Cushing Terrell

08.29.2025

Structural Calculations for

SOUTHEAST ALASKA REGIONAL HEALTH CONSORTIUM

WRANGELL STAFF HOUSING

SINGLE FAMILY ONE STORY (SHED ROOF)

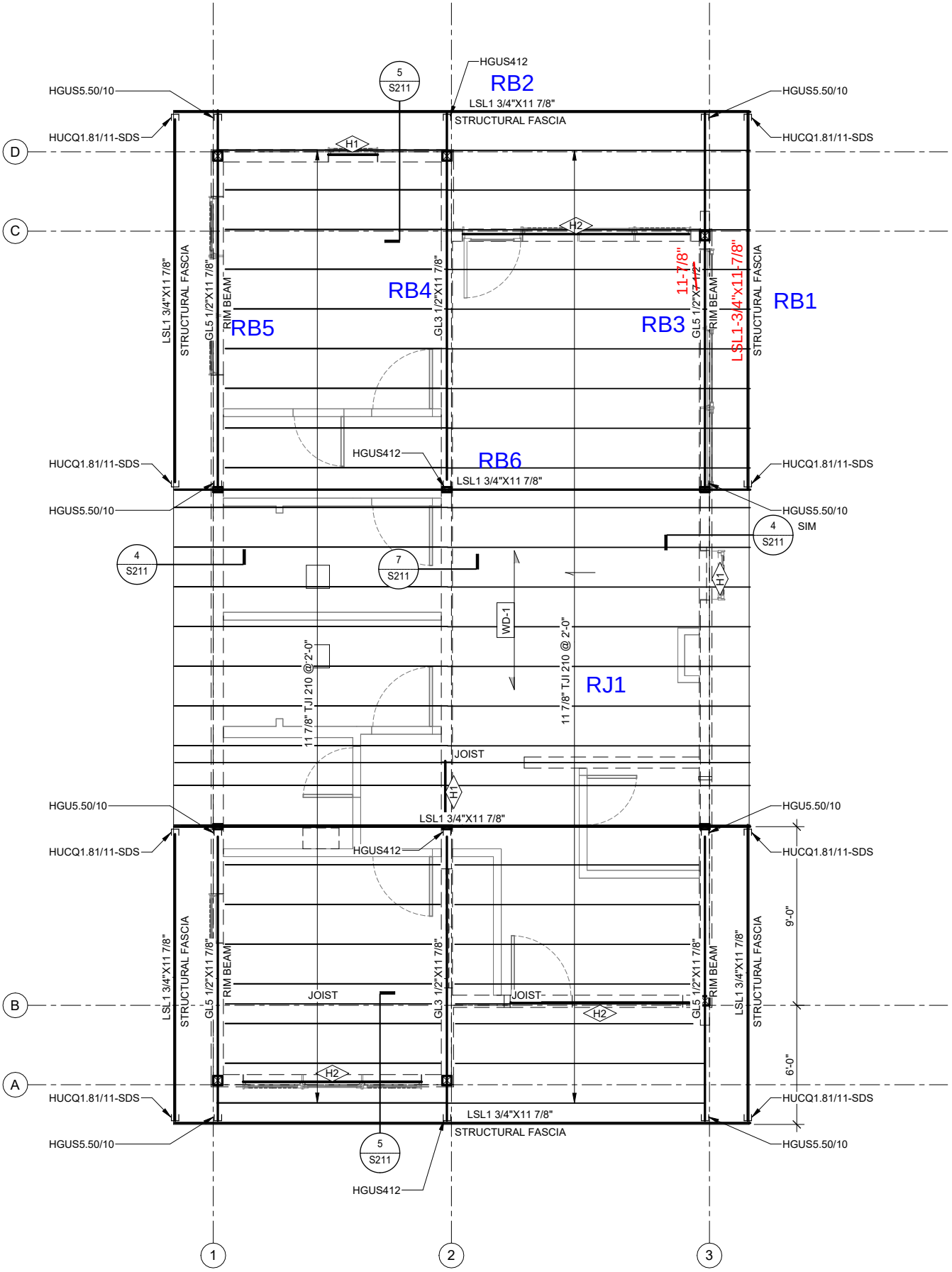
1064 Zimovia Hwy, Wrangell AK 99929

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 = 1.2 kips (ULTIMATE)
   l) ALLOWABLE STORY DRIFT ▲ = 0.020hsx
6) FOOTING BEARING PRESSURE: 3000 psf ON APPROVED SUBGRADE, SEE SECTION FOUNDATIONS
7) SOIL FRICTION COEFFICIENT: 0.4
8) LATERAL SOIL PRESSURE:
   a) ACTIVE EQUIVALENT FLUID PRESSURE: 35 pcf
   b) AT-REST EQUIVALENT FLUID PRESSURE: 55 pcf
   c) PASSIVE EQUIVALENT FLUID PRESSURE: 400 pcf
9) FROST DEPTH: 32 INCHES TOP OF FOOTING



1 S102 ROOF FRAMING PLAN

1/4" = 1'-0"

NORTH REF

Cushing Terrell

JOB TITLE	SEARHC Wrangell - Staff Housing		
	Single Family One Story (Shed 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)		=	26.0 ft
Roof length parallel to ridge (L)		=	47.0 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			0.52 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..

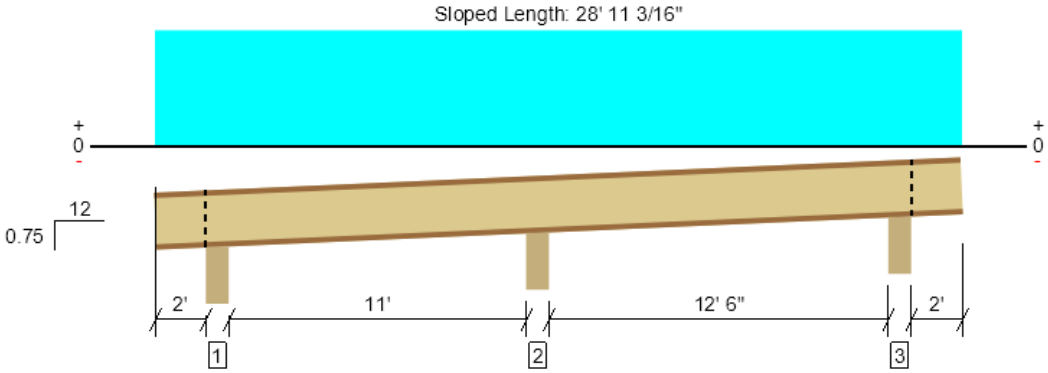
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof: Joist RJ1

1 piece(s) 11 7/8" TJI® 210 @ 24" 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)	1790 @ 13' 8 1/4"	2956 (5.25")	Passed (61%)	1.15	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	816 @ 13' 11"	1903	Passed (43%)	1.15	1.0 D + 1.0 S (Adj Spans)
Moment (Ft-lbs)	-2165 @ 13' 8 1/4"	4364	Passed (50%)	1.15	1.0 D + 1.0 S (Adj Spans)
Live Load Defl. (in)	0.128 @ 20' 7 15/16"	0.649	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.173 @ 20' 8 5/8"	0.866	Passed (L/901)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 28' 11 15/16"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0.75/12

- 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"	239	285	599	838	Blocking	R1
2 - Beveled Plate - DF	5.50"	5.50"	3.50"	530	600	1260	1790	None	R7
3 - Beveled Plate - DF	5.50"	5.50"	3.50"	272	314	658	931	Blocking	R1

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 11" o/c	
Bottom Edge (Lu)	5' 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.

