**San Mina Engineering, Inc.**
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24310 Moulton Pkwy, Ste. O-105, Laguna Hills, CA 92637
Phone (949) 446-1417 & (949) 536-9645

**October 30, 2026**

**PROJECT NO. 25-10281**

# NEW BUILD
# **STRUCTURAL ANALYSIS**

FOR

## **CITY OF UPLAND WATER DISTRICT**
## SE CORNER OF E 20TH ST & FLOWER CT
## UPLAND, CA
## APN 1044-091-22

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| Maintenance Building…….. | …… |
| Trash Enclosure …… | ……..…… |

# E 20th St,

# Upland, CA 91784

Projecct # 85-25

# STRUCTURAL CALCULATIONS
# Main House

Date :10/30/26

Rev. : 1

# Pages : 67

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# GRAVITY LOADS

## ROOF LOADS

| | | |
|---|---|---|
| **DEAD LOAD** | | |
| Roofing Shingles Clay Tile (w/ 10 psf Mortar) | 11.50 | psf |
| Sheathing 15/32" Plywood | 2.81 | psf |
| Framing 2x12 @ 16" O.C. DF-Larch | 3.15 | psf |
| Drywall Finish | 3.00 | psf |
| Insulation Fiber Glass Loose | 0.56 | psf |
| Miscellaneous | 1.98 | psf |
| **ROOF DEAD LOAD TOTAL** | **23.00** | **psf** |
| 315 **ROOF LIVE LOAD TOTAL** | **20.00** | **psf** |

## OPEN DECK

| | | |
|---|---|---|
| **DEAD LOAD** | | |
| Flooring Hardwood (1 in) | 3.00 | psf |
| Sheathing 3/4" T&G | 2.25 | psf |
| Framing 2x12 @ 16" O.C. DF-Larch | 3.15 | psf |
| Drywall Finish | 3.00 | psf |
| Miscellaneous | 1.60 | psf |
| **DECK DEAD LOAD TOTAL** | **13.00** | **psf** |
| **DECK LIVE LOAD TOTAL** | **100.00** | **psf** |

## CEILING LOADS

| | | |
|---|---|---|
| **DEAD LOAD** | | |
| Framing 2x 8 @ 16" O.C. DF-Larch | 2.10 | psf |
| Drywall Finish | 3.00 | psf |
| Miscellaneous | 1.00 | psf |
| **CEILING DEAD LOAD TOTAL** | **6.00** | **psf** |
| **CEILING LIVE LOAD TOTAL** | **20.00** | **psf** |

## EXTERIOR WALL

| | | |
|---|---|---|
| Wall Plaster (1 in) on Metal Lath | 10.00 | psf |
| Sheathing 15/32" Plywood | 2.81 | psf |
| Wall Wood Studs 2x6 @ 16" O.C. DF-Larch | 1.58 | psf |
| Insulation Fiber Glass Loose | 0.50 | psf |
| Drywall Finish | 3.00 | psf |
| **EXTERIOR WALL LOAD** | **18.00** | **psf** |

## INTERIOR WALL

| | | |
|---|---|---|
| Drywall Finish | 3.00 | psf |
| Wall Wood Studs 2x4 @ 16" O.C. DF-Larch | 1.05 | psf |
| Sheathing 15/32" Plywood | 2.81 | psf |
| Drywall Finish | 3.00 | psf |
| **INTERIOR WALL LOAD** | **10.00** | **psf** |

# BUILDING WEIGHT

## DESIGN CRITERIA

| | | | | | |
|---|---|---|---|---|---|
| Code Used | : | 2022 CBC | Concrete F'c | : | 2,500 psi |
| Building Code | : | 2021 IBC | Steel Fy | : | 60,000 psi |
| LACity Requirement | : | Yes | | | |

## SOILS REPORT

NO SOILS REPORT — Bearing Capacity : 1,500 psf

## SEISMIC DESIGN PARAMETERS

| | | | | | | |
|---|---|---|---|---|---|---|
| Short Period, Fa | : | 1.2 | 0.2 sec Fig 1613.5(1) | Latitude | : | 34.135827 |
| Long Period, Fv | : | 1.5 | 1.0 sec Fig 1613.5(2) | Longitude | : | -117.646592 |
| Response Spectral | : | 198.00% | 0.2 sec Fig 1613.5(3) | Site Class | : | D |
| Response Spectral | : | 67.00% | 1.0 sec Fig 1613.5(4) | | | |

## BUILDING SUMMARY

| Level | Height ft | Elevation | Unit Weight psf | |
|---|---|---|---|---|
| | | | Dead | Live |
| ROOF | 8.50 | 8.50 | 23.00 | 20.00 |

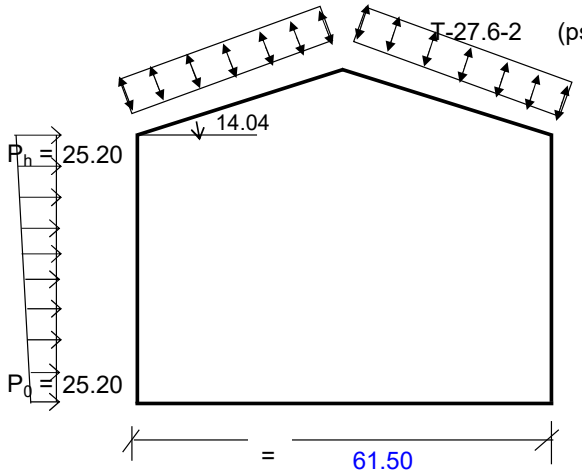
| Wall Type | Weight psf |
|---|---|
| Exterior | 18.00 |
| Interior | 10.00 |

## BUILDING WEIGHT

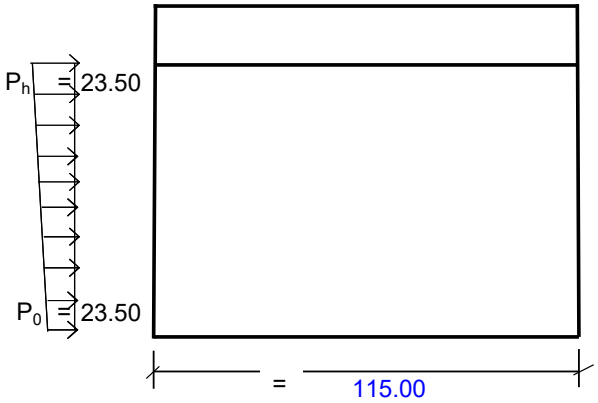
### ROOF

| Area Type | L (ft) | W (ft) | H (ft) | Area (ft^2) | Dead Load (psf) | Weight (kips) |
|---|---|---|---|---|---|---|
| Roof | 61.50 | 115.00 | | 5,468.8 | 23.00 | 125.80 |
| Ext. Wall | 123.00 | 230.00 | 4.25 | | 18.00 | 27.00 |
| Int. Wall | 246.00 | 172.50 | 4.25 | | 10.00 | 17.79 |
| TOTAL ROOF AREA / LOAD | | | | 5,468.8 | | **170.59** |

**27.5 Directional Procedure, Part 2: Enclosed Simple Diaphragm Buildings With H ≤ 160 Ft**




Roof Exp adjust factor T-27.6-2 = 1




*Example will work for V =110, 115 and 120 MPH only.*

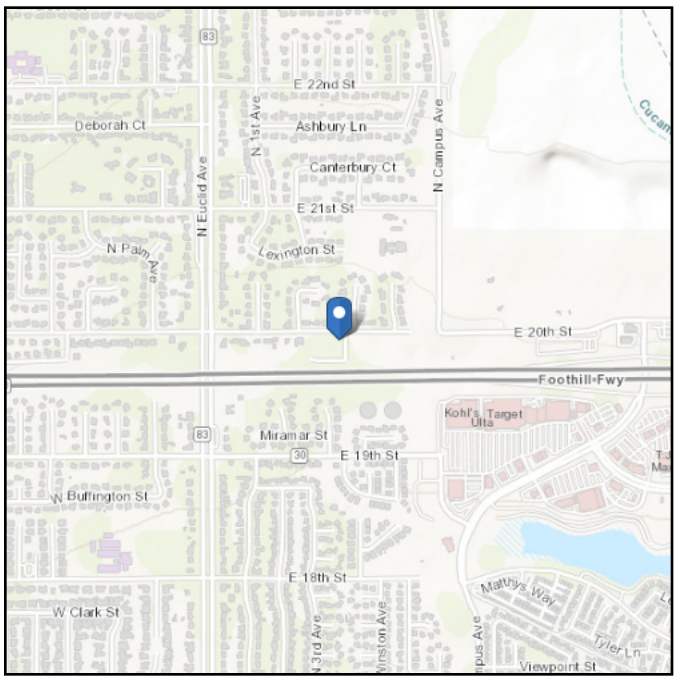
| | Wind Normal to Ridge | | Wind Parallel to Ridge | |
|---|---|---|---|---|
| Roof Height h = | 15 feet | | | |
| Exposure | C | | | |
| Roof Pitch = | 3.00 :12 | | | |
| Topography factor $K_{zt}$ = | 1.00 | 26.8.2, Figure 26.8-1 | | |
| Building & Structure Risk Category = | II, standard | IBC T-1604.5 | | |
| Wind Speed V = | 110 mph | Fig. 26.5-1A, MRI = 700 yrs | | |
| Wind Normal to Ridge, L/B = | 0.535 use 0.5 | | Wind Parallel to Ridge, L/B = | 1.87 use 1.9 |
| Since .2 ≤ L/B ≤ 5.0 = | Yes | | Since .2 ≤ L/B ≤ 5.0 = | Yes |
| and h ≤ 60 = | Yes | | and h ≤ 60 = | Yes |
| Building meet Class I condition ? | Yes ⇐ | | Building meet Class I condition ? | Yes ⇐ |
| Since .5 ≤ L/B ≤ 2.0 = | Yes | | Since .5 ≤ L/B ≤ 2.0 = | Yes |
| and 60 ≤h ≤1 60 = | No | | and 60 ≤h ≤1 60 = | No |
| Fundamental period = | 0.500 sec | | Fundamental period = | 0.500 sec |
| | More than h/75 sec. NG | | | More than h/75 sec. NG |
| Building meet Class II condition ? | No | | Building meet Class II condition ? | No |
| From T-27.6-1, V = 110 MPH Exp C, L/B =0.5 and 15 FT. HT | | | From T-27.6-1, V = 110 MPH Exp C, L/B =1.9 and 15 FT. HT | |
| $P_h$ = | 25.20 $K_{zt}$ | | $P_h$ = | 23.50 $K_{zt}$ |
| $P_o$ = | 25.20 $K_{zt}$ | | $P_o$ = | 23.50 $K_{zt}$ |
| T-27.6-2 V =110 Exp C, h =15 Roof slope =3:12 | | | | |
| Zone 1 = | -23.5 | | | |
| Adjust factor T-27.6-2, = | 1.00 | | | |
| Design roof pressure for zone 1 = | -23.50 PSF | | | |
| Wind Base Shear = | 26.08 kips | | Wind Base Shear = | 13.01 kips |

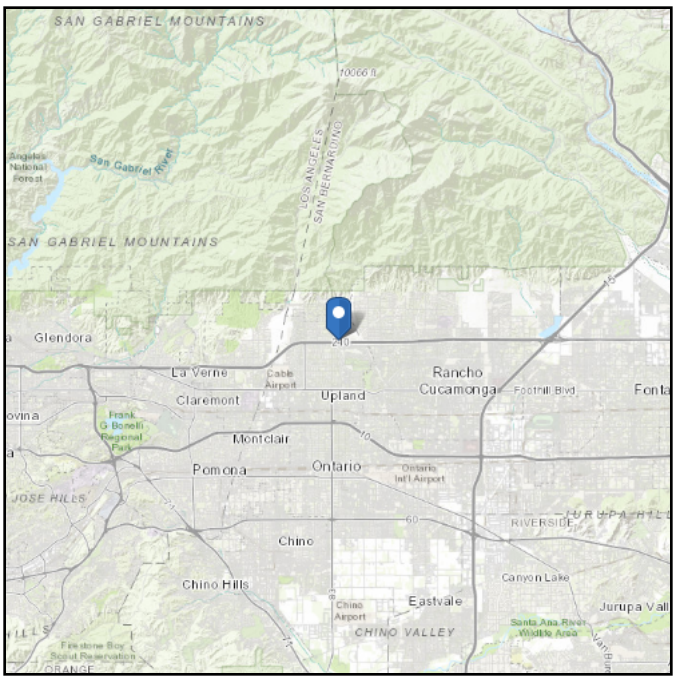
# ASCE Hazards Report

**Address:**
352 E 20th St
Upland, California
91784

**Standard:** ASCE/SEI 7-22
**Risk Category:** II
**Soil Class:** Default

**Latitude:** 34.135827
**Longitude:** -117.646592
**Elevation:** 1648.2100926574194 ft (NAVD 88)




## Wind

**Results:**

| | |
|---|---|
| Wind Speed | 95 Vmph |
| 10-year MRI | 66 Vmph |
| 25-year MRI | 72 Vmph |
| 50-year MRI | 77 Vmph |
| 100-year MRI | 81 Vmph |
| 300-year MRI | 89 Vmph |
| 700-year MRI | 95 Vmph |
| 1,700-year MRI | 102 Vmph |
| 3,000-year MRI | 106 Vmph |
| 10,000-year MRI | 115 Vmph |
| 100,000-year MRI | 133 Vmph |
| 1,000,000-year MRI | 151 Vmph |

Data Source: ASCE/SEI 7-22, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Fri Aug 15 2025

# Seismic

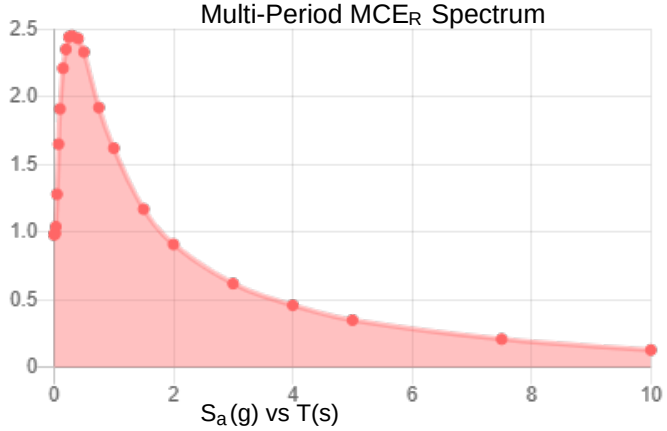
**Site Soil Class:** Default

**Results:**

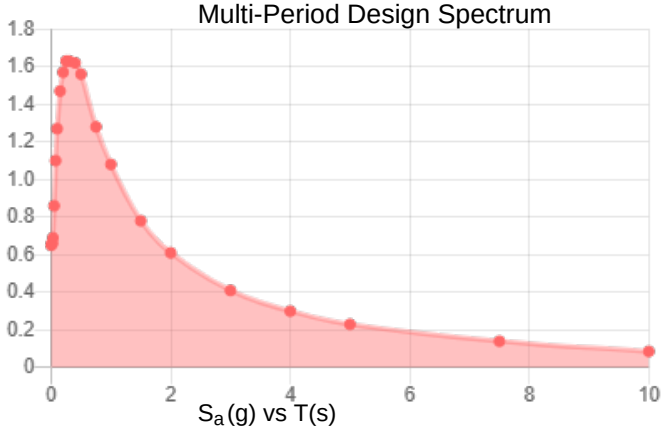
| | | | |
|---|---|---|---|
| $PGA_M$ : | 0.85 | $T_L$ : | 12 |
| $S_{MS}$ : | 2.2 | $S_S$ : | 1.98 |
| $S_{M1}$ : | 1.67 | $S_1$ : | 0.67 |
| $S_{DS}$ : | 1.47 | $V_{S30}$ : | 260 |
| $S_{D1}$ : | 1.12 | | |

**Seismic Design Category: D**

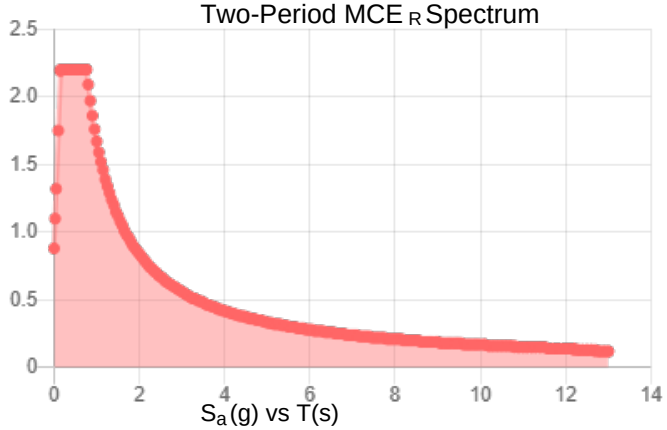
Multi-Period $MCE_R$ Spectrum



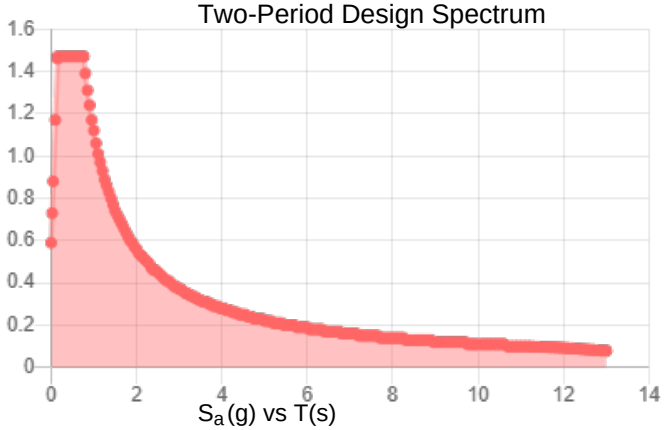

Multi-Period Design Spectrum




Two-Period $MCE_R$ Spectrum




Two-Period Design Spectrum




$MCE_R$ Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

**IBC2021 (1613), ASCE 7-16 CHAPTER 11, 12, 13 SEISMIC DESIGN CRITERIA**

| | | | |
|---|---|---|---|
| Response Spectral Acc. (0.2 sec) Ss = | 1.980 g | | Figure 22-1,22-3,22-5,22-6 |
| Response Spectral Acc.( 1.0 sec) $S_1$ = | 0.670 g | | Figure 22-2,22-4,22-5,22-6 |
| Soil Site Class | D | Table 20-3-1, Default = D | |
| Site Coefficient $F_a$ = | 1.200 | | Table 11.4-1 |
| Site Coefficient $F_v$ = | 1.500 | | Table 11.4-2 |
| Max Considered Earthquake Acc. $S_{MS}$ = | $F_a.S_s$ | = 2.376g | (11.4-1) |
| Max Considered Earthquake Acc. $S_{M1}$ = | $F_v.S_1$ | = 1.005g | (11.4-2) |
| @ 5% Damped Design $S_{DS}$ = | $2/3(S_{MS})$ | = 1.584g | (11.4-3) |
| $S_{D1}$ = | $2/3(S_{M1})$ | = 0.670g | (11.4-4) |
| Building Risk Categories | II, Standard | | Table 1604.5 |
| **Design Category Consideration:** | Flexible Diaphragm | | with dist. between seismic resisting system >40ft |
| Seismic Design Category for 0.1sec | D | | Table 11.6-1 |
| Seismic Design Category for 1.0sec | D | | Table 11.6-2 |
| S1 < .75g | NA | | Section 11.6 |
| Since Ta < .8Ts (see below), SDC = | D | Control (exception of Section 11.6 does not apply) | |

**IBC, Seismic Design Category D** | IRC, Seismic Design Category = E | T-R301.2.2.1.1

**12.8 Equivalent lateral force procedure**

A. BEARING WALL SYSTEMS — T-12.2

**Seismic Force Resisting Systems**: 15. Light-framed (wood) walls sheathed with wood structural panels rated for shear resistance or stee

| | | | | |
|---|---|---|---|---|
| $C_t$ = | 0.02 | x = 0.75 | | T-12.8-2 |
| Building ht. $H_n$ = | 35 | ft | iited Building Height (ft) = | 65 |
| $C_u$ = | 1.400 | for $S_{D1}$ of 0.670g | Table 12.8-1 | |
| Approx Fundamental period, $T_a$ = | $C_t(h_n)^x$ | = 0.288 | 12.8-7 | $T_L$ = 6.000 Sec |
| Calculated T shall not exceed ≤ | Cu.Ta | = 0.403 | | Use T = 0.403 sec. |
| 0.8Ts = | $0.8(S_{D1}/S_{DS})$ | = 0.338 | < Ta | |
| **Is structure Regular & ≤ 5 stories ?** | No | | | 12.8.1.3 |
| Response Spectral Acc.( 0.2 sec) $S_s$ = | 1.980g | | | |
| $F_a$ = | 1.20 | | | |
| @ 5% Damped Design $S_{DS}$ = | $⅔(F_a.S_s)$ | = 1.584g | | (11.4-3) |
| Response Modification Coef. R = | 6.5 | | | Table-12.2-1 |
| Over Strength Factor $\Omega_o$ = | 2.5 | | | foot note g |
| Importance factor I = | 1 | | | T 1.5-2 |
| Seismic Base Shear V = | $C_s W$ | | | |

$$C_s = \frac{S_{DS}}{R/I} = 0.244 \quad (12.8\text{-}2)$$

$$\text{or need not to exceed, } C_s = \frac{S_{D1}}{(R/I).T} = 0.256 \quad \text{For } T \le T_L \quad (12.8\text{-}3)$$

$$\text{or } C_s = \frac{S_{D1}T_L}{T^2(R/I)} = \text{N/A} \quad \text{For } T > T_L \quad (12.8\text{-}4)$$

$C_s$ shall not be less than = $0.044S_{DS}.I \ge .01$ = 0.070 (12.8-5)

Min $C_s$ = $0.5S_1I/R$ = 0.052 For $S_1 \ge 0.6g$ (12.8-6)

Use $C_s$ = 0.244

**Design base shear V =** 0.244 W **Control**

T-12.14

**12.14 Simplified Seismic base shear**: 15. Light-framed (wood) walls sheathed with wood structural panels rated for shear resistance or stee

@ 5% Damped Design $S_{DS}$ = 1.584 SDC = D Limitations: P

F = 1.2 For three story building R = 6.5

$$V = \frac{FS_{DS}(W)}{R} = 0.292\ W \quad (12.14\text{-}11)$$

## LATERAL FORCE DISTRIBUTION

### SEISMIC BASE SHEAR

| | | | | | |
|---|---|---|---|---|---|
| Importance Factor, I | ASCE7-16 Table 11.5-1 | | | I = | 1.00 |
| EQ Acc. @ 5% Damped Design | ASCE7-16 EQ 11.4-3 | | | SDS = | 1.58 |

| | | | | | |
|---|---|---|---|---|---|
| Vult | = 2021 IBC SHEET | | = 0.244 | W | |
| Vwork | = Vult / 1.4 | | = 0.174 | W | Working Stress Level |
| Vwork | = 0.174 * 170.6 kips | | = 29.7 | kips | Seismic Base Shear |
| p | = 1.30 | ==> Vwork | = 38.6 | kips | Seismic Base Shear |

### WIND BASE SHEAR

| | | | | |
|---|---|---|---|---|
| Vult | = MWFR < 160 ft | = | 26.1 | kips |
| Vwork | = Vult * 0.6 | = | 15.6 | kips |

### SEISMIC BASE SHEAR GOVERNS

| | | | |
|---|---|---|---|
| **DESIGN BASE SHEAR** | = | **38.6** | **kips** |

### BASE SHEAR VERTICAL DISTRIBUTION

| Floor Type | Height hx ft | Floor Area ft^2 | Weight wx kips | wx*hx kips-ft | Fx % wx*hx / Σ(wx*hx) | Fx (V-Ft) Fx% kips | Story V Ft+ΣFi kips | Fx / Fl Area psf |
|---|---|---|---|---|---|---|---|---|
| ROOF | 8.50 | 5,469 | 170.59 | 1,450 | 100.0% | 38.60 | 38.60 | 7.06 |
| | | Total | 170.59 | 1,450 | 100.0% | 38.60 | | |

### DIAPHRAGM FORCE DISTRIBUTION

| Floor Type | Weight | | Story V | Fpx | Min | Max | Fpx |
|---|---|---|---|---|---|---|---|
| | wpx kips | Σwi kips | Ft+ΣFi kips | V*wpx/Σw kips | Fpx[1] kips | Fpx[2] kips | Design kips |
| ROOF | 157.08 | 157.08 | 38.60 | 38.60 | 49.76 | 99.53 | 49.76 |

1 Fpx min = 0.2*SDs*I*wpx (for Flexible Diaphragm) ASCE7-16 12.10.1.1

2 Fpx max = 0.4*SDs*I*wpx (for Flexible Diaphragm) ASCE7-16 12.10.1.1

### SHEARWALL DESIGN FORCES

| Level | Fl. Area | Wall Ht. | Stry Shear | Base[2] | Shear |
|---|---|---|---|---|---|
| | ft2 | ft | kips | Shear % | psf |
| ROOF | 5,469 | 8.50 | 38.60 | 100.0% | 7.06 |

1 Redundancy Factor Used Per ASCE7-16 12.3.4.2

# TABLES REFERENCED IN SHEARWALL DESIGN SPREADSHEET

**Table 2306.4.1 Allowable Shear (plf) for Wood Shearwall Panels For Wind or Seismic Loading**

| Mark | # sides | Sheathing | Edge Nailing | A35/LTP 4 Simpson | Sill Plate @ Framed Floor | Anchor @ Foundation | V_allow (100%) (plf) | V_allow (75%) (plf) |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 15/32" | 10d @6" | @16" | 3/8" dia Lag Screw @32"OC | 5/8" dia A.B. @48"OC | 340 | 255 |
| 2 | 1 | 15/32" | 10d @4" | @8" | 3/8" dia Lag Screw @16"OC | 5/8" dia A.B. @32"OC | 510 | 380 |
| 3 | 1 | 15/32" | 10d @3" | @12" | 3/8" dia Lag Screw @12"OC | 5/8" dia A.B. @24"OC | 665 | 500 |
| 4 | 1 | 15/32" | 10d @2" | @8" | 3/8" dia Lag Screw @9"OC | 5/8" dia A.B. @16"OC | 870 | 650 |
| 5 | 2 | 15/32" | 10d @4" | @8" | 3/8" dia Lag Screw @9"OC | 5/8" dia A.B. @16"OC | 1,020 | 765 |
| 6 | 2 | 15/32" | 10d @3" | @4" | 3/8" dia Lag Screw @9"OC | 5/8" dia A.B. @12"OC | 1,370 | 1,030 |
| 7 | 2 | 15/32" | 10d @2" | @4" | 3/8" dia Lag Screw @4"OC | 5/8" dia A.B. @16"OC | 1,740 | 1,305 |

**NOTES:**

1. ALL SHEATHING TO BE DOUGLAS FIR-LARCH STRUCT. I.
2. ALL FIELD NAILING TO INTERMEDIATE FRAMING TO BE AT 12" O.C.
3. FRAMING AT ADJOINING PANEL EDGES SHALL BE 3" (INCH) NOMINAL OR THICKER (i.e. MIN 3x VERTICAL STUDS AND BLOCKING) NAILS SHALL BE STAGGERED IN TWO LINES ALONG PANEL EDGES WHERE NAILS ARE SPACED 2" INCHES ON CENTER OR WHEN 10d COMMON NAILS SPACED 3" O.C. PENETRATE FRAMING MORE THAN 1 5/8".
4. WHERE PLYWOOD APPLIES ON BOTH FACES OF A WALL AND NAIL SPACING IS LESS THAN 6" INCHES ON CENTER ON EITHER SIDE. PANEL JOINTS SHALL HAVE MIN 3x (VERTICAL STUDS & BLOCKING) AND NAILS SHALL BE STAGGERED. OFFSET PANEL JOINTS TO FALL ON DIFFERENT FRAMING MEMBER WHERE PLYWOOD IS PLACED AT BOTH FACES.
5. NAILS SHALL BE PLACED NOT LESS THAN 1/2" INCH FROM PANEL EDGES.
6. FOR HOLD-DOWNS AT THE END OF THE SHEAR WALL, SEE PLANS AND SCHEDULE. PROVIDE 3"x3"x1/4" WASHER PLATE AT ALL SILL PLATE ANCHOR BOLTS AND AT ALL HOLD-DOWN BOLTS CONNECTED TO VERTICAL POSTS.
7. USE WELDED STUD BOLTS OF SAME SIZE & SPACING AS OF SILL PLATE ANCHOR BOLTS, WHERE STEEL BEAM OCCURS UNDER SHEAR WALL.
8. PROVIDE DOUBLE PARALLAM BLOCKING TO ACCOMODATE 2 ROWS OF SIMPSON SDS SCREWS.
9. FOUNDATION SILL PLATE SHALL BE 3x. U.N.O.
10. SIMPSON SDS 3/8"x7" WOOD SCREWS. TYP. USE |2"x4|4" SDS INTO NAILER AT STEEL BEAMS.
11. WHERE 2-2x SILL PLATES ARE USED, SCREW LOWER PLATE TO FRAMING BELOW. DRILL HOLE IN UPPER SILL PLATE FOR SCREW HEAD SO THAT UPPER PLATE SITS FLAT ON LOW SILL PLATE.

# TABLES REFERENCED IN SHEARWALL DESIGN SPREADSHEET (HOLDOWN)

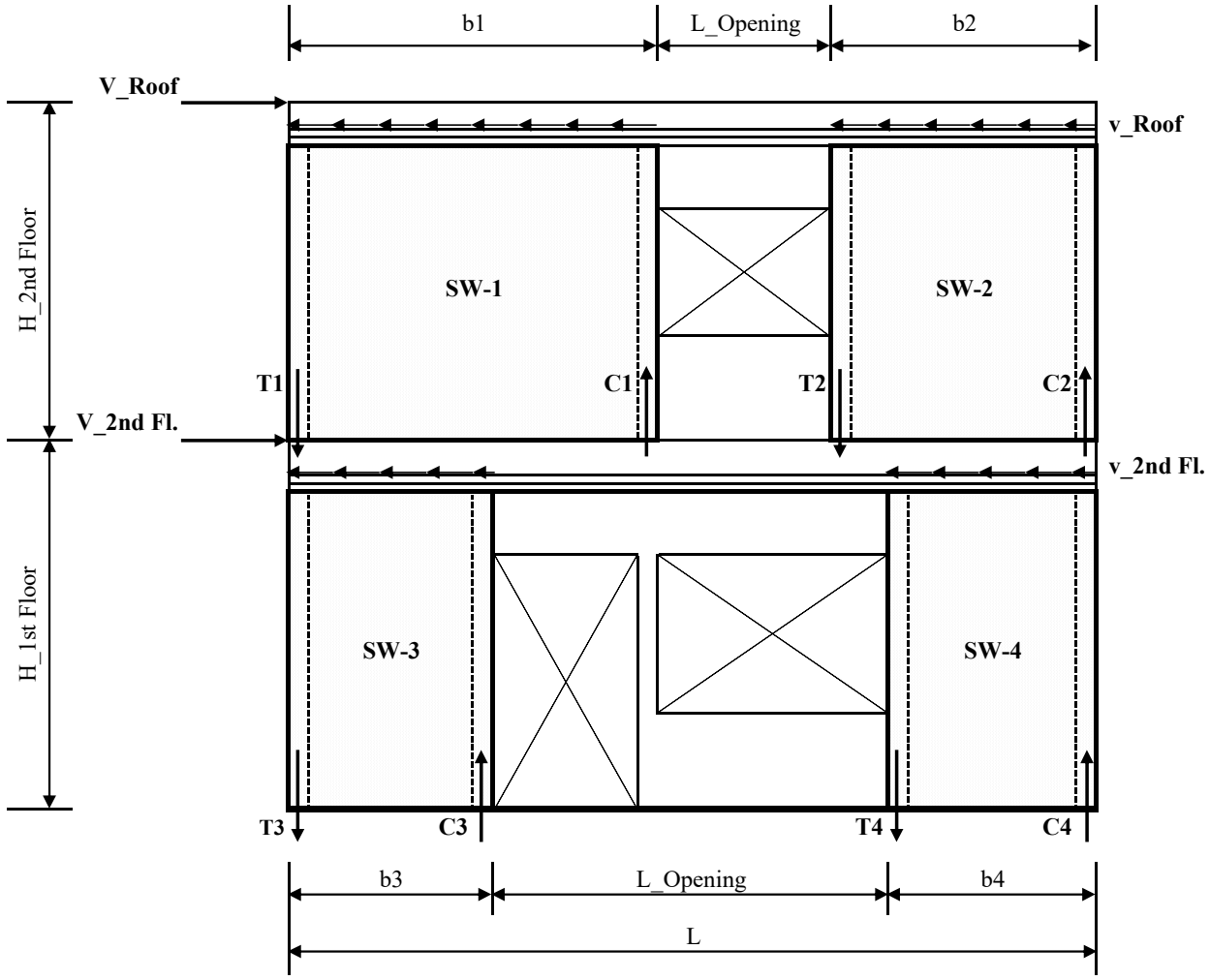
**Holdown Capcity**

| HD Type | Max Uplift Force (lbs) | | | Post Size |
|---|---|---|---|---|
| | 75% | Full | Used | |
| HDU2 | 2,306 | 3,075 | 2,306 | 4x4 |
| HDU4 | 3,424 | 4,565 | 3,424 | 4x4 |
| HDU5 | 4,253 | 5,670 | 4,253 | 4x4 |
| HDU8 | 5,903 | 7,870 | 5,903 | 4x6 |
| HDU11 | 7,151 | 9,535 | 7,151 | 4x6 |
| HDU14 | 10,793 | 14,390 | 10,793 | 4x8 |

**NOTES:**

1. USE THREADED ROD @ EXISTING FOOTING ONLY. SEE DETAIL 16/S4 LARR# 25279.
2. USE SSTB @ NEW FOOTING ONLY PER LARR# 25248.
3. PROVIDE MIN. POST SIZE AS INDICATED, INCREASE SIZE TO MATCH WALL THICKNESS.
4. ALL HOLDOWN TO BE DOUGLAS FIR-LARCH No. 1.

## SHEARWALL DESCRIPTION




**AT ROOF LEVEL**

```
Total Shearwall Length ft  =  Sum (b1 + b2 + ..)
Total Shear (V_Roof)   lbs =  Shear Trib Width * Line Trib Length (L) * Roof Unit Shear (psf)
Unit Shear (v_Roof)    plf =  V_Roof / Sum(b1 + b2 + ..)
SW-1 Dead Load         lbs =  Roof_Dead_Laod + Ceiling_Dead_Load + 2nd Fl Wall_Selfweight
SW-1 Uplift Force T1   lbs =  (   Upward Force  ) - (    Downward Force     )
                           =  (v_Roof * H_2nd Fl) - (0.6 - 0.14*Sds) * SW-1 Dead Load /2)
Drag Force at Open     lbs =  V_Roof / Line Trib Length (L) * L_Opening
```

**AT SECOND FLOOR**

```
Total Shearwall Length ft  =  Sum (b3 + b4 + ..)
Total Shear (V_2nd Fl) lbs =  Shear Trib Width * Line Trib Length (L) * 2nd Fl Unit Shear (psf)
                              + Roof Total Shear (V_Roof)
Unit Shear (v_2nd Fl)  plf =  V_2nd Fl  / Sum(b3 + b4 + ..)
SW-3 Dead Load         lbs =  Roof_Dead_Laod + Ceiling_Dead_Load + 2nd Fl_Wall_Selfweight
                              + Floor_Dead_Load + 1st Fl_Wall_Selfweight
SW-3 Uplift Force T3   lbs =  (   Upward Force   ) - (    Downward Force     )
Upward Force           lbs =  v_Roof * (H_2nd Fl + H_1st Fl) + v_2nd Fl * H_1st Fl
Downward Force         lbs =  (0.6 - 0.14*Sds) * SW-3 Dead Load /2
Drag Force at Open     lbs =  V_2nd Fl / Line Trib Length (L) * L_Opening
```

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

### LINE A PERFORATED

| ROOF | | | SW-01 | SW-02 | SW-03 | SW-04 | | |
|---|---|---|---|---|---|---|---|---|
| Total Shearwall Segments | ΣLi | ft | 14.50 | 7.83 | 6.67 | 20.24 | | |
| Total Shearwall Length | Ltot | ft | 19.25 | 7.83 | 11.42 | 26.75 | | |
| Percent Full-Height Sheathing | | % | 75% | 100% | 58% | 76% | | |
| Total Area of Openings | Ao | ft2 | 21.38 | - | 21.38 | 29.30 | | |
| Sheathing Area Ratio | $r = \frac{1}{1+\frac{A_o}{h\sum L_i}}$ | | 0.85 | 1.00 | 0.73 | 0.85 | | |
| Shear Capacity Adjustment Factor | $C_o = \left(\frac{r}{3-2r}\right)\frac{L_{tot}}{\sum L_i}$ | | 0.87 | 1.00 | 0.80 | 0.87 | | |
| Shear Trib. Width | | ft | 12.0 | | | | | |
| Line Trib. Length | | ft | 92.0 | | | | | |
| Shortest Panel > H/3.5 and < H/2 | | ft | 3.1 | | | | | |
| Line Total Shear | V | lbs | 7,793 | | | | | |
| Line Unit Shear | V / (Σ Li x Co) | plf | 197 | x 4.25 ft / 3.08 ft = | | 272 | pdf | |
| **100% Wood Shearwall 10d** | **1** | | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | | |
| Roof DL Trib. Width | | ft | - | - | - | - | | |
| Ceiling DL Trib. Width | | ft | - | - | - | - | | |
| Wall Height | | ft | 8.5 | 8.5 | 8.5 | 8.5 | | |
| Wall Dead Load | | plf | 153.0 | 153.0 | 153.0 | 153.0 | | |
| Uplift Force (Demand) | $T = \frac{Vh}{C_o \sum L_i}$ | lbs | 1,255 | 1,448 | 1,481 | 1,089 | | |
| **Holdown Type** | | | **HDU4** | **HDU4** | **HDU4** | **HDU4** | | |
| **Uplift Force (Capacity)** | | **lbs** | **3,424** | **3,424** | **3,424** | **3,424** | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

### LINE D PERFORATED

| ROOF | | | SW-05 | SW-06 | SW-07 | SW-08 | SW-09 | |
|---|---|---|---|---|---|---|---|---|
| Total Shearwall Segments | $\Sigma$ Li | ft | 8.83 | 22.08 | 16.92 | 4.42 | 5.83 | |
| Total Shearwall Length | Ltot | ft | 14.83 | 22.08 | 16.92 | 4.42 | 5.83 | |
| Percent Full-Height Sheathing | | % | 60% | 100% | 100% | 100% | 100% | |
| Total Area of Openings | Ao | ft2 | 27.00 | - | - | - | - | |
| Sheathing Area Ratio | $r = \frac{1}{1+\frac{A_o}{h\sum L_i}}$ | | 0.74 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Shear Capacity Adjustment Factor | $C_o = \left(\frac{r}{3-2r}\right)\frac{L_{tot}}{\sum L_i}$ | | 0.81 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Shear Trib. Width | | ft | 21.0 | | | | | |
| Line Trib. Length | | ft | 114.0 | | | | | |
| Shortest Panel > H/3.5 and < H/2 | | ft | | | | | | |
| Line Total Shear | V | lbs | 16,898 | | | | | |
| Line Unit Shear | V / ($\Sigma$ Li x Co) | plf | 360 | | | | | |
| **100% Wood Shearwall 10d** | **2** | | **v = 510 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 4"-6"-12" O.C.)** | | | | | |
| Roof DL Trib. Width | | ft | - | - | - | - | | |
| Ceiling DL Trib. Width | | ft | - | - | - | - | | |
| Wall Height | | ft | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | |
| Wall Dead Load | | plf | 153.0 | 153.0 | 153.0 | 153.0 | 153.0 | |
| Uplift Force (Demand) | $T = \frac{Vh}{C_o \sum L_i}$ | lbs | 2,806 | 2,423 | 2,572 | 2,934 | 2,893 | |
| **Holdown Type** | | | **HDU4** | **HDU4** | **HDU4** | **HDU4** | **HDU4** | |
| **Uplift Force (Capacity)** | | **lbs** | **3,424** | **3,424** | **3,424** | **3,424** | **3,424** | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

### LINE F

| ROOF | | SW-10 | SW-11 | SW-12 | SW-13 | SW-11A | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 9.00 | 6.08 | 4.00 | 3.50 | 6.67 | |
| **Total Shearwall Length** | **ft** | **29.25** | | | | | |
| Shear Trib. Width | ft | 11.0 | 6.0 | | | | |
| Line Trib. Length | ft | 87.0 | 44.0 | | | | |
| Line Total Length | ft | 131.0 | | | | | |
| Line Total Shear | lbs | 8,618 | | | | | |
| Line Unit Shear | plf | 295 | x 4 ft / 3.5 ft = | | 357.8 | plf | |
| **100% Wood Shearwall 10d** | | **4** | **v = 870 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 2"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 822 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | |
| Wall Height | ft | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | |
| Wall Dead Load | plf | 153.0 | 153.0 | 153.0 | 153.0 | 153.0 | |
| Wall Shear Force | lbs | 2,652 | 1,791 | 1,179 | 1,031 | 1,965 | |
| Uplift Force (Demand) | lbs | 2,781 | 2,865 | 2,925 | 2,940 | 2,848 | |
| **Holdown Type** | | **HDU4** | **HDU4** | **HDU4** | **HDU4** | **HDU4** | |
| **Uplift Force (Capacity)** | **lbs** | **3,424** | **3,424** | **3,424** | **3,424** | **3,424** | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 17.00 ft |

### LINE F-(HFX)

| ROOF | | SW-14 | SW-15 | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 1.50 | 1.50 | | | | |
| **Total Shearwall Length** | **ft** | **3.00** | | | | | |
| Shear Trib. Width | ft | 8.0 | | | | | |
| Line Trib. Length | ft | 40.0 | | | | | |
| Line Total Length | ft | 40.0 | | | | | |
| Line Total Shear | lbs | 2,259 | | | | | |
| Line Unit Shear | plf | 753 | | | | | |
| **18" HFX on 3,000 psi Conc.** | | **HFX-18x17-HS** | **v = 1195 lbs/Panel - Width = 18" - Height = 200 1/4"** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 706 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | | |
| Ceiling DL Trib. Width | ft | - | - | - | - | | |
| Wall Height | ft | 17.0 | 17.0 | | | | |
| Wall Dead Load | plf | 306.0 | 306.0 | | | | |
| Wall Shear Force | lbs | 1,129 | 1,129 | | | | |
| Uplift Force (Demand) | lbs | 12,713 | 12,713 | | | | |
| **Holdown Type** | | **1 1/8" HS** | **1 1/8" HS** | | | | |
| **Uplift Force (Capacity)** | **lbs** | **18,775** | **18,775** | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

### LINE H-J PERFORATED

| ROOF | | | SW-16 | SW-17 | | | | |
|---|---|---|---|---|---|---|---|---|
| Total Shearwall Segments | $\Sigma$ Li | ft | 8.08 | 14.00 | | | | |
| Total Shearwall Length | Ltot | ft | 16.17 | 26.00 | | | | |
| Percent Full-Height Sheathing | | % | 50% | 54% | | | | |
| Total Area of Openings | Ao | ft2 | 35.64 | 54.00 | | | | |
| Sheathing Area Ratio | $r = \frac{1}{1+\frac{A_o}{h\sum L_i}}$ | | 0.66 | 0.69 | | | | |
| Shear Capacity Adjustment Factor | $C_o = \left(\frac{r}{3-2r}\right)\frac{L_{tot}}{\sum L_i}$ | | 0.78 | 0.79 | | | | |
| Shear Trib. Width | | ft | 9.0 | | | | | |
| Line Trib. Length | | ft | 44.0 | | | | | |
| Shortest Panel > H/3.5 and < H/2 | | ft | 3.7 | | | | | |
| Line Total Shear | V | lbs | 2,795 | | | | | |
| Line Unit Shear | V / ($\Sigma$ Li x Co) | plf | 162 | x 4.25 ft / 3.67 ft = | | 187 | pdf | |
| **100% Wood Shearwall 10d** | **1** | | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | | |
| Roof DL Trib. Width | | ft | - | - | | - | | |
| Ceiling DL Trib. Width | | ft | - | - | | - | | |
| Wall Height | | ft | 8.5 | 8.5 | | | | |
| Wall Dead Load | | plf | 153.0 | 153.0 | | | | |
| Uplift Force (Demand) | $T = \frac{Vh}{C_o \sum L_i}$ | lbs | 1,141 | 970 | | | | |
| **Holdown Type** | | | **HDU4** | **HDU4** | | | | |
| **Uplift Force (Capacity)** | | **lbs** | **3,424** | **3,424** | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

### LINE 1-2 PERFORATED

| ROOF | | | SW-18 | SW-19 | | | | |
|---|---|---|---|---|---|---|---|---|
| Total Shearwall Segments | $\Sigma$ Li | ft | 10.25 | 8.92 | | | | |
| Total Shearwall Length | Ltot | ft | 16.25 | 14.92 | | | | |
| Percent Full-Height Sheathing | | % | 63% | 60% | | | | |
| Total Area of Openings | Ao | ft2 | 27.00 | 27.00 | | | | |
| Sheathing Area Ratio | $r = \frac{1}{1+\frac{A_o}{h\sum L_i}}$ | | 0.76 | 0.74 | | | | |
| Shear Capacity Adjustment Factor | $C_o = \left(\frac{r}{3-2r}\right)\frac{L_{tot}}{\sum L_i}$ | | 0.82 | 0.81 | | | | |
| Shear Trib. Width | | ft | 10.0 | | | | | |
| Line Trib. Length | | ft | 40.0 | | | | | |
| Shortest Panel > H/3.5 and < H/2 | | ft | | | | | | |
| Line Total Shear | V | lbs | 2,823 | | | | | |
| Line Unit Shear | V / ($\Sigma$ Li x Co) | plf | 182 | | | | | |
| **100% Wood Shearwall 10d** | **1** | | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | | |
| Roof DL Trib. Width | | ft | - | - | | | | |
| Ceiling DL Trib. Width | | ft | - | - | | | | |
| Wall Height | | ft | 8.5 | 8.5 | | | | |
| Wall Dead Load | | plf | 153.0 | 153.0 | | | | |
| Uplift Force (Demand) | $T = \frac{Vh}{C_o \sum L_i}$ | lbs | 1,251 | 1,290 | | | | |
| **Holdown Type** | | | **HDU4** | **HDU4** | | | | |
| **Uplift Force (Capacity)** | | **lbs** | **3,424** | **3,424** | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

### LINE 3

| **ROOF** | | **SW-20** | | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 16.08 | | | | | |
| **Total Shearwall Length** | **ft** | **16.08** | | | | | |
| Shear Trib. Width | ft | 20.0 | | | | | |
| Line Trib. Length | ft | 35.0 | | | | | |
| Line Total Length | ft | 35.0 | | | | | |
| Line Total Shear | lbs | 4,941 | | | | | |
| Line Unit Shear | plf | 307 | | | | | |
| **100% Wood Shearwall 10d** | | **1** | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 1,765 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | | | | | |
| Ceiling DL Trib. Width | ft | - | | | | | |
| Wall Height | ft | 8.5 | | | | | |
| Wall Dead Load | plf | 153.0 | | | | | |
| Wall Shear Force | lbs | 4,941 | | | | | |
| Uplift Force (Demand) | lbs | 2,147 | | | | | |
| **Holdown Type** | | **HDU4** | | | | | |
| **Uplift Force (Capacity)** | **lbs** | **3,424** | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

**LINE 4**

| **ROOF** | | **POST** | | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 16.08 | | | | | |
| **Total Shearwall Length** | **ft** | **16.08** | | | | | |
| Shear Trib. Width | ft | 10.0 | | | | | |
| Line Trib. Length | ft | 20.0 | | | | | |
| Line Total Length | ft | 20.0 | | | | | |
| Line Total Shear R=2.5 | lbs | 3,670 | | | | | |
| Line Unit Shear | plf | | | | | | |
| **75% Wood Shearwall 10d** | | | | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω/1.2 | lbs | | | | | | |
| **Strap Type** | | | | | | | |
| Roof DL Trib. Width | ft | - | | | | | |
| Ceiling DL Trib. Width | ft | - | | | | | |
| Wall Height | ft | 8.5 | | | | | |
| Wall Dead Load | plf | | | | | | |
| Wall Shear Force | lbs | | | | | | |
| Uplift Force (Demand) | lbs | | | | | | |
| **Holdown Type** | | | | | | | |
| **Uplift Force (Capacity)** | **lbs** | | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

### LINE 5 PERFORATED

| ROOF | | | SW-21 | SW-22 | | | | |
|---|---|---|---|---|---|---|---|---|
| Total Shearwall Segments | ΣLi | ft | 11.00 | 22.08 | | | | |
| Total Shearwall Length | Ltot | ft | 11.00 | 24.25 | | | | |
| Percent Full-Height Sheathing | | % | 100% | 91% | | | | |
| Total Area of Openings | Ao | ft2 | - | 9.77 | | | | |
| Sheathing Area Ratio | $r = 1/\left(1+\frac{A_o}{h\sum L_i}\right)$ | | 1.00 | 0.95 | | | | |
| Shear Capacity Adjustment Factor | $C_o = \left(\frac{r}{3-2r}\right)\frac{L_{tot}}{\sum L_i}$ | | 1.00 | 0.95 | | | | |
| Shear Trib. Width | | ft | 12.0 | 12.0 | | | | |
| Line Trib. Length | | ft | 58.0 | 46.0 | | | | |
| Shortest Panel > H/3.5 and < H/2 | | ft | | | | | | |
| Line Total Shear | V | lbs | 8,809 | | | | | |
| Line Unit Shear | V / (Σ Li x Co) | plf | 280 | | | | | |
| **100% Wood Shearwall 10d** | **1** | | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | | |
| Roof DL Trib. Width | | ft | - | - | | | | |
| Ceiling DL Trib. Width | | ft | - | - | | | | |
| Wall Height | | ft | 8.5 | 8.5 | | | | |
| Wall Dead Load | | plf | 153.0 | 153.0 | | | | |
| Uplift Force (Demand) | $T = \frac{Vh}{C_o\sum L_i}$ | lbs | 2,064 | 1,744 | | | | |
| **Holdown Type** | | | **HDU4** | **HDU4** | | | | |
| **Uplift Force (Capacity)** | | **lbs** | **3,424** | **3,424** | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 17.00 ft |

### LINE 6

| ROOF | | SW-23 | SW-24 | SW-25 | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 10.33 | 8.83 | 3.92 | | | |
| **Total Shearwall Length** | **ft** | **23.08** | | | | | |
| Shear Trib. Width | ft | 21.0 | | | | | |
| Line Trib. Length | ft | 46.0 | | | | | |
| Line Total Length | ft | 46.0 | | | | | |
| Line Total Shear | lbs | 6,818 | | | | | |
| Line Unit Shear | plf | 295 | | | | | |
| **100% Wood Shearwall 10d** | | **3** | **v = 665 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 3"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 1,853 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | | | |
| Ceiling DL Trib. Width | ft | - | - | - | | | |
| Wall Height | ft | - | - | - | | | |
| Wall Dead Load | plf | - | - | - | | | |
| Wall Shear Force | lbs | 3,052 | 2,609 | 1,158 | | | |
| Uplift Force (Demand) | lbs | 5,022 | 5,022 | 5,022 | | | |
| **Holdown Type** | | **HDU8** | **HDU8** | **HDU8** | | | |
| **Uplift Force (Capacity)** | **lbs** | **5,903** | **5,903** | **5,903** | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

### LINE 7 (HFX)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **ROOF** | | **SW-26** | | | | | |
| Shearwall Length | ft | 1.75 | | | | | |
| **Total Shearwall Length** | **ft** | **1.75** | | | | | |
| Shear Trib. Width | ft | 20.0 | | | | | |
| Line Trib. Length | ft | 11.0 | | | | | |
| Line Total Length | ft | 11.0 | | | | | |
| Line Total Shear | lbs | 1,553 | | | | | |
| Line Unit Shear | plf | 887 | | | | | |
| **21" HFX on 3,000 psi Conc.** | | **HFX-21x17-HS** | **v = 1745 lbs/Panel - Width = 21" - Height = 200 1/4"** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 1,765 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | | | | | |
| Ceiling DL Trib. Width | ft | - | | | | | |
| Wall Height | ft | 8.5 | | | | | |
| Wall Dead Load | plf | 153.0 | | | | | |
| Wall Shear Force | lbs | 1,553 | | | | | |
| Uplift Force (Demand) | lbs | 7,492 | | | | | |
| **Holdown Type** | | **1 1/8" HS** | | | | | |
| **Uplift Force (Capacity)** | **lbs** | **23,050** | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 17.00 ft |

### LINE 7

| **ROOF** | | **SW-27** | **SW-28** | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 12.00 | 6.92 | | | | |
| **Total Shearwall Length** | **ft** | **18.92** | | | | | |
| Shear Trib. Width | ft | 8.0 | 12.0 | | | | |
| Line Trib. Length | ft | 42.0 | 31.0 | | | | |
| Line Total Length | ft | 73.0 | | | | | |
| Line Total Shear | lbs | 4,997 | | | | | |
| Line Unit Shear | plf | 264 | x 9 ft / 6.92 ft | = | 324.4 | plf | |
| **75% Wood Shearwall 10d** | | **3** | **v = 499 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 3"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 856 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | - | | | | |
| Ceiling DL Trib. Width | ft | - | - | | | | |
| Wall Height | ft | - | - | | | | |
| Wall Dead Load | plf | - | - | | | | |
| Wall Shear Force | lbs | 3,170 | 1,828 | | | | |
| Uplift Force (Demand) | lbs | 5,515 | 5,515 | | | | |
| **Holdown Type** | | **HDU11** | **HDU11** | | | | |
| **Uplift Force (Capacity)** | **lbs** | **7,151** | **7,151** | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 7.06 psf | Ext. | 8.50 ft |

### LINE 8

| **ROOF** | | **SW-29** | | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 9.67 | | | | | |
| **Total Shearwall Length** | **ft** | **9.67** | | | | | |
| Shear Trib. Width | ft | 13.0 | | | | | |
| Line Trib. Length | ft | 43.0 | | | | | |
| Line Total Length | ft | 43.0 | | | | | |
| Line Total Shear | lbs | 3,946 | | | | | |
| Line Unit Shear | plf | 408 | | | | | |
| **100% Wood Shearwall 10d** | | **2** | **v = 510 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 4"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 1,147 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | | | | | |
| Ceiling DL Trib. Width | ft | - | | | | | |
| Wall Height | ft | 10.0 | | | | | |
| Wall Dead Load | plf | 180.0 | | | | | |
| Wall Shear Force | lbs | 3,946 | | | | | |
| Uplift Force (Demand) | lbs | 3,139 | | | | | |
| **Holdown Type** | | **HDU4** | | | | | |
| **Uplift Force (Capacity)** | **lbs** | **3,424** | | | | | |

# TABLES REFERENCED IN BEAM DESIGN SPREADSHEET

**2018 NDS Table 4A**

| Douglas Fir-Larch [1] WWPA | Design Values for Visually Graded (2"-4") | | |
|---|---|---|---|
| | fb | fv | E |
| Select Str | 1,500 | 180 | 1,900,000 |
| No.1&Better | 1,200 | 180 | 1,800,000 |
| No.1 | 1,000 | 180 | 1,700,000 |
| No.2 | 900 | 180 | 1,600,000 |
| No.3 | 525 | 180 | 1,400,000 |
| Stud | 700 | 180 | 1,400,000 |

**2018 NDS Table 4D**

| Douglas Fir-Larch [1] WWPA | Design Values for Visually Graded (5" & Larger) | | |
|---|---|---|---|
| | fb | fv | E |
| Dense Str | 1,900 | 170 | 1,700,000 |
| Select Str | 1,600 | 170 | 1,600,000 |
| Dense No. 1 | 1,550 | 170 | 1,700,000 |
| No.1 | 1,350 | 170 | 1,600,000 |
| Dense No. 2 | 1,000 | 170 | 1,400,000 |
| No.2 | 875 | 170 | 1,300,000 |

