



Standard Plans for Steel Bridges

# Single Span Bridges and Multi-span Bridges with Link Slabs



**Smarter.  
Stronger.  
Steel.**





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by

American Institute of Steel Construction

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# AISC STANDARD PLANS FOR STEEL BRIDGES

## SINGLE SPAN BRIDGES AND MULTI-SPAN BRIDGES WITH LINK SLABS

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

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Steel.**

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SHEET INDEX

GENERAL NOTES:

Specifications:

AASHTO LRFD Bridge Design Specifications, 10th Edition.

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

Materials:

Girder Webs and Flanges

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

Gr HPS 70W flanges are noted with a ▲

Stiffeners

A709 Gr 50W

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

Lateral Bracing and Diaphragm / Crossframe Members

ASTM A709 Gr 50W

Concrete Deck

$f'_c = 4$  ksi

Reinforcing Steel

$F_y = 60$  ksi

Bolts

ASTM F3125 Grade A325, diameter provided on detail sheets

Loading:

Live Load

Live load is the controlling force effects from:

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

Dead Load

Dead load assumptions:

For DC1

Slab thickness as shown in plans  
Overhang thickness = slab thickness + 4 in.  
Concrete haunch weight, 50 plf per beam  
Stay-in-place form allowance, 15 psf  
Miscellaneous steel weight:  
8 ft girder spacing - 30 plf  
10 ft girder spacing - 35 plf  
12 ft girder spacing - 40 plf  
14 ft girder spacing - 55 plf

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

For DC2

Assumed single slope TL5 railing  
600 plf divided to two beams

For DW

2 in. asphalt at 140 pcf

Final Design Dead Loads

8 ft girder spacing designs:

DC1 = 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 also designed for flange lateral bending moments from overhang brackets and concrete deck finishing machine. Flange lateral bending moments for exterior beams are provided on the **Fascia Beam Design Criteria** sheet.

Wind Load

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



GENERAL NOTES

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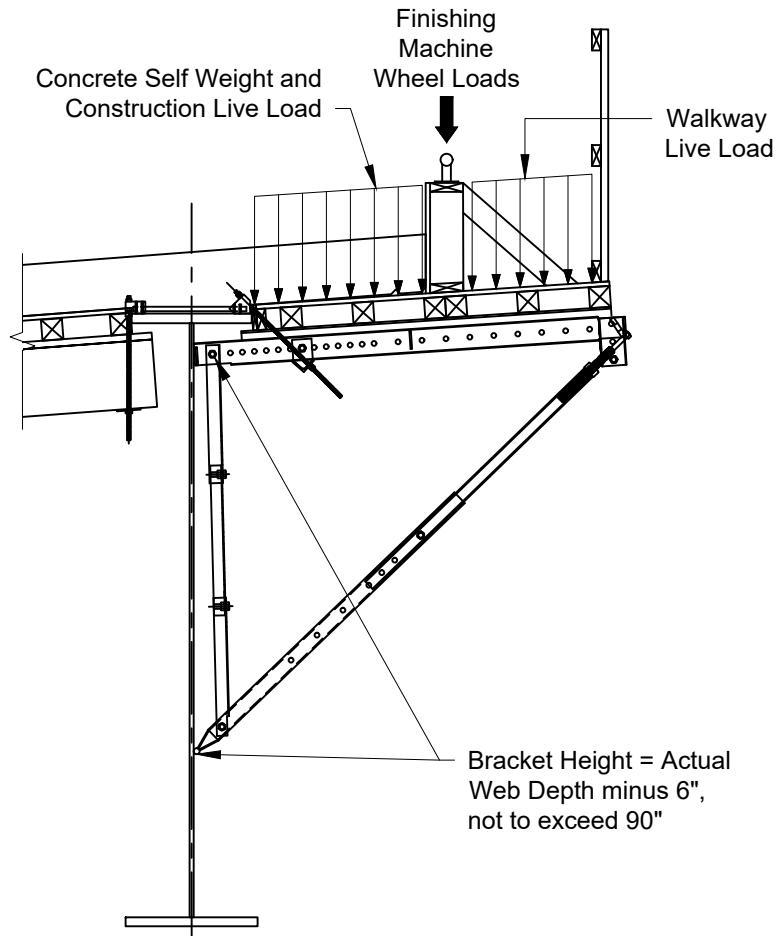
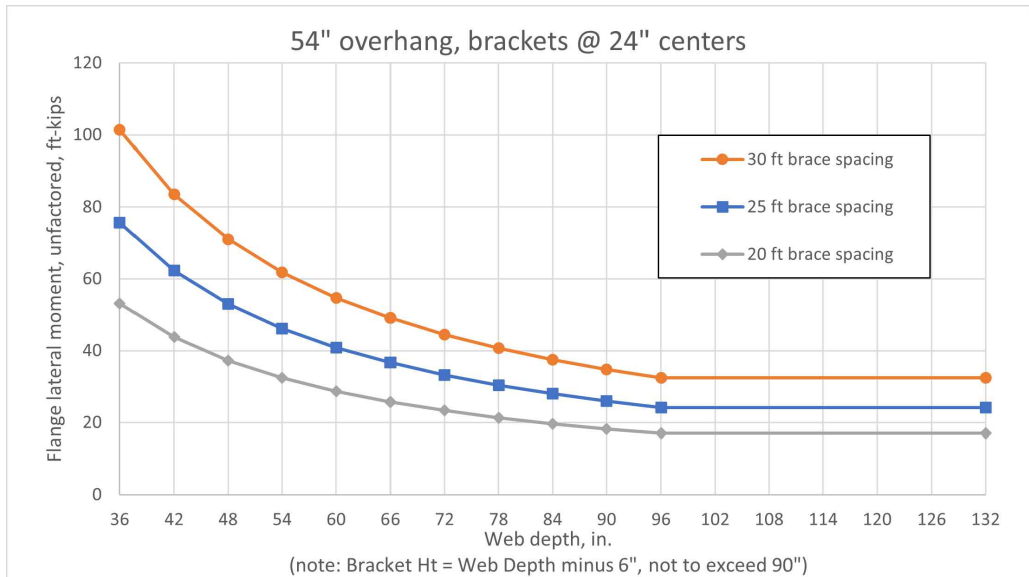
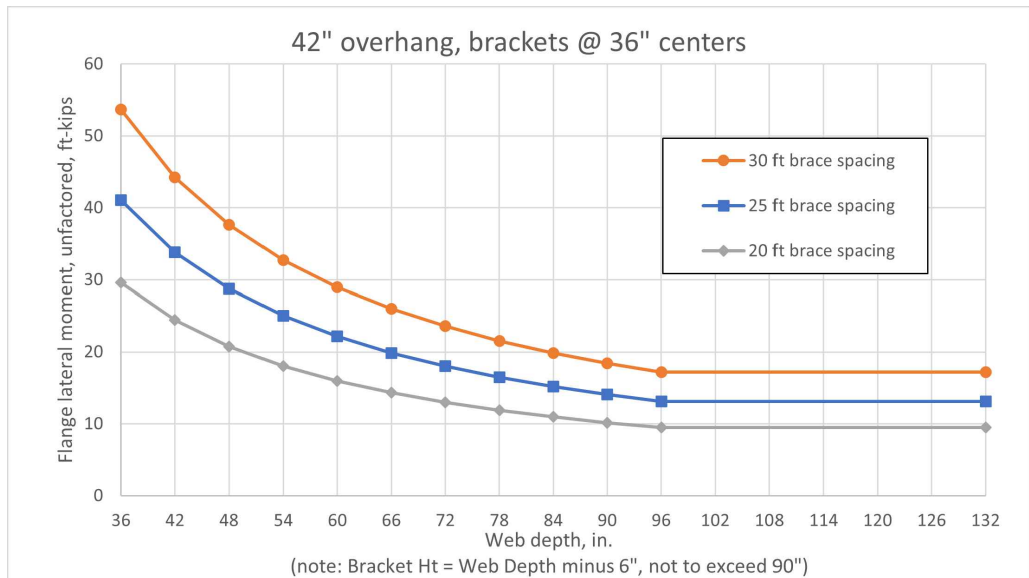
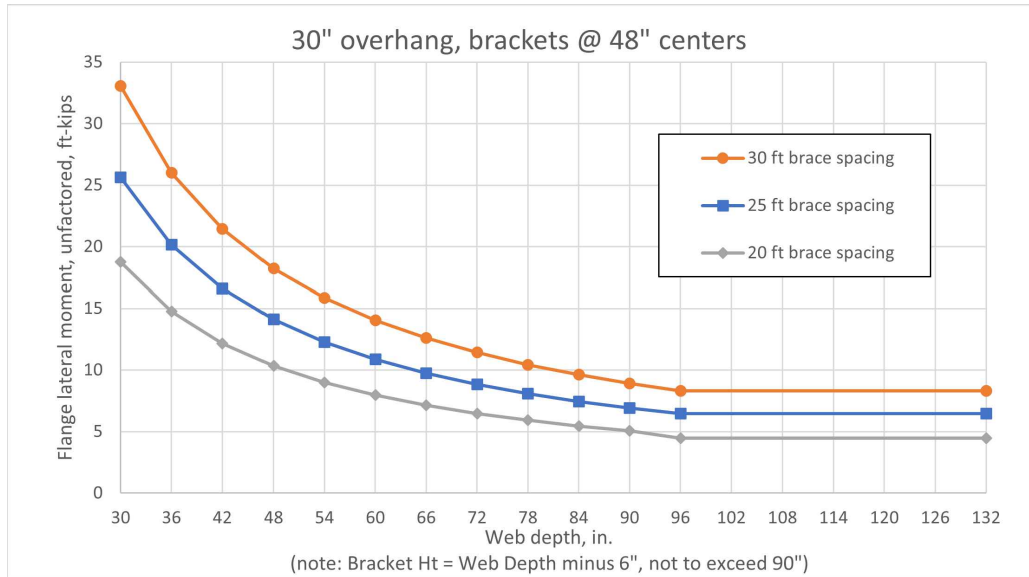
Design Assumptions and Criteria:

1. Girder Design
  - a. All designs performed using NSBA LRFD SIMON.
  - b. Interior and exterior beams were designed. In LRFD SIMON, the "BOTH" option is used for the LL distribution factors. This results in a single beam designed for the governing shear and moment distribution factors for an interior and exterior beam. The composite slab effective width is based on an exterior beam.
  - c. Live load distribution follows AASHTO LRFD 4.6.2.2 for all beam spacings and span lengths. Designs where the AASHTO distribution factor equations are used beyond the range of applicability are noted in the design tables.
  - d. A skew of 20 degrees from normal is assumed for all designs.
  - e. Live load deflection satisfies AASHTO LRFD 2.5.2.6.2 Criteria for Deflection for vehicular bridges, L/800.
  - f. Girder depth satisfies AASHTO LRFD 2.5.2.6.3 Optional Criteria for Span-to-Depth Ratios.
  - g. Fatigue design based on Category C for shear studs welded to top flanges and Category C' for welded transverse stiffeners,  $ADTT_{SL} = 1,000$  vehicles per day and a 75-year design life.
  - h. Maximum segment length, 140 feet.
  - i. 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 top flange width,  $b_{tfs} \geq L_{fs} / 85$  where  $L_{fs}$  is the field section length. AASHTO LRFD (C6.10.2.2-1).
  - n. Flange widths held constant in a field section.
  - o. Minimum flange thickness, 1 in. Maximum flange thickness, 3 in. Flange thickness increments, 1/4 in.
  - p. Minimum web thickness, 1/2 in. Web thickness increments, 1/8 in.
  - q. No more than two complete joint penetration flange butt welds per flange in any field section.
  - r. When a single size flange is used in a field section, the weight reduction of a complete joint penetration transition was first evaluated and then eliminated based on weight, cost, and stress considerations.
  - s. Single-sided transverse shear stiffeners are used when needed.
  - t. Longitudinal stiffeners are not used.
  - u. All girders are composite for positive and negative bending.
  - w. Shear stud design based on LRFD SIMON and AASHTO LRFD 9th edition. For flanges  $\leq 16$  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. Intermediate diaphragms and cross-frames are designed as below. End diaphragms or cross-frames that support the deck and/or expansion joint are not considered as part of these standards.
  - b. Diaphragm and cross-frame spacing is uniform in the span. Maximum spacing does not exceed 30 ft.
  - c. Depth of bracing is at least 0.8 times girder web height.
  - d. 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  $S / \text{Cosine } 20 \text{ deg}$  assuming a maximum 20 degree skew for all designs.
  - e. Solid diaphragms are used when the girder spacing to web depth ratio,  $S/D > 3.5$ .
  - f. K-frames are used when  $1.5 < S/D \leq 3.5$ .
  - g. X-frames are used when  $S/D \leq 1.5$ .
  - h. Angles are used for all cross-frame members.
  - i. Cross-Frame members are designed as secondary members.
  - j. Cross-Frame members are designed for tension / compression loading.
  - k. Cross-frame member stiffness is based on 0.65AE stiffness reduction factor for eccentrically loaded angles, AASHTO LRFD C4.6.3.3.4.
  - l. Diaphragms and cross-frames are designed for combined stability-induced loads along with simultaneous deck casting forces. The finishing machine is assumed to be centered at a brace point location.
3. Top Flange Lateral Bracing Design
  - a. Lateral bracing is used to control wind load lateral deformations of the completed steel in an inactive work zone condition and to provide stiffness and strength during the deck casting sequence. See the **Lateral Bracing Details** sheet for additional information. Designer to coordinate final lateral bracing details with deck forming method and details.
4. Bolted Field Splices
  - a. All bolted field splices use 1 in. diameter ASTM F3125 Grade A325 bolts and standard sized holes.
  - b. All connection and fill plates are Gr 50W.
  - c. Slip resistance is based on a Class B surface condition.
  - d. For connections where the bottom flange and a portion of the web are required to be in tension to resist the factored moments at the point of splice an additional check was made to determine if the slab has adequate compression strength. This check is not in AASHTO. If the slab is unable to provide a compression capacity equal to the tensile forces of the bottom flange and web in tension, the connection was designed as a noncomposite splice. If or when this situation occurs, these splices are noted "Non-Composite" in the **Bolted Field Splices** sheets. This condition was commonly encountered in the simple spans between 150 - 300 ft in length with splices located in regions of significant flexure.

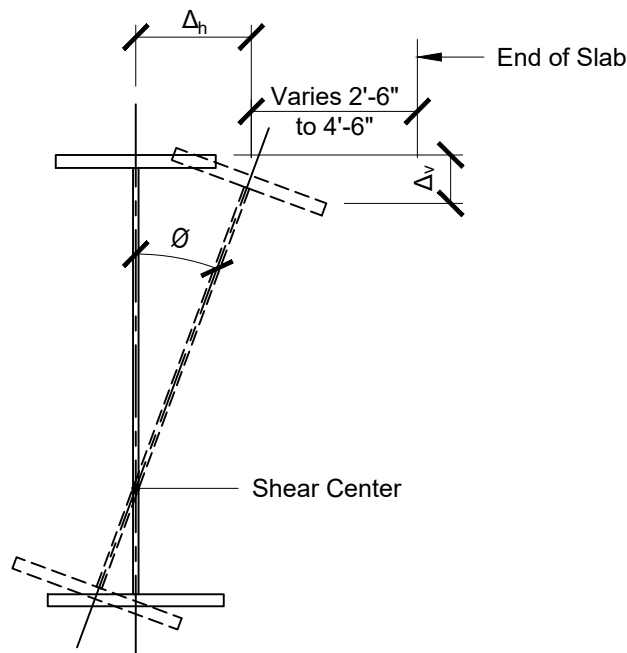


GENERAL DESIGN CRITERIA

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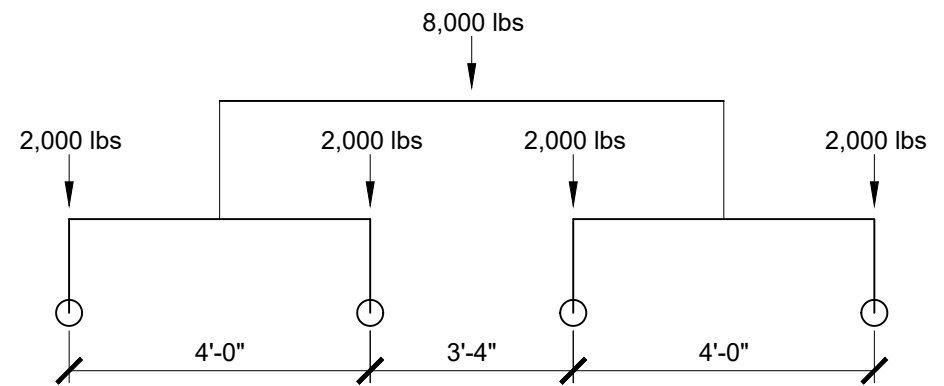
#### TYPICAL SECTION



#### GIRDER ROTATION DIAGRAM

#### Fascia Beam Design Criteria:

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



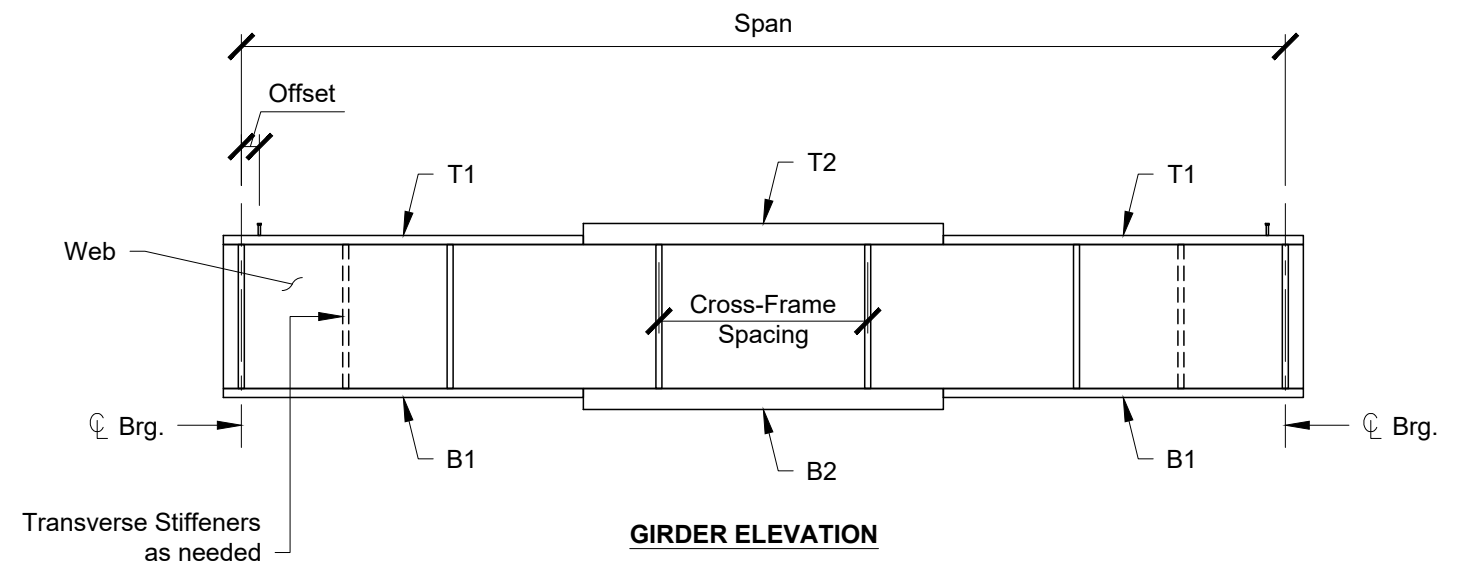
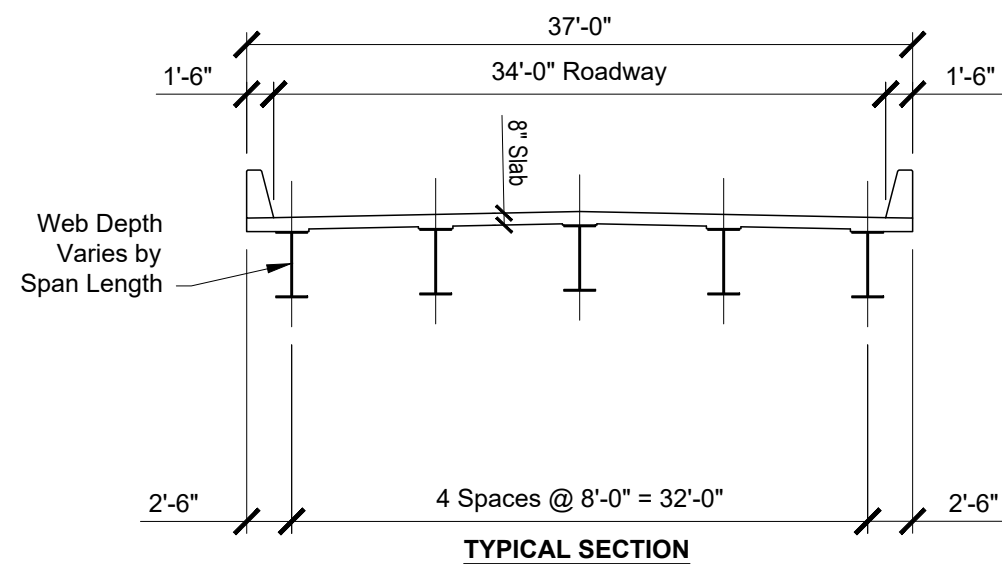
#### ASSUMED FINISHING MACHINE



#### FASCIA BEAM DESIGN CRITERIA

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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	---	14 x 1.25 x 80	---	14 x 1.25 x 80
90	36 x 0.5 x 90	---	14 x 1.25 x 90	---	14 x 1.5 x 90
100	42 x 0.5 x 100	---	15 x 1 x 100	---	16 x 1.25 x 100
110	44 x 0.5 x 110	---	16 x 1.25 x 110	16 x 1 x 28	16 x 1.5 x 54
120	46 x 0.5 x 120	---	17 x 1.25 x 120	18 x 1 x 28	18 x 1.5 x 64
130	50 x 0.5 x 130	---	18 x 1 x 130	18 x 1 x 27	18 x 1.75 x 76
140	54 x 0.5 x 140	---	20 x 1 x 140	20 x 1 x 30	20 x 1.5 x 80

Note: All plates are A709 Gr 50W

TRANSVERSE AND BEARING STIFFENERS					
Span ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

GIRDER WEIGHT	
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.

