

MINNESOTA DEPARTMENT OF TRANSPORTATION

Bridge Office

Bridge Details Manual Part I

MnDOT BRIDGE OFFICE

Bridge Details Manual Part I

B-Details

Minnesota Department of Transportation
3485 Hadley Avenue North • Mail Stop 610
Oakdale, MN 55128-3307
Phone: 651/366-4500 Fax: 651/366-4497

Last Date Revised: April 09, 2020

BRIDGE DETAILS MANUAL PART I *
(B-DETAILS)

October 22, 2019

Index (1)

DETAIL NO.	DESCRIPTION	DATE APPROVED	DATE REVISED
B101	Bridge Nameplate (For New Bridges)	Nov. 22, 2002	09-11-2014
B102	Bridge Nameplate (For Bridge Reconstruction)	Nov. 22, 2002	11-08-2018
B201	Pile Splice (Cast-In-Place Concrete Piles)	Nov. 22, 2002	11-06-2013
B202	Pile Splice (Steel H Bearing Piles 10" To 14")	Nov. 22, 2002	11-06-2013
B303	Sole Plate (Prestressed Concrete Beams) (For Bearings With Pintles)	Sept. 22, 2011	12-20-2018
B304	Elastomeric Fixed Bearing Assembly (Prestressed Concrete Beams) (For Replacement Of Inplace Bearings Only)	Nov. 22, 2002	11-08-2018
B305	Elastomeric Bearing Pad (Prestressed Concrete Beams)	Oct. 22, 2019	
B307	Bearing Pad Restraint	Nov. 02, 2017	12-20-2018
B309	Tapered Bearing Plate Assembly (For Integral Abutments or Piers with Continuity Diaphragms)	Dec. 20, 2018	10-22-2019
B310	Curved Plate Bearing Assembly (Prestressed Concrete Beams) (Fixed)	Dec. 20, 2018	10-22-2019
B311	Curved Plate Bearing Assembly (Prestressed Concrete Beams) (Expansion)	Dec. 20, 2018	10-22-2019
B312	Pot Type Bearing Assembly (Prestressed Concrete Beams) (Guided Expansion)	Nov. 22, 2002	02-27-2019
B313	Pot Type Bearing Assembly (Prestressed Concrete Beams) (Non-Guided Expansion)	Nov. 22, 2002	11-03-2015
B314	Pot Bearing Assembly (Steel Beams) (Guided Expansion)	Sept. 18, 2007	11-03-2015
B315	Pot Bearing Assembly (Steel Beams) (Non-Guided Expansion)	Sept. 18, 2007	11-03-2015
B316	Pot Bearing Assembly (Steel Beams) (Fixed)	Sept. 18, 2007	02-27-2019
B354	Curved Plate Bearing Assembly (Steel Beams) (Fixed)	Nov. 22, 2002	11-08-2018
B355	Curved Plate Bearing Assembly (Steel Beams) (Expansion)	Nov. 22, 2002	11-08-2018
B400	Splices For Steel Beams	Nov. 22, 2002	01-05-2017
B402	Bolted Diaphragms (For Steel Beams)	Mar. 26, 2009	01-05-2017
B403	Steel Intermediate Diaphragm (For 36M, 40MH, MN45 - MN63 Prestressed Concrete Beams)	Nov. 03, 2015	12-20-2018
B407	Cross Frame Intermediate Diaphragm (For Straight Steel Beams)	Mar. 26, 2009	06-12-2019

* Refer to <http://www.dot.state.mn.us/bridge/> for current Bridge CADD Standards

BRIDGE DETAILS MANUAL PART I *
(B-DETAILS)

April 09, 2020

Index (2)

DETAIL NO.	DESCRIPTION	DATE APPROVED	DATE REVISED
B408	Cross Frame Intermediate Diaphragm (For Curved Steel Beams)	Mar. 26, 2009	06-12-2019
B410	Bolted Flange To Stiffener Detail	Nov. 22, 2002	01-05-2017
B411	Stiffener Details (For Steel Beams)	Oct. 22, 2008	
B412	Steel Intermediate Bolted Diaphragm (All MW Prestressed Concrete Beams)	Sept. 22, 2011	10-22-2019
B553	Protection Plate (For End Of Slab)	Nov. 22, 2002	01-05-2017
B701	Bridge Floor Drain (Welded Box)	Nov. 22, 2002	01-05-2017
B702	Bridge Floor Drain (Structural Tube)	Nov. 22, 2002	01-05-2017
B705	Bridge Offset Floor Drain (Welded Box)	Nov. 22, 2002	
B706	Bridge Offset Floor Drain (Structural Tube)	Nov. 22, 2002	
B801	Contraction Joint	Nov. 22, 2002	01-05-2017
B814	Concrete End Diaphragm (27M, 30MH, 35MH, 36M, 40MH, MN45 - MN63, 82MW & 96MW Prestressed Concrete Beams) (Parapet Abutment)	Sept. 22, 2011	12-20-2018
B816	Concrete End Diaphragm (14", 18" & 22" Rectangular Prestressed Concrete Beams) (Integral Abutment)	May 24, 2012	11-08-2018
B830	Concrete Barrier or Parapet (Slipform Alternate)	Aug. 24, 2016	04-09-2020
B850	Concrete Relief Joint Detail (Bridge Reconstruction On Trunk Highway Bridges)	Nov. 22, 2002	01-05-2017
B901	Median Sign Post Anchor	May 10, 2017	
B905	Fence Post Anchorage (Type A)	Jan. 05, 2017	
B906	Fence Post Anchorage (Type B and C)	Jan. 05, 2017	05-10-2017
B910	Drainage System	Jan. 13, 2015	11-08-2018
B919	Temporary Portable Precast Concrete Barrier Anchorage to Glue-Laminated Wood Panel (Temporary Usage In Limited Barrier Displacement Areas)	Apr. 09, 2020	
B920	Temporary Portable Precast Concrete Barrier Anchorage to Concrete (Temporary Usage In Limited Barrier Displacement Areas)	Apr. 09, 2020	
B935	Triple Beam Guardrail	Nov. 22, 2002	01-05-2017
B942	Inspection Door (In Vertical Or Horizontal Position)	Nov. 22, 2002	01-05-2017
B950	Anchor Bolt Cluster for Light Poles	Apr. 09, 2020	

* 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

Index (3)

DETAIL NO.	DESCRIPTION	DATE APPROVED	DATE REVISED
B308	Elastomeric Bearing Assembly (22" And 30" Concrete Double Tee Beams) (Fixed and Expansion) ARCHIVED 10-22-2009	Nov. 22, 2002	
B317	Curved Cast Bearing Assembly (Prestressed Concrete Beams) (Fixed) ARCHIVED 11-10-2005	Nov. 22, 2002	
B318	Curved Cast Bearing Assembly (Prestressed Concrete Beams) (Expansion) ARCHIVED 11-10-2005	Nov. 22, 2002	
B341	Fixed Bearing Assembly (Rocker Type) ARCHIVED 01-17-2000	July 30, 1999	
B342	Expansion Bearing Assembly (Rocker Type) ARCHIVED 01-17-2000	July 30, 1999	
B351	Bearing Assembly (Steel Beams) (Fixed) ARCHIVED 03-25-2004	Nov. 22, 2002	
B352	Bearing Assembly (Steel Beams) (Expansion with Guide Bars) ARCHIVED 01-17-2000	July 30, 1999	
B353	Bearing Assembly (Steel Beams) (Expansion without Guide Bars) ARCHIVED 01-18-2000	July 30, 1999	
B357	Curved Plate Bearing Assembly (Steel Beams) (Vulcanized Expansion) ARCHIVED 08-25-2006	Nov. 22, 2002	
B406	Steel Intermediate Bolted Diaphragm (For 63M – 81M Prestressed Concrete Beams) ARCHIVED 09-22-2011	Nov. 22, 2002	10-22-2009
B601	Expansion Hinge for Welded Beams (For Straight Bridges) ARCHIVED 02-11-2000	July 30, 1999	
B602	Expansion Hinge for Wide Flange Beams (For Straight Bridges) ARCHIVED 02-11-2000	July 30, 1999	
B704	Drain Extension ARCHIVED 03-22-2002	July 30, 1999	
B710	Floor Drain For Tee Beams ARCHIVED 10-22-2009	Nov. 22, 2002	

* 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

Index (4)

DETAIL NO.	DESCRIPTION	DATE APPROVED	DATE REVISED
B802	Concrete Intermediate Diaphragm (28M – 40" Prestressed Concrete Beam Spans) ARCHIVED 09-17-1997	May 23, 1995	
B803	Concrete End Diaphragm (28M – 40" Prestressed Concrete Beams) (Parapet Abutment) ARCHIVED 03-22-2002	July 30, 1999	
B806	Concrete Intermediate Diaphragm (63" – 81" Prestressed Concrete Beam Spans) ARCHIVED 09-17-1997	May 23, 1995	
B807	Concrete End Diaphragm (For Double Tee Beams with Contraction Abutment) ARCHIVED 12-17-2008	Nov. 22, 2002	12-17-2008
B809	Concrete End Diaphragm (For Steel Beams With Contraction Abutment) ARCHIVED 12-17-2008	Nov. 22, 2002	12-17-2008
B810	Concrete End Diaphragm (28M – 40" Prestressed Concrete Beams) (Pile Bent Abutment) ARCHIVED 03-22-2002	July 30, 1999	
B811	Concrete End Diaphragm (27M – 81M, MN45 – MN63 Prestressed Concrete Beams) (Contraction Abutment) ARCHIVED 12-17-2008	Oct. 26, 2005	12-17-2008
B812	Concrete End Diaphragm (63M – 81M Prestressed Concrete Beams) (Parapet Abutment) ARCHIVED 05-24-2012	Nov. 22, 2002	05-24-2012
B813	Concrete Intermediate Diaphragm (45M – 54M Prestressed Concrete Beam Spans) ARCHIVED 09-17-1997	May 23, 1995	
B822	Concrete Pier Diaphragm (For Double Tee Beams) ARCHIVED 12-17-2008	Nov. 22, 2002	12-17-2008
B831	Concrete Parapet Railing (Slipform Alternate) ARCHIVED 08-24-2016	Nov. 22, 2002	08-24-2016
B911	Drainage System (For Slab Over Parapet Abutments) (With No Approach Treatment) ARCHIVED 01-13-2015	Nov. 22, 2002	

* Refer to <http://www.dot.state.mn.us/bridge/> for current Bridge CADD Standards

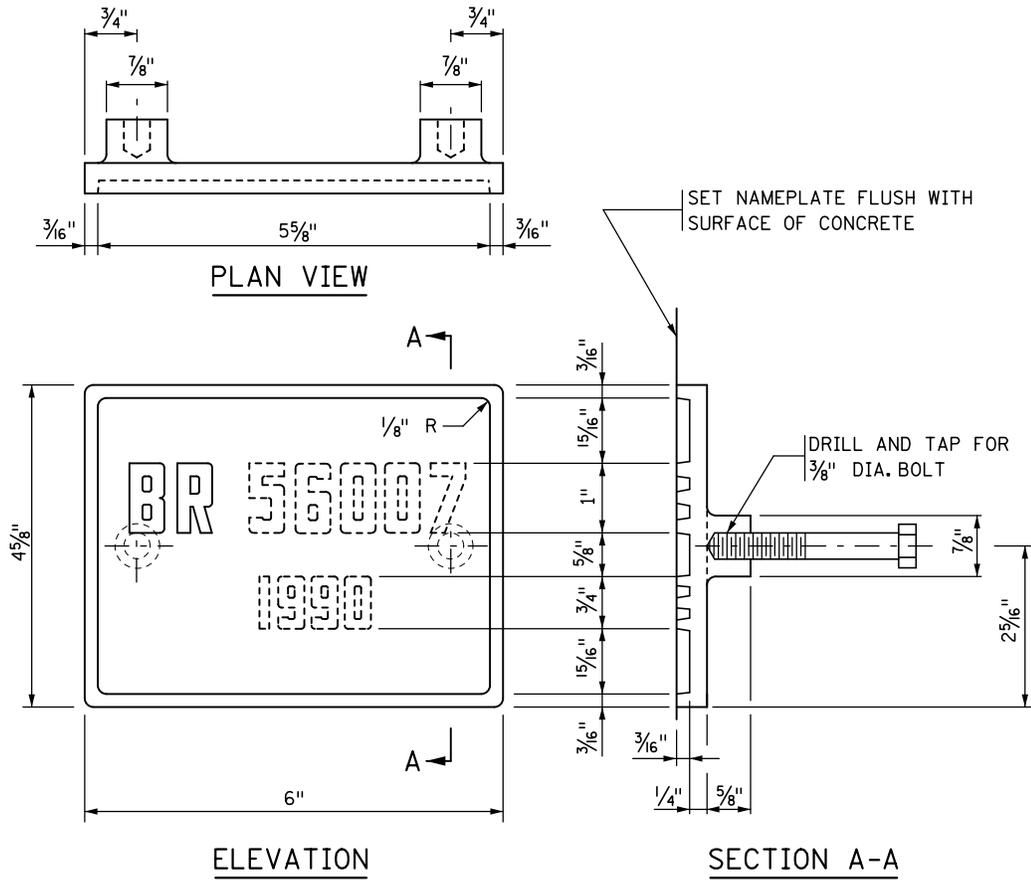
BRIDGE DETAILS MANUAL PART I *
(B-DETAILS)
(ARCHIVED – No Longer In Use)

August 24, 2016

Index (5)

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



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

BRIDGE _____
YEAR _____



NUMBERS FOR NAMEPLATE

NOTES:

- MATERIAL SHALL COMPLY WITH SPEC. 3327.
- LETTERS AND NUMBERS SHALL CONFORM TO THOSE SHOWN.
- DRAFT ON LETTERS AND NUMBERS SHALL NOT BE MORE THAN 3" IN 12".
- HORIZONTAL SPACING OF LETTERS AND NUMBERS SHALL PRODUCE A BALANCED LAYOUT IN PROPORTION TO SPACING SHOWN.
- TOP SURFACE OF LETTERS, NUMBERS AND FRAMES SHALL BE BURNISHED.
- FURNISH 2 STEEL BOLTS 3/8" DIA. x 3" LONG WITH EACH PLATE.
- ALL DIMENSIONS FOR 3/4" HIGH LETTERS AND NUMBERS SHALL BE IN DIRECT PROPORTION TO THOSE SHOWN FOR THE 1" HIGH LETTERS AND NUMBERS.

APPROVED: NOVEMBER 22, 2002

Daniel J. Morgan
STATE BRIDGE ENGINEER

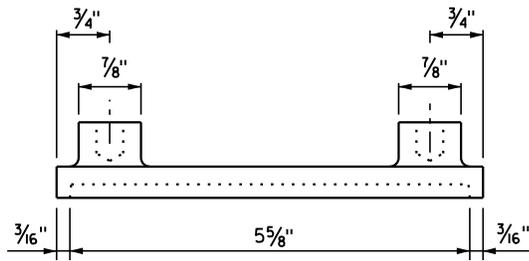
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

BRIDGE NAMEPLATE
(FOR NEW BRIDGES)

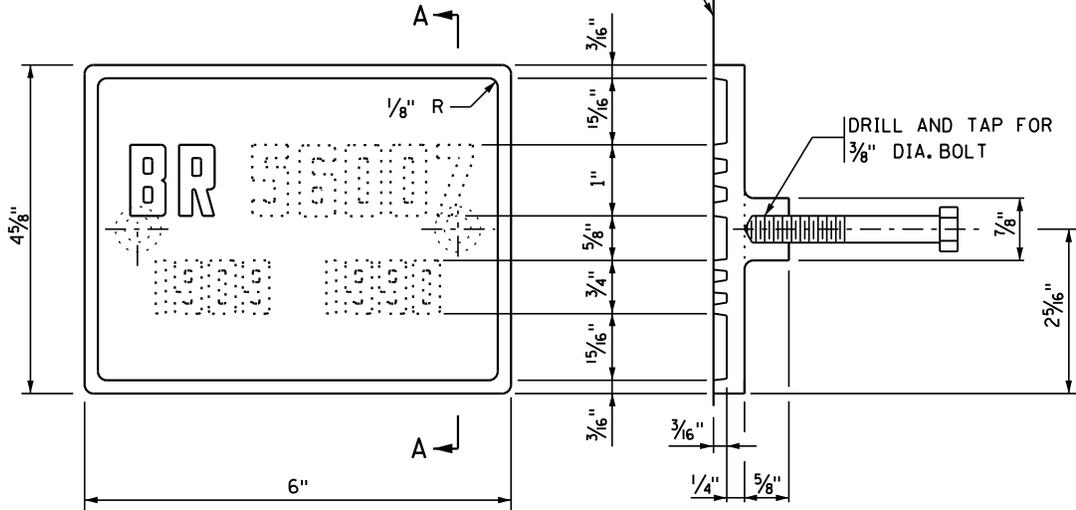
REVISION
09-11-2014

DETAIL NO.

B101



PLAN VIEW



ELEVATION

SECTION A-A

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

BRIDGE: _____
YEAR: _____ YEAR: _____

DESIGNER NOTE
(REMOVE DESIGNER NOTE PRIOR TO PLOTTING FINAL PLAN);
INDICATE THE YEAR WHICH THE BRIDGE WAS
ORIGINALLY OPENED TO TRAFFIC.



NUMBERS FOR NAMEPLATE

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 3/8" DIA. x 3" LONG WITH EACH PLATE.
- ALL DIMENSIONS FOR 3/4" HIGH LETTERS AND NUMBERS SHALL BE IN DIRECT PROPORTION TO THOSE SHOWN FOR THE 1" HIGH LETTERS AND NUMBERS.

APPROVED: NOVEMBER 22, 2002

Daniel J. Hanson
STATE BRIDGE ENGINEER

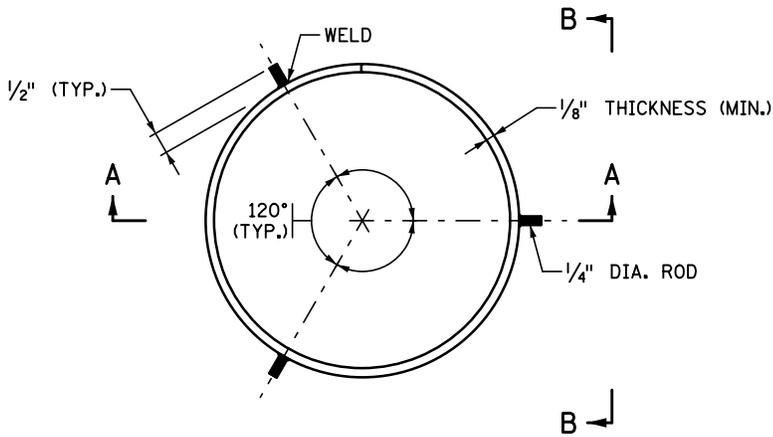
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

BRIDGE NAMEPLATE
(FOR BRIDGE RECONSTRUCTION)

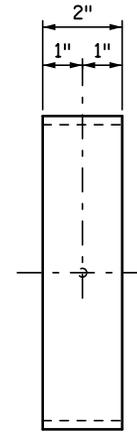
REVISION
09-11-2014
11-08-2018

DETAIL NO.

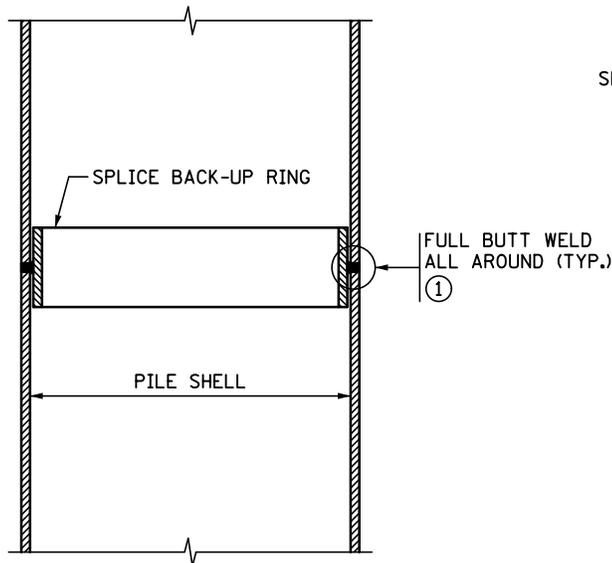
B102



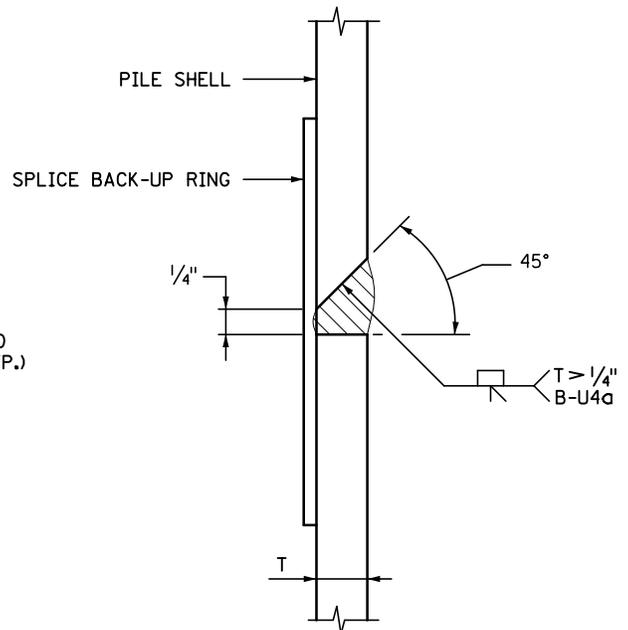
PLAN VIEW - SPLICE BACK-UP RING
PILE NOT SHOWN



SECTION B-B
PILE NOT SHOWN



SECTION A-A



DETAIL "A" ①

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".

APPROVED: NOVEMBER 22, 2002

Daniel J. Morgan
STATE BRIDGE ENGINEER

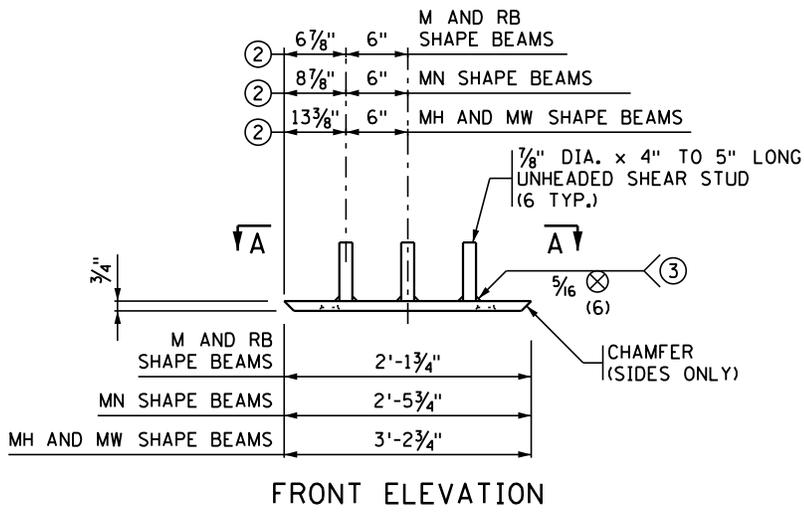
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

PILE SPLICE
(CAST-IN-PLACE CONCRETE PILES)

REVISION:
11-06-2013

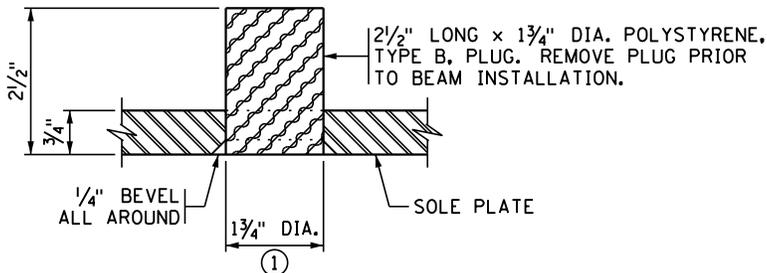
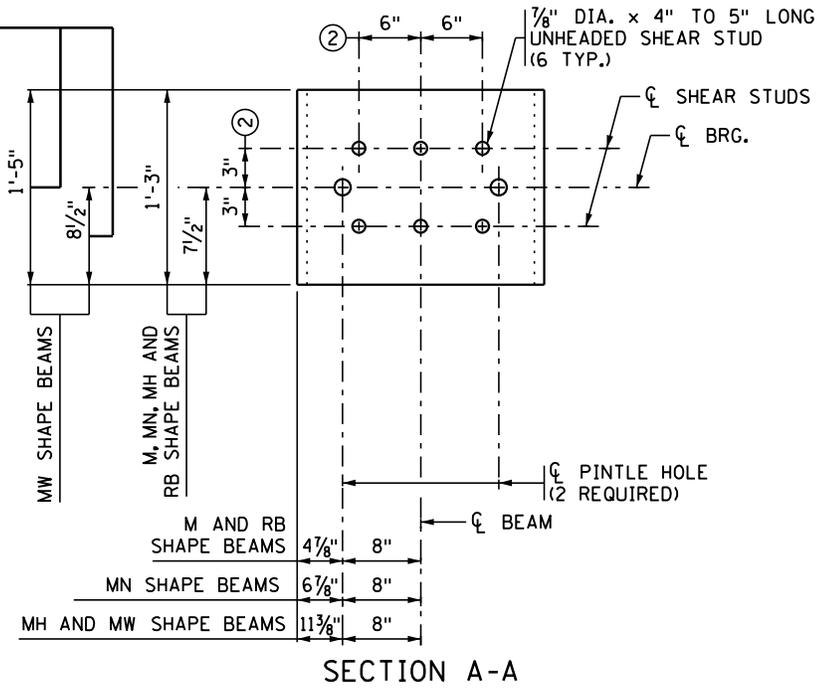
DETAIL NO.

B201



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.



PINTLE HOLE DETAIL

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 1 1/2" DIA. PINTLES.
- ② THESE DIMENSIONS MAY BE MODIFIED TO CLEAR PRESTRESSED STRANDS. HOWEVER, CHANGES MUST BE APPROVED BY THE ENGINEER.
- ③ STUD WELDING PER AWS D1.1.

APPROVED: SEPTEMBER 22, 2011

Nancy Dubenberger
 STATE BRIDGE ENGINEER

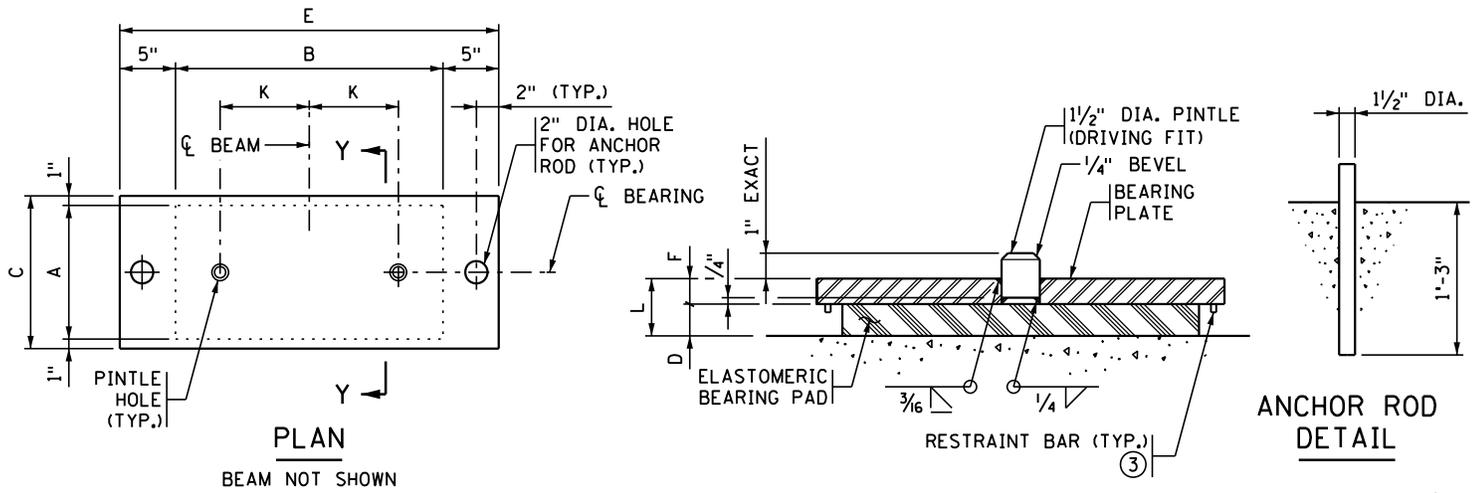
STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION

SOLE PLATE
 (PRESTRESSED CONCRETE BEAMS)
 (FOR BEARINGS WITH PINTLES)

REVISION
 01-05-2017
 12-20-208

DETAIL NO.

B303



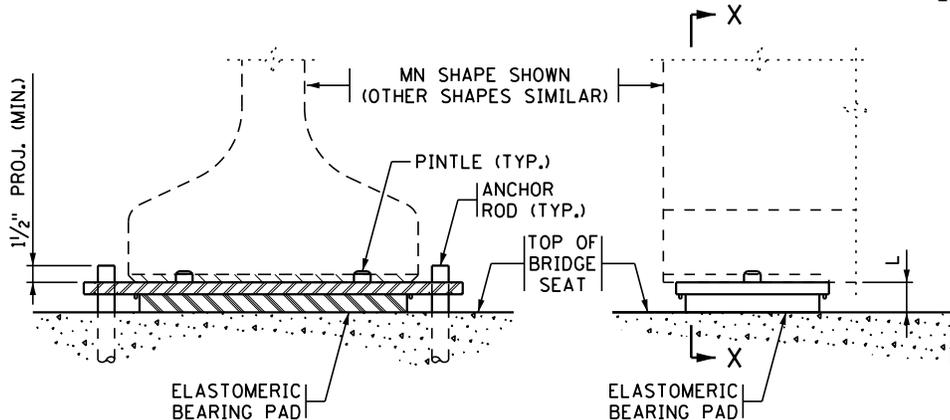
PLAN

BEAM NOT SHOWN

SECTION Y-Y

ENLARGED

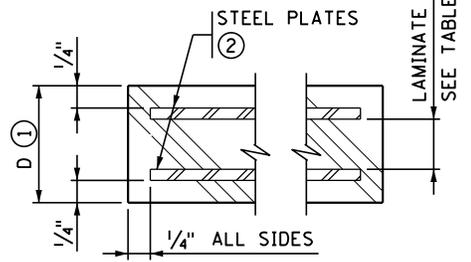
ANCHOR ROD
DETAIL



SECTION X-X

SIDE ELEVATION

ANCHOR RODS NOT SHOWN



SECTION THROUGH
ELASTOMERIC BEARING PAD

TABLE																
ASSEMBLY TYPE	LOCATION	BEAM SIZE	BEARING PAD SIZE			STEEL PLATES		LAMINATES		SHAPE FACTOR	BEARING PLATE SIZE			PINTLE DISTANCE	ASSY. HEIGHT	RESTRAINT PATTERN ③
			A	B	D	NO.	THICK.	NO.	THICK.		C	E	F			

NOTES:

- PROVIDE ELASTOMERIC MATERIALS AND PAD CONSTRUCTION PER SPEC. 3741.
- PROVIDE STEEL PLATES PER SPEC. 3306.
- PROVIDE ANCHOR RODS PER SPEC. 3306. GALVANIZE PER SPEC. 3394.
- PROVIDE PINTLES PER SPEC. 3309.
- GALVANIZE STRUCTURAL STEEL BEARING ASSEMBLY AFTER FABRICATION PER SPEC. 3394, EXCEPT AS NOTED.
- PAYMENT FOR BEARING ASSEMBLY INCLUDES ALL MATERIAL ON THIS DETAIL.

