAD)</th>
<th>TOTAL MOVEMENT (INCHES)</th>
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<th>ASSEMBLY TYPE</th>
<th>LOCATION</th>
<th>FACTORED LL ROTATION (RAD)</th>
<th>TOTAL MOVEMENT (INCHES)</th>
<th>MASONRY PLATE</th>
<th>ANCHOR ROD</th>
<th>ASSUMED BOTTOM FLANGE WIDTH</th>
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APPROVED: SEPTEMBER 18, 2007
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POT BEARING ASSEMBLY
(Steel Beams)
(Guided Expansion)
**BEARING ASSEMBLY TABLE**

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<tr>
<th>ASSEMBLY TYPE</th>
<th>LOCATION FACTORED LL ROTATION (RAD)</th>
<th>TOTAL MOVEMENT (INCHES)</th>
<th>MASONERY PLATE Ø</th>
<th>ANCHOR ROD OFFSET</th>
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**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.L.2.  
1. FACTORED LIVE LOAD (LL) ROTATION OR 0.02 RADIANS WHICHEVER IS GREATER.  
2. THE SOLE PLATE IS INCLUDED IN THE POT BEARING ASSEMBLY QUANTITY.  
   1 1/2" 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 1/2" DIAMETER.  
4. FACTORED HORIZONTAL RESISTANCE IS A MINIMUM OF 10% 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 "+", CONSIDER THE SIZE AND PROXIMITY OF THE DIAPHRAGM AND LONGITUDINAL PIER REINFORCEMENT TO ALLOW ADEQUATE ROOM FOR INSTALLATION OF ANCHOR RODS.
NOTES:

PROVIDE MATERIALS, DESIGN AND FABRICATION PER SPECIAL PROVISIONS.

PROVIDE STEEL PLATES, PINTLES AND ANCHOR RODS PER SPEC. 3309.

GALVANIZE SOLE PLATE, AND MASONRY 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.

MASONRY PLATE, SOLE PLATE, THREADED FASTENERS, BOLTED FLANGE CONNECTIONS, PINTLES AND OVERALL HEIGHT, AND COORDINATE SHARING OF ALL BEARING COMPONENTS INCLUDING PISTON, POT, POT BEARING MANUFACTURER TO DETERMINE THE FINAL DIMENSIONS PER AASHTO LRFD BRIDGE CONSTRUCTION SPEC. SECTION 18.10.

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.

1) FACTORED LIVE LOAD (LL) ROTATION OR 0.02 RADIANS WHICHERVER IS GREATER.

2) THE SOLE PLATE IS INCLUDED IN THE POT BEARING ASSEMBLY QUANTITY. 0.5" 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" 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. "-" DENOTES OFFSET OPPOSITE OF SHOWN.

DESIGNER NOTE REMOVE DESIGNER NOTE PRIOR TO PLOTTING FINAL PLAN.

TWO 1½" 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

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<tr>
<th>ASSEMBLY TYPE</th>
<th>LOCATION</th>
<th>FACTORED LL ROTATION (1) RAD</th>
<th>MASONRY PLATE 3</th>
<th>ANCHOR ROD OFFSET</th>
<th>ASSUMED HEIGHT &quot;H&quot; (3)</th>
<th>BOTTOM FLANGE WIDTH</th>
<th>DESIGN LOADS (KIPS)</th>
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APPROVED: SEPTEMBER 18, 2007

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POT BEARING ASSEMBLY
(STEEL BEAMS) (FIXED)

REVISION
12-17-2008
11-03-2015
02-27-2019

DETAIL NO.
B316
Provide Elastomeric materials and pad construction per Spec. 3301.

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 1 1/2" 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.

Designer note: remove prior to plotting final plans per note 4. 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.