**Other Material**

| | | | |
|---|---|---|---|
| Prllm2.0E | 2,900 | 290 | 2,000,000 |
| Mcrlm1.8E | 2,600 | 285 | 1,800,000 |
| Mcrlm1.9E | 2,600 | 285 | 1,900,000 |
| Steel Fy=36 ksi | 23,760 | 14400 | 29,000,000 |
| Steel Fy=46 ksi | 30,360 | 18400 | 29,000,000 |
| Steel Fy=50 ksi | 33,000 | 20000 | 29,000,000 |

1. FOR DOUGLAS FIR-LARCH USE 19% MAX. MOISTURE CONTENT

**LOAD SYMBOLS AND NOTATION**

D = Dead Load
Lr = Roof Live Load
L = Floor Live Load
E = Earthquake Load
W = Wind Load

**ASCE7-16 2.4 LOAD COMBINATION - ALLOWABLE STRESS DESIGN**

1. D
2. D + Lr — Load Duration = 1.25
3. D + L
4. D + 0.75 (Lr + L) — Load Duration = 1.25

Max. (Dead + Live)

5. $(1.0 + 0.14S_{DS})D + 0.7\Omega E$
6. $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$
7. $(0.6 - 0.14S_{DS})D + 0.7\Omega E$

Max. (Dead + Live + Lateral)
Allowable Stress Increase = 1.2
Ω = 2.5 For Flexible Diaphragm
ASCE7-16 12.4.3.2

**TABLE 1604.3 (2022 CBC) DEFLECTION LIMITS**

| Roof Members | L | D + L |
|---|---|---|
| Supporting Plaster Ceiling | *l* / 360 | *l* / 240 |
| Supporting Nonplaster Ceiling | *l* / 240 | *l* / 180 |
| Not Supporting Ceiling | *l* / 180 | *l* / 120 |
| Floor Members | *l* / 360 | *l* / 240 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RR | RR1 | RR2 | RR3 | CJ | CJ1 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 8.00 | 12.00 | 18.00 | 21.00 | 6.00 | 10.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 2x 6 | 2x 8 | 2x10 | 2x12 | 2x 4 | 2x 6 |
| **GRADE** | | No.2 | No.2 | No.2 | No.2 | No.2 | No.2 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | YES | YES | YES | YES | YES | YES |
| REPETITIVE FACTOR, Cr | | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 |
| SIZE FACTOR, Cf | | 1.30 | 1.20 | 1.10 | 1.00 | 1.50 | 1.30 |
| BENDING STRESSES, F'b | psi | 1,346 | 1,242 | 1,139 | 1,035 | 1,553 | 1,346 |
| SHEAR STRESSES, F'v | psi | 207 | 207 | 207 | 207 | 207 | 207 |
| MODULUS OF ELASTICITY | ksi | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | 1.33 | 1.33 | 1.33 | 1.33 | | |
| CEILING TRIB. WIDTH | ft | | | | | 1.33 | 1.33 |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 30.59 | 30.59 | 30.59 | 30.59 | 7.98 | 7.98 |
| TOTAL ROOF LIVE LOAD (Lr | plf | 26.60 | 26.60 | 26.60 | 26.60 | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | 26.60 | 26.60 |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P2 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RR | RR1 | RR2 | RR3 | CJ | CJ1 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 8.00 | 12.00 | 18.00 | 21.00 | 6.00 | 10.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 2x 6 | 2x 8 | 2x10 | 2x12 | 2x 4 | 2x 6 |
| **GRADE** | | No.2 | No.2 | No.2 | No.2 | No.2 | No.2 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 245 | 551 | 1,239 | 1,686 | 36 | 100 |
| MAX. DEFLECTION | in | 0.085 | 0.187 | 0.457 | 0.470 | 0.027 | 0.054 |
| LEFT REACTION | lbs | 122 | 184 | 275 | 321 | 24 | 40 |
| RIGHT REACTION | lbs | 122 | 184 | 275 | 321 | 24 | 40 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 213 | 479 | 1,077 | 1,466 | - | - |
| MAX. DEFLECTION | in | 0.074 | 0.163 | 0.397 | 0.409 | - | - |
| LEFT REACTION | lbs | 106 | 160 | 239 | 279 | - | - |
| RIGHT REACTION | lbs | 106 | 160 | 239 | 279 | - | - |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | - | - | - | - | 120 | 333 |
| MAX. DEFLECTION | in | - | - | - | - | 0.090 | 0.180 |
| LEFT REACTION | lbs | - | - | - | - | 80 | 133 |
| RIGHT REACTION | lbs | - | - | - | - | 80 | 133 |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 366 | 824 | 1,853 | 2,522 | 29 | 80 |
| MAX. DEFLECTION | in | 0.158 | 0.350 | 0.853 | 0.879 | 0.027 | 0.054 |
| LEFT REACTION | lbs | 183 | 275 | 412 | 480 | 19 | 32 |
| RIGHT REACTION | lbs | 183 | 275 | 412 | 480 | 19 | 32 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 245 | 551 | 1,239 | 1,686 | 156 | 432 |
| MAX. DEFLECTION | in | 0.085 | 0.187 | 0.457 | 0.470 | 0.118 | 0.234 |
| LEFT REACTION | lbs | 122 | 184 | 275 | 321 | 104 | 173 |
| RIGHT REACTION | lbs | 122 | 184 | 275 | 321 | 104 | 173 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 323 | 728 | 1,638 | 2,229 | 101 | 279 |
| MAX. DEFLECTION | in | 0.140 | 0.309 | 0.754 | 0.777 | 0.095 | 0.189 |
| LEFT REACTION | lbs | 202 | 303 | 455 | 531 | 84 | 140 |
| RIGHT REACTION | lbs | 202 | 303 | 455 | 531 | 84 | 140 |
| **LOAD CASE 5: $(1.0 + 0.14S_{ds})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 187 | 420 | 946 | 1,288 | 27 | 76 |
| MAX. DEFLECTION | in | 0.086 | 0.191 | 0.465 | 0.479 | 0.028 | 0.055 |
| LEFT REACTION | lbs | 125 | 187 | 280 | 327 | 24 | 41 |
| RIGHT REACTION | lbs | 125 | 187 | 280 | 327 | 24 | 41 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RR | RR1 | RR2 | RR3 | CJ | CJ1 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 8.00 | 12.00 | 18.00 | 21.00 | 6.00 | 10.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 2x 6 | 2x 8 | 2x10 | 2x12 | 2x 4 | 2x 6 |
| **GRADE** | | No.2 | No.2 | No.2 | No.2 | No.2 | No.2 |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 278 | 626 | 1,408 | 1,917 | 82 | 229 |
| MAX. DEFLECTION | in | 0.128 | 0.284 | 0.692 | 0.712 | 0.083 | 0.165 |
| LEFT REACTION | lbs | 185 | 278 | 417 | 487 | 73 | 122 |
| RIGHT REACTION | lbs | 185 | 278 | 417 | 487 | 73 | 122 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 58 | 130 | 293 | 399 | 8 | 24 |
| MAX. DEFLECTION | in | 0.027 | 0.059 | 0.144 | 0.148 | 0.009 | 0.017 |
| LEFT REACTION | lbs | 39 | 58 | 87 | 101 | 8 | 13 |
| RIGHT REACTION | lbs | 39 | 58 | 87 | 101 | 8 | 13 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 366.0 | 823.6 | 1,853.1 | 2,522.2 | 155.6 | 432.3 |
| SECTION MODULUS, S | in3 | 7.6 | 13.1 | 21.4 | 31.6 | 3.1 | 7.6 |
| BENDING STRESS | psi | 580.8 | 752.1 | 1,039.6 | 956.6 | 609.7 | 685.9 |
| CHECK BENDING STRESS RATIO | | 43% OK | 61% OK | 91% OK | 92% OK | 39% OK | 51% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 202.2 | 303.26 | 454.89 | 530.70 | 103.74 | 172.90 |
| SECTION AREA, A | in2 | 8.25 | 10.88 | 13.88 | 16.88 | 5.25 | 8.25 |
| SHEAR STRESS, fv | psi | 36.76 | 41.83 | 49.18 | 47.17 | 29.64 | 31.44 |
| CHECK SHEAR STRESS RATIO | | 18% OK | 20% OK | 24% OK | 23% OK | 14% OK | 15% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 20.80 | 47.63 | 98.93 | 177.98 | 5.36 | 20.80 |
| MAX. DEFLECTION, DL | in | 0.085 | 0.187 | 0.457 | 0.470 | 0.027 | 0.054 |
| MAX. DEFLECTION, LL | in | 0.074 | 0.163 | 0.397 | 0.409 | 0.090 | 0.180 |
| DEFLECTION LIMITS, LL | | L / 240 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.4 OK | < 0.4 OK | < 0.6 OK | < 0.7 OK | < 0.2 OK | < 0.33 OK |
| MAX. DEFLECTION, DL+LL | in | 0.158 | 0.350 | 0.853 | 0.879 | 0.118 | 0.234 |
| DEFLECTION LIMITS, DL+LL | | L / 180 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.53 OK | < 0.6 OK | < 0.9 OK | < 1.05 OK | < 0.3 OK | < 0.5 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CJ1 | CJ2 | CJ3 | RDG1 | RDG2 | RDG3 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 15.00 | 18.00 | 21.00 | 19.00 | 24.00 | 17.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD Prllm | WOOD Glm |
| **BEAM SECTION** | in | 2x 8 | 2x10 | 2x12 | 5.25x14 | 5.25x16 | 5.25x14 |
| **GRADE** | | No.2 | No.2 | No.2 | Prllm2.2E | Prllm2.2E | Prllm2.0E |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | YES | YES | YES | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | 1.15 | 1.15 | 1.15 | 1.00 | 1.00 | 1.00 |
| SIZE FACTOR, Cf | | 1.20 | 1.10 | 1.00 | 1.00 | 1.00 | 1.00 |
| BENDING STRESSES, F'b | psi | 1,242 | 1,139 | 1,035 | 2,900 | 2,900 | 2,900 |
| SHEAR STRESSES, F'v | psi | 207 | 207 | 207 | 290 | 290 | 290 |
| MODULUS OF ELASTICITY | ksi | 1,600 | 1,600 | 1,600 | 2,200 | 2,200 | 2,000 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | 16.00 | 11.00 | 11.00 |
| CEILING TRIB. WIDTH | ft | 1.33 | 1.33 | 1.33 | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 7.98 | 7.98 | 7.98 | 368.04 | 253.03 | 253.03 |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | 320.00 | 220.00 | 220.00 |
| TOTAL FLOOR LIVE LOAD (L | plf | 26.60 | 26.60 | 26.60 | - | - | - |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P2 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CJ1 | CJ2 | CJ3 | RDG1 | RDG2 | RDG3 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 15.00 | 18.00 | 21.00 | 19.00 | 24.00 | 17.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD Prllm | WOOD Glm |
| **BEAM SECTION** | in | 2x 8 | 2x10 | 2x12 | 5.25x14 | 5.25x16 | 5.25x14 |
| **GRADE** | | No.2 | No.2 | No.2 | Prllm2.2E | Prllm2.2E | Prllm2.0E |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 224 | 323 | 440 | 16,608 | 18,218 | 9,141 |
| MAX. DEFLECTION | in | 0.119 | 0.119 | 0.123 | 0.409 | 0.479 | 0.198 |
| LEFT REACTION | lbs | 60 | 72 | 84 | 3,496 | 3,036 | 2,151 |
| RIGHT REACTION | lbs | 60 | 72 | 84 | 3,496 | 3,036 | 2,151 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | - | - | - | 14,440 | 15,840 | 7,948 |
| MAX. DEFLECTION | in | - | - | - | 0.355 | 0.417 | 0.172 |
| LEFT REACTION | lbs | - | - | - | 3,040 | 2,640 | 1,870 |
| RIGHT REACTION | lbs | - | - | - | 3,040 | 2,640 | 1,870 |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 748 | 1,077 | 1,466 | - | - | - |
| MAX. DEFLECTION | in | 0.398 | 0.397 | 0.409 | - | - | - |
| LEFT REACTION | lbs | 200 | 239 | 279 | - | - | - |
| RIGHT REACTION | lbs | 200 | 239 | 279 | - | - | - |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 180 | 259 | 352 | 24,838 | 27,246 | 17,088 |
| MAX. DEFLECTION | in | 0.119 | 0.119 | 0.123 | 0.764 | 0.896 | 0.370 |
| LEFT REACTION | lbs | 48 | 57 | 67 | 5,229 | 4,541 | 3,217 |
| RIGHT REACTION | lbs | 48 | 57 | 67 | 5,229 | 4,541 | 3,217 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 973 | 1,400 | 1,906 | 16,608 | 18,218 | 9,141 |
| MAX. DEFLECTION | in | 0.517 | 0.516 | 0.531 | 0.409 | 0.479 | 0.198 |
| LEFT REACTION | lbs | 259 | 311 | 363 | 3,496 | 3,036 | 2,151 |
| RIGHT REACTION | lbs | 259 | 311 | 363 | 3,496 | 3,036 | 2,151 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 628 | 905 | 1,232 | 21,950 | 24,078 | 15,101 |
| MAX. DEFLECTION | in | 0.417 | 0.417 | 0.429 | 0.675 | 0.792 | 0.327 |
| LEFT REACTION | lbs | 209 | 251 | 293 | 5,776 | 5,016 | 3,553 |
| RIGHT REACTION | lbs | 209 | 251 | 293 | 5,776 | 5,016 | 3,553 |
| **LOAD CASE 5: $(1.0 + 0.14S_{ds})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 171 | 247 | 336 | 12,682 | 13,911 | 9,306 |
| MAX. DEFLECTION | in | 0.121 | 0.121 | 0.125 | 0.416 | 0.488 | 0.202 |
| LEFT REACTION | lbs | 61 | 73 | 85 | 3,560 | 3,091 | 2,190 |
| RIGHT REACTION | lbs | 61 | 73 | 85 | 3,560 | 3,091 | 2,190 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CJ1 | CJ2 | CJ3 | RDG1 | RDG2 | RDG3 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 15.00 | 18.00 | 21.00 | 19.00 | 24.00 | 17.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD Prllm | WOOD Glm |
| **BEAM SECTION** | in | 2x 8 | 2x10 | 2x12 | 5.25x14 | 5.25x16 | 5.25x14 |
| **GRADE** | | No.2 | No.2 | No.2 | Prllm2.2E | Prllm2.2E | Prllm2.0E |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 514 | 741 | 1,008 | 18,875 | 20,705 | 13,851 |
| MAX. DEFLECTION | in | 0.364 | 0.364 | 0.375 | 0.619 | 0.726 | 0.300 |
| LEFT REACTION | lbs | 183 | 219 | 256 | 5,298 | 4,601 | 3,259 |
| RIGHT REACTION | lbs | 183 | 219 | 256 | 5,298 | 4,601 | 3,259 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 53 | 76 | 104 | 3,926 | 4,307 | 2,881 |
| MAX. DEFLECTION | in | 0.038 | 0.038 | 0.039 | 0.129 | 0.151 | 0.062 |
| LEFT REACTION | lbs | 19 | 23 | 26 | 1,102 | 957 | 678 |
| RIGHT REACTION | lbs | 19 | 23 | 26 | 1,102 | 957 | 678 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 972.6 | 1,400.5 | 1,906.2 | 24,838.2 | 27,246.4 | 17,088.1 |
| SECTION MODULUS, S | in3 | 13.1 | 21.4 | 31.6 | 171.5 | 224.0 | 171.5 |
| BENDING STRESS | psi | 888.1 | 785.7 | 723.0 | 1,738.0 | 1,459.6 | 1,195.7 |
| CHECK BENDING STRESS RATIO | | 72% OK | 69% OK | 70% OK | 60% OK | 50% OK | 41% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 259.4 | 311.22 | 363.09 | 5,776.38 | 5,016.33 | 3,553.23 |
| SECTION AREA, A | in2 | 10.88 | 13.88 | 16.88 | 73.50 | 84.00 | 73.50 |
| SHEAR STRESS, fv | psi | 35.77 | 33.65 | 32.27 | 117.89 | 89.58 | 72.51 |
| CHECK SHEAR STRESS RATIO | | 17% OK | 16% OK | 16% OK | 41% OK | 31% OK | 25% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 47.63 | 98.93 | 177.98 | 1,200.50 | 1,792.00 | 1,200.50 |
| MAX. DEFLECTION, DL | in | 0.119 | 0.119 | 0.123 | 0.409 | 0.479 | 0.198 |
| MAX. DEFLECTION, LL | in | 0.398 | 0.397 | 0.409 | 0.355 | 0.417 | 0.172 |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.5 OK | < 0.6 OK | < 0.7 OK | < 0.63 OK | < 0.8 OK | < 0.57 OK |
| MAX. DEFLECTION, DL+LL | in | 0.517 | 0.516 | 0.531 | 0.764 | 0.896 | 0.370 |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.75 OK | < 0.9 OK | < 1.05 OK | < 0.95 OK | < 1.2 OK | < 0.85 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RB1 | RDG4 | CB1 | CB2 | RDG5 | RDG6 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 12.00 | 26.50 | 15.00 | 5.25 | 17.50 | 16.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD Glm | WOOD Prllm | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 3.5x14 | 5.25x18 | 6x12 | 6x14 | 6x14 | 6x12 |
| **GRADE** | | Prllm2.0E | Prllm2.2E | No.1 | No.1 | No.1 | No.1 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | NO | NO | NO | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| SIZE FACTOR, Cf | | 1.00 | 1.00 | 1.00 | 0.98 | 0.98 | 1.00 |
| BENDING STRESSES, F'b | psi | 2,900 | 2,900 | 1,350 | 1,327 | 1,327 | 1,350 |
| SHEAR STRESSES, F'v | psi | 290 | 290 | 170 | 170 | 170 | 170 |
| MODULUS OF ELASTICITY | ksi | 2,000 | 2,200 | 1,700 | 1,700 | 1,700 | 1,700 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | 1.33 | 11.00 | 7.50 | | 13.00 | 6.50 |
| CEILING TRIB. WIDTH | ft | | | | 1.33 | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 30.66 | 253.03 | 172.52 | 7.98 | 299.03 | 149.52 |
| TOTAL ROOF LIVE LOAD (Lr | plf | 26.66 | 220.00 | 150.00 | - | 260.00 | 130.00 |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | 26.60 | - | - |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | RDG2 | | | 2-RDG1 | | |
| DEAD LOAD (P D ) | lbs | 3,036.3 | | | 6,992.8 | | |
| ROOF LIVE LOAD (P Lr) | lbs | 2,640.0 | | | 6,080.0 | | |
| FLOOR LIVE LOAD (P L ) | lbs | - | | | - | | |
| LATERAL, P (W or 0.7E) | lbs | - | | | - | | |
| DIST. (LEFT SUPPORT) | ft | 2.50 | | | 1.75 | | |
| P2 | | RDG3 | | | | | |
| DEAD LOAD (P D ) | lbs | 2,150.7 | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | 1,870.0 | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | - | | | | | |
| LATERAL, P (W or 0.7E) | lbs | - | | | | | |
| DIST. (LEFT SUPPORT) | ft | 2.50 | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RB1 | RDG4 | CB1 | CB2 | RDG5 | RDG6 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 12.00 | 26.50 | 15.00 | 5.25 | 17.50 | 16.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD Glm | WOOD Prllm | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 3.5x14 | 5.25x18 | 6x12 | 6x14 | 6x14 | 6x12 |
| **GRADE** | | Prllm2.0E | Prllm2.2E | No.1 | No.1 | No.1 | No.1 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 10,494 | 22,211 | 4,852 | 8,101 | 11,447 | 4,785 |
| MAX. DEFLECTION | in | 0.130 | 0.500 | 0.166 | 0.016 | 0.329 | 0.186 |
| LEFT REACTION | lbs | 4,290 | 3,353 | 1,294 | 4,683 | 2,617 | 1,196 |
| RIGHT REACTION | lbs | 1,265 | 3,353 | 1,294 | 2,352 | 2,617 | 1,196 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 9,124 | 19,312 | 4,219 | 7,022 | 9,953 | 4,160 |
| MAX. DEFLECTION | in | 0.113 | 0.435 | 0.144 | 0.014 | 0.286 | 0.162 |
| LEFT REACTION | lbs | 3,730 | 2,915 | 1,125 | 4,053 | 2,275 | 1,040 |
| RIGHT REACTION | lbs | 1,100 | 2,915 | 1,125 | 2,027 | 2,275 | 1,040 |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | - | - | - | 92 | - | - |
| MAX. DEFLECTION | in | - | - | - | 0.000 | - | - |
| LEFT REACTION | lbs | - | - | - | 70 | - | - |
| RIGHT REACTION | lbs | - | - | - | 70 | - | - |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 19,618 | 33,218 | 7,257 | 12,099 | 17,120 | 7,156 |
| MAX. DEFLECTION | in | 0.243 | 0.935 | 0.310 | 0.031 | 0.615 | 0.348 |
| LEFT REACTION | lbs | 6,417 | 5,014 | 1,935 | 6,989 | 3,913 | 1,789 |
| RIGHT REACTION | lbs | 1,891 | 5,014 | 1,935 | 3,503 | 3,913 | 1,789 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 10,494 | 22,211 | 4,852 | 8,184 | 11,447 | 4,785 |
| MAX. DEFLECTION | in | 0.130 | 0.500 | 0.166 | 0.017 | 0.329 | 0.186 |
| LEFT REACTION | lbs | 4,290 | 3,353 | 1,294 | 4,753 | 2,617 | 1,196 |
| RIGHT REACTION | lbs | 1,265 | 3,353 | 1,294 | 2,422 | 2,617 | 1,196 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 17,337 | 29,356 | 6,413 | 10,744 | 15,130 | 6,324 |
| MAX. DEFLECTION | in | 0.214 | 0.826 | 0.274 | 0.027 | 0.544 | 0.307 |
| LEFT REACTION | lbs | 7,088 | 5,539 | 2,138 | 7,775 | 4,323 | 1,976 |
| RIGHT REACTION | lbs | 2,089 | 5,539 | 2,138 | 3,924 | 4,323 | 1,976 |
| **LOAD CASE 5: $(1.0 + 0.14S_{ds})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 10,684 | 16,960 | 3,705 | 6,186 | 8,741 | 3,653 |
| MAX. DEFLECTION | in | 0.132 | 0.509 | 0.169 | 0.017 | 0.335 | 0.189 |
| LEFT REACTION | lbs | 4,368 | 3,413 | 1,317 | 4,768 | 2,664 | 1,218 |
| RIGHT REACTION | lbs | 1,288 | 3,413 | 1,317 | 2,395 | 2,664 | 1,218 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RB1 | RDG4 | CB1 | CB2 | RDG5 | RDG6 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 12.00 | 26.50 | 15.00 | 5.25 | 17.50 | 16.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD Glm | WOOD Prllm | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 3.5x14 | 5.25x18 | 6x12 | 6x14 | 6x14 | 6x12 |
| **GRADE** | | Prllm2.0E | Prllm2.2E | No.1 | No.1 | No.1 | No.1 |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 15,902 | 25,243 | 5,514 | 9,236 | 13,010 | 5,438 |
| MAX. DEFLECTION | in | 0.197 | 0.758 | 0.251 | 0.025 | 0.499 | 0.282 |
| LEFT REACTION | lbs | 6,501 | 5,080 | 1,961 | 7,128 | 3,965 | 1,813 |
| RIGHT REACTION | lbs | 1,916 | 5,080 | 1,961 | 3,596 | 3,965 | 1,813 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 3,308 | 5,251 | 1,147 | 1,915 | 2,706 | 1,131 |
| MAX. DEFLECTION | in | 0.041 | 0.158 | 0.052 | 0.005 | 0.104 | 0.059 |
| LEFT REACTION | lbs | 1,352 | 1,057 | 408 | 1,476 | 825 | 377 |
| RIGHT REACTION | lbs | 399 | 1,057 | 408 | 741 | 825 | 377 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 19,617.5 | 33,218.4 | 7,256.7 | 12,099.0 | 17,120.4 | 7,155.6 |
| SECTION MODULUS, S | in3 | 114.3 | 283.5 | 121.2 | 167.1 | 167.1 | 121.2 |
| BENDING STRESS | psi | 2,059.0 | 1,406.1 | 718.3 | 869.1 | 1,229.7 | 708.3 |
| CHECK BENDING STRESS RATIO | | 71% OK | 48% OK | 53% OK | 65% OK | 93% OK | 52% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 7,088.2 | 5,538.86 | 2,137.64 | 7,775.16 | 4,322.78 | 1,976.13 |
| SECTION AREA, A | in2 | 49.00 | 94.50 | 63.25 | 74.25 | 74.25 | 63.25 |
| SHEAR STRESS, fv | psi | 216.99 | 87.92 | 50.70 | 157.07 | 87.33 | 46.86 |
| CHECK SHEAR STRESS RATIO | | 75% OK | 30% OK | 30% OK | 92% OK | 51% OK | 28% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 800.33 | 2,551.50 | 697.07 | 1,127.67 | 1,127.67 | 697.07 |
| MAX. DEFLECTION, DL | in | 0.130 | 0.500 | 0.166 | 0.016 | 0.329 | 0.186 |
| MAX. DEFLECTION, LL | in | 0.113 | 0.435 | 0.144 | 0.014 | 0.286 | 0.162 |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.4 OK | < 0.88 OK | < 0.5 OK | < 0.18 OK | < 0.58 OK | < 0.53 OK |
| MAX. DEFLECTION, DL+LL | in | 0.243 | 0.935 | 0.310 | 0.031 | 0.615 | 0.348 |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.6 OK | < 1.33 OK | < 0.75 OK | < 0.26 OK | < 0.88 OK | < 0.8 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RB2 | RB3 | RB4 | RDG7 | RDG8 | CB3 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 13.00 | 15.50 | 13.00 | 14.00 | 9.00 | 5.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 6x12 | 4x12 | 6x12 | 6x14 | 6x14 | 6x14 |
| **GRADE** | | No.1 | No.1 | No.1 | No.1 | No.1 | No.2 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | NO | NO | NO | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| SIZE FACTOR, Cf | | 1.00 | 1.10 | 1.00 | 0.98 | 0.98 | 0.98 |
| BENDING STRESSES, F'b | psi | 1,350 | 1,100 | 1,350 | 1,327 | 1,327 | 860 |
| SHEAR STRESSES, F'v | psi | 170 | 180 | 170 | 170 | 170 | 170 |
| MODULUS OF ELASTICITY | ksi | 1,700 | 1,700 | 1,700 | 1,700 | 1,700 | 1,600 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | 1.33 | 6.00 | 1.33 | 21.00 | 21.00 | |
| CEILING TRIB. WIDTH | ft | | | | | | 11.00 |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 30.59 | 138.02 | 30.59 | 483.05 | 483.05 | 66.00 |
| TOTAL ROOF LIVE LOAD (Lr | plf | 26.60 | 120.00 | 26.60 | 420.00 | 420.00 | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | 220.00 |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | RDG6 | | RDG6 | | | RDG7+RDG8 |
| DEAD LOAD (P D ) | lbs | 1,196.1 | | 1,495.2 | | | 5,555.1 |
| ROOF LIVE LOAD (P Lr) | lbs | 1,040.0 | | 1,300.0 | | | 4,830.0 |
| FLOOR LIVE LOAD (P L ) | lbs | - | | - | | | - |
| LATERAL, P (W or 0.7E) | lbs | - | | - | | | - |
| DIST. (LEFT SUPPORT) | ft | 6.50 | | 6.50 | | | 2.50 |
| P2 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RB2 | RB3 | RB4 | RDG7 | RDG8 | CB3 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 13.00 | 15.50 | 13.00 | 14.00 | 9.00 | 5.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 6x12 | 4x12 | 6x12 | 6x14 | 6x14 | 6x14 |
| **GRADE** | | No.1 | No.1 | No.1 | No.1 | No.1 | No.2 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 4,534 | 4,145 | 5,506 | 11,835 | 4,891 | 7,150 |
| MAX. DEFLECTION | in | 0.096 | 0.254 | 0.116 | 0.218 | 0.037 | 0.014 |
| LEFT REACTION | lbs | 797 | 1,070 | 946 | 3,381 | 2,174 | 2,943 |
| RIGHT REACTION | lbs | 797 | 1,070 | 946 | 3,381 | 2,174 | 2,943 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 3,942 | 3,604 | 4,787 | 10,290 | 4,253 | 6,038 |
| MAX. DEFLECTION | in | 0.084 | 0.221 | 0.101 | 0.189 | 0.032 | 0.012 |
| LEFT REACTION | lbs | 693 | 930 | 823 | 2,940 | 1,890 | 2,415 |
| RIGHT REACTION | lbs | 693 | 930 | 823 | 2,940 | 1,890 | 2,415 |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | - | - | - | - | - | 688 |
| MAX. DEFLECTION | in | - | - | - | - | - | 0.002 |
| LEFT REACTION | lbs | - | - | - | - | - | 550 |
| RIGHT REACTION | lbs | - | - | - | - | - | 550 |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 6,781 | 6,199 | 8,234 | 17,700 | 7,315 | 10,550 |
| MAX. DEFLECTION | in | 0.180 | 0.475 | 0.218 | 0.407 | 0.070 | 0.026 |
| LEFT REACTION | lbs | 1,192 | 1,600 | 1,415 | 5,057 | 3,251 | 4,286 |
| RIGHT REACTION | lbs | 1,192 | 1,600 | 1,415 | 5,057 | 3,251 | 4,286 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 4,534 | 4,145 | 5,506 | 11,835 | 4,891 | 7,838 |
| MAX. DEFLECTION | in | 0.096 | 0.254 | 0.116 | 0.218 | 0.037 | 0.016 |
| LEFT REACTION | lbs | 797 | 1,070 | 946 | 3,381 | 2,174 | 3,493 |
| RIGHT REACTION | lbs | 797 | 1,070 | 946 | 3,381 | 2,174 | 3,493 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 5,992 | 5,478 | 7,277 | 15,642 | 6,464 | 9,755 |
| MAX. DEFLECTION | in | 0.159 | 0.419 | 0.192 | 0.360 | 0.061 | 0.025 |
| LEFT REACTION | lbs | 1,317 | 1,767 | 1,564 | 5,586 | 3,591 | 5,166 |
| RIGHT REACTION | lbs | 1,317 | 1,767 | 1,564 | 5,586 | 3,591 | 5,166 |
| **LOAD CASE 5: $(1.0 + 0.14S_{ds})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 3,462 | 3,165 | 4,204 | 9,037 | 3,735 | 5,460 |
| MAX. DEFLECTION | in | 0.098 | 0.258 | 0.118 | 0.222 | 0.038 | 0.015 |
| LEFT REACTION | lbs | 811 | 1,089 | 964 | 3,443 | 2,213 | 2,996 |
| RIGHT REACTION | lbs | 811 | 1,089 | 964 | 3,443 | 2,213 | 2,996 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RB2 | RB3 | RB4 | RDG7 | RDG8 | CB3 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 13.00 | 15.50 | 13.00 | 14.00 | 9.00 | 5.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 6x12 | 4x12 | 6x12 | 6x14 | 6x14 | 6x14 |
| **GRADE** | | No.1 | No.1 | No.1 | No.1 | No.1 | No.2 |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 5,153 | 4,711 | 6,257 | 13,450 | 5,559 | 8,364 |
| MAX. DEFLECTION | in | 0.146 | 0.385 | 0.176 | 0.330 | 0.056 | 0.023 |
| LEFT REACTION | lbs | 1,208 | 1,621 | 1,434 | 5,124 | 3,294 | 4,713 |
| RIGHT REACTION | lbs | 1,208 | 1,621 | 1,434 | 5,124 | 3,294 | 4,713 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 1,072 | 980 | 1,302 | 2,798 | 1,156 | 1,690 |
| MAX. DEFLECTION | in | 0.030 | 0.080 | 0.037 | 0.069 | 0.012 | 0.005 |
| LEFT REACTION | lbs | 251 | 337 | 298 | 1,066 | 685 | 927 |
| RIGHT REACTION | lbs | 251 | 337 | 298 | 1,066 | 685 | 927 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 6,780.5 | 6,198.8 | 8,234.0 | 17,699.8 | 7,314.7 | 10,550.1 |
| SECTION MODULUS, S | in3 | 121.2 | 73.8 | 121.2 | 167.1 | 167.1 | 167.1 |
| BENDING STRESS | psi | 671.2 | 1,007.6 | 815.1 | 1,271.4 | 525.4 | 757.8 |
| CHECK BENDING STRESS RATIO | | 50% OK | 92% OK | 60% OK | 96% OK | 40% OK | 88% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 1,316.6 | 1,767.12 | 1,563.61 | 5,586.37 | 3,591.24 | 5,166.30 |
| SECTION AREA, A | in2 | 63.25 | 39.38 | 63.25 | 74.25 | 74.25 | 74.25 |
| SHEAR STRESS, fv | psi | 31.22 | 67.32 | 37.08 | 112.86 | 72.55 | 104.37 |
| CHECK SHEAR STRESS RATIO | | 18% OK | 37% OK | 22% OK | 66% OK | 43% OK | 61% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 697.07 | 415.28 | 697.07 | 1,127.67 | 1,127.67 | 1,127.67 |
| MAX. DEFLECTION, DL | in | 0.096 | 0.254 | 0.116 | 0.218 | 0.037 | 0.014 |
| MAX. DEFLECTION, LL | in | 0.084 | 0.221 | 0.101 | 0.189 | 0.032 | 0.012 |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.43 OK | < 0.52 OK | < 0.43 OK | < 0.47 OK | < 0.3 OK | < 0.17 OK |
| MAX. DEFLECTION, DL+LL | in | 0.180 | 0.475 | 0.218 | 0.407 | 0.070 | 0.026 |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.65 OK | < 0.78 OK | < 0.65 OK | < 0.7 OK | < 0.45 OK | < 0.25 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CB4 | RB5 | HDR1 | RB6 | RB7 | HDR2 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 5.00 | 14.00 | 16.50 | 13.00 | 24.00 | 3.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD Prllm | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD DF-L |
| **BEAM SECTION** | in | 4x12 | 5.25x11.25 | 6x16 | 6x12 | 5.25x14 | 6x 8 |
| **GRADE** | | No.1 | Prllm2.2E | No.1 | No.1 | Prllm2.2E | No.2 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | NO | NO | NO | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| SIZE FACTOR, Cf | | 1.10 | 1.00 | 0.97 | 1.00 | 1.00 | 1.00 |
| BENDING STRESSES, F'b | psi | 1,100 | 2,900 | 1,308 | 1,350 | 2,900 | 875 |
| SHEAR STRESSES, F'v | psi | 180 | 290 | 170 | 170 | 290 | 170 |
| MODULUS OF ELASTICITY | ksi | 1,700 | 2,200 | 1,700 | 1,700 | 2,200 | 1,600 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | 5.00 | 0.67 | 6.00 | 9.00 | 6.50 | 11.00 |
| CEILING TRIB. WIDTH | ft | 4.50 | | | | | 0.67 |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | 3.00 | | 4.00 | 4.00 |
| WALL TYPE (EXT, INT) | | | | INT | | EXT | EXT |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 142.01 | 15.41 | 168.02 | 207.02 | 221.52 | 329.05 |
| TOTAL ROOF LIVE LOAD (Lr | plf | 100.00 | 13.40 | 120.00 | 180.00 | 130.00 | 220.00 |
| TOTAL FLOOR LIVE LOAD (L | plf | 90.00 | - | - | - | - | 13.40 |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | RDG8 | RDG5 | RDG5 | | | |
| DEAD LOAD (P D ) | lbs | 2,173.7 | 2,616.5 | 2,616.5 | | | |
| ROOF LIVE LOAD (P Lr) | lbs | 1,890.0 | 2,275.0 | 2,275.0 | | | |
| FLOOR LIVE LOAD (P L ) | lbs | - | - | - | | | |
| LATERAL, P (W or 0.7E) | lbs | - | - | - | | | |
| DIST. (LEFT SUPPORT) | ft | 2.50 | 7.00 | 8.25 | | | |
| P2 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CB4 | RB5 | HDR1 | RB6 | RB7 | HDR2 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 5.00 | 14.00 | 16.50 | 13.00 | 24.00 | 3.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD Prllm | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD DF-L |
| **BEAM SECTION** | in | 4x12 | 5.25x11.25 | 6x16 | 6x12 | 5.25x14 | 6x 8 |
| **GRADE** | | No.1 | Prllm2.2E | No.1 | No.1 | Prllm2.2E | No.2 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 3,161 | 9,535 | 16,511 | 4,373 | 15,949 | 370 |
| MAX. DEFLECTION | in | 0.017 | 0.198 | 0.242 | 0.112 | 0.626 | 0.002 |
| LEFT REACTION | lbs | 1,442 | 1,416 | 2,694 | 1,346 | 2,658 | 494 |
| RIGHT REACTION | lbs | 1,442 | 1,416 | 2,694 | 1,346 | 2,658 | 494 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 2,675 | 8,291 | 13,468 | 3,803 | 9,360 | 248 |
| MAX. DEFLECTION | in | 0.014 | 0.172 | 0.196 | 0.098 | 0.367 | 0.001 |
| LEFT REACTION | lbs | 1,195 | 1,231 | 2,128 | 1,170 | 1,560 | 330 |
| RIGHT REACTION | lbs | 1,195 | 1,231 | 2,128 | 1,170 | 1,560 | 330 |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 281 | - | - | - | - | 15 |
| MAX. DEFLECTION | in | 0.002 | - | - | - | - | 0.000 |
| LEFT REACTION | lbs | 225 | - | - | - | - | 20 |
| RIGHT REACTION | lbs | 225 | - | - | - | - | 20 |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 4,669 | 14,261 | 23,983 | 6,541 | 20,247 | 494 |
| MAX. DEFLECTION | in | 0.031 | 0.371 | 0.438 | 0.210 | 0.994 | 0.003 |
| LEFT REACTION | lbs | 2,110 | 2,118 | 3,858 | 2,013 | 3,375 | 659 |
| RIGHT REACTION | lbs | 2,110 | 2,118 | 3,858 | 2,013 | 3,375 | 659 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 3,442 | 9,535 | 16,511 | 4,373 | 15,949 | 385 |
| MAX. DEFLECTION | in | 0.018 | 0.198 | 0.242 | 0.112 | 0.626 | 0.002 |
| LEFT REACTION | lbs | 1,667 | 1,416 | 2,694 | 1,346 | 2,658 | 514 |
| RIGHT REACTION | lbs | 1,667 | 1,416 | 2,694 | 1,346 | 2,658 | 514 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 4,303 | 12,603 | 21,290 | 5,780 | 18,375 | 454 |
| MAX. DEFLECTION | in | 0.029 | 0.328 | 0.389 | 0.185 | 0.902 | 0.003 |
| LEFT REACTION | lbs | 2,507 | 2,340 | 4,290 | 2,223 | 3,828 | 756 |
| RIGHT REACTION | lbs | 2,507 | 2,340 | 4,290 | 2,223 | 3,828 | 756 |
| **LOAD CASE 5: $(1.0 + 0.14S_{ds})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 2,414 | 7,281 | 12,608 | 3,339 | 12,179 | 283 |
| MAX. DEFLECTION | in | 0.017 | 0.202 | 0.247 | 0.114 | 0.637 | 0.002 |
| LEFT REACTION | lbs | 1,468 | 1,442 | 2,743 | 1,370 | 2,706 | 503 |
| RIGHT REACTION | lbs | 1,468 | 1,442 | 2,743 | 1,370 | 2,706 | 503 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CB4 | RB5 | HDR1 | RB6 | RB7 | HDR2 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 5.00 | 14.00 | 16.50 | 13.00 | 24.00 | 3.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD Prllm | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD DF-L |
| **BEAM SECTION** | in | 4x12 | 5.25x11.25 | 6x16 | 6x12 | 5.25x14 | 6x 8 |
| **GRADE** | | No.1 | Prllm2.2E | No.1 | No.1 | Prllm2.2E | No.2 |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 3,690 | 10,837 | 18,349 | 4,970 | 16,014 | 393 |
| MAX. DEFLECTION | in | 0.026 | 0.301 | 0.358 | 0.170 | 0.838 | 0.003 |
| LEFT REACTION | lbs | 2,289 | 2,146 | 3,948 | 2,039 | 3,559 | 699 |
| RIGHT REACTION | lbs | 2,289 | 2,146 | 3,948 | 2,039 | 3,559 | 699 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 747 | 2,254 | 3,903 | 1,034 | 3,770 | 88 |
| MAX. DEFLECTION | in | 0.005 | 0.063 | 0.076 | 0.035 | 0.197 | 0.001 |
| LEFT REACTION | lbs | 454 | 446 | 849 | 424 | 838 | 156 |
| RIGHT REACTION | lbs | 454 | 446 | 849 | 424 | 838 | 156 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 4,668.8 | 14,261.0 | 23,983.3 | 6,540.7 | 20,247.3 | 494.1 |
| SECTION MODULUS, S | in3 | 73.8 | 110.7 | 220.2 | 121.2 | 171.5 | 51.6 |
| BENDING STRESS | psi | 758.9 | 1,545.3 | 1,306.8 | 647.4 | 1,416.7 | 115.0 |
| CHECK BENDING STRESS RATIO | | 69% OK | 53% OK | 100% OK | 48% OK | 49% OK | 13% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 2,506.9 | 2,339.62 | 4,290.02 | 2,223.15 | 3,828.20 | 756.15 |
| SECTION AREA, A | in2 | 39.38 | 59.06 | 85.25 | 63.25 | 73.50 | 41.25 |
| SHEAR STRESS, fv | psi | 95.50 | 59.42 | 75.48 | 52.72 | 78.13 | 27.50 |
| CHECK SHEAR STRESS RATIO | | 53% OK | 20% OK | 44% OK | 31% OK | 27% OK | 16% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 415.28 | 622.92 | 1,706.78 | 697.07 | 1,200.50 | 193.36 |
| MAX. DEFLECTION, DL | in | 0.017 | 0.198 | 0.242 | 0.112 | 0.626 | 0.002 |
| MAX. DEFLECTION, LL | in | 0.014 | 0.172 | 0.196 | 0.098 | 0.367 | 0.001 |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.17 OK | < 0.47 OK | < 0.55 OK | < 0.43 OK | < 0.8 OK | < 0.1 OK |
| MAX. DEFLECTION, DL+LL | in | 0.031 | 0.371 | 0.438 | 0.210 | 0.994 | 0.003 |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.25 OK | < 0.7 OK | < 0.83 OK | < 0.65 OK | < 1.2 OK | < 0.15 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | | HDR3 | HDR4 | RB | RB | RB | RB |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 3.50 | 6.00 | 19.00 | | | |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 6x10 | 6x12 | 6x12 | 5.25x14 | 4x14 | 4x14 |
| **GRADE** | | No.2 | No.2 | No.1 | Prllm2.2E | No.1 | No.1 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | NO | NO | NO | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | 1.00 | 1.00 | 1.00 | | | |
| SIZE FACTOR, Cf | | 1.00 | 1.00 | 1.00 | | | |
| BENDING STRESSES, F'b | psi | 875 | 875 | 1,350 | | | |
| SHEAR STRESSES, F'v | psi | 170 | 170 | 170 | | | |
| MODULUS OF ELASTICITY | ksi | 1,600 | 1,600 | 1,700 | | | |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | 1.33 | 6.50 | | | | |
| CEILING TRIB. WIDTH | ft | | | 1.00 | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | 3.50 | 3.50 | | | | |
| WALL TYPE (EXT, INT) | | EXT | EXT | | | | |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 93.59 | 212.52 | 6.00 | | | |
| TOTAL ROOF LIVE LOAD (Lr | plf | 26.60 | 130.00 | - | | | |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | 20.00 | | | |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | | | |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | | | |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | | | |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | | | |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | | | |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | RDG1 | RDG3 | | | | |
| DEAD LOAD (P D ) | lbs | 3,496.4 | 2,150.7 | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | 3,040.0 | 1,870.0 | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | - | - | | | | |
| LATERAL, P (W or 0.7E) | lbs | - | - | | | | |
| DIST. (LEFT SUPPORT) | ft | 1.00 | 3.00 | | | | |
| P2 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | HDR3 | HDR4 | RB | RB | RB | RB |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 3.50 | 6.00 | 19.00 | | | |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 6x10 | 6x12 | 6x12 | 5.25x14 | 4x14 | 4x14 |
| **GRADE** | | No.2 | No.2 | No.1 | Prllm2.2E | No.1 | No.1 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 2,568 | 4,182 | 271 | | | |
| MAX. DEFLECTION | in | 0.007 | 0.021 | 0.015 | | | |
| LEFT REACTION | lbs | 2,661 | 1,713 | 57 | | | |
| RIGHT REACTION | lbs | 1,163 | 1,713 | 57 | | | |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 2,162 | 3,390 | - | | | |
| MAX. DEFLECTION | in | 0.006 | 0.016 | - | | | |
| LEFT REACTION | lbs | 2,218 | 1,325 | - | | | |
| RIGHT REACTION | lbs | 915 | 1,325 | - | | | |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | - | - | 903 | | | |
| MAX. DEFLECTION | in | - | - | 0.049 | | | |
| LEFT REACTION | lbs | - | - | 190 | | | |
| RIGHT REACTION | lbs | - | - | 190 | | | |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 3,784 | 6,058 | 217 | | | |
| MAX. DEFLECTION | in | 0.013 | 0.037 | 0.015 | | | |
| LEFT REACTION | lbs | 3,903 | 2,430 | 46 | | | |
| RIGHT REACTION | lbs | 1,662 | 2,430 | 46 | | | |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 2,568 | 4,182 | 1,173 | | | |
| MAX. DEFLECTION | in | 0.007 | 0.021 | 0.064 | | | |
| LEFT REACTION | lbs | 2,661 | 1,713 | 247 | | | |
| RIGHT REACTION | lbs | 1,163 | 1,713 | 247 | | | |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 3,352 | 5,380 | 758 | | | |
| MAX. DEFLECTION | in | 0.012 | 0.033 | 0.052 | | | |
| LEFT REACTION | lbs | 4,325 | 2,707 | 200 | | | |
| RIGHT REACTION | lbs | 1,849 | 2,707 | 200 | | | |
| **LOAD CASE 5: $(1.0 + 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 1,961 | 3,194 | 207 | | | |
| MAX. DEFLECTION | in | 0.007 | 0.021 | 0.015 | | | |
| LEFT REACTION | lbs | 2,709 | 1,744 | 58 | | | |
| RIGHT REACTION | lbs | 1,184 | 1,744 | 58 | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | HDR3 | HDR4 | RB | RB | RB | RB |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 3.50 | 6.00 | 19.00 | | | |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 6x10 | 6x12 | 6x12 | 5.25x14 | 4x14 | 4x14 |
| **GRADE** | | No.2 | No.2 | No.1 | Prllm2.2E | No.1 | No.1 |
| **LOAD CASE 6: (1.0 + 0.105$S_{DS}$)D + 0.525ΩE + 0.75(L + Lr)** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 2,885 | 4,638 | 620 | | | |
| MAX. DEFLECTION | in | 0.011 | 0.030 | 0.045 | | | |
| LEFT REACTION | lbs | 3,973 | 2,493 | 174 | | | |
| RIGHT REACTION | lbs | 1,702 | 2,493 | 174 | | | |
| **LOAD CASE 7: (0.6 − 0.14$S_{DS}$)D + 0.7ΩE** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 607 | 989 | 64 | | | |
| MAX. DEFLECTION | in | 0.002 | 0.006 | 0.005 | | | |
| LEFT REACTION | lbs | 839 | 540 | 18 | | | |
| RIGHT REACTION | lbs | 367 | 540 | 18 | | | |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 3,784.1 | 6,057.9 | 1,173.3 | | | |
| SECTION MODULUS, S | in3 | 82.7 | 121.2 | 121.2 | | | |
| BENDING STRESS | psi | 548.9 | 599.7 | 116.1 | | | |
| CHECK BENDING STRESS RATIO | | 63% OK | 69% OK | 9% OK | | | |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 4,324.7 | 2,706.67 | 247.00 | | | |
| SECTION AREA, A | in2 | 52.25 | 63.25 | 63.25 | | | |
| SHEAR STRESS, fv | psi | 124.15 | 64.19 | 5.86 | | | |
| CHECK SHEAR STRESS RATIO | | 73% OK | 38% OK | 3% OK | | | |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 392.96 | 697.07 | 697.07 | | | |
| MAX. DEFLECTION, DL | in | 0.007 | 0.021 | 0.015 | | | |
| MAX. DEFLECTION, LL | in | 0.006 | 0.016 | 0.049 | | | |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.12 OK | < 0.2 OK | < 0.63 OK | | | |
| MAX. DEFLECTION, DL+LL | in | 0.013 | 0.037 | 0.064 | | | |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.18 OK | < 0.3 OK | < 0.95 OK | | | |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RR2 (Case 1)

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-16

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined Beam-by-Beam

| | |
|---|---|
| Fb + | 875.0 psi |
| Fb - | 875.0 psi |
| Fc - Prll | 600.0 psi |
| Fc - Perp | 625.0 psi |
| Fv | 170.0 psi |
| Ft | 425.0 psi |

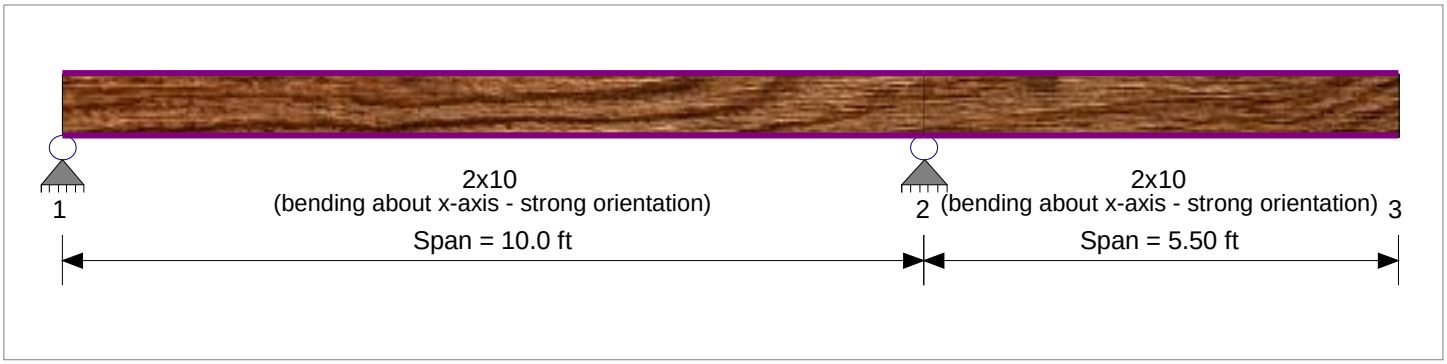
*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,300.0 ksi |
| Eminbend - xx | 470.0 ksi |
| Density | 31.210 pcf |

Repetitive Member Stress Increase

## Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1
Self Weight : D = 0.003007 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (RR)

Load for Span Number 2
Self Weight : D = 0.003007 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (RR)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.369** : 1 | Maximum Shear Stress Ratio | = | **0.177** : 1 |
| Section used for this span | | **2x10** NDS2018 | Section used for this span | | **2x10** NDS2018 |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 510.77 psi | fv: Actual | = | 37.66 psi |
| F'b | = | 1,383.59 psi | F'v | = | 212.50 psi |
| Load Combination | | +D+Lr+H, LL Comb Run (LL) | Load Combination | | +D+Lr+H, LL Comb Run (LL) |
| Location of maximum on span | = | 10.000 ft | Location of maximum on span | = | 9.274 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

### Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.140 in | Ratio = | 944 | >=360 | Span: 2 : Lr Only, LL Comb Run (*L) |
| Max Upward Transient Deflection | -0.082 in | Ratio = | 1610 | >=360 | Span: 2 : Lr Only, LL Comb Run (L*) |
| Max Downward Total Deflection | 0.213 in | Ratio = | 618 | >=180 | Span: 2 : +D+Lr+H, LL Comb Run (*L) |
| Max Upward Total Deflection | -0.025 in | Ratio = | 4764 | >=180 | Span: 1 : +D+Lr+H, LL Comb Run (*L) |

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Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RR2 (Case 1)

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+H | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.286 | 0.137 | 0.90 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 996.2 | 0.19 | 21.0 | 153.0 |
| Length = 5.50 ft | 2 | 0.286 | 0.112 | 0.90 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 996.2 | 0.16 | 17.2 | 153.0 |
| +D+L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.258 | 0.124 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,106.9 | 0.19 | 21.0 | 170.0 |
| Length = 5.50 ft | 2 | 0.258 | 0.101 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,106.9 | 0.16 | 17.2 | 170.0 |
| +D+L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.258 | 0.124 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,106.9 | 0.19 | 21.0 | 170.0 |
| Length = 5.50 ft | 2 | 0.258 | 0.101 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,106.9 | 0.16 | 17.2 | 170.0 |
| +D+L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.258 | 0.124 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,106.9 | 0.19 | 21.0 | 170.0 |
| Length = 5.50 ft | 2 | 0.258 | 0.101 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,106.9 | 0.16 | 17.2 | 170.0 |
| +D+Lr+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.369 | 0.145 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.91 | 510.8 | 1,383.6 | 0.28 | 30.8 | 212.5 |
| Length = 5.50 ft | 2 | 0.369 | 0.145 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.91 | 510.8 | 1,383.6 | 0.28 | 30.8 | 212.5 |
| +D+Lr+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.211 | 0.157 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.52 | 291.6 | 1,383.6 | 0.31 | 33.3 | 212.5 |
| Length = 5.50 ft | 2 | 0.206 | 0.081 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,383.6 | 0.16 | 17.2 | 212.5 |
| +D+Lr+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.369 | 0.177 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.91 | 510.8 | 1,383.6 | 0.35 | 37.7 | 212.5 |
| Length = 5.50 ft | 2 | 0.369 | 0.145 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.91 | 510.8 | 1,383.6 | 0.28 | 30.8 | 212.5 |
| +D+S+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.224 | 0.108 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,272.9 | 0.19 | 21.0 | 195.5 |
| Length = 5.50 ft | 2 | 0.224 | 0.088 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,272.9 | 0.16 | 17.2 | 195.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.328 | 0.129 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.81 | 454.3 | 1,383.6 | 0.25 | 27.4 | 212.5 |
| Length = 5.50 ft | 2 | 0.328 | 0.129 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.81 | 454.3 | 1,383.6 | 0.25 | 27.4 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.206 | 0.142 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,383.6 | 0.28 | 30.2 | 212.5 |
| Length = 5.50 ft | 2 | 0.206 | 0.081 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,383.6 | 0.16 | 17.2 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.328 | 0.158 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.81 | 454.3 | 1,383.6 | 0.31 | 33.5 | 212.5 |
| Length = 5.50 ft | 2 | 0.328 | 0.129 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.81 | 454.3 | 1,383.6 | 0.25 | 27.4 | 212.5 |
| +D+0.750L+0.750S+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.224 | 0.108 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,272.9 | 0.19 | 21.0 | 195.5 |
| Length = 5.50 ft | 2 | 0.224 | 0.088 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,272.9 | 0.16 | 17.2 | 195.5 |
| +D+0.750L+0.750S+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.224 | 0.108 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,272.9 | 0.19 | 21.0 | 195.5 |
| Length = 5.50 ft | 2 | 0.224 | 0.088 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,272.9 | 0.16 | 17.2 | 195.5 |
| +D+0.750L+0.750S+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.224 | 0.108 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,272.9 | 0.19 | 21.0 | 195.5 |
| Length = 5.50 ft | 2 | 0.224 | 0.088 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,272.9 | 0.16 | 17.2 | 195.5 |
| +D+0.60W+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.161 | 0.077 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.19 | 21.0 | 272.0 |
| Length = 5.50 ft | 2 | 0.161 | 0.063 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.16 | 17.2 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.257 | 0.101 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.81 | 454.3 | 1,771.0 | 0.25 | 27.4 | 272.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RR2 (Case 1)

