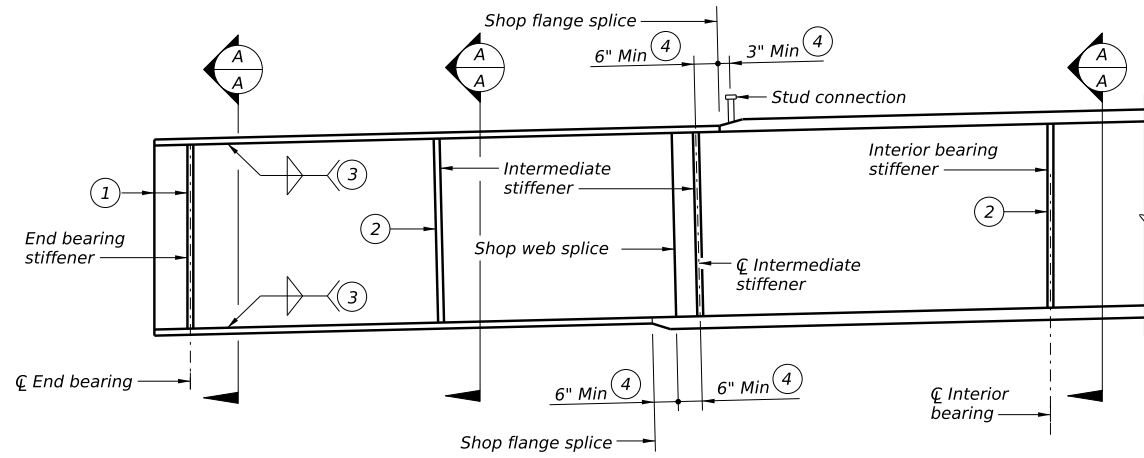
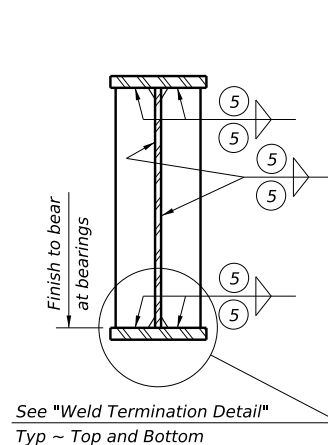


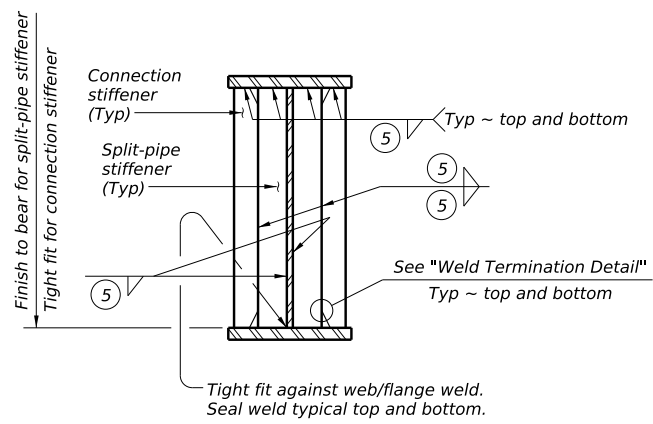
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TYPICAL GIRDER ELEVATION

