



June 12, 2019

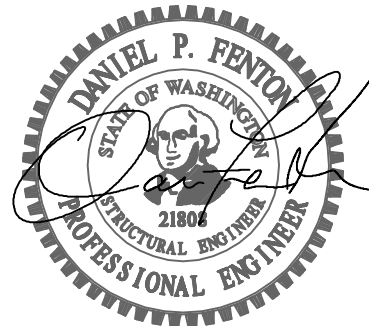
STRUCTURAL CALCULATIONS
(Permit Submittal)

KAHN RESIDENCE ADDITION
18 Brook Bay Road
Mercer Island, WA 98040

Quantum Job Number: 17527.01.01

Prepared for:
DIMARCO ARCHITECTURE
1319 E. Howell St.
Seattle, Washington 98122

Prepared by:
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1511 Third Avenue, Suite 323
Seattle, WA 98101
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10 JUN 2019



STRUCTURAL DESIGN CRITERIA

KAHN RESIDENCE ADDITION
18 BROOK BAY
MERCER ISLAND, WA 98105

QUANTUM JOB NUMBER: 17527.01

CODE CRITERIA:

BUILDING CODE..... 2015 INTERNATIONAL BUILDING CODE
 BUILDING DEPARTMENT..... CITY OF MERCER ISLAND
 WIND CRITERIA 110 MPH; EXPOSURE "C"
 RISK CATEGORY = II
 $K_{ZT} = 1.0$
 SEISMIC ZONE SDC = D
 SITE CLASS = D
 $R = 6.5$
 $I_E = 1.0$
 $S_s = 1.46, S_1 = 0.51$
 $S_{DS} = 0.97, S_{D1} = 0.51$
 SNOW 25 PSF
 LIVE LOAD (RESIDENTIAL) 40 PSF

SOILS CRITERIA:

ALLOWABLE BEARING PRESSURE (ASSUMED)..... 1,500 PSF
 MINIMUM FOOTING WIDTH CONTINUOUS: 18" MIN., ISOLATED: 24" MIN.
 FROST DEPTH 18" MIN.
 ACTIVE SOIL PRESSURE (RESTRAINED / UNRESTRAINED) 50 PCF / 35 PCF
 SEISMIC SURCHARGE PRESSURE (RESTRAINED / UNRESTRAINED)..... 8H PSF / 6H PSF
 PASSIVE SOIL PRESSURE 350 PCF
 COEFFICIENT OF FRICTION 0.35

MATERIALS CRITERIA:

CONCRETE (28 DAY STRENGTH):

FOUNDATION/S.O.G – design for 2,500 psi but specify 3,000 for exposure.....F'C=3,000 PSI

REINFORCING STEEL:

GRADE 60 (#5 BAR OR LARGER).....FY=60,000 PSI
 GRADE 40 (#4 BAR).....FY=40,000 PSI

WOOD FRAMING:

2X, 3X, & 4X FRAMING MBRS HF#2 OR DF#2
 6X FRAMING MBRS DF#1
 GLULAM BEAMS 24F-V4 (V8 @ CONT. AND CANT. MBRS)
 PARALLAM BEAMS 2.2 E PSL
 LSL MEMBERS – BEAMS & HEADERS 1.55 E LSL
 WOOD SHTG APA RATED

STRUCTURAL DESIGN CRITERIA

KAHN RESIDENCE ADDITION
18 BROOK BAY
MERCER ISLAND, WA 98105

QUANTUM JOB NUMBER: 17527.01

ASSEMBLY WEIGHTS

ROOF LOADS

COMMENTS

| | | | |
|------------------------|-------|----------|-------------------------------|
| STANDARD ROOFING | 4.0 | PSF | |
| 1/2" PLYWOOD SHEATHING | 1.5 | PSF | |
| ROOF JOISTS @ 24" O.C. | 2.1 | PSF | |
| R38 INSULATION | 1.0 | PSF | |
| LIGHTS, DUCTS | 0.5 | PSF | |
| 5/8" GWB | 2.8 | PSF | |
| PV ALLOWANCE | 5.0 | PSF | INCL. W/ MISC. FOR SEISMIC |
| MISCELLANEOUS | 2.5 | PSF | |
| ROOF DL | <hr/> | 17.0 PSF | SL = 25 PSF |

FLOOR LOAD

| | | | |
|-------------------------|-------|----------|-------------|
| HARDWOOD FLOORING | 3.0 | PSF | |
| 3/4" SHEATHING | 2.3 | PSF | |
| FLOOR JOISTS @ 16" O.C. | 2.5 | PSF | |
| LIGHTS, DUCTS | 0.8 | PSF | |
| 5/8" GWB | 2.8 | PSF | |
| MISCELLANEOUS | 0.6 | PSF | |
| FLOOR DL | <hr/> | 12.0 PSF | LL = 40 PSF |