Vertical Load	Location	Spacing	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 28' 10 1/2"	24"	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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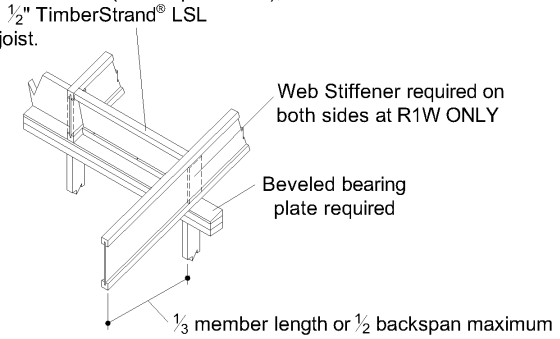
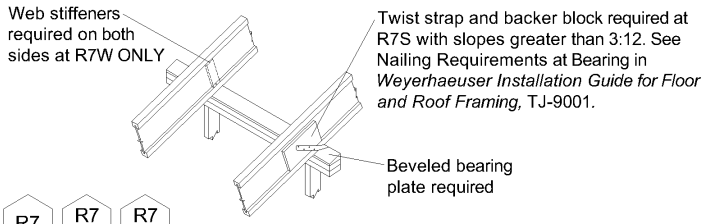
8/27/2025 6:04:11 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 2bdrm1stryShed

Shear blocking:
1 1/8" TJ® Rim Board (with depths ≤ 16"),
1 1/4"or 1 1/2" TimberStrand® LSL
or TJI® joist.



R1 R1W

INTERMEDIATE BEARING
Blocking panels or shear blocking may be specified for joist stability at intermediate supports



R7 R7 W R7 S

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

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8/29/2025 8:32:41 PM UTC
ForteWEB v3.9
File Name: SEARHC Wrangell 2bdrm1stryShed

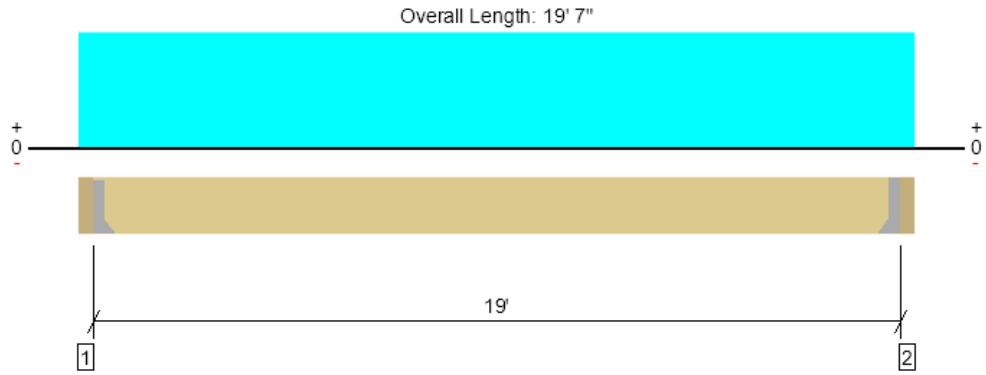
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Str Fascia RB1

1 piece(s) 1 3/4" x 11 7/8" 1.55E TimberStrand® LSL



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)	632 @ 3 1/2"	2363 (1.50")	Passed (27%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	566 @ 1' 3 3/8"	4939	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3000 @ 9' 9 1/2"	9173	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.339 @ 9' 9 1/2"	0.950	Passed (L/673)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.537 @ 9' 9 1/2"	1.267	Passed (L/425)	--	1.0 D + 1.0 S (All Spans)

Member Length : 19'
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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	238	196	411	649	See note [1]
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	238	196	411	649	See note [1]

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 1" o/c	
Bottom Edge (Lu)	19' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	
2 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 19' 3 1/2"	N/A	6.5	--	--	
1 - Uniform (PSF)	0 to 19' 7" (Front)	1'	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
Asrade Mengstu Cushing Terrell (406) 500-3544 asrademengstu@cushingterrell.com	6

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8/27/2025 6:13:20 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 2bdrm1stryShed

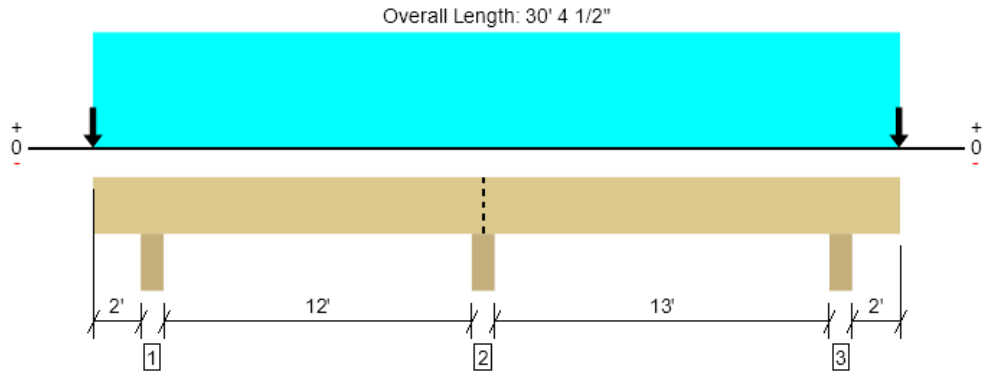
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Str Fascia RB2

1 piece(s) 1 3/4" x 11 7/8" 1.55E TimberStrand® LSL



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1335 @ 28' 1 3/4"	6256 (5.50")	Passed (21%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	716 @ 1' 1/8"	4939	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-1612 @ 28' 1 3/4"	9173	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.047 @ 0	0.223	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.065 @ 0	0.297	Passed (2L/818)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 30' 4 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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Beam - GLB	5.50"	5.50"	1.50"	475	399	838	1313	None
2 - Beam - GLB	5.50"	5.50"	1.50"	260	268	563	823	Blocking
3 - Beam - GLB	5.50"	5.50"	1.50"	485	405	850	1335	None

• 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)	29' 2" o/c	
Bottom Edge (Lu)	23' 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 30' 4 1/2"	N/A	6.5	--	--	
1 - Uniform (PSF)	0 to 30' 4 1/2" (Front)	1'	18.0	20.0	42.0	Default Load
2 - Point (lb)	30' 4" (Front)	N/A	238	196	411	Linked from: Roof Str Fascia RB1, Support 1
3 - Point (lb)	0 (Front)	N/A	238	196	411	Linked from: Roof Str Fascia 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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ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 2bdrm1stryShed