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 5.50 ft | 2 | 0.257 | 0.101 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.81 | 454.3 | 1,771.0 | 0.25 | 27.4 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.161 | 0.111 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.28 | 30.2 | 272.0 |
| Length = 5.50 ft | 2 | 0.161 | 0.063 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.16 | 17.2 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.257 | 0.123 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.81 | 454.3 | 1,771.0 | 0.31 | 33.5 | 272.0 |
| Length = 5.50 ft | 2 | 0.257 | 0.101 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.81 | 454.3 | 1,771.0 | 0.25 | 27.4 | 272.0 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.161 | 0.077 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.19 | 21.0 | 272.0 |
| Length = 5.50 ft | 2 | 0.161 | 0.063 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.16 | 17.2 | 272.0 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.161 | 0.077 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.19 | 21.0 | 272.0 |
| Length = 5.50 ft | 2 | 0.161 | 0.063 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.16 | 17.2 | 272.0 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.161 | 0.077 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.19 | 21.0 | 272.0 |
| Length = 5.50 ft | 2 | 0.161 | 0.063 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.16 | 17.2 | 272.0 |
| +0.60D+0.60W+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.097 | 0.046 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.30 | 171.0 | 1,771.0 | 0.12 | 12.6 | 272.0 |
| Length = 5.50 ft | 2 | 0.097 | 0.038 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.30 | 171.0 | 1,771.0 | 0.10 | 10.3 | 272.0 |
| +D+0.70E+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.161 | 0.077 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.19 | 21.0 | 272.0 |
| Length = 5.50 ft | 2 | 0.161 | 0.063 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.16 | 17.2 | 272.0 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.161 | 0.077 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.19 | 21.0 | 272.0 |
| Length = 5.50 ft | 2 | 0.161 | 0.063 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.16 | 17.2 | 272.0 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.161 | 0.077 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.19 | 21.0 | 272.0 |
| Length = 5.50 ft | 2 | 0.161 | 0.063 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.16 | 17.2 | 272.0 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.161 | 0.077 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.19 | 21.0 | 272.0 |
| Length = 5.50 ft | 2 | 0.161 | 0.063 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.51 | 285.1 | 1,771.0 | 0.16 | 17.2 | 272.0 |
| +0.60D+0.70E+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 10.0 ft | 1 | 0.097 | 0.046 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.30 | 171.0 | 1,771.0 | 0.12 | 12.6 | 272.0 |
| Length = 5.50 ft | 2 | 0.097 | 0.038 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.30 | 171.0 | 1,771.0 | 0.10 | 10.3 | 272.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr+H, LL Comb Run (L*) | 0.0639 | 4.637 | +D+Lr+H, LL Comb Run (*L) | -0.0196 | 8.715 |
| 2 | +D+Lr+H, LL Comb Run (*L) | 0.2130 | 5.500 | | 0.0000 | 8.715 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from all Load Cases & Combinations | 0.250 | 0.723 |
| Max Upward from Load Combinations | 0.250 | 0.723 |
| Max Upward from Load Cases | 0.133 | 0.404 |
| Max Downward from all Load Cases & Combinations (Res | -0.040 | |
| Max Downward from Load Cases (Resisting Uplift) | -0.040 | |
| +D+H | 0.117 | 0.404 |
| +D+L+H, LL Comb Run (*L) | 0.117 | 0.404 |
| +D+L+H, LL Comb Run (L*) | 0.117 | 0.404 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam



LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RR2 (Case 1)

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| +D+L+H, LL Comb Run (LL) | 0.117 | 0.404 |
| +D+Lr+H, LL Comb Run (*L) | 0.077 | 0.590 |
| +D+Lr+H, LL Comb Run (L*) | 0.250 | 0.537 |
| +D+Lr+H, LL Comb Run (LL) | 0.210 | 0.723 |
| +D+S+H | 0.117 | 0.404 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | 0.087 | 0.543 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | 0.217 | 0.503 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | 0.187 | 0.643 |
| +D+0.750L+0.750S+H, LL Comb Run (*L) | 0.117 | 0.404 |
| +D+0.750L+0.750S+H, LL Comb Run (L*) | 0.117 | 0.404 |
| +D+0.750L+0.750S+H, LL Comb Run (LL) | 0.117 | 0.404 |
| +D+0.60W+H | 0.117 | 0.404 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | 0.087 | 0.543 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | 0.217 | 0.503 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | 0.187 | 0.643 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (*L) | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (L*) | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (LL) | 0.117 | 0.404 |
| +0.60D+0.60W+0.60H | 0.070 | 0.242 |
| +D+0.70E+H | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L) | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*) | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL) | 0.117 | 0.404 |
| +0.60D+0.70E+0.60H | 0.070 | 0.242 |
| D Only | 0.117 | 0.404 |
| Lr Only, LL Comb Run (*L) | -0.040 | 0.187 |
| Lr Only, LL Comb Run (L*) | 0.133 | 0.133 |
| Lr Only, LL Comb Run (LL) | 0.093 | 0.320 |
| H Only | | |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Cases | 0.133 | 0.404 |
| Max Downward from Load Cases (Resisting Uplift) | -0.040 | |
| D Only | 0.117 | 0.404 |
| Lr Only, LL Comb Run (*L) | -0.040 | 0.187 |
| Lr Only, LL Comb Run (L*) | 0.133 | 0.133 |
| Lr Only, LL Comb Run (LL) | 0.093 | 0.320 |
| H Only | | |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Combinations | 0.250 | 0.723 |
| +D+H | 0.117 | 0.404 |
| +D+L+H, LL Comb Run (*L) | 0.117 | 0.404 |
| +D+L+H, LL Comb Run (L*) | 0.117 | 0.404 |
| +D+L+H, LL Comb Run (LL) | 0.117 | 0.404 |
| +D+Lr+H, LL Comb Run (*L) | 0.077 | 0.590 |
| +D+Lr+H, LL Comb Run (L*) | 0.250 | 0.537 |
| +D+Lr+H, LL Comb Run (LL) | 0.210 | 0.723 |
| +D+S+H | 0.117 | 0.404 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | 0.087 | 0.543 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | 0.217 | 0.503 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | 0.187 | 0.643 |
| +D+0.750L+0.750S+H, LL Comb Run (*L) | 0.117 | 0.404 |
| +D+0.750L+0.750S+H, LL Comb Run (L*) | 0.117 | 0.404 |
| +D+0.750L+0.750S+H, LL Comb Run (LL) | 0.117 | 0.404 |
| +D+0.60W+H | 0.117 | 0.404 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | 0.087 | 0.543 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | 0.217 | 0.503 |

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www.fastructural.com

Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RR2 (Case 1)

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | 0.187 | 0.643 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (*L) | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (L*) | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (LL) | 0.117 | 0.404 |
| +0.60D+0.60W+0.60H | 0.070 | 0.242 |
| +D+0.70E+H | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L) | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*) | 0.117 | 0.404 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL) | 0.117 | 0.404 |
| +0.60D+0.70E+0.60H | 0.070 | 0.242 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 0.117 | 0.133 | | | | | |
| Support #2 | 0.404 | 0.320 | | | | | |

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Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RR2 (Case 2)

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-16

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined Beam-by-Beam

| | |
|---|---|
| Fb + | 875.0 psi |
| Fb - | 875.0 psi |
| Fc - Prll | 600.0 psi |
| Fc - Perp | 625.0 psi |
| Fv | 170.0 psi |
| Ft | 425.0 psi |

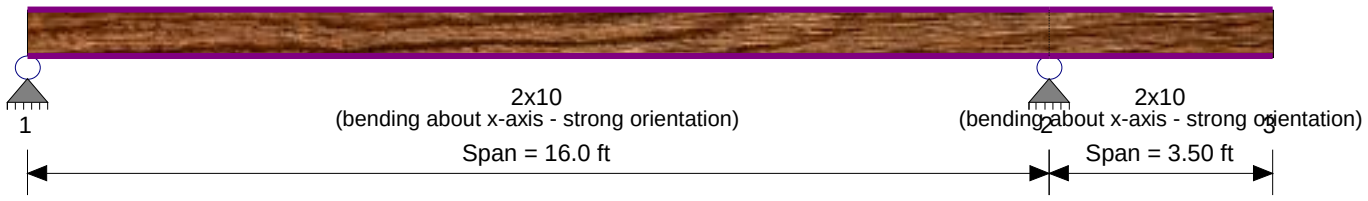
*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,300.0 ksi |
| Eminbend - xx | 470.0 ksi |
| Density | 31.210 pcf |

Repetitive Member Stress Increase

## Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1
Self Weight : D = 0.003007 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (RR)

Load for Span Number 2
Self Weight : D = 0.003007 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (RR)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | 0.740 : 1 | Maximum Shear Stress Ratio | = | 0.235 : 1 |
| Section used for this span | | 2x10 NDS2024 | Section used for this span | | 2x10 NDS2024 |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 1,023.70 psi | fv: Actual | = | 49.90 psi |
| F'b | = | 1,383.59 psi | F'v | = | 212.50 psi |
| Load Combination | | +D+Lr+H, LL Comb Run (L*) | Load Combination | | +D+Lr+H, LL Comb Run (LL) |
| Location of maximum on span | = | 7.777 ft | Location of maximum on span | = | 15.285 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.308 in | Ratio = | 623 | >=240 | Span: 1 : Lr Only, LL Comb Run (L*) |
| Max Upward Transient Deflection | -0.213 in | Ratio = | 392 | >=240 | Span: 2 : Lr Only, LL Comb Run (L*) |
| Max Downward Total Deflection | 0.652 in | Ratio = | 294 | >=180 | Span: 1 : +D+Lr+H, LL Comb Run (L*) |
| Max Upward Total Deflection | -0.423 in | Ratio = | 198 | >=180 | Span: 2 : +D+Lr+H, LL Comb Run (L*) |

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Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RR2 (Case 2)

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+H | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.549 | 0.182 | 0.90 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 996.2 | 0.26 | 27.9 | 153.0 |
| Length = 3.50 ft | 2 | 0.116 | 0.065 | 0.90 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 996.2 | 0.09 | 9.9 | 153.0 |
| +D+L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.494 | 0.164 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,106.9 | 0.26 | 27.9 | 170.0 |
| Length = 3.50 ft | 2 | 0.104 | 0.058 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,106.9 | 0.09 | 9.9 | 170.0 |
| +D+L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.494 | 0.164 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,106.9 | 0.26 | 27.9 | 170.0 |
| Length = 3.50 ft | 2 | 0.104 | 0.058 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,106.9 | 0.09 | 9.9 | 170.0 |
| +D+L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.494 | 0.164 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,106.9 | 0.26 | 27.9 | 170.0 |
| Length = 3.50 ft | 2 | 0.104 | 0.058 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,106.9 | 0.09 | 9.9 | 170.0 |
| +D+Lr+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.364 | 0.136 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.90 | 504.1 | 1,383.6 | 0.27 | 29.0 | 212.5 |
| Length = 3.50 ft | 2 | 0.149 | 0.084 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.37 | 206.8 | 1,383.6 | 0.16 | 17.8 | 212.5 |
| +D+Lr+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.740 | 0.230 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 1.82 | 1,023.7 | 1,383.6 | 0.45 | 48.8 | 212.5 |
| Length = 3.50 ft | 2 | 0.083 | 0.047 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,383.6 | 0.09 | 9.9 | 212.5 |
| +D+Lr+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.708 | 0.235 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 1.75 | 979.7 | 1,383.6 | 0.46 | 49.9 | 212.5 |
| Length = 3.50 ft | 2 | 0.149 | 0.084 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.37 | 206.8 | 1,383.6 | 0.16 | 17.8 | 212.5 |
| +D+S+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.430 | 0.142 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,272.9 | 0.26 | 27.9 | 195.5 |
| Length = 3.50 ft | 2 | 0.091 | 0.051 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,272.9 | 0.09 | 9.9 | 195.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.372 | 0.135 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.92 | 514.6 | 1,383.6 | 0.27 | 28.7 | 212.5 |
| Length = 3.50 ft | 2 | 0.133 | 0.075 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.33 | 184.0 | 1,383.6 | 0.15 | 15.8 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.654 | 0.205 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 1.61 | 904.4 | 1,383.6 | 0.40 | 43.6 | 212.5 |
| Length = 3.50 ft | 2 | 0.083 | 0.047 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,383.6 | 0.09 | 9.9 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.630 | 0.209 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 1.55 | 871.5 | 1,383.6 | 0.41 | 44.4 | 212.5 |
| Length = 3.50 ft | 2 | 0.133 | 0.075 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.33 | 184.0 | 1,383.6 | 0.15 | 15.8 | 212.5 |
| +D+0.750L+0.750S+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.430 | 0.142 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,272.9 | 0.26 | 27.9 | 195.5 |
| Length = 3.50 ft | 2 | 0.091 | 0.051 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,272.9 | 0.09 | 9.9 | 195.5 |
| +D+0.750L+0.750S+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.430 | 0.142 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,272.9 | 0.26 | 27.9 | 195.5 |
| Length = 3.50 ft | 2 | 0.091 | 0.051 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,272.9 | 0.09 | 9.9 | 195.5 |
| +D+0.750L+0.750S+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.430 | 0.142 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,272.9 | 0.26 | 27.9 | 195.5 |
| Length = 3.50 ft | 2 | 0.091 | 0.051 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,272.9 | 0.09 | 9.9 | 195.5 |
| +D+0.60W+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.309 | 0.102 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,771.0 | 0.26 | 27.9 | 272.0 |
| Length = 3.50 ft | 2 | 0.065 | 0.037 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,771.0 | 0.09 | 9.9 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.291 | 0.105 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.92 | 514.6 | 1,771.0 | 0.27 | 28.7 | 272.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam



LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RR2 (Case 2)

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 3.50 ft | 2 | 0.104 | 0.058 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.33 | 184.0 | 1,771.0 | 0.15 | 15.8 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.511 | 0.160 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 1.61 | 904.4 | 1,771.0 | 0.40 | 43.6 | 272.0 |
| Length = 3.50 ft | 2 | 0.065 | 0.037 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,771.0 | 0.09 | 9.9 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.492 | 0.163 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 1.55 | 871.5 | 1,771.0 | 0.41 | 44.4 | 272.0 |
| Length = 3.50 ft | 2 | 0.104 | 0.058 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.33 | 184.0 | 1,771.0 | 0.15 | 15.8 | 272.0 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.309 | 0.102 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,771.0 | 0.26 | 27.9 | 272.0 |
| Length = 3.50 ft | 2 | 0.065 | 0.037 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,771.0 | 0.09 | 9.9 | 272.0 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.309 | 0.102 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,771.0 | 0.26 | 27.9 | 272.0 |
| Length = 3.50 ft | 2 | 0.065 | 0.037 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,771.0 | 0.09 | 9.9 | 272.0 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.309 | 0.102 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,771.0 | 0.26 | 27.9 | 272.0 |
| Length = 3.50 ft | 2 | 0.065 | 0.037 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,771.0 | 0.09 | 9.9 | 272.0 |
| +0.60D+0.60W+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.185 | 0.061 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.58 | 328.1 | 1,771.0 | 0.15 | 16.7 | 272.0 |
| Length = 3.50 ft | 2 | 0.039 | 0.022 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.12 | 69.3 | 1,771.0 | 0.06 | 6.0 | 272.0 |
| +D+0.70E+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.309 | 0.102 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,771.0 | 0.26 | 27.9 | 272.0 |
| Length = 3.50 ft | 2 | 0.065 | 0.037 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,771.0 | 0.09 | 9.9 | 272.0 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.309 | 0.102 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,771.0 | 0.26 | 27.9 | 272.0 |
| Length = 3.50 ft | 2 | 0.065 | 0.037 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,771.0 | 0.09 | 9.9 | 272.0 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.309 | 0.102 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,771.0 | 0.26 | 27.9 | 272.0 |
| Length = 3.50 ft | 2 | 0.065 | 0.037 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,771.0 | 0.09 | 9.9 | 272.0 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.309 | 0.102 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.97 | 546.8 | 1,771.0 | 0.26 | 27.9 | 272.0 |
| Length = 3.50 ft | 2 | 0.065 | 0.037 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.21 | 115.4 | 1,771.0 | 0.09 | 9.9 | 272.0 |
| +0.60D+0.70E+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 16.0 ft | 1 | 0.185 | 0.061 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.58 | 328.1 | 1,771.0 | 0.15 | 16.7 | 272.0 |
| Length = 3.50 ft | 2 | 0.039 | 0.022 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.15 | 0.12 | 69.3 | 1,771.0 | 0.06 | 6.0 | 272.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr+H, LL Comb Run (L*) | 0.6519 | 7.955 | | 0.0000 | 0.000 |
| 2 | | 0.0000 | 7.955 | +D+Lr+H, LL Comb Run (L*) | -0.4231 | 3.500 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from all Load Cases & Combinations | 0.469 | 0.715 |
| Max Upward from Load Combinations | 0.469 | 0.715 |
| Max Upward from Load Cases | 0.256 | 0.399 |
| Max Downward from all Load Cases & Combinations (Res | -0.010 | |
| Max Downward from Load Cases (Resisting Uplift) | -0.010 | |
| +D+H | 0.256 | 0.399 |
| +D+L+H, LL Comb Run (*L) | 0.256 | 0.399 |
| +D+L+H, LL Comb Run (L*) | 0.256 | 0.399 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam



LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RR2 (Case 2)

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| +D+L+H, LL Comb Run (LL) | 0.256 | 0.399 |
| +D+Lr+H, LL Comb Run (*L) | 0.246 | 0.503 |
| +D+Lr+H, LL Comb Run (L*) | 0.469 | 0.612 |
| +D+Lr+H, LL Comb Run (LL) | 0.459 | 0.715 |
| +D+S+H | 0.256 | 0.399 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | 0.248 | 0.477 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | 0.416 | 0.559 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | 0.408 | 0.636 |
| +D+0.750L+0.750S+H, LL Comb Run (*L) | 0.256 | 0.399 |
| +D+0.750L+0.750S+H, LL Comb Run (L*) | 0.256 | 0.399 |
| +D+0.750L+0.750S+H, LL Comb Run (LL) | 0.256 | 0.399 |
| +D+0.60W+H | 0.256 | 0.399 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | 0.248 | 0.477 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | 0.416 | 0.559 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | 0.408 | 0.636 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (*L) | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (L*) | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (LL) | 0.256 | 0.399 |
| +0.60D+0.60W+0.60H | 0.154 | 0.240 |
| +D+0.70E+H | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L) | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*) | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL) | 0.256 | 0.399 |
| +0.60D+0.70E+0.60H | 0.154 | 0.240 |
| D Only | 0.256 | 0.399 |
| Lr Only, LL Comb Run (*L) | -0.010 | 0.103 |
| Lr Only, LL Comb Run (L*) | 0.213 | 0.213 |
| Lr Only, LL Comb Run (LL) | 0.203 | 0.316 |
| H Only | | |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Cases | 0.256 | 0.399 |
| Max Downward from Load Cases (Resisting Uplift) | -0.010 | |
| D Only | 0.256 | 0.399 |
| Lr Only, LL Comb Run (*L) | -0.010 | 0.103 |
| Lr Only, LL Comb Run (L*) | 0.213 | 0.213 |
| Lr Only, LL Comb Run (LL) | 0.203 | 0.316 |
| H Only | | |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Combinations | 0.469 | 0.715 |
| +D+H | 0.256 | 0.399 |
| +D+L+H, LL Comb Run (*L) | 0.256 | 0.399 |
| +D+L+H, LL Comb Run (L*) | 0.256 | 0.399 |
| +D+L+H, LL Comb Run (LL) | 0.256 | 0.399 |
| +D+Lr+H, LL Comb Run (*L) | 0.246 | 0.503 |
| +D+Lr+H, LL Comb Run (L*) | 0.469 | 0.612 |
| +D+Lr+H, LL Comb Run (LL) | 0.459 | 0.715 |
| +D+S+H | 0.256 | 0.399 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | 0.248 | 0.477 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | 0.416 | 0.559 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | 0.408 | 0.636 |
| +D+0.750L+0.750S+H, LL Comb Run (*L) | 0.256 | 0.399 |
| +D+0.750L+0.750S+H, LL Comb Run (L*) | 0.256 | 0.399 |
| +D+0.750L+0.750S+H, LL Comb Run (LL) | 0.256 | 0.399 |
| +D+0.60W+H | 0.256 | 0.399 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | 0.248 | 0.477 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | 0.416 | 0.559 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RR2 (Case 2)

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | 0.408 | 0.636 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (*L) | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (L*) | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run (LL) | 0.256 | 0.399 |
| +0.60D+0.60W+0.60H | 0.154 | 0.240 |
| +D+0.70E+H | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L) | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*) | 0.256 | 0.399 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL) | 0.256 | 0.399 |
| +0.60D+0.70E+0.60H | 0.154 | 0.240 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 0.256 | 0.213 | | | | | |
| Support #2 | 0.399 | 0.316 | | | | | |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG2-Main Building

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-16

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

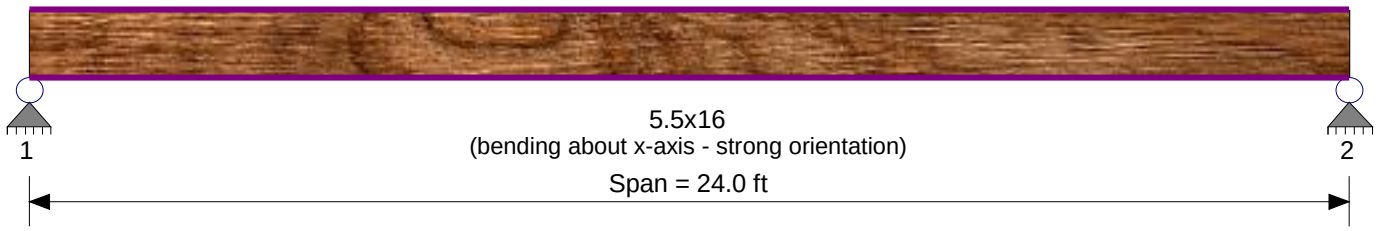
Wood Species : DF/DF
Wood Grade : 24F-V8

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 2,400.0 psi |
| Fb - | 2,400.0 psi |
| Fc - Prll | 1,650.0 psi |
| Fc - Perp | 650.0 psi |
| Fv | 265.0 psi |
| Ft | 1,100.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,800.0 ksi |
| Eminbend - xx | 950.0 ksi |
| Ebend- yy | 1,600.0 ksi |
| Eminbend - yy | 850.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Self Weight : D = 0.01907 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 11.0 ft, (RR)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.634** : 1 | Maximum Shear Stress Ratio | = | **0.271** : 1 |
| Section used for this span | | **5.5x16** | Section used for this span | | **5.5x16** |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 1,811.72 psi | fv: Actual | = | 89.63 psi |
| F'b | = | 2,856.02 psi | F'v | = | 331.25 psi |
| Load Combination | | +D+Lr | Load Combination | | +D+Lr |
| Location of maximum on span | = | 12.000 ft | Location of maximum on span | = | 0.000 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.489 in | Ratio = | 589 | >=360 | Span: 1 : Lr Only |
| Max Upward Transient Deflection | 0 in | Ratio = | 0 | >=360 | n/a |
| Max Downward Total Deflection | 1.093 in | Ratio = | 263 | >=240 | Span: 1 : +D+Lr |
| Max Upward Total Deflection | 0 in | Ratio = | 0 | >=240 | n/a |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 24.0 ft | 1 | 0.487 | 0.208 | 0.90 | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | 19.59 | 1,001.7 | 2,056.3 | 2.91 | 49.6 | 238.5 |
| +D+Lr | | | | | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 24.0 ft | 1 | 0.634 | 0.271 | 1.25 | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | 35.43 | 1,811.7 | 2,856.0 | 5.26 | 89.6 | 331.3 |
| +D+0.750Lr | | | | | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 24.0 ft | 1 | 0.563 | 0.240 | 1.25 | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | 31.47 | 1,609.2 | 2,856.0 | 4.67 | 79.6 | 331.3 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG2-Main Building

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.60D | | | | | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 24.0 ft | **1** | 0.164 | 0.070 | 1.60 | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | 11.75 | 601.0 | 3,655.7 | 1.74 | 29.7 | 424.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr | 1.0934 | 12.088 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from all Load Cases & Combinations | 5.905 | 5.905 |
| Max Upward from Load Combinations | 5.905 | 5.905 |
| Max Upward from Load Cases | 3.265 | 3.265 |
| D Only | 3.265 | 3.265 |
| +D+Lr | 5.905 | 5.905 |
| +D+0.750Lr | 5.245 | 5.245 |
| +0.60D | 1.959 | 1.959 |
| Lr Only | 2.640 | 2.640 |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Cases | 3.265 | 3.265 |
| D Only | 3.265 | 3.265 |
| Lr Only | 2.640 | 2.640 |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Combinations | 5.905 | 5.905 |
| +D+Lr | 5.905 | 5.905 |
| +D+0.750Lr | 5.245 | 5.245 |
| +0.60D | 1.959 | 1.959 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 3.265 | 2.640 | | | | | |
| Support #2 | 3.265 | 2.640 | | | | | |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RDG3-Main Building

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-16

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

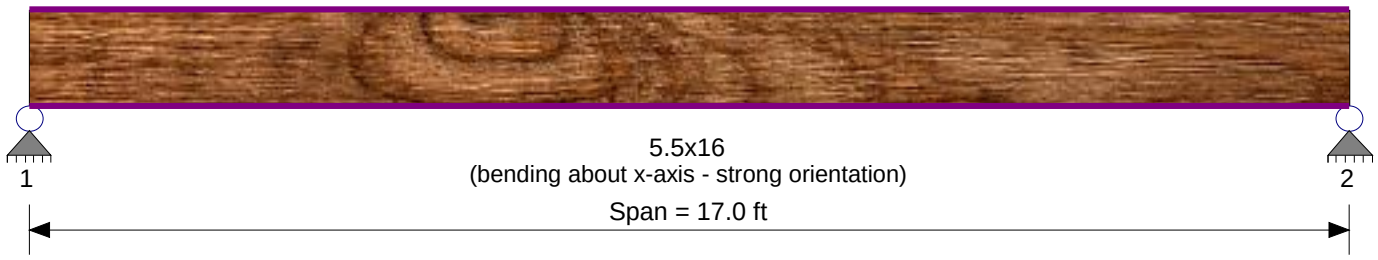
Wood Species : DF/DF
Wood Grade : 24F-V8

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 2,400.0 psi |
| Fb - | 2,400.0 psi |
| Fc - Prll | 1,650.0 psi |
| Fc - Perp | 650.0 psi |
| Fv | 265.0 psi |
| Ft | 1,100.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,800.0 ksi |
| Eminbend - xx | 950.0 ksi |
| Ebend- yy | 1,600.0 ksi |
| Eminbend - yy | 850.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Self Weight : D = 0.01907 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 11.0 ft, (RR)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.307** : 1 | Maximum Shear Stress Ratio | = | **0.182** : 1 |
| Section used for this span | | **5.5x16** | Section used for this span | | **5.5x16** |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 909.01 psi | fv: Actual | = | 60.37 psi |
| F'b | = | 2,956.23 psi | F'v | = | 331.25 psi |
| Load Combination | | +D+Lr | Load Combination | | +D+Lr |
| Location of maximum on span | = | 8.500 ft | Location of maximum on span | = | 0.000 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.123 in | Ratio = | 1657 | >=360 | Span: 1 : Lr Only |
| Max Upward Transient Deflection | 0 in | Ratio = | 0 | >=360 | n/a |
| Max Downward Total Deflection | 0.275 in | Ratio = | 741 | >=240 | Span: 1 : +D+Lr |
| Max Upward Total Deflection | 0 in | Ratio = | 0 | >=240 | n/a |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 17.0 ft | 1 | 0.236 | 0.140 | 0.90 | 1.00 | 1.00 | 1.00 | 0.985 | 1.00 | 1.00 | 1.00 | 9.83 | 502.6 | 2,128.5 | 1.96 | 33.4 | 238.5 |
| +D+Lr | | | | | 1.00 | 1.00 | 1.00 | 0.985 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 17.0 ft | 1 | 0.307 | 0.182 | 1.25 | 1.00 | 1.00 | 1.00 | 0.985 | 1.00 | 1.00 | 1.00 | 17.78 | 909.0 | 2,956.2 | 3.54 | 60.4 | 331.3 |
| +D+0.750Lr | | | | | 1.00 | 1.00 | 1.00 | 0.985 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 17.0 ft | 1 | 0.273 | 0.162 | 1.25 | 1.00 | 1.00 | 1.00 | 0.985 | 1.00 | 1.00 | 1.00 | 15.79 | 807.4 | 2,956.2 | 3.15 | 53.6 | 331.3 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG3-Main Building

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.60D | | | | | 1.00 | 1.00 | 1.00 | 0.985 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 17.0 ft | **1** | 0.080 | 0.047 | 1.60 | 1.00 | 1.00 | 1.00 | 0.985 | 1.00 | 1.00 | 1.00 | 5.90 | 301.6 | 3,784.0 | 1.17 | 20.0 | 424.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr | 0.2752 | 8.562 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from all Load Cases & Combinations | 4.183 | 4.183 |
| Max Upward from Load Combinations | 4.183 | 4.183 |
| Max Upward from Load Cases | 2.313 | 2.313 |
| D Only | 2.313 | 2.313 |
| +D+Lr | 4.183 | 4.183 |
| +D+0.750Lr | 3.715 | 3.715 |
| +0.60D | 1.388 | 1.388 |
| Lr Only | 1.870 | 1.870 |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Cases | 2.313 | 2.313 |
| D Only | 2.313 | 2.313 |
| Lr Only | 1.870 | 1.870 |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Combinations | 4.183 | 4.183 |
| +D+Lr | 4.183 | 4.183 |
| +D+0.750Lr | 3.715 | 3.715 |
| +0.60D | 1.388 | 1.388 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 2.313 | 1.870 | | | | | |
| Support #2 | 2.313 | 1.870 | | | | | |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG4-Main Building

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-16

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

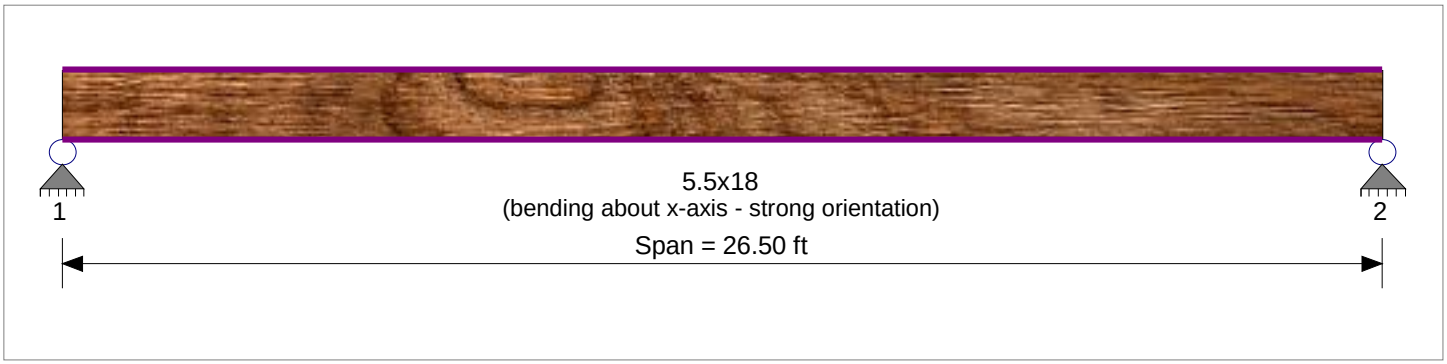
Wood Species : DF/DF
Wood Grade : 24F-V8

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 2,400.0 psi |
| Fb - | 2,400.0 psi |
| Fc - Prll | 1,650.0 psi |
| Fc - Perp | 650.0 psi |
| Fv | 265.0 psi |
| Ft | 1,100.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,800.0 ksi |
| Eminbend - xx | 950.0 ksi |
| Ebend- yy | 1,600.0 ksi |
| Eminbend - yy | 850.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Self Weight : D = 0.02146 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 11.0 ft, (RR)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.627** : 1 | Maximum Shear Stress Ratio | = | **0.267** : 1 |
| Section used for this span | | **5.5x18** NDS2018 | Section used for this span | | **5.5x18** NDS2018 |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 1,753.70 psi | fv: Actual | = | 88.40 psi |
| F'b | = | 2,794.75 psi | F'v | = | 331.25 psi |
| Load Combination | | +D+Lr | Load Combination | | +D+Lr |
| Location of maximum on span | = | 13.250 ft | Location of maximum on span | = | 25.049 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.510 in | Ratio = | 623 | >=360 | Span: 1 : Lr Only |
| Max Upward Transient Deflection | 0 in | Ratio = | 0 | >=360 | n/a |
| Max Downward Total Deflection | 1.147 in | Ratio = | 277 | >=240 | Span: 1 : +D+Lr |
| Max Upward Total Deflection | 0 in | Ratio = | 0 | >=240 | n/a |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 26.50 ft | 1 | 0.484 | 0.206 | 0.90 | 1.00 | 1.00 | 1.00 | 0.932 | 1.00 | 1.00 | 1.00 | 24.09 | 973.4 | 2,012.2 | 3.24 | 49.1 | 238.5 |
| +D+Lr | | | | | 1.00 | 1.00 | 1.00 | 0.932 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 26.50 ft | 1 | 0.627 | 0.267 | 1.25 | 1.00 | 1.00 | 1.00 | 0.932 | 1.00 | 1.00 | 1.00 | 43.40 | 1,753.7 | 2,794.7 | 5.83 | 88.4 | 331.3 |
| +D+0.750Lr | | | | | 1.00 | 1.00 | 1.00 | 0.932 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 26.50 ft | 1 | 0.558 | 0.237 | 1.25 | 1.00 | 1.00 | 1.00 | 0.932 | 1.00 | 1.00 | 1.00 | 38.58 | 1,558.6 | 2,794.7 | 5.19 | 78.6 | 331.3 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG4-Main Building

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.60D | | | | | 1.00 | 1.00 | 1.00 | 0.932 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 26.50 ft | 1 | 0.163 | 0.069 | 1.60 | 1.00 | 1.00 | 1.00 | 0.932 | 1.00 | 1.00 | 1.00 | 14.46 | 584.1 | 3,577.3 | 1.94 | 29.4 | 424.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr | 1.1470 | 13.347 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from all Load Cases & Combinations | 6.552 | 6.552 |
| Max Upward from Load Combinations | 6.552 | 6.552 |
| Max Upward from Load Cases | 3.637 | 3.637 |
| D Only | 3.637 | 3.637 |
| +D+Lr | 6.552 | 6.552 |
| +D+0.750Lr | 5.823 | 5.823 |
| +0.60D | 2.182 | 2.182 |
| Lr Only | 2.915 | 2.915 |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Cases | 3.637 | 3.637 |
| D Only | 3.637 | 3.637 |
| Lr Only | 2.915 | 2.915 |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Combinations | 6.552 | 6.552 |
| +D+Lr | 6.552 | 6.552 |
| +D+0.750Lr | 5.823 | 5.823 |
| +0.60D | 2.182 | 2.182 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 3.637 | 2.915 | | | | | |
| Support #2 | 3.637 | 2.915 | | | | | |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RB1-Main Building

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-16

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

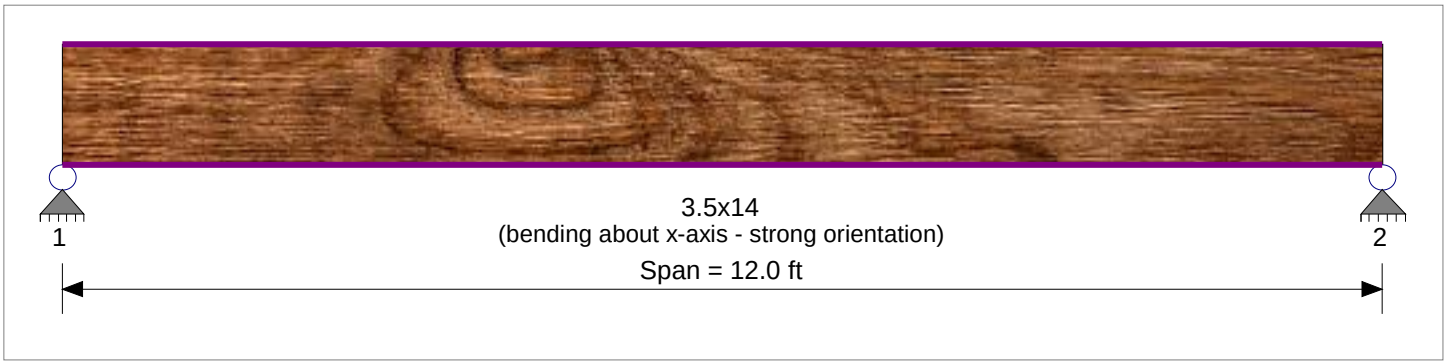
Wood Species : DF/DF
Wood Grade : 24F-V8

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 2,400.0 psi |
| Fb - | 2,400.0 psi |
| Fc - Prll | 1,650.0 psi |
| Fc - Perp | 650.0 psi |
| Fv | 265.0 psi |
| Ft | 1,100.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,800.0 ksi |
| Eminbend - xx | 950.0 ksi |
| Ebend- yy | 1,600.0 ksi |
| Eminbend - yy | 850.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Self Weight : D = 0.01062 k/ft
Uniform Load : D = 0.0130, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (RR)

Linked Load(s)
Beam RDG2-Main Building, Support 2: D = 3.265, Lr = 2.640 k on Span 1 @ 2.5 ft
Beam RDG3-Main Building, Support 1: D = 2.313, Lr = 1.870 k on Span 1 @ 2.5 ft

## DESIGN SUMMARY — bending about x-axis - strong orientation — Design OK

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | 0.720 : 1 | Maximum Shear Stress Ratio | = | 0.763 : 1 |
| Section used for this span | | 3.5x14 | Section used for this span | | 3.5x14 |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 2,160.24 psi | fv: Actual | = | 252.58 psi |
| F'b | = | 3,000.00 psi | F'v | = | 331.25 psi |
| Load Combination | | +D+Lr | Load Combination | | +D+Lr |
| Location of maximum on span | = | 2.496 ft | Location of maximum on span | = | 0.000 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

### Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.126 in | Ratio = | 1140 | >=360 | Span: 1 : Lr Only |
| Max Upward Transient Deflection | 0 in | Ratio = | 0 | >=360 | n/a |
| Max Downward Total Deflection | 0.281 in | Ratio = | 512 | >=240 | Span: 1 : +D+Lr |
| Max Upward Total Deflection | 0 in | Ratio = | 0 | >=240 | n/a |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 12.0 ft | 1 | 0.552 | 0.584 | 0.90 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 11.35 | 1,191.6 | 2,160.0 | 4.55 | 139.3 | 238.5 |
| +D+Lr | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 12.0 ft | 1 | 0.720 | 0.763 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 20.58 | 2,160.2 | 3,000.0 | 8.25 | 252.6 | 331.3 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RB1-Main Building

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+0.750Lr | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 12.0 ft | 1 | 0.639 | 0.677 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 18.28 | 1,918.1 | 3,000.0 | 7.33 | 224.3 | 331.3 |
| +0.60D | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 12.0 ft | 1 | 0.186 | 0.197 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 6.81 | 715.0 | 3,840.0 | 2.73 | 83.6 | 424.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr | 0.2808 | 5.299 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from all Load Cases & Combinations | 8.313 | 2.429 |
| Max Upward from Load Combinations | 8.313 | 2.429 |
| Max Upward from Load Cases | 4.583 | 1.329 |
| D Only | 4.583 | 1.329 |
| +D+Lr | 8.313 | 2.429 |
| +D+0.750Lr | 7.380 | 2.154 |
| +0.60D | 2.750 | 0.798 |
| Lr Only | 3.730 | 1.099 |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Cases | 4.583 | 1.329 |
| D Only | 4.583 | 1.329 |
| Lr Only | 3.730 | 1.099 |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Combinations | 8.313 | 2.429 |
| +D+Lr | 8.313 | 2.429 |
| +D+0.750Lr | 7.380 | 2.154 |
| +0.60D | 2.750 | 0.798 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 4.583 | 3.730 | | | | | |
| Support #2 | 1.329 | 1.099 | | | | | |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RB7-Main Building

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-16

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

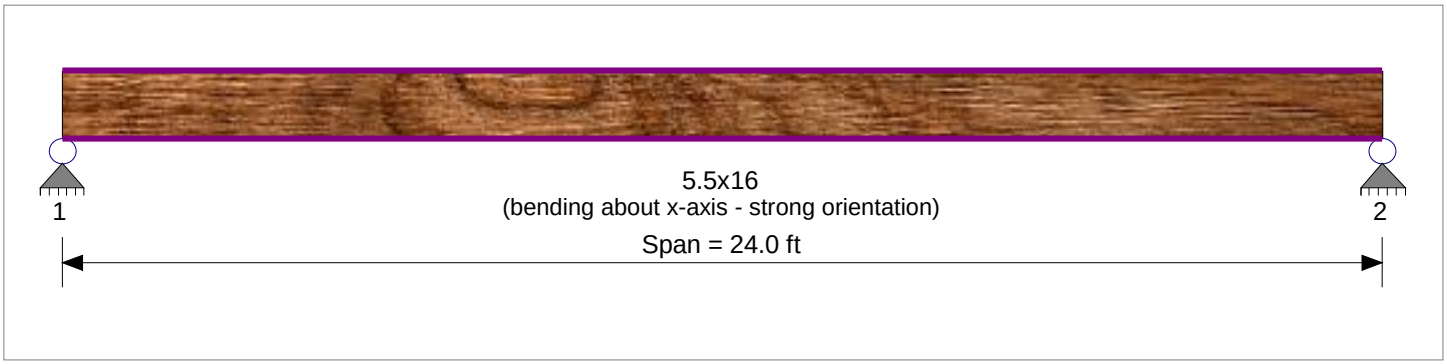
Wood Species : DF/DF
Wood Grade : 24F-V8

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 2,400.0 psi |
| Fb - | 2,400.0 psi |
| Fc - Prll | 1,650.0 psi |
| Fc - Perp | 650.0 psi |
| Fv | 265.0 psi |
| Ft | 1,100.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,800.0 ksi |
| Eminbend - xx | 950.0 ksi |
| Ebend- yy | 1,600.0 ksi |
| Eminbend - yy | 850.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Self Weight : D = 0.01907 k/ft
Uniform Load : D = 0.0130, Lr = 0.020 ksf, Tributary Width = 6.50 ft, (RR)

Uniform Load : D = 0.0180 ksf, Tributary Width = 6.0 ft, (WALL)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.440** : 1 | Maximum Shear Stress Ratio | = | **0.188** : 1 |
| Section used for this span | | **5.5x16** | Section used for this span | | **5.5x16** |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 1,257.61 psi | fv: Actual | = | 62.22 psi |
| F'b | = | 2,856.02 psi | F'v | = | 331.25 psi |
| Load Combination | | +D+Lr | Load Combination | | +D+Lr |
| Location of maximum on span | = | 12.000 ft | Location of maximum on span | = | 0.000 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.289 in | Ratio = | 997 | >=360 | Span: 1 : Lr Only |
| Max Upward Transient Deflection | 0 in | Ratio = | 0 | >=360 | n/a |
| Max Downward Total Deflection | 0.759 in | Ratio = | 379 | >=240 | Span: 1 : +D+Lr |
| Max Upward Total Deflection | 0 in | Ratio = | 0 | >=240 | n/a |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 24.0 ft | 1 | 0.379 | 0.162 | 0.90 | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | 15.23 | 779.0 | 2,056.3 | 2.26 | 38.5 | 238.5 |
| +D+Lr | | | | | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 24.0 ft | 1 | 0.440 | 0.188 | 1.25 | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | 24.59 | 1,257.6 | 2,856.0 | 3.65 | 62.2 | 331.3 |
| +D+0.750Lr | | | | | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RB7-Main Building

## Maximum Forces & Stresses for Load Combinations

| Load Combination | | Max Stress Ratios | | | | | | | | | | Moment Values | | | Shear Values | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment Length | Span # | M | V | CD | CM | $C_t$ | CLx | $C_V$ | Cfu | $C_i$ | $C_r$ | M | fb | F'b | V | fv | F'v |
| Length = 24.0 ft | **1** | 0.398 | 0.170 | 1.25 | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | 22.25 | 1,137.9 | 2,856.0 | 3.30 | 56.3 | 331.3 |
| +0.60D | | | | | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 24.0 ft | **1** | 0.128 | 0.055 | 1.60 | 1.00 | 1.00 | 1.00 | 0.952 | 1.00 | 1.00 | 1.00 | 9.14 | 467.4 | 3,655.7 | 1.36 | 23.1 | 424.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr | 0.7590 | 12.088 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from all Load Cases & Combinations | 4.099 | 4.099 |
| Max Upward from Load Combinations | 4.099 | 4.099 |
| Max Upward from Load Cases | 2.539 | 2.539 |
| D Only | 2.539 | 2.539 |
| +D+Lr | 4.099 | 4.099 |
| +D+0.750Lr | 3.709 | 3.709 |
| +0.60D | 1.523 | 1.523 |
| Lr Only | 1.560 | 1.560 |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Cases | 2.539 | 2.539 |
| D Only | 2.539 | 2.539 |
| Lr Only | 1.560 | 1.560 |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Combinations | 4.099 | 4.099 |
| +D+Lr | 4.099 | 4.099 |
| +D+0.750Lr | 3.709 | 3.709 |
| +0.60D | 1.523 | 1.523 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 2.539 | 1.560 | | | | | |
| Support #2 | 2.539 | 1.560 | | | | | |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** CB2(HOUSE)

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : IBC 2021

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

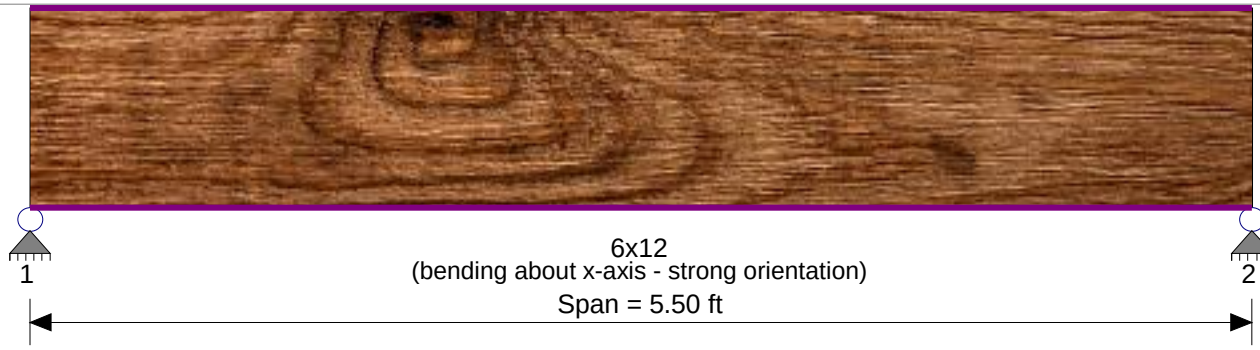
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 1,350.0 psi |
| Fb - | 1,350.0 psi |
| Fc - Prll | 925.0 psi |
| Fc - Perp | 625.0 psi |
| Fv | 170.0 psi |
| Ft | 675.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,600.0 ksi |
| Eminbend - xx | 580.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Self Weight : D = 0.01371 k/ft
Point Load : D = 3.496, Lr = 3.040 k @ 1.750 ft, (RDG1)
Point Load : D = 3.496, Lr = 3.040 k @ 1.750 ft, (RDG1)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.916** : 1 | Maximum Shear Stress Ratio | = | **0.997** : 1 |
| Section used for this span | | **6x12** NDS2018 *(bending about x-axis - strong orientation)* | Section used for this span | | **6x12** NDS2018 *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 1,545.14 psi | fv: Actual | = | 211.96 psi |
| F'b | = | 1,687.50 psi | F'v | = | 212.50 psi |
| Load Combination | | +D+Lr | Load Combination | | +D+Lr |
| Location of maximum on span | = | 1.746 ft | Location of maximum on span | = | 0.000 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

### Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.027 in | Ratio = | 2406 | >=360 | Span: 1 : Lr Only |
| Max Upward Transient Deflection | 0 in | Ratio = | 0 | >=360 | n/a |
| Max Downward Total Deflection | 0.059 in | Ratio = | 1114 | >=240 | Span: 1 : +D+Lr |
| Max Upward Total Deflection | 0 in | Ratio = | 0 | >=240 | n/a |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 5.50 ft | 1 | 0.682 | 0.743 | 0.90 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 8.37 | 828.5 | 1,215.0 | 4.79 | 113.6 | 153.0 |
| +D+Lr | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 5.50 ft | 1 | 0.916 | 0.997 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 15.61 | 1,545.1 | 1,687.5 | 8.94 | 212.0 | 212.5 |
| +D+0.750Lr | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 5.50 ft | 1 | 0.809 | 0.882 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 13.80 | 1,366.0 | 1,687.5 | 7.90 | 187.4 | 212.5 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** CB2(HOUSE)

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.60D | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 5.50 ft | 1 | 0.230 | 0.251 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 5.02 | 497.1 | 2,160.0 | 2.88 | 68.2 | 272.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr | 0.0592 | 2.509 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from all Load Cases & Combinations | 8.950 | 4.197 |
| Max Upward from Load Combinations | 8.950 | 4.197 |
| Max Upward from Load Cases | 4.805 | 2.262 |
| D Only | 4.805 | 2.262 |
| +D+Lr | 8.950 | 4.197 |
| +D+0.750Lr | 7.914 | 3.713 |
| +0.60D | 2.883 | 1.357 |
| Lr Only | 4.145 | 1.935 |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Cases | 4.805 | 2.262 |
| D Only | 4.805 | 2.262 |
| Lr Only | 4.145 | 1.935 |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from Load Combinations | 8.950 | 4.197 |
| +D+Lr | 8.950 | 4.197 |
| +D+0.750Lr | 7.914 | 3.713 |
| +0.60D | 2.883 | 1.357 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 4.805 | 4.145 | | | | | |
| Support #2 | 2.262 | 1.935 | | | | | |

## COLUMN AXIAL CAPACITY

**WOOD PROPERTIES:**

Use Douglas Fir-Larch
Species: Stud
E = 1,400,000 psi
F'c = 850 psi
E' = 1,400,000 psi
Fc* = 935 psi

| | |
|---|---|
| $C_F$ = | 1.1 |
| $C_m$ = | 1.0 |
| CT = | 1.0 |
| $C_t$ = | 1.0 |
| Ci = | 1.0 |
| $C_D$ = | 1.0 |

Kce = 0.30
c = 0.80
Kf = 1.00
(for bolted or nailed members)

Buckling about x-axis? YES
Check le/d reqmt. OK!

| COL | No. of Plies | Size | $d_y$ | $d_x$ | $le_{x,y}$ | le/dy | le/dx | (le/d) | Fce | Fce/Fc* | 1+ Fce/Fc* / 2c | $C_P$ | F'c | Column Capacity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C01 | 1 - | 2x 4 | 1.5 | 3.50 | 10 | 80.0 | 34.3 | 34.3 | 357.29 | 0.382 | 0.86 | 0.346 | 323.16 | 1.70 kips |
| C02 | 2 - | 2x 4 | 3.0 | 3.50 | 10 | 40.0 | 34.3 | 34.3 | 357.29 | 0.382 | 0.86 | 0.346 | 323.16 | 3.39 kips |
| C03 | 1 - | 2x 6 | 1.5 | 5.50 | 10 | 80.0 | 21.8 | 21.8 | 882.29 | 0.944 | 1.21 | 0.671 | 627.00 | 5.17 kips |
| C04 | 2 - | 2x 6 | 3.0 | 5.50 | 10 | 40.0 | 21.8 | 21.8 | 882.29 | 0.944 | 1.21 | 0.671 | 627.00 | 10.35 kips |
| C05 | 1 - | 2x 8 | 1.5 | 7.50 | 10 | 80.0 | 16.0 | 16.0 | 1,640.63 | 1.755 | 1.72 | 0.844 | 788.87 | 8.87 kips |
| C06 | 2 - | 2x 8 | 3.0 | 7.25 | 10 | 40.0 | 16.6 | 16.6 | 1,533.07 | 1.640 | 1.65 | 0.830 | 775.95 | 16.88 kips |

**WOOD PROPERTIES:**

Use Douglas Fir-Larch
Species: No.1
E = 1,700,000 psi
F'c = 1,500 psi
E' = 1,700,000 psi
Fc* = 1,650 psi

| | |
|---|---|
| $C_F$ = | 1.1 |
| $C_m$ = | 1.0 |
| CT = | 1.0 |
| $C_t$ = | 1.0 |
| Ci = | 1.0 |
| $C_D$ = | 1.0 |

Kce = 0.30
c = 0.80
Kf = 1.00
(for bolted or nailed members)

Buckling about x-axis? YES
Check le/d reqmt. OK!

| COL | No. of Plies | Size | $d_y$ | $d_x$ | $le_{x,y}$ | le/dy | le/dx | (le/d) | Fce | Fce/Fc* | 1+ Fce/Fc* / 2c | $C_P$ | F'c | Column Capacity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C07 | 1 - | 4x 4 | 3.5 | 3.50 | 10 | 34.3 | 34.3 | 34.3 | 357.29 | 0.382 | 0.86 | 0.346 | 323.16 | 3.96 kips |
| C08 | 1 - | 4x 6 | 3.5 | 5.50 | 10 | 34.3 | 21.8 | 21.8 | 882.29 | 0.944 | 1.21 | 0.671 | 627.00 | 12.07 kips |
| C09 | 1 - | 4x 8 | 3.5 | 7.50 | 10 | 34.3 | 16.0 | 16.0 | 1,640.63 | 1.755 | 1.72 | 0.844 | 788.87 | 20.71 kips |
| C10 | 1 - | 6x 6 | 5.5 | 5.50 | 10 | 21.8 | 21.8 | 21.8 | 882.29 | 0.944 | 1.21 | 0.671 | 627.00 | 18.97 kips |
| C11 | 1 - | 6x 8 | 5.5 | 7.25 | 10 | 21.8 | 16.6 | 16.6 | 1,533.07 | 1.640 | 1.65 | 0.830 | 775.95 | 30.94 kips |

**Note:**

$Kc_E$ = 0.510 - 0.839(COV)

0.3 - for visually graded lumber
0.384 - for machine evaluated lumber (MEL)
0.418 - for products w/ COV<=0.11

where COV =

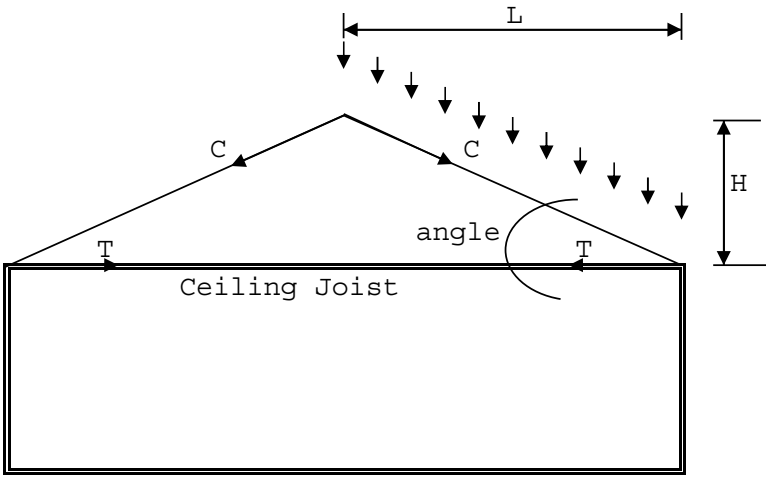
0.25 - sawn lumber
0.15 - MEL
0.11 - MSR (machine stress rated)
0.10 - glu-lam

