

Contraflexure Points for Continuous Highway Bridges

BridgeSight Solutions™
for the
AASHTO LRFD Bridge Design Specifications

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Title Contraflexure Points For Continuous Highway Bridges		Publication No. BSS01011999-1	
Abstract <p>This design aid tabulates points of contraflexure due to a uniform load in all spans for two, three, and four span continuous highway bridge structures. This design aid is intended to assist practicing engineers perform routine computations requiring the effective span lengths of a structure.</p>			
Notes <p>Fixed errors in Table 2.0 US, Table 2.2 SI and Table 2.2 US. Thanks to Mark Doerflinger of George Butler Associates, Inc. for bringing these errors to our attention.</p>			
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Introduction

BridgeSight Software is proud to share with you this time saving design aid for the AASHTO LRFD Bridge Design Specification. Several of the equations and procedures given by the specification make use of effective span lengths, most notably Article 3.6.1.3.1 application of the dual truck train element of the HL93 live load, Article 4.6.2.2.1 live load distribution factors, and Article 4.6.2.6 effective flange width. The effective span lengths are taken to be the distance between points of contraflexure due to either the permanent weight of the structure or a unit uniform load applied over the entire length of the structure, depending upon the provision.

This design aid tabulates the points of contraflexure for two, three, and four span prismatic, continuous bridges subjected to a unit uniform load, for a total of 456 unique configurations.

All of the three and four span configurations are symmetrical about their centerline. The ratio of the interior span lengths to the exterior span lengths is designated by N . Interior spans are equal to or longer than exterior spans.

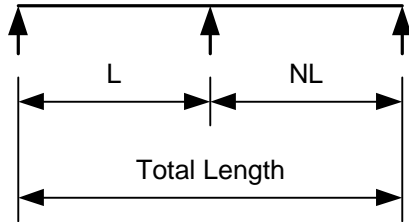
While the tables present discrete bridge configurations, the intervals between span lengths and span ratios are small enough to permit linear interpolation without significant error.

This design aid is part of the BridgeSight Solutions™ series. The BridgeSight Solutions™ series is comprised of design aids and design examples to assist practicing engineers and engineering students learn and implement the AASHTO LRFD Bridge Design Specification. Visit the BridgeSight Solutions™ section of our web site at www.BridgeSight.com for more information.

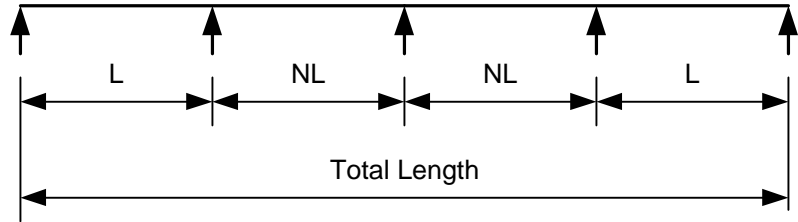
Span Lengths

Table 1.0

Two-span Continuous Beam



Symmetrical Four-Span Continuous Beam

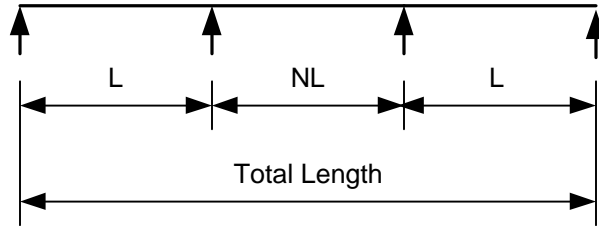


Total Length (m)		N = 1.0		N = 1.1		N = 1.2		N = 1.3		N = 1.4		N = 1.5		N = 1.6		N = 1.7	
2 Spans	4 Spans	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)
15.000	30.000	7.500	7.500	7.143	7.857	6.818	8.182	6.522	8.478	6.250	8.750	6.000	9.000	5.769	9.231	5.556	9.444
18.000	36.000	9.000	9.000	8.571	9.429	8.182	9.818	7.826	10.174	7.500	10.500	7.200	10.800	6.923	11.077	6.667	11.333
21.000	42.000	10.500	10.500	10.000	11.000	9.545	11.455	9.130	11.870	8.750	12.250	8.400	12.600	8.077	12.923	7.778	13.222
24.000	48.000	12.000	12.000	11.429	12.571	10.909	13.091	10.435	13.565	10.000	14.000	9.600	14.400	9.231	14.769	8.889	15.111
27.000	54.000	13.500	13.500	12.857	14.143	12.273	14.727	11.739	15.261	11.250	15.750	10.800	16.200	10.385	16.615	10.000	17.000
30.000	60.000	15.000	15.000	14.286	15.714	13.636	16.364	13.043	16.957	12.500	17.500	12.000	18.000	11.538	18.462	11.111	18.889
33.000	66.000	16.500	16.500	15.714	17.286	15.000	18.000	14.348	18.652	13.750	19.250	13.200	19.800	12.692	20.308	12.222	20.778
36.000	72.000	18.000	18.000	17.143	18.857	16.364	19.636	15.652	20.348	15.000	21.000	14.400	21.600	13.846	22.154	13.333	22.667
39.000	78.000	19.500	19.500	18.571	20.429	17.727	21.273	16.957	22.043	16.250	22.750	15.600	23.400	15.000	24.000	14.444	24.556
42.000	84.000	21.000	21.000	20.000	22.000	19.091	22.909	18.261	23.739	17.500	24.500	16.800	25.200	16.154	25.846	15.556	26.444
45.000	90.000	22.500	22.500	21.429	23.571	20.455	24.545	19.565	25.435	18.750	26.250	18.000	27.000	17.308	27.692	16.667	28.333
48.000	96.000	24.000	24.000	22.857	25.143	21.818	26.182	20.870	27.130	20.000	28.000	19.200	28.800	18.462	29.538	17.778	30.222
51.000	102.000	25.500	25.500	24.286	26.714	23.182	27.818	22.174	28.826	21.250	29.750	20.400	30.600	19.615	31.385	18.889	32.111
54.000	108.000	27.000	27.000	25.714	28.286	24.545	29.455	23.478	30.522	22.500	31.500	21.600	32.400	20.769	33.231	20.000	34.000
57.000	114.000	28.500	28.500	27.143	29.857	25.909	31.091	24.783	32.217	23.750	33.250	22.800	34.200	21.923	35.077	21.111	35.889
60.000	120.000	30.000	30.000	28.571	31.429	27.273	32.727	26.087	33.913	25.000	35.000	24.000	36.000	23.077	36.923	22.222	37.778
63.000	126.000	31.500	31.500	30.000	33.000	28.636	34.364	27.391	35.609	26.250	36.750	25.200	37.800	24.231	38.769	23.333	39.667
66.000	132.000	33.000	33.000	31.429	34.571	30.000	36.000	28.696	37.304	27.500	38.500	26.400	39.600	25.385	40.615	24.444	41.556
69.000	138.000	34.500	34.500	32.857	36.143	31.364	37.636	30.000	39.000	28.750	40.250	27.600	41.400	26.538	42.462	25.556	43.444

