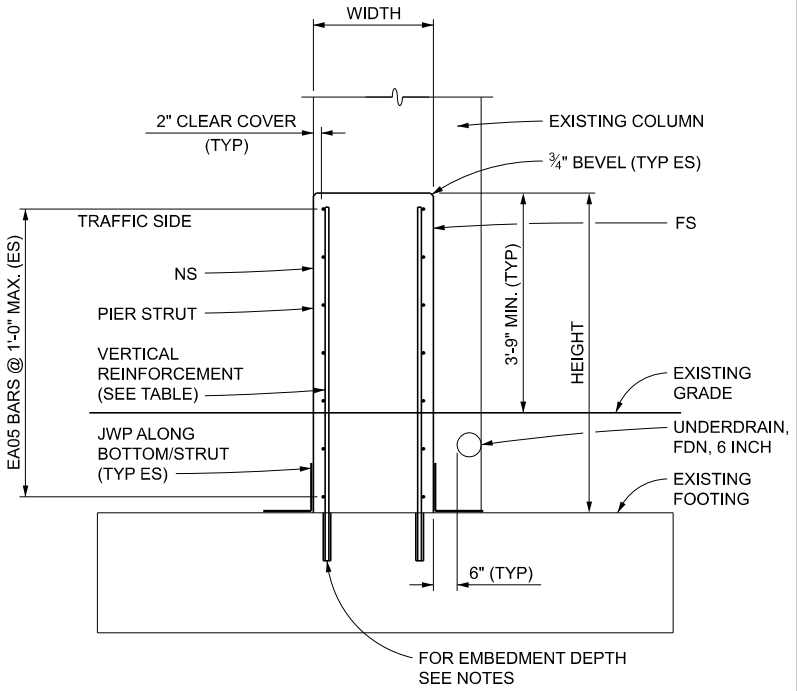
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 10/26/26
CHECKED BY: CWC	PIER STRUT RETROFIT	SUPERSEDES: 08/25/25
APPROVED BY: BMW		

PIER STRUT RETROFIT REINFORCED CONCRETE DESIGN			
HEIGHT (FT)	WIDTH (FT)	VERTICAL REINFORCEMENT (IN^2/FT)	APPLIED TENSION LOAD (KIP/FT)
5.0	1.5	1.11	60
6.0	2.0	0.90	52
7.0	2.0	1.11	61
8.0	2.5	0.94	54
9.0	2.5	1.11	61
10.0	3.0	0.95	56
11.0	3.0	1.05	61
12.0	3.0	1.18	67



PIER STRUT SECTION

NOTES:

NS DENOTES NEAR SIDE, FS DENOTES FAR SIDE, AND ES DENOTES EACH SIDE.

DETAILS INCLUDED IN THIS GUIDE MAY BE USED TO RETROFIT EXISTING BRIDGE PIERS THAT MEET ONE OF THE CONDITIONS OUTLINED IN BRIDGE DESIGN MANUAL SECTION 6.08.08.

INFORMATION PROVIDED IN THE TABLE APPLIES WHEN THE LENGTH OF THE PIER STRUT IS LESS THAN THE CRITICAL WALL LENGTH OVER WHICH THE YIELD LINE MECHANISM OCCURS (Lc). IF THE LENGTH OF THE PIER STRUT EXCEEDS Lc, DESIGN THE REINFORCEMENT IN ACCORDANCE WITH AASHTO LRFD SECTION A13.3.1. FOR DEFINITIONS OF YIELD LINE MECHANISM AND Lc SEE AASHTO LRFD A13.3.1.

AT MEDIAN PIERS, PLACE VERTICAL REINFORCEMENT, SPECIFIED IN THE TABLE, IN BOTH FACES OF THE PIER STRUT. THE WIDTH OF THE STRUT AT MEDIAN PIERS SHOULD MATCH THE WIDTH/DIAMETER OF THE EXISTING PIER COLUMNS.

VERTICAL ADHESIVE ANCHORS IN THE PIER FOOTING MUST BE DESIGNED FOR THE APPLIED TENSION (SEE TABLE) AND SHEAR LOADS USING THE DESIGN STRENGTH OF THE CONCRETE IN THE PIER FOOTING AND ASSUMING A CRACKED SECTION. THE ADHESIVE SYSTEM AND MINIMUM EMBEDMENT DEPTH OF THE VERTICAL REINFORCING ANCHORED INTO THE FOOTING IS REQUIRED TO MEET THE PROVISIONS OF BRIDGE DESIGN MANUAL SECTION 7.06.02.B.

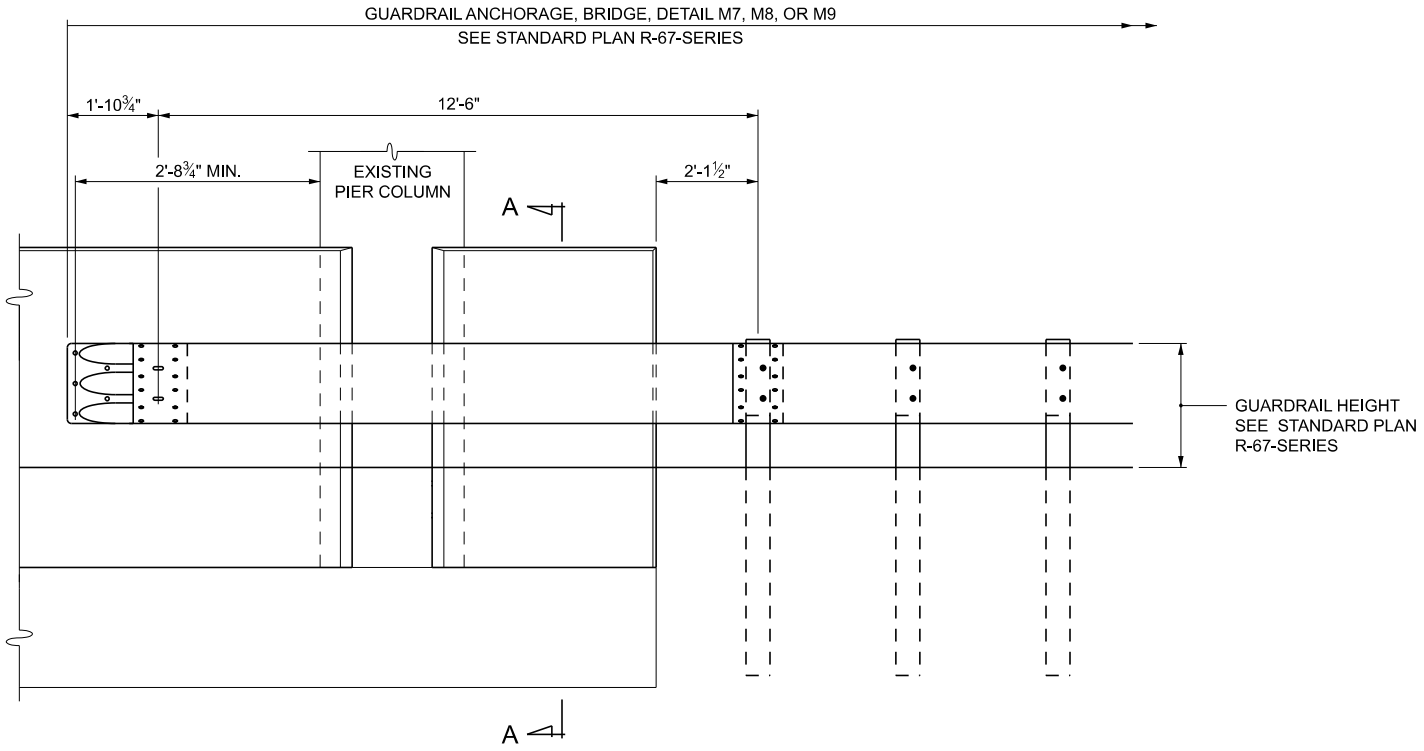
PIER STRUTS WITH HEIGHTS AND WIDTHS OTHER THAN THOSE LISTED IN THE PIER STRUT RETROFIT REINFORCED CONCRETE DESIGN TABLE SHALL BE DESIGNED IN ACCORDANCE WITH AASHTO LRFD SECTION 3.6.5.

PLACE ½" JOINT FILLER BETWEEN PIER COLUMNS OR STRUTS AND SLOPE PAVING OR HEADER. FOR SLOPE PAVING DETAILS AT THE INTERFACE WITH PIER COLUMNS OR STRUTS, SEE STANDARD PLAN B-102-SERIES.

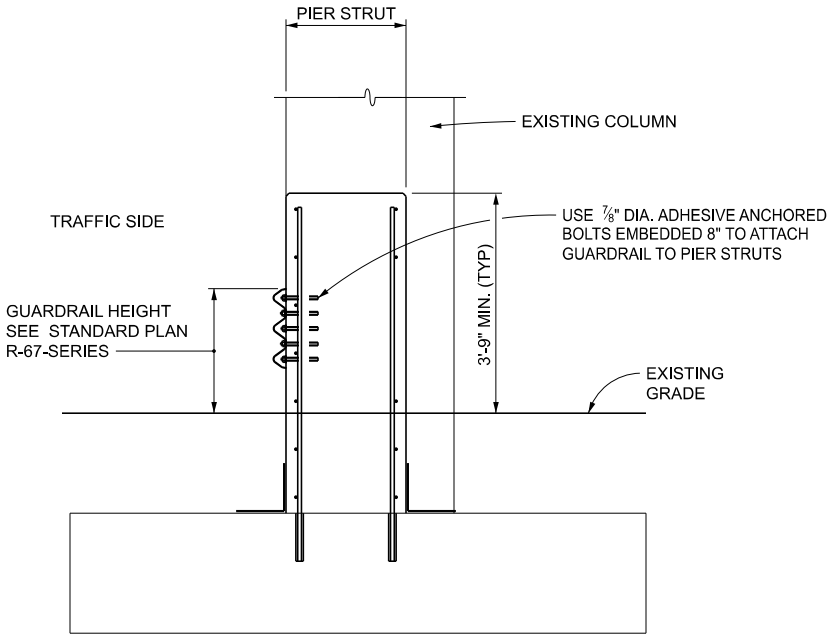
INCLUDE PAY ITEMS FOR UNDERDRAIN OUTLET AND UNDERDRAIN OUTLET ENDINGS. FOR UNDERDRAIN AND OUTLET ENDING DETAILS SEE STANDARD PLAN R-80-SERIES.

PREPARED BY DESIGN DIVISION	5.22.02A

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 02/26/24
CHECKED BY: VZ	PIER STRUT RETROFIT	SUPERSEDES:
APPROVED BY: KCK		



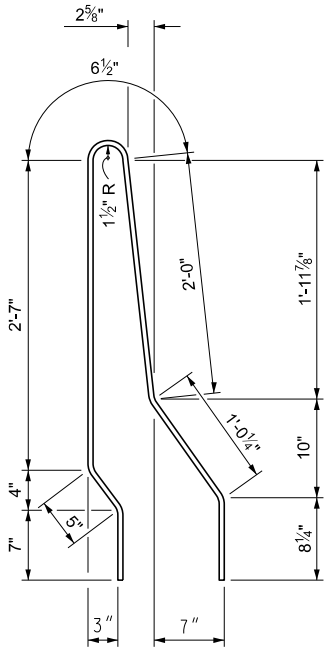
PIER STRUT ELEVATION
(SEE STANDARD PLAN R-67-SERIES FOR GUARDRAIL ATTACHMENT DETAILS)



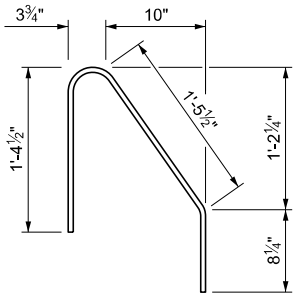
SECTION A-A

PREPARED BY DESIGN DIVISION	5.22.02B

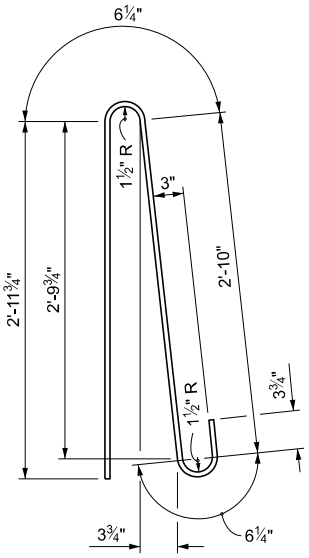
DRAWN BY: BLT CHECKED BY: CWC APPROVED BY: BMW	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT BRIDGE BARRIER RAILING, TYPE 4 FOR RAILING REPAIR	ISSUED: 10/26/26 SUPERSEDES: 01/27/25



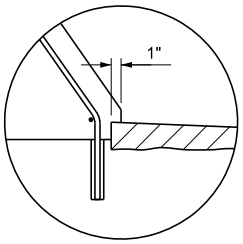
EG040710



EZ040310



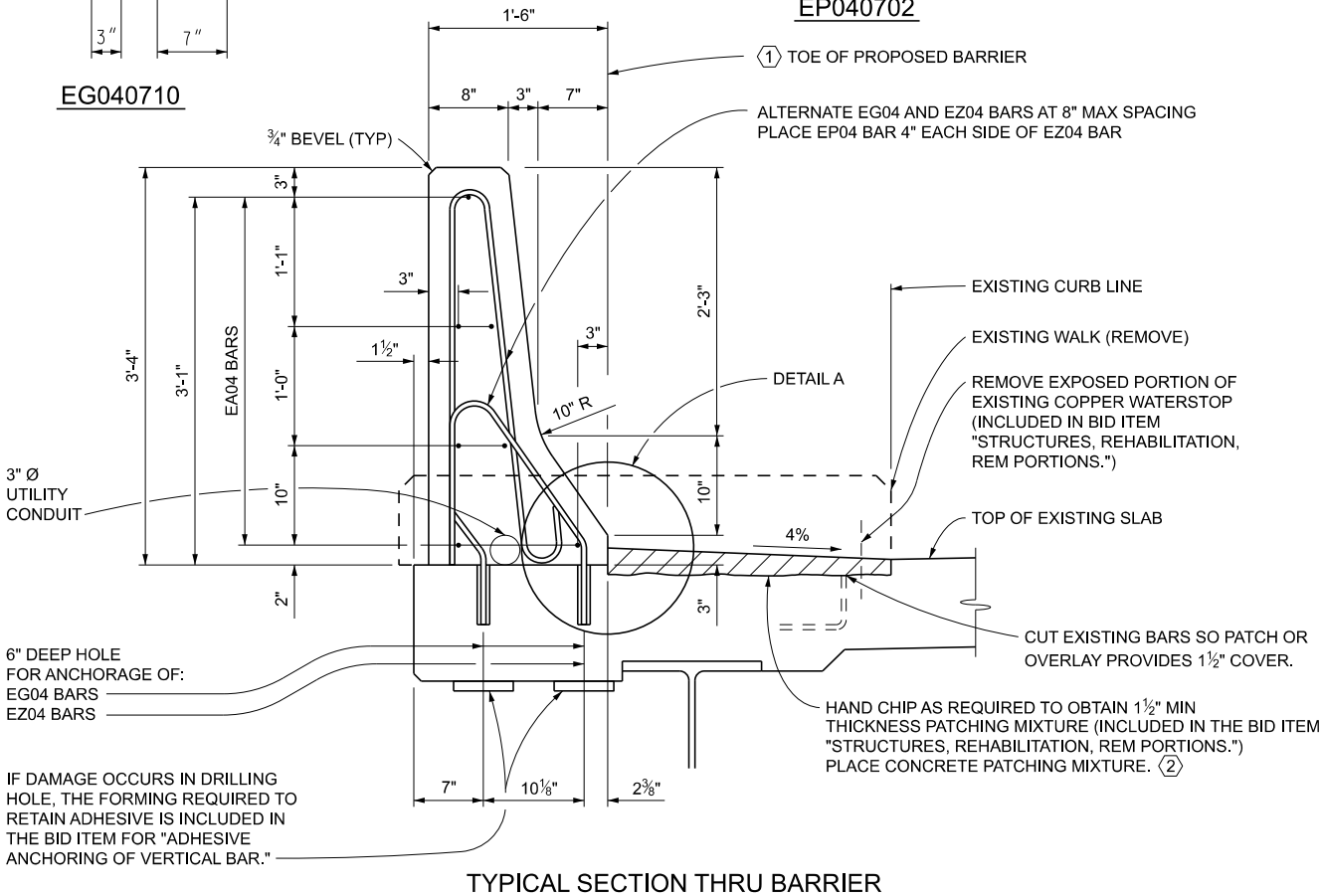
EP040702



DETAIL A

(OPTIONAL)

CONTRACTOR MAY PLACE OVERLAY PRIOR TO PLACEMENT OF BARRIER. ADDITIONAL OVERLAY MATERIAL NEEDED SHALL BE AT CONTRACTOR'S EXPENSE.



TYPICAL SECTION THRU BARRIER

DO NOT PLACE MORE THAN ONE 3" Ø UTILITY CONDUIT IN THE BARRIER.

HAND CHIPPING IN FRONT OF BARRIER IS NOT REQUIRED WHEN PROJECT INCLUDES CONCRETE OVERLAY.

1 PERPENDICULAR TO PLANE OF SLAB - NORMAL CROWN SECTIONS AND HIGH SIDE OF SUPERELEVATED SECTIONS.
VERTICAL - LOW SIDE OF SUPERELEVATED SECTIONS.

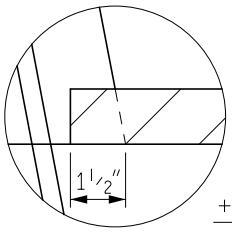
2 PLAN QUANTITIES SHOULD SHOW PATCHING MIXTURE TO BE "PATCHING MORTAR OR CONCRETE."

NOTE:
DO NOT USE THIS GUIDE FOR FULL BRIDGE BARRIER REPLACEMENT.

FOR PERMISSIBLE USES OF BRIDGE BARRIER RAILING REPAIRS SEE BRIDGE DESIGN MANUAL SECTION 6.05.05.

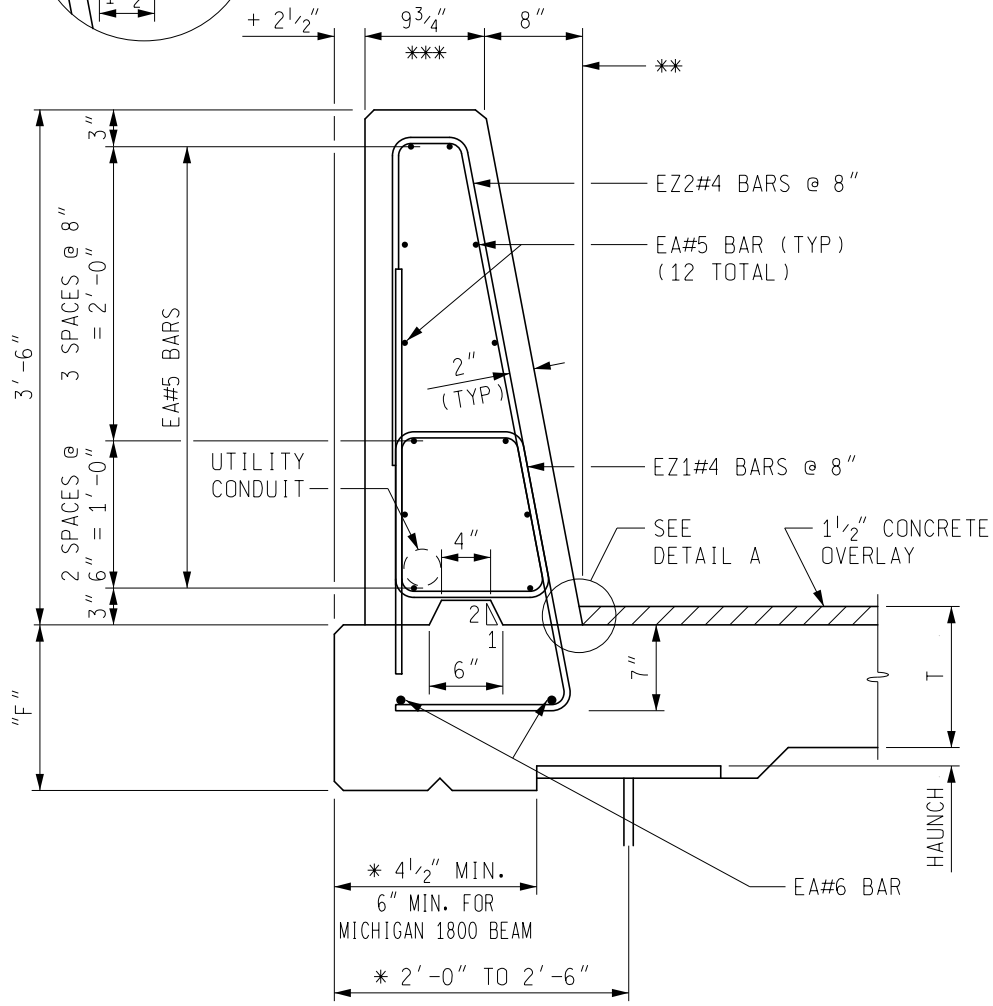
PREPARED BY DESIGN DIVISION	6.29.09A

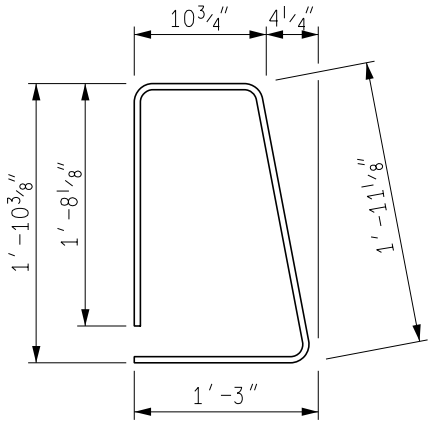
DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: BMW	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT BRIDGE BARRIER RAILING TYPE 6 TWO STAGE DECK	ISSUED: 12/16/19 SUPERSEDES: 02/14/11



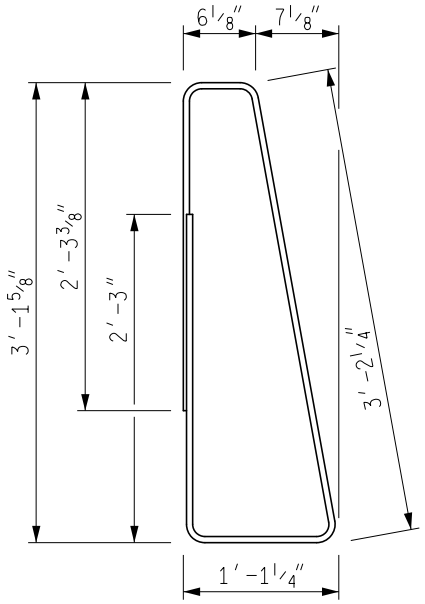
DETAIL A - OPTIONAL

CONTRACTOR MAY PLACE OVERLAY PRIOR TO PLACEMENT OF BARRIER. ADDITIONAL OVERLAY MATERIAL NEEDED SHALL BE AT CONTRACTOR'S EXPENSE.