CROSS-FRAME 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

DEAD AND LIVE LOAD REACTIONS				
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.



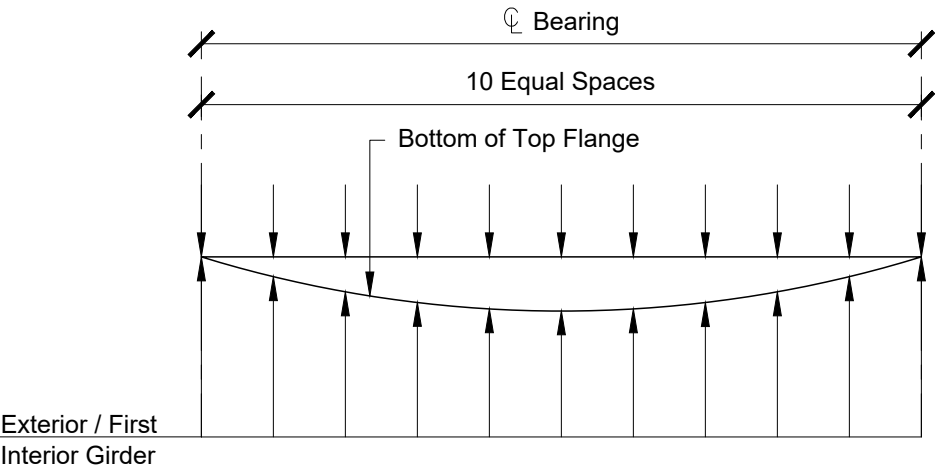
## SINGLE SPAN 80-140 FT 8 FT SPACING

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DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
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 Assumptions

"Steel Only" = self weight of girders

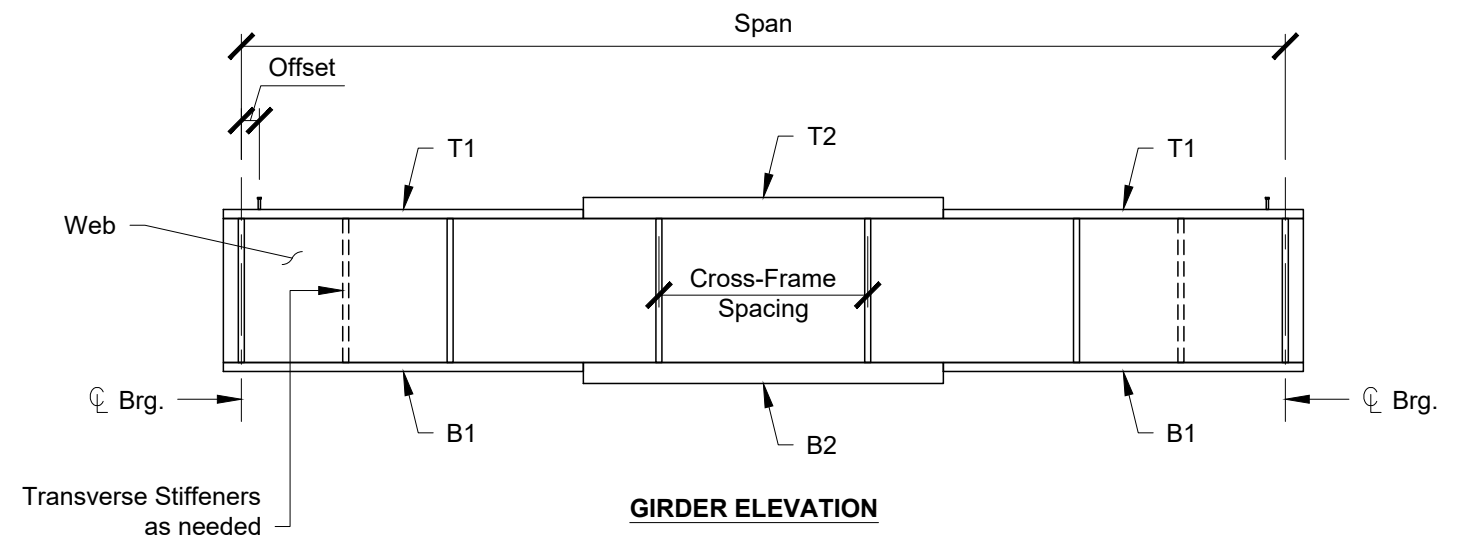
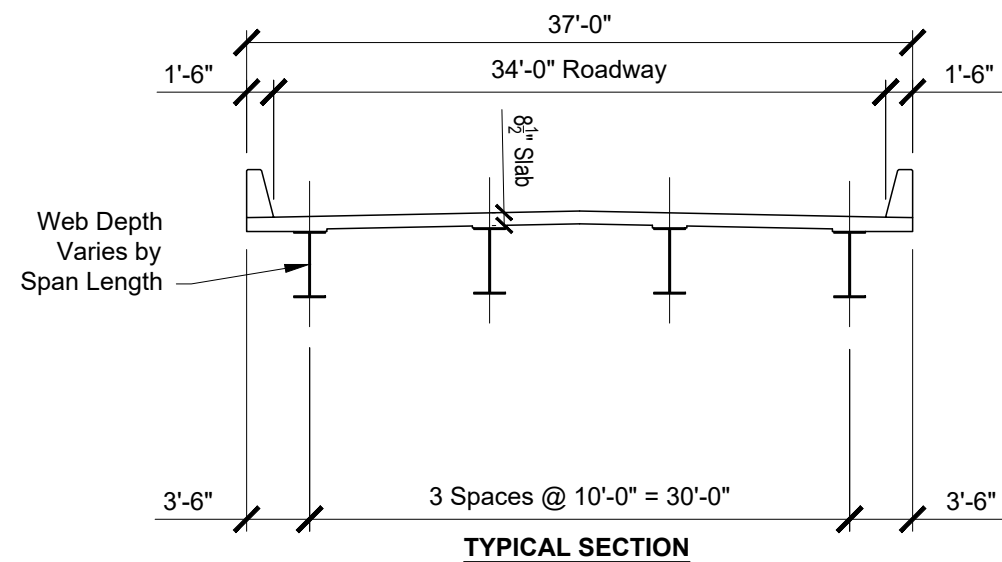
"Slab" = deflection due to user-input non composite uniform dead load (slab, haunch, allowance for bracing)

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



SINGLE SPAN 80-140 FT  
8 FT SPACING

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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	---	15 x 1 x 80	---	15 x 1.5 x 80
90	39 x 0.5 x 90	---	16 x 1.25 x 90	---	16 x 1.75 x 90
100	42 x 0.5 x 100	---	16 x 1.25 x 100	16 x 1 x 22	16 x 1.75 x 56
110	46 x 0.5 x 110	---	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	---	18 x 1.25 x 120	22 x 1 x 25	22 x 1.5 x 70
130	53 x 0.5 x 130	---	18 x 1.25 x 130	22 x 1 x 30	22 x 1.5 x 70
140	55 x 0.5 x 140	---	21 x 1.25 x 140	22 x 1 x 27	22 x 1.75 x 86

Note: All plates are A709 Gr 50W

TRANSVERSE AND BEARING STIFFENERS					
Span, ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

GIRDER WEIGHT	
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.

CROSS-FRAME 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

DEAD AND LIVE LOAD REACTIONS				
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

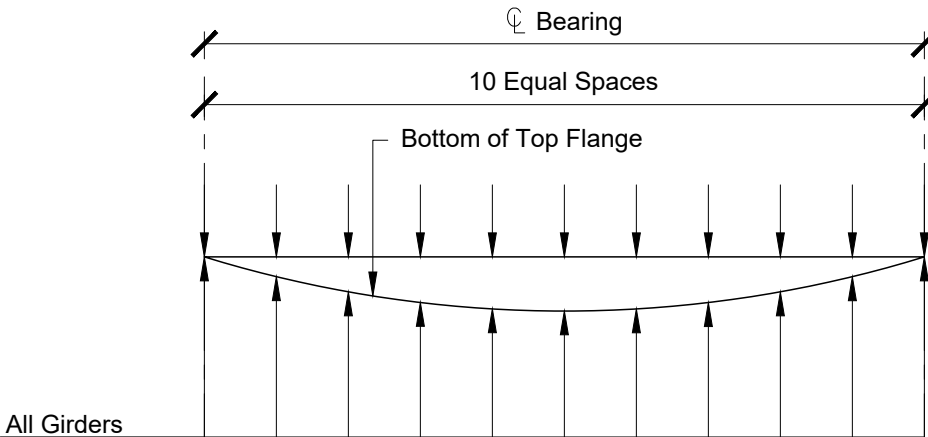
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DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
80 ft. span - steel only, in.	0.00	0.13	0.24	0.33	0.39	0.41	0.39	0.33	0.24	0.13	0.00
slab, in.	0.00	0.83	1.57	2.15	2.52	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

Deflection Assumptions

"Steel Only" = self weight of girders

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

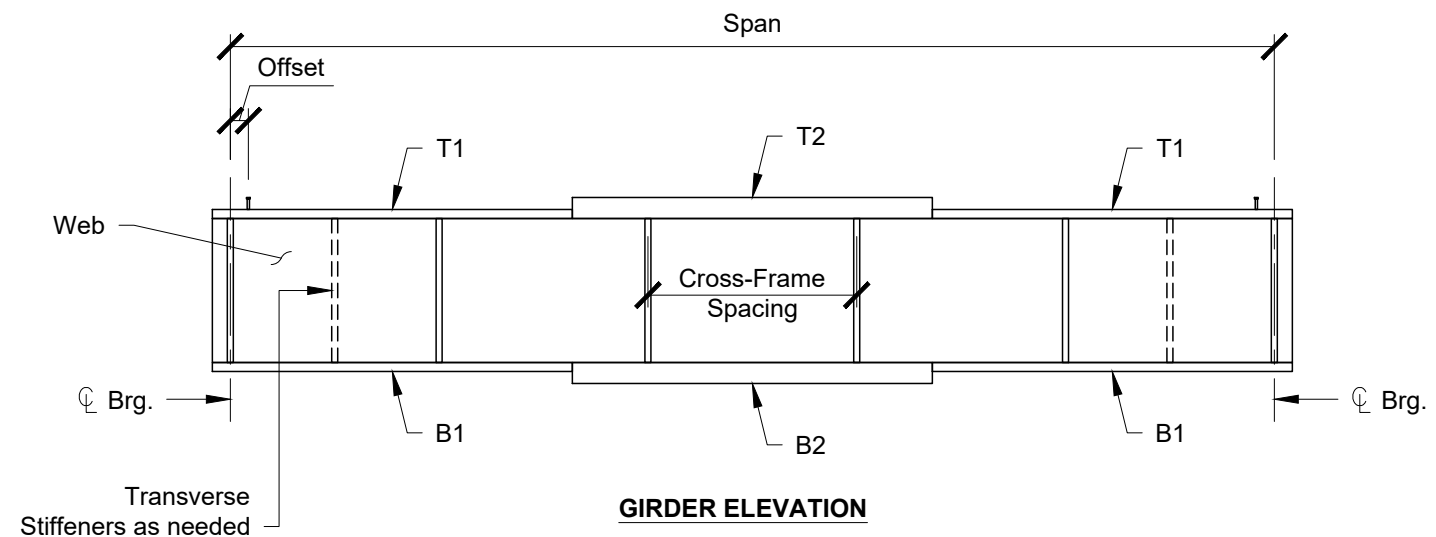
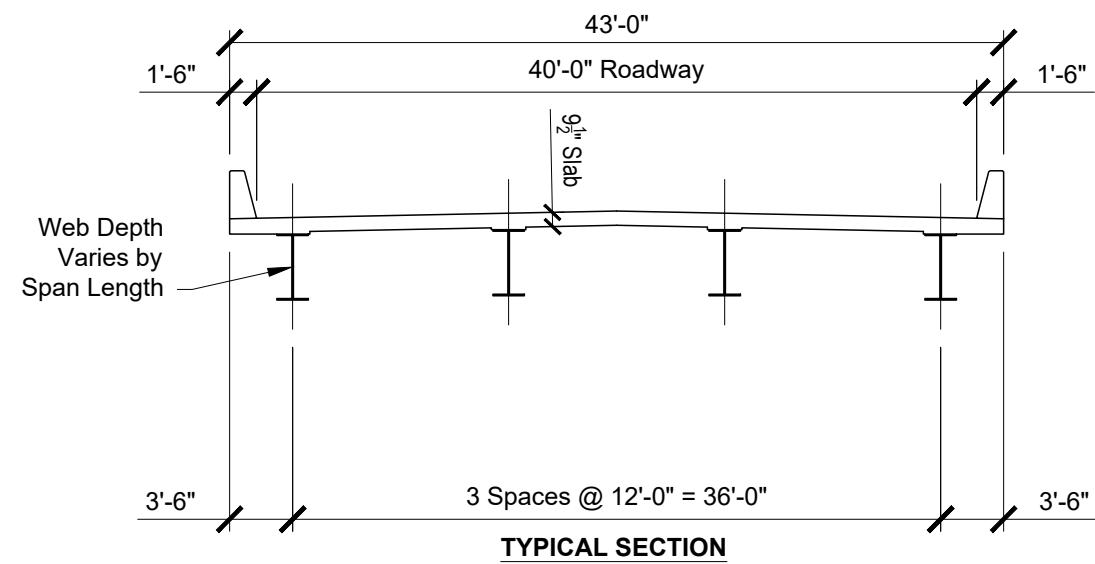
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



SINGLE SPAN 80-140 FT  
10 FT SPACING

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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	---	15 x 1.25 x 80	---	15 x 1.5 x 80
90	38 x 0.5 x 90	---	16 x 1.25 x 90	---	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 Gr 50W

TRANSVERSE AND BEARING STIFFENERS					
Span, ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

GIRDER WEIGHT	
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.

CROSS-FRAME 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	28	K-Frame

DEAD AND LIVE LOAD REACTIONS				
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.



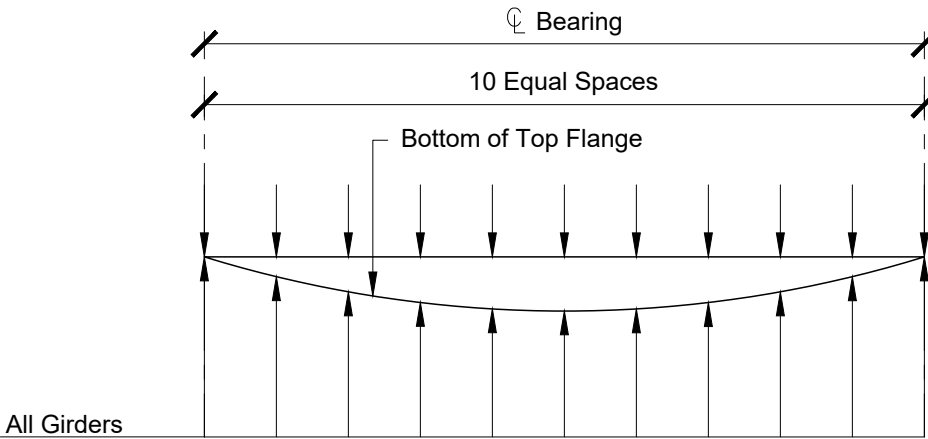
## SINGLE SPAN 80-140 FT 12 FT SPACING

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DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
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

Deflection Assumptions

"Steel Only" = self weight of girders

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

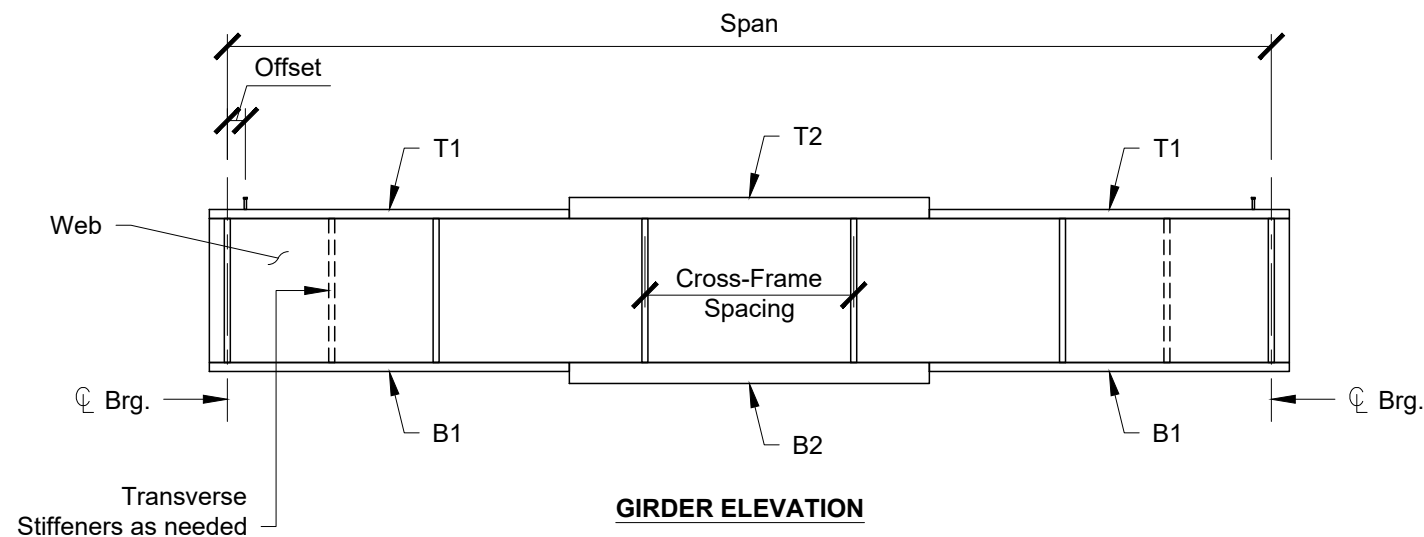
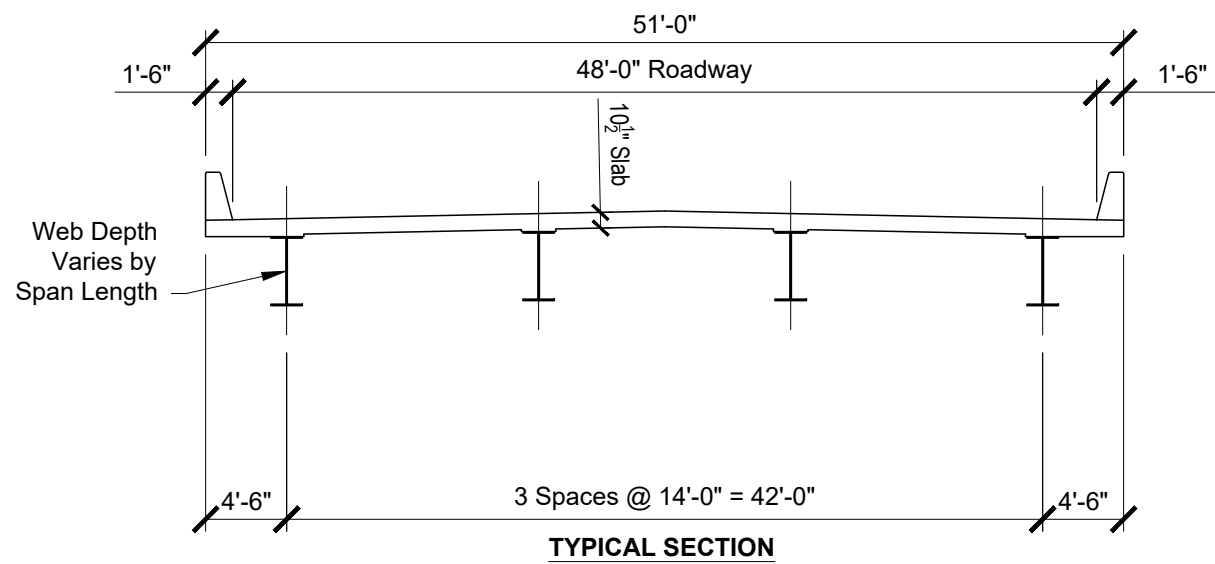
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



SINGLE SPAN 80-140 FT  
12 FT SPACING

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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	---	15 x 1.75 x 80	---	15 x 1.75 x 80
90	39 x 0.5 x 90	---	18 x 1.75 x 90	---	18 x 1.75 x 90
100	45 x 0.625 x 100	---	18 x 1.5 x 100	---	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 Gr 50W

TRANSVERSE AND BEARING STIFFENERS					
Span, ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

GIRDER WEIGHT	
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.

CROSS-FRAME 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

DEAD AND LIVE LOAD REACTIONS				
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.



