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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>
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<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>
</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>Oct. 22, 2019</td>
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<tr>
<td>B307</td>
<td>Bearing Pad Retraint</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>
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<tr>
<td>B310</td>
<td>Curved Plate Bearing Assembly (Prestressed Concrete Beams) (Fixed)</td>
<td>Dec. 20, 2018</td>
<td>10-22-2019</td>
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<tr>
<td>B311</td>
<td>Curved Plate Bearing Assembly (Prestressed Concrete Beams) (Expansion)</td>
<td>Dec. 20, 2018</td>
<td>10-22-2019</td>
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<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>
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<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>
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<tr>
<td>B314</td>
<td>Pot Bearing Assembly (Steel Beams) (Guided Expansion)</td>
<td>Sept. 18, 2007</td>
<td>11-03-2015</td>
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<tr>
<td>B315</td>
<td>Pot Bearing Assembly (Steel Beams) (Non-Guided Expansion)</td>
<td>Sept. 18, 2007</td>
<td>11-03-2015</td>
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<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>
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<tr>
<td>B400</td>
<td>Splices For Steel Beams</td>
<td>Nov. 22, 2002</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>
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<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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* Refer to [http://www.dot.state.mn.us/bridge/] for current Bridge CADD Standards
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<tr>
<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>
</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>
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<tr>
<td>B705</td>
<td>Bridge Offset Floor Drain (Welded Box)</td>
<td>Nov. 22, 2002</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>
<td>04-09-2020</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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<td>B901</td>
<td>Median Sign Post Anchor</td>
<td>May 10, 2017</td>
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<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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<td>B910</td>
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<td>Jan. 13, 2015</td>
<td>11-08-2018</td>
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<td>B919</td>
<td>Temporary Portable Precast Concrete Barrier Anchorage to Glue-Laminated Wood Panel (Temporary Usage In Limited Barrier Displacement Areas)</td>
<td>Apr. 09, 2020</td>
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<tr>
<td>B920</td>
<td>Temporary Portable Precast Concrete Barrier Anchorage to Concrete (Temporary Usage In Limited Barrier Displacement Areas)</td>
<td>Apr. 09, 2020</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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<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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<td>B950</td>
<td>Anchor Bolt Cluster for Light Poles</td>
<td>Apr. 09, 2020</td>
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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>
<td>July 30, 1999</td>
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<td>B342</td>
<td>Expansion Bearing Assembly (Rocker Type)</td>
<td>ARCHIVED 01-17-2000</td>
<td>July 30, 1999</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>
<td>July 30, 1999</td>
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<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>
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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 10-22-2009</td>
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<td>B601</td>
<td>Expansion Hinge for Welded Beams (For Straight Bridges)</td>
<td>ARCHIVED 02-11-2000</td>
<td>July 30, 1999</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>
<td>July 30, 1999</td>
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<td>B704</td>
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<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>
<td>Nov. 22, 2002</td>
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<tr>
<td>B802</td>
<td>Concrete Intermediate Diaphragm (28M – 40” Prestressed Concrete Beam Spans)</td>
<td>May 23, 1995</td>
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<td>B803</td>
<td>Concrete End Diaphragm (28M – 40” Prestressed Concrete Beams) (Parapet Abutment)</td>
<td>July 30, 1999</td>
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<td>B806</td>
<td>Concrete Intermediate Diaphragm (63” – 81” Prestressed Concrete Beam Spans)</td>
<td>May 23, 1995</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>
<td>Nov. 22, 2002</td>
<td>12-17-2008</td>
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<td>B809</td>
<td>Concrete End Diaphragm (For Steel Beams With Contraction Abutment)</td>
<td>Nov. 22, 2002</td>
<td>12-17-2008</td>
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<td><strong>ARCHIVED 12-17-2008</strong></td>
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<td>B810</td>
<td>Concrete End Diaphragm (28M – 40” Prestressed Concrete Beams) (Pile Bent Abutment)</td>
<td>July 30, 1999</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>
<td>Oct. 26, 2005</td>
<td>12-17-2008</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>
<td>Nov. 22, 2002</td>
<td>05-24-2012</td>
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<td><strong>ARCHIVED 05-24-2012</strong></td>
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<tr>
<td>B813</td>
<td>Concrete Intermediate Diaphragm (45M – 54M Prestressed Concrete Beam Spans)</td>
<td>May 23, 1995</td>
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<td><strong>ARCHIVED 09-17-1997</strong></td>
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<tr>
<td>B822</td>
<td>Concrete Pier Diaphragm (For Double Tee Beams)</td>
<td>Nov. 22, 2002</td>
<td>12-17-2008</td>
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<td><strong>ARCHIVED 12-17-2008</strong></td>
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<td>B831</td>
<td>Concrete Parapet Railing (Slipform Alternate)</td>
<td>Nov. 22, 2002</td>
<td>08-24-2016</td>
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<td><strong>ARCHIVED 08-24-2016</strong></td>
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<td>B911</td>
<td>Drainage System (For Slab Over Parapet Abutments) (With No Approach Treatment)</td>
<td>Nov. 22, 2002</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/](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.

MATERIAL SHALL COMPLY WITH SPEC. 3327.

LETTERS AND NUMBERS SHALL CONFORM TO THOSE SHOWN.

HORIZONTAL SPACING OF LETTERS AND NUMBERS SHALL PRODUCE A BALANCED LAYOUT IN PROPORTION TO SPACING SHOWN.

