



Project Number: U2716.0388.241

May 20, 2024

Sunmodo
14800 NE 65th Street
Vancouver, WA 98682

**REFERENCE: SunModo Sunturf Ground Mount D6 – Large Format Panels
Ground Mount PV Array Installation**

To Whom It May Concern:

Per request of SunModo, we have been asked to prepare the structural design of a ground-mounted PV solar array system with several foundation options as shown in the attached calculations. The adopted building code in this jurisdiction is the 2023 Florida Building Code (2021 IBC). Vector Structural Engineering requires that we review each site-specific install, and we are not liable for installs at site-specific locations we have not reviewed. This document does not address site-specific installations. The following design parameters are used in our analysis:

- Minimum Design Loads for Buildings and Other Structures (ASCE 7-22)
- Design wind speed for risk category I structures: 150 mph
- Wind exposure: C
- Ground snow load: 0 psf
- The ground screws and helical piers must be tested to 1.5 times uplift and 2.0 times lateral reactions found in the table below. A minimum of one ground screw or helical pier must be tested.

Load (ASD)	Value (lbs)	Factor of Safety	Test Value (lbs)
UPLIFT	2388	1.5	3582
LATERAL	1307	2	2614

Foundation concrete shall have a minimum compressive strength of 2500 psi at 28 days. Cement for all concrete shall be Type I or II with a water/cement ratio of 0.50. Maximum aggregate size shall be 3/4". No special inspection of concrete strength is required.

Footings are designed based on an allowable soil bearing pressure of 1500 psf an allowable skin friction of 250 psf, an allowable lateral bearing pressure of 150 pcf, and a coefficient of friction of 0.3. Vector Structural Engineering strongly recommends independent soils testing be performed by a licensed geotechnical engineer to verify the assumed soil parameters.

All ground mounts are to be installed per manufacturer’s recommendations. The use of solar panel support span tables provided by the manufacturer is allowed only where the site conditions and solar panel configuration match the description of the span tables. Electrical engineering is beyond our scope. All work performed must be in accordance with accepted industry-wide methods and applicable safety standards. Vector Structural Engineering assumes no responsibility for improper installation of the solar panels.

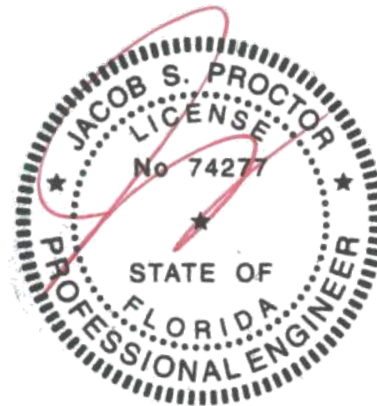
Very truly yours,

VECTOR STRUCTURAL ENGINEERING, LLC

Jacob Proctor, P.E.
License: 74277 - Expires: 02/28/2025
Project Engineer

Enclosures

JSP/cjt



05/20/2024

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No. 74277



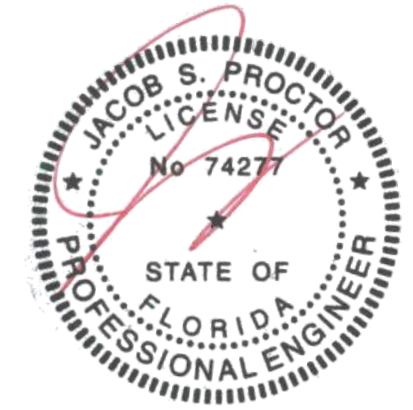
JOB NO. U2716.0388.241
 PROJECT SUNMODO SUNTURF GROUND MOUNT D6
 SUBJECT ALL OPTIONS

