# * Loads

- From ASCE 7-05:
  - + Deck Dead = 7psf
  - + Deck Snow = 48 psf
  - + Deck Live = 100 psf
  - + Wind = 24.1 psf
    - * 90 mph

- Live Load: $(100\ lb/ft^2)(4\ ft)(8\ ft) \Rightarrow LL = 3200\ lb$
- Dead Load: $(7\ lb/ft^2)(4\ ft)(8\ ft) \Rightarrow DL = 224\ lb$
- Snow Load: $(48\ lb/ft^2)(4\ ft)(8\ ft) \Rightarrow SL = 1536\ lb$
  - + SL will be ignored b/c SL & LL will not be applied at same time & LL governs.
- Wind Load: $(24.1\ lb/ft^2)(12\ ft)(9\ ft) = 2635.2\ lb$

# * Wood Strength

- $F_{allow} = 1350\ lb/in^2 (\pi/4)(12\ in)^2 = 152681\ lb \Rightarrow$
  $152.7\ K/pole$
- $16.9\ K\text{-}ft/pole \div 1\ ft \Rightarrow \quad 16.9\ K/pole = F_{Applied}$

$\therefore F_{allow} > F_{applied}$

- $V_{allow} = 95\ lb/in^2 (\pi/4)(12\ in)^2 = 10714.2\ lb \Rightarrow$

$V_{allow} = 10.7\ K/pole$

- $V_{applied} = 2.12\ K/pole$

$\therefore V_{allow} > V_{applied}$

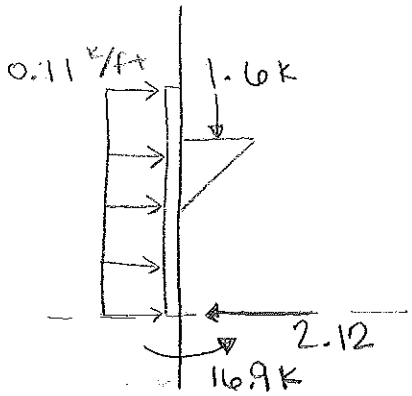
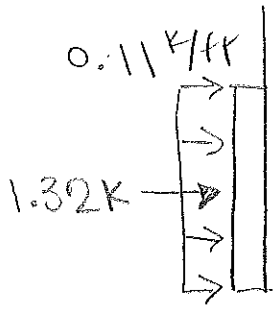



Diagram created from RISA results



Deck load

Wind = 24.4 PSF

92" x 135" x 24.4 PSF

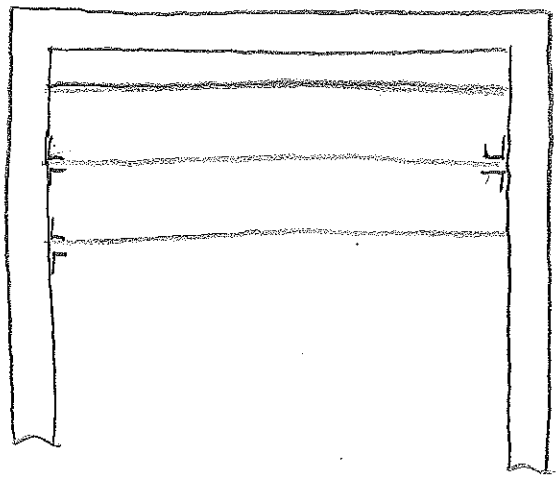
Area: $\frac{92" \times 135"}{144} = 86.25$ Sq ft

7.667 x 11.26 x 24.4 PSF = 2104.5 Lb wind force

# 2x6 = 11

Simpson A35 [4] = 44 Qt

Allowable lateral load for A35 [4] = 510 lb per



WL = 2104.5 lb or 24.4 PSF

Total Area = 86.25

Area per 2x6 joist = $\frac{86.25}{11 \text{ beams}} = 7.85$ Sq ft

WL per Joist = 7.85 SF x 24.4 = 191.54

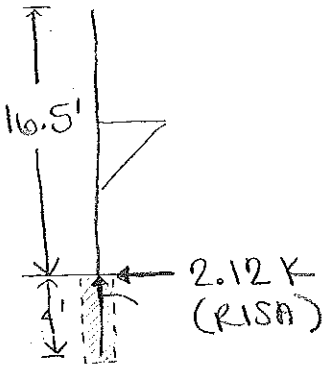
Allowable load per joist with A35 [4] Simpson tie

= 510 lb x 4 = 2040 lb

# * Foundation

- Soil Bearing Strength = 4000 psf
- Foam Strengths vary, for Rainbow Tech Pole Setting Foam:
  - + Tensile = 64 psi $\left(\frac{144 in^2}{ft^2}\right)$ = 9216 psf
  - + Shear = 42 psi $\left(\frac{144 in^2}{ft^2}\right)$ = 6048 psf

- Shear:




$V_{applied} = 2.12\ K$

$V_{allow} = 6.048 K$

$V_{applied} < V_{allow}$ ✓

$\frac{V_{allow}}{V_{applied}} = \frac{6.048}{2.12} = 2.85 = FS$

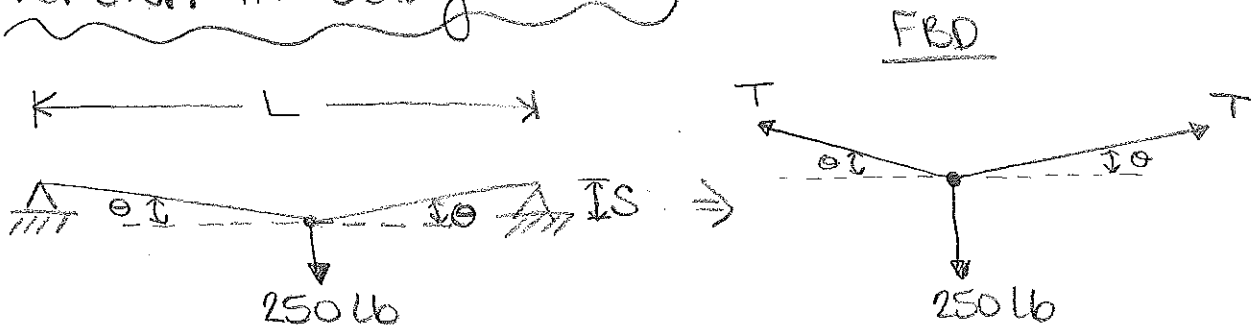
- Vertically:
  - Vertical Foundation Pressure of Rock: 4,000 psf
  - + $A_{C-S} = \left(\frac{\pi}{4}\right)(1)^2 = 0.785\ ft^2$
  - + $P_{allow} = 4{,}000\ lb/ft^2 (0.785\ ft^2) \Rightarrow 3.14\ K$
  - $P_{applied} = 2.138 K \Rightarrow P_{applied} < P_{allow}$

$\frac{P_{allow}}{P_{applied}} = \frac{3.14}{2.138} = 1.47 = FS$

- Depth of Embedment
  - 4 feet or 10% of length plus 2 feet, whichever is greater.
  - + $2 + (0.1)(16.5) = 2.165\ ft$

$\Rightarrow$ **Depth of Embedment = 4 feet**

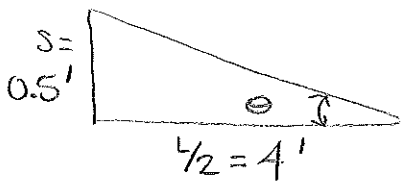
# * Tension in Belay Cable




- CCCZLT Standards: $S/L = 1/20$ for Static Belay
  pg 69

  $L = 8' \Rightarrow S_{min} = 1/20(8) = 2/5 = 0.4$ feet $= S_{min}$

  + Will use $S = 0.5$ feet

- 


  $\tan\theta = \frac{0.5}{4} \Rightarrow \theta = \tan^{-1}\left(\frac{0.5}{4}\right) \Rightarrow$