EZ1#4 BAR



EZ2#4 BAR

NOTE:

"F" EQUALS SLAB THICKNESS, MINUS SECOND STAGE, PLUS THICKEST FASCIA BEAM FLANGE, PLUS 1/2", PLUS AMOUNT OF FASCIA BEAM DROP REQUIRED TO MAINTAIN MINIMUM THICKNESS AT CURB PLUS HAUNCH (1").

IF "F" BECOMES GREATER THAN 12" USE A HAUNCH DETAIL ON THE FASCIA SIDE OF THE BEAM SIMILAR TO THE HAUNCH DETAIL ON THE INTERIOR SIDE. ADDITIONAL REINFORCEMENT MAY BE REQUIRED IN THE AREA OVER THE BEAM FLANGE IF THE HAUNCH BECOMES EXCESSIVE.

BARS WITH PREFIX "E" ARE TO BE EPOXY COATED.

FOR ADDITIONAL DETAILS OF RAILING, SEE STANDARD PLAN B-29-SERIES.

DO NOT PLACE MORE THAN ONE 3" Ø UTILITY CONDUIT IN THE BARRIER.

* IT IS PREFERRED TO POSITION THE FASCIA BEAM TO CARRY THE SCREED RAIL WHICH WILL BE 6" TO 8" FROM THE EZ BAR. HOWEVER, 4 1/2" MINIMUM WILL APPLY TO CURVED GIRDERS ONLY.

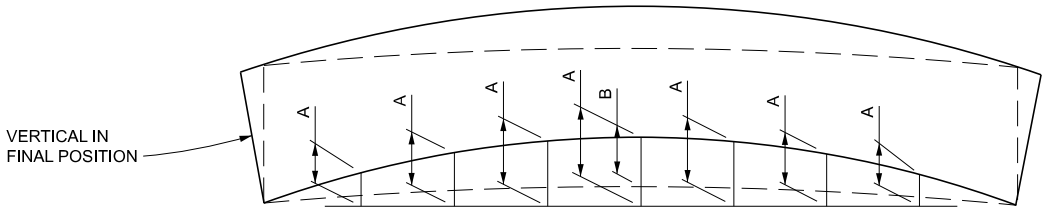
** PERPENDICULAR TO PLANE OF SLAB - NORMAL CROWN SECTION AND HIGH SIDE OF SUPERELEVATED SECTIONS. VERTICAL - LOW SIDE OF SUPERELEVATED SECTIONS.

*** 10 3/4" BRIDGE BARRIER RAILING AESTHETIC TYPE 6, DET 2.

\+ BACK OF BARRIER TO SLAB FASCIA MAY BE DECREASED TO 1 1/2" (FROM 2 1/2") AND TOE OF BARRIER SHIFTED ACCORDINGLY TO ACCOMMODATE THE NEED FOR INCREASED OR MAINTAINING SHOULDER WIDTHS. DISTANCE TO BE DETAILED ON THE PLANS.

PREPARED BY DESIGN DIVISION	6.29.09D

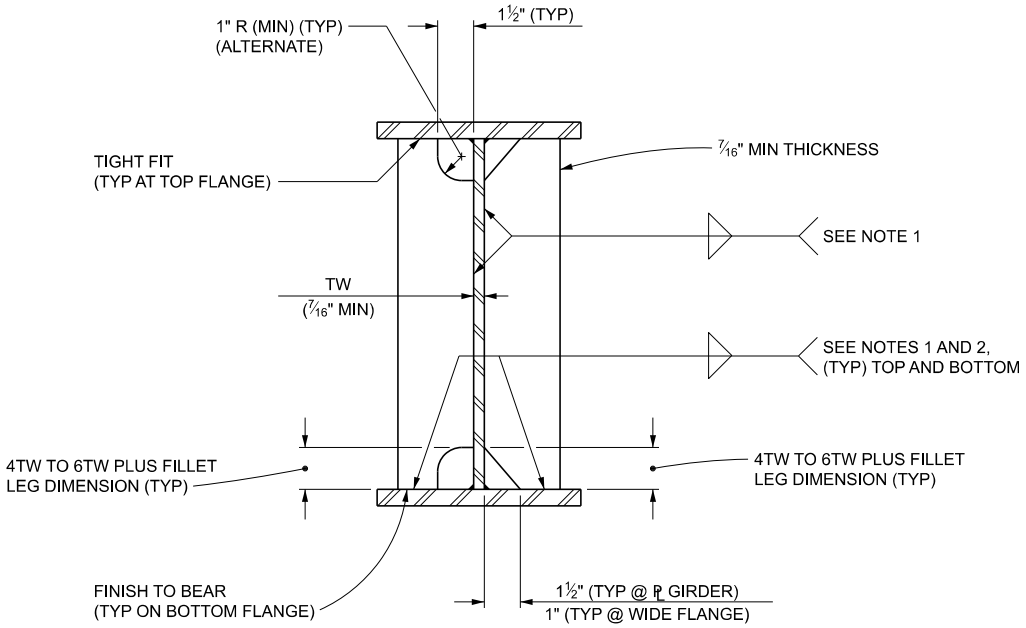
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 04/28/25
CHECKED BY: CWC	WELDED GIRDER, CAMBER DIAGRAM AND STIFFENER DETAILS	SUPERSEDES: 02/16/16
APPROVED BY: KCK		



WEBS - CAMBER DIAGRAM

A = TOTAL CAMBER REQUIRED WITH GIRDER LYING ON ITS SIDE. (PROVIDE CAMBER ORDINATES AT A SPACING OF APPROXIMATELY 10'.)

B = DEFLECTION OF ℄ GIRDER DUE TO ITS OWN WEIGHT, CENTER ONLY.



BEARING STIFFENERS

NOTE 1: STOP WELD ¼" SHORT OF CORNER CLIPS
NOTE 2: WRAP WELD AROUND OUTSIDE EDGE

NOTES TO DESIGNER:

ALL BEARING STIFFENERS, WHETHER FOR PLATE GIRDERS OR ROLLED BEAMS, SIMPLE OR CONTINUOUS, SHALL BE GIVEN THE TREATMENT SHOWN ABOVE.

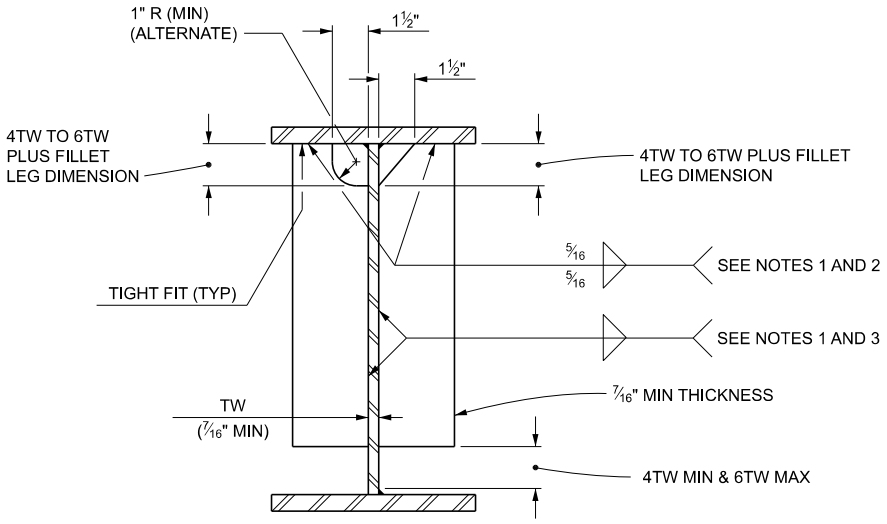
DESIGNER MUST INSURE THAT THE FATIGUE REQUIREMENTS OF AASHTO ARE MET.

STIFFENER TO WEB WELD MUST TRANSMIT END REACTION TO WEB.

FIT AND FINISH OF STIFFENER MUST MEET REQUIREMENTS OF AWS D1.5

PREPARED BY DESIGN DIVISION	8.06.02

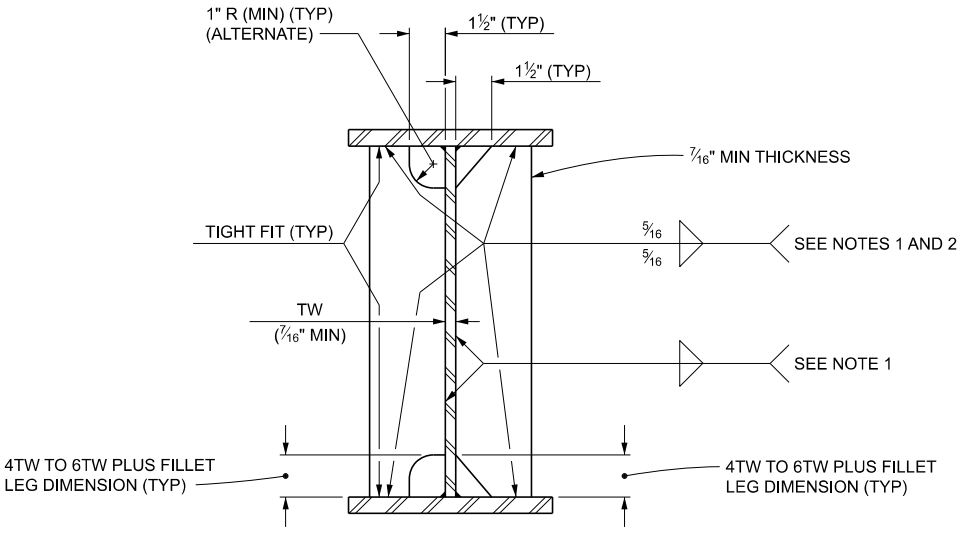
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 02/16/16
CHECKED BY: VZ	WELDED GIRDER AND STIFFENER DETAILS	SUPERSEDES: 05/04/06
APPROVED BY: DAJ		

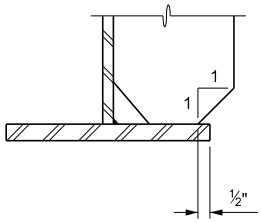


INTERMEDIATE TRANSVERSE STIFFENERS

NOTE 1: STOP WELD ¼" SHORT OF CORNER CLIP
NOTE 2: WRAP WELD AROUND OUTSIDE EDGE
NOTE 3: WRAP WELD AROUND STIFFENER END NOT WELDED TO FLANGE

NOTES:
WELD TO COMPRESSION FLANGE.
DESIGNER MUST INSURE THAT THE FATIGUE REQUIREMENTS OF AASHTO ARE MET.
EITHER BEVEL OR J COPE HOLES MUST BE USED ON A PARTICULAR PROJECT.





DETAIL A

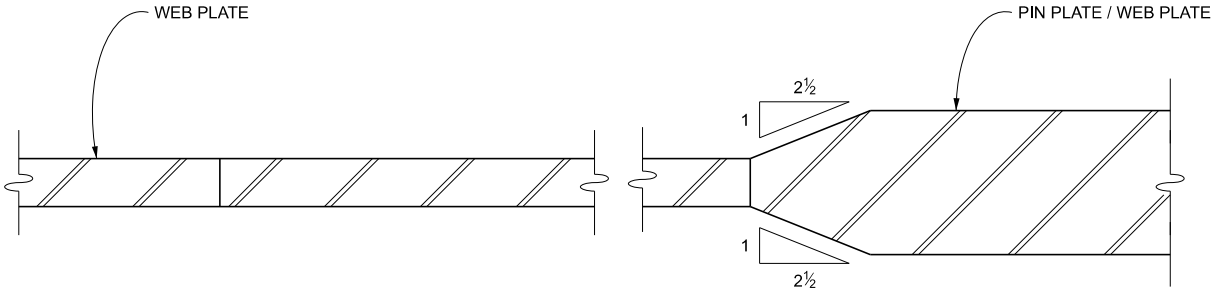
INTERMEDIATE TRANSVERSE STIFFENERS @ CROSSFRAME LOCATIONS

NOTE 1: STOP WELD ¼" SHORT OF CORNER CLIPS
NOTE 2: WRAP WELD AROUND OUTSIDE EDGE

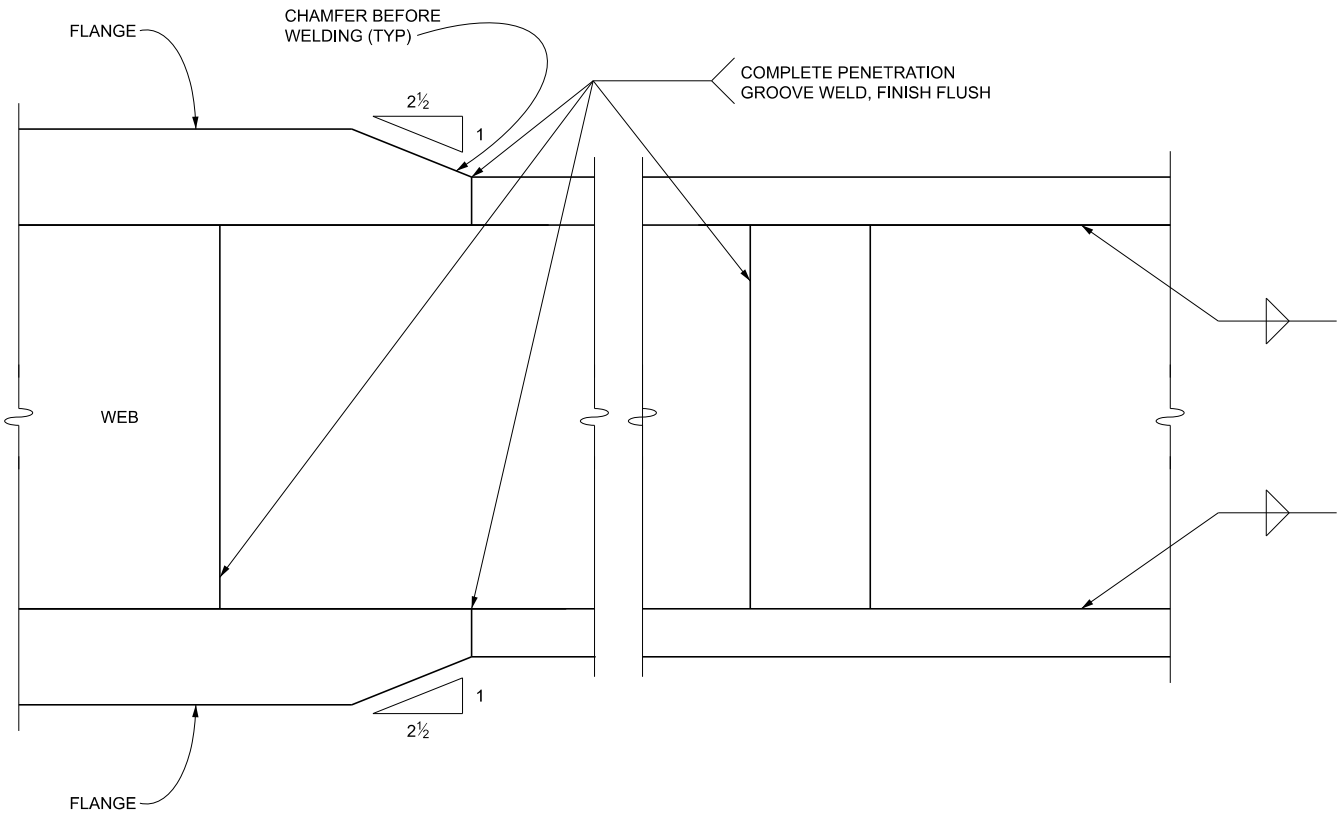
NOTES:
DESIGNER MUST INSURE THAT THE FATIGUE REQUIREMENTS OF AASHTO ARE MET.
USE DETAIL A IF CONNECTION PLATE STIFFENER EXTENDS BEYOND FLANGE.
EITHER BEVEL OR J COPE HOLES MUST BE USED ON A PARTICULAR PROJECT.

PREPARED BY DESIGN DIVISION	8.06.02A

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: DAJ	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT PLATE GIRDER WELDING DETAILS	ISSUED: 02/16/16 SUPERSEDES: 11/27/01



WEB TRANSITION



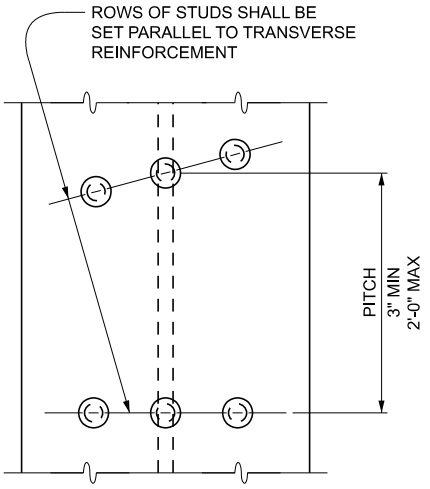
WELDED JOINT INFORMATION FOR DESIGN PLANS

CHECKER PLEASE NOTE:

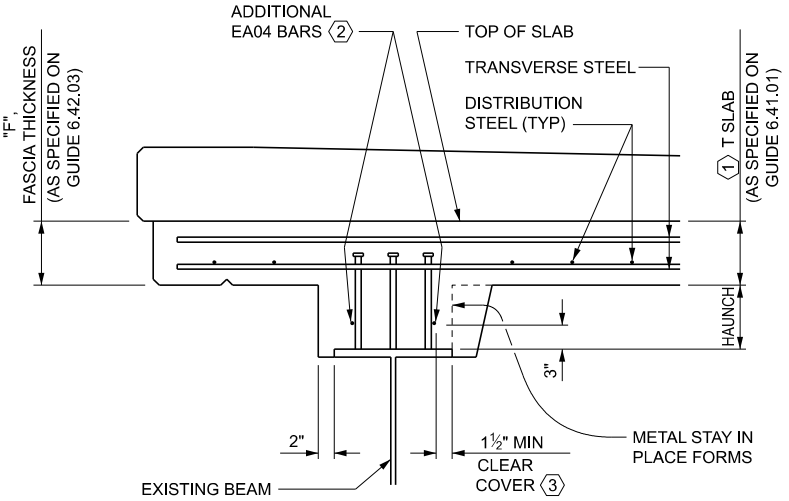
SHOP DRAWINGS MUST SHOW WELD CALLOUTS AND WELD PROCEDURE SPECIFICATION NUMBER IN TAIL.

PREPARED BY DESIGN DIVISION	8.06.03

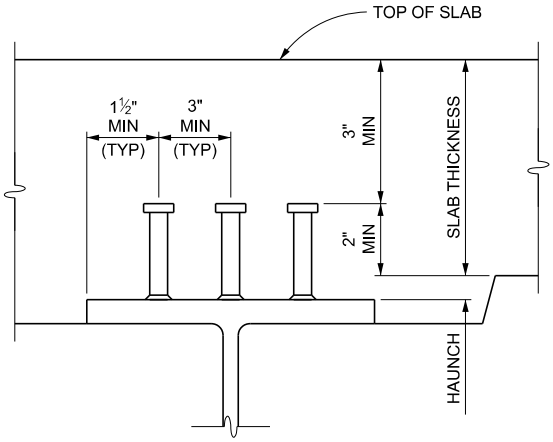
DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: DAJ	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STUD SHEAR DEVELOPER DETAILS	ISSUED: 09/25/17 SUPERSEDES: 12/19/16



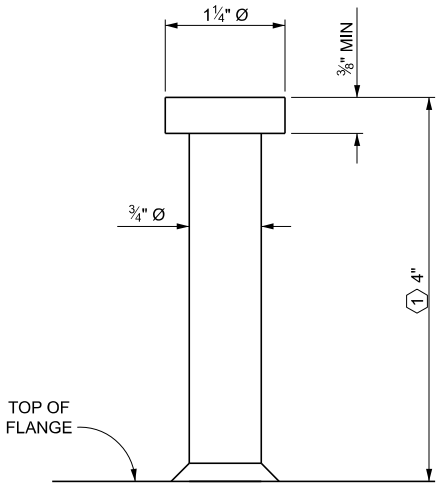
PLAN



BEAM HAUNCH > 6" DETAIL



SECTION



DETAIL OF STUD

PLAN NOTES:
THE HAUNCH REINFORCEMENT QUANTITY SHOWN PROVIDES THE AMOUNT NECESSARY TO COVER THE LIMITS SHOWN ON THE PLANS.

NOTES:

1 INCREASE LENGTH OF STUD WHEN NECESSARY TO MAINTAIN 2" MINIMUM PENETRATION OF STUD INTO DECK SLAB. (1" INCREMENTS)

MAXIMUM STUD LENGTH IS LIMITED TO 16".

2 EXTEND EA04 BARS A MINIMUM OF 2'-0" BEYOND THE POINT WHERE THE HAUNCH DROPS BELOW 6". DETAIL REINFORCEMENT ON PLAN SHEETS AND STEEL REINFORCEMENT DETAILS SHEET.

