QUANTUM
CONSULTING ENGINEERS

June 7, 2023

**STRUCTURAL CALCULATIONS**
(Permit Submittal)

HONG AND KAO RESIDENCE
5425 W. Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 23127.01

(Professional Engineer stamp — State of Washington, SCOTT H. TINKER, Structural Engineer, 36098, signed)

Prepared for:
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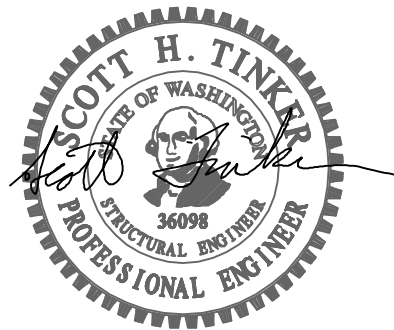
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TABLE OF CONTENTS

HONG AND KAO RESIDENCE

5425 W. Mercer Way
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DESIGN CRITERIA

Structural Design Criteria

Building Code: 2018 International Building Code
Building Department: City of Mercer Island

Seismic Criteria

S_s:	1.45	I_e:	1.00
S_1:	0.51	Seismic Soil Site Class:	D
S_{ds}:	0.97	Seismic Design Category:	D
S_{d1}:	0.61	Cs:	0.15
R:	6.50	Light-Framed Wood Walls Sheathed With Wood Structural Panels	

Wind Criteria

Wind Speed:	97 MPH
Risk Category:	II
Wind Exposure:	C
Kzt:	1.0

Geotechnical Criteria

Allowable Bearing Pressure	2000 PSF
Minimum Footing Width	Continuous: 16" min., Isolated: 24" min.
Frost Depth	18" min.
Soils Consultant	GEO Group Northwest, Inc.
Soils Report Number	#G-5881
Soils Report Date	May 20, 2023
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/Slab on Grade	F'c=	2,500 PSI
Basement Walls	F'c=	3,000 PSI

Reinforcing Steel:

Grade 60 (#5 bar and larger)	Fy=	60,000 PSI
Grade 40 (#4 bar)	Fy=	40,000 PSI

Structural Steel:

Wide-Flange Sections: A-992	Fy=	50,000 PSI
Miscellaneous Sections: A-36	Fy=	36,000 PSI
Tube Sections: A-500	Fy=	46,000 PSI
Pipe Sections: A-53	Fy=	35,000 PSI
Welding	Fy=	70,000 PSI

Wood Framing:

2x, 3x & 4x Framing Members	HF#2 or DF#2
6x Framing Members	DF#1
Glulam Beams	24F-V4 (V8 @ Cont. and Cant. Members)
LSL Members - Beams & Headers	1.55 E LSL
LVL Members - Beams & Headers	1.9 E LVL
Wood Sheathing	APA RATED

Residential Building Loads

Snow Load	Roof	25 psf	+ 5 psf Rain on Snow
Live Load	Residential	40 psf	
	Residential exterior decks / balconies	60 psf	

Assembly Loads

Typical Roof Loads		Comments
Standard Roofing	4.0 psf	
1/2" Ply. Sheathing	1.5 psf	
Joists @ 24" o.c.	2.1 psf	
R38 Insulation	1.0 psf	
5/8" GWB	2.8 psf	
Lights, ducts	0.5 psf	
PV Allowance	5.0 psf	0.0 psf for seismic
Misc. + Sprinklers	3.1 psf	
Total:	**20.0 psf**	SL=30 psf

East Low Roof Loads		Comments
Standard Roofing	4.0 psf	
1/2" Ply. Sheathing	1.5 psf	
Joists @ 24" o.c.	2.1 psf	
R38 Insulation	1.0 psf	
5/8" GWB	2.8 psf	
Lights, ducts	0.5 psf	
2" gravel	18.0 psf	
Misc. + Sprinklers	3.1 psf	
Total:	**33.0 psf**	SL=30 psf

Typical Floor Loads		Comments
Flooring	3.0 psf	
Sprinklers	3.0 psf	1.0 psf for seismic
3/4" Ply. Sheathing	2.3 psf	
Joists @ 16" o.c.	2.5 psf	
5/8" GWB	2.8 psf	
Lights, ducts	0.8 psf	
Miscellaneous	0.6 psf	
Partitons	-	
Total:	**15.0 psf**	LL=40 psf

Typical Deck Loads		Comments
Porcelain Ped. Pavers	9.0 psf	
Membrane Roofing	2.2 psf	
3/4" Ply. Sheathing	2.3 psf	
Joists @ 16" o.c.	2.5 psf	
R38 Insulation	1.0 psf	
5/8" GWB	2.8 psf	
Lights, ducts	0.5 psf	
Miscellaneous	1.7 psf	
Total:	**22.0 psf**	LL=60 psf

Exterior Wood Stud Wall	
Siding	2.3 psf
1/2" Plywood	1.5 psf
2x6 studs @ 16" o.c.	1.7 psf
Insulation	0.5 psf
1/2" GWB	2.2 psf
Mech./Elec.	0.5 psf
Misc.	1.3 psf
Total:	**10.0 psf**

Exterior Wall with Veneer	
Exterior Finish	2.2 psf
1/2" Plywood	1.5 psf
Studs @ 16" o.c.	1.7 psf
Insulation	0.5 psf
1/2" GWB	2.2 psf
Mech./Elec.	0.5 psf
Misc.	1.4 psf
Veneer	38.0 psf
Total:	**48.0 psf**

Interior Wall Framing	
5/8" GWB	2.8 psf
2x4 @ 16" o.c.	0.9 psf
5/8" GWB	2.8 psf
Mech./Elec.	0.5 psf
Misc.	1.0 psf
Total:	**8.0 psf**

Deflection Criteria

Roof		Walls			Floor	
			L/120	*flexible finishes		
Live Load: **L/240**			L/240	*brittle finish	Live Load: **L/480**	
Total Load: **L/240**	3/4" max.		L/240	*supporting glass	Total Load: **L/240**	3/4" max.
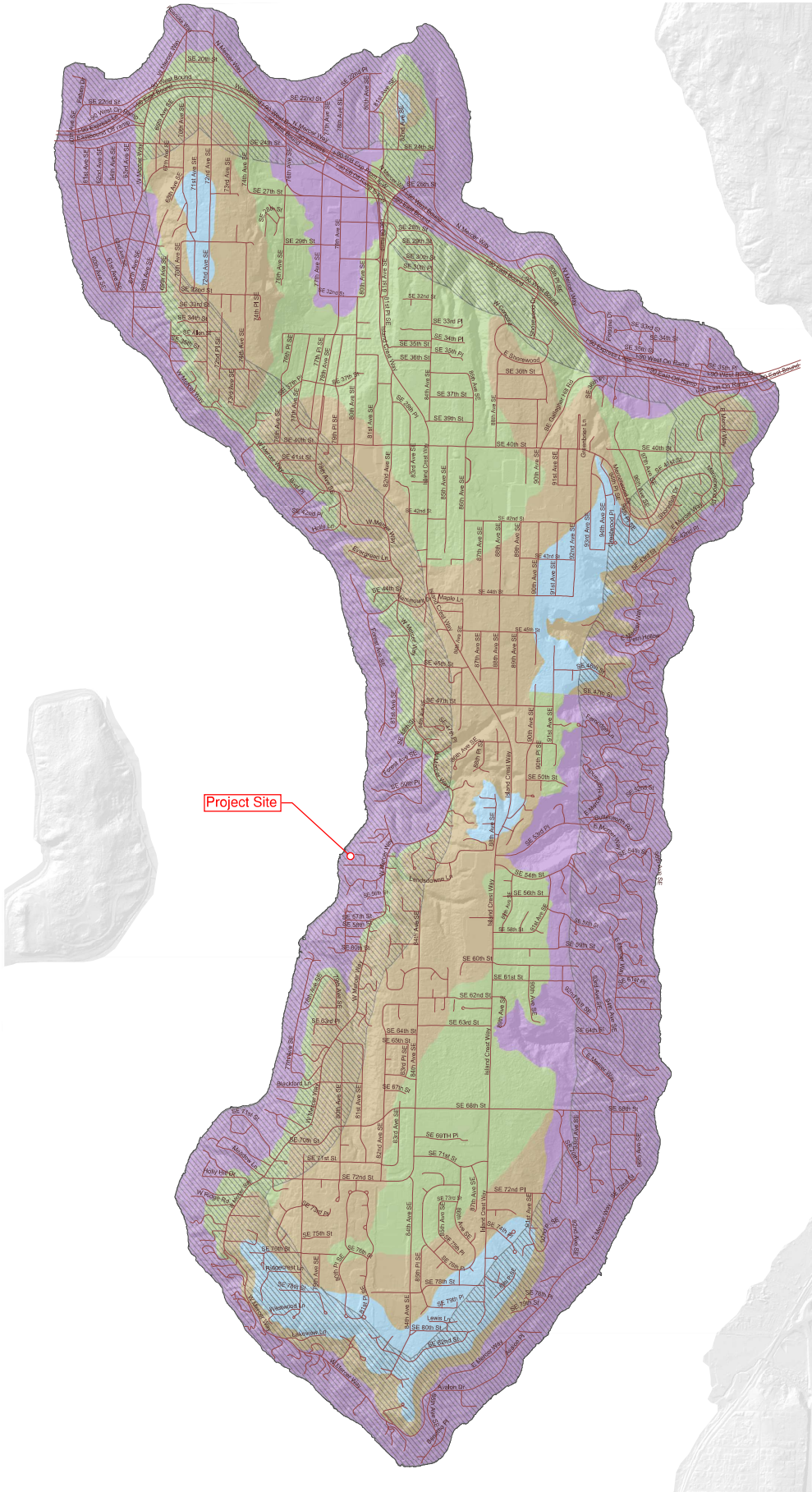
submit additional calculations and supporting topographic documentation (to verify the values utilized in their wind load determination).

Please note – The Kzt values indicated on this map are approximations based upon periodic calculations of representative samplings around Mercer Island. These values are intended for City of Mercer Island's plan review purposes only.

WIND EXPOSURE CATEGORIES:

Wind Exposure Category

Exposure 'C' (1500 feet from Lake)

Exposure 'B' (all other areas)

WIND SPEED-UP (TOPOGRAPHIC EFFECT) - K_zt Factor :

K_zt Factor

$K_zt = 1.0$

$K_zt = 1.3$

$K_zt = 1.6$

$K_zt = 1.9$

Project Site

GENERAL NOTES FOR WIND EXPOSURE AND WIND SPEED-UP MAP

This map is the Wind Exposure Category and Wind Speed-up (Topographic Effects) Map for the City of Mercer Island. This map shows the minimum wind exposure category and the minimum wind speed-up, "K_zt" factor, which will be accepted without site specific documentation and calculation.

Other wind speed phenomena may occur on Mercer Island that is not specifically indentified on this map. It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the appropriate design wind speed and exposure category for their specific project and location.

This map is for the sole use of the staff of the City of Mercer Island's Development Services Group (DSG) for the purposes of permit application evaluation. This map provides DSG staff a general assessment of Wind Exposure Category and Wind Speed-up (Topographic Effects). All areas have not been specifically evaluated and there may be locations that are not correctly represented on this map. It is the responsibility of individual property owners and map users to evaluate risk associated with their proposed development. No site-specific assessment of risk is implied or otherwise indicated by the City of Mercer Island with this map.

Information about data used for the map, references, and data limitation are all described the associated "Read Me" document. The digital version of this map is accompanied by a meta data file containing pertinent information about map construction. This data map is available on the City of Mercer Island website.

The City of Mercer Island is using guidance provided within ICC Section 1609 & ASCE 7-05 Chapter 6 regarding definitions used when creating this map.

DEFINITIONS:

K_zt factor: The topographic effect of wind speed-up at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, that meet all of the conditions noted in ASCE 7-05 Minimum Design Loads for Buildings and Other Structures, Section 6.5.7.

Exposure B: The wind exposure category that applies where the site in question is located a minimum of 1500 feet from the shoreline and the mean roof height is less than or equal to 30 feet per IBC 2006 section 1609.4.3.

Exposure C: The wind exposure category that applies where the site in question is located within 1500 feet from the shoreline per IBC 2006 section 1609.4.3.

Wind Speed: Minimum 85 mph 3-second gust per IRC Figure R301.2(4)
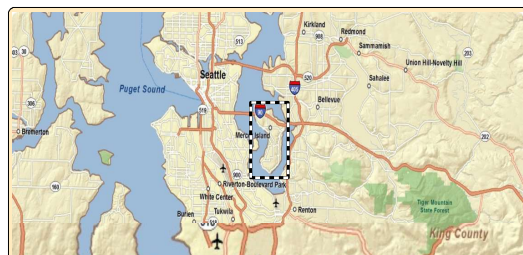
⚠ This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

ℹ The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

ΔTC   Hazards by Location

Search Information

Address:	5425 W Mercer Way, Mercer Island, WA 98040, USA
Coordinates:	47.55428420000001, -122.2323217
Elevation:	35 ft
Timestamp:	2023-04-03T18:49:04.254Z
Hazard Type:	Wind
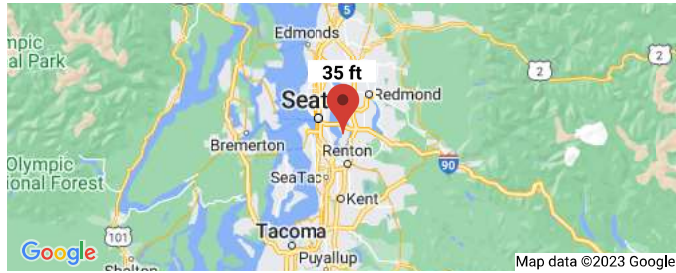
ASCE 7-16

MRI 10-Year	67 mph
MRI 25-Year	73 mph
MRI 50-Year	78 mph
MRI 100-Year	83 mph
Risk Category I	92 mph
Risk Category II	97 mph
Risk Category III	104 mph
Risk Category IV	108 mph

ASCE 7-10

MRI 10-Year	72 mph
MRI 25-Year	79 mph
MRI 50-Year	85 mph
MRI 100-Year	91 mph
Risk Category I	100 mph
Risk Category II	110 mph
Risk Category III-IV	115 mph

ASCE 7-05

ASCE 7-05 Wind Speed	85 mph

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.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

While the information presented on this website is believed to be correct, ATC and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in the report should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. ATC does not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.
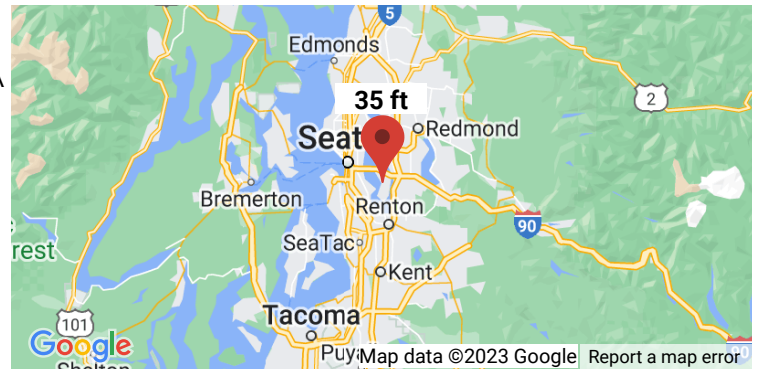
ATC Hazards by Location

Search Information

Address:	5425 W Mercer Way, Mercer Island, WA 98040, USA
Coordinates:	47.55428420000001, -122.2323217
Elevation:	35 ft
Timestamp:	2023-05-24T19:00:24.918Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D

Basic Parameters

Name	Value	Description
S_S	1.457	MCE_R ground motion (period=0.2s)
S_1	0.506	MCE_R ground motion (period=1.0s)
S_{MS}	1.457	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	0.972	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	0.624	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.687	Site modified peak ground acceleration

T_L	6	Long-period transition period (s)	
SsRT	1.457	Probabilistic risk-targeted ground motion (0.2s)	
SsUH	1.616	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)	
SsD	4.124	Factored deterministic acceleration value (0.2s)	
S1RT	0.506	Probabilistic risk-targeted ground motion (1.0s)	
S1UH	0.563	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)	
S1D	1.606	Factored deterministic acceleration value (1.0s)	
PGAd	1.384	Factored deterministic acceleration value (PGA)	

* See Section 11.4.8

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Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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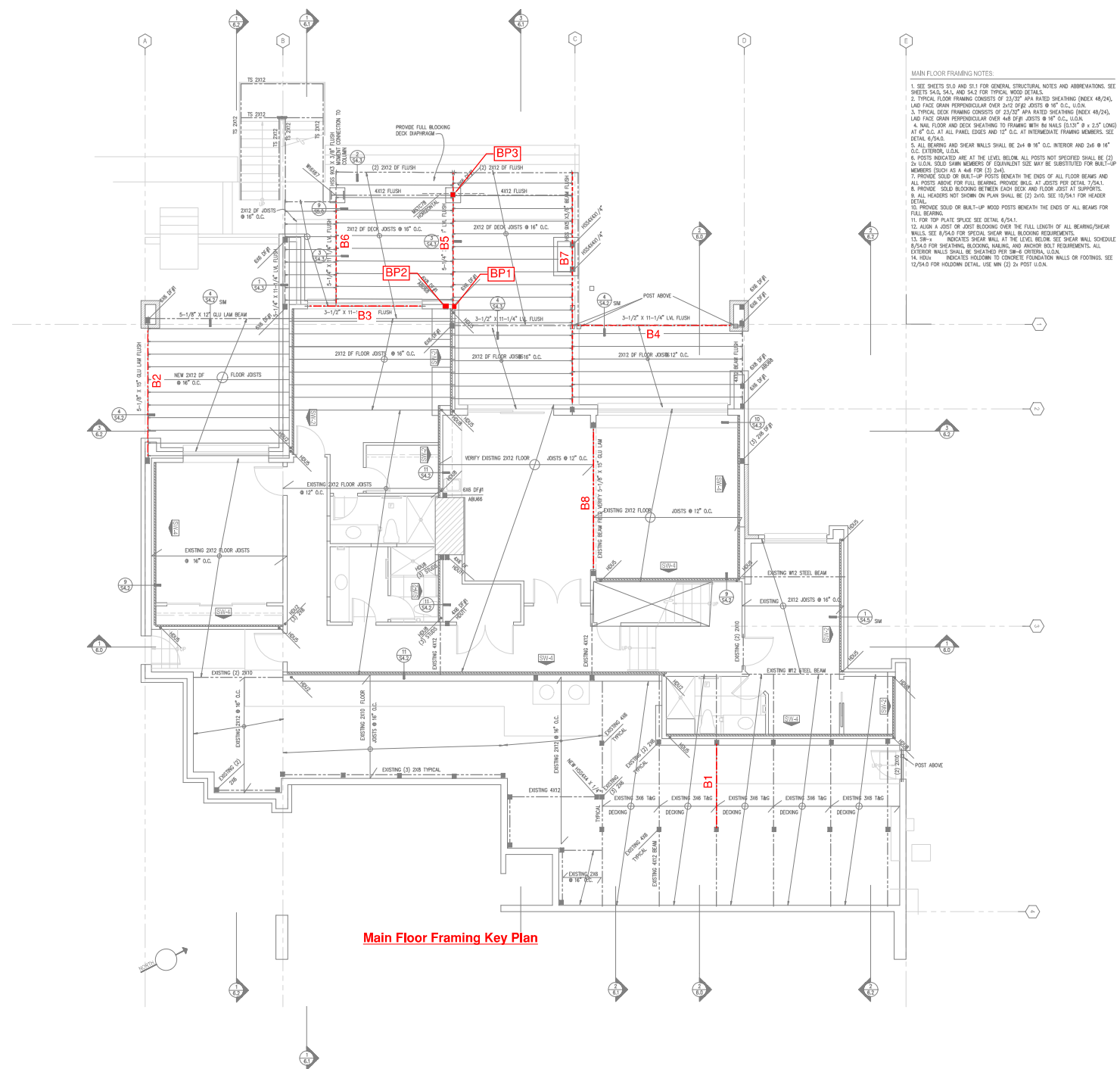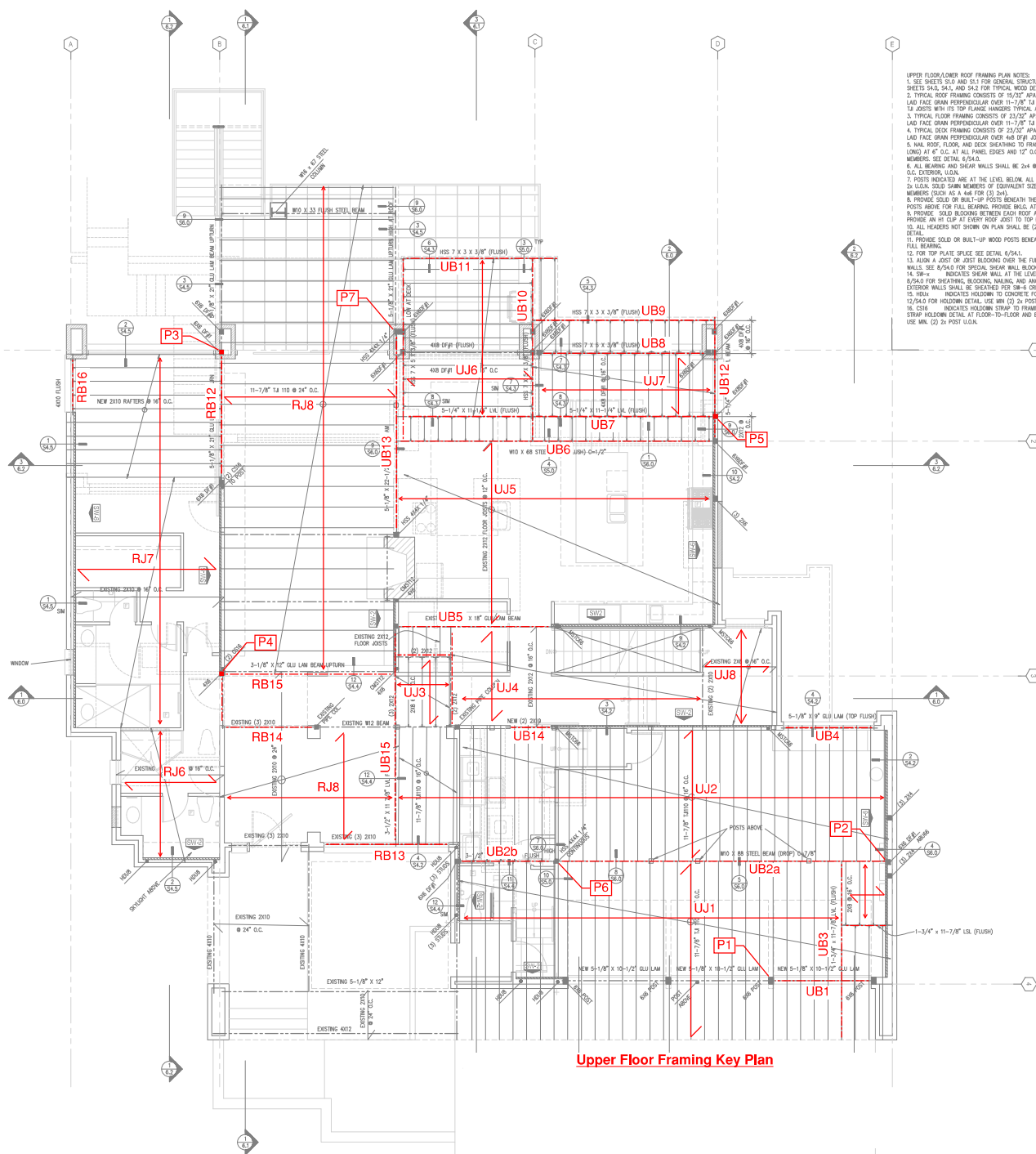
HONG AND KAO RESIDENCE

5425 W. Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 23127.01
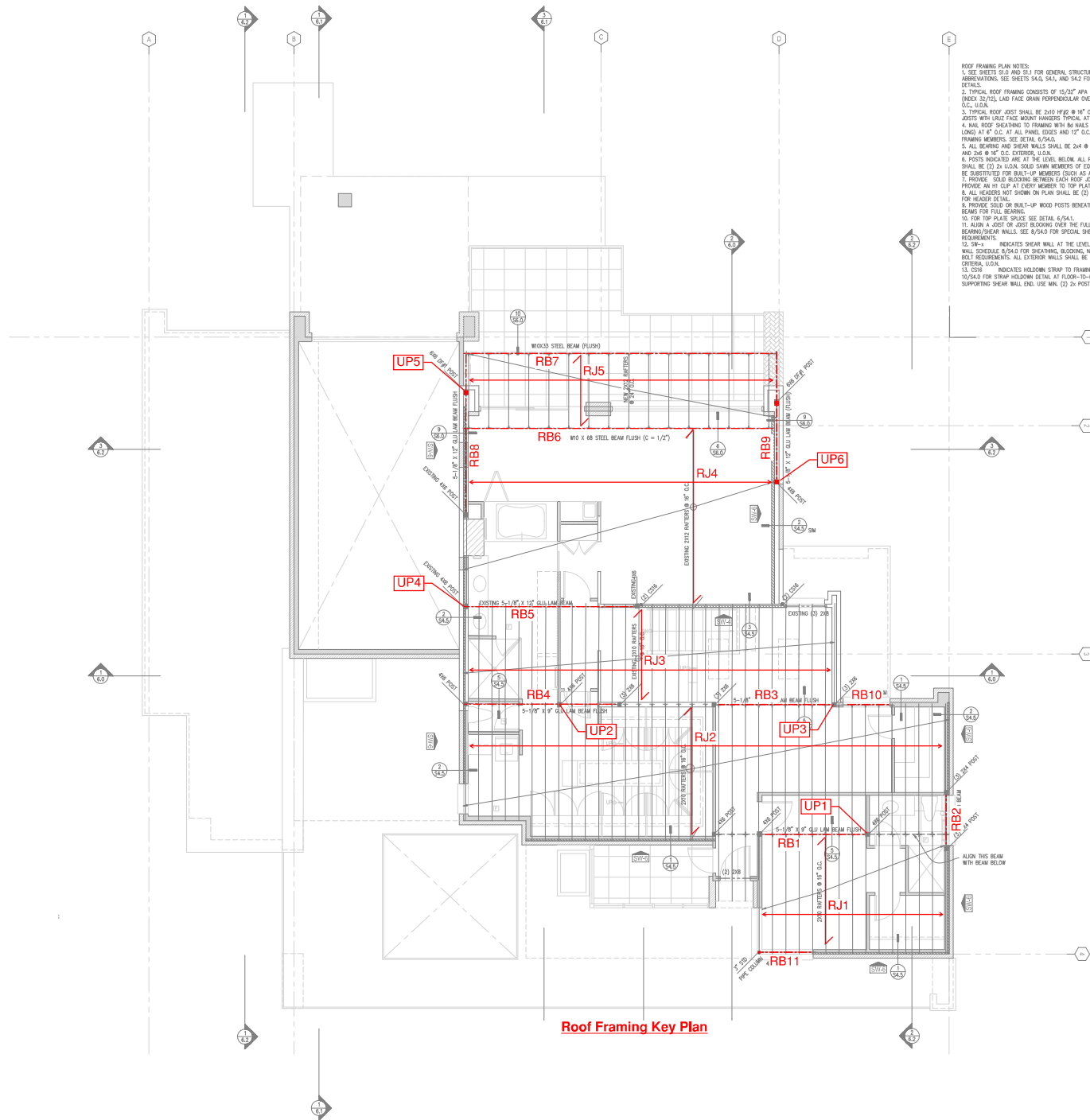
GRAVITY DESIGN – MAIN HOUSE

Main Floor Framing Key Plan

MAIN FLOOR FRAMING NOTES:

1. SEE SHEETS S1.0 AND S1.1 FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS. SEE SHEETS S4.0, S4.1, AND S4.2 FOR TYPICAL WOOD DETAILS.
2. TYPICAL FLOOR FRAMING CONSISTS OF 23/32" APA RATED SHEATHING (INDEX 48/24), LAID FACE GRAIN PERPENDICULAR OVER 2x12 DF#2 JOISTS @ 16" O.C., U.O.N.
3. TYPICAL DECK FRAMING CONSISTS OF 23/32" APA RATED SHEATHING (INDEX 48/24), LAID FACE GRAIN PERPENDICULAR OVER 4x8 DF#1 JOISTS @ 16" O.C., U.O.N.
4. NAIL FLOOR AND DECK SHEATHING TO FRAMING WITH 8d NAILS (0.131" Ø x 2.5" LONG) AT 6" O.C. AT ALL PANEL EDGES AND 12" O.C. AT INTERMEDIATE FRAMING MEMBERS. SEE DETAIL 6/S4.0.
5. ALL BEARING AND SHEAR WALLS SHALL BE 2x4 @ 16" O.C. INTERIOR AND 2x6 @ 16" O.C. EXTERIOR, U.O.N.
6. POSTS INDICATED ARE AT THE LEVEL BELOW. ALL POSTS NOT SPECIFIED SHALL BE (2) 2x U.O.N. SOLID SAWN MEMBERS OF EQUIVALENT SIZE MAY BE SUBSTITUTED FOR BUILT-UP MEMBERS (SUCH AS A 4x6 FOR (3) 2x4).
7. PROVIDE SOLID OR BUILT-UP POSTS BENEATH THE ENDS OF ALL FLOOR BEAMS AND ALL POSTS ABOVE FOR FULL BEARING. PROVIDE BLKG. AT JOISTS PER DETAIL 7/S4.1.
8. PROVIDE SOLID BLOCKING BETWEEN EACH DECK AND FLOOR JOIST AT SUPPORTS.
9. ALL HEADERS NOT SHOWN ON PLAN SHALL BE (2) 2x10. SEE 10/S4.1 FOR HEADER DETAIL.
10. PROVIDE SOLID OR BUILT-UP WOOD POSTS BENEATH THE ENDS OF ALL BEAMS FOR FULL BEARING.
11. FOR TOP PLATE SPLICE SEE DETAIL 6/S4.1.
12. ALIGN A JOIST OR JOIST BLOCKING OVER THE FULL LENGTH OF ALL BEARING/SHEAR WALLS. SEE 8/S4.0 FOR SPECIAL SHEAR WALL BLOCKING REQUIREMENTS.
13. SW-x   INDICATES SHEAR WALL AT THE LEVEL BELOW. SEE SHEAR WALL SCHEDULE 8/S4.0 FOR SHEATHING, BLOCKING, NAILING, AND ANCHOR BOLT REQUIREMENTS. ALL EXTERIOR WALLS SHALL BE SHEATHED PER SW-6 CRITERIA, U.O.N.
14. HDXx   INDICATES HOLDOWN TO CONCRETE FOUNDATION WALLS OR FOOTINGS. SEE 12/S4.0 FOR HOLDOWN DETAIL. USE MIN (2) 2x POST U.O.N.

Upper Floor Framing Key Plan

UPPER FLOOR/LOWER ROOF FRAMING PLAN NOTES:
1. SEE SHEETS S1.0 AND S1.1 FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS. SEE SHEETS S4.0, S4.1, AND S4.2 FOR TYPICAL WOOD DETAILS.
2. TYPICAL ROOF FRAMING CONSISTS OF 15/32" APA RATED SHEATHING (INDEX 32/12), LAID FACE GRAIN PERPENDICULAR OVER 11-7/8" TJI 110 JOISTS @ 24" O.C., U.O.N. HANG TJI JOISTS WITH ITS TOP FLANGE HANGERS TYPICAL AT FLUSH BEAMS, U.O.N.
3. TYPICAL FLOOR FRAMING CONSISTS OF 23/32" APA RATED SHEATHING (INDEX 48/24), LAID FACE GRAIN PERPENDICULAR OVER 11-7/8" TJI 110 JOISTS @ 16" O.C., U.O.N.
4. TYPICAL DECK FRAMING CONSISTS OF 23/32" APA RATED SHEATHING (INDEX 48/24), LAID FACE GRAIN PERPENDICULAR OVER 4x8 DF#1 JOISTS @ 16" O.C., U.O.N.
5. NAIL ROOF, FLOOR, AND DECK SHEATHING TO FRAMING WITH 8d NAILS (0.131" Ø x 2.5" LONG) AT 6" O.C. AT PANEL EDGES AND 12" O.C. AT INTERMEDIATE FRAMING MEMBERS. SEE DETAIL 8/S4.0.
6. ALL BEARING AND SHEAR WALLS SHALL BE 2x4 @ 16" O.C. INTERIOR AND 2x6 @ 16" O.C. EXTERIOR, U.O.N.
7. POSTS INDICATED ARE AT THE LEVEL BELOW. ALL POSTS NOT SPECIFIED SHALL BE (2) 2x U.O.N. SOLID SAWN MEMBERS OF EQUIVALENT SIZE MAY BE SUBSTITUTED FOR BUILT-UP MEMBERS (SUCH AS A 4x4 FOR (3) 2x4).
8. PROVIDE SOLID OR BUILT-UP POSTS BENEATH THE ENDS OF ALL FLOOR BEAMS AND ALL POSTS ABOVE FOR FULL BEARING. PROVIDE BKLG. AT JOISTS PER DETAIL 7/S4.1.
9. PROVIDE SOLID BLOCKING BETWEEN EACH ROOF AND FLOOR JOIST AT SUPPORTS. PROVIDE AN H1 CLIP AT EVERY ROOF JOIST TO TOP PLATE.
10. ALL HEADERS NOT SHOWN ON PLAN SHALL BE (2) 2x10. SEE 10/S4.1 FOR HEADER DETAIL.
11. PROVIDE SOLID OR BUILT-UP WOOD POSTS BENEATH THE ENDS OF ALL BEAMS FOR FULL BEARING.
12. FOR TOP PLATE SPLICE SEE DETAIL 8/S4.1.
13. ALIGN A JOIST OR JOIST BLOCKING OVER THE FULL LENGTH OF ALL BEARING/SHEAR WALLS. SEE 8/S4.0 FOR SPECIAL SHEAR WALL BLOCKING REQUIREMENTS.
14. SW-x   INDICATES SHEAR WALL AT THE LEVEL BELOW. SEE SHEAR WALL SCHEDULE 8/S4.0 FOR SHEATHING, BLOCKING, NAILING, AND ANCHOR BOLT REQUIREMENTS. ALL EXTERIOR WALLS SHALL BE SHEATHED PER SW-6 CRITERIA, U.O.N.
15. HDU=   INDICATES HOLDOWN TO CONCRETE FOUNDATION WALLS OR FOOTINGS. SEE 12/S4.0 FOR HOLDOWN DETAIL. USE MIN (2) 2x4 POST U.O.N.
16. CS16   INDICATES HOLDOWN STRAP TO FRAMING BELOW WALL. SEE 10/S4.0 FOR STRAP HOLDOWN DETAIL AT FLOOR-TO-FLOOR AND BEAM SUPPORTING SHEAR WALL END. USE MIN. (2) 2x POST U.O.N.

No.   Date   Revision

HONG AND KAO RESIDENCE
5425 W. MERCER WAY
MERCER ISLAND, WA 98040

UPPER FLOOR
FRAMING PLAN

S.3

Sheet No.
Project No.   2222
Date: 5/30/23

Roof Framing Key Plan

ROOF FRAMING PLAN NOTES:
1. SEE SHEETS S1.0 AND S1.1 FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS. SEE SHEETS S4.0, S4.1, AND S4.2 FOR TYPICAL WOOD DETAILS.
2. TYPICAL ROOF FRAMING CONSISTS OF 15/32" APA RATED SHEATHING (INDEX 32/12), LAID FACE GRAIN PERPENDICULAR OVER 2x FRAMING @ 16" O.C., U.O.N.
3. TYPICAL ROOF JOIST SHALL BE 2x10 HF#2 @ 16" O.C., U.O.N. HANG JOISTS WITH LRUZ FACE MOUNT HANGERS TYPICAL AT FLUSH BEAMS.
4. NAIL ROOF SHEATHING TO FRAMING WITH 8d NAILS (0.131" Ø x 2.5" LONG) AT 6" O.C. AT ALL PANEL EDGES AND 12" O.C. AT INTERMEDIATE FRAMING MEMBERS. SEE DETAIL 6/S4.0.
5. ALL BEARING AND SHEAR WALLS SHALL BE 2x4 @ 16" O.C. INTERIOR AND 2x6 @ 16" O.C. EXTERIOR, U.O.N.
6. POSTS INDICATED ARE AT THE LEVEL BELOW. ALL POSTS NOT SPECIFIED SHALL BE (2) 2x U.O.N. SOLID SAWN MEMBERS OF EQUIVALENT SIZE MAY BE SUBSTITUTED FOR BUILT-UP MEMBERS (SUCH AS A 4x6 FOR (3) 2x4).
7. PROVIDE SOLID BLOCKING BETWEEN EACH ROOF JOIST AT SUPPORTS. PROVIDE AN H1 CLIP AT EVERY MEMBER TO TOP PLATE.
8. ALL HEADERS NOT SHOWN ON PLAN SHALL BE (2) 2x10. SEE DETAIL 10/S4.1 FOR HEADER DETAIL.
9. PROVIDE SOLID OR BUILT-UP WOOD POSTS BENEATH THE ENDS OF ALL BEAMS FOR FULL BEARING.
10. FOR TOP PLATE SPLICE SEE DETAIL 6/S4.1.
11. ALIGN A JOIST OR JOIST BLOCKING OVER THE FULL LENGTH OF ALL BEARING/SHEAR WALLS. SEE DETAIL 8/S4.0 FOR SPECIAL SHEAR WALL BLOCKING REQUIREMENTS.
12. SW-x   INDICATES SHEAR WALL AT THE LEVEL BELOW. SEE SHEAR WALL SCHEDULE 8/S4.0 FOR SHEATHING, BLOCKING, NAILING, AND ANCHOR BOLT REQUIREMENTS. ALL EXTERIOR WALLS SHALL BE SHEATHED PER SW-6 CRITERIA, U.O.N.
13. CS16   INDICATES HOLDOWN STRAP TO FRAMING BELOW WALL. SEE 10/S4.0 FOR STRAP HOLDOWN DETAIL AT FLOOR-TO-FLOOR AND BEAM SUPPORTING SHEAR WALL END. USE MIN. (2) 2x POST U.O.N.

No.	Date	Revision

ROOF
FRAMING PLAN

Sheet No.   S.4
Project No.   2222
Date: 5/30/23

Upper Roof			
Member Name	Results	Current Solution	Comments
RJ1 - Master Closet Roof Joist, 11'-0"	Passed	1 piece(s) 2 x 10 HF No.2 @ 16" OC	
RJ2 - Master Closet Roof Joist, 13'-0"	Passed	1 piece(s) 2 x 10 HF No.2 @ 16" OC	
RJ3 - Existing 2x10, 9'-6"	Passed	1 piece(s) 2 x 10 HF No.2 @ 16" OC	
RJ4 - Existing 2x12, 17'-6"	Passed	1 piece(s) 2 x 12 HF No.2 @ 16" OC	
RJ5 - Master Bed Roof Joist , 7'-6"	Passed	1 piece(s) 2 x 12 HF No.2 @ 24" OC	
RB1 - Bed 4 Flush Beam, 10'-6"	Passed	1 piece(s) 5 1/8" x 9" 24F-V8 DF Glulam	
RB2 - Bath 4 Header, 5'-0"	Passed	2 piece(s) 2 x 10 HF No.2	
RB3 - Exercise Room Beam, 11'-8"	Passed	1 piece(s) 5 1/8" x 9" 24F-V4 DF Glulam	
RB4 - Master Closet Beam, Two Span	Passed	1 piece(s) 5 1/8" x 9" 24F-V4 DF Glulam	
RB5 - Existing Glulam, 17'-0"	Passed	1 piece(s) 5 1/8" x 12" 24F-V4 DF Glulam	
RB8 - South Master Roof Beam, 3'-3" Cantilever	Passed	1 piece(s) 5 1/8" x 12" 24F-V8 DF Glulam	
RB9 - North Master Roof Beam, 3'-3" Cantilever	Passed	1 piece(s) 5 1/8" x 12" 24F-V8 DF Glulam	
RB10 - Exercise Room Header, 5'-0"	Passed	2 piece(s) 2 x 8 HF No.2	
RB11 - Bedroom Header, 5'-3"	Passed	1 piece(s) 4 x 10 HF No.2	
Lower Roof			
Member Name	Results	Current Solution	Comments
RJ6 - Existing Powder Roof Joist, 9'-8"	Passed	1 piece(s) 2 x 8 HF No.2 @ 16" OC	
RJ7 - Existing Office Roof Joist, 14'-3"	Passed	1 piece(s) 2 x 10 HF No.2 @ 16" OC	
RJ8 - Living Room Roof Joist, 17'-0"	Passed	1 piece(s) 11 7/8" TJI® 110 @ 24" OC	
RJ9 - Entry Roof Joist, 11'-4"	Passed	1 piece(s) 2 x 10 HF No.2 @ 24" OC	
RB12 - Living Room Roof Beam, Grid B	Passed	1 piece(s) 5 1/8" x 21" 24F-V4 DF Glulam	
RB13 - Existing Entry Header, 12'-0"	Passed	3 piece(s) 2 x 10 DF No.2	
RB14 - Existing Entry Header, 8'-9"	Passed	3 piece(s) 2 x 10 DF No.2	
RB15 - Living Room Flush Beam, Grid 3	Passed	1 piece(s) 3 1/8" x 12" 24F-V4 DF Glulam	
RB16 - Office Flush Header, Grid A	Passed	1 piece(s) 4 x 10 HF No.2	

| ForteWEB Software Operator	Job Notes
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File Name: 23127 Hong and Kao Residence - Main House

Page 1 / 70

Upper Floor			
Member Name	Results	Current Solution	Comments
UJ1 - Solarium Floor Joist, 11'-9"	Passed	1 piece(s) 11 7/8" TJI® 110 @ 16" OC	Right cantilever exceeds the maximum braced cantilever length of 4'.
UJ2 - Exercise Floor Joist, 12'-6"	Passed	1 piece(s) 11 7/8" TJI® 110 @ 16" OC	
UJ3 - Shower Floor Joist, 6'-0"	Passed	1 piece(s) 2 x 8 HF No.2 @ 16" OC	
UJ4 - Landing Floor Joist, 9'-6"	Passed	1 piece(s) 2 x 12 HF No.2 @ 16" OC	
UJ5 - Master Floor Joist, 18'-0"	Passed	1 piece(s) 2 x 12 HF No.2 @ 12" OC	
UJ6 - Deck Joist, 12'-6"	Passed	1 piece(s) 4 x 8 DF No.1 @ 16" OC	
UJ7 - Deck Joist, 6'-0"	Passed	1 piece(s) 4 x 8 DF No.1 @ 16" OC	
UJ8 - Landing Floor Joist, 7'-0"	Passed	1 piece(s) 2 x 6 HF No.2 @ 16" OC	
UB1 - Garage Door Header, 9'-6"	Passed	1 piece(s) 5 1/8" x 10 1/2" 24F-V4 DF Glulam	
UB3 - Flush Beam at Shower, 11'-9"	Passed	1 piece(s) 1 3/4" x 11 7/8" 1.55E TimberStrand® LSL	
UB4 - Garage Window Header, 9'-6"	Passed	1 piece(s) 5 1/8" x 9" 24F-V4 DF Glulam	
UB5 - Beam over Pantry, 15'-0"	Passed	1 piece(s) 3 1/8" x 18" 24F-V4 DF Glulam	
UB7 - Flush Header at Master Window, 17'-0"	Passed	3 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL	
UB12 - Deck Edge Beam, Grid D	Passed	2 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL	
UB13 - Flush Beam over Dining, 19'-9"	Passed	1 piece(s) 5 1/8" x 22 1/2" 24F-V4 DF Glulam	
UB14 - Utility Room Header, 5'-6"	Passed	2 piece(s) 2 x 10 HF No.2	
UB15 - Flush Beam over Entry, 11'-6"	Passed	1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL	
UP1 - Post at Bed 4	Passed	1 piece(s) 4 x 6 HF No.2	
UP2 - Post at Master Closet	Passed	1 piece(s) 4 x 6 HF No.2	
UP3 - Post at Exercise Room	Passed	3 piece(s) 2 x 6 HF No.2	
UP4 - Existing Post at Master Bath	Passed	1 piece(s) 4 x 6 HF No.2	
UP5 - Post at South Deck	Passed	1 piece(s) 6 x 6 DF No.1	
UP6 - Post at North Master	Passed	1 piece(s) 4 x 6 HF No.2	
Main Floor			
Member Name	Results	Current Solution	Comments
J1 - Deck Joist, 13'-0"	Passed	1 piece(s) 2 x 12 DF No.2 @ 16" OC	
J2 - Floor Joist, 14'-0"	Passed	1 piece(s) 2 x 12 HF No.2 @ 16" OC	
J3 - Floor Joist, 17'-0"	Passed	1 piece(s) 2 x 12 DF No.2 @ 16" OC	
J4 - Floor Joist, 18'-0"	Passed	1 piece(s) 2 x 12 DF No.2 @ 12" OC	
J5 - Entry Floor Joist, 12'-0"	Passed	1 piece(s) 2 x 8 DF No.1 @ 16" OC	
B1 - Garage Floor Beam, 9'-0"	Passed	1 piece(s) 4 x 12 DF No.2	
B2 - Office Flush Beam, Grid A	Passed	1 piece(s) 5 1/8" x 15" 24F-V4 DF Glulam	
B3 - Bedroom 2 Window Header, Grid 1	Passed	1 piece(s) 3 1/8" x 10 1/2" 24F-V4 DF Glulam	
B4 - Kitchen Flush Beam, Grid 1	Passed	2 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL	
B5 - Deck Flush Beam	Passed	3 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL	
B6 - Deck Flush Beam	Passed	3 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL	
B8 - Family Room Flush Beam, Grid C	Passed	1 piece(s) 5 1/8" x 15" 24F-V4 DF Glulam	
P1 - Garage Header Post	Passed	1 piece(s) 6 x 6 DF No.1	
P2 - Garage Wall Post	Passed	1 piece(s) 6 x 6 DF No.1	
P3 - Living Room Wall Post, Grid 1	Passed	1 piece(s) 6 x 6 DF No.1	
P4 - Living Room Wall Post, Grid 3	Passed	1 piece(s) 4 x 6 HF No.2	
P5 - Kitchen Wall Post, Grid D	Passed	1 piece(s) 6 x 8 DF No.1	

Basement			
Member Name	Results	Current Solution	Comments
BP1 - Basement Wall Post	Passed	1 piece(s) 6 x 8 DF No.1	
BP2 - Basement Corner Wall Post	Passed	1 piece(s) 6 x 6 DF No.1	
BP3 - Deck Post	Passed	1 piece(s) 6 x 6 DF No.1	

Upper Roof, RJ1 - Master Closet Roof Joist, 11'-0"
1 piece(s) 2 x 10 HF No.2 @ 16" OC
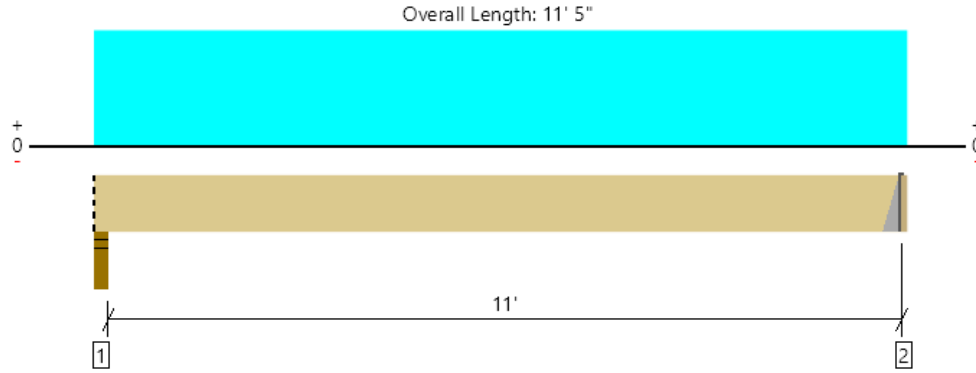
Overall Length: 11' 5"

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)	369 @ 11' 3 1/2"	911 (1.50")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	318 @ 10' 6 1/4"	1596	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1024 @ 5' 9"	2204	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.106 @ 5' 9"	0.554	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.176 @ 5' 9"	0.739	Passed (L/756)	--	1.0 D + 1.0 S (All 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).

• 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 - Stud wall - HF	3.50"	3.50"	1.50"	153	230	383	Blocking
2 - Hanger on 9 1/4" GLB beam	1.50"	Hanger¹	1.50"	151	227	378	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)	10' 3" o/c	
Bottom Edge (Lu)	11' 4" 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 - Top 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 Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 11' 5"	16"	20.0	30.0	Roof

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Upper Roof, RJ2 - Master Closet Roof Joist, 13'-0"
1 piece(s) 2 x 10 HF No.2 @ 16" OC
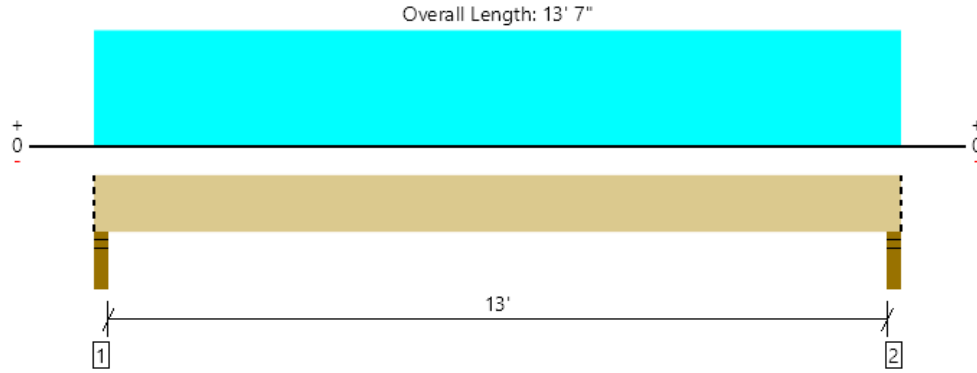
Overall Length: 13' 7"

13'

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)	453 @ 2 1/2"	2126 (3.50")	Passed (21%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	382 @ 1' 3/4"	1596	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1445 @ 6' 9 1/2"	2204	Passed (66%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.210 @ 6' 9 1/2"	0.658	Passed (L/751)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.351 @ 6' 9 1/2"	0.878	Passed (L/451)	--	1.0 D + 1.0 S (All 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).
• 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 - Stud wall - HF	3.50"	3.50"	1.50"	181	272	453	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	181	272	453	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)	6' 6" o/c	
Bottom Edge (Lu)	13' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

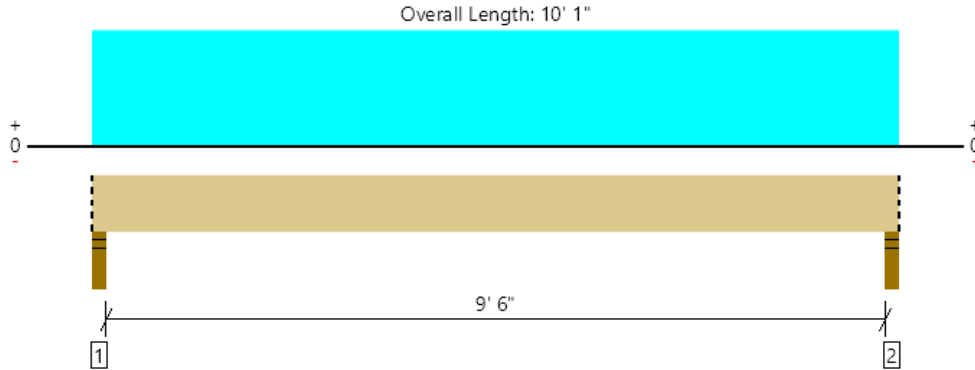| Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 13' 7"	16"	20.0	30.0	Roof

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

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File Name: 23127 Hong and Kao Residence - Main House
Page 5 / 70

Upper Roof, RJ3 - Existing 2x10, 9'-6"
1 piece(s) 2 x 10 HF No.2 @ 16" OC

Overall Length: 10' 1"

9' 6"

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)	336 @ 2 1/2"	2126 (3.50")	Passed (16%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	265 @ 1' 3/4"	1596	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	779 @ 5' 1/2"	2204	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.061 @ 5' 1/2"	0.483	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.102 @ 5' 1/2"	0.644	Passed (L/999+)	--	1.0 D + 1.0 S (All 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).
- 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 - Stud wall - HF	3.50"	3.50"	1.50"	134	202	336	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	134	202	336	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)	10' 1" o/c	
Bottom Edge (Lu)	10' 1" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 10' 1"	16"	20.0	30.0	Roof

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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
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

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File Name: 23127 Hong and Kao Residence - Main House
Page 6 / 70

Upper Roof, RJ4 - Existing 2x12, 17'-6"
1 piece(s) 2 x 12 HF No.2 @ 16" OC
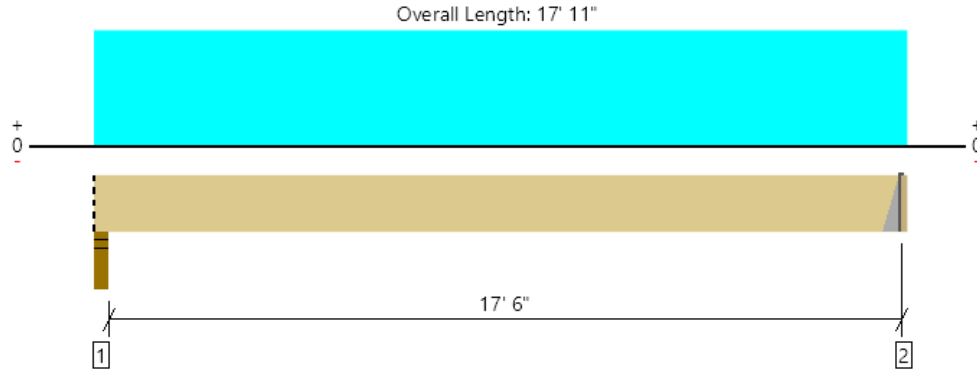
Overall Length: 17' 11"

17' 6"

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)	586 @ 17' 9 1/2"	911 (1.50")	Passed (64%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	524 @ 16' 10 1/4"	1941	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2576 @ 9'	2964	Passed (87%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.372 @ 9'	0.879	Passed (L/567)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.620 @ 9'	1.172	Passed (L/340)	--	1.0 D + 1.0 S (All 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).