- ① THE TOTAL THICKNESS SHOWN INCLUDES THE STEEL PLATES.
- ② DO NOT GALVANIZE THESE PLATES.
- ③ REFER TO BEARING PAD RESTRAINT B-DETAIL FOR ADDITIONAL INFORMATION AND DETAILS.

*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

APPROVED: NOVEMBER 22, 2002	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION	REVISION 01-05-2017 11-02-2017 11-08-2018	DETAIL NO.
<i>Daniel J. Morgan</i> STATE BRIDGE ENGINEER	ELASTOMERIC FIXED BEARING ASSEMBLY (PRESTRESSED CONCRETE BEAMS) (FOR REPLACEMENT OF INPLACE BEARINGS ONLY)		B304

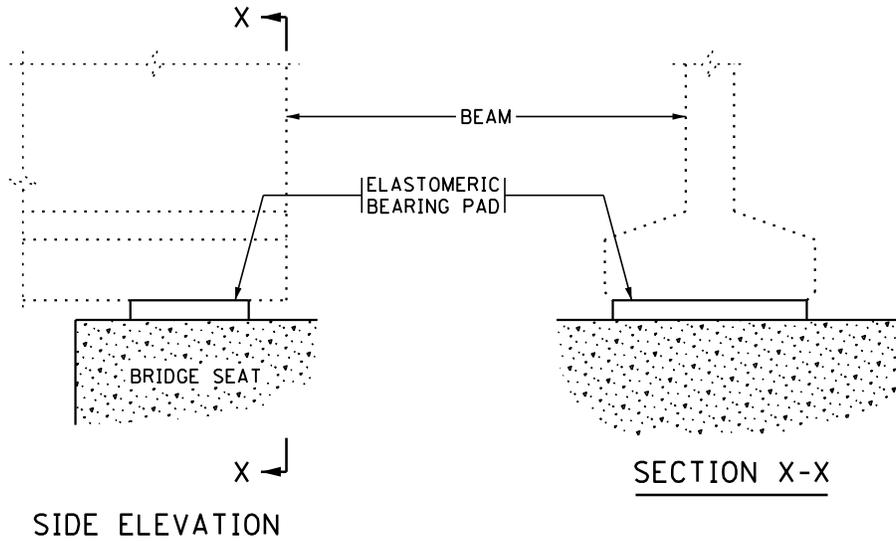
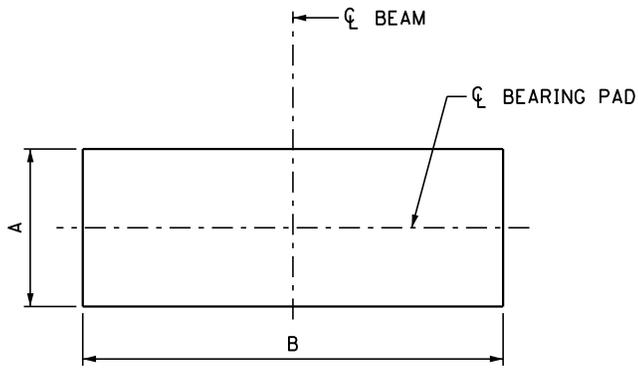


TABLE						
PAD TYPE	LOCATION	BEAM SIZE	BEARING PAD SIZE			SHAPE FACTOR
			A	B	D ①	
		--RB, --M, MN--	12	24	1/2	8.0
		--MH	12	30	1/2	8.6

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.*

APPROVED: OCTOBER 22, 2019

Kevin Westrom
 STATE BRIDGE ENGINEER

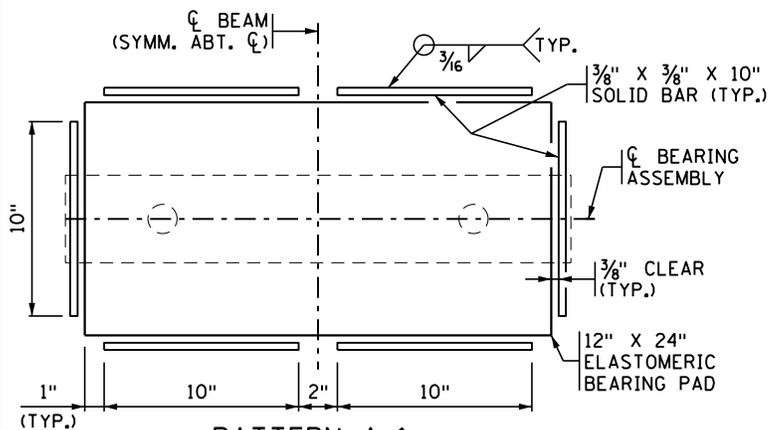
STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION

ELASTOMERIC BEARING PAD
 (PRESTRESSED CONCRETE BEAMS)

REVISION

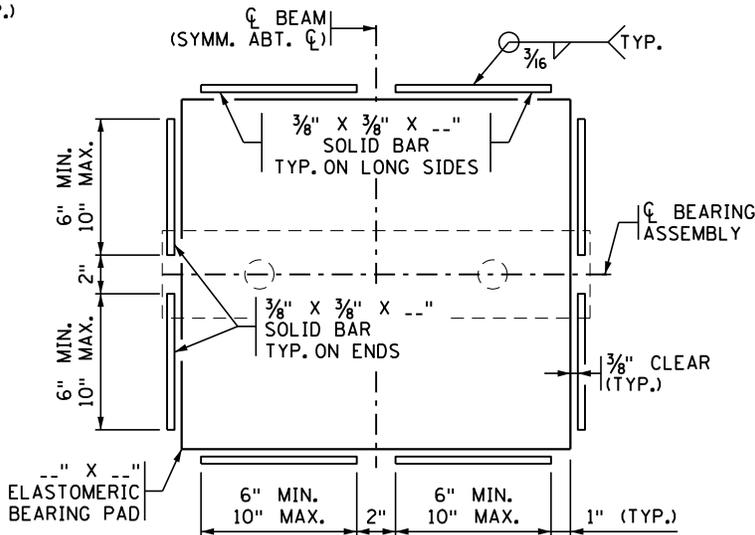
DETAIL NO.

B305



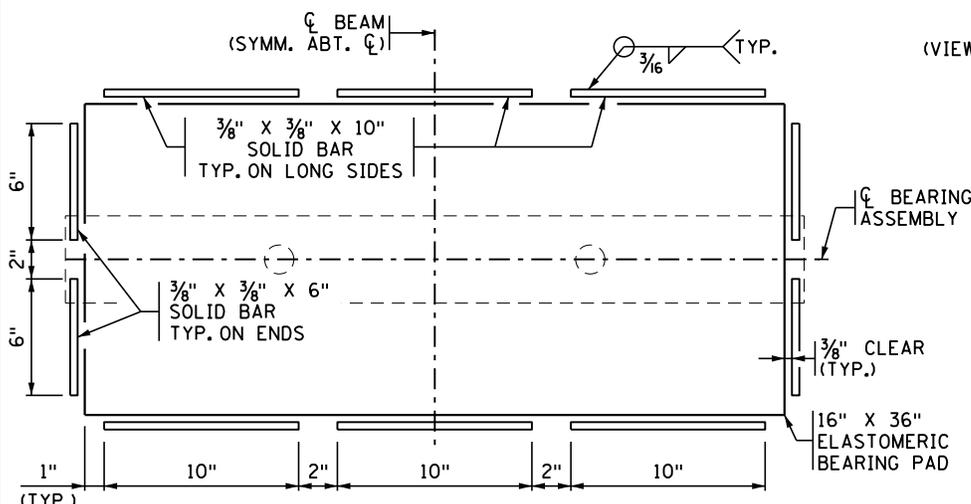
PATTERN A-1

(VIEW AT BOTTOM OF BEARING PLATE)



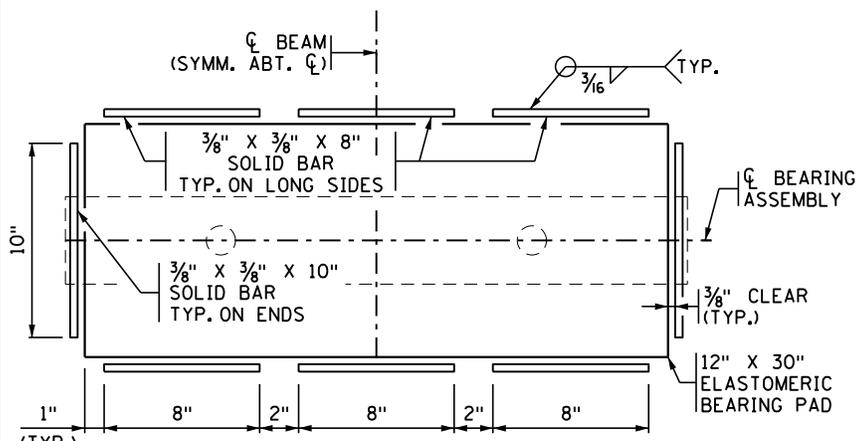
PATTERN A-4

(VIEW AT BOTTOM OF BEARING PLATE)



PATTERN A-2

(VIEW AT BOTTOM OF BEARING PLATE)



PATTERN A-3

(VIEW AT BOTTOM OF BEARING PLATE)

DESIGNER NOTE (REMOVE PRIOR TO PLOTTING FINAL PLAN):
 INCLUDE THIS DETAIL WHEN USING BEARING ASSEMBLY DETAILS B304, B309, B310, B311, B354, OR B355.
 FOR CUSTOM BEARING PAD SIZES, MODIFY PATTERN A-4 USING THE FOLLOWING DESIGN CRITERIA:
 MIN. BAR LENGTH OF 6", MAX LENGTH 10", MAX GAP BETWEEN BARS OF 2", MAX DISTANCE FROM END OF BAR TO CORNER OF BEARING PAD OF 1".

NOTES:

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.

RESTRAINT BARS INCLUDED IN PAYMENT FOR BEARING ASSEMBLY.

APPROVED: NOVEMBER 02, 2017

Kevin Weston
STATE BRIDGE ENGINEER

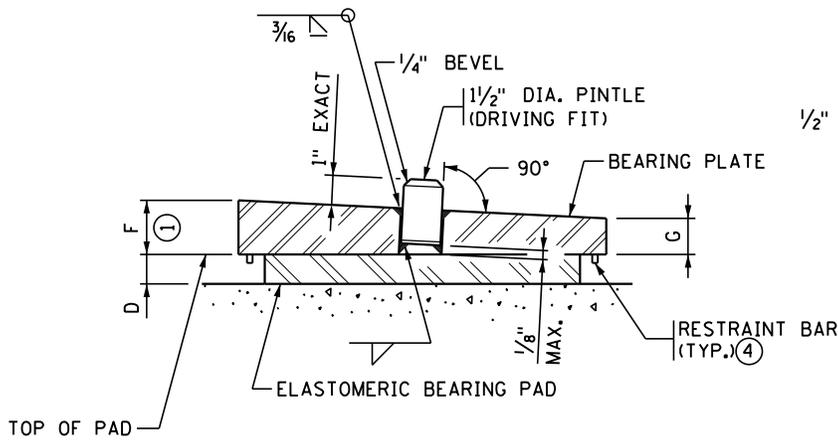
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

BEARING PAD RESTRAINT

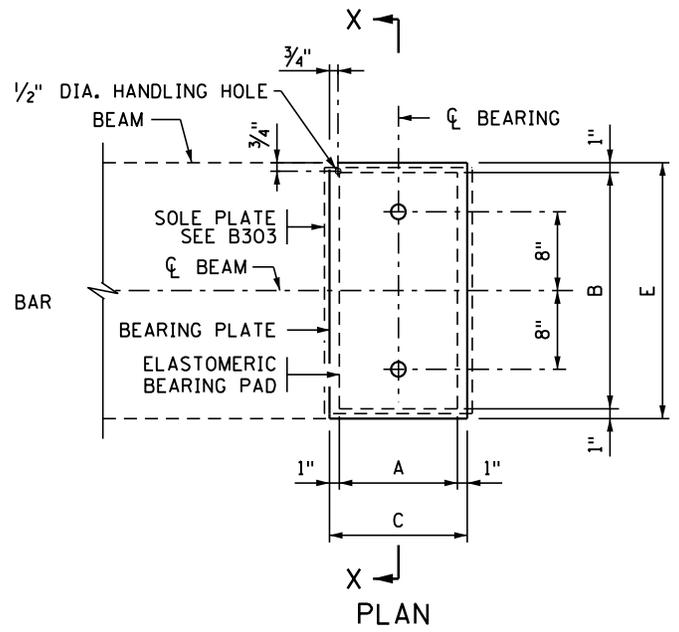
REVISION
11-08-2018
12-20-2018

DETAIL NO.

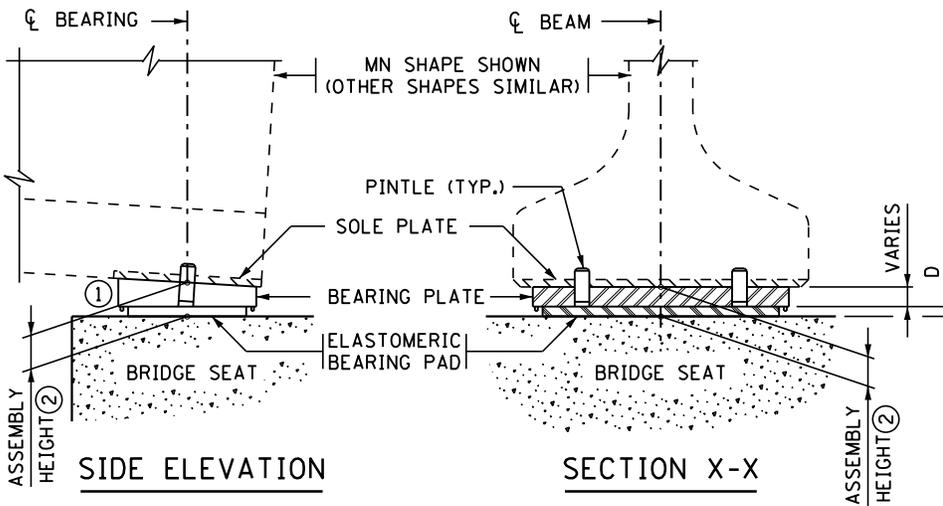
B307



BEARING PLATE DETAIL



PLAN



SIDE ELEVATION

SECTION X-X

DESIGNER NOTE (REMOVE PRIOR TO PLOTTING FINAL PLAN):
 USE TAPERED PLATE FOR GRADES EXCEEDING 3%. MAINTAIN SAME TAPERED PLATE THICKNESS WITHIN 2% SLOPE INCREMENTS, I.E. 3-5% OR 4-6%.
 INSERT TABLE VALUES AS NEEDED AND DELETE UNUSED DATA.
 MINIMUM THICKNESS OF TAPERED PLATE IS 1/2". ROUND ASSEMBLY HEIGHT TO NEAREST 1/8".
 MODIFY FRAMING PLAN PER NOTE 1.
 USE 1/2" UNREINFORCED PAD WITH CONTINUITY DIAPHRAGMS OR INTEGRAL ABUTMENTS.
 PER NOTE 4 INCLUDE B307 AND MODIFY AS NECESSARY.

ASSEMBLY TYPE	LOCATION	BEAM SIZE	BEARING PAD SIZE			SHAPE FACTOR	BEARING PLATE SIZE				ASSEMBLY HEIGHT HT. (2)	RESTRAINT PATTERN (4)
			A	B	D (3)		C	E	F	G		
		--RB, --M, MN--	12	24	1/2	8.0	14"	26"				A-1
		--MH	12	30	1/2	8.6	14"	32"				A-3

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.

1 MARK THICKER SIDE OF SLOPED PLATES WITH AN "H" FOR PLACEMENT. SEE FRAMING PLAN SHEET NO. ...

2 BEARING PAD AND BEARING PLATE THICKNESS AT BEARING.

3 "D" INDICATES THE THICKNESS OF THE BEARING PAD.

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

DESIGN DATA:

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

APPROVED: DECEMBER 20, 2018

STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION

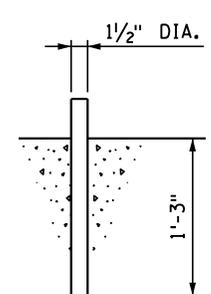
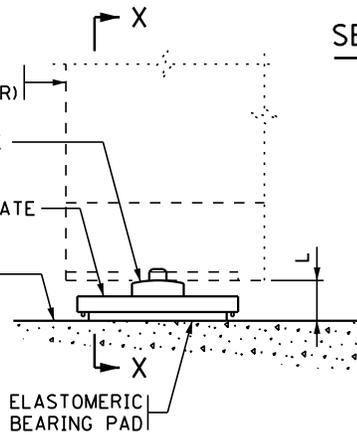
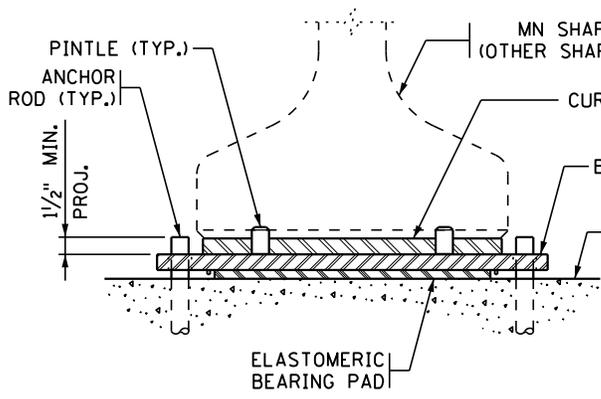
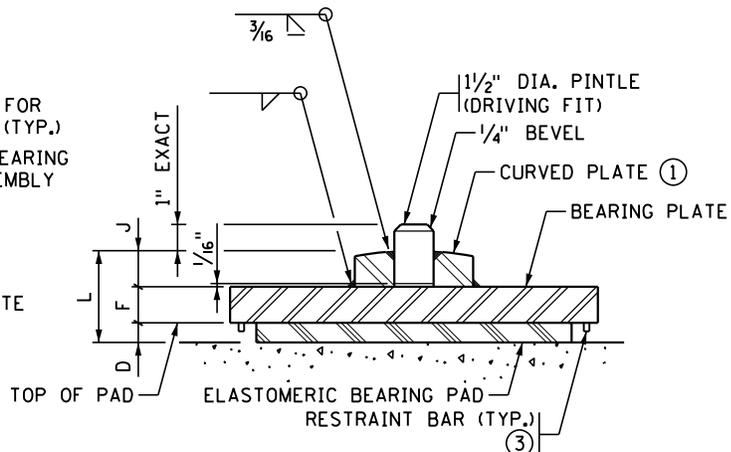
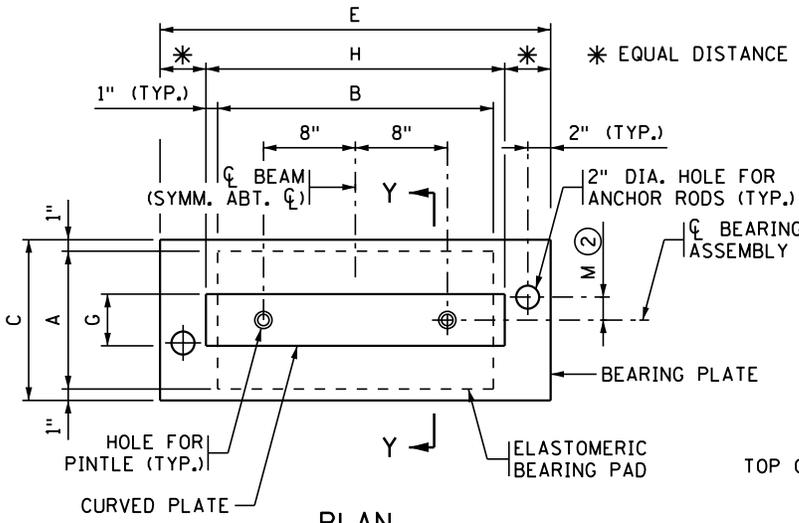
REVISION
 10-22-2019

DETAIL NO.

Kevin Westrom
 STATE BRIDGE ENGINEER

TAPERED BEARING PLATE ASSEMBLY
 (FOR INTEGRAL ABUTMENTS OR PIERS WITH CONTINUITY DIAPHRAGMS)

B309



PLAN

SECTION Y-Y

SECTION X-X

SIDE ELEVATION

ANCHOR ROD DETAIL

TABLE

ASSEMBLY TYPE	LOCATION	BEAM SIZE	BEARING PAD SIZE			SHAPE FACTOR	BEARING PLATE SIZE			CURVED PLATE SIZE				ANCHOR ROD OFFSET	ASSY. HEIGHT	RESTRAINT PATTERN ③
			A	B	D		C	E	F	G	H	J	R ①			
		--RB, --M, MN--	12"	24"	1/2"	8.0	14"		1 1/2"	4 1/2"	26"	1 1/4"			3 1/4"	A-1
		--MW	16"	36"	1/2"	11.1	18"	47"	1 1/2"	4 1/2"	38"	1 1/4"			3 1/4"	A-2
		--MH	12"	30"	1/2"	8.6	14"	47"	1 1/2"	4 1/2"	32"	1 1/4"			3 1/4"	A-3

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 1/16" LESS THAN SHOWN.
- ② "+" DENOTES OFFSET AS SHOWN. "-" DENOTES OFFSET OPPOSITE OF SHOWN.
- ③ REFER TO BEARING PAD RESTRAINT B-DETAIL FOR ADDITIONAL INFORMATION AND DETAILS.

DESIGNER NOTE (REMOVE PRIOR TO PLOTTING FINAL 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

USE BEARING PLATE SIZE DIMENSION "E" OF 34" FOR RB AND M SHAPE, 38" FOR MN SHAPE.

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

PER NOTE ③ INCLUDE B307 AND MODIFY AS NECESSARY.

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: DECEMBER 20, 2018

Kevin Westrom
 STATE BRIDGE ENGINEER

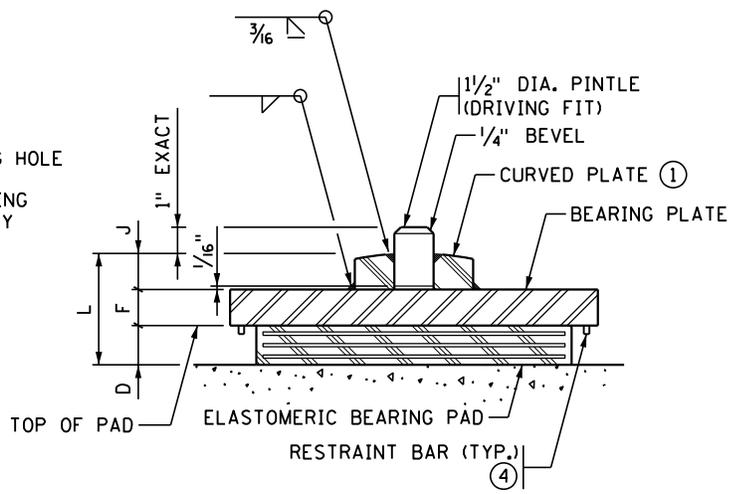
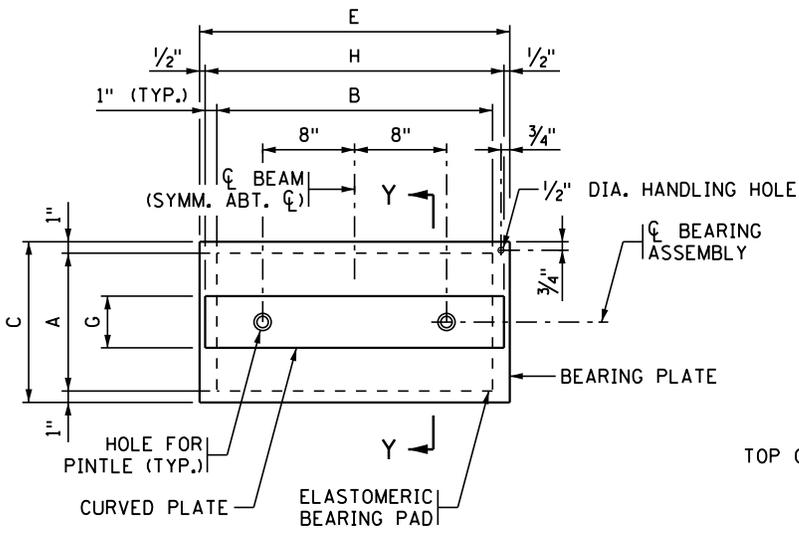
STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION

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

REVISED
 10-22-2019

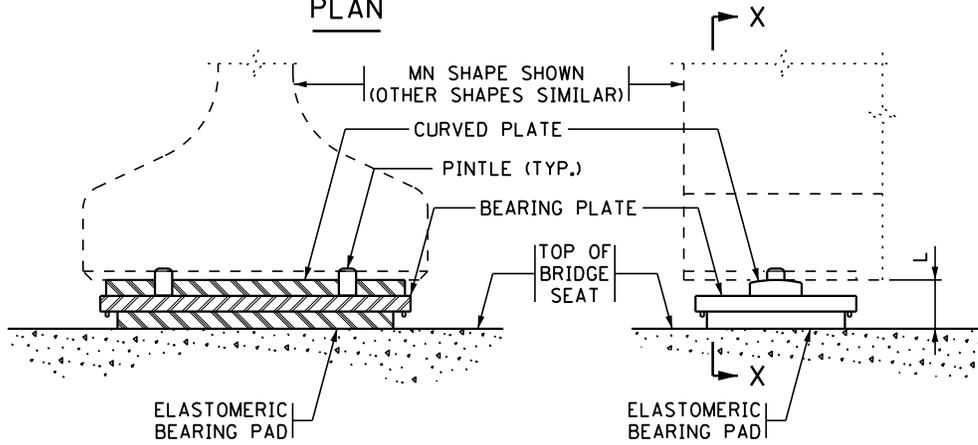
DETAIL NO.

B310



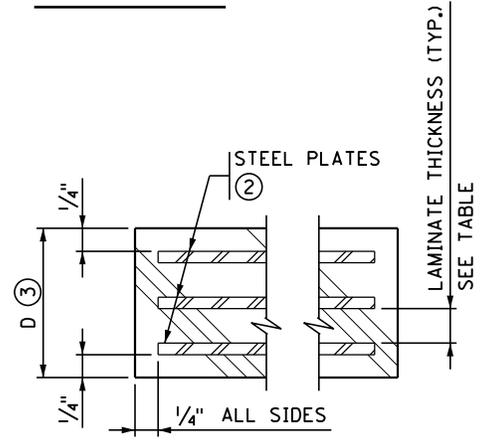
PLAN

SECTION Y-Y



SECTION X-X

SIDE ELEVATION



SECTION THROUGH ELASTOMERIC BEARING PAD

TABLE

ASSEMBLY TYPE	LOCATION	BEAM SIZE	BEARING PAD SIZE			STEEL PLATES		LAMINATES		SHAPE FACTOR	BEARING PLATE SIZE			CURVED PLATE SIZE				ASSY. HEIGHT	RESTRAINT PATTERN (4)
			A	B	D	NO.	THICK.	NO.	THICK.		C	E	F	G	H	J	R (1)		
		--RB, --M, MN--	12"	24"			1/8"		1/2"	8.0	14"	27"	1 1/2"	4 1/2"	26"	1 1/4"			A-1
		--MW	16"	36"			1/8"		3/4"	7.4	18"	39"	1 1/2"	4 1/2"	38"	1 1/4"			A-2
		--MH	12"	30"			1/8"		1/2"	8.6	14"	33"	1 1/2"	4 1/2"	32"	1 1/4"			A-3

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, 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 1/16" 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.
PER NOTE (4) INCLUDE B307 AND MODIFY AS NECESSARY.*

DESIGN DATA:

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

APPROVED: DECEMBER 20, 2018

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

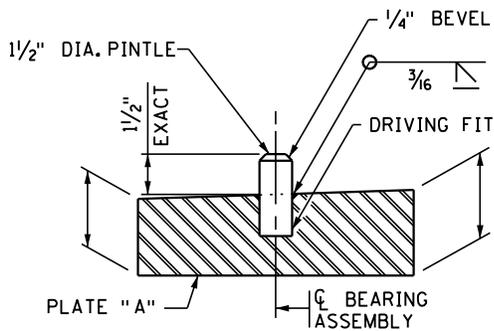
REVISED
10-22-2019

DETAIL NO.

