Post Frame Structural Engineering Calculations

Roper Steve Finley Taylor Bldg 1
Post Frame Building
4637 West 2800 South
Taylor, Utah

Prepared for:

Roper Buildings
office@roperbuildings.com
801-689-3630

Date: 7/12/2024

WHITE PINE ENGINEERING
- CIVIL STRUCTURAL -

White Pine Engineering, LLC
P.O. Box 669 Hyde Park, Utah 84318
435-515-0126
Jackson Sagers, P.E.
jackson@whitepineeng.com
Tom Hill, P.E.
tom@whitepineeng.com

Project	Roper Steve Finley Taylor Bldg 1
Date	7/12/2024
Engineer	J. Sagers

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Design Criteria

Codes

IBC 2021
ASCE7-16

Risk Category	II	ASCE 7-16 Table 1.5-1

Is	1.0	ASCE 7-16 Table 1.5-2
Ie	1.0	ASCE 7-16 Table 1.5-2

Seismic Loads

S1	0.44	ASCE 7 Hazard Tool
SM1	0.95	ASCE 7 Hazard Tool
SMS	1.38	ASCE 7 Hazard Tool
TL	8	ASCE 7 Hazard Tool

Site Class	D	(ASSUMED)
SDC	D	ASCE 7 Hazard Tool

R (Cant)	1.5	ASCE7-16 table 12.2-1
R (SW)	6.5	ASCE7-16 table 12.2-1

Wind Loads

V	115	mph 3 Sec Gust	
Category	C		
Elevation	4251	ft	USU Snow Load Map

Snow Loads

Pg	43	psf	USU Snow Load Map
Ws	0	psf	

Ce	1.0	ASCE7-16 Table 7.3-1
Ct	1.0	ASCE7-16 Table 7.3-2
Cs	1.0	ASCE7-16 Figure 7.4-1

Pf	30	ASCE7-16 Eq 7.3-1
Ps	30	ASCE7-16 Eq 7.4-1

Dead Loads

Roof	3	psf	(Trusses, Purlins, 29 gauge metal)
Floor	10	psf	(Joists, 3/4" OSB)
Walls	4	psf	(Posts, Girts, 29 gauge metal, OSB)
Concrete	145	pcf	

Live Loads

Roof	20	psf	ASCE7-16 Table 4.3-1
Floor	40	psf	ASCE7-16 Table 4.3-1

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Soil Properties

Geotechnical Report by	N/A
Report Number	N/A
Date of Report	N/A

If no report is listed above, the following values are assumed
Unified Soil Classification Assumed to be GW, GP, SW, or SP IBC Table 1610.1

Bearing Pressure	1500	psf
Active Pressure	35	pcf
At Rest Presssure	60	pcf
Passive Pressure	250	pcf
Coefficient of Friction	0.3	
Lateral Bearing Pressure	400	psf/ft

IBC 1806.1, 1806.2, & 1806.3.4

**Engineer assumes stable soil conditions.
If there are any global stability concerns, a geotechnical report is required.

Deflection Criteria

Roof

Live Load	L/150	Table 1604.3 Footnote a
Total Load	L/120	Table 1604.3

Floor

Live Load	L/360	Table 1604.3
Total Load	L/240	Table 1604.3

Wall

Live Load	L/90	Table 1604.3 Footnote a

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Main Building Info

Ridge Ht	33	ft
Width	66	ft
Length	80	ft
Clear Ht	23	ft
Floor Level	0	ft
Floor Area	0	ft^2
Pitch	4	:12
Bearing Posts	27	quantity
Gable Posts	9	quantity
Post Spacing	10	ft

Pier Diameter Requirements

Bearing Pressure	1500	psf
Adj Bearing Pressure	1800	psf
Tributary Area	330	ft^2
Axial Load	10890	lbs
Minimum Area	6.05	ft^2
Minimum Diameter	33.3	in

Continuous Trimmer Option
8.1 in^2 of bearing area

Ledger Lok Option
17 # of lags per block

3/4" Thru Bolt Option
5 # of thru bolts

16d Option
51 # of nails per block

SDWH Option
15 # of lags per block

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ELF

SD1	0.63	Eq 11.4-4
SDS	0.92	Eq 11.4-3
Cs	0.14	Eq 12.8-2
Ta	0.24	Eq 12.8-7
Ct	0.02	table 12.8-2
x	0.75	table 12.8-2
hn	28	
Cs Max	0.40	Eq 12.8-3
Cs Max	N/A	Eq 12.8-4
Cs Min	0.04	Eq 12.8-5
Cs Min	0.01	Eq 12.8-5
Cs Min	N/A	Eq 12.8-6
Cs Max	0.40	
Cs Min	0.04	
Cs	0.14	
V (lbs)	6044	Eq 12.8-1

Building Info

k=1 for T<=.5

	Z (ft)	Area (ft^2)	Weight (psf)	Weight (lbs)	Wx (lbs)	Cvx	Fx (lbs)	Shear (lbs)
Ridge	33	5280	3	15840				
Top Clear Ht	23	6716	4	26864	29272	1.000	6044	6044
Floor	0	0	10	0				
Bottom Clear Ht	0	0	4	0	13432	0.000	0	6044
				42704				

Width	66
Length	80
Roof Pitch F-B	4 :12 Pitch

Simplified Seismic

V	6044	Eq 12.14-12
F	1	1 1 story
		1.1 2 story
		1.2 3 story

	Wx (lbs)	Fx (lbs)	Shear (lbs)
Top	29272	4143	4143
Bottom	13432	1901	6044

Directional

hn	28	
G	0.85	(26.11.4,26.11.2)
ke	0.8573696	table 26.9-1
kzt	1	26.8.2
kd	0.85	table 26.6-1
kh	0.964	table 26.10-1

