Standard Plans for Steel Bridges

Two-span Continuous Span Bridges

Smarter.
Stronger.
Steel.

Standard Plans for Steel Bridges

Two-span Continuous Span Bridges

National Steel Bridge Alliance

AISC STANDARD PLANS FOR STEEL BRIDGES

TWO-SPAN CONTINUOUS SPAN BRIDGES

Design Specification: AASHTO LRFD 10th Edition
Release Date: January 2025

Smarter.
Stronger.
Steel.

SHEET INDEX	SHEET NUMBER
SHEET INDEX	1
GENERAL NOTES	2
GENERAL DESIGN CRITERIA	3
FASCIA BEAM DESIGN CRITERIA	4
DECK POURING SEQUENCE	5
TWO EQUAL SPAN UNIT, 100-250 FT, 8 FT SPACING	6-8
TWO EQUAL SPAN UNIT, 100-250 FT, 10 FT SPACING	9-11
TWO EQUAL SPAN UNIT, 100-250 FT, 12 FT SPACING	12-14
TWO EQUAL SPAN UNIT, 100-250 FT, 14 FT SPACING	15-17
CROSS-FRAME & DIAPHRAGM DETAILS	18-20
LATERAL BRACING DETAILS	21
BOLTED FIELD SPLICES	22-24
DECK DETAILS	25-27

SHEET INDEX

Issued January 2025
Revision 0

GENERAL NOTES:

Specifications:

AASHTO LRFD Bridge Design Specifications, 10th Edition.

AASHTO Guide Specifications for Wind Loads on Bridges During Construction, 1st Edition.

Materials:

Girder Webs and Flanges

ASTM A709 Gr 50W or Gr HPS 70W as noted in the plate size tables.

Gr HPS 70W flanges are noted with a ▲

Stiffeners

A709 Gr 50W

Intermediate transverse shear stiffeners, single sided
Stiffener sizes shown as required by design, $\frac{1}{2}$ in. minimum thickness

Lateral Bracing and Diaphragm / Crossframe Members

ASTM A709 Gr 50W

Concrete Deck

f'_c = 4 ksi

Reinforcing Steel

F_y = 60 ksi

Bolts

ASTM F3125 Grade A325, diameter provided on detail sheets

Loading:

Live Load

Live load is the controlling force effects from:

HL93
EV3 - Present in multiple lanes
Fatigue design based on $ADTT_{sl}$ = 1000 trucks per day

Dead Load

Dead load assumptions:

For DC1

Slab thickness as shown in plans
Overhang thickness = slab thickness + 4 in.
Concrete haunch weight, 50 plf per beam
Stay-in-place form allowance, 15 psf
Miscellaneous steel weight:
8 ft girder spacing - 30 plf
10 ft girder spacing - 30 plf
12 ft girder spacing - 30 plf
14 ft girder spacing - 45 plf

Total DC1 loads shown on this sheet are computed with the above assumptions and assuming equal loading to all beams in the cross-section.

For DC2

Assumed single slope TL5 railing
600 plf divided to two beams

For DW

2 in. asphalt at 140 pcf

Final Design Dead Loads

8 ft girder spacing designs:

DC1 = 930 plf
DC2 = 300 plf
DW = 160 plf

10 ft girder spacing designs:

DC1 = 1,220 plf
DC2 = 300 plf
DW = 200 plf

12 ft girder spacing designs:

DC1 = 1,540 plf
DC2 = 300 plf
DW = 240 plf

14 ft girder spacing designs:

DC1 = 2,000 plf
DC2 = 300 plf
DW = 280 plf

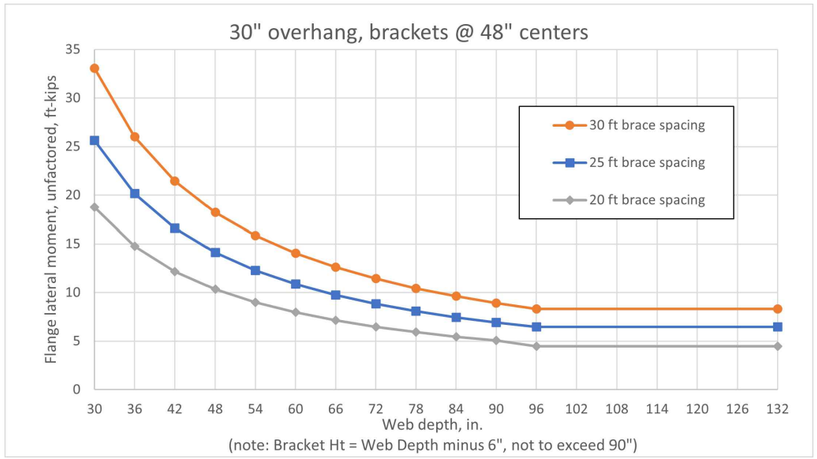
Note: exterior girders also designed for flange lateral bending moments from overhang brackets and concrete deck finishing machine. Flange lateral bending moments for exterior beams are provided on the **Fascia Beam Design Criteria** sheet.

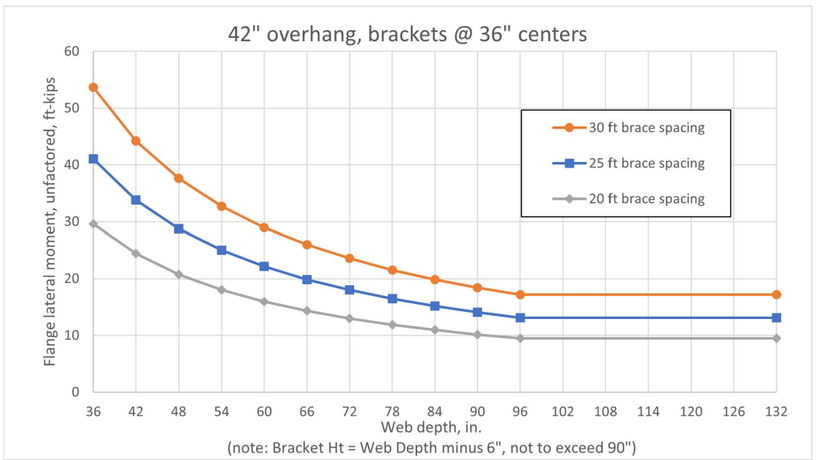
Wind Load

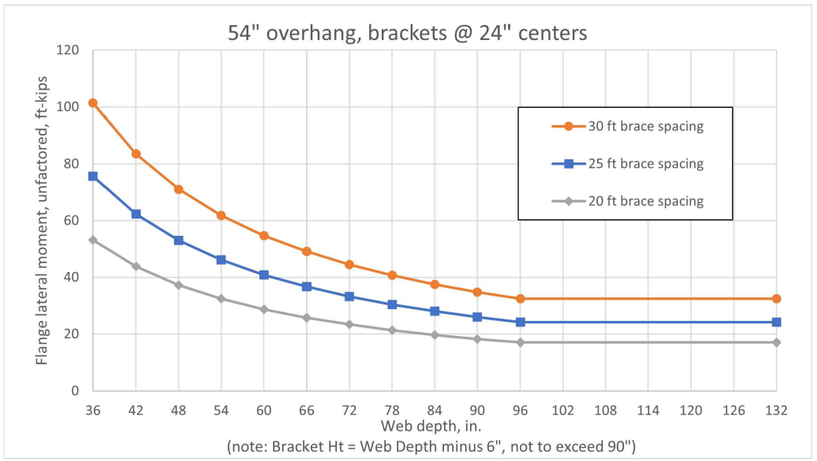
Wind on completed bridge 44 psf
Wind on open framing during construction, see **Lateral Bracing Details** sheet.

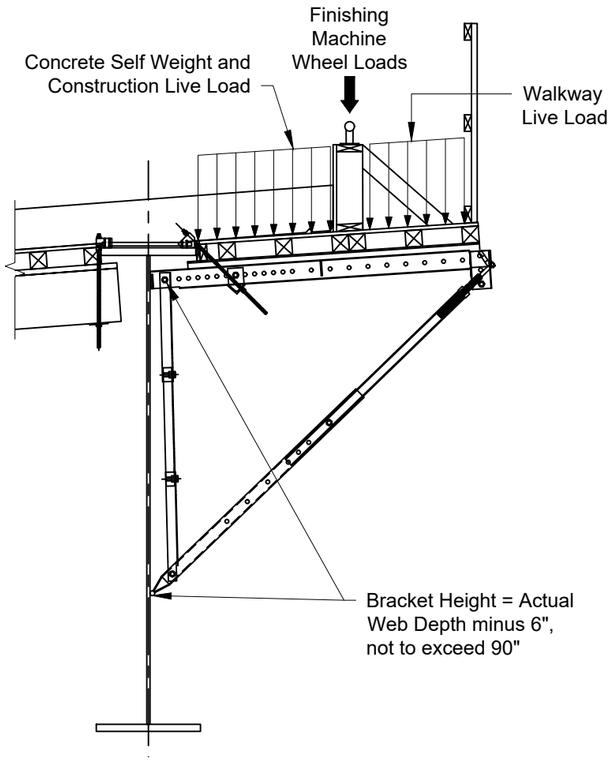
Design Assumptions and Criteria, Continuous Span Bridges:

1. Girder Design
   a. All designs performed using NSBA LRFD SIMON.
   b. Interior and exterior beams were designed. In LRFD SIMON, the "BOTH" option is used for the LL distribution factors. This results in a single beam designed for the governing shear and moment distribution factors for an interior and exterior beam. The composite slab effective width is based on an exterior beam.
   c. Live load distribution follows AASHTO LRFD 4.6.2.2 for all beam spacings and span lengths. Designs where the AASHTO distribution factor equations are used beyond the range of applicability are noted in the design tables.
   d. A skew of 20 degrees from normal is assumed for all designs.
   e. Live load deflection satisfies AASHTO LRFD 2.5.2.6.2 Criteria for Deflection for vehicular bridges, L/800.
   f. Girder depth satisfies AASHTO LRFD 2.5.2.6.3 Optional Criteria for Span-to-Depth Ratios.
   g. Fatigue design based on Category C for shear studs welded to top flanges and Category C' for welded transverse stiffeners, $ADTT_{SL}$ = 1,000 vehicles per day and a 75-year design life.
   h. Maximum segment length, 140 feet.
   i. All continuous span bridges have field splices adjacent to each pier at approximately 0.7L of the end span.
   j. Some continuous span bridges have additional splices at approximately 0.25L of the end span to meet shipping length requirements. These are noted in the plans.
   k. Maximum shipping weight, 50 tons.
   l. Maximum web depth, 11 feet.
   m. Minimum top flange width, $b_{tfs} \geq L_{fs} / 85$ where L_{fs} is the field section length. AASHTO LRFD (C6.10.2.2-1).
   n. Flange widths held constant in a field section.
   o. Minimum flange thickness, 1 in. Maximum flange thickness, 3 in. Flange thickness increments, 1/4 in.
   p. Minimum web thickness, 1/2 in. Web thickness increments, 1/8 in.
   q. No more than two complete joint penetration flange butt welds per flange in any field section.
   r. When a single size flange is used in a field section, the weight reduction of a complete joint penetration transition was first evaluated and then eliminated based on weight, cost, and stress considerations.
   s. Single-sided transverse shear stiffeners are used when needed.
   t. Longitudinal stiffeners are not used.
   u. All girders are composite for positive and negative bending.
   v. Negative moment longitudinal deck reinforcing is 1% of the gross deck cross-section. This reinforcing extends at least between the field splices, or longer as required by AASHTO LRFD 6.10.1.7 for the Service II Limit State. Designer to determine if the factored deck casting and construction loads require this reinforcing steel to be extended. See the **Deck Details** sheets for additional details.
   w. Shear stud design based on LRFD SIMON and AASHTO LRFD 9th edition. For flanges ≤ 16 in. wide, three 7/8 in. diameter studs in a transverse row are used. All other flange widths use four studs in a transverse row.
2. Diaphragm and Cross-Frame Design
   x. Intermediate diaphragms and cross-frames are designed as below. End diaphragms or cross-frames that support the deck and/or expansion joint are not considered as part of these standards.
   y. Diaphragm and cross-frame spacing varies within the span. Maximum spacing does not exceed 30 ft.
   z. Depth of bracing is at least 0.8 times girder web height.
   aa. For cross-frame design, the effective depth of the chords was assumed to be 5 in. vertically from the top and bottom of web. This dimension is used for "D" in the S/D checks. For all S/D checks, "S" is S / Cosine 20 deg assuming a maximum 20 degree skew for all designs.
   ab. Solid diaphragms are used when the girder spacing to web depth ratio, S/D > 3.5.
   ac. K-frames are used when 1.5 < S/D ≤ 3.5.
   ad. X-frames are used when S/D ≤ 1.5
   ae. Angles are used for all cross-frame members.
   af. Cross-Frame members are designed as secondary members.
   ag. Cross-Frame members are designed for tension / compression loading.
   ah. Cross-frame member stiffness is based on 0.65AE stiffness reduction factor for eccentrically loaded angles, AASHTO LRFD C4.6.3.3.4.
   ai. Diaphragms and cross-frames are designed for combined stability-induced loads along with simultaneous deck casting forces. The finishing machine is assumed to be centered at a brace point location.
3. Top Flange Lateral Bracing Design
   a. Lateral bracing is used to control wind load lateral deformations of the completed steel in an inactive work zone condition and to provide stiffness and strength during the deck casting sequence. See the **Lateral Bracing Details** sheet for additional information. Designer to coordinate lateral final bracing details with deck forming method and details.
4. Bolted Field Splices
   a. All bolted field splices use 1 in. diameter ASTM F3125 Grade A325 bolts and standard sized holes.
   b. All connection and fill plates are Gr 50W.
   c. Slip resistance is based on a Class B surface condition.
   d. For connections where the bottom flange and a portion of the web are required to be in tension to resist the factored moments at the point of splice an additional check was made to determine if the slab has adequate compression strength. This check is not in AASHTO. If the slab is unable to provide a compression capacity equal to the tensile forces of the bottom flange and web in tension, the connection was designed as a noncomposite splice. If or when this situation occurs, these splices are noted "Non-Composite" in the **Bolted Field Splices** sheets. This condition was encountered in some continuous spans with additional splices at the quarter points of the end spans.

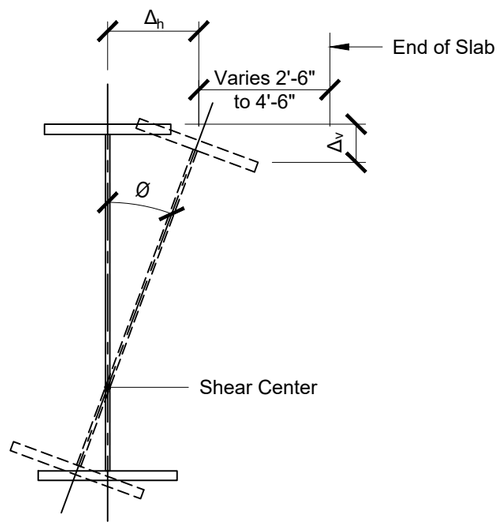








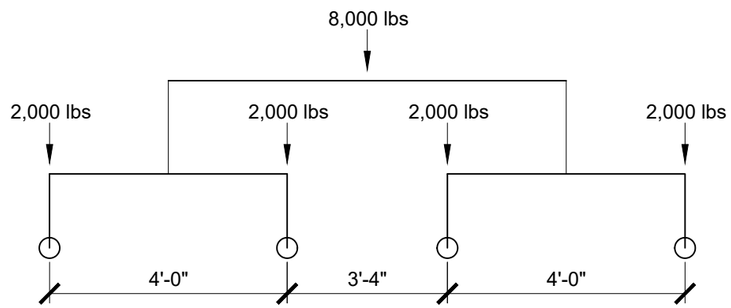
TYPICAL SECTION



GIRDER ROTATION DIAGRAM

Fascia Beam Design Criteria:

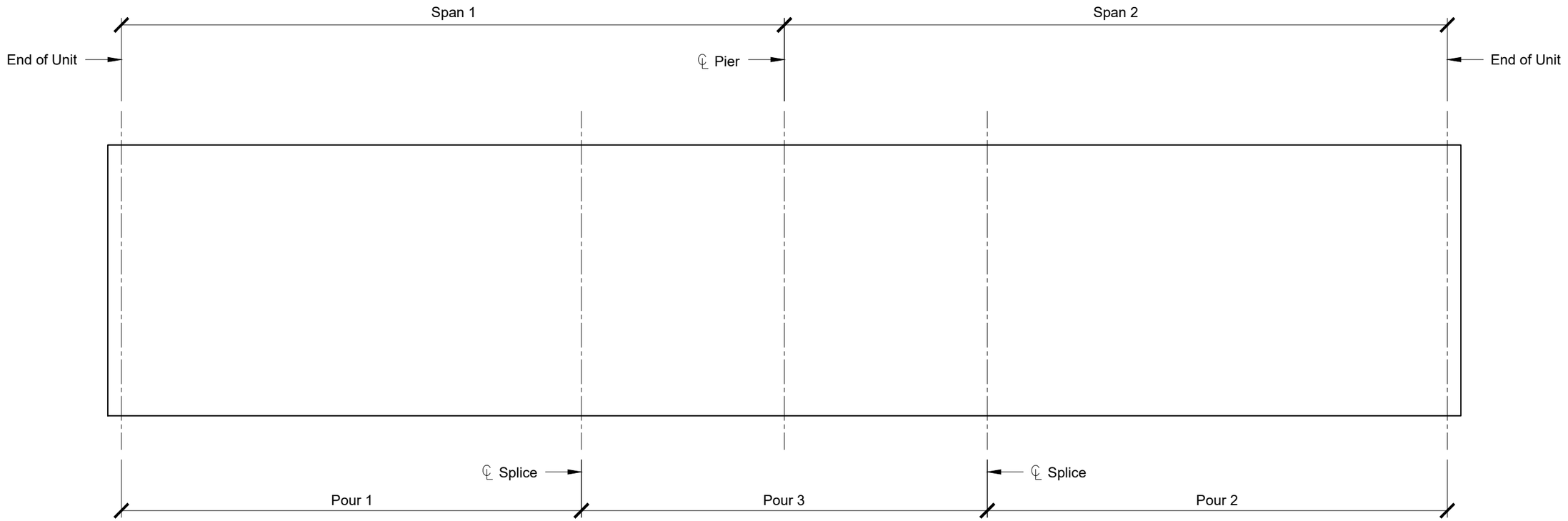
1. Finishing machine wheel load, 4 @ 2000 pounds. Loads shown are representative of finishing machines used for bridge widths and types shown on these plans.
2. Concrete density, 160 pcf, to account for formwork weight allowance.
3. Construction live load on deck, 50 psf.
4. Walkway live load, 50 psf. Assumed walkway width, 2 ft.
5. Overhang slab thickness equals nominal slab thickness + 4 in. assuming slab is flush to underside of top flange and an assumed 4 in. haunch.
6. Finishing machine is assumed to be midway between cross-frames for lateral bending moment calculations.
   a. Factored load combination: AASHTO LRFD 3.4.2, 1.25 DC + 1.5 LL
   b. An equivalent service bending moment is computed for LRFD SIMON input. LRFD SIMON uses a 1.4 factor on all lateral bending moments. Moments shown on the accompanying graphs are unfactored and are a total weighted average of the dead and live load lateral flange bending moments.
7. Bracket spacing assumed as follows. Bracket spacing is based on limiting capacities of common commercially available hangers and brackets. Assumed safe working load of 6,000 lbs. per hanger. Assumed safe working load of 3,750 lbs. per diagonal.
   a. 30 in. overhangs, 48 in. bracket spacing.
   b. 42 in. overhang, 36 in. bracket spacing.
   c. 54 in. overhang, 24 in. bracket spacing.
8. Girder service load rotations, Ø, are limited to 1 degree.
9. Lateral deflection at the top of web, Δ_h, limited to 0.25 in. Vertical deflection of the edge of slab, Δ_v, limited to 0.5 in. Both limits checked for maximum finishing machine loading and are instantaneous values.



ASSUMED FINISHING MACHINE

FASCIA BEAM DESIGN CRITERIA

Issued January 2025
Revision 0

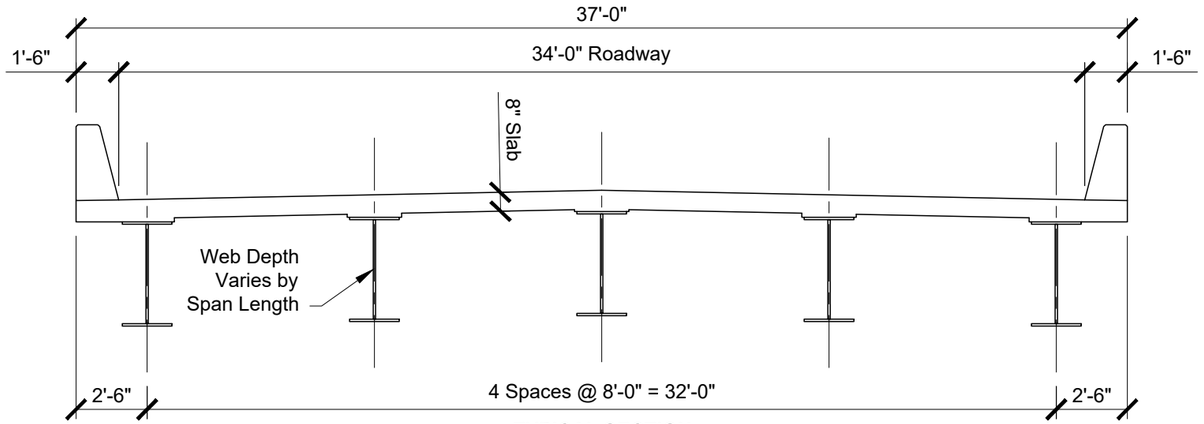


2-SPAN UNIT DECK POURING SEQUENCE

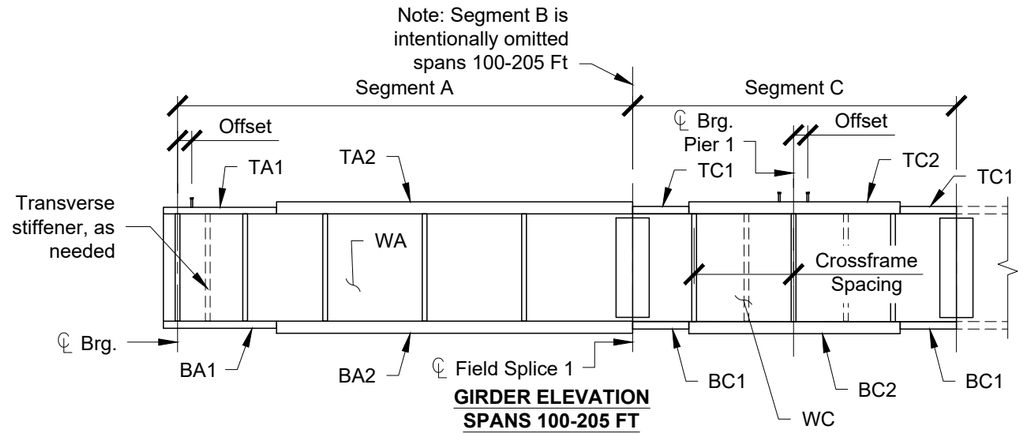
DECK POURING NOTES

1. The deck pouring sequence shown is the basis of design.
2. The beams are designed for local and lateral-torsional buckling limits for the specified pour sequence and additionally for the global stability and cross-frame requirements of AASHTO LRFD 10th edition Article 6.7.4.2.2.
3. For the 2-span unit, the critical checks for deck casting positive and negative bending in noncomposite sections occur during Pour 1 and 3.
4. The provisions of AASHTO LRFD 6.7.4.2.2 do not account for the stiffening influence of any previously cast and composite deck sections and are conservative for other than Pour 1.
5. Uplift is prevented in all cases.