  $\theta = 7.125°$

- $\sum F_y = 0 = 2T(\sin\theta) - 250\,lb \Rightarrow T = \frac{250\,lb}{2\sin(7.125°)} \Rightarrow$

  $T = 1{,}007.78\,lb * 5 = 5038.91\,lb$

  CCCZLT Standards pg. 10 Section C1.1

**Tension in cables: 5,039 lb**

* Multiline II Rope:

diameter = ½" → Tensile Strength = 5,800 lb

- **Minimum Rope diameter = ½"**

* GAC Wire Rope:

diameter = 3/8" → Minimum breaking Strength / lbs = 14,100 ✓

7 x 19 construction

* Belay Cable Attachment

Wood Bearing:

$F_{3''} = 560\ lb/in^2$

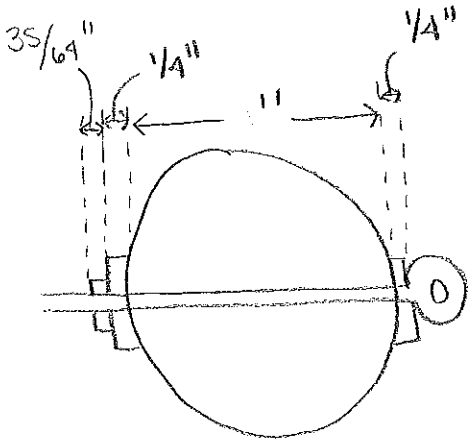
$F_{c\perp} \Rightarrow \frac{1.875}{\phi}(F_{c\perp}) = \frac{1.875}{0.9}(255\ lb/in^2) = 531.25\ \frac{lb}{in^2}$

$F_{3''} > F_{c\perp}$ ∴ Must use bigger washer

$F_{4''} = 315\ lb/in^2$, $F_{4''} < F_{c\perp}$ ✓

∴ 4x4x1/4 Curved Washer (does not come in 1/2" ϕ bolt size)

Use 5/8" ϕ Forged Eye Bolt (2724.6116-6) with 4"x4" Curved Washer (CW60) and 5/8" ϕ Hex Nut (HN60) from Hughes Brothers, Inc.

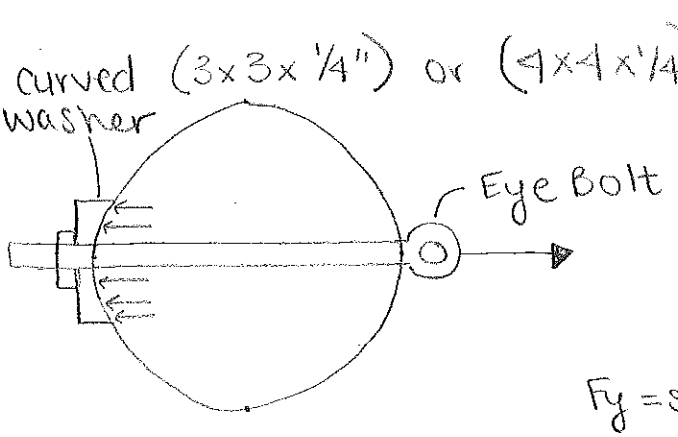


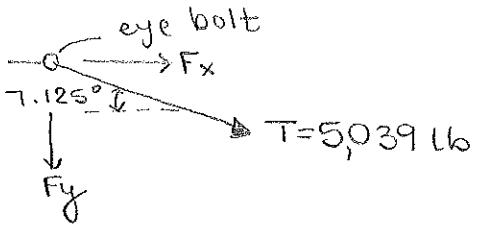

Minimum bolt length:

$12" + 1/4" + 35/64" + 1/4" = 13.05"$

Use 16"

# Eye Bolts




$F_x = \cos(7.125°)(5039\,lb) \Rightarrow$

$F_x = 5{,}000\,lb$

$F_y = \sin(7.125°)(5039\,lb) \Rightarrow F_y = 625\,lb$

- $(P/A)_3 = 5039\,lb / (3" \times 3") = 560\ lb/in^2 = F_3$

OR

$(P/A)_4 = 5039\,lb / (4 \times 4) = 315\ lb/in^2 = F_4$

- $F_y = 36\ ksi$

$P_{allow_3} = (3")(1/4")(36\ ksi) = 27\ K$

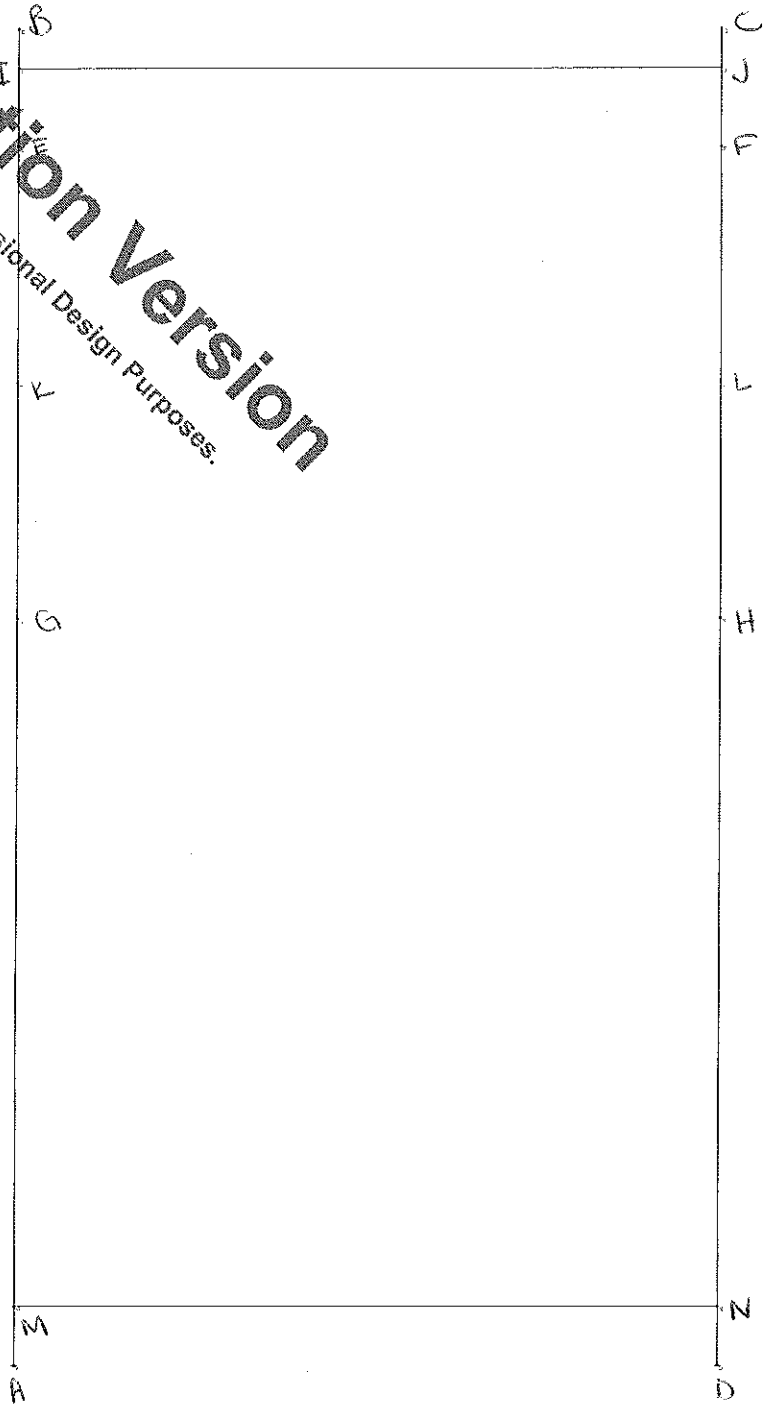
$P_{allow_4} = (4")(1/4")(36\ ksi) = 36K$

