AISC STANDARD PLANS FOR STEEL BRIDGES

1 TO 4 SPAN

Release Date: AASHTO LRFD 10th Edition

Smarter. Stronger. Steel.

SHEET INDEX

DRAWING INDEX

Issued January 2023
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 HPS70W as noted on drawings

HPS70W flanges are noted with a ▲

Stiffeners

A709 Gr 50W

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

Lateral Bracing and Crossframe Members

F_y = 50 ksi

Diaphragms

F_y = 50 ksi

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 - 35 plf
- 12 ft girder spacing - 40 plf
- 14 ft girder spacing - 55 plf

Total DC1 loads shown below computed with assumptions above 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 = 920 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 = 1,990 plf
DC2 = 300 plf
DW = 280 plf

Note: exterior girders are also designed for flange lateral bending moments from overhang brackets and concrete deck finishing machine. Flange lateral bending moments for exterior beams are provided in the design plans.

Wind Load

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

NATIONAL STEEL BRIDGE ALLIANCE NSBA FOUNDED 1995

GENERAL NOTES

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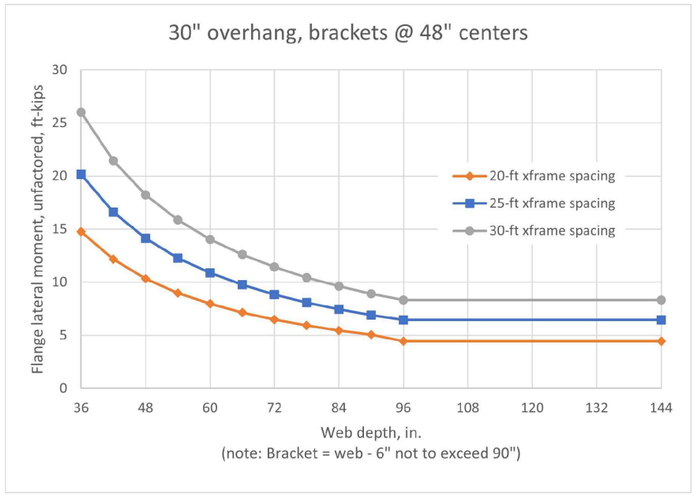
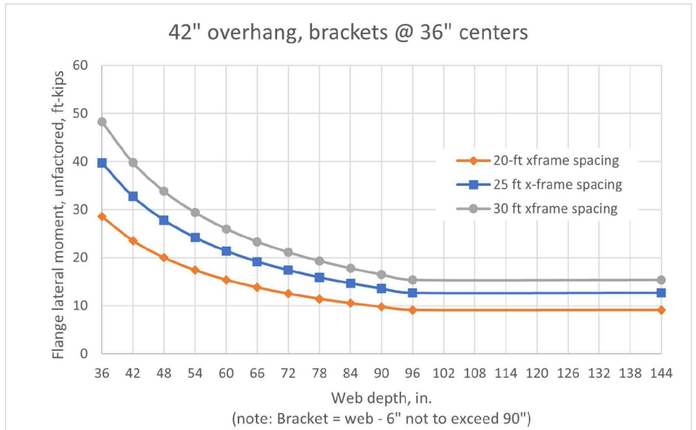
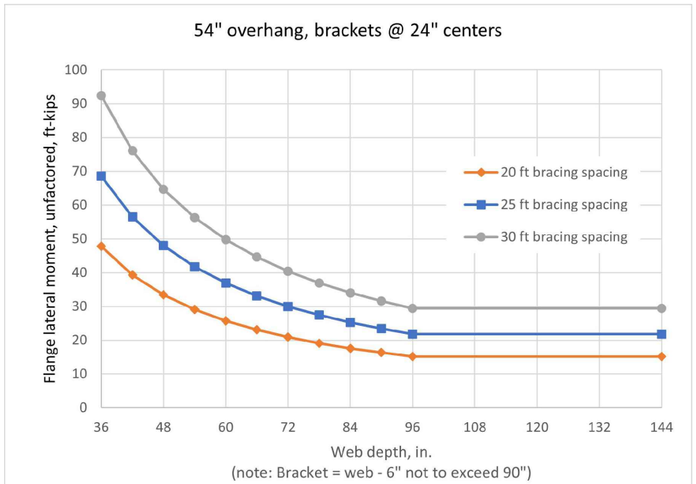
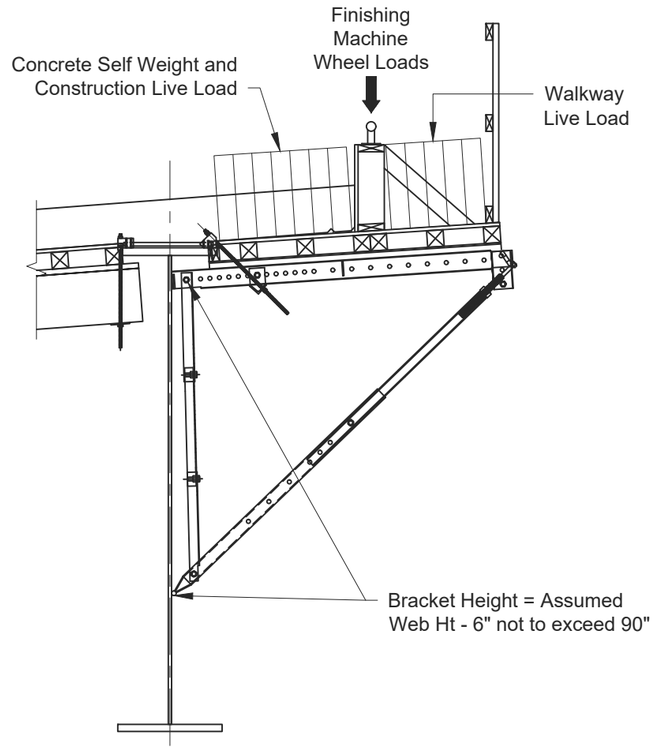
Design Assumptions and Criteria:

1. Girder Design
   a. All designs performed using NSBA SIMON.
   b. Interior and exterior beams were designed. In 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 DF equations are used beyond the range of applicability are noted in the design tables.
   d. A skew of 20 degrees is assumed for all designs.
   e. Live load deflection meets LRFD 2.5.2.6.2 Criteria for Deflection for vehicular bridges, L/800.
   f. Girder depths meet 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 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. For spans 150 - 210 ft, a single field splice is used. It is located between 0.25 - 0.33L.
   j. For spans 220 - 300 ft, two symmetric field splices are used. They are located between 0.25 - 0.33L.
   k. Maximum shipping weight, 50 tons.
   l. Maximum web depth, 11 feet.
   m. Minimum flange width, L/85 where L is the field section length.
   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 CJP welds per flange in any field section.
   r. When a single size flange is used in a field section, the weight reduction of a CJP transition was first evaluated and then eliminated based on weight, cost, and stress considerations.
   s. Single-sided 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 steel is 1% of the gross deck cross-section. Negative moment steel is assumed placed over piers between the closest field splices.
   w. 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
   a. Diaphragm and cross-frame spacing is uniform in the span. Maximum spacing was 30 ft.
   b. Depth of bracing at least 0.8 times girder web height.
   c. 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.
   d. Solid diaphragms used when the girder spacing to web depth ratio, S/D > 3.5.
   e. K-frames used when 1.5 < S/D < 3.5.
   f. X-frames used when S/D ≤ 1.5
   g. Angles used for all cross-frame members.
   h. Cross-frame members designed as secondary members.
   i. Cross-frame members designed for tension / compression loading.
   j. Member stiffness based on 0.65AE stiffness reduction factor for eccentrically loaded angles.
   k. 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 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” drawing 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 A325 bolts and standard sized holes.
   b. All connection and fill plates are Gr 50W.
   c. Slip 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. These splices are noted in the design drawings. This condition was commonly encountered in the simple spans between 150 - 300 ft in length with splices located in regions of significant flexure.

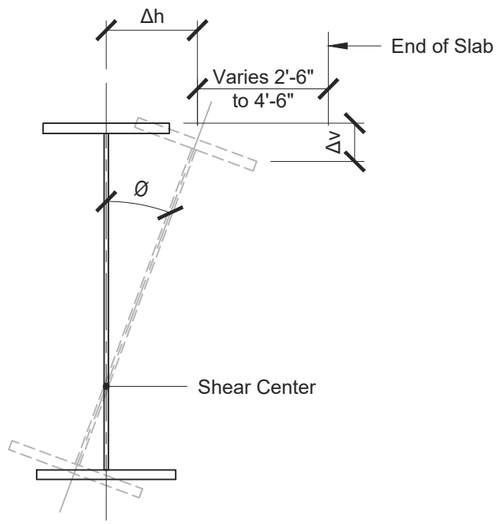






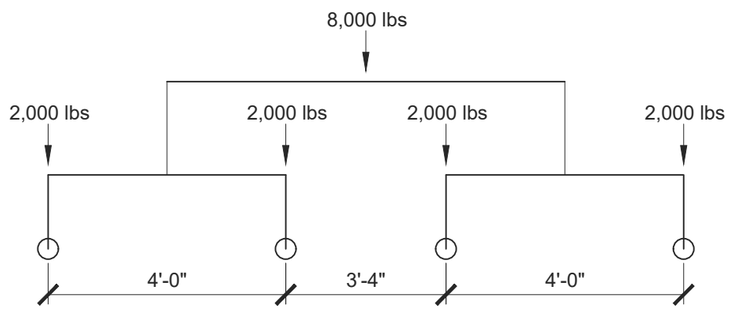


TYPICAL SECTION



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: LRFD 3.4.2, 1.25 DC + 1.5 LL
   b. An equivalent service bending moment is computed for SIMON input. 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 are limited to 1 degree.
9. Lateral deflection at the top of web limited to 0.25 in. Vertical deflection of the edge of slab limited to 0.5 in. Both limits checked for maximum finishing machine loading and are instantaneous values.



ASSUMED FINISHING MACHINE

FASCIA BEAM DESIGN CRITERIA

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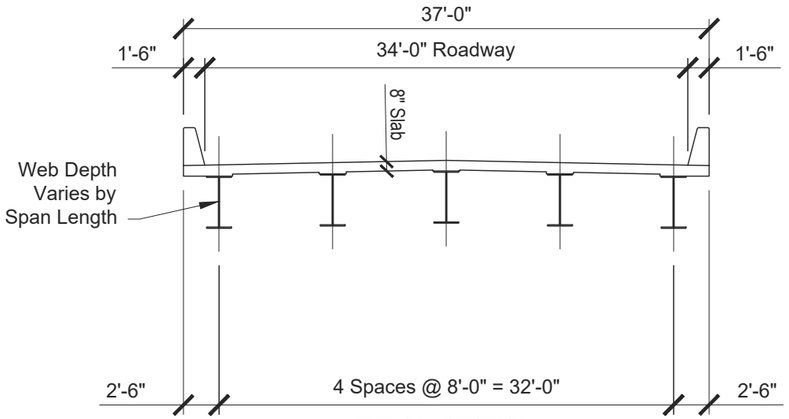

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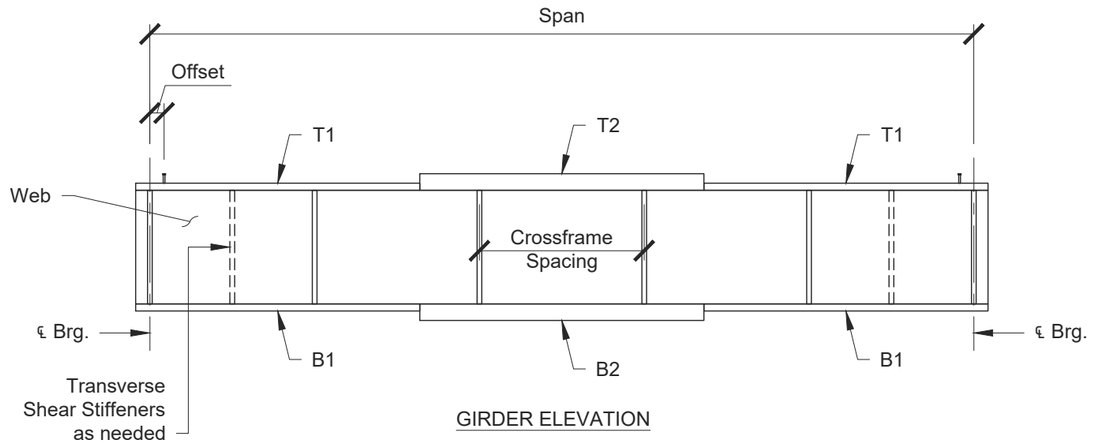

GIRDER ELEVATION

Span, ft.	Web (in. x in. x ft.)	T1 (in. x in. x ft.)	T2 (in. x in. x ft.)	B1 (in. x in. x ft.)	B2 (in. x in. x ft.)
80	32 x 0.5 x 80	N/A	14 x 1.25 x 80	N/A	14 x 1.25 x 80
90	36 x 0.5 x 90	N/A	14 x 1.25 x 90	N/A	14 x 1.5 x 90
100	42 x 0.5 x 100	N/A	15 x 1 x 100	N/A	16 x 1.25 x 100
110	44 x 0.5 x 110	N/A	16 x 1.25 x 110	16 x 1 x 28	16 x 1.5 x 54
120	46 x 0.5 x 120	N/A	17 x 1.25 x 120	18 x 1 x 28	18 x 1.5 x 64
130	50 x 0.5 x 130	N/A	18 x 1 x 130	18 x 1 x 27	18 x 1.75 x 76
140	54 x 0.5 x 140	N/A	20 x 1 x 140	20 x 1 x 30	20 x 1.5 x 80

Note: All plates are A709 - 50W

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
80				6.25	0.625
90				6.25	0.625
100				6.75	0.625
110				7.25	0.75
120				7.75	0.75
130	4.5	0.5	6.25, 123.75	8.25	0.75
140	5	0.5	6.75, 20.25, 119.75, 133.25	9.25	0.875

Span ft.	Girder weight tons
80	6.94
90	8.65
100	9.53
110	11.59
120	13.69
130	15.24
140	17.32

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft.	Spacing, ft.	Type
80	26.67	Diaphragm
90	22.5	Diaphragm
100	25	K frame
110	27.5	K frame
120	30	K frame
130	26	K frame
140	28	K frame

Reaction Data				
Span ft.	DC kips	DW kips	Truck kips	Lane kips
80	56	6	74	23
90	64	7	75	25
100	71	8	76	28
110	79	9	77	31
120	87	10	77	33
130	95	10	77	36
140	103	11	78	39

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

SINGLE SPAN 80-140 FT 8 FT SPACING

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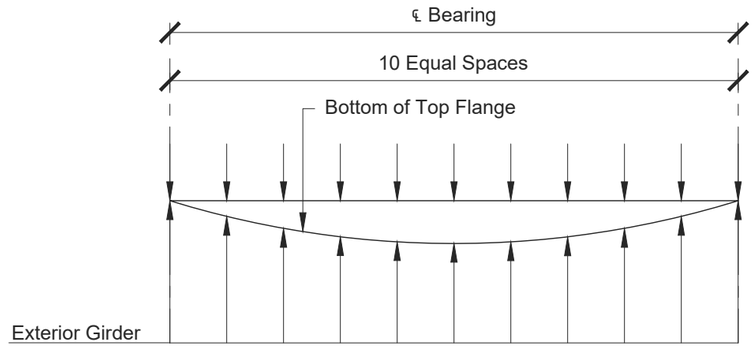
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
80 ft. span - steel only, in.	0.00	0.16	0.30	0.41	0.48	0.50	0.48	0.41	0.30	0.16	0.00
slab, in.	0.00	0.83	1.57	2.15	2.52	2.64	2.52	2.15	1.57	0.83	0.00
barrier rails, in.	0.00	0.14	0.27	0.36	0.43	0.45	0.43	0.36	0.27	0.14	0.00
80 ft. span - total, in.	**0.00**	**1.13**	**2.13**	**2.92**	**3.42**	**3.59**	**3.42**	**2.92**	**2.13**	**1.13**	**0.00**
90 ft. span - steel only, in.	0.00	0.20	0.38	0.52	0.61	0.64	0.61	0.52	0.38	0.20	0.00
slab, in.	0.00	0.96	1.81	2.48	2.91	3.05	2.91	2.48	1.81	0.96	0.00
barrier rails, in.	0.00	0.17	0.31	0.43	0.50	0.53	0.50	0.43	0.31	0.17	0.00
90 ft. span - total, in.	**0.00**	**1.32**	**2.50**	**3.43**	**4.02**	**4.22**	**4.02**	**3.43**	**2.50**	**1.32**	**0.00**
100 ft. span - steel only, in.	0.00	0.24	0.46	0.63	0.73	0.77	0.73	0.63	0.46	0.24	0.00
slab, in.	0.00	1.17	2.21	3.02	3.54	3.72	3.54	3.02	2.21	1.17	0.00
barrier rails, in.	0.00	0.20	0.38	0.51	0.60	0.63	0.60	0.51	0.38	0.20	0.00
100 ft. span - total, in.	**0.00**	**1.61**	**3.04**	**4.16**	**4.88**	**5.12**	**4.88**	**4.16**	**3.04**	**1.61**	**0.00**
110 ft. span - steel only, in.	0.00	0.32	0.59	0.80	0.94	0.98	0.94	0.80	0.59	0.32	0.00
slab, in.	0.00	1.34	2.53	3.42	3.98	4.17	3.98	3.42	2.53	1.34	0.00
barrier rails, in.	0.00	0.26	0.48	0.65	0.75	0.79	0.75	0.65	0.48	0.26	0.00
110 ft. span - total, in.	**0.00**	**1.91**	**3.60**	**4.87**	**5.66**	**5.94**	**5.66**	**4.87**	**3.60**	**1.91**	**0.00**
120 ft. span - steel only, in.	0.00	0.40	0.75	1.02	1.19	1.25	1.19	1.02	0.75	0.40	0.00
slab, in.	0.00	1.57	2.95	4.00	4.67	4.90	4.67	4.00	2.95	1.57	0.00
barrier rails, in.	0.00	0.30	0.57	0.77	0.90	0.94	0.90	0.77	0.57	0.30	0.00
120 ft. span - total, in.	**0.00**	**2.28**	**4.28**	**5.80**	**6.76**	**7.09**	**6.76**	**5.80**	**4.28**	**2.28**	**0.00**
130 ft. span - steel only, in.	0.00	0.50	0.93	1.26	1.46	1.54	1.46	1.26	0.93	0.50	0.00
slab, in.	0.00	1.87	3.51	4.74	5.52	5.79	5.52	4.74	3.51	1.87	0.00
barrier rails, in.	0.00	0.34	0.64	0.87	1.01	1.06	1.01	0.87	0.64	0.34	0.00
130 ft. span - total, in.	**0.00**	**2.71**	**5.08**	**6.86**	**7.99**	**8.38**	**7.99**	**6.86**	**5.08**	**2.71**	**0.00**
140 ft. span - steel only, in.	0.00	0.57	1.07	1.45	1.69	1.77	1.69	1.45	1.07	0.57	0.00
slab, in.	0.00	2.05	3.85	5.23	6.10	6.40	6.10	5.23	3.85	2.05	0.00
barrier rails, in.	0.00	0.40	0.74	1.01	1.17	1.23	1.17	1.01	0.74	0.40	0.00
140 ft. span - total, in.	**0.00**	**3.02**	**5.66**	**7.68**	**8.96**	**9.40**	**8.96**	**7.68**	**5.66**	**3.02**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
80	3	1.5	40	6	20	53	9	39.75	40	6	20
90	3	0	18	6	9	96	9	72	18	6	9
100	3	1.5	133	9	99.75						
110	3	0	39	12	39	24	16	32	39	12	39
120	4	0	30	12	30	48	15	60	30	12	30
130	4	0	20	12	20	72	15	90	20	12	20
140	4	4	21	12	21	73	16	97.33	21	12	21



DEFLECTION DIAGRAM

SINGLE SPAN 80-140 FT 8 FT SPACING

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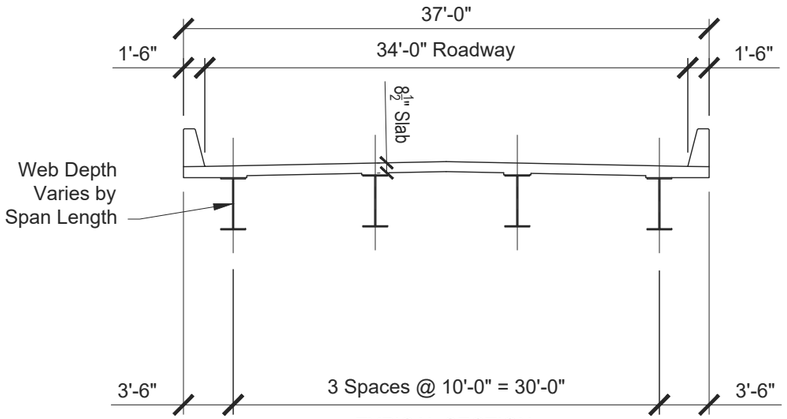

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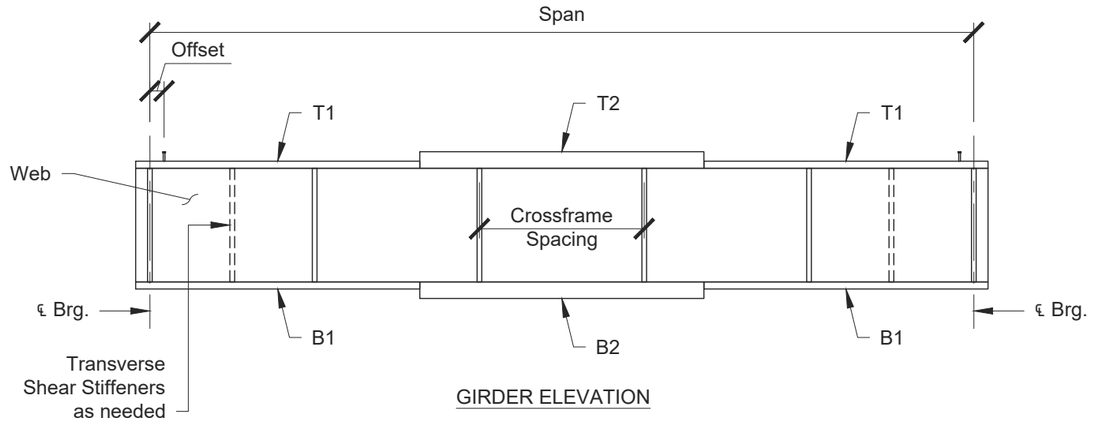

GIRDER ELEVATION

Span, ft.	Web (in. x in. x ft.)	T1 (in. x in. x ft.)	T2 (in. x in. x ft.)	B1 (in. x in. x ft.)	B2 (in. x in. x ft.)
80	36 x 0.5 x 80	N/A	15 x 1 x 80	N/A	15 x 1.5 x 80
90	39 x 0.5 x 90	N/A	16 x 1.25 x 90	N/A	16 x 1.75 x 90
100	42 x 0.5 x 100	N/A	16 x 1.25 x 100	16 x 1 x 22	16 x 1.75 x 56
110	46 x 0.5 x 110	N/A	16 x 1.5 x 110	18 x 1.25 x 30	18 x 1.75 x 50
120	47 x 0.5 x 120	N/A	18 x 1.25 x 120	22 x 1 x 25	22 x 1.5 x 70
130	53 x 0.5 x 130	N/A	18 x 1.25 x 130	22 x 1 x 30	22 x 1.5 x 70
140	55 x 0.5 x 140	N/A	21 x 1.25 x 140	22 x 1 x 27	22 x 1.75 x 86