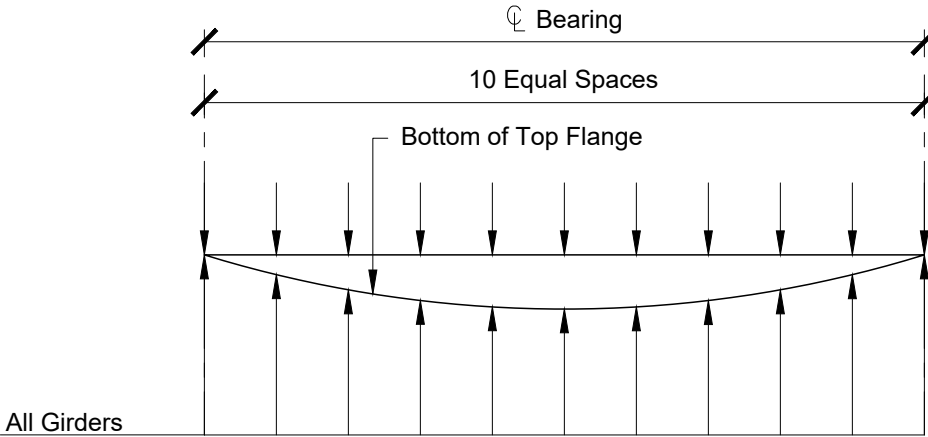
## SINGLE SPAN 80-140 FT 14 FT SPACING

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DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
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

Deflection Assumptions

"Steel Only" = self weight of girders

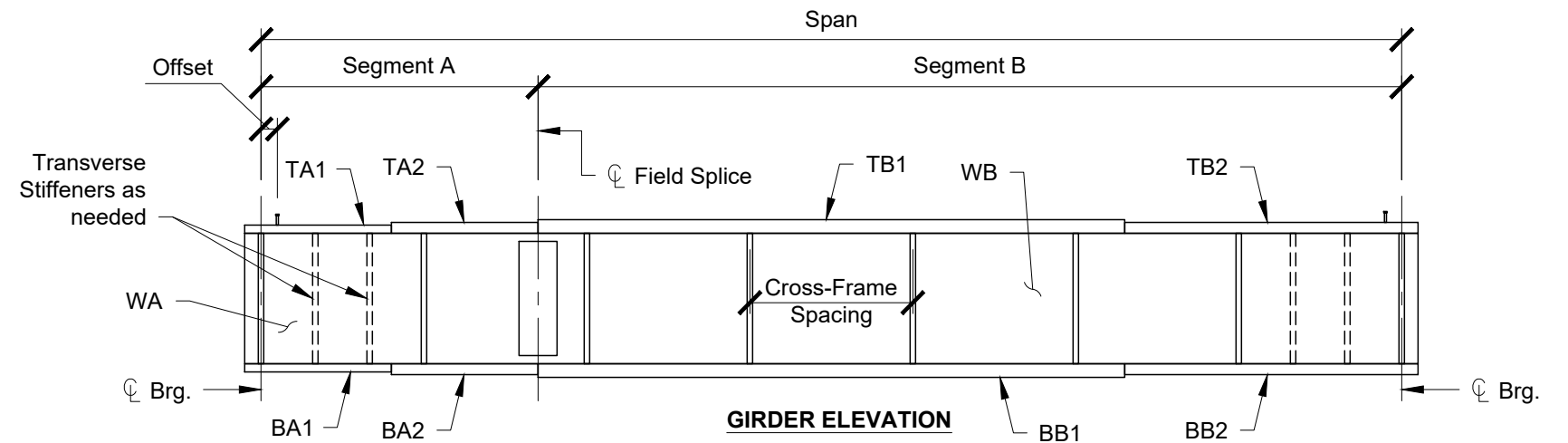
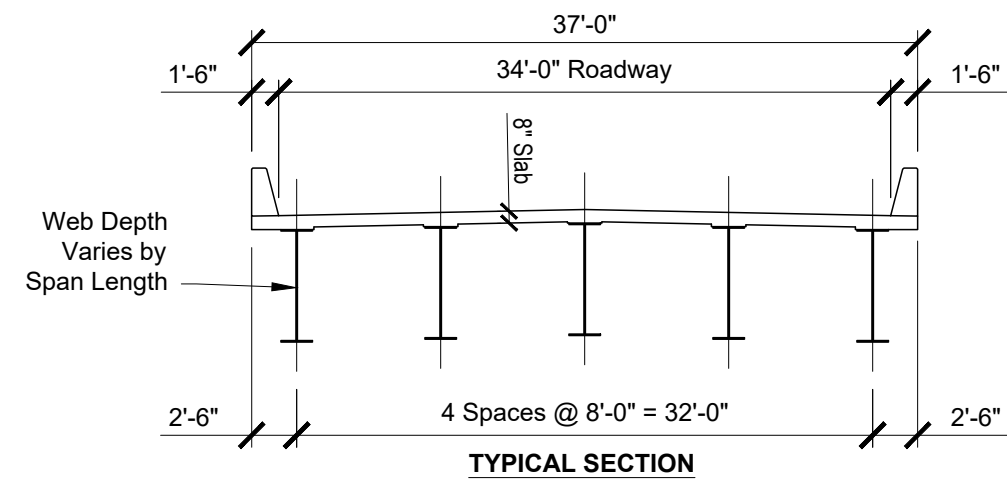
"Slab" = deflection due to user-input non composite uniform dead load (slab, haunch, allowance for bracing)

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



SINGLE SPAN 80-140 FT  
14 FT SPACING

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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	---	18 x 1 x 38	---	22 x 1.5 x 38	60 x 0.5 x 112	20 x 1 x 112	---	22 x 1.5 x 74	22 x 1 x 38	---
160	64 x 0.5 x 40	---	18 x 1 x 40	---	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	---
170	70 x 0.625 x 43	---	19 x 1 x 43	---	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	---
180	74 x 0.625 x 45	---	20 x 1 x 45	---	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	---
190	80 x 0.625 x 63	---	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	---	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	---	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 Gr 50W

Footnotes:

- AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.
- Lateral bracing required for deck casting stability and / or wind loads. See [Lateral Bracing Details](#) sheet.

TRANSVERSE AND BEARING STIFFENERS					
Span ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

GIRDER WEIGHT			
Span, ft.	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.

CROSS-FRAME 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

DEAD LOAD AND LIVE LOAD REACTIONS				
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.



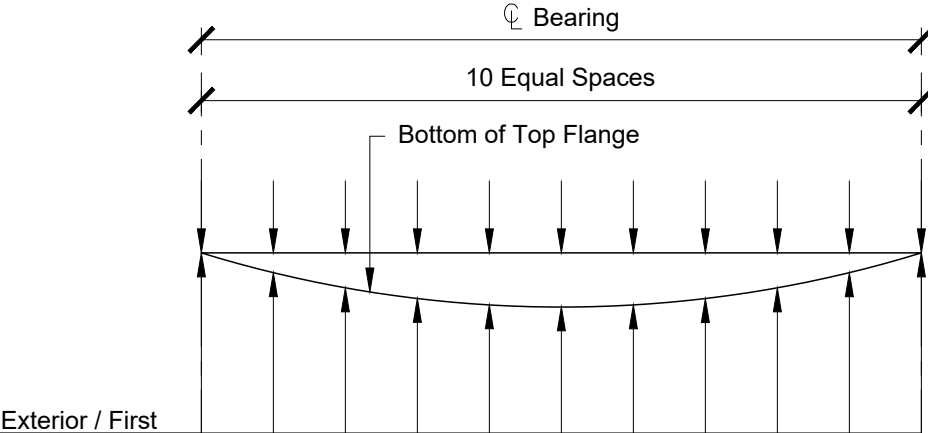
## SINGLE SPAN 150-210 FT 8 FT SPACING

Issued January 2025  
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DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
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	3.35	6.32	8.62	10.08	10.61	10.15	8.74	6.50	3.47	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

Deflection Assumptions

"Steel Only" = self weight of girders

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

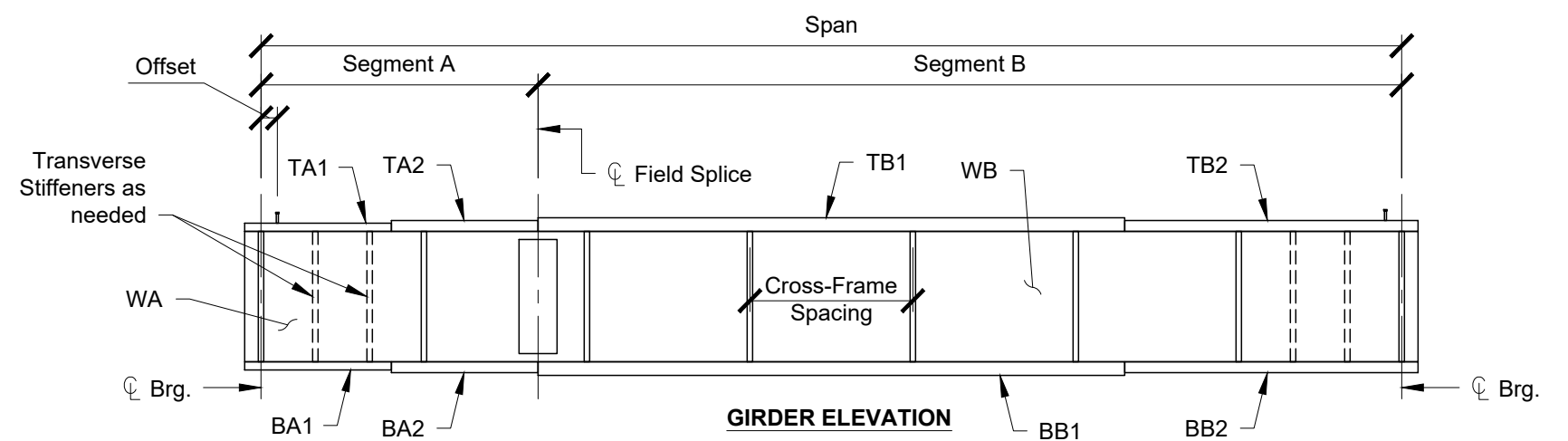
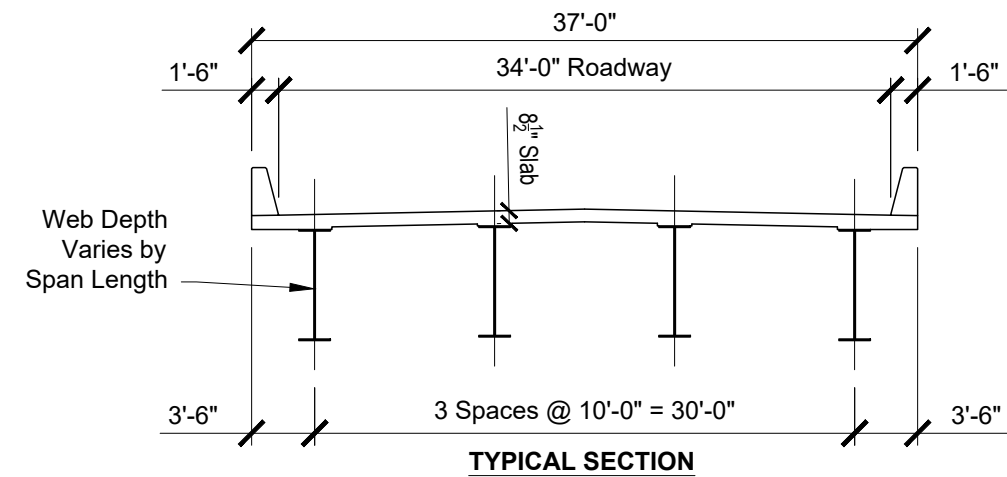
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



SINGLE SPAN 150-210 FT  
8 FT SPACING

Issued January 2025  
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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	---	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	---
160	64 x 0.625 x 40	---	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	---
170	68 x 0.625 x 43	---	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	---
180	74 x 0.625 x 45	---	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 Gr 50W

Footnotes:

- AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.
- Lateral bracing required for deck casting stability and / or wind loads. See [Lateral Bracing Details](#) sheet.

TRANSVERSE AND BEARING STIFFENERS					
Span ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

GIRDER WEIGHT			
Span, ft.	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.

CROSS-FRAME 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

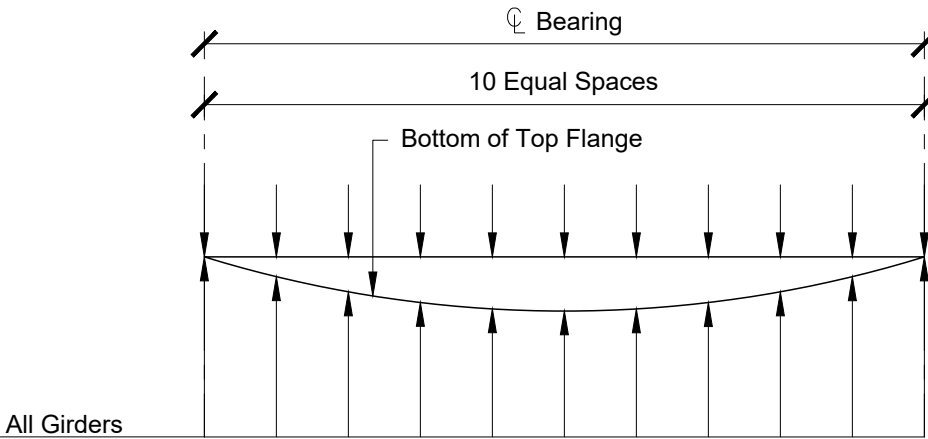
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DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
150 ft. span - steel only, in.	0.00	0.64	1.18	1.60	1.86	1.95	1.86	1.60	1.18	0.64	0.00
slab, in.	0.00	2.35	4.37	5.90	6.86	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

Deflection Assumptions

"Steel Only" = self weight of girders

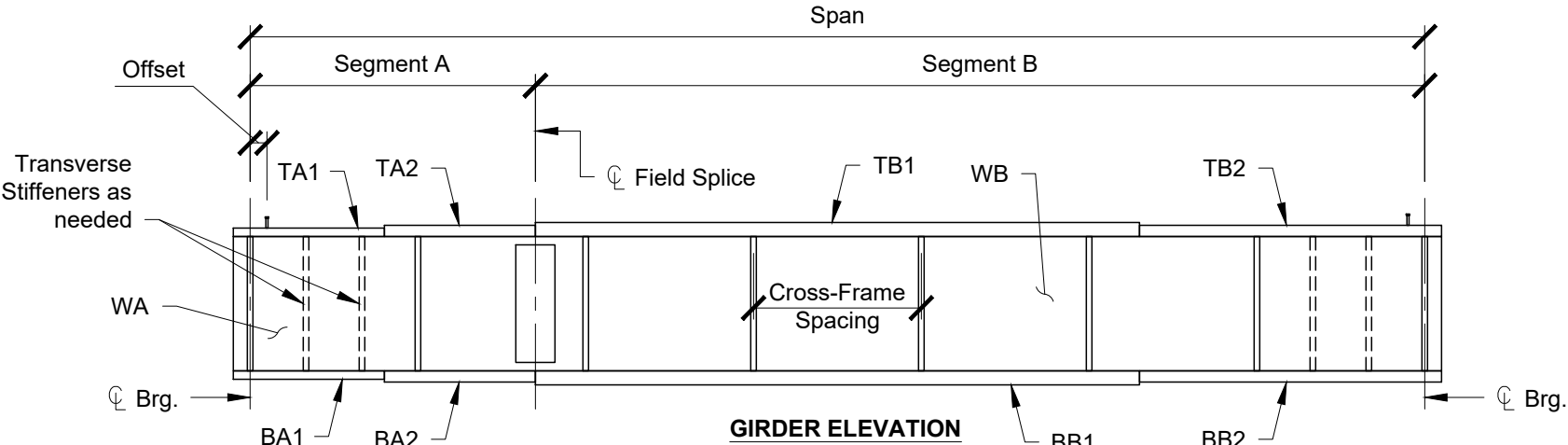
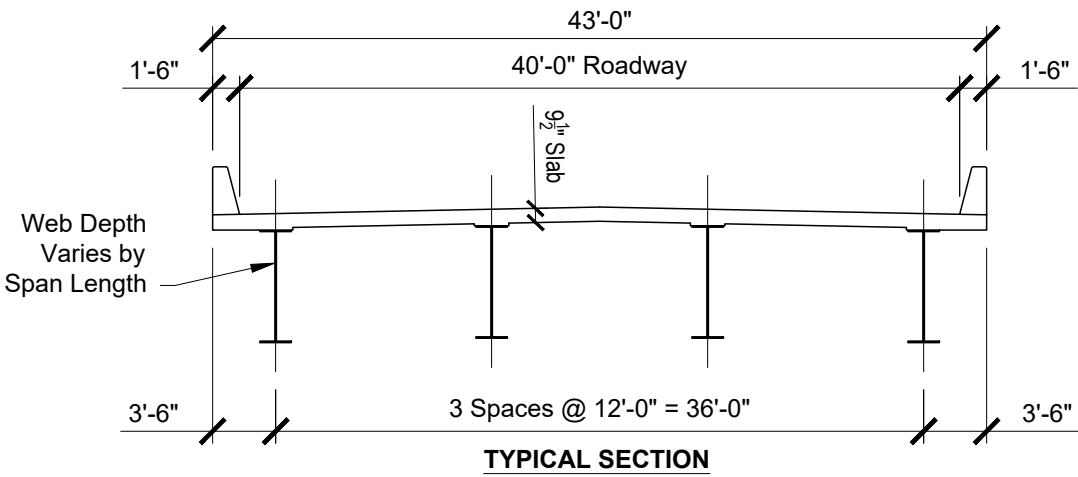
"Slab" = deflection due to user-input non composite uniform dead load (slab, haunch, allowance for bracing)

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



SINGLE SPAN 150-210 FT  
10 FT SPACING

Issued January 2025  
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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	---	21 x 1.5 x 38	22 x 1 x 26	22 x 2 x 12	60 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	---
160	64 x 0.625 x 40	---	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	---
170	70 x 0.625 x 43	---	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	---
180	77 x 0.625 x 45	---	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	---
190	80 x 0.75 x 50	---	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	---
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	---
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	---

Note: All plates are A709 Gr 50W

Footnotes:

a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.

b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TRANSVERSE AND BEARING STIFFENERS					
Span ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

GIRDER WEIGHT			
Span, ft.	Segment A tons	Segment B tons	Total tons
150	6.33	20.65	26.98
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.

CROSS-FRAME 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

DEAD LOAD AND LIVE LOAD REACTIONS				
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.