V 115 mph 3 Sec Gust

Category C

Surface	Cp	L/B or h/L	z or h	kz or kh	Theta	q (psf)	p (psf)	Area (ft^2)	Force (lbs)
Top Front Wall	0.80	0.83	23	0.92	0.00	22.80	15.50	1840	28525
Bottom Front Wall	0.80	0.83	0	0.85	0.00	20.97	14.26	0	0
Front Roof Plane	0.00	0.42	28	0.96	18.43	23.78	0.05	800	38
Top Rear Wall	-0.50	0.83	28	0.96	0.00	23.78	-10.11	1840	-18600
Bottom Rear Wall	-0.50	0.83	28	0.96	0.00	23.78	-10.11	0	0
Rear Roof Plane	-0.57	0.42	28	0.96	18.43	23.78	-11.50	800	-9198
Top Left Wall	0.80	1.21	23	0.92	0.00	22.80	15.50	1518	23533
Bottom Left Wall	0.80	1.21	0	0.85	0.00	20.97	14.26	0	0
Left Roof Plane	0.80	0.35	28	0.96	90.00	23.78	16.17	330	5337
Top Right Wall	-0.46	1.21	28	0.96	0.00	23.78	-9.25	1518	-14043
Bottom Right Wall	-0.46	1.21	28	0.96	0.00	23.78	-9.25	0	0
Right Roof Plane	-0.46	0.35	28	0.96	90.00	23.78	-9.25	330	-3053

L/R Walls	Shear (lbs)
Top	32798
Bottom	56361

F/B Walls	Shear (lbs)
Top	27178
Bottom	45966

Simplified Wind

Case A	A	B	C	D
Ps30	28.15	0.00	18.81	0.00
Ps	38.85	0.00	25.95	0.00

Case B	A	C
Ps30	21.00	13.90
Ps	28.98	19.18

a 6.6 Lambda 1.38

	C&D (lbs)	C&D/2 (lbs)	A&B (lbs)	L/R Shear (lbs)		C&D (lbs)	C&D/2 (lbs)	AA&BA (lbs)	AB (lbs)	A&B (lsb)	F/B Shear (lbs)
Top	23875	11938	1959	13896		20889	10445	1959	744	744	11188
Bottom	47750	23875	3917	27792		35448	17724	3917	1487	1487	19212

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Shear Table

	Top		Bottom	
	F/B	L/R	F/B	L/R
ELF	3022	3022	3022	3022
Simplfied S	2072	2072	3022	3022
Directional	13589	16399	22983	28180
Simplified W	11188	13896	19212	27792

Factored Shear Table (0.6W 0.7E)

	Top		Bottom	
	F/B	L/R	F/B	L/R
ELF	2115	2115	2115	2115
Simplfied S	1450	1450	2115	2115
Directional	8153	9840	13790	16908
Simplified W	6713	8338	11527	16675

Factored Shear Table w/ Wind Converted to Seismic Equivalent Loading (W/1.4) (SHEAR WALLS ONLY)

	Top		Bottom	
	F/B	L/R	F/B	L/R
ELF	2115	2115	2115	2115
Simplfied S	1450	1450	2115	2115
Directional	5824	7028	9850	12077
Simplified W	4795	5956	8234	11911

Factored Shear Table w/ Wind Converted to Seismic Equivalent Loading (W/1.4) (SHEAR WALLS ONLY)

	Top		Bottom	
	F/B	L/R	F/B	L/R
Simplfied S	1450	1450	2115	2115
Simplified W	4795	5956	8234	11911

Factored Shear Table w/ Wind Converted to Seismic Equivalent Loading (W/1.4) (SHEAR WALLS ONLY)

	Top		Bottom	
	F/B	L/R	F/B	L/R
Max Load	4795	5956	8234	11911
		Gable Walls		Gable Walls

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Top Shear 29 GA STEEL, GIRTS @ 24" O.C., 1-1/2" #10 @ 9" O.C. 145 PLF
Front 4795 lbs 29 GA STEEL, GIRTS @ 32" O.C., 1-1/2" #10 @ 9" O.C. 108 PLF

Segments (ft)	80										Segmented	18	62
Segmented h (ft)	23	23	23	23	23	23	23	23	23	23		24	35
Segmented ARF	1	0	0	0	0	0	0	0	0	0		30	22
Adjusted Length (ft)	80	0	0	0	0	0	0	0	0	0		36	16
Segmented shear (plf)	60	Segmented Uplift (lbs)		1379								42	11
Perforated Height	23	23	23	23	23	23	23	23	23	23			
Perforated ARF	1	0	0	0	0	0	0	0	0	0	Perforated	18	62
Adjusted Length (ft)	80	0	0	0	0	0	0	0	0	0		24	35
Perforation Width (ft)												30	22
Perforation Height (ft)												36	16
Perforation Area (ft^2)	0	0	0	0	0	0	0	0	0	0		42	11
Perforated Length (ft)	80	Afhs (ft^2)	80	Ao (ft^2)	0	Awall (ft^2)	1840	Sumbi (ft)	80	Co	1.00		
Perforated Shear (plf)	60	Perforated Uplift		1379									

Top Shear
Back 4795 lbs

Segments (ft)	9.5	9.5	9.5	10							Segmented	18	90
Segmented h (ft)	23	23	23	23	23	23	23	23	23	23		24	51
Segmented ARF	0.9473684	0.94736842	0.9473684	0.9625	0	0	0	0	0	0		30	32
Adjusted Length (ft)	9	9	9	9.625	0	0	0	0	0	0		36	23
Segmented shear (plf)	131	Segmented Uplift (lbs)		1991								42	17
Perforated Height	23	23	23	23	23	23	23	23	23	23			
Perforated ARF	0.826087	0.82608696	0.826087	0.869565217	0	0	0	0	0	0	Perforated	18	109
Adjusted Length (ft)	7.8478261	7.84782609	7.8478261	8.695652174	0	0	0	0	0	0		24	61
Perforation Width (ft)												30	39
Perforation Height (ft)												36	27
Perforation Area (ft^2)	0	0	0	0	0	0	0	0	0	0		42	20
Perforated Length (ft)	40	Afhs (ft^2)	40	Ao (ft^2)	0	Awall (ft^2)	920	Sumbi (ft)	32.2391304	Co	1.00		
Perforated Shear (plf)	149	Perforated Uplift		2401									

