Cushing Terrell

08.29.2025

Structural Calculations for

SOUTHEAST ALASKA REGIONAL HEALTH CONSORTIUM
WRANGELL STAFF HOUSING
SINGLE BEDROOM DUPLEX (PITCHED ROOF)

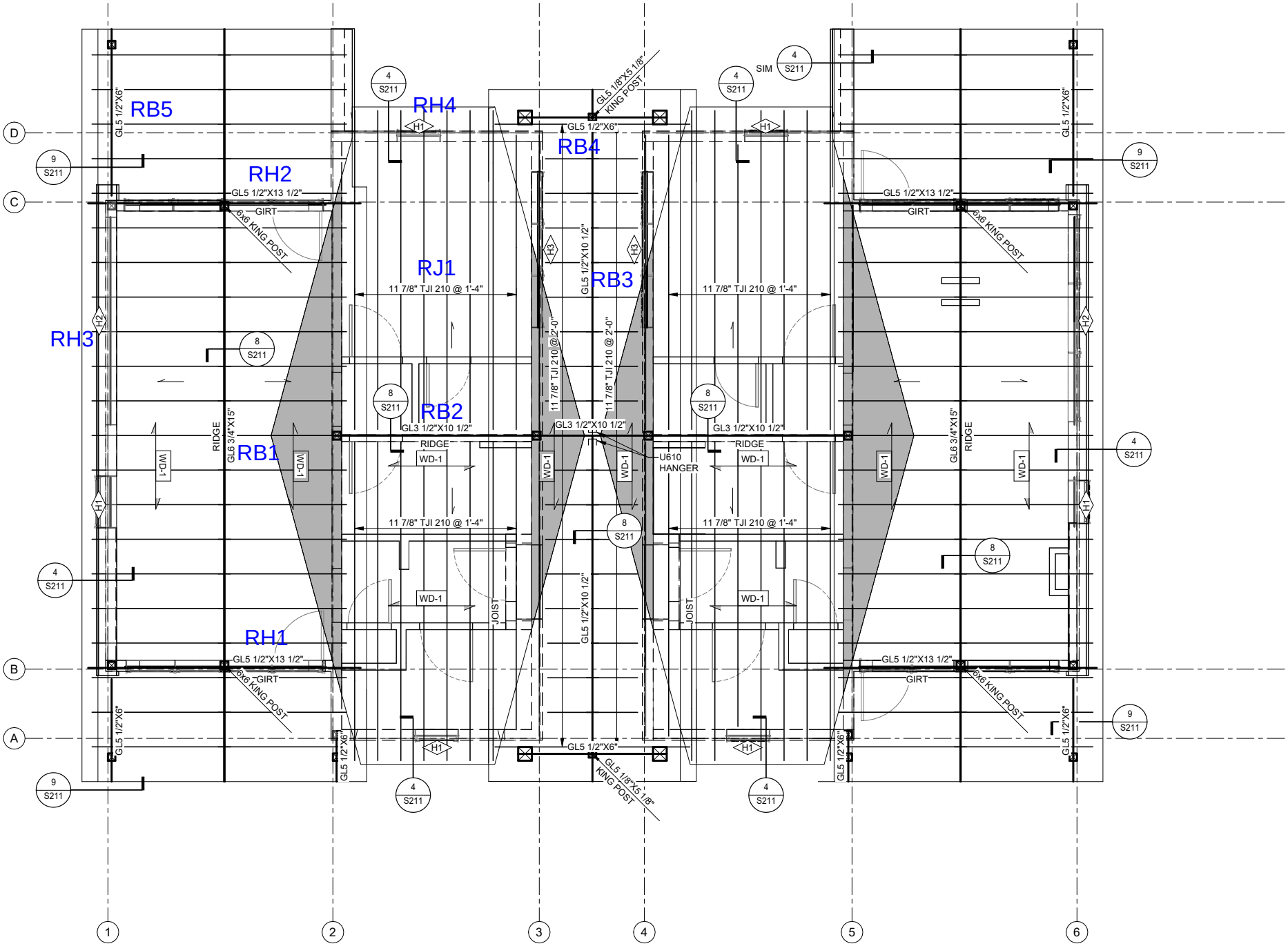
1064 Zimovia Hwy, Wrangell AK 99929

Prepared by:
Asrade Mengstu PE

Reviewed by:
Kevin Feldman PE

DESIGN LOADS AND CRITERIA

1) GRAVITY LOADS:
   a) ROOF LOADS:
      1. ROOF DEAD LOAD: 18 psf
      2. ROOF LIVE LOAD: 20 psf
   b) FLOOR LOADS:
      1. FLOOR LIVE LOAD: 40 psf (RESIDENTIAL — ONE- AND TWO-FAMILY DWELLINGS — ALL OTHER AREAS EXCEPT STAIRS)
      2. FLOOR LIVE LOAD: 60 psf (BALCONIES AND DECKS)
   c) SLABS ON GRADE:
      1. SLABS ON GRADE LIVE LOAD: 40 psf
2) HANDRAIL AND GUARDRAIL SYSTEM LOADS:
   a) CONCENTRATED LOAD: 200 lb (HANDRAIL OR TOP RAIL)
   b) CONCENTRATED LOAD: 50 lb (INTERMEDIATE RAIL)
   c) LINEAR LOAD: 50 lb/ft (HANDRAIL OR TOP RAIL)
3) SNOW LOADS:
   a) GROUND SNOW LOAD: Pg = 60 psf, Is = 1.00, Ce = 1.0, Ct = 1.0, Cs = 1.0
   b) FLAT ROOF SNOW LOAD: Pf = 42 psf UNIFORM + DRIFT
4) WIND CRITERIA:
   a) 3-SEC PEAK GUST WIND SPEED = 139 mph
   b) RISK CATEGORY = II
   c) Iw = 1.00
   d) EXPOSURE = D
   e) INTERNAL PRESSURE COEFFICIENT (GCpi): ±0.18
   f) EXTERNAL ROOF COMPONENTS & CLADDING: 75 psf MINIMUM (ULTIMATE)
   g) EXTERNAL WALL COMPONENTS & CLADDING: 80 psf MINIMUM (ULTIMATE)
   h) STEEL ROOF JOIST NET UPLIFT - PERIMETER 20 FT: 50 psf MINIMUM (ULTIMATE)
   i) INTERSTORY DRIFT LIMIT = 1/400
5) SEISMIC CRITERIA:
   a) SS = 0.249 g / S1 = 0.254 g MAPPED MCER VALUES
   b) RISK CATEGORY = II
   c) PROJECT SITE CLASS = B
   d) Ie = 1.00
   e) SDS = 0.149 g / SD1 = 0.136 g DESIGN RESPONSE COEFFICIENT
   f) SEISMIC DESIGN CATEGORY = C
   g) ANALYSIS PROCEDURE: EQUIVALENT LATERAL FORCE PROCEDURE
   h) SEISMIC FORCE-RESISTING SYSTEM: BEARING WALL SYSTEMS: LIGHT-FRAME (WOOD) WALLS SHEATHED WITH WOOD STRUCTURAL PANELS RATED FOR SHEAR RESISTANCE, R = 6.5
   i) REDUNDANCY FACTOR: PLAN N-S RHO = 1.3 / PLAN E-W RHO = 1.3
   j) SEISMIC RESPONSE COEFFICIENT Cs = 0.030
   k) SEISMIC BASE SHEAR V = 1.7 kips (ULTIMATE)
   l) ALLOWABLE STORY DRIFT ▲ = 0.020hsx



1 S102 ROOF FRAMING PLAN

1/4" = 1'-0"

NORTH REF

Cushing Terrell

JOB TITLE	SEARHC Wrangell - Staff Housing Single Bedroom Duplex (Pitched Roof)		
JOB NO.	SEARHC_WRNGL\	**SHEET NO.**	
CALCULATED BY	AM	**DATE**	8/29/25
CHECKED BY	KF	**DATE**	8/29/25

Snow Loads : ASCE 7- 16

Nominal Snow Forces

Roof slope		=	3.6 deg
Horiz. eave to ridge dist (W)		=	35.0 ft
Roof length parallel to ridge (L)		=	57.0 ft
Type of Roof			Monoslope
Ground Snow Load	Pg	=	60.0 psf
Risk Category		=	II
Importance Factor	I	=	1.0
Thermal Factor	Ct	=	1.00
Exposure Factor	Ce	=	1.0
Pf = 0.7*Ce*Ct*I*Pg		=	42.0 psf
Unobstructed Slippery Surface			no
Sloped-roof Factor	Cs	=	1.00
Balanced Snow Load		**=**	**42.0 psf**
Rain on Snow Surcharge Angle			0.70 deg
Code Maximum Rain Surcharge			5.0 psf
Rain on Snow Surcharge		=	0.0 psf
Ps plus rain surcharge		=	42.0 psf
Minimum Snow Load	Pm	=	20.0 psf
Uniform Roof Design Snow Load		=	**42.0 psf**

Near ground level surface balanced snow load = **60.0 psf**

NOTE: Alternate spans of continuous beams shall be loaded with half the design roof snow load so as to produce the greatest possible effect - see code for loading diagrams and exceptions for gable roofs..