Note: All plates are A709 - 50W

Span, ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location, ft.	Width in.	Thickness in.
80				6.75	0.625
90				7.25	0.75
100				7.25	0.75
110				7.25	0.75
120	5.5	0.5	5.75, 114.25	8.25	0.75
130	5.5	0.5	6.5, 19.75, 110.25, 123.5	8.25	0.75
140	5.5	0.5	6.75, 20.5, 34.25, 105.75, 119.5, 133.25	9.75	0.875

Span ft.	Girder weight tons
80	7.55
90	10.34
100	10.84
110	13.77
120	15.19
130	17.01
140	20.46

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft	Spacing, ft.	Type
80	20	Diaphragm
90	22.5	Diaphragm
100	25	Diaphragm
110	27.5	Diaphragm
120	24	K frame
130	26	K frame
140	28	K frame

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
80	68	8	87	26
90	79	9	87	29
100	87	10	89	33
110	97	11	89	36
120	106	12	90	39
130	116	13	90	42
140	127	14	91	45

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

SINGLE SPAN 80-140 FT 10 FT SPACING

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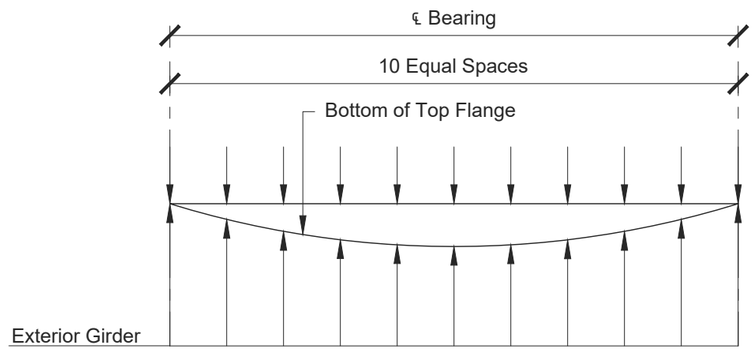
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
80 ft. span - steel only, in.	0.00	0.13	0.24	0.33	0.39	0.41	0.39	0.33	0.24	0.13	0.00
slab, in.	0.00	0.83	1.57	2.15	2.52	2.65	2.52	2.15	1.57	0.83	0.00
barrier rails, in.	0.00	0.09	0.17	0.23	0.27	0.29	0.27	0.23	0.17	0.09	0.00
80 ft. span - total, in.	**0.00**	**1.05**	**1.99**	**2.72**	**3.18**	**3.34**	**3.18**	**2.72**	**1.99**	**1.05**	**0.00**
90 ft. span - steel only, in.	0.00	0.17	0.32	0.44	0.51	0.54	0.51	0.44	0.32	0.17	0.00
slab, in.	0.00	0.89	1.69	2.31	2.71	2.85	2.71	2.31	1.69	0.89	0.00
barrier rails, in.	0.00	0.11	0.21	0.28	0.33	0.35	0.33	0.28	0.21	0.11	0.00
90 ft. span - total, in.	**0.00**	**1.17**	**2.21**	**3.03**	**3.55**	**3.73**	**3.55**	**3.03**	**2.21**	**1.17**	**0.00**
100 ft. span - steel only, in.	0.00	0.23	0.43	0.58	0.68	0.71	0.68	0.58	0.43	0.23	0.00
slab, in.	0.00	1.25	2.34	3.16	3.68	3.85	3.68	3.16	2.34	1.25	0.00
barrier rails, in.	0.00	0.16	0.29	0.40	0.46	0.48	0.46	0.40	0.29	0.16	0.00
100 ft. span - total, in.	**0.00**	**1.64**	**3.06**	**4.14**	**4.81**	**5.05**	**4.81**	**4.14**	**3.06**	**1.64**	**0.00**
110 ft. span - steel only, in.	0.00	0.28	0.52	0.70	0.82	0.86	0.82	0.70	0.52	0.28	0.00
slab, in.	0.00	1.31	2.46	3.34	3.89	4.08	3.89	3.34	2.46	1.31	0.00
barrier rails, in.	0.00	0.18	0.34	0.46	0.53	0.56	0.53	0.46	0.34	0.18	0.00
110 ft. span - total, in.	**0.00**	**1.76**	**3.32**	**4.50**	**5.23**	**5.49**	**5.23**	**4.50**	**3.32**	**1.76**	**0.00**
120 ft. span - steel only, in.	0.00	0.38	0.72	0.97	1.14	1.19	1.14	0.97	0.72	0.38	0.00
slab, in.	0.00	1.79	3.36	4.55	5.31	5.57	5.31	4.55	3.36	1.79	0.00
barrier rails, in.	0.00	0.24	0.44	0.60	0.70	0.73	0.70	0.60	0.44	0.24	0.00
120 ft. span - total, in.	**0.00**	**2.41**	**4.52**	**6.13**	**7.15**	**7.50**	**7.15**	**6.13**	**4.52**	**2.41**	**0.00**
130 ft. span - steel only, in.	0.00	0.42	0.79	1.08	1.26	1.32	1.26	1.08	0.79	0.42	0.00
slab, in.	0.00	1.92	3.60	4.88	5.69	5.97	5.69	4.88	3.60	1.92	0.00
barrier rails, in.	0.00	0.26	0.49	0.66	0.77	0.81	0.77	0.66	0.49	0.26	0.00
130 ft. span - total, in.	**0.00**	**2.60**	**4.88**	**6.62**	**7.72**	**8.10**	**7.72**	**6.62**	**4.88**	**2.60**	**0.00**
140 ft. span - steel only, in.	0.00	0.51	0.96	1.31	1.53	1.60	1.53	1.31	0.96	0.51	0.00
slab, in.	0.00	2.07	3.86	5.25	6.13	6.43	6.13	5.25	3.86	2.07	0.00
barrier rails, in.	0.00	0.29	0.55	0.74	0.87	0.91	0.87	0.74	0.55	0.29	0.00
140 ft. span - total, in.	**0.00**	**2.87**	**5.37**	**7.30**	**8.53**	**8.95**	**8.53**	**7.30**	**5.37**	**2.87**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
80	3	1.5	64	6	32	21	9	15.75	64	6	32
90	3	0	54	6	27	48	9	36	54	6	27
100	3	0	50	6	25	66	9	49.5	51	6	25.5
110	3	0	44	6	22	88	9	66	44	6	22
120	4	0	40	9	30	60	12	60	40	9	30
130	4	0	18	9	13.5	103	12	103	18	9	13.5
140	4	2	11	8	7.33	125	12	125	11	8	7.33



DEFLECTION DIAGRAM

SINGLE SPAN 80-140 FT 10 FT SPACING

Issued January 2023
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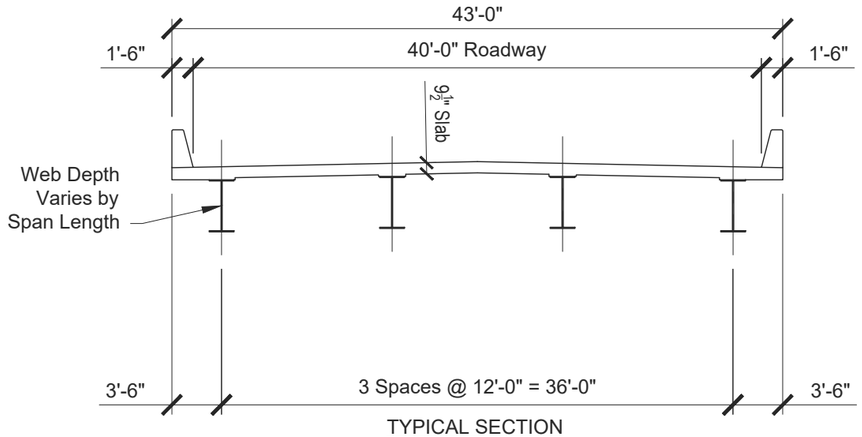
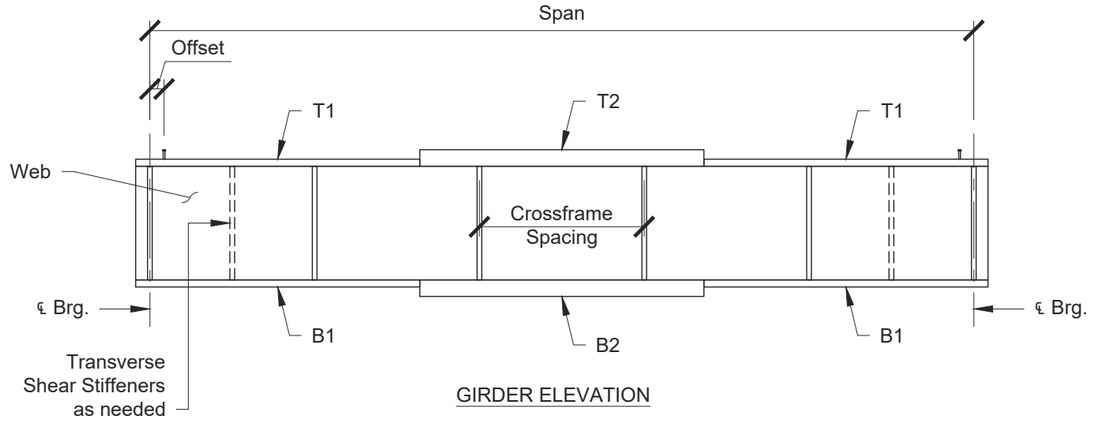


TYPICAL SECTION



GIRDER ELEVATION

Span, ft.	Web (in. x in. x ft.)	T1 (in. x in. x ft.)	T2 (in. x in. x ft.)	B1 (in. x in. x ft.)	B2 (in. x in. x ft.)
80	36 x 0.5 x 80	N/A	15 x 1.25 x 80	N/A	15 x 1.5 x 80
90	38 x 0.5 x 90	N/A	16 x 1.25 x 90	N/A	16 x 1.75 x 90
100	45 x 0.5 x 100	18 x 1 x 35	18 x 1.5 x 30	18 x 1 x 24	18 x 1.5 x 52
110	47 x 0.5 x 110	18 x 1 x 40	18 x 1.5 x 30	18 x 1 x 20	18 x 1.75 x 70
120	50 x 0.5 x 120	18 x 1 x 25	18 x 1.5 x 70	18 x 1 x 20	18 x 2 x 80
130	52 x 0.5 x 130	19 x 1 x 30	19 x 1.5 x 70	20 x 1 x 22	20 x 2 x 86
140	56 x 0.5 x 140	20 x 1 x 30	20 x 1.5 x 80	22 x 1 x 25	22 x 2 x 90

Note: All plates are A709 - 50W

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
80				6.75	0.625
90				7.25	0.75
100	4.5	0.5	5.5, 94.5	8.25	0.75
110	4.5	0.5	5.75, 17.5, 92.5, 104.25	8.25	0.75
120	4.5	0.5	6.25, 18.75, 101.25, 113.75	8.25	0.75
130	5	0.5	6.25, 19.25, 32.25, 97.75, 110.75, 123.75	8.75	0.875
140	6	0.5	5.75, 19.75, 33.75, 47.75, 92.25, 106.25, 120.25, 134.25	9.25	0.875

Span ft.	Girder weight tons
80	8.06
90	10.26
100	11.21
110	13.20
120	15.98
130	18.43
140	21.40

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft.	Spacing, ft.	Type
80	20	Diaphragm
90	22.5	Diaphragm
100	25	K frame
110	22	K frame
120	24	K frame
130	26	K frame
140	28	K frame

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
80	82	10	99	30
90	93	11	100	34
100	103	12	101	37
110	114	13	102	41
120	126	14	103	45
130	138	16	103	48
140	150	17	103	52

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

SINGLE SPAN 80-140 FT 12 FT SPACING

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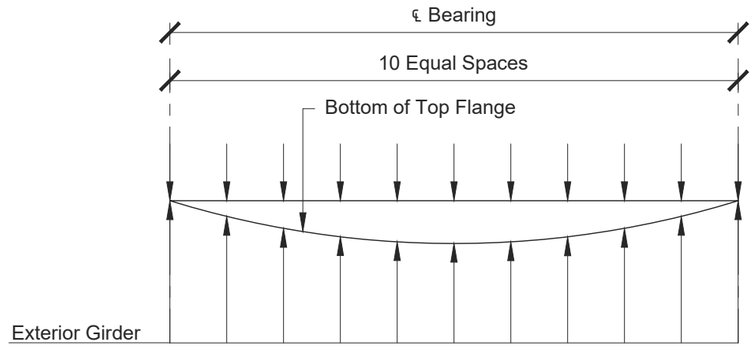
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
80 ft. span - steel only, in.	0.00	0.12	0.23	0.32	0.37	0.39	0.37	0.32	0.23	0.12	0.00
slab, in.	0.00	0.94	1.78	2.44	2.86	3.00	2.86	2.44	1.78	0.94	0.00
barrier rails, in.	0.00	0.08	0.15	0.21	0.25	0.26	0.25	0.21	0.15	0.08	0.00
80 ft. span - total, in.	**0.00**	**1.15**	**2.17**	**2.97**	**3.48**	**3.65**	**3.48**	**2.97**	**2.17**	**1.15**	**0.00**
90 ft. span - steel only, in.	0.00	0.18	0.33	0.46	0.53	0.56	0.53	0.46	0.33	0.18	0.00
slab, in.	0.00	1.19	2.25	3.08	3.61	3.79	3.61	3.08	2.25	1.19	0.00
barrier rails, in.	0.00	0.10	0.20	0.27	0.32	0.33	0.32	0.27	0.20	0.10	0.00
90 ft. span - total, in.	**0.00**	**1.47**	**2.78**	**3.81**	**4.46**	**4.68**	**4.46**	**3.81**	**2.78**	**1.47**	**0.00**
100 ft. span - steel only, in.	0.00	0.20	0.38	0.51	0.59	0.62	0.59	0.51	0.38	0.20	0.00
slab, in.	0.00	1.33	2.49	3.34	3.85	4.03	3.85	3.34	2.49	1.33	0.00
barrier rails, in.	0.00	0.13	0.24	0.32	0.37	0.39	0.37	0.32	0.24	0.13	0.00
100 ft. span - total, in.	**0.00**	**1.66**	**3.10**	**4.17**	**4.81**	**5.03**	**4.81**	**4.17**	**3.10**	**1.66**	**0.00**
110 ft. span - steel only, in.	0.00	0.27	0.51	0.69	0.80	0.84	0.80	0.69	0.51	0.27	0.00
slab, in.	0.00	1.67	3.11	4.20	4.85	5.06	4.85	4.20	3.11	1.67	0.00
barrier rails, in.	0.00	0.16	0.29	0.40	0.46	0.48	0.46	0.40	0.29	0.16	0.00
110 ft. span - total, in.	**0.00**	**2.10**	**3.91**	**5.28**	**6.11**	**6.38**	**6.11**	**5.28**	**3.91**	**2.10**	**0.00**
120 ft. span - steel only, in.	0.00	0.34	0.63	0.84	0.98	1.03	0.98	0.84	0.63	0.34	0.00
slab, in.	0.00	1.85	3.40	4.57	5.30	5.55	5.30	4.57	3.40	1.85	0.00
barrier rails, in.	0.00	0.18	0.34	0.46	0.54	0.57	0.54	0.46	0.34	0.18	0.00
120 ft. span - total, in.	**0.00**	**2.37**	**4.37**	**5.87**	**6.82**	**7.15**	**6.82**	**5.87**	**4.37**	**2.37**	**0.00**
130 ft. span - steel only, in.	0.00	0.43	0.79	1.07	1.24	1.30	1.24	1.07	0.79	0.43	0.00
slab, in.	0.00	2.19	4.04	5.42	6.29	6.59	6.29	5.42	4.04	2.19	0.00
barrier rails, in.	0.00	0.22	0.41	0.56	0.65	0.68	0.65	0.56	0.41	0.22	0.00
130 ft. span - total, in.	**0.00**	**2.84**	**5.24**	**7.04**	**8.18**	**8.57**	**8.18**	**7.04**	**5.24**	**2.84**	**0.00**
140 ft. span - steel only, in.	0.00	0.50	0.93	1.25	1.45	1.52	1.45	1.25	0.93	0.50	0.00
slab, in.	0.00	2.37	4.37	5.87	6.81	7.14	6.81	5.87	4.37	2.37	0.00
barrier rails, in.	0.00	0.25	0.46	0.62	0.72	0.76	0.72	0.62	0.46	0.25	0.00
140 ft. span - total, in.	**0.00**	**3.12**	**5.76**	**7.73**	**8.99**	**9.41**	**8.99**	**7.73**	**5.76**	**3.12**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
80	3	0	160	6	80						
90	4	0	9	6	4.5	108	9	81	9	6	4.5
100	4	3	47	9	35.25	29	12	29	47	9	35.25
110	4	0	44	9	33	44	12	44	44	9	33
120	4	0	32	9	24	72	12	72	32	9	24
130	4	3	35	9	26.25	77	12	77	35	9	26.25
140	4	0	38	9	28.5	83	12	83	38	9	28.5



DEFLECTION DIAGRAM

SINGLE SPAN 80-140 FT 12 FT SPACING

Issued January 2023
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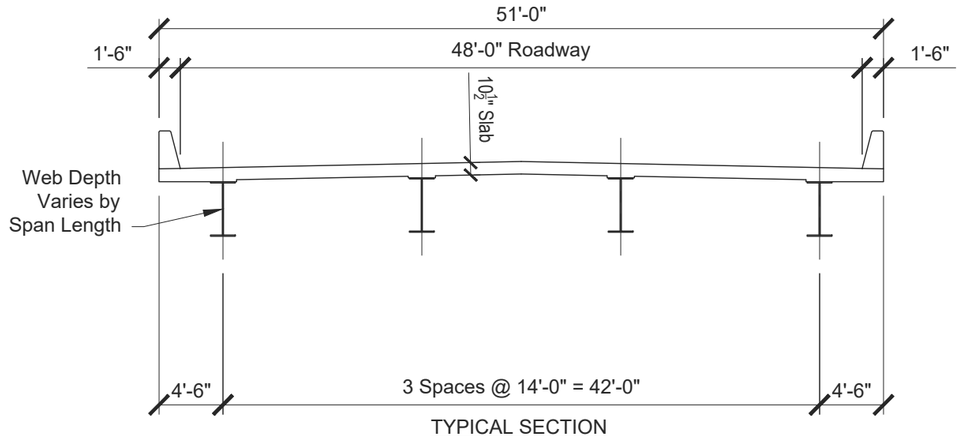
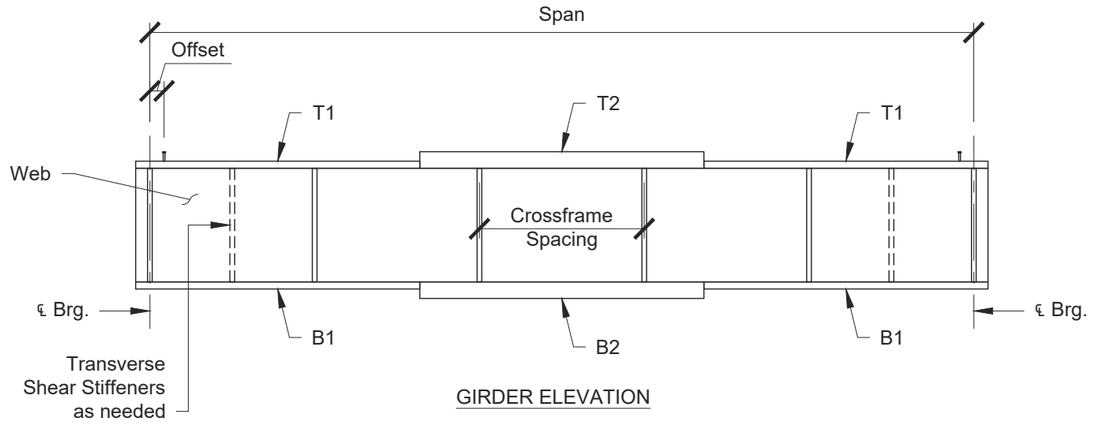


TYPICAL SECTION



GIRDER ELEVATION

Span, ft.	Web (in. x in. x ft.)	T1 (in. x in. x ft.)	T2 (in. x in. x ft.)	B1 (in. x in. x ft.)	B2 (in. x in. x ft.)
80	36 x 0.5 x 80	N/A	15 x 1.75 x 80	N/A	15 x 1.75 x 80
90	39 x 0.5 x 90	N/A	18 x 1.75 x 90	N/A	18 x 1.75 x 90
100	45 x 0.625 x 100	N/A	18 x 1.5 x 100	N/A	18 x 1.75 x 100
110	50 x 0.625 x 110	18 x 1 x 24	18 x 1.5 x 62	18 x 1 x 18	18 x 2 x 74
120	51 x 0.625 x 120	18 x 1 x 23	18 x 1.75 x 74	20 x 1 x 20	20 x 2 x 80
130	54 x 0.625 x 130	20 x 1 x 25	20 x 1.75 x 80	22 x 1 x 23	22 x 2 x 84
140	56 x 0.625 x 140	20 x 1 x 25	20 x 1.75 x 90	20 x 1.25 x 20	20 x 2.5 x 100

Note: All plates are A709 - 50W

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
80				6.75	0.625
90	4.5	0.5	4.75, 85.25	8.25	0.75
100				8.25	0.75
110				8.25	0.75
120				8.25	0.75
130				9.25	0.875
140				9.25	0.875

Span ft.	Girder weight tons
80	9.60
90	12.63
100	14.74
110	15.80
120	18.69
130	21.94
140	25.61

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft	Spacing, ft.	Type
80	20	Diaphragm
90	22.5	Diaphragm
100	25	Diaphragm
110	22	Diaphragm
120	24	Diaphragm
130	26	Diaphragm
140	23.33	Diaphragm

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
80	101	11	111	34
90	116	13	112	38
100	129	14	113	42
110	142	15	114	46
120	156	17	115	50
130	171	18	115	54
140	186	20	116	58

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

SINGLE SPAN 80-140 FT 14 FT SPACING

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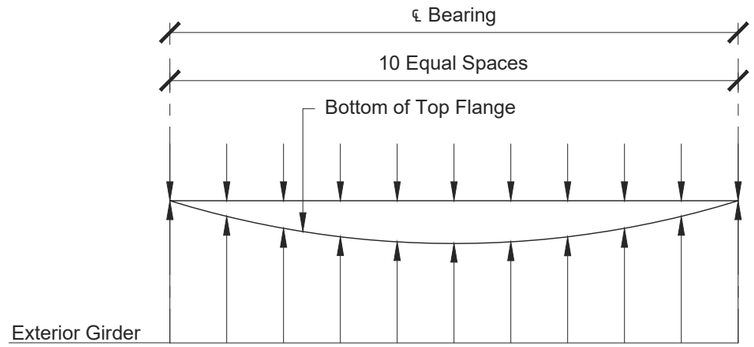
Sheet 1 of XX

Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
80 ft. span - steel only, in.	0.00	0.12	0.22	0.30	0.35	0.37	0.35	0.30	0.22	0.12	0.00
slab, in.	0.00	0.96	1.82	2.49	2.91	3.06	2.91	2.49	1.82	0.96	0.00
barrier rails, in.	0.00	0.07	0.12	0.17	0.20	0.21	0.20	0.17	0.12	0.07	0.00
80 ft. span - total, in.	**0.00**	**1.14**	**2.16**	**2.96**	**3.46**	**3.63**	**3.46**	**2.96**	**2.16**	**1.14**	**0.00**
90 ft. span - steel only, in.	0.00	0.16	0.30	0.41	0.47	0.50	0.47	0.41	0.30	0.16	0.00
slab, in.	0.00	1.11	2.10	2.87	3.36	3.53	3.36	2.87	2.10	1.11	0.00
barrier rails, in.	0.00	0.08	0.16	0.21	0.25	0.26	0.25	0.21	0.16	0.08	0.00
90 ft. span - total, in.	**0.00**	**1.35**	**2.55**	**3.49**	**4.09**	**4.29**	**4.09**	**3.49**	**2.55**	**1.35**	**0.00**
100 ft. span - steel only, in.	0.00	0.20	0.37	0.51	0.60	0.63	0.60	0.51	0.37	0.20	0.00
slab, in.	0.00	1.33	2.51	3.44	4.03	4.23	4.03	3.44	2.51	1.33	0.00
barrier rails, in.	0.00	0.10	0.18	0.25	0.29	0.30	0.29	0.25	0.18	0.10	0.00
100 ft. span - total, in.	**0.00**	**1.62**	**3.07**	**4.20**	**4.92**	**5.16**	**4.92**	**4.20**	**3.07**	**1.62**	**0.00**
110 ft. span - steel only, in.	0.00	0.25	0.46	0.62	0.72	0.76	0.72	0.62	0.46	0.25	0.00
slab, in.	0.00	1.63	3.01	4.04	4.69	4.91	4.69	4.04	3.01	1.63	0.00
barrier rails, in.	0.00	0.11	0.21	0.29	0.34	0.35	0.34	0.29	0.21	0.11	0.00
110 ft. span - total, in.	**0.00**	**1.99**	**3.68**	**4.95**	**5.75**	**6.02**	**5.75**	**4.95**	**3.68**	**1.99**	**0.00**
120 ft. span - steel only, in.	0.00	0.33	0.60	0.81	0.95	0.99	0.95	0.81	0.60	0.33	0.00
slab, in.	0.00	1.96	3.61	4.85	5.64	5.91	5.64	4.85	3.61	1.96	0.00
barrier rails, in.	0.00	0.15	0.27	0.37	0.43	0.45	0.43	0.37	0.27	0.15	0.00
120 ft. span - total, in.	**0.00**	**2.44**	**4.48**	**6.03**	**7.01**	**7.35**	**7.01**	**6.03**	**4.48**	**2.44**	**0.00**
130 ft. span - steel only, in.	0.00	0.40	0.74	0.99	1.15	1.21	1.15	0.99	0.74	0.40	0.00
slab, in.	0.00	2.20	4.05	5.44	6.32	6.62	6.32	5.44	4.05	2.20	0.00
barrier rails, in.	0.00	0.17	0.32	0.43	0.50	0.53	0.50	0.43	0.32	0.17	0.00
130 ft. span - total, in.	**0.00**	**2.77**	**5.10**	**6.86**	**7.98**	**8.36**	**7.98**	**6.86**	**5.10**	**2.77**	**0.00**
140 ft. span - steel only, in.	0.00	0.49	0.91	1.23	1.44	1.51	1.44	1.23	0.91	0.49	0.00
slab, in.	0.00	2.51	4.63	6.27	7.31	7.66	7.31	6.27	4.63	2.51	0.00
barrier rails, in.	0.00	0.19	0.36	0.49	0.58	0.60	0.58	0.49	0.36	0.19	0.00
140 ft. span - total, in.	**0.00**	**3.20**	**5.91**	**7.99**	**9.32**	**9.77**	**9.32**	**7.99**	**5.91**	**3.20**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
80	4	0	48	6	24	42	9	31.5	49	6	24.5
90	4	0	36	6	18	72	9	54	36	6	18
100	4	0	150	8	100						
110	4	1.5	22	6	11	117	9	87.75	22	6	11
120	4	0	24	6	12	128	9	96	24	6	12
130	4	0	13	6	6.5	156	9	117	13	6	6.5
140	4	3	47	9	35.25	69	12	69	47	9	35.25



DEFLECTION DIAGRAM

SINGLE SPAN 80-140 FT 14 FT SPACING

Issued January 2023
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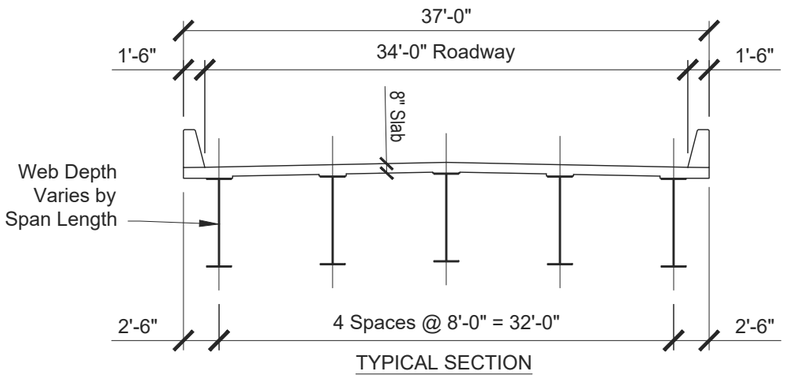
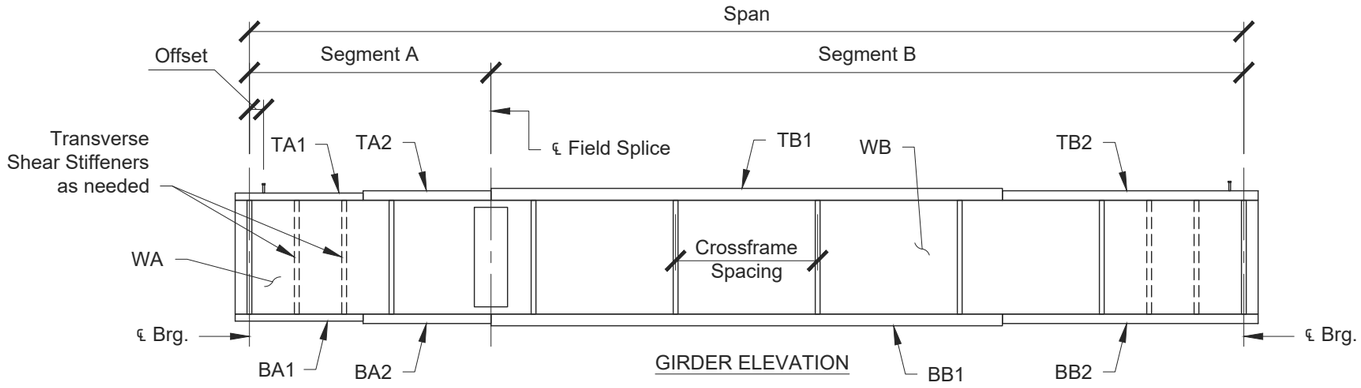


TYPICAL SECTION



GIRDER ELEVATION

Span, ft.	SEGMENT A					SEGMENT B					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.)	TB1 (in. x in. x ft.)	TB2 (in. x in. x ft.)	BB1 (in. x in. x ft.)	BB2 (in. x in. x ft.)	
150	60 x 0.5 x 38	N/A	18 x 1 x 38	N/A	22 x 1.5 x 38	60 x 0.5 x 112	20 x 1 x 112	N/A	22 x 1.5 x 74	22 x 1 x 38	N/A
160	64 x 0.5 x 40	N/A	18 x 1 x 40	N/A	22 x 1.5 x 40	64 x 0.5 x 120	18 x 1.25 x 80	18 x 1 x 40	22 x 1.5 x 80	22 x 1 x 40	N/A
170	70 x 0.625 x 43	N/A	19 x 1 x 43	N/A	23 x 1.5 x 43	70 x 0.625 x 127	19 x 1.25 x 87	19 x 1 x 40	23 x 1.5 x 87	23 x 1 x 40	N/A
180	74 x 0.625 x 45	N/A	20 x 1 x 45	N/A	22 x 1.75 x 45	74 x 0.625 x 135	20 x 1.25 x 80	20 x 1 x 55	22 x 2 x 65	22 x 1.5 x 70	N/A
190	80 x 0.625 x 63	N/A	20 x 1 x 63	22 x 1 x 40	22 x 2 x 23	80 x 0.625 x 127	20 x 1.5 x 64	20 x 1 x 63	22 x 2 x 87	22 x 1 x 40	b
200	84 x 0.625 x 67	N/A	19 x 1.25 x 67	21 x 1.25 x 50	21 x 2.25 x 17	84 x 0.625 x 133	19 x 1.5 x 83	19 x 1 x 50	21 x 2.25 x 83	21 x 1.25 x 50	b
210	90 x 0.625 x 70	N/A	21 x 1.25 x 70	23 x 1 x 45	23 x 2 x 25	90 x 0.625 x 140	21 x 1.5 x 88	21 x 1 x 52	23 x 2 x 88	23 x 1 x 52	b

Note: All plates are A709 - 50W

Footnotes:

a. AASHTO DF 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.

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
150	5.5	0.5	7.5, 22.5, 37.5, 112.5, 127.5, 142.5	8.25	0.75
160	5.5	0.5	7.5, 23.5, 39.5, 120.5, 136.5, 152.5	8.25	0.75
170				8.75	0.875
180				9.25	0.875
190	5.5	0.5	10, 180	9.25	0.875
200	5.5	0.5	10.5, 31.5, 168.5, 189.5	8.75	0.875
210	6.5	0.5	11.25, 33.75, 176.25, 198.75	9.75	0.875

Span, ft.	GIRDER WEIGHT TABLE		
	Segment A tons	Segment B tons	Total tons
150	5.24	15.10	20.34
160	5.65	16.81	22.46
170	7.11	20.93	28.05
180	8.02	24.69	32.71
190	10.72	24.22	34.95
200	12.29	26.43	38.72
210	13.54	28.89	42.44

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft	Spacing, ft.	Type
150	25	K frame
160	26.67	K frame
170	28.33	K frame
180	30	K frame
190	23.75	X Frame
200	25	X Frame
210	26.25	X Frame

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
150	112	12	78	41
160	121	13	78	44
170	132	14	78	47
180	143	14	78	49
190	151	15	78	52
200	161	16	78	55
210	170	17	78	57

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

SINGLE SPAN 150-210 FT 8 FT SPACING

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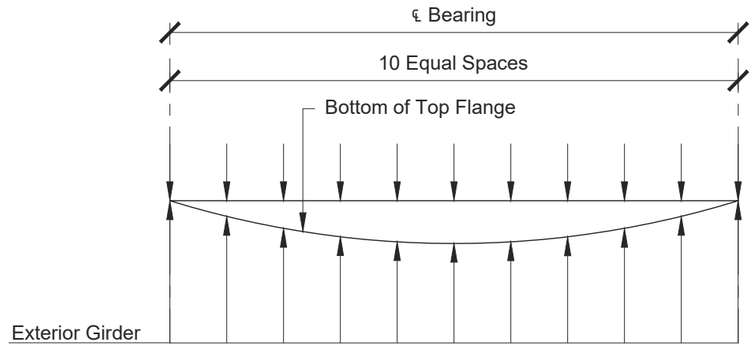
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
150 ft. span - steel only, in.	0.00	0.61	1.16	1.58	1.85	1.95	1.86	1.60	1.18	0.63	0.00
slab, in.	0.00	2.04	3.86	5.28	6.18	6.50	6.22	5.35	3.95	2.10	0.00
barrier rails, in.	0.00	0.39	0.74	1.02	1.20	1.26	1.21	1.04	0.77	0.41	0.00
150 ft. span - total, in.	**0.00**	**3.05**	**5.77**	**7.88**	**9.23**	**9.71**	**9.28**	**7.99**	**5.90**	**3.14**	**0.00**
160 ft. span - steel only, in.	0.00	0.69	1.31	1.78	2.08	2.19	2.09	1.80	1.34	0.71	0.00
slab, in.	0.00	2.22	4.18	5.69	6.66	7.00	6.70	5.78	4.30	2.30	0.00
barrier rails, in.	0.00	0.44	0.84	1.15	1.35	1.42	1.36	1.17	0.87	0.46	0.00
160 ft. span - total, in.	**0.00**	**3.37**	**6.36**	**8.67**	**10.13**	**10.64**	**10.16**	**8.73**	**6.46**	**3.45**	**0.00**
170 ft. span - steel only, in.	0.00	0.79	1.48	2.02	2.36	2.47	2.36	2.03	1.50	0.80	0.00
slab, in.	0.00	2.14	4.04	5.50	6.42	6.74	6.44	5.54	4.10	2.19	0.00
barrier rails, in.	0.00	0.45	0.84	1.15	1.35	1.42	1.36	1.17	0.86	0.46	0.00
170 ft. span - total, in.	**0.00**	**3.37**	**6.36**	**8.67**	**10.13**	**10.64**	**10.16**	**8.73**	**6.46**	**3.45**	**0.00**
180 ft. span - steel only, in.	0.00	0.88	1.66	2.25	2.63	2.77	2.66	2.30	1.70	0.90	0.00
slab, in.	0.00	2.18	4.10	5.57	6.52	6.87	6.61	5.73	4.23	2.25	0.00
barrier rails, in.	0.00	0.46	0.86	1.18	1.38	1.46	1.40	1.21	0.89	0.47	0.00
180 ft. span - total, in.	**0.00**	**3.51**	**6.62**	**9.00**	**10.53**	**11.10**	**10.67**	**9.24**	**6.82**	**3.63**	**0.00**
190 ft. span - steel only, in.	0.00	0.98	1.82	2.43	2.81	2.94	2.81	2.43	1.82	0.98	0.00
slab, in.	0.00	2.32	4.31	5.76	6.64	6.94	6.64	5.76	4.31	2.32	0.00
barrier rails, in.	0.00	0.50	0.94	1.26	1.46	1.53	1.46	1.26	0.94	0.50	0.00
190 ft. span - total, in.	**0.00**	**3.80**	**7.07**	**9.46**	**10.91**	**11.40**	**10.91**	**9.46**	**7.07**	**3.80**	**0.00**
200 ft. span - steel only, in.	0.00	1.07	2.00	2.69	3.12	3.27	3.13	2.70	2.02	1.08	0.00
slab, in.	0.00	2.43	4.54	6.10	7.07	7.40	7.08	6.12	4.59	2.47	0.00
barrier rails, in.	0.00	0.54	1.01	1.36	1.57	1.65	1.57	1.36	1.01	0.54	0.00
200 ft. span - total, in.	**0.00**	**4.04**	**7.55**	**10.15**	**11.76**	**12.32**	**11.77**	**10.18**	**7.62**	**4.09**	**0.00**
210 ft. span - steel only, in.	0.00	1.13	2.12	2.84	3.30	3.45	3.29	2.84	2.12	1.14	0.00
slab, in.	0.00	2.46	4.58	6.15	7.13	7.46	7.12	6.15	4.60	2.48	0.00
barrier rails, in.	0.00	0.56	1.05	1.41	1.64	1.72	1.64	1.41	1.05	0.57	0.00
210 ft. span - total, in.	**0.00**	**4.16**	**7.75**	**10.41**	**12.07**	**12.63**	**12.06**	**10.40**	**7.77**	**4.19**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
150	4	0	12	15	15	75	18	112.5	18	15	22.5
160	4	0	24	16	32	48	20	80	36	16	48
170	4	2	7	16	9.33	81	20	135	19	16	25.33
180	4	8	33	20	55	31	24	62	37	20	61.67
190	4	6	29	20	48.33	47	24	94	28	20	46.67
200	4	6	14	18	21	74	24	148	20	18	30
210	4	0	28	23	53.67	44	28	102.67	28	23	53.67



DEFLECTION DIAGRAM

SINGLE SPAN 150-210 FT 8 FT SPACING

Issued January 2023
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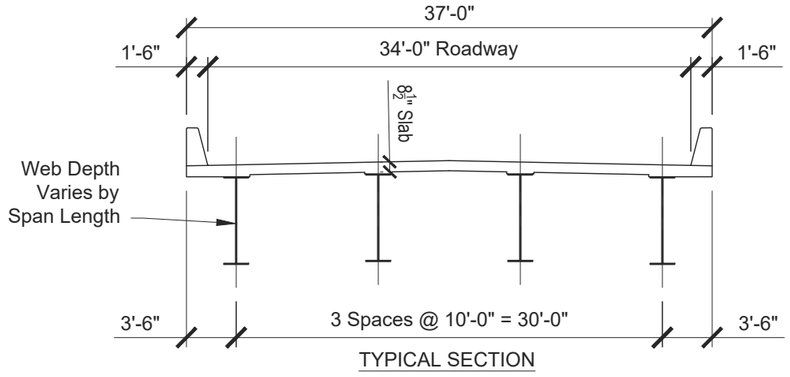

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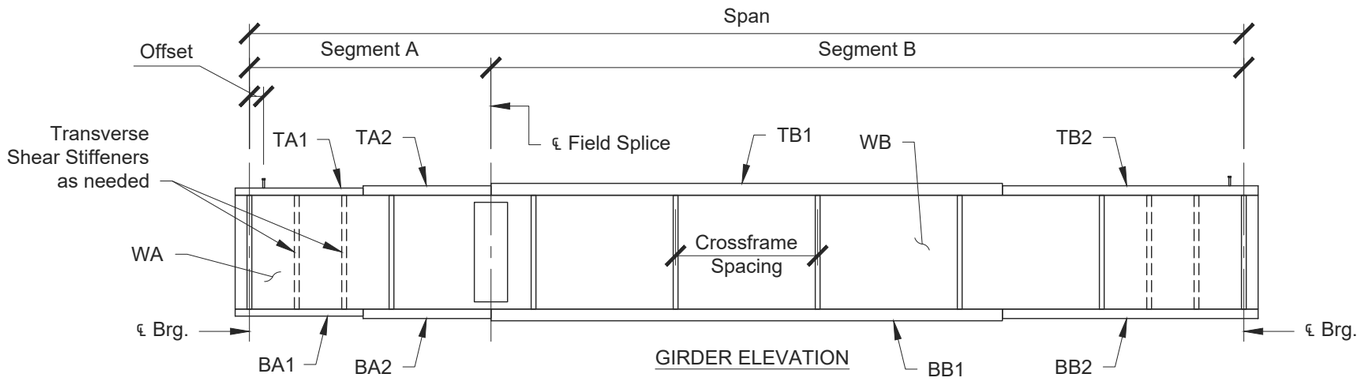

GIRDER ELEVATION

Span, ft.	SEGMENT A					SEGMENT B					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.)	TB1 (in. x in. x ft.)	TB2 (in. x in. x ft.)	BB1 (in. x in. x ft.)	BB2 (in. x in. x ft.)	
150	60 x 0.625 x 38	N/A	19 x 1 x 38	20 x 1 x 25	20 x 2 x 13	60 x 0.625 x 112	19 x 1.25 x 74	19 x 1 x 38	20 x 2 x 87	20 x 1 x 25	N/A
160	64 x 0.625 x 40	N/A	20 x 1 x 40	21 x 1 x 30	21 x 2 x 10	64 x 0.625 x 120	20 x 1.5 x 90	20 x 1 x 30	21 x 2 x 90	21 x 1 x 30	N/A
170	68 x 0.625 x 43	N/A	20 x 1.25 x 43	22 x 1 x 30	22 x 2 x 13	68 x 0.625 x 127	20 x 1.5 x 87	20 x 1 x 40	22 x 2 x 97	22 x 1 x 30	N/A
180	74 x 0.625 x 45	N/A	21 x 1 x 45	22 x 1 x 30	22 x 2 x 15	74 x 0.625 x 135	21 x 1.5 x 90	21 x 1 x 45	22 x 2 x 105	22 x 1 x 30	b
190	81 x 0.625 x 63	20 x 1 x 45	20 x 1.5 x 18	24 x 1.25 x 50	24 x 2.25 x 13	81 x 0.625 x 127	22 x 1.5 x 82	22 x 1 x 45	24 x 2.25 x 87	24 x 1.25 x 40	b
200	84 x 0.75 x 67	20 x 1 x 51	20 x 1.5 x 16	24 x 1.25 x 45	24 x 2.25 x 22	84 x 0.75 x 133	22 x 1.5 x 73	22 x 1 x 60	24 x 2.25 x 83	24 x 1.25 x 50	b
210	88 x 0.75 x 70	22 x 1 x 50	22 x 1.5 x 20	24 x 1.25 x 50	24 x 2.5 x 20	88 x 0.75 x 140	22 x 1.5 x 90	22 x 1 x 50	24 x 2.5 x 90	24 x 1.25 x 50	b

Note: All plates are A709 - 50W

Footnotes:

a. AASHTO DF 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.