ATC Hazards by Location

Search Information

Address: 18 Brook Bay Rd, Mercer Island, WA 98040, USA
Coordinates: 47.55261290000001, -122.23090780000001
Elevation: 93 ft
Timestamp: 2019-06-05T14:15:48.675Z
Hazard Type: Seismic
Reference Document: ASCE7-16
Risk Category: II
Site Class: D



Basic Parameters

| Name | Value | Description |
|-----------------|--------|--|
| S _s | 1.46 | MCE _R ground motion (period=0.2s) |
| S ₁ | 0.506 | MCE _R ground motion (period=1.0s) |
| S _{MS} | 1.46 | Site-modified spectral acceleration value |
| S _{M1} | * null | Site-modified spectral acceleration value |
| S _{Ds} | 0.973 | Numeric seismic design value at 0.2s SA |
| S _{D1} | * null | Numeric seismic design value at 1.0s SA |

* See Section 11.4.8

Additional Information

| Name | Value | Description |
|------------------|--------|--|
| SDC | * null | Seismic design category |
| F _a | 1 | Site amplification factor at 0.2s |
| F _v | * null | Site amplification factor at 1.0s |
| CR _s | 0.902 | Coefficient of risk (0.2s) |
| CR ₁ | 0.898 | Coefficient of risk (1.0s) |
| PGA | 0.625 | MCE _G peak ground acceleration |
| F _{PGA} | 1.1 | Site amplification factor at PGA |
| PGA _M | 0.688 | Site modified peak ground acceleration |
| T _L | 6 | Long-period transition period (s) |
| S _{sRT} | 1.46 | Probabilistic risk-targeted ground motion (0.2s) |
| S _{sUH} | 1.619 | Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years) |
| S _{sD} | 4.172 | Factored deterministic acceleration value (0.2s) |
| S _{1RT} | 0.506 | Probabilistic risk-targeted ground motion (1.0s) |
| S _{1UH} | 0.564 | Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years) |
| S _{1D} | 1.621 | Factored deterministic acceleration value (1.0s) |
| PGAd | 1.398 | Factored deterministic acceleration value (PGA) |

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey [Seismic Design Web Services](http://www.seismicdesign.org).

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Seismic Base Shear for the Equivalent Lateral Force Procedure

Per IBC 2015 & ASCE 7-10

Structure: **Kahn Residence Addition**
 Address:
 Latitude: Longitude:

Structure Classification

Risk Category : **II** per ASCE Table 1.5-1

Seismic Force-Resisting System: **Light-Framed Wood Walls Sheathed with Structural Panels**

R: **6 1/2** per ASCE Table 12.2-1
 W_o: **2 1/2** per ASCE Table 12.2-1
 C_d: **4** per ASCE Table 12.2-1
 h_n (ft): **26.00** height above the base to the highest level of the structure

Site Ground Motion

Reg. Structure 5 Stories or Less: **Yes** S_s (max) = 1.5 Per ASCE 12.8.1.3
 S₁ (g-sec): **0.51** S_S (g-sec): **1.46**
 Site Class: **D Per Geotechnical Report** per ASCE Table 20.3-1
 S_{D1} (g-sec): **0.51** S_{DS} (g-sec): **0.97** per ASCE 11.4.4
 Seismic Design Category: **D** per ASCE 11.6
 I_E: **1.00** per ASCE Table 1.5-2


Fundamental Period per ASCE 12.8.2

Period Method: **Approximate Fundamental Period**
 Structure Type: **All Other Structural Systems**
 T_L (sec): **6.00** ASCE Figures 22-12 through 22-16
 T_a (sec): 0.23 C_t * h_{nx} per ASCE Eq. 12.8-7
 T_{use} (sec): **0.23** T ≤ TL

Equivalent Lateral Force Procedure Design Base Shear per ASCE 12.8

C_S: 0.15 = S_{DS} / (R/I_E) per ASCE Eq. 12.8-2
 C_{S-max}: 0.34 = S_{D1} / (T_a*R/I_E) for T ≤ T_L per ASCE Eq. 12.8-3
 C_{S-max}: 9 = S_{D1}*T_L / (T_a²*R/I_E) for T > T_L per ASCE Eq. 12.8-4
 C_{S-min}: 0.04 per ASCE Eq. 12.8-5
 C_{S-min}: -- = 0.5S₁ / (R/I_E) for S₁ ⇒ 0.6g per ASCE Eq. 12.8-6
 C_{S-use}: 0.150

V : 0.150 W = C_{S-use} * W per ASCE Eq. 12.8-1

| | | | | |
|---|---|----------------------|----------------------|----------|
|  | Quantum Consulting Engineers LLC | Project: Kahn | Date: 6/10/19 | Job No: |
| | 1511 Third Avenue, Suite 323 | | Designer: dpf | Sheet: 1 |
| | Seattle, WA 98101 | Client: | Checked By: | |