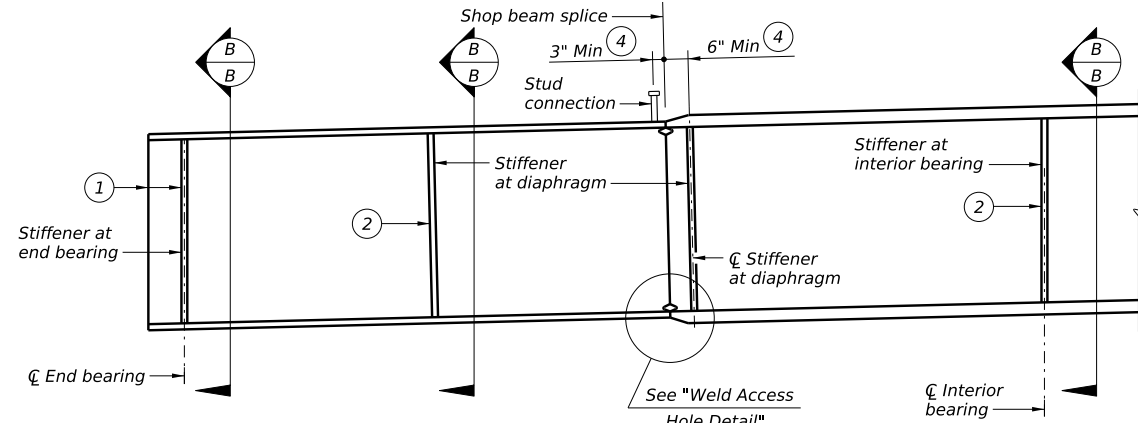


CONVENTIONAL STIFFENERS

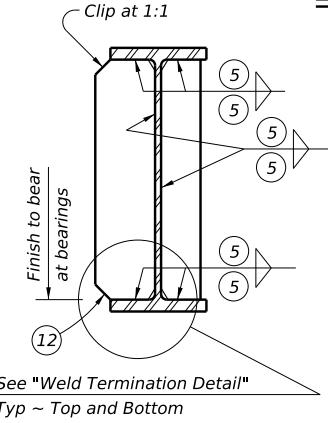


SPLIT-PIPE BEARING STIFFENERS

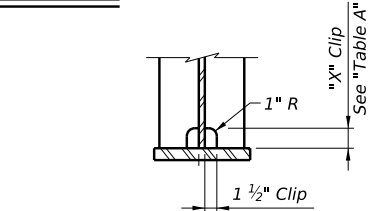
TABLE A	
Web Thickness tw	"X" (6)
$\frac{5}{16}$ " to $\frac{3}{8}$ "	1 1/2"
Over $\frac{3}{8}$ " to $\frac{5}{8}$ "	2 1/2"
Over $\frac{5}{8}$ " to 1"	4"



TYPICAL BEAM ELEVATION

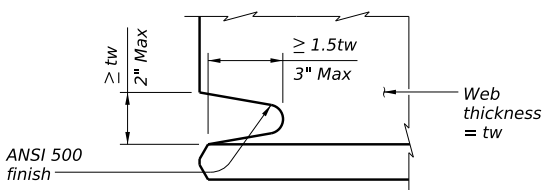


SECTION B-B

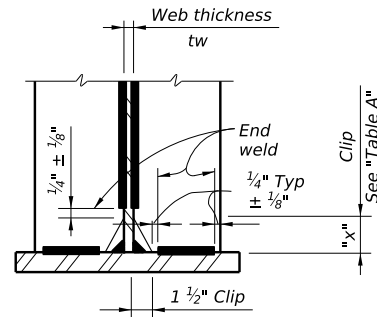


ALTERNATE STIFFENER CLIP DETAIL

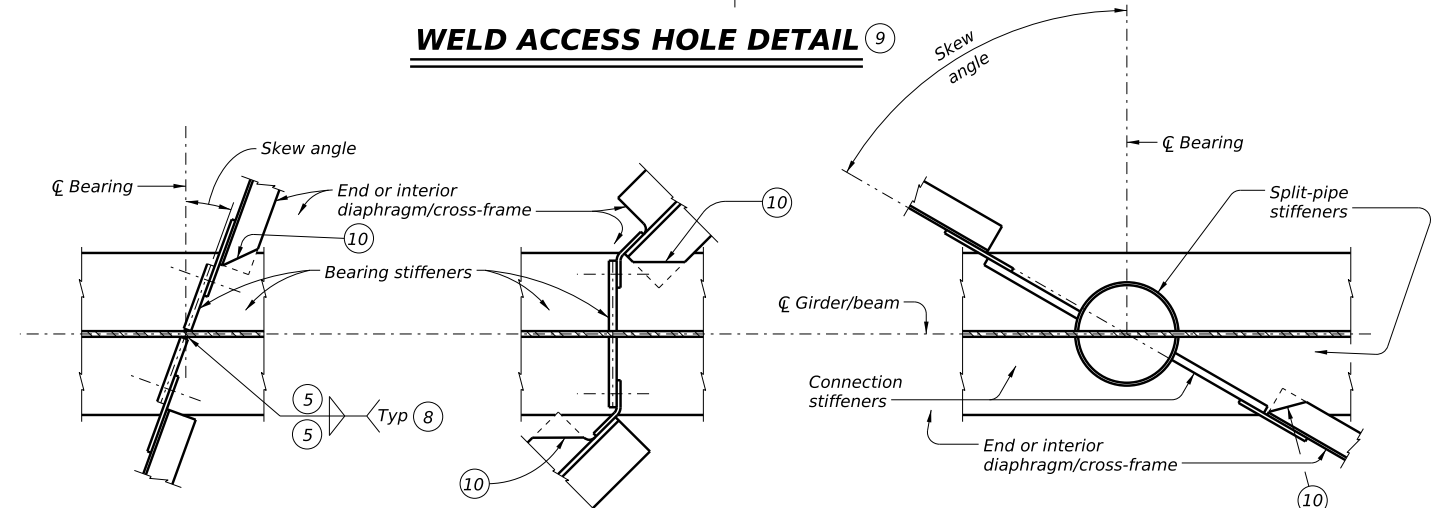
(Welds not shown for clarity)
(Bottom shown, top similar)



