



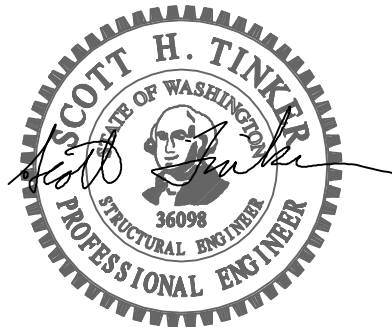
May 17, 2023

STRUCTURAL CALCULATIONS
(Permit Submittal)

SIPIORA RESIDENCE DADU
7215 93rd Ave SE
Mercer Island, WA 98040

Quantum Job Number: 22580.02

Prepared for:
LAINIE SIPIORA
7215 93rd Ave SE
Mercer Island, WA 98040



Prepared by:
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7215 93RD AVE SE
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 22580.02

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SIPIORA RESIDENCE DADU

7215 93RD AVE SE
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 22580.02

DESIGN CRITERIA

Structural Design Criteria

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

Seismic Criteria

S_s : 1.45 I_e : 1.00
 S_1 : 0.50 Seismic Soil Site Class: D
 S_{ds} : 1.16 Seismic Design Category: D
 S_{d1} : 0.60 C_s : 0.18
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 1500 PSF
Minimum Footing Width Continuous: 18" min., Isolated: 24" min.
Frost Depth 18" min.
Active Soil Pressure (Restrained/Unrestrained) 50 PCF / 35 PCF
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

Reinforcing Steel:

Grade 60 (#5 bar and larger) F_y = 60,000 PSI
Grade 40 (#4 bar) F_y = 40,000 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)
LVL Members - Beams & Headers 1.9 E LVL
Wood Sheathing APA RATED

Residential Building Loads

Snow Load	Roof	25 psf
Live Load	Residential	40 psf
	Residential exterior decks / balconies	60 psf

Assembly Loads

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	
Miscellaneous	1.1 psf	
Total:	13.0 psf	

SL=25 PSF

Typical Floor Loads		Comments
Flooring	3.0 psf	
3/4" Ply. Sheathing	2.3 psf	
Floor Joists @ 16" o.c.	2.5 psf	
5/8" GWB	2.8 psf	
Lights, ducts	0.8 psf	
Miscellaneous	0.6 psf	
Partitons	-	
Total:	12.0 psf	

LL=40 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

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

Roof Deck Loads		Comments
Gravity:		
Wood Decking	3.0 psf	
Membrane Roofing	2.2 psf	
3/4" Ply. Sheathing	2.3 psf	
2x + Joists @ 16" o.c.	2.6 psf	
r38 Insulation	1.0 psf	
5/8" GWB – 2 Layers	5.2 psf	
Lights, ducts	0.7 psf	
Miscellaneous	1.0 psf	
Total:	18.0 psf	

LL=60 PSF

Deflection Criteria

Roof	Walls	Floor
Live Load: L/240	L/120 *flexible finishes	Live Load: L/360
Total Load: L/180	L/240 *brittle finish	Total Load: L/240
	L/240 *supporting glass	

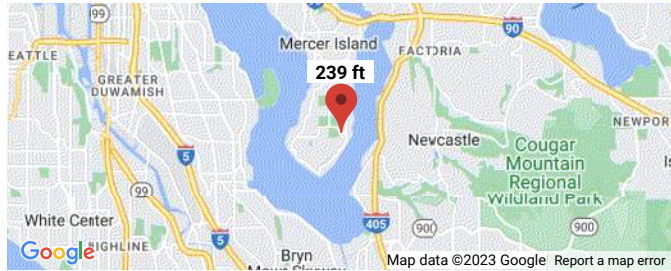
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ℹ The ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

ATC Hazards by Location

Search Information

Address: 7215 93rd Ave SE, Mercer Island, WA 98040, USA
Coordinates: 47.5380446, -122.2154268
Elevation: 239 ft
Timestamp: 2023-02-06T16:37:12.263Z
Hazard Type: Seismic
Reference Document: ASCE7-16
Risk Category: II
Site Class: D-default



Basic Parameters

Name	Value	Description
S _S	1.454	MCE _R ground motion (period=0.2s)
S ₁	0.503	MCE _R ground motion (period=1.0s)
S _{MS}	1.745	Site-modified spectral acceleration value
S _{M1}	* null	Site-modified spectral acceleration value
S _{DS}	1.163	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	1.2	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	0.622	MCE _G peak ground acceleration
F _{PGA}	1.2	Site amplification factor at PGA
PGA _M	0.747	Site modified peak ground acceleration
T _L	6	Long-period transition period (s)
SsRT	1.454	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.612	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	4.303	Factored deterministic acceleration value (0.2s)
S1RT	0.503	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.559	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.64	Factored deterministic acceleration value (1.0s)
PGA _d	1.424	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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

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 provided by the U.S. Geological Survey [Seismic Design Web Services](#).

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ATC Hazards by Location

Search Information

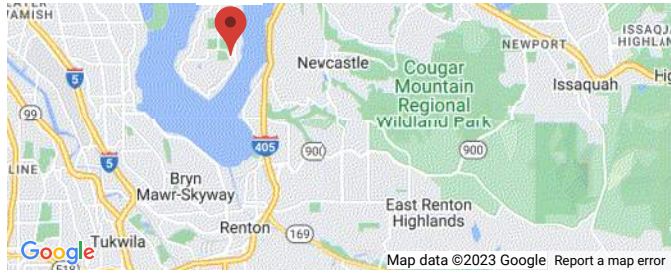
Address: 7215 93rd Ave SE, Mercer Island, WA 98040, USA

Coordinates: 47.5380446, -122.2154268

Elevation: 239 ft

Timestamp: 2023-02-06T16:36:47.760Z

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

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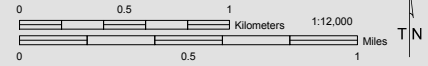
Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour 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.

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Mercer Island Wind Exposure and Wind Speed-Up (Topographic Effect)

by Development Services Group (DSG), City of Mercer Island
April 2009



WIND EXPOSURE CATEGORIES & WIND SPEED-UP FACTORS (ICC Section 1609 & ASCE 7-05 Chapter 6)

It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the K_{zt} factor to be utilized for each specific project. The K_{zt} factors and wind exposure categories indicated on this map are the minimum values accepted by the City of Mercer Island without requiring the design professional to submit additional calculations and supporting topographic documentation (to verify the values utilized in their wind load determination).

