

Northwoods Software

Uniform Beam Load Reactions, Moments and Deflection

Last Revised: October 31, 2016

Applicable Codes

CSA S16

Project Information

Date: Saturday, July 07, 2018

Project Number:

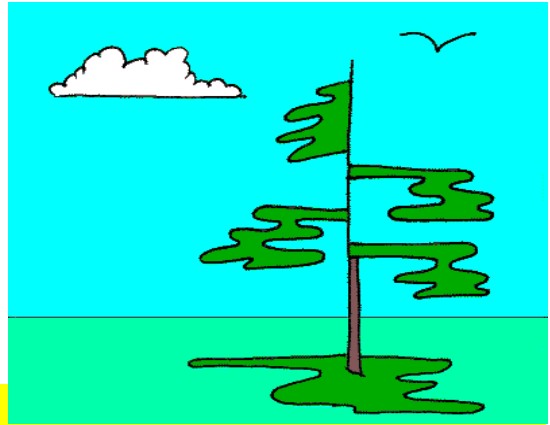
Project Name:

Description:

Designer: **Dik**

Checked: **Dik**

Date:



Load Factors

$\alpha_{DL} = 1.25$

Dead Load Factor

$\alpha_{LL} = 1.5$

Live Load Factor

Material

Steel

$F_y = 50$ Ksi

Yield Strength of Steel

$\phi_s = 0.9$

Material Property Factor

Deflection Limits (L / nnn)

Total Load = 180

Live Load = 240

Loading Uniform)

	Service (Ksf)	Factored (Ksf)	Service (KPa)	Factored (KPa)	
$q_{SDL} =$	0.089	0.111	4.26	5.33	Uniform Dead Load
$q_{SLL} =$	0.063	0.094	3.00	4.50	Uniform Live Load
$q_{STL} =$	0.152	0.205	7.26	9.83	Uniform Total Load

Beam: Eng Tips

W =	17.390 ft	5.300 m	Tributary Width
L =	28.200 ft	8.595 m	Span

Loading

	Service (Klf)	Factored (Klf)	Service (KN/m)	Factored (KN/m)	
q_{SDL} =	1.603	2.003	23.39	29.24	Uniform Dead Load
q_{SLL} =	1.090	1.636	15.91	23.87	Uniform Live Load
q_{STL} =	2.693	3.639	39.30	53.11	Uniform Total Load

Design Information

Reactions	Service (K)	Factored (K)	Service (KN)	Factored (KN)	
$R_A = R_B$ =	22.60	28.25	100.52	125.65	Dead Load Beam Reactions
$R_A = R_B$ =	15.37	23.06	68.39	102.58	Live Load Beam Reactions
$R_A = R_B$ =	37.97	51.31	168.91	228.23	Total Load Beam Reactions

Moments	Service (K-ft)	Factored (K-ft)	Service (KN-m)	Factored (KN-m)	
M_{LL} =	108.4	162.6	146.95	220.43	Live Load Beam Moment
M_{TL} =	267.7	361.7	362.96	490.44	Total Load Beam Moment

$$S_{Xreqd} = 96.5 \text{ in}^3 \quad 1580.70 \text{ } 10^3 \times \text{mm}^3 \quad S_x \text{ required}$$

Section:	W18x55	W460x82		
S_{Xprov} =	98.3 in ³	1610.85	10 ³ x mm ³	OK S_x provided
I_{Xprov} =	890.0 in ⁴	370.45	10 ⁶ x mm ⁴	I_x provided

Deflections

D_{LL} =	0.60 in	15.3	OK	L / 560	Defl Ratio for LL
D_{TL} =	1.49 in	37.9	OK	L / 227	Defl Ratio for TL

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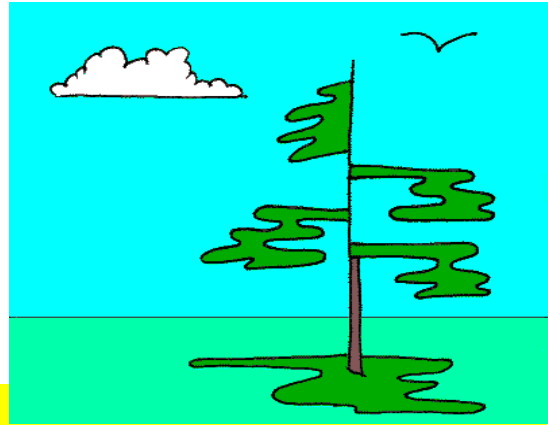
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Load Factors

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Dead Load Factor

$\alpha_{LL} = 1.5$

Live Load Factor

Material

Steel

$F_y = 50$ Ksi

Yield Strength of Steel

$\phi_s = 0.9$

Material Property Factor

Deflection Limits (L / nnn)

Total Load = 180

Live Load = 240

Loading Uniform)

	Service (Ksf)	Factored (Ksf)	Service (KPa)	Factored (KPa)	
$q_{SDL} =$	0.089	0.111	4.26	5.33	Uniform Dead Load
$q_{SLL} =$	0.063	0.094	3.00	4.50	Uniform Live Load
$q_{STL} =$	0.152	0.205	7.26	9.83	Uniform Total Load

Beam: Eng Tips

W =	17.390 ft	5.300 m	Tributary Width
L =	28.200 ft	8.595 m	Span

Loading

	Service (Klf)	Factored (Klf)	Service (KN/m)	Factored (KN/m)	
q_{SDL} =	1.635	2.043	23.86	29.82	Uniform Dead Load
q_{SLL} =	1.090	1.636	15.91	23.87	Uniform Live Load
q_{STL} =	2.725	3.679	39.77	53.69	Uniform Total Load

Design Information

Reactions	Service (K)	Factored (K)	Service (KN)	Factored (KN)	
$R_A = R_B$ =	23.05	28.81	102.53	128.16	Dead Load Beam Reactions
$R_A = R_B$ =	15.37	23.06	68.39	102.58	Live Load Beam Reactions
$R_A = R_B$ =	38.42	51.87	170.92	230.74	Total Load Beam Reactions

Moments	Service (K-ft)	Factored (K-ft)	Service (KN-m)	Factored (KN-m)	
M_{LL} =	108.4	162.6	146.95	220.43	Live Load Beam Moment
M_{TL} =	270.9	365.7	367.27	495.83	Total Load Beam Moment

$$S_{Xreqd} = 97.5 \text{ in}^3 \quad 1598.08 \text{ } 10^3 \text{ x mm}^3 \quad S_x \text{ required}$$

Section:	W12x87	W310x129		
S_{Xprov} =	118.0 in ³	1933.67	10 ³ x mm ³	OK S_x provided
I_{Xprov} =	740.0 in ⁴	308.01	10 ⁶ x mm ⁴	I_x provided

Deflections

D_{LL} =	0.73 in	18.5	OK	L / 466	Defl Ratio for LL
D_{TL} =	1.82 in	46.1	OK	L / 186	Defl Ratio for TL