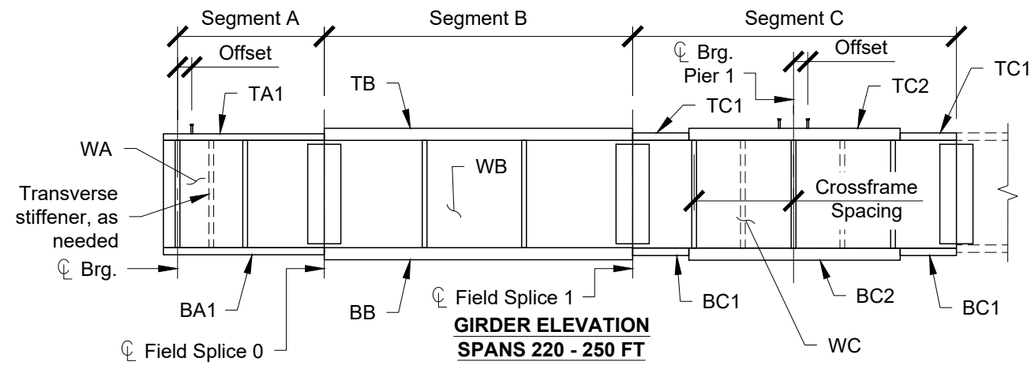
Note: An alternate pouring sequence with the deck cast continuously end-to-end is also permitted. All girder designs in these standards satisfy stress, strength, uplift, and stability requirements for the alternate pouring sequence.



TYPICAL SECTION



GIRDER ELEVATION
SPANS 100-205 FT



GIRDER ELEVATION
SPANS 220 - 250 FT

Span ft.	SEGMENT A					SEGMENT B			SEGMENT C					Additional Footnotes
	WA (in. x in. x ft.)	TA1 (in. x in. x ft.)	TA2 (in. x in. x ft.)	BA1 (in. x in. x ft.)	BA2 (in. x in. x ft.)	WB (in. x in. x ft.)	TB (in. x in. x ft.)	BB (in. x in. x ft.)	WC (in. x in. x ft.)	TC1 (in. x in. x ft.)	TC2 (in. x in. x ft.)	BC1 (in. x in. x ft.)	BC2 (in. x in. x ft.)	
2 @ 100	42 x 0.5 x 70	---	16 x 1 x 70	---	18 x 1.25 x 70	---	---	---	42 x 0.5 x 60	---	22 x 1.25 x 60	---	22 x 1.75 x 60	---
2 @ 115	48 x 0.5 x 81	---	16 x 1 x 81	---	18 x 1.25 x 81	---	---	---	48 x 0.5 x 68	---	22 x 1.25 x 68	22 x 1 x 17	22 x 1.5 x 34	---
2 @ 130	54 x 0.5 x 91	---	16 x 1 x 91	---	18 x 1.25 x 91	---	---	---	54 x 0.5 x 78	22 x 1 x 19	22 x 1.5 x 40	22 x 1 x 19	22 x 1.75 x 40	---
2 @ 145	60 x 0.5 x 102	---	18 x 1 x 102	---	20 x 1.25 x 102	---	---	---	60 x 0.5 x 86	24 x 1 x 21	24 x 1.75 x 44	24 x 1 x 21	24 x 1.75 x 44	---
2 @ 160	66 x 0.5 x 112	---	18 x 1 x 112	---	20 x 1.25 x 112	---	---	---	66 x 0.5 x 96	24 x 1 x 24	24 x 1.75 x 48	24 x 1 x 24	24 x 2 x 48	---
2 @ 175	72 x 0.5 x 123	---	18 x 1 x 123	20 x 1 x 65	20 x 1.25 x 58	---	---	---	72 x 0.5 x 104	24 x 1 x 26	24 x 2 x 52	24 x 1.25 x 26	24 x 2.25 x 52	---
2 @ 190	76 x 0.625 x 133	---	20 x 1 x 133	---	22 x 1 x 133	---	---	---	76 x 0.625 x 114	26 x 1.25 x 28	26 x 2 x 58	26 x 1.25 x 28	26 x 2.25 x 58	---
2 @ 205	82 x 0.625 x 140	---	20 x 1 x 140	---	22 x 1 x 140	---	---	---	82 x 0.625 x 130	26 x 1.25 x 32	26 x 2.25 x 66	26 x 1.25 x 32	26 x 2.5 x 66	---
2 @ 220	92 x 0.625 x 55	22 x 1 x 55	---	22 x 1 x 55	---	92 x 0.625 x 99	22 x 1 x 99	22 x 1 x 99	92 x 0.625 x 132	26 x 1.25 x 33	26 x 2.25 x 66	26 x 1.25 x 33	26 x 2.5 x 66	---
2 @ 235	96 x 0.75 x 60	24 x 1 x 60	---	24 x 1 x 60	---	96 x 0.75 x 105	24 x 1 x 105	24 x 1 x 105	96 x 0.75 x 140	28 x 1.25 x 35	28 x 2.25 x 70	28 x 1.25 x 35	28 x 2.25 x 70	---
2 @ 250	102 x 0.75 x 60	24 x 1 x 60	---	24 x 1 x 60	---	102 x 0.75 x 120	24 x 1 x 120	24 x 1 x 120	102 x 0.75 x 140	28 x 1.25 x 35	28 x 2.25 x 70	28 x 1.25 x 35	28 x 2.5 x 70	a, b

Note: All plates are A709 Gr 50W.

Footnotes:
a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.
b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TWO SPAN 100-250 FT 8 FT SPACING

Issued January 2025
Revision 0

TRANSVERSE AND BEARING STIFFENERS							
Span ft.	Transverse Stiffener Size and Location, Distance From End support			Bearing Stiffeners, End		Bearing Stiffeners, Int.	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.	Width in.	Thickness in.
2 @ 100	---	---	---	7.25	0.75	10.25	1
2 @ 115	5.5	0.5	103	7.25	0.75	10.25	1
2 @ 130	5.5	0.5	103, 116.5	7.25	0.75	10.25	1
2 @ 145	6	0.5	7.5, 115, 130	8.25	0.75	11.25	1
2 @ 160	6	0.5	8.25, 24.75, 95.5, 112, 127, 143.5	8.25	0.75	11.25	1
2 @ 175	7	0.5	8.75, 26.75, 87, 105, 123, 140.75, 158.75	8.25	0.75	11.25	1
2 @ 190	6.5	0.5	152, 171	9.25	0.875	12.25	1.125
2 @ 205	6.5	0.5	143.5, 164, 184.5	9.25	0.875	12.25	1.125
2 @ 220	8	0.625	11.5, 131, 154, 174, 197	10.25	1	12.25	1.125
2 @ 235	7	0.5	211	11	1	13	1.125
2 @ 250	7	0.5	199, 224.5	11	1	13	1.125

SHEAR STUD LAYOUT TABLE, SPAN 1 (SPAN 2 MIRRORED)														
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3			Group 4		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
2 @ 100	4	0	10	6	5	70	12	70	5	48	20	1	42	3.5
2 @ 115	4	0	23	12	23	38	16	50.67	13	12	13	7	48	28
2 @ 130	4	0	13	12	13	64	16	85.33	7	48	28	---	---	---
2 @ 145	4	0	22	12	22	58	18	87	9	48	36	---	---	---
2 @ 160	4	0	18	16	24	58	20	96.67	9	48	36	---	---	---
2 @ 175	4	0	20	16	26.67	63	20	105	10	48	40	---	---	---
2 @ 190	4	0	15	16	20	74	20	123.33	11	48	44	---	---	---
2 @ 205	4	0	21	18	31.5	35	24	70	28	18	42	15	48	60
2 @ 220	4	0	14	20	23.33	71	24	142	13	48	52	---	---	---
2 @ 235	4	0	7	21	12.25	6	24	12	68	27	153	14	48	56
2 @ 250	4	0	13	24	26	70	28	163.33	15	48	60	---	---	---

GIRDER WEIGHT				
Span ft.	Segment A tons	Segment B tons	Segment C tons	Total tons
2 @ 100	7.09	---	8.88	23.05
2 @ 115	8.61	---	9.14	26.37
2 @ 130	10.14	---	11.29	31.58
2 @ 145	12.67	---	14.11	39.45
2 @ 160	14.48	---	16.66	45.62
2 @ 175	15.98	---	20.17	52.13
2 @ 190	20.25	---	26.31	66.82
2 @ 205	22.21	---	32.28	76.70
2 @ 220	9.50	17.10	34.08	87.27
2 @ 235	12.25	21.44	40.49	107.87
2 @ 250	12.71	25.42	42.40	118.65

Note: Girder weight is total weight of web and flanges only measured between CL brg at each end. Does not include girder extension at end bearings, stiffeners, shear studs, bracing, or any other allowances.

DEAD LOAD AND LIVE LOAD REACTIONS								
Span ft.	End Reaction				Pier Reaction			
	DC kips	DW kips	Truck kips	Lane kips	DC kips	DW kips	Truck kips	Lane kips
2 @ 100	51	6	73	24	190	20	122	64
2 @ 115	60	7	75	28	216	23	127	73
2 @ 130	67	8	75	31	248	27	133	83
2 @ 145	76	8	76	35	283	30	136	92
2 @ 160	85	9	76	38	316	33	138	101
2 @ 175	92	10	77	41	352	36	140	111
2 @ 190	101	11	77	45	399	39	141	121
2 @ 205	109	12	77	48	439	43	142	131
2 @ 220	121	12	77	51	474	46	143	140
2 @ 235	136	13	78	55	523	49	143	148
2 @ 250	145	14	78	58	562	52	143	158

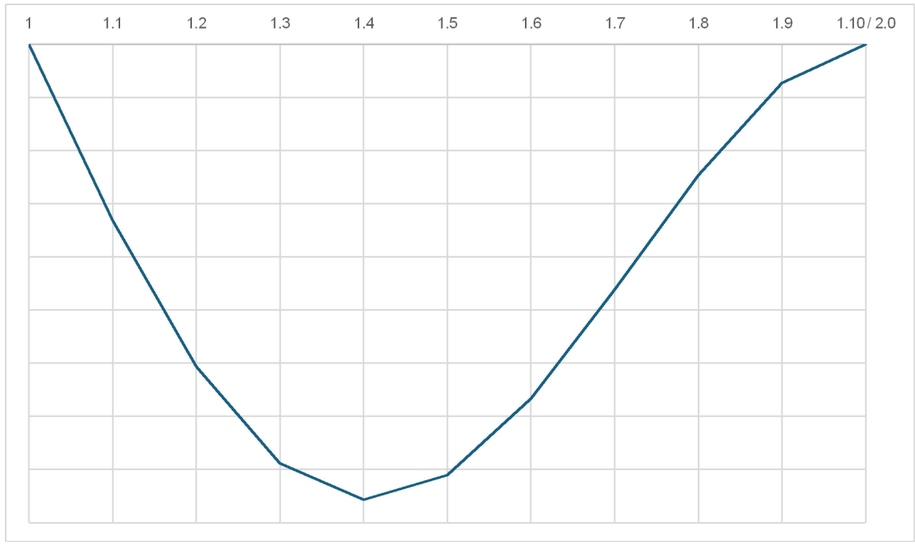
Note: Truck and lane reactions include distribution factors, skew correction, and impact on the truck loading.

CROSS-FRAME SPACING, SPAN 1 (SPAN 2 MIRRORED)		
Span, ft.	Spacing, ft.	Type
2 @ 100	5 @ 20 = 100	K-Frame
2 @ 115	3 @ 25 + 2 @ 20 = 115	K-Frame
2 @ 130	4 @ 23.5 + 2 @ 18 = 130	K-Frame
2 @ 145	4 @ 26.25 + 2 @ 20 = 145	K-Frame
2 @ 160	5 @ 23 + 2 @ 22.5 = 160	K-Frame
2 @ 175	5 @ 23 + 3 @ 20 = 175	K-Frame
2 @ 190	5 @ 26 + 3 @ 20 = 190	K-Frame
2 @ 205	6 @ 23.83 + 3 @ 20.67 = 205	X-Frame
2 @ 220	6 @ 26.17 + 3 @ 21 = 220	X-Frame
2 @ 235	7 @ 24 + 3 @ 22.33 = 235	X-Frame
2 @ 250	8 @ 23 + 3 @ 22 = 250	X-Frame

TWO SPAN 100-250 FT 8 FT SPACING

Issued January 2025
Revision 0

DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in., Span 1 Shown. Span 2 Symmetric About Pier											
	1.0	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**	**1.7**	**1.8**	**1.9**	**1.10**
100 ft. span - steel only, in.	0.00	0.11	0.20	0.25	0.28	0.26	0.22	0.15	0.08	0.02	0.00
slab, in.	0.00	0.47	0.86	1.12	1.22	1.15	0.94	0.65	0.35	0.10	0.00
barrier rails, in.	0.00	0.08	0.15	0.20	0.22	0.21	0.17	0.12	0.06	0.02	0.00
100 ft. span - total, in.	**0.00**	**0.66**	**1.21**	**1.58**	**1.71**	**1.62**	**1.33**	**0.92**	**0.49**	**0.15**	**0.00**
115 ft. span - steel only, in.	0.00	0.15	0.27	0.36	0.39	0.37	0.31	0.21	0.11	0.03	0.00
slab, in.	0.00	0.64	1.18	1.54	1.67	1.59	1.31	0.91	0.48	0.14	0.00
barrier rails, in.	0.00	0.12	0.22	0.28	0.31	0.30	0.25	0.17	0.09	0.03	0.00
115 ft. span - total, in.	**0.00**	**0.91**	**1.67**	**2.18**	**2.38**	**2.26**	**1.86**	**1.29**	**0.68**	**0.20**	**0.00**
130 ft. span - steel only, in.	0.00	0.19	0.35	0.45	0.49	0.46	0.38	0.26	0.13	0.04	0.00
slab, in.	0.00	0.78	1.43	1.86	2.01	1.89	1.54	1.05	0.54	0.16	0.00
barrier rails, in.	0.00	0.15	0.27	0.36	0.39	0.37	0.30	0.21	0.11	0.03	0.00
130 ft. span - total, in.	**0.00**	**1.12**	**2.05**	**2.66**	**2.89**	**2.72**	**2.22**	**1.52**	**0.79**	**0.23**	**0.00**
145 ft. span - steel only, in.	0.00	0.23	0.43	0.56	0.60	0.57	0.46	0.31	0.16	0.05	0.00
slab, in.	0.00	0.87	1.59	2.06	2.23	2.09	1.70	1.15	0.59	0.17	0.00
barrier rails, in.	0.00	0.18	0.32	0.42	0.46	0.43	0.36	0.25	0.13	0.04	0.00
145 ft. span - total, in.	**0.00**	**1.28**	**2.34**	**3.03**	**3.29**	**3.09**	**2.52**	**1.71**	**0.88**	**0.26**	**0.00**
160 ft. span - steel only, in.	0.00	0.29	0.54	0.70	0.75	0.71	0.58	0.39	0.20	0.06	0.00
slab, in.	0.00	1.05	1.91	2.48	2.68	2.51	2.03	1.37	0.69	0.20	0.00
barrier rails, in.	0.00	0.21	0.39	0.51	0.55	0.52	0.43	0.29	0.15	0.04	0.00
160 ft. span - total, in.	**0.00**	**1.55**	**2.84**	**3.68**	**3.99**	**3.74**	**3.04**	**2.05**	**1.04**	**0.30**	**0.00**
175 ft. span - steel only, in.	0.00	0.36	0.66	0.86	0.92	0.85	0.69	0.46	0.23	0.07	0.00
slab, in.	0.00	1.28	2.33	3.00	3.20	2.97	2.38	1.58	0.78	0.22	0.00
barrier rails, in.	0.00	0.27	0.49	0.63	0.67	0.63	0.51	0.35	0.18	0.05	0.00
175 ft. span - total, in.	**0.00**	**1.91**	**3.48**	**4.48**	**4.79**	**4.45**	**3.58**	**2.39**	**1.19**	**0.33**	**0.00**
190 ft. span - steel only, in.	0.00	0.46	0.84	1.09	1.17	1.09	0.88	0.59	0.30	0.09	0.00
slab, in.	0.00	1.37	2.51	3.23	3.47	3.22	2.58	1.72	0.87	0.25	0.00
barrier rails, in.	0.00	0.30	0.55	0.71	0.77	0.72	0.59	0.40	0.21	0.06	0.00
190ft. span - total, in.	**0.00**	**2.13**	**3.90**	**5.03**	**5.40**	**5.03**	**4.04**	**2.70**	**1.38**	**0.40**	**0.00**
205 ft. span - steel only, in.	0.00	0.54	0.98	1.26	1.35	1.26	1.01	0.67	0.34	0.10	0.00
slab, in.	0.00	1.53	2.79	3.59	3.84	3.55	2.82	1.86	0.93	0.27	0.00
barrier rails, in.	0.00	0.34	0.62	0.81	0.87	0.81	0.66	0.44	0.23	0.07	0.00
205ft. span - total, in.	**0.00**	**2.41**	**4.39**	**5.65**	**6.06**	**5.62**	**4.49**	**2.97**	**1.50**	**0.44**	**0.00**
220 ft. span - steel only, in.	0.00	0.59	1.08	1.39	1.50	1.39	1.12	0.75	0.38	0.11	0.00
slab, in.	0.00	1.56	2.84	3.66	3.93	3.65	2.92	1.93	0.96	0.27	0.00
barrier rails, in.	0.00	0.36	0.65	0.84	0.91	0.85	0.69	0.46	0.24	0.07	0.00
220 ft. span - total, in.	**0.00**	**2.50**	**4.57**	**5.89**	**6.33**	**5.89**	**4.73**	**3.14**	**1.57**	**0.45**	**0.00**
235 ft. span - steel only, in.	0.00	0.75	1.38	1.79	1.93	1.81	1.46	0.99	0.50	0.14	0.00
slab, in.	0.00	1.69	3.09	3.99	4.30	4.02	3.24	2.16	1.08	0.30	0.00
barrier rails, in.	0.00	0.40	0.72	0.94	1.02	0.96	0.78	0.53	0.27	0.08	0.00
235 ft. span - total, in.	**0.00**	**2.84**	**5.19**	**6.71**	**7.25**	**6.78**	**5.48**	**3.68**	**1.85**	**0.52**	**0.00**
250 ft. span - steel only, in.	0.00	0.86	1.58	2.04	2.20	2.06	1.66	1.11	0.56	0.16	0.00
slab, in.	0.00	1.87	3.41	4.41	4.74	4.42	3.56	2.37	1.18	0.33	0.00
barrier rails, in.	0.00	0.44	0.80	1.04	1.13	1.06	0.86	0.58	0.30	0.08	0.00
250 ft. span - total, in.	**0.00**	**3.17**	**5.79**	**7.49**	**8.07**	**7.54**	**6.08**	**4.07**	**2.03**	**0.57**	**0.00**



DEFLECTION VERSUS SPAN TENTH POINT, SYMMETRIC ABOUT CENTER PIER

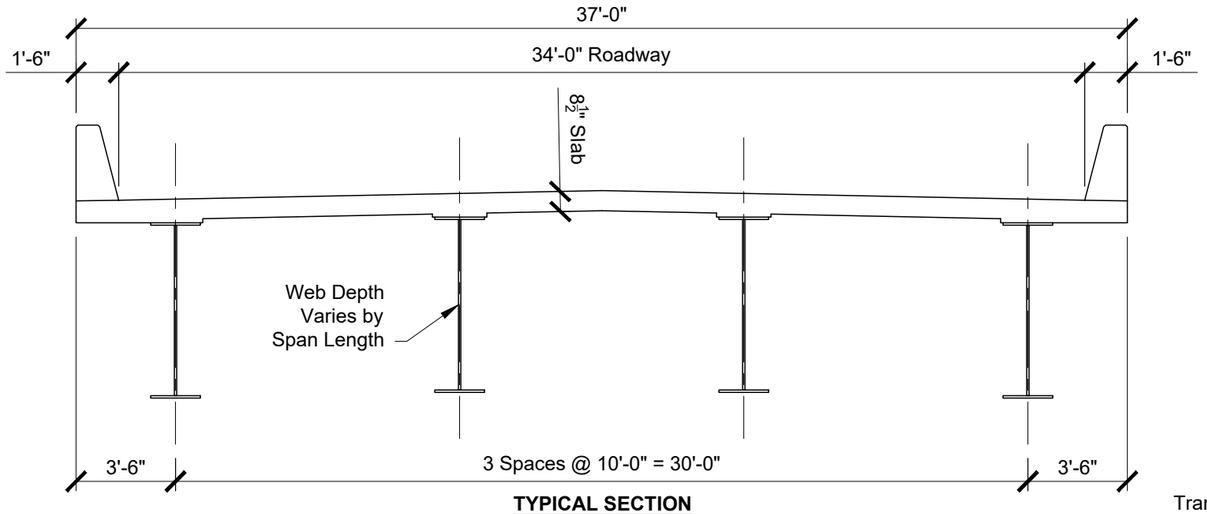
Exterior and First Interior Girder

Deflection Assumptions

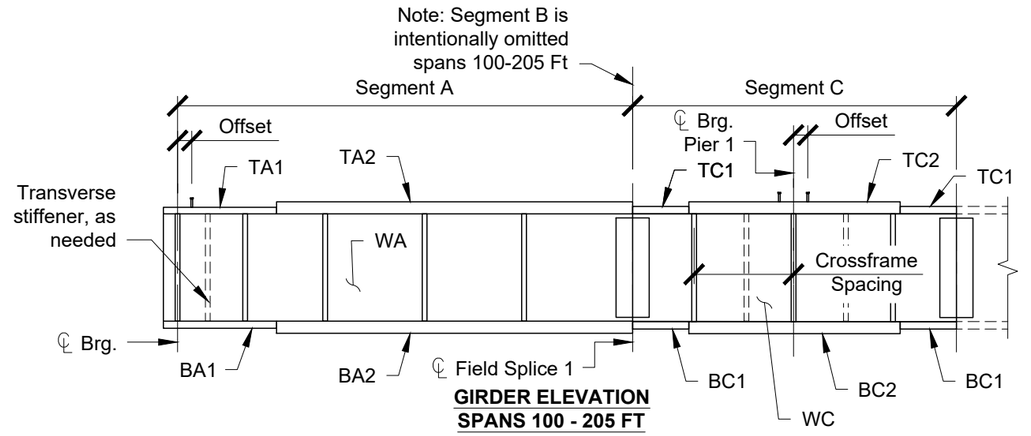
"Steel Only" = self weight of girders

"Slab" = deflection due to user-input non composite uniform dead load (slab, haunch, allowance for bracing)

