

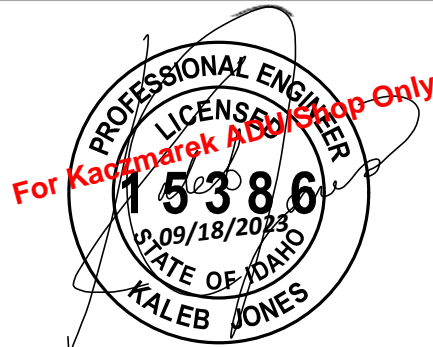
Structural Calculations

Project Title: Kaczmarek ADU/Shop

**Address: Lot 2 & 3 Block 2 King's
Pines Estates**

Location: Adams County, Idaho

Job #: 2023-5574 ADU/Shop



Prepared in accordance with 2018 IBC. Calculations expire by: 09/18/2024

SITE SPECIFIC DESIGN CRITERIA:

Snow Criteria:

| | | |
|---------------------------|----------------|-----------|
| Roof Load (P_f) | 150 psf | |
| Ground Load (P_g) | 150 psf | |
| Exposure Factor (C_e) | 1.0 | Partially |
| Thermal Factor (C_t) | 1.0 | Typical |
| Importance (I_s) | 1.0 | |

Wind Criteria:

| | | |
|---------------------------|----------------|--------------|
| Wind Speed (V_3) | 115 mph | |
| Wind Exposure | C | Open Terrain |
| Wind Importance (I_w) | 1.0 | |
| Building Category | II | |

Seismic Criteria:

| | | |
|-------------------------------|-------------|----------------------|
| Site Class | D | Stiff Soil |
| S_s | 0.42 | F_a 1.47 |
| S_1 | 0.13 | F_v 2.28 |
| S_{D1} | 0.41 | S_{D1} 0.20 |
| Risk Category | II | Other |
| Seismic Importance (I_E) | 1.0 | |
| Seismic Design Category (SDC) | C | |

Seismic Criteria (continued):

| Wall Material | Design Base Shear | Response Coeff., R | |
|---------------|-------------------|--------------------|-----------|
| OSB | .08Wp | 6.5 | Typ @ Ext |
| GYP | .24Wp | 2 | Typ @ Int |
| CANT COL | .33Wp | 1.5 | |

Soil Criteria:

| | |
|---------------|-----------------|
| Brg. Strength | 1500 psf |
|---------------|-----------------|

STRUCTURE SPECIFIC DESIGN CRITERIA:

Live Loads:

| | |
|-----------------|---------------|
| Typ Residential | 40 psf |
| Garage (P.V.) | 50 psf |
| Sleeping Area's | 30 psf |

Roof Dead Loads:

| | |
|--------------|---------------|
| Deck | 1.5 |
| Insulation | 2.0 |
| Roofing | 3.0 |
| Joist | 2.5 |
| Ceiling | 3.0 |
| Misc | 4.5 |
| TOTAL | 17 psf |

Exterior Wall Dead Loads:

| | |
|--------------|---------------|
| Studs | 2.0 |
| Siding | 9.0 |
| Insulation | 0.5 |
| Gyp. Board | 2.5 |
| Sheathing | 1.5 |
| Misc | 3.0 |
| TOTAL | 18 psf |

Floor Dead Loads:

| | |
|--------------|---------------|
| Deck | 2.5 |
| Joist | 2.0 |
| Ceiling | 2.0 |
| Flooring | 2.5 |
| Misc | 3.0 |
| TOTAL | 12 psf |

Interior Wall Dead Loads:

| | |
|--------------|--------------|
| Studs | 2.0 |
| Gyp. Board | 2.5 |
| Misc | 3.0 |
| TOTAL | 8 psf |

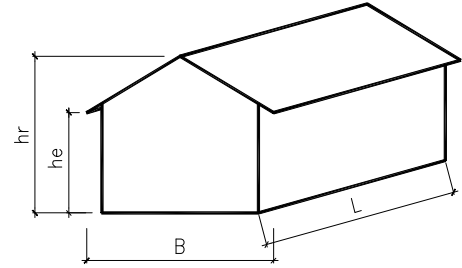
Deck Dead Load

| | |
|--------------|---------------|
| Decking | 4.4 |
| Joist | 2.0 |
| Conc. | 50.0 |
| Misc | 3.0 |
| TOTAL | 60 psf |

WIND ANALYSIS: Low-rise Building - Based on IBC / ASCE 7

INPUT DATA

| | | | | | |
|--|------------|----------------------|--|-----|--|
| Exposure category (B, C or D, ASCE 7-16 26.7.3) | | C | | | |
| Importance factor (ASCE 7-16 Table 1.5-2) | $I_w =$ | 1.00 | for all Category | | |
| Basic wind speed (ASCE 7-16 26.5.1 or 2018 IBC) | $V =$ | 115 | mph | | |
| Topographic factor (ASCE 7-16 26.8 & Table 26.8-1) | $K_{zt} =$ | 1.00 | Flat | | |
| Building height to ridge | $h_r =$ | 21.34 ft | ft | | |
| Building height to eave | $h_e =$ | 9.00 ft | ft | | |
| Building width | $B =$ | 80.00 ft | ft | | |
| Building length | $L =$ | 113.50 ft | ft | | |
| Overhang sloped width | $O_h =$ | 3.00 ft | ft | | |
| Effective area of components (or Solar Panel area) | $A =$ | 27.0 ft ² | ft ² , <== Overhang? (Yes or No): | Yes | |
| Enclosed? (Y/N) | | y | | | |



ANALYSIS

Velocity pressure

$$q_h = 0.00256 K_z K_{zt} K_d K_e V^2 = 24.49 \text{ psf}$$

where: q_h = velocity pressure at mean roof height, h. (Eq. 26.10-1 page 268)

K_z = velocity pressure exposure coefficient evaluated at height, h, (Tab. 26.10-1, pg 268) = **0.85**

K_d = wind directionality factor. (Tab. 26.6-1, for building, page 266) = **0.85**

h = mean roof height = **15.17 ft**

K_e = ground elevation factor. (**1.0** per Sec. 26.9, page 268) **< 60 ft, [Satisfactory]** (ASCE 7-16 26.2.1)

< Min (L, B), [Satisfactory] (ASCE 7-16 26.2.2)

Design pressures for MWFRS

$$p = q_h [(G C_{p_f}) - (G C_{p_i})]$$

where: p = pressure in appropriate zone. (Eq. 28.3-1, page 311).

$p_{min} = 16 \text{ psf}$ (ASCE 7-16 28.3.4)

$G C_{p_f}$ = product of gust effect factor and external pressure coefficient, see table below. (Fig. 28.3-1, page 312 & 313)

$G C_{p_i}$ = product of gust effect factor and internal pressure coefficient. (Tab. 26.13-1, Enclosed Building, page 271)

= **0.18** or **-0.18**

a = width of edge strips, Fig 28.3-1, page 312, $MAX[MIN(0.1B, 0.1L, 0.4h), MIN(0.04B, 0.04L), 3] = 6.07 \text{ ft}$

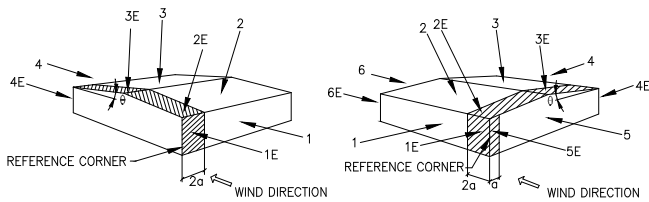
Net Pressures (psf), Basic Load Cases

| Surface | Roof angle $q = 18.43$ | | | Roof angle $q = 18.43$ | | |
|---------|------------------------|------------------|------------------|------------------------|------------------|------------------|
| | $G C_{p_f}$ | Net Press. W/ | | $G C_{p_f}$ | Net Press. W/ | |
| | | (+ $G C_{p_i}$) | (- $G C_{p_i}$) | | (+ $G C_{p_i}$) | (- $G C_{p_i}$) |
| 1 | 0.52 | 8.24 | 17.05 | -0.45 | -15.43 | -6.61 |
| 2 | -0.69 | -21.30 | -12.49 | -0.69 | -21.30 | -12.49 |
| 3 | -0.47 | -15.88 | -7.07 | -0.37 | -13.47 | -4.65 |
| 4 | -0.42 | -14.58 | -5.76 | -0.45 | -15.43 | -6.61 |
| 5 | | | | 0.40 | 5.39 | 14.20 |
| 6 | | | | -0.29 | -11.51 | -2.69 |
| 1E | 0.78 | 14.70 | 23.51 | -0.48 | -16.16 | -7.35 |
| 2E | -1.07 | -30.61 | -21.79 | -1.07 | -30.61 | -21.79 |
| 3E | -0.67 | -20.89 | -12.08 | -0.53 | -17.39 | -8.57 |
| 4E | -0.62 | -19.54 | -10.73 | -0.48 | -16.16 | -7.35 |
| 5E | | | | 0.61 | 10.53 | 19.34 |
| 6E | | | | -0.43 | -14.94 | -6.12 |

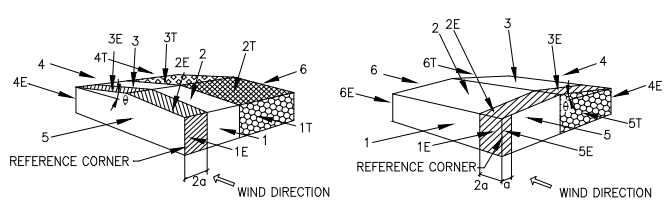
Net Pressures (psf), Torsional Load Cases

| Surface | Roof angle $q = 18.43$ | | |
|---------|------------------------|------------------|------------------|
| | $G C_{p_f}$ | Net Press. W/ | |
| | | (+ $G C_{p_i}$) | (- $G C_{p_i}$) |
| 1T | 0.52 | 2.06 | 4.26 |
| 2T | -0.69 | -5.33 | -3.12 |
| 3T | -0.47 | -3.97 | -1.77 |
| 4T | 0.00 | -3.64 | -1.44 |
| Surface | Roof angle $q = 0.00$ | | |
| | $G C_{p_f}$ | Net Press. W/ | |
| | | (+ $G C_{p_i}$) | (- $G C_{p_i}$) |
| 5T | 0.40 | 1.35 | 3.55 |
| 6T | -0.29 | -2.88 | -0.67 |

+ / - Wind Pressure 64%



Load Case A (Transverse) Load Case B (Longitudinal)
Basic Load Cases



Load Case A (Transverse) Load Case B (Longitudinal)
Torsional Load Cases

Design pressures for components and cladding

$$p = q_h [(G C_p) - (G C_{pi})]$$

where: p = pressure on component. (Eq. 30.3-1, pg 33)

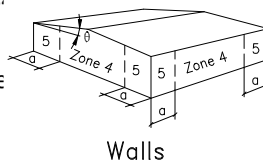
$$p_{min} = 16.00 \text{ psf (ASCE 7-16 30.2.2)}$$

$G C_p = 1.00$ external pressure coefficient
 see table below. (ASCE 7-16 30.3.2)

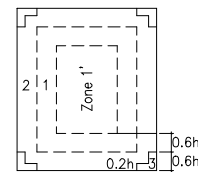
$$q = 18.43 \text{ }^\circ$$

$$p_{overhang} = -84.48 \text{ psf}$$

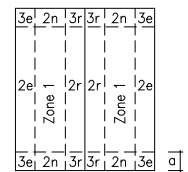
(ASCE 7-16 28.3.3)



Walls



Roof $\theta \leq 7^\circ$



Roof $\theta > 7^\circ$

| Comp. & Cladding Coeffs. | Effective Area (ft ²) | Zone 1 | | Zone 1' | | Zone 2 | | Zone 2e | | Zone 2n | | Zone 2r | |
|-----------------------------------|-----------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | | GC _p | -GC _p | GC _p | -GC _p | GC _p | -GC _p | GC _p | -GC _p | GC _p | -GC _p | GC _p | -GC _p |
| | 2133 | 0.30 | -0.80 | 0.30 | -0.80 | 0.30 | -2.20 | 0.30 | -0.80 | 0.30 | -1.00 | 0.30 | -1.00 |
| Effective Area (ft ²) | Zone 3 | | Zone 3e | | Zone 3r | | Zone 4 | | Zone 5 | | | | |
| | GC _p | -GC _p | GC _p | -GC _p | GC _p | -GC _p | GC _p | -GC _p | GC _p | -GC _p | GC _p | -GC _p | |
| 27 | 0.30 | -2.50 | 0.30 | -2.50 | 0.30 | -1.80 | 0.99 | -1.09 | 0.99 | -1.38 | | | |

| Comp. & Cladding Pressures | Zone 1 | | Zone 1' | | Zone 2 | | Zone 2e | | Zone 2n | | Zone 2r | |
|----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------------------------|----------|----------|
| | Positive | Negative | Positive | Negative | Positive | Negative | Positive | Negative | Positive | Negative | Positive | Negative |
| | 2.94 | -15.18 | 2.94 | -15.18 | 2.94 | -49.46 | 2.94 | -15.18 | 2.94 | -20.08 | 2.94 | -20.08 |
| | Zone 3 | | Zone 3e | | Zone 3r | | Zone 4 | | Zone 5 | | | |
| Positive | Negative | Positive | Negative | Positive | Negative | Positive | Negative | Positive | Negative | (Max Pressure 56.81 psf) | | |
| 2.94 | -56.81 | 2.94 | -56.81 | 2.94 | -39.67 | 19.82 | -22.27 | 19.82 | -29.36 | | | |

| LOAD CASE 'A' FACTORED LOADS | |
|--|-----------------|
| $0.6 * W_r = (Z_2 + Z_3) * 0.6 =$ | 3.3 psf |
| $0.6 * W_{rE} = (Z_{2E} + Z_{3E}) * 0.6 =$ | 5.8 psf |
| $0.6 * W_w = (Z_1 + Z_4) * 0.6 =$ | 13.7 psf |
| $0.6 * W_{wE} = (Z_{1E} + Z_{4E}) * 0.6 =$ | 20.5 psf |

| LOAD CASE 'B' FACTORED LOADS | |
|--|-----------------|
| $0.6 * W_r = (Z_2 + Z_3) * 0.6 =$ | 4.7 psf |
| $0.6 * W_{rE} = (Z_{2E} + Z_{3E}) * 0.6 =$ | 7.9 psf |
| $0.6 * W_w = (Z_5 + Z_6) * 0.6 =$ | 10.1 psf |
| $0.6 * W_{wE} = (Z_{5E} + Z_{6E}) * 0.6 =$ | 15.3 psf |

| ROOF COMPONENTS FACTORED LOAD | |
|-------------------------------|-----------------|
| $0.6 * Z_{r,c\&c} =$ | 12.0 psf |

| WALL COMPONENTS FACTORED LOAD | |
|-------------------------------|-----------------|
| $0.6 * Z_{w,c\&c} =$ | 13.4 psf |

OSB SEISMIC LOADING ANALYSIS

IBC / ASCE 7: Equivalent Lateral Force (ELF) Procedure:

INPUT DATA

Typical floor height: $h = 9$ ft
 Typical floor weight: $w_x = 154.4$ kips
 Number of floors: $n = 2$
 Importance factor (ASCE 11.5.1): $I_e = 1.00$
 Design spectral response: $S_{DS} = 0.41$ g
 $S_{D1} = 0.20$ g
 Mapped spectral resp.: $S_1 = 0.13$ g
 Period Parameter, C_t :
 (ASCE Tab 12.8-2): $C_t = 0.020$
 Resp. coefficient: (ASCE
 Tab. 12.2.1): $R = 6.5$
 Seismic design category: SDC = C
 $h_n = 21.3$ ft

DESIGN SUMMARY

$C_s = 1.2 * S_{DS} / (R / I_e) = 0.0753$ <= Applicable
 Period Parameter, $x = 0.75$, ASCE Tab 12.8-2
 Period: $T_a = C_t (h_n)^x = 0.20$ sec, ASCE 12.8.2.1
 $C_s < S_{D1} / [(R / I_e) T_a] = 0.1530$, ASCE Tab 12.8.1.1 <= Not Applicable
 $C_s > 0.044 S_{DS} I_e = 0.0179$, ASCE Tab 12.8.1.1 <= Not Applicable
 $C_s > 0.5 S_1 / (R / I_e) = 0.0100$, ASCE Tab 12.8.1.1 <= Not Applicable
 $k = 2.14$, (ASCE 12.8.3, page 91)
 $V = C_s W = 0.0753$ W
 $0.7 * V = 0.0527$ W
 $W = 309$ kips, total

SEISMIC COMPONENT & ANCHORING ANALYSIS

Out-of-plane seismic force for wall design (ASCE 7, Sec.12.11.1)

$$w_{1, seismic} = MAX(0.4 I S_{DS} W_p, 0.1 W_p) = 0.2 W_p = 0.2 \text{ psf} \quad \leq \text{USE FOR DIAPHRAGMS}$$

Where: $W_p = 1.0$ psf , $I_e = 1.00$
 (CBC / IBC Tab. 1604.5 & ASCE 7 Tab. 1.5-2)

Out-of-plane seismic force for anchorage design

For seismic design category A & B, any diaphragm (ASCE 7 Sec. 12.11.2)

$$F_{anch, seismic} = MAX \left[0.4 S_{DS} I W_p \frac{(h+h_p)^2}{2h}, 0.1 W_p \frac{(h+h_p)^2}{2h}, 400 S_{DS} I, F_{min} \right] =$$

Where: $F_{min} = 0.17$ plf, $1.53 W_p = 163$ plf (Horizontal) <= Not Applicable
 (ASCE 7 Sec. 12.11.2 & 11.7.3)

For seismic design category C and above, flexible diaphragm (ASCE 7 Sec. 12.11.2.1)

$$F_{anch, seismic} = MAX \left[0.8 S_{DS} I W_p \frac{(h+h_p)^2}{2h}, 0.1 W_p \frac{(h+h_p)^2}{2h}, 400 S_{DS} I, F_{min} \right] =$$

= $3.06 W_p = 163$ plf (Horizontal) <= Applicable

For connections (ASCE 7 Sec. 12.11.2.1)

$$F_{conn, seismic} = MAX [0.133 S_{DS} w_p, 0.5 w_p] = 0.5 W_p = 0.5 \text{ plf (Horizontal)}$$

GYP SEISMIC LOADING ANALYSIS

IBC / ASCE 7: Equivalent Lateral Force (ELF) Procedure:

INPUT DATA

Typical floor height: $h = 9$ ft
 Typical floor weight: $w_x = 154.4$ kips
 Number of floors: $n = 2$
 Importance factor (ASCE 11.5.1): $I_e = 1.00$
 Design spectral response: $S_{DS} = 0.41$ g
 $S_{D1} = 0.20$ g
 Mapped spectral resp.: $S_1 = 0.13$ g
 Period Parameter, C_t :
 (ASCE Tab 12.8-2): $C_t = 0.020$
 Resp. coefficient: (ASCE
 Tab. 12.2.1): $R = 2$
 Seismic design category: SDC = C
 $h_n = 21.3$ ft

DESIGN SUMMARY

$C_s = 1.2 * S_{DS} / (R / I_e) = 0.2447$ <= Applicable
 Period Parameter, $x = 0.75$, ASCE Tab 12.8-2
 Period: $T_a = C_t (h_n)^x = 0.20$ sec, ASCE 12.8.2.1
 $C_s < S_{D1} / [(R / I_e) T_a] = 0.4973$, ASCE Tab 12.8.1.1 <= Not Applicable
 $C_s > 0.044 S_{DS} I_e = 0.0179$, ASCE Tab 12.8.1.1 <= Not Applicable
 $C_s > 0.5 S_1 / (R / I_e) = 0.0325$, ASCE Tab 12.8.1.1 <= Not Applicable
 $k = 2.14$, (ASCE 12.8.3, page 91)
 $V = C_s W = 0.2447$ W
 $0.7 * V = 0.1713$ W
 $W = 309$ kips, total

SEISMIC COMPONENT & ANCHORING ANALYSIS

Out-of-plane seismic force for wall design (ASCE 7, Sec.12.11.1)

$$w_{1, seismic} = MAX(0.4 I S_{DS} W_p, 0.1 W_p) = 0.2 W_p = 0.2 \text{ psf} \quad \leq \text{USE FOR DIAPHRAGMS}$$

Where: $W_p = 1.0$ psf , $I_e = 1.00$
 (CBC / IBC Tab. 1604.5 & ASCE 7 Tab. 1.5-2)

Out-of-plane seismic force for anchorage design

For seismic design category A & B, any diaphragm (ASCE 7 Sec. 12.11.2)

$$F_{anch, seismic} = MAX \left[0.4 S_{DS} I W_p \frac{(h+h_p)^2}{2h}, 0.1 W_p \frac{(h+h_p)^2}{2h}, 400 S_{DS} I, F_{min} \right] =$$

Where: $F_{min} = 0.17$ plf, $1.53 W_p = 163$ plf (Horizontal) <= Not Applicable
 (ASCE 7 Sec. 12.11.2 & 11.7.3)

For seismic design category C and above, flexible diaphragm (ASCE 7 Sec. 12.11.2.1)

$$F_{anch, seismic} = MAX \left[0.8 S_{DS} I W_p \frac{(h+h_p)^2}{2h}, 0.1 W_p \frac{(h+h_p)^2}{2h}, 400 S_{DS} I, F_{min} \right] =$$

= $3.06 W_p = 163$ plf (Horizontal) <= Applicable

For connections (ASCE 7 Sec. 12.11.2.1)

$$F_{conn, seismic} = MAX [0.133 S_{DS} w_p, 0.5 w_p] = 0.5 W_p = 0.5 \text{ plf (Horizontal)}$$

1) FOUNDATIONS & SLAB ON GRADE:

- a) INSTALL FOUNDATION AND PREPARE SOILS FOR SLABS & FOUNDATIONS ACCORDING TO IBC CHAPTER 18. PROVIDE POSITIVE DRAINAGE AWAY FROM STRUCTURE AND AVOID EXCESSIVE WETTING & DRYING DURING EXCAVATIONS.
- b) ALL FOOTING AND FOUNDATION DESIGNS ARE BASED ON AN ALLOWABLE SOIL BEARING CAPACITY (SEE DESIGN CRITERIA) OF COMPETENT NATIVE SOIL. IF THE SITE HAS A LOWER BEARING CAPACITY THAN ASSUMED THE FOUNDATION PLAN WILL NEED TO BE REDESIGNED. IF SOIL IS DISTURBED, COMPACT SOIL IN 8" LIFTS TO 95% MAXIMUM DRY DENSITY PER ASTM D1557 OR IN ACCORDANCE WITH GEOTECHNICAL REPORT ASSOCIATED WITH PROJECT.
- c) REPLACE ANY ENCOUNTERED EXISTING FILL WITH COMPACTED FILL, SEE NOTE 1.A. ABOVE FOR MORE INFORMATION.
- d) MINIMUM FROST DEPTH (SEE DESIGN CRITERIA) FROM LOWEST ADJACENT FINISH GRADE TO BOTTOM OF FOOTING SHALL BE MAINTAINED FOR ALL EXTERIOR FOOTINGS.
- e) CONTRACTOR TO VERIFY LOCATIONS FOR STEP FOOTINGS AND FOUNDATION WALLS BASED ON SITE RELATED FINISHED GRADE, IF NECESSARY. FOOTING STEPS ARE TO BE A MAXIMUM OF (2) VERTICALLY TO (1) HORIZONTALLY.
- f) ALL SLABS SHALL HAVE REINFORCING PER PLANS & CONTROL JOINTS AT 10'-0" SPACING MAXIMUM.
- g) ALL STRUCTURAL FILL BELOW FOOTINGS SHALL EXTEND OUT PAST FOOTINGS AT A SLOPE OF 1 VERTICAL TO 2 HORIZONTAL UNITS TO COMPETENT SOILS.
- h) PROVIDE ADEQUATE DRAINAGE BEHIND ALL WALLS TO ALLEVIATE ANY STANDING WATER.
- i) ALL CONCRETE PAD & APRON LOCATIONS TO BE SECURED TO FOUNDATION WITH #4 DOWELS AT 24" O.C. EXTEND EXPOSED SIDES A MINIMUM OF 8" BELOW FINISHED GRADE.
- j) MINIMUM CONCRETE SLAB DEPTH IS 4".

2) CONCRETE:

- a) ALL CONCRETE WORK TO BE DONE IN ACCORDANCE WITH THE CURRENT ACI "STANDARD SPECIFICATION FOR STRUCTURAL CONCRETE" UNLESS NOTED.
 - b) USE ASTM C150 COMPLIANT TYPE I/II CEMENT, MINIMUM OF 450#/YARD.
 - c) ALLOW 5% (WITHIN 1.5%) ENTRAINED AIR IN EXPOSED CONCRETE.
 - d) ALLOW 4" MAXIMUM SLUMP (WITHOUT SUPERPLASTICIZER).
 - e) USE ¾" MAXIMUM NORMAL WEIGHT AGGREGATE. USE OF CHLORIDE ADMIXTURES IS PROHIBITED.
 - f) THE MINIMUM COMPRESSIVE STRENGTHS FOR CONCRETE AT 28 DAYS SHALL BE AS FOLLOWS
- 3) (DESIGNED USING 2,500 PSI):
- i) ALL FOOTINGS, FOUNDATIONS, AND STEM WALLS F'C = 3,000 PSI.
 - ii) SLABS ON GRADE F'C = 3,500 PSI.
- b) MINIMUM CLEAR PROTECTION FOR REINFORCEMENT SHALL BE AS FOLLOWS:
 - i) PLACED DIRECTLY AGAINST EARTH: 3".
 - ii) FORMED SURFACES #5 BARS OR SMALLER: 1-1/2".
 - iii) STRUCTURAL SLABS & INTERIOR WALLS: 1".
 - c) ALL EMBEDDED ANCHOR BOLTS SHALL BE A36 OR A307 OR F1554 GR. 36 STEEL W/ 7" MIN. EMBEDMENT. ANCHOR BOLTS TO BE WITHIN 1'-0" OF SILL PLATE ENDS, WITH A MIN. OF TWO PER WALL AND NO CLOSER THAN 6" FROM CONCRETE WALL CORNERS.
 - d) SAWN CONTROL & CONSTRUCTION JOINTS SHALL BE MADE AS SOON AS POSSIBLE WITHOUT DAMAGE TO THE SURFACE. FILLING OF SAWN JOINTS WHERE REQUIRED SHALL BE DELAYED AS LONG AS POSSIBLE TO ALLOW MAXIMUM SHRINKAGE TO OCCUR IN SLABS.
 - e) PROTECT ALL CONCRETE FROM FREEZING.
 - f) WET SETTING OF REINFORCING BARS IN FOOTINGS AND WALLS IS NOT ALLOWED.
 - g) BLOCK-OUT ALL STEM WALLS AT ENTRIES AS REQUIRED.
 - h) CONCRETE FORM WORK TO BE OF ADEQUATE STRENGTH AND BRACED TO PREVENT DEFORMATION.
 - i) ALL LOWER LEVEL AND RETAINING WALLS WHICH HAVE FILL HIGHER THAN AN INTERIOR FLOOR LEVEL SHALL HAVE AN APPROVED WATERPROOFING MEMBRANE APPLIED TO WITHIN 3" OF FINISHED GRADE HEIGHT.

