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Instant Roof Framing Analysis

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STRUCTURAL ANALYSIS

for the

ROOFTOP PV SOLAR INSTALLATION

Project: Billy H Riggsbee, 10 Braddock Drive, Lillington, NC 27546

Prepared for:

FREEDOM SOLAR POWER

Freedom Solar, LLC

4801 Freidrich Ln, Ste 100 - Austin, TX 78744

Calculation Report Index

Project Number: 36.114862, Rev. 0

Report Date: 07/03/2024

Report Prepared by:

NORTH CAROLINA PROFESSIONAL SEAL 043326 ENGINEER RICHARD PANTEL

Richard Pantel, P.E.
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Sealed 07/03/2024

Richard Pantel

Digitally signed by Richard Pantel
DN: c=US, o=TECTONICORP PC, dnQualifier=A01410C0000018E57987 26E0001A3B4, cn=Richard Pantel
Date: 2024.07.03 16:17:18 -04'00'

V240625
ID.L1PW

Loading Summary

Exposure and Occupancy Categories		
B		*Exposure Category (ASCE 7-16 Table 26.7.3, Page 266)*
II		*Building Use Occupancy / Risk Category (ASCE 7-16 Table 1.5-1, Page 4)*

Wind Loading:			
v	118	*mph*	*ASCE 7-16, Figure 26.5-1 A, B or C, pp 249-251. [(118 mph, 50 year wind MRI)]*
qz	21.05	*psf*	*Velocity qz, calculated at height z [ASD]*

Snow Loading			
pg	15.00	*psf*	*Ground Snow Load pg (ASCE 7-16 Table 7.2-1, Page 52-53)*
Total Snow Load			
ps	15.00	*psf*	*Effective snow load on roof and modules*

Module Data			
SunPower: SPR-M425-H-AC			
Dimensions	*mm*	*ft*	*in*
Length	1,872	6.14	73.70
Width	1,032	3.39	40.63
Area (m^2, ft^2)	1.9	20.79	
Weight	kg	lb	
Module	21.82	48.10	

Roof Panel (Cladding) Loading Summary		Module Loading Summary			
Support Point Loads		*Upward*	*Upward*	*Upward*	*Downward*
Roof Zones		1,2e,2r	2n,3r	3e	All
Net load per module	*lb*	-132	-187	-285	234

Positive values indicate net downward force

Primary Stanchion: Pegasus Solar InstaFlash PIF-RB0

Stanchion Fastener Pull-out and Spacing Calculations					
Framing spacing			*ft*	2.00	
Rails / Module			*ea*	2	
Max proposed stanchion span			*ft*	4.00	
# fasteners per stanchion				1	
Bolt thread embedment depth			*in*	3.00	
Safety Factor				1.10	
Pull-out for 5/16 threaded fasteners			*lb/in*	220	
Factored max fastener uplift capacity			*lb*	599	
Fastener details	*Material*	Stainless	*Size*	5/16	*Predrill hole 0.16" dia or use self tapping*
Max stanchion uplift capacity			*lb*	618	
Max support point uplift capacity			*lb*	599	

Roof Zones			*1,2e,2r*	*2n,3r*	*3e*
Net lift per module		*lb*	132	187	285
Min tot bolt thread embedment depth rq'd		*in*	0.66	0.94	1.43
Net uplift pressure	7. 0.60D - 0.6W	*psf*	-6.98	-9.12	-12.35
Allowable lift area / support point		*sf*	85.75	65.69	48.51
Max rail span per framing spacing		*ft*	4.00	4.00	4.00
Landscape Modules					
Length along rafter		*ft*	3.39		
Lift calc'ed max stanchion EW spacing		*ft*	> 6	> 6	> 6
Max stanchion EW spacing		*ft*	4.00	4.00	4.00
Maximum module area / support point		*sf*	6.77	6.77	6.77
Factored lift per support point		*lb*	-47	-62	-84
Portrait Modules					
Length along rafter		*ft*	6.14		
Lift calc'ed max stanchion EW spacing		*ft*	> 6	> 6	> 6
Max stanchion EW spacing		*ft*	4.00	4.00	4.00
Maximum module area / support point		*sf*	12.28	12.28	12.28
Factored lift per support point		*lb*	-86	-112	-152

Stanchion support threaded fastener sizes are indicated in the Module Loading Summary table above. Lift forces were determined from GCp and other coefficients contained in the ASCE nomographs

Conclusions

We were asked to review the roof of Billy H Riggsbee, located at 10 Braddock Drive, Lillington, NC, by Freedom Solar, LLC, to determine its suitability to support a PV solar system installation.