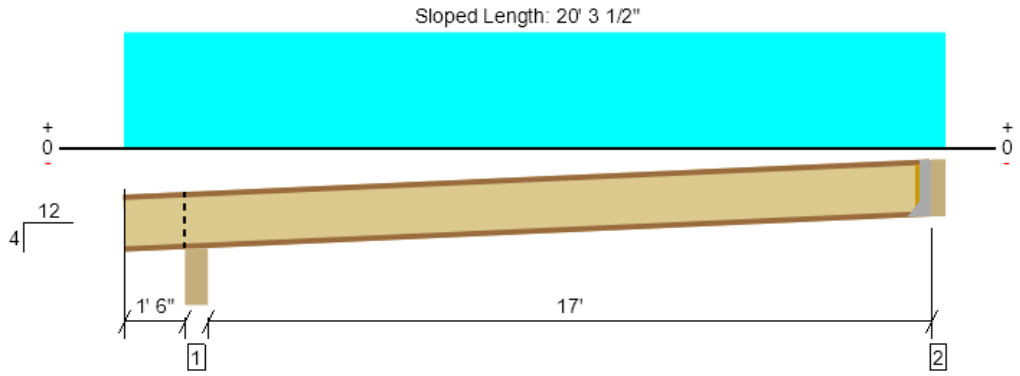
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof: Joist RJ1

1 piece(s) 11 7/8" TJI® 210 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	696 @ 18' 11 1/2"	1156 (1.75")	Passed (60%)	1.15	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	696 @ 18' 11 1/2"	1903	Passed (37%)	1.15	1.0 D + 1.0 S (Alt Spans)
Moment (Ft-lbs)	2977 @ 10' 4 13/16"	4364	Passed (68%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.424 @ 10' 4 5/16"	0.908	Passed (L/514)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.614 @ 10' 4 3/8"	1.211	Passed (L/355)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 20' 3 3/4"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 4/12

- 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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories	Details
	Total	Available	Required	Dead	Roof Live	Snow	Factored		
1 - Beveled Plate - DF	5.50"	5.50"	3.50"	264	278	584	848	Blocking	R1
2 - Hanger on 11 7/8" GLB beam	3.50"	Hanger[1]	1.75" / - [2]	223	236	496	719	See note [1]	H5S

- 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.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 2" o/c	
Bottom Edge (Lu)	8' 8" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.
- Dimensions for lateral bracing intervals are measured along the length of the member for sloped conditions.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LSSR2.1Z	1.88"	N/A	14-10dx2.5	12-10dx1.5	Web Stiffeners

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

Vertical Load	Location	Spacing	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 19' 3"	16"	18.0	20.0	42.0	Default Load

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

ForteWEB Software Operator	Job Notes
Asrade Mengstu Cushing Terrell (406) 500-3544 asrademengstu@cushingterrell.com	4

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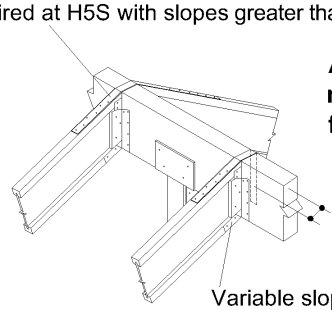
8/29/2025 7:53:37 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 1bdrmDupPitched

LSTA24 (Simpson Strong-Tie or USP Structural Connectors) strap with twelve 10d (0.148 x 1 ½") nails required at H5S with slopes greater than 3:12



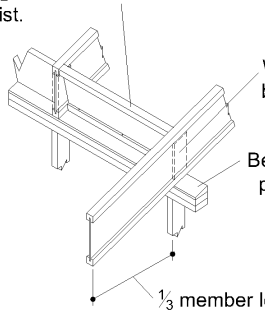
Additional blocking may be required for shear transfer.

Strap nails:
Leave 2 ⅜" minimum end distance

Variable slope joist hanger. Beveled web stiffener required each side.

H5 H5 S

Shear blocking:
1 ⅛" TJ® Rim Board (with depths ≤ 16"),
1 ¼"or 1 ½" TimberStrand® LSL
or TJI® joist.



Web Stiffener required on both sides at R1W ONLY

Beveled bearing plate required

⅓ member length or ½ backspan maximum

R1 R1W

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Asrade Mengstu Cushing Terrell (406) 500-3544 asrademengstu@cushingterrell.com	

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FORTEWEB

MEMBER REPORT

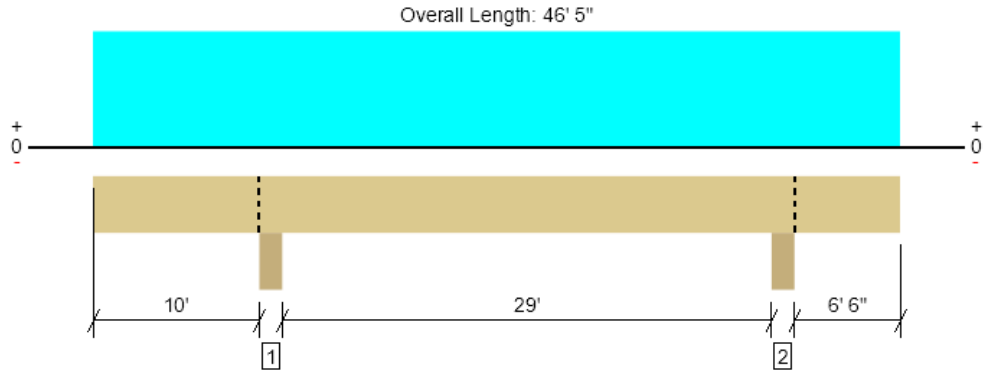
FAILED

OK PER MFR

Roof, Roof Beam RB1

1 piece(s) 6 3/4" x 15" 24F-V8 DF Glulam

Left cantilever exceeds the maximum braced cantilever length of 7'.



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	10871 @ 10' 2 3/4"	24131 (5.50")	Passed (45%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	6016 @ 11' 8 1/2"	20571	Passed (29%)	1.15	1.0 D + 1.0 S (Adj Spans)
Pos Moment (Ft-lbs)	34646 @ 25' 7 5/8"	54247	Passed (64%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-21692 @ 10' 2 3/4"	42661	Passed (51%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	1.073 @ 25' 1 15/16"	1.473	Passed (L/329)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	1.485 @ 25' 3"	1.964	Passed (L/238)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 46' 5"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
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).
- Upward deflection on right cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 0.93 was calculated for positive bending using length L = 25' 10 1/4".
- Volume factor of 0.98 was calculated for negative bending using length L = 16' 1 1/8".
- Upward deflection on left and right cantilevers exceeds 0.4".
- 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	Roof Live	Snow	Factored	
1 - Column - DF	5.50"	5.50"	2.48"	3677	3426	7194	10871	Blocking
2 - Column - DF	5.50"	5.50"	1.99"	2896	2774	5826	8722	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)	46' 5" o/c	
Bottom Edge (Lu)	46' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 46' 5"	N/A	24.6	--	--	
1 - Uniform (PSF)	0 to 46' 5" (Front)	6' 6"	18.0	20.0	42.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