Top Shear
Left 5956 lbs

Segments (ft)	66										Segmented	18	63
Segmented h (ft)	23	23	23	23	23	23	23	23	23	23		24	35
Segmented ARF	1	0	0	0	0	0	0	0	0	0		30	23
Adjusted Length (ft)	66	0	0	0	0	0	0	0	0	0		36	16
Segmented shear (plf)	90	Segmented Uplift (lbs)		2075								42	12
Perforated Height	23	23	23	23	23	23	23	23	23	23			
Perforated ARF	1	0	0	0	0	0	0	0	0	0	Perforated	18	94
Adjusted Length (ft)	66	0	0	0	0	0	0	0	0	0		24	53
Perforation Width (ft)												30	34
Perforation Height (ft)												36	23
Perforation Area (ft^2)	0	0	0	0	0	0	0	0	0	0		42	17
Perforated Length (ft)	66	Afhs (ft^2)	66	Ao (ft^2)	0	Awall (ft^2)	1518	Sumbi (ft)	66	Co	1.00		
Perforated Shear (plf)	90	Perforated Uplift		2075									

Top Shear
Right 5956 lbs SEE BLDG 2 TOP LEFT

												18	0
												24	0
												30	0
												36	0
												42	0
												18	0
												24	0
												30	0
												36	0
												42	0

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Gable Post

Height (ft)	23
Posts	1
Ref. #	114

	Live Loads	Dead Loads	Units	Location	
Distributed	102.32	0	plf		
Triangular	0	0	Max plf	Max @ Right	
Triangular	0	0	Max plf	Centered	
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left

Deflection Limits

Live load	L/	90
Total Load	L/	90

Factors	
CD	1.6
CM	1.0
Ct	1.0
CL	1.0
CF	1.0
Cfu	1.0
Ci	1.0
Cr	1.0
CV	1.0
Cc	1.0
CI	1.0
CVR	1.0

Type	#	Size	Design
	1	Titan Timber (4) Ply 2x8	OK

Fb	2300.00	psi	Max Moment	6,766	ft lbs	Flexure Check	Ratio	
Fb'	3680.00	psi	Location	11.50	ft From Left	OK	0.474	
Sx	46.54	In^3	Req Sx	22.06	In^3			
Fv	260.00	psi	L Reaction	1,177	lbs	Shear Check	Ratio	
Fv'	416.00	psi	R Reaction	1,177	lbs	OK	0.108	
Area	39.19	In^2	Max Shear	1,177	lbs			
			Req Area	4.24	In^2	Adj Shear Check	Ratio	
		3.4.3.1	Adj Max Shear	1,130	lbs	OK	0.104	
		(Non Hangered Loads)	Req Area	4.07	In^2			
E	1,900,000	psi	Max LL Defl.	2.045	In	LL Deflection Check	Actual L/	
E'	1,900,000	psi	Location	11.50	ft From Left	OK	135	
Ix	165.78	In^4						
Deflection Limits			Max TL Defl.	2.045	In	TL Deflection Check	Actual L/	
LL	3.067	In	Location	11.50	ft From Left	OK	135	
TL	3.067	In						

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Combined Bending and Axial

Fc	1700	psi
Fc*	2720	psi
Fc'	820	psi
Emin	1000000	psi
Emin'	1000000	psi
Fb	2300	psi
Fb*	3680	psi
Fb'	3646	psi
Sx	46.54	in^3
fb1	1190	psi
FcE2	67452	psi
fb2	0	psi
FcE1	856	psi
FbE	23074	psi
fc	208	psi
l2	24	in
l1	276	in
ke	0.8	
le2	19.2	in
le1	220.8	in
d2	5.5	in
d1	7.125	in
Rb	7.211561	
c	0.9	

Factors	
CD	1.6
CM	1.0
Ct	1.0
CL	0.99
CF	1.0
Cfu	1.0
Ci	1.0
Cr	1.0
CV	1.0
Cc	1.0
Cl	1.0
CVR	1.0
Cp	0.30

fc<FCE1	OK	
fc<FcE2	OK	
fb1<FbE	OK	
Check	0.50	(3.9-3)
Check	0.01	(3.9-4)

Ref. #	114	
Plys	1	
Section	Titan Timber (4) Ply 2x8	
Height	23	ft
Vertical Load	8168	lbs
Lateral Load	70	plf
Moment	4613	ft lbs

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Purlin Calc

Span (ft)	9.25
Plys	1
Ref. #	2

	Live Loads	Dead Loads	Units		
Distributed	102	6	plf		

Deflection Limits

Live load	L/	150
Total Load	L/	120

Factors	
CD	1.15
CM	1.0
Ct	1.0
CL	1.0
CF	1.3
Cfu	1.0
Ci	1.0
Cr	1.15
CV	1.0
Cc	1.0
Cl	1.0
CVR	1.0