651 W GALENA PARK BLVD. #101 (801) 990-1775
 DRAPER, UTAH 84020 (801) 990-1776 FAX

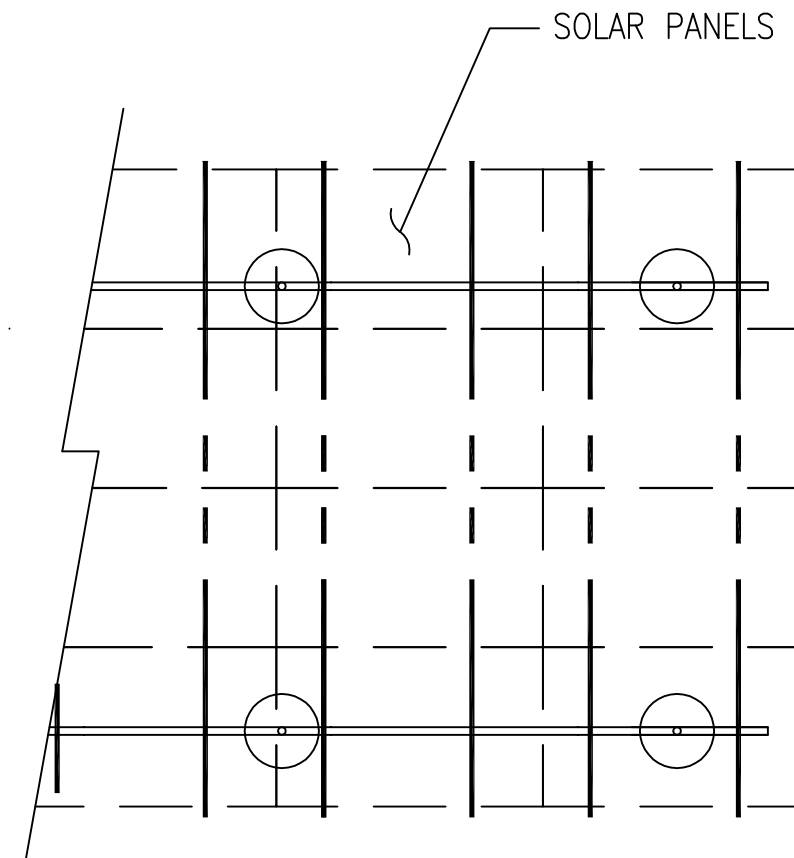
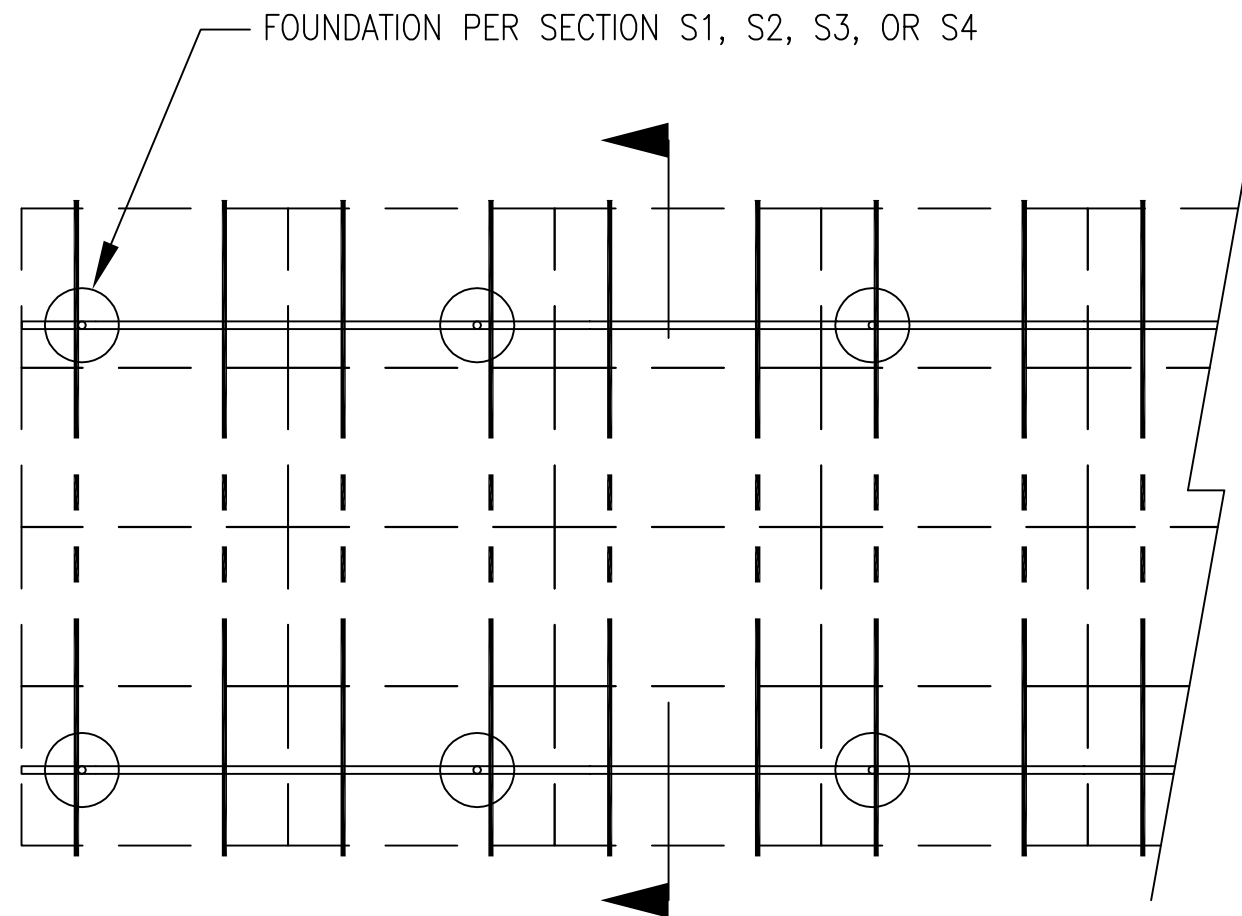
NOTES:

- SEE SUNMODO SHOP DRAWINGS FOR GROUND MOUNT MEMBER SIZES, GEOMETRY, AND POST SPACING

Vector Structural Engineering requires that we review each site-specific install, and we are not liable for installs at site-specific locations we have not reviewed. This document does not address site-specific installations.



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PV ARRAY PLAN

N.T.S.



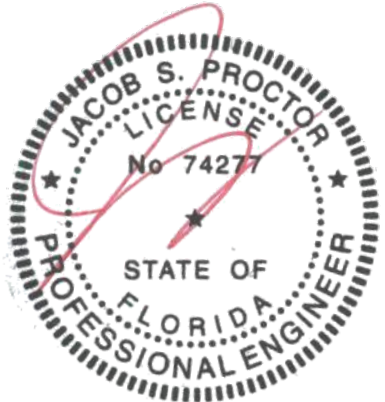
JOB NO. U2716.0388.241

PROJECT SUNMODO SUNTURF GROUND MOUNT D6

SUBJECT DRILLED PIER OPTION

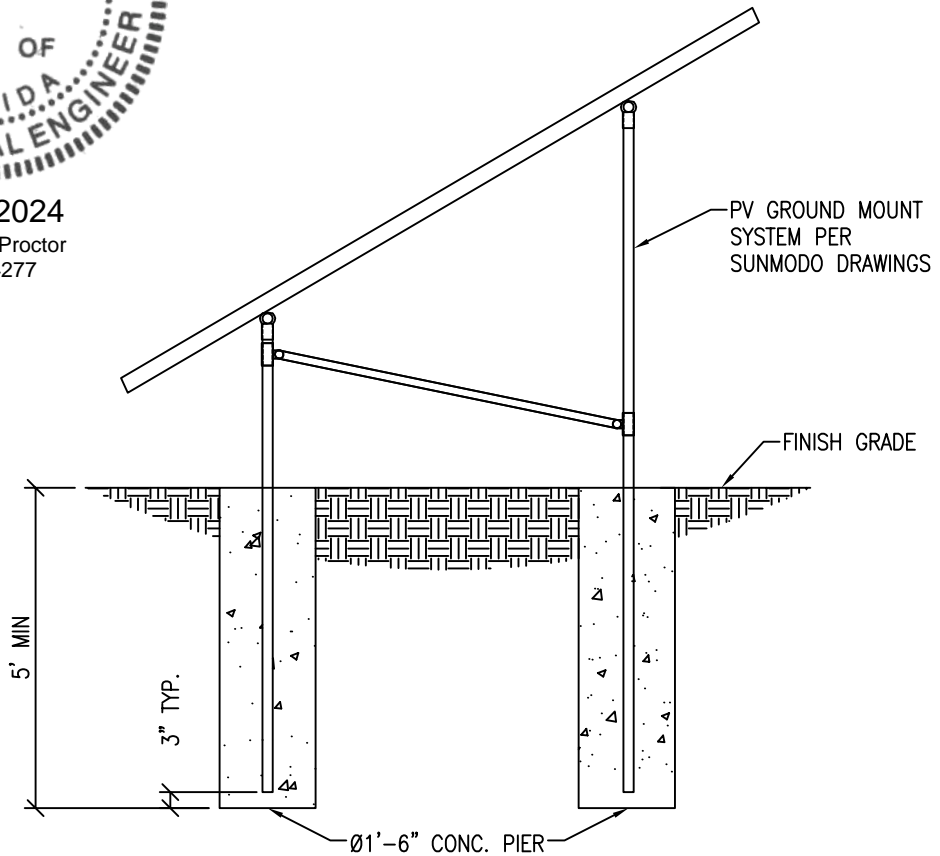
NOTES:

- 1. SEE SUNMODO SHOP DRAWINGS FOR GROUND MOUNT MEMBER SIZES AND GEOMETRY



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DRILLED PIER SECTION

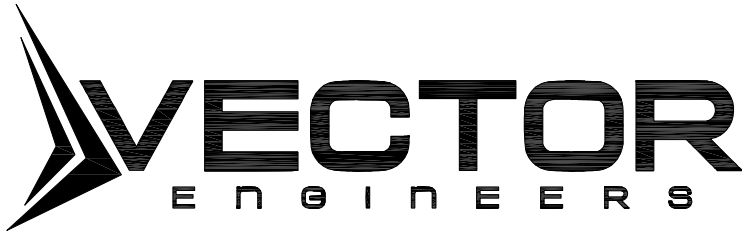
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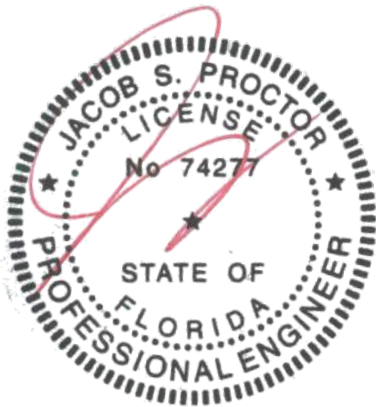
PROJECT SUNMODO SUNTURF GROUND MOUNT D6

SUBJECT HELICAL PIER OPTION

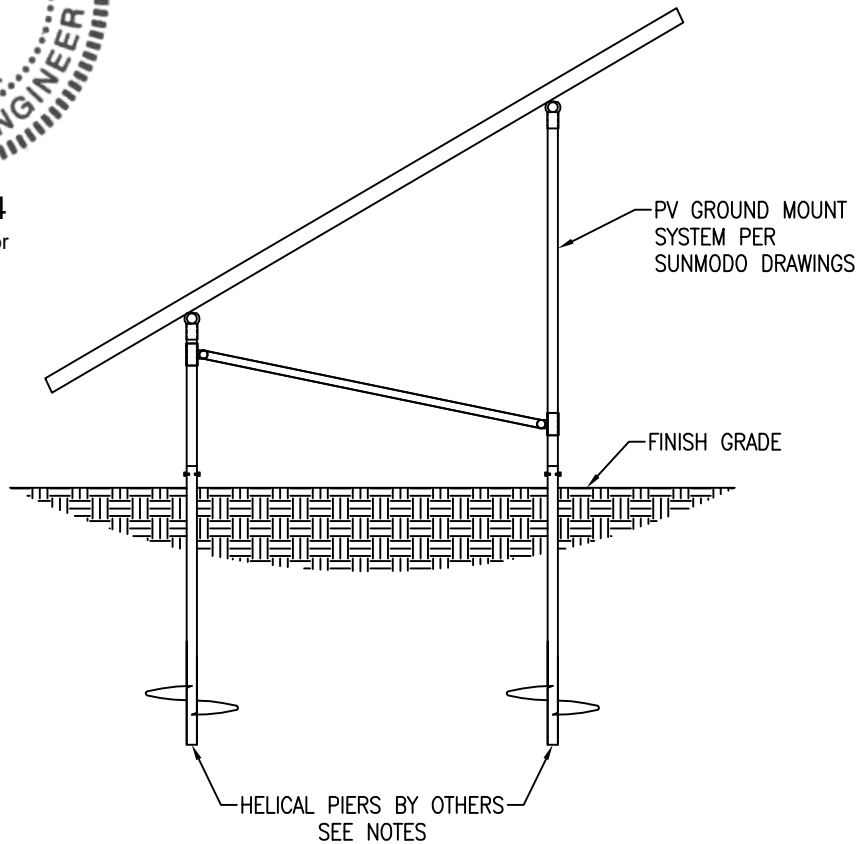
NOTES:

1. SEE SUNMODOD SHOP DRAWINGS FOR GROUND MOUNT MEMBER SIZES AND GEOMETRY
2. A MINIMUM OF (1) HELICAL PIER SHALL BE LOAD TESTED PER THE TEST LOADS LISTED ON THE COVER PAGE OF THIS LETTER. FAILURE CRITERIA IS AS FOLLOWS:
 - 2.1. LATERAL DEFLECTION OF 1" MEASURED AT GRADE UNDER LATERAL LOAD
 - 2.2. VERTICAL DEFLECTION OF 1/2" UNDER AXIAL LOAD
3. LOAD TESTS SHALL BE PERFORMED BY A LICENSED CONTRACTOR AS APPROVED BY THE AHJ