The referenced building's roof structure was field measured by Freedom Solar, LLC on 06/25/2024. The attached framing analyses reflect the results of those field measurements combined with the PV solar module locations shown on the PV solar roof layout design prepared by Freedom Solar, LLC. Loads are calculated to combine the existing building and environmental loads with the proposed new PV array loads.

The SunPower InvisiMount 6000 series racking and Pegasus Solar InstaFlash PIF-RB0 stanchions were selected for this project by Freedom Solar, LLC. The racking and support stanchions shall be placed as shown on their plans, dated 07/03/2024, and shall be fastened to the roof framing using fastener sizes indicated in this report. Rack support spacing shall be no more than that shown above. Note that support points for alternating rows shall share the same truss. Intermediate rows shall move the support points laterally to the next truss. The support rail can be cantilevered up to 1/3 of the maximum span between modules. 1/3 maximum span = 16.00 inches.

Google Location Map

Framing Summary

	Ex. Framing	Total Ex DL
MP 1: Truss @ 24" OC	0.79 psf	5.19 psf
MP 2: Truss @ 24" OC	0.79 psf	5.19 psf

** Wood species used in these calculations assumes spruce, pine or fir, #2 grade.*

Based upon the attached calculations, the existing roofs' framing systems are capable of supporting the additional loading for the proposed PV solar system along with the existing building and environmental loads. No supplemental roof framing structural supports are required. Minimum required anchorage fastening is described above.

Wood fastener notes: 1) Fastener threads must be embedded in the side grain of a roof support structural member or other structural member integrated into the building's structure. 2) Fastener must be located in the middle third of the structural member. 3) Install fasteners with head and where required, washer, flush to material surface (no gap). Do not over-torque.

References and Codes:

1) *ASCE 7-16 Minimum Design Loads for Buildings and Other Structures*
2) *2018 IBC*
3) *2018 NC Building Code*
4) *American Wood Council, NDS 2018,Table 12.2A, 12.3.3A.*
5) *American Wood Council, Wood Structural Design, 1992, Figure 6.*

Geometric Data			
Θ	*deg.*	30.00	*Angle of roof plane from horizontal, in degrees*
ω	*deg.*	0.00	*Angle the solar panel makes with the roof surface*
L	*ft.*	40.00	*Length of roof plane, in feet (meters)*
W	*ft.*	14.00	*Plan view width of roof plane, in feet (meters)*
h	*ft.*	18.67	*Average height of roof above grade, in feet (meters)*

Roof Wind Zone Width			
	use, a =	3.00	*ft*

Wind Velocity Pressure, q_z evaluated at the height z						
q_z=	21.05	*psf*	*Vasd* q_z=	12.89	*psf*	Basic wind pressure
V=	118	mph				

Framing Data		
Wood type	US Spruce	
Wood source, moisture content	White 0.12%	
# Framing Members / Support		1
Rafter / Truss OC	*in*	24.00
Member Total Length	*ft*	16.00

2	# Rafters / Rack Support Width
4.00	Rack Support Spacing (ft)
48	Max. Rack Support Spacing (in)
2	Max # of mod's / Truss top chord

Member Properties		**Member**
Name		(1) 2x4
Repetitive Member Factor (Cr)		1.15

** Mem properties based upon field measurements*

Truss top chord

Module Physical Data			
Weight	kg	lb	psf load
Module	21.82	48.10	2.31
4 Stanchions	1.36	3.0	0.14

Existing Dead Loads	*Units*	*Value*	*Description*
Roof Deck & Surface	*psf*	4.40	*Truss members' self weight added to FEA analysis*

Rack Support Spacing and Loading				
Across rafters	*ft*	4.0		
Along rafter slope	*ft*	6.1		
Area / support point	*sf*	12.3		
Uphill gap between modules	*in*	1.0	0.08	*ft*

Member Total Length	*ft*	16.00	
Maximum member free span	*ft*	16.00	Truss top chord span

ASCE 7-16 **Method for Calculating Uplift on PV Modules**

Notation
Lp = Panel chord length.
p = uplift wind pressure
γa = Solar panel pressure equalization factor, defined in Fig. 29.4-8.
γE = Array edge factor as defined in Section 29.4.4.
θ = Angle of plane of roof from horizontal, in degrees.