Vert. Distribution of Seismic Forces for the Equiv. Lateral Force Procedure

Per IBC 2015 & ASCE 7-10

Structure: **Kahn Residence Addition**

Seismic Parameters

I_E : 1.00 per ASCE Table 1.5-2
 S_{DS} (g-sec): 0.97 per ASCE 11.4.4
 Period (Sec): 0.23 per ASCE 12.8.2.1
 k : 1.00 per ASCE 12.8.3

Vertical Distribution of Seismic Forces per ASCE 12.8.3

$$F_x = C_{vx}V \text{ per ASCE Eq. 12.8-11}$$

$$C_{vx} = (w_x h_x^k) / (S_w h_i^k) \text{ per ASCE Eq. 12.8-12}$$

| Level | h_x (ft) | w_x (k) | % of W_{total} | $w_x * h_x^k$ | C_{vx} (%) | F_x (k) | V_x (k) |
|-------|------------|-----------|------------------|---------------|--------------|-----------|-----------|
| Roof | 26.00 | 2.26 | 64.7% | 58.79 | 83.1% | 0.43 | |
| main | 9.67 | 1.24 | 35.3% | 11.95 | 16.9% | 0.09 | 0.43 |
| | | | | | | | 0.52 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Total WT (k): 3.50 Sum: 70.73
 C_{s-use} : 0.150
 V (k): 0.52 per ASCE 12.8.1

Vertical Distribution of Seismic Diaphragm Forces per ASCE 12.10.1.1

$$F_{px} = (SF_i / S_w i) * w_{px} \text{ per ASCE Eq 12.10-1}$$

$$F_{px-max} = 0.4 * S_{DS} * I_E * w_{px} \text{ per per ASCE 12.10.1.1}$$

$$F_{px-min} = 0.2 * S_{DS} * I_E * w_{px} \text{ per per ASCE 12.10.1.1}$$

| Level | w_{px} (k) | Σw_i (k) | F_x (k) | ΣF_i (k) | F_{px} (k) | Notes |
|-------|--------------|------------------|-----------|------------------|--------------|--------------|
| Roof | 2.26 | 2.26 | 0.43 | 0.43 | 0.44 | = F_p -min |
| main | 1.24 | 3.50 | 0.09 | 0.52 | 0.24 | = F_p -min |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Wind Loads Criteria

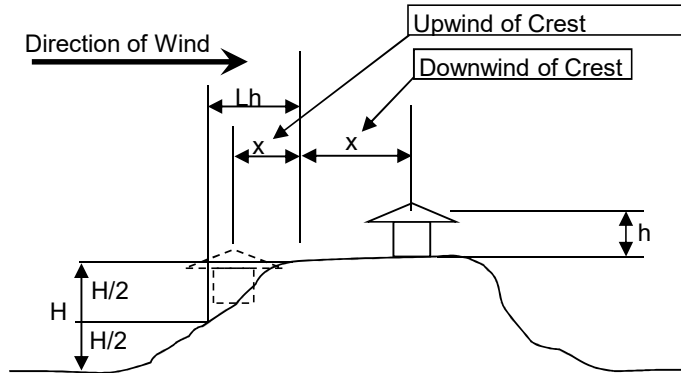
ASCE 7-10

Wind Load Criteria

Risk Category: **II** Table 1.5-1
 Basic Wind Speed: **110** Figure 26.5.1
 Exposure Category: **C** Section 26.7.3
 Wall Ht: **26.0 ft**

Roof Type: **Monoslope Roof**
 Roof Slope: **5.5:12**
 Mean Roof HT: **23.3 ft** UP TO 60FT
 Parapet: **No**
26.0 ft UP TO 60FT


Wind Topographic Factor, K_{zt} :
 per Section 26.8



Terrain Type: **Flat Terrain**
 Direction: **Upwind of Crest**

L_h : **200 ft** DIST UPWIND OF CREST TO HALF HT OF HILL OR ESCARP.
 H : **200 ft** HT. OF HILL OR ESCARP. RELATIVE TO THE UPWIND TERRAIN
 x : **50 ft** DIST. (UPWIND OR DOWNWIND) FROM THE CREST TO THE BUILDING
 h : **23.3 ft** MEAN ROOF HT ABOVE LOCAL GROUND LEVEL

K_{zt} : 1.00 EQUATION 26.8-1
 K_{zt} : **1.00** MANUALLY INPUT

| | | | |
|--|----------------------|----------------------|-----------------|
|  Quantum Consulting Engineers LLC 1511 Third Avenue, Suite 323 Seattle, WA 98101 | Project: Kahn | Date: 6/10/19 | Job No: |
| | Client: | Designer: dpf | Sheet: 1 |
| | Checked By: | | |

Wind Loads - Main Wind Force Resisting System

ASCE 7-10 Chapter 27 Part 2 - Enclosed Simple Diaphragm, $h < 160\text{ft}$

Wind Load Criteria

Risk Category: **II** Table 1.5-1
 Basic Wind Speed: **110 mph** Figure 26.5.1
 Exposure Category: **C** Section 26.7.3
 K_{zt} : **1.00** Section 26.8