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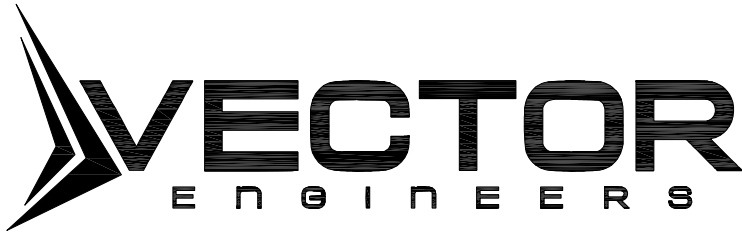
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HELICAL PIER SECTION

NTS.

S2



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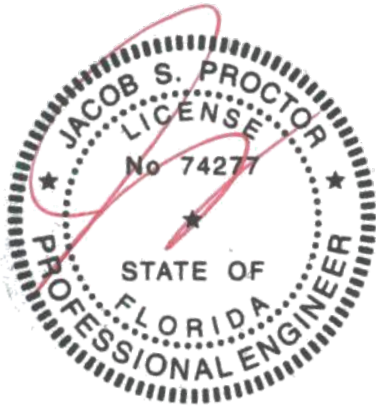
PROJECT SUNMODO SUNTURF GROUND MOUNT D6

SUBJECT GROUND SCREW OPTION

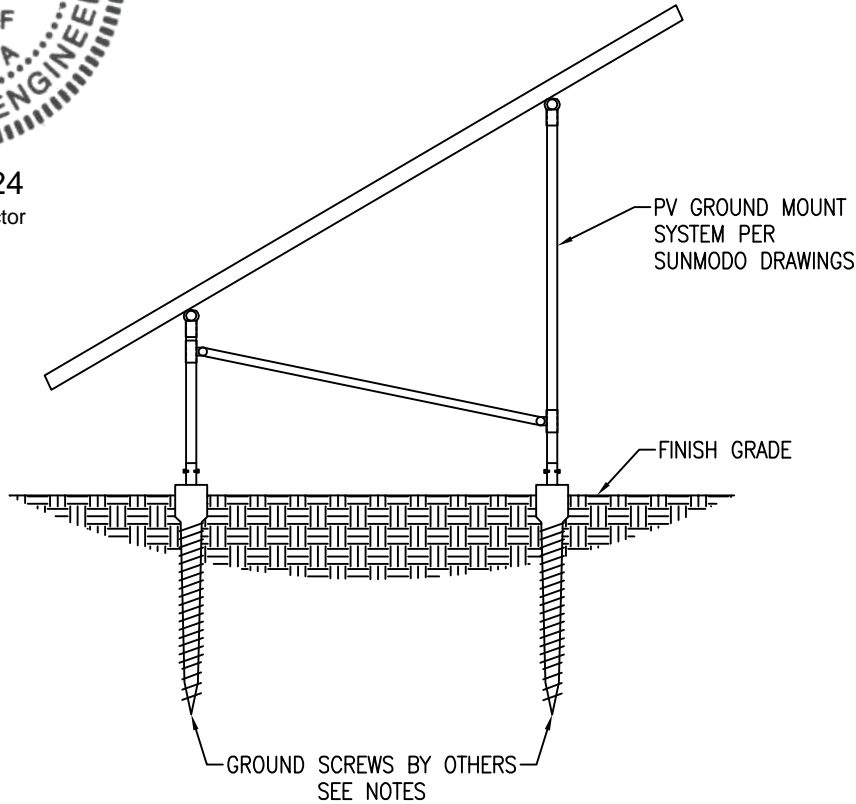
NOTES:

1. SEE SUNMODOD SHOP DRAWINGS FOR GROUND MOUNT MEMBER SIZES AND GEOMETRY
2. A MINIMUM OF (1) GROUND SCREW SHALL BE LOAD TESTED PER THE TEST LOADS LISTED ON THE COVER PAGE OF THIS LETTER. FAILURE CRITERIA IS AS FOLLOWS:
 - 2.1. LATERAL DEFLECTION OF 1" MEASURED AT GRADE UNDER LATERAL LOAD
 - 2.2. VERTICAL DEFLECTION OF 1/2" UNDER AXIAL LOAD
3. LOAD TESTS SHALL BE PERFORMED BY A LICENSED CONTRACTOR AS APPROVED BY THE AHJ