WELD ACCESS HOLE DETAIL (9)



WELD TERMINATION DETAIL



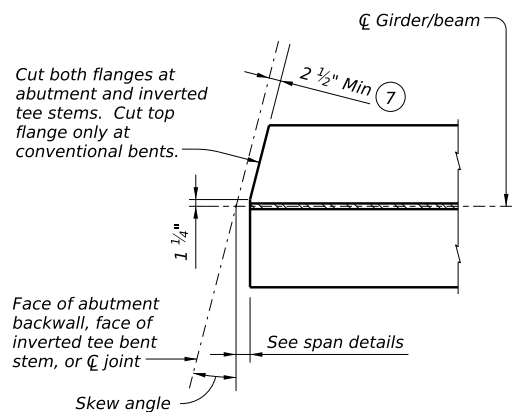
SKREW ANGLE = 0° THRU 20°

SKREW ANGLE = OVER 20° THRU 45°

SPLIT-PIPE STIFFENER 60° MAX SKEW ANGLE

BEARING STIFFENER DETAILS

(Showing diaphragm/cross-frame connections.)



SKEWED GIRDER END DETAIL (11)

- Detail girder ends and end bearing stiffeners, including split-pipe/connection stiffeners, to be plumb after all dead load deflection has occurred.
- Intermediate stiffeners and interior bearing stiffeners, including split-pipe/connection stiffeners, may be built perpendicular to girder flanges or plumb at the fabricator's option.
- See span details for weld size.
- Shop flange and web splices and stud connectors may be moved (6" Max), if required, to obtain clearances shown.
- Unless shown otherwise on the span details, use minimum size specified in AWS D1.5.
- The fabricator may use an "X" value different from what is shown provided that the following is satisfied: $4tw \leq "X" \leq 6tw$.
- Unless shown otherwise on span details.
- Increase weld size by amount of gap if gap exceeds $\frac{1}{16}$ ". Maximum gap permitted is $\frac{3}{16}$ ".
- For rolled beam shop splices only.
- Clip flanges of W- and C-shape diaphragm/cross-frame members at 45°. Required only for skewed connections and at flanges making an acute angle with main girder web.
- This detail does not address conflicts with beams in an adjacent span.
- Clip at 1:1 or as required to clear bearing anchor bolt, allowing anchor bolt nut installation.



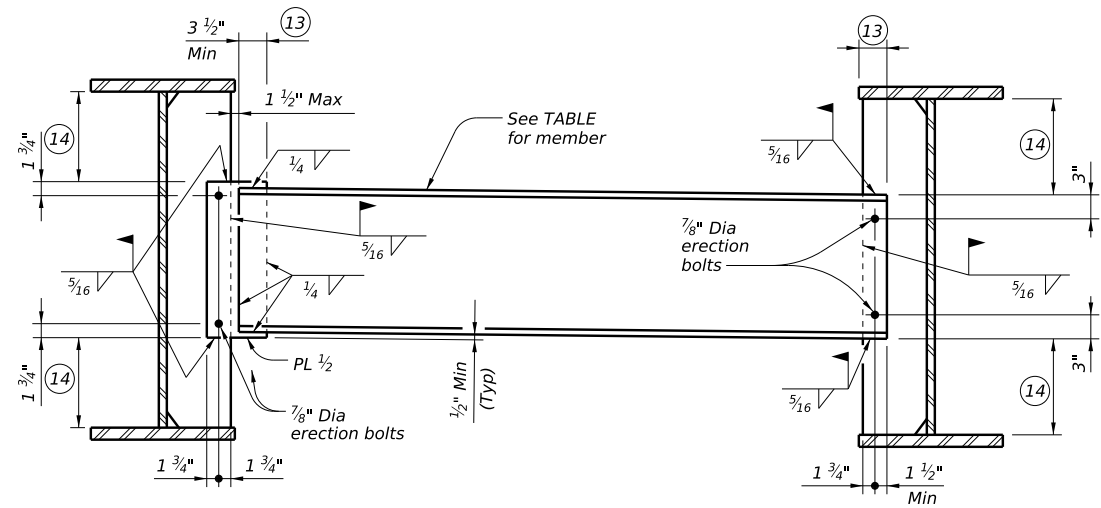
**MISCELLANEOUS DETAILS
STEEL GIRDERS AND BEAMS**