• 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 - Stud wall - HF	3.50"	3.50"	1.50"	240	360	600	Blocking
2 - Hanger on 11 1/4" GLB beam	1.50"	Hanger¹	1.50"	238	357	594	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)	3' 6" o/c	
Bottom Edge (Lu)	17' 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
2 - Top 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 Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 17' 11"	16"	20.0	30.0	Roof

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

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Upper Roof, RJ5 - Master Bed Roof Joist , 7'-6"
1 piece(s) 2 x 12 HF No.2 @ 24" OC
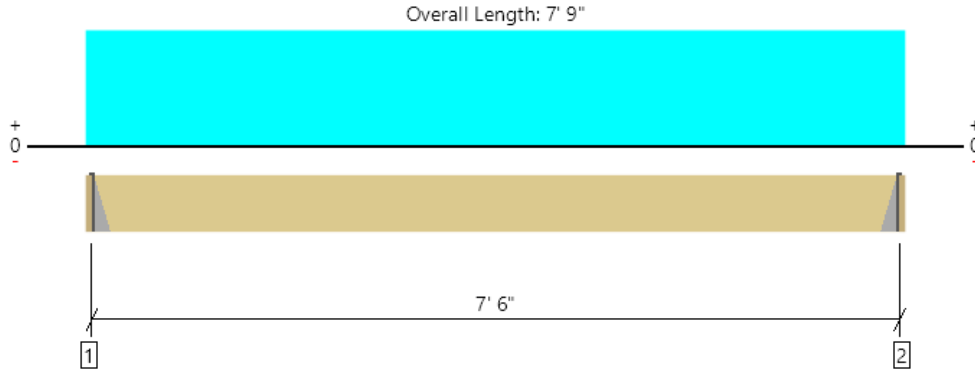
Overall Length: 7' 9"

7' 6"

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)	375 @ 1 1/2"	911 (1.50")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	281 @ 1' 3/4"	1941	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	703 @ 3' 10 1/2"	2964	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.018 @ 3' 10 1/2"	0.375	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.031 @ 3' 10 1/2"	0.500	Passed (L/999+)	--	1.0 D + 1.0 S (All 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).
• 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 - Hanger on 11 1/4" GLB beam	1.50"	Hanger¹	1.50"	155	233	388	See note ¹
2 - Hanger on 11 1/4" GLB beam	1.50"	Hanger¹	1.50"	155	233	388	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)	7' 6" o/c	
Bottom Edge (Lu)	7' 6" 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top 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 Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 7' 9"	24"	20.0	30.0	Roof

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File Name: 23127 Hong and Kao Residence - Main House

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Upper Roof, RB1 - Bed 4 Flush Beam, 10'-6"
1 piece(s) 5 1/8" x 9" 24F-V8 DF Glulam
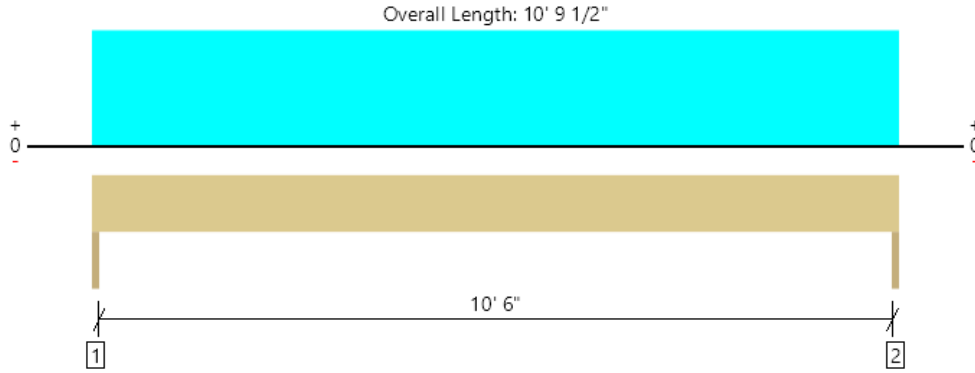
Overall Length: 10' 9 1/2"

10' 6"

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)	3298 @ 1/4"	5830 (1.75")	Passed (57%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2750 @ 10 3/4"	9371	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	8829 @ 5' 4 3/4"	15913	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.193 @ 5' 4 3/4"	0.538	Passed (L/668)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.328 @ 5' 4 3/4"	0.717	Passed (L/394)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush 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 factor of 1.00 that was calculated using length L = 10' 9".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Column - HF	1.75"	1.75"	1.50"	1355	1943	3298	None
2 - Column - HF	1.75"	1.75"	1.50"	1355	1943	3298	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 10" o/c	
Bottom Edge (Lu)	10' 10" 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 10' 9 1/2"	N/A	11.2	--	
1 - Uniform (PSF)	0 to 10' 9 1/2" (Front)	12'	20.0	30.0	Roof

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

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File Name: 23127 Hong and Kao Residence - Main House
Page 9 / 70

Weyerhaeuser

Upper Roof, RB2 - Bath 4 Header, 5'-0"
2 piece(s) 2 x 10 HF No.2

Overall Length: 5' 3"

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)	1767 @ 0	1823 (1.50")	Passed (97%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1761 @ 10 3/4"	3191	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1764 @ 1'	3833	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.015 @ 2' 3 5/8"	0.262	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.025 @ 2' 3 11/16"	0.350	Passed (L/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).
- 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 - Trimmer - HF	1.50"	1.50"	1.50"	674	1093	1767	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	173	257	430	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 3" o/c	
Bottom Edge (Lu)	5' 3" 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' 3"	N/A	7.0	--	
1 - Point (lb)	1' (Top)	N/A	810	1350	Flush Beam

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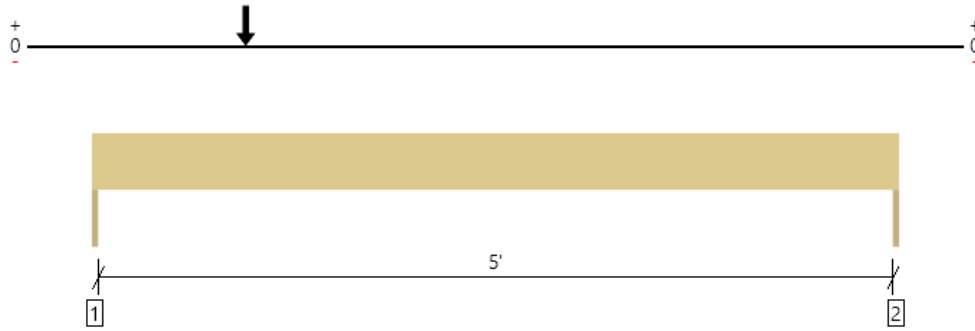
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

Weyerhaeuser

Upper Roof, RB3 - Exercise Room Beam, 11'-8"
1 piece(s) 5 1/8" x 9" 24F-V4 DF Glulam
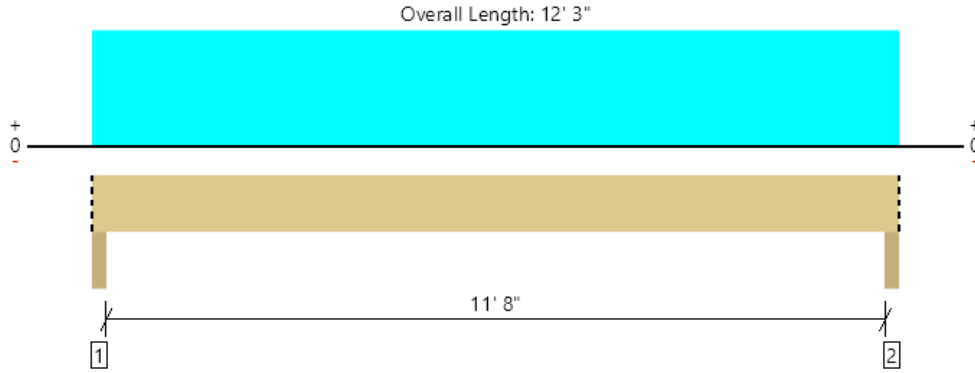
Overall Length: 12' 3"

11' 8"

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)	3591 @ 2"	11659 (3.50")	Passed (31%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2980 @ 1' 1/2"	9371	Passed (32%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	10406 @ 6' 1 1/2"	15913	Passed (65%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.279 @ 6' 1 1/2"	0.596	Passed (L/512)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.475 @ 6' 1 1/2"	0.794	Passed (L/301)	--	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 factor of 1.00 that was calculated using length L = 11' 11".
- 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 - Column - HF	3.50"	3.50"	1.50"	1477	2113	3591	Blocking
2 - Column - HF	3.50"	3.50"	1.50"	1477	2113	3591	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)	12' 3" o/c	
Bottom Edge (Lu)	12' 3" 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 12' 3"	N/A	11.2	--	
1 - Uniform (PSF)	0 to 12' 3" (Top)	11' 6"	20.0	30.0	Roof

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

Upper Roof, RB4 - Master Closet Beam, Two Span
1 piece(s) 5 1/8" x 9" 24F-V4 DF Glulam
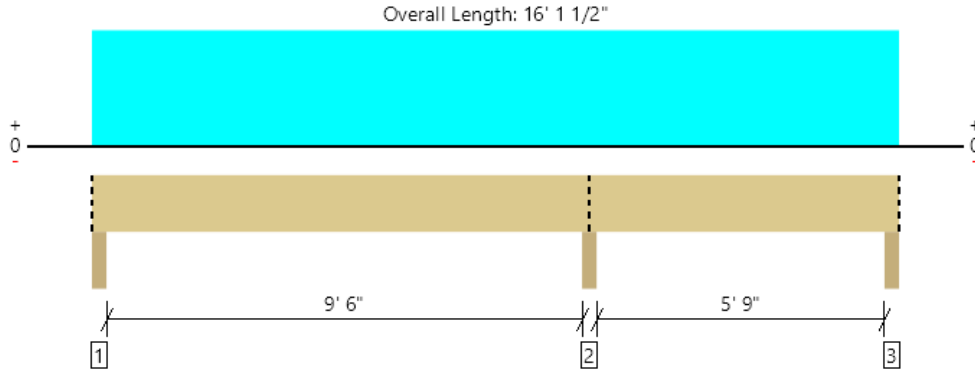
Overall Length: 16' 1 1/2"

9' 6"   5' 9"

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)	5804 @ 9' 11 1/4"	11659 (3.50")	Passed (50%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2762 @ 9' 1/2"	9371	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	4501 @ 4' 2 1/16"	15913	Passed (28%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-5113 @ 9' 11 1/4"	12266	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.071 @ 4' 7 5/8"	0.489	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.118 @ 4' 7 5/16"	0.651	Passed (L/994)	--	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).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 8' 1/8".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 4' 10 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 - Column - HF	3.50"	3.50"	1.50"	952	1389	2341	Blocking
2 - Column - HF	3.50"	3.50"	1.74"	2391	3413	5804	Blocking
3 - Column - HF	3.50"	3.50"	1.50"	385	751	1136	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)	16' 2" o/c	
Bottom Edge (Lu)	16' 2" 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 16' 1 1/2"	N/A	11.2	--	
1 - Uniform (PSF)	0 to 16' 1 1/2" (Top)	11'	20.0	30.0	Roof

ForteWEB Software Operator	Job Notes
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MSkotheim@quantumce.com	

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Upper Roof, RB5 - Existing Glulam, 17'-0"
1 piece(s) 5 1/8" x 12" 24F-V4 DF Glulam
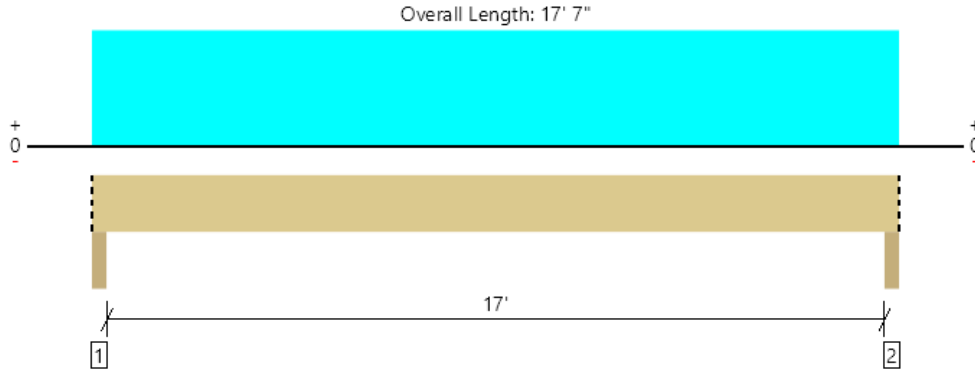
Overall Length: 17' 7"

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)	6176 @ 2"	11659 (3.50")	Passed (53%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	5268 @ 1' 3 1/2"	12495	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	26128 @ 8' 9 1/2"	28290	Passed (92%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.619 @ 8' 9 1/2"	0.863	Passed (L/335)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.053 @ 8' 9 1/2"	1.150	Passed (L/196)	--	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 factor of 1.00 that was calculated using length L = 17' 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 - Column - HF	3.50"	3.50"	1.85"	2549	3627	6176	Blocking
2 - Column - HF	3.50"	3.50"	1.85"	2549	3627	6176	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' 7" o/c	
Bottom Edge (Lu)	17' 7" 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' 7"	N/A	14.9	--	
1 - Uniform (PSF)	0 to 17' 7" (Top)	13' 9"	20.0	30.0	Roof

ForteWEB Software Operator	Job Notes
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Upper Roof, RB8 - South Master Roof Beam, 3'-3" Cantilever
1 piece(s) 5 1/8" x 12" 24F-V8 DF Glulam
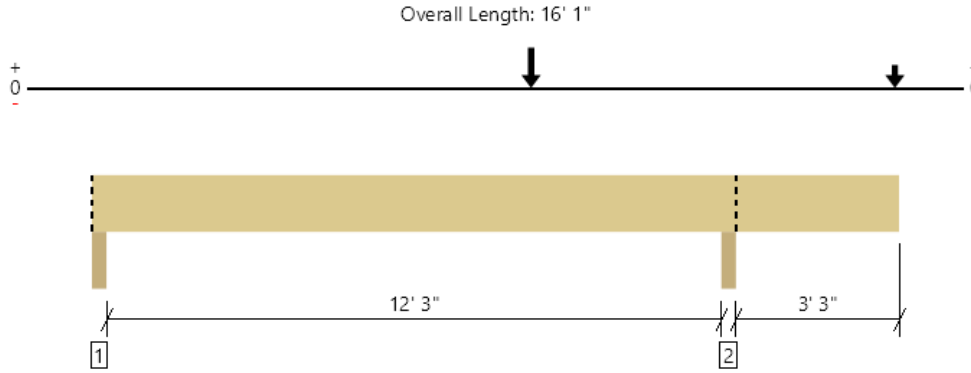
Overall Length: 16' 1"

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)	11260 @ 12' 8 1/4"	11659 (3.50")	Passed (97%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	7935 @ 11' 6 1/2"	12495	Passed (64%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	22323 @ 8' 9"	28290	Passed (79%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-10875 @ 12' 8 1/4"	28290	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.221 @ 6' 11 9/16"	0.626	Passed (L/680)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.352 @ 6' 10 15/16"	0.835	Passed (L/427)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush 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 factor of 1.00 that was calculated using length L = 11' 5 7/8".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 4' 9 3/16".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Column - HF	3.50"	3.50"	1.50"	1053	1614	2667	Blocking
2 - Column - HF	3.50"	3.50"	3.38"	5003	6257	11260	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)	16' 1" o/c	
Bottom Edge (Lu)	16' 1" 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 16' 1"	N/A	14.9	--	
1 - Point (lb)	8' 9" (Front)	N/A	4322	5875	Linked from: RB6 - Master Bed Flush Beam, 31'-0", Support 1
2 - Point (lb)	16' (Front)	N/A	1494	1763	Linked from: RB7 - Deck Roof Flush Beam, 31'-0", Support 1

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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
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

Upper Roof, RB9 - North Master Roof Beam, 3'-3" Cantilever
1 piece(s) 5 1/8" x 12" 24F-V8 DF Glulam
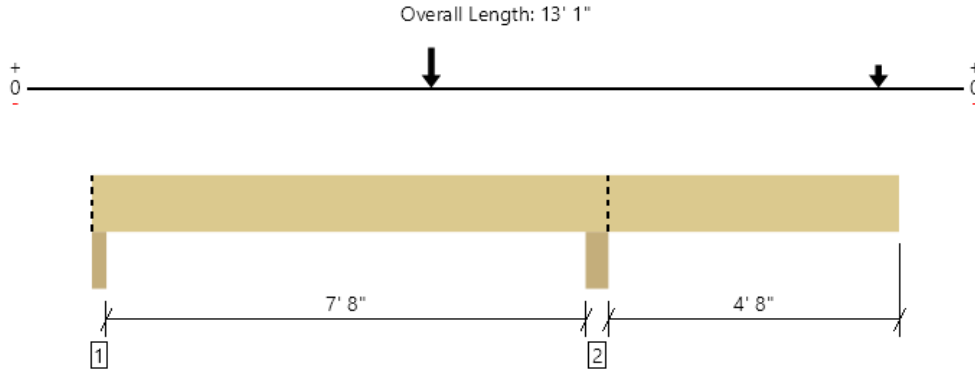
Overall Length: 13' 1"

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)	12045 @ 8' 2 1/4"	18322 (5.50")	Passed (66%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	8697 @ 6' 11 1/2"	12495	Passed (70%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	11003 @ 5' 6"	28290	Passed (39%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-15039 @ 8' 2 1/4"	28290	Passed (53%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.143 @ 13' 1"	0.490	Passed (2L/822)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.220 @ 13' 1"	0.653	Passed (2L/534)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush 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 positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 6' 8 1/8".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 6' 7 1/2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Column - HF	3.50"	3.50"	1.50"	638	1467/-19	2106	Blocking
2 - Column - DF	5.50"	5.50"	3.62"	5373	6672	12045	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)	13' 1" o/c	
Bottom Edge (Lu)	13' 1" 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 13' 1"	N/A	14.9	--	
1 - Point (lb)	5' 6" (Front)	N/A	4322	5875	Linked from: RB6 - Master Bed Flush Beam, 31'-0", Support 1
2 - Point (lb)	12' 9" (Front)	N/A	1494	1763	Linked from: RB7 - Deck Roof Flush Beam, 31'-0", Support 1

Weyerhaeuser Notes

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

Weyerhaeuser

Upper Roof, RB10 - Exercise Room Header, 5'-0"
2 piece(s) 2 x 8 HF No.2
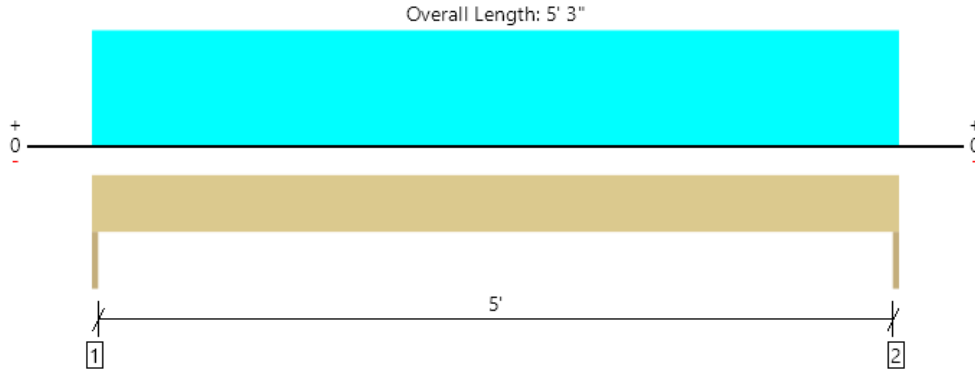
Overall Length: 5' 3"

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)	999 @ 0	1823 (1.50")	Passed (55%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	721 @ 8 3/4"	2501	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1311 @ 2' 7 1/2"	2569	Passed (51%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.031 @ 2' 7 1/2"	0.262	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.053 @ 2' 7 1/2"	0.350	Passed (L/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).
• 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 - Trimmer - HF	1.50"	1.50"	1.50"	408	591	999	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	408	591	999	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 3" o/c	
Bottom Edge (Lu)	5' 3" 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' 3"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 5' 3" (Top)	7' 6"	20.0	30.0	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
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6/7/2023 7:55:51 PM UTC
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File Name: 23127 Hong and Kao Residence - Main House
Page 16 / 70

FORTEWEB

Upper Roof, RB11 - Bedroom Header, 5'-3"
1 piece(s) 4 x 10 HF No.2
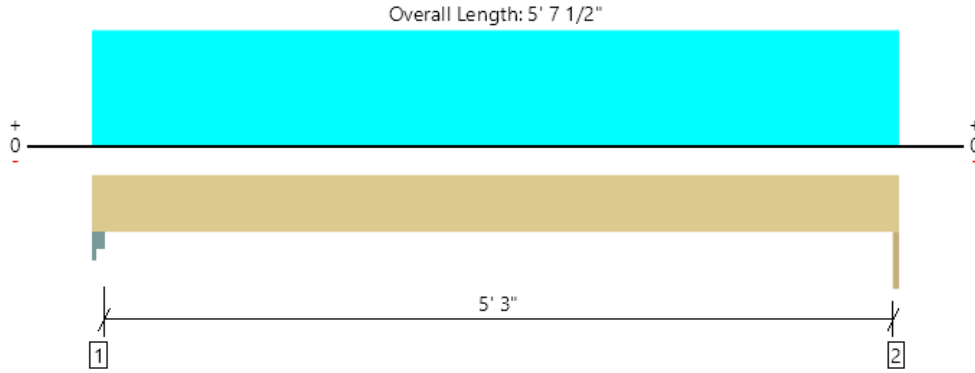
Overall Length: 5' 7 1/2"

5' 3"

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)	779 @ 5' 7 1/2"	2126 (1.50")	Passed (37%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	525 @ 1' 1/4"	3723	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1071 @ 2' 10 1/2"	4879	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.011 @ 2' 10 1/2"	0.275	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.019 @ 2' 10 1/2"	0.367	Passed (L/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).
• 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 - Column Cap - steel	3.00"	3.00"	1.50"	340	474	814	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	325	454	779	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	8.2	--	
1 - Uniform (PSF)	0 to 5' 7 1/2" (Top)	5' 6"	20.0	30.0	Roof

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

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Weyerhaeuser

Lower Roof, RJ6 - Existing Powder Roof Joist, 9'-8"
1 piece(s) 2 x 8 HF No.2 @ 16" OC
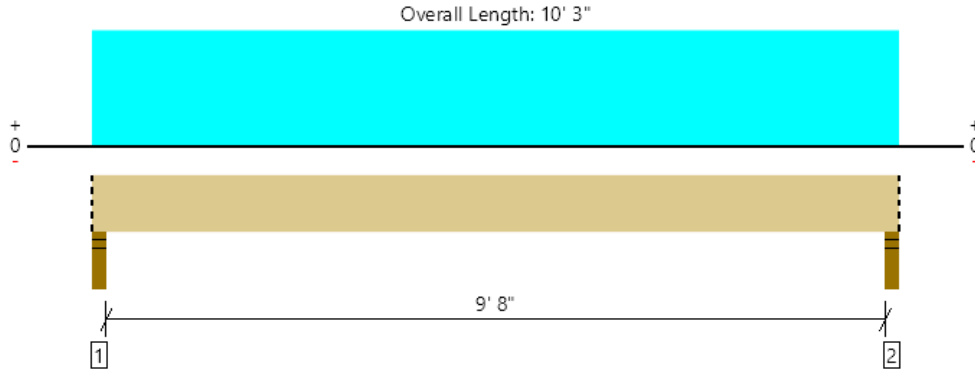
Overall Length: 10' 3"

9' 8"

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)	342 @ 2 1/2"	2126 (3.50")	Passed (16%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	282 @ 10 3/4"	1251	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	806 @ 5' 1 1/2"	1477	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.136 @ 5' 1 1/2"	0.492	Passed (L/868)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.226 @ 5' 1 1/2"	0.656	Passed (L/521)	--	1.0 D + 1.0 S (All 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).
• 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 - Stud wall - HF	3.50"	3.50"	1.50"	137	205	342	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	137	205	342	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)	10' 2" o/c	
Bottom Edge (Lu)	10' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 10' 3"	16"	20.0	30.0	Roof

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File Name: 23127 Hong and Kao Residence - Main House
Page 18 / 70

Lower Roof, RJ7 - Existing Office Roof Joist, 14'-3"
1 piece(s) 2 x 10 HF No.2 @ 16" OC

Overall Length: 14' 10"

14' 3"

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)	494 @ 2 1/2"	2126 (3.50")	Passed (23%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	424 @ 1' 3/4"	1596	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1732 @ 7' 5"	2204	Passed (79%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.302 @ 7' 5"	0.721	Passed (L/572)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.504 @ 7' 5"	0.961	Passed (L/343)	--	1.0 D + 1.0 S (All 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).
- 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 - Stud wall - HF	3.50"	3.50"	1.50"	198	297	494	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	198	297	494	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 10" o/c	
Bottom Edge (Lu)	14' 10" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 14' 10"	16"	20.0	30.0	Roof

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Page 19 / 70

FORTEWEB

Lower Roof, RJ8 - Living Room Roof Joist, 17'-0"
1 piece(s) 11 7/8" TJI ® 110 @ 24" OC

Overall Length: 14' 10"

14' 3"

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)	742 @ 2 1/2"	1581 (3.50")	Passed (47%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	713 @ 3 1/2"	1794	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2598 @ 7' 5"	3634	Passed (71%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.246 @ 7' 5"	0.721	Passed (L/702)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.411 @ 7' 5"	0.961	Passed (L/421)	--	1.0 D + 1.0 S (All 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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	297	445	742	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.75"	297	445	742	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)	3' 6" o/c	
Bottom Edge (Lu)	14' 10" o/c	

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

| Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 14' 10"	24"	20.0	30.0	Roof

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Lower Roof, RJ9 - Entry Roof Joist, 11'-4"
1 piece(s) 2 x 10 HF No.2 @ 24" OC
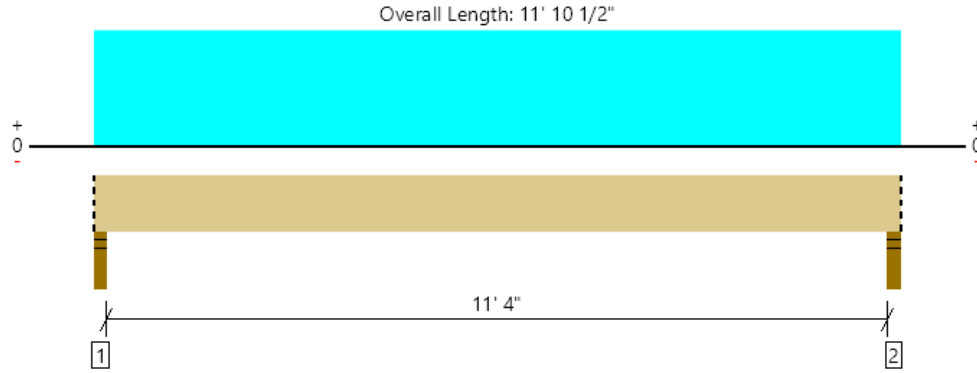
Overall Length: 11' 10 1/2"

11' 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)	746 @ 2"	1823 (3.00")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	617 @ 1' 1/4"	1596	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2083 @ 5' 11"	2204	Passed (94%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.184 @ 5' 11"	0.575	Passed (L/752)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.386 @ 5' 11"	0.767	Passed (L/358)	--	1.0 D + 1.0 S (All 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).
• 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 - Stud wall - HF	3.00"	3.00"	1.50"	391	355	746	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	393	358	751	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)	2' 7" o/c	
Bottom Edge (Lu)	11' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 11' 10 1/2"	24"	33.0	30.0	Roof w/ Gravel

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File Name: 23127 Hong and Kao Residence - Main House
Page 21 / 70

Weyerhaeuser

Lower Roof, RB12 - Living Room Roof Beam, Grid B
1 piece(s) 5 1/8" x 21" 24F-V4 DF Glulam
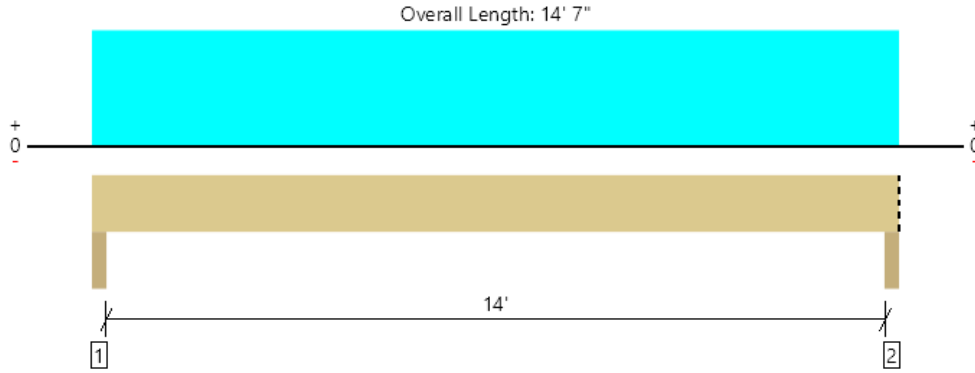
Overall Length: 14' 7"

14'

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)	8941 @ 14' 5"	11211 (3.50")	Passed (80%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6437 @ 2' 1/2"	21866	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	31123 @ 7' 3 1/2"	85162	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.059 @ 7' 3 1/2"	0.712	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.160 @ 7' 3 1/2"	0.950	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush 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 factor of 0.98 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 - Column - DF	3.50"	3.50"	2.68"	5659	3281	8941	None
2 - Beam - DF	3.50"	3.50"	2.79"	5659	3281	8941	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)	14' 7" o/c	
Bottom Edge (Lu)	14' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

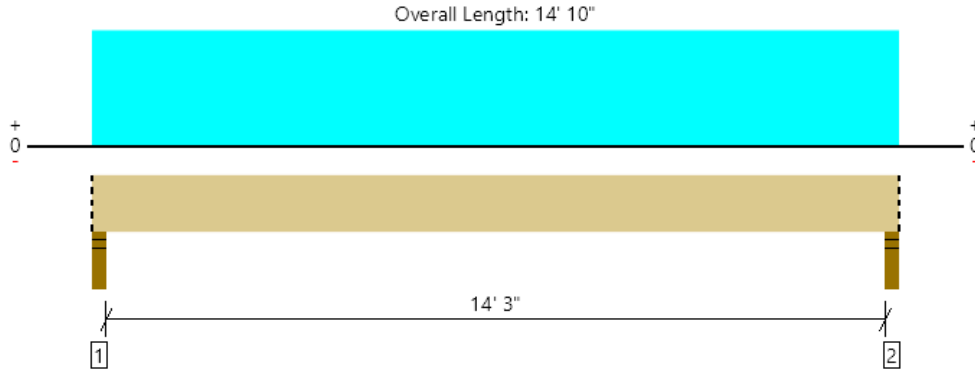| Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 7"	N/A	26.2	--	
1 - Uniform (PSF)	0 to 14' 7" (Front)	15'	20.0	30.0	Roof
2 - Uniform (PLF)	0 to 14' 7" (Top)	N/A	450.0	-	Veneer

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Page 22 / 70

Lower Roof, RB13 - Existing Entry Header, 12'-0"
3 piece(s) 2 x 10 DF No.2
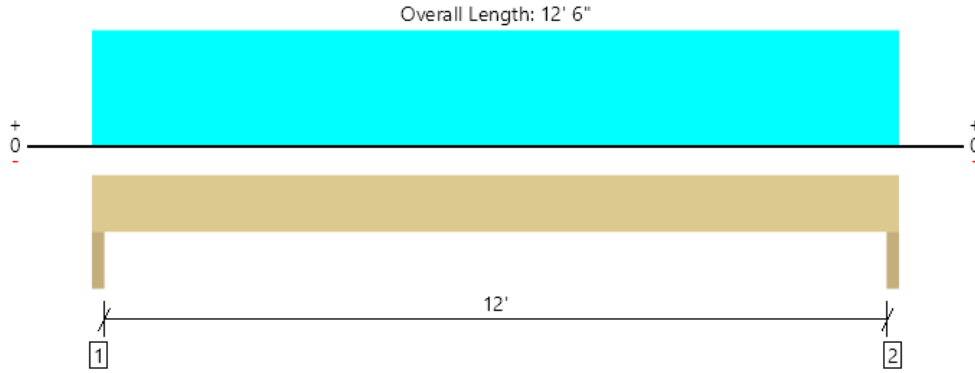
Overall Length: 12' 6"

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)	853 @ 1 1/2"	8438 (3.00")	Passed (10%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	714 @ 1' 1/4"	5744	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2561 @ 6' 3"	6088	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.064 @ 6' 3"	0.613	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.146 @ 6' 3"	0.817	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush 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 - Trimmer - HF	3.00"	3.00"	1.50"	478	375	853	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	478	375	853	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 6" o/c	
Bottom Edge (Lu)	12' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

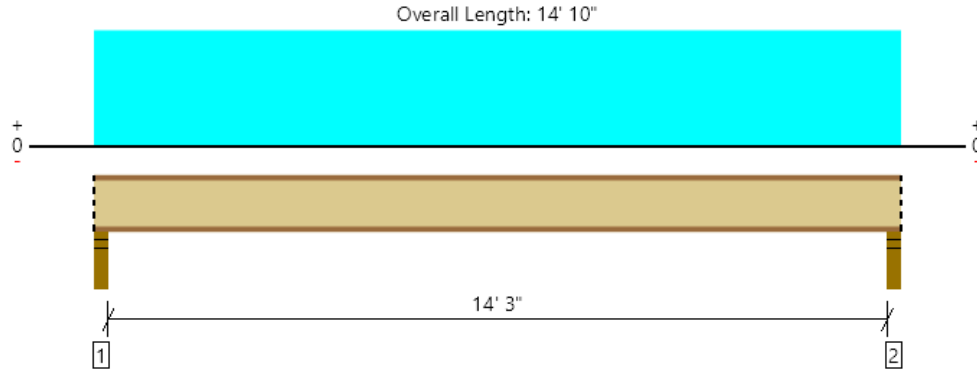| Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12' 6"	N/A	10.6	--	
1 - Uniform (PSF)	0 to 12' 6" (Top)	2'	33.0	30.0	Roof w/ Gravel

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

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Weyerhaeuser

Lower Roof, RB14 - Existing Entry Header, 8'-9"
3 piece(s) 2 x 10 DF No.2
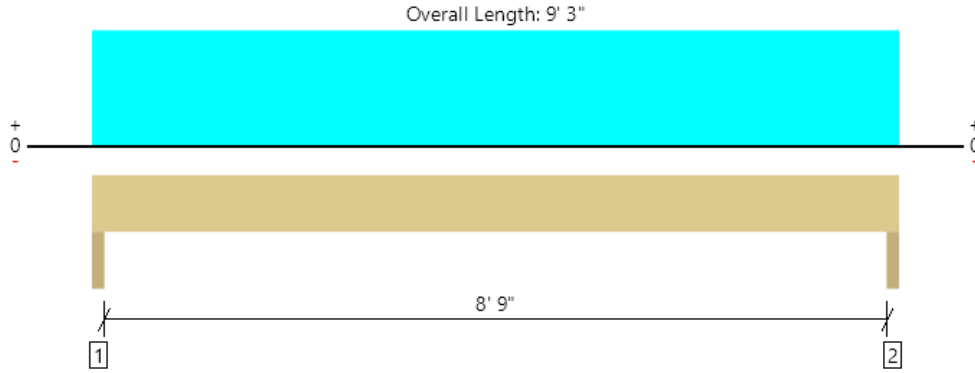
Overall Length: 9' 3"

8' 9"

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)	2525 @ 1 1/2"	8438 (3.00")	Passed (30%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1968 @ 1' 1/4"	5744	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5529 @ 4' 7 1/2"	6088	Passed (91%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.079 @ 4' 7 1/2"	0.450	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.170 @ 4' 7 1/2"	0.600	Passed (L/636)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush 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 - Trimmer - HF	3.00"	3.00"	1.50"	1346	1179	2525	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	1346	1179	2525	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 3" o/c	
Bottom Edge (Lu)	9' 3" 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 9' 3"	N/A	10.6	--	
1 - Uniform (PSF)	0 to 9' 3" (Top)	8' 6"	33.0	30.0	Roof w/ Gravel

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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
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

Weyerhaeuser

Lower Roof, RB15 - Living Room Flush Beam, Grid 3
1 piece(s) 3 1/8" x 12" 24F-V4 DF Glulam
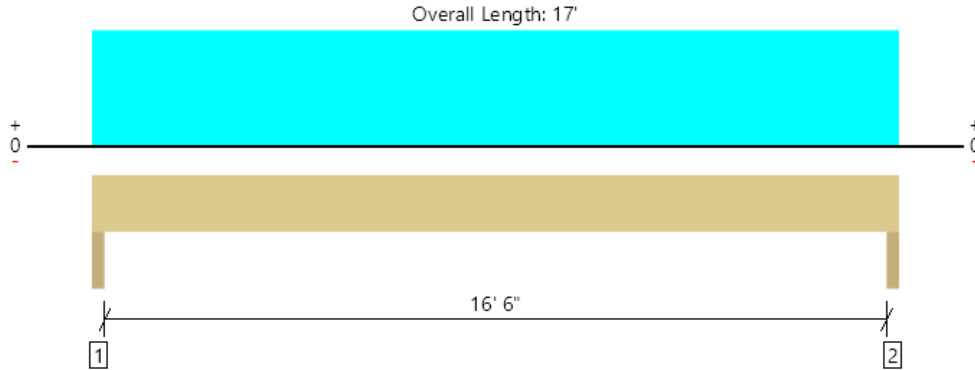
Overall Length: 17'

16' 6"

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)	2457 @ 1 1/2"	6094 (3.00")	Passed (40%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2096 @ 1' 3"	7619	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	10139 @ 8' 6"	17250	Passed (59%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.197 @ 8' 6"	0.837	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.632 @ 8' 6"	1.117	Passed (L/318)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush 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 factor of 1.00 that was calculated using length L = 16' 9".
- 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 - Trimmer - HF	3.00"	3.00"	1.50"	1692	765	2457	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	1692	765	2457	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' o/c	
Bottom Edge (Lu)	17' 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'	N/A	9.1	--	
1 - Uniform (PSF)	0 to 17' (Top)	2'	20.0	30.0	Roof
2 - Uniform (PLF)	0 to 17' (Top)	N/A	150.0	30.0	Veneer

Weyerhaeuser Notes

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Page 25 / 70

FORTEWEB

Lower Roof, RB16 - Office Flush Header, Grid A
1 piece(s) 4 x 10 HF No.2

Overall Length: 6'

5' 6"

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)	1465 @ 1 1/2"	4253 (3.00")	Passed (34%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	966 @ 1' 1/4"	3723	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2018 @ 3'	4879	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.020 @ 3'	0.287	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.040 @ 3'	0.383	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush 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 - Trimmer - HF	3.00"	3.00"	1.50"	745	720	1465	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	745	720	1465	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' o/c	
Bottom Edge (Lu)	6' 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 6'	N/A	8.2	--	
1 - Uniform (PSF)	0 to 6' (Top)	7'	20.0	30.0	Roof
2 - Uniform (PLF)	0 to 6' (Top)	N/A	100.0	30.0	Parapet w/ veneer

Weyerhaeuser Notes

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Weyerhaeuser

Upper Floor, UJ1 - Solarium Floor Joist, 11'-9"
1 piece(s) 11 7/8" TJI® 110 @ 16" OC
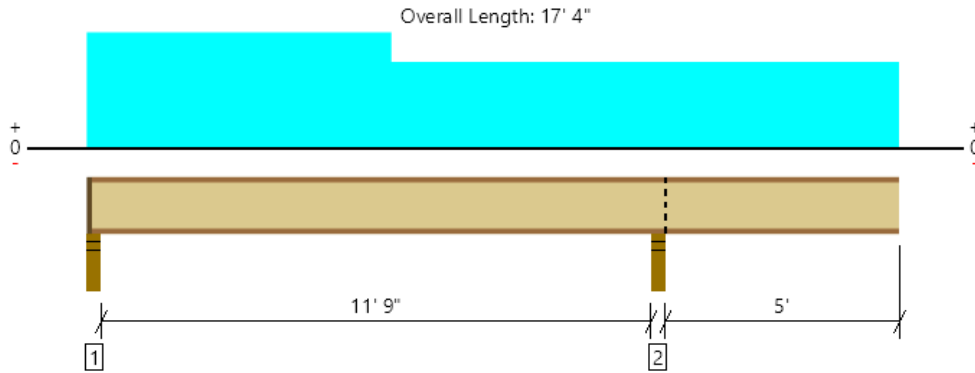
Overall Length: 17' 4"

11' 9"   5'

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)	529 @ 2 1/2"	1041 (2.25")	Passed (51%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	508 @ 3 1/2"	1560	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-1077 @ 12' 2 1/4"	2726	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.075 @ 5' 9 7/16"	0.299	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.109 @ 5' 8 3/4"	0.599	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	56	45	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Moment capacity over cantilever support 2 has been reduced by 25% to lessen the effects of buckling.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - HF	3.50"	2.25"	1.75"	152	388	32/-17	540	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	3.50"	3.50"	486	132	424	910	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	5' 2" o/c	
Bottom Edge (Lu)	5' 6" o/c	

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

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 6' 6"	16"	22.0	60.0	-	Roof Deck
2 - Uniform (PSF)	6' 6" to 17' 4"	16"	31.0	-	30.0	Low Roof

ForteWEB Software Operator	Job Notes
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Upper Floor, UJ2 - Exercise Floor Joist, 12'-6"
1 piece(s) 11 7/8" TJI ® 110 @ 16" OC
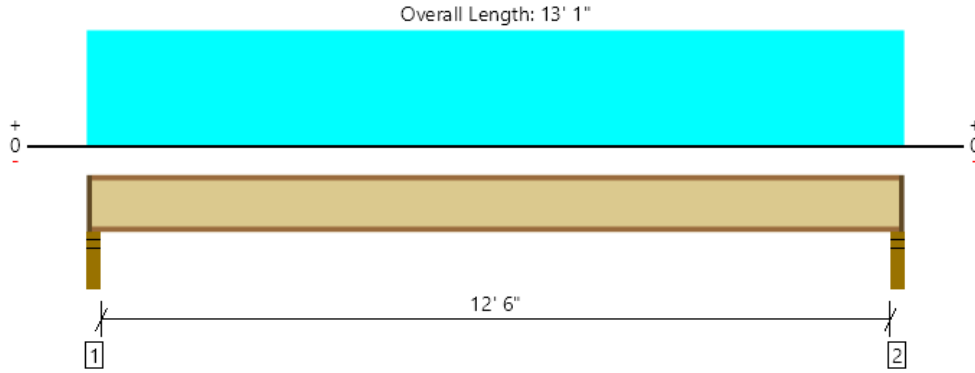
Overall Length: 13' 1"

12' 6"

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)	446 @ 2 1/2"	1041 (2.25")	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	433 @ 3 1/2"	1560	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1391 @ 6' 6 1/2"	3160	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.111 @ 6' 6 1/2"	0.317	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.145 @ 6' 6 1/2"	0.633	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	54	45	Passed	--	--

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 structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	2.25"	1.75"	105	349	454	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	2.25"	1.75"	105	349	454	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 10" o/c	
Bottom Edge (Lu)	12' 11" o/c	

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

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 13' 1"	16"	12.0	40.0	Floor

ForteWEB Software Operator	Job Notes
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Page 28 / 70

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Upper Floor, UJ3 - Shower Floor Joist, 6'-0"
1 piece(s) 2 x 8 HF No.2 @ 16" OC

Overall Length: 6' 7"

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)	221 @ 2 1/2"	1367 (2.25")	Passed (16%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	166 @ 10 3/4"	1088	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	330 @ 3' 3 1/2"	1284	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.028 @ 3' 3 1/2"	0.154	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.036 @ 3' 3 1/2"	0.308	Passed (L/999+)	--	1.0 D + 1.0 L (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	Floor Live	Factored	
1 - Stud wall - HF	3.50"	2.25"	1.50"	53	176	228	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	2.25"	1.50"	53	176	228	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 5" o/c	
Bottom Edge (Lu)	6' 5" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 6' 7"	16"	12.0	40.0	Floor

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

Weyerhaeuser

Upper Floor, UJ4 - Landing Floor Joist, 9'-6"
1 piece(s) 2 x 12 HF No.2 @ 16" OC
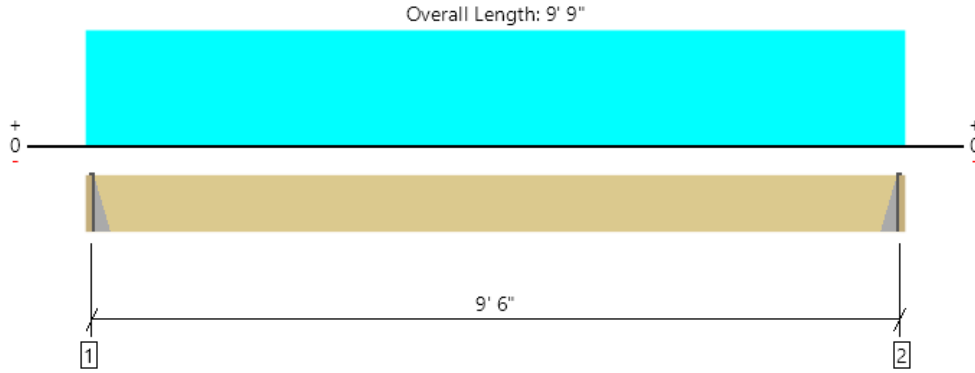
Overall Length: 9' 9"

9' 6"

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)	329 @ 1 1/2"	911 (1.50")	Passed (36%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	264 @ 1' 3/4"	1688	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	782 @ 4' 10 1/2"	2577	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.042 @ 4' 10 1/2"	0.237	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.055 @ 4' 10 1/2"	0.475	Passed (L/999+)	--	1.0 D + 1.0 L (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)			
	Total	Available	Required	Dead	Floor Live	Factored	Accessories
1 - Hanger on 11 1/4" HF beam	1.50"	Hanger¹	1.50"	78	260	338	See note ¹
2 - Hanger on 11 1/4" HF beam	1.50"	Hanger¹	1.50"	78	260	338	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)	9' 6" o/c	
Bottom Edge (Lu)	9' 6" 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top 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.

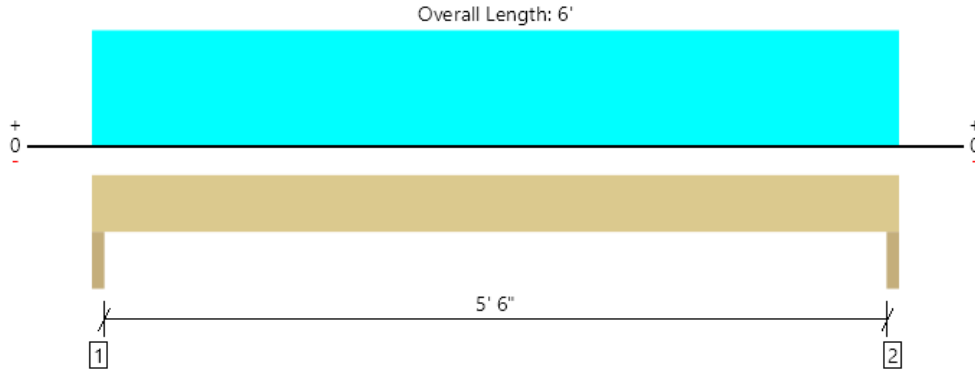| Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 9' 9"	16"	12.0	40.0	Floor

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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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Page 30 / 70

Weyerhaeuser

Upper Floor, UJ5 - Master Floor Joist, 18'-0"
1 piece(s) 2 x 12 HF No.2 @ 12" OC
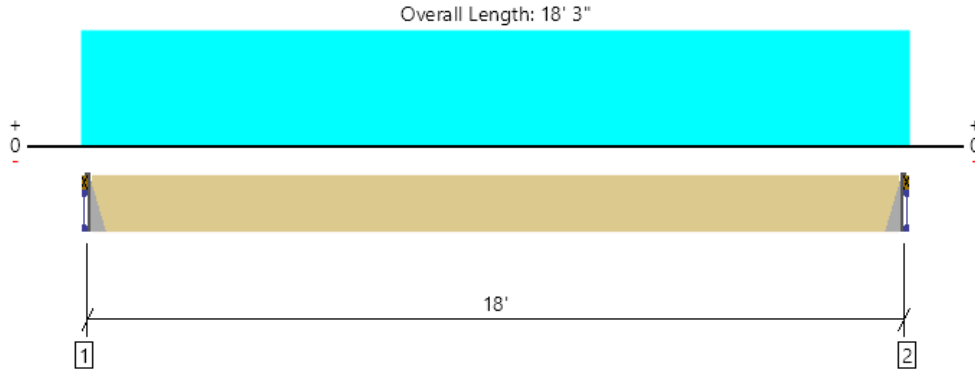
Overall Length: 18' 3"

18'

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)	468 @ 1 1/2"	911 (1.50")	Passed (51%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	419 @ 1' 3/4"	1688	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2106 @ 9' 1 1/2"	2577	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.408 @ 9' 1 1/2"	0.450	Passed (L/529)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.531 @ 9' 1 1/2"	0.900	Passed (L/407)	--	1.0 D + 1.0 L (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	Floor Live	Factored	
1 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	110	365	475	See note ¹
2 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	110	365	475	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)	4' 8" o/c	
Bottom Edge (Lu)	18' 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top 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 Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 18' 3"	12"	12.0	40.0	Floor

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ForteWEB Software Operator	Job Notes
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Page 31 / 70

Upper Floor, UJ6 - Deck Joist, 12'-6"
1 piece(s) 4 x 8 DF No.1 @ 16" OC
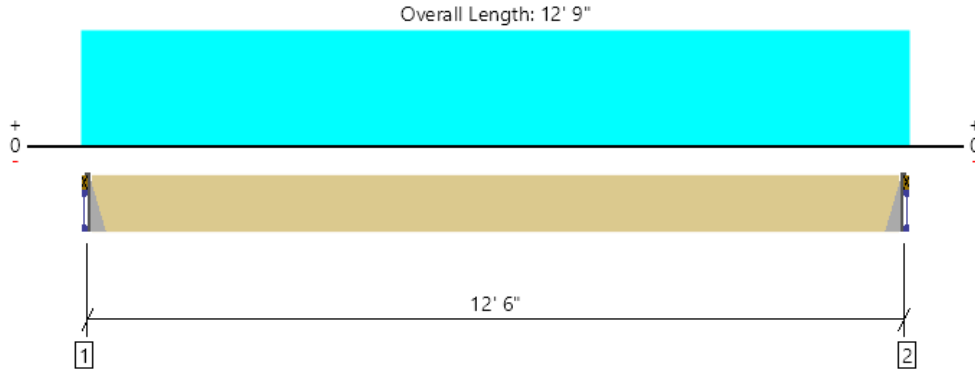
Overall Length: 12' 9"

12' 6"

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)	683 @ 1 1/2"	3281 (1.50")	Passed (21%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	617 @ 8 3/4"	3045	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2135 @ 6' 4 1/2"	3820	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.233 @ 6' 4 1/2"	0.313	Passed (L/645)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.318 @ 6' 4 1/2"	0.625	Passed (L/472)	--	1.0 D + 1.0 L (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	Floor Live	Factored	
1 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	187	510	697	See note ¹
2 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	187	510	697	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' 6" o/c	
Bottom Edge (Lu)	12' 6" 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top 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 Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 12' 9"	16"	22.0	60.0	Deck

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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
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

Weyerhaeuser

Upper Floor, UJ7 - Deck Joist, 6'-0"
1 piece(s) 4 x 8 DF No.1 @ 16" OC
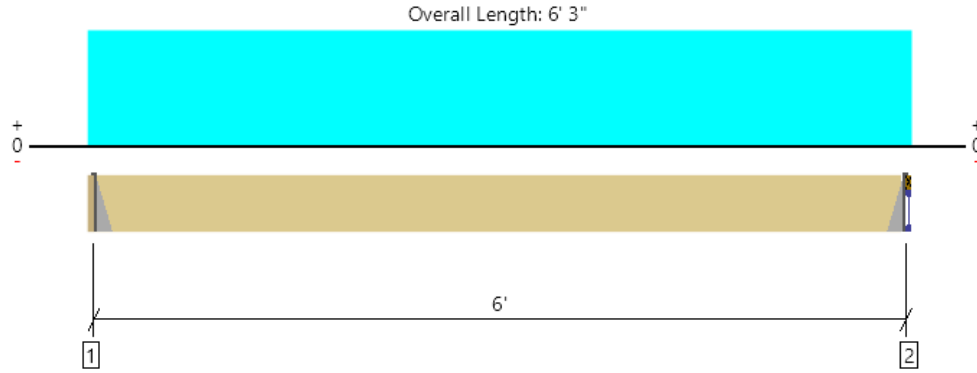
All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	328 @ 1 1/2"	3281 (1.50")	Passed (10%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	262 @ 8 3/4"	3045	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	492 @ 3' 1 1/2"	3820	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.012 @ 3' 1 1/2"	0.150	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.017 @ 3' 1 1/2"	0.300	Passed (L/999+)	--	1.0 D + 1.0 L (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	Floor Live	Factored	
1 - Hanger on 7 1/4" LVL beam	1.50"	Hanger¹	1.50"	92	250	342	See note ¹
2 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	92	250	342	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)	6' o/c	
Bottom Edge (Lu)	6' 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top 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 Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 6' 3"	16"	22.0	60.0	Deck

ForteWEB Software Operator	Job Notes
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ForteWEB v3.5, Engine: V8.2.5.1, Data: V8.1.3.6
File Name: 23127 Hong and Kao Residence - Main House
Page 33 / 70

Weyerhaeuser

Upper Floor, UJ8 - Landing Floor Joist, 7'-0"
1 piece(s) 2 x 6 HF No.2 @ 16" OC

Overall Length: 7' 3"

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)	243 @ 1 1/2"	911 (1.50")	Passed (27%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	211 @ 7"	825	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	425 @ 3' 7 1/2"	801	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.107 @ 3' 7 1/2"	0.175	Passed (L/788)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.139 @ 3' 7 1/2"	0.350	Passed (L/606)	--	1.0 D + 1.0 L (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	Floor Live	Factored	
1 - Hanger on 5 1/2" HF beam	1.50"	Hanger¹	1.50"	58	193	251	See note ¹
2 - Hanger on 5 1/2" HF beam	1.50"	Hanger¹	1.50"	58	193	251	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)	7' o/c	
Bottom Edge (Lu)	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
1 - Top Mount Hanger	THA29	2.25"	4-10d	6-10d	4-10d	
2 - Top Mount Hanger	THA29	2.25"	4-10d	6-10d	4-10d	

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

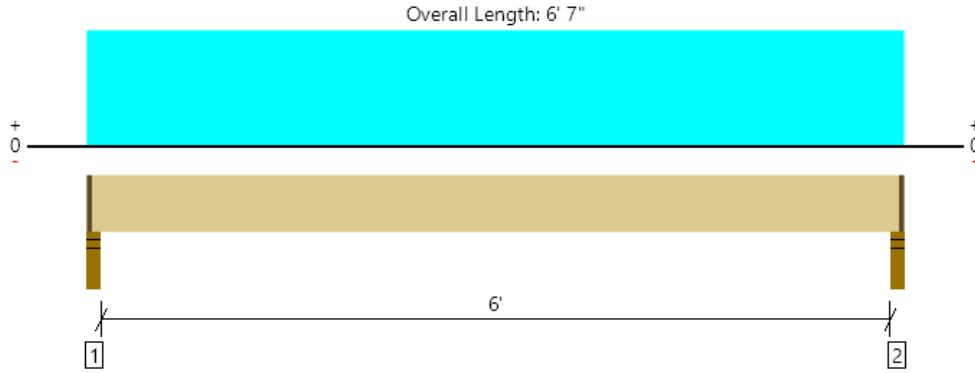| Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 7' 3"	16"	12.0	40.0	Floor

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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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File Name: 23127 Hong and Kao Residence - Main House
Page 34 / 70

Weyerhaeuser

Upper Floor, UB1 - Garage Door Header, 9'-6"
1 piece(s) 5 1/8" x 10 1/2" 24F-V4 DF Glulam

Overall Length: 9' 10"

9' 6"

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)	6230 @ 1/2"	6663 (2.00")	Passed (94%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4832 @ 1' 1/2"	9507	Passed (51%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	14819 @ 4' 11"	18834	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.110 @ 4' 11"	0.325	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.290 @ 4' 11"	0.488	Passed (L/404)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 9".
- 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	Floor Live	Snow	Factored	
1 - Trimmer - HF	2.00"	2.00"	1.87"	3870	2262	885	6230	None
2 - Trimmer - HF	2.00"	2.00"	1.87"	3870	2262	885	6230	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 10" o/c	
Bottom Edge (Lu)	9' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 10"	N/A	13.1	--	--	
1 - Uniform (PSF)	0 to 9' 10" (Top)	11' 6"	12.0	40.0	-	Floor
2 - Uniform (PSF)	0 to 9' 10" (Top)	6'	18.0	-	30.0	Roof
3 - Uniform (PLF)	0 to 9' 10" (Top)	N/A	528.0	-	-	Wall w/ Veneer

Weyerhaeuser Notes

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

Weyerhaeuser

Upper Floor, UB3 - Flush Beam at Shower, 11'-9"
1 piece(s) 1 3/4" x 11 7/8" 1.55E TimberStrand® LSL
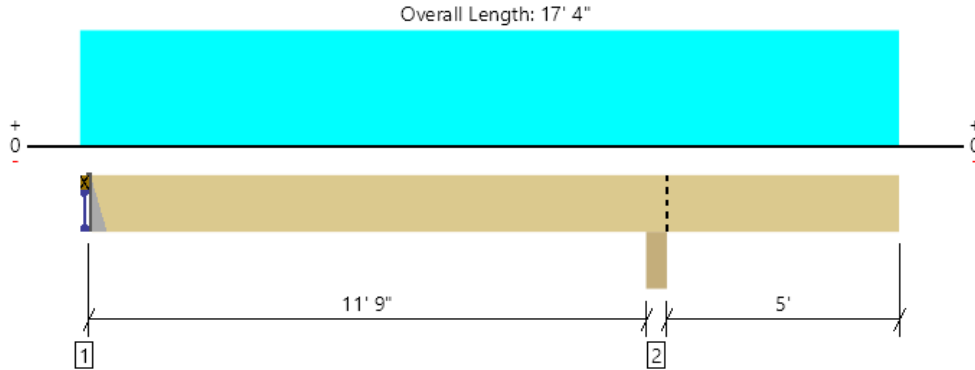
Overall Length: 17' 4"

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

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	775 @ 2"	2363 (1.50")	Passed (33%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	807 @ 10' 11 1/8"	4295	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2199 @ 5' 10 1/8"	7977	Passed (28%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.180 @ 17' 4"	0.260	Passed (2L/694)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.184 @ 17' 4"	0.521	Passed (2L/678)	--	1.0 D + 1.0 L (Alt Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/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 - Hanger on Single 2X HF plate	2.00"	Hanger¹	1.50"	182	615/-97	796	See note ¹
2 - Beam - GLB	5.00"	5.00"	1.50"	450	1232	1682	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)	16' 11" 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
1 - Top 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)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	2" to 17' 4"	N/A	6.5	--	
1 - Uniform (PSF)	0 to 17' 4" (Front)	2' 6"	12.0	40.0	Floor

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Page 36 / 70

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FORTEWEB

Upper Floor, UB4 - Garage Window Header, 9'-6"
1 piece(s) 5 1/8" x 9" 24F-V4 DF Glulam

Overall Length: 9' 1"

8' 9"

1   2

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

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4884 @ 1/2"	6663 (2.00")	Passed (73%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3604 @ 11"	8149	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	10066 @ 4' 6 1/2"	13838	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.090 @ 4' 6 1/2"	0.300	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.283 @ 4' 6 1/2"	0.450	Passed (L/381)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

• Deflection criteria: LL (L/360) and TL (L/240).
• Allowed moment does not reflect the adjustment for the beam stability factor.
• Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9'.
• 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	Floor Live	Snow	Factored	
1 - Trimmer - HF	2.00"	2.00"	1.50"	3335	1181	886	4884	None
2 - Trimmer - HF	2.00"	2.00"	1.50"	3335	1181	886	4884	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 1" o/c	
Bottom Edge (Lu)	9' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 1"	N/A	11.2	--	--	
1 - Uniform (PSF)	0 to 9' 1" (Top)	6' 6"	12.0	40.0	-	Floor
2 - Uniform (PSF)	0 to 9' 1" (Top)	6' 6"	18.0	-	30.0	Roof
3 - Uniform (PLF)	0 to 9' 1" (Top)	N/A	528.0	-	-	Wall w/ Veneer

Weyerhaeuser Notes

ForteWEB Software Operator	Job Notes
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Weyerhaeuser

Upper Floor, UB5 - Beam over Pantry, 15'-0"
1 piece(s) 3 1/8" x 18" 24F-V4 DF Glulam
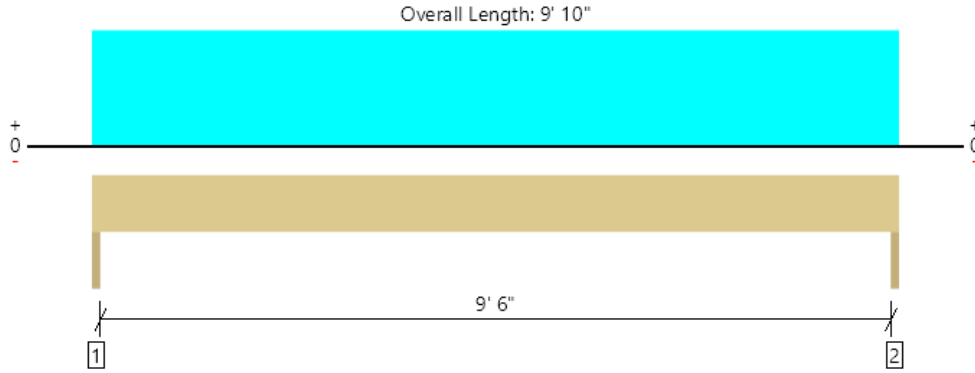
Overall Length: 9' 10"

9' 6"

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)	3647 @ 1/2"	4063 (2.00")	Passed (90%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2410 @ 1' 8"	9938	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	8813 @ 4' 11"	33750	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.042 @ 4' 11"	0.325	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.055 @ 4' 11"	0.488	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/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 9".
- 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	Floor Live	Factored	
1 - Trimmer - HF	2.00"	2.00"	1.80"	893	2753	3647	None
2 - Trimmer - HF	2.00"	2.00"	1.80"	893	2753	3647	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 10" o/c	
Bottom Edge (Lu)	9' 10" 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 9' 10"	N/A	13.7	--	
1 - Uniform (PSF)	0 to 9' 10" (Top)	14'	12.0	40.0	Floor

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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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6/7/2023 7:55:51 PM UTC
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File Name: 23127 Hong and Kao Residence - Main House
Page 38 / 70

Weyerhaeuser

Upper Floor, UB7 - Flush Header at Master Window, 17'-0"
3 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL
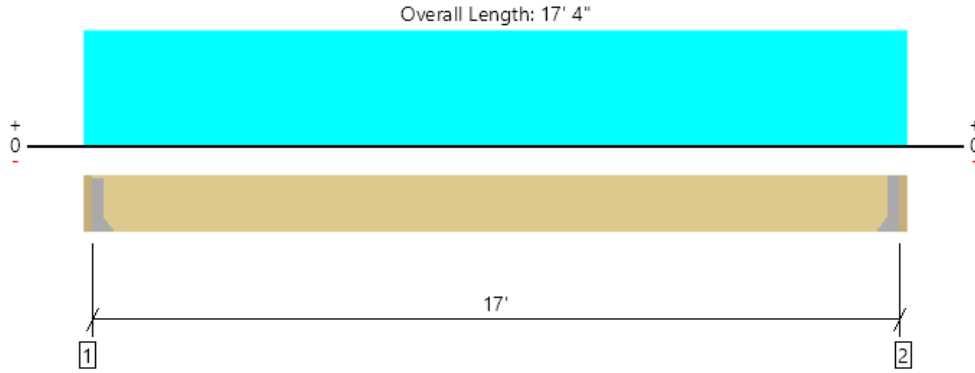
Overall Length: 17' 4"

17'

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)	3359 @ 2"	5906 (1.50")	Passed (57%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2989 @ 1' 1 1/4"	11222	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	14278 @ 8' 8"	24206	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.347 @ 8' 8"	0.425	Passed (L/587)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.624 @ 8' 8"	0.850	Passed (L/327)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush 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 - Hanger on 11 1/4" GLB beam	2.00"	Hanger¹	1.50"	1516	1907	3422	See note ¹
2 - Hanger on 11 1/4" GLB beam	2.00"	Hanger¹	1.50"	1516	1907	3422	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)	17' o/c	
Bottom Edge (Lu)	17' 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	HHUS5.50/10	3.00"	N/A	30-10d	10-10d	
2 - Face Mount Hanger	HHUS5.50/10	3.00"	N/A	30-10d	10-10d	

• 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)	2" to 17' 2"	N/A	17.2	--	
1 - Uniform (PSF)	0 to 17' 4" (Top)	1'	12.0	40.0	Floor
2 - Uniform (PSF)	0 to 17' 4" (Top)	3'	22.0	60.0	Deck
3 - Uniform (PLF)	0 to 17' 4" (Top)	N/A	80.0	-	Glazing

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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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Upper Floor, UB12 - Deck Edge Beam, Grid D
2 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL
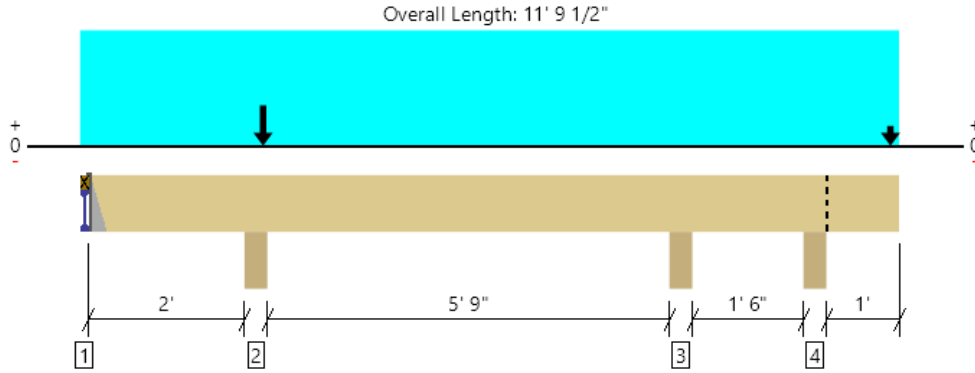
Overall Length: 11' 9 1/2"

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

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	13834 @ 2' 4 3/4"	14438 (5.50")	Passed (96%)	--	1.0 D + 0.75 L + 0.75 S (Adj Spans)
Shear (lbs)	1499 @ 11' 8 3/4"	7481	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-1837 @ 10' 6 3/4"	16137	Passed (11%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.006 @ 11' 9 1/2"	0.200	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.010 @ 11' 9 1/2"	0.200	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)

• Deflection criteria: LL (L/480) and TL (L/240).