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

Approved: November 22, 2002

Rev. 11-03-2015
Rev. 11-06-2013
Rev. 11-02-2017
Rev. 11-08-2018

Detail No. B354

State of Minnesota
Department of Transportation
Curved Plate Bearing Assembly
(Steel Beams)
(Fixed)
### TABLE

| ASSEMBLY | LOCATION | BEAM FLANGE WIDTH | BEARING PAD SIZE | STEEL PLATES NO. | THICK. | LAMINATES | SHAPE FACTOR | BEARING PLATE SIZE | CURVED PLATE SIZE | SOLE PLATE SIZE | PINTLE DIAM. | ASSY. HEIGHT | RESTRAINT PATTERN |
|----------|----------|-------------------|------------------|------------------|--------|-----------|--------------|-------------------|-----------------|---------------|-------------|-------------|----------------|----------------|
|          |          |                   |                  |                  |        |           |              |                   |                 |              |             |             |               |                |

### 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.

**DESIGNER NOTE:** REMOVE PRIOR TO PLOTTING FINAL PLAN PER NOTE 3. INCLUDE B307 AND MODIFY AS NECESSARY.

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

**APPROVED:** NOVEMBER 22, 2002

**STATE BRIDGE ENGINEER**

**STATE OF MINNESOTA**

**DEPARTMENT OF TRANSPORTATION**

**CURVED PLATE BEARING ASSEMBLY**

**(STEEL BEAMS)**

**(EXPANSION)**

**B355**
FILL PLATE AS REQUIRED

ELEVATION

SECTION Z-Z

IN-SPS.

SYMMETRICAL ABOUT Q OF SPLICE

FILL PLATE AS REQUIRED

SECTION X-X

NOTES:

USE FILL PLATES WHERE THE DIFFERENCE IN WEB THICKNESS IS 1/4" 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.

 GLenum

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>
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APPROVED: NOVEMBER 22, 2002

STATE OF MINNESOTA

DEPARTMENT OF TRANSPORTATION

SPLICES FOR STEEL BEAMS

REVISION
10-22-2009
05-24-2012
01-05-2017

DETAIL NO.

B400
FOR BEAMS 36" OR LESS

A SLOPED

SEE PLAN FOR STIFFENER SIZE

MAX. SPACING

2 @ 3"
3" SPACING

USED ONLY AT BEARINGS

FASCIA BEAM

AT PIER AND INTERMEDIATE DIAPHRAGMS

INTERIOR BEAM

AT PIER AND INTERMEDIATE DIAPHRAGMS

FASCIA BEAM

AT ABUTMENT DIAPHRAGMS

COPE FLANGES FLUSH WITH WEB,
FILLET RE-ENTRANT CORNERS.

(TYP)

SECTION C-C

SKEW TO 30° MAX.

SECTION C-C

SKews 30° to 60°

BEVEL SKEWED

BEARING STIFFENER

PLATE TO WEB

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

BOLTED DIAPHRAGMS

FOR STEEL BEAMS

APPROVED: MARCH 26, 2009
STATE BRIDGE ENGINEER

REVISED: 01-05-2017
DETAIL NO. B402
**DEPARTMENT OF TRANSPORTATION**  
**STATE OF MINNESOTA**

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

---

**PAYMENT LENGTH FOR DIAPHRAGMS**

**TABLE**

<table>
<thead>
<tr>
<th>BEAM HEIGHT</th>
<th>DISTANCE</th>
<th>CHANNEL SIZE</th>
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<tbody>
<tr>
<td>36M</td>
<td>1'-3&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>40MH</td>
<td>1'-5&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>MN45</td>
<td>1'-7½&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>MN54</td>
<td>1'-7½&quot;</td>
<td>1'-1&quot;</td>
</tr>
<tr>
<td>MN63</td>
<td>1'-7½&quot;</td>
<td>1'-1&quot;</td>
</tr>
</tbody>
</table>

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**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 3/4" 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 3/16" IN THICKNESS, AND HAVE LEGS 5" LONG.
- GALVANIZE STEEL PLATES AND SHAPES PER SPEC. 3394.
- GALVANIZE BOLTS, NUTS AND WASHERS PER SPEC. 3392.
- 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**

**STATE OF MINNESOTA**  
**DEPARTMENT OF TRANSPORTATION**  
**REVISION**  
**01-05-2017**  
**12-20-2018**

**DETAIL NO.**  
B403
NOTES:

1. 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 GIRDER ELEVATIONS FOR ADDITIONAL INFORMATION.
3. MILL TO BEAR AT BEARING STIFFENERS.
4. MINIMUM TOTAL WELD LENGTH EQUAL TO 4 TIMES NOMINAL ANGLE SIZE.