- 4) PROVIDE ADEQUATE TEMPORARY BRACING OF CONCRETE AND/OR CMU RETAINING WALLS DURING BACKFILL PRIOR TO INSTALLATION OF MAIN FLOOR FRAMING AND BASEMENT CONCRETE SLAB ON GRADES. WALL DESIGNS ARE BASED ON TOP OF WALL RESTRAINED BY FINISHED FLOOR SYSTEM AND RESISTING SLIDING BY HAVING BASEMENT CONCRETE SLAB ON GRADE FLOOR INSTALLED.
- a) REQUIRE THAT ALL GRADING, EXCAVATION, AND INSTALLATION OF FOUNDATIONS BE PERFORMED UNDER THE INSPECTION AND TESTING OF A QUALIFIED GEOTECHNICAL CONSULTANT DURING THE CRITICAL STAGES OF CONSTRUCTION.
 - b) STAIN & TEXTURE OF EXPOSED CONCRETE SURFACES PER OWNER'S DIRECTION.
 - c) USE SIMPSON 'SET' OR EQUIVALENT FOR FASTENING POST-INSTALLED ANCHORS TO EXISTING CONCRETE.
 - d) USE 6x6-W4.0xW4.0 WELDED WIRE FABRIC (WWF) FOR SLABS REQUIRING REINFORCEMENT (UNLESS NOTED). PLACE 1-1/2" FROM BOTTOM OF SLAB USING APPROVED METAL DEVICES. LAP ONE FULL MESH AT SPLICES.
 - e) USE ASTM C827 COMPLIANT NON-METALLIC, NON-SHRINK, 3-DAY 4000 PSI GROUT FOR BASEPLATES.
 - f) USE ASTM C1116 COMPLIANT FIBRILLATED POLYPROPYLENE TO REINFORCE SLABS (IF USING FIBER REINFORCEMENT IN LIEU OF WWF).
- 5) REINFORCING STEEL:
- a) PLACE REBAR ACCORDING TO CURRENT ACI DETAILING MANUAL.
 - b) USE ASTM A615 COMPLIANT GRADE 60 BARS; IF INTENDED TO BE WELDED, USE ASTM A706 COMPLIANT GRADE 60 BARS (WELDING OF REBAR NOT PERMITTED UNLESS SPECIFICALLY NOTED OR DETAILED).
 - c) MINIMUM LENGTH OF LAPPED SPLICES SHALL BE 48 TIMES BAR DIAMETER UNLESS NOTED. SPLICE TOP BARS NEAR MID-SPAN, BOTTOM BARS NEAR SUPPORTS.
 - d) OTHERWISE. STAGGER SPLICES IN WALLS SO THAT NO TWO ADJACENT BARS ARE SPLICED IN THE SAME LOCATION.
 - e) WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185, FY = 75,000 PSI.
 - f) REINFORCING SHALL BE CONTINUOUS THROUGH ALL COLD JOINTS.
 - g) PROVIDE CORNER BARS W/ 18" LEGS AT CORNERS AND INTERSECTING WALLS AND FOOTINGS, SIZE AND PLACEMENT TO MATCH HORIZONTAL REINFORCEMENT.
 - h) PROVIDE #4 CONTINUOUS HORIZONTALS AT TOP OF WALL, (2) #4 CONTINUOUS IN FOOTINGS, AND (2) #4 CONTINUOUS ABOVE ALL OPENINGS U.N.O. PROVIDE #4 HORIZONTALS AT ALL INTERSECTING FLOORS AND ROOF LEVELS, BOTTOM OF ALL WINDOWS AND AT 10'-0" O.C. MAXIMUM OR PER PLANS.
 - i) PROVIDE #4 VERTICALS AT 24" O.C. AT EACH SIDE OF WALL OPENINGS AND AT EACH END OF WALLS W/ STANDARD HOOK EXTENDING INTO FOOTING.
 - j) PROVIDE FOUNDATION HOLDOWNS AT ALL SHEAR WALL LOCATIONS PER PLAN, IF APPLICABLE.
- 6) WOOD FRAMING:
- a) STRUCTURAL LUMBER SHALL BE DOUGLAS FIR-LARCH (DF-L) #2 OR BETTER.
 - b) WOOD INSTALLED WITHIN 1" OF CONCRETE OR MASONRY SHALL BE REDWOOD OR PRESSURE TREATED.
 - c) PROVIDE WET USE ADHESIVES.
 - d) MAXIMUM LUMBER MOISTURE CONTENTS SHALL BE 15%.
 - e) ALL FRAMING SHALL BE IN ACCORDANCE WITH THE ADOPTED CODE.
 - f) PROVIDE SOLID BLOCKING BELOW ALL BEARING WALLS AND POSTS. PROVIDE BLOCKING AT 24" O.C. AT JOISTS PARALLEL WITH BEARING WALLS ABOVE.
 - g) MINIMUM HEADER AT BEARING WALL TO BE 4x8 WITH 2x6 TRIMMER STUD PLUS 2x6 KING STUD EACH SIDE. HEADERS WITH LARGER LOADING OR DIFFERENT BEARING/KING STUD CONDITIONS WILL BE CALLED OUT IN PLANS.
 - h) BLOCK AND NAIL ALL HORIZONTAL PANEL EDGES AT SHEAR WALLS & AS NOTED ON THE PLAN.
 - (1) ROOF SHEATHING IN AREAS W/ SNOW LOAD < 50 PSF: 7/16" CDX MINIMUM, 24/16 SPAN RATING WITH 8D AT 6" O.C. EDGE AND 12" O.C. FIELD U.N.O.

- (2) ROOF SHEATHING IN AREAS W/ SNOW LOAD > 50 PSF: 19/32" CDX MINIMUM, 32/16 SPAN RATING WITH 8D AT 6" O.C. EDGE AND 12" O.C. FIELD U.N.O.
- (3) FLOOR SHEATHING: 3/4" CDX MINIMUM, 48/24 SPAN RATING WITH 10D AT 6" O.C. EDGE AND 12" O.C. FIELD U.N.O.
- (4) EXT. WALL SHEATHING: 7/16" CDX MINIMUM, 24/16 SPAN RATING WITH AT 6" O.C. EDGE AND 12" O.C. FIELD U.N.O.

(5) ALL SPAN RATINGS TO MEET LOCAL CODES.

- i) ORIENTED STRAND BOARD (OSB) WITH THE SAME SPAN RATING MAY BE SUBSTITUTED FOR PLYWOOD NOTED ABOVE. SHEATHING SHALL BE APA RATED EXPOSURE 1. STAGGER SHEATHING END JOINTS 4'-0". PROVIDE 1/8" MINIMUM SPACE AT ALL PANEL EDGES FOR EXPANSION.
 - j) ALL EXTERIOR WALLS TO BE 2x6 AT 16" O.C. AND INTERIOR NON-LOAD BEARING PARTITIONS TO BE 2x4 AT 16" O.C. STUD WALLS (U.N.O. ON PLAN).
 - k) PROVIDE STEEL STRAPS AT PIPES IN STUD WALLS AS REQUIRED BY THE ADOPTED CODE.
 - l) OVER-FRAMING SHALL BE DONE SUCH THAT VERTICAL LOADS ARE TRANSFERRED TO MAIN STRUCTURE BELOW BY DIRECT BEARING AT SPACING NOT TO EXCEED 24" O.C. FOR RAFTERS AND 48" FOR POSTS WHEN SNOW LOAD LESS THAN 50 PSF.
 - m) METAL HANGERS AND CONNECTIONS ARE 'SIMPSON' AND SHALL BE INSTALLED PER 'SIMPSON' RECOMMENDATIONS.
 - n) ENGINEERED "I" JOISTS TO CONFORM TO ASTM D2559 AND BE DESIGNED, CERTIFIED, ERECTED, INSTALLED, AND BRACED PER MANUFACTURER'S SPECS. ALL REFERENCES ON PLANS ARE FOR WEYERHAEUSER PRODUCTS. USE THESE PRODUCTS OR AN APPROVED EQUIVALENT.
 - o) ALL MICROLLAM LVL PRODUCTIONS SHALL CONFORM TO ASTM D2559 AND HAVE THE MINIMUM SECTION PROPERTIES OF $F_b = 2600$ PSI, $F_v = 285$ PSI, $E = 2,000,000$ PSI.
 - p) ALL ROOF OPENINGS GREATER THAN 12"x12" SHALL BE FRAMED IN OPENINGS.
-
- q) GLUE-LAM BEAMS SHALL CONFORM TO ANSI/AITC A190.1 AND BE DOUGLAS FIR COMBINATION 24F-V4 FOR SIMPLY SUPPORTED AND 24F-V8 FOR CANTILEVERED AND/OR DOUBLE SPAN BEAMS, $F_b = 2400$ PSI, $F_v = 165$ PSI, $E = 1,600,000$ PSI. PROVIDE WET USE GLUE ON ALL EXTERIOR LOCATIONS.
 - r) ALL NAILS SPECIFIED TO BE COMMON WIRE NAILS U.N.O.

7) PRE-MANUFACTURED METAL PLATED TRUSSES:

- i) TRUSS MANUFACTURER TO PROVIDE PROOF OF 3RD PARTY INSPECTION PER IBC 2303.4.
- ii) PRE-MANUFACTURED TRUSS PROVIDER TO VERIFY ALL LOADING PATTERNS TO FOOTINGS BELOW.
- b) PRE-MANUFACTURED TRUSS PROVIDER TO PROVIDE SUPPORT AT TRUSSES FOR LOADING SHOWN ON ALL PLANS, SECTIONS AND DETAILS. VERIFY SECOND FLOOR LOADING AND SPECIAL CASE POINT LOADING FROM FRAMED ROOF SYSTEMS.
- c) ALL PRE-MANUFACTURED ROOF TRUSSES SHALL BE DESIGNATED AS A DEFERRED SUBMITTAL AND DESIGNED FOR THE ROOF LOADS SHOWN AND ACCOUNT FOR ANY REQUIRED ADDITIONAL DRIFT, VALLEY, OR EAVE LOADS PER CODE.
- d) IN ADDITION TO 7 PSF DEAD LOAD ON TOP CHORD, DESIGN BOTTOM CHORD FOR 10 PSF LIVE LOAD AND 10 PSF DEAD LOAD.
- e) TRUSS SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD (E.O.R.) FOR REVIEW AND COMPLIANCE.

8) GENERAL STRUCTURAL NOTES:

- a) CONTRACTOR TO VERIFY ALL OPENINGS, BUILDING DIMENSIONS, COLUMN LOCATIONS AND DIMENSIONS WITH OWNER, ENGINEER, DRAFTER, AND/OR COMPONENT MANUFACTURERS PRIOR TO POURING OF ANY CONCRETE FOUNDATIONS OR CONSTRUCTION.

- b) THE ENGINEER OF RECORD IS NOT RESPONSIBLE FOR ANY DEVIATIONS FROM THESE PLANS UNLESS SUCH CHANGES ARE AUTHORIZED IN WRITING TO THE ENGINEER OF RECORD.
- c) THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SAFE AND ADEQUATE SHORING AND/OR TEMPORARY STRUCTURAL STABILITY FOR ALL PARTS OF THE STRUCTURE DURING CONSTRUCTION. THE STRUCTURE SHOWN ON THE DRAWINGS HAS BEEN DESIGNED FOR FINAL CONFIGURATION.
- d) NOTCHING AND/OR CUTTING OF ANY STRUCTURAL MEMBER IN THE FIELD IS PROHIBITED, UNLESS PRIOR CONSENT IS GIVEN BY THE ENGINEER OF RECORD.
- e) DIMENSIONS SHOWN DO NOT INCLUDE THE THICKNESS OF ANY APPLIED FINISH MATERIALS. DIMENSIONS ARE EITHER TO FACE OF STUD, FACE OF MASONRY, OR CENTERLINE OF OPENINGS/STRUCTURE.
- f) ALL WORK TO CONFORM TO ALL LOCAL, STATE, AND NATIONAL CODES.
- g) CONTRACTOR IS RESPONSIBLE FOR ALL FEES, PERMITS, AND INSPECTIONS AS REQUIRED BY GOVERNING AGENCY.
- h) ALL ELEVATION REFERENCES ARE FROM THE MAIN FLOOR ELEVATION, SET AT 0'-0".
- i) ALL SHOP DRAWINGS FOR STRUCTURAL SYSTEMS TO BE REVIEWED AND STAMPED BY THE ENGINEER OF RECORD.

9) SPECIAL INSPECTIONS & STRUCTURAL OBSERVATIONS:

- a) PER IBC SECTION 1704, WHEN SPECIFICALLY REQUIRED BY THE LOCAL JURISDICTION, A REPRESENTATIVE FROM THE ENGINEER OF RECORD'S OFFICE SHALL BE PRESENT TO PERFORM ON-SITE STRUCTURAL OBSERVATION VISITS. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF ALL SIGNIFICANT TIMES OF CONSTRUCTION WITH THE ENGINEER OF RECORDS OFFICE PRIOR TO THE DAY OF CONSTRUCTION AND/OR PLACEMENT (MINIMUM OF 7 DAYS). SIGNIFICANT TIMES OF CONSTRUCTION ARE AS FOLLOWS:
 - i) PLACEMENT OF STRUCTURALLY RELATED REINFORCED CONCRETE FOUNDATIONS, INCLUDING REBAR.
 - ii) PLACEMENT OF PERIMETER LOAD BEARING WALLS, LOAD SUPPORTING BEAMS AND/OR HEADERS AND LATERAL RESISTING CONNECTION ELEMENTS.
 - iii) COMPLETION OF STRUCTURAL SYSTEMS AS REQUIRED AND/OR DEFINED BY THE LOCAL JURISDICTION.
- b) STRUCTURAL OBSERVATIONS DO NOT INCLUDE OR WAIVE THE RESPONSIBILITY FOR THE SPECIAL INSPECTIONS REQUIRED BY THE IBC SECTION 1705 OR OTHER SECTIONS OF THE CODE AS REQUIRED BY THE LOCAL BUILDING JURISDICTION.
- c) ALL SPECIAL INSPECTIONS SHALL BE PERFORMED TO MEET THE REQUIRMENTS OF THE LATEST IBC AND THE LOCAL BUILDING JURISDICTION.
 - i) ALL SPECIAL INSPECTIONS SHALL BE PERFORMED BY A QUALIFIED PERSON WHO SHALL SHOW COMPETANCE TO THE SATISFACTION OF THE BUILDING OFFICIAL, OWNER, ARCHITECT AND ENGINEER OF RECORD FOR THE PARTICULAR OPERATION. ALL SPECIAL INSPECTION REPORTS SHALL BE SUBMITTED TO THE BUILDING DEPARTMENT AND ENGINEER OF RECORD WITH THE PROJECT INFORMATION AND ADDRESS.

WIND / SEISMIC SHEAR FORCE CALCULATIONS:

From ASCE 7-16 Wind & Seismic Loading Analysis

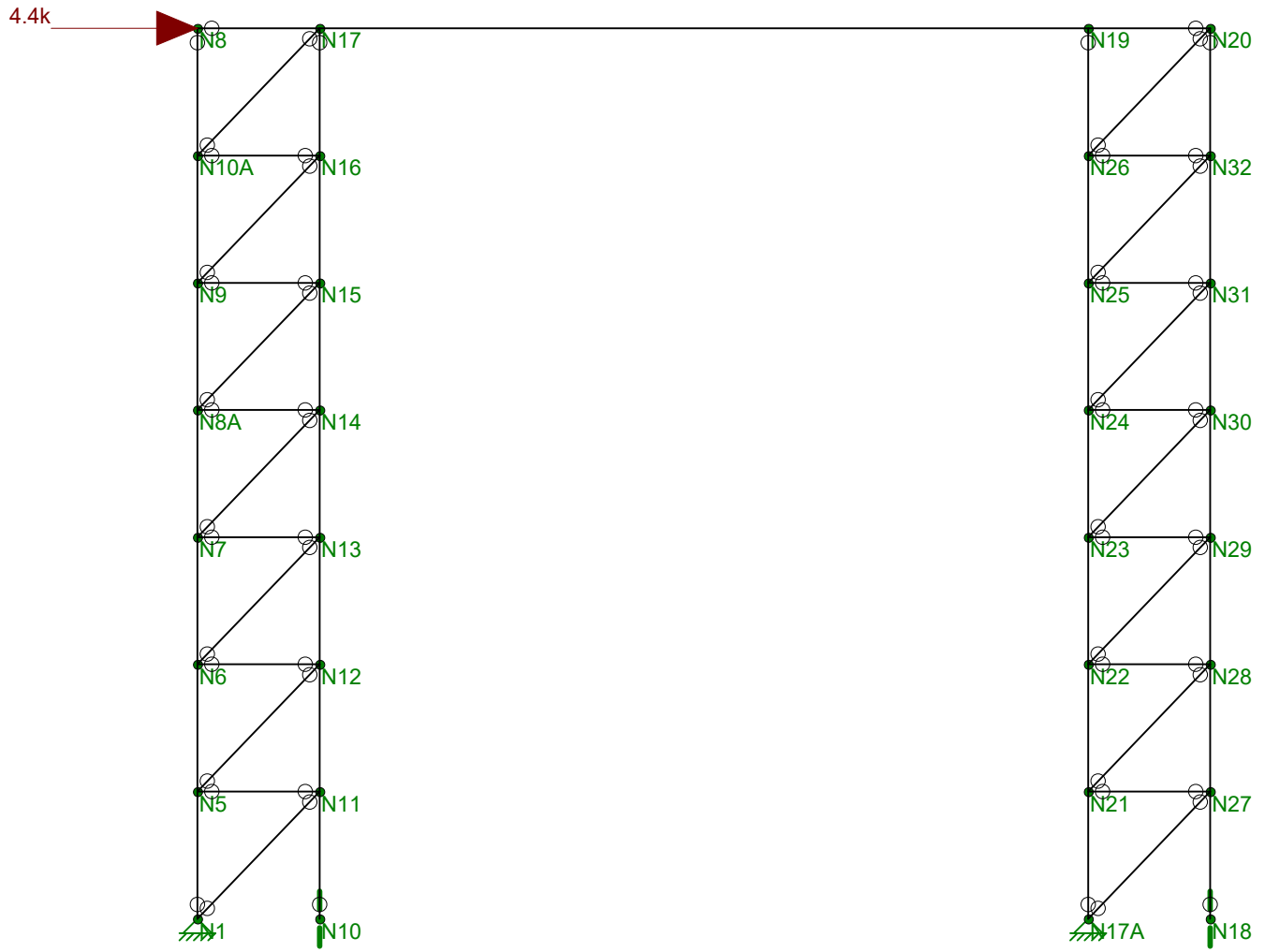
| Wall Line | Roof / Floor | | | | | | Wall | | | | | Load above | | *C _s (Wp) | = | Loading | | |
|-----------|------------------|---------------|------------------------|-------------|-------------|------------------|---------------|--------------|---------------------|-----------------------|----------|-------------|-------------------|----------------------|------|----------------------|-----------------|--|
| | Wind Force (psf) | Diaph. Weight | Wr, We truss trib (ft) | Area W (ft) | Area L (ft) | Wind Force (psf) | Wall DL (psf) | Wall ht (ft) | wall line dist (ft) | Upr. Flr Wall ht (ft) | Wind (#) | Seismic (#) | Wind Force (kips) | | | Seismic Force (kips) | Lateral Control | |
| X1-2 | 9.6 | 55 | 3.5 | 60.0 | 20.0 | 15.1 | 19.0 | 10.8 | 60.0 | | | | 0.05 | = | 3.44 | 2.37 | Wind | |
| X2-2 | 9.6 | 55 | 3.5 | 60.0 | 20.0 | 15.1 | 19.0 | 10.8 | 60.0 | | | | 0.05 | = | 3.44 | 2.37 | Wind | |
| Y1-2 | 9.6 | 55 | 3.5 | 20.0 | 60.0 | 17.8 | 19.0 | 10.8 | 20.0 | | | | 0.05 | = | 1.30 | 1.94 | Seismic | |
| Y2-2 | 9.6 | 55 | 3.5 | 20.0 | 60.0 | 17.8 | 19.0 | 10.8 | 20.0 | | | | 0.05 | = | 1.30 | 1.94 | Seismic | |
| X1-1 | 9.6 | 55 | 5.0 | 60.0 | 33.5 | 15.1 | 19.0 | 16.0 | 60.0 | 0.0 | 0 | 0 | 0.05 | = | 3.23 | 2.46 | Wind | |
| X2-1 | 0.0 | 18 | 0.0 | 60.0 | 33.5 | 15.1 | 19.0 | 16.0 | 60.0 | 5.5 | 3.44 | 2.37 | 0.05 | = | 6.10 | 2.74 | Wind | |
| Y1-1 | 9.6 | 55 | 5.0 | 43.0 | 60.0 | 15.6 | 19.0 | 16.0 | 43.0 | 0 | 0 | 0 | 0.05 | = | 3.72 | 4.39 | Seismic | |
| Y2-1 | 0.0 | 18 | 0.0 | 24.0 | 24.0 | 17.2 | 8.0 | 16.0 | 24.0 | 5.5 | 1.30 | 1.94 | 0.17 | = | 4.07 | 3.35 | Wind | |

SHEAR WALL CALCULATIONS:

| | | X1-2 | X2-2 | Y1-2 | Y2-2 | | |
|--|--|-------------|-------------|------------------|------------------|--|--|
| Shear Wall Forces | | | | | | | |
| Total length of wall | | 20.00 ft | 20.00 ft | 60.00 ft | 60.00 ft | | |
| Total length of shear wall | L = | 20.00 ft | 20.00 ft | 49.16 ft | 33.50 ft | | |
| Total length of full ht seg. | L _w = | 14.99 ft | 9.00 ft | 12.00 ft | 12.75 ft | | |
| height of shear wall | H = | 10.75 ft | 8.00 ft | 10.00 ft | 11.50 ft | | |
| Maximum opening height | H' = | 2.00 ft | 8.00 ft | 2.00 ft | 10.00 ft | | |
| Total force at top of wall | V ₁ = | 3439 lbs | 3439 lbs | 1939 lbs | 1939 lbs | | |
| Self weight | W _{DL self} = | 204 plf | 152 plf | 190 plf | 219 plf | | |
| Applied dead load | W _{DL above} = | 60 plf | 60 plf | 60 plf | 60 plf | | |
| Prefered OSB thickness | in | 7/16 | 7/16 | 7/16 | 7/16 | | |
| Prefered Gyp thickness | in | 1/2 | 1/2 | 1/2 | 1/2 | | |
| Wall Connected to Concrete | y/n = | N | N | N | Y | | |
| Shear Wall Segments | | | | | | | |
| | | 4.83 | 3.00 | 4.00 | 8.75 | | |
| | | 10.16 | 6.00 | 4.00 | 4.00 | | |
| | | | | 4.00 | | | |
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| | | | | | | | |
| | | | | | | | |
| Shear Transfer to Concrete | | | | | | | |
| | T = | 355 lbs | 2867 lbs | Not Req'd | Not Req'd | | |
| Provide: | | | | | 72" O.C. | | |
| Min # of 1/2 Anchor Bolts | | | | | Code Min. | | |
| Load From Above | | | | | (2) Min | | |
| Holddown | | 0.00 | 0.00 | 0.00 | 0.00 | | |
| | | Perp. Wall | S3 | | | | |
| Shear Resisting System | | | | | | | |
| Force Calculated | | 229.43 | 802.46 | 161.56 | 303.57 | | |
| | | OSB | OSB | OSB | OSB | | |
| Min Shear Wall Segment: | | 3.07 ft | 2.29 ft | 2.86 ft | 3.29 ft | | |
| Provide: | V _a = | SW1 | SW4 | SW1 | SW1 | | |
| Min Shear Wall Segment: | | | | | | | |
| Provide: | V _a = | | | | | | |
| Blocking / Nailing Framing Attachment | | | | | | | |
| Blocking Unit Shear | | 172 plf | 172 plf | 32 plf | 32 plf | | |
| Blocking | | NONE | NONE | NONE | NONE | | |
| Nailing | | T1 | T1 | See SCHED | See SCHED | | |
| Unit Base Shear | | | | | | | |
| % of full height segments | %fh = L _w /L = | 0.750 | 0.450 | 0.244 | 0.381 | | |
| % of maximum opening height | %oh = H'/H = | 0.186 | 1.000 | 0.200 | 0.870 | | |
| Shear cap adj factor | SCAF = | 1.00 | 0.48 | 1.00 | 0.50 | | |
| Unit base shear | vbase V ₁ /L _w = | 229 plf | 382 plf | 162 plf | 152 plf | | |
| Effective unit base shear | vreq=v _{base} /SCAF = | 229 plf | 802 plf | 162 plf | 304 plf | | |
| Ovrtrn. mo. Ttl. length of wall | OTM = | 37.0 k-ft | 9.2 k-ft | 19.4 k-ft | 44.5 k-ft | | |
| Shear wall adjustment factor | | | | | | | |
| Resist moment total L. of wall | RM = | 52.8 k-ft | 1.0 k-ft | 301.5 k-ft | 156.0 k-ft | | |
| | r = | 0.9415 | 0.4500 | 0.6175 | 0.4140 | | |
| | C _o = | 1.1245 | 0.4762 | 1.4334 | 0.5009 | | |

SHEAR WALL CALCULATIONS:

| | | | | | | | X1-1 | X2-1 | X2-1 | Y1-1 | Y2-1 | | | |
|--|--|--|--|--|--|--|-------------|-------------|-------------|-------------|-------------|--|--|--|
| Shear Wall Forces | | | | | | | | | | | | | | |
| Total length of wall | | | | | | | 24.50 ft | 43.00 ft | 43.00 ft | 60.00 ft | 24.00 ft | | | |
| Total length of shear wall | L = | | | | | | 24.50 ft | 14.42 ft | 6.00 ft | 60.00 ft | 24.00 ft | | | |
| Total length of full ht seg. | L _w = | | | | | | 12.00 ft | 4.42 ft | 6.00 ft | 13.00 ft | 24.00 ft | | | |
| height of shear wall | H = | | | | | | 9.13 ft | 16.00 ft | 16.00 ft | 16.00 ft | 16.00 ft | | | |
| Maximum opening height | H' = | | | | | | 2.00 ft | 12.50 ft | 0.00 ft | 2.00 ft | 0.00 ft | | | |
| Total force at top of wall | V ₁ = | | | | | | 3232 lbs | 3965 lbs | 2135 lbs | 4394 lbs | 4075 lbs | | | |
| Self weight | W _{DL self} = | | | | | | 173 plf | 304 plf | 304 plf | 304 plf | 304 plf | | | |
| Applied dead load | W _{DL above} = | | | | | | 72 plf | 72 plf | 72 plf | 60 plf | 60 plf | | | |
| Prefered OSB thickness | in | | | | | | 7/16 | 7/16 | 7/16 | 7/16 | 7/16 | | | |
| Prefered Gyp thickness | in | | | | | | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | | | |
| Wall Connected to Concrete | y/n = | | | | | | Y | Y | Y | Y | Y | | | |
| Shear Wall Segments | | | | | | | | | | | | | | |
| | | | | | | | 4.00 | 2.75 | 6.00 | 6.50 | 24.00 | | | |
| | | | | | | | 4.00 | 1.67 | | 6.50 | | | | |
| | | | | | | | 4.00 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Shear Transfer to Concrete | | | | | | | | | | | | | | |
| | T = | | | | | | Not Req'd | 3500 lbs | 5017 lbs | Not Req'd | 99 lbs | | | |
| 1/2 Anchor Bolts @ | | | | | | | 72 " O.C. | | 72 " O.C. | 72 " O.C. | 72 " O.C. | | | |
| Provide: | | | | | | | Code Min. | | Code Min. | Code Min. | Code Min. | | | |
| Min # of 1/2 Anchor Bolts | | | | | | | (4) Min | | (3) Min | (5) Min | (4) Min | | | |
| Load From Above | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| | | | | | | | HD3 | HD3 | | | Perp. Wall | | | |
| Shear Resisting System | | | | | | | | | | | | | | |
| Force Calculated | | | | | | | 269.36 | 896.96 | 355.80 | 338.02 | 169.78 | | | |
| | | | | | | | OSB | B.F. | OSB | OSB | OSB | | | |
| Min Shear Wall Segment: | | | | | | | 2.61 ft | 1.33 ft | 4.57 ft | 4.57 ft | 4.57 ft | | | |
| Provide: | V _a = | | | | | | SW1 | 4400 | SW1 | SW1 | SW1 | | | |
| | | | | | | | | | | | Gyp. | | | |
| Min Shear Wall Segment: | | | | | | | | | | | 8.00 ft | | | |
| Provide: | V _a = | | | | | | | | | | SWC | | | |
| Blocking / Nailing Framing Attachment | | | | | | | | | | | | | | |
| Blocking Unit Shear | | | | | | | 132 plf | 92 plf | 50 plf | 73 plf | 170 plf | | | |
| Blocking | | | | | | | NONE | NONE | NONE | NONE | NONE | | | |
| Nailing | | | | | | | See SCHED | See SCHED | See SCHED | See SCHED | T1 | | | |
| Unit Base Shear | | | | | | | | | | | | | | |
| % of full height segments | %fh = L _w /L = | | | | | | 0.490 | 0.307 | 1.000 | 0.217 | 1.000 | | | |
| % of maximum opening height | %oh = H'/H = | | | | | | 0.219 | 0.781 | 0.000 | 0.125 | 0.000 | | | |
| Shear cap adj factor | SCAF = | | | | | | 1.00 | 0.52 | 1.00 | 1.00 | 1.00 | | | |
| Unit base shear | v _{base} V ₁ /L _w = | | | | | | 269 plf | 897 plf | 356 plf | 338 plf | 170 plf | | | |
| Effective unit base shear | v _{req} = v _{base} /SCAF = | | | | | | 269 plf | 1733 plf | 356 plf | 338 plf | 170 plf | | | |
| Ovrtrn. mo. Ttl. length of wall | OTM = | | | | | | 29.5 k-ft | 24.0 k-ft | 34.2 k-ft | 70.3 k-ft | 65.2 k-ft | | | |
| Shear wall adjustment factor | | | | | | | | | | | | | | |
| Resist moment total L. of wall | RM = | | | | | | 73.5 k-ft | 0.5 k-ft | 6.8 k-ft | 654.3 k-ft | 104.7 k-ft | | | |
| | r = | | | | | | 0.8141 | 0.3613 | 1.0000 | 0.6887 | 1.0000 | | | |
| | C ₀ = | | | | | | 1.2117 | 0.5176 | 1.0000 | 1.9592 | 1.0000 | | | |



Loads: BLC 1, Wind Load
Envelope Only Solution

KccX'GYW]cb'GYlg

| | Šca^ | Ü@^ | V^ | Ö• a} / Šca c | Tæ æ | Ö• a} Ä ^• | ÖZá Gá | Ö ÉÜ € | Ö ÉÜ € | Ö ÉÜ € |
|---|------|---------|--------|---------------|---------------|-------------|--------|--------|--------|--------|
| F | Ö@ á | I ÈYÍÈÜ | Ö } | Ü^æ* æ | Ö ÉÜ | V^ æ | G ÈÍ | I ÈÍ | I ÈÍ | I ÈÍ |
| G | Y ^à | GÍ | Ö^æ | Þ } ^ | Ö ÉÜ | V^ æ | I ÈÍ | FÈÍ | GÈÍ | JÍ |
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| Ì | þÌ | € | Î | € |
| J | þJ | € | F€ | € |
| F€ | þF€ | € | FG | € |
| FF | þFF | FÈG | G | € |
| FG | þFG | FÈG | I | € |
| FH | þFH | FÈG | Í | € |
| FI | þFI | FÈG | Ì | € |
| FÍ | þFÍ | FÈG | F€ | € |
| FÎ | þFÎ | FÈG | FG | € |
| FÏ | þFÏ | FI | € | € |
| FÌ | þFÌ | FÍÈG | € | € |
| FJ | þFJ | FI | FI | € |
| F€ | þF€ | FÍÈG | FI | € |
| F€ | þF€ | FI | G | € |
| GG | þGG | FI | I | € |
| GH | þGH | FI | Í | € |
| GI | þGI | FI | Ì | € |
| GÍ | þGÍ | FI | F€ | € |
| GÎ | þGÎ | FI | FG | € |
| GÏ | þGÏ | FÍÈG | G | € |
| GÌ | þGÌ | FÍÈG | I | € |
| GJ | þGJ | FÍÈG | Í | € |
| G€ | þG€ | FÍÈG | Ì | € |
| H€ | þH€ | FÍÈG | € | € |
| HF | þHF | FÍÈG | F€ | € |
| HG | þHG | FÍÈG | FG | € |