## FOUNDATION DESIGN

| | | |
|---|---|---|
| ALLOW BEARING CAPACITY | 1,500.00 | psf |
| CONCRETE STRENGTH, f'c | 2,500.00 | psi |
| YEILD STRENGTH, Fy | 60,000.00 | psi |

| | | | EXT. WALL FTG | INT. WALL FTG | F1 | F1 | F2 |
|---|---|---|---|---|---|---|---|
| **FOOTING DIMENSION** | | | | | | | |
| WIDTH | | in | 18.0 | 18.0 | 30.0 | 42.0 | 60.0 |
| LENGTH | | in | 12.0 | 12.0 | 30.0 | 42.0 | 60.0 |
| DEPTH | | in | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| **COLUMN DIMENSION** | | | | | | | |
| WIDTH | | in | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| LENGTH | | in | 12.0 | 12.0 | 4.0 | 6.0 | 6.0 |
| **FOOTING LOAD** | | | | | | | |
| ROOF TRIB. AREA | | ft2 | 18.0 | 20.0 | | | |
| CEILING TRIB. AREA | | ft2 | 18.0 | 20.0 | | | |
| FLOOR TRIB. AREA | | ft2 | - | - | | | |
| DECK TRIB. AREA | | ft2 | - | - | | | |
| WALL AREA | | ft2 | 20.0 | 20.0 | | | |
| WALL TYPE | | | EXT | INT | | | |
| DEAD LOAD | D | lbs | 702.0 | 580.1 | 1,500.0 | 3,500.0 | 7,500.0 |
| LIVE LOAD | L | lbs | 720.0 | 800.0 | 1,800.0 | 5,500.0 | 9,500.0 |
| SEISMIC LOAD | E | lbs | - | - | | | |
| **CHECK BEARING CAPACITY** | | | | | | | |
| SERVICE LOAD, (D+L) | | lbs | 1,422.0 | 1,380.1 | 3,300.0 | 9,000.0 | 17,000.0 |
| SERVICE LOAD, (D+L+E)/1.33 | | lbs | 1,069.2 | 1,037.6 | 2,481.2 | 6,766.9 | 12,782.0 |
| SOIL PRESSURE, $fb=P/A_{FTG}$ | | psf | 948.0 | 920.0 | 528.0 | 734.7 | 680.0 |
| CHECK fb < Fb | | | OK | OK | OK | OK | OK |
| **CHECK MINIMUM REINFORCEMENT** | | | | | | | |
| REINFORCEMENT USE | | | 2#4 | 2#4 | 2#4 | 3#4 | 4#4 |
| AREA OF STEEL, As | | in2 | 0.40 | 0.40 | 0.40 | 0.60 | 0.80 |
| As1 min = 0.0018*Area_Conc. | | in2 | 0.68 | 0.68 | 1.13 | 1.59 | 2.27 |
| As2 min = 1.33*As_Required | | in2 | 0.00 | 0.00 | 0.02 | 0.07 | 0.21 |
| As min = Min(As1,As2) | | in2 | 0.00 | 0.00 | 0.02 | 0.07 | 0.21 |
| CHECK As > As MIN | | | OK | OK | OK | OK | OK |
| **CHECK BENDING STRESSES** | | | | | | | |
| FACTORED, 1.4D+1.7L | | lbs | 2,207 | 2,172 | 5,160 | 14,250 | 26,650 |
| FACTORED, 1.4(D+L+E)/1.33 | | lbs | 1,991 | 1,932 | 4,620 | 12,600 | 23,800 |
| MAXIMUM MOMENT, Mu | | lb-in | 3,004 | 2,956 | 14,534 | 61,241 | 174,113 |
| b | | in | 12.00 | 12.00 | 30.00 | 42.00 | 60.00 |
| a = As*Fy / 0.85*f'c*b | | in | 0.94 | 0.94 | 0.38 | 0.40 | 0.38 |
| $\phi Mn = \phi*As*Fy*(d-a/2)$ | | lb-in | 443,435 | 443,435 | 449,534 | 673,866 | 899,068 |
| CHECK Mu < $\phi$Mn | | | OK | OK | OK | OK | OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAXIMUM SHEAR, Vu | | lbs | - | - | 1,548 | 7,125 | 17,323 |
| b | | in | 12.00 | 12.00 | 30.00 | 42.00 | 60.00 |
| $\phi Vc = 2*\phi*bw*d*sqrt(f'c)$ | | lbs | 21,420 | 21,420 | 53,550 | 74,970 | 107,100 |
| CHECK Vu < $\phi$Vc | | | OK | OK | OK | OK | OK |

## Nailing & Bolting Schedule for eaves tie connections




W= L(ft) x rafter spacing (ft) x roof design load (L.L. + D.L. in psf)

$$T = \frac{W \times L}{2H}$$

*Given:*

Roof Rafter

| | | | | |
|---|---|---|---|---|
| Roof Rafter Trib. Width | L | = | 9.5 | ft |
| Roof Dead Load | DL | = | 13.003 | psf |
| Roof Live Load | LL | = | 20 | psf |
| Roof Rafter Spacing | s | = | 1.33 | ft |
| Roof Pitch | | | 5: 12 | |

*Calculated:*

| | |
|---|---|
| Tan a= | 0.42 |
| Angle a | 22.62 |
| H= | L*tana |
| | 3.96 |
| W= | 417 |
| T= | 500 |

Design criteria:

| Nail Capcit | #/nail | Cd | #/nail |
|---|---|---|---|
| 8d | 98 | 1.25 | 123 |
| 16d | 103 | 1.25 | 129 |
| 1/2" MB | | | 400 |

Number of nails required= T/nail capacity

| | |
|---|---|
| 8d= | 4 nails @ each connection |
| 16d= | 4 nails @ each connection |
| 1/2" bolts= | 1 bolts @ each connection |

# E 20th St,

# Upland, CA 91784

Projecct # 85-25

# STRUCTURAL CALCULATIONS

Storage

Date :10/30/26

Rev. : 1

# Pages : 80

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| 2. Building Weight | | 2 |
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| | Site Latitude & Longitude | 4 |
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| | Seismic Analysis 2022 IBC | 6 |
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| | Foundation Design | 75 |
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## GRAVITY LOADS

### ROOF LOADS

| DEAD LOAD | | |
|---|---|---|
| Roofing Shingles Clay Tile (w/ 10 psf Mortar) | 11.50 | psf |
| Sheathing 15/32" Plywood | 2.81 | psf |
| Framing 2x12 @ 16" O.C. DF-Larch | 3.15 | psf |
| Drywall Finish | 3.00 | psf |
| Insulation Fiber Glass Loose | 0.56 | psf |
| Miscellaneous | 1.98 | psf |
| **ROOF DEAD LOAD TOTAL** | **23.00** | **psf** |
| **ROOF LIVE LOAD TOTAL** | **20.00** | **psf** |

### FLOOR LOADS

| DEAD LOAD | | |
|---|---|---|
| Flooring Hardwood (1 in) | 3.00 | psf |
| Sheathing 3/4" T&G | 2.25 | psf |
| Framing 2x12 @ 16" O.C. DF-Larch | 3.15 | psf |
| Drywall Finish | 3.00 | psf |
| Miscellaneous | 1.60 | psf |
| FLOOR DEAD LOAD TOTAL | 13.00 | psf |
| FLOOR LIVE LOAD TOTAL | 40.00 | psf |

### OPEN DECK

| DEAD LOAD | | |
|---|---|---|
| Flooring Hardwood (1 in) | 3.00 | psf |
| Sheathing 3/4" T&G | 2.25 | psf |
| Framing 2x12 @ 16" O.C. DF-Larch | 3.15 | psf |
| Drywall Finish | 3.00 | psf |
| Miscellaneous | 1.60 | psf |
| **DECK DEAD LOAD TOTAL** | **13.00** | **psf** |
| **DECK LIVE LOAD TOTAL** | **100.00** | **psf** |

### CEILING LOADS

| DEAD LOAD | | |
|---|---|---|
| Framing 2x 8 @ 16" O.C. DF-Larch | 2.10 | psf |
| Drywall Finish | 3.00 | psf |
| Miscellaneous | 1.00 | psf |
| **CEILING DEAD LOAD TOTAL** | **6.00** | **psf** |
| **CEILING LIVE LOAD TOTAL** | **20.00** | **psf** |

### EXTERIOR WALL

| | | |
|---|---|---|
| Wall Plaster (1 in) on Metal Lath | 10.00 | psf |
| Sheathing 15/32" Plywood | 2.81 | psf |
| Wall Wood Studs 2x6 @ 16" O.C. DF-Larch | 1.58 | psf |
| Insulation Fiber Glass Loose | 0.50 | psf |
| Drywall Finish | 3.00 | psf |
| **EXTERIOR WALL LOAD** | **18.00** | **psf** |

### INTERIOR WALL

| | | |
|---|---|---|
| Drywall Finish | 3.00 | psf |
| Wall Wood Studs 2x4 @ 16" O.C. DF-Larch | 1.05 | psf |
| Sheathing 15/32" Plywood | 2.81 | psf |
| Drywall Finish | 3.00 | psf |
| **INTERIOR WALL LOAD** | **10.00** | **psf** |

# BUILDING WEIGHT

## DESIGN CRITERIA

| | | | | | |
|---|---|---|---|---|---|
| Code Used | : | 2022 CBC | Concrete F'c | : | 2,500 psi |
| Building Code | : | 2021 IBC | Steel Fy | : | 60,000 psi |
| LACity Requirement | : | Yes | | | |

## SOILS REPORT

NO SOILS REPORT — Bearing Capacity : 1,500 psf

## SEISMIC DESIGN PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Short Period, Fa | : | 1.2 | 0.2 sec Fig 1613.5(1) | Latitude | : 34.135827 |
| Long Period, Fv | : | 1.5 | 1.0 sec Fig 1613.5(2) | Longitude | :-117.646592 |
| Response Spectral | : | 198.00% | 0.2 sec Fig 1613.5(3) | Site Class | : D |
| Response Spectral | : | 67.00% | 1.0 sec Fig 1613.5(4) | | |

## BUILDING SUMMARY

| Level | Height ft | Elevation | Unit Weight psf | |
|---|---|---|---|---|
| | | | Dead | Live |
| ROOF | 8.50 | 8.50 | 29.00 | 20.00 |

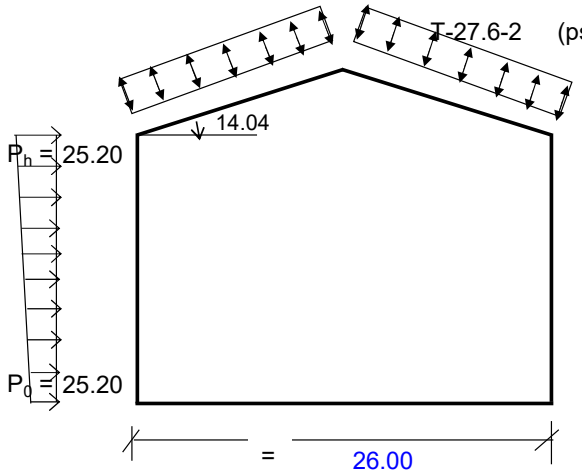
| Wall Type | Weight psf |
|---|---|
| Exterior | 18.00 |
| Interior | 10.00 |

## BUILDING WEIGHT

### ROOF

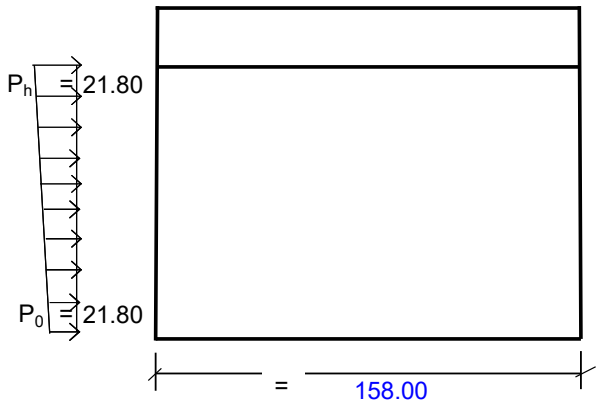
| Area Type | L (ft) | W (ft) | H (ft) | Area (ft^2) | Dead Load (psf) | Weight (kips) |
|---|---|---|---|---|---|---|
| Roof | 158.00 | 26.00 | | 4,703.9 | 23.00 | 108.20 |
| Ext. Wall | 316.00 | 52.00 | 4.25 | | 18.00 | 28.15 |
| Int. Wall | 10.00 | 78.00 | 4.25 | | 10.00 | 3.74 |
| TOTAL ROOF AREA / LOAD | | | | 4,703.9 | | **140.09** |

**27.5 Directional Procedure, Part 2: Enclosed Simple Diaphragm Buildings With H ≤ 160 Ft**




T-27.6-2 (psf) X

Roof Exp adjust factor T-27.6-2 = 1




*Example will work for V =110, 115 and 120 MPH only.*

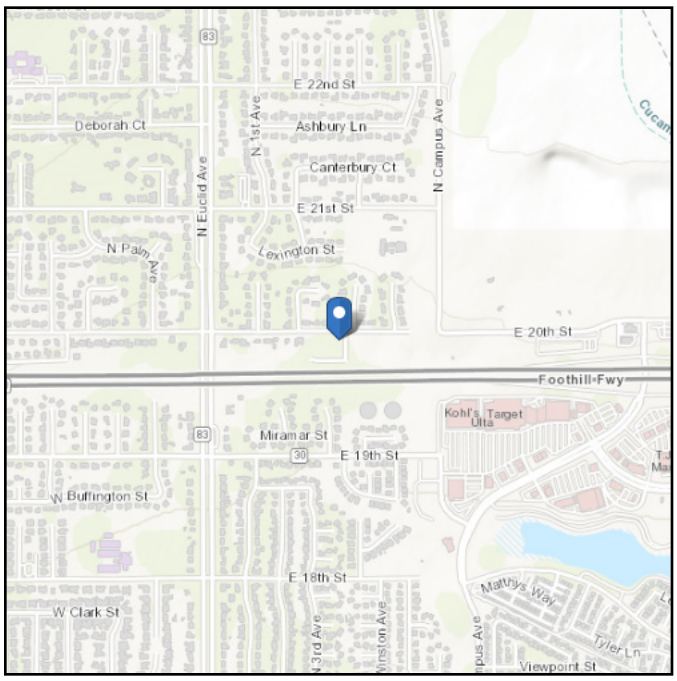
| | Wind Normal to Ridge | | Wind Parallel to Ridge | |
|---|---|---|---|---|
| Roof Height h = | 15 feet | | | |
| Exposure | C | | | |
| Roof Pitch = | 3.00 :12 | | | |
| Topography factor $K_{zt}$ = | 1.00 | 26.8.2, Figure 26.8-1 | | |
| Building & Structure Risk Category = | II, standard | IBC T-1604.5 | | |
| Wind Speed V = | 110 mph | Fig. 26.5-1A, MRI = 700 yrs | | |
| Wind Normal to Ridge, L/B = | 0.165 use 0.5 | | Wind Parallel to Ridge, L/B = | 6.08 use 2.0 |
| Since .2 ≤ L/B ≤ 5.0 = | No | | Since .2 ≤ L/B ≤ 5.0 = | No |
| and h ≤ 60 = | Yes | | and h ≤ 60 = | Yes |
| Building meet Class I condition ? | No | | Building meet Class I condition ? | No |
| Since .5 ≤ L/B ≤ 2.0 = | No | | Since .5 ≤ L/B ≤ 2.0 = | No |
| and 60 ≤h ≤1 60 = | No | | and 60 ≤h ≤1 60 = | No |
| Fundamental period = | 0.500 sec | | Fundamental period = | 0.500 sec |
| | More than h/75 sec. NG | | | More than h/75 sec. NG |
| Building meet Class II condition ? | No | | Building meet Class II condition ? | No |
| | Simplified method cannot be use | | | Simplified method cannot be use |
| From T-27.6-1, V = 110 MPH Exp C, L/B =0.5 and 15 FT. HT | | | From T-27.6-1, V = 110 MPH Exp C, L/B =2.0 and 15 FT. HT | |
| $P_h$ = | 25.20 $K_{zt}$ | | $P_h$ = | 21.80 $K_{zt}$ |
| $P_o$ = | 25.20 $K_{zt}$ | | $P_o$ = | 21.80 $K_{zt}$ |
| T-27.6-2 V =110 Exp C, h =15 Roof slope =3:12 | | | | |
| Zone 1 = | -23.5 | | | |
| Adjust factor T-27.6-2, = | 1.00 | | | |
| Design roof pressure for zone 1 = | -23.50 PSF | | | |
| Wind Base Shear = | 35.83 kips | | Wind Base Shear = | 5.10 kips |

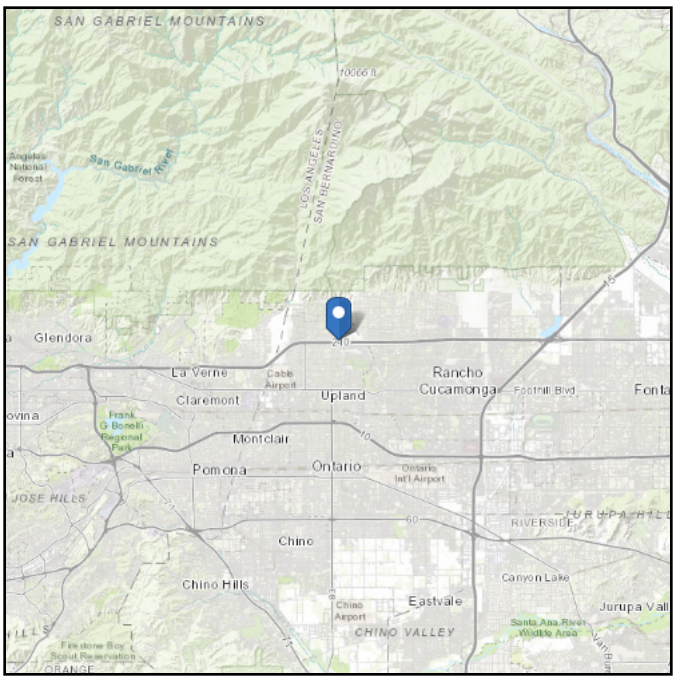
# ASCE Hazards Report

**Address:**
352 E 20th St
Upland, California
91784

**Standard:** ASCE/SEI 7-22
**Risk Category:** II
**Soil Class:** Default

**Latitude:** 34.135827
**Longitude:** -117.646592
**Elevation:** 1648.2100926574194 ft (NAVD 88)




## Wind

**Results:**

| | |
|---|---|
| Wind Speed | 95 Vmph |
| 10-year MRI | 66 Vmph |
| 25-year MRI | 72 Vmph |
| 50-year MRI | 77 Vmph |
| 100-year MRI | 81 Vmph |
| 300-year MRI | 89 Vmph |
| 700-year MRI | 95 Vmph |
| 1,700-year MRI | 102 Vmph |
| 3,000-year MRI | 106 Vmph |
| 10,000-year MRI | 115 Vmph |
| 100,000-year MRI | 133 Vmph |
| 1,000,000-year MRI | 151 Vmph |

Data Source: ASCE/SEI 7-22, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Fri Aug 15 2025

# Seismic

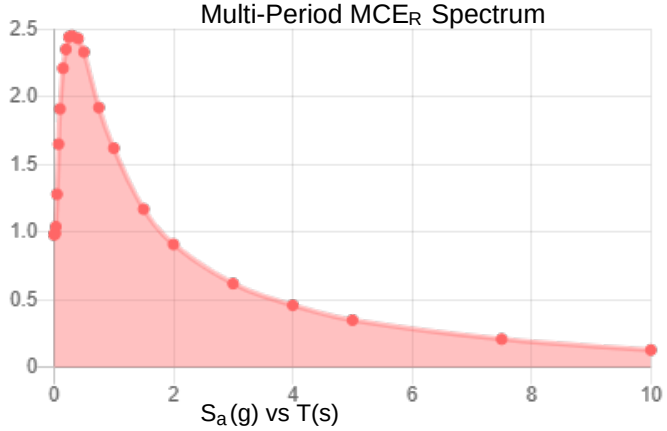
**Site Soil Class:** Default

**Results:**

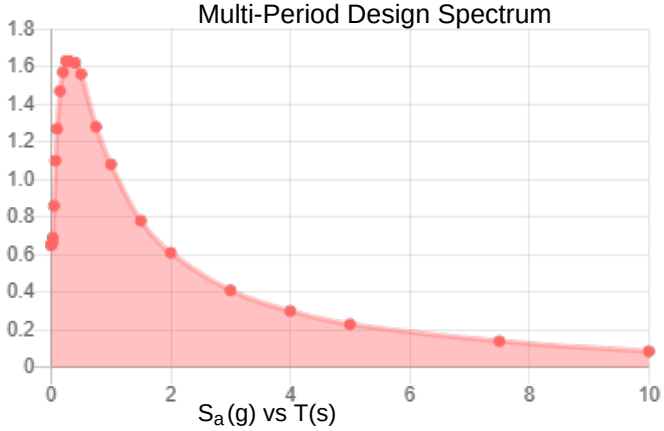
| | | | |
|---|---|---|---|
| $PGA_M$ : | 0.85 | $T_L$ : | 12 |
| $S_{MS}$ : | 2.2 | $S_S$ : | 1.98 |
| $S_{M1}$ : | 1.67 | $S_1$ : | 0.67 |
| $S_{DS}$ : | 1.47 | $V_{S30}$ : | 260 |
| $S_{D1}$ : | 1.12 | | |

**Seismic Design Category: D**

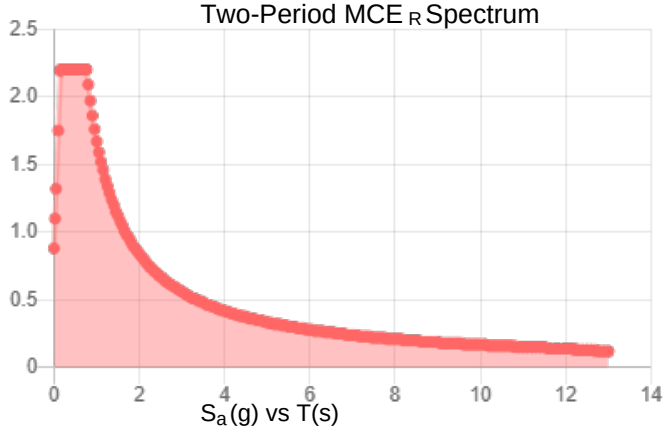
Multi-Period $MCE_R$ Spectrum



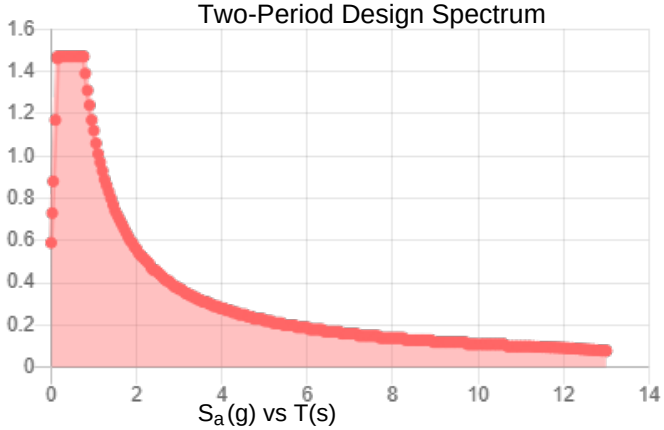

Multi-Period Design Spectrum




Two-Period $MCE_R$ Spectrum




Two-Period Design Spectrum




$MCE_R$ Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

**IBC2021 (1613), ASCE 7-16 CHAPTER 11, 12, 13 SEISMIC DESIGN CRITERIA**

| | | | |
|---|---|---|---|
| Response Spectral Acc. (0.2 sec) Ss = | 1.980 g | | Figure 22-1,22-3,22-5,22-6 |
| Response Spectral Acc.( 1.0 sec) $S_1$ = | 0.670 g | | Figure 22-2,22-4,22-5,22-6 |
| Soil Site Class | D | Table 20-3-1, Default = D | |
| Site Coefficient $F_a$ = | 1.200 | | Table 11.4-1 |
| Site Coefficient $F_v$ = | 1.500 | | Table 11.4-2 |
| Max Considered Earthquake Acc. $S_{MS}$ = | $F_a.S_s$ | = 2.376g | (11.4-1) |
| Max Considered Earthquake Acc. $S_{M1}$ = | $F_v.S_1$ | = 1.005g | (11.4-2) |
| @ 5% Damped Design $S_{DS}$ = | $2/3(S_{MS})$ | = 1.584g | (11.4-3) |
| $S_{D1}$ = | $2/3(S_{M1})$ | = 0.670g | (11.4-4) |
| Building Risk Categories | II, Standard | | Table 1604.5 |
| **Design Category Consideration:** | Flexible Diaphragm | with dist. between seismic resisting system >40ft | |
| Seismic Design Category for 0.1sec | D | | Table 11.6-1 |
| Seismic Design Category for 1.0sec | D | | Table 11.6-2 |
| S1 < .75g | NA | | Section 11.6 |
| Since Ta < .8Ts (see below), SDC = | D | Control (exception of Section 11.6 does not apply) | |

**IBC, Seismic Design Category D** | IRC, Seismic Design Category = E | T-R301.2.2.1.1

**12.8 Equivalent lateral force procedure**

A. BEARING WALL SYSTEMS — T-12.2

**Seismic Force Resisting Systems**: 15. Light-framed (wood) walls sheathed with wood structural panels rated for shear resistance or stee

| | | | | |
|---|---|---|---|---|
| $C_t$ = | 0.02 | x = 0.75 | | T-12.8-2 |
| Building ht. $H_n$ = | 35 ft | | ıited Building Height (ft) = | 65 |
| $C_u$ = | 1.400 | for $S_{D1}$ of 0.670g | Table 12.8-1 | |
| Approx Fundamental period, $T_a$ = | $C_t(h_n)^x$ | = 0.288 | 12.8-7 | $T_L$ = 6.000 Sec |
| Calculated T shall not exceed ≤ | Cu.Ta | = 0.403 | | Use T = 0.403 sec. |
| 0.8Ts = | $0.8(S_{D1}/S_{DS})$ | = 0.338 | < Ta | |
| **Is structure Regular & ≤ 5 stories ?** | No | | | 12.8.1.3 |
| Response Spectral Acc.( 0.2 sec) $S_s$ = | 1.980g | | | |
| $F_a$ = | 1.20 | | | |
| @ 5% Damped Design $S_{DS}$ = | $⅔(F_a.S_s)$ | = 1.584g | | (11.4-3) |
| Response Modification Coef. R = | 6.5 | | | Table-12.2-1 |
| Over Strength Factor $\Omega_o$ = | 2.5 | | | foot note g |
| Importance factor I = | 1 | | | T 1.5-2 |
| Seismic Base Shear V = | $C_s W$ | | | |

$$C_s = \frac{S_{DS}}{R/I} = 0.244 \quad (12.8\text{-}2)$$

$$\text{or need not to exceed, } C_s = \frac{S_{D1}}{(R/I).T} = 0.256 \quad \text{For } T \le T_L \quad (12.8\text{-}3)$$

$$\text{or } C_s = \frac{S_{D1}T_L}{T^2(R/I)} = \text{N/A} \quad \text{For } T > T_L \quad (12.8\text{-}4)$$

| | | | | |
|---|---|---|---|---|
| $C_s$ shall not be less than = | $0.044S_{DS}.I \ge .01$ | = 0.070 | | (12.8-5) |
| Min $C_s$ = | $0.5S_1I/R$ | = 0.052 | For $S_1 \ge 0.6g$ | (12.8-6) |
| Use $C_s$ = | 0.244 | | | |
| **Design base shear V =** | 0.244 W | **Control** | | |

**12.14 Simplified Seismic base shear** — T-12.14

15. Light-framed (wood) walls sheathed with wood structural panels rated for shear resistance or stee

| | | | |
|---|---|---|---|
| @ 5% Damped Design $S_{DS}$ = | 1.584 | SDC = D | Limitations: P |
| F = | 1.2 | For three story building | R = 6.5 |
| V = | $FS_{DS}(W)/R$ | = 0.292 W | (12.14-11) |

## LATERAL FORCE DISTRIBUTION

### SEISMIC BASE SHEAR

| | | | | | | |
|---|---|---|---|---|---|---|
| Importance Factor, I | | ASCE7-16 Table 11.5-1 | | | I = | 1.00 |
| EQ Acc. @ 5% Damped Design | | ASCE7-16 EQ 11.4-3 | | | SDS = | 1.58 |
| Vult | = 2021 IBC SHEET | | = | 0.244 W | | |
| Vwork | = Vult / 1.4 | | = | 0.174 W | Working Stress Level | |
| Vwork | = 0.174 * 140.1 kips | | = | 24.4 kips | Seismic Base Shear | |
| p | = 1.30 | ==> Vwork | = | 31.7 kips | Seismic Base Shear | |

### WIND BASE SHEAR

| | | | |
|---|---|---|---|
| Vult | = MWFR < 160 ft | = | 35.8 kips |
| Vwork | = Vult * 0.6 | = | 21.5 kips |

### SEISMIC BASE SHEAR GOVERNS

| | | |
|---|---|---|
| **DESIGN BASE SHEAR** | = | **31.7 kips** |

### BASE SHEAR VERTICAL DISTRIBUTION

| Floor Type | Height hx ft | Floor Area ft^2 | Weight wx kips | wx*hx kips-ft | Fx % wx*hx / Σ(wx*hx) | Fx (V-Ft) Fx% kips | Story V Ft+ΣFi kips | Fx / Fl Area psf |
|---|---|---|---|---|---|---|---|---|
| ROOF | 8.50 | 4,704 | 140.09 | 1,191 | 100.0% | 31.70 | 31.70 | 6.74 |
| | | Total | 140.09 | 1,191 | 100.0% | 31.70 | | |

### DIAPHRAGM FORCE DISTRIBUTION

| Floor Type | Weight | | Story V | Fpx | Min | Max | Fpx |
|---|---|---|---|---|---|---|---|
| | wpx kips | Σwi kips | Ft+ΣFi kips | V*wpx/Σw kips | Fpx[1] kips | Fpx[2] kips | Design kips |
| ROOF | 126.02 | 126.02 | 31.70 | 31.70 | 39.92 | 79.84 | 39.92 |

1 Fpx min = 0.2*SDs*I*wpx (for Flexible Diaphragm) ASCE7-16 12.10.1.1

2 Fpx max = 0.4*SDs*I*wpx (for Flexible Diaphragm) ASCE7-16 12.10.1.1

### SHEARWALL DESIGN FORCES

| Level | Fl. Area | Wall Ht. | Stry Shear | Base[2] | Shear |
|---|---|---|---|---|---|
| | ft2 | ft | kips | Shear % | psf |
| ROOF | 4,704 | 8.50 | 31.70 | 100.0% | 6.74 |

1 Redundancy Factor Used Per ASCE7-16 12.3.4.2

# TABLES REFERENCED IN SHEARWALL DESIGN SPREADSHEET

**Table 2306.4.1 Allowable Shear (plf) for Wood Shearwall Panels For Wind or Seismic Loading**

| Mark | # sides | Sheathing | Edge Nailing | A35/LTP 4 Simpson | Sill Plate @ Framed Floor | Anchor @ Foundation | V_allow (100%) (plf) | V_allow (75%) (plf) |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 15/32" | 10d @6" | @16" | 3/8" dia Lag Screw @32"OC | 5/8" dia A.B. @48"OC | 340 | 255 |
| 2 | 1 | 15/32" | 10d @4" | @8" | 3/8" dia Lag Screw @16"OC | 5/8" dia A.B. @32"OC | 510 | 380 |
| 3 | 1 | 15/32" | 10d @3" | @12" | 3/8" dia Lag Screw @12"OC | 5/8" dia A.B. @24"OC | 665 | 500 |
| 4 | 1 | 15/32" | 10d @2" | @8" | 3/8" dia Lag Screw @9"OC | 5/8" dia A.B. @16"OC | 870 | 650 |
| 5 | 2 | 15/32" | 10d @4" | @8" | 3/8" dia Lag Screw @9"OC | 5/8" dia A.B. @16"OC | 1,020 | 765 |
| 6 | 2 | 15/32" | 10d @3" | @4" | 3/8" dia Lag Screw @9"OC | 5/8" dia A.B. @12"OC | 1,370 | 1,030 |
| 7 | 2 | 15/32" | 10d @2" | @4" | 3/8" dia Lag Screw @4"OC | 5/8" dia A.B. @16"OC | 1,740 | 1,305 |

**NOTES:**

1. ALL SHEATHING TO BE DOUGLAS FIR-LARCH STRUCT. I.
2. ALL FIELD NAILING TO INTERMEDIATE FRAMING TO BE AT 12" O.C.
3. FRAMING AT ADJOINING PANEL EDGES SHALL BE 3" (INCH) NOMINAL OR THICKER (i.e. MIN 3x VERTICAL STUDS AND BLOCKING) NAILS SHALL BE STAGGERED IN TWO LINES ALONG PANEL EDGES WHERE NAILS ARE SPACED 2" INCHES ON CENTER OR WHEN 10d COMMON NAILS SPACED 3" O.C. PENETRATE FRAMING MORE THAN 1 5/8".
4. WHERE PLYWOOD APPLIES ON BOTH FACES OF A WALL AND NAIL SPACING IS LESS THAN 6" INCHES ON CENTER ON EITHER SIDE. PANEL JOINTS SHALL HAVE MIN 3x (VERTICAL STUDS & BLOCKING) AND NAILS SHALL BE STAGGERED. OFFSET PANEL JOINTS TO FALL ON DIFFERENT FRAMING MEMBER WHERE PLYWOOD IS PLACED AT BOTH FACES.
5. NAILS SHALL BE PLACED NOT LESS THAN 1/2" INCH FROM PANEL EDGES.
6. FOR HOLD-DOWNS AT THE END OF THE SHEAR WALL, SEE PLANS AND SCHEDULE. PROVIDE 3"x3"x1/4" WASHER PLATE AT ALL SILL PLATE ANCHOR BOLTS AND AT ALL HOLD-DOWN BOLTS CONNECTED TO VERTICAL POSTS.
7. USE WELDED STUD BOLTS OF SAME SIZE & SPACING AS OF SILL PLATE ANCHOR BOLTS, WHERE STEEL BEAM OCCURS UNDER SHEAR WALL.
8. PROVIDE DOUBLE PARALLAM BLOCKING TO ACCOMODATE 2 ROWS OF SIMPSON SDS SCREWS.
9. FOUNDATION SILL PLATE SHALL BE 3x. U.N.O.
10. SIMPSON SDS 3/8"x7" WOOD SCREWS. TYP. USE |2"x4|4" SDS INTO NAILER AT STEEL BEAMS.
11. WHERE 2-2x SILL PLATES ARE USED, SCREW LOWER PLATE TO FRAMING BELOW. DRILL HOLE IN UPPER SILL PLATE FOR SCREW HEAD SO THAT UPPER PLATE SITS FLAT ON LOW SILL PLATE.

# TABLES REFERENCED IN SHEARWALL DESIGN SPREADSHEET (HOLDOWN)

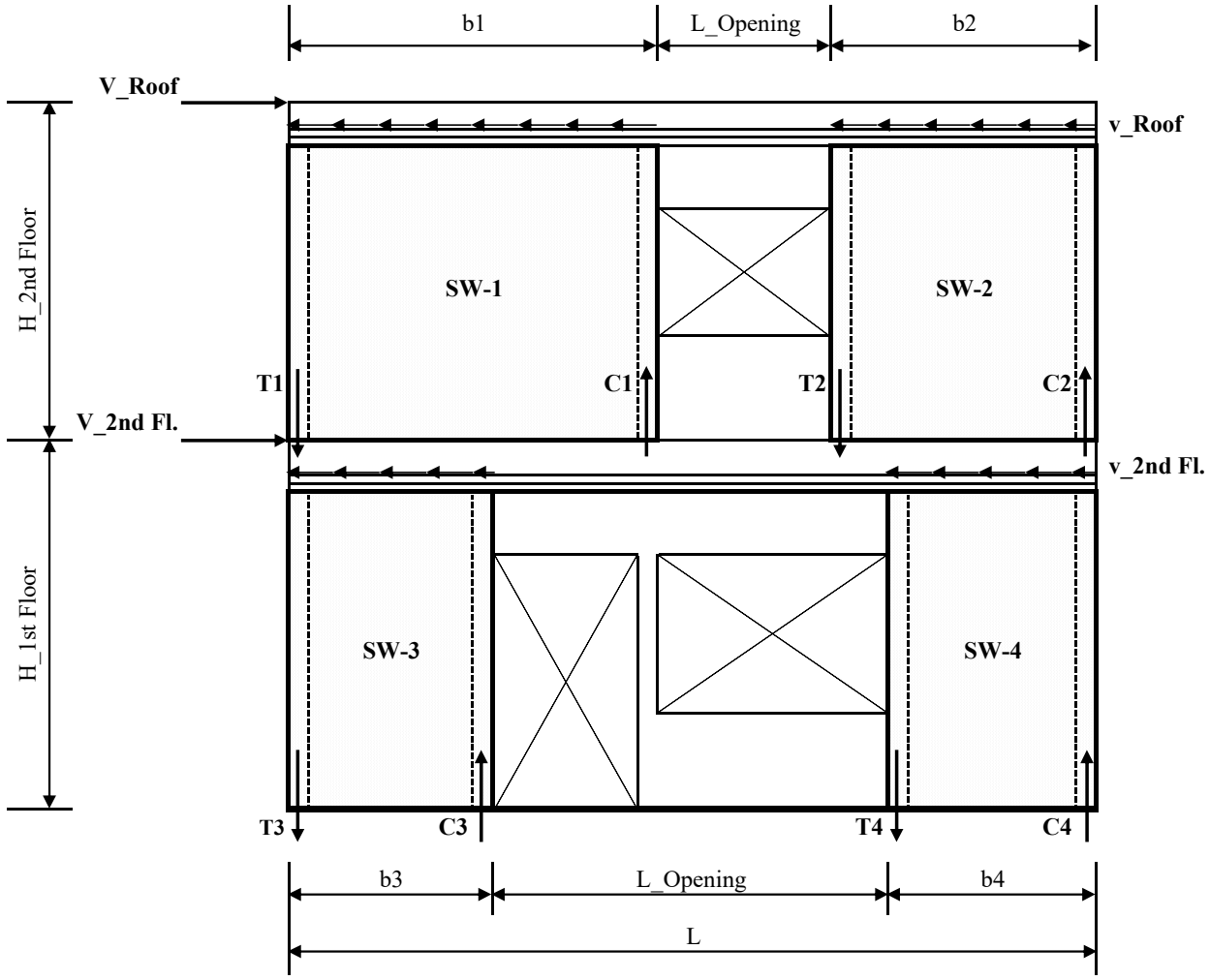
**Holdown Capcity**

| HD Type | Max Uplift Force (lbs) | | | Post Size |
|---|---|---|---|---|
| | 75% | Full | Used | |
| HDU2 | 2,306 | 3,075 | 2,306 | 4x4 |
| HDU4 | 3,424 | 4,565 | 3,424 | 4x4 |
| HDU5 | 4,253 | 5,670 | 4,253 | 4x4 |
| HDU8 | 5,903 | 7,870 | 5,903 | 4x6 |
| HDU11 | 7,151 | 9,535 | 7,151 | 4x6 |
| HDU14 | 10,793 | 14,390 | 10,793 | 4x8 |

**NOTES:**

1. USE THREADED ROD @ EXISTING FOOTING ONLY. SEE DETAIL 16/S4 LARR# 25279.
2. USE SSTB @ NEW FOOTING ONLY PER LARR# 25248.
3. PROVIDE MIN. POST SIZE AS INDICATED, INCREASE SIZE TO MATCH WALL THICKNESS.
4. ALL HOLDOWN TO BE DOUGLAS FIR-LARCH No. 1.

## SHEARWALL DESCRIPTION




**AT ROOF LEVEL**

```
Total Shearwall Length ft  =  Sum (b1 + b2 + ..)
Total Shear (V_Roof)   lbs =  Shear Trib Width * Line Trib Length (L) * Roof Unit Shear (psf)
Unit Shear (v_Roof)    plf =  V_Roof / Sum(b1 + b2 + ..)
SW-1 Dead Load         lbs =  Roof_Dead_Laod + Ceiling_Dead_Load + 2nd Fl Wall_Selfweight
SW-1 Uplift Force T1   lbs =  (   Upward Force  ) - (    Downward Force     )
                           =  (v_Roof * H_2nd Fl) - (0.6 - 0.14*Sds) * SW-1 Dead Load /2)
Drag Force at Open     lbs =  V_Roof / Line Trib Length (L) * L_Opening
```

**AT SECOND FLOOR**

```
Total Shearwall Length ft  =  Sum (b3 + b4 + ..)
Total Shear (V_2nd Fl) lbs =  Shear Trib Width * Line Trib Length (L) * 2nd Fl Unit Shear (psf)
                              + Roof Total Shear (V_Roof)
Unit Shear (v_2nd Fl)  plf =  V_2nd Fl  / Sum(b3 + b4 + ..)
SW-3 Dead Load         lbs =  Roof_Dead_Laod + Ceiling_Dead_Load + 2nd Fl_Wall_Selfweight
                              + Floor_Dead_Load + 1st Fl_Wall_Selfweight
SW-3 Uplift Force T3   lbs =  (   Upward Force   ) - (    Downward Force     )
Upward Force           lbs =  v_Roof * (H_2nd Fl + H_1st Fl) + v_2nd Fl * H_1st Fl
Downward Force         lbs =  (0.6 - 0.14*Sds) * SW-3 Dead Load /2
Drag Force at Open     lbs =  V_2nd Fl / Line Trib Length (L) * L_Opening
```

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE A PERFORATED

| ROOF | | | SW-01 | | | | | |
|---|---|---|---|---|---|---|---|---|
| Total Shearwall Segments | $\Sigma$ Li | ft | 14.49 | | | | | |
| Total Shearwall Length | Ltot | ft | 21.00 | | | | | |
| Percent Full-Height Sheathing | | % | 69% | | | | | |
| Total Area of Openings | Ao | ft2 | 29.30 | | | | | |
| Sheathing Area Ratio | $r = 1 \Big/ 1 + \frac{A_o}{h\sum L_i}$ | | 0.81 | | | | | |
| Shear Capacity Adjustment Factor | $C_o = \left(\frac{r}{3-2r}\right)\frac{L_{tot}}{\sum L_i}$ | | 0.85 | | | | | |
| Shear Trib. Width | | ft | 14.5 | | | | | |
| Line Trib. Length | | ft | 25.0 | | | | | |
| Shortest Panel > H/3.5 and < H/2 | | ft | 3.0 | | | | | |
| Line Total Shear | V | lbs | 2,443 | | | | | |
| Line Unit Shear | V / ($\Sigma$ Li x Co) | plf | 199 | x 4.25 ft / 3 ft = | | 282 | pdf | |
| **100% Wood Shearwall 10d** | **1** | | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | | |
| Roof DL Trib. Width | | ft | - | - | - | - | | |
| Ceiling DL Trib. Width | | ft | - | - | - | - | | |
| Wall Height | | ft | 8.5 | | | | | |
| Wall Dead Load | | plf | 153.0 | | | | | |
| Uplift Force (Demand) | $T = \frac{Vh}{C_o\sum L_i}$ | lbs | 1,275 | | | | | |
| **Holdown Type** | | | **HDU4** | | | | | |
| **Uplift Force (Capacity)** | | **lbs** | **3,424** | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE B PERFORATED

| ROOF | | | SW-02 | | | | | |
|---|---|---|---|---|---|---|---|---|
| Total Shearwall Segments | $\Sigma$ Li | ft | 14.49 | | | | | |
| Total Shearwall Length | Ltot | ft | 21.00 | | | | | |
| Percent Full-Height Sheathing | | % | 69% | | | | | |
| Total Area of Openings | Ao | ft2 | 29.30 | | | | | |
| Sheathing Area Ratio | $r = \frac{1}{1+\frac{A_o}{h\sum L_i}}$ | | 0.81 | | | | | |
| Shear Capacity Adjustment Factor | $C_o = \left(\frac{r}{3-2r}\right)\frac{L_{tot}}{\sum L_i}$ | | 0.85 | | | | | |
| Shear Trib. Width | | ft | 14.5 | | | | | |
| Line Trib. Length | | ft | 25.0 | | | | | |
| Shortest Panel > H/3.5 and < H/2 | | ft | 3.0 | | | | | |
| Line Total Shear | V | lbs | 2,443 | | | | | |
| Line Unit Shear | V / ($\Sigma$ Li x Co) | plf | 199 | x 4.25 ft / 3 ft = | | 282 | pdf | |
| **100% Wood Shearwall 10d** | **1** | | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | | |
| Roof DL Trib. Width | | ft | - | - | - | - | | |
| Ceiling DL Trib. Width | | ft | - | - | - | - | | |
| Wall Height | | ft | 8.5 | | | | | |
| Wall Dead Load | | plf | 153.0 | | | | | |
| Uplift Force (Demand) | $T = \frac{Vh}{C_o \sum L_i}$ | lbs | 1,275 | | | | | |
| **Holdown Type** | | | **HDU4** | | | | | |
| **Uplift Force (Capacity)** | | **lbs** | **3,424** | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE 2 PERFORATED

| ROOF | | | SW-03 | | | | | |
|---|---|---|---|---|---|---|---|---|
| Total Shearwall Segments | $\Sigma$ Li | ft | 21.04 | | | | | |
| Total Shearwall Length | Ltot | ft | 25.83 | | | | | |
| Percent Full-Height Sheathing | | % | 81% | | | | | |
| Total Area of Openings | Ao | ft2 | 19.53 | | | | | |
| Sheathing Area Ratio | $r = \frac{1}{1+\frac{A_o}{h\sum L_i}}$ | | 0.90 | | | | | |
| Shear Capacity Adjustment Factor | $C_o = \left(\frac{r}{3-2r}\right)\frac{L_{tot}}{\sum L_i}$ | | 0.92 | | | | | |
| Shear Trib. Width | | ft | 12.5 | | | | | |
| Line Trib. Length | | ft | 29.0 | | | | | |
| Shortest Panel > H/3.5 and < H/2 | | ft | | | | | | |
| Line Total Shear | V | lbs | 2,443 | | | | | |
| Line Unit Shear | V / ($\Sigma$ Li x Co) | plf | 126 | | | | | |
| **100% Wood Shearwall 10d** | **1** | | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | | |
| Roof DL Trib. Width | | ft | - | - | - | - | | |
| Ceiling DL Trib. Width | | ft | - | - | - | - | | |
| Wall Height | | ft | 8.5 | | | | | |
| Wall Dead Load | | plf | 153.0 | | | | | |
| Uplift Force (Demand) | $T = \frac{Vh}{C_o \sum L_i}$ | lbs | 459 | | | | | |
| **Holdown Type** | | | **HDU4** | | | | | |
| **Uplift Force (Capacity)** | | **lbs** | **3,424** | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE 3 PERFORATED

| ROOF | | | SW-04 | | | | | |
|---|---|---|---|---|---|---|---|---|
| Total Shearwall Segments | $\Sigma$ Li | ft | 21.49 | | | | | |
| Total Shearwall Length | Ltot | ft | 25.83 | | | | | |
| Percent Full-Height Sheathing | | % | 83% | | | | | |
| Total Area of Openings | Ao | ft2 | 19.53 | | | | | |
| Sheathing Area Ratio | $r = 1 \Big/ 1 + \frac{A_o}{h\sum L_i}$ | | 0.90 | | | | | |
| Shear Capacity Adjustment Factor | $C_o = \left(\frac{r}{3-2r}\right)\frac{L_{tot}}{\sum L_i}$ | | 0.91 | | | | | |
| Shear Trib. Width | | ft | 12.5 | | | | | |
| Line Trib. Length | | ft | 29.0 | | | | | |
| Shortest Panel > H/3.5 and < H/2 | | ft | | | | | | |
| Line Total Shear | V | lbs | 2,443 | | | | | |
| Line Unit Shear | V / ($\Sigma$ Li x Co) | plf | 125 | | | | | |
| **100% Wood Shearwall 10d** | **1** | | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | | |
| Roof DL Trib. Width | | ft | - | - | - | - | | |
| Ceiling DL Trib. Width | | ft | - | - | - | - | | |
| Wall Height | | ft | 8.5 | | | | | |
| Wall Dead Load | | plf | 153.0 | | | | | |
| Uplift Force (Demand) | $T = \frac{Vh}{C_o\sum L_i}$ | lbs | 440 | | | | | |
| **Holdown Type** | | | **HDU4** | | | | | |
| **Uplift Force (Capacity)** | | **lbs** | **3,424** | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE A

| ROOF | | SW-05 | SW-06 | SW-07 | SW8-9 | SW-10 | SW-11 |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 34.25 | 12.75 | 22.00 | 11.50 | 3.08 | 3.08 |
| **Total Shearwall Length** | **ft** | **86.66** | | | | | |
| Shear Trib. Width | ft | 16.0 | | | | | |
| Line Trib. Length | ft | 158.0 | | | | | |
| Line Total Length | ft | 158.0 | | | | | |
| Line Total Shear | lbs | 19,480 | TOP ROOF ADDED | | | | |
| Line Unit Shear | plf | 225 | x 4 ft / 3.08 ft = | | 310.2 | plf | |
| **100% Wood Shearwall 10d** | | **1** | **v = 340 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 1,541 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | - |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | - |
| Wall Height | ft | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 |
| Wall Dead Load | plf | 153.0 | 153.0 | 153.0 | 153.0 | 153.0 | 153.0 |
| Wall Shear Force | lbs | 7,699 | 2,866 | 4,945 | 2,585 | 692 | 692 |
| Uplift Force (Demand) | lbs | 1,645 | 2,268 | 2,000 | 2,304 | 2,547 | 2,547 |
| **Holdown Type** | | **HDU4** | **HDU4** | **HDU4** | **HDU4** | **HDU4** | **HDU4** |
| **Uplift Force (Capacity)** | **lbs** | **3,424** | **3,424** | **3,424** | **3,424** | **3,424** | **3,424** |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE B

| ROOF | | SW-12 | SW-13 | SW-14 | SW-15 | SW-16 | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 34.25 | 12.75 | 22.00 | 22.00 | 16.58 | |
| **Total Shearwall Length** | **ft** | **107.58** | | | | | |
| Shear Trib. Width | ft | 16.0 | | | | | |
| Line Trib. Length | ft | 158.0 | | | | | |
| Line Total Length | ft | 158.0 | | | | | |
| Line Total Shear | lbs | 19,480 | TOP ROOF ADDED | | | | |
| Line Unit Shear | plf | 181 | | | | | |
| **75% Wood Shearwall 10d** | | **1** | **v = 255 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 1,541 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | |
| Wall Height | ft | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | |
| Wall Dead Load | plf | 153.0 | 153.0 | 153.0 | 153.0 | 153.0 | |
| Wall Shear Force | lbs | 6,202 | 2,309 | 3,984 | 3,984 | 3,002 | |
| Uplift Force (Demand) | lbs | 548 | 1,170 | 903 | 903 | 1,059 | |
| **Holdown Type** | | **HDU4** | **HDU4** | **HDU4** | **HDU4** | **HDU4** | |
| **Uplift Force (Capacity)** | **lbs** | **3,424** | **3,424** | **3,424** | **3,424** | **3,424** | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE 1

| ROOF | | SW-17 | SW-18 | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 7.67 | 7.67 | | | | |
| **Total Shearwall Length** | **ft** | **15.34** | | | | | |
| Shear Trib. Width | ft | 17.0 | | | | | |
| Line Trib. Length | ft | 26.0 | | | | | |
| Line Total Length | ft | 26.0 | | | | | |
| Line Total Shear | lbs | 2,979 | | | | | |
| Line Unit Shear | plf | 194 | | | | | |
| **75% Wood Shearwall 10d** | | **1** | **v = 255 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 1,432 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | - |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | - |
| Wall Height | ft | 8.5 | 8.5 | | | | |
| Wall Dead Load | plf | 153.0 | 153.0 | | | | |
| Wall Shear Force | lbs | 1,489 | 1,489 | | | | |
| Uplift Force (Demand) | lbs | 1,429 | 1,429 | | | | |
| **Holdown Type** | | **HDU4** | **HDU4** | | | | |
| **Uplift Force (Capacity)** | **lbs** | **3,424** | **3,424** | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE 1.5-MF

| ROOF | | MF1 | | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 7.50 | | | | | |
| **Total Shearwall Length** | **ft** | **7.50** | | | | | |
| Shear Trib. Width | ft | 26.0 | | | | | |
| Line Trib. Length | ft | 26.0 | | | | | |
| Line Total Length | ft | 26.0 | | | | | |
| Line Total Shear | lbs | 4,556 | | | | | |
| Line Unit Shear | plf | | | | | | |
| **75% Wood Shearwall 10d** | | | | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | | | | | | |
| **Strap Type** | | | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | - |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | - |
| Wall Height | ft | 8.5 | | | | | |
| Wall Dead Load | plf | | | | | | |
| Wall Shear Force | lbs | | | | | | |
| Uplift Force (Demand) | lbs | | | | | | |
| **Holdown Type** | | | | | | | |
| **Uplift Force (Capacity)** | **lbs** | | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE 1.8-MF

| ROOF | | MF1 | | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 7.50 | | | | | |
| **Total Shearwall Length** | **ft** | **7.50** | | | | | |
| Shear Trib. Width | ft | 26.0 | | | | | |
| Line Trib. Length | ft | 26.0 | | | | | |
| Line Total Length | ft | 26.0 | | | | | |
| Line Total Shear + TOP RO | lbs | 6,999 | | | | | |
| Line Unit Shear | plf | | | | | | |
| **75% Wood Shearwall 10d** | | | | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω/1.2 | lbs | | | | | | |
| **Strap Type** | | | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | - |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | - |
| Wall Height | ft | 8.5 | | | | | |
| Wall Dead Load | plf | | | | | | |
| Wall Shear Force | lbs | | | | | | |
| Uplift Force (Demand) | lbs | | | | | | |
| **Holdown Type** | | | | | | | |
| **Uplift Force (Capacity)** | **lbs** | | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE 3

| **ROOF** | | **SW-19** | | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 8.17 | | | | | |
| **Total Shearwall Length** | **ft** | **8.17** | | | | | |
| Shear Trib. Width | ft | 17.0 | | | | | |
| Line Trib. Length | ft | 26.0 | | | | | |
| Line Total Length | ft | 26.0 | | | | | |
| Line Total Shear +TOP ROO | lbs | 5,422 | | | | | |
| Line Unit Shear | plf | 664 | | | | | |
| **100% Wood Shearwall 10d** | | **4** | **v = 870 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 2"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 2,607 | | | | | |
| **Strap Type** | | **MST37** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | - |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | - |
| Wall Height | ft | 8.5 | | | | | |
| Wall Dead Load | plf | 153.0 | | | | | |
| Wall Shear Force | lbs | 5,422 | | | | | |
| Uplift Force (Demand) | lbs | 5,404 | | | | | |
| **Holdown Type** | | **HDU14** | | | | | |
| **Uplift Force (Capacity)** | **lbs** | **10,793** | | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE 4

| ROOF | | SW-20 | SW-21 | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 7.75 | 4.00 | | | | |
| **Total Shearwall Length** | **ft** | **11.75** | | | | | |
| Shear Trib. Width | ft | 25.0 | | | | | |
| Line Trib. Length | ft | 31.0 | | | | | |
| Line Total Length | ft | 31.0 | | | | | |
| Line Total Shear +TOP ROO | lbs | 5,223 | | | | | |
| Line Unit Shear | plf | 445 | x 4 ft / 4 ft = | | 472.3 | plf | |
| **75% Wood Shearwall 10d** | | **3** | **v = 499 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 3"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 2,106 | | | | | |
| **Strap Type** | | **MST37** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | - |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | - |
| Wall Height | ft | 8.5 | 8.5 | | | | |
| Wall Dead Load | plf | 153.0 | 153.0 | | | | |
| Wall Shear Force | lbs | 3,445 | 1,778 | | | | |
| Uplift Force (Demand) | lbs | 3,790 | 3,899 | | | | |
| **Holdown Type** | | **HDU5** | **HDU5** | | | | |
| **Uplift Force (Capacity)** | **lbs** | **4,253** | **4,253** | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE 5

| ROOF | | SW-22 | SW-23 | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 9.58 | 14.00 | | | | |
| **Total Shearwall Length** | **ft** | **23.58** | | | | | |
| Shear Trib. Width | ft | 24.0 | | | | | |
| Line Trib. Length | ft | 31.0 | | | | | |
| Line Total Length | ft | 31.0 | | | | | |
| Line Total Shear +TOP ROO | lbs | 5,014 | | | | | |
| Line Unit Shear | plf | 213 | | | | | |
| **75% Wood Shearwall 10d** | | **1** | **v = 255 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 2,022 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | - |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | - |
| Wall Height | ft | 8.5 | 8.5 | | | | |
| Wall Dead Load | plf | 153.0 | 153.0 | | | | |
| Wall Shear Force | lbs | 2,037 | 2,977 | | | | |
| Uplift Force (Demand) | lbs | 1,530 | 1,402 | | | | |
| **Holdown Type** | | **HDU4** | **HDU4** | | | | |
| **Uplift Force (Capacity)** | **lbs** | **3,424** | **3,424** | | | | |