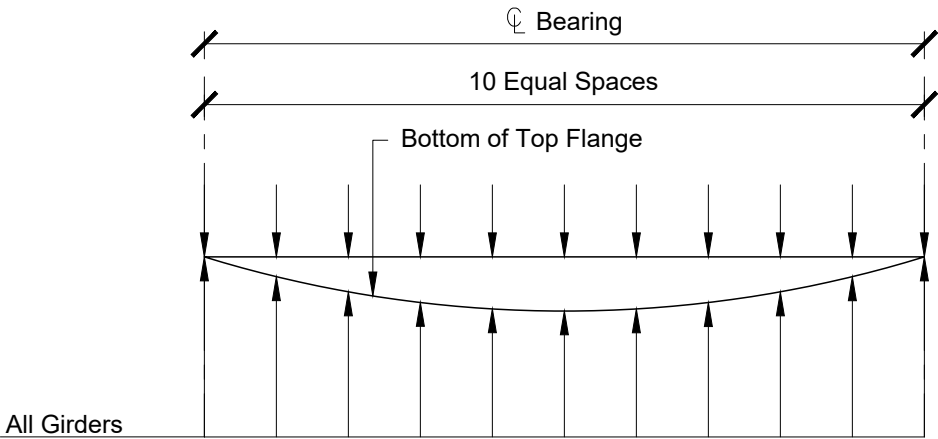
SINGLE SPAN 150-210 FT  
12 FT SPACING

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DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
150 ft. span - steel only, in.	0.00	0.59	1.10	1.49	1.74	1.83	1.74	1.50	1.12	0.60	0.00
slab, in.	0.00	2.39	4.45	6.03	7.04	7.39	7.06	6.09	4.54	2.46	0.00
barrier rails, in.	0.00	0.27	0.50	0.67	0.78	0.82	0.78	0.67	0.50	0.27	0.00
150 ft. span - total, in.	0.00	3.25	6.05	8.19	9.56	10.03	9.59	8.26	6.15	3.33	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	12	8	8	127	12	127	22	8	14.67
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

Deflection Assumptions

"Steel Only" = self weight of girders

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

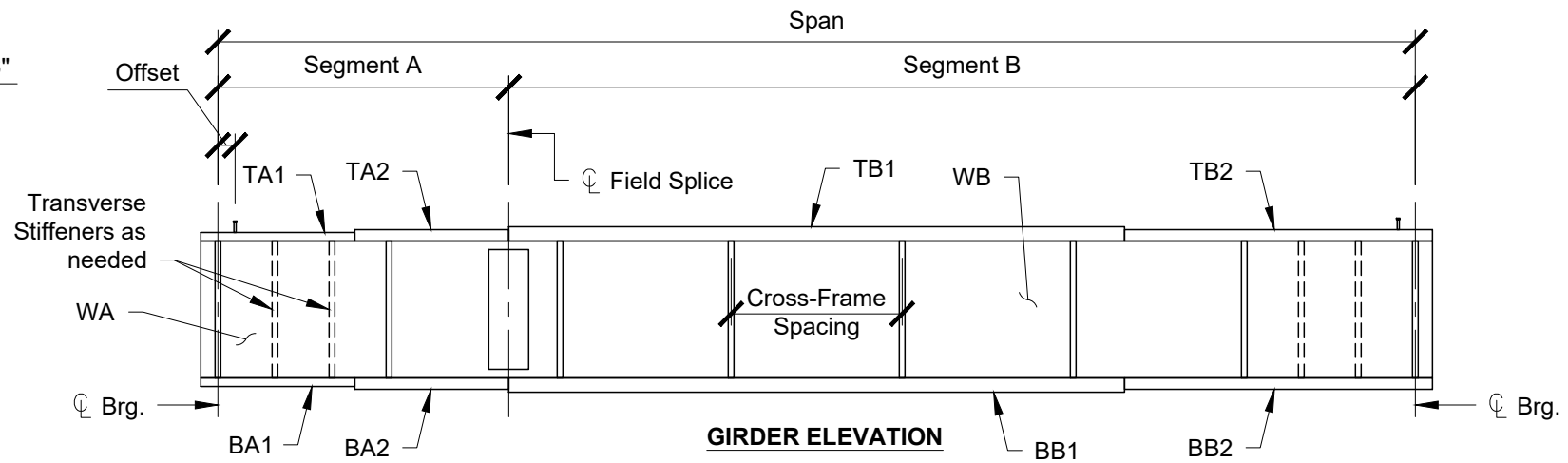
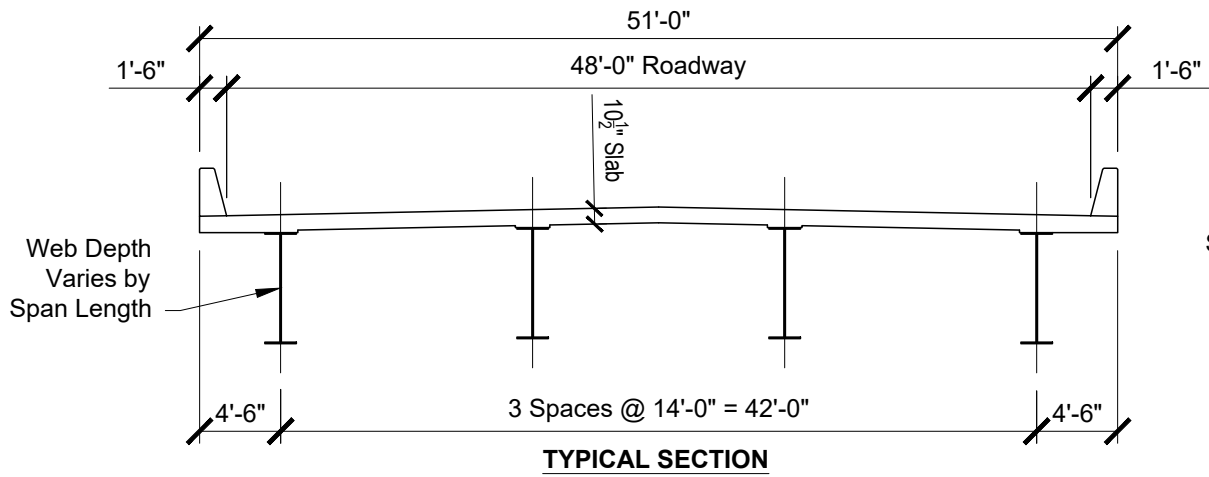
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



SINGLE SPAN 150-210 FT  
12 FT SPACING

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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	---	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	---
160	64 x 0.625 x 40	---	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	---
170	70 x 0.625 x 43	---	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	---
180	76 x 0.625 x 45	---	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	---
190	82 x 0.75 x 50	---	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	---
200	84 x 0.75 x 60	---	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	---
210	92 x 0.75 x 70	---	24 x 1.75 x 70	32 x 1.75 x 60	32 x 2.5 x 10	92 x 0.75 x 140	24 x 2 x 75	24 x 1.75 x 65	32 x 2.5 x 75	32 x 1.75 x 65	---

Note: All plates are A709 Gr 50W

Footnotes:

a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.

b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TRANSVERSE AND BEARING STIFFENERS					
Span ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

GIRDER WEIGHT			
Span, ft.	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	20.30	43.61	63.90

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.

CROSS-FRAME 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	304	29	116	85

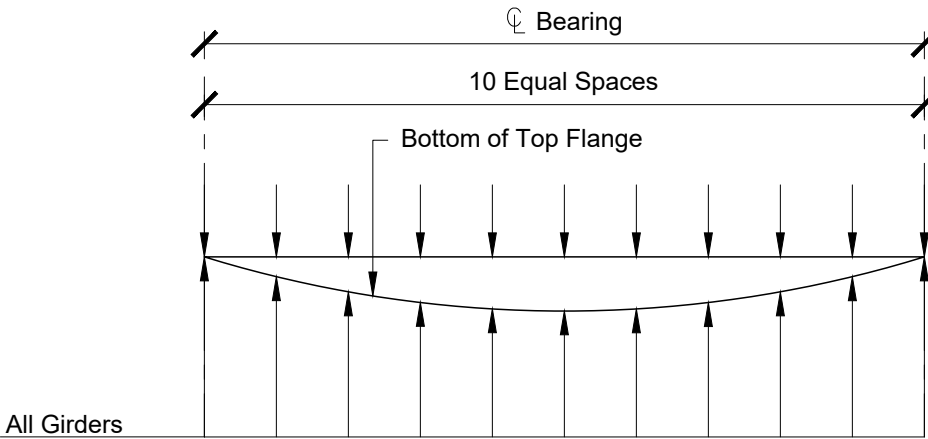
Note: Truck and lane reactions include distribution factors, skew correction, and impact on the truck loading.



SINGLE SPAN 150-210 FT  
14 FT SPACING

DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
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	3.21	6.03	8.16	9.47	9.94	9.51	8.23	6.08	3.23	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
210 ft. span - total, in.	0.00	4.51	8.49	11.49	13.35	14.00	13.40	11.59	8.56	4.55	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

Deflection Assumptions

"Steel Only" = self weight of girders

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

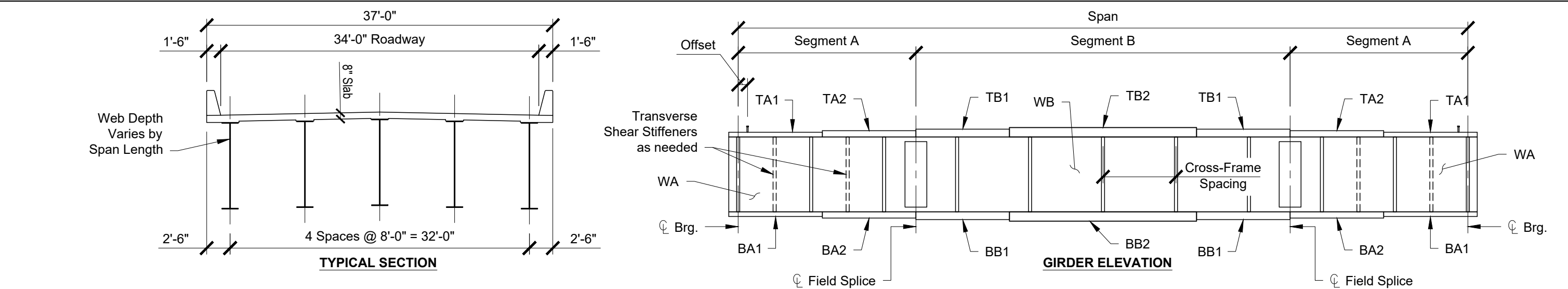
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



SINGLE SPAN 150-210 FT  
14 FT SPACING

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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	---	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	---	24 x 1.75 x 110	---	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	---	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	---	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	---	20 x 1.5 x 65	22 x 1 x 55	22 x 2 x 10	112 x 0.875 x 130	---	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	---	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	---	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 A709 Gr 50W except those noted with a ▲ are Gr HPS 70W

Footnotes:

a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.

b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TRANSVERSE AND BEARING STIFFENERS					
Span ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

CROSS-FRAME 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

DEAD LOAD AND LIVE LOAD REACTIONS				
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: 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.

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

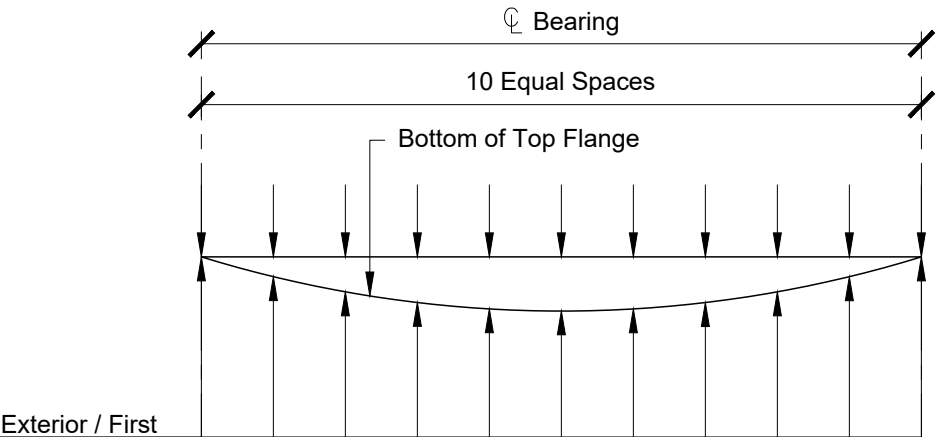


SINGLE SPAN 220-300 FT  
8 FT SPACING

Issued January 2025  
Revision 0

DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
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

Deflection Assumptions

"Steel Only" = self weight of girders

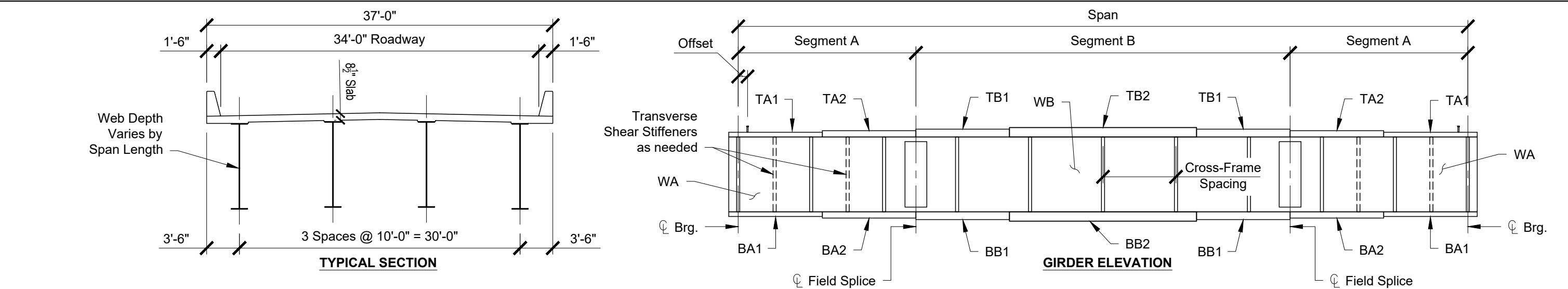
"Slab" = deflection due to user-input non composite uniform dead load (slab, haunch, allowance for bracing)

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



SINGLE SPAN 220-300 FT  
8 FT SPACING

Issued January 2025  
Revision 0



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	---	22 x 1 x 53	24 x 1 x 40	24 x 2 x 13	92 x 0.75 x 114	---	26 x 1.75 x 114	---	28 x 1.75 x 114	b
230	98 x 0.75 x 60	---	24 x 1.25 x 60	26 x 1.25 x 50	26 x 2 x 10	98 x 0.75 x 110	---	26 x 1.75 x 110	---	28 x 1.75 x 110	b
240	103 x 0.75 x 60	---	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	---	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	---	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	---	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	---	30 x 2 x 130	---	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	---	30 x 1.5 x 140 ▲	---	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	---	30 x 1.25 x 130 ▲	30 x 1.5 x 30 ▲	30 x 1.75 x 70 ▲	a, b

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

Footnotes:

a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.

b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TRANSVERSE AND BEARING STIFFENERS						GIRDER WEIGHT				CROSS-FRAME SPACING			DEAD LOAD AND LIVE LOAD REACTIONS				
Span ft.	Transverse Stiffener Size and Location			Bearing Stiffeners		Span, ft.	Segment A tons	Segment B tons	Total tons	Span, ft.	Spacing, ft.	Type	Span, ft.	DC kips	DW kips	Truck kips	Lane kips
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.												
220	---	---	---	10	0.875	220	10.90	31.71	53.51	220	27.5	K-Frame	220	221	22	92	70
230	6.5	0.5	12.25, 217.75	11	1	230	14.22	31.44	59.87	230	28.75	X-Frame	230	235	23	92	73
240	7	0.5	12.75, 37.75, 202.25, 227.25	10	0.875	240	14.16	34.66	62.99	240	26.67	X-Frame	240	245	24	92	77
250	---	---	---	10	0.875	250	16.91	40.46	74.29	250	25	X-Frame	250	264	25	92	80
260	---	---	---	11	1	260	18.38	44.39	81.14	260	21.67	X-Frame	260	279	26	92	83
270	---	---	---	11	1	270	19.42	48.91	87.75	270	27	X-Frame	270	293	27	92	86
280	6.75	0.5	15.25, 264.75	11	1	280	22.04	46.83	90.92	280	28	X-Frame	280	304	28	92	89
290	6.75	0.5	15.75, 274.25	11	1	290	22.75	47.70	93.19	290	29	X-Frame	290	314	29	92	92
300	---	---	---	12	1.125	300	30.43	48.34	109.19	300	30	X-Frame	300	337	30	92	95

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.

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



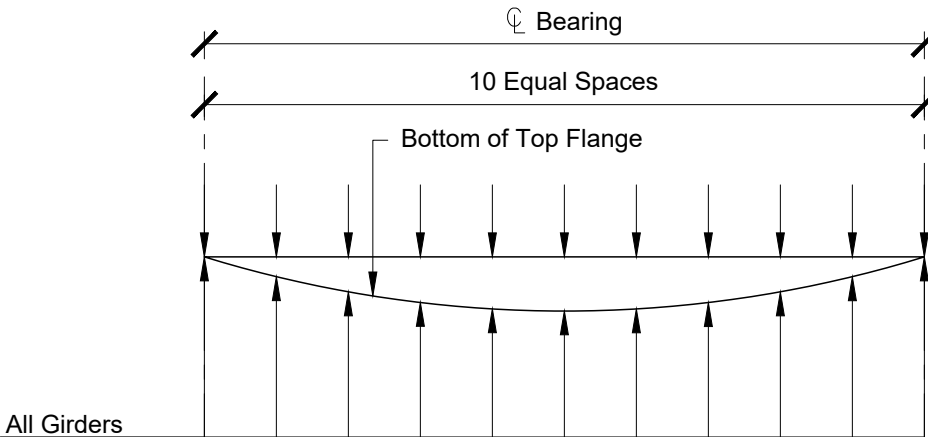
# SINGLE SPAN 220-300 FT 10 FT SPACING

Issued January 2025  
Revision 0



DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
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

Deflection Assumptions

"Steel Only" = self weight of girders

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

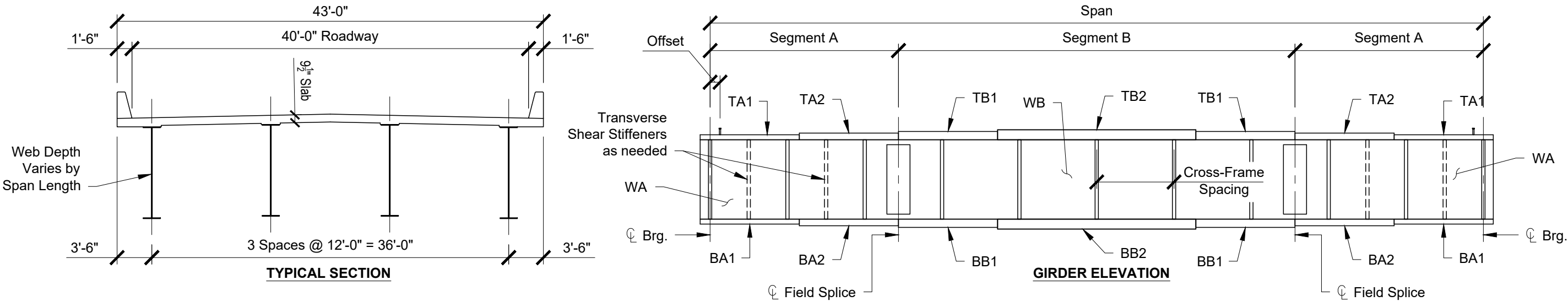
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



SINGLE SPAN 220-300 FT  
10 FT SPACING

Issued January 2025  
Revision 0

Sheet 24 of 38



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	---	24 x 1.25 x 58	24 x 1.25 x 43	24 x 2.5 x 15	93 x 0.75 x 104	---	28 x 1.5 x 104	---	28 x 2 x 104	b
230	99 x 0.75 x 60	---	24 x 1.5 x 60	28 x 1.25 x 50	28 x 2 x 10	99 x 0.75 x 110	---	28 x 1.5 x 110	---	30 x 2 x 110	b
240	105 x 0.875 x 60	---	24 x 1.25 x 60	28 x 1.25 x 50	28 x 2 x 10	105 x 0.875 x 120	---	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	---	26 x 1.25 x 63	28 x 1.25 x 53	28 x 2.25 x 10	109 x 0.875 x 124	---	28 x 1.75 x 124	---	32 x 2.25 x 124	a, b
260	114 x 0.875 x 65	---	26 x 1.25 x 65	28 x 1.25 x 50	28 x 2.25 x 15	114 x 0.875 x 130	---	30 x 1.75 x 130	---	30 x 2 x 130 ▲	a, b
270	118 x 1 x 68	---	26 x 1.25 x 68	28 x 1.25 x 45	28 x 2.25 x 23	118 x 1 x 134	---	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	---	28 x 1.25 x 75	28 x 1.25 x 60	28 x 2.5 x 15	122 x 1 x 130	---	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 1.75 x 25	30 x 1.5 x 60	30 x 2.75 x 25	128 x 1 x 120	---	28 x 2 x 120 ▲	---	30 x 2 x 120 ▲	a, b
300	132 x 1 x 95	28 x 1.25 x 70	28 x 2 x 25	32 x 1.5 x 75	32 x 2.75 x 20	132 x 1 x 110	---	28 x 2 x 110 ▲	---	32 x 2 x 110 ▲	a, b

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

Footnotes:

a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.

b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TRANSVERSE AND BEARING STIFFENERS					
Span ft.	Transverse Stiffener Size and Location			Bearing Stiffeners	
	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

GIRDER WEIGHT			
Span, ft.	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	32.27	49.82	114.36
300	37.01	47.16	121.17

CROSS-FRAME 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

DEAD LOAD AND LIVE LOAD REACTIONS				
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	381	35	105	105
300	397	36	105	108

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.

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



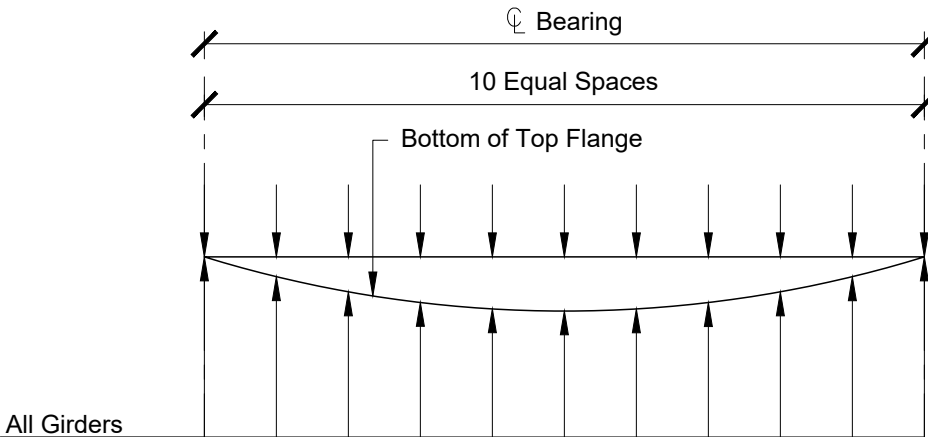
SINGLE SPAN 220-300 FT  
12 FT SPACING

Issued January 2025  
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DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
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	2.24	4.19	5.67	6.61	6.93	6.61	5.67	4.19	2.24	0.00
slab, in.	0.00	4.25	7.93	10.71	12.48	13.08	12.48	10.71	7.93	4.25	0.00
barrier rails, in.	0.00	0.60	1.13	1.54	1.79	1.88	1.79	1.54	1.13	0.60	0.00
290 ft. span - total, in.	0.00	7.10	13.26	17.91	20.88	21.89	20.88	17.91	13.26	7.10	0.00
300 ft. span - steel only, in.	0.00	2.38	4.46	6.01	7.01	7.35	7.01	6.01	4.46	2.38	0.00
slab, in.	0.00	4.40	8.22	11.07	12.91	13.54	12.91	11.07	8.22	4.40	0.00
barrier rails, in.	0.00	0.63	1.18	1.59	1.86	1.96	1.86	1.59	1.18	0.63	0.00
300 ft. span - total, in.	0.00	7.41	13.85	18.67	21.78	22.85	21.78	18.67	13.85	7.41	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	3	38	24	76	59	30	147.5	38	24	76



DEFLECTION DIAGRAM

Deflection Assumptions

"Steel Only" = self weight of girders

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

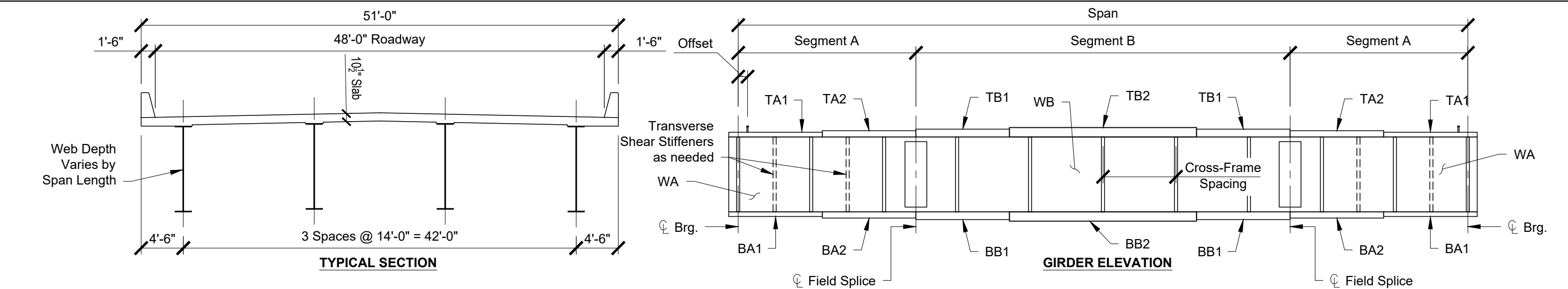
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



SINGLE SPAN 220-300 FT  
12 FT SPACING

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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	---	24 x 1.5 x 55	28 x 1.25 x 40	28 x 2.25 x 15	95 x 0.75 x 110	---	24 x 2.25 x 110	28 x 2.25 x 30	28 x 2.5 x 50	---
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	---	24 x 2.5 x 110	---	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 1.25	30 x 2.5 x 20	104 x 0.875 x 120	---	30 x 1.75 x 120	---	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 2.5 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	---	30 x 2 x 130	---	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 1.5 x 50	30 x 2.75 x 20	118 x 0.875 x 130	30 x 2 x 45	30 x 2.25 x 40	---	30 x 2 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	---	30 x 2.5 x 100	---	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	---	32 x 2.25 x 100	---	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	---	30 x 2.5 x 100	---	36 x 2.25 x 100 ▲	a, b

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

Footnotes:

a. AASHTO distribution factor equations were used with girder stiffness and / or span length exceeding AASHTO limits. Check with refined analysis.

b. Lateral bracing required for deck casting stability and / or wind loads. See **Lateral Bracing Details** sheet.