3 PLACE EA04 BAR INSIDE OF STUD IF NECESSARY TO MEET CLEAR COVER REQUIREMENTS.

IF FEASIBLE/EFFECTIVE, USE "W" BAR INSTEAD OF LONGER STUDS SIMILAR TO DETAILS ON GUIDE 6.42.03A.

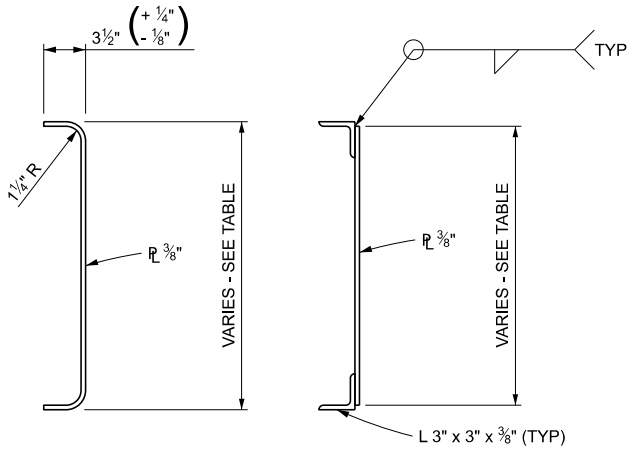
DETAILS AND SPACING FOR STUDS SHOULD BE SHOWN ON THE PLANS.

FOUR STUDS PER ROW MAY BE USED WHEN REQUIRED.

USE OF HAUNCH GREATER THAN 12" MUST BE APPROVED BY THE BRIDGE DESIGN SUPERVISING ENGINEER.

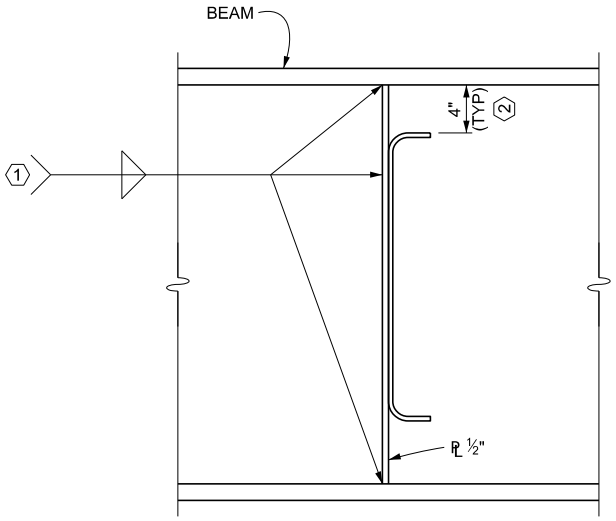
PREPARED BY DESIGN DIVISION	8.07.01

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 10/26/26
CHECKED BY: CWC	DIAPHRAGM AND CONNECTION PLATE DETAILS	SUPERSEDES: 11/27/01
APPROVED BY: BMW		



ALTERNATE

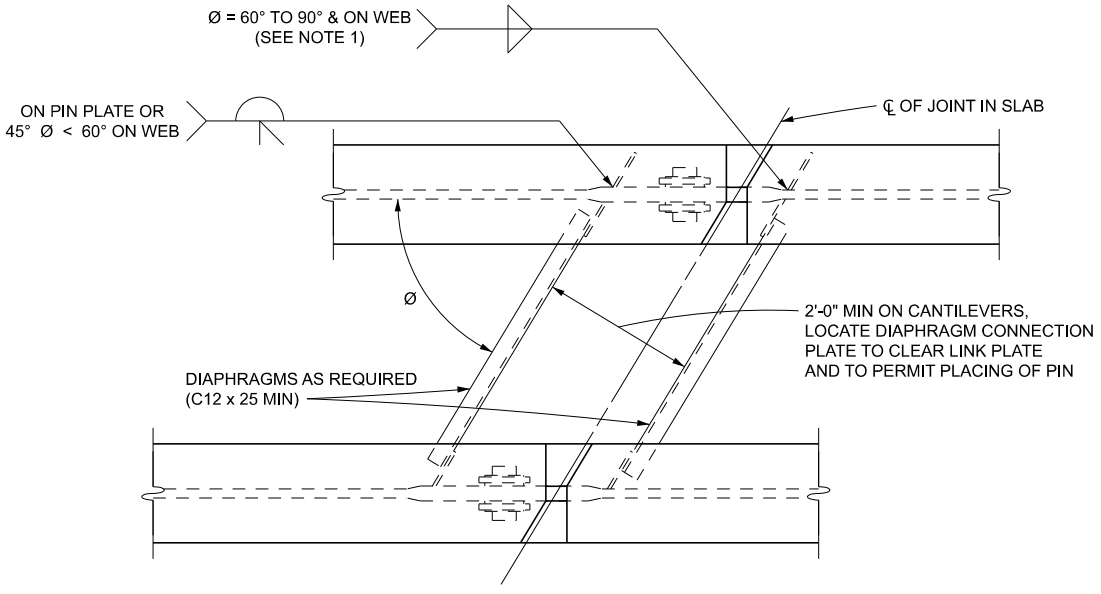
INTERMEDIATE DIAPHRAGM



WELDED DIAPHRAGM CONNECTION PLATE DETAIL

1. WRAP WELD AROUND OUTSIDE EDGE. STOP ALL WELDS ¼" SHORT OF CORNER CLIPS.
2. 3" FOR PLATE GIRDERS WITH WEB DEPTHS OF 24" AND 27".

INTERMEDIATE DIAPHRAGMS							
BEAM DEPTH/PLATE GIRDER WEB DEPTH	21"	24"	27"	30"	33"	36"	42"
DIAPHRAGM DEPTH WITH ROLLED BEAMS	11"	12"	16"	18"	22"	24"	30"
DIAPHRAGM DEPTH WITH PLATE GIRDERS	N/A	18"	21"	23"	25"	27"	32"



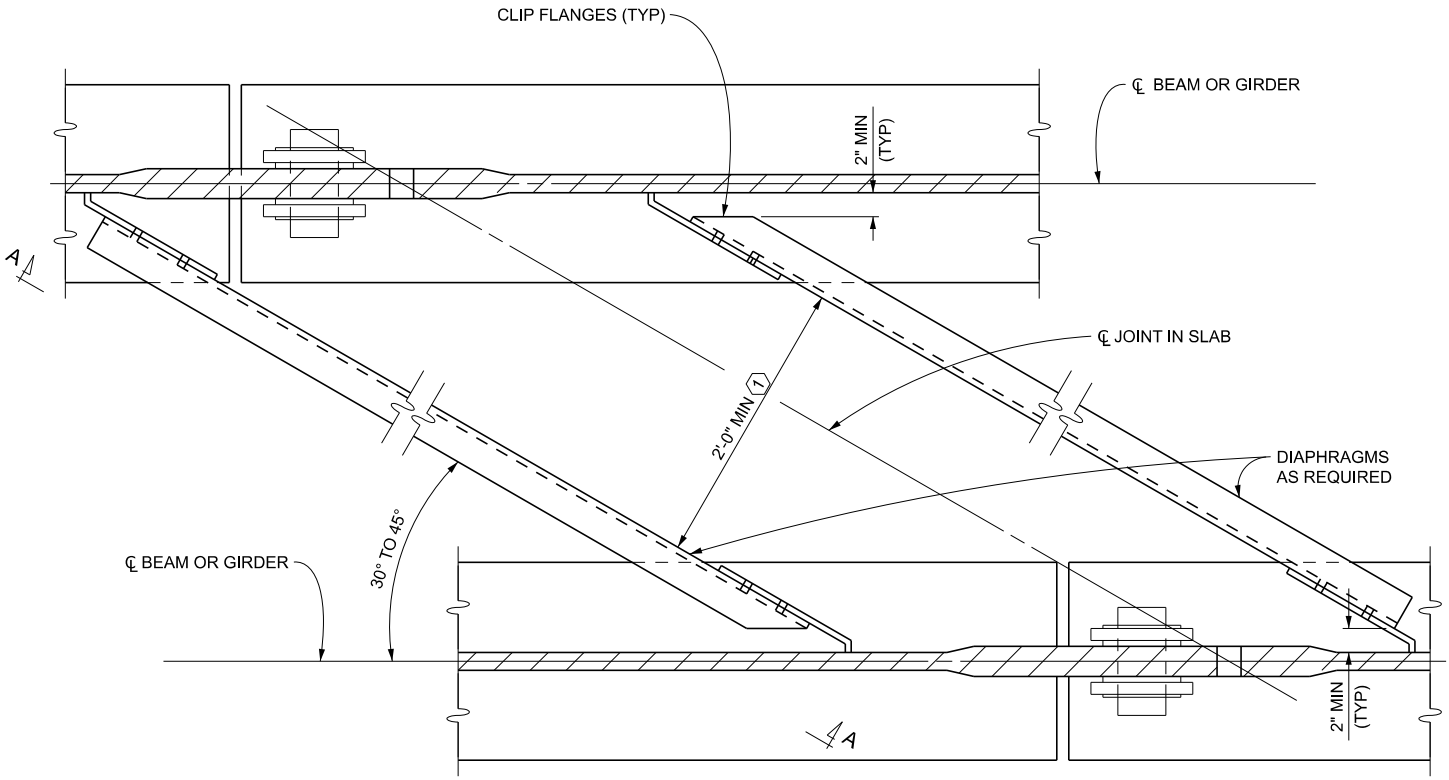
END DIAPHRAGM

NOTES:

1. IF WELDS ARE DISALLOWED BY FATIGUE, USE GUIDE 8.11.08.
2. FOR ADDITIONAL END DIAPHRAGM DETAILS SEE GUIDE 8.11.04.
3. FOR CROSS FRAME DETAILS SEE GUIDE 8.11.07.

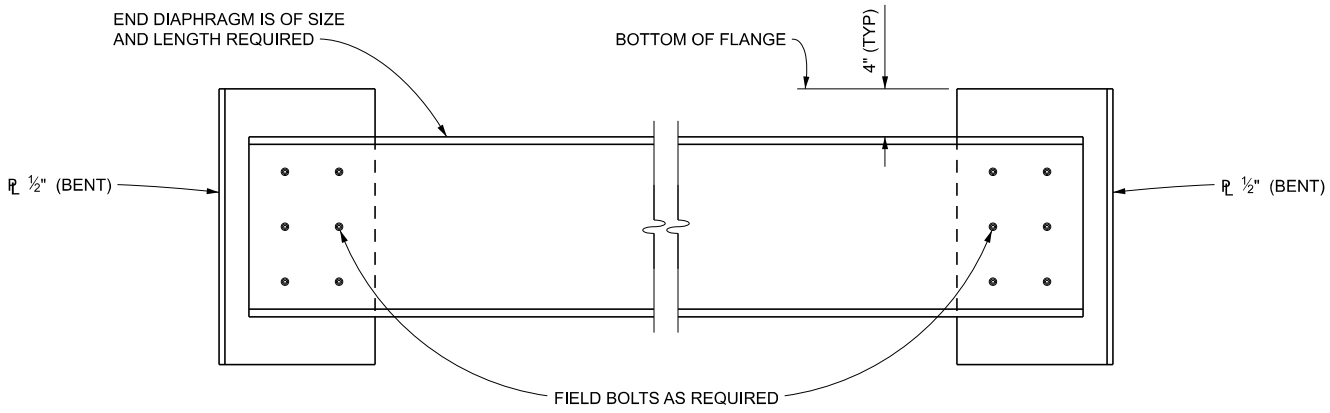
PREPARED BY DESIGN DIVISION	8.11.03

DRAWN BY: MJB CHECKED BY: VZ APPROVED BY: TGF	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT END DIAPHRAGM CONNECTION DETAILS 30° TO 45°	ISSUED: 11/27/01 SUPERSEDES: 04/15/95



(1) ON CANTILEVERS, LOCATE DIAPHRAGM CONNECTION PLATE TO CLEAR LINK PLATE AND TO PERMIT PLACING OF PIN

PLAN



VIEW A-A

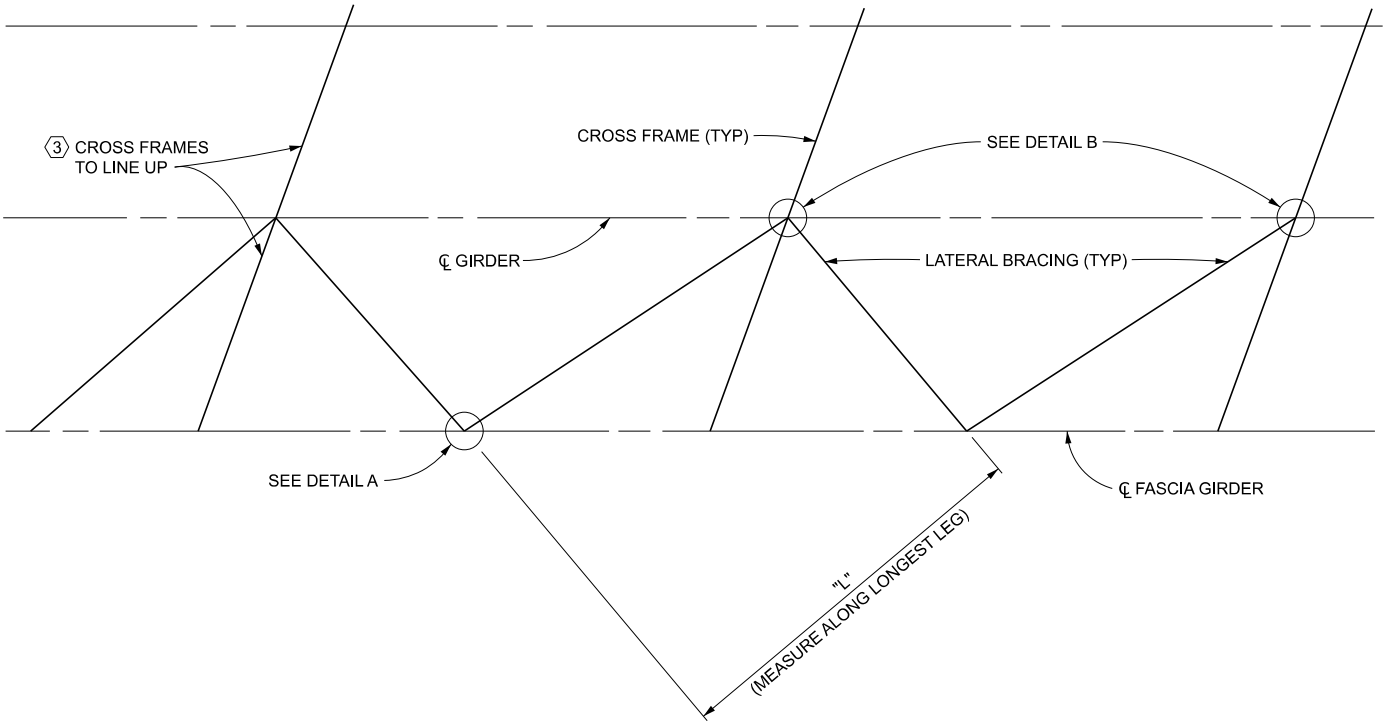
NOTES:

SEE GUIDE 8.11.03 FOR CONNECTION PLATE WELDING.

IF WELDS ARE DISALLOWED BY FATIGUE, USE GUIDE 8.11.08.

PREPARED BY DESIGN DIVISION	8.11.04

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 06/19/17
CHECKED BY: VZ	LATERAL BRACING DETAILS	SUPERSEDES: 11/27/01
APPROVED BY: DAJ		



LATERAL BRACING TABLE

LATERAL BRACING LENGTH "L"	STRUCTURAL TEE SIZE	① BOLTS REQUIRED WEB CONNECTION	② BOLTS REQUIRED TEE CONNECTION
UP TO 14'-6"	WT 5 x 11.0	5	4
OVER 14'-6" TO 15'-9"	WT 5 x 13.0	5	4
OVER 15'-9" TO 17'-9"	WT 6 x 17.5	6	4
OVER 17'-9" TO 18'-6"	WT 6 x 22.5	7	6

NOTES:

① NUMBER OF ¾" Ø ASTM F3125/F3125M, GRADE A325 BOLTS REQUIRED TO BOLT ANGLE OR BENT PLATE TO GIRDER WEB.

② NUMBER OF ¾" Ø ASTM F3125/F3125M, GRADE A325 BOLTS REQUIRED TO BOLT TEE TO ANGLE OR BENT PLATE.

③ CROSS FRAMES PARALLEL TO REFERENCE LINE FOR ANGLE OF CROSSING 70° TO 90°.
CROSS FRAMES PERPENDICULAR TO BEAM FOR ANGLE OF CROSSING < 70°.

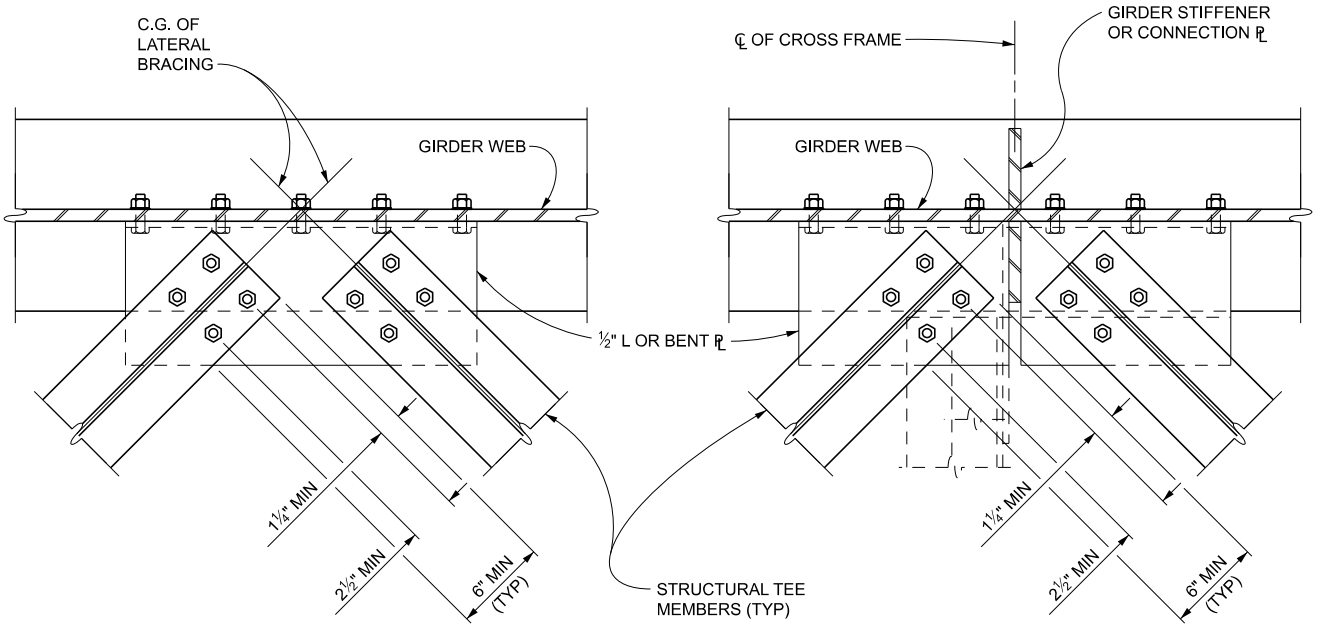
LATERAL BRACING IS DETERMINED BY CURRENT AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
PLACE LATERAL BRACING IN THE FASCIA BAYS.

PROVIDE LATERAL BRACING IN THE CANTILEVER WHEN DISTANCE FROM CENTERLINE BEARING TO PIN EXCEEDS BEAM SPACING.

WORK THIS GUIDE WITH GUIDE 8.11.05A.