Total Length (ft)		N = 1.0		N = 1.1		N = 1.2		N = 1.3		N = 1.4		N = 1.5		N = 1.6		N = 1.7	
2 Spans	4 Spans	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)
60.00	120.00	30.00	30.00	28.57	31.43	27.27	32.73	26.09	33.91	25.00	35.00	24.00	36.00	23.08	36.92	22.22	37.78
70.00	140.00	35.00	35.00	33.33	36.67	31.82	38.18	30.43	39.57	29.17	40.83	28.00	42.00	26.92	43.08	25.93	44.07
80.00	160.00	40.00	40.00	38.10	41.90	36.36	43.64	34.78	45.22	33.33	46.67	32.00	48.00	30.77	49.23	29.63	50.37
90.00	180.00	45.00	45.00	42.86	47.14	40.91	49.09	39.13	50.87	37.50	52.50	36.00	54.00	34.62	55.38	33.33	56.67
100.00	200.00	50.00	50.00	47.62	52.38	45.45	54.55	43.48	56.52	41.67	58.33	40.00	60.00	38.46	61.54	37.04	62.96
110.00	220.00	55.00	55.00	52.38	57.62	50.00	60.00	47.83	62.17	45.83	64.17	44.00	66.00	42.31	67.69	40.74	69.26
120.00	240.00	60.00	60.00	57.14	62.86	54.55	65.45	52.17	67.83	50.00	70.00	48.00	72.00	46.15	73.85	44.44	75.56
130.00	260.00	65.00	65.00	61.90	68.10	59.09	70.91	56.52	73.48	54.17	75.83	52.00	78.00	50.00	80.00	48.15	81.85
140.00	280.00	70.00	70.00	66.67	73.33	63.64	76.36	60.87	79.13	58.33	81.67	56.00	84.00	53.85	86.15	51.85	88.15
150.00	300.00	75.00	75.00	71.43	78.57	68.18	81.82	65.22	84.78	62.50	87.50	60.00	90.00	57.69	92.31	55.56	94.44
160.00	320.00	80.00	80.00	76.19	83.81	72.73	87.27	69.57	90.43	66.67	93.33	64.00	96.00	61.54	98.46	59.26	100.74
170.00	340.00	85.00	85.00	80.95	89.05	77.27	92.73	73.91	96.09	70.83	99.17	68.00	102.00	65.38	104.62	62.96	107.04
180.00	360.00	90.00	90.00	85.71	94.29	81.82	98.18	78.26	101.74	75.00	105.00	72.00	108.00	69.23	110.77	66.67	113.33
190.00	380.00	95.00	95.00	90.48	99.52	86.36	103.64	82.61	107.39	79.17	110.83	76.00	114.00	73.08	116.92	70.37	119.63
200.00	400.00	100.00	100.00	95.24	104.76	90.91	109.09	86.96	113.04	83.33	116.67	80.00	120.00	76.92	123.08	74.07	125.93
210.00	420.00	105.00	105.00	100.00	110.00	95.45	114.55	91.30	118.70	87.50	122.50	84.00	126.00	80.77	129.23	77.78	132.22
220.00	440.00	110.00	110.00	104.76	115.24	100.00	120.00	95.65	124.35	91.67	128.33	88.00	132.00	84.62	135.38	81.48	138.52
230.00	460.00	115.00	115.00	109.52	120.48	104.55	125.45	100.00	130.00	95.83	134.17	92.00	138.00	88.46	141.54	85.19	144.81
240.00	480.00	120.00	120.00	114.29	125.71	109.09	130.91	104.35	135.65	100.00	140.00	96.00	144.00	92.31	147.69	88.89	151.11

Table 1.1

Symmetrical Three-Span Continuous Beam



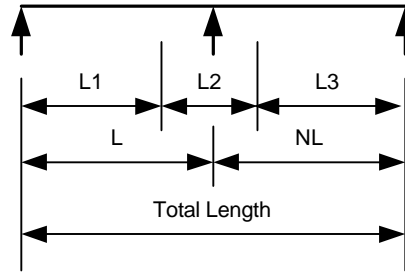
Total Length	N = 1.0		N = 1.1		N = 1.2		N = 1.3		N = 1.4		N = 1.5		N = 1.6		N = 1.7	
	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)	L (m)	NL (m)
25.000	8.333	8.333	8.065	8.871	7.813	9.375	7.576	9.848	7.353	10.294	7.143	10.714	6.944	11.111	6.757	11.486
29.500	9.833	9.833	9.516	10.468	9.219	11.063	8.939	11.621	8.676	12.147	8.429	12.643	8.194	13.111	7.973	13.554
34.000	11.333	11.333	10.968	12.065	10.625	12.750	10.303	13.394	10.000	14.000	9.714	14.571	9.444	15.111	9.189	15.622
38.500	12.833	12.833	12.419	13.661	12.031	14.438	11.667	15.167	11.324	15.853	11.000	16.500	10.694	17.111	10.405	17.689
43.000	14.333	14.333	13.871	15.258	13.438	16.125	13.030	16.939	12.647	17.706	12.286	18.429	11.944	19.111	11.622	19.757
47.500	15.833	15.833	15.323	16.855	14.844	17.813	14.394	18.712	13.971	19.559	13.571	20.357	13.194	21.111	12.838	21.824
52.000	17.333	17.333	16.774	18.452	16.250	19.500	15.758	20.485	15.294	21.412	14.857	22.286	14.444	23.111	14.054	23.892
56.500	18.833	18.833	18.226	20.048	17.656	21.188	17.121	22.258	16.618	23.265	16.143	24.214	15.694	25.111	15.270	25.959
61.000	20.333	20.333	19.677	21.645	19.063	22.875	18.485	24.030	17.941	25.118	17.429	26.143	16.944	27.111	16.486	28.027
65.500	21.833	21.833	21.129	23.242	20.469	24.563	19.848	25.803	19.265	26.971	18.714	28.071	18.194	29.111	17.703	30.095
70.000	23.333	23.333	22.581	24.839	21.875	26.250	21.212	27.576	20.588	28.824	20.000	30.000	19.444	31.111	18.919	32.162
74.500	24.833	24.833	24.032	26.435	23.281	27.938	22.576	29.348	21.912	30.676	21.286	31.929	20.694	33.111	20.135	34.230
79.000	26.333	26.333	25.484	28.032	24.688	29.625	23.939	31.121	23.235	32.529	22.571	33.857	21.944	35.111	21.351	36.297
83.500	27.833	27.833	26.935	29.629	26.094	31.313	25.303	32.894	24.559	34.382	23.857	35.786	23.194	37.111	22.568	38.365
88.000	29.333	29.333	28.387	31.226	27.500	33.000	26.667	34.667	25.882	36.235	25.143	37.714	24.444	39.111	23.784	40.432
92.500	30.833	30.833	29.839	32.823	28.906	34.688	28.030	36.439	27.206	38.088	26.429	39.643	25.694	41.111	25.000	42.500
97.000	32.333	32.333	31.290	34.419	30.313	36.375	29.394	38.212	28.529	39.941	27.714	41.571	26.944	43.111	26.216	44.568
101.500	33.833	33.833	32.742	36.016	31.719	38.063	30.758	39.985	29.853	41.794	29.000	43.500	28.194	45.111	27.432	46.635
106.000	35.333	35.333	34.194	37.613	33.125	39.750	32.121	41.758	31.176	43.647	30.286	45.429	29.444	47.111	28.649	48.703