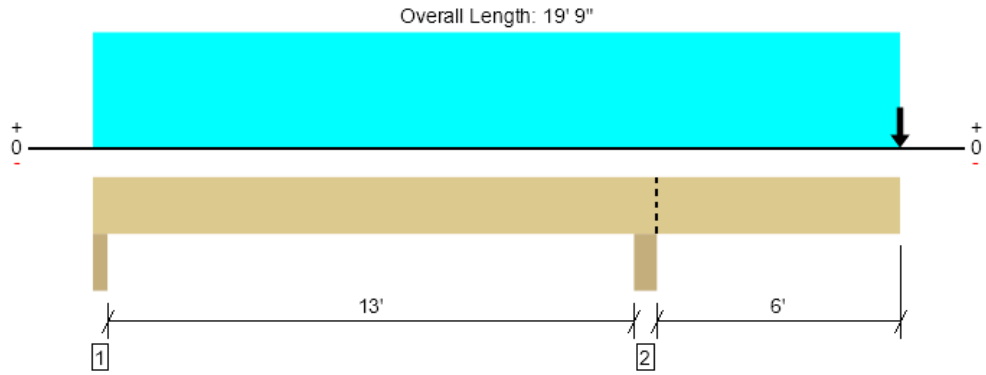
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Beam RB3

1 piece(s) 5 1/2" x 11 7/8" 24F-V8 DF Glulam



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	8647 @ 13' 6 1/4"	19663 (5.50")	Passed (44%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3842 @ 12' 3 5/8"	13269	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	5376 @ 4' 11 5/8"	29731	Passed (18%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-17354 @ 13' 6 1/4"	29731	Passed (58%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.434 @ 19' 9"	0.623	Passed (2L/344)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.608 @ 19' 9"	0.831	Passed (2L/246)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 19' 9"
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 = 9' 7 5/16".
- Volume factor of 1.00 was calculated for negative bending using length L = 11' 9 11/16".
- 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	3.50"	3.50"	1.50"	587	823	1729	2316	None
2 - Column - DF	5.50"	5.50"	2.42"	2878	2748	5770	8647	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' 9" o/c	
Bottom Edge (Lu)	19' 9" 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 19' 9"	N/A	15.9	--	--	
1 - Uniform (PSF)	0 to 19' 9" (Front)	7' 6"	18.0	20.0	42.0	Default Load
2 - Point (lb)	19' 9" (Front)	N/A	485	405	850	Linked from: Roof Str Fascia RB2, Support 3

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

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ForteWEB Software Operator	Job Notes
Asrade Mengstu Cushing Terrell (406) 500-3544 asrademengstu@cushingterrell.com	8

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8/27/2025 6:16:46 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 2bdrm1stryShed

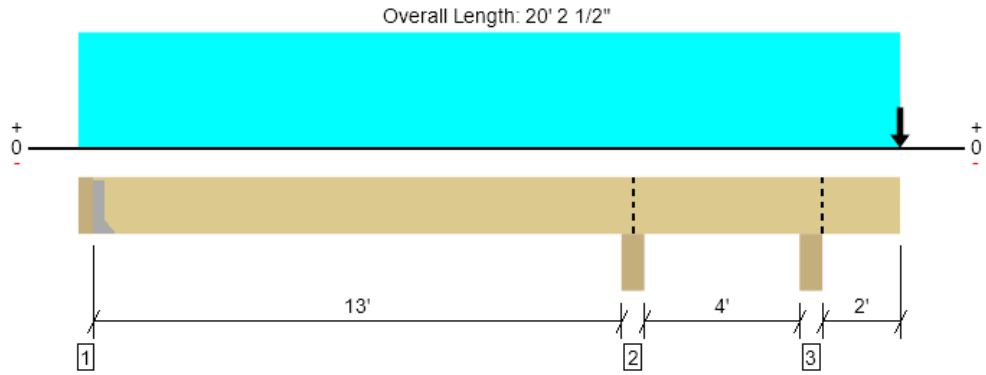
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Beam RB4

1 piece(s) 3 1/2" x 11 7/8" 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)	4100 @ 3 1/2"	4100 (1.80")	Passed (100%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	5054 @ 12' 3 5/8"	8444	Passed (60%)	1.15	1.0 D + 1.0 S (Adj Spans)
Pos Moment (Ft-lbs)	11055 @ 5' 8 1/4"	18920	Passed (58%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-12605 @ 13' 6 1/4"	18920	Passed (67%)	1.15	1.0 D + 1.0 S (Adj Spans)
Live Load Defl. (in)	0.233 @ 6' 3 1/2"	0.661	Passed (L/681)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.336 @ 6' 3 7/16"	0.882	Passed (L/472)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 19' 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).
- 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 = 10' 9 7/16".
- Volume factor of 1.00 was calculated for negative bending using length L = 9' 2 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 - Hanger on 11 7/8" DF beam	3.50"	Hanger[1]	1.80"	1330	1423	2988	4318	See note [1]
2 - Column - DF	5.50"	5.50"	4.38"	2972	3325	6982	9954	Blocking
3 - Column - DF	5.50"	5.50"	1.50"	706	1196	2513	3219	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 11" o/c	
Bottom Edge (Lu)	19' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HHUS48	3.00"	N/A	22-16d	8-16d	

- 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)	3 1/2" to 20' 2 1/2"	N/A	10.1	--	--	
1 - Uniform (PSF)	0 to 20' 2 1/2" (Front)	12' 6"	18.0	20.0	42.0	Default Load
2 - Point (lb)	20' 2 1/2" (Front)	N/A	260	268	563	Linked from: Roof Str Fascia RB2, Support 2

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

ForteWEB Software Operator	Job Notes
Asrade Mengstu Cushing Terrell (406) 500-3544 asrademengstu@cushingterrell.com	9

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ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 2bdrm1stryShed

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

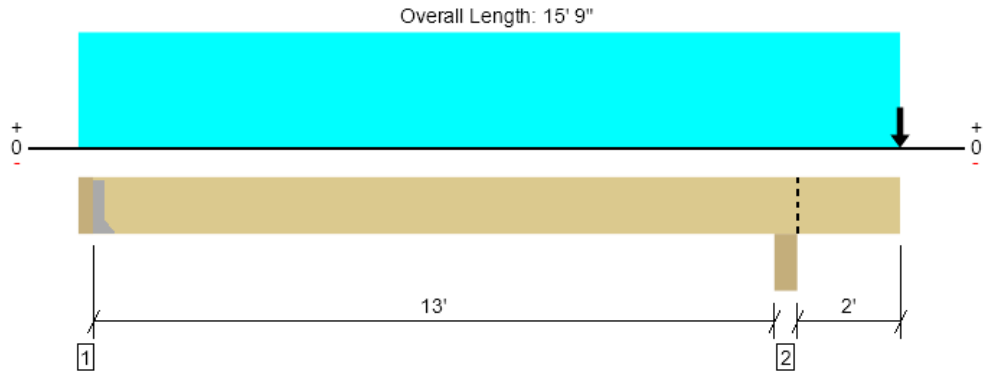
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Beam RB5