• Overhang deflection criteria: LL (0.2") and TL (0.2").

• Allowed moment does not reflect the adjustment for the beam stability factor.

• -881 lbs uplift at support located at 8' 7 1/4". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Hanger on Single 2X HF plate	2.00"	Hanger[1]	1.50"	-15	73/-85	-	58/-101	See note [1]
2 - Column - DF	5.50"	5.50"	5.27"	7107	2297	6672	13834	None
3 - Column - DF	5.50"	5.50"	1.50"	-237	335/-644	-	97/-881	None
4 - Column - DF	5.50"	5.50"	1.50"	1027	1799/-28	-	2826	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)	11' 8" o/c	
Bottom Edge (Lu)	11' 8" 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

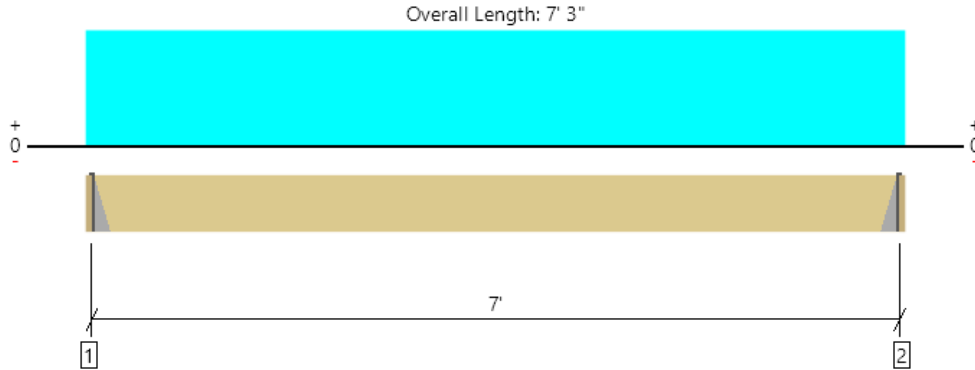• Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	2" to 11' 9 1/2"	N/A	11.5	--	--	
1 - Uniform (PSF)	0 to 11' 9 1/2" (Top)	1'	22.0	60.0	-	Deck
2 - Point (lb)	2' 6" (Front)	N/A	1516	1907	-	Linked from: B7 - Flush Header at Master Window, 17'-0", Support 1
3 - Point (lb)	11' 8" (Front)	N/A	600	1000	-	Deck Edge Beam
4 - Point (lb)	2' 6" (Top)	N/A	5373	-	6672	Linked from: RB9 - North Master Roof Beam, 3'-3" Cantilever, Support 2

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File Name: 23127 Hong and Kao Residence - Main House

Page 41 / 70

Upper Floor, UB13 - Flush Beam over Dining, 19'-9"
1 piece(s) 5 1/8" x 22 1/2" 24F-V4 DF Glulam
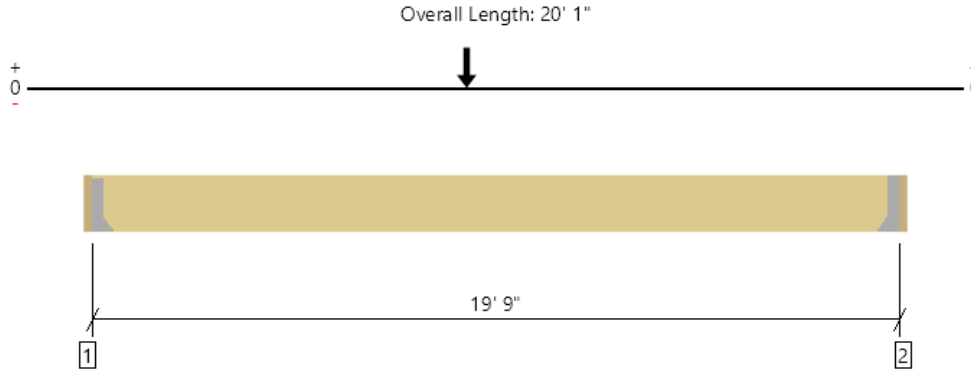
Overall Length: 20' 1"

19' 9"

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)	7983 @ 2"	7983 (2.40")	Passed (100%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	7930 @ 2' 1/2"	20372	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	71995 @ 9' 4"	81715	Passed (88%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.296 @ 9' 10 3/16"	0.494	Passed (L/802)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.463 @ 9' 10 1/4"	0.988	Passed (L/512)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush 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 factor of 0.94 that was calculated using length L = 19' 9".
• 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	Floor Live	Factored	
1 - Hanger on 22 1/2" HF beam	2.00"	Hanger¹	2.40"	2945	5037	7983	See note ¹
2 - Hanger on 22 1/2" HF beam	2.00"	Hanger¹	2.09"	2588	4363	6951	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)	19' 9" o/c	
Bottom Edge (Lu)	19' 9" 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	
2 - 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.

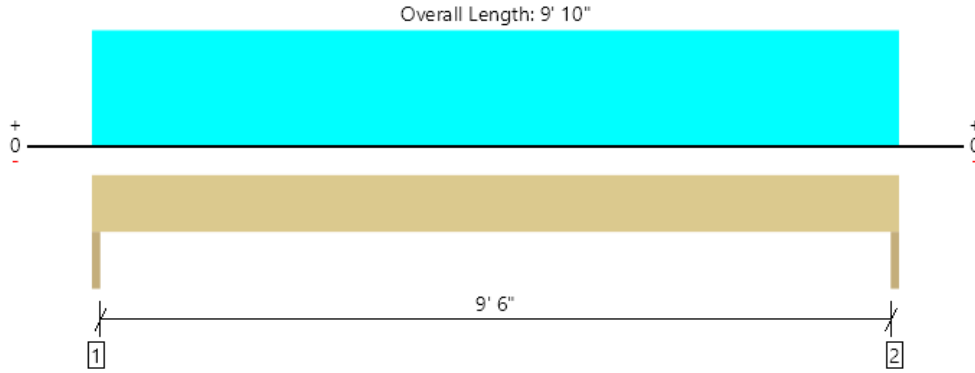| Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	2" to 19' 11"	N/A	28.0	--	
1 - Point (lb)	9' 4" (Front)	N/A	4980	9400	B6 Beam

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

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Page 42 / 70

Upper Floor, UB14 - Utility Room Header, 5'-6"
2 piece(s) 2 x 10 HF No.2

Overall Length: 4' 4"

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)	1283 @ 1/2"	2430 (2.00")	Passed (53%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	728 @ 11 1/4"	2775	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1337 @ 2' 2"	3333	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.013 @ 2' 2"	0.142	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.017 @ 2' 2"	0.213	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/360) and TL (L/240).
- 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	Floor Live	Factored	
1 - Trimmer - HF	2.00"	2.00"	1.50"	308	975	1283	None
2 - Trimmer - HF	2.00"	2.00"	1.50"	308	975	1283	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 4" o/c	
Bottom Edge (Lu)	4' 4" 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 4' 4"	N/A	7.0	--	
1 - Uniform (PSF)	0 to 4' 4" (Top)	11' 3"	12.0	40.0	Floor

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Page 43 / 70

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Upper Floor, UB15 - Flush Beam over Entry, 11'-6"
1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL

Overall Length: 12'

11' 6"

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)	3653 @ 1 1/2"	4725 (1.50")	Passed (77%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2706 @ 1' 1 3/8"	7731	Passed (35%)	0.90	1.0 D (All Spans)
Moment (Ft-lbs)	9477 @ 5' 11 1/4"	14358	Passed (66%)	0.90	1.0 D (All Spans)
Live Load Defl. (in)	0.041 @ 5' 11 1/4"	0.291	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.379 @ 5' 11 1/4"	0.581	Passed (L/368)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Flush 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	Snow	Factored	
1 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	3329	238	297	3730	See note ¹
2 - Beam - HF	4.50"	4.50"	2.69"	3401	243	303	3810	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)	11' 11" o/c	
Bottom Edge (Lu)	11' 11" 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

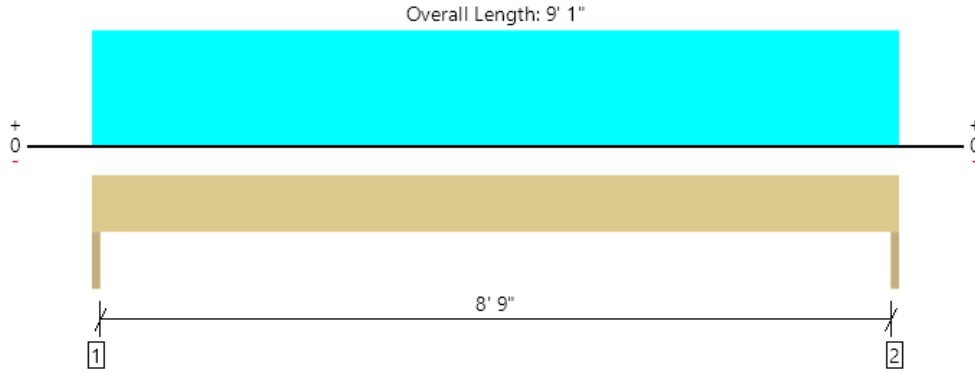• Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/2" to 12'	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 12' (Front)	1'	12.0	40.0	-	Floor
2 - Uniform (PSF)	0 to 12' (Top)	2'	18.0	-	25.0	Roof
3 - Uniform (PLF)	0 to 12' (Top)	N/A	500.0	-	-	Wall w/ veneer

Weyerhaeuser Notes

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Upper Floor, UP1 - Post at Bed 4
1 piece(s) 4 x 6 HF No.2
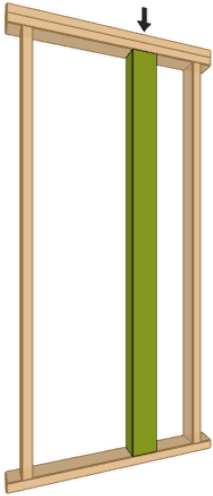
Wall Height: 9' | Member Height: 8' 7 1/2" | Tributary Width: 1'

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	30	50	Passed (59%)	--	--
Compression (lbs)	5310	7969	Passed (67%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	5310	7796	Passed (68%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	0	--	--	--	N/A
Lateral Shear (lbs)	0	N/A	Passed (N/A)	--	N/A
Lateral Moment (ft-lbs)	0 @ mid-span	N/A	Passed (N/A)	--	N/A
Total Deflection (in)	0.03 @ mid-span	0.86	Passed (L/3253)	--	1.0 D + 1.0 S
Bending/Compression	0.63	1	Passed (63%)	1.15	1.0 D + 1.0 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

Max Unbraced Length	Comments
8' 7 1/2"	

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Drawing is Conceptual

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	1990	3320	Roof

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Page 45 / 70

Upper Floor, UP2 - Post at Master Closet
1 piece(s) 4 x 6 HF No.2

Wall Height: 9'   Member Height: 8' 7 1/2"   Tributary Width: 1'

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	30	50	Passed (59%)	--	--
Compression (lbs)	5804	7969	Passed (73%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	5804	7796	Passed (74%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	0	--	--	--	N/A
Lateral Shear (lbs)	0	N/A	Passed (N/A)	--	N/A
Lateral Moment (ft-lbs)	0 @ mid-span	N/A	Passed (N/A)	--	N/A
Total Deflection (in)	0.03 @ mid-span	0.86	Passed (L/2976)	--	1.0 D + 1.0 S
Bending/Compression	0.74	1	Passed (74%)	1.15	1.0 D + 1.0 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

Max Unbraced Length	Comments
8' 7 1/2"	

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Drawing is Conceptual

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	2391	3413	Linked from: RB4 - Master Closet Beam, Two Span, Support 2

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File Name: 23127 Hong and Kao Residence - Main House
Page 46 / 70

Upper Floor, UP3 - Post at Exercise Room
3 piece(s) 2 x 6 HF No.2

Wall Height: 9'	Member Height: 8' 7 1/2"	Tributary Width: 1'
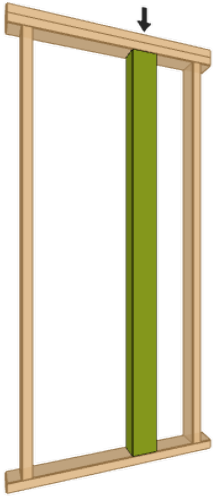
Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	23	50	Passed (46%)	--	--
Compression (lbs)	3590	9601	Passed (37%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	3590	10024	Passed (36%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	0	--	--	--	N/A
Lateral Shear (lbs)	0	N/A	Passed (N/A)	--	N/A
Lateral Moment (ft-lbs)	0 @ mid-span	N/A	Passed (N/A)	--	N/A
Total Deflection (in)	0.02 @ mid-span	0.86	Passed (L/6187)	--	1.0 D + 1.0 S
Bending/Compression	0.22	1	Passed (22%)	1.15	1.0 D + 1.0 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
8' 7 1/2"	

Drawing is Conceptual

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	1477	2113	Linked from: RB3 - Exercise Room Beam, 11'-8", Support 1

Weyerhaeuser Notes

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Upper Floor, UP4 - Existing Post at Master Bath
1 piece(s) 4 x 6 HF No.2
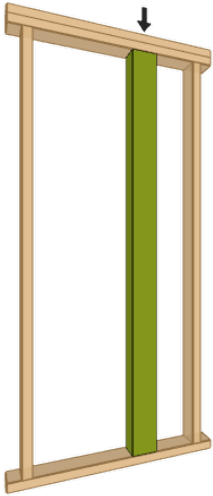
Wall Height: 9'   Member Height: 8' 7 1/2"   Tributary Width: 1'

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	30	50	Passed (59%)	--	--
Compression (lbs)	6176	7969	Passed (78%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	6176	7796	Passed (79%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	0	--	--	--	N/A
Lateral Shear (lbs)	0	N/A	Passed (N/A)	--	N/A
Lateral Moment (ft-lbs)	0 @ mid-span	N/A	Passed (N/A)	--	N/A
Total Deflection (in)	0.04 @ mid-span	0.86	Passed (L/2797)	--	1.0 D + 1.0 S
Bending/Compression	0.83	1	Passed (83%)	1.15	1.0 D + 1.0 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
8' 7 1/2"	

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	2549	3627	Linked from: RB5 - Existing Glulam, 17'-0", Support 1

*Drawing is Conceptual*

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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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Weyerhaeuser

6/7/2023 7:55:51 PM UTC
ForteWEB v3.5, Engine: V8.2.5.1, Data: V8.1.3.6
File Name: 23127 Hong and Kao Residence - Main House
Page 48 / 70

Upper Floor, UP5 - Post at South Deck
1 piece(s) 6 x 6 DF No.1

Wall Height: 9'   Member Height: 8' 7 1/2"   Tributary Width: 1'
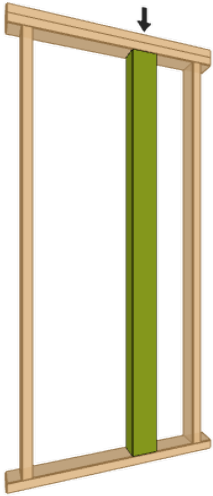
Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	19	50	Passed (38%)	--	--
Compression (lbs)	11260	25830	Passed (44%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	11260	12251	Passed (92%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	0	--	--	--	N/A
Lateral Shear (lbs)	0	N/A	Passed (N/A)	--	N/A
Lateral Moment (ft-lbs)	0 @ mid-span	N/A	Passed (N/A)	--	N/A
Total Deflection (in)	0.03 @ mid-span	0.86	Passed (L/2967)	--	1.0 D + 1.0 S
Bending/Compression	0.43	1	Passed (43%)	1.15	1.0 D + 1.0 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.
- This product has a square cross section. The analysis engine has checked both edge and plank orientations to allow for either installation.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
8' 7 1/2"	

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	5003	6257	Linked from: RB8 - South Master Roof Beam, 3'-3" Cantilever, Support 2

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Upper Floor, UP6 - Post at North Master
1 piece(s) 4 x 6 HF No.2

Wall Height: 9'　　　　　Member Height: 8' 7 1/2"　　　　　Tributary Width: 1'
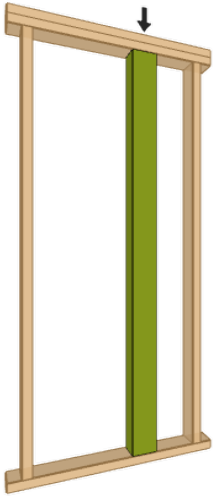
Design Results	Actual	Allowed	Result	LDF	Load: Combination [Load Group]
Slenderness	27	50	Passed (55%)	--	--
Compression (lbs)	2105	9143	Passed (23%)	1.15	1.0 D + 1.0 S [1]
Plate Bearing (lbs)	2105	7796	Passed (27%)	--	1.0 D + 1.0 S [1]
Lateral Reaction (lbs)	0	--	--	--	N/A
Lateral Shear (lbs)	0	N/A	Passed (N/A)	--	N/A
Lateral Moment (ft-lbs)	0 @ mid-span	N/A	Passed (N/A)	--	N/A
Total Deflection (in)	0.01 @ mid-span	0.86	Passed (L/8207)	--	1.0 D + 1.0 S [1]
Bending/Compression	0.11	1	Passed (11%)	1.15	1.0 D + 1.0 S [1]

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

Max Unbraced Length	Comments
8'	

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Drawing is Conceptual

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	638	1467/-19	Linked from: RB9 - North Master Roof Beam, 3'-3" Cantilever, Support 1

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Main Floor, J1 - Deck Joist, 13'-0"
1 piece(s) 2 x 12 DF No.2 @ 16" OC
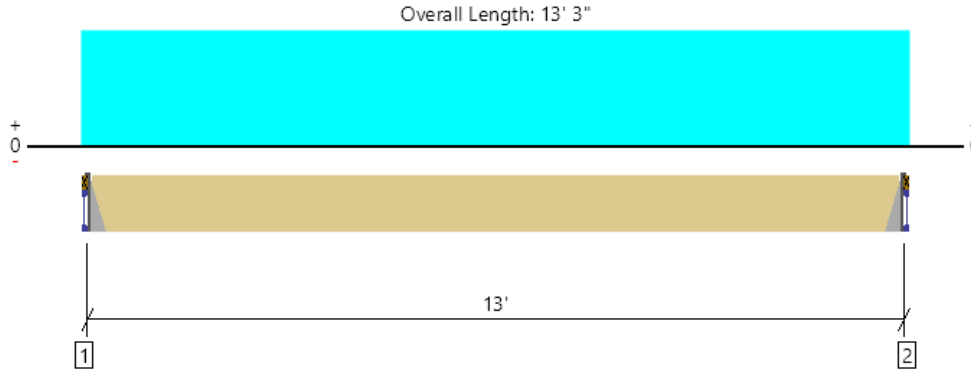
Overall Length: 13' 3"

13'

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)	711 @ 1 1/2"	1406 (1.50")	Passed (51%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	608 @ 1' 3/4"	2025	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2310 @ 6' 7 1/2"	2729	Passed (85%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.181 @ 6' 7 1/2"	0.325	Passed (L/864)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.247 @ 6' 7 1/2"	0.650	Passed (L/632)	--	1.0 D + 1.0 L (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	Floor Live	Factored	
1 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	194	530	724	See note ¹
2 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	194	530	724	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)	5' o/c	
Bottom Edge (Lu)	13' 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top 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 Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 13' 3"	16"	22.0	60.0	Deck

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File Name: 23127 Hong and Kao Residence - Main House
Page 51 / 70

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Main Floor, J2 - Floor Joist, 14'-0"
1 piece(s) 2 x 12 HF No.2 @ 16" OC
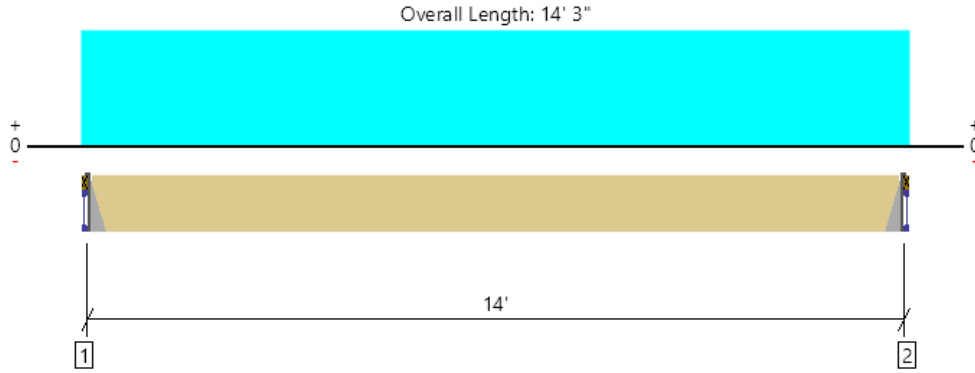
Overall Length: 14' 3"

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)	485 @ 1 1/2"	911 (1.50")	Passed (53%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	420 @ 1' 3/4"	1688	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1699 @ 7' 1 1/2"	2577	Passed (66%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.199 @ 7' 1 1/2"	0.350	Passed (L/843)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.259 @ 7' 1 1/2"	0.700	Passed (L/649)	--	1.0 D + 1.0 L (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	Floor Live	Factored	
1 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	114	380	494	See note ¹
2 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	114	380	494	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)	6' 6" o/c	
Bottom Edge (Lu)	14' 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

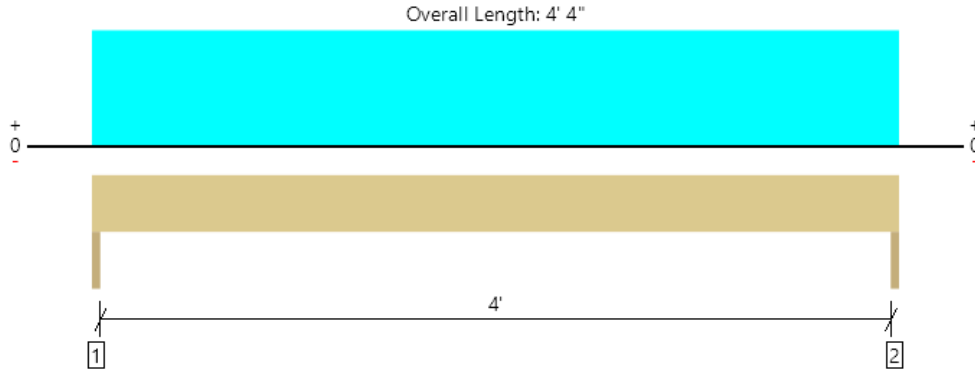- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 14' 3"	16"	12.0	40.0	Floor

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File Name: 23127 Hong and Kao Residence - Main House
Page 52 / 70

Main Floor, J3 - Floor Joist, 17'-0"
1 piece(s) 2 x 12 DF No.2 @ 16" OC

Overall Length: 16' 9"

16' 6"

| 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)	572 @ 1 1/2"	1406 (1.50")	Passed (41%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	507 @ 1' 3/4"	2025	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2360 @ 8' 4 1/2"	2729	Passed (86%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.312 @ 8' 4 1/2"	0.412	Passed (L/634)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.406 @ 8' 4 1/2"	0.825	Passed (L/488)	--	1.0 D + 1.0 L (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	Floor Live	Factored	
1 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	134	447	581	See note ¹
2 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	134	447	581	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)	4' 9" o/c	
Bottom Edge (Lu)	16' 6" 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top 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.

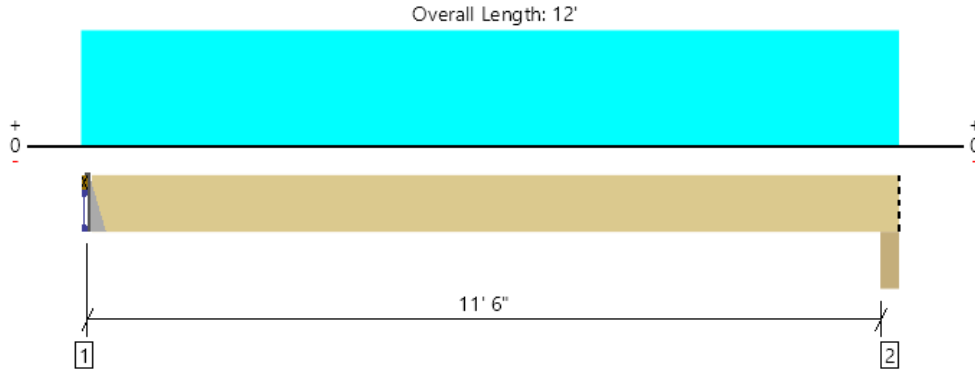| Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 16' 9"	16"	12.0	40.0	Floor

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File Name: 23127 Hong and Kao Residence - Main House

Main Floor, J4 - Floor Joist, 18'-0"
1 piece(s) 2 x 12 DF No.2 @ 12" OC

Overall Length: 18' 3"

18'

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)	468 @ 1 1/2"	1406 (1.50")	Passed (33%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	419 @ 1' 3/4"	2025	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2106 @ 9' 1 1/2"	2729	Passed (77%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.332 @ 9' 1 1/2"	0.450	Passed (L/651)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.431 @ 9' 1 1/2"	0.900	Passed (L/501)	--	1.0 D + 1.0 L (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	Floor Live	Factored	
1 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	110	365	475	See note ¹
2 - Hanger on Single 2X HF plate	1.50"	Hanger¹	1.50"	110	365	475	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)	6' o/c	
Bottom Edge (Lu)	18' 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top 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 Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 18' 3"	12"	12.0	40.0	Floor

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Main Floor, J5 - Entry Floor Joist, 12'-0"
1 piece(s) 2 x 8 DF No.1 @ 16" OC
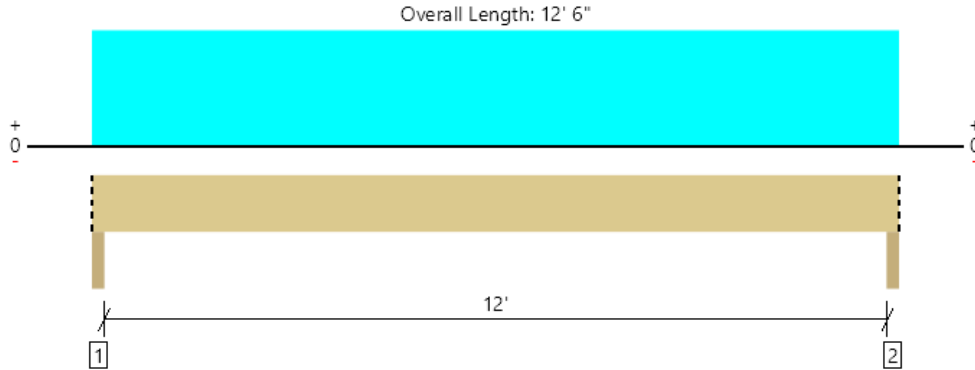
Overall Length: 12' 6"

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)	433 @ 2"	1823 (3.00")	Passed (24%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	374 @ 10 1/4"	1305	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1283 @ 6' 3"	1511	Passed (85%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.325 @ 6' 3"	0.406	Passed (L/450)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.422 @ 6' 3"	0.608	Passed (L/346)	--	1.0 D + 1.0 L (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/360) 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	Floor Live	Factored	
1 - Beam - HF	3.00"	3.00"	1.50"	100	333	433	Blocking
2 - Beam - HF	3.00"	3.00"	1.50"	100	333	433	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)	6' 9" o/c	
Bottom Edge (Lu)	12' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 12' 6"	16"	12.0	40.0	Floor

| ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

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Main Floor, B1 - Garage Floor Beam, 9'-0"
1 piece(s) 4 x 12 DF No.2
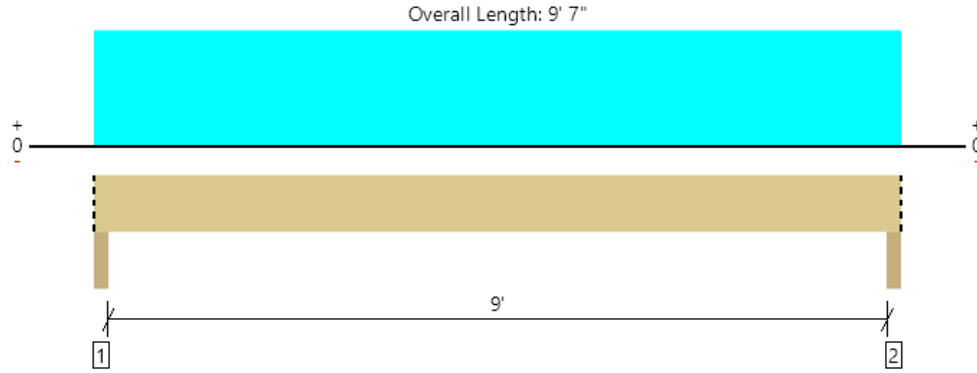
Overall Length: 9' 7"

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)	2348 @ 2"	7656 (3.50")	Passed (31%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1746 @ 1' 2 3/4"	4725	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5240 @ 4' 9 1/2"	6091	Passed (86%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.059 @ 4' 9 1/2"	0.308	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.121 @ 4' 9 1/2"	0.463	Passed (L/914)	--	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/360) and TL (L/240).
- 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	Floor Live	Factored	
1 - Column - HF	3.50"	3.50"	1.50"	1198	1150	2348	Blocking
2 - Column - HF	3.50"	3.50"	1.50"	1198	1150	2348	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)	9' 7" o/c	
Bottom Edge (Lu)	9' 7" 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 9' 7"	N/A	10.0	--	
1 - Uniform (PSF)	0 to 9' 7" (Top)	6'	40.0	40.0	Floor w/ Topping

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

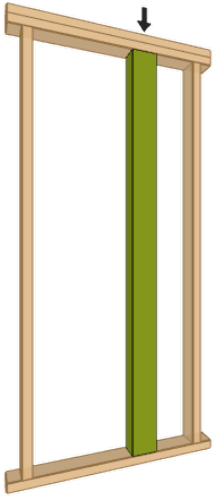| ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	

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Main Floor, B2 - Office Flush Beam, Grid A
1 piece(s) 5 1/8" x 15" 24F-V4 DF Glulam
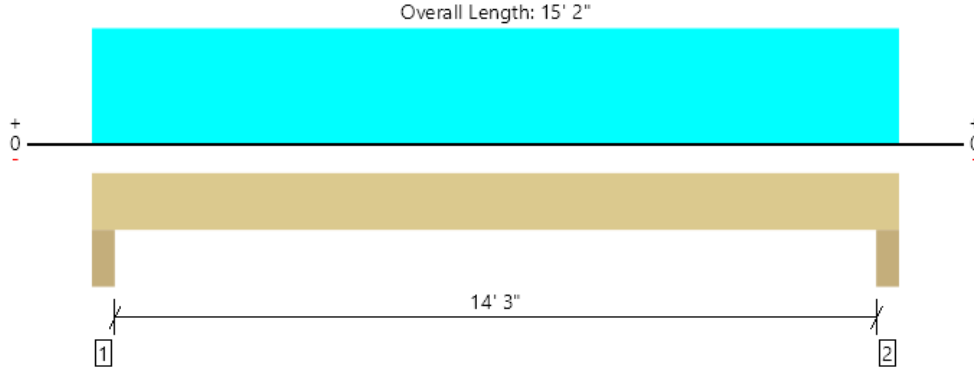
Overall Length: 15' 2"

14' 3"

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)	8646 @ 4"	18322 (5.50")	Passed (47%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	6185 @ 1' 8 1/2"	13581	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	27666 @ 7' 7"	38438	Passed (72%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.141 @ 7' 7"	0.363	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.437 @ 7' 7"	0.725	Passed (L/398)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Flush 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 factor of 1.00 that was calculated using length L = 14' 6".
- 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	Floor Live	Snow	Factored	
1 - Column - HF	5.50"	5.50"	2.60"	5860	2123	1593	8646	None
2 - Column - HF	5.50"	5.50"	2.60"	5860	2123	1593	8646	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	15' 2" o/c	
Bottom Edge (Lu)	15' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 15' 2"	N/A	18.7	--	--	
1 - Uniform (PSF)	0 to 15' 2" (Front)	7'	12.0	40.0	-	Floor
2 - Uniform (PSF)	0 to 15' 2" (Top)	7'	20.0	-	30.0	Roof
3 - Uniform (PLF)	0 to 15' 2" (Top)	N/A	530.0	-	-	Wall w/ veneer

ForteWEB Software Operator	Job Notes
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Main Floor, B3 - Bedroom 2 Window Header, Grid 1
1 piece(s) 3 1/8" x 10 1/2" 24F-V4 DF Glulam
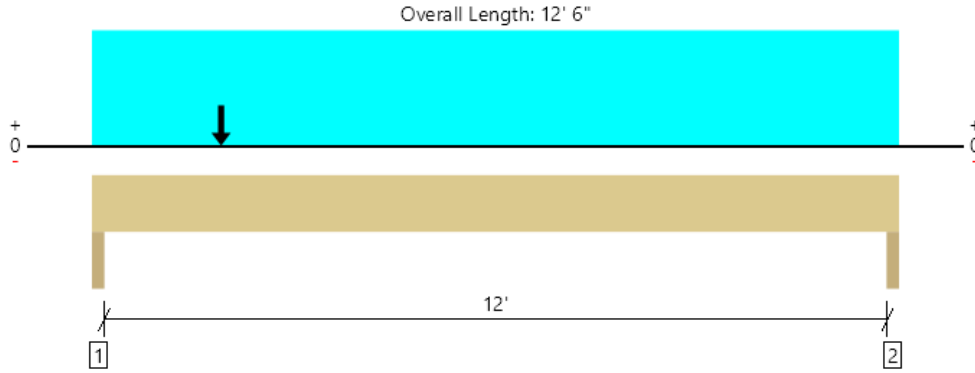
Overall Length: 12' 6"

12'

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)	4349 @ 1 1/2"	6094 (3.00")	Passed (71%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4205 @ 1' 1 1/2"	5797	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	7899 @ 2'	11484	Passed (69%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.170 @ 5' 4 3/4"	0.306	Passed (L/866)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.350 @ 5' 8 1/2"	0.613	Passed (L/420)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush 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 factor of 1.00 that was calculated using length L = 12' 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	Floor Live	Factored	
1 - Trimmer - HF	3.00"	3.00"	2.14"	1757	2592	4349	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	973	468	1441	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 6" o/c	
Bottom Edge (Lu)	12' 6" 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 12' 6"	N/A	8.0	--	
1 - Uniform (PLF)	0 to 12' 6" (Top)	N/A	120.0	-	Glazing
2 - Point (lb)	2' (Front)	N/A	1130	3060	Deck Beam

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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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Main Floor, B4 - Kitchen Flush Beam, Grid 1
2 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL
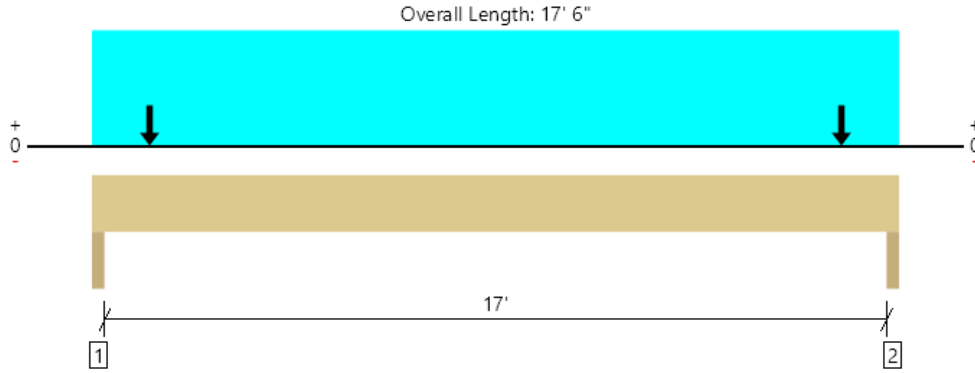
Overall Length: 17' 6"

17'

| 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)	4335 @ 1 1/2"	7613 (3.00")	Passed (57%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4203 @ 1' 2 1/4"	7481	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	7927 @ 8' 9"	16137	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.221 @ 8' 9"	0.431	Passed (L/936)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.581 @ 8' 9"	0.863	Passed (L/356)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush 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 - Column - HF	3.00"	3.00"	1.71"	1875	2460	4335	None
2 - Column - HF	3.00"	3.00"	1.71"	1875	2460	4335	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 6" o/c	
Bottom Edge (Lu)	17' 6" 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 17' 6"	N/A	11.5	--	
1 - Uniform (PLF)	0 to 17' 6" (Top)	N/A	100.0	-	Glazing
2 - Point (lb)	1' 3" (Top)	N/A	900	2460	Post Above
3 - Point (lb)	16' 3" (Top)	N/A	900	2460	Post Above

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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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File Name: 23127 Hong and Kao Residence - Main House
Page 59 / 70

Main Floor, B5 - Deck Flush Beam
3 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL
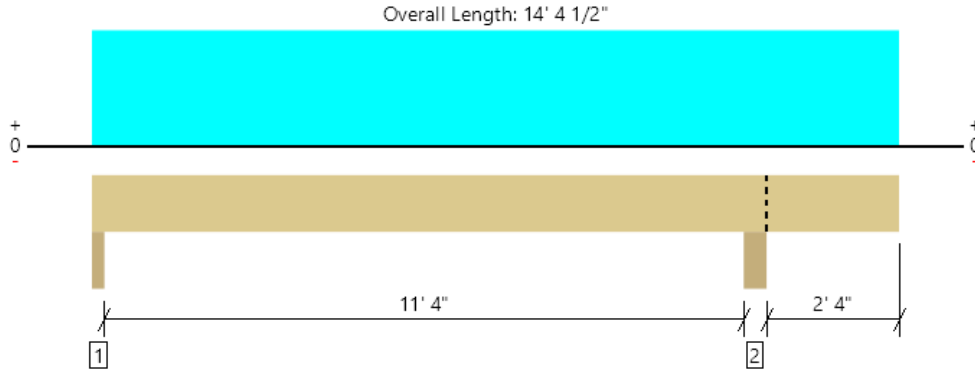
Overall Length: 14' 4 1/2"

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)	6380 @ 1 1/2"	11419 (3.00")	Passed (56%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	5371 @ 10' 7 3/4"	11222	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	18001 @ 5' 10 11/16"	24206	Passed (74%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.289 @ 5' 11 5/8"	0.292	Passed (L/486)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.389 @ 5' 11 5/16"	0.584	Passed (L/360)	--	1.0 D + 1.0 L (Alt Spans)

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/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 - Column - HF	3.00"	3.00"	1.68"	1725	4656/-219	6380	None
2 - Column - HF	5.50"	5.50"	2.47"	2634	6776	9410	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)	14' o/c	
Bottom Edge (Lu)	14' 5" 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 14' 4 1/2"	N/A	17.2	--	
1 - Uniform (PSF)	0 to 14' 4 1/2" (Top)	13'	22.0	60.0	Deck

ForteWEB Software Operator	Job Notes
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Main Floor, B6 - Deck Flush Beam
3 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL
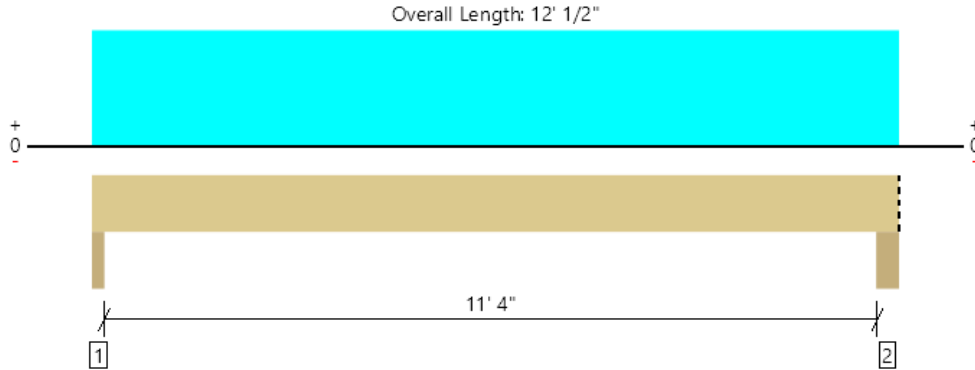
Overall Length: 12' 1/2"

11' 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)	4468 @ 1 1/2"	11419 (3.00")	Passed (39%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3572 @ 1' 2 1/4"	11222	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	12666 @ 5' 11"	24206	Passed (52%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.193 @ 5' 11"	0.290	Passed (L/719)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.270 @ 5' 11"	0.579	Passed (L/514)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush 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 - Column - HF	3.00"	3.00"	1.50"	1273	3195	4468	None
2 - Column - HF	5.50"	5.50"	1.50"	1318	3308	4626	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)	12' 1" o/c	
Bottom Edge (Lu)	12' 1" 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 12' 1/2"	N/A	17.2	--	
1 - Uniform (PSF)	0 to 12' 1/2" (Top)	9'	22.0	60.0	Deck

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Page 61 / 70

Main Floor, B8 - Family Room Flush Beam, Grid C
1 piece(s) 5 1/8" x 15" 24F-V4 DF Glulam
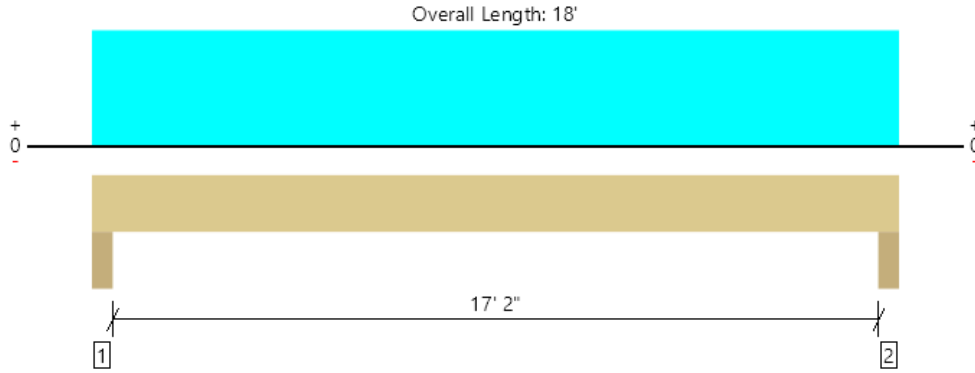
Overall Length: 18'

17' 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)	7422 @ 3 1/2"	16656 (5.00")	Passed (45%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	6048 @ 1' 8"	13581	Passed (45%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	31270 @ 9'	38299	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.495 @ 9'	0.581	Passed (L/422)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.658 @ 9'	0.871	Passed (L/318)	--	1.0 D + 1.0 L (All Spans)

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 17' 5".
- 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	Floor Live	Factored	
1 - Column - HF	5.00"	5.00"	2.23"	1842	5580	7422	None
2 - Column - HF	5.00"	5.00"	2.23"	1842	5580	7422	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	18' o/c	
Bottom Edge (Lu)	18' 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'	N/A	18.7	--	
1 - Uniform (PSF)	0 to 18' (Top)	15' 6"	12.0	40.0	Floor

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File Name: 23127 Hong and Kao Residence - Main House
Page 62 / 70

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Main Floor, P1 - Garage Header Post
1 piece(s) 6 x 6 DF No.1

Post Height: 8'

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	17	50	Passed (35%)	--	--
Compression (lbs)	12264	24796	Passed (49%)	1.00	1.0 D + 1.0 L
Base Bearing (lbs)	12461	898425	Passed (1%)	--	1.0 D + 0.75 L + 0.75 S
Bending/Compression	N/A	1	Passed (N/A)	--	N/A

- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.

Supports	Type	Material
Base	Plate	Steel

Max Unbraced Length	Comments
Full Member Length	No bracing assumed.

Member Type : Free Standing Post
Building Code : IBC 2018
Design Methodology : ASD

Drawing is Conceptual

Vertical Loads	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Point (lb)	3870	2262	885	Linked from: B1 - Existing Garage Header, 9'-6", Support 1
2 - Point (lb)	3870	2262	885	Linked from: B1 - Existing Garage Header, 9'-6", Support 1

ForteWEB Software Operator	Job Notes		
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Page 63 / 70

Main Floor, P2 - Garage Wall Post
1 piece(s) 6 x 6 DF No.1
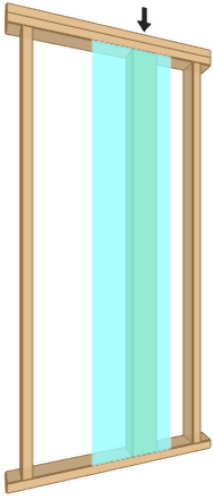
Wall Height: 8'   Member Height: 7' 7 1/2"   Tributary Width: 1'

Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	17	50	Passed (33%)	--	--
Compression (lbs)	18167	28163	Passed (65%)	1.15	1.0 D + 0.75 L + 0.75 S
Plate Bearing (lbs)	18167	18906	Passed (96%)	--	1.0 D + 0.75 L + 0.75 S
Lateral Reaction (lbs)	41	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	36	5485	Passed (1%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	79 @ mid-span	4437	Passed (2%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.05 @ mid-span	0.76	Passed (L/1925)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S
Bending/Compression	0.85	1	Passed (85%)	1.15	1.0 D + 0.75 L + 0.75 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.
- This product has a square cross section. The analysis engine has checked both edge and plank orientations to allow for either installation.

Supports	Type	Material
Top	Dbl 2X	Douglas Fir-Larch
Base	2X	Douglas Fir-Larch

Max Unbraced Length	Comments
1'	

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Lateral Connections				
Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Point (lb)	N/A	8144	7832	5532	Steel Beam

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	18.1	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (B), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (97), Risk Category(II), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.
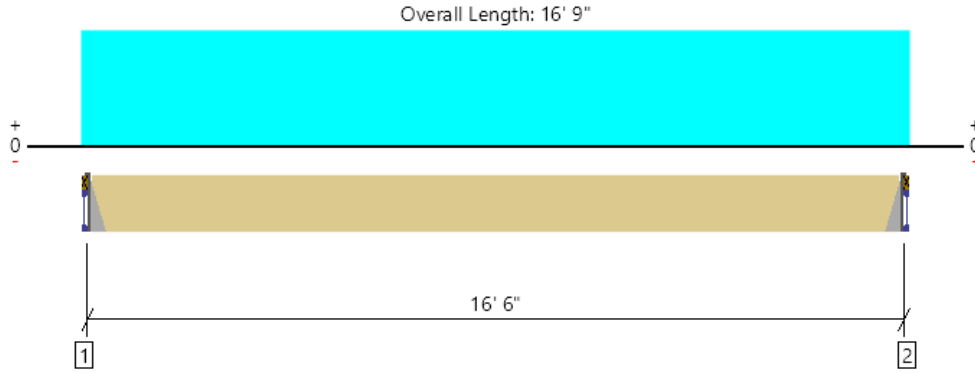
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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Main Floor, P3 - Living Room Wall Post, Grid 1
1 piece(s) 6 x 6 DF No.1
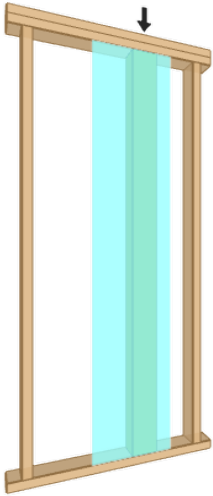
Wall Height: 8' Member Height: 7' 7 1/2" Tributary Width: 1'

Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	17	50	Passed (33%)	--	--
Compression (lbs)	11240	28163	Passed (40%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	11240	12251	Passed (92%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	41	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	36	5485	Passed (1%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	79 @ mid-span	4437	Passed (2%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.03 @ mid-span	0.76	Passed (L/3261)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S
Bending/Compression	0.38	1	Passed (38%)	1.15	1.0 D + 1.0 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.
- This product has a square cross section. The analysis engine has checked both edge and plank orientations to allow for either installation.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
7' 7 1/2"	

Lateral Connections				
Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Loads	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	1100	1200	Deck Roof Beam
2 - Point (lb)	N/A	5659	3281	Linked from: RB - Living Room Roof Beam, Grid B, Support 1

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	18.1	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (B), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (97), Risk Category(II), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

Weyerhaeuser Notes

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Weyerhaeuser

Main Floor, P4 - Living Room Wall Post, Grid 3
1 piece(s) 4 x 6 HF No.2

Wall Height: 15'	Member Height: 14' 7 1/2"	Tributary Width: 1'
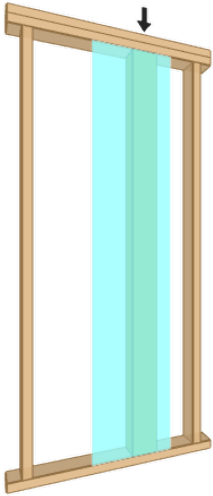
Design Results

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	32	50	Passed (64%)	--	--
Compression (lbs)	2457	6917	Passed (36%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	2457	7796	Passed (32%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	73	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	68	3080	Passed (2%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	267 @ mid-span	2558	Passed (10%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.14 @ mid-span	1.46	Passed (L/1225)	--	1.0 D + 0.6 W
Bending/Compression	0.28	1	Passed (28%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
8'	

Drawing is Conceptual

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	1692	765	Linked from: RB - Living Room Flush Beam, Grid 3, Support 1

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	16.6	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (B), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (97), Risk Category(II), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.
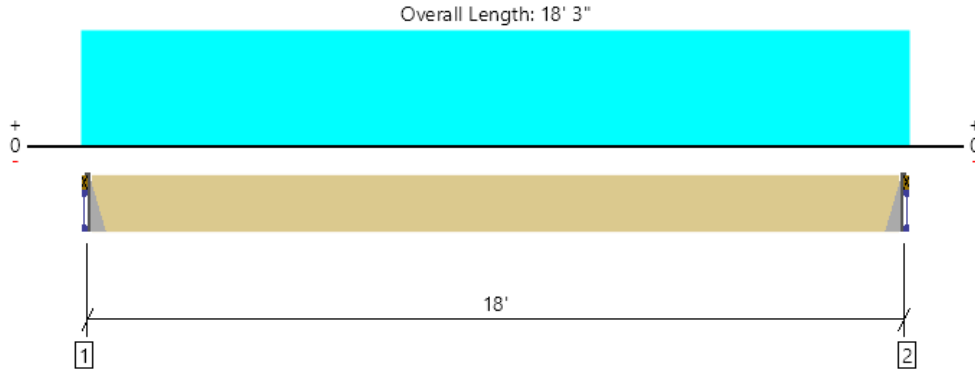
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File Name: 23127 Hong and Kao Residence - Main House
Page 66 / 70

Main Floor, P5 - Kitchen Wall Post, Grid D
1 piece(s) 6 x 8 DF No.1

Wall Height: 9' 6"   Member Height: 9' 1 1/2"   Tributary Width: 1'
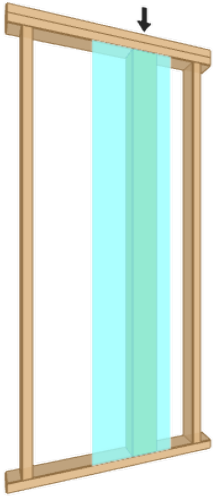
Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	17	50	Passed (35%)	--	--
Compression (lbs)	13834	37262	Passed (37%)	1.15	1.0 D + 0.75 L + 0.75 S
Plate Bearing (lbs)	13834	16706	Passed (83%)	--	1.0 D + 0.75 L + 0.75 S
Lateral Reaction (lbs)	48	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	42	7480	Passed (1%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	111 @ mid-span	8193	Passed (1%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.03 @ mid-span	0.91	Passed (L/3828)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S
Bending/Compression	0.32	1	Passed (32%)	1.15	1.0 D + 0.75 L + 0.75 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

Max Unbraced Length	Comments
8'	

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Point (lb)	N/A	7107	2297	6672	Linked from: B12 - Deck Edge Beam, Grid D, Support 2

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	17.7	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (B), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (97), Risk Category(II), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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Page 67 / 70

Basement, BP1 - Basement Wall Post
1 piece(s) 6 x 8 DF No.1
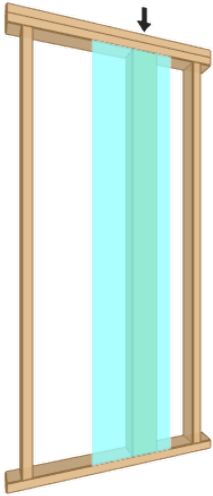
Wall Height: 10'	Member Height: 9' 7 1/2"	Tributary Width: 1'

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	17	50	Passed (35%)	--	--
Compression (lbs)	16520	37262	Passed (44%)	1.15	1.0 D + 0.75 L + 0.75 S
Plate Bearing (lbs)	16520	16706	Passed (99%)	--	1.0 D + 0.75 L + 0.75 S
Lateral Reaction (lbs)	51	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	44	7480	Passed (1%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	122 @ mid-span	8193	Passed (1%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.04 @ mid-span	0.96	Passed (L/3061)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S
Bending/Compression	0.43	1	Passed (43%)	1.15	1.0 D + 0.75 L + 0.75 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
8'	

Drawing is Conceptual

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Point (lb)	N/A	8000	4360	7000	Post Above

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	17.6	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (B), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (97), Risk Category(II), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

Weyerhaeuser Notes

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Basement, BP2 - Basement Corner Wall Post
1 piece(s) 6 x 6 DF No.1
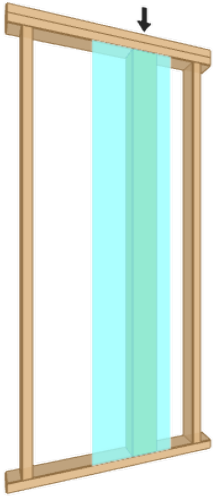
Wall Height: 10'   Member Height: 9' 7 1/2"   Tributary Width: 1'

Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	21	50	Passed (42%)	--	--
Compression (lbs)	6400	21697	Passed (29%)	1.00	1.0 D + 1.0 L
Plate Bearing (lbs)	6400	12251	Passed (52%)	--	1.0 D + 1.0 L
Lateral Reaction (lbs)	51	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	46	5485	Passed (1%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	122 @ mid-span	4437	Passed (3%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.03 @ mid-span	0.96	Passed (L/3990)	--	1.0 D + 0.45 W + 0.75 L + 0.75 Lr
Bending/Compression	0.22	1	Passed (22%)	1.00	1.0 D + 1.0 L

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for this design is 10% of applicable member side dimension.
- Applicable calculations are based on NDS.
- This product has a square cross section. The analysis engine has checked both edge and plank orientations to allow for either installation.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
8'	

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
1 - Point (lb)	N/A	1720	4680	Deck Beam

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	17.6	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (B), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (97), Risk Category(II), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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Page 69 / 70

Basement, BP3 - Deck Post
1 piece(s) 6 x 6 DF No.1

Post Height: 10' 6"

Design Results

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	23	50	Passed (46%)	--	--
Compression (lbs)	9410	19871	Passed (47%)	1.00	1.0 D + 1.0 L
Base Bearing (lbs)	9410	898425	Passed (1%)	--	1.0 D + 1.0 L
Bending/Compression	N/A	1	Passed (N/A)	--	N/A

- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.