PROVIDE STEEL IN ACCORDANCE WITH SPEC. 3309.
TIGHT FIT, USE BOLTED CONNECTIONS (SEE DETAIL B410) IN AREA "A" ON PLANS. WELD BOTH SIDES AT ALL OTHER LOCATIONS.

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

DETAIL NO.

CROSS FRAME INTERMEDIATE DIAPHRAGM

FOR CURVED STEEL BEAMS

NOTE:

REMOVE PRIOR TO PLOTTING FINAL PLANS.

DESIGNER TO SPECIFY GUSSET PLATE THICKNESS.
1/4" MINIMUM FILLER PLATE THICKNESS TO MATCH GUSSET.

NOTES:

PROVIDE STEEL IN ACCORDANCE WITH SPEC. 3309.

1. PROJECT NEUTRAL AXIS OF MEMBER THROUGH CENTER OF BOLT PATTERN.
2. SEE BRIDGE FRAMING PLAN AND GIRDER ELEVATIONS FOR ADDITIONAL INFORMATION.
3. MILL TO BEAR AT BEARING STIFFENERS.
4. MINIMUM TOTAL WELD LENGTH EQUAL TO 4 TIMES NOMINAL ANGLE SIZE.
5. FOR DIAPHRAGMS LOCATED BENEATH DECK JOINT, ORIENT FLANGES OF CROSS FRAME MEMBERS AWAY FROM THE DECK JOINT.
**SECTION A-A**

**CONNECTION WITH 2 BOLTS AT INTERIOR BEAMS**

**SECTION B-B**

**CONNECTION WITH 2 BOLTS**

**SECTION A-A**

**CONNECTION WITH 4 BOLTS AT INTERIOR BEAMS**

**SECTION C-C**

**CONNECTION WITH 4 BOLTS**

---

**PLAN VIEW**

**AT INTERIOR BEAMS (UP TO 20° SKEW)**

---

**NOTES:**

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

---

**STATE OF MINNESOTA**

DEPARTMENT OF TRANSPORTATION

BOLTED FLANGE TO STIFFENER DETAIL

B410
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

STIFFENER DETAILS
(FOR STEEL BEAMS)

NOTES:
1. DO NOT WELD IN THIS AREA.
SEE B410 FOR CONNECTION DETAILS.

WEB THICKNESS
DIMENSION
C

1/4", 5/16", 5/32"  2 1/2"

1/16", 3/32"  3"

STATE BRIDGE ENGINEER
APPROVED: OCTOBER 22, 2008

B411

REVISION DETAIL NO.

TOP OR BOTTOM FLANGE
STIFFENER TO FLANGE CONNECTION
OPTION 1

STIFFENER TO TAB PLATE CONNECTION
OPTION 1

TOP OR BOTTOM FLANGE
STIFFENER TO FLANGE CONNECTION
OPTION 2

STIFFENER TO TAB PLATE CONNECTION
OPTION 2

STIFFENER COPE DETAIL
PLATE GIRDER OR ROLLED BEAM

SOLE PLATE AT BEARING
PART TRANSVERSE SECTION
SQUARE BRIDGE SHOWN

SECTION A-A
FASCIA BEAM
HOLES FOR 3/8" DIA. BOLTS (TYP.)

SECTION C-C
FASCIA BEAM

SECTION B-B
TYPICAL SECTION AT FASCIA BEAM

INTERMEDIATE DIAPHRAGM
TYPICAL SECTION AT INTERIOR DIAPHRAGM

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 SKREW ANGLES UNDER 20°, USE 90° LESS THE SKREW ANGLE. FOR SKREW 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".