>c]bh6ci bXUf m7 cbX]h]cbg

| | R á Šca^ | Y / Z á | Y / Z á | Ü (æ) Z È á |
|---|----------|---------|---------|-------------|
| F | þF | Ü^æcá } | Ü^æcá } | |
| G | þFÍ | | Ü^æcá } | |
| H | þF€ | | Ü^æcá } | |
| I | þFÍ | Ü^æcá } | Ü^æcá } | |

KccX'8 YgJ b'DUFUa YNfg

| | Ša^ | Ú@^ | Š^)*c@Š Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá | Š^ Š^ cžá |
|----|------|------|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| F | TF | Ô@Iá | FI | G | G | Ša^ c | | | | | | | | | | | | |
| G | TG | Ô@Iá | FI | G | G | | | | | | | | | | | | | |
| H | TI | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| I | TÍ | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| Í | TÎ | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| Ī | TĪ | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| Ĭ | TĬ | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| Ī | TJ | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| J | TF€ | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| F€ | TF€ | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| FF | TFG | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| FG | TFH | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| FH | TFI | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| FI | TFÍ | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| FĪ | TFĪ | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| FĬ | TFĬ | Ô@Iá | FI | G | G | | | | | | | | | | | | | |
| FĪ | TFĪ | Ô@Iá | FI | G | G | | | | | | | | | | | | | |
| FĪ | TFJ | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| FJ | TGE | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| GE | TGE | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| GF | TGG | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| GG | TGH | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| GH | TGI | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| G | TGI | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| Ĝ | TĜ | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| Ĝ | TĜ | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| Ĝ | TĜ | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| Ĝ | TĜ | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| GJ | THE | Y^à | FEG | | | Ša^ c | | | | | | | | | | | | |
| HE | TFH | Y^à | GEIG | | | Ša^ c | | | | | | | | | | | | |
| HF | TFHE | Ôæ | FĪEG | € | € | Ša^ c | | | | | | | | | | | | |

>c|bh'@UXg'UbX'9bz'fWX'8]gd'UMWa Ybhg'f6 @ % . 'K JbX'@UXL

| | R á cŠa^ | ŠÖH | Öá^&ç | T æ } æ á ^ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × |
|---|----------|-----|-------|---|
| F | PĪ | Š | Y | IĪ |

6 UqJW@UX'7 UqYg

| | ÓŠ/Ô•&ç | Öæ* !^ | Y/Ö:ææ | Y/Ö:ææ | R á c | Ú á c | Öæ d æ' çá |
|---|-------------|--------|--------|--------|-------|-------|------------|
| F | Y á á Šj ææ | Y Š | | | F | | |
| G | Ö^ææ Šj ææ | Ö Š | | | | | F |

9bj YcdYAUI ja i a 'A Ya Vyf'GYW]cb': cfWYg

| | T^ { á!: | ÖæŠ á | Š &žá | ŠÖ | Ú@æŽ á | Š &žá | ŠÖ | T [{ ^) çžá | Š &žá | ŠÖ |
|---|----------|----------|-------|----|--------|-------|----|--------------|-------|----|
| F | TF | { æ FĪUF | FĪFĪ | FĪ | FĪHF | GĪG | FĪ | FĪH | GĪG | FĪ |
| G | | { á ĪĪHH | € | FĪ | FĪHG | € | FĪ | FĪHG | FĪFĪI | FĪ |
| H | TG | { æ ĪĪIJ | € | J | FĪGH | IĪH | FĪ | FĪFF | IĪH | J |

9bj YcdYAUIja i a 'A Ya Vyf'GWNcb': cfWg'f'cbh'bi YXL

| | T^{\wedge} a^{\wedge} | | Oraš á | Š &žca | ŠO | U@aš á | Š &žca | ŠO | T[{\wedge} a^{\wedge} ošca | Š &žca | ŠO |
|----|-----------------------|-----|--------|--------|----|--------|--------|----|----------------------------|--------|----|
| I | | { a | ĪĪ Ī | FGĪĪ | FĪ | ĪĪ Ī | GĪĪ G | J | ĪĪ Ī | FĪĪ Ī | J |
| Í | TI | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| Ī | | { a | ĪĪ ĪF | € | FĪ | € | € | F | € | € | F |
| Ī | TĪ | { æ | FĪĪ | € | FĪ | € | € | F | € | € | F |
| Ī | | { a | ĪĪ Ī | € | F | € | € | F | € | € | F |
| J | TĪ | { æ | ĪĪF | € | FĪ | € | € | F | € | € | F |
| F€ | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| FF | TĪ | { æ | FĪĪ H | € | FĪ | € | € | F | € | € | F |
| FG | | { a | ĪĪ Ī | € | F | € | € | F | € | € | F |
| FH | TĪ | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| FI | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| FĪ | TJ | { æ | FĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| FĪ | | { a | ĪĪ Ī | € | F | € | € | F | € | € | F |
| FĪ | TF€ | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| FĪ | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| FJ | TF€ | { æ | FĪĪ | € | FĪ | € | € | F | € | € | F |
| G€ | | { a | ĪĪ Ī | € | F | € | € | F | € | € | F |
| GF | TFG | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| GG | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| GH | TFH | { æ | FĪĪ G | € | FĪ | € | € | F | € | € | F |
| G | | { a | ĪĪ Ī | € | F | € | € | F | € | € | F |
| G | TFI | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| G | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| G | TFĪ | { æ | FĪĪ H | € | FĪ | € | € | F | € | € | F |
| G | | { a | ĪĪ Ī | € | F | € | € | F | € | € | F |
| GJ | TFĪ | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| H€ | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| HF | TFĪ | { æ | GĪĪ Ī | FGĪĪ | J | ĪĪ H | FĪĪ H | J | ĪĪ Ī | GĪĪ G | J |
| HG | | { a | ĪĪ Ī | € | FĪ | ĪĪ F | € | J | ĪĪ Ī | FĪĪ Ī | J |
| HH | TFĪ | { æ | ĪĪ Ī | € | J | ĪĪ G | ĪĪ H | J | ĪĪ Ī | ĪĪ H | FĪ |
| HI | | { a | ĪĪ F | FGĪĪ | J | ĪĪ H | GĪĪ G | J | ĪĪ Ī | FĪĪ Ī | J |
| HĪ | TFJ | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| HĪ | | { a | ĪĪ Ī | € | J | € | € | F | € | € | F |
| HĪ | TG€ | { æ | FĪĪ Ī | € | J | € | € | F | € | € | F |
| HĪ | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| HJ | TGF | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| I€ | | { a | ĪĪ Ī | € | J | € | € | F | € | € | F |
| IF | TGG | { æ | FĪĪ Ī | € | J | € | € | F | € | € | F |
| IG | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| IH | TGH | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| II | | { a | ĪĪ Ī | € | J | € | € | F | € | € | F |
| IĪ | TG | { æ | FĪĪ Ī | € | J | € | € | F | € | € | F |
| IĪ | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| IĪ | TG | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| IĪ | | { a | ĪĪ Ī | € | J | € | € | F | € | € | F |
| IJ | TG | { æ | FĪĪ Ī | € | J | € | € | F | € | € | F |
| I€ | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| ÍF | TG | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| ÍG | | { a | ĪĪ Ī | € | J | € | € | F | € | € | F |
| ÍH | TG | { æ | FĪĪ G | € | J | € | € | F | € | € | F |
| ÍĪ | | { a | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |
| ÍĪ | TGJ | { æ | ĪĪ Ī | € | FĪ | € | € | F | € | € | F |

9bj YcdYA UI ja i a 'A Ya Vyf'GYWjcb': cfWg'f' cbi YXL

| | T^{\ à^!} | | Qpž á | Š &žca | ŠŌ | Ú@žá | Š &žca | ŠŌ | T[{\ ^} ōžca | Š &žca | ŠŌ |
|----|-----------|-----|-------|--------|----|------|--------|----|--------------|--------|----|
| íí | | { a | ĚĚF | € | J | € | € | F | € | € | F |
| íi | THE | { æ | FĚI | € | J | € | € | F | € | € | F |
| ii | | { a | ĚF | € | FĪ | € | € | F | € | € | F |
| íJ | THF | { æ | ĚI | € | FĪ | € | € | F | € | € | F |
| í€ | | { a | ĚĚG | € | J | € | € | F | € | € | F |
| íF | THFOE | { æ | GĚI | € | FĪ | FĚĚ | FĚĚJ | J | HĚG | FĚH | J |
| íG | | { a | ĚĚ | € | F | ĚĪ | FĚH | J | ĚĚ | FĚJ | FĪ |

9bj YcdYA Ya Vyf'9bX'FYUWjcbg

| | T^{\ à^! | T^{\ à^! Ě | | Qpž á | ŠŌ | Ú@žá | ŠŌ | T[{\ ^} ōžca | ŠŌ |
|----|----------|------------|-----|-------|----|------|----|--------------|----|
| F | TF | Q | { æ | ĚĚ | FĪ | € | F | € | F |
| G | | | { a | ĚĚH | FĪ | ĚĚG | FĪ | € | F |
| H | | R | { æ | FĚUF | FĪ | ĚĚ | F | € | F |
| I | | | { a | ĚGF | F | ĚFH | FĪ | € | F |
| í | TG | Q | { æ | ĪĚJ | J | ĚĚ | J | € | F |
| í | | | { a | Ě | FĪ | € | F | € | F |
| i | | R | { æ | ĚI | FĪ | ĚĚH | F | € | F |
| ì | | | { a | ĚĚI | FĪ | ĚĚG | FĪ | € | F |
| J | TI | Q | { æ | ĚĚ | FĪ | € | F | € | F |
| F€ | | | { a | ĚĚJF | FĪ | € | F | € | F |
| FF | | R | { æ | ĚĚ | FĪ | € | F | € | F |
| FG | | | { a | ĚĚJF | FĪ | € | F | € | F |
| FH | TÍ | Q | { æ | FĚĚ | FĪ | € | F | € | F |
| FI | | | { a | ĚĚI | F | € | F | € | F |
| Fí | | R | { æ | FĚĚ | FĪ | € | F | € | F |
| Fî | | | { a | ĚĚI | F | € | F | € | F |
| FĪ | TĪ | Q | { æ | ĚĚF | FĪ | € | F | € | F |
| FĪ | | | { a | ĚĚFĪ | FĪ | € | F | € | F |
| FJ | | R | { æ | ĚĚF | FĪ | € | F | € | F |
| G€ | | | { a | ĚĚFĪ | FĪ | € | F | € | F |
| GF | TĪ | Q | { æ | FĚĚH | FĪ | € | F | € | F |
| GG | | | { a | ĚĚI | F | € | F | € | F |
| GH | | R | { æ | FĚĚH | FĪ | € | F | € | F |
| G | | | { a | ĚĚI | F | € | F | € | F |
| Q | TĪ | Q | { æ | ĚĚI | FĪ | € | F | € | F |
| Q | | | { a | ĚĚH | FĪ | € | F | € | F |
| Q | | R | { æ | ĚĚI | FĪ | € | F | € | F |
| Q | | | { a | ĚĚH | FĪ | € | F | € | F |
| QJ | TJ | Q | { æ | FĚĚI | FĪ | € | F | € | F |
| H€ | | | { a | ĚĚI | F | € | F | € | F |
| HF | | R | { æ | FĚĚI | FĪ | € | F | € | F |
| HG | | | { a | ĚĚI | F | € | F | € | F |
| HH | TF€ | Q | { æ | ĚĚI | FĪ | € | F | € | F |
| Hi | | | { a | ĚĚH | FĪ | € | F | € | F |
| Hí | | R | { æ | ĚĚI | FĪ | € | F | € | F |
| Hî | | | { a | ĚĚH | FĪ | € | F | € | F |
| HĪ | TFF | Q | { æ | FĚĚ | FĪ | € | F | € | F |
| HĪ | | | { a | ĚĚI | F | € | F | € | F |
| HJ | | R | { æ | FĚĚ | FĪ | € | F | € | F |
| I€ | | | { a | ĚĚI | F | € | F | € | F |

9bj YcdYA Ya Vyf 9bX'FYUW]cbg'f' c b h i YXL

| | T^{\ } a^: | T^{\ } a^E | | QraZá | ŠÔ | Ú@aZá | ŠÔ | T[{\ } a^č Eca | ŠÔ |
|----|------------|------------|-----|-------|----|-------|----|----------------|----|
| IF | TFG | Q | { æ | ÉJ | FĪ | € | F | € | F |
| IG | | | { ā | ÉÉG | FĪ | € | F | € | F |
| IH | | R | { æ | ÉJ | FĪ | € | F | € | F |
| II | | | { ā | ÉÉG | FĪ | € | F | € | F |
| IÍ | TFH | Q | { æ | FÉG | FĪ | € | F | € | F |
| IĪ | | | { ā | ÉÉĪ | F | € | F | € | F |
| IÏ | | R | { æ | FÉG | FĪ | € | F | € | F |
| Iì | | | { ā | ÉÉĪ | F | € | F | € | F |
| IJ | TFI | Q | { æ | ÉJ | FĪ | € | F | € | F |
| I€ | | | { ā | ÉÉĪ | FĪ | € | F | € | F |
| IF | | R | { æ | ÉJ | FĪ | € | F | € | F |
| IG | | | { ā | ÉÉĪ | FĪ | € | F | € | F |
| IH | TFÍ | Q | { æ | FÉH | FĪ | € | F | € | F |
| II | | | { ā | ÉÉĪ | F | € | F | € | F |
| IÍ | | R | { æ | FÉH | FĪ | € | F | € | F |
| IĪ | | | { ā | ÉÉĪ | F | € | F | € | F |
| IÏ | TFĪ | Q | { æ | ÉJ | FĪ | € | F | € | F |
| Iì | | | { ā | ÉÉĪ | FĪ | € | F | € | F |
| IJ | | R | { æ | ÉJ | FĪ | € | F | € | F |
| I€ | | | { ā | ÉÉĪ | FĪ | € | F | € | F |
| IF | TFĪ | Q | { æ | ÉJ | FĪ | € | F | € | F |
| IG | | | { ā | ÉÉĪ | FĪ | ÉÉF | J | € | F |
| IH | | R | { æ | ÉÉĪ | J | ÉÉH | F | € | F |
| II | | | { ā | ÉÉĪ | FĪ | ÉÉG | J | € | F |
| IÍ | TFĪ | Q | { æ | ÉÉH | J | ÉÉJ | J | € | F |
| IĪ | | | { ā | ÉÉĪ | FĪ | € | F | € | F |
| IÏ | | R | { æ | ÉÉĪ | FĪ | ÉÉG | F | € | F |
| Iì | | | { ā | ÉÉF | J | ÉÉĪ | J | € | F |
| IJ | TFJ | Q | { æ | ÉÉĪ | FĪ | € | F | € | F |
| I€ | | | { ā | ÉÉĪ | J | € | F | € | F |
| IF | | R | { æ | ÉÉĪ | FĪ | € | F | € | F |
| IG | | | { ā | ÉÉĪ | J | € | F | € | F |
| IH | TGE | Q | { æ | FÉÉ | J | € | F | € | F |
| II | | | { ā | ÉÉ | FĪ | € | F | € | F |
| IÍ | | R | { æ | FÉÉ | J | € | F | € | F |
| IĪ | | | { ā | ÉÉ | FĪ | € | F | € | F |
| IÏ | TGF | Q | { æ | ÉÉĪ | FĪ | € | F | € | F |
| Iì | | | { ā | ÉÉG | J | € | F | € | F |
| IJ | | R | { æ | ÉÉĪ | FĪ | € | F | € | F |
| I€ | | | { ā | ÉÉG | J | € | F | € | F |
| IF | TGG | Q | { æ | FÉÉJ | J | € | F | € | F |
| IG | | | { ā | ÉÉH | FĪ | € | F | € | F |
| IH | | R | { æ | FÉÉJ | J | € | F | € | F |
| II | | | { ā | ÉÉH | FĪ | € | F | € | F |
| IÍ | TGH | Q | { æ | ÉÉĪ | FĪ | € | F | € | F |
| IĪ | | | { ā | ÉÉĪ | J | € | F | € | F |
| IÏ | | R | { æ | ÉÉĪ | FĪ | € | F | € | F |
| Iì | | | { ā | ÉÉĪ | J | € | F | € | F |
| IJ | TG | Q | { æ | FÉĪ | J | € | F | € | F |
| J€ | | | { ā | ÉÉH | FĪ | € | F | € | F |
| JF | | R | { æ | FÉĪ | J | € | F | € | F |
| JG | | | { ā | ÉÉH | FĪ | € | F | € | F |

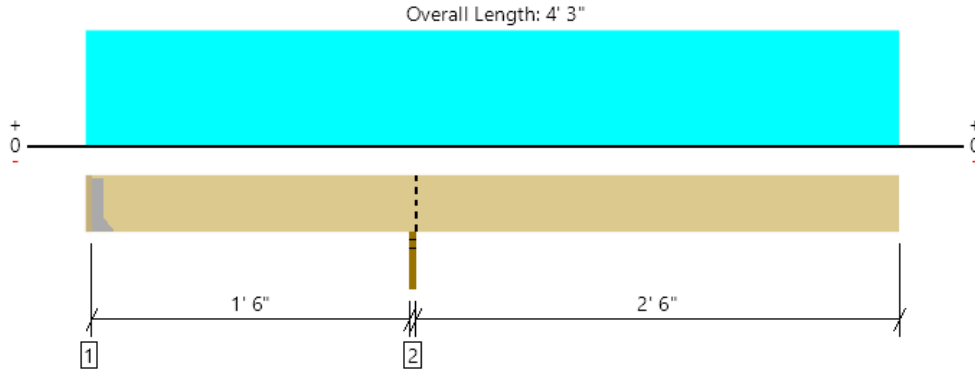
9bj YcdYA Ya Vyf 9bX'FYUW]cbgf77 cb]bi YXL

| | T^{\ à^!} | T^{\ à^!}È | Q | { æ | Ù@ãžá | ŠO | Ú@ãžá | ŠO | T[{\ ^}ãžá | ŠO |
|-----|-----------|------------|---|-----|-------|----|-------|----|------------|----|
| JH | TG | | Q | { æ | ÈÍ | FÌ | € | F | € | F |
| Jl | | | | { à | ÈÍÍ | J | € | F | € | F |
| Jí | | | R | { æ | ÈÍ | FÌ | € | F | € | F |
| Jĭ | | | | { à | ÈÍÍ | J | € | F | € | F |
| Jĭ | TG | | Q | { æ | FÈÍ | J | € | F | € | F |
| Jì | | | | { à | ÈHU | FÌ | € | F | € | F |
| JJ | | | R | { æ | FÈÍ | J | € | F | € | F |
| F€€ | | | | { à | ÈHU | FÌ | € | F | € | F |
| FÈ | TG | | Q | { æ | ÈÈ | FÌ | € | F | € | F |
| FEG | | | | { à | ÈÈÍ | J | € | F | € | F |
| FÈH | | | R | { æ | ÈÈ | FÌ | € | F | € | F |
| FÈ | | | | { à | ÈÈÍ | J | € | F | € | F |
| FÉ | TG | | Q | { æ | FÈÍ G | J | € | F | € | F |
| FĚ | | | | { à | ÈHU | FÌ | € | F | € | F |
| Fě | | | R | { æ | FÈÍ G | J | € | F | € | F |
| Fē | | | | { à | ÈHU | FÌ | € | F | € | F |
| F€J | TGJ | | Q | { æ | ÈÈ | FÌ | € | F | € | F |
| FF€ | | | | { à | ÈÈF | J | € | F | € | F |
| FFF | | | R | { æ | ÈÈ | FÌ | € | F | € | F |
| FFG | | | | { à | ÈÈF | J | € | F | € | F |
| FFH | THE | | Q | { æ | FÈÍ | J | € | F | € | F |
| FF | | | | { à | ÈF | FÌ | € | F | € | F |
| FFí | | | R | { æ | FÈÍ | J | € | F | € | F |
| FFĭ | | | | { à | ÈF | FÌ | € | F | € | F |
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| F€€ | | | | { à | ÈÈG | J | € | F | € | F |
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| FGH | | | R | { æ | FÈ | J | FÈF | J | € | F |
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9bj YcdYKccX7cXY7\ YWg

| | T^{\ à^!} | Ú@ã | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | Ù@ã^ | |
|----|-----------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
| F | TF | GÝ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ |
| G | TG | GÝ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ | ÈJ |
| H | TI | GÝ | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI |
| I | TÍ | GÝ | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG |
| Í | TÍ | GÝ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ |
| ĭ | Tì | GÝ | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG |
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| J | TF€ | GÝ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ |
| F€ | TF€ | GÝ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ | ÈÈ |
| FF | TFG | GÝ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ | ÈÍ |
| FG | TFH | GÝ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ | ÈÈ€ |
| FH | TFI | GÝ | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI | ÈJI |
| FI | TFÍ | GÝ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ | ÈFÍ |
| FÌ | TFĭ | GÝ | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG | ÈEG |

Level, 2X6 OUTLOOKERS
1 piece(s) 2 x 6 DF No.2 @ 16" OC



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|-------------------|--------------|-----------------|------|-----------------------------|
| Member Reaction (lbs) | 1212 @ 1' 8 1/4" | 1406 (1.50") | Passed (86%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 526 @ 1' 2" | 1139 | Passed (46%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | -731 @ 1' 8 1/4" | 975 | Passed (75%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.099 @ 4' 3" | 0.256 | Passed (2L/618) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.110 @ 4' 3" | 0.342 | Passed (2L/558) | -- | 1.0 D + 1.0 S (Alt Spans) |

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- -344 lbs uplift at support located at 1 1/2". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|------------------------------|----------------|---------------------|----------|-------------------------|------|----------|-----------------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Hanger on 5 1/2" DF beam | 1.50" | Hanger ¹ | 1.50" | -27 | -317 | -344 | See note ¹ |
| 2 - Stud wall - DF | 1.50" | 1.50" | 1.50" | 123 | 1089 | 1212 | Blocking |

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

| Lateral Bracing | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu) | 4' 2" o/c | |
| Bottom Edge (Lu) | 4' 2" o/c | |

- Maximum allowable bracing intervals based on applied load.

| Connector: Simpson Strong-Tie | | | | | | | |
|-------------------------------|-------|-------------|---------------|----------------|------------------|-------------|--|
| Support | Model | Seat Length | Top Fasteners | Face Fasteners | Member Fasteners | Accessories | |
| 1 - Face Mount Hanger | LU26 | 1.50" | N/A | 6-10dx1.5 | 4-10dx1.5 | | |

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

| Vertical Load | Location (Side) | Spacing | Dead (0.90) | Snow (1.15) | Comments |
|-------------------|-----------------|---------|-------------|-------------|--------------|
| 1 - Uniform (PSF) | 0 to 4' 3" | 16" | 17.0 | 150.0 | Default Load |

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

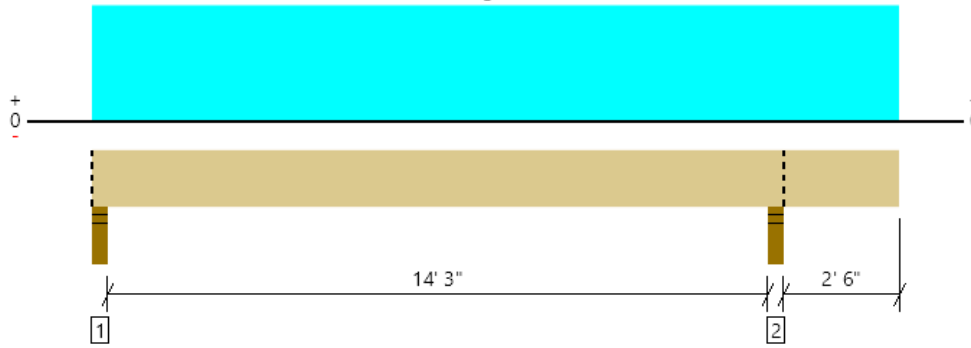
| ForteWEB Software Operator | Job Notes |
|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, RB1

1 piece(s) 6 3/4" x 16 1/2" 24F-V4 DF Glulam

Overall Length: 17' 4 1/2"



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|---------------------|---------------|----------------|------|-----------------------------|
| Member Reaction (lbs) | 15128 @ 14' 8 5/8" | 15820 (3.75") | Passed (96%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 8896 @ 13' 2 1/4" | 22628 | Passed (39%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Pos Moment (Ft-lbs) | 37830 @ 7' 3 13/16" | 69003 | Passed (55%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Neg Moment (Ft-lbs) | -5251 @ 14' 8 5/8" | 54301 | Passed (10%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.278 @ 7' 4 15/16" | 0.727 | Passed (L/627) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.314 @ 7' 4 7/8" | 0.969 | Passed (L/556) | -- | 1.0 D + 1.0 S (All Spans) |

System : Roof
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2018
 Design Methodology : ASD
 Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 0.98 that was calculated using length L = 14' 3 1/8".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 1 11/16".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|--------------------|----------------|-----------|----------|-------------------------|-------|----------|-------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - DF | 3.75" | 3.75" | 2.58" | 1268 | 9623 | 10891 | Blocking |
| 2 - Stud wall - DF | 3.75" | 3.75" | 3.59" | 1787 | 13341 | 15128 | 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) | 17' 5" o/c | |
| Bottom Edge (Lu) | 17' 5" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|-----------------------|-------------------------|-----------------|-------------|-------------|--------------|
| 0 - Self Weight (PLF) | 0 to 17' 4 1/2" | N/A | 27.1 | -- | |
| 1 - Uniform (PSF) | 0 to 17' 4 1/2" (Front) | 8' 9" | 17.0 | 150.0 | Default Load |

Weyerhaeuser Notes

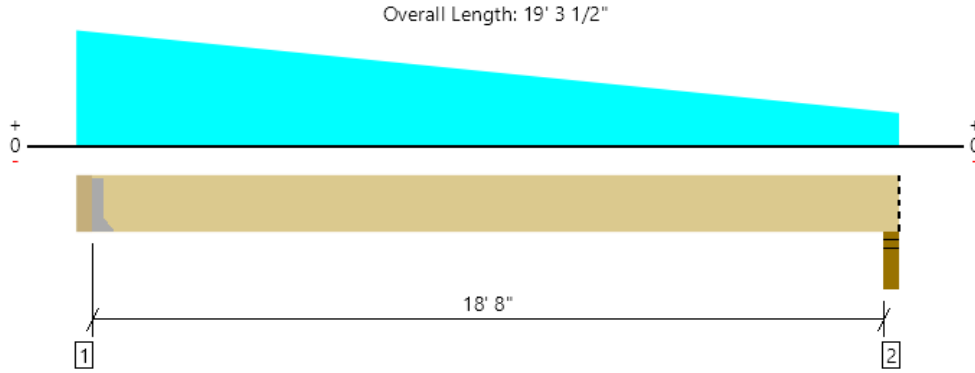
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

| ForteWEB Software Operator | Job Notes |
|--|-----------|
| Trevor Steelsmith 09/18/23 Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, RB2
1 piece(s) 6 3/4" x 15" 24F-V4 DF Glulam



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|--------------------|---------------|----------------|------|-----------------------------|
| Member Reaction (lbs) | 10618 @ 3 3/4" | 10618 (2.42") | Passed (100%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 8824 @ 1' 6 3/4" | 20571 | Passed (43%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Pos Moment (Ft-lbs) | 42727 @ 8' 10 3/4" | 56006 | Passed (76%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.691 @ 9' 6 1/8" | 0.940 | Passed (L/327) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.789 @ 9' 6 3/16" | 1.253 | Passed (L/286) | -- | 1.0 D + 1.0 S (All Spans) |

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
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.
- Critical positive moment adjusted by a volume/size factor of 0.96 that was calculated using length L = 18' 9 1/2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---------------------------|----------------|---------------------|----------|-------------------------|------|----------|-----------------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Hanger on 15" DF beam | 3.75" | Hanger ¹ | 2.42" | 1335 | 9742 | 11077 | See note ¹ |
| 2 - Stud wall - DF | 3.75" | 3.75" | 1.78" | 977 | 6540 | 7517 | Blocking |

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

| Lateral Bracing | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu) | 19' o/c | |
| Bottom Edge (Lu) | 19' o/c | |

- Maximum allowable bracing intervals based on applied load.

| Connector: Simpson Strong-Tie | | | | | | | |
|-------------------------------|-------------|-------------|---------------|----------------|------------------|-------------|--|
| Support | Model | Seat Length | Top Fasteners | Face Fasteners | Member Fasteners | Accessories | |
| 1 - Face Mount Hanger | HGUS6.88/12 | 4.00" | N/A | 56-10d | 20-10d | | |

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|-----------------------|-------------------------|-----------------|-------------|-------------|--------------|
| 0 - Self Weight (PLF) | 3 3/4" to 19' 3 1/2" | N/A | 24.6 | -- | |
| 1 - Tapered (PSF) | 0 to 19' 3 1/2" (Front) | 8' 9" to 2' 6" | 17.0 | 150.0 | Default Load |

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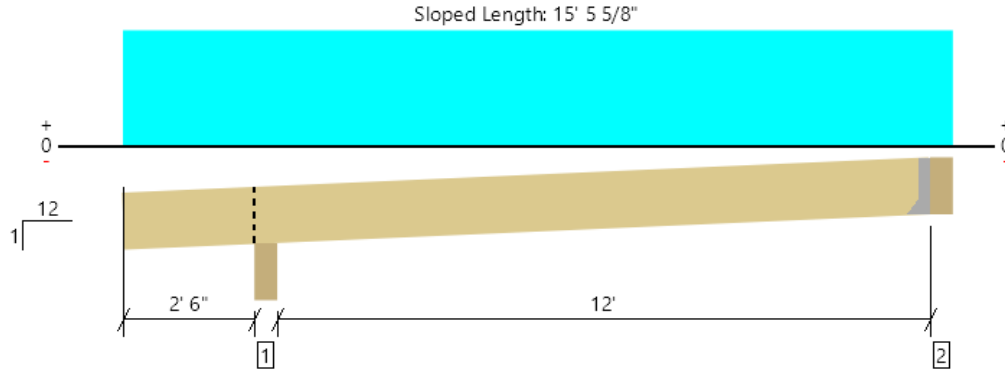
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| ForteWEB Software Operator | Job Notes |
|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, Roof: Joist
2 piece(s) 2 x 12 DF No.2 @ 24" OC