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
150				8.75	0.875
160				9.25	0.875
170	5.25	0.5	8.5, 161.5	9.25	0.875
180	5.25	0.5	9.25, 27.75, 152.25, 170.75	9.75	0.875
190	6	0.5	10, 30.25, 159.75, 180	9.25	0.875
200				9	0.875
210				10	0.875

Span, ft.	GIRDER WEIGHT TABLE		
	Segment A tons	Segment B tons	Total tons
150	5.39	18.14	23.52
160	5.87	21.28	27.15
170	7.03	23.37	30.40
180	7.39	26.04	33.43
190	11.62	27.26	38.88
200	14.05	30.78	44.83
210	15.45	34.39	49.83

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft	Spacing, ft.	Type
150	25	K frame
160	26.67	K frame
170	28.33	K frame
180	30	K frame
190	23.75	K frame
200	25	K frame
210	23.33	K frame

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
150	138	15	91	49
160	149	16	91	52
170	160	17	91	55
180	170	18	91	58
190	184	19	91	61
200	197	20	91	64
210	209	21	91	67

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

SINGLE SPAN 150-210 FT 10 FT SPACING

Issued January 2023
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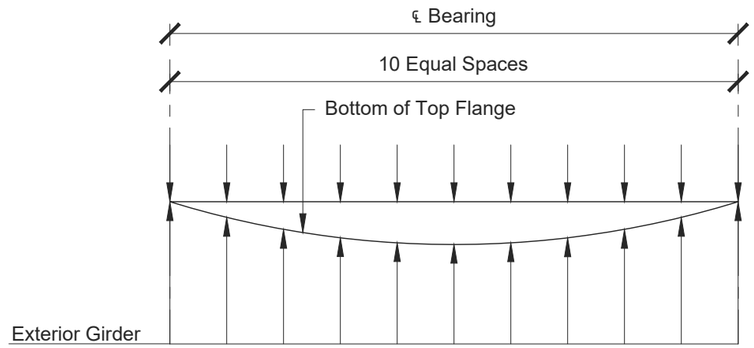
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
150 ft. span - steel only, in.	0.00	0.64	1.18	1.60	1.86	1.95	1.86	1.60	1.18	0.64	0.00
slab, in.	0.00	2.35	4.37	5.90	6.86	7.19	6.86	5.90	4.37	2.35	0.00
barrier rails, in.	0.00	0.32	0.60	0.81	0.95	0.99	0.95	0.81	0.60	0.32	0.00
150 ft. span - total, in.	**0.00**	**3.31**	**6.16**	**8.31**	**9.67**	**10.13**	**9.67**	**8.31**	**6.16**	**3.31**	**0.00**
160 ft. span - steel only, in.	0.00	0.70	1.30	1.75	2.03	2.12	2.02	1.73	1.28	0.69	0.00
slab, in.	0.00	2.39	4.42	5.92	6.86	7.18	6.83	5.86	4.34	2.35	0.00
barrier rails, in.	0.00	0.35	0.65	0.88	1.03	1.08	1.03	0.88	0.65	0.35	0.00
160 ft. span - total, in.	**0.00**	**3.44**	**6.37**	**8.55**	**9.92**	**10.38**	**9.89**	**8.48**	**6.28**	**3.39**	**0.00**
170 ft. span - steel only, in.	0.00	0.79	1.48	2.00	2.33	2.44	2.33	2.00	1.49	0.80	0.00
slab, in.	0.00	2.57	4.78	6.46	7.51	7.88	7.52	6.48	4.82	2.61	0.00
barrier rails, in.	0.00	0.39	0.72	0.98	1.14	1.20	1.14	0.98	0.72	0.39	0.00
170 ft. span - total, in.	**0.00**	**3.75**	**6.98**	**9.43**	**10.98**	**11.52**	**10.99**	**9.46**	**7.03**	**3.80**	**0.00**
180 ft. span - steel only, in.	0.00	0.87	1.61	2.17	2.52	2.64	2.52	2.17	1.61	0.87	0.00
slab, in.	0.00	2.71	5.01	6.73	7.81	8.18	7.81	6.73	5.01	2.71	0.00
barrier rails, in.	0.00	0.41	0.77	1.04	1.21	1.27	1.21	1.04	0.77	0.41	0.00
180 ft. span - total, in.	**0.00**	**3.99**	**7.39**	**9.93**	**11.54**	**12.09**	**11.54**	**9.93**	**7.39**	**3.99**	**0.00**
190 ft. span - steel only, in.	0.00	0.92	1.72	2.29	2.65	2.76	2.63	2.26	1.69	0.91	0.00
slab, in.	0.00	2.62	4.86	6.47	7.44	7.75	7.38	6.35	4.74	2.55	0.00
barrier rails, in.	0.00	0.41	0.76	1.01	1.17	1.22	1.16	1.00	0.74	0.40	0.00
190 ft. span - total, in.	**0.00**	**3.95**	**7.34**	**9.78**	**11.25**	**11.73**	**11.17**	**9.61**	**7.17**	**3.86**	**0.00**
200 ft. span - steel only, in.	0.00	1.10	2.05	2.75	3.18	3.33	3.18	2.76	2.06	1.10	0.00
slab, in.	0.00	2.86	5.32	7.10	8.21	8.59	8.22	7.13	5.34	2.87	0.00
barrier rails, in.	0.00	0.44	0.83	1.11	1.29	1.36	1.30	1.12	0.84	0.45	0.00
200 ft. span - total, in.	**0.00**	**4.41**	**8.20**	**10.97**	**12.68**	**13.27**	**12.70**	**11.01**	**8.23**	**4.42**	**0.00**
210 ft. span - steel only, in.	0.00	1.20	2.23	2.99	3.47	3.64	3.47	2.99	2.23	1.20	0.00
slab, in.	0.00	2.93	5.44	7.26	8.42	8.81	8.42	7.26	5.44	2.93	0.00
barrier rails, in.	0.00	0.47	0.87	1.17	1.36	1.42	1.36	1.17	0.87	0.47	0.00
210 ft. span - total, in.	**0.00**	**4.60**	**8.54**	**11.42**	**13.24**	**13.87**	**13.24**	**11.42**	**8.54**	**4.60**	**0.00**

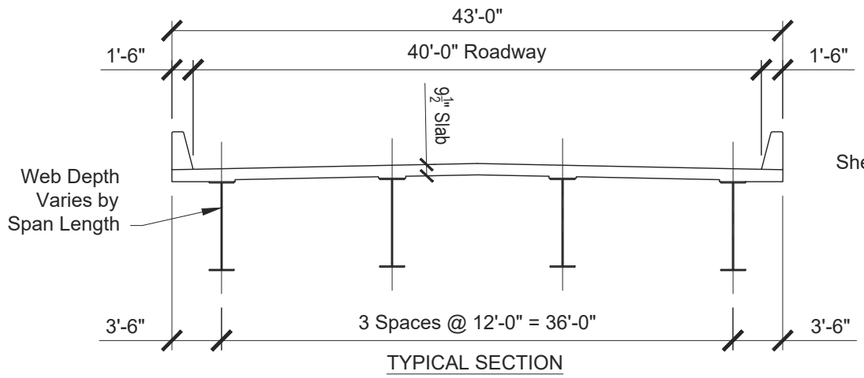
Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
150	4	0	30	12	30	72	15	90	30	12	30
160	4	0	32	12	32	72	16	96	32	12	32
170	4	4	34	12	34	76	16	101.33	34	12	34
180	4	0	36	12	36	72	18	108	36	12	36
190	4	6	43	16	57.33	51	20	85	35	16	46.67
200	4	6	38	16	50.67	53	20	88.33	45	16	60
210	4	6	32	16	42.67	75	20	125	31	16	41.33



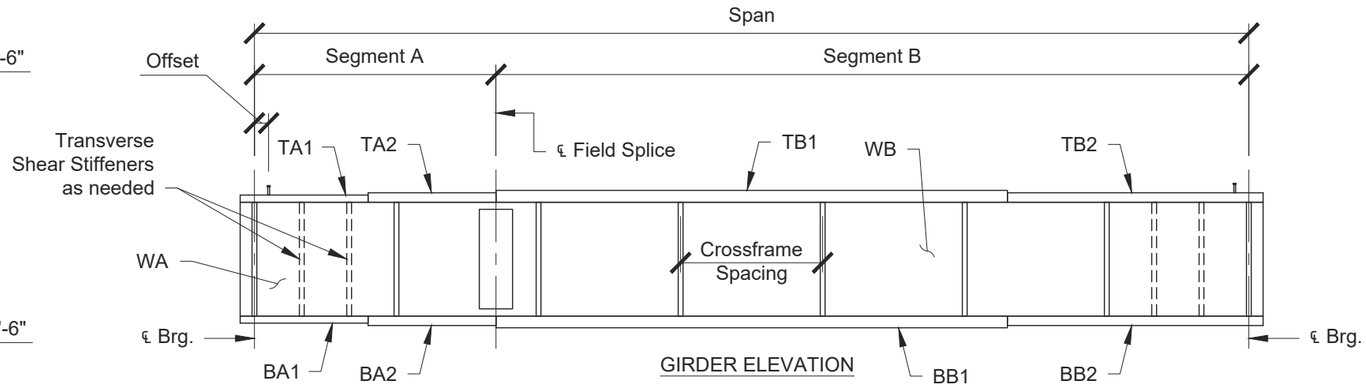
DEFLECTION DIAGRAM

SINGLE SPAN 150-210 FT
10 FT SPACING

Issued January 2023
Revision 0



TYPICAL SECTION



GIRDER ELEVATION

Span, ft.	SEGMENT A					SEGMENT B					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.)	TB1 (in. x in. x ft.)	TB2 (in. x in. x ft.)	BB1 (in. x in. x ft.)	BB2 (in. x in. x ft.)	
150	59 x 0.625 x 38	N/A	21 x 1.5 x 38	22 x 1 x 26	22 x 2 x 12	59 x 0.625 x 112	21 x 1.5 x 77	21 x 1 x 35	24 x 2 x 87	24 x 1 x 25	N/A
160	64 x 0.625 x 40	N/A	22 x 1.5 x 40	24 x 1 x 30	24 x 2 x 10	64 x 0.625 x 120	22 x 1.5 x 85	22 x 1 x 35	24 x 2 x 85	24 x 1.25 x 35	N/A
170	70 x 0.625 x 43	N/A	23 x 1.5 x 43	24 x 1.25 x 33	24 x 2 x 10	70 x 0.625 x 127	23 x 1.5 x 87	23 x 1 x 40	24 x 2 x 90	24 x 1.25 x 37	N/A
180	77 x 0.625 x 45	N/A	24 x 1 x 45	24 x 1.25 x 35	24 x 2 x 10	77 x 0.625 x 135	24 x 1.5 x 90	24 x 1 x 45	24 x 2 x 95	24 x 1.25 x 40	N/A
190	80 x 0.75 x 50	N/A	23 x 1 x 50	26 x 1.5 x 40	26 x 2 x 10	80 x 0.75 x 140	23 x 1.5 x 90	23 x 1 x 50	26 x 2 x 85	26 x 1.5 x 55	N/A
200	86 x 0.75 x 60	22 x 1 x 45	22 x 1.75 x 15	26 x 1.25 x 40	26 x 2.25 x 20	86 x 0.75 x 140	22 x 1.75 x 95	22 x 1 x 45	26 x 2.25 x 100	26 x 1.25 x 40	N/A
210	88 x 0.75 x 70	22 x 1 x 40	22 x 1.5 x 30	28 x 1.25 x 50	28 x 2.5 x 20	88 x 0.75 x 140	24 x 1.5 x 95	24 x 1 x 45	28 x 2.5 x 85	28 x 1.5 x 55	N/A

Note: All plates are A709 - 50W

Footnotes:

a. AASHTO DF 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.

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
150				9.75	0.875
160	6	0.5	8, 152	10.25	1
170	6	0.5	8.75, 26.25, 143.75, 161.25	10.75	1
180	6	0.5	9.5, 28.75, 45, 132, 151.25, 170.5	11.25	1
190				10.5	1
200				10	0.875
210	7	0.5	11, 199	10	0.875

Span, ft.	GIRDER WEIGHT TABLE		
	Segment A tons	Segment B tons	Total tons
150	6.29	20.53	26.82
160	7.01	22.98	29.99
170	8.23	25.36	33.59
180	8.13	28.20	36.33
190	10.60	32.70	43.30
200	13.45	35.44	48.89
210	16.40	37.43	53.83

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft	Spacing, ft.	Type
150	25	K frame
160	26.67	K frame
170	28.33	K frame
180	30	K frame
190	23.75	K frame
200	25	K frame
210	26.25	K frame

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
150	165	18	104	55
160	178	19	104	59
170	191	20	104	63
180	202	22	104	66
190	218	23	104	69
200	233	24	104	73
210	248	25	104	77

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

SINGLE SPAN 150-210 FT 12 FT SPACING

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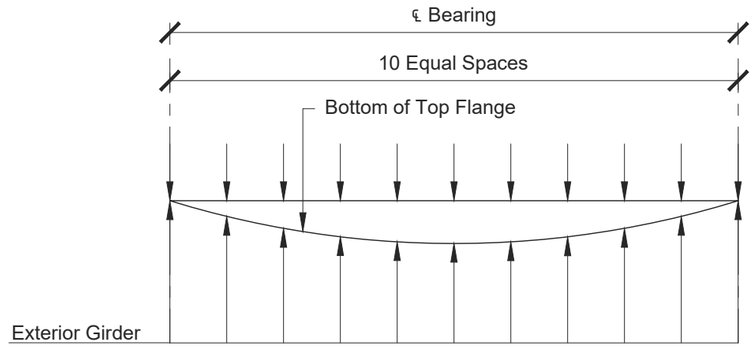
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
150 ft. span - steel only, in.	0.00	0.61	1.13	1.54	1.79	1.88	1.80	1.55	1.15	0.62	0.00
slab, in.	0.00	2.48	4.61	6.25	7.29	7.65	7.32	6.31	4.70	2.55	0.00
barrier rails, in.	0.00	0.28	0.51	0.69	0.81	0.85	0.81	0.69	0.51	0.28	0.00
150 ft. span - total, in.	**0.00**	**3.36**	**6.26**	**8.48**	**9.89**	**10.38**	**9.92**	**8.54**	**6.36**	**3.44**	**0.00**
160 ft. span - steel only, in.	0.00	0.67	1.25	1.70	1.99	2.09	2.00	1.72	1.28	0.69	0.00
slab, in.	0.00	2.62	4.89	6.65	7.77	8.17	7.83	6.76	5.05	2.72	0.00
barrier rails, in.	0.00	0.30	0.56	0.76	0.89	0.93	0.89	0.77	0.57	0.30	0.00
160 ft. span - total, in.	**0.00**	**3.59**	**6.70**	**9.11**	**10.65**	**11.19**	**10.71**	**9.24**	**6.90**	**3.71**	**0.00**
170 ft. span - steel only, in.	0.00	0.72	1.34	1.83	2.14	2.26	2.16	1.86	1.38	0.74	0.00
slab, in.	0.00	2.67	5.01	6.83	8.00	8.42	8.07	6.97	5.20	2.80	0.00
barrier rails, in.	0.00	0.32	0.59	0.80	0.94	0.99	0.94	0.81	0.60	0.32	0.00
170 ft. span - total, in.	**0.00**	**3.70**	**6.95**	**9.47**	**11.08**	**11.67**	**11.17**	**9.64**	**7.19**	**3.87**	**0.00**
180 ft. span - steel only, in.	0.00	0.78	1.45	1.96	2.28	2.39	2.28	1.97	1.47	0.79	0.00
slab, in.	0.00	2.83	5.27	7.10	8.25	8.66	8.28	7.15	5.34	2.87	0.00
barrier rails, in.	0.00	0.33	0.62	0.84	0.98	1.03	0.98	0.85	0.63	0.34	0.00
180 ft. span - total, in.	**0.00**	**3.94**	**7.34**	**9.89**	**11.51**	**12.08**	**11.54**	**9.96**	**7.43**	**3.99**	**0.00**
190 ft. span - steel only, in.	0.00	0.95	1.78	2.40	2.79	2.93	2.80	2.41	1.79	0.96	0.00
slab, in.	0.00	3.11	5.81	7.83	9.09	9.53	9.11	7.87	5.86	3.13	0.00
barrier rails, in.	0.00	0.36	0.68	0.92	1.07	1.13	1.08	0.93	0.68	0.36	0.00
190 ft. span - total, in.	**0.00**	**4.42**	**8.27**	**11.15**	**12.95**	**13.58**	**12.98**	**11.21**	**8.33**	**4.45**	**0.00**
200 ft. span - steel only, in.	0.00	1.01	1.87	2.51	2.92	3.06	2.92	2.51	1.87	1.01	0.00
slab, in.	0.00	3.02	5.58	7.46	8.66	9.06	8.66	7.46	5.58	3.02	0.00
barrier rails, in.	0.00	0.37	0.68	0.92	1.07	1.12	1.07	0.92	0.68	0.37	0.00
200 ft. span - total, in.	**0.00**	**4.39**	**8.13**	**10.89**	**12.64**	**13.24**	**12.64**	**10.89**	**8.13**	**4.39**	**0.00**
210 ft. span - steel only, in.	0.00	1.18	2.20	2.95	3.43	3.59	3.43	2.96	2.21	1.18	0.00
slab, in.	0.00	3.38	6.25	8.38	9.71	10.17	9.72	8.41	6.28	3.37	0.00
barrier rails, in.	0.00	0.41	0.75	1.01	1.17	1.23	1.18	1.02	0.76	0.40	0.00
210 ft. span - total, in.	**0.00**	**4.97**	**9.20**	**12.34**	**14.31**	**14.99**	**14.33**	**12.39**	**9.25**	**4.96**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
150	4	2	23	8	15.33	119	12	119	23	8	15.33
160	4	3	32	12	32	70	15	87.5	40	12	40
170	4	4	34	12	34	70	16	93.33	42	12	42
180	4	4	27	12	27	94	16	125.33	27	12	27
190	4	0	46	15	57.5	50	18	75	46	15	57.5
200	4	2	38	16	50.67	59	20	98.33	38	16	50.67
210	4	4	40	16	53.33	56	20	93.33	47	16	62.67



DEFLECTION DIAGRAM

SINGLE SPAN 150-210 FT 12 FT SPACING

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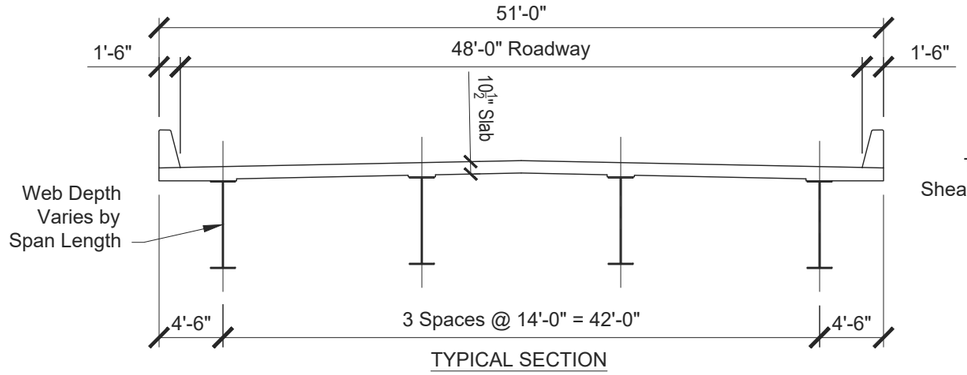
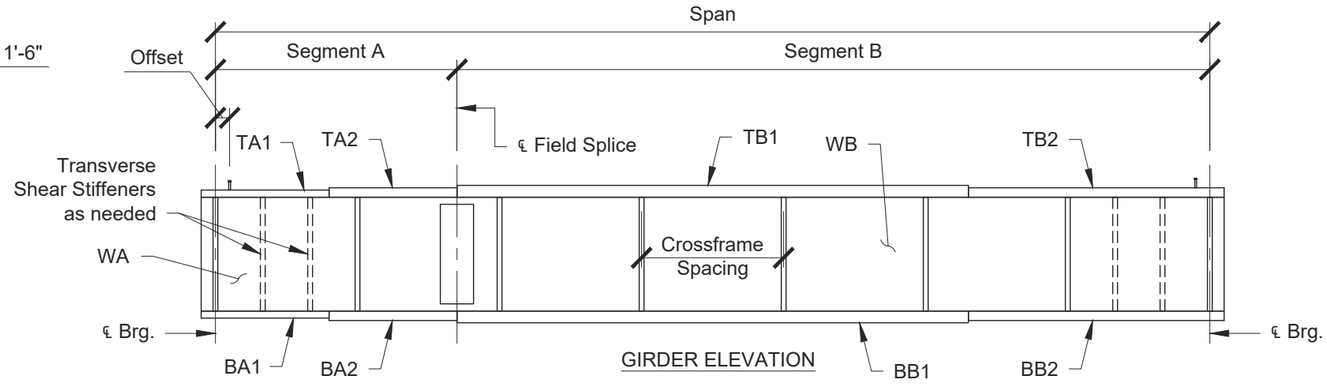


TYPICAL SECTION



GIRDER ELEVATION

Span, ft.	SEGMENT A					SEGMENT B					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.)	TB1 (in. x in. x ft.)	TB2 (in. x in. x ft.)	BB1 (in. x in. x ft.)	BB2 (in. x in. x ft.)	
150	60 x 0.625 x 38	N/A	24 x 1.25 x 38	24 x 1.25 x 28	24 x 2.25 x 10	60 x 0.625 x 112	24 x 1.5 x 77	24 x 1 x 35	24 x 2.25 x 87	24 x 1.25 x 25	N/A
160	64 x 0.625 x 40	N/A	24 x 1.25 x 40	26 x 1.25 x 30	26 x 2.25 x 10	64 x 0.625 x 120	26 x 1.75 x 70	26 x 1.25 x 50	26 x 2.25 x 90	26 x 1.25 x 30	N/A
170	70 x 0.625 x 43	N/A	22 x 1.5 x 43	30 x 1.25 x 33	30 x 2 x 10	70 x 0.625 x 127	24 x 2 x 72	24 x 1.5 x 55	30 x 2 x 87	30 x 1.25 x 40	N/A
180	76 x 0.625 x 45	N/A	24 x 1.5 x 45	28 x 1.25 x 35	28 x 2 x 10	76 x 0.625 x 135	26 x 1.75 x 75	26 x 1.5 x 60	30 x 2 x 85	30 x 1.5 x 50	N/A
190	82 x 0.75 x 50	N/A	24 x 1.25 x 50	30 x 1.25 x 40	30 x 2 x 10	82 x 0.75 x 140	26 x 1.5 x 80	26 x 1.25 x 60	30 x 2 x 85	30 x 1.5 x 55	N/A
200	84 x 0.75 x 60	N/A	24 x 1.5 x 60	28 x 1.75 x 50	28 x 2.5 x 10	84 x 0.75 x 140	24 x 2 x 80	24 x 1.5 x 60	30 x 2.5 x 85	30 x 1.75 x 55	N/A
210	92 x 0.75 x 70	N/A	24 x 1.75 x 70	30 x 1.75 x 60	30 x 2.5 x 10	92 x 0.75 x 140	24 x 2 x 75	24 x 1.75 x 65	30 x 2.5 x 75	30 x 1.75 x 65	N/A

Note: All plates are A709 - 50W

Footnotes:

a. AASHTO DF 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.

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
150	6	0.5	7.5, 22.5, 127.5, 142.5	11.25	1
160	6.5	0.5	8, 24, 136, 152	11.25	1
170	7.5	0.5	8.75, 26.25, 43, 126.25, 143.75, 161.25	10.25	1
180	7.5	0.5	8, 27, 45, 134, 153, 172	11.25	1
190	7.5	0.5	10.25, 179.75	11	1
200	7.5	0.5	10.5, 31.5, 168.5, 189.5	11	1
210	7.5	0.5	11.5, 34.5, 175.5, 198.5	11	1

Span, ft.	GIRDER WEIGHT TABLE		
	Segment A tons	Segment B tons	Total tons
150	6.71	22.56	29.27
160	7.42	26.97	34.39
170	8.74	30.14	38.88
180	9.43	33.20	42.63
190	11.36	36.16	47.52
200	15.47	40.97	56.44
210	19.86	42.58	62.44

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft	Spacing, ft.	Type
150	25	Diaphragm
160	26.67	K frame
170	28.33	K frame
180	30	K frame
190	23.75	K frame
200	25	K frame
210	26.25	K frame

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
150	201	21	116	62
160	218	22	116	66
170	234	24	116	70
180	249	25	116	74
190	265	27	116	78
200	286	28	116	82
210	303	29	116	86