1 piece(s) 5 1/2" x 11 7/8" 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)	4821 @ 3 1/2"	5363 (1.50")	Passed (90%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	4498 @ 12' 3 5/8"	13269	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	15172 @ 6' 7 1/16"	29731	Passed (51%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-4830 @ 13' 6 1/4"	29731	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.240 @ 6' 9 7/8"	0.661	Passed (L/661)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.338 @ 6' 9 7/16"	0.882	Passed (L/470)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 15' 5 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 = 12' 7 1/16".
- Volume factor of 1.00 was calculated for negative bending using length L = 3' 2 3/16".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Hanger on 11 7/8" DF beam	3.50"	Hanger[1]	1.50"	1534	1669	3506	5040	See note [1]
2 - Column - DF	5.50"	5.50"	2.36"	2731	2724	5721	8451	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)	15' 6" o/c	
Bottom Edge (Lu)	15' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HGUS5.50/10	4.00"	N/A	46-10d	16-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 15' 9"	N/A	15.9	--	--	
1 - Uniform (PSF)	0 to 15' 9" (Front)	12' 6"	18.0	20.0	42.0	Default Load
2 - Point (lb)	15' 9" (Front)	N/A	475	399	838	Linked from: Roof Str Fascia RB2, Support 1

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

ForteWEB Software Operator	Job Notes
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ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 2bdrm1stryShed

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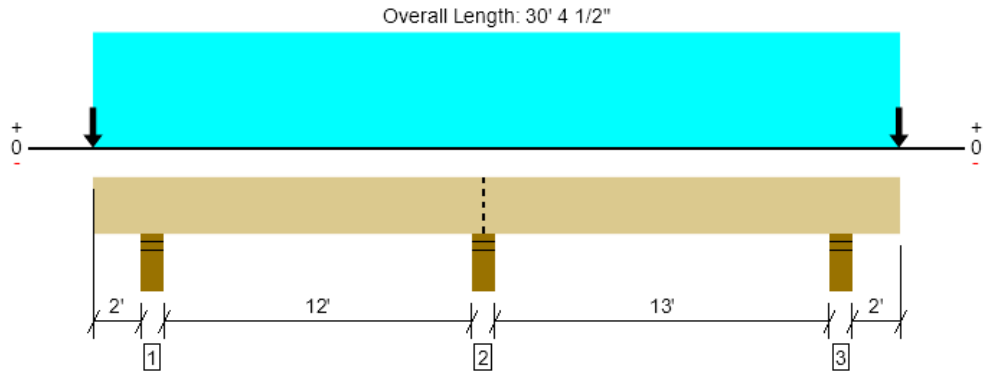
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, Roof Beam RB6

1 piece(s) 1 3/4" x 11 7/8" 1.55E TimberStrand® LSL



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)	1809 @ 28' 1 3/4"	6016 (5.50")	Passed (30%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	777 @ 1' 1/8"	4939	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-2068 @ 14' 8 1/4"	9173	Passed (23%)	1.15	1.0 D + 1.0 S (Adj Spans)
Live Load Defl. (in)	0.050 @ 0	0.223	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.063 @ 0	0.297	Passed (2L/848)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 30' 4 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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.61"	602	550	1154	1757	None
2 - Stud wall - DF	5.50"	5.50"	1.62"	542	587	1232	1773	Blocking
3 - Stud wall - DF	5.50"	5.50"	1.65"	623	565	1186	1809	None

• 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)	25' o/c	
Bottom Edge (Lu)	18' 1" 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 30' 4 1/2"	N/A	6.5	--	--	
1 - Uniform (PSF)	0 to 30' 4 1/2" (Front)	2'	18.0	20.0	42.0	Default Load
2 - Point (lb)	30' 4" (Front)	N/A	238	196	411	Linked from: Roof Str Fascia RB1, Support 2
3 - Point (lb)	0 (Front)	N/A	238	196	411	Linked from: Roof Str Fascia RB1, Support 2

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

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ForteWEB Software Operator	Job Notes
Asrade Mengstu Cushing Terrell (406) 500-3544 asrademengstu@cushingterrell.com	13

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ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 2bdrm1stryShed

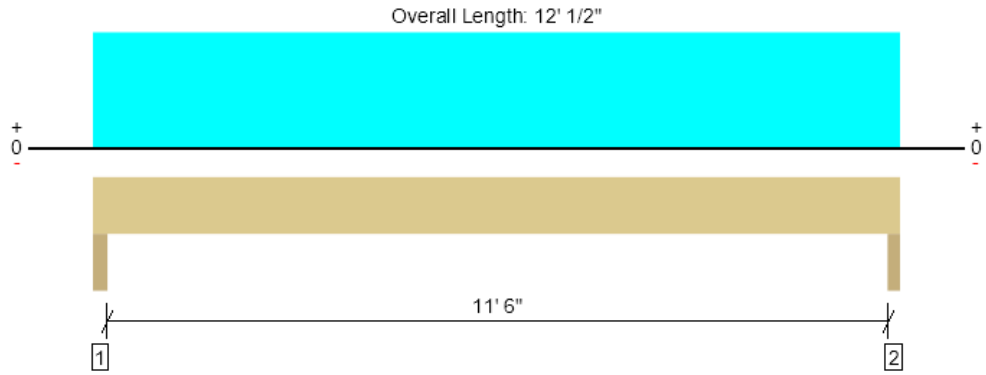
FORTEWEB

MEMBER REPORT

PASSED

Roof, Roof Header Beam RH1

1 piece(s) 4 x 10 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)	769 @ 11' 11"	6563 (3.00")	Passed (12%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	638 @ 1' 3/4"	4468	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2212 @ 6' 1/2"	5166	Passed (43%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.098 @ 6' 1/2"	0.587	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.149 @ 6' 1/2"	0.783	Passed (L/947)	--	1.0 D + 1.0 S (All Spans)

Member Length : 12' 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).
- 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	3.50"	3.50"	1.50"	267	242	508	775	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	265	240	504	769	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 1" o/c	
Bottom Edge (Lu)	12' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12' 1/2"	N/A	8.2	--	--	
1 - Uniform (PSF)	0 to 12' 1/2" (Front)	2'	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
Asrade Mengstu Cushing Terrell (406) 500-3544 asrademengstu@cushingterrell.com	14

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8/27/2025 7:01:16 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: SEARHC Wrangell 2bdrm1stryShed

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

SINGLE FAMILY ONE STORY (SHED 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:

ROOF = $319 \times 28.7 = 9,155$ #

→ WIND IN N-S DIRECTION:

ROOF = $171 \times 28.7 = 4,908$ #

SEISMIC ANALYSIS

SEISMIC DEAD LOAD:

ROOF DL = $1,480 \times 18 + 2(47+26) \times 11/2 \times 15$ psf

$= 26,640 + 12,045 = 38,685$ #

FROM ATTACHED CALCULATIONS, $V = 0.021W = 0.8k$ (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.