Supports	Type	Material
Base	Plate	Steel

Max Unbraced Length	Comments
Full Member Length	No bracing assumed.

Member Type : Free Standing Post
Building Code : IBC 2018
Design Methodology : ASD

Drawing is Conceptual

| Vertical Load	Dead (0.90)	Floor Live (1.00)	Comments
1 - Point (lb)	2634	6776	Linked from: B5 - Deck Flush Beam, Support 2

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Page 70 / 70

Weyerhaeuser

Steel Beam

DESCRIPTION: Roof RB6 - Steel Beam over Master Bedroom, 31ft

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	Fy : Steel Yield : 50.0 ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	E: Modulus : 29,000.0 ksi
Bending Axis : Major Axis Bending	

D(0.250) S(0.3750)

W10x68

Span = 31.0 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, S = 0.030 ksf, Tributary Width = 12.50 ft, (Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.391** : 1	Maximum Shear Stress Ratio =		**0.110** : 1
Section used for this span	**W10x68**	Section used for this span		**W10x68**
Ma : Applied	83.256 k-ft	Va : Applied		10.743 k
Mn / Omega : Allowable	212.824 k-ft	Vn/Omega : Allowable		97.760 k
Load Combination	+D+S	Load Combination		+D+S
		Location of maximum on span		0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs		Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.685	in Ratio =	542	>=360.	Span: 1 : S Only	
Max Upward Transient Deflection	0	in Ratio =	0	<360.0	n/a	
Max Downward Total Deflection	1.266	in Ratio =	294	>=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		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb Rm	Va Max	Vnx	Vnx/Omega
D Only												
Dsgn. L = 30.91 ft	1	0.180	0.050	38.21		38.21	355.42	212.82	1.00 1.00	4.93	146.64	97.76
Dsgn. L = 0.09 ft	1	0.002	0.050	0.44		0.44	355.42	212.82	1.00 1.00	4.93	146.64	97.76
+D+S												
Dsgn. L = 30.91 ft	1	0.391	0.110	83.26		83.26	355.42	212.82	1.00 1.00	10.74	146.64	97.76
Dsgn. L = 0.09 ft	1	0.004	0.110	0.95		0.95	355.42	212.82	1.00 1.00	10.74	146.64	97.76
+D+0.750S												
Dsgn. L = 30.91 ft	1	0.338	0.095	71.99		71.99	355.42	212.82	1.00 1.00	9.29	146.64	97.76
Dsgn. L = 0.09 ft	1	0.004	0.095	0.82		0.82	355.42	212.82	1.00 1.00	9.29	146.64	97.76
+0.60D												
Dsgn. L = 30.91 ft	1	0.108	0.030	22.93		22.93	355.42	212.82	1.00 1.00	2.96	146.64	97.76
Dsgn. L = 0.09 ft	1	0.001	0.030	0.26		0.26	355.42	212.82	1.00 1.00	2.96	146.64	97.76

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	1.2662	15.589		0.0000	0.000

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	10.743	10.743
Max Upward from Load Combinations	10.743	10.743
Max Upward from Load Cases	5.813	5.813

Steel Beam

DESCRIPTION: Roof RB6 - Steel Beam over Master Bedroom, 31ft

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2
D Only	4.930	4.930
+D+S	10.743	10.743
+D+0.750S	9.290	9.290
+0.60D	2.958	2.958
S Only	5.813	5.813

Steel Beam

Project File: Hong Kao.ec6

DESCRIPTION: Roof RB7 - Steel Beam over Deck, 31ft

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

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

D(0.0750) S(0.1125)

W10x33

Span = 31.0 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, S = 0.030 ksf, Tributary Width = 3.750 ft, (Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.274** : 1	Maximum Shear Stress Ratio =	**0.061** : 1
Section used for this span	**W10x33**	Section used for this span	**W10x33**
Ma : Applied	26.494 k-ft	Va : Applied	3.419 k
Mn / Omega : Allowable	96.806 k-ft	Vn/Omega : Allowable	56.434 k
Load Combination	+D+S	Load Combination	+D+S
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.473 in	Ratio =	785	>=240.	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<240.0	n/a
Max Downward Total Deflection	0.928 in	Ratio =	401	>=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb Rm	Va Max	Vnx	Vnx/Omega
D Only												
Dsgn. L = 30.91 ft	1	0.134	0.030	12.98		12.98	161.67	96.81	1.00 1.00	1.67	84.65	56.43
Dsgn. L = 0.09 ft	1	0.002	0.030	0.15		0.15	161.67	96.81	1.00 1.00	1.67	84.65	56.43
+D+S												
Dsgn. L = 30.91 ft	1	0.274	0.061	26.49		26.49	161.67	96.81	1.00 1.00	3.42	84.65	56.43
Dsgn. L = 0.09 ft	1	0.003	0.061	0.30		0.30	161.67	96.81	1.00 1.00	3.42	84.65	56.43
+D+0.750S												
Dsgn. L = 30.91 ft	1	0.239	0.053	23.12		23.12	161.67	96.81	1.00 1.00	2.98	84.65	56.43
Dsgn. L = 0.09 ft	1	0.003	0.053	0.26		0.26	161.67	96.81	1.00 1.00	2.98	84.65	56.43
+0.60D												
Dsgn. L = 30.91 ft	1	0.080	0.018	7.79		7.79	161.67	96.81	1.00 1.00	1.00	84.65	56.43
Dsgn. L = 0.09 ft	1	0.001	0.018	0.09		0.09	161.67	96.81	1.00 1.00	1.00	84.65	56.43

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.9284	15.589		0.0000	0.000

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.419	3.419
Max Upward from Load Combinations	3.419	3.419
Max Upward from Load Cases	1.744	1.744

Steel Beam

Project File: Hong Kao.ec6

DESCRIPTION: Roof RB7 - Steel Beam over Deck, 31ft

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2
D Only	1.675	1.675
+D+S	3.419	3.419
+D+0.750S	2.983	2.983
+0.60D	1.005	1.005
S Only	1.744	1.744

Steel Beam

Steel Beam	Project File: Hong Kao.ec6
LIC# : KW-06016450, Build:20.23.05.25 QUANTUM CONSULTING ENGINEERS	(c) ENERCALC INC 1983-2023

DESCRIPTION: Upper Floor UB2a - Floor Steel Beam over Garage, 32'-0"

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	Fy : Steel Yield : 50.0 ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	E: Modulus : 29,000.0 ksi
Bending Axis : Major Axis Bending	

```
        D(0.120) S(0.180)
                                                D(0.240) S(0.360)
     D(0.1320) L(0.360)
     D(0.0720) L(0.240)
       D(0.5280)
                                                D(0.1440) L(0.480)

                                    W10x88
                              Span = 32.0 ft
```

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Load for Span Number 1

Uniform Load : D = 0.0120, L = 0.040 ksf, Extent = 9.0 -->> 32.0 ft, Tributary Width = 12.0 ft, (Floor)

Uniform Load : D = 0.0480 ksf, Extent = 0.0 -->> 9.0 ft, Tributary Width = 11.0 ft, (Wall w/ veneer)

Uniform Load : D = 0.0120, L = 0.040 ksf, Extent = 0.0 -->> 9.0 ft, Tributary Width = 6.0 ft, (Floor)

Uniform Load : D = 0.0220, L = 0.060 ksf, Extent = 0.0 -->> 9.0 ft, Tributary Width = 6.0 ft, (Roof Deck)

Uniform Load : D = 0.020, S = 0.030 ksf, Extent = 9.0 -->> 32.0 ft, Tributary Width = 12.0 ft, (Roof)

Uniform Load : D = 0.020, S = 0.030 ksf, Extent = 0.0 -->> 9.0 ft, Tributary Width = 6.0 ft, (Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.531** : 1	Maximum Shear Stress Ratio =	**0.160** : 1
Section used for this span	**W10x88**	Section used for this span	**W10x88**
Ma : Applied	149.751 k-ft	Va : Applied	20.904 k
Mn / Omega : Allowable	281.936 k-ft	Vn/Omega : Allowable	130.680 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.767 in	Ratio =	500 >=240.	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <240.0	n/a
Max Downward Total Deflection	1.803 in	Ratio =	213 >=180	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only												
Dsgn. L = 32.00 ft	1	0.249	0.085	70.26		70.26	470.83	281.94 1.00	1.00	11.17	196.02	130.68
+D+L												
Dsgn. L = 32.00 ft	1	0.475	0.151	134.05		134.05	470.83	281.94 1.00	1.00	19.78	196.02	130.68
+D+S												
Dsgn. L = 32.00 ft	1	0.399	0.119	112.41		112.41	470.83	281.94 1.00	1.00	15.54	196.02	130.68
+D+0.750L												
Dsgn. L = 32.00 ft	1	0.419	0.135	118.09		118.09	470.83	281.94 1.00	1.00	17.63	196.02	130.68

Steel Beam

Project File: Hong Kao.ec6

DESCRIPTION: Upper Floor UB2a - Floor Steel Beam over Garage, 32'-0"

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+0.750L+0.750S													
Dsgn. L = 32.00 ft	1	0.531	0.160	149.75		149.75	470.83	281.94	1.00	1.00	20.90	196.02	130.68
+0.60D													
Dsgn. L = 32.00 ft	1	0.150	0.051	42.16		42.16	470.83	281.94	1.00	1.00	6.70	196.02	130.68

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	1.8033	15.909		0.0000	0.000

Vertical Reactions

Support notation : Far left is # Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	20.904	18.167
Max Upward from Load Combinations	20.904	18.167
Max Upward from Load Cases	11.172	8.144
D Only	11.172	8.144
+D+L	19.780	15.976
+D+S	15.540	13.677
+D+0.750L	17.628	14.018
+D+0.750L+0.750S	20.904	18.167
+0.60D	6.703	4.887
L Only	8.608	7.832
S Only	4.368	5.532

Wood Beam

Project File: Hong Kao.ec6

DESCRIPTION: Upper Floor UB2b - Floor Beam over Utility, 9'-4"

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2600 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	2600 psi	Ebend- xx	1900 ksi
		Fc - Prll	2510 psi	Eminbend - xx	965.71 ksi
Wood Species	: iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade	: MicroLam LVL 1.9 E	Fv	285 psi		
		Ft	1555 psi	Density	42.01 pcf
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling				
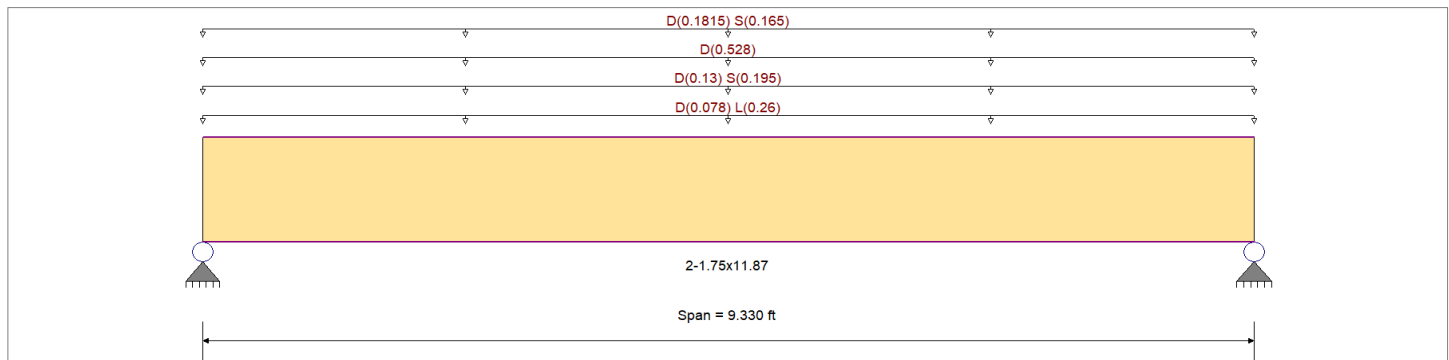
D(0.1815) S(0.165)
D(0.528)
D(0.13) S(0.195)
D(0.078) L(0.26)

2-1.75x11.87

Span = 9.330 ft

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 = 6.50 ft, (Floor)
   Uniform Load : D = 0.020, S = 0.030 ksf, Tributary Width = 6.50 ft, (Roof)
   Uniform Load : D = 0.0480 ksf, Tributary Width = 11.0 ft, (Wall w/ veneer)
   Uniform Load : D = 0.0330, S = 0.030 ksf, Tributary Width = 5.50 ft, (Roof Deck)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.739 : 1	Maximum Shear Stress Ratio	=	0.565 : 1
Section used for this span		2-1.75x11.87	Section used for this span		2-1.75x11.87
fb: Actual	=	2,213.75 psi	fv: Actual	=	185.10 psi
F'b	=	2,994.26 psi	F'v	=	327.75 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	4.665 ft	Location of maximum on span	=	8.343 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection
Max Downward Transient Deflection	0.067 in	Ratio =	1682 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.258 in	Ratio =	434 >=180	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 9.330 ft	1	0.630	0.481	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	10.12	1,475.6	2,343.3	3.42	123.4	256.5
+D+L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.330 ft	1	0.725	0.554	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	12.94	1,888.3	2,603.7	4.37	157.9	285.0
+D+S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.330 ft	1	0.684	0.522	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	14.03	2,047.1	2,994.3	4.74	171.2	327.8
+D+0.750L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.330 ft	1	0.548	0.419	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	12.24	1,785.2	3,254.6	4.14	149.3	356.3

Wood Beam

Project File: Hong Kao.ec6

LIC# : KW-06016450, Build:20.23.05.25   QUANTUM CONSULTING ENGINEERS   (c) ENERCALC INC 1983-2023

DESCRIPTION: Upper Floor UB2b - Floor Beam over Utility, 9'-4"

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+D+0.750L+0.750S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.330 ft	1	0.739	0.565	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	15.18	2,213.7	2,994.3	5.13	185.1	327.8
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.330 ft	1	0.213	0.162	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	6.07	885.4	4,165.9	2.05	74.0	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.2577	4.699		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1   Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	6.506	6.506
Max Upward from Load Combinations	6.506	6.506
Max Upward from Load Cases	4.337	4.337
D Only	4.337	4.337
+D+L	5.550	5.550
+D+S	6.016	6.016
+D+0.750L	5.246	5.246
+D+0.750L+0.750S	6.506	6.506
+0.60D	2.602	2.602
L Only	1.213	1.213
S Only	1.679	1.679

Steel Beam

Steel Beam		Project File: Hong Kao.ec6
LIC# : KW-06016450, Build:20.23.05.25	QUANTUM CONSULTING ENGINEERS	(c) ENERCALC INC 1983-2023

DESCRIPTION: Upper Floor UB6 - Floor Steel Beam, 30'-9"

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	F_y : Steel Yield :	50.0 ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		

D(1.320) L(2.0)   D(1.320)(2.0) L(0.410)

W10x68

Span = 30.750 ft

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 = 10.250 ft, (Floor)

Point Load : D = 1.320, L = 2.0 k @ 0.750 ft, (Deck Beam)

Point Load : D = 1.320, L = 2.0 k @ 13.250 ft, (Deck Beam)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.452** : 1	Maximum Shear Stress Ratio =	**0.147** : 1
Section used for this span	**W10x68**	Section used for this span	**W10x68**
Ma : Applied	96.127 k-ft	Va : Applied	14.369 k
Mn / Omega : Allowable	212.824 k-ft	Vn/Omega : Allowable	97.760 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.916 in	Ratio =	402	>=360.	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360.0	n/a
Max Downward Total Deflection	1.383 in	Ratio =	267	>=240.	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
D Only												
Dsgn. L = 30.75 ft	1	0.153	0.051	32.66		32.66	355.42	212.82	1.00	1.00	4.98	146.64 97.76
+D+L												
Dsgn. L = 30.75 ft	1	0.452	0.147	96.13		96.13	355.42	212.82	1.00	1.00	14.37	146.64 97.76
+D+0.750L												
Dsgn. L = 30.75 ft	1	0.377	0.123	80.26		80.26	355.42	212.82	1.00	1.00	12.02	146.64 97.76
+0.60D												
Dsgn. L = 30.75 ft	1	0.092	0.031	19.59		19.59	355.42	212.82	1.00	1.00	2.99	146.64 97.76

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	1.3828	15.199		0.0000	0.000

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	14.369	10.752
Max Upward from Load Combinations	14.369	10.752

Steel Beam

Project File: Hong Kao.ec6

DESCRIPTION: Upper Floor UB6 - Floor Steel Beam, 30'-9"

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from Load Cases	9.393	7.214
D Only	4.976	3.538
+D+L	14.369	10.752
+D+0.750L	12.021	8.948
+0.60D	2.985	2.123
L Only	9.393	7.214

Steel Beam

DESCRIPTION: Upper Floor UB8 - Flush Header at Kitchen Window , 15'-4"

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	F_y : Steel Yield :	46.0 ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		

D(0.1074) L(0.2928)

HSS7x5x3/8

Span = 15.333 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Uniform Load : D = 0.0220, L = 0.060 ksf, Tributary Width = 4.880 ft, (Deck)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.313** : 1	Maximum Shear Stress Ratio =	**0.048** : 1
Section used for this span	**HSS7x5x3/8**	Section used for this span	**HSS7x5x3/8**
Ma : Applied	12.567 k-ft	Va : Applied	3.279 k
Mn / Omega : Allowable	40.170 k-ft	Vn/Omega : Allowable	68.673 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.255 in	Ratio =	722	>=360.	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360.0	n/a
Max Downward Total Deflection	0.372 in	Ratio =	494	>=240.	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only												
Dsgn. L = 15.33 ft	1	0.099	0.015	3.96		3.96	67.08	40.17 1.00	1.00	1.03	114.68	68.67
+D+L												
Dsgn. L = 15.33 ft	1	0.313	0.048	12.57		12.57	67.08	40.17 1.00	1.00	3.28	114.68	68.67
+D+0.750L												
Dsgn. L = 15.33 ft	1	0.259	0.040	10.42		10.42	67.08	40.17 1.00	1.00	2.72	114.68	68.67
+0.60D												
Dsgn. L = 15.33 ft	1	0.059	0.009	2.38		2.38	67.08	40.17 1.00	1.00	0.62	114.68	68.67

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3722	7.710		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1   Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.279	3.279
Max Upward from Load Combinations	3.279	3.279
Max Upward from Load Cases	2.245	2.245
D Only	1.034	1.034
+D+L	3.279	3.279
+D+0.750L	2.717	2.717
+0.60D	0.620	0.620

Steel Beam

Project File: Hong Kao.ec6

DESCRIPTION: Upper Floor UB8 - Flush Header at Kitchen Window , 15'-4"

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2
L Only	2.245	2.245

Steel Beam

	Project File: Hong Kao.ec6

DESCRIPTION: Upper Floor UB9 - Flush Header at Kitchen Window , 17'-0"

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	Fy : Steel Yield :	46.0 ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		

D(0.07150) L(0.1950)

D(0.03850) L(0.1050)

HSS7x3x3/8

Span = 17.50 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Load for Span Number 1

Uniform Load : D = 0.0220, L = 0.060 ksf, Extent = 2.0 -->> 17.50 ft, Tributary Width = 1.750 ft, (Deck)

Uniform Load : D = 0.0220, L = 0.060 ksf, Extent = 0.0 -->> 2.0 ft, Tributary Width = 3.250 ft, (Deck)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.220** : 1	Maximum Shear Stress Ratio =	**0.025** : 1
Section used for this span	**HSS7x3x3/8**	Section used for this span	**HSS7x3x3/8**
Ma : Applied	6.473 k-ft	Va : Applied	1.683 k
Mn / Omega : Allowable	29.381 k-ft	Vn/Omega : Allowable	68.673 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.231 in	Ratio =	908	>=360.	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360.0	n/a
Max Downward Total Deflection	0.364 in	Ratio =	577	>=240.	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length		M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 17.50 ft	1	0.080	0.009	2.36		2.36	49.07	29.38	1.00	1.00	0.59	114.68	68.67
+D+L													
Dsgn. L = 17.50 ft	1	0.220	0.025	6.47		6.47	49.07	29.38	1.00	1.00	1.68	114.68	68.67
+D+0.750L													
Dsgn. L = 17.50 ft	1	0.185	0.021	5.45		5.45	49.07	29.38	1.00	1.00	1.41	114.68	68.67
+0.60D													
Dsgn. L = 17.50 ft	1	0.048	0.005	1.42		1.42	49.07	29.38	1.00	1.00	0.36	114.68	68.67

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3638	8.750		0.0000	0.000

Vertical Reactions

Support notation : Far left is #'   Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.683	1.465
Max Upward from Load Combinations	1.683	1.465
Max Upward from Load Cases	1.088	0.929
D Only	0.595	0.536

Steel Beam

Project File: Hong Kao.ec6

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DESCRIPTION: Upper Floor UB9 - Flush Header at Kitchen Window , 17'-0"

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2
+D+L	1.683	1.465
+D+0.750L	1.411	1.233
+0.60D	0.357	0.322
L Only	1.088	0.929

Steel Beam

	Project File: Hong Kao.ec6
LIC# : KW-06016450, Build:20.23.05.25	QUANTUM CONSULTING ENGINEERS	(c) ENERCALC INC 1983-2023

DESCRIPTION: Upper Floor UB10 - Cantilever Deck Beam, 7'-0" Cant.

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	Fy : Steel Yield :	46.0 ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		
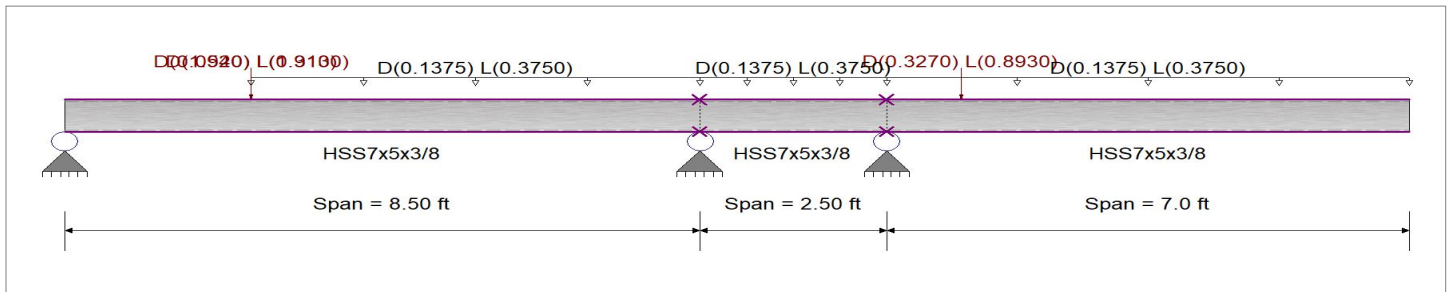
Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Load for Span Number 1
    Uniform Load : D = 0.0220, L = 0.060 ksf, Extent = 2.50 -->> 8.50 ft, Tributary Width = 6.250 ft, (Deck)

    Point Load : D = 0.0940, L = 0.3130 k @ 2.50 ft, (Flush Beam)

    Point Load : D = 1.520, L = 1.910 k @ 2.50 ft, (Flush Beam)

Load for Span Number 2
    Uniform Load : D = 0.0220, L = 0.060 ksf, Tributary Width = 6.250 ft, (Deck)

Load for Span Number 3
    Uniform Load : D = 0.0220, L = 0.060 ksf, Tributary Width = 6.250 ft, (Deck)

    Point Load : D = 0.3270, L = 0.8930 k @ 1.0 ft, (Flush Rim)

DESIGN SUMMARY

		Design OK
Maximum Bending Stress Ratio =	**0.360** : 1	Maximum Shear Stress Ratio =	**0.073** : 1
Section used for this span	**HSS7x5x3/8**	Section used for this span	**HSS7x5x3/8**
Ma : Applied	14.450 k-ft	Va : Applied	5.0 k
Mn / Omega : Allowable	40.170 k-ft	Vn/Omega : Allowable	68.673 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 3

Maximum Deflection

Max Downward Transient Deflection	0.218 in	Ratio =	770	>=360.	Span: 3 : L Only
Max Upward Transient Deflection	-0.006 in	Ratio =	4,943	>=360.	Span: 3 : L Only
Max Downward Total Deflection	0.315 in	Ratio =	533	>=240.	Span: 3 : +D+L
Max Upward Total Deflection	-0.009 in	Ratio =	3340	>=240.	Span: 3 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only												
Dsgn. L = 8.50 ft	1	0.080	0.020	3.20	-1.95	3.20	67.08	40.17 1.00	1.00	1.35	114.68	68.67
Dsgn. L = 2.50 ft	2	0.109	0.012	-0.00	-4.37	4.37	67.08	40.17 1.00	1.00	1.48	199.34	119.37
Dsgn. L = 7.00 ft	3	0.109	0.022		-4.37	4.37	67.08	40.17 1.00	1.00	1.48	114.68	68.67
+D+L												
Dsgn. L = 8.50 ft	1	0.204	0.056	8.19	-5.02	8.19	67.08	40.17 1.00	1.00	3.83	114.68	68.67

Steel Beam

DESCRIPTION: Upper Floor UB10 - Cantilever Deck Beam, 7'-0" Cant.

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 2.50 ft	2	0.360	0.042	-0.00	-14.45	14.45	67.08	40.17	1.00	1.00	5.00	199.34	119.37
Dsgn. L = 7.00 ft	3	0.360	0.073		-14.45	14.45	67.08	40.17	1.00	1.00	5.00	114.68	68.67
+D+0.750L													
Dsgn. L = 8.50 ft	1	0.173	0.047	6.95	-4.25	6.95	67.08	40.17	1.00	1.00	3.21	114.68	68.67
Dsgn. L = 2.50 ft	2	0.297	0.035	-0.00	-11.93	11.93	67.08	40.17	1.00	1.00	4.12	199.34	119.37
Dsgn. L = 7.00 ft	3	0.297	0.060		-11.93	11.93	67.08	40.17	1.00	1.00	4.12	114.68	68.67
+0.60D													
Dsgn. L = 8.50 ft	1	0.048	0.012	1.92	-1.17	1.92	67.08	40.17	1.00	1.00	0.81	114.68	68.67
Dsgn. L = 2.50 ft	2	0.065	0.007	-0.00	-2.62	2.62	67.08	40.17	1.00	1.00	0.89	199.34	119.37
Dsgn. L = 7.00 ft	3	0.065	0.013		-2.62	2.62	67.08	40.17	1.00	1.00	0.89	114.68	68.67

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0566	3.740		0.0000	0.000
	2	0.0000	3.740	+D+L	-0.0090	1.367
+D+L	3	0.3152	7.000		0.0000	1.367

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions	3.320	0.727	9.448	
Max Upward from Load Combinations	3.320	0.727	9.448	
Max Upward from Load Cases	2.003	0.593	6.792	
D Only	1.318	0.593	2.656	
+D+L	3.320	0.727	9.448	
+D+0.750L	2.820	0.693	7.750	
+0.60D	0.791	0.356	1.594	
L Only	2.003	0.134	6.792	

Steel Beam

DESCRIPTION: Upper Floor UB11 - Flush Header at Kitchen Window , 13'-0"

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	Fy : Steel Yield :	46.0 ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		

D(0.0330) L(0.090)   D(0.0660) L(0.180)

HSS7x3x1/4   HSS7x3x1/4

Span = 13.0 ft   Span = 2.0 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Load for Span Number 1
   Uniform Load : D = 0.0220, L = 0.060 ksf, Tributary Width = 1.50 ft, (Deck)

Load for Span Number 2
   Uniform Load : D = 0.0220, L = 0.060 ksf, Tributary Width = 3.0 ft, (Deck)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.126** : 1	Maximum Shear Stress Ratio =	**0.019** : 1	
Section used for this span	**HSS7x3x1/4**	Section used for this span	**HSS7x3x1/4**	
Ma : Applied	2.673 k-ft	Va : Applied	0.9413 k	
Mn / Omega : Allowable	21.164 k-ft	Vn/Omega : Allowable	48.528 k	
Load Combination	+D+L	Load Combination	+D+L	
		Location of maximum on span	13.000 ft	
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.071	in	Ratio =	2,208	>=360.	Span: 2 : L Only
Max Upward Transient Deflection	-0.031	in	Ratio =	1,561	>=360.	Span: 2 : L Only
Max Downward Total Deflection	0.110	in	Ratio =	1424	>=240.	Span: 2 : +D+L
Max Upward Total Deflection	-0.048	in	Ratio =	999	>=240.	Span: 2 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only												
Dsgn. L = 13.00 ft	1	0.045	0.007	0.95	-0.16	0.95	35.34	21.16 1.00	1.00	0.33	81.04	48.53
Dsgn. L = 2.00 ft	2	0.008	0.003		-0.16	0.16	35.34	21.16 1.00	1.00	0.16	81.04	48.53
+D+L												
Dsgn. L = 13.00 ft	1	0.126	0.019	2.67	-0.52	2.67	35.34	21.16 1.00	1.00	0.94	81.04	48.53
Dsgn. L = 2.00 ft	2	0.025	0.011		-0.52	0.52	35.34	21.16 1.00	1.00	0.52	81.04	48.53
+D+0.750L												
Dsgn. L = 13.00 ft	1	0.106	0.016	2.24	-0.43	2.24	35.34	21.16 1.00	1.00	0.79	81.04	48.53
Dsgn. L = 2.00 ft	2	0.020	0.009		-0.43	0.43	35.34	21.16 1.00	1.00	0.43	81.04	48.53
+0.60D												
Dsgn. L = 13.00 ft	1	0.027	0.004	0.57	-0.10	0.57	35.34	21.16 1.00	1.00	0.20	81.04	48.53
Dsgn. L = 2.00 ft	2	0.005	0.002		-0.10	0.10	35.34	21.16 1.00	1.00	0.10	81.04	48.53

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1096	6.396		0.0000	0.000
	2	0.0000	6.396	+D+L	-0.0481	2.000

Steel Beam

Project File: Hong Kao.ec6

DESCRIPTION: Upper Floor UB11 - Flush Header at Kitchen Window , 13'-0"

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.861	1.465	
Max Upward from Load Combinations	0.861	1.465	
Max Upward from Load Cases	0.557	0.973	
D Only	0.303	0.492	
+D+L	0.861	1.465	
+D+0.750L	0.721	1.221	
+0.60D	0.182	0.295	
L Only	0.557	0.973	

Steel Beam

Project File: Hong Kao.ec6

LIC# : KW-06016450, Build:20.23.05.25   QUANTUM CONSULTING ENGINEERS   (c) ENERCALC INC 1983-2023

DESCRIPTION: Main Floor B7 - Deck Beam, Grid C

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	Fy : Steel Yield :	46.0 ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		

D(0.180) L(0.60)
D(0.680) L(0.2460) D(6.790) L(0.1430) L(0.390)   D(0.1430) L(0.390)   D(0.1430) L(0.390)

HSS9x5x3/8   HSS9x5x3/8   HSS9x5x3/8

Span = 14.50 ft   Span = 3.0 ft   Span = 7.250 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Load for Span Number 1
    Uniform Load : D = 0.0220, L = 0.060 ksf, Extent = 9.0 -->> 14.50 ft, Tributary Width = 6.50 ft, (Deck)

    Uniform Load : D = 0.0120, L = 0.040 ksf, Extent = 0.0 -->> 9.0 ft, Tributary Width = 15.0 ft, (Deck)

    Point Load : D = 0.590, L = 0.130 k @ 8.670 ft, (Post Above)

    Point Load : D = 2.660, L = 6.790 k @ 10.50 ft, (Post Above)

    Point Load : D = 1.680, L = 2.460 k @ 8.670 ft, (Flush Beam)

Load for Span Number 2
    Uniform Load : D = 0.0220, L = 0.060 ksf, Tributary Width = 6.50 ft, (Deck)

Load for Span Number 3
    Uniform Load : D = 0.0220, L = 0.060 ksf, Tributary Width = 6.50 ft, (Deck)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.767** : 1	Maximum Shear Stress Ratio =	**0.193** : 1
Section used for this span	**HSS9x5x3/8**	Section used for this span	**HSS9x5x3/8**
Ma : Applied	45.264 k-ft	Va : Applied	17.661 k
Mn / Omega : Allowable	58.992 k-ft	Vn/Omega : Allowable	91.744 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	14.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection
Max Downward Transient Deflection	0.249 in	Ratio =	697	>=360.	Span: 3 : L Only
Max Upward Transient Deflection	-0.015 in	Ratio =	2,423	>=360.	Span: 3 : L Only
Max Downward Total Deflection	0.370 in	Ratio =	471	>=240.	Span: 3 : +D+L
Max Upward Total Deflection	-0.022 in	Ratio =	1644	>=240.	Span: 3 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 14.50 ft	1	0.249	0.062	10.50	-14.70	14.70	98.52	58.99	1.00	1.00	5.67	153.21	91.74
Dsgn. L = 3.00 ft	2	0.249	0.040	-0.00	-14.70	14.70	98.52	58.99	1.00	1.00	3.63	153.21	91.74
Dsgn. L = 7.25 ft	3	0.078	0.014		-4.61	4.61	98.52	58.99	1.00	1.00	1.27	153.21	91.74

Steel Beam

DESCRIPTION: Main Floor B7 - Deck Beam, Grid C

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+L												
Dsgn. L = 14.50 ft	1	0.767	0.193	30.78	-45.26	45.26	98.52	58.99 1.00	1.00	17.66	153.21	91.74
Dsgn. L = 3.00 ft	2	0.767	0.120	-0.00	-45.26	45.26	98.52	58.99 1.00	1.00	10.98	153.21	91.74
Dsgn. L = 7.25 ft	3	0.252	0.045		-14.86	14.86	98.52	58.99 1.00	1.00	4.10	153.21	91.74
+D+0.750L												
Dsgn. L = 14.50 ft	1	0.638	0.160	25.71	-37.62	37.62	98.52	58.99 1.00	1.00	14.66	153.21	91.74
Dsgn. L = 3.00 ft	2	0.638	0.100	-0.00	-37.62	37.62	98.52	58.99 1.00	1.00	9.14	153.21	91.74
Dsgn. L = 7.25 ft	3	0.209	0.037		-12.30	12.30	98.52	58.99 1.00	1.00	3.39	153.21	91.74
+0.60D												
Dsgn. L = 14.50 ft	1	0.150	0.037	6.30	-8.82	8.82	98.52	58.99 1.00	1.00	3.40	153.21	91.74
Dsgn. L = 3.00 ft	2	0.150	0.024	-0.00	-8.82	8.82	98.52	58.99 1.00	1.00	2.18	153.21	91.74
Dsgn. L = 7.25 ft	3	0.047	0.008		-2.77	2.77	98.52	58.99 1.00	1.00	0.76	153.21	91.74

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3697	7.057		0.0000	0.000
	2	0.0000	7.057	+D+L	-0.0219	1.380
+D+L	3	0.2974	7.250		0.0000	1.380

Vertical Reactions

Support notation : Far left is #   Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions	7.073	28.643		
Max Upward from Load Combinations	7.073	28.643		
Max Upward from Load Cases	4.938	19.342		
Max Downward from all Load Conditions (Resi			-5.184	
Max Downward from Load Combinations (Resi			-5.184	
Max Downward from Load Cases (Resisting U			-3.357	
D Only	2.135	9.301	-1.827	
+D+L	7.073	28.643	-5.184	
+D+0.750L	5.838	23.807	-4.345	
+0.60D	1.281	5.580	-1.096	
L Only	4.938	19.342	-3.357	

Steel Column

DESCRIPTION: Main Floor P6 - Steel Garage Column

Code References

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

General Information

Steel Section Name : **HSS4x4x1/4**

Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	8.0 ft
Top & Bottom Fixity	Top & Bottom Pinned
Brace condition :	

Unbraced Length for buckling ABOUT X-X Axis = 8.0 ft, K = 1.0
Unbraced Length for buckling ABOUT Y-Y Axis = 8.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Column self weight included : 97.680 lbs * Dead Load Factor
AXIAL LOADS . . .
    Steel Beam: Axial Load at 8.0 ft, D = 21.60, L = 18.0, S = 7.760 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5779** : 1

Load Combination	+D+0.750L+0.750S
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pa : Axial	41.018 k
Pn / Omega : Allowable	70.980 k
Ma-x : Applied	0.0 k-ft
Mn-x / Omega : Allowable	10.765 k-ft
Ma-y : Applied	0.0 k-ft
Mn-y / Omega : Allowable	10.765 k-ft

Maximum Load Reactions . .

Top along X-X	k
Bottom along X-X	k
Top along Y-Y	k
Bottom along Y-Y	k

Maximum Load Deflections . . .

Along Y-Y	in at		ft	above base
for load combination :				
Along X-X	in at		ft	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			Cbx	Cby	KxLx/Ry	KyLy/Rx	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location

Maximum Reactions   Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base	k-ft @ Top	My - End Moments @ Base	@ Top

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base	k-ft @ Top	My - End Moments @ Base	@ Top

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance

Steel Section Properties : HSS4x4x1/4
Steel Section Properties : HSS4x4x1/4

Steel Column

Project File: Hong Kao.ec6

LIC# : KW-06016450, Build:20.23.05.25   QUANTUM CONSULTING ENGINEERS   (c) ENERCALC INC 1983-2023

DESCRIPTION: Main Floor P6 - Steel Garage Column

Depth	=	4.000 in	I xx	=	7.80 in^4	J	=	12.800 in^4
Design Thick	=	0.233 in	S xx	=	3.90 in^3			
Width	=	4.000 in	R xx	=	1.520 in			
Wall Thick	=	0.250 in	Zx	=	4.690 in^3			
Area	=	3.370 in^2	I yy	=	7.800 in^4	C	=	6.560 in^3
Weight	=	12.210 plf	S yy	=	3.900 in^3			
			R yy	=	1.520 in			

Ycg   =   0.000 in

Sketches

Steel Column

Project File: Hong Kao.ec6

DESCRIPTION: Main Floor P7 - Steel Living Room Column

Code References

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

General Information

Steel Section Name : **HSS4x4x1/4**

Analysis Method :	Allowable Strength
Steel Stress Grade	
F_y : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	15.0 ft
Top & Bottom Fixity	Top & Bottom Pinned
Brace condition :	

Unbraced Length for buckling ABOUT X-X Axis = 15.0 ft, K = 1.0
Unbraced Length for buckling ABOUT Y-Y Axis = 15.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Column self weight included : 183.150 lbs * Dead Load Factor
AXIAL LOADS . . .
   Roof Beam: Axial Load at 15.0 ft, D = 5.20, S = 7.0 k
   Floor Beam: Axial Load at 15.0 ft, D = 2.590, L = 4.360 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS	Max. Axial+Bending Stress Ratio =	**0.4566** : 1	
	Load Combination	+D+0.750L+0.750S	
	Location of max.above base	0.0 ft	
	At maximum location values are . . .		
	Pa : Axial	16.493 k	
	Pn / Omega : Allowable	36.120 k	
	Ma-x : Applied	0.0 k-ft	
	Mn-x / Omega : Allowable	10.765 k-ft	
	Ma-y : Applied	0.0 k-ft	
	Mn-y / Omega : Allowable	10.765 k-ft	

PASS	Maximum Shear Stress Ratio	**0.0** : 1	
	Load Combination	0.0	
	Location of max.above base	0.0 ft	
	At maximum location values are . . .		
	Va : Applied	0.0 k	
	Vn / Omega : Allowable	0.0 k	

Maximum Load Reactions . .

Top along X-X	k
Bottom along X-X	k
Top along Y-Y	k
Bottom along Y-Y	k

Maximum Load Deflections . . .

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

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cbx	Cby	KxLx/Ry	KyLy/Rx	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base	k-ft @ Top	My - End Moments @ Base	@ Top

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base	k-ft @ Top	My - End Moments @ Base	@ Top

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance

Steel Section Properties : **HSS4x4x1/4**
Steel Section Properties : **HSS4x4x1/4**

Steel Column

DESCRIPTION: Main Floor P7 - Steel Living Room Column

Depth	=	4.000 in	I xx	=	7.80 in^4	J	=	12.800 in^4
Design Thick	=	0.233 in	S xx	=	3.90 in^3			
Width	=	4.000 in	R xx	=	1.520 in			
Wall Thick	=	0.250 in	Zx	=	4.690 in^3			
Area	=	3.370 in^2	I yy	=	7.800 in^4	C	=	6.560 in^3
Weight	=	12.210 plf	S yy	=	3.900 in^3			
			R yy	=	1.520 in			

Ycg   =   0.000 in

Sketches

Steel Column

DESCRIPTION: Crawlspace BP4 - Crawlspace Column

Code References

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

General Information

Steel Section Name : **HSS4x4x1/4**

Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height   12 ft
Top & Bottom Fixity   Top & Bottom Pinned
Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 12 ft, K = 1.0
Unbraced Length for buckling ABOUT Y-Y Axis = 12 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Column self weight included : 146.520 lbs * Dead Load Factor
AXIAL LOADS . . .
Flush Wood Beam: Axial Load at 12.0 ft, D = 4.340, L = 1.210, S = 1.680 k
Dropped Steel Beam: Axial Load at 12.0 ft, D = 11.170, L = 8.610, S = 4.370 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5430** : 1

Load Combination	+D+0.750L+0.750S
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pa : Axial	27.559 k
Pn / Omega : Allowable	50.754 k
Ma-x : Applied	0.0 k-ft
Mn-x / Omega : Allowable	10.765 k-ft
Ma-y : Applied	0.0 k-ft
Mn-y / Omega : Allowable	10.765 k-ft

Maximum Load Reactions . .

Top along X-X	k
Bottom along X-X	k
Top along Y-Y	k
Bottom along Y-Y	k

Maximum Load Deflections . . .

Along Y-Y   in at   ft above base
  for load combination :

Along X-X   in at   ft 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			Cbx	Cby	KxLx/Ry	KyLy/Rx	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base k-ft	@ Top	My - End Moments @ Base	@ Top

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base k-ft	@ Top	My - End Moments @ Base	@ Top

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance

Steel Section Properties : HSS4x4x1/4
Steel Section Properties : HSS4x4x1/4

Steel Column

LIC# : KW-06016450, Build:20.23.05.25   QUANTUM CONSULTING ENGINEERS   (c) ENERCALC INC 1983-2023

DESCRIPTION: Crawlspace BP4 - Crawlspace Column

Depth	=	4.000 in	I xx	=	7.80 in^4	J	=	12.800 in^4
Design Thick	=	0.233 in	S xx	=	3.90 in^3			
Width	=	4.000 in	R xx	=	1.520 in			
Wall Thick	=	0.250 in	Zx	=	4.690 in^3			
Area	=	3.370 in^2	I yy	=	7.800 in^4	C	=	6.560 in^3
Weight	=	12.210 plf	S yy	=	3.900 in^3			
			R yy	=	1.520 in			

Ycg   =   0.000 in

Sketches

QCE		SK-1
MKS		Jun 07, 2023
		Living Room Roof Framing.r3d

Y
Z — X

Code Check
(LC 4)
No Calc
> 1.0
.90-1.0
.75-.90
.50-.75
0.-.50

0.10

0.03

0.18

0.34

Member Code Checks Displayed
Results for LC 4, - EQ Only

QCE
MKS

SK-2
Jun 07, 2023
Living Room Roof Framing.r3d

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	0	11.25	0	
3	N3	0	27	0	
4	N4	0	27	5.5	
5	N5	0	27	-11.5	
6	N6	-2.75	27	5.5	
7	N7	-2.75	27	-11.5	
8	N8	11.25	27	5.5	
9	N9	11.25	27	-11.5	
10	N11	31	27	-11.5	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]
1	N11	Reaction	Reaction	Reaction	
2	N9	Reaction	Reaction	Reaction	Reaction
3	N8	Reaction	Reaction	Reaction	Reaction
4	N1	Reaction	Reaction	Reaction	
5	N2	Reaction		Reaction	

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.25	65	1.15
8	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Wood Properties

	Label	Type	Database	Species	Grade	Cm	Ci	Emod	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]
1	DF	Solid Sawn	Visually Graded	Douglas Fir-Larch	No.1			1	0.3	0.3	0.035
2	SP	Solid Sawn	Visually Graded	Southern Pine	No.1			1	0.3	0.3	0.035
3	HF	Solid Sawn	Visually Graded	Hem-Fir	No.1			1	0.3	0.3	0.035
4	SPF	Solid Sawn	Visually Graded	Spruce-Pine-fir	No.1			1	0.3	0.3	0.035
5	24F-1.8E DF Balanced	Glulam	NDS Table 5A	24F-1.8E_DF_BAL	na			1	0.3	0.3	0.035
6	24F-1.8E DF Unbalanced	Glulam	NDS Table 5A	24F-1.8E_DF_UNBAL	na			1	0.3	0.3	0.035
7	24F-1.8E SP Balanced	Glulam	NDS Table 5A	24F-1.8E_SP_BAL	na			1	0.3	0.3	0.035
8	24F-1.8E SP Unbalanced	Glulam	NDS Table 5A	24F-1.8E_SP_UNBAL	na			1	0.3	0.3	0.035
9	1.3E-1600F_VERSALAM	SCL	Boise Cascade	1.3E-1600F_VERSALAM	na			1	0.3	0.3	0.035
10	1.35E LSL_SolidStart	SCL	Louisiana Pacific	1.35E LSL_SolidStart	na			1	0.3	0.3	0.035
11	1.3E_RIGIDLAM LVL	SCL	Roseburg Forest Products	1.3E_RIGIDLAM LVL	na			1	0.3	0.3	0.035
12	2.0E_DF Parallam PSL	SCL	TrusJoist	2.0E_DF Parallam PSL	na			1	0.3	0.3	0.035
13	LVL_PRL_1.5E_2250F	Custom	N/A	LVL_PRL_1.5E_2250F	na			1	0.3	0.3	0.035
14	LVL_Microlam_1.9E_2600F	Custom	N/A	LVL_Microllam_1.9E_2600F	na			1	0.3	0.3	0.035
15	PSL_Parallam_2.0E_2900F	Custom	N/A	PSL_Parallam_2.0E_2900F	na			1	0.3	0.3	0.035
16	LSL_TimberStrand_1.55E_2325F	Custom	N/A	LSL_TimberStrand_1.55E_2325F	na			1	0.3	0.3	0.035

Custom Wood Properties

	Label	Fb	Ft	Fv	Fc	E	E05	Type
1	LVL_PRL_1.5E_2250F	2.25	1.5	0.22	1.95	1500	1005	SCL
2	LVL_PRL_2.0E_2900F	2.9	1.9	0.285	2.75	2000	1340	SCL
3	LVL_Microllam_1.9E_2600F	2.6	1.555	0.285	2.51	1900	1273	SCL
4	PSL_Parallam_2.0E_2900F	2.9	2.025	0.29	2.9	2000	1340	SCL
5	PSL_Parallam_1.8E	2.4	1.755	0.18	2.5	1800	1206	SCL
6	LSL_TimberStrand_1.55E_2325F	2.325	1.07	0.31	2.05	1550	1038.5	SCL
7	LSL_TimberStrand_1.3E_1700F	1.7	1.075	0.4	1.4	1300	871	SCL

Member Primary Data

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N11	N7		5.125X21FS	Beam	Glulam_Western	24F-1.8E DF Balanced	Typical
2	M2	N8	N6		5.125X21FS	Beam	Glulam_Western	24F-1.8E DF Balanced	Typical
3	M3	N4	N5		W10X33	Beam	Wide Flange	A992	Typical
4	M4	N1	N3	90	W16X67	Column	Wide Flange	A992	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lcomp top [ft]	Channel Conn.	a [ft]	Function
1	M3	W10X33	17	Lbyy	N/A	N/A	Lateral
2	M4	W16X67	27	Lbyy	N/A	N/A	Lateral

Wood Design Parameters

	Label	Shape	Length [ft]	le2 [ft]	le-bend top [ft]	Cr	y sway	z sway
1	M1	5.125X21FS	33.75	2	Lbyy			
2	M2	5.125X21FS	14	2	Lbyy			

Design Size and Code Check Parameters

	Label	Max Axial/Bending Chk	Max Shear Chk
1	Typical	1	1

Deflection Design

	Label	LC	Ratio	LC	Ratio	LC	Ratio
1	Typical	1	240	2	360	3	240

Node Loads and Enforced Displacements (BLC 2 : Deck Dead Load)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N2	L	Y	-1.5

Node Loads and Enforced Displacements (BLC 4 : Live Load)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N2	L	Y	-4

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Company : QCE
Designer : MKS
Job Number :
Model Name :

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Node Loads and Enforced Displacements (BLC 5 : Earthquake)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N3	L	Z	2.91

Member Distributed Loads (BLC 1 : Roof Dead Load)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M2	Y	-0.18	-0.18	0	%100
2	M1	Y	-0.18	-0.18	0	%100

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	Y	-0.27	-0.27	0	%100

Basic Load Cases

	BLC Description	Category	Y Gravity	Z Gravity	Nodal	Distributed
1	Roof Dead Load	DL	-1			2
2	Deck Dead Load	DL			1	
3	Snow Load	SL				1
4	Live Load	LL			1	
5	Earthquake	EL		0.78	1	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	Live Only	Yes	Y	LL	1								
2	Snow Only	Yes	Y	SL	1								
3	+ EQ Only	Yes	Y	EL	1								
4	- EQ Only	Yes	Y	EL	-1								
5	IBC 16-8 D Only	Yes	Y	DL	1								
6	IBC 16-9 D + L	Yes	Y	DL	1	LL	1						
7	IBC 16-10 D +S	Yes	Y	DL	1	SL	1						
8	IBC 16-11 D+0.75L+0.75S	Yes	Y	DL	1	LL	0.75	SL	0.75				
9	IBC 16-12 D+0.7E	Yes	Y	DL	1	Sds*DL	0.14	EL	0.7				
10		Yes	Y	DL	1	Sds*DL	0.14	EL	-0.7				
11	IBC 16-14 D+0.525E+0.75L+0.75S	Yes	Y	DL	1	Sds*DL	0.105	EL	0.525	LL	0.75	SL	0.75
12		Yes	Y	DL	1	Sds*DL	0.105	EL	-0.525	LL	0.75	SL	0.75
13	IBC 16-16 0.6D+0.7E	Yes	Y	DL	0.6	Sds*DL	-0.14	EL	0.7				
14		Yes	Y	DL	0.6	Sds*DL	-0.14	EL	-0.7				
15	IBC 16-5 (LRFD)		Y	DL	1.2	Sds*DL	0.2	EL	1	LL	0.5	SL	0.7

Node Reactions

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N11	0	-0.001	0	0	0	0
2	1	N9	0	0.002	0	0	0	0
3	1	N8	0	0	0	0	0	0
4	1	N1	0	3.998	0.002	0	0	0
5	1	N2	0	0	-0.002	0	0	0
6	1	Totals:	0	4	0			
7	1	COG (ft):	X: 0	Y: 11.25	Z: 0			
8	2	N11	0	1.692	-0.01	0	0	0
9	2	N9	0	6.779	0.027	0	0	0

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Designer   : MKS
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Model Name :

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Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
10	2	N8	0	0	0	0	0	0
11	2	N1	0	0.642	-0.632	0	0	0
12	2	N2	-0.001	0	0.615	0	0	0
13	2	Totals:	0	9.113	0			
14	2	COG (ft):	X: 14.125	Y: 27	Z: -11.5			
15	3	N11	0	0.489	-0.111	0	0	0
16	3	N9	0	-1.348	-0.559	0	0	0
17	3	N8	0	0.001	-0.108	0	0	0
18	3	N1	0	0.858	4.371	0	0	0
19	3	N2	0	0	-9.32	0	0	0
20	3	Totals:	0	0	-5.727			
21	3	COG (ft):	NC	NC	NC			
22	4	N11	0	-0.488	0.111	0	0	0
23	4	N9	0	1.344	0.558	0	0	0
24	4	N8	0	-0.001	0.108	0	0	0
25	4	N1	0	-0.856	-4.362	0	0	0
26	4	N2	0	0	9.312	0	0	0
27	4	Totals:	0	0	5.727			
28	4	COG (ft):	NC	NC	NC			
29	5	N11	0	1.374	0.001	0	0	0
30	5	N9	0	4.951	-0.003	0	0	0
31	5	N8	0	1.091	0	0	0	0
32	5	N1	0	6.291	0.078	0	0	0
33	5	N2	-0.001	0	-0.076	0	0	0
34	5	Totals:	0	13.707	0			
35	5	COG (ft):	X: 8.065	Y: 23.503	Z: -4.803			
36	6	N11	0	1.373	0.001	0	0	0
37	6	N9	0	4.953	-0.003	0	0	0
38	6	N8	0	1.091	0	0	0	0
39	6	N1	0	10.29	0.08	0	0	0
40	6	N2	-0.001	0	-0.078	0	0	0
41	6	Totals:	0	17.707	0			
42	6	COG (ft):	X: 6.243	Y: 20.735	Z: -3.718			
43	7	N11	0	3.066	-0.009	0	0	0
44	7	N9	0	11.73	0.024	0	0	0
45	7	N8	0.001	1.09	0	0	0	0
46	7	N1	0	6.933	-0.557	0	0	0
47	7	N2	-0.001	0	0.542	0	0	0
48	7	Totals:	0	22.819	0			
49	7	COG (ft):	X: 10.485	Y: 24.899	Z: -7.477			
50	8	N11	0	2.642	-0.006	0	0	0
51	8	N9	0	10.037	0.017	0	0	0
52	8	N8	0.001	1.09	0	0	0	0
53	8	N1	0	9.771	-0.397	0	0	0
54	8	N2	-0.001	0	0.386	0	0	0
55	8	Totals:	0	23.541	0			
56	8	COG (ft):	X: 8.797	Y: 22.957	Z: -6.135			
57	9	N11	0	1.904	-0.076	0	0	0
58	9	N9	0	4.676	-0.395	0	0	0
59	9	N8	0.001	1.239	-0.076	0	0	0
60	9	N1	0	7.749	3.163	0	0	0
61	9	N2	-0.001	0	-6.625	0	0	0
62	9	Totals:	0	15.568	-4.009			
63	9	COG (ft):	X: 8.065	Y: 23.503	Z: -4.803			
64	10	N11	0	1.217	0.079	0	0	0

Company   : QCE
Designer   : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
Checked By : _____

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
65	10	N9	0	6.569	0.387	0	0	0
66	10	N8	0	1.238	0.076	0	0	0
67	10	N1	0	6.544	-2.98	0	0	0
68	10	N2	-0.001	0	6.447	0	0	0
69	10	Totals:	0	15.568	4.009			
70	10	COG (ft):	X: 8.065	Y: 23.503	Z: -4.803			
71	11	N11	0	3.04	-0.064	0	0	0
72	11	N9	0	9.831	-0.277	0	0	0
73	11	N8	0.001	1.202	-0.057	0	0	0
74	11	N1	0	10.864	1.916	0	0	0
75	11	N2	-0.001	0	-4.525	0	0	0
76	11	Totals:	0	24.937	-3.007			
77	11	COG (ft):	X: 8.756	Y: 22.987	Z: -6.06			
78	12	N11	0	2.525	0.052	0	0	0
79	12	N9	0	11.251	0.31	0	0	0
80	12	N8	0.001	1.201	0.057	0	0	0
81	12	N1	0	9.96	-2.692	0	0	0
82	12	N2	-0.001	0	5.28	0	0	0
83	12	Totals:	0	24.937	3.007			
84	12	COG (ft):	X: 8.756	Y: 22.987	Z: -6.06			
85	13	N11	0	0.98	-0.077	0	0	0
86	13	N9	0	1.353	-0.393	0	0	0
87	13	N8	0	0.507	-0.076	0	0	0
88	13	N1	0	3.522	3.101	0	0	0
89	13	N2	-0.001	0	-6.564	0	0	0
90	13	Totals:	0	6.363	-4.009			
91	13	COG (ft):	X: 8.065	Y: 23.503	Z: -4.803			
92	14	N11	0	0.296	0.078	0	0	0
93	14	N9	0	3.241	0.389	0	0	0
94	14	N8	0	0.505	0.076	0	0	0
95	14	N1	0	2.32	-3.024	0	0	0
96	14	N2	0	0	6.49	0	0	0
97	14	Totals:	0	6.363	4.009			
98	14	COG (ft):	X: 8.065	Y: 23.503	Z: -4.803			

Node Displacements

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
1	1	N1	0	0	0	-1.908e-7	0	0
2	1	N2	0	-0.001	0	4.535e-7	0	0
3	1	N3	0	-0.001	0	2.292e-6	0	3.1e-8
4	1	N4	0	-0.001	0	0	1.913e-6	9.901e-6
5	1	N5	0	-0.001	0	0	2.259e-6	4.434e-6
6	1	N6	0	-0.002	0	0	1.913e-6	9.901e-6
7	1	N7	0	-0.001	0	0	2.259e-6	4.434e-6
8	1	N8	0	0	0	0	1.913e-6	9.91e-6
9	1	N9	0	0	0	0	1.218e-6	2.399e-6
10	1	N11	0	0	0	0	-6.086e-7	-1.178e-6
11	2	N1	0	0	0	7.708e-5	5.587e-7	9.213e-8
12	2	N2	0	0	0	-1.832e-4	5.587e-7	-1.859e-7
13	2	N3	0	0	-0.104	-9.255e-4	5.587e-7	1.9e-6
14	2	N4	0	0.061	-0.104	0	-7.726e-4	-4.487e-4
15	2	N5	0	-0.273	-0.104	0	-9.123e-4	2.479e-3
16	2	N6	0	0.075	-0.13	0	-7.726e-4	-4.487e-4
17	2	N7	0	-0.355	-0.134	0	-9.123e-4	2.498e-3
18	2	N8	0	0	0	0	-7.726e-4	-4.492e-4

Company   : QCE
Designer   : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
Checked By : _____

Node Displacements (Continued)