29.4.4 Rooftop Solar Panels Parallel to the Roof Surface on Buildings of All Heights and Roof Slopes.

Θ >= 7 deg TRUE

Min.d1: Exposed	**FALSE**
Max.d1: Exposed	**TRUE**
1.5(Lp) =	5.08
γE =	1.5
γa =	0.67

Use EXPOSED for uplift calculations

$p = qh(GCp)\ (\gamma_E)\ (\gamma_a)$ (lb/ft2) (29.4-7)

Zones	1,2e,2r	2n,3r	3e
GCp	-1.48	-1.76	-2.17
p, Windload (psf)	-19.28	-22.84	-28.22

Downward, Zones All Zones
GCp 0.77

ASCE 7-16 Chapter 2 Combinations of Loads, Table 2.4, Page 8 (in psf)				
Zones	1,2e,2r	2n,3r	3e	All Zones
2.2 SYMBOLS AND NOTATION	*Module Upward*	*Module Upward*	*Module Upward*	*Downward*
D = dead load of PV Module + Stanchion	2.46	2.46	2.46	2.46
S = snow load	15.00	15.00	15.00	15.00
W = wind load = (Vu Windload) = (Vasd Windload / 0.6)	-19.28	-22.84	-28.22	9.96

2.4 Combining Nominal Loads Using Allowable Stress Design (in psf)				
2.4.1 Basic Combinations. Loads listed herein shall be considered to act in the following combinations; whichever produces the most unfavorable effect in the building, foundation, or structural member being considered. Effects of one or more loads not acting shall be considered.				
Combination Formulae	*Upward*	*Upward*	*Upward*	*Downward*
Use this loading combination for DOWNWARD for Proposed PV Dead Load				
6. D + 0.75L - 0.75(0.60W) + 0.75(Lr or S or R)	17.46	17.46	17.46	21.94
Module Support point load (lb)	214	214	214	270
Cr Factored Module Support point load (lb)	186	186	186	234

Use this loading combination for UPWARD for Proposed PV Dead Load				
7. 0.60D - 0.6W	-6.98	-9.12	-12.35	7.64
Module Support point load (lb)	-86	-112	-152	94

DOWNWARD

Presume loading directly over member.

Combined Dead and Wind Pressure Downward Loading					
	Truss top chord span				
PV Module Row	Point load loc's from Left support	Point Load #'s	Module Support Point Load	Comment	Module Orientation
	ft from left		*lb*		
1	2.25		234		Portrait
1	8.39			Support placed on adjoining truss	Portrait
2	8.48			Support placed on adjoining truss	Portrait
2	14.62		234		Portrait

Truss Data and Loading for MP 1

Roof slope (degrees)	30.00
Top ridge height above floor plane	8.00

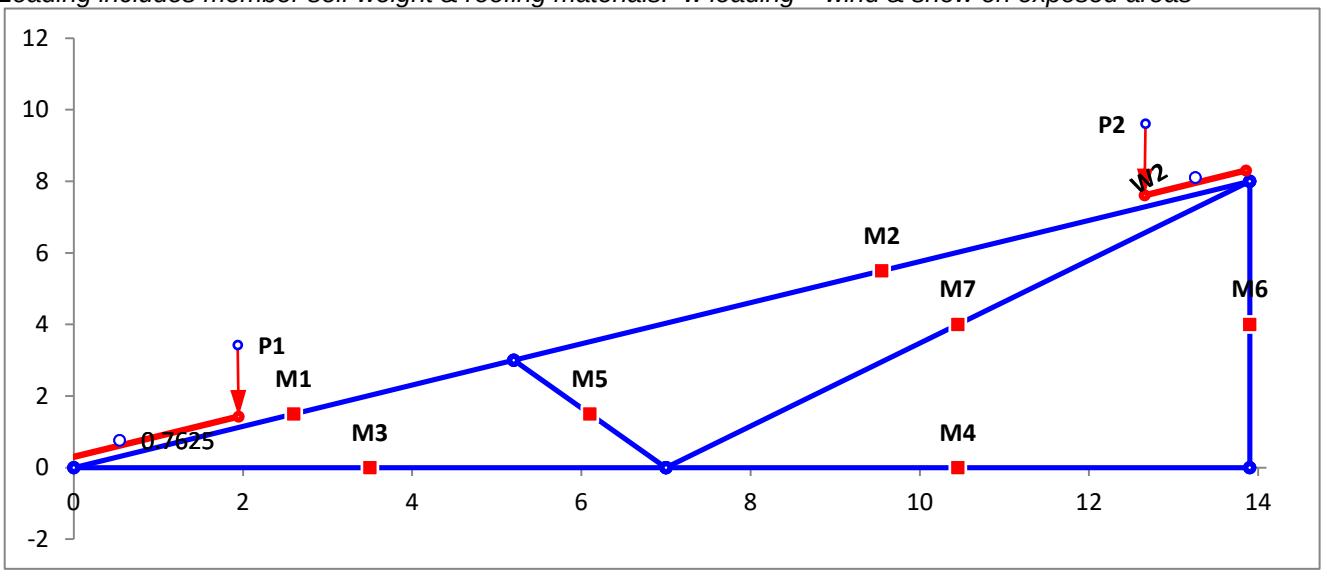
	Length of roof plane	16.00
	Length of floor plane	14.00