12" Lap Required Nailing
4 16D @ each end and middle
13 16D Total each lap

Type	#	Size		Design
	1	2 X 6 DF-L#2	Lapped	OK

Fb	900.00	psi		Max Moment	770	ft lbs	Flexure Check	Ratio
Fb'	1547.33	psi		Location	0.00	ft From Left	OK	0.790
Sx	7.56	In^3		Req Sx	5.97	In^3		
Fv	180.00	psi		L Reaction	500	lbs	Shear Check	Ratio
Fv'	207.00	psi		R Reaction	500	lbs	OK	0.439
Area	8.25	In^2		Max Shear	500	lbs		
				Req Area	3.62	In^2	Adj Shear Check	Ratio
			3.4.3.1	Adj Max Shear	460	lbs	OK	0.404
			(Non Hangered Loads)	Req Area	3.33	In^2		
E	1,600,000	psi		Max LL Defl.	0.101	In	LL Deflection Check	Actual L/
E'	1,600,000	psi		Location	4.63	ft From Left	OK	1099
Ix	20.80	In^4						
Deflection Limits				Max TL Defl.	0.107	In	TL Deflection Check	Actual L/
LL	0.740	In		Location	4.63	ft From Left	OK	1038
TL	0.925	In						

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Girt Calc

Span (ft)	11.25
Plys	1
Ref. #	2

	Live Loads	Dead Loads	Units	Location	
Distributed	18.6	0	plf		
Triangular	0	0	Max plf	Max @ Right	
Triangular	0	0	Max plf	Centered	
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left

Deflection Limits

Live load	L/	90
Total Load	L/	90

**WALLS CONSIDERED FLEXIBLE, DEFLECTION CRITERIA NOT CONSIDERED

Factors	
CD	1.6
CM	1.0
Ct	1.0
CL	1.0
CF	1.3
Cfu	1.00
Ci	1.0
Cr	1.15
CV	1.0
Cc	1.0
CI	1.0
CVR	1.0

Type	#	Size	Design
	1	2 X 6 DF-L#2	OK

Fb	900.00	psi	Max Moment	294	ft lbs	Flexure Check	Ratio
Fb'	2152.80	psi	Location	5.63	ft From Left	OK	0.217
Sx	7.56	In^3	Req Sx	1.64	In^3		
Fv	180.00	psi	L Reaction	105	lbs	Shear Check	Ratio
Fv'	288.00	psi	R Reaction	105	lbs	OK	0.066
Area	8.25	In^2	Max Shear	105	lbs		
			Req Area	0.55	In^2	Adj Shear Check	Ratio
		3.4.3.1	Adj Max Shear	96	lbs	OK	0.061
		(Non Hangered Loads)	Req Area	0.50	In^2		
E	1,600,000	psi	Max LL Defl.	0.201	In	LL Deflection Check	Actual L/
E'	1,600,000	psi	Location	5.63	ft From Left		670
Ix	20.80	In^4					
Deflection Limits			Max TL Defl.	0.201	In	TL Deflection Check	Actual L/
LL	1.500	In	Location	5.63	ft From Left		670
TL	1.500	In					

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Beam Calc #1

Span (ft)	14
Plys	1
Ref. #	103

	Live Loads	Dead Loads	Units	Location	
Distributed	255	15	plf		
Triangular	0	0	Max plf	Max @ Right	
Triangular	0	0	Max plf	Centered	
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left

Deflection Limits

Live load	L/	240
Total Load	L/	180

Factors	
CD	1.0
CM	1.0
Ct	1.0
CL	1.0
CF	1.0
Cfu	1.0
Ci	1.0
Cr	1.0
CV	1.0
Cc	1.0
CI	1.0
CVR	1.0

Type	#	Size	Design
	1	1-3/4" X 11-7/8" LVL	OK

Fb	2600.00	psi		Max Moment	6,615	ft lbs	Flexure Check	Ratio
Fb'	2600.00	psi		Location	7.00	ft From Left	OK	0.742
Sx	41.13	In^3		Req Sx	30.53	In^3		
Fv	285.00	psi		L Reaction	1,890	lbs	Shear Check	Ratio
Fv'	285.00	psi		R Reaction	1,890	lbs	OK	0.479
Area	20.78	In^2		Max Shear	1,890	lbs		
				Req Area	9.95	In^2	Adj Shear Check	Ratio
			3.4.3.1	Adj Max Shear	1,625	lbs	OK	0.412
			(Non Hangered Loads)	Req Area	8.55	In^2		
E	1,900,000	psi		Max LL Defl.	0.475	In	LL Deflection Check	Actual L/
E'	1,900,000	psi		Location	7.00	ft From Left	OK	354
Ix	244.21	In^4						
Deflection Limits				Max TL Defl.	0.503	In	TL Deflection Check	Actual L/
LL	0.700	In		Location	7.00	ft From Left	OK	334
TL	0.933	In						

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Beam Calc #2

Span (ft)	10
Plys	2
Ref. #	103

	Live Loads	Dead Loads	Units	Location	
Distributed	0	0	plf		
Triangular	0	0	Max plf	Max @ Right	
Triangular	0	0	Max plf	Centered	
Point Load	7800	780	lbs	0.5	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left

Deflection Limits

Live load	L/	360
Total Load	L/	240

Factors	
CD	1.2
CM	1.0
Ct	1.0
CL	1.0
CF	1.0
Cfu	1.0
Ci	1.0
Cr	1.0
CV	1.0
Cc	1.0
CI	1.0
CVR	1.0

Type	#	Size	Design
	2	1-3/4" X 11-7/8" LVL	OK

Fb	2600.00	psi		Max Moment	4,076	ft lbs	Flexure Check	Ratio
Fb'	2990.00	psi		Location	0.50	ft From Left	OK	0.199
Sx	82.26	In^3		Req Sx	16.36	In^3		
Fv	285.00	psi		L Reaction	8,151	lbs	Shear Check	Ratio
Fv'	327.75	psi		R Reaction	429	lbs	OK	0.898
Area	41.56	In^2		Max Shear	8,151	lbs		
				Req Area	37.30	In^2	Adj Shear Check	Ratio
			3.4.3.1	Adj Max Shear	4,118	lbs	OK	0.453
			(Non Hangered Loads)	Req Area	18.85	In^2		
E	1,900,000	psi		Max LL Defl.	0.046	In	LL Deflection Check	Actual L/
E'	1,900,000	psi		Location	4.20	ft From Left	OK	2586
Ix	488.41	In^4						
Deflection Limits				Max TL Defl.	0.051	In	TL Deflection Check	Actual L/
LL	0.333	In		Location	4.20	ft From Left	OK	2351
TL	0.500	In						