SGMD

FILE: MS-SGMD-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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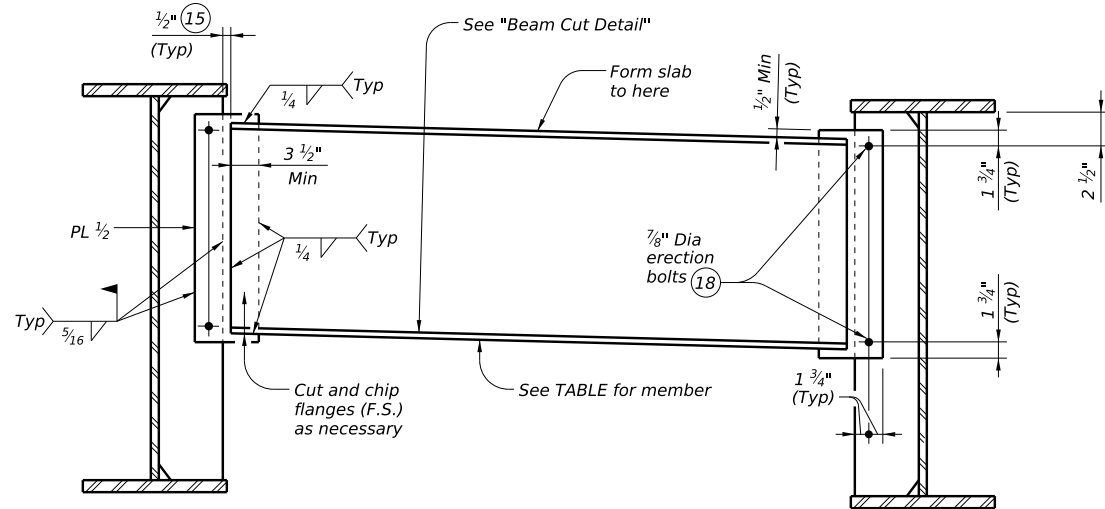


AT END BEARINGS WITH SKEW OVER 20°

AT INTERIOR LOCATIONS AND END BEARINGS WITH SKEW UP TO 20°

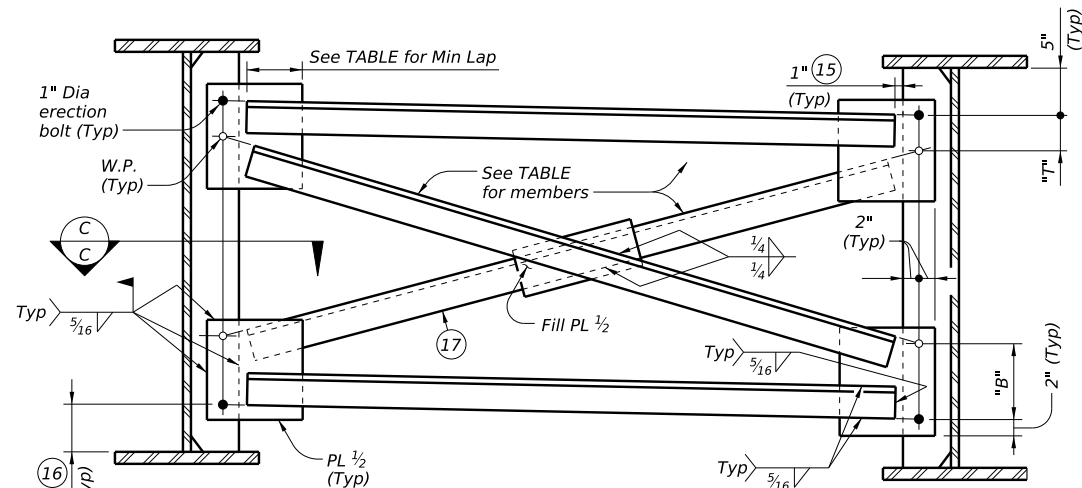
TYPE D1 THRU D5 DIAPHRAGMS

For straight rolled beams and for straight plate girders with web depths less than 52". For all locations, including end bearings when thickened slab ends, shown on standard SGTS, are used. Minimum stiffener width is 7" for use with these diaphragms.