Truss Segments

Roof Plane		*Floor Plane*	
Mem #	*Mem Type*	Mem #	*Mem Type*
1	2x4	3	2x4
2	2x4	4	2x4

Diagonals		*Diagonals*	
Mem #	*Mem Type*	Mem #	*Mem Type*
5	2x4	7	2x4
6	2x4		

** Loading includes member self weight & roofing materials. w loading = wind & snow on exposed areas*



Geometric Data			
Θ	*deg.*	16.00	*Angle of roof plane from horizontal, in degrees*
ω	*deg.*	0.00	*Angle the solar panel makes with the roof surface*
L	*ft.*	40.00	*Length of roof plane, in feet (meters)*
W	*ft.*	14.00	*Plan view width of roof plane, in feet (meters)*
h	*ft.*	18.67	*Average height of roof above grade, in feet (meters)*

Roof Wind Zone Width			
	use, a =	3.00	*ft*

Wind Velocity Pressure, q_z evaluated at the height z						
q_z=	21.05	*psf*	*Vasd* q_z=	12.89	*psf*	Basic wind pressure
V=	118	mph				

Framing Data		
Wood type	US Spruce	
Wood source, moisture content	White 0.12%	
# Framing Members / Support		1
Rafter / Truss OC	*in*	24.00
Member Total Length	*ft*	14.50

2	# Rafters / Rack Support Width
4.00	Rack Support Spacing (ft)
48	Max. Rack Support Spacing (in)
2	Max # of mod's / Truss top chord

Member Properties		**Member**
Name		(1) 2x4
Repetitive Member Factor (Cr)		1.15

** Mem properties based upon field measurements*

Truss top chord

Module Physical Data			
Weight	kg	lb	psf load
Module	21.82	48.10	2.31
4 Stanchions	1.36	3.0	0.14

Existing Dead Loads	*Units*	*Value*	*Description*
Roof Deck & Surface	*psf*	4.40	*Truss members' self weight added to FEA analysis*

Rack Support Spacing and Loading				
Across rafters	*ft*	4.0		
Along rafter slope	*ft*	6.1		
Area / support point	*sf*	12.3		
Uphill gap between modules	*in*	1.0	0.08	*ft*

Member Total Length	*ft*	14.50	
Maximum member free span	*ft*	14.50	Truss top chord span

ASCE 7-16 **Method for Calculating Uplift on PV Modules**

Notation
Lp = Panel chord length.
p = uplift wind pressure
γa = Solar panel pressure equalization factor, defined in Fig. 29.4-8.
γE = Array edge factor as defined in Section 29.4.4.
θ = Angle of plane of roof from horizontal, in degrees.

29.4.4 Rooftop Solar Panels Parallel to the Roof Surface on Buildings of All Heights and Roof Slopes.

Θ >= 7 deg TRUE

Min.d1: Exposed	**FALSE**
Max.d1: Exposed	**TRUE**
1.5(Lp) =	5.08
γE =	1.5
γa =	0.67

Use EXPOSED for uplift calculations

$p = qh(GCp)\ (\gamma_E)\ (\gamma_a)$ (lb/ft2) (29.4-7)

Zones	1,2e	2n,2r,3e	3r
GCp	-1.96	-2.54	-3.56
p, Windload (psf)	-25.55	-33.00	-46.27

Downward, Zones All Zones
GCp 0.48

ASCE 7-16 Chapter 2 Combinations of Loads, Table 2.4, Page 8 (in psf)				
Zones	1,2e	2n,2r,3e	3r	All Zones
2.2 SYMBOLS AND NOTATION	*Module Upward*	*Module Upward*	*Module Upward*	*Downward*
D = dead load of PV Module + Stanchion	2.46	2.46	2.46	2.46
S = snow load	15.00	15.00	15.00	15.00
W = wind load = (Vu Windload) = (Vasd Windload / 0.6)	-25.55	-33.00	-46.27	6.13