## SHEARWALL DESIGN

| Fl. Type | Story Shear | Wall Type | Wall Height |
|---|---|---|---|
| ROOF | 6.74 psf | Ext. | 8.50 ft |

### LINE 6

| **ROOF** | | **SW-24** | | | | | |
|---|---|---|---|---|---|---|---|
| Shearwall Length | ft | 14.92 | | | | | |
| **Total Shearwall Length** | **ft** | **14.92** | | | | | |
| Shear Trib. Width | ft | 13.5 | | | | | |
| Line Trib. Length | ft | 31.0 | | | | | |
| Line Total Length | ft | 31.0 | | | | | |
| Line Total Shear +TOP ROO | lbs | 2,820 | | | | | |
| Line Unit Shear | plf | 189 | | | | | |
| **75% Wood Shearwall 10d** | | **1** | **v = 255 plf (1-Side 15/32" Str. I w/ 10d Common Nails @ 6"-6"-12" O.C.)** | | | | |
| Drag Length | ft | 6.0 | | | | | |
| Drag Force x Ω / 1.2 | lbs | 1,137 | | | | | |
| **Strap Type** | | **MST27** | | | | | |
| Roof DL Trib. Width | ft | - | - | - | - | - | - |
| Ceiling DL Trib. Width | ft | - | - | - | - | - | - |
| Wall Height | ft | 8.5 | | | | | |
| Wall Dead Load | plf | 153.0 | | | | | |
| Wall Shear Force | lbs | 2,820 | | | | | |
| Uplift Force (Demand) | lbs | 1,175 | | | | | |
| **Holdown Type** | | **HDU4** | | | | | |
| **Uplift Force (Capacity)** | **lbs** | **3,424** | | | | | |

# TABLES REFERENCED IN BEAM DESIGN SPREADSHEET

**2018 NDS Table 4A**

| Douglas Fir-Larch [1] WWPA | Design Values for Visually Graded (2"-4") | | |
|---|---|---|---|
| | fb | fv | E |
| Select Str | 1,500 | 180 | 1,900,000 |
| No.1&Better | 1,200 | 180 | 1,800,000 |
| No.1 | 1,000 | 180 | 1,700,000 |
| No.2 | 900 | 180 | 1,600,000 |
| No.3 | 525 | 180 | 1,400,000 |
| Stud | 700 | 180 | 1,400,000 |

**2018 NDS Table 4D**

| Douglas Fir-Larch [1] WWPA | Design Values for Visually Graded (5" & Larger) | | |
|---|---|---|---|
| | fb | fv | E |
| Dense Str | 1,900 | 170 | 1,700,000 |
| Select Str | 1,600 | 170 | 1,600,000 |
| Dense No. 1 | 1,550 | 170 | 1,700,000 |
| No.1 | 1,350 | 170 | 1,600,000 |
| Dense No. 2 | 1,000 | 170 | 1,400,000 |
| No.2 | 875 | 170 | 1,300,000 |

**Other Material**

| | | | |
|---|---|---|---|
| Prllm2.0E | 2,900 | 290 | 2,000,000 |
| Mcrlm1.8E | 2,600 | 285 | 1,800,000 |
| Mcrlm1.9E | 2,600 | 285 | 1,900,000 |
| Steel Fy=36 ksi | 23,760 | 14400 | 29,000,000 |
| Steel Fy=46 ksi | 30,360 | 18400 | 29,000,000 |
| Steel Fy=50 ksi | 33,000 | 20000 | 29,000,000 |

1. FOR DOUGLAS FIR-LARCH USE 19% MAX. MOISTURE CONTENT

**LOAD SYMBOLS AND NOTATION**

D = Dead Load
Lr = Roof Live Load
L = Floor Live Load
E = Earthquake Load
W = Wind Load

**ASCE7-16 2.4 LOAD COMBINATION - ALLOWABLE STRESS DESIGN**

1. D
2. D + Lr — Load Duration = 1.25
3. D + L
4. D + 0.75 (Lr + L) — Load Duration = 1.25

Max. (Dead + Live)

5. $(1.0 + 0.14S_{DS})D + 0.7\Omega E$
6. $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$
7. $(0.6 - 0.14S_{DS})D + 0.7\Omega E$

Max. (Dead + Live + Lateral)
Allowable Stress Increase = 1.2
$\Omega$ = 2.5 For Flexible Diaphragm
ASCE7-16 12.4.3.2

**TABLE 1604.3 (2022 CBC) DEFLECTION LIMITS**

| Roof Members | L | D + L |
|---|---|---|
| Supporting Plaster Ceiling | *l* / 360 | *l* / 240 |
| Supporting Nonplaster Ceiling | *l* / 240 | *l* / 180 |
| Not Supporting Ceiling | *l* / 180 | *l* / 120 |
| Floor Members | *l* / 360 | *l* / 240 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RR | RR1 | RR2 | RR3 | CJ | CJ1 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 8.00 | 12.00 | 18.00 | 21.00 | 6.00 | 10.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 2x 6 | 2x 8 | 2x10 | 2x12 | 2x 4 | 2x 6 |
| **GRADE** | | No.2 | No.2 | No.2 | No.2 | No.2 | No.2 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | YES | YES | YES | YES | YES | YES |
| REPETITIVE FACTOR, Cr | | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 |
| SIZE FACTOR, Cf | | 1.30 | 1.20 | 1.10 | 1.00 | 1.50 | 1.30 |
| BENDING STRESSES, F'b | psi | 1,346 | 1,242 | 1,139 | 1,035 | 1,553 | 1,346 |
| SHEAR STRESSES, F'v | psi | 207 | 207 | 207 | 207 | 207 | 207 |
| MODULUS OF ELASTICITY | ksi | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | 1.33 | 1.33 | 1.33 | 1.33 | | |
| CEILING TRIB. WIDTH | ft | | | | | 1.33 | 1.33 |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 30.59 | 30.59 | 30.59 | 30.59 | 7.98 | 7.98 |
| TOTAL ROOF LIVE LOAD (Lr | plf | 26.60 | 26.60 | 26.60 | 26.60 | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | 26.60 | 26.60 |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P2 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RR | RR1 | RR2 | RR3 | CJ | CJ1 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 8.00 | 12.00 | 18.00 | 21.00 | 6.00 | 10.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 2x 6 | 2x 8 | 2x10 | 2x12 | 2x 4 | 2x 6 |
| **GRADE** | | No.2 | No.2 | No.2 | No.2 | No.2 | No.2 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 245 | 551 | 1,239 | 1,686 | 36 | 100 |
| MAX. DEFLECTION | in | 0.085 | 0.187 | 0.457 | 0.470 | 0.027 | 0.054 |
| LEFT REACTION | lbs | 122 | 184 | 275 | 321 | 24 | 40 |
| RIGHT REACTION | lbs | 122 | 184 | 275 | 321 | 24 | 40 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 213 | 479 | 1,077 | 1,466 | - | - |
| MAX. DEFLECTION | in | 0.074 | 0.163 | 0.397 | 0.409 | - | - |
| LEFT REACTION | lbs | 106 | 160 | 239 | 279 | - | - |
| RIGHT REACTION | lbs | 106 | 160 | 239 | 279 | - | - |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | - | - | - | - | 120 | 333 |
| MAX. DEFLECTION | in | - | - | - | - | 0.090 | 0.180 |
| LEFT REACTION | lbs | - | - | - | - | 80 | 133 |
| RIGHT REACTION | lbs | - | - | - | - | 80 | 133 |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 366 | 824 | 1,853 | 2,522 | 29 | 80 |
| MAX. DEFLECTION | in | 0.158 | 0.350 | 0.853 | 0.879 | 0.027 | 0.054 |
| LEFT REACTION | lbs | 183 | 275 | 412 | 480 | 19 | 32 |
| RIGHT REACTION | lbs | 183 | 275 | 412 | 480 | 19 | 32 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 245 | 551 | 1,239 | 1,686 | 156 | 432 |
| MAX. DEFLECTION | in | 0.085 | 0.187 | 0.457 | 0.470 | 0.118 | 0.234 |
| LEFT REACTION | lbs | 122 | 184 | 275 | 321 | 104 | 173 |
| RIGHT REACTION | lbs | 122 | 184 | 275 | 321 | 104 | 173 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 323 | 728 | 1,638 | 2,229 | 101 | 279 |
| MAX. DEFLECTION | in | 0.140 | 0.309 | 0.754 | 0.777 | 0.095 | 0.189 |
| LEFT REACTION | lbs | 202 | 303 | 455 | 531 | 84 | 140 |
| RIGHT REACTION | lbs | 202 | 303 | 455 | 531 | 84 | 140 |
| **LOAD CASE 5: $(1.0 + 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 187 | 420 | 946 | 1,288 | 27 | 76 |
| MAX. DEFLECTION | in | 0.086 | 0.191 | 0.465 | 0.479 | 0.028 | 0.055 |
| LEFT REACTION | lbs | 125 | 187 | 280 | 327 | 24 | 41 |
| RIGHT REACTION | lbs | 125 | 187 | 280 | 327 | 24 | 41 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RR | RR1 | RR2 | RR3 | CJ | CJ1 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 8.00 | 12.00 | 18.00 | 21.00 | 6.00 | 10.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 2x 6 | 2x 8 | 2x10 | 2x12 | 2x 4 | 2x 6 |
| **GRADE** | | No.2 | No.2 | No.2 | No.2 | No.2 | No.2 |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 278 | 626 | 1,408 | 1,917 | 82 | 229 |
| MAX. DEFLECTION | in | 0.128 | 0.284 | 0.692 | 0.712 | 0.083 | 0.165 |
| LEFT REACTION | lbs | 185 | 278 | 417 | 487 | 73 | 122 |
| RIGHT REACTION | lbs | 185 | 278 | 417 | 487 | 73 | 122 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 58 | 130 | 293 | 399 | 8 | 24 |
| MAX. DEFLECTION | in | 0.027 | 0.059 | 0.144 | 0.148 | 0.009 | 0.017 |
| LEFT REACTION | lbs | 39 | 58 | 87 | 101 | 8 | 13 |
| RIGHT REACTION | lbs | 39 | 58 | 87 | 101 | 8 | 13 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 366.0 | 823.6 | 1,853.1 | 2,522.2 | 155.6 | 432.3 |
| SECTION MODULUS, S | in3 | 7.6 | 13.1 | 21.4 | 31.6 | 3.1 | 7.6 |
| BENDING STRESS | psi | 580.8 | 752.1 | 1,039.6 | 956.6 | 609.7 | 685.9 |
| CHECK BENDING STRESS RATIO | | 43% OK | 61% OK | 91% OK | 92% OK | 39% OK | 51% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 202.2 | 303.26 | 454.89 | 530.70 | 103.74 | 172.90 |
| SECTION AREA, A | in2 | 8.25 | 10.88 | 13.88 | 16.88 | 5.25 | 8.25 |
| SHEAR STRESS, fv | psi | 36.76 | 41.83 | 49.18 | 47.17 | 29.64 | 31.44 |
| CHECK SHEAR STRESS RATIO | | 18% OK | 20% OK | 24% OK | 23% OK | 14% OK | 15% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 20.80 | 47.63 | 98.93 | 177.98 | 5.36 | 20.80 |
| MAX. DEFLECTION, DL | in | 0.085 | 0.187 | 0.457 | 0.470 | 0.027 | 0.054 |
| MAX. DEFLECTION, LL | in | 0.074 | 0.163 | 0.397 | 0.409 | 0.090 | 0.180 |
| DEFLECTION LIMITS, LL | | L / 240 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.4 OK | < 0.4 OK | < 0.6 OK | < 0.7 OK | < 0.2 OK | < 0.33 OK |
| MAX. DEFLECTION, DL+LL | in | 0.158 | 0.350 | 0.853 | 0.879 | 0.118 | 0.234 |
| DEFLECTION LIMITS, DL+LL | | L / 180 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.53 OK | < 0.6 OK | < 0.9 OK | < 1.05 OK | < 0.3 OK | < 0.5 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RR | RR1 | RR2 | RDG1 | HDR1 | HDR2 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 8.00 | 12.00 | 18.00 | 25.00 | 2.50 | 11.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Glm | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 2x 8 | 2x 8 | 2x10 | 5.25x16 | 6x10 | 6x10 |
| **GRADE** | | No.2 | No.2 | No.2 | Mcrlm1.9E | No.2 | No.2 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | YES | YES | YES | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | 1.15 | 1.15 | 1.15 | 1.00 | 1.00 | 1.00 |
| SIZE FACTOR, Cf | | 1.20 | 1.20 | 1.10 | 1.00 | 1.00 | 1.00 |
| BENDING STRESSES, F'b | psi | 1,242 | 1,242 | 1,139 | 2,600 | 875 | 875 |
| SHEAR STRESSES, F'v | psi | 207 | 207 | 207 | 285 | 170 | 170 |
| MODULUS OF ELASTICITY | ksi | 1,600 | 1,600 | 1,600 | 1,900 | 1,600 | 1,600 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | 1.33 | 1.33 | 1.33 | 10.00 | 1.33 | 0.67 |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | 6.00 |
| WALL TYPE (EXT, INT) | | | | | | | EXT |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 30.59 | 30.59 | 30.59 | 230.03 | 30.59 | 123.41 |
| TOTAL ROOF LIVE LOAD (Lr | plf | 26.60 | 26.60 | 26.60 | 200.00 | 26.60 | 13.40 |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | | | | | RDG1 | |
| DEAD LOAD (P D ) | lbs | | | | | 2,875.3 | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | 2,500.0 | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | - | |
| LATERAL, P (W or 0.7E) | lbs | | | | | - | |
| DIST. (LEFT SUPPORT) | ft | | | | | 1.25 | |
| P2 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RR | RR1 | RR2 | RDG1 | HDR1 | HDR2 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 8.00 | 12.00 | 18.00 | 25.00 | 2.50 | 11.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Glm | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 2x 8 | 2x 8 | 2x10 | 5.25x16 | 6x10 | 6x10 |
| **GRADE** | | No.2 | No.2 | No.2 | Mcrlm1.9E | No.2 | No.2 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 245 | 551 | 1,239 | 17,971 | 1,821 | 1,867 |
| MAX. DEFLECTION | in | 0.037 | 0.187 | 0.457 | 0.594 | 0.003 | 0.065 |
| LEFT REACTION | lbs | 122 | 184 | 275 | 2,875 | 1,476 | 679 |
| RIGHT REACTION | lbs | 122 | 184 | 275 | 2,875 | 1,476 | 679 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 213 | 479 | 1,077 | 15,625 | 1,583 | 203 |
| MAX. DEFLECTION | in | 0.032 | 0.163 | 0.397 | 0.516 | 0.002 | 0.007 |
| LEFT REACTION | lbs | 106 | 160 | 239 | 2,500 | 1,283 | 74 |
| RIGHT REACTION | lbs | 106 | 160 | 239 | 2,500 | 1,283 | 74 |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | - | - | - | - | - | - |
| MAX. DEFLECTION | in | - | - | - | - | - | - |
| LEFT REACTION | lbs | - | - | - | - | - | - |
| RIGHT REACTION | lbs | - | - | - | - | - | - |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 366 | 824 | 1,853 | 33,596 | 2,723 | 1,655 |
| MAX. DEFLECTION | in | 0.069 | 0.350 | 0.853 | 1.110 | 0.005 | 0.072 |
| LEFT REACTION | lbs | 183 | 275 | 412 | 4,300 | 2,207 | 602 |
| RIGHT REACTION | lbs | 183 | 275 | 412 | 4,300 | 2,207 | 602 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 245 | 551 | 1,239 | 17,971 | 1,821 | 1,867 |
| MAX. DEFLECTION | in | 0.037 | 0.187 | 0.457 | 0.594 | 0.003 | 0.065 |
| LEFT REACTION | lbs | 122 | 184 | 275 | 2,875 | 1,476 | 679 |
| RIGHT REACTION | lbs | 122 | 184 | 275 | 2,875 | 1,476 | 679 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 323 | 728 | 1,638 | 29,689 | 2,407 | 1,615 |
| MAX. DEFLECTION | in | 0.061 | 0.309 | 0.754 | 0.981 | 0.004 | 0.070 |
| LEFT REACTION | lbs | 202 | 303 | 455 | 4,750 | 2,438 | 734 |
| RIGHT REACTION | lbs | 202 | 303 | 455 | 4,750 | 2,438 | 734 |
| **LOAD CASE 5: $(1.0 + 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 187 | 420 | 946 | 18,297 | 1,390 | 1,425 |
| MAX. DEFLECTION | in | 0.038 | 0.191 | 0.465 | 0.605 | 0.003 | 0.066 |
| LEFT REACTION | lbs | 125 | 187 | 280 | 2,927 | 1,503 | 691 |
| RIGHT REACTION | lbs | 125 | 187 | 280 | 2,927 | 1,503 | 691 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | RR | RR1 | RR2 | RDG1 | HDR1 | HDR2 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 8.00 | 12.00 | 18.00 | 25.00 | 2.50 | 11.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Glm | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 2x 8 | 2x 8 | 2x10 | 5.25x16 | 6x10 | 6x10 |
| **GRADE** | | No.2 | No.2 | No.2 | Mcrlm1.9E | No.2 | No.2 |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 278 | 626 | 1,408 | 27,232 | 2,070 | 1,456 |
| MAX. DEFLECTION | in | 0.056 | 0.284 | 0.692 | 0.900 | 0.004 | 0.067 |
| LEFT REACTION | lbs | 185 | 278 | 417 | 4,357 | 2,237 | 706 |
| RIGHT REACTION | lbs | 185 | 278 | 417 | 4,357 | 2,237 | 706 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 58 | 130 | 293 | 5,664 | 430 | 441 |
| MAX. DEFLECTION | in | 0.012 | 0.059 | 0.144 | 0.187 | 0.001 | 0.020 |
| LEFT REACTION | lbs | 39 | 58 | 87 | 906 | 465 | 214 |
| RIGHT REACTION | lbs | 39 | 58 | 87 | 906 | 465 | 214 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 366.0 | 823.6 | 1,853.1 | 33,595.7 | 2,723.4 | 1,866.6 |
| SECTION MODULUS, S | in3 | 13.1 | 13.1 | 21.4 | 224.0 | 82.7 | 82.7 |
| BENDING STRESS | psi | 334.3 | 752.1 | 1,039.6 | 1,799.8 | 395.0 | 270.8 |
| CHECK BENDING STRESS RATIO | | 27% OK | 61% OK | 91% OK | 69% OK | 45% OK | 31% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 202.2 | 303.26 | 454.89 | 4,750.31 | 2,438.34 | 734.04 |
| SECTION AREA, A | in2 | 10.88 | 10.88 | 13.88 | 84.00 | 52.25 | 52.25 |
| SHEAR STRESS, fv | psi | 27.89 | 41.83 | 49.18 | 84.83 | 70.00 | 21.07 |
| CHECK SHEAR STRESS RATIO | | 13% OK | 20% OK | 24% OK | 30% OK | 41% OK | 12% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 47.63 | 47.63 | 98.93 | 1,792.00 | 392.96 | 392.96 |
| MAX. DEFLECTION, DL | in | 0.037 | 0.187 | 0.457 | 0.594 | 0.003 | 0.065 |
| MAX. DEFLECTION, LL | in | 0.032 | 0.163 | 0.397 | 0.516 | 0.002 | 0.007 |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.27 OK | < 0.4 OK | < 0.6 OK | < 0.83 OK | < 0.08 OK | < 0.37 OK |
| MAX. DEFLECTION, DL+LL | in | 0.069 | 0.350 | 0.853 | 1.110 | 0.005 | 0.072 |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.4 OK | < 0.6 OK | < 0.9 OK | < 1.25 OK | < 0.13 OK | < 0.55 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | | FB1 | FB2 | HDR3 | HDR4 | CB1 | CB2 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 20.00 | 20.00 | 16.50 | 10.50 | 18.50 | 13.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD Prllm | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 5.25x14 | 6x14 | 6x14 | 6x14 | 6x16 | 6x12 |
| **GRADE** | | Prllm2.2E | No.1 | No.1 | No.1 | No.1 | No.1 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | NO | NO | NO | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| SIZE FACTOR, Cf | | 1.00 | 0.98 | 0.98 | 0.98 | 0.97 | 1.00 |
| BENDING STRESSES, F'b | psi | 2,900 | 1,327 | 1,327 | 1,327 | 1,308 | 1,350 |
| SHEAR STRESSES, F'v | psi | 290 | 170 | 170 | 170 | 170 | 170 |
| MODULUS OF ELASTICITY | ksi | 2,200 | 1,700 | 1,700 | 1,700 | 1,700 | 1,700 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | 12.50 | 8.00 | | 10.50 |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | 9.00 | 5.50 | | 5.50 | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | 4.00 | 12.00 | | |
| WALL TYPE (EXT, INT) | | | | EXT | EXT | | |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 117.00 | 71.50 | 359.53 | 471.52 | - | 241.53 |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | 250.00 | 160.00 | - | 210.00 |
| TOTAL FLOOR LIVE LOAD (L | plf | 360.00 | 220.00 | - | 220.00 | - | - |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | | | | RDG2 | RDG2 | |
| DEAD LOAD (P D ) | lbs | | | | 610.0 | 2,040.0 | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | 1,020.0 | 2,920.0 | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | - | - | |
| LATERAL, P (W or 0.7E) | lbs | | | | - | - | |
| DIST. (LEFT SUPPORT) | ft | | | | 5.00 | 9.25 | |
| P2 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | FB1 | FB2 | HDR3 | HDR4 | CB1 | CB2 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 20.00 | 20.00 | 16.50 | 10.50 | 18.50 | 13.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD Prllm | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 5.25x14 | 6x14 | 6x14 | 6x14 | 6x16 | 6x12 |
| **GRADE** | | Prllm2.2E | No.1 | No.1 | No.1 | No.1 | No.1 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 5,850 | 3,575 | 12,235 | 8,074 | 9,435 | 5,102 |
| MAX. DEFLECTION | in | 0.159 | 0.134 | 0.313 | 0.080 | 0.160 | 0.131 |
| LEFT REACTION | lbs | 1,170 | 715 | 2,966 | 2,795 | 1,020 | 1,570 |
| RIGHT REACTION | lbs | 1,170 | 715 | 2,966 | 2,766 | 1,020 | 1,570 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | - | - | 8,508 | 4,853 | 13,505 | 4,436 |
| MAX. DEFLECTION | in | - | - | 0.217 | 0.045 | 0.229 | 0.114 |
| LEFT REACTION | lbs | - | - | 2,063 | 1,374 | 1,460 | 1,365 |
| RIGHT REACTION | lbs | - | - | 2,063 | 1,326 | 1,460 | 1,365 |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 18,000 | 11,000 | - | 3,032 | - | - |
| MAX. DEFLECTION | in | 0.491 | 0.413 | - | 0.031 | - | - |
| LEFT REACTION | lbs | 3,600 | 2,200 | - | 1,155 | - | - |
| RIGHT REACTION | lbs | 3,600 | 2,200 | - | 1,155 | - | - |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 4,680 | 2,860 | 16,594 | 10,342 | 18,352 | 7,631 |
| MAX. DEFLECTION | in | 0.159 | 0.134 | 0.530 | 0.125 | 0.390 | 0.245 |
| LEFT REACTION | lbs | 936 | 572 | 4,023 | 3,335 | 1,984 | 2,348 |
| RIGHT REACTION | lbs | 936 | 572 | 4,023 | 3,273 | 1,984 | 2,348 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 23,850 | 14,575 | 12,235 | 11,101 | 9,435 | 5,102 |
| MAX. DEFLECTION | in | 0.650 | 0.547 | 0.313 | 0.112 | 0.160 | 0.131 |
| LEFT REACTION | lbs | 4,770 | 2,915 | 2,966 | 3,950 | 1,020 | 1,570 |
| RIGHT REACTION | lbs | 4,770 | 2,915 | 2,966 | 3,921 | 1,020 | 1,570 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 15,480 | 9,460 | 14,893 | 11,187 | 15,651 | 6,744 |
| MAX. DEFLECTION | in | 0.528 | 0.444 | 0.476 | 0.138 | 0.332 | 0.216 |
| LEFT REACTION | lbs | 3,870 | 2,365 | 4,513 | 4,692 | 2,115 | 2,594 |
| RIGHT REACTION | lbs | 3,870 | 2,365 | 4,513 | 4,626 | 2,115 | 2,594 |
| **LOAD CASE 5: $(1.0 + 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 4,467 | 2,730 | 9,343 | 6,165 | 7,205 | 3,896 |
| MAX. DEFLECTION | in | 0.162 | 0.137 | 0.318 | 0.082 | 0.163 | 0.133 |
| LEFT REACTION | lbs | 1,191 | 728 | 3,020 | 2,846 | 1,038 | 1,598 |
| RIGHT REACTION | lbs | 1,191 | 728 | 3,020 | 2,816 | 1,038 | 1,598 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | FB1 | FB2 | HDR3 | HDR4 | CB1 | CB2 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 20.00 | 20.00 | 16.50 | 10.50 | 18.50 | 13.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD Prllm | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 5.25x14 | 6x14 | 6x14 | 6x14 | 6x16 | 6x12 |
| **GRADE** | | Prllm2.2E | No.1 | No.1 | No.1 | No.1 | No.1 |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 12,702 | 7,762 | 12,907 | 9,579 | 13,208 | 5,799 |
| MAX. DEFLECTION | in | 0.462 | 0.389 | 0.440 | 0.126 | 0.299 | 0.198 |
| LEFT REACTION | lbs | 3,387 | 2,070 | 4,172 | 4,297 | 1,904 | 2,379 |
| RIGHT REACTION | lbs | 3,387 | 2,070 | 4,172 | 4,239 | 1,904 | 2,379 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 1,383 | 845 | 2,892 | 1,909 | 2,230 | 1,206 |
| MAX. DEFLECTION | in | 0.050 | 0.042 | 0.099 | 0.025 | 0.051 | 0.041 |
| LEFT REACTION | lbs | 369 | 225 | 935 | 881 | 322 | 495 |
| RIGHT REACTION | lbs | 369 | 225 | 935 | 872 | 322 | 495 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 23,850.0 | 14,575.0 | 16,594.5 | 11,187.3 | 18,352.0 | 7,630.8 |
| SECTION MODULUS, S | in3 | 171.5 | 167.1 | 167.1 | 167.1 | 220.2 | 121.2 |
| BENDING STRESS | psi | 1,668.8 | 1,046.9 | 1,192.0 | 803.6 | 1,000.0 | 755.3 |
| CHECK BENDING STRESS RATIO | | 58% OK | 79% OK | 90% OK | 61% OK | 76% OK | 56% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 4,770.0 | 2,915.00 | 4,513.01 | 4,691.97 | 2,115.00 | 2,593.67 |
| SECTION AREA, A | in2 | 73.50 | 74.25 | 74.25 | 74.25 | 85.25 | 63.25 |
| SHEAR STRESS, fv | psi | 97.35 | 58.89 | 91.17 | 94.79 | 37.21 | 61.51 |
| CHECK SHEAR STRESS RATIO | | 34% OK | 35% OK | 54% OK | 56% OK | 22% OK | 36% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 1,200.50 | 1,127.67 | 1,127.67 | 1,127.67 | 1,706.78 | 697.07 |
| MAX. DEFLECTION, DL | in | 0.159 | 0.134 | 0.313 | 0.080 | 0.160 | 0.131 |
| MAX. DEFLECTION, LL | in | 0.491 | 0.413 | 0.217 | 0.057 | 0.229 | 0.114 |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.67 OK | < 0.67 OK | < 0.55 OK | < 0.35 OK | < 0.62 OK | < 0.43 OK |
| MAX. DEFLECTION, DL+LL | in | 0.650 | 0.547 | 0.530 | 0.138 | 0.390 | 0.245 |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 1 OK | < 1 OK | < 0.83 OK | < 0.53 OK | < 0.93 OK | < 0.65 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | CB3 NG | CB4 | CB5 | HDR5 | HDR6 | HDR7 |
|---|---|---|---|---|---|---|
| **SPAN** ft | 25.00 | 10.50 | 22.00 | 10.50 | 10.50 | 4.00 |
| **MATERIAL (WOOD, STEEL)** | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** in | 6x12 | 6x12 | 6x16 | 6x12 | 6x10 | 6x10 |
| **GRADE** | No.1 | No.1 | No.1 | No.1 | No.1 | No.1 |
| **ALLOWABLE STRESSES** | | | | | | |
| REPETITIVE MEMBER | NO | NO | NO | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | | 1.00 | 1.00 | 1.00 | 1.00 |
| SIZE FACTOR, Cf | | | 0.97 | 1.00 | 1.00 | 1.00 |
| BENDING STRESSES, F'b psi | | | 1,308 | 1,350 | 1,350 | 1,350 |
| SHEAR STRESSES, F'v psi | | | 170 | 170 | 170 | 170 |
| MODULUS OF ELASTICITY ksi | | | 1,700 | 1,700 | 1,700 | 1,700 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | |
| ROOF TRIB. WIDTH ft | 5.00 | 1.33 | | 5.50 | 1.33 | 5.50 |
| CEILING TRIB. WIDTH ft | | 6.50 | | 6.50 | | 5.50 |
| FLOOR TRIB. WIDTH ft | | | | | | |
| DECK TRIB. WIDTH ft | | | | | | |
| WALL HEIGHT ft | | 4.00 | | 4.00 | 4.00 | 4.00 |
| WALL TYPE (EXT, INT) | | EXT | | EXT | EXT | EXT |
| AUTO CALC BEAM WEIGHT | | | | | | |
| TOTAL DEAD LOAD (D plf | | | - | 237.51 | 102.59 | 231.51 |
| TOTAL ROOF LIVE LOAD (Lr plf | | | - | 110.00 | 26.60 | 110.00 |
| TOTAL FLOOR LIVE LOAD (L plf | | | - | 130.00 | - | 110.00 |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | |
| ROOF TRIB. WIDTH ft | | | | | | |
| CEILING TRIB. WIDTH ft | | | | | | |
| FLOOR TRIB. WIDTH ft | | | | | | |
| DECK TRIB. WIDTH ft | | | | | | |
| WALL HEIGHT ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | |
| TOTAL DEAD LOAD (D plf | | | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr plf | | | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L plf | | | - | - | - | - |
| FROM (LEFT SUPPORT) ft | | | | | | |
| LENGTH OF LOAD ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | |
| ROOF TRIB. WIDTH ft | | | | | | |
| TOTAL DEAD LOAD (D plf | | | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr plf | | | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | |
| P1 | | | RDG3 | RDG2 | RDG3 | RDG4 |
| DEAD LOAD (P D ) lbs | | 610.0 | 1,720.0 | 610.0 | 550.0 | 350.0 |
| ROOF LIVE LOAD (P Lr) lbs | | 1,020.0 | 2,600.0 | 1,020.0 | 930.0 | 1,040.0 |
| FLOOR LIVE LOAD (P L ) lbs | | - | - | - | - | - |
| LATERAL, P (W or 0.7E) lbs | | - | - | - | - | - |
| DIST. (LEFT SUPPORT) ft | | 5.25 | 11.00 | 5.25 | 5.25 | 2.00 |
| P2 | | | | | | |
| DEAD LOAD (P D ) lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) lbs | | | | | | |
| LATERAL, P (W or 0.7E) lbs | | | | | | |
| DIST. (LEFT SUPPORT) ft | | | | | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CB3 NG | CB4 | CB5 | HDR5 | HDR6 | HDR7 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 25.00 | 10.50 | 22.00 | 10.50 | 10.50 | 4.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 6x12 | 6x12 | 6x16 | 6x12 | 6x10 | 6x10 |
| **GRADE** | | No.1 | No.1 | No.1 | No.1 | No.1 | No.1 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | | | 9,460 | 4,874 | 2,858 | 813 |
| MAX. DEFLECTION | in | | | 0.227 | 0.076 | 0.076 | 0.003 |
| LEFT REACTION | lbs | | | 860 | 1,552 | 814 | 638 |
| RIGHT REACTION | lbs | | | 860 | 1,552 | 814 | 638 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | | | 14,300 | 4,193 | 2,808 | 1,260 |
| MAX. DEFLECTION | in | | | 0.343 | 0.061 | 0.069 | 0.005 |
| LEFT REACTION | lbs | | | 1,300 | 1,088 | 605 | 740 |
| RIGHT REACTION | lbs | | | 1,300 | 1,088 | 605 | 740 |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | | | - | 1,792 | - | 220 |
| MAX. DEFLECTION | in | | | - | 0.030 | - | 0.001 |
| LEFT REACTION | lbs | | | - | 683 | - | 220 |
| RIGHT REACTION | lbs | | | - | 683 | - | 220 |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | | | 19,008 | 7,254 | 4,532 | 1,658 |
| MAX. DEFLECTION | in | | | 0.571 | 0.138 | 0.145 | 0.008 |
| LEFT REACTION | lbs | | | 1,728 | 2,112 | 1,135 | 1,102 |
| RIGHT REACTION | lbs | | | 1,728 | 2,112 | 1,135 | 1,102 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | | | 9,460 | 6,666 | 2,858 | 1,033 |
| MAX. DEFLECTION | in | | | 0.227 | 0.106 | 0.076 | 0.004 |
| LEFT REACTION | lbs | | | 860 | 2,234 | 814 | 858 |
| RIGHT REACTION | lbs | | | 860 | 2,234 | 814 | 858 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | | | 16,148 | 7,491 | 3,971 | 1,538 |
| MAX. DEFLECTION | in | | | 0.485 | 0.145 | 0.128 | 0.007 |
| LEFT REACTION | lbs | | | 1,835 | 2,879 | 1,267 | 1,358 |
| RIGHT REACTION | lbs | | | 1,835 | 2,879 | 1,267 | 1,358 |
| **LOAD CASE 5: $(1.0 + 0.14S_{ds})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | | | 7,224 | 3,722 | 2,182 | 621 |
| MAX. DEFLECTION | in | | | 0.231 | 0.078 | 0.078 | 0.003 |
| LEFT REACTION | lbs | | | 876 | 1,580 | 828 | 650 |
| RIGHT REACTION | lbs | | | 876 | 1,580 | 828 | 650 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CB3 NG | CB4 | CB5 | HDR5 | HDR6 | HDR7 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 25.00 | 10.50 | 22.00 | 10.50 | 10.50 | 4.00 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L |
| **BEAM SECTION** | in | 6x12 | 6x12 | 6x16 | 6x12 | 6x10 | 6x10 |
| **GRADE** | | No.1 | No.1 | No.1 | No.1 | No.1 | No.1 |
| **LOAD CASE 6: (1.0 + 0.105$S_{DS}$)D + 0.525ΩE + 0.75(L + Lr)** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | | | 13,599 | 6,359 | 3,399 | 1,286 |
| MAX. DEFLECTION | in | | | 0.436 | 0.131 | 0.117 | 0.007 |
| LEFT REACTION | lbs | | | 1,648 | 2,615 | 1,169 | 1,220 |
| RIGHT REACTION | lbs | | | 1,648 | 2,615 | 1,169 | 1,220 |
| **LOAD CASE 7: (0.6 − 0.14$S_{DS}$)D + 0.7ΩE** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | | | 2,236 | 1,152 | 676 | 192 |
| MAX. DEFLECTION | in | | | 0.072 | 0.024 | 0.024 | 0.001 |
| LEFT REACTION | lbs | | | 271 | 489 | 256 | 201 |
| RIGHT REACTION | lbs | | | 271 | 489 | 256 | 201 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | | | 19,008.0 | 7,490.6 | 4,532.4 | 1,658.4 |
| SECTION MODULUS, S | in3 | | | 220.2 | 121.2 | 82.7 | 82.7 |
| BENDING STRESS | psi | | | 1,035.7 | 741.5 | 657.4 | 240.6 |
| CHECK BENDING STRESS RATIO | | | | 79% OK | 55% OK | 49% OK | 18% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | | | 1,835.00 | 2,879.45 | 1,267.10 | 1,358.03 |
| SECTION AREA, A | in2 | | | 85.25 | 63.25 | 52.25 | 52.25 |
| SHEAR STRESS, fv | psi | | | 32.29 | 68.29 | 36.38 | 38.99 |
| CHECK SHEAR STRESS RATIO | | | | 19% OK | 40% OK | 21% OK | 23% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | | | 1,706.78 | 697.07 | 392.96 | 392.96 |
| MAX. DEFLECTION, DL | in | | | 0.227 | 0.076 | 0.076 | 0.003 |
| MAX. DEFLECTION, LL | in | | | 0.343 | 0.068 | 0.069 | 0.005 |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | | | < 0.73 OK | < 0.35 OK | < 0.35 OK | < 0.13 OK |
| MAX. DEFLECTION, DL+LL | in | | | 0.571 | 0.145 | 0.145 | 0.008 |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | | | < 1.1 OK | < 0.53 OK | < 0.53 OK | < 0.2 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CB6 | CB7 | CB8 | FB3 | STRINGER | FB4 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 5.50 | 9.50 | 3.50 | 8.00 | 18.50 | 5.50 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | STEEL HSS | WOOD DF-L |
| **BEAM SECTION** | in | 6x12 | 4x12 | 6x12 | 6x12 | HSS12x 3x1/4 | 6x12 |
| **GRADE** | | No.1 | No.1 | No.1 | No.1 | Fy=46 ksi | No.1 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | NO | NO | NO | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| SIZE FACTOR, Cf | | 1.00 | 1.10 | 1.00 | 1.00 | 1.00 | 1.00 |
| BENDING STRESSES, F'b | psi | 1,350 | 1,100 | 1,350 | 1,350 | 30,360 | 1,350 |
| SHEAR STRESSES, F'v | psi | 170 | 180 | 170 | 170 | 18,400 | 170 |
| MODULUS OF ELASTICITY | ksi | 1,700 | 1,700 | 1,700 | 1,700 | 29,000 | 1,700 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | 1.33 | 9.00 | 6.00 | 9.00 | | |
| CEILING TRIB. WIDTH | ft | 4.50 | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | 5.50 | | |
| DECK TRIB. WIDTH | ft | | | | | 3.00 | 4.00 |
| WALL HEIGHT | ft | | | 4.00 | 12.00 | 3.50 | |
| WALL TYPE (EXT, INT) | | | | EXT | EXT | EXT | |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 57.59 | 207.02 | 210.02 | 494.52 | 102.00 | 52.00 |
| TOTAL ROOF LIVE LOAD (Lr | plf | 26.60 | 180.00 | 120.00 | 180.00 | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | 90.00 | - | - | 220.00 | 300.00 | 400.00 |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | - | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | | | | |
| LENGTH OF LOAD | ft | | | | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | RDG4 | | CB2 | CB2 | | STRINGER |
| DEAD LOAD (P D ) | lbs | 2,930.0 | | 1,569.9 | 1,569.9 | | 943.5 |
| ROOF LIVE LOAD (P Lr) | lbs | 4,140.0 | | 1,365.0 | 1,365.0 | | - |
| FLOOR LIVE LOAD (P L ) | lbs | - | | - | - | | 2,775.0 |
| LATERAL, P (W or 0.7E) | lbs | - | | - | - | | - |
| DIST. (LEFT SUPPORT) | ft | 3.50 | | 1.75 | 4.00 | | 1.00 |
| P2 | | | | | | | STRINGER |
| DEAD LOAD (P D ) | lbs | | | | | | 943.5 |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | - |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | 2,775.0 |
| LATERAL, P (W or 0.7E) | lbs | | | | | | - |
| DIST. (LEFT SUPPORT) | ft | | | | | | 4.00 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CB6 | CB7 | CB8 | FB3 | STRINGER | FB4 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 5.50 | 9.50 | 3.50 | 8.00 | 18.50 | 5.50 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | STEEL HSS | WOOD DF-L |
| **BEAM SECTION** | in | 6x12 | 4x12 | 6x12 | 6x12 | HSS12x 3x1/4 | 6x12 |
| **GRADE** | | No.1 | No.1 | No.1 | No.1 | Fy=46 ksi | No.1 |
| P3 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| P4 | | | | | | | |
| DEAD LOAD (P D ) | lbs | | | | | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | | | |
| LATERAL, P (W or 0.7E) | lbs | | | | | | |
| DIST. (LEFT SUPPORT) | ft | | | | | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 3,893 | 2,335 | 1,695 | 7,096 | 4,364 | 1,442 |
| MAX. DEFLECTION | in | 0.014 | 0.054 | 0.003 | 0.063 | 0.090 | 0.007 |
| LEFT REACTION | lbs | 1,224 | 983 | 1,152 | 2,763 | 944 | 1,172 |
| RIGHT REACTION | lbs | 2,023 | 983 | 1,152 | 2,763 | 944 | 1,001 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 5,309 | 2,031 | 1,378 | 4,170 | - | - |
| MAX. DEFLECTION | in | 0.019 | 0.047 | 0.002 | 0.035 | - | - |
| LEFT REACTION | lbs | 1,579 | 855 | 893 | 1,403 | - | - |
| RIGHT REACTION | lbs | 2,708 | 855 | 893 | 1,403 | - | - |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 340 | - | - | 1,760 | 12,834 | 5,061 |
| MAX. DEFLECTION | in | 0.002 | - | - | 0.017 | 0.265 | 0.025 |
| LEFT REACTION | lbs | 248 | - | - | 880 | 2,775 | 4,127 |
| RIGHT REACTION | lbs | 248 | - | - | 880 | 2,775 | 3,623 |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 7,361 | 3,493 | 2,459 | 9,013 | 4,364 | 1,153 |
| MAX. DEFLECTION | in | 0.034 | 0.100 | 0.005 | 0.098 | 0.090 | 0.007 |
| LEFT REACTION | lbs | 2,242 | 1,471 | 1,636 | 3,332 | 755 | 938 |
| RIGHT REACTION | lbs | 3,784 | 1,471 | 1,636 | 3,332 | 755 | 801 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 4,206 | 2,335 | 1,695 | 8,856 | 17,198 | 6,484 |
| MAX. DEFLECTION | in | 0.016 | 0.054 | 0.003 | 0.080 | 0.355 | 0.032 |
| LEFT REACTION | lbs | 1,471 | 983 | 1,152 | 3,643 | 3,719 | 5,300 |
| RIGHT REACTION | lbs | 2,270 | 983 | 1,152 | 3,643 | 3,719 | 4,623 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 6,488 | 3,087 | 2,183 | 9,235 | 13,989 | 4,175 |
| MAX. DEFLECTION | in | 0.030 | 0.089 | 0.004 | 0.102 | 0.289 | 0.025 |
| LEFT REACTION | lbs | 2,593 | 1,625 | 1,822 | 4,475 | 3,025 | 4,268 |
| RIGHT REACTION | lbs | 4,239 | 1,625 | 1,822 | 4,475 | 3,025 | 3,718 |
| **LOAD CASE 5: $(1.0 + 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 2,972 | 1,783 | 1,295 | 5,419 | 4,443 | 1,101 |
| MAX. DEFLECTION | in | 0.015 | 0.055 | 0.003 | 0.064 | 0.092 | 0.007 |
| LEFT REACTION | lbs | 1,246 | 1,001 | 1,173 | 2,813 | 961 | 1,194 |
| RIGHT REACTION | lbs | 2,060 | 1,001 | 1,173 | 2,813 | 961 | 1,019 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | CB6 | CB7 | CB8 | FB3 | STRINGER | FB4 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 5.50 | 9.50 | 3.50 | 8.00 | 18.50 | 5.50 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD DF-L | STEEL HSS | WOOD DF-L |
| **BEAM SECTION** | in | 6x12 | 4x12 | 6x12 | 6x12 | HSS12x 3x1/4 | 6x12 |
| **GRADE** | | No.1 | No.1 | No.1 | No.1 | Fy=46 ksi | No.1 |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 5,473 | 2,654 | 1,882 | 7,952 | 12,263 | 3,410 |
| MAX. DEFLECTION | in | 0.027 | 0.081 | 0.004 | 0.094 | 0.253 | 0.022 |
| LEFT REACTION | lbs | 2,331 | 1,490 | 1,678 | 4,112 | 2,651 | 3,719 |
| RIGHT REACTION | lbs | 3,813 | 1,490 | 1,678 | 4,112 | 2,651 | 3,237 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 920 | 552 | 401 | 1,677 | 1,375 | 341 |
| MAX. DEFLECTION | in | 0.005 | 0.017 | 0.001 | 0.020 | 0.028 | 0.002 |
| LEFT REACTION | lbs | 386 | 310 | 363 | 871 | 297 | 370 |
| RIGHT REACTION | lbs | 638 | 310 | 363 | 871 | 297 | 315 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 7,361.3 | 3,492.9 | 2,458.7 | 9,234.8 | 17,198.1 | 6,483.5 |
| SECTION MODULUS, S | in3 | 121.2 | 73.8 | 121.2 | 121.2 | 17.2 | 121.2 |
| BENDING STRESS | psi | 728.7 | 567.7 | 243.4 | 914.1 | 11,998.6 | 641.8 |
| CHECK BENDING STRESS RATIO | | 54% OK | 52% OK | 18% OK | 68% OK | 40% OK | 48% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 4,239.3 | 1,624.61 | 1,821.86 | 4,474.93 | 3,718.50 | 5,299.55 |
| SECTION AREA, A | in2 | 63.25 | 39.38 | 63.25 | 63.25 | 6.63 | 63.25 |
| SHEAR STRESS, fv | psi | 100.54 | 61.89 | 43.21 | 106.12 | 841.29 | 125.68 |
| CHECK SHEAR STRESS RATIO | | 59% OK | 34% OK | 25% OK | 62% OK | 5% OK | 74% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 697.07 | 415.28 | 697.07 | 697.07 | 103.00 | 697.07 |
| MAX. DEFLECTION, DL | in | 0.014 | 0.054 | 0.003 | 0.063 | 0.090 | 0.007 |
| MAX. DEFLECTION, LL | in | 0.019 | 0.047 | 0.002 | 0.039 | 0.265 | 0.025 |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.18 OK | < 0.32 OK | < 0.12 OK | < 0.27 OK | < 0.62 OK | < 0.18 OK |
| MAX. DEFLECTION, DL+LL | in | 0.034 | 0.100 | 0.005 | 0.102 | 0.355 | 0.032 |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.28 OK | < 0.48 OK | < 0.18 OK | < 0.4 OK | < 0.93 OK | < 0.28 OK |

## SIMPLY SUPPORTED BEAM DESIGN

| | | FB5 | FB6 | FB7 | FB8 | FB9 | FB11 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 10.50 | 6.50 | 7.50 | 21.00 | 20.00 | 10.50 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD Prllm | WOOD DF-L |
| **BEAM SECTION** | in | 6x14 | 6x14 | 6x12 | 7x14 | 5.25x14 | 6x12 |
| **GRADE** | | No.1 | No.1 | No.1 | Prllm2.2E | Prllm2.2E | No.1 |
| **ALLOWABLE STRESSES** | | | | | | | |
| REPETITIVE MEMBER | | NO | NO | NO | NO | NO | NO |
| REPETITIVE FACTOR, Cr | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| SIZE FACTOR, Cf | | 0.98 | 0.98 | 1.00 | 1.00 | 1.00 | 1.00 |
| BENDING STRESSES, F'b | psi | 1,327 | 1,327 | 1,350 | 2,900 | 2,900 | 1,350 |
| SHEAR STRESSES, F'v | psi | 170 | 170 | 170 | 290 | 290 | 170 |
| MODULUS OF ELASTICITY | ksi | 1,700 | 1,700 | 1,700 | 2,200 | 2,200 | 1,700 |
| **UNIFORM DISTRIBUTED LOAD OVER FULL SPAN** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | 8.00 | 8.00 | 1.33 | 8.50 | 1.33 |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | 1.33 | 1.33 | 2.50 | | 1.50 | 1.33 |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | 3.50 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| WALL TYPE (EXT, INT) | | EXT | EXT | EXT | EXT | EXT | EXT |
| AUTO CALC BEAM WEIGHT | | | | | | | |
| TOTAL DEAD LOAD (D | plf | 80.29 | 345.31 | 360.52 | 174.59 | 359.02 | 191.88 |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | 160.00 | 160.00 | 26.60 | 170.00 | 26.60 |
| TOTAL FLOOR LIVE LOAD (L | plf | 53.20 | 53.20 | 100.00 | - | 60.00 | 53.20 |
| **PARTIALLY DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| CEILING TRIB. WIDTH | ft | | | | | | |
| FLOOR TRIB. WIDTH | ft | | | 3.00 | | | |
| DECK TRIB. WIDTH | ft | | | | | | |
| WALL HEIGHT | ft | | | | | | |
| WALL TYPE (EXT, INT) | | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | 39.00 | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| TOTAL FLOOR LIVE LOAD (L | plf | - | - | 120.00 | - | - | - |
| FROM (LEFT SUPPORT) | ft | | | 5.50 | | | |
| LENGTH OF LOAD | ft | | | 2.00 | | | |
| **TRIANGULAR DISTRIBUTED LOAD** | | | | | | | |
| ROOF TRIB. WIDTH | ft | | | | | | |
| TOTAL DEAD LOAD (D | plf | - | - | - | - | - | - |
| TOTAL ROOF LIVE LOAD (Lr | plf | - | - | - | - | - | - |
| **CONCENTRATED LOADS** | | | | | | | |
| P1 | | FB4 | FB8 | FB5 | HDR1 | | HDR1 |
| DEAD LOAD (P D ) | lbs | 1,000.7 | 3,645.7 | 1,041.0 | 1,475.9 | | 1,475.9 |
| ROOF LIVE LOAD (P Lr) | lbs | - | 1,621.7 | - | 1,283.3 | | 1,283.3 |
| FLOOR LIVE LOAD (P L ) | lbs | 3,622.7 | 837.6 | 2,521.9 | - | | - |
| LATERAL, P (W or 0.7E) | lbs | - | - | - | - | | - |
| DIST. (LEFT SUPPORT) | ft | 6.50 | 1.00 | 5.50 | 9.00 | | 1.50 |
| P2 | | | | | HDR1 | | |
| DEAD LOAD (P D ) | lbs | | | | 1,475.9 | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | 1,283.3 | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | - | | |
| LATERAL, P (W or 0.7E) | lbs | | | | - | | |
| DIST. (LEFT SUPPORT) | ft | | | | 11.50 | | |

## SIMPLY SUPPORTED BEAM DESIGN

| | | FB5 | FB6 | FB7 | FB8 | FB9 | FB11 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 10.50 | 6.50 | 7.50 | 21.00 | 20.00 | 10.50 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD Prllm | WOOD DF-L |
| **BEAM SECTION** | in | 6x14 | 6x14 | 6x12 | 7x14 | 5.25x14 | 6x12 |
| **GRADE** | | No.1 | No.1 | No.1 | Prllm2.2E | Prllm2.2E | No.1 |
| P3 | | | | | FB4 | | |
| DEAD LOAD (P D ) | lbs | | | | 1,172.3 | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | - | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | 4,127.3 | | |
| LATERAL, P (W or 0.7E) | lbs | | | | - | | |
| DIST. (LEFT SUPPORT) | ft | | | | 17.00 | | |
| P4 | | | | | FB7 | | |
| DEAD LOAD (P D ) | lbs | | | | 1,640.0 | | |
| ROOF LIVE LOAD (P Lr) | lbs | | | | 600.0 | | |
| FLOOR LIVE LOAD (P L ) | lbs | | | | 1,079.5 | | |
| LATERAL, P (W or 0.7E) | lbs | | | | - | | |
| DIST. (LEFT SUPPORT) | ft | | | | 20.00 | | |
| **LOAD CASE 1: D** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 3,515 | 4,101 | 3,730 | 26,662 | 17,951 | 3,867 |
| MAX. DEFLECTION | in | 0.032 | 0.016 | 0.032 | 0.573 | 0.489 | 0.066 |
| LEFT REACTION | lbs | 803 | 4,207 | 1,640 | 3,646 | 3,590 | 2,272 |
| RIGHT REACTION | lbs | 1,041 | 1,683 | 2,183 | 5,785 | 3,590 | 1,218 |
| **LOAD CASE: Lr** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | - | 1,850 | 1,125 | 13,677 | 8,500 | 1,814 |
| MAX. DEFLECTION | in | - | 0.007 | 0.010 | 0.279 | 0.232 | 0.025 |
| LEFT REACTION | lbs | - | 1,892 | 600 | 1,622 | 1,700 | 1,240 |
| RIGHT REACTION | lbs | - | 769 | 600 | 2,103 | 1,700 | 323 |
| **LOAD CASE: L** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 9,639 | 855 | 4,371 | 14,071 | 3,000 | 733 |
| MAX. DEFLECTION | in | 0.081 | 0.003 | 0.031 | 0.232 | 0.082 | 0.012 |
| LEFT REACTION | lbs | 1,659 | 882 | 1,080 | 838 | 600 | 279 |
| RIGHT REACTION | lbs | 2,522 | 302 | 2,432 | 4,369 | 600 | 279 |
| **LOAD CASE 2: D + Lr** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 2,812 | 4,761 | 3,855 | 32,271 | 21,161 | 4,348 |
| MAX. DEFLECTION | in | 0.032 | 0.023 | 0.041 | 0.852 | 0.721 | 0.091 |
| LEFT REACTION | lbs | 642 | 4,879 | 1,792 | 4,214 | 4,232 | 2,810 |
| RIGHT REACTION | lbs | 833 | 1,962 | 2,226 | 6,311 | 4,232 | 1,233 |
| **LOAD CASE 3: D + L** | | | | | **Wood Load Duration Factor = 1.0** | | |
| MAX. BENDING MOMENT | lb-ft | 13,154 | 4,943 | 7,971 | 36,192 | 20,951 | 4,575 |
| MAX. DEFLECTION | in | 0.112 | 0.019 | 0.063 | 0.802 | 0.571 | 0.078 |
| LEFT REACTION | lbs | 2,462 | 5,089 | 2,719 | 4,483 | 4,190 | 2,552 |
| RIGHT REACTION | lbs | 3,563 | 1,985 | 4,615 | 10,154 | 4,190 | 1,498 |
| **LOAD CASE 4: D + 0.75 (Lr + L)** | | | | | **Wood Load Duration Factor = 1.25** | | |
| MAX. BENDING MOMENT | lb-ft | 8,595 | 4,895 | 6,054 | 35,234 | 21,261 | 4,430 |
| MAX. DEFLECTION | in | 0.092 | 0.023 | 0.062 | 0.953 | 0.724 | 0.094 |
| LEFT REACTION | lbs | 2,047 | 6,287 | 2,900 | 5,490 | 5,315 | 3,412 |
| RIGHT REACTION | lbs | 2,932 | 2,487 | 4,457 | 10,639 | 5,315 | 1,670 |
| **LOAD CASE 5: $(1.0 + 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 2,684 | 3,132 | 2,848 | 20,359 | 13,707 | 2,953 |
| MAX. DEFLECTION | in | 0.032 | 0.016 | 0.032 | 0.583 | 0.498 | 0.067 |
| LEFT REACTION | lbs | 817 | 4,283 | 1,670 | 3,712 | 3,655 | 2,314 |
| RIGHT REACTION | lbs | 1,060 | 1,714 | 2,223 | 5,890 | 3,655 | 1,240 |