∴ 3"x3"x1/4" Square Curved Washer → Minimum

because $T < F_y$ $(5.04K < 27\ K)$

- Bolt Diameter = 1/2" ⇒ Minimum Tensile Strength = 7,800lbs

$T < T_{min}$ ∴ 1/2" Forged Eyebolt → Minimum




| | | |
|---|---|---|
| | | SK - 1 |
| | | Mar 5, 2013 at 1:11 PM |
| | | Steel Bar.r2d |

Wood Beam

## Joint Boundary Conditions

| | Joint Label | X [k/in] | Y [k/in] | Rotation[k-ft/rad] | Footing |
|---|---|---|---|---|---|
| 1 | A | Reaction | Reaction | Reaction | |
| 2 | D | Reaction | Reaction | Reaction | |
| 3 | E | | | | |
| 4 | F | | | | |

## Wood Design Parameters

| | Label | Shape | Length[ft] | Le-out[ft] | Le-in[ft] | le-bend to... | le-bend bo... | K-out | K-in | CV | Cr | Out sway | In sway |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | AB | 12RND | 17 | | | | | | | | | | |
| 2 | CD | 12RND | 17 | | | | | | | | | | |
| 3 | IJ | 4X6 | 9 | | | | | | | | | | |
| 4 | MN | 4X6 | 9 | | | | | | | | | | |

## Global

| | |
|---|---|
| Display Sections for Member Calcs | 5 |
| Max Internal Sections for Member Calcs | 97 |
| Include Shear Deformation? | Yes |
| Merge Tolerance (in) | .12 |
| P-Delta Analysis Tolerance | 0.50% |
| Include P-Delta for Walls? | Yes |
| Gravity Acceleration (ft/sec^2) | 32.2 |
| Wall Mesh Size (in) | 12 |
| Eigensolution Convergence Tol. (1.E-) | 4 |
| Solver | Standard Skyline |

| | |
|---|---|
| Hot Rolled Steel Code | AISC 13th(360-05): ASD |
| Adjust Stiffness? | Yes(Iterative) |
| Cold Formed Steel Code | AISI NAS-07: ASD |
| Wood Code | AF&PA NDS-05/08: ASD |
| Wood Temperature | < 100F |
| Concrete Code | ACI 318-08 |
| Masonry Code | ACI 530-05/08: ASD |
| Aluminum Code | AA ADM1-05: ASD |

| | |
|---|---|
| Number of Shear Regions | 4 |
| Region Spacing Increment (in) | 4 |
| Concrete Stress Block | Rectangular |
| Use Cracked Sections? | Yes |
| Bad Framing Warnings? | No |
| Unused Force Warnings? | Yes |
| Min 1 Bar Diam. Spacing? | No |
| Concrete Rebar Set | REBAR_SET_ASTMA615 |
| Min % Steel for Column | 1 |
| Max % Steel for Column | 8 |

## Joint Coordinates and Temperatures

| | Label | X [ft] | Y [ft] | Temp [F] |
|---|---|---|---|---|
| 1 | A | 0 | 0 | 70 |
| 2 | B | 0 | 17 | 70 |
| 3 | C | 9 | 17 | 70 |
| 4 | D | 9 | 0 | 70 |
| 5 | E | 0 | 15.5 | 70 |

And so on...



Wood Beam

## Joint Deflections

| | LC | Joint Label | X [in] | Y [in] | Rotation [rad] |
|---|---|---|---|---|---|
| 1 | 15 | A | 0 | 0 | 0 |
| 2 | 15 | B | -.006 | 0 | 2.379e-3 |
| 3 | 15 | C | .006 | 0 | -2.379e-3 |
| 4 | 15 | D | 0 | 0 | 0 |
| 5 | 15 | E | .037 | 0 | 2.092e-3 |

And so on...

## Joint Reactions (By Combination)

| | LC | Joint Label | X [k] | Y [k] | MZ [k-ft] |
|---|---|---|---|---|---|
| 1 | 15 | A | .11 | 0 | 1.993 |
| 2 | 15 | D | -.11 | 0 | -1.993 |
| 3 | 15 | Totals: | 0 | 0 | |
| 4 | 15 | COG (ft): | NC | NC | |

## Load Combination Design

| | Description | ASIF | CD | ABIF | Service | Hot Rolled | Cold Form... | Wood | Concrete | Masonry | Footings | Aluminum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 2 | ASCE 1 | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 3 | ASCE 2 (a) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 4 | ASCE 2 (b) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 5 | ASCE 2 (c) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |

And so on...

## Load Combinations

| | Description | Solve | PD... | SR... | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | | | |
| 2 | ASCE 1 | | | | DL | 1.4 | | | | | | | | | | | | | | |
| 3 | ASCE 2 (a) | | | | DL | 1.2 | LL | 1.6 | LLS | 1.6 | RLL | .5 | | | | | | | | |
| 4 | ASCE 2 (b) | | | | DL | 1.2 | LL | 1.6 | LLS | 1.6 | SL | .5 | | | | | | | | |
| 5 | ASCE 2 (c) | | | | DL | 1.2 | LL | 1.6 | LLS | 1.6 | RL | .5 | | | | | | | | |

And so on...

## Member Distributed Loads

| Member Label | Direction | Start Magnitude[k/ft,d... | End Magnitude[k/ft,d... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|
| No Data to Print ... | | | | | |

## Member Point Loads (BLC 1 : Live)

| | Member Label | Direction | Magnitude[k,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | AB | X | 5 | 15.5 |
| 2 | CD | X | -5 | 1.5 |

## Wood Material Properties

| | Label | Species | Grade | Cm | Emod | Nu | Therm (\1E... | Dens[k/ft^3] |
|---|---|---|---|---|---|---|---|---|
| 1 | DF/SPine | Com Species Group I D... | No.1 | | 1 | .3 | .3 | .035 |
| 2 | HF/Spruce Fir | Com Species Group II ... | No.1 | | 1 | .3 | .3 | .035 |
| 3 | DF | Douglas Fir-Larch | No.1 | | 1 | .3 | .3 | .035 |
| 4 | SP | Southern Pine | No.1 | | 1 | .3 | .3 | .035 |
| 5 | HF | Hem-Fir | No.1 | | 1 | .3 | .3 | .035 |

And so on...



Wood Beam

## Member Primary Data

| | Label | I Joint | J Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AB | A | B | | 12RND | Beam | Rectangular | Cedar | Typical |
| 2 | CD | C | D | | 12RND | Beam | Rectangular | Cedar | Typical |
| 3 | IJ | I | J | | 4X6 | Beam | Rectangular | Douglas | Typical |
| 4 | MN | M | N | | 4X6 | Beam | Rectangular | Douglas | Typical |

## Member Section Deflections

| | LC | Member Label | Sec | x [in] | y [in] | (n) L/y Ratio |
|---|---|---|---|---|---|---|
| 1 | 15 | AB | 1 | 0 | 0 | NC |
| 2 | | | 2 | 0 | -.028 | 7005.329 |
| 3 | | | 3 | 0 | -.073 | 2663.636 |
| 4 | | | 4 | 0 | -.08 | 2398.872 |
| 5 | | | 5 | 0 | .006 | NC |

And so on...

