

mBrace3D

Model Report

NSBA Design Example 4

Project	NSBA Design Example 4
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Units	US customary (ft along the girders, in for cross-sections, kip, ksi)
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1 Geometry

1.1 Alignment

Superstructure	Steel I-girders, 4 girders (G1 to G4)
Curvature	Horizontally curved, curvature orientation: left
Radius of curvature, interior girder (G1)	683.50 ft
Radius of curvature, bridge centerline	700.00 ft
Skew angle at the first support line	0° (not skewed)

1.2 Girders

Girder	Length (ft)	Spacing to previous (ft)	Offset from G1 (ft)	Radius (ft)
G1	517.50	-	0.00	683.50
G2	525.80	11.00	11.00	694.50
G3	534.20	11.00	22.00	705.50
G4	542.50	11.00	33.00	716.50

1.3 Deck

Deck thickness	9 in
Left overhang width	3.75 ft
Right overhang width	3.75 ft
Haunch thickness	4 in
Total deck width	40.50 ft

1.4 Framing plan

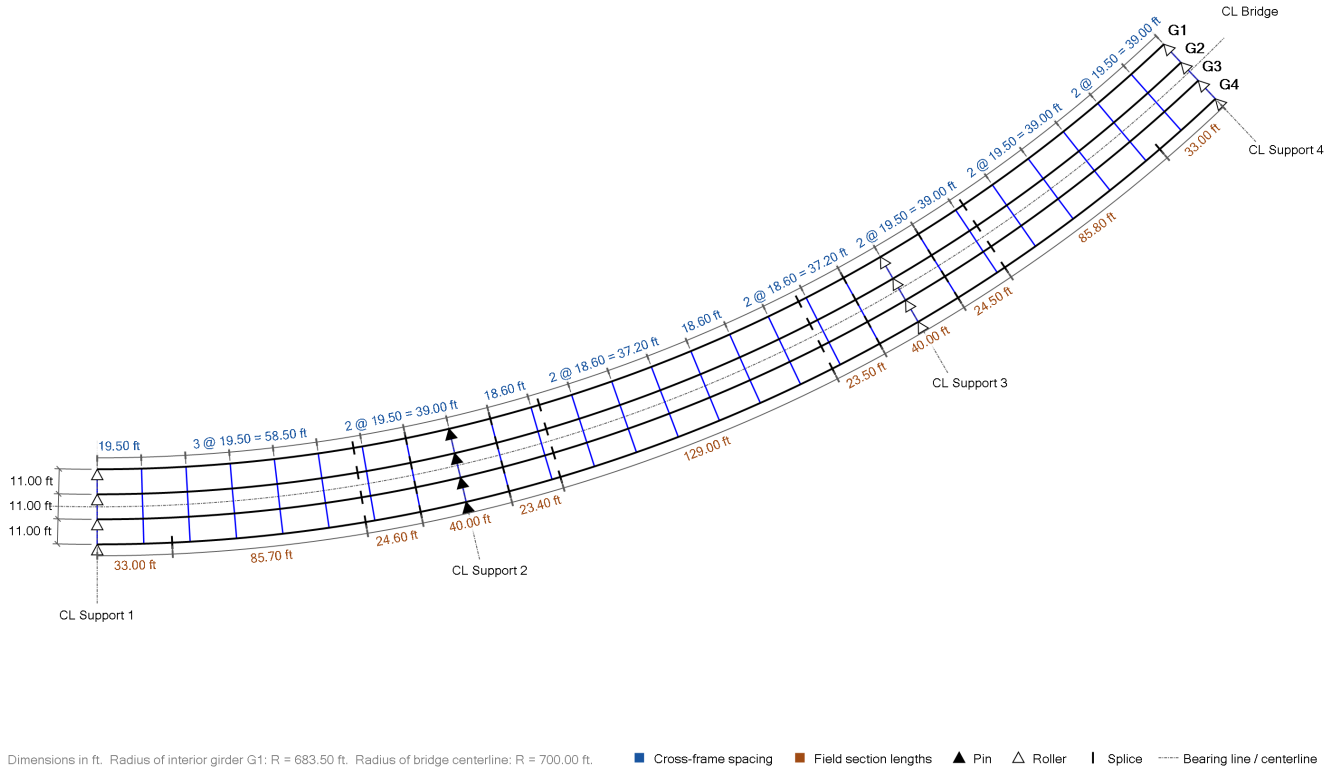


Figure 1. Framing plan.

2 Material properties

2.1 Steel

Modulus of elasticity, E	29000 ksi
Poisson's ratio	0.3
Unit weight	490 pcf

2.2 Concrete

Modulus of elasticity, Ec	3834 ksi
Poisson's ratio	0.2
Unit weight	150 pcf

3 Reference points

3.1 Pin and roller supports

Girder	Station (ft) and type
G1	0.00 (roller); 156.20 (pin); 361.30 (roller); 517.50 (roller)
G2	0.00 (roller); 158.70 (pin); 367.10 (roller); 525.80 (roller)
G3	0.00 (roller); 161.30 (pin); 372.90 (roller); 534.20 (roller)
G4	0.00 (roller); 163.80 (pin); 378.70 (roller); 542.50 (roller)

3.2 Splices

Girder	Stations (ft)	Field section lengths (ft)
G1	113.30, 136.70, 174.90, 197.30, 320.30, 342.60, 380.80, 404.30	113.30, 23.40, 38.20, 22.40, 123.00, 22.30, 38.20, 23.50, 113.20
G2	115.10, 138.90, 177.70, 200.40, 325.40, 348.20, 386.90, 410.70	115.10, 23.80, 38.80, 22.70, 125.00, 22.80, 38.70, 23.80, 115.10
G3	116.90, 141.10, 180.50, 203.60, 330.60, 353.70, 393.10, 417.30	116.90, 24.20, 39.40, 23.10, 127.00, 23.10, 39.40, 24.20, 116.90
G4	33.00, 118.70, 143.30, 183.30, 206.70, 335.70, 359.20, 399.20, 423.70, 509.50	33.00, 85.70, 24.60, 40.00, 23.40, 129.00, 23.50, 40.00, 24.50, 85.80, 33.00

3.3 Transverse web stiffeners

Girder	Side	Thickness × width	No.	Stations (ft)
G1	Both sides	1 × 7	28	0.00, 19.50, 39.10, 58.60, 78.10, 97.60, 117.20, 136.70, 156.20, 174.90, 193.50, 212.20, 230.80, 249.40, 268.10, 286.70, 305.40, 324.00, 342.60, 361.30, 380.80, 400.30, 419.90, 439.40, 458.90, 478.50, 498.00, 517.50
G2	Both sides	1 × 7	28	0.00, 19.80, 39.70, 59.50, 79.40, 99.20, 119.10, 138.90, 158.70, 177.70, 196.60, 215.60, 234.50, 253.40, 272.40, 291.30, 310.30, 329.20, 348.20, 367.10, 386.90, 406.80, 426.60, 446.50, 466.30, 486.20, 506.00, 525.80
G3	Both sides	1 × 7	28	0.00, 20.20, 40.30, 60.50, 80.60, 100.80, 120.90, 141.10, 161.30, 180.50, 199.70, 219.00, 238.20, 257.50, 276.70, 295.90, 315.20, 334.40, 353.70, 372.90, 393.10, 413.20, 433.40, 453.50, 473.70, 493.90, 514.00, 534.20
G4	Both sides	1 × 7	28	0.00, 20.50, 40.90, 61.40, 81.90, 102.40, 122.80, 143.30, 163.80, 183.30, 202.90, 222.40, 241.90, 261.50, 281.00, 300.60, 320.10, 339.60, 359.20, 378.70, 399.20, 419.70, 440.10, 460.60, 481.10, 501.60, 522.00, 542.50

