

STRUCTURAL CALCULATIONS



DATE: April 30, 2021

PROJECT: 18-220 **PATIO ROOF RISER – OPTIONAL INSTALLATION (BLOCKING)**
136 42nd Street
Springfield, OR 97478

BY: JOSHUA ANNETT
CHECKED BY: RICK HERNANDEZ, P.E., S.E. (OR)
RON DERRICK, P.E., (CA)

FOR: **WOODSTONE STRUCTURES, LLC**

PROJECT DESCRIPTION & SCOPE OF SERVICES:

Structural design in accordance with the 2012 International Building Code (IBC) for the above referenced project as follows:

<u>Wood-Framing Connection Analysis</u>	

Should conditions differ from those depicted in this report or accompanying drawings, contact this office for further direction. The analyses contained herein is for the Patio Roof Riser only. Branch Engineering, Inc. has not reviewed any framing or foundation elements for any structure considered to be supporting the above referenced product and/or the connected patio roof.

SPECIAL INSPECTION:

None

NOTES:

Analysis based upon measurements taken from Patio Roof Riser, supplied by Woodstone Structures, LLC June 2018.

No analysis of supporting structure or supporting framing has been conducted in conjunction with this report. Consult a local Engineer for each individual installation scenario.

See additional notes below "PRR Allowable Loads" table.



Renews: JUNE 30, 2023

STRUCTURAL ENGINEERING REPORT

PATIO ROOF RISER (PRR) (cont.)

OPTIONAL BLOCKING INSTALLATION

INSTALLATION OPTION:

The PRR may be installed on blocking between rafters or truss members, where sufficient framing does not exist. For this installation a length 4x blocking is added between existing roof supporting members and secured with either framing clips, lag screws, or nails. Actual capacity may vary depending on the available existing roof members. Consult a local Engineer for each individual scenario.

ASSUMED MATERIALS:

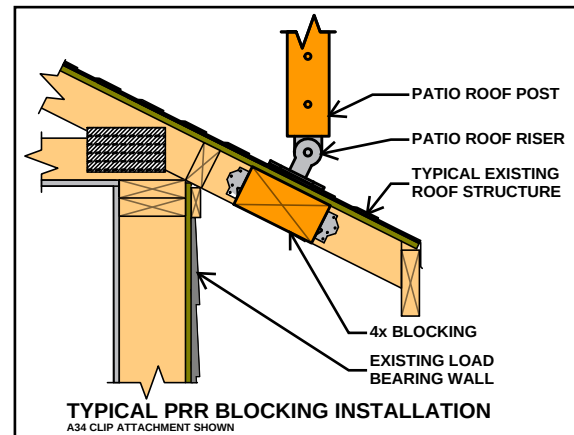
PRR BRACKET & ALL INCLUDED ACCESSORIES

4x8 #2 DF BLOCKING AT EACH PRR (22½" MAX LENGTH)

(4) SIMPSON STRONG-TIE A34 FRAMING CLIPS

& ASSOCIATED FASTENERS (NOT SUPPLIED)

OR NAILS OR LAG SCREWS PER TABLES BELOW (NOT SUPPLIED)