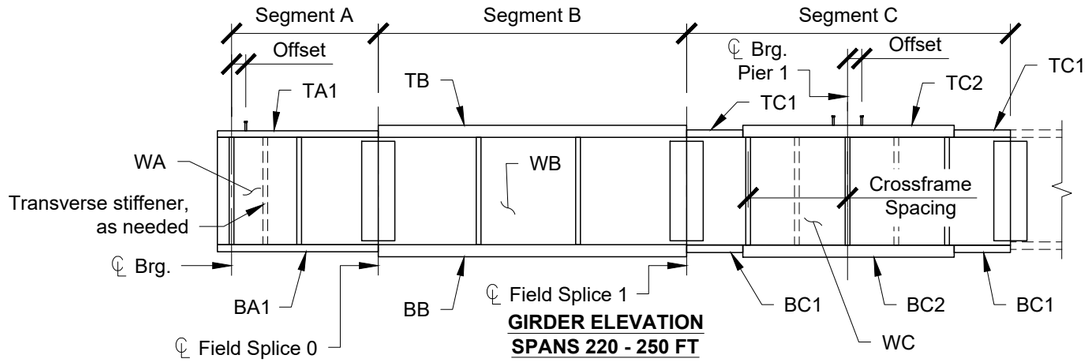
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



TYPICAL SECTION



GIRDER ELEVATION
SPANS 100 - 205 FT



GIRDER ELEVATION
SPANS 220 - 250 FT

Span ft.	SEGMENT A					SEGMENT B			SEGMENT C					Additional Footnotes
	WA (in. x in. x ft.)	TA1 (in. x in. x ft.)	TA2 (in. x in. x ft.)	BA1 (in. x in. x ft.)	BA2 (in. x in. x ft.)	WB (in. x in. x ft.)	TB (in. x in. x ft.)	BB (in. x in. x ft.)	WC (in. x in. x ft.)	TC1 (in. x in. x ft.)	TC2 (in. x in. x ft.)	BC1 (in. x in. x ft.)	BC2 (in. x in. x ft.)	
2 @ 100	42 x 0.5 x 70	---	16 x 1 x 70	18 x 1 x 30	18 x 1.75 x 40	---	---	---	42 x 0.5 x 60	---	22 x 1.5 x 60	22 x 1 x 15	22 x 2 x 30	---
2 @ 115	48 x 0.5 x 81	---	16 x 1 x 81	18 x 1.25 x 35	18 x 1.75 x 46	---	---	---	48 x 0.5 x 68	22 x 1 x 17	22 x 1.5 x 34	22 x 1 x 17	22 x 2 x 34	---
2 @ 130	54 x 0.5 x 91	---	16 x 1 x 91	18 x 1 x 39	18 x 2 x 52	---	---	---	54 x 0.5 x 78	22 x 1 x 19	22 x 2 x 40	22 x 1.25 x 19	22 x 2.25 x 40	---
2 @ 145	60 x 0.5 x 102	---	18 x 1 x 102	20 x 1 x 44	20 x 1.75 x 58	---	---	---	60 x 0.5 x 86	24 x 1 x 21	24 x 2 x 44	24 x 1.25 x 21	24 x 2.25 x 44	---
2 @ 160	66 x 0.5 x 112	---	18 x 1 x 112	20 x 1.5 x 60	20 x 1.75 x 52	---	---	---	66 x 0.5 x 96	24 x 1.25 x 28	24 x 2.25 x 40	24 x 1.25 x 28	24 x 2.5 x 40	---
2 @ 175	72 x 0.625 x 123	---	18 x 1 x 123	20 x 1.25 x 65	20 x 1.75 x 58	---	---	---	72 x 0.625 x 104	24 x 1.25 x 26	24 x 2.25 x 52	24 x 1.25 x 26	24 x 2.5 x 52	---
2 @ 190	76 x 0.625 x 133	---	20 x 1 x 133	22 x 1.25 x 70	22 x 1.75 x 63	---	---	---	76 x 0.625 x 114	26 x 1.25 x 28	26 x 2.5 x 58	26 x 1.5 x 28	26 x 2.75 x 58	---
2 @ 205	82 x 0.625 x 140	---	22 x 1 x 140	22 x 1 x 65	22 x 1.75 x 75	---	---	---	82 x 0.625 x 130	26 x 1.5 x 40	26 x 2.75 x 50	28 x 1.5 x 40	28 x 2.75 x 50	---
2 @ 220	92 x 0.625 x 55	20 x 1 x 55	---	26 x 1.25 x 55	---	92 x 0.625 x 99	20 x 1 x 99	26 x 1.25 x 99	92 x 0.625 x 132	26 x 1.5 x 41	26 x 2.75 x 50	28 x 1.75 x 41	28 x 2.75 x 50	---
2 @ 235	96 x 0.75 x 60	22 x 1 x 60	---	24 x 1.25 x 60	---	96 x 0.75 x 105	22 x 1 x 105	24 x 1.25 x 105	96 x 0.75 x 140	28 x 1.5 x 40	28 x 2.75 x 60	28 x 1.5 x 40	28 x 3 x 60	b
2 @ 250	102 x 0.75 x 60	22 x 1 x 60	---	24 x 1.25 x 60	---	102 x 0.75 x 120	22 x 1 x 120	24 x 1.25 x 120	102 x 0.75 x 140	28 x 1.5 x 35	28 x 3 x 70	30 x 1.5 x 35	30 x 3 x 70	a, b

Note: All plates are A709 Gr 50W.

Footnotes:
a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.
b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TWO SPAN 100-250 FT 10 FT SPACING

Issued January 2025
Revision 0

TRANSVERSE AND BEARING STIFFENERS							
Span ft.	Transverse Stiffener Size and Location, Distance From End support			Bearing Stiffeners, End		Bearing Stiffeners, Int.	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.	Width in.	Thickness in.
2 @ 100	5.5	0.5	89.5	7.25	0.75	10.25	1
2 @ 115	5.5	0.5	91, 103	7.25	0.75	10.25	1
2 @ 130	5.5	0.5	6.75, 104, 117.5	7.25	0.75	10.25	1
2 @ 145	6	0.5	7.5, 22.5, 87, 102, 118.5, 133.5	8.25	0.75	11.25	1
2 @ 160	7	0.5	7.5, 24, 40.5, 79, 95.5, 112, 117.75, 134.25, 148.5	8.25	0.75	11.25	1
2 @ 175	6	0.5	139, 157	8.25	0.75	11.25	1
2 @ 190	6.5	0.5	152, 171	9.25	0.875	12.25	1.125
2 @ 205	7	0.5	10.25, 30.75, 143.5, 164, 184.5	10.25	1	12.25	1.125
2 @ 220	9	0.625	11.5, 34.5, 131, 154, 174, 197	9.25	0.875	12.25	1.125
2 @ 235	7	0.5	187, 211	10	0.875	13	1.125
2 @ 250	8	0.625	199, 224.5	10	0.875	13	1.125

SHEAR STUD LAYOUT TABLE, SPAN 1 (SPAN 2 MIRRORED)														
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3			Group 4		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
2 @ 100	4	0	50	6	25	40	12	40	20	6	10	10	30	25
2 @ 115	4	0	26	8	17.33	69	12	69	7	32	18.67	3	36	9
2 @ 130	4	0	20	8	13.33	85	12	85	5	36	15	4	48	16
2 @ 145	4	0	15	6	7.5	102	12	102	4	42	14	5	48	20
2 @ 160	4	0	24	12	24	72	16	96	10	48	40	---	---	---
2 @ 175	4	0	27	12	27	79	16	105.33	10	48	40	---	---	---
2 @ 190	4	0	19	12	19	93	16	124	11	48	44	---	---	---
2 @ 205	4	0	11	12	11	100	16	133.33	6	20	10	12	48	48
2 @ 220	4	0	25	16	33.33	79	20	131.67	13	48	52	---	---	---
2 @ 235	4	0	18	16	24	92	20	153.33	14	48	56	---	---	---
2 @ 250	4	0	10	16	13.33	105	20	175	15	48	60	---	---	---

GIRDER WEIGHT				
Span ft.	Segment A tons	Segment B tons	Segment C tons	Total tons
2 @ 100	7.47	---	8.88	23.82
2 @ 115	9.32	---	9.78	28.41
2 @ 130	11.04	---	13.15	35.22
2 @ 145	13.28	---	15.88	42.45
2 @ 160	15.88	---	18.87	50.62
2 @ 175	19.40	---	23.36	62.16
2 @ 190	22.68	---	29.50	74.85
2 @ 205	24.79	---	34.99	84.58
2 @ 220	10.29	18.53	37.82	95.47
2 @ 235	12.66	22.15	45.02	114.64
2 @ 250	13.12	26.24	49.31	128.01

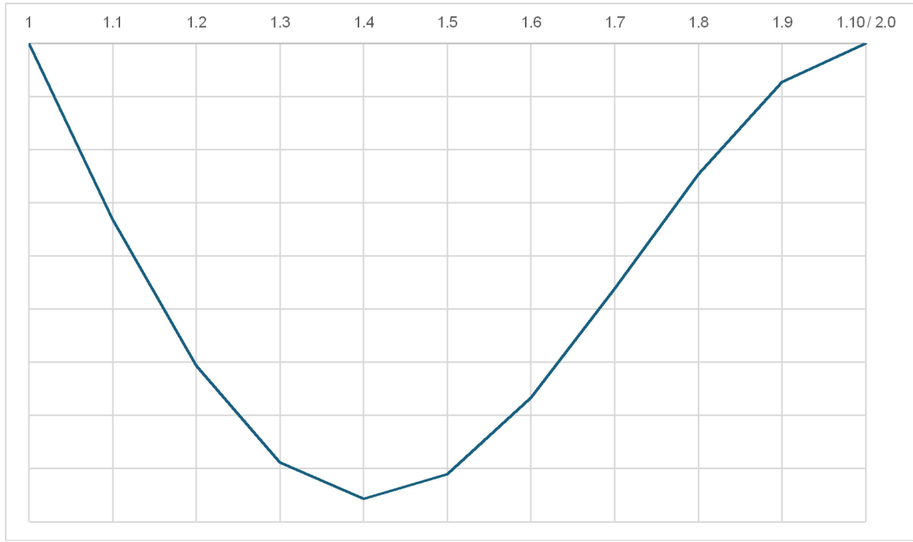
Note: Girder weight is total weight of web and flanges only measured between CL brg at each end. Does not include girder extension at end bearings, stiffeners, shear studs, bracing, or any other allowances.

DEAD LOAD AND LIVE LOAD REACTIONS								
Span ft.	End Reaction				Pier Reaction			
	DC kips	DW kips	Truck kips	Lane kips	DC kips	DW kips	Truck kips	Lane kips
2 @ 100	62	7	86	28	228	25	141	74
2 @ 115	73	9	87	33	262	29	149	85
2 @ 130	80	9	88	36	305	33	155	96
2 @ 145	90	10	89	40	345	37	159	108
2 @ 160	102	12	89	45	384	41	161	118
2 @ 175	113	13	90	49	430	45	163	129
2 @ 190	122	14	90	52	426	49	165	141
2 @ 205	133	15	90	56	526	53	166	152
2 @ 220	145	16	90	60	571	57	166	163
2 @ 235	158	17	91	64	627	61	167	174
2 @ 250	169	18	91	68	678	65	168	186

Note: Truck and lane reactions include distribution factors, skew correction, and impact on the truck loading.

CROSS-FRAME SPACING, SPAN 1 (SPAN 2 MIRRORED)		
Span, ft.	Spacing, ft.	Type
2 @ 100	5 @ 20 = 100	Diaphragm
2 @ 115	3 @ 25 + 2 @ 20 = 115	K-Frame
2 @ 130	4 @ 23.5 + 2 @ 18 = 130	K-Frame
2 @ 145	4 @ 26.25 + 2 @ 20 = 145	K-Frame
2 @ 160	5 @ 23 + 2 @ 22.5 = 160	K-Frame
2 @ 175	5 @ 23 + 3 @ 20 = 175	K-Frame
2 @ 190	5 @ 26 + 3 @ 20 = 190	K-Frame
2 @ 205	6 @ 23.83 + 3 @ 20.67 = 205	K-Frame
2 @ 220	6 @ 26.17 + 3 @ 21 = 220	K-Frame
2 @ 235	7 @ 24 + 3 @ 22.33 = 235	X-Frame
2 @ 250	8 @ 23 + 3 @ 22 = 250	X-Frame

DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in., Span 1 Shown. Span 2 Symmetric About Pier											
	1.0	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**	**1.7**	**1.8**	**1.9**	**1.10**
100 ft. span - steel only, in.	0.00	0.11	0.20	0.25	0.27	0.25	0.21	0.14	0.07	0.02	0.00
slab, in.	0.00	0.61	1.10	1.39	1.48	1.38	1.12	0.76	0.40	0.12	0.00
barrier rails, in.	0.00	0.08	0.14	0.17	0.18	0.17	0.14	0.10	0.05	0.02	0.00
100 ft. span - total, in.	**0.00**	**0.79**	**1.43**	**1.82**	**1.93**	**1.80**	**1.47**	**1.01**	**0.52**	**0.15**	**0.00**
115 ft. span - steel only, in.	0.00	0.15	0.27	0.35	0.38	0.36	0.29	0.20	0.10	0.03	0.00
slab, in.	0.00	0.78	1.43	1.84	1.97	1.85	1.51	1.03	0.52	0.15	0.00
barrier rails, in.	0.00	0.10	0.18	0.23	0.25	0.24	0.19	0.14	0.07	0.02	0.00
115 ft. span - total, in.	**0.00**	**1.03**	**1.88**	**2.42**	**2.60**	**2.44**	**1.99**	**1.36**	**0.70**	**0.20**	**0.00**
130 ft. span - steel only, in.	0.00	0.19	0.35	0.44	0.47	0.44	0.35	0.24	0.12	0.04	0.00
slab, in.	0.00	0.95	1.71	2.16	2.27	2.10	1.68	1.13	0.57	0.17	0.00
barrier rails, in.	0.00	0.13	0.23	0.29	0.31	0.29	0.23	0.16	0.09	0.03	0.00
130 ft. span - total, in.	**0.00**	**1.27**	**2.29**	**2.89**	**3.05**	**2.82**	**2.27**	**1.53**	**0.78**	**0.23**	**0.00**
145 ft. span - steel only, in.	0.00	0.24	0.43	0.55	0.59	0.55	0.44	0.30	0.15	0.05	0.00
slab, in.	0.00	1.10	1.99	2.53	2.67	2.46	1.97	1.32	0.67	0.19	0.00
barrier rails, in.	0.00	0.16	0.28	0.36	0.38	0.35	0.29	0.20	0.10	0.03	0.00
145 ft. span - total, in.	**0.00**	**1.50**	**2.71**	**3.44**	**3.63**	**3.36**	**2.70**	**1.81**	**0.92**	**0.27**	**0.00**
160 ft. span - steel only, in.	0.00	0.29	0.53	0.68	0.73	0.68	0.55	0.37	0.18	0.05	0.00
slab, in.	0.00	1.23	2.24	2.88	3.09	2.87	2.31	1.54	0.76	0.21	0.00
barrier rails, in.	0.00	0.17	0.32	0.41	0.44	0.42	0.34	0.24	0.12	0.03	0.00
160 ft. span - total, in.	**0.00**	**1.69**	**3.08**	**3.98**	**4.27**	**3.98**	**3.21**	**2.14**	**1.07**	**0.30**	**0.00**
175 ft. span - steel only, in.	0.00	0.38	0.69	0.89	0.96	0.89	0.72	0.48	0.24	0.07	0.00
slab, in.	0.00	1.45	2.64	3.39	3.61	3.34	2.68	1.79	0.89	0.25	0.00
barrier rails, in.	0.00	0.21	0.39	0.50	0.54	0.50	0.41	0.28	0.15	0.04	0.00
175 ft. span - total, in.	**0.00**	**2.04**	**3.72**	**4.79**	**5.10**	**4.74**	**3.81**	**2.56**	**1.28**	**0.36**	**0.00**
190 ft. span - steel only, in.	0.00	0.45	0.82	1.05	1.12	1.03	0.83	0.55	0.28	0.08	0.00
slab, in.	0.00	1.58	2.87	3.67	3.88	3.56	2.83	1.87	0.94	0.27	0.00
barrier rails, in.	0.00	0.24	0.44	0.57	0.61	0.56	0.46	0.31	0.16	0.05	0.00
190ft. span - total, in.	**0.00**	**2.27**	**4.13**	**5.28**	**5.60**	**5.16**	**4.12**	**2.74**	**1.38**	**0.40**	**0.00**
205 ft. span - steel only, in.	0.00	0.55	0.99	1.26	1.34	1.24	0.99	0.66	0.33	0.09	0.00
slab, in.	0.00	1.83	3.31	4.19	4.41	4.05	3.22	2.12	1.05	0.29	0.00
barrier rails, in.	0.00	0.29	0.53	0.67	0.71	0.66	0.53	0.36	0.18	0.05	0.00
205ft. span - total, in.	**0.00**	**2.66**	**4.82**	**6.12**	**6.45**	**5.94**	**4.74**	**3.15**	**1.56**	**0.43**	**0.00**
220 ft. span - steel only, in.	0.00	0.57	1.04	1.34	1.44	1.34	1.08	0.72	0.36	0.10	0.00
slab, in.	0.00	1.81	3.30	4.25	4.55	4.22	3.37	2.22	1.10	0.31	0.00
barrier rails, in.	0.00	0.29	0.52	0.68	0.73	0.69	0.56	0.38	0.20	0.06	0.00
220 ft. span - total, in.	**0.00**	**2.66**	**4.86**	**6.26**	**6.73**	**6.25**	**5.00**	**3.32**	**1.66**	**0.47**	**0.00**
235 ft. span - steel only, in.	0.00	0.71	1.30	1.68	1.80	1.67	1.34	0.89	0.44	0.12	0.00
slab, in.	0.00	2.02	3.68	4.74	5.08	4.70	3.74	2.46	1.21	0.33	0.00
barrier rails, in.	0.00	0.33	0.61	0.79	0.85	0.80	0.64	0.43	0.22	0.06	0.00
235 ft. span - total, in.	**0.00**	**3.06**	**5.58**	**7.20**	**7.73**	**7.17**	**5.73**	**3.78**	**1.87**	**0.52**	**0.00**
250 ft. span - steel only, in.	0.00	0.81	1.48	1.90	2.04	1.89	1.51	1.00	0.49	0.14	0.00
slab, in.	0.00	2.22	4.04	5.20	5.56	5.13	4.07	2.66	1.30	0.35	0.00
barrier rails, in.	0.00	0.37	0.67	0.87	0.94	0.88	0.71	0.48	0.24	0.07	0.00
250 ft. span - total, in.	**0.00**	**3.39**	**6.19**	**7.97**	**8.54**	**7.90**	**6.29**	**4.13**	**2.03**	**0.56**	**0.00**



DEFLECTION VERSUS SPAN TENTH POINT, SYMMETRIC ABOUT CENTER PIER

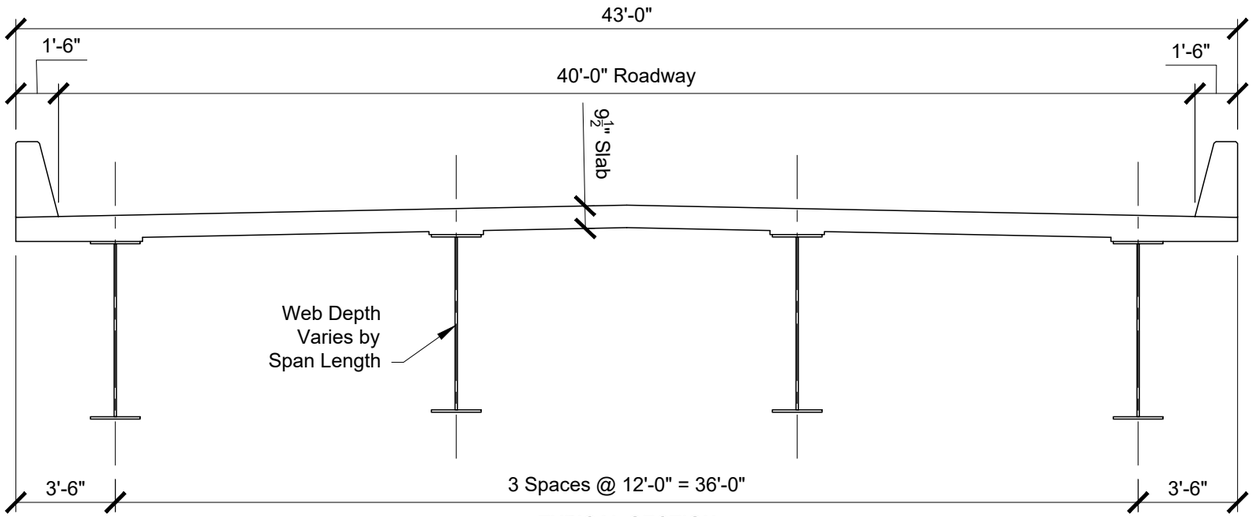
All Girders

Deflection Assumptions

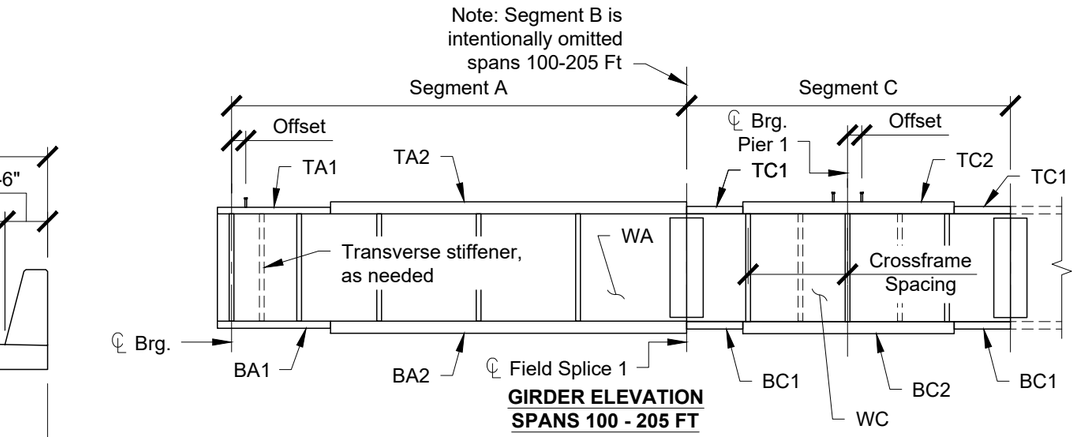
"Steel Only" = self weight of girders

"Slab" = deflection due to user-input non composite uniform dead load (slab, haunch, allowance for bracing)