## Member Section Forces

| | LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|---|
| 1 | 15 | AB | 1 | 0 | -.11 | 1.993 |
| 2 | | | 2 | 0 | .433 | .587 |
| 3 | | | 3 | 0 | .433 | -1.252 |
| 4 | | | 4 | 0 | .433 | -3.092 |
| 5 | | | 5 | 0 | 0 | 0 |

And so on...

## Member Section Stresses

| | LC | Member Label | Sec | Axial[ksi] | Shear[ksi] | Top Bending[ksi] | Bot Bending[ksi] |
|---|---|---|---|---|---|---|---|
| 1 | 15 | AB | 1 | 0 | -.004 | .141 | .141 |
| 2 | | | 2 | 0 | .006 | -.041 | .041 |
| 3 | | | 3 | 0 | .006 | .088 | -.088 |
| 4 | | | 4 | 0 | .006 | .218 | -.218 |
| 5 | | | 5 | 0 | 0 | 0 | 0 |

And so on...

## Wood Wall Panel Parameters

| | Label | Top Plate | Sill Plate | Studs | Min Stud Space[in] | Max Stud Space[... | Green Lumber? |
|---|---|---|---|---|---|---|---|
| 1 | Typical | 2-2X6 | 2X6 | 2X6 | 16 | 16 | |

## Additional Wood Wall Panel Parameters

| | Label | Schedule | Min. Panel... | Max. Pane... | Double Sid... | Max. Nail ... | Min. Nail S... | HD Chords | HD Chord ... | Hold Down |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Typical | IBC06-09 Pane... | .375 | .75 | Optimum | 6-in. | 3-in. | 2-2X6 | Same as ... | SIMP HDA Dat... |

## Wood Section Sets

| | Label | Shape | Type | Design List | Material | Design Rules | A [in2] | I (90,270) [i... | I (0,180) [in4] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | WOOD1A | 2X6 | Beam | Rectangular | DF/SPine | Typical | 8.25 | 1.547 | 20.797 |



Wood Beam

## Member Wood Code Checks

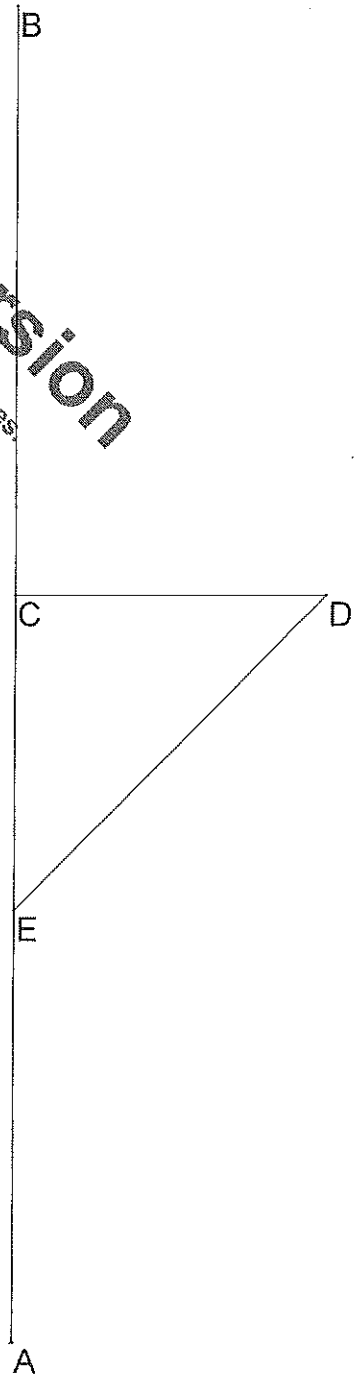
| | LC | Member | Shape | UC Max | Loc[ft] | Shear ... | Loc[ft] | Fc'[ksi] | Ft'[ksi] | Fb'[ksi] | Fv'[ksi] | RB | CL | CP | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | AB | 12RND | .222 | 15.406 | .638 | 15.583 | .547 | 1 | 1.35 | .095 | 4.38 | 1 | .729 | 3.9-3 |
| 2 | 15 | CD | 12RND | .222 | 1.594 | .638 | .531 | .547 | 1 | 1.35 | .095 | 4.38 | 1 | .729 | 3.9-3 |
| 3 | 15 | IJ | 4X6 | .513 | 0 | .000 | 0 | .463 | .747 | 1.17 | .18 | 6.963 | 1 | .312 | 3.6.3 |
| 4 | 15 | MN | 4X6 | .061 | 0 | .000 | 0 | .463 | .747 | 1.17 | .18 | 6.963 | 1 | .312 | 3.6.3 |

## Warning Log

| Message |
|---|
| No Data to Print ... |



Wood Beam




Results for LC 13, ASCE 4 (b)

| | | |
|---|---|---|
| | | SK - 2 |
| | | Mar 5, 2013 at 1:18 PM |
| | | Model.r2d |

## Joint Boundary Conditions

| | Joint Label | X [k/in] | Y [k/in] | Rotation[k-ft/rad] | Footing |
|---|---|---|---|---|---|
| 1 | A | Reaction | Reaction | Reaction | |
| 2 | C | | | | |
| 3 | D | | | | |
| 4 | E | | | | |

## Wood Design Parameters

| | Label | Shape | Length[ft] | Le-out[ft] | Le-in[ft] | le-bend to... | le-bend bo... | K-out | K-in | CV | Cr | Out sway | In sway |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | AB | 12RND | 17 | | | | | | | | | | |
| 2 | Cd | 4X6 | 4 | | | | | | | | | | |
| 3 | DE | 4X6 | 5.657 | | | | | | | | | | |

## Global

| | |
|---|---|
| Display Sections for Member Calcs | 5 |
| Max Internal Sections for Member Calcs | 97 |
| Include Shear Deformation? | Yes |
| Merge Tolerance (in) | .12 |
| P-Delta Analysis Tolerance | 0.50% |
| Include P-Delta for Walls? | Yes |
| Gravity Acceleration (ft/sec^2) | 32.2 |
| Wall Mesh Size (in) | 12 |
| Eigensolution Convergence Tol. (1.E-) | 4 |
| Solver | Standard Skyline |

| | |
|---|---|
| Hot Rolled Steel Code | AISC 13th(360-05): ASD |
| Adjust Stiffness? | Yes(Iterative) |
| Cold Formed Steel Code | AISI NAS-07: ASD |
| Wood Code | AF&PA NDS-05/08: ASD |
| Wood Temperature | < 100F |
| Concrete Code | ACI 318-08 |
| Masonry Code | ACI 530-05/08: ASD |
| Aluminum Code | AA ADM1-05: ASD |

| | |
|---|---|
| Number of Shear Regions | 4 |
| Region Spacing Increment (in) | 4 |
| Concrete Stress Block | Rectangular |
| Use Cracked Sections? | Yes |
| Bad Framing Warnings? | No |
| Unused Force Warnings? | Yes |
| Min 1 Bar Diam. Spacing? | No |
| Concrete Rebar Set | REBAR_SET_ASTMA615 |
| Min % Steel for Column | 1 |
| Max % Steel for Column | 8 |

## Joint Coordinates and Temperatures

| | Label | X [ft] | Y [ft] | Temp [F] |
|---|---|---|---|---|
| 1 | A | 0 | 0 | 70 |
| 2 | B | 0 | 17 | 70 |
| 3 | C | 0 | 9.5 | 70 |
| 4 | D | 4 | 9.5 | 70 |
| 5 | E | 0 | 5.5 | 70 |

And so on...