PREPARED BY DESIGN DIVISION	8.11.05

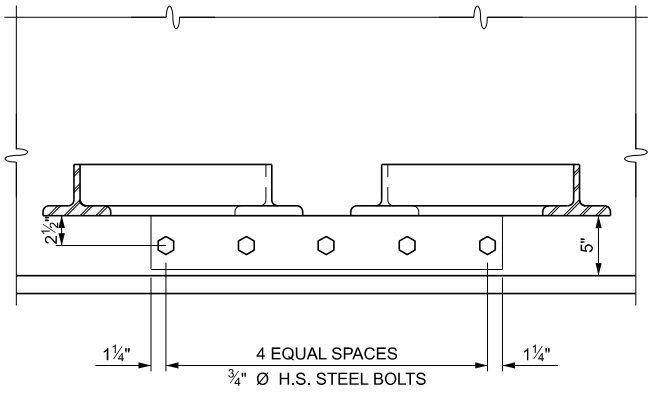
DRAWN BY: MJB	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 11/27/01
CHECKED BY: VZ	LATERAL BRACING DETAILS	SUPERSEDES: 04/15/95
APPROVED BY: TGF		



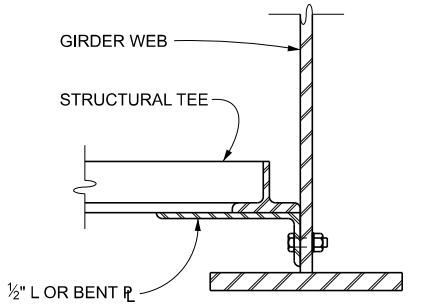
DETAIL A
(ROTATED 180°)
(FASCIA GIRDERS)

DETAIL B
(INTERIOR GIRDERS)

BOLTS FOR WEB CONNECTION SHOULD BE INSTALLED IN THE SHOP AND TORQUE CHECKED IN THE FIELD



ELEVATION

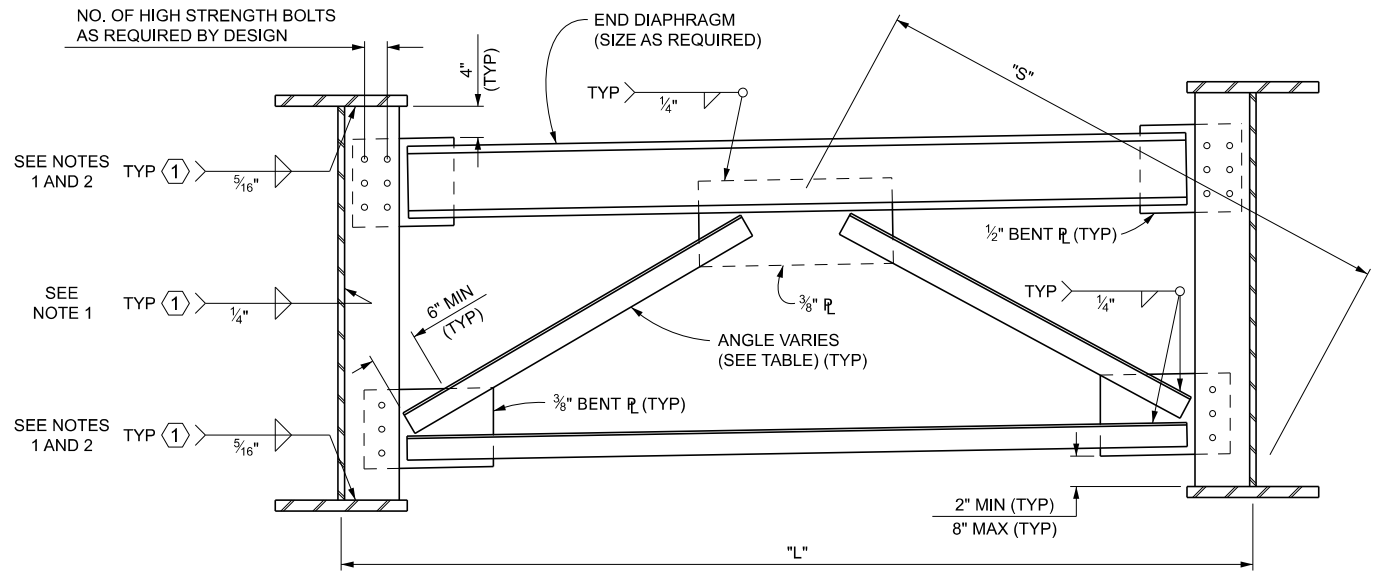


HALF SECTION

WORK THIS GUIDE WITH GUIDE 8.11.05

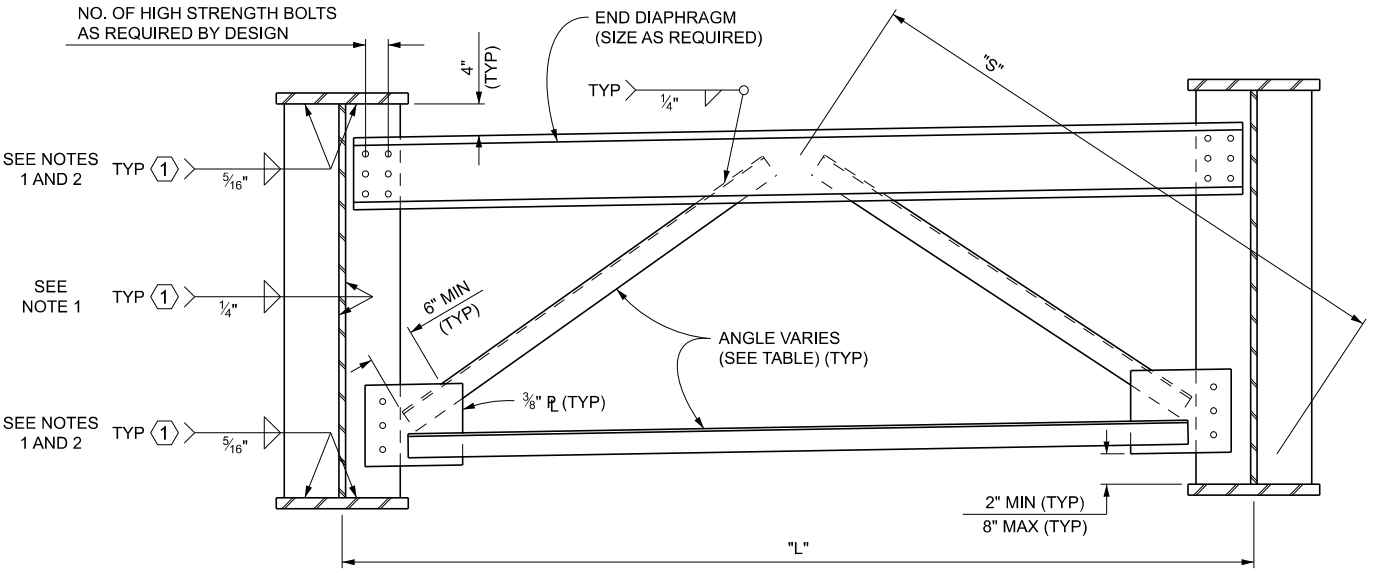
PREPARED BY DESIGN DIVISION	8.11.05A

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 11/27/17
CHECKED BY: VZ	END CROSS FRAMES	SUPERSEDES: 06/25/12
APPROVED BY: DAJ		



ANGLE OF CROSSING < 45° AT HANGERS OR
< 70° AT PIERS & ABUTMENTS WITH INDEPENDENT BACKWALLS

BEARING STIFFENERS OR CONNECTION PLATES SHALL BE SET PERPENDICULAR TO GIRDER



ANGLE OF CROSSING = 45° - 90° AT HANGERS OR
= 70° - 90° AT PIERS & ABUTMENTS WITH INDEPENDENT BACKWALLS

BEARING STIFFENERS OR CONNECTION PLATES SHALL BE SET AT ANGLE OF CROSSING

STRAIGHT GIRDERS	
"L" OR "S"	MINIMUM ANGLE SIZE
LESS THAN 6'-9"	3" x 3" x 5/16"
6'-9" TO 9'-3"	4" x 4" x 5/16"
9'-3" TO 11'-6"	5" x 5" x 3/8"
11'-6" TO 13'-9"	6" x 6" x 3/8"
13'-9" TO 18'-6"	8" x 8" x 1/2"
CURVED GIRDERS	
LESS THAN 5'-9"	3" x 3" x 5/16"
5'-9" TO 7'-9"	4" x 4" x 5/16"
7'-9" TO 9'-9"	5" x 5" x 3/8"
9'-9" TO 11'-9"	6" x 6" x 1/2"
11'-9" TO 15'-9"	8" x 8" x 5/8"

NOTES:

USE FULL DEPTH STIFFENERS OR 1/2" CONNECTION PLATES.

ANGLE SIZE BASED ON L/R RATIO. STRESSES MAY REQUIRE USE OF LARGER ANGLES.

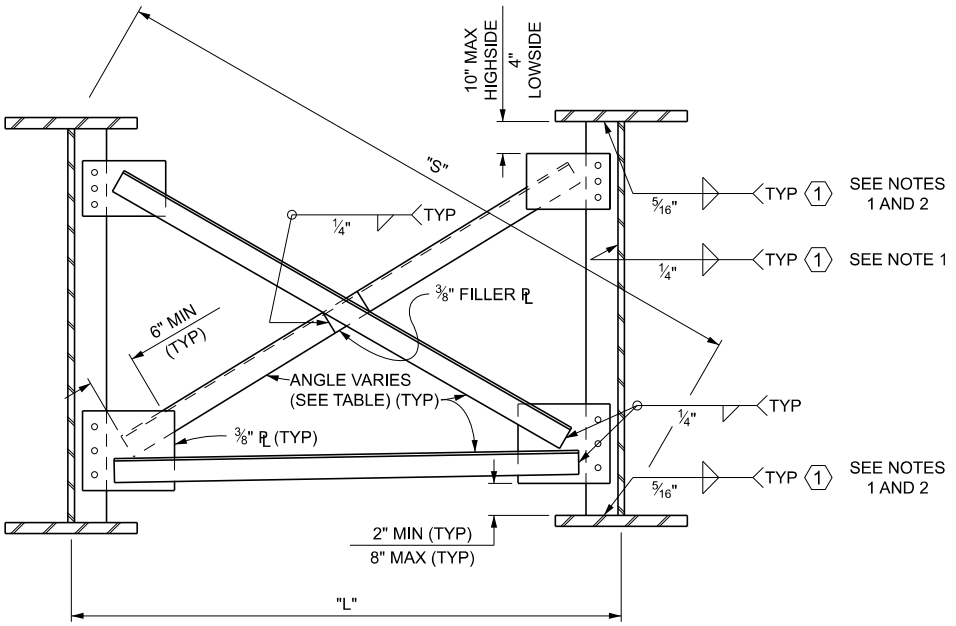
USE DETAIL A, GUIDE 8.06.02 IF CONNECTION PLATE EXTENDS BEYOND FLANGE.

(1) WELD TOP AND BOTTOM UNLESS FATIGUE LIMITATIONS CONTROL. CONNECTION PLATE WELDS SHOWN HERE. SEE GUIDE 8.06.02 FOR STIFFENER WELDING DETAILS. SEE GUIDE 8.11.08 FOR CONNECTION PL DETAILS IF FATIGUE LIMITATIONS CONTROL.

NOTE 1: STOP WELD 1/4" SHORT OF CORNER CLIPS
NOTE 2: WRAP WELD AROUND OUTSIDE EDGE

PREPARED BY DESIGN DIVISION	8.11.06

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 10/26/26
CHECKED BY: CWC	INTERMEDIATE AND PIER CROSS FRAMES	SUPERSEDES: 11/27/17
APPROVED BY: BMW		



PIER AND INTERMEDIATE CROSS FRAMES

NOTES:

USE FULL DEPTH STIFFENERS OR ½" CONNECTION PLATES.

FOR ANGLES OF CROSSING > 70°, SET CONNECTION PLATE AND BEARING STIFFENER TO ANGLE OF CROSSING. FOR ANGLE OF CROSSING < 70°, SET CONNECTION PLATE AND BEARING STIFFENER NORMAL TO WEB. USE BENT GUSSET PLATES ON PIER CROSSFRAMES.

USE DETAIL A, GUIDE 8.06.02A IF CONNECTION PLATE EXTENDS BEYOND FLANGE.

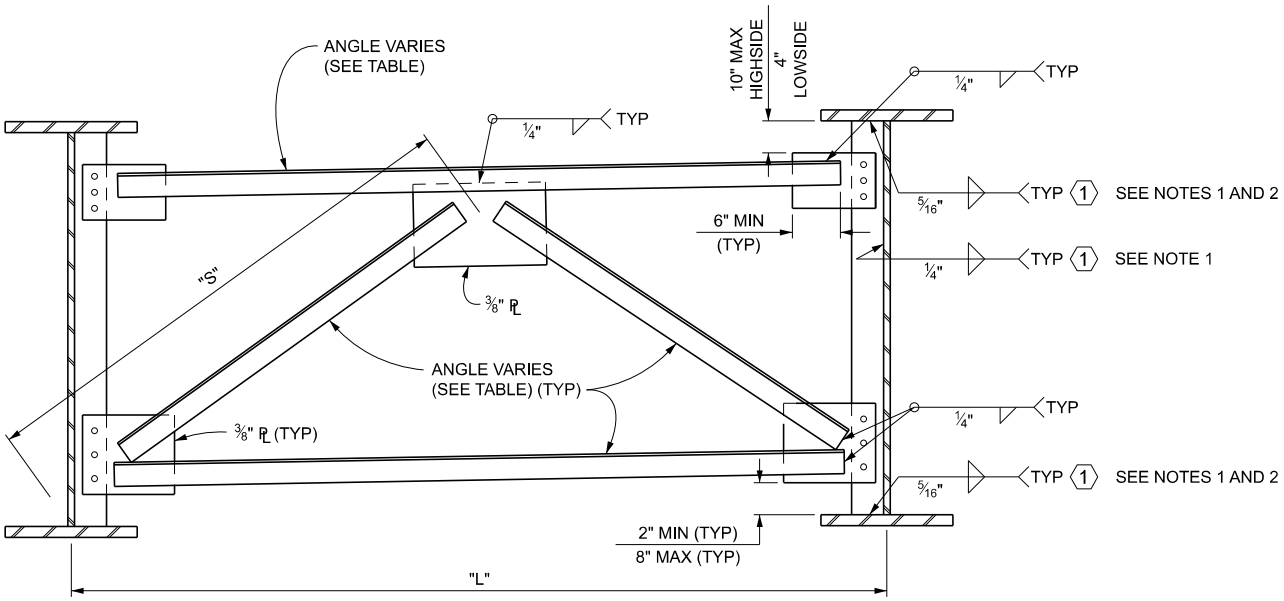
INTERMEDIATE CROSS FRAMES TO BE IN LINE.

ANGLE SIZE BASED ON L/R RATIO. STRESSES MAY REQUIRE USE OF LARGER ANGLES.

USE DIAPHRAGMS FOR WEB DEPTHS < 48". SEE GUIDE 8.11.03 FOR DETAILS.

(1) WELD TOP AND BOTTOM UNLESS FATIGUE LIMITATIONS CONTROL. CONNECTION PLATE WELDING SHOWN HERE. SEE GUIDE 8.06.02 FOR STIFFENER WELDING DETAILS. SEE GUIDE 8.11.08 FOR CONNECTION PLATE DETAILS IF FATIGUE LIMITATIONS CONTROL.

NOTE 1: STOP WELD ¼" SHORT OF CORNER CLIPS
NOTE 2: WRAP WELD AROUND OUTSIDE EDGE



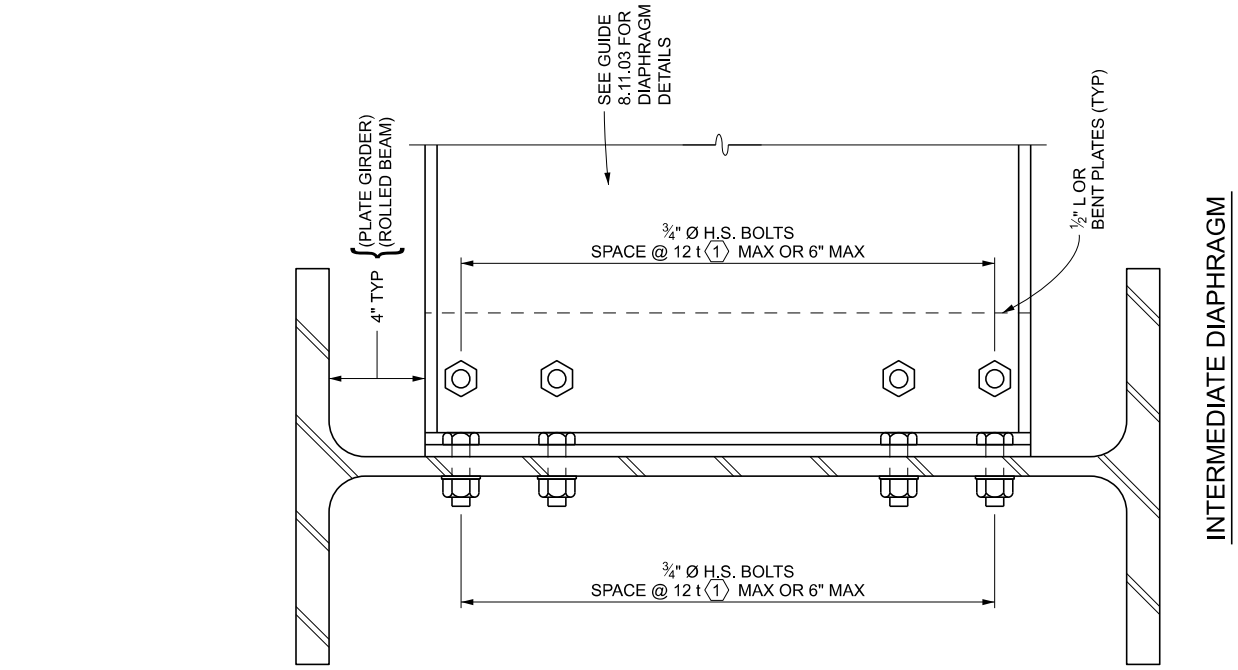
PIER CROSS FRAMES

BEAM SPACING > 12'-6"

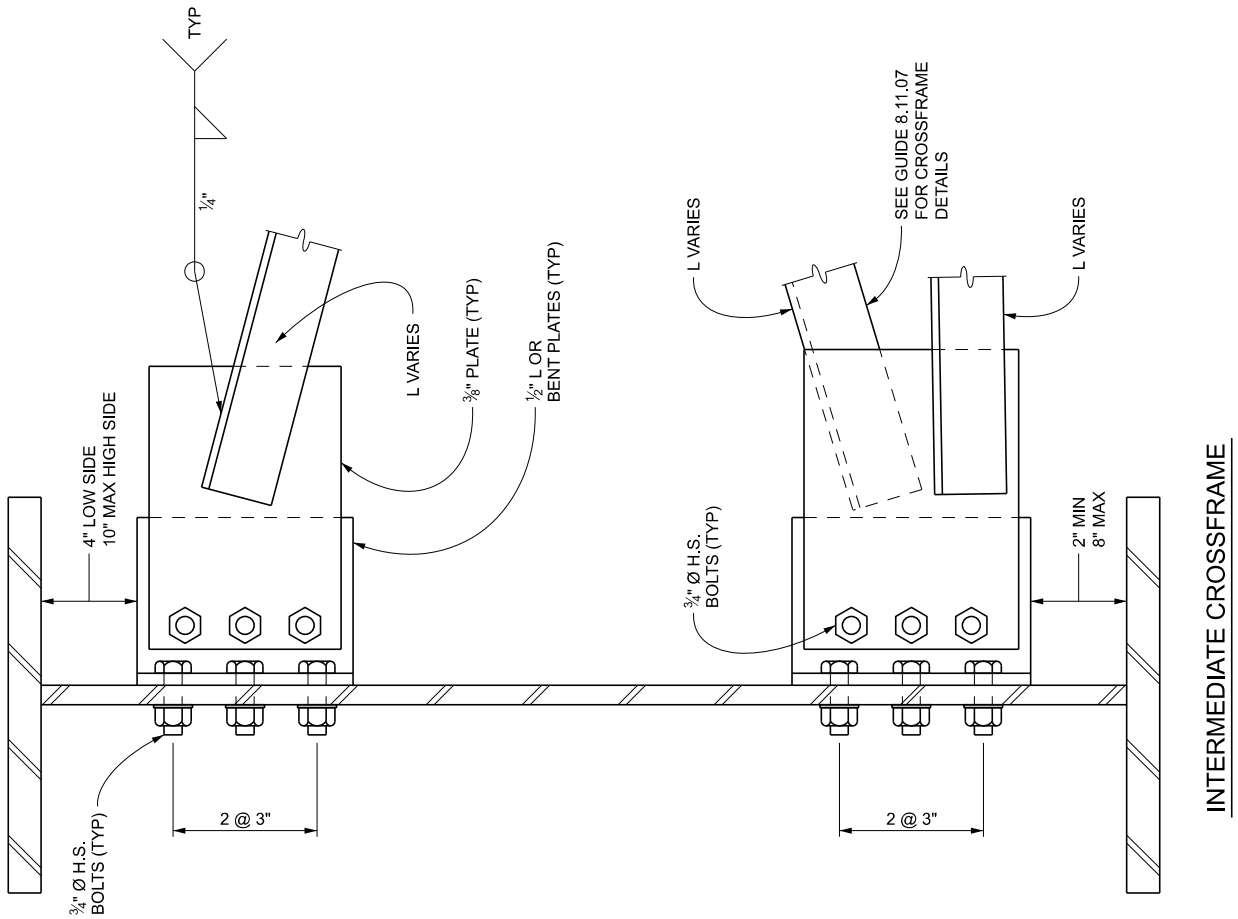
STRAIGHT GIRDERS	
"L" OR "S"	MINIMUM ANGLE SIZE
LESS THAN 6'-9"	3" x 3" x 5/16"
6'-9" TO 9'-3"	4" x 4" x 5/16"
9'-3" TO 11'-6"	5" x 5" x 3/8"
11'-6" TO 13'-9"	6" x 6" x 3/8"
13'-9" TO 18'-6"	8" x 8" x 1/2"
CURVED GIRDERS	
LESS THAN 5'-9"	3" x 3" x 5/16"
5'-9" TO 7'-9"	4" x 4" x 5/16"
7'-9" TO 9'-9"	5" x 5" x 3/8"
9'-9" TO 11'-9"	6" x 6" x 1/2"
11'-9" TO 15'-9"	8" x 8" x 5/8"

PREPARED BY DESIGN DIVISION	8.11.07

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 05/04/06
CHECKED BY: VZ	BOLTED CONNECTIONS FOR INTERMEDIATE DIAPHRAGMS AND CROSSFRAMES	SUPERSEDES: 11/27/01
APPROVED BY: TGF		



INTERMEDIATE DIAPHRAGM



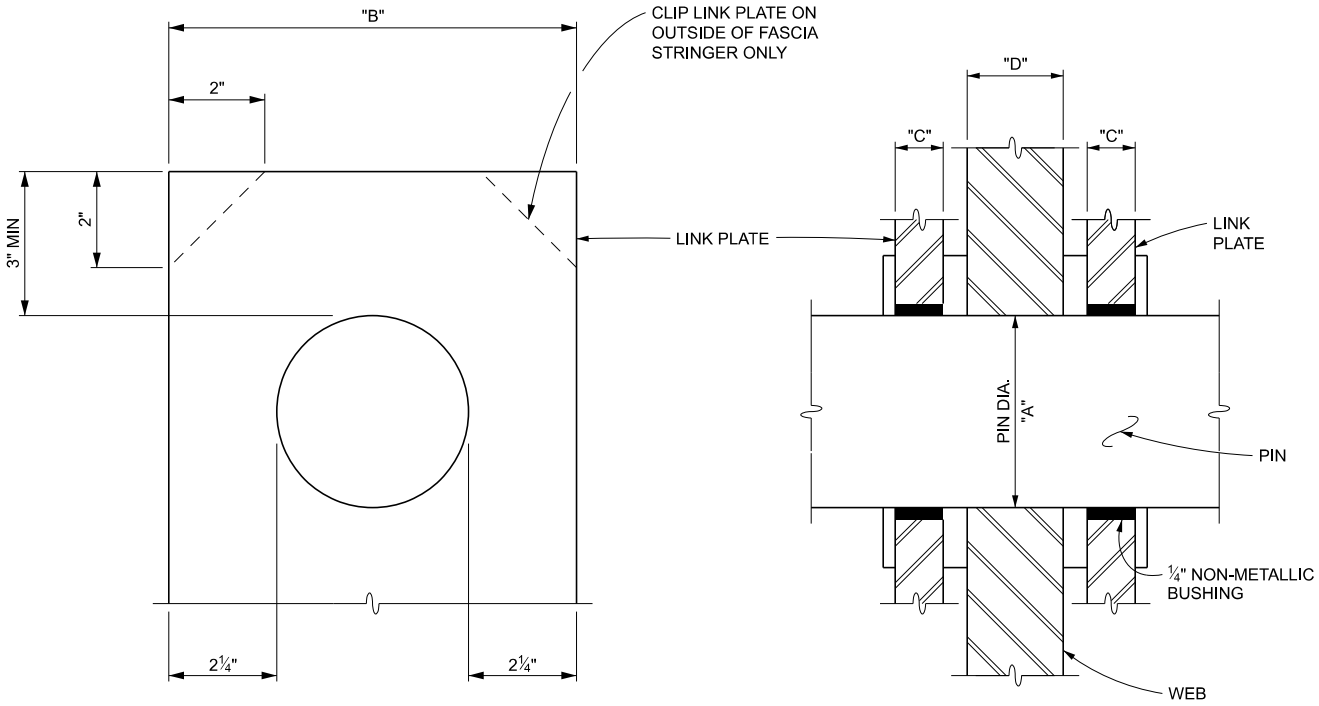
INTERMEDIATE CROSSFRAME

⟨1⟩ t = THICKNESS OF THINNER PART JOINED.