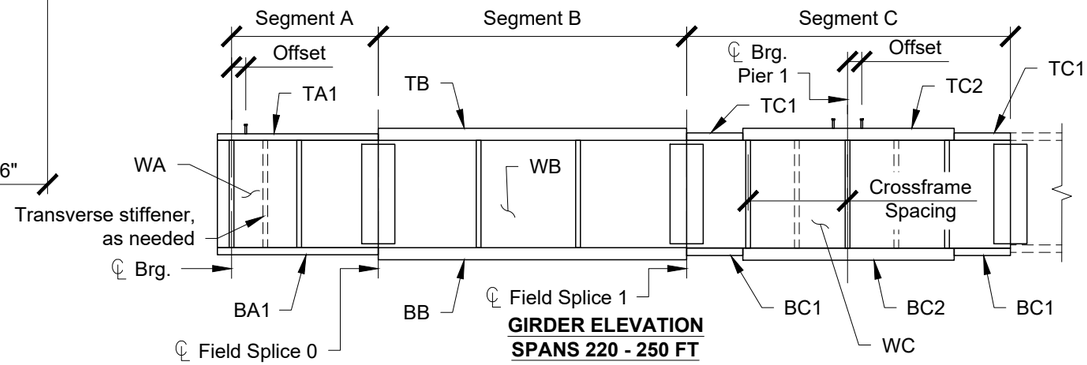
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



TYPICAL SECTION



GIRDER ELEVATION
SPANS 100 - 205 FT



GIRDER ELEVATION
SPANS 220 - 250 FT

Span ft.	SEGMENT A					SEGMENT B			SEGMENT C					Additional Footnotes
	WA (in. x in. x ft.)	TA1 (in. x in. x ft.)	TA2 (in. x in. x ft.)	BA1 (in. x in. x ft.)	BA2 (in. x in. x ft.)	WB (in. x in. x ft.)	TB (in. x in. x ft.)	BB (in. x in. x ft.)	WC (in. x in. x ft.)	TC1 (in. x in. x ft.)	TC2 (in. x in. x ft.)	BC1 (in. x in. x ft.)	BC2 (in. x in. x ft.)	
2 @ 100	42 x 0.5 x 70	---	16 x 1 x 70	20 x 1 x 35	20 x 1.5 x 35	---	---	---	42 x 0.5 x 60	22 x 1 x 20	22 x 1.75 x 20	22 x 1.25 x 20	22 x 2.25 x 20	---
2 @ 115	48 x 0.5 x 81	---	18 x 1 x 81	18 x 1.25 x 45	18 x 2 x 36	---	---	---	48 x 0.5 x 68	22 x 1 x 17	22 x 2 x 34	24 x 1 x 17	24 x 2 x 34	---
2 @ 130	54 x 0.5 x 91	---	16 x 1 x 91	18 x 1.25 x 39	18 x 2 x 52	---	---	---	54 x 0.5 x 78	22 x 1.5 x 19	22 x 2.25 x 40	22 x 1.5 x 19	22 x 2.75 x 40	---
2 @ 145	60 x 0.5 x 102	---	18 x 1 x 102	20 x 1 x 44	20 x 2 x 58	---	---	---	60 x 0.5 x 86	24 x 1.25 x 21	24 x 2.5 x 44	24 x 1.5 x 21	24 x 2.75 x 44	---
2 @ 160	66 x 0.625 x 112	---	18 x 1.25 x 112	20 x 1.75 x 48	20 x 2 x 64	---	---	---	66 x 0.625 x 96	24 x 1.25 x 24	24 x 2.5 x 48	24 x 1.5 x 24	24 x 2.75 x 48	---
2 @ 175	72 x 0.625 x 123	---	18 x 1 x 123	20 x 1.25 x 53	20 x 1.75 x 70	---	---	---	72 x 0.625 x 104	24 x 1.5 x 26	24 x 2.75 x 52	24 x 1.5 x 26	24 x 3 x 52	---
2 @ 190	76 x 0.625 x 133	---	20 x 1 x 133	22 x 1.25 x 57	22 x 1.75 x 76	---	---	---	76 x 0.625 x 114	26 x 1.5 x 28	26 x 3 x 58	28 x 1.5 x 28	28 x 3 x 58	---
2 @ 205	82 x 0.625 x 140	---	20 x 1 x 140	22 x 1.25 x 62	22 x 1.75 x 78	---	---	---	82 x 0.625 x 130	28 x 1.5 x 35	28 x 3 x 60	30 x 1.5 x 35	30 x 3 x 60	---
2 @ 220	92 x 0.75 x 55	22 x 1.25 x 55	---	22 x 1.5 x 55	---	92 x 0.75 x 99	22 x 1.25 x 99	22 x 1.5 x 99	92 x 0.75 x 132	28 x 1.5 x 33	28 x 3 x 66	30 x 1.5 x 33	30 x 3 x 66	---
2 @ 235	96 x 0.75 x 60	22 x 1 x 60	---	28 x 1.25 x 60	---	96 x 0.75 x 105	22 x 1 x 105	28 x 1.25 x 105	96 x 0.75 x 140	30 x 1.75 x 48	30 x 2 x 44 ▲	32 x 1.75 x 48	32 x 2 x 44 ▲	b
2 @ 250	102 x 0.875 x 60	24 x 1 x 60	---	28 x 1.25 x 60	---	102 x 0.875 x 120	24 x 1 x 120	28 x 1.25 x 120	102 x 0.875 x 140	28 x 1.25 x 49 ▲	28 x 2 x 42 ▲	32 x 1.5 x 49 ▲	32 x 2 x 42 ▲	a, b

Note: All plates are A709 Gr 50W except those noted with a ▲ are Gr HPS 70W.

Footnotes:
a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.
b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TWO SPAN 100-250 FT 12 FT SPACING

Issued January 2025
Revision 0

TRANSVERSE AND BEARING STIFFENERS							
Span ft.	Transverse Stiffener Size and Location, Distance From End support			Bearing Stiffeners, End		Bearing Stiffeners, Int.	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.	Width in.	Thickness in.
2 @ 100	5.5	0.5	79, 89.5	7.25	0.75	10.25	1
2 @ 115	6	0.5	6, 81.5, 93.5, 105.5	8.25	0.75	10.25	1
2 @ 130	5.5	0.5	6.75, 20.25, 77.5, 91, 98, 111.5, 121.75	7.25	0.75	10.25	1
2 @ 145	6	0.5	7, 22, 37, 72, 87, 102, 115.5, 127.5, 137	8.25	0.75	11.25	1
2 @ 160	6	0.5	127, 143.5	8.25	0.75	11.25	1
2 @ 175	6.25	0.5	9, 139, 157	8.25	0.75	11.25	1
2 @ 190	7	0.5	9.5, 28.5, 114, 134.75, 153.75, 172.75	9.25	0.875	12.25	1.125
2 @ 205	8	0.625	10.25, 30.75, 119.5, 140, 147.25, 167.75, 188.25	9.25	0.875	13.25	1.25
2 @ 220	7.5	0.5	174, 197	10	0.875	13	1.125
2 @ 235	8	0.625	187, 211	10	0.875	14	1.25
2 @ 250	8	0.5	224.5	11	1	13	1.125

SHEAR STUD LAYOUT TABLE, SPAN 1 (SPAN 2 MIRRORED)														
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3			Group 4		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
2 @ 100	4	0	119	8	79.33	12	20	20	---	---	---	---	---	---
2 @ 115	4	0	130	8	86.67	14	24	28	---	---	---	---	---	---
2 @ 130	4	0	30	8	20	78	12	78	12	32	32	---	---	---
2 @ 145	4	0	22	8	14.67	94	12	94	5	40	16.67	5	48	16
2 @ 160	4	0	120	12	120	7	42	24.5	3	48	12	---	---	---
2 @ 175	4	0	62	12	62	12	16	16	54	12	54	10	48	40
2 @ 190	4	0	38	12	38	79	16	105.33	11	48	44	---	---	---
2 @ 205	4	0	31	12	31	92	16	122.67	12	48	48	---	---	---
2 @ 220	4	0	22	12	22	96	18	144	13	48	52	---	---	---
2 @ 235	4	0	36	16	48	20	20	33.33	72	16	96	14	48	56
2 @ 250	4	0	28	16	37.33	90	20	150	15	48	60	---	---	---

GIRDER WEIGHT				
Span ft.	Segment A tons	Segment B tons	Segment C tons	Total tons
2 @ 100	7.38	---	8.51	23.28
2 @ 115	9.72	---	10.76	30.19
2 @ 130	11.34	---	15.34	38.01
2 @ 145	13.77	---	18.54	46.09
2 @ 160	19.36	---	22.42	61.14
2 @ 175	19.61	---	26.54	65.76
2 @ 190	22.92	---	32.92	78.76
2 @ 205	24.98	---	39.46	89.42
2 @ 220	12.12	21.81	44.80	112.67
2 @ 235	13.17	23.05	44.15	116.58
2 @ 250	15.13	30.27	43.67	134.48

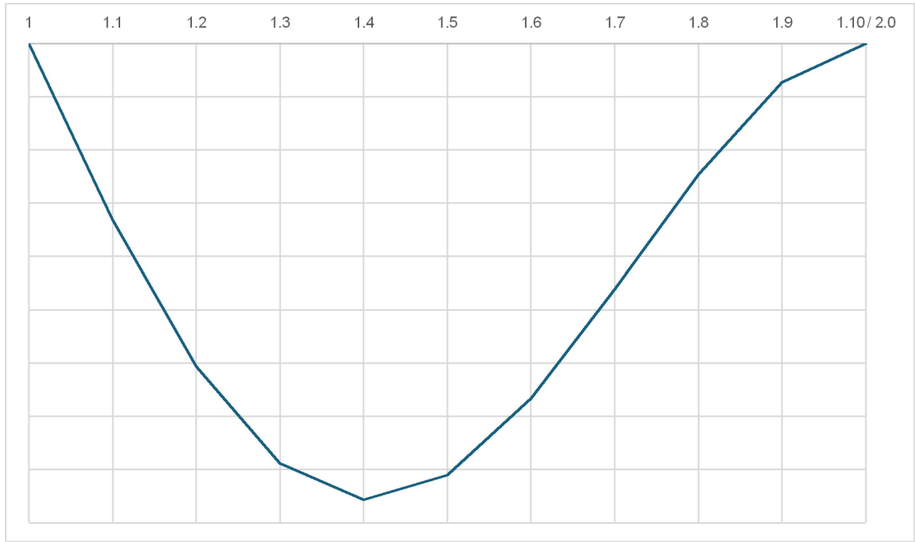
Note: Girder weight is total weight of web and flanges only measured between CL brg at each end. Does not include girder extension at end bearings, stiffeners, shear studs, bracing, or any other allowances.

DEAD LOAD AND LIVE LOAD REACTIONS								
Span ft.	End Reaction				Pier Reaction			
	DC kips	DW kips	Truck kips	Lane kips	DC kips	DW kips	Truck kips	Lane kips
2 @ 100	73	9	98	32	269	31	162	85
2 @ 115	86	10	100	37	313	35	170	97
2 @ 130	94	11	100	41	366	40	178	111
2 @ 145	105	12	101	46	416	45	182	124
2 @ 160	124	14	102	51	464	49	183	135
2 @ 175	131	15	103	55	514	54	187	148
2 @ 190	141	16	103	60	574	59	188	162
2 @ 205	154	17	103	64	625	64	189	174
2 @ 220	174	19	103	69	687	68	190	187
2 @ 235	189	20	104	74	720	72	190	197
2 @ 250	211	22	104	79	767	76	190	208

Note: Truck and lane reactions include distribution factors, skew correction, and impact on the truck loading.

CROSS-FRAME SPACING, SPAN 1 (SPAN 2 MIRRORED)		
Span, ft.	Spacing, ft.	Type
2 @ 100	5 @ 20 = 100	Diaphragm
2 @ 115	3 @ 25 + 2 @ 20 = 115	Diaphragm
2 @ 130	4 @ 23.5 + 2 @ 18 = 130	K-Frame
2 @ 145	4 @ 26.25 + 2 @ 20 = 145	K-Frame
2 @ 160	5 @ 23 + 2 @ 22.5 = 160	K-Frame
2 @ 175	5 @ 23 + 3 @ 20 = 175	K-Frame
2 @ 190	5 @ 26 + 3 @ 20 = 190	K-Frame
2 @ 205	6 @ 23.83 + 3 @ 20.67 = 205	K-Frame
2 @ 220	6 @ 26.17 + 3 @ 21 = 220	K-Frame
2 @ 235	7 @ 24 + 3 @ 22.33 = 235	K-Frame
2 @ 250	8 @ 23 + 3 @ 22 = 250	K-Frame

DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in., Span 1 Shown. Span 2 Symmetric About Pier											
	1.0	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**	**1.7**	**1.8**	**1.9**	**1.10**
100 ft. span - steel only, in.	0.00	0.11	0.19	0.25	0.27	0.25	0.20	0.14	0.07	0.02	0.00
slab, in.	0.00	0.77	1.39	1.78	1.90	1.76	1.42	0.96	0.48	0.13	0.00
barrier rails, in.	0.00	0.07	0.12	0.16	0.17	0.16	0.13	0.09	0.05	0.01	0.00
100 ft. span - total, in.	**0.00**	**0.94**	**1.71**	**2.19**	**2.33**	**2.17**	**1.76**	**1.18**	**0.59**	**0.16**	**0.00**
115 ft. span - steel only, in.	0.00	0.14	0.26	0.34	0.36	0.34	0.27	0.19	0.09	0.03	0.00
slab, in.	0.00	0.92	1.67	2.15	2.28	2.12	1.71	1.15	0.57	0.16	0.00
barrier rails, in.	0.00	0.09	0.16	0.21	0.22	0.21	0.17	0.12	0.06	0.02	0.00
115 ft. span - total, in.	**0.00**	**1.15**	**2.10**	**2.69**	**2.87**	**2.66**	**2.15**	**1.45**	**0.73**	**0.20**	**0.00**
130 ft. span - steel only, in.	0.00	0.18	0.33	0.42	0.45	0.41	0.33	0.22	0.11	0.03	0.00
slab, in.	0.00	1.09	1.98	2.50	2.64	2.43	1.94	1.28	0.65	0.19	0.00
barrier rails, in.	0.00	0.11	0.19	0.25	0.26	0.25	0.20	0.14	0.07	0.02	0.00
130 ft. span - total, in.	**0.00**	**1.38**	**2.50**	**3.17**	**3.35**	**3.09**	**2.47**	**1.64**	**0.83**	**0.24**	**0.00**
145 ft. span - steel only, in.	0.00	0.23	0.42	0.53	0.56	0.52	0.41	0.27	0.14	0.04	0.00
slab, in.	0.00	1.30	2.34	2.94	3.06	2.79	2.20	1.45	0.72	0.21	0.00
barrier rails, in.	0.00	0.14	0.25	0.31	0.33	0.30	0.24	0.17	0.09	0.03	0.00
145 ft. span - total, in.	**0.00**	**1.67**	**3.00**	**3.78**	**3.95**	**3.60**	**2.86**	**1.89**	**0.95**	**0.28**	**0.00**
160 ft. span - steel only, in.	0.00	0.29	0.53	0.68	0.73	0.69	0.56	0.38	0.19	0.06	0.00
slab, in.	0.00	1.27	2.32	2.99	3.21	3.00	2.42	1.62	0.81	0.23	0.00
barrier rails, in.	0.00	0.14	0.26	0.34	0.36	0.34	0.28	0.20	0.10	0.03	0.00
160 ft. span - total, in.	**0.00**	**1.70**	**3.10**	**4.00**	**4.31**	**4.03**	**3.26**	**2.19**	**1.10**	**0.32**	**0.00**
175 ft. span - steel only, in.	0.00	0.37	0.66	0.85	0.91	0.84	0.67	0.45	0.22	0.06	0.00
slab, in.	0.00	1.72	3.13	3.99	4.22	3.88	3.08	2.02	0.99	0.27	0.00
barrier rails, in.	0.00	0.19	0.34	0.44	0.47	0.44	0.36	0.24	0.12	0.04	0.00
175 ft. span - total, in.	**0.00**	**2.28**	**4.13**	**5.28**	**5.59**	**5.16**	**4.11**	**2.71**	**1.33**	**0.37**	**0.00**
190 ft. span - steel only, in.	0.00	0.43	0.78	0.99	1.05	0.97	0.77	0.51	0.26	0.08	0.00
slab, in.	0.00	1.87	3.38	4.29	4.52	4.14	3.26	2.12	1.05	0.30	0.00
barrier rails, in.	0.00	0.21	0.39	0.50	0.53	0.49	0.40	0.27	0.14	0.04	0.00
190ft. span - total, in.	**0.00**	**2.52**	**4.55**	**5.78**	**6.11**	**5.60**	**4.43**	**2.90**	**1.45**	**0.42**	**0.00**
205 ft. span - steel only, in.	0.00	0.52	0.95	1.21	1.29	1.19	0.95	0.62	0.31	0.09	0.00
slab, in.	0.00	2.19	3.96	5.04	5.31	4.86	3.83	2.49	1.20	0.33	0.00
barrier rails, in.	0.00	0.25	0.46	0.59	0.63	0.58	0.47	0.32	0.16	0.05	0.00
205ft. span - total, in.	**0.00**	**2.96**	**5.37**	**6.84**	**7.23**	**6.63**	**5.25**	**3.43**	**1.67**	**0.46**	**0.00**
220 ft. span - steel only, in.	0.00	0.56	1.02	1.32	1.42	1.32	1.06	0.70	0.35	0.10	0.00
slab, in.	0.00	1.92	3.50	4.51	4.83	4.48	3.56	2.34	1.15	0.33	0.00
barrier rails, in.	0.00	0.24	0.45	0.58	0.63	0.59	0.48	0.32	0.16	0.05	0.00
220 ft. span - total, in.	**0.00**	**2.73**	**4.97**	**6.41**	**6.87**	**6.38**	**5.09**	**3.36**	**1.66**	**0.48**	**0.00**
235 ft. span - steel only, in.	0.00	0.75	1.38	1.79	1.94	1.83	1.50	1.03	0.55	0.16	0.00
slab, in.	0.00	2.56	4.68	6.06	6.56	6.15	5.01	3.42	1.79	0.51	0.00
barrier rails, in.	0.00	0.31	0.57	0.74	0.81	0.76	0.63	0.44	0.23	0.07	0.00
235 ft. span - total, in.	**0.00**	**3.62**	**6.62**	**8.59**	**9.30**	**8.75**	**7.14**	**4.89**	**2.56**	**0.74**	**0.00**
250 ft. span - steel only, in.	0.00	0.92	1.69	2.20	2.39	2.26	1.86	1.29	0.67	0.19	0.00
slab, in.	0.00	2.78	5.09	6.62	7.20	6.81	5.59	3.84	1.99	0.55	0.00
barrier rails, in.	0.00	0.34	0.63	0.82	0.90	0.85	0.71	0.49	0.26	0.07	0.00
250 ft. span - total, in.	**0.00**	**4.04**	**7.41**	**9.64**	**10.49**	**9.93**	**8.16**	**5.62**	**2.92**	**0.81**	**0.00**



DEFLECTION VERSUS SPAN TENTH POINT, SYMMETRIC ABOUT CENTER PIER

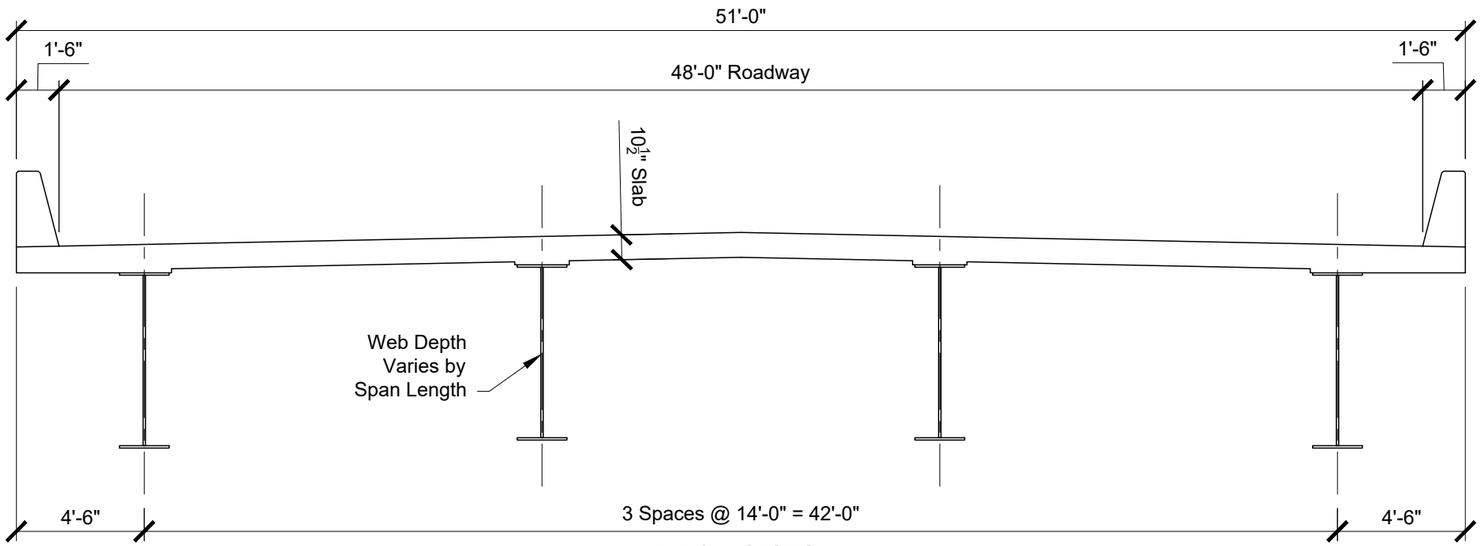
All Girders

Deflection Assumptions

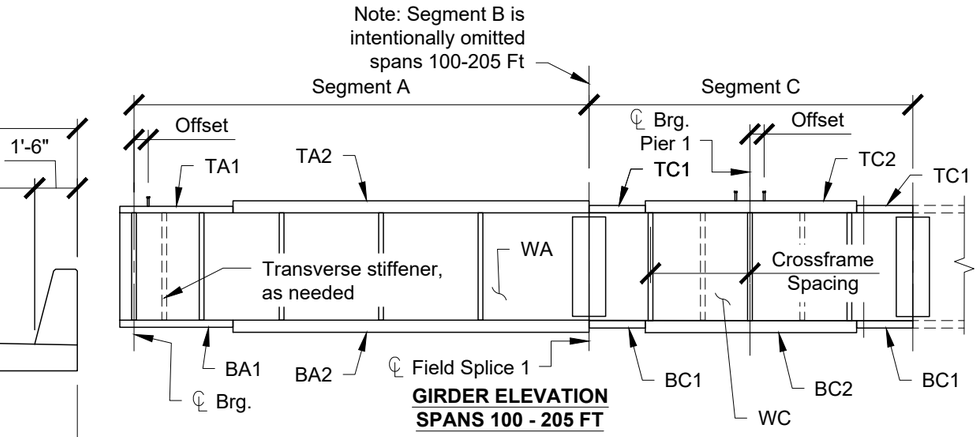
"Steel Only" = self weight of girders

"Slab" = deflection due to user-input non composite uniform dead load (slab, haunch, allowance for bracing)

