# Timber Beam-Cont. Beam Example 1-Floor Beam B-1

Element: C:/DCC/Timber12/Projects/Cont Beam Example 1-Floor Beam B-1.rtf
Description:
Date: 6/18/2015 10:09:35 AM

Company:
User:
Software: Timber Design 12.0

## Input Data

| Span | Horizontal Span Length | Actual Length | Left Support Width | Right Support Width |
|---|---|---|---|---|
| | ft | ft | in | in |
| Member 1 | | | | |
| Span 1 | 25 | 25.7694 | 8 | 8 |
| Overall Length | 25 | 25.7694 | | |

**Notes:**
- Lengths are to center line of bearing.
- Slope is 3 in 12.
- Eave Height is 0 ft.
- Spacing or tributary width is 4 ft.

## Area Loads

| Dead | Construction | Floor Live | Roof Live | Wind | Snow |
|---|---|---|---|---|---|
| ksf | ksf | ksf | ksf | ksf | ksf |
| 0.02 | 0.01 | 0.04 | 0 | Varies | 0.02 |

## User Defined Loads

| Load Case | Load Type | Distance(s) to Start | Load Length | Load at Start | Load at End | Offset |
|---|---|---|---|---|---|---|
| | | ft | ft | K<br>klf | K<br>klf | ft |
| Description: | Conc. Load @ mid-span | | | | | |
| Floor Live | Concentrated | 5 | | 0.5 | | 0 |
| Description: | Linear Load | | | | | |
| Floor Live | Linear | 12 | 6 | 0.05 | 0.15 | 0 |

## Code Parameters - IBC 2006

| IBC | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind | | | | | Snow | | | | | Floor | |
| Wind Speed | I | Exposure Category | Open to Wind? | Edge Beam? | Ground Snow | $C_e$ | $C_t$ | $L_u$ | I | Garage? | Conc. Load |
| mph | | | | | ksf | | | ft | | | K |
| 90 | 1 | B | Partial | No | 0.02 | 0.7 | 1 | 300 | 1 | No | 0 |

**Notes:**
- Positive loads act down.
- Distances are measured along horizontal axis.
- Live loads are patterned to 100%.
- Live load reduction will be calculated based upon tributary area.
- Weight of members is included in the calculations.

## Summary of Member Forces - Load Combinations

| Member | Span | Shear Max | Bending Max | Torsion | Deflection |
|---|---|---|---|---|---|
| | | K | ft-kip | ft-kip | in |
| 1 | 1 | 3.97 | 25.60 | | -1.637 |

## Reactions

| Support | Load Comb. | Horizontal | Vertical | Moment |
|---|---|---|---|---|
| | | K | K | ft-kip |
| 1 | Dead+0.75*Wind in Pos X+0.75*Floor Live+0.75*Snow Condition 2 w/Pattern Loads | 0.24 | 4.06 | 0.00 |

| | | | | |
|---|---|---|---|---|
| 2 | Dead+0.75*Wind in Pos X+0.75*Floor Live+0.75*Snow Condition 2 w/Pattern Loads | 0.24 | 3.95 | 0.00 |

# Timber Design 1 - Option 1 - Design of Member 1 - 3 1/8"x16 1/2"

## Design Data

| Design of Member 1 - 3 1/8"x16 1/2" | | |
|---|---|---|
| Material type is 20F-V3-Un-Balanced Layup-Glulam - Western | | |
| Check for repetitive use? Yes | Top flange bracing is Fully Braced | $E_{bx}$: 1600 ksi |
| Moist use? No | Bottom flange bracing is Braced At Inflection Points | $E_{by}$: 1500 ksi |
| $I_x$= 1169.8 in^4<br>$S_x$= 141.8 in^3 | $I_y$= 42 in^4<br>$S_y$= 26.9 in^3 | G assumed as .06E |
| Snow $C_d$= 1.15 | This is not a spaced column | $F_b$: 2 ksi |
| Side loaded? No | $K_x$ = 1 | $F_t$: 0.975 ksi |
| Overstress factor = 1 | $L_x$ = | $F_c$: 1.55 ksi |
| Allowable Roof live load deflection = L/240 | $K_y$ = 1 | $F_{c\perp}$: 0.56 ksi |
| Allowable Roof total load deflection = L/180 | $L_y$ = | $F_v$: 0.265 ksi |
| Member weight used in analysis = 0.01 klf | Area = 51.56 in^2 | Actual density: 31.2 pcf |

## Critical Design Checks

| | Critical reaction | Axial | Bending - X | Bending -Y | Shear | LL Defl. | TL Defl. |
|---|---|---|---|---|---|---|---|
| | K | ksi | ksi | ksi | ksi | in | in |
| **Span 1** | | | | | | | |
| **Value** | 3.968 | 0.018 | 2.03 | 0 | 0.094 | -1.168 | -1.637 |
| **Allowable** | 6.791 | 1.121 | 2.293 | 1.929 | 0.305 | 1.2885 | 1.718 |
| **% of Allow.** | 58 ✓ | 2 ✓ | 89 ✓ | 0 ✓ | 31 ✓ | 90 ✓ | 95 ✓ |
| **Location** | 0 | 13.5446 | 12.8847 | 12.8847 | 1.69838 | 12.8848 | 12.8848 |
| **Comb.** | 14 | 8 | 8 | 8 | 8 | 14 | 14 |

| | $C_d$ | $C_t$ | $C_L$ | $C_v$ | $C_{fu}$ | $C_r$ | $C_f$ | $C_{Px}$ | $C_{Py}$ | $C_T$ | $C_b$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Span 1** | 1.150 | 1.000 | 1.000 | 0.997 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

| | $C_{Fb}$ | $C_{Ft}$ | $C_{Fc}$ | $C_{Mb}$ | $C_{Mt}$ | $C_{Mv}$ | $C_{Mc\perp}$ | $C_{Mc}$ | $C_{ME}$ | $R_b$ |
|---|---|---|---|---|---|---|---|---|---|---|
| **Span 1** | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00 |

| | L/d Limit | $L_x$/d | $L_y$/d | $F_{CE\,x}$ | $F_{CE\,y}$ | $F_{bE}$ | $K_{CE}$ | c | $F^*_c$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | ksi | ksi | ksi | | | ksi |
| **Span 1** | 50 | 0 | 0 | 0 | 0 | 9.95E+006 | 0.42614 | 0.9 | 1.7825 |

**Notes:**

- Member has an actual/allowable ratio in span 1 of 95 ✓ %.
- Design is governed by total deflection
- Governing load combination is Dead+0.75*Wind in Pos X+0.75*Floor Live+0.75*Snow Condition 2 w/Pattern Loads
- Axial capacity of member is 6.64 K.
- Maximum hanger forces: 3.968 K (Left) and 3.855 K (Right).

## Minimum Bearing

| Span | Actual Length | Left Support Min. Bearing | Right Support Min. Bearing |
|---|---|---|---|
| | ft | in | in |
| **1** | 25.7694 | 2.29 | 2.225 |

**Notes:**

- Locations of maximum stress, moment, etc. are measured from the left end of the member.
- Bearing across full width of beam is required.
- Structural adequacy of supporting members must be confirmed.
- Bearing lengths required may be limited by bearing stress on supporting members.
- A negative reaction indicates that the beam must be fastened to the support to resist uplift.
- See manufacturer's literature for side loaded connection requirements.
- Cantilever deflection allowables are based on twice the span length.

- Timber design is governed by NDS 2005.