STRUCTURAL CALCULATIONS

FOR

REVIEWED
FOR
CODE
COMPLIANCE
01/30/2025

Martin Woodrow

28'x36'x12' Pole Structure

November 22, 2024

Project: 14167

PREPARED FOR:

Martin Woodrow
31555 Green Ridge Drive
Oak, Creek, Colorado 80467

PREPARED BY:

Steel Structures America, Inc.
PO Box 895
Post Falls, Idaho 83877

STEEL STRUCTURES AMERICA INC.

Post-Frame Building Calculations

Prepared For:	Martin Woodrow	**Job #:**	14167
Project Location:	31555 Green Ridge Drive	**DATE:**	11/6/2024
	Oak, Creek, Colorado 80467		

Design Criteria

Codes:	2021	International Building Code
	7-22	ASCE
	2018	NDS
	2015	PFBDM

Roof Loads:

Top Chord: DL_{RT} =	8	psf
Bot Chord: DL_{RB} =	7	psf
Top Chord LL_R =	102	psf

Loft Floor Loads:

DL_F =	12	DL (psf)
LL_F =	40	LL (psf)

Wall Weight:

Main DL:	8	psf

Lean-To Weight:

Lean-To DL:	15	psf

Snow Loads:

Flat Roof Snow, P_f =	110	psf	*Section 7.3 ASCE7-16*
Peak Ground, P_g =	143	psf	Elev. = 8004 ft
C_e=	1		*Per Table 7.3-1: ASCE7-16*
			Wind/Terrain Category: B *Section 26.7*
			Roof Exposure Condition: Partially Exposed
C_t=	1.1		*Per Table 7.3-2: ASCE7-16*
			Thermal Conditions: 3. Well Ventilated Roofs
Is=	1		*Per Table 1-5.2: ASCE7-16*
			Risk Category: II *Ref: Table 1.5-1: ASCE7-16*
Sloped Roof Snow, P_s=	102	psf	*Section 7.3 ASCE7-16*
C_S=	0.93		*Per Figure 7.4-1: ASCE7-16*

Wind Loads:

90	mph (nominal)	
115	mph (ULTIMATE)	
B	Exp.	
$P_{int.\ zone}$ 11.64	psf.	
$P_{ext.\ zone}$ 15.6	psf.	
a 3	ft.	

Seismic Loads:

0.511	S_s
0.474	S_{ds}
0.096	S_1
0.153	S_{d1}
2.5	R

Soil Bearing:

P_{soil}	3000	psf.
Perma ?	YES	

Building Dimensions:

Width	28	ft.
Length	36	ft.
Height	12	ft.
Bay Spacing	12	ft.
Eave Overhangs	2	ft.

Lean-to:

Width	12	ft.
Enclosed	NO	?
Eave H	9	ft.
End O/Hang	2	ft.

Roof Slope:	6	:12
Ridge Height:	19.00	ft.
Mean Roof Height:	15.50	ft.

Per ICC Commentary:
"Wind speeds are designated as "ultimate design" or "nominal design" wind speeds and are used for either strength design or allowable stress designs respectively. The ultimate design wind speeds are indicated in Figures 1609A, B & C, and vary based on the building's risk category and location. The ultimate design for wind speeds for a Risk Category II building vary from 110 mph on the West Coast to 180 mph in hurricane-prone areas in southern Florida. These wind speeds would convert to a nominal design wind speed, or what was previously called the "basic wind speed" 85 mph for the West Coast and 139 mph for southern Florida when using allowable stress design."

Project : **File :**
Subject : **Date :** 10/31/2024
Location : **Eng :**

Design Wind Pressure,p,Equation 28.5-1 (ASCE 7-16)

System Type	Structure Type	Equation
Main Wind Force Resisting System (Envelope Procedure)	Rigid Structures Low-Rise Buildings Simple Diaphragm Enclosed Buildings	*ps* : λ Kzt (ps30) λ : Adjustment Factor Kzt : Topographic Factor ps30 : Figure 28.5-1

Building Height	=	15.5 ft	
Roof Angle	=	26.5 deg.	
Basic Wind Speed	=	90 mph	(Figure 26.5-1&2 A-D)
Occupancy Category	=	II	(Table 1.5-1)
Exposure Category	=	B	(Section 26.7.3)
Topography	=	None	
Kzt @ h	=	Topographic factor	(Figure 26.8-1)
	=	$(1 + K1 \cdot K2 \cdot K3)^2$	
	=	1.00	

Design Wind Pressure, p, Figure 26.8-1 - Load Case 1

Location	Adjustment Factor	Case A Ps30 (psf)	Case A Ending P (psf)	Case B Ps30 (psf)	Case B Ending P (psf)
Zone A	1.00	15.59	15.59	12.80	12.80
Zone B	1.00	4.79	4.79	-6.70	-6.70
Zone C	1.00	11.64	11.64	8.50	8.50
Zone D	1.00	4.26	4.26	-4.00	-4.00
Zone E	1.00	-4.71	-4.71	-15.40	-15.40
Zone F	1.00	-9.50	-9.50	-8.80	-8.80
Zone G	1.00	-3.52	-3.52	-10.70	-10.70
Zone H	1.00	-7.71	-7.71	-6.80	-6.80
Eoh	1.00	-10.84	-10.84	-21.60	-21.60
Goh	1.00	-9.72	-9.72	-16.90	-16.90

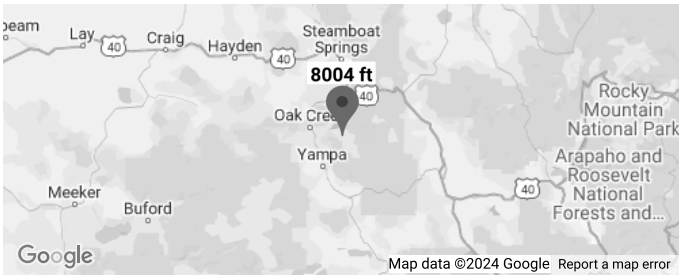
Design Wind Pressure, p, Figure 28.5-1 - Load Case 2

Location	Adjustment Factor	Case A Ps30(psf)	Case A Ending P (psf)
Zone A	1.00	4.32	4.32
Zone B	1.00	2.97	2.97
Zone C	1.00	3.45	3.45
Zone D	1.00	2.37	2.37
Zone E	1.00	-0.21	-0.21
Zone F	1.00	-5.00	-5.00
Zone G	1.00	0.95	0.95
Zone H	1.00	-3.31	-3.31
Eoh	1.00	-1.53	-1.53
Goh	1.00	-1.74	-1.74

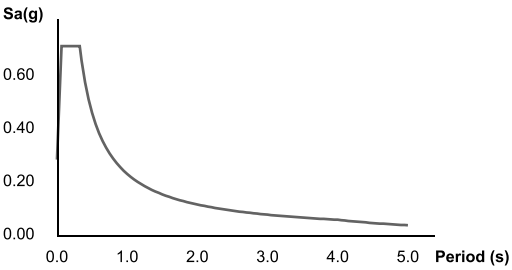
Hazards by Location

Search Information

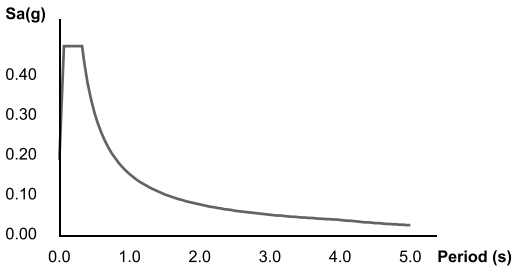
Address:	31555 Green Ridge Drive, Oak Creek, COLO
Coordinates:	40.236389, -106.831358
Elevation:	8004 ft
Timestamp:	2024-11-06T19:23:49.382Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D-default



MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	0.511	MCE_R ground motion (period=0.2s)
S_1	0.096	MCE_R ground motion (period=1.0s)
S_{MS}	0.711	Site-modified spectral acceleration value
S_{M1}	0.23	Site-modified spectral acceleration value
S_{DS}	0.474	Numeric seismic design value at 0.2s SA
S_{D1}	0.153	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	C	Seismic design category
F_a	1.391	Site amplification factor at 0.2s
F_v	2.4	Site amplification factor at 1.0s
CR_S	0.918	Coefficient of risk (0.2s)
CR_1	0.94	Coefficient of risk (1.0s)
PGA	0.344	MCE_G peak ground acceleration
F_{PGA}	1.256	Site amplification factor at PGA
PGA_M	0.432	Site modified peak ground acceleration
T_L	4	Long-period transition period (s)
SsRT	0.511	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.556	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.096	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.102	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)

WOOD BEAM DESIGN

calculations per 2018 NDS as referenced by the 2021 IBC

Prepared For:	Martin Woodrow	**Job #:**	14167
Project Location:	31555 Green Ridge Drive	**DATE:**	11/6/2024
	Oak, Creek, Colorado 80467		
Framing Member:	Typical Roof Purlins		

Beam dimensions:

Beam size =	2 x 10	
b =	1.5	in.
d =	9.25	in.
Clear Span =	11.5	ft.
spacing (in.) =	16	in.