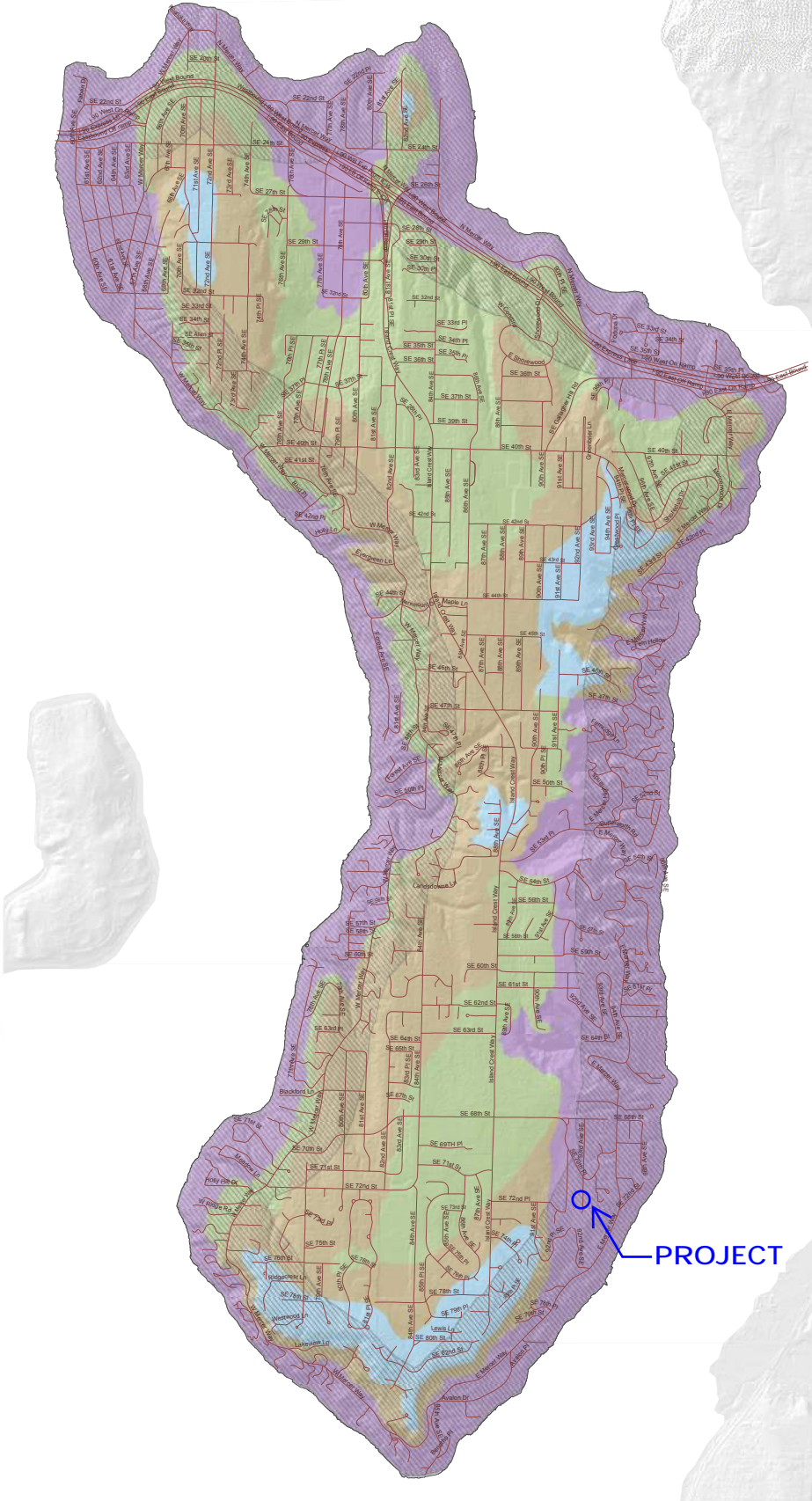
Please note – The K_{zt} values indicated on this map are approximations based upon periodic calculations of representative samplings around Mercer Island. These values are intended for City of Mercer Island's plan review purposes only.

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		$K_{zt} = 1.0$
		$K_{zt} = 1.3$
		$K_{zt} = 1.6$
		$K_{zt} = 1.9$



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 identified 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.

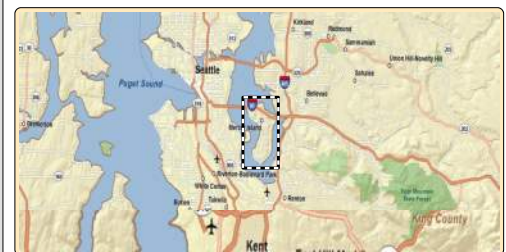
DEFINITIONS:

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)



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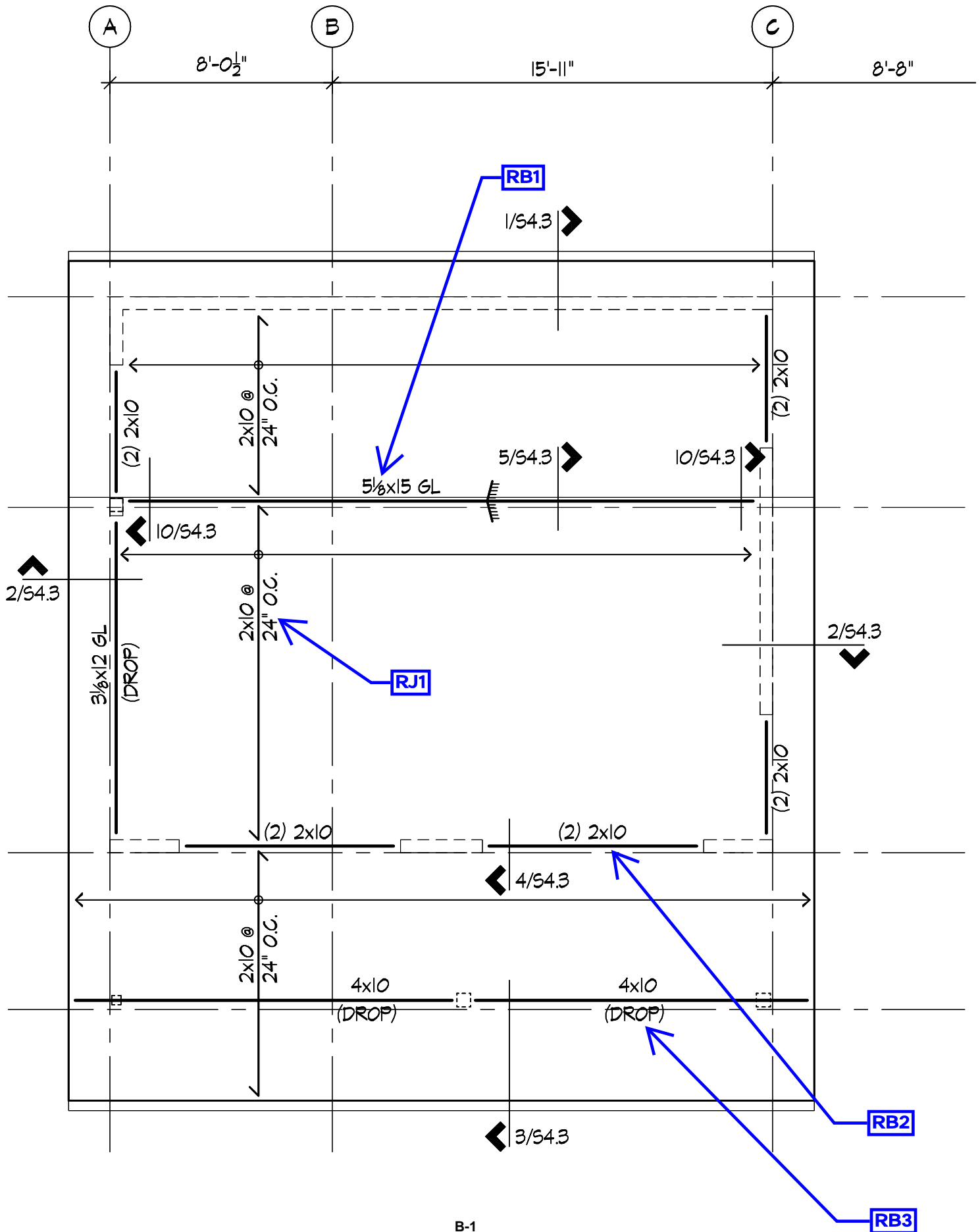
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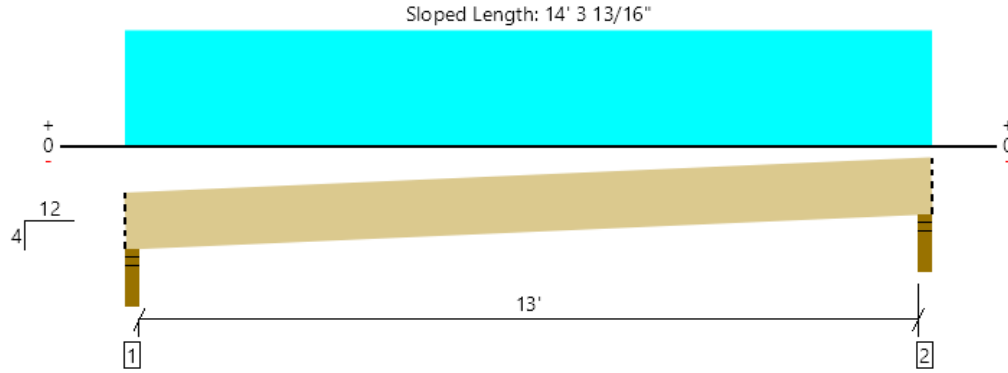
QUANTUM JOB NUMBER: 22580.02