PRR ALLOWABLE LOAD NEAR THE END OF 4x BLOCKING

ROOF PITCH	(2) A34 w/ #9x1.5" SD EA. END					(2) A34 w/ 0.131x1.5" NAILS EA. END					(6) 10d NAIL AT 1.5" SPACING EA. END					(3) 3/8" LAG SCREWS AT EQ. SPACING EA. END				
	DEAD ONLY	FLOOR	SNOW	ROOF (125)	UPLIFT	DEAD ONLY	FLOOR	SNOW	ROOF (125)	UPLIFT	DEAD ONLY	FLOOR	SNOW	ROOF (125)	UPLIFT	DEAD ONLY	FLOOR	SNOW	ROOF (125)	UPLIFT
	(90)	(100)	(115)	(125)	(160)	(90)	(100)	(115)	(125)	(160)	(90)	(100)	(115)	(125)	(160)	(90)	(100)	(115)	(125)	(160)
	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)
12:12	454	505	505	505	505	335	372	372	372	372	312	347	399	434	555	179	199	229	248	318
8:12	508	565	565	565	565	366	407	407	407	407	316	351	404	439	562	182	203	233	253	324
6:12	562	624	624	624	624	397	442	442	442	442	325	362	416	452	579	189	209	241	262	335
5:12	601	667	667	667	667	420	467	467	467	467	333	370	425	462	592	193	215	247	269	344
4:12	652	725	725	725	725	450	500	500	500	500	343	381	438	477	610	200	222	255	278	355
2:12	816	907	907	907	907	541	601	601	601	601	374	416	478	520	666	220	244	281	305	391
0:12	1152	1280	1280	1280	1280	711	790	790	790	790	427	474	545	593	758	253	281	323	351	450

PRR ALLOWABLE LOAD AT MID-SPAN OF 4x BLOCKING

ROOF PITCH	(2) A34 w/ #9x1.5" SD EA. END					(2) A34 w/ 0.131x1.5" NAILS EA. END					(6) 10d NAIL AT 1.5" SPACING EA. END					(3) 3/8" LAG SCREWS AT EQ. SPACING EA. END				
	DEAD ONLY	FLOOR	SNOW	ROOF (125)	UPLIFT	DEAD ONLY	FLOOR	SNOW	ROOF (125)	UPLIFT	DEAD ONLY	FLOOR	SNOW	ROOF (125)	UPLIFT	DEAD ONLY	FLOOR	SNOW	ROOF (125)	UPLIFT
	(90)	(100)	(115)	(125)	(160)	(90)	(100)	(115)	(125)	(160)	(90)	(100)	(115)	(125)	(160)	(90)	(100)	(115)	(125)	(160)
	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)
12:12	757	841	841	841	841	657	730	730	730	730	625	694	798	868	1111	358	397	457	497	636
8:12	804	894	894	894	894	714	793	793	793	793	633	703	808	879	1125	365	405	466	507	648
6:12	855	951	951	951	951	772	857	857	857	857	651	723	832	904	1157	377	419	482	524	670
5:12	893	992	992	992	992	813	904	904	904	904	666	740	851	925	1184	387	430	494	537	688
4:12	941	1046	1046	1046	1046	868	964	964	964	964	686	763	877	953	1220	400	444	511	555	711
2:12	1087	1208	1208	1208	1208	1034	1149	1149	1149	1149	749	832	957	1040	1331	440	488	562	610	781
0:12	1341	1490	1490	1490	1490	1341	1490	1490	1490	1490	853	948	1090	1185	1517	506	562	646	703	899

NOTES:

1. ALLOWABLE LOADS SHOWN ARE FOR A SINGLE PRR INSTALLED AT THE INDICATED ROOF SLOPE, AND SECURED TO 4x8 #2 DF BLOCKING SPANNING BETWEEN EXISTING ROOF MEMBERS.
2. ANALYSIS AND ALLOWABLE LOADS ARE FOR THE BLOCKING, CLIPS, AND/OR FASTENERS ONLY.
3. CONSULT WITH A LOCAL ENGINEER FOR EACH INDIVIDUAL INSTALLATION.
4. NO DESIGN OF SUPPORTING OR SUPPORTED FRAMING HAS BEEN CONDUCTED. CONSULT AN INDEPENDENT ENGINEER FOR DESIGN OF SUCH FRAMING.
5. LOADS MAY BE REDUCED TO LESS THAN 200 POUNDS WHERE LOAD IS APPLIED TO A SINGLE 2x4 RAFTER CANTILEVERING 18" BEYOND BEARING WALL.
6. UPLIFT LOADS HAVE BEEN INCREASED FOR WIND OR SEISMIC LOADING, WITH NO FURTHER INCREASE ALLOWED.
7. ALLOWABLE LOADS ARE FOR VERTICAL LOADS ONLY. LATERAL BRACING MUST BE SUPPLIED BY OTHER LATERAL FORCE RESISTING SYSTEMS DESIGNED BY OTHERS. LATERAL BRACING SYSTEMS MUST BE INDEPENDENT FROM THE PRR SUPPORT BRACKET & POSTS.
8. ALLOWABLE LOADS SHOWN ARE FOR DRY-SERVICE CONDITIONS ONLY (MOISTURE CONTENT <19%). FOR WET-SERVICE CONDITIONS, MULTIPLY BY 0.7.
9. SEE PRR ALLOWABLE LOAD TABLE FOR ADDITIONAL INFORMATION RELATING TO THE ALLOWABLE CAPACITY OF THE PRR.
10. LAG SCREWS SHALL HAVE A SUFFICIENT LENGTH (NOT INCLUDING THE LENGTH OF THE TAPERED TIP) SUCH THAT THE MINIMUM PENETRATION LENGTH INTO THE BLOCKING IS NOT LESS THAN 3" (8D).
11. WHERE LAG SCREW PENETRATION LENGTH (P) IS LESS THAN 8D BUT NOT LESS THAN 4D, TABULATED VALUES ABOVE SHALL BE MULTIPLIED BY P/8D.
12. EXISTING ROOF SUPPORTING MEMBER MINIMUM END DISTANCE FOR LAG SCREWS SHALL BE 7D.
13. MINIMUM EDGE DISTANCE FOR LAG SCREWS SHALL BE 4D.
14. MINIMUM SPACING BETWEEN ROWS OF LAG SCREW SHALL BE 5D.

THIS SHEET NOT A PART OF THIS REPORT - INCLUDED FOR REFERENCE ONLY.
EXCERPT FROM PREVIOUSLY ISSUED PRR REPORT



310 5th Street
Springfield, Oregon 97477
Telephone: (541) 746 0637

DATE: 4/20/2021

PROJECT: 18-220 WOODSTONE STRUCTURES - PRR
BY: JOSHUA ANNETT
CHECKED BY: RICK HERNANDEZ, P.E., S.E.
SHEET: STATICS (DF)

PATIO ROOF RISER BRACKET CONNECTION STABILITY (OVERTURNING & SLIDING AT ANCHORED BASE)

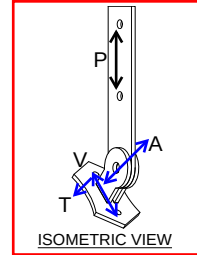
HARDWARE MOMENT ARM, L	ANCHOR SPACING, S	CL COL TO ANCH, A'	EDGE OF BEARING TO ANCHOR, N'	LENGTH OF BEARING, A
2 in	3 in	1.5 in	3.75 in	3.75 in
2 in		0 in	1.25 in	1.25 in

ASD CAPACITY OF VARIOUS COMPONENTS

5301 lb	(2) 1/2" BOLTS THRU 1/4" PLATE
2991 lb	5/8" BOLT THRU 1/4" PLATE
Z = 8290 lb	DOUBLE SHEAR STEEL SIDE - STEEL MAIN
Z = 3094 lb	DOUBLE SHEAR WOOD SIDE - STEEL MAIN
Z = 1491 lb	SHEAR STRENGTH OF SINGLE LAG
W = 1241 lb	TENSILE STRENGTH OF LAG BOLT
ROOT DIAMETER OF LAG SCREW, Dr 0.265	

ASD CAPACITIES CONTROLLING CAPACITY OF OVERALL ASSEMBLY

3094 lb	MINIMUM DOWNLOAD CAPACITY OF CONNECTIONS ABOVE BASE PLATE
2991 lb	MINIMUM UPLIFT CAPACITY OF CONNECTIONS ABOVE BASE PLATE
1491 lb	SHEAR STRENGTH OF SINGLE LAG (SLIDING RESISTANCE)
1241 lb	TENSILE STRENGTH OF LAG BOLT (OVERTURNING RESISTANCE)