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.
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.

NOTES:

Designer Note
REMOVE DESIGNER NOTE PRIOR TO PLOTTING FINAL PLAN.
INDICATE THE YEAR WHICH THE BRIDGE WAS ORIGINALLY OPENED TO TRAFFIC.

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

BRIDGE: ______
YEAR: ______
YEAR: ______

DATA TO BE SHOWN ON NAMEPLATE IS AS FOLLOWS:

BRIDGE: ______
YEAR: ______
YEAR: ______

PLAN VIEW
SET NAMEPLATE FLUSH WITH SURFACE OF CONCRETE

SECTION A-A
DRILL AND TAP FOR \( \frac{3}{4} \)" DIA. BOLT

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 \( \frac{3}{4} \)" 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.
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".
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. 3391.20.

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 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

PROVIDE STEEL PLATES PER SPEC. 3306.

PROVIDE ANCHOR RODS PER SPEC. 3306. GALVANIZE PER SPEC. 3394.

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 ANCHOR RODS PER SPEC. 3306. GALVANIZE PER SPEC. 3394.

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 1½" DIA. PINTLE
- 36.2 KIPS PER 1½" DIA. ANCHOR ROD

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
ELASTOMERIC FIXED BEARING ASSEMBLY
(PRESTRESSED CONCRETE BEAMS)
(FOR REPLACEMENT OF INPLACE BEARINGS ONLY)
PRESTRESSED CONCRETE BEAMS

DETAIL NO.

DEPARTMENT OF TRANSPORTATION
STATE OF MINNESOTA

BRAKE SEAT

X
(BEAM NOT SHOWN)

NOTES:

BEAM PLAN

BEARING PAD

ELASTOMERIC BEARING PAD

SIDE ELEVATION

SECTION X-X

PLAN

(X-SECTION)

TABLE

<table>
<thead>
<tr>
<th>PAD TYPE</th>
<th>LOCATION</th>
<th>BEAM SIZE</th>
<th>BEARING PAD SIZE</th>
<th>SHAPE FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>EB</td>
<td>M, MN</td>
<td>12 24 ½</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>EH</td>
<td>M</td>
<td>12 30 ½</td>
<td>8.6</td>
<td></td>
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</tbody>
</table>

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 ½" UNREINFORCED PAD WITH CONTINUITY DIAPHRAGMS OR INTEGRAL ABUTMENTS.

APPROVED: OCTOBER 22, 2019

STATE BRIDGE ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
ELASTOMERIC BEARING PAD
(PRESTRESSED CONCRETE BEAMS)
**PATTERN A-1**
(View at bottom of bearing plate)

- **BEARING PLATE**
- **ELASTOMERIC BEARING PAD**
- **BEARING ASSEMBLY**
- **SOLID BAR (TYP.)**
- **10" X 10" X 1"**
- **SYMM. ABT. (Q) BEAM**

**NOTES:**
- **PATTERN A-2**
- **VIEW AT BOTTOM OF BEARING PLATE**
- **SYMM. ABT. (Q) BEAM**
- **10" X 2" X 1"**
- **10" X 2" X 1"**
- **SYMM. ABT. (Q) BEAM**

**NOTES:**
- **PATTERN A-3**
- **VIEW AT BOTTOM OF BEARING PLATE**
- **SYMM. ABT. (Q) BEAM**
- **10" X 2" X 1"**

**NOTES:**
- **PATTERN A-4**
- **VIEW AT BOTTOM OF BEARING PLATE**
- **SYMM. ABT. (Q) BEAM**
- **10" X 2" X 1"**

**DESIGNER NOTE (REMOVE PRIOR TO PLOTTING FINAL PLAN):**
- **IN)CLUDE 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".**

**NOTES:**
- **INSTALL 3/4" X 3/4" SOLID RESTRAINT BARS SYMMETRIC TO CENTER OF BEARING PLATE WITH CLEAR DISTANCE OF 3/4" FROM EDGE OF BEARING PAD TO INSIDE FACE OF RESTRAINT BAR.**
- **RESTRAINT BARS INCLUDED IN PAYMENT FOR BEARING ASSEMBLY.**
**TAPERED BEARING PLATE ASSEMBLY**

**BEARING PLATE 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>__.RB, __.M, <strong>.MN</strong></td>
<td>12 24 1/2</td>
<td>8.0</td>
<td>14&quot; 26&quot;</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>.MH</strong></td>
<td>12 30 1/2</td>
<td>8.6</td>
<td>14&quot; 32&quot;</td>
<td>A-3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 1/2" DIA. PINTLE

**STATE OF MINNESOTA**

**DEPARTMENT OF TRANSPORTATION**

**TAPERED BEARING PLATE ASSEMBLY**

(for integral abutments or piers with continuity diaphragms)
**DEPARTMENT OF TRANSPORTATION**

**STATE OF MINNESOTA**

**DESIGN DATA:**

**CURVED PLATE BEARING ASSEMBLY**

(FIXED)