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

Member Length : 15' 1 1/16"

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|----------------------|--------------|----------------|------|-----------------------------|
| Member Reaction (lbs) | 1987 @ 14' 11 1/2" | 2813 (1.50") | Passed (71%) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Shear (lbs) | 1756 @ 3' 10 11/16" | 4658 | Passed (38%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | 5908 @ 9' 1/8" | 6277 | Passed (94%) | 1.15 | 1.0 D + 1.0 S (Alt Spans) |
| Live Load Defl. (in) | 0.251 @ 8' 10 3/4" | 0.614 | Passed (L/587) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.278 @ 8' 10 13/16" | 0.818 | Passed (L/530) | -- | 1.0 D + 1.0 S (Alt Spans) |

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 1/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|-------------------------------|----------------|---------------------|----------|-------------------------|------|----------|-----------------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Beveled Plate - DF | 5.50" | 5.50" | 1.62" | 312 | 2744 | 3057 | Blocking |
| 2 - Hanger on 11 1/4" DF beam | 5.50" | Hanger ¹ | 1.50" | 214 | 1926 | 2140 | See note ¹ |

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

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

•Maximum allowable bracing intervals based on applied load.

| Connector: Simpson Strong-Tie | | | | | | |
|-------------------------------|------------|-------------|---------------|----------------|------------------|-------------|
| Support | Model | Seat Length | Top Fasteners | Face Fasteners | Member Fasteners | Accessories |
| 2 - Face Mount Hanger | LSSR210-2Z | 1.88" | N/A | 22-16dx2.5 | 18-16dx2.5 | |

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

| Vertical Load | Location (Side) | Spacing | Dead (0.90) | Snow (1.15) | Comments |
|-------------------|-----------------|---------|-------------|-------------|--------------|
| 1 - Uniform (PSF) | 0 to 15' 5" | 24" | 17.0 | 150.0 | Default Load |

Weyerhaeuser Notes

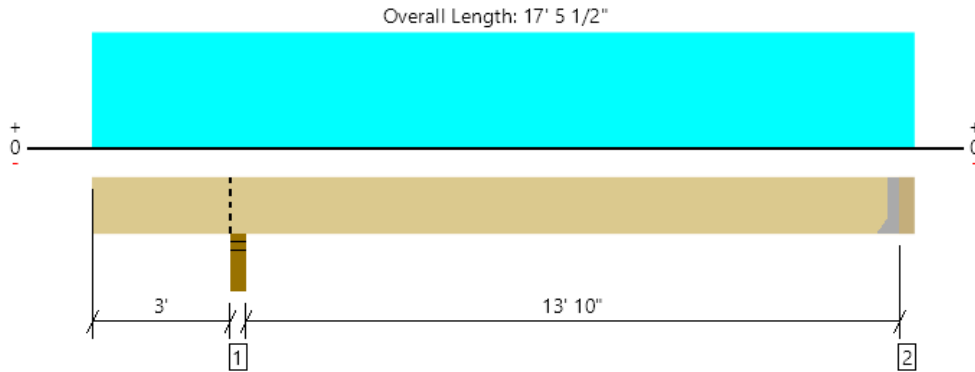
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| ForteWEB Software Operator | Job Notes |
|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, RB3
2 piece(s) 2 x 12 DF No.2



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|----------------------|--------------|----------------|------|-----------------------------|
| Member Reaction (lbs) | 1476 @ 17' 1 3/4" | 2813 (1.50") | Passed (52%) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Shear (lbs) | 1360 @ 4' 3" | 4658 | Passed (29%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | 5013 @ 10' 4 1/4" | 5458 | Passed (92%) | 1.15 | 1.0 D + 1.0 S (Alt Spans) |
| Live Load Defl. (in) | 0.266 @ 10' 2 9/16" | 0.699 | Passed (L/630) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.306 @ 10' 2 11/16" | 0.933 | Passed (L/549) | -- | 1.0 D + 1.0 S (Alt Spans) |

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|-------------------------------|----------------|---------------------|----------|-------------------------|------|----------|-----------------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Stud wall - DF | 3.75" | 3.75" | 1.50" | 313 | 1970 | 2283 | Blocking |
| 2 - Hanger on 11 1/4" DF beam | 3.75" | Hanger ¹ | 1.50" | 204 | 1337 | 1541 | See note ¹ |

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

| Lateral Bracing | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu) | 6' o/c | |
| Bottom Edge (Lu) | 17' 2" o/c | |

- Maximum allowable bracing intervals based on applied load.

| Connector: Simpson Strong-Tie | | | | | | | |
|-------------------------------|---------|-------------|---------------|----------------|------------------|-------------|--|
| Support | Model | Seat Length | Top Fasteners | Face Fasteners | Member Fasteners | Accessories | |
| 2 - Face Mount Hanger | LUS28-2 | 2.00" | N/A | 6-16d | 4-16d | | |

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|-----------------------|-------------------------|-----------------|-------------|-------------|--------------|
| 0 - Self Weight (PLF) | 0 to 17' 1 3/4" | N/A | 8.6 | -- | |
| 1 - Uniform (PSF) | 0 to 17' 5 1/2" (Front) | 1' 3" | 17.0 | 150.0 | Default Load |

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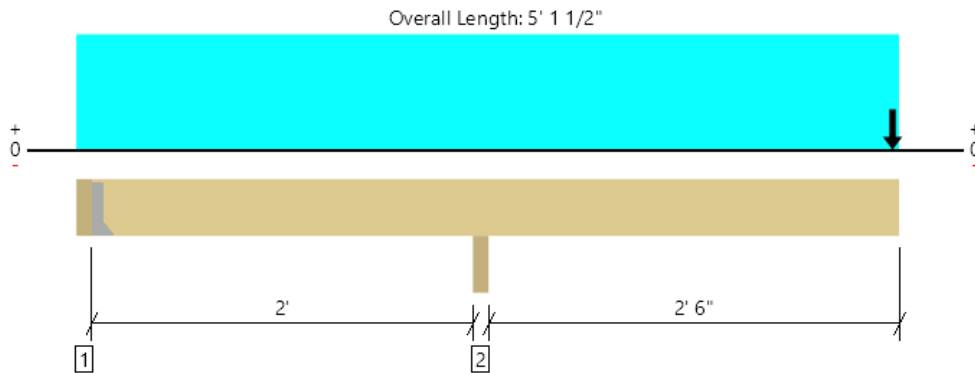
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

| ForteWEB Software Operator | Job Notes |
|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, RB4
1 piece(s) 5 1/8" x 6" 24F-V4 DF Glulam



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

| Design Results | Actual @ Location | Allowed | Result | LDf | Load: Combination (Pattern) |
|-----------------------|-------------------|---------------|-----------------|------|-----------------------------|
| Member Reaction (lbs) | 4675 @ 2' 5 5/8" | 12012 (3.75") | Passed (39%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 2372 @ 1' 9 3/4" | 6247 | Passed (38%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Pos Moment (Ft-lbs) | 0 @ N/A | N/A | Passed (N/A) | -- | N/A |
| Neg Moment (Ft-lbs) | -4905 @ 2' 5 5/8" | 5452 | Passed (90%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.183 @ 5' 1 1/2" | 0.266 | Passed (2L/348) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.211 @ 5' 1 1/2" | 0.354 | Passed (2L/302) | -- | 1.0 D + 1.0 S (Alt Spans) |

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4' 9 3/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|--------------------------|----------------|---------------------|----------|-------------------------|-------|----------|-----------------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Hanger on 6" DF beam | 3.75" | Hanger ¹ | 1.50" | -261 | -1804 | -2065 | See note ¹ |
| 2 - Beam - DF | 3.75" | 3.75" | 1.50" | 617 | 4058 | 4675 | None |

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

| Lateral Bracing | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu) | 4' 10" o/c | |
| Bottom Edge (Lu) | 4' 10" o/c | |

- Maximum allowable bracing intervals based on applied load.

| Connector: Simpson Strong-Tie | | | | | | |
|-------------------------------|---------------------|-------------|---------------|----------------|------------------|-------------|
| Support | Model | Seat Length | Top Fasteners | Face Fasteners | Member Fasteners | Accessories |
| 1 - Face Mount Hanger | Connector not found | N/A | N/A | N/A | N/A | |

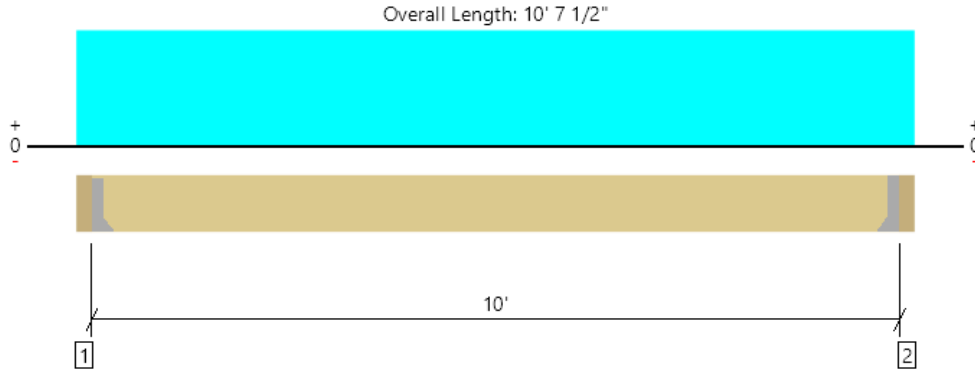
- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|-----------------------|------------------------|-----------------|-------------|-------------|-----------------------------|
| 0 - Self Weight (PLF) | 3 3/4" to 5' 1 1/2" | N/A | 7.5 | -- | |
| 1 - Uniform (PSF) | 0 to 5' 1 1/2" (Front) | 1' 4" | 17.0 | 150.0 | Default Load |
| 2 - Point (lb) | 5' 1" (Front) | N/A | 204 | 1337 | Linked from: RB3, Support 2 |

| ForteWEB Software Operator | Job Notes |
|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, RB5
1 piece(s) 2 x 12 DF No.2



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|-------------------|--------------|----------------|------|-----------------------------|
| Member Reaction (lbs) | 1065 @ 3 3/4" | 1406 (1.50") | Passed (76%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 865 @ 1' 3" | 2329 | Passed (37%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | 2663 @ 5' 3 3/4" | 2729 | Passed (98%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.148 @ 5' 3 3/4" | 0.500 | Passed (L/810) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.168 @ 5' 3 3/4" | 0.667 | Passed (L/713) | -- | 1.0 D + 1.0 S (All Spans) |

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
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.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|-------------------------------|----------------|---------------------|----------|-------------------------|------|----------|-----------------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Hanger on 11 1/4" DF beam | 3.75" | Hanger ¹ | 1.50" | 134 | 996 | 1130 | See note ¹ |
| 2 - Hanger on 11 1/4" DF beam | 3.75" | Hanger ¹ | 1.50" | 134 | 996 | 1130 | See note ¹ |

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

| Lateral Bracing | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu) | 1' 10" o/c | |
| Bottom Edge (Lu) | 10' o/c | |

•Maximum allowable bracing intervals based on applied load.

| Connector: Simpson Strong-Tie | | | | | | |
|-------------------------------|-------|-------------|---------------|----------------|------------------|-------------|
| Support | Model | Seat Length | Top Fasteners | Face Fasteners | Member Fasteners | Accessories |
| 1 - Face Mount Hanger | LUS28 | 1.75" | N/A | 6-10dx1.5 | 4-10d | |
| 2 - Face Mount Hanger | LUS28 | 1.75" | N/A | 6-10dx1.5 | 4-10d | |

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

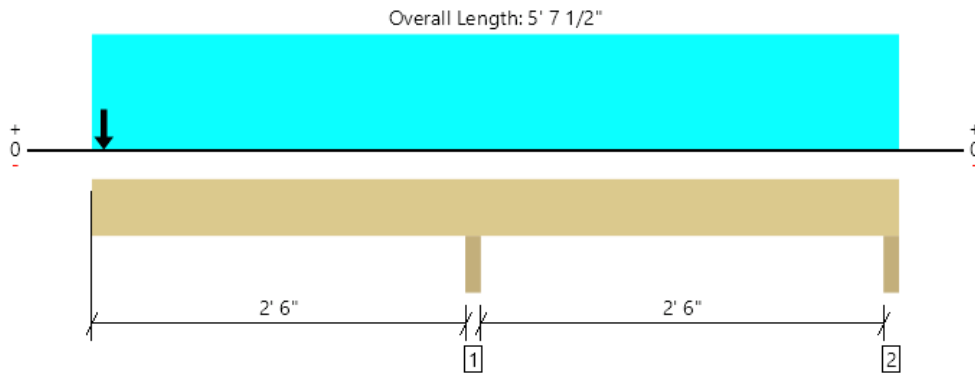
| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|-----------------------|-------------------------|-----------------|-------------|-------------|--------------|
| 0 - Self Weight (PLF) | 3 3/4" to 10' 3 3/4" | N/A | 4.3 | -- | |
| 1 - Uniform (PSF) | 0 to 10' 7 1/2" (Front) | 1' 3" | 17.0 | 150.0 | Default Load |

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|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, RB6
2 piece(s) 2 x 12 DF No.2



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|-------------------|--------------|------------------|------|-----------------------------|
| Member Reaction (lbs) | 3996 @ 2' 7 7/8" | 7031 (3.75") | Passed (57%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 1665 @ 1' 6 3/4" | 4658 | Passed (36%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | -4116 @ 2' 7 7/8" | 5458 | Passed (75%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.050 @ 0 | 0.266 | Passed (2L/999+) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.056 @ 0 | 0.354 | Passed (2L/999+) | -- | 1.0 D + 1.0 S (All Spans) |

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---------------|----------------|-----------|----------|-------------------------|-------|----------|-------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Beam - DF | 3.75" | 3.75" | 2.13" | 484 | 3512 | 3996 | None |
| 2 - Beam - DF | 3.75" | 3.75" | 1.50" | -111 | -1065 | -1176 | None |

| Lateral Bracing | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu) | 5' 8" o/c | |
| Bottom Edge (Lu) | 5' 8" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|-----------------------|------------------------|-----------------|-------------|-------------|-----------------------------|
| 0 - Self Weight (PLF) | 0 to 5' 7 1/2" | N/A | 8.6 | -- | |
| 1 - Uniform (PSF) | 0 to 5' 7 1/2" (Front) | 2' | 17.0 | 150.0 | Default Load |
| 2 - Point (lb) | 1" (Front) | N/A | 134 | 996 | Linked from: RB5, Support 1 |

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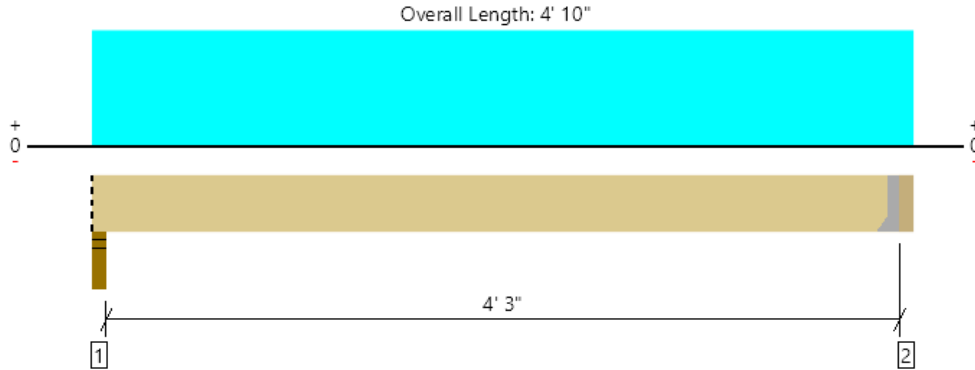
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Level, FB1
2 piece(s) 1 3/4" x 18" 2.OE Microllam® LVL



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|-------------------|--------------|-----------------|------|-----------------------------|
| Member Reaction (lbs) | 893 @ 4' 6 1/2" | 3938 (1.50") | Passed (23%) | -- | 1.0 D + 1.0 L (All Spans) |
| Shear (lbs) | 281 @ 3' 1/2" | 11970 | Passed (2%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Moment (Ft-lbs) | 977 @ 2' 4 1/4" | 38753 | Passed (3%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Live Load Defl. (in) | 0.002 @ 2' 4 1/4" | 0.109 | Passed (L/999+) | -- | 1.0 D + 1.0 L (All Spans) |
| Total Load Defl. (in) | 0.003 @ 2' 4 1/4" | 0.219 | Passed (L/999+) | -- | 1.0 D + 1.0 L (All Spans) |

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---------------------------|----------------|---------------------|----------|-------------------------|------------|----------|-----------------------|
| | Total | Available | Required | Dead | Floor Live | Factored | |
| 1 - Stud wall - DF | 3.50" | 3.50" | 1.50" | 255 | 706 | 961 | Blocking |
| 2 - Hanger on 18" DF beam | 3.50" | Hanger ¹ | 1.50" | 263 | 744 | 1007 | See note ¹ |

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

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

- Maximum allowable bracing intervals based on applied load.

| Connector: Simpson Strong-Tie | | | | | | | |
|-------------------------------|---------------|-------------|---------------|----------------|------------------|-------------|--|
| Support | Model | Seat Length | Top Fasteners | Face Fasteners | Member Fasteners | Accessories | |
| 2 - Face Mount Hanger | IUS3.56/11.88 | 2.00" | N/A | 12-10dx1.5 | 2-10dx1.5 | | |

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

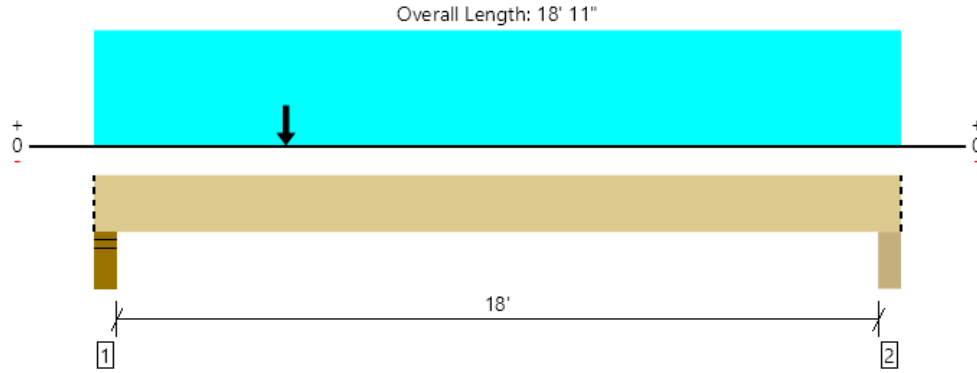
| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Floor Live (1.00) | Comments |
|-----------------------|---------------------|-----------------|-------------|-------------------|--------------|
| 0 - Self Weight (PLF) | 0 to 4' 6 1/2" | N/A | 18.4 | -- | |
| 1 - Uniform (PSF) | 0 to 4' 10" (Front) | 7' 6" | 12.0 | 40.0 | Default Load |

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| ForteWEB Software Operator | Job Notes |
|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, FB2
2 piece(s) 1 3/4" x 18" 2.OE Microllam® LVL



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|--------------------|---------------|-----------------|------|-----------------------------|
| Member Reaction (lbs) | 1935 @ 4" | 12031 (5.50") | Passed (16%) | -- | 1.0 D + 1.0 L (All Spans) |
| Shear (lbs) | 1695 @ 1' 11 1/2" | 11970 | Passed (14%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Moment (Ft-lbs) | 7409 @ 7' 6 15/16" | 38753 | Passed (19%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Live Load Defl. (in) | 0.098 @ 9' 1 1/16" | 0.456 | Passed (L/999+) | -- | 1.0 D + 1.0 L (All Spans) |
| Total Load Defl. (in) | 0.145 @ 9' 1 7/16" | 0.913 | Passed (L/999+) | -- | 1.0 D + 1.0 L (All Spans) |

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|--------------------|----------------|-----------|----------|-------------------------|------------|----------|-------------|
| | Total | Available | Required | Dead | Floor Live | Factored | |
| 1 - Stud wall - DF | 5.50" | 5.50" | 1.50" | 604 | 1331 | 1935 | Blocking |
| 2 - Beam - DF | 5.50" | 5.50" | 1.50" | 461 | 927 | 1387 | 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) | 18' 11" o/c | |
| Bottom Edge (Lu) | 18' 11" o/c | |

- Maximum allowable bracing intervals based on applied load.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Floor Live (1.00) | Comments |
|-----------------------|----------------------|-----------------|-------------|-------------------|-----------------------------|
| 0 - Self Weight (PLF) | 0 to 18' 11" | N/A | 18.4 | -- | |
| 1 - Uniform (PSF) | 0 to 18' 11" (Front) | 2' | 12.0 | 40.0 | Default Load |
| 2 - Point (lb) | 4' 6" (Front) | N/A | 263 | 744 | Linked from: FB1, Support 2 |

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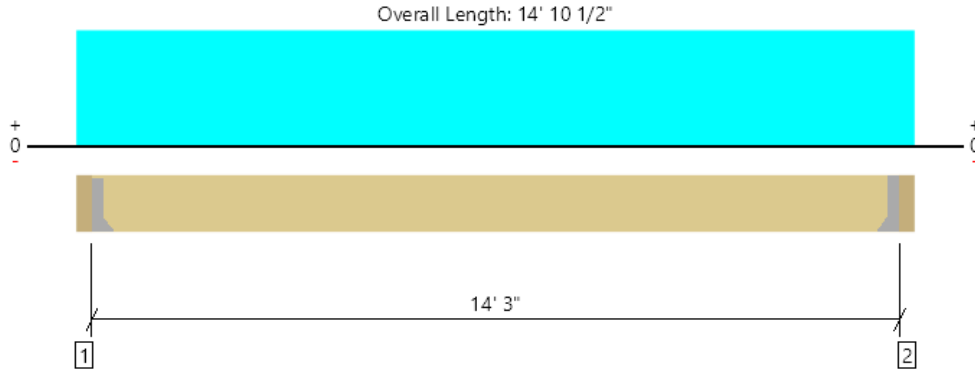
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

| ForteWEB Software Operator | Job Notes |
|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, FB3

1 piece(s) 5 1/8" x 12" 24F-V4 DF Glulam



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|-------------------|--------------|----------------|------|-----------------------------|
| Member Reaction (lbs) | 3826 @ 3 3/4" | 4997 (1.50") | Passed (77%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 3289 @ 1' 3 3/4" | 12495 | Passed (26%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Pos Moment (Ft-lbs) | 13629 @ 7' 5 1/4" | 28290 | Passed (48%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.314 @ 7' 5 1/4" | 0.356 | Passed (L/544) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.375 @ 7' 5 1/4" | 0.712 | Passed (L/456) | -- | 1.0 D + 1.0 S (All Spans) |

System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2018
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 14' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|---------------------------|----------------|---------------------|----------|-------------------------|------|----------|-----------------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Hanger on 12" DF beam | 3.75" | Hanger ¹ | 1.50" | 642 | 3347 | 3989 | See note ¹ |
| 2 - Hanger on 12" DF beam | 3.75" | Hanger ¹ | 1.50" | 642 | 3347 | 3989 | See note ¹ |

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

| Lateral Bracing | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu) | 14' 3" o/c | |
| Bottom Edge (Lu) | 14' 3" o/c | |

•Maximum allowable bracing intervals based on applied load.

| Connector: Simpson Strong-Tie | | | | | | | |
|-------------------------------|-------------|-------------|---------------|----------------|------------------|-------------|--|
| Support | Model | Seat Length | Top Fasteners | Face Fasteners | Member Fasteners | Accessories | |
| 1 - Face Mount Hanger | HGUS5.25/10 | 4.00" | N/A | 46-10d | 16-10d | | |
| 2 - Face Mount Hanger | HGUS5.25/10 | 4.00" | N/A | 46-10d | 16-10d | | |

• Refer to manufacturer notes and instructions for proper installation and use of all connectors.

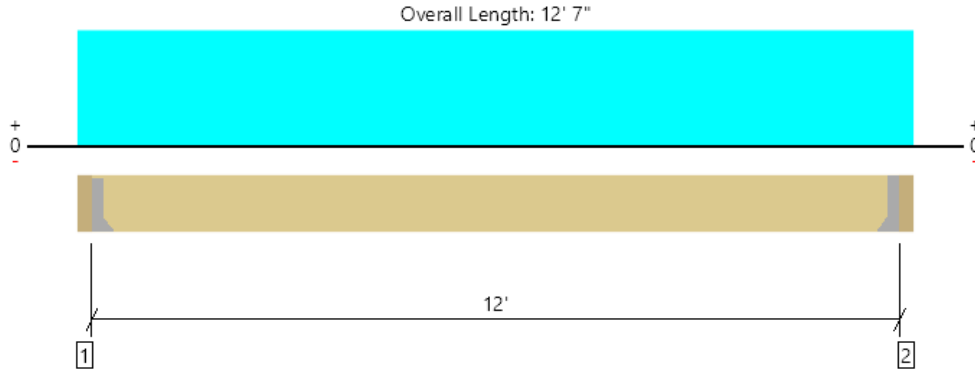
| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Snow (1.15) | Comments |
|-----------------------|--------------------------|-----------------|-------------|-------------|--------------|
| 0 - Self Weight (PLF) | 3 3/4" to 14' 6 3/4" | N/A | 14.9 | -- | |
| 1 - Uniform (PSF) | 0 to 14' 10 1/2" (Front) | 6' | 12.0 | 75.0 | 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 |
|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Level, DECK JOISTS
2 piece(s) 2 x 10 DF No.2 @ 16" OC



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

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|-------------------|--------------|----------------|------|-----------------------------|
| Member Reaction (lbs) | 696 @ 3 1/2" | 2813 (1.50") | Passed (25%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 607 @ 1' 3/4" | 3830 | Passed (16%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | 2088 @ 6' 3 1/2" | 4668 | Passed (45%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.147 @ 6' 3 1/2" | 0.300 | Passed (L/977) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.171 @ 6' 3 1/2" | 0.600 | Passed (L/842) | -- | 1.0 D + 1.0 S (All Spans) |
| TJ-Pro™ Rating | N/A | N/A | N/A | -- | N/A |

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | Accessories |
|------------------------------|----------------|---------------------|----------|-------------------------|------|----------|-----------------------|
| | Total | Available | Required | Dead | Snow | Factored | |
| 1 - Hanger on 9 1/4" DF beam | 3.50" | Hanger ¹ | 1.50" | 101 | 629 | 730 | See note ¹ |
| 2 - Hanger on 9 1/4" DF beam | 3.50" | Hanger ¹ | 1.50" | 101 | 629 | 730 | See note ¹ |

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

| Lateral Bracing | Bracing Intervals | Comments |
|------------------|-------------------|----------|
| Top Edge (Lu) | 12' o/c | |
| Bottom Edge (Lu) | 12' o/c | |

- Maximum allowable bracing intervals based on applied load.

| Connector: Simpson Strong-Tie | | | | | | | |
|-------------------------------|---------|-------------|---------------|----------------|------------------|-------------|--|
| Support | Model | Seat Length | Top Fasteners | Face Fasteners | Member Fasteners | Accessories | |
| 1 - Face Mount Hanger | LUS28-2 | 2.00" | N/A | 6-10dx1.5 | 3-10d | | |
| 2 - Face Mount Hanger | LUS28-2 | 2.00" | N/A | 6-10dx1.5 | 3-10d | | |

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

| Vertical Load | Location (Side) | Spacing | Dead (0.90) | Snow (1.15) | Comments |
|-------------------|-----------------|---------|-------------|-------------|--------------|
| 1 - Uniform (PSF) | 0 to 12' 7" | 16" | 12.0 | 75.0 | 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 |
|--|-----------|
| Trevor Steelsmith Snake River Engineering (208) 453-6512 trevor@snakeriverengineering.com | |



Steel Beam

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: --None--

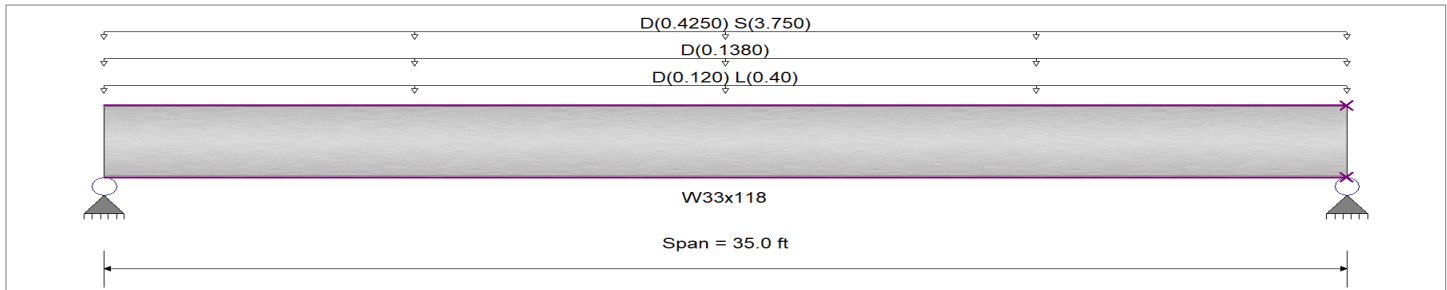
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

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
 Uniform Load : D = 0.0120, L = 0.040 ksf, Tributary Width = 10.0 ft

Uniform Load : D = 0.0120 ksf, Tributary Width = 11.50 ft

Uniform Load : D = 0.0170, S = 0.150 ksf, Tributary Width = 25.0 ft

DESIGN SUMMARY

Design OK

| | | | |
|-----------------------------------|------------------|------------------------------|------------------|
| Maximum Bending Stress Ratio = | 0.673 : 1 | Maximum Shear Stress Ratio = | 0.245 : 1 |
| Section used for this span | W33x118 | Section used for this span | W33x118 |
| Ma : Applied | 696.872 k-ft | Va : Applied | 79.643 k |
| Mn / Omega : Allowable | 1,035.429 k-ft | Vn/Omega : Allowable | 325.060 k |
| Load Combination | +D+S | Load Combination | +D+S |
| Span # where maximum occurs | Span # 1 | Location of maximum on span | 0.000 ft |
| | | Span # where maximum occurs | Span # 1 |
| Maximum Deflection | | | |
| Max Downward Transient Deflection | 0.743 in Ratio = | 564 >=480. | Span: 1 : S Only |
| Max Upward Transient Deflection | 0 in Ratio = | 0 <480.0 | n/a |
| Max Downward Total Deflection | 0.902 in Ratio = | 466 >=240. | Span: 1 : +D+S |
| 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 | | Summary of Moment Values | | | | | Summary of Shear Values | | | | |
|--------------------|----------------|--------|-------------------|-------|--------------------------|--------|--------|----------|-----------|-------------------------|------|--------|--------|-----------|
| | | | M | V | Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Va Max | Vnx | Vnx/Omega |
| D Only | | | | | | | | | | | | | | |
| Dsgn. L = 35.00 ft | | 1 | 0.118 | 0.043 | 122.65 | | 122.65 | 1,729.17 | 1,035.43 | 1.00 | 1.00 | 14.02 | 542.85 | 325.06 |
| +D+L | | | | | | | | | | | | | | |
| Dsgn. L = 35.00 ft | | 1 | 0.178 | 0.065 | 183.90 | | 183.90 | 1,729.17 | 1,035.43 | 1.00 | 1.00 | 21.02 | 542.85 | 325.06 |
| +D+S | | | | | | | | | | | | | | |
| Dsgn. L = 35.00 ft | | 1 | 0.673 | 0.245 | 696.87 | | 696.87 | 1,729.17 | 1,035.43 | 1.00 | 1.00 | 79.64 | 542.85 | 325.06 |
| +D+0.750L | | | | | | | | | | | | | | |
| Dsgn. L = 35.00 ft | | 1 | 0.163 | 0.059 | 168.59 | | 168.59 | 1,729.17 | 1,035.43 | 1.00 | 1.00 | 19.27 | 542.85 | 325.06 |
| +D+0.750L+0.750S | | | | | | | | | | | | | | |
| Dsgn. L = 35.00 ft | | 1 | 0.579 | 0.211 | 599.25 | | 599.25 | 1,729.17 | 1,035.43 | 1.00 | 1.00 | 68.49 | 542.85 | 325.06 |
| +0.60D | | | | | | | | | | | | | | |
| Dsgn. L = 35.00 ft | | 1 | 0.071 | 0.026 | 73.59 | | 73.59 | 1,729.17 | 1,035.43 | 1.00 | 1.00 | 8.41 | 542.85 | 325.06 |

Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|------------------|------|---------------|------------------|------------------|---------------|------------------|
| +D+S | 1 | 0.9022 | 17.600 | +D+S | 0.0000 | 0.000 |

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: --None--

Vertical Reactions

Support notation : Far left is #

Values in KIPS

| Load Combination | Support 1 | Support 2 |
|-------------------------------------|-----------|-----------|
| Max Upward from all Load Conditions | 79.643 | 79.643 |
| Max Upward from Load Combinations | 79.643 | 79.643 |
| Max Upward from Load Cases | 65.625 | 65.625 |
| D Only | 14.018 | 14.018 |
| +D+L | 21.018 | 21.018 |
| +D+S | 79.643 | 79.643 |
| +D+0.750L | 19.268 | 19.268 |
| +D+0.750L+0.750S | 68.486 | 68.486 |
| +0.60D | 8.411 | 8.411 |
| L Only | 7.000 | 7.000 |
| S Only | 65.625 | 65.625 |

WOOD HEADER ALLOWABLE LOADS (kips/ft)

Load Duration Factor: 1.15

LVL Grade: 2.0E

Top Chord Bracing: 2'-0" O.C.