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
19	2	N9	0	0	0	0	-4.92e-4	8.234e-4
20	2	N11	0	0	0	0	2.458e-4	4.878e-4
21	3	N1	0	0	0	-5.486e-4	3.966e-7	6.545e-8
22	3	N2	0	0	0	1.331e-3	3.966e-7	-1.321e-7
23	3	N3	0	-0.001	0.559	3.403e-3	3.966e-7	1.349e-6
24	3	N4	0	-0.225	0.559	0	3.793e-3	1.666e-3
25	3	N5	0	0.275	0.56	0	5.07e-3	-2.39e-3
26	3	N6	0	-0.28	0.685	0	3.82e-3	1.666e-3
27	3	N7	0	0.354	0.727	0	5.097e-3	-2.39e-3
28	3	N8	0	0	0	0	4.552e-3	1.668e-3
29	3	N9	0	0	0	0	1.991e-3	-1.293e-3
30	3	N11	0	0	0	0	2.578e-4	6.35e-4
31	4	N1	0	0	0	5.475e-4	-3.964e-7	-6.552e-8
32	4	N2	0	0	0	-1.329e-3	-3.964e-7	1.322e-7
33	4	N3	0	0.001	-0.558	-3.396e-3	-3.964e-7	-1.349e-6
34	4	N4	0	0.225	-0.558	0	-3.785e-3	-1.664e-3
35	4	N5	0	-0.275	-0.558	0	-5.06e-3	2.385e-3
36	4	N6	0	0.28	-0.684	0	-3.812e-3	-1.664e-3
37	4	N7	0	-0.353	-0.726	0	-5.087e-3	2.385e-3
38	4	N8	0	0	0	0	-4.544e-3	-1.665e-3
39	4	N9	0	0	0	0	-1.986e-3	1.29e-3
40	4	N11	0	0	0	0	-2.603e-4	-6.335e-4
41	5	N1	0	0	0	-9.553e-6	7.401e-7	1.213e-7
42	5	N2	0	-0.002	0	2.27e-5	7.401e-7	-2.447e-7
43	5	N3	0	-0.003	0.013	1.144e-4	7.401e-7	2.51e-6
44	5	N4	0	-0.06	0.013	0	9.563e-5	2.582e-4
45	5	N5	0	-0.163	0.013	0	1.129e-4	1.494e-3
46	5	N6	0	-0.069	0.016	0	9.563e-5	2.727e-4
47	5	N7	0	-0.212	0.017	0	1.129e-4	1.508e-3
48	5	N8	0	0	0	0	9.563e-5	6.646e-4
49	5	N9	0	0	0	0	6.09e-5	4.129e-4
50	5	N11	0	0	0	0	-3.042e-5	4.785e-4
51	6	N1	0	0	0	-9.745e-6	7.492e-7	1.228e-7
52	6	N2	0	-0.003	0	2.316e-5	7.492e-7	-2.478e-7
53	6	N3	0	-0.004	0.013	1.167e-4	7.492e-7	2.541e-6
54	6	N4	0	-0.061	0.013	0	9.755e-5	2.682e-4
55	6	N5	0	-0.163	0.013	0	1.152e-4	1.498e-3
56	6	N6	0	-0.071	0.016	0	9.755e-5	2.826e-4
57	6	N7	0	-0.213	0.017	0	1.152e-4	1.512e-3
58	6	N8	0	0	0	0	9.755e-5	6.745e-4
59	6	N9	0	0	0	0	6.213e-5	4.153e-4
60	6	N11	0	0	0	0	-3.103e-5	4.773e-4
61	7	N1	0	0	0	6.796e-5	1.301e-6	2.129e-7
62	7	N2	0	-0.002	0	-1.615e-4	1.301e-6	-4.297e-7
63	7	N3	0	-0.004	-0.092	-8.137e-4	1.301e-6	4.412e-6
64	7	N4	0	0.001	-0.092	0	-6.801e-4	-1.918e-4
65	7	N5	0	-0.436	-0.092	0	-8.031e-4	3.974e-3
66	7	N6	0	0.006	-0.114	0	-6.801e-4	-1.773e-4
67	7	N7	0	-0.568	-0.118	0	-8.031e-4	4.008e-3
68	7	N8	0	0	0	0	-6.801e-4	2.141e-4
69	7	N9	0	0	0	0	-4.332e-4	1.237e-3
70	7	N11	0	0	0	0	2.164e-4	9.658e-4
71	8	N1	0	0	0	4.842e-5	1.168e-6	1.912e-7
72	8	N2	0	-0.003	0	-1.151e-4	1.168e-6	-3.858e-7
73	8	N3	0	-0.004	-0.065	-5.799e-4	1.168e-6	3.96e-6

Company : QCE
Designer : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
Checked By : _____

Node Displacements (Continued)

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
74	8	N4	0	-0.016	-0.065	0	-4.846e-4	-7.18e-5
75	8	N5	0	-0.368	-0.065	0	-5.723e-4	3.357e-3
76	8	N6	0	-0.014	-0.081	0	-4.846e-4	-5.734e-5
77	8	N7	0	-0.48	-0.084	0	-5.723e-4	3.386e-3
78	8	N8	0	0	0	0	-4.846e-4	3.342e-4
79	8	N9	0	0	0	0	-3.086e-4	1.033e-3
80	8	N11	0	0	0	0	1.542e-4	8.431e-4
81	9	N1	0	0	0	-3.966e-4	1.122e-6	1.835e-7
82	9	N2	0	-0.002	0	9.618e-4	1.122e-6	-3.703e-7
83	9	N3	0	-0.004	0.408	2.522e-3	1.122e-6	3.802e-6
84	9	N4	0	-0.227	0.408	0	2.776e-3	1.465e-3
85	9	N5	0	0.009	0.408	0	3.692e-3	1.614e-5
86	9	N6	0	-0.276	0.5	0	2.795e-3	1.481e-3
87	9	N7	0	0.008	0.53	0	3.711e-3	3.255e-5
88	9	N8	0	0	0	0	3.308e-3	1.928e-3
89	9	N9	0	0	0	0	1.471e-3	-4.401e-4
90	9	N11	0	0	0	0	1.418e-4	9.898e-4
91	10	N1	0	0	0	3.743e-4	5.606e-7	9.181e-8
92	10	N2	0	-0.002	0	-9.089e-4	5.606e-7	-1.853e-7
93	10	N3	0	-0.003	-0.378	-2.259e-3	5.606e-7	1.901e-6
94	10	N4	0	0.09	-0.378	0	-2.555e-3	-8.771e-4
95	10	N5	0	-0.378	-0.378	0	-3.431e-3	3.374e-3
96	10	N6	0	0.118	-0.463	0	-2.574e-3	-8.607e-4
97	10	N7	0	-0.49	-0.492	0	-3.45e-3	3.39e-3
98	10	N8	0	0	0	0	-3.086e-3	-4.167e-4
99	10	N9	0	0	0	0	-1.33e-3	1.376e-3
100	10	N11	0	0	0	0	-2.122e-4	9.787e-5
101	11	N1	0	0	0	-2.419e-4	1.455e-6	2.378e-7
102	11	N2	0	-0.003	0	5.892e-4	1.455e-6	-4.799e-7
103	11	N3	0	-0.005	0.231	1.226e-3	1.455e-6	4.929e-6
104	11	N4	0	-0.14	0.231	0	1.526e-3	8.333e-4
105	11	N5	0	-0.239	0.231	0	2.112e-3	2.249e-3
106	11	N6	0	-0.168	0.282	0	1.54e-3	8.493e-4
107	11	N7	0	-0.315	0.301	0	2.126e-3	2.28e-3
108	11	N8	0	0	0	0	1.924e-3	1.282e-3
109	11	N9	0	0	0	0	7.489e-4	3.934e-4
110	11	N11	0	0	0	0	2.834e-4	1.227e-3
111	12	N1	0	0	0	3.365e-4	1.033e-6	1.69e-7
112	12	N2	0	-0.003	0	-8.142e-4	1.033e-6	-3.411e-7
113	12	N3	0	-0.004	-0.359	-2.361e-3	1.033e-6	3.502e-6
114	12	N4	0	0.097	-0.359	0	-2.474e-3	-9.238e-4
115	12	N5	0	-0.529	-0.359	0	-3.232e-3	4.768e-3
116	12	N6	0	0.127	-0.441	0	-2.488e-3	-9.078e-4
117	12	N7	0	-0.688	-0.466	0	-3.246e-3	4.798e-3
118	12	N8	0	0	0	0	-2.872e-3	-4.772e-4
119	12	N9	0	0	0	0	-1.353e-3	1.756e-3
120	12	N11	0	0	0	0	1.822e-5	5.575e-4
121	13	N1	0	0	0	-3.891e-4	6.216e-7	1.022e-7
122	13	N2	0	-0.001	0	9.439e-4	6.216e-7	-2.063e-7
123	13	N3	0	-0.002	0.398	2.439e-3	6.216e-7	2.112e-6
124	13	N4	0	-0.186	0.398	0	2.704e-3	1.288e-3
125	13	N5	0	0.117	0.398	0	3.607e-3	-9.823e-4
126	13	N6	0	-0.229	0.488	0	2.723e-3	1.295e-3
127	13	N7	0	0.15	0.518	0	3.625e-3	-9.756e-4
128	13	N8	0	0	0	0	3.235e-3	1.478e-3

Node Displacements (Continued)

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
129	13	N9	0	0	0	0	1.425e-3	-7.148e-4
130	13	N11	0	0	0	0	1.649e-4	6.672e-4
131	14	N1	0	0	0	3.797e-4	6.404e-8	1.054e-8
132	14	N2	0	-0.001	0	-9.216e-4	6.404e-8	-2.128e-8
133	14	N3	0	-0.001	-0.386	-2.33e-3	6.404e-8	2.176e-7
134	14	N4	0	0.13	-0.386	0	-2.611e-3	-1.047e-3
135	14	N5	0	-0.268	-0.386	0	-3.497e-3	2.366e-3
136	14	N6	0	0.164	-0.472	0	-2.63e-3	-1.041e-3
137	14	N7	0	-0.346	-0.502	0	-3.516e-3	2.373e-3
138	14	N8	0	0	0	0	-3.143e-3	-8.598e-4
139	14	N9	0	0	0	0	-1.366e-3	1.097e-3
140	14	N11	0	0	0	0	-1.943e-4	-2.223e-4

Member Section Forces

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1	1	M1	1	0	-0.001	0	0	0	0
2			2	0	-0.001	0	0	0	0.008
3			3	0	-0.001	0	0	0	0.015
4			4	0	0.002	0	0	0	0.009
5			5	0	0	0	0	0	0
6	1	M2	1	0	0	0	0	0	0
7			2	0	0	0	0	0	0
8			3	0	0	0	0	0	0
9			4	0	0	0	0	0	0
10			5	0	0	0	0	0	0
11	1	M3	1	0	0	0	0	0	0
12			2	0	0	0	0	0	0
13			3	0	-0.002	0	0	0	-0.014
14			4	0	-0.002	0	0	0	-0.007
15			5	0	-0.002	0	0	0	0
16	1	M4	1	3.998	0.002	0	0	0	0
17			2	3.998	0.002	0	0	0	-0.011
18			3	-0.002	0	0	0	0	-0.018
19			4	-0.002	0	0	0	0	-0.018
20			5	-0.002	0	0	0	0	-0.018
21	2	M1	1	0	1.692	0.01	0	0	0
22			2	0	-0.586	0.01	0	0.084	-4.669
23			3	0	-2.864	0.01	0	0.167	9.884
24			4	0	1.637	-0.017	0	0.099	5.953
25			5	0	0	0	0	0	0
26	2	M2	1	0	0	0	0	0	0
27			2	0	0	0	0	0	0.001
28			3	0	0	0	0	0	0.002
29			4	0	0	0	0	0	0.003
30			5	0	0	0	0	0	0
31	2	M3	1	0	0	0	0.004	0	0
32			2	0	0	0	0.004	0.001	0.001
33			3	0.017	0.642	0	0.01	0.001	5.454
34			4	0.017	0.642	0	0.01	0.001	2.727
35			5	0.017	0.642	0	0.01	0	0
36	2	M4	1	0.642	-0.632	0	0	0	0
37			2	0.642	-0.632	0	0	0.001	4.267
38			3	0.642	-0.017	0	0	0	7.15
39			4	0.642	-0.017	0	0	-0.003	7.263
40			5	0.642	-0.017	0	0	-0.006	7.377

Company   : QCE
Designer   : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
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Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
41	3	M1	1	0	0.489	0.111	0	0	0
42			2	0	0.489	-0.061	0	0.211	-4.124
43			3	0	0.489	-0.233	0	-1.031	-8.248
44			4	0	-0.859	0.153	0	-0.618	-4.876
45			5	0	0	0	0	0	0
46	3	M2	1	0	0.001	0.108	0	0	0
47			2	0	0.001	0.037	0	0.253	-0.004
48			3	0	0.001	-0.035	0	0.255	-0.009
49			4	0	0.001	-0.106	0	0.008	-0.013
50			5	0	0	0	0	0	0
51	3	M3	1	-0.178	0.003	0	-0.014	0	0
52			2	-0.287	0.003	0	-0.014	0.001	-0.011
53			3	0.238	0.858	0	-0.009	0.001	7.296
54			4	0.129	0.858	0	-0.009	0	3.648
55			5	0.019	0.858	0	-0.009	0	0
56	3	M4	1	0.858	4.371	0	0	0	0
57			2	0.858	4.722	0	0	0	-30.687
58			3	0.858	-4.251	0	0	0	-42.766
59			4	0.858	-3.9	0	0	-0.002	-15.255
60			5	0.858	-3.549	0	0	-0.004	9.885
61	4	M1	1	0	-0.488	-0.111	0	0	0
62			2	0	-0.488	0.061	0	-0.212	4.114
63			3	0	-0.488	0.233	0	1.029	8.229
64			4	0	0.857	-0.153	0	0.617	4.864
65			5	0	0	0	0	0	0
66	4	M2	1	0	-0.001	-0.108	0	0	0
67			2	0	-0.001	-0.037	0	-0.253	0.004
68			3	0	-0.001	0.035	0	-0.255	0.008
69			4	0	-0.001	0.106	0	-0.008	0.013
70			5	0	0	0	0	0	0
71	4	M3	1	0.178	0	0	0.014	0	0
72			2	0.287	0	0	0.014	-0.001	-0.001
73			3	-0.238	-0.857	0	0.009	-0.001	-7.288
74			4	-0.129	-0.857	0	0.009	0	-3.644
75			5	-0.019	-0.857	0	0.009	0	0
76	4	M4	1	-0.856	-4.362	0	0	0	0
77			2	-0.856	-4.713	0	0	0	30.628
78			3	-0.856	4.243	0	0	0	42.685
79			4	-0.856	3.892	0	0	0.002	15.227
80			5	-0.856	3.541	0	0	0.004	-9.859
81	5	M1	1	0	1.374	-0.001	0	0	0
82			2	0	-0.366	-0.001	0	-0.01	-4.253
83			3	0	-2.105	-0.001	0	-0.021	6.17
84			4	0	1.106	0.002	0	-0.012	3.731
85			5	0	0	0	0	0	0
86	5	M2	1	0	1.091	0	0	0	0
87			2	0	0.369	0	0	0	-2.554
88			3	0	-0.353	0	0	0	-2.583
89			4	0	-1.074	0	0	0	-0.086
90			5	0	0	0	0	0	0
91	5	M3	1	0	-1.796	0	-0.002	0	0
92			2	0	-1.936	0	-0.002	0.002	7.93
93			3	-0.002	0.914	0	0.006	0.002	6.576
94			4	-0.002	0.774	0	0.006	0.001	2.99
95			5	-0.002	0.633	0	0.006	0	0

Company : QCE
Designer : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
Checked By : _____

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
96	5	M4	1	6.291	0.078	0	0	0	0
97			2	5.841	0.078	0	0	0.001	-0.529
98			3	3.891	0.002	-0.001	0	0	-0.885
99			4	3.441	0.002	-0.001	0	-0.004	-0.897
100			5	2.991	0.002	-0.001	0	-0.008	-0.909
101	6	M1	1	0	1.373	-0.001	0	0	0
102			2	0	-0.367	-0.001	0	-0.011	-4.246
103			3	0	-2.106	-0.001	0	-0.021	6.185
104			4	0	1.108	0.002	0	-0.012	3.74
105			5	0	0	0	0	0	0
106	6	M2	1	0	1.091	0	0	0	0
107			2	0	0.369	0	0	0	-2.554
108			3	0	-0.353	0	0	0	-2.583
109			4	0	-1.074	0	0	0	-0.086
110			5	0	0	0	0	0	0
111	6	M3	1	0	-1.796	0	-0.002	0	0
112			2	0	-1.936	0	-0.002	0.002	7.93
113			3	-0.002	0.912	0	0.006	0.002	6.562
114			4	-0.002	0.772	0	0.006	0.001	2.983
115			5	-0.002	0.632	0	0.006	0	0
116	6	M4	1	10.29	0.08	0	0	0	0
117			2	9.84	0.08	0	0	0.001	-0.539
118			3	3.889	0.002	-0.001	0	0	-0.903
119			4	3.439	0.002	-0.001	0	-0.004	-0.915
120			5	2.989	0.002	-0.001	0	-0.008	-0.927
121	7	M1	1	0	3.066	0.009	0	0	0
122			2	0	-0.952	0.009	0	0.074	-8.919
123			3	0	-4.969	0.009	0	0.147	16.06
124			4	0	2.743	-0.015	0	0.087	9.688
125			5	0	0	0	0	0	0
126	7	M2	1	-0.001	1.09	0	0	0	0
127			2	-0.001	0.369	0	0	0	-2.553
128			3	-0.001	-0.353	0	0	0	-2.58
129			4	-0.001	-1.074	0	0	0	-0.082
130			5	0	0	0	0	0	0
131	7	M3	1	0	-1.796	0.001	0.002	0	0
132			2	0	-1.936	0.001	0.002	0.003	7.931
133			3	0.015	1.555	0	0.016	0.003	12.024
134			4	0.015	1.415	0	0.016	0.001	5.714
135			5	0.015	1.274	0	0.016	0	0
136	7	M4	1	6.933	-0.557	0	0	0	0
137			2	6.482	-0.557	0	0	0.001	3.762
138			3	4.532	-0.012	-0.001	0	0	6.297
139			4	4.082	-0.012	-0.001	0	-0.007	6.378
140			5	3.632	-0.012	-0.001	0	-0.014	6.46
141	8	M1	1	0	2.642	0.006	0	0	0
142			2	0	-0.806	0.006	0	0.052	-7.747
143			3	0	-4.254	0.006	0	0.105	13.599
144			4	0	2.335	-0.011	0	0.062	8.205
145			5	0	0	0	0	0	0
146	8	M2	1	-0.001	1.09	0	0	0	0
147			2	-0.001	0.369	0	0	0	-2.553
148			3	-0.001	-0.353	0	0	0	-2.581
149			4	-0.001	-1.074	0	0	0	-0.083
150			5	0	0	0	0	0	0

Company   : QCE
Designer   : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
Checked By : _____

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
151	8	M3	1	0	-1.796	0.001	0.001	0	0
152			2	0	-1.936	0.001	0.001	0.003	7.931
153			3	0.011	1.394	0	0.013	0.003	10.652
154			4	0.011	1.253	0	0.013	0.001	5.028
155			5	0.011	1.113	0	0.013	0	0
156	8	M4	1	9.771	-0.397	0	0	0	0
157			2	9.321	-0.397	0	0	0.001	2.68
158			3	4.371	-0.009	-0.001	0	0	4.487
159			4	3.921	-0.009	-0.001	0	-0.006	4.545
160			5	3.47	-0.009	-0.001	0	-0.013	4.604
161	9	M1	1	0	1.904	0.076	0	0	0
162			2	0	-0.072	-0.044	0	0.134	-7.73
163			3	0	-2.047	-0.165	0	-0.748	1.21
164			4	0	0.653	0.11	0	-0.448	0.811
165			5	0	0	0	0	0	0
166	9	M2	1	-0.001	1.239	0.076	0	0	0
167			2	-0.001	0.42	0.026	0	0.177	-2.904
168			3	-0.001	-0.4	-0.024	0	0.179	-2.939
169			4	-0.001	-1.219	-0.074	0	0.006	-0.106
170			5	0	0	0	0	0	0
171	9	M3	1	-0.124	-2.038	0.001	-0.012	0	0
172			2	-0.201	-2.197	0.001	-0.012	0.003	8.999
173			3	0.164	1.642	0	0	0.002	12.601
174			4	0.087	1.482	0	0	0.001	5.962
175			5	0.011	1.323	0	0	0	0
176	9	M4	1	7.749	3.163	0	0	0	0
177			2	7.237	3.409	0	0	0.001	-22.178
178			3	5.022	-2.986	-0.001	0	0	-31.074
179			4	4.511	-2.74	-0.001	0	-0.006	-11.747
180			5	4	-2.495	-0.001	0	-0.012	5.92
181	10	M1	1	0	1.217	-0.079	0	0	0
182			2	0	-0.758	0.041	0	-0.158	-1.937
183			3	0	-2.734	0.162	0	0.7	12.796
184			4	0	1.859	-0.105	0	0.42	7.66
185			5	0	0	0	0	0	0
186	10	M2	1	0	1.238	-0.076	0	0	0
187			2	0	0.418	-0.026	0	-0.177	-2.898
188			3	0	-0.401	0.024	0	-0.179	-2.927
189			4	0	-1.221	0.074	0	-0.006	-0.088
190			5	0	0	0	0	0	0
191	10	M3	1	0.124	-2.04	0	0.007	0	0
192			2	0.201	-2.199	0	0.007	0.001	9.009
193			3	-0.169	0.435	0	0.013	0.001	2.341
194			4	-0.092	0.275	0	0.013	0.001	0.832
195			5	-0.016	0.116	0	0.013	0	0
196	10	M4	1	6.544	-2.98	0	0	0	0
197			2	6.033	-3.226	0	0	0.001	20.946
198			3	3.817	2.986	0	0	0	29.022
199			4	3.306	2.74	0	0	-0.003	9.695
200			5	2.795	2.495	0	0	-0.006	-7.973
201	11	M1	1	0	3.04	0.064	0	0	0
202			2	0	-0.585	-0.026	0	0.161	-10.354
203			3	0	-4.211	-0.116	0	-0.441	9.88
204			4	0	1.995	0.07	0	-0.265	6.016
205			5	0	0	0	0	0	0

Company : QCE
Designer : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
Checked By : _____

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
206	11	M2	1	-0.001	1.202	0.057	0	0	0
207			2	-0.001	0.407	0.019	0	0.133	-2.816
208			3	-0.001	-0.388	-0.018	0	0.134	-2.848
209			4	-0.001	-1.183	-0.056	0	0.004	-0.099
210			5	0	0	0	0	0	0
211	11	M3	1	-0.093	-1.978	0.001	-0.007	0	0
212			2	-0.151	-2.132	0.001	-0.007	0.003	8.734
213			3	0.135	1.94	0	0.009	0.003	15.172
214			4	0.078	1.785	0	0.009	0.002	7.257
215			5	0.02	1.63	0	0.009	0	0
216	11	M4	1	10.864	1.916	0	0	0	0
217			2	10.368	2.101	0	0	0.001	-13.557
218			3	5.219	-2.25	-0.001	0	0	-18.155
219			4	4.723	-2.065	-0.001	0	-0.008	-3.592
220			5	4.227	-1.881	-0.001	0	-0.016	9.726
221	12	M1	1	0	2.525	-0.052	0	0	0
222			2	0	-1.1	0.038	0	-0.058	-6.009
223			3	0	-4.726	0.129	0	0.646	18.57
224			4	0	2.9	-0.091	0	0.386	11.153
225			5	0	0	0	0	0	0
226	12	M2	1	-0.001	1.201	-0.057	0	0	0
227			2	-0.001	0.406	-0.019	0	-0.133	-2.811
228			3	-0.001	-0.389	0.018	0	-0.134	-2.839
229			4	-0.001	-1.184	0.056	0	-0.004	-0.085
230			5	0	0	0	0	0	0
231	12	M3	1	0.093	-1.979	0.001	0.008	0	0
232			2	0.151	-2.134	0.001	0.008	0.002	8.74
233			3	-0.114	1.034	0	0.019	0.002	7.473
234			4	-0.057	0.879	0	0.019	0.001	3.408
235			5	0.001	0.724	0	0.019	0	0
236	12	M4	1	9.96	-2.692	0	0	0	0
237			2	9.464	-2.877	0	0	0.001	18.796
238			3	4.315	2.231	-0.001	0	0	26.929
239			4	3.819	2.046	-0.001	0	-0.006	12.494
240			5	3.323	1.862	-0.001	0	-0.011	-0.697
241	13	M1	1	0	0.98	0.077	0	0	0
242			2	0	0.173	-0.043	0	0.142	-4.865
243			3	0	-0.635	-0.164	0	-0.732	-2.918
244			4	0	-0.089	0.108	0	-0.439	-1.686
245			5	0	0	0	0	0	0
246	13	M2	1	0	0.507	0.076	0	0	0
247			2	0	0.172	0.026	0	0.177	-1.189
248			3	0	-0.163	-0.024	0	0.179	-1.205
249			4	0	-0.498	-0.074	0	0.006	-0.049
250			5	0	0	0	0	0	0
251	13	M3	1	-0.124	-0.832	0	-0.011	0	0
252			2	-0.201	-0.897	0	-0.011	0.001	3.674
253			3	0.166	1.026	0	-0.004	0.001	8.169
254			4	0.089	0.961	0	-0.004	0.001	3.946
255			5	0.012	0.896	0	-0.004	0	0
256	13	M4	1	3.522	3.101	0	0	0	0
257			2	3.313	3.347	0	0	0.001	-21.761
258			3	2.407	-2.979	0	0	0	-30.394
259			4	2.198	-2.734	0	0	-0.003	-11.113
260			5	1.989	-2.488	0	0	-0.007	6.509

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
261	14	M1	1	0	0.296	-0.078	0	0	0
262			2	0	-0.512	0.042	0	-0.152	0.912
263			3	0	-1.319	0.163	0	0.712	8.637
264			4	0	1.115	-0.106	0	0.427	5.145
265			5	0	0	0	0	0	0
266	14	M2	1	0	0.505	-0.076	0	0	0
267			2	0	0.17	-0.026	0	-0.177	-1.183
268			3	0	-0.165	0.024	0	-0.179	-1.193
269			4	0	-0.499	0.074	0	-0.006	-0.031
270			5	0	0	0	0	0	0
271	14	M3	1	0.124	-0.834	0	0.009	0	0
272			2	0.201	-0.899	0	0.009	0	3.682
273			3	-0.168	-0.177	0	0.009	0	-2.06
274			4	-0.091	-0.242	0	0.009	0	-1.169
275			5	-0.014	-0.308	0	0.009	0	0
276	14	M4	1	2.32	-3.024	0	0	0	0
277			2	2.111	-3.27	0	0	0	21.243
278			3	1.206	2.977	0	0	0	29.535
279			4	0.997	2.732	0	0	0	10.267
280			5	0.788	2.486	0	0	-0.001	-7.341

Maximum Member Section Forces

	LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
1	1	M1	max	0	33.75	0.002	30.938	0	30.938	0	33.75	0	33.75	0.018	19.688
2			min	0	20.039	-0.001	0	0	0	0	0	0	19.688	0	0
3	1	M2	max	0	14	0	11.229	0	14	0	14	0	14	0	14
4			min	0	0	0	11.375	0	0	0	0	0	0	0	11.229
5	1	M3	max	0	5.49	0	5.49	0	5.49	0	17	0	5.49	0	17
6			min	0	5.667	-0.002	5.667	0	5.667	0	0	0	0	-0.018	5.667
7	1	M4	max	3.998	11.25	0.002	11.25	0	11.25	0	27	0	11.25	0	0
8			min	-0.002	11.531	0	11.531	0	11.531	0	0	0	27	-0.018	27
9	2	M1	max	0	33.75	3.06	20.039	0.01	19.688	0	33.75	0.195	19.688	19.007	19.688
10			min	0	20.039	-3.623	19.688	-0.017	20.039	0	0	0	0	-5.303	6.328
11	2	M2	max	0	14	0	14	0	14	0	14	0	14	0.004	11.229
12			min	0	0	0	0	0	0	0	0	0	0	0	0
13	2	M3	max	0.017	17	0.642	17	0	5.49	0.01	17	0.002	5.49	7.271	5.667
14			min	0	0	0	0	0	5.667	0.004	0	0	0	0	0
15	2	M4	max	0.642	27	-0.017	27	0	11.25	0	27	0.001	11.25	7.377	27
16			min	0.642	0	-0.632	0	0	11.531	0	0	-0.006	27	0	0
17	3	M1	max	0	33.75	0.489	19.688	0.261	20.039	0	33.75	0.302	5.273	0	33.75
18			min	0	20.039	-0.859	20.039	-0.291	19.688	0	0	-1.768	19.688	-9.623	19.688
19	3	M2	max	0	14	0.001	11.229	0.108	0	0	14	0.285	5.25	0	14
20			min	0	0	0	11.375	-0.121	11.229	0	0	-0.075	11.229	-0.014	11.229
21	3	M3	max	0.311	5.667	0.858	17	0	5.49	-0.009	17	0.001	5.49	9.728	5.667
22			min	-0.319	5.49	0.003	0	0	5.667	-0.014	0	0	0	-0.014	5.49
23	3	M4	max	0.858	27	4.956	11.25	0	11.25	0	27	0.001	11.25	9.885	27
24			min	0.858	0	-4.354	11.531	0	11.531	0	0	-0.004	27	-52.462	11.25
25	4	M1	max	0	30.938	0.857	30.938	0.291	19.688	0	33.75	1.766	19.688	9.6	19.688
26			min	0	0	-0.488	0	-0.261	20.039	0	0	-0.302	5.273	0	0
27	4	M2	max	0	11.229	0	14	0.121	11.229	0	14	0.075	11.229	0.014	11.229
28			min	0	11.375	-0.001	0	-0.108	0	0	0	-0.285	5.25	0	0
29	4	M3	max	0.319	5.49	0	5.49	0	17	0.014	5.49	0	17	0	17
30			min	-0.311	5.667	-0.857	5.667	0	0	0.009	5.667	-0.001	5.49	-9.717	5.667
31	4	M4	max	-0.856	10.969	4.346	11.531	0	27	0	27	0.004	27	52.363	11.25
32			min	-0.856	11.25	-4.947	11.25	0	0	0	0	-0.001	11.25	-9.859	27

Company : QCE
Designer : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
Checked By : _____

Maximum Member Section Forces (Continued)

	LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
33	5	M1	max	0	33.75	2.193	20.039	0.002	30.938	0	33.75	0	33.75	12.907	19.688
34			min	0	20.039	-2.685	19.688	-0.001	0	0	0	-0.024	19.688	-4.577	6.68
35	5	M2	max	0	14	1.091	0	0	14	0	14	0	14	0.752	11.229
36			min	0	0	-1.224	11.229	0	0	0	0	0	0	-2.884	5.25
37	5	M3	max	0	5.49	1.008	5.667	0	5.49	0.006	17	0.002	5.49	10.355	5.49
38			min	-0.002	5.667	-1.977	5.49	0	5.667	-0.002	0	0	0	0	0
39	5	M4	max	6.291	0	0.078	11.25	0	11.25	0	27	0.001	11.25	0	0
40			min	2.991	27	0.002	11.531	-0.001	11.531	0	0	-0.008	27	-0.909	27
41	6	M1	max	0	33.75	2.195	20.039	0.002	30.938	0	33.75	0	33.75	12.925	19.688
42			min	0	20.039	-2.686	19.688	-0.001	0	0	0	-0.025	19.688	-4.571	6.68
43	6	M2	max	0	14	1.091	0	0	14	0	14	0	14	0.752	11.229
44			min	0	0	-1.224	11.229	0	0	0	0	0	0	-2.884	5.25
45	6	M3	max	0	5.49	1.006	5.667	0	5.49	0.006	17	0.002	5.49	10.355	5.49
46			min	-0.002	5.667	-1.977	5.49	0	5.667	-0.002	0	0	0	0	0
47	6	M4	max	10.29	0	0.08	11.25	0	11.25	0	27	0.001	11.25	0	0
48			min	2.989	27	0.002	11.531	-0.001	11.531	0	0	-0.008	27	-0.927	27
49	7	M1	max	0	33.75	5.254	20.039	0.009	19.688	0	33.75	0.172	19.688	31.921	19.688
50			min	0	20.039	-6.308	19.688	-0.015	20.039	0	0	0	0	-9.866	6.328
51	7	M2	max	0	14	1.09	0	0	14	0	14	0	14	0.756	11.229
52			min	-0.001	0	-1.225	11.229	0	0	0	0	0	0	-2.882	5.25
53	7	M3	max	0.015	17	1.649	5.667	0.001	5.49	0.016	17	0.004	5.49	16.563	5.667
54			min	0	0	-1.977	5.49	0	5.667	0.002	0	0	0	0	0
55	7	M4	max	6.933	0	-0.012	27	0	11.25	0	27	0.002	11.25	6.46	27
56			min	3.632	27	-0.557	0	-0.001	11.531	0	0	-0.014	27	0	0
57	8	M1	max	0	33.75	4.49	20.039	0.006	19.688	0	33.75	0.122	19.688	27.181	19.688
58			min	0	20.039	-5.403	19.688	-0.011	20.039	0	0	0	0	-8.536	6.328
59	8	M2	max	0	14	1.09	0	0	14	0	14	0	14	0.755	11.229
60			min	-0.001	0	-1.225	11.229	0	0	0	0	0	0	-2.883	5.25
61	8	M3	max	0.011	17	1.487	5.667	0.001	5.49	0.013	17	0.003	5.49	14.733	5.667
62			min	0	0	-1.977	5.49	0	5.667	0.001	0	0	0	0	0
63	8	M4	max	9.771	0	-0.009	27	0	11.25	0	27	0.002	11.25	4.604	27
64			min	3.47	27	-0.397	0	-0.001	11.531	0	0	-0.013	27	0	0
65	9	M1	max	0	33.75	1.904	0	0.185	20.039	0	33.75	0.203	5.273	7.895	19.688
66			min	0	20.039	-2.706	19.688	-0.205	19.688	0	0	-1.268	19.688	-7.74	8.086
67	9	M2	max	0	14	1.239	0	0.076	0	0	14	0.2	5.25	0.845	11.229
68			min	-0.001	0	-1.39	11.229	-0.085	11.229	0	0	-0.052	11.229	-3.28	5.25
69	9	M3	max	0.215	5.667	1.748	5.667	0.001	5.49	0	17	0.003	5.49	17.404	5.667
70			min	-0.223	5.49	-2.244	5.49	0	5.667	-0.012	0	0	0	0	0
71	9	M4	max	7.749	0	3.572	11.25	0	11.25	0	27	0.002	11.25	5.92	27
72			min	4	27	-3.058	11.531	-0.001	11.531	0	0	-0.012	27	-37.885	11.25
73	10	M1	max	0	33.75	3.094	20.039	0.202	19.688	0	33.75	1.212	19.688	21.412	19.688
74			min	0	20.039	-3.393	19.688	-0.18	20.039	0	0	-0.218	5.625	-3.163	5.273
75	10	M2	max	0	14	1.238	0	0.085	11.229	0	14	0.052	11.229	0.864	11.229
76			min	0	0	-1.392	11.229	-0.076	0	0	0	-0.2	5.25	-3.271	5.25
77	10	M3	max	0.223	5.49	0.541	5.667	0	5.49	0.013	17	0.002	5.49	11.764	5.49
78			min	-0.22	5.667	-2.246	5.49	0	5.667	0.007	0	0	0	0	0
79	10	M4	max	6.544	0	3.058	11.531	0	11.25	0	27	0.001	11.25	35.832	11.25
80			min	2.795	27	-3.39	11.25	0	11.531	0	0	-0.006	27	-7.973	27
81	11	M1	max	0	33.75	4.261	20.039	0.126	20.039	0	33.75	0.193	5.977	23.423	19.688
82			min	0	20.039	-5.419	19.688	-0.147	19.688	0	0	-0.811	19.688	-10.751	7.031
83	11	M2	max	0	14	1.202	0	0.057	0	0	14	0.15	5.25	0.824	11.229
84			min	-0.001	0	-1.349	11.229	-0.064	11.229	0	0	-0.039	11.229	-3.18	5.25
85	11	M3	max	0.174	5.667	2.043	5.667	0.001	5.49	0.009	17	0.004	5.49	20.814	5.667
86			min	-0.168	5.49	-2.178	5.49	0	5.667	-0.007	0	0	0	0	0
87	11	M4	max	10.864	0	2.216	10.969	0	10.969	0	27	0.002	11.25	9.726	27

Company : QCE
Designer : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
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Maximum Member Section Forces (Continued)

	LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
88			min	4.227	27	-2.311	11.25	-0.001	11.25	0	0	-0.016	27	-23.285	11.25
89	12	M1	max	0	33.75	5.166	20.039	0.159	19.688	0	33.75	1.05	19.688	33.562	19.688
90			min	0	20.039	-5.934	19.688	-0.148	20.039	0	0	-0.127	4.922	-7.416	5.977
91	12	M2	max	0	14	1.201	0	0.064	11.229	0	14	0.039	11.229	0.839	11.229
92			min	-0.001	0	-1.35	11.229	-0.057	0	0	0	-0.15	5.25	-3.173	5.25
93	12	M3	max	0.168	5.49	1.137	5.667	0.001	5.49	0.019	17	0.003	5.49	11.413	5.49
94			min	-0.152	5.667	-2.179	5.49	0	5.667	0.008	0	0	0	0	0
95	12	M4	max	9.96	0	2.285	11.531	0	11.25	0	27	0.002	11.25	32.018	11.25
96			min	3.323	27	-3	11.25	-0.001	11.531	0	0	-0.011	27	-0.697	27
97	13	M1	max	0	33.75	0.98	0	0.184	20.039	0	33.75	0.208	5.273	0.327	30.938
98			min	0	20.039	-0.904	19.688	-0.204	19.688	0	0	-1.25	19.688	-5.021	10.195
99	13	M2	max	0	14	0.507	0	0.076	0	0	14	0.2	5.25	0.34	11.229
100			min	0	0	-0.568	11.229	-0.085	11.229	0	0	-0.052	11.229	-1.343	5.25
101	13	M3	max	0.217	5.667	1.07	5.667	0	5.49	-0.004	17	0.002	5.49	11.138	5.667
102			min	-0.223	5.49	-0.916	5.49	0	5.667	-0.011	0	0	0	0	0
103	13	M4	max	3.522	0	3.511	11.25	0	11.25	0	27	0.001	11.25	6.509	27
104			min	1.989	27	-3.051	11.531	0	11.531	0	0	-0.007	27	-37.19	11.25
105	14	M1	max	0	33.75	1.619	20.039	0.203	19.688	0	33.75	1.226	19.688	12.726	19.688
106			min	0	20.039	-1.588	19.688	-0.182	20.039	0	0	-0.214	5.625	-0.456	3.164
107	14	M2	max	0	14	0.505	0	0.085	11.229	0	14	0.052	11.229	0.359	11.229
108			min	0	0	-0.569	11.229	-0.076	0	0	0	-0.2	5.25	-1.334	5.25
109	14	M3	max	0.223	5.49	-0.134	5.667	0	5.49	0.009	17	0	5.49	4.809	5.49
110			min	-0.219	5.667	-0.918	5.49	0	5.667	0.009	0	0	0	-2.501	5.667
111	14	M4	max	2.32	0	3.049	11.531	0	11.25	0	27	0	11.25	36.326	11.25
112			min	0.788	27	-3.434	11.25	0	11.531	0	0	-0.001	27	-7.341	27

Member End Reactions

	LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1	1	M1	I	0	-0.001	0	0	0	0
2			J	0	0	0	0	0	0
3	1	M2	I	0	0	0	0	0	0
4			J	0	0	0	0	0	0
5	1	M3	I	0	0	0	0	0	0
6			J	0	-0.002	0	0	0	0
7	1	M4	I	3.998	0.002	0	0	0	0
8			J	-0.002	0	0	0	0	-0.018
9	2	M1	I	0	1.692	0.01	0	0	0
10			J	0	0	0	0	0	0
11	2	M2	I	0	0	0	0	0	0
12			J	0	0	0	0	0	0
13	2	M3	I	0	0	0	0.004	0	0
14			J	0.017	0.642	0	0.01	0	0
15	2	M4	I	0.642	-0.632	0	0	0	0
16			J	0.642	-0.017	0	0	-0.006	7.377
17	3	M1	I	0	0.489	0.111	0	0	0
18			J	0	0	0	0	0	0
19	3	M2	I	0	0.001	0.108	0	0	0
20			J	0	0	0	0	0	0
21	3	M3	I	-0.178	0.003	0	-0.014	0	0
22			J	0.019	0.858	0	-0.009	0	0
23	3	M4	I	0.858	4.371	0	0	0	0
24			J	0.858	-3.549	0	0	-0.004	9.885
25	4	M1	I	0	-0.488	-0.111	0	0	0
26			J	0	0	0	0	0	0
27	4	M2	I	0	-0.001	-0.108			

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Job Number :
Model Name :

Member End Reactions (Continued)

	LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
28			J	0	0	0	0	0	0
29	4	M3	I	0.178	0	0	0.014	0	0
30			J	-0.019	-0.857	0	0.009	0	0
31	4	M4	I	-0.856	-4.362	0	0	0	0
32			J	-0.856	3.541	0	0	0.004	-9.859
33	5	M1	I	0	1.374	-0.001	0	0	0
34			J	0	0	0	0	0	0
35	5	M2	I	0	1.091	0	0	0	0
36			J	0	0	0	0	0	0
37	5	M3	I	0	-1.796	0	-0.002	0	0
38			J	-0.002	0.633	0	0.006	0	0
39	5	M4	I	6.291	0.078	0	0	0	0
40			J	2.991	0.002	-0.001	0	-0.008	-0.909
41	6	M1	I	0	1.373	-0.001	0	0	0
42			J	0	0	0	0	0	0
43	6	M2	I	0	1.091	0	0	0	0
44			J	0	0	0	0	0	0
45	6	M3	I	0	-1.796	0	-0.002	0	0
46			J	-0.002	0.632	0	0.006	0	0
47	6	M4	I	10.29	0.08	0	0	0	0
48			J	2.989	0.002	-0.001	0	-0.008	-0.927
49	7	M1	I	0	3.066	0.009	0	0	0
50			J	0	0	0	0	0	0
51	7	M2	I	-0.001	1.09	0	0	0	0
52			J	0	0	0	0	0	0
53	7	M3	I	0	-1.796	0.001	0.002	0	0
54			J	0.015	1.274	0	0.016	0	0
55	7	M4	I	6.933	-0.557	0	0	0	0
56			J	3.632	-0.012	-0.001	0	-0.014	6.46
57	8	M1	I	0	2.642	0.006	0	0	0
58			J	0	0	0	0	0	0
59	8	M2	I	-0.001	1.09	0	0	0	0
60			J	0	0	0	0	0	0
61	8	M3	I	0	-1.796	0.001	0.001	0	0
62			J	0.011	1.113	0	0.013	0	0
63	8	M4	I	9.771	-0.397	0	0	0	0
64			J	3.47	-0.009	-0.001	0	-0.013	4.604
65	9	M1	I	0	1.904	0.076	0	0	0
66			J	0	0	0	0	0	0
67	9	M2	I	-0.001	1.239	0.076	0	0	0
68			J	0	0	0	0	0	0
69	9	M3	I	-0.124	-2.038	0.001	-0.012	0	0
70			J	0.011	1.323	0	0	0	0
71	9	M4	I	7.749	3.163	0	0	0	0
72			J	4	-2.495	-0.001	0	-0.012	5.92
73	10	M1	I	0	1.217	-0.079	0	0	0
74			J	0	0	0	0	0	0
75	10	M2	I	0	1.238	-0.076	0	0	0
76			J	0	0	0	0	0	0
77	10	M3	I	0.124	-2.04	0	0.007	0	0
78			J	-0.016	0.116	0	0.013	0	0
79	10	M4	I	6.544	-2.98	0	0	0	0
80			J	2.795	2.495	0	0	-0.006	-7.973
81	11	M1	I	0	3.04	0.064	0	0	0
82			J	0	0	0	0	0	0

			6/7/2023
Company	: QCE		9:49:02 AM
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Job Number	:		
Model Name	:		

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Member End Reactions (Continued)

	LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
83	11	M2	I	-0.001	1.202	0.057	0	0	0
84			J	0	0	0	0	0	0
85	11	M3	I	-0.093	-1.978	0.001	-0.007	0	0
86			J	0.02	1.63	0	0.009	0	0
87	11	M4	I	10.864	1.916	0	0	0	0
88			J	4.227	-1.881	-0.001	0	-0.016	9.726
89	12	M1	I	0	2.525	-0.052	0	0	0
90			J	0	0	0	0	0	0
91	12	M2	I	-0.001	1.201	-0.057	0	0	0
92			J	0	0	0	0	0	0
93	12	M3	I	0.093	-1.979	0.001	0.008	0	0
94			J	0.001	0.724	0	0.019	0	0
95	12	M4	I	9.96	-2.692	0	0	0	0
96			J	3.323	1.862	-0.001	0	-0.011	-0.697
97	13	M1	I	0	0.98	0.077	0	0	0
98			J	0	0	0	0	0	0
99	13	M2	I	0	0.507	0.076	0	0	0
100			J	0	0	0	0	0	0
101	13	M3	I	-0.124	-0.832	0	-0.011	0	0
102			J	0.012	0.896	0	-0.004	0	0
103	13	M4	I	3.522	3.101	0	0	0	0
104			J	1.989	-2.488	0	0	-0.007	6.509
105	14	M1	I	0	0.296	-0.078	0	0	0
106			J	0	0	0	0	0	0
107	14	M2	I	0	0.505	-0.076	0	0	0
108			J	0	0	0	0	0	0
109	14	M3	I	0.124	-0.834	0	0.009	0	0
110			J	-0.014	-0.308	0	0.009	0	0
111	14	M4	I	2.32	-3.024	0	0	0	0
112			J	0.788	2.486	0	0	-0.001	-7.341

Beam Deflections

	LC	Member Label	Span	Location [ft]	y' [in]	(n) L'/y' Ratio
1	1	M1	1	19.688	0	NC
2			2	33.75	-0.001	NC
3	1	M2	1	14	0	NC
4	1	M3	1	5.49	0	NC
5			2	17	0	NC
6	2	M1	1	19.688	0.001	NC
7			2	33.75	-0.355	945
8	2	M2	1	14	0	NC
9	2	M3	1	5.49	0	NC
10			2	17	-0.145	1906
11	3	M1	1	11.25	-0.059	4044
12			2	33.75	0.354	949
13	3	M2	1	14	0	NC
14	3	M3	1	5.49	0	NC
15			2	17	-0.194	1424
16	4	M1	1	11.25	0.058	4053
17			2	33.75	-0.353	951
18	4	M2	1	14	0	NC
19	4	M3	1	5.49	0	NC
20			2	17	0.194	1426
21	5	M1	1	7.383	-0.025	9370
22			2	33.75	-0.212	1582

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Company : QCE
Designer : MKS
Job Number :
Model Name :

6/7/2023
9:49:02 AM
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Beam Deflections (Continued)

	LC	Member Label	Span	Location [ft]	y' [in]	(n) L'/y' Ratio
23	5	M2	1	14	0.042	7912
24	5	M3	1	0	-0.049	2673
25			2	17	-0.175	1576
26	6	M1	1	7.383	-0.025	9404
27			2	33.75	-0.213	1577
28	6	M2	1	14	0.042	7912
29	6	M3	1	0	-0.049	2673
30			2	17	-0.175	1579
31	7	M1	1	7.031	-0.048	4941
32			2	33.75	-0.568	591
33	7	M2	1	14	0.042	7918
34	7	M3	1	0	-0.049	2672
35			2	17	-0.32	863
36	8	M1	1	7.031	-0.042	5613
37			2	33.75	-0.48	700
38	8	M2	1	14	0.042	7916
39	8	M3	1	0	-0.049	2672
40			2	17	-0.283	974
41	9	M1	1	9.141	-0.066	3614
42			2	25.313	0.01	NC
43	9	M2	1	14	0.048	6954
44	9	M3	1	0	-0.056	2355
45			2	17	-0.335	823
46	10	M1	1	15.117	0.032	7444
47			2	33.75	-0.49	686
48	10	M2	1	14	0.048	6978
49	10	M3	1	0	-0.056	2353
50			2	17	-0.063	4401
51	11	M1	1	8.086	-0.071	3351
52			2	33.75	-0.315	1068
53	11	M2	1	14	0.047	7174
54	11	M3	1	0	-0.054	2427
55			2	17	-0.403	684
56	12	M1	1	16.172	0.032	7447
57			2	33.75	-0.688	488
58	12	M2	1	14	0.047	7194
59	12	M3	1	0	-0.054	2425
60			2	17	-0.199	1387
61	13	M1	1	9.844	-0.05	4726
62			2	33.75	0.15	2245
63	13	M2	1	3.792	0.001	NC
64	13	M3	1	0	-0.023	5769
65			2	17	-0.217	1271
66	14	M1	1	13.359	0.035	6777
67			2	33.75	-0.346	970
68	14	M2	1	3.792	0.001	NC
69	14	M3	1	0	-0.023	5756
70			2	17	0.054	5064

AISC 15TH (360-16): ASD Member Steel Code Checks

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
1	1	M3	W10X33	0	17	0	5.49	z	129.682	290.719	34.93	96.806	1.885	H1-1b*
2	1	M4	W16X67	0.023	11.25	0	11.25	y	170.388	586.826	88.573	219.402	1.13	H1-1b*
3	2	M3	W10X33	0.075	5.667	0.016	17	y	129.682	290.719	34.93	96.806	1.887	H1-1b
4	2	M4	W16X67	0.036	27	0.005	11.25	y	170.388	586.826	88.573	219.25	1.13	H1-1b

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Company   : QCE
Designer   : MKS
Job Number :
Model Name :

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AISC 15TH (360-16): ASD Member Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
5	3	M3	W10X33	0.102	5.667	0.019	17	y	129.682	290.719	34.93	96.806	1.886	H1-1b
6	3	M4	W16X67	0.184	11.25	0.038	11.25	y	170.388	586.826	88.573	289.257	1.49	H1-1b
7	4	M3	W10X33	0.101	5.667	0.019	17	y	129.682	290.719	34.93	96.806	1.887	H1-1b
8	4	M4	W16X67	0.182	11.25	0.038	11.25	y	170.388	586.826	88.573	289.259	1.49	H1-1b
9	5	M3	W10X33	0.107	5.49	0.036	5.49	y	129.682	290.719	34.93	96.806	1.524	H1-1b
10	5	M4	W16X67	0.037	0	0.001	11.25	y	170.388	586.826	88.573	218.573	1.126	H1-1b*
11	6	M3	W10X33	0.107	5.49	0.036	5.49	y	129.682	290.719	34.93	96.806	1.525	H1-1b
12	6	M4	W16X67	0.06	0	0.001	11.25	y	170.388	586.826	88.573	218.574	1.126	H1-1b*
13	7	M3	W10X33	0.171	5.667	0.036	5.667	y	129.682	290.719	34.93	96.806	1.587	H1-1b
14	7	M4	W16X67	0.047	11.25	0.004	11.25	y	170.388	586.826	88.573	218.418	1.125	H1-1b
15	8	M3	W10X33	0.152	5.667	0.035	5.49	y	129.682	290.719	34.93	96.806	1.557	H1-1b
16	8	M4	W16X67	0.057	0	0.003	11.25	y	170.388	586.826	88.573	218.456	1.125	H1-1b*
17	9	M3	W10X33	0.181	5.667	0.045	5.49	y	129.682	290.719	34.93	96.806	1.567	H1-1b
18	9	M4	W16X67	0.152	11.25	0.028	11.25	y	170.388	586.826	88.573	286.541	1.476	H1-1b
19	10	M3	W10X33	0.122	5.49	0.043	5.49	y	129.682	290.719	34.93	96.806	2.153	H1-1b
20	10	M4	W16X67	0.139	11.25	0.026	11.25	y	170.388	586.826	88.573	292.139	1.505	H1-1b
21	11	M3	W10X33	0.216	5.667	0.042	5.49	y	129.682	290.719	34.93	96.806	1.619	H1-1b
22	11	M4	W16X67	0.105	11.25	0.018	11.25	y	170.388	586.826	88.573	309.944	1.597	H1-1b
23	12	M3	W10X33	0.119	5.49	0.042	5.49	y	129.682	290.719	34.93	96.806	1.504	H1-1b
24	12	M4	W16X67	0.143	11.25	0.023	11.25	y	170.388	586.826	88.573	275.83	1.421	H1-1b
25	13	M3	W10X33	0.116	5.667	0.021	5.49	y	129.682	290.719	34.93	96.806	1.67	H1-1b
26	13	M4	W16X67	0.138	11.25	0.027	11.25	y	170.388	586.826	88.573	288.12	1.484	H1-1b
27	14	M3	W10X33	0.051	5.49	0.02	5.49	y	129.682	290.719	34.93	96.806	1.726	H1-1b
28	14	M4	W16X67	0.131	11.25	0.027	11.25	y	170.388	586.826	88.573	290.412	1.496	H1-1b

AWC NDS-18: ASD Member Wood Code Checks

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Fc' [ksi]	Ft' [ksi]	Fb1' [ksi]	Fb2' [ksi]	Fv' [ksi]	RB	CL	CP	Eqn
1	1	M1	5.125X21FS	0	19.688	0	30.938	y	1.355	1.1	2.16	1.45	0.265	17.995	0.9	0.847	3.9-3
2	1	M2	5.125X21FS	0	11.229	0	11.229	y	1.577	1.1	2.363	1.45	0.265	4.38	0.998	0.985	3.9-1
3	2	M1	5.125X21FS	0.299	19.688	0.191	19.688	y	1.355	1.1	2.16	1.45	0.265	17.995	0.9	0.847	3.9-3
4	2	M2	5.125X21FS	0	11.229	0	11.229	y	1.577	1.1	2.347	1.45	0.265	11.59	0.978	0.985	3.9-1
5	3	M1	5.125X21FS	0.334	19.688	0.05	30.938	y	1.254	0.99	1.948	1.305	0.239	4.38	0.998	0.871	3.9-3
6	3	M2	5.125X21FS	0.029	5.25	0.008	11.229	z	1.421	0.99	2.127	1.305	0.207	4.38	0.998	0.987	3.9-1
7	4	M1	5.125X21FS	0.335	19.688	0.05	30.938	y	1.254	0.99	1.948	1.305	0.239	17.995	0.92	0.871	3.9-3
8	4	M2	5.125X21FS	0.029	5.25	0.008	11.229	z	1.421	0.99	2.119	1.305	0.207	11.59	0.981	0.987	3.9-3
9	5	M1	5.125X21FS	0.214	19.688	0.157	19.688	y	1.254	0.99	1.948	1.305	0.239	17.995	0.92	0.871	3.9-3
10	5	M2	5.125X21FS	0.043	5.25	0.072	11.229	y	1.421	0.99	2.127	1.305	0.239	4.38	0.998	0.987	3.9-3
11	6	M1	5.125X21FS	0.193	19.688	0.141	19.688	y	1.355	1.1	2.16	1.45	0.265	17.995	0.9	0.847	3.9-3
12	6	M2	5.125X21FS	0.039	5.25	0.064	11.229	y	1.577	1.1	2.363	1.45	0.265	4.38	0.998	0.985	3.9-3
13	7	M1	5.125X21FS	0.442	19.688	0.289	19.688	y	1.484	1.265	2.382	1.667	0.305	17.995	0.863	0.806	3.9-3
14	7	M2	5.125X21FS	0.034	5.25	0.056	11.229	y	1.809	1.265	2.718	1.667	0.305	4.38	0.997	0.983	3.9-3
15	8	M1	5.125X21FS	0.374	19.688	0.247	19.688	y	1.484	1.265	2.382	1.667	0.305	17.995	0.863	0.806	3.9-3
16	8	M2	5.125X21FS	0.034	5.25	0.056	11.229	y	1.809	1.265	2.718	1.667	0.305	4.38	0.997	0.983	3.9-3
17	9	M1	5.125X21FS	0.163	19.688	0.089	19.688	y	1.736	1.76	2.773	2.32	0.424	17.995	0.722	0.678	3.9-3
18	9	M2	5.125X21FS	0.039	5.25	0.046	11.229	y	2.496	1.76	3.781	2.32	0.424	4.38	0.996	0.975	3.9-3
19	10	M1	5.125X21FS	0.318	19.688	0.112	19.688	y	1.736	1.76	2.773	2.32	0.424	17.995	0.722	0.678	3.9-3
20	10	M2	5.125X21FS	0.039	5.25	0.046	11.229	y	2.496	1.76	3.781	2.32	0.424	4.38	0.996	0.975	3.9-3
21	11	M1	5.125X21FS	0.317	19.688	0.178	19.688	y	1.736	1.76	2.773	2.32	0.424	17.995	0.722	0.678	3.9-3
22	11	M2	5.125X21FS	0.035	5.25	0.044	11.229	y	2.496	1.76	3.781	2.32	0.424	4.38	0.996	0.975	3.9-3
23	12	M1	5.125X21FS	0.452	19.688	0.195	19.688	y	1.736	1.76	2.773	2.32	0.424	17.995	0.722	0.678	3.9-3
24	12	M2	5.125X21FS	0.035	5.25	0.044	11.229	y	2.496	1.76	3.781	2.32	0.424	4.38	0.996	0.975	3.9-3
25	13	M1	5.125X21FS	0.077	19.688	0.032	0	y	1.736	1.76	3.463	2.32	0.424	4.38	0.996	0.678	3.9-3
26	13	M2	5.125X21FS	0.023	5.25	0.019	11.229	y	2.496	1.76	3.781	2.32	0.424	4.38	0.996	0.975	3.9-3
27	14	M1	5.125X21FS	0.216	19.688	0.053	20.039	y	1.736	1.76	2.773	2.32	0.424	17.995	0.722	0.678	3.9-3
28	14	M2	5.125X21FS	0.022	5.25	0.019	11.229	y	2.496	1.76	3.781	2.32	0.424	4.38	0.996	0.975	3.9-3

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N11	max	0	11	3.066	7	0.111	4	0	14	0	14	0	14
2		min	0	4	-0.488	4	-0.111	3	0	1	0	1	0	1
3	N9	max	0	11	11.73	7	0.558	4	0	14	0	14	0	14
4		min	0	4	-1.348	3	-0.559	3	0	1	0	1	0	1
5	N8	max	0.001	11	1.239	9	0.108	4	0	14	0	14	0	14
6		min	0	4	-0.001	4	-0.108	3	0	1	0	1	0	1
7	N1	max	0	11	10.864	11	4.371	3	0	14	0	14	0	14
8		min	0	4	-0.856	4	-4.362	4	0	1	0	1	0	1
9	N2	max	0	4	0	14	9.312	4	0	14	0	14	0	14
10		min	-0.001	11	0	1	-9.32	3	0	1	0	1	0	1
11	Totals:	max	0	11	24.937	12	5.727	4						
12		min	0	4	0	3	-5.727	3						