**PRESTRESSED CONCRETE BEAMS**

**NOTES:**

**DETAIL NO.**

**ANCHOR RODS (TYP.)**

**2” DIA. HOLE FOR 1” DIA. ANCHOR ROD**

**CURVED PLATE**

**BEARING PLATE**

**ELASTOMERIC BEARING PAD**

**BEARING PLATE**

**ELASTOMERIC BEARING PAD**

**TOP OF BRIDGE SEAT**

**SECTION X-X**

**SIDE ELEVATION**

**ANCHOR ROD DETAIL**

**ANCHOR RODS NOT SHOWN**

**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>CURVED PLATE SIZE</th>
<th>ANCHOR ROD OFFSET</th>
<th>ASSY., HEIGHT</th>
<th>RESTRAINT PATTERN</th>
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<tr>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
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<td>A-B-C-D</td>
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<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
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<tr>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
<td>A-B-C-D</td>
</tr>
<tr>
<td>12” x 24” x ½”</td>
<td>12” x 24” x ½”</td>
<td>12” x 24” x ½”</td>
<td>12” x 24” x ½”</td>
<td>12” x 24” x ½”</td>
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<td>12” x 24” x ½”</td>
<td>12” x 24” x ½”</td>
<td>12” x 24” x ½”</td>
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</tbody>
</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 ½" LESS THAN SHOWN.

2. "++" DENOTES OFFSET AS SHOWN.

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

**DESIGN DATA:**

- MAX., FACTORED SHEAR RESISTANCE: 50.3 KIPS PER 1½" DIA. PINTLE
- 36.2 KIPS PER 1½" DIA. ANCHOR ROD

**APPROVED:** DECEMBER 20, 2018

**STATE BRIDGE ENGINEER**

**STATE OF MINNESOTA**

**DEPARTMENT OF TRANSPORTATION**

**CURVED PLATE BEARING ASSEMBLY**

(FIXED)

**REVISED**

10-22-2019

**DETAIL NO.**

B310
NOTEs:

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 1/16" LESS THAN SHOWN.

2. DO NOT GALVANIZE THESE PLATES.

3. THE TOTAL THICKNESS SHOWN INCLUDES THE STEEL PLATES.

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

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" 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.

- THE TOTAL THICKNESS SHOWN INCLUDES THE STEEL PLATES.

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

TABLE

<table>
<thead>
<tr>
<th>Assembly 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>Ass'y Height</th>
<th>Restraint Pattern</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A  B  D</td>
<td>No. Thick No. Thick</td>
<td>C  E  F</td>
<td>G  H  J  R</td>
<td>L</td>
<td></td>
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<tr>
<td>RB, MN, M</td>
<td>12&quot; 24&quot;</td>
<td>1/8&quot; 1/2&quot;</td>
<td>8.0</td>
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<td>4 1/2&quot; 26&quot; 1 1/2&quot;</td>
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<td>18&quot; 39&quot; 1/2&quot;</td>
<td>4 1/2&quot; 38&quot; 1 1/2&quot;</td>
<td>A-2</td>
<td></td>
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<td>MH</td>
<td>12&quot; 30&quot;</td>
<td>1/8&quot; 1/2&quot;</td>
<td>8.6</td>
<td></td>
<td></td>
<td>14&quot; 33&quot; 1/2&quot;</td>
<td>4 1/2&quot; 32&quot; 1 1/2&quot;</td>
<td>A-3</td>
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SECTION Y-Y

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

SECTION X-X

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; (DIA.)</th>
<th>PLATE &quot;B&quot; (DIA.)</th>
<th>PLATE &quot;C&quot; (MAXIMUM)</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>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>ASSEMBLY TYPE</th>
<th>ROTATION 1</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; (DIAMETER) (MAXIMUM)</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>
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</tbody>
</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 PLATES "A", "D" AND PINTLES PER SPEC. 3394.
- METALIZE PLATES "B" & "C" PER SPEC. 2471.3.L.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 Ø OF BRG. PLATES "A" AND "B" TO FACILITATE PLACEMENT.
  3. HEIGHT IS MINIMUM DIMENSION IF PLATE IS TAPERED.

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

STATE BRIDGE ENGINEER

REVISION 11-03-2015
DETAIL NO. B313
**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.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. 1/8" 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. "M" DENOTES OFFSET AS SHOWN.
   "O" DENOTES OFFSET OPPOSITE OF SHOWN.

**BEARING ASSEMBLY TABLE**

<table>
<thead>
<tr>
<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 OFFSET</th>
<th>ASSUMED BOTTOM FLANGE WIDTH</th>
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</thead>
<tbody>
<tr>
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**DESIGN LOADS (KIPS)**

<table>
<thead>
<tr>
<th>SERVICE LIMIT STATE</th>
<th>STRENGTH LIMIT STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERTICAL</td>
<td>HORIZONTAL</td>
</tr>
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</table>

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

TWO 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.

**STATE OF MINNESOTA**

DEPARTMENT OF TRANSPORTATION

POT BEARING ASSEMBLY

(STEEL BEAMS) (GUIDED EXPANSION)

APPROVED: SEPTEMBER 18, 2007

STATE BRIDGE ENGINEER

REVISION 12-17-2008 11-03-2015

DETAIL NO. B314
**SEE FRAME PLAN**

**DETAIL AT MASONRY PLATE**

- **3/4" Ø LARGER THAN PINTLE**
- **SOLE PLATE**
- **PINTLE**
- **BEVEL**
- **DRIVING FIT**

**BEARING ASSEMBLY TABLE**

<table>
<thead>
<tr>
<th>ASSEMBLY TYPE</th>
<th>LOCATION</th>
<th>FACTORED LL (INCHES)</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>
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<td>TRANSVERSE</td>
<td>LONGITUDINAL</td>
<td>M</td>
<td>A</td>
<td>B</td>
<td>+/-</td>
<td>C</td>
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</tbody>
</table>

**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. 24713.1.2.
- 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. 1/2" 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, TITRED 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 FRAME PLAN
- 6 "H" DENOTES OFFSET AS SHOWN.
- 7 H" 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 "H", 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.