Loading:

w_D (psf) =	8	
w_{LL} (psf) =	102	SNOW
Limit Δ/L =	180	
Comp Edge Braced?	Y	

Wood properties:

Species=	DF
Grade=	2
C_D =	1.15
C_F =	1.10
C_r =	1.15
C_i =	1.00
C_L =	1.00
F_b (psi) =	1309
F_v (psi) =	207
E (psi) =	1,600,000

Calculations:

Load Analysis:

W =	147.203067	plf
V =	846.417633	lbs
M =	29201	in-lbs

Stresses:

f_v(psi) =	92	f_v/F_v =	0.44	**Shear OK**
f_b(psi) =	1365	f_b/F_b =	1.04	**Bending OK**

Deflection:

Δ (in) =	0.37	Δ/L =	377	**Deflection OK**

USE: **2 x 10 @ 16in O.C., DF No. 2**

WOOD BEAM DESIGN

calculations per 2018 NDS as referenced by the 2021 IBC

Prepared For: Martin Woodrow
Project Location: 31555 Green Ridge Drive, Oak, Creek, Colorado 80467
Job #: 14167
DATE: 11/6/2024

Framing Member: Lean-To Roof Rafters

Gable End Rafter Worst Case When Gable Overhang Present

Beam dimensions:			**Loading:**			**Wood properties:**	
Beam size =	1 3/4 x 14		w_D (psf) =	8		Species=	LVL
b =	1.75	in.	w_{LL} (psf) =	102	SNOW	Grade=	2.0E
d =	14	in.				C_D =	1.15
Clear Span =	11.5	ft.	Limit Δ/L =	180		C_F =	0.97
spacing (in.) =	72	in.				C_r=	1.00
End Overhang (in.) =	24	in.				C_i =	1.00
Trib. Width (in.) =	96	in.	Comp Edge Braced?	Y		C_L =	1.00
						F_b (psi) =	3234
						F_v (psi) =	328
						E (psi) =	2,000,000

Calculations:

Load Analysis:

W = 883.2184 plf
V = 5078.5058 lbs
M = 175208 in-lbs

Stresses:

f_v(psi) = 311 f_v/F_v = 0.95 **Shear OK**
f_b(psi) = 3065 f_b/F_b = 0.95 **Bending OK**

Deflection:

Δ (in) = 0.43 Δ/L = 318 **Deflection OK**

USE: **1 3/4" x 14" @ 72in O.C., LVL Gr: 2.0E**

Post Connections:

	Reactions:			*Connection:*			
	COMMON RAFTER						
	DL	SL	Total	z'/bolt 3/4" Bolt	z'/nail 16d Nails	QTY 16d (8 min.)	
Main Post =	276	3532.87935	3808.87935	787.75	162.15	**19**	**Add Shear Blocks**
Lean-To Post =	372	4761.70695	5134	787.75	162.15	**27**	**Add Shear Blocks**
	GABLE RAFTER (INCLUDES GABLE END O/HANG)						
	DL	SL	Total	z'/2 screw (2)1/4" SDS	z'/nail 16d Nails	QTY 16d (8 min.)	
Main Post =	368	4710.5058	5078.5058	782	162.15	**27**	**Add Shear Blocks**
Lean-To Post =	496	6348.9426	6845	782	162.15	**38**	**Shear Block**

WOOD BEAM DESIGN

calculations per 2018 NDS as referenced by the 2021 IBC

Prepared For: Martin Woodrow
Project Location: 31555 Green Ridge Drive, Oak, Creek, Colorado 80467
Framing Member: Rafter Crossing

Job #: 14167
DATE: 11/6/2024

Beam dimensions:

Beam size =	1 3/4 x 16	
b =	1.75	in.
d =	16	in.
Clear Span =	13.5	ft.
spacing (in.) =	72	in.
End Overhang (in.) =	24	in.
Trib. Width (in.) =	96	in.

Loading:

w_D (psf) =	12	
w_{LL} (psf) =	102	SNOW
Limit Δ/L =	180	
Comp Edge Braced?	Y	

Wood properties:

Species=	LVL
Grade=	2.0E
C_D =	1.15
C_F =	0.94
C_r=	1.00
C_i =	1.00
C_L =	1.00
F_b (psi) =	3149
F_v (psi) =	328
E (psi) =	2,000,000

Calculations:

Load Analysis:

W =	915.2184	plf
V =	6177.7242	lbs
M =	250198	in-lbs

Stresses:

f_v(psi) =	331	f_v/F_v =	1.01	**Shear OK**
f_b(psi) =	3351	f_b/F_b =	1.06	**Bending NG**

Deflection:

Δ (in) =	0.57	Δ/L =	283	**Deflection OK**

USE: **1 3/4" x 16" @ 72in O.C., LVL Gr: 2.0E**

Post Connections:

	Reactions:			*Connection:*			
	COMMON RAFTER						
	DL	SL	Total	z'/bolt 3/4" Bolt	z'/nail 16d Nails	QTY 16d (8 min.)	
Main Post =	486	4147.29315	4633.29315	787.75	162.15	**24**	**Add Shear Blocks**
Lean-To Post =	630	5376.12075	6006	787.75	162.15	**33**	**Add Shear Blocks**
	GABLE RAFTER (INCLUDES GABLE END O/HANG)						
	DL	SL	Total	z'/2 screw (2)1/4" SDS	z'/nail 16d Nails	QTY 16d (8 min.)	
Main Post =	648	5529.7242	6177.7242	782	162.15	**34**	**Add Shear Blocks**
Lean-To Post =	840	7168.161	8008	782	162.15	**45**	**Shear Block**

Project Title:
Engineer:
Project ID:
Project Descr:

Multiple Simple Beam

Project File: 14167.ec6

LIC# : KW-06016166, Build:20.24.03.04 Steel Structures America Inc (c) ENERCALC INC 1983-2023

Description : 14167- Loft framing

Wood Beam Design : Loft Joist

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **2x8, Sawn, Fully Braced**
Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending
Wood Species : Douglas Fir-Larch Wood Grade : No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

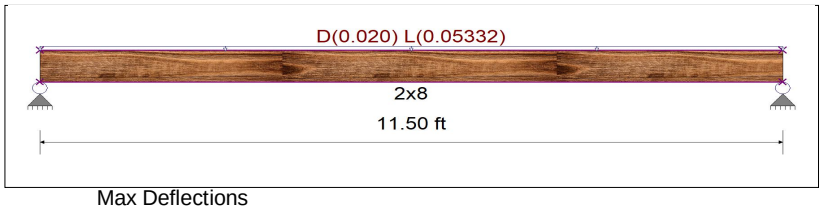
Beam self weight calculated and added to loads
Unif Load: D = 0.0150, L = 0.040 k/ft, Trib= 1.333 ft

Design Summary

Max fb/Fb Ratio = **0.920** : 1
fb : Actual : 1,142.37 psi at 5.750 ft in Span # 1
Fb : Allowable : 1,242.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.300** : 1
fv : Actual : 54.01 psi at 0.000 ft in Span # 1
Fv : Allowable : 180.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	Lr	L	S	W	E	H
Left Support	0.13		0.31				
Right Support	0.13		0.31				



Max Deflections

Transient Downward	0.277 in	Total Downward	0.393 in
Ratio	498	Ratio	351
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : Loft Edge Beam/Ledger

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **1.75x11.875, VersaLam, Fully Braced**
Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending
Wood Species : TecLam Laminates Wood Grade : TecLam 2.0E

Fb - Tension	2850 psi	Fc - Prll	1600 psi	Fv	285 psi	Ebend- xx	2000 ksi	Density	43.7 pcf
Fb - Compr	2850 psi	Fc - Perp	750 psi	Ft	1000 psi	Eminbend - xx	530120482 ksi		

Applied Loads

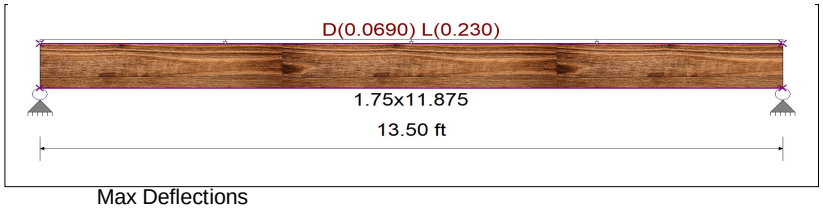
Beam self weight calculated and added to loads
Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 5.750 ft

Design Summary

Max fb/Fb Ratio = **0.711** : 1
fb : Actual : 2,027.58 psi at 6.750 ft in Span # 1
Fb : Allowable : 2,853.18 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.449** : 1
fv : Actual : 127.87 psi at 12.555 ft in Span # 1
Fv : Allowable : 285.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	Lr	L	S	W	E	H
Left Support	0.51		1.55				
Right Support	0.51		1.55				



Max Deflections

Transient Downward	0.353 in	Total Downward	0.469 in
Ratio	458	Ratio	345
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

WOOD POST DESIGN

calculations per 2018 NDS as referenced by the 2021 IBC

Prepared For: Martin Woodrow
Project Location: 31555 Green Ridge Drive, Oak, Creek, Colorado 80467
Job #: 14167
DATE: 11/6/2024
Post Location: Main Posts w/ Lean-To

Post dimensions:

Post size =	(3)2x8
b (in) =	4.5
d (in) =	7.125
Unbraced L_x (ft) =	12
K_x =	0.8
Unbraced L_y (ft) =	2
K_y =	0.8
Perma ?	YES

Loading:

DL	3792	lbs.
SL	27034	lbs.
LL	0	lbs.
D+S	**30826**	**lbs.**
w_{wind} (plf) =	140	
Eccentricity (in) =	0	
Snow?	Y	

Wood properties:

Species=	SPF
Grade=	ISR 1950Fb-1.7E
(F_b) C_D =	1.6
(F_c) C_D =	1.15
(F_b) C_F =	1.0
(F_c) C_F =	1.0
C_L =	1.0
C_r =	1.25
Ci =	1.0
C_P =	0.7
c' =	0.8
K_{CE} =	0.3
F_b (psi) =	3900
F^*_c (psi) =	2659
F'_c (psi) =	1756
E (psi) =	1,700,000

Calculations:

Slenderness ratio:

Max L_e/d = 16.2 — Slenderness ratio OK

Stresses:

	D+S	D+.75(S+L)+.75W	0.6D+W
f_c (psi) =	961	751	71
f_{bwind} (psi) =	0	594	792

Deflection:

D (in) = 0.12

Interaction equation:

	D+S	D+.75(S+L)+.75W	0.6D+W	
[fc/F'c]^2 + [1/(1-fc/Fcex)](fbx/F'bx) =	0.09	0.35	0.22	<1 OK

Results:

(3)2x8 POST SPF Gr: MSR 1950Fb-1.7E
Perma Column PC8300

EMBEDDED POST FOOTING

calculations per 2015 PFBDM

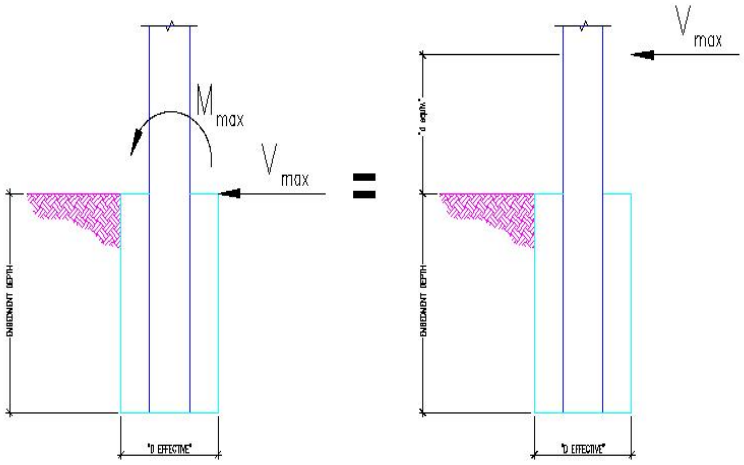
Prepared For:	Martin Woodrow	**Job #:**	14167
Project Location:	31555 Green Ridge Drive	**DATE:**	11/6/2024
	Oak, Creek, Colorado 80467		
Post Location:	Main Post w/ Lean-To Footing		

Lateral Loads:

H (ft) =	12	
wind (plf)	140	
Footing Diamter (in)	24	
Surface Restraint?	N	
Passive Soil Pressure Bearing (psf)=	250	
V_{max} (lbs)=	1048	
M_{max} (lb-ft)=	2514	
d_{equiv} (ft)= M/V=	2.4	
D_{eff} (in)= 1.4D=	34	
ft. minimum embedment	**2.6**	=0.5A[1 + (1 + (1 + 4.36d/A)^1/2]

Vertical Loads:

DL	4944	lbs.
SL	27034	lbs.
LL	0	lbs.
D+S	**31978**	**lbs.**
P_{soil}	3000	psf.
Embedment	**5.0**	**OK**
P_{soil}	5400	psf
$A_{ftg.}$	5.9	sf.
Diameter	**2.7**	**Bell to 3'-0 Diameter w/ 12 in. Shoulder**



WOOD POST DESIGN

calculations per 2018 NDS as referenced by the 2021 IBC

Prepared For:	Martin Woodrow	**Job #:**	14167
Project Location:	31555 Green Ridge Drive Oak, Creek, Colorado 80467	**DATE:**	11/6/2024
Post Location:	Lean-To Posts		

Post dimensions:

Post size =	6x6
b (in) =	5.5
d (in) =	5.5
Unbraced L_x (ft) =	9
K_x =	0.8
Unbraced L_y (ft) =	9
K_y =	0.8
Perma ?	YES

Loading:

DL	1440	lbs.
SL	9831	lbs.
LL	40	lbs.
D+S	**11271**	**lbs.**
w_{wind} (plf) =	16	
Eccentricity (in) =	0	
Snow?	Y	

Wood properties:

Species=	HF
Grade=	HF #2
$(F_b)\ C_D$ =	1.6
$(F_c)\ C_D$ =	1.15
$(F_b)\ C_F$ =	1.0
$(F_c)\ C_F$ =	1.0
C_L =	1.0
C_r =	1.00
Ci =	0.8
C_P =	0.9
c' =	0.8
K_{CE} =	0.3
F_b (psi) =	920
F^*_c (psi) =	661
F'_c (psi) =	575
E (psi) =	1,100,000

Calculations:

Slenderness ratio:

Max L_e/d = 15.7 Slenderness ratio OK

Stresses:

	D+S	*D+.75S+.75W*	*0.6D+W*
f_c (psi) =	373	291	29
f_{bwind} (psi) =	0	51	68

Deflection:

D (in) = 0.01

Interaction equation:

	D+S	*D+.75S+.75W*	*0.6D+W*	
[fc/F'c]^2 + [1/(1-fc/Fcex)](fbx/F'bx) =	0.18	0.16	0.08	<1 OK

Results:

PT 6x6 POST HF Gr: HF #2
Perma Column PC6400

EMBEDDED POST FOOTING

calculations per 2015 PFBDM

Prepared For:	Martin Woodrow	**Job #:**	14167
Project Location:	31555 Green Ridge Drive	**DATE:**	11/6/2024
	Oak, Creek, Colorado 80467		
Post Location:	Lean-To Post Footing		

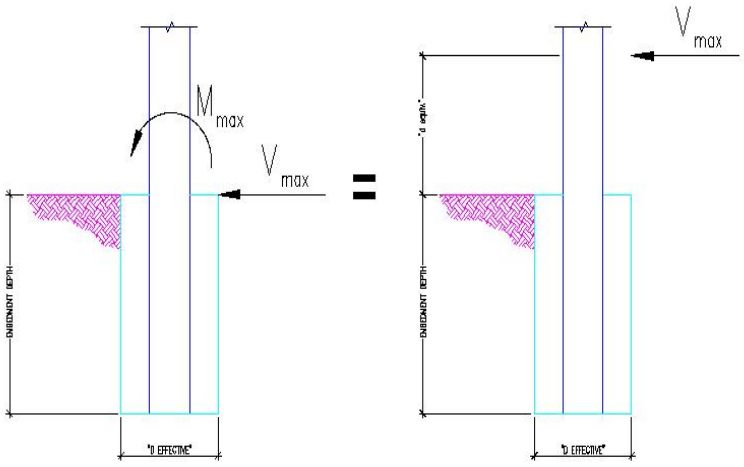
Lateral Loads:

H (ft) =	9
wind (plf)	140
Footing Diamter (in)	24
Surface Restraint?	N
Passive Soil Pressure Bearing (psf)=	250
V_{max} (lbs)=	786
M_{max} (lb-ft)=	1414
d_{equiv} (ft)= M/V=	1.8
D_{eff} (in)= 1.4D=	34
ft. minimum embedment	**2.0**

=0.5A[1 + (1 + (1 + 4.36d/A)^1/2]

Vertical Loads:

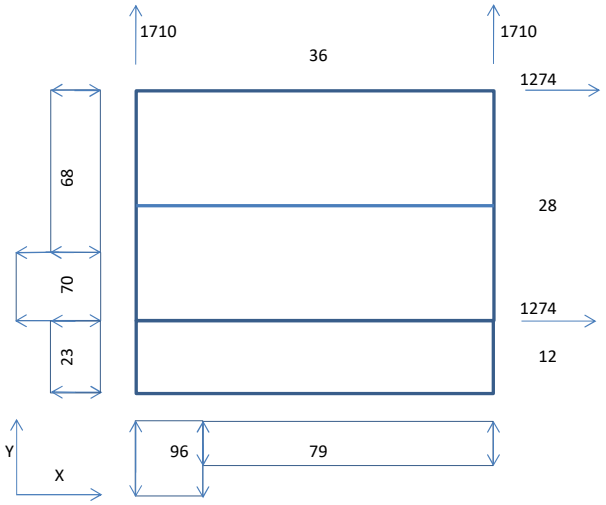
DL	1440	lbs.
SL	9831	lbs.
LL	0	lbs.
D+S	**11271**	**lbs.**
P_{soil}	3000	psf.
Embedment	**4.0**	**OK**
P_{soil}	4800	psf.
$A_{ftg.}$	2.3	sf.
Diameter	**1.7**	**USE 2'-0 Diameter**



Lateral Design

Project: Martin Woodrow
Job Location: Oak, Creek, Colorado 80467

a	3	ft.
2a	6	ft.



X-Direction:

$$s = \frac{1.0*Sds*[DL_{roof}*L_{roof}+DL_{wall}*H_{wall}*2\ walls]*.375}{2.5} = 91\ plf.$$

$P_{wind\ iz}$ = 68 plf.

Seismic Governs

$P_{wind\ ez}$ = 70 plf.

$P_{wind\ l/t}$ = 23 plf.

Y-Direction:

$$s = \frac{1.0*Sds*[DL_{roof}*W_{roof}+DL_{wall}*H_{wall}*2\ walls]*.375}{2.5} = 95\ plf.$$

$P_{wind\ iz}$ = 79 plf.

Seismic Governs

$P_{wind\ ez}$ = 96 plf.