GRAVITY FRAMING

ROOF FRAMING KEY PLAN



DADU Roof, RJ1 - DADU
1 piece(s) 2 x 10 DF No.2 @ 24" OC



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

Member Length : 14' 6 7/8"

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	554 @ 2' 1/2"	3281 (3.50")	Passed (17%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	471 @ 1' 1/4"	1915	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1769 @ 6' 9 1/2"	2334	Passed (76%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.237 @ 6' 9 1/2"	0.694	Passed (L/702)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.387 @ 6' 9 1/2"	0.925	Passed (L/430)	--	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 : 4/12

- 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 - DF	3.50"	3.50"	1.50"	215	340	554	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.50"	215	340	554	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)	14' 4" 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"	24"	15.0	25.0	Default Load

Weyerhaeuser Notes

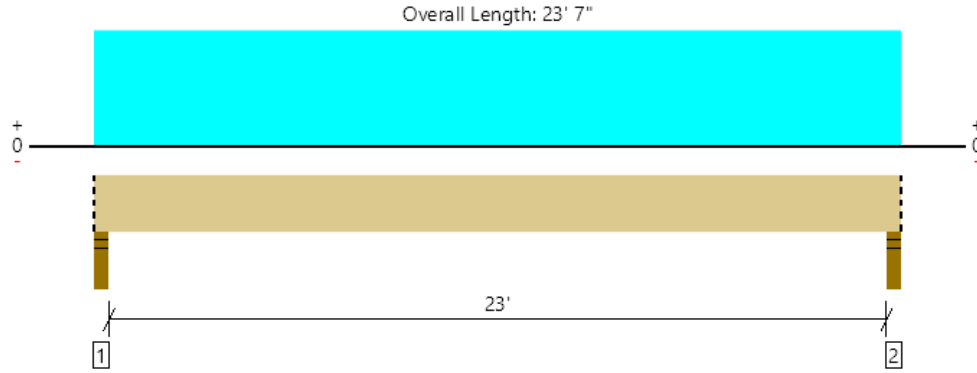
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Bryce Dacus Quantum Consulting Engineers (206) 957-3900 BDacus@quantumce.com	



DADU Roof, RB1 - DADU Ridge
 1 piece(s) 5 1/8" x 15" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4982 @ 2"	11211 (3.50")	Passed (44%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4330 @ 1' 6 1/2"	15618	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	28546 @ 11' 9 1/2"	42790	Passed (67%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.612 @ 11' 9 1/2"	1.163	Passed (L/456)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.071 @ 11' 9 1/2"	1.550	Passed (L/261)	--	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 0.97 that was calculated using length L = 23' 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 - Stud wall - DF	3.50"	3.50"	1.56"	2132	2850	4982	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.56"	2132	2850	4982	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)	23' 7" o/c	
Bottom Edge (Lu)	23' 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 23' 7"	N/A	18.7	--	
1 - Uniform (PSF)	0 to 23' 7" (Front)	9' 8"	16.8	25.0	Default Load

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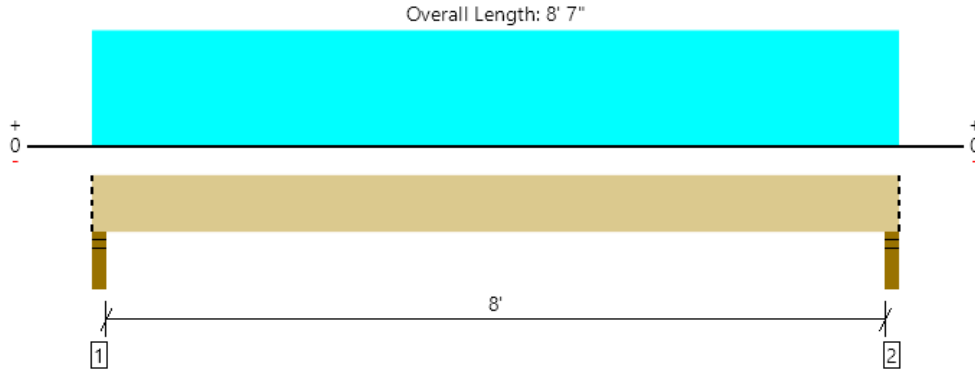
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Bryce Dacus Quantum Consulting Engineers (206) 957-3900 BDacus@quantumce.com	



DADU Roof, RB2 - DADU slider
2 piece(s) 2 x 10 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1614 @ 2"	6563 (3.50")	Passed (25%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1214 @ 1' 3/4"	3830	Passed (32%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3199 @ 4' 3 1/2"	4059	Passed (79%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.073 @ 4' 3 1/2"	0.412	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.124 @ 4' 3 1/2"	0.550	Passed (L/800)	--	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 - Stud wall - DF	3.50"	3.50"	1.50"	666	948	1614	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.50"	666	948	1614	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)	8' 7" o/c	
Bottom Edge (Lu)	8' 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 8' 7"	N/A	7.0	--	
1 - Uniform (PSF)	0 to 8' 7" (Front)	8' 10"	16.8	25.0	Default Load

Weyerhaeuser Notes

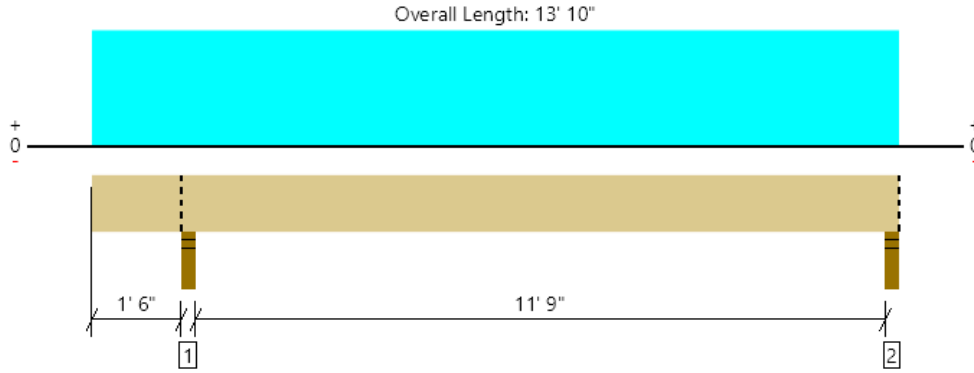
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Bryce Dacus Quantum Consulting Engineers (206) 957-3900 BDacus@quantumce.com	