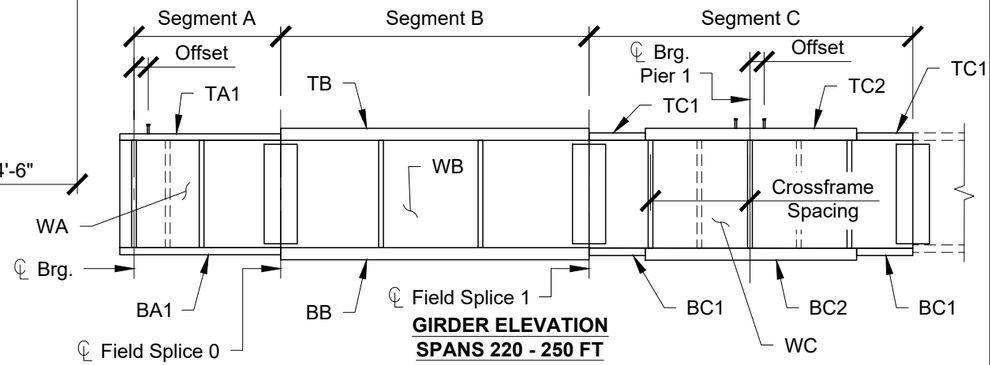
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



TYPICAL SECTION



GIRDER ELEVATION
SPANS 100 - 205 FT



GIRDER ELEVATION
SPANS 220 - 250 FT

Span ft.	SEGMENT A					SEGMENT B			SEGMENT C					Additional Footnotes
	WA (in. x in. x ft.)	TA1 (in. x in. x ft.)	TA2 (in. x in. x ft.)	BA1 (in. x in. x ft.)	BA2 (in. x in. x ft.)	WB (in. x in. x ft.)	TB (in. x in. x ft.)	BB (in. x in. x ft.)	WC (in. x in. x ft.)	TC1 (in. x in. x ft.)	TC2 (in. x in. x ft.)	BC1 (in. x in. x ft.)	BC2 (in. x in. x ft.)	
2 @ 100	42 x 0.5 x 70	---	18 x 1 x 70	18 x 1.25 x 30	18 x 2 x 40	---	---	---	42 x 0.5 x 60	22 x 1 x 14	22 x 2 x 32	22 x 1.25 x 14	22 x 2.5 x 32	---
2 @ 115	48 x 0.5 x 81	---	16 x 1.5 x 81	18 x 1.5 x 35	18 x 2.25 x 46	---	---	---	48 x 0.5 x 68	22 x 1.25 x 17	22 x 2.25 x 34	22 x 1.5 x 17	22 x 2.75 x 34	---
2 @ 130	54 x 0.5 x 91	---	16 x 1.5 x 91	18 x 1.5 x 39	18 x 2.25 x 52	---	---	---	54 x 0.5 x 78	22 x 1.5 x 19	22 x 2.75 x 40	22 x 1.5 x 19	22 x 3 x 40	---
2 @ 145	60 x 0.625 x 102	---	18 x 1.5 x 102	20 x 1.25 x 44	20 x 2.25 x 58	---	---	---	60 x 0.625 x 86	24 x 1.5 x 21	24 x 2.75 x 44	26 x 1.5 x 21	26 x 3 x 44	---
2 @ 160	66 x 0.625 x 112	---	18 x 1.5 x 112	20 x 2 x 65	20 x 2.25 x 47	---	---	---	66 x 0.625 x 96	24 x 1.5 x 28	24 x 3 x 40	26 x 1.5 x 28	26 x 3 x 40	---
2 @ 175	72 x 0.625 x 123	---	20 x 1.25 x 123	22 x 1.5 x 65	22 x 2 x 58	---	---	---	72 x 0.625 x 104	26 x 1.5 x 26	26 x 3 x 52	30 x 1.5 x 26	30 x 3 x 52	---
2 @ 190	76 x 0.625 x 133	---	20 x 1.5 x 133	22 x 1.5 x 57	22 x 2 x 76	---	---	---	76 x 0.625 x 114	32 x 1.5 x 28	32 x 3 x 58	34 x 1.5 x 28	34 x 3 x 58	---
2 @ 205	82 x 0.75 x 140	---	20 x 1.5 x 140	22 x 1.5 x 62	22 x 2 x 78	---	---	---	82 x 0.75 x 130	34 x 1.5 x 32	34 x 3 x 66	36 x 1.5 x 32	36 x 3 x 66	---
2 @ 220	92 x 0.75 x 55	24 x 1 x 55	---	24 x 1.75 x 55	---	92 x 0.75 x 99	24 x 1.25 x 99	24 x 1.75 x 99	92 x 0.75 x 132	30 x 1.5 x 41	30 x 2 x 50 ▲	30 x 1.75 x 41	30 x 2.5 x 50 ▲	---
2 @ 235	96 x 0.75 x 60	24 x 1 x 60	---	26 x 1.75 x 60	---	96 x 0.75 x 105	24 x 1.25 x 105	26 x 1.75 x 105	96 x 0.75 x 140	30 x 1.75 x 45	30 x 2.25 x 50 ▲	30 x 2.25 x 45	30 x 2.75 x 50 ▲	---
2 @ 250	102 x 0.75 x 60	26 x 1.25 x 60	---	26 x 2 x 60	---	102 x 0.75 x 120	26 x 1.5 x 120	26 x 2 x 120	102 x 0.75 x 140	32 x 1.5 x 50 ▲	32 x 2.25 x 40 ▲	34 x 1.75 x 50 ▲	34 x 2.5 x 40 ▲	a

Note: All plates are A709 Gr 50W except those noted with a ▲ are Gr HPS 70W.

Footnotes:
a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.
b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TWO SPAN 100-250 FT 14 FT SPACING

Issued January 2025
Revision 0

TRANSVERSE AND BEARING STIFFENERS							
Span ft.	Transverse Stiffener Size and Location, Distance From End support			Bearing Stiffeners, End		Bearing Stiffeners, Int.	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.	Width in.	Thickness in.
2 @ 100	5.5	0.5	72.5, 83, 93	8.25	0.75	10.25	1
2 @ 115	5.5	0.5	6, 18, 69, 81, 92.25, 101.75, 109	7.25	0.75	10.25	1.125
2 @ 130	5.5	0.5	6.5, 20, 64, 77.5, 91, 100, 110, 117.75, 124.25	7.25	0.75	10.25	1.25
2 @ 145	6.5	0.5	115, 130	8.25	0.75	11.25	1
2 @ 160	6.5	0.5	8.25, 128.75, 145.25	8.25	0.75	11.25	1.125
2 @ 175	7.5	0.5	9, 27, 105, 123, 126.5, 144.5, 161.75	9.25	0.875	12.25	1.25
2 @ 190	8.5	0.5	9.5, 28.5, 114, 133, 144.25, 163.25, 178	9.25	0.875	15.25	1.375
2 @ 205	9	0.625	143.5, 164, 184.5	9	0.875	16	1.5
2 @ 220	8	0.5	11.5, 174, 197	11	1	14	1.25
2 @ 235	9	0.625	12, 36, 141, 165, 187, 211	11	1	14	1.25
2 @ 250	10	0.75	12.75, 38.25, 154.5, 180, 200.5, 226.25	12	1.125	15	1.375

SHEAR STUD LAYOUT TABLE, SPAN 1 (SPAN 2 MIRRORED)														
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3			Group 4		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
2 @ 100	4	0	150	6	75	10	12	10	10	18	15	---	---	---
2 @ 115	4	0	130	8	86.67	11	20	18.33	1	28	2.33	3	24	6
2 @ 130	4	0	195	6	97.5	7	24	14	6	36	18	---	---	---
2 @ 145	4	0	164	8	109.33	6	32	16	5	44	18.33	---	---	---
2 @ 160	4	0	32	6	16	110	12	110	8	30	20	3	48	12
2 @ 175	4	0	26	8	17.33	114	12	114	8	40	26.67	4	48	16
2 @ 190	4	0	14	8	9.33	133	12	133	11	48	44	---	---	---
2 @ 205	4	0	154	12	154	12	48	48	---	---	---	---	---	---
2 @ 220	4	0	33	12	33	99	16	132	13	48	52	---	---	---
2 @ 235	4	0	24	12	24	115	16	153.33	14	48	56	---	---	---
2 @ 250	4	0	13	12	13	131	16	174.67	15	48	60	---	---	---

GIRDER WEIGHT				
Span ft.	Segment A tons	Segment B tons	Segment C tons	Total tons
2 @ 100	8.24	---	9.89	26.38
2 @ 115	11.39	---	12.64	35.42
2 @ 130	13.27	---	16.46	43.00
2 @ 145	17.51	---	21.63	56.64
2 @ 160	21.03	---	24.09	66.15
2 @ 175	22.64	---	30.26	75.54
2 @ 190	26.43	---	38.18	91.04
2 @ 205	31.12	---	48.62	110.85
2 @ 220	12.63	23.75	40.58	113.35
2 @ 235	14.44	26.35	48.29	129.88
2 @ 250	16.44	34.20	47.20	148.46

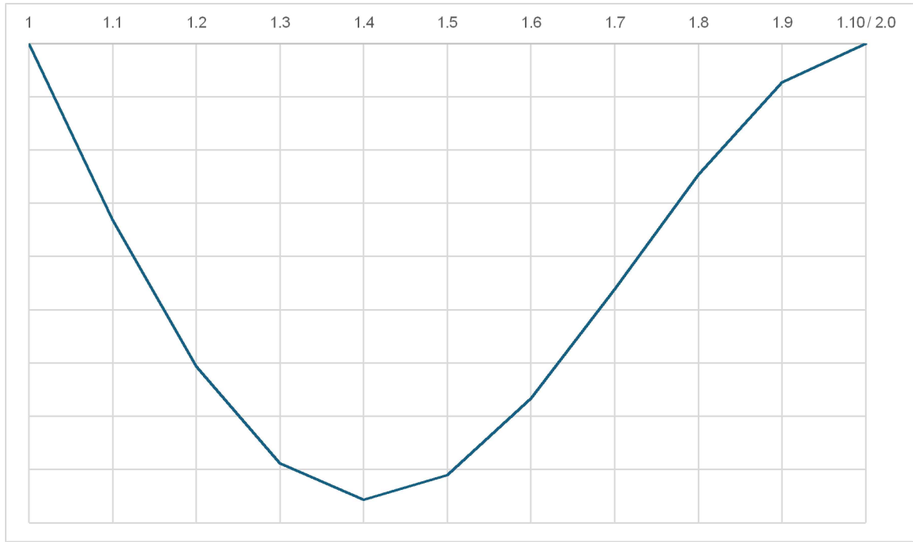
Note: Girder weight is total weight of web and flanges only measured between CL brg at each end. Does not include girder extension at end bearings, stiffeners, shear studs, bracing, or any other allowances.

DEAD LOAD AND LIVE LOAD REACTIONS								
Span ft.	End Reaction				Pier Reaction			
	DC kips	DW kips	Truck kips	Lane kips	DC kips	DW kips	Truck kips	Lane kips
2 @ 100	89	10	110	36	335	36	182	96
2 @ 115	106	12	112	41	387	41	191	109
2 @ 130	118	13	113	46	448	47	199	124
2 @ 145	133	15	113	51	514	52	203	138
2 @ 160	152	16	114	57	565	57	206	151
2 @ 175	163	18	115	62	631	63	209	166
2 @ 190	175	19	115	67	706	69	211	181
2 @ 205	192	20	115	71	782	75	212	195
2 @ 220	218	22	116	78	803	79	211	206
2 @ 235	232	24	116	83	876	84	212	220
2 @ 250	260	26	116	88	928	89	212	232

Note: Truck and lane reactions include distribution factors, skew correction, and impact on the truck loading.

CROSS-FRAME SPACING, SPAN 1 (SPAN 2 MIRRORED)		
Span, ft.	Spacing, ft.	Type
2 @ 100	5 @ 20 = 100	Diaphragm
2 @ 115	3 @ 25 + 2 @ 20 = 115	Diaphragm
2 @ 130	4 @ 23.5 + 2 @ 18 = 130	Diaphragm
2 @ 145	4 @ 26.25 + 2 @ 20 = 145	Diaphragm
2 @ 160	5 @ 23 + 2 @ 22.5 = 160	K-Frame
2 @ 175	5 @ 23 + 3 @ 20 = 175	K-Frame
2 @ 190	5 @ 26 + 3 @ 20 = 190	K-Frame
2 @ 205	6 @ 23.83 + 3 @ 20.67 = 205	K-Frame
2 @ 220	6 @ 26.17 + 3 @ 21 = 220	K-Frame
2 @ 235	7 @ 24 + 3 @ 22.33 = 235	K-Frame
2 @ 250	8 @ 23 + 3 @ 22 = 250	K-Frame

DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in., Span 1 Shown. Span 2 Symmetric About Pier											
	1.0	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**	**1.7**	**1.8**	**1.9**	**1.10**
100 ft. span - steel only, in.	0.00	0.10	0.18	0.23	0.25	0.23	0.19	0.13	0.06	0.02	0.00
slab, in.	0.00	0.84	1.52	1.93	2.04	1.89	1.52	1.02	0.51	0.15	0.00
barrier rails, in.	0.00	0.05	0.10	0.12	0.13	0.12	0.10	0.07	0.04	0.01	0.00
100 ft. span - total, in.	**0.00**	**0.99**	**1.80**	**2.28**	**2.42**	**2.25**	**1.81**	**1.21**	**0.61**	**0.18**	**0.00**
115 ft. span - steel only, in.	0.00	0.14	0.25	0.32	0.34	0.32	0.26	0.18	0.09	0.03	0.00
slab, in.	0.00	0.96	1.74	2.23	2.37	2.22	1.80	1.22	0.61	0.17	0.00
barrier rails, in.	0.00	0.07	0.13	0.16	0.17	0.16	0.13	0.09	0.05	0.01	0.00
115 ft. span - total, in.	**0.00**	**1.16**	**2.11**	**2.71**	**2.89**	**2.70**	**2.19**	**1.49**	**0.75**	**0.21**	**0.00**
130 ft. span - steel only, in.	0.00	0.17	0.31	0.39	0.42	0.39	0.32	0.21	0.11	0.03	0.00
slab, in.	0.00	1.14	2.07	2.63	2.79	2.58	2.07	1.38	0.70	0.20	0.00
barrier rails, in.	0.00	0.09	0.16	0.20	0.22	0.20	0.17	0.12	0.06	0.02	0.00
130 ft. span - total, in.	**0.00**	**1.40**	**2.53**	**3.22**	**3.42**	**3.17**	**2.55**	**1.71**	**0.87**	**0.25**	**0.00**
145 ft. span - steel only, in.	0.00	0.23	0.41	0.53	0.56	0.52	0.42	0.28	0.14	0.04	0.00
slab, in.	0.00	1.31	2.36	2.99	3.14	2.89	2.31	1.54	0.77	0.23	0.00
barrier rails, in.	0.00	0.11	0.19	0.25	0.26	0.24	0.20	0.13	0.07	0.02	0.00
145 ft. span - total, in.	**0.00**	**1.64**	**2.97**	**3.76**	**3.96**	**3.64**	**2.92**	**1.95**	**0.99**	**0.29**	**0.00**
160 ft. span - steel only, in.	0.00	0.28	0.51	0.66	0.71	0.66	0.54	0.36	0.18	0.05	0.00
slab, in.	0.00	1.47	2.69	3.47	3.74	3.48	2.81	1.87	0.92	0.25	0.00
barrier rails, in.	0.00	0.12	0.22	0.29	0.31	0.29	0.24	0.17	0.09	0.02	0.00
160 ft. span - total, in.	**0.00**	**1.87**	**3.42**	**4.42**	**4.76**	**4.44**	**3.58**	**2.40**	**1.19**	**0.33**	**0.00**
175 ft. span - steel only, in.	0.00	0.34	0.62	0.80	0.86	0.79	0.64	0.42	0.21	0.06	0.00
slab, in.	0.00	1.83	3.32	4.25	4.51	4.16	3.31	2.18	1.06	0.29	0.00
barrier rails, in.	0.00	0.15	0.28	0.35	0.38	0.35	0.29	0.20	0.10	0.03	0.00
175 ft. span - total, in.	**0.00**	**2.32**	**4.22**	**5.41**	**5.75**	**5.30**	**4.23**	**2.80**	**1.37**	**0.38**	**0.00**
190 ft. span - steel only, in.	0.00	0.40	0.72	0.92	0.98	0.91	0.72	0.48	0.24	0.07	0.00
slab, in.	0.00	1.96	3.54	4.50	4.76	4.36	3.45	2.25	1.12	0.32	0.00
barrier rails, in.	0.00	0.18	0.32	0.41	0.43	0.40	0.33	0.22	0.11	0.03	0.00
190ft. span - total, in.	**0.00**	**2.53**	**4.58**	**5.83**	**6.17**	**5.67**	**4.50**	**2.95**	**1.47**	**0.43**	**0.00**
205 ft. span - steel only, in.	0.00	0.49	0.90	1.15	1.22	1.13	0.90	0.59	0.30	0.09	0.00
slab, in.	0.00	2.16	3.91	4.97	5.25	4.80	3.79	2.47	1.23	0.35	0.00
barrier rails, in.	0.00	0.20	0.36	0.46	0.49	0.45	0.37	0.25	0.13	0.04	0.00
205ft. span - total, in.	**0.00**	**2.85**	**5.16**	**6.58**	**6.95**	**6.38**	**5.05**	**3.31**	**1.65**	**0.48**	**0.00**
220 ft. span - steel only, in.	0.00	0.60	1.10	1.41	1.53	1.45	1.19	0.82	0.43	0.12	0.00
slab, in.	0.00	2.49	4.54	5.85	6.32	5.95	4.86	3.32	1.72	0.50	0.00
barrier rails, in.	0.00	0.22	0.40	0.52	0.56	0.54	0.44	0.31	0.16	0.05	0.00
220 ft. span - total, in.	**0.00**	**3.31**	**6.04**	**7.79**	**8.42**	**7.93**	**6.49**	**4.44**	**2.31**	**0.67**	**0.00**
235 ft. span - steel only, in.	0.00	0.71	1.30	1.68	1.81	1.71	1.40	0.96	0.50	0.15	0.00
slab, in.	0.00	2.81	5.11	6.58	7.08	6.63	5.39	3.67	1.91	0.55	0.00
barrier rails, in.	0.00	0.25	0.45	0.59	0.64	0.61	0.50	0.35	0.18	0.05	0.00
235 ft. span - total, in.	**0.00**	**3.77**	**6.87**	**8.84**	**9.53**	**8.94**	**7.29**	**4.98**	**2.60**	**0.75**	**0.00**
250 ft. span - steel only, in.	0.00	0.81	1.48	1.92	2.09	1.98	1.64	1.14	0.59	0.16	0.00
slab, in.	0.00	2.84	5.20	6.73	7.32	6.94	5.72	3.96	2.06	0.57	0.00
barrier rails, in.	0.00	0.27	0.49	0.64	0.70	0.66	0.55	0.39	0.20	0.06	0.00
250 ft. span - total, in.	**0.00**	**3.92**	**7.16**	**9.29**	**10.11**	**9.59**	**7.92**	**5.48**	**2.86**	**0.79**	**0.00**