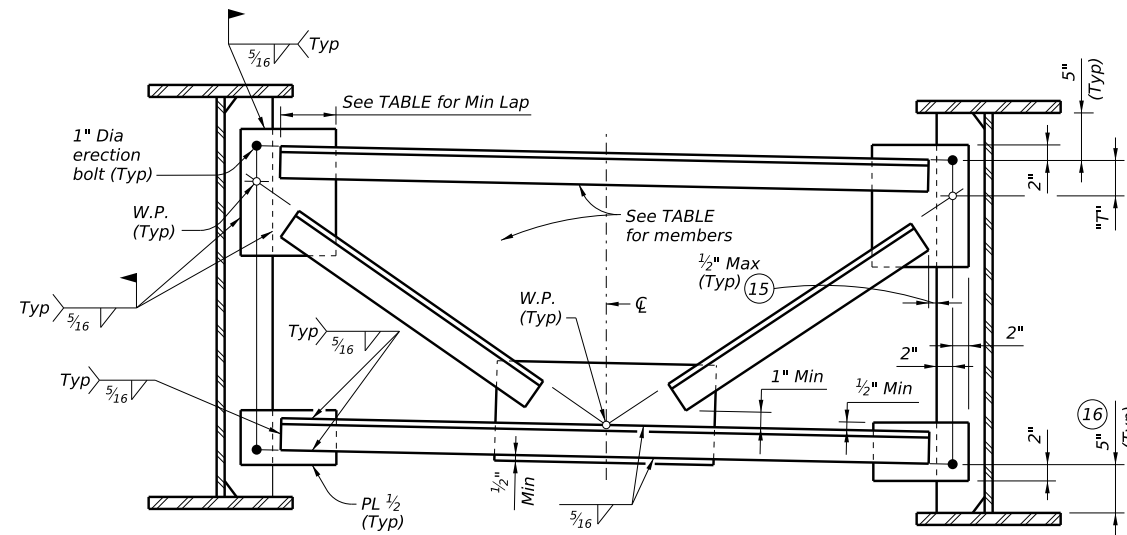
TYPE ED1 THRU ED4 END DIAPHRAGMS

For straight rolled beams and for straight plate girders with web depths less than 52". Not for use with thickened slab ends, shown on standard SGTS. Minimum stiffener width is 7" for use with these diaphragms.



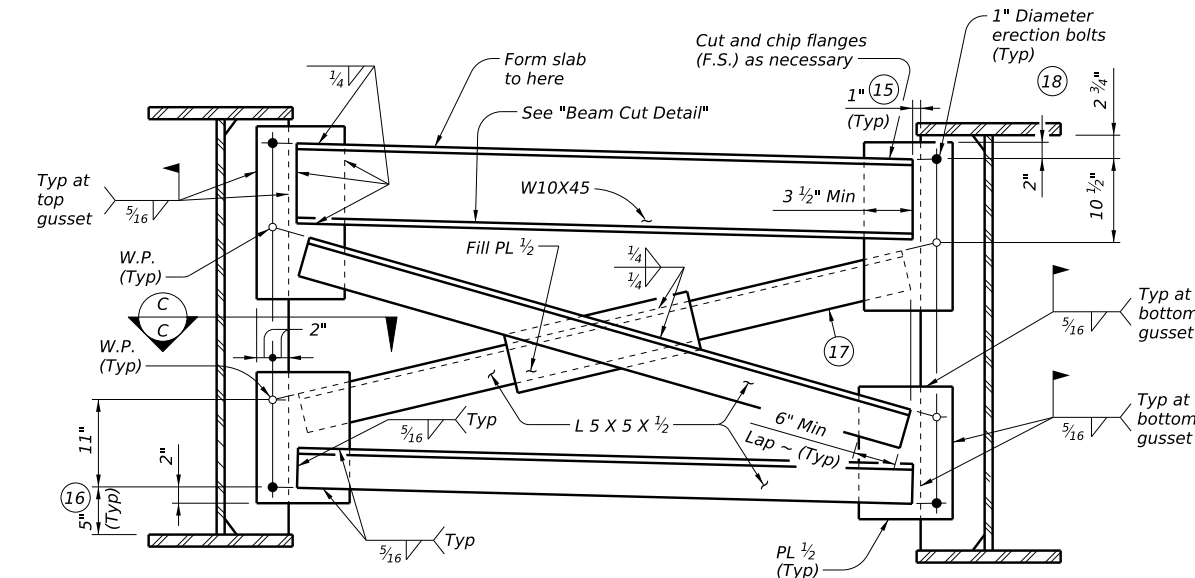
TYPE XF1 THRU XF3 CROSS-FRAMES

For Plate Girders with web depths of 52" to 96". For all locations, including end bearings when thickened slab ends, shown on standard SGTS are used. Minimum stiffener width is 8" for use with these cross-frames.