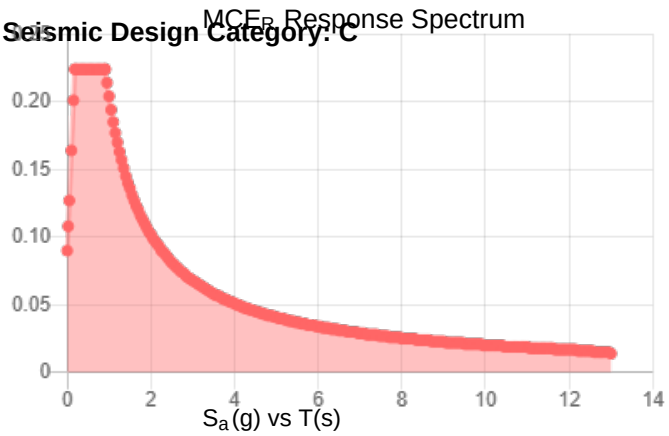
Seismic

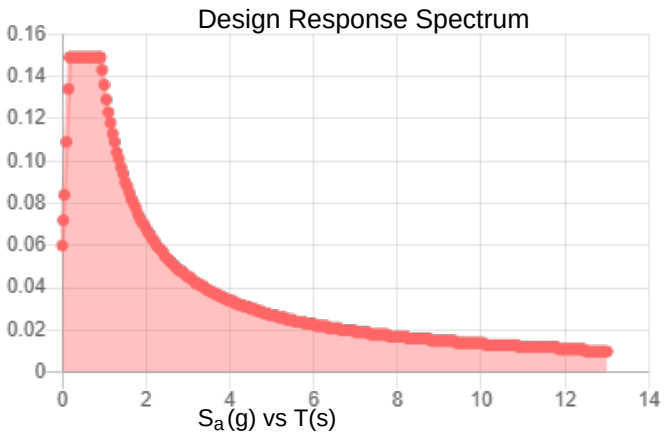
Site Soil Class: B - Rock

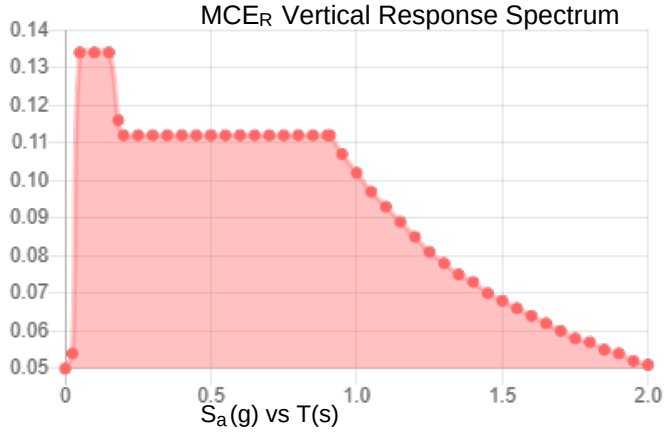
Results:

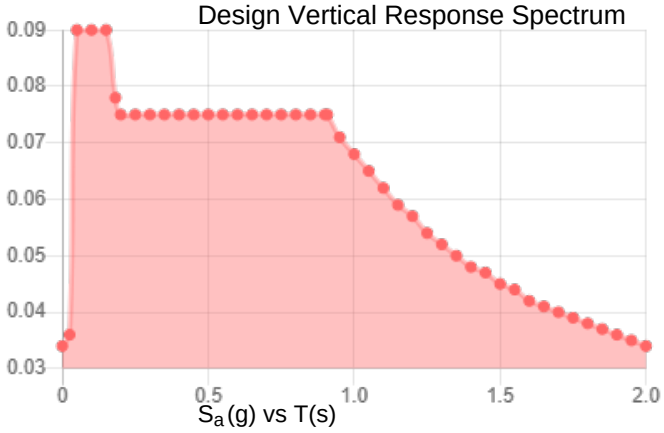
S_S :	0.249	S_{D1} :	0.136
S_1 :	0.254	T_L :	12
F_a :	0.9	PGA :	0.093
F_v :	0.8	PGA_M :	0.083
S_{MS} :	0.224	F_{PGA} :	0.9
S_{M1} :	0.204	I_e :	1
S_{DS} :	0.149	C_v :	0.749

Seismic Design Category: C









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 - 2bd1stryShed

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

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**

Vmin = 0.044*Sds W = 0.01

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

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

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

Where:

Sds =	0.149	T expo'	0.75
Sd1 =	0.135	Ct =	0.02
I =	1	Hn =	11
WOOD SW R =	6.5	T =	0.121
		Total W =	38.7 kips

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

Therefore:

V.ult=	0.023	W	V=	0.9	kips
V.service=	0.016	W	V=	0.6	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=	1.2	kips
V.service=	0.021	W	V=	0.8	kips

Note: IBC Ax and r are evaluated at each floor

Therefore: **pEx = 1.2** kips **pEy = 1.2** kips

pEx = 0.8 kips **pEy = 0.8** 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 / ΣWh^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	38.7	11	426	1.00	1.2	1.2	0.8	0.8	0.016	0.6	0.016
Σ	38.7		426	1	1.2		0.8			0.6	
							.7E		.7E	.7E	.7E

SEISMIC DISTRIBUTION: Y-Direction

level	W (kips)	h (ft)	Wh^k (kip-ft)	Wh^k / ΣWh^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	38.7	10	387	1.00	1.2	1.2	0.8	0.8	0.016	0.6	0.016
Σ	38.7		387	1	1.2		0.8			0.6	
							.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)	0.75 / 12	3.6 deg
Building length	47.0 ft	
Least width	26.0 ft	
Mean Roof Ht (h)	12.0 ft	
Parapet ht above grd	0.0 ft	
Minimum parapet ht	0.0 ft	

Live Loads:

Roof
0 to 200 sf: 20 psf
200 to 600 sf: 24 - 0.02Area, 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

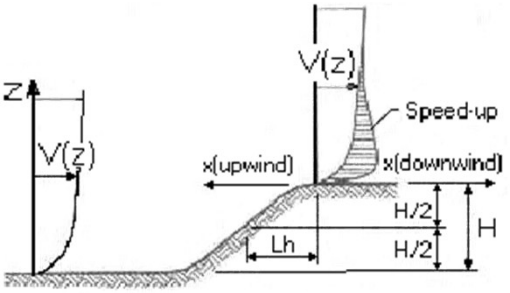
Wind Loads : ASCE 7- 16

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

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

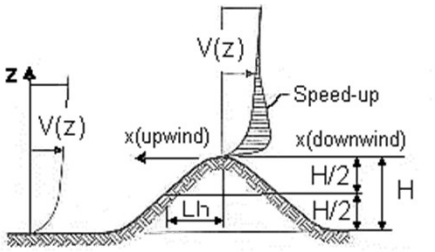


ESCARPMENT

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 =	12.0 ft
B =	26.0 ft
/z (0.6h) =	7.2 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 = 0.46 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 =	537.4 ft	
Q =	0.95	
I_z =	0.19	
G =	**0.90**	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 =	137.7				
N_1 =	0.00				
R_n =	0.000				
R_h =	28.282	η =	0.000	h =	12.0 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 Partially Enclosed
Agi	10000.0	sf			