Kevin Weston
STATE BRIDGE ENGINEER

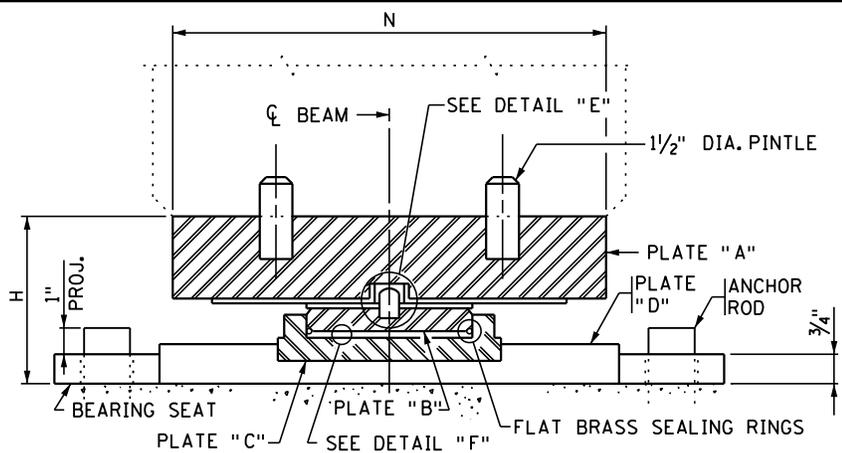
CURVED PLATE BEARING ASSEMBLY
(PRESTRESSED CONCRETE BEAMS)
(EXPANSION)

B311

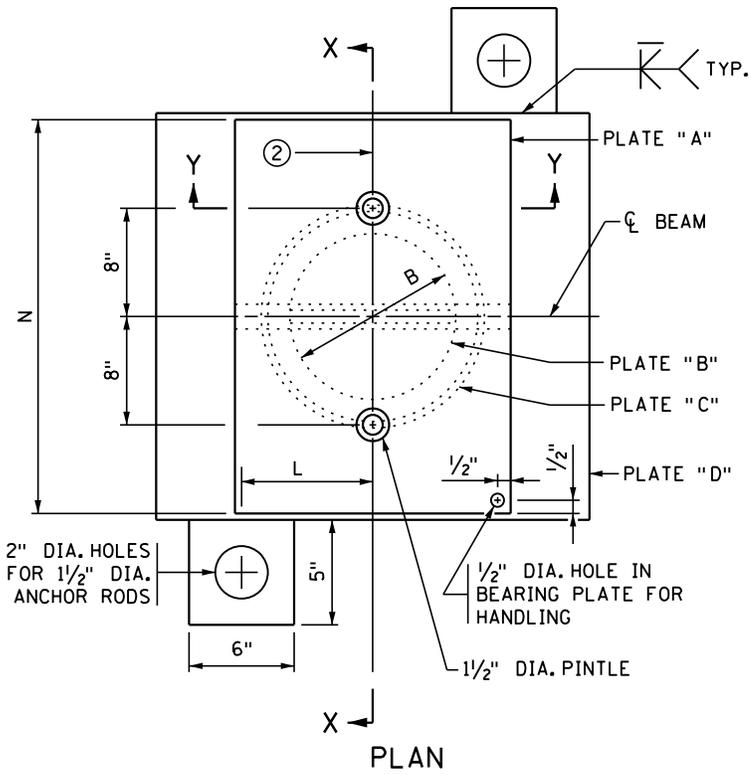


SECTION Y-Y

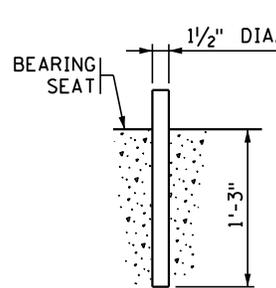
(ALL PLATES & MATERIALS BELOW PLATE "A" NOT SHOWN)



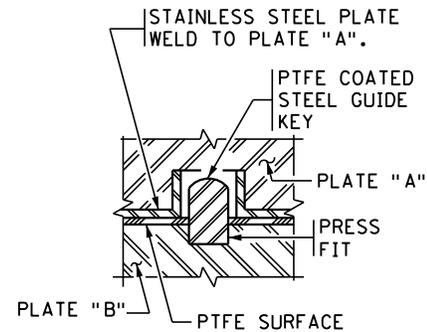
SECTION X-X



PLAN



ANCHOR ROD DETAIL

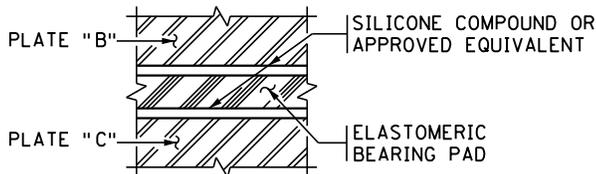


DETAIL "E"

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. 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 ϕ OF BRG. PLATES "A" AND "B" TO FACILITATE PLACEMENT.
- ③ HEIGHT IS MINIMUM DIMENSION IF PLATE IS TAPERED.



DETAIL "F"

BEARING ASSEMBLY DIMENSIONS

ASSEMBLY TYPE	ROTATION ①	TOTAL LOAD (KIPS)	TOTAL MOVEMENT (INCHES)	PLATE "A" ③	PLATE "B" (DIA.)	PLATE "C" (DIAMETER)	PLATE "D" (MAXIMUM)	DIMENSION "L"	DIMENSION "H"	DIMENSION "N"

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

DESIGN DATA:

MAXIMUM HORIZONTAL LOAD IS 70 KIPS FOR 1/2" PINTLES.

APPROVED: NOVEMBER 22, 2002

Daniel J. Morgan
STATE BRIDGE ENGINEER

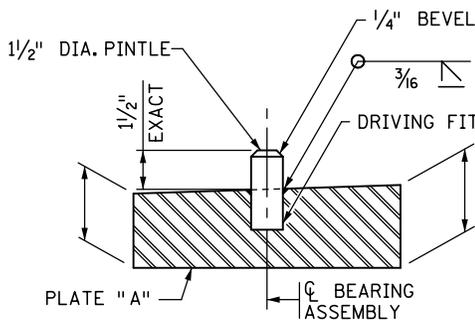
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POT TYPE BEARING ASSEMBLY
(PRESTRESSED CONCRETE BEAMS)
(GUIDED EXPANSION)

REVISION
11-03-2015
02-27-2019

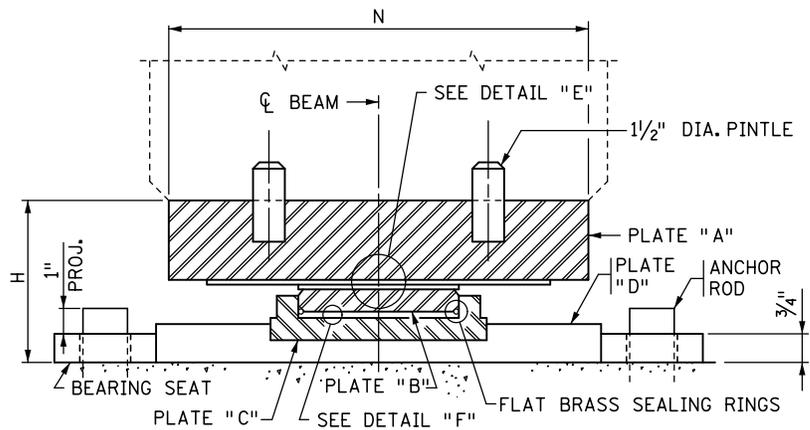
DETAIL NO.

B312

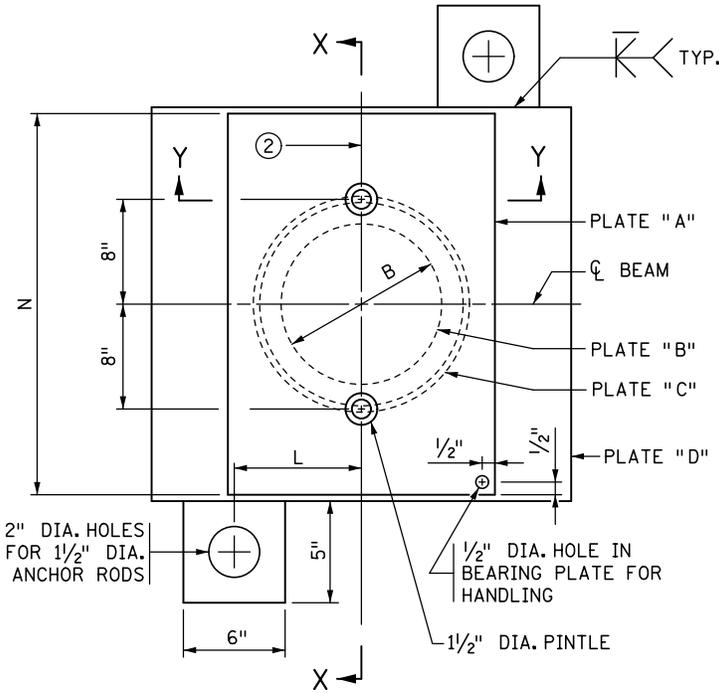


SECTION Y-Y

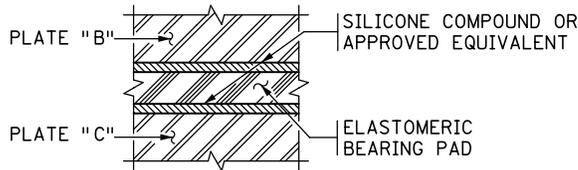
(ALL PLATES & MATERIALS BELOW PLATE "A" NOT SHOWN)



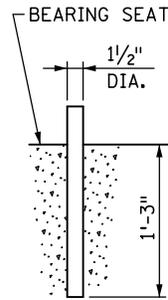
SECTION X-X



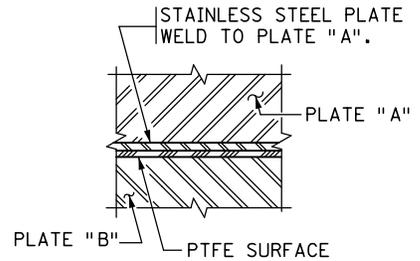
PLAN



DETAIL "F"



ANCHOR ROD DETAIL



DETAIL "E"

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 RADIAN
- ② MARK ϕ OF BRG. PLATES "A" AND "B" TO FACILITATE PLACEMENT.
- ③ HEIGHT IS MINIMUM DIMENSION IF PLATE IS TAPERED.

BEARING ASSEMBLY DIMENSIONS

ASSEMBLY TYPE	ROTATION ①	TOTAL LOAD (KIPS)	TOTAL MOVEMENT (INCHES)	PLATE "A" ③	PLATE "B" (DIA.)	PLATE "C" (DIAMETER)	PLATE "D" (MAXIMUM)	DIMENSION "L"	DIMENSION "H"	DIMENSION "N"

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

APPROVED: NOVEMBER 22, 2002

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

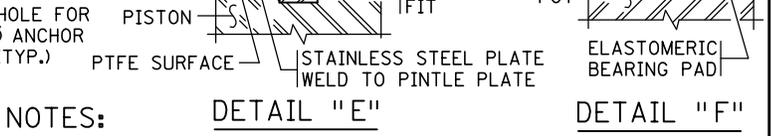
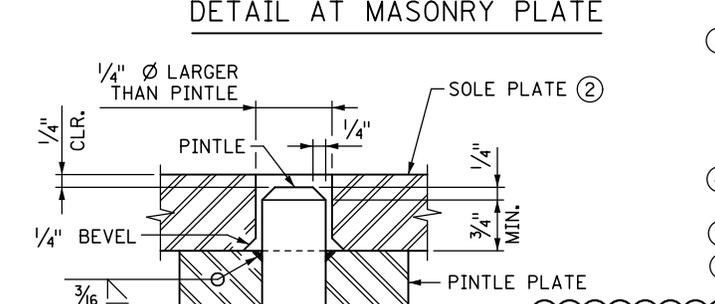
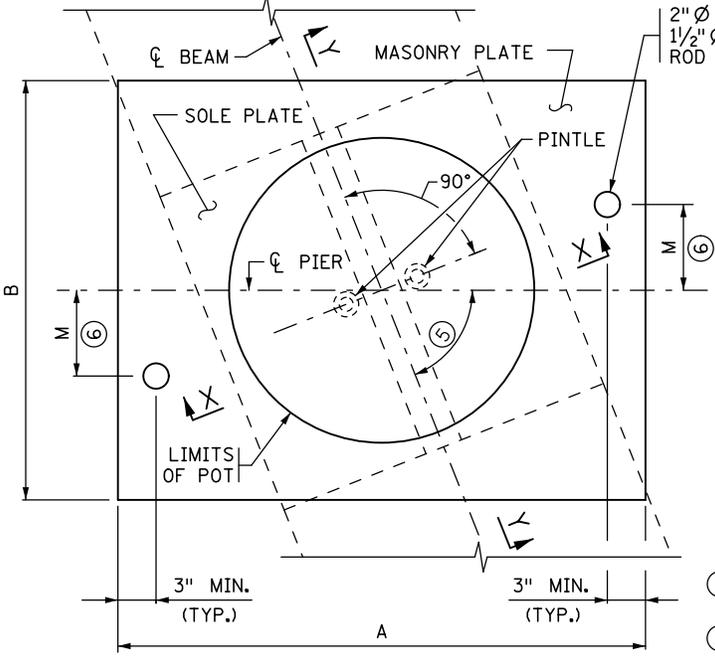
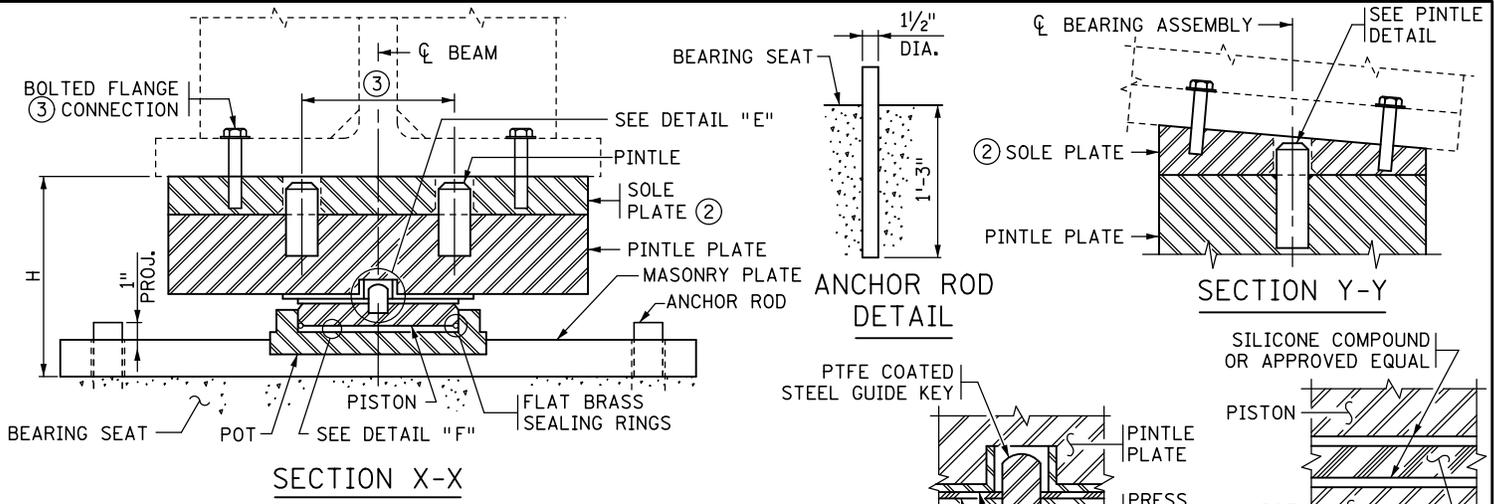
REVISION
11-03-2015

DETAIL NO.

POT TYPE BEARING ASSEMBLY
(PRESTRESSED CONCRETE BEAMS)
(NON-GUIDED EXPANSION)

B313

Ramirez & Wagoner
STATE BRIDGE ENGINEER



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 RADIAN 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 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 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

ASSEMBLY TYPE	LOCATION	FACTORED LL ROTATION ① (RAD)	TOTAL MOVEMENT (INCHES)	MASONRY PLATE ③		ANCHOR ROD OFFSET		ASSUMED HEIGHT "H" ③	BOTTOM FLANGE WIDTH	DESIGN LOADS (KIPS)			
				A	B	+/- ⑥	M			SERVICE LIMIT STATE		STRENGTH LIMIT STATE	
										VERTICAL	HORIZONTAL	VERTICAL	HORIZONTAL ④

APPROVED: SEPTEMBER 18, 2007

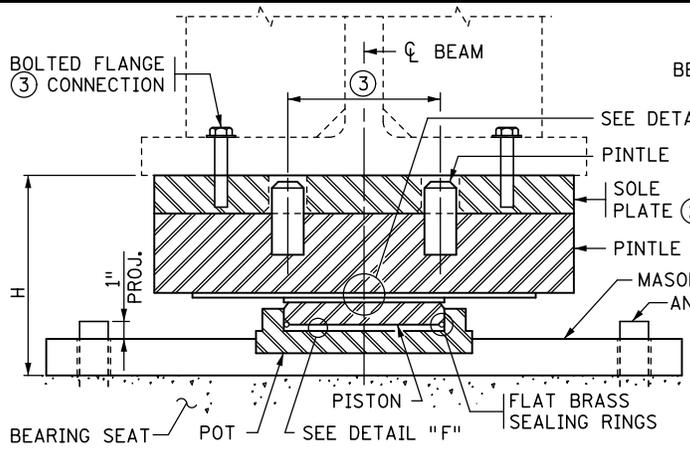
Daniel J. Woznyan
STATE BRIDGE ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

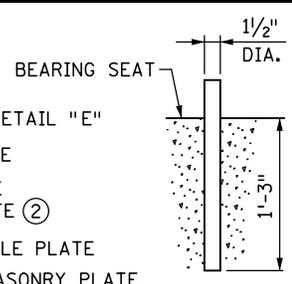
POT BEARING ASSEMBLY
(STEEL BEAMS)
(GUIDED EXPANSION)

REVISION
12-17-2008
11-03-2015

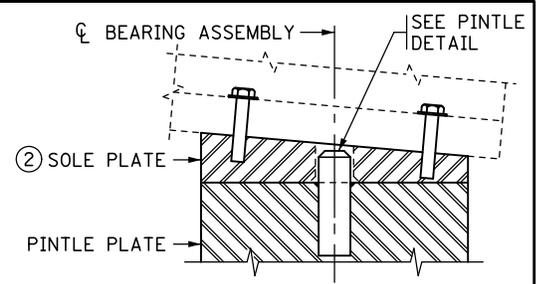
DETAIL NO.
B314



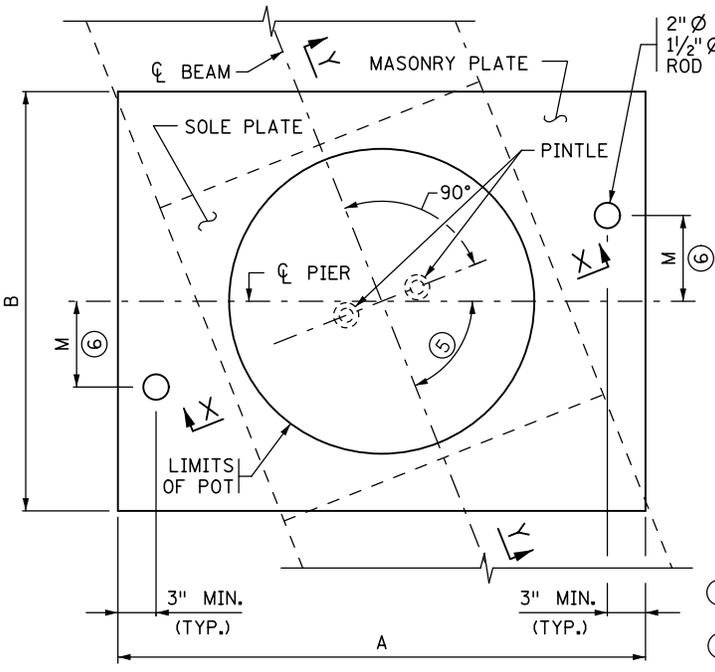
SECTION X-X



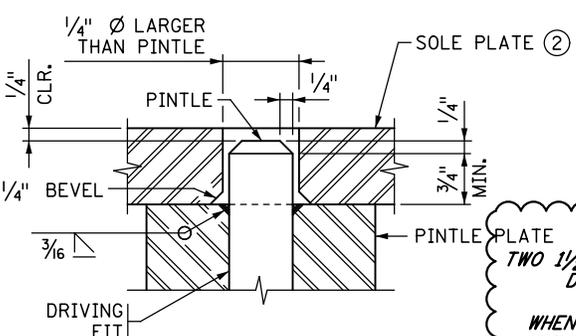
ANCHOR ROD DETAIL



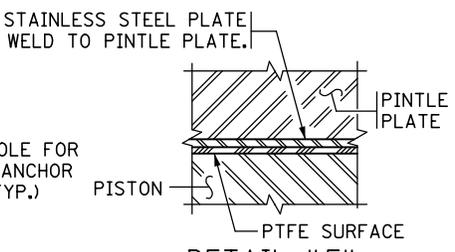
SECTION Y-Y



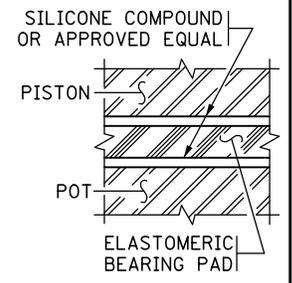
DETAIL AT MASONRY PLATE



DETAIL AT PINTLE



DETAIL "E"



DETAIL "F"

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 RADIAN'S 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 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.
"-" DENOTES OFFSET OPPOSITE OF SHOWN.

DESIGNER NOTE (REMOVE DESIGNER NOTE PRIOR TO PLOTTING FINAL PLAN):
 TWO 1 1/2" DIAMETER ANCHOR RODS HAVE A FACTORED HORIZONTAL RESISTANCE OF 95 KIPS. DESIGNER SHALL INCREASE DIAMETER, NUMBER OF RODS OR BOTH WHEN NEEDED.
 WHEN SPECIFYING OFFSET DIMENSION "M", CONSIDER THE SIZE AND PROXIMITY OF THE DIAPHRAGM AND LONGITUDINAL PIER REINFORCEMENT TO ALLOW ADEQUATE ROOM FOR INSTALLATION OF ANCHOR RODS.

BEARING ASSEMBLY TABLE

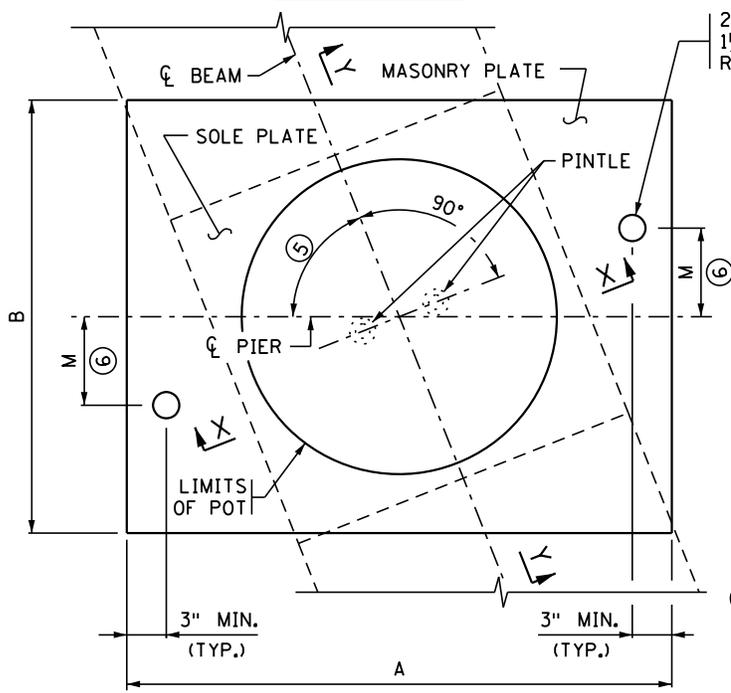
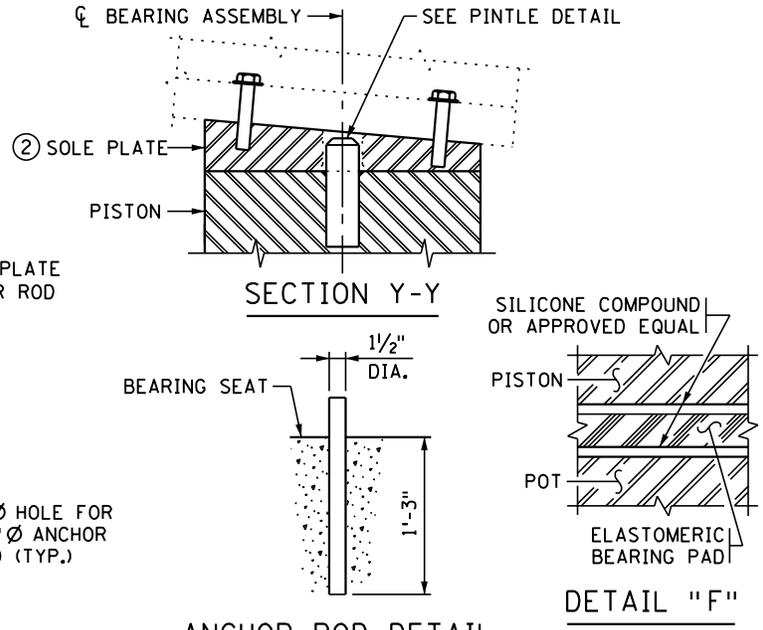
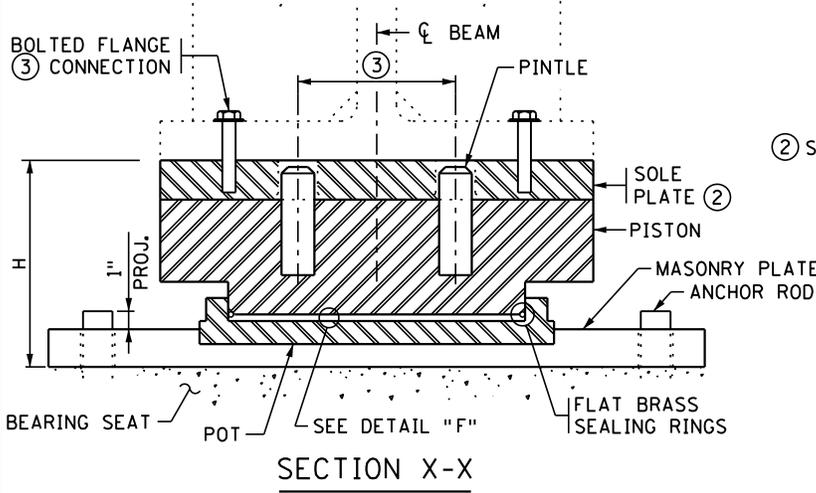
ASSEMBLY TYPE	LOCATION	FACTORED LL ROTATION ① (RAD)	TOTAL MOVEMENT (INCHES)		MASONRY PLATE ③		ANCHOR ROD OFFSET		ASSUMED HEIGHT "H" ③	BOTTOM FLANGE WIDTH	DESIGN LOADS (KIPS)			
			TRANSVERSE	LONGITUDINAL	A	B	+/- ⑥	M			SERVICE LIMIT STATE		STRENGTH LIMIT STATE	
											VERTICAL	HORIZONTAL	VERTICAL	HORIZ. ④
			"	"	"	"	"	"	"	"				
			"	"	"	"	"	"	"	"				

APPROVED: SEPTEMBER 18, 2007
Daniel J. Woznyan
 STATE BRIDGE ENGINEER

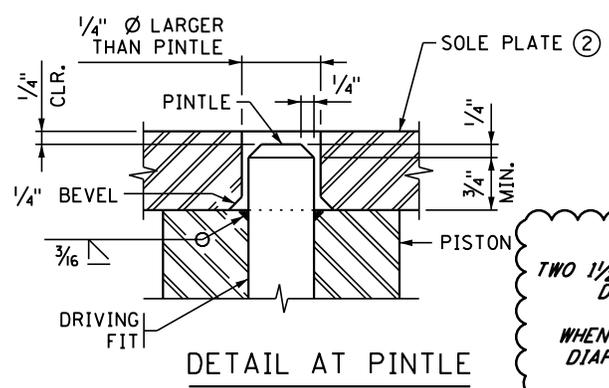
STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION
POT BEARING ASSEMBLY
 (STEEL BEAMS)
 (NON-GUIDED EXPANSION)

REVISION
 12-17-2008
 11-03-2015

DETAIL NO.
B315



- 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.L.2.
- FACTORED LIVE LOAD (LL) ROTATION OR 0.02 RADIAN WHICHEVER IS GREATER.
 - 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.
 - 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.
 - FACTORED HORIZONTAL RESISTANCE IS A MINIMUM OF 15% OF THE STRENGTH LIMIT STATE VERTICAL LOAD UNLESS STATED OTHERWISE.
 - SEE FRAMING PLAN
 - "+" DENOTES OFFSET AS SHOWN.
"-" DENOTES OFFSET OPPOSITE OF SHOWN.