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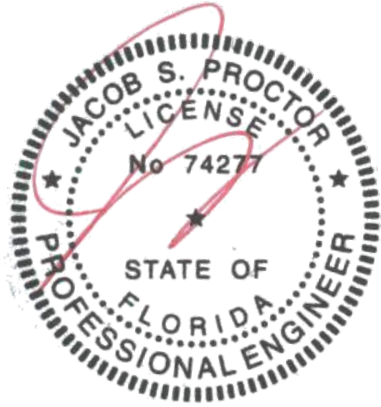
GROUND SCREW SECTION

NTS.



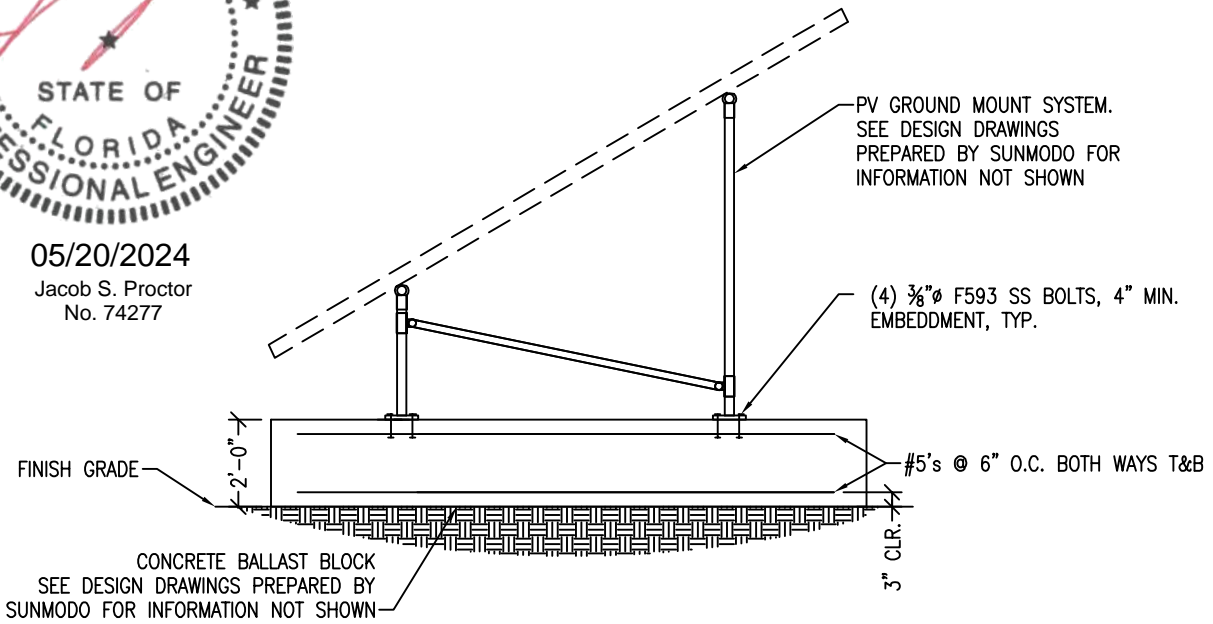
PROJECT SUNMODO SUNTURF GROUND MOUNTS D6

SUBJECT BALLASTED BLOCK OPTION

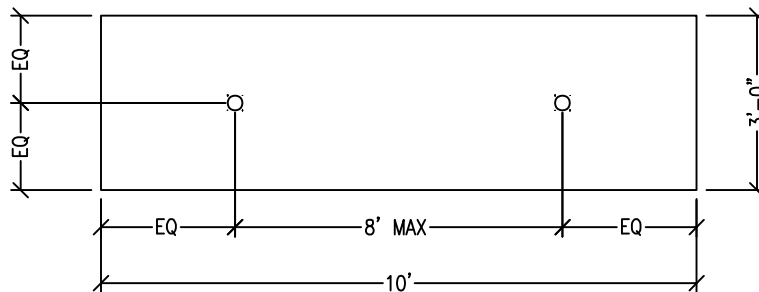


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SECTION VIEW



PLAN VIEW

PV ARRAY SECTION

N.T.S.