TO BE USED ON SHORT ANCHOR SPANS OR TRANSVERSELY UNSTIFFENED CONTINUOUS SPANS WHERE FATIGUE LIMITATIONS DO NOT PERMIT A WELDED CONNECTION.

PREPARED BY DESIGN DIVISION	8.11.08

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 05/04/06
CHECKED BY: VZ	BEAM OR GIRDER	SUPERSEDES: 11/27/01
APPROVED BY: TGF	SUSPENDER DESIGN TABLE	



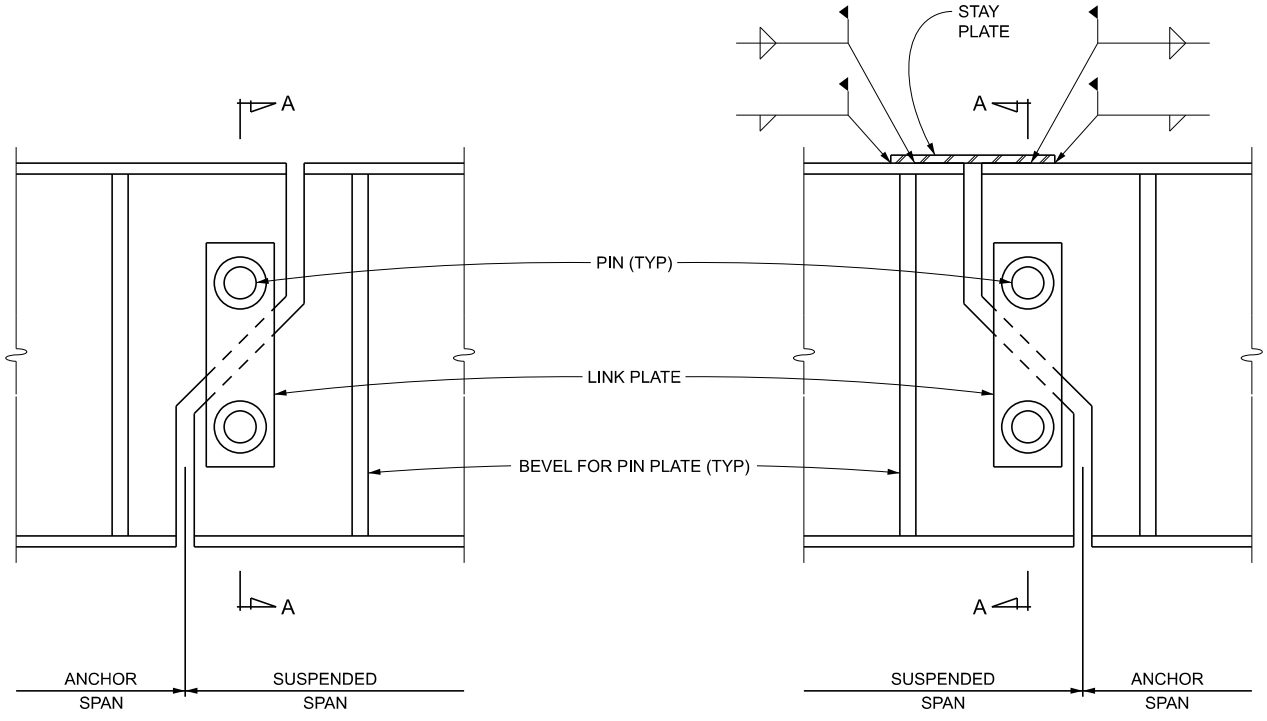
REACTION "KIPS"	PIN DIA. "A"	LINK PLATE "B"	LINK PLATE "C"	WEB "D"
80	4"	⟨1⟩	⟨1⟩	1"
100	4"	⟨1⟩	⟨1⟩	1¼"
120	4"	⟨1⟩	⟨1⟩	1½"
140	4"	⟨1⟩	⟨1⟩	1¾"
157	5"	⟨1⟩	⟨1⟩	1¾"
180	5"	⟨1⟩	⟨1⟩	2"
202	5"	⟨1⟩	⟨1⟩	2¼"

ALLOWABLE STRESSES (P.S.I.)		A276 STAINLESS STEEL PIN	AASHTO M223 OR M222 (ASTM A572 OR A588) LINK PLATE OR WEB
BENDING	=	40,000	
SHEAR	=	20,000	
BEARING	=	20,000	20,000
TENSION	=		27,000

⟨1⟩ LINKS PLATES SHALL BE DESIGNED ACCORDING TO THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 10.

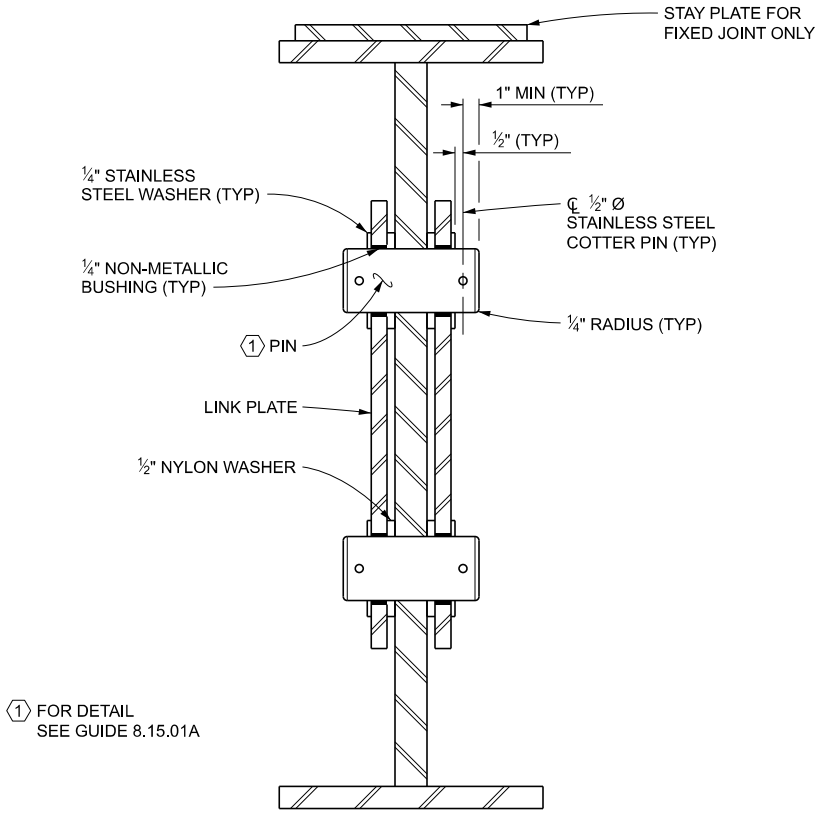
PREPARED BY DESIGN DIVISION	8.14.02

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 06/25/12
CHECKED BY: VZ	SUSPENDER DETAILS FOR CANTILEVERED PLATE GIRDERS	SUPERSEDES: 05/04/06
APPROVED BY: DAJ		



ELEVATION
EXPANSION JOINT

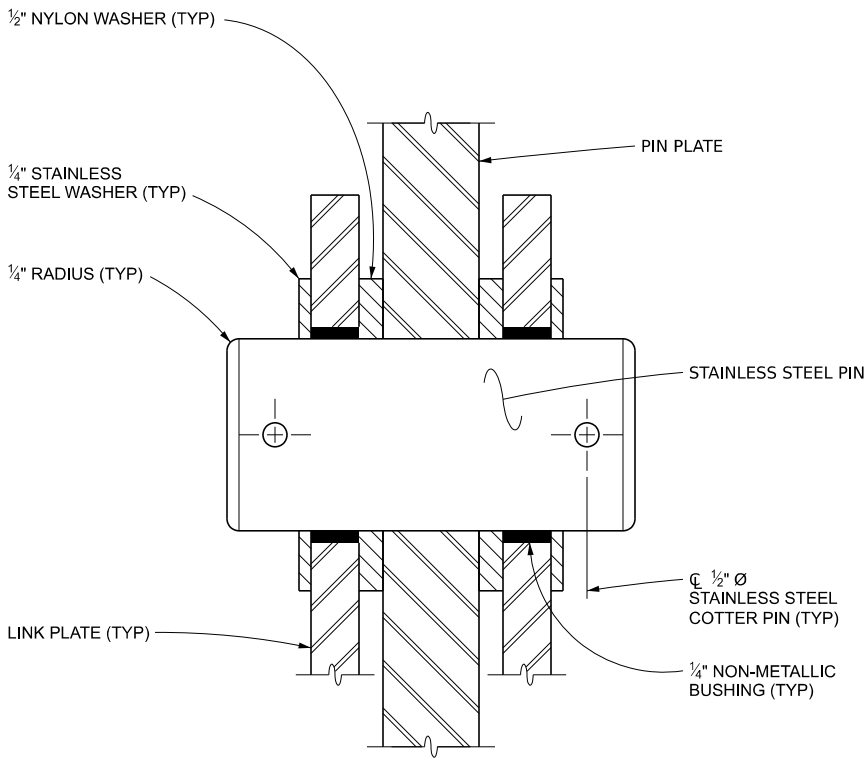
ELEVATION
FIXED JOINT



SECTION A-A

PREPARED BY DESIGN DIVISION	8.15.01

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 05/04/06
CHECKED BY: VZ	PIN DETAIL	SUPERSEDES: 11/27/01
APPROVED BY: TGF		

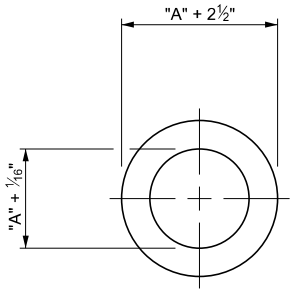


PIN DETAIL

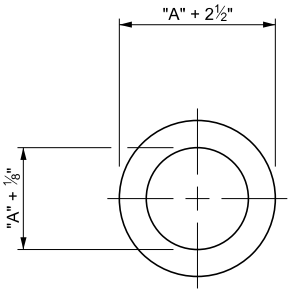
NOTE:
SEE GUIDE 8.16.02 FOR WASHER DETAILS.

PREPARED BY DESIGN DIVISION	8.15.01A

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: TGF	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT SUSPENDER DETAILS FOR ROLLED BEAMS	ISSUED: 05/04/06 SUPERSEDES: 11/27/01

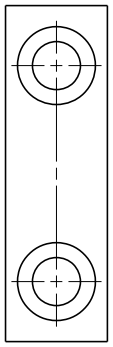


¼" STAINLESS STEEL WASHER

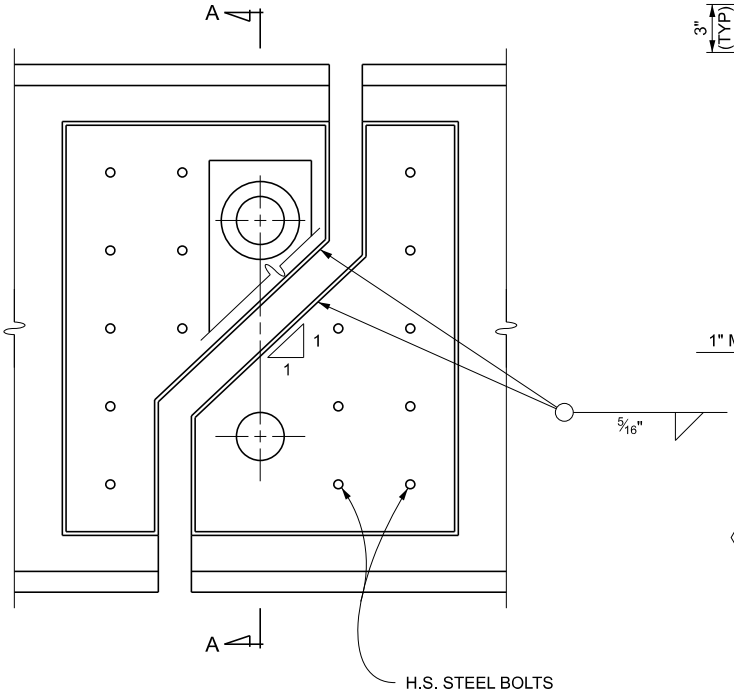


½" NYLON WASHER

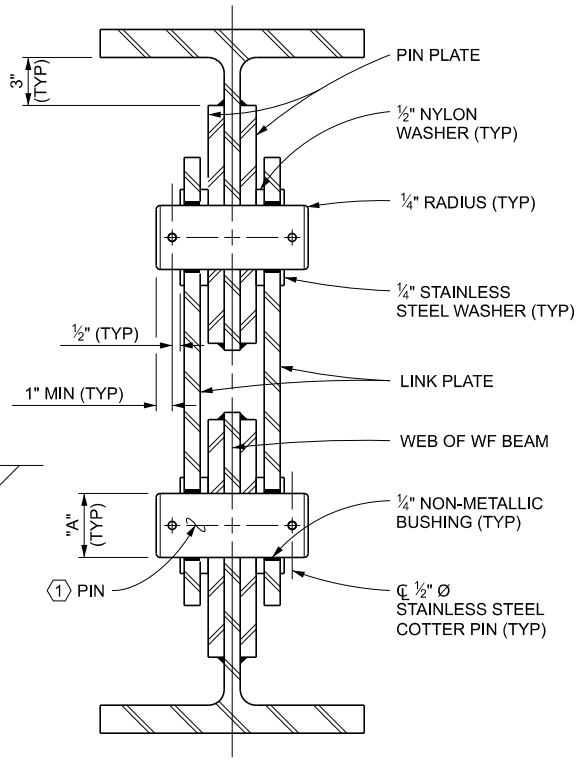
INCLUDED IN THE BID ITEM
"STRUCTURAL STEEL, [TYPE], FURN AND FAB"



LINK PLATE



WELDED PIN PLATES



SECTION A-A

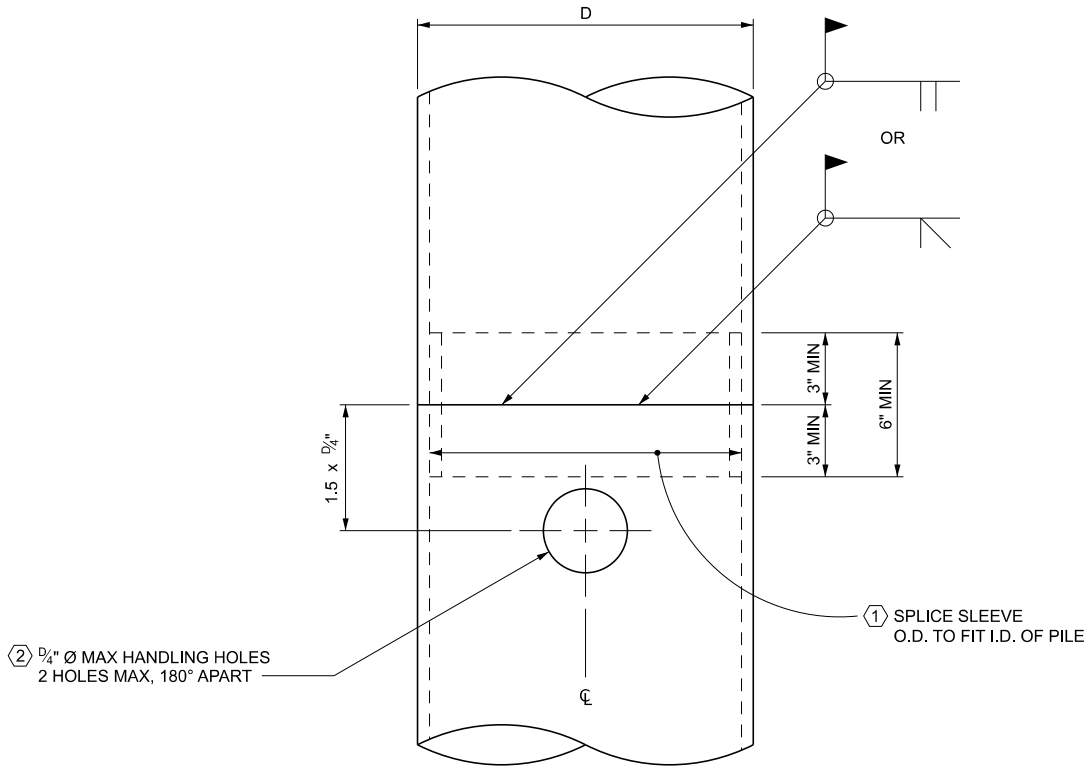
1 FOR DETAIL SEE 8.15.01A

NOTE:

SPACING OF THE H.S. STEEL BOLTS SHALL BE ACCORDING TO THE CURRENT AASHTO SPECIFICATIONS.

PREPARED BY DESIGN DIVISION	8.16.02

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 03/16/15
CHECKED BY: VZ	CIP PILE SPLICES	SUPERSEDES: 02/14/11
APPROVED BY: DAJ		

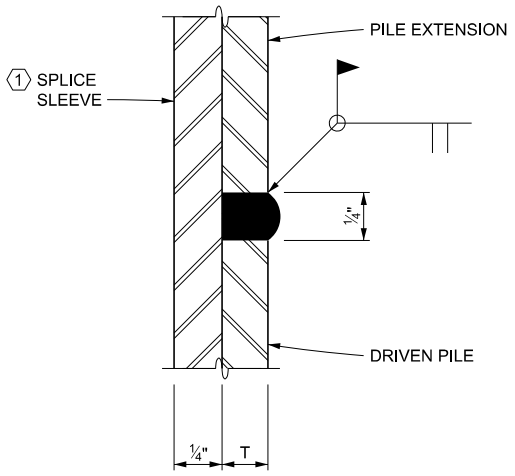


SPLICE DETAILS

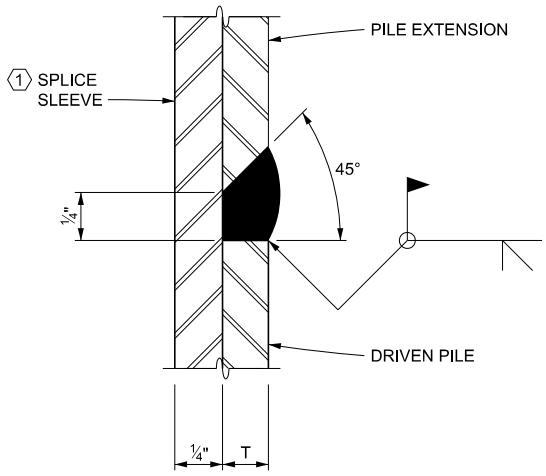
FOR SPIRAL WELDED AND SEAMLESS PIPE SHELLS

1. SPLIT CHILL RINGS AS RECOMMENDED BY THE MANUFACTURER MAY BE SUBSTITUTED FOR SPLICE SLEEVES IF APPROVED BY THE ENGINEER.

2. DRILL OR FLAME CUT CIRCULAR HANDLING HOLES. GRIND FLAME CUT HOLES TO MAKE CIRCULAR AND REMOVE HARDENED EDGE OR CUT OFF SECTION OF PILE WITH FLAME CUT HOLES PRIOR TO SPLICING OR CONCRETE PLACEMENT.