## Joint Deflections

| | LC | Joint Label | X [in] | Y [in] | Rotation [rad] |
|---|---|---|---|---|---|
| 1 | 13 | A | 0 | 0 | 0 |
| 2 | 13 | B | 1.956 | -.002 | -1.191e-2 |
| 3 | 13 | C | .884 | -.002 | -1.185e-2 |
| 4 | 13 | D | .885 | -.534 | -1.009e-2 |
| 5 | 13 | E | .356 | -.001 | -9.506e-3 |

And so on...

## Joint Reactions

| | LC | Joint Label | X [k] | Y [k] | MZ [k-ft] |
|---|---|---|---|---|---|
| 1 | 13 | A | -2.112 | 2.138 | 16.947 |
| 2 | 13 | Totals: | -2.112 | 2.138 | |
| 3 | 13 | COG (ft): | X: 2 | Y: 9.5 | |

## Load Combination Design

| | Description | ASIF | CD | ABIF | Service | Hot Rolled | Cold Form... | Wood | Concrete | Masonry | Footings | Aluminum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 2 | ASCE 1 | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 3 | ASCE 2 (a) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 4 | ASCE 2 (b) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 5 | ASCE 2 (c) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |

And so on...

## Load Combinations

| | Description | Solve | PD... | SR... | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | |
| 2 | ASCE 1 | | | | DL | 1.4 | | | | | | | | | | | | |
| 3 | ASCE 2 (a) | | | | DL | 1.2 | LL | 1.6 | LLS | 1.6 | RLL | .5 | | | | | | |
| 4 | ASCE 2 (b) | | | | DL | 1.2 | LL | 1.6 | LLS | 1.6 | SL | .5 | | | | | | |
| 5 | ASCE 2 (c) | | | | DL | 1.2 | LL | 1.6 | LLS | 1.6 | RL | .5 | | | | | | |

And so on...

## Member Distributed Loads (BLC 2 : Wind)

| | Member Label | Direction | Start Magnitude[k/ft,d... | End Magnitude[k/ft,d... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | AB | X | .11 | .11 | 0 | 12 |

## Member Distributed Loads (BLC 3 : Dead)

| | Member Label | Direction | Start Magnitude[k/ft,d... | End Magnitude[k/ft,d... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | Cd | Y | -.112 | -.112 | 0 | 4 |

## Member Point Loads (BLC 1 : Live)

| | Member Label | Direction | Magnitude[k,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | Cd | y | -1.6 | 2 |

## Wood Material Properties

| | Label | Species | Grade | Cm | Emod | Nu | Therm (\1E... | Dens[k/ft^3] |
|---|---|---|---|---|---|---|---|---|
| 1 | DF/SPine | Com Species Group I D... | No.1 | | 1 | .3 | .3 | .035 |
| 2 | HF/Spruce Fir | Com Species Group II ... | No.1 | | 1 | .3 | .3 | .035 |
| 3 | DF | Douglas Fir-Larch | No.1 | | 1 | .3 | .3 | .035 |

## Wood Material Properties (Continued)

| | Label | Species | Grade | Cm | Emod | Nu | Therm (\1E... | Dens[k/ft^3] |
|---|---|---|---|---|---|---|---|---|
| 4 | SP | Southern Pine | No.1 | | 1 | .3 | .3 | .035 |
| 5 | HF | Hem-Fir | No.1 | | 1 | .3 | .3 | .035 |

And so on...

## Member Primary Data

| | Label | I Joint | J Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AB | A | B | | 12RND | Beam | Rectangular | Cedar | Typical |
| 2 | Cd | C | D | | 4X6 | Beam | Rectangular | Douglas | Typical |
| 3 | DE | D | E | | 4X6 | Beam | Rectangular | Douglas | Typical |

## Member Section Deflections

| | LC | Member Label | Sec | x [in] | y [in] | (n) L/y Ratio |
|---|---|---|---|---|---|---|
| 1 | 13 | AB | 1 | 0 | 0 | NC |
| 2 | | | 2 | -.001 | -.224 | 911.209 |
| 3 | | | 3 | -.002 | -.743 | 274.733 |
| 4 | | | 4 | -.002 | -1.348 | 151.349 |
| 5 | | | 5 | -.002 | -1.956 | 104.32 |

And so on...

## Member Section Forces

| | LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|---|
| 1 | 13 | AB | 1 | 2.138 | 2.112 | 16.947 |
| 2 | | | 2 | 2.138 | 1.364 | 9.561 |
| 3 | | | 3 | 1.115 | 1.286 | 2.582 |
| 4 | | | 4 | 0 | 0 | 0 |
| 5 | | | 5 | 0 | 0 | 0 |

And so on...

## Member Section Stresses

| | LC | Member Label | Sec | Axial[ksi] | Shear[ksi] | Top Bending[ksi] | Bot Bending[ksi] |
|---|---|---|---|---|---|---|---|
| 1 | 13 | AB | 1 | .019 | .028 | -1.197 | 1.197 |
| 2 | | | 2 | .019 | .018 | -.675 | .675 |
| 3 | | | 3 | .01 | .017 | -.182 | .182 |
| 4 | | | 4 | 0 | 0 | 0 | 0 |
| 5 | | | 5 | 0 | 0 | 0 | 0 |

And so on...

## Wood Wall Panel Parameters

| | Label | Top Plate | Sill Plate | Studs | Min Stud Space[in] | Max Stud Space[... | Green Lumber? |
|---|---|---|---|---|---|---|---|
| 1 | Typical | 2-2X6 | 2X6 | 2X6 | 16 | 16 | |

## Additional Wood Wall Panel Parameters

| | Label | Schedule | Min. Panel... | Max. Pane... | Double Sid... | Max. Nail ... | Min. Nail S... | HD Chords | HD Chord ... | Hold Down |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Typical | IBC06-09 Pane... | .375 | .75 | Optimum | 6-in. | 3-in. | 2-2X6 | Same as ... | SIMP HDA Dat... |

## Wood Section Sets

| | Label | Shape | Type | Design List | Material | Design Rules | A [in2] | I (90,270) [i... | I (0,180) [in4] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | WOOD1A | 2X6 | Beam | Rectangular | DF/SPine | Typical | 8.25 | 1.547 | 20.797 |

## Member Wood Code Checks

| | LC | Member | Shape | UC Max | Loc[ft] | Shear ... | Loc[ft] | Fc'[ksi] | Ft'[ksi] | Fb'[ksi] | Fv'[ksi] | RB | CL | CP | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 13 | AB | 12RND | .910 | 0 | .295 | 0 | .547 | 1 | 1.35 | .095 | 4.38 | 1 | .729 | 3.9-3 |
| 2 | 13 | Cd | 4X6 | .701 | 2 | .483 | 0 | 1.247 | .747 | 1.17 | .18 | 4.642 | 1 | .84 | 3.9-1 |
| 3 | 13 | DE | 4X6 | .456 | 5.657 | .108 | 0 | .946 | .747 | 1.17 | .18 | 5.521 | 1 | .637 | 3.9-3 |