DESIGNER NOTE (REMOVE DESIGNER NOTE PRIOR TO PLOTTING FINAL 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													
ASSEMBLY TYPE	LOCATION	FACTORED LL ROTATION (1) (RAD)	MASONRY PLATE (3)		ANCHOR ROD OFFSET +/- (6) M	ASSUMED HEIGHT "H" (3)	BOTTOM FLANGE WIDTH	DESIGN LOADS (KIPS)					
			A	B				SERVICE LIMIT STATE		STRENGTH LIMIT STATE			
								VERTICAL	HORIZONTAL	VERTICAL	HORIZONTAL (4)		

APPROVED: SEPTEMBER 18, 2007

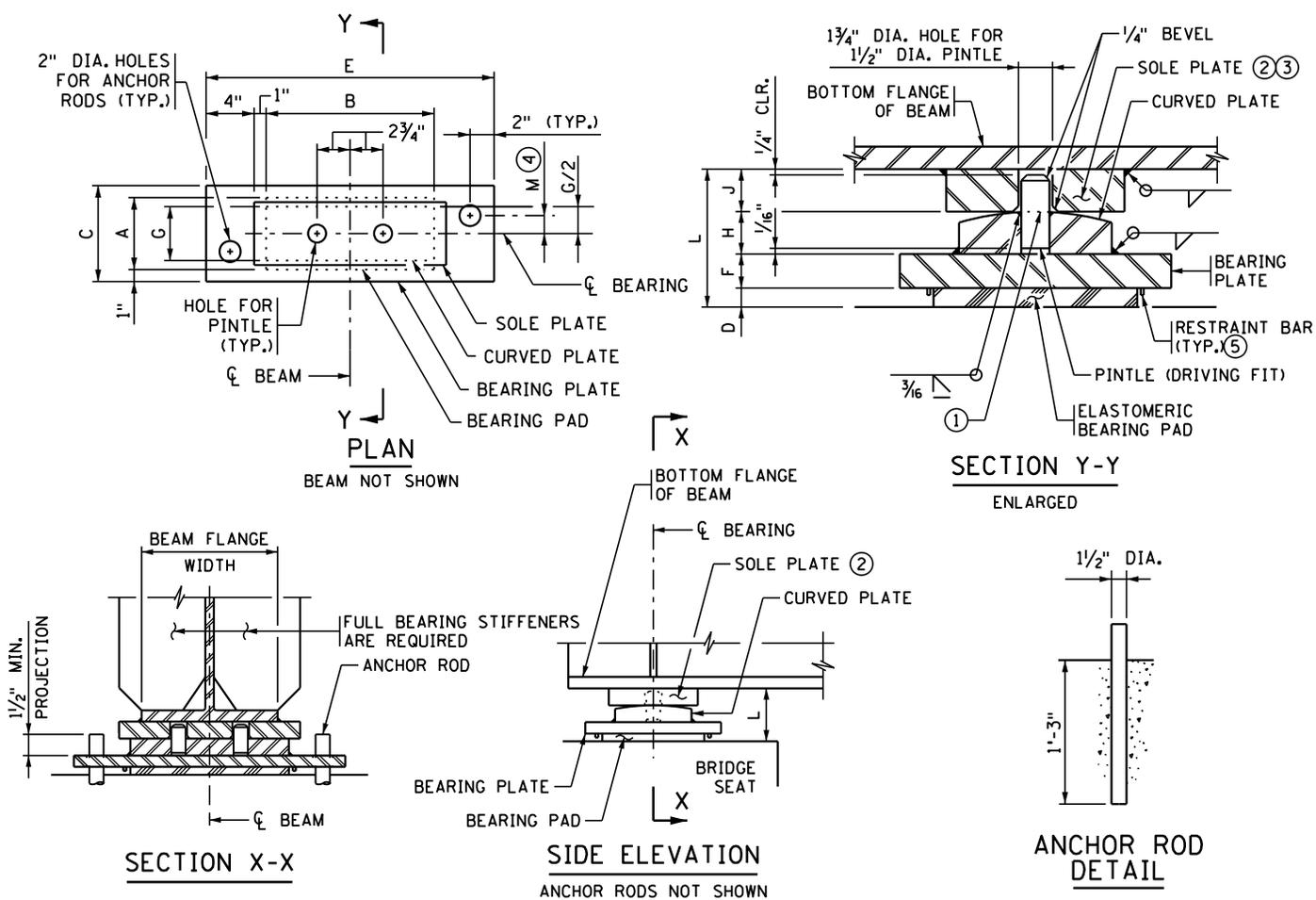
Daniel J. Morgan
 STATE BRIDGE ENGINEER

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



TABLE

ASSEMBLY TYPE	LOCATION	BEAM FLANGE WIDTH	BEARING PAD SIZE			SHAPE FACTOR	BEARING PLATE SIZE			CURVED PLATE SIZE				SOLE PLATE SIZE			PINTLE DIA.	ASSY. HEIGHT L	ANCHOR ROD OFFSET		RESTRAINT PATTERN (5)
			A	B	D		C	E	F	G	B	H	R (1)	WID.	LEN.	J (2)			+/- (4)	M	

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 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.

- (1) 16" MIN. RADIUS 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) WHEN THE SOLE PLATE IS TAPERED, DIMENSIONS "J" AND "L" ARE THICKNESS OF SOLE PLATE AND BEARING ASSEMBLY AT CENTERLINE OF BEARING.
- (3) DO NOT GALVANIZE THIS PLATE.
- (4) "+" DENOTES OFFSET AS SHOWN. "-" DENOTES OFFSET OPPOSITE OF SHOWN.
- (5) REFER TO BEARING PAD RESTRAINT B-DETAIL FOR ADDITIONAL INFORMATION AND DETAILS.

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

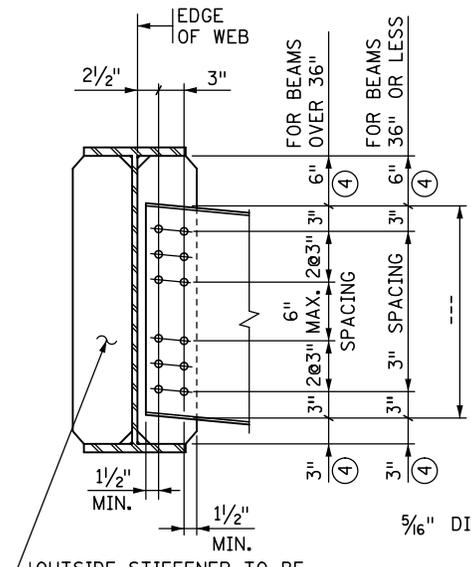
DESIGN DATA:
MAX. FACTORED SHEAR RESISTANCE:
- 50.3 KIPS PER 1/2" DIA. PINTLE
- 36.2 KIPS PER 1/2" DIA. ANCHOR ROD

APPROVED: NOVEMBER 22, 2002
Samuel J. Morgan
STATE BRIDGE ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
CURVED PLATE BEARING ASSEMBLY
(STEEL BEAMS)
(FIXED)

REVISED
08-10-2006
12-17-2008
11-06-2013
11-03-2015
11-02-2017
11-08-2018

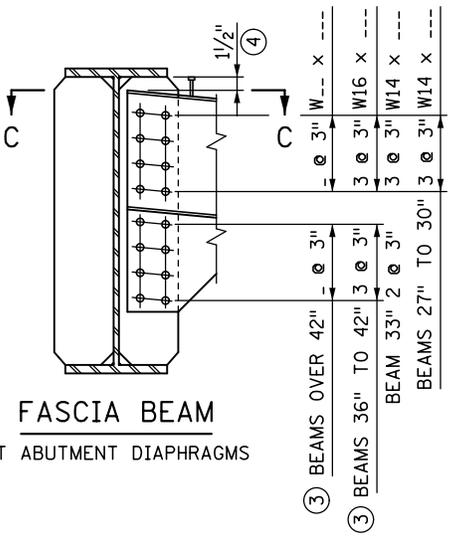
DETAIL NO.
B354



OUTSIDE STIFFENER TO BE USED ONLY AT BEARINGS

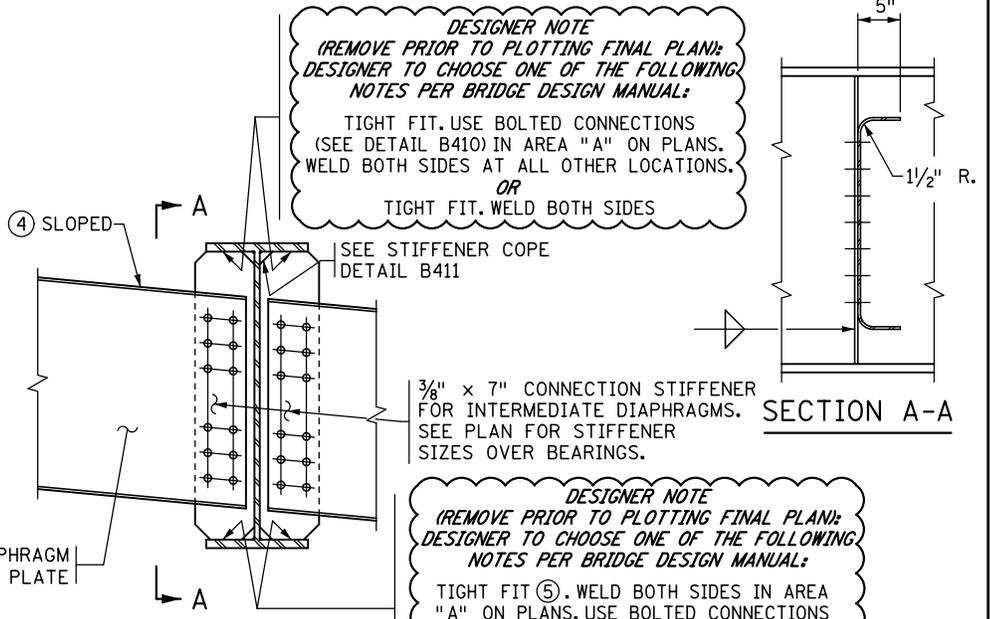
FASCIA BEAM

AT PIER AND INTERMEDIATE DIAPHRAGMS



FASCIA BEAM

AT ABUTMENT DIAPHRAGMS



INTERIOR BEAM

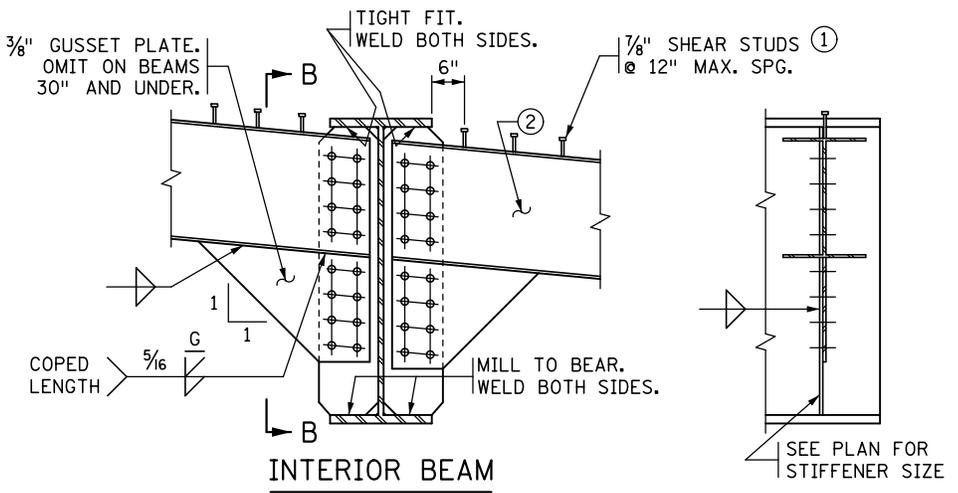
AT PIER AND INTERMEDIATE DIAPHRAGMS

DESIGNER NOTE
(REMOVE PRIOR TO PLOTTING FINAL PLAN);
DESIGNER TO CHOOSE ONE OF THE FOLLOWING NOTES PER BRIDGE DESIGN MANUAL:
TIGHT FIT. USE BOLTED CONNECTIONS (SEE DETAIL B410) IN AREA "A" ON PLANS.
WELD BOTH SIDES AT ALL OTHER LOCATIONS.
OR
TIGHT FIT. WELD BOTH SIDES

SEE STIFFENER COPE DETAIL B411
3/8" x 7" CONNECTION STIFFENER FOR INTERMEDIATE DIAPHRAGMS. SEE PLAN FOR STIFFENER SIZES OVER BEARINGS.

DESIGNER NOTE
(REMOVE PRIOR TO PLOTTING FINAL PLAN);
DESIGNER TO CHOOSE ONE OF THE FOLLOWING NOTES PER BRIDGE DESIGN MANUAL:
TIGHT FIT (5). WELD BOTH SIDES IN AREA "A" ON PLANS. USE BOLTED CONNECTIONS (SEE DETAIL B410) AT ALL OTHER LOCATIONS.
OR
TIGHT FIT (5). WELD BOTH SIDES

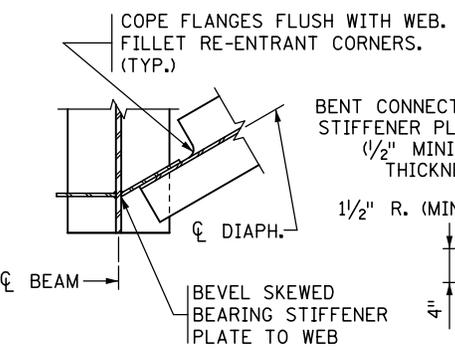
SECTION A-A



INTERIOR BEAM

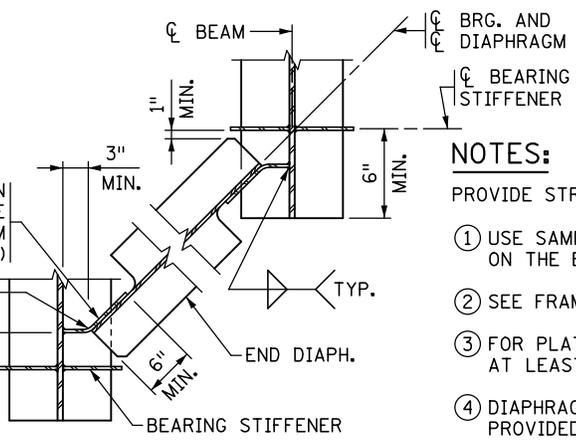
AT ABUTMENT DIAPHRAGMS

SECTION B-B



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 GIRDERS, 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.

APPROVED: MARCH 26, 2009

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

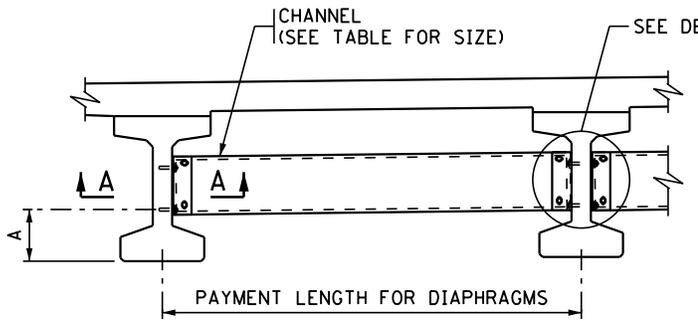
REVISED
01-05-2017

DETAIL NO.

Ramirez
STATE BRIDGE ENGINEER

BOLTED DIAPHRAGMS
(FOR STEEL BEAMS)

B402

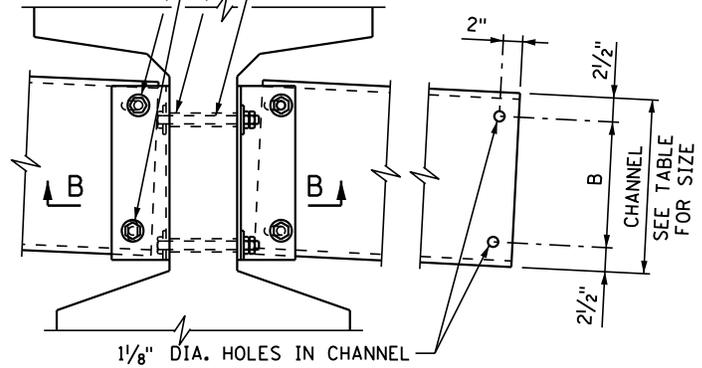


PART TRANSVERSE SECTION AT DIAPHRAGM

7/8" DIA. HIGH STRENGTH BOLTS PER SPEC. 3391.2.B WITH HEX NUT AND ONE 3" SQ. x 5/16" PLATE WASHER ON SLOTTED SIDE AND HARDENED WASHER ON DIAPHRAGM SIDE

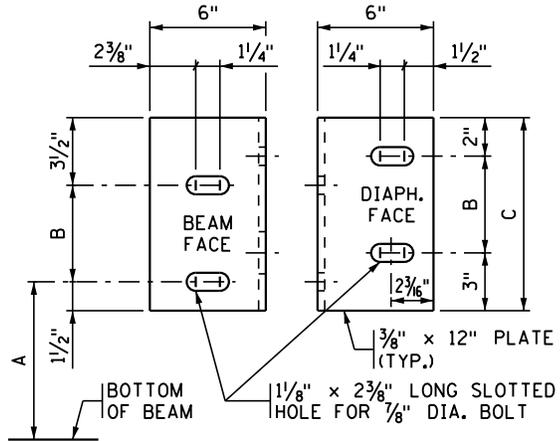
FORM 1/2" DIA. HOLES IN WEB (TYP.)

7/8" DIA. A307 BOLTS, PER SPEC. 3391.2.A, WITH TWO HEX NUTS, OR EQUAL, AND TWO HARDENED 3" SQ. x 5/16" PLATE WASHERS EACH AT ALL INTERIOR BEAM DIAPHRAGM CONNECTIONS



DETAIL "A"

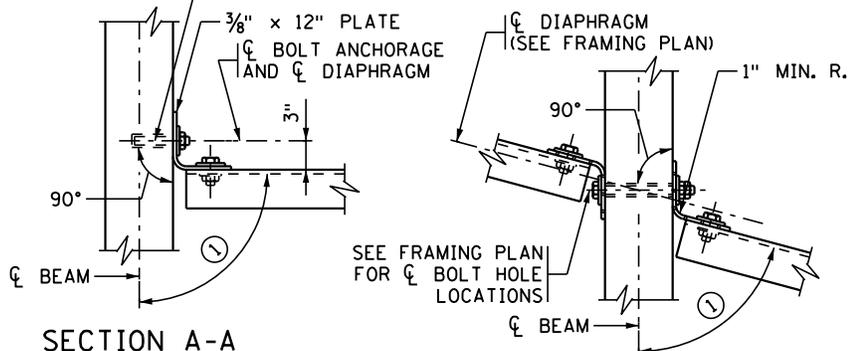
INTERIOR BEAM WITH CONTINUOUS LINE OF DIAPHRAGMS



DIAPHRAGM CONNECTION

FOR 36M, 40MH AND MN45 BEAMS

7/8" DIA. CAST-IN-PLACE BOLT ANCHORAGE, 7/8" x 2 1/4" H.S. BOLT PER SPEC. 3391.2.B AND 3" SQ. x 5/16" PLATE WASHER.

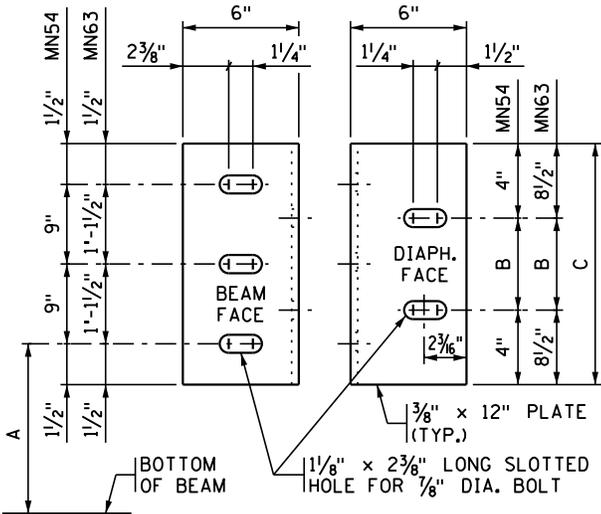


SECTION A-A

TYPICAL SECTION AT ALL FASCIA BEAMS

SECTION B-B

TYPICAL SECTION AT INTERIOR BEAM WITH CONTINUOUS OR STAGGERED INTERMEDIATE DIAPHRAGMS



DIAPHRAGM CONNECTION

FOR MN54 AND MN63 BEAMS

NOTES:

PROVIDE STEEL PER SPEC. 3306.

INSTALL PER SPEC. 2405.3.K.

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

SHOP BEND THE LEG OF THE 12" PLATE TO CONFORM TO THE DIAPHRAGM. A 3/8" 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 5/16" IN THICKNESS, AND HAVE LEGS 5" LONG.

GALVANIZE STEEL PLATES AND SHAPES PER SPEC. 3394.

GALVANIZE BOLTS, NUTS AND WASHERS PER SPEC. 3392.

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

BEAM HEIGHT	DISTANCE			CHANNEL SIZE
	A	B	C	
36M	1'-3"	7"	1'-0"	C12x20.7
40MH	1'-5"	7"	1'-0"	C12x20.7
MN45	1'-7 3/4"	7"	1'-0"	C12x20.7
MN54	1'-7 3/4"	1'-1"	1'-9"	MC18x42.7
MN63	1'-7 3/4"	1'-1"	2'-6"	MC18x42.7

APPROVED: NOVEMBER 03, 2015

Kevin A. F. Sanaker
STATE BRIDGE ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

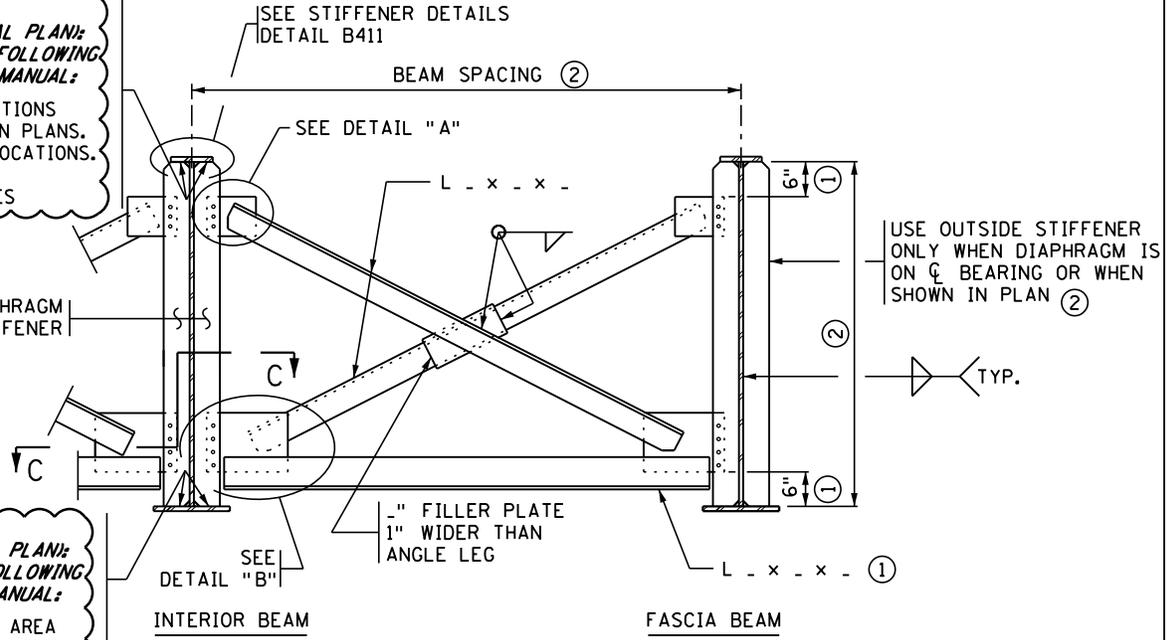
STEEL INTERMEDIATE DIAPHRAGM
(FOR 36M, 40MH, MN45 - MN63 PRESTRESSED CONCRETE BEAMS)

REVISION
01-05-2017
12-20-2018

DETAIL NO.

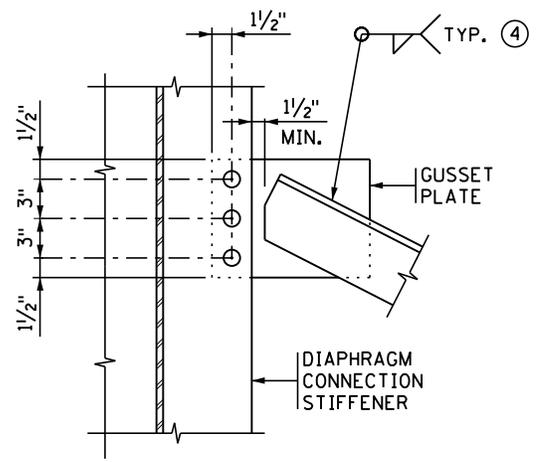
B403

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.
 OR
 TIGHT FIT. WELD BOTH SIDES

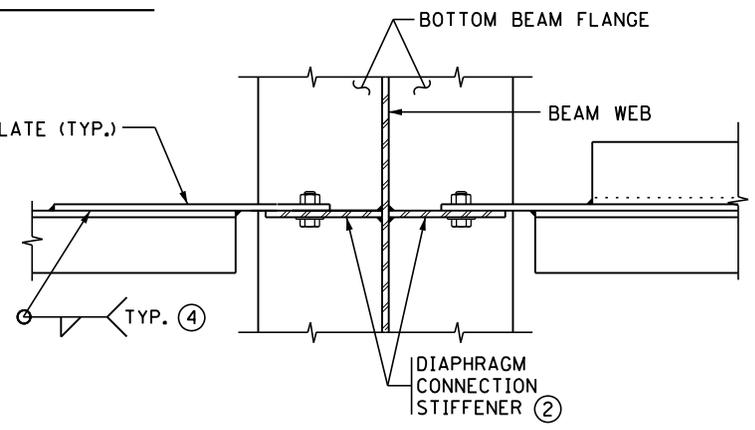


ELEVATION

DESIGNER NOTE
 (REMOVE PRIOR TO PLOTTING FINAL PLAN);
 DESIGNER TO CHOOSE ONE OF THE FOLLOWING
 NOTES PER MnDOT LRFD DESIGN MANUAL:
 TIGHT FIT (3). WELD BOTH SIDES IN AREA
 "A" ON PLANS. USE BOLTED CONNECTIONS
 (SEE DETAIL B410) AT ALL OTHER LOCATIONS.
 OR
 TIGHT FIT (3). WELD BOTH SIDES



DETAIL "A"

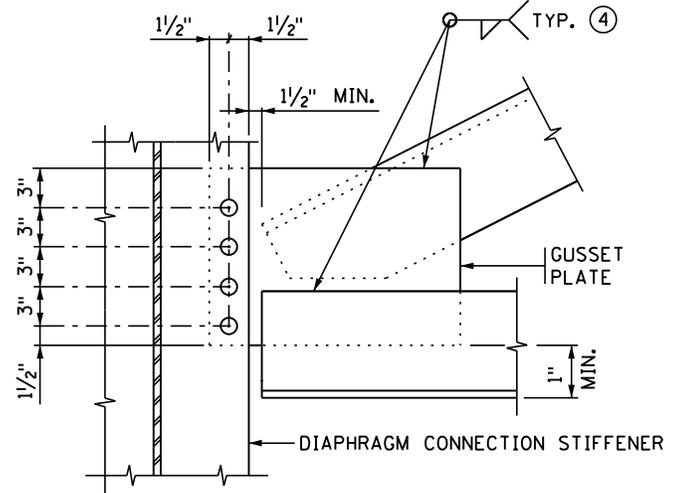


SECTION C-C

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) 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.



DETAIL "B"

APPROVED: MARCH 26, 2009

Daniel J. Morgan
 STATE BRIDGE ENGINEER

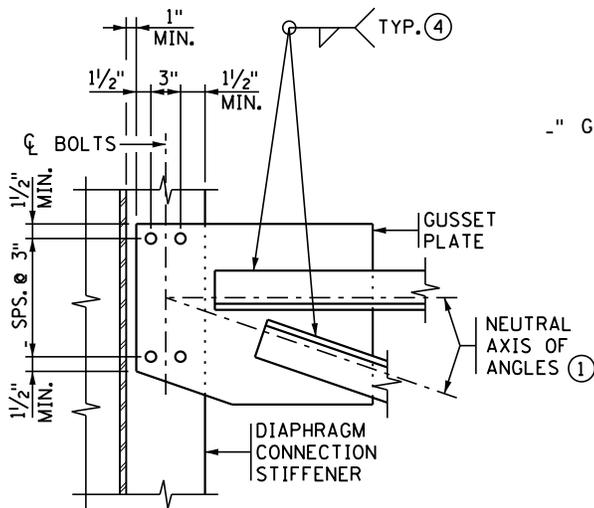
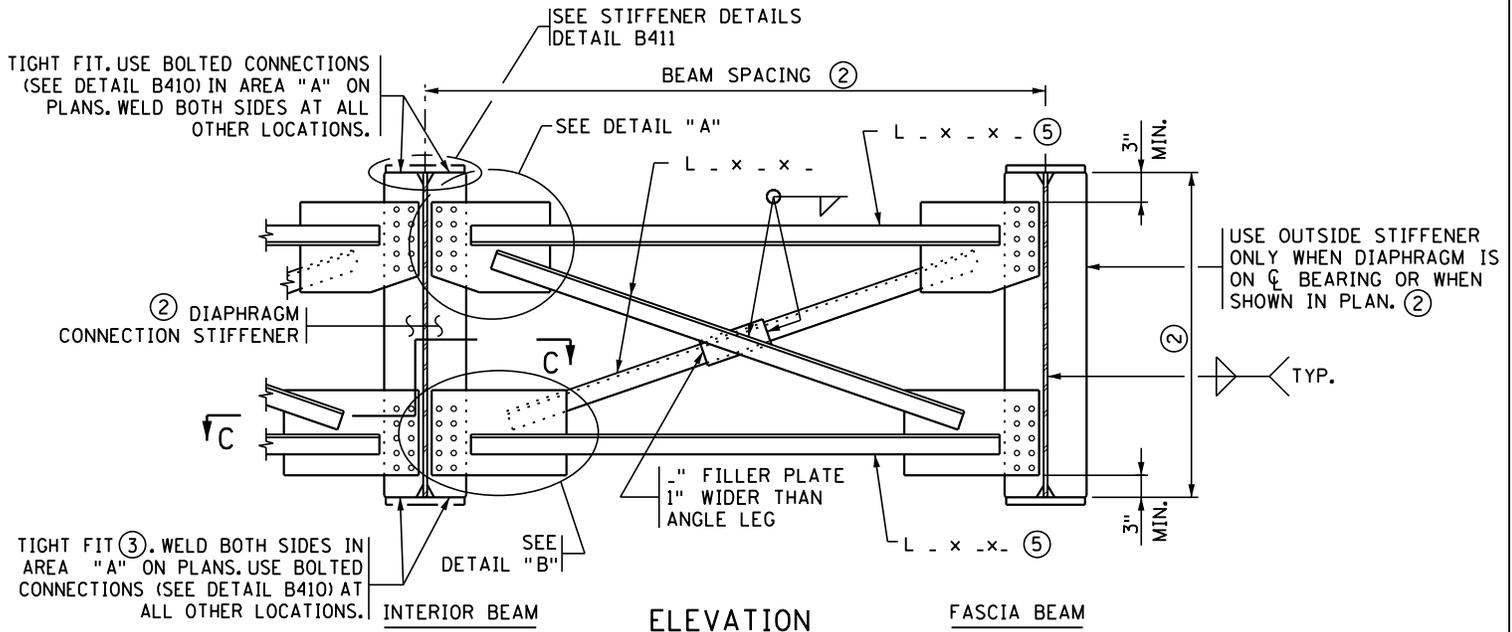
STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION

CROSS FRAME INTERMEDIATE DIAPHRAGM
 (FOR STRAIGHT STEEL BEAMS)

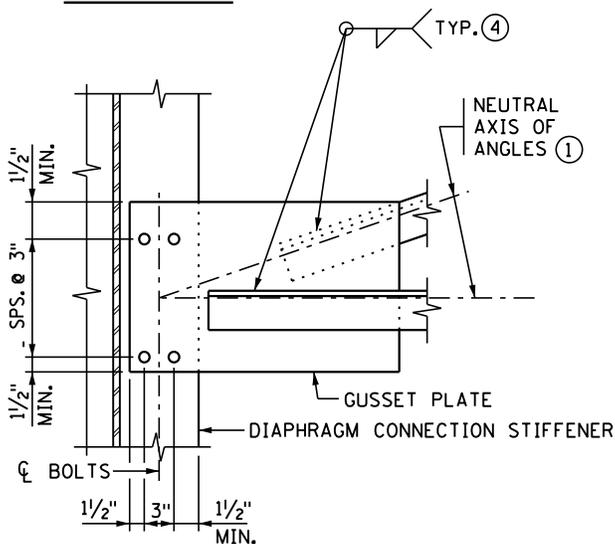
REVISED
 11-03-2015
 06-12-2019

DETAIL NO.