3.4 X-frames

Bay	No.	Stations on left girder (ft)	Stations on right girder (ft)	Lean-on
Bay 1 (G1-G2)	28	0.00, 19.50, 39.10, 58.60, 78.10, 97.60, 117.20, 136.70, 156.20, 174.90, 193.50, 212.20, 230.80, 249.40, 268.10, 286.70, 305.40, 324.00, 342.60, 361.30, 380.80, 400.30, 419.90, 439.40, 458.90, 478.50, 498.00, 517.50	0.00, 19.80, 39.70, 59.50, 79.40, 99.20, 119.10, 138.90, 158.70, 177.70, 196.60, 215.60, 234.50, 253.40, 272.40, 291.30, 310.30, 329.20, 348.20, 367.10, 386.90, 406.80, 426.60, 446.50, 466.30, 486.20, 506.00, 525.80	No
Bay 2 (G2-G3)	28	0.00, 19.80, 39.70, 59.50, 79.40, 99.20, 119.10, 138.90, 158.70, 177.70, 196.60, 215.60, 234.50, 253.40, 272.40, 291.30, 310.30, 329.20, 348.20, 367.10, 386.90, 406.80, 426.60, 446.50, 466.30, 486.20, 506.00, 525.80	0.00, 20.20, 40.30, 60.50, 80.60, 100.80, 120.90, 141.10, 161.30, 180.50, 199.70, 219.00, 238.20, 257.50, 276.70, 295.90, 315.20, 334.40, 353.70, 372.90, 393.10, 413.20, 433.40, 453.50, 473.70, 493.90, 514.00, 534.20	No
Bay 3 (G3-G4)	28	0.00, 20.20, 40.30, 60.50, 80.60, 100.80, 120.90, 141.10, 161.30, 180.50, 199.70, 219.00, 238.20, 257.50, 276.70, 295.90, 315.20, 334.40, 353.70, 372.90, 393.10, 413.20, 433.40, 453.50, 473.70, 493.90, 514.00, 534.20	0.00, 20.50, 40.90, 61.40, 81.90, 102.40, 122.80, 143.30, 163.80, 183.30, 202.90, 222.40, 241.90, 261.50, 281.00, 300.60, 320.10, 339.60, 359.20, 378.70, 399.20, 419.70, 440.10, 460.60, 481.10, 501.60, 522.00, 542.50	No

Member areas (in^2)

Member	Intermediate	At supports
Top chord	4.75	4.75
Bottom chord	4.75	4.75
Diagonals	4.75	4.75

3.5 Additional reference points

Girder	Stations (ft)
G1	511.50
G2	519.80
G3	528.20
G4	536.50

4 Critical points and segments

4.1 Critical points

Girder	Number	Stations (ft)
G1	33	0.00, 19.50, 39.10, 58.60, 78.10, 97.60, 113.30, 117.20, 136.70, 156.20, 174.90, 193.50, 197.30, 212.20, 230.80, 249.40, 268.10, 286.70, 305.40, 320.30, 324.00, 342.60, 361.30, 380.80, 400.30, 404.30, 419.90, 439.40, 458.90, 478.50, 498.00, 511.50, 517.50
G2	33	0.00, 19.80, 39.70, 59.50, 79.40, 99.20, 115.10, 119.10, 138.90, 158.70, 177.70, 196.60, 200.40, 215.60, 234.50, 253.40, 272.40, 291.30, 310.30, 325.40, 329.20, 348.20, 367.10, 386.90, 406.80, 410.70, 426.60, 446.50, 466.30, 486.20, 506.00, 519.80, 525.80
G3	33	0.00, 20.20, 40.30, 60.50, 80.60, 100.80, 116.90, 120.90, 141.10, 161.30, 180.50, 199.70, 203.60, 219.00, 238.20, 257.50, 276.70, 295.90, 315.20, 330.60, 334.40, 353.70, 372.90, 393.10, 413.20, 417.30, 433.40, 453.50, 473.70, 493.90, 514.00, 528.20, 534.20
G4	35	0.00, 20.50, 33.00, 40.90, 61.40, 81.90, 102.40, 118.70, 122.80, 143.30, 163.80, 183.30, 202.90, 206.70, 222.40, 241.90, 261.50, 281.00, 300.60, 320.10, 335.70, 339.60, 359.20, 378.70, 399.20, 419.70, 423.70, 440.10, 460.60, 481.10, 501.60, 509.50, 522.00, 536.50, 542.50

4.2 Segments and mesh size

Girder	Segment	Start (ft)	End (ft)	Length (ft)	Mesh size (in)
G1	1	0.00	19.50	19.50	72
	2	19.50	39.10	19.60	72
	3	39.10	58.60	19.50	72
	4	58.60	78.10	19.50	72
	5	78.10	97.60	19.50	72
	6	97.60	113.30	15.70	72
	7	113.30	117.20	3.90	45.8
	8	117.20	136.70	19.50	72
	9	136.70	156.20	19.50	72
	10	156.20	174.90	18.70	72
	11	174.90	193.50	18.60	72
	12	193.50	197.30	3.80	44.6
	13	197.30	212.20	14.90	72
	14	212.20	230.80	18.60	72
	15	230.80	249.40	18.60	72
	16	249.40	268.10	18.70	72
	17	268.10	286.70	18.60	72
	18	286.70	305.40	18.70	72
	19	305.40	320.30	14.90	72
	20	320.30	324.00	3.70	43.4
	21	324.00	342.60	18.60	72
	22	342.60	361.30	18.70	72
	23	361.30	380.80	19.50	72
	24	380.80	400.30	19.50	72
	25	400.30	404.30	4.00	47
	26	404.30	419.90	15.60	72
	27	419.90	439.40	19.50	72
	28	439.40	458.90	19.50	72
	29	458.90	478.50	19.60	72
	30	478.50	498.00	19.50	72
	31	498.00	511.50	13.50	72
	32	511.50	517.50	6.00	71
G2	1	0.00	19.80	19.80	72
	2	19.80	39.70	19.90	72