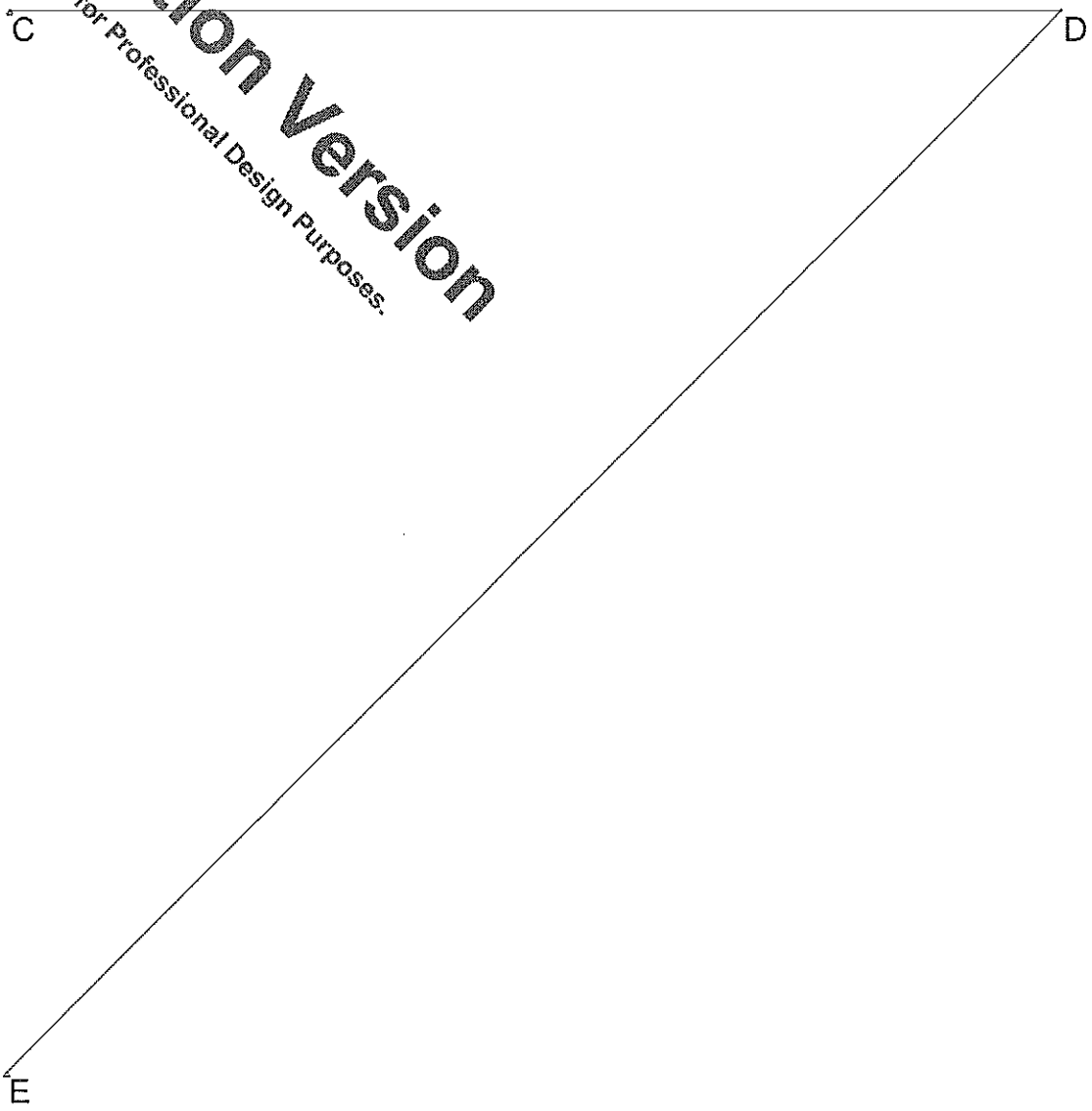
## Warning Log

| Message |
|---|
| No Data to Print ... |

## Basic Load Cases

| | BLC Description | Category | X Gravity | Y Gravity | Joint | Point | Distributed |
|---|---|---|---|---|---|---|---|
| 1 | Live | LL | | | | 1 | |
| 2 | Wind | WL | | | | | 1 |
| 3 | Dead | DL | | | | | 1 |

And so on..




| | | |
|---|---|---|
| | | SK - 3 |
| | | Mar 5, 2013 at 1:19 PM |
| | | Truss Model.r2d |

## Joint Boundary Conditions

| | Joint Label | X [k/in] | Y [k/in] | Rotation[k-ft/rad] | Footing |
|---|---|---|---|---|---|
| 1 | C | Reaction | Reaction | | |
| 2 | D | | | | |
| 3 | E | Reaction | Reaction | | |

## Wood Design Parameters

| | Label | Shape | Length[ft] | Le-out[ft] | Le-in[ft] | le-bend to... | le-bend bo... | K-out | K-in | CV | Cr | Out sway | In sway |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CD | 4X6 | 4 | 4 | 4 | | | 1 | 1 | | | | |
| 2 | DE | 4X6 | 5.657 | 5.66 | 5.66 | | | 1 | 1 | | | | |

## Global

| | |
|---|---|
| Display Sections for Member Calcs | 5 |
| Max Internal Sections for Member Calcs | 97 |
| Include Shear Deformation? | Yes |
| Merge Tolerance (in) | 12 |
| P-Delta Analysis Tolerance | 0.50% |
| Include P-Delta for Walls? | Yes |
| Gravity Acceleration (ft/sec^2) | 32.2 |
| Wall Mesh Size (in) | 12 |
| Eigensolution Convergence Tol. (1.E-) | 4 |
| Solver | Standard Skyline |

| | |
|---|---|
| Hot Rolled Steel Code | AISC 13th(360-05): ASD |
| Adjust Stiffness? | Yes(Iterative) |
| Cold Formed Steel Code | AISI NAS-07: ASD |
| Wood Code | AF&PA NDS-05/08: ASD |
| Wood Temperature | < 100F |
| Concrete Code | ACI 318-08 |
| Masonry Code | ACI 530-05/08: ASD |
| Aluminum Code | AA ADM1-05: ASD |

| | |
|---|---|
| Number of Shear Regions | 4 |
| Region Spacing Increment (in) | 4 |
| Concrete Stress Block | Rectangular |
| Use Cracked Sections? | Yes |
| Bad Framing Warnings? | No |
| Unused Force Warnings? | Yes |
| Min 1 Bar Diam. Spacing? | No |
| Concrete Rebar Set | REBAR_SET_ASTMA615 |
| Min % Steel for Column | 1 |
| Max % Steel for Column | 8 |

## Joint Coordinates and Temperatures

| | Label | X [ft] | Y [ft] | Temp [F] |
|---|---|---|---|---|
| 1 | C | 0 | 4 | 70 |
| 2 | D | 4 | 4 | 70 |
| 3 | E | 0 | 0 | 70 |

## Joint Deflections

| LC | Joint Label | X [in] | Y [in] | Rotation [rad] |
|---|---|---|---|---|
| No Data to Print ... | | | | |

## Joint Reactions

| LC | Joint Label | X [k] | Y [k] | MZ [k-ft] |
|---|---|---|---|---|
| No Data to Print ... | | | | |

## Load Combination Design

| | Description | ASIF | CD | ABIF | Service | Hot Rolled | Cold Form... | Wood | Concrete | Masonry | Footings | Aluminum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASCE 1 | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 2 | ASCE 2 (a) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 3 | ASCE 2 (b) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 4 | ASCE 2 (c) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |
| 5 | ASCE 3 (a) | | | | | Yes | Yes | Yes | Yes | Yes | Yes | |

And so on...

## Load Combinations

| | Description | Solve | PD... | SR... | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor | BLC | Factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASCE 1 | Yes | | | DL | 1.4 | | | | | | | | | | | | | | |
| 2 | ASCE 2 (a) | Yes | | | DL | 1.2 | LL | 1.6 | LLS | 1.6 | RLL | .5 | | | | | | | | |
| 3 | ASCE 2 (b) | Yes | | | DL | 1.2 | LL | 1.6 | LLS | 1.6 | SL | .5 | | | | | | | | |
| 4 | ASCE 2 (c) | Yes | | | DL | 1.2 | LL | 1.6 | LLS | 1.6 | RL | .5 | | | | | | | | |
| 5 | ASCE 3 (a) | Yes | | | DL | 1.2 | RLL | 1.6 | LLS | 1 | LLS | 1 | | | | | | | | |

And so on...

