| | COMPANY | PROJECT |
|---|---|---|
| WoodWorks® SOFTWARE FOR WOOD DESIGN | Apr. 30, 2025 12:21 | Beam1- US.wwbu |

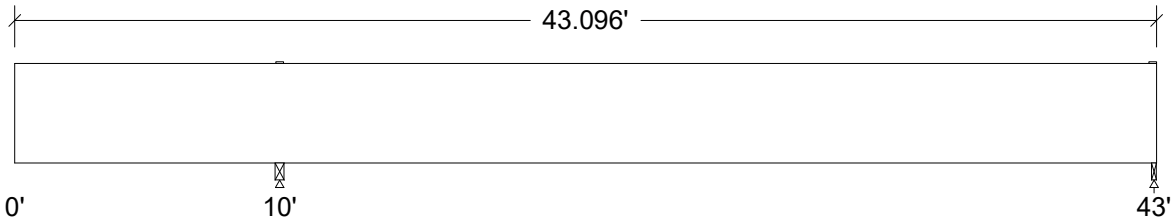
# Design Check Calculation Sheet

WoodWorks Sizer 13.2.1

## Loads:

| Load | Type | Distribution | Pat-tern | Location [ft] Start | End | Magnitude Start | End | Unit |
|---|---|---|---|---|---|---|---|---|
| D | Dead | Full UDL | No | | | 410.0 | | plf |
| S | Snow | Full UDL | Yes | | | 680.0 | | plf |
| Self-weight | Dead | Full UDL | No | | | 111.4 | | plf |

## Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :




| | | | | | |
|---|---|---|---|---|---|
| Unfactored: | | | | | |
| Dead | | | 14606 | | 7852 |
| Snow | | | 19050 | | 10770 |
| Factored: | | | | | |
| Total | | | 27942 | | 15410 |
| Bearing: | | | | | |
| Capacity | | | | | |
| Beam | | | 31680 | | 16027 |
| Support | | | 27942 | | 15410 |
| Des ratio | | | | | |
| Beam | | | 0.88 | | 0.96 |
| Support | | | 1.00 | | 1.00 |
| Load comb | | | #2 | | #4 |
| Length | | | 4.16 | | 2.29 |
| Min req'd | | | 4.16** | | 2.29** |
| Cb | | | 1.09 | | 1.00 |
| Cb min | | | 1.09 | | 1.00 |
| Cb support | | | 1.00 | | 1.00 |
| Fcp sup | | | 625 | | 625 |

**Minimum bearing length governed by the required width of the supporting member.

**Glulam-Balanced, West Species, 24F-1.8E WS, 10-3/4"x45"**

Supports: All - Timber-soft Beam, D.Fir-L No.2

Total length: 43.1'; Clear span: 9.827', 32.731'; Volume = 144.8 cu.ft.; 30 laminations, 10-3/4" maximum width,

Lateral support: top = at supports, bottom = at supports;

**This section PASSES the design code check.**

## Analysis vs. Allowable Stress and Deflection using NDS 2024 :

| Criterion | Analysis Value | Design Value | Unit | Analysis/Design |
|---|---|---|---|---|
| Shear | fv = 44 | Fv' = 305 | psi | fv/Fv' = 0.14 |
| Bending(+) | fb = 388 | Fb' = 2161 | psi | fb/Fb' = 0.18 |
| Bending(-) | fb = 165 | Fb' = 2355 | psi | fb/Fb' = 0.07 |
| Deflection: | | | | |
| Interior Live | 0.08 = < L/999 | 1.65 = L/240 | in | 0.05 |
| Total | 0.19 = < L/999 | 2.20 = L/180 | in | 0.09 |
| Cantil. Live | -0.06 = < L/999 | 1.00 = L/120 | in | 0.06 |
| Total | -0.14 = L/853 | 1.33 = L/90 | in | 0.11 |

## Additional Data:

| FACTORS: | F/E(psi) | CD | CM | Ct | CL | CV | Cfu | Cr | Cfrt | Notes | Cvr | LC# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fv' | 265 | 1.15 | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | 1.00 | 2 |
| Fb'+ | 2400 | 1.15 | 1.00 | 1.00 | 0.906 | 0.783 | - | - | 1.00 | 1.00 | - | 4 |
| Fb'- | 2400 | 1.15 | 1.00 | 1.00 | 0.985 | 0.853 | - | - | 1.00 | 1.00 | - | 2 |
| Fcp' | 650 | - | 1.00 | 1.00 | - | - | - | - | 1.00 | - | - | - |
| E' | 1.8 million | 1.00 | 1.00 | - | - | - | - | 1.00 | - | - | 4 | |
| Eminy' | 0.85 million | 1.00 | 1.00 | - | - | - | - | 1.00 | - | - | 4 | |

Only the lesser of CL and CV is applied, as per NDS 5.3.6

CRITICAL LOAD COMBINATIONS:

```
Shear     : LC #2  = D + 0.7S
Bending(+): LC #4  = D + S (pattern: sS)
Bending(-): LC #2  = D + 0.7S
Deflection: LC #4  =   (live)
            LC #4  =   (total)
Bearing   : Support 1 - LC #2 = D + 0.7S
            Support 2 - LC #4 = D + S (pattern: sS)
Load Types: D=dead S=snow
Load Patterns: s=S/2,  X=L+S or L+Lr,  _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-22 2.4; all LC's listed in the Analysis report
```

CALCULATIONS:

```
V max = 17968, V design = 14063 (NDS 3.4.3.1(a)) lbs
M(+) = 117430 lbs-ft; M(-) = 49869 lbs-ft
EI = 146936e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Lateral stability(+):  Lu = 33.00'  Le = 58.75'  RB = 16.6; Lu based on full span
Lateral stability(-):  Lu = 10.00'  Le = 18.69'  RB = 9.3; Lu based on full span
```

## Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2024) and the National Design Specification (NDS 2024), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI A190.1-2012
4. Grades with equal bending capacity in the top and bottom edges of the beam cross-section are recommended for continuous beams.
5. GLULAM: bxd = actual breadth x actual depth.
6. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
7. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).