Total Length (ft)	N = 1.0		N = 1.1		N = 1.2		N = 1.3		N = 1.4		N = 1.5		N = 1.6		N = 1.7	
	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)	L (ft)	NL (ft)
90.00	30.00	30.00	29.03	31.94	28.13	33.75	27.27	35.45	26.47	37.06	25.71	38.57	25.00	40.00	24.32	41.35
105.00	35.00	35.00	33.87	37.26	32.81	39.38	31.82	41.36	30.88	43.24	30.00	45.00	29.17	46.67	28.38	48.24
120.00	40.00	40.00	38.71	42.58	37.50	45.00	36.36	47.27	35.29	49.41	34.29	51.43	33.33	53.33	32.43	55.14
135.00	45.00	45.00	43.55	47.90	42.19	50.63	40.91	53.18	39.71	55.59	38.57	57.86	37.50	60.00	36.49	62.03
150.00	50.00	50.00	48.39	53.23	46.88	56.25	45.45	59.09	44.12	61.76	42.86	64.29	41.67	66.67	40.54	68.92
165.00	55.00	55.00	53.23	58.55	51.56	61.88	50.00	65.00	48.53	67.94	47.14	70.71	45.83	73.33	44.59	75.81
180.00	60.00	60.00	58.06	63.87	56.25	67.50	54.55	70.91	52.94	74.12	51.43	77.14	50.00	80.00	48.65	82.70
195.00	65.00	65.00	62.90	69.19	60.94	73.13	59.09	76.82	57.35	80.29	55.71	83.57	54.17	86.67	52.70	89.59
210.00	70.00	70.00	67.74	74.52	65.63	78.75	63.64	82.73	61.76	86.47	60.00	90.00	58.33	93.33	56.76	96.49
225.00	75.00	75.00	72.58	79.84	70.31	84.38	68.18	88.64	66.18	92.65	64.29	96.43	62.50	100.00	60.81	103.38
240.00	80.00	80.00	77.42	85.16	75.00	90.00	72.73	94.55	70.59	98.82	68.57	102.86	66.67	106.67	64.86	110.27
255.00	85.00	85.00	82.26	90.48	79.69	95.63	77.27	100.45	75.00	105.00	72.86	109.29	70.83	113.33	68.92	117.16
270.00	90.00	90.00	87.10	95.81	84.38	101.25	81.82	106.36	79.41	111.18	77.14	115.71	75.00	120.00	72.97	124.05
285.00	95.00	95.00	91.94	101.13	89.06	106.88	86.36	112.27	83.82	117.35	81.43	122.14	79.17	126.67	77.03	130.95
300.00	100.00	100.00	96.77	106.45	93.75	112.50	90.91	118.18	88.24	123.53	85.71	128.57	83.33	133.33	81.08	137.84
315.00	105.00	105.00	101.61	111.77	98.44	118.13	95.45	124.09	92.65	129.71	90.00	135.00	87.50	140.00	85.14	144.73
330.00	110.00	110.00	106.45	117.10	103.13	123.75	100.00	130.00	97.06	135.88	94.29	141.43	91.67	146.67	89.19	151.62
345.00	115.00	115.00	111.29	122.42	107.81	129.38	104.55	135.91	101.47	142.06	98.57	147.86	95.83	153.33	93.24	158.51
360.00	120.00	120.00	116.13	127.74	112.50	135.00	109.09	141.82	105.88	148.24	102.86	154.29	100.00	160.00	97.30	165.41

Points of Contraflexure

Table 2.0 SI

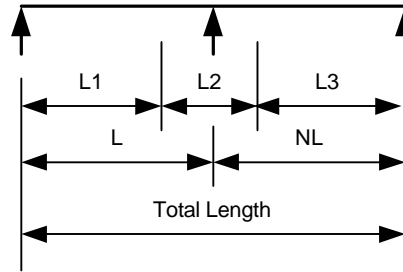
Two-span Continuous Beam



Total Length (m)	N = 1.0			N = 1.1			N = 1.2			N = 1.3			N = 1.4			N = 1.5			N = 1.6			N = 1.7		
	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L
	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)
15.000	5.625	3.750	5.625	5.161	3.559	6.280	4.705	3.519	6.777	4.255	3.562	7.182	3.813	3.659	7.528	3.375	3.796	7.829	2.942	3.961	8.097	2.514	4.148	8.338
18.000	6.750	4.500	6.750	6.193	4.271	7.536	5.645	4.223	8.132	5.107	4.275	8.619	4.575	4.391	9.034	4.050	4.555	9.395	3.531	4.753	9.717	3.017	4.978	10.005
21.000	7.875	5.250	7.875	7.225	4.983	8.792	6.586	4.926	9.487	5.958	4.987	10.055	5.338	5.123	10.539	4.725	5.314	10.961	4.119	5.545	11.336	3.519	5.808	11.673
24.000	9.000	6.000	9.000	8.257	5.695	10.048	7.527	5.630	10.843	6.809	5.699	11.492	6.100	5.855	12.045	5.400	6.073	12.527	4.708	6.337	12.955	4.022	6.637	13.340
27.000	10.125	6.750	10.125	9.289	6.407	11.304	8.468	6.334	12.198	7.660	6.412	12.928	6.863	6.587	13.551	6.075	6.832	14.093	5.296	7.129	14.575	4.525	7.467	15.008
30.000	11.250	7.500	11.250	10.321	7.119	12.560	9.409	7.038	13.553	8.511	7.124	14.365	7.625	7.319	15.056	6.750	7.591	15.659	5.885	7.921	16.194	5.028	8.297	16.676
33.000	12.375	8.250	12.375	11.354	7.830	13.816	10.350	7.742	14.909	9.362	7.837	15.801	8.388	8.051	16.562	7.425	8.350	17.225	6.473	8.713	17.814	5.531	9.126	18.343
36.000	13.500	9.000	13.500	12.386	8.542	15.072	11.291	8.445	16.264	10.213	8.549	17.238	9.150	8.783	18.068	8.100	9.109	18.791	7.062	9.505	19.433	6.033	9.956	20.011
39.000	14.625	9.750	14.625	13.418	9.254	16.328	12.232	9.149	17.619	11.064	9.262	18.674	9.913	9.514	19.573	8.775	9.869	20.356	7.650	10.298	21.053	6.536	10.786	21.678
42.000	15.750	10.500	15.750	14.450	9.966	17.584	13.173	9.853	18.974	11.915	9.974	20.111	10.675	10.246	21.079	9.450	10.628	21.922	8.238	11.090	22.672	7.039	11.615	23.346
45.000	16.875	11.250	16.875	15.482	10.678	18.840	14.114	10.557	20.330	12.766	10.687	21.547	11.438	10.978	22.584	10.125	11.387	23.488	8.827	11.882	24.291	7.542	12.445	25.013
48.000	18.000	12.000	18.000	16.514	11.390	20.096	15.055	11.260	21.685	13.617	11.399	22.984	12.200	11.710	24.090	10.800	12.146	25.054	9.415	12.674	25.911	8.044	13.275	26.681
51.000	19.125	12.750	19.125	17.546	12.102	21.352	15.995	11.964	23.040	14.468	12.111	24.420	12.963	12.442	25.596	11.475	12.905	26.620	10.004	13.466	27.530	8.547	14.104	28.348
54.000	20.250	13.500	20.250	18.579	12.813	22.608	16.936	12.668	24.396	15.320	12.824	25.857	13.725	13.174	27.101	12.150	13.664	28.186	10.592	14.258	29.150	9.050	14.934	30.016
57.000	21.375	14.250	21.375	19.611	13.525	23.864	17.877	13.372	25.751	16.171	13.536	27.293	14.488	13.906	28.607	12.825	14.423	29.752	11.181	15.050	30.769	9.553	15.764	31.684
60.000	22.500	15.000	22.500	20.643	14.237	25.120	18.818	14.075	27.106	17.022	14.249	28.730	15.250	14.638	30.113	13.500	15.182	31.318	11.769	15.842	32.388	10.056	16.593	33.351
63.000	23.625	15.750	23.625	21.675	14.949	26.376	19.759	14.779	28.462	17.873	14.961	30.166	16.013	15.369	31.618	14.175	15.942	32.883	12.358	16.634	34.008	10.558	17.423	35.019
66.000	24.750	16.500	24.750	22.707	15.661	27.632	20.700	15.483	29.817	18.724	15.674	31.603	16.775	16.101	33.124	14.850	16.701	34.449	12.946	17.427	35.627	11.061	18.253	36.686
69.000	25.875	17.250	25.875	23.739	16.373	28.888	21.641	16.187	31.172	19.575	16.386	33.039	17.538	16.833	34.629	15.525	17.460	36.015	13.535	18.219	37.247	11.564	19.082	38.354