DADU Roof, RB3 - DADU deck
1 piece(s) 4 x 10 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2065 @ 1' 7 3/4"	7656 (3.50")	Passed (27%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1384 @ 2' 6 3/4"	4468	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4674 @ 7' 8 13/16"	5166	Passed (90%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.192 @ 7' 8 1/16"	0.601	Passed (L/753)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.327 @ 7' 8 3/16"	0.801	Passed (L/441)	--	1.0 D + 1.0 S (All Spans)

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

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - DF	3.50"	3.50"	1.50"	867	1198	2065	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.50"	677	944	1621	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' 10" o/c	
Bottom Edge (Lu)	13' 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 13' 10"	N/A	8.2	--	
1 - Uniform (PSF)	0 to 13' 10" (Front)	6' 2"	16.8	25.0	Default Load

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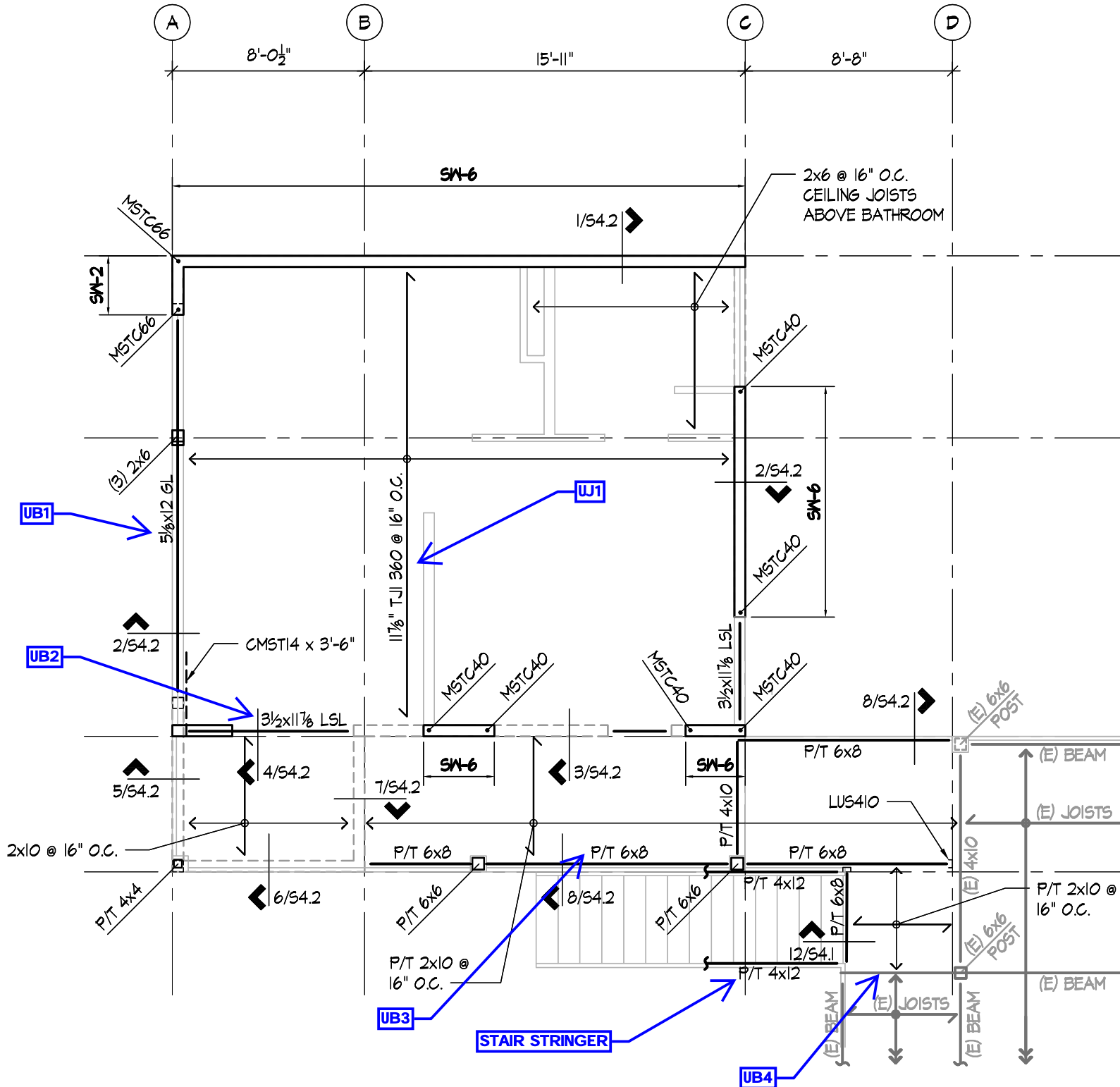
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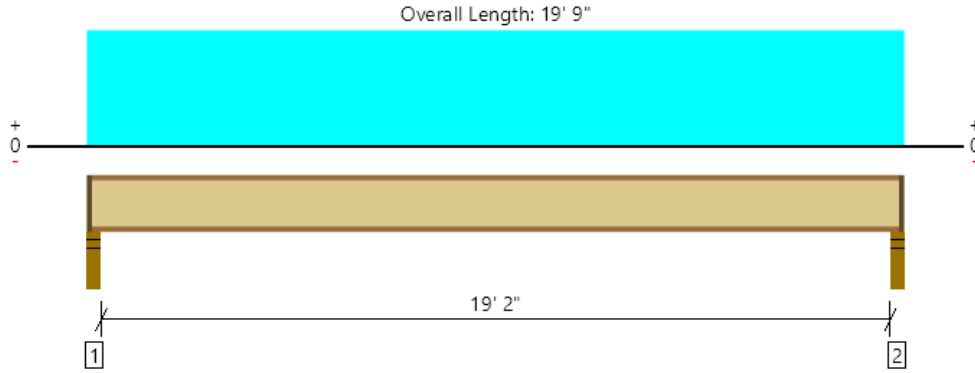
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UPPER FLOOR FRAMING KEY PLAN



DADU Floor, UJ1 - DADU
 1 piece(s) 11 7/8" TJI @ 360 @ 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)	717 @ 2 1/2"	1202 (2.25")	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	703 @ 3 1/2"	1705	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3426 @ 9' 10 1/2"	6180	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.382 @ 9' 10 1/2"	0.483	Passed (L/607)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.526 @ 9' 10 1/2"	0.967	Passed (L/441)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	48	40	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: 1/2" Gypsum ceiling, Perpendicular Partitions.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.50"	2.25"	1.75"	197	527	724	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	2.25"	1.75"	197	527	724	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)	5' o/c	
Bottom Edge (Lu)	19' 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)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 19' 9"	16"	15.0	40.0	Default Load