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ForteWEB Software Operator	Job Notes
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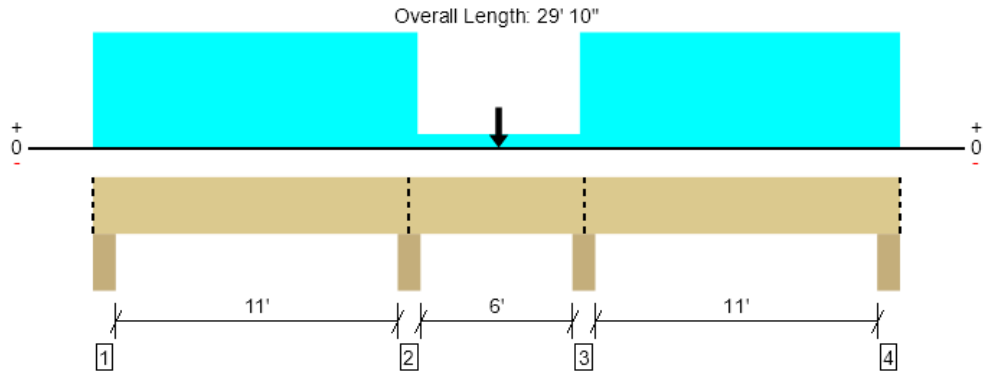
8/29/2025 12:14:02 AM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 1bdrmDupPitched

Roof, Roof Beam RB2

1 piece(s) 3 1/2" x 10 1/2" 24F-V8 DF Glulam



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9884 @ 11' 8 1/4"	12513 (5.50")	Passed (79%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	5687 @ 19' 3"	7466	Passed (76%)	1.15	1.0 D + 1.0 S (Adj Spans)
Pos Moment (Ft-lbs)	11980 @ 5' 1 15/16"	14792	Passed (81%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-11147 @ 18' 1 3/4"	14792	Passed (75%)	1.15	1.0 D + 1.0 S (Adj Spans)
Live Load Defl. (in)	0.288 @ 5' 7 11/16"	0.568	Passed (L/474)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.408 @ 5' 7 1/2"	0.757	Passed (L/334)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 29' 10"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
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.
- Volume factor of 1.00 was calculated for positive bending using length L = 9' 7 13/16".
- Volume factor of 1.00 was calculated for negative bending using length L = 10' 1 5/16".
- 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	Roof Live	Snow	Factored	
1 - Column - DF	5.50"	5.50"	2.33"	1606	1763	3702	5308	Blocking
2 - Column - DF	5.50"	5.50"	4.34"	2881	3335	7003	9884	Blocking
3 - Column - DF	5.50"	5.50"	4.33"	2874	3319	6970	9844	Blocking
4 - Column - DF	5.50"	5.50"	2.33"	1606	1762	3701	5307	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)	19' 11" o/c	
Bottom Edge (Lu)	22' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 29' 10"	N/A	8.9	--	--	
1 - Uniform (PSF)	0 to 12' (Front)	17'	18.0	20.0	42.0	Default Load
2 - Uniform (PSF)	18' to 29' 10" (Front)	17'	18.0	20.0	42.0	Default Load
3 - Uniform (PSF)	12' to 18' (Front)	2'	18.0	20.0	42.0	Default Load
4 - Point (lb)	15' (Front)	N/A	596	538	1130	Linked from: Roof Beam RB3, Support 1
5 - Point (lb)	15' (Front)	N/A	596	538	1130	Linked from: Roof Beam RB3, Support 1

• Side loads are assumed to not induce cross-grain tension.

ForteWEB Software Operator	Job Notes
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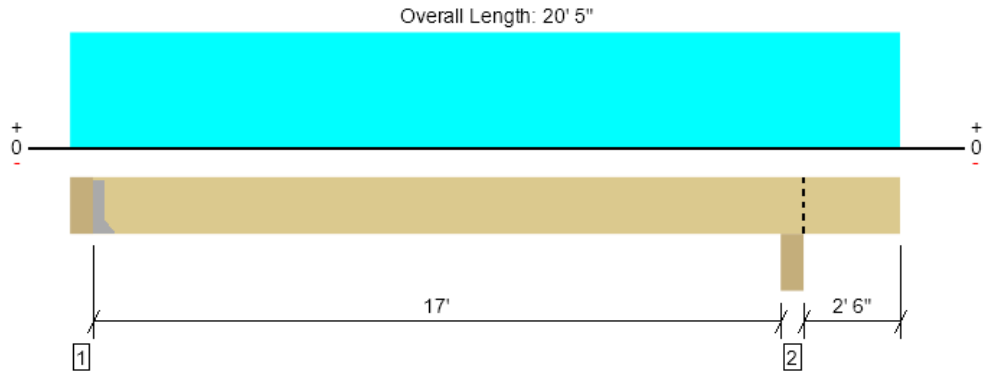
MEMBER REPORT

PASSED

Roof, Roof Beam RB3

1 piece(s) 5 1/2" x 10 1/2" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1643 @ 5 1/2"	5363 (1.50")	Passed (31%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	1499 @ 16' 7"	11733	Passed (13%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	6958 @ 8' 11 1/8"	23244	Passed (30%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-723 @ 17' 8 1/4"	23244	Passed (3%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.254 @ 9' 7/16"	0.861	Passed (L/815)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.386 @ 9' 1/4"	1.149	Passed (L/535)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 19' 11 1/2"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
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.
- Volume factor of 1.00 was calculated for positive bending using length L = 16' 11 1/4".
- Volume factor of 1.00 was calculated for negative bending using length L = 3' 1 15/16".
- 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	Roof Live	Snow	Factored	
1 - Hanger on 10 1/2" GLB beam	5.50"	Hanger[1]	1.50"	596	538	1130	1726	See note [1]
2 - Column - DF	5.50"	5.50"	1.50"	786	694	1457	2243	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)	20' o/c	
Bottom Edge (Lu)	20' 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	U610	2.00"	N/A	14-10d	6-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 20' 5"	N/A	14.0	--	--	
1 - Uniform (PSF)	0 to 20' 5" (Front)	3'	18.0	20.0	42.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

ForteWEB Software Operator	Job Notes
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File Name: SEARHC Wrangell 1bdrmDupPitched

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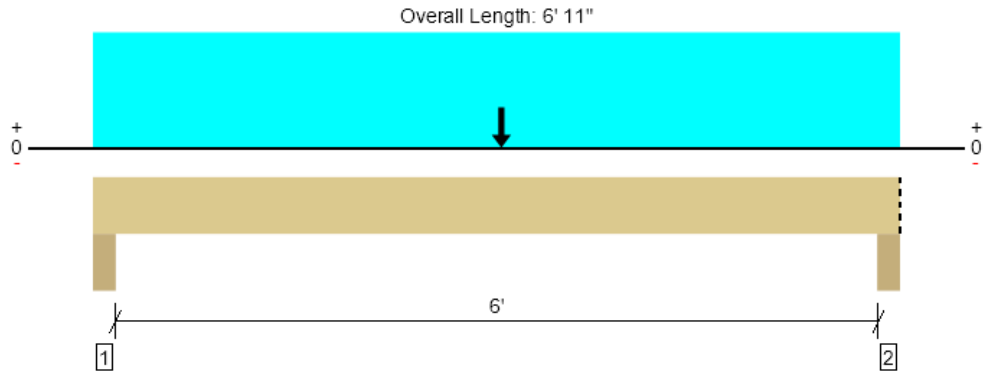
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Beam RB4

1 piece(s) 5 1/2" x 6" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1579 @ 6' 7"	19663 (5.50")	Passed (8%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1457 @ 5' 11 1/2"	6705	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	4129 @ 3' 6"	7590	Passed (54%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.088 @ 3' 5 9/16"	0.313	Passed (L/852)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.135 @ 3' 5 9/16"	0.417	Passed (L/554)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 11"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
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.
- Volume factor of 1.00 was calculated for positive bending using length L = 6' 3".
- 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	Roof Live	Snow	Factored	
1 - Column - DF	5.50"	5.50"	1.50"	540	481	1009	1549	None
2 - Column - DF	5.50"	5.50"	1.50"	550	490	1029	1579	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' 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)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 11"	N/A	8.0	--	--	
1 - Uniform (PSF)	0 to 6' 11" (Front)	2'	18.0	20.0	42.0	Default Load
2 - Point (lb)	3' 6" (Top)	N/A	786	694	1457	Linked from: Roof Beam RB3, Support 2

• Side loads are assumed to not induce cross-grain tension.