DIAPHRAGM SUPPORT

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

STEEL INTERMEDIATE BOLTED DIAPHRAGM
(ALL MW PRESTRESSED CONCRETE BEAMS)

APPROVED: SEPTEMBER 22, 2011
STATE BRIDGE ENGINEER

REVISIONS:
09-11-2014
11-03-2015
01-05-2017
10-22-2019
DETAIL NO. B412
ELEVATION
CONCRETE NOT SHOWN

SECTION A-A

NOTES:
EXTEND PLATES FULL WIDTH OF ROADWAY
BETWEEN GUTTER LINES WITH A ½" 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.
BRIDGE FLOOR DRAIN
(WELDED BOX)

SECTION A-A
STEEL BEAM SHOWN

SECTION B-B

BRACKET DETAIL

NOTES:

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 _____ INCLUIDES ALL MATERIAL ON THIS DETAIL.

GRATE OPENING AREA IS 106 SQ. IN.

1. ATTACH TO BEAM WITH 3/4" DIA. BOLT, LOCKWASHER AND NUT AS REQUIRED. SEE SPECIAL PROVISIONS FOR APPROVED ANCHORAGE REQUIRED FOR CONCRETE BEAMS. ANCHORAGE TO MISS DRAPED STRANDS.

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

APPROVED: NOVEMBER 22, 2002
STATE BRIDGE ENGINEER

REVISED: 01-05-2017
DETAIL NO. B701


**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.
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 3/8" DIA. HOLES

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

BOTTOM OF BEAM

SECTION A-A

CONCRETE BEAM SHOWN

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

1/4" NOM.

1/4" CHAMFER 2 SIDES

SECTION B-B

1/4" CHAMFER 2 SIDES

DRILL AND TAP FOR 3/8" DIA. CAP SCREW, MAY BE DRILLED AND TAPPED AFTER GALVANIZING.

1/4" DIA. HOLE AND COUNTERSINK FOR 3/8" DIA. FLATHEAD CAP SCREW.

IDRILL 3/16" DIA. HOLE AND COUNTERSINK FOR 3/8" DIA. FLATHEAD CAP SCREW.

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

GUTTER LINE

TOP OF CURB

10"

1/2"

1/4"

SLOTTED HOLE

1/4" CHAMFER 2 SIDES

1/2"

NOTE:

ALL STEEL PLATES PER Mn/DOT SPEC. 3306.

FABRICATE GRATE USING AUTOMATICALLY CONTROLLED CUTTING TORCH.

CAST IRON GRATE PER Mn/DOT SPEC. 3321, CLASS 35B, MAY BE USED AS AN ALTERNATE.

WORKMANSHIP AND FABRICATION PER Mn/DOT SPEC. 2471.

Blast clean scupper and grate after fabrication.

GALVANIZE, EXCEPT CAST IRON, PER Mn/DOT SPEC. 3394.

GALVANIZE HOREWARE PER Mn/DOT SPEC. 3392.

INSTALL GRATE WITH ARROW ON CURB SIDE AND IN DIRECTION OF FLOW.

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

GRATE OPENING AREA IS 106 SQ. IN.

1 ATTACH TO BEAM WITH 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.
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 A, 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 3/4" DIAM BOLT, LOCK WASHER AND NUT AS REQUIRED. SEE SPECIAL PROVISIONS FOR APPROVED ANCHORAGE REQUIRED FOR CONCRETE BEAMS, ANCHORAGE TO MISS DRAPED STRANDS.
**PART SECTION THROUGH ABUTMENT AT JOINT**

**SECTION A-A**

**NOTES:**

Consider the methods and materials indicated on this sheet as suggestions only. Variations will be permitted, subject to approval by the engineer, but must provide dummy joints of a depth shown. Provide a separation of the horizontal reinforcement bars in the back of the parapet and back face of the abutment that is not less than 1/6" nor more than 3", centered as shown, regardless of the procedure used for forming the dummy joint.

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.