JOB NO.: U2716.0388.241
SUBJECT: WIND PRESSURES
CONDITION: 10° TILT

PROJECT: Sunturf Package D6 Ground Mount

WIND PRESSURES

Calculations per:	ASCE 7-22	
Design Wind Speed, V [mph]:	150	
Risk Category:	I	(Table 1.5-1)
Exposure Category:	C	(Section 26.7)
Elevation [ft]:	-156.2	
Ground Elevation Factor, K_e :		(Not applicable)
α :	9.8	(Table 26.11-1)
z_g [ft]:	2460	(Table 26.11-1)
Velocity Pressure Exposure Coefficient, K_h :	0.85	(Table 26.10-1)
Topographic Factor, K_{ht} :	1.0	(Section 26.8)
Wind Directionality Factor, K_d :	0.85	(Table 26.6-1)
Internal Pressure Coefficient, GC_{pi} :	0.00	(Figure 26.13-1)
Velocity Pressure, q_h [psf]:	49.03	(Equation 26.10-1)
Gust Effect Factor, G:	0.85	(Section 26.11.4)
Panel Slope [degrees]:	10.0	
Wind Flow:	Clear	
Roof Configuration:	Monoslope	

Wind Pressures in Transverse (N-S) Direction

Net Pressure Coefficients per Figure 27.3-4

Clear Wind Flow	C_{NW}	C_{NL}
Case 1 ($\gamma = 0^\circ$, Load Case A)	-0.7	-1.1
Case 2 ($\gamma = 0^\circ$, Load Case B)	-1.6	0.0
Case 3 ($\gamma = 180^\circ$, Load Case A)	1.0	1.5
Case 4 ($\gamma = 180^\circ$, Load Case B)	1.7	0.4

Design Wind Pressures per Equation 27.3-2 [psf]

Clear Wind Flow	$k_d q_h GC_{NW}$	$k_d q_h GC_{NL}$
Case 1 ($\gamma = 0^\circ$, Load Case A)	-24.8	-39.0
Case 2 ($\gamma = 0^\circ$, Load Case B)	-56.7	0.0
Case 3 ($\gamma = 180^\circ$, Load Case A)	35.4	53.1
Case 4 ($\gamma = 180^\circ$, Load Case B)	60.2	14.2
Case 5 ($\gamma = 0^\circ$, 16 psf Min. Horiz.)	-16.0	-16.0
Case 6 ($\gamma = 180^\circ$, 16 psf Min. Horiz.)	16.0	16.0



JOB NO.: U2716.0388.241
SUBJECT: WIND PRESSURES
CONDITION: 20° TILT

PROJECT: Sunturf Package D6 Ground Mount

WIND PRESSURES

Calculations per:	ASCE 7-22	
Design Wind Speed, V [mph]:	150	
Risk Category:	I	(Table 1.5-1)
Exposure Category:	C	(Section 26.7)
Elevation [ft]:	-156.2	
Ground Elevation Factor, K_e :		(Not applicable)
α :	9.8	(Table 26.11-1)
z_g [ft]:	2460	(Table 26.11-1)
Velocity Pressure Exposure Coefficient, K_h :	0.85	(Table 26.10-1)
Topographic Factor, K_{ht} :	1.0	(Section 26.8)
Wind Directionality Factor, K_d :	0.85	(Table 26.6-1)
Internal Pressure Coefficient, GC_{pi} :	0.00	(Figure 26.13-1)
Velocity Pressure, q_h [psf]:	49.03	(Equation 26.10-1)
Gust Effect Factor, G:	0.85	(Section 26.11.4)
Panel Slope [degrees]:	20.0	
Wind Flow:	Clear	
Roof Configuration:	Monoslope	

Wind Pressures in Transverse (N-S) Direction

Net Pressure Coefficients per Figure 27.3-4

Clear Wind Flow	C_{NW}	C_{NL}
Case 1 ($\gamma = 0^\circ$, Load Case A)	-1.3	-1.5
Case 2 ($\gamma = 0^\circ$, Load Case B)	-2.2	-0.2
Case 3 ($\gamma = 180^\circ$, Load Case A)	1.6	1.7
Case 4 ($\gamma = 180^\circ$, Load Case B)	2.1	0.7

Design Wind Pressures per Equation 27.3-2 [psf]