DEFLECTION VERSUS SPAN TENTH POINT, SYMMETRIC ABOUT CENTER PIER

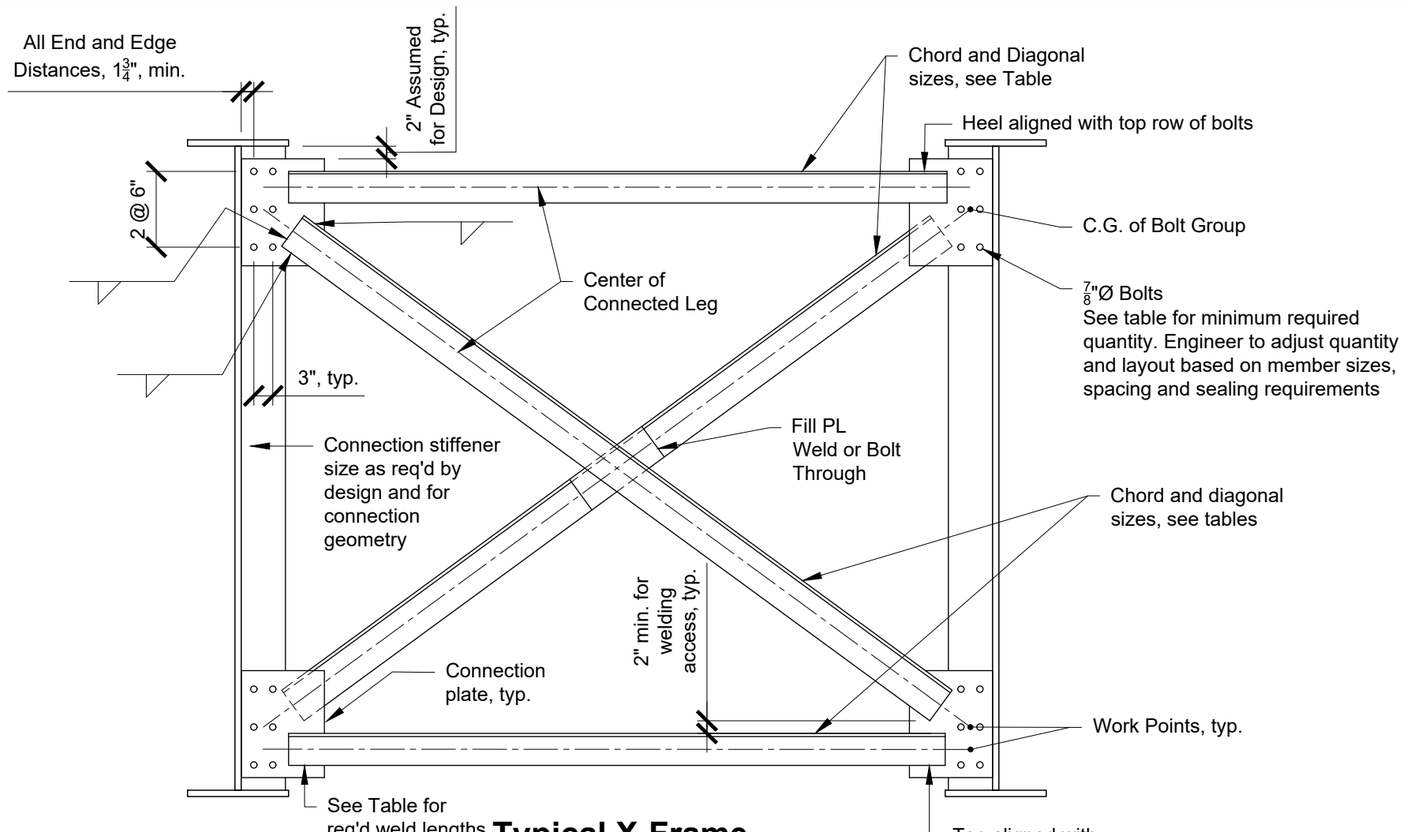
All Girders

Deflection Assumptions

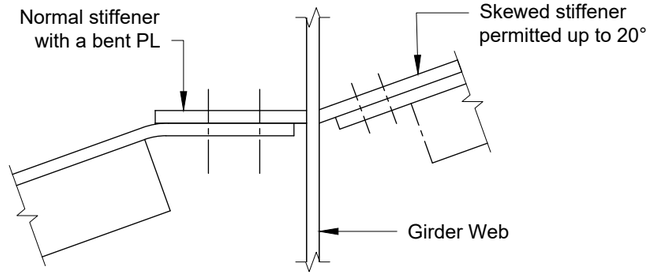
"Steel Only" = self weight of girders

"Slab" = deflection due to user-input non composite uniform dead load (slab, haunch, allowance for bracing)

"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



Typical X-Frame



Connection Options

Not to Scale

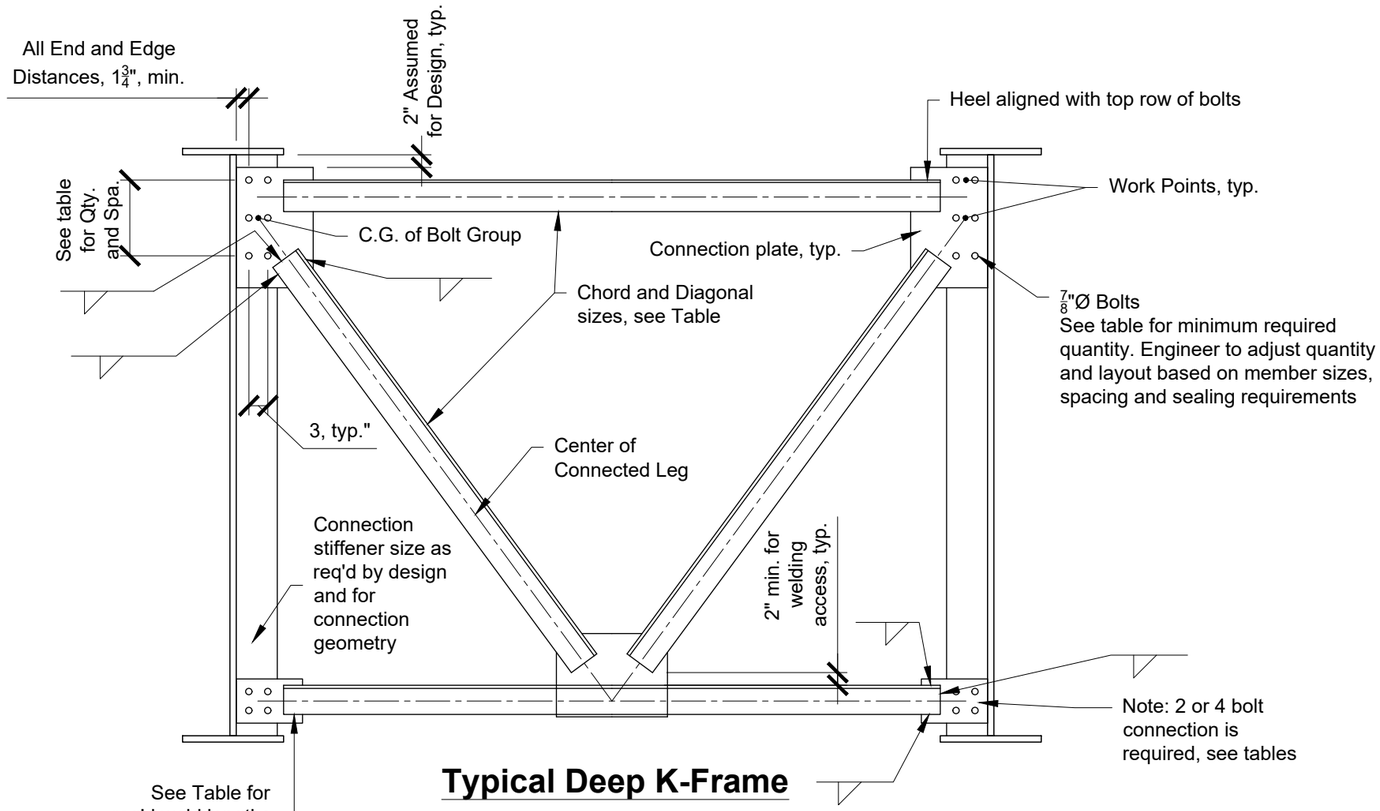
CROSS-FRAME MEMBER SIZES				
Beam Spacing, ft.	Span, ft.	Type	Chord	Diagonal
8	100-190	K-Frame	L5X5X3/8	L5X5X3/8
	205-250	X-Frame	L5X5X3/8	L5X5X3/8
10	115-220	K-Frame	L5X5X3/8	L5X5X3/8
	235-250	X-Frame	L5X5X3/8	L6X6X3/8
12	130-250	K-Frame	L6X6X3/8	L5X5X3/8
14	160-250	K-Frame	L8X6X1/2	L5X5X3/8

CROSS-FRAME WELD DETAILS		
Angle Size	Toe Length	Heel Length
L5x5x3/8	2 in. min. See notes regarding toe weld length	4 in.
L6x6x3/8		4 in.
L8x6x1/2		4

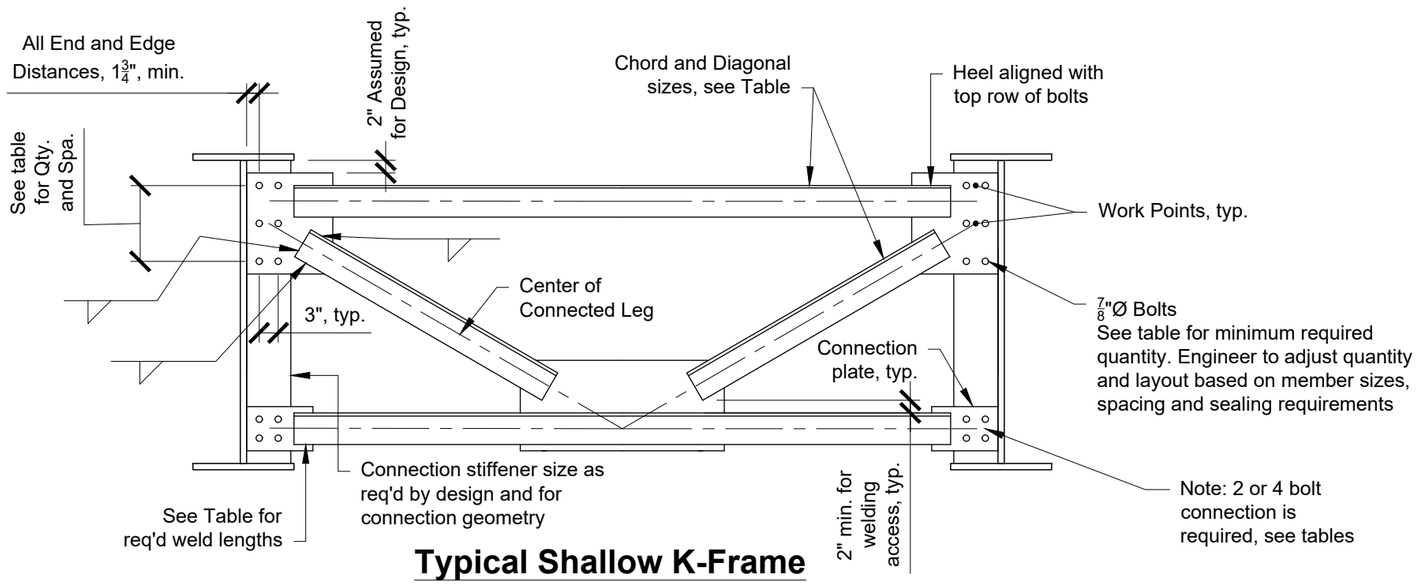
CROSS-FRAME BOLTED CONNECTION DETAILS					
Beam Spacing, ft.	Type	Top Connection		Bottom Connection	
		Total Num Bolts	Vertical Spacing	Total Num Bolts	Vertical Spacing
8	K-Frame	6	6 in.	2	3 in.
	X-Frame	6	6 in.	6	6 in.
10	K-Frame	6	6 in.	2	3 in.
	X-Frame	6	6 in.	6	6 in.
12	K-Frame	6	6 in.	2	3 in.
14	K-Frame	8	4.75	4	4.75

Notes:

1. All bolts for bent plate diaphragms 7/8 in. diameter ASTM F3125 Grade A325 bolts assumed in single shear with threads in the shear plane.
2. All bolts for K and X cross-frames 7/8 in. diameter ASTM F3125 Grade A325 bolts assumed in single shear with threads in the shear plane.
3. All welds 5/16 in. fillet welds. The minimum heel and toe dimensions provided meet load and eccentricity requirements. The toe may be lengthened to equal the heel dimension provided in the tables; the resulting eccentricity was considered in design. Other weld geometries may be needed for dimensional or sealing requirements and are to be designed.
4. Member and connection designs based on stability, construction, and wind forces.
5. General layout and details follow industry preferences. Provide details in accordance with owner preferences and modify these details accordingly.
6. Determine cross-frame forces for specific designs and proportion members and connections accordingly. Bolt connection layout, quantity and spacing provided on this sheet are approximate based on member loads and several representative geometries. Deck cross-slope was not considered in developing the details. Given a wide range of beam depths and spacing, the geometry of each connection was not fully studied. A scale drawing of the connection including chosen work points should be used for layout of the members, final bolt patterns, and determination of connection plate sizes. The selection of work points, member axes and orientation shown represent one acceptable approach. Engineers may choose alternate work point locations and overall connection geometries that consider the effects of eccentricity on the welded and bolted connections.



Typical Deep K-Frame



Typical Shallow K-Frame

CROSS-FRAME MEMBER SIZES				
Beam Spacing, ft.	Span, ft.	Type	Chord	Diagonal
8	100-190	K-Frame	L5X5X3/8	L5X5X3/8
	205-250	X-Frame	L5X5X3/8	L5X5X3/8
10	115-220	K-Frame	L5X5X3/8	L5X5X3/8
	235-250	X-Frame	L5X5X3/8	L6X6X3/8
12	130-250	K-Frame	L6X6X3/8	L5X5X3/8
14	160-250	K-Frame	L8X6X1/2	L5X5X3/8

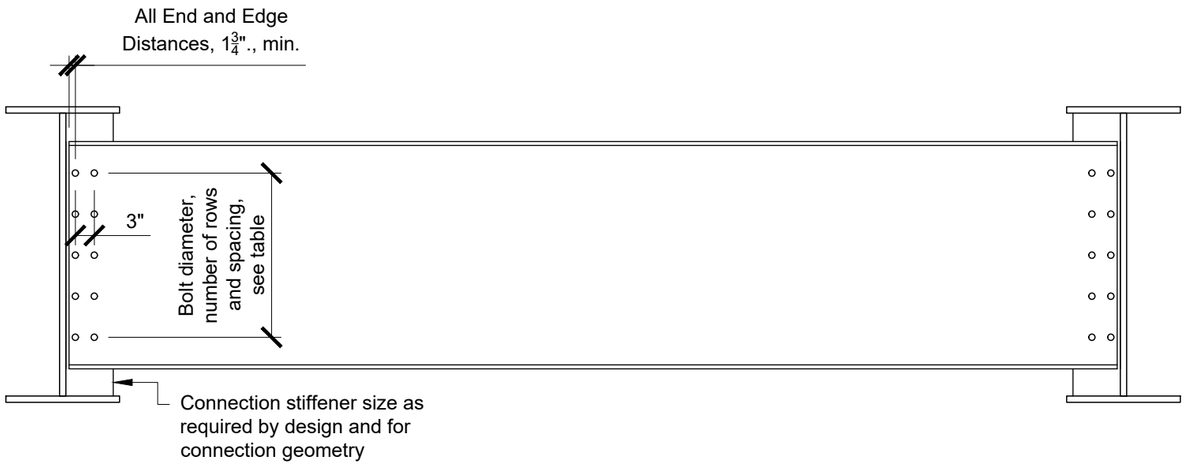
CROSS-FRAME WELD DETAILS		
Angle Size	Toe Length	Heel Length
L5x5x3/8	2 in. min. See notes regarding toe weld length	4 in.
L6x6x3/8		4 in.
L8x6x1/2		4

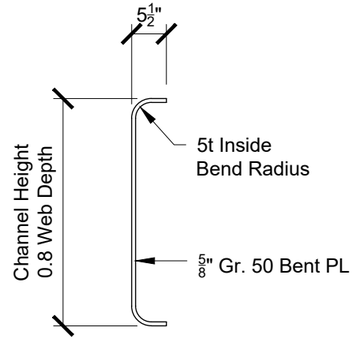
CROSS-FRAME BOLTED CONNECTION DETAILS					
Beam Spacing, ft.	Type	Top Connection		Bottom Connection	
		Total Num Bolts	Vertical Spacing	Total Num Bolts	Vertical Spacing
8	K-Frame	6	6 in.	2	3 in.
	X-Frame	6	6 in.	6	6 in.
10	K-Frame	6	6 in.	2	3 in.
	X-Frame	6	6 in.	6	6 in.
12	K-Frame	6	6 in.	2	3 in.
14	K-Frame	8	4.75	4	4.75

Notes:
1. For general notes, see **Cross-Frame & Diaphragm Details 1**.

CROSS-FRAME & DIAPHRAGM DETAILS 2

Issued January 2025
Revision 0

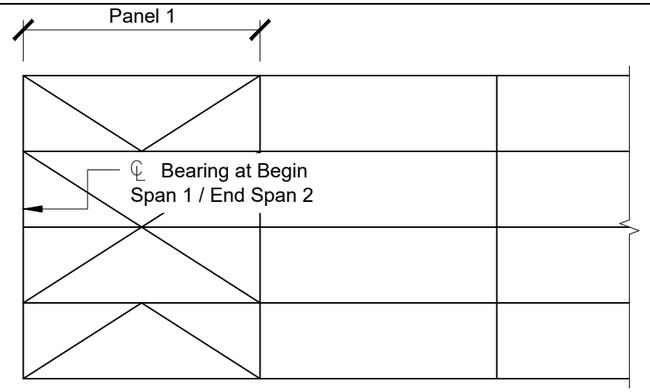




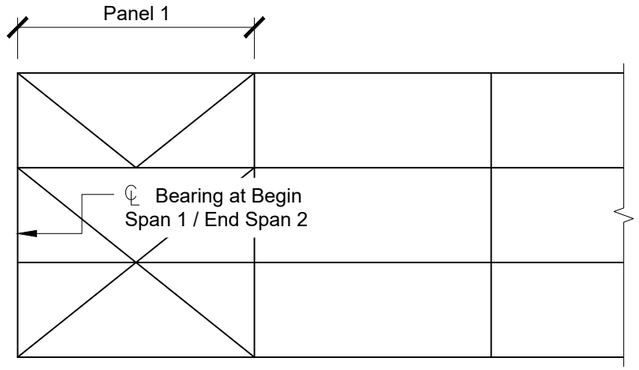
SOLID DIAPHRAGM DETAILS					
Beam Spacing, ft.	Span, Ft.	Web Depth, in.	Channel Height, in.	Rows and Spacing	Bolt Diameter, in
10	100	42	34	5 @ 6 in.	7/8
12	100	42	34	5 @ 6 in.	7/8
	115	48	39	6 @ 5.75 in.	
14	100	42	34	6 @ 4.75 in.	7/8
	115	48	39	6 @ 5.75 in.	
	130	54	44	7 @ 5.75 in.	
	145	60	48	7 @ 6.25 in.	

Bent Plate Diaphragm Typical Details

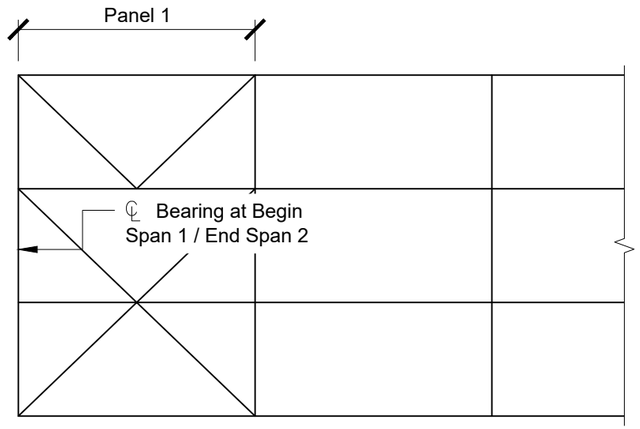
Notes:
1. For general notes, see sheet **Cross-Frame & Diaphragm Details 1**.



8 FT GIRDER SPACING



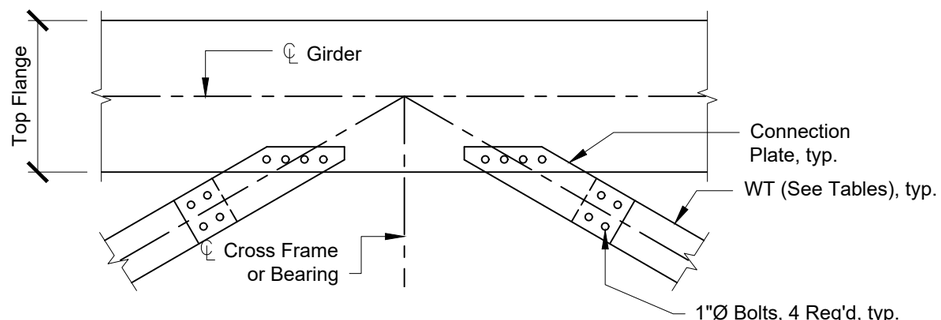
10 FT GIRDER SPACING



12 FT GIRDER SPACING

Note: lateral bracing is not required for any 14 ft beam spacings designed using the criteria below.

2-SPAN UNIT LATERAL BRACING REQUIREMENTS				
SPACING	SPAN LENGTH	DIAGONALS PER PANEL	NUMBER OF BRACED PANELS	BRACING SIZE
8	250-250	2	1	WT 7x34
10	235-235	2	1	WT 7x34
	250-250	2	1	WT 7x34
12	235-235	2	1	WT 7x34
	250-250	2	1	WT 7x34



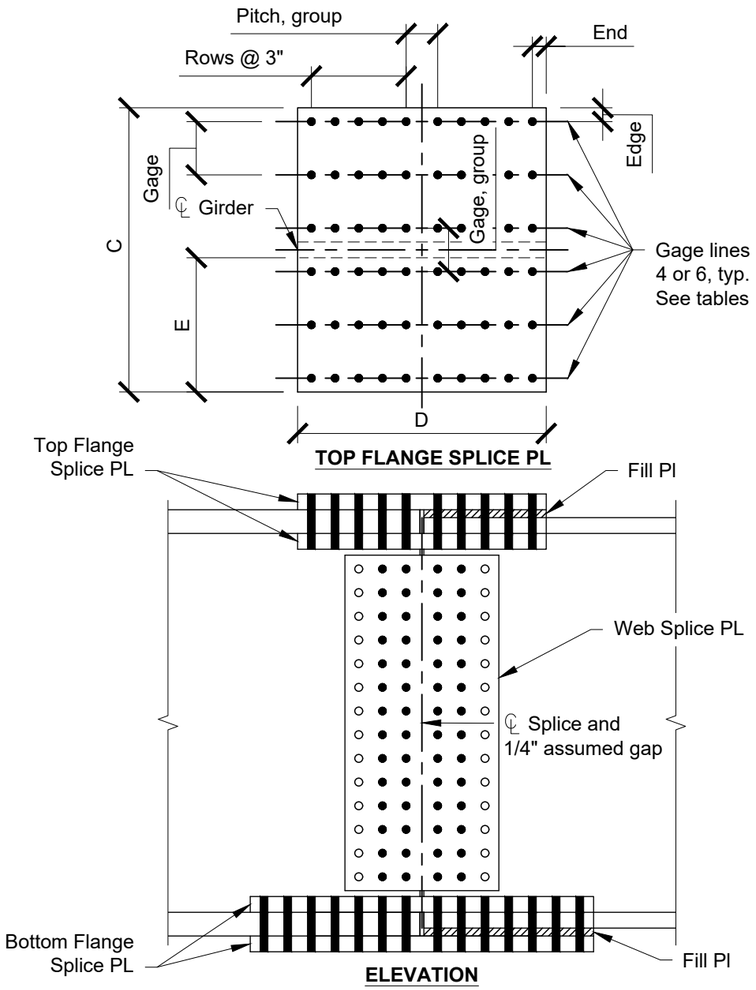
LATERAL BRACING CONNECTION DETAIL

NOTES AND DESIGN CRITERIA:

1. Lateral bracing is required for the indicated spans only at a single panel at the discontinuous end of Span 1 and 2. Bracing shown is needed to control lateral deflections and flange stresses due to wind on the fully erected steel, for global stability during deck placement, or a combination of those factors.
2. Lateral deflections due to wind loads on the fully erected steel satisfy the Span / 150 requirement established by PennDOT BD-620M. All references to BD-620M are to the April 29, 2016 edition.
   2.1. For this deflection check, a 32 psf assumed pressure is applied to fascia beams only for a superstructure height = 30 ft. For other superstructure heights, refer to PennDOT BD-620M.
3. Girder flange lateral bending is checked and lateral bracing is designed for strength as follows:
   3.1. Midspan and pier region checked. Check other plate transitions in final design.
   3.2. Fascia beam checked for global bending of the span and local bending between cross-frames.
   3.3. Wind loads on erected steel determined from the *AASHTO Guide Specification for Wind Loads on Bridges During Construction, 2017.*
      3.3.1. Inactive wind condition, V = 115 mph. Superstructure height, 30 ft.
      3.3.2. Superstructure construction duration 6 weeks - 1 year, R = 0.73
      3.3.3. K_z = 1.0, C_d = 2.2 for fascia beam, per AASHTO Guide Specifications for other beams
4. Lateral bracing members were designed to transfer the *Guide Specification* wind load at each end of the fully erected unit.
5. Bracing members were designed as eccentrically loaded WTs in compression using *Tables for Eccentrically Loaded WT Shapes in Compression*, AISC Engineering Journal, Second Quarter, 2010.
6. Lateral bracing bolts are designed as bearing type connections for the inactive wind condition, AASHTO LRFD 6.13.2.1.2. Lateral bracing bolts additionally designed to prevent slip during deck casting, AASHTO LRFD 6.13.2.1.1 and 6.10.3.1. For the determination of bolt slip resistance, oversized holes in one ply are permitted. Provide a minimum of a Class A surface condition.