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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
Asrade Mengstu Cushing Terrell (406) 500-3544 asrademengstu@cushingterrell.com	11

Weyerhaeuser

8/29/2025 7:53:23 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 1bdrmDupPitched

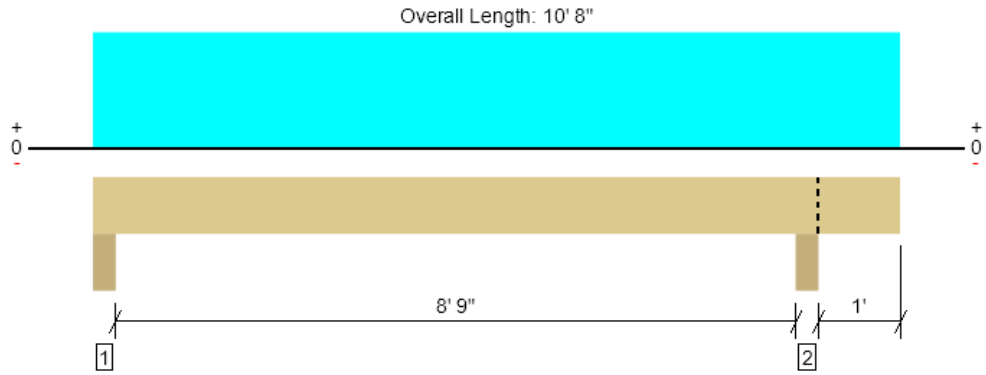
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Beam RB5

1 piece(s) 5 1/2" x 6" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1630 @ 9' 5 1/4"	19663 (5.50")	Passed (8%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1086 @ 8' 8 1/2"	6705	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	2812 @ 4' 9 15/16"	7590	Passed (37%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-210 @ 9' 5 1/4"	7590	Passed (3%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.160 @ 4' 10 7/16"	0.455	Passed (L/681)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.234 @ 4' 10 3/8"	0.607	Passed (L/466)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 10' 8"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
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.
- Volume factor of 1.00 was calculated for positive bending using length L = 8' 11 15/16".
- Volume factor of 1.00 was calculated for negative bending using length L = 1' 4 3/4".
- 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	Roof Live	Snow	Factored	
1 - Column - DF	5.50"	5.50"	1.50"	428	436	916	1343	None
2 - Column - DF	5.50"	5.50"	1.50"	522	528	1108	1630	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' 8" o/c	
Bottom Edge (Lu)	10' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 10' 8"	N/A	8.0	--	--	
1 - Uniform (PSF)	0 to 10' 8" (Front)	4' 6"	18.0	20.0	42.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

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ForteWEB Software Operator	Job Notes
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Weyerhaeuser

8/29/2025 7:53:43 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 1bdrmDupPitched

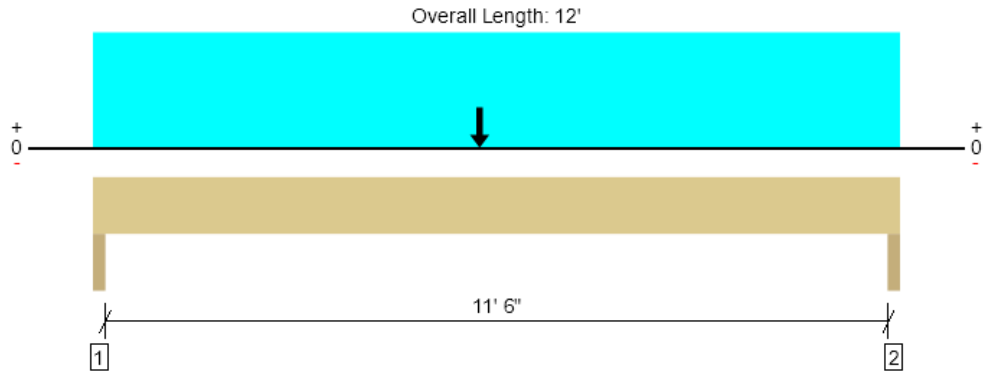
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Header Beam RH1

1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6135 @ 1 1/2"	10725 (3.00")	Passed (57%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6028 @ 1' 4 1/2"	15085	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	33220 @ 5' 9"	38424	Passed (86%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.215 @ 5' 11 5/16"	0.587	Passed (L/655)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.329 @ 5' 11 5/16"	0.783	Passed (L/429)	--	1.0 D + 1.0 S (All Spans)

Member Length : 12'
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
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.
- Volume factor of 1.00 was calculated for positive bending using length L = 11' 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.72"	2133	1906	4002	6135	None
2 - Trimmer - DF	3.00"	3.00"	1.59"	1977	1760	3696	5672	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12'	N/A	18.0	--	--	
1 - Uniform (PSF)	0 to 12' (Front)	1'	18.0	20.0	42.0	Default Load
2 - Point (lb)	5' 9" (Top)	N/A	3677	3426	7194	Linked from: Roof: Drop Beam RB1, Support 1

• Side loads are assumed to not induce cross-grain tension.

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ForteWEB Software Operator	Job Notes
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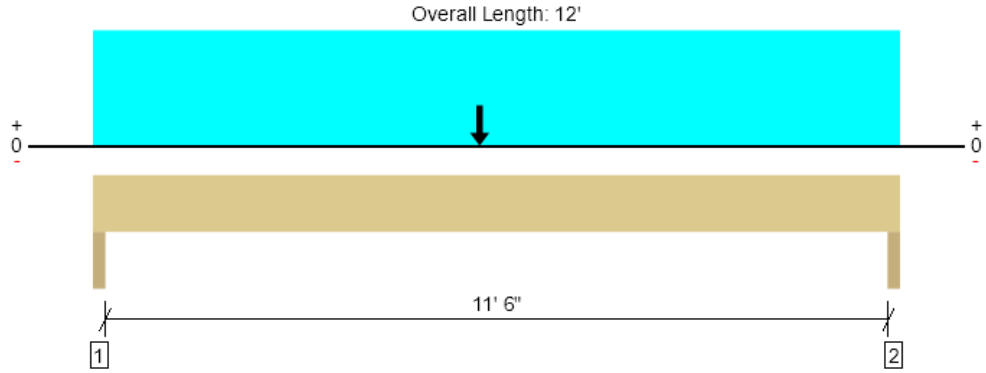
8/29/2025 7:53:01 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 1bdrmDupPitched

Roof, Roof Header Beam RH2

1 piece(s) 5 1/2" x 12" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5003 @ 1 1/2"	10725 (3.00")	Passed (47%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4908 @ 1' 3"	13409	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	26884 @ 5' 9"	30360	Passed (89%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.251 @ 5' 11 5/16"	0.587	Passed (L/562)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.379 @ 5' 11 5/16"	0.783	Passed (L/372)	--	1.0 D + 1.0 S (All Spans)

Member Length : 12'
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
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.
- Volume factor of 1.00 was calculated for positive bending using length L = 11' 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.50"	1714	1566	3289	5003	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	1591	1448	3041	4632	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12'	N/A	16.0	--	--	
1 - Uniform (PSF)	0 to 12' (Front)	1'	18.0	20.0	42.0	Default Load
2 - Point (lb)	5' 9" (Top)	N/A	2896	2774	5826	Linked from: Roof: Drop Beam RB1, Support 2

• Side loads are assumed to not induce cross-grain tension.