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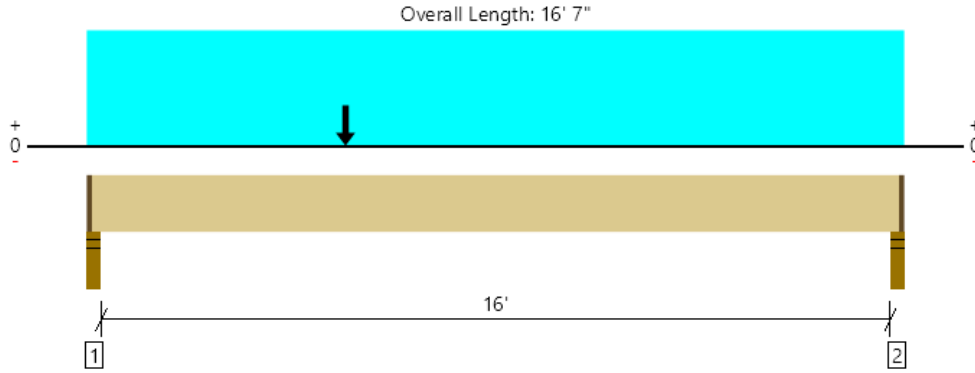
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ForteWEB Software Operator	Job Notes
Bryce Dacus Quantum Consulting Engineers (206) 957-3900 BDacus@quantumce.com	



DADU Floor, UB1 - DADU Garage HDR
1 piece(s) 5 1/8" x 12" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3669 @ 2"	7207 (2.25")	Passed (51%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3633 @ 1' 3 1/2"	12495	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	18253 @ 5' 3"	28290	Passed (65%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.274 @ 7' 6 1/2"	0.406	Passed (L/713)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.513 @ 7' 7 1/16"	0.813	Passed (L/380)	--	1.0 D + 1.0 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 = 16' 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	Snow	Factored	
1 - Stud wall - DF	3.50"	2.25"	1.50"	1712	332	1958	3670	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	2.25"	1.50"	914	332	892	1831	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)	16' 5" o/c	
Bottom Edge (Lu)	16' 5" 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)	1 1/4" to 16' 5 3/4"	N/A	14.9	--	--	
1 - Uniform (PSF)	0 to 16' 7" (Front)	1'	15.0	40.0	-	Default Load
2 - Point (lb)	5' 3" (Front)	N/A	2132	-	2850	Linked from: RB1 - DADU Ridge, Support 1

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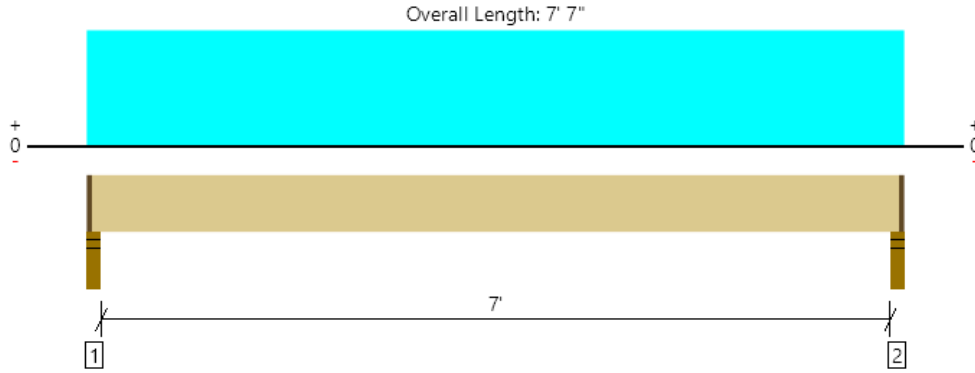
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DADU Floor, UB2 - DADU

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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)	2799 @ 2"	4922 (2.25")	Passed (57%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1906 @ 1' 3 3/8"	8590	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4988 @ 3' 9 1/2"	15953	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.058 @ 3' 9 1/2"	0.181	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.080 @ 3' 9 1/2"	0.363	Passed (L/999+)	--	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 - Stud wall - DF	3.50"	2.25"	1.50"	785	2092	2877	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	2.25"	1.50"	785	2092	2877	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)	7' 5" o/c	
Bottom Edge (Lu)	7' 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)	1 1/4" to 7' 5 3/4"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 7' 7" (Front)	9' 8"	15.0	40.0	FLOOR
2 - Uniform (PSF)	0 to 7' 7" (Front)	2' 9"	18.0	60.0	DECK

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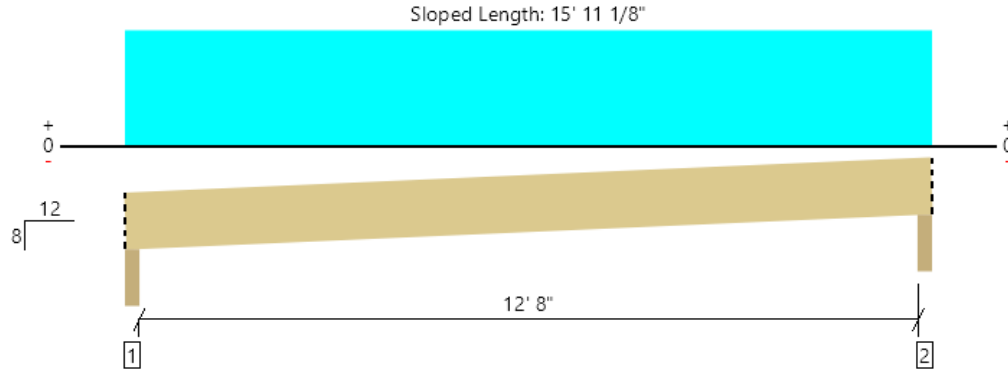
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Bryce Dacus Quantum Consulting Engineers (206) 957-3900 BDacus@quantumce.com	



DADU Floor, Stair Stringer
1 piece(s) 4 x 12 DF No.2



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

Member Length : 16' 6 5/8"

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1008 @ 2"	7656 (3.50")	Passed (13%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	845 @ 1' 7/8"	4725	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3172 @ 6' 7 1/2"	6091	Passed (52%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.109 @ 6' 7 1/2"	0.776	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.207 @ 6' 7 1/2"	1.035	Passed (L/900)	--	1.0 D + 1.0 L (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 8/12

- 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	Floor Live	Factored	
1 - Beveled Plate - DF	3.50"	3.50"	1.50"	478	530	1008	Blocking
2 - Beveled Plate - DF	3.50"	3.50"	1.50"	478	530	1008	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)	15' 11" o/c	
Bottom Edge (Lu)	15' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 13' 3"	N/A	10.0	--	
1 - Uniform (PSF)	0 to 13' 3"	2'	15.0	40.0	stairs
2 - Uniform (PLF)	0 to 13' 3"	N/A	20.0	-	railing

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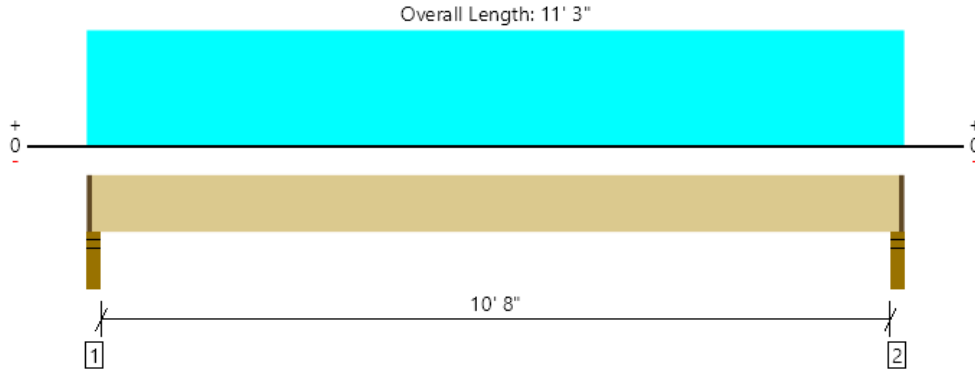
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Bryce Dacus Quantum Consulting Engineers (206) 957-3900 BDacus@quantumce.com	