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.

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. 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 1/2" 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. 

"-" DENOTES OFFSET OPPOSITE OF SHOWN.

DESIGNER NOTE REMOVE DESIGNER NOTE PRIOR TO PLOTTING FINAL PLAN.

TWO 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 ROTATION (RAD)</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>
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<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>+/- (6)</td>
<td>M</td>
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<td>VERTICAL</td>
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APPROVED: SEPTEMBER 18, 2007

STATE OF MINNESOTA

POT BEARING ASSEMBLY

(steel beams)

(Fixed)

STATE BRIDGE ENGINEER

DEPARTMENT OF TRANSPORTATION

REVISION

12-17-2008

11-03-2015

02-27-2019

DETAIL NO.

B316
**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 IS 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

**TABLE**

<table>
<thead>
<tr>
<th>ASSEMBLY</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>PINTElia DIA.</th>
<th>ASY. HEIGHT</th>
<th>ANCHOR ROD OFFSET</th>
<th>RESTRAINT PATTERN</th>
</tr>
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<tbody>
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</table>

**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

**CURVED PLATE BEARING ASSEMBLY**
(STEEL BEAMS) (FIXED)

**DETAIL NO.**

<table>
<thead>
<tr>
<th>REVISED</th>
<th>DETAIL NO.</th>
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<tr>
<td>08-10-2006</td>
<td>B354</td>
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<td>11-02-2017</td>
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<tr>
<td>11-08-2018</td>
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</table>
FULL BEARING STIFFENERS ARE REQUIRED.

BOTTOM FLANGE OF BEAM

SOLE PLATE

CURVED PLATE

BEARING PLATE

BEARING PAD

PLAN

SECTION X-X

SIDE ELEVATION

SECTION Y-Y

SECTION THROUGH BEARING PAD

TABLE

<table>
<thead>
<tr>
<th>ASSEMBLY</th>
<th>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>ASSY. LENGTH</th>
<th>PINTLE DIAM.</th>
<th>RESTRAINT PATTERN</th>
</tr>
</thead>
</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.

Designer note remove prior to plotting final plan. Per Note 9 include B307 and modify as necessary.

Design Data:

Max. factored shear resistance: - 50.3 kips per 1/8" dia. pintle.

Approved: November 22, 2002

State Bridge Engineer
**Section X-X**

**Notes:**

Use fill plates where the difference in web thickness is \( \frac{1}{8}'' \) or greater. Fill plates shall be structural steel with minimum thickness of \( \frac{3}{8}'' \). When the difference in web thickness is \( \frac{1}{4}'' \) or more, place fill plates of the same thickness on both sides of the thinner web.

**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>
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<tbody>
<tr>
<td></td>
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</tbody>
</table>
FOR BEAMS 36" OR LESS

SEE PLAN FOR STIFFENER SIZE

MIN. SPACING 1"

2" SPACING

STIFFENER SIZE

MAX.

FOR BEAMS OVER 36"

FOR BEAMS OVER 42"

FOR BEAMS 33" TO 30"

INTERIOR BEAM

AT PIER AND INTERMEDIATE DIAPHRAGMS

INTERIOR BEAM

AT ABUTMENT DIAPHRAGMS

BEAMS 27" TO 30"

BEAMS 33" TO 36"

BEAMS 2" TO 36"

INTERIOR BEAM

AT ABUTMENT DIAPHRAGMS

COPE FLANGES FLUSH WITH WEB.

FILLET RE-ENTRANT CORNERS.

(TYP.)

BENT CONNECTION

STIFFENER PLATE

(0.5" MINIMUM THICKNESS)

1 1/2" R. (MIN.)

SECTION C-C

SKEWS TO 30° MAX.

SECTION C-C

SKEWS OVER 30° TO 60°

NOTES:

PROVIDE STRUCTURAL STEEL PER SPEC. 3309.

1) USE SAME SHEAR STUD HEIGHT AS USED ON THE BEAMS.

2) SEE FRAMING PLAN FOR SIZE OF DIAPHRAGM.

3) FOR PLATE GIRDER, PROVIDE END DIAPHRAGMS AT LEAST 1/2 THE BEAM HEIGHT.

4) DIAPHRAGMS MAY BE PLACED LEVEL, PROVIDED MINIMUM CLEARANCES ARE MET.