2.4 Combining Nominal Loads Using Allowable Stress Design (in psf)				
2.4.1 Basic Combinations. Loads listed herein shall be considered to act in the following combinations; whichever produces the most unfavorable effect in the building, foundation, or structural member being considered. Effects of one or more loads not acting shall be considered.				
Combination Formulae	*Upward*	*Upward*	*Upward*	*Downward*
Use this loading combination for DOWNWARD for Proposed PV Dead Load				
6. D + 0.75L - 0.75(0.60W) + 0.75(Lr or S or R)	17.46	17.46	17.46	20.22
Module Support point load (lb)	214	214	214	248
Cr Factored Module Support point load (lb)	186	186	186	216

Use this loading combination for UPWARD for Proposed PV Dead Load				
7. 0.60D - 0.6W	-10.74	-15.21	-23.18	7.64
Module Support point load (lb)	-132	-187	-285	94

DOWNWARD

Presume loading directly over member.

Combined Dead and Wind Pressure Downward Loading					
	Truss top chord span				
PV Module Row	Point load loc's from Left support	Point Load #'s	Module Support Point Load	Comment	Module Orientation
	ft from left		*lb*		
1	0.75		216		Portrait
1	6.89			Support placed on adjoining truss	Portrait
2	6.98			Support placed on adjoining truss	Portrait
2	13.12		216		Portrait

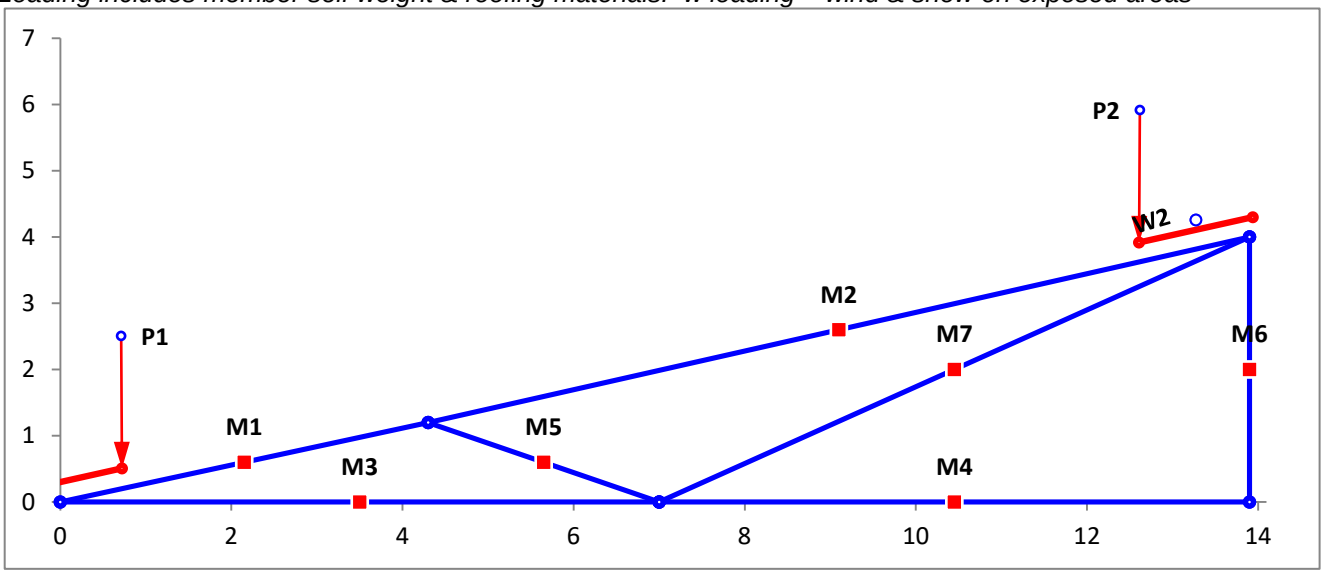
Truss Data and Loading for MP 2

Roof slope (degrees)	16.00			Length of roof plane	14.50
Top ridge height above floor plane	4.00			Length of floor plane	14.00

Truss Segments

Roof Plane		*Floor Plane*		*Diagonals*		*Diagonals*	
Mem #	*Mem Type*	Mem #	*Mem Type*	Mem #	*Mem Type*	Mem #	*Mem Type*
1	2x4	3	2x4	5	2x4	7	2x4
2	2x4	4	2x4	6	2x4		

** Loading includes member self weight & roofing materials. w loading = wind & snow on exposed areas*



Snow Loading Analysis

where:

