

SPAN LENGTH BY STANDARD NDS METHOD

The standard NDS joist check limits the deflection/span for a given weight per square foot.

Given this, our procedure here is:

Hold deflection/span and weight per square foot constant and compute how the span changes when the boardwalk section parameters change relative to the reference boardwalk section.

According to the NDS equations for joists, for fixed weight per square foot:

deflection/span is directly proportional to:

the cube of the span
and

the length of the tread

and inversely proportional to:

the actual width of the stringer
and

the cube of the actual height of the stringer
and

the number of stringers

and

the elastic modulus of the wood

For simplicity of output, we set:

H = effective height of stringers

= actual height of a stringer if NOT truss

= sum of actual heights of 'stringers' if truss

W = sum of actual widths of stringers

(typically number of stringers times actual
width of one stringer)

Reference Section Values:

span = 8ft

cross section = 2x8, actual 1.50in x 7.25in

number of stringers = 2

tread length = 36in

elastic modulus = 1600000 for No 1 Standard

W = 3.0

H = 7.25

STANDARD NON-TRUSS SPAN LENGTH IN FEET

H					
W	3.50	5.50	7.25	9.25	11.25
3.00	3.86	6.07	8.00	10.21	12.41
3.50	4.07	6.39	8.42	10.75	13.07
4.00	4.25	6.68	8.81	11.23	13.66
4.50	4.42	6.95	9.16	11.68	14.21
5.00	4.58	7.20	9.49	12.10	14.72
5.50	4.73	7.43	9.79	12.49	15.19
6.00	4.87	7.65	10.08	12.86	15.64
6.50	5.00	7.85	10.35	13.21	16.06
7.00	5.12	8.05	10.61	13.54	16.47
7.50	5.24	8.24	10.86	13.85	16.85
8.00	5.36	8.42	11.09	14.15	17.21
8.50	5.46	8.59	11.32	14.44	17.57
9.00	5.57	8.75	11.54	14.72	17.90
9.50	5.67	8.91	11.75	14.99	18.23
10.00	5.77	9.07	11.95	15.25	18.54
10.50	5.86	9.21	12.15	15.50	18.85
11.00	5.96	9.36	12.34	15.74	19.14
11.50	6.04	9.50	12.52	15.97	19.43
12.00	6.13	9.63	12.70	16.20	19.71
12.50	6.21	9.77	12.87	16.42	19.98
13.00	6.30	9.89	13.04	16.64	20.24
13.50	6.38	10.02	13.21	16.85	20.49
14.00	6.45	10.14	13.37	17.06	20.74
14.50	6.53	10.26	13.53	17.26	20.99
15.00	6.60	10.38	13.68	17.45	21.23
15.50	6.68	10.49	13.83	17.65	21.46
16.00	6.75	10.60	13.98	17.83	21.69
18.00	7.02	11.03	14.54	18.55	22.56
24.00	7.72	12.14	16.00	20.41	24.83
30.00	8.32	13.08	17.24	21.99	26.74
36.00	8.84	13.89	18.32	23.37	28.42
42.00	9.31	14.63	19.28	24.60	29.92
48.00	9.73	15.29	20.16	25.72	31.28

STANDARD TRUSS SPAN LENGTH IN FEET

*** TRUSS BRIDGE DESIGNS MUST BE ***
 ***** CHECKED BY AN ENGINEER *****

W					
H	3.00	6.00	7.00	10.00	14.00
11.00	12.14	15.29	16.10	18.13	20.28
12.75	14.07	17.73	18.66	21.02	23.51
14.50	16.00	20.16	21.22	23.90	26.74
14.75	16.28	20.51	21.59	24.31	27.20
16.50	18.21	22.94	24.15	27.20	30.43
16.75	18.48	23.29	24.51	27.61	30.89
18.50	20.41	25.72	27.08	30.49	34.11
20.50	22.62	28.50	30.00	33.79	37.80
22.50	24.83	31.28	32.93	37.09	41.49

STANDARD MODULUS OF ELASTICITY SPAN LENGTH MULTIPLIER

type	E	multiplier
No 1 Dense	1800000	1.04
No 1	1600000	1.00
No 1 Non-Dense	1400000	0.96

STANDARD TREAD LENGTH SPAN LENGTH MULTIPLIER

length	multiplier
24in	1.14
36in	1.00
44in	0.94
48in	0.91

SPAN LENGTH BY ALTERNATE NDS METHOD

This is the same as the Standard NDS Method, except that instead of holding the weight per square foot constant, we hold total weight constant.