L/B Ratio:

Building Type: Class 1
 Wall Height: 26.0 ft
 Short Dimension: **8.6 ft**
 Long Dimension: **12.0 ft**
 Transverse Wind L/B: 0.715
 Longitudinal Wind L/B: 1.4

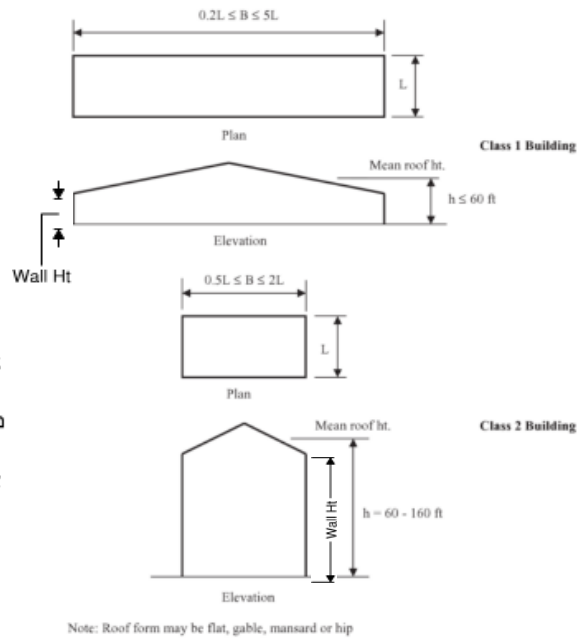
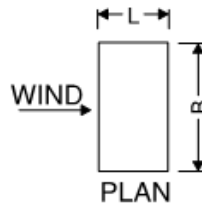


FIGURE 27.5-1

Wall Pressures:

| <u>Transverse</u> Wind Direction | <u>Longitudinal</u> Wind Direction |
|-------------------------------------|---------------------------------------|
| P_h : 28.5 psf | 26.9 psf |
| P_o : 26.9 psf | 25.3 psf |

*Values from ASCE table 27.6-1

*All Values Ultimate (multiply x0.6 for ASD)

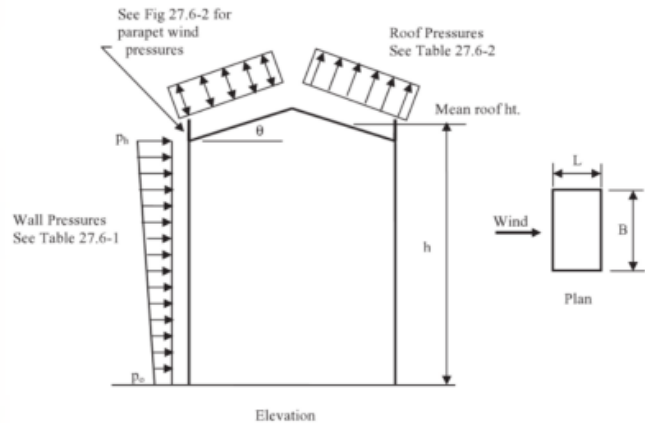


FIGURE 27.6-1



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 1511 Third Avenue, Suite 323
 Seattle, WA 98101

Project: Kahn
 Client: _____

Date: 6/10/19 Job No: _____
 Designer: dpf Sheet: 2
 Checked By: _____

Wind Loads - Main Wind Force Resisting System (Cont.)

ASCE 7-10 Chapter 27 Part 2 - Enclosed Simple Diaphragm, $h < 160\text{ft}$

Roof Pressure:

Slope: 5.5:12
 Mean Roof HT: 23.3 ft

| Load Case | Zone (PSF) | | | | |
|-----------|------------|-------|-------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 |
| 1 | -16.0 | -17.8 | -27.4 | -24.4 | -20.0 |
| 2 | 10.8 | -8.5 | 0.0 | 0.0 | 0.0 |

*Values from Table 27.6-2
 *All Values Ultimate (multiply x0.6 for ASD)