Diaphragm:

$$Vu_x = \frac{1274}{36} = 35\ plf.$$

V_{allow} = 107 plf (4/3) = 143 plf > Vmax - Use 29 Ga with #9@9o.c.

$$Vu_y = \frac{1710}{28} = 61\ plf.$$

Chord Forces:

$$C_x = T_x = \frac{wl^2}{8d} = \frac{123120}{224} = 550\ lbs.$$

T_{allow} = 1235 lbs. > Tmax - Use (1) LSTA18 Strap

$$C_y = T_y = \frac{wl^2}{8d} = \frac{71344}{288} = 248\ lbs.$$

Endwall:

Length =	28	ft.	
L_{open} =	14	ft.	
N_{frames}	2		
% $Force_{frame}$ =	13%		
V =	1283	lbs.	
V_u =	92	plf.	**V_{allow} = 145 plf (4/3) = 193 plf > Vu - Use 29 Ga with #9@9 o.c.**
N_{posts} =	6		
P_{lat} =	NA	lbs.	
M_{lat} =	NA	ft.-lbs.	
$S_{req'd}$ =	NA	$in.^3$	

Sidewall:

Length =	36	ft.	
L_{open} =	21	ft.	
V =	1274	lbs.	
V_u =	85	plf.	**V_{allow} = 145 plf (4/3) = 193 plf > Vu - Use 29 Ga with #9@9 o.c.**

STRUCTURAL NOTES

GENERAL:

1. Dimensions: The structural drawings shall be considered as a part of the complete set of Contract drawings, including the drawings of all disciplines. It is intended that the Structural drawings will provide sufficient dimensions to locate the primary structural elements and members. Location of secondary members which are affected by systems detailed by others may require reference to the drawings of other disciplines and layout and coordination by the contractor. If direct conflict between dimensions of two or more disciplines is encountered, such conflicts shall be resolved by the Architect. Do not use scaled dimensions. Use written dimensions or where dimensions are not provided, consult the architect for clarifications before proceeding with the work in question.

2. Omissions or conflicts between various elements of the drawings, specifications, notes, and details shall be brought to the attention of the structural engineer and resolved before proceeding with the work. The contractor must submit in writing any requests for modifications to the plans and specifications. Shop drawings submitted to the structural engineer for review do not constitute "in writing" unless it is clearly noted that specific changes are being requested.

3. Deferred Submittals: Where Structural components are fully or partially designed and detailed by the supplier or fabricator, complete shop drawings and calculations, signed and sealed by a professional engineer registered in the state where the project is located, shall be submitted to the structural engineer for review. In addition, a copy of these documents shall be submitted to the Building Official for approval in accordance with IBC Section 107.3.4.1.

4. The Contract drawings and specifications represent the finished structure. They do not indicate the method of construction. The contractor shall provide all measures necessary to protect the structure during construction. Such measures shall include but not be limited to bracing and shoring for loads due to construction equipment and materials.

DESIGN CRITERIA:

1. Used 2021 International Building Code.
2. ASD Design Loads:
   - 2.1. Roof: D.L. = 15#/SF., L.L. = 102#/SF. Snow.
   - 2.2. Loft: D.L. = 12#/SF., L.L. = 40#/SF. Accessible Access
3. Wind load = 90 MPH (nominal), 115 MPH (ultimate), exposure B, Iw = 1.0.
4. Seismic: Equivalent Static Force Design Procedure.
   Seismic Design Category D, Site Class D.
   Ss = 0.511 SDS = 0.474
   S1 = 0.096 SD1 = 0.153
   R = 2.5 - Light framed walls w/shear panels all other materials.
   Ie = 1.0.

**Per ICC Commentary:

"Wind speeds are designated as "ultimate design" or "nominal design" wind speeds and are used for either strength design or allowable stress designs respectively. The ultimate design wind speeds are indicated in Figures 1609A, B & C, and vary based on the building's risk category and location. The ultimate design for wind speeds for a Risk Category II building vary from 110 mph on the West Coast to 180 mph in hurricane-prone areas in southern Florida. These wind speeds would convert to a nominal design wind speed, or what was previously called the "basic wind speed" 85 mph for the West Coast and 139 mph for southern Florida when using allowable stress design."

QUALITY ASSURANCE:

FOUNDATIONS:

1. Followed recommendations from soils investigation report No. 23-12920 prepared by NorthWest Colorado Consultants, Inc. dated Jan. 20, 2023.
2. Maximum foundation soil bearing pressure used = 3000#/SF.

MATERIALS:

CONCRETE:

1. Mix design shall be established in accordance to Chapter 5 of ACI 318.
2. Minimum foundation cement content = 376#/YD.
3. Maximum slump = 4".
4. Foundation 28 day strength f'c = 2,500 PSI. Special inspection not required per IBC 1705.3, exception 2.
5. Pre-Engineered Perma-Column 28 day strength f'c = 10,000 PSI.
   (If using Perma Column's)

STRUCTURAL AND MISCELLANEOUS STEEL:

1. All steel work shall conform with AISC specifications.
2. Bolts ASTM A307 for connections to concrete. Bolts ASTM A325 for steel to steel connections. Bolts to be snug tight except bolts indicated as S.C. to be fully tightened.
3. Roof Steel shall be painted 26 Ga, nail strip steel and shall be attached to framing with 1 ½" x #9 screws with neoprene washers at 9" o.c.
4. Wall Steel shall be painted 26 Ga, PBR steel and shall be attached to framing with 1 ½" x #9 screws with neoprene washers at 9" o.c.

LUMBER:

1. Sawn lumber for studs, joists, etc.(2x6 or larger) = No.2 Doug Fir larch or SPF 1250 psi. or better.
2. 2x4's = Standard Doug Fir larch.
3. Posts (Interior) = Triad Building Components MSR SPF.
   - 3.1. 2x8 Post Lam Uppers = 1,950Fb-1.7E
   - 3.2. 2x6 Post Lam Uppers = 1,650Fb-1.5E
   - 3.3. #1 Treated So. Pine Lam when embedment is in contact with ground. (Excludes Perma Columns)
4. Posts (Exterior) = Triad Building Components MSR SPF.
   - 4.1. 2x8 Post Lam Uppers = 1,950Fb-1.7E
   - 4.2. 2x6 Post Lam Uppers = 1,650Fb-1.5E
   - 4.3. #1 Treated So. Pine Lam when embedment is in contact with ground. (Excludes Perma Columns)
5. Roof Sheathing = $\frac{5}{8}$", minimum.
   - 5.1. Nailing = 8d(.131 Ø shank x 2 ½" long) or 1 ½" x 16Ga. staples at 6" o.c. all supported edges, 12" o.c. in field.
6. Wall Sheathing = $\frac{7}{16}$", minimum.
   - 6.1. Nailing = 8d(.131 Ø shank x 2 ½" long) or 1 ½" x 16Ga. staples at 6" o.c. all supported edges, 12" o.c. in field.
7. All nails are to be common nails unless noted otherwise.
8. For connections of "SIMPSON" hardware or equivalent follow manufacturers recommendations.
9. Trus-Joist products:
   - 9.1. Roof joists shown as TJI etc. shall be designed for the loads specified and shall conform to Trus-Joist specification.
   - 9.2. Joists exceeding 24' in length shall be cambered to a standard radius of R = 2250.
   - 9.3. Any alternate joist system(s) shall be the same depth and load Carrying capacity as the Trus-Joist system show on the drawings.
   - 9.4. Micro Lam (LVL) E-1,900,000 psi.
10. Premanufactured Trusses
    - 10.1. Truss Loading:
      Top Chord D.L. = 8 PSF.
      Bottom Chord D.L. = 7 PSF.
      Top Chord L.L. = 102 PSF.
      Bottom Chord L.L. = 2 PSF. Does not act concurrently with top chord L.L.
    - 10.2. Member Properties:
      Chords shall be #2 Douglas Fir or better.
      Webs shall have minimum Modulus of Elasticity of 1,500,000 psi.
    - 10.3. All truss blocking shall be provided by the truss manufacturer and constructed with approved plates.
    - 10.4. Truss Manufacturer shall verify all truss dimensions, accounting for tolerances, connections, and splice requirements.
    - 10.5. Truss profiles shown are representations of possible configurations of Web locations and member sizes. Truss manufacturer shall submit shop drawings for approval. All trusses shall be designed by a registered professional engineer and all shop drawings shall be stamped and signed by a registered professional engineer.
    - 10.6. Truss manufacturer shall provide proof of approved third party I inspection as required by IBC chapter 2303.4.
    - 10.7. Truss manufacturer shall design all truss to truss connections and shall indicate said connections on the shop drawings.
    - 10.8. Each truss shall be marked with the following information:
      10.8.1. Manufacturers identity.
      10.8.2. Design Load.
      10.8.3. Truss spacing.
11. All lumber in contact with concrete, masonry, or ground shall be preservative treated wood in accordance with AWPA standards. Posts embedded in the ground shall comply with UC4B .60 treatment or greater.