Table 2.0 US

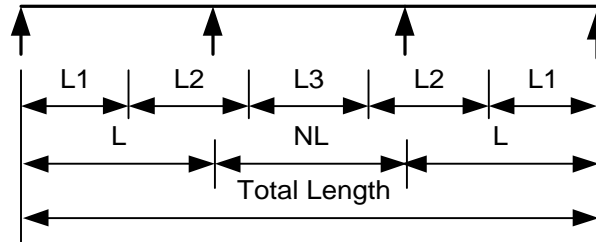
Two-span Continuous Beam



Total Length (ft)	N = 1.0			N = 1.1			N = 1.2			N = 1.3			N = 1.4			N = 1.5			N = 1.6			N = 1.7		
	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L
	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)
60.00	22.50	15.00	22.50	20.64	14.24	25.12	18.82	14.08	27.11	17.02	14.25	28.73	15.25	14.64	30.11	13.50	15.18	31.32	11.77	15.84	32.39	10.06	16.59	33.35
70.00	26.25	17.50	26.25	24.08	16.61	29.31	21.95	16.42	31.62	19.86	16.62	33.52	17.79	17.08	35.13	15.75	17.71	36.54	13.73	18.48	37.79	11.73	19.36	38.91
80.00	30.00	20.00	30.00	27.52	18.98	33.49	25.09	18.77	36.14	22.70	19.00	38.31	20.33	19.52	40.15	18.00	20.24	41.76	15.69	21.12	43.18	13.41	22.12	44.47
90.00	33.75	22.50	33.75	30.96	21.36	37.68	28.23	21.11	40.66	25.53	21.37	43.09	22.88	21.96	45.17	20.25	22.77	46.98	17.65	23.76	48.58	15.08	24.89	50.03
100.00	37.50	25.00	37.50	34.40	23.73	41.87	31.36	23.46	45.18	28.37	23.75	47.88	25.42	24.40	50.19	22.50	25.30	52.20	19.62	26.40	53.98	16.76	27.66	55.59
110.00	41.25	27.50	41.25	37.85	26.10	46.05	34.50	25.81	49.70	31.21	26.12	52.67	27.96	26.84	55.21	24.75	27.83	57.42	21.58	29.04	59.38	18.44	30.42	61.14
120.00	45.00	30.00	45.00	41.29	28.47	50.24	37.64	28.15	54.21	34.04	28.50	57.46	30.50	29.28	60.23	27.00	30.36	62.64	23.54	31.68	64.78	20.11	33.19	66.70
130.00	48.75	32.50	48.75	44.73	30.85	54.43	40.77	30.50	58.73	36.88	30.87	62.25	33.04	31.71	65.24	29.25	32.90	67.85	25.50	34.33	70.18	21.79	35.95	72.26
140.00	52.50	35.00	52.50	48.17	33.22	58.61	43.91	32.84	63.25	39.72	33.25	67.04	35.58	34.15	70.26	31.50	35.43	73.07	27.46	36.97	75.57	23.46	38.72	77.82
150.00	56.25	37.50	56.25	51.61	35.59	62.80	47.05	35.19	67.77	42.55	35.62	71.82	38.13	36.59	75.28	33.75	37.96	78.29	29.42	39.61	80.97	25.14	41.48	83.38
160.00	60.00	40.00	60.00	55.05	37.97	66.99	50.18	37.53	72.28	45.39	38.00	76.61	40.67	39.03	80.30	36.00	40.49	83.51	31.38	42.25	86.37	26.81	44.25	88.94
170.00	63.75	42.50	63.75	58.49	40.34	71.17	53.32	39.88	76.80	48.23	40.37	81.40	43.21	41.47	85.32	38.25	43.02	88.73	33.35	44.89	91.77	28.49	47.01	94.49
180.00	67.50	45.00	67.50	61.93	42.71	75.36	56.45	42.23	81.32	51.07	42.75	86.19	45.75	43.91	90.34	40.50	45.55	93.95	35.31	47.53	97.17	30.17	49.78	100.05
190.00	71.25	47.50	71.25	65.37	45.08	79.55	59.59	44.57	85.84	53.90	45.12	90.98	48.29	46.35	95.36	42.75	48.08	99.17	37.27	50.17	102.56	31.84	52.55	105.61
200.00	75.00	50.00	75.00	68.81	47.46	83.73	62.73	46.92	90.35	56.74	47.50	95.77	50.83	48.79	100.38	45.00	50.61	104.39	39.23	52.81	107.96	33.52	55.31	111.17
210.00	78.75	52.50	78.75	72.25	49.83	87.92	65.86	49.26	94.87	59.58	49.87	100.55	53.38	51.23	105.39	47.25	53.14	109.61	41.19	55.45	113.36	35.19	58.08	116.73
220.00	82.50	55.00	82.50	75.69	52.20	92.11	69.00	51.61	99.39	62.41	52.25	105.34	55.92	53.67	110.41	49.50	55.67	114.83	43.15	58.09	118.76	36.87	60.84	122.29
230.00	86.25	57.50	86.25	79.13	54.58	96.29	72.14	53.96	103.91	65.25	54.62	110.13	58.46	56.11	115.43	51.75	58.20	120.05	45.12	60.73	124.16	38.55	63.61	127.85
240.00	90.00	60.00	90.00	82.57	56.95	100.48	75.27	56.30	108.43	68.09	56.99	114.92	61.00	58.55	120.45	54.00	60.73	125.27	47.08	63.37	129.55	40.22	66.37	133.40