Max TL Deflection: L/240, 0.75in

Repetitive Stress Increase: No

| Header Type | Header Span | | | | | | | | | | |
|----------------------|-------------|-------|-------|-------|------|------|------|------|------|------|------|
| | 2' | 3' | 4' | 5' | 6' | 8' | 10' | 12' | 14' | 16' | 18' |
| (2) 2x4 DF Stud | 1.15 | 0.69 | 0.29 | 0.22 | 0.12 | NA | NA | NA | NA | NA | NA |
| (3) 2x4 DF Stud | 1.84 | 1.04 | 0.46 | 0.35 | 0.18 | NA | NA | NA | NA | NA | NA |
| (2) 2x6 DF #2 | 3.34 | 1.44 | 0.83 | 0.48 | 0.36 | 0.20 | 0.12 | NA | NA | NA | NA |
| (3) 2x6 DF #2 | 5.06 | 2.19 | 1.27 | 0.72 | 0.55 | 0.30 | 0.18 | 0.13 | NA | NA | NA |
| (2) 2x8 DF #2 | 5.41 | 2.30 | 1.27 | 0.80 | 0.59 | 0.32 | 0.20 | 0.14 | 0.09 | NA | NA |
| (3) 2x8 DF #2 | 8.74 | 3.39 | 2.19 | 1.18 | 0.97 | 0.53 | 0.33 | 0.23 | 0.16 | 0.12 | NA |
| (2) 2x10 DF #2 | 8.05 | 3.39 | 1.96 | 1.18 | 0.89 | 0.48 | 0.31 | 0.21 | 0.15 | 0.10 | NA |
| (3) 2x10 DF #2 | 13.23 | 5.18 | 3.22 | 1.80 | 1.38 | 0.82 | 0.52 | 0.36 | 0.25 | 0.20 | 0.15 |
| (2) 2x12 DF #2 | 10.81 | 4.83 | 2.65 | 1.60 | 1.15 | 0.67 | 0.41 | 0.29 | 0.21 | 0.15 | 0.12 |
| (3) 2x12 DF #2 | 17.94 | 7.02 | 4.49 | 2.40 | 1.96 | 1.10 | 0.70 | 0.48 | 0.35 | 0.26 | 0.21 |
| (2) 1-3/4x7-1/4 LVL | 13.80 | 6.79 | 3.80 | 2.40 | 1.61 | 0.94 | 0.52 | 0.30 | 0.18 | 0.12 | NA |
| (3) 1-3/4x7-1/4 LVL | 20.70 | 10.47 | 5.64 | 3.50 | 2.53 | 1.38 | 0.79 | 0.45 | 0.28 | 0.17 | NA |
| (2) 1-3/4x9-1/2 LVL | 24.73 | 10.47 | 5.64 | 3.75 | 2.65 | 1.50 | 0.92 | 0.63 | 0.39 | 0.24 | 0.15 |
| (3) 1-3/4x9-1/2 LVL | 37.15 | 17.25 | 8.51 | 6.00 | 4.03 | 2.30 | 1.38 | 0.95 | 0.60 | 0.37 | 0.22 |
| (2) 1-3/4x11-7/8 LVL | 40.71 | 17.25 | 8.86 | 6.00 | 4.49 | 2.53 | 1.61 | 1.12 | 0.82 | 0.53 | 0.32 |
| (3) 1-3/4x11-7/8 LVL | 61.30 | 24.15 | 13.23 | 8.75 | 6.67 | 3.80 | 2.42 | 1.61 | 1.15 | 0.79 | 0.48 |
| (2) 1-3/4x14 LVL | 56.47 | 24.15 | 12.54 | 8.00 | 5.75 | 3.45 | 2.19 | 1.50 | 1.13 | 0.86 | 0.54 |
| (3) 1-3/4x14 LVL | 85.10 | 28.75 | 18.86 | 12.00 | 8.63 | 5.29 | 3.34 | 2.30 | 1.61 | 1.27 | 0.81 |

DU (6) Beam Calculations

| | Additional Drift | Roof | Floor | Deck | Wall | Total Load | Total Load |
|------------------|------------------|------|-------|------|-------|------------|------------|
| Trib | 0.0 | 0 | 7.5 | 0 | 9.33 | | 567.3 plf |
| Dead Load | - | 0.0 | 90.0 | 0.0 | 177.3 | 267.3 plf | |
| Live / Snow Load | 0 | 0.0 | 300.0 | 0.0 | - | 300.0 plf | |

| | | | | | | | |
|---------------------|----------------|--|--|--|--|--|--|
| Description: | 3.0 ft Opening | | | | | | |
|---------------------|----------------|--|--|--|--|--|--|

| | | | | | | | |
|-----------------------|-----------------------|--|--|--|--|--|--|
| Header Callout | 4x8 DF-L No. 2 | | | | | | |
| Trimmers | (1) 2x6 DF-L No. 2 | | | | | | |
| King Studs | (2) 2x6 DF-L No. 2 | | | | | | |

| | | | | | | | |
|--------------------|---------|--|--|--|--|--|--|
| Wood Design | | | | | | | |
| Species | DF-L | | | | | | |
| Grade | No. 2 | | | | | | |
| Width | 3.50 in | | | | | | |
| Depth | 7.25 in | | | | | | |

| | | | | | | | |
|-----------------|---------|--|--|--|--|--|--|
| Reaction | | | | | | | |
| Dead Load | 401 lbs | | | | | | |
| Live Load | 450 lbs | | | | | | |

| | | | | | | | |
|----------------|--------|--|--|--|--|--|--|
| Load | | | | | | | |
| l _u | 3.0 ft | | | | | | |
| l _e | 6.2 ft | | | | | | |

| | | | | | | | |
|---------------------------|------|--|--|--|--|--|--|
| Adjustment Factors | | | | | | | |
| C _d | 1.15 | | | | | | |
| C _F | 1.2 | | | | | | |

| | | | | | | | |
|----------------------------|---------------|--|--|--|--|--|--|
| Material Properties | | | | | | | |
| F _b | 900 psi | | | | | | |
| F _v | 180 psi | | | | | | |
| E | 1,600,000 psi | | | | | | |
| E _{min} | 580,000 psi | | | | | | |

| | | | | | | | |
|-------------------------|------------------------|--|--|--|--|--|--|
| Calculated Prop. | | | | | | | |
| A | 25.38 in ² | | | | | | |
| I | 111.15 in ⁴ | | | | | | |
| S | 30.66 in ³ | | | | | | |
| RB | 6.62 | | | | | | |
| E _{min} ' | 580,000 psi | | | | | | |
| F _{bE} | 15,858 psi | | | | | | |
| F _b * | 1,242 psi | | | | | | |
| C _L | 1 | | | | | | |

| | | | | | | | |
|-------------------------|-------------|--|--|--|--|--|--|
| Shear and Moment | | | | | | | |
| M | 7,658 lb-in | | | | | | |
| V | 851 lbs | | | | | | |

| | | | | | | | |
|----------------------------------|-----------|--|--|--|--|--|--|
| Stress | | | | | | | |
| f _b | 250 psi | | | | | | |
| F _b ' | 1,237 psi | | | | | | |
| f _b /F _b ' | 0.20 | | | | | | |
| f _v | 50 psi | | | | | | |
| F _v ' | 207 psi | | | | | | |
| f _v /F _v ' | 0.24 | | | | | | |
| Max Ratio | 0.24 | | | | | | |
| | Pass | | | | | | |

| | | | | | | | |
|----------------------------|----------|--|--|--|--|--|--|
| Deflection | | | | | | | |
| Δ _{T_L} | 0.01 in | | | | | | |
| | L/6,192 | | | | | | |
| Δ _{L_L} | 0.00 in | | | | | | |
| | L/11,709 | | | | | | |
| | Pass | | | | | | |

DU (5) Beam Calculations

| | | | | | | | |
|------------------|------------------|-------|-------|------|-------|------------|------------|
| | Additional Drift | Roof | Floor | Deck | Wall | Total Load | Total Load |
| Trib | 0.0 | 3.5 | 0 | 0 | 9.33 | | |
| Dead Load | - | 59.5 | 0.0 | 0.0 | 177.3 | 236.8 plf | 761.8 plf |
| Live / Snow Load | 0 | 525.0 | 0.0 | 0.0 | - | 525.0 plf | |

| | | | | | | | | |
|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|--|--|--|--|
| Description: | 16.0 ft Opening | 5.0 ft Opening | 10.0 ft Opening | 3.5 ft Opening | | | | |
| Header Callout | (3)11-7/8" LVL 2.0E | 4x8 DF-L No. 2 | (3)9-1/2" LVL 2.0E | 4x8 DF-L No. 2 | | | | |
| Trimmers | (2) 2x6 DF-L No. 2 | (1) 2x6 DF-L No. 2 | (2) 2x6 DF-L No. 2 | (1) 2x6 DF-L No. 2 | | | | |
| King Studs | (6) 2x6 DF-L No. 2 | (3) 2x6 DF-L No. 2 | (4) 2x6 DF-L No. 2 | (2) 2x6 DF-L No. 2 | | | | |

| | | | | | | | | |
|--------------------|----------|---------|---------|---------|--|--|--|--|
| Wood Design | | | | | | | | |
| Species | LVL | DF-L | LVL | DF-L | | | | |
| Grade | 2.0E | No. 2 | 2.0E | No. 2 | | | | |
| Width | 5.25 in | 3.50 in | 5.25 in | 3.50 in | | | | |
| Depth | 11.88 in | 7.25 in | 9.50 in | 7.25 in | | | | |

| | | | | | | | | |
|-----------------|-----------|-----------|-----------|---------|--|--|--|--|
| Reaction | | | | | | | | |
| Dead Load | 1,894 lbs | 592 lbs | 1,184 lbs | 414 lbs | | | | |
| Live Load | 4,200 lbs | 1,313 lbs | 2,625 lbs | 919 lbs | | | | |

| | | | | | | | | |
|-------------|---------|---------|---------|--------|--|--|--|--|
| Load | | | | | | | | |
| lu | 16.0 ft | 5.0 ft | 10.0 ft | 3.5 ft | | | | |
| le | 29.4 ft | 10.0 ft | 18.7 ft | 7.2 ft | | | | |

| | | | | | | | | |
|---------------------------|------|------|------|------|--|--|--|--|
| Adjustment Factors | | | | | | | | |
| Cd | 1.15 | 1.15 | 1.15 | 1.15 | | | | |
| CF | 1 | 1.2 | 1.1 | 1.2 | | | | |

| | | | | | | | | |
|----------------------------|---------------|---------------|---------------|---------------|--|--|--|--|
| Material Properties | | | | | | | | |
| Fb | 2,900 psi | 900 psi | 2,900 psi | 900 psi | | | | |
| Fv | 285 psi | 180 psi | 285 psi | 180 psi | | | | |
| E | 2,000,000 psi | 1,600,000 psi | 2,000,000 psi | 1,600,000 psi | | | | |
| Emin | 1,016,535 psi | 580,000 psi | 1,016,535 psi | 580,000 psi | | | | |

| | | | | | | | | |
|-------------------------|---------------|-------------|---------------|-------------|--|--|--|--|
| Calculated Prop. | | | | | | | | |
| A | 62.34 in^2 | 25.38 in^2 | 49.88 in^2 | 25.38 in^2 | | | | |
| I | 732.62 in^4 | 111.15 in^4 | 375.10 in^4 | 111.15 in^4 | | | | |
| S | 123.39 in^3 | 30.66 in^3 | 78.97 in^3 | 30.66 in^3 | | | | |
| RB | 12.34 | 8.41 | 8.79 | 7.16 | | | | |
| Emin' | 1,016,535 psi | 580,000 psi | 1,016,535 psi | 580,000 psi | | | | |
| FbE | 8,014 psi | 9,837 psi | 15,793 psi | 13,592 psi | | | | |
| Fb* | 3,335 psi | 1,242 psi | 3,669 psi | 1,242 psi | | | | |
| CL | 1 | 1 | 1 | 1 | | | | |

| | | | | | | | | |
|-------------------------|---------------|--------------|---------------|--------------|--|--|--|--|
| Shear and Moment | | | | | | | | |
| M | 292,520 lb-in | 28,566 lb-in | 114,266 lb-in | 13,998 lb-in | | | | |
| V | 6,094 lbs | 1,904 lbs | 3,809 lbs | 1,333 lbs | | | | |

| | | | | | | | | |
|---------------|-----------|-----------|-----------|-----------|--|--|--|--|
| Stress | | | | | | | | |
| fb | 2,371 psi | 932 psi | 1,447 psi | 457 psi | | | | |
| Fb' | 3,226 psi | 1,233 psi | 3,615 psi | 1,236 psi | | | | |
| fb/Fb' | 0.73 | 0.76 | 0.40 | 0.37 | | | | |
| fv | 147 psi | 113 psi | 115 psi | 79 psi | | | | |
| Fv' | 328 psi | 207 psi | 328 psi | 207 psi | | | | |
| fv/Fv' | 0.45 | 0.54 | 0.35 | 0.38 | | | | |
| Max Ratio | 0.73 | 0.76 | 0.40 | 0.38 | | | | |
| | Pass | Pass | Pass | Pass | | | | |

| | | | | | | | | |
|-------------------|---------|---------|---------|---------|--|--|--|--|
| Deflection | | | | | | | | |
| ΔTL | 0.77 in | 0.06 in | 0.23 in | 0.01 in | | | | |
| | L/250 | L/996 | L/525 | L/2,904 | | | | |
| ΔTL | 0.53 in | 0.04 in | 0.16 in | 0.01 in | | | | |
| | L/363 | L/1,445 | L/762 | L/4,214 | | | | |
| | Pass | Pass | Pass | Pass | | | | |

DU (4) Beam Calculations

| | Additional Drift | Roof | Floor | Deck | Wall | Total Load | Total Load |
|------------------|------------------|--------|-------|------|-------|-------------|-------------|
| Trib | 0.0 | 15 | 0 | 0 | 9.33 | | 2,682.3 plf |
| Dead Load | - | 255.0 | 0.0 | 0.0 | 177.3 | 432.3 plf | |
| Live / Snow Load | 0 | 2250.0 | 0.0 | 0.0 | - | 2,250.0 plf | |

| Description: | 5.0 ft Opening | | | | | | |
|----------------|------------------------|--|--|--|--|--|--|
| Header Callout | (2)9'-1/2" LVL 2.0E | | | | | | |
| Trimmers | (3) 2x6 DF-L No. 2 | | | | | | |
| King Studs | (3) 2x6 DF-L No. 2 | | | | | | |

| Wood Design | | | | | | | |
|-------------|---------|--|--|--|--|--|--|
| Species | LVL | | | | | | |
| Grade | 2.0E | | | | | | |
| Width | 3.50 in | | | | | | |
| Depth | 9.50 in | | | | | | |

| Reaction | | | | | | | |
|-----------|-----------|--|--|--|--|--|--|
| Dead Load | 1,081 lbs | | | | | | |
| Live Load | 5,625 lbs | | | | | | |

| Load | | | | | | | |
|----------------|---------|--|--|--|--|--|--|
| l _u | 5.0 ft | | | | | | |
| l _e | 10.3 ft | | | | | | |

| Adjustment Factors | | | | | | | |
|--------------------|------|--|--|--|--|--|--|
| C _d | 1.15 | | | | | | |
| C _F | 1.1 | | | | | | |

| Material Properties | | | | | | | |
|---------------------|---------------|--|--|--|--|--|--|
| F _b | 2,900 psi | | | | | | |
| F _v | 285 psi | | | | | | |
| E | 2,000,000 psi | | | | | | |
| E _{min} | 1,016,535 psi | | | | | | |

| Calculated Prop. | | | | | | | |
|--------------------|------------------------|--|--|--|--|--|--|
| A | 33.25 in ² | | | | | | |
| I | 250.07 in ⁴ | | | | | | |
| S | 52.65 in ³ | | | | | | |
| RB | 9.79 | | | | | | |
| E _{min} ' | 1,016,535 psi | | | | | | |
| F _{bE} | 12,726 psi | | | | | | |
| F _b * | 3,669 psi | | | | | | |
| C _L | 1 | | | | | | |

| Shear and Moment | | | | | | | |
|------------------|---------------|--|--|--|--|--|--|
| M | 100,585 lb-in | | | | | | |
| V | 6,706 lbs | | | | | | |

| Stress | | | | | | | |
|----------------------------------|-----------|--|--|--|--|--|--|
| f _b | 1,911 psi | | | | | | |
| F _b ' | 3,598 psi | | | | | | |
| f _b /F _b ' | 0.53 | | | | | | |
| f _v | 303 psi | | | | | | |
| F _v ' | 328 psi | | | | | | |
| f _v /F _v ' | 0.92 | | | | | | |
| Max Ratio | 0.92 | | | | | | |
| | Pass | | | | | | |

| Deflection | | | | | | | |
|----------------------------|---------|--|--|--|--|--|--|
| Δ _{T_L} | 0.08 in | | | | | | |
| | L/796 | | | | | | |
| Δ _{L_L} | 0.06 in | | | | | | |
| | L/948 | | | | | | |
| | Pass | | | | | | |

DU (3) Beam Calculations

| | Additional Drift | Roof | Floor | Deck | Wall | Total Load | Total Load |
|------------------|------------------|--------|-------|------|------|-------------|-------------|
| Trib | 0.0 | 16.25 | 0 | 0 | 4.83 | | 2,805.5 plf |
| Dead Load | - | 276.3 | 0.0 | 0.0 | 91.8 | 368.0 plf | |
| Live / Snow Load | 0 | 2437.5 | 0.0 | 0.0 | - | 2,437.5 plf | |

| Description: | 11.0 ft Opening | 3.5 ft Opening | 14.8 ft Opening | | | | |
|----------------|-----------------------|-----------------------|---------------------------|--|--|--|--|
| Header Callout | (3)14" LVL 2.0E | 4x12 DF-L No. 2 | 5.25x21 DF/DF 24F - V4 | | | | |
| Trimmers | (4) 2x6 DF-L No. 2 | (2) 2x6 DF-L No. 2 | (5) 2x6 DF-L No. 2 | | | | |
| King Studs | (2) 2x6 DF-L No. 2 | (1) 2x6 DF-L No. 2 | (2) 2x6 DF-L No. 2 | | | | |

| Wood Design | | | | | | | |
|-------------|----------|----------|----------|--|--|--|--|
| Species | LVL | DF-L | DF/DF | | | | |
| Grade | 2.0E | No. 2 | 24F - V4 | | | | |
| Width | 5.25 in | 3.50 in | 5.25 in | | | | |
| Depth | 14.00 in | 11.25 in | 21.00 in | | | | |

| Reaction | | | | | | | |
|-----------|------------|-----------|------------|--|--|--|--|
| Dead Load | 2,024 lbs | 644 lbs | 2,714 lbs | | | | |
| Live Load | 13,406 lbs | 4,266 lbs | 17,977 lbs | | | | |

| Load | | | | | | | |
|------|---------|--------|---------|--|--|--|--|
| lu | 11.0 ft | 3.5 ft | 14.8 ft | | | | |
| le | 21.4 ft | 7.2 ft | 29.3 ft | | | | |

| Adjustment Factors | | | | | | | |
|--------------------|------|------|------|--|--|--|--|
| Cd | 1.15 | 1.15 | 1.15 | | | | |
| CF | 1 | 1 | 1 | | | | |

| Material Properties | | | | | | | |
|---------------------|---------------|---------------|---------------|--|--|--|--|
| Fb | 2,900 psi | 900 psi | 2,400 psi | | | | |
| Fv | 285 psi | 180 psi | 265 psi | | | | |
| E | 2,000,000 psi | 1,600,000 psi | 1,850,000 psi | | | | |
| Emin | 1,016,535 psi | 580,000 psi | 950,000 psi | | | | |

| Calculated Prop. | | | | | | | |
|------------------|---------------|-------------|---------------|--|--|--|--|
| A | 73.50 in^2 | 39.38 in^2 | 110.25 in^2 | | | | |
| I | 1,200.50 in^4 | 415.28 in^4 | 4,051.69 in^4 | | | | |
| S | 171.50 in^3 | 73.83 in^3 | 385.88 in^3 | | | | |
| RB | 11.43 | 8.91 | 16.37 | | | | |
| Emin' | 1,016,535 psi | 580,000 psi | 950,000 psi | | | | |
| FbE | 9,339 psi | 8,759 psi | 4,257 psi | | | | |
| Fb* | 3,335 psi | 1,035 psi | 2,760 psi | | | | |
| CL | 1 | 1 | 1 | | | | |

| Shear and Moment | | | | | | | |
|------------------|---------------|--------------|---------------|--|--|--|--|
| M | 509,202 lb-in | 51,551 lb-in | 915,564 lb-in | | | | |
| V | 15,430 lbs | 4,910 lbs | 20,691 lbs | | | | |

| Stress | | | | | | | |
|-----------|-----------|-----------|-----------|--|--|--|--|
| fb | 2,969 psi | 698 psi | 2,373 psi | | | | |
| Fb' | 3,248 psi | 1,028 psi | 2,565 psi | | | | |
| fb/Fb' | 0.91 | 0.68 | 0.92 | | | | |
| fv | 315 psi | 187 psi | 282 psi | | | | |
| Fv' | 328 psi | 207 psi | 305 psi | | | | |
| fv/Fv' | 0.96 | 0.90 | 0.92 | | | | |
| Max Ratio | 0.96 | 0.90 | 0.92 | | | | |
| | Pass | Pass | Pass | | | | |

| Deflection | | | | | | | |
|-----------------|---------|---------|---------|--|--|--|--|
| Δ _L | 0.38 in | 0.01 in | 0.40 in | | | | |
| | L/343 | L/2,946 | L/444 | | | | |
| Δ _{LL} | 0.33 in | 0.01 in | 0.35 in | | | | |
| | L/395 | L/3,391 | L/511 | | | | |
| | Pass | Pass | Pass | | | | |

DU (2) Beam Calculations

| | Additional Drift | Roof | Floor | Deck | Wall | Total Load | Total Load |
|------------------|------------------|--------|-------|------|------|-------------|-------------|
| Trib | 0.0 | 13 | 0 | 0 | 3.33 | | 2,234.3 plf |
| Dead Load | - | 221.0 | 0.0 | 0.0 | 63.3 | 284.3 plf | |
| Live / Snow Load | 0 | 1950.0 | 0.0 | 0.0 | - | 1,950.0 plf | |

| | | | | | | | |
|---------------------|----------------|--|--|--|--|--|--|
| Description: | 3.0 ft Opening | | | | | | |
|---------------------|----------------|--|--|--|--|--|--|

| | | | | | | | |
|-----------------------|-----------------------|--|--|--|--|--|--|
| Header Callout | 4x8 DF-L No. 2 | | | | | | |
| Trimmers | (2) 2x6 DF-L No. 2 | | | | | | |
| King Studs | (1) 2x6 DF-L No. 2 | | | | | | |

| | | | | | | | |
|--------------------|---------|--|--|--|--|--|--|
| Wood Design | | | | | | | |
| Species | DF-L | | | | | | |
| Grade | No. 2 | | | | | | |
| Width | 3.50 in | | | | | | |
| Depth | 7.25 in | | | | | | |

| | | | | | | | |
|-----------------|-----------|--|--|--|--|--|--|
| Reaction | | | | | | | |
| Dead Load | 426 lbs | | | | | | |
| Live Load | 2,925 lbs | | | | | | |

| | | | | | | | |
|----------------|--------|--|--|--|--|--|--|
| Load | | | | | | | |
| l _u | 3.0 ft | | | | | | |
| l _e | 6.2 ft | | | | | | |

| | | | | | | | |
|---------------------------|------|--|--|--|--|--|--|
| Adjustment Factors | | | | | | | |
| C _d | 1.15 | | | | | | |
| C _F | 1.2 | | | | | | |

| | | | | | | | |
|----------------------------|---------------|--|--|--|--|--|--|
| Material Properties | | | | | | | |
| F _b | 900 psi | | | | | | |
| F _v | 180 psi | | | | | | |
| E | 1,600,000 psi | | | | | | |
| E _{min} | 580,000 psi | | | | | | |

| | | | | | | | |
|-------------------------|------------------------|--|--|--|--|--|--|
| Calculated Prop. | | | | | | | |
| A | 25.38 in ² | | | | | | |
| I | 111.15 in ⁴ | | | | | | |
| S | 30.66 in ³ | | | | | | |
| RB | 6.62 | | | | | | |
| E _{min'} | 580,000 psi | | | | | | |
| F _{bE} | 15,858 psi | | | | | | |
| F _{b*} | 1,242 psi | | | | | | |
| C _L | 1 | | | | | | |

| | | | | | | | |
|-------------------------|--------------|--|--|--|--|--|--|
| Shear and Moment | | | | | | | |
| M | 30,163 lb-in | | | | | | |
| V | 3,351 lbs | | | | | | |

| | | | | | | | |
|---------------------------------|-----------|--|--|--|--|--|--|
| Stress | | | | | | | |
| f _b | 984 psi | | | | | | |
| F _{b'} | 1,237 psi | | | | | | |
| f _b /F _{b'} | 0.80 | | | | | | |
| f _v | 198 psi | | | | | | |
| F _{v'} | 207 psi | | | | | | |
| f _v /F _{v'} | 0.96 | | | | | | |
| Max Ratio | 0.96 | | | | | | |
| | Pass | | | | | | |

| | | | | | | | |
|----------------------------|---------|--|--|--|--|--|--|
| Deflection | | | | | | | |
| Δ _{T_L} | 0.02 in | | | | | | |
| | L/1,572 | | | | | | |
| Δ _{T_U} | 0.02 in | | | | | | |
| | L/1,801 | | | | | | |
| | Pass | | | | | | |