---

**STATE BRIDGE ENGINEER**

**CONTRACTION JOINT**
DEPARTMENT OF TRANSPORTATION
STATE OF MINNESOTA

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>
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<td>SD501E</td>
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<td>&quot;-&quot;</td>
<td>DIAPHRAGM TIE</td>
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</table>

SD606S BAR IS STAINLESS STEEL

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 SDOE1 END TIE
2 2" x 12" KEYWAY (BETWEEN BEAMS ONLY)
3 12" x 24" x ⅞" ELASTOMERIC BEARING PAD
4 SEE BEAM DETAIL SHEETS FOR DIMENSION.
5 SD603E BF & SD602E FF HORIZONTAL
6 ⅜" 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.

TEXT IN ITALICS ARE DESIGNER NOTES. REMOVE PRIOR TO PLOTTING FINAL PLAN.

USE B-DETAIL WHEN BARS ARE NOT CALLED OUT IN SUPERSTRUCTURE PLAN. CONCRETE VOLUME AND REBAR WEIGHT SHALL BE INCLUDED IN THE SUPERSTRUCTURE QUANTITIES.

MAXIMUM BEAM SPACING IS 13 FEET. ADJUST SECTION A-A AND BAR SD606 FOR SKEW.

STATE BRIDGE ENGINEER

APPROVED: MAY 24, 2012

REVISION
4-17-2013
8-24-2016
01-05-2017
05-10-2017
11-08-2018

DETAIL NO. B816
INSIDE ELEVATION OF BARRIER OR PARAPET

1'-0" MAX. SPG.
1'-0"

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

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.
CONCRETE ROADWAY

INPLACE CONCRETE ROADWAY
TOWARDS BRIDGE

6'-0"

INPLACE CONCRETE ROADWAY

CUT LINE

BIT, SHOULDER

3'-0"

CUT LINE

PREFORMED JOINT FILLER
2'-10"

4"

6'

4"

2'-4" PROL.

5'

3'

6'

1'-0"

MIN

MILL. THICK PLASTIC SHEETING
TO BREAK BOND PER SPEC. 3756.

FILL ANY VOIDS BENEATH PREFORMED FILLER
WITH POLYSTYRENE, TYPE __, AS DIRECTED
BY THE ENGINEER.

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" ± 1/8" 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 SKEWSTAND 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, 1/8" 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.

APPREVED: NOVEMBER 22, 2002
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

CONCRETE RELIEF JOINT DETAIL
(BRIDGE RECONSTRUCTION ON TRUNK HIGHWAY BRIDGES)

REVISED
05-31-2004
04-17-2013
01-05-2017
DETAIL NO.

B850
NOTES:

GALVANIZE SIGN ANCHOR INCLUDING THREADED ROD AFTER FABRICATION PER SPEC. 3394

PROVIDE STRUCTURAL STEEL TUBING PER SPEC. 3361, TYPE A, EXCEPT AS NOTED.

PLAN VIEW

SECTION A-A

HSS 4" x 4" x 3/8" x 1/2" LONG

¢ 3/8" DIA. HOLES (TYP.)

5/6" DIA. BOLT, FLAT WASHER, AND LOCK NUT

3/8" DIA. X 9" THREADED ROD WITH NUT AND WASHER EACH SIDE.

SECTION B-B

MEDIAN ISLAND

TOP OF

B

B

STATE BRIDGE ENGINEER

DEPARTMENT OF TRANSPORTATION

MEDIAN SIGN POST ANCHOR

B901
PLANT VIEW - TYPE A

ESTIMATED WEIGHT = 18 LBS.

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.

1. ADHESIVE ANCHORAGE WITH 3/4" 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 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.

2. ETOX ELECTRODES FOR ¾" POST TO BASE PLATE WELD.

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

APPROVED: JANUARY 05, 2017

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

FENCE POST ANCHORAGE
(TYPE A)

REVISION DETAIL NO.

B905
**PLAN VIEW - TYPE B**

*ESTIMATED WEIGHT = 24 LBS.*

**PLAN VIEW - TYPE C**

*ESTIMATED WEIGHT = 23 LBS.*

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**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.

---

**SECTION A-A**

**SECTION B-B**

**ADHESIVE ANCHORAGE WITH 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 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 5.8 KIPS; SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.

