

**Northwoods Software**

**Uniform Beam Load Reactions, Moments and Deflection**

Last Revised: October 31, 2016

**Applicable Codes**

**CSA S16**

**Project Information**

**Date:** Sunday, July 08, 2018

**Project Number:**

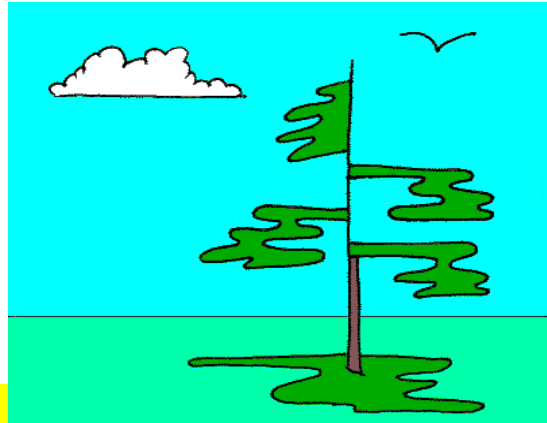
**Project Name:**

**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)	
$q_{SDL} =$	0.152	0.190	7.28	9.10	Uniform Dead Load
$q_{SLL} =$	0.021	0.031	1.00	1.50	Uniform Live Load
$q_{STL} =$	0.173	0.221	8.28	10.60	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)	
$q_{SDL}$ =	2.698	3.373	39.38	49.22	Uniform Dead Load
$q_{SLL}$ =	0.363	0.545	5.30	7.95	Uniform Live Load
$q_{STL}$ =	3.062	3.918	44.68	57.18	Uniform Total Load

### Design Information

Reactions	Service (K)	Factored (K)	Service (KN)	Factored (KN)	
$R_A = R_B$ =	38.05	47.56	169.24	211.54	Dead Load Beam Reactions
$R_A = R_B$ =	5.12	7.68	22.78	34.18	Live Load Beam Reactions
$R_A = R_B$ =	43.17	55.24	192.02	245.72	Total Load Beam Reactions

Moments	Service (K-ft)	Factored (K-ft)	Service (KN-m)	Factored (KN-m)	
$M_{LL}$ =	36.1	54.2	48.96	73.44	Live Load Beam Moment
$M_{TL}$ =	304.3	389.4	412.62	528.02	Total Load Beam Moment

$$S_{Xreqd} = 103.9 \text{ in}^3 \quad 1701.83 \text{ } 10^3 \times \text{mm}^3 \quad S_x \text{ required}$$

**W18x55 no longer works, within**

Section: **W21x55**

**W530x82 a few %.**

$$S_{Xprov} = 111.0 \text{ in}^3 \quad 1818.96 \text{ } 10^3 \times \text{mm}^3 \quad \text{OK} \quad S_x \text{ provided}$$

$$I_{Xprov} = 1150.0 \text{ in}^4 \quad 478.67 \text{ } 10^6 \times \text{mm}^4 \quad I_x \text{ provided}$$

### Deflections

$D_{LL}$ =	0.16 in	4.0	OK	L / 2172	Defl Ratio for LL
$D_{TL}$ =	1.31 in	33.4	OK	L / 258	Defl Ratio for TL

### Beam 202

W =	15.000 ft	4.572 m	Tributary Width
L =	18.000 ft	5.486 m	Span

### Loading

	Service (Klf)	Factored (Klf)	Service (KN/m)	Factored (KN/m)	
$q_{SDL}$ =	2.335	2.919	34.08	42.60	Uniform Dead Load
$q_{SLL}$ =	0.313	0.470	4.57	6.86	Uniform Live Load
$q_{STL}$ =	2.648	3.389	38.65	49.46	Uniform Total Load

### Design Information

Reactions	Service (K)	Factored (K)	Service (KN)	Factored (KN)	
$R_A = R_B$ =	21.02	26.27	93.48	116.85	Dead Load Beam Reactions
$R_A = R_B$ =	2.82	4.23	12.54	18.82	Live Load Beam Reactions
$R_A = R_B$ =	23.84	30.50	106.02	135.67	Total Load Beam Reactions

Moments	Service (K-ft)	Factored (K-ft)	Service (KN-m)	Factored (KN-m)	
$M_{LL}$ =	12.7	19.0	17.21	25.81	Live Load Beam Moment

$$M_{TL} = 107.3 \quad \mathbf{137.2} \quad 145.42 \quad 186.08 \quad \text{Total Load Beam Moment}$$

$$S_{Xreqd} = 36.6 \text{ in}^3 \quad 599.75 \text{ } 10^3 \times \text{mm}^3 \quad S_X \text{ required}$$

Section:	<b>W18x55</b>	<b>W460x82</b>		
$S_{Xprov} =$	98.3 in <sup>3</sup>	1610.85 10 <sup>3</sup> x mm <sup>3</sup>	<b>OK</b>	$S_X$ provided
$I_{Xprov} =$	890.0 in <sup>4</sup>	370.45 10 <sup>6</sup> x mm <sup>4</sup>		$I_X$ provided

#### Deflections

$D_{LL} =$	0.03 in	0.7	<b>OK</b>	L / 7493	Defl Ratio for LL
$D_{TL} =$	0.24 in	6.2	<b>OK</b>	L / 887	Defl Ratio for TL

#### Beam 203

W =	<b>8.000</b> ft	2.438 m	Tributary Width
L =	<b>18.000</b> ft	5.486 m	Span

#### Loading

	Service (Klf)	Factored (Klf)	Service (KN/m)	Factored (KN/m)	
$q_{SDL} =$	1.252	1.565	18.27	22.84	Uniform Dead Load
$q_{SLL} =$	<b>0.167</b>	0.251	2.44	3.66	Uniform Live Load
$q_{STL} =$	1.419	<b>1.816</b>	20.71	26.50	Uniform Total Load

#### Design Information

Reactions	Service (K)	Factored (K)	Service (KN)	Factored (KN)	
$R_A = R_B =$	11.27	14.09	50.12	62.65	Dead Load Beam Reactions
$R_A = R_B =$	<b>1.50</b>	2.26	6.69	10.04	Live Load Beam Reactions
$R_A = R_B =$	12.77	<b>16.34</b>	56.81	72.69	Total Load Beam Reactions

Moments	Service (K-ft)	Factored (K-ft)	Service (KN-m)	Factored (KN-m)	
$M_{LL} =$	6.8	10.2	9.18	13.76	Live Load Beam Moment
$M_{TL} =$	57.5	<b>73.5</b>	77.92	99.70	Total Load Beam Moment

$$S_{Xreqd} = 19.6 \text{ in}^3 \quad 321.34 \text{ } 10^3 \times \text{mm}^3 \quad S_X \text{ required}$$

Section:	<b>W16x36</b>	<b>W410x54</b>		
$S_{Xprov} =$	56.5 in <sup>3</sup>	925.87 10 <sup>3</sup> x mm <sup>3</sup>	<b>OK</b>	$S_X$ provided
$I_{Xprov} =$	448.0 in <sup>4</sup>	186.47 10 <sup>6</sup> x mm <sup>4</sup>		$I_X$ provided

#### Deflections

$D_{LL} =$	0.03 in	0.8	<b>OK</b>	L / 7072	Defl Ratio for LL
$D_{TL} =$	0.26 in	6.6	<b>OK</b>	L / 833	Defl Ratio for TL