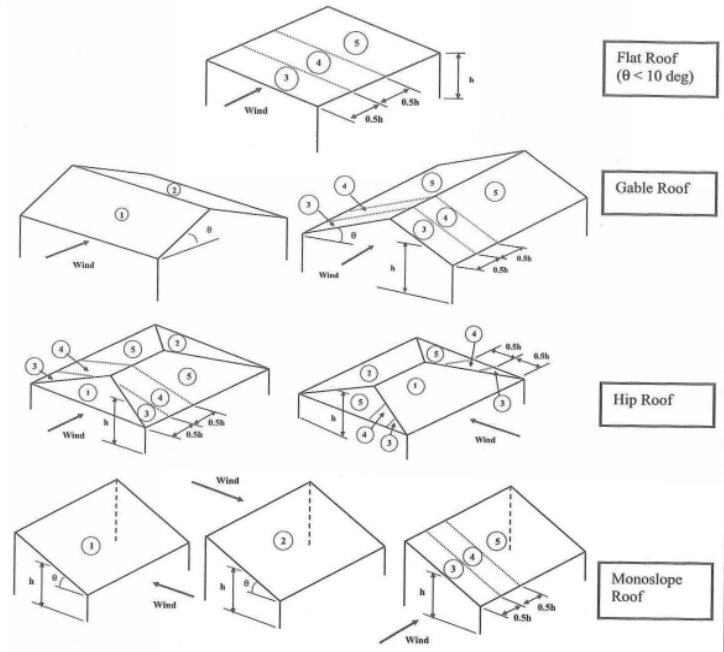


Table 27.6-2

Roof Overhang (PSF)

P_{ovh} : -20.6 psf

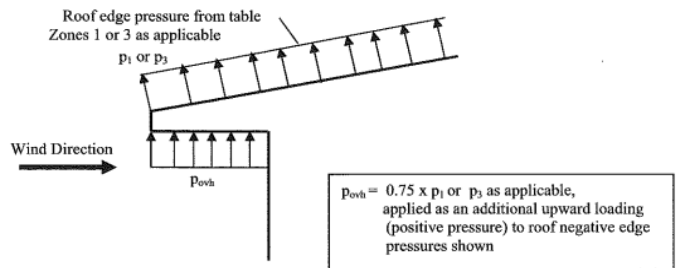



Figure 27.6-3

| | | | | | | |
|---|----------|------|-------------|---------|---------|---|
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| | Client: | | Designer: | dpf | Sheet: | 3 |
| | | | Checked By: | | | |

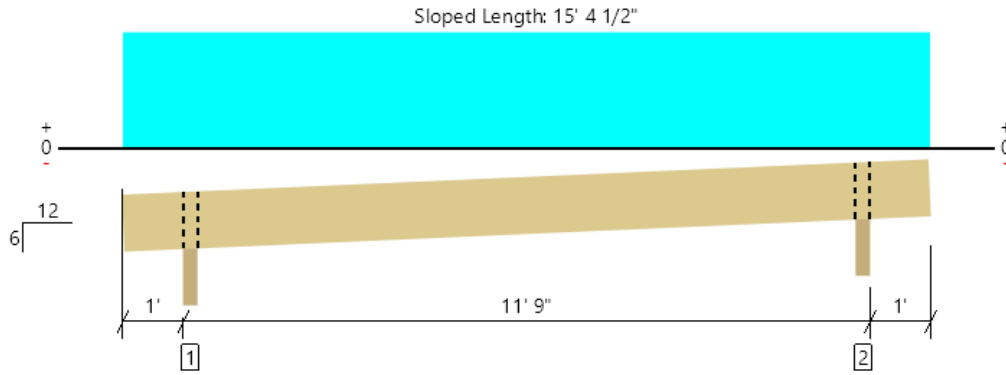
Kahn Residence

| | |
|--------------------------------|-------------|
| Wind Base Shear | |
| wind pressure | 28.5 psf |
| Sail Area for wind east west | 140 sf |
| Wind Base shear - east west | 3993 pounds |
| | |
| Sail Area for wind north-south | 163 psf |
| Wind Base shear - north south | 4644 pounds |

| Roof | | | |
|---------------------|---------|--|----------|
| Member Name | Results | Current Solution | Comments |
| Roof: Joist | Passed | 1 piece(s) 2 x 12 Hem-Fir No. 2 @ 24" OC | |
| Roof: Window Header | Passed | 2 piece(s) 2 x 4 Hem-Fir No. 2 | |
| Floor | | | |
| Member Name | Results | Current Solution | Comments |
| Floor: Joist | Passed | 1 piece(s) 2 x 12 Hem-Fir No. 2 @ 16" OC | |
| Floor: Support Beam | Passed | 1 piece(s) 4 x 12 Hem-Fir No. 2 | |
| Floor: End Beam | Passed | 2 piece(s) 2 x 12 Hem-Fir No. 2 | |

| | |
|--|------------------|
| <p>ForteWEB Software Operator</p> <p>Dan Fenton Quantum Consulting Engineers (206) 957-3900 dfenton@quantumce.com</p> | <p>Job Notes</p> |
|--|------------------|

Roof, Roof: Joist
1 piece(s) 2 x 12 Hem-Fir 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' 10 1/8"

| Design Results | Actual @ Location | Allowed | Result | LDF | Load: Combination (Pattern) |
|-----------------------|--------------------|--------------|-----------------|------|-----------------------------|
| Member Reaction (lbs) | 607 @ 1' 1 3/4" | 2377 (3.50") | Passed (26%) | -- | 1.0 D + 1.0 S (Adj Spans) |
| Shear (lbs) | 419 @ 11' 7 7/16" | 1941 | Passed (22%) | 1.15 | 1.0 D + 1.0 S (Adj Spans) |
| Moment (Ft-lbs) | 1403 @ 6' 10 1/2" | 2964 | Passed (47%) | 1.15 | 1.0 D + 1.0 S (Alt Spans) |
| Live Load Defl. (in) | 0.102 @ 6' 10 1/2" | 0.427 | Passed (L/999+) | -- | 1.0 D + 1.0 S (Alt Spans) |
| Total Load Defl. (in) | 0.178 @ 6' 10 1/2" | 0.641 | Passed (L/863) | -- | 1.0 D + 1.0 S (Alt Spans) |