$T \leq \frac{1}{4}"$



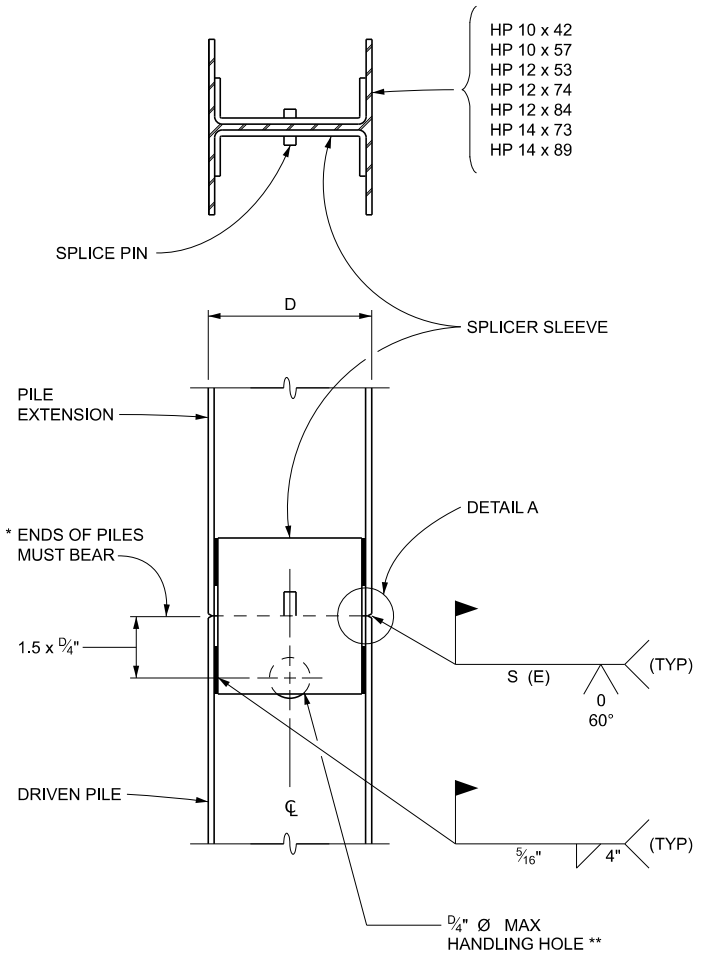
$T > \frac{1}{4}"$

NOTE:

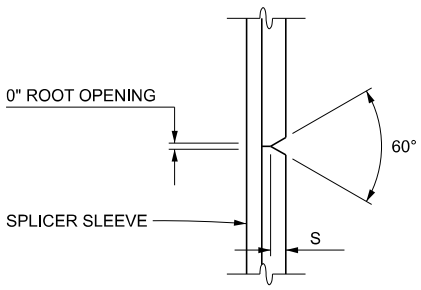
THESE DETAILS SHOULD BE SHOWN ON PLANS WHERE CAST-IN-PLACE PILES ARE USED.

PREPARED BY DESIGN DIVISION	8.21.01

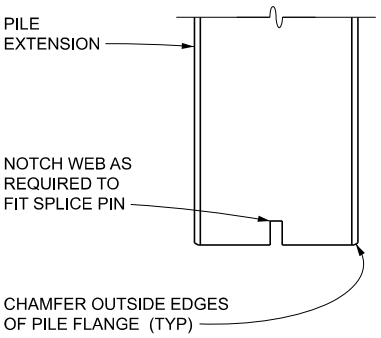
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 06/23/25
CHECKED BY: CWC	H PILE	SUPERSEDES: 08/22/16
APPROVED BY: KCK	ABUTMENT CONSTRUCTION JOINT	



ALTERNATE SPLICE DETAILS



DETAIL A



NOTCH DETAIL

* SET PILE EXTENSION IN PLACE WITH SPLICER SLEEVE ATTACHED, TAP STEEL PILE AND SPLICER SLEEVE ASSEMBLY FROM THE SIDES WITH A SUFFICIENT HAMMER TO IMPROVE BEARING CONTACT AND ENSURE FULL BEARING BETWEEN PILE EXTENSION AND DRIVEN PILE, THEN COMPLETE THE WELDING OF SLEEVES TO LOWER SECTION.

** DRILL OR FLAME CUT CIRCULAR HANDLING HOLE. GRIND FLAME CUT HOLE TO MAKE CIRCULAR AND REMOVE HARDENED EDGE OR CUT OFF SECTION OF PILE WITH FLAME CUT HOLE PRIOR TO SPLICING OR CONCRETE PLACEMENT. HOLES IN FLANGES ARE PERMITTED FOR HANDLING ONLY IF THAT PORTION OF THE PILE IS CUT OFF PRIOR TO SPLICING OR EMBEDMENT INTO CONCRETE.

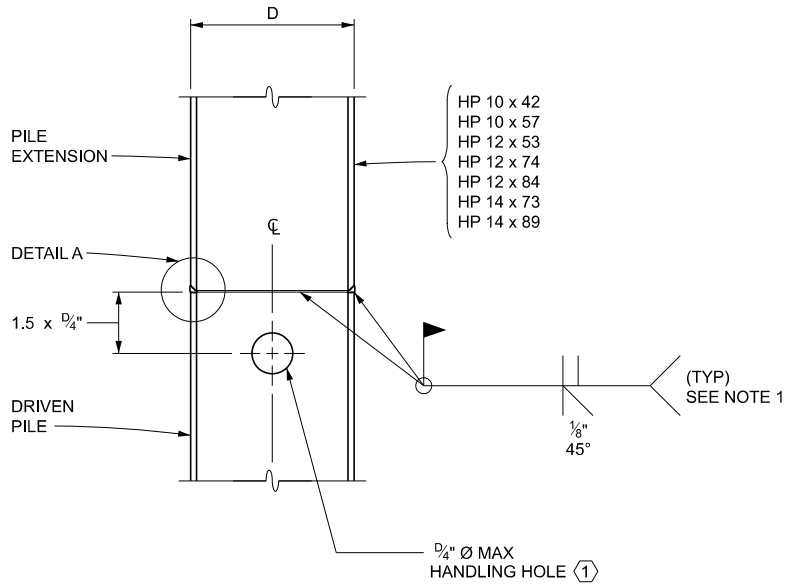
PILE	WELD SIZE (E)	BEVEL DEPTH (S)
HP 10 x 42 HP 10 x 57 HP 12 x 53	5/16" 5/16" 5/16"	5/16" 5/16" 5/16"
HP 12 x 74 HP 14 x 73 HP 14 x 89	3/8" 3/8" 3/8"	3/8" 3/8" 3/8"
HP 12 x 84	7/16"	7/16"
ALL OTHERS	CHECK WITH MDOT CONSTRUCTION FIELD SERVICES GEOTECHNICAL SECTION AND THE BRIDGE FIELD SERVICES SECTION.	

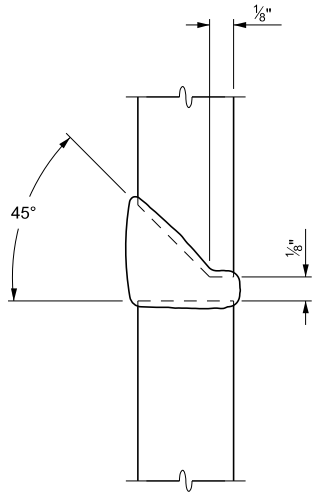
NOTES:

DO NOT USE THE ALTERNATE SPLICE SLEEVE DETAIL WITH INTEGRAL ABUTMENTS, PILE BENTS, OR ANY OTHER PILES THAT MUST RESIST BENDING STRESSES. ONLY USE FULL PENETRATION BUTT WELD SPLICE DETAIL WITH INTEGRAL ABUTMENTS.

PREPARED BY DESIGN DIVISION	8.21.02

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: DAJ	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT H PILE SPLICE (FULL PENETRATION BUTT WELD)	ISSUED: 03/16/15 SUPERSEDES: 01/23/12

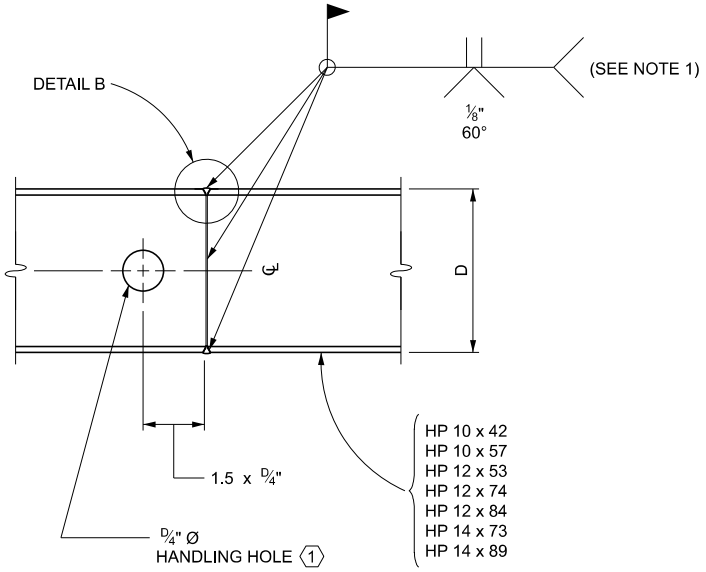


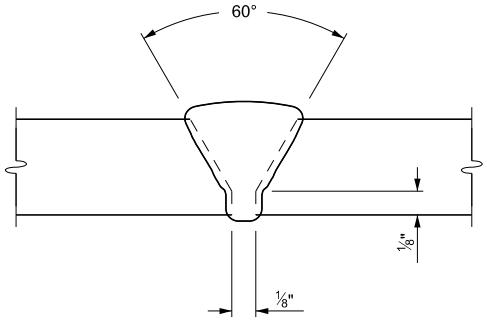


DETAIL A

SPLICE DETAILS

FOR PILES IN PLACE (HORIZONTAL JOINT)





DETAIL B

SPLICE DETAILS

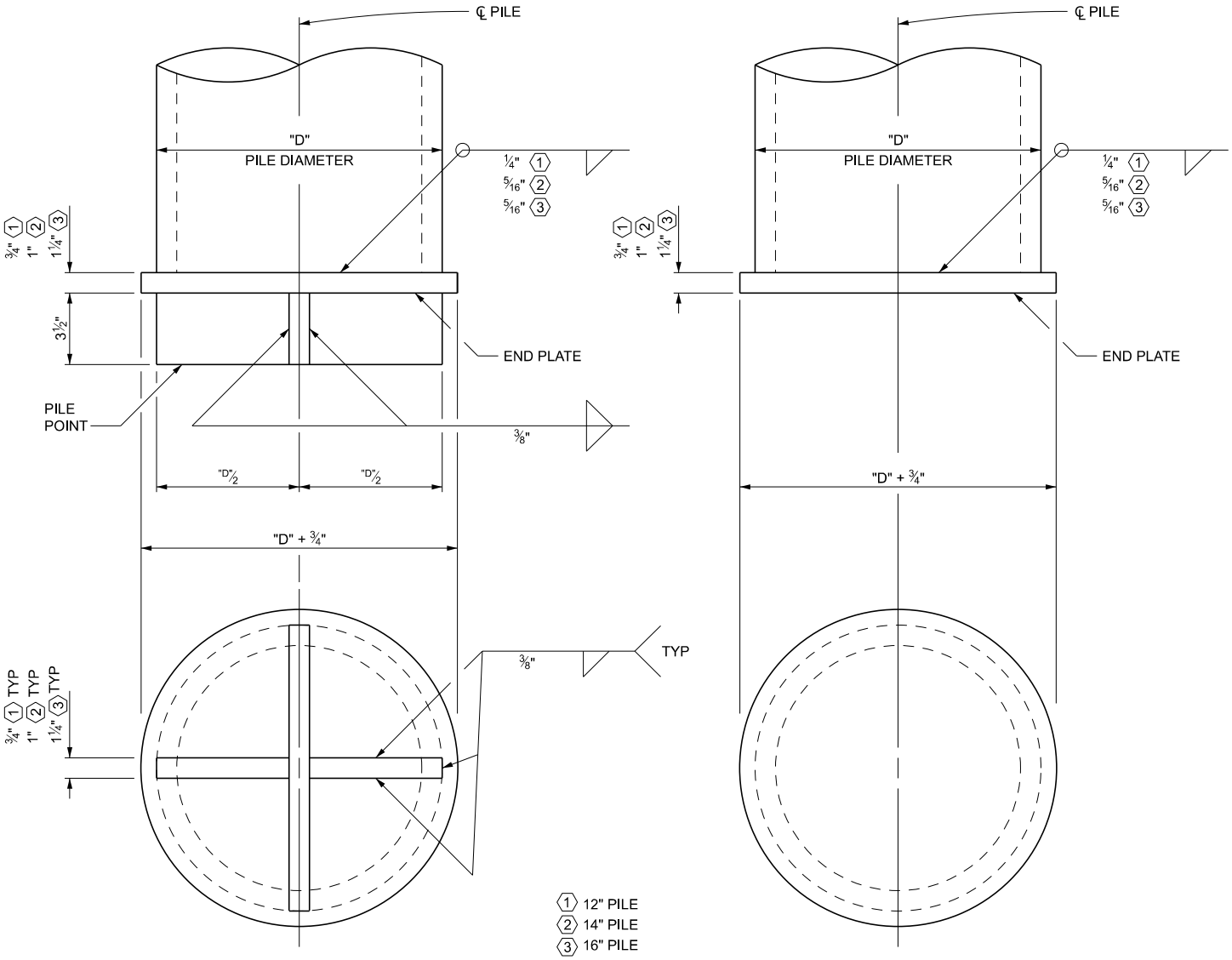
FOR PILES IN HORIZONTAL POSITION

NOTE 1: BACK GOUGE AND GRIND EDGE PREPARATION SMOOTH.

1 DRILL OR FLAME CUT CIRCULAR HANDLING HOLE. GRIND FLAME CUT HOLE TO MAKE CIRCULAR AND REMOVE HARDENED EDGE OR CUT OFF SECTION OF PILE WITH FLAME CUT HOLE PRIOR TO SPLICING OR CONCRETE PLACEMENT. HOLES IN FLANGES ARE PERMITTED FOR HANDLING ONLY IF THAT PORTION OF THE PILE IS CUT OFF PRIOR TO SPLICING OR EMBEDMENT INTO CONCRETE.

PREPARED BY DESIGN DIVISION	8.21.02A

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 12/26/17
CHECKED BY: VZ	CIP PILE POINT/END PLATE DETAILS	SUPERSEDES: 10/17/16
APPROVED BY: DAJ		



CIP PILE POINT DETAILS

FOR POINT BEARING PILES ONLY. USE WHEN RECOMMENDED BY GEOTECHNICAL SERVICES SECTION.

CIP PILE END PLATE DETAILS

NOTE TO DESIGNER:

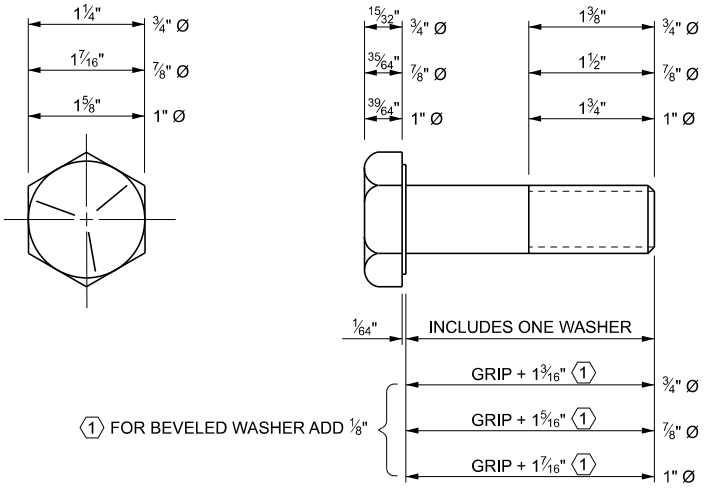
THE END PLATES DETAILED ON THIS SHEET SHOULD NOT BE PAID FOR SEPARATELY.

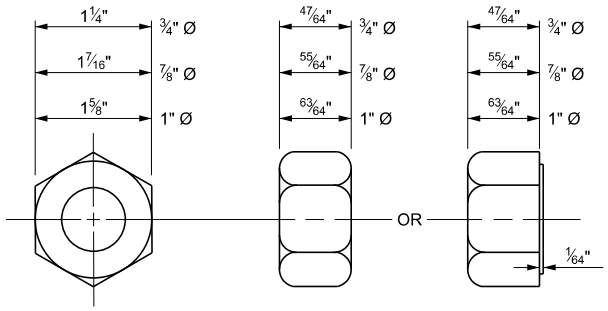
PREPARED BY DESIGN DIVISION	8.21.03

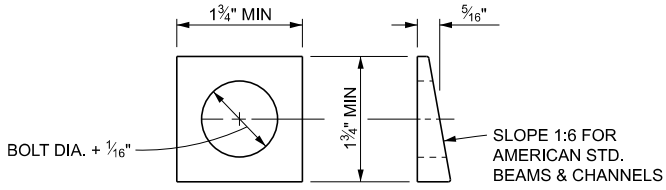
DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: DAJ	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT FASTENER DETAILING MINIMUMS FOR ASTM F 3125 GRADE A 325 BOLTS AND NUTS	ISSUED: 06/09/17 SUPERSEDES: 11/27/01

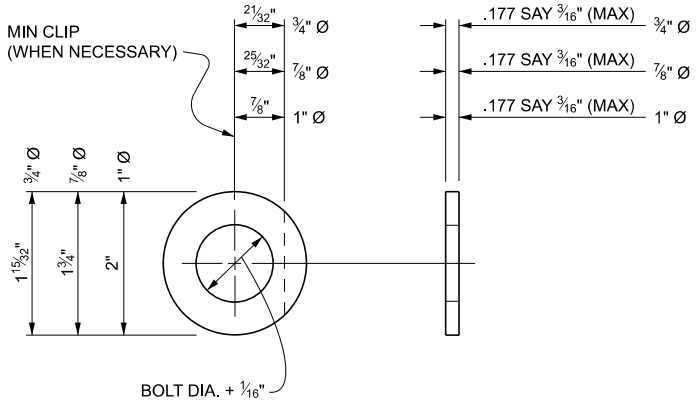
ASTM F 3125 GRADE A 325 STRUCTURAL BOLTS & NUTS

DIMENSIONS SHOWN ARE NOMINAL EXCEPT AS NOTED





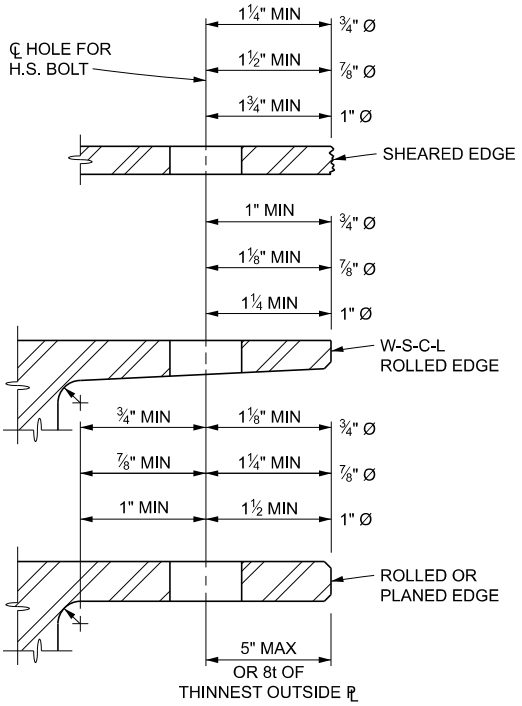




BEVELED WASHER FOR

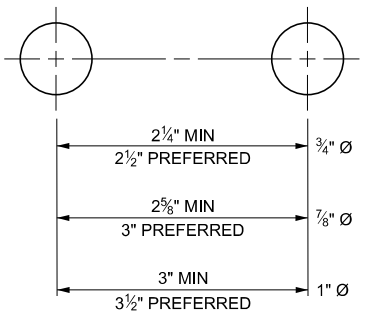
¾" Ø, ⅞" Ø, & 1" Ø BOLTS

NOTE: USE BEVELED WASHER WHEN SLOPE IS MORE THAN 1:20



CIRCULAR FLAT WASHER

FOR ¾" Ø WASHERS, USE 4.8# PER 100
FOR ⅞" Ø WASHERS, USE 7.0# PER 100
FOR 1" Ø WASHERS, USE 9.4# PER 100



MIN SPACING FOR BOLTS

SEE ART. 10.24.5 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES 17th EDITION
SEE ART. 6.13.2.6 OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

MIN EDGE DISTANCES FOR BOLTS

SEE ART. 10.24.7 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES 17th EDITION
SEE ART. 6.13.2.6 OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

PREPARED BY DESIGN DIVISION	8.26.01

CONTINUOUS AND SIMPLE SPANS

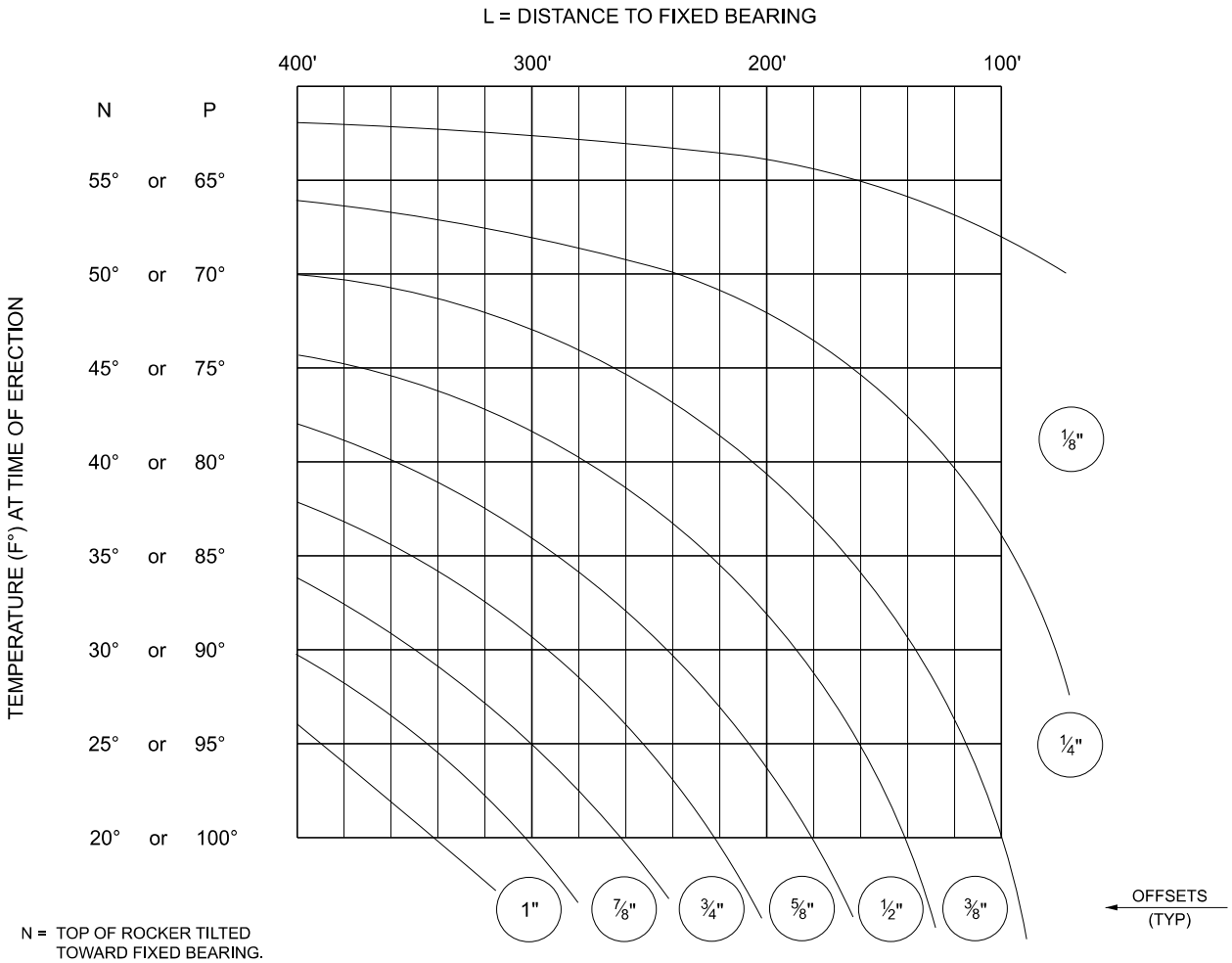
LENGTH OF EXPANSION	TYPE OF MOVEMENT	TYPE OF BEARING	BEVEL SOLE PLATE
THRU 120'	FIXED	CURVED STEEL PLATES (SEE BRIDGE DESIGN GUIDE 8.42.01)	YES
	EXPANSION	ELASTOMERIC BEARINGS SEE SECTION 14 OF EITHER (AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES OR LRFD BRIDGE DESIGN SPECIFICATIONS)	YES
OVER 120'	FIXED	BUILT UP PEDESTALS (SEE BRIDGE DESIGN GUIDES 8.32.03 & 8.32.05)	NO
	EXPANSION	BUILT UP ROCKERS (SEE BRIDGE DESIGN GUIDES 8.32.01)	NO

IF ROCKERS ARE REQUIRED AT ANY BEARINGS, USE ROCKERS AND PEDESTALS THROUGHOUT.