## SIMPLY SUPPORTED BEAM DESIGN

| | | FB5 | FB6 | FB7 | FB8 | FB9 | FB11 |
|---|---|---|---|---|---|---|---|
| **SPAN** | ft | 10.50 | 6.50 | 7.50 | 21.00 | 20.00 | 10.50 |
| **MATERIAL (WOOD, STEEL)** | | WOOD DF-L | WOOD DF-L | WOOD DF-L | WOOD Prllm | WOOD Prllm | WOOD DF-L |
| **BEAM SECTION** | in | 6x14 | 6x14 | 6x12 | 7x14 | 5.25x14 | 6x12 |
| **GRADE** | | No.1 | No.1 | No.1 | Prllm2.2E | Prllm2.2E | No.1 |
| **LOAD CASE 6: $(1.0 + 0.105S_{DS})D + 0.525\Omega E + 0.75(L + Lr)$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 7,080 | 4,251 | 5,109 | 30,298 | 18,476 | 3,862 |
| MAX. DEFLECTION | in | 0.081 | 0.022 | 0.056 | 0.874 | 0.672 | 0.088 |
| LEFT REACTION | lbs | 1,817 | 5,823 | 2,644 | 5,080 | 4,927 | 3,158 |
| RIGHT REACTION | lbs | 2,588 | 2,305 | 4,017 | 9,668 | 4,927 | 1,560 |
| **LOAD CASE 7: $(0.6 - 0.14S_{DS})D + 0.7\Omega E$** | | | | | **Wood Load Duration Factor = 1.6** | | |
| MAX. BENDING MOMENT | lb-ft | 831 | 970 | 882 | 6,303 | 4,244 | 914 |
| MAX. DEFLECTION | in | 0.010 | 0.005 | 0.010 | 0.181 | 0.154 | 0.021 |
| LEFT REACTION | lbs | 253 | 1,326 | 517 | 1,149 | 1,132 | 716 |
| RIGHT REACTION | lbs | 328 | 531 | 688 | 1,823 | 1,132 | 384 |
| **CHECK BENDING STRESSES** | | | | | | | |
| MAX. BENDING MOMENT | lb-ft | 13,153.6 | 4,942.8 | 7,970.8 | 36,192.4 | 21,260.9 | 4,575.1 |
| SECTION MODULUS, S | in3 | 167.1 | 167.1 | 121.2 | 228.7 | 171.5 | 121.2 |
| BENDING STRESS | psi | 944.8 | 355.0 | 789.0 | 1,899.3 | 1,487.6 | 452.9 |
| CHECK BENDING STRESS RATIO | | 71% OK | 27% OK | 58% OK | 65% OK | 51% OK | 34% OK |
| **CHECK SHEAR STRESSES** | | | | | | | |
| MAX. SHEAR FORCE | lbs | 3,563.0 | 6,287.38 | 4,615.39 | 10,639.33 | 5,315.21 | 3,411.60 |
| SECTION AREA, A | in2 | 74.25 | 74.25 | 63.25 | 98.00 | 73.50 | 63.25 |
| SHEAR STRESS, fv | psi | 71.98 | 127.02 | 109.46 | 162.85 | 108.47 | 80.91 |
| CHECK SHEAR STRESS RATIO | | 42% OK | 75% OK | 64% OK | 56% OK | 37% OK | 48% OK |
| **CHECK DEFLECTION** | | | | | | | |
| MOMENT OF INERTIA, I | in4 | 1,127.67 | 1,127.67 | 697.07 | 1,600.67 | 1,200.50 | 697.07 |
| MAX. DEFLECTION, DL | in | 0.032 | 0.016 | 0.032 | 0.573 | 0.489 | 0.066 |
| MAX. DEFLECTION, LL | in | 0.081 | 0.008 | 0.031 | 0.381 | 0.235 | 0.028 |
| DEFLECTION LIMITS, LL | | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 | L / 360 |
| CHECK DEFLECTION ΔLL | | < 0.35 OK | < 0.22 OK | < 0.25 OK | < 0.7 OK | < 0.67 OK | < 0.35 OK |
| MAX. DEFLECTION, DL+LL | in | 0.112 | 0.023 | 0.063 | 0.953 | 0.724 | 0.094 |
| DEFLECTION LIMITS, DL+LL | | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 | L / 240 |
| CHECK DEFLECTION Δ(DL+LL) | | < 0.53 OK | < 0.33 OK | < 0.38 OK | < 1.05 OK | < 1 OK | < 0.53 OK |

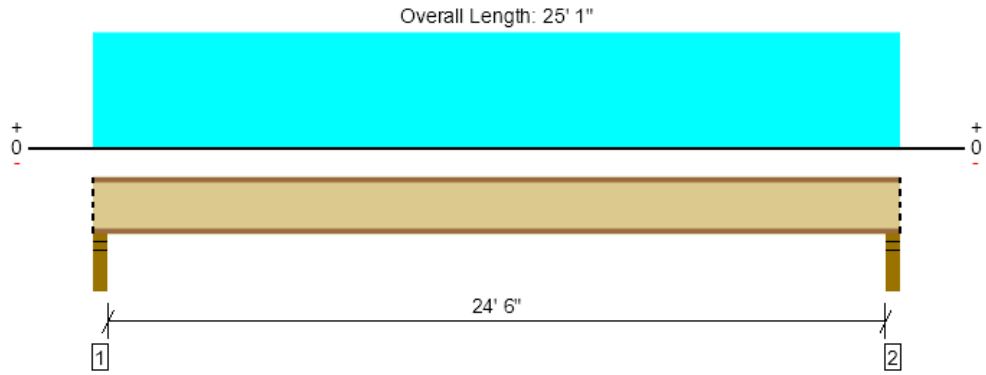
FORTEWEB®

# MEMBER REPORT

**PASSED**

*Level, Roof: Joist*

**1 piece(s) 14" TJI® 360 @ 16" OC**




Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 719 @ 2 1/2" | 1881 (3.50") | Passed (38%) | 1.25 | 1.0 D + 1.0 Lr (All Spans) |
| Shear (lbs) | 702 @ 3 1/2" | 2444 | Passed (29%) | 1.25 | 1.0 D + 1.0 Lr (All Spans) |
| Moment (Ft-lbs) | 4361 @ 12' 6 1/2" | 9169 | Passed (48%) | 1.25 | 1.0 D + 1.0 Lr (All Spans) |
| Live Load Defl. (in) | 0.394 @ 12' 6 1/2" | 0.822 | Passed (L/752) | -- | 1.0 D + 1.0 Lr (All Spans) |
| Total Load Defl. (in) | 0.847 @ 12' 6 1/2" | 1.233 | Passed (L/350) | -- | 1.0 D + 1.0 Lr (All Spans) |

Member Length : 25' 1"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2024
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Roof Live | Factored | Accessories |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 1.75" | 385 | 334 | 719 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 1.75" | 385 | 334 | 719 | Blocking |

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 4' 11" o/c | |
| Bottom Edge (Lu) | 25' 1" o/c | |

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

| Vertical Load | Location | Spacing | Dead (0.90) | Roof Live (1.25) | Comments |
|---|---|---|---|---|---|
| 1 - Uniform (PSF) | 0 to 25' 1" | 16" | 23 | 20 | Default Load |

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

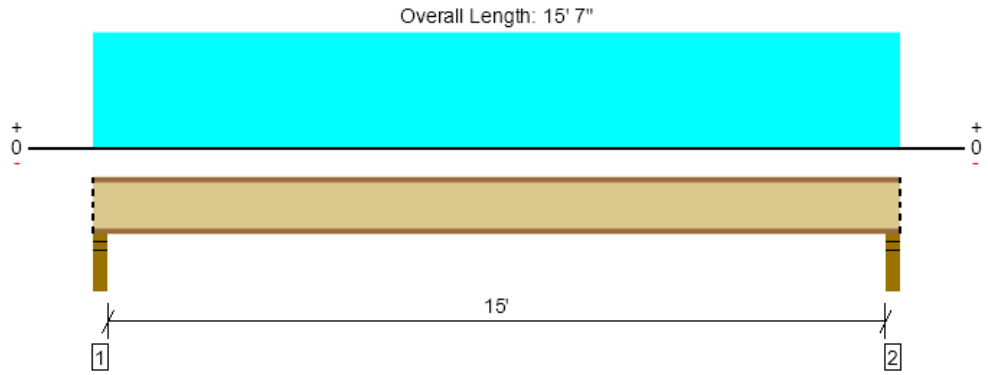
| ForteWEB Software Operator | Job Notes |
|---|---|
| feby awad<br>N/A<br>(714) 642-1004<br>febynawad@gmail.com | |

Weyerhaeuser

10/30/2026 5:43:50 PM UTC
ForteWEB v4.1, Engine: V8.5.1.3, Data: V26.12.18.51
File Name: 85-25

*Level, FLOOR: Joist*

**1 piece(s) 14" TJI® 360 @ 16" OC**




Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|---|---|---|---|---|---|
| Member Reaction (lbs) | 1454 @ 2 1/2" | 1881 (3.50") | Passed (77%) | 1.25 | 1.0 D + 1.0 Lr (All Spans) |
| Shear (lbs) | 1400 @ 3 1/2" | 2444 | Passed (57%) | 1.25 | 1.0 D + 1.0 Lr (All Spans) |
| Moment (Ft-lbs) | 5367 @ 7' 9 1/2" | 9169 | Passed (59%) | 1.25 | 1.0 D + 1.0 Lr (All Spans) |
| Live Load Defl. (in) | 0.397 @ 7' 9 1/2" | 0.758 | Passed (L/458) | -- | 1.0 D + 1.0 Lr (All Spans) |
| Total Load Defl. (in) | 0.445 @ 7' 9 1/2" | 1.011 | Passed (L/409) | -- | 1.0 D + 1.0 Lr (All Spans) |

Member Length : 15' 7"
System : Roof
Member Type : Joist
Building Use : Commercial
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---|---|---|---|---|---|---|---|
| | Total | Available | Required | Dead | Roof Live | Factored | |
| 1 - Stud wall - SPF | 3.50" | 3.50" | 2.09" | 156 | 1299 | 1454 | Blocking |
| 2 - Stud wall - SPF | 3.50" | 3.50" | 2.09" | 156 | 1299 | 1454 | Blocking |

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

| Lateral Bracing | Bracing Intervals | Comments |
|---|---|---|
| Top Edge (Lu) | 4' 5" o/c | |
| Bottom Edge (Lu) | 15' 7" o/c | |

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

| Vertical Load | Location | Spacing | Dead (0.90) | Roof Live (1.25) | Comments |
|---|---|---|---|---|---|
| 1 - Uniform (PSF) | 0 to 15' 7" | 16" | 15.0 | 125.0 | Default Load |

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

| ForteWEB Software Operator | Job Notes |
|---|---|
| Atef Gerges<br>FA Structural<br>(714) 519-5027<br>atefg@fastructural.com | |

Weyerhaeuser

8/18/2025 9:13:07 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: RJ STORAGE

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG2

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-22 / IBC 2024

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-22 / IBC 2024

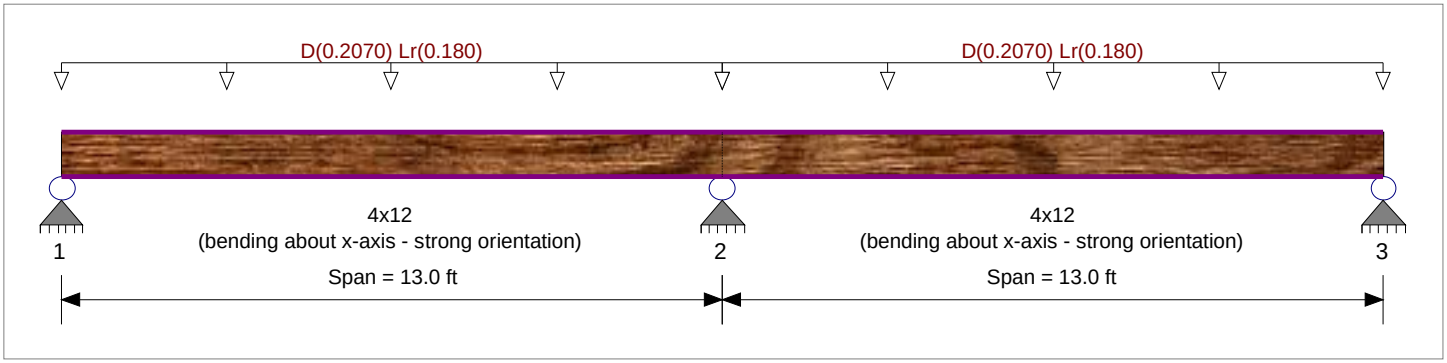
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 1,350.0 psi |
| Fb - | 1,350.0 psi |
| Fc - Prll | 925.0 psi |
| Fc - Perp | 625.0 psi |
| Fv | 170.0 psi |
| Ft | 675.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,600.0 ksi |
| Eminbend - xx | 580.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1
Self Weight : D = 0.008534 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 9.0 ft, (RR)

Load for Span Number 2
Self Weight : D = 0.008534 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 9.0 ft, (RR)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.732** : 1 | Maximum Shear Stress Ratio | = | **0.514** : 1 |
| Section used for this span | | **4x12** NDS2024 | Section used for this span | | **4x12** NDS2024 |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 1,358.13 psi | fv: Actual | = | 109.30 psi |
| F'b | = | 1,856.25 psi | F'v | = | 212.50 psi |
| Load Combination | | +D+Lr+H, LL Comb Run (LL) | Load Combination | | +D+Lr+H, LL Comb Run (LL) |
| Location of maximum on span | = | 13.000 ft | Location of maximum on span | = | 12.128 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.124 in | Ratio = | 1263 | >=360 | Span: 1 : Lr Only, LL Comb Run (L*) |
| Max Upward Transient Deflection | -0.054 in | Ratio = | 2868 | >=360 | Span: 2 : Lr Only, LL Comb Run (L*) |
| Max Downward Total Deflection | 0.210 in | Ratio = | 741 | >=240 | Span: 1 : +D+Lr+H, LL Comb Run (L*) |
| Max Upward Total Deflection | -0.017 in | Ratio = | 9279 | >=240 | Span: 2 : +D+Lr+H, LL Comb Run (L*) |

## Maximum Forces & Stresses for Load Combinations

| Load Combination | | Max Stress Ratios | | | | | | | | | | Moment Values | | | Shear Values | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment Length | Span # | M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | M | fb | F'b | V | fv | F'v |
| +D+H | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | **1** | 0.554 | 0.389 | 0.90 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,336.5 | 1.56 | 59.6 | 153.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RDG2

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 13.0 ft | 2 | 0.554 | 0.389 | 0.90 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,336.5 | 1.56 | 59.6 | 153.0 |
| +D+L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.498 | 0.350 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,485.0 | 1.56 | 59.6 | 170.0 |
| Length = 13.0 ft | 2 | 0.498 | 0.350 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,485.0 | 1.56 | 59.6 | 170.0 |
| +D+L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.498 | 0.350 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,485.0 | 1.56 | 59.6 | 170.0 |
| Length = 13.0 ft | 2 | 0.498 | 0.350 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,485.0 | 1.56 | 59.6 | 170.0 |
| +D+L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.498 | 0.350 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,485.0 | 1.56 | 59.6 | 170.0 |
| Length = 13.0 ft | 2 | 0.498 | 0.350 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,485.0 | 1.56 | 59.6 | 170.0 |
| +D+Lr+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.565 | 0.488 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 6.45 | 1,049.1 | 1,856.3 | 2.72 | 103.7 | 212.5 |
| Length = 13.0 ft | 2 | 0.565 | 0.488 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 6.45 | 1,049.1 | 1,856.3 | 2.72 | 103.7 | 212.5 |
| +D+Lr+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.565 | 0.488 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 6.45 | 1,049.1 | 1,856.3 | 2.72 | 103.7 | 212.5 |
| Length = 13.0 ft | 2 | 0.565 | 0.306 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 6.45 | 1,049.1 | 1,856.3 | 1.71 | 65.1 | 212.5 |
| +D+Lr+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.732 | 0.514 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 8.36 | 1,358.1 | 1,856.3 | 2.87 | 109.3 | 212.5 |
| Length = 13.0 ft | 2 | 0.732 | 0.514 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 8.36 | 1,358.1 | 1,856.3 | 2.87 | 109.3 | 212.5 |
| +D+0.70S+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.433 | 0.305 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,707.8 | 1.56 | 59.6 | 195.5 |
| Length = 13.0 ft | 2 | 0.433 | 0.305 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,707.8 | 1.56 | 59.6 | 195.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.524 | 0.436 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.98 | 971.8 | 1,856.3 | 2.43 | 92.7 | 212.5 |
| Length = 13.0 ft | 2 | 0.524 | 0.436 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.98 | 971.8 | 1,856.3 | 2.43 | 92.7 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.524 | 0.436 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.98 | 971.8 | 1,856.3 | 2.43 | 92.7 | 212.5 |
| Length = 13.0 ft | 2 | 0.524 | 0.300 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.98 | 971.8 | 1,856.3 | 1.67 | 63.7 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.648 | 0.456 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 7.41 | 1,203.6 | 1,856.3 | 2.54 | 96.9 | 212.5 |
| Length = 13.0 ft | 2 | 0.648 | 0.456 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 7.41 | 1,203.6 | 1,856.3 | 2.54 | 96.9 | 212.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.433 | 0.305 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,707.8 | 1.56 | 59.6 | 195.5 |
| Length = 13.0 ft | 2 | 0.433 | 0.305 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,707.8 | 1.56 | 59.6 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.433 | 0.305 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,707.8 | 1.56 | 59.6 | 195.5 |
| Length = 13.0 ft | 2 | 0.433 | 0.305 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,707.8 | 1.56 | 59.6 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.433 | 0.305 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,707.8 | 1.56 | 59.6 | 195.5 |
| Length = 13.0 ft | 2 | 0.433 | 0.305 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 1,707.8 | 1.56 | 59.6 | 195.5 |
| +D+0.60W+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| Length = 13.0 ft | 2 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.409 | 0.341 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.98 | 971.8 | 2,376.0 | 2.43 | 92.7 | 272.0 |
| Length = 13.0 ft | 2 | 0.409 | 0.341 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.98 | 971.8 | 2,376.0 | 2.43 | 92.7 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RDG2

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 13.0 ft | 1 | 0.409 | 0.341 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.98 | 971.8 | 2,376.0 | 2.43 | 92.7 | 272.0 |
| Length = 13.0 ft | 2 | 0.409 | 0.234 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.98 | 971.8 | 2,376.0 | 1.67 | 63.7 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.507 | 0.356 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 7.41 | 1,203.6 | 2,376.0 | 2.54 | 96.9 | 272.0 |
| Length = 13.0 ft | 2 | 0.507 | 0.356 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 7.41 | 1,203.6 | 2,376.0 | 2.54 | 96.9 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| Length = 13.0 ft | 2 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| Length = 13.0 ft | 2 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| Length = 13.0 ft | 2 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| +0.60D+0.60W+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.187 | 0.131 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.73 | 444.0 | 2,376.0 | 0.94 | 35.7 | 272.0 |
| Length = 13.0 ft | 2 | 0.187 | 0.131 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.73 | 444.0 | 2,376.0 | 0.94 | 35.7 | 272.0 |
| +D+0.70E+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| Length = 13.0 ft | 2 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| Length = 13.0 ft | 2 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| Length = 13.0 ft | 2 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| Length = 13.0 ft | 2 | 0.311 | 0.219 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.55 | 740.1 | 2,376.0 | 1.56 | 59.6 | 272.0 |
| +0.60D+0.70E+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 13.0 ft | 1 | 0.187 | 0.131 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.73 | 444.0 | 2,376.0 | 0.94 | 35.7 | 272.0 |
| Length = 13.0 ft | 2 | 0.187 | 0.131 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.73 | 444.0 | 2,376.0 | 0.94 | 35.7 | 272.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr+H, LL Comb Run (L*) | 0.2104 | 5.883 | | 0.0000 | 0.000 |
| 2 | +D+Lr+H, LL Comb Run (*L) | 0.2091 | 7.190 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Max Upward from all Load Cases & Combinations | 2.074 | 6.427 | 2.074 |
| Max Upward from Load Combinations | 2.074 | 6.427 | 2.074 |
| Max Upward from Load Cases | 1.051 | 3.502 | 1.051 |
| Max Downward from all Load Cases & Combinations (Res | -0.146 | | -0.146 |
| Max Downward from Load Cases (Resisting Uplift) | -0.146 | | -0.146 |
| +D+H | 1.051 | 3.502 | 1.051 |
| +D+L+H, LL Comb Run (*L) | 1.051 | 3.502 | 1.051 |
| +D+L+H, LL Comb Run (L*) | 1.051 | 3.502 | 1.051 |
| +D+L+H, LL Comb Run (LL) | 1.051 | 3.502 | 1.051 |
| +D+Lr+H, LL Comb Run (*L) | 0.904 | 4.965 | 2.074 |
| +D+Lr+H, LL Comb Run (L*) | 2.074 | 4.965 | 0.904 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG2

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| +D+Lr+H, LL Comb Run (LL) | 1.928 | 6.427 | 1.928 |
| +D+0.70S+H | 1.051 | 3.502 | 1.051 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | 0.941 | 4.599 | 1.819 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | 1.819 | 4.599 | 0.941 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | 1.709 | 5.696 | 1.709 |
| +D+0.750L+0.5250S+H, LL Comb Run (*L) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.5250S+H, LL Comb Run (L*) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.5250S+H, LL Comb Run (LL) | 1.051 | 3.502 | 1.051 |
| +D+0.60W+H | 1.051 | 3.502 | 1.051 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | 0.941 | 4.599 | 1.819 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | 1.819 | 4.599 | 0.941 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | 1.709 | 5.696 | 1.709 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL) | 1.051 | 3.502 | 1.051 |
| +0.60D+0.60W+0.60H | 0.630 | 2.101 | 0.630 |
| +D+0.70E+H | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL) | 1.051 | 3.502 | 1.051 |
| +0.60D+0.70E+0.60H | 0.630 | 2.101 | 0.630 |
| D Only | 1.051 | 3.502 | 1.051 |
| Lr Only, LL Comb Run (*L) | -0.146 | 1.462 | 1.024 |
| Lr Only, LL Comb Run (L*) | 1.024 | 1.462 | -0.146 |
| Lr Only, LL Comb Run (LL) | 0.878 | 2.925 | 0.878 |
| H Only | | | |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Max Upward from Load Cases | 1.051 | 3.502 | 1.051 |
| Max Downward from Load Cases (Resisting Uplift) | -0.146 | | -0.146 |
| D Only | 1.051 | 3.502 | 1.051 |
| Lr Only, LL Comb Run (*L) | -0.146 | 1.462 | 1.024 |
| Lr Only, LL Comb Run (L*) | 1.024 | 1.462 | -0.146 |
| Lr Only, LL Comb Run (LL) | 0.878 | 2.925 | 0.878 |
| H Only | | | |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Max Upward from Load Combinations | 2.074 | 6.427 | 2.074 |
| +D+H | 1.051 | 3.502 | 1.051 |
| +D+L+H, LL Comb Run (*L) | 1.051 | 3.502 | 1.051 |
| +D+L+H, LL Comb Run (L*) | 1.051 | 3.502 | 1.051 |
| +D+L+H, LL Comb Run (LL) | 1.051 | 3.502 | 1.051 |
| +D+Lr+H, LL Comb Run (*L) | 0.904 | 4.965 | 2.074 |
| +D+Lr+H, LL Comb Run (L*) | 2.074 | 4.965 | 0.904 |
| +D+Lr+H, LL Comb Run (LL) | 1.928 | 6.427 | 1.928 |
| +D+0.70S+H | 1.051 | 3.502 | 1.051 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | 0.941 | 4.599 | 1.819 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | 1.819 | 4.599 | 0.941 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | 1.709 | 5.696 | 1.709 |
| +D+0.750L+0.5250S+H, LL Comb Run (*L) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.5250S+H, LL Comb Run (L*) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.5250S+H, LL Comb Run (LL) | 1.051 | 3.502 | 1.051 |
| +D+0.60W+H | 1.051 | 3.502 | 1.051 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | 0.941 | 4.599 | 1.819 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | 1.819 | 4.599 | 0.941 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | 1.709 | 5.696 | 1.709 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*) | 1.051 | 3.502 | 1.051 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG2

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL) | 1.051 | 3.502 | 1.051 |
| +0.60D+0.60W+0.60H | 0.630 | 2.101 | 0.630 |
| +D+0.70E+H | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*) | 1.051 | 3.502 | 1.051 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL) | 1.051 | 3.502 | 1.051 |
| +0.60D+0.70E+0.60H | 0.630 | 2.101 | 0.630 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 1.051 | 1.024 | | | | | |
| Support #2 | 3.502 | 2.925 | | | | | |
| Support #3 | 1.051 | 1.024 | | | | | |

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# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG3

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-22 / IBC 2024

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-22 / IBC 2024

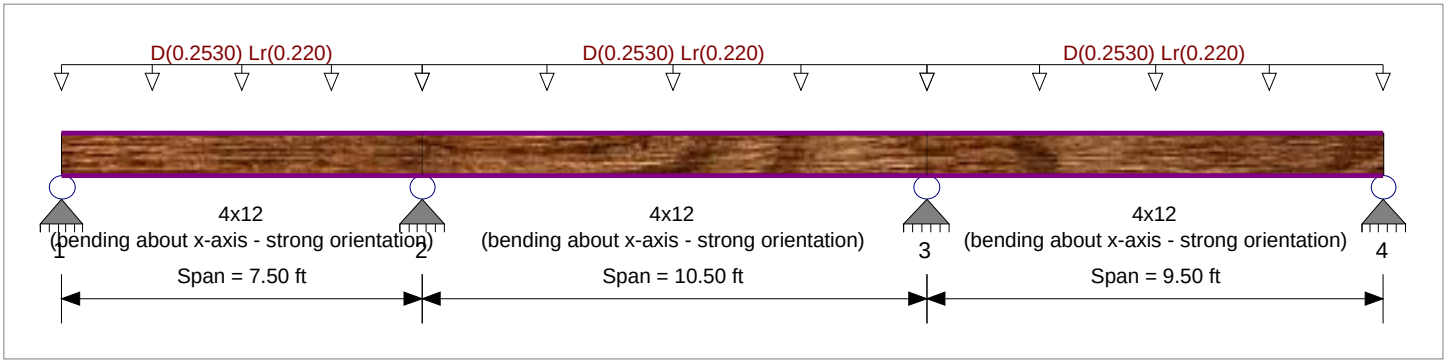
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 1,350.0 psi |
| Fb - | 1,350.0 psi |
| Fc - Prll | 925.0 psi |
| Fc - Perp | 625.0 psi |
| Fv | 170.0 psi |
| Ft | 675.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,600.0 ksi |
| Eminbend - xx | 580.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1
Self Weight : D = 0.008534 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 11.0 ft, (RR)

Load for Span Number 2
Self Weight : D = 0.008534 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 11.0 ft, (RR)

Load for Span Number 3
Self Weight : D = 0.008534 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 11.0 ft, (RR)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.460** : 1 | Maximum Shear Stress Ratio | = | **0.433** : 1 |
| Section used for this span | | **4x12** NDS2024 | Section used for this span | | **4x12** NDS2024 |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 853.15 psi | fv: Actual | = | 92.07 psi |
| F'b | = | 1,856.25 psi | F'v | = | 212.50 psi |
| Load Combination | | +D+Lr+H, LL Comb Run (*LL) | Load Combination | | +D+Lr+H, LL Comb Run (*LL) |
| Location of maximum on span | = | 10.500 ft | Location of maximum on span | = | 10.500 ft |
| Span # where maximum occurs | = | Span # 2 | Span # where maximum occurs | = | Span # 2 |

### Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.045 in | Ratio = | 2520 | >=360 | Span: 3 : Lr Only, LL Comb Run (L*L) |
| Max Upward Transient Deflection | -0.026 in | Ratio = | 4849 | >=360 | Span: 2 : Lr Only, LL Comb Run (L*L) |
| Max Downward Total Deflection | 0.078 in | Ratio = | 1465 | >=240 | Span: 3 : +D+Lr+H, LL Comb Run (L*L) |
| Max Upward Total Deflection | -0.011 in | Ratio = | 11237 | >=240 | Span: 2 : +D+Lr+H, LL Comb Run (L*L) |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG3

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+H | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.251 | 0.268 | 0.90 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,336.5 | 1.08 | 41.0 | 153.0 |
| Length = 10.50 ft | 2 | 0.335 | 0.324 | 0.90 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,336.5 | 1.30 | 49.6 | 153.0 |
| Length = 9.50 ft | 3 | 0.335 | 0.324 | 0.90 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,336.5 | 1.30 | 49.6 | 153.0 |
| +D+L+H, LL Comb Run (**L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.226 | 0.241 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,485.0 | 1.08 | 41.0 | 170.0 |
| Length = 10.50 ft | 2 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| Length = 9.50 ft | 3 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| +D+L+H, LL Comb Run (*L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.226 | 0.241 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,485.0 | 1.08 | 41.0 | 170.0 |
| Length = 10.50 ft | 2 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| Length = 9.50 ft | 3 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| +D+L+H, LL Comb Run (*LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.226 | 0.241 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,485.0 | 1.08 | 41.0 | 170.0 |
| Length = 10.50 ft | 2 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| Length = 9.50 ft | 3 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| +D+L+H, LL Comb Run (L**) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.226 | 0.241 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,485.0 | 1.08 | 41.0 | 170.0 |
| Length = 10.50 ft | 2 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| Length = 9.50 ft | 3 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| +D+L+H, LL Comb Run (L*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.226 | 0.241 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,485.0 | 1.08 | 41.0 | 170.0 |
| Length = 10.50 ft | 2 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| Length = 9.50 ft | 3 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| +D+L+H, LL Comb Run (LL*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.226 | 0.241 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,485.0 | 1.08 | 41.0 | 170.0 |
| Length = 10.50 ft | 2 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| Length = 9.50 ft | 3 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| +D+L+H, LL Comb Run (LLL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.226 | 0.241 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,485.0 | 1.08 | 41.0 | 170.0 |
| Length = 10.50 ft | 2 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| Length = 9.50 ft | 3 | 0.301 | 0.292 | 1.00 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,485.0 | 1.30 | 49.6 | 170.0 |
| +D+Lr+H, LL Comb Run (**L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.148 | 0.175 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 1.69 | 275.3 | 1,856.3 | 0.98 | 37.2 | 212.5 |
| Length = 10.50 ft | 2 | 0.353 | 0.410 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.03 | 654.7 | 1,856.3 | 2.29 | 87.2 | 212.5 |
| Length = 9.50 ft | 3 | 0.353 | 0.410 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.03 | 654.7 | 1,856.3 | 2.29 | 87.2 | 212.5 |
| +D+Lr+H, LL Comb Run (*L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.305 | 0.369 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.48 | 565.4 | 1,856.3 | 2.06 | 78.3 | 212.5 |
| Length = 10.50 ft | 2 | 0.348 | 0.385 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.97 | 645.7 | 1,856.3 | 2.15 | 81.9 | 212.5 |
| Length = 9.50 ft | 3 | 0.348 | 0.256 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.97 | 645.7 | 1,856.3 | 1.43 | 54.5 | 212.5 |
| +D+Lr+H, LL Comb Run (*LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.272 | 0.340 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.11 | 504.9 | 1,856.3 | 1.90 | 72.3 | 212.5 |
| Length = 10.50 ft | 2 | 0.460 | 0.433 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.25 | 853.2 | 1,856.3 | 2.42 | 92.1 | 212.5 |
| Length = 9.50 ft | 3 | 0.460 | 0.433 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.25 | 853.2 | 1,856.3 | 2.42 | 92.1 | 212.5 |
| +D+Lr+H, LL Comb Run (L**) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.242 | 0.314 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.76 | 449.3 | 1,856.3 | 1.75 | 66.6 | 212.5 |
| Length = 10.50 ft | 2 | 0.242 | 0.230 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.76 | 449.3 | 1,856.3 | 1.28 | 48.9 | 212.5 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RDG3

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 9.50 ft | 3 | 0.225 | 0.230 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.57 | 417.4 | 1,856.3 | 1.28 | 48.9 | 212.5 |
| +D+Lr+H, LL Comb Run (L*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.209 | 0.305 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.39 | 388.8 | 1,856.3 | 1.70 | 64.8 | 212.5 |
| Length = 10.50 ft | 2 | 0.337 | 0.407 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.84 | 624.9 | 1,856.3 | 2.27 | 86.4 | 212.5 |
| Length = 9.50 ft | 3 | 0.337 | 0.407 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.84 | 624.9 | 1,856.3 | 2.27 | 86.4 | 212.5 |
| +D+Lr+H, LL Comb Run (LL*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.366 | 0.384 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.18 | 678.9 | 1,856.3 | 2.14 | 81.5 | 212.5 |
| Length = 10.50 ft | 2 | 0.366 | 0.384 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.18 | 678.9 | 1,856.3 | 2.14 | 81.5 | 212.5 |
| Length = 9.50 ft | 3 | 0.332 | 0.253 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.79 | 615.9 | 1,856.3 | 1.41 | 53.8 | 212.5 |
| +D+Lr+H, LL Comb Run (LLL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.333 | 0.356 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.80 | 618.4 | 1,856.3 | 1.98 | 75.5 | 212.5 |
| Length = 10.50 ft | 2 | 0.444 | 0.430 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.07 | 823.4 | 1,856.3 | 2.40 | 91.3 | 212.5 |
| Length = 9.50 ft | 3 | 0.444 | 0.430 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 5.07 | 823.4 | 1,856.3 | 2.40 | 91.3 | 212.5 |
| +D+0.70S+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.197 | 0.210 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,707.8 | 1.08 | 41.0 | 195.5 |
| Length = 10.50 ft | 2 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| Length = 9.50 ft | 3 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (**L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.156 | 0.177 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 1.79 | 290.5 | 1,856.3 | 0.99 | 37.6 | 212.5 |
| Length = 10.50 ft | 2 | 0.325 | 0.366 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.71 | 602.8 | 1,856.3 | 2.04 | 77.8 | 212.5 |
| Length = 9.50 ft | 3 | 0.325 | 0.366 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.71 | 602.8 | 1,856.3 | 2.04 | 77.8 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.274 | 0.325 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.13 | 508.0 | 1,856.3 | 1.81 | 69.0 | 212.5 |
| Length = 10.50 ft | 2 | 0.321 | 0.343 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.67 | 596.0 | 1,856.3 | 1.91 | 72.9 | 212.5 |
| Length = 9.50 ft | 3 | 0.321 | 0.251 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.67 | 596.0 | 1,856.3 | 1.40 | 53.3 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.249 | 0.304 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.85 | 462.6 | 1,856.3 | 1.69 | 64.5 | 212.5 |
| Length = 10.50 ft | 2 | 0.405 | 0.383 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.62 | 751.7 | 1,856.3 | 2.14 | 81.5 | 212.5 |
| Length = 9.50 ft | 3 | 0.405 | 0.383 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.62 | 751.7 | 1,856.3 | 2.14 | 81.5 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L**) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.227 | 0.281 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.59 | 420.9 | 1,856.3 | 1.57 | 59.8 | 212.5 |
| Length = 10.50 ft | 2 | 0.229 | 0.231 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.61 | 424.9 | 1,856.3 | 1.29 | 49.1 | 212.5 |
| Length = 9.50 ft | 3 | 0.229 | 0.231 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.61 | 424.9 | 1,856.3 | 1.29 | 49.1 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.202 | 0.275 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.31 | 375.5 | 1,856.3 | 1.53 | 58.3 | 212.5 |
| Length = 10.50 ft | 2 | 0.313 | 0.363 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.57 | 580.5 | 1,856.3 | 2.03 | 77.2 | 212.5 |
| Length = 9.50 ft | 3 | 0.313 | 0.363 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.57 | 580.5 | 1,856.3 | 2.03 | 77.2 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.320 | 0.336 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.65 | 593.1 | 1,856.3 | 1.87 | 71.4 | 212.5 |
| Length = 10.50 ft | 2 | 0.320 | 0.336 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.65 | 593.1 | 1,856.3 | 1.87 | 71.4 | 212.5 |
| Length = 9.50 ft | 3 | 0.309 | 0.248 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.53 | 573.7 | 1,856.3 | 1.38 | 52.7 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LLL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.295 | 0.315 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.37 | 547.7 | 1,856.3 | 1.76 | 66.9 | 212.5 |
| Length = 10.50 ft | 2 | 0.393 | 0.381 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.49 | 729.3 | 1,856.3 | 2.12 | 80.9 | 212.5 |
| Length = 9.50 ft | 3 | 0.393 | 0.381 | 1.25 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.49 | 729.3 | 1,856.3 | 2.12 | 80.9 | 212.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (**L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.197 | 0.210 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,707.8 | 1.08 | 41.0 | 195.5 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG3

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 10.50 ft | 2 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| Length = 9.50 ft | 3 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (*L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.197 | 0.210 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,707.8 | 1.08 | 41.0 | 195.5 |
| Length = 10.50 ft | 2 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| Length = 9.50 ft | 3 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (*LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.197 | 0.210 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,707.8 | 1.08 | 41.0 | 195.5 |
| Length = 10.50 ft | 2 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| Length = 9.50 ft | 3 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (L**) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.197 | 0.210 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,707.8 | 1.08 | 41.0 | 195.5 |
| Length = 10.50 ft | 2 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| Length = 9.50 ft | 3 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (L*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.197 | 0.210 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,707.8 | 1.08 | 41.0 | 195.5 |
| Length = 10.50 ft | 2 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| Length = 9.50 ft | 3 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (LL*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.197 | 0.210 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,707.8 | 1.08 | 41.0 | 195.5 |
| Length = 10.50 ft | 2 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| Length = 9.50 ft | 3 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (LLL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.197 | 0.210 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 1,707.8 | 1.08 | 41.0 | 195.5 |
| Length = 10.50 ft | 2 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| Length = 9.50 ft | 3 | 0.262 | 0.254 | 1.15 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 1,707.8 | 1.30 | 49.6 | 195.5 |
| +D+0.60W+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (**L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.122 | 0.138 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 1.79 | 290.5 | 2,376.0 | 0.99 | 37.6 | 272.0 |
| Length = 10.50 ft | 2 | 0.254 | 0.286 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.71 | 602.8 | 2,376.0 | 2.04 | 77.8 | 272.0 |
| Length = 9.50 ft | 3 | 0.254 | 0.286 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.71 | 602.8 | 2,376.0 | 2.04 | 77.8 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.214 | 0.254 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.13 | 508.0 | 2,376.0 | 1.81 | 69.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.251 | 0.268 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.67 | 596.0 | 2,376.0 | 1.91 | 72.9 | 272.0 |
| Length = 9.50 ft | 3 | 0.251 | 0.196 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.67 | 596.0 | 2,376.0 | 1.40 | 53.3 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.195 | 0.237 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.85 | 462.6 | 2,376.0 | 1.69 | 64.5 | 272.0 |
| Length = 10.50 ft | 2 | 0.316 | 0.299 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.62 | 751.7 | 2,376.0 | 2.14 | 81.5 | 272.0 |
| Length = 9.50 ft | 3 | 0.316 | 0.299 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.62 | 751.7 | 2,376.0 | 2.14 | 81.5 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L**) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.177 | 0.220 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.59 | 420.9 | 2,376.0 | 1.57 | 59.8 | 272.0 |
| Length = 10.50 ft | 2 | 0.179 | 0.180 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.61 | 424.9 | 2,376.0 | 1.29 | 49.1 | 272.0 |
| Length = 9.50 ft | 3 | 0.179 | 0.180 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.61 | 424.9 | 2,376.0 | 1.29 | 49.1 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RDG3

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 7.50 ft | 1 | 0.158 | 0.214 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.31 | 375.5 | 2,376.0 | 1.53 | 58.3 | 272.0 |
| Length = 10.50 ft | 2 | 0.244 | 0.284 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.57 | 580.5 | 2,376.0 | 2.03 | 77.2 | 272.0 |
| Length = 9.50 ft | 3 | 0.244 | 0.284 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.57 | 580.5 | 2,376.0 | 2.03 | 77.2 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.250 | 0.263 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.65 | 593.1 | 2,376.0 | 1.87 | 71.4 | 272.0 |
| Length = 10.50 ft | 2 | 0.250 | 0.263 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.65 | 593.1 | 2,376.0 | 1.87 | 71.4 | 272.0 |
| Length = 9.50 ft | 3 | 0.241 | 0.194 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.53 | 573.7 | 2,376.0 | 1.38 | 52.7 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LLL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.231 | 0.246 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 3.37 | 547.7 | 2,376.0 | 1.76 | 66.9 | 272.0 |
| Length = 10.50 ft | 2 | 0.307 | 0.297 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.49 | 729.3 | 2,376.0 | 2.12 | 80.9 | 272.0 |
| Length = 9.50 ft | 3 | 0.307 | 0.297 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 4.49 | 729.3 | 2,376.0 | 2.12 | 80.9 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (**L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L**) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LLL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +0.60D+0.60W+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.085 | 0.091 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 1.24 | 201.5 | 2,376.0 | 0.65 | 24.6 | 272.0 |
| Length = 10.50 ft | 2 | 0.113 | 0.109 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 1.65 | 268.3 | 2,376.0 | 0.78 | 29.8 | 272.0 |
| Length = 9.50 ft | 3 | 0.113 | 0.109 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 1.65 | 268.3 | 2,376.0 | 0.78 | 29.8 | 272.0 |
| +D+0.70E+H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RDG3

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (**L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*LL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L**) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*L) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL*) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LLL) | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.141 | 0.151 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.07 | 335.8 | 2,376.0 | 1.08 | 41.0 | 272.0 |
| Length = 10.50 ft | 2 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| Length = 9.50 ft | 3 | 0.188 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 2.75 | 447.2 | 2,376.0 | 1.30 | 49.6 | 272.0 |
| +0.60D+0.70E+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 7.50 ft | 1 | 0.085 | 0.091 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 1.24 | 201.5 | 2,376.0 | 0.65 | 24.6 | 272.0 |
| Length = 10.50 ft | 2 | 0.113 | 0.109 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 1.65 | 268.3 | 2,376.0 | 0.78 | 29.8 | 272.0 |
| Length = 9.50 ft | 3 | 0.113 | 0.109 | 1.60 | 1.00 | 1.00 | 1.00 | 1.100 | 1.00 | 1.00 | 1.00 | 1.65 | 268.3 | 2,376.0 | 0.78 | 29.8 | 272.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | +D+Lr+H, LL Comb Run (L*L) | 0.0305 | 3.466 | +D+Lr+H, LL Comb Run (*L*) | -0.0036 | 7.122 |
| 2 | +D+Lr+H, LL Comb Run (*L*) | 0.0652 | 5.206 | +D+Lr+H, LL Comb Run (L*L) | -0.0047 | 10.147 |
| 3 | +D+Lr+H, LL Comb Run (L*L) | 0.0778 | 5.189 | | 0.0000 | 10.147 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Max Upward from all Load Cases & Combinations | 1.487 | 4.928 | 5.572 | 1.883 |
| Max Upward from Load Combinations | 1.487 | 4.928 | 5.572 | 1.883 |
| Max Upward from Load Cases | 0.782 | 2.564 | 2.970 | 0.953 |
| Max Downward from all Load Cases & Combinations (Res | -0.188 | -0.207 | -0.103 | -0.129 |
| Max Downward from Load Cases (Resisting Uplift) | -0.188 | -0.207 | -0.103 | -0.129 |
| +D+H | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (**L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (*L*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (*LL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (L**) | 0.705 | 2.564 | 2.970 | 0.953 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RDG3

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (LL*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (LLL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+Lr+H, LL Comb Run (**L) | 0.755 | 2.357 | 4.307 | 1.863 |
| +D+Lr+H, LL Comb Run (*L*) | 0.517 | 3.926 | 4.235 | 0.824 |
| +D+Lr+H, LL Comb Run (*LL) | 0.567 | 3.719 | 5.572 | 1.735 |
| +D+Lr+H, LL Comb Run (L**) | 1.437 | 3.566 | 2.867 | 0.972 |
| +D+Lr+H, LL Comb Run (L*L) | 1.487 | 3.359 | 4.203 | 1.883 |
| +D+Lr+H, LL Comb Run (LL*) | 1.249 | 4.928 | 4.132 | 0.843 |
| +D+Lr+H, LL Comb Run (LLL) | 1.299 | 4.721 | 5.469 | 1.754 |
| +D+0.70S+H | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750Lr+0.750L+H, LL Comb Run (**L) | 0.742 | 2.409 | 3.973 | 1.636 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L*) | 0.564 | 3.585 | 3.919 | 0.856 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*LL) | 0.601 | 3.430 | 4.921 | 1.539 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L**) | 1.254 | 3.316 | 2.893 | 0.967 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*L) | 1.291 | 3.161 | 3.895 | 1.650 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL*) | 1.113 | 4.337 | 3.842 | 0.871 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LLL) | 1.150 | 4.182 | 4.844 | 1.554 |
| +D+0.750L+0.5250S+H, LL Comb Run (**L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (*L*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (*LL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (L**) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (L*L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (LL*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (LLL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.60W+H | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (**L) | 0.742 | 2.409 | 3.973 | 1.636 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L*) | 0.564 | 3.585 | 3.919 | 0.856 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*LL) | 0.601 | 3.430 | 4.921 | 1.539 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L**) | 1.254 | 3.316 | 2.893 | 0.967 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*L) | 1.291 | 3.161 | 3.895 | 1.650 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL*) | 1.113 | 4.337 | 3.842 | 0.871 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LLL) | 1.150 | 4.182 | 4.844 | 1.554 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (**L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*LL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L**) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LLL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +0.60D+0.60W+0.60H | 0.423 | 1.538 | 1.782 | 0.572 |
| +D+0.70E+H | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (**L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*LL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L**) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LLL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +0.60D+0.70E+0.60H | 0.423 | 1.538 | 1.782 | 0.572 |
| D Only | 0.705 | 2.564 | 2.970 | 0.953 |
| Lr Only, LL Comb Run (**L) | 0.050 | -0.207 | 1.336 | 0.911 |
| Lr Only, LL Comb Run (*L*) | -0.188 | 1.362 | 1.265 | -0.129 |
| Lr Only, LL Comb Run (*LL) | -0.139 | 1.155 | 2.602 | 0.782 |
| Lr Only, LL Comb Run (L**) | 0.732 | 1.002 | -0.103 | 0.019 |
| Lr Only, LL Comb Run (L*L) | 0.782 | 0.795 | 1.233 | 0.930 |
| Lr Only, LL Comb Run (LL*) | 0.544 | 2.364 | 1.162 | -0.109 |
| Lr Only, LL Comb Run (LLL) | 0.593 | 2.157 | 2.499 | 0.801 |
| H Only | | | | |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RDG3

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Max Upward from Load Cases | 0.782 | 2.564 | 2.970 | 0.953 |
| Max Downward from Load Cases (Resisting Uplift) | -0.188 | -0.207 | -0.103 | -0.129 |
| D Only | 0.705 | 2.564 | 2.970 | 0.953 |
| Lr Only, LL Comb Run (**L) | 0.050 | -0.207 | 1.336 | 0.911 |
| Lr Only, LL Comb Run (*L*) | -0.188 | 1.362 | 1.265 | -0.129 |
| Lr Only, LL Comb Run (*LL) | -0.139 | 1.155 | 2.602 | 0.782 |
| Lr Only, LL Comb Run (L**) | 0.732 | 1.002 | -0.103 | 0.019 |
| Lr Only, LL Comb Run (L*L) | 0.782 | 0.795 | 1.233 | 0.930 |
| Lr Only, LL Comb Run (LL*) | 0.544 | 2.364 | 1.162 | -0.109 |
| Lr Only, LL Comb Run (LLL) | 0.593 | 2.157 | 2.499 | 0.801 |
| H Only | | | | |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Max Upward from Load Combinations | 1.487 | 4.928 | 5.572 | 1.883 |
| +D+H | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (**L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (*L*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (*LL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (L**) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (L*L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (LL*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+L+H, LL Comb Run (LLL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+Lr+H, LL Comb Run (**L) | 0.755 | 2.357 | 4.307 | 1.863 |
| +D+Lr+H, LL Comb Run (*L*) | 0.517 | 3.926 | 4.235 | 0.824 |
| +D+Lr+H, LL Comb Run (*LL) | 0.567 | 3.719 | 5.572 | 1.735 |
| +D+Lr+H, LL Comb Run (L**) | 1.437 | 3.566 | 2.867 | 0.972 |
| +D+Lr+H, LL Comb Run (L*L) | 1.487 | 3.359 | 4.203 | 1.883 |
| +D+Lr+H, LL Comb Run (LL*) | 1.249 | 4.928 | 4.132 | 0.843 |
| +D+Lr+H, LL Comb Run (LLL) | 1.299 | 4.721 | 5.469 | 1.754 |
| +D+0.70S+H | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750Lr+0.750L+H, LL Comb Run (**L) | 0.742 | 2.409 | 3.973 | 1.636 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L*) | 0.564 | 3.585 | 3.919 | 0.856 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*LL) | 0.601 | 3.430 | 4.921 | 1.539 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L**) | 1.254 | 3.316 | 2.893 | 0.967 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*L) | 1.291 | 3.161 | 3.895 | 1.650 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL*) | 1.113 | 4.337 | 3.842 | 0.871 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LLL) | 1.150 | 4.182 | 4.844 | 1.554 |
| +D+0.750L+0.5250S+H, LL Comb Run (**L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (*L*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (*LL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (L**) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (L*L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (LL*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+H, LL Comb Run (LLL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.60W+H | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (**L) | 0.742 | 2.409 | 3.973 | 1.636 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L*) | 0.564 | 3.585 | 3.919 | 0.856 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*LL) | 0.601 | 3.430 | 4.921 | 1.539 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L**) | 1.254 | 3.316 | 2.893 | 0.967 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*L) | 1.291 | 3.161 | 3.895 | 1.650 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL*) | 1.113 | 4.337 | 3.842 | 0.871 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LLL) | 1.150 | 4.182 | 4.844 | 1.554 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (**L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*LL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L**) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LLL) | 0.705 | 2.564 | 2.970 | 0.953 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG3

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +0.60D+0.60W+0.60H | 0.423 | 1.538 | 1.782 | 0.572 |
| +D+0.70E+H | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (**L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*LL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L**) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*L) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL*) | 0.705 | 2.564 | 2.970 | 0.953 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LLL) | 0.705 | 2.564 | 2.970 | 0.953 |
| +0.60D+0.70E+0.60H | 0.423 | 1.538 | 1.782 | 0.572 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 0.705 | 0.782 | | | | | |
| Support #2 | 2.564 | 2.364 | | | | | |
| Support #3 | 2.970 | 2.602 | | | | | |
| Support #4 | 0.953 | 0.930 | | | | | |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG4

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024
Load Combination Set : ASCE 7-22 / IBC 2024

ρ = 1.00

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-22 / IBC 2024

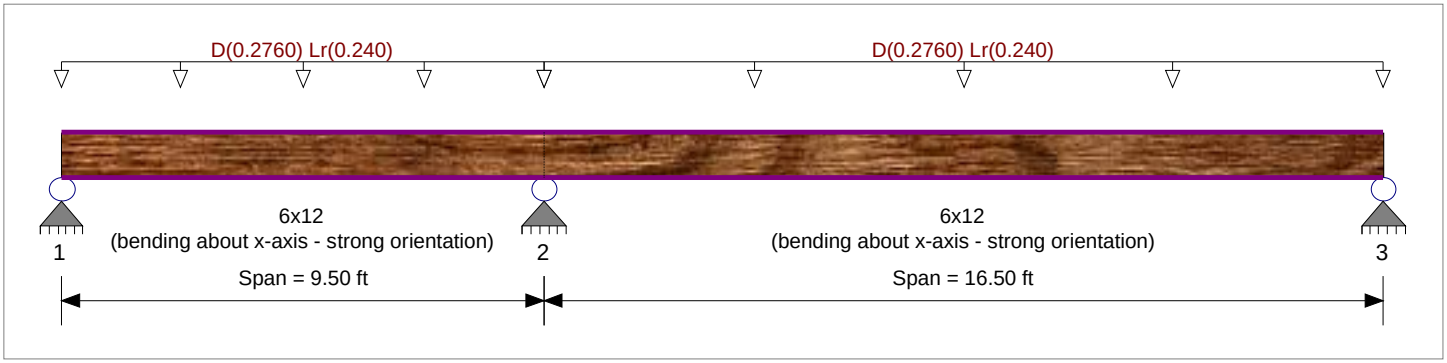
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 1,350.0 psi |
| Fb - | 1,350.0 psi |
| Fc - Prll | 925.0 psi |
| Fc - Perp | 625.0 psi |
| Fv | 170.0 psi |
| Ft | 675.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,600.0 ksi |
| Eminbend - xx | 580.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1
Self Weight : D = 0.01371 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 12.0 ft, (RR)

Load for Span Number 2
Self Weight : D = 0.01371 k/ft
Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 12.0 ft, (RR)

## DESIGN SUMMARY — bending about x-axis - strong orientation

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | 0.799 : 1 | Maximum Shear Stress Ratio | = | 0.525 : 1 |
| Section used for this span | | 6x12 | Section used for this span | | 6x12 |
| | | NDS2024 | | | NDS2024 |
| | | *(bending about x-axis - strong orientation)* | | | *(bending about x-axis - strong orientation)* |
| fb: Actual | = | 1,348.53 psi | fv: Actual | = | 111.64 psi |
| F'b | = | 1,687.50 psi | F'v | = | 212.50 psi |
| Load Combination | | +D+Lr+H, LL Comb Run (LL) | Load Combination | | +D+Lr+H, LL Comb Run (LL) |
| Location of maximum on span | = | 9.500 ft | Location of maximum on span | = | 9.500 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

### Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.225 in | Ratio = | 879 | >=360 | Span: 2 : Lr Only, LL Comb Run (*L) |
| Max Upward Transient Deflection | -0.047 in | Ratio = | 2434 | >=360 | Span: 1 : Lr Only, LL Comb Run (*L) |
| Max Downward Total Deflection | 0.466 in | Ratio = | 424 | >=240 | Span: 2 : +D+Lr+H, LL Comb Run (*L) |
| Max Upward Total Deflection | -0.068 in | Ratio = | 1664 | >=240 | Span: 1 : +D+Lr+H, LL Comb Run (*L) |

## Maximum Forces & Stresses for Load Combinations

| Load Combination | | Max Stress Ratios | | | | | | | | | | Moment Values | | | Shear Values | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment Length | Span # | M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | M | fb | F'b | V | fv | F'v |
| +D+H | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.607 | 0.399 | 0.90 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,215.0 | 2.57 | 61.1 | 153.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** RDG4