		Fully Exposed	Exposure category
Ce	=	0.9	Exposure Factor, Ce (ASCE 7-16 Table 7.3-1, Page 58)
Ct	=	1.0	Thermal Factor, Ct (ASCE 7-16 Table 7.3-2, Page 58)
Is	=	1.0	Snow Importance Factor, Is (ASCE 7-16 Table 1.5-2, Page 5)
$\mathbf{p_g}$	=	15.00	Ground Snow Load pg (ASCE 7-16 Table 7.2-1, Page 52-53)
$\mathbf{p_f}$	=	**0.7CeCtIsPg**	Flat Roof Snow Load, pf (ASCE 7-16 Table 7.3-1, Page 58)
$\mathbf{p_f}$	=	**9.45**	psf
			but where Pf is not less than the following:
			Minimum Snow Load pm (ASCE 7-16 Table 7.3.4, Page 53)
$\mathbf{p_m}$	=	**15.00**	When Pg <=20 psf, then use Pf = Pg x Is
$\mathbf{p_f}$	=	**15.00**	psf. Resultant Snow pressure to be used with Roof slope factor below
$\mathbf{p_s}$	=	$\mathbf{C_s p_f}$	Sloped Roof Snow Load ps (ASCE 7-16 Table 7.4, Page 54)

Roof Type Warm Roofs

Roof slope factor Cs for Warm Roofs, where Ct = 1.0

Roof surface condition = Slippery Roof

$\mathbf{C_s}$	=	1.00	Roof Slope Factor, Cs (ASCE 7-16 Table 7-2a, Page 59)

Total Snow Load

$\mathbf{p_s}$	=	**15.00**	**psf**	Roof snow load

FEA Calculation Results for Roof Plane MP 1 for Freedom Solar, LLC Client BILLY H RIGGSBEE

IDSPL - 2D Frame Analysis of a 2D frame subject to distributed loads, point loads and moments

Equilibrium check	FX	FY
Total applied forces	0.00	1814
Total output reactions	0.00	-1814
Output error	1.51E-13	-9.09E-13

9.9E-05

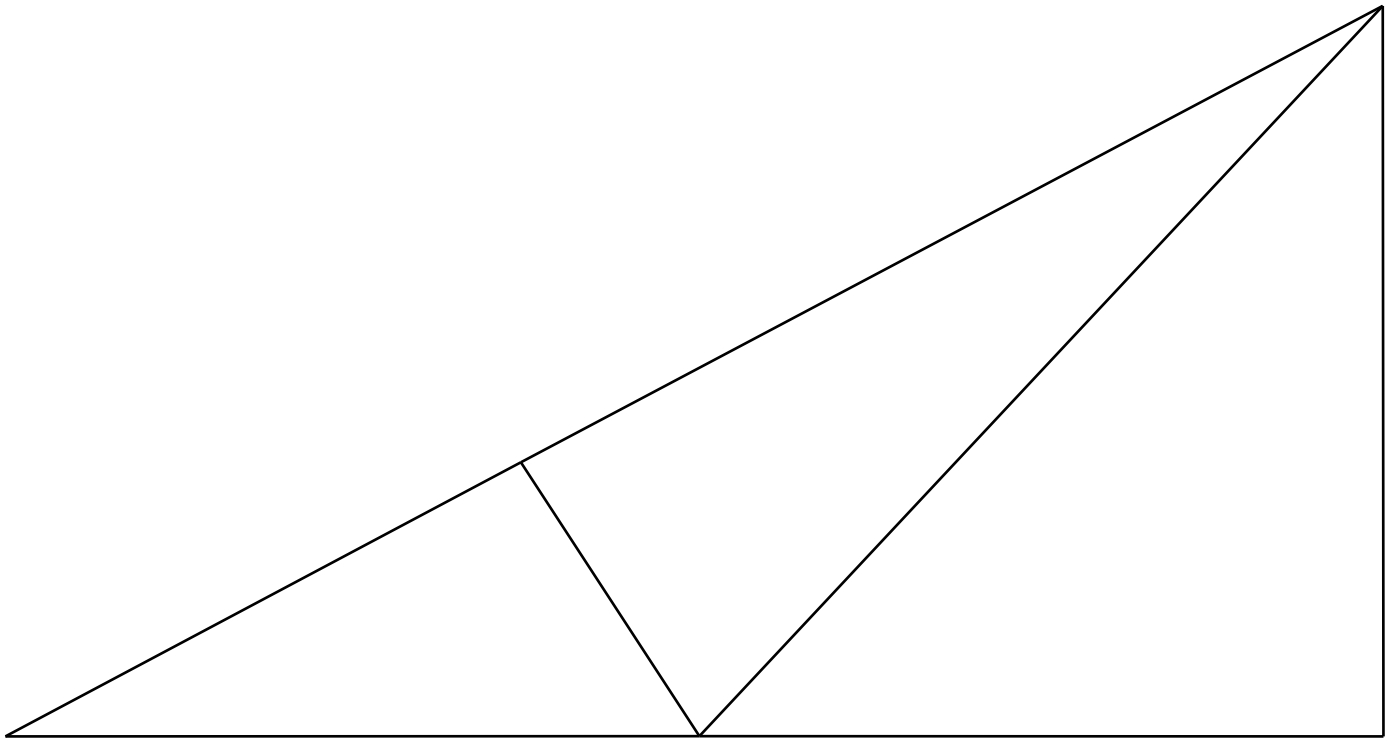
	Shear	Mom	Ax		
Max (psi)	2	20	284		
Allowable (psi)	115	950	5,610	Maximum Deflections	
# of segments/beam		1		-2.74E-03	1.34E-03