Girder	Segment	Start (ft)	End (ft)	Length (ft)	Mesh size (in)
	3	39.70	59.50	19.80	72
	4	59.50	79.40	19.90	72
	5	79.40	99.20	19.80	72
	6	99.20	115.10	15.90	72
	7	115.10	119.10	4.00	47
	8	119.10	138.90	19.80	72
	9	138.90	158.70	19.80	72
	10	158.70	177.70	19.00	72
	11	177.70	196.60	18.90	72
	12	196.60	200.40	3.80	44.6
	13	200.40	215.60	15.20	72
	14	215.60	234.50	18.90	72
	15	234.50	253.40	18.90	72
	16	253.40	272.40	19.00	72
	17	272.40	291.30	18.90	72
	18	291.30	310.30	19.00	72
	19	310.30	325.40	15.10	72
	20	325.40	329.20	3.80	44.6
	21	329.20	348.20	19.00	72
	22	348.20	367.10	18.90	72
	23	367.10	386.90	19.80	72
	24	386.90	406.80	19.90	72
	25	406.80	410.70	3.90	45.8
	26	410.70	426.60	15.90	72
	27	426.60	446.50	19.90	72
	28	446.50	466.30	19.80	72
	29	466.30	486.20	19.90	72
	30	486.20	506.00	19.80	72
	31	506.00	519.80	13.80	72
	32	519.80	525.80	6.00	71
G3	1	0.00	20.20	20.20	72
	2	20.20	40.30	20.10	72
	3	40.30	60.50	20.20	72
	4	60.50	80.60	20.10	72
	5	80.60	100.80	20.20	72
	6	100.80	116.90	16.10	72
	7	116.90	120.90	4.00	47
	8	120.90	141.10	20.20	72
	9	141.10	161.30	20.20	72
	10	161.30	180.50	19.20	72
	11	180.50	199.70	19.20	72
	12	199.70	203.60	3.90	45.8
	13	203.60	219.00	15.40	72
	14	219.00	238.20	19.20	72
	15	238.20	257.50	19.30	72
	16	257.50	276.70	19.20	72
	17	276.70	295.90	19.20	72
	18	295.90	315.20	19.30	72
	19	315.20	330.60	15.40	72
	20	330.60	334.40	3.80	44.6
	21	334.40	353.70	19.30	72
	22	353.70	372.90	19.20	72

Girder	Segment	Start (ft)	End (ft)	Length (ft)	Mesh size (in)
	23	372.90	393.10	20.20	72
	24	393.10	413.20	20.10	72
	25	413.20	417.30	4.10	48.2
	26	417.30	433.40	16.10	72
	27	433.40	453.50	20.10	72
	28	453.50	473.70	20.20	72
	29	473.70	493.90	20.20	72
	30	493.90	514.00	20.10	72
	31	514.00	528.20	14.20	72
	32	528.20	534.20	6.00	71
G4	1	0.00	20.50	20.50	72
	2	20.50	33.00	12.50	72
	3	33.00	40.90	7.90	72
	4	40.90	61.40	20.50	72
	5	61.40	81.90	20.50	72
	6	81.90	102.40	20.50	72
	7	102.40	118.70	16.30	72
	8	118.70	122.80	4.10	48.2
	9	122.80	143.30	20.50	72
	10	143.30	163.80	20.50	72
	11	163.80	183.30	19.50	72
	12	183.30	202.90	19.60	72
	13	202.90	206.70	3.80	44.6
	14	206.70	222.40	15.70	72
	15	222.40	241.90	19.50	72
	16	241.90	261.50	19.60	72
	17	261.50	281.00	19.50	72
	18	281.00	300.60	19.60	72
	19	300.60	320.10	19.50	72
	20	320.10	335.70	15.60	72
	21	335.70	339.60	3.90	45.8
	22	339.60	359.20	19.60	72
	23	359.20	378.70	19.50	72
	24	378.70	399.20	20.50	72
	25	399.20	419.70	20.50	72
	26	419.70	423.70	4.00	47
	27	423.70	440.10	16.40	72
	28	440.10	460.60	20.50	72
	29	460.60	481.10	20.50	72
	30	481.10	501.60	20.50	72
	31	501.60	509.50	7.90	72
	32	509.50	522.00	12.50	72
	33	522.00	536.50	14.50	72
	34	536.50	542.50	6.00	71

Elements over the web depth: 4.

5 Profiles

5.1 Profile definition

Profile	Top flange width	Top flange thickness	Web depth	Web thickness	Bottom flange width	Bottom flange thickness
1	15	1	84	0.5625	16	1
2	21	1.25	84	0.625	21	1.5
3	21	2.5	84	0.625	21	3
4	15	1	84	0.5625	18	1
5	18	1.25	84	0.625	19	1.5
6	18	2.5	84	0.625	19	3
7	15	1	84	0.5625	17	1
8	16	1	84	0.5625	18	1
9	20	1.25	84	0.625	21	1.5
10	20	2.5	84	0.625	21	3
11	15	1	84	0.5625	20	1
12	20	1	84	0.5625	21	1
13	20	1	84	0.5625	21	1.5
14	28	1.25	84	0.625	27	1.5
15	28	2.5	84	0.625	27	3
16	17	1	84	0.5625	21	1.5

Dimensions in in.

5.2 Profile assignation

Girder	Segment	Stations (ft)	Profile	Top flange (in)	Web (in)	Bottom flange (in)
G1	1	0.00 - 19.50	1	15 × 1	84 × 0.5625	16 × 1
	2	19.50 - 39.10	1	15 × 1	84 × 0.5625	16 × 1
	3	39.10 - 58.60	1	15 × 1	84 × 0.5625	16 × 1
	4	58.60 - 78.10	1	15 × 1	84 × 0.5625	16 × 1
	5	78.10 - 97.60	1	15 × 1	84 × 0.5625	16 × 1
	6	97.60 - 113.30	1	15 × 1	84 × 0.5625	16 × 1
	7	113.30 - 117.20	2	21 × 1.25	84 × 0.625	21 × 1.5
	8	117.20 - 136.70	2	21 × 1.25	84 × 0.625	21 × 1.5
	9	136.70 - 156.20	3	21 × 2.5	84 × 0.625	21 × 3
	10	156.20 - 174.90	3	21 × 2.5	84 × 0.625	21 × 3
	11	174.90 - 193.50	2	21 × 1.25	84 × 0.625	21 × 1.5
	12	193.50 - 197.30	2	21 × 1.25	84 × 0.625	21 × 1.5
	13	197.30 - 212.20	4	15 × 1	84 × 0.5625	18 × 1
	14	212.20 - 230.80	4	15 × 1	84 × 0.5625	18 × 1
	15	230.80 - 249.40	4	15 × 1	84 × 0.5625	18 × 1
	16	249.40 - 268.10	4	15 × 1	84 × 0.5625	18 × 1
	17	268.10 - 286.70	4	15 × 1	84 × 0.5625	18 × 1
	18	286.70 - 305.40	4	15 × 1	84 × 0.5625	18 × 1
	19	305.40 - 320.30	4	15 × 1	84 × 0.5625	18 × 1
	20	320.30 - 324.00	2	21 × 1.25	84 × 0.625	21 × 1.5
	21	324.00 - 342.60	2	21 × 1.25	84 × 0.625	21 × 1.5
	22	342.60 - 361.30	3	21 × 2.5	84 × 0.625	21 × 3
	23	361.30 - 380.80	3	21 × 2.5	84 × 0.625	21 × 3
	24	380.80 - 400.30	2	21 × 1.25	84 × 0.625	21 × 1.5
	25	400.30 - 404.30	2	21 × 1.25	84 × 0.625	21 × 1.5
	26	404.30 - 419.90	1	15 × 1	84 × 0.5625	16 × 1