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

SINGLE SPAN 150-210 FT 14 FT SPACING

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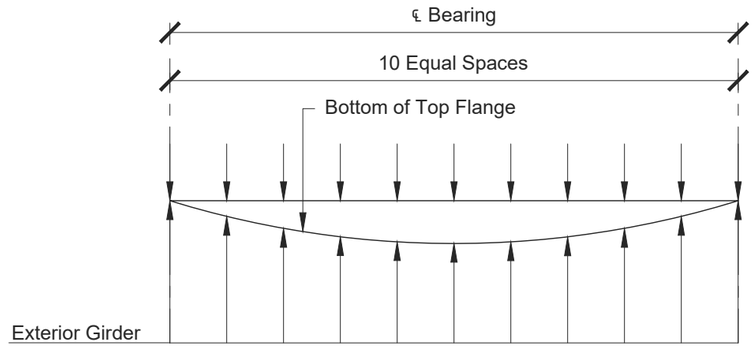
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
150 ft. span - steel only, in.	0.00	0.58	1.07	1.45	1.69	1.78	1.70	1.46	1.08	0.58	0.00
slab, in.	0.00	2.78	5.18	7.01	8.16	8.55	8.17	7.03	5.23	2.83	0.00
barrier rails, in.	0.00	0.22	0.41	0.56	0.65	0.68	0.65	0.56	0.41	0.22	0.00
150 ft. span - total, in.	**0.00**	**3.58**	**6.67**	**9.02**	**10.50**	**11.01**	**10.51**	**9.05**	**6.73**	**3.63**	**0.00**
160 ft. span - steel only, in.	0.00	0.65	1.20	1.62	1.88	1.97	1.89	1.63	1.21	0.65	0.00
slab, in.	0.00	2.83	5.25	7.04	8.18	8.58	8.22	7.11	5.29	2.85	0.00
barrier rails, in.	0.00	0.24	0.45	0.60	0.70	0.74	0.70	0.60	0.45	0.24	0.00
160 ft. span - total, in.	**0.00**	**3.72**	**6.90**	**9.26**	**10.76**	**11.29**	**10.81**	**9.35**	**6.94**	**3.74**	**0.00**
170 ft. span - steel only, in.	0.00	0.69	1.29	1.75	2.03	2.13	2.04	1.76	1.31	0.70	0.00
slab, in.	0.00	2.88	5.35	7.21	8.37	8.78	8.41	7.28	5.42	2.91	0.00
barrier rails, in.	0.00	0.25	0.47	0.64	0.75	0.78	0.75	0.65	0.48	0.26	0.00
170 ft. span - total, in.	**0.00**	**3.82**	**7.12**	**9.59**	**11.15**	**11.69**	**11.19**	**9.68**	**7.21**	**3.86**	**0.00**
180 ft. span - steel only, in.	0.00	0.75	1.40	1.90	2.21	2.32	2.22	1.91	1.41	0.75	0.00
slab, in.	0.00	3.05	5.68	7.67	8.93	9.37	8.96	7.72	5.71	3.04	0.00
barrier rails, in.	0.00	0.27	0.51	0.69	0.80	0.85	0.81	0.69	0.51	0.27	0.00
180 ft. span - total, in.	**0.00**	**4.07**	**7.59**	**10.25**	**11.94**	**12.53**	**11.98**	**10.33**	**7.63**	**4.06**	**0.00**
190 ft. span - steel only, in.	0.00	0.88	1.65	2.23	2.59	2.71	2.59	2.23	1.65	0.87	0.00
slab, in.	0.00	3.41	6.36	8.56	9.94	10.41	9.94	8.57	6.33	3.37	0.00
barrier rails, in.	0.00	0.29	0.55	0.74	0.86	0.91	0.86	0.74	0.55	0.29	0.00
190 ft. span - total, in.	**0.00**	**4.58**	**8.57**	**11.53**	**13.39**	**14.03**	**13.40**	**11.54**	**8.52**	**4.53**	**0.00**
200 ft. span - steel only, in.	0.00	0.99	1.86	2.50	2.90	3.03	2.90	2.50	1.86	0.99	0.00
slab, in.	0.00	3.37	6.31	8.47	9.80	10.25	9.80	8.47	6.30	3.36	0.00
barrier rails, in.	0.00	0.31	0.57	0.77	0.90	0.94	0.90	0.77	0.57	0.30	0.00
200 ft. span - total, in.	**0.00**	**4.67**	**8.74**	**11.75**	**13.59**	**14.23**	**13.59**	**11.74**	**8.72**	**4.65**	**0.00**
210 ft. span - steel only, in.	0.00	1.01	1.90	2.57	2.99	3.14	3.00	2.59	1.91	1.02	0.00
slab, in.	0.00	3.29	6.18	8.36	9.72	10.19	9.76	8.44	6.23	3.32	0.00
barrier rails, in.	0.00	0.31	0.58	0.79	0.91	0.96	0.92	0.79	0.59	0.31	0.00
210 ft. span - total, in.	**0.00**	**4.61**	**8.66**	**11.72**	**13.62**	**14.29**	**13.68**	**11.82**	**8.73**	**4.64**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
150	4	0	40	9	30	90	12	90	40	9	30
160	4	3	43	9	32.25	95	12	95	43	9	32.25
170	4	2	13	8	8.67	153	12	153	12	8	8
180	4	0	36	12	36	72	15	90	54	12	54
190	4	0	57	12	57	57	16	76	57	12	57
200	4	4	50	12	50	82	16	109.33	40	12	40
210	4	3	51	15	63.75	48	18	72	59	15	73.75



DEFLECTION DIAGRAM

SINGLE SPAN 150-210 FT 14 FT SPACING

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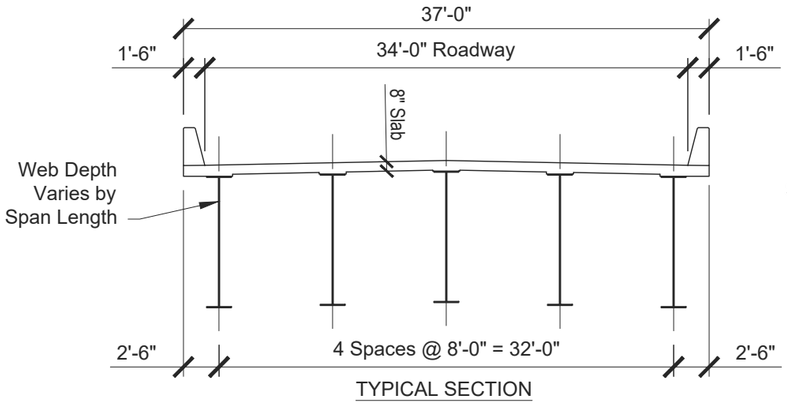

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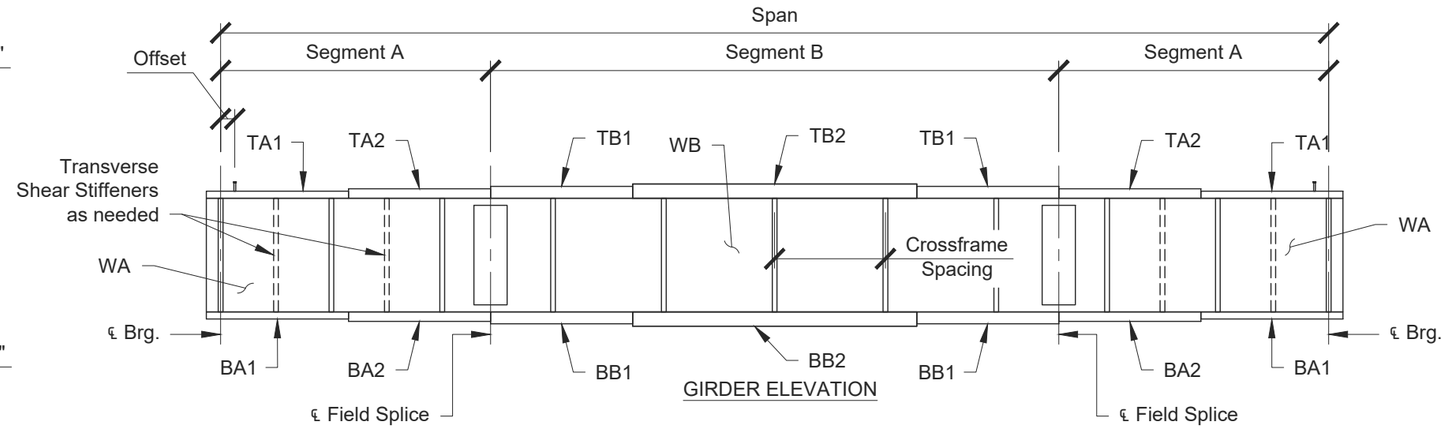

GIRDER ELEVATION

Span, ft.	SEGMENT A					SEGMENT B					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.)	TB1 (in. x in. x ft.)	TB2 (in. x in. x ft.)	BB1 (in. x in. x ft.)	BB2 (in. x in. x ft.)	
220	92 x 0.75 x 55	18 x 1 x 40	18 x 2 x 15	20 x 1 x 45	20 x 2 x 10	92 x 0.75 x 110	N/A	24 x 1.5 x 110	24 x 1.75 x 40	24 x 2 x 30	b
230	98 x 0.75 x 60	20 x 1 x 50	20 x 1.5 x 10	22 x 1 x 50	22 x 2 x 10	98 x 0.75 x 110	N/A	24 x 1.75 x 110	N/A	24 x 2 x 110	b
240	102 x 0.75 x 60	20 x 1 x 40	20 x 1.5 x 20	22 x 1 x 50	22 x 2 x 10	102 x 0.75 x 120	N/A	24 x 1.75 x 120	26 x 1.5 x 25	26 x 2 x 70	b
250	108 x 0.875 x 63	20 x 1 x 53	20 x 1.75 x 10	22 x 1 x 53	22 x 1.75 x 10	108 x 0.875 x 124	N/A	27 x 1.5 x 124	27 x 1.5 x 30	27 x 2 x 64	a, b
260	112 x 0.875 x 65	N/A	20 x 1.5 x 65	22 x 1 x 55	22 x 2 x 10	112 x 0.875 x 130	N/A	27 x 1.75 x 130	28 x 1.5 x 40	28 x 2 x 50	a, b
270	118 x 0.875 x 68	22 x 1 x 50	22 x 1.5 x 18	22 x 1 x 50	22 x 2 x 18	118 x 0.875 x 134	N/A	26 x 1.75 x 134	29 x 1.5 x 32	29 x 2 x 70	a, b
280	122 x 0.875 x 70	21 x 1 x 50	21 x 1.5 x 20	22 x 1 x 60	22 x 2 x 10	122 x 0.875 x 140	N/A	26 x 2 x 140	30 x 1.5 x 45	30 x 2 x 50	a, b
290	128 x 0.875 x 75	23 x 1 x 55	23 x 1.5 x 20	23 x 1.5 x 60	23 x 2 x 15	128 x 0.875 x 140	30 x 1.5 x 45	30 x 1.75 x 50	30 x 1.25 x 50 ▲	30 x 1.5 x 40 ▲	a, b
300	131 x 0.875 x 80	22 x 1.25 x 60	22 x 1.75 x 20	22 x 1.5 x 60	22 x 2.25 x 20	131 x 0.875 x 140	30 x 1.5 x 35	30 x 1.75 x 70	30 x 1.25 x 50 ▲	30 x 1.5 x 40 ▲	a, b

Note: All plates are 50 ksi yield except those noted with a ▲ are HPS70W

Footnotes:

a. AASHTO DF 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.

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
220				8	0.75
230				9	0.875
240				9	0.875
250				9	0.875
260				9	0.875
270				10	0.875
280				9.5	0.875
290				10.5	1
300				10	0.875

Span, ft.	GIRDER WEIGHT TABLE		
	Segment A tons	Segment B tons	Total tons
220	10.81	27.82	49.44
230	12.34	30.60	55.27
240	12.81	33.70	59.33
250	15.17	38.50	68.83
260	16.96	42.61	76.53
270	18.05	45.56	81.65
280	18.57	49.81	86.94
290	22.31	47.48	92.10
300	24.77	48.36	97.90

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft	Spacing, ft.	Type
220	27.5	X Frame
230	28.75	X Frame
240	24	X Frame
250	25	X Frame
260	21.67	X Frame
270	27	X Frame
280	28	X Frame
290	29	X Frame
300	30	X Frame

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
220	184	18	78	60
230	196	18	78	63
240	206	19	78	65
250	221	20	78	68
260	235	21	78	71
270	246	22	78	73
280	258	22	78	76
290	269	23	79	79
300	281	24	79	81

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

SINGLE SPAN 220-300 FT 8 FT SPACING

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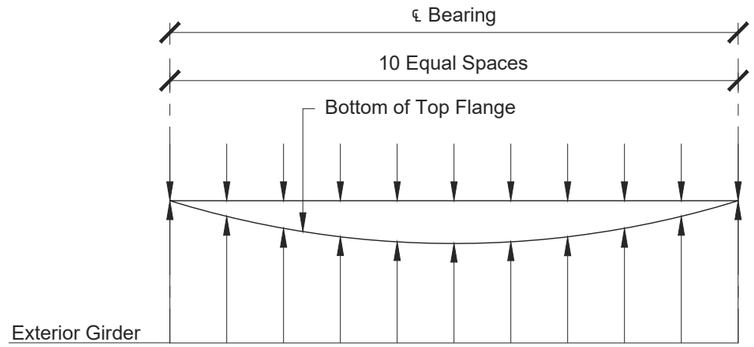
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.00	**0.10**	**0.20**	**0.30**	**0.40**	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**	**1.00**
220 ft. span - steel only, in.	0.00	1.38	2.55	3.41	3.95	4.13	3.95	3.41	2.55	1.38	0.00
slab, in.	0.00	2.67	4.91	6.56	7.59	7.94	7.59	6.56	4.91	2.67	0.00
barrier rails, in.	0.00	0.63	1.18	1.58	1.83	1.91	1.83	1.58	1.18	0.63	0.00
220 ft. span - total, in.	**0.00**	**4.68**	**8.63**	**11.54**	**13.37**	**13.98**	**13.37**	**11.54**	**8.63**	**4.68**	**0.00**
230 ft. span - steel only, in.	0.00	1.47	2.72	3.61	4.17	4.36	4.17	3.61	2.72	1.47	0.00
slab, in.	0.00	2.66	4.90	6.48	7.46	7.80	7.46	6.48	4.90	2.66	0.00
barrier rails, in.	0.00	0.64	1.18	1.57	1.82	1.91	1.82	1.57	1.18	0.64	0.00
230 ft. span - total, in.	**0.00**	**4.77**	**8.80**	**11.67**	**13.45**	**14.06**	**13.45**	**11.67**	**8.80**	**4.77**	**0.00**
240 ft. span - steel only, in.	0.00	1.62	2.99	3.99	4.61	4.81	4.61	3.99	2.99	1.62	0.00
slab, in.	0.00	2.85	5.24	6.98	8.03	8.39	8.03	6.98	5.24	2.85	0.00
barrier rails, in.	0.00	0.69	1.29	1.73	1.99	2.08	1.99	1.73	1.29	0.69	0.00
240 ft. span - total, in.	**0.00**	**5.16**	**9.53**	**12.70**	**14.63**	**15.28**	**14.63**	**12.70**	**9.53**	**5.16**	**0.00**
250 ft. span - steel only, in.	0.00	1.81	3.36	4.47	5.15	5.38	5.15	4.47	3.36	1.81	0.00
slab, in.	0.00	2.87	5.31	7.05	8.11	8.47	8.11	7.05	5.31	2.87	0.00
barrier rails, in.	0.00	0.70	1.30	1.74	2.01	2.10	2.01	1.74	1.30	0.70	0.00
250 ft. span - total, in.	**0.00**	**5.38**	**9.97**	**13.26**	**15.27**	**15.94**	**15.27**	**13.26**	**9.97**	**5.38**	**0.00**
260 ft. span - steel only, in.	0.00	1.92	3.57	4.78	5.53	5.77	5.53	4.78	3.57	1.92	0.00
slab, in.	0.00	2.87	5.32	7.11	8.21	8.57	8.21	7.11	5.32	2.87	0.00
barrier rails, in.	0.00	0.73	1.36	1.82	2.11	2.20	2.11	1.82	1.36	0.73	0.00
260 ft. span - total, in.	**0.00**	**5.52**	**10.26**	**13.71**	**15.84**	**16.54**	**15.84**	**13.71**	**10.26**	**5.52**	**0.00**
270 ft. span - steel only, in.	0.00	2.01	3.72	4.99	5.77	6.03	5.77	4.99	3.72	2.01	0.00
slab, in.	0.00	2.90	5.35	7.16	8.26	8.63	8.26	7.16	5.35	2.90	0.00
barrier rails, in.	0.00	0.73	1.35	1.82	2.11	2.20	2.11	1.82	1.35	0.73	0.00
270 ft. span - total, in.	**0.00**	**5.64**	**10.42**	**13.97**	**16.13**	**16.86**	**16.13**	**13.97**	**10.42**	**5.64**	**0.00**
280 ft. span - steel only, in.	0.00	2.23	4.11	5.46	6.30	6.57	6.30	5.46	4.11	2.23	0.00
slab, in.	0.00	3.11	5.72	7.59	8.74	9.11	8.74	7.59	5.72	3.11	0.00
barrier rails, in.	0.00	0.80	1.48	1.97	2.28	2.38	2.28	1.97	1.48	0.80	0.00
280 ft. span - total, in.	**0.00**	**6.13**	**11.31**	**15.02**	**17.31**	**18.06**	**17.31**	**15.02**	**11.31**	**6.13**	**0.00**
290 ft. span - steel only, in.	0.00	2.33	4.35	5.89	6.84	7.15	6.84	5.89	4.35	2.33	0.00
slab, in.	0.00	3.27	6.10	8.25	9.58	10.01	9.58	8.25	6.10	3.27	0.00
barrier rails, in.	0.00	0.84	1.57	2.13	2.48	2.60	2.48	2.13	1.57	0.84	0.00
290 ft. span - total, in.	**0.00**	**6.43**	**12.03**	**16.27**	**18.90**	**19.76**	**18.90**	**16.27**	**12.03**	**6.43**	**0.00**
300 ft. span - steel only, in.	0.00	2.53	4.72	6.40	7.44	7.79	7.44	6.40	4.72	2.53	0.00
slab, in.	0.00	3.46	6.46	8.75	10.17	10.63	10.17	8.75	6.46	3.46	0.00
barrier rails, in.	0.00	0.90	1.68	2.29	2.66	2.79	2.66	2.29	1.68	0.90	0.00
300 ft. span - total, in.	**0.00**	**6.88**	**12.87**	**17.43**	**20.27**	**21.21**	**20.27**	**17.43**	**12.87**	**6.88**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
220	4	7	23	23	44.08	56	28	130.67	23	23	44.08
230	4	9	29	24	58	45	30	112.5	29	24	58
240	4	0	25	24	50	56	30	140	25	24	50
250	4	3	13	24	26	79	30	197.5	13	24	26
260	4	6	26	30	65	43	36	129	26	30	65
270	4	9	32	30	80	31	42	108.5	32	30	80
280	4	0	28	30	70	40	42	140	28	30	70
290	4	6	19	36	57	50	42	175	19	36	57
300	4	18	25	36	75	42	42	147	25	36	75



DEFLECTION DIAGRAM

SINGLE SPAN 220-300 FT 8 FT SPACING

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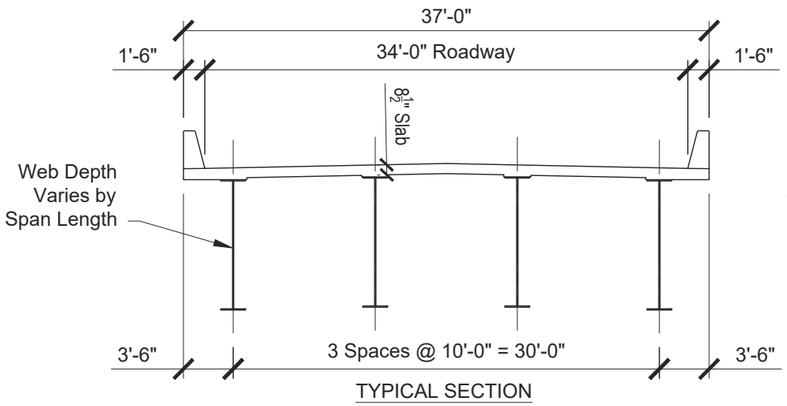

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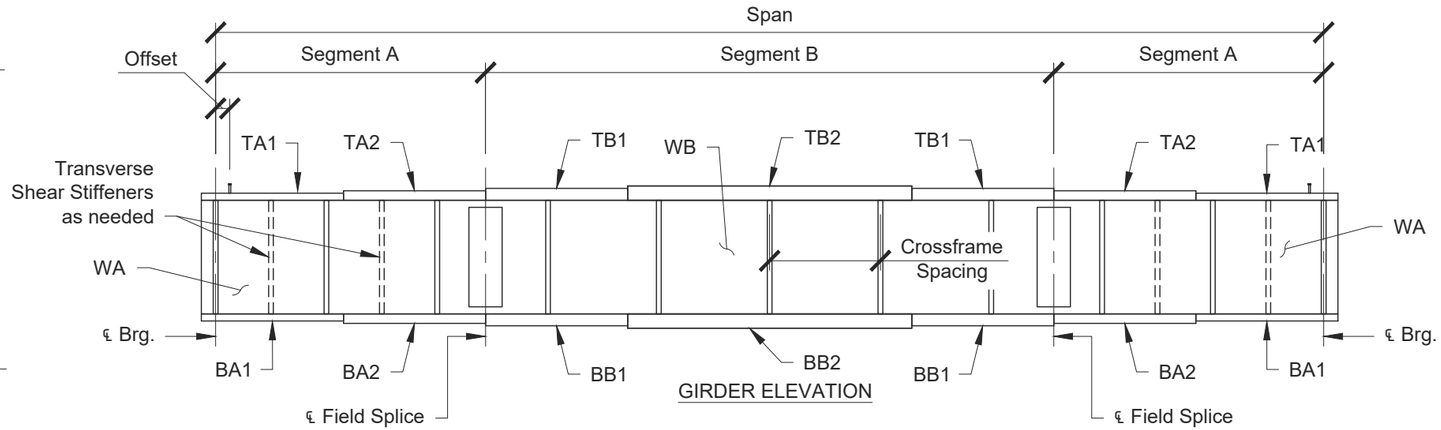

GIRDER ELEVATION

Span, ft.	SEGMENT A					SEGMENT B					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.)	TB1 (in. x in. x ft.)	TB2 (in. x in. x ft.)	BB1 (in. x in. x ft.)	BB2 (in. x in. x ft.)	
220	92 x 0.75 x 53	N/A	22 x 1 x 53	24 x 1 x 40	24 x 2 x 13	92 x 0.75 x 114	N/A	26 x 1.75 x 114	N/A	28 x 1.75 x 114	b
230	98 x 0.75 x 60	N/A	24 x 1.25 x 60	26 x 1.25 x 50	26 x 2 x 10	98 x 0.75 x 110	N/A	26 x 1.75 x 110	N/A	28 x 1.75 x 110	b
240	103 x 0.75 x 60	N/A	22 x 1.25 x 60	24 x 1.25 x 50	24 x 2.25 x 10	103 x 0.75 x 120	26 x 1.25 x 20	26 x 1.75 x 80	28 x 1.75 x 40	28 x 2 x 40	b
250	110 x 0.875 x 63	N/A	22 x 1.25 x 63	22 x 1.25 x 48	22 x 2.5 x 15	110 x 0.875 x 124	28 x 1.25 x 20	28 x 1.75 x 84	30 x 1.5 x 37	30 x 2 x 50	a, b
260	115 x 0.875 x 65	N/A	24 x 1.25 x 65	24 x 1.25 x 50	24 x 2.25 x 15	115 x 0.875 x 130	28 x 1.25 x 20	28 x 1.75 x 90	30 x 1.75 x 40	30 x 2 x 50	a, b
270	118 x 0.875 x 68	24 x 1 x 48	24 x 1.5 x 20	24 x 1.25 x 48	24 x 2.25 x 20	118 x 0.875 x 134	N/A	28 x 2 x 134	30 x 1.75 x 42	30 x 2 x 50	a, b
280	122 x 0.875 x 75	24 x 1 x 50	24 x 1.5 x 25	24 x 1.25 x 55	24 x 2.5 x 20	122 x 0.875 x 130	N/A	30 x 2 x 130	N/A	30 x 1.5 x 130 ▲	a, b
290	126 x 0.875 x 75	24 x 1 x 50	24 x 1.5 x 25	24 x 1.25 x 50	24 x 2.5 x 25	126 x 0.875 x 140	N/A	30 x 1.5 x 140 ▲	N/A	30 x 1.5 x 140 ▲	a, b
300	132 x 1 x 85	26 x 1.25 x 60	26 x 1.75 x 25	26 x 1.25 x 60	26 x 2.5 x 25	132 x 1 x 130	N/A	30 x 1.25 x 130 ▲	30 x 1.5 x 30 ▲	30 x 1.75 x 70 ▲	a, b

Note: All plates are 50 ksi yield except those noted with a ▲ are HPS70W

Footnotes:

a. AASHTO DF 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.