This method is NOT valid if the resulting span length is less than the reference length. For example, if the reference section can hold 3 people, this method calculates the span that can hold 3 people for other parameters, but if the result is 60% of the reference length, only 2 people will fit. So results less than the reference length are NOT given.

According to the NDS equations for joists, for fixed total weight:

deflection/span is directly proportional to:
the square of the span

and inversely proportional to:

the actual width of the stringer

and

the cube of the actual height of the stringer

and

the number of stringers

The elastic modulus multiplier given below is different for the alternate method.

For simplicity of output, we set:

H = effective height of stringers

= actual height of a stringer if NOT truss

= sum of actual heights of 'stringers' if truss

W = sum of actual widths of stringers

(typically number of stringers times actual
width of one stringer)

ALTERNATE NON-TRUSS SPAN LENGTH IN FEET

W	H				
	3.50	5.50	7.25	9.25	11.25
3.00	-----	-----	8.00	11.53	15.46
3.50	-----	-----	8.64	12.45	16.70
4.00	-----	-----	9.24	13.31	17.86
4.50	-----	-----	9.80	14.12	18.94
5.00	-----	-----	10.33	14.88	19.96
5.50	-----	-----	10.83	15.61	20.94
6.00	-----	-----	11.31	16.30	21.87
6.50	-----	-----	11.78	16.97	22.76
7.00	-----	8.07	12.22	17.61	23.62
7.50	-----	8.36	12.65	18.23	24.45
8.00	-----	8.63	13.06	18.83	25.25
8.50	-----	8.90	13.47	19.41	26.03
9.00	-----	9.16	13.86	19.97	26.78
9.50	-----	9.41	14.24	20.52	27.52
10.00	-----	9.65	14.61	21.05	28.23
10.50	-----	9.89	14.97	21.57	28.93
11.00	-----	10.12	15.32	22.08	29.61
11.50	-----	10.35	15.66	22.57	30.28
12.00	-----	10.57	16.00	23.06	30.93
12.50	-----	10.79	16.33	23.53	31.57
13.00	-----	11.00	16.65	24.00	32.19
13.50	-----	11.21	16.97	24.46	32.80
14.00	-----	11.42	17.28	24.91	33.41
14.50	-----	11.62	17.59	25.35	34.00
15.00	-----	11.82	17.89	25.78	34.58
15.50	-----	12.02	18.18	26.21	35.15
16.00	-----	12.21	18.48	26.63	35.71
18.00	-----	12.95	19.60	28.24	37.88
24.00	-----	14.95	22.63	32.61	43.74
30.00	8.49	16.72	25.30	36.46	48.90
36.00	9.30	18.31	27.71	39.94	53.57
42.00	10.04	19.78	29.93	43.14	57.86
48.00	10.73	21.14	32.00	46.12	61.85

ALTERNATE TRUSS SPAN LENGTH IN FEET

*** TRUSS BRIDGE DESIGNS MUST BE ***
 ***** CHECKED BY AN ENGINEER *****

H	W				
	3.00	6.00	7.00	10.00	14.00
11.00	14.95	21.14	22.84	27.30	32.30
12.75	18.66	26.39	28.50	34.06	40.30
14.50	22.63	32.00	34.56	41.31	48.88
14.75	23.22	32.83	35.46	42.38	50.15
16.50	27.47	38.84	41.96	50.15	59.34
16.75	28.09	39.73	42.91	51.29	60.69
18.50	32.61	46.12	49.81	59.54	70.44
20.50	38.04	53.79	58.10	69.45	82.17
22.50	43.74	61.85	66.81	79.85	94.48

ALTERNATE MODULUS OF ELASTICITY SPAN LENGTH MULTIPLIER

type	E	multiplier
No 1 Dense	1800000	1.06
No 1	1600000	1.00
No 1 Non-Dense	1400000	0.94