## Member Distributed Loads (BLC 1 : Dead)

| | Member Label | Direction | Start Magnitude[k/ft,d... | End Magnitude[k/ft,d... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | CD | Y | -.112 | -.112 | 0 | 4 |

## Member Point Loads (BLC 2 : Live)

| | Member Label | Direction | Magnitude[k,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | CD | Y | -1.6 | 2 |

## Wood Material Properties

| | Label | Species | Grade | Cm | Emod | Nu | Therm (\1E... | Dens[k/ft^3] |
|---|---|---|---|---|---|---|---|---|
| 1 | DF/SPine | Com Species Group I D... | No.1 | | 1 | .3 | .3 | .035 |
| 2 | HF/Spruce Fir | Com Species Group II ... | No.1 | | 1 | .3 | .3 | .035 |
| 3 | DF | Douglas Fir-Larch | No.1 | | 1 | .3 | .3 | .035 |
| 4 | SP | Southern Pine | No.1 | | 1 | .3 | .3 | .035 |
| 5 | HF | Hem-Fir | No.1 | | 1 | .3 | .3 | .035 |

And so on...

## Member Primary Data

| | Label | I Joint | J Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|
| 1 | CD | C | D | | 4X6 | Beam | Rectangular | Douglas | Typical |
| 2 | DE | D | E | | 4X6 | Beam | Rectangular | Douglas | Typical |

## Member Section Deflections

| LC | Member Label | Sec | x [in] | y [in] | (n) L/y Ratio |
|---|---|---|---|---|---|
| No Data to Print ... | | | | | |

## Member Section Forces

| LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|
| No Data to Print ... | | | | | |

## Member Section Stresses

| LC | Member Label | Sec | Axial[ksi] | Shear[ksi] | Top Bending[ksi] | Bot Bending[ksi] |
|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | |

## Wood Wall Panel Parameters

| | Label | Top Plate | Sill Plate | Studs | Min Stud Space[in] | Max Stud Space[... | Green Lumber? |
|---|---|---|---|---|---|---|---|
| 1 | Typical | 2-2X6 | 2X6 | 2X6 | 16 | 16 | |

## Additional Wood Wall Panel Parameters

| | Label | Schedule | Min. Panel... | Max. Pane... | Double Std... | Max. Nail ... | Min. Nail S... | HD Chords | HD Chord ... | Hold Down |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Typical | IBC06-09 Pane... | .375 | .75 | Optimum | 6-in. | 3-in. | 2-2X6 | Same as ... | SIMP HDA Dat... |

## Wood Section Sets

| | Label | Shape | Type | Design List | Material | Design Rules | A [in2] | I (90,270) [i... | I (0,180) [in4] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | WOOD1 | 2X6 | Beam | Rectangular | DF/SPine | Typical | 8.25 | 1.547 | 20.797 |

## Member Wood Code Checks

| LC | Member | Shape | UC Max | Loc[ft] | Shear ... | Loc[ft] | Fc'[ksi] | Ft'[ksi] | Fb'[ksi] | Fv[ksi] | RB | CL | CP | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | | | | | | | | | |

## Warning Log

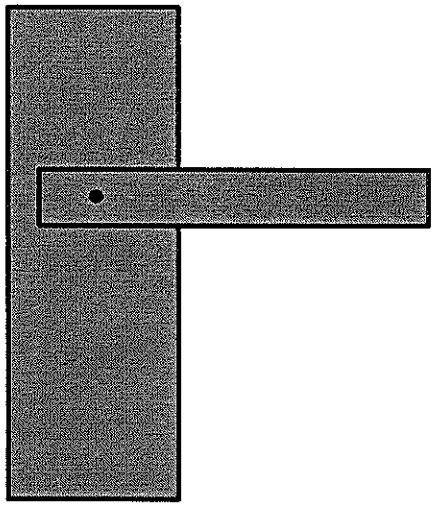
| Message |
|---|
| No Data to Print ... |

## Basic Load Cases

| | BLC Description | Category | X Gravity | Y Gravity | Joint | Point | Distributed |
|---|---|---|---|---|---|---|---|
| 1 | Dead | DL | | | | | 1 |
| 2 | Live | LL | | | | 1 | |

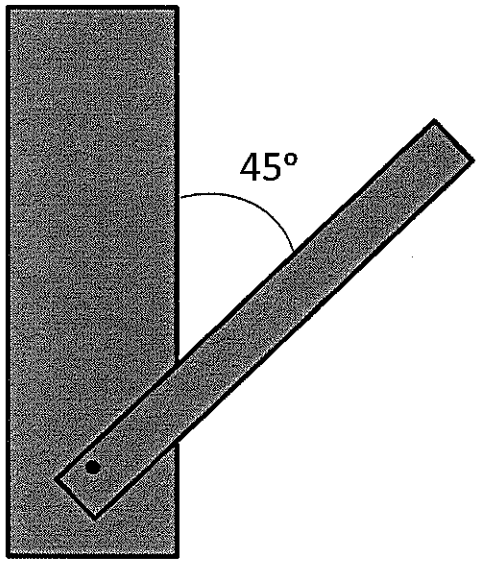
And so on...

| | | |
|---|---|---|
| $t_m$ | 12 | in |
| $t_s$ | 3.5 | in |
| $F_{em}$ | 4,050 | psi (11.3.2) |
| $F_{es}$ | 2,600 | psi (11.3.2) |
| $F_{yb}$ | 45,000 | psi |
| D | 0.75 | in |
| $R_e$ | 1.56 | |
| $R_t$ | 3.43 | |
| $\theta$ | 90 | deg. |
| $k\theta$ | 1.25 | |
| | | |
| $k_1$ | 1.67 | |
| $k_2$ | 1.29 | |
| $k_3$ | 1.12 | |
| | | |
| $I_m$ | 7,290.00 | lb |
| $I_s$ | 1,365.00 | lb |
| II | 2,526.50 | lb |
| $III_m$ | 2,851.72 | lb |
| $III_s$ | 836.65 | lb |
| IV | 969.23 | lb |
| **Failure** | 836.65 | lb |



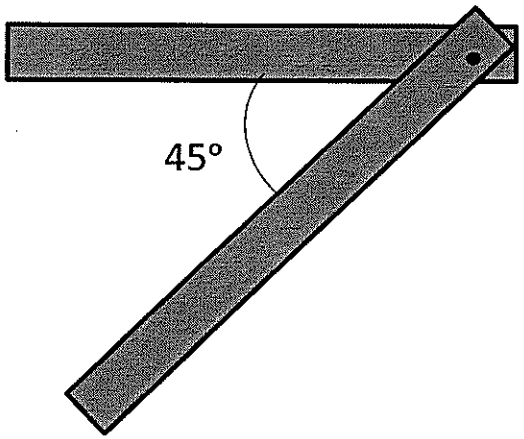
| Adjustment Factors for Dowel-type Fasteners | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Z, lb | | | | | | | | | | | Z' |
| Z | $C_M$ | $C_t$ | $C_g$ | $C_\Delta$ | $C_{eg}$ | $C_{di}$ | $C_{tn}$ | $K_F$ | $\phi_z$ | $\lambda$ | |
| 836.65 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 3.32 | 0.65 | 1.00 | **1,807.16** |