TRANSVERSE AND BEARING STIFFENERS						GIRDER WEIGHT				CROSS-FRAME SPACING			DEAD LOAD AND LIVE LOAD REACTIONS				
Span ft.	Transverse Stiffener Size and Location			Bearing Stiffeners		Span, ft.	Segment A tons	Segment B tons	Total tons	Span, ft.	Spacing, ft.	Type	Span, ft.	DC kips	DW kips	Truck kips	Lane kips
	Width in.	Thickness in.	Location ft.	Width in.	Thickness in.												
220	8	0.625	11.75, 35.5, 184.5, 208.25	11	1	220	14.03	35.83	63.88	220	27.5	K-Frame	220	316	31	117	90
230	8	0.625	11.75, 36.5, 193.5, 218.25	11	1	230	15.81	38.23	69.85	230	28.75	K-Frame	230	333	32	117	94
240	7.5	0.5	13, 227	11	1	240	15.39	44.00	74.78	240	26.67	K-Frame	240	355	34	117	98
250	7.5	0.5	13.75, 38.75, 211.25, 236.25	11	1	250	18.81	46.26	83.89	250	25	K-Frame	250	370	35	117	101
260	8	0.625	14.25, 39.25, 220.75, 245.75	12	1.125	260	20.13	46.95	87.20	260	26	K-Frame	260	385	36	117	106
270	9	0.625	14.75, 39.75, 230.25, 255.25	12	1.125	270	23.47	49.89	96.82	270	27	K-Frame	270	406	38	117	109
280	---	---	---	12	1.125	280	36.66	45.77	119.09	280	28	K-Frame	280	440	39	117	113
290	---	---	---	13	1.125	290	38.71	47.09	124.50	290	29	K-Frame	290	457	41	117	117
300	9	0.625	16.5, 283.5	13	1.125	300	41.73	49.00	132.45	300	30	K-Frame	300	476	42	117	121

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.

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



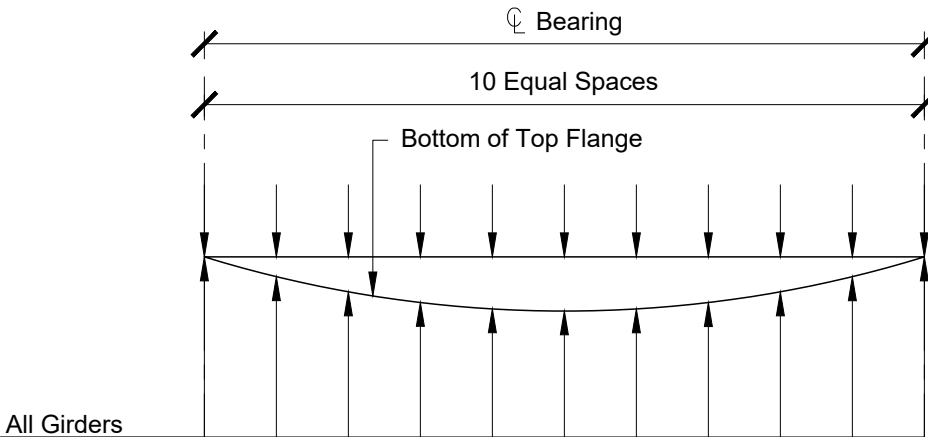
# SINGLE SPAN 220-300 FT 14 FT SPACING

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DEAD LOAD DEFLECTIONS											
Span Tenth Points and Deflections, in.											
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
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	4.21	4.41	4.21	3.62	2.68	1.45	0.00
slab, in.	0.00	4.12	7.61	10.25	11.91	12.49	11.91	10.25	7.61	4.12	0.00
barrier rails, in.	0.00	0.40	0.74	1.00	1.17	1.23	1.17	1.00	0.74	0.40	0.00
240 ft. span - total, in.	0.00	5.97	11.04	14.87	17.29	18.12	17.29	14.87	11.04	5.97	0.00
250 ft. span - steel only, in.	0.00	1.55	2.87	3.88	4.51	4.72	4.51	3.88	2.87	1.55	0.00
slab, in.	0.00	4.36	8.07	10.88	12.63	13.21	12.63	10.88	8.07	4.36	0.00
barrier rails, in.	0.00	0.42	0.78	1.06	1.23	1.29	1.23	1.06	0.78	0.42	0.00
250 ft. span - total, in.	0.00	6.33	11.72	15.82	18.36	19.22	18.36	15.82	11.72	6.33	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	1.80	3.36	4.56	5.32	5.57	5.32	4.56	3.36	1.80	0.00
slab, in.	0.00	4.81	8.93	12.11	14.13	14.81	14.13	12.11	8.93	4.81	0.00
barrier rails, in.	0.00	0.50	0.93	1.27	1.48	1.56	1.48	1.27	0.93	0.50	0.00
270 ft. span - total, in.	0.00	7.11	13.21	17.93	20.93	21.94	20.93	17.93	13.21	7.11	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

Deflection Assumptions

"Steel Only" = self weight of girders

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

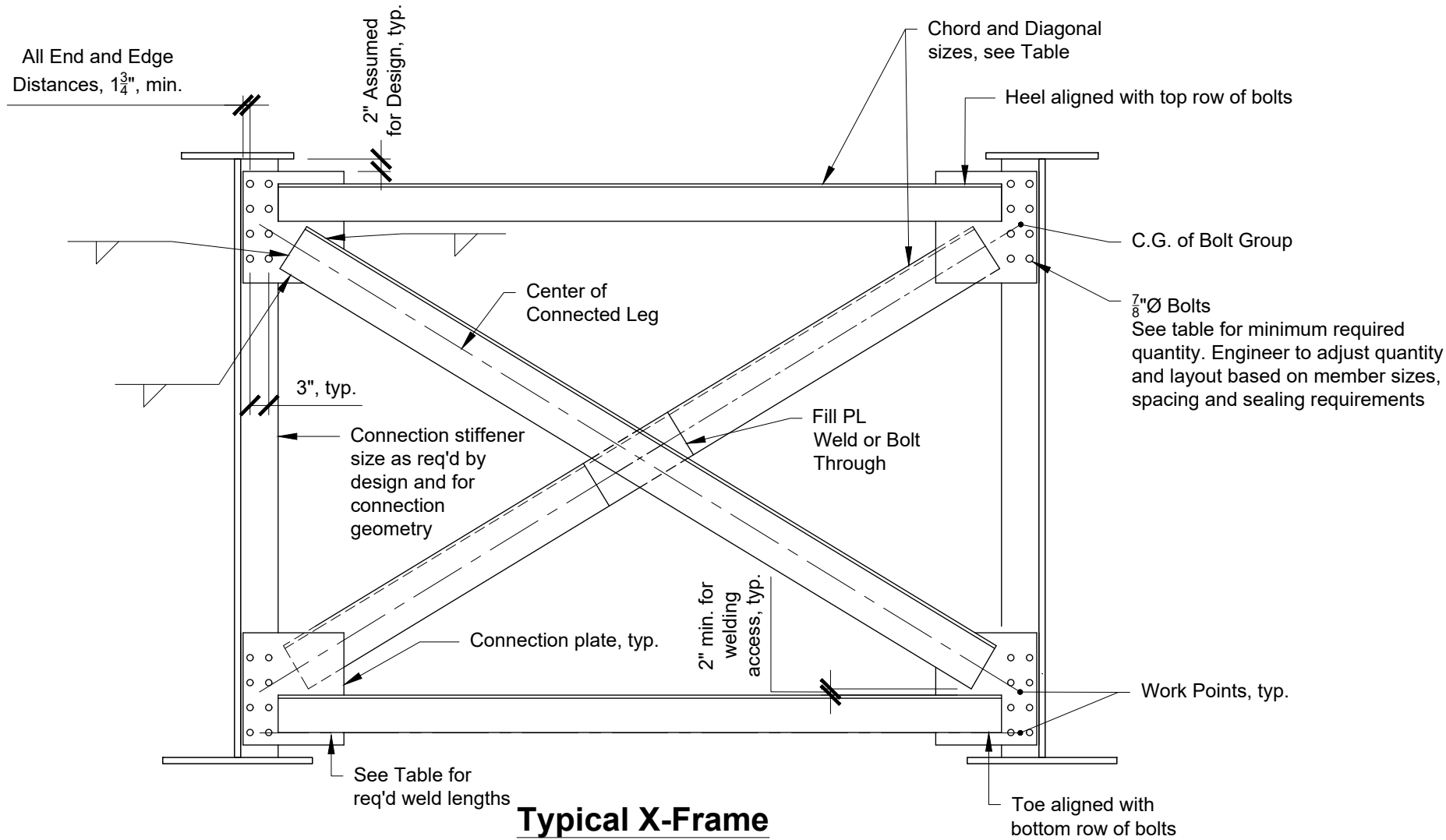
"Barrier Rails" = deflection due to barrier rail loading distributed evenly to exterior and first interior girder.



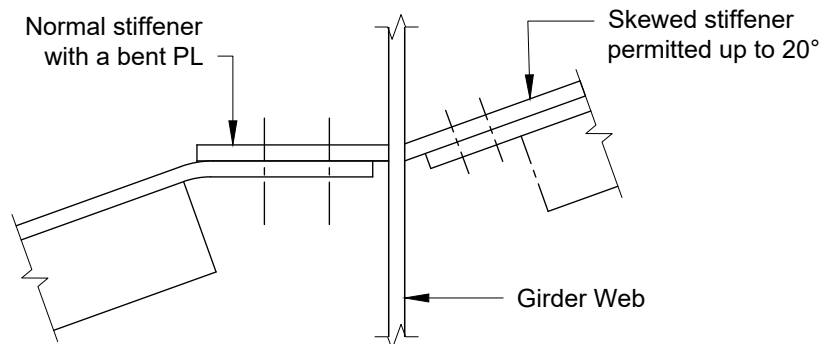
SINGLE SPAN 220-300 FT  
14 FT SPACING

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**Typical X-Frame**



**Connection Options**

Not to Scale

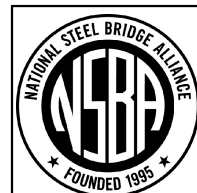
**Notes:**

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

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.	4 in.
L5x5x1/2		4.5 in.
L5x5x5/8		4.5 in.
L6x6x3/8		4 in.
L6x6x1/2	See notes regarding toe weld length	5.5
L6x6x5/8		6 in.
L6x6x3/4		7 in.
L8x6x1/2		5.5 in.
L8x8x1/2		6.5 in.

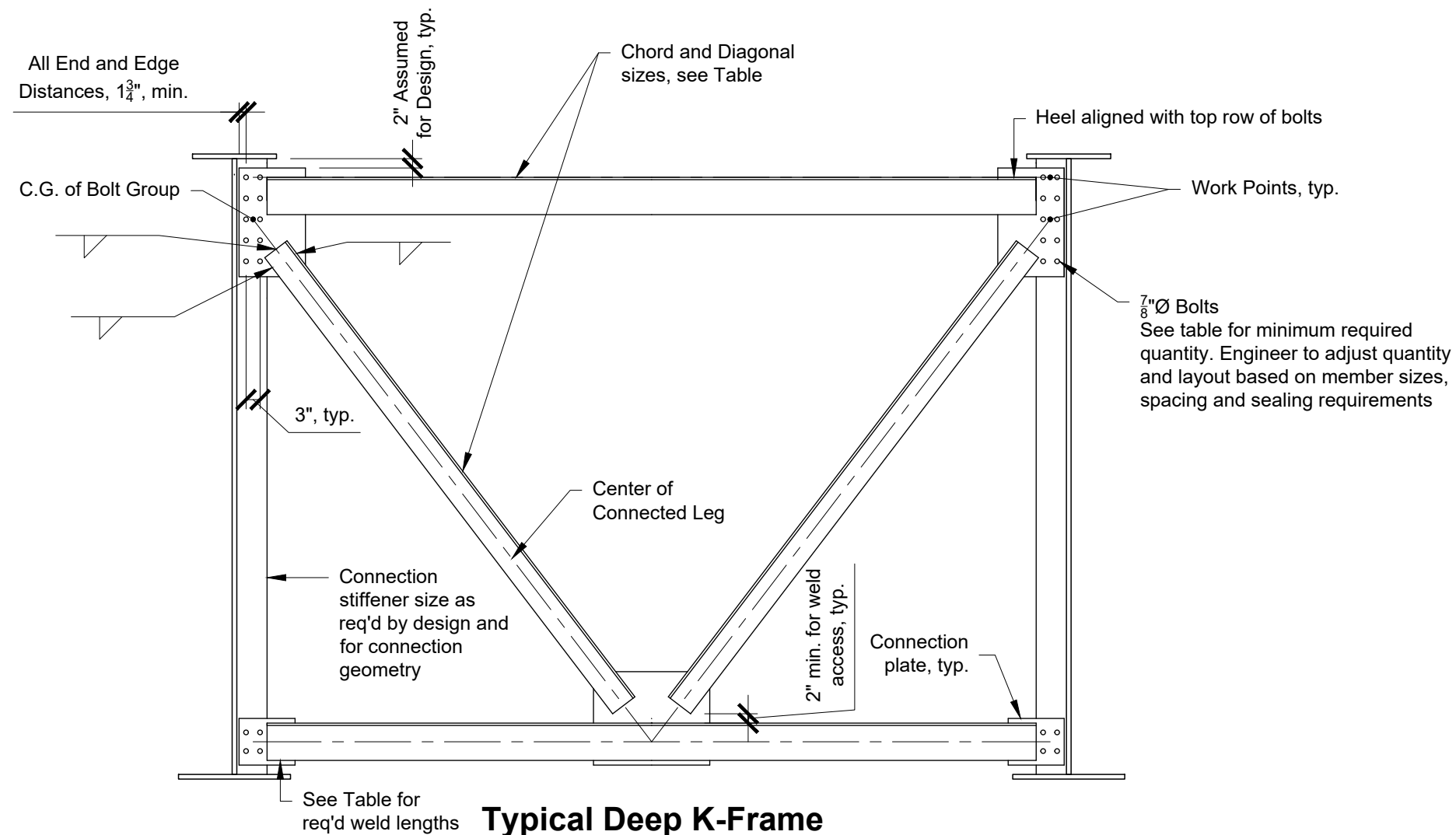
CROSS-FRAME BOLTED CONNECTION DETAILS					
Beam Spacing, ft.	Type	Top Connection		Bottom Connection	
		Total Num Bolts	Vertical Spacing	Total Num Bolts	Vertical Spacing
8	K-Frame	6	6 in.	2	3 in.
	X-Frame	6	6 in.	6	6 in.
10	K-Frame	6	6 in.	2	3 in.
	X-Frame	8	4 in.	8	4 in.
12	K-Frame	6	6 in.	2	3 in.
	X-Frame	8	4 in.	8	4 in.
14	K-Frame	10	4.5 in.	4	3 in.



**CROSS-FRAME & DIAPHRAGM DETAILS 1**

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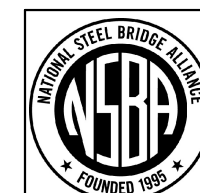
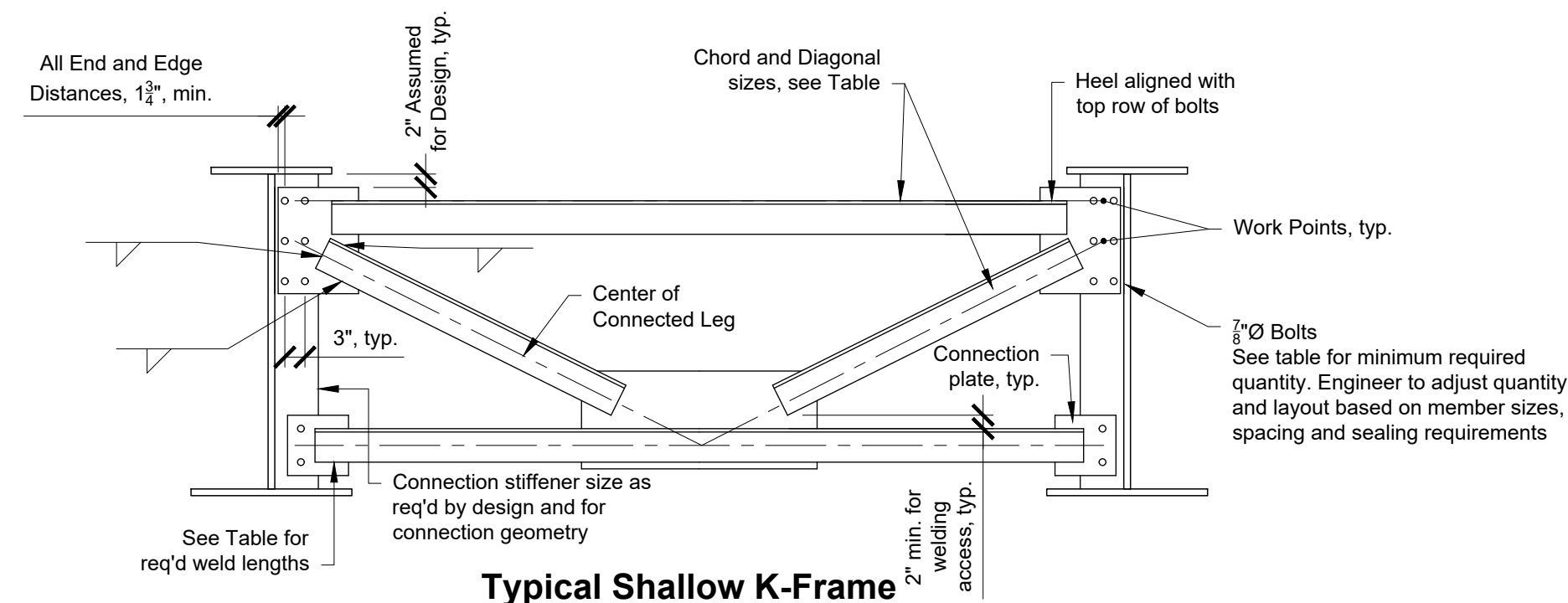
CROSS-FRAME MEMBER SIZES				
Beam Spacing, ft.	Span, ft.	Type	Chord	Diagonal
8	100-180	K-Frame	L5X5X3/8	L5X5X3/8
	190-300	X-Frame	L5X5X3/8	L6x6x3/8
10	120-220	K-Frame	L5X5X1/2	L5X5X1/2
	230-260	X-Frame	L5X5X1/2	L6X6X3/8
	260-300	X-Frame	L5X5X1/2	L8X6X1/2
12	140-250	K-Frame	L6X6X3/8	L5X5X5/8
	260-300	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.	4 in.
L5x5x1/2		4.5 in.
L5x5x5/8		4.5 in.
L6x6x3/8		4 in.
L6x6x1/2	See notes regarding toe weld length	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:

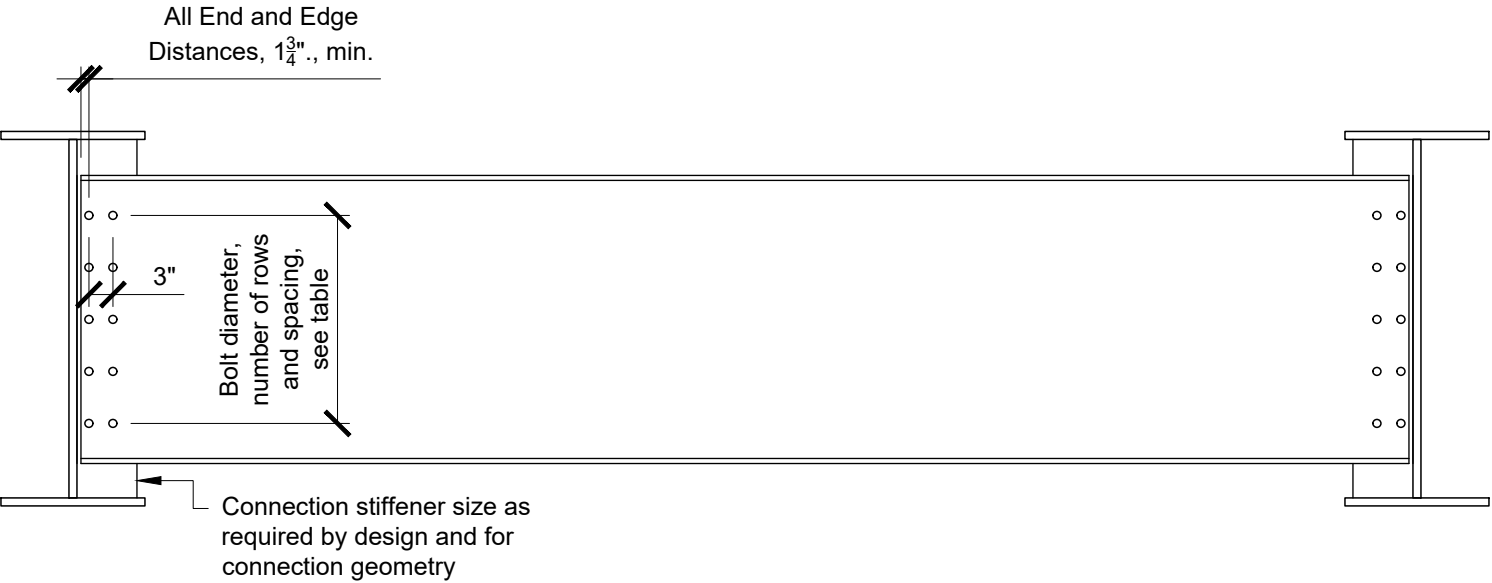
- For general notes, see **Cross-Frame & Diaphragm Details 1**.