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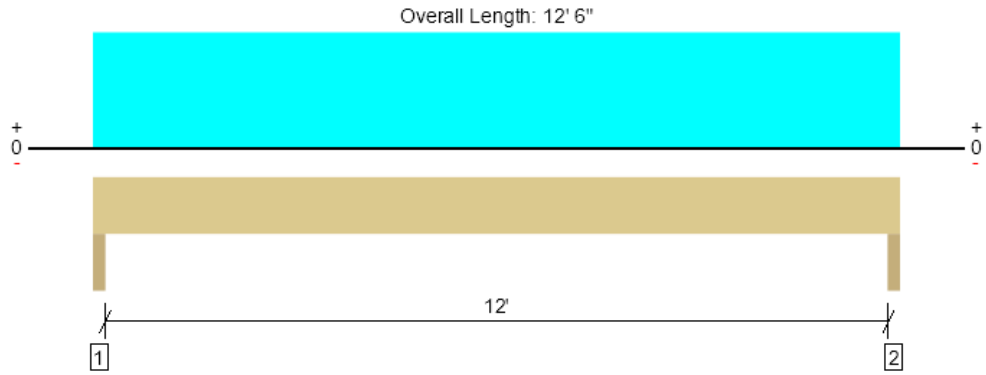
MEMBER REPORT

PASSED

Roof, Roof Header Beam RH3

1 piece(s) 5 1/2" x 6" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1550 @ 1 1/2"	10725 (3.00")	Passed (14%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1364 @ 9"	6705	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	4652 @ 6' 3"	7590	Passed (61%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.478 @ 6' 3"	0.613	Passed (L/308)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.705 @ 6' 3"	0.817	Passed (L/208)	--	1.0 D + 1.0 S (All Spans)

Member Length : 12' 6"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
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.
- Volume factor of 1.00 was calculated for positive bending using length L = 12' 3".
- 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.50"	500	500	1050	1550	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	500	500	1050	1550	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)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12' 6"	N/A	8.0	--	--	
1 - Uniform (PSF)	0 to 12' 6" (Front)	4'	18.0	20.0	42.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

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ForteWEB Software Operator	Job Notes
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8/29/2025 7:53:27 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 1bdrmDupPitched

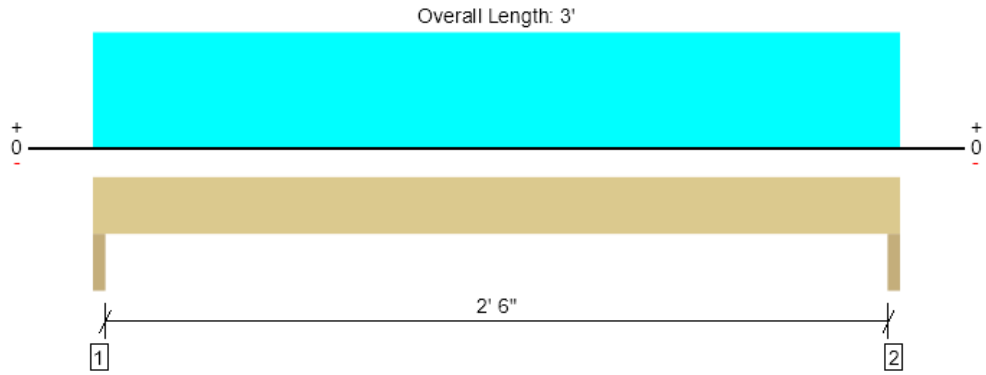
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Header Beam RH4

1 piece(s) 4 x 6 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	907 @ 1 1/2"	6563 (3.00")	Passed (14%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	479 @ 8 1/2"	2657	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	572 @ 1' 6"	1979	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.007 @ 1' 6"	0.138	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.010 @ 1' 6"	0.183	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 3'
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
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	Roof Live	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.50"	277	300	630	907	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	277	300	630	907	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' o/c	
Bottom Edge (Lu)	3' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3'	N/A	4.9	--	--	
1 - Uniform (PSF)	0 to 3' (Front)	10'	18.0	20.0	42.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

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ForteWEB Software Operator	Job Notes
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Weyerhaeuser

8/29/2025 7:53:32 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 1bdrmDupPitched

SEARHC WRANGELL – STAFF HOUSING – 1064 ZIMOVIA HWY WRANGELL AK 99929

SINGLE BEDROOM DUPLEX (PITCHED ROOF)

LATERAL ANALYSIS

WIND ANALYSIS

$V = 139$ mph, Exp 'D', $K_{zt} = 1.0$

SEE ATTACHED WIND PRESSURE CALCULATIONS (STRUWARE)

→ WIND IN E-W DIRECTION:

$$\text{ROOF} = 338 \times 13.1 + (42.5' \times 5.5') \times 28.7 = 4,428 + 6,709 = 11,137\ \#$$

→ WIND IN N-S DIRECTION:

$$\text{ROOF} = 62 \times 2 \times 13.1 + (221 \times 2) \times 28.7 = 1,624.4 + 12,685.4 = 14,310\ \#$$

SEISMIC ANALYSIS

SEISMIC DEAD LOAD:

$$\text{ROOF DL} = 2,334 \times 18 + 2(56 + 35) \times 11/2 \times 15\ \text{psf}$$

$$= 42,012 + 15,015 = 57,027\ \#$$

FROM ATTACHED CALCULATIONS, $V = 0.021W = 1.2k$ (ASD)

⇒ WIND GOVERNS BOTH DIRECTIONS.

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16	**Latitude:**	56.460443
Risk Category:	II	**Longitude:**	-132.376976
Soil Class:	B - Rock	**Elevation:**	96.81758915131236 ft (NAVD 88)

Wind

Results:

Wind Speed	139 Vmph
10-year MRI	98 Vmph
25-year MRI	106 Vmph
50-year MRI	113 Vmph
100-year MRI	119 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed: Mon Aug 18 2025

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Seismic

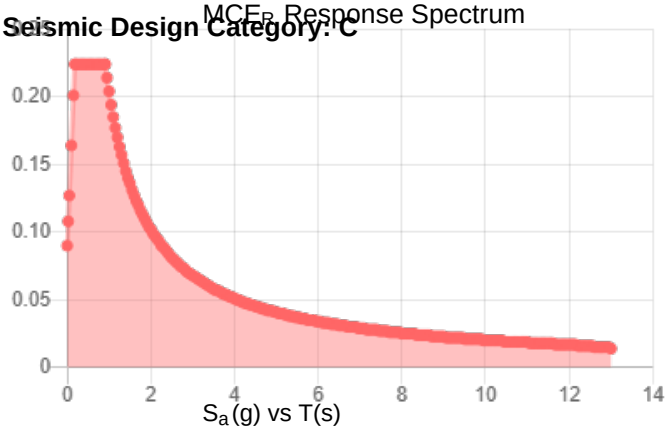
Site Soil Class: B - Rock

Results:

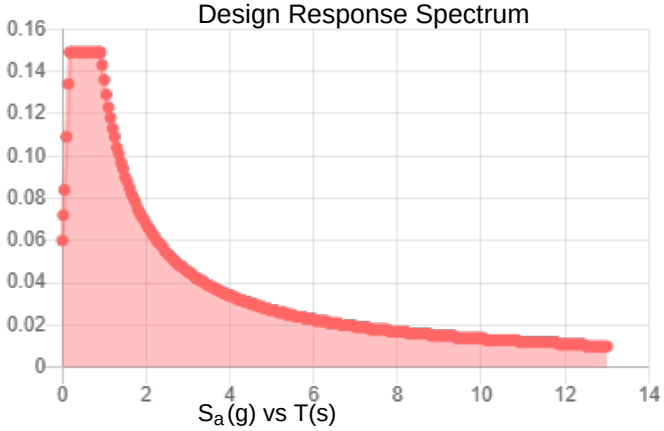
S_S :	0.249	S_{D1} :	0.136
S_1 :	0.254	T_L :	12
F_a :	0.9	PGA :	0.093
F_v :	0.8	PGA_M :	0.083
S_{MS} :	0.224	F_{PGA} :	0.9
S_{M1} :	0.204	I_e :	1
S_{DS} :	0.149	C_v :	0.749