DADU Floor, UB3 - deck edge
1 piece(s) 6 x 8 DF No.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)	1196 @ 2"	7734 (2.25")	Passed (15%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1020 @ 11"	4675	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3228 @ 5' 7 1/2"	5156	Passed (63%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.170 @ 5' 7 1/2"	0.273	Passed (L/769)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.224 @ 5' 7 1/2"	0.546	Passed (L/585)	--	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.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.50"	2.25"	1.50"	290	928	1218	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	2.25"	1.50"	290	928	1218	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)	11' 1" o/c	
Bottom Edge (Lu)	11' 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)	1 1/4" to 11' 1 3/4"	N/A	10.4	--	
1 - Uniform (PSF)	0 to 11' 3" (Front)	2' 9"	15.0	60.0	deck

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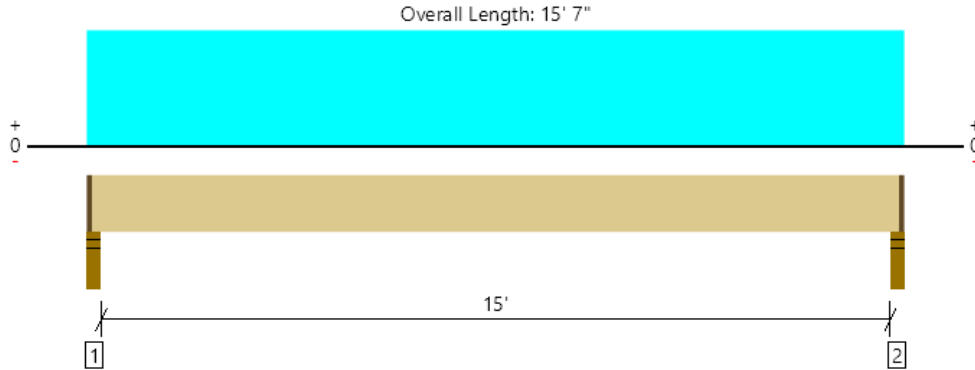
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DADU Floor, UB4 - (E) Deck cantilever
1 piece(s) 4 x 10 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	463 @ 2"	4922 (2.25")	Passed (9%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	405 @ 1' 3/4"	3885	Passed (10%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1750 @ 7' 9 1/2"	4492	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.132 @ 7' 9 1/2"	0.381	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.198 @ 7' 9 1/2"	0.762	Passed (L/923)	--	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.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.50"	2.25"	1.50"	157	312	468	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	2.25"	1.50"	157	312	468	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)	15' 5" o/c	
Bottom Edge (Lu)	15' 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)	1 1/4" to 15' 5 3/4"	N/A	8.2	--	
1 - Uniform (PSF)	0 to 15' 7" (Front)	1'	12.0	40.0	Default Load

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SIPIORA RESIDENCE DADU

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QUANTUM JOB NUMBER: 22580.02

LATERAL DESIGN

QUANTUM | CONSULTING ENGINEERS

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Project	Sipiora DADU	Job #	22580.02
Client	Lainie Sipiora	By	BSD
Subject	Seismic Dead Load	Date:	5/16/2023

SEISMIC DEAD LOAD

ROOF


ELEMENT	AREA (FT ²)	UNIT WT. (PSF)	WEIGHT (LB)
ROOF FRAMING	830.0	15.0	12450
EXTERIOR WALLS	220.0	10.0	2200
INT. WALLS	150.0	8.0	1200

TOTAL DL 15850 LB

UPPER FLOOR

ELEMENT	AREA (FT ²)	UNIT WT. (PSF)	WEIGHT (LB)
FLOOR FRAMING	480.0	12.0	5760
DECK FRAMING	135.0	18.0	2430
EXTERIOR WALLS	520.0	10.0	5200
INT. WALLS	150.0	8.0	1200

TOTAL DL 14590 LB

	Quantum Consulting Engineers LLC Project: Sipiora Residence Date: 5/16/23
	1511 Third Avenue, Suite 323 Designer: BSD
	Seattle, WA 98101 Client: Lainie Sipiora Job# 22580

Seismic Base Shear for the Equivalent Lateral Force Procedure

Per IBC 2018 & ASCE 7-16

Structure: **Sipiora Residence DADU**
 Address: **Mercer Island**
 Latitude: Longitude:

Structure Classification

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

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

R: **6 1/2** per ASCE Table 12.2-1
 W_o: **3** per ASCE Table 12.2-1
 C_d: **4** per ASCE Table 12.2-1
 h_n (ft): **25.00** 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

S₁ (g-sec): **0.50** 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 **1.80**

F_a **1.20**

1.2 Min Value where SC D Assumed

S_{M1} (g-sec): **0.90**

S_{MS} (g-sec): **1.74**

per ASCE 11.4.4

S_{D1} (g-sec): **0.60**

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

T_a (sec): 0.22 Ct * h_{nx} per ASCE Eq. 12.8-7

T_{use} (sec): **0.22** ≤ 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}: 0.41 = 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_a²*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}: -- = 0.5S₁ / (R/I_E) for S₁ ⇒ 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



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 Seattle, WA 98101

Project: **Sipiora DADU**

Date: 5/16/23

Job No: **22580.02**

Client: **Lainie Sipiora**

Checked By:

Designer: **BSD**

Sheet: 1

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

Per IBC 2018 & ASCE 7-16

Structure: **Sipiora 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): 0.22 per ASCE 12.8.2.1
 k : 1.00 per ASCE 12.8.3

Vertical Distribution of Seismic Forces per ASCE 12.8.3

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

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

Level	h_x (ft)	w_x (k)	% of W_{total}	$w_x * h_x^k$	C_{vx} (%)	F_x (k)	V_x (k)
Roof	18.00	15.85	52.1%	285.3	71.0%	3.86	3.86
Upper	8.00	14.59	47.9%	116.7	29.0%	1.58	5.43

Total WT (k): 30.44 Sum: 402

C_{s-use} : 0.178

V (k): 5.43 per ASCE 12.8.1

Vertical Distribution of Seismic Diaphragm Forces per ASCE 12.10.1.1

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

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

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

Level	w_{px} (k)	$\sum w_i$ (k)	F_x (k)	$\sum F_i$ (k)	F_{px} (k)	Notes
Roof	15.85	15.85	3.86	3.86	3.86	
Upper	14.59	30.44	1.58	5.43	3.38	= F_{p-min}