5) MILL TO BEAR FOR BEARING STIFFENERS.
PART TRANSVERSE SECTION AT DIAPHRAGM

DIAPHRAGM CONNECTION
FOR 36M, 40MH AND MN45 BEAMS

DIAPHRAGM CONNECTION
FOR MN54 AND MN63 BEAMS

TABLE

<table>
<thead>
<tr>
<th>BEAM HEIGHT</th>
<th>DISTANCE</th>
<th>CHANNEL SIZE</th>
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</thead>
<tbody>
<tr>
<td>36M</td>
<td>1'-3&quot;</td>
<td>C12x20.7</td>
</tr>
<tr>
<td>40MH</td>
<td>1'-5&quot;</td>
<td>C12x20.7</td>
</tr>
<tr>
<td>MN45</td>
<td>1'-7&quot;</td>
<td>C12x20.7</td>
</tr>
<tr>
<td>MN54</td>
<td>1'-7½&quot;</td>
<td>MC18x42.7</td>
</tr>
<tr>
<td>MN63</td>
<td>1'-7½&quot;</td>
<td>MC18x42.7</td>
</tr>
</tbody>
</table>

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 3/8" 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°.
DESIGNER NOTE
REMOVE PRIOR TO PLOTTING FINAL PLAN.
DESIGNER TO CHOOSE ONE OF THE FOLLOWING NOTES PER MnDOT 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

ELEVATION

SECTION C-C

NOTES:

PROVIDE STEEL IN ACCORDANCE WITH SPEC. 3309.

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

BEAM SPACING

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

INTERIOR BEAM

DETAIL "A"

DETAIL "B"

ELEVATION

FASCIA BEAM

SECTION C-C

(BOLTED CONNECTION SHOWN)

DESIGNER NOTE (REMOVE PRIOR TO PLOTTING FINAL PLAN):
DESIGNER TO SPECIFY GUSSET PLATE THICKNESS, 1/2" 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 C-C
CONNECTION WITH 4 BOLTS

NOTES:
PROVIDE STRUCTURAL STEEL
PER SPEC. 3309.

1. SEE DETAIL B411.
2. MINIMUM PLATE THICKNESS
   IS 3/8".
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.
STIFFENER TO FLANGE CONNECTION

OPTION 1

STIFFENER TO TAB PLATE CONNECTION

OPTION 1

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

NOTES:

1. DO NOT WELD IN THIS AREA. SEE B410 FOR CONNECTION DETAILS.
PART TRANSVERSE SECTION
SQUARE BRIDGE SHOWN

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

SECTION C-C
FASCIA BEAM
WEB RADIOUS (TYP.)

SECTION B-B
TYPICAL SECTION AT FASCIA BEAM

INTERMEDIATE DIAPHRAGM
TYPICAL SECTION AT INTERIOR DIAPHRAGM WITH CONTINUOUS OR STAGGERED INTERMEDIATE DIAPHRAGMS

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
(AL/W PRESTRESSED CONCRETE BEAMS)

STATE BRIDGE ENGINEER
APPROVED: SEPTEMBER 22, 2011

REVISED
09-11-2014
11-03-2015
01-05-2017
10-22-2019

B412
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.
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 ___ INCLUDES ALL MATERIAL ON THIS DETAIL.
- GRATE OPENING AREA IS 106 SQ. IN.
- 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.

DETAIL NO. B701

STATE BRIDGE ENGINEER

APPROVED: NOVEMBER 22, 2002
**PLAN VIEW**

- $\frac{3}{4}'' \times \frac{3}{4}'' \times 3''$ BAR
- $\frac{1}{2}'' \times 1\frac{1}{2}''$ BAR

3' x $\frac{1}{6}''$ BAR for beam depths over 5'-0" only, not needed for slabs.

**NOTES:**

- PROVIDE SHIMS AS REQUIRED.
- 3'' SQUARE PLATES WITH $\frac{1}{16}''$ DIA. HOLES.

**SECTION A-A**

- MID-HEIGHT OF BEAM
- FACE OF BEAM WEB
- BOTTOM OF BEAM IFLANGE OR SLAB

**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.
TOP VIEW (SCUPPER)

SLOPE TO DRAIN FOR 1'-0" ALL AROUND
1 1/4" DIA. ADJUSTING BOLT & 2 HEX NUTS AT 4 CORNERS
3" X 1/2" BRACE FOR BEAMS 4'-0" AND OVER

SECTION A-A (CONCRETE BEAM SHOWN)

BOTTOM OF BEAM

SECTION B-B

BRACKET DETAIL

NOTES:
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 HARDWARE 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 3/4" DIA. BOLT, LOCKWASHER AND NUT AS REQUIRED. SEE SPECIAL PROVISIONS FOR APPROVED ANCHORAGE REQUIRED FOR CONCRETE BEAMS.
ANCHORAGE TO MISS DRAPED STRANDS.
**BRIDGE OFFSET FLOOR DRAIN**  
(STRUCTURAL TUBE)
PART SECTION THROUGH ABUTMENT AT JOINT

SECTION A-A

NO REINFORCEMENT THROUGH WEAKENED PLANE ABOVE TOP OF FOOTING (BACK FACE ONLY)

APPLY MEMBRANE WATERPROOFING SYSTEM PER SPEC. 2481.3B TO BACK FACE OF CONTRACTION JOINT REINFORCEMENT BARS

26 GA. SHEET METAL OR EQUAL, 8" WIDE

3" MIN.

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**

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

Prestressed Concrete Beams (Parapet Abutment)

**NOTES:**

Concrete for end diaphragms shall be the same mix as used in deck.

Quantities for end diaphragm concrete and reinforcement shown on this detail shall be listed in superstructure quantities.

Threaded rods are incidental to prestressed concrete beams.

1. Use of construction joint requires clearance for expansion device. When construction joint is used at this location, diaphragm falsework shall remain inplace until completion of slab curing period.