Girder	Segment	Stations (ft)	Profile	Top flange (in)	Web (in)	Bottom flange (in)
	27	419.90 - 439.40	1	15 × 1	84 × 0.5625	16 × 1
	28	439.40 - 458.90	1	15 × 1	84 × 0.5625	16 × 1
	29	458.90 - 478.50	1	15 × 1	84 × 0.5625	16 × 1
	30	478.50 - 498.00	1	15 × 1	84 × 0.5625	16 × 1
	31	498.00 - 511.50	1	15 × 1	84 × 0.5625	16 × 1
	32	511.50 - 517.50	1	15 × 1	84 × 0.5625	16 × 1
G2	1	0.00 - 19.80	1	15 × 1	84 × 0.5625	16 × 1
	2	19.80 - 39.70	1	15 × 1	84 × 0.5625	16 × 1
	3	39.70 - 59.50	1	15 × 1	84 × 0.5625	16 × 1
	4	59.50 - 79.40	1	15 × 1	84 × 0.5625	16 × 1
	5	79.40 - 99.20	1	15 × 1	84 × 0.5625	16 × 1
	6	99.20 - 115.10	1	15 × 1	84 × 0.5625	16 × 1
	7	115.10 - 119.10	5	18 × 1.25	84 × 0.625	19 × 1.5
	8	119.10 - 138.90	5	18 × 1.25	84 × 0.625	19 × 1.5
	9	138.90 - 158.70	6	18 × 2.5	84 × 0.625	19 × 3
	10	158.70 - 177.70	6	18 × 2.5	84 × 0.625	19 × 3
	11	177.70 - 196.60	5	18 × 1.25	84 × 0.625	19 × 1.5
	12	196.60 - 200.40	5	18 × 1.25	84 × 0.625	19 × 1.5
	13	200.40 - 215.60	7	15 × 1	84 × 0.5625	17 × 1
	14	215.60 - 234.50	7	15 × 1	84 × 0.5625	17 × 1
	15	234.50 - 253.40	7	15 × 1	84 × 0.5625	17 × 1
	16	253.40 - 272.40	7	15 × 1	84 × 0.5625	17 × 1
	17	272.40 - 291.30	7	15 × 1	84 × 0.5625	17 × 1
	18	291.30 - 310.30	7	15 × 1	84 × 0.5625	17 × 1
	19	310.30 - 325.40	7	15 × 1	84 × 0.5625	17 × 1
	20	325.40 - 329.20	5	18 × 1.25	84 × 0.625	19 × 1.5
	21	329.20 - 348.20	5	18 × 1.25	84 × 0.625	19 × 1.5
	22	348.20 - 367.10	6	18 × 2.5	84 × 0.625	19 × 3
	23	367.10 - 386.90	6	18 × 2.5	84 × 0.625	19 × 3
	24	386.90 - 406.80	5	18 × 1.25	84 × 0.625	19 × 1.5
	25	406.80 - 410.70	5	18 × 1.25	84 × 0.625	19 × 1.5
	26	410.70 - 426.60	1	15 × 1	84 × 0.5625	16 × 1
	27	426.60 - 446.50	1	15 × 1	84 × 0.5625	16 × 1
	28	446.50 - 466.30	1	15 × 1	84 × 0.5625	16 × 1
	29	466.30 - 486.20	1	15 × 1	84 × 0.5625	16 × 1
	30	486.20 - 506.00	1	15 × 1	84 × 0.5625	16 × 1
	31	506.00 - 519.80	1	15 × 1	84 × 0.5625	16 × 1
	32	519.80 - 525.80	1	15 × 1	84 × 0.5625	16 × 1
G3	1	0.00 - 20.20	8	16 × 1	84 × 0.5625	18 × 1
	2	20.20 - 40.30	8	16 × 1	84 × 0.5625	18 × 1
	3	40.30 - 60.50	8	16 × 1	84 × 0.5625	18 × 1
	4	60.50 - 80.60	8	16 × 1	84 × 0.5625	18 × 1
	5	80.60 - 100.80	8	16 × 1	84 × 0.5625	18 × 1
	6	100.80 - 116.90	8	16 × 1	84 × 0.5625	18 × 1
	7	116.90 - 120.90	9	20 × 1.25	84 × 0.625	21 × 1.5
	8	120.90 - 141.10	9	20 × 1.25	84 × 0.625	21 × 1.5
	9	141.10 - 161.30	10	20 × 2.5	84 × 0.625	21 × 3
	10	161.30 - 180.50	10	20 × 2.5	84 × 0.625	21 × 3
	11	180.50 - 199.70	9	20 × 1.25	84 × 0.625	21 × 1.5
	12	199.70 - 203.60	9	20 × 1.25	84 × 0.625	21 × 1.5
	13	203.60 - 219.00	11	15 × 1	84 × 0.5625	20 × 1
	14	219.00 - 238.20	11	15 × 1	84 × 0.5625	20 × 1

Girder	Segment	Stations (ft)	Profile	Top flange (in)	Web (in)	Bottom flange (in)
	15	238.20 - 257.50	11	15 × 1	84 × 0.5625	20 × 1
	16	257.50 - 276.70	11	15 × 1	84 × 0.5625	20 × 1
	17	276.70 - 295.90	11	15 × 1	84 × 0.5625	20 × 1
	18	295.90 - 315.20	11	15 × 1	84 × 0.5625	20 × 1
	19	315.20 - 330.60	11	15 × 1	84 × 0.5625	20 × 1
	20	330.60 - 334.40	9	20 × 1.25	84 × 0.625	21 × 1.5
	21	334.40 - 353.70	9	20 × 1.25	84 × 0.625	21 × 1.5
	22	353.70 - 372.90	10	20 × 2.5	84 × 0.625	21 × 3
	23	372.90 - 393.10	10	20 × 2.5	84 × 0.625	21 × 3
	24	393.10 - 413.20	9	20 × 1.25	84 × 0.625	21 × 1.5
	25	413.20 - 417.30	9	20 × 1.25	84 × 0.625	21 × 1.5
	26	417.30 - 433.40	8	16 × 1	84 × 0.5625	18 × 1
	27	433.40 - 453.50	8	16 × 1	84 × 0.5625	18 × 1
	28	453.50 - 473.70	8	16 × 1	84 × 0.5625	18 × 1
	29	473.70 - 493.90	8	16 × 1	84 × 0.5625	18 × 1
	30	493.90 - 514.00	8	16 × 1	84 × 0.5625	18 × 1
	31	514.00 - 528.20	8	16 × 1	84 × 0.5625	18 × 1
	32	528.20 - 534.20	8	16 × 1	84 × 0.5625	18 × 1
G4	1	0.00 - 20.50	12	20 × 1	84 × 0.5625	21 × 1
	2	20.50 - 33.00	12	20 × 1	84 × 0.5625	21 × 1
	3	33.00 - 40.90	13	20 × 1	84 × 0.5625	21 × 1.5
	4	40.90 - 61.40	13	20 × 1	84 × 0.5625	21 × 1.5
	5	61.40 - 81.90	13	20 × 1	84 × 0.5625	21 × 1.5
	6	81.90 - 102.40	13	20 × 1	84 × 0.5625	21 × 1.5
	7	102.40 - 118.70	13	20 × 1	84 × 0.5625	21 × 1.5
	8	118.70 - 122.80	14	28 × 1.25	84 × 0.625	27 × 1.5
	9	122.80 - 143.30	14	28 × 1.25	84 × 0.625	27 × 1.5
	10	143.30 - 163.80	15	28 × 2.5	84 × 0.625	27 × 3
	11	163.80 - 183.30	15	28 × 2.5	84 × 0.625	27 × 3
	12	183.30 - 202.90	14	28 × 1.25	84 × 0.625	27 × 1.5
	13	202.90 - 206.70	14	28 × 1.25	84 × 0.625	27 × 1.5
	14	206.70 - 222.40	16	17 × 1	84 × 0.5625	21 × 1.5
	15	222.40 - 241.90	16	17 × 1	84 × 0.5625	21 × 1.5
	16	241.90 - 261.50	16	17 × 1	84 × 0.5625	21 × 1.5
	17	261.50 - 281.00	16	17 × 1	84 × 0.5625	21 × 1.5
	18	281.00 - 300.60	16	17 × 1	84 × 0.5625	21 × 1.5
	19	300.60 - 320.10	16	17 × 1	84 × 0.5625	21 × 1.5
	20	320.10 - 335.70	16	17 × 1	84 × 0.5625	21 × 1.5
	21	335.70 - 339.60	14	28 × 1.25	84 × 0.625	27 × 1.5
	22	339.60 - 359.20	14	28 × 1.25	84 × 0.625	27 × 1.5
	23	359.20 - 378.70	15	28 × 2.5	84 × 0.625	27 × 3
	24	378.70 - 399.20	15	28 × 2.5	84 × 0.625	27 × 3
	25	399.20 - 419.70	14	28 × 1.25	84 × 0.625	27 × 1.5
	26	419.70 - 423.70	14	28 × 1.25	84 × 0.625	27 × 1.5
	27	423.70 - 440.10	13	20 × 1	84 × 0.5625	21 × 1.5
	28	440.10 - 460.60	13	20 × 1	84 × 0.5625	21 × 1.5
	29	460.60 - 481.10	13	20 × 1	84 × 0.5625	21 × 1.5
	30	481.10 - 501.60	13	20 × 1	84 × 0.5625	21 × 1.5
	31	501.60 - 509.50	13	20 × 1	84 × 0.5625	21 × 1.5
	32	509.50 - 522.00	12	20 × 1	84 × 0.5625	21 × 1
	33	522.00 - 536.50	12	20 × 1	84 × 0.5625	21 × 1
	34	536.50 - 542.50	12	20 × 1	84 × 0.5625	21 × 1