ROOF SNOW LOAD FACTORS

Pf = 0.7(Ce)(Ct)(I)Pg

Elevation	= 8004 ft.
Ground snow	= 143 psf.
Importance	= 1.0
Thermal (Ct)	= 1.1
Exposure (Ce)	= 1.0
Slope (Cs)	= 0.93
Roof Snow (Pf)	= 110.00
Sloped Roof Snow (Ps)	= 102.00

COLORADO LICENSED
JASON O. CLARK
64770
11/22/2024
PROFESSIONAL ENGINEER

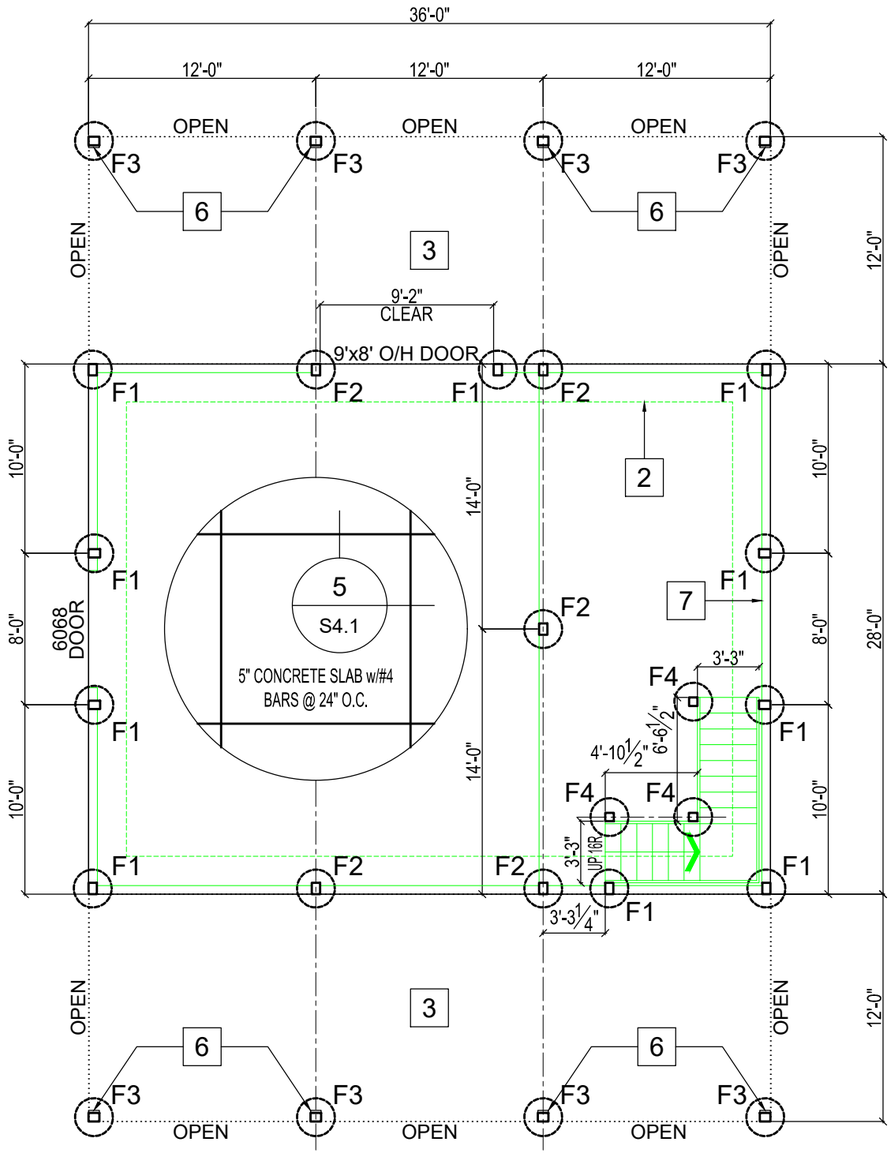
NOTES STRUCTURAL

NO.	REVISIONS	DATE

STEEL STRUCTURES AMERICA INC.

POST FRAME BLDG FOR:
MARTIN WOODROW
31555 GREEN RIDGE DR.
OAK CREEK, COLORADO

DRAWN	CW
DATE	11/22/24
JOB NO.	14167
SHEET	S0



FOUNDATION PLAN

SCALE: ⅛" = 1'-0"

FOUNDATION NOTES:

1. OSB SHIMS & TYP. NAILING ON FACES OF PERMA COLUMN POSTS TO FLUSH OUT WHERE NEEDED.
2. INSTALL R-10 FROST BARRIER UNDER SLAB, SEE DETAIL 4/S4.1
3. 4" CONCRETE SLAB UNDER EA. LEANTO. SEE DETAIL 5/S4.1
4. STAIR STRINGERS SHALL BE 1 3/4"x 14 LVL TYP.
   MIN. RUN = 10"
   MAX RISE = 7 3/4"
5. FRAMED STAIR HANDRAILS TO BE INSTALLED I.A.W. 2021 IRC. R311.7
6. PROVIDE 2x8 STRONGBACKS ON INSIDE FACE OF UNBRACED POSTS. ATTACH w/(2) 16d @ 12" O.C. TYP.
7. 2x6 STUDS FRAMED @ 16" O.C. w/PT 2x SILL PLATE w/MIN. ½"Øx2¾" EXPANSION ANCHORS AND STD. WASHERS @ 5' O.C. & 12" FROM ENDS.

FOOTING SCHEDULE

MARK	"D"	DEPTH	POST - LOWER	POST - UPPER	DETAIL	BELL - WIDTH	BELL - DEPTH
F1	2'-0"Ø	4'-0"	Perma-Column 8300	(3) 2x8 SPF	2/S3	-----	-----
F2	2'-0"Ø	5'-0"	Perma-Column 8300	(3) 2x8 SPF	2/S3	3'-0"Ø	12"
F3	2'-0"Ø	4'-0"	Perma-Column 6400	(4) 2x6 SPF	2/S3	-----	-----
F4	2'-0"Ø	4'-0"	Perma-Column 6300	(3) 2x6 SPF	2/S3	-----	-----

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FOUNDATION PLAN

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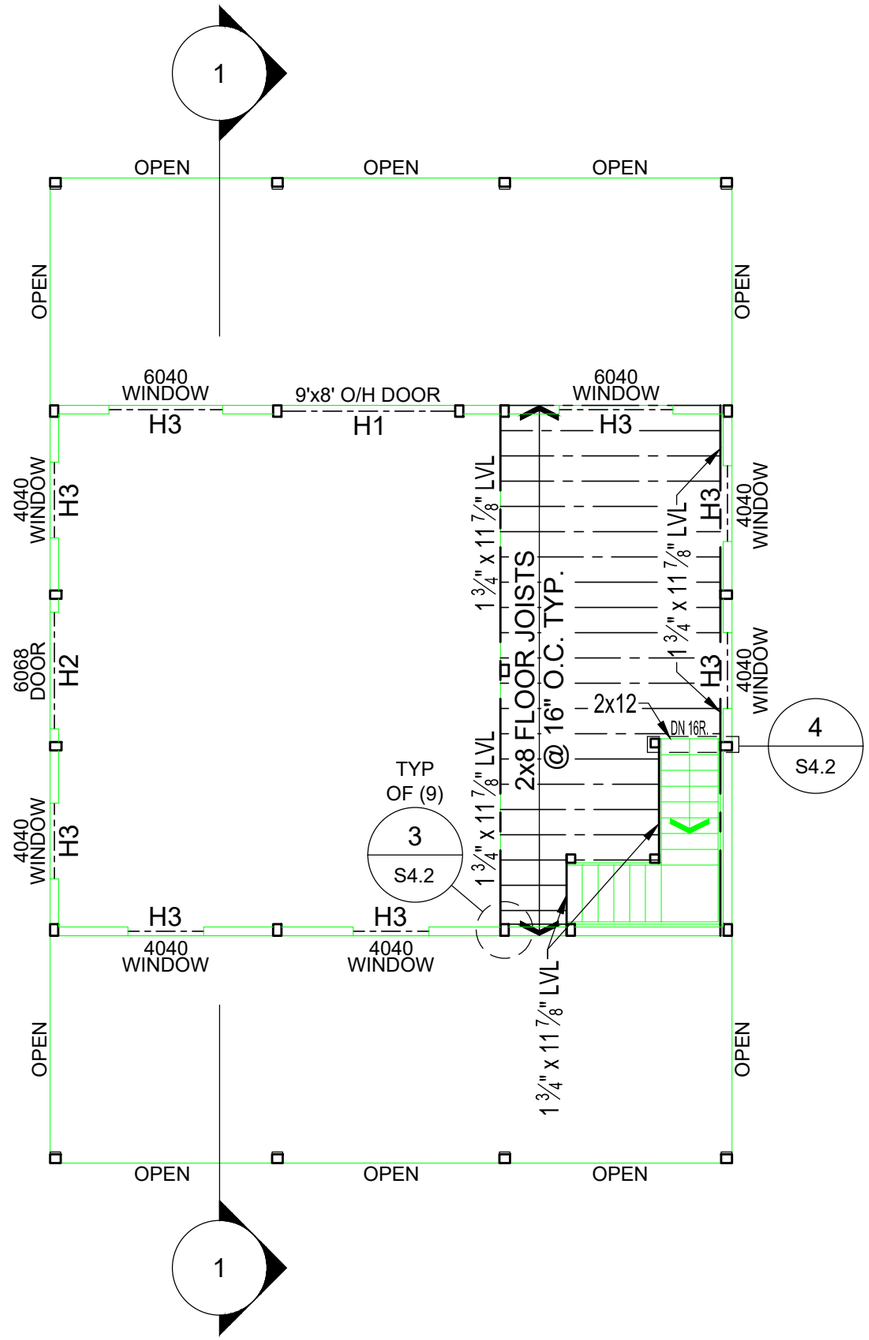
POST FRAME BLDG FOR:
MARTIN WOODROW
31555 GREEN RIDGE DR.
OAK CREEK, COLORADO

DRAWN	CW
DATE	11/22/24
JOB NO.	14167
SHEET	S1



LOFT FRAMING NOTES:

1. STAIR STRINGERS SHALL BE 1 3/4"x14" LVL TYP.
   MIN. RUN = 10"
   MAX RISE = 7 3/4"
2. ATTACH 2x8 JOISTS TO GLB/RIM JOIST w/HU28 HANGER TYP.
3. FRAMED STAIR HANDRAILS TO BE INSTALLED I.A.W. 2021 IRC. R311.7
4. SEE DETAIL 5/S4.2 FOR HANDRAIL DETAIL
5. CONFIRM WINDOW & MAN DOOR LOCATIONS w/OWNER.