PROVIDE ANCHORAGE FOR UPLIFT OF ANCHOR SPANS OF CONTINUOUS BRIDGES. SEE BRIDGE DESIGN GUIDE 8.32.07 FOR EXPANSION ROCKER WITH PROVISION FOR UPLIFT.

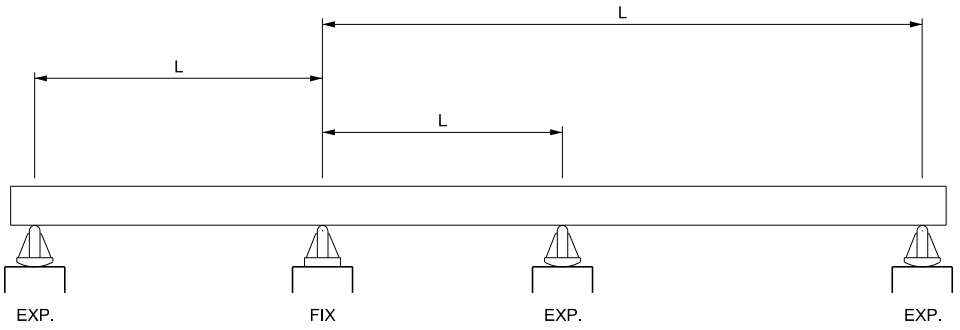
CURVED GIRDERS TO HAVE ALL ELASTOMERIC BEARINGS.

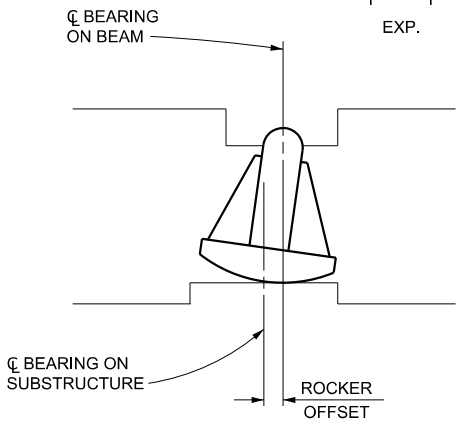
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 02/14/11
CHECKED BY: VZ	OFFSET DIMENSIONS FOR ROCKER TILT	SUPERSEDES: 11/27/01
APPROVED BY: TGF		



N = TOP OF ROCKER TILTED TOWARD FIXED BEARING.

P = TOP OF ROCKER TILTED AWAY FIXED BEARING.

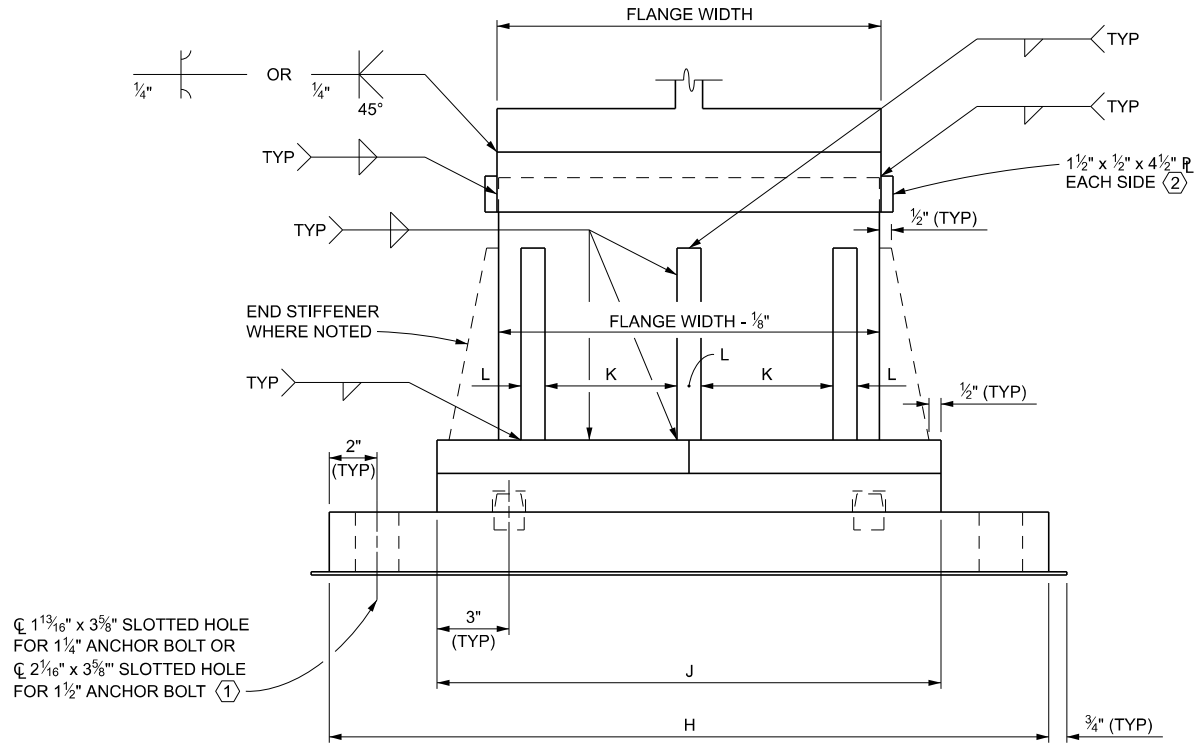




THE SPAN LENGTH DIMENSIONS SHOWN ON THE PLANS ASSUME A TEMPERATURE OF 60°F WHEN BEAMS ARE ERECTED. THE BEAMS WILL BE LONGER IF THE TEMPERATURE IS HIGHER, AND SHORTER IF COLDER, WITH THE ROCKERS TILTED AT TIME OF ERECTION. IT MAY BE NECESSARY TO ADJUST THE MASONRY PLATE TO ACHIEVE THE PROPER OFFSETS.

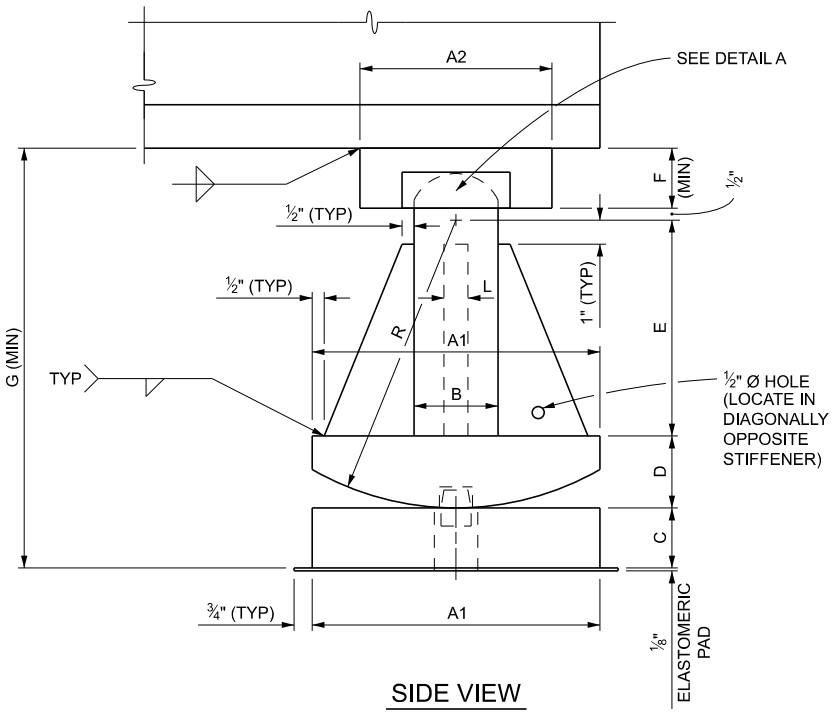
PREPARED BY DESIGN DIVISION	8.31.02

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 02/14/11
CHECKED BY: VZ	EXPANSION ROCKER	SUPERSEDES: 11/27/01
APPROVED BY: TGF		

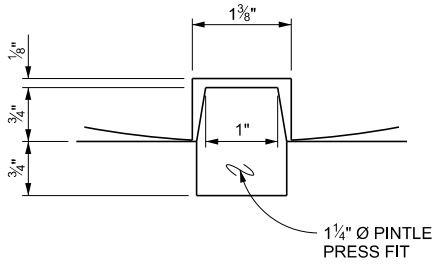


END VIEW

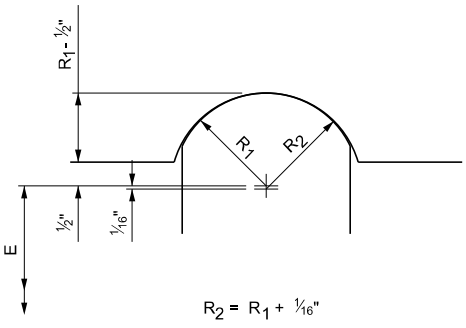
NOTE: ANCHOR BOLTS SHALL BE FURNISHED WITH ¼" x 3" x 6½" PL WASHERS.



SIDE VIEW



PINTLE DETAIL



DETAIL A

NOTES:

SEE GUIDE 8.32.02 FOR TABULATION OF BEARING DIMENSIONS

1 USE 1½" ANCHOR BOLT FOR SPANS OVER 100'

2 USE 2" x ½" x 5½" PL WHEN $R_1 = 1\frac{15}{16}$"

PREPARED BY DESIGN DIVISION	8.32.01

MAX LOAD (kip)	FLANGE WIDTH (in)	A1 (in)	A2 (in)	B (in)	C (in)	D (in)	E (in)	F (MIN) (in)	G (MIN) (in)	H (in)	J (in)	K (in)	L (in)	END STIFF REQ.	R1 (in)	R (MIN) (in)	WEIGHT OF STEEL (lbs)
100	12	6	6	2½	1¾	1½	6½	2	12¼	22	13	4	⅝		1 7/16	8	200
100	14	6	6	2½	1¾	1¼	6¾	2	12¼	24	15	5	⅝		1 7/16	8	225
100	16	6	6	2½	1¾	1¼	6¾	2	12¼	26	17	6	⅝		1 7/16	8	250
125	12	7	6	2½	2	1¾	6¼	2	12½	22	13	4	¾		1 7/16	8	230
125	14	7	6	2½	2	1¾	6¼	2	12½	24	15	5	¾		1 7/16	8	260
125	16	7	6	2½	1¾	1¾	6¼	2	12¼	26	17	6	¾		1 7/16	8	280
150	12	8	6	2½	2	2	6	2	12½	23	14	4	¾		1 7/16	8	260
150	14	8	6	2½	2	2	6	2	12½	24	15	5	¾		1 7/16	8	285
150	16	8	6	2½	2	2	6	2	12½	26	17	6	¾		1 7/16	8	320
175	12	9	6	2½	2¼	2¼	9¾	2	16¾	22	13	4	¾		1 7/16	12	340
175	14	9	6	2½	2¼	2¼	9¾	2	16¾	24	15	5	¾		1 7/16	12	380
175	16	9	6	2½	2	2¼	9¾	2	16½	26	17	6	¾		1 7/16	12	410
200	12	10	6	2½	2½	2½	9½	2	17	22	13	4	¾		1 7/16	12	380
200	14	10	6	2½	2¼	2½	9½	2	16¾	24	15	5	¾		1 7/16	12	410
200	16	10	6	2½	2¼	2½	9½	2	16¾	26	17	6	¾		1 7/16	12	460
250	14	11	8	3½	2½	3	9	2½	17½	24	15	5	¾		1 15/16	12	540
250	16	11	8	3½	2½	3	9	2½	17½	26	17	6	¾		1 15/16	12	600
300	16	12	8	3½	2½	3	9	2½	17½	30	21	5½	1		1 15/16	12	700
300	18	12	8	3½	2½	3	9	2½	17½	28	19	6½	1		1 15/16	12	695
350	16	13	8	3½	2¾	3	9	2½	17¾	33	24	5½	1	⟨1⟩	1 15/16	12	825
350	18	13	8	3½	2¾	3	9	2½	17¾	33	24	6½	1		1 15/16	12	845
400	16	14	8	3½	2¾	3½	8½	2½	17¾	35	26	5½	1	⟨1⟩	1 15/16	12	950
400	18	14	8	3½	2¾	3½	8½	2½	17¾	35	26	6½	1	⟨1⟩	1 15/16	12	975
400	20	14	8	3½	2¾	3½	8½	2½	17¾	35	26	7½	1		1 15/16	12	995
450	18	15	8	3½	3	3½	8½	2½	18	37	28	6	1¼	⟨1⟩	1 15/16	12	1110
450	20	15	8	3½	3	3½	8½	2½	18	37	28	7	1¼	⟨1⟩	1 15/16	12	1140
450	22	15	8	3½	3	3½	8½	2½	18	37	28	8	1¼		1 15/16	12	1155

⟨1⟩ DENOTES END STIFFNERS ARE REQUIRED

DRAWN BY: BLT
CHECKED BY: VZ
APPROVED BY: TGF

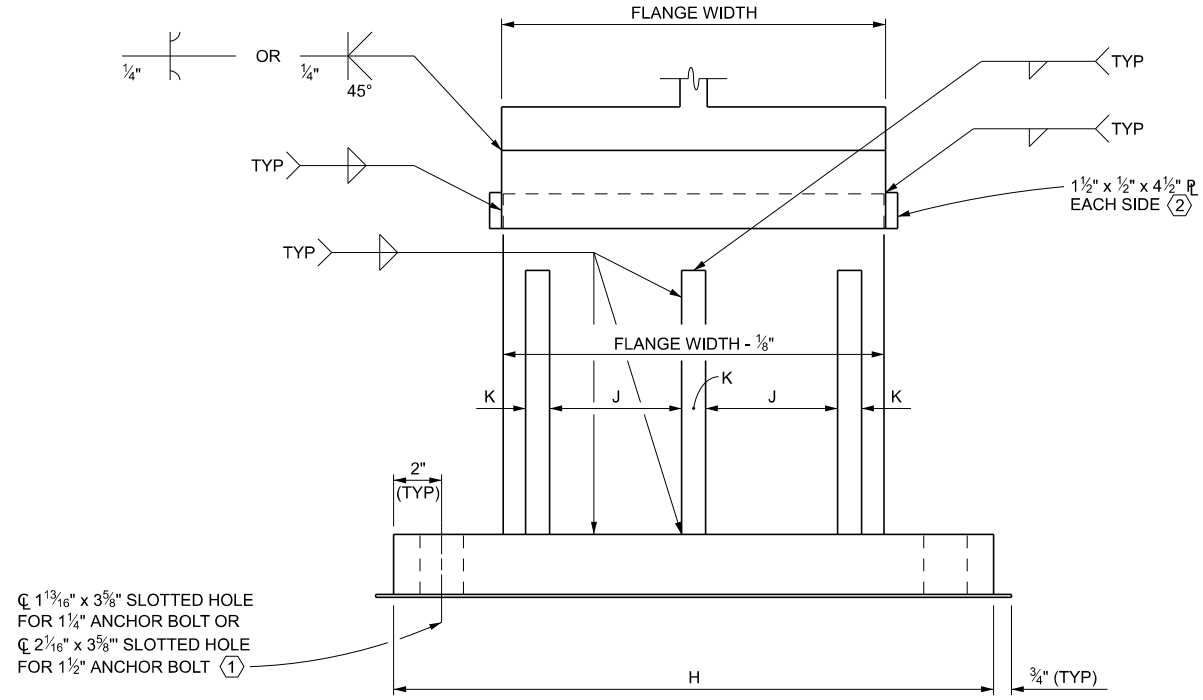
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT
ROCKER BEARING DIMENSIONS

ISSUED: 05/04/06
SUPERSEDES: 11/27/01

PREPARED BY DESIGN DIVISION

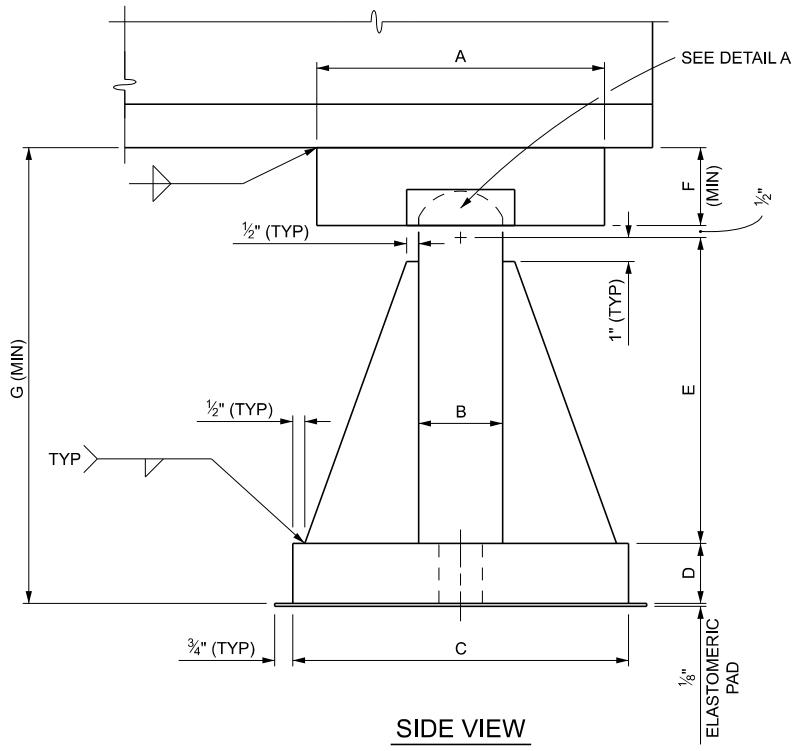
8.32.02

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 02/14/11
CHECKED BY: VZ	FIXED BEARING	SUPERSEDES: 11/27/01
APPROVED BY: TGF		

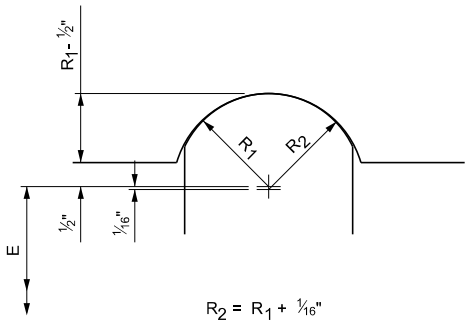


END VIEW

NOTE: ANCHOR BOLTS SHALL BE FURNISHED WITH ¼" x 3" x 6½" ℙ WASHERS.



SIDE VIEW



$R_2 = R_1 + \frac{1}{16}"$

DETAIL A

NOTES:

SEE GUIDE 8.32.04 FOR TABULATION OF BEARING DIMENSIONS

1 USE 1½" ANCHOR BOLT FOR SPANS OVER 100'

2 USE 2" x ½" x 5½" ℙ WHEN $R_1 = 1\frac{15}{16}"$

USE THIS BEARING WHEN A BUILT UP PEDESTAL AND EXPANSION ROCKER ARE REQUIRED ON THE SAME PIER.