Flanges: width × thickness; web: depth × thickness.

5.3 Profile elevation

Girder	Segment	Stations (ft)	Elevation at start (in)	Elevation at end (in)
G1	1	0.00 - 19.50	0	0
	2	19.50 - 39.10	0	0
	3	39.10 - 58.60	0	0
	4	58.60 - 78.10	0	0
	5	78.10 - 97.60	0	0
	6	97.60 - 113.30	0	0
	7	113.30 - 117.20	-0.5	-0.5
	8	117.20 - 136.70	-0.5	-0.5
	9	136.70 - 156.20	-2	-2
	10	156.20 - 174.90	-2	-2
	11	174.90 - 193.50	-0.5	-0.5
	12	193.50 - 197.30	-0.5	-0.5
	13	197.30 - 212.20	0	0
	14	212.20 - 230.80	0	0
	15	230.80 - 249.40	0	0
	16	249.40 - 268.10	0	0
	17	268.10 - 286.70	0	0
	18	286.70 - 305.40	0	0
	19	305.40 - 320.30	0	0
	20	320.30 - 324.00	-0.5	-0.5
	21	324.00 - 342.60	-0.5	-0.5
	22	342.60 - 361.30	-2	-2
	23	361.30 - 380.80	-2	-2
	24	380.80 - 400.30	-0.5	-0.5
	25	400.30 - 404.30	-0.5	-0.5
	26	404.30 - 419.90	0	0
	27	419.90 - 439.40	0	0
	28	439.40 - 458.90	0	0
	29	458.90 - 478.50	0	0
	30	478.50 - 498.00	0	0
	31	498.00 - 511.50	0	0
	32	511.50 - 517.50	0	0
G2	1	0.00 - 19.80	0	0
	2	19.80 - 39.70	0	0
	3	39.70 - 59.50	0	0
	4	59.50 - 79.40	0	0
	5	79.40 - 99.20	0	0
	6	99.20 - 115.10	0	0
	7	115.10 - 119.10	-0.5	-0.5
	8	119.10 - 138.90	-0.5	-0.5
	9	138.90 - 158.70	-2	-2
	10	158.70 - 177.70	-2	-2
	11	177.70 - 196.60	-0.5	-0.5
	12	196.60 - 200.40	-0.5	-0.5
	13	200.40 - 215.60	0	0
	14	215.60 - 234.50	0	0
	15	234.50 - 253.40	0	0
	16	253.40 - 272.40	0	0

Girder	Segment	Stations (ft)	Elevation at start (in)	Elevation at end (in)
	17	272.40 - 291.30	0	0
	18	291.30 - 310.30	0	0
	19	310.30 - 325.40	0	0
	20	325.40 - 329.20	-0.5	-0.5
	21	329.20 - 348.20	-0.5	-0.5
	22	348.20 - 367.10	-2	-2
	23	367.10 - 386.90	-2	-2
	24	386.90 - 406.80	-0.5	-0.5
	25	406.80 - 410.70	-0.5	-0.5
	26	410.70 - 426.60	0	0
	27	426.60 - 446.50	0	0
	28	446.50 - 466.30	0	0
	29	466.30 - 486.20	0	0
	30	486.20 - 506.00	0	0
	31	506.00 - 519.80	0	0
	32	519.80 - 525.80	0	0
G3	1	0.00 - 20.20	0	0
	2	20.20 - 40.30	0	0
	3	40.30 - 60.50	0	0
	4	60.50 - 80.60	0	0
	5	80.60 - 100.80	0	0
	6	100.80 - 116.90	0	0
	7	116.90 - 120.90	-0.5	-0.5
	8	120.90 - 141.10	-0.5	-0.5
	9	141.10 - 161.30	-2	-2
	10	161.30 - 180.50	-2	-2
	11	180.50 - 199.70	-0.5	-0.5
	12	199.70 - 203.60	-0.5	-0.5
	13	203.60 - 219.00	0	0
	14	219.00 - 238.20	0	0
	15	238.20 - 257.50	0	0
	16	257.50 - 276.70	0	0
	17	276.70 - 295.90	0	0
	18	295.90 - 315.20	0	0
	19	315.20 - 330.60	0	0
	20	330.60 - 334.40	-0.5	-0.5
	21	334.40 - 353.70	-0.5	-0.5
	22	353.70 - 372.90	-2	-2
	23	372.90 - 393.10	-2	-2
	24	393.10 - 413.20	-0.5	-0.5
	25	413.20 - 417.30	-0.5	-0.5
	26	417.30 - 433.40	0	0
	27	433.40 - 453.50	0	0
	28	453.50 - 473.70	0	0
	29	473.70 - 493.90	0	0
	30	493.90 - 514.00	0	0
	31	514.00 - 528.20	0	0
	32	528.20 - 534.20	0	0
G4	1	0.00 - 20.50	0	0
	2	20.50 - 33.00	0	0
	3	33.00 - 40.90	-0.5	-0.5
	4	40.90 - 61.40	-0.5	-0.5