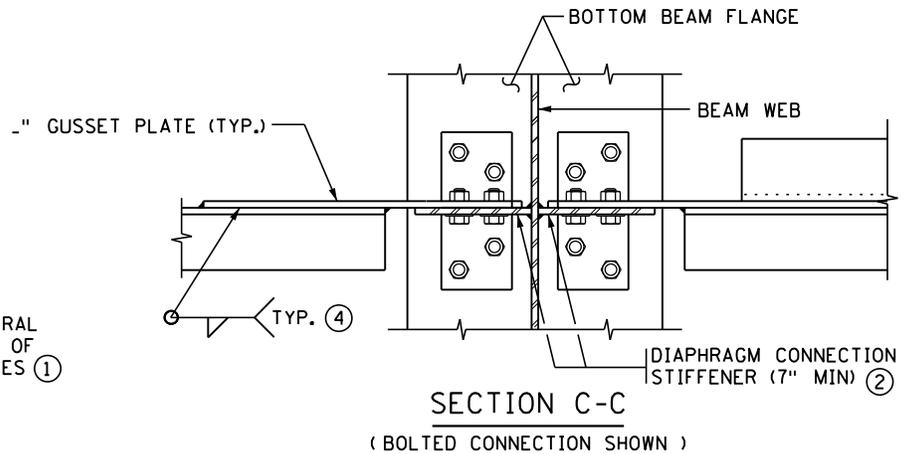
B407



DETAIL "A"



DETAIL "B"



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.

APPROVED: MARCH 26, 2009

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

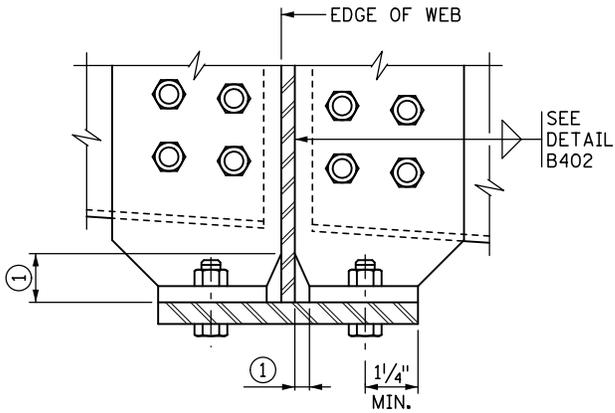
REVISED
11-03-2015
06-12-2019

DETAIL NO.

CROSS FRAME INTERMEDIATE DIAPHRAGM
(FOR CURVED STEEL BEAMS)

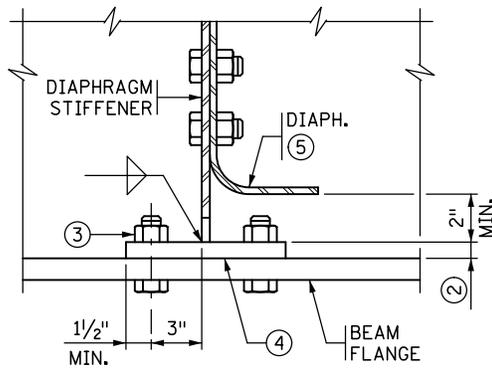
B408

Daniel J. Morgan
STATE BRIDGE ENGINEER



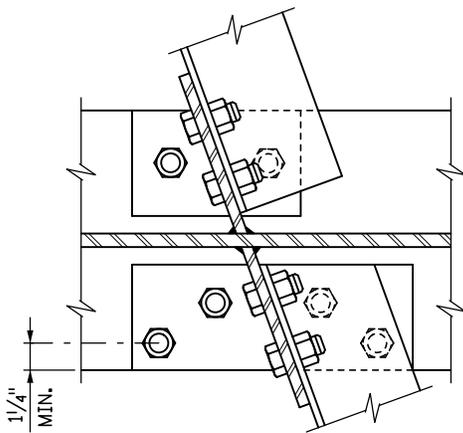
SECTION A-A

CONNECTION WITH 2 BOLTS
AT INTERIOR BEAMS



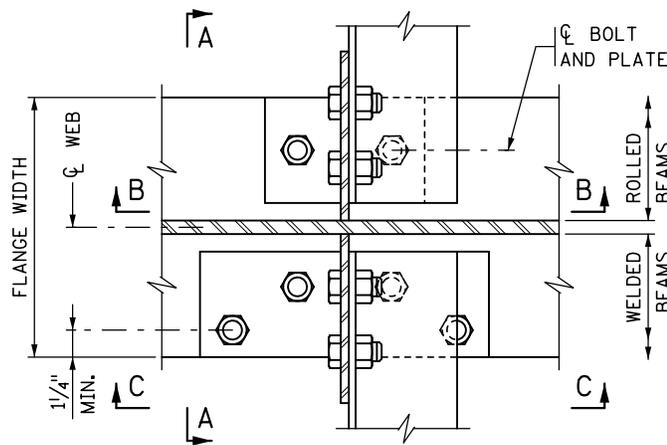
SECTION B-B

CONNECTION WITH 2 BOLTS



PLAN VIEW

AT INTERIOR BEAMS
(UP TO 20° SKEW)

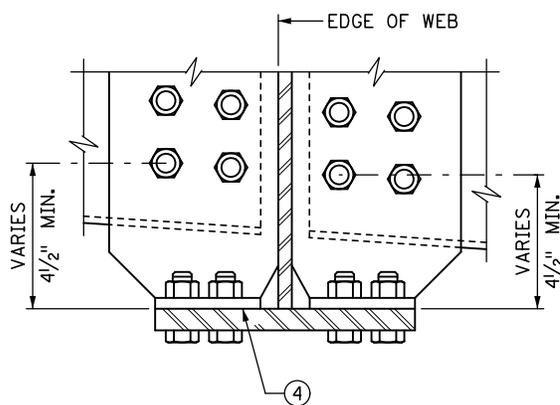


PLAN VIEW

AT INTERIOR BEAMS

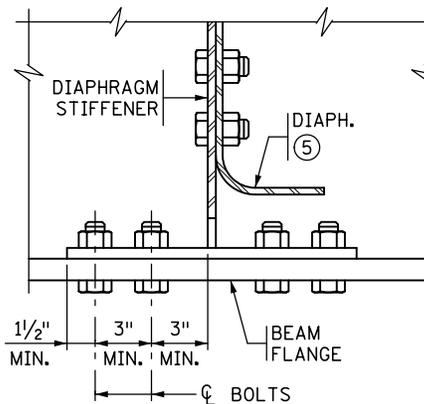
DESIGNER NOTE
(REMOVE PRIOR TO PLOTTING FINAL PLAN):

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



SECTION A-A

CONNECTION WITH 4 BOLTS
AT INTERIOR BEAMS



SECTION C-C

CONNECTION WITH 4 BOLTS

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.

APPROVED: NOVEMBER 22, 2002

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

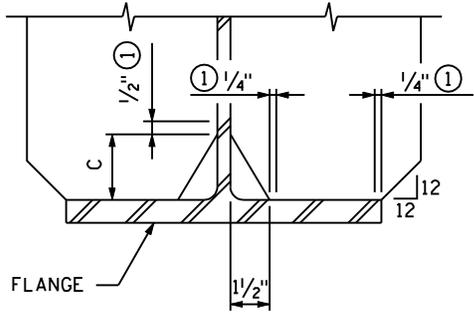
REVISED
09-11-2004
10-28-2008
05-24-2012
01-05-2017

DETAIL NO.

Daniel J. Wagoner
STATE BRIDGE ENGINEER

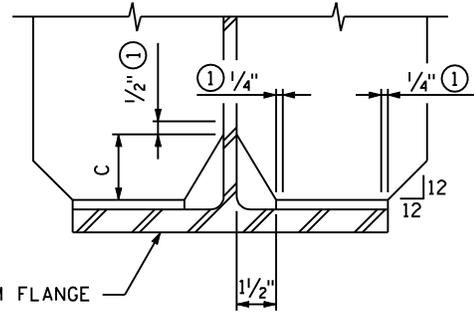
BOLTED FLANGE TO STIFFENER DETAIL

B410



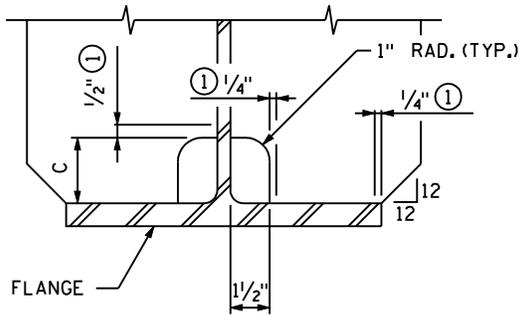
TOP OR BOTTOM FLANGE

STIFFENER TO FLANGE CONNECTION
OPTION 1



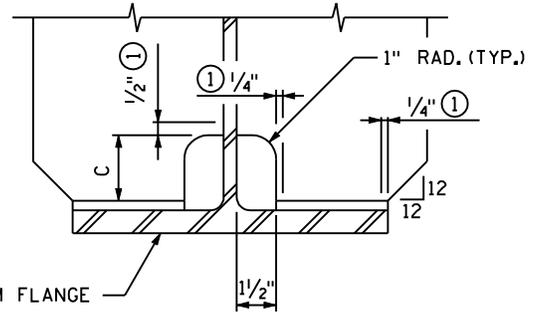
TOP OR BOTTOM FLANGE

STIFFENER TO TAB PLATE CONNECTION
OPTION 1



TOP OR BOTTOM FLANGE

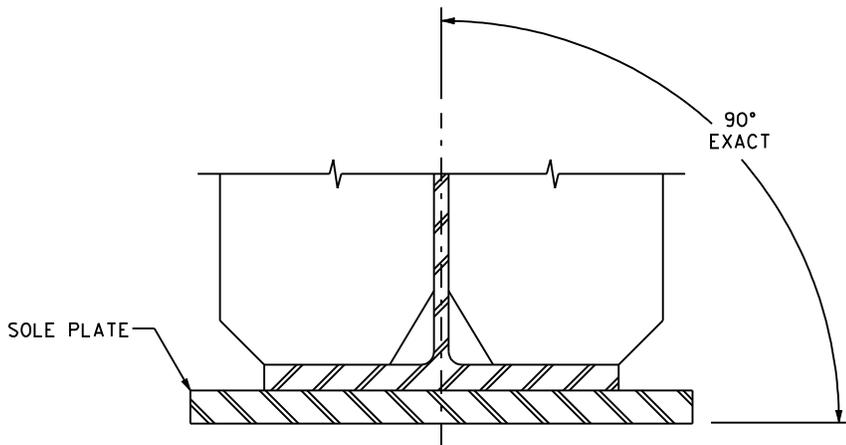
STIFFENER TO FLANGE CONNECTION
OPTION 2



TOP OR BOTTOM FLANGE

STIFFENER TO TAB PLATE CONNECTION
OPTION 2

STIFFENER COPE DETAIL
PLATE GIRDER OR ROLLED BEAM



SOLE PLATE

SOLE PLATE AT BEARING

WEB THICKNESS	DIMENSION C
1/2" ± 9/16" ± 5/8"	2 1/2"
1/16" ± 3/4"	3"

NOTES:

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

APPROVED: OCTOBER 22, 2008

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

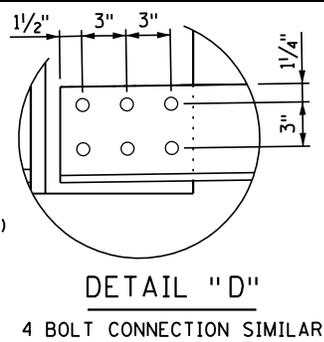
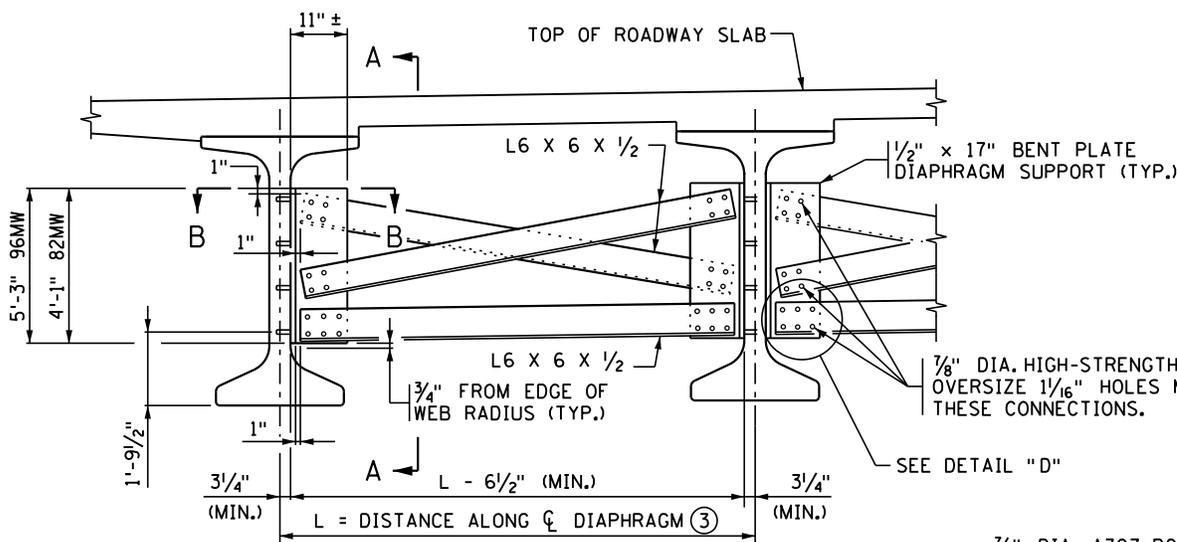
REVISION

DETAIL NO.

STIFFENER DETAILS
(FOR STEEL BEAMS)

B411

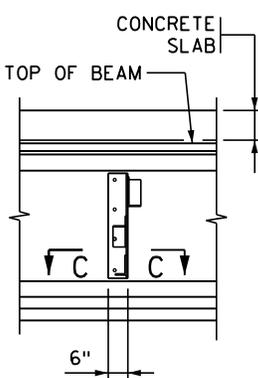
Daniel J. Morgan
STATE BRIDGE ENGINEER



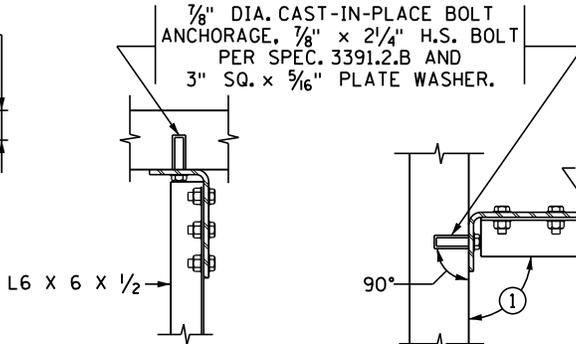
PART TRANSVERSE SECTION

SQUARE BRIDGE SHOWN

7/8" DIA. A307 BOLTS, PER SPEC. 3391.2.A, WITH TWO HEX NUTS, OR EQUAL, AND TWO HARDENED 3" SQ. x 5/16" PLATE WASHERS EACH AT ALL INTERIOR BEAM DIAPHRAGM CONNECTIONS

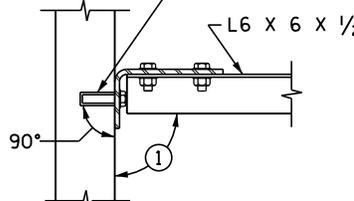


SECTION A-A



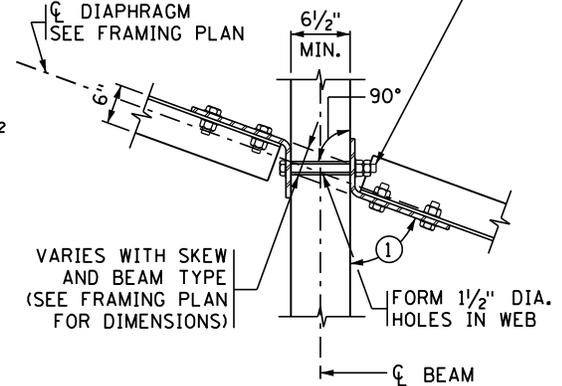
SECTION C-C

FASCIA BEAM



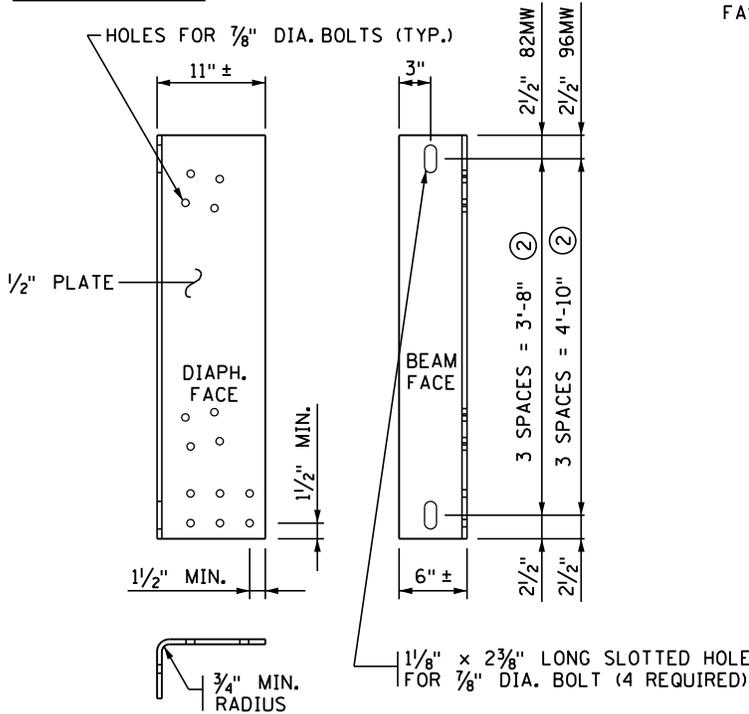
SECTION B-B

TYPICAL SECTION AT FASCIA BEAM



INTERMEDIATE DIAPHRAGM

TYPICAL SECTION AT INTERIOR BEAM WITH CONTINUOUS OR STAGGERED INTERMEDIATE DIAPHRAGMS



DIAPHRAGM SUPPORT

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".

APPROVED: SEPTEMBER 22, 2011

Nancy Subenberger
STATE BRIDGE ENGINEER

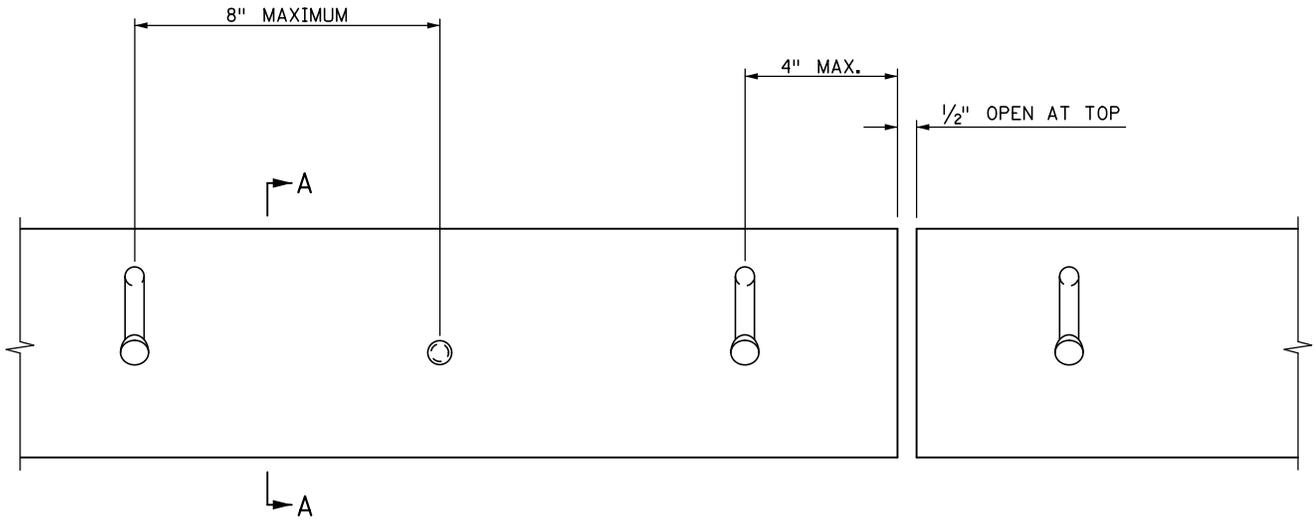
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

STEEL INTERMEDIATE BOLTED DIAPHRAGM
(ALL MW PRESTRESSED CONCRETE BEAMS)

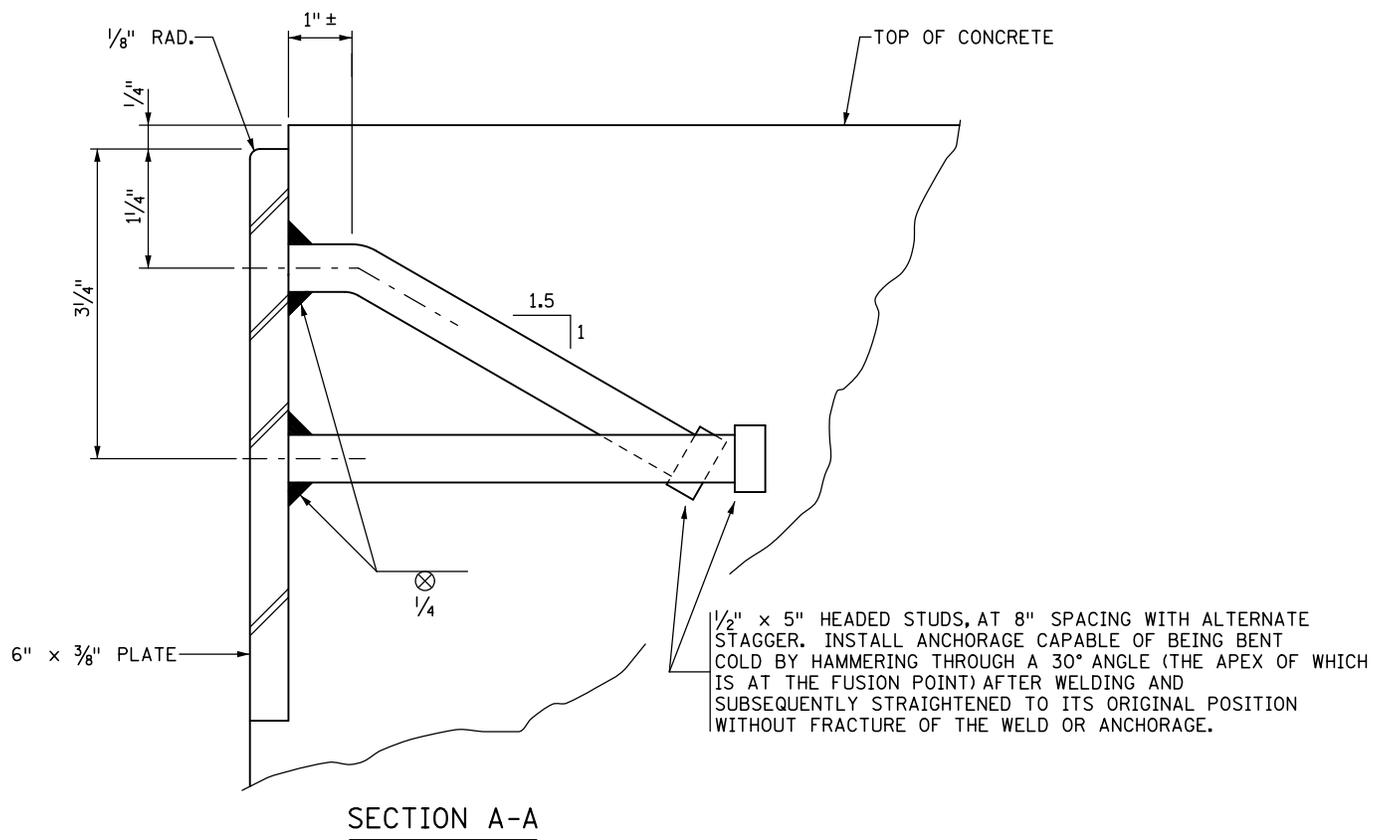
REVISED
09-11-2014
11-03-2015
01-05-2017
10-22-2019

DETAIL NO.

B412



ELEVATION
CONCRETE NOT SHOWN



1/2" x 5" HEADED STUDS, AT 8" SPACING WITH ALTERNATE STAGGER. INSTALL ANCHORAGE CAPABLE OF BEING BENT COLD BY HAMMERING THROUGH A 30° ANGLE (THE APEX OF WHICH IS AT THE FUSION POINT) AFTER WELDING AND SUBSEQUENTLY STRAIGHTENED TO ITS ORIGINAL POSITION WITHOUT FRACTURE OF THE WELD OR ANCHORAGE.

SECTION A-A

NOTES:

- EXTEND PLATES FULL WIDTH OF ROADWAY BETWEEN GUTTER LINES WITH A 1/2" OPEN JOINT AT EACH BREAK IN CROWN PROFILE. MAX. LENGTH 22 FT.
- PROVIDE STRUCTURAL STEEL PER SPEC. 3306. GALVANIZE AFTER FABRICATION PER SPEC. 3394
- SET PLATE TO PROPER GRADE AND CROWN.

APPROVED: NOVEMBER 22, 2002
Daniel J. Horgan
STATE BRIDGE ENGINEER

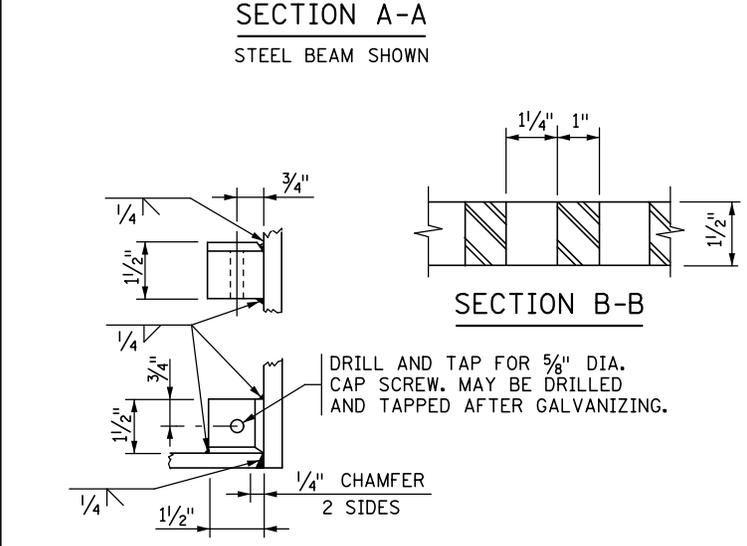
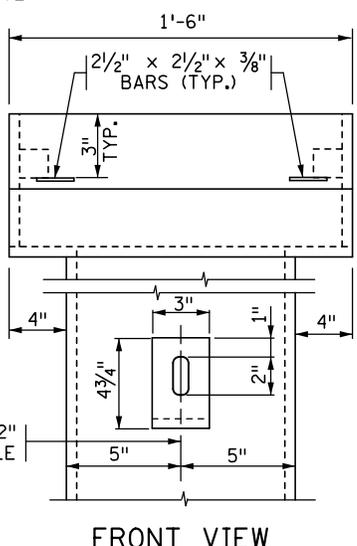
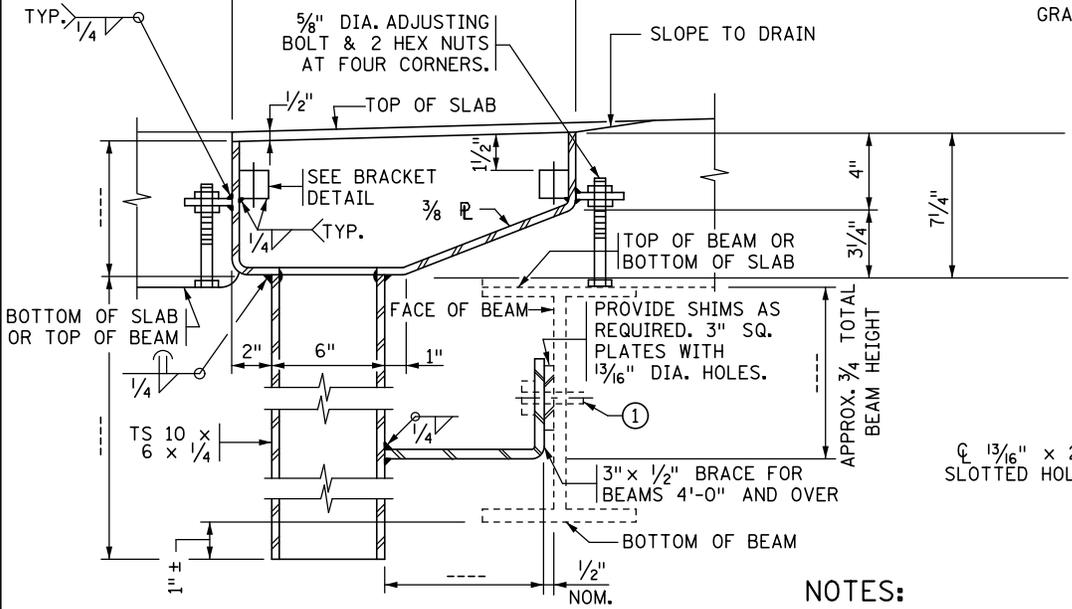
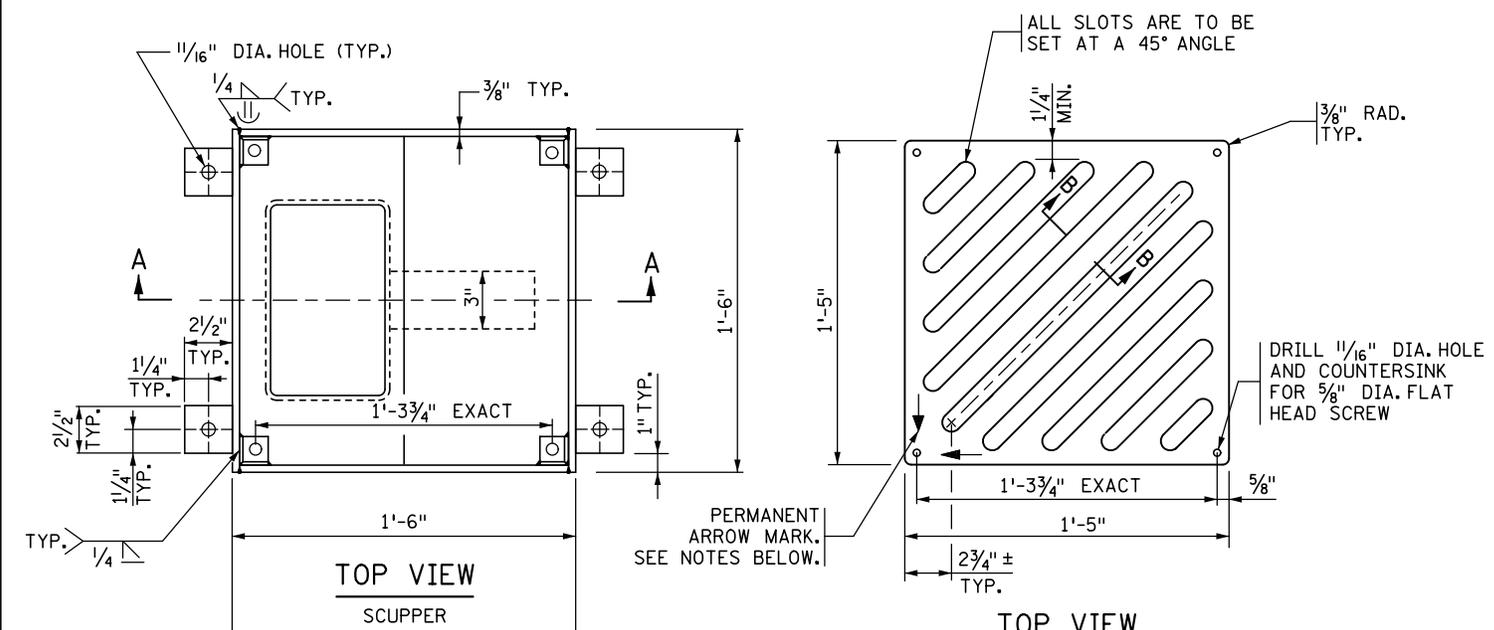
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

PROTECTION PLATE
(FOR END OF SLAB)

REVISION
01-05-2017

DETAIL NO.