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 Family One Story (Shed 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 =	47.0 ft	G =	0.85
Roof Angle (θ) =	3.6 deg	Bldg dim normal to ridge =	26.0 ft	qi = qh	
Roof tributary area:		h =	12.0 ft		
Wind normal to ridge =(h/2)*L:	282 sf	ridge ht =	12.8 ft		
Wind parallel to ridge =(h/2)*L:	156 sf				

Nominal Wind Surface Pressures (psf)

Surface	Wind Normal to Ridge L/B = 0.55 h/L = 0.46 Cp	q_hGC_p	w/+q_iGC_{pi}	w/-q_hGC_{pi}	Wind Parallel to Ridge L/B = 1.81 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		-0.34	-7.5	-12.2	-2.8
Side Wall (SW)	-0.70	-15.5	-20.1	-10.8		-0.70	-15.5	-20.1	-10.8
Leeward Roof (LR)		**				Included in windward roof			
Neg Windward Roof: 0 to h/2*	-0.90	-19.9	-24.6	-15.2	0 to h/2*	-0.90	-19.9	-24.6	-15.2
h/2 to h*	-0.90	-19.9	-24.6	-15.2	h/2 to h*	-0.90	-19.9	-24.6	-15.2
h to 2h*	-0.50	-11.0	-15.7	-6.4	h to 2h*	-0.50	-11.0	-15.7	-6.4
> 2h*	-0.30	-6.6	-11.3	-1.9	> 2h*	-0.30	-6.6	-11.3	-1.9
Pos/min windward roof press.	-0.18	-4.0	-8.7	0.7	Min press.	-0.18	-4.0	-8.7	0.7

**Roof angle < 10 degrees. Therefore, leeward roof is included in windward roof pressure zones.

*Horizontal distance from windward edge

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

Parapet

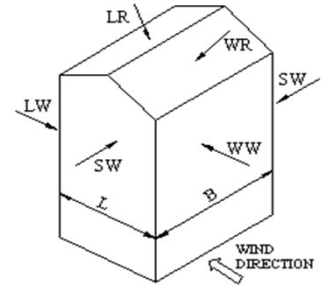
z	Kz	Kzt	qp (psf)
0.0 ft	1.03	1.00	0.0

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

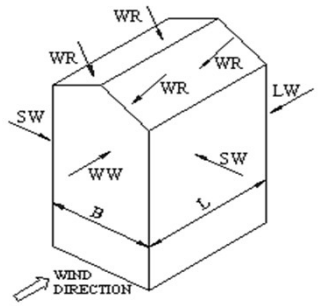
Windward roof overhangs : 17.7 psf (upward - add to windward roof pressure)

Windward Wall Pressures at "z" (psf)

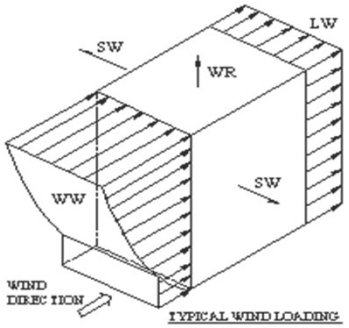
	z	Kz	Kzt	Windward Wall q_zGC_p	w/+q_iGC_{pi}	w/-q_hGC_{pi}	Combined WW + LW Wind Normal to Ridge	Wind Parallel to Ridge
h=	0 to 15'	1.03	1.00	17.7	13.0	22.3	28.7	25.1



WIND NORMAL TO RIDGE

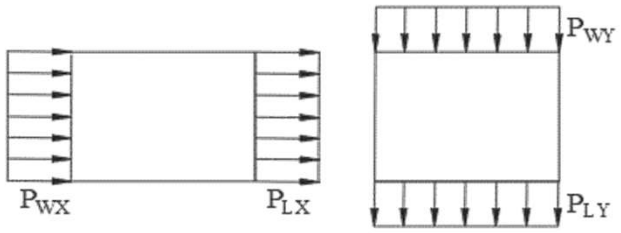


WIND PARALLEL TO RIDGE

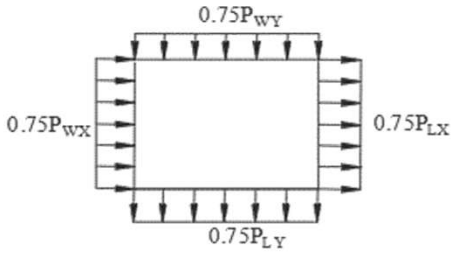


TYPICAL WIND LOADING

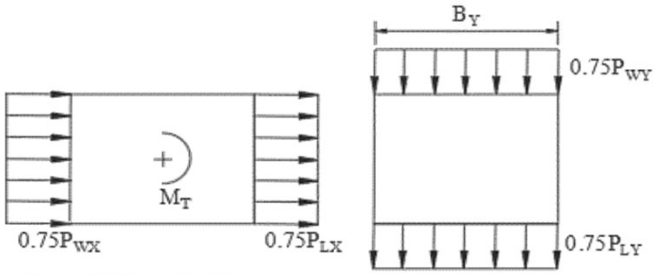
NOTE: ASCE 7 requires the application of full and partial loading of the wind pressures per the 4 cases below.



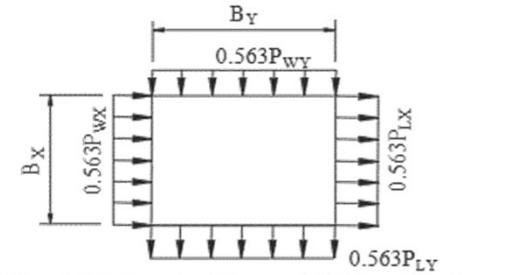
CASE 1



CASE 3



CASE 2



CASE 4

Wind Forces at Floors

Building dimension (parallel with ridge) = 47.0 ft e = 7.05 ft

Total Floors = 1 Building dimension (normal to ridge) = 26.0 ft e = 3.90 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	26.0	47.0	352.5	10.1	10.1	0.0	195.0	4.9	4.9	0.0
1	0.00	2.00	26.0	47.0	352.5	10.1	20.2	151.8	195.0	4.9	9.8	73.6
FDN		0.00						192.3				93.2

Cushing Terrell

JOB TITLE	SEARHC Wrangell - Staff Housing		
	Single Family One Story (Shed Roof)		
JOB NO.	SEARHC_WRNGLWF	SHEET NO.	
CALCULATED BY	AM	DATE	8/29/25
CHECKED BY	KF	DATE	8/29/25

Nominal Wind Pressures

Wind Loads - Components & Cladding : h ≤ 60'

Kh (case 2) =	1.03	h =	12.0 ft
Base pressure (qh) =	**26.0 psf**	a =	3.0 ft
Minimum parapet ht =	0.0 ft	GCpi =	+/-0.18
Roof Angle (θ) =	3.6 deg	qi = qh =	26.0 psf
Type of roof =	Monoslope		