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
220				10	0.875
230	6.5	0.5	12.25, 217.75	11	1
240	7	0.5	12.75, 37.75, 202.25, 227.25	10	0.875
250				10	0.875
260				11	1
270				11	1
280	6.75	0.5	15.25, 264.75	11	1
290	6.75	0.5	15.75, 274.25	11	1
300				12	1.125

Span, ft.	GIRDER WEIGHT TABLE		
	Segment A tons	Segment B tons	Total tons
220	10.90	31.71	53.51
230	14.22	31.44	59.87
240	14.16	34.66	62.99
250	16.91	40.46	74.29
260	18.38	44.39	81.14
270	19.42	48.91	87.75
280	22.04	46.83	90.92
290	22.75	47.70	93.19
300	30.43	48.34	109.19

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft	Spacing, ft.	Type
220	27.5	K frame
230	28.75	X Frame
240	26.67	X Frame
250	25	X Frame
260	21.67	X Frame
270	27	X Frame
280	28	X Frame
290	29	X Frame
300	30	X Frame

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

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
220	221	22	92	70
230	235	23	92	73
240	245	24	92	77
250	264	25	92	80
260	279	26	92	83
270	293	27	92	86
280	304	28	92	89
290	314	29	92	92
300	337	30	92	95

NATIONAL STEEL BRIDGE ALLIANCE NSBA FOUNDED 1995

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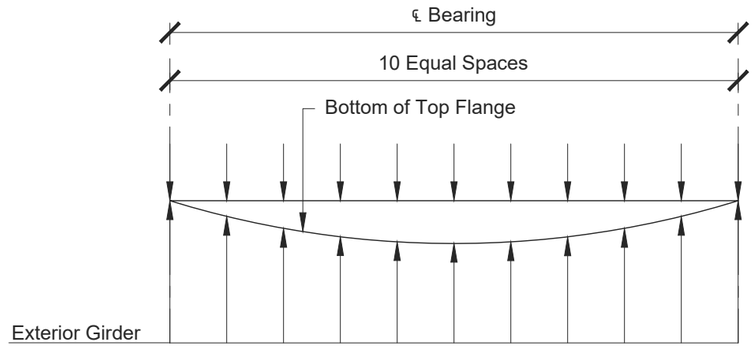
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.00	**0.10**	**0.20**	**0.30**	**0.40**	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**	**1.00**
220 ft. span - steel only, in.	0.00	1.31	2.41	3.22	3.74	3.92	3.74	3.22	2.41	1.31	0.00
slab, in.	0.00	3.09	5.67	7.58	8.78	9.19	8.78	7.58	5.67	3.09	0.00
barrier rails, in.	0.00	0.53	0.97	1.31	1.53	1.60	1.53	1.31	0.97	0.53	0.00
220 ft. span - total, in.	**0.00**	**4.92**	**9.05**	**12.11**	**14.05**	**14.71**	**14.05**	**12.11**	**9.05**	**4.92**	**0.00**
230 ft. span - steel only, in.	0.00	1.39	2.60	3.49	4.05	4.25	4.05	3.49	2.60	1.39	0.00
slab, in.	0.00	3.13	5.85	7.86	9.11	9.54	9.11	7.86	5.85	3.13	0.00
barrier rails, in.	0.00	0.54	1.02	1.38	1.60	1.68	1.60	1.38	1.02	0.54	0.00
230 ft. span - total, in.	**0.00**	**5.07**	**9.46**	**12.72**	**14.76**	**15.46**	**14.76**	**12.72**	**9.46**	**5.07**	**0.00**
240 ft. span - steel only, in.	0.00	1.53	2.86	3.83	4.43	4.63	4.43	3.83	2.86	1.53	0.00
slab, in.	0.00	3.41	6.35	8.50	9.80	10.24	9.80	8.50	6.35	3.41	0.00
barrier rails, in.	0.00	0.59	1.09	1.47	1.71	1.79	1.71	1.47	1.09	0.59	0.00
240 ft. span - total, in.	**0.00**	**5.53**	**10.30**	**13.81**	**15.94**	**16.65**	**15.94**	**13.81**	**10.30**	**5.53**	**0.00**
250 ft. span - steel only, in.	0.00	1.64	3.04	4.10	4.74	4.94	4.74	4.10	3.04	1.64	0.00
slab, in.	0.00	3.21	5.96	8.02	9.24	9.65	9.24	8.02	5.96	3.21	0.00
barrier rails, in.	0.00	0.56	1.05	1.42	1.65	1.72	1.65	1.42	1.05	0.56	0.00
250 ft. span - total, in.	**0.00**	**5.41**	**10.06**	**13.54**	**15.63**	**16.31**	**15.63**	**13.54**	**10.06**	**5.41**	**0.00**
260 ft. span - steel only, in.	0.00	1.75	3.27	4.40	5.10	5.33	5.10	4.40	3.27	1.75	0.00
slab, in.	0.00	3.28	6.11	8.22	9.51	9.94	9.51	8.22	6.11	3.28	0.00
barrier rails, in.	0.00	0.59	1.09	1.48	1.71	1.79	1.71	1.48	1.09	0.59	0.00
260 ft. span - total, in.	**0.00**	**5.62**	**10.47**	**14.10**	**16.32**	**17.07**	**16.32**	**14.10**	**10.47**	**5.62**	**0.00**
270 ft. span - steel only, in.	0.00	1.94	3.59	4.81	5.57	5.83	5.57	4.81	3.59	1.94	0.00
slab, in.	0.00	3.45	6.36	8.52	9.86	10.30	9.86	8.52	6.36	3.45	0.00
barrier rails, in.	0.00	0.63	1.17	1.58	1.83	1.92	1.83	1.58	1.17	0.63	0.00
270 ft. span - total, in.	**0.00**	**6.02**	**11.12**	**14.91**	**17.26**	**18.05**	**17.26**	**14.91**	**11.12**	**6.02**	**0.00**
280 ft. span - steel only, in.	0.00	2.11	3.91	5.27	6.13	6.43	6.13	5.27	3.91	2.11	0.00
slab, in.	0.00	3.78	6.99	9.41	10.93	11.45	10.93	9.41	6.99	3.78	0.00
barrier rails, in.	0.00	0.70	1.30	1.77	2.07	2.17	2.07	1.77	1.30	0.70	0.00
280 ft. span - total, in.	**0.00**	**6.59**	**12.20**	**16.44**	**19.13**	**20.05**	**19.13**	**16.44**	**12.20**	**6.59**	**0.00**
290 ft. span - steel only, in.	0.00	2.35	4.38	5.94	6.94	7.28	6.94	5.94	4.38	2.35	0.00
slab, in.	0.00	4.31	8.02	10.87	12.69	13.31	12.69	10.87	8.02	4.31	0.00
barrier rails, in.	0.00	0.78	1.45	1.98	2.31	2.43	2.31	1.98	1.45	0.78	0.00
290 ft. span - total, in.	**0.00**	**7.44**	**13.84**	**18.79**	**21.94**	**23.02**	**21.94**	**18.79**	**13.84**	**7.44**	**0.00**
300 ft. span - steel only, in.	0.00	2.58	4.83	6.59	7.70	8.08	7.70	6.59	4.83	2.58	0.00
slab, in.	0.00	4.23	7.92	10.79	12.62	13.24	12.62	10.79	7.92	4.23	0.00
barrier rails, in.	0.00	0.77	1.44	1.96	2.29	2.40	2.29	1.96	1.44	0.77	0.00
300 ft. span - total, in.	**0.00**	**7.57**	**14.18**	**19.33**	**22.61**	**23.72**	**22.61**	**19.33**	**14.18**	**7.57**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
220	4	6	37	18	55.5	54	24	108	37	18	55.5
230	4	3	33	21	57.75	57	24	114	33	21	57.75
240	4	0	36	20	60	60	24	120	36	20	60
250	4	8	46	23	88.17	31	28	72.33	46	23	88.17
260	4	0	26	24	52	66	28	154	27	24	54
270	4	0	27	24	54	64	30	160	28	24	56
280	4	3	28	24	56	67	30	167.5	28	24	56
290	4	4	29	24	58	65	32	173.33	29	24	58
300	4	10	33	28	77	55	32	146.67	32	28	74.67



DEFLECTION DIAGRAM

SINGLE SPAN 220-300 FT 10 FT SPACING

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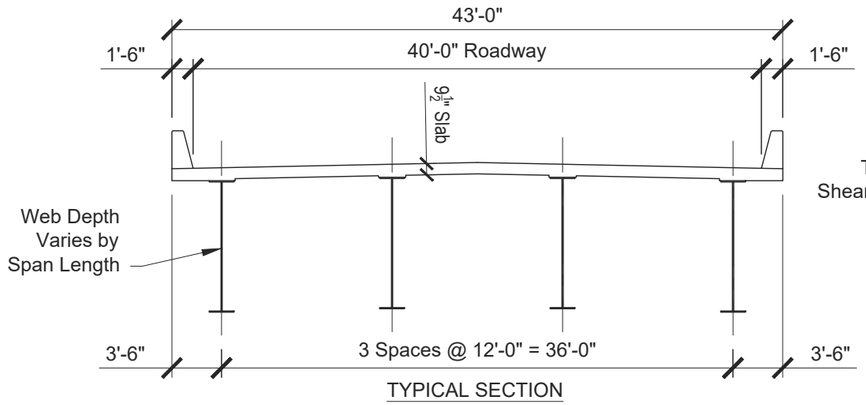
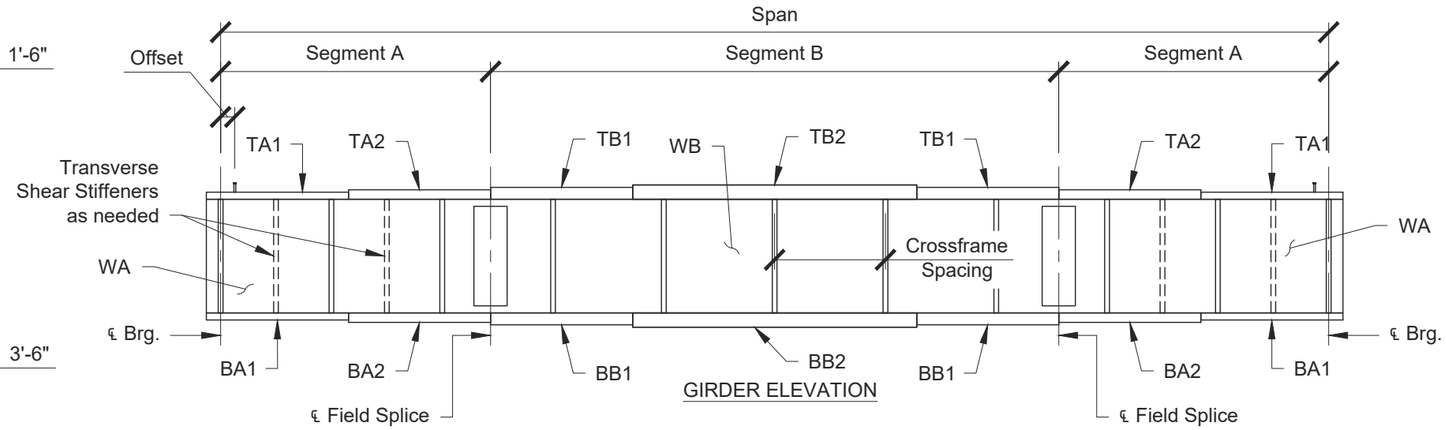


TYPICAL SECTION



GIRDER ELEVATION

Span, ft.	SEGMENT A					SEGMENT B					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.)	TB1 (in. x in. x ft.)	TB2 (in. x in. x ft.)	BB1 (in. x in. x ft.)	BB2 (in. x in. x ft.)	
220	93 x 0.75 x 58	N/A	24 x 1.25 x 58	24 x 1.25 x 43	24 x 2.5 x 15	93 x 0.75 x 104	N/A	28 x 1.5 x 104	N/A	28 x 2 x 104	b
230	99 x 0.75 x 60	N/A	24 x 1.5 x 60	28 x 1.25 x 50	28 x 2 x 10	99 x 0.75 x 110	N/A	28 x 1.5 x 110	N/A	30 x 2 x 110	b
240	105 x 0.875 x 60	N/A	24 x 1.25 x 60	28 x 1.25 x 50	28 x 2 x 10	105 x 0.875 x 120	N/A	30 x 1.25 x 120	30 x 2 x 35	30 x 2.5 x 50	a, b
250	109 x 0.875 x 63	N/A	26 x 1.25 x 63	28 x 1.25 x 53	28 x 2.25 x 10	109 x 0.875 x 124	N/A	28 x 1.75 x 124	N/A	32 x 2.25 x 124	a, b
260	114 x 0.875 x 65	N/A	26 x 1.25 x 65	28 x 1.25 x 50	28 x 2.25 x 15	114 x 0.875 x 130	N/A	30 x 1.75 x 130	N/A	30 x 2 x 130 ▲	a, b
270	118 x 1 x 68	N/A	26 x 1.25 x 68	28 x 1.25 x 45	28 x 2.25 x 23	118 x 1 x 134	N/A	28 x 1.5 x 134 ▲	30 x 1.5 x 42 ▲	30 x 1.75 x 50 ▲	a, b
280	122 x 1 x 75	N/A	28 x 1.25 x 75	28 x 1.25 x 60	28 x 2.5 x 15	122 x 1 x 130	N/A	28 x 1.75 x 130 ▲	30 x 1.5 x 50 ▲	30 x 1.75 x 30 ▲	a, b
290	128 x 1 x 85	28 x 1.25 x 60	28 x 1.5 x 25	30 x 1.25 x 60	30 x 2.5 x 25	128 x 1 x 120	N/A	28 x 2 x 120 ▲	N/A	30 x 1.75 x 120 ▲	a, b
300	132 x 1 x 95	28 x 1.25 x 70	28 x 1.75 x 25	30 x 1.5 x 75	30 x 2.75 x 20	132 x 1 x 110	N/A	28 x 2 x 110 ▲	N/A	30 x 2 x 110 ▲	a, b

Note: All plates are 50 ksi yield except those noted with a ▲ are HPS70W

Footnotes:

a. AASHTO DF 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.

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
220	6	0.5	11.5, 34.75, 185.25, 208.5	11	1
230	7	0.5	12.25, 37, 193, 217.75	11	1
240				11	1
250				12	1.125
260	7	0.5	14.25, 245.75	12	1.125
270				12	1.125
280				13	1.125
290				13	1.125
300				13	1.125

Span, ft.	GIRDER WEIGHT TABLE		
	Segment A tons	Segment B tons	Total tons
220	13.57	29.68	56.82
230	15.18	32.99	63.36
240	16.37	39.94	72.68
250	17.93	45.65	81.52
260	19.21	46.95	85.37
270	22.56	47.38	92.49
280	25.39	48.16	98.94
290	30.89	48.29	110.06
300	36.14	46.41	118.69

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft	Spacing, ft.	Type
220	27.5	K frame
230	28.75	K frame
240	26.67	K frame
250	25	K frame
260	26	X Frame
270	27	X Frame
280	28	X Frame
290	29	X Frame
300	30	X Frame

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

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
220	257	26	104	80
230	273	28	105	84
240	291	29	104	87
250	312	30	105	91
260	325	31	105	94
270	341	32	105	98
280	357	34	105	102
290	377	35	105	105
300	395	36	105	108

SINGLE SPAN 220-300 FT 12 FT SPACING

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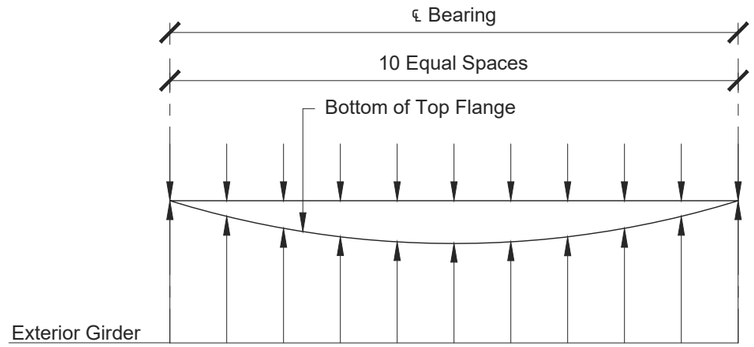
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
220 ft. span - steel only, in.	0.00	1.25	2.33	3.15	3.67	3.84	3.67	3.15	2.33	1.25	0.00
slab, in.	0.00	3.52	6.55	8.83	10.26	10.75	10.26	8.83	6.55	3.52	0.00
barrier rails, in.	0.00	0.45	0.84	1.14	1.33	1.39	1.33	1.14	0.84	0.45	0.00
220 ft. span - total, in.	**0.00**	**5.23**	**9.72**	**13.12**	**15.26**	**15.99**	**15.26**	**13.12**	**9.72**	**5.23**	**0.00**
230 ft. span - steel only, in.	0.00	1.34	2.51	3.38	3.94	4.13	3.94	3.38	2.51	1.34	0.00
slab, in.	0.00	3.57	6.67	8.99	10.44	10.94	10.44	8.99	6.67	3.57	0.00
barrier rails, in.	0.00	0.47	0.88	1.18	1.38	1.44	1.38	1.18	0.88	0.47	0.00
230 ft. span - total, in.	**0.00**	**5.38**	**10.05**	**13.56**	**15.76**	**16.51**	**15.76**	**13.56**	**10.05**	**5.38**	**0.00**
240 ft. span - steel only, in.	0.00	1.51	2.83	3.80	4.40	4.61	4.40	3.80	2.83	1.51	0.00
slab, in.	0.00	3.65	6.80	9.12	10.55	11.03	10.55	9.12	6.80	3.65	0.00
barrier rails, in.	0.00	0.47	0.88	1.18	1.37	1.43	1.37	1.18	0.88	0.47	0.00
240 ft. span - total, in.	**0.00**	**5.63**	**10.50**	**14.10**	**16.32**	**17.07**	**16.32**	**14.10**	**10.50**	**5.63**	**0.00**
250 ft. span - steel only, in.	0.00	1.64	3.04	4.07	4.71	4.93	4.71	4.07	3.04	1.64	0.00
slab, in.	0.00	3.68	6.83	9.10	10.51	11.00	10.51	9.10	6.83	3.68	0.00
barrier rails, in.	0.00	0.49	0.91	1.22	1.42	1.48	1.42	1.22	0.91	0.49	0.00
250 ft. span - total, in.	**0.00**	**5.80**	**10.78**	**14.40**	**16.64**	**17.41**	**16.64**	**14.40**	**10.78**	**5.80**	**0.00**
260 ft. span - steel only, in.	0.00	1.72	3.19	4.31	5.01	5.25	5.01	4.31	3.19	1.72	0.00
slab, in.	0.00	3.86	7.17	9.65	11.21	11.75	11.21	9.65	7.17	3.86	0.00
barrier rails, in.	0.00	0.53	0.98	1.33	1.55	1.63	1.55	1.33	0.98	0.53	0.00
260 ft. span - total, in.	**0.00**	**6.10**	**11.34**	**15.29**	**17.78**	**18.63**	**17.78**	**15.29**	**11.34**	**6.10**	**0.00**
270 ft. span - steel only, in.	0.00	2.03	3.81	5.20	6.07	6.37	6.07	5.20	3.81	2.03	0.00
slab, in.	0.00	4.48	8.39	11.43	13.35	13.99	13.35	11.43	8.39	4.48	0.00
barrier rails, in.	0.00	0.60	1.13	1.55	1.81	1.90	1.81	1.55	1.13	0.60	0.00
270 ft. span - total, in.	**0.00**	**7.11**	**13.34**	**18.18**	**21.23**	**22.25**	**21.23**	**18.18**	**13.34**	**7.11**	**0.00**
280 ft. span - steel only, in.	0.00	2.20	4.12	5.58	6.50	6.80	6.50	5.58	4.12	2.20	0.00
slab, in.	0.00	4.67	8.75	11.84	13.78	14.43	13.78	11.84	8.75	4.67	0.00
barrier rails, in.	0.00	0.65	1.22	1.65	1.93	2.02	1.93	1.65	1.22	0.65	0.00
280 ft. span - total, in.	**0.00**	**7.52**	**14.08**	**19.07**	**22.21**	**23.26**	**22.21**	**19.07**	**14.08**	**7.52**	**0.00**
290 ft. span - steel only, in.	0.00	2.29	4.28	5.78	6.73	7.05	6.73	5.78	4.28	2.29	0.00
slab, in.	0.00	4.50	8.40	11.33	13.19	13.83	13.19	11.33	8.40	4.50	0.00
barrier rails, in.	0.00	0.64	1.20	1.63	1.90	1.99	1.90	1.63	1.20	0.64	0.00
290 ft. span - total, in.	**0.00**	**7.43**	**13.88**	**18.73**	**21.81**	**22.87**	**21.81**	**18.73**	**13.88**	**7.43**	**0.00**
300 ft. span - steel only, in.	0.00	2.41	4.51	6.09	7.09	7.44	7.09	6.09	4.51	2.41	0.00
slab, in.	0.00	4.56	8.51	11.46	13.35	14.00	13.35	11.46	8.51	4.56	0.00
barrier rails, in.	0.00	0.65	1.21	1.64	1.92	2.01	1.92	1.64	1.21	0.65	0.00
300 ft. span - total, in.	**0.00**	**7.62**	**14.24**	**19.19**	**22.36**	**23.45**	**22.36**	**19.19**	**14.24**	**7.62**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
220	4	2	33	16	44	79	20	131.67	33	16	44
230	4	4	9	16	12	124	20	206.67	8	16	10.67
240	4	6	44	20	73.33	47	24	94	43	20	71.67
250	4	6	38	20	63.33	62	24	124	37	20	61.67
260	4	6	32	20	53.33	77	24	154	31	20	51.67
270	4	6	17	20	28.33	107	24	214	16	20	26.67
280	4	0	10	18	15	125	24	250	10	18	15
290	4	9	37	24	74	57	30	142.5	36	24	72
300	4	0	45	24	90	48	30	120	45	24	90



DEFLECTION DIAGRAM

SINGLE SPAN 220-300 FT 12 FT SPACING

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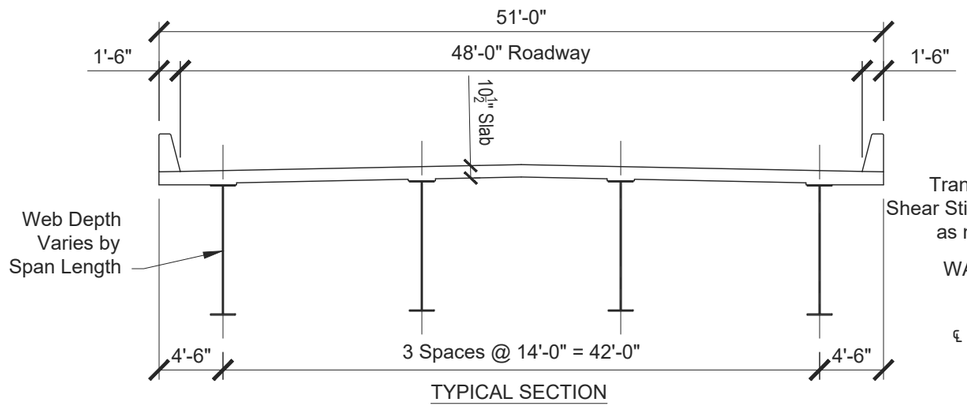