Post Frame Structural Engineering Calculations

Roper Steve Finley Taylor Bldg 2
Post Frame Building
4637 West 2800 South
Taylor, Utah

Prepared for:

Roper Buildings
office@roperbuildings.com
801-689-3630

Date: 7/12/2024

WHITE PINE ENGINEERING
- CIVIL STRUCTURAL -

White Pine Engineering, LLC
P.O. Box 669 Hyde Park, Utah 84318
435-515-0126
Jackson Sagers, P.E.
jackson@whitepineeng.com
Tom Hill, P.E.
tom@whitepineeng.com

Project	Roper Steve Finley Taylor Bldg 2
Date	7/12/2024
Engineer	J. Sagers

WHITE PINE ENGINEERING
CIVIL STRUCTURAL

Design Criteria

Codes

IBC 2021
ASCE7-16

Risk Category	II	ASCE 7-16 Table 1.5-1

Is	1.0	ASCE 7-16 Table 1.5-2
Ie	1.0	ASCE 7-16 Table 1.5-2

Seismic Loads

S1	0.44	ASCE 7 Hazard Tool
SM1	0.95	ASCE 7 Hazard Tool
SMS	1.38	ASCE 7 Hazard Tool
TL	8	ASCE 7 Hazard Tool

Site Class	D	(ASSUMED)
SDC	D	ASCE 7 Hazard Tool

R (Cant)	1.5	ASCE7-16 table 12.2-1
R (SW)	6.5	ASCE7-16 table 12.2-1

Wind Loads

V	115	mph 3 Sec Gust	
Category	C		
Elevation	4251	ft	USU Snow Load Map

Snow Loads

Pg	43	psf	USU Snow Load Map
Ws	0	psf	

Ce	1.0	ASCE7-16 Table 7.3-1
Ct	1.0	ASCE7-16 Table 7.3-2
Cs	1.0	ASCE7-16 Figure 7.4-1

Pf	30	ASCE7-16 Eq 7.3-1
Ps	30	ASCE7-16 Eq 7.4-1

Dead Loads

Roof	3	psf	(Trusses, Purlins, 29 gauge metal)
Floor	10	psf	(Joists, 3/4" OSB)
Walls	4	psf	(Posts, Girts, 29 gauge metal, OSB)
Concrete	145	pcf	

Live Loads

Roof	20	psf	ASCE7-16 Table 4.3-1
Floor	40	psf	ASCE7-16 Table 4.3-1

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Soil Properties

Geotechnical Report by	N/A
Report Number	N/A
Date of Report	N/A

If no report is listed above, the following values are assumed
Unified Soil Classification Assumed to be GW, GP, SW, or SP IBC Table 1610.1

Bearing Pressure	1500	psf
Active Pressure	35	pcf
At Rest Presssure	60	pcf
Passive Pressure	250	pcf
Coefficient of Friction	0.3	
Lateral Bearing Pressure	400	psf/ft

IBC 1806.1, 1806.2, & 1806.3.4

**Engineer assumes stable soil conditions.
If there are any global stability concerns, a geotechnical report is required.

Deflection Criteria

Roof

Live Load	L/150	Table 1604.3 Footnote a
Total Load	L/120	Table 1604.3

Floor

Live Load	L/360	Table 1604.3
Total Load	L/240	Table 1604.3

Wall

Live Load	L/90	Table 1604.3 Footnote a

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WHITE PINE ENGINEERING

Main Building Info

Ridge Ht	24.7	ft
Width	66	ft
Length	70	ft
Clear Ht	13.5	ft
Floor Level	0	ft
Floor Area	0	ft^2
Pitch	4	:12
Bearing Posts	14	quantity
Gable Posts	5	quantity
Post Spacing	10	ft

Pier Diameter Requirements

Bearing Pressure	1500	psf
Adj Bearing Pressure	1800	psf
Tributary Area	380	ft^2
Axial Load	12578	lbs
Minimum Area	6.987778	ft^2
Minimum Diameter	35.8	in

Continuous Trimmer Option
9.3 in^2 of bearing area

Ledger Lok Option
20 # of lags per block

3/4" Thru Bolt Option
5 # of thru bolts

16d Option
59 # of nails per block

SDWH Option
18 # of lags per block

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WHITE PINE ENGINEERING

ELF

SD1	0.63	Eq 11.4-4
SDS	0.92	Eq 11.4-3
Cs	0.14	Eq 12.8-2
Ta	0.18	Eq 12.8-7
Ct	0.02	table 12.8-2
x	0.75	table 12.8-2
hn	19.1	
Cs Max	0.53	Eq 12.8-3
Cs Max	N/A	Eq 12.8-4
Cs Min	0.04	Eq 12.8-5
Cs Min	0.01	Eq 12.8-5
Cs Min	N/A	Eq 12.8-6
Cs Max	0.53	
Cs Min	0.04	
Cs	0.14	
V (lbs)	4041	Eq 12.8-1

Building Info

k=1 for T<=.5

	Z (ft)	Area (ft^2)	Weight (psf)	Weight (lbs)	Wx (lbs)	Cvx	Fx (lbs)	Shear (lbs)
Ridge	24.7	4620	3	13860				
Top Clear Ht	13.5	3672	4	14688	21204	1.000	4041	4041
Floor	0	0	10	0				
Bottom Clear Ht	0	0	4	0	7344	0.000	0	4041
				28548				