Girder	Segment	Stations (ft)	Elevation at start (in)	Elevation at end (in)
	5	61.40 - 81.90	-0.5	-0.5
	6	81.90 - 102.40	-0.5	-0.5
	7	102.40 - 118.70	-0.5	-0.5
	8	118.70 - 122.80	-0.5	-0.5
	9	122.80 - 143.30	-0.5	-0.5
	10	143.30 - 163.80	-2	-2
	11	163.80 - 183.30	-2	-2
	12	183.30 - 202.90	-0.5	-0.5
	13	202.90 - 206.70	-0.5	-0.5
	14	206.70 - 222.40	-0.5	-0.5
	15	222.40 - 241.90	-0.5	-0.5
	16	241.90 - 261.50	-0.5	-0.5
	17	261.50 - 281.00	-0.5	-0.5
	18	281.00 - 300.60	-0.5	-0.5
	19	300.60 - 320.10	-0.5	-0.5
	20	320.10 - 335.70	-0.5	-0.5
	21	335.70 - 339.60	-0.5	-0.5
	22	339.60 - 359.20	-0.5	-0.5
	23	359.20 - 378.70	-2	-2
	24	378.70 - 399.20	-2	-2
	25	399.20 - 419.70	-0.5	-0.5
	26	419.70 - 423.70	-0.5	-0.5
	27	423.70 - 440.10	-0.5	-0.5
	28	440.10 - 460.60	-0.5	-0.5
	29	460.60 - 481.10	-0.5	-0.5
	30	481.10 - 501.60	-0.5	-0.5
	31	501.60 - 509.50	-0.5	-0.5
	32	509.50 - 522.00	0	0
	33	522.00 - 536.50	0	0
	34	536.50 - 542.50	0	0

Elevation of the underside of the bottom flange.

5.4 Girder elevations

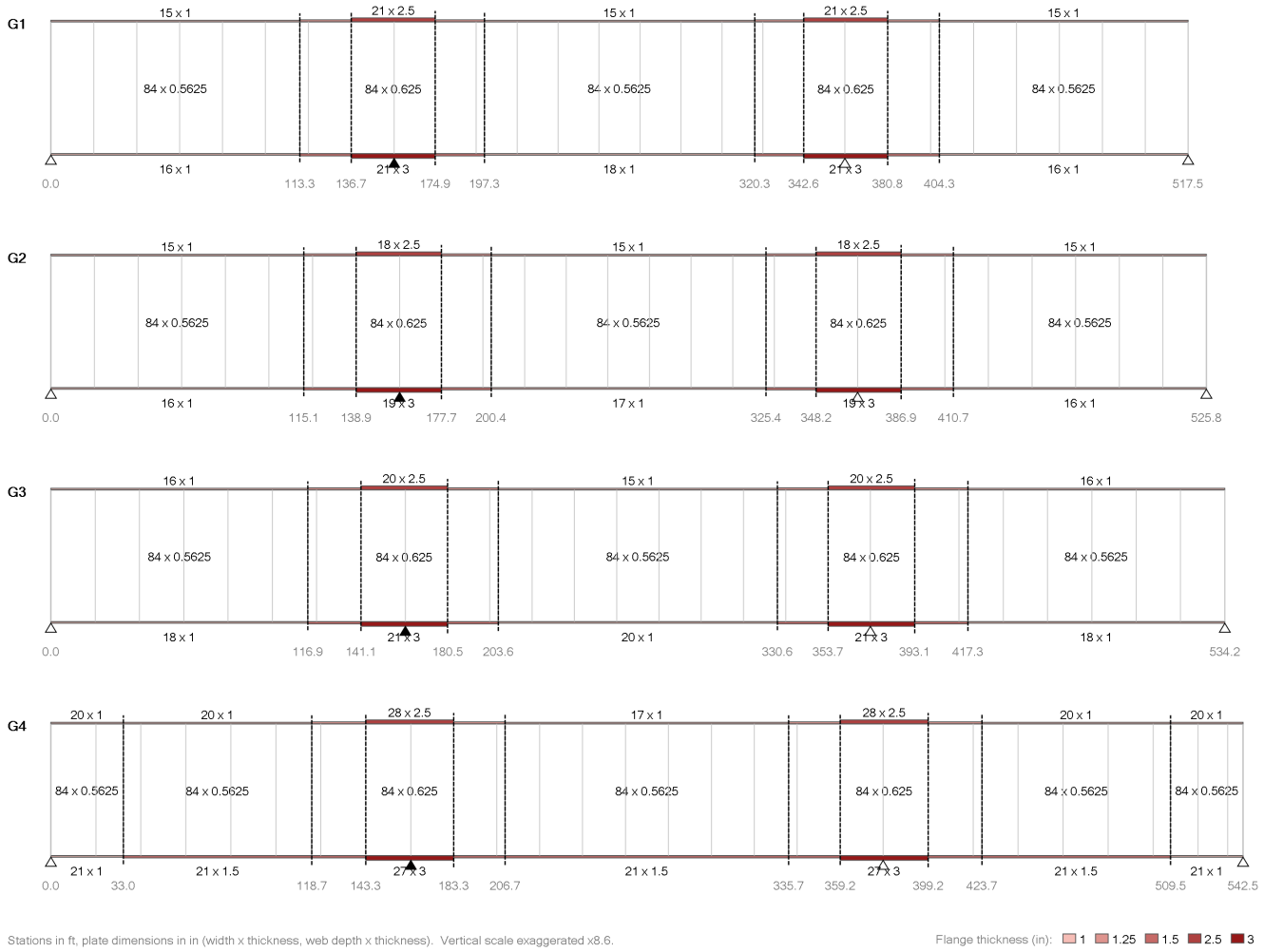


Figure 2. Girder elevations.

6 Analysis sequence

Analysis type	Composite analysis
Number of analysis steps	1
Additional analyses	direct influence, moving load