Envelope Node Displacements

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N1	max	0	4	0	4	0	4	5.475e-4	4	1.455e-6	11	2.378e-7	11
2		min	0	11	0	11	0	3	-5.486e-4	3	-3.964e-7	4	-6.552e-8	4
3	N2	max	0	11	0	4	0	3	1.331e-3	3	1.455e-6	11	1.322e-7	4
4		min	0	4	-0.003	11	0	4	-1.329e-3	4	-3.964e-7	4	-4.799e-7	11
5	N3	max	0	4	0.001	4	0.559	3	3.403e-3	3	1.455e-6	11	4.929e-6	11
6		min	0	11	-0.005	11	-0.558	4	-3.396e-3	4	-3.964e-7	4	-1.349e-6	4
7	N4	max	0	4	0.225	4	0.559	3	0	14	3.793e-3	3	1.666e-3	3
8		min	0	11	-0.227	9	-0.558	4	0	1	-3.785e-3	4	-1.664e-3	4
9	N5	max	0	4	0.275	3	0.56	3	0	14	5.07e-3	3	4.768e-3	12
10		min	0	11	-0.529	12	-0.558	4	0	1	-5.06e-3	4	-2.39e-3	3
11	N6	max	0	4	0.28	4	0.685	3	0	14	3.82e-3	3	1.666e-3	3
12		min	0	11	-0.28	3	-0.684	4	0	1	-3.812e-3	4	-1.664e-3	4
13	N7	max	0	4	0.354	3	0.727	3	0	14	5.097e-3	3	4.798e-3	12
14		min	0	11	-0.688	12	-0.726	4	0	1	-5.087e-3	4	-2.39e-3	3
15	N8	max	0	4	0	4	0	3	0	14	4.552e-3	3	1.928e-3	9
16		min	0	11	0	9	0	4	0	1	-4.544e-3	4	-1.665e-3	4
17	N9	max	0	4	0	3	0	3	0	14	1.991e-3	3	1.756e-3	12
18		min	0	11	0	7	0	4	0	1	-1.986e-3	4	-1.293e-3	3
19	N11	max	0	4	0	4	0	3	0	14	2.834e-4	11	1.227e-3	11
20		min	0	11	0	7	0	4	0	1	-2.603e-4	4	-6.335e-4	4

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1	M1	1	max	0	14	3.066	7	0.111	3	0	14	0	14	0	14
2			min	0	1	-0.488	4	-0.111	4	0	1	0	1	0	1
3		2	max	0	14	0.489	3	0.061	4	0	14	0.211	3	4.114	4
4			min	0	1	-1.1	12	-0.061	3	0	1	-0.212	4	-10.354	11
5		3	max	0	14	0.489	3	0.233	4	0	14	1.029	4	18.57	12
6			min	0	1	-4.969	7	-0.233	3	0	1	-1.031	3	-8.248	3
7		4	max	0	4	2.9	12	0.153	3	0	14	0.617	4	11.153	12
8			min	0	11	-0.859	3	-0.153	4	0	1	-0.618	3	-4.876	3
9		5	max	0	14	0	14	0	14	0	14	0	14	0	14
10			min	0	1	0	1	0	1	0	1	0	1	0	1
11	M2	1	max	0	4	1.239	9	0.108	3	0	14	0	14	0	14
12			min	-0.001	11	-0.001	4	-0.108	4	0	1	0	1	0	1
13		2	max	0	4	0.42	9	0.037	3	0	14	0.253	3	0.004	4
14			min	-0.001	11	-0.001	4	-0.037	4	0	1	-0.253	4	-2.904	9

Company : QCE
Designer : MKS
Job Number :
Model Name :

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Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
15		3	max	0	4	0.001	3	0.035	4	0	14	0.255	3	0.008	4
16			min	-0.001	11	-0.401	10	-0.035	3	0	1	-0.255	4	-2.939	9
17		4	max	0	4	0.001	3	0.106	4	0	14	0.008	3	0.013	4
18			min	-0.001	11	-1.221	10	-0.106	3	0	1	-0.008	4	-0.106	9
19		5	max	0	14	0	14	0	14	0	14	0	14	0	14
20			min	0	1	0	1	0	1	0	1	0	1	0	1
21	M3	1	max	0.178	4	0.003	3	0.001	11	0.014	4	0	14	0	14
22			min	-0.178	3	-2.04	10	0	4	-0.014	3	0	1	0	1
23		2	max	0.287	4	0.003	3	0.001	11	0.014	4	0.003	11	9.009	10
24			min	-0.287	3	-2.199	10	0	4	-0.014	3	-0.001	4	-0.011	3
25		3	max	0.238	3	1.94	11	0	4	0.019	12	0.003	11	15.172	11
26			min	-0.238	4	-0.857	4	0	11	-0.009	3	-0.001	4	-7.288	4
27		4	max	0.129	3	1.785	11	0	4	0.019	12	0.002	11	7.257	11
28			min	-0.129	4	-0.857	4	0	11	-0.009	3	0	4	-3.644	4
29		5	max	0.02	11	1.63	11	0	4	0.019	12	0	14	0	14
30			min	-0.019	4	-0.857	4	0	11	-0.009	3	0	1	0	1
31	M4	1	max	10.864	11	4.371	3	0	11	0	14	0	14	0	14
32			min	-0.856	4	-4.362	4	0	4	0	1	0	1	0	1
33		2	max	10.368	11	4.722	3	0	11	0	14	0.001	11	30.628	4
34			min	-0.856	4	-4.713	4	0	4	0	1	0	4	-30.687	3
35		3	max	5.219	11	4.243	4	0	4	0	14	0	4	42.685	4
36			min	-0.856	4	-4.251	3	-0.001	11	0	1	0	11	-42.766	3
37		4	max	4.723	11	3.892	4	0	4	0	14	0.002	4	15.227	4
38			min	-0.856	4	-3.9	3	-0.001	11	0	1	-0.008	11	-15.255	3
39		5	max	4.227	11	3.541	4	0	4	0	14	0.004	4	9.885	3
40			min	-0.856	4	-3.549	3	-0.001	11	0	1	-0.016	11	-9.859	4

Envelope Member End Reactions

	Member	Member End		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1	M1	I	max	0	14	3.066	7	0.111	3	0	14	0	14	0	14
2			min	0	1	-0.488	4	-0.111	4	0	1	0	1	0	1
3		J	max	0	14	0	14	0	14	0	14	0	14	0	14
4			min	0	1	0	1	0	1	0	1	0	1	0	1
5	M2	I	max	0	4	1.239	9	0.108	3	0	14	0	14	0	14
6			min	-0.001	11	-0.001	4	-0.108	4	0	1	0	1	0	1
7		J	max	0	14	0	14	0	14	0	14	0	14	0	14
8			min	0	1	0	1	0	1	0	1	0	1	0	1
9	M3	I	max	0.178	4	0.003	3	0.001	11	0.014	4	0	14	0	14
10			min	-0.178	3	-2.04	10	0	4	-0.014	3	0	1	0	1
11		J	max	0.02	11	1.63	11	0	4	0.019	12	0	14	0	14
12			min	-0.019	4	-0.857	4	0	11	-0.009	3	0	1	0	1
13	M4	I	max	10.864	11	4.371	3	0	11	0	14	0	14	0	14
14			min	-0.856	4	-4.362	4	0	4	0	1	0	1	0	1
15		J	max	4.227	11	3.541	4	0	4	0	14	0.004	4	9.885	3
16			min	-0.856	4	-3.549	3	-0.001	11	0	1	-0.016	11	-9.859	4

Envelope Maximum Member Section Forces

	Member		Axial[k]	Loc[ft]	LC	y Shear[k]	Loc[ft]	LC	z Shear[k]	Loc[ft]	LC	Torque[k-ft]	Loc[ft]	LC	y-y Moment[k-ft]	Loc[ft]	LC	z-z Moment[k-ft]	Loc[ft]	LC
1	M1	max	0	30.938	4	5.254	20.039	7	0.291	19.688	4	0	33.75	14	1.766	19.688	4	33.562	19.688	12
2		min	0	20.039	11	-6.308	19.688	7	-0.291	19.688	3	0	0	1	-1.768	19.688	3	-10.751	7.031	11
3	M2	max	0	11.229	4	1.239	0	9	0.121	11.229	4	0	14	14	0.285	5.25	3	0.864	11.229	10
4		min	-0.001	0	11	-1.392	11.229	10	-0.121	11.229	3	0	0	1	-0.285	5.25	4	-3.28	5.25	9
5	M3	max	0.319	5.49	4	2.043	5.667	11	0.001	5.49	11	0.019	17	12	0.004	5.49	11	20.814	5.667	11

Envelope Maximum Member Section Forces (Continued)

	Member		Axial[k]	Loc[ft]	LC	y Shear[k]	Loc[ft]	LC	z Shear[k]	Loc[ft]	LC	Torque[k-ft]	Loc[ft]	LC	y-y Moment[k-ft]	Loc[ft]	LC	z-z Moment[k-ft]	Loc[ft]	LC
6		min	-0.319	5.49	3	-2.246	5.49	10	0	5.667	11	-0.014	0	3	-0.001	5.49	4	-9.717	5.667	4
7	M4	max	10.864	0	11	4.956	11.25	3	0	27	4	0	27	14	0.004	27	4	52.363	11.25	4
8		min	-0.856	11.25	4	-4.947	11.25	4	-0.001	11.25	11	0	0	1	-0.016	27	11	-52.462	11.25	3

Material Take-Off

	Material	Size	Pieces	Length[ft]	Weight[K]
1	Hot Rolled Steel				
2	A992	W10X33	1	17	0.562
3	A992	W16X67	1	27	1.801
4	Total HR Steel		2	44	2.362
5					
6	Wood				
7	24F-1.8E DF Balanced	5.125X21FS	2	47.8	1.249
8	Total Wood		2	47.8	1.249

HONG AND KAO RESIDENCE
5425 W. Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 23127.01

LATERAL DESIGN – MAIN HOUSE

Seismic Base Shear for the Equivalent Lateral Force Procedure

Per IBC 2021 & ASCE 7-16

Structure:	**Hong-Koa Residence**		
Address:	**5425 W. Mercer Way Mercer Island, WA 98040**		
Latitude:	**47.5540**	Longitude:	**-122.2320**

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: **3** per ASCE Table 12.2-1

C_d: **4** per ASCE Table 12.2-1

h_n (ft): **32.00** height above the base to the highest level of the structure

Site Ground Motion

Reg. Structure/5 Stories Max: **Yes** **S_{ds} (max) = 1.0** Per ASCE 12.8.1.3

S_1 (g-sec): **0.51** S_S (g-sec): **1.45**

Site Class: **D** **Per Geotechnical Report** per ASCE 11.4.3

F_v **1.79** F_a **1.00**

S_{M1} (g-sec): **0.91** S_{MS} (g-sec): **1.45** per ASCE 11.4.4

S_{D1} (g-sec): **0.61** S_{DS} (g-sec): **0.97** per ASCE 11.4.5

SDC: **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 22-14 through 22-17

T_s: 0.63

T_a (sec): 0.27 $C_t * h_n^x$ per ASCE Eq. 12.8-7

T_{use} (sec): **0.27** $<= T_L$

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}: 0.35 $= S_{D1} / (T_a*R/I_E)$ for $T <= T_L$ per ASCE Eq. 12.8-3

C_{s-max}: -- $= S_{D1}*T_L / (T_a^2*R/I_E)$ for $T > T_L$ per ASCE Eq. 12.8-4

C_{s-min}: 0.04 per ASCE Eq. 12.8-5

C_{s-min}: -- $= 0.5S_1 / (R/I_E)$ for $S_1 => 0.6g$ per ASCE Eq. 12.8-6

C_{s-use}: 0.15

V : 0.149 W = C_{S-use} * W per ASCE Eq. 12.8-1

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

Per IBC 2021 & ASCE 7-16

Structure: **Hong-Koa Residence**

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):	0.27	per ASCE 12.8.2.1
k:	1.00	per ASCE 12.8.3

Vertical Distribution of Seismic Forces per ASCE 12.8.3

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

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

Level	h_x (ft)	w_x (k)	% of W_{total}	$w_x * h_x^k$	C_{vx} (%)	F_x (k)	V_x (k)	F_x/w_x
High Roof	32.00	80.7	17.7%	2583.4	30.2%	20.45	20.45	0.253
Upper Floor	21.00	202.2	44.4%	4246.6	49.7%	33.61	54.06	0.166
Main Floor	10.00	172.2	37.8%	1722.1	20.1%	13.63	67.69	0.079

Total WT (k):	455.16	Sum:	8552
C_{s-use}:	0.149		
V (k):	**67.69**	per ASCE 12.8.1	

Vertical Distribution of Seismic Diaphragm Forces per ASCE 12.10.1.1

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

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

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

Level	w_{px} (k)	Σw_i (k)	F_x (k)	ΣF_i (k)	F_{px} (k)	Notes	Diaphragm/Story Force Ratio
High Roof	80.73	80.73	20.45	20.45	**20.45**		1.000
Upper Floor	202.22	282.95	33.61	54.06	**39.10**	= Fp-min	1.163
Main Floor	172.21	455.16	13.63	67.69	**33.29**	= Fp-min	2.443

Wind Loads Criteria

Per IBC 2021 & ASCE 7-16

Wind Load Criteria

Risk Category:	**II**	Table 1.5-1	Roof Type:	**Flat**	<=3deg
Basic Wind Speed:	**97**	Figure 26.5.1	Roof Slope:	**0.0:12**	0.0 DEG
Exposure Category:	**C**	Section 26.7.3	Mean Roof HT:	**31.0 ft**	UP TO 160FT
Ground Elevation:	**35 ft**		Parapet:	**Yes**	
Wall Ht:	**31.0 ft**		Parapet Elevation:	**32.0 ft**	UP TO 160FT

Wind Topographic Factor, K_{zt}:

per Section 26.8
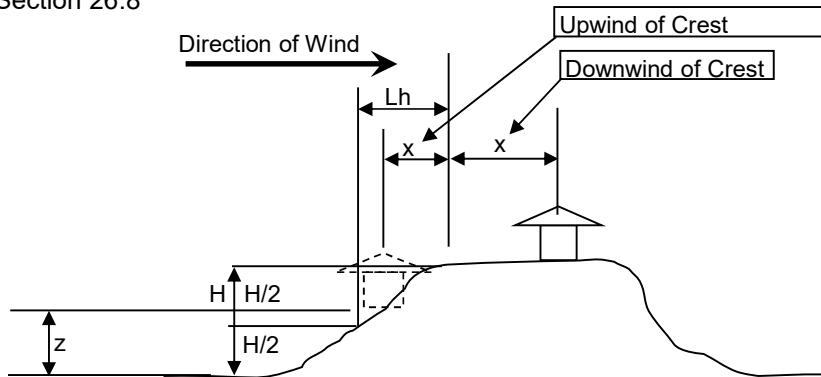
Terrain Type:	**Per Local Jurisdiction**
Direction:	**Upwind of Crest**

L_h:		*DIST UPWIND OF CREST TO HALF HT OF HILL OR ESCARP.*
H:		*HT. OF HILL OR ESCARP. RELATIVE TO THE UPWIND TERRAIN*
X:		*DIST. (UPWIND OR DOWNWIND) FROM THE CREST TO THE BUILDING*
Z:		*HEIGHT ABOVE GROUND SURFACE AT BUILDING SITE*

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

K_e: **0.999** ASCE 26.10.1

K_d: **0.85** ASCE 26.6

Wind Loads - Main Wind Force Resisting System

Per IBC 2021 & ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, h<160ft

Wind Load Criteria

Risk Category:	**II**	Table 1.5-1	K_e:	**0.9987**	Section 26.10.1
Basic Wind Speed:	**97 mph**	Figure 26.5.1	K_d:	**0.85**	Section 26.6
Exposure Category:	**C**	Section 26.7.3	G:	**0.85**	Section 26.11
K_{zt}:	**1.00**	Section 26.8	Wall Height:	**31.0 ft**	
			Parapet Elevation:	**32.0 ft**	

Wall Pressures:

L/B Ratio:

Short Dimension:	**62.0 ft**
Long Dimension:	**80.0 ft**
Transverse Wind L/B:	0.78
Longitudinal Wind L/B:	1.29
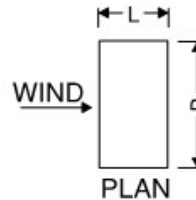
*NOTE: INTERNAL BUILDING PRESSURE CANCEL
EACH OTHER OUT IN ENCLOSED BUILDING

K_h & K_z:	0.989	At Top of Wall
K_z:	0.85	0 ft to 15 ft
Kp:	1.00	At Top of Parapet
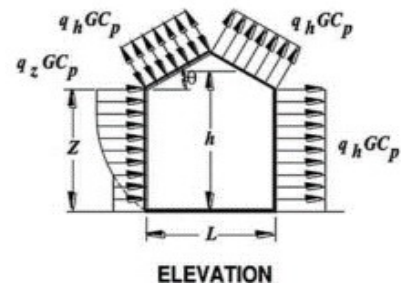
	Transverse Wind Direction	Longitudinal Wind Direction	
Top of Wall:	**22.3 psf**	**21.3 psf**	ASCE EQ 27.3-1
0 ft to 15 ft Wall:	**20.4 psf**	**19.4 psf**	ASCE EQ 27.3-1

Parapet: 50.9 psf (Parapet)   ASCE EQ 27.3-3

*Enveloped Leeward and Windward Pressure
*All Values Ultimate (multiply x0.6 for ASD)

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

ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, h<160ft

Roof Pressure:

Slope:	0.0:12	=	0.0	DEGREES
Mean Roof HT:	31.0 ft			
Building Dimension:	**62.0 ft**	**Parallel to Ridge**		
Building Dimension:	**80.0 ft**	**Normal to Ridge**		
K_h & K_z:	0.989	At Mean Roof Ht		

FLAT ROOF   *tal*

Windward Pressure

	LC 1	LC 2		LC 1	LC 2
0 to h/2	-19.1 psf	0.5 psf		0.0 psf	0.0 psf
h/2 to h	-19.1 psf	0.5 psf		0.0 psf	0.0 psf
h to 2h	-12.2 psf	0.5 psf		0.0 psf	0.0 psf
>2h	-8.8 psf	0.5 psf		0.0 psf	0.0 psf

*Negative indicates pressure away from surface
*Total horizontal shear shall not be less than that determined by neglecting roof wind forces
*All Values Ultimate (multiply x0.6 for ASD)

Roof Overhang (PSF)

P_{ovh}: **-32.9 psf**   **0.0 psf**

Minimum Total Projected Horizontal Pressure (PSF)   **8.0 psf**   ASCE 27.1.5

Wind Loads - Components and Cladding
Per IBC 2021 & ASCE 7-16 Chapter 30.3 & 30.5 - Part 1 and Part 3 Enclosed Buildings With h<160 FT

Wind Load Criteria
Risk Category:	**II**	Table 1.5-1	K_d:	**0.85**	Section 26.6	
Basic Wind Speed:	**97 mph**	Figure 26.5.1	Roof Type:	**Flat**		
Exposure Category:	**C**	Section 26.7.3	Roof Slope:	**0.0:12**	=	0.0 DEG
K_{zt}:	**1.00**	Section 26.8	Mean Roof Height:	**31.0 ft**		
K_e:	**1.00**	Section 26.10.1	Wall Height:	**31.0 ft**	Parapet Height:	**1.0 ft**

Zone Dimensions
Least Horiz. BLDG Dimension: **62 ft** a: **6.2 ft**
2a: **12.4 ft**

Wall Pressures
K_z: 0.850 Table 26.10-1 0-15 ft (PART 3)
K_h: 0.989 Table 26.10-1

Effective Wind Area: Zone 4:
Zone 5:

	At Top of Wall		0 FT TO 15 FT (>60' bldg)	
Load Case	4	5	4	5
1	**21.8**	**21.8**		
2	**-23.7**	**-29.1**		

*Negative indicates pressure away from surface
*Okay to interpolate between 15ft and top of wall (>60' bldg)
*All Values Ultimate (multiply x0.6 for ASD)

ELEVATION
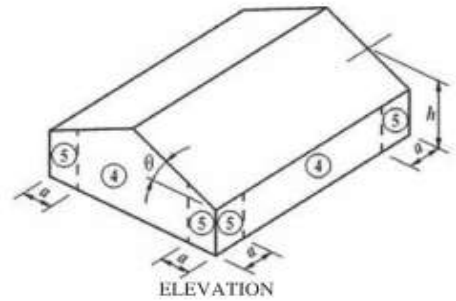
Roof Pressures
K_h: 0.989 Table 26.10-1
Overhang?: **No**

Effective Wind Area:
Zone 1: Zone 2: Zone 3:
Zone 1': Zone 2e: Zone 3e:
Zone 2n: Zone 3r:
Zone 2r: Zone 3':
Zone 2':

Zone (PSF)
Load Case	1	1'
1	**9.7**	**9.7**
2	**-38.0**	**-14.6**

Load Case	2	2e	2n	2r	2'
1	**9.7**	-	-	-	-
2	**-50.2**	-	-	-	-

Load Case	3	3e	3r	3'
1	**9.7**	-	-	-
2	**-68.4**	-	-	-

*Negative indicates pressure away from surface
*All Values Ultimate (multiply x0.6 for ASD)

	Zone 4	Zone 5
Parapet Pressures --------------------→ Windward:	**72.0**	**90.2**
Leeward:	**45.5**	**51.0**

Wind Loads - Components and Cladding (Cont.)

ASCE 7-16 Chapter 30 - Part 4 Enclosed Buildings With h<160 FT (Simplified)
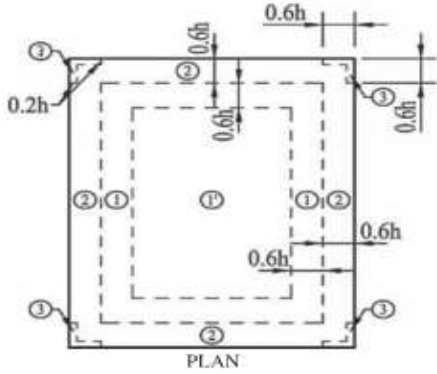
ASCE FIG 30.3-2A
FLAT/GABLE ROOF θ <= 7°
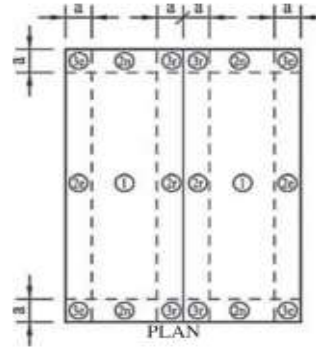
ASCE FIG 30.3-2B to D
GABLE ROOF 7°< θ <= 45°
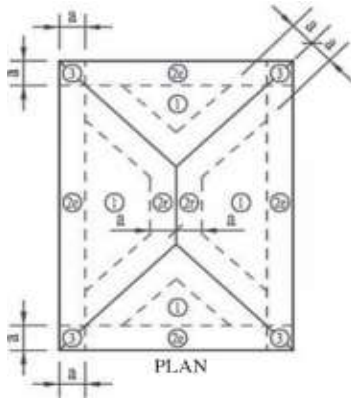
ASCE FIG 30.3-2E to I
HIP ROOF 7°< θ <= 45°
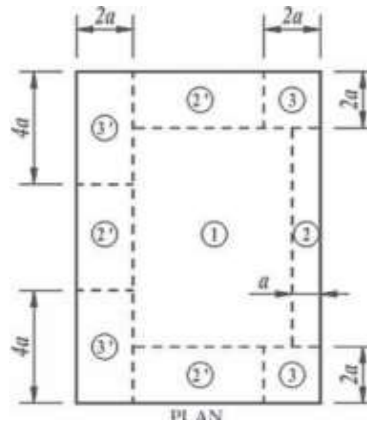
ASCE FIG 30.3-5A
Monoslope ROOF 3°< θ <= 10°
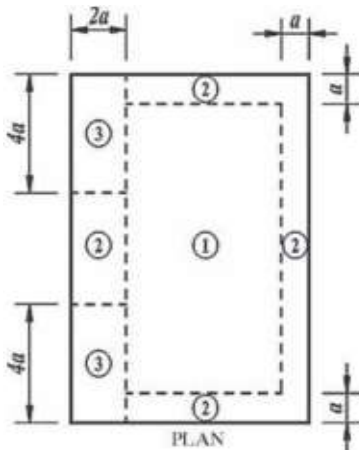
ASCE FIG 30.3-5B
Monoslope ROOF 10°< θ <= 30°
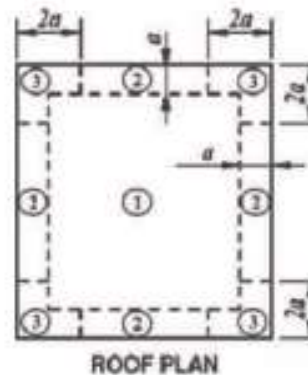
ASCE FIG 30.5-1
ROOF H > 60ft, θ <= 7°

Seismic Weight

At High Roof:
Roof = 2105 sf
Veneer = 795 sf
Weight = 2105*24+795*38 = 80730 lb

At Low Roof/Second Floor:
Roof = 1528 sf
Roof w/ Gravel = 970 sf
Floor = 1978 sf
Deck = 77+376 = 453 sf
Veneer = 633+1247 = 1880 sf
Weight = 1528*24+970*35+1978*24
+453*28+1880*38 = 202218 lb

At Main Floor:
Floor = 3930 sf
Deck = 510 sf
Veneer = 1674 sf
Weight = 3930*24+510*28
+1674*38 = 172212 lb

Base Shear = (80.7+202.2+172.2)*0.149 = 67.8 K
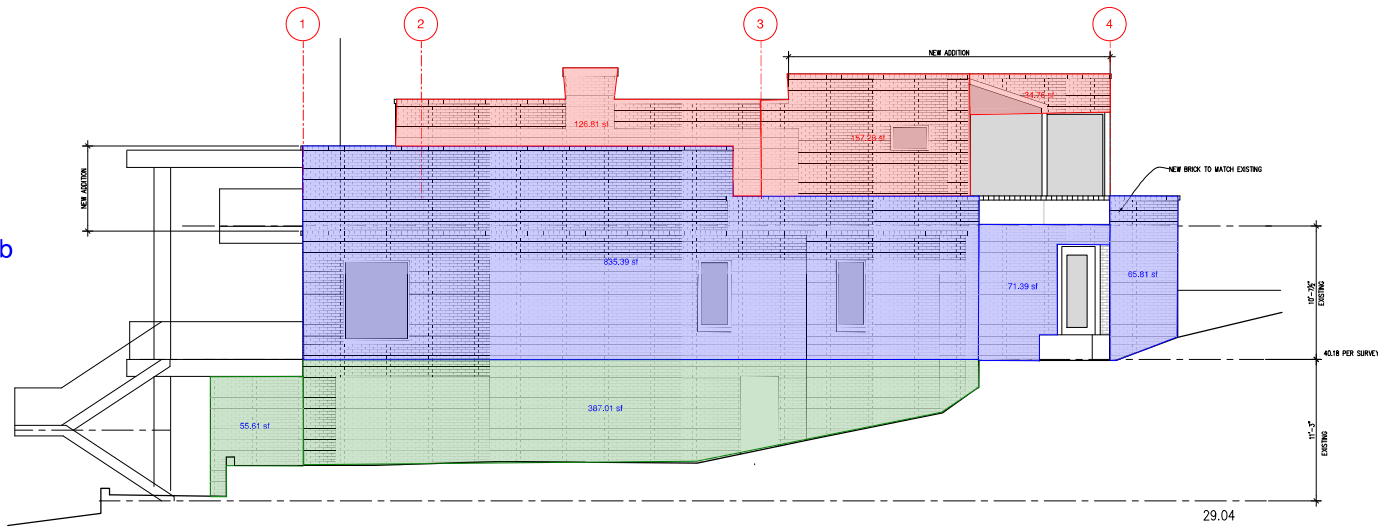
SOUTH ELEVATION
1/4" = 1'-0"
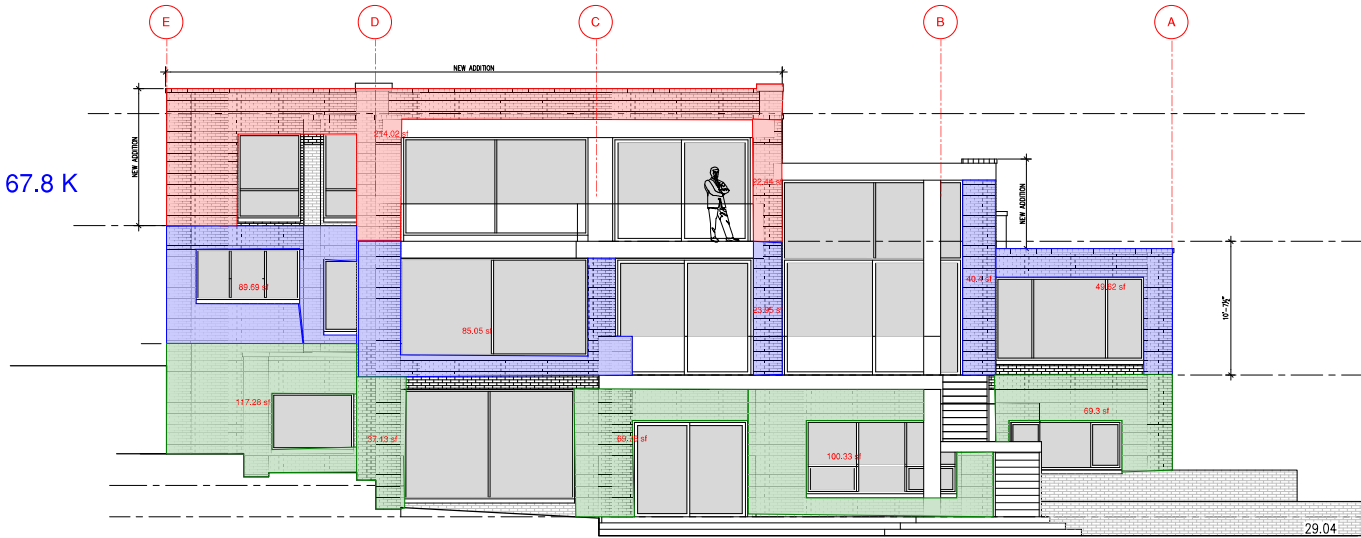
No.   Date   Revision

NEW ADDITION

NEW BRICK TO MATCH EXISTING

PRELIMINARY NOT FOR CONSTRUCTION

ELEVATIONS

Sheet No.   5.0
Project No.   2222

N-S Wind Tributary Area

At High Roof:
Grid 3 = 222/2+265/8 = 144
Grid 4 = 265/4 +265/8 = 99

At Low Roof/Second Floor:
Grid 3 = 222+611/2+265/2+362/4 = 751
Grid 4 = 265/2+362/4+66/2 = 256

At Main Floor:
Grid 3 = 222+611+355/2+
265/2+362/4+91/2 = 1279

Base Shear = 1600*20.4/1000 = 32.6 K
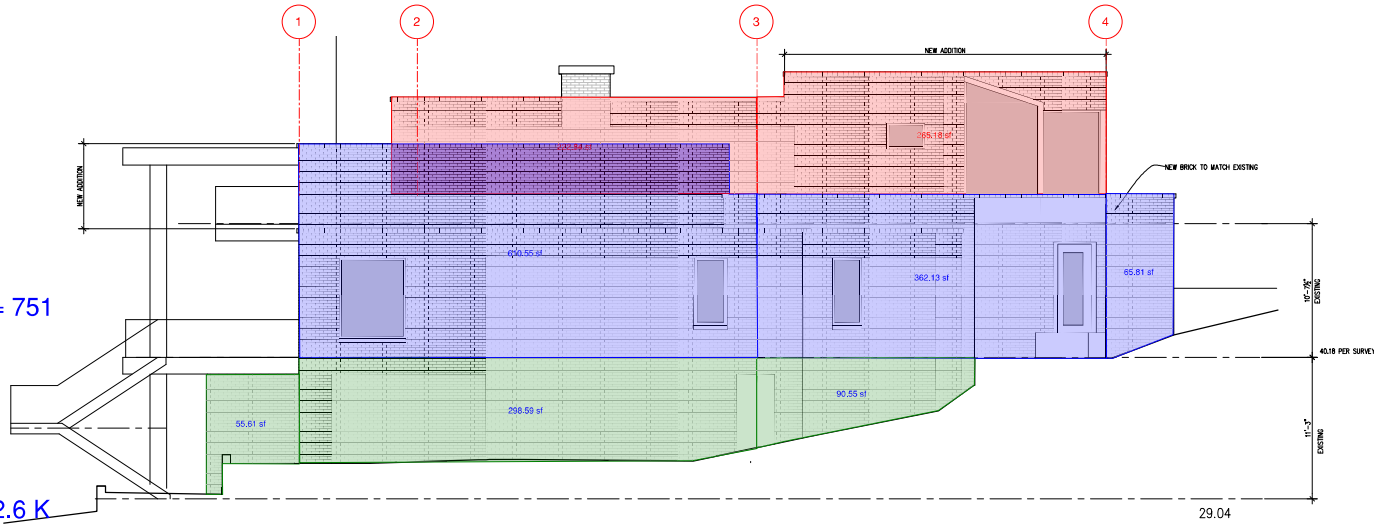
E-W Wind Tributary Area

At High Roof:
Grid C = 578/4 = 145
Grid E = 578/4 = 145

At Low Roof/Second Floor:
Grid A = 141/4 = 35
Grid B = (286+141)/4 = 107
Grid C = 578/2 + (286+362)/4 = 451
Grid D = (142+362)/4 = 126
Grid E = 578/2 + 142/4 = 325

At Main Floor:
Grid A = 141/2+161/4 = 111
Grid B = (286+141)/2 + (189+161)/4 = 301
Grid C = 578/2 + (286+362)/2 + (372+189)/4 = 754
Grid D = (142+362)/2 + (372+147)/4 = 382
Grid E = 578/2 + 142/2 + 147/4 = 397

Base Shear = 1820*21.4/1000 = 38.9 K

SOUTH ELEVATION
1/4" = 1'-0"

NEW ADDITION
NEW BRICK TO MATCH EXISTING
29.04

No. Date Revision
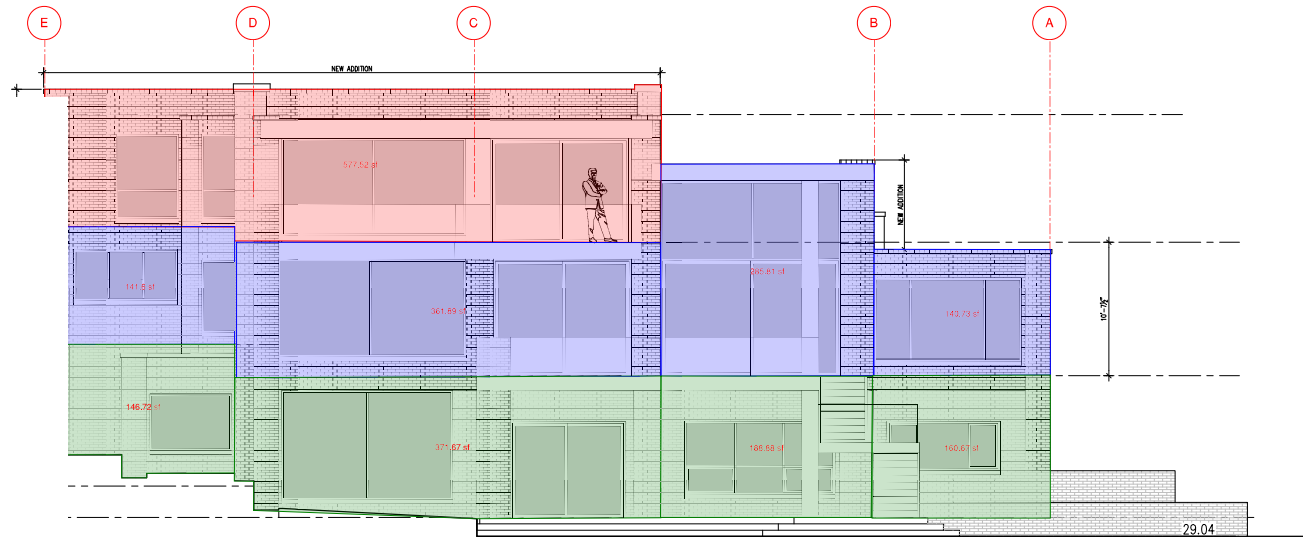
Shear Wall Loads

Structure: **Hong & Kao Residence - Main House**

Seismic Loads:

Dead Load at Roof:	**24 psf**
Roof Snow Load:	**30 psf**
Seismic Snow Load:	**0.0 psf**
Dead Load at Floor:	**24 psf**
Load at Deck:	**22 psf**
Veneer:	**38 psf**

Wind Loads:

Wall Load (E-W):	**21.4 psf**
Wall Load (N-S):	**20.4 psf**
Projected Roof Load:	**8.0 psf**

$C_{v,roof}$:	**0.253**
$C_{v,upper}$:	**0.166**
$C_{v,main}$:	**0.079**

Basement Floor Shear Walls:

SW Grid (N-S)	Seismic Tributary (sf) Roof	Floor	Deck	Veneer	EQ (lb)	Wind Tributary (sf) Wall	Roof	Wind (lb)
					0			0
					0			0
Grid 3	4101	4367	886	1398	54354	1279	0	26092
					0			0
					0			0
					0			0
(E-W)								
Grid A	369	334	0	114	2446	111	0	2375
Grid B	1007	915	255	225	12110	301	0	6441
					0			0
Grid C	1934	1593	631	332	22488	754	0	16136
Grid D	0	888	0	242	5064	382	0	8175
Grid E	1402	1114	0	305	14875	397	0	8496

Main Floor Shear Walls:

SW Grid (N-S)	Seismic Tributary (sf) Roof	Floor	Deck	Veneer	EQ (lb)	Wind Tributary (sf) Wall	Roof	Wind (lb)
					0			0
					0			0
Grid 3	3995	1416	376	704	35713	751	0	15320
Grid 4	1211	562	78	300	11769	256	0	5222
					0			0
					0			0
(E-W)								
Grid A	369	0	0	74	1937	35	0	749
Grid B	1007	0	0	177	7231	107	0	2290
					0			0
Grid C	1934	990	265	305	18579	451	0	9651
Grid D	527	495	188	151	6811	126	0	2696
Grid E	770	495	0	254	8250	325	0	6955

Quantum Consulting Engineers LLC
1511 Third Avenue, Suite 323
Seattle, WA 98101

Upper Floor Shear Walls:

SW Grid	Seismic Tributary (sf)					Wind Tributary (sf)		
(N-S)	Roof	Floor	Deck	Veneer	EQ (lb)	Wall	Roof	Wind (lb)
Grid 3	1332	0	0	329	11251	144	0	2938
					0			0
Grid 4	774	0	0	199	6613	99	0	2020
					0			0
					0			0
					0			0
(E-W)								
Grid C	1053	0	0	127	7615	145	0	3103
					0			0
Grid D	527	0	0	64	3815	72	0	1541
Grid E	527	0	0	64	3815	72	0	1541
					0			0
					0			0
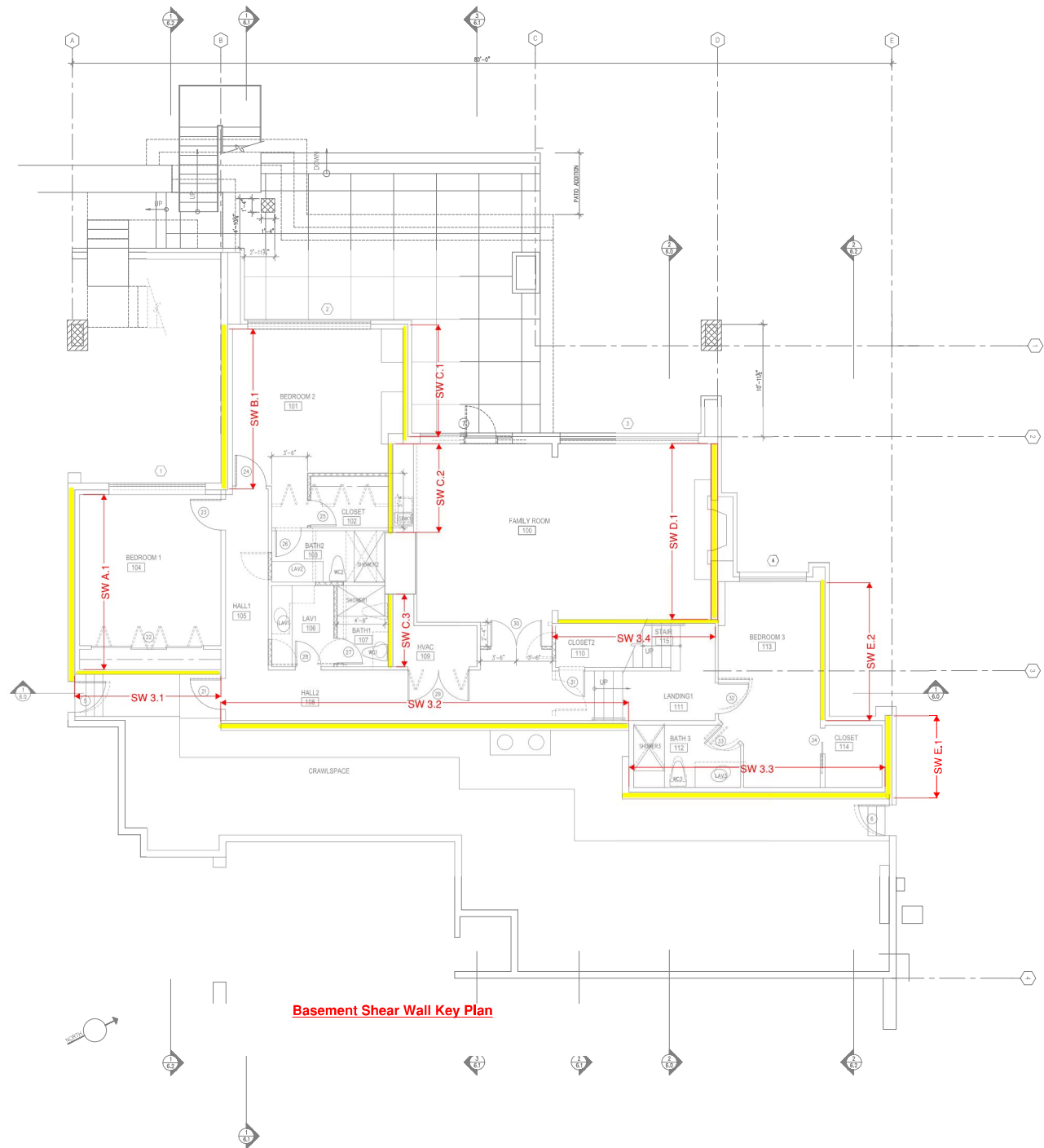
Basement Shear Wall Key Plan

BEDROOM 2
101

SW B.1

SW C.1

SW C.2

CLOSET
102

BATH2
103

FAMILY ROOM
100

SW D.1

BEDROOM 1
104

SW A.1

HALL1
105

LAV1
106

SHOWER2

SW C.3

BATH1
107

HVAC
109

CLOSET2
110

SW 3.4

STAIR
115

BEDROOM 3
113

SW E.2

SW 3.1

HALL2
108

SW 3.2

LANDING1
111

SW E.1

CRAWLSPACE

BATH 3
112

SHOWER3

SW 3.3

CLOSET
114

CHESMORE|BUCK
architecture

27 100TH AVENUE NE. SUITE 100
BELLEVUE, WA 98004
FAX: 425-679-0804
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No.   Date   Revision

HONG AND KAO RESIDENCE
5425 W. MERCER WAY
MERCER ISLAND, WA 98040

MAIN FLOOR

Sheet No.   3.1
Project No.   2222
Date: 2/27/23

Main Floor Shear Wall Key Plan

80'-0"
14'-6"
EXISTING

A   B   C   D   E

DECK

DECK ADDITION

NEW ADDITION
NEW ADDITION

ALIGN W/ EXISTING
ALIGN W/ EXISTING

OFFICE 212
DINING 210
BREAKFAST 208
CLOSET 213
SW A.2
SW B.2
LIVING ROOM 211
KITCHEN 207
SW D.2
WC3 214
LAV3
SW C.4
PANTRY 209
VERIFY
ROOF BELOW
BATH 4 215
SHOWER4
HALL3 202
SW 3.5
SW 3.6
LANDING2 206
COATS 216
ENTRY 200
UTILITY 204
WC5
LAV2
MUSIC 201
SINK2
POWDER 217
SW 4.1
GARAGE 205
SW E.3
WC2 203
WC8
SW C.5
SW 4.2

REMOVE EXISTING WINDOW
INFILL OPENING TO
MATCH EXISTING

DO WE WANT
A SKYLIGHT HERE?

No.   Date   Revision

Upper Floor Shear Wall Key Plan

SW C.7

SITTING
307

M.BEDROOM
306

SW D.3

VESTIBULE
308

TUB1

LAV6

M.BATH
309

SW 3.7

LANDING 3
311

WC3
310

SW C.6

SHOWER
312

EXERCISE
304

SAUNA
303

SW E.5

LAV8

WC8

BATH5
302

SW 4.3

UTILITY2
313

M.CLOSET
314

BEDROOM 4
300

SHOWER6

SW E.4

CLOSET
301

SW 4.4

LIVING ROOM BELOW

ROOF BELOW

DECK2

DECK ADDITION

DECK ADDITION

NEW ADDITION

NEW ADDITION

NEW ADDITION

ALIGN WITH WALL BELOW

ALIGN WITH WALL BELOW

PRELIMINARY NOT FOR CONSTRUCTION

HONG AND KAO RESIDENCE

5425 W. MERCER WAY
MERCER ISLAND, WA 98040

UPPER FLOOR

3.2
Sheet No.
Project No.   2222
Date: 2/27/23

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN
Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **High Roof (N-S)**

Sds = 0.97
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	3	18.75	-	-	-	-	-	-	-	-	-
SW Segment	3.7	18.75	8.75	0.47	HF #2	0.43	Interstory	8.75	10.0	14.0	15.0
SW GRID	4	32.50	-	-	-	-	-	-	-	-	-
	4.3	18.75	8.75	0.47	HF #2	0.43	Interstory	8.75	48.0	4.0	15.0
	4.4	13.75	8.75	0.64	HF #2	0.43	Interstory	8.75	48.0	6.0	15.0
SW GRID		0.00	-	-	-	-	-	-	-	-	-
SW GRID		0.00	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	3	11250	4140	-	-	-	-	-	-
SW Segment	3.70	11250	4140	5578			**SW-4**	2	**(2) CS16 (3410)**
SW GRID	4	6620	2020				-	-	-
	4.30	3819	1165	9000			**SW-6**	2	**No Strap**
	4.40	2801	855	7013			**SW-6**	2	**No Strap**
SW GRID							-	-	-
SW GRID							-	-	-

Quantum Consulting Engineers LLC	Project: Hong Kao Residence	Date: 6/7/23	Job No: 23127.01
1511 Third Avenue, Suite 323		Designer: MKS	Sheet: 1
Seattle, WA 98101	Client: Chesmore Buck	Checked By: SHT	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **High Roof (N-S)**

Shear Wall Schedule (LRFD) $\phi_D =$ 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	620	496	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	920	736	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1200	960	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	1540	1232	2155	1724	23
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
3.70	600	1.00	645	221	237	645	SW-4	736	OK	Seismic
4.30	204	1.00	219	62	67	219	SW-6	496	OK	Seismic
4.40	204	1.00	219	62	67	219	SW-6	496	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
3.70	18.75	18.54	1.12%	No	
4.30	18.75	18.54	1.12%	No	
4.40	13.75	13.54	1.54%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **High Roof (N-S)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
3.70	3675		3675	1159		1159	2789	2789
4.30	1248		1248	326		326	4500	4500
4.40	1248		1248	326		326	3506	3506

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
3.70	514	-2380	514	-2380	**-2380**	(2) CS16 (3410)	-3410	OK
4.30	2374	841	2374	841	**841**	No Strap	0	OK
4.40	1777	380	1777	380	**380**	No Strap	0	OK

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Low Roof / Upper Floor (N-S)**

Sds = 0.97
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	3	38.25	-	-	-	-	-	-	-	-	-
SW Segment											
	3.5	16.75	9.50	0.57	HF #2	0.43	Interstory	9.50	10.0	9.0	12.0
	3.6	21.50	8.25	0.38	HF #2	0.43	Interstory	8.25	10.0	8.0	12.0
SW GRID	4	13.50	-	-	-	-	-	-	-	-	-
	4.1	8.50	9.50	1.12	HF #2	0.43	Base	9.50	48.0	2.0	15.0
	4.2	5.00	8.25	1.65	HF #2	0.43	Base	8.25	48.0	11.5	30.0
SW GRID		0.00	-	-	-	-	-	-	-	-	-
SW GRID		0.00	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	3	35720	15320	-	-	-	-	-	-
SW Segment									
	3.50	15642	6709	3400			**SW-2**	**2**	**MSTC66 (5850 max.)**
	3.60	20078	8611	3838			**SW-2**	**2**	**MSTC66 (5850 max.)**
SW GRID	4	11770	5230				-	-	-
	4.10	7411	3293	4131			**SW-3**	**2**	**HDU8 (6765DF, 5820HF)**
	4.20	4359	1937	3705			**SW-3**	**2**	**HDU8 (6765DF, 5820HF)**
SW GRID							-	-	-
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Low Roof / Upper Floor (N-S)**

Shear Wall Schedule (LRFD) $\phi_D =$ 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	620	496	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	920	736	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1200	960	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	1540	1232	2155	1724	23
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
3.50	934	1.00	1004	401	431	**1004**	SW-2	1232	OK	Seismic
3.60	934	1.00	1004	401	431	**1004**	SW-2	1232	OK	Seismic
4.10	872	1.00	937	387	417	**937**	SW-3	960	OK	Seismic
4.20	872	1.00	937	387	417	**937**	SW-3	960	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
	0.00	-0.21	100.00%		
3.50	16.75	16.54	1.26%	No	
3.60	21.50	21.29	0.98%	No	
4.10	8.50	8.01	6.11%	No	
4.20	5.00	4.51	10.85%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Low Roof / Upper Floor (N-S)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
3.50	6210		6210	2283		2283	1700	1700
3.60	5393		5393	1983		1983	1919	1919
4.10	5798		5798	2208		2208	2066	2066
4.20	5035		5035	1918		1918	1853	1853

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
3.50	-1263	-5421	-1263	-5421	**-5421**	MSTC66 (5850 max.)	**-5499**	**OK**
3.60	-831	-4502	-831	-4502	**-4502**	MSTC66 (5850 max.)	**-5499**	**OK**
4.10	-969	-4839	-969	-4839	**-4839**	HDU8 (6765DF, 5820HF)	**-5820**	**OK**
4.20	-806	-4175	-806	-4175	**-4175**	HDU8 (6765DF, 5820HF)	**-5820**	**OK**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Main Floor (N-S)**

Sds =   0.97
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) =   17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**3**	**95.75**	-	-	-	-	-	-	-	-	-
SW Segment	3.1	14.25	10.50	0.74	HF #2	0.43	Base	10.50	10.0	4.0	12.0
	3.2	39.75	7.50	0.19	HF #2	0.43	Base	7.50	10.0	4.0	12.0
	3.3	25.75	7.50	0.29	HF #2	0.43	Base	7.50	10.0	4.0	12.0
	3.4	16.00	10.50	0.66	HF #2	0.43	Base	10.50	10.0	4.0	12.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**3**	54360	26100	-	-	-	-	-	-
SW Segment	3.10	8090	3884	2180			**SW-4**	**2**	**HDU5 (5645DF, 4340HF)**
	3.20	22567	10835	4889			**SW-4**	**2**	**HDU2 (3075DF,2215HF)**
	3.30	14619	7019	3167			**SW-4**	**2**	**HDU5 (5645DF, 4340HF)**
	3.40	9084	4361	2448			**SW-4**	**2**	**HDU5 (5645DF, 4340HF)**
SW GRID							-	-	-
SW GRID							-	-	-
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Main Floor (N-S)**

Shear Wall Schedule (LRFD) $\phi_D =$ 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	620	496	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	920	736	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1200	960	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	1540	1232	2155	1724	23
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
3.10	568	1.00	610	273	293	610	SW-4	736	OK	Seismic
3.20	568	1.00	610	273	293	610	SW-4	736	OK	Seismic
3.30	568	1.00	610	273	293	610	SW-4	736	OK	Seismic
3.40	568	1.00	610	273	293	610	SW-4	736	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
3.10	14.25	13.77	3.52%	No	
3.20	39.75	39.27	1.23%	No	
3.30	25.75	25.27	1.92%	No	
3.40	16.00	15.52	3.12%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Main Floor (N-S)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
3.10	4173		4173	1717		1717	1090	1090
3.20	2981		2981	1227		1227	2445	2445
3.30	2981		2981	1227		1227	1584	1584
3.40	4173		4173	1717		1717	1224	1224

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
3.10	-1063	-3667	-1063	-3667	**-3667**	HDU5 (5645DF, 4340HF)	**-4340**	**OK**
3.20	240	-1846	240	-1846	**-1846**	HDU2 (3075DF,2215HF)	**-2215**	**OK**
3.30	-276	-2245	-276	-2245	**-2245**	HDU5 (5645DF, 4340HF)	**-4340**	**OK**
3.40	-983	-3605	-983	-3605	**-3605**	HDU5 (5645DF, 4340HF)	**-4340**	**OK**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **High Roof (E-W)**

Sds = 0.97
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**C**	**32.58**	-	-	-	-	-	-	-	-	-
SW Segment	C.6	21.33	8.75	0.41	HF #2	0.43	Interstory	8.75	48.0	2.0	15.0
	C.7	11.25	8.75	0.78	HF #2	0.43	Interstory	8.75	48.0	2.0	15.0
SW GRID	**D**	**19.75**	-	-	-	-	-	-	-	-	-
	D.4	19.75	8.75	0.44	HF #2	0.43	Interstory	8.75	48.0	2.0	15.0
SW GRID	**E**	**20.00**	-	-	-	-	-	-	-	-	-
	E.4	10.75	8.75	0.81	HF #2	0.43	Interstory	8.75	48.0	2.0	15.0
	E.5	9.25	8.75	0.95	HF #2	0.43	Interstory	8.75	48.0	2.0	15.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**C**	7620	6190	-	-	-	-	-	-
SW Segment	C.6	4989	4053	9599			SW-6	2	No Strap
	C.7	2631	2137	5063	1000	1000	SW-6	2	No Strap
SW GRID	**D**	3820	1540				-	-	-
	D.4	3820	1540	8888			SW-6	2	No Strap
SW GRID	**E**	3820	1540				-	-	-
	E.4	2053	828	4838	200	200	SW-6	2	No Strap
	E.5	1767	712	4163	200	200	SW-6	2	CS16 (1705)
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **High Roof (E-W)**

Shear Wall Schedule (LRFD) $\phi_D =$ 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	620	496	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	920	736	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1200	960	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	1540	1232	2155	1724	23
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
C.6	234	1.00	251	190	204	251	SW-6	496	OK	Seismic
C.7	234	1.00	251	190	204	251	SW-6	496	OK	Seismic
D.4	193	1.00	208	78	84	208	SW-6	496	OK	Seismic
E.4	191	1.00	205	77	83	205	SW-6	496	OK	Seismic
E.5	191	1.00	205	77	83	205	SW-6	496	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
C.6	21.33	21.12	0.99%	No	
C.7	11.25	11.04	1.89%	No	
D.4	19.75	19.54	1.07%	No	
E.4	10.75	10.54	1.98%	No	
E.5	9.25	9.04	2.30%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **High Roof (E-W)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
C.6	1433		1433	997		997	4799	4799
C.7	1433		1433	997		997	3531	3531
D.4	1185		1185	409		409	4444	4444
E.4	1170		1170	404		404	2619	2619
E.5	1170		1170	404		404	2281	2281

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
C.6	1882	795	1882	795	**795**	No Strap	0	OK
C.7	1121	207	1121	207	**207**	No Strap	0	OK
D.4	2257	878	2257	878	**878**	No Strap	0	OK
E.4	1167	46	1167	46	**46**	No Strap	0	OK
E.5	965	-111	965	-111	**-111**	CS16 (1705)	-1705	OK

Quantum Consulting Engineers LLC	Project: Hong Kao Residence	Date:	6/7/23	Job No:	23127.01
1511 Third Avenue, Suite 323		Designer:	MKS	Sheet:	3
Seattle, WA 98101	Client: Chesmore Buck	Checked By:	SHT		

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Low Roof / Upper Floor (E-W)**

Sds = 0.97
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**A**	**30.75**	-	-	-	-	-	-	-	-	-
SW Segment	A.2	30.75	8.00	0.26	HF #2	0.43	Interstory	8.00	48.0	7.0	15.0
SW GRID	**B**	**19.25**	-	-	-	-	-	-	-	-	-
	B.2	19.25	11.00	0.57	HF #2	0.43	Interstory	11.00	10.0	6.0	15.0
SW GRID	**C**	**16.58**	-	-	-	-	-	-	-	-	-
	C.4	7.25	11.00	1.52	HF #2	0.43	Interstory	11.00	10.0	8.0	15.0
	C.5	9.33	9.50	1.02	HF #2	0.43	Base	9.50	48.0	2.0	30.0
SW GRID	**D**	**20.75**	-	-	-	-	-	-	-	-	-
	D.2	20.75	9.50	0.46	HF #2	0.43	Interstory	9.50	48.0	2.0	15.0

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**A**	1940	750	-	-	-	-	-	-
SW Segment	A.2	1940	750	15037			**SW-6**	**2**	**No Strap**
SW GRID	**B**	7240	2290				-	-	-
	B.2	7240	2290	3850			**SW-6**	**2**	**(2) CS16 (3410)**
SW GRID	**C**	18580	9650				-	-	-
	C.4	8125	4220	1668			**SW-2**	**2**	**CMST12 (9215)**
	C.5	10455	5430	4814	200	200	**SW-2**	**3**	**HDU8 (3) Studs (7870DF, 6580HF)**
SW GRID	**D**	6820	2700				-	-	-
	D.2	6820	2700	10085			**SW-6**	**2**	**No Strap**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Low Roof / Upper Floor (E-W)**

Shear Wall Schedule (LRFD) ϕ_D =   0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	620	496	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	920	736	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1200	960	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	1540	1232	2155	1724	23
2SW-4	APA Rated, 15/32", 10d Common	4	1840	1472	2580	2064	34
2SW-3	APA Rated, 15/32", 10d Common	3	2400	1920	3360	2688	38
2SW-2	APA Rated, 15/32", 10d Common	2	3080	2464	4310	3448	46