HEADER SCHEDULE

MARK	MEMBER	SUPPORT
H1	V = (1) 2x10 DF#2 H = (1) 2x8 DF#2	(1) 2x8 TRIMMER
H2	V = (1) 2x8 DF#2 H = (1) 2x6 DF#2	(1) 2x6 TRIMMER (1) 2x6 KING
H3	V = (1) 2x8 DF#2 H = (1) 2x6 DF#2	(1) 2x6 TRIMMER (1) 2x6 KING

NOTE: REFER TO DETAILS 2 & 3/S4.1 FOR HEADER FRAMING CONDITIONS.

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LOFT FRAMING PLAN

SCALE: ⅛" = 1'-0"

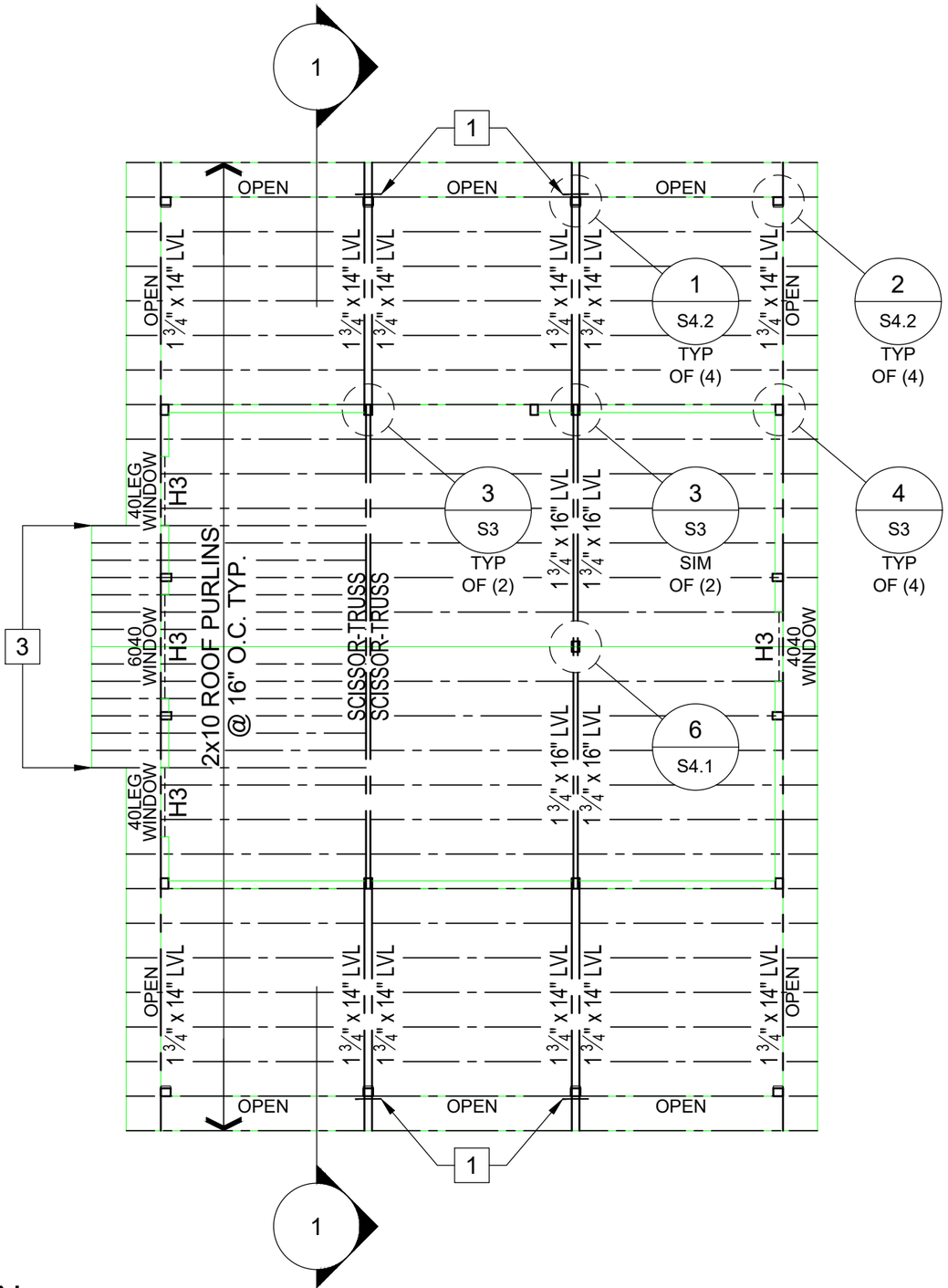
LOFT FRAMING PLAN

NO.	REVISIONS	DATE

STEEL STRUCTURES AMERICA INC.

POST FRAME BLDG FOR:
MARTIN WOODROW
31555 GREEN RIDGE DR.
OAK CREEK, COLORADO

DRAWN	CW
DATE	11/22/24
JOB NO.	14167
SHEET	S2.1



ROOF FRAMING PLAN

SCALE: 1/8" = 1'-0"

ROOF FRAMING NOTES:

1. LSTA18 STRAP- PLACE AT INSIDE OF FASCIA BOARD IF NO OVERHANGS. PLACE AT INSIDE FACE OF TOP WALL GIRT IF OVERHANGS
2. CONFIRM WINDOW & MAN DOOR LOCATIONS w/OWNER.
3. GABLE EXTENSION PURLINS TO BE SAME SIZE & HALF SPACING AS TYP. PER PLANS.

HEADER SCHEDULE

MARK	MEMBER	SUPPORT
H1	V = (1) 2x10 DF#2 H = (1) 2x8 DF#2	(1) 2x8 TRIMMER
H2	V = (1) 2x8 DF#2 H = (1) 2x6 DF#2	(1) 2x6 TRIMMER (1) 2x6 KING
H3	V = (1) 2x8 DF#2 H = (1) 2x6 DF#2	(1) 2x6 TRIMMER (1) 2x6 KING

NOTE: REFER TO DETAILS 2 & 3/S4.1 FOR HEADER FRAMING CONDITIONS.

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ROOF FRAMING PLAN

NO.	REVISIONS	DATE

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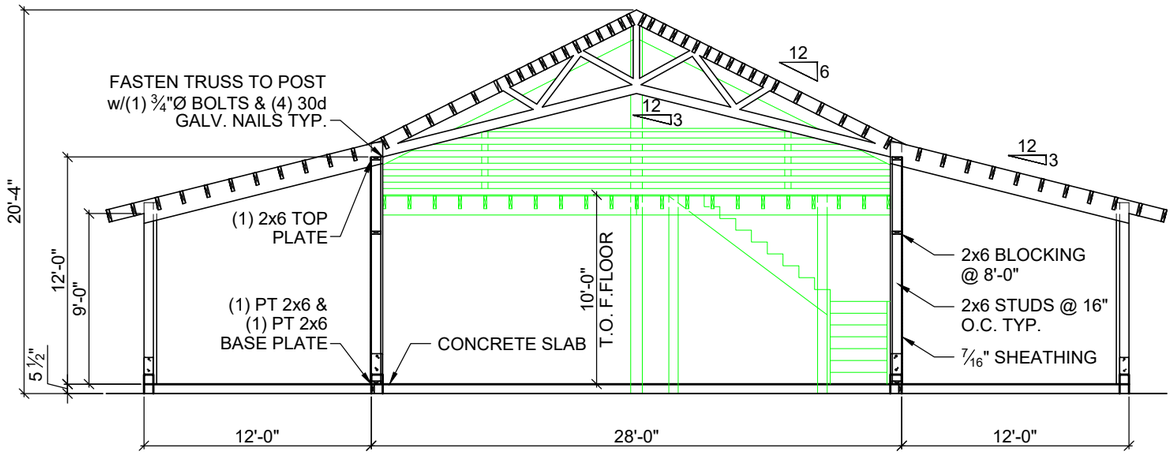
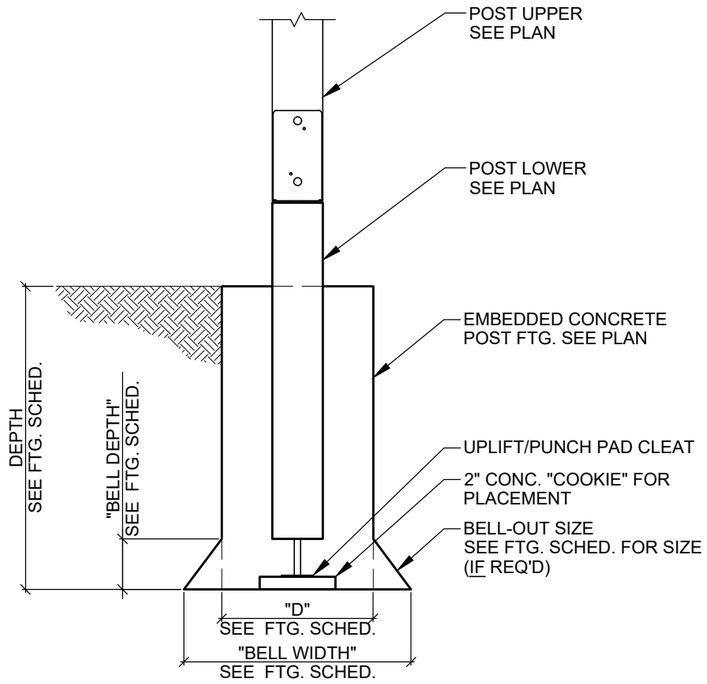
POST FRAME BLDG FOR:
MARTIN WOODROW
31555 GREEN RIDGE DR.
OAK CREEK, COLORADO