6.1 Deck model

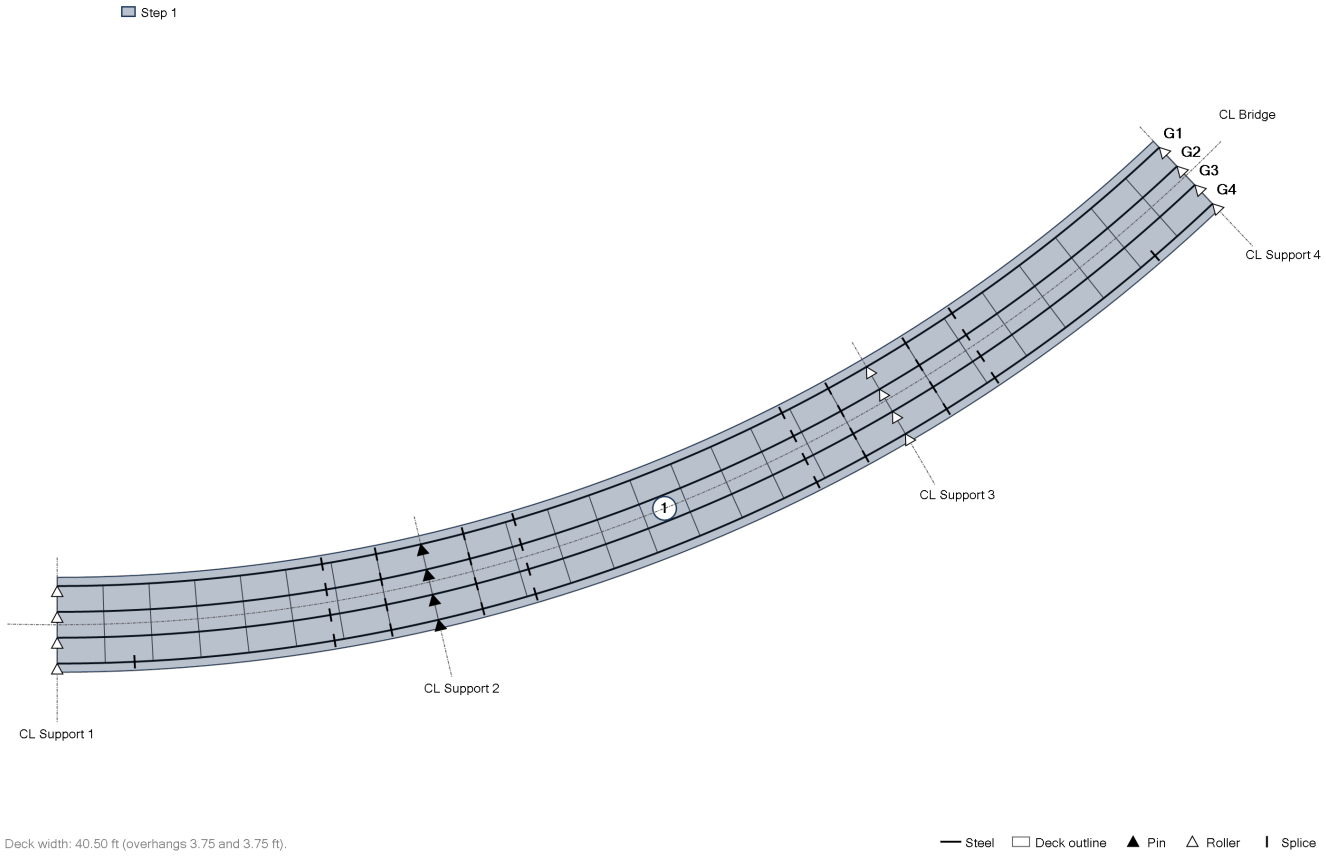


Figure 3. Deck model.

7 Loads

7.1 Load combination factors

Step	1
Self-weight	1.00

8 Analysis parameters

8.1 Direct influence analysis

No.	Girder	Station (ft)	Node	Influence type
1	G4	481.10	5	Composite moment M
2	G4	378.70	5	Composite moment M
3	G4	536.50	5	Shear V
4	G4	542.50	5	Shear V
5	G4	481.10	2	Lateral flange bending stress
6	G4	378.70	2	Lateral flange bending stress
7	G4	481.10	8	Lateral flange bending stress
8	G4	378.70	8	Lateral flange bending stress

The composite moment M is obtained by integration of the bending stresses over the composite cross-section; the shear V is obtained by integration of the shear stresses over the steel cross-section.

8.2 Moving load analysis

Truck models	6
Truck positions	5, increment 3.00 ft
Dynamic load allowance (impact factor)	1.33
Design lanes	3; lane load 0.576 over 10.00 ft
Fatigue analysis	No
Both directions of travel	Yes
Overturning effect	Yes
Wheel load factors (automatic)	Design speed 35, superelevation 5; left 0.788, right 1.212

Truck model 1 (wheel spacing 6.00 ft)

Axle	Spacing (ft)	Left wheel (kip)	Right wheel (kip)
1	0.00	3.6	3.6
2	14.00	14.4	14.4
3	14.00	14.4	14.4
4	50.00	3.6	3.6
5	14.00	14.4	14.4
6	14.00	14.4	14.4

Truck model 2 (wheel spacing 6.00 ft)

Axle	Spacing (ft)	Left wheel (kip)	Right wheel (kip)
1	0.00	3.6	3.6
2	14.00	14.4	14.4
3	14.00	14.4	14.4
4	70.00	3.6	3.6
5	14.00	14.4	14.4
6	14.00	14.4	14.4

Truck model 3 (wheel spacing 6.00 ft)

Axle	Spacing (ft)	Left wheel (kip)	Right wheel (kip)
1	0.00	3.6	3.6
2	14.00	14.4	14.4
3	14.00	14.4	14.4
4	90.00	3.6	3.6
5	14.00	14.4	14.4

Axle	Spacing (ft)	Left wheel (kip)	Right wheel (kip)
6	14.00	14.4	14.4

Truck model 4 (wheel spacing 6.00 ft)

Axle	Spacing (ft)	Left wheel (kip)	Right wheel (kip)
1	0.00	3.6	3.6
2	14.00	14.4	14.4
3	14.00	14.4	14.4
4	110.00	3.6	3.6
5	14.00	14.4	14.4
6	14.00	14.4	14.4

Truck model 5 (wheel spacing 6.00 ft)

Axle	Spacing (ft)	Left wheel (kip)	Right wheel (kip)
1	0.00	3.6	3.6
2	14.00	14.4	14.4
3	14.00	14.4	14.4
4	130.00	3.6	3.6
5	14.00	14.4	14.4
6	14.00	14.4	14.4

Truck model 6 (wheel spacing 6.00 ft)

Axle	Spacing (ft)	Left wheel (kip)	Right wheel (kip)
1	0.00	3.6	3.6
2	14.00	14.4	14.4
3	14.00	14.4	14.4
4	150.00	3.6	3.6
5	14.00	14.4	14.4
6	14.00	14.4	14.4

Design lanes

Lane	Width (ft)	Centerline (ft)	Left wheel	Right wheel
1	12.00	10.50	2	2
2	12.00	22.50	2	2
3	12.00	34.50	2	2

Multiple presence factors (1 to 8 lanes): 1.2, 1, 0.85, 0.65, 0.65, 0.65, 0.65, 0.

9 Design parameters

9.1 Additional transverse web stiffeners

Girder	Side	Thickness × width	No.	Stations (ft)
G1	-	-	0	-
G2	-	-	0	-
G3	-	-	0	-
G4	Both sides	1 × 7	1	535.50

10 Analysis results

10.1 Finite element model

Quantity	Number
Girder (and stiffener) nodes	11,992
Deck nodes	6,305
Total nodes	18,297
Girder (and stiffener) shell elements	3,600
Deck shell elements	2,030
Total shell elements	5,630
Total degrees of freedom	94,012

All shell elements are isoparametric eight-noded general shell elements, with five degrees of freedom per node.

Main results of every analysis step, as computed by the solver (analysis run on May 4, 2026).

10.2 Summary of all steps

Quantity	Step 1
Minimum vertical displacement (in)	-2.038
Maximum vertical displacement (in)	0.001
Maximum Von Mises stress (ksi)	12.769
Minimum brace force (kips)	-22.439
Maximum brace force (kips)	14.592

Tensile forces are positive, compressive forces are negative.

10.3 Support reactions

Vertical reactions at the supports, special DOF fixities and temporary supports, with the total of each step.