DU Beam Calculations

| | | | | | | | |
|------------------|------------------|-------|-------|------|------|------------|------------|
| | Additional Drift | Roof | Floor | Deck | Wall | Total Load | Total Load |
| Trib | 0.0 | 3.5 | 0 | 0 | 4.83 | | |
| Dead Load | - | 59.5 | 0.0 | 0.0 | 91.8 | 151.3 plf | 676.3 plf |
| Live / Snow Load | 0 | 525.0 | 0.0 | 0.0 | - | 525.0 plf | |

| | | | | | | | |
|---------------------|----------------|----------------|--|--|--|--|--|
| Description: | 3.5 ft Opening | 5.0 ft Opening | | | | | |
|---------------------|----------------|----------------|--|--|--|--|--|

| | | | | | | | |
|-----------------------|------------|------------|--|--|--|--|--|
| Header Callout | 4x8 | 4x8 | | | | | |
| | DF-L No. 2 | DF-L No. 2 | | | | | |
| Trimmers | (1) 2x6 | (1) 2x6 | | | | | |
| | DF-L No. 2 | DF-L No. 2 | | | | | |
| King Studs | (1) 2x6 | (1) 2x6 | | | | | |
| | DF-L No. 2 | DF-L No. 2 | | | | | |

| | | | | | | | |
|--------------------|---------|---------|--|--|--|--|--|
| Wood Design | | | | | | | |
| Species | DF-L | DF-L | | | | | |
| Grade | No. 2 | No. 2 | | | | | |
| Width | 3.50 in | 3.50 in | | | | | |
| Depth | 7.25 in | 7.25 in | | | | | |

| | | | | | | | |
|-----------------|---------|-----------|--|--|--|--|--|
| Reaction | | | | | | | |
| Dead Load | 265 lbs | 378 lbs | | | | | |
| Live Load | 919 lbs | 1,313 lbs | | | | | |

| | | | | | | | |
|-------------|--------|---------|--|--|--|--|--|
| Load | | | | | | | |
| lu | 3.5 ft | 5.0 ft | | | | | |
| le | 7.2 ft | 10.0 ft | | | | | |

| | | | | | | | |
|---------------------------|------|------|--|--|--|--|--|
| Adjustment Factors | | | | | | | |
| Cd | 1.15 | 1.15 | | | | | |
| CF | 1.2 | 1.2 | | | | | |

| | | | | | | | |
|----------------------------|---------------|---------------|--|--|--|--|--|
| Material Properties | | | | | | | |
| Fb | 900 psi | 900 psi | | | | | |
| Fv | 180 psi | 180 psi | | | | | |
| E | 1,600,000 psi | 1,600,000 psi | | | | | |
| Emin | 580,000 psi | 580,000 psi | | | | | |

| | | | | | | | |
|-------------------------|-------------|-------------|--|--|--|--|--|
| Calculated Prop. | | | | | | | |
| A | 25.38 in^2 | 25.38 in^2 | | | | | |
| I | 111.15 in^4 | 111.15 in^4 | | | | | |
| S | 30.66 in^3 | 30.66 in^3 | | | | | |
| RB | 7.16 | 8.41 | | | | | |
| Emin' | 580,000 psi | 580,000 psi | | | | | |
| FbE | 13,592 psi | 9,837 psi | | | | | |
| Fb* | 1,242 psi | 1,242 psi | | | | | |
| CL | 1 | 1 | | | | | |

| | | | | | | | |
|-------------------------|--------------|--------------|--|--|--|--|--|
| Shear and Moment | | | | | | | |
| M | 12,426 lb-in | 25,360 lb-in | | | | | |
| V | 1,183 lbs | 1,691 lbs | | | | | |

| | | | | | | | |
|---------------|-----------|-----------|--|--|--|--|--|
| Stress | | | | | | | |
| fb | 405 psi | 827 psi | | | | | |
| Fb' | 1,236 psi | 1,233 psi | | | | | |
| fb/Fb' | 0.33 | 0.67 | | | | | |
| fv | 70 psi | 100 psi | | | | | |
| Fv' | 207 psi | 207 psi | | | | | |
| fv/Fv' | 0.34 | 0.48 | | | | | |
| Max Ratio | 0.34 | 0.67 | | | | | |
| | Pass | Pass | | | | | |

| | | | | | | | |
|-------------------|---------|---------|--|--|--|--|--|
| Deflection | | | | | | | |
| ΔTL | 0.01 in | 0.05 in | | | | | |
| | L/3,271 | L/1,122 | | | | | |
| ΔLL | 0.01 in | 0.04 in | | | | | |
| | L/4,214 | L/1,445 | | | | | |
| | Pass | Pass | | | | | |

WOOD TALL WALL & KING STUD ALLOWABLE LOADS (plf):

Load Duration Factor: 1.6
Max Vert. Load: 50 lbs

Max Deflection: $L/180$

| King Stud | Height | | | | | | |
|---------------|--------|-------|-------|-------|-------|------|------|
| | 12' | 14' | 16' | 18' | 20' | 22' | 24' |
| (1) 2x4 Stud | 12.8 | NA | NA | NA | NA | NA | NA |
| (2) 2x4 Stud | 25.6 | NA | NA | NA | NA | NA | NA |
| (3) 2x4 Stud | 38.4 | NA | NA | NA | NA | NA | NA |
| (1) 2x6 DF #2 | 57.0 | 35.8 | 24.1 | 16.9 | NA | NA | NA |
| (2) 2x6 DF #2 | 114.0 | 71.6 | 48.2 | 33.8 | NA | NA | NA |
| (3) 2x6 DF #2 | 171.0 | 107.4 | 72.3 | 50.7 | NA | NA | NA |
| (1) 2x8 DF #2 | 130.0 | 81.7 | 55.0 | 38.7 | 28.2 | 21.2 | 16.3 |
| (2) 2x8 DF #2 | 260.0 | 163.4 | 110.0 | 77.4 | 56.4 | 42.4 | 32.6 |
| (3) 2x8 DF #2 | 390.0 | 245.1 | 165.0 | 116.1 | 84.6 | 63.6 | 48.9 |
| (1) 2x6 LSL | 67.8 | 42.7 | 28.5 | 20.0 | 14.7 | NA | NA |
| (2) 2x6 LSL | 135.6 | 85.4 | 57.0 | 40.0 | 29.4 | NA | NA |
| (3) 2x6 LSL | 203.4 | 128.1 | 85.5 | 60.0 | 44.1 | NA | NA |
| (1) 2x8 LSL | 155.0 | 98.3 | 65.5 | 46.0 | 33.5 | 25.2 | 19.5 |
| (2) 2x8 LSL | 310.0 | 196.6 | 131.0 | 92.0 | 67.0 | 50.4 | 39.0 |
| (3) 2x8 LSL | 465.0 | 294.9 | 196.5 | 138.0 | 100.5 | 75.6 | 58.5 |

*NOTE 1: this table combined with trimmer table to determine combined stress on each common wall stud.
*NOTE 2: allowable loads are interpolated at heights not in 2' increments.

WOOD TRIMMER ALLOWABLE LOADS (kips):

Load Duration Factor: 1.0
Eccentricity: 0"

Weak Axis Braced: Y

| Trimmer Type | Height | | | | | | |
|---------------|--------|------|------|------|------|------|------|
| | 8' | 10' | 12' | 14' | 16' | 18' | 20' |
| (1) 2x4 Stud | 2.4 | 1.7 | 1.2 | NA | NA | NA | NA |
| (2) 2x4 Stud | 4.9 | 3.4 | 2.4 | NA | NA | NA | NA |
| (3) 2x4 Stud | 7.1 | 5.0 | 3.6 | NA | NA | NA | NA |
| (1) 2x6 DF #2 | 5.1 | 5.1 | 5.0 | 3.8 | 3.0 | NA | NA |
| (2) 2x6 DF #2 | 10.3 | 10.3 | 10.1 | 7.7 | 6.0 | NA | NA |
| (3) 2x6 DF #2 | 15.4 | 15.4 | 15.1 | 11.6 | 9.1 | NA | NA |
| (1) 2x8 DF #2 | 6.7 | 6.7 | 6.7 | 6.7 | 6.4 | 5.3 | 4.4 |
| (2) 2x8 DF #2 | 13.5 | 13.5 | 13.5 | 13.5 | 12.9 | 10.6 | 8.8 |
| (3) 2x8 DF #2 | 20.3 | 20.3 | 20.3 | 20.3 | 19.4 | 15.9 | 13.2 |

*NOTE 1: this table combined with king stud table to determine combined stress on each common wall stud.
*NOTE 2: allowable loads are interpolated at heights not in 2' increments.

TALL WALL CALCULATIONS:

This spreadsheet is used for designing a stud wall according to the NDS.

| Description: | 9' Tall Wall | 13.5' Tall Wall | 13.5' Tall Wall | 10' Tall Wall | 18' Tall Wall | |
|---|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--|
| Type: | 2x Lumber (2"-4") | 2x Lumber (2"-4") | 2x Lumber (2"-4") | 2x Lumber (2"-4") | 2x Lumber (2"-4") | |
| Species: | DF-L | DF-L | DF-L | DF-L | DF-L | |
| Grade: | No. 2 | No. 2 | No. 2 | No. 2 | No. 2 | |
| Nominal width, t = | (1) 2 | (1) 2 | (1) 2 | (1) 2 | (1) 2 | |
| Actual width = | 1.50 in | 1.50 in | 1.50 in | 1.50 in | 1.50 in | |
| Nominal depth, d = | 6 | 10 | 6 | 6 | 10 | |
| Actual depth = | 5.50 in | 9.25 in | 5.50 in | 5.50 in | 9.25 in | |
| Span, L = | 9.000 ft | 13.500 ft | 13.500 ft | 10.000 ft | 18.000 ft | |
| w/o Plates | 8.750 ft | 13.250 ft | 13.250 ft | 9.750 ft | 17.750 ft | |
| Stud spacing, s = | 16 in | 16 in | 16 in | 16 in | 16 in | |
| Lat. Pressure, w _{wind} = | 13.36 psf | 13.36 psf | 13.36 psf | 13.36 psf | 13.36 psf | |
| Axial load, P = | 3229 lbs | 4453 lbs | 891 lbs | 5121 lbs | 891 lbs | |
| Eccentricity, e = | 0 in | 0 in | 0 in | 0 in | 0 in | |
| K _{cE} = | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | |
| c = | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | |
| w = | 17.8 plf | 17.8 plf | 17.8 plf | 17.8 plf | 17.8 plf | |
| F _b | 900 psi | 900 psi | 900 psi | 900 psi | 900 psi | |
| F _v | 180 psi | 180 psi | 180 psi | 180 psi | 180 psi | |
| F _{c-prll} | 1,350 psi | 1,350 psi | 1,350 psi | 1,350 psi | 1,350 psi | |
| F _{c-perp} | 625 psi | 625 psi | 625 psi | 625 psi | 625 psi | |
| C _d | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | |
| C _{F,Fb} | 1.30 | 1.10 | 1.30 | 1.30 | 1.10 | |
| C _{F,Fcprll} | 1.10 | 1.00 | 1.10 | 1.10 | 1.00 | |
| C _r | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | |
| C _p | 0.47 | 0.59 | 0.23 | 0.39 | 0.37 | |
| C _H | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| C _b | 1.07 | 1.00 | 1.07 | 1.07 | 1.00 | |
| E | 1,600,000 psi | 1,600,000 psi | 1,600,000 psi | 1,600,000 psi | 1,600,000 psi | |
| E _{min} | 580,000 psi | 580,000 psi | 580,000 psi | 580,000 psi | 580,000 psi | |
| Allowable Stress: | | | | | | |
| F' _b = F _b C _d C _F C _r | 2153 psi | 1822 psi | 2153 psi | 2153 psi | 1822 psi | |
| F' _v = F _v C _d C _H | 288 psi | 288 psi | 288 psi | 288 psi | 288 psi | |
| F' _c = F _c C _d C _F | 2376 psi | 2160 psi | 2376 psi | 2376 psi | 2160 psi | |
| F' _{cE} = (K _{cE} E')/(l/d)2 | 1317 psi | 1625 psi | 574 psi | 1061 psi | 905 psi | |
| F' _c = F _c C _d C _F C _p | 1118 psi | 1266 psi | 542 psi | 938 psi | 809 psi | |
| F' _{c-perp} = F _{c-perp} C _b | 668 psi | 625 psi | 668 psi | 668 psi | 625 psi | |
| E' | 1600000 psi | 1600000 psi | 1600000 psi | 1600000 psi | 1600000 psi | |
| F _{bE} | 2712 psi | 1065 psi | 1791 psi | 2434 psi | 795 psi | |
| Slenderness Ratio: | < 50 OK | < 50 OK | < 50 OK | < 50 OK | < 50 OK | |
| R _b | 16 | 26 | 20 | 17 | 30 | |
| Bending: | < F'_b OK | < F'_b OK | < F'_b OK | < F'_b OK | < F'_b OK | |
| M = w L ² /8 + P e/12 | 171 ft-lbs | 391 ft-lbs | 391 ft-lbs | 212 ft-lbs | 702 ft-lbs | |
| f _b = M/S | 271 psi | 219 psi | 620 psi | 336 psi | 394 psi | |
| S | 8 in ³ | 21 in ³ | 8 in ³ | 8 in ³ | 21 in ³ | |
| Shear: | < F'_v OK | < F'_v OK | < F'_v OK | < F'_v OK | < F'_v OK | |
| V = w L/2 | 78 lbs | 118 lbs | 118 lbs | 87 lbs | 158 lbs | |
| f _v = 1.5 V/A | 14 psi | 13 psi | 21 psi | 16 psi | 17 psi | |
| A | 8 in ² | 14 in ² | 8 in ² | 8 in ² | 14 in ² | |
| Compression: | < F'_c OK | < F'_c OK | < F'_c OK | < F'_c OK | < F'_c OK | |
| f _c = P/A | 391 psi | 321 psi | 108 psi | 621 psi | 64 psi | |
| Compression (perp.): | < F'_c OK | < F'_c OK | < F'_c OK | < F'_c OK | < F'_c OK | |
| f _{c-perp} = P/A | 391 psi | 321 psi | 108 psi | 621 psi | 64 psi | |
| Combined: | < 1.0 OK | < 1.0 OK | < 1.0 OK | < 1.0 OK | < 1.0 OK | |
| (f _c /F _c)2 + (f _b /[F _b (1-(f _c /F _{cE})]) | 0.30 | 0.21 | 0.39 | 0.81 | 0.24 | |
| Deflection: | > 180 OK | > 180 OK | > 180 OK | > 180 OK | > 180 OK | |
| D = 22.5 w L ⁴ /E' I = | 0.07 in | 0.08 in | 0.37 in | 0.11 in | 0.25 in | |
| I | 21 in ⁴ | 99 in ⁴ | 21 in ⁴ | 21 in ⁴ | 99 in ⁴ | |
| SPAN / | 1487 | 2037 | 428 | 1075 | 847 | |

TALL WALL CALCULATIONS:

This spreadsheet is used for designing a stud wall according to the NDS.

Description:

| | 11.5' Tall Wall | 16' Tall Wall | 16' Tall Wall | 16' Tall Wall | | |
|--|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--|--|
| Type: | 2x Lumber (2"-4") | 2x Lumber (2"-4") | 2x Lumber (2"-4") | 2x Lumber (2"-4") | | |
| Species: | DF-L | DF-L | DF-L | DF-L | | |
| Grade: | No. 2 | No. 2 | No. 2 | No. 2 | | |
| Nominal width, t = | (1) 2 | (2) 2 | (1) 2 | (1) 2 | | |
| Actual width = | 1.50 in | 3.00 in | 1.50 in | 1.50 in | | |
| Nominal depth, d = | 6 | 6 | 6 | 6 | | |
| Actual depth = | 5.50 in | 5.50 in | 5.50 in | 5.50 in | | |
| Span, L = | 11.500 ft | 16.000 ft | 16.000 ft | 16.000 ft | | |
| w/o Plates | 11.250 ft | 15.750 ft | 15.750 ft | 15.750 ft | | |
| Stud spacing, s = | 16 in | 12 in | 8 in | 16 in | | |
| Lat. Pressure, w _{wind} = | 13.36 psf | 5.00 psf | 13.36 psf | 13.36 psf | | |
| Axial load, P = | 3618 lbs | 4695 lbs | 1670 lbs | 891 lbs | | |
| Eccentricity, e = | 0 in | 0 in | 0 in | 0 in | | |
| K _{c,E} = | 0.3 | 0.3 | 0.3 | 0.3 | | |
| c = | 0.8 | 0.8 | 0.8 | 0.8 | | |
| w = | 17.8 plf | 5.0 plf | 8.9 plf | 17.8 plf | | |
| F _b | 900 psi | 900 psi | 900 psi | 900 psi | | |
| F _v | 180 psi | 180 psi | 180 psi | 180 psi | | |
| F _{c-prll} | 1,350 psi | 1,350 psi | 1,350 psi | 1,350 psi | | |
| F _{c-perp} | 625 psi | 625 psi | 625 psi | 625 psi | | |
| C _d | 1.60 | 1.60 | 1.60 | 1.60 | | |
| C _{F,Fb} | 1.30 | 1.30 | 1.30 | 1.30 | | |
| C _{F,Fcprll} | 1.10 | 1.10 | 1.10 | 1.10 | | |
| C _r | 1.15 | 1.15 | 1.15 | 1.15 | | |
| C _p | 0.31 | 0.16 | 0.16 | 0.16 | | |
| C _H | 1.00 | 1.00 | 1.00 | 1.00 | | |
| C _b | 1.07 | 1.07 | 1.07 | 1.07 | | |
| E | 1,600,000 psi | 1,600,000 psi | 1,600,000 psi | 1,600,000 psi | | |
| E _{min} | 580,000 psi | 580,000 psi | 580,000 psi | 580,000 psi | | |
| Allowable Stress: | | | | | | |
| F' _b = F _b C _d C _F C _r | 2153 psi | 2153 psi | 2153 psi | 2153 psi | | |
| F' _v = F _v C _d C _H | 288 psi | 288 psi | 288 psi | 288 psi | | |
| F' _c = F _c C _d C _F | 2376 psi | 2376 psi | 2376 psi | 2376 psi | | |
| F' _{cE} = (K _{cE} E')/(l/d)2 | 797 psi | 406 psi | 406 psi | 406 psi | | |
| F' _c = F _c C _d C _F C _p | 732 psi | 391 psi | 391 psi | 391 psi | | |
| F' _{c-perp} = F _{c-perp} C _b | 668 psi | 668 psi | 668 psi | 668 psi | | |
| E' | E = 1600000 psi | 1600000 psi | 1600000 psi | 1600000 psi | | |
| F _{bE} | 2109 psi | 6026 psi | 1506 psi | 1506 psi | | |
| Slenderness Ratio: | < 50 OK | < 50 OK | < 50 OK | < 50 OK | | |
| R _b | 18 | 11 | 21 | 21 | | |
| Bending: | < F'_b OK | < F'_b OK | < F'_b OK | < F'_b OK | | |
| M = w L ² /8 + P e/12 = | 282 ft-lbs | 155 ft-lbs | 276 ft-lbs | 553 ft-lbs | | |
| f _b = M/S = | 447 psi | 123 psi | 438 psi | 877 psi | | |
| S = | 8 in ³ | 15 in ³ | 8 in ³ | 8 in ³ | | |
| Shear: | < F'_v OK | < F'_v OK | < F'_v OK | < F'_v OK | | |
| V = w L/2 = | 100 lbs | 39 lbs | 70 lbs | 140 lbs | | |
| f _v = 1.5 V/A = | 18 psi | 4 psi | 13 psi | 26 psi | | |
| A = | 8 in ² | 17 in ² | 8 in ² | 8 in ² | | |
| Compression: | < F'_c OK | < F'_c OK | < F'_c OK | < F'_c OK | | |
| f _c = P/A = | 439 psi | 285 psi | 202 psi | 108 psi | | |
| Compression (perp.): | < F'_c OK | < F'_c OK | < F'_c OK | < F'_c OK | | |
| f _{c-perp} = P/A = | 439 psi | 285 psi | 202 psi | 108 psi | | |
| Combined: | < 1.0 OK | < 1.0 OK | < 1.0 OK | < 1.0 OK | | |
| (f _c /F _c)2 + (f _b /[F _b (1-(f _c /F _c E))]) = | 0.82 | 0.72 | 0.67 | 0.63 | | |
| Deflection: | > 180 OK | > 180 OK | > 180 OK | > 180 OK | | |
| D = 22.5 w L ⁴ /E' I = | 0.19 in | 0.10 in | 0.37 in | 0.74 in | | |
| I = | 21 in ⁴ | 42 in ⁴ | 21 in ⁴ | 21 in ⁴ | | |
| SPAN / | 700 | 1817 | 510 | 255 | | |

UNBRACED WOOD COLUMN ALLOWABLE LOADS (kips)

| Column Type | Unbraced Height | | | | | | | Compression Perp. To Grain |
|---------------|-----------------|-------|-------|-------|-------|-------|-------|----------------------------------|
| | 8' | 10' | 12' | 14' | 16' | 18' | 20' | |
| (2) 2x4 DF #2 | 4.50 | 3.00 | 2.10 | SR | SR | SR | SR | 6.50 |
| (3) 2x4 DF #2 | 8.80 | 5.90 | 4.20 | 3.20 | SR | SR | SR | 9.80 |
| 4x4 DF #2 | 7.00 | 4.60 | 3.30 | 2.40 | SR | SR | SR | 7.60 |
| (2) 2x6 DF #2 | 7.20 | 4.70 | 3.30 | SR | SR | SR | SR | 10.30 |
| (3) 2x6 DF #2 | 20.40 | 14.70 | 10.70 | 8.00 | 6.20 | 4.90 | SR | 15.40 |
| 6x6 DF #2 | 18.00 | 15.70 | 13.00 | 10.50 | 8.50 | 6.90 | 5.70 | 18.90 |
| 6x8 DF #2 | 24.50 | 21.40 | 17.80 | 14.30 | 11.60 | 9.40 | 7.80 | 25.70 |
| 6x10 DF #2 | 31.40 | 27.10 | 22.50 | 18.20 | 14.70 | 12.00 | 9.90 | 32.60 |
| 8x8 DF #2 | 36.60 | 34.60 | 31.90 | 28.50 | 24.90 | 21.30 | 18.20 | 35.20 |
| 8x10 DF #2 | 46.30 | 43.90 | 40.40 | 36.20 | 31.50 | 27.00 | 23.10 | 44.50 |
| 8x12 DF #2 | 56.20 | 53.10 | 49.00 | 43.80 | 38.10 | 32.70 | 28.00 | 53.40 |
| 10x10 DF #2 | 60.50 | 58.80 | 56.50 | 53.40 | 49.60 | 45.20 | 40.50 | 56.40 |

Steel Column

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: --None--

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combinations Used : IBC 2018

General Information

| | | |
|---|--|---------------------|
| Steel Section Name : HSS7x5x5/16 | Overall Column Height | 16 ft |
| Analysis Method : Allowable Strength | Top & Bottom Fixity | Top & Bottom Pinned |
| Steel Stress Grade | Brace condition : | |
| Fy : Steel Yield | Fully braced against buckling ABOUT X-X Axis | |
| E : Elastic Bending Modulus | Unbraced Length for buckling ABOUT Y-Y Axis = 10 ft, K = 1.0 | |

Applied Loads

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

Column self weight included : 373.440 lbs * Dead Load Factor
 AXIAL LOADS . . .
 Axial Load at 16.0 ft, D = 14.020, L = 7.0, S = 65.630 k

DESIGN SUMMARY

Bending & Shear Check Results

| | | | |
|---|-------------------|---------------------------------------|----------------------------|
| PASS Max. Axial+Bending Stress Ratio = | 0.9424 : 1 | Maximum Load Reactions . . | |
| Load Combination | +D+S | Top along X-X | 0.0 k |
| Location of max.above base | 0.0 ft | Bottom along X-X | 0.0 k |
| At maximum location values are . . . | | Top along Y-Y | 0.0 k |
| Pa : Axial | 80.023 k | Bottom along Y-Y | 0.0 k |
| Pn / Omega : Allowable | 84.912 k | | |
| Ma-x : Applied | 0.0 k-ft | Maximum Load Deflections . . . | |
| Mn-x / Omega : Allowable | 26.946 k-ft | Along Y-Y | 0.0 in at 0.0ft above base |
| Ma-y : Applied | 0.0 k-ft | for load combination : | |
| Mn-y / Omega : Allowable | 21.377 k-ft | Along X-X | 0.0 in at 0.0ft above base |
| | | for load combination : | |
| 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 | | |

Load Combination Results

| Load Combination | Maximum Axial + Bending Stress Ratios | | | | Maximum Shear Ratios | | | | | |
|------------------|---------------------------------------|--------|----------|------|----------------------|---------|---------|--------------|--------|----------|
| | Stress Ratio | Status | Location | Cbx | Cby | KxLx/Ry | KyLy/Rx | Stress Ratio | Status | Location |
| D Only | 0.170 | PASS | 0.00 ft | 1.00 | 1.00 | 0.00 | 96.48 | 0.000 | PASS | 0.00 ft |
| +D+L | 0.252 | PASS | 0.00 ft | 1.00 | 1.00 | 0.00 | 96.48 | 0.000 | PASS | 0.00 ft |
| +D+S | 0.942 | PASS | 0.00 ft | 1.00 | 1.00 | 0.00 | 96.48 | 0.000 | PASS | 0.00 ft |
| +D+0.750L | 0.231 | PASS | 0.00 ft | 1.00 | 1.00 | 0.00 | 96.48 | 0.000 | PASS | 0.00 ft |
| +D+0.750L+0.750S | 0.811 | PASS | 0.00 ft | 1.00 | 1.00 | 0.00 | 96.48 | 0.000 | PASS | 0.00 ft |
| +0.60D | 0.102 | PASS | 0.00 ft | 1.00 | 1.00 | 0.00 | 96.48 | 0.000 | PASS | 0.00 ft |

Maximum Reactions

Note: Only non-zero reactions are listed.

| Load Combination | Axial Reaction | X-X Axis Reaction | | k | Y-Y Axis Reaction | | Mx - End Moments | | My - End Moments | |
|------------------|----------------|-------------------|-------|---|-------------------|-------|------------------|-------|------------------|-------|
| | @ Base | @ Base | @ Top | | @ Base | @ Top | @ Base | @ Top | @ Base | @ Top |
| D Only | 14.393 | | | | | | | | | |
| +D+L | 21.393 | | | | | | | | | |
| +D+S | 80.023 | | | | | | | | | |
| +D+0.750L | 19.643 | | | | | | | | | |
| +D+0.750L+0.750S | 68.866 | | | | | | | | | |
| +0.60D | 8.636 | | | | | | | | | |
| L Only | 7.000 | | | | | | | | | |
| S Only | 65.630 | | | | | | | | | |

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: --None--

Extreme Reactions

| Item | Extreme Value | Axial Reaction | X-X Axis Reaction | | k | Y-Y Axis Reaction | | Mx - End Moments | | k-ft | My - End Moments | |
|-------------------------|---------------|----------------|-------------------|-------|---|-------------------|-------|------------------|-------|------|------------------|-------|
| | | @ Base | @ Base | @ Top | | @ Base | @ Top | @ Base | @ Top | | @ Base | @ Top |
| Axial @ Base | Maximum | 80.023 | | | | | | | | | | |
| " | Minimum | 7.000 | | | | | | | | | | |
| Reaction, X-X Axis Base | Maximum | 14.393 | | | | | | | | | | |
| " | Minimum | 14.393 | | | | | | | | | | |
| Reaction, Y-Y Axis Base | Maximum | 14.393 | | | | | | | | | | |
| " | Minimum | 14.393 | | | | | | | | | | |
| Reaction, X-X Axis Top | Maximum | 14.393 | | | | | | | | | | |
| " | Minimum | 14.393 | | | | | | | | | | |
| Reaction, Y-Y Axis Top | Maximum | 14.393 | | | | | | | | | | |
| " | Minimum | 14.393 | | | | | | | | | | |
| Moment, X-X Axis Base | Maximum | 14.393 | | | | | | | | | | |
| " | Minimum | 14.393 | | | | | | | | | | |
| Moment, Y-Y Axis Base | Maximum | 14.393 | | | | | | | | | | |
| " | Minimum | 14.393 | | | | | | | | | | |
| Moment, X-X Axis Top | Maximum | 14.393 | | | | | | | | | | |
| " | Minimum | 14.393 | | | | | | | | | | |
| Moment, Y-Y Axis Top | Maximum | 14.393 | | | | | | | | | | |
| " | Minimum | 14.393 | | | | | | | | | | |

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 | 0.000 in | 0.000 ft |
| +D+L | 0.0000 in | 0.000 ft | 0.000 in | 0.000 ft |
| +D+S | 0.0000 in | 0.000 ft | 0.000 in | 0.000 ft |
| +D+0.750L | 0.0000 in | 0.000 ft | 0.000 in | 0.000 ft |
| +D+0.750L+0.750S | 0.0000 in | 0.000 ft | 0.000 in | 0.000 ft |
| +0.60D | 0.0000 in | 0.000 ft | 0.000 in | 0.000 ft |
| L Only | 0.0000 in | 0.000 ft | 0.000 in | 0.000 ft |
| S Only | 0.0000 in | 0.000 ft | 0.000 in | 0.000 ft |

Steel Section Properties : HSS7x5x5/16

| | | | | | | | | |
|--------------|---|------------|------|---|-------------|----|---|-------------|
| Depth | = | 7.000 in | I xx | = | 43.00 in^4 | J | = | 52.100 in^4 |
| Design Thick | = | 0.291 in | S xx | = | 12.30 in^3 | Cw | = | 18.30 in^6 |
| Width | = | 5.000 in | R xx | = | 2.590 in | | | |
| Wall Thick | = | 0.313 in | Zx | = | 15.000 in^3 | | | |
| Area | = | 6.430 in^2 | I yy | = | 25.500 in^4 | C | = | 18.300 in^3 |
| Weight | = | 23.340 plf | S yy | = | 10.200 in^3 | | | |
| | | | R yy | = | 1.990 in | | | |
| | | | Zy | = | 11.900 in^3 | | | |
| Ycg | = | 0.000 in | | | | | | |