Table 2.1 SI

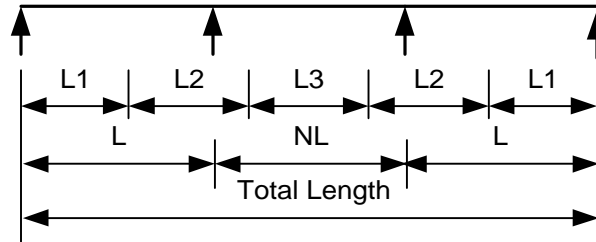
Symmetrical Three-Span Continuous Beam



Total Length (m)	N = 1.0			N = 1.1			N = 1.2			N = 1.3			N = 1.4			N = 1.5			N = 1.6			N = 1.7		
	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L
	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)	L1 (m)	L2 (m)	L3 (m)
25.000	6.667	3.970	3.727	6.291	3.891	4.635	5.909	3.925	5.331	5.523	4.027	5.898	5.133	4.179	6.377	4.739	4.366	6.791	4.342	4.581	7.153	3.943	4.819	7.476
29.500	7.867	4.685	4.397	7.424	4.592	5.470	6.973	4.632	6.291	6.518	4.752	6.960	6.057	4.931	7.525	5.592	5.152	8.013	5.124	5.405	8.441	4.653	5.686	8.822
34.000	9.067	5.399	5.068	8.556	5.292	6.304	8.037	5.338	7.251	7.512	5.477	8.022	6.981	5.683	8.673	6.445	5.937	9.235	5.906	6.230	9.729	5.363	6.554	10.168
38.500	10.267	6.114	5.739	9.688	5.992	7.139	9.100	6.045	8.210	8.506	6.202	9.084	7.905	6.435	9.821	7.299	6.723	10.458	6.687	7.054	11.016	6.073	7.421	11.514
43.000	11.467	6.828	6.410	10.821	6.693	7.973	10.164	6.751	9.170	9.500	6.927	10.145	8.829	7.187	10.969	8.152	7.509	11.680	7.469	7.879	12.304	6.782	8.289	12.859
47.500	12.667	7.543	7.081	11.953	7.393	8.807	11.228	7.458	10.129	10.495	7.652	11.207	9.753	7.939	12.117	9.005	8.295	12.902	8.250	8.703	13.592	7.492	9.156	14.205
52.000	13.867	8.258	7.751	13.086	8.094	9.642	12.292	8.164	11.089	11.489	8.377	12.269	10.677	8.692	13.265	9.858	9.081	14.125	9.032	9.528	14.879	8.202	10.023	15.551
56.500	15.067	8.972	8.422	14.218	8.794	10.476	13.355	8.871	12.049	12.483	9.102	13.331	11.601	9.444	14.412	10.711	9.867	15.347	9.814	10.352	16.167	8.912	10.891	16.897
61.000	16.267	9.687	9.093	15.350	9.494	11.311	14.419	9.577	13.008	13.477	9.827	14.392	12.525	10.196	15.560	11.564	10.652	16.569	10.595	11.177	17.454	9.622	11.758	18.242
65.500	17.467	10.401	9.764	16.483	10.195	12.145	15.483	10.284	13.968	14.472	10.551	15.454	13.449	10.948	16.708	12.417	11.438	17.792	11.377	12.001	18.742	10.331	12.626	19.588
70.000	18.667	11.116	10.435	17.615	10.895	12.979	16.546	10.990	14.928	15.466	11.276	16.516	14.373	11.700	17.856	13.270	12.224	19.014	12.159	12.826	20.030	11.041	13.493	20.934
74.500	19.867	11.831	11.105	18.748	11.596	13.814	17.610	11.697	15.887	16.460	12.001	17.577	15.297	12.452	19.004	14.123	13.010	20.236	12.940	13.650	21.317	11.751	14.360	22.280
79.000	21.067	12.545	11.776	19.880	12.296	14.648	18.674	12.403	16.847	17.454	12.726	18.639	16.221	13.205	20.152	14.976	13.796	21.459	13.722	14.475	22.605	12.461	15.228	23.625
83.500	22.267	13.260	12.447	21.012	12.996	15.483	19.737	13.110	17.806	18.448	13.451	19.701	17.145	13.957	21.300	15.829	14.581	22.681	14.503	15.299	23.893	13.170	16.095	24.971
88.000	23.467	13.974	13.118	22.145	13.697	16.317	20.801	13.816	18.766	19.443	14.176	20.763	18.068	14.709	22.448	16.682	15.367	23.903	15.285	16.124	25.180	13.880	16.963	26.317
92.500	24.667	14.689	13.789	23.277	14.397	17.151	21.865	14.523	19.726	20.437	14.901	21.824	18.992	15.461	23.596	17.535	16.153	25.126	16.067	16.948	26.468	14.590	17.830	27.663
97.000	25.867	15.404	14.459	24.410	15.098	17.986	22.928	15.229	20.685	21.431	15.626	22.886	19.916	16.213	24.744	18.388	16.939	26.348	16.848	17.773	27.755	15.300	18.697	29.008
101.500	27.067	16.118	15.130	25.542	15.798	18.820	23.992	15.936	21.645	22.425	16.351	23.948	20.840	16.965	25.891	19.242	17.725	27.570	17.630	18.597	29.043	16.010	19.565	30.354
106.000	28.267	16.833	15.801	26.674	16.498	19.654	25.056	16.642	22.605	23.420	17.076	25.010	21.764	17.718	27.039	20.095	18.511	28.793	18.412	19.422	30.331	16.719	20.432	31.700