** vertical deflections do not take into account any supporting intermediate walls*

Node Results			Beam End Results			
Direction	Deflection	Reaction	Beam	Shear	Axial	BM
DX1	0.00E+00	0	1-1	-970	-499	55
DY1	0.00E+00	-537	1-2	-701	-654	-5094
RZ1	-1.48E-04	0	2-1	-2112	-1955	-12255
DX2	3.19E-04	0	2-2	-991	-2599	-30149
DY2	-1.01E-03	0	3-1	55	917	-55
RZ2	-5.36E-04	0	3-2	148	917	240
DX3	-2.45E-03	0	4-1	-354	1894	2937
DY3	8.77E-04	0	4-2	-354	1894	496
RZ3	1.98E-03	0	5-1	-1267	1445	-2723
DX4	4.35E-04	0	5-2	-1272	1437	-7161
DY4	-1.34E-03	0	6-1	1894	1631	496
RZ4	-7.17E-05	0	6-2	1894	1591	15647
DX5	1.32E-03	0	7-1	1357	-267	26
DY5	0.00E+00	-1277	7-2	1401	-317	14502
RZ5	2.46E-04	0				

Beam	X	Shear	Mom	Axial	DX	DY	RZ
1	0.00	-970	55	-499	0.00E+00	0.00E+00	-1.48E-04
1	6.00	-742	-4876	-631	3.12E-04	1.02E-03	-6.07E-04
2	0.00	-2112	-12255	-1955	3.19E-04	1.01E-03	-5.36E-04
2	10.03	-1431	-21603	-2346	-2.74E-03	-7.11E-04	-4.97E-03
3	0.00	55	-55	917	0.00E+00	0.00E+00	-1.48E-04
3	7.00	92	535	917	4.35E-04	1.34E-03	-1.43E-04
4	0.00	-354	2937	1894	4.35E-04	1.34E-03	-7.17E-05
4	6.90	-354	496	1894	1.32E-03	0.00E+00	1.63E-04
5	0.00	-1267	-2723	1445	4.35E-04	1.34E-03	-7.17E-05
5	3.50	-1271	-7162	1439	3.19E-04	1.01E-03	-3.83E-04
6	0.00	1894	496	1631	1.32E-03	0.00E+00	2.46E-04
6	8.00	1894	15647	1598	-2.45E-03	-8.77E-04	1.97E-03
7	0.00	1357	26	-267	4.35E-04	1.34E-03	-7.17E-05
7	10.56	1394	14505	-309	-2.45E-03	-8.77E-04	1.98E-03

* vertical deflections do not take into account any supporting intermediate walls



Scaled 2X Deflected Truss Plot
Roof Plane MP 1 for Freedom Solar, LLC Client BILLY H RIGGSBEE

FEA Calculation Results for Roof Plane MP 2 for Freedom Solar, LLC Client BILLY H RIGGSBEE

IDSPL - 2D Frame Analysis of a 2D frame subject to distributed loads, point loads and moments

Equilibrium check	FX	FY
Total applied forces	0.00	1632
Total output reactions	0.00	-1632
Output error	-6.34E-14	4.55E-13