B553



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.

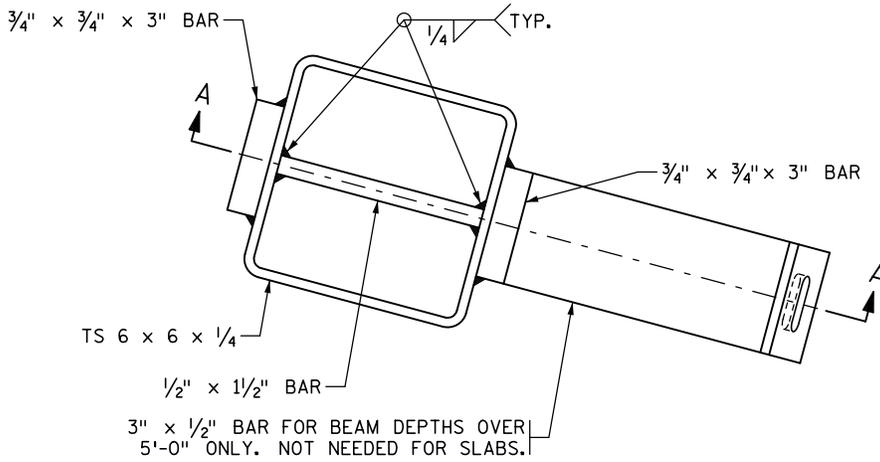
INSTALL GRATE WITH ARROW ON CURB SIDE AND IN DIRECTION OF FLOW.

PAYMENT FOR FLOOR DRAIN, TYPE ___ INCLUDES ALL MATERIAL ON THIS DETAIL.

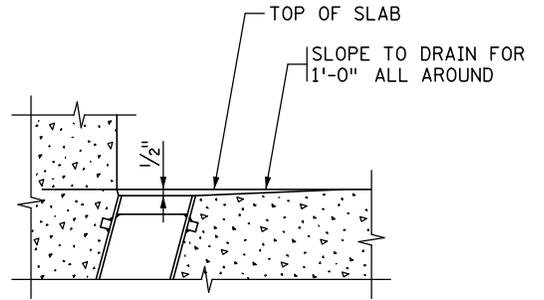
GRATE OPENING AREA IS 106 SQ. IN.

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.

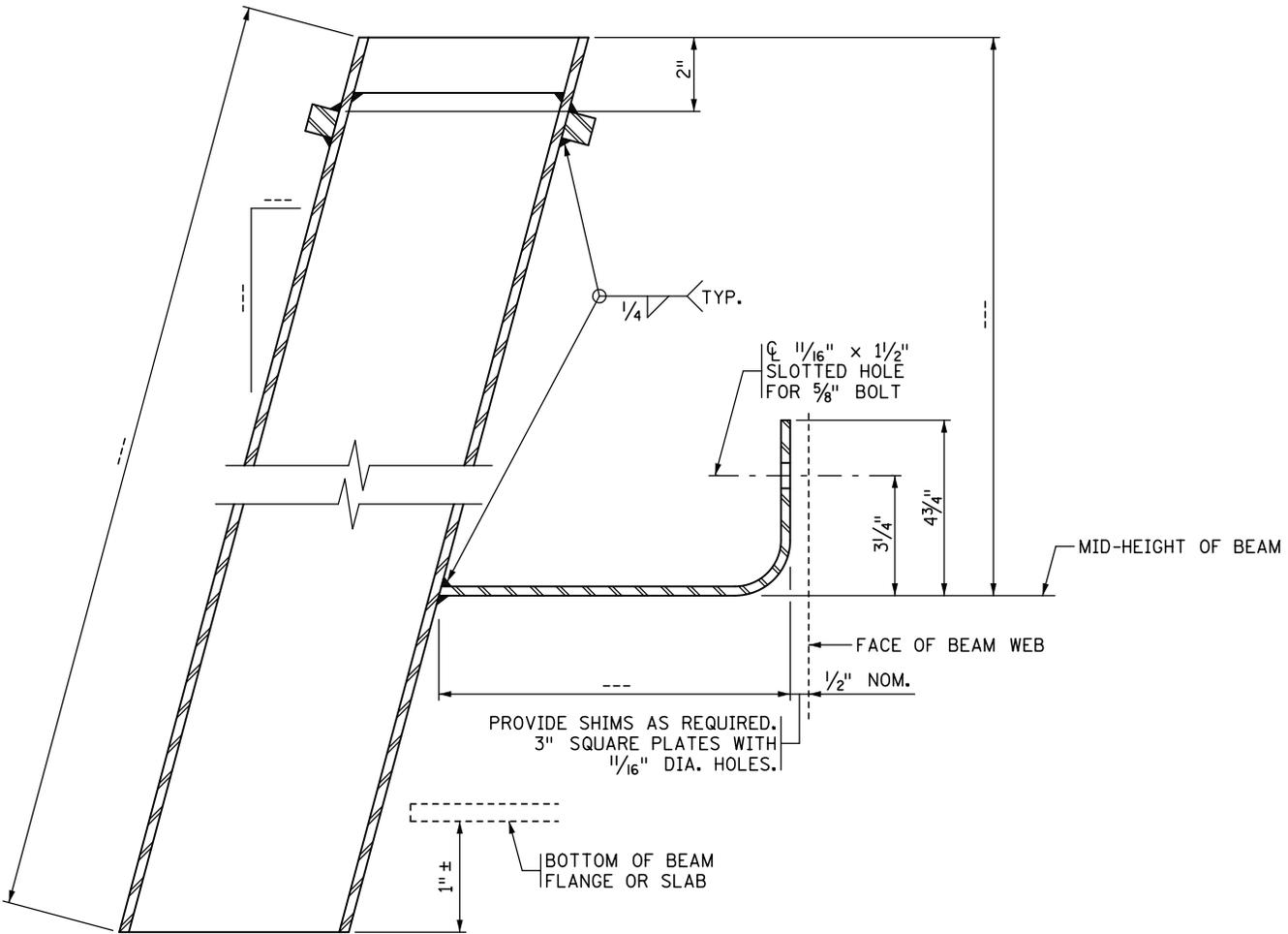
APPROVED: NOVEMBER 22, 2002	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION	REVISION 01-05-2017	DETAIL NO.
 STATE BRIDGE ENGINEER	BRIDGE FLOOR DRAIN (WELDED BOX)		B701



PLAN VIEW



PLACEMENT DIAGRAM



SECTION A-A

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.

APPROVED: NOVEMBER 22, 2002

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

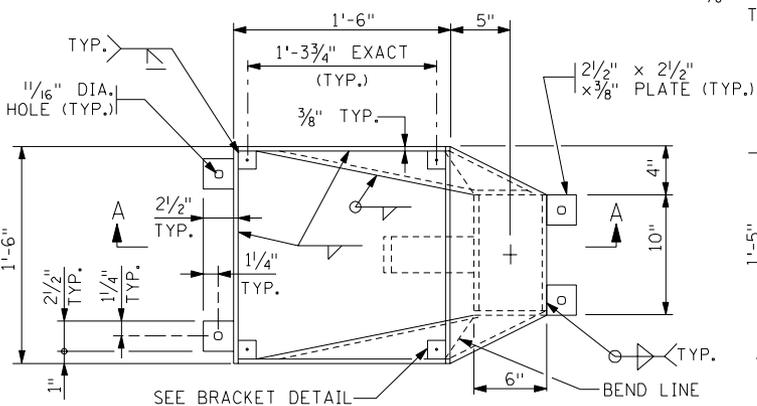
REVISED
01-13-2004
01-05-2017

DETAIL NO.

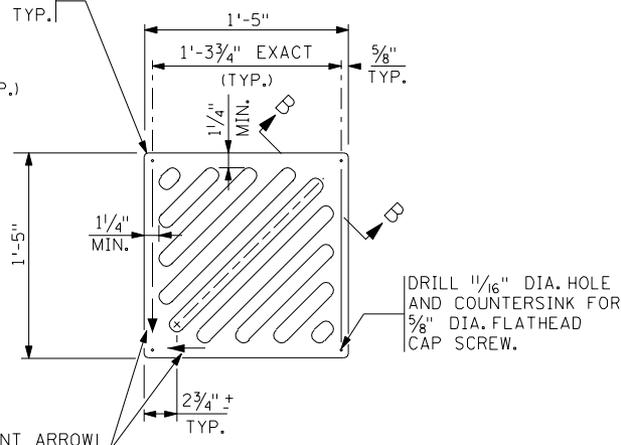
BRIDGE FLOOR DRAIN
(STRUCTURAL TUBE)

B702

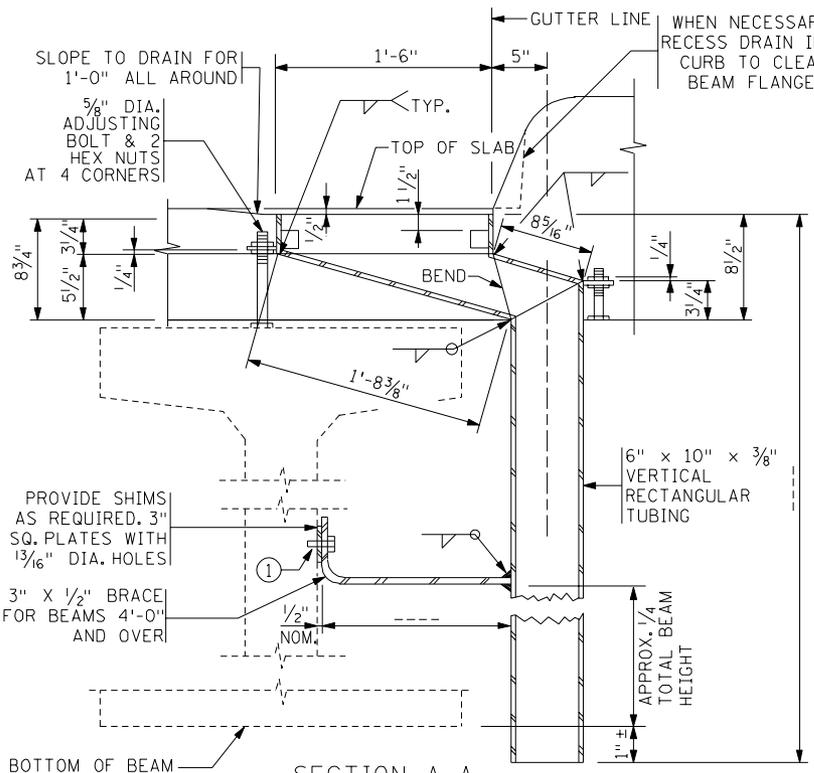
Daniel J. Wagoner
STATE BRIDGE ENGINEER



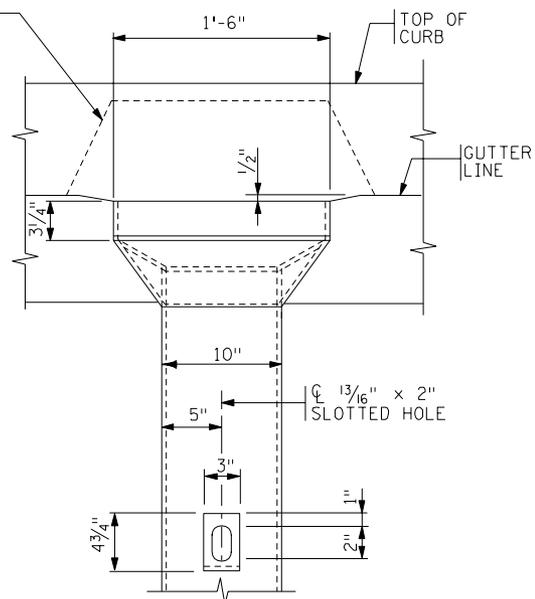
TOP VIEW
(SCUPPER)



TOP VIEW
(GRATE)



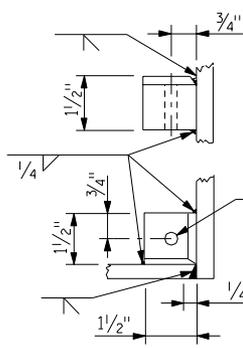
SECTION A-A
(CONCRETE BEAM SHOWN)



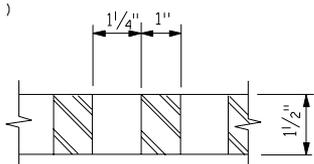
FRONT VIEW

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.



BRACKET DETAIL



SECTION B-B

DRILL AND TAP FOR 5/8" DIA. CAP SCREW. MAY BE DRILLED AND TAPPED AFTER GALVANIZING.

APPROVED: NOVEMBER 22, 2002

Daniel J. Morgan
STATE BRIDGE ENGINEER

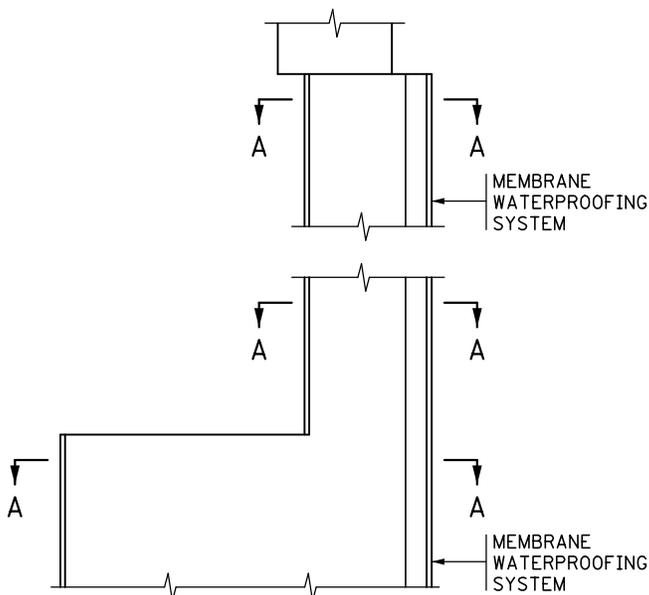
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

BRIDGE OFFSET FLOOR DRAIN
(WELDED BOX)

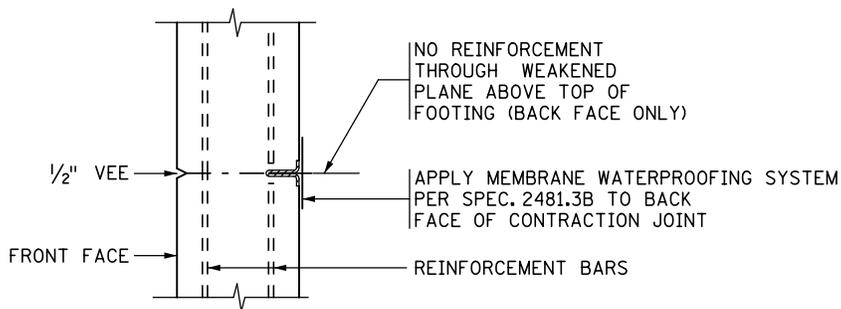
REVISION

DETAIL NO.

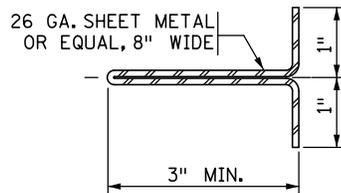
B705



PART SECTION THROUGH
ABUTMENT AT JOINT



SECTION A-A



BACK STRIP

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 1/2" 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.

APPROVED: NOVEMBER 22, 2002

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

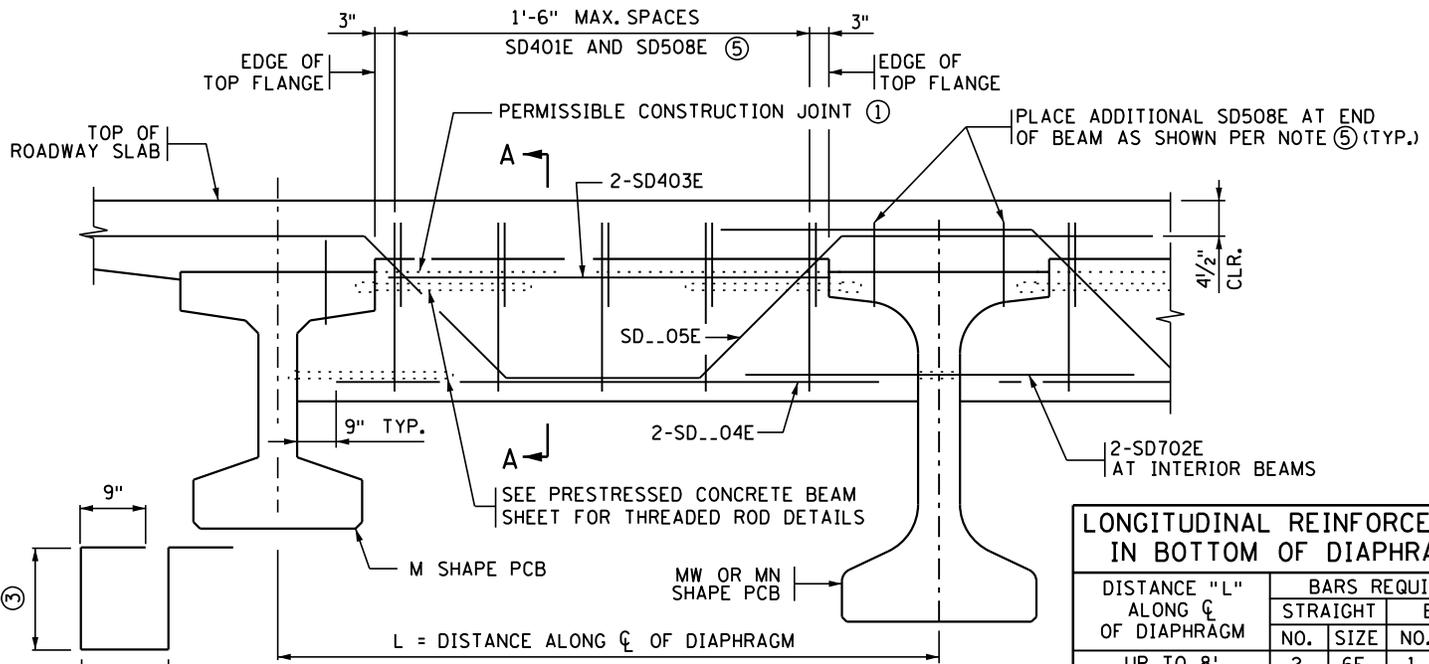
REVISION
03-30-2010
01-05-2017

DETAIL NO.

CONTRACTION JOINT

B801

Daniel J. Horgan
STATE BRIDGE ENGINEER



LONGITUDINAL REINFORCEMENT IN BOTTOM OF DIAPHRAGM

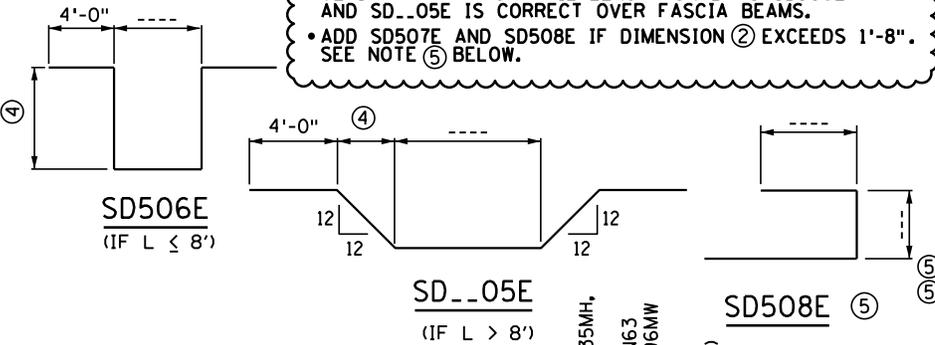
DISTANCE "L" ALONG \bar{C} OF DIAPHRAGM	BARS REQUIRED			
	STRAIGHT		BENT	
	NO.	SIZE	NO.	SIZE
UP TO 8'	2	6E	1	5E
OVER 8' TO 11'	2	7E	1	6E
OVER 11' TO 13'	2	8E	1	8E
OVER 13' TO 15'	2	9E	1	10E
OVER 15' TO 18'	2	11E	1	11E

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 ② EXCEEDS 1'-8". SEE NOTE ⑤ BELOW.

BILL OF REINFORCEMENT FOR END DIAPHRAGM

BAR	NO.	LENGTH	SHAPE	LOCATION
SD401E				VERTICAL TIE
SD702E		5'-0"		LONG. THRU BEAM
SD403E				LONG. TOP
SD...04E				LONG. BOTTOM
SD...05E				LONGITUDINAL
SD506E				LONGITUDINAL
SD507E				LONGITUDINAL
SD508E				VERTICAL TIE



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.

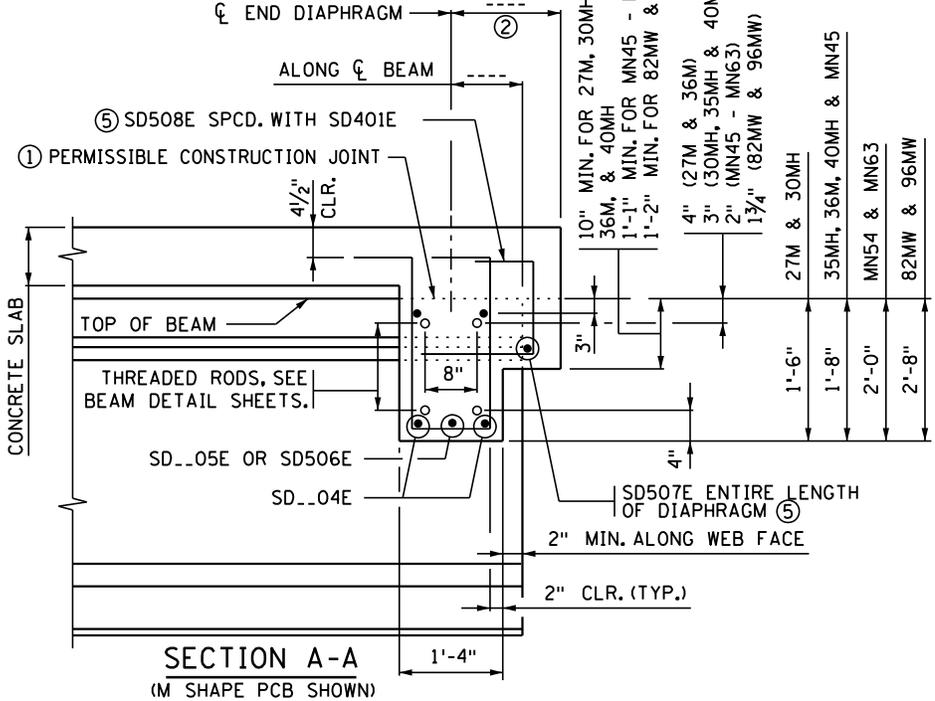
① USE OF CONSTRUCTION JOINT REQUIRES CLEARANCE FOR EXPANSION DEVICE. WHEN CONSTRUCTION JOINT IS USED AT THIS LOCATION, DIAPHRAGM FALSEWORK SHALL REMAIN IN PLACE UNTIL COMPLETION OF SLAB CURING PERIOD.

② PERPENDICULAR TO CENTERLINE OF DIAPHRAGM.

③ 1'-11" (27M & 30MH);
 2'-1" (35MH, 36M, 40MH AND MN45);
 2'-5" (MN54 AND MN63); 3'-1" (82MW AND 96MW).
 BASED ON 3" STOOL AND 9" DECK.

④ 1'-10" (27M, 30MH); 2'-0" (36M, 35MH, 40MH AND MN45);
 2'-4" (MN54 AND MN63); 3'-0" (82MW AND 96MW).
 BASED ON NOTE ③.

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.



APPROVED: SEPTEMBER 22, 2011

Nancy Subenberger
 STATE BRIDGE ENGINEER

STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION

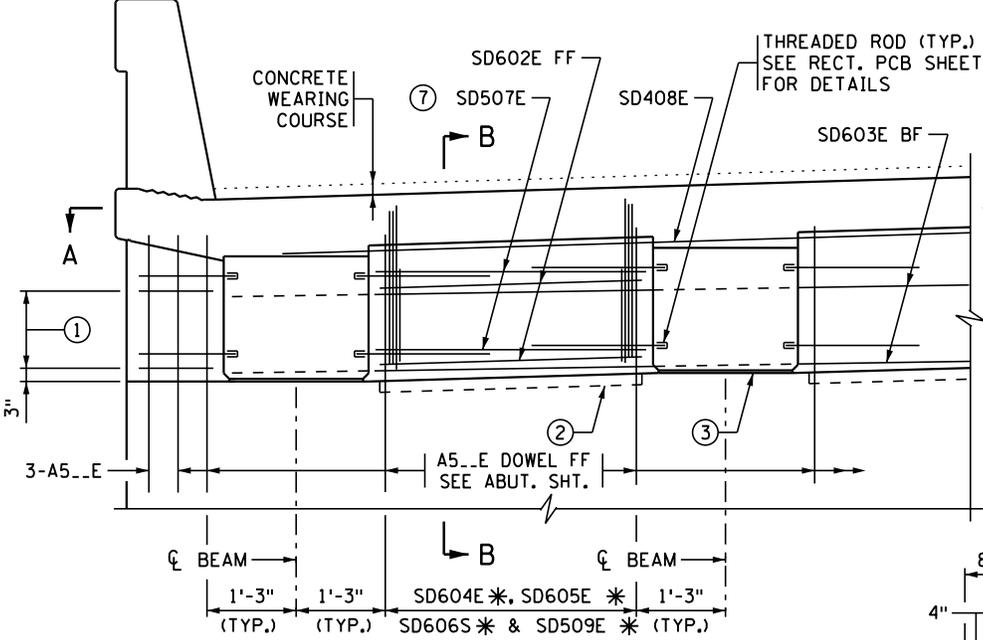
CONCRETE END DIAPHRAGM
 (27M, 30MH, 35MH, 36M, 40MH, MN45 - MN63, 82MW & 96MW
 PRESTRESSED CONCRETE BEAMS) (PARAPET ABUTMENT)

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

DETAIL NO.

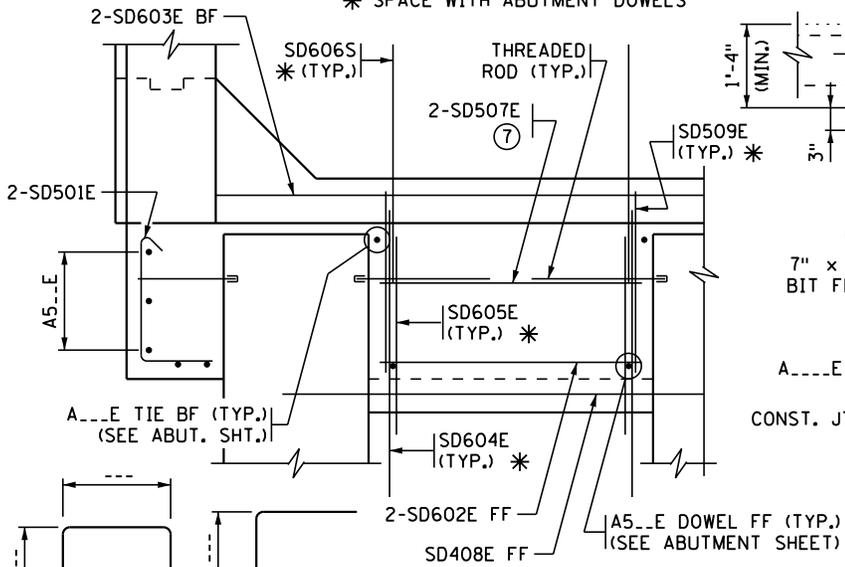
B814

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 SD501E FOR SKEW.