Table 2.1 US

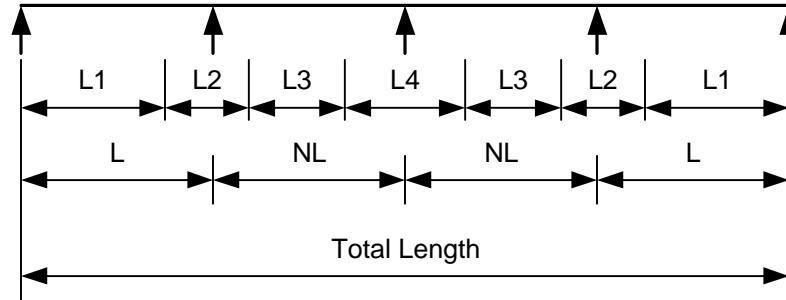
Symmetrical Three-Span Continuous Beam



Total Length (ft)	N = 1.0			N = 1.1			N = 1.2			N = 1.3			N = 1.4			N = 1.5			N = 1.6			N = 1.7		
	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L	L1/L	L2/L	L3/L
	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L1 (ft)	L2 (ft)	L3 (ft)
90.00	24.00	14.29	13.42	22.65	14.01	16.69	21.27	14.13	19.19	19.88	14.50	21.23	18.48	15.04	22.96	17.06	15.72	24.45	15.63	16.49	25.75	14.20	17.35	26.91
105.00	28.00	16.67	15.65	26.42	16.34	19.47	24.82	16.49	22.39	23.20	16.91	24.77	21.56	17.55	26.78	19.91	18.34	28.52	18.24	19.24	30.04	16.56	20.24	31.40
120.00	32.00	19.06	17.89	30.20	18.68	22.25	28.37	18.84	25.59	26.51	19.33	28.31	24.64	20.06	30.61	22.75	20.96	32.60	20.84	21.99	34.34	18.93	23.13	35.89
135.00	36.00	21.44	20.12	33.97	21.01	25.03	31.91	21.20	28.79	29.83	21.75	31.85	27.72	22.56	34.44	25.59	23.57	36.67	23.45	24.74	38.63	21.29	26.02	40.37
150.00	40.00	23.82	22.36	37.75	23.35	27.81	35.46	23.55	31.99	33.14	24.16	35.39	30.80	25.07	38.26	28.44	26.19	40.74	26.05	27.48	42.92	23.66	28.91	44.86
165.00	44.00	26.20	24.60	41.52	25.68	30.59	39.00	25.91	35.19	36.46	26.58	38.93	33.88	27.58	42.09	31.28	28.81	44.82	28.66	30.23	47.21	26.03	31.80	49.34
180.00	48.00	28.58	26.83	45.30	28.02	33.38	42.55	28.26	38.39	39.77	29.00	42.47	36.96	30.09	45.92	34.12	31.43	48.89	31.27	32.98	51.51	28.39	34.70	53.83
195.00	52.00	30.97	29.07	49.07	30.35	36.16	46.09	30.62	41.58	43.08	31.41	46.01	40.04	32.59	49.74	36.97	34.05	52.97	33.87	35.73	55.80	30.76	37.59	58.32
210.00	56.00	33.35	31.30	52.85	32.69	38.94	49.64	32.97	44.78	46.40	33.83	49.55	43.12	35.10	53.57	39.81	36.67	57.04	36.48	38.48	60.09	33.12	40.48	62.80
225.00	60.00	35.73	33.54	56.62	35.02	41.72	53.18	35.33	47.98	49.71	36.25	53.09	46.20	37.61	57.39	42.65	39.29	61.12	39.08	41.23	64.38	35.49	43.37	67.29
240.00	64.00	38.11	35.78	60.39	37.35	44.50	56.73	37.68	51.18	53.03	38.66	56.63	49.28	40.12	61.22	45.50	41.91	65.19	41.69	43.97	68.67	37.86	46.26	71.77
255.00	68.00	40.49	38.01	64.17	39.69	47.28	60.28	40.04	54.38	56.34	41.08	60.16	52.36	42.62	65.05	48.34	44.53	69.27	44.29	46.72	72.97	40.22	49.15	76.26
270.00	72.00	42.88	40.25	67.94	42.02	50.06	63.82	42.39	57.58	59.65	43.49	63.70	55.44	45.13	68.87	51.18	47.15	73.34	46.90	49.47	77.26	42.59	52.04	80.74
285.00	76.00	45.26	42.48	71.72	44.36	52.84	67.37	44.75	60.78	62.97	45.91	67.24	58.52	47.64	72.70	54.03	49.77	77.41	49.50	52.22	81.55	44.95	54.94	85.23
300.00	80.00	47.64	44.72	75.49	46.69	55.63	70.91	47.10	63.98	66.28	48.33	70.78	61.60	50.14	76.53	56.87	52.39	81.49	52.11	54.97	85.84	47.32	57.83	89.72
315.00	84.00	50.02	46.96	79.27	49.03	58.41	74.46	49.46	67.17	69.60	50.74	74.32	64.68	52.65	80.35	59.72	55.01	85.56	54.71	57.72	90.13	49.68	60.72	94.20
330.00	88.00	52.40	49.19	83.04	51.36	61.19	78.00	51.81	70.37	72.91	53.16	77.86	67.76	55.16	84.18	62.56	57.63	89.64	57.32	60.46	94.43	52.05	63.61	98.69
345.00	92.00	54.79	51.43	86.82	53.70	63.97	81.55	54.17	73.57	76.22	55.58	81.40	70.84	57.67	88.01	65.40	60.25	93.71	59.92	63.21	98.72	54.42	66.50	103.17
360.00	96.00	57.17	53.66	90.59	56.03	66.75	85.10	56.52	76.77	79.54	57.99	84.94	73.92	60.17	91.83	68.25	62.87	97.79	62.53	65.96	103.01	56.78	69.39	107.66