Roof

	GCp +/- Gcpi				Surface Pressure (psf)				User input	
Area	10 sf	20 sf	50 sf	100 sf	10 sf	20 sf	50 sf	100 sf	75 sf	150 sf
Negative Zone 1	-1.28	-1.28	-1.28	-1.28	-33.3	-33.3	-33.3	-33.3	-33.3	-33.3
Negative Zone 2	-1.48	-1.45	-1.41	-1.38	-38.5	-37.7	-36.6	-35.9	-36.2	-35.9
Negative Zone 2'	-1.78	-1.75	-1.71	-1.68	-46.3	-45.5	-44.4	-43.7	-44.0	-43.7
Negative Zone 3	-1.98	-1.8	-1.56	-1.38	-51.5	-46.8	-40.6	-35.9	-37.8	-35.9
Negative Zone 3'	-2.78	-2.48	-2.08	-1.78	-72.2	-64.4	-54.1	-46.3	-49.5	-46.3
Positive All Zones	0.48	0.45	0.41	0.38	12.5	11.7	10.7	10.0	10.2	10.0

Parapet

qp = 0.0 psf

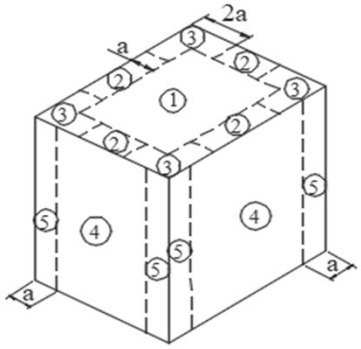
		Surface Pressure (psf)						User input
Solid Parapet Pressure		10 sf	20 sf	50 sf	100 sf	200 sf	500 sf	40 sf
CASE A:	Zone 2 :	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Zone 2' :	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Zone 3 :	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Zone 3' :	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CASE B:	Interior zone :	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Corner zone :	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Walls

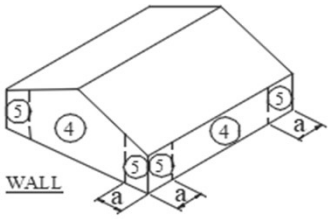
	GCp +/- GCpi				Surface Pressure at h				User input	
Area	10 sf	100 sf	200 sf	500 sf	10 sf	100 sf	200 sf	500 sf	50 sf	300 sf
Negative Zone 4	-1.17	-1.01	-0.96	-0.90	-30.4	-26.3	-25.0	-23.4	-27.5	-24.3
Negative Zone 5	-1.44	-1.12	-1.03	-0.90	-37.4	-29.2	-26.7	-23.4	-31.6	-25.2
Positive Zone 4 & 5	1.08	0.92	0.87	0.81	28.1	23.9	22.7	21.1	25.2	22.0

Note: GCp reduced by 10% due to roof angle <= 10 deg.

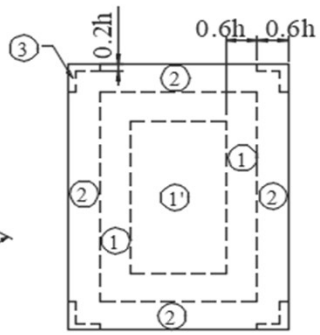
Location of C&C Wind Pressure Zones - ASCE 7-16



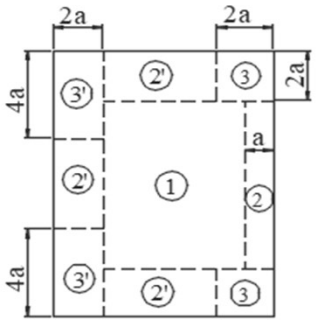
Roofs w/ θ ≤ 10°
and all walls
h > 60'



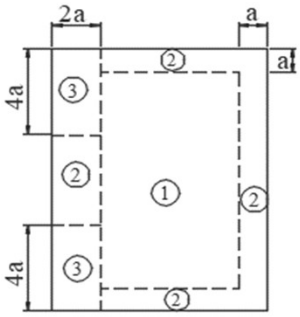
Walls h ≤ 60'
& alt design h<90'



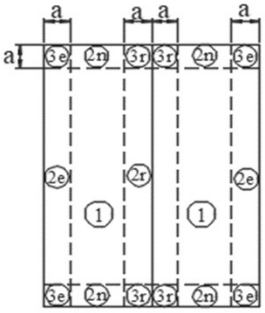
Gable, Sawtooth and
Multispan Gable θ ≤ 7 degrees &
Monoslope ≤ 3 degrees
h ≤ 60' & alt design h<90'



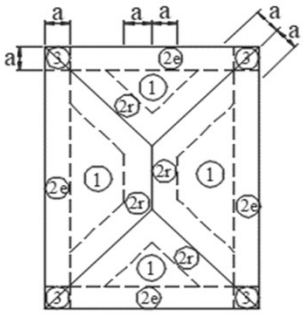
Monoslope roofs
3° < θ ≤ 10°
h ≤ 60' & alt design h<90'



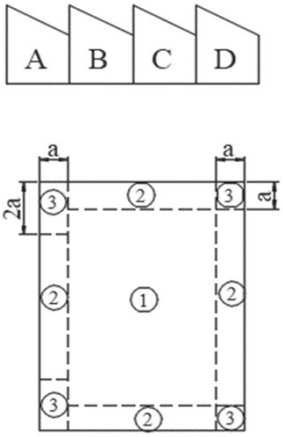
Monoslope roofs
10° < θ ≤ 30°
h ≤ 60' & alt design h<90'



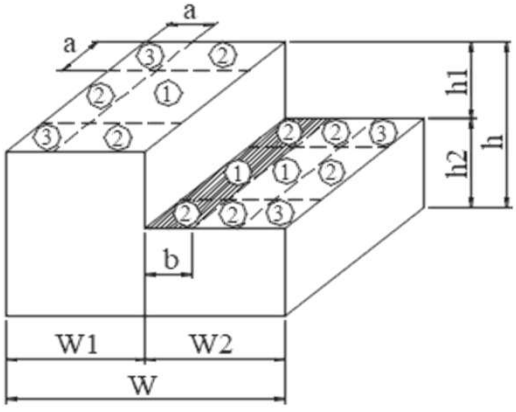
Multispan Gable &
Gable 7° < θ ≤ 45°



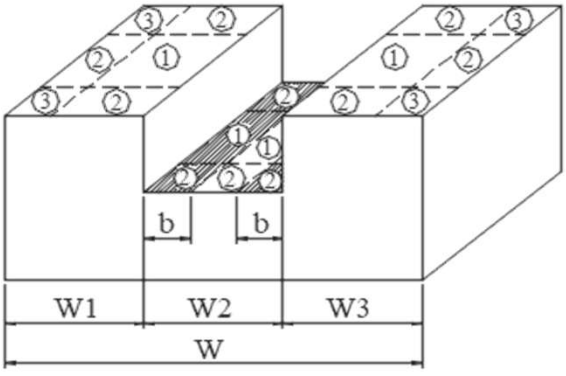
Hip 7° < θ ≤ 27°



Sawtooth 10° < θ ≤ 45°
h ≤ 60' & alt design h<90'