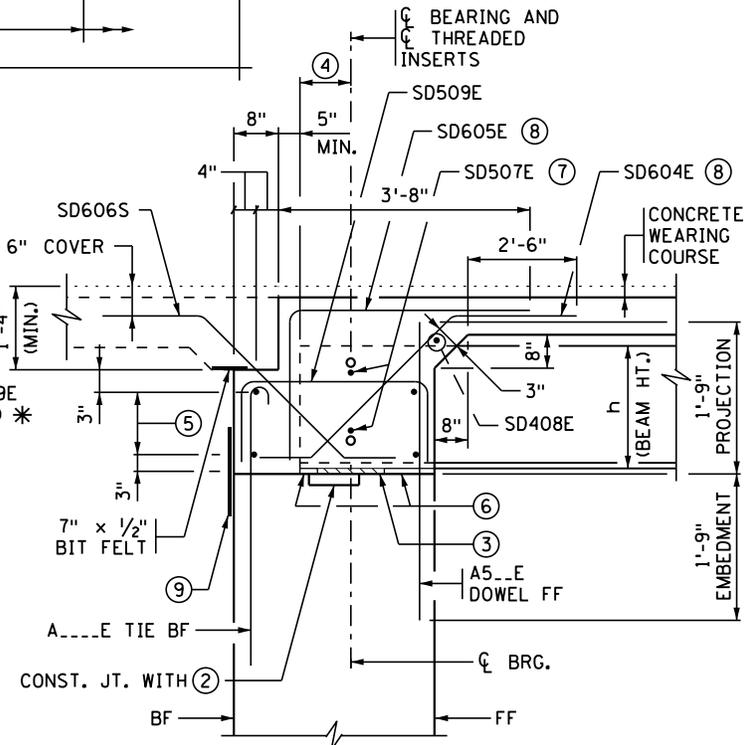
PARTIAL ELEVATION

* SPACE WITH ABUTMENT DOWELS



SECTION A-A

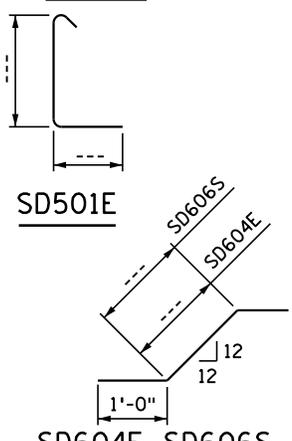
* SPACE WITH ABUTMENT DOWELS



SECTION B-B

NOTES:

- DIAPHRAGM CONCRETE AND REINFORCEMENT QUANTITIES ARE INCLUDED IN SUPERSTRUCTURE QUANTITIES.
- USE SAME CONCRETE MIX FOR END DIAPHRAGMS AS USED IN DECK.
- BF DENOTES BACK FACE. FF DENOTES FRONT FACE.
- ① SD501E END TIE
- ② 2" x 12" KEYWAY (BETWEEN BEAMS ONLY)
- ③ 12" x 24" x 1/2" ELASTOMERIC BEARING PAD
- ④ SEE BEAM DETAIL SHEETS FOR DIMENSION.
- ⑤ SD603E BF & SD602E FF HORIZONTAL
- ⑥ 1/2" MIN. TYPE B POLYSTYRENE UNDER COMPLETE FLANGE
- ⑦ SPACE WITH THREADED RODS.
- ⑧ TIE BAR TO TOP MAT.
- ⑨ MEMBRANE WATERPROOFING SYSTEM PER SPEC. 2481.3.B.



BILL OF REINFORCEMENT FOR END DIAPHRAGM				
BAR	NO.	LENGTH	SHAPE	LOCATION
SD501E		'- "		HORIZONTAL END TIE
SD602E		'- "		HORIZONTAL FF
SD603E		'- "		HORIZONTAL BF
SD604E		'- "		DIAPH./FILLET TIE
SD605E		'- "		DIAPH./DECK TIE
SD606S		'- "		DIAPH./APPROACH TIE
SD507E		'- "		HORIZONTAL
SD408E		'- "		FILLET HORIZONTAL
SD509E		'- "		DIAPHRAGM TIE

SD604E, SD606S

SD606S BAR IS STAINLESS STEEL

APPROVED: MAY 24, 2012

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

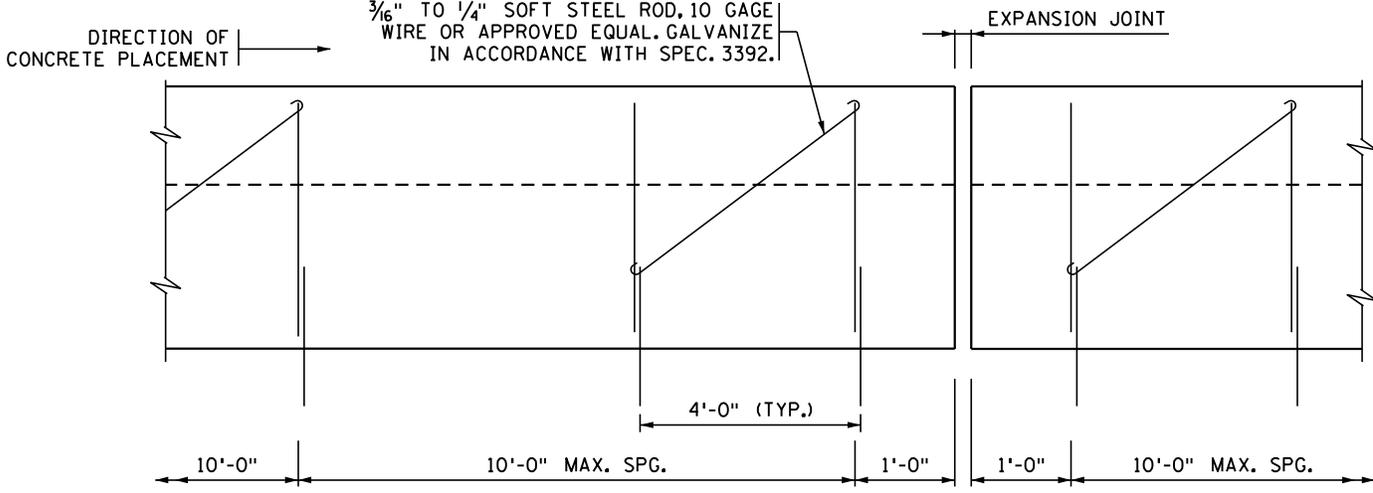
REVISION
4-17-2013
8-24-2016
01-05-2017
05-10-2017
11-08-2018

DETAIL NO.

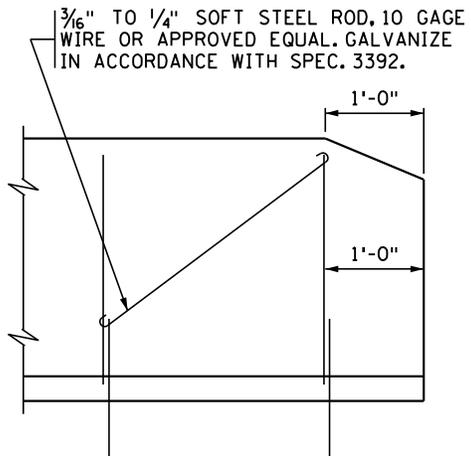
Nancy Subenberger
STATE BRIDGE ENGINEER

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

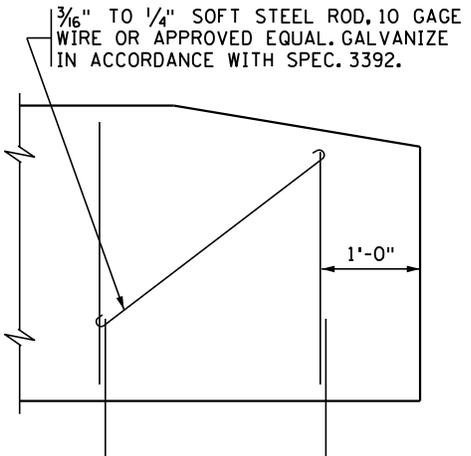
B816



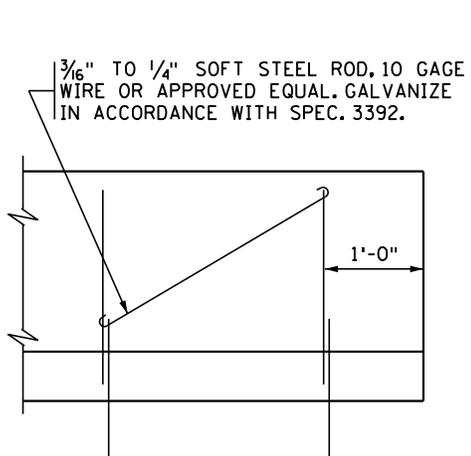
INSIDE ELEVATION OF BARRIER OR PARAPET



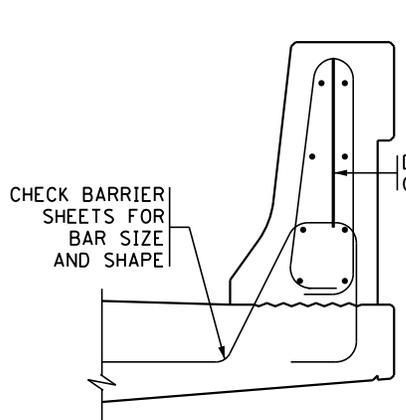
INSIDE ELEVATION OF F BARRIER AT END OF BARRIER



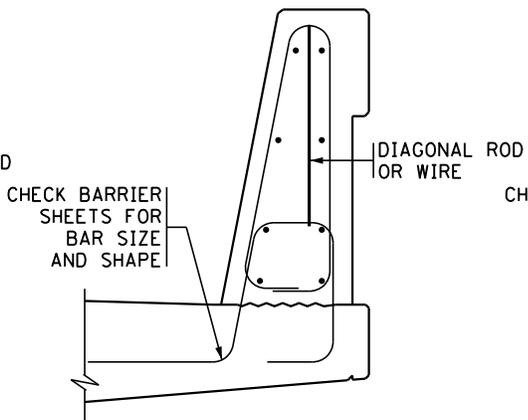
INSIDE ELEVATION OF S BARRIER AT END OF BARRIER



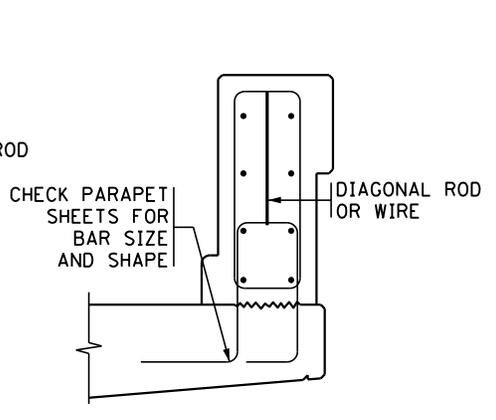
INSIDE ELEVATION OF PARAPET AT END OF PARAPET



F BARRIER SECTION



S BARRIER SECTION



PARAPET SECTION

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.

APPROVED: AUGUST 24, 2016

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

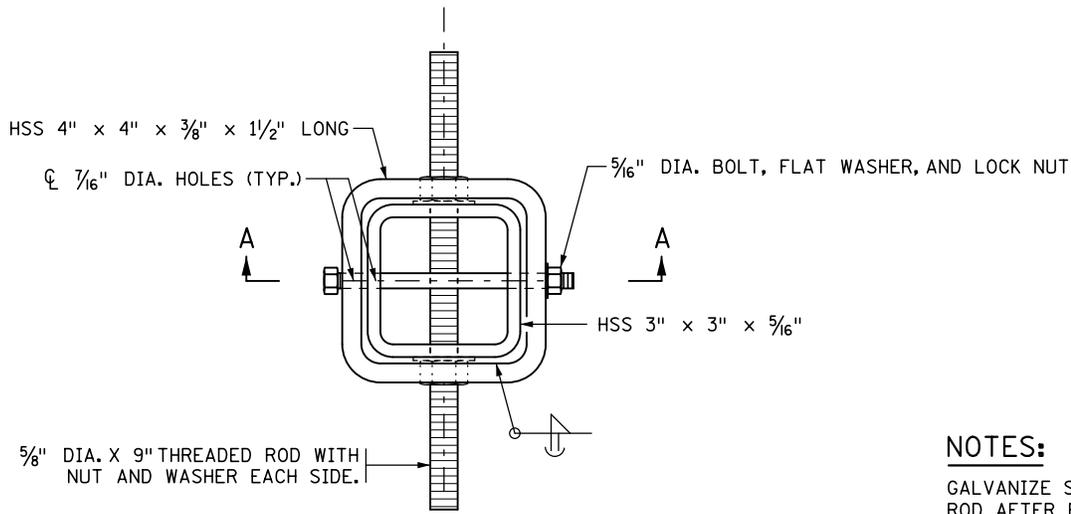
REVISION:
04-09-2020

DETAIL NO.

CONCRETE BARRIER OR PARAPET
(SLIPFORM ALTERNATE)

B830

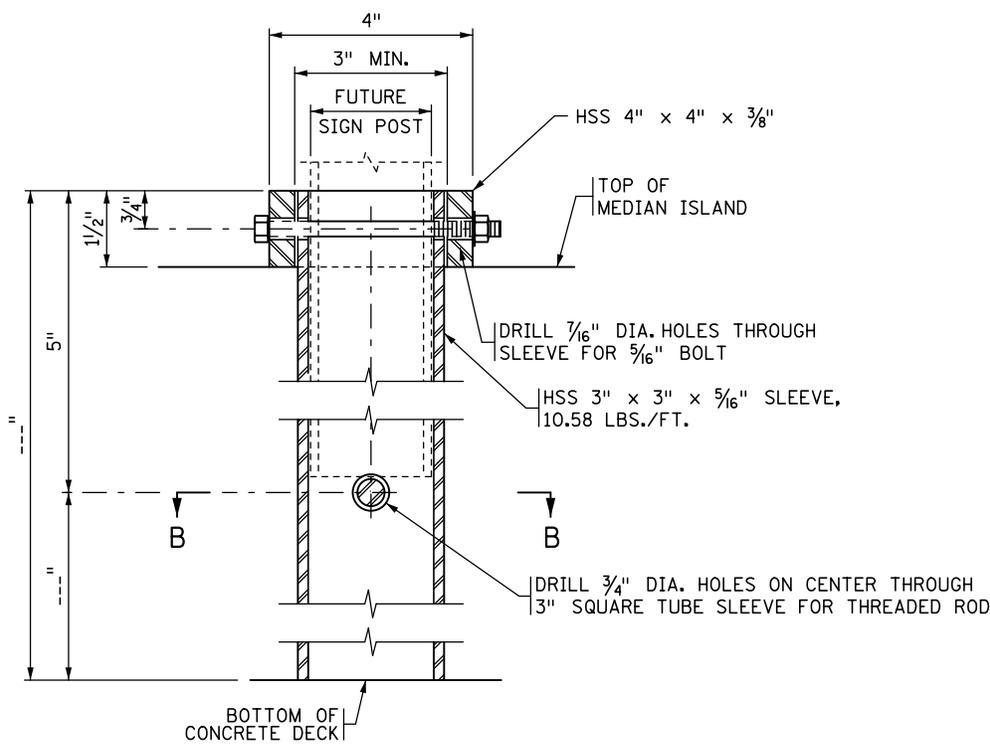
Kevin Weston
STATE BRIDGE ENGINEER



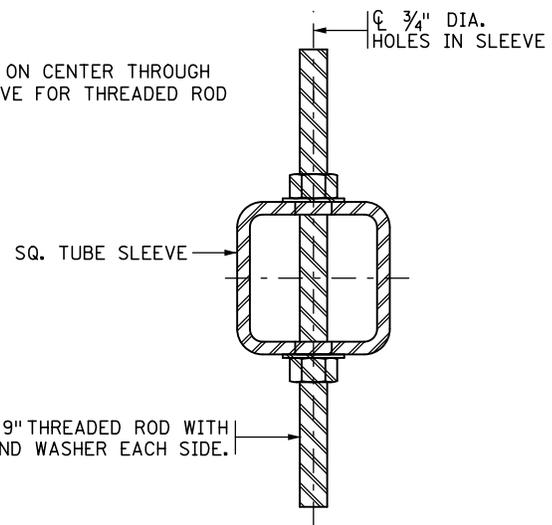
PLAN VIEW

NOTES:

GALVANIZE SIGN ANCHOR INCLUDING THREADED ROD AFTER FABRICATION PER SPEC. 3394
 PROVIDE STRUCTURAL STEEL TUBING PER SPEC. 3361, TYPE A, EXCEPT AS NOTED.



SECTION A-A



SECTION B-B

APPROVED: MAY 10, 2017

Kevin Westrom
 STATE BRIDGE ENGINEER

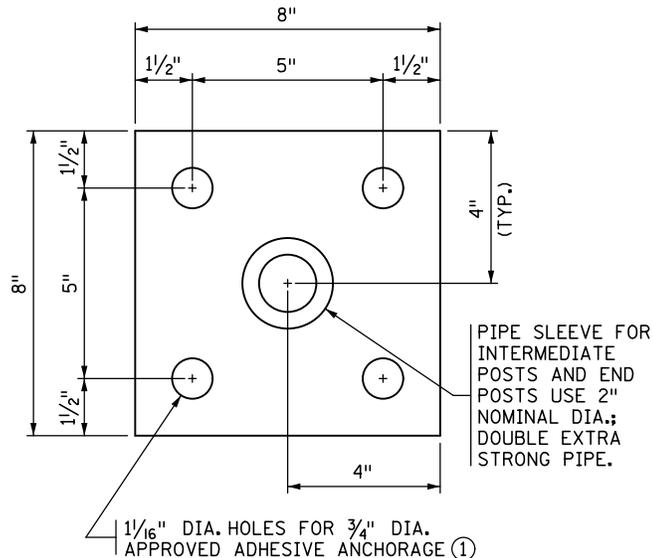
STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION

MEDIAN SIGN POST ANCHOR

REVISION

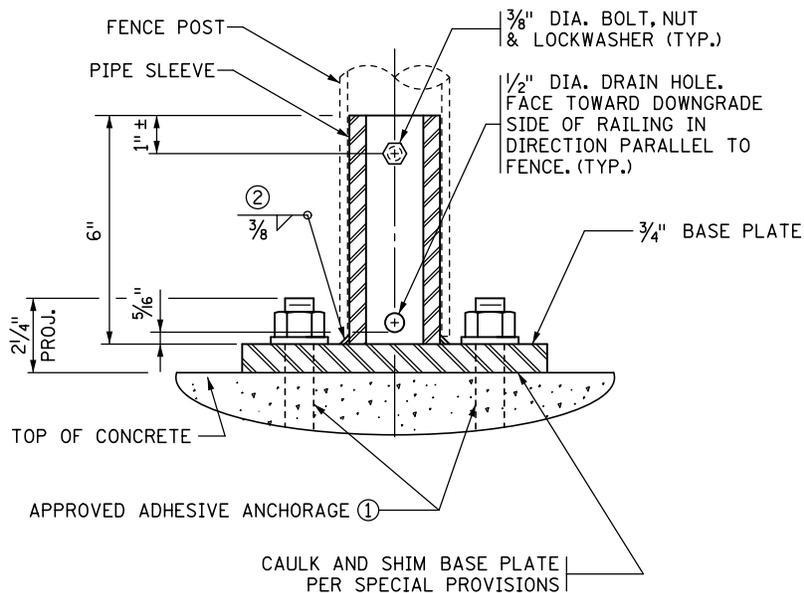
DETAIL NO.

B901



PLAN VIEW - TYPE A

ESTIMATED WEIGHT = 18 LBS.



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 3/4" 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 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 E70X 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

Kevin Westrom
STATE BRIDGE ENGINEER

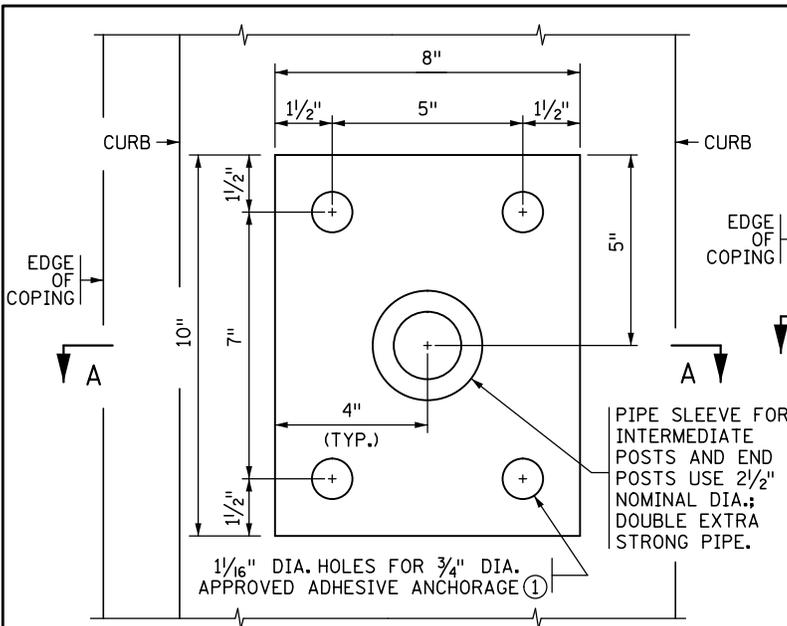
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

FENCE POST ANCHORAGE
(TYPE A)

REVISION

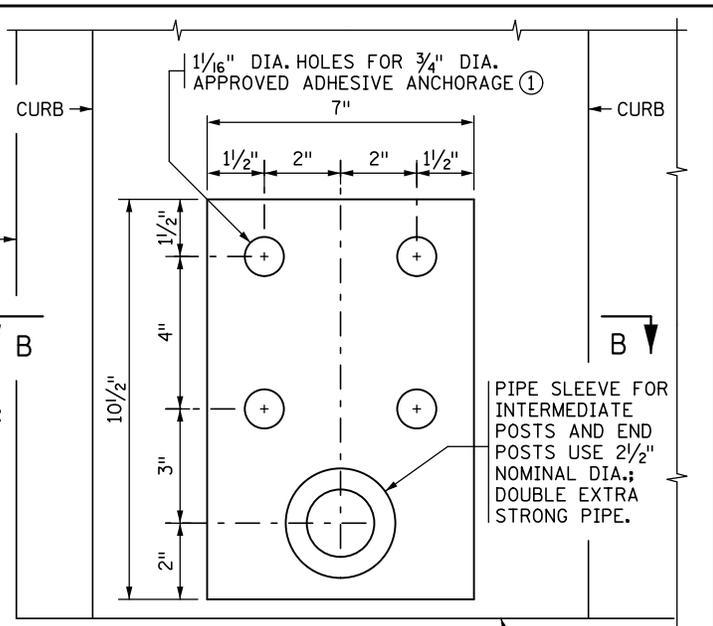
DETAIL NO.

B905



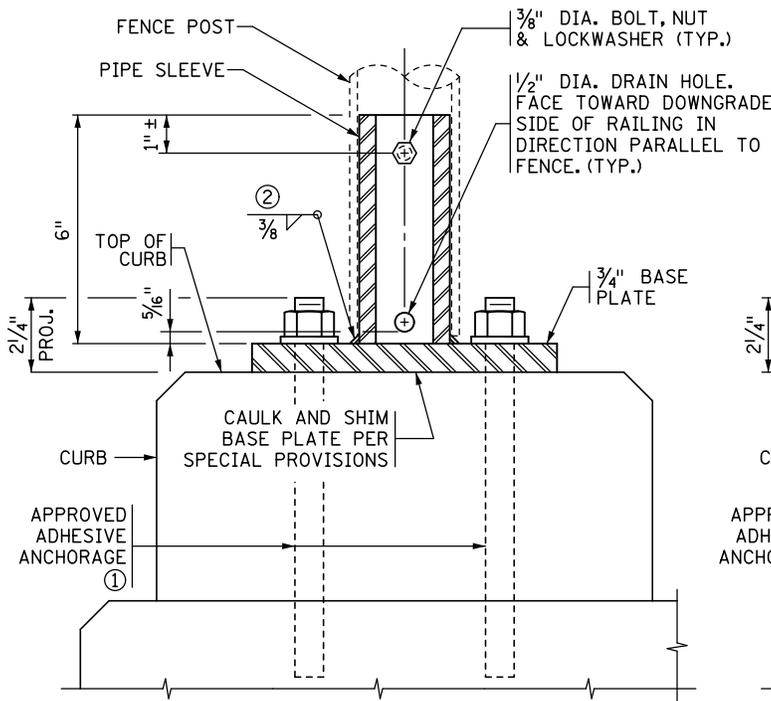
PLAN VIEW - TYPE B

ESTIMATED WEIGHT = 24 LBS.

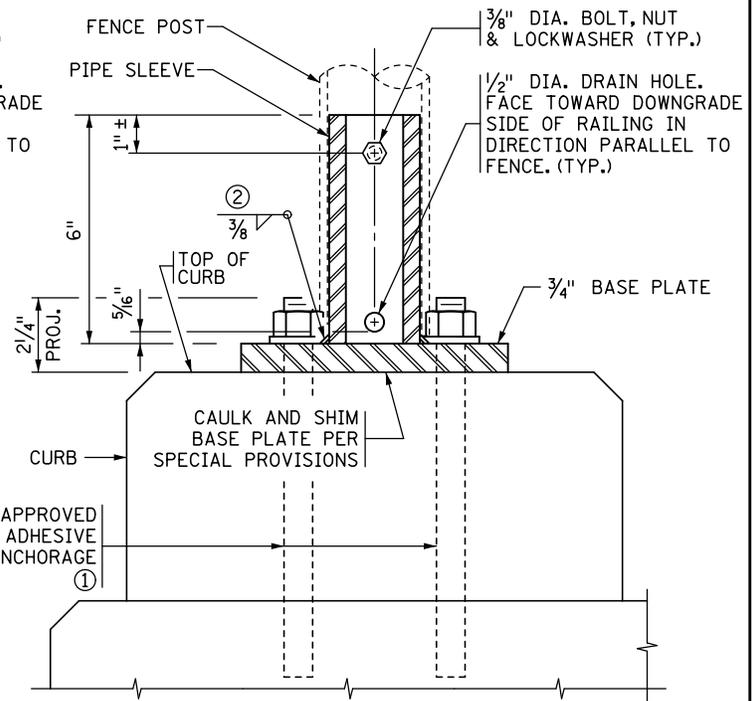


PLAN VIEW - TYPE C

ESTIMATED WEIGHT = 23 LBS.



SECTION A-A



SECTION B-B

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 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.
- ② E70X ELECTRODES FOR 3/8" POST TO BASE PLATE WELD.

DOUBLE EXTRA STRONG PIPE WEIGHTS;
2 1/2" NOMINAL DIA. = 13.69 LBS./FT.

APPROVED: JANUARY 05, 2017

Kevin Weston
STATE BRIDGE ENGINEER

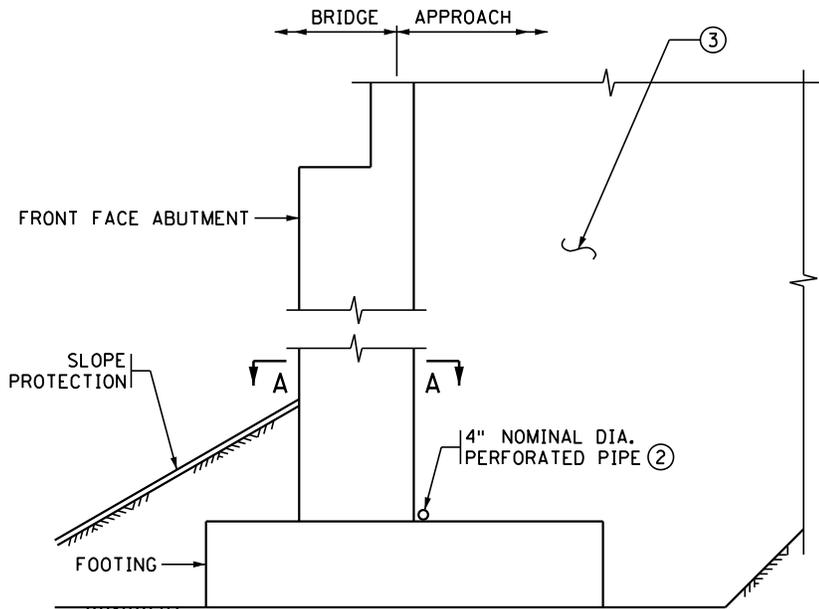
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

FENCE POST ANCHORAGE
(TYPE B AND C)

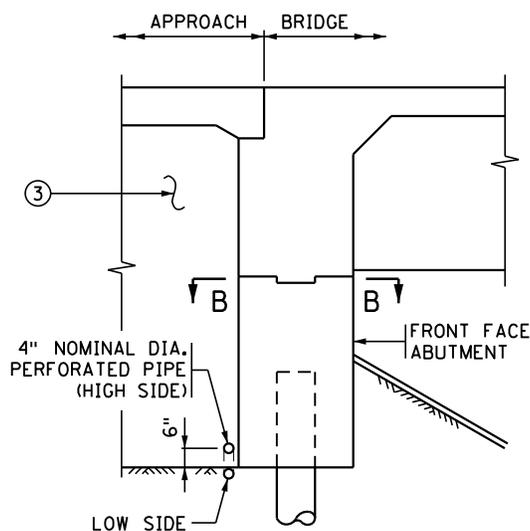
REVISION
05-10-2017

DETAIL NO.