ADJUSTED ASD CAPACITY

LOAD DURATION FACTOR				
DOWN	DOWN	DOWN	DOWN	UPLIFT
(90)	(100)	(115)	(125)	(160)
(lb)	(lb)	(lb)	(lb)	(lb)
1491	1491	1491	1491	1491
2109	2109	2109	2109	1463
2688	2688	2688	2688	1579
3094	3094	3094	3094	1665
3094	3094	3094	3094	1729
3094	3094	3094	3094	1811
3094	3094	3094	3094	2059
3094	3094	3094	3094	2482

CAPACITIES SHOWN HERE APPLY ONLY TO INSTALLATIONS USING DOUG-FIR
(G=0.50) POST ATTACHED TO INSTA-PITCH BAR

ROOF PITCH	DOWNWARD VERTICAL LOAD MAGNITUDE, -P	UPLIFT VERTICAL LOAD MAGNITUDE, P	ANGLE OF LOAD APPLIED, θ	AXIAL FORCE	SHEAR	MOMENT	TENSION AT ANCHOR (DOWN LOAD CASE)	TENSION AT ANCHOR (UPLIFT CASE)	UC TENSION, T	MAX T OR V	BASE RATED CAPACITY FOR VERTICAL DOWN LOADS
	(lb)	(lb)	(degrees)	(lb)	(lb)	(lb-in)	(lb)	(lb)	(%)	(%)	(lb)
SIDEWALL	1491	1491	0.0	0.0	1491.0	2982.0	1192.8	1192.8	1.000	0.961	1491
12:12	2109	1463	45.0	1491.0	1491.0	2982.1	596.4	1241.0	1.000	1.000	2109
8:12	2688	1579	56.3	2236.5	1491.0	2982.1	298.2	1241.0	1.000	1.000	2688
6:12	3334	1665	63.4	2982.1	1491.0	2982.1	0.0	1241.0	1.000	1.000	3094
5:12	3809	1729	67.4	3516.4	1465.2	2930.3	0.0	1241.0	0.983	1.000	3094
4:12	4402	1811	71.6	4175.7	1391.9	2783.8	0.0	1241.0	0.934	1.000	3094
2:12	6773	2059	80.5	6681.2	1113.5	2227.1	0.0	1241.0	0.747	1.000	3094
0:12	9070	2482	90.0	9069.6				1241.0	1.000		3094



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310 5th Street
Springfield, Oregon 97477
Telephone: (541) 746 0637

DATE: 4/20/2021

PROJECT: 18-220 WOODSTONE STRUCTURES - PRR

BY: JOSHUA ANNETT

CHECKED BY: RICK HERNANDEZ, P.E., S.E.

SHEET: 4x BLKNG

Wood Beam Design

MEMBER ID: 4x BLKNG

MEMBER DATA

↑	SPAN	↑	O'HANG
R1		R2	
DL	6.6 psf		
LL	0 psf		
SL	20 psf		
s	24 in		

LOAD DATA

Load	D start	D end	L start	L end	S start	S end	E	W	Start Loc	End Loc	ID
Uniform 1	13	-	0	-	40	-	-	-	0	1.875	
Uniform 2		-		-		-	-	-	0	1	
Uniform 3		-		-		-	-	-	0	1	
Uniform 4		-		-		-	-	-	0	1	
Uniform 5		-		-		-	-	-	0	1	
Uniform 6		-		-		-	-	-	0	1	
Point 1		-	1490	-		-	-	-	0.9375	-	
Point 2		-		-		-	-	-	1	-	
Point 3		-		-		-	-	-	1	-	
Point 4		-		-		-	-	-	1	-	
Tapered 1							-	-	0	1	
Tapered 2							-	-	0	1	
Frame Moment (+ for load to right)			-	-	-	-	0	0	-	-	