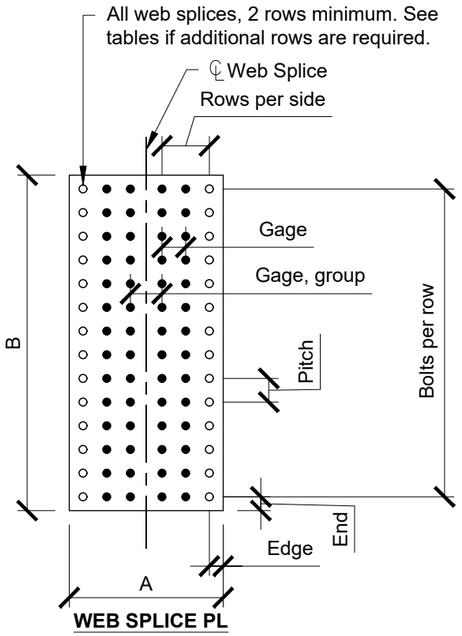
LATERAL BRACING DETAILS

Issued January 2025
Revision 0

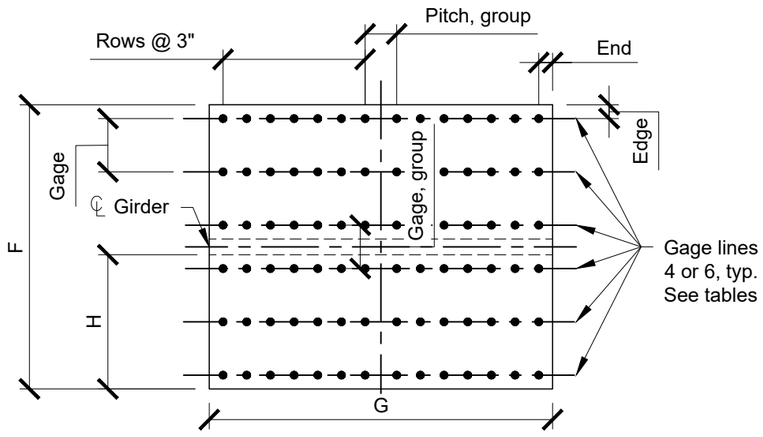


TOP FLANGE SPLICE PL

ELEVATION



WEB SPLICE PL



BOTTOM FLANGE SPLICE PL

NOTES:

All bolted field splices designed using NSBA Splice Version 03_15. Design assumptions listed below. For bolt quantity and plate dimensions, see Sheets **Bolted Field Splice Dimensions 1 and 2**.

1. Bolts F3125 Grade A325, Type 3 weathering, 1 in. diameter in 1.125 in. diameter holes. All plates A709 Grade 50W.
2. Threads excluded from flange shear planes. Threads included in web shear planes.
3. Class B surface condition for slip resistance.
4. For continuous spans in which "Splice 0" is used to control the field section lengths, a large moment must be carried by the web (AASHTO LRFD 6.13.6.1.3c). If the combined tension due to the bottom flange force plus the web force, H_w, exceeds the compression capacity of the slab, these splices are designed as noncomposite and noted in the design tables.
5. Top and bottom flange bolt group dimension, "Gage, Group" exceeds the 7 in. maximum spacing for sealing for some splices (AASHTO LRFD 6.13.2.6.2). This is due to girder tension flange net section requirements at the splice, the choice of 1 in. diameter bolts, and enforced symmetry requirements for the inner flange splice plates. The engineer may choose to accept the proposed designs, or redesign the splice. Solutions could include using asymmetric inner plates, staggered bolts, or smaller diameter fasteners. If additional and smaller diameter bolts are used to decrease the "Gage, Group" dimension, check the net section. See AASHTO LRFD 6.10.1.8.

BOLTED FIELD SPLICE LAYOUT

Issued January 2025
Revision 0

Spacing-Span	Web Splice Plates				Top Flange Plates, Outer				Top Flange Plates, Inner, 2 req'd.			Bottom Flange Plates, Outer				Bottom Flange Plates, Inner, 2 req'd.			Web Bolts					Top Flange Bolts					Bottom Flange Bolts					Composite Note
	Width, A	Length, B	Thk.	Edge / End Distance	Width, C	Length, D	Thk.	Edge / End Distance	Width, E	Length, D	Thk.	Width, F	Length, G	Thk.	Edge / End Distance	Width, H	Length, G	Thk.	Bolts per Row	Rows per Side	Pitch	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	
8-100 Splice 1	12.25	36.75	0.5	1.5 / 1.5	16	18.25	0.75	1.5 / 1.5	7.125	18.25	0.75	18	24.25	0.75	1.5 / 1.5	8.125	24.25	0.75	7	2	5.625	3	3.25	3	3.25	4	4.125	4.75	4	3.25	4	5.125	4.75	Composite
8-115 Splice 1	12.25	43.25	0.5	1.5 / 1.5	16	18.25	0.625	1.5 / 1.5	7.125	18.25	0.625	18	24.25	0.75	1.5 / 1.5	8.125	24.25	0.75	8	2	5.75	3	3.25	3	3.25	4	4.125	4.75	4	3.25	4	5.125	4.75	Composite
8-130 Splice 1	12.25	49	0.5	1.5 / 1.5	16	18.25	0.625	1.5 / 1.5	7.125	18.25	0.625	18	24.25	0.75	1.5 / 1.5	8.125	24.25	0.75	9	2	5.75	3	3.25	3	3.25	4	4.125	4.75	4	3.25	4	5.125	4.75	Composite
8-145 Splice 1	12.25	54.75	0.5	1.5 / 1.5	18	18.25	0.75	1.5 / 1.5	8.25	18.25	0.75	20	18.25	0.75	1.5 / 1.5	9.25	18.25	0.75	10	2	5.75	3	3.25	3	3.25	4	5.25	4.5	3	3.25	6	3.125	4.5	Composite
8-160 Splice 1	12.25	60.5	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8.25	18.25	0.625	20	18.25	0.75	1.5 / 1.5	9.25	18.25	0.75	11	2	5.75	3	3.25	3	3.25	4	5.25	4.5	3	3.25	6	3.125	4.5	Composite
8-175 Splice 1	12.25	66.25	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8.25	18.25	0.625	20	18.25	0.75	1.5 / 1.5	9.25	18.25	0.75	12	2	5.75	3	3.25	3	3.25	4	5.25	4.5	3	3.25	6	3.125	4.5	Composite
8-190 Splice 1	12.25	70.5	0.5	1.5 / 1.5	20	18.25	0.625	1.5 / 1.5	9.125	18.25	0.625	22	18.25	0.75	1.5 / 1.5	10.125	18.25	0.75	13	2	5.625	3	3.25	3	3.25	6	3.0625	4.75	3	3.25	6	3.5625	4.75	Composite
8-205 Splice 1	12.25	76.125	0.5	1.5 / 1.5	20	18.25	0.625	1.5 / 1.5	9.125	18.25	0.625	22	18.25	0.75	1.5 / 1.5	10.125	18.25	0.75	14	2	5.625	3	3.25	3	3.25	6	3.0625	4.75	3	3.25	6	3.5625	4.75	Composite
8-220 Splice 0	12.25	85.5	0.5	1.5 / 1.5	22	24.25	0.625	1.5 / 1.5	9.375	24.25	0.625	22	24.25	0.75	1.5 / 1.5	9.375	24.25	0.75	16	2	5.5	3	3.25	4	3.25	4	6.375	6.25	4	3.25	4	6.375	6.25	Composite
8-220 Splice 1	12.25	85.5	0.5	1.5 / 1.5	22	18.25	0.625	1.5 / 1.5	10.125	18.25	0.625	22	18.25	0.75	1.5 / 1.5	10.125	18.25	0.75	16	2	5.5	3	3.25	3	3.25	6	3.5625	4.75	3	3.25	6	3.5625	4.75	Composite
8-235 Splice 0	14.25	90.25	0.5	2 / 2	24	26.25	0.75	2 / 2	11	26.25	0.75	24	26.25	0.75	2 / 2	11	26.25	0.75	24	2	3.75	3	4.25	4	4.25	4	7	6	4	4.25	4	7	6	Non-Composite
8-235 Splice 1	12.25	91.125	0.5	1.5 / 1.5	24	18.25	0.75	1.5 / 1.5	11	18.25	0.75	24	18.25	0.75	1.5 / 1.5	11	18.25	0.75	16	2	5.875	3	3.25	3	3.25	6	4	5	3	3.25	6	4	5	Composite
8-250 Splice 0	14.25	97	0.5	2 / 2	24	26.25	0.75	2 / 2	11	26.25	0.75	24	26.25	0.75	2 / 2	11	26.25	0.75	25	2	3.875	3	4.25	4	4.25	4	7	6	4	4.25	4	7	6	Non-Composite
8-250 Splice 1	12.25	97	0.5	1.5 / 1.5	24	18.25	0.75	1.5 / 1.5	11	18.25	0.75	24	18.25	0.75	1.5 / 1.5	11	18.25	0.75	17	2	5.875	3	3.25	3	3.25	6	4	5	3	3.25	6	4	5	Composite

8 FT SPACING - 2 SPAN

Spacing-Span	Web Splice Plates				Top Flange Plates, Outer				Top Flange Plates, Inner, 2 req'd.			Bottom Flange Plates, Outer				Bottom Flange Plates, Inner, 2 req'd.			Web Bolts					Top Flange Bolts					Bottom Flange Bolts					Composite Note
	Width, A	Length, B	Thk.	Edge / End Distance	Width, C	Length, D	Thk.	Edge / End Distance	Width, E	Length, D	Thk.	Width, F	Length, G	Thk.	Edge / End Distance	Width, H	Length, G	Thk.	Bolts per Row	Rows per Side	Pitch	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	
10-100 Splice 1	12.25	36.75	0.5	1.5 / 1.5	16	18.25	0.625	1.5 / 1.5	7	18.25	0.625	18	30.25	0.75	1.5 / 1.5	8	30.25	0.75	7	2	5.625	3	3.25	3	3.25	4	4	5	5	3.25	4	5	5	Composite
10-115 Splice 1	12.25	43.25	0.5	1.5 / 1.5	16	18.25	0.625	1.5 / 1.5	7	18.25	0.625	18	30.25	0.75	1.5 / 1.5	8	30.25	0.75	8	2	5.75	3	3.25	3	3.25	4	4	5	5	3.25	4	5	5	Composite
10-130 Splice 1	12.25	48	0.5	1.5 / 1.5	16	18.25	0.625	1.5 / 1.5	7	18.25	0.625	18	36.25	1	1.5 / 1.5	8	36.25	1	9	2	5.625	3	3.25	3	3.25	4	4	5	6	3.25	4	5	5	Composite
10-145 Splice 1	12.25	54.75	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8	18.25	0.625	20	24.25	1	1.5 / 1.5	9	24.25	1	10	2	5.75	3	3.25	3	3.25	4	5	5	4	3.25	6	3	5	Composite
10-160 Splice 1	12.25	60.5	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8	18.25	0.625	20	24.25	1	1.5 / 1.5	9	24.25	1	11	2	5.75	3	3.25	3	3.25	4	5	5	4	3.25	6	3	5	Composite
10-175 Splice 1	12.25	66.25	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8	18.25	0.625	20	24.25	1	1.5 / 1.5	9	24.25	1	12	2	5.75	3	3.25	3	3.25	4	5	5	4	3.25	6	3	5	Composite
10-190 Splice 1	12.25	70.5	0.5	1.5 / 1.5	20	24.25	0.625	1.5 / 1.5	9	24.25	0.625	22	24.25	1.125	1.5 / 1.5	10	24.25	1.125	13	2	5.625	3	3.25	4	3.25	4	6	5	4	3.25	6	3.5	5	Composite
10-205 Splice 1	12.25	76.125	0.5	1.5 / 1.5	22	18.25	0.625	1.5 / 1.5	10	18.25	0.625	22	24.25	1.125	1.5 / 1.5	10	24.25	1.125	14	2	5.625	3	3.25	3	3.25	6	3.5	5	4	3.25	6	3.5	5	Composite
10-220 Splice 0	12.25	85.5	0.5	1.5 / 1.5	20	18.25	0.625	1.5 / 1.5	9	18.25	0.625	26	18.25	0.75	1.5 / 1.5	12	18.25	0.75	16	2	5.5	3	3.25	3	3.25	4	6	5	3	3.25	6	4.5	5	Composite
10-220 Splice 1	12.25	85.5	0.5	1.5 / 1.5	20	18.25	0.625	1.5 / 1.5	9	18.25	0.625	26	24.25	0.75	1.5 / 1.5	12	24.25	0.75	16	2	5.5	3	3.25	3	3.25	6	3	5	4	3.25	6	4.5	5	Composite
10-235 Splice 0	13.25	91.625	0.5	1.75 / 1.75	22	26.25	0.625	2 / 2	10	26.25	0.625	24	32.25	0.75	2 / 2	11	32.25	0.75	16	2	5.875	3	3.75	4	4.25	4	6	6	5	4.25	4	7	6	Composite
10-235 Splice 1	12.25	91.125	0.5	1.5 / 1.5	22	18.25	0.625	1.5 / 1.5	10	18.25	0.625	24	18.25	0.75	1.5 / 1.5	11	18.25	0.75	16	2	5.875	3	3.25	3	3.25	6	3.5	5	3	3.25	6	4	5	Composite
10-250 Splice 0	13.25	97.5	0.5	1.75 / 1.75	22	26.25	0.625	2 / 2	10	26.25	0.625	24	32.25	0.75	2 / 2	11	32.25	0.75	17	2	5.875	3	3.75	4	4.25	4	6	6	5	4.25	4	7	6	Composite
10-250 Splice 1	12.25	97	0.5	1.5 / 1.5	22	18.25	0.625	1.5 / 1.5	10	18.25	0.625	24	18.25	0.75	1.5 / 1.5	11	18.25	0.75	17	2	5.875	3	3.25	3	3.25	6	3.5	5	3	3.25	6	4	5	Composite

10 FT SPACING - 2 SPAN

NOTES:

1. All dimensions / spacing shown in tables in inch units.

BOLTED FIELD SPLICE DIMENSIONS 1

Issued January 2025
Revision 0

Spacing-Span	Web Splice Plates				Top Flange Plates, Outer				Top Flange Plates, Inner, 2 req'd.			Bottom Flange Plates, Outer				Bottom Flange Plates, Inner, 2 req'd.			Web Bolts					Top Flange Bolts					Bottom Flange Bolts					Composite Note
	Width, A	Length, B	Thk.	Edge / End Distance	Width, C	Length, D	Thk.	Edge / End Distance	Width, E	Length, D	Thk.	Width, F	Length, G	Thk.	Edge / End Distance	Width, H	Length, G	Thk.	Bolts per Row	Rows per Side	Pitch	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	
12-100 Splice 1	12.25	36.75	0.5	1.5 / 1.5	16	18.25	0.625	1.5 / 1.5	7	18.25	0.625	20	18.25	0.875	1.5 / 1.5	9	18.25	0.875	7	2	5.625	3	3.25	3	3.25	4	4	5	3	3.25	6	3	5	Composite
12-115 Splice 1	12.25	42.375	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8	18.25	0.625	18	36.25	0.875	1.5 / 1.5	8	36.25	0.875	8	2	5.625	3	3.25	3	3.25	4	5	5	6	3.25	4	5	5	Composite
12-130 Splice 1	12.25	48	0.5	1.5 / 1.5	16	18.25	0.625	1.5 / 1.5	7	18.25	0.625	18	36.25	1.25	1.5 / 1.5	8	36.25	1.25	9	2	5.625	3	3.25	3	3.25	4	4	5	6	3.25	4	5	5	Composite
12-145 Splice 1	12.25	53.625	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8	18.25	0.625	20	42.25	1.125	1.5 / 1.5	9	42.25	1.125	10	2	5.625	3	3.25	3	3.25	4	5	5	7	3.25	4	6	5	Composite
12-160 Splice 1	12.25	59.25	0.5	1.5 / 1.5	18	25.25	0.75	1.75 / 1.75	8	25.25	0.75	20	25.25	1.25	1.5 / 1.75	9	25.25	1.25	11	2	5.625	3	3.25	4	3.75	4	4.5	5.5	4	3.75	6	3	5	Composite
12-175 Splice 1	12.25	66.25	0.5	1.5 / 1.5	18	24.25	0.625	1.5 / 1.5	8	24.25	0.625	20	24.25	1.125	1.5 / 1.5	9	24.25	1.125	12	2	5.75	3	3.25	4	3.25	4	5	5	4	3.25	6	3	5	Composite
12-190 Splice 1	14.25	71.5	0.5	2 / 2	20	18.25	0.625	1.5 / 1.5	9	18.25	0.625	22	24.25	1.125	1.5 / 1.5	10	24.25	1.125	13	2	5.625	3	4.25	3	3.25	6	3	5	4	3.25	6	3.5	5	Composite
12-205 Splice 1	12.25	76.125	0.5	1.5 / 1.5	20	18.25	0.625	1.5 / 1.5	9	18.25	0.625	22	24.25	1.125	1.5 / 1.5	10	24.25	1.125	14	2	5.625	3	3.25	3	3.25	6	3	5	4	3.25	6	3.5	5	Composite
12-220 Splice 0	12.25	85.5	0.5	1.5 / 1.5	22	24.25	0.75	1.5 / 1.5	10	24.25	0.75	22	30.25	1	1.5 / 1.5	10	30.25	1	16	2	5.5	3	3.25	4	3.25	4	7	5	5	3.25	4	7	5	Composite
12-220 Splice 1	12.25	85.25	0.5	1.5 / 1.5	22	18.25	0.75	1.5 / 1.5	10	18.25	0.75	22	18.25	1	1.5 / 1.5	10	18.25	1	15	2	5.875	3	3.25	3	3.25	6	3.5	5	3	3.25	6	3.5	5	Composite
12-235 Splice 0	12.25	90.125	0.5	1.5 / 1.5	22	25.25	0.625	3 / 1.75	10	25.25	0.625	28	37.25	0.75	3 / 1.75	13	37.25	0.75	18	2	5.125	3	3.25	4	3.75	4	4	8	6	3.75	4	7	8	Composite
12-235 Splice 1	12.25	91.125	0.5	1.5 / 1.5	22	18.25	0.625	1.5 / 1.5	10	18.25	0.625	28	24.25	0.75	1.5 / 1.5	13	24.25	0.75	16	2	5.875	3	3.25	3	3.25	6	3.5	5	4	3.25	6	5	5	Composite
12-250 Splice 0	12.25	96.5	0.5	1.5 / 1.5	24	26.25	0.625	3 / 2	11	26.25	0.625	28	38.25	0.75	3 / 2	13	38.25	0.75	23	2	4.25	3	3.25	4	4.25	4	5	8	6	4.25	4	7	8	Composite
12-250 Splice 1	12.25	97	0.5	1.5 / 1.5	24	18.25	0.75	1.5 / 1.5	11	18.25	0.75	28	24.25	0.875	1.5 / 1.5	13	24.25	0.875	17	2	5.875	3	3.25	3	3.25	6	4	5	4	3.25	6	5	5	Composite

