

Northwoods Software

Uniform Beam Load Reactions, Moments and Deflection

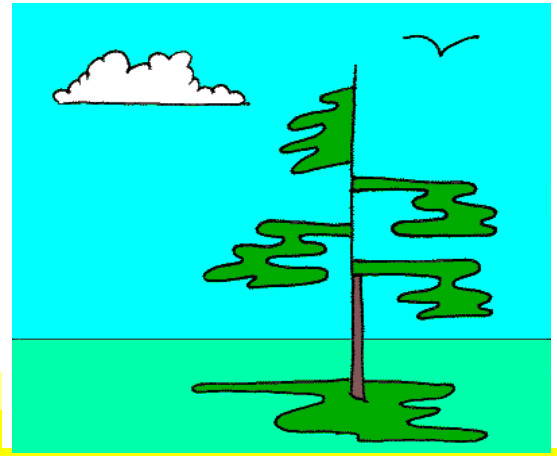
Last Revised: July 8, 2018

Applicable Codes

CSA S16

Project Information

Date: Monday, July 09, 2018
Project Number:
Project Name:
Description:
Designer: Dik
Checked: Dik
Date:



Load Factors

α_{DL} = 1.25 Dead Load Factor
 α_{LL} = 1.5 Live Load Factor

Material

Steel
Fy = 350 Mpa Yield Strength of Steel
 ϕ_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

| | Service (Ksf) | Factored (Ksf) | Service (KPa) | Factored (KPa) | |
|-----|------------------|-------------------|------------------|-------------------|-----------------|
| | 0.152 | 0.190 | 7.28 | 9.10 | |
| | 0.021 | 0.031 | 1.00 | 1.50 | |
| W = | 20.000 ft | | 6.096 m | | Tributary Width |
| L = | 32.500 ft | | 9.906 m | | Span |

Loading

| | Service (Klf) | Factored (Klf) | Service (KN/m) | Factored (KN/m) | |
|-------------|------------------|-------------------|-------------------|--------------------|--------------------|
| q_{SDL} = | 3.210 | 4.013 | 46.85 | 58.56 | Uniform Dead Load |
| q_{SLL} = | 0.418 | 0.627 | 6.10 | 9.15 | Uniform Live Load |
| q_{STL} = | 3.628 | 4.639 | 52.94 | 67.70 | Uniform Total Load |

Design Information

| Reactions | Service (K) | Factored (K) | Service (KN) | Factored (KN) | |
|---------------|----------------|-----------------|-----------------|------------------|---------------------------|
| $R_A = R_B$ = | 52.16 | 65.20 | 232.03 | 290.04 | Dead Load Beam Reactions |
| $R_A = R_B$ = | 6.79 | 10.18 | 30.20 | 45.30 | Live Load Beam Reactions |
| $R_A = R_B$ = | 58.95 | 75.39 | 262.23 | 335.34 | Total Load Beam Reactions |

| Moments | Service (K-ft) | Factored (K-ft) | Service (KN-m) | Factored (KN-m) | |
|------------|-------------------|--------------------|-------------------|--------------------|------------------------|
| M_{LL} = | 55.2 | 82.7 | 74.79 | 112.19 | Live Load Beam Moment |
| M_{TL} = | 479.0 | 612.5 | 649.41 | 830.46 | Total Load Beam Moment |

| Section: | W12x170 | W310x253 | |
|----------|------------------------|--|------------------|
| Class: | 1 | | Class of Section |
| h = | 14.0 in | 25 mm | |
| b = | 12.6 in | 319 mm | |
| t = | 1.6 in | 40 mm | |
| w = | 1.0 in | 24 mm | |
| S_x = | 235.0 in ³ | 3851 10 ³ x mm ³ | |
| Z_x = | 275.0 in ³ | 4506 10 ³ x mm ³ | |
| I_x = | 1650.0 in ⁴ | 686.78 10 ⁶ x mm ⁴ | I_x provided |

| | 0 | Class 1 | Class 2 | Class 3 |
|----------------|-------|---------|---------|---------|
| Web h/w = | 11.36 | 58.80 | 90.87 | 101.56 |
| Flange b/t = | 4.03 | 7.75 | 9.09 | 10.69 |

M_r = 1047.0 K-ft 1419.5 KN-m OK

Deflections

| | | | | | |
|------------|---------|------|----|----------|-------------------|
| D_{LL} = | 0.22 in | 5.6 | OK | L / 1770 | Defl Ratio for LL |
| D_{TL} = | 1.91 in | 48.6 | OK | L / 204 | Defl Ratio for TL |