Diaphragm/Story

Force Ratio

1.000

2.146



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Project: Sipiora DADU

Client: Lainie Sipiora

Date: 5/16/23

Designer: BSD

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Job No: 22580.02

Sheet: 2

Wind Loads Criteria

ASCE 7-16

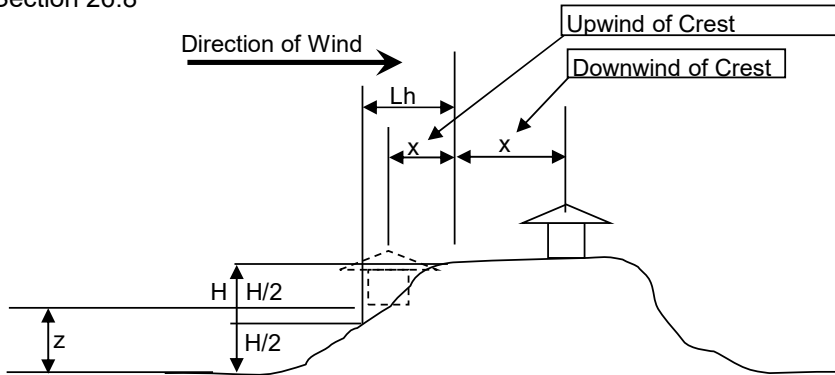
Wind Load Criteria

Risk Category: **II** Table 1.5-1
 Basic Wind Speed: **97** Figure 26.5.1
 Exposure Category: **C** Section 26.7.3
 Ground Elevation: **240 ft**
 Wall Ht: **25.0 ft**

Roof Type: **Monoslope Roof**
 Roof Slope: **4.0:12** 18.4 DEG
 Mean Roof HT: **25.0 ft** UP TO 160FT
 Parapet: **No** UP TO 160FT

Wind Topographic Factor, K_{zt} :

per Section 26.8



Terrain Type: **2-dimensional escarpments**
 Direction: **Upwind of Crest**


L_h : **100 ft** DIST UPWIND OF CREST TO HALF HT OF HILL OR ESCARP.
 H : **2 ft** HT. OF HILL OR ESCARP. RELATIVE TO THE UPWIND TERRAIN
 x : **10 ft** DIST. (UPWIND OR DOWNWIND) FROM THE CREST TO THE BUILDING
 z : **30 ft** HEIGHT ABOVE GROUND SURFACE AT BUILDING SITE

K_{zt} : 1.00 EQUATION 26.8-1

K_{zt} : **1.00** MANUALLY INPUT

K_e : **0.991** ASCE 26.10.1

K_d : **0.85** ASCE 26.6

 Quantum Consulting Engineers LLC 1511 Third Avenue, Suite 323 Seattle, WA 98101	Project: Sipiora Residence	Date: 5/16/23	Job No: 22580.02
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Wind Loads - Main Wind Force Resisting System

ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, $h < 160\text{ft}$

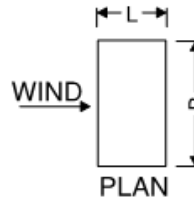
Wind Load Criteria

Risk Category:	II	Table 1.5-1	K_e :	0.9913	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:	25.0 ft	

Wall Pressures:

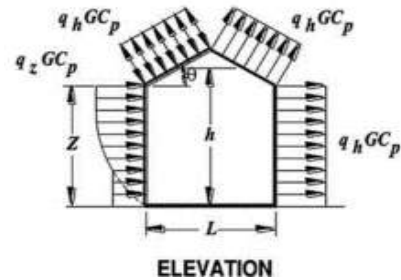
L/B Ratio:

Short Dimension:	25.0 ft
Long Dimension:	25.0 ft
Transverse Wind L/B:	1.00
Longitudinal Wind L/B:	1.00



*NOTE: INTERNAL BUILDING PRESSURE CANCEL EACH OTHER OUT IN ENCLOSED BUILDING

K_h & K_z :	0.945	At Top of Wall
K_z :	0.85	0 ft to 15 ft



	<u>Transverse</u> Wind Direction	<u>Longitudinal</u> Wind Direction
Top of Wall:	21.2 psf	21.2 psf
0 ft to 15 ft Wall:	19.9 psf	19.9 psf

ASCE EQ 27.3-1
ASCE EQ 27.3-1

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



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

ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, $h < 160\text{ft}$

Roof Pressure:

Slope: 4.0:12 = 18.4 DEGREES
 Mean Roof HT: 25.0 ft
 Building Dimension: **40.0 ft** Parallel to Ridge
 Building Dimension: **40.0 ft** Normal to Ridge
 K_n & K_z : 0.945 At Mean Roof Ht

Windward Pressure Parallel to Ridge

	LC 1	LC 2	LC 1	LC 2
0 to $h/2$	-23.0 psf	0.5 psf		
$h/2$ to h	-15.7 psf	0.5 psf		
h to $2h$	-14.1 psf	0.5 psf		
$>2h$	-13.2 psf	0.5 psf		

Windward Pressure Normal to Ridge

1.0 psf Horizontal Projected Pressure: **0.3 psf**

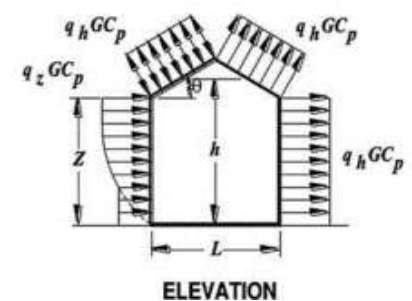
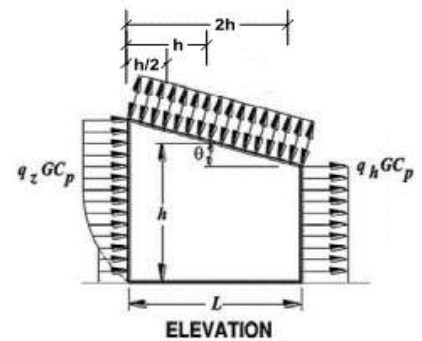
Leeward Pressure Normal to Ridge

-13.1 psf Horizontal Projected Pressure: **-4.1 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} : **-26.2 psf** Horizontal Projected Pressure: **-8.3 psf**

Minimum Total Projected Horizontal Pressure (PSF)

8.0 psf

ASCE 27.1.5



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 DADU
 Client: Lainie Sipiora

Date: 5/16/23
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 Checked By:

Job No: #####
 Sheet: 3

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

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

Structure: **Sipiora DADU**
 Floor Level: **Upper Level**


Sds = 1.16
 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 1	24.00	-	-	-	-	-	-	-	-	-
SW Segment 1.10	24.00	7.50	0.31	DF #2	0.50	Interstory	7.50	10.0	4.0	15.0
SW GRID 3	5.50	-	-	-	-	-	-	-	-	-
SW Segment 3.10	3.00	7.00	2.33	DF #2	0.50	Interstory	9.75	10.0	9.0	15.0
SW Segment 3.20	2.50	7.00	2.80	DF #2	0.50	Interstory	9.75	10.0	9.0	15.0
SW GRID A	2.50	-	-	-	-	-	-	-	-	-
SW Segment A.1	2.50	7.50	3.00	DF #2	0.50	Interstory	8.50	10.0	2.0	15.0
SW GRID C	9.50	-	-	-	-	-	-	-	-	-
SW Segment C.1	9.50	10.00	1.05	DF #2	0.50	Interstory	10.00	10.0	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	Holddown
SW GRID 1	1930	1650	-	-	-	-	-	-
SW Segment 1.10	1930	1650	3240	-	-	SW-6	2	No Strap
SW GRID 3	1930	1650	-	-	-	-	-	-
SW Segment 3.10	1053	900	698	-	-	SW-6	2	MSTC40 (3070 max.)
SW Segment 3.20	877	750	581	-	-	SW-6	2	MSTC40 (3070 max.)
SW GRID A	1930	2875	-	-	-	-	-	-
SW Segment A.1	1930	2875	288	-	-	SW-2	2	MSTC66 (5850 max.)
SW GRID C	1930	2875	-	-	-	-	-	-
SW Segment C.1	1930	2875	1235	-	-	SW-6	2	MSTC40 (3070 max.)