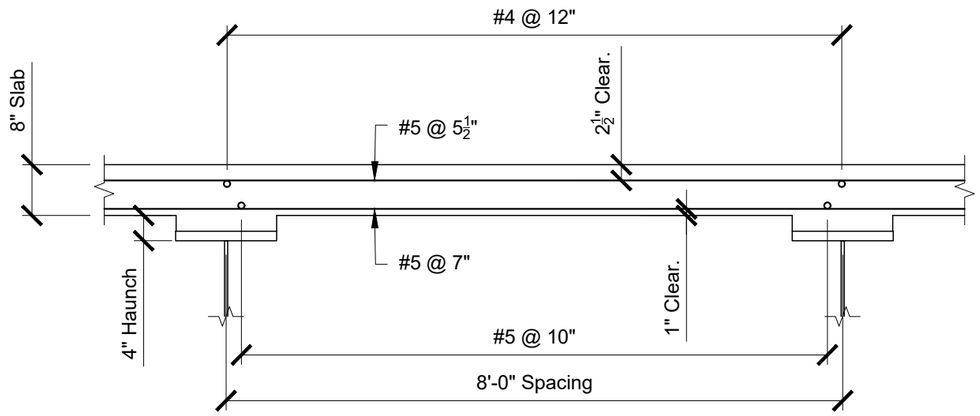
12 FT SPACING - 2 SPAN

Spacing-Span	Web Splice Plates				Top Flange Plates, Outer				Top Flange Plates, Inner, 2 req'd.			Bottom Flange Plates, Outer				Bottom Flange Plates, Inner, 2 req'd.			Web Bolts					Top Flange Bolts					Bottom Flange Bolts					Composite Note
	Width, A	Length, B	Thk.	Edge / End Distance	Width, C	Length, D	Thk.	Edge / End Distance	Width, E	Length, D	Thk.	Width, F	Length, G	Thk.	Edge / End Distance	Width, H	Length, G	Thk.	Bolts per Row	Rows per Side	Pitch	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	
14-100 Splice 1	12.25	36.75	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8	18.25	0.625	18	36.25	1	1.5 / 1.5	8	36.25	1	7	2	5.625	3	3.25	3	3.25	4	5	5	6	3.25	4	5	5	Composite
14-115 Splice 1	12.25	41.5	0.5	1.5 / 1.5	16	24.25	1	1.5 / 1.5	7	24.25	1	18	36.25	1.125	1.5 / 1.5	8	36.25	1.25	8	2	5.5	3	3.25	4	3.25	4	4	5	6	3.25	4	5	5	Composite
14-130 Splice 1	12.25	48	0.5	1.5 / 1.5	16	24.25	0.875	1.5 / 1.5	7	24.25	1	18	36.25	1.125	1.5 / 1.5	8	36.25	1.25	9	2	5.625	3	3.25	4	3.25	4	4	5	6	3.25	4	5	5	Composite
14-145 Splice 1	12.25	53.625	0.5	1.5 / 1.5	18	24.25	0.875	1.5 / 1.5	8	24.25	0.875	20	30.25	1.375	1.5 / 1.5	9	30.25	1.375	10	2	5.625	3	3.25	4	3.25	4	5	5	5	3.25	6	3	5	Composite
14-160 Splice 1	12.25	59.25	0.5	1.5 / 1.5	18	24.25	1	1.5 / 1.5	8	24.25	1	20	30.25	1.375	1.5 / 1.5	9	30.25	1.375	11	2	5.625	3	3.25	4	3.25	4	5	5	5	3.25	6	3	5	Composite
14-175 Splice 1	12.25	66.25	0.5	1.5 / 1.5	20	18.25	0.875	1.5 / 1.5	9	18.25	0.875	22	30.25	1.25	1.5 / 1.5	10	30.25	1.25	12	2	5.75	3	3.25	3	3.25	6	3	5	5	3.25	6	3.5	5	Composite
14-190 Splice 1	12.25	69	0.5	1.5 / 1.5	20	18.25	1	1.5 / 1.5	9	18.25	1	22	30.25	1.25	1.5 / 1.5	10	30.25	1.25	13	2	5.5	3	3.25	3	3.25	6	3	5	5	3.25	6	3.5	5	Composite
14-205 Splice 1	12.25	76.125	0.5	1.5 / 1.5	20	18.25	1	1.5 / 1.5	9	18.25	1	22	30.25	1.25	1.5 / 1.5	10	30.25	1.25	14	2	5.625	3	3.25	3	3.25	6	3	5	5	3.25	6	3.5	5	Composite
14-220 Splice 0	12.25	85	0.5	1.5 / 1.5	24	32.25	0.75	2 / 2	11	32.25	0.75	24	38.25	1.125	2 / 2	11	38.25	1.125	17	2	5.125	3	3.25	5	4.25	4	7	6	6	4.25	4	7	6	Composite
14-220 Splice 1	12.25	85.25	0.5	1.5 / 1.5	24	18.25	0.75	1.5 / 1.5	11	18.25	0.75	24	24.25	1.125	1.5 / 1.5	11	24.25	1.125	15	2	5.875	3	3.25	3	3.25	6	4	5	4	3.25	6	4	5	Composite
14-235 Splice 0	12.25	88.25	0.5	1.5 / 1.5	24	30.25	0.75	2.5 / 1.5	11	30.25	0.75	26	42.25	1.125	2.5 / 1.5	12	42.25	1.125	23	2	3.875	3	3.25	5	3.25	4	6	7	7	3.25	4	7	7	Composite
14-235 Splice 1	12.25	89.25	0.5	1.5 / 1.5	24	24.25	0.75	1.5 / 1.5	11	24.25	0.75	26	30.25	1	1.5 / 1.5	12	30.25	1.125	16	2	5.75	3	3.25	4	3.25	6	4	5	5	3.25	6	4.5	5	Composite
14-250 Splice 0	12.25	96	0.5	1.5 / 1.5	26	36.25	1	2.5 / 1.5	12	36.25	1	26	48.25	1.25	2.5 / 1.5	12	48.25	1.25	25	2	3.875	3	3.25	6	3.25	4	7	7	8	3.25	4	7	7	Composite
14-250 Splice 1	12.25	95	0.5	1.5 / 1.5	26	24.25	1	1.5 / 1.5	12	24.25	1	26	30.25	1.25	1.5 / 1.5	12	30.25	1.25	17	2	5.75	3	3.25	4	3.25	6	4.5	5	5	3.25	6	4.5	5	Composite

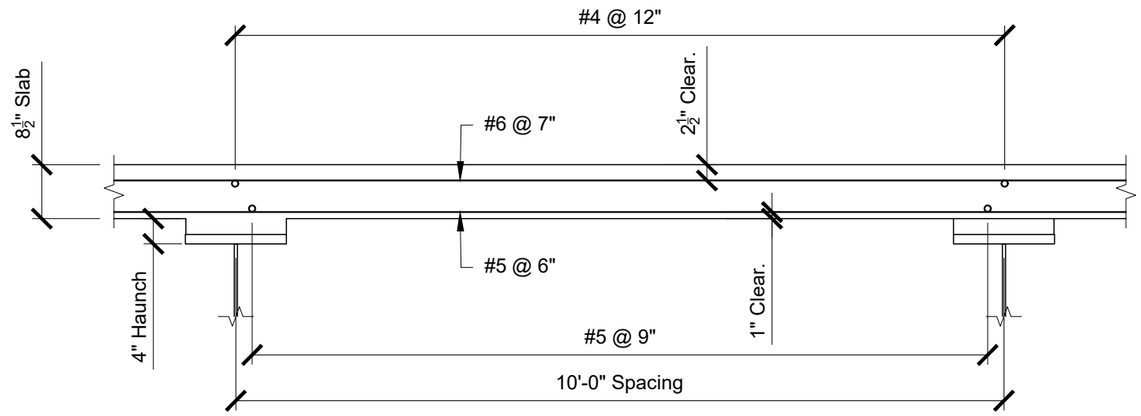
14 FT SPACING - 2 SPAN

NOTES:

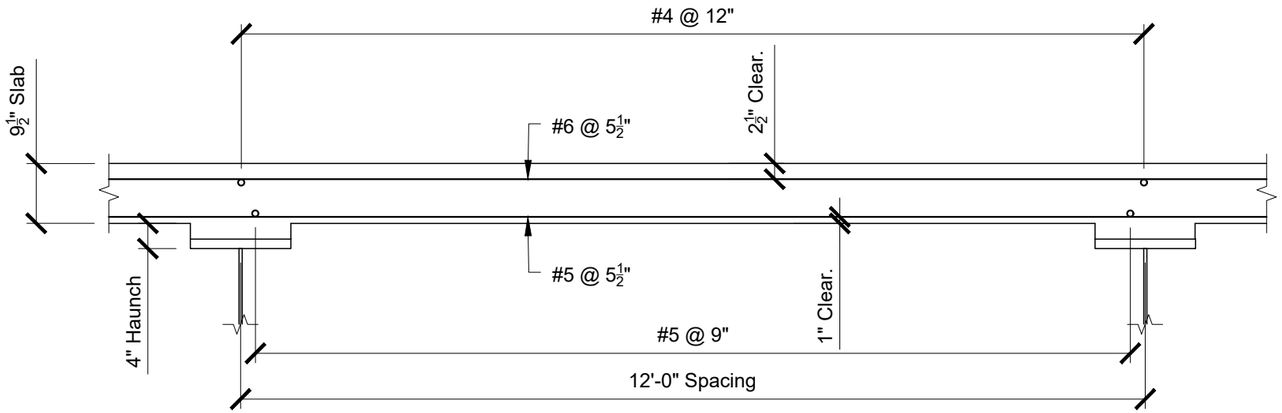
1. All dimensions / spacing shown in tables in inch units.



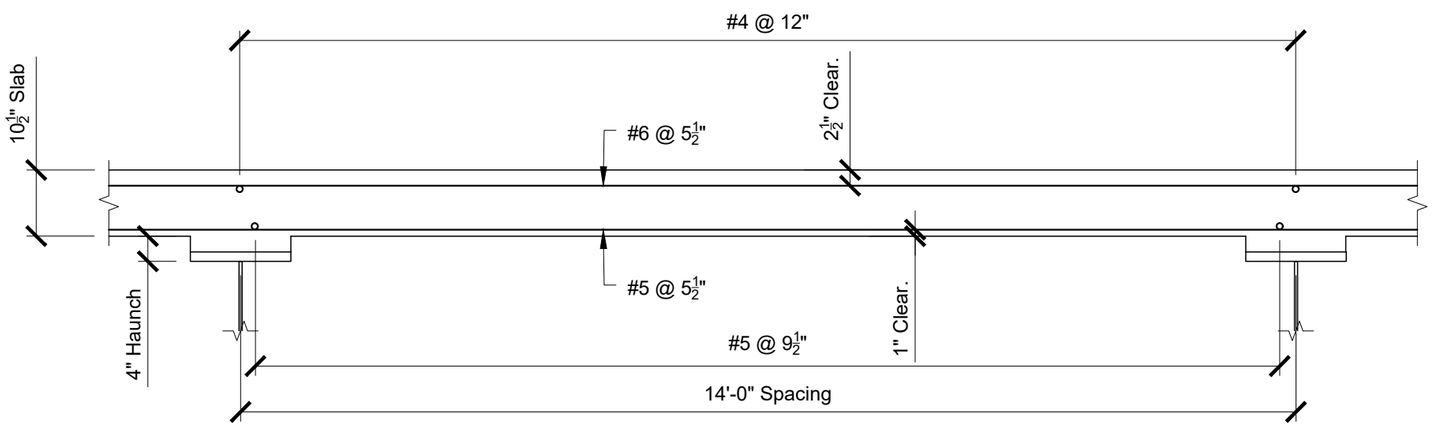
8 FT SPACING



10 FT SPACING



12 FT SPACING



14 FT SPACING

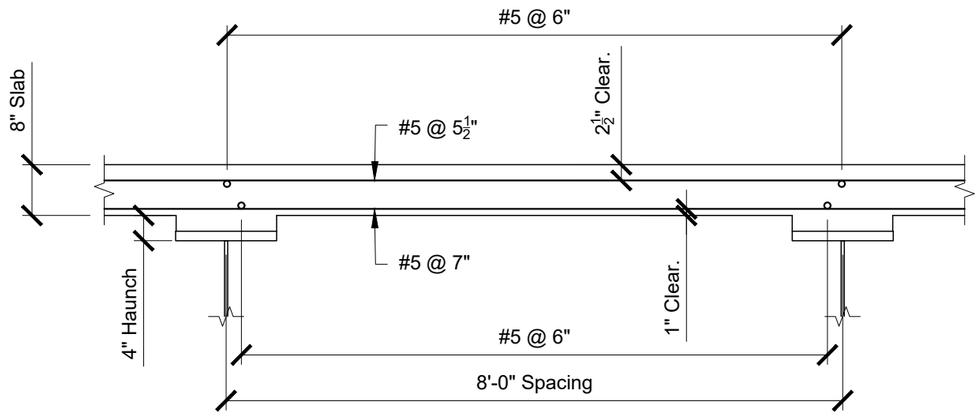
DECK DESIGN NOTES

1. Deck details are representative of slab designs for the beam spacings used in these plans.
2. The gross thickness shown is used for weight calculations. Structural capacity assumes a 1/2 in. loss in deck thickness due to wear.
3. The details on this sheet are for positive moment regions of the span and represent an acceptable transverse and longitudinal reinforcing steel design complying with AASHTO LRFD 9.7.3.
4. The slab thickness, cover, bar sizes and spacing are based on decks designed using the AASHTO equivalent strip method.

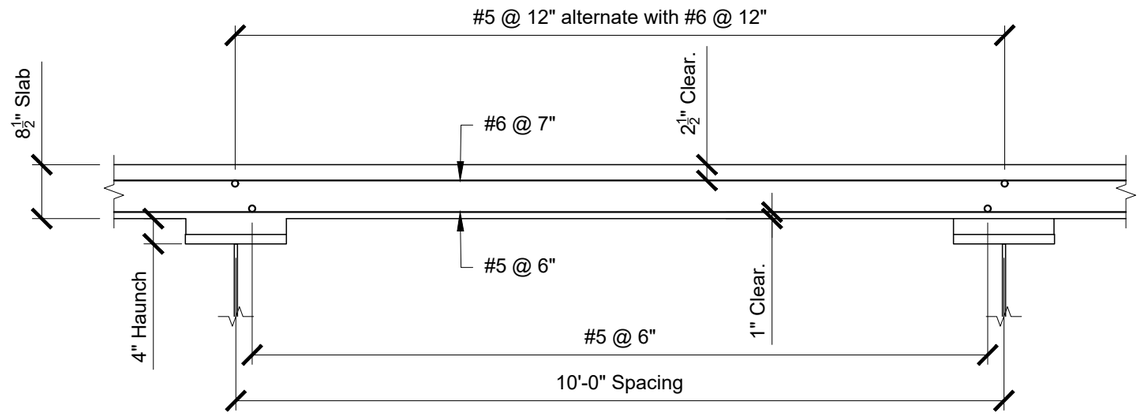
DECK DETAILS

Simple Spans and Positive Moment Region of Continuous Spans

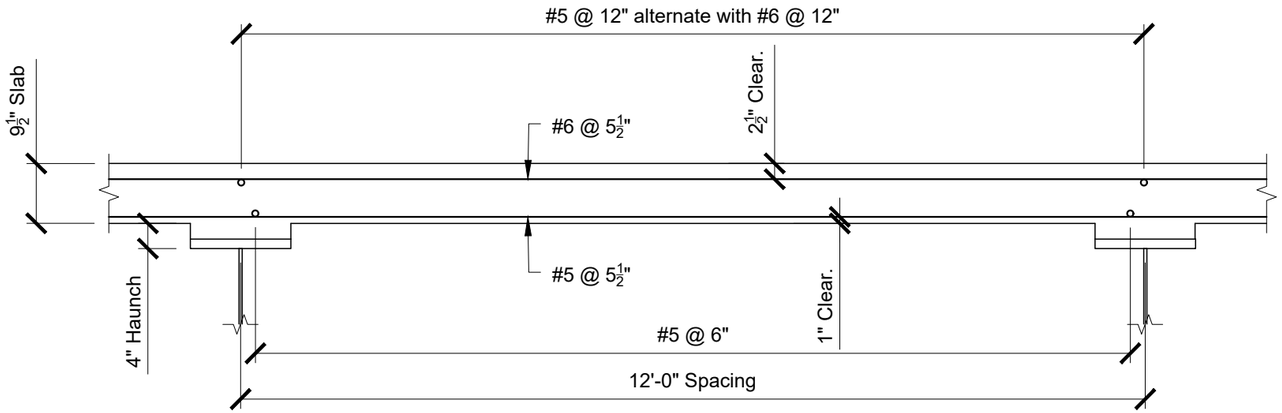
Issued January 2025
Revision 0



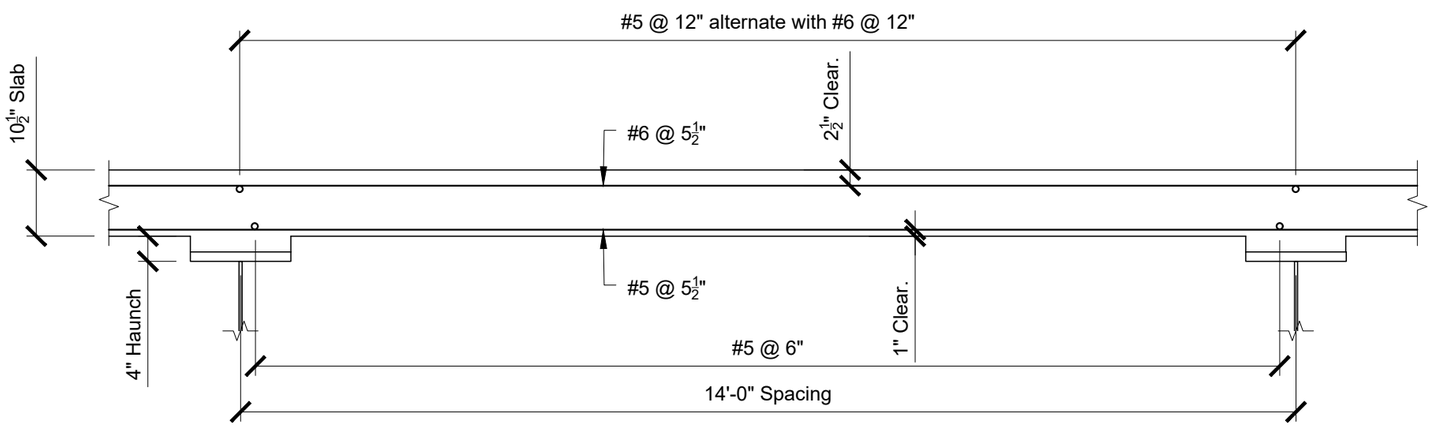
8 FT SPACING



10 FT SPACING



12 FT SPACING



14 FT SPACING

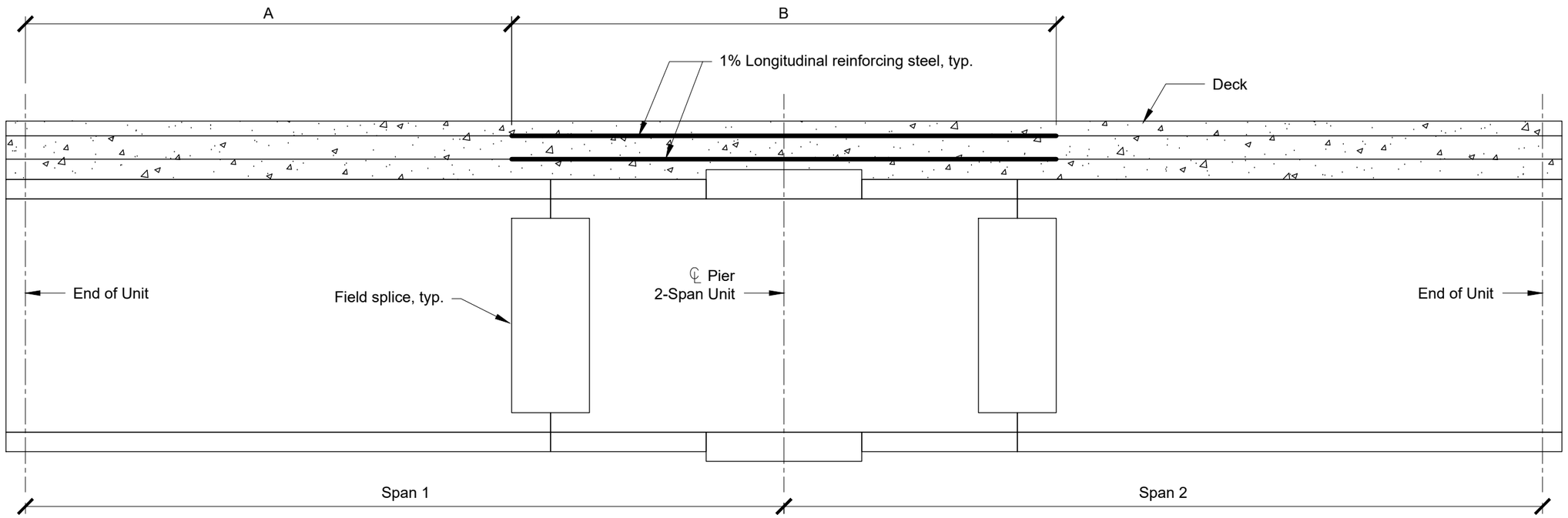
DECK DESIGN NOTES

1. Deck details are representative of slab designs for the beam spacings used in these plans.
2. The gross thickness shown is used for weight calculations. Structural capacity assumes a 1/2 in. loss in deck thickness due to wear.
3. The details on this sheet are for negative moment regions of the span and represent an acceptable longitudinal reinforcing steel design complying with AASHTO LRFD 6.10.1.7.
4. The slab thickness, cover, bar sizes and spacing are based on decks designed using the AASHTO equivalent strip method.
5. Because owner policies and preferences for deck detailing vary, the negative moment region longitudinal reinforcing steel used for the beam designs is assumed to be 1%. The specific bar patterns in these plans are not used in design. The bar pattern in these plans was used to estimate the c.g. of the longitudinal reinforcing steel for negative moment region girder design.
6. See Sheet 27 **Deck Details Longitudinal Steel Termination** for cutoff limits.

DECK DETAILS

Continuous Spans
Negative Moment Regions

Issued January 2025
Revision 0



LONGITUDINAL REINFORCING STEEL TERMINATION LIMITS

Notes:

1. Dimension "A" defines the start of the required one percent longitudinal reinforcing steel from the end of the unit.
2. Dimension "B" defines the limit of required one percent longitudinal reinforcing steel extending from the pier into each symmetric end span. It was designed to extend at least between field splices, or further into the end spans as required by Note (3) below.
3. Longitudinal reinforcing steel is designed to meet the requirements of Service II Limit State, AASHTO LRFD 6.10.1.7 in the completed bridge only. The cutoff locations are approximate and are to be refined in final design.
4. Designer to determine if the factored deck casting and construction loads require this reinforcing steel to be extended.
5. For beam design, the longitudinal reinforcing steel was assumed to be exactly one percent and meeting the preferred two-thirds top mat placement. Sample reinforcing steel patterns for the positive and negative moment region longitudinal reinforcing steel are provided on Sheets 25 and 26.

1% Longitudinal Steel, Distances A and B, ft. Versus Beam Spacing, ft.				
Span, ft.	8 ft.	10 ft.	12 ft.	14 ft.
	Length A, B	Length A, B	Length A, B	Length A, B
2 @ 100	70 60	70 60	70 60	70 60
2 @ 115	81 68	81 68	81 68	81 68
2 @ 130	91 78	91 78	86 88	89 82
2 @ 145	97 96	100 90	97 96	100 90
2 @ 160	108 104	112 96	112 96	112 96
2 @ 175	114 122	120 110	115 120	120 110
2 @ 190	118 144	122 136	122 136	127 126
2 @ 205	135 140	135 140	135 140	135 140
2 @ 220	140 160	140 160	140 160	154 132
2 @ 235	150 170	150 170	164 142	164 142
2 @ 250	155 190	158 184	170 160	175 150

NATIONAL STEEL BRIDGE ALLIANCE NSBA FOUNDED 1995

DECK DETAILS

LONGITUDINAL REINFORCING STEEL TERMINATION, 2-SPAN UNITS

Issued January 2025
Revision 0

Smarter. Stronger. Steel.

National Steel Bridge Alliance
312.670.2400 | aisc.org/nsba