Table 2.2 SI

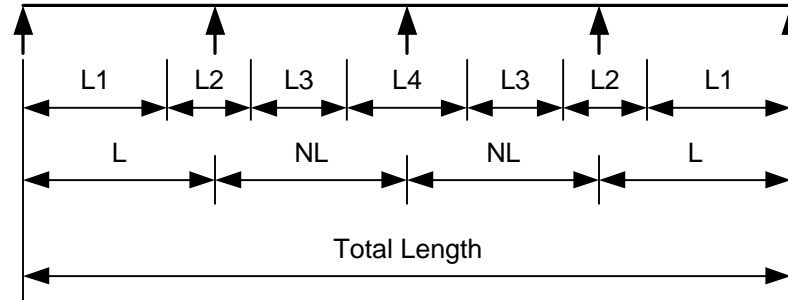
Symmetrical Four-Span Continuous Beam



Total Length (m)	N = 1.0				N = 1.1				N = 1.2				N = 1.3				N = 1.4				N = 1.5				N = 1.6				N = 1.7			
	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L
	L1 (m)	L2 (m)	L3 (m)	L4 (m)	L1 (m)	L2 (m)	L3 (m)	L4 (m)	L1 (m)	L2 (m)	L3 (m)	L4 (m)	L1 (m)	L2 (m)	L3 (m)	L4 (m)	L1 (m)	L2 (m)	L3 (m)	L4 (m)	L1 (m)	L2 (m)	L3 (m)	L4 (m)	L1 (m)	L2 (m)	L3 (m)	L4 (m)	L1 (m)	L2 (m)	L3 (m)	L4 (m)
30.000	5.893	3.603	4.045	2.920	5.513	3.491	4.392	3.206	5.146	3.436	4.698	3.439	4.790	3.428	4.966	3.633	4.442	3.458	5.201	3.800	4.103	3.517	5.408	3.946	3.771	3.601	5.592	4.074	3.446	3.705	5.756	4.188
36.000	7.071	4.324	4.854	3.504	6.615	4.189	5.271	3.848	6.175	4.124	5.637	4.127	5.747	4.114	5.959	4.360	5.330	4.149	6.241	4.560	4.923	4.220	6.489	4.735	4.525	4.321	6.710	4.888	4.135	4.446	6.907	5.026
42.000	8.250	5.044	5.663	4.088	7.718	4.887	6.149	4.489	7.204	4.811	6.577	4.815	6.705	4.800	6.952	5.087	6.219	4.841	7.281	5.320	5.744	4.923	7.571	5.524	5.279	5.041	7.828	5.703	4.824	5.187	8.058	5.864
48.000	9.428	5.765	6.472	4.672	8.821	5.585	7.027	5.130	8.233	5.498	7.516	5.503	7.663	5.486	7.945	5.813	7.107	5.532	8.321	6.080	6.564	5.627	8.652	6.313	6.033	5.761	8.946	6.518	5.513	5.928	9.209	6.701
54.000	10.607	6.485	7.281	5.256	9.923	6.283	7.906	5.772	9.262	6.185	8.456	6.190	8.621	6.171	8.938	6.540	7.995	6.224	9.361	6.840	7.385	6.330	9.734	7.102	6.787	6.481	10.065	7.333	6.202	6.669	10.360	7.539
60.000	11.786	7.206	8.090	5.840	11.026	6.981	8.784	6.413	10.291	6.873	9.395	6.878	9.579	6.857	9.931	7.267	8.884	6.915	10.401	7.600	8.206	7.033	10.816	7.891	7.542	7.201	11.183	8.147	6.891	7.410	11.511	8.377
66.000	12.964	7.927	8.898	6.423	12.128	7.680	9.663	7.054	11.321	7.560	10.335	7.566	10.537	7.543	10.924	7.993	9.772	7.607	11.441	8.360	9.026	7.737	11.897	8.680	8.296	7.921	12.301	8.962	7.580	8.151	12.662	9.214
72.000	14.143	8.647	9.707	7.007	13.231	8.378	10.541	7.695	12.350	8.247	11.275	8.254	11.495	8.228	11.918	8.720	10.661	8.298	12.482	9.120	9.847	8.440	12.979	9.469	9.050	8.641	13.420	9.777	8.269	8.892	13.813	10.052
78.000	15.321	9.368	10.516	7.591	14.333	9.076	11.420	8.337	13.379	8.935	12.214	8.942	12.453	8.914	12.911	9.446	11.549	8.990	13.522	9.880	10.667	9.143	14.060	10.259	9.804	9.362	14.538	10.592	8.958	9.633	14.964	10.890
84.000	16.500	10.088	11.325	8.175	15.436	9.774	12.298	8.978	14.408	9.622	13.154	9.629	13.411	9.600	13.904	10.173	12.437	9.681	14.562	10.640	11.488	9.846	15.142	11.048	10.558	10.082	15.656	11.406	9.648	10.374	16.116	11.727
90.000	17.678	10.809	12.134	8.759	16.539	10.472	13.176	9.619	15.437	10.309	14.093	10.317	14.369	10.285	14.897	10.900	13.326	10.373	15.602	11.400	12.308	10.550	16.223	11.837	11.312	10.802	16.775	12.221	10.337	11.115	17.267	12.565
96.000	18.857	11.530	12.943	9.343	17.641	11.170	14.055	10.261	16.466	10.996	15.033	11.005	15.327	10.971	15.890	11.626	14.214	11.064	16.642	12.160	13.129	11.253	17.305	12.626	12.066	11.522	17.893	13.036	11.026	11.856	18.418	13.403
102.000	20.035	12.250	13.752	9.927	18.744	11.868	14.933	10.902	17.495	11.684	15.972	11.693	16.285	11.657	16.883	12.353	15.102	11.756	17.882	12.920	13.950	11.956	18.387	13.415	12.821	12.242	19.011	13.850	11.715	12.597	19.569	14.240
108.000	21.214	12.971	14.561	10.511	19.846	12.567	15.812	11.543	18.524	12.371	16.912	12.381	17.242	12.343	17.876	13.080	15.991	12.447	18.722	13.680	14.770	12.660	19.468	14.204	13.575	12.962	20.130	14.665	12.404	13.338	20.720	15.078
114.000	22.392	13.691	15.370	11.095	20.949	13.265	16.690	12.184	19.554	13.058	17.851	13.069	18.200	13.028	18.869	13.806	16.879	13.139	19.762	14.440	15.591	13.363	20.550	14.993	14.329	13.682	21.248	15.480	13.093	14.079	21.871	15.916
120.000	23.571	14.412	16.179	11.679	22.051	13.963	17.569	12.826	20.583	13.745	18.791	13.756	19.158	13.714	19.863	14.533	17.768	13.830	20.803	15.200	16.411	14.066	21.631	15.782	15.083	14.402	22.366	16.295	13.782	14.820	23.022	16.753
126.000	24.750	15.133	16.988	12.263	23.154	14.661	18.447	13.467	21.612	14.433	19.730	14.444	20.116	14.400	20.856	15.260	18.656	14.522	21.843	15.960	17.232	14.770	22.713	16.572	15.837	15.122	23.484	17.109	14.471	15.561	24.173	17.591
132.000	25.928	15.853	17.797	12.847	24.257	15.359	19.325	14.108	22.641	15.120	20.670	15.132	21.074	15.085	21.849	15.986	19.544	15.213	22.883	16.720	18.052	15.473	23.794	17.361	16.591	15.843	24.603	17.924	15.160	16.302	25.324	18.429
138.000	27.107	16.574	18.606	13.431	25.359	16.057	20.204	14.750	23.670	15.807	21.610	15.820	22.032	15.771	22.842	16.713	20.433	15.905	23.923	17.480	18.873	16.176	24.876	18.150	17.346	16.563	25.721	18.739	15.850	17.043	26.476	19.266

