

Project Description:

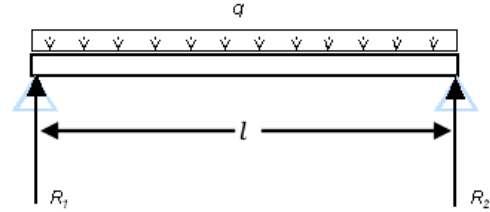
78 Caleb Street

First Story Support Beam

Required Beam: W8 x 15

Load Case: Simply Supported
1st Story
Load Bearing
Center Wall
Trussed Roof
Uniform Distributed Load

Clear Span: 14' 7" (175")
Tributary Width: 12' (144")
Weight of Beam: 15 lb/ft



Beam Properties		Loading	
Type	W8 x 15	Live Load	40PSF
Supplier	American Steel & Aluminum	Dead Load	10PSF
Material	ASTM A992 Hot Rolled Carbon Steel	Uniform Load	50PSF
Modulus of Elasticity	$E_{A992} = 29.6 \times 10^3$ ksi		
Moment of Inertia (Principal Bending Axis)	$I_{W8 \times 15} = 75.3$ in ⁴		

Allowable Deflection (IRC)	
$\delta_{ALLOW(LL)} L/360$.486in
$\delta_{ALLOW(LL+DL)} L/240$.729in

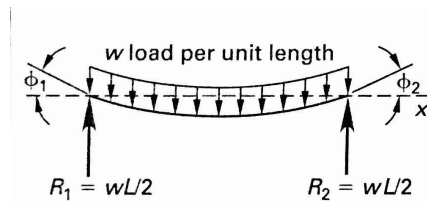
Analysis

Reactions at Supports

$$W_{TOT} = W_{BEAM} + W_{DL} + W_{LL}$$

$$R_1 = R_2 = 1/2 (l)(W_{TOT})$$

R ₁	4482.6 lb
R ₂	4482.6 lb



$$\delta_{max} = \frac{5wL^4}{384EI}$$

Deflection

	ACTUAL (in)	ALLOWED (in)	CAPACITY	ANALYSIS
$\delta_{ALLOW(LL)}$	0.3544	0.486	72.9%	PASSED
$\delta_{ALLOW(LL+DL)}$	0.4403	0.729	60.4%	PASSED

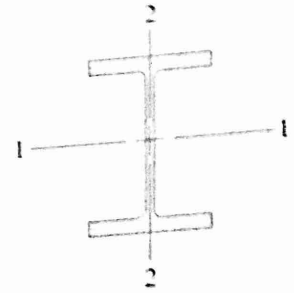


TABLE E-1(a) PROPERTIES OF WIDE-FLANGE SECTIONS (W SHAPES) - USCS UNITS
(ABRIDGED LIST)

Designation	Weight per foot lb	Area in. ²	Depth in.	Web thickness in.	Flange		Axis 1-1			Axis 2-2		
					Width in.	Thickness in.	<i>I</i> in. ⁴	<i>S</i> in. ³	<i>r</i> in.	<i>I</i> in. ⁴	<i>S</i> in. ³	<i>r</i> in.
W 30 × 211	211	62.2	30.9	0.775	15.1	1.32	10300	665	12.9	757	100	3.49
W 30 × 132	132	38.9	30.3	0.615	10.5	1.00	5770	380	12.2	196	37.2	2.25
W 24 × 162	162	47.7	25.0	0.705	13.0	1.22	5170	414	10.4	443	68.4	3.05
W 24 × 94	94.0	27.7	24.3	0.515	9.07	0.875	2700	222	9.87	109	24.0	1.98
W 18 × 119	119	35.1	19.0	0.655	11.3	1.06	2190	231	7.90	253	44.9	2.69
W 18 × 71	71.0	20.8	18.5	0.495	7.64	0.810	1170	127	7.50	60.3	15.8	1.70
W 16 × 100	100	29.5	17.0	0.585	10.4	0.985	1490	175	7.10	186	35.7	2.51
W 16 × 77	77.0	22.6	16.5	0.455	10.3	0.760	1110	134	7.00	138	26.9	2.47
W 16 × 57	57.0	16.8	16.4	0.430	7.12	0.715	758	92.2	6.72	43.1	12.1	1.60
W 16 × 31	31.0	9.13	15.9	0.275	5.53	0.440	375	47.2	6.41	12.4	4.49	1.17
W 14 × 120	120	35.3	14.5	0.590	14.7	0.940	1380	190	6.24	495	67.5	3.74
W 14 × 82	82.0	24.0	14.3	0.510	10.1	0.855	881	123	6.05	148	29.3	2.48
W 14 × 53	53.0	15.6	13.9	0.370	8.06	0.660	541	77.8	5.89	57.7	14.3	1.92
W 14 × 26	26.0	7.69	13.9	0.255	5.03	0.420	245	35.3	5.65	8.91	3.55	1.08
W 12 × 87	87.0	25.6	12.5	0.515	12.1	0.810	740	118	5.38	241	39.7	3.07
W 12 × 50	50.0	14.6	12.2	0.370	8.08	0.640	391	64.2	5.18	56.3	13.9	1.96
W 12 × 35	35.0	10.3	12.5	0.300	6.56	0.520	285	45.6	5.25	24.5	7.47	1.54
W 12 × 14	14.0	4.16	11.9	0.200	3.97	0.225	88.6	14.9	4.62	2.36	1.19	0.753
W 10 × 60	60.0	17.6	10.2	0.420	10.1	0.680	341	66.7	4.39	116	23.0	2.57
W 10 × 45	45.0	13.3	10.1	0.350	8.02	0.620	248	49.1	4.32	53.4	13.3	2.01
W 10 × 30	30.0	8.84	10.5	0.300	5.81	0.510	170	32.4	4.38	16.7	5.75	1.37
W 10 × 12	12.0	3.54	9.87	0.190	3.96	0.210	53.8	10.9	3.90	2.18	1.10	0.785
W 8 × 35	35.0	10.3	8.12	0.310	8.02	0.495	127	31.2	3.51	42.6	10.6	2.03
W 8 × 28	28.0	8.24	8.06	0.285	6.54	0.465	98.0	24.3	3.45	21.7	6.63	1.62
W 8 × 21	21.0	6.16	8.28	0.250	5.27	0.400	75.3	18.2	3.49	9.77	3.71	1.26
W 8 × 15	15.0	4.44	8.11	0.245	4.01	0.315	48.0	11.8	3.29	3.41	1.70	0.876

Note: Axes 1-1 and 2-2 are principal centroidal axes.