PRR MIN.
REACTION

DEFLECTION REQUIREMENTS

Allowable Deflection D+L	L / 240
Allowable Deflection D+S	L / 180
Allowable Deflection L	L / 360
Allowable Deflection S	L / 240
Allowable Deflection W	L / 180

MEMBER RESULTS

Design Moment	705 lb-ft	Unity:	Design Shear	756 lb	Unity:
Allowable Moment	731 lb-ft	OK	Allowable Shear	1470 lb	OK

	SPAN		
Design Deflection D+L	0.02 in. = L /	1258	OK
Design Deflection D+S	0.00 in. = L /	29010	OK
Design Deflection L	0.02 in. = L /	1273	OK
Design Deflection S	0.00 in. = L /	40471	OK
Design Deflection W	0.00 in. = L /	N/A	

JOINT REACTIONS

	R1	R2	
D	15	15	
L	745	745	
S	38	38	
W	0	0	
E	0	0	
D+L	760	760	
D+S	52	52	
D+0.75(L+S)	602	602	
Uplift			
MAX. COMBINED REACTION	760	760	760



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PROJECT: 18-220 WOODSTONE STRUCTURES - PRR
BY: JOSHUA ANNETT
CHECKED BY: RICK HERNANDEZ, P.E., S.E.

SHEET: BLKNG CONN.

FASTENERS AT ENDS OF BLOCKING

LOAD PERPENDICULAR TO ROOF SURFACE

	QTY	Z	CD	Ceg	Z'	LOAD AT END - CHECK	LOAD AT MID - CHECK
3/8" LAG SCREWS AT EQ. SPACING EA. END	3	140	1	0.67	281	281	562
10d NAIL AT 1.5" SPACING EA. END	6	118	1	0.67	474	474	948
A34 w/ 0.131x1.5" NAILS EA. END	2	395	1	1.00	790	790	1490
A34 w/ #9x1.5" SD EA. END	2	640	1	1.00	1280	1280	1490

LOAD PARALLEL TO ROOF SURFACE

	QTY	Z	CD	Ceg	Z'	LOAD AT END - CHECK	LOAD AT MID - CHECK
3/8" LAG SCREWS AT EQ. SPACING EA. END	3	140	1	0.67	281	281	562
10d NAIL AT 1.5" SPACING EA. END	8	95	1	0.67	509	509	1018
A34 w/ 0.131x1.5" NAILS EA. END	1	395	1	1.00	395	395	790
A34 w/ #9x1.5" SD EA. END	1	495	1	1.00	495	495	990

$$UC = 1.0 = \frac{P \cdot \cos(\theta)}{Z'_r} + \frac{P \cdot \sin(\theta)}{Z'_h}$$

$$P = \left[\frac{\cos(\theta)}{Z'_r} + \frac{\sin(\theta)}{Z'_h} \right]^{-1}$$

SUM UNITY RATIOS = 1.0
AND SOLVE TO FIND
COMMON VALUE FOR
LOAD FROM PRR

SIDEWALL ANGLE

END LOADING				
3/8" LAG SCREWS AT EQ. SPACING EA. END	10d NAIL AT 1.5" SPACING EA. END	A34 w/ 0.131x1.5 " NAILS EA. END	A34 w/ #9x1.5" SD EA. END	
281	509	395	495	
199	347	372	505	
203	351	407	565	
209	362	442	624	
215	370	467	667	
222	381	500	725	
244	416	601	907	
281	474	790	1280	

MID SPAN LOADING			
3/8" LAG SCREWS AT EQ. SPACING EA. END	10d NAIL AT 1.5" SPACING EA. END	A34 w/ 0.131x1.5 " NAILS EA. END	A34 w/ #9x1.5" SD EA. END
562	1018	790	990
397	694	730	841
405	703	793	894
419	723	857	951
430	740	904	992
444	763	964	1046
488	832	1149	1208
562	948	1490	1490