DRAWN	CW
DATE	11/22/24
JOB NO.	14167
SHEET	S2.2



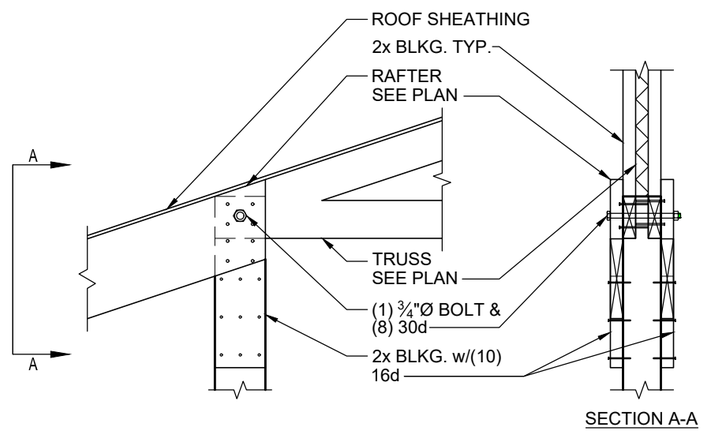
1 SECTION 1-1

SCALE: ⅛"=1'-0"



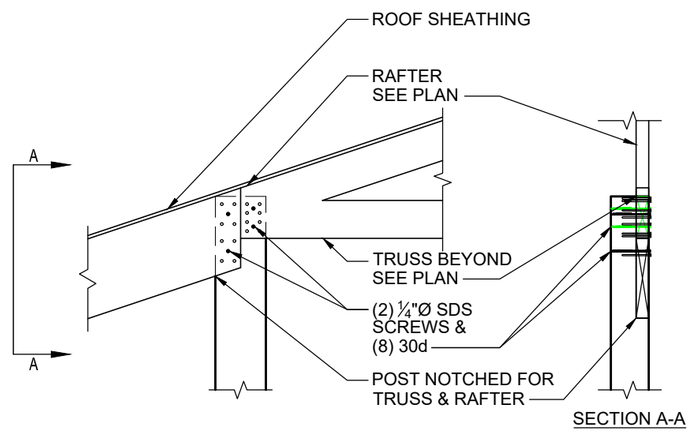
2 POST FOOTING

SCALE: ½"=1'-0"



3 ROOF FRAMING CONNECTION DETAIL

SCALE: ½"=1'-0"



4 ROOF FRAMING CONNECTION DETAIL

SCALE: ½"=1'-0"

BLDG. SECTION & FRAMING DETAILS

NO.	REVISIONS	DATE

STEEL STRUCTURES AMERICA INC.

POST FRAME BLDG FOR:
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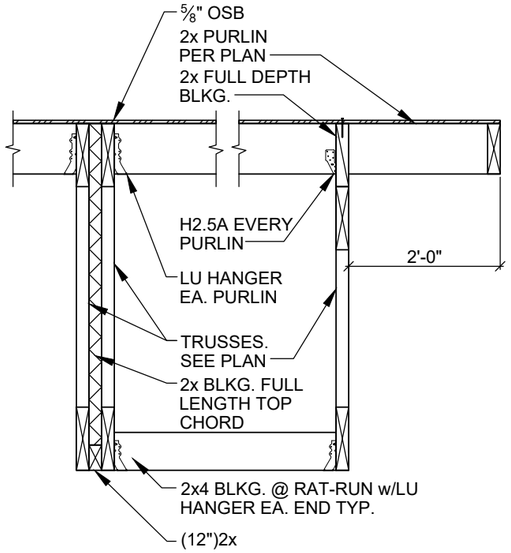
31555 GREEN RIDGE DR.
OAK CREEK, COLORADO

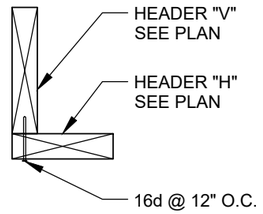
COLORADO LICENSED
JASON O. CLARK
64770
11/22/2024
PROFESSIONAL ENGINEER

DRAWN	CW
DATE	11/22/24
JOB NO.	14167
SHEET	S3



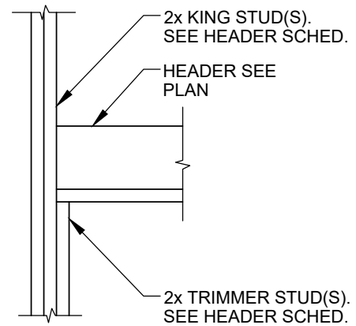
1 GABLE TRUSS FRAMING DETAIL

SCALE: ½"=1'-0"



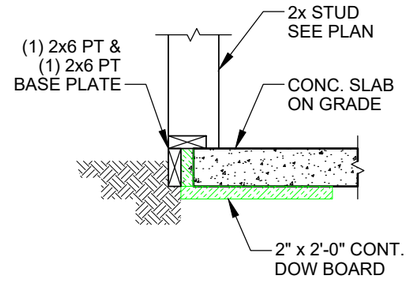
2 HEADER DETAIL

SCALE: 1"=1'-0"



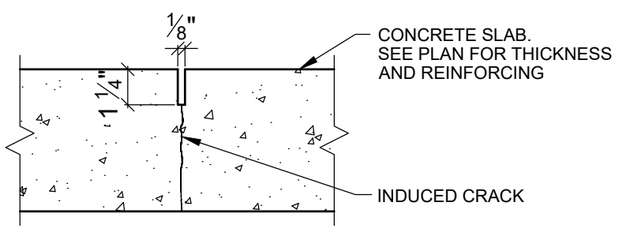
3 HEADER FRAMING DETAIL

SCALE: ½"=1'-0"



4 EXTERIOR FROST WALL

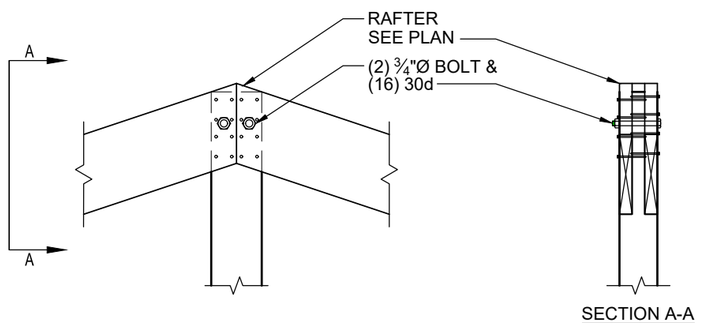
SCALE: ½"=1'-0"



NOTE:
1. CONTROL JOINT SPACING NOT TO EXCEED 12'-0" O.C.
2. SAW CUT SLAB WITHIN 12 HOURS AFTER SLAB HAS BEEN PLACED.

5 CONTROL JOINT DETAIL

SCALE: 1 ½"=1'-0"



6 MAIN FRAME RAFTER BEARING DETAIL

SCALE: ½"=1'-0"

FRAMING DETAILS

NO.	REVISIONS	DATE

STEEL STRUCTURES AMERICA INC.

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MARTIN WOODROW
31555 GREEN RIDGE DR. OAK CREEK, COLORADO

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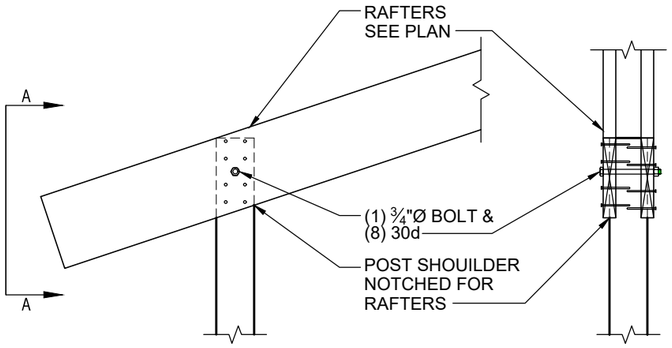
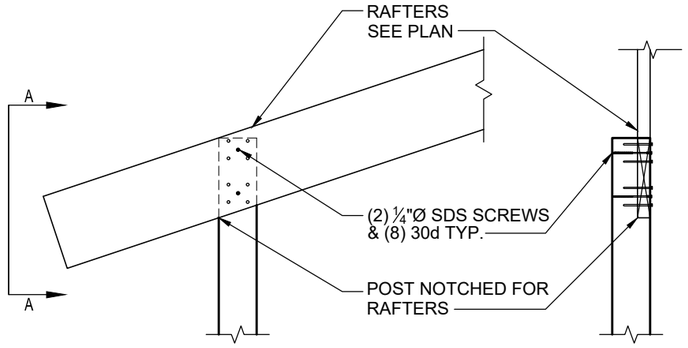
JOB NO.	14167
SHEET	S4.1