**E70X ELECTRODES FOR 3/8" POST TO BASE PLATE WELD.**

**DOUBLE EXTRA STRONG PIPE WEIGHTS:**

21/2" NOMINAL DIA. = 13.69 LBS./FT.
**ANCHORAGE DETAILS**

**OPTION 1**

**REINFORCEMENT NOT SHOWN**

- **HEAVY HEX NUT, LOCK WASHER AND 1/2 PLATE WASHER, CHECK PLAN FOR NUMBER REQUIRED.**
- **1/8 DIA., SPEC. 3385 TYPE A ANCHOR ROD**
- **2-HEAVY HEX JAM NUTS, 1/2 PLATE WASHER, CHECK PLAN FOR NUMBER REQUIRED.**

**SIDE VIEW**

**OPTION 2**

**BARRIER ANCHORAGE TO CONCRETE**

- **3 - 1/4 DIA., SPEC. 3385 TYPE A ANCHOR RODS PER BARRIER SEGMENT**

**NOTES:**

- **ALL HARDWARE TO BE GALVANIZED PER SPEC. 3392.**
- **ALL STRUCTURAL STEEL TO BE SPEC. 3306 UNLESS OTHERWISE NOTED.**
- **PIN BARRIERS TOGETHER PER STANDARD PLATE B837.**
- **THROUGH BOLT ANCHOR RODS MUST BE USED IF THE DECK UNDERSIDE IS PENETRATED DURING DRILLING PROCESS.**
- **DO NOT USE OPTION 2 ON BRIDGES WITH A BITUMINOUS OVERLAY.**
- **REFER TO TRAFFIC CONTROL PLANS FOR DEPLOYMENT LENGTH AND BARRIER TERMINATION REQUIREMENTS.**
- **REFER TO STANDARD FIGURE 5-297.680 (1 OF 2) REGARDING ANCHORING BARRIER OVER BRIDGE EXPANSION JOINTS.**
- **ANCHOR ON TRAFFIC SIDE OF BARRIER ONLY.**
- **SEE SPECIAL PROVISIONS FOR BARRIER INSTALLATION AND REMOVAL REQUIREMENTS.**

1. **HAMMER DRILLING OF THESE HOLES IS NOT PERMITTED.**
2. **1/2" MINIMUM TO PREVENT BOTTOM OF SLAB FROM SPALLING OR FRACTURING DURING DRILLING.**
3. **5/8" MINIMUM FOR BRIDGE DECKS WITH TOP MAT REINFORCEMENT AND SOUND CONCRETE.**
4. **PROVIDE AN ADHESIVE WITH A MINIMUM CHARACTERISTIC BOND STRENGTH IN UNCRACKED CONCRETE OF 1.0 KSI. EMBED THE ANCHORAGE NO LESS THAN 5/8" REGARDLESS OF CHARACTERISTIC BOND STRENGTH, DRILL THROUGH REINFORCEMENT (IF ENCOUNTERED) TO ACHIEVE MINIMUM EMBEDMENT. ENSURE HEX NUT IS IN CONTACT WITH THE ADJACENT SURFACE. PROOF LOAD TO 7.0 KIPS. SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.**

**DESIGNER NOTE**

- **REMOVE PRIOR TO PLOTTING FINAL PLAN.**
- **COORDINATE W/ROADWAY DESIGNER FOR LAYOUT AND PAYMENT.**
- **ADD SPECIAL PROVISION FOR "TEMPORARY PORTABLE PRECAST CONCRETE BARRIER ANCHORAGE INSTALLATION AND REMOVAL".**

**STATE OF MINNESOTA**

**DEPARTMENT OF TRANSPORTATION**

**TEMPORARY PORTABLE PRECAST CONCRETE BARRIER ANCHORAGE TO CONCRETE**

(Temporary Usage in Limited Barrier Displacement Areas)
01-05-2017

TRANSITION BEAM SECTION

SLOTTED Holes TYP. EACH END

PLAN VIEW

ELEVATION

STANDARD BRIDGE BEAM SECTION
(OVERLAPPING SPLICE)

END VIEW

SLOTTED Holes TYP. EACH END

ELEVATION

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

END VIEW

SLOTTED Holes TYP. EACH END

ELEVATION

CUSTOM BRIDGE BEAM SECTION

NOTES:

FABRICATE TUBULAR TRIPLE BEAM RAIL SECTIONS BY WELDING TWO 0210 GAUGE 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 AASHO M399.