Step	Support	Girder	Station (ft)	Reaction (kips)
1	Support	G1	0.000	67.384
1	Support	G1	156.200	329.628
1	Support	G1	361.300	327.499
1	Support	G1	517.500	68.100
1	Support	G2	0.000	76.065
1	Support	G2	158.700	315.411
1	Support	G2	367.100	315.337
1	Support	G2	525.800	76.366
1	Support	G3	0.000	82.981
1	Support	G3	161.300	335.948
1	Support	G3	372.900	336.316
1	Support	G3	534.200	82.941
1	Support	G4	0.000	99.415
1	Support	G4	163.800	320.478
1	Support	G4	378.700	322.635
1	Support	G4	542.500	98.076
	Total, step 1			**3254.580**

11 Contour plots

11.1 Composite analysis

11.1.1 Geometry

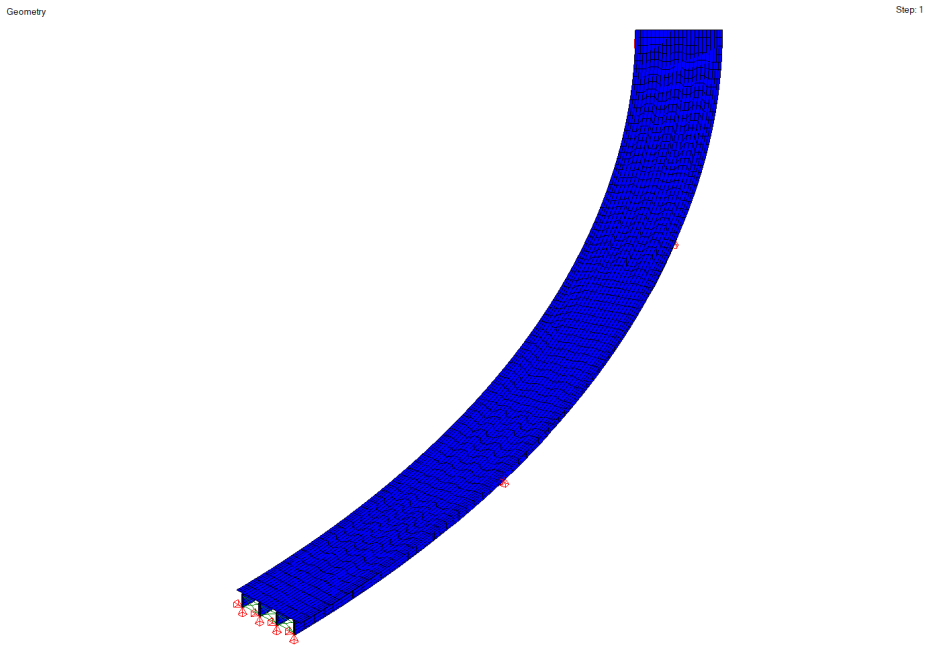


Figure 4. Geometry.

11.1.2 Deflected shape

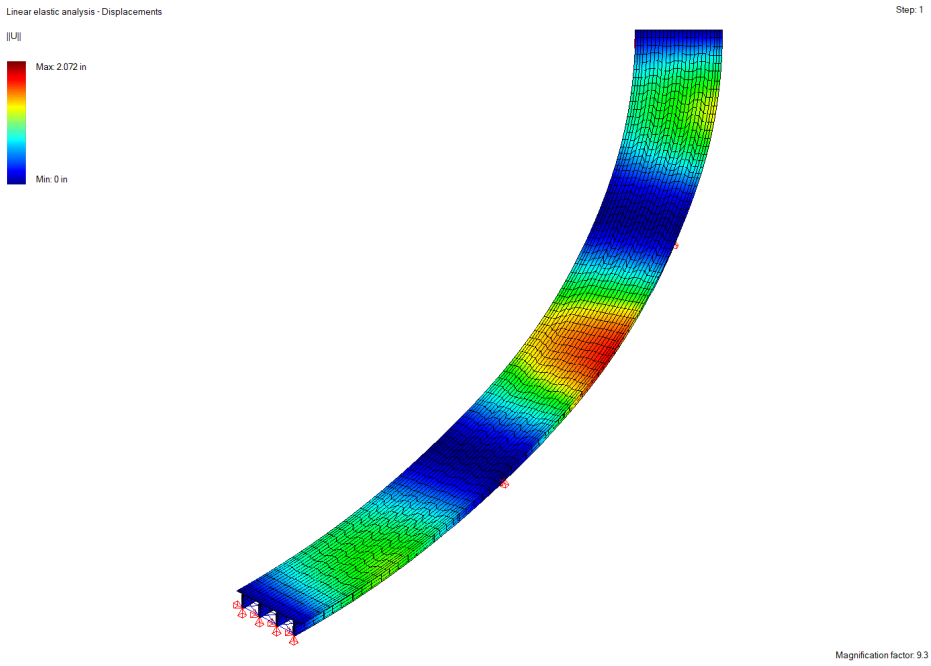


Figure 5. Deflected shape.

11.2 Influence surfaces

11.2.1 Influence surface 2 (minimum)

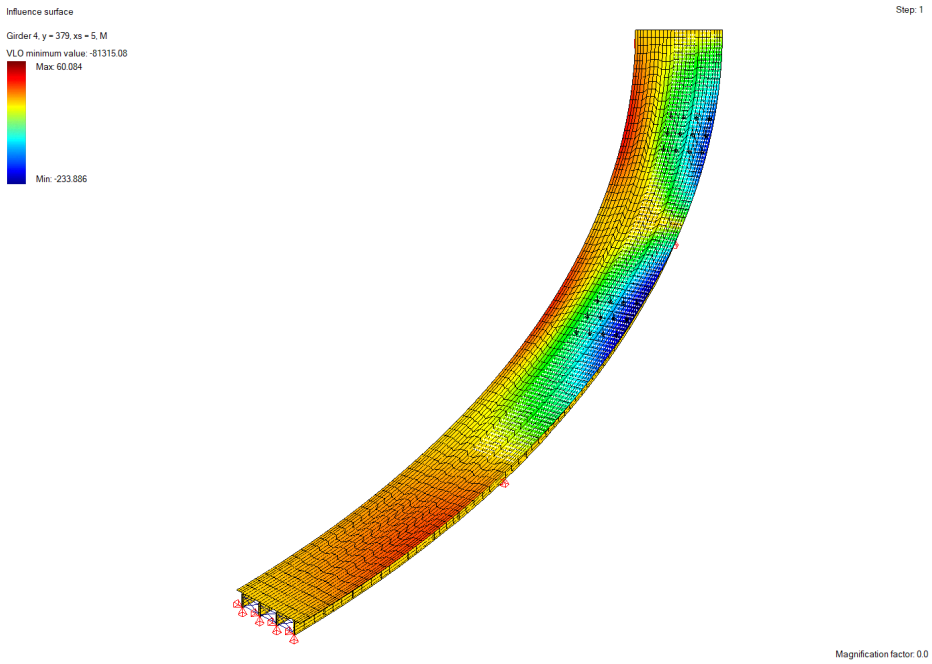


Figure 6. Influence surface 2 (minimum): G4, station 378.70 ft, node 5, Composite moment M.