Steel Column

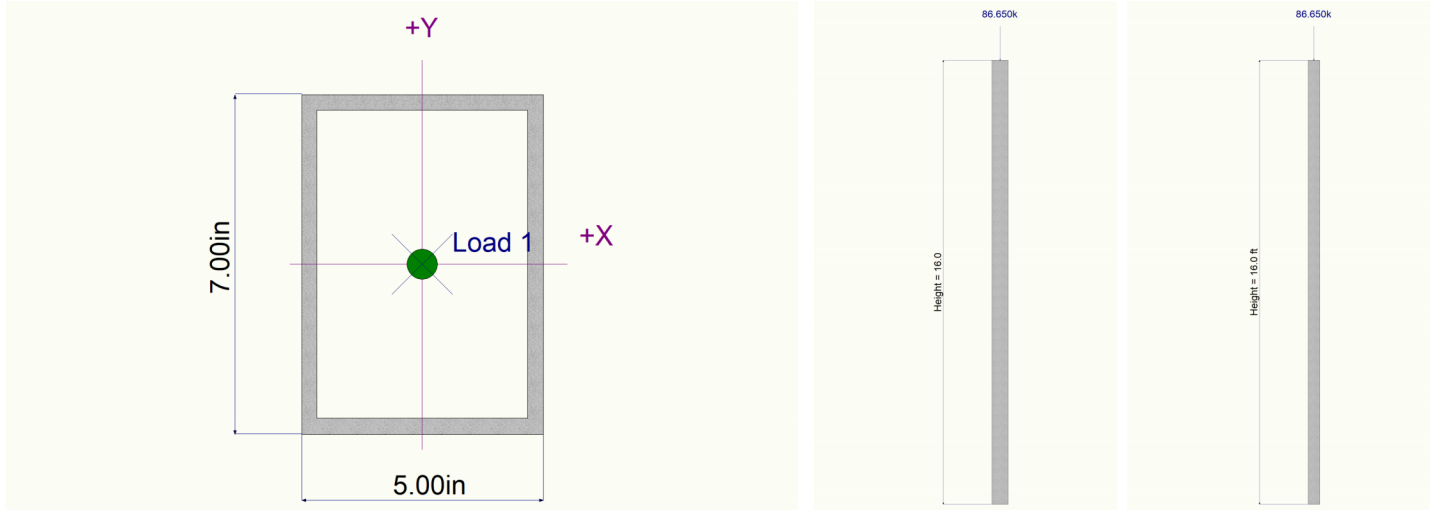
LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: --None--

Sketches



Individual Footing Design

Program: Continuous Footing

Soil Bearing Pressure: 1500psf

| Roof | | | | |
|-------------|------------|------------|---|----------------|
| Roof Dead | (17psf) | (12.5ft) | = | 213plf |
| Snow Live | (150psf) | (12.5ft) | = | 1875plf |

| Upper Floor | | | | |
|--------------------|-----------|----------|---|------------|
| Floor Dead | (12psf) | (.0ft) | = | plf |
| Floor Live | (40psf) | (.0ft) | = | plf |

| Deck Floor | | | | |
|-------------------|------------|----------|---|------------|
| Floor Dead | (12psf) | (.0ft) | = | plf |
| Snow Live | (150psf) | (.0ft) | = | plf |

| Misc | | | | |
|-------------|------------|--------------|----------|---------------|
| Wall Load: | (18psf) | (16.0ft) | = | 296plf |
| Conc Stem: | (145pcf) | (4 x .5ft) | = | 254plf |
| Misc Load: | (.0ft) | (.0ft) | (.0ft) | = plf |

2637plf

| | | | | |
|--------------------|------------|-----------|--------------|-----------|
| Use Footing Width: | 24 | x | 8 | in |
| w/ | (2) | #4 | Cont. | |

Individual Footing Design

Program: Continuous Footing

Soil Bearing Pressure: 1500psf

| Roof | | | | |
|-------------|------------|-----------|---|---------------|
| Roof Dead | (17psf) | (4.0ft) | = | 68plf |
| Snow Live | (150psf) | (4.0ft) | = | 600plf |

| Upper Floor | | | | |
|--------------------|-----------|-----------|---|--------------|
| Floor Dead | (12psf) | (1.0ft) | = | 12plf |
| Floor Live | (40psf) | (1.0ft) | = | 40plf |

| Deck Floor | | | | |
|-------------------|------------|----------|---|------------|
| Floor Dead | (12psf) | (.0ft) | = | plf |
| Snow Live | (150psf) | (.0ft) | = | plf |

| Misc | | | | |
|-------------|------------|-------------------|---|---------------|
| Wall Load: | (18psf) | (27.0ft) | = | 499plf |
| Conc Stem: | (145pcf) | (2 x .5ft) | = | 145plf |
| Misc Load: | (.0ft) | (.0ft) (.0ft) | = | plf |

1324plf

| | | | | |
|--------------------|------------|-----------|--------------|-----------|
| Use Footing Width: | 12 | x | 8 | in |
| w/ | (2) | #4 | Cont. | |

Individual Footing Design

Program: Continuous Footing

Soil Bearing Pressure: 1500psf

| Roof | | | | |
|-------------|------------|------------|---|----------------|
| Roof Dead | (17psf) | (14.5ft) | = | 247plf |
| Snow Live | (150psf) | (14.5ft) | = | 2175plf |

| Upper Floor | | | | |
|--------------------|-----------|----------|---|------------|
| Floor Dead | (12psf) | (.0ft) | = | plf |
| Floor Live | (40psf) | (.0ft) | = | plf |

| Deck Floor | | | | |
|-------------------|------------|----------|---|------------|
| Floor Dead | (12psf) | (.0ft) | = | plf |
| Snow Live | (150psf) | (.0ft) | = | plf |

| Misc | | | | |
|-------------|------------|-------------------|---|---------------|
| Wall Load: | (18psf) | (16.0ft) | = | 296plf |
| Conc Stem: | (145pcf) | (2 x .5ft) | = | 145plf |
| Misc Load: | (.0ft) | (.0ft) (.0ft) | = | plf |

2862plf

| | | | | |
|--------------------|------------|-----------|--------------|-----------|
| Use Footing Width: | 30 | x | 10 | in |
| w/ | (3) | #4 | Cont. | |

Individual Footing Design

Program: Continuous Footing

Soil Bearing Pressure: 1500psf

| Roof | | | |
|-------------|------------|------------|-----------|
| Roof Dead | (17psf) | (24.3ft) | = 412plf |
| Snow Live | (150psf) | (24.3ft) | = 3638plf |

| Upper Floor | | | |
|--------------------|-----------|------------|----------|
| Floor Dead | (12psf) | (10.0ft) | = 120plf |
| Floor Live | (40psf) | (10.0ft) | = 400plf |

| Deck Floor | | | |
|-------------------|------------|----------|-------|
| Floor Dead | (12psf) | (.0ft) | = plf |
| Snow Live | (150psf) | (.0ft) | = plf |

| Misc | | | |
|-------------|------------|-------------------|----------|
| Wall Load: | (18psf) | (27.0ft) | = 499plf |
| Conc Stem: | (145pcf) | (x .5ft) | = plf |
| Misc Load: | (.0ft) | (.0ft) (.0ft) | = plf |

4669plf

| | | | | |
|--------------------|------------|-----------|--------------|-----------|
| Use Footing Width: | 42 | x | 10 | in |
| w/ | (4) | #4 | Cont. | |

PAD FOOTING DESIGN CAPACITIES:

| Soil Bearing (1500 psf) | | | | | | | |
|-------------------------|---|----|----------|-----------|----------------|----|---------|
| Dimensions (Inches) | | | Capacity | # of Bars | Min. Col. Size | | |
| 72 | x | 72 | x | 12 | 47,500 lbs | 10 | 3.5 sq. |
| 66 | x | 66 | x | 12 | 39,750 lbs | 8 | 3.5 sq. |
| 60 | x | 60 | x | 10 | 33,450 lbs | 6 | 3.5 sq. |
| 54 | x | 54 | x | 10 | 27,000 lbs | 5 | 3.5 sq. |
| 48 | x | 48 | x | 8 | 21,500 lbs | 4 | 3.5 sq. |
| 42 | x | 42 | x | 8 | 16,500 lbs | 4 | 3.5 sq. |
| 36 | x | 36 | x | 8 | 12,000 lbs | 4 | 3.5 sq. |
| 30 | x | 30 | x | 8 | 8,350 lbs | 3 | 3.5 sq. |
| 24 | x | 24 | x | 8 | 5,300 lbs | 2 | 3.5 sq. |
| 18 | x | 18 | x | 8 | 2,900 lbs | 2 | 3.5 sq. |

Bars to be 3 1/2" from bottom of pad. Evenly space in both directions.

CONT. FOOTING DESIGN CAPACITIES:

| Soil Bearing (1500 psf) | | | | |
|-------------------------|---|----|-----------|-----------|
| Dimensions (Inches) | | | Capacity | # of Bars |
| 60 | x | 10 | 6,850 plf | 6 |
| 54 | x | 10 | 6,200 plf | 5 |
| 48 | x | 10 | 5,500 plf | 4 |
| 42 | x | 10 | 4,750 plf | 4 |
| 36 | x | 10 | 4,000 plf | 3 |
| 30 | x | 10 | 3,400 plf | 3 |
| 24 | x | 8 | 2,800 plf | 2 |
| 18 | x | 8 | 2,100 plf | 2 |
| 16 | x | 8 | 1,850 plf | 2 |
| 12 | x | 8 | 1,350 plf | 2 |

Bars to be 3 1/2" from bottom of footing.

General Footing

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: --None--

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
 Load Combinations Used : IBC 2018

General Information

Material Properties

| | | |
|---|---|-------------|
| f _c : Concrete 28 day strength | = | 2.50 ksi |
| f _y : Rebar Yield | = | 60.0 ksi |
| E _c : Concrete Elastic Modulus | = | 3,122.0 ksi |
| Concrete Density | = | 145.0 pcf |
| φ Values Flexure | = | 0.90 |
| Shear | = | 0.750 |

Soil Design Values

| | | |
|---------------------------------------|---|-----------|
| Allowable Soil Bearing | = | 1.50 ksf |
| Soil Density | = | 110.0 pcf |
| Increase Bearing By Footing Weight | = | No |
| Soil Passive Resistance (for Sliding) | = | 250.0 pcf |
| Soil/Concrete Friction Coeff. | = | 0.30 |

Analysis Settings

| | | |
|--|---|---------|
| Min Steel % Bending Reinf. | = | |
| Min Allow % Temp Reinf. | = | 0.00180 |
| Min. Overturning Safety Factor | = | 1.0 : 1 |
| Min. Sliding Safety Factor | = | 1.0 : 1 |
| Add Ftg Wt for Soil Pressure | : | Yes |
| Use ftg wt for stability, moments & shears | : | Yes |
| Add Pedestal Wt for Soil Pressure | : | No |
| Use Pedestal wt for stability, mom & shear | : | No |

Increases based on footing depth

| | | |
|--|---|-----------|
| Footing base depth below soil surface | = | ft |
| Allow press. increase per foot of depth when footing base is below | = | ksf ft |

Increases based on footing plan dimension

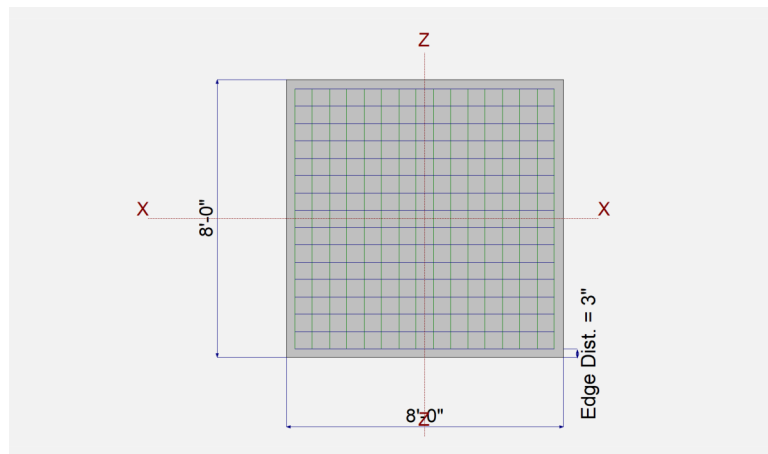
| | | |
|---|---|-----------|
| Allowable pressure increase per foot of depth when max. length or width is greater than | = | ksf ft |
|---|---|-----------|

Dimensions

| | | |
|-----------------------------|---|---------|
| Width parallel to X-X Axis | = | 8.0 ft |
| Length parallel to Z-Z Axis | = | 8.0 ft |
| Footing Thickness | = | 18.0 in |

Pedestal dimensions...

| | | |
|--|---|--------|
| px : parallel to X-X Axis | = | in |
| pz : parallel to Z-Z Axis | = | in |
| Height | = | in |
| Rebar Centerline to Edge of Concrete... at Bottom of footing | = | 3.0 in |



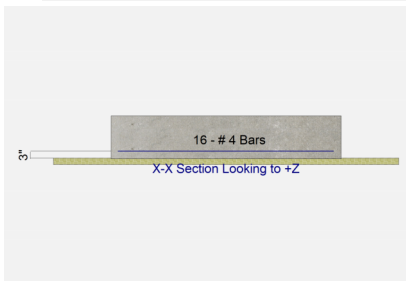
Reinforcing

| | | |
|---------------------------|---|-----|
| Bars parallel to X-X Axis | = | |
| Number of Bars | = | 16 |
| Reinforcing Bar Size | = | # 4 |

| | | |
|---------------------------|---|-----|
| Bars parallel to Z-Z Axis | = | |
| Number of Bars | = | 16 |
| Reinforcing Bar Size | = | # 4 |

Bandwidth Distribution Check (ACI 15.4.4.2)

| | | |
|---------------------------------------|---|-----|
| Direction Requiring Closer Separation | = | n/a |
| # Bars required within zone | = | n/a |
| # Bars required on each side of zone | = | n/a |



Applied Loads

| | D | L _r | L | S | W | E | H |
|-----------------|---|----------------|---|-----|--------|---|------|
| P : Column Load | = | 14.020 | | 7.0 | 65.630 | | k |
| OB : Overburden | = | | | | | | ksf |
| M-xx | = | | | | | | k-ft |
| M-zz | = | | | | | | k-ft |
| V-x | = | | | | | | k |
| V-z | = | | | | | | k |

General Footing

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: --None--

DESIGN SUMMARY

Design OK

| | Min. Ratio | Item | Applied | Capacity | Governing Load Combination |
|------|------------|-------------------|----------------|----------------|----------------------------|
| PASS | 0.9747 | Soil Bearing | 1.462 ksf | 1.50 ksf | +D+S about Z-Z axis |
| PASS | n/a | Overturning - X-X | 0.0 k-ft | 0.0 k-ft | No Overturning |
| PASS | n/a | Overturning - Z-Z | 0.0 k-ft | 0.0 k-ft | No Overturning |
| PASS | n/a | Sliding - X-X | 0.0 k | 0.0 k | No Sliding |
| PASS | n/a | Sliding - Z-Z | 0.0 k | 0.0 k | No Sliding |
| PASS | n/a | Uplift | 0.0 k | 0.0 k | No Uplift |
| PASS | 0.5990 | Z Flexure (+X) | 15.667 k-ft/ft | 26.153 k-ft/ft | +1.20D+0.50L+1.60S |
| PASS | 0.5990 | Z Flexure (-X) | 15.667 k-ft/ft | 26.153 k-ft/ft | +1.20D+0.50L+1.60S |
| PASS | 0.5990 | X Flexure (+Z) | 15.667 k-ft/ft | 26.153 k-ft/ft | +1.20D+0.50L+1.60S |
| PASS | 0.5990 | X Flexure (-Z) | 15.667 k-ft/ft | 26.153 k-ft/ft | +1.20D+0.50L+1.60S |
| PASS | 0.3946 | 1-way Shear (+X) | 29.592 psi | 75.0 psi | +1.20D+0.50L+1.60S |
| PASS | 0.3946 | 1-way Shear (-X) | 29.592 psi | 75.0 psi | +1.20D+0.50L+1.60S |
| PASS | 0.3946 | 1-way Shear (+Z) | 29.592 psi | 75.0 psi | +1.20D+0.50L+1.60S |
| PASS | 0.3946 | 1-way Shear (-Z) | 29.592 psi | 75.0 psi | +1.20D+0.50L+1.60S |
| PASS | 0.9046 | 2-way Punching | 135.693 psi | 150.0 psi | +1.20D+0.50L+1.60S |

Detailed Results

Soil Bearing

| Rotation Axis & Load Combination... | Gross Allowable | Xeccc | Zeccc (in) | Actual Soil Bearing Stress @ Location | | | | Actual / Allow Ratio |
|-------------------------------------|-----------------|-------|------------|---------------------------------------|---------|----------|-----------|----------------------|
| | | | | Bottom, -Z | Top, +Z | Left, -X | Right, +X | |
| X-X, D Only | 1.50 | n/a | 0.0 | 0.4366 | 0.4366 | n/a | n/a | 0.291 |
| X-X, +D+L | 1.50 | n/a | 0.0 | 0.5459 | 0.5459 | n/a | n/a | 0.364 |
| X-X, +D+S | 1.50 | n/a | 0.0 | 1.462 | 1.462 | n/a | n/a | 0.975 |
| X-X, +D+0.750L | 1.50 | n/a | 0.0 | 0.5186 | 0.5186 | n/a | n/a | 0.346 |
| X-X, +D+0.750L+0.750S | 1.50 | n/a | 0.0 | 1.288 | 1.288 | n/a | n/a | 0.859 |
| X-X, +0.60D | 1.50 | n/a | 0.0 | 0.2619 | 0.2619 | n/a | n/a | 0.175 |
| Z-Z, D Only | 1.50 | 0.0 | n/a | n/a | n/a | 0.4366 | 0.4366 | 0.291 |
| Z-Z, +D+L | 1.50 | 0.0 | n/a | n/a | n/a | 0.5459 | 0.5459 | 0.364 |
| Z-Z, +D+S | 1.50 | 0.0 | n/a | n/a | n/a | 1.462 | 1.462 | 0.975 |
| Z-Z, +D+0.750L | 1.50 | 0.0 | n/a | n/a | n/a | 0.5186 | 0.5186 | 0.346 |
| Z-Z, +D+0.750L+0.750S | 1.50 | 0.0 | n/a | n/a | n/a | 1.288 | 1.288 | 0.859 |
| Z-Z, +0.60D | 1.50 | 0.0 | n/a | n/a | n/a | 0.2619 | 0.2619 | 0.175 |

Overturning Stability

| Rotation Axis & Load Combination... | Overturning Moment | Resisting Moment | Stability Ratio | Status |
|-------------------------------------|--------------------|------------------|-----------------|--------|
| Footing Has NO Overturning | | | | |

All units k

Sliding Stability

| Force Application Axis Load Combination... | Sliding Force | Resisting Force | Stability Ratio | Status |
|--|---------------|-----------------|-----------------|--------|
| Footing Has NO Sliding | | | | |

Footing Flexure

| Flexure Axis & Load Combination | Mu k-ft | Side | Tension Surface | As Req'd in^2 | Gvrn. As in^2 | Actual As in^2 | Phi*Mn k-ft | Status |
|---------------------------------|---------|------|-----------------|---------------|---------------|----------------|-------------|--------|
| X-X, +1.40D | 2.454 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.40D | 2.454 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+1.60L | 3.503 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+1.60L | 3.503 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+1.60L+0.50S | 7.605 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+1.60L+0.50S | 7.605 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+0.50L | 2.541 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+0.50L | 2.541 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D | 2.103 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D | 2.103 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+0.50L+1.60S | 15.667 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+0.50L+1.60S | 15.667 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+1.60S | 15.229 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: --None--

Footing Flexure

| Flexure Axis & Load Combination | Mu k-ft | Side | Tension Surface | As Req'd in^2 | Gvrn. As in^2 | Actual As in^2 | Phi*Mn k-ft | Status |
|---------------------------------|------------|------|--------------------|------------------|------------------|-------------------|----------------|--------|
| X-X, +1.20D+1.60S | 15.229 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+0.50L+0.50S | 6.642 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+0.50L+0.50S | 6.642 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+0.50L+0.70S | 8.283 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +1.20D+0.50L+0.70S | 8.283 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +0.90D | 1.577 | +Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| X-X, +0.90D | 1.577 | -Z | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.40D | 2.454 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.40D | 2.454 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+1.60L | 3.503 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+1.60L | 3.503 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+1.60L+0.50S | 7.605 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+1.60L+0.50S | 7.605 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+0.50L | 2.541 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+0.50L | 2.541 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D | 2.103 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D | 2.103 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+0.50L+1.60S | 15.667 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+0.50L+1.60S | 15.667 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+1.60S | 15.229 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+1.60S | 15.229 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+0.50L+0.50S | 6.642 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+0.50L+0.50S | 6.642 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+0.50L+0.70S | 8.283 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +1.20D+0.50L+0.70S | 8.283 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +0.90D | 1.577 | -X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |
| Z-Z, +0.90D | 1.577 | +X | Bottom | 0.3888 | AsMin | 0.40 | 26.153 | OK |

One Way Shear

| Load Combination... | Vu @ -X | Vu @ +X | Vu @ -Z | Vu @ +Z | Vu:Max | Phi Vn | Vu / Phi*Vn | Status |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|--------|
| +1.40D | 4.63 psi | 4.63 psi | 4.63 psi | 4.63 psi | 4.63 psi | 75.00 psi | 0.06 | OK |
| +1.20D+1.60L | 6.62 psi | 6.62 psi | 6.62 psi | 6.62 psi | 6.62 psi | 75.00 psi | 0.09 | OK |
| +1.20D+1.60L+0.50S | 14.37 psi | 14.37 psi | 14.37 psi | 14.37 psi | 14.37 psi | 75.00 psi | 0.19 | OK |
| +1.20D+0.50L | 4.80 psi | 4.80 psi | 4.80 psi | 4.80 psi | 4.80 psi | 75.00 psi | 0.06 | OK |
| +1.20D | 3.97 psi | 3.97 psi | 3.97 psi | 3.97 psi | 3.97 psi | 75.00 psi | 0.05 | OK |
| +1.20D+0.50L+1.60S | 29.59 psi | 29.59 psi | 29.59 psi | 29.59 psi | 29.59 psi | 75.00 psi | 0.39 | OK |
| +1.20D+1.60S | 28.77 psi | 28.77 psi | 28.77 psi | 28.77 psi | 28.77 psi | 75.00 psi | 0.38 | OK |
| +1.20D+0.50L+0.50S | 12.55 psi | 12.55 psi | 12.55 psi | 12.55 psi | 12.55 psi | 75.00 psi | 0.17 | OK |
| +1.20D+0.50L+0.70S | 15.65 psi | 15.65 psi | 15.65 psi | 15.65 psi | 15.65 psi | 75.00 psi | 0.21 | OK |
| +0.90D | 2.98 psi | 2.98 psi | 2.98 psi | 2.98 psi | 2.98 psi | 75.00 psi | 0.04 | OK |

Two-Way "Punching" Shear

All units k

| Load Combination... | Vu | Phi*Vn | Vu / Phi*Vn | Status |
|---------------------|------------|-----------|-------------|--------|
| +1.40D | 21.25 psi | 150.00psi | 0.1417 | OK |
| +1.20D+1.60L | 30.34 psi | 150.00psi | 0.2023 | OK |
| +1.20D+1.60L+0.50S | 65.87 psi | 150.00psi | 0.4391 | OK |
| +1.20D+0.50L | 22.00 psi | 150.00psi | 0.1467 | OK |
| +1.20D | 18.22 psi | 150.00psi | 0.1214 | OK |
| +1.20D+0.50L+1.60S | 135.69 psi | 150.00psi | 0.9046 | OK |
| +1.20D+1.60S | 131.90 psi | 150.00psi | 0.8794 | OK |
| +1.20D+0.50L+0.50S | 57.53 psi | 150.00psi | 0.3835 | OK |
| +1.20D+0.50L+0.70S | 71.74 psi | 150.00psi | 0.4783 | OK |
| +0.90D | 13.66 psi | 150.00psi | 0.09107 | OK |

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FA ADU

Code Reference:

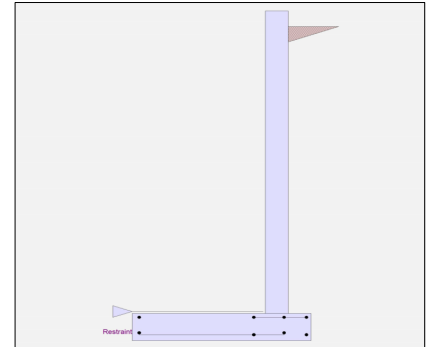
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

| | | |
|-------------------------------------|---|----------|
| Retained Height | = | 12.33 ft |
| Wall height above soil | = | 0.67 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 | = | 35.0 psf/ft |
| | = | |
| Passive Pressure | = | 250.0 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 |
| Used To Resist Sliding & Overturning | | |
| Surcharge Over Toe | = | 0.0 |
| Used for Sliding & Overturning | | |

Axial Load Applied to Stem

| | | |
|-------------------------|---|-------------|
| Axial Dead Load | = | 686.0 lbs |
| Axial Live Load | = | 3,700.0 lbs |
| Axial Load Eccentricity | = | 0.0 in |

Lateral Load Applied to Stem

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

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 |

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FA ADU

Design Summary

Wall Stability Ratios

| | | | |
|-----------------------------------|---|-----------|----|
| Overturning | = | 1.58 | OK |
| Slab Resists All Sliding ! | | | |
| Global Stability | = | 0.96 | |
| | | | |
| Total Bearing Load | = | 8,268 lbs | |
| ...resultant ecc. | = | 1.26 in | |
| Eccentricity within middle third | | | |
| Soil Pressure @ Toe | = | 1,151 psf | OK |
| Soil Pressure @ Heel | = | 1,397 psf | OK |
| Allowable | = | 1,500 psf | |
| Soil Pressure Less Than Allowable | | | |
| ACI Factored @ Toe | = | 1,611 psf | |
| ACI Factored @ Heel | = | 1,956 psf | |
| Footing Shear @ Toe | = | 47.3 psi | OK |
| Footing Shear @ Heel | = | 0.6 psi | OK |
| Allowable | = | 75.0 psi | |

Sliding Calcs

| | | |
|-----------------------|---|-------------|
| Lateral Sliding Force | = | 3,187.8 lbs |
|-----------------------|---|-------------|

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

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

Design Height Above Ftc

| | | |
|--------------------------|---------|----------|
| ft = | Stem OK | 0.00 |
| Wall Material Above "Ht" | = | Concrete |
| Design Method | = | SD |
| Thickness | = | 10.00 |
| Rebar Size | = | # 5 |
| Rebar Spacing | = | 6.00 |
| Rebar Placed at | = | Edge |

Design Data

| | | |
|---------------|---|-------|
| fb/FB + fa/Fa | = | 0.841 |
|---------------|---|-------|

Total Force @ Section

| | | |
|----------------|-------|---------|
| Service Level | lbs = | |
| Strength Level | lbs = | 4,256.8 |

Moment....Actual

| | | |
|----------------|--------|----------|
| Service Level | ft-# = | |
| Strength Level | ft-# = | 17,495.5 |

| | | |
|----------------------|---|----------|
| Moment.....Allowable | = | 20,802.0 |
|----------------------|---|----------|

Shear.....Actual

| | | |
|----------------|-------|------|
| Service Level | psi = | |
| Strength Level | psi = | 43.3 |

| | | |
|---------------------|-------|------|
| Shear.....Allowable | psi = | 75.0 |
|---------------------|-------|------|

| | | |
|----------------|-------|--|
| Anet (Masonry) | in2 = | |
|----------------|-------|--|

| | | |
|-------------|-------|-------|
| Wall Weight | psf = | 125.0 |
|-------------|-------|-------|

| | | |
|-----------------|------|------|
| Rebar Depth 'd' | in = | 8.19 |
|-----------------|------|------|

Masonry Data

| | | |
|-----------------------|-------|-----|
| f'm | psi = | |
| Fs | psi = | |
| Solid Grouting | = | |
| Modular Ratio 'n' | = | |
| Equiv. Solid Thick. | = | |
| Masonry Block Type | = | |
| Masonry Design Method | = | ASD |

Concrete Data

| | | |
|-----|-------|----------|
| f'c | psi = | 2,500.0 |
| Fy | psi = | 60,000.0 |

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FA ADU

Concrete Stem Rebar Area Details

| | <u>Vertical Reinforcing</u> | <u>Horizontal Reinforcing</u> | |
|------------------------------------|-----------------------------|--|--------------|
| Bottom Stem | | | |
| As (based on applied moment) : | 0.4941 in2/ft | | |
| (4/3) * As : | 0.6588 in2/ft | Min Stem T&S Reinf Area 3.120 in2 | |
| 200bd/fy : 200(12)(8.1875)/60000 : | 0.3275 in2/ft | Min Stem T&S Reinf Area per ft of stem Height : 0.240 in2/ft | |
| 0.0018bh : 0.0018(12)(10) : | 0.216 in2/ft | Horizontal Reinforcing Options : | |
| | ===== | <u>One layer of :</u> <u>Two layers of :</u> | |
| Required Area : | 0.4941 in2/ft | #4@ 10.00 in | #4@ 20.00 in |
| Provided Area : | 0.62 in2/ft | #5@ 15.50 in | #5@ 31.00 in |
| Maximum Area : | 1.1092 in2/ft | #6@ 22.00 in | #6@ 44.00 in |

Footing Data

| | | |
|--------------------------|-----------|-----------------------------|
| Toe Width | = | 4.83 ft |
| Heel Width | = | 1.66 |
| Total Footing Width | = | 6.49 |
| Footing Thickness | = | 14.00 in |
| Key Width | = | 0.00 in |
| Key Depth | = | 0.00 in |
| Key Distance from Toe | = | 0.00 ft |
| f _c = | 2,500 psi | F _y = 60,000 psi |
| Footing Concrete Density | = | 150.00 pcf |
| Min. As % | = | 0.0018 |
| Cover @ Top | 2.00 | @ Btm.= 3.00 in |

Footing Design Results

| | <u>Toe</u> | <u>Heel</u> |
|--------------------------------|-----------------|-------------|
| Factored Pressure | = 1,611 | 1,956 psf |
| Mu' : Upward | = 19,790 | 712 ft-# |
| Mu' : Downward | = 2,450 | 628 ft-# |
| Mu: Design | = 17,340 OK | -84 ft-# |
| phiMn | = 21,219 | 23,311 ft-# |
| Actual 1-Way Shear | = 47.28 | 0.58 psi |
| Allow 1-Way Shear | = 75.00 | 75.00 psi |
| Toe Reinforcing | = # 5 @ 8.00 in | |
| Heel Reinforcing | = # 5 @ 8.00 in | |
| 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@ 5.71 in, #5@ 8.85 in, #6@ 12.57 in, #7@ 17.14 in, #8@ 22.57 in, #9@ 28.57 in, #10@ 36.28 in

Heel: #4@ 7.93 in, #5@ 12.30 in, #6@ 17.46 in, #7@ 23.80 in, #8@ 31.34 in, #9@ 39.68 in, #10@ 50.39 in

Key: No key defined

| | | |
|-------------------------------------|------|---------|
| Min footing T&S reinf Area | 1.96 | in2 |
| Min footing T&S reinf Area per foot | 0.30 | in2 /ft |

If one layer of horizontal bars:

#4@ 7.94 in
 #5@ 12.30 in
 #6@ 17.46 in

If two layers of horizontal bars:

#4@ 15.87 in
 #5@ 24.60 in
 #6@ 34.92 in

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FA ADU

Summary of Overturning & Resisting Forces & Moments

| Item |OVERTURNING..... | | |RESISTING..... | | | |
|---|-----------------------|-----------------|-----------------|---|--------------------|----------------|-----------------|
| | Force lbs | Distance ft | Moment ft-# | Force lbs | Distance ft | Moment ft-# | |
| HL Act Pres (ab water tbl) | 3,187.8 | 4.50 | 14,341.6 | Soil Over HL (ab. water tbl) | 1,121.2 | 6.08 | 6,813.2 |
| HL Act Pres (be water tbl) | | | | Soil Over HL (bel. water tbl) | | 6.08 | 6,813.2 |
| 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 = | 686.0 | 5.25 | 3,599.2 |
| Added Lateral Load = | | | | * Axial Live Load on Stem = | 3,700.0 | 5.25 | 19,412.7 |
| Load @ Stem Above Soil = | | | | Soil Over Toe = | | | |
| | | | | Surcharge Over Toe = | | | |
| | | | | Stem Weight(s) = | 1,625.0 | 5.25 | 8,525.8 |
| | | | | Earth @ Stem Transitions = | | | |
| Total | = 3,187.8 | O.T.M. = | 14,341.6 | Footing Weight = | 1,135.8 | 3.25 | 3,685.5 |
| | | | | Key Weight = | | | |
| | | | | Vert. Component = | | | |
| Resisting/Overturning Ratio | | = 1.58 | | Total = | 4,568.0 lbs | R.M.= | 22,623.8 |
| Vertical Loads used for Soil Pressure = | | 8,268.0 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 NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT 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) 0.000 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.