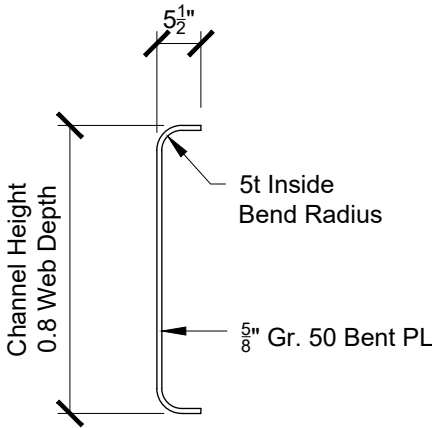
## CROSS-FRAME & DIAPHRAGM DETAILS 2

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**Bent Plate Diaphragm Typical Details**



SOLID DIAPHRAGM DETAILS					
Beam Spacing, ft.	Span, ft.	Web Depth, in.	Channel Height, in.	Rows and Spacing	Bolt Diameter, in
8	80	32	26	4 @ 5.5 in.	7/8
	90	36	29	4 @ 6.5 in.	
10	80	34	28	4 @ 6 in.	7/8
	90	37	30	5 @ 5 in.	
	100	42	34	5 @ 6 in.	
	110	46	37	5 @ 6.5 in.	
12	80	36	29	7 @ 3.25 in.	7/8
	90	38	31	6 @ 4.25 in.	
	100	45	36	6 @ 5.25 in.	
	110	47	38	6 @ 5.5 in.	
	120	49	40	6 @ 6 in.	
	130	52	42	6 @ 6.5 in.	
14	80	36	29	6 @ 3.75 in.	1
	90	39	32	6 @ 4.5 in.	
	100	45	36	6 @ 5.25 in.	
	110	50	40	6 @ 6 in.	
	120	51	41	6 @ 6.25 in.	
	130	54	44	6 @ 6.5 in.	
	140	56	45	6 @ 6.5 in.	
	150	60	48	6 @ 6.5 in.	

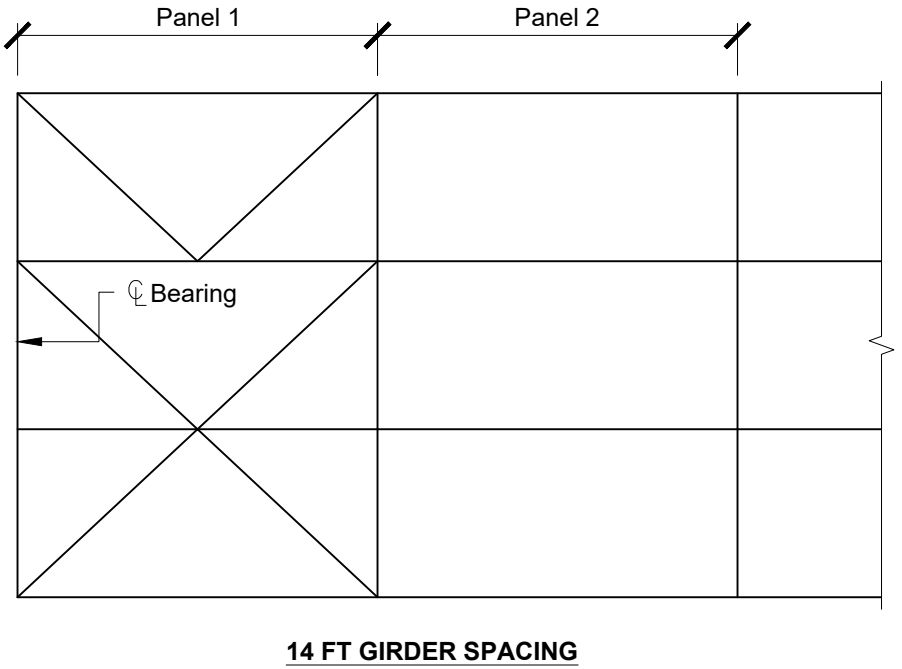
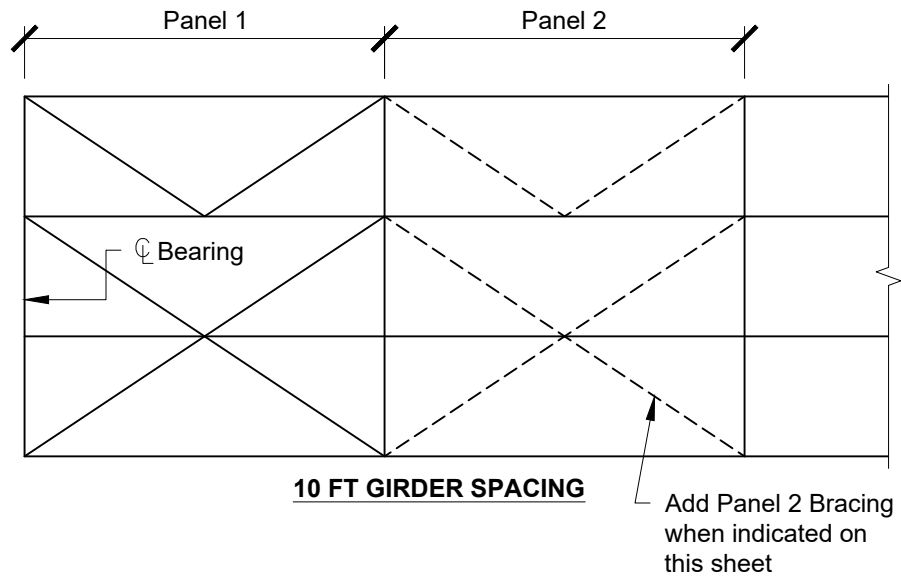
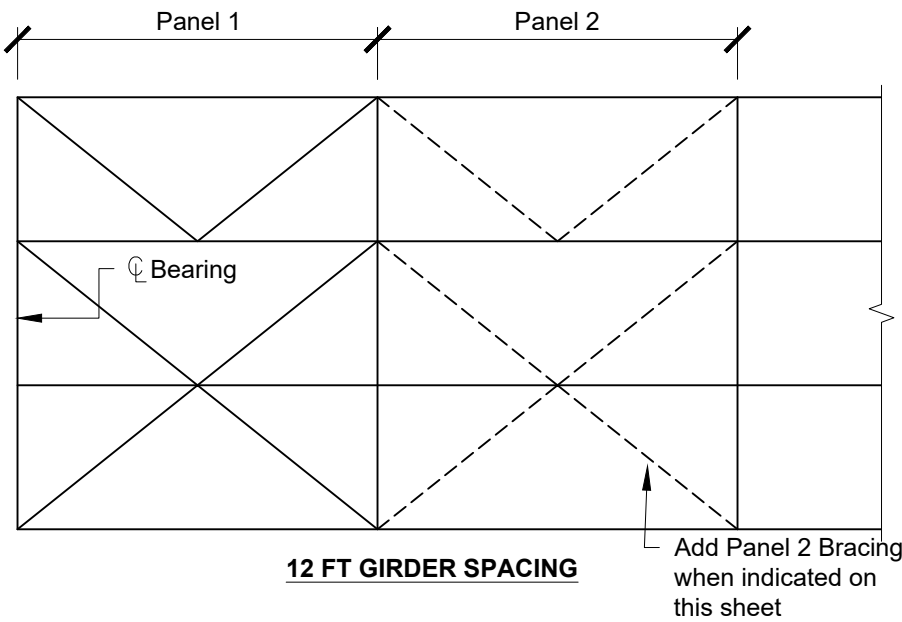
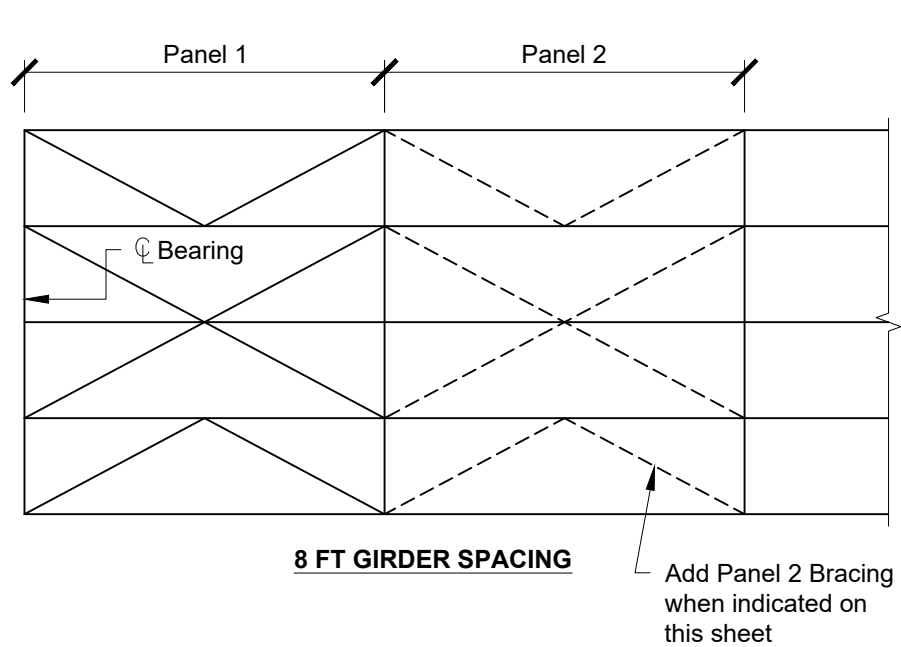
- Notes:
1. For general notes, see **Cross-Frame & Diaphragm Details 1.**



**CROSS-FRAME &  
DIAPHRAGM DETAILS 3**

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SPACING	SPAN LENGTH	NUMBER OF BRACED PANELS	BRACING SIZE
8	190	1	WT 7 x 17
8	200	1	WT 7 x 17
8	210	1	WT 7 x 24
8	220	1	WT 7 x 24
8	230	1	WT 7 x 24
8	240	1	WT 7 x 30.5
8	250	1	WT 7 x 30.5
8	260	1	WT 8 x 33.5
8	270	1	WT 8 x 33.5
8	280	2	WT 8 x 33.5
8	290	2	WT 8 x 33.5
8	300	2	WT 8 x 33.5

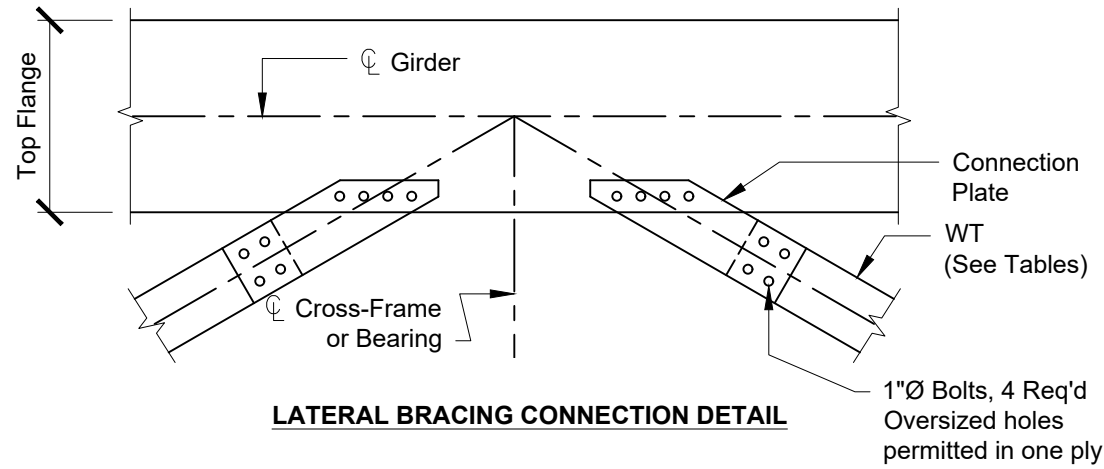
SPACING	SPAN LENGTH	NUMBER OF BRACED PANELS	BRACING SIZE
10	180	1	WT 7 x 17
10	190	1	WT 7 x 17
10	200	1	WT 7 x 19
10	210	1	WT 7 x 19
10	220	1	WT 7 x 24
10	230	1	WT 7 x 24
10	240	1	WT 8 x 33.5
10	250	1	WT 8 x 33.5
10	260	1	WT 8 x 33.5
10	270	1	WT 8 x 33.5
10	280	2	WT 8 x 33.5
10	290	2	WT 8 x 33.5
10	300	2	WT 8 x 33.5

SPACING	SPAN LENGTH	NUMBER OF BRACED PANELS	BRACING SIZE
12	220	1	WT 7 x 26.5
12	230	1	WT 7 x 26.5
12	240	1	WT 7 x 26.5
12	250	1	WT 8 x 33.5
12	260	1	WT 8 x 33.5
12	270	1	WT 8 x 33.5
12	280	2	WT 8 x 33.5
12	290	2	WT 8 x 33.5
12	300	2	WT 8 x 33.5

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

#### NOTES AND DESIGN CRITERIA:

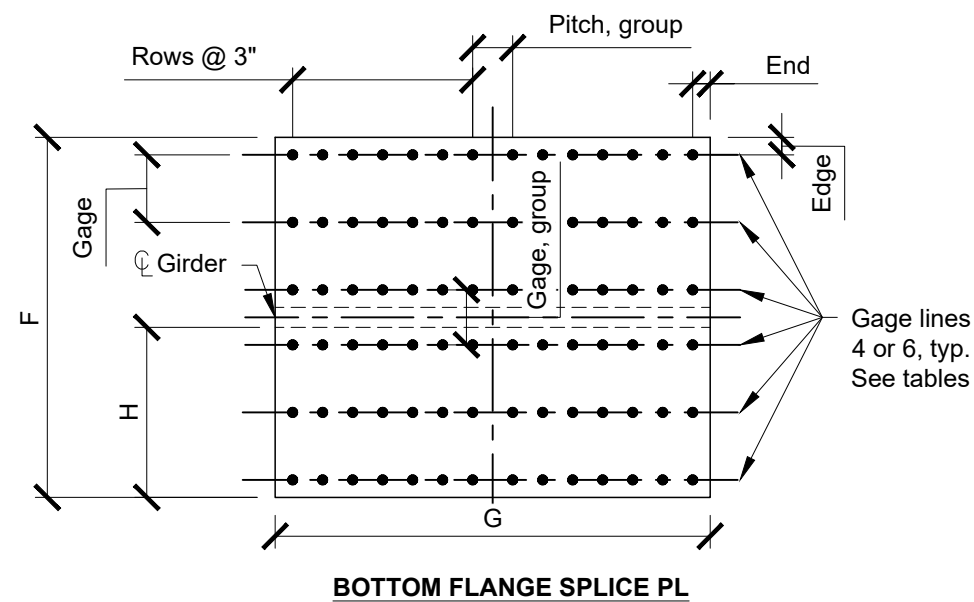
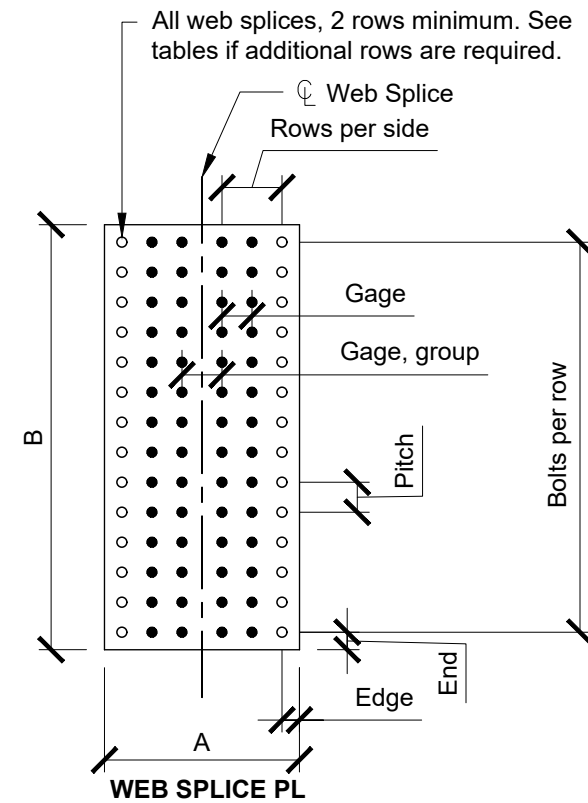
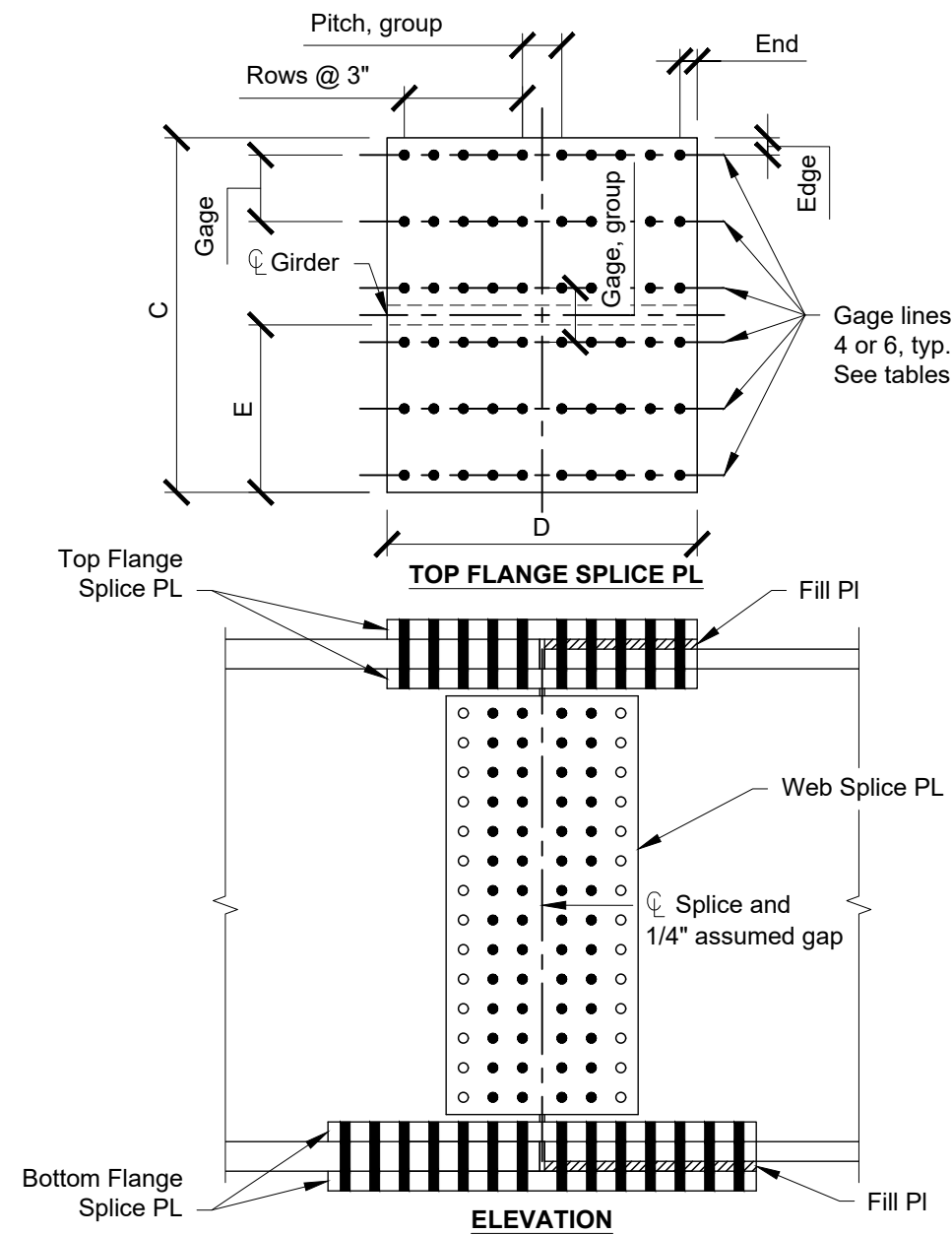
- Lateral bracing is required for the indicated spans. Bracing shown is needed to control lateral deflections and flange stresses due to wind on the fully erected steel, for global stability during deck placement, or a combination of those factors.
- Lateral deflections due to wind loads on the fully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