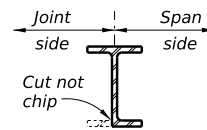
TYPE KF1 THRU KF3 CROSS-FRAMES

For plate girders with web depths of 52" to 96". For all locations, including end bearings when thickened slab ends, shown on standard SGTS, are used. Minimum stiffener width is 8" for use with these cross-frames.



TYPE EF END CROSS-FRAME

For plate girders with web depths of 52" to 96". Not for use with thickened slab ends, shown on standard SGTS. Minimum stiffener width is 8" for use with this cross-frame.



BEAM CUT DETAIL

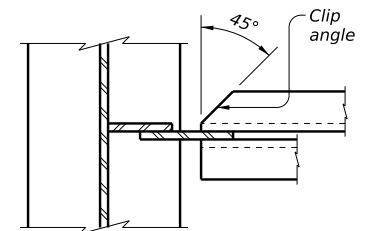
At end diaphragms and end cross-frames, treat wide flange sections as shown between gusset plates.

Type	Cross-Frame Members	Min Lap at Gussets	"B"	"T"
XF1	L 4 x 4 x 3/8	5"	9"	4 1/2"
XF2	L 5 x 5 x 1/2	6"	11"	5 1/2"
XF3	L 6 x 6 x 5/8	7"	13"	6 1/2"
KF1	L 4 x 4 x 3/8	5"	----	4 1/2"
KF2	L 5 x 5 x 1/2	6"	----	5 1/2"
KF3	L 6 x 6 x 5/8	7"	----	6 1/2"

- 13 For wide flange diaphragm members, cut and chip F.S. of diaphragm flanges as required to clear stiffener/gusset plate.
- 14 Center diaphragm between flanges (+/- 1/2").
- 15 Increase as required when gusset plates are bent (end bearing locations with skew over 20°).
- 16 At bearings, increase dimension (up to 1"), if necessary, to allow for bearing anchor bolt nut installation.
- 17 Clip outstanding leg of indicated cross-frame angles at 45°; typical each end.
- 18 Fully tighten top erection bolts in accordance with Item 447, "Structural Bolting" or seal weld top edge of gusset plate to stiffener to prevent moisture between gusset plate and stiffener.

Type	Beam Size/ Web Depth, D	Diaphragm Member
D1	W21 & W24	C12 x 20.7
D2	W27 & W30	C15 x 33.9
D3	W33 & W36	MC18 x 42.7
D4	W40	W21 x 44
D5	40" ≤ D < 52"	W27 x 84

Type	Beam Size/ Web Depth, D	Diaphragm Member
ED1	W21	W10 x 45
ED2	W24 & W27	W16 x 36
ED3	W30 to W40	W21 x 44
ED4	40" ≤ D < 52"	W27 x 84



SECTION C-C

Typical for Type XF1 thru XF3 and EF cross-frames.

HL93 LOADING

SHEET 2 OF 3



MISCELLANEOUS DETAILS STEEL GIRDERS AND BEAMS

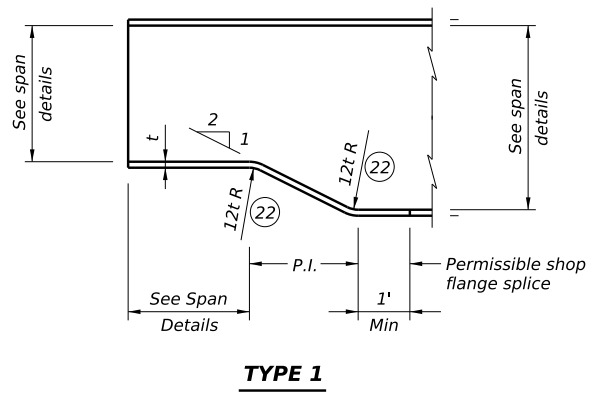
SGMD

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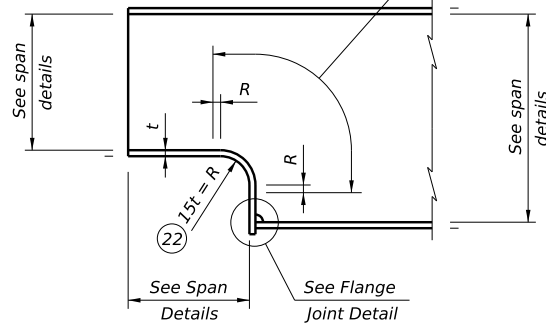
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TYPE 1

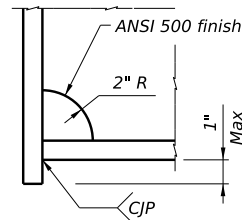
Use complete penetration groove weld for flange to web connection