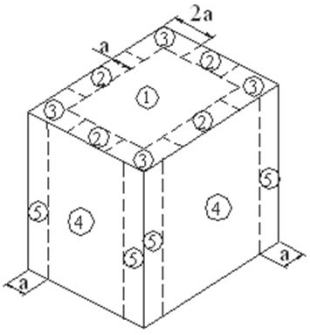


Stepped roofs θ ≤ 3°
h ≤ 60' & alt design h<90'

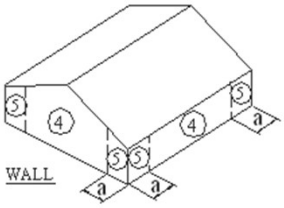


Note: The stepped roof zones above are as shown in ASCE 7-16 (except the upper roof zones 1 and 2 are shown at the inside edge per the notes). Prior editions didn't show zones, but the notes sent you to the low slope gable figure. The note in ASCE 7-16 still sends you to the low slope gable figure, but for some reasons the zones shown are per editions prior to ASCE 7-16. Therefore, the above zones may be a code mistake and the correct zone locations may be per the low slope gable roof shown at the top of this page.

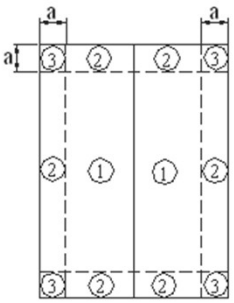
Location of C&C Wind Pressure Zones - ASCE 7-10 & earlier



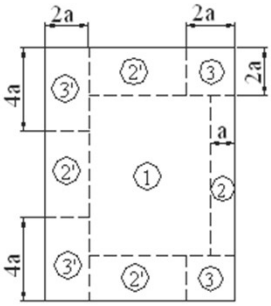
Roofs w/ θ ≤ 10°
and all walls
h > 60'



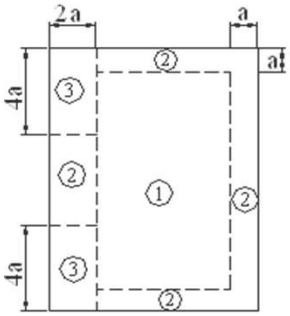
Walls h ≤ 60'
& alt design h<90'



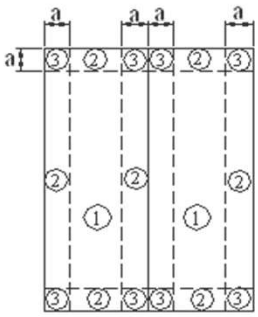
Gable, Sawtooth and
Multispan Gable θ ≤ 7 degrees &
Monoslope ≤ 3 degrees
h ≤ 60' & alt design h<90'



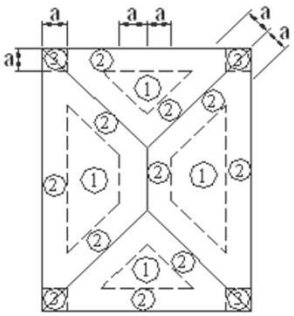
Monoslope roofs
3° < θ ≤ 10°
h ≤ 60' & alt design h<90'



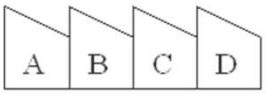
Monoslope roofs
10° < θ ≤ 30°
h ≤ 60' & alt design h<90'

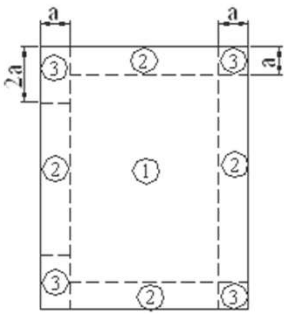


Multispan Gable &
Gable 7° < θ ≤ 45°

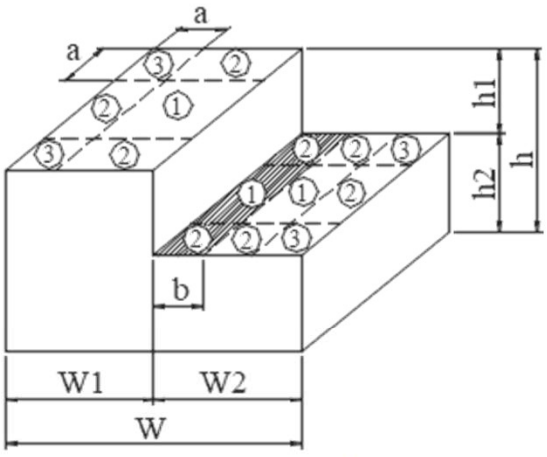


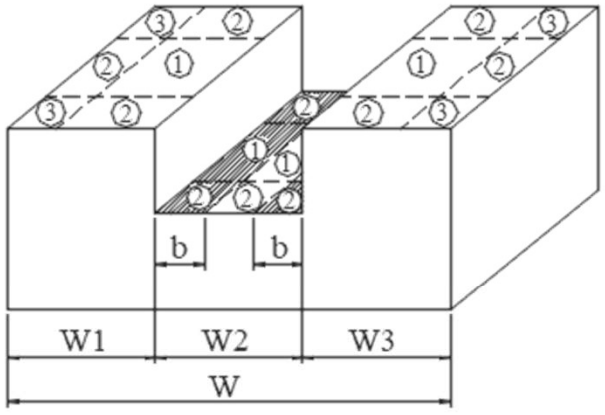
Hip 7° < θ ≤ 27°





Sawtooth 10° < θ ≤ 45°
h ≤ 60' & alt design h<90'





Stepped roofs θ ≤ 3°
h ≤ 60' & alt design h<90'

SEARHC WRANGELL - 2bd1stryShed

V in N-S Roof shear (k) = 4.91 (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	13	2.46	26	**94**	SWA													1
3	13	2.46	21.5	**114**	SWA													3
	26																	

* 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=	94	plf													
1	26	10	24.55	8	18	144	10	100	82	49.5	2.02	**0**	N/A	1	944
v=	114	plf													
3	21.5	12	29.46	8.5	18	153	10	120	63	37.9	1.29	**0**	N/A	3	1370

SEARHC WRANGELL - 2bd1stryShed

V in E-W Roof shear (k) = 9.16 (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
B	32	6.24	19.25	**324**	SWB													B
D	15	2.92	9.5	**308**	SWB													D
	47																	

* Shearwall capacity reduced by 1.25-0.125h/b

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=	324	plf													
B	3	10	9.72	2	18	36	10	100	1	0.4	0.04	**3117**	4	B	3240
B'	8.75	10	28.35	2	18	36	10	100	5	3.1	0.11	**2883**	4	B'	3240
B''	7.5	10	24.30	2	18	36	10	100	4	2.3	0.09	**2934**	4	B''	3240
v=	308	plf													
D1	5.75	11	19.46	3	18	54	10	110	3	1.6	0.08	**3102**	4	D1	3385
D2	3.75	11	12.69	3	18	54	10	110	1	0.7	0.05	**3200**	4	D2	3385