Width	66
Length	70
Roof Pitch F-B	4 :12 Pitch

Simplified Seismic

V	4041	Eq 12.14-12
F	1	1 1 story
		1.1 2 story
		1.2 3 story

	Wx (lbs)	Fx (lbs)	Shear (lbs)
Top	21204	3001	3001
Bottom	7344	1039	4041

Directional

hn	19.1		V	115 mph 3 Sec Gust
G	0.85	(26.11.4,26.11.2)	Category	C
ke	0.8573696	table 26.9-1		
kzt	1	26.8.2		
kd	0.85	table 26.6-1		
kh	0.891	table 26.10-1		

Surface	Cp	L/B or h/L	z or h	kz or kh	Theta	q (psf)	p (psf)	Area (ft^2)	Force (lbs)
Top Front Wall	0.80	0.94	13.5	0.85	0.00	20.97	14.26	945	13477
Bottom Front Wall	0.80	0.94	0	0.85	0.00	20.97	14.26	0	0
Front Roof Plane	0.11	0.29	19.1	0.89	18.43	21.98	2.00	784	1566
Top Rear Wall	-0.50	0.94	19.1	0.89	0.00	21.98	-9.34	945	-8829
Bottom Rear Wall	-0.50	0.94	19.1	0.89	0.00	21.98	-9.34	0	0
Rear Roof Plane	-0.57	0.29	19.1	0.89	18.43	21.98	-10.63	784	-8331
Top Left Wall	0.80	1.06	13.5	0.85	0.00	20.97	14.26	891	12707
Bottom Left Wall	0.80	1.06	0	0.85	0.00	20.97	14.26	0	0
Left Roof Plane	0.80	0.27	19.1	0.89	90.00	21.98	14.95	369.6	5525
Top Right Wall	-0.49	1.06	19.1	0.89	0.00	21.98	-9.12	891	-8123
Bottom Right Wall	-0.49	1.06	19.1	0.89	0.00	21.98	-9.12	0	0
Right Roof Plane	-0.49	0.27	19.1	0.89	90.00	21.98	-9.12	369.6	-3369

L/R Walls	Shear (lbs)
Top	21050
Bottom	32203

F/B Walls	Shear (lbs)
Top	19309
Bottom	29724

Simplified Wind

Case A	A	B	C	D
Ps30	28.15	0.00	18.81	0.00
Ps	35.91	0.00	23.99	0.00

Case B	A	C
Ps30	21.00	13.90
Ps	26.79	17.73

a 6.6 Lambda 1.2756

	C&D (lbs)	C&D/2 (lbs)	A&B (lbs)	L/R Shear (lbs)		C&D (lbs)	C&D/2 (lbs)	AA&BA (lbs)	AB (lbs)	A&B (lsb)	F/B Shear (lbs)
Top	11334	5667	1063	6730		14452	7226	1063	403	403	7630
Bottom	22669	11334	2125	13460		22351	11176	2125	807	807	11983

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Shear Table

	Top		Bottom	
	F/B	L/R	F/B	L/R
ELF	2020	2020	2020	2020
Simplfied S	1501	1501	2020	2020
Directional	9655	10525	14862	16101
Simplified W	7630	6730	11983	13460

Factored Shear Table (0.6W 0.7E)

	Top		Bottom	
	F/B	L/R	F/B	L/R
ELF	1414	1414	1414	1414
Simplfied S	1050	1050	1414	1414
Directional	5793	6315	8917	9661
Simplified W	4578	4038	7190	8076

Factored Shear Table w/ Wind Converted to Seismic Equivalent Loading (W/1.4) (SHEAR WALLS ONLY)

	Top		Bottom	
	F/B	L/R	F/B	L/R
ELF	1414	1414	1414	1414
Simplfied S	1050	1050	1414	1414
Directional	4138	4511	6369	6901
Simplified W	3270	2884	5135	5768

Factored Shear Table w/ Wind Converted to Seismic Equivalent Loading (W/1.4) (SHEAR WALLS ONLY)

	Top		Bottom	
	F/B	L/R	F/B	L/R
Simplfied S	1050	1050	1414	1414
Simplified W	3270	2884	5135	5768

Factored Shear Table w/ Wind Converted to Seismic Equivalent Loading (W/1.4) (SHEAR WALLS ONLY)

	Top		Bottom	
	F/B	L/R	F/B	L/R
Max Load	3270	2884	5135	5768
		Gable Walls		Gable Walls

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Top Shear — 29 GA STEEL, GIRTS @ 24" O.C., 1-1/2" #10 @ 9" O.C. — 145 PLF
Front 3270 lbs — 29 GA STEEL, GIRTS @ 32" O.C., 1-1/2" #10 @ 9" O.C. — 108 PLF

Segments (ft)	70										Segmented	18	29
Segmented h (ft)	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5		24	16
Segmented ARF	1	0	0	0	0	0	0	0	0	0		30	10
Adjusted Length (ft)	70	0	0	0	0	0	0	0	0	0		36	7
Segmented shear (plf)	47	Segmented Uplift (lbs)		631								42	5
Perforated Height	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5			
Perforated ARF	1	0	0	0	0	0	0	0	0	0	Perforated	18	29
Adjusted Length (ft)	70	0	0	0	0	0	0	0	0	0		24	16
Perforation Width (ft)												30	10
Perforation Height (ft)												36	7
Perforation Area (ft^2)	0	0	0	0	0	0	0	0	0	0		42	5
Perforated Length (ft)	70	Afhs (ft^2)	70	Ao (ft^2)	0	Awall (ft^2)	945	Sumbi (ft)	70	Co	1.00		
Perforated Shear (plf)	47	Perforated Uplift		631									