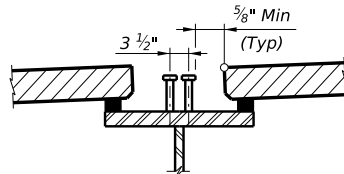
TYPE 2

DAPPED GIRDER END DETAILS

(Plate girders only)

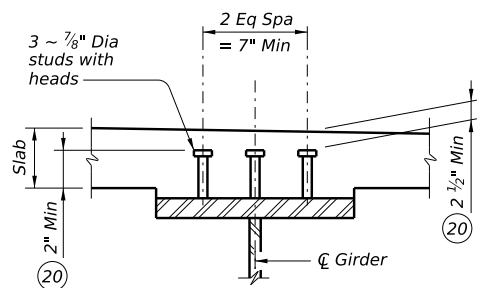


FLANGE JOINT DETAIL



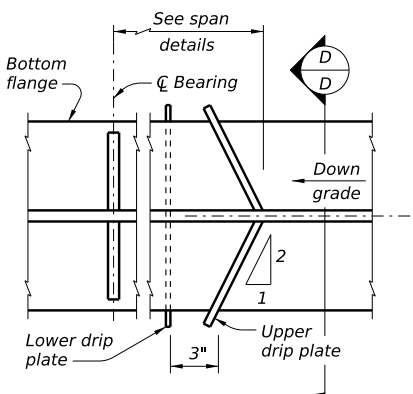
OPTION WITH PCP (21)

See prestressed concrete panels (PCP) for details and notes not shown.

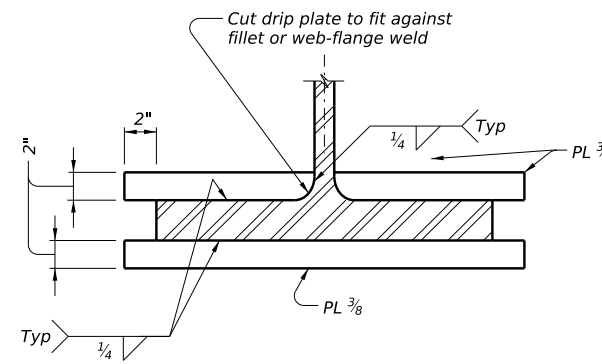


STUD CONNECTOR DETAILS (21)

Weld studs to the flange in accordance with AWS D1.5.

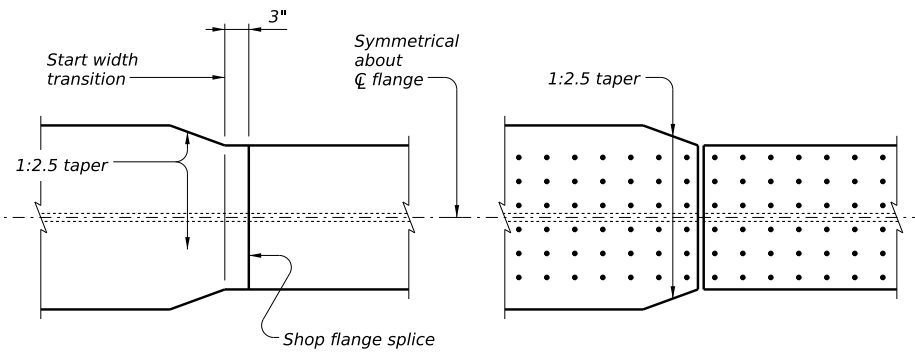


PLAN



SECTION D-D

DRIP PLATE DETAILS (19)

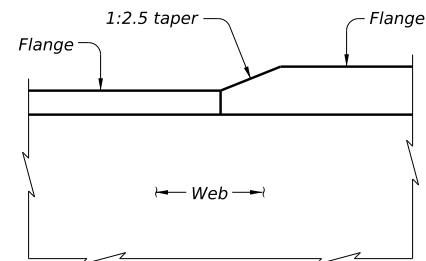


WELDED SHOP SPLICE

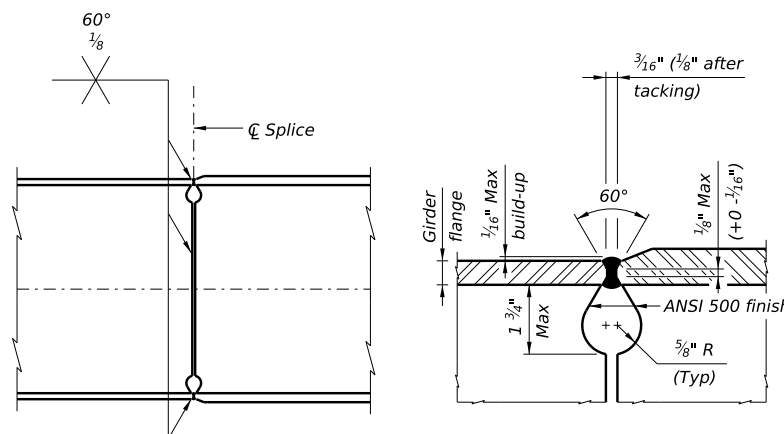
BOLTED FIELD SPLICE

(Bottom flange only)