| | | |
|---|---|---|
| $t_m$ | 12 | in |
| $t_s$ | 3.5 | in |
| $F_{em}$ | 4,050 | psi (11.3.2) |
| $F_{es}$ | 2,600 | psi (11.3.2) |
| $F_{yb}$ | 45,000 | psi |
| D | 0.75 | in |
| $R_e$ | 1.56 | |
| $R_t$ | 3.43 | |
| θ | 45 | deg. |
| kθ | 1.125 | |
| | | |
| $k_1$ | 1.67 | |
| $k_2$ | 1.29 | |
| $k_3$ | 1.12 | |
| | | |
| $I_m$ | 8,100.00 | lb |
| $I_s$ | 1,516.67 | lb |
| II | 2,807.22 | lb |
| $III_m$ | 3,168.58 | lb |
| $III_s$ | 929.61 | lb |
| IV | 1,076.92 | lb |
| **Failure** | 929.61 | lb |




| Adjustment Factors for Dowel-type Fasteners | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Z, lb** | | | | | | | | | | | **Z'** |
| Z | $C_M$ | $C_t$ | $C_g$ | $C_\Delta$ | $C_{eg}$ | $C_{di}$ | $C_{tn}$ | $K_F$ | $\phi_z$ | λ | |
| 929.61 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 3.32 | 0.65 | 1.00 | **2,007.95** |

| | | |
|---|---|---|
| $t_m$ | 3.5 | in |
| $t_s$ | 3.5 | in |
| $F_{em}$ | 5,600 | psi (11.3.2) |
| $F_{es}$ | 2,600 | psi (11.3.2) |
| $F_{yb}$ | 45,000 | psi |
| D | 0.75 | in |
| $R_e$ | 2.15 | |
| $R_t$ | 1.00 | |
| θ | 45 | deg. |
| kθ | 1.125 | |
| | | |
| $k_1$ | 0.64 | |
| $k_2$ | 1.76 | |
| $k_3$ | 0.99 | |
| | | |
| $I_m$ | 3,266.67 | lb |
| $I_s$ | 1,516.67 | lb |
| II | 1,076.82 | lb |
| $III_m$ | 1,353.42 | lb |
| $III_s$ | 970.79 | lb |
| IV | 1,140.39 | lb |
| **Failure** | 970.79 | lb |




| Adjustment Factors for Dowel-type Fasteners | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Z, lb | | | | | | | | | | | Z' |
| Z | $C_M$ | $C_t$ | $C_g$ | $C_\Delta$ | $C_{eg}$ | $C_{di}$ | $C_{tn}$ | $K_F$ | $\phi_z$ | λ | |
| 970.79 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 3.32 | 0.65 | 1.00 | **2,096.91** |

## Adjustment Factors for Sawn Lumber Douglas Fir-Larch No. 2

| $F_b$, psi | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_b$ | $C_M$ | $C_t$ | $C_L$ | $C_F$ | $C_{fu}$ | $C_i$ | $C_r$ | | | | $K_F$ | $\phi_b$ | $\lambda$ | $F_b'$ |
| 900 | 0.85 | 1.00 | 1.00 | 1.30 | 1.05 | 0.80 | 1.15 | | | | 2.54 | 0.85 | 1.00 | **2,067.29** |
| $F_t$, psi | | | | | | | | | | | | | | $F_t'$ |
| $F_t$ | $C_M$ | $C_t$ | | $C_F$ | | $C_i$ | | | | | $K_F$ | $\phi_t$ | $\lambda$ | |
| 575 | 1.00 | 1.00 | | 1.30 | | 0.80 | | | | | 2.70 | 0.80 | 1.00 | **1,291.68** |
| $F_v$, psi | | | | | | | | | | | | | | $F_v'$ |
| $F_v$ | $C_M$ | $C_t$ | | | | $C_i$ | | | | | $K_F$ | $\phi_v$ | $\lambda$ | |
| 180 | 0.97 | 1.00 | | | | 0.80 | | | | | 2.88 | 0.75 | 1.00 | **301.71** |
| $F_{cper}$, psi | | | | | | | | | | | | | | $F_{cper}'$ |
| $F_{cper}$ | $C_M$ | $C_t$ | | | | $C_i$ | $C_r$ | | | $C_b$ | $K_F$ | $\phi_c$ | $\lambda$ | |
| 625 | 0.67 | 1.00 | | | | 1.00 | 1.15 | | | 1.10 | 2.08 | 0.90 | 1.00 | **993.22** |
| $F_c$, psi | | | | | | | | | | | | | | $F_c'$ |
| $F_c$ | $C_M$ | $C_t$ | | $C_F$ | | $C_i$ | | $C_P$ | | | $K_F$ | $\phi_c$ | $\lambda$ | |
| 1,350 | 0.80 | 1.00 | | 1.10 | | 0.80 | | 1.00 | | | 2.40 | 0.90 | 1.00 | **2,052.86** |
| E, psi | | | | | | | | | | | | | | E' |
| E | $C_M$ | $C_t$ | | | | $C_i$ | | | | | | | | |
| 1,600,000 | 0.90 | 1.00 | | | | 0.95 | | | | | | | | **1,368,000** |
| $E_{min}$, psi | | | | | | | | | | | | | | $E_{min}'$ |
| $E_{min}$ | $C_M$ | $C_t$ | | | | $C_i$ | | | $C_T$ | | $K_F$ | $\phi_s$ | | |
| 580,000 | 0.90 | 1.00 | | | | 0.95 | | | 1.03 | | 1.76 | 0.85 | | **764,420** |

| | |
|---|---|
| $d_{min}$ | 10.00 |
| $d_{max}$ | 12.00 |
| a | 0.70 |
| d | 11.35 |
| $C_T$ | 1.03 |
| | |
| $l_u$ | 48.00 |
| d | 6.00 |
| b | 4.00 |
| $l_e$ | 87.12 |
| $R_B$ | 5.72 |
| $F_{bE}$ | 28077.87 |
| $F_b^*$ | 1976.27 |
| $F_{bE}/F_b^*$ | 14.21 |
| $C_L$ | 0.9962 |

## Adjustment Factors for Round Timber Poles Western Red Cedar

| Fc, psi | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fc | Ct | Cu | | CP | Ccs | | Csp | KF | ϕc | λ | Fc' |
| 750 | 1 | 1 | | 0.38 | 1.04 | | 0.80 | 2.40 | 0.90 | 1 | **647.19** |
| **Fb, psi** | | | | | | | | | | | **Ft'** |
| Fb | Ct | Cu | CF | | | | Csp | KF | ϕb | λ | |
| 1,350 | 1 | 1 | 1 | | | | 0.77 | 2.54 | 0.85 | 1 | **2,245.32** |
| **Fv, psi** | | | | | | | | | | | **Fv'** |
| Fv | Ct | Cu | | | | | | KF | ϕv | λ | |
| 95 | 1 | 1 | | | | | | 2.88 | 0.75 | 1 | **205.20** |
| **Fcper, psi** | | | | | | | | | | | **Fcper'** |
| Fcper | Ct | Cu | | | | Cb | | KF | ϕc | λ | |
| 255 | 1 | 1 | | | | 1.00 | | 2.08 | 0.90 | 1 | **478.13** |
| **E, psi** | | | | | | | | | | | **E'** |
| E | Ct | | | | | | | | | | |
| 940,000 | 1 | | | | | | | | | | **940,000** |
| **Emin, psi** | | | | | | | | | | | **Emin'** |
| Emin | Ct | | | | | | | KF | ϕs | | |
| 500,000 | 1 | | | | | | | 1.76 | 0.85 | | **750,000** |

CP ?

| | | |
|---|---|---|
| le | 396.00 | |
| FcE | 566.12 | |
| Fc* | 1349.14 | |
| FcE/Fc* | 0.4196 | |
| c | 0.85 | |
| CP | ~~0.3838~~ | Too small |
| | 517.75 | |