2. Perpendicular to centerline of diaphragm.

3. 1'-1" (27M & 30MH); 2'-1" (35MH, 36M, 40MH and MN45);

4. 2'-4" (MN54 and MN63); 3'-0" (82MW and 96MW). Based on 3" stool and 9" deck.

5. Add SD507E and SD508E only if no. of bars and lengths are included in Bill of Reinforcement. Space SD508E at 1'-6" max. for entire length of diaphragm. Refer to "Part Transverse Section" above.

**LONGITUDINAL REINFORCEMENT IN BOTTOM OF DIAPHRAGM**

- **BARS REQUIRED**
  - STRAIGHT
  - BENT

**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>SD401E</td>
<td>5E</td>
<td>5'-0&quot;</td>
<td>VERTICAL TIE</td>
<td>LONG. THRU BEAM</td>
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<tr>
<td>SD403E</td>
<td>5E</td>
<td>4'-0&quot;</td>
<td>VERTICAL TIE</td>
<td>LONG. TOP</td>
</tr>
<tr>
<td>SD.05E</td>
<td>5E</td>
<td>3'-0&quot;</td>
<td>VERTICAL TIE</td>
<td>M SHAPE PCB</td>
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<tr>
<td>SD508E</td>
<td>5E</td>
<td>3'-0&quot;</td>
<td>VERTICAL TIE</td>
<td>LONGITUDINAL</td>
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<tr>
<td>SD506E</td>
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<td>2'-0&quot;</td>
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<tr>
<td>SD507E</td>
<td>5E</td>
<td>1'-0&quot;</td>
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<tr>
<td>SD508E</td>
<td>5E</td>
<td>1'-0&quot;</td>
<td>VERTICAL TIE</td>
<td>M SHAPE PCB</td>
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</table>

**REINFORCEMENT SHEET FOR THREADED ROD DETAILS**

**DESIGNER NOTE:**

Remove Designer Note prior to plotting final plan:
- Verify that 4'-0" tail length on bars SD506E and SD.05E is correct over fascia beams.
- Add SD507E and SD508E if dimension exceeds 1'-8". See Note 5 below.
CONCRETE END DIAPHRAGM

14", 18" AND 22" RECTANGULAR Prestressed Concrete Beams
(INTEGRAL ABUTMENT)

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

CONCRETE WEARING COURSE

B816

1'-3" (TYP.)

PARTIAL ELEVATION

*SPACE WITH ABUTMENT DOWELS

SECTION A-A

*SPACE WITH ABUTMENT DOWELS

BILL OF REINFORCEMENT FOR END DIAPHRAGM

<table>
<thead>
<tr>
<th>BAR</th>
<th>NO.</th>
<th>LENGTH SHAP</th>
<th>LOCATION</th>
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<tr>
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</tr>
<tr>
<td>SD602E</td>
<td>&quot;-&quot;</td>
<td>&quot;&quot; HORIZONTAL FF</td>
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</tr>
<tr>
<td>SD603E</td>
<td>&quot;-&quot;</td>
<td>&quot;&quot; HORIZONTAL BF</td>
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<tr>
<td>SD604E</td>
<td>&quot;-&quot;</td>
<td>&quot;&quot; DIAPHR./FILLET TIE</td>
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<tr>
<td>SD605E</td>
<td>&quot;-&quot;</td>
<td>&quot;&quot; DIAPHR./DECK TIE</td>
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<tr>
<td>SD606S</td>
<td>&quot;-&quot;</td>
<td>&quot;&quot; DIAPHR./APPROACH TIE</td>
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<td>SD509E</td>
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<td>&quot;&quot; DIAPHR. TIE</td>
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</table>

2-SD602E (BF)
2-SD500E (BF)
SD604E, SD605E, SD606S

SD606S BAR IS STAINLESS STEEL

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 S606E FOR SKEW.

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 SDO01E 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 THREAD RODS.
8 TIE BAR TO TOP MAT.
9 MEMBRANE WATERPROOFING SYSTEM PER SPEC. 2481.3.B.

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

DETAIL NO. B816

APPROVED: MAY 24, 2012
STATE BRIDGE ENGINEER
Nancy Duerksen

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

REVISION

SD604E, SD605E, SD606S

CONCRETE WEARING COURSE

B816
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 \( \frac{3}{4} \)" to 1" below top of pavement. Place joint sealer per Spec. 3720 above filler \( \frac{3}{4} \)" ± \( \frac{1}{8} \)" 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 \( \xi \) of roadway on skews and tangent to \( \xi \) 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, \( \frac{1}{4} \)" 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.

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

DESIGNER NOTE REMOVE PRIOR TO PLOTTING FINAL PLAN: DEFINE TYPE A OR B FOR POLYSTYRENE.
Plan View

- HSS 4" x 4" x ¾" x 1 ½" long
- Ø ¾" dia. holes (typ.)
- ¼" dia. bolt, flat washer, and lock nut
- HSS 3" x 3" x ½"

Section A-A

- DRILL ¾" dia. holes on center through 3" square tube sleeve for threaded rod
- HSS 3" x 3" x ½" sleeve, 10.58 lbs./ft.
- DRILL ¾" dia. holes through sleeve for ⅜" bolt

Section B-B

- ¾" dia. x 9" threaded rod with nut and washer each side.

Notes:

- Galvanize sign anchor including threaded rod after fabrication per Spec. 3394
- Provide structural steel tubing per Spec. 3361, Type A, except as noted.
APPROVED ADHESIVE ANCHORAGE

ESTIMATED WEIGHT = 18 LBS.