FLANGE WIDTH TRANSITIONS



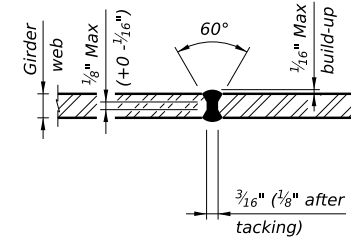
FLANGE THICKNESS TRANSITION



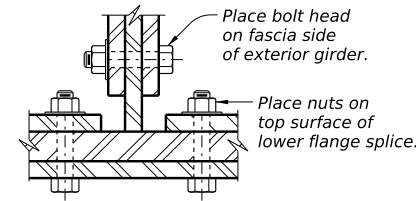
GIRDER SPLICE

FLANGE SPLICE

WELDED FIELD SPLICE DETAILS



WEB SPLICE



BOLTED SPLICE DETAIL

See Item 447, "Structural Bolting", for washer requirements.

- (19) Drip plates (ASTM A709 Gr 50W) are required for all girders in structures to remain unpainted.
- (20) The Fabricator is required to provide studs meeting the restrictions shown. Studs must be at least 5" in height.
- (21) If prestressed concrete panels are used (straight girders only), use optional stud spacing shown. Min allowable clear between studs and panels is 5/8". If this option is used, decrease spacing between rows by 1/3. The Contractor is responsible for coordinating necessary adjustment to stud connector placement with panel and steel fabricators.
- (22) Optionally, a 12" radius can be used for plates up to 1.5" thick and a 24" radius for thicker plates.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Division Specifications.

These details are intended for use with W21 thru W40 rolled beams and I-shape welded plate girders with web depths up to 96". Maximum beam/girder C-C spacing is 10', measured perpendicular to beams/girders. Maximum skew angle is 45 degrees (60 degrees with split-pipe stiffeners). These details apply to both straight and curved girders, unless noted otherwise.

See span details for location of tension flanges; diaphragm location and type; cross-frame location and type; stiffener location, type and size; and stud connector spacing.

MATERIAL NOTES:

For unpainted weathering steel bridges, provide ASTM A709 Gr 50W steel for diaphragms, cross-frames, plate stiffeners or gusset plates unless noted otherwise on the span details. Provide ASTM A847 Round HSS or ASTM A709 Gr 50W rolled 5/8" plate for split-pipe stiffeners unless noted otherwise on the span details. Minimum wall thickness for round HSS is 1/2". Fabrication of rolled plate may use incremental cold bending with bend lines nominally 1" apart to obtain semi-circular shape. Provide ASTM F3125 Gr A325 erection bolts with two ASTM F436 hardened washers and one ASTM A563 Gr C3 or DH3 heavy hex nut each.

For painted bridges, provide ASTM A709 Gr 50, 50W, or 50S steel for diaphragms, cross-frames, plate stiffeners or gusset plates unless noted otherwise on the span details. Provide ASTM A500 Gr B or A1085 round HSS for split-pipe stiffeners unless noted otherwise on the span details. Minimum wall thickness for round HSS is 1/2". Provide galvanized ASTM F3125 Gr A325 erection bolts with two ASTM F436 hardened washers and one ASTM A563 Gr DH or A194 Gr 2H heavy hex nut each.

Provide galvanized bolts, nuts, and washers for all field connections in painted structures requiring ASTM F3125 Gr A325 bolts, including Erection Bolts. Galvanizing must meet the requirements of Item 445, "Galvanizing." Fit-up bolts are not required to be galvanized.

Do not provide galvanized ASTM F3125 Gr A490 bolts for any structure.

CONSTRUCTION/FABRICATION NOTES:

Provide complete joint penetration welds for all shop flange, web, and beam splices. Erection bolt holes may be standard or oversize, at the Contractor's option. Erection bolts do not need to be tightened beyond snug tight. Leave erection bolts in the finished structure.

HL93 LOADING

SHEET 3 OF 3



Bridge Division Standard

MISCELLANEOUS DETAILS STEEL GIRDERS AND BEAMS

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