0.0001

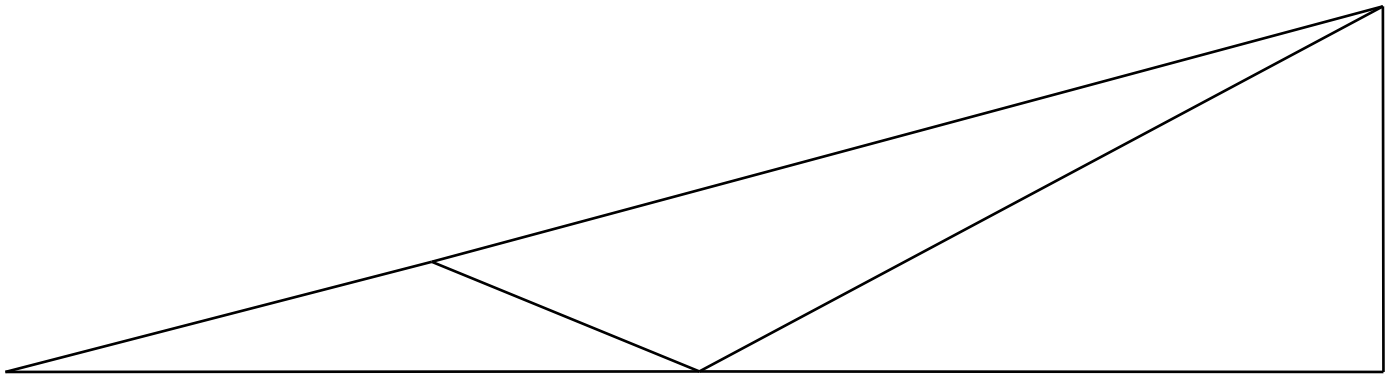
	Shear	Mom	Ax		
Max (psi)	2	17	267		
Allowable (psi)	115	950	5,610	Maximum Deflections	
# of segments/beam		1		-1.85E-03	2.66E-03

** vertical deflections do not take into account any supporting intermediate walls*

Node Results			Beam End Results			
Direction	Deflection	Reaction	Beam	Shear	Axial	BM
DX1	0.00E+00	0	1-1	-986	-379	-211
DY1	0.00E+00	-533	1-2	-726	-452	-3932
RZ1	-3.66E-04	0	2-1	-1909	-1952	-10625
DX2	3.27E-04	0	2-2	-748	-2291	-26274
DY2	-1.65E-03	0	3-1	314	630	211
RZ2	-5.92E-04	0	3-2	408	630	2325
DX3	-1.69E-03	0	4-1	-74	2207	4915
DY3	3.17E-04	0	4-2	-74	2207	4404
RZ3	1.74E-03	0	5-1	-69	1916	-6486
DX4	2.99E-04	0	5-2	-75	1913	-6693
DY4	-2.66E-03	0	6-1	2207	1173	4404
RZ4	-6.94E-05	0	6-2	2207	1161	13230
DX5	1.33E-03	0	7-1	1137	-425	3895
DY5	0.00E+00	-1098	7-2	1172	-445	13044
RZ5	7.94E-04	0				

Beam	X	Shear	Mom	Axial	DX	DY	RZ
1	0.00	-986	-211	-379	0.00E+00	0.00E+00	-3.66E-04
1	4.46	-760	-3754	-442	3.24E-04	1.65E-03	-6.79E-04
2	0.00	-1909	-10625	-1952	3.27E-04	1.65E-03	-5.92E-04
2	10.00	-1203	-18178	-2159	-1.85E-03	-2.72E-04	-4.03E-03
3	0.00	314	211	630	0.00E+00	0.00E+00	-3.66E-04
3	7.00	352	2620	630	2.99E-04	2.66E-03	-1.48E-04
4	0.00	-74	4915	2207	2.99E-04	2.66E-03	-6.94E-05
4	6.90	-74	4404	2207	1.33E-03	0.00E+00	6.54E-04
5	0.00	-69	-6486	1916	2.99E-04	2.66E-03	-6.94E-05
5	2.95	-73	-6694	1914	3.27E-04	1.65E-03	-1.62E-04
6	0.00	2207	4404	1173	1.33E-03	0.00E+00	7.94E-04
6	4.00	2207	13230	1164	-1.69E-03	-3.17E-04	1.53E-03
7	0.00	1137	3895	-425	2.99E-04	2.66E-03	-6.94E-05
7	7.98	1165	13047	-442	-1.69E-03	-3.17E-04	1.65E-03

* vertical deflections do not take into account any supporting intermediate walls



Scaled 2X Deflected Truss Plot
Roof Plane MP 2 for Freedom Solar, LLC Client BILLY H RIGGSBEE