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 16.50 ft | 2 | 0.607 | 0.399 | 0.90 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,215.0 | 2.57 | 61.1 | 153.0 |
| +D+L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.546 | 0.359 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,350.0 | 2.57 | 61.1 | 170.0 |
| Length = 16.50 ft | 2 | 0.546 | 0.359 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,350.0 | 2.57 | 61.1 | 170.0 |
| +D+L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.546 | 0.359 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,350.0 | 2.57 | 61.1 | 170.0 |
| Length = 16.50 ft | 2 | 0.546 | 0.359 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,350.0 | 2.57 | 61.1 | 170.0 |
| +D+L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.546 | 0.359 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,350.0 | 2.57 | 61.1 | 170.0 |
| Length = 16.50 ft | 2 | 0.546 | 0.359 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,350.0 | 2.57 | 61.1 | 170.0 |
| +D+Lr+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.741 | 0.519 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 12.63 | 1,250.6 | 1,687.5 | 4.65 | 110.2 | 212.5 |
| Length = 16.50 ft | 2 | 0.741 | 0.519 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 12.63 | 1,250.6 | 1,687.5 | 4.65 | 110.2 | 212.5 |
| +D+Lr+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.495 | 0.323 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 8.44 | 835.5 | 1,687.5 | 2.90 | 68.7 | 212.5 |
| Length = 16.50 ft | 2 | 0.495 | 0.294 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 8.44 | 835.5 | 1,687.5 | 2.63 | 62.5 | 212.5 |
| +D+Lr+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.799 | 0.525 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 13.62 | 1,348.5 | 1,687.5 | 4.71 | 111.6 | 212.5 |
| Length = 16.50 ft | 2 | 0.799 | 0.525 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 13.62 | 1,348.5 | 1,687.5 | 4.71 | 111.6 | 212.5 |
| +D+0.70S+H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.475 | 0.312 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,552.5 | 2.57 | 61.1 | 195.5 |
| Length = 16.50 ft | 2 | 0.475 | 0.312 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,552.5 | 2.57 | 61.1 | 195.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.665 | 0.461 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 11.34 | 1,122.3 | 1,687.5 | 4.13 | 97.9 | 212.5 |
| Length = 16.50 ft | 2 | 0.665 | 0.461 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 11.34 | 1,122.3 | 1,687.5 | 4.13 | 97.9 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.481 | 0.295 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 8.19 | 811.0 | 1,687.5 | 2.64 | 62.7 | 212.5 |
| Length = 16.50 ft | 2 | 0.481 | 0.292 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 8.19 | 811.0 | 1,687.5 | 2.62 | 62.1 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.709 | 0.466 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 12.08 | 1,195.8 | 1,687.5 | 4.17 | 99.0 | 212.5 |
| Length = 16.50 ft | 2 | 0.709 | 0.466 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 12.08 | 1,195.8 | 1,687.5 | 4.17 | 99.0 | 212.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.475 | 0.312 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,552.5 | 2.57 | 61.1 | 195.5 |
| Length = 16.50 ft | 2 | 0.475 | 0.312 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,552.5 | 2.57 | 61.1 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.475 | 0.312 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,552.5 | 2.57 | 61.1 | 195.5 |
| Length = 16.50 ft | 2 | 0.475 | 0.312 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,552.5 | 2.57 | 61.1 | 195.5 |
| +D+0.750L+0.5250S+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.475 | 0.312 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,552.5 | 2.57 | 61.1 | 195.5 |
| Length = 16.50 ft | 2 | 0.475 | 0.312 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 1,552.5 | 2.57 | 61.1 | 195.5 |
| +D+0.60W+H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| Length = 16.50 ft | 2 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.520 | 0.360 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 11.34 | 1,122.3 | 2,160.0 | 4.13 | 97.9 | 272.0 |
| Length = 16.50 ft | 2 | 0.520 | 0.360 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 11.34 | 1,122.3 | 2,160.0 | 4.13 | 97.9 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |

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Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG4

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 9.50 ft | 1 | 0.375 | 0.231 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 8.19 | 811.0 | 2,160.0 | 2.64 | 62.7 | 272.0 |
| Length = 16.50 ft | 2 | 0.375 | 0.228 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 8.19 | 811.0 | 2,160.0 | 2.62 | 62.1 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.554 | 0.364 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 12.08 | 1,195.8 | 2,160.0 | 4.17 | 99.0 | 272.0 |
| Length = 16.50 ft | 2 | 0.554 | 0.364 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 12.08 | 1,195.8 | 2,160.0 | 4.17 | 99.0 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| Length = 16.50 ft | 2 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| Length = 16.50 ft | 2 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| Length = 16.50 ft | 2 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| +0.60D+0.60W+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.205 | 0.135 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 4.47 | 442.5 | 2,160.0 | 1.54 | 36.6 | 272.0 |
| Length = 16.50 ft | 2 | 0.205 | 0.135 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 4.47 | 442.5 | 2,160.0 | 1.54 | 36.6 | 272.0 |
| +D+0.70E+H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| Length = 16.50 ft | 2 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| Length = 16.50 ft | 2 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| Length = 16.50 ft | 2 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| Length = 16.50 ft | 2 | 0.341 | 0.224 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 7.45 | 737.5 | 2,160.0 | 2.57 | 61.1 | 272.0 |
| +0.60D+0.70E+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 9.50 ft | 1 | 0.205 | 0.135 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 4.47 | 442.5 | 2,160.0 | 1.54 | 36.6 | 272.0 |
| Length = 16.50 ft | 2 | 0.205 | 0.135 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 4.47 | 442.5 | 2,160.0 | 1.54 | 36.6 | 272.0 |

## Overall Maximum Deflections

| Span | Load Combination | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| 1 | | 0.0000 | 0.000 | +D+Lr+H, LL Comb Run (*L) | -0.0685 | 6.050 |
| 2 | +D+Lr+H, LL Comb Run (*L) | 0.4660 | 9.034 | | 0.0000 | 6.050 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Max Upward from all Load Cases & Combinations | 1.628 | 9.146 | 3.604 |
| Max Upward from Load Combinations | 1.628 | 9.146 | 3.604 |
| Max Upward from Load Cases | 1.036 | 5.002 | 1.939 |
| Max Downward from all Load Cases & Combinations (Res | -0.546 | | -0.060 |
| Max Downward from Load Cases (Resisting Uplift) | -0.546 | | -0.060 |
| +D+H | 0.592 | 5.002 | 1.939 |
| +D+L+H, LL Comb Run (*L) | 0.592 | 5.002 | 1.939 |
| +D+L+H, LL Comb Run (L*) | 0.592 | 5.002 | 1.939 |
| +D+L+H, LL Comb Run (LL) | 0.592 | 5.002 | 1.939 |
| +D+Lr+H, LL Comb Run (*L) | 0.046 | 7.842 | 3.604 |
| +D+Lr+H, LL Comb Run (L*) | 1.628 | 6.306 | 1.879 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG4

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| +D+Lr+H, LL Comb Run (LL) | 1.082 | 9.146 | 3.544 |
| +D+0.70S+H | 0.592 | 5.002 | 1.939 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | 0.183 | 7.132 | 3.188 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | 1.369 | 5.980 | 1.894 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | 0.960 | 8.110 | 3.143 |
| +D+0.750L+0.5250S+H, LL Comb Run (*L) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.5250S+H, LL Comb Run (L*) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.5250S+H, LL Comb Run (LL) | 0.592 | 5.002 | 1.939 |
| +D+0.60W+H | 0.592 | 5.002 | 1.939 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | 0.183 | 7.132 | 3.188 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | 1.369 | 5.980 | 1.894 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | 0.960 | 8.110 | 3.143 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL) | 0.592 | 5.002 | 1.939 |
| +0.60D+0.60W+0.60H | 0.355 | 3.001 | 1.163 |
| +D+0.70E+H | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL) | 0.592 | 5.002 | 1.939 |
| +0.60D+0.70E+0.60H | 0.355 | 3.001 | 1.163 |
| D Only | 0.592 | 5.002 | 1.939 |
| Lr Only, LL Comb Run (*L) | -0.546 | 2.840 | 1.666 |
| Lr Only, LL Comb Run (L*) | 1.036 | 1.304 | -0.060 |
| Lr Only, LL Comb Run (LL) | 0.490 | 4.144 | 1.606 |
| H Only | | | |

## Vertical Reactions for Load Cases

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Max Upward from Load Cases | 1.036 | 5.002 | 1.939 |
| Max Downward from Load Cases (Resisting Uplift) | -0.546 | | -0.060 |
| D Only | 0.592 | 5.002 | 1.939 |
| Lr Only, LL Comb Run (*L) | -0.546 | 2.840 | 1.666 |
| Lr Only, LL Comb Run (L*) | 1.036 | 1.304 | -0.060 |
| Lr Only, LL Comb Run (LL) | 0.490 | 4.144 | 1.606 |
| H Only | | | |

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Max Upward from Load Combinations | 1.628 | 9.146 | 3.604 |
| +D+H | 0.592 | 5.002 | 1.939 |
| +D+L+H, LL Comb Run (*L) | 0.592 | 5.002 | 1.939 |
| +D+L+H, LL Comb Run (L*) | 0.592 | 5.002 | 1.939 |
| +D+L+H, LL Comb Run (LL) | 0.592 | 5.002 | 1.939 |
| +D+Lr+H, LL Comb Run (*L) | 0.046 | 7.842 | 3.604 |
| +D+Lr+H, LL Comb Run (L*) | 1.628 | 6.306 | 1.879 |
| +D+Lr+H, LL Comb Run (LL) | 1.082 | 9.146 | 3.544 |
| +D+0.70S+H | 0.592 | 5.002 | 1.939 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | 0.183 | 7.132 | 3.188 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | 1.369 | 5.980 | 1.894 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | 0.960 | 8.110 | 3.143 |
| +D+0.750L+0.5250S+H, LL Comb Run (*L) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.5250S+H, LL Comb Run (L*) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.5250S+H, LL Comb Run (LL) | 0.592 | 5.002 | 1.939 |
| +D+0.60W+H | 0.592 | 5.002 | 1.939 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L) | 0.183 | 7.132 | 3.188 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*) | 1.369 | 5.980 | 1.894 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL) | 0.960 | 8.110 | 3.143 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*) | 0.592 | 5.002 | 1.939 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** RDG4

## Vertical Reactions for Load Combinations

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| +D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL) | 0.592 | 5.002 | 1.939 |
| +0.60D+0.60W+0.60H | 0.355 | 3.001 | 1.163 |
| +D+0.70E+H | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*) | 0.592 | 5.002 | 1.939 |
| +D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL) | 0.592 | 5.002 | 1.939 |
| +0.60D+0.70E+0.60H | 0.355 | 3.001 | 1.163 |

## Extreme Reactions

Values in KIPS

| Support | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Support #1 | 0.592 | 1.036 | | | | | |
| Support #2 | 5.002 | 4.144 | | | | | |
| Support #3 | 1.939 | 1.666 | | | | | |

Fa Structural Engineering
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: CA 92648
Phone : (949) 337-7075

Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** CANT. FB10

## CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

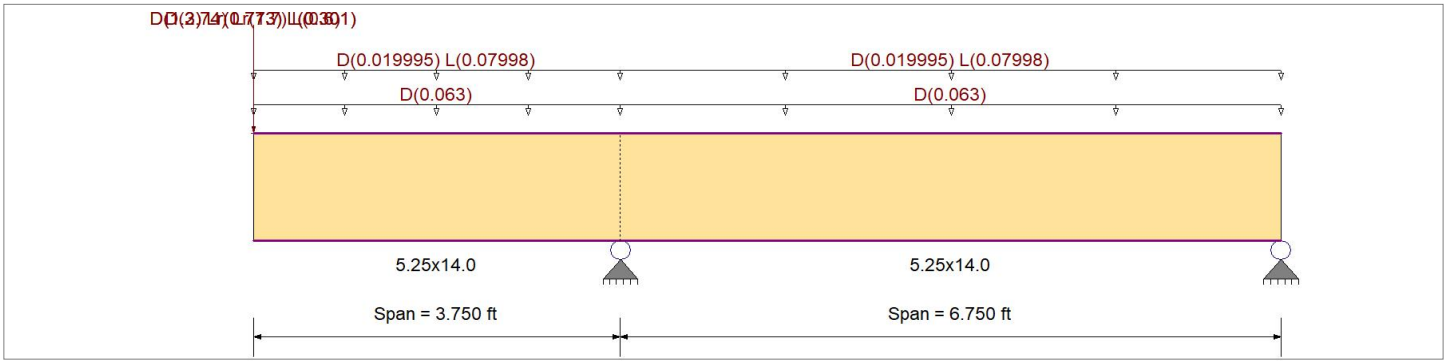
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.2E

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 2900 psi |
| Fb - | 2900 psi |
| Fc - Prll | 2900 psi |
| Fc - Perp | 750 psi |
| Fv | 290 psi |
| Ft | 2025 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 2200 ksi |
| Eminbend - xx | 1118.19 ksi |
| Density | 45.07 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0180 ksf, Tributary Width = 3.50 ft, (WALL)
Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 1.333 ft, (FJ)
Point Load : D = 1.30, Lr = 0.7730, L = 0.3010 k @ 0.0 ft, (FB6)
Point Load : D = 1.30, Lr = 0.7730, L = 0.3010 k @ 0.0 ft, (FB6)
Point Load : D = 2.740, Lr = 1.70, L = 0.60 k @ 0.0 ft, (FB9)
Load for Span Number 2
Uniform Load : D = 0.0180 ksf, Tributary Width = 3.50 ft, (WALL)
Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 1.333 ft, (FJ)

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | 0.662 : 1 | Maximum Shear Stress Ratio | = | 0.513 : 1 |
| Section used for this span | | 5.25x14.0 | Section used for this span | | 5.25x14.0 |
| fb: Actual | = | 2,358.16 psi | fv: Actual | = | 185.86 psi |
| F'b | = | 3,563.50 psi | F'v | = | 362.50 psi |
| Load Combination | | +D+0.750Lr+0.750L+H, LL Comb Run (L*) | Load Combination | | +D+0.750Lr+0.750L+H, LL Comb Run (LL) |
| Location of maximum on span | = | 3.750 ft | Location of maximum on span | = | 2.598 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

### Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.105 in | Ratio = | 858 | >=360 | Span: 2 : L Only, LL Comb Run (*L) |
| Max Upward Transient Deflection | -0.024 in | Ratio = | 3429 | >=360 | Span: 2 : Lr Only, LL Comb Run (L*) |
| Max Downward Total Deflection | 0.286 in | Ratio = | 314 | >=240 | Span: 1 : +D+0.750Lr+0.750L+H, LL Comb Run (L*) |
| Max Upward Total Deflection | -0.064 in | Ratio = | 1274 | >=240 | Span: 2 : +D+0.750Lr+0.750L+H, LL Comb Run (L*) |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+H | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.566 | 0.439 | 0.90 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 2,565.7 | 5.62 | 114.6 | 261.0 |
| Length = 6.750 ft | 2 | 0.566 | 0.439 | 0.90 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 2,565.7 | 3.31 | 114.6 | 261.0 |

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Phone : (949) 337-7075

Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage.ec6



**DESCRIPTION:** CANT. FB10

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.510 | 0.395 | 1.00 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 2,850.8 | 5.62 | 114.6 | 290.0 |
| Length = 6.750 ft | 2 | 0.510 | 0.395 | 1.00 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 2,850.8 | 3.49 | 114.6 | 290.0 |
| +D+L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.634 | 0.494 | 1.00 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 25.84 | 1,808.1 | 2,850.8 | 7.03 | 143.4 | 290.0 |
| Length = 6.750 ft | 2 | 0.634 | 0.494 | 1.00 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 25.84 | 1,808.1 | 2,850.8 | 4.07 | 143.4 | 290.0 |
| +D+L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.634 | 0.494 | 1.00 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 25.84 | 1,808.1 | 2,850.8 | 7.03 | 143.4 | 290.0 |
| Length = 6.750 ft | 2 | 0.634 | 0.494 | 1.00 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 25.84 | 1,808.1 | 2,850.8 | 4.25 | 143.4 | 290.0 |
| +D+Lr+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.408 | 0.316 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 3,563.5 | 5.62 | 114.6 | 362.5 |
| Length = 6.750 ft | 2 | 0.408 | 0.316 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 3,563.5 | 3.31 | 114.6 | 362.5 |
| +D+Lr+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.647 | 0.499 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 32.94 | 2,305.0 | 3,563.5 | 8.86 | 180.8 | 362.5 |
| Length = 6.750 ft | 2 | 0.647 | 0.499 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 32.94 | 2,305.0 | 3,563.5 | 5.12 | 180.8 | 362.5 |
| +D+Lr+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.647 | 0.499 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 32.94 | 2,305.0 | 3,563.5 | 8.86 | 180.8 | 362.5 |
| Length = 6.750 ft | 2 | 0.647 | 0.499 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 32.94 | 2,305.0 | 3,563.5 | 5.12 | 180.8 | 362.5 |
| +D+S+H | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.443 | 0.344 | 1.15 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 3,278.4 | 5.62 | 114.6 | 333.5 |
| Length = 6.750 ft | 2 | 0.443 | 0.344 | 1.15 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 3,278.4 | 3.31 | 114.6 | 333.5 |
| +D+0.750Lr+0.750L+H, LL Cc | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.408 | 0.316 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 3,563.5 | 5.62 | 114.6 | 362.5 |
| Length = 6.750 ft | 2 | 0.408 | 0.316 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 3,563.5 | 3.45 | 114.6 | 362.5 |
| +D+0.750Lr+0.750L+H, LL Cc | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.662 | 0.513 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 33.70 | 2,358.2 | 3,563.5 | 9.11 | 185.9 | 362.5 |
| Length = 6.750 ft | 2 | 0.662 | 0.513 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 33.70 | 2,358.2 | 3,563.5 | 5.23 | 185.9 | 362.5 |
| +D+0.750Lr+0.750L+H, LL Cc | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.662 | 0.513 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 33.70 | 2,358.2 | 3,563.5 | 9.11 | 185.9 | 362.5 |
| Length = 6.750 ft | 2 | 0.662 | 0.513 | 1.25 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 33.70 | 2,358.2 | 3,563.5 | 5.37 | 185.9 | 362.5 |
| +D+0.750L+0.750S+H, LL Co | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.443 | 0.344 | 1.15 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 3,278.4 | 5.62 | 114.6 | 333.5 |
| Length = 6.750 ft | 2 | 0.443 | 0.344 | 1.15 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 3,278.4 | 3.45 | 114.6 | 333.5 |
| +D+0.750L+0.750S+H, LL Co | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.524 | 0.408 | 1.15 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 3,278.4 | 6.67 | 136.2 | 333.5 |
| Length = 6.750 ft | 2 | 0.524 | 0.408 | 1.15 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 3,278.4 | 3.88 | 136.2 | 333.5 |
| +D+0.750L+0.750S+H, LL Co | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.524 | 0.408 | 1.15 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 3,278.4 | 6.67 | 136.2 | 333.5 |
| Length = 6.750 ft | 2 | 0.524 | 0.408 | 1.15 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 3,278.4 | 4.01 | 136.2 | 333.5 |
| +D+0.60W+H | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 5.62 | 114.6 | 464.0 |
| Length = 6.750 ft | 2 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 3.31 | 114.6 | 464.0 |
| +D+0.70E+H | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 5.62 | 114.6 | 464.0 |
| Length = 6.750 ft | 2 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 3.31 | 114.6 | 464.0 |
| +D+0.750Lr+0.750L+0.450W | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 5.62 | 114.6 | 464.0 |

Fa Structural Engineering
Email : atefg@fastructural.com
Address : 18682 Beach Blvd.,
: Huntington Beach
: CA 92648
Phone : (949) 337-7075

Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** CANT. FB10

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 6.750 ft | 2 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 3.45 | 114.6 | 464.0 |
| +D+0.750Lr+0.750L+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.517 | 0.401 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 33.70 | 2,358.2 | 4,561.3 | 9.11 | 185.9 | 464.0 |
| Length = 6.750 ft | 2 | 0.517 | 0.401 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 33.70 | 2,358.2 | 4,561.3 | 5.23 | 185.9 | 464.0 |
| +D+0.750Lr+0.750L+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.517 | 0.401 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 33.70 | 2,358.2 | 4,561.3 | 9.11 | 185.9 | 464.0 |
| Length = 6.750 ft | 2 | 0.517 | 0.401 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 33.70 | 2,358.2 | 4,561.3 | 5.37 | 185.9 | 464.0 |
| +D+0.750L+0.750S+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 5.62 | 114.6 | 464.0 |
| Length = 6.750 ft | 2 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 3.45 | 114.6 | 464.0 |
| +D+0.750L+0.750S+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.377 | 0.293 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 4,561.3 | 6.67 | 136.2 | 464.0 |
| Length = 6.750 ft | 2 | 0.377 | 0.293 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 4,561.3 | 3.88 | 136.2 | 464.0 |
| +D+0.750L+0.750S+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.377 | 0.293 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 4,561.3 | 6.67 | 136.2 | 464.0 |
| Length = 6.750 ft | 2 | 0.377 | 0.293 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 4,561.3 | 4.01 | 136.2 | 464.0 |
| +D+0.750L+0.750S+0.5250E- | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 5.62 | 114.6 | 464.0 |
| Length = 6.750 ft | 2 | 0.319 | 0.247 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 20.77 | 1,453.3 | 4,561.3 | 3.45 | 114.6 | 464.0 |
| +D+0.750L+0.750S+0.5250E- | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.377 | 0.293 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 4,561.3 | 6.67 | 136.2 | 464.0 |
| Length = 6.750 ft | 2 | 0.377 | 0.293 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 4,561.3 | 3.88 | 136.2 | 464.0 |
| +D+0.750L+0.750S+0.5250E- | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.377 | 0.293 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 4,561.3 | 6.67 | 136.2 | 464.0 |
| Length = 6.750 ft | 2 | 0.377 | 0.293 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 24.57 | 1,719.4 | 4,561.3 | 4.01 | 136.2 | 464.0 |
| +0.60D+0.60W+0.60H | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.191 | 0.148 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 12.46 | 872.0 | 4,561.3 | 3.37 | 68.8 | 464.0 |
| Length = 6.750 ft | 2 | 0.191 | 0.148 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 12.46 | 872.0 | 4,561.3 | 1.99 | 68.8 | 464.0 |
| +0.60D+0.70E+0.60H | | | | | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 3.750 ft | 1 | 0.191 | 0.148 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 12.46 | 872.0 | 4,561.3 | 3.37 | 68.8 | 464.0 |
| Length = 6.750 ft | 2 | 0.191 | 0.148 | 1.60 | 1.00 | 1.00 | 1.00 | 0.983 | 1.00 | 1.00 | 1.00 | 12.46 | 872.0 | 4,561.3 | 1.99 | 68.8 | 464.0 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+0.750Lr+0.750L+0.450W+H, l | 1 | 0.2856 | 0.000 | | 0.0000 | 0.000 |
| | 2 | 0.0000 | 0.000 | +D+0.750Lr+0.750L+0.450W+H, l | -0.0636 | 2.866 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Max Upward from all Load Conditions | | 14.852 | 0.270 |
| Max Upward from Load Combinations | | 14.852 | |
| Max Upward from Load Cases | | 9.172 | 0.270 |
| Max Downward from all Load Conditio | | | -4.635 |
| Max Downward from Load Combinations | | | -4.635 |
| Max Downward from Load Cases (Resis | | | -2.719 |
| +D+H | | 9.172 | -2.719 |
| +D+L+H, LL Comb Run (*L) | | 9.442 | -2.449 |
| +D+L+H, LL Comb Run (L*) | | 11.425 | -3.470 |
| +D+L+H, LL Comb Run (LL) | | 11.695 | -3.200 |
| +D+Lr+H, LL Comb Run (*L) | | 9.172 | -2.719 |
| +D+Lr+H, LL Comb Run (L*) | | 14.222 | -4.523 |
| +D+Lr+H, LL Comb Run (LL) | | 14.222 | -4.523 |

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Phone : (949) 337-7075

Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** CANT. FB10

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| +D+S+H | | 9.172 | -2.719 |
| +D+0.750Lr+0.750L+H, LL Comb Run (* | | 9.375 | -2.517 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L | | 14.649 | -4.635 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L | | 14.852 | -4.433 |
| +D+0.750L+0.750S+H, LL Comb Run (*L | | 9.375 | -2.517 |
| +D+0.750L+0.750S+H, LL Comb Run (L* | | 10.862 | -3.283 |
| +D+0.750L+0.750S+H, LL Comb Run (LL | | 11.065 | -3.080 |
| +D+0.60W+H | | 9.172 | -2.719 |
| +D+0.70E+H | | 9.172 | -2.719 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb | | 9.375 | -2.517 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb | | 14.649 | -4.635 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb | | 14.852 | -4.433 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 9.375 | -2.517 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 10.862 | -3.283 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 11.065 | -3.080 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb | | 9.375 | -2.517 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb | | 10.862 | -3.283 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb | | 11.065 | -3.080 |
| +0.60D+0.60W+0.60H | | 5.503 | -1.632 |
| +0.60D+0.70E+0.60H | | 5.503 | -1.632 |
| D Only | | 9.172 | -2.719 |
| Lr Only, LL Comb Run (L*) | | 5.049 | -1.803 |
| Lr Only, LL Comb Run (LL) | | 5.049 | -1.803 |
| L Only, LL Comb Run (*L) | | 0.270 | 0.270 |
| L Only, LL Comb Run (L*) | | 2.253 | -0.751 |
| L Only, LL Comb Run (LL) | | 2.523 | -0.481 |
| H Only | | | |

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Address : 18682 Beach Blvd.,
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: CA 92648
Phone : (949) 337-7075

Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** FB12

## CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

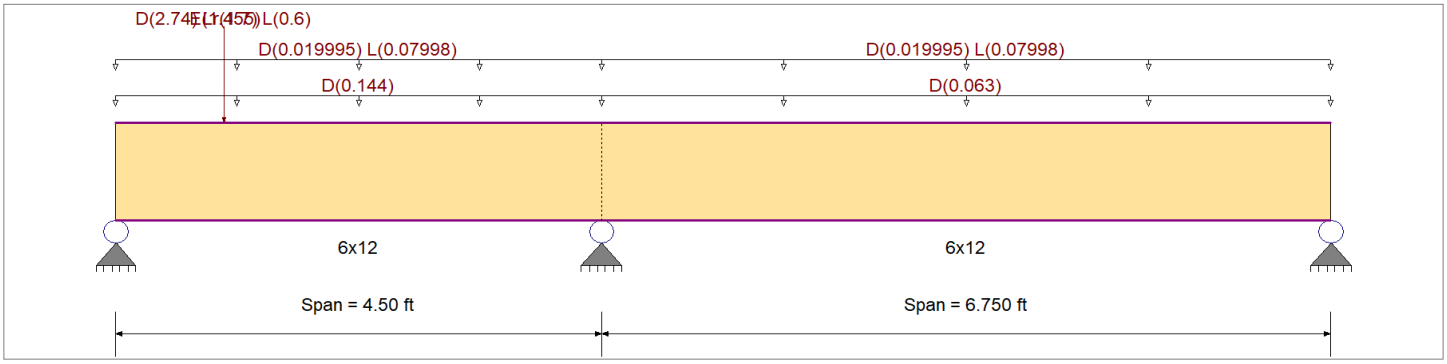
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

| | |
|---|---|
| Fb + | 1350 psi |
| Fb - | 1350 psi |
| Fc - Prll | 925 psi |
| Fc - Perp | 625 psi |
| Fv | 170 psi |
| Ft | 675 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1600 ksi |
| Eminbend - xx | 580 ksi |
| Density | 31.21 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0180 ksf, Tributary Width = 8.0 ft, (WALL)
Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 1.333 ft, (FJ)
Point Load : D = 2.740, Lr = 1.70, L = 0.60 k @ 1.0 ft, (FB9)
Point Load : E = 1.455 k @ 1.0 ft, (SW9)
Load for Span Number 2
Uniform Load : D = 0.0180 ksf, Tributary Width = 3.50 ft, (WALL)
Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 1.333 ft, (FJ)

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | 0.209 : 1 | Maximum Shear Stress Ratio | = | 0.387 : 1 |
| Section used for this span | | 6x12 | Section used for this span | | 6x12 |
| fb: Actual | = | 353.14 psi | fv: Actual | = | 82.17 psi |
| F'b | = | 1,687.50 psi | F'v | = | 212.50 psi |
| Load Combination | | +D+0.750Lr+0.750L+H, LL Comb Run (L*) | Load Combination | | +D+0.750Lr+0.750L+H, LL Comb Run (L*) |
| Location of maximum on span | = | 1.006 ft | Location of maximum on span | = | 0.000 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

### Maximum Deflection

| | | | | |
|---|---|---|---|---|
| Max Downward Transient Deflection | 0.003 in | Ratio = | 20663 >=360 | Span: 2 : L Only, LL Comb Run (*L) |
| Max Upward Transient Deflection | -0.001 in | Ratio = | 54546 >=360 | Span: 2 : Lr Only, LL Comb Run (L*) |
| Max Downward Total Deflection | 0.008 in | Ratio = | 6972 >=240 | Span: 2 : +D+L+H, LL Comb Run (*L) |
| Max Upward Total Deflection | -0.003 in | Ratio = | 29649 >=240 | Span: 2 : +D+0.750Lr+0.750L+H, LL Comb Run (L*) |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+H | | | | | | | | | | | | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.180 | 0.330 | 0.90 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.21 | 218.7 | 1,215.0 | 2.13 | 50.6 | 153.0 |
| Length = 6.750 ft | 2 | 0.084 | 0.330 | 0.90 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.03 | 102.1 | 1,215.0 | 0.39 | 50.6 | 153.0 |
| +D+L+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage.ec6



**DESCRIPTION:** FB12

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length = 4.50 ft | 1 | 0.158 | 0.289 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.15 | 212.7 | 1,350.0 | 2.07 | 49.1 | 170.0 |
| Length = 6.750 ft | 2 | 0.096 | 0.289 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.30 | 129.1 | 1,350.0 | 0.62 | 49.1 | 170.0 |
| +D+L+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.203 | 0.371 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.77 | 274.4 | 1,350.0 | 2.66 | 63.1 | 170.0 |
| Length = 6.750 ft | 2 | 0.090 | 0.371 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.23 | 121.4 | 1,350.0 | 0.42 | 63.1 | 170.0 |
| +D+L+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.199 | 0.362 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.71 | 268.4 | 1,350.0 | 2.60 | 61.6 | 170.0 |
| Length = 6.750 ft | 2 | 0.110 | 0.362 | 1.00 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.50 | 148.4 | 1,350.0 | 0.65 | 61.6 | 170.0 |
| +D+Lr+H, LL Comb Run (*L) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.130 | 0.238 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.21 | 218.7 | 1,687.5 | 2.13 | 50.6 | 212.5 |
| Length = 6.750 ft | 2 | 0.060 | 0.238 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.03 | 102.1 | 1,687.5 | 0.39 | 50.6 | 212.5 |
| +D+Lr+H, LL Comb Run (L*) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.203 | 0.377 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 3.46 | 342.2 | 1,687.5 | 3.38 | 80.2 | 212.5 |
| Length = 6.750 ft | 2 | 0.079 | 0.377 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.35 | 134.1 | 1,687.5 | 0.44 | 80.2 | 212.5 |
| +D+Lr+H, LL Comb Run (LL) | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.203 | 0.377 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 3.46 | 342.2 | 1,687.5 | 3.38 | 80.2 | 212.5 |
| Length = 6.750 ft | 2 | 0.079 | 0.377 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.35 | 134.1 | 1,687.5 | 0.44 | 80.2 | 212.5 |
| +D+S+H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.141 | 0.259 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.21 | 218.7 | 1,552.5 | 2.13 | 50.6 | 195.5 |
| Length = 6.750 ft | 2 | 0.066 | 0.259 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.03 | 102.1 | 1,552.5 | 0.39 | 50.6 | 195.5 |
| +D+0.750Lr+0.750L+H, LL Cc | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.127 | 0.233 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.16 | 214.2 | 1,687.5 | 2.09 | 49.5 | 212.5 |
| Length = 6.750 ft | 2 | 0.073 | 0.233 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.24 | 122.4 | 1,687.5 | 0.56 | 49.5 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Cc | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.209 | 0.387 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 3.57 | 353.1 | 1,687.5 | 3.46 | 82.2 | 212.5 |
| Length = 6.750 ft | 2 | 0.083 | 0.387 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.42 | 140.6 | 1,687.5 | 0.45 | 82.2 | 212.5 |
| +D+0.750Lr+0.750L+H, LL Cc | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.207 | 0.382 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 3.52 | 348.6 | 1,687.5 | 3.42 | 81.1 | 212.5 |
| Length = 6.750 ft | 2 | 0.095 | 0.382 | 1.25 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.62 | 160.9 | 1,687.5 | 0.62 | 81.1 | 212.5 |
| +D+0.750L+0.750S+H, LL Co | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.138 | 0.253 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.16 | 214.2 | 1,552.5 | 2.09 | 49.5 | 195.5 |
| Length = 6.750 ft | 2 | 0.079 | 0.253 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.24 | 122.4 | 1,552.5 | 0.56 | 49.5 | 195.5 |
| +D+0.750L+0.750S+H, LL Co | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.168 | 0.307 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.63 | 260.5 | 1,552.5 | 2.53 | 59.9 | 195.5 |
| Length = 6.750 ft | 2 | 0.075 | 0.307 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.18 | 116.6 | 1,552.5 | 0.41 | 59.9 | 195.5 |
| +D+0.750L+0.750S+H, LL Co | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.165 | 0.301 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.59 | 256.0 | 1,552.5 | 2.48 | 58.9 | 195.5 |
| Length = 6.750 ft | 2 | 0.088 | 0.301 | 1.15 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.38 | 136.9 | 1,552.5 | 0.59 | 58.9 | 195.5 |
| +D+0.60W+H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.101 | 0.186 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.21 | 218.7 | 2,160.0 | 2.13 | 50.6 | 272.0 |
| Length = 6.750 ft | 2 | 0.047 | 0.186 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.03 | 102.1 | 2,160.0 | 0.39 | 50.6 | 272.0 |
| +D+0.70E+H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.136 | 0.251 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.96 | 292.7 | 2,160.0 | 2.88 | 68.3 | 272.0 |
| Length = 6.750 ft | 2 | 0.056 | 0.251 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.22 | 121.3 | 2,160.0 | 0.42 | 68.3 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.099 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.16 | 214.2 | 2,160.0 | 2.09 | 49.5 | 272.0 |
| Length = 6.750 ft | 2 | 0.057 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.24 | 122.4 | 2,160.0 | 0.56 | 49.5 | 272.0 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** FB12

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | CD | CM | $C_t$ | CLx | $C_F$ | Cfu | $C_i$ | $C_r$ | Moment Values M | fb | F'b | Shear Values V | fv | F'v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+0.750Lr+0.750L+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.163 | 0.302 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 3.57 | 353.1 | 2,160.0 | 3.46 | 82.2 | 272.0 |
| Length = 6.750 ft | 2 | 0.065 | 0.302 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.42 | 140.6 | 2,160.0 | 0.45 | 82.2 | 272.0 |
| +D+0.750Lr+0.750L+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.161 | 0.298 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 3.52 | 348.6 | 2,160.0 | 3.42 | 81.1 | 272.0 |
| Length = 6.750 ft | 2 | 0.074 | 0.298 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.62 | 160.9 | 2,160.0 | 0.62 | 81.1 | 272.0 |
| +D+0.750L+0.750S+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.099 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.16 | 214.2 | 2,160.0 | 2.09 | 49.5 | 272.0 |
| Length = 6.750 ft | 2 | 0.057 | 0.182 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.24 | 122.4 | 2,160.0 | 0.56 | 49.5 | 272.0 |
| +D+0.750L+0.750S+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.121 | 0.220 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.63 | 260.5 | 2,160.0 | 2.53 | 59.9 | 272.0 |
| Length = 6.750 ft | 2 | 0.054 | 0.220 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.18 | 116.6 | 2,160.0 | 0.41 | 59.9 | 272.0 |
| +D+0.750L+0.750S+0.450W+ | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.118 | 0.216 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.59 | 256.0 | 2,160.0 | 2.48 | 58.9 | 272.0 |
| Length = 6.750 ft | 2 | 0.063 | 0.216 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.38 | 136.9 | 2,160.0 | 0.59 | 58.9 | 272.0 |
| +D+0.750L+0.750S+0.5250E- | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.125 | 0.231 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.72 | 269.7 | 2,160.0 | 2.65 | 62.8 | 272.0 |
| Length = 6.750 ft | 2 | 0.063 | 0.231 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.38 | 136.8 | 2,160.0 | 0.59 | 62.8 | 272.0 |
| +D+0.750L+0.750S+0.5250E- | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.146 | 0.269 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 3.19 | 316.0 | 2,160.0 | 3.09 | 73.3 | 272.0 |
| Length = 6.750 ft | 2 | 0.061 | 0.269 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.32 | 130.9 | 2,160.0 | 0.43 | 73.3 | 272.0 |
| +D+0.750L+0.750S+0.5250E- | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.144 | 0.265 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 3.15 | 311.5 | 2,160.0 | 3.04 | 72.2 | 272.0 |
| Length = 6.750 ft | 2 | 0.070 | 0.265 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.53 | 151.2 | 2,160.0 | 0.61 | 72.2 | 272.0 |
| +0.60D+0.60W+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.061 | 0.112 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.33 | 131.2 | 2,160.0 | 1.28 | 30.3 | 272.0 |
| Length = 6.750 ft | 2 | 0.028 | 0.112 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 0.62 | 61.3 | 2,160.0 | 0.23 | 30.3 | 272.0 |
| +0.60D+0.70E+0.60H | | | | | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | | | 0.0 | 0.00 | 0.0 | 0.0 |
| Length = 4.50 ft | 1 | 0.095 | 0.177 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 2.07 | 205.2 | 2,160.0 | 2.03 | 48.1 | 272.0 |
| Length = 6.750 ft | 2 | 0.037 | 0.177 | 1.60 | 1.00 | 1.00 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 0.81 | 80.4 | 2,160.0 | 0.26 | 48.1 | 272.0 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+0.750Lr+0.750L+0.450W+H, I | 1 | 0.0077 | 1.860 | | 0.0000 | 0.000 |
| L Only, LL Comb Run (*L) | 2 | 0.0022 | 3.620 | +D+0.750Lr+0.750L+0.450W+H, I | -0.0027 | 2.149 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Max Upward from all Load Conditions | 3.692 | 2.658 | 0.403 |
| Max Upward from Load Combinations | 3.692 | 2.658 | 0.403 |
| Max Upward from Load Cases | 2.302 | 1.717 | 0.229 |
| Max Downward from all Load Conditio | -0.061 | | -0.048 |
| Max Downward from Load Cases (Resis | -0.061 | | -0.048 |
| +D+H | 2.302 | 1.717 | 0.174 |
| +D+L+H, LL Comb Run (*L) | 2.241 | 2.088 | 0.403 |
| +D+L+H, LL Comb Run (L*) | 2.905 | 2.103 | 0.145 |
| +D+L+H, LL Comb Run (LL) | 2.844 | 2.474 | 0.374 |
| +D+Lr+H, LL Comb Run (*L) | 2.302 | 1.717 | 0.174 |
| +D+Lr+H, LL Comb Run (L*) | 3.552 | 2.215 | 0.126 |
| +D+Lr+H, LL Comb Run (LL) | 3.552 | 2.215 | 0.126 |
| +D+S+H | 2.302 | 1.717 | 0.174 |
| +D+0.750Lr+0.750L+H, LL Comb Run (* | 2.256 | 1.995 | 0.346 |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: 85-25_Storage.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** FB12

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| +D+0.750Lr+0.750L+H, LL Comb Run (L | 3.692 | 2.379 | 0.116 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L | 3.646 | 2.658 | 0.288 |
| +D+0.750L+0.750S+H, LL Comb Run (*L | 2.256 | 1.995 | 0.346 |
| +D+0.750L+0.750S+H, LL Comb Run (L* | 2.754 | 2.006 | 0.152 |
| +D+0.750L+0.750S+H, LL Comb Run (LL | 2.709 | 2.285 | 0.324 |
| +D+0.60W+H | 2.302 | 1.717 | 0.174 |
| +D+0.70E+H | 3.051 | 2.015 | 0.145 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb | 2.256 | 1.995 | 0.346 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb | 3.692 | 2.379 | 0.116 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb | 3.646 | 2.658 | 0.288 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 2.256 | 1.995 | 0.346 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 2.754 | 2.006 | 0.152 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 2.709 | 2.285 | 0.324 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb | 2.818 | 2.219 | 0.324 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb | 3.316 | 2.230 | 0.130 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb | 3.271 | 2.508 | 0.302 |
| +0.60D+0.60W+0.60H | 1.381 | 1.030 | 0.104 |
| +0.60D+0.70E+0.60H | 2.130 | 1.328 | 0.075 |
| D Only | 2.302 | 1.717 | 0.174 |
| Lr Only, LL Comb Run (L*) | 1.250 | 0.497 | -0.048 |
| Lr Only, LL Comb Run (LL) | 1.250 | 0.497 | -0.048 |
| L Only, LL Comb Run (*L) | -0.061 | 0.371 | 0.229 |
| L Only, LL Comb Run (L*) | 0.603 | 0.386 | -0.029 |
| L Only, LL Comb Run (LL) | 0.543 | 0.757 | 0.201 |
| E Only | 1.070 | 0.426 | -0.041 |
| H Only | | | |

## COLUMN AXIAL CAPACITY

**WOOD PROPERTIES:**

Use Douglas Fir-Larch
Species: Stud
E = 1,400,000 psi
F'c = 850 psi
E' = 1,400,000 psi
Fc* = 935 psi

$C_F$ = 1.1
$C_m$ = 1.0
CT = 1.0
$C_t$ = 1.0
Ci = 1.0
$C_D$ = 1.0

Kce = 0.30
c = 0.80
Kf = 1.00
(for bolted or nailed members)

Buckling about x-axis? YES
Check le/d reqmt. OK!

| COL | No. of Plies | Size | $d_y$ | $d_x$ | $le_{x,y}$ | le/dy | le/dx | (le/d) | Fce | Fce/Fc* | 1+ Fce/Fc* / 2c | $C_P$ | F'c | Column Capacity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C01 | 1 - | 2x 4 | 1.5 | 3.50 | 8 | 64.0 | 27.4 | 27.4 | 558.27 | 0.597 | 1.00 | 0.498 | 465.79 | 2.45 kips |
| C02 | 2 - | 2x 4 | 3.0 | 3.50 | 8 | 32.0 | 27.4 | 27.4 | 558.27 | 0.597 | 1.00 | 0.498 | 465.79 | 4.89 kips |
| C03 | 1 - | 2x 6 | 1.5 | 5.50 | 8 | 64.0 | 17.5 | 17.5 | 1,378.58 | 1.474 | 1.55 | 0.806 | 753.41 | 6.22 kips |
| C04 | 2 - | 2x 6 | 3.0 | 5.50 | 8 | 32.0 | 17.5 | 17.5 | 1,378.58 | 1.474 | 1.55 | 0.806 | 753.41 | 12.43 kips |
| C05 | 1 - | 2x 8 | 1.5 | 7.50 | 8 | 64.0 | 12.8 | 12.8 | 2,563.48 | 2.742 | 2.34 | 0.910 | 850.54 | 9.57 kips |
| C06 | 2 - | 2x 8 | 3.0 | 7.25 | 8 | 32.0 | 13.2 | 13.2 | 2,395.43 | 2.562 | 2.23 | 0.902 | 843.35 | 18.34 kips |

**WOOD PROPERTIES:**

Use Douglas Fir-Larch
Species: No.1
E = 1,700,000 psi
F'c = 1,500 psi
E' = 1,700,000 psi
Fc* = 1,650 psi

$C_F$ = 1.1
$C_m$ = 1.0
CT = 1.0
$C_t$ = 1.0
Ci = 1.0
$C_D$ = 1.0

Kce = 0.30
c = 0.80
Kf = 1.00
(for bolted or nailed members)

Buckling about x-axis? YES
Check le/d reqmt. OK!

| COL | No. of Plies | Size | $d_y$ | $d_x$ | $le_{x,y}$ | le/dy | le/dx | (le/d) | Fce | Fce/Fc* | 1+ Fce/Fc* / 2c | $C_P$ | F'c | Column Capacity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C07 | 1 - | 4x 4 | 3.5 | 3.50 | 8 | 27.4 | 27.4 | 27.4 | 558.27 | 0.597 | 1.00 | 0.498 | 465.79 | 5.71 kips |
| C08 | 1 - | 4x 6 | 3.5 | 5.50 | 8 | 27.4 | 17.5 | 17.5 | 1,378.58 | 1.474 | 1.55 | 0.806 | 753.41 | 14.50 kips |
| C09 | 1 - | 4x 8 | 3.5 | 7.50 | 8 | 27.4 | 12.8 | 12.8 | 2,563.48 | 2.742 | 2.34 | 0.910 | 850.54 | 22.33 kips |
| C10 | 1 - | 6x 6 | 5.5 | 5.50 | 8 | 17.5 | 17.5 | 17.5 | 1,378.58 | 1.474 | 1.55 | 0.806 | 753.41 | 22.79 kips |
| C11 | 1 - | 6x 8 | 5.5 | 7.25 | 8 | 17.5 | 13.2 | 13.2 | 2,395.43 | 2.562 | 2.23 | 0.902 | 843.35 | 33.63 kips |

**Note:**

$Kc_E$ = 0.510 - 0.839(COV)

0.3 - for visually graded lumber
0.384 - for machine evaluated lumber (MEL)
0.418 - for products w/ COV<=0.11

where COV =

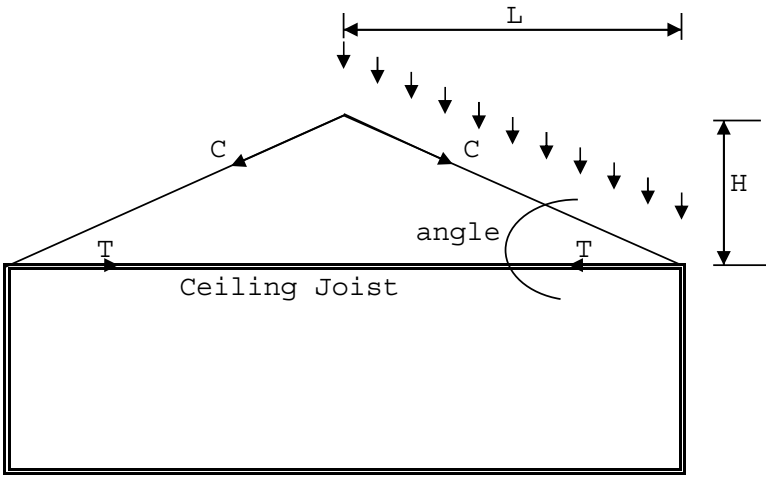
0.25 - sawn lumber
0.15 - MEL
0.11 - MSR (machine stress rated)
0.10 - glu-lam

## FOUNDATION DESIGN

| | | |
|---|---|---|
| ALLOW BEARING CAPACITY | 1,500.00 | psf |
| CONCRETE STRENGTH, f'c | 2,500.00 | psi |
| YEILD STRENGTH, Fy | 60,000.00 | psi |

| | | EXT. WALL FTG | INT. WALL FTG | F1 | F1 | F2 |
|---|---|---|---|---|---|---|
| **FOOTING DIMENSION** | | | | | | |
| WIDTH | in | 18.0 | 18.0 | 18.0 | 30.0 | 42.0 |
| LENGTH | in | 12.0 | 12.0 | 18.0 | 30.0 | 42.0 |
| DEPTH | in | 24.0 | 24.0 | 12.0 | 12.0 | 12.0 |
| **COLUMN DIMENSION** | | | | | | |
| WIDTH | in | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| LENGTH | in | 12.0 | 12.0 | 4.0 | 6.0 | 6.0 |
| **FOOTING LOAD** | | | | | | |
| ROOF TRIB. AREA | ft2 | 18.0 | 20.0 | | | |
| CEILING TRIB. AREA | ft2 | 18.0 | 20.0 | | | |
| FLOOR TRIB. AREA | ft2 | - | - | | | |
| DECK TRIB. AREA | ft2 | - | - | | | |
| WALL AREA | ft2 | 20.0 | 20.0 | | | |
| WALL TYPE | | EXT | INT | | | |
| DEAD LOAD D | lbs | 702.0 | 580.1 | | | |
| LIVE LOAD L | lbs | 720.0 | 800.0 | | | |
| SEISMIC LOAD E | lbs | - | - | | | |
| **CHECK BEARING CAPACITY** | | | | | | |
| SERVICE LOAD, (D+L) | lbs | 1,422.0 | 1,380.1 | | | |
| SERVICE LOAD, (D+L+E)/1.33 | lbs | 1,069.2 | 1,037.6 | | | |
| SOIL PRESSURE, fb=P/$A_{FTG}$ | psf | 948.0 | 920.0 | | | |
| CHECK fb < Fb | | OK | OK | | | |
| **CHECK MINIMUM REINFORCEMENT** | | | | | | |
| REINFORCEMENT USE | | 2#4 | 2#4 | 2#4 | 3#4 | 4#4 |
| AREA OF STEEL, As | in2 | 0.40 | 0.40 | | | |
| As1 min = 0.0018*Area_Conc. | in2 | 0.68 | 0.68 | | | |
| As2 min = 1.33*As_Required | in2 | 0.00 | 0.00 | | | |
| As min = Min(As1,As2) | in2 | 0.00 | 0.00 | | | |
| CHECK As > As MIN | | OK | OK | | | |
| **CHECK BENDING STRESSES** | | | | | | |
| FACTORED, 1.4D+1.7L | lbs | 2,207 | 2,172 | | | |
| FACTORED, 1.4(D+L+E)/1.33 | lbs | 1,991 | 1,932 | | | |
| MAXIMUM MOMENT, Mu | lb-in | 3,004 | 2,956 | | | |
| b | in | 12.00 | 12.00 | | | |
| a = As*Fy / 0.85*f'c*b | in | 0.94 | 0.94 | | | |
| ϕMn = ϕ*As*Fy*(d-a/2) | lb-in | 443,435 | 443,435 | | | |
| CHECK Mu < ϕMn | | OK | OK | | | |
| **CHECK SHEAR STRESSES** | | | | | | |
| MAXIMUM SHEAR, Vu | lbs | - | - | | | |
| b | in | 12.00 | 12.00 | | | |
| ϕVc = 2*ϕ*bw*d*sqrt(f'c) | lbs | 21,420 | 21,420 | | | |
| CHECK Vu < ϕVc | | OK | OK | | | |

## Nailing & Bolting Schedule for eaves tie connections




W= L(ft) x rafter spacing (ft) x roof design load (L.L. + D.L. in psf)

$$T = \frac{W \times L}{2H}$$

*Given:*

Roof Rafter

| | | | | |
|---|---|---|---|---|
| Roof Rafter Trib. Width | L | = | 9.5 | ft |
| Roof Dead Load | DL | = | 13.003 | psf |
| Roof Live Load | LL | = | 20 | psf |
| Roof Rafter Spacing | s | = | 1.33 | ft |
| Roof Pitch | | | 5: 12 | |

*Calculated:*

| | |
|---|---|
| Tan a= | 0.42 |
| Angle a | 22.62 |
| H= | L*tana |
| | 3.96 |
| W= | 417 |
| T= | 500 |

Design criteria:

| Nail Capcit | #/nail | Cd | #/nail |
|---|---|---|---|
| 8d | 98 | 1.25 | 123 |
| 16d | 103 | 1.25 | 129 |
| 1/2" MB | | | 400 |

Number of nails required= T/nail capacity

| | |
|---|---|
| 8d= | 4 nails @ each connection |
| 16d= | 4 nails @ each connection |
| 1/2" bolts= | 1 bolts @ each connection |

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www.fastructural.com

Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# 2D Frame

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** MF1

## Code References

Governing Code : IBC 2024
Referenced Design Standard(s) : NDS 2024 , AISC 360-22
Load Combinations Used : IBC 2021

Rho (or Omega) = 1.00

## Joints...

| Joint Label | Joint Coordinates X ft | Y ft | X Translational Restraint | Y Translational Restraint | Z Rotational Restraint | Joint Temp deg F |
|---|---|---|---|---|---|---|
| 1 | 0.0 | 0.0 | Restrained | Restrained | Restrained | 0 |
| 2 | 0.0 | 10.0 | Unrestrained | Unrestrained | Unrestrained | 0 |
| 3 | 25.0 | 10.0 | Unrestrained | Unrestrained | Unrestrained | 0 |
| 4 | 25.0 | 0.0 | Restrained | Restrained | Restrained | 0 |

## Members...

| Member Label | Property Label | Endpoint Joints I Joint | J Joint | Member Length ft | Releases Specify Connectivity of Member Ends to Joints I End x | I End y | I End z (rotation) | J End x | J End y | J End z (rotation) |
|---|---|---|---|---|---|---|---|---|---|---|
| A | Column | 1 | 2 | 10.000 | Unreleased | Unreleased | Released | Unreleased | Unreleased | Unreleased |
| B | Beam | 2 | 3 | 25.000 | Unreleased | Unreleased | Unreleased | Unreleased | Unreleased | Unreleased |
| C | Column | 3 | 4 | 10.000 | Unreleased | Unreleased | Unreleased | Unreleased | Unreleased | Released |

## Member Stress Check Data...

| Member Label | Unbraced Lengths Lu : z (ft) | Lu : y (ft) | Lb (ft) | Lex (ft) | Slenderness K : z | K : y | Steel Factors Cm | Cb | Wood Factors Cr |
|---|---|---|---|---|---|---|---|---|---|
| A | 10.000 | 10.000 | 10.000 | 0.000 | 1.00 | 1.00 | Internal | Internal | 1.000 |
| B | 25.000 | 25.000 | 25.000 | 0.000 | 1.00 | 1.00 | Internal | Internal | 1.000 |
| C | 10.000 | 10.000 | 10.000 | 0.000 | 1.00 | 1.00 | Internal | Internal | 1.000 |

## Materials...

| Member Label | Youngs ksi | Density kcf | Thermal in/degr | Yield ksi |
|---|---|---|---|---|
| Default | 1.00 | 0.000 | 0.000000 | 1.00 |
| Steel | 29,000.00 | 0.490 | 0.000007 | 50.00 |
| Wood | 1,800.00 | 0.035 | 0.000000 | 0.00 |

## Wood Material Data...

Wood, Not Defined, Density= 35.0pcf, FbT= 1000psi, FbC= 1000psi, Fv= 1000psi, Ft= 1000, Fc= 400psi, E Bend XX= 1800ksi, E BendMin XX= 1800ksi, E Beny YY= 1800ksi, E BendMin YY= 1800ksi, E Axial= 1800ksi, Species= , Grade= Any, Class=

## Member Sections...

| Prop Label | Group Tag | Material | Area | Depth | Width | Ixx | Iyy |
|---|---|---|---|---|---|---|---|
| Default | Group | Default | 1.0 in^2 | 0.0 in | 0.0 in | 1.0 in^4 | 1.0 in^4 |
| W10x45 | Column | Steel | 13.30 in^2 | 10.10 in | 8.020 in | 248.0 in^4 | 53.40 in^4 |
| W10x45 | Beam | Steel | 13.30 in^2 | 10.10 in | 8.020 in | 248.0 in^4 | 53.40 in^4 |

## Joint Loads....

Note: Loads labeled "Global Y" act downward (in "-Y" direction)

| Joint Label | Load Direction | Load Magnitude Dead | Roof Live | Live | Snow | Seismic | Wind | Earth |
|---|---|---|---|---|---|---|---|---|
| 2 | Global X | | | | | 6.990 | | k |

## Member Distributed Loads....

Note: Loads labeled "Global Y" act downward (in "-Y" direction)

| Member Label | Load Direction | Load Extents Start / End ft | | Load Magnitude Dead | Roof Live | Live | Snow | Seismic | Wind | Earth |
|---|---|---|---|---|---|---|---|---|---|---|
| B | Global Y | 0.0 | Start Mag : | 0.0150 | 0.020 | | | | | k/ft |
| | | 25.0 | End Mag : | 0.0150 | 0.020 | | | | | k/ft |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# 2D Frame