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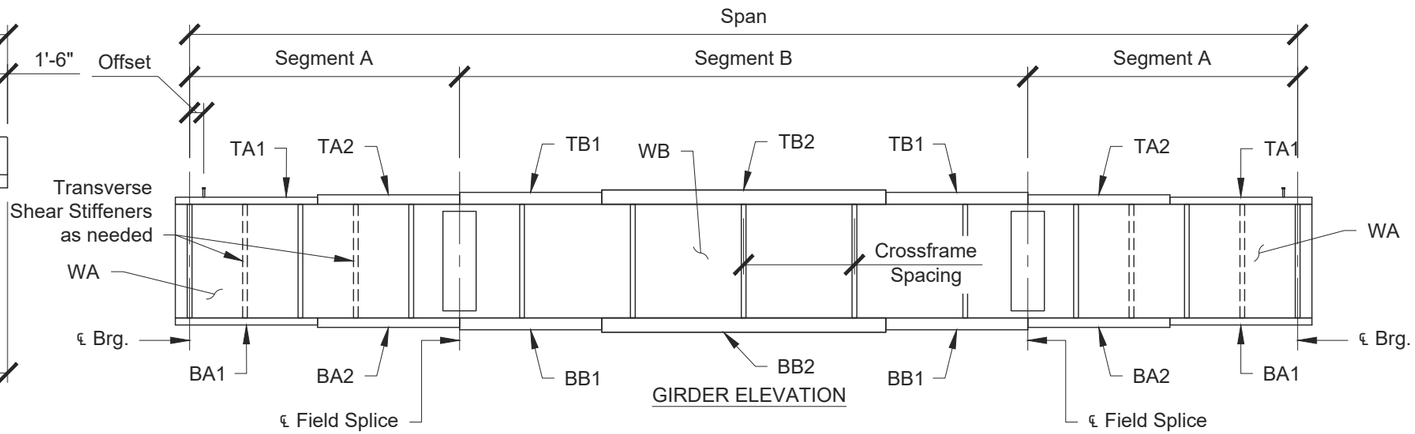

GIRDER ELEVATION

Span, ft.	SEGMENT A					SEGMENT B					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.)	TB1 (in. x in. x ft.)	TB2 (in. x in. x ft.)	BB1 (in. x in. x ft.)	BB2 (in. x in. x ft.)	
220	95 x 0.75 x 55	N/A	24 x 1.5 x 55	28 x 1.25 x 40	28 x 2.25 x 15	95 x 0.75 x 110	N/A	24 x 2.25 x 110	28 x 2.25 x 30	28 x 2.5 x 50	N/A
230	99 x 0.75 x 60	24 x 1.25 x 40	24 x 1.75 x 20	28 x 1.25 x 40	28 x 2.5 x 20	99 x 0.75 x 110	N/A	24 x 2.5 x 110	N/A	28 x 2.5 x 110	a, b
240	104 x 0.875 x 60	24 x 1.25 x 40	24 x 1.75 x 20	30 x 1.25 x 40	30 x 2.25 x 20	104 x 0.875 x 120	N/A	30 x 1.75 x 120	N/A	32 x 2.25 x 120	a, b
250	110 x 0.875 x 63	24 x 1.25 x 45	24 x 1.75 x 18	30 x 1.25 x 49	30 x 2.25 x 14	110 x 0.875 x 124	30 x 1.5 x 25	30 x 1.75 x 74	32 x 2.25 x 50	32 x 2.5 x 24	a, b
260	114 x 0.875 x 65	26 x 1.25 x 45	26 x 1.75 x 20	28 x 1.25 x 45	28 x 2.5 x 20	114 x 0.875 x 130	50	30 x 2 x 130	N/A	30 x 1.75 x 130 ▲	a, b
270	118 x 0.875 x 70	26 x 1.25 x 50	26 x 2 x 20	30 x 1.25 x 50	30 x 2.5 x 20	118 x 0.875 x 130	30 x 2 x 28	30 x 2.25 x 74	N/A	30 x 1.75 x 130 ▲	a, b
280	122 x 1 x 90	26 x 1.5 x 55	26 x 2.25 x 35	34 x 1.5 x 55	34 x 3 x 35	122 x 1 x 100	N/A	30 x 2.5 x 100	N/A	36 x 2 x 100 ▲	a, b
290	126 x 1 x 95	28 x 1.5 x 60	28 x 2 x 35	35 x 1.5 x 70	35 x 3 x 25	126 x 1 x 100	N/A	32 x 2.25 x 100	N/A	35 x 2.25 x 100 ▲	a, b
300	132 x 1 x 100	28 x 1.25 x 50	28 x 2.5 x 50	36 x 1.5 x 75	36 x 2.25 x 25 ▲	132 x 1 x 100	N/A	30 x 2.5 x 100	N/A	36 x 2.25 x 100 ▲	a, b

Note: All plates are 50 ksi yield except those noted with a ▲ are HPS70W

Footnotes:

a. AASHTO DF 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.

Span ft.	Stiffener Data Table				
	Transverse Stiffener Size and Location			Bearing Stiffener	
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.
220	8	0.625	11.75, 35.5, 184.5, 208.25	11	1
230	8	0.625	11.75, 36.5, 193.5, 218.25	11	1
240	7.5	0.5	13, 227	11	1
250	7.5	0.5	13.75, 38.75, 211.25, 236.25	11	1
260	8	0.625	14.25, 39.25, 220.75, 245.75	12	1.125
270	9	0.625	14.75, 39.75, 230.25, 255.25	12	1.125
280				12	1.125
290				13	1.125
300	9	0.625	16.5, 283.5	13	1.125

Span, ft.	GIRDER WEIGHT TABLE		
	Segment A tons	Segment B tons	Total tons
220	14.03	35.83	63.88
230	15.81	38.23	69.85
240	17.61	44.00	79.22
250	18.63	46.26	83.53
260	20.13	46.95	87.20
270	22.57	48.66	93.81
280	36.66	45.77	119.09
290	38.71	47.09	124.50
300	41.73	49.00	132.45

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, splices, bracing, or any other allowances

Crossframe Spacing		
Span, ft.	Spacing, ft.	Type
220	27.5	K frame
230	28.75	K frame
240	26.67	K frame
250	25	K frame
260	26	K frame
270	27	K frame
280	28	K frame
290	29	K frame
300	30	K frame

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

Reaction Data				
Span, ft.	DC kips	DW kips	Truck kips	Lane kips
220	316	31	117	90
230	333	32	117	94
240	354	34	117	98
250	370	35	117	101
260	385	36	117	106
270	403	38	117	110
280	440	39	117	113
290	457	41	117	117
300	476	42	117	121

SINGLE SPAN 220-300 FT 14 FT SPACING

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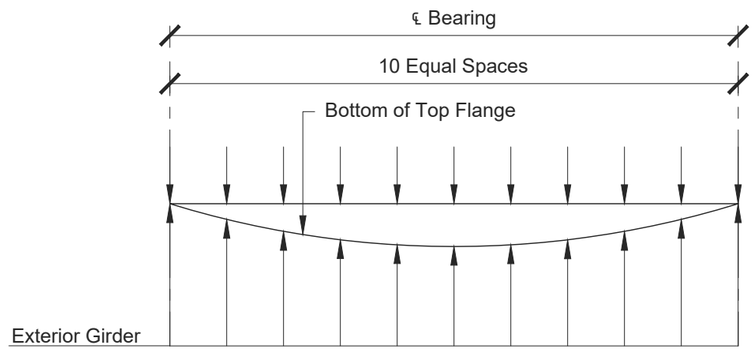
Deflection Summaries - Tenth Points Shown											
Tenth Points and Deflection, in.											
	0.0	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
220 ft. span - steel only, in.	0.00	1.15	2.13	2.87	3.33	3.48	3.33	2.87	2.13	1.15	0.00
slab, in.	0.00	3.74	6.92	9.29	10.76	11.26	10.76	9.29	6.92	3.74	0.00
barrier rails, in.	0.00	0.36	0.67	0.90	1.05	1.10	1.05	0.90	0.67	0.36	0.00
220 ft. span - total, in.	**0.00**	**5.25**	**9.73**	**13.06**	**15.14**	**15.84**	**15.14**	**13.06**	**9.73**	**5.25**	**0.00**
230 ft. span - steel only, in.	0.00	1.28	2.36	3.16	3.66	3.84	3.66	3.16	2.36	1.28	0.00
slab, in.	0.00	3.93	7.23	9.67	11.19	11.71	11.19	9.67	7.23	3.93	0.00
barrier rails, in.	0.00	0.38	0.71	0.96	1.12	1.17	1.12	0.96	0.71	0.38	0.00
230 ft. span - total, in.	**0.00**	**5.60**	**10.30**	**13.79**	**15.97**	**16.72**	**15.97**	**13.79**	**10.30**	**5.60**	**0.00**
240 ft. span - steel only, in.	0.00	1.45	2.68	3.62	4.20	4.41	4.20	3.62	2.68	1.45	0.00
slab, in.	0.00	4.15	7.67	10.30	11.97	12.54	11.97	10.30	7.67	4.15	0.00
barrier rails, in.	0.00	0.40	0.75	1.01	1.18	1.23	1.18	1.01	0.75	0.40	0.00
240 ft. span - total, in.	**0.00**	**6.00**	**11.10**	**14.93**	**17.35**	**18.18**	**17.35**	**14.93**	**11.10**	**6.00**	**0.00**
250 ft. span - steel only, in.	0.00	1.56	2.89	3.89	4.52	4.73	4.52	3.89	2.89	1.56	0.00
slab, in.	0.00	4.40	8.15	10.97	12.71	13.30	12.71	10.97	8.15	4.40	0.00
barrier rails, in.	0.00	0.42	0.79	1.07	1.24	1.30	1.24	1.07	0.79	0.42	0.00
250 ft. span - total, in.	**0.00**	**6.38**	**11.82**	**15.93**	**18.47**	**19.33**	**18.47**	**15.93**	**11.82**	**6.38**	**0.00**
260 ft. span - steel only, in.	0.00	1.71	3.17	4.30	5.01	5.26	5.01	4.30	3.17	1.71	0.00
slab, in.	0.00	4.85	9.01	12.19	14.21	14.91	14.21	12.19	9.01	4.85	0.00
barrier rails, in.	0.00	0.50	0.93	1.26	1.48	1.55	1.48	1.26	0.93	0.50	0.00
260 ft. span - total, in.	**0.00**	**7.06**	**13.10**	**17.75**	**20.70**	**21.71**	**20.70**	**17.75**	**13.10**	**7.06**	**0.00**
270 ft. span - steel only, in.	0.00	1.84	3.41	4.63	5.40	5.66	5.40	4.63	3.41	1.84	0.00
slab, in.	0.00	5.04	9.34	12.66	14.76	15.47	14.76	12.66	9.34	5.04	0.00
barrier rails, in.	0.00	0.52	0.98	1.34	1.56	1.64	1.56	1.34	0.98	0.52	0.00
270 ft. span - total, in.	**0.00**	**7.40**	**13.73**	**18.63**	**21.73**	**22.78**	**21.73**	**18.63**	**13.73**	**7.40**	**0.00**
280 ft. span - steel only, in.	0.00	1.94	3.61	4.90	5.72	6.01	5.72	4.90	3.61	1.94	0.00
slab, in.	0.00	4.35	8.07	10.93	12.76	13.39	12.76	10.93	8.07	4.35	0.00
barrier rails, in.	0.00	0.46	0.87	1.18	1.38	1.45	1.38	1.18	0.87	0.46	0.00
280 ft. span - total, in.	**0.00**	**6.76**	**12.55**	**17.01**	**19.87**	**20.85**	**19.87**	**17.01**	**12.55**	**6.76**	**0.00**
290 ft. span - steel only, in.	0.00	2.16	4.02	5.40	6.28	6.58	6.28	5.40	4.02	2.16	0.00
slab, in.	0.00	4.79	8.91	11.95	13.88	14.55	13.88	11.95	8.91	4.79	0.00
barrier rails, in.	0.00	0.51	0.94	1.27	1.49	1.56	1.49	1.27	0.94	0.51	0.00
290 ft. span - total, in.	**0.00**	**7.45**	**13.87**	**18.63**	**21.65**	**22.68**	**21.65**	**18.63**	**13.87**	**7.45**	**0.00**
300 ft. span - steel only, in.	0.00	2.26	4.20	5.65	6.57	6.88	6.57	5.65	4.20	2.26	0.00
slab, in.	0.00	4.88	9.04	12.14	14.08	14.74	14.08	12.14	9.04	4.88	0.00
barrier rails, in.	0.00	0.53	0.99	1.34	1.55	1.63	1.55	1.34	0.99	0.53	0.00
300 ft. span - total, in.	**0.00**	**7.67**	**14.23**	**19.13**	**22.20**	**23.25**	**22.20**	**19.13**	**14.23**	**7.67**	**0.00**

Shear Stud Layout											
Span ft.	Studs per row	Offset in.	Group 1			Group 2			Group 3		
			Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.	Spaces	Pitch in.	Length ft.
220	4	4.5	36	15	45	87	18	130.5	35	15	43.75
230	4	6	37	15	46.25	91	18	136.5	37	15	46.25
240	4	4	36	16	48	86	20	143.33	36	16	48
250	4	2	38	16	50.67	89	20	148.33	38	16	50.67
260	4	6	39	16	52	93	20	155	39	16	52
270	4	6	36	18	54	92	21	161	36	18	54
280	4	4	34	20	56.67	83	24	166	34	20	56.67
290	4	6	44	20	73.33	72	24	144	43	20	71.67
300	4	0	36	20	60	90	24	180	36	20	60



DEFLECTION DIAGRAM

SINGLE SPAN 220-300 FT
14 FT SPACING

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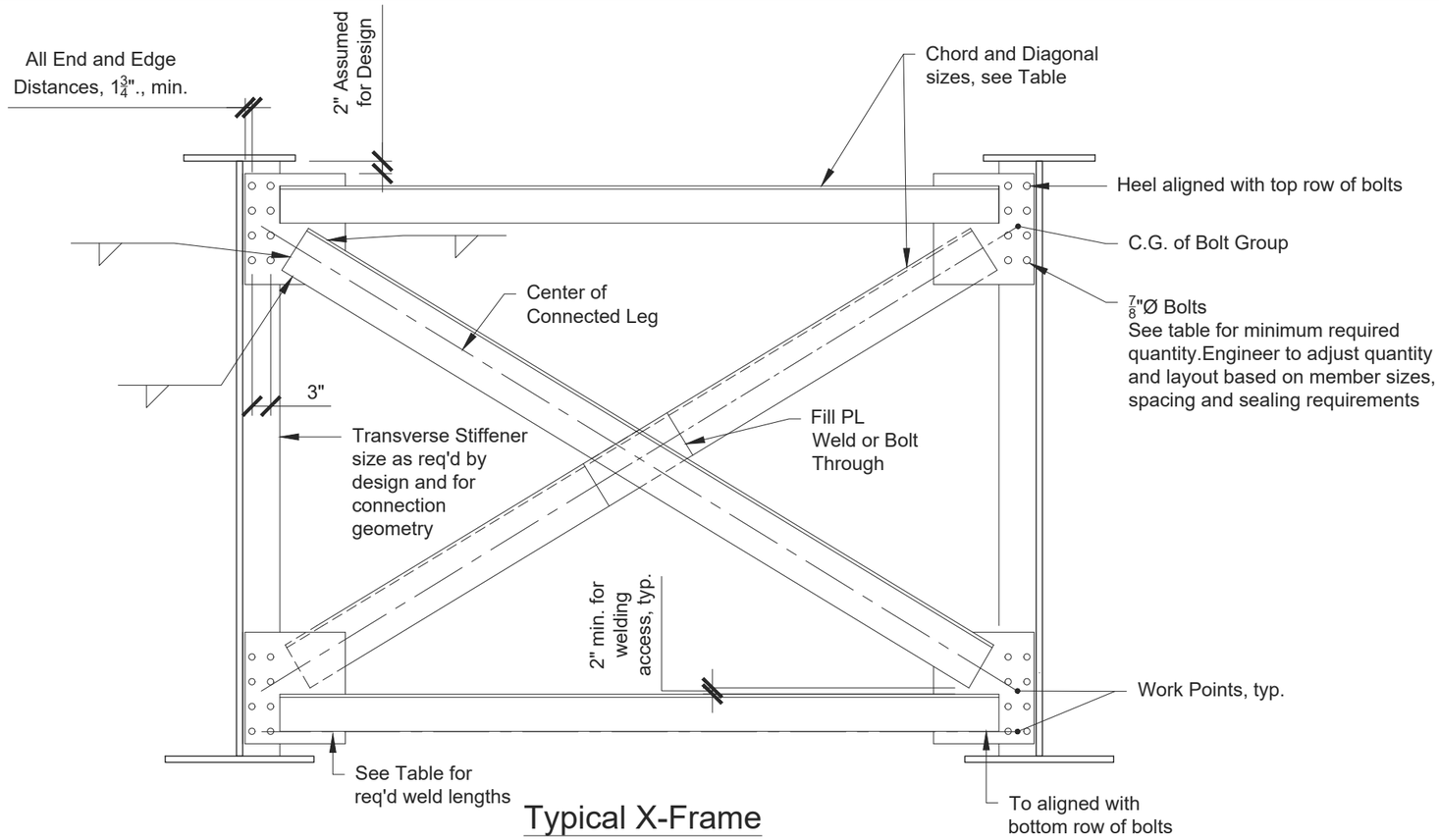
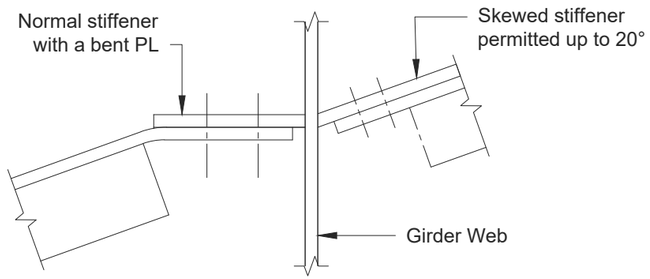


Typical X-Frame



Connection Options

Not to Scale

CROSS-FRAME MEMBER SIZES				
Beam Spacing, ft.	Span, ft.	Type	Chord	Diagonal
8	100-180	K-FRAME	L5X5X3/8	L5X5X3/8
	190-300	X-FRAME	L5X5X3/8	L6x6x3/8
10	120-220	K-FRAME	L5X5X1/2	L5X5X1/2
	230-260	X-FRAME	L5X5X1/2	L6X6X3/8
	260-300	X-FRAME	L5X5X1/2	L8X6X1/2
12	140-250	K-FRAME	L6X6X3/8	L5X5X5/8
	260-300	X-FRAME	L6X6X3/8	L8X8X1/2
14	160-210	K-FRAME	L8X6X1/2	L6X6X3/8
	220-260	K-FRAME	L8X6X1/2	L6X6X1/2
	270-290	K-FRAME	L8X6X1/2	L6X6X5/8
	300	K-FRAME	L8X6X1/2	L6X6X3/4

CROSS-FRAME WELD DETAILS		
Angle Size	Toe Length	Heel Length
L5x5x3/8	2 in. min. See notes regarding toe weld length	4 in.
L5x5x1/2		4.5 in.
L5x5x5/8		4.5 in.
L6x6x3/8		4 in.
L6x6x1/2		5.5
L6x6x5/8		6 in.
L6x6x3/4		7 in.
L8x6x1/2		5.5 in.
L8x8x1/2		6.5 in.

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	8	4 in.	8	4 in.
12	K-FRAME	6	6 in.	2	3 in.
	X-FRAME	8	4 in.	8	4 in.
14	K-FRAME	10	4.5 in.	4	3 in.

Notes:

1. All bolts for K and X cross-frames 7/8 in. diameter ASTM F3125 Grade 325 bolts assumed in single shear with threads in the shear plane.
2. Bolts for bent plate diaphragms either 7/8 in. or 1 in. diameter ASTM F3125 Grade 325 bolts assumed in single shear with threads in the shear plane. See "Crossframe and Diaphragm 3 Details" sheet for additional information.
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 and 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. 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 workpoints, member axes and orientation represent one acceptable approach. Engineers may choose alternate workpoint locations and overall connection geometries that consider the effects of eccentricity on the welded and bolted connections.

CROSSFRAME & DIAPHRAGM 1 DETAILS

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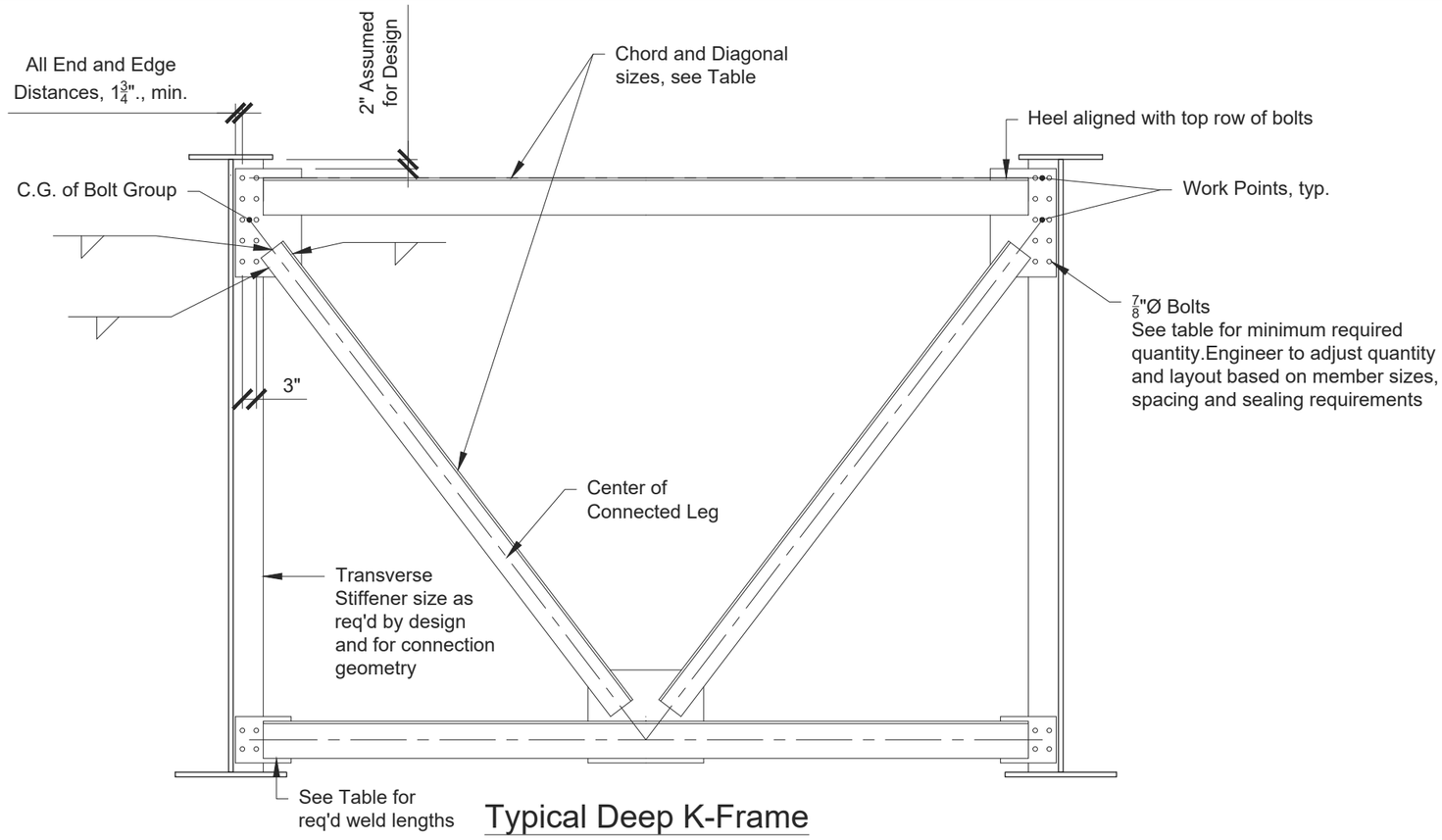
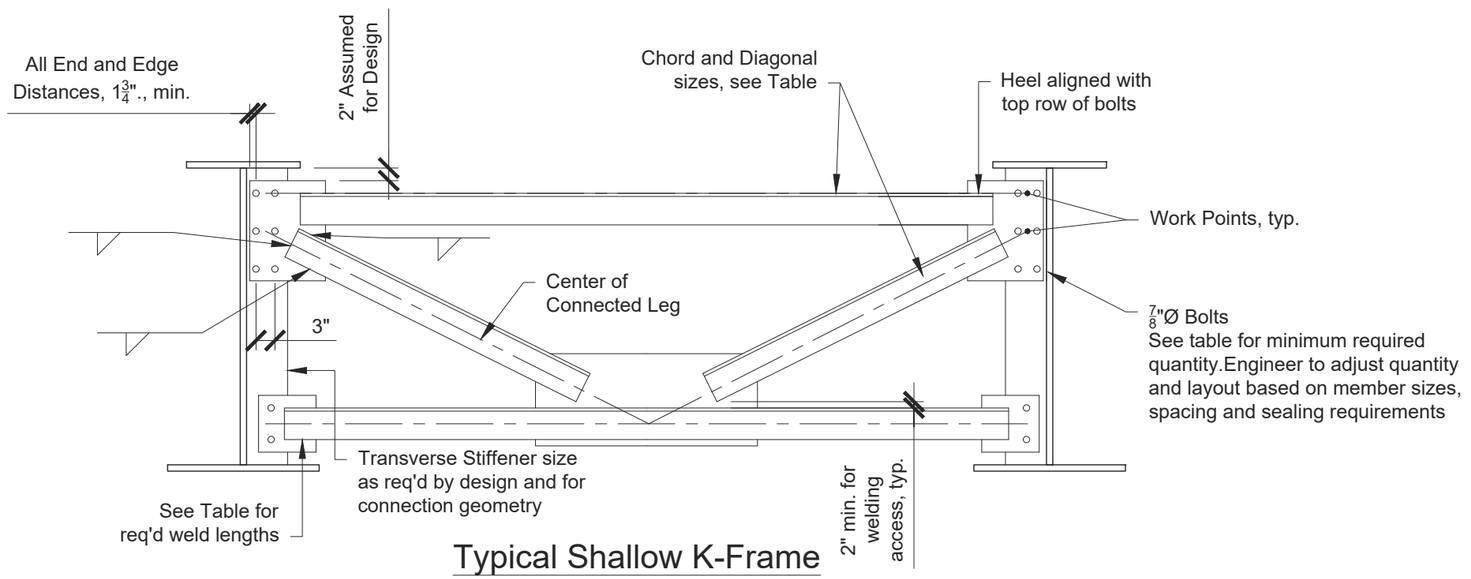