PIPE SLEEVE FOR INTERMEDIATE POSTS AND END POSTS USE 2" NOMINAL DIA., DOUBLE EXTRA STRONG PIPE.

1/8" DIA. HOLES FOR 5/8" DIA. APPROVED ADHESIVE ANCHORAGE

PLAN VIEW - TYPE A

1/4" DIA. BOLT, NUT & LOCK WASHER (TYP.)

1/8" DIA. DRAIN HOLE. FACE TOWARD DOWNGRADE SIDE OF RAILING IN DIRECTION PARALLEL TO FENCE. (TYP.)

3/4" BASE PLATE

CAULK AND SHIM BASE PLATE PER SPECIAL PROVISIONS

TYPICAL SECTION

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 3/8" DIA. ANCHOR ROD PER SPEC. 3385, TYPE A WITH HEX NUT AND WASHER. PROVIDE AN ADHESIVE WITH A MINIMUM CHARACTERISTIC BOND STRENGTH IN UNCRAKED CONCRETE OF 1.5 KSI. EMBED THE ANCHORAGE NO LESS THAN 5" 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 3/8" 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
NOTE:

1. ALL PIPE DIAMETERS ARE NOMINAL.

2. SEE SPECIAL PROVISIONS FOR REQUIREMENTS NOT INCLUDED ON THIS SHEET.

3. STRUCTURAL STEEL PER SPEC. 3306

4. STRUCTURAL PIPE PER SPEC. 3362

5. GALVANIZE THE FENCE POST ANCHORAGE AFTER FABRICATION PER SPEC. 3394.

6. GALVANIZE THE FASTENERS PER SPEC. 3392.

7. GURALIZE THE FENCE POST ANCHORAGE AFTER FABRICATION PER SPEC. 3394.

8. GALVANIZE THE FASTENERS PER SPEC. 3392.

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

10. E70X ELECTRODES FOR 1/2" POST TO BASE PLATE WELD.

11. DOUBLE EXTRA STRONG PIPE WEIGHTS:

   - 2 1/2" NOMINAL DIA. = 13.69 LBS./FT.
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 3245.2(G).

SLEEVE PERFORATED PIPE WITH GEOTEXTILE KNOT 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 1/4" PER FT. MINIMUM SLOPE.

③ REFER TO GRADING PLANS FOR ABUTMENT BACKFILL REQUIREMENTS.
STATE BRIDGE ENGINEER

ANCHOR DETAILS

NOTES:

- All hardware to be galvanized in accordance with Spec. 3392.
- Plate washers to be structural steel in accordance with Spec. 3306.
- Cost of anchorage system and anchor removal are included in cost of placing temporary portable precast barrier.
- Pin barriers together per standard plate 8337.
- Refer to traffic control plans for deployment length and barrier termination requirements.
- Anchor on traffic side of barrier only.

1. Thickness of wood plank risers to match thickness of bituminous wearing course at gutterline. Minimum bituminous thickness = 2", maximum bituminous thickness = 4". Minimum riser width = 6". Minimum no. of riser lines = 3. Minimum riser specific gravity, G = 0.55, minimum riser modulus of elasticity, E = 1,700,000 psi. See detail "B" for riser connection details.

2. Attach each wood plank riser to glued-laminated wood bridge deck panels with 2 wood screws spaced at 1'-0" max. along length of riser. 4" min. screw embedment in glued-laminated wood panel.

3. Attach each wood plank riser to glued-laminated wood bridge deck panels with 1 - 7/8" dia. lag screw spaced at 1'-0" max. along length of riser. 4" min. screw embedment in glued-laminated wood panel. Lag screw to meet ANSI/ASME standard B18.2.1. Min. lag screw bending yield strength = 45,000 psi. See special provisions for installation instructions.

DESIGNER NOTE: REMOVE PRIOR TO PRINTING FINAL PLAN:

REFER TO MnDOT BDM "MEMO TO DESIGNERS 2019-01" AND "TEMPORARY BARRIER GUIDANCE MANUAL", TABLE 3-3 FOR GUIDANCE ON DEFLECTION DISTANCE.

APPROVED: APRIL 09, 2020

STATE BRIDGE ENGINEER

STATE OF MINNESOTA

DEPARTMENT OF TRANSPORTATION

TEMPORARY PORTABLE PRECAST CONCRETE BARRIER

ANCHORAGE TO GLUED-LAMINATED WOOD PANEL

(Temporary usage in limited barrier displacement areas)
ANCHORAGE DETAILS

OPTION 1 ANCHOR

(3 PER BARRIER SEGMENT)

HEAVY HEX NUT, LOCK WASHER AND 1⁄2" PLATE WASHER, CHECK PLAN FOR NUMBER REQUIRED.

1⁄2" DIA. SPEC. 3385 TYPE A ANCHOR ROD

2-HEAVY HEX JAM NUTS, 1⁄2" PLATE WASHER, CHECK PLAN FOR NUMBER REQUIRED.

TOP PLATE WASHER

(ONLY USED FOR OPTION 1)

BOTTOM PLATE WASHER

4" N + SLAB THICKNESS

HEAVY HEX NUT, LOCK WASHER AND 1⁄2" PLATE WASHER, TORQUE ANCHOR RODS TO 80 FT. LBS.