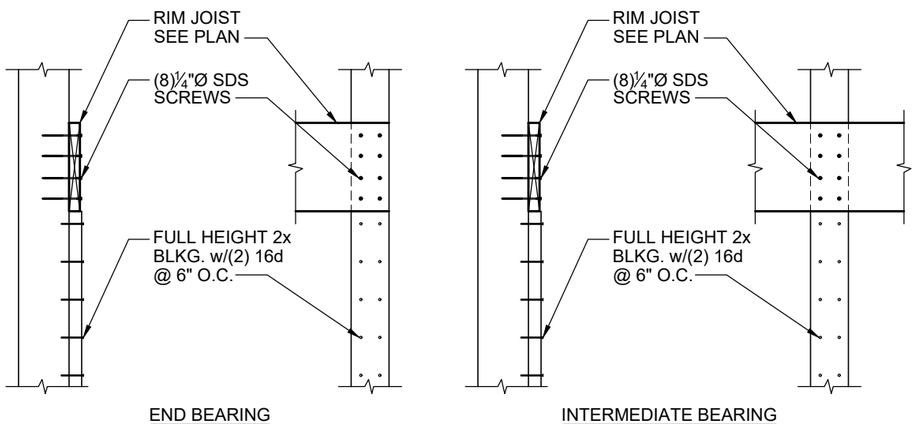
1 ROOF FRAMING CONNECTION DETAIL

SCALE: ½"=1'-0"



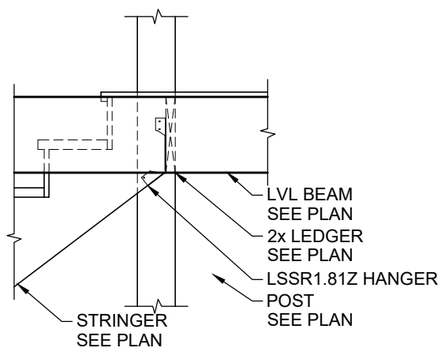
2 ROOF FRAMING CONNECTION DETAIL

SCALE: ½"=1'-0"



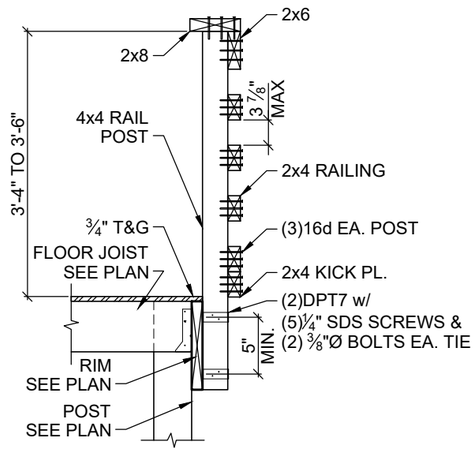
3 LOFT RIM CONNECTION DETAIL

SCALE: ½"=1'-0"



4 STAIR FRAMING DETAIL

SCALE: ½"=1'-0"



5 LOFT RAILING DETAIL

SCALE: ½"=1'-0"

COLORADO LICENSED
JASON O. CLARK
64770
11/22/2024
PROFESSIONAL ENGINEER

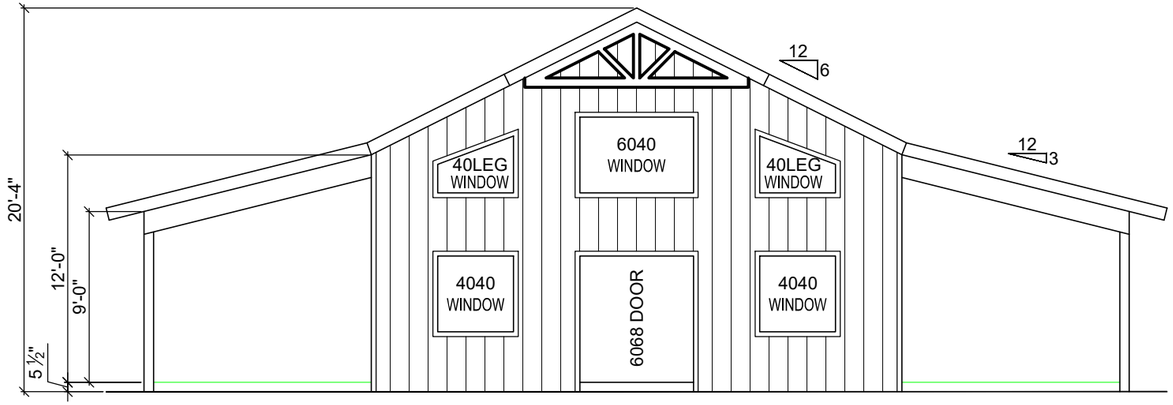
FRAMING DETAILS

NO.	REVISIONS	DATE

STEEL STRUCTURES AMERICA INC.

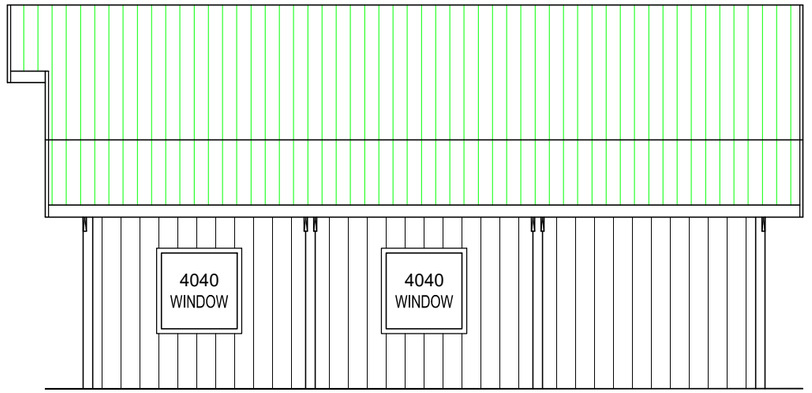
POST FRAME BLDG FOR:
MARTIN WOODROW
31555 GREEN RIDGE DR.
OAK CREEK, COLORADO

DRAWN	CW
DATE	11/22/24
JOB NO.	14167
SHEET	S4.2



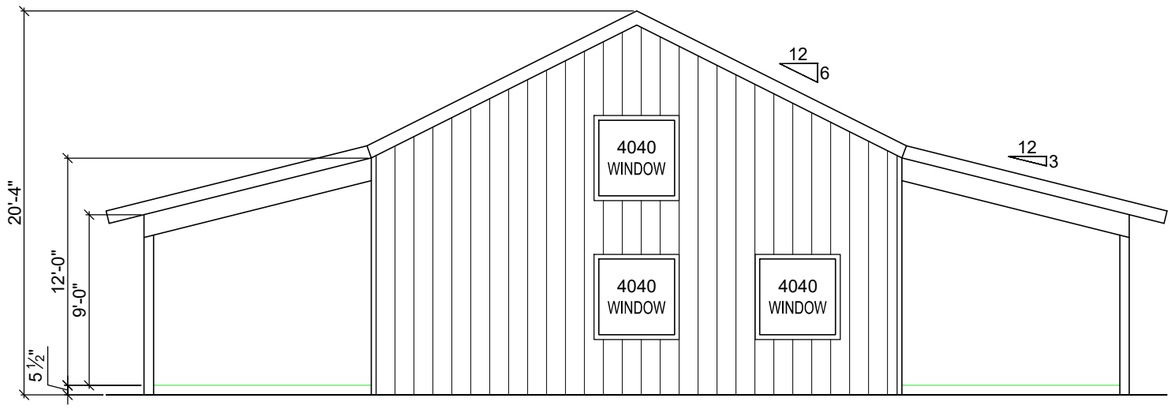
1 FRONT ELEVATION

SCALE: ⅛"=1'-0"



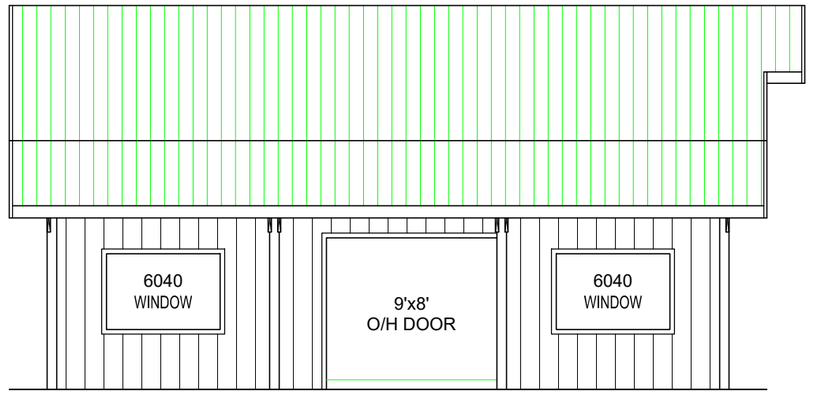
3 RIGHT ELEVATION

SCALE: ⅛"=1'-0"



2 REAR ELEVATION

SCALE: ⅛"=1'-0"



4 LEFT ELEVATION

SCALE: ⅛"=1'-0"

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ELEVATIONS

NO.	REVISIONS	DATE

STEEL STRUCTURES AMERICA INC.

POST FRAME BLDG FOR:

MARTIN WOODROW

31555 GREEN RIDGE DR. OAK CREEK, COLORADO

DRAWN	CW
DATE	11/22/24
JOB NO.	14167
SHEET	S5