Clear Wind Flow	$k_d q_h GC_{NW}$	$k_d q_h GC_{NL}$
Case 1 ($\gamma = 0^\circ$, Load Case A)	-46.0	-53.1
Case 2 ($\gamma = 0^\circ$, Load Case B)	-77.9	-7.1
Case 3 ($\gamma = 180^\circ$, Load Case A)	56.7	60.2
Case 4 ($\gamma = 180^\circ$, Load Case B)	74.4	24.8
Case 5 ($\gamma = 0^\circ$, 16 psf Min. Horiz.)	-16.0	-16.0
Case 6 ($\gamma = 180^\circ$, 16 psf Min. Horiz.)	16.0	16.0

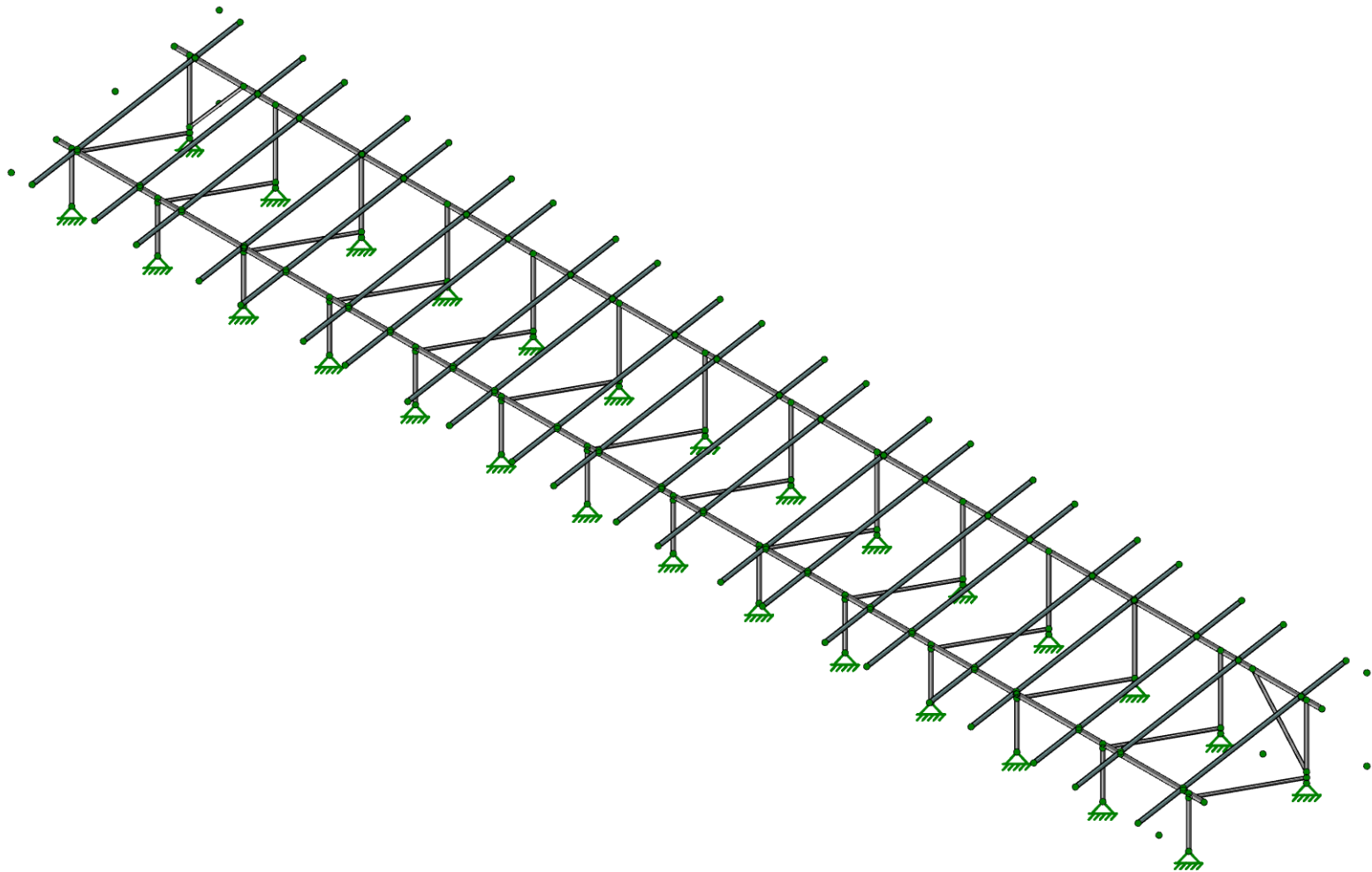
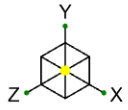


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PROJECT: Sunturf Package D6 Ground Mount

Framing Analysis