Seismic Design Category: C

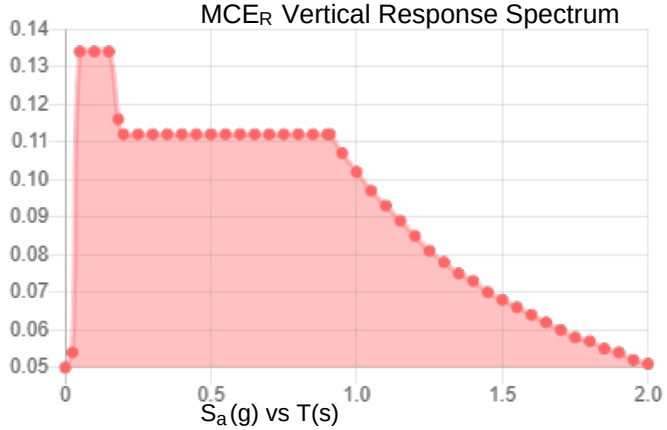
MCE_R Response Spectrum



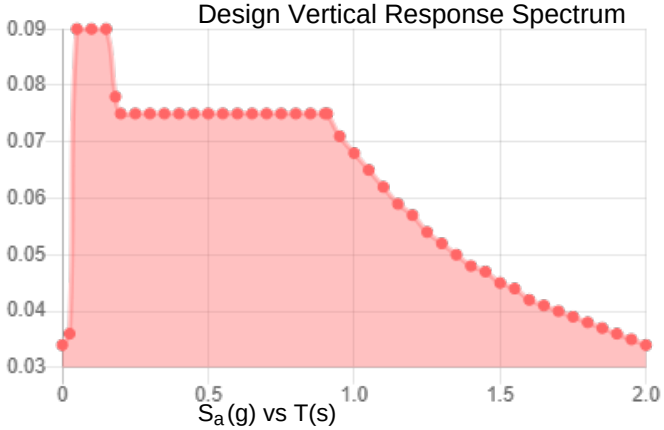
Design Response Spectrum



MCE_R Vertical Response Spectrum



Design Vertical Response Spectrum



Data Accessed: **Mon Aug 18 2025**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Snow

Results:

Ground Snow Load, p_g:	60 lb/ft^2
Mapped Elevation:	96.8 ft
Data Source:	ASCE/SEI 7-16, Table 7.2-8
Date Accessed:	Mon Aug 18 2025

Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

Snow load values are mapped to a 0.5 mile resolution. This resolution can create a mismatch between the mapped elevation and the site-specific elevation in topographically complex areas. Engineers should consult the local authority having jurisdiction in locations where the reported ‘elevation’ and ‘mapped elevation’ differ significantly from each other.

SEISMIC BASE SHEAR: ASCE 7-16

SEARHC WRANGELL - 1bdDupPitched

Occupancy Category	1
Site Class =	B
Lat.	56.460
Long.	-132.377
Ss =	24.9 % g
S1 =	25.4 % g
Seismic Design Category (SDC) =	C 3
Fa =	0.900
Fv =	0.8
Sds =	0.149
Sd1 =	0.135

Occupancy Category	
I & II (1)	Ordinary Buildings
III (2)	High Occupancy Buildings
IV (3)	Hazardous/Essential Bldgs

scratch work

Fa upper =	1
Fa lower =	1
Fv upper =	1
Fv lower =	1
Sms =Fa*Ss =	0.224
Sm1 = Fv*S1 =	0.203
SDC Sds =	A 1
SDC Sd1 =	C 3

Vmin = 0.044*Sds W = 0.01

V = $\frac{Sds * I}{R}$ W = 0.02

Vmax = $\frac{Sd1 * I}{R*T}$ W = 0.17

Where:	Sds =	0.149	
	Sd1 =	0.135	
	I =	1	
WOOD SW	R =	6.5	
	T expo'	0.75	
	Ct =	0.02	
	Hn =	11	
	T =	0.121	
	Total W =	57.0	kips

Therefore:

V.ult= 0.023 W V= 1.3 kips

V.service= 0.016 W V= 0.9 kips

E = ρ Eh + Ev

where ρ = 1.0 or 1.3

ρ.y.= 1.3

ρ.x= 1.3

INCREASE SEISMIC

V.ult= 0.030 W V= 1.7 kips

V.service= 0.021 W V= 1.2 kips

Fa	Ss <	Ss =	Ss =	Ss =	Ss >
	0.25	0.5	0.75	1	1.25
A	0.8	0.8	0.8	0.8	0.8
B	1	1	1	1	1
C	1.2	1.2	1.1	1	1
D	1.6	1.4	1.2	1.1	1
E	2.5	1.7	1.2	0.9	0.9
F	**a**	**a**	**a**	**a**	**a**

Fv	S1 <	S1 =	S1 =	S1 =	S1 >
	0.1	0.2	0.3	0.4	0.5
A	0.8	0.8	0.8	0.8	0.8
B	1	1	1	1	1
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	**a**	**a**	**a**	**a**	**a**

T exponer	Ct	
0.75	0.02	default
0.75	0.03	Ecc Braced Frames
0.8	0.016	Concrete Moment Frames
0.9	0.028	Steel Moment Frames

Common Values	R	omega	
Wood SW	6.5	3	bearing wall system
Special Conc SW	5	2.5	bearing wall system
Special CMU SW	5	2.5	bearing wall system
Steel OMRF	3.5	3	building frame system
Steel SMRF	8	3	building frame system
Steel OBF	5	2	building frame system
Steel SBF	6	2	building frame system
Cant Col			building frame system

Note: IBC Ax and r are evaluated at each floor

Therefore: **pEx = 1.7** kips **pEy = 1.7** kips

pEx = 1.2 kips **pEy = 1.2** kips

static distribution is relative to building period: T = 0.121 sec ------> linear distribution ----> k (exponent)= 1.00

SEISMIC DISTRIBUTION: X-Direction

level	W (kips)	h (ft)	Wh^k (kip-ft)	Wh^k / Σ Wh^k	STRENGTH / LRFD story shear (kips)	STRENGTH / LRFD Σ (kips)	ALLOW. STRESS DESIGN story shear (kips)	ALLOW. STRESS DESIGN Σ (kips)	Scaled Seismic	Fx (kips)	Diaphragm Scaled Seismic
Roof	57.0	11	627	1.00	1.7	1.7	1.2	1.2	0.016	0.9	0.016
Σ	57.0		627	1	1.7		1.2			0.9	
							.7E		.7E	.7E	.7E

SEISMIC DISTRIBUTION: Y-Direction

level	W (kips)	h (ft)	Wh^k (kip-ft)	Wh^k / Σ Wh^k	STRENGTH / LRFD story shear (kips)	STRENGTH / LRFD Σ (kips)	ALLOW. STRESS DESIGN story shear (kips)	ALLOW. STRESS DESIGN Σ (kips)	Scaled Seismic	Fx (kips)	Diaphragm Scaled Seismic
Roof	57.0	10	570	1.00	1.7	1.7	1.2	1.2	0.016	0.9	0.016
Σ	57.0		570	1	1.7		1.2			0.9	
							.7E		.7E	.7E	.7E

STRUCTURAL CALCULATIONS

FOR

SEARHC Wrangell - Staff Housing

Wrangell, Alaska

Code Search

Code: International Building Code 2021

Occupancy:

Occupancy Group = R Residential

Risk Category & Importance Factors:

Risk Category =	II	
Wind factor =	1.00	use 0.60 NOTE: Output will be nominal wind pressures
Snow factor =	1.00	
Seismic factor =	1.00	

Type of Construction:

Fire Rating:

Roof =	1.0 hr
Floor =	1.0 hr

Building Geometry:

Roof angle (θ)	11.00 / 12	42.5 deg
Building length	57.0 ft	
Least width	35.0 ft	
Mean Roof Ht (h)	15.0 ft	
Parapet ht above grd	0.0 ft	
Minimum parapet ht	0.0 ft	

Live Loads:

Roof

0 to 200 sf:	13 psf
200 to 600 sf:	15.6 - 0.013Area, but not less than 12 psf
over 600 sf:	12 psf

Floor:

Typical Floor	40 psf
Partitions	N/A
	0 psf
0	0 psf
Stairs and exit ways	100 psf

Wind Loads : ASCE 7- 16

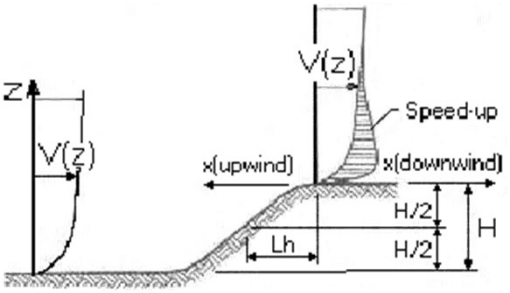
Ultimate Wind Speed	139 mph
Nominal Wind Speed	107.7 mph
Risk Category	II
Exposure Category	D
Enclosure Classif.	Enclosed Building
Internal pressure	+/-0.18
Directionality (Kd)	0.85
Kh case 1	1.030
Kh case 2	1.030
Type of roof	Monoslope

Monosloped roof must be <= 30 deg.