1. FOR ADDITIONAL BOLT HOLE SPACING FOR CONNECTION TO TRANSITION BEAM SECTION, SEE TRANSITION BEAM SECTION.

2. TYPICAL POST SPACING, EXCEPT AS NOTED.

3. 60% MIN. WELD PENETRATION TOP AND BOTTOM.
DEPARTMENT OF TRANSPORTATION  
STATE OF MINNESOTA

SECTION A-A
ANCHOR BAR ALTERNATE

MECHANICAL CAGE ALTERNATE

ANCHOR PLATE ALTERNATE

DESIGNER TO ENSURE REINFORCEMENT IN BARRIER OR PARAPET CAN DEVELOP YIELD STRENGTH OF ANCHORAGE RODS.

NOTES:

PROVIDE HEAVY HEX NUTS, JAM NUTS, AND FLAT WASHERS PER SPEC. 3391.2.A FOR 1" DIA. THREADED RODS. TAP NUTS 1/8" 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.

ANCHOR ROD LENGTH

<table>
<thead>
<tr>
<th>STANDARD BARRIER AND PARAPET TYPES (SEE PLANS FOR TYPE)</th>
<th>ANCHOR ROD LENGTH</th>
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</thead>
<tbody>
<tr>
<td>36&quot; TYPE &quot;S&quot; W/O CONCRETE WEARING COURSE</td>
<td>3'-5&quot;</td>
</tr>
<tr>
<td>36&quot; TYPE &quot;S&quot; W/ CONCRETE WEARING COURSE</td>
<td>3'-7&quot;</td>
</tr>
<tr>
<td>42&quot; TYPE &quot;S&quot; W/ CONCRETE WEARING COURSE</td>
<td>3'-11&quot;</td>
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<tr>
<td>42&quot; TYPE &quot;S&quot; W/ CONCRETE WEARING COURSE</td>
<td>4'-1&quot;</td>
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<td>54&quot; TYPE &quot;S&quot; W/ CONCRETE WEARING COURSE</td>
<td>4'-11&quot;</td>
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<tr>
<td>54&quot; TYPE &quot;S&quot; W/ CONCRETE WEARING COURSE</td>
<td>5'-1&quot;</td>
</tr>
<tr>
<td>32&quot; TYPE &quot;F&quot; W/O CONCRETE WEARING COURSE</td>
<td>3'-1&quot;</td>
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<tr>
<td>32&quot; TYPE &quot;F&quot; W/O CONCRETE WEARING COURSE</td>
<td>3'-3&quot;</td>
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<td>32&quot; TYPE &quot;F&quot; W/ CONCRETE WEARING COURSE</td>
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<tr>
<td>32&quot; TYPE &quot;F&quot; MEDIAN W/ CONC. WEARING COURSE</td>
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</tr>
<tr>
<td>36&quot; TYPE &quot;S&quot; ON RETAINING WALL</td>
<td>3'-5&quot;</td>
</tr>
<tr>
<td>36&quot; TYPE &quot;S&quot; ON RETAINING WALL</td>
<td>3'-5&quot;</td>
</tr>
<tr>
<td>32&quot; CONCRETE PARAPET (TYPE P4) W/O CONC. W.C.</td>
<td>3'-1&quot;</td>
</tr>
<tr>
<td>32&quot; CONCRETE PARAPET (TYPE P4) W/ CONC. W.C.</td>
<td>3'-3&quot;</td>
</tr>
</tbody>
</table>

STATE BRIDGE ENGINEER
APPROVED: AUGUST 24, 2016

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

ANCHOR ROD CLUSTER FOR LIGHT POLES

REVISED 02-22-2018

DETAIL NO. B950