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
A.2	63	1.00	68	24	26	68	SW-6	496	OK	Seismic
B.2	376	1.00	404	119	128	404	SW-6	496	OK	Seismic
C.4	1121	1.00	1205	582	626	1205	SW-2	1232	OK	Seismic
C.5	1121	1.00	1205	582	626	1205	SW-2	1232	OK	Seismic
D.2	329	1.00	353	130	140	353	SW-6	496	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
A.2	30.75	30.54	0.68%	No	
				No	
B.2	19.25	19.04	1.09%	No	
C.4	7.25	7.04	2.96%	No	
C.5	9.33	8.72	7.05%	No	
D.2	20.75	20.54	1.01%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Low Roof / Upper Floor (E-W)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
A.2	353		353	117		117	7518	7518
B.2	2896		2896	785		785	1925	1925
C.4	8629		8629	3841		3841	834	834
C.5	7452		7452	3318		3318	2607	2607
D.2	2186		2186	742		742	5042	5042

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
A.2	4394	3137	4394	3137	**3137**	No Strap	**0**	OK
B.2	370	-2002	370	-2002	**-2002**	(2) CS16 (3410)	**-3410**	OK
C.4	-3341	-8242	-3341	-8242	**-8242**	CMST12 (9215)	**-9215**	OK
C.5	-1753	-6242	-1753	-6242	**-6242**	HDU8 (3) Studs (7870DF, 6580HF	**-6580**	OK
D.2	2284	155	2284	155	**155**	No Strap	**0**	OK

Quantum Consulting Engineers LLC	Project: Hong Kao Residence	Date: 6/7/23	Job No:	23127.01
1511 Third Avenue, Suite 323		Designer: MKS	Sheet:	3
Seattle, WA 98101	Client: Chesmore Buck	Checked By: SHT		

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Low Roof / Upper Floor Continued (E-W)**

Sds = 0.97
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**E**	**24.00**	-	-	-	-	-	-	-	-	-
SW Segment	E.3	24.00	8.25	0.34	HF #2	0.43	Interstory	8.25	48.0	2.0	12.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**E**	8250	7000	-	-	-	-	-	-
SW Segment	E.3	8250	7000	10080			**SW-6**	**2**	**No Strap**
SW GRID							-	-	-
SW GRID							-	-	-
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Low Roof / Upper Floor Continued (E-W)**

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	620	496	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	920	736	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1200	960	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	1540	1232	2155	1724	23
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
E.3	344	1.00	370	292	314	370	SW-6	496	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
E.3	24.00	23.79	0.88%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN
Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Low Roof / Upper Floor Continued (E-W)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
E.3	1985		1985	1444		1444	5040	5040

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
E.3	1580	354	1580	354	**354**	No Strap	**0**	OK

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Main Floor (E-W)**

Sds = 0.97
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	A	17.00	-	-	-	-	-	-	-	-	-
SW Segment	A.1	17.00	10.00	0.59	HF #2	0.43	Base	10.00	48.0	7.0	12.0
SW GRID	B	15.75	-	-	-	-	-	-	-	-	-
	B.1	15.75	10.50	0.67	HF #2	0.43	Base	10.25	48.0	15.0	12.0
SW GRID	C	27.00	-	-	-	-	-	-	-	-	-
	C.1	11.00	10.25	0.93	HF #2	0.43	Base	10.25	48.0	15.0	12.0
	C.2	9.00	10.25	1.14	HF #2	0.43	Base	10.25	10.0	15.0	12.0
	C.3	7.00	10.25	1.46	HF #2	0.43	Base	10.25	10.0	15.0	12.0
SW GRID	D	17.00	-	-	-	-	-	-	-	-	-
	D.1	17.00	10.25	0.60	HF #2	0.43	Base	10.25	48.0	8.0	12.0

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	A	2450	2380	-	-	-	-	-	-
SW Segment	A.1	2450	2380	9588			SW-6	2	No HD
SW GRID	B	12110	6440				-	-	-
	B.1	12110	6440	10584			SW-3	2	HDU5 (5645DF, 4340HF)
SW GRID	C	22490	16140				-	-	-
	C.1	9163	6576	7392			SW-3	2	HDU5 (5645DF, 4340HF)
	C.2	7497	5380	2543			SW-3	2	HDU8 (6765DF, 5820HF)
	C.3	5831	4184	1978			SW-3	2	HDU8 (6765DF, 5820HF)
SW GRID	D	5070	8180				-	-	-
	D.1	5070	8180	9996			SW-6	2	No HD

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Main Floor (E-W)**

Shear Wall Schedule (LRFD) $\phi_D =$ 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	620	496	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	920	736	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1200	960	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	1540	1232	2155	1724	23
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
A.1	144	1.00	155	140	151	**155**	SW-6	496	OK	Seismic
B.1	769	1.00	827	409	440	**827**	SW-3	960	OK	Seismic
C.1	833	1.00	896	598	643	**896**	SW-3	960	OK	Seismic
C.2	833	1.00	896	598	643	**896**	SW-3	960	OK	Seismic
C.3	833	1.00	896	598	643	**896**	SW-3	960	OK	Seismic
D.1	298	1.00	321	481	517	**517**	SW-6	696	OK	Wind

***NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ**

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
A.1	17.00	16.63	2.26%	No	
B.1	15.75	15.27	3.17%	No	
C.1	11.00	10.52	4.61%	No	
C.2	9.00	8.51	5.75%	No	
C.3	7.00	6.51	7.52%	No	
D.1	17.00	16.63	2.26%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Main Floor (E-W)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
A.1	1009		1009	840		840	4794	4794
B.1	5517		5517	2515		2515	5292	5292
C.1	5977		5977	3676		3676	3696	3696
C.2	5977		5977	3676		3676	1271	1271
C.3	5977		5977	3676		3676	989	989
D.1	2140		2140	2959	**-2284**	676	4998	4998

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
A.1	2036	1217	2036	1217	**1217**	No HD	**0**	OK
B.1	661	-3060	661	-3060	**-3060**	HDU5 (5645DF, 4340HF)	**-4340**	OK
C.1	-1459	-4261	-1459	-4261	**-4261**	HDU5 (5645DF, 4340HF)	**-4340**	OK
C.2	-2914	-5386	-2914	-5386	**-5386**	HDU8 (6765DF, 5820HF)	**-5820**	OK
C.3	-3083	-5518	-3083	-5518	**-5518**	HDU8 (6765DF, 5820HF)	**-5820**	OK
D.1	2323	180	2323	180	**180**	No HD	**0**	OK

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN
Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Main Floor Continued (E-W)**

Sds = 0.97
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**E**	**20.50**	-	-	-	-	-	-	-	-	-
SW Segment	E.1	6.50	10.50	1.62	HF #2	0.43	Base	10.50	48.0	2.0	12.0
	E.2	14.00	10.50	0.75	HF #2	0.43	Base	10.50	48.0	6.0	12.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**E**	14880	8500	-	-	-	-	-	-
SW Segment	E.1	4718	2695	3432			**SW-3**	2	**HDU8 (6765DF, 5820HF)**
	E.2	10162	5805	8064			**SW-3**	2	**HDU5 (5645DF, 4340HF)**
SW GRID							-	-	-
SW GRID							-	-	-
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Main Floor Continued (E-W)**

Shear Wall Schedule (LRFD) $\phi_D = $ 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	620	496	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	920	736	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1200	960	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	1540	1232	2155	1724	23
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
E.1	726	1.00	780	415	446	780	SW-3	960	OK	Seismic
E.2	726	1.00	780	415	446	780	SW-3	960	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
E.1	6.50	6.01	8.15%	No	
E.2	14.00	13.52	3.58%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Koa and Hong Residence**
Floor Level: **Main Floor Continued (E-W)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
E.1	5335		5335	2612		2612	1716	1716
E.2	5335		5335	2612		2612	4032	4032

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
E.1	-1583	-4538	-1583	-4538	**-4538**	HDU8 (6765DF, 5820HF)	**-5820**	OK
E.2	-193	-3463	-193	-3463	**-3463**	HDU5 (5645DF, 4340HF)	**-4340**	OK

HONG AND KAO RESIDENCE
5425 W. Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 23127.01

FOUNDATION DESIGN – MAIN HOUSE

Spread Footing Schedule Design

Per IBC 2018 & ACI 318-14

Typical Properties:

Allowable Soil Bearing Pressure:	**2**	ksf
Ultimate Factor, F (1.25<F<1.6):	**1.4**	
Minimum Thickness:	**10**	inches
f'c:	**2.5**	ksi
f$_y$:	**40**	ksi

Design:

Footing	Column Size B in	Column Size H in	Allowable Soil Load kips	Pu kips	Min. d in	Minimum Ftg Th. in	Ftg. Th. Input in	As(ult) in^2	As (min) in^2	Rebar Size	Rebar Quantity	Rebar Spacing in
F- 2	6	6	8.0	11	6	10	10	0.09	0.43	#4	3	10.8
F- 2.5	6	6	12.5	18	6	10	10	0.20	0.54	#4	3	13.8
F- 3	6	6	18.0	25	6	10	12	0.28	0.78	#4	4	11.2
F- 3.5	6	6	24.5	34	6	10	12	0.47	0.91	#4	5	9.9
F- 4	6	6	32.0	45	6	10	12	0.73	1.04	#4	6	9.1
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A
F-			0.0	0	#DIV/0!	#DIV/0!		#DIV/0!	0.00		#DIV/0!	#N/A

General Footing

DESCRIPTION: Spread Footing at Deck Stair Column

Code References

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

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50 ksi
fy : Rebar Yield	=	40.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

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

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	Yes
Soil Passive Resistance (for Sliding)	=	350.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	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	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	12.0 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
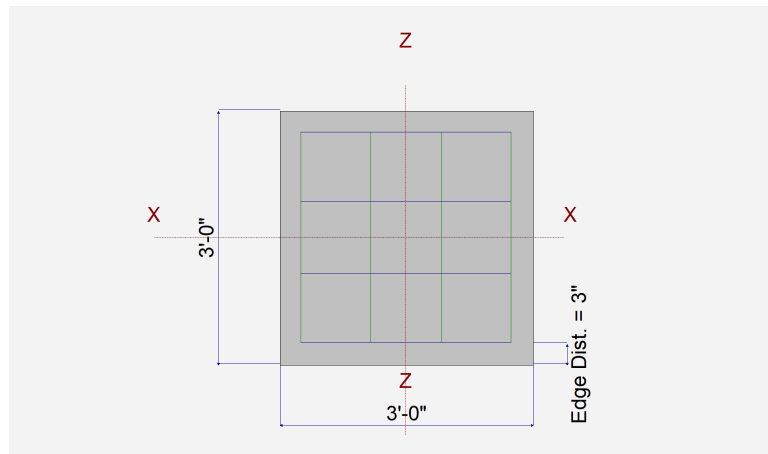
Reinforcing

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

4 - # 4 Bars

X-X Section Looking to +Z

4 - # 4 Bars

Z-Z Section Looking to +X
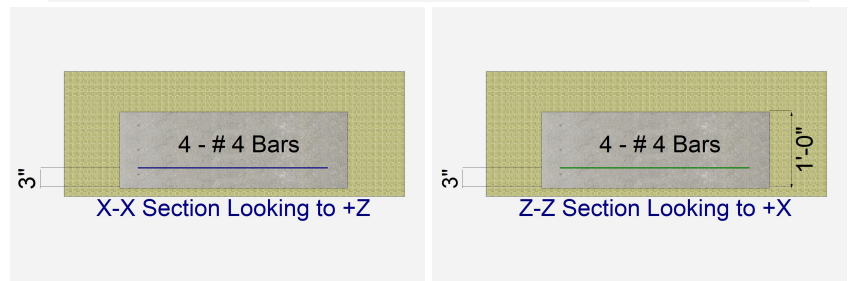
Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	2.10		2.80	0.0		0.0		k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=			2.560					k-ft
V-x	=	0.0			0.0		0.0		k
V-z	=								k

General Footing

LIC# : KW-06016450, Build:20.23.05.25   QUANTUM CONSULTING ENGINEERS   (c) ENERCALC INC 1983-2023

DESCRIPTION: Spread Footing at Deck Stair Column

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6098	Soil Bearing	1.308 ksf	2.145 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	3.926	Overturning - Z-Z	2.560 k-ft	10.050 k-ft	+D+L
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	0.2215	Z Flexure (+X)	1.558 k-ft/ft	7.033 k-ft/ft	+1.20D+1.60L
PASS	0.05226	Z Flexure (-X)	0.3675 k-ft/ft	7.033 k-ft/ft	+1.40D
PASS	0.1244	X Flexure (+Z)	0.8750 k-ft/ft	7.033 k-ft/ft	+1.20D+1.60L
PASS	0.1244	X Flexure (-Z)	0.8750 k-ft/ft	7.033 k-ft/ft	+1.20D+1.60L
PASS	0.1352	1-way Shear (+X)	10.142 psi	75.0 psi	+1.20D+1.60L
PASS	0.03025	1-way Shear (-X)	2.269 psi	75.0 psi	+1.40D
PASS	0.07202	1-way Shear (+Z)	5.401 psi	75.0 psi	+1.20D+1.60L
PASS	0.07202	1-way Shear (-Z)	5.401 psi	75.0 psi	+1.20D+1.60L
PASS	0.1350	2-way Punching	20.255 psi	150.0 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	2.145	n/a	0.0	0.4333	0.4333	n/a	n/a	0.202
X-X, +D+L	2.145	n/a	0.0	0.7444	0.7444	n/a	n/a	0.347
X-X, +D+0.750L	2.145	n/a	0.0	0.6667	0.6667	n/a	n/a	0.311
X-X, +0.60D	2.145	n/a	0.0	0.260	0.260	n/a	n/a	0.121
Z-Z, D Only	2.145	0.0	n/a	n/a	n/a	0.4333	0.4333	0.202
Z-Z, +D+L	2.145	4.585	n/a	n/a	n/a	0.1812	1.308	0.610
Z-Z, +D+0.750L	2.145	3.840	n/a	n/a	n/a	0.2443	1.089	0.508
Z-Z, +0.60D	2.145	0.0	n/a	n/a	n/a	0.260	0.260	0.121

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+L	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750L	None	0.0 k-ft	Infinity	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+L	2.560 k-ft	10.050 k-ft	3.926	OK
Z-Z, +D+0.750L	1.920 k-ft	9.0 k-ft	4.688	OK
Z-Z, +0.60D	None	0.0 k-ft	Infinity	OK

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	0.3675	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.40D	0.3675	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+1.60L	0.8750	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+1.60L	0.8750	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L	0.6650	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L	0.6650	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D	0.3150	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D	0.3150	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +0.90D	0.2363	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +0.90D	0.2363	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK

General Footing

DESCRIPTION: Spread Footing at Deck Stair Column

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
Z-Z, +1.40D	0.3675	-X	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +1.40D	0.3675	+X	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +1.20D+1.60L	0.1924	-X	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +1.20D+1.60L	1.558	+X	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +1.20D+L	0.2384	-X	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +1.20D+L	1.092	+X	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +1.20D	0.3150	-X	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +1.20D	0.3150	+X	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +0.90D	0.2363	-X	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +0.90D	0.2363	+X	Bottom	0.2592	AsMin	0.2667	7.033	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.27 psi	2.27 psi	2.27 psi	2.27 psi	2.27 psi	75.00 psi	0.03	OK
+1.20D+1.60L	0.66 psi	10.14 psi	5.40 psi	5.40 psi	10.14 psi	75.00 psi	0.14	OK
+1.20D+L	1.14 psi	7.07 psi	4.11 psi	4.11 psi	7.07 psi	75.00 psi	0.09	OK
+1.20D	1.94 psi	1.94 psi	1.94 psi	1.94 psi	1.94 psi	75.00 psi	0.03	OK
+0.90D	1.46 psi	1.46 psi	1.46 psi	1.46 psi	1.46 psi	75.00 psi	0.02	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	8.51 psi	150.00 psi	0.05671	OK
+1.20D+1.60L	20.26 psi	150.00 psi	0.135	OK
+1.20D+L	15.39 psi	150.00 psi	0.1026	OK
+1.20D	7.29 psi	150.00 psi	0.04861	OK
+0.90D	5.47 psi	150.00 psi	0.03646	OK

DESCRIPTION: Spread Footing at Cantilevered Column

Code References

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

General Information

Material Properties				Soil Design Values			
f'c : Concrete 28 day strength	=	2.50 ksi		Allowable Soil Bearing	=	2.0 ksf	
fy : Rebar Yield	=	40.0 ksi		Soil Density	=	110.0 pcf	
Ec : Concrete Elastic Modulus	=	3,122.0 ksi		Increase Bearing By Footing Weight	=	Yes	
Concrete Density	=	145.0 pcf		Soil Passive Resistance (for Sliding)	=	350.0 pcf	
φ Values Flexure	=	0.90		Soil/Concrete Friction Coeff.	=	0.350	
Shear	=	0.750		**Increases based on footing Depth**			

Analysis Settings						
Min Steel % Bending Reinf.	=		Footing base depth below soil surface	=	1.50 ft	
Min Allow % Temp Reinf.	=	0.00180	Allow press. increase per foot of depth	=	ksf	
Min. Overturning Safety Factor	=	1.0 : 1	when footing base is below	=	ft	
Min. Sliding Safety Factor	=	1.0 : 1	**Increases based on footing plan dimension**			
Add Ftg Wt for Soil Pressure	:	Yes	Allowable pressure increase per foot of depth			
Use ftg wt for stability, moments & shears	:	Yes		=	ksf	
Add Pedestal Wt for Soil Pressure	:	No	when max. length or width is greater than			
Use Pedestal wt for stability, mom & shear	:	No		=	ft	

Dimensions

Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	12.0 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
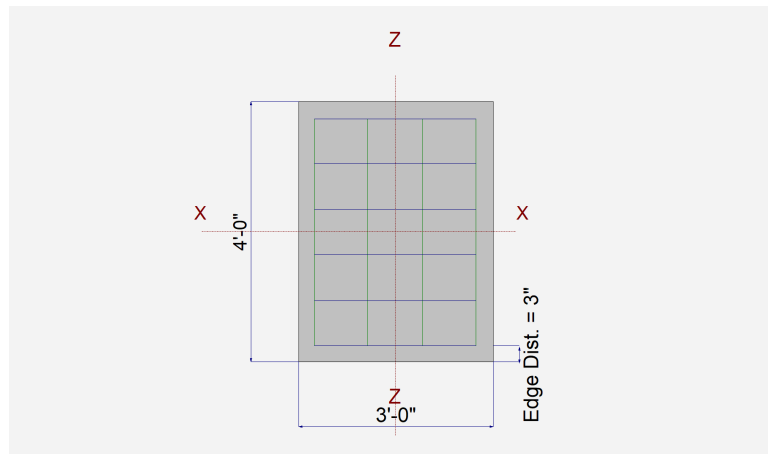
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		6
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		4
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)
Direction Requiring Closer Separation

Bars along X-X Axis

# Bars required within zone	85.7 %
# Bars required on each side of zone	14.3 %

X-X Section Looking to +Z

Z-Z Section Looking to +X
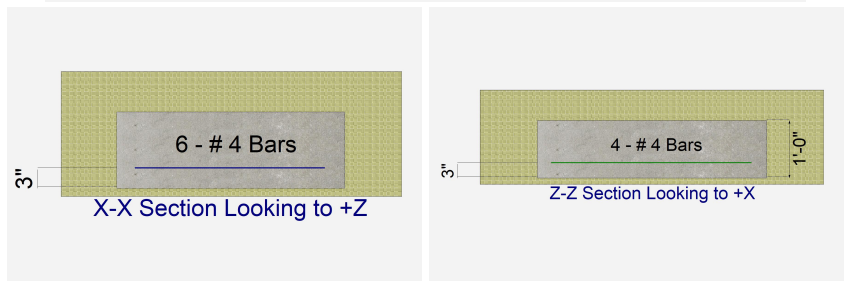
Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	6.30		4.0	0.60		0.90		k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=	0.10			-0.60		4.40		k
V-z	=								k

General Footing

DESCRIPTION: Spread Footing at Cantilevered Column

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6410	Soil Bearing	1.375 ksf	2.145 ksf	+D+0.750L+0.750S+0.5250E about Z
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	2.795	Overturning - Z-Z	3.140 k-ft	8.775 k-ft	+0.60D+0.70E
PASS	1.098	Sliding - X-X	3.140 k	3.448 k	+0.60D+0.70E
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	0.2192	Z Flexure (+X)	1.729 k-ft/ft	7.888 k-ft/ft	+1.20D+L+0.20S+E
PASS	0.1723	Z Flexure (-X)	1.359 k-ft/ft	7.888 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.3379	X Flexure (+Z)	2.377 k-ft/ft	7.033 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.3379	X Flexure (-Z)	2.377 k-ft/ft	7.033 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.1480	1-way Shear (+X)	11.10 psi	75.0 psi	+1.20D+L+0.20S+E
PASS	0.1121	1-way Shear (-X)	8.409 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.1819	1-way Shear (+Z)	13.644 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.1819	1-way Shear (-Z)	13.644 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2802	2-way Punching	42.032 psi	150.0 psi	+1.20D+1.60L+0.50S

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.145	n/a	0.0	0.7250	0.7250	n/a	n/a	0.338
X-X, +D+L	2.145	n/a	0.0	1.058	1.058	n/a	n/a	0.493
X-X, +D+S	2.145	n/a	0.0	0.7750	0.7750	n/a	n/a	0.361
X-X, +D+0.750L	2.145	n/a	0.0	0.9750	0.9750	n/a	n/a	0.455
X-X, +D+0.750L+0.750S	2.145	n/a	0.0	1.013	1.013	n/a	n/a	0.472
X-X, +0.60D	2.145	n/a	0.0	0.4350	0.4350	n/a	n/a	0.203
X-X, +D+0.70E	2.145	n/a	0.0	0.7775	0.7775	n/a	n/a	0.363
X-X, +D+0.750L+0.750S+0.5250E	2.145	n/a	0.0	1.052	1.052	n/a	n/a	0.490
X-X, +0.60D+0.70E	2.145	n/a	0.0	0.4875	0.4875	n/a	n/a	0.227
Z-Z, D Only	2.145	0.1379	n/a	n/a	n/a	0.7085	0.7415	0.346
Z-Z, +D+L	2.145	0.09449	n/a	n/a	n/a	1.042	1.075	0.501
Z-Z, +D+S	2.145	-0.6452	n/a	n/a	n/a	0.8575	0.6925	0.400
Z-Z, +D+0.750L	2.145	0.1026	n/a	n/a	n/a	0.9585	0.9915	0.462
Z-Z, +D+0.750L+0.750S	2.145	-0.3457	n/a	n/a	n/a	1.070	0.9548	0.499
Z-Z, +0.60D	2.145	0.1379	n/a	n/a	n/a	0.4251	0.4449	0.207
Z-Z, +D+0.70E	2.145	4.090	n/a	n/a	n/a	0.2528	1.302	0.607
Z-Z, +D+0.750L+0.750S+0.5250E	2.145	1.863	n/a	n/a	n/a	0.7285	1.375	0.641
Z-Z, +0.60D+0.70E	2.145	6.441	n/a	n/a	n/a	0.0	1.007	0.470

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	**OK**
X-X, +D+L	None	0.0 k-ft	Infinity	**OK**
X-X, +D+S	None	0.0 k-ft	Infinity	**OK**
X-X, +D+0.750L	None	0.0 k-ft	Infinity	**OK**
X-X, +D+0.750L+0.750S	None	0.0 k-ft	Infinity	**OK**
X-X, +0.60D	None	0.0 k-ft	Infinity	**OK**
X-X, +D+0.70E	None	0.0 k-ft	Infinity	**OK**
X-X, +D+0.750L+0.750S+0.5250E	None	0.0 k-ft	Infinity	**OK**
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	**OK**
Z-Z, D Only	0.10 k-ft	13.050 k-ft	130.50	**OK**
Z-Z, +D+L	0.10 k-ft	19.050 k-ft	190.50	**OK**
Z-Z, +D+S	0.60 k-ft	14.050 k-ft	23.417	**OK**
Z-Z, +D+0.750L	0.10 k-ft	17.550 k-ft	175.50	**OK**
Z-Z, +D+0.750L+0.750S	0.450 k-ft	18.325 k-ft	40.722	**OK**
Z-Z, +0.60D	0.060 k-ft	7.830 k-ft	130.50	**OK**
Z-Z, +D+0.70E	3.180 k-ft	13.995 k-ft	4.401	**OK**
Z-Z, +D+0.750L+0.750S+0.5250E	2.410 k-ft	19.384 k-ft	8.043	**OK**
Z-Z, +0.60D+0.70E	3.140 k-ft	8.775 k-ft	2.795	**OK**

General Footing

DESCRIPTION: Spread Footing at Cantilevered Column

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.10 k	4.445 k	44.450	OK
X-X, +D+L	0.10 k	5.845 k	58.450	OK
X-X, +D+S	-0.50 k	4.655 k	9.310	OK
X-X, +D+0.750L	0.10 k	5.495 k	54.950	OK
X-X, +D+0.750L+0.750S	-0.350 k	5.653 k	16.150	OK
X-X, +0.60D	0.060 k	3.227 k	53.783	OK
X-X, +D+0.70E	3.180 k	4.666 k	1.467	OK
X-X, +D+0.750L+0.750S+0.5250E	1.960 k	5.818 k	2.968	OK
X-X, +0.60D+0.70E	3.140 k	3.448 k	1.098	OK
Z-Z, D Only	0.0 k	4.095 k	No Sliding	OK
Z-Z, +D+L	0.0 k	5.495 k	No Sliding	OK
Z-Z, +D+S	0.0 k	4.305 k	No Sliding	OK
Z-Z, +D+0.750L	0.0 k	5.145 k	No Sliding	OK
Z-Z, +D+0.70E	0.0 k	4.316 k	No Sliding	OK
Z-Z, +D+0.750L+0.750S+0.5250E	0.0 k	5.468 k	No Sliding	OK
Z-Z, +0.60D+0.70E	0.0 k	3.098 k	No Sliding	OK
Z-Z, +D+0.750L+0.750S	0.0 k	5.303 k	No Sliding	OK
Z-Z, +0.60D	0.0 k	2.877 k	No Sliding	OK

Footing Flexure

Flexure Axis & Load Combination	M_u 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	1.470	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.40D	1.470	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+1.60L	2.327	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+1.60L	2.327	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+1.60L+0.50S	2.377	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+1.60L+0.50S	2.377	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L	1.927	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L	1.927	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D	1.260	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D	1.260	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L+1.60S	2.087	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L+1.60S	2.087	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+1.60S	1.420	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+1.60S	1.420	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L+0.50S	1.977	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L+0.50S	1.977	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +0.90D	0.9450	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +0.90D	0.9450	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L+0.20S+E	2.097	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +1.20D+L+0.20S+E	2.097	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +0.90D+E	1.095	+Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
X-X, +0.90D+E	1.095	-Z	Bottom	0.2592	AsMin	0.2667	7.033	OK
Z-Z, +1.40D	0.8094	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.40D	0.8444	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+1.60L	1.294	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+1.60L	1.324	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+1.60L+0.50S	1.359	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+1.60L+0.50S	1.314	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+L	1.069	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+L	1.099	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D	0.6938	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D	0.7237	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+L+1.60S	1.279	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+L+1.60S	1.069	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+1.60S	0.9037	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+1.60S	0.6938	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+L+0.50S	1.134	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+L+0.50S	1.089	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +0.90D	0.5203	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +0.90D	0.5428	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +1.20D+L+0.20S+E	0.6294	-X	Bottom	0.2592	AsMin	0.30	7.888	OK

General Footing

DESCRIPTION: Spread Footing at Cantilevered Column

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
Z-Z, +1.20D+L+0.20S+E	1.729	+X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +0.90D+E	0.05485	-X	Bottom	0.2592	AsMin	0.30	7.888	OK
Z-Z, +0.90D+E	1.177	+X	Bottom	0.2592	AsMin	0.30	7.888	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	4.98 psi	5.23 psi	8.44 psi	8.44 psi	8.44 psi	75.00 psi	0.11	OK
+1.20D+1.60L	7.98 psi	8.18 psi	13.36 psi	13.36 psi	13.36 psi	75.00 psi	0.18	OK
+1.20D+1.60L+0.50S	8.41 psi	8.10 psi	13.64 psi	13.64 psi	13.64 psi	75.00 psi	0.18	OK
+1.20D+L	6.59 psi	6.79 psi	11.06 psi	11.06 psi	11.06 psi	75.00 psi	0.15	OK
+1.20D	4.27 psi	4.48 psi	7.23 psi	7.23 psi	7.23 psi	75.00 psi	0.10	OK
+1.20D+L+1.60S	7.98 psi	6.52 psi	11.98 psi	11.98 psi	11.98 psi	75.00 psi	0.16	OK
+1.20D+1.60S	5.66 psi	4.20 psi	8.15 psi	8.15 psi	8.15 psi	75.00 psi	0.11	OK
+1.20D+L+0.50S	7.02 psi	6.71 psi	11.35 psi	11.35 psi	11.35 psi	75.00 psi	0.15	OK
+0.90D	3.20 psi	3.36 psi	5.43 psi	5.43 psi	5.43 psi	75.00 psi	0.07	OK
+1.20D+L+0.20S+E	3.46 psi	11.10 psi	12.04 psi	12.04 psi	12.04 psi	75.00 psi	0.16	OK
+0.90D+E	0.10 psi	7.70 psi	6.29 psi	6.29 psi	7.70 psi	75.00 psi	0.10	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	26.00 psi	150.00 psi	0.1733	OK
+1.20D+1.60L	41.15 psi	150.00 psi	0.2743	OK
+1.20D+1.60L+0.50S	42.03 psi	150.00 psi	0.2802	OK
+1.20D+L	34.07 psi	150.00 psi	0.2272	OK
+1.20D	22.28 psi	150.00 psi	0.1486	OK
+1.20D+L+1.60S	36.90 psi	150.00 psi	0.246	OK
+1.20D+1.60S	25.11 psi	150.00 psi	0.1674	OK
+1.20D+L+0.50S	34.96 psi	150.00 psi	0.2331	OK
+0.90D	16.71 psi	150.00 psi	0.1114	OK
+1.20D+L+0.20S+E	37.08 psi	150.00 psi	0.2472	OK
+0.90D+E	19.37 psi	150.00 psi	0.1291	OK

HONG AND KAO RESIDENCE
5425 W. Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 23127.01

GRAVITY DESIGN – DADU
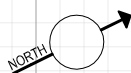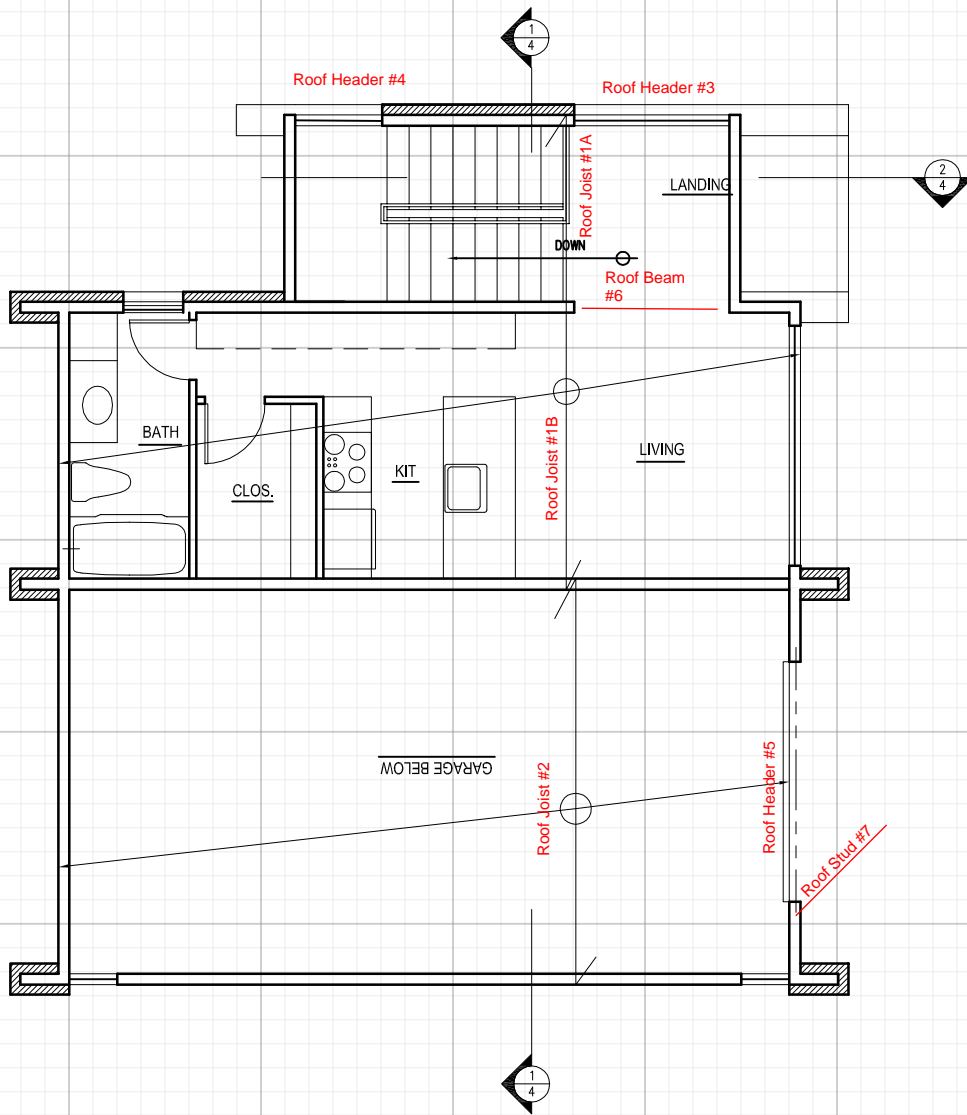
Roof Header #4

Roof Header #3

Roof Joist #1A

LANDING

DOWN

Roof Beam #6

BATH

CLOS.

KIT

Roof Joist #1B

LIVING

GARAGE BELOW

Roof Joist #2

Roof Header #5

Roof Stud #7

ADU ROOF FRAMING PLAN
1/4" = 1'-0"

NORTH

Kao and Hong DADU

project

Chesmore Buck

client

date

drawn by:

design by:

23127.01

job no.

sheet no.

Roof, Roof: Joist #1a
1 piece(s) 11 7/8" TJI® 110 @ 24" OC
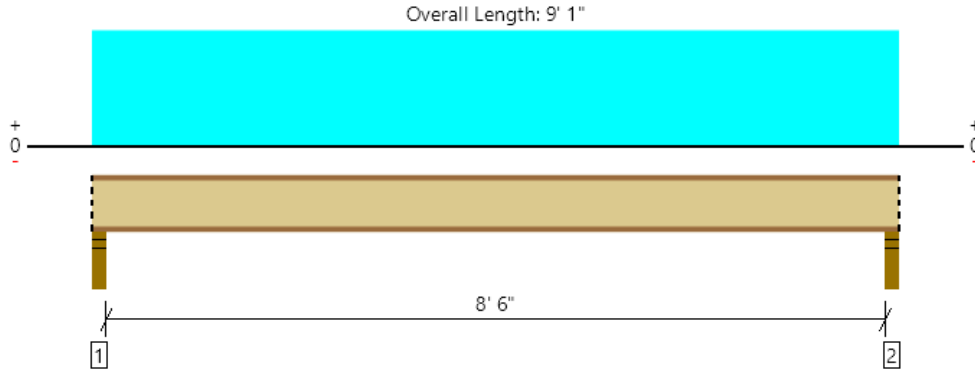
Overall Length: 9' 1"

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)	436 @ 2 1/2"	1581 (3.50")	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	408 @ 3 1/2"	1794	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	901 @ 4' 6 1/2"	3634	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.039 @ 4' 6 1/2"	0.289	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.062 @ 4' 6 1/2"	0.433	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	164	273	436	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.75"	164	273	436	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)	6' 1" o/c	
Bottom Edge (Lu)	9' 1" o/c	

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

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 9' 1"	24"	18.0	30.0	+5PSF b/c Slope >5

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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
Joshua Shin
Quantum
(206) 957-3900
jshin@quantumce.com	

5/26/2023 10:21:44 PM UTC
ForteWEB v3.5, Engine: V8.2.5.1, Data: V8.1.3.6
File Name: 23127 Hong and Kao Residence - DADU
Page 2 / 14

Roof, Roof: Joist #1b
1 piece(s) 11 7/8" TJI ® 110 @ 24" OC

Overall Length: 12' 7"

12'

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)	604 @ 2 1/2"	1581 (3.50")	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	576 @ 3 1/2"	1794	Passed (32%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1776 @ 6' 3 1/2"	3634	Passed (49%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.131 @ 6' 3 1/2"	0.406	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.209 @ 6' 3 1/2"	0.608	Passed (L/698)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	227	378	604	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.75"	227	378	604	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 3" o/c	
Bottom Edge (Lu)	12' 7" o/c	

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

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 12' 7"	24"	18.0	30.0	+5PSF b/c Slope >5

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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
Joshua Shin Quantum (206) 957-3900 jshin@quantumce.com	

Weyerhaeuser

Overall Length: 17' 1"

16' 6"

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)	820 @ 2 1/2"	1581 (3.50")	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	792 @ 3 1/2"	1794	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3333 @ 8' 6 1/2"	3634	Passed (92%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.428 @ 8' 6 1/2"	0.556	Passed (L/468)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.684 @ 8' 6 1/2"	0.833	Passed (L/292)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	308	513	820	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.75"	308	513	820	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)	3' o/c	
Bottom Edge (Lu)	17' 1" o/c	

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

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 17' 1"	24"	18.0	30.0	+5PSF b/c Slope >5

Weyerhaeuser Notes

ForteWEB Software Operator	Job Notes
Joshua Shin	
Quantum	
(206) 957-3900	
jshin@quantumce.com	

Weyerhaeuser

Roof, Roof: Header #3
2 piece(s) 2 x 8 HF No.2
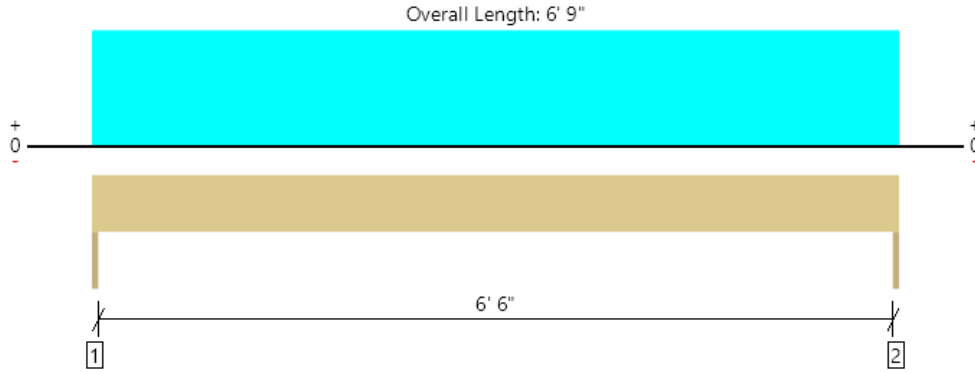
Overall Length: 6' 9"

6' 6"

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)	756 @ 0	1823 (1.50")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	593 @ 8 3/4"	2501	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1276 @ 3' 4 1/2"	2569	Passed (50%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.051 @ 3' 4 1/2"	0.225	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.084 @ 3' 4 1/2"	0.313	Passed (L/959)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- 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 - Trimmer - HF	1.50"	1.50"	1.50"	295	461	756	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	295	461	756	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 9" o/c	
Bottom Edge (Lu)	6' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

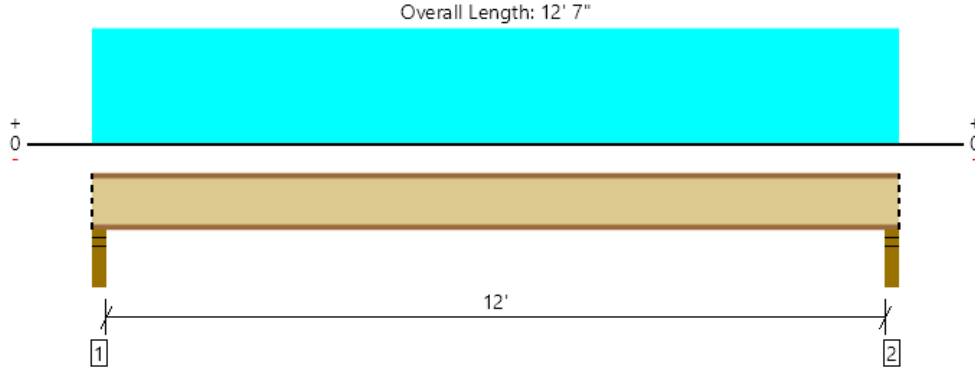| Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 9"	N/A	5.5	--	
1 - Uniform (PLF)	0 to 6' 9"	N/A	82.0	136.5	Linked from: Roof: Joist #1a, Support 1

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

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File Name: 23127 Hong and Kao Residence - DADU
Page 5 / 14

Roof, Roof: Header #4
2 piece(s) 2 x 8 HF No.2

Overall Length: 3' 9"

3' 6"

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)	420 @ 0	1823 (1.50")	Passed (23%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	257 @ 8 3/4"	2501	Passed (10%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	394 @ 1' 10 1/2"	2569	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.005 @ 1' 10 1/2"	0.125	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.008 @ 1' 10 1/2"	0.188	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

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

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	164	256	420	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	164	256	420	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 9" o/c	
Bottom Edge (Lu)	3' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

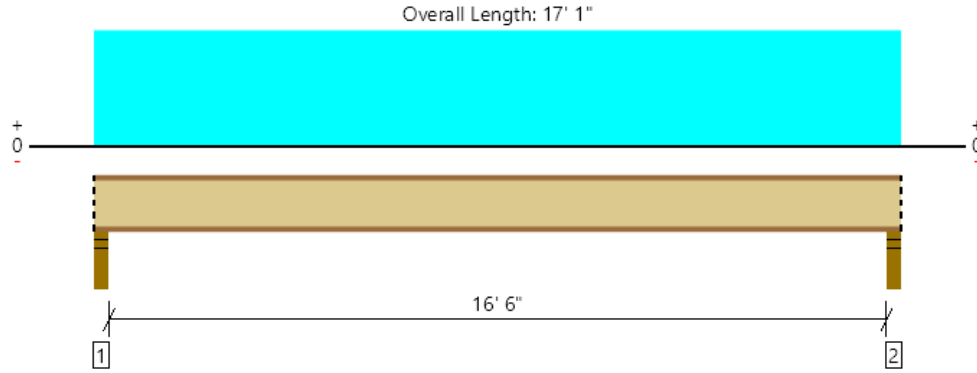| Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 9"	N/A	5.5	--	
1 - Uniform (PLF)	0 to 3' 9"	N/A	82.0	136.5	Linked from: Roof: Joist #1, Support 1

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File Name: 23127 Hong and Kao Residence - DADU
Page 6 / 14

Roof, Roof: Header #5
1 piece(s) 4 x 8 HF No.2
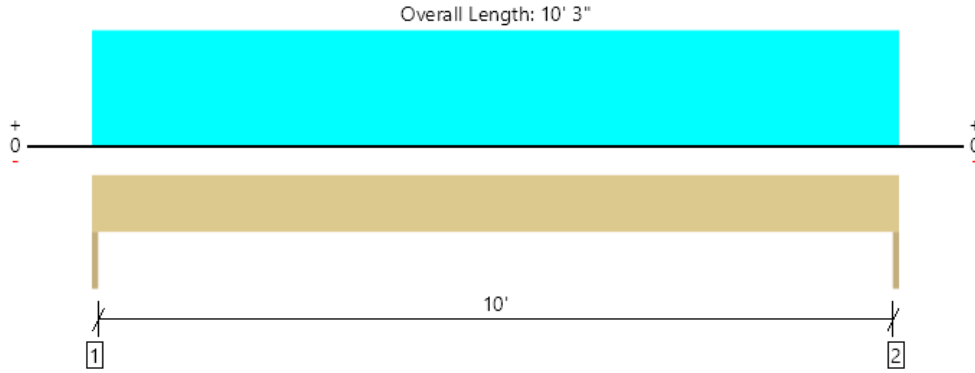
Overall Length: 10' 3"

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)	299 @ 0	2126 (1.50")	Passed (14%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	257 @ 8 3/4"	2538	Passed (10%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	767 @ 5' 1 1/2"	2823	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.069 @ 5' 1 1/2"	0.342	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.100 @ 5' 1 1/2"	0.313	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	94	205	299	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	94	205	299	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 3" o/c	
Bottom Edge (Lu)	10' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 10' 3"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 10' 3"	1'	12.0	40.0	Default Load

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File Name: 23127 Hong and Kao Residence - DADU
Page 7 / 14

Roof, Roof Beam #6
1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL
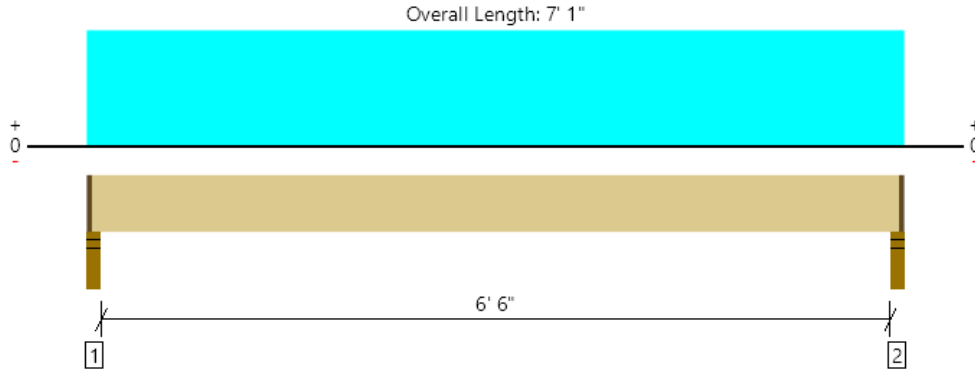
Overall Length: 7' 1"

6' 6"

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)	223 @ 2"	3189 (2.25")	Passed (7%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	147 @ 1' 3 3/8"	8590	Passed (2%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	370 @ 3' 6 1/2"	15953	Passed (2%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 3' 6 1/2"	0.169	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.005 @ 3' 6 1/2"	0.338	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
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 - HF	3.50"	2.25"	1.50"	87	142	229	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	2.25"	1.50"	87	142	229	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 11" o/c	
Bottom Edge (Lu)	6' 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)	1 1/4" to 6' 11 3/4"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 7' 1" (Front)	1'	12.0	40.0	Default Load

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File Name: 23127 Hong and Kao Residence - DADU
Page 9 / 14

Floor Header #4

UP

ENTRY

Floor Header #3

Upper Floor Joist #1

UTIL

Upper Floor Beam #2

36'-3"

GARAGE

30'-11"

NORTH

ADU UPPER FLOOR FRAMING PLAN
1/4" = 1'-0"

Kao and Hong DADU
project

23127.01
date   job no.

drawn by:

Chesmore Buck
client

design by: sheet no.

Upper Floor, Floor: Joist #1
1 piece(s) 9 1/2" TJI® 210 @ 16" OC

Overall Length: 12' 4"

11' 9"

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)	452 @ 2 1/2"	1460 (3.50")	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	431 @ 3 1/2"	1330	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1302 @ 6' 2"	3000	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.125 @ 6' 2"	0.298	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.172 @ 6' 2"	0.596	Passed (L/831)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	55	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
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 structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1/2" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	123	329	452	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.75"	123	329	452	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)	5' 8" o/c	
Bottom Edge (Lu)	12' 4" o/c	

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

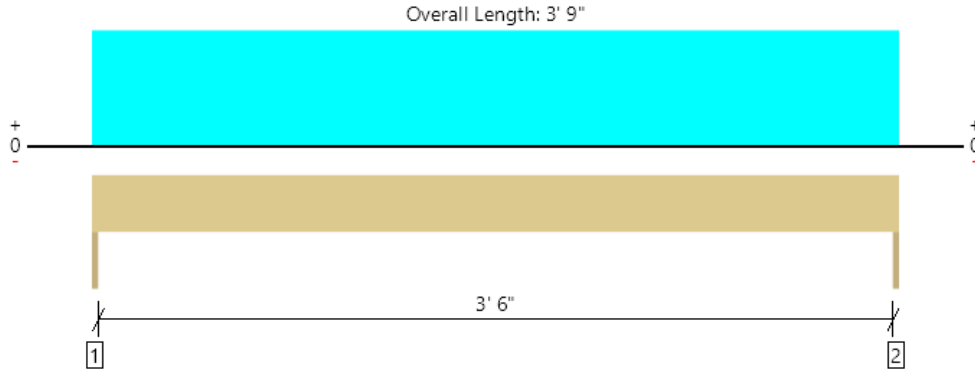| Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 12' 4"	16"	15.0	40.0	Residential Loading

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Page 11 / 14

Upper Floor, Floor: Drop Beam #2
1 piece(s) 5 1/8" x 24" 24F-V4 DF Glulam
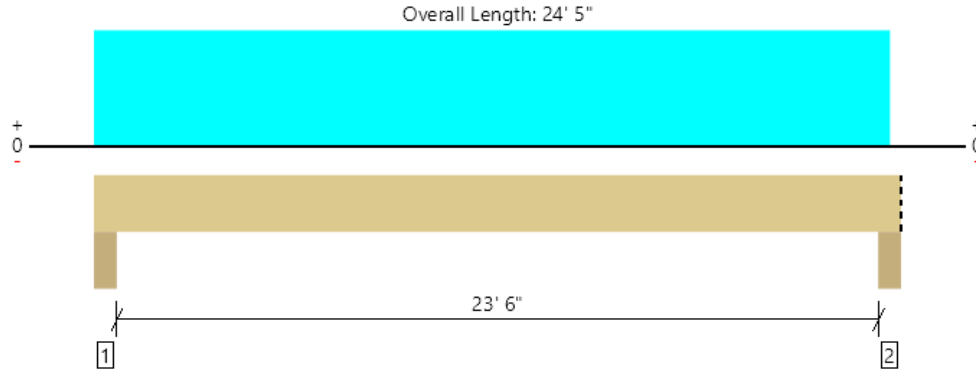
Overall Length: 24' 5"

23' 6"

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)	11095 @ 4"	18322 (5.50")	Passed (61%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	8861 @ 2' 5 1/2"	24990	Passed (35%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	64080 @ 12' 2 1/2"	83549	Passed (77%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.350 @ 12' 2 1/2"	0.594	Passed (L/815)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.612 @ 12' 2 1/2"	1.188	Passed (L/466)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- A 26.2% decrease in the moment capacity has been added to account for lateral stability.
- Critical positive moment adjusted by a volume factor of 0.92 that was calculated using length L = 23' 9".
- 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	Floor Live	Snow	Factored	
1 - Column - HF	5.50"	5.50"	3.33"	4757	3012	5439	11095	None
2 - Column - HF	5.50"	5.50"	3.24"	4637	2930	5290	10802	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)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 24' 5"	N/A	29.9	--	--	
1 - Uniform (PLF)	0 to 24' 1" (Top)	N/A	113.5	-	189.0	Linked from: Roof: Joist #1b, Support 1
2 - Uniform (PLF)	0 to 24' 1" (Top)	N/A	154.0	-	256.5	Linked from: Roof: Joist #2, Support 1
3 - Uniform (PLF)	0 to 24' 1" (Top)	N/A	92.3	246.8	-	Linked from: Floor: Joist #1, Support 1

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Upper Floor, Floor: Header #3
2 piece(s) 2 x 8 HF No.2
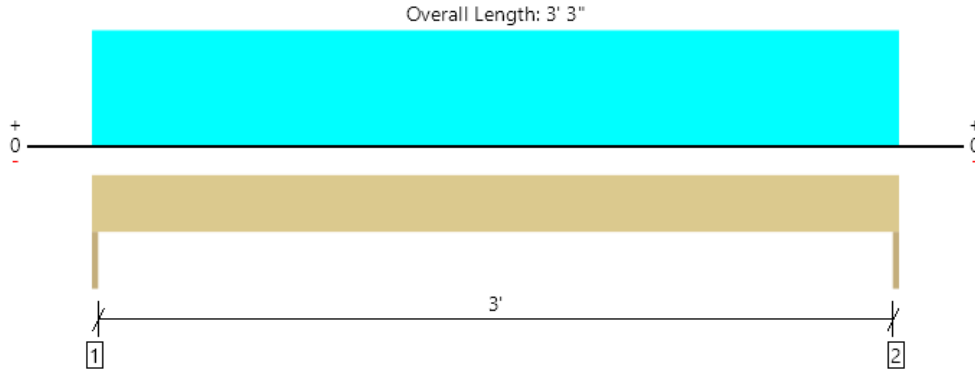
Overall Length: 3' 3"

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)	962 @ 0	1823 (1.50")	Passed (53%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	530 @ 8 3/4"	2175	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	782 @ 1' 7 1/2"	2234	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.009 @ 1' 7 1/2"	0.108	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.012 @ 1' 7 1/2"	0.162	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

• Deflection criteria: LL (L/360) and TL (L/240).