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 6/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 8" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 4" o/c unless detailed otherwise.
- 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 | Total | |
| 1 - Beveled Plate - DF | 3.50" | 3.50" | 1.50" | 261 | 345 | 606 | Blocking |
| 2 - Beveled Plate - DF | 3.50" | 3.50" | 1.50" | 261 | 345 | 606 | Blocking |

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

| Vertical Load | Location (Side) | Spacing | Dead (0.90) | Snow (1.15) | Comments |
|-------------------|-----------------|---------|-------------|-------------|----------|
| 1 - Uniform (PSF) | 0 to 13' 9" | 24" | 17.0 | 25.0 | Roof |

Weyerhaeuser Notes

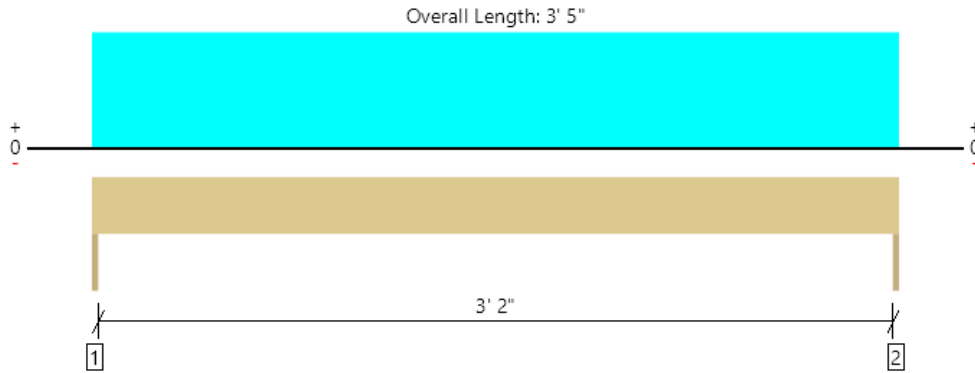
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator



| ForteWEB Software Operator | Job Notes |
|---|-----------|
| Dan Fenton Quantum Consulting Engineers (206) 957-3900 dfenton@quantumce.com | 14 |

Roof, Roof: Window Header
2 piece(s) 2 x 4 Hem-Fir 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) | 548 @ 0 | 1823 (1.50") | Passed (30%) | -- | 1.0 D + 1.0 S (All Spans) |
| Shear (lbs) | 414 @ 5" | 1208 | Passed (34%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Moment (Ft-lbs) | 468 @ 1' 8 1/2" | 748 | Passed (63%) | 1.15 | 1.0 D + 1.0 S (All Spans) |
| Live Load Defl. (in) | 0.038 @ 1' 8 1/2" | 0.114 | Passed (L/999+) | -- | 1.0 D + 1.0 S (All Spans) |
| Total Load Defl. (in) | 0.071 @ 1' 8 1/2" | 0.171 | Passed (L/581) | -- | 1.0 D + 1.0 S (All Spans) |

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 3' 5" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | | Accessories |
|------------------|----------------|-----------|----------|-------------------------|-----------|------|-------|-------------|
| | Total | Available | Required | Dead | Roof Live | Snow | Total | |
| 1 - Trimmer - HF | 1.50" | 1.50" | 1.50" | 253 | 34 | 295 | 582 | None |
| 2 - Trimmer - HF | 1.50" | 1.50" | 1.50" | 253 | 34 | 295 | 582 | None |

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Roof Live (non-snow: 1.25) | Snow (1.15) | Comments |
|-----------------------|--------------------|-----------------|-------------|----------------------------|-------------|-------------------------------------|
| 0 - Self Weight (PLF) | 0 to 3' 5" | N/A | 2.7 | -- | -- | |
| 1 - Uniform (PSF) | 0 to 3' 5" (Front) | 1' | 15.0 | 20.0 | - | Roof |
| 2 - Uniform (PLF) | 0 to 3' 5" (Front) | N/A | 130.5 | - | 172.5 | Linked from: Roof: Joist, Support 1 |