Typical Deep K-Frame



Typical Shallow K-Frame

CROSS-FRAME MEMBER SIZES				
Beam Spacing, ft.	Span, ft.	Type	Chord	Diagonal
8	100-180	K-FRAME	L5X5X3/8	L5X5X3/8
	190-300	X-FRAME	L5X5X3/8	L6x6x3/8
10	120-220	K-FRAME	L5X5X1/2	L5X5X1/2
	230-260	X-FRAME	L5X5X1/2	L6X6X3/8
	260-300	X-FRAME	L5X5X1/2	L8X6X1/2
12	140-250	K-FRAME	L6X6X3/8	L5X5X5/8
	260-300	X-FRAME	L6X6X3/8	L8X8X1/2
14	160-210	K-FRAME	L8X6X1/2	L6X6X3/8
	220-260	K-FRAME	L8X6X1/2	L6X6X1/2
	270-290	K-FRAME	L8X6X1/2	L6X6X5/8
	300	K-FRAME	L8X6X1/2	L6X6X3/4

CROSS-FRAME WELD DETAILS		
Angle Size	Toe Length	Heel Length
L5x5x3/8	2 in. min. See notes regarding toe weld length	4 in.
L5x5x1/2		4.5 in.
L5x5x5/8		4.5 in.
L6x6x3/8		4 in.
L6x6x1/2		5.5
L6x6x5/8		6 in.
L6x6x3/4		7 in.
L8x6x1/2		5.5 in.
L8x8x1/2		6.5 in.

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	8	4 in.	8	4 in.
12	K-FRAME	6	6 in.	2	3 in.
	X-FRAME	8	4 in.	8	4 in.
14	K-FRAME	10	4.5 in.	4	3 in.

Notes:
1. For general notes, see sheet Cross-Frame and Diaphragm 1.

CROSSFRAME & DIAPHRAGM 2 DETAILS

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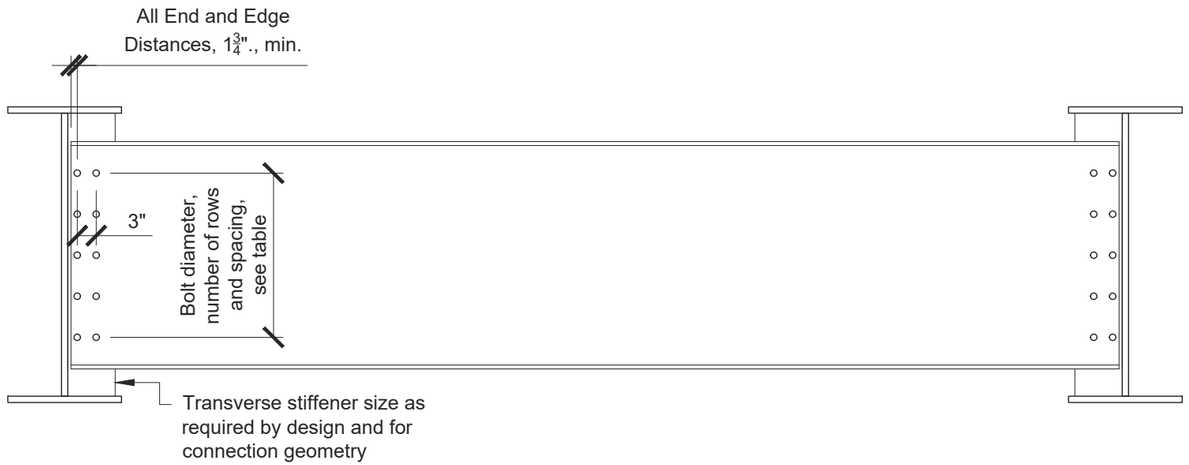
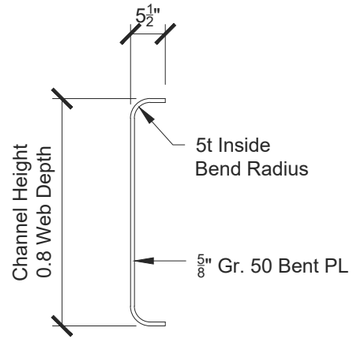
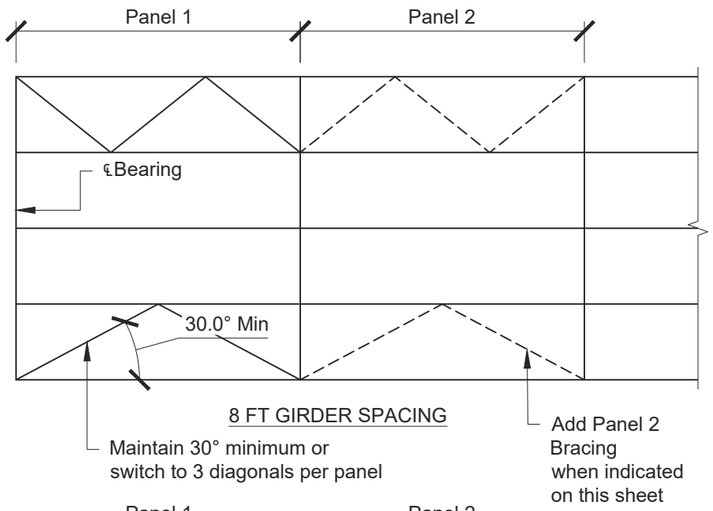




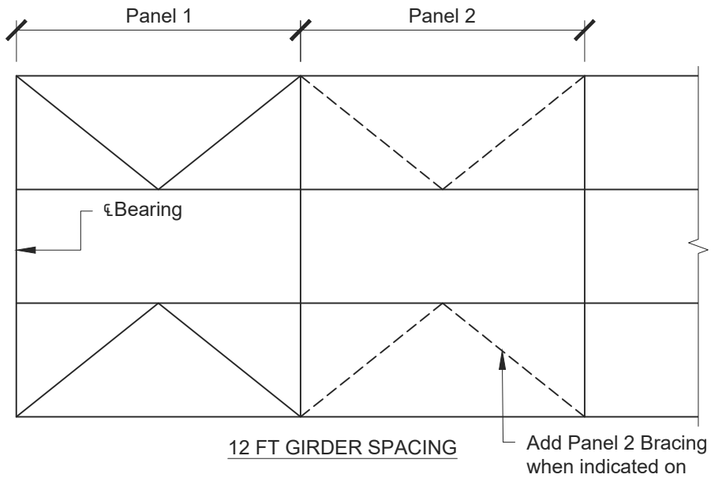
Bent Plate Diaphragm Typical Details

SOLID DIAPHRAGM DETAILS				
Beam Spacing, ft.	Web Depth, in.	Channel Height, in.	Rows and Spacing	Bolt Diameter, in
8	32	26	4 @ 5.5 in.	7/8
	36	29	4 @ 6.5 in.	
10	34	28	4 @ 6 in.	7/8
	37	30	5 @ 5 in.	
	42	34	5 @ 6 in.	
	46	37	5 @ 6.5 in.	
12	36	29	7 @ 3.25 in.	7/8
	38	31	6 @ 4.25 in.	
	45	36	6 @ 5.25 in.	
	47	38	6 @ 5.5 in.	
	49	40	6 @ 6 in.	
	52	42	6 @ 6.5 in.	
14	36	29	6 @ 3.75 in.	1
	39	32	6 @ 4.5 in.	
	45	36	6 @ 5.25 in.	
	50	40	6 @ 6 in.	
	51	41	6 @ 6.25 in.	
	54	44	6 @ 6.5 in.	
	56	45	6 @ 6.5 in.	
	60	48	6 @ 6.5 in.	

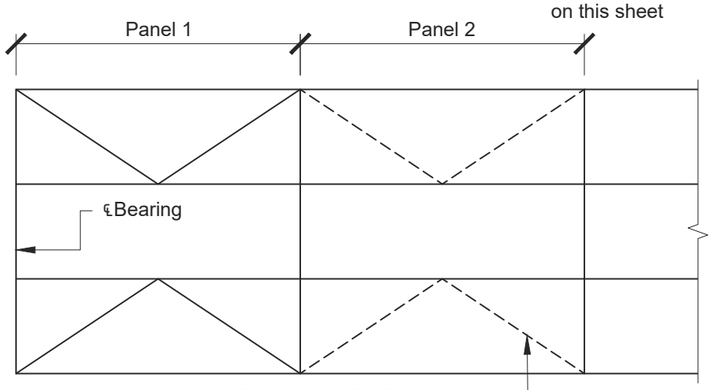
Notes:
1. For general notes, see sheet Cross-Frame and Diaphragm 1.



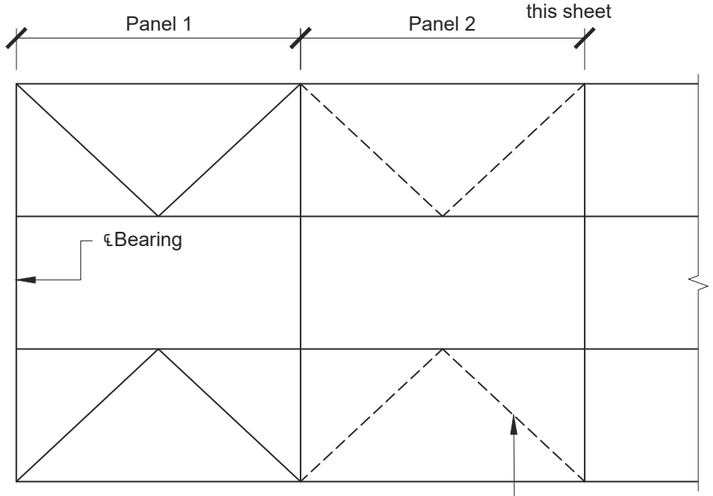
8 FT GIRDER SPACING



12 FT GIRDER SPACING



10 FT GIRDER SPACING



14 FT GIRDER SPACING

SPACING	SPAN LENGTH	DIAGONALS PER PANEL	NUMBER OF BRACED PANELS	BRACING SIZE
8	190	2	1	WT 7 x 19
8	200	2	1	WT 7 x 19
8	210	2	1	WT 7 x 24
8	220	2	1	WT 7 x 24
8	230	3	1	WT 7 x 26.5
8	240	2	1	WT 7 x 26.5
8	250	2	1	WT 7 x 26.5
8	260	2	1	WT 7 x 26.5
8	270	3	2	WT 7 x 24
8	280	3	2	WT 7 x 24
8	290	3	2	WT 7 x 26.5
8	300	3	2	WT 7 x 30.5

Note : Spans 190-260 are braced for deflection control.
Spans 270-300 require bracing for deflection control, for flange lateral stresses and for global stability.

SPACING	SPAN LENGTH	DIAGONALS PER PANEL	NUMBER OF BRACED PANELS	BRACING SIZE
10	180	2	1	WT 7 x 17
10	190	2	1	WT 7 x 17
10	200	2	1	WT 7 x 17
10	210	2	1	WT 7 x 17
10	220	2	1	WT 7 x 24
10	230	2	1	WT 7 x 24
10	240	2	1	WT 7 x 24
10	250	2	1	WT 7 x 24
10	260	2	1	WT 7 x 24
10	270	2	2	WT 7 x 34
10	280	2	2	WT 7 x 34
10	290	2	2	WT 8 x 33.5
10	300	2	2	WT 8 x 33.5

Note : Spans 180-260 are braced for deflection control.
Spans 270-300 require bracing for deflection control, for flange lateral stresses and for global stability.

SPACING	SPAN LENGTH	DIAGONALS PER PANEL	NUMBER OF BRACED PANELS	BRACING SIZE
12	220	2	1	WT 7 x 24
12	230	2	1	WT 7 x 24
12	240	2	1	WT 7 x 24
12	250	2	1	WT 7 x 34
12	260	2	1	WT 7 x 34
12	270	2	2	WT 7 x 34
12	280	2	2	WT 8 x 33.5
12	290	2	2	WT 8 x 33.5
12	300	2	2	WT 8 x 33.5

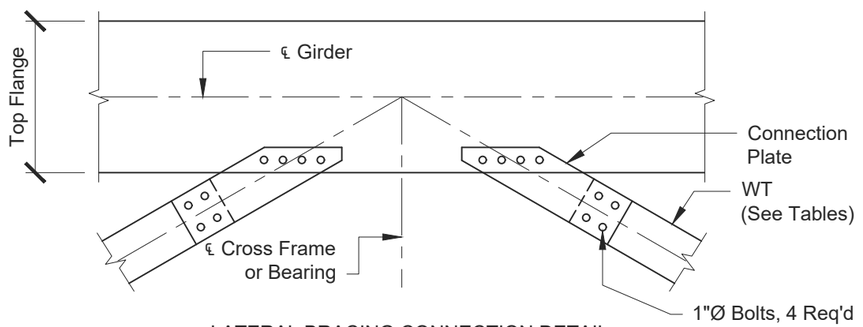
Note : Spans 220-260 are braced for deflection control.
Spans 270-300 require bracing for deflection control, for flange lateral stresses and for global stability.

SPACING	SPAN LENGTH	DIAGONALS PER PANEL	NUMBER OF BRACED PANELS	BRACING SIZE
14	230	2	1	WT 7 x 24
14	240	2	1	WT 7 x 24
14	250	2	1	WT 7 x 24
14	260	2	1	WT 7 x 34
14	270	2	2	WT 7 x 34
14	280	2	2	WT 7 x 34
14	290	2	2	WT 8 x 33.5
14	300	2	2	WT 8 x 33.5

Note : Spans 230-260 are braced for deflection control.
Spans 270-300 require bracing for deflection control, for flange lateral stresses and for global stability.

NOTES AND DESIGN CRITERIA:

1. Lateral bracing is required for the indicated spans. Bracing shown is needed to control lateral deflections and flange stresses during construction, for global stability during deck placement, or a combination of those factors.
2. Lateral deflections due to wind loads during erection satisfy Span / 150 requirement established by PennDOT BD-620M.
   - 2.1. 32 psf assumed pressure applied to fascia beams only for a superstructure height = 30 ft.
   - 2.2. Deflections were estimated as a uniformly loaded beam having the midspan lateral stiffness properties. More detailed checks should be performed in final design.
3. Girder flange lateral bending and lateral bracing are designed for strength as follows:
   - 3.1. Midspan 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
     - 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 sizes determined to transfer the wind load at each end of the span.
5. Bracing members designed as eccentrically loaded WTs in compression using *Tables for Eccentrically Loaded WT Shapes in Compression*, AISC Engineering Journal, Second Quarter, 2010.
6. When lateral bracing is used, deflection and stress checks are based on treating the unbraced portion of the beam as an assumed simply suported span in the lateral direction.



LATERAL BRACING CONNECTION DETAIL

LATERAL BRACING DETAILS

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BOLTED FIELD SPLICES

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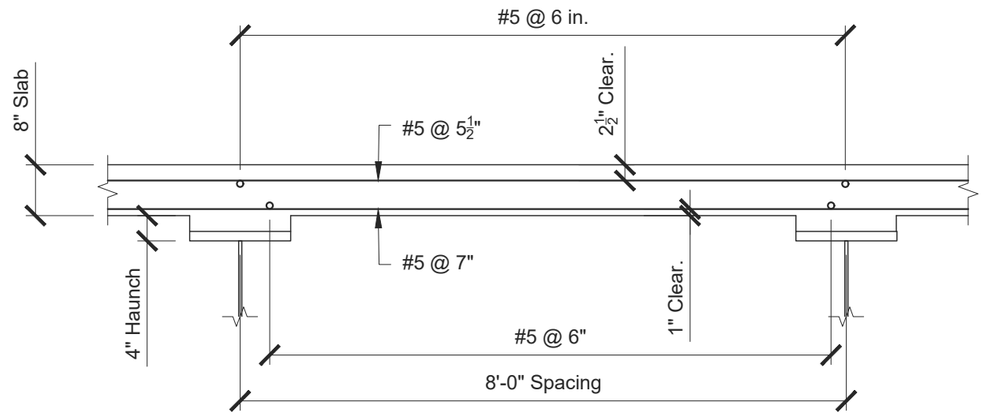
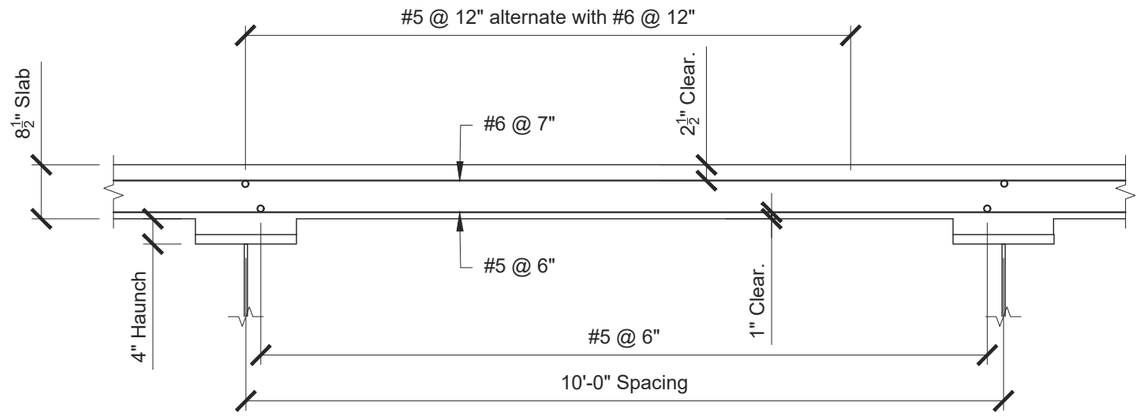
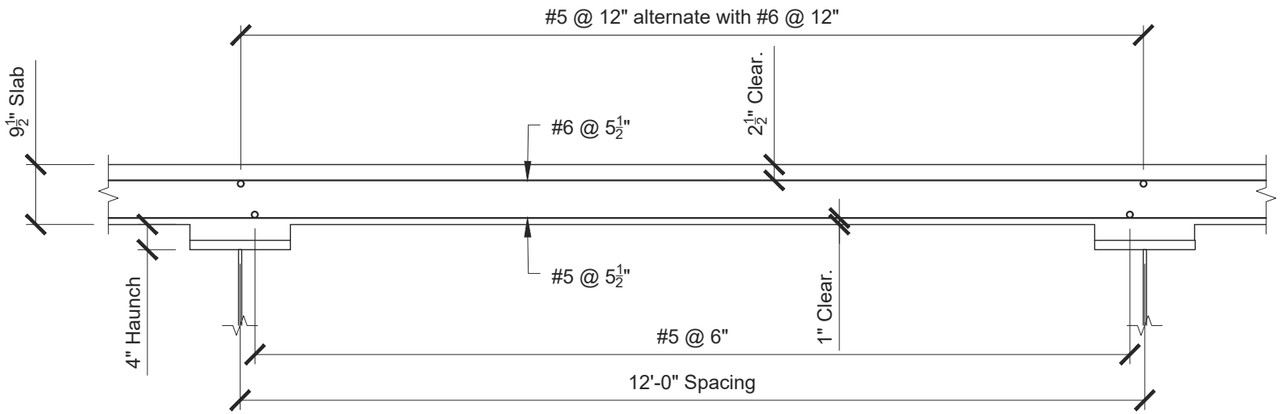


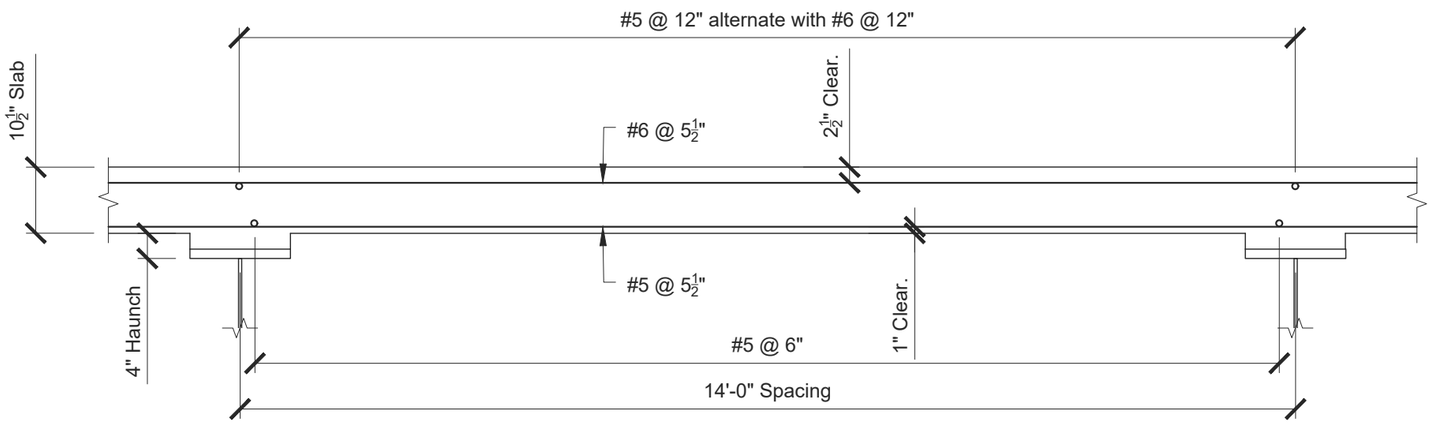
8 FT SPACING



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 due to wear.
3. The details are for negative moment regions of the span and represent an acceptable longitudinal 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 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 steel for negative moment region design.
6. The 1% steel is assumed to exist between bolted splices on either side of a pier. The longitudinal steel is assumed to be 0 otherwise.

DECK DETAILS

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