• 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	269	693	962	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	269	693	962	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 3"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 3' 3"	4' 6"	15.0	40.0	Residential Loading
2 - Uniform (PLF)	0 to 3' 3"	N/A	92.3	246.8	Linked from: Floor: Joist #1, Support 1

Weyerhaeuser Notes

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File Name: 23127 Hong and Kao Residence - DADU
Page 13 / 14

Upper Floor, Floor: Header #4
2 piece(s) 2 x 8 HF No.2
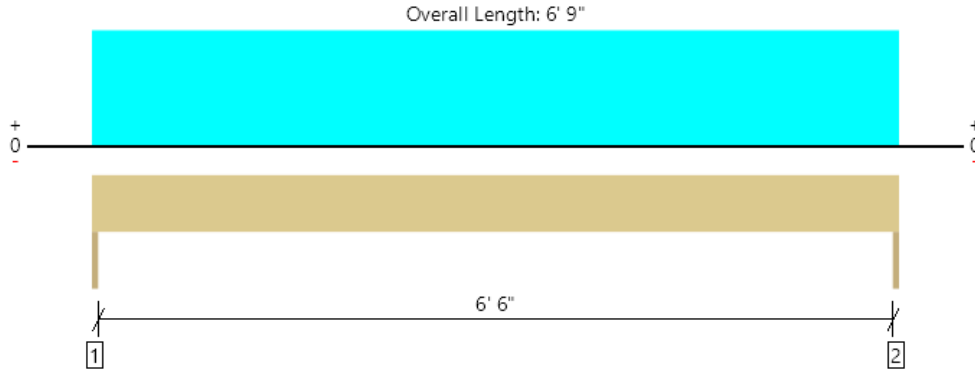
Overall Length: 6' 9"

6' 6"

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)	854 @ 0	1823 (1.50")	Passed (47%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	669 @ 8 3/4"	2175	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1441 @ 3' 4 1/2"	2234	Passed (65%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.068 @ 3' 4 1/2"	0.225	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.095 @ 3' 4 1/2"	0.313	Passed (L/849)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	246	608	854	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	246	608	854	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 9" o/c	
Bottom Edge (Lu)	6' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

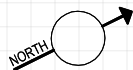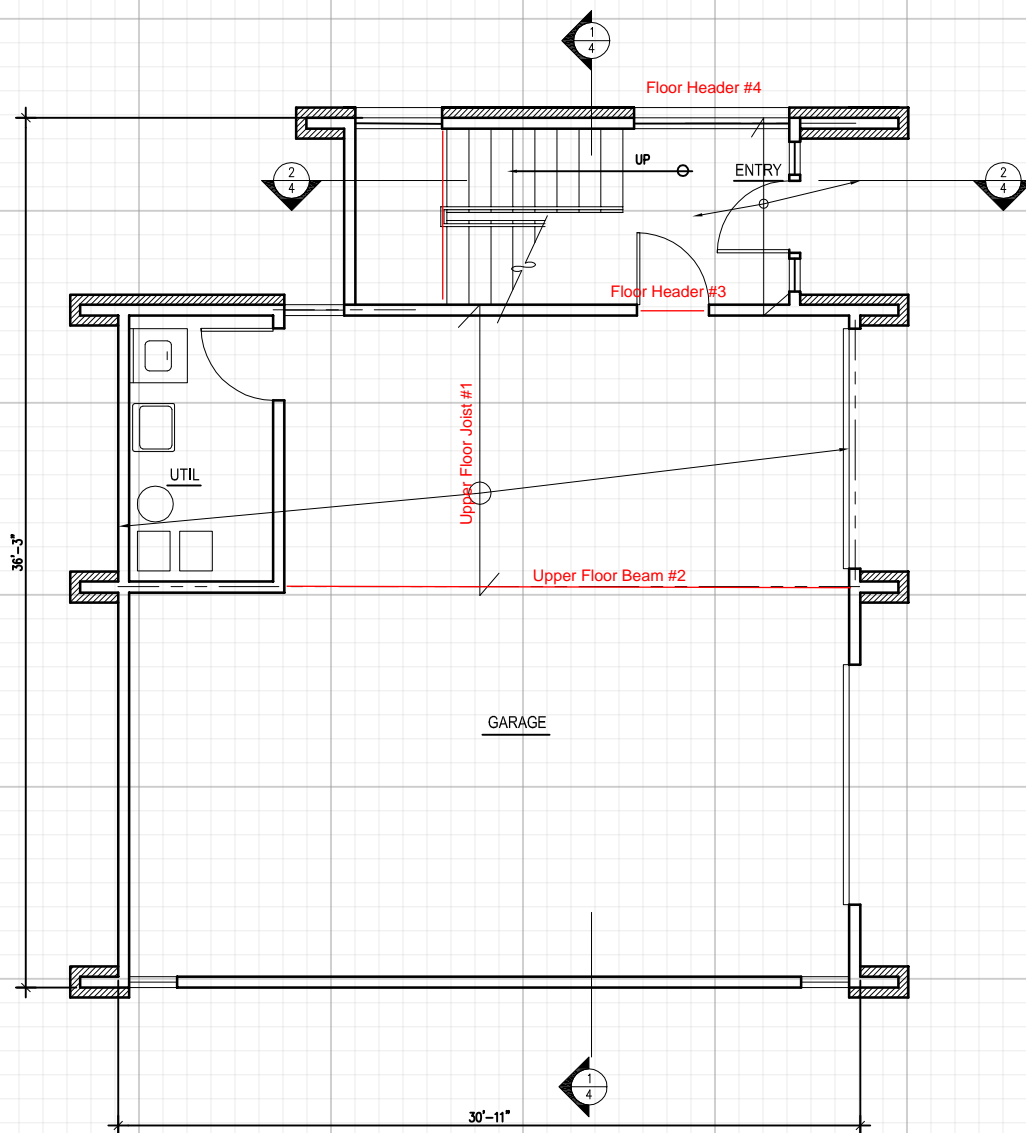| Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 9"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 6' 9"	4' 6"	15.0	40.0	Residential Loading

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
Joshua Shin Quantum (206) 957-3900 jshin@quantumce.com	

Weyerhaeuser

5/26/2023 10:21:44 PM UTC
ForteWEB v3.5, Engine: V8.2.5.1, Data: V8.1.3.6
File Name: 23127 Hong and Kao Residence - DADU
Page 14 / 14

Wood Stud Wall Design

Per IBC 2018 & NDS 2018

Structure: Garage Double Height Wall
Wall Line: Exterior Bearing Wall

Wall Configuration

Wall Height (ft):	21.00	Stud Spacing (in):	16
Stud Size:	2x8	Stud Species & Grade:	HF #2
Bot. Plate Th.:	2x	Bot. Plate Species & Grade:	HF #2

Wall Finish Type: **Brittle**   Defl. Criteria: L/240 =1.05 in per IBC 1604.3.1

Bending Stress and Stiffness Increase per NDS 3.1.1.1 ?: Yes

Wall Loading

Axial Load		*Out of Plane Pressure Load*			*Wall Axial Load Eccentricity*	
DL (plf):	160	Wind (psf):	20	Strength	n (in):	2.75
LL (plf):	0	EQ (psf):	5	Strength	e (in):	0.88
SL (plf):	240	S_{ds}:	1			
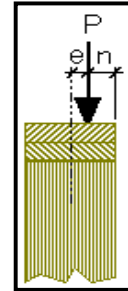
Stud Properties

b (in):	1.50	E (psi):	1300000	per NDS Table 4A	F_b (psi):	850	per NDS Table 4A
d (in):	7.25	E' (psi):	1300000	$= E*C_M*C_t$	F_c (psi):	1300	per NDS Table 4A
A (in²):	10.88	E_{min} (psi):	470000	per NDS Table 4A			
S (in³):	13.14	E'_{min} (psi):	470000	$= E_{min}*C_M*C_t$			
I (in⁴):	47.63						

C_P:	L_e (ft):	20.63	stud height	Bending C_F:	1.20	per NDS Table 4A
	L_e/d:	34.14		Axial C_F:	1.05	per NDS Table 4A
	F_{cE} (psi):	332	$= 0.822*E'_{min}/(L_e/d)^2$	C_M:	1.00	per NDS 4.3.3
	c:	0.8	per NDS 3.7.1.5	C_t:	1.00	per NDS 4.3.4

Bot. Plate Properties

b (in):	1.50	

$F_{c⊥}$ (psi):	405	per NDS Table 4A	$F'_{c⊥}$ (psi):	506	$= F_{c⊥}*C_M*C_t*C_b$
C_b:	1.25	per NDS 3.10.4	P_{all} (lb):	5505	$= F'_c*A$

Wood Stud Wall Design

Per IBC 2018 & NDS 2018

Structure: Garage Double Height Wall
Wall Line: Exterior Bearing Wall

Check Wall Axial and Flexural Capacities for Load Cases per IBC 1605.3.1

$f_c = P_{axial}/A$ $\qquad$ $f_b = M_{tot}/S$

$F'_c = F_c*C_D*C_M*C_t*C_F*C_P$ $\qquad$ $F'_b = F_b*C_D*C_M*C_t*C_F*C_r$

P_{Axial} (lb)	Bot. Plate P_{all} Status	f_c (psi)	C_D: NDS Table 2.3.2	C_P	F'_c (psi)	C_r: NDS 4.3.9	M_{tot} (lb-ft)	f_b (psi)	F'_b (psi)	Interaction per NDS 3.9.2	Deflection (in)	Wall Status
Load Case: D + L												
213	<= Pall: OK	20	1.00	0.23	313	1.15	16	14	1173	0.06	0.01	OK
Load Case: D + S												
533	<= Pall: OK	49	1.15	0.20	316	1.15	39	36	1349	0.16	0.03	OK
Load Case: D + 0.75(L + S)												
453	<= Pall: OK	42	1.15	0.20	316	1.15	33	30	1349	0.13	0.03	OK
Load Case: D + 0.6W												
213	<= Pall: OK	20	1.60	0.15	320	1.25	866	791	2040	0.42	0.75	OK
Load Case: D + 0.75(L + S + 0.6W)												
453	<= Pall: OK	42	1.60	0.15	320	1.15	671	613	1877	0.39	0.58	OK
Load Case: (1.0 + 0.14Sds) D + 0.7E												
243	<= Pall: OK	22	1.60	0.15	320	1.15	266	243	1877	0.14	0.32	OK
Load Case: (1.0 + 0.14Sds) D + 0.75(L + S + 0.7E)												
517	<= Pall: OK	48	1.60	0.15	320	1.15	224	204	1877	0.15	0.26	OK

Wall: 2x8 @ 16 in. o.c. is acceptable

p

LATERAL DESIGN – DADU

Wind Loads - Main Wind Force Resisting System

Per IBC 2021 & ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, h<160ft

Wind Load Criteria

Risk Category:	**II**	Table 1.5-1	K_e:	**0.9987**	Section 26.10.1
Basic Wind Speed:	**97 mph**	Figure 26.5.1	K_d:	**0.85**	Section 26.6
Exposure Category:	**C**	Section 26.7.3	G:	**0.85**	Section 26.11
K_{zt}:	**1.00**	Section 26.8			
			Wall Height:	**21.0 ft**	
			Parapet Elevation:	**23.0 ft**	

Wall Pressures:

L/B Ratio:

Short Dimension:	**31.0 ft**
Long Dimension:	**36.3 ft**
Transverse Wind L/B:	0.86
Longitudinal Wind L/B:	1.17
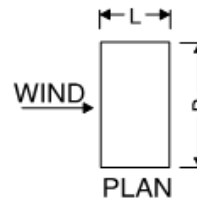
*NOTE: INTERNAL BUILDING PRESSURE CANCEL
        EACH OTHER OUT IN ENCLOSED BUILDING

K_h & K_z:	0.911	At Top of Wall
K_z:	0.85	0 ft to 15 ft
Kp:	0.93	At Top of Parapet

PLAN

ELEVATION
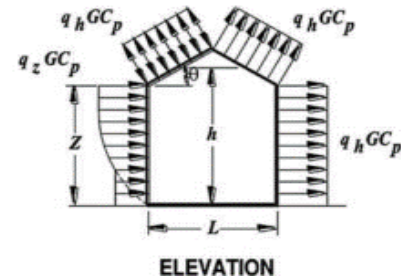
	Transverse Wind Direction	Longitudinal Wind Direction	
Top of Wall:	**20.6 psf**	**20.1 psf**	ASCE EQ 27.3-1
0 ft to 15 ft Wall:	**19.7 psf**	**19.2 psf**	ASCE EQ 27.3-1

Parapet: **47.5 psf** (Parapet)   ASCE EQ 27.3-3

*Enveloped Leeward and Windward Pressure
*All Values Ultimate (multiply x0.6 for ASD)

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

ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, h<160ft

Roof Pressure:

Slope:	0.0:12	=	0.0	DEGREES	
Mean Roof HT:	21.0 ft				
Building Dimension:	**31.0 ft**	**Parallel to Ridge**			
Building Dimension:	**36.3 ft**	**Normal to Ridge**			
K_h & K_z:	0.911	At Mean Roof Ht			

FLAT ROOF   *tal*

Windward Pressure

	LC 1	LC 2		LC 1	LC 2
0 to h/2	**-21.7 psf**	**0.5 psf**		**0.0 psf**	**0.0 psf**
h/2 to h	**-15.6 psf**	**0.5 psf**		**0.0 psf**	**0.0 psf**
h to 2h	**-13.3 psf**	**0.5 psf**		**0.0 psf**	**0.0 psf**
>2h	**-12.2 psf**	**0.5 psf**		**0.0 psf**	**0.0 psf**

*Negative indicates pressure away from surface

*Total horizontal shear shall not be less than that determined by neglecting roof wind forces

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

Roof Overhang (PSF)

P_{ovh}: -34.4 psf   **0.0 psf**

Minimum Total Projected Horizontal Pressure (PSF)   **8.0 psf**   ASCE 27.1.5

Wind Loads - Components and Cladding

Per IBC 2021 & ASCE 7-16 Chapter 30.3 & 30.5 - Part 1 and Part 3 Enclosed Buildings With h<160 FT

Wind Load Criteria

Risk Category:	**II**	Table 1.5-1	K_d:	**0.85**	Section 26.6	
Basic Wind Speed:	**97 mph**	Figure 26.5.1	Roof Type:	**Flat**		
Exposure Category:	**C**	Section 26.7.3	Roof Slope:	**0.0:12**	= 0.0	DEG
K_{zt}:	**1.00**	Section 26.8	Mean Roof Height:	**21.0 ft**		
K_e:	**1.00**	Section 26.10.1	Wall Height:	**21.0 ft**	Parapet Height:	**2.0 ft**

Zone Dimensions

Least Horiz. BLDG Dimension: **31 ft**

a: **3.1 ft**

2a: **6.2 ft**

Wall Pressures

K_z: 0.850 Table 26.10-1 0-15 ft (PART 3)

K_h: 0.911 Table 26.10-1

Effective Wind Area: Zone 4: **147 ft^2**

Zone 5: **147 ft^2**

	At Top of Wall		0 FT TO 15 FT (>60' bldg)	
Load Case	4	5	4	5
1	**16.7**	**16.7**		
2	**-18.3**	**-19.9**		

*Negative indicates pressure away from surface
*Okay to interpolate between 15ft and top of wall (>60' bldg)
*All Values Ultimate (multiply x0.6 for ASD)

ELEVATION
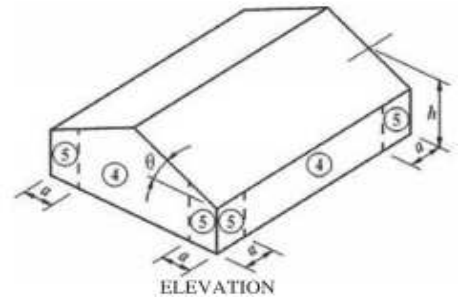
Roof Pressures

K_h: 0.911 Table 26.10-1

Overhang?: **No**

Effective Wind Area:

Zone 1:	**67 ft^2**	Zone 2:	**968 ft^2**	Zone 3:	**208 ft^2**	
Zone 1':		Zone 2e:		Zone 3e:		
		Zone 2n:		Zone 3r:		
		Zone 2r:		Zone 3':		
		Zone 2':				

Zone (PSF)

Load Case	1	1'		Load Case	2	2e	2n	2r	2'
1	**7.4**	**8.9**		1	**7.1**	-	-	-	-
2	**-28.7**	**-13.4**		2	**-29.4**	-	-	-	-

Load Case	3	3e	3r	3'
1	**7.1**	-	-	-
2	**-37.0**	-	-	-

*Negative indicates pressure away from surface
*All Values Ultimate (multiply x0.6 for ASD)

Parapet Pressures

		Zone 4	Zone 5
--------------------→	Windward:	**46.1**	**53.6**
	Leeward:	**35.0**	**36.6**

Wind Loads - Components and Cladding (Cont.)

ASCE 7-16 Chapter 30 - Part 4 Enclosed Buildings With h<160 FT (Simplified)
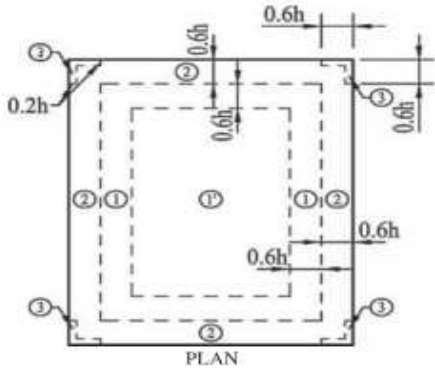
ASCE FIG 30.3-2A
FLAT/GABLE ROOF θ <= 7°
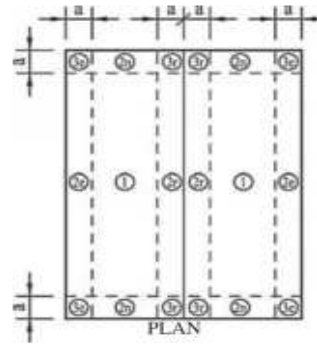
ASCE FIG 30.3-2B to D
GABLE ROOF 7°< θ <= 45°
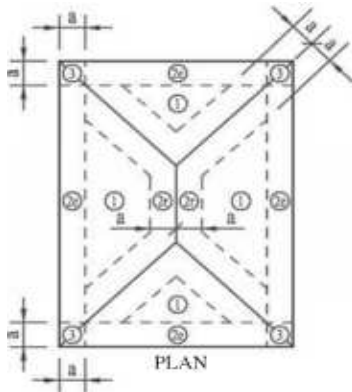
ASCE FIG 30.3-2E to I
HIP ROOF 7°< θ <= 45°
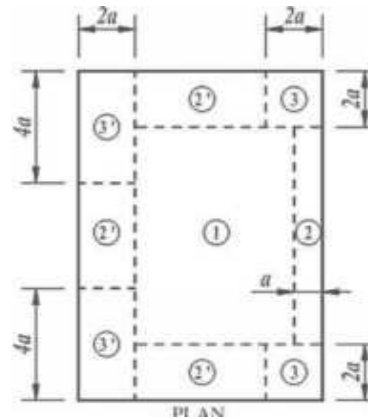
ASCE FIG 30.3-5A
Monoslope ROOF 3°< θ <= 10°
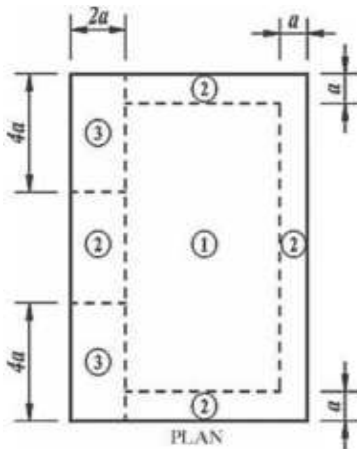
ASCE FIG 30.3-5B
Monoslope ROOF 10°< θ <= 30°
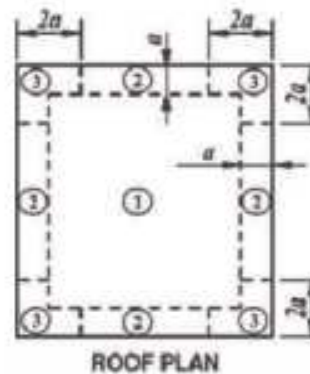
ASCE FIG 30.5-1
ROOF H > 60ft, θ <= 7°

Seismic Base Shear for the Equivalent Lateral Force Procedure

Per IBC 2021 & ASCE 7-16

e

Structure: **Hong-Koa Residence - DADU**
Address: **5425 W. Mercer Way Mercer Island, WA 98040**
Latitude: **47.5540**   Longitude: **-122.2320**

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: **3**   per ASCE Table 12.2-1
C_d: **4**   per ASCE Table 12.2-1
h_n (ft): **21.00**   height above the base to the highest level of the structure

Site Ground Motion

Reg. Structure/5 Stories Max: **Yes**   **Sds (max) = 1.0**   Per ASCE 12.8.1.3
S_1 (g-sec): **0.51** S_S (g-sec): **1.45**
Site Class: **D**   **Assumed Value**   per ASCE 11.4.3

ASCE 11.4.8 Exception 2 Used

F_v **1.79** F_a **1.20**

1.2 Min Value where SC D Assumed

S_{M1} (g-sec): **0.91** S_{MS} (g-sec): **1.74**   per ASCE 11.4.4
S_{D1} (g-sec): **0.61** S_{DS} (g-sec): **1.16**   per ASCE 11.4.5
SDC: **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 22-14 through 22-17
T_s: 0.52

Ta (sec): 0.20 C_t * hnx per ASCE Eq. 12.8-7

T_{use} (sec): **0.20**   ¯ <= TL

Equivalent Lateral Force Procedure Design Base Shear per ASCE 12.8

C_s: 0.18   = $S_{DS} / (R/I_E)$ per ASCE Eq. 12.8-2
C_{s-max}: 0.47   = $S_{D1} / (T_a*R/I_E)$ for T <= T_L per ASCE Eq. 12.8-3
C_{s-max}: --   = $S_{D1}*T_L / (T_a^2*R/I_E)$ for T > T_L per ASCE Eq. 12.8-4
C_{s-min}: 0.05   per ASCE Eq. 12.8-5
C_{s-min}: --   = $0.5S_1 / (R/I_E)$ for S_1 => 0.6g per ASCE Eq. 12.8-6
C_{s-use}: 0.18

V : 0.178 W = C_{S-use} * W per ASCE Eq. 12.8-1

Quantum Consulting Engineers LLC	Project: Kao & Hong Residence	Date: 5/30/23	Job No: 23127.01
1511 Third Avenue, Suite 323		Designer: JJS	Sheet: 1
Seattle, WA 98101	Client: Chesmore Buck	Checked By:	

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

Per IBC 2021 & ASCE 7-16

Structure: **Hong-Koa Residence - DADU**

Seismic Parameters

I_E:	1.00	per ASCE Table 1.5-2
S_{DS} (g-sec):	1.16	per ASCE 11.4.4
Period (Sec):	0.20	per ASCE 12.8.2.1
k:	1.00	per ASCE 12.8.3

Vertical Distribution of Seismic Forces per ASCE 12.8.3

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

$C_{vx} = (w_x h_x^k)/(Sw_i h_i^k)$ 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	21.00	27.42	45.4%	575.8	63.6%	6.85	6.85
Upper Floor	10.00	32.99	54.6%	329.9	36.4%	3.93	10.78

Total WT (k): 60.40   Sum: 906

C_{s-use}: 0.178

V (k): **10.78**   per ASCE 12.8.1

Vertical Distribution of Seismic Diaphragm Forces per ASCE 12.10.1.1

$F_{px} = (SF_i/Sw_i) * w_{px}$ per ASCE Eq 12.10-1

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

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

Level	w_{px} (k)	Σw_i (k)	F_x (k)	ΣF_i (k)	F_{px} (k)	Notes	Diaphragm/Story Force Ratio
Roof	27.42	27.42	6.85	6.85	6.85		1.000
Upper Floor	32.99	60.40	3.93	10.78	7.65	= Fp-min	1.949
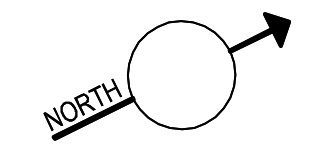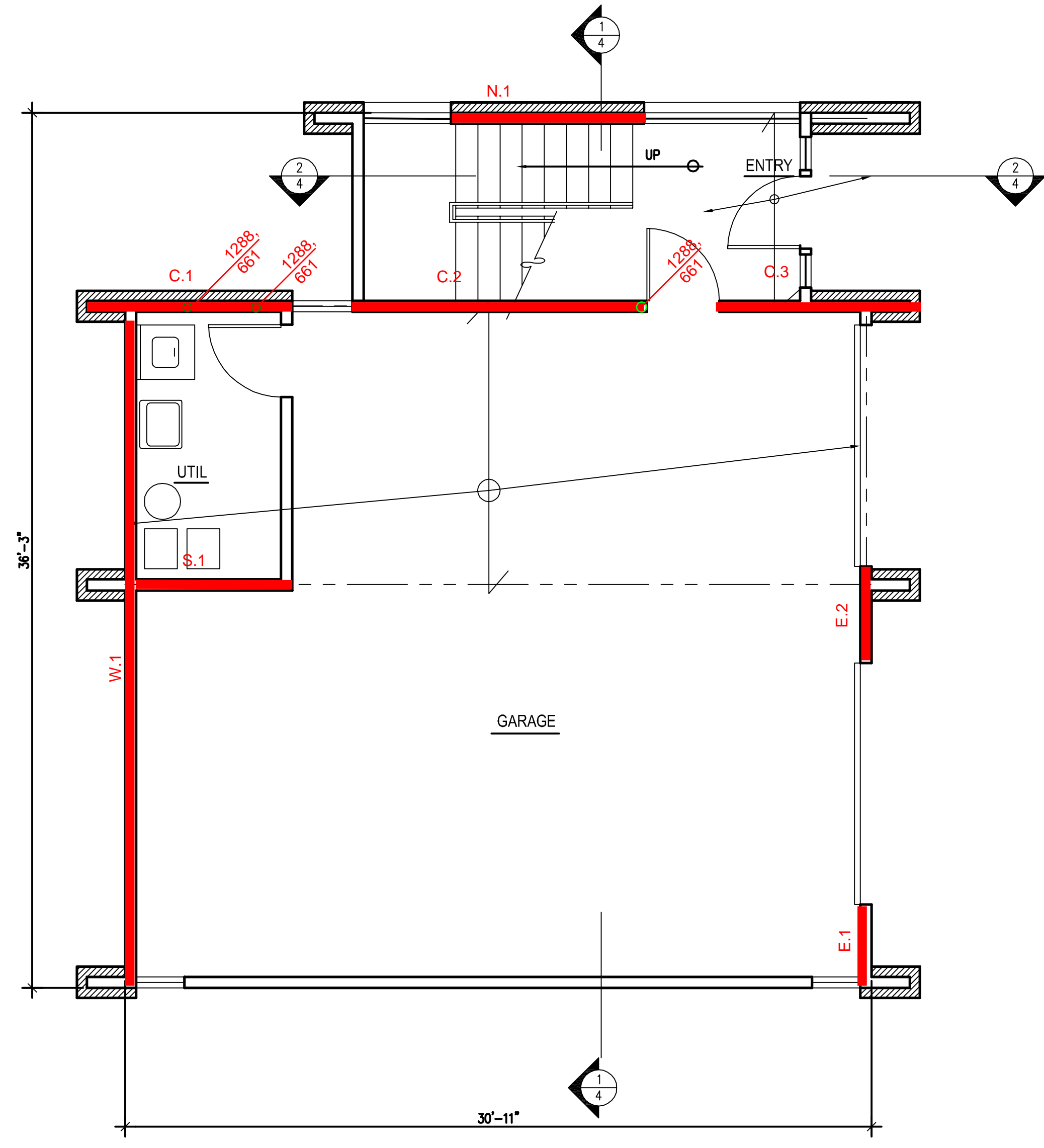
ADU UPPER FLOOR FRAMING PLAN
1/4" = 1'-0"
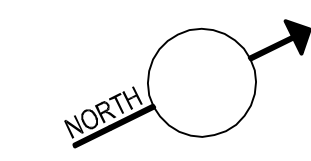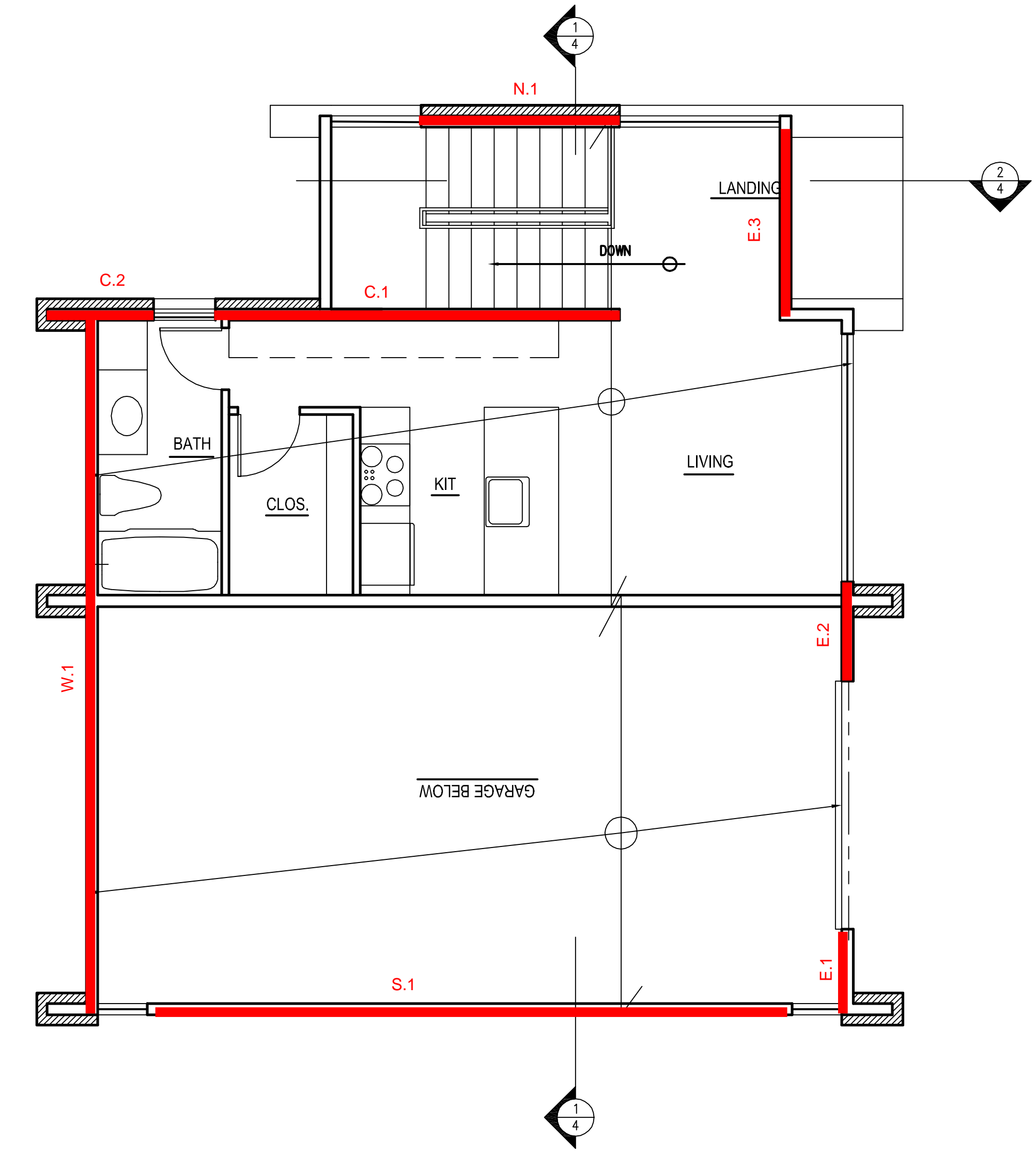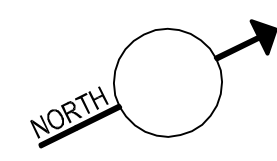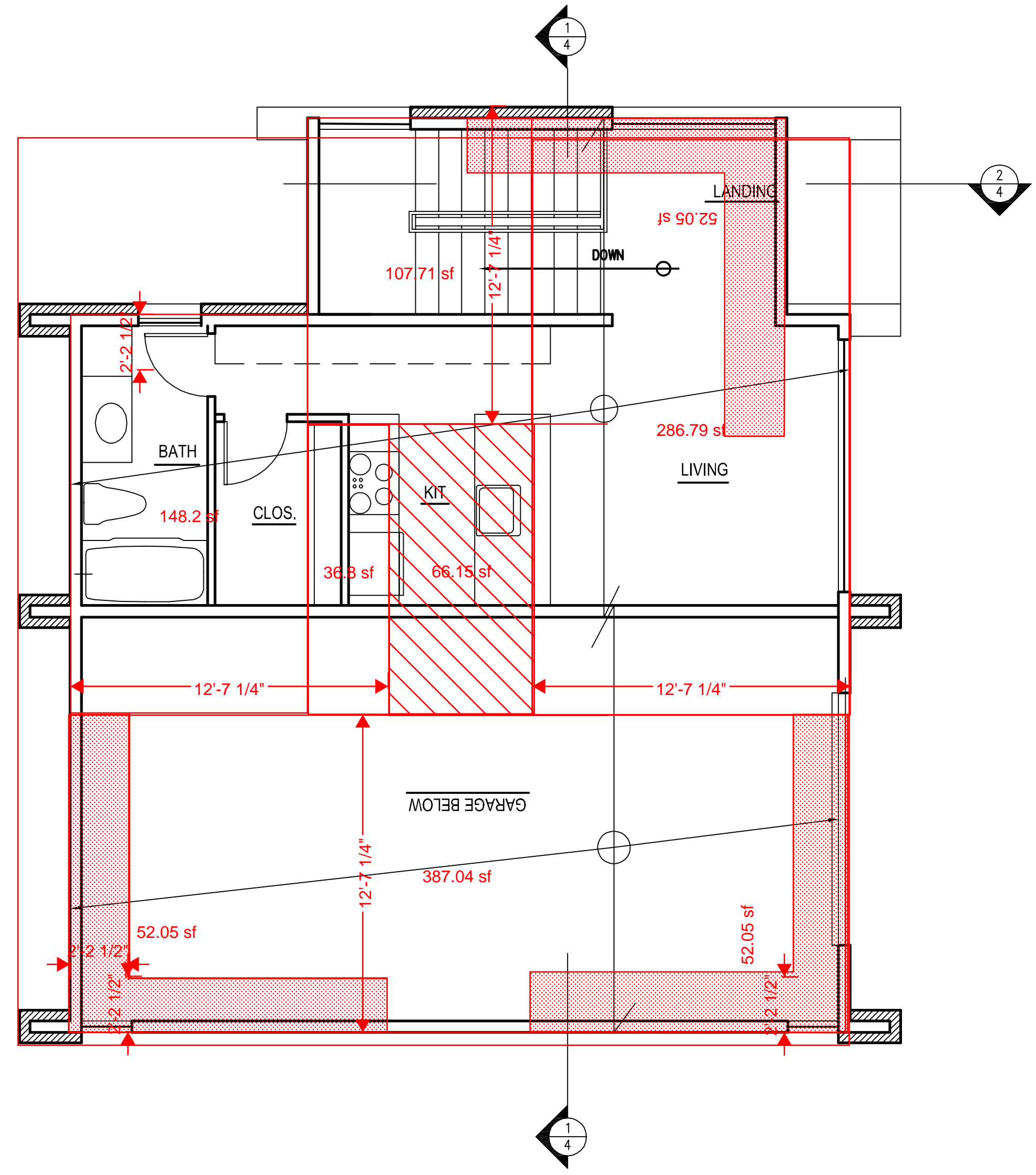
NORTH

GARAGE

UTIL

ENTRY

UP

N.1

C.1   C.2   C.3

W.1

E.2

E.1

S.1

1288/661   1288/661   1288/661

36'-3"

30'-11"

ADU ROOF FRAMING PLAN
1/4" = 1'-0"

NORTH

LIVING

BATH

CLOS.

KIT

LANDING

GARAGE BELOW

DOWN

N.1

C.2   C.1

E.3

W.1

E.2

E.1

S.1

LANDING

52.05 sf

107.71 sf

12'-2 1/4"

DOWN

2'-2 1/2"

286.79 sf

BATH

LIVING

148.2 sf

CLOS.

KIT.

36.3 sf

66.15 sf

12'-7 1/4"

12'-7 1/4"

GARAGE BELOW

12'-7 1/4"

387.04 sf

52.05 sf

2 1/2"

2 1/2"

52.05 sf

2 1/2"

ADU ROOF FRAMING PLAN

1/4" = 1'-0"

NORTH

ADU SHEARWALL MAP

NOT TO SCALE

NORTH

N.1

C.2 **C.1**

E.3

LANDING

DOWN

BATH

CLOS.

KIT

LIVING

W.1

E.2

GARAGE BELOW

S.1

E.1

Kao Hong DADU	06-02-2023
project	**date**
	draw
Chesmore Buck	JJS
client	**design**

23127.01
job no.

sheet
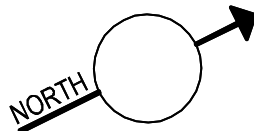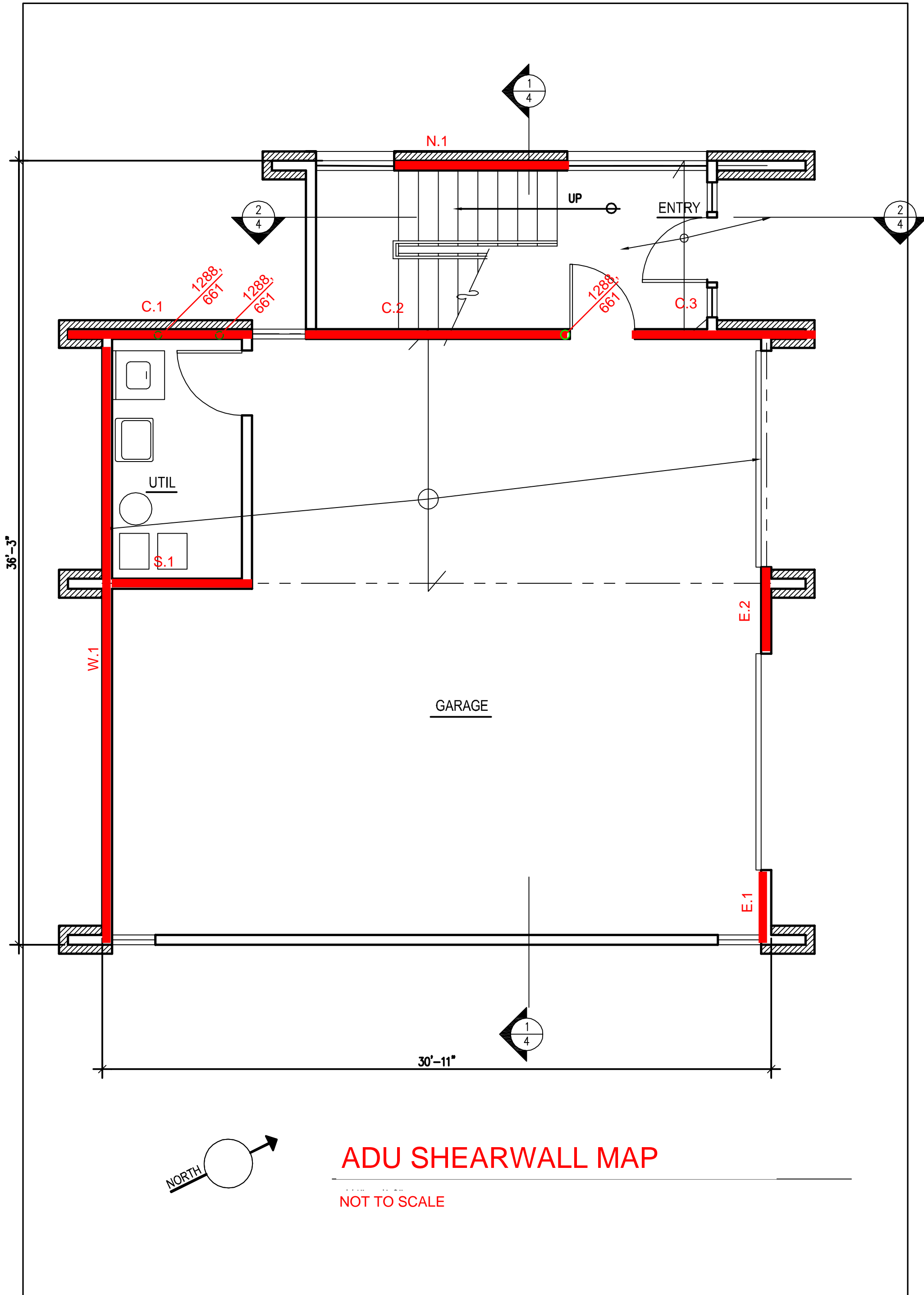
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CONSULTING ENGINEERS

1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

N.1

UP

ENTRY

1288/661
1288/661
1288/661

C.1   C.2   C.3

UTIL

S.1

W.1

E.2

E.1

GARAGE

36'-3"

30'-11"

NORTH

ADU SHEARWALL MAP

NOT TO SCALE

Kao Hong DADU
project

Chesmore Buck
client

06-02-2023
date

23127.01
job no.

draw

JJS
design

sheet

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Roof**

Sds = **1.166**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = **17.25**

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**N**	**8.00**	-	-	-	-	-	-	-	-	-
SW Segment	N.1	8.00	11.00	1.38	HF #2	0.43	Interstory	11.00	10.0	4.0	15.0
SW GRID	**C**	**20.50**	-	-	-	-	-	-	-	-	-
SW Segment	C.1	16.25	11.00	0.68	HF #2	0.43	Interstory	11.00	10.0	18.0	15.0
SW Segment	C.2	4.25	11.00	2.59	HF #2	0.43	Interstory	11.00	10.0	18.0	15.0
SW GRID	**S**	**26.00**	-	-	-	-	-	-	-	-	-
SW Segment	S.1	26.00	21.00	0.81	HF #2	0.43	Base	21.00	10.0	14.0	15.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**N**	490	482	-	-	-	-	-	-
SW Segment	N.1	490	482	1360			**SW-6**	**2**	**CS16 (1705)**
SW GRID	**C**	3430	2054				-	-	-
SW Segment	C.1	2719	1628	6175			**SW-6**	**2**	**CS16 (1705)**
SW Segment	C.2	711	426	1615			**SW-6**	**2**	**CS16 (1705)**
SW GRID	**S**	2940	1586				-	-	-
SW Segment	S.1	2940	1586	10920			**SW-6**	**2**	**HDU2 (3075DF,2215HF)**
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Roof**

EQ φ SDPWS 4.1.4.1   WIND φ SDPWS 4.1.4.2

ϕ_D =   0.5 ϕ_D =   0.8

Shear Wall Schedule (LRFD)

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	870	435	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	1290	645	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1680	840	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	2155	1078	2155	1724	23
2SW-4	APA Rated, 15/32", 10d Common	4	2580	1290	2580	2064	34
2SW-3	APA Rated, 15/32", 10d Common	3	3360	1680	3360	2688	38
2SW-2	APA Rated, 15/32", 10d Common	2	4310	2155	4310	3448	46

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
N.1	61	1.00	66	60	65	66	SW-6	435	OK	Seismic
C.1	167	1.00	180	100	108	180	SW-6	435	OK	Seismic
C.2	167	0.93	194	100	116	194	SW-6	435	OK	Seismic
S.1	113	1.00	122	61	66	122	SW-6	435	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
N.1	8.00	7.79	2.67%	No	
C.1	16.25	16.04	1.30%	No	
C.2	4.25	4.04	5.15%	No	
				No	
S.1	26.00	25.52	1.90%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Roof**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
N.1	472		472	397		397	680	680
C.1	1288		1288	661		661	3088	3088
C.2	1288		1288	661		661	808	808
S.1	1662		1662	769		769	5460	5460

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
N.1	11	-175	11	-175	-175	CS16 (1705)	-1705	OK
C.1	1191	60	1191	60	60	CS16 (1705)	-1705	OK
C.2	-177	-936	-177	-936	-936	CS16 (1705)	-1705	OK
S.1	2507	722	2507	722	722	HDU2 (3075DF,2215HF)	-2215	OK

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Project: Hong and Kao Residence	Date:	5/30/23	Job No:	23127.01
	Designer:	JJS	Sheet:	3
Client: Chesmore Buck Architect	Checked By:	XX		

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Upper Floor**

Sds = 1.166
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**N**	**8.00**	-	-	-	-	-	-	-	-	-
SW Segment	N.1	8.00	10.00	1.25	HF #2	0.43	Base	10.00	12.0	4.0	15.0
SW GRID	**C**	**28.75**	-	-	-	-	-	-	-	-	-
SW Segment	C.1	8.50	10.00	1.18	HF #2	0.43	Base	10.00	12.0	18.0	15.0
SW Segment	C.2	12.25	10.00	0.82	HF #2	0.43	Base	10.00	12.0	18.0	15.0
SW Segment	C.3	8.00	10.00	1.25	HF #2	0.43	Base	10.00	12.0	18.0	15.0
SW GRID	**S**	**8.50**	-	-	-	-	-	-	-	-	-
SW Segment	S.1	8.50	10.00	1.18	HF #2	0.43	Base	10.00	12.0	14.0	15.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**N**	1540	1357	-	-	-	-	-	-
SW Segment	N.1	1540	1357	1440			**SW-6**	**2**	**HDU2 (3075DF,2215HF)**
SW GRID	**C**	5390	5787				-	-	-
SW Segment	C.1	1594	1711	3315			**SW-6**	**2**	**HDU4 (4565DF, 3285HF)**
SW Segment	C.2	2297	2466	4778			**SW-6**	**2**	**HDU2 (3075DF,2215HF)**
SW Segment	C.3	1500	1610	3120			**SW-6**	**2**	**HDU2 (3075DF,2215HF)**
SW GRID	**S**	3850	4470				-	-	-
SW Segment	S.1	3850	4470	2805		5522	**SW-4**	**2**	**HDU4 (4565DF, 3285HF)**
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Upper Floor**

EQ φ SDPWS 4.1.4.1   WIND φ SDPWS 4.1.4.2

Shear Wall Schedule (LRFD) ϕ_D =   0.5 ϕ_D =   0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	870	435	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	1290	645	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1680	840	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	2155	1078	2155	1724	23
2SW-4	APA Rated, 15/32", 10d Common	4	2580	1290	2580	2064	34
2SW-3	APA Rated, 15/32", 10d Common	3	3360	1680	3360	2688	38
2SW-2	APA Rated, 15/32", 10d Common	2	4310	2155	4310	3448	46

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
N.1	193	1.00	207	170	182	**207**	SW-6	435	OK	Seismic
C.1	187	1.00	202	201	216	**202**	SW-6	435	OK	Seismic
C.2	187	1.00	202	201	216	**202**	SW-6	435	OK	Seismic
C.3	187	1.00	202	201	216	**202**	SW-6	435	OK	Seismic
S.1	453	1.00	487	526	565	**487**	SW-4	645	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
N.1	8.00	7.52	6.44%	No	
				No	
				No	
C.1	8.50	8.02	6.04%	No	
C.2	12.25	11.77	4.12%	No	
C.3	8.00	7.52	6.44%	No	
S.1	8.50	8.02	6.04%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Upper Floor**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
N.1	1348	**472**	1819	1018	**397**	1415	720	720
C.1	1312	**1705**	3017	1208	**875**	2083	1658	1658
C.2	1312	**1288**	2600	1208	**661**	1869	2389	2389
C.3	1312		1312	1208		1208	1560	1560
S.1	3171		3171	3155		3155	1403	6925

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
N.1	-983	-1505	-983	-1505	**-1505**	HDU2 (3075DF,2215HF)	**-2215**	**OK**
C.1	-1088	-2293	-1088	-2293	**-2293**	HDU4 (4565DF, 3285HF)	**-3285**	**OK**
C.2	-436	-1557	-436	-1557	**-1557**	HDU2 (3075DF,2215HF)	**-2215**	**OK**
C.3	-272	-631	-272	-631	**-631**	HDU2 (3075DF,2215HF)	**-2215**	**OK**
S.1	-2314	-2558	999	-146	**-2558**	HDU4 (4565DF, 3285HF)	**-3285**	**OK**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Roof**

Sds =   **1.166**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) =   **17.25**

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**E**	**15.75**	-	-	-	-	-	-	-	-	-
SW Segment	E.1	3.50	11.00	3.14	HF #2	0.43	Interstory	11.00	10.0	1.0	15.0
	E.2	4.00	11.00	2.75	HF #2	0.43	Interstory	11.00	10.0	1.0	15.0
	E.3	8.25	11.00	1.33	HF #2	0.43	Interstory	11.00	10.0	1.0	15.0
SW GRID	**W**	**28.50**	-	-	-	-	-	-	-	-	-
SW Segment	W.1	28.50	11.00	0.39	HF #2	0.43	Interstory	11.00	10.0	1.0	15.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**E**	3425	1935	-	-	-	-	-	-
SW Segment	E.1	761	430	438			**SW-6**	**2**	**CS16 (1705)**
	E.2	870	491	500			**SW-6**	**2**	**CS16 (1705)**
	E.3	1794	1013	1031			**SW-6**	**2**	**CS16 (1705)**
SW GRID	**W**	3425	1935				-	-	-
SW Segment	W.1	3425	1935	3563			**SW-6**	**2**	**CS16 (1705)**
SW GRID							-	-	-
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Roof**

EQ φ SDPWS 4.1.4.1   WIND φ SDPWS 4.1.4.2

Shear Wall Schedule (LRFD) ϕ_D =   0.5 ϕ_D =   0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	870	435	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	1290	645	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1680	840	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	2155	1078	2155	1724	23
2SW-4	APA Rated, 15/32", 10d Common	4	2580	1290	2580	2064	34
2SW-3	APA Rated, 15/32", 10d Common	3	3360	1680	3360	2688	38
2SW-2	APA Rated, 15/32", 10d Common	2	4310	2155	4310	3448	46

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
E.1	217	0.86	273	123	154	273	SW-6	435	OK	Seismic
E.2	217	0.91	258	123	146	258	SW-6	435	OK	Seismic
E.3	217	1.00	234	123	132	234	SW-6	435	OK	Seismic
W.1	120	1.00	129	68	73	129	SW-6	435	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
E.1	3.50	3.29	6.33%	No	
E.2	4.00	3.79	5.49%	No	
E.3	8.25	8.04	2.59%	No	
W.1	28.50	28.29	0.74%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**

Floor Level: **Roof**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
E.1	1674		1674	811		811	219	219
E.2	1674		1674	811		811	250	250
E.3	1674		1674	811		811	516	516
W.1	925		925	448		448	1781	1781

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
E.1	-679	-1579	-679	-1579	**-1579**	CS16 (1705)	**-1705**	**OK**
E.2	-661	-1565	-661	-1565	**-1565**	CS16 (1705)	**-1705**	**OK**
E.3	-501	-1449	-501	-1449	**-1449**	CS16 (1705)	**-1705**	**OK**
W.1	621	-147	621	-147	**-147**	CS16 (1705)	**-1705**	**OK**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Roof**

Sds =	1.166
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) =	17.25

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**E**	**7.50**	-	-	-	-	-	-	-	-	-
SW Segment	E.1	3.50	10.00	2.86	HF #2	0.43	Base	10.00	10.0	1.0	15.0
SW Segment	E.2	4.00	10.00	2.50	HF #2	0.43	Base	10.00	10.0	1.0	15.0
SW GRID	**W**	**28.50**	-	-	-	-	-	-	-	-	-
SW Segment	W.1	28.50	10.00	0.35	HF #2	0.43	Base	10.00	10.0	1.0	15.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**E**	5390	5452	-	-	-	-	-	-
SW Segment	E.1	2515	2544	403			SW-2	4	HDU11 (4) Studs (9335DF, 8030HF)
SW Segment	E.2	2875	2908	460			SW-2	4	HDU11 (4) Studs (9335DF, 8030HF)
SW GRID	**W**	5390	5452				-	-	-
SW Segment	W.1	5390	5452	3278			SW-6	2	HDU2 (3075DF,2215HF)
SW GRID							-	-	-
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**
Floor Level: **Roof**

EQ φ SDPWS 4.1.4.1   WIND φ SDPWS 4.1.4.2

Shear Wall Schedule (LRFD) ϕ_D = 0.5 ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 10d Common	6	870	435	870	696	14
SW-4	APA Rated, 15/32", 10d Common	4	1290	645	1290	1032	17
SW-3	APA Rated, 15/32", 10d Common	3	1680	840	1680	1344	19
SW-2	APA Rated, 15/32", 10d Common	2	2155	1078	2155	1724	23
2SW-4	APA Rated, 15/32", 10d Common	4	2580	1290	2580	2064	34
2SW-3	APA Rated, 15/32", 10d Common	3	3360	1680	3360	2688	38
2SW-2	APA Rated, 15/32", 10d Common	2	4310	2155	4310	3448	46

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
E.1	719	0.89	865	727	875	865	SW-2	1077.5	OK	Seismic
E.2	719	0.94	824	727	834	824	SW-2	1077.5	OK	Seismic
W.1	189	1.00	203	191	206	203	SW-6	435	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
E.1	3.50	2.76	26.79%	No	
E.2	4.00	3.26	22.68%	No	
				No	
W.1	28.50	28.02	1.73%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Kao and Hong Residence**

Floor Level: **Roof**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
E.1	5031	**1674**	6705	4362	**811**	5172	201	201
E.2	5031	**1674**	6705	4362	**811**	5172	230	230
W.1	1324	**925**	2249	1148	**448**	1596	1639	1639

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
E.1	-5052	-6617	-5052	-6617	**-6617**	HDU11 (4) Studs (9335DF, 8030H	**-8030**	OK
E.2	-5034	-6605	-5034	-6605	**-6605**	HDU11 (4) Studs (9335DF, 8030H	**-8030**	OK
W.1	-613	-1533	-613	-1533	**-1533**	HDU2 (3075DF,2215HF)	**-2215**	OK

HONG AND KAO RESIDENCE

5425 W. Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 23127.01

FOUNDATION DESIGN – DADU
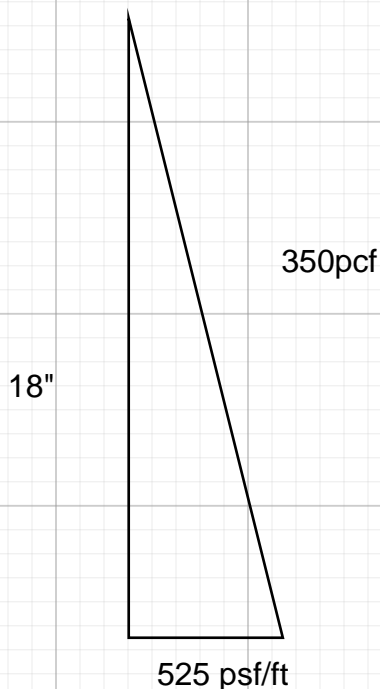
Base Shear: 29.81k

Passive Pressure: 350pcf

Assume 18" Depth (Frost Depth)

Resist Force= Length of house*depth^2* Passive pressure/2
N-S direction=(35.5ft*3 wall lines)*1.5ft^{2}350pcf/2
=41.9 kips
E-W direction=(38ft*2 wall lines)*1.5ft2350pcf/2
=29.9 kips

350pcf

18"

525 psf/ft

1. Top of Plan:
4'-6" Trib
Ext Wall+ Veneer
Roof+Res+Parking
D+L=1260 + 540 plf
1800 plf
3dia Pile: 12k cap
6'-6" spacing

2.Under Upper Beam
14'-3" Trib
D+L= 1623+ 713 plf
2335 plf
3dia Pile: 12k cap
5' spacing

Level Loading
Roof 18/30
Upper Floor 15/40
Parking 90/50
GB 340/0
Exterior Wall 190/0
Veneer 722/0

3. Below Stairs
10'-0" Trib
Int Wall
Roof Res Parking
D+L= 1760 + 1200 plf
2960 plf
3dia Pile: 12k cap
4' spacing

4. Under Util Room
14'-3" Trib
Int Wall
Roof Res Parking
D+L= 2283 +1710 plf
3993 plf
3dia Pile: 12k cap
3' spacing

5. Bottom of Plan
8'-6" Trib
Ext Wall
Roof Res Parking
D+L= 1576 +
1020
2596 plf
3dia Pile: 12k cap
4'-6" spacing

6. 2'-0" Trib
Ext Wall
Roof Res Parking
D+L= 776 + 240 plf
1016 plf
3dia Pile: 12k cap
11'-9" spacing

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

Per IBC 2021 & ASCE 7-16

Structure: **Hong-Koa Residence - DADU**

Seismic Parameters

I_E:	1.00	per ASCE Table 1.5-2
S_{DS} (g-sec):	1.16	per ASCE 11.4.4
Period (Sec):	0.20	per ASCE 12.8.2.1
k:	1.00	per ASCE 12.8.3

Vertical Distribution of Seismic Forces per ASCE 12.8.3

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

$C_{vx} = (w_x h_x^k)/(Sw_i h_i^k)$ 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	22.50	27.42	16.4%	616.9	53.4%	15.91	15.91
Upper Floor	11.50	32.99	19.7%	379.4	32.8%	9.78	25.69
Foundation	1.50	106.65	63.8%	160.0	13.8%	4.12	29.81

Total WT (k):	167.05	Sum:	1156
C_{s-use}:	0.178		
V (k):	**29.81**	per ASCE 12.8.1	

Vertical Distribution of Seismic Diaphragm Forces per ASCE 12.10.1.1

$F_{px} = (SF_i/Sw_i) * w_{px}$ per ASCE Eq 12.10-1

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

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

Level	w_{px} (k)	Σw_i (k)	F_x (k)	ΣF_i (k)	F_{px} (k)	Notes	Diaphragm/Story Force Ratio
Roof	27.42	27.42	15.91	15.91	**12.72**	= Fp-max	0.800
Upper Floor	32.99	60.40	9.78	25.69	**14.03**		1.434
Foundation	106.65	167.05	4.12	29.81	**24.74**	= Fp-min	5.998

One-Way Slab Design - Simple Span

Per IBC 2021 & ACI 318-19

Identification: 15' Span

Loads:

				Load Factors:		
Superimposed DL:	5	psf				
LL:	50	psf		DL:	1.2	ACI 5.3.1
	25	% LL sustained		LL:	1.6	ACI 5.3.1
				Average Factor=	1.34	

Geometry:

Clear span (L):	15	ft.	
Conc. Cover:	2	in.	ACI 20.6.1.3
Thickness:	7	in.	
Minimum Thickness:	9.0	in.	ACI 7.3.1.1 **Check Deflection**

Strength & Reinforcing f'_c = 4 ksi f_y = 60 ksi

Transverse Reinforcing			*Longitudinal Reinforcing (Midspan)*			
0.15	in^2 / ft.	ACI 24.4.3.1	Bottom bar:	#5	@ 12	in o.c.
#4 @ 16 in o.c.			Top bar:	#5	@ 12	in o.c.

Design:

b =	12	in.	A_s =	0.31	in^2 / ft.		ρ = 0.0055
d =	4.69	in.	A_s min =	0.15	in^2 / ft.	**OK** ACI 9.6.1.2	
w_u=	191	psf	A_s max =	1.02	in^2 / ft.	**OK** (Tension Ctrl'd Section)	
			A_s' =	0.31	in^2 / ft.		ρ' = 0.0055

Check Shear

V_u @ 'd' =	1.36	kips / ft.		ACI 7.4.3.2
φVc =	5.34	kips / ft.	**OK**	ACI 22.5.5.1 (Simple)
φVc =	5.64	kips / ft.	**OK**	ACI 22.5.5.1 (Detailed)

Check Flexure

M_u =	64.5	k-in. / ft.
ϕM_n =	74.7	k-in. / ft. **OK**

Check Deflection

E_{conc} =	3605 ksi	ACI 19.2.2.1		M_a =	48.1	k-in. / ft.
I_g =	343 in^4			f_r =	474 psi	ACI 19.2.3.1
I_{cr} =	37 in^4			M_{cr} =	46.5	k-in. / ft. ACI 24.2.3.5b
I_e =	313 in^4	ACI 23.2.3.5a		M_a/M_{cr} =	1.03	
I for Deflection =	**313 in^4**					

Time Factor (ξ)=	2.0	ACI 24.2.4.1.3	
Deflection Factor =	1.57	ACI 24.2.4.1.1	

LL Deflection =	0.05 in.	L/3570	Total LL (Regardless of % Sustained)
DL Deflection =	0.09 in.	L/1930	
Total Deflection =	**0.30 in.**	**L/606**	(DL+Sust. LL)xDefl. Factor + Remaining LL +DL

Concrete Beam Design - Simple Span
Per IBC 2021 & ACI 318-19

Identification: <mark>Grade Beam</mark>

Loads:

	UNIFORM		LINE		total		*Load Factors:*	
Superimposed DL	5	psf	0	plf	0.07 klf		DL: 1.2	ACI 5.3.1
LL:	50	psf	0	plf	0.68 klf		LL: 1.6	ACI 5.3.1
	25	% LL sustained					Average Factor= 1.47	

Geometry:

Tributary (B):	13.5	ft.		
Clear span (L):	11	ft.		
Conc. Cover	1.5	in.	ACI 20.6.1.3	
Width (b):	18	in.		
Thickness (h):	14	in.		
min. h:	8.3		ACI 9.3.1.1	**OK**

Strength & Reinforcing $f'c =$ 2.5 ksi $fy =$ 60 ksi

Transverse Reinforcing			*Longitudinal Reinforcing (Midspan)*		
Stirrup bar size:	#3		Bottom bar:	(3)	#5
Stirrup Legs:	(2)		Spacing b/w Bot. Bars	6.19 in.	**OK**
Stirrup Spacing:	12	in.	Top bar:	(2)	#4
s max:	5.91	in.			

Design:

$d =$	11.81 in.		$A_s =$	0.93 in^2		ρ:	0.0044
$w_u =$	1.48 klf		As min =	0.71 in^2	**OK**		
			As max =	2.4003 in^2	**OK Tension Controlled**		
			$As' =$	0.40 in^2		ρ':	0.0019

Check Shear

Vu @ 'd' =	6.7 kips	ACI 7.4.3.2	
$\phi Vc =$	15.9 kips	ACI 22.5.5.1 (Simple)	
$\phi Vc =$	16.7 kips	ACI 22.5.5.1 (Detailed)	
ϕVs Required =	0.0 kips		
Av =	0.22 in^2	@ 12 in. oc	
ϕVs Provided =	9.7 kips	**OK**	ACI 22.5.10.5.3

Check Flexure

Mu =	268 k-in		
$\phi Mn =$	557 k-in	**OK**	

Check Serviceability

$z_{cracking} =$	93 kip-in.	**OK for tank**	ACI 318-95 EQ 10-5

Check Deflection

$E_{conc} =$	2881 ksi	ACI 19.2.2.1	Ma =	182 k-in.	
$I_g =$	4116 in^4		fr =	375 psi	ACI 19.2.3.1
$I_{cr} =$	889 in^4		Mcr =	221 k-in.	ACI 24.2.3.5b
$I_e =$	6589 in^4	ACI 23.2.3.5a	Ma/Mcr =	0.83 uncracked, use Ig	
I for defl. =	**4116 in^4**				

Time Factor (ξ)=	2.0	ACI 24.2.4.1.3	
Deflection Factor =	1.83	ACI 24.2.4.1.1	

LL Deflection =	0.02 in.	L/7039	Total LL (Regardless of % Sustained)
DL Deflection =	0.01 in.	L/14399	
Total Deflection =	**0.05 in.**	**L/2718**	(DL+Sust. LL)xDefl. Factor + Remaining LL +Dl

Quantum Consulting Engineers LLC	Project: Kao Hong Residence	Date: 6/1/23	Job No: 23127.01
1511 Third Avenue, Suite 323		Designer: JJS	Sheet:
Seattle, WA 98101	Client: Chesmore Buck	Checked By:	

Kao Hong ACI 318-19 Conc Beam Design.xls