#### LATERAL BRACING DETAILS

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#### NOTES:

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

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



## BOLTED FIELD SPLICE LAYOUT

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Spacing-Span	Web Splice Plates				Top Flange Plates, Outer				Top Flange Plates, Inner, 2 req'd.			Bottom Flange Plates, Outer				Bottom Flange Plates, Inner, 2 req'd.			Web Bolts					Top Flange Bolts					Bottom Flange Bolts					Composite Note
	Width, A	Length, B	Thk.	Edge / End Distance	Width, C	Length, D	Thk.	Edge / End Distance	Width, E	Length, D	Thk.	Width, F	Length, G	Thk.	Edge / End Distance	Width, H	Length, G	Thk.	Bolts per Row	Rows per Side	Pitch	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	
8-150	12.25	54.75	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8	18.25	0.625	22	30.25	1	1.5 / 1.5	10	30.25	1	10	2	5.75	3	3.25	3	3.25	4	5	5	5	3.25	4	7	5	Composite
8-160	12.25	58	0.5	1.5 / 1.5	18	18.25	0.625	1.5 / 1.5	8	18.25	0.625	22	30.25	1	1.5 / 1.5	10	30.25	1	11	2	5.5	3	3.25	3	3.25	4	5	5	5	3.25	4	7	5	Composite
8-170	12.25	64.875	0.5	1.5 / 1.5	19	24.25	0.625	1.5 / 1.5	8	24.25	0.625	23	36.25	0.875	1.5 / 1.5	10	36.25	0.875	12	2	5.625	3	3.25	4	3.25	4	5	6	6	3.25	4	7	6	Composite
8-180	12.25	67.625	0.5	1.5 / 1.5	20	24.25	0.625	1.5 / 1.5	9	24.25	0.625	22	36.25	1.125	1.5 / 1.5	10	36.25	1.125	12	2	5.875	3	3.25	4	3.25	4	6	5	6	3.25	4	7	5	Composite
8-190	12.25	72	0.5	1.5 / 1.5	20	24.25	0.625	1.5 / 1.5	9	24.25	0.625	22	42.25	1.25	1.5 / 1.5	10	42.25	1.25	24	2	3	3	3.25	4	3.25	4	6	5	7	3.25	4	7	5	Non-Composite
8-200	12.25	77.75	0.5	1.5 / 1.5	19	24.25	0.75	1.5 / 1.5	8.5	24.25	0.75	21	42.25	1.375	1.5 / 1.5	9.5	42.25	1.375	24	2	3.25	3	3.25	4	3.25	4	5.5	5	7	3.25	4	6.5	5	Non-Composite
8-210	12.25	84.25	0.5	1.5 / 1.5	21	30.25	0.75	1.5 / 1.5	9	30.25	0.75	23	42.25	1.25	1.5 / 1.5	10	42.25	1.25	27	2	3.125	3	3.25	5	3.25	4	6	6	7	3.25	4	7	6	Non-Composite
8-220	12.25	84.25	0.5	1.5 / 1.5	18	36.25	1.25	1.5 / 1.5	8	36.25	1.25	20	42.25	1.25	1.5 / 1.5	9	42.25	1.25	26	2	3.25	3	3.25	6	3.25	4	5	5	7	3.25	4	6	5	Non-Composite
8-230	12.25	92.25	0.5	1.5 / 1.5	20	30.25	0.875	1.5 / 1.5	9	30.25	0.875	22	42.25	1.25	1.5 / 1.5	10	42.25	1.25	22	2	4.25	3	3.25	5	3.25	4	6	5	7	3.25	4	7	5	Non-Composite
8-240	14.25	96	0.5	2 / 2	20	30.25	0.875	1.5 / 1.5	9	30.25	0.875	22	42.25	1.125	1.5 / 1.5	10	42.25	1.125	24	2	4	3	4.25	5	3.25	4	6	5	7	3.25	4	7	5	Non-Composite
8-250	14.25	103	0.5	2 / 2	20	36.25	1	1.5 / 1.5	9	36.25	1	22	36.25	1.125	1.5 / 1.5	10	36.25	1.125	34	2	3	3	4.25	6	3.25	4	6	5	6	3.25	4	7	5	Non-Composite
8-260	14.25	104.625	0.5	2 / 2	20	30.25	0.875	1.5 / 1.5	9	30.25	0.875	22	48.25	1.25	1.5 / 1.5	10	48.25	1.25	24	2	4.375	3	4.25	5	3.25	4	6	5	8	3.25	4	7	5	Non-Composite
8-270	14.25	112	0.5	2 / 2	22	36.25	1	1.5 / 1.5	10	36.25	1	22	48.25	1.25	1.5 / 1.5	10	48.25	1.25	28	2	4	3	4.25	6	3.25	4	7	5	8	3.25	4	7	5	Non-Composite
8-280	14.25	116.375	0.5	2 / 2	21	36.25	1	1.5 / 1.5	9.5	36.25	1	22	48.25	1.25	1.5 / 1.5	10	48.25	1.25	30	2	3.875	3	4.25	6	3.25	4	6.5	5	8	3.25	4	7	5	Non-Composite
8-290	14.25	122.75	0.5	2 / 2	23	30.25	1	2 / 1.5	10.5	30.25	1	23	48.25	1.125	2 / 1.5	10.5	48.25	1.125	39	2	3.125	3	4.25	5	3.25	4	6.5	6	8	3.25	4	6.5	6	Non-Composite
8-300	20.25	123.625	0.5	2 / 2	22	36.25	1.125	1.5 / 1.5	10	36.25	1.125	22	48.25	1.125	1.5 / 1.5	10	48.25	1.125	30	3	4.125	3	4.25	6	3.25	4	7	5	8	3.25	4	7	5	Non-Composite

**8 FT SPACING - 1 SPAN**

Spacing-Span	Web Splice Plates				Top Flange Plates, Outer				Top Flange Plates, Inner, 2 req'd.			Bottom Flange Plates, Outer				Bottom Flange Plates, Inner, 2 req'd.			Web Bolts					Top Flange Bolts					Bottom Flange Bolts					Composite Note
	Width, A	Length, B	Thk.	Edge / End Distance	Width, C	Length, D	Thk.	Edge / End Distance	Width, E	Length, D	Thk.	Width, F	Length, G	Thk.	Edge / End Distance	Width, H	Length, G	Thk.	Bolts per Row	Rows per Side	Pitch	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	
10-150	12.25	54.25	0.5	1.5 / 1.5	19	24.25	0.625	1.5 / 1.5	8.5	24.25	0.625	20	36.25	1.25	1.5 / 1.5	9	36.25	1.25	11	2	5.125	3	3.25	4	3.25	4	5.5	5	6	3.25	4	6	5	Composite
10-160	12.25	58	0.5	1.5 / 1.5	20	24.25	0.625	1.5 / 1.5	9	24.25	0.625	21	36.25	1.25	1.5 / 1.5	9.5	36.25	1.25	11	2	5.5	3	3.25	4	3.25	4	6	5	6	3.25	4	6.5	5	Composite
10-170	12.25	61.75	0.5	1.5 / 1.5	20	30.25	0.75	1.5 / 1.5	9	30.25	0.75	22	42.25	1.25	1.5 / 1.5	10	42.25	1.25	11	2	5.875	3	3.25	5	3.25	4	6	5	7	3.25	4	7	5	Composite
10-180	12.25	67.625	0.5	1.5 / 1.5	21	24.25	0.625	1.5 / 1.5	9.5	24.25	0.625	22	42.25	1.25	1.5 / 1.5	10	42.25	1.25	12	2	5.875	3	3.25	4	3.25	4	6.5	5	7	3.25	4	7	5	Composite
10-190	20.25	74.5	0.5	2 / 2	20	30.25	1	2 / 1.5	8.5	30.25	1	24	54.25	1.5	2 / 1.5	10.5	54.25	1.5	13	3	5.875	3	4.25	5	3.25	4	4.5	7	9	3.25	4	6.5	7	Non-Composite
10-200	18.25	76.5	0.5	1.5 / 1.5	20	30.25	0.875	2 / 1.5	9	30.25	0.875	24	48.25	1.375	2 / 1.5	11	48.25	1.375	22	3	3.5	3	3.25	5	3.25	4	5	6	8	3.25	4	7	6	Non-Composite
10-210	18.25	81.75	0.5	1.5 / 1.5	22	30.25	1	2 / 1.5	10	30.25	1	24	54.25	1.5	2 / 1.5	11	54.25	1.5	19	3	4.375	3	3.25	5	3.25	4	6	6	9	3.25	4	7	6	Non-Composite
10-220	14.25	86.5	0.5	2 / 2	22	30.25	0.625	2 / 1.5	10	30.25	0.625	24	48.25	1.25	2 / 1.5	11	48.25	1.25	23	2	3.75	3	4.25	5	3.25	4	6	6	8	3.25	4	7	6	Non-Composite
10-230	12.25	90	0.5	1.5 / 1.5	24	36.25	0.75	2.5 / 1.5	11	36.25	0.75	26	48.25	1.125	2.5 / 1.5	12	48.25	1.125	30	2	3	3	3.25	6	3.25	4	6	7	8	3.25	4	7	7	Non-Composite
10-240	14.25	95	0.5	2 / 2	22	24.25	0.75	2 / 1.5	10	24.25	0.75	24	54.25	1.25	2 / 1.5	11	54.25	1.25	29	2	3.25	3	4.25	4	3.25	4	6	6	9	3.25	4	7	6	Non-Composite
10-250	14.25	104	0.5	2 / 2	22	24.25	0.75	1.5 / 1.5	10	24.25	0.75	22	54.25	1.375	1.5 / 1.5	10	54.25	1.375	33	2	3.125	3	4.25	4	3.25	4	7	5	9	3.25	4	7	5	Non-Composite
10-260	12.25	108.125	0.5	1.5 / 1.5	24	30.25	0.75	2 / 1.5	11	30.25	0.75	24	60.25	1.375	2 / 1.5	11	60.25	1.375	30	2	3.625	3	3.25	5	3.25	4	7	6	10	3.25	4	7	6	Non-Composite
10-270	14.25	112.75	0.5	2 / 2	24	42.25	1	2 / 1.5	11	42.25	1	24	60.25	1.375	2 / 1.5	11	60.25	1.375	31	2	3.625	3	4.25	7	3.25	4	7	6	10	3.25	4	7	6	Non-Composite
10-280	14.25	116	0.5	2 / 2	24	42.25	1	2 / 1.5	11	42.25	1	24	66.25	1.5	2 / 1.5	11	66.25	1.5	33	2	3.5	3	4.25	7	3.25	4	7	6	11	3.25	4	7	6	Non-Composite
10-290	14.25	119.5	0.5	2 / 2	24	36.25	1	2 / 1.5	11	36.25	1	24	66.25	1.5	2 / 1.5	11	66.25	1.5	34	2	3.5	3	4.25	6	3.25	4	7	6	11	3.25	4	7	6	Non-Composite
10-300	20.25	127.25	0.5	2 / 2	26	54.25	1.25	2.5 / 1.5	12	54.25	1.25	26	72.25	1.25	2.5 / 1.5	12	72.25	1.25	30	3	4.25	3	4.25	9	3.25	4	7	7	12	3.25	4	7	7	Non-Composite

**10 FT SPACING - 1 SPAN**

**NOTES:**

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



**BOLTED FIELD SPLICE  
DIMENSIONS 1**

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Spacing-Span	Web Splice Plates				Top Flange Plates, Outer				Top Flange Plates, Inner, 2 req'd.			Bottom Flange Plates, Outer				Bottom Flange Plates, Inner, 2 req'd.			Web Bolts					Top Flange Bolts					Bottom Flange Bolts					Composite Note
	Width, A	Length, B	Thk.	Edge / End Distance	Width, C	Length, D	Thk.	Edge / End Distance	Width, E	Length, D	Thk.	Width, F	Length, G	Thk.	Edge / End Distance	Width, H	Length, G	Thk.	Bolts per Row	Rows per Side	Pitch	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	
12-150	12.25	54.25	0.5	1.5 / 1.5	21	30.25	1	1.5 / 1.5	9.5	30.25	1	22	42.25	1.25	1.5 / 1.5	10	42.25	1.25	11	2	5.125	3	3.25	5	3.25	4	6.5	5	7	3.25	4	7	5	Composite
12-160	12.25	58	0.5	1.5 / 1.5	22	30.25	1	2 / 1.5	10	30.25	1	24	42.25	1.25	2 / 1.5	11	42.25	1.25	11	2	5.5	3	3.25	5	3.25	4	6	6	7	3.25	4	7	6	Composite
12-170	12.25	63.5	0.5	1.5 / 1.5	23	30.25	1	2 / 1.5	10.5	30.25	1	24	42.25	1.25	2 / 1.5	11	42.25	1.25	12	2	5.5	3	3.25	5	3.25	4	6.5	6	7	3.25	4	7	6	Composite
12-180	12.25	70.5	0.5	1.5 / 1.5	24	30.25	0.75	2 / 1.5	11	30.25	0.75	24	42.25	1.25	2 / 1.5	11	42.25	1.25	13	2	5.625	3	3.25	5	3.25	4	7	6	7	3.25	4	7	6	Composite
12-190	12.25	73.125	0.5	1.5 / 1.5	23	30.25	0.75	2.5 / 1.5	10.5	30.25	0.75	26	48.25	1.25	2.5 / 1.5	12	48.25	1.25	18	2	4.125	3	3.25	5	3.25	4	5.5	7	8	3.25	4	7	7	Composite
12-200	12.25	79.5	0.5	1.5 / 1.5	22	36.25	1.125	2.5 / 1.5	10	36.25	1.125	26	54.25	1.375	2.5 / 1.5	12	54.25	1.375	18	2	4.5	3	3.25	6	3.25	4	5	7	9	3.25	4	7	7	Composite
12-210	18.25	80.625	0.5	1.5 / 1.5	22	30.25	1	3 / 1.5	10	30.25	1	28	66.25	1.5	3 / 1.5	13	66.25	1.5	24	3	3.375	3	3.25	5	3.25	4	4	8	11	3.25	4	7	8	Non-Composite
12-220	14.25	86.5	0.5	2 / 2	24	36.25	0.75	2 / 1.5	10.5	36.25	0.75	24	66.25	1.5	2 / 1.5	10.5	66.25	1.5	21	2	4.125	3	4.25	6	3.25	4	6.5	7	11	3.25	4	6.5	7	Non-Composite
12-230	18.25	91	0.5	1.5 / 1.5	24	36.25	1	3 / 1.5	11	36.25	1	28	54.25	1.25	3 / 1.5	13	54.25	1.25	23	3	4	3	3.25	6	3.25	4	5	8	9	3.25	4	7	8	Non-Composite
12-240	18.25	99.25	0.5	1.5 / 1.5	24	30.25	0.75	3 / 1.5	11	30.25	0.75	28	54.25	1.25	3 / 1.5	13	54.25	1.25	23	3	4.375	3	3.25	5	3.25	4	5	8	9	3.25	4	7	8	Non-Composite
12-250	18.25	102.75	0.625	1.5 / 1.5	26	42.25	0.75	3 / 1.5	12	42.25	0.75	28	60.25	1.375	3 / 1.5	13	60.25	1.375	22	3	4.75	3	3.25	7	3.25	4	6	8	10	3.25	4	7	8	Non-Composite
12-260	14.25	108	0.5	2 / 2	26	42.25	0.75	3 / 1.5	12	42.25	0.75	28	66.25	1.375	3 / 1.5	13	66.25	1.375	27	2	4	3	4.25	7	3.25	4	6	8	11	3.25	4	7	8	Non-Composite
12-270	20.25	111.25	0.625	2 / 2	26	36.25	0.75	3 / 1.5	12	36.25	0.75	28	66.25	1.25	3 / 1.5	13	66.25	1.25	27	3	4.125	3	4.25	6	3.25	4	6	8	11	3.25	4	7	8	Non-Composite
12-280	20.25	116	0.625	2 / 2	28	42.25	0.75	3 / 1.5	13	42.25	0.75	28	72.25	1.25	3 / 1.5	13	72.25	1.25	33	3	3.5	3	4.25	7	3.25	4	7	8	12	3.25	4	7	8	Non-Composite
12-290	20.25	119.5	0.5	2 / 2	28	36.25	1.125	1.5 / 1.5	12.5	36.25	1.125	30	54.25	1.5	1.5 / 1.5	13.5	54.25	1.5	29	3	4.125	3	4.25	6	3.25	6	4.75	6	9	3.25	6	5.25	6	Non-Composite
12-300	20.25	124	0.5	2 / 2	28	36.25	1.25	1.5 / 1.5	12.5	36.25	1.25	32	60.25	1.5	1.5 / 1.5	14.5	60.25	1.5	31	3	4	3	4.25	6	3.25	6	4.75	6	10	3.25	6	5.75	6	Non-Composite

**12 FT SPACING - 1 SPAN**

Spacing-Span	Web Splice Plates				Top Flange Plates, Outer				Top Flange Plates, Inner, 2 req'd.			Bottom Flange Plates, Outer				Bottom Flange Plates, Inner, 2 req'd.			Web Bolts					Top Flange Bolts					Bottom Flange Bolts					Composite Note
	Width, A	Length, B	Thk.	Edge / End Distance	Width, C	Length, D	Thk.	Edge / End Distance	Width, E	Length, D	Thk.	Width, F	Length, G	Thk.	Edge / End Distance	Width, H	Length, G	Thk.	Bolts per Row	Rows per Side	Pitch	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	Num Rows Ea Side	Pitch, group	Gage Lines	Gage	Gage, group	
14-150	12.25	53.625	0.5	1.5 / 1.5	24	30.25	0.75	2 / 1.5	11	30.25	0.75	22	42.25	1.375	2 / 1.5	10	42.25	1.375	16	2	3.375	3	3.25	5	3.25	4	7	6	7	3.25	4	6	6	Composite
14-160	12.25	58	0.5	1.5 / 1.5	24	36.25	0.75	2.5 / 1.5	11	36.25	0.75	26	54.25	1.375	2.5 / 1.5	12	54.25	1.375	12	2	5	3	3.25	6	3.25	4	6	7	9	3.25	4	7	7	Composite
14-170	12.25	64.25	0.5	1.5 / 1.5	22	36.25	1	1.5 / 1.5	10	36.25	1	30	36.25	1.25	1.5 / 1.5	14	36.25	1.25	15	2	4.375	3	3.25	6	3.25	4	7	5	6	3.25	6	5.5	5	Composite
14-180	12.25	69	0.5	1.5 / 1.5	24	36.25	1	3 / 1.5	11	36.25	1	28	54.25	1.25	3 / 1.5	13	54.25	1.25	17	2	4.125	3	3.25	6	3.25	4	5	8	9	3.25	4	7	8	Composite
14-190	12.25	73.875	0.5	1.5 / 1.5	24	36.25	0.75	2 / 1.5	10.5	36.25	0.75	30	36.25	1.25	2 / 1.5	13.5	36.25	1.25	22	2	3.375	3	3.25	6	3.25	4	6.5	7	6	3.25	6	4.75	7	Composite
14-200	18.25	77.25	0.5	1.5 / 1.5	24	42.25	1	3 / 1.5	11	42.25	1	28	66.25	1.5	3 / 1.5	13	66.25	1.5	19	3	4.125	3	3.25	7	3.25	4	5	8	11	3.25	4	7	8	Composite
14-210	12.25	84.25	0.5	1.5 / 1.5	24	48.25	1.125	2 / 1.5	10.5	48.25	1.125	30	48.25	1.5	2 / 1.5	13.5	48.25	1.5	26	2	3.25	3	3.25	8	3.25	4	6.5	7	8	3.25	6	4.75	7	Composite
14-220	12.25	87	0.5	1.5 / 1.5	24	42.25	1	3 / 1.5	11	42.25	1	28	60.25	1.375	3 / 1.5	13	60.25	1.375	25	2	3.5	3	3.25	7	3.25	4	5	8	10	3.25	4	7	8	Composite
14-230	12.25	90	0.5	1.5 / 1.5	24	48.25	1.125	3 / 1.5	11	48.25	1.125	28	66.25	1.5	3 / 1.5	13	66.25	1.5	25	2	3.625	3	3.25	8	3.25	4	5	8	11	3.25	4	7	8	Composite
14-240	18.25	97.5	0.5	1.5 / 1.5	24	24.25	1.125	1.5 / 1.5	11	24.25	1.125	30	48.25	1.5	1.5 / 1.5	14	48.25	1.5	29	3	3.375	3	3.25	4	3.25	6	4	5	8	3.25	6	5.5	5	Composite
14-250	18.25	103	0.5	1.5 / 1.5	24	42.25	1.125	2.5 / 1.5	11	42.25	1.125	30	48.25	1.5	2.5 / 1.5	14	48.25	1.5	26	3	4	3	3.25	7	3.25	4	6	7	8	3.25	6	4.5	7	Composite
14-260	18.25	106.125	0.5	1.5 / 1.5	26	48.25	1.125	3 / 1.5	12	48.25	1.125	28	78.25	1.375	3 / 1.5	13	78.25	1.375	26	3	4.125	3	3.25	8	3.25	4	6	8	13	3.25	4	7	8	Non-Composite
14-270	20.25	112.75	0.5	2 / 2	26	30.25	1.25	1.5 / 1.5	12	30.25	1.25	30	54.25	1.5	1.5 / 1.5	14	54.25	1.5	31	3	3.625	3	4.25	5	3.25	6	4.5	5	9	3.25	6	5.5	5	Non-Composite
14-280	24.25	115.375	0.5	1.5 / 1.5	26	36.25	1.375	1.5 / 1.5	11.875	36.25	1.375	34	66.25	1.5	1.5 / 1.5	15.875	66.25	1.5	30	4	3.875	3	3.25	6	3.25	6	4.4375	5.25	11	3.25	6	6.4375	5.25	Non-Composite
14-290	24.25	118.5	0.5	1.5 / 1.5	28	36.25	1.25	1.5 / 1.5	12.5	36.25	1.25	35	72.25	1.625	1.5 / 1.5	16	72.25	1.625	34	4	3.5	3	3.25	6	3.25	6	4.75	6	12	3.25	6	6.5	6	Non-Composite
14-300	24.25	123.125	0.625	1.5 / 1.5	28	42.25	1.5	1.5 / 1.5	12.5	42.25	1.5	36	60.25	1.75	1.5 / 1.5	16.5	60.25	1.75	32	4	3.875	3	3.25	7	3.25	6	4.75	6	10	3.25	6	6.75	6	Non-Composite