Topographic Factor (Kzt)

Topography		2D Escarpment
Hill Height	(H)	20.0 ft
Half Hill Length (Lh)		300.0 ft
Actual H/Lh	=	0.07
Use H/Lh	=	0.00
Modified Lh	=	300.0 ft
From top of crest: x =		50.0 ft
Bldg up/down wind?		downwind

H/Lh<0.2
∴ Kzt=1.0

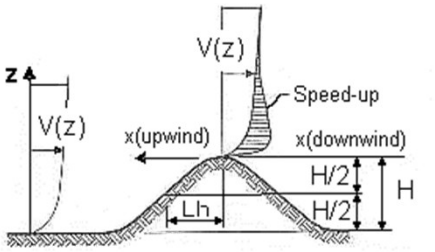


ESCARPMENT

H/Lh= 0.00	K_1 = 0.000
x/Lh = 0.17	K_2 = 0.958
z/Lh = 0.05	K_3 = 0.882

At Mean Roof Ht:

$Kzt = (1+K_1K_2K_3)^2$ = 1.00



2D RIDGE or 3D AXISYMMETRICAL HILL

Gust Effect Factor

h =	15.0 ft
B =	35.0 ft
/z (0.6h) =	9.0 ft

Flexible structure if natural frequency < 1 Hz (T > 1 second).
If building h/B>4 then may be flexible and should be investigated.
h/B = 0.43 Rigid structure (low rise bldg)

G = 0.85 Using rigid structure default

Rigid Structure

$\bar{e}$ =	0.13
ℓ =	650 ft
z_{min} =	7 ft
c =	0.15
g_Q, g_v =	3.4
L_z =	552.6 ft
Q =	0.94
I_z =	0.19
G =	**0.89** use G = 0.85

Flexible or Dynamically Sensitive Structure

Natural Frequency (η_1) =	0.0 Hz				
Damping ratio (β) =	0				
/b =	0.80				
/α =	0.11				
Vz =	141.2				
N_1 =	0.00				
R_n =	0.000				
R_h =	28.282	η =	0.000	h =	15.0 ft
R_B =	28.282	η =	0.000		
R_L =	28.282	η =	0.000		
g_R =	0.000				
R =	0.000				
Gf =	0.000				

Enclosure Classification

Test for Enclosed Building: Ao < 0.01Ag or 4 sf, whichever is smaller

Test for Open Building: All walls are at least 80% open.
Ao ≥ 0.8Ag

Test for Partially Enclosed Building: Predominately open on one side only

	Input			Test	
Ao	500.0	sf	Ao ≥ 1.1Aoi	NO	
Ag	600.0	sf	Ao > 4' or 0.01Ag	YES	
Aoi	1000.0	sf	Aoi / Agi ≤ 0.20	YES	Building is NOT
Agi	10000.0	sf			Partially Enclosed

Conditions to qualify as Partially Enclosed Building. Must satisfy all of the following:
Ao ≥ 1.1Aoi
Ao > smaller of 4' or 0.01 Ag
Aoi / Agi ≤ 0.20
Where:
Ao = the total area of openings in a wall that receives positive external pressure.
Ag = the gross area of that wall in which Ao is identified.
Aoi = the sum of the areas of openings in the building envelope (walls and roof) not including Ao.
Agi = the sum of the gross surface areas of the building envelope (walls and roof) not including Ag.

Test for Partially Open Building: A building that does not qualify as open, enclosed or partially enclosed.
(This type building will have same wind pressures as an enclosed building.

Reduction Factor for large volume partially enclosed buildings (Ri) :

If the partially enclosed building contains a single room that is unpartitioned , the internal pressure coefficient may be multiplied by the reduction factor Ri.

Total area of all wall & roof openings (Aog): 0 sf
Unpartitioned internal volume (Vi) : 0 cf
Ri = 1.00

Ground Elevation Factor (Ke)

Grd level above sea level = 0.0 ft Ke = 1.0000
Constant = 0.00256 Adj Constant = 0.00256

Cushing Terrell

JOB TITLE	SEARHC Wrangell - Staff Housing		
	Single Bedroom Duplex (Pitched Roof)		
JOB NO.	SEARHC_WRNGLWF	SHEET NO.	
CALCULATED BY	AM	DATE	8/29/25
CHECKED BY	KF	DATE	8/29/25

Wind Loads - MWFRS all h (Except for Open Buildings)

Kh (case 2) =	1.03			GCpi =	+/-0.18
Base pressure (q_h) =	**26.0 psf**	Bldg dim parallel to ridge =	57.0 ft	G =	0.85
Roof Angle (θ) =	42.5 deg	Bldg dim normal to ridge =	35.0 ft	qi = qh	
Roof tributary area:		h =	15.0 ft		
Wind normal to ridge =(h/2)*L:	428 sf	ridge ht =	23.0 ft		
Wind parallel to ridge =(h/2)*L:	263 sf				

Nominal Wind Surface Pressures (psf)

Surface	Wind Normal to Ridge L/B = 0.61 h/L = 0.43 Cp	q_hGC_p	w/+q_iGC_{pi}	w/-q_hGC_{pi}	Wind Parallel to Ridge L/B = 1.63 h/L = 0.26 Dist.*	Cp	q_hGC_p	w/ +q_iGC_{pi}	w/ -q_hGC_{pi}
Windward Wall (WW)	0.80	17.7	see table below			0.80	17.7	see table below	
Leeward Wall (LW)	-0.50	-11.0	-15.7	-6.4		-0.37	-8.3	-12.9	-3.6
Side Wall (SW)	-0.70	-15.5	-20.1	-10.8		-0.70	-15.5	-20.1	-10.8
Leeward Roof (LR)	-0.60	-13.3	-17.9	-8.6		Included in windward roof			
Neg Windward Roof pressure	-0.04	-0.8	-5.5	3.9	0 to h/2*	-0.90	-19.9	-24.6	-15.2
Pos/min Windward Roof press.	0.38	8.4	3.8	13.1	h/2 to h*	-0.90	-19.9	-24.6	-15.2
					h to 2h*	-0.50	-11.0	-15.7	-6.4
					> 2h*	-0.30	-6.6	-11.3	-1.9
					Min press.	-0.18	-4.0	-8.7	0.7

*Horizontal distance from windward edge

For monoslope roofs, entire roof surface is either windward or leeward surface.