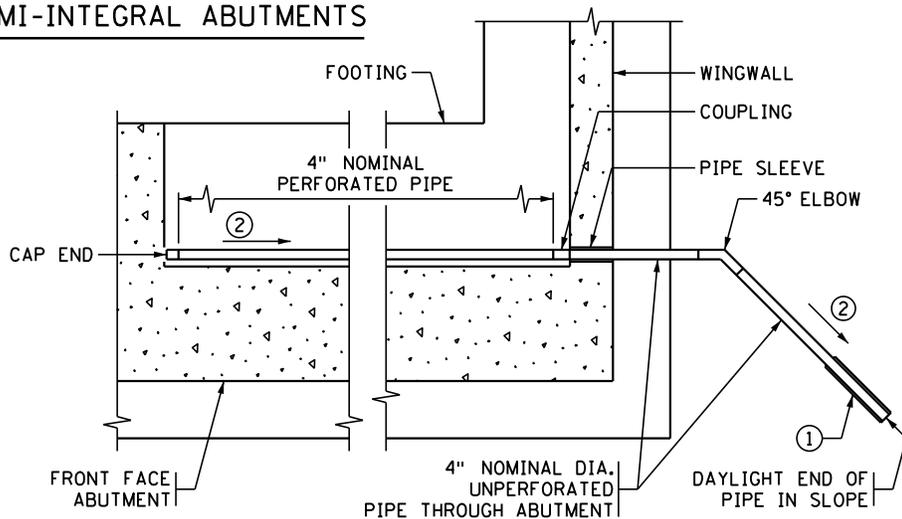
B906



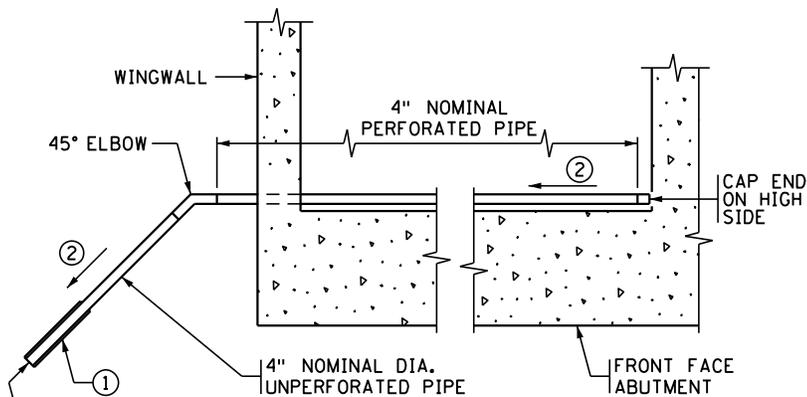
SECTION THROUGH PARAPET AND SEMI-INTEGRAL ABUTMENTS



SECTION THROUGH INTEGRAL ABUTMENT



SECTION A-A



SECTION B-B

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(6).

SLEEVE PERFORATED PIPE WITH GEOTEXTILE KNIT SOCK PER SPEC. 3733, TYPE 1. ATTACH TO PIPE PER SPEC. 2502.3.B.

① AT CONTRACTOR'S OPTION, TIE APPROACH PANEL DRAINAGE SYSTEM AND ABUTMENT DRAINAGE SYSTEM INTO A SINGLE PRECAST CONCRETE HEADWALL OR INTO A CATCH BASIN AS LONG AS A MINIMUM OF 1% POSITIVE SLOPE CAN BE MAINTAINED.

USE PRECAST CONCRETE HEADWALL WITH RODENT SCREEN. SEE STANDARD PLATE 3131 FOR DETAILS.

② 1/8" PER FT. MINIMUM SLOPE.

③ REFER TO GRADING PLANS FOR ABUTMENT BACKFILL REQUIREMENTS.

APPROVED: JANUARY 13, 2015

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

REVISED
12-02-2015
02-22-2018
11-08-2018

DETAIL NO.

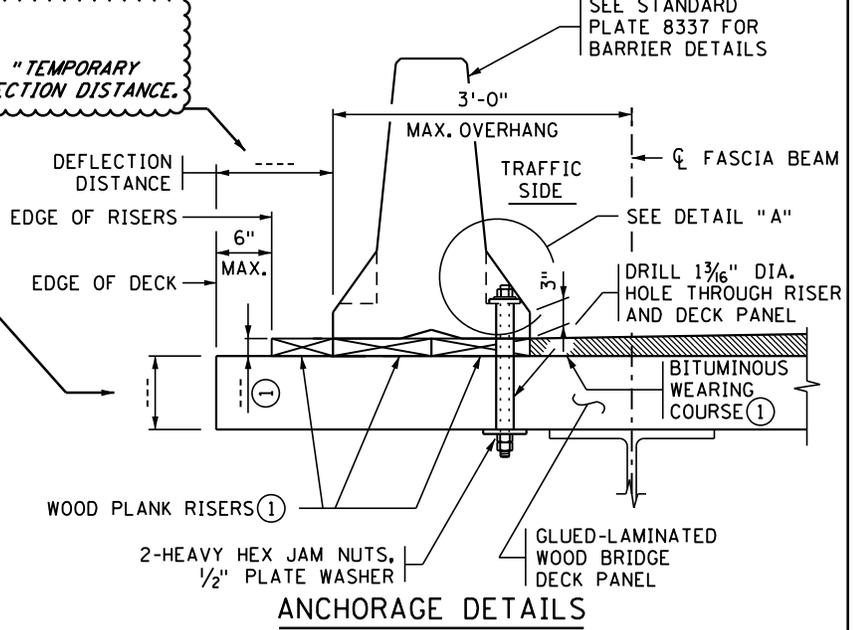
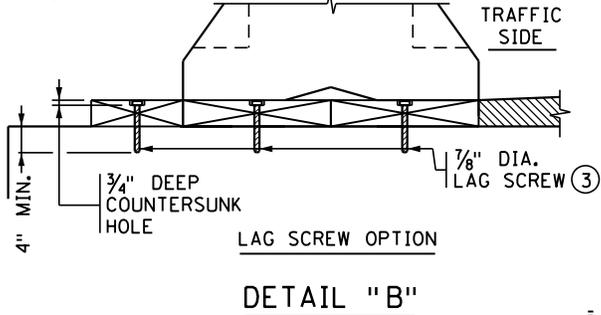
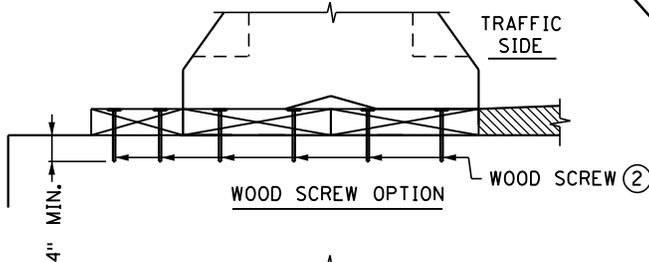
Nancy Subenberger
STATE BRIDGE ENGINEER

DRAINAGE SYSTEM

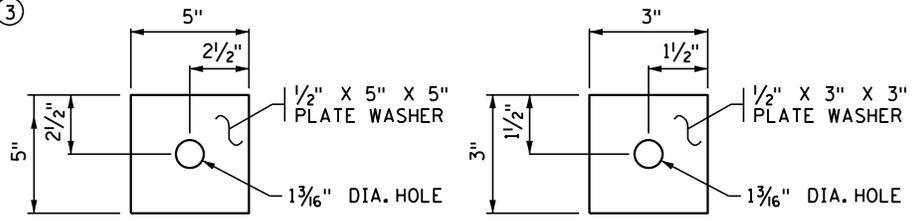
B910

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.

DESIGNER NOTE
 (REMOVE PRIOR TO PRINTING FINAL PLAN);
 MIN. THICKNESS FOR GLUED-LAMINATED WOOD BRIDGE DECK
 PANEL IS 5", REFER TO MNDOT BDM ARTICLE 2.4.1.3 FOR
 ADDITIONAL REQUIREMENTS.



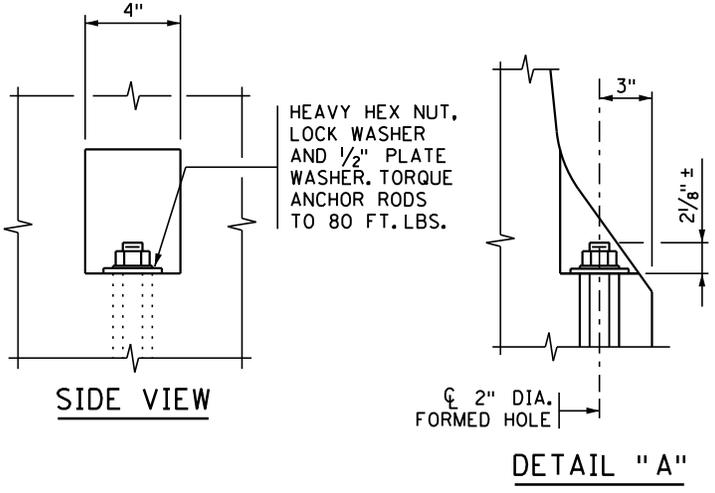
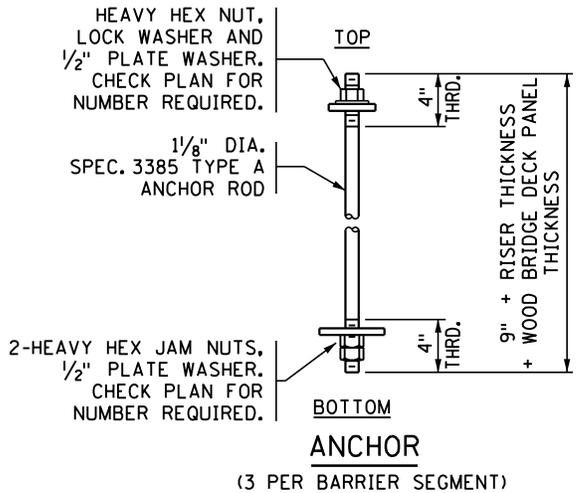
**ANCHORED BARRIER MEETS
 MASH TL-3 REQUIREMENTS**



BOTTOM PLATE WASHER **TOP PLATE WASHER**

DESIGNER NOTE (REMOVE PRIOR TO PRINTING FINAL PLAN);
 COORDINATE W/ROADWAY DESIGNER FOR LAYOUT AND PAYMENT.
 INSERT SPECIAL PROVISION 2433.B.D FOR INSTALLATION INSTRUCTIONS.

- 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.

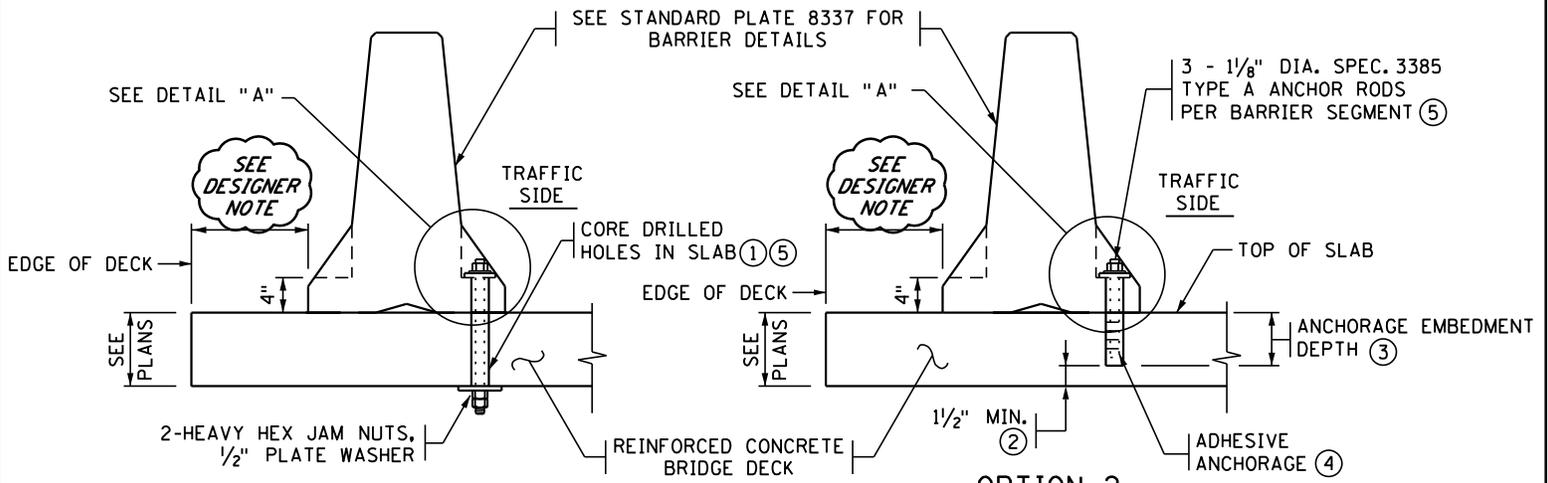


APPROVED: APRIL 09, 2020

 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)

REVISED DETAIL NO.
 B919



OPTION 1

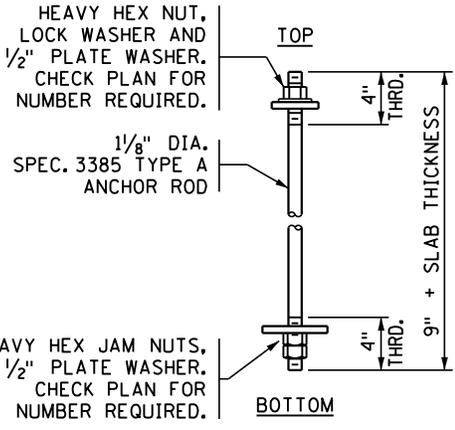
DO NOT USE ON NEW DECK

OPTION 2

ANCHORAGE DETAILS

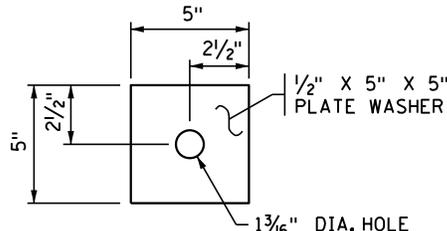
REINFORCEMENT NOT SHOWN

DESIGNER NOTE
 REMOVE PRIOR TO PRINTING FINAL PLAN.
 "DO NOT USE OPTION 1 ON NEW BRIDGE DECKS. USE OPTION 2 ONLY ON NEW DECKS OR WHERE THE EXISTING DECK CONCRETE IS IN CONDITION STATE 1 OR 2 AS CONFIRMED BY VISUAL INSPECTION IN AREAS OF ANCHORAGES BY THE REGIONAL CONSTRUCTION ENGINEER."



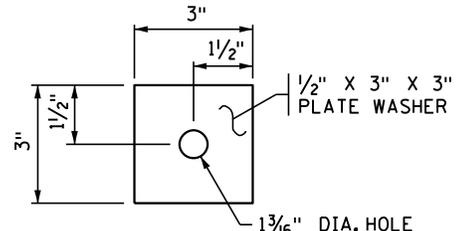
OPTION 1 ANCHOR

(3 PER BARRIER SEGMENT)



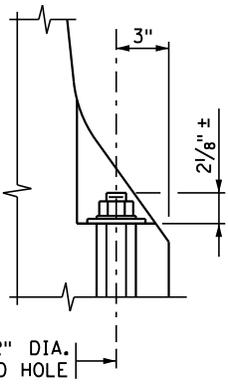
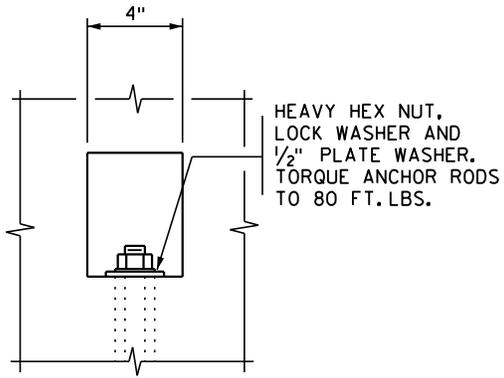
BOTTOM PLATE WASHER

(ONLY USED FOR OPTION 1)



TOP PLATE WASHER

ANCHORED BARRIER MEETS MASH TL-3 REQUIREMENTS



DETAIL "A"

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 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) 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 3/16" MIN., 1/2" MAX.

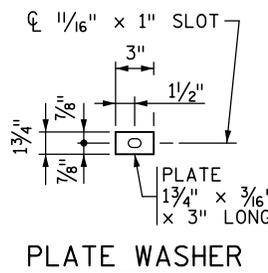
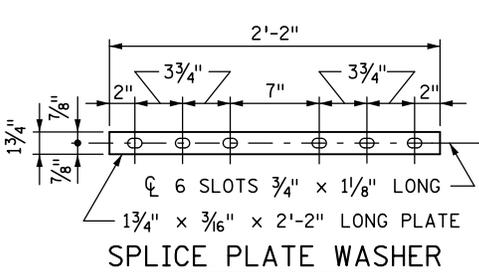
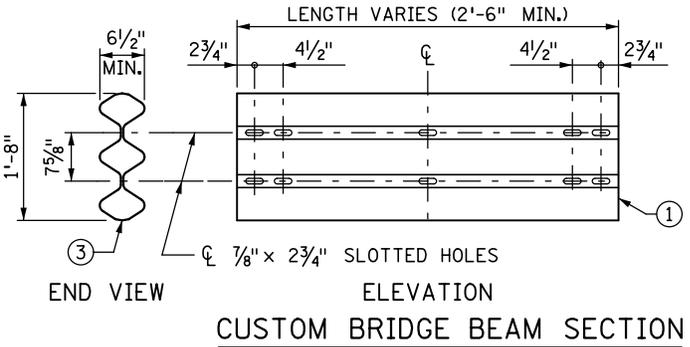
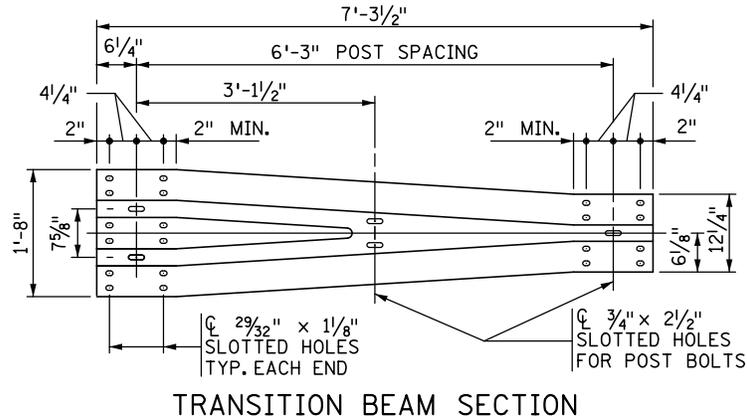
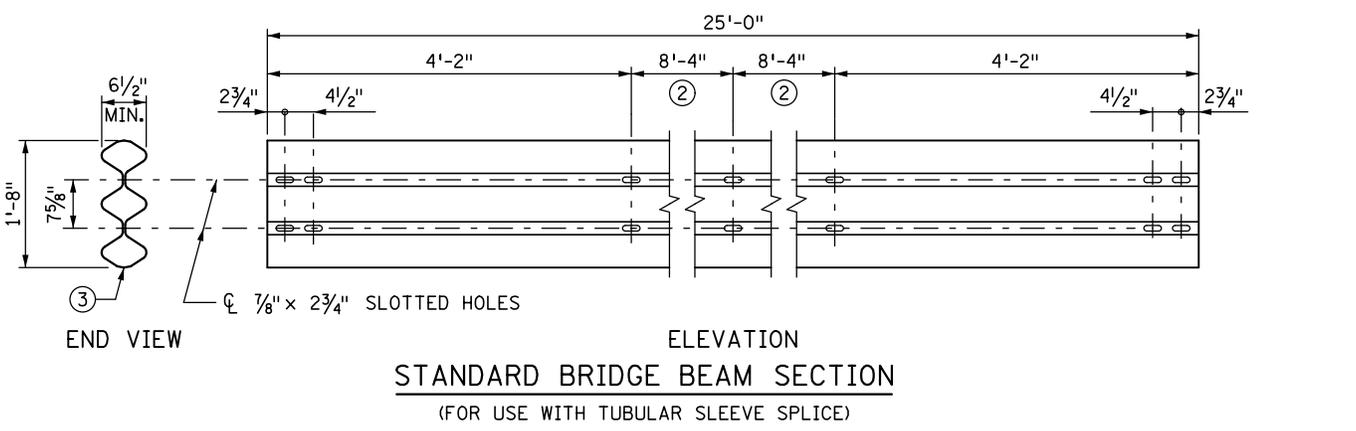
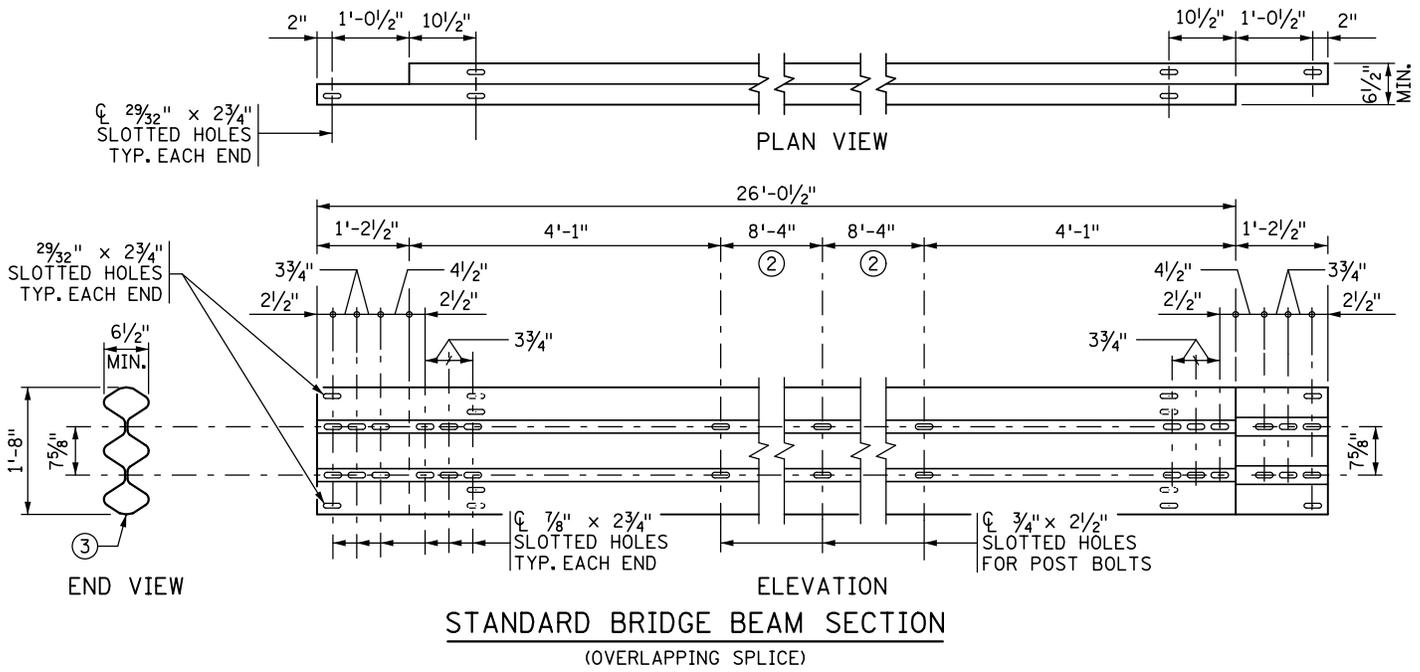
DESIGNER NOTE
 REMOVE PRIOR TO PRINTING FINAL PLAN.
 REFER TO MNDOT BDM "MEMO TO DESIGNERS #2019-01" AND "TEMPORARY BARRIER GUIDANCE MANUAL", TABLE 3-3 FOR GUIDANCE ON DEFLECTION DISTANCE.
 COORDINATE W/ROADWAY DESIGNER FOR LAYOUT AND PAYMENT. ADD SPECIAL PROVISION FOR "TEMPORARY PORTABLE PRECAST CONCRETE BARRIER ANCHORAGE INSTALLATION AND REMOVAL".

APPROVED: APRIL 09, 2020

 STATE BRIDGE ENGINEER

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



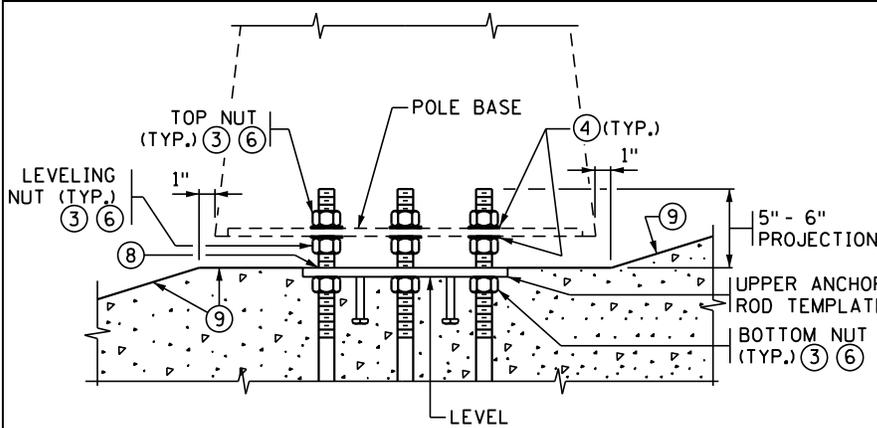
- NOTES:**
- FABRICATE TUBULAR TRIPLE BEAM RAIL SECTIONS BY WELDING TWO (2) 10 GAUGE TRIPLE BEAM RAIL ELEMENTS AS SHOWN.
 - CONSTRUCT TRAFFIC BARRIER PER SPEC. 2554, EXCEPT AS NOTED.
 - GALV. RAIL COMPONENTS PER SPEC. 3394 AFTER FABRICATION.
 - PROVIDE TRIPLE AND PLATE BEAM GUARDRAIL HARDWARE DIMENSIONS AND BOLT SPACING PER AASHTO M180.
 - 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.

APPROVED: NOVEMBER 22, 2002
Ramirez
 STATE BRIDGE ENGINEER

STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION
 TRIPLE BEAM GUARDRAIL

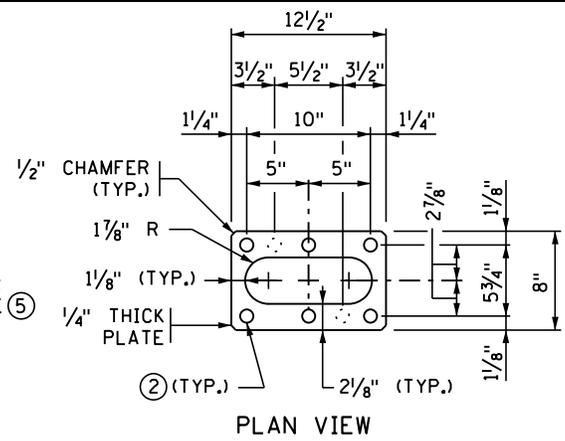
REVISION
 01-05-2017

DETAIL NO.
 B935

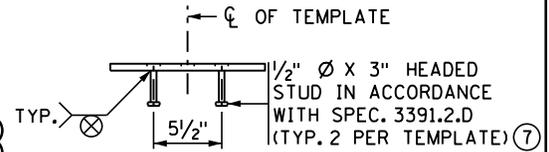


PARTIAL ELEVATION

(SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION)

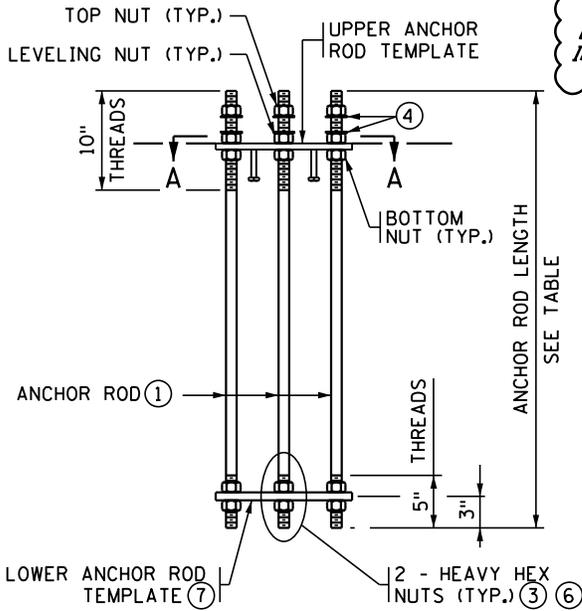


PLAN VIEW



**ELEVATION VIEW
SECTION A-A
ANCHOR ROD TEMPLATE**

*DESIGNER NOTE (REMOVE PRIOR TO PRINTING FINAL PLAN):
DESIGNER TO ENSURE REINFORCEMENT IN BARRIER OR PARAPET CAN DEVELOP YIELD STRENGTH OF ANCHOR RODS.*



ANCHOR ROD ASSEMBLY

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.

- ① PROVIDE 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.
- ② 1/16" Ø HOLE FOR 1" NOMINAL DIA. ANCHOR ROD, 15/16" Ø HOLE FOR 1/4" NOMINAL DIA. ANCHOR ROD.
- ③ HEAVY HEX NUTS IN ACCORDANCE WITH SPEC. 3391.2.A (30 REQ'D PER ASSEMBLY)
- ④ FLAT WASHERS IN ACCORDANCE WITH SPEC 3391.2.A (12 REQ'D PER ASSEMBLY)
- ⑤ 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.
- ⑥ USE A 12" LONG WRENCH TO SNUG TIGHTEN NUTS PULLING THE HANDLE WITH ONE ARM IN ONE SMOOTH MOTION.
- ⑦ OMIT HEADED STUDS ON LOWER ANCHOR ROD TEMPLATE.
- ⑧ 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.
- ⑨ CAST LEVEL CONCRETE SURFACE BENEATH LIGHT FIXTURE. SLOPE ADJACENT CONCRETE, AS SHOWN ON SLOPED OR SUPERELEVATED BRIDGES.

STANDARD BARRIER AND PARAPET TYPES (SEE PLANS FOR TYPE)	ANCHOR ROD LENGTH
36" TYPE "S" W/O CONCRETE WEARING COURSE *	3'-5"
36" TYPE "S" W/ CONCRETE WEARING COURSE *	3'-5"
42" TYPE "S" W/O CONCRETE WEARING COURSE *	3'-11"
42" TYPE "S" W/ CONCRETE WEARING COURSE *	3'-11"
54" TYPE "S" W/O CONCRETE WEARING COURSE *	4'-11"
54" TYPE "S" W/ CONCRETE WEARING COURSE *	4'-11"
32" TYPE "F" W/O CONCRETE WEARING COURSE	3'-3"
32" TYPE "F" W/ CONCRETE WEARING COURSE	3'-3"
32" TYPE "F" MEDIAN W/O CONC. WEARING COURSE	3'-1"
32" TYPE "F" MEDIAN W/ CONC. WEARING COURSE	3'-3"
32" TYPE "F" ON RETAINING WALL	3'-1"
36" TYPE "S" ON RETAINING WALL	3'-5"
32" CONCRETE PARAPET (TYPE P4) W/O CONC. W. C.	3'-1"
32" CONCRETE PARAPET (TYPE P4) W/ CONC. W. C.	3'-1"

* USE SAME ANCHOR ROD LENGTH FOR TYPE "S" SPLIT OR SOLID MEDIAN BARRIERS.

APPROVED: APRIL 09, 2020

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

REVISED

DETAIL NO.

ANCHOR ROD ASSEMBLY FOR LIGHT POLES

B950

Kevin Westrom
STATE BRIDGE ENGINEER