**14 FT SPACING - 1 SPAN**

**NOTES:**

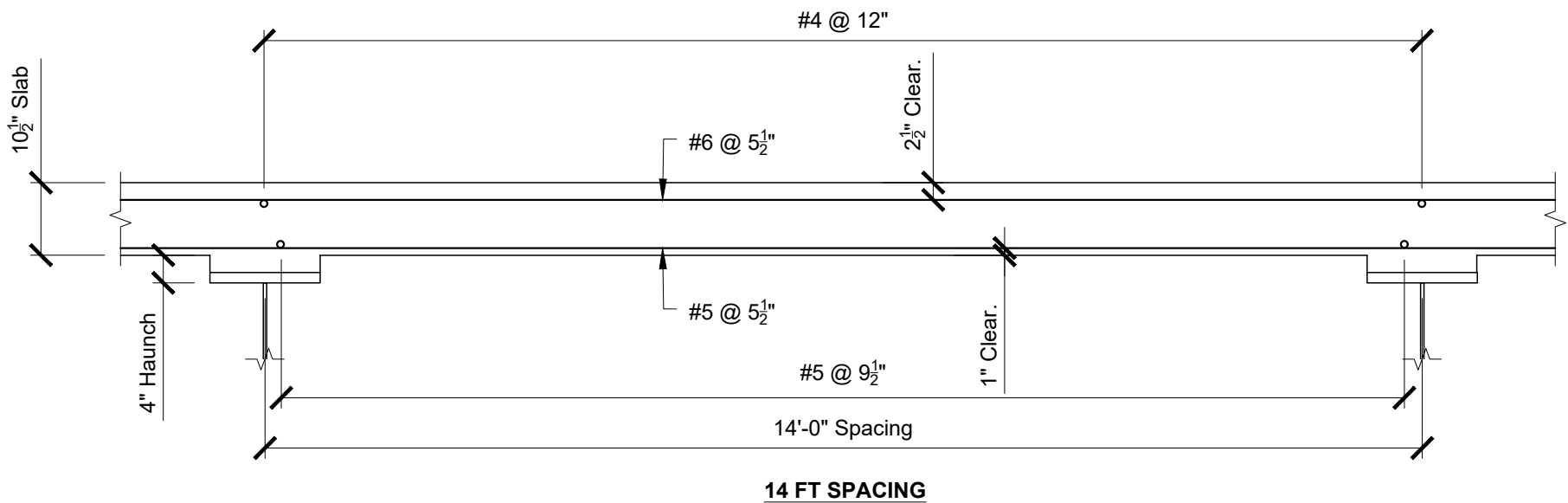
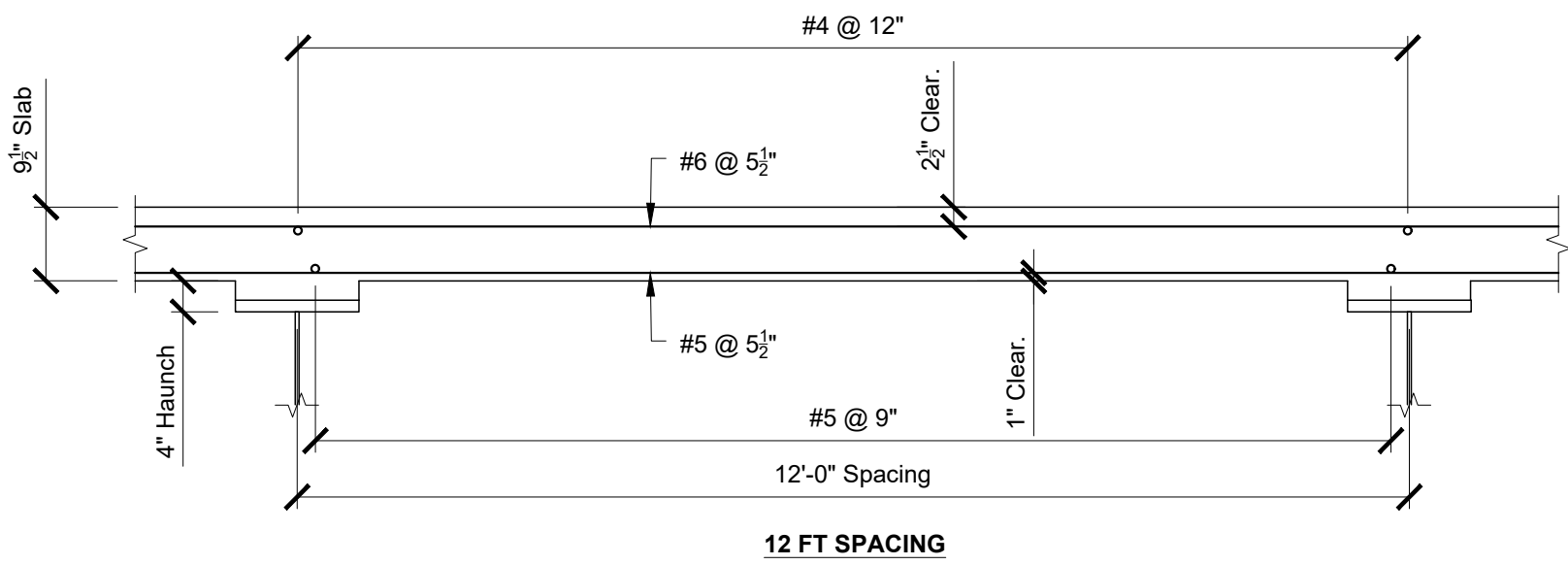
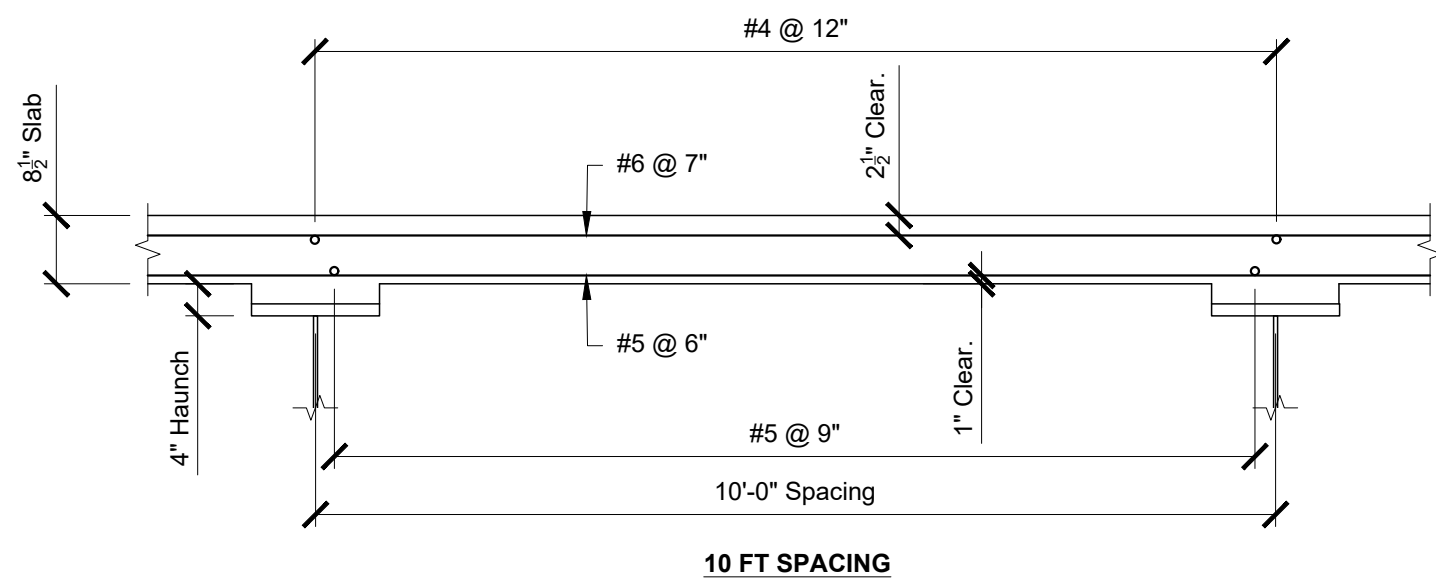
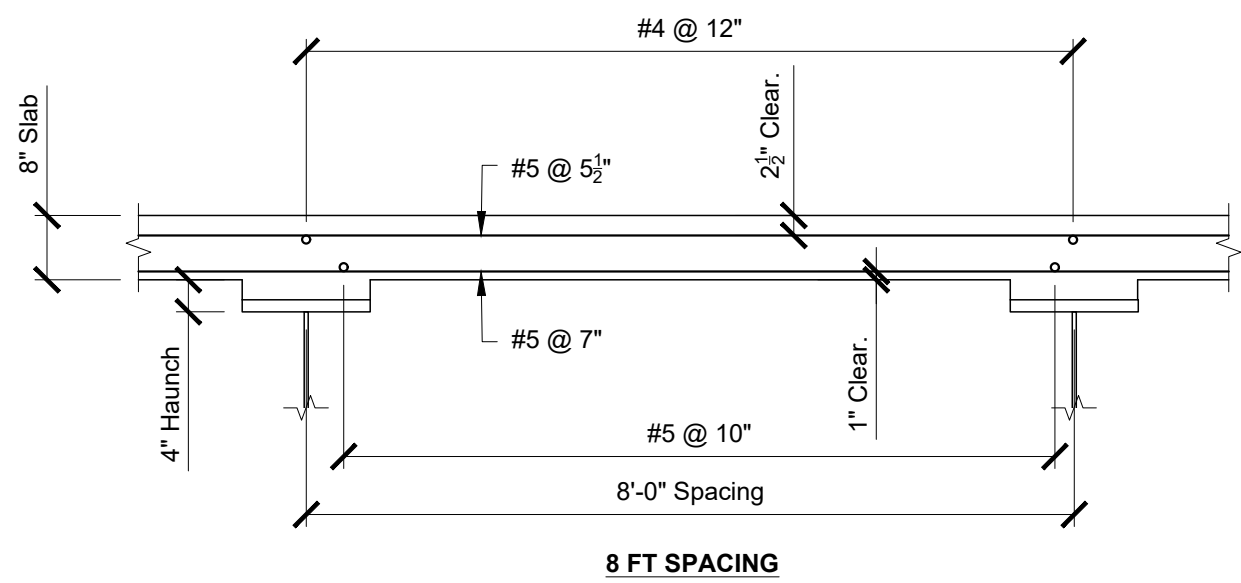
1. All dimensions / spacing shown in tables in inch units.



**BOLTED FIELD SPLICE  
DIMENSIONS 2**

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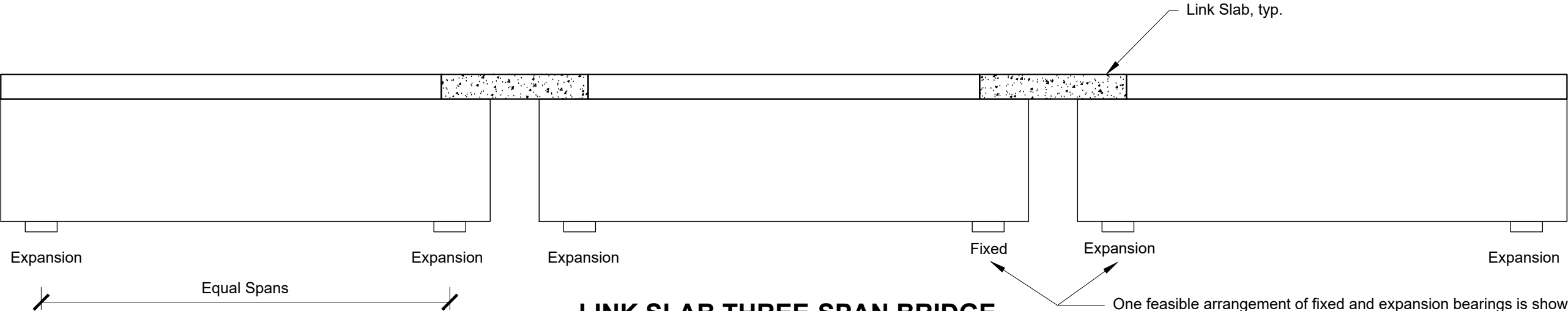


**DECK DESIGN NOTES**

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

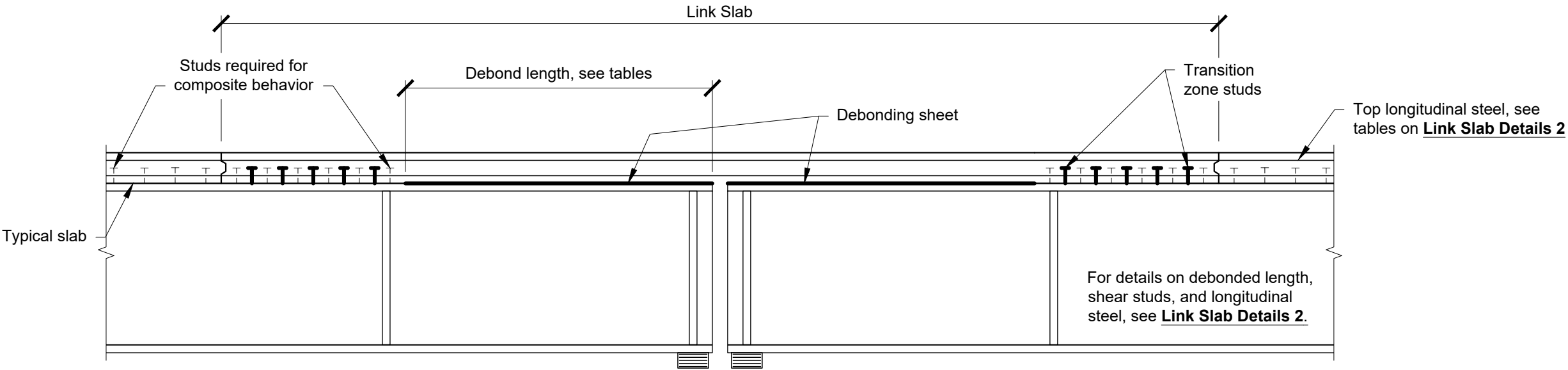


DECK DETAILS		
Simple Spans and Positive Moment Region of Continuous Spans		
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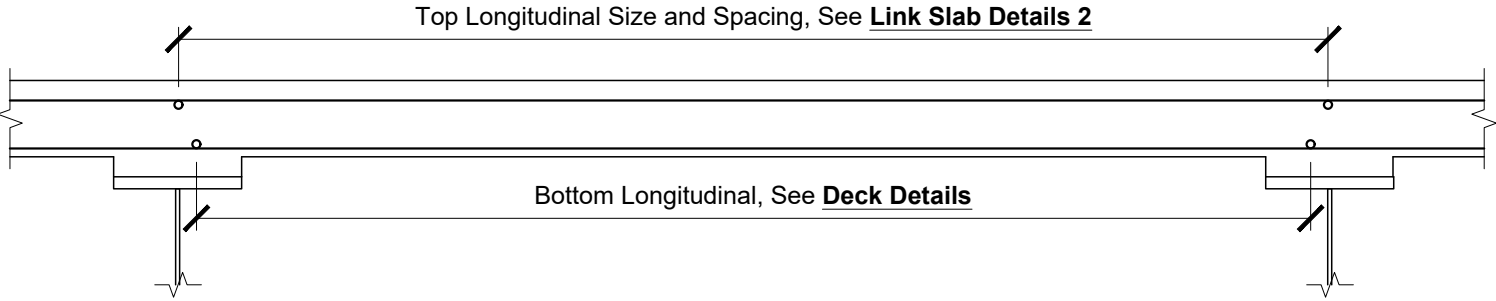


One feasible arrangement of fixed and expansion bearings is shown. Alternate arrangements with a single fixed bearing at a different substructure unit are also permitted. Use of additional fixed bearings, or two fixed bearings at a single substructure must be investigated by the design engineer.

A similar arrangement can be used for a two-span bridge.



**LINK SLAB DETAILS**



**TRANSVERSE SECTION**



**LINK SLAB DETAILS 1**

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Spacing, Ft	Notes	Span, Ft																	
		80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250
8	Top longitudinal bar quantity, size, spacing, in.	2 - #6 @ 5 in.	2 - #6 @ 6 in.	2 - #6 @ 6.5 in.	2 - #6 @ 6.5 in.	2 - #6 @ 6.5 in.	2 - #6 @ 7 in.	2 - #6 @ 7.5 in.	2 - #6 @ 8 in.	2 - #6 @ 8.5 in.	2 - #6 @ 9.5 in.	1 - #6 @ 5 in.	1 - #6 @ 5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 6 in.	1 - #6 @ 6 in.	1 - #6 @ 6 in.
	Debond length, each span, Ft	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5
	Transition zone studs, additional rows required	8	7	7	7	4	4	4	4	3	3	3	3	3	3	3	3	3	3
10	Top longitudinal bar quantity, size, spacing, in.	2 - #6 @ 6 in.	2 - #6 @ 6.5 in.	2 - #6 @ 6.5 in.	2 - #6 @ 6.5 in.	2 - #6 @ 6.5 in.	2 - #6 @ 7.5 in.	2 - #6 @ 7.5 in.	2 - #6 @ 8.5 in.	2 - #6 @ 9 in.	2 - #6 @ 9 in.	2 - #6 @ 9.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 6 in.
	Debond length, each span, Ft	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5
	Transition zone studs, additional rows required	9	8	8	8	5	4	4	4	4	4	4	4	4	4	4	4	4	3
12	Top longitudinal bar quantity, size, spacing, in.	2 - #6 @ 5.5 in.	2 - #6 @ 5.5 in.	2 - #6 @ 6 in.	2 - #6 @ 6.5 in.	2 - #6 @ 7 in.	2 - #6 @ 7 in.	2 - #6 @ 7.5 in.	2 - #6 @ 8 in.	2 - #6 @ 8.5 in.	2 - #6 @ 9 in.	2 - #6 @ 9.5 in.	1 - #6 @ 5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 6 in.	1 - #6 @ 6 in.
	Debond length, each span, Ft	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5
	Transition zone studs, additional rows required	11	6	6	6	5	5	5	5	5	5	5	4	4	4	4	4	4	4
14	Top longitudinal bar quantity, size, spacing, in.	2 - #6 @ 6 in.	2 - #6 @ 6.5 in.	2 - #6 @ 7 in.	2 - #6 @ 8 in.	2 - #6 @ 8 in.	2 - #6 @ 8 in.	2 - #6 @ 8.5 in.	2 - #6 @ 9 in.	2 - #6 @ 9.5 in.	1 - #6 @ 5 in.	1 - #6 @ 5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 5.5 in.	1 - #6 @ 6 in.	1 - #6 @ 6 in.	1 - #6 @ 6 in.	1 - #6 @ 6 in.	1 - #6 @ 6.5 in.
	Debond length, each span, Ft	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5
	Transition zone studs, additional rows required	7	7	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	4

- NOTES**
- 1. Design based on principles from *Behavior and Design of Link Slabs for Jointless Bridge Decks*, Alp Caner and Paul Zia, PCI Journal, May-June 1998.
  - 2. Debond length, 5% of each span. Designer is to choose a debonding mechanism in conjunction with owner preferences.
  - 3. Dead load rotation is the end rotation produced by barrier rails applied to the composite section assuming a uniformly distributed load deflected shape.
  - 4. Live load rotation is computed from midspan live load deflection assuming a parabolic deflected shape.
  - 5. Top longitudinal bars are designed to control deck transverse cracking per AASHTO LRFD 5.6.7, Class 2 exposure condition. Reinforcing steel may be transitioned to typical top longitudinal bars beyond the link slab region.
  - 6. Additional shear studs are required in the transition zone. Space at half-spacing of typical shear studs required for composite behavior and provide the required number of additional rows.



LINK SLAB DETAILS 2

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