Parapet

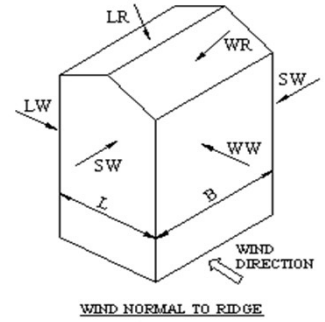
z	Kz	Kzt	qp (psf)
0.0 ft	1.03	1.00	0.0

Windward parapet: 0.0 psf (GCpn = +1.5)
Leeward parapet: 0.0 psf (GCpn = -1.0)

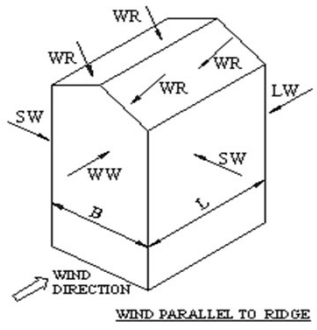
Windward roof overhangs : 17.7 psf (upward - add to windward roof pressure)

Windward Wall Pressures at "z" (psf)

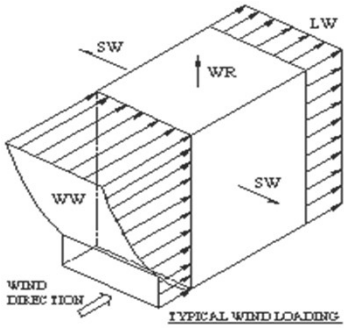
	z	Kz	Kzt	Windward Wall q_zGC_p	w/+q_iGC_{pi}	w/-q_hGC_{pi}	Combined WW + LW Wind Normal to Ridge	Wind Parallel to Ridge
h=	0 to 15'	1.03	1.00	17.7	13.0	22.3	28.7	25.9
ridge =	23.0 ft	1.11	1.00	19.0	14.4	23.7	30.1	27.3



WIND NORMAL TO RIDGE

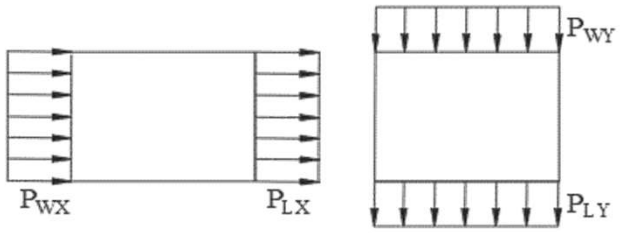


WIND PARALLEL TO RIDGE

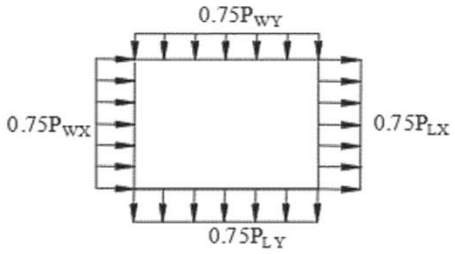


TYPICAL WIND LOADING

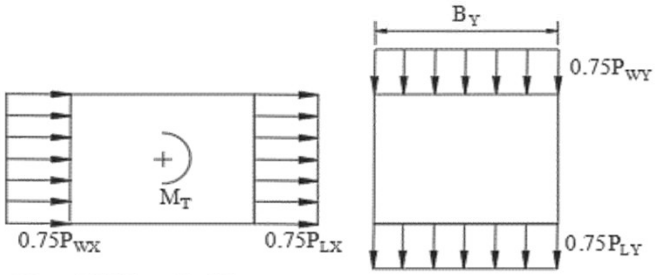
NOTE: ASCE 7 requires the application of full and partial loading of the wind pressures per the 4 cases below.



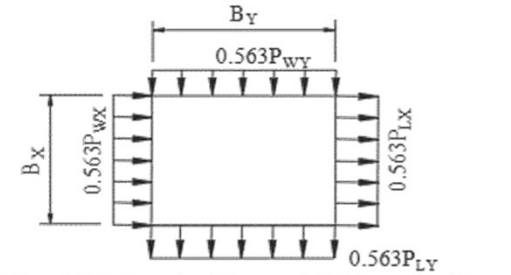
CASE 1



CASE 3



CASE 2



CASE 4

Wind Forces at Floors

Building dimension (parallel with ridge) = 57.0 ft e = 8.55 ft

Total Floors = 1 Building dimension (normal to ridge) = 35.0 ft e = 5.25 ft

T/Fdn (dist below grade) = 2.0 ft L is the building dimension parallel to the wind direction

	Elevation	Height of	Wind Normal to Ridge						Wind Parallel to Ridge			
	Above	Centroid				Applied	Story	Overturning		Applied	Story	Overturning
Level	Grade (ft)	to Fdn (ft)	L	B	Area (sf)	Force (k)	Shear (k)	Moment ('k)	Area	Force (k)	Shear (k)	Moment ('k)
Equip,etc		0.00	wind on equip, screenwalls, etc =					0.0				
Parapet	0.00	0.00				0.0		0.0		0.0		
T/Ridge	0.00	0.00			0.0	0.0		0.0	0.0	0.0		0.0
Roof	15.00	17.00	35.0	57.0	427.5	12.3	12.3	0.0	262.5	6.8	6.8	0.0
1	0.00	2.00	35.0	57.0	427.5	12.3	24.6	184.1	262.5	6.8	13.6	102.1
FDN		0.00						233.3				129.4

SEARHC WRANGELL - 1bdDupPitched

V in N-S Roof shear (k) = 14.31 (Wind)

Wall	TW (ft)	V (k)	L (ft)	v (plf)	SW Type	h (ft)	Mot (k-ft)	TW (ft)	DLroof (psf)	Wfl (plf)	DLwall (psf)	Wwall (plf)	Mr (k-ft)	.6Mr (k-ft)	FS	T (lbs)	Holdowns	Wall
1	12.5	3.19	8	**399**	SWB													1
3	15.5	3.96	19.5	**203**	SWA													3
4	15.5	3.96	19.5	**203**	SWA													4
6	12.5	3.19	8	**399**	SWB													6
	56																	

* Shearwall capacity reduced by 1.25-0.125h/b

Holdowns

V in N-S Roof

Wall	L (ft)	h (ft)	Mot (k-ft)	TW (ft)	DLroof (psf)	Wfl (plf)	DLwall (psf)	Wwall (plf)	Mr (k-ft)	.6Mr (k-ft)	FS	T (lbs)	Holdowns	Wall	C (lbs)
v=	399	plf													
1	8	11	35.14	2	18	36	10	110	5	2.8	0.08	**4042**	4	1	4392
v=	203	plf													
3a	12.5	11	27.93	6	18	108	10	110	17	10.2	0.37	**1417**	4	3a	2234
3b	7	11	15.64	6	18	108	10	110	5	3.2	0.20	**1776**	4	3b	2234
v=	203	plf													
4a	12.5	11	27.93	6	18	108	10	110	17	10.2	0.37	**1417**	4	4a	2234
4b	7	11	15.64	6	18	108	10	110	5	3.2	0.20	**1776**	4	4b	2234
v=	399	plf													
6	8	11	35.14	2	18	36	10	110	5	2.8	0.08	**4042**	4	6	4392

SEARHC WRANGELL - 1bdDupPitched

V in E-W Roof shear (k) = 11.14 (Wind)

Wall	TW (ft)	V (k)	L (ft)	v (plf)	SW Type	h (ft)	Mot (k-ft)	TW (ft)	DLfloor(psf)	Wfl (plf)	DLwall (psf)	Wwall (plf)	Mr (k-ft)	.6Mr (k-ft)	FS	T (lbs)	Holdowns	Wall
A	17.5	5.57	19	**293**	SWB													A
D	17.5	5.57	19	**293**	SWB													D
	35																	

Holdowns

V in E-W Roof

Wall	L (ft)	h (ft)	Mot (k-ft)	TW (ft)	DLroof (psf)	Wfl (plf)	DLwall (psf)	Wwall (plf)	Mr (k-ft)	.6Mr (k-ft)	FS	T (lbs)	Holdowns	Wall	C (lbs)
v=	293	plf													
A1	4.75	10	13.93	10.5	18	189	10	100	3	2.0	0.14	**2520**	4	A1	2932
A2	4.75	10	13.93	10.5	18	189	10	100	3	2.0	0.14	**2520**	4	A2	2932
A3	4.75	10	13.93	10.5	18	189	10	100	3	2.0	0.14	**2520**	4	A3	2932
A4	4.75	10	13.93	10.5	18	189	10	100	3	2.0	0.14	**2520**	4	A4	2932
v=	293	plf													
D1	3.75	12	13.19	10.5	18	189	10	120	2	1.3	0.10	**3170**	4	D1	3518
D2	5.75	12	20.23	10.5	18	189	10	120	5	3.1	0.15	**2985**	4	D2	3518
D3	5.75	12	20.23	10.5	18	189	10	120	5	3.1	0.15	**2985**	4	D3	3518
D4	3.75	12	13.19	10.5	18	189	10	120	2	1.3	0.10	**3170**	4	D4	3518