Project File: 85-25_Storage AND Main Building_R1.ec6



**DESCRIPTION:** MF1

## Stress/Strength Load Combinations

IBC 2021

| Load Combination Description | Cd | Load Combination Factors | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Dead | 0.2*Sds* Seismic | Roof Live | Live | Snow | Wind | Seismic | Rho | Earth |
| +D+H | 0.9 | 1.0 | | | | | | | | 1.0 |
| +D+L+H | 1 | 1.0 | | | 1.0 | | | | | 1.0 |
| +D+Lr+H | 1.25 | 1.0 | | 1.0 | | | | | | 1.0 |
| +D+S+H | 1.15 | 1.0 | | | | 1.0 | | | | 1.0 |
| +D+0.750Lr+0.750L+H | 1.25 | 1.0 | | 0.750 | 0.750 | | | | | 1.0 |
| +D+0.750L+0.750S+H | 1.15 | 1.0 | | | 0.750 | 0.750 | | | | 1.0 |
| +D+0.60W+H | 1.6 | 1.0 | | | | | 0.60 | | | 1.0 |
| +D+0.70E+H | 0.9 | 1.0 | | | | | | 0.70 | | 1.0 |
| +D+0.750Lr+0.750L+0.450W+H | 1.6 | 1.0 | | 0.750 | 0.750 | | 0.450 | | | 1.0 |
| +D+0.750L+0.750S+0.450W+H | 1.6 | 1.0 | | | 0.750 | 0.750 | 0.450 | | | 1.0 |
| +D+0.750L+0.750S+0.5250E+H | 1.15 | 1.0 | | | 0.750 | 0.750 | | 0.5250 | | 1.0 |
| +0.60D+0.60W+0.60H | 1.6 | 0.60 | | | | | 0.60 | | | 0.60 |
| +0.60D+0.70E+0.60H | 0.9 | 0.60 | | | | | | 0.70 | | 0.60 |

## Reaction Load Combinations

IBC 2021

| Load Combination Description | Load Combination Factors | | | | | | |
|---|---|---|---|---|---|---|---|
| | Dead | Roof Live | Live | Snow | Wind | Seismic | Earth |
| +D+H | 1.0 | | | | | | 1.0 |
| +D+L+H | 1.0 | | 1.0 | | | | 1.0 |
| +D+Lr+H | 1.0 | 1.0 | | | | | 1.0 |
| +D+S+H | 1.0 | | | 1.0 | | | 1.0 |
| +D+0.750Lr+0.750L+H | 1.0 | 0.750 | 0.750 | | | | 1.0 |
| +D+0.750L+0.750S+H | 1.0 | | 0.750 | 0.750 | | | 1.0 |
| +D+0.60W+H | 1.0 | | | | 0.60 | | 1.0 |
| +D+0.70E+H | 1.0 | | | | | 0.70 | 1.0 |
| +D+0.750Lr+0.750L+0.450W+H | 1.0 | 0.750 | 0.750 | | 0.450 | | 1.0 |
| +D+0.750L+0.750S+0.450W+H | 1.0 | | 0.750 | 0.750 | 0.450 | | 1.0 |
| +D+0.750L+0.750S+0.5250E+H | 1.0 | | 0.750 | 0.750 | | 0.5250 | 1.0 |
| +0.60D+0.60W+0.60H | 0.60 | | | | 0.60 | | 0.60 |
| +0.60D+0.70E+0.60H | 0.60 | | | | | 0.70 | 0.60 |
| D Only | 1.0 | | | | | | |
| Lr Only | | 1.0 | | | | | |
| L Only | | | 1.0 | | | | |
| S Only | | | | 1.0 | | | |
| W Only | | | | | 1.0 | | |
| E Only | | | | | | 1.0 | |
| H Only | | | | | | | 1.0 |

## Deflection Load Combinations

IBC 2021

| Load Combination Description | Load Combination Factors | | | | | | |
|---|---|---|---|---|---|---|---|
| | Dead | Roof Live | Live | Snow | Wind | Seismic | Earth |
| +D+H | 1.0 | | | | | | 1.0 |
| +D+L+H | 1.0 | | 1.0 | | | | 1.0 |
| +D+Lr+H | 1.0 | 1.0 | | | | | 1.0 |
| +D+S+H | 1.0 | | | 1.0 | | | 1.0 |
| +D+0.750Lr+0.750L+H | 1.0 | 0.750 | 0.750 | | | | 1.0 |
| +D+0.750L+0.750S+H | 1.0 | | 0.750 | 0.750 | | | 1.0 |
| +D+0.60W+H | 1.0 | | | | 0.60 | | 1.0 |
| +D+0.70E+H | 1.0 | | | | | 0.70 | 1.0 |
| +D+0.750Lr+0.750L+0.450W+H | 1.0 | 0.750 | 0.750 | | 0.450 | | 1.0 |
| +D+0.750L+0.750S+0.450W+H | 1.0 | | 0.750 | 0.750 | 0.450 | | 1.0 |
| +D+0.750L+0.750S+0.5250E+H | 1.0 | | 0.750 | 0.750 | | 0.5250 | 1.0 |
| +0.60D+0.60W+0.60H | 0.60 | | | | 0.60 | | 0.60 |
| +0.60D+0.70E+0.60H | 0.60 | | | | | 0.70 | 0.60 |
| D Only | 1.0 | | | | | | |
| Lr Only | | 1.0 | | | | | |
| L Only | | | 1.0 | | | | |
| S Only | | | | 1.0 | | | |
| W Only | | | | | 1.0 | | |
| E Only | | | | | | 1.0 | |

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Engineer:
Project ID:
Project Descr:

# 2D Frame

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** MF1

## Deflection Load Combinations

IBC 2021

| Load Combination Description | Load Combination Factors | | | | | | |
|---|---|---|---|---|---|---|---|
| | Dead | Roof Live | Live | Snow | Wind | Seismic | Earth |
| H Only | | | | | | | 1.0 |

## Extreme Joint Displacements

Only Load Combinations giving maximum values are listed

| Joint Label | | Joint Displacements X in | Y in | Z Radians |
|---|---|---|---|---|
| 1 | Max | 0.0 E Only | 0.0 E Only | 0.0 |
| 1 | Min | 0.0 +D+Lr | 0.0 +D+Lr | 0.0 |
| 2 | Max | 0.6319 E Only | 0.000870 E Only | -.0000250 +0.60D |
| 2 | Min | .0000140 +0.60D | -0.000136 +D+Lr | -0.002930 E Only |
| 3 | Max | 0.6291 E Only | -.0000350 +0.60D | .0000960 +D+Lr |
| 3 | Min | -.0000560 +D+Lr | -0.000870 E Only | -0.002913 E Only |
| 4 | Max | 0.0 E Only | 0.0 +0.60D | 0.0 |
| 4 | Min | 0.0 +0.60D | 0.0 E Only | 0.0 |

## Extreme Joint Reactions

Only Load Combinations giving maximum values are listed

| Joint Label | | Joint Reactions X k | Y k | Z k-ft |
|---|---|---|---|---|
| 1 | Max | 0.1438 +D+Lr | 0.4375 +D+Lr | |
| | Min | -3.499 E Only | -2.796 E Only | |
| 2 | Max | | | |
| | Min | | | |
| 3 | Max | | | |
| | Min | | | |
| 4 | Max | -0.03697 +0.60D | 2.796 E Only | |
| | Min | -3.491 E Only | 0.1125 +0.60D | |

## Extreme Member End Forces

Only Load Combinations giving maximum values are listed

**A compressive force will produce a positive Axial Member End Force value at the I end and Negative Value at the J end.**

| Member Label | | Member " I " End Forces Axial k | Shear k | Moment k-ft | Member " J " End Forces Axial k | Shear k | Moment k-ft |
|---|---|---|---|---|---|---|---|
| A | Max | 0.4375 +D+Lr | 2.412 +0.60D+0.70E | 0.0 D Only | 1.845 +0.60D+0.70E | 0.1438 +D+Lr | 24.120 +0.60D+0.70E |
| A | Min | -1.845 +0.60D+0.70E | -0.1438 +D+Lr | 0.0 D Only | -0.4375 +D+Lr | -2.412 +0.60D+0.70E | -1.438 +D+Lr |
| B | Max | 2.506 +D+0.70E | 0.4375 +D+Lr | 1.438 +D+Lr | -0.03697 +0.60D | 2.145 +D+0.70E | -0.3697 +0.60D |

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Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# 2D Frame

Project File: 85-25_Storage AND Main Building_R1.ec6

LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** MF1

## Extreme Member End Forces

Only Load Combinations giving maximum values are listed

**A compressive force will produce a positive Axial Member End Force value at the I end and Negative Value at the J end.**

| Member Label | Member " I " End Forces Axial k | Shear k | Moment k-ft | Member " J " End Forces Axial k | Shear k | Moment k-ft |
|---|---|---|---|---|---|---|
| B | 0.03697 | -1.845 | -24.120 | -2.506 | 0.1125 | -25.056 |
| *Min* | +0.60D | +0.60D+0.70E | +0.60D+0.70E | +D+0.70E | +0.60D | +D+0.70E |
| C | 2.145 | 2.506 | 25.056 | -0.1125 | -0.03697 | 0.0 |
| *Max* | +D+0.70E | +D+0.70E | +D+0.70E | +0.60D | +0.60D | D Only |
| C | 0.1125 | 0.03697 | 0.3697 | -2.145 | -2.506 | 0.0 |
| *Min* | +0.60D | +0.60D | +0.60D | +D+0.70E | +D+0.70E | D Only |

## Extreme Member Forces

Only Load Combinations giving maximum values are listed

| Mmbr Label | Axial | Dist from "I" Joint | Moment | Dist from "I" Joint | Shear | Dist from "I" Joint |
|---|---|---|---|---|---|---|
| A | 1.845 k | 0.0 ft | 1.438 k-ft | 10.0 ft | 2.412 k | 0.0 ft |
| *Max* | *+0.60D+0.70E* | | *+D+Lr* | | *+0.60D+0.70E* | |
| A | -0.4375 k | 0.0 ft | -24.120 k-ft | 10.0 ft | -0.1438 k | 0.0 ft |
| *Min* | *+D+Lr* | | *+0.60D+0.70E* | | *+D+Lr* | |
| B | -0.03697 k | 0.0 ft | 25.056 k-ft | 25.0 ft | 0.4375 k | 0.0 ft |
| *Max* | *+0.60D* | | *+D+0.70E* | | *+D+Lr* | |
| B | -2.506 k | 0.0 ft | -24.120 k-ft | 0.0 ft | -2.145 k | 25.0 ft |
| *Min* | *+D+0.70E* | | *+0.60D+0.70E* | | *+D+0.70E* | |
| C | -0.1125 k | 0.0 ft | 25.056 k-ft | 0.0 ft | 2.506 k | 0.0 ft |
| *Max* | *+0.60D* | | *+D+0.70E* | | *+D+0.70E* | |
| C | -2.145 k | 0.0 ft | 0.007545 k-ft | 9.796 ft | 0.03697 k | 0.0 ft |
| *Min* | *+D+0.70E* | | *+0.60D* | | *+0.60D* | |

## Member Stress Checks...

Stress Checks per AISC 360-22 & NDS 2024

| Member Label | Section Label | Material | Max. Axial + Bending Stress Ratios Load Combination | Ratio | Status | Dist (ft) | Max. Shear Stress Ratios Load Combination | Ratio | Status | Dist (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| A | Column | Steel | +0.60D+0.70E | 0.189 | PASS | 10.00 | +0.60D+0.70E | 0.034 | PASS | 0.00 |
| B | Beam | Steel | +D+0.70E | 0.290 | PASS | 25.00 | +D+0.70E | 0.030 | PASS | 25.00 |
| C | Column | Steel | +D+0.70E | 0.197 | PASS | 0.00 | +D+0.70E | 0.035 | PASS | 0.00 |

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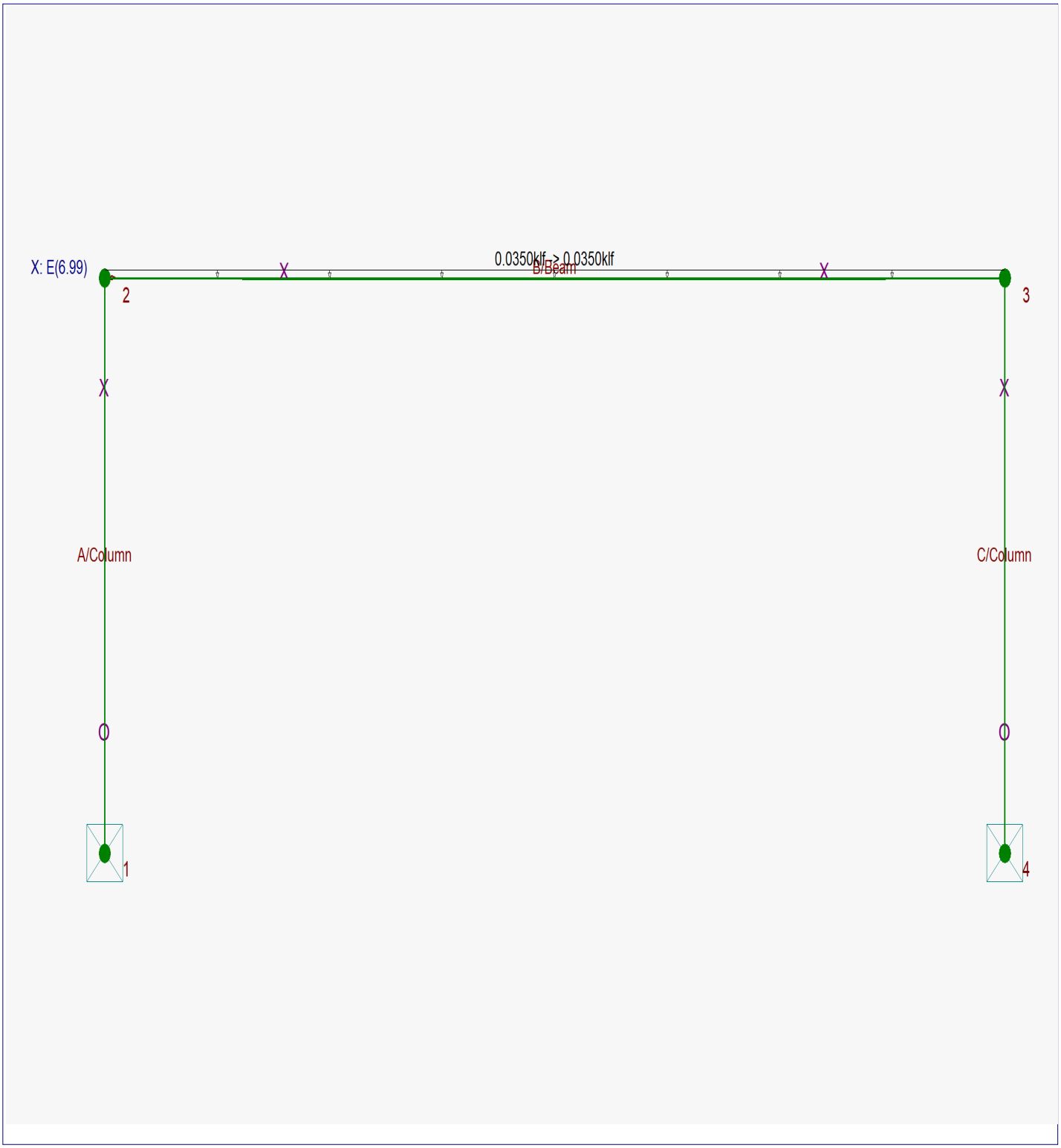
Project Title: 85-25 - E 20th St
Engineer:
Project ID:
Project Descr:

# 2D Frame



LIC# : KW-06018875, Build:20.26.10.15 FA STRUCTURAL (c) ENERCALC, LLC 1982-2026

**DESCRIPTION:** MF1



## DRIFT CALCULATION

ALLOWBLE STORY DRIFT , $\Delta a = 0.025\ h_{sx}$ ASCE7- 16 - TABLE 12.12-1

DEFLECTION AMPLIFICATION FACTOR, Cd = 4.5 IMF ASCE7-16 - TABLE 12.2-

IMPORTANCE FACTOR, I = 1

STORY HEIGHT = 12 FT

ALLOWABLE STORY DRIFT, $\Delta a$ = 0.025 x 10 ft x 12 = 3.6 "

AMPLIFIED DISPLACEMENT, $\delta x = Cd\ \delta ex/I$ ASCE7-10 - (12.8-15)

**CHECK DRIFT**

$\delta e$ = 0.6319 "

$\delta e$ = Cd x $\delta e$ / I = 4.5 x 0.427" / 1 = 3.47545 < 3.6

# E 20th St,

# Upland, CA 91784

Projecct # 85-25

# STRUCTURAL CALCULATIONS

## Trash Enclosure

Date : 09/12/25

Rev. : 0

# Pages : 15

Fa Structural Engineering
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Project Title: TRASH ENCLOSURE
Engineer:
Project ID: 85-25 Water Structure
Project Descr:

# Steel Beam

Project File: 85-25 TRASH ENCLOSURE.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** RB1

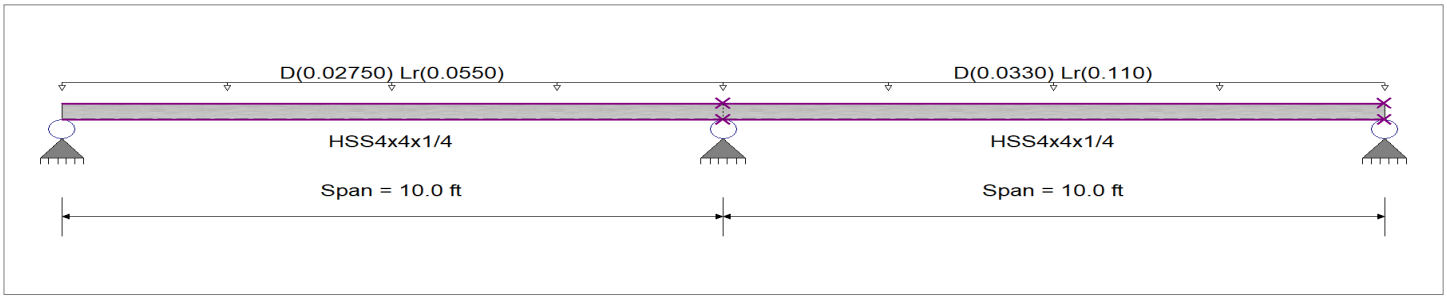
## CODE REFERENCES

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

## Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0050, Lr = 0.010 ksf, Tributary Width = 5.50 ft, (RR)

Load for Span Number 2
Uniform Load : D = 0.0060, Lr = 0.020 ksf, Tributary Width = 5.50 ft, (RR)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.133 : 1 | Maximum Shear Stress Ratio = | 0.034 : 1 |
| Section used for this span | HSS4x4x1/4 | Section used for this span | HSS4x4x1/4 |
| Ma : Applied | 1.562 k-ft | Va : Applied | 0.9321 k |
| Mn / Omega : Allowable | 11.702 k-ft | Vn/Omega : Allowable | 27.634 k |
| Load Combination | +D+Lr+H, LL Comb Run (LL) | Load Combination | +D+Lr+H, LL Comb Run (LL) |
| | | Location of maximum on span | 10.000 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.077 in | Ratio = | 1,553 | >=360. | Span: 2 : Lr Only, LL Comb Run (*L) |
| Max Upward Transient Deflection | -0.034 in | Ratio = | 3,543 | >=360. | Span: 2 : Lr Only, LL Comb Run (*L) |
| Max Downward Total Deflection | 0.097 in | Ratio = | 1233 | >=240. | Span: 2 : +D+Lr+H, LL Comb Run (*L) |
| Max Upward Total Deflection | -0.023 in | Ratio = | 5145 | >=240. | Span: 2 : +D+Lr+H, LL Comb Run (*L) |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | Vnx | Vnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+H | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+L+H, LL Comb Run (*L) | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+L+H, LL Comb Run (L*) | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+L+H, LL Comb Run (LL) | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+Lr+H, LL Comb Run (*L) | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.104 | 0.032 | 0.07 | -1.22 | 1.22 | 19.54 | 11.70 | 1.00 | 1.00 | 0.90 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.118 | 0.032 | 1.38 | -1.22 | 1.38 | 19.54 | 11.70 | 1.00 | 1.00 | 0.90 | 46.15 | 27.63 |
| +D+Lr+H, LL Comb Run (L*) | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.075 | 0.020 | 0.79 | -0.87 | 0.87 | 19.54 | 11.70 | 1.00 | 1.00 | 0.56 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.075 | 0.011 | 0.21 | -0.87 | 0.87 | 19.54 | 11.70 | 1.00 | 1.00 | 0.31 | 46.15 | 27.63 |

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Project Title: TRASH ENCLOSURE
Engineer:
Project ID: 85-25 Water Structure
Project Descr:

# Steel Beam

Project File: 85-25 TRASH ENCLOSURE.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** RB1

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | Vnx | Vnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+Lr+H, LL Comb Run (LL) | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.133 | 0.034 | 0.53 | -1.56 | 1.56 | 19.54 | 11.70 | 1.00 | 1.00 | 0.93 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.133 | 0.034 | 1.24 | -1.56 | 1.56 | 19.54 | 11.70 | 1.00 | 1.00 | 0.93 | 46.15 | 27.63 |
| +D+S+H | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.750Lr+0.750L+H, LL Comb | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.089 | 0.027 | 0.11 | -1.05 | 1.05 | 19.54 | 11.70 | 1.00 | 1.00 | 0.74 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.095 | 0.027 | 1.12 | -1.05 | 1.12 | 19.54 | 11.70 | 1.00 | 1.00 | 0.74 | 46.15 | 27.63 |
| +D+0.750Lr+0.750L+H, LL Comb | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.067 | 0.017 | 0.66 | -0.79 | 0.79 | 19.54 | 11.70 | 1.00 | 1.00 | 0.48 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.067 | 0.011 | 0.24 | -0.79 | 0.79 | 19.54 | 11.70 | 1.00 | 1.00 | 0.30 | 46.15 | 27.63 |
| +D+0.750Lr+0.750L+H, LL Comb | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.111 | 0.028 | 0.46 | -1.30 | 1.30 | 19.54 | 11.70 | 1.00 | 1.00 | 0.77 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.111 | 0.028 | 1.01 | -1.30 | 1.30 | 19.54 | 11.70 | 1.00 | 1.00 | 0.77 | 46.15 | 27.63 |
| +D+0.750L+0.750S+H, LL Comb I | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.750L+0.750S+H, LL Comb I | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.750L+0.750S+H, LL Comb I | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.60W+H | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.70E+H | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.750Lr+0.750L+0.450W+H, I | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.089 | 0.027 | 0.11 | -1.05 | 1.05 | 19.54 | 11.70 | 1.00 | 1.00 | 0.74 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.095 | 0.027 | 1.12 | -1.05 | 1.12 | 19.54 | 11.70 | 1.00 | 1.00 | 0.74 | 46.15 | 27.63 |
| +D+0.750Lr+0.750L+0.450W+H, I | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.067 | 0.017 | 0.66 | -0.79 | 0.79 | 19.54 | 11.70 | 1.00 | 1.00 | 0.48 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.067 | 0.011 | 0.24 | -0.79 | 0.79 | 19.54 | 11.70 | 1.00 | 1.00 | 0.30 | 46.15 | 27.63 |
| +D+0.750Lr+0.750L+0.450W+H, I | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.111 | 0.028 | 0.46 | -1.30 | 1.30 | 19.54 | 11.70 | 1.00 | 1.00 | 0.77 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.111 | 0.028 | 1.01 | -1.30 | 1.30 | 19.54 | 11.70 | 1.00 | 1.00 | 0.77 | 46.15 | 27.63 |
| +D+0.750L+0.750S+0.450W+H, L | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.750L+0.750S+0.450W+H, L | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.750L+0.750S+0.450W+H, L | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.750L+0.750S+0.5250E+H, I | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.750L+0.750S+0.5250E+H, I | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +D+0.750L+0.750S+0.5250E+H, I | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.045 | 0.010 | 0.27 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.045 | 0.010 | 0.33 | -0.53 | 0.53 | 19.54 | 11.70 | 1.00 | 1.00 | 0.28 | 46.15 | 27.63 |
| +0.60D+0.60W+0.60H | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.027 | 0.006 | 0.16 | -0.32 | 0.32 | 19.54 | 11.70 | 1.00 | 1.00 | 0.17 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.027 | 0.006 | 0.20 | -0.32 | 0.32 | 19.54 | 11.70 | 1.00 | 1.00 | 0.17 | 46.15 | 27.63 |
| +0.60D+0.70E+0.60H | | | | | | | | | | | | | |
| Dsgn. L = 10.00 ft | 1 | 0.027 | 0.006 | 0.16 | -0.32 | 0.32 | 19.54 | 11.70 | 1.00 | 1.00 | 0.17 | 46.15 | 27.63 |
| Dsgn. L = 10.00 ft | 2 | 0.027 | 0.006 | 0.20 | -0.32 | 0.32 | 19.54 | 11.70 | 1.00 | 1.00 | 0.17 | 46.15 | 27.63 |

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Project Title: TRASH ENCLOSURE
Engineer:
Project ID: 85-25 Water Structure
Project Descr:

# Steel Beam

Project File: 85-25 TRASH ENCLOSURE.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** RB1

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+Lr+H | 1 | 0.0535 | 4.560 | Lr Only | -0.0268 | 7.840 |
| +D+Lr+H | 2 | 0.0973 | 5.400 | | 0.0000 | 7.840 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Max Upward from all Load Conditions | 0.386 | 1.562 | 0.654 |
| Max Upward from Load Combinations | 0.386 | 1.562 | 0.654 |
| Max Upward from Load Cases | 0.241 | 1.031 | 0.481 |
| Max Downward from all Load Conditions (Resis | -0.069 | | -0.034 |
| Max Downward from Load Cases (Resisting Up | -0.069 | | -0.034 |
| +D+H | 0.145 | 0.530 | 0.173 |
| +D+L+H, LL Comb Run (*L) | 0.145 | 0.530 | 0.173 |
| +D+L+H, LL Comb Run (L*) | 0.145 | 0.530 | 0.173 |
| +D+L+H, LL Comb Run (LL) | 0.145 | 0.530 | 0.173 |
| +D+Lr+H, LL Comb Run (*L) | 0.077 | 1.218 | 0.654 |
| +D+Lr+H, LL Comb Run (L*) | 0.386 | 0.874 | 0.138 |
| +D+Lr+H, LL Comb Run (LL) | 0.317 | 1.562 | 0.620 |
| +D+S+H | 0.145 | 0.530 | 0.173 |
| +D+0.750Lr+0.750L+H, LL Comb Run (*L) | 0.094 | 1.046 | 0.534 |
| +D+0.750Lr+0.750L+H, LL Comb Run (L*) | 0.326 | 0.788 | 0.147 |
| +D+0.750Lr+0.750L+H, LL Comb Run (LL) | 0.274 | 1.304 | 0.508 |
| +D+0.750L+0.750S+H, LL Comb Run (*L) | 0.145 | 0.530 | 0.173 |
| +D+0.750L+0.750S+H, LL Comb Run (L*) | 0.145 | 0.530 | 0.173 |
| +D+0.750L+0.750S+H, LL Comb Run (LL) | 0.145 | 0.530 | 0.173 |
| +D+0.60W+H | 0.145 | 0.530 | 0.173 |
| +D+0.70E+H | 0.145 | 0.530 | 0.173 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run | 0.094 | 1.046 | 0.534 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run | 0.326 | 0.788 | 0.147 |
| +D+0.750Lr+0.750L+0.450W+H, LL Comb Run | 0.274 | 1.304 | 0.508 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run | 0.145 | 0.530 | 0.173 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run | 0.145 | 0.530 | 0.173 |
| +D+0.750L+0.750S+0.450W+H, LL Comb Run | 0.145 | 0.530 | 0.173 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run | 0.145 | 0.530 | 0.173 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run | 0.145 | 0.530 | 0.173 |
| +D+0.750L+0.750S+0.5250E+H, LL Comb Run | 0.145 | 0.530 | 0.173 |
| +0.60D+0.60W+0.60H | 0.087 | 0.318 | 0.104 |
| +0.60D+0.70E+0.60H | 0.087 | 0.318 | 0.104 |
| D Only | 0.145 | 0.530 | 0.173 |
| Lr Only, LL Comb Run (*L) | -0.069 | 0.687 | 0.481 |
| Lr Only, LL Comb Run (L*) | 0.241 | 0.344 | -0.034 |
| Lr Only, LL Comb Run (LL) | 0.172 | 1.031 | 0.447 |
| H Only | | | |

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Project Title: TRASH ENCLOSURE
Engineer:
Project ID: 85-25 Water Structure
Project Descr:

# Steel Beam

Project File: 85-25 TRASH ENCLOSURE.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** RB2

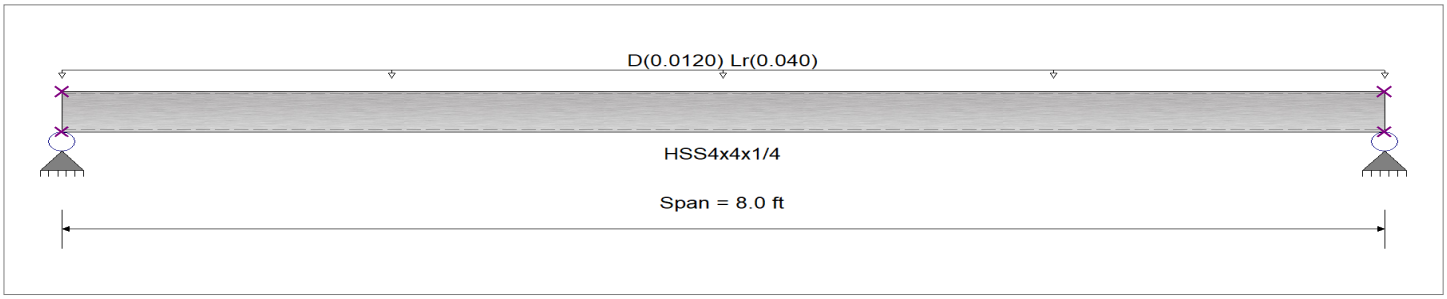
## CODE REFERENCES

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

## Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.0060, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (RR)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.044 : 1 | Maximum Shear Stress Ratio = | 0.009 : 1 |
| Section used for this span | HSS4x4x1/4 | Section used for this span | HSS4x4x1/4 |
| Ma : Applied | 0.513 k-ft | Va : Applied | 0.2567 k |
| Mn / Omega : Allowable | 11.702 k-ft | Vn/Omega : Allowable | 27.634 k |
| Load Combination | +D+Lr | Load Combination | +D+Lr |
| | | Location of maximum on span | 0.000 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.016 in | Ratio = | 5,863 | >=360. | Span: 1 : Lr Only |
| Max Upward Transient Deflection | 0 in | Ratio = | 0 | <360.0 | n/a |
| Max Downward Total Deflection | 0.026 in | Ratio = | 3655 | >=240. | Span: 1 : +D+Lr |
| Max Upward Total Deflection | 0 in | Ratio = | 0 | <240.0 | n/a |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | Vnx | Vnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | |
| Dsgn. L = 8.00 ft | 1 | 0.017 | 0.004 | 0.19 | | 0.19 | 19.54 | 11.70 | 1.14 | 1.00 | 0.10 | 46.15 | 27.63 |
| +D+Lr | | | | | | | | | | | | | |
| Dsgn. L = 8.00 ft | 1 | 0.044 | 0.009 | 0.51 | | 0.51 | 19.54 | 11.70 | 1.14 | 1.00 | 0.26 | 46.15 | 27.63 |
| +D+0.750Lr | | | | | | | | | | | | | |
| Dsgn. L = 8.00 ft | 1 | 0.037 | 0.008 | 0.43 | | 0.43 | 19.54 | 11.70 | 1.14 | 1.00 | 0.22 | 46.15 | 27.63 |
| +0.60D | | | | | | | | | | | | | |
| Dsgn. L = 8.00 ft | 1 | 0.010 | 0.002 | 0.12 | | 0.12 | 19.54 | 11.70 | 1.14 | 1.00 | 0.06 | 46.15 | 27.63 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+Lr | 1 | 0.0263 | 4.023 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Max Upward from all Load Conditions | 0.257 | 0.257 |
| Max Upward from Load Combinations | 0.257 | 0.257 |
| Max Upward from Load Cases | 0.160 | 0.160 |
| D Only | 0.097 | 0.097 |
| +D+Lr | 0.257 | 0.257 |
| +D+0.750Lr | 0.217 | 0.217 |
| +0.60D | 0.058 | 0.058 |

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Project Title: TRASH ENCLOSURE
Engineer:
Project ID: 85-25 Water Structure
Project Descr:

## Steel Beam



LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** RB2

### Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Lr Only | 0.160 | 0.160 |

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Project Title: TRASH ENCLOSURE
Engineer:
Project ID: 85-25 Water Structure
Project Descr:

# Steel Column

Project File: 85-25 TRASH ENCLOSURE.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** Steel Column

## Code References

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combinations Used : IBC 2021

## General Information

Steel Section Name : **HSS4x4x1/4**

| | |
|---|---|
| Analysis Method : | Allowable Strength |
| Steel Stress Grade | |
| Fy : Steel Yield | 36.0 ksi |
| E : Elastic Bending Modulus | 29,000.0 ksi |

| | |
|---|---|
| Overall Column Height | 8.0 ft |
| Top & Bottom Fixity | Top Free, Bottom Fixed |
| Brace condition : | |

Unbraced Length for buckling ABOUT X-X Axis = 8.0 ft, K = 2.4
Unbraced Length for buckling ABOUT Y-Y Axis = 8.0 ft, K = 2.4

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 97.446 lbs * Dead Load Factor
AXIAL LOADS . . .
Roof Load: Axial Load at 8.0 ft, D = 0.530, LR = 1.030 k
BENDING LOADS . . .
Moment acting about X-X axis at 8.0 ft, D = 2.0 k-ft

## DESIGN SUMMARY

**Bending & Shear Check Results**

PASS Max. Axial+Bending Stress Ratio = **0.2750** : 1

| | |
|---|---|
| Load Combination | +D+Lr |
| Location of max.above base | 0.0 ft |
| At maximum location values are . . . | |
| Pa : Axial | 1.657 k |
| Pn / Omega : Allowable | 22.046 k |
| Ma-x : Applied | 2.0 k-ft |
| Mn-x / Omega : Allowable | 8.425 k-ft |
| Ma-y : Applied | 0.0 k-ft |
| Mn-y / Omega : Allowable | 8.425 k-ft |

PASS Maximum Shear Stress Ratio **0.0** : 1

| | |
|---|---|
| Load Combination | 0.0 |
| Location of max.above base | 0.0 ft |
| At maximum location values are . . . | |
| Va : Applied | 0.0 k |
| Vn / Omega : Allowable | 0.0 k |

**Maximum Load Reactions . .**

| | |
|---|---|
| Top along X-X | 0.0 k |
| Bottom along X-X | 0.0 k |
| Top along Y-Y | 0.0 k |
| Bottom along Y-Y | 0.0 k |

**Maximum Load Deflections . . .**

Along Y-Y -0.4856 in at 8.0 ft above base
for load combination : D Only

Along X-X 0.0 in at 0.0 ft above base
for load combination :

## Load Combination Results

| Load Combination | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Cbx | Cby | KxLx/Ry | KyLy/Rx | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|---|---|
| D Only | 0.252 | PASS | 0.00 ft | 1.00 | 1.00 | 151.58 | 151.58 | 0.000 | PASS | 0.00 ft |
| +D+Lr | 0.275 | PASS | 0.00 ft | 1.00 | 1.00 | 151.58 | 151.58 | 0.000 | PASS | 0.00 ft |
| +D+0.750Lr | 0.269 | PASS | 0.00 ft | 1.00 | 1.00 | 151.58 | 151.58 | 0.000 | PASS | 0.00 ft |
| +0.60D | 0.151 | PASS | 0.00 ft | 1.00 | 1.00 | 151.58 | 151.58 | 0.000 | PASS | 0.00 ft |

## Maximum Reactions

Note: Only non-zero reactions are listed.

| Load Combination | Axial Reaction @ Base | X-X Axis Reaction (k) @ Base | @ Top | Y-Y Axis Reaction (k) @ Base | @ Top | Mx - End Moments (k-ft) @ Base | @ Top | My - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|
| D Only | 0.627 | | | | | 2.000 | | | |
| +D+Lr | 1.657 | | | | | 2.000 | | | |
| +D+0.750Lr | 1.400 | | | | | 2.000 | | | |
| +0.60D | 0.376 | | | | | 1.200 | | | |
| Lr Only | 1.030 | | | | | | | | |

## Extreme Reactions

| Item | Extreme Value | Axial Reaction @ Base | X-X Axis Reaction (k) @ Base | @ Top | Y-Y Axis Reaction (k) @ Base | @ Top | Mx - End Moments (k-ft) @ Base | @ Top | My - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|---|
| Axial @ Base | Maximum | 1.657 | | | | | 2.000 | | | |

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Project Title: TRASH ENCLOSURE
Engineer:
Project ID: 85-25 Water Structure
Project Descr:

# Steel Column

Project File: 85-25 TRASH ENCLOSURE.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** Steel Column

## Extreme Reactions

| Item | Extreme Value | Axial Reaction @ Base | X-X Axis Reaction @ Base | @ Top | k | Y-Y Axis Reaction @ Base | @ Top | Mx - End Moments @ Base | @ Top | k-ft | My - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| " | Minimum | 0.376 | | | | | | 1.200 | | | | |
| Reaction, X-X Axis Base | Maximum | 0.627 | | | | | | 2.000 | | | | |
| " | Minimum | 0.627 | | | | | | 2.000 | | | | |
| Reaction, Y-Y Axis Base | Maximum | 0.627 | | | | | | 2.000 | | | | |
| " | Minimum | 0.627 | | | | | | | | | 2.000 | |
| Reaction, X-X Axis Top | Maximum | 0.627 | | | | | | 2.000 | | | | |
| " | Minimum | 0.627 | | | | | | 2.000 | | | | |
| Reaction, Y-Y Axis Top | Maximum | 0.627 | | | | | | 2.000 | | | | |
| " | Minimum | 0.627 | | | | | | 2.000 | | | | |
| Moment, X-X Axis Base | Maximum | 0.627 | 2.000 | | | | | 2.000 | | | | |
| " | Minimum | 1.030 | | | | | | | | | | |
| Moment, Y-Y Axis Base | Maximum | 0.627 | | | | | | 2.000 | | | | |
| " | Minimum | 0.627 | | | | | | 2.000 | | | | |
| Moment, X-X Axis Top | Maximum | 0.627 | | | | | | 2.000 | | | | |
| " | Minimum | 0.627 | | | | | | 2.000 | | | | |
| Moment, Y-Y Axis Top | Maximum | 0.627 | | | | | | 2.000 | | | | |
| " | Minimum | 0.627 | | | | | | 2.000 | | | | |

## Maximum Deflections for Load Combinations

| Load Combination | Max. Deflection in X dir | | Distance | | Max. Deflection in Y dir | | Distance | |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.0000 | in | 0.000 | ft | -0.486 | in | 8.000 | ft |
| +D+Lr | 0.0000 | in | 0.000 | ft | -0.486 | in | 8.000 | ft |
| +D+0.750Lr | 0.0000 | in | 0.000 | ft | -0.486 | in | 8.000 | ft |
| +0.60D | 0.0000 | in | 0.000 | ft | -0.291 | in | 8.000 | ft |
| Lr Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |

## Steel Section Properties : HSS4x4x1/4

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | = | 4.000 in | I xx | = | 7.80 in^4 | J | = | 12.800 in^4 |
| Design Thick | = | 0.233 in | S xx | = | 3.90 in^3 | | | |
| Width | = | 4.000 in | R xx | = | 1.520 in | | | |
| Wall Thick | = | 0.250 in | Zx | = | 4.690 in^3 | | | |
| Area | = | 3.370 in^2 | I yy | = | 7.800 in^4 | C | = | 6.560 in^3 |
| Weight | = | 12.181 plf | S yy | = | 3.900 in^3 | | | |
| | | | R yy | = | 1.520 in | | | |
| Ycg | = | 0.000 in | | | | | | |

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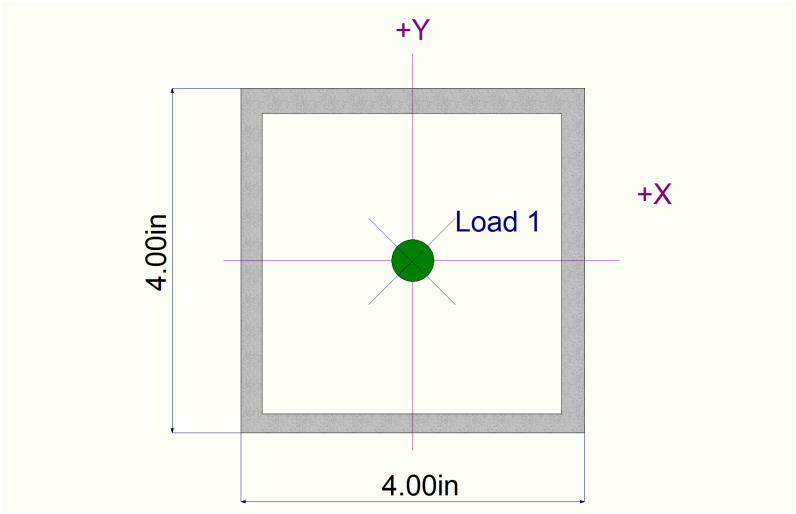
# Steel Column

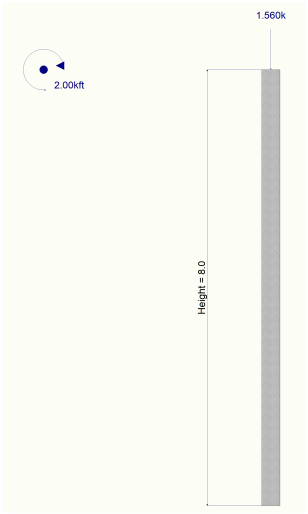
Project File: 85-25 TRASH ENCLOSURE.ec6

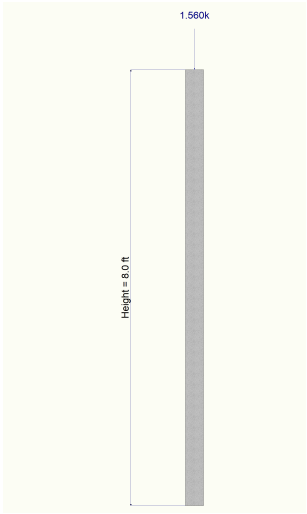
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**DESCRIPTION:** Steel Column

## Sketches



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Project Title: TRASH ENCLOSURE
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Project Descr:

# Cantilevered Retaining Wall

Project File: 85-25 TRASH ENCLOSURE.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** Wall

## Code Reference

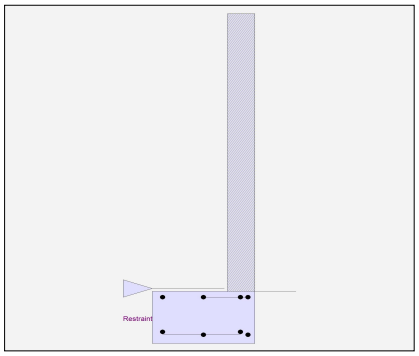
Calculations per IBC 2021 1807.3, ASCE 7-16

### Criteria

| | | |
|---|---|---|
| Retained Height | = | 0.00 ft |
| Wall height above soil | = | 8.00 ft |
| Slope Behind Wall | = | 0.00 |
| Height of Soil over Toe | = | 0.00 in |
| Water table above bottom of footing | = | 0.0 ft |

### Soil Data

| | | |
|---|---|---|
| Allow Soil Bearing | = | 1,500.0 psf |
| Equivalent Fluid Pressure Method | | |
| Active Heel Pressure | = | 32.0 psf/ft |
| | = | |
| Passive Pressure | = | 100.0 psf/ft |
| Soil Density, Heel | = | 110.00 pcf |
| Soil Density, Toe | = | 110.00 pcf |
| Footing\|\|Soil Friction | = | 0.400 |
| Soil height to ignore for passive pressure | = | 12.00 in |




### Surcharge Loads

| | | |
|---|---|---|
| Surcharge Over Heel | = | 0.0 psf |
| NOT Used To Resist Sliding & Overturning | | |
| Surcharge Over Toe | = | 0.0 |
| NOT Used for Sliding & Overturning | | |

### Axial Load Applied to Stem

| | | |
|---|---|---|
| Axial Dead Load | = | 0.0 lbs |
| Axial Live Load | = | 0.0 lbs |
| Axial Load Eccentricity | = | 0.0 in |

### Lateral Load Applied to Stem

| | | |
|---|---|---|
| Lateral Load | = | 0.0 #/ft |
| ...Height to Top | = | 7.00 ft |
| ...Height to Bottom | = | 0.00 ft |
| Load Type | = | Wind (W) (Strength Level) |
| Wind on Exposed Stem (Strength Level) | = | 10.0 psf |

### Adjacent Footing Load

| | | |
|---|---|---|
| Adjacent Footing Load | = | 0.0 lbs |
| Footing Width | = | 0.00 ft |
| Eccentricity | = | 0.00 in |
| Wall to Ftg CL Dist | = | 0.00 ft |
| Footing Type | | Spread Footing |
| Base Above/Below Soil at Back of Wall | = | 0.0 ft |
| Poisson's Ratio | = | 0.300 |

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# Cantilevered Retaining Wall

Project File: 85-25 TRASH ENCLOSURE.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** Wall

## Design Summary

**Wall Stability Ratios**

| | | | |
|---|---|---|---|
| Overturning | = | 2.63 | OK |
| Slab Resists All Sliding ! | | | |
| Global Stability | = | 1.82 | |

| | | | |
|---|---|---|---|
| Total Bearing Load | = | 578 | lbs |
| ...resultant ecc. | = | 5.13 | in |
| Eccentricity outside middle third | | | |
| Soil Pressure @ Toe | = | 456 | psf OK |
| Soil Pressure @ Heel | = | 0 | psf OK |
| Allowable | = | 1,500 | psf |
| Soil Pressure Less Than Allowable | | | |
| ACI Factored @ Toe | = | 639 | psf |
| ACI Factored @ Heel | = | 0 | psf |
| Footing Shear @ Toe | = | 1.4 | psi OK |
| Footing Shear @ Heel | = | 0.1 | psi OK |
| Allowable | = | 75.0 | psi |

**Sliding Calcs**

| | | | |
|---|---|---|---|
| Lateral Sliding Force | = | 84.0 | lbs |

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

**Load Factors**

| | |
|---|---|
| Building Code | |
| Dead Load | 1.200 |
| Live Load | 1.600 |
| Earth, H | 1.600 |
| Wind, W | 1.600 |
| Seismic, E | 1.000 |

## Stem Construction

| | | Bottom | | | | |
|---|---|---|---|---|---|---|
| | | Stem OK | | | | |
| **Design Height Above Ftg** | ft = | 0.00 | | | | |
| Wall Material Above "Ht" | = | Masonry | | | | |
| Design Method | = | ASD | SD | SD | SD | SD |
| Thickness | = | 8.00 | | | | |
| Rebar Size | = | # 4 | | | | |
| Rebar Spacing | = | 16.00 | | | | |
| Rebar Placed at | = | Center | | | | |

**Design Data**

| | | |
|---|---|---|
| fb/FB + fa/Fa | = | **0.191** |
| **Total Force @ Section** | | |
| Service Level | lbs = | 48.0 |
| Strength Level | lbs = | |
| **Moment....Actual** | | |
| Service Level | ft-# = | 192.0 |
| Strength Level | ft-# = | |
| Moment.....Allowable | = | 1,004.1 |
| **Shear.....Actual** | | |
| Service Level | psi = | 0.5 |
| Strength Level | psi = | |
| Shear.....Allowable | psi = | 43.6 |
| Anet (Masonry) | in2 = | 91.50 |
| Wall Weight | psf = | 0.0 |
| Rebar Depth 'd' | in = | 3.81 |

**Masonry Data**

| | | |
|---|---|---|
| f'm | psi = | 1,500 |
| Fs | psi = | 32,000 |
| Solid Grouting | = | Yes |
| Modular Ratio 'n' | = | 21.48 |
| Equiv. Solid Thick. | in = | 7.63 |
| Masonry Block Type | = | |
| Masonry Design Method | = | ASD |

**Concrete Data**

| | | |
|---|---|---|
| f'c | psi = | |
| Fy | psi = | |

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Project Descr:

# Cantilevered Retaining Wall

Project File: 85-25 TRASH ENCLOSURE.ec6

LIC# : KW-06018875, Build:20.23.08.30 FA STRUCTURAL (c) ENERCALC INC 1983-2023

**DESCRIPTION:** Wall

## Footing Data

| | | |
|---|---|---|
| Toe Width | = | 1.83 ft |
| Heel Width | = | 0.67 |
| Total Footing Width | = | 2.50 |
| Footing Thickness | = | 18.00 in |
| Key Width | = | 0.00 in |
| Key Depth | = | 0.00 in |
| Key Distance from Toe | = | 0.00 ft |

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

## Footing Design Results

| | | Toe | Heel | |
|---|---|---|---|---|
| Factored Pressure | = | 639 | 0 | psf |
| Mu' : Upward | = | 805 | 0 | ft-# |
| Mu' : Downward | = | 534 | 0 | ft-# |
| Mu: Design | = | 270 OK | 0 ft-# | OK |
| phiMn | = | 29,589 | OK - Flush | |
| Actual 1-Way Shear | = | 1.38 | 0.14 | psi |
| Allow 1-Way Shear | = | 75.00 | 75.00 | psi |

Toe Reinforcing = # 5 @ 8.00 in
Heel Reinforcing = Flush heel condition. No reinforcing required.
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

**If torsion exceeds allowable, provide supplemental design for footing torsion.**

Other Acceptable Sizes & Spacings

Toe: #4@ 6.17 in, #5@ 9.56 in, #6@ 13.58 in, #7@ 18.51 in, #8@ 24.38 in, #9@ 30.86 in, #10@ 39.19 in

Heel: Flush heel condition. No reinforcing required.

Key: No key defined

Min footing T&S reinf Area 0.97 in2
Min footing T&S reinf Area per foot 0.39 in2 /ft

| If one layer of horizontal bars: | If two layers of horizontal bars: |
|---|---|
| #4@ 6.17 in | #4@ 12.35 in |
| #5@ 9.57 in | #5@ 19.14 in |
| #6@ 13.58 in | #6@ 27.16 in |

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Engineer:
Project ID: 85-25 Water Structure
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## Summary of Overturning & Resisting Forces & Moments

| Item | | .....OVERTURNING..... Force lbs | Distance ft | Moment ft-# | | .....RESISTING..... Force lbs | Distance ft | Moment ft-# |
|---|---|---|---|---|---|---|---|---|
| HL Act Pres (ab water tbl) | | 36.0 | 0.50 | 18.0 | Soil Over HL (ab. water tbl) | 0.0 | 2.50 | 0.0 |
| HL Act Pres (be water tbl) | | | | | Soil Over HL (bel. water tbl) | | 2.50 | 0.0 |
| Hydrostatic Force | | | | | Water Table | | | |
| Buoyant Force | = | | | | Sloped Soil Over Heel | = | | |
| Surcharge over Heel | = | | | | Surcharge Over Heel | = | | |
| Surcharge Over Toe | = | | | | Adjacent Footing Load | = | | |
| Adjacent Footing Load | = | | | | Axial Dead Load on Stem | = | | |
| Added Lateral Load | = | | | | * Axial Live Load on Stem | = | | |
| Load @ Stem Above Soil | = | 48.0 | 5.50 | 264.0 | Soil Over Toe | = | | |
| | = | | | | Surcharge Over Toe | = | | |
| | | | | | Stem Weight(s) | = | | |
| | | | | | Earth @ Stem Transitions | = | | |
| **Total** | = | 84.0 | **O.T.M.** = | 282.0 | Footing Weight | = | 561.8 | 1.25 | 701.3 |
| | | | | | Key Weight | = | | |
| | | | | | Vert. Component | = | 16.7 | 2.50 | 41.7 |
| | | | | | **Total =** | | 578.5 lbs | **R.M.=** | 743.0 |

**Resisting/Overturning Ratio** = **2.63**
Vertical Loads used for Soil Pressure = 578.5 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

## Tilt

### Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

| | | |
|---|---|---|
| Soil Spring Reaction Modulus | 250.0 | pci |
| Horizontal Defl @ Top of Wall (approximate only) | 0.041 | in |

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

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## Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing
Calculated Rebar Stress, fs = 4495.54 psi

| | |
|---|---|
| Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) = | 20.00 in |
| Development length for #4 bar specified in this stem design segment = | 12.00 in |
| Hooked embedment length into footing for #4 bar specified in this stem design segment = | 0.00 in |
| As Provided = | 0.1500 in2/ft |
| As Required = | 0.0210 in2/ft |

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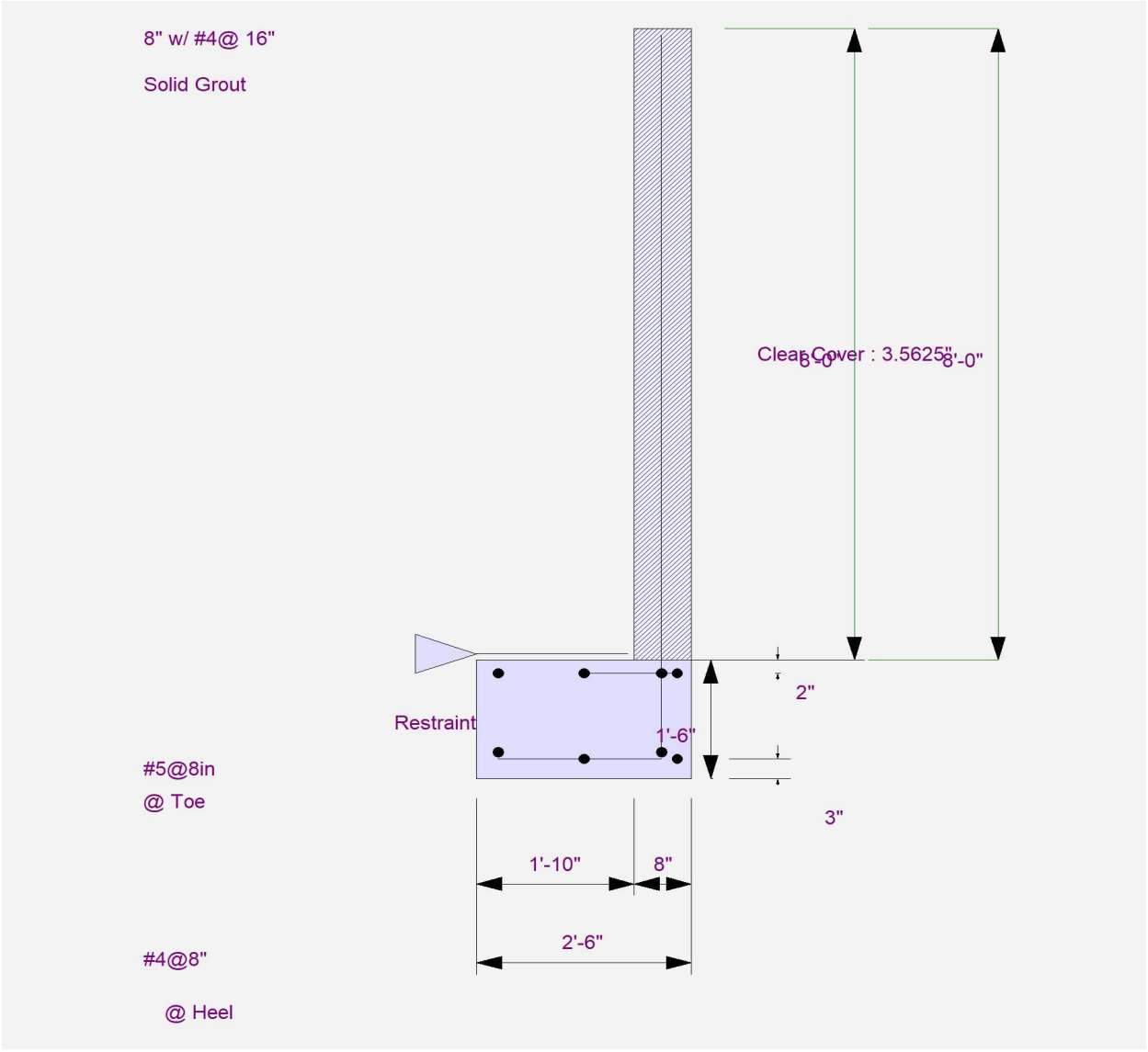
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