Table 2.2 US

Symmetrical Four-Span Continuous Beam



Total Length (ft)	N = 1.0				N = 1.1				N = 1.2				N = 1.3				N = 1.4				N = 1.5				N = 1.6				N = 1.7			
	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L	L1/L	L2/L	L3/L	L4/L
	L1 (ft)	L2 (ft)	L3 (ft)	L4 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L4 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L4 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L4 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L4 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L4 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L4 (ft)	L1 (ft)	L2 (ft)	L3 (ft)	L4 (ft)
120.00	23.57	14.41	16.18	11.68	22.05	13.96	17.57	12.83	20.58	13.75	18.79	13.76	19.16	13.71	19.86	14.53	17.77	13.83	20.80	15.20	16.41	14.07	21.63	15.78	15.08	14.40	22.37	16.29	13.78	14.82	23.02	16.75
140.00	27.50	16.81	18.88	13.63	25.73	16.29	20.50	14.96	24.01	16.04	21.92	16.05	22.35	16.00	23.17	16.96	20.73	16.14	24.27	17.73	19.15	16.41	25.24	18.41	17.60	16.80	26.09	19.01	16.08	17.29	26.86	19.55
160.00	31.43	19.22	21.57	15.57	29.40	18.62	23.42	17.10	27.44	18.33	25.05	18.34	25.54	18.29	26.48	19.38	23.69	18.44	27.74	20.27	21.88	18.76	28.84	21.04	20.11	19.20	29.82	21.73	18.38	19.76	30.70	22.34
180.00	35.36	21.62	24.27	17.52	33.08	20.94	26.35	19.24	30.87	20.62	28.19	20.63	28.74	20.57	29.79	21.80	26.65	20.75	31.20	22.80	24.62	21.10	32.45	23.67	22.62	21.60	33.55	24.44	20.67	22.23	34.53	25.13
200.00	39.29	24.02	26.97	19.47	36.75	23.27	29.28	21.38	34.30	22.91	31.32	22.93	31.93	22.86	33.10	24.22	29.61	23.05	34.67	25.33	27.35	23.44	36.05	26.30	25.14	24.00	37.28	27.16	22.97	24.70	38.37	27.92
220.00	43.21	26.42	29.66	21.41	40.43	25.60	32.21	23.51	37.74	25.20	34.45	25.22	35.12	25.14	36.41	26.64	32.57	25.36	38.14	27.87	30.09	25.79	39.66	28.93	27.65	26.40	41.00	29.87	25.27	27.17	42.21	30.71
240.00	47.14	28.82	32.36	23.36	44.10	27.93	35.14	25.65	41.17	27.49	37.58	27.51	38.32	27.43	39.73	29.07	35.54	27.66	41.61	30.40	32.82	28.13	43.26	31.56	30.17	28.80	44.73	32.59	27.56	29.64	46.04	33.51
260.00	51.07	31.23	35.05	25.30	47.78	30.25	38.07	27.79	44.60	29.78	40.71	29.81	41.51	29.71	43.04	31.49	38.50	29.97	45.07	32.93	35.56	30.48	46.87	34.20	32.68	31.21	48.46	35.31	29.86	32.11	49.88	36.30
280.00	55.00	33.63	37.75	27.25	51.45	32.58	40.99	29.93	48.03	32.07	43.85	32.10	44.70	32.00	46.35	33.91	41.46	32.27	48.54	35.47	38.29	32.82	50.47	36.83	35.19	33.61	52.19	38.02	32.16	34.58	53.72	39.09
300.00	58.93	36.03	40.45	29.20	55.13	34.91	43.92	32.06	51.46	34.36	46.98	34.39	47.90	34.28	49.66	36.33	44.42	34.58	52.01	38.00	41.03	35.17	54.08	39.46	37.71	36.01	55.92	40.74	34.46	37.05	57.56	41.88
320.00	62.86	38.43	43.14	31.14	58.80	37.23	46.85	34.20	54.89	36.65	50.11	36.68	51.09	36.57	52.97	38.75	47.38	36.88	55.47	40.53	43.76	37.51	57.68	42.09	40.22	38.41	59.64	43.45	36.75	39.52	61.39	44.68
340.00	66.78	40.83	45.84	33.09	62.48	39.56	49.78	36.34	58.32	38.95	53.24	38.98	54.28	38.86	56.28	41.18	50.34	39.19	58.94	43.07	46.50	39.85	61.29	44.72	42.74	40.81	63.37	46.17	39.05	41.99	65.23	47.47
360.00	70.71	43.24	48.54	35.04	66.15	41.89	52.71	38.48	61.75	41.24	56.37	41.27	57.47	41.14	59.59	43.60	53.30	41.49	62.41	45.60	49.23	42.20	64.89	47.35	45.25	43.21	67.10	48.88	41.35	44.46	69.07	50.26
380.00	74.64	45.64	51.23	36.98	69.83	44.22	55.63	40.61	65.18	43.53	59.50	43.56	60.67	43.43	62.90	46.02	56.26	43.80	65.87	48.13	51.97	44.54	68.50	49.98	47.76	45.61	70.83	51.60	43.64	46.93	72.90	53.05
400.00	78.57	48.04	53.93	38.93	73.50	46.54	58.56	42.75	68.61	45.82	62.64	45.85	63.86	45.71	66.21	48.44	59.23	46.10	69.34	50.67	54.70	46.89	72.10	52.61	50.28	48.01	74.55	54.32	45.94	49.40	76.74	55.84
420.00	82.50	50.44	56.63	40.88	77.18	48.87	61.49	44.89	72.04	48.11	65.77	48.15	67.05	48.00	69.52	50.87	62.19	48.41	72.81	53.20	57.44	49.23	75.71	55.24	52.79	50.41	78.28	57.03	48.24	51.87	80.58	58.64
440.00	86.43	52.84	59.32	42.82	80.86	51.20	64.42	47.03	75.47	50.40	68.90	50.44	70.25	50.28	72.83	53.29	65.15	50.71	76.28	55.73	60.17	51.58	79.31	57.87	55.30	52.81	82.01	59.75	50.53	54.34	84.41	61.43
460.00	90.36	55.25	62.02	44.77	84.53	53.52	67.35	49.17	78.90	52.69	72.03	62.73	73.44	52.57	76.14	55.71	68.11	53.02	79.74	58.27	62.91	53.92	82.92	60.50	57.82	55.21	85.74	62.46	62.83	56.81	88.25	64.22
480.00	94.28	57.65	64.72	46.72	88.21	55.85	70.27	51.30	82.33	54.98	75.16	55.03	76.63	54.86	79.45	58.13	71.07	55.32	83.21	60.80	65.64	56.27	86.52	63.13	60.33	57.61	89.46	65.18	55.13	59.28	92.09	67.01

Appendix

Conversion Factors

Multiply	By	To Produce
in	25.40	mm
ft	0.3048	m
in ²	645.2	mm ²
ft ²	0.0929	m ²
in ³	16387	mm ³
ft ³	0.0283	m ³
in ⁴	416231	mm ⁴
ft ⁴	0.00863	m ⁴
lbf	4.448	N
kip	4.448	kN
ton	8.896	kN
lbf/in	0.175	N/mm
lbf/ft	0.015	N/mm
kip/in	175.2	kN/m
kip/ft	14.6	kN/m
lbf	0.453	kg
lbm	0.453	kg
slug	14.594	kg
ft/sec ²	0.3048	m/sec ²
psi	6894.757	Pa
ksi	6.895	MPa
psf	47.88	Pa
ksf	0.04788	MPa
°F	(°t-32°)/1.8	°C

Multiplication Factor	Prefix	Symbol
1,000,000,000 = 10 ⁹	giga	G
1,000,000 = 10 ⁶	mega	M
1,000 = 10 ³	kilo	k
100 = 10 ²	hecto	h
1 = 1		
0.01 = 10 ⁻²	centi	c
0.001 = 10 ⁻³	milli	m
0.000001 = 10 ⁻⁶	micro	μ
0.00000001 = 10 ⁻⁹	nano	n

Reinforcing Bar Properties

Bar Size	Nominal Mass	Nominal Diameter	Nominal Area	Bar Size	Nominal Weight	Nominal Diameter	Nominal Area
No.	kg/m	mm	mm ²	No.	lb/ft	in	in ²
10	0.560	9.5	71	3	0.376	0.375	0.11
13	0.994	12.7	129	4	0.668	0.500	0.20
16	1.552	15.9	199	5	1.043	0.625	0.31
19	2.235	19.1	284	6	1.502	0.750	0.44
22	3.042	22.2	387	7	2.044	0.875	0.60
25	3.973	25.4	510	8	2.670	1.000	0.79
29	5.060	28.7	645	9	3.400	1.128	1.00
32	6.404	32.3	819	10	4.303	1.270	1.27
36	7.907	35.8	1006	11	5.313	1.410	1.56
43	11.380	43.0	1452	14	7.650	1.693	2.25
57	20.240	57.3	2581	18	13.600	2.254	4.00