EQUIV. d FOR BEARING CHECK:

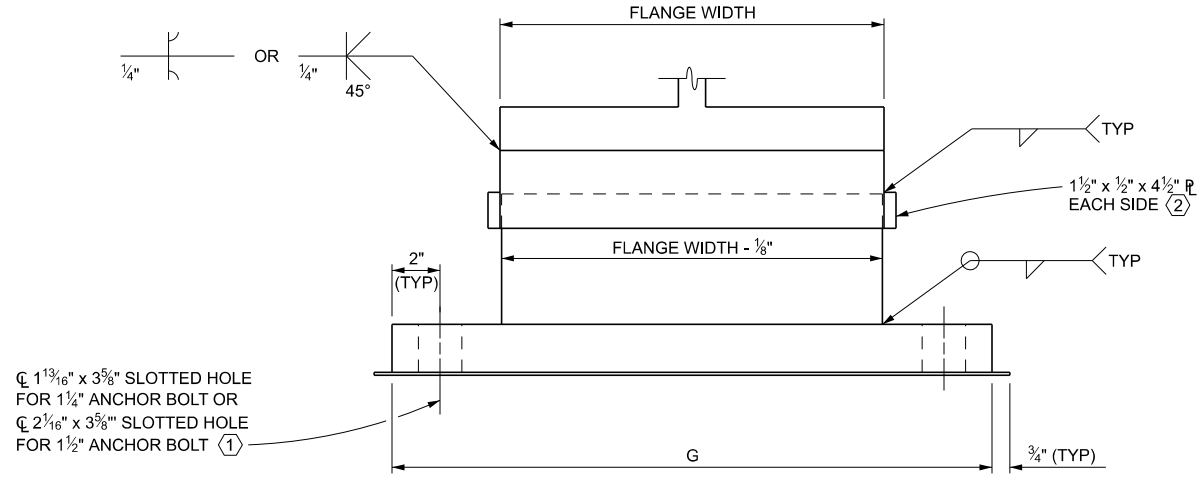
$$d = \frac{2R_1\ R_2}{R_2 - R_1}$$

PREPARED BY DESIGN DIVISION	8.32.03

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: TGF	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT FIXED BEARING DIMENSIONS	ISSUED: 05/04/06 SUPERSEDES: 11/27/01

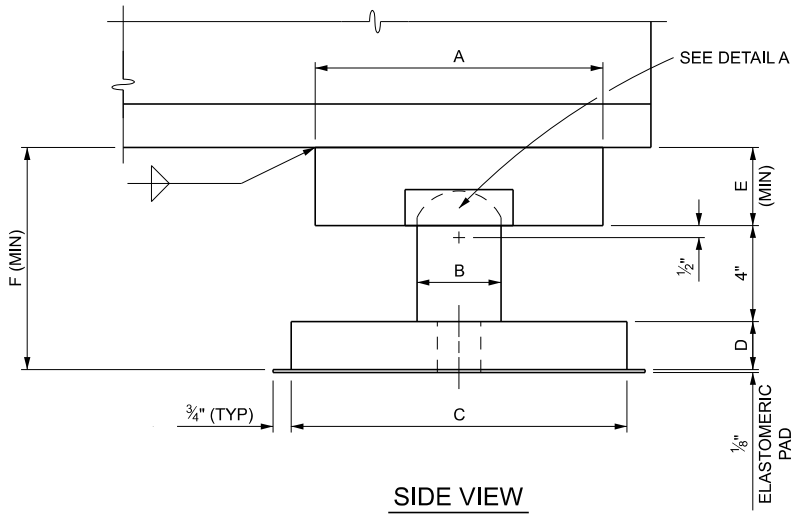
MAX LOAD (kip)	FLANGE WIDTH (in)	A (in)	B (in)	C (in)	D (in)	E (in)	F (MIN) (in)	G (MIN) (in)	H (in)	J (in)	K (in)	R1 (in)	WEIGHT OF STEEL (lbs)
100	12	6	2½	7	1½	8¼	2	12¼	21	4	¾	1 7/16	185
100	14	6	2½	6	1½	8¼	2	12¼	23	5	¾	1 7/16	200
100	16	6	2½	6	1½	8¼	2	12¼	25	6	¾	1 7/16	225
125	12	7	2½	8	1⅝	8⅜	2	12½	21	4	¾	1 7/16	215
125	14	7	2½	7	1⅝	8⅜	2	12½	23	5	¾	1 7/16	230
125	16	7	2½	7	1⅝	8⅛	2	12¼	25	6	¾	1 7/16	250
150	12	8	2½	9	1¾	8¼	2½	13	21	4	¾	1 7/16	250
150	14	8	2½	8	1¾	8¼	2	12½	23	5	¾	1 7/16	255
150	16	8	2½	8	1¾	8¼	2	12½	25	6	¾	1 7/16	285
175	12	9	2½	11	1¾	12½	2½	17¼	21	4	¾	1 7/16	330
175	14	9	2½	10	1¾	12½	2½	17¼	23	5	¾	1 7/16	360
175	16	9	2½	9	1¾	12¼	2½	17	25	6	¾	1 7/16	380
200	12	10	2½	12	1¾	12¾	3	18	21	4	¾	1 7/16	375
200	14	10	2½	11	1¾	12½	2½	17¼	23	5	¾	1 7/16	355
200	16	10	2½	10	1¾	12½	2½	17¼	25	6	¾	1 7/16	410
250	14	11	3½	13	1¾	12¾	3¼	18¼	23	5	¾	1 15/16	505
250	16	11	3½	12	1¾	12¾	3	18	25	6	¾	1 15/16	540
300	16	12	3½	14	1¾	12¾	3¼	18¼	25	5½	1	1 15/16	610
300	18	12	3½	13	1¾	12¾	3¼	18¼	27	6½	1	1 15/16	655
350	16	13	3½	16	1¾	13	3⅜	18⅝	25	5½	1	1 15/16	675
350	18	13	3½	15	1¾	13	3¼	18½	27	6½	1	1 15/16	715
400	16	14	3½	19	1¾	13	3½	18¾	25	5½	1	1 15/16	750
400	18	14	3½	18	1¾	13	3⅜	18⅝	27	6½	1	1 15/16	795
400	20	14	3½	16	1¾	13	3¼	18½	29	7½	1	1 15/16	820
450	18	15	3½	20	1¾	13¼	3¾	19¼	27	6	1¼	1 15/16	905
450	20	15	3½	19	1¾	13¼	3½	19	29	7	1¼	1 15/16	940
450	22	15	3½	17	1¾	13¼	3¼	18¾	31	8	1¼	1 15/16	955

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 03/26/12
CHECKED BY: VZ	FIXED SHOE	SUPERSEDES: 02/14/11
APPROVED BY: DAJ		

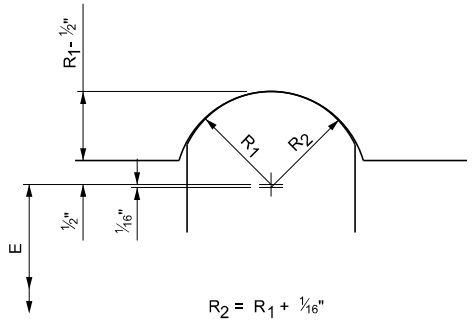


NOTE: ANCHOR BOLTS SHALL BE FURNISHED WITH ¼" x 3" x 6½" PL WASHERS.

END VIEW



SIDE VIEW



DETAIL A

EQUIV. d FOR BEARING CHECK:

$$d = \frac{2R_1\ R_2}{R_2 - R_1}$$

NOTES:

SEE GUIDE 8.32.06 FOR TABULATION OF BEARING DIMENSIONS

USE FIXED SHOE WHEN A BUILT UP PEDESTAL IS REQUIRED. AN EXCEPTION IS WHEN A PEDESTAL IS USED ON THE SAME PIER AS A ROCKER, THEN USE GUIDE 8.32.03.

(1) USE 1½" ANCHOR BOLT FOR SPANS OVER 100'

(2) USE 2" x ½" x 5½" PL WHEN $R_1 = 1\ 15/16$"

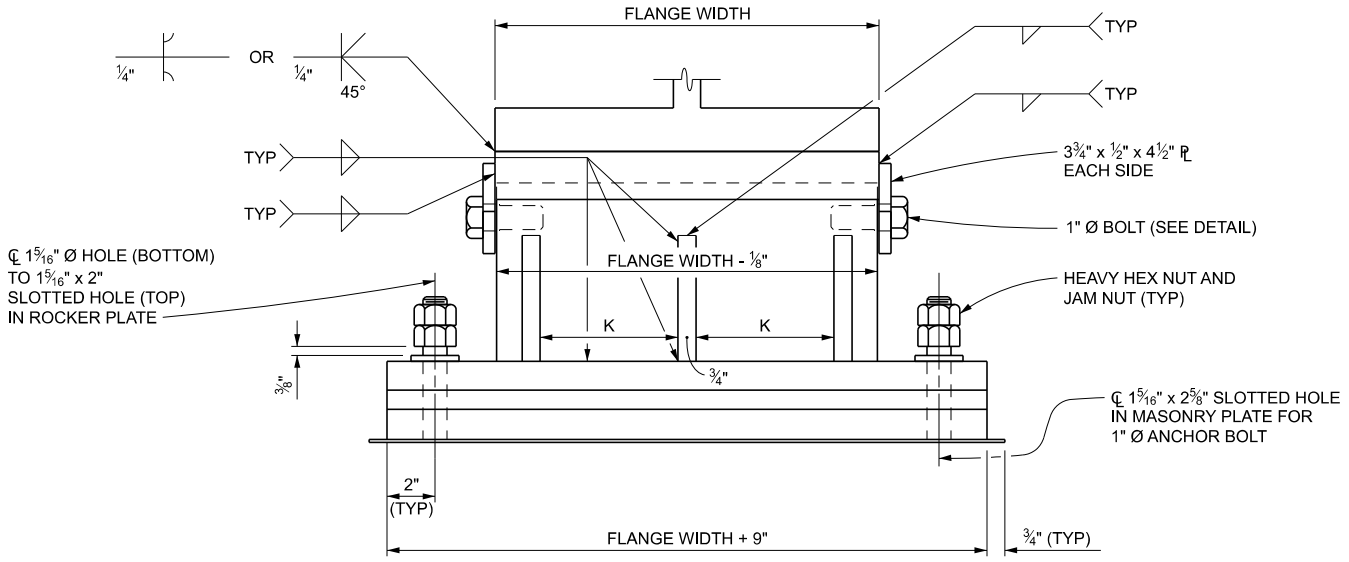
PREPARED BY DESIGN DIVISION	8.32.05

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: TGF	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT FIXED SHOE DIMENSIONS	ISSUED: 05/04/06 SUPERSEDES: 11/27/01

MAX LOAD (kip)	FLANGE WIDTH (in)	A (in)	B (in)	C (in)	D (in)	E (in)	F (MIN) (in)	G (in)	R1 (in)	WEIGHT OF STEEL (lbs)
100	12	6	2½	6	2	2	8	21	1 7/16	150
100	14	6	2½	6	2	2	8	23	1 7/16	170
100	16	6	2½	6	2	2	8	25	1 7/16	185
125	12	7	2½	7	2	2	8	21	1 7/16	165
125	14	7	2½	7	2	2	8	23	1 7/16	190
125	16	7	2½	7	2	2	8	25	1 7/16	210
150	12	8	2½	8	2	2½	8½	21	1 7/16	200
150	14	8	2½	8	2	2	8	23	1 7/16	210
150	16	8	2½	8	2	2	8	25	1 7/16	235
175	12	9	2½	10	2¼	2½	8¾	21	1 7/16	245
175	14	9	2½	9	2¼	2½	8¾	23	1 7/16	265
175	16	9	2½	9	2¼	2½	8¾	25	1 7/16	295
200	12	10	2½	11	2½	3	9½	21	1 7/16	300
200	14	10	2½	10	2¼	2½	8¾	23	1 7/16	290
200	16	10	2½	10	2¼	2½	8¾	25	1 7/16	320
250	14	11	3½	12	2½	3¼	9¾	23	1 15/16	395
250	16	11	3½	12	2½	3	9½	25	1 15/16	425
300	16	12	3½	13	2½	3¼	9¾	25	1 15/16	470
300	18	12	3½	13	2½	3¼	9¾	27	1 15/16	520
350	16	13	3½	15	3	3⅜	10⅜	25	1 15/16	580
350	18	13	3½	14	2¾	3¼	10	27	1 15/16	585
400	16	14	3½	17	3¼	3½	10¾	25	1 15/16	680
400	18	14	3½	16	3¼	3⅜	10⅝	27	1 15/16	715
400	20	14	3½	15	3	3¼	10¼	29	1 15/16	710
450	18	15	3½	18	3½	3¾	11¼	27	1 15/16	850
450	20	15	3½	17	3½	3½	11	29	1 15/16	870
450	22	15	3½	16	3½	3½	11	31	1 15/16	915

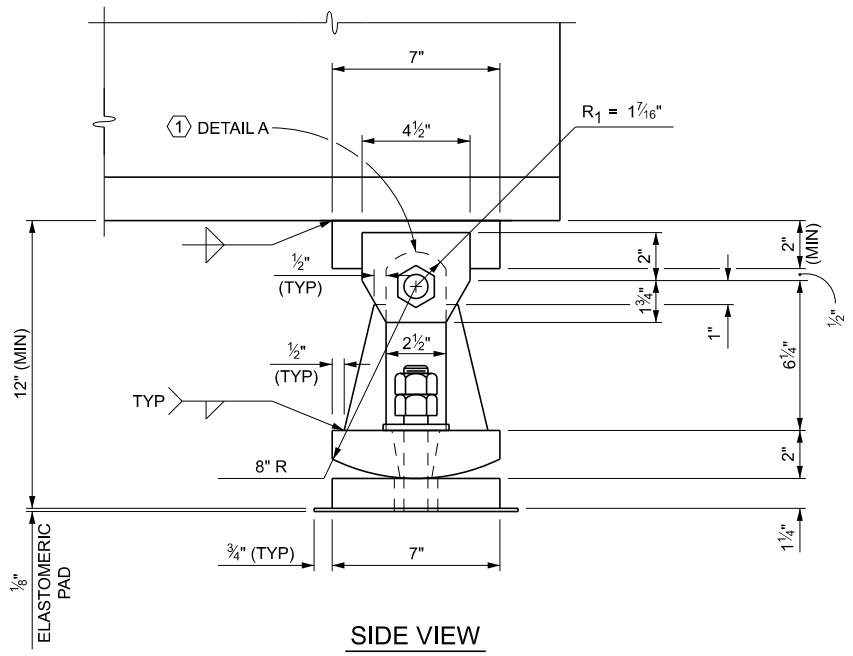
PREPARED BY DESIGN DIVISION	8.32.06

DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 02/14/11
CHECKED BY: VZ	EXPANSION ROCKER WITH PROVISION FOR UPLIFT	SUPERSEDES: 11/27/01
APPROVED BY: TGF		

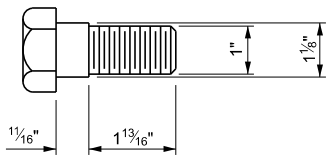


END VIEW

NOTE: ANCHOR BOLTS SHALL BE FURNISHED WITH
¼" x 2" x 3½" PL WASHERS WITH 1 3/16" Ø HOLES.



SIDE VIEW



BOLT DETAIL

MAX LOAD	FLANGE	K	WEIGHT
125 K	12"	4"	240 LBS
	14"	5"	270 LBS
	16"	6"	300 LBS

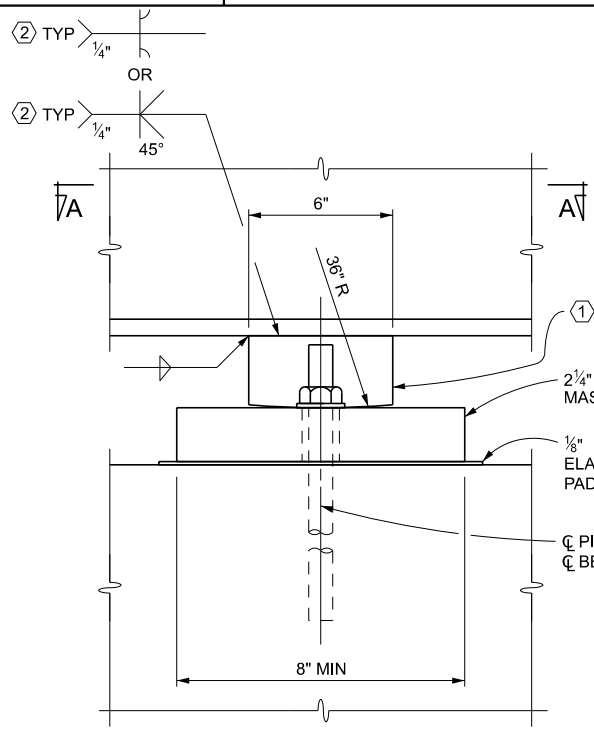
NOTES:

ANCHOR BOLTS AND KEEPER BOLTS SHOWN ARE MINIMUM.
INCREASE IF NECESSARY BASED ON AMOUNT OF UPLIFT.

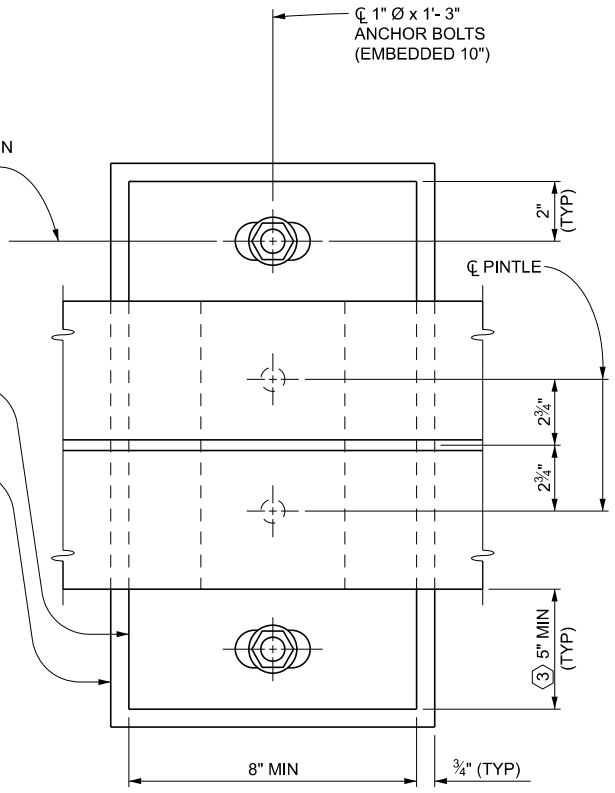
1 SEE GUIDE 8.32.01 FOR DETAIL A.

PREPARED BY DESIGN DIVISION	8.32.07

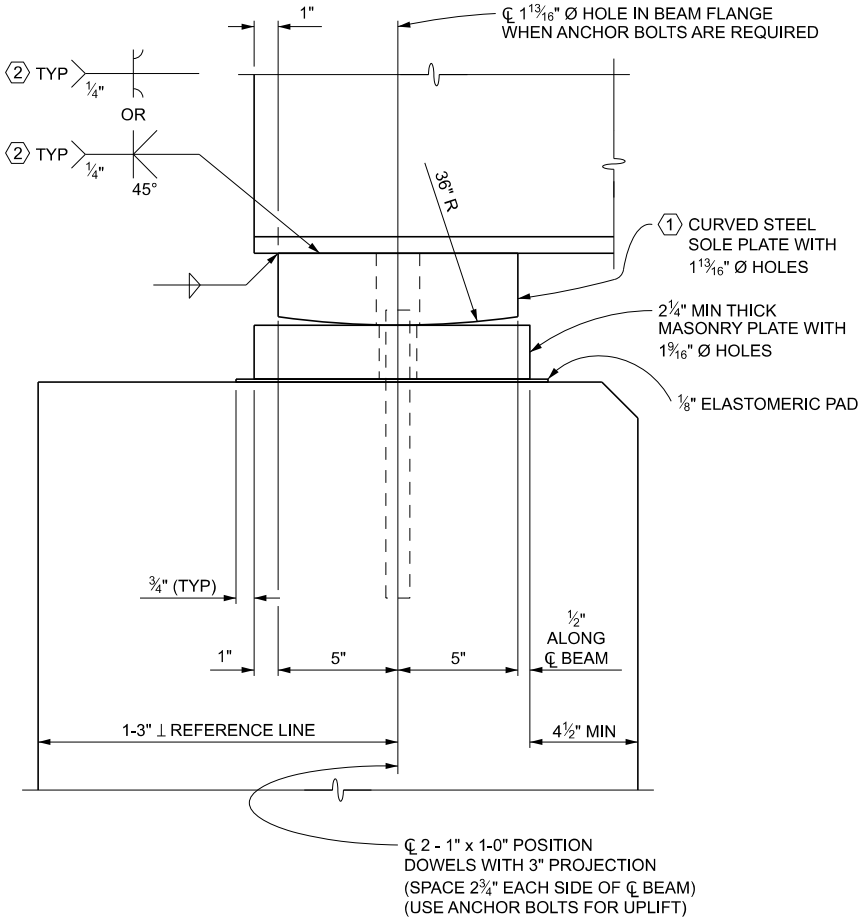
DRAWN BY: BLT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT	ISSUED: 02/14/11
CHECKED BY: VZ	CURVED STEEL PLATE BEARING DETAILS	SUPERSEDES: 11/27/01
APPROVED BY: TGF		



ELEVATION AT PIER



SECTION A-A



ELEVATION AT ABUTMENT

NOTES:

FOR PINTLE DETAILS, SEE GUIDE 8.32.01.

MAKE SOLE PLATE SAME WIDTH AS FLANGE (MIN).

BEVEL SOLE PLATE WHEN REQUIRED BEVEL EXCEEDS ⅛" PER FOOT.

AT ABUTMENTS, USE MASONRY PLATE 1" WIDER THAN SOLE PLATE (MIN).

PLATE THICKNESSES SHOWN ON THIS SHEET ARE FOR EITHER A572 OR A36 STEEL.

1 MINIMUM SOLE PLATE THICKNESS IS 1½", MAXIMUM THICKNESS IS 6".

2 USE FILLET WELD WHEN SOLE PLATE IS WIDER THAN FLANGE.

3 WHEN MORE THAN 6" IS REQUIRED TO OBTAIN THE ALLOWABLE MASONRY PRESSURE, USE A FIXED SHOE (SEE GUIDE 8.32.05).

PREPARED BY DESIGN DIVISION	8.42.01