Weyerhaeuser Notes

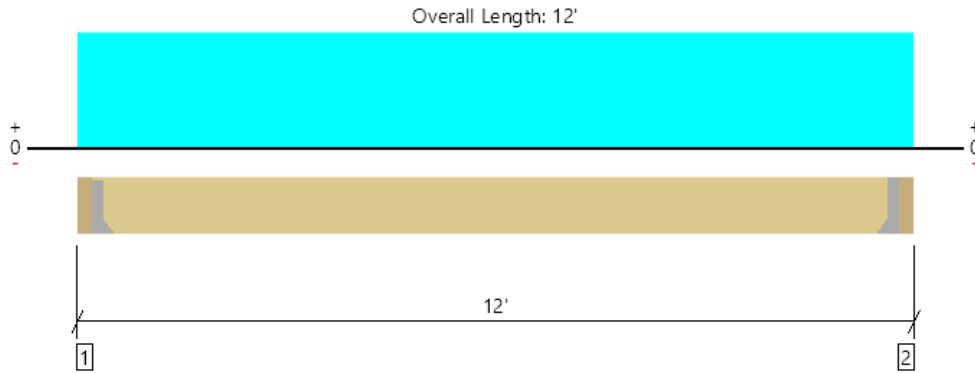
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator



| | |
|---|-----------|
| ForteWEB Software Operator | Job Notes |
| Dan Fenton Quantum Consulting Engineers (206) 957-3900 dfenton@quantumce.com | 15 |

Floor, Floor: Joist
 1 piece(s) 2 x 12 Hem-Fir 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) | 396 @ 3 1/2" | 911 (1.50") | Passed (43%) | -- | 1.0 D + 1.0 L (All Spans) |
| Shear (lbs) | 331 @ 1' 2 3/4" | 1688 | Passed (20%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Moment (Ft-lbs) | 1130 @ 6' | 2577 | Passed (44%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Live Load Defl. (in) | 0.088 @ 6' | 0.285 | Passed (L/999+) | -- | 1.0 D + 1.0 L (All Spans) |
| Total Load Defl. (in) | 0.115 @ 6' | 0.571 | Passed (L/999+) | -- | 1.0 D + 1.0 L (All Spans) |
| TJ-Pro™ Rating | N/A | N/A | -- | -- | -- |

System : Floor
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 11' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 11' 5" o/c unless detailed otherwise.
- 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 | Floor Live | Total | |
| 1 - Hanger on 11 1/4" HF beam | 3.50" | Hanger ¹ | 1.50" | 96 | 320 | 416 | See note ¹ |
| 2 - Hanger on 11 1/4" HF beam | 3.50" | Hanger ¹ | 1.50" | 96 | 320 | 416 | 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.

| 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 | |
| 2 - Face Mount Hanger | Connector not found | N/A | N/A | N/A | N/A | |

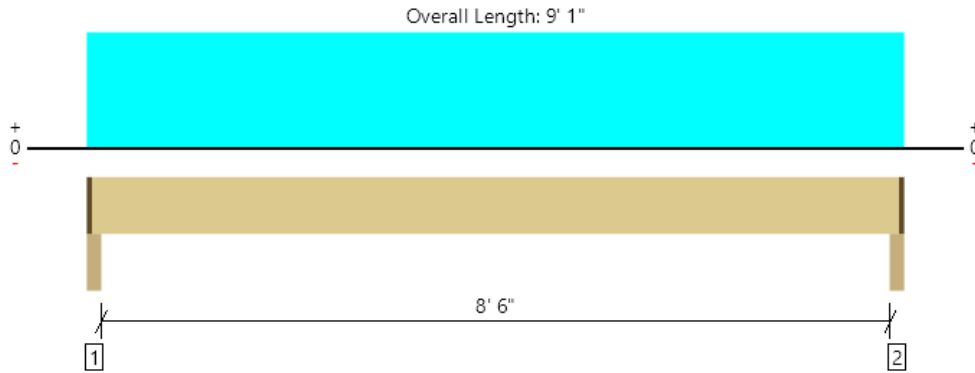
| Vertical Load | Location (Side) | Spacing | Dead (0.90) | Floor Live (1.00) | Comments |
|-------------------|-----------------|---------|-------------|-------------------|----------------------------|
| 1 - Uniform (PSF) | 0 to 12' | 16" | 12.0 | 40.0 | Residential - Living Areas |

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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 |
|---|-----------|
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Floor, Floor: Support Beam
1 piece(s) 4 x 12 Hem-Fir 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) | 2795 @ 2" | 3189 (2.25") | Passed (88%) | -- | 1.0 D + 0.75 L + 0.75 S (All Spans) |
| Shear (lbs) | 1857 @ 1' 2 3/4" | 3938 | Passed (47%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Moment (Ft-lbs) | 5364 @ 4' 6 1/2" | 5752 | Passed (93%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Live Load Defl. (in) | 0.076 @ 4' 6 1/2" | 0.219 | Passed (L/999+) | -- | 1.0 D + 0.75 L + 0.75 S (All Spans) |
| Total Load Defl. (in) | 0.154 @ 4' 6 1/2" | 0.438 | Passed (L/682) | -- | 1.0 D + 0.75 L + 0.75 S (All Spans) |