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FA ADU

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

| | |
|---|----------------------------|
| Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) = | 23.40 in |
| Development length for #5 bar specified in this stem design segment = | 18.00 in |
| Hooked embedment length into footing for #5 bar specified in this stem design segment = | 10.50 in |
| As Provided = | 0.6200 in ² /ft |
| As Required = | 0.4941 in ² /ft |

Cantilevered Retaining Wall

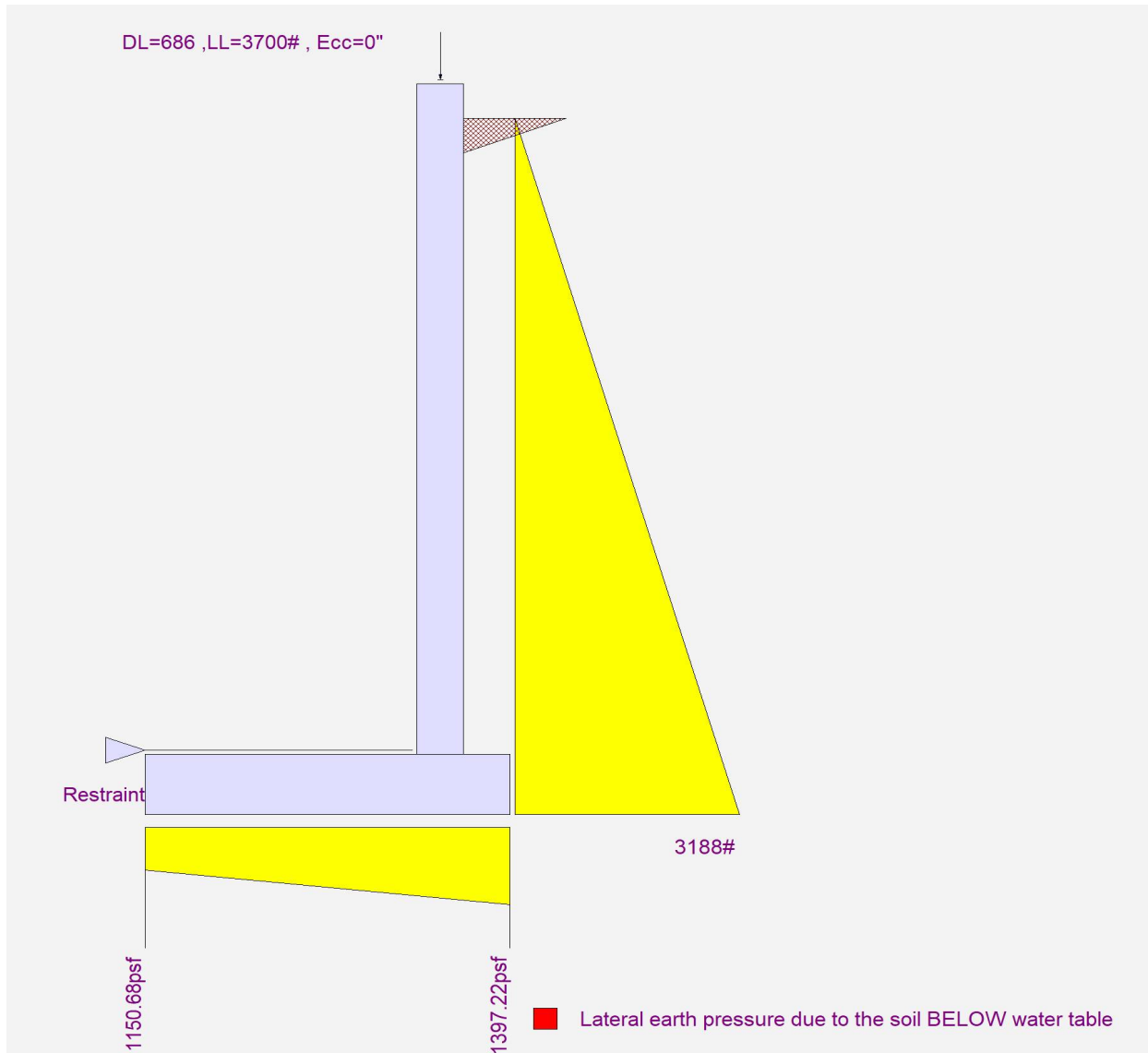
Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

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DESCRIPTION: FA ADU



Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

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DESCRIPTION: FB ADU

Code Reference:

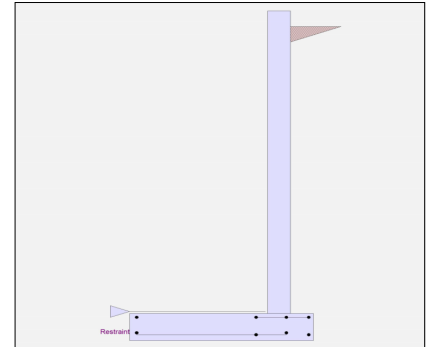
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

| | | |
|-------------------------------------|---|----------|
| Retained Height | = | 12.33 ft |
| Wall height above soil | = | 0.67 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 | = | 35.0 psf/ft |
| | = | |
| Passive Pressure | = | 250.0 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 |
| Used To Resist Sliding & Overturning | | |
| Surcharge Over Toe | = | 0.0 |
| Used for Sliding & Overturning | | |

Axial Load Applied to Stem

| | | |
|-------------------------|---|-----------|
| Axial Dead Load | = | 376.0 lbs |
| Axial Live Load | = | 640.0 lbs |
| Axial Load Eccentricity | = | 0.0 in |

Lateral Load Applied to Stem

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

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 |

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FB ADU

Design Summary

Wall Stability Ratios

| | | | |
|-----------------------------------|---|-----------|----|
| Overturning | = | 1.51 | OK |
| Slab Resists All Sliding ! | | | |
| Global Stability | = | 0.96 | |
| Total Bearing Load | = | 4,928 lbs | |
| ...resultant ecc. | = | 13.54 in | |
| Eccentricity outside middle third | | | |
| Soil Pressure @ Toe | = | 1,492 psf | OK |
| Soil Pressure @ Heel | = | 0 psf | OK |
| Allowable | = | 1,500 psf | |
| Soil Pressure Less Than Allowable | | | |
| ACI Factored @ Toe | = | 2,089 psf | |
| ACI Factored @ Heel | = | 0 psf | |
| Footing Shear @ Toe | = | 40.2 psi | OK |
| Footing Shear @ Heel | = | 10.3 psi | OK |
| Allowable | = | 75.0 psi | |

Sliding Calcs

| | | |
|-----------------------|---|-------------|
| Lateral Sliding Force | = | 3,187.8 lbs |
|-----------------------|---|-------------|

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

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

Design Height Above Ftc

| | | |
|--------------------------|---------|----------|
| ft = | Stem OK | 0.00 |
| Wall Material Above "Ht" | = | Concrete |
| Design Method | = | SD |
| Thickness | = | 10.00 |
| Rebar Size | = | # 5 |
| Rebar Spacing | = | 6.00 |
| Rebar Placed at | = | Edge |

Design Data

| | | |
|---------------|---|-------|
| fb/FB + fa/Fa | = | 0.841 |
|---------------|---|-------|

Total Force @ Section

| | | |
|----------------|-------|---------|
| Service Level | lbs = | |
| Strength Level | lbs = | 4,256.8 |

Moment....Actual

| | | |
|----------------|--------|----------|
| Service Level | ft-# = | |
| Strength Level | ft-# = | 17,495.5 |

| | | |
|----------------------|---|----------|
| Moment.....Allowable | = | 20,802.0 |
|----------------------|---|----------|

Shear.....Actual

| | | |
|----------------|-------|------|
| Service Level | psi = | |
| Strength Level | psi = | 43.3 |

| | | |
|---------------------|-------|------|
| Shear.....Allowable | psi = | 75.0 |
|---------------------|-------|------|

| | | |
|----------------|-------|--|
| Anet (Masonry) | in2 = | |
|----------------|-------|--|

| | | |
|-------------|-------|-------|
| Wall Weight | psf = | 125.0 |
|-------------|-------|-------|

| | | |
|-----------------|------|------|
| Rebar Depth 'd' | in = | 8.19 |
|-----------------|------|------|

Masonry Data

| | | |
|-----------------------|-------|-----|
| f'm | psi = | |
| Fs | psi = | |
| Solid Grouting | = | |
| Modular Ratio 'n' | = | |
| Equiv. Solid Thick. | = | |
| Masonry Block Type | = | |
| Masonry Design Method | = | ASD |

Concrete Data

| | | |
|-----|-------|----------|
| f'c | psi = | 2,500.0 |
| Fy | psi = | 60,000.0 |

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FB ADU

Concrete Stem Rebar Area Details

| | <u>Vertical Reinforcing</u> | <u>Horizontal Reinforcing</u> | |
|------------------------------------|-----------------------------|--|--------------|
| Bottom Stem | | | |
| As (based on applied moment) : | 0.4941 in2/ft | | |
| (4/3) * As : | 0.6588 in2/ft | Min Stem T&S Reinf Area 3.120 in2 | |
| 200bd/fy : 200(12)(8.1875)/60000 : | 0.3275 in2/ft | Min Stem T&S Reinf Area per ft of stem Height : 0.240 in2/ft | |
| 0.0018bh : 0.0018(12)(10) : | 0.216 in2/ft | Horizontal Reinforcing Options : | |
| | ===== | <u>One layer of :</u> <u>Two layers of :</u> | |
| Required Area : | 0.4941 in2/ft | #4@ 10.00 in | #4@ 20.00 in |
| Provided Area : | 0.62 in2/ft | #5@ 15.50 in | #5@ 31.00 in |
| Maximum Area : | 1.1092 in2/ft | #6@ 22.00 in | #6@ 44.00 in |

Footing Data

| | | |
|--------------------------|-----------|--------------------|
| Toe Width | = | 5.00 ft |
| Heel Width | = | 1.66 |
| Total Footing Width | = | 6.66 |
| Footing Thickness | = | 14.00 in |
| Key Width | = | 0.00 in |
| Key Depth | = | 0.00 in |
| Key Distance from Toe | = | 0.00 ft |
| f_c = | 2,500 psi | F_y = 60,000 psi |
| Footing Concrete Density | = | 150.00 pcf |
| Min. As % | = | 0.0018 |
| Cover @ Top | 2.00 | @ Btm.= 3.00 in |

Footing Design Results

| | <u>Toe</u> | <u>Heel</u> | |
|------------------------------------|------------|---------------|-------------|
| Factored Pressure | = | 2,089 | 0 psf |
| μ_u : Upward | = | 19,524 | 24 ft-# |
| μ_u : Downward | = | 2,625 | 628 ft-# |
| μ_u : Design | = | 16,899 OK | 604 ft-# OK |
| ϕM_n | = | 21,219 | 23,311 ft-# |
| Actual 1-Way Shear | = | 40.16 | 10.33 psi |
| Allow 1-Way Shear | = | 75.00 | 75.00 psi |
| Toe Reinforcing | = | # 5 @ 8.00 in | |
| Heel Reinforcing | = | # 5 @ 8.00 in | |
| Key Reinforcing | = | None Spec'd | |
| Footing Torsion, T_u | = | | 0.00 ft-lbs |
| Footing Allow. Torsion, ϕT_u | = | | 0.00 ft-lbs |

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

Other Acceptable Sizes & Spacings

Toe: #4@ 5.71 in, #5@ 8.85 in, #6@ 12.57 in, #7@ 17.14 in, #8@ 22.57 in, #9@ 28.57 in, #10@ 36.28 in

Heel: #4@ 7.93 in, #5@ 12.30 in, #6@ 17.46 in, #7@ 23.80 in, #8@ 31.34 in, #9@ 39.68 in, #10@ 50.39 in

Key: No key defined

| | | |
|-------------------------------------|------|---------|
| Min footing T&S reinf Area | 2.01 | in2 |
| Min footing T&S reinf Area per foot | 0.30 | in2 /ft |

If one layer of horizontal bars:

#4@ 7.94 in
 #5@ 12.30 in
 #6@ 17.46 in

If two layers of horizontal bars:

#4@ 15.87 in
 #5@ 24.60 in
 #6@ 34.92 in

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FB ADU

Summary of Overturning & Resisting Forces & Moments

| Item |OVERTURNING..... | | |RESISTING..... | | | |
|---|-----------------------|-----------------|-----------------|---|--------------------|----------------|-----------------|
| | Force lbs | Distance ft | Moment ft-# | Force lbs | Distance ft | Moment ft-# | |
| HL Act Pres (ab water tbl) | 3,187.8 | 4.50 | 14,341.6 | Soil Over HL (ab. water tbl) | 1,121.2 | 6.25 | 7,003.8 |
| HL Act Pres (be water tbl) | | | | Soil Over HL (bel. water tbl) | | 6.25 | 7,003.8 |
| 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 = | 376.0 | 5.42 | 2,036.7 |
| Added Lateral Load = | | | | * Axial Live Load on Stem = | 640.0 | 5.42 | 3,466.7 |
| Load @ Stem Above Soil = | | | | Soil Over Toe = | | | |
| | | | | Surcharge Over Toe = | | | |
| | | | | Stem Weight(s) = | 1,625.0 | 5.42 | 8,802.1 |
| | | | | Earth @ Stem Transitions = | | | |
| Total | = 3,187.8 | O.T.M. = | 14,341.6 | Footing Weight = | 1,165.5 | 3.33 | 3,881.1 |
| | | | | Key Weight = | | | |
| | | | | Vert. Component = | | | |
| Resisting/Overturning Ratio | | = 1.51 | | Total = | 4,287.7 lbs | R.M.= | 21,723.7 |
| Vertical Loads used for Soil Pressure = | | 4,927.7 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 NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT 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) 0.081 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.

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FB ADU

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

| | |
|---|----------------------------|
| Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) = | 23.40 in |
| Development length for #5 bar specified in this stem design segment = | 18.00 in |
| Hooked embedment length into footing for #5 bar specified in this stem design segment = | 10.50 in |
| As Provided = | 0.6200 in ² /ft |
| As Required = | 0.4941 in ² /ft |

Cantilevered Retaining Wall

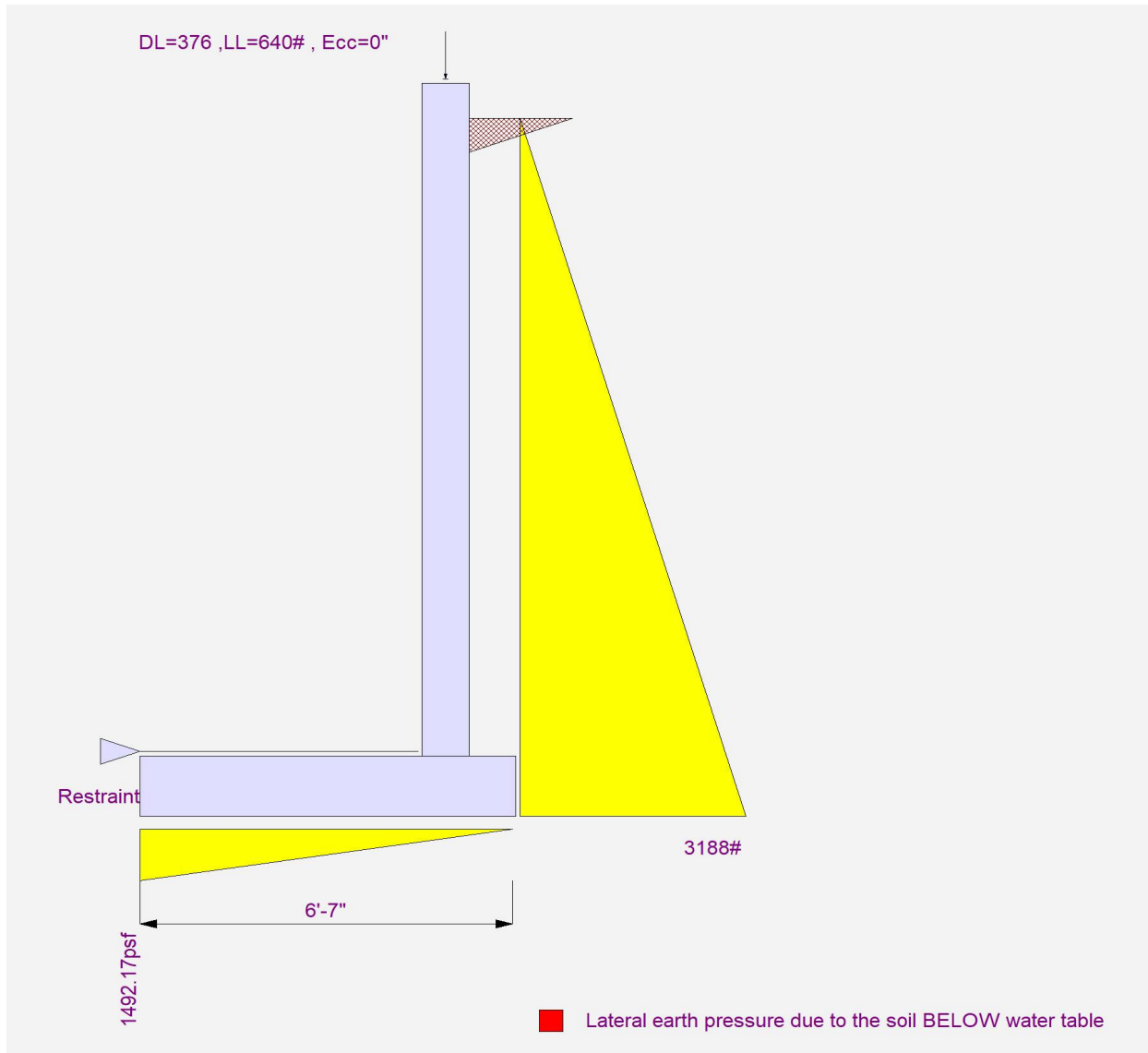
Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

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DESCRIPTION: FB ADU



Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

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DESCRIPTION: FC ADU

Code Reference:

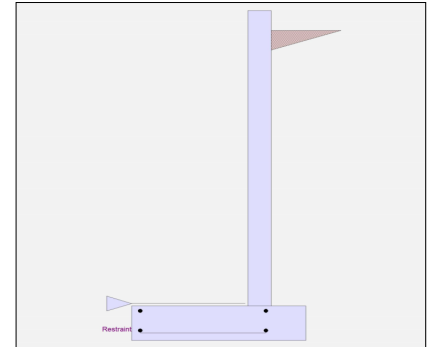
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

| | | |
|-------------------------------------|---|---------|
| Retained Height | = | 9.33 ft |
| Wall height above soil | = | 0.67 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 | = | 35.0 psf/ft |
| | = | |
| Passive Pressure | = | 250.0 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 |
| Used To Resist Sliding & Overturning | | |
| Surcharge Over Toe | = | 0.0 |
| Used for Sliding & Overturning | | |

Axial Load Applied to Stem

| | | |
|-------------------------|---|-----------|
| Axial Dead Load | = | 376.0 lbs |
| Axial Live Load | = | 640.0 lbs |
| Axial Load Eccentricity | = | 0.0 in |

Lateral Load Applied to Stem

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

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 |

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: FC ADU

Design Summary

| | | | |
|-----------------------------------|---|-----------|----|
| Wall Stability Ratios | | | |
| Overturning | = | 1.75 | OK |
| Slab Resists All Sliding ! | | | |
| Global Stability | = | 1.24 | |
| Total Bearing Load = 3,909 lbs | | | |
| ...resultant ecc. | = | 7.23 in | |
| Eccentricity within middle third | | | |
| Soil Pressure @ Toe | = | 1,350 psf | OK |
| Soil Pressure @ Heel | = | 216 psf | OK |
| Allowable | = | 1,500 psf | |
| Soil Pressure Less Than Allowable | | | |
| ACI Factored @ Toe | = | 1,891 psf | |
| ACI Factored @ Heel | = | 303 psf | |
| Footing Shear @ Toe | = | 25.1 psi | OK |
| Footing Shear @ Heel | = | 6.8 psi | OK |
| Allowable | = | 75.0 psi | |

Sliding Calcs

Lateral Sliding Force = 1,928.2 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

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

| | | | | | | |
|--------------------------------|------|----------|----|----|----|----|
| Design Height Above Ftc | ft = | Stem OK | | | | |
| | | 0.00 | | | | |
| Wall Material Above "Ht" | = | Concrete | | | | |
| Design Method | = | SD | SD | SD | SD | SD |
| Thickness | = | 8.00 | | | | |
| Rebar Size | = | # 5 | | | | |
| Rebar Spacing | = | 12.00 | | | | |
| Rebar Placed at | = | Edge | | | | |

Design Data

fb/FB + fa/Fa = 0.933

Total Force @ Section

Service Level lbs =
 Strength Level lbs = 2,437.4

Moment....Actual

Service Level ft-# =
 Strength Level ft-# = 7,580.2

Moment.....Allowable = 8,121.3

Shear.....Actual

Service Level psi =
 Strength Level psi = 32.8

Shear.....Allowable psi = 75.0

Anet (Masonry) in2 =

Wall Weight psf = 100.0

Rebar Depth 'd' in = 6.19

Masonry Data

f'm psi =
 Fs psi =
 Solid Grouting =
 Modular Ratio 'n' =
 Equiv. Solid Thick. =
 Masonry Block Type =
 Masonry Design Method = ASD

Concrete Data

f'c psi = 2,500.0
 Fy psi = 60,000.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.23.05.25

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DESCRIPTION: FC ADU

Concrete Stem Rebar Area Details

| | <u>Vertical Reinforcing</u> | <u>Horizontal Reinforcing</u> | |
|------------------------------------|-----------------------------|---|--------------|
| Bottom Stem | | | |
| As (based on applied moment) : | 0.287 in ² /ft | | |
| (4/3) * As : | 0.3827 in ² /ft | Min Stem T&S Reinf Area 1.920 in ² | |
| 200bd/fy : 200(12)(6.1875)/60000 : | 0.2475 in ² /ft | Min Stem T&S Reinf Area per ft of stem Height : 0.192 in ² /ft | |
| 0.0018bh : 0.0018(12)(8) : | 0.1728 in ² /ft | Horizontal Reinforcing Options : | |
| | ===== | <u>One layer of :</u> <u>Two layers of :</u> | |
| Required Area : | 0.287 in ² /ft | #4@ 12.50 in | #4@ 25.00 in |
| Provided Area : | 0.31 in ² /ft | #5@ 19.38 in | #5@ 38.75 in |
| Maximum Area : | 0.8382 in ² /ft | #6@ 27.50 in | #6@ 55.00 in |

Footing Data

| | | |
|--------------------------|-----------|-----------------------------|
| Toe Width | = | 3.33 ft |
| Heel Width | = | 1.66 |
| Total Footing Width | = | 4.99 |
| Footing Thickness | = | 14.00 in |
| Key Width | = | 0.00 in |
| Key Depth | = | 0.00 in |
| Key Distance from Toe | = | 0.00 ft |
| f _c = | 2,500 psi | F _y = 60,000 psi |
| Footing Concrete Density | = | 150.00 pcf |
| Min. As % | = | 0.0018 |
| Cover @ Top | 2.00 | @ Btm.= 3.00 in |

Footing Design Results

| | <u>Toe</u> | <u>Heel</u> | |
|--------------------------------|------------|----------------|-------------|
| Factored Pressure | = | 1,891 | 303 psf |
| Mu' : Upward | = | 8,524 | 201 ft-# |
| Mu' : Downward | = | 1,164 | 711 ft-# |
| Mu: Design | = | 7,360 OK | 510 ft-# OK |
| phiMn | = | 14,400 | 3,600 ft-# |
| Actual 1-Way Shear | = | 25.13 | 6.77 psi |
| Allow 1-Way Shear | = | 75.00 | 40.00 psi |
| Toe Reinforcing | = | # 5 @ 12.00 in | |
| Heel Reinforcing | = | None Spec'd | |
| 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@ 7.93 in, #5@ 12.30 in, #6@ 17.46 in, #7@ 23.80 in, #8@ 31.34 in, #9@ 39.68 in, #10@ 50.39 in

Heel: phiMn = phi*5*lambda*sqrt(fc)*Sm

Key: No key defined

Min footing T&S reinf Area 1.51 in²
 Min footing T&S reinf Area per foot 0.30 in² /ft

If one layer of horizontal bars:

#4@ 7.94 in
 #5@ 12.30 in
 #6@ 17.46 in

If two layers of horizontal bars:

#4@ 15.87 in
 #5@ 24.60 in
 #6@ 34.92 in

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Summary of Overturning & Resisting Forces & Moments

| Item |OVERTURNING..... | | |RESISTING..... | | | |
|---|-----------------------|----------------|----------------|---|----------------|----------------|----------|
| | Force lbs | Distance ft | Moment ft-# | Force lbs | Distance ft | Moment ft-# | |
| HL Act Pres (ab water tbl) | 1,928.2 | 3.50 | 6,746.4 | Soil Over HL (ab. water tbl) | 1,019.5 | 4.49 | 4,580.8 |
| HL Act Pres (be water tbl) | | | | Soil Over HL (bel. water tbl) | | 4.49 | 4,580.8 |
| 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 = | 376.0 | 3.66 | 1,377.4 |
| Added Lateral Load = | | | | * Axial Live Load on Stem = | 640.0 | 3.66 | 2,344.5 |
| Load @ Stem Above Soil = | | | | Soil Over Toe = | | | |
| | | | | Surcharge Over Toe = | | | |
| | | | | Stem Weight(s) = | 1,000.0 | 3.66 | 3,663.3 |
| | | | | Earth @ Stem Transitions = | | | |
| | | | | Footing Weight = | 873.3 | 2.50 | 2,178.8 |
| | | | | Key Weight = | | | |
| | | | | Vert. Component = | | | |
| Total | = 1,928.2 | O.T.M. | = 6,746.4 | Total = | 3,268.7 lbs | R.M.= | 11,800.3 |
| Resisting/Overturning Ratio | | = | 1.75 | * Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation. | | | |
| Vertical Loads used for Soil Pressure = | | 3,908.7 | lbs | | | | |

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT 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) 0.075 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.

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

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DESCRIPTION: FC ADU

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

| | |
|---|----------------------------|
| Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) = | 23.40 in |
| Development length for #5 bar specified in this stem design segment = | 18.00 in |
| Hooked embedment length into footing for #5 bar specified in this stem design segment = | 10.50 in |
| As Provided = | 0.3100 in ² /ft |
| As Required = | 0.2870 in ² /ft |

Cantilevered Retaining Wall

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