SIDE VIEW

DETAIL "A"

ANCHORED BARRIER MEETS MASH TL-3 REQUIREMENTS

NOTES:

ALL HARDWARE TO BE GALVANIZED IN ACCORDANCE WITH SPEC. 3392.

PLATE WASHERS TO BE STRUCTURAL STEEL IN ACCORDANCE WITH SPEC. 3306.

PIN BARRIERS TOGETHER PER STANDARD PLATE 8337.

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 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. 6" 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 6" 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.

5. HOLE DIAMETER 1/8" MIN., 1/2" MAX.

DESIGNER NOTE

REMOVE PRIOR TO PRINTING FINAL PLAN.

REFER TO MnDOT BDM "MEMO TO DESIGNERS 2019-01" AND "TEMPORARY BARRIER GUIDANCE MANUAL", TABLE 3-3 FOR GUIDANCE ON DEFORMATION DISTANCE.

COORDINATE W/ROADWAY DESIGNER FOR LAYOUT AND PAYMENT. ADD SPECIAL PROVISION FOR "TEMPORARY PORTABLE PRECAST CONCRETE BARRIER ANCHORAGE INSTALLATION AND REMOVAL".

DESIGNER NOTE

REMOVE PRIOR TO PRINTING FINAL PLAN.

REFER TO MnDOT BDM "MEMO TO DESIGNERS #2019-01" AND "TEMPORARY BARRIER GUIDANCE MANUAL", TABLE 3-3 FOR GUIDANCE ON DEFORMATION DISTANCE.

COORDINATE W/ROADWAY DESIGNER FOR LAYOUT AND PAYMENT. ADD SPECIAL PROVISION FOR "TEMPORARY PORTABLE PRECAST CONCRETE BARRIER ANCHORAGE INSTALLATION AND REMOVAL".

APPROVED: APRIL 09, 2020

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
TEMPORARY PORTABLE PRECAST CONCRETE BARRIER ANCHORAGE TO CONCRETE
(TEMPORARY USAGE IN LIMITED BARRIER DISPLACEMENT AREAS)

REVISED DETAIL NO.

B920
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 AASHTO M80.

(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.
**PARAPET TYPES**

- **3'-1"** 32" TYPE "F" MEDIAN W/O CONCRETE WEARING COURSE
- **3'-3"** 32" TYPE "F" MEDIAN W/ CONCRETE WEARING COURSE
- **3'-3"
  - 36" TYPE "S" W/ CONCRETE WEARING COURSE
  - 36" TYPE "S" W/O CONCRETE WEARING COURSE

**NOTES:**

- **INSTALL ANCHOR ROD ASSEMBLY PLUMB WITH UPPER ANCHOR ROD TEMPLATE LEVEL AND EMBEDDED IN CONCRETE AS SHOWN IN PARTIAL ELEVATION.**
- **PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.**
- **GALVANIZE THREADED RODS, WASHERS, AND NUTS AFTER FABRICATION IN ACCORDANCE WITH SPEC. 3392.**
- **FURNISH & INSTALL PLATES IN ACCORDANCE WITH SPEC. 3306, GALVANIZE IN ACCORDANCE WITH SPEC. 3394.**
- **TACK WELDING IS PROHIBITED.**
- **SUBSTITUTE MATERIALS IN ACCORDANCE WITH SPEC. 1605.**
- **PROVIDE 1 1/4" NOMINAL DIA. ANCHOR RODS TYPE B, IN ACCORDANCE WITH SPEC. 3385.2.B FOR 49' LIGHT STANDARDS WITH TWIN ARMS 10' OR LONGER (6 REQUIRED), PROVIDE 1" NOMINAL DIA. ANCHOR RODS TYPE B, IN ACCORDANCE WITH SPEC. 3385.2.B FOR ALL OTHER INSTALLATIONS.**
- **1 1/4" Ø HOLE FOR 1" NOMINAL DIA. ANCHOR ROD, 1 5/8" Ø HOLE FOR 1 1/4" NOMINAL DIA. ANCHOR ROD.**
- **HEAVY HEX NUTS IN ACCORDANCE WITH SPEC. 3391.2.A (30 REQ'D PER ASSEMBLY.)**
- **FLAT WASHERS IN ACCORDANCE WITH SPEC. 3391.2.A (12 REQ'D PER ASSEMBLY.)**
- **TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE WITH THE LEVELING NUTS BEFORE CONCRETE PLACEMENT. AFTER CONCRETE PLACEMENT, LEAVE LEVELING NUTS SECURED AGAINST TEMPLATE UNTIL CLEANING & LUBRICATING THE ANCHOR ROD CONNECTIONS, JUST PRIOR TO POLE INSTALLATION.**
- **USE A 1 1/2" LONG WRENCH TO SNUG TIGHTEN NUTS PULLING THE HANDLE WITH ONE ARM IN ONE SMOOTH MOTION.**
- **OMIT HEADED STUDS ON LOWER ANCHOR ROD TEMPLATE.**
- **REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MNDOT’S APPROVED/QUALIFIED PRODUCTS LIST UNDER BRIDGE PRODUCTS.**
- **CAST LEVEL CONCRETE SURFACE BENEATH LIGHT FIXTURE. SLOPE ADJACENT CONCRETE, AS SHOWN ON SLOPED OR SUPERELEVATED BRIDGES.**