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 11" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | | Accessories |
|-----------------|----------------|-----------|----------|-------------------------|------------|------|-------|------------------|
| | Total | Available | Required | Dead | Floor Live | Snow | Total | |
| 1 - Column - HF | 3.50" | 2.25" | 1.97" | 1454 | 1090 | 783 | 3327 | 1 1/4" Rim Board |
| 2 - Column - HF | 3.50" | 2.25" | 1.97" | 1454 | 1090 | 783 | 3327 | 1 1/4" Rim Board |

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Floor Live (1.00) | Snow (1.15) | Comments |
|-----------------------|----------------------|-----------------|-------------|-------------------|-------------|--------------------------------------|
| 0 - Self Weight (PLF) | 1 1/4" to 8' 11 3/4" | N/A | 10.0 | -- | -- | |
| 1 - Uniform (PSF) | 0 to 9' 1" (Front) | 9' | 12.0 | - | - | wall |
| 2 - Uniform (PLF) | 0 to 9' 1" (Front) | N/A | 72.0 | 240.0 | - | Linked from: Floor: Joist, Support 1 |
| 3 - Uniform (PLF) | 0 to 9' 1" (Front) | N/A | 130.5 | - | 172.5 | Linked from: Roof: Joist, Support 1 |

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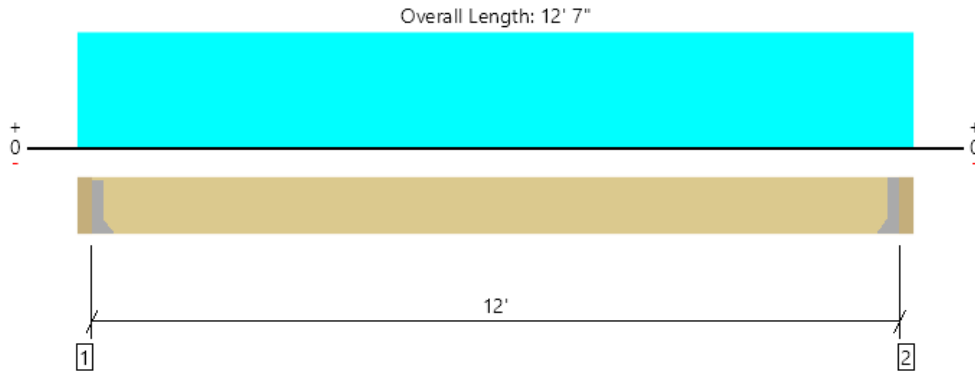
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Floor, Floor: End Beam
2 piece(s) 2 x 12 Hem-Fir No. 2



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) | 1596 @ 3 1/2" | 1823 (1.50") | Passed (88%) | -- | 1.0 D + 0.75 L + 0.75 S (All Spans) |
| Shear (lbs) | 1208 @ 1' 2 3/4" | 3375 | Passed (36%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Moment (Ft-lbs) | 4294 @ 6' 3 1/2" | 4482 | Passed (96%) | 1.00 | 1.0 D + 1.0 L (All Spans) |
| Live Load Defl. (in) | 0.068 @ 6' 3 1/2" | 0.300 | Passed (L/999+) | -- | 1.0 D + 0.75 L + 0.75 S (All Spans) |
| Total Load Defl. (in) | 0.268 @ 6' 3 1/2" | 0.600 | Passed (L/537) | -- | 1.0 D + 0.75 L + 0.75 S (All Spans) |

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 10" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

| Supports | Bearing Length | | | Loads to Supports (lbs) | | | | Accessories |
|-------------------------------|----------------|---------------------|----------|-------------------------|------------|------|-------|-----------------------|
| | Total | Available | Required | Dead | Floor Live | Snow | Total | |
| 1 - Hanger on 11 1/4" HF beam | 3.50" | Hanger ¹ | 1.50" | 1247 | 252 | 315 | 1814 | See note ¹ |
| 2 - Hanger on 11 1/4" HF beam | 3.50" | Hanger ¹ | 1.50" | 1247 | 252 | 315 | 1814 | 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.

| 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 | |
| 2 - Face Mount Hanger | Connector not found | N/A | N/A | N/A | N/A | |

| Vertical Loads | Location (Side) | Tributary Width | Dead (0.90) | Floor Live (1.00) | Snow (1.15) | Comments |
|-----------------------|----------------------|-----------------|-------------|-------------------|-------------|----------|
| 0 - Self Weight (PLF) | 3 1/2" to 12' 3 1/2" | N/A | 8.6 | -- | -- | |
| 1 - Uniform (PSF) | 0 to 12' 7" (Front) | 12' | 12.0 | - | - | wall |
| 2 - Uniform (PSF) | 0 to 12' 7" (Front) | 2' | 17.0 | - | 25.0 | roof |
| 3 - Uniform (PSF) | 0 to 12' 7" (Front) | 1' | 12.0 | 40.0 | - | floor |

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