	Quantum Consulting Engineers LLC	Project: Sipiora DADU	Date: 5/16/23	Job No: 22580.01
	1511 Third Avenue, Suite 323		Designer: BSD	Sheet: 1
	Seattle, WA 98101	Client: Lainie Sipiora	Checked By:	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

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

Structure: **Sipora DADU**
 Floor Level: **Upper Level**

Shear Wall Schedule (LRFD)

$\phi_p = 0.8$

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_s (lb/in)
SW-6	APA Rated, 7/16", 8d Common	6	520	416	730	584	10
SW-4	APA Rated, 7/16", 8d Common	4	760	608	1065	852	13
SW-3	APA Rated, 7/16", 8d Common	3	980	784	1370	1096	15
SW-2	APA Rated, 7/16", 8d Common	2	1280	1024	1790	1432	20
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
1.10	80	1.00	80	69	69	80	SW-6	416	OK	Seismic
3.10	351	0.96	366	300	313	366	SW-6	416	OK	Seismic
3.20	351	0.90	390	300	333	390	SW-6	416	OK	Seismic
A.1	772	0.88	882	1150	1314	1314	SW-2	1432	OK	Wind
C.1	203	1.00	203	303	303	303	SW-6	584	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)
1.10	24.00	23.79	0.88%	No	
3.10	3.00	2.79	7.46%	No	
3.20	2.50	2.29	9.09%	No	
A.1	2.50	2.29	9.09%	No	
C.1	9.50	9.29	2.24%	No	

Q	Quantum Consulting Engineers LLC	Project: Sipora DADU	Date: 5/16/23	Job No: 22580.01
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	Seattle, WA 98101	Client: Lainie Sipora	Checked By:	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

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


Structure: **Sipiora DADU**
 Floor Level: **Upper Level**

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)
1.10	422		422	309		309	1620	1620
3.10	2395		2395	1755		1755	349	349
3.20	2395		2395	1755		1755	291	291
A.1	4593		4593	5865		5865	144	144
C.1	1422		1422	1816		1816	618	618

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
1.10	663	287	663	287	287	No Strap	0	OK
3.10	-1546	-2242	-1546	-2242	-2242	MSTC40 (3070 max.)	-2686	OK
3.20	-1581	-2268	-1581	-2268	-2268	MSTC40 (3070 max.)	-2686	OK
A.1	-5779	-4530	-5779	-4530	-5779	MSTC66 (5850 max.)	-5850	OK
C.1	-1445	-1152	-1445	-1152	-1445	MSTC40 (3070 max.)	-2686	OK

	Quantum Consulting Engineers LLC	Project: Sipiora DADU	Date: 5/16/23	Job No: 22580.01
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	Seattle, WA 98101	Client: Lainie Sipiora	Checked By:	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

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

Structure: **Sipiora DADU**
 Floor Level: **Main Level**


Sds = 1.16
 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 1	24.00	-	-	-	-	-	-	-	-	-
SW Segment 1.10	24.00	8.00	0.33	DF #2	0.50	Base	8.00	10.0	9.5	15.0
SW GRID 3	13.17	-	-	-	-	-	-	-	-	-
SW Segment 3.10	3.00	8.00	2.67	DF #2	0.50	Base	8.00	10.0	9.5	15.0
SW Segment 3.20	10.17	8.00	0.79	DF #2	0.50	Base	8.00	10.0	9.5	15.0
SW GRID A	7.25	-	-	-	-	-	-	-	-	-
SW Segment A.2	7.25	8.00	1.10	DF #2	0.50	Base	8.00	10.0	2.0	15.0
SW GRID B	15.00	-	-	-	-	-	-	-	-	-
SW Segment B.1	15.00	8.00	0.53	DF #2	0.50	Base	8.00	10.0	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	Holddown
SW GRID 1	2715	4025	-	-	-	-	-	-
SW Segment 1.10	2715	4025	5340			SW-6	2	No HD
SW GRID 3	2715	4025						
SW Segment 3.10	618	917	668			SW-6	2	HDU4 (4565DF, 3285HF)
SW Segment 3.20	2097	3108	2263			SW-6	2	HDU2 (3075DF, 2215HF)
SW GRID A	2715	5345						
SW Segment A.2	2715	5345	841			SW-4	2	HDU4 (4565DF, 3285HF)
SW GRID B	2715	5345						
SW Segment B.1	2715	5345	1650			SW-6	2	HDU2 (3075DF, 2215HF)

	Quantum Consulting Engineers LLC	Project: Sipiora DADU	Date: 5/16/23	Job No: 22580.01
	1511 Third Avenue, Suite 323		Designer: BSD	Sheet: 1
	Seattle, WA 98101	Client: Lainie Sipiora	Checked By:	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

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

Structure: **Sipora DADU**
 Floor Level: **Main Level**

Shear Wall Schedule (LRFD)

$\phi_p = 0.8$

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_s (lb/in)
SW-6	APA Rated, 7/16", 8d Common	6	520	416	730	584	10
SW-4	APA Rated, 7/16", 8d Common	4	760	608	1065	852	13
SW-3	APA Rated, 7/16", 8d Common	3	980	784	1370	1096	15
SW-2	APA Rated, 7/16", 8d Common	2	1280	1024	1790	1432	20
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
1.10	113	1.00	113	168	168	168	SW-6	584	OK	Wind
3.10	206	0.92	225	306	333	333	SW-6	584	OK	Wind
3.20	206	1.00	206	306	306	306	SW-6	584	OK	Wind
A.2	374	1.00	374	737	737	737	SW-2 SW-4	852	OK	Wind
B.1	181	1.00	181	356	356	356	SW-6	584	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)
1.10	24.00	23.63	1.59%	No	
3.10	3.00	2.52	19.25%	No	
3.20	10.17	9.69	5.00%	No	
A.2	7.25	6.77	7.16%	No	
B.1	15.00	14.52	3.34%	No	

Quantum Consulting Engineers LLC 1511 Third Avenue, Suite 323 Seattle, WA 98101	Project: Sipora DADU	Date: 5/16/23	Job No: 22580.01
		Designer: BSD	Sheet: 3
	Client: Lainie Sipora	Checked By:	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

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


Structure: **Sipora DADU**
 Floor Level: **Main Level**

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)
1.10	634	422	1056	805	309	1114	2670	2670
3.10	1154	2395	3549	1467	1755	3222	334	334
3.20	1154	2395	3549	1467	1755	3222	1131	1131
A.2	2097	4593	2097	3539	5865	3539	421	421
B.1	1014	1422	2436	1710	1816	3526	825	825

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
1.10	488	113	488	113	113	No HD	0	OK
3.10	-3022	-3403	-3022	-3403	-3403	HDU4 (4565DF, 3285HF)	-4565	OK
3.20	-2543	-3054	-2543	-3054	-3054	HDU2 (3075DF, 2215HF)	-3075	OK
A.2	-3286	-1913	-3286	-1913	-3286	HDU8 (3) Studs (7870DF, 6580HF) HDU4 (4565DF, 3285HF)	-4565	OK
B.1	-3031	-2075	-3031	-2075	-3031	HDU2 (3075DF, 2215HF)	-3075	OK

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		Designer: BSD	Sheet: 3
	Client: Lainie Sipora	Checked By:	