Top Shear
Back 3270 lbs

Segments (ft)	70										Segmented	18	29
Segmented h (ft)	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5		24	16
Segmented ARF	1	0	0	0	0	0	0	0	0	0		30	10
Adjusted Length (ft)	70	0	0	0	0	0	0	0	0	0		36	7
Segmented shear (plf)	47	Segmented Uplift (lbs)		631								42	5
Perforated Height	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5			
Perforated ARF	1	0	0	0	0	0	0	0	0	0	Perforated	18	29
Adjusted Length (ft)	70	0	0	0	0	0	0	0	0	0		24	16
Perforation Width (ft)												30	10
Perforation Height (ft)												36	7
Perforation Area (ft^2)	0	0	0	0	0	0	0	0	0	0		42	5
Perforated Length (ft)	70	Afhs (ft^2)	70	Ao (ft^2)	0	Awall (ft^2)	945	Sumbi (ft)	70	Co	1.00		
Perforated Shear (plf)	47	Perforated Uplift		631									

Top Shear
Left 8840 lbs

Segments (ft)	23										Segmented	18	144
Segmented h (ft)	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5		24	81
Segmented ARF	1	0	0	0	0	0	0	0	0	0		30	52
Adjusted Length (ft)	23	0	0	0	0	0	0	0	0	0		36	36
Segmented shear (plf)	384	Segmented Uplift (lbs)		4784								42	27
Perforated Height	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5			
Perforated ARF	1	0	0	0	0	0	0	0	0	0	Perforated	18	217
Adjusted Length (ft)	23	0	0	0	0	0	0	0	0	0		24	122
Perforation Width (ft)												30	78
Perforation Height (ft)												36	54
Perforation Area (ft^2)	0	0	0	0	0	0	0	0	0	0		42	40
Perforated Length (ft)	23	Afhs (ft^2)	23	Ao (ft^2)	0	Awall (ft^2)	310.5	Sumbi (ft)	23	Co	1.00		
Perforated Shear (plf)	384	Perforated Uplift		4784									

Top Shear
Right 2884 lbs

Segments (ft)	22	22									Segmented	18	40
Segmented h (ft)	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5		24	23
Segmented ARF	1	1	0	0	0	0	0	0	0	0		30	14
Adjusted Length (ft)	22	22	0	0	0	0	0	0	0	0		36	10
Segmented shear (plf)	66	Segmented Uplift (lbs)		885								42	7
Perforated Height	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5			
Perforated ARF	1	1	0	0	0	0	0	0	0	0	Perforated	18	40
Adjusted Length (ft)	22	22	0	0	0	0	0	0	0	0		24	23
Perforation Width (ft)												30	14
Perforation Height (ft)												36	10
Perforation Area (ft^2)	0	0	0	0	0	0	0	0	0	0		42	7
Perforated Length (ft)	44	Afhs (ft^2)	44	Ao (ft^2)	0	Awall (ft^2)	594	Sumbi (ft)	44	Co	1.00		
Perforated Shear (plf)	66	Perforated Uplift		885									

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WHITE PINE ENGINEERING

Gable Post	
Height (ft)	13.5
Posts	1
Ref. #	113

	Live Loads	Dead Loads	Units	Location	
Distributed	94.12	0	plf		
Triangular	0	0	Max plf	Max @ Right	
Triangular	0	0	Max plf	Centered	
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left

Deflection Limits		
Live load	L/	90
Total Load	L/	90

Factors	
CD	1.6
CM	1.0
Ct	1.0
CL	1.0
CF	1.0
Cfu	1.0
Ci	1.0
Cr	1.0
CV	1.0
Cc	1.0
CI	1.0
CVR	1.0

Type	#	Size	Design
	1	Titan Timber (3) Ply 2x8	OK

Fb	2100.00	psi		Max Moment	2,144	ft lbs	Flexure Check	Ratio
Fb'	3360.00	psi		Location	6.75	ft From Left	OK	0.219
Sx	34.90	In^3		Req Sx	7.66	In^3		
Fv	260.00	psi		L Reaction	635	lbs	Shear Check	Ratio
Fv'	416.00	psi		R Reaction	635	lbs	OK	0.078
Area	29.39	In^2		Max Shear	635	lbs		
				Req Area	2.29	In^2	Adj Shear Check	Ratio
			3.4.3.1	Adj Max Shear	585	lbs	OK	0.072
			(Non Hangered Loads)	Req Area	2.11	In^2		
E	1,900,000	psi		Max LL Defl.	0.298	In	LL Deflection Check	Actual L/
E'	1,900,000	psi		Location	6.75	ft From Left	OK	544
Ix	124.34	In^4						
Deflection Limits				Max TL Defl.	0.298	In	TL Deflection Check	Actual L/
LL	1.800	In		Location	6.75	ft From Left	OK	544
TL	1.800	In						

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Combined Bending and Axial

Fc	1700	psi
Fc*	2720	psi
Fc'	1969	psi
Emin	1000000	psi
Emin'	1000000	psi
Fb	2100	psi
Fb*	3360	psi
Fb'	3330	psi
Sx	34.90	in^3
fb1	503	psi
FcE2	37942	psi
fb2	0	psi
FcE1	2484	psi
FbE	22113	psi
fc	321	psi
l2	24	in
l1	162	in
ke	0.8	
le2	19.2	in
le1	129.6	in
d2	4.125	in
d1	7.125	in
Rb	7.366666	
c	0.9	

Factors	
CD	1.6
CM	1.0
Ct	1.0
CL	0.99
CF	1.0
Cfu	1.0
Ci	1.0
Cr	1.0
CV	1.0
Cc	1.0
Cl	1.0
CVR	1.0
Cp	0.72

fc<FCE1	OK	
fc<FcE2	OK	
fb1<FbE	OK	
Check	0.20	(3.9-3)
Check	0.01	(3.9-4)

Ref. #	113	
Plys	1	
Section	Titan Timber (3) Ply 2x8	
Height	13.5	ft
Vertical Load	9434	lbs
Lateral Load	64	plf
Moment	1462	ft lbs

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Purlin Calc

Span (ft)	9.25
Plys	1
Ref. #	2

	Live Loads	Dead Loads	Units		
Distributed	60.2	6	plf		

Deflection Limits

Live load	L/	150
Total Load	L/	120

Factors	
CD	1.15
CM	1.0
Ct	1.0
CL	1.0
CF	1.3
Cfu	1.0
Ci	1.0
Cr	1.15
CV	1.0
Cc	1.0
Cl	1.0
CVR	1.0

12" Lap Required Nailing

3 16D @ each end and middle

8 16D Total each lap

Type	#	Size		Design
	1	2 X 6 DF-L#2	Lapped	OK

Fb	900.00	psi		Max Moment	472	ft lbs	Flexure Check	Ratio
Fb'	1547.33	psi		Location	0.00	ft From Left	OK	0.484
Sx	7.56	In^3		Req Sx	3.66	In^3		
Fv	180.00	psi		L Reaction	306	lbs	Shear Check	Ratio
Fv'	207.00	psi		R Reaction	306	lbs	OK	0.269
Area	8.25	In^2		Max Shear	306	lbs		
				Req Area	2.22	In^2	Adj Shear Check	Ratio
			3.4.3.1	Adj Max Shear	282	lbs	OK	0.247
			(Non Hangered Loads)	Req Area	2.04	In^2		
E	1,600,000	psi		Max LL Defl.	0.060	In	LL Deflection Check	Actual L/
E'	1,600,000	psi		Location	4.63	ft From Left	OK	1862
Ix	20.80	In^4						
Deflection Limits				Max TL Defl.	0.066	In	TL Deflection Check	Actual L/
LL	0.740	In		Location	4.63	ft From Left	OK	1694
TL	0.925	In						

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Girt Calc

Span (ft)	11.25
Plys	1
Ref. #	2

	Live Loads	Dead Loads	Units	Location	
Distributed	17.1	0	plf		
Triangular	0	0	Max plf	Max @ Right	
Triangular	0	0	Max plf	Centered	
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left

Deflection Limits

Live load	L/	90
Total Load	L/	90

**WALLS CONSIDERED FLEXIBLE, DEFLECTION CRITERIA NOT CONSIDERED

Factors	
CD	1.6
CM	1.0
Ct	1.0
CL	1.0
CF	1.3
Cfu	1.00
Ci	1.0
Cr	1.15
CV	1.0
Cc	1.0
CI	1.0
CVR	1.0

Type	#	Size	Design
	1	2 X 6 DF-L#2	OK

Fb	900.00	psi	Max Moment	271	ft lbs	Flexure Check	Ratio
Fb'	2152.80	psi	Location	5.63	ft From Left	OK	0.200
Sx	7.56	In^3	Req Sx	1.51	In^3		
Fv	180.00	psi	L Reaction	96	lbs	Shear Check	Ratio
Fv'	288.00	psi	R Reaction	96	lbs	OK	0.061
Area	8.25	In^2	Max Shear	96	lbs		
			Req Area	0.50	In^2	Adj Shear Check	Ratio
		3.4.3.1	Adj Max Shear	89	lbs	OK	0.056
		(Non Hangered Loads)	Req Area	0.46	In^2		
E	1,600,000	psi	Max LL Defl.	0.185	In	LL Deflection Check	Actual L/
E'	1,600,000	psi	Location	5.63	ft From Left		728
Ix	20.80	In^4					
Deflection Limits			Max TL Defl.	0.185	In	TL Deflection Check	Actual L/
LL	1.500	In	Location	5.63	ft From Left		728
TL	1.500	In					

Project	Roper Steve Finley Taylor Bldg 2
Date	7/12/2024
Engineer	J. Sagers

Beam Calc #1

Span (ft)	10
Plys	1
Ref. #	101

	Live Loads	Dead Loads	Units	Location	
Distributed	195	20	plf		
Triangular	0	0	Max plf	Max @ Right	
Triangular	0	0	Max plf	Centered	
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left
Point Load	0	0	lbs	0	ft From Left

Deflection Limits

Live load	L/	240
Total Load	L/	180

Factors	
CD	1.0
CM	1.0
Ct	1.0
CL	1.0
CF	1.0
Cfu	1.0
Ci	1.0
Cr	1.0
CV	1.0
Cc	1.0
Cl	1.0
CVR	1.0

Type	#	Size	Design
	1	1-3/4" X 7-1/4" LVL	OK

Fb	2600.00	psi		Max Moment	2,681	ft lbs	Flexure Check	Ratio
Fb'	2600.00	psi		Location	5.00	ft From Left	OK	0.807
Sx	15.33	In^3		Req Sx	12.38	In^3		
Fv	285.00	psi		L Reaction	1,073	lbs	Shear Check	Ratio
Fv'	285.00	psi		R Reaction	1,073	lbs	OK	0.445
Area	12.69	In^2		Max Shear	1,073	lbs		
				Req Area	5.64	In^2	Adj Shear Check	Ratio
			3.4.3.1	Adj Max Shear	944	lbs	OK	0.392
			(Non Hangered Loads)	Req Area	4.97	In^2		
E	1,900,000	psi		Max LL Defl.	0.416	In	LL Deflection Check	Actual L/
E'	1,900,000	psi		Location	5.00	ft From Left	OK	289
Ix	55.57	In^4						
Deflection Limits				Max TL Defl.	0.457	In	TL Deflection Check	Actual L/
LL	0.500	In		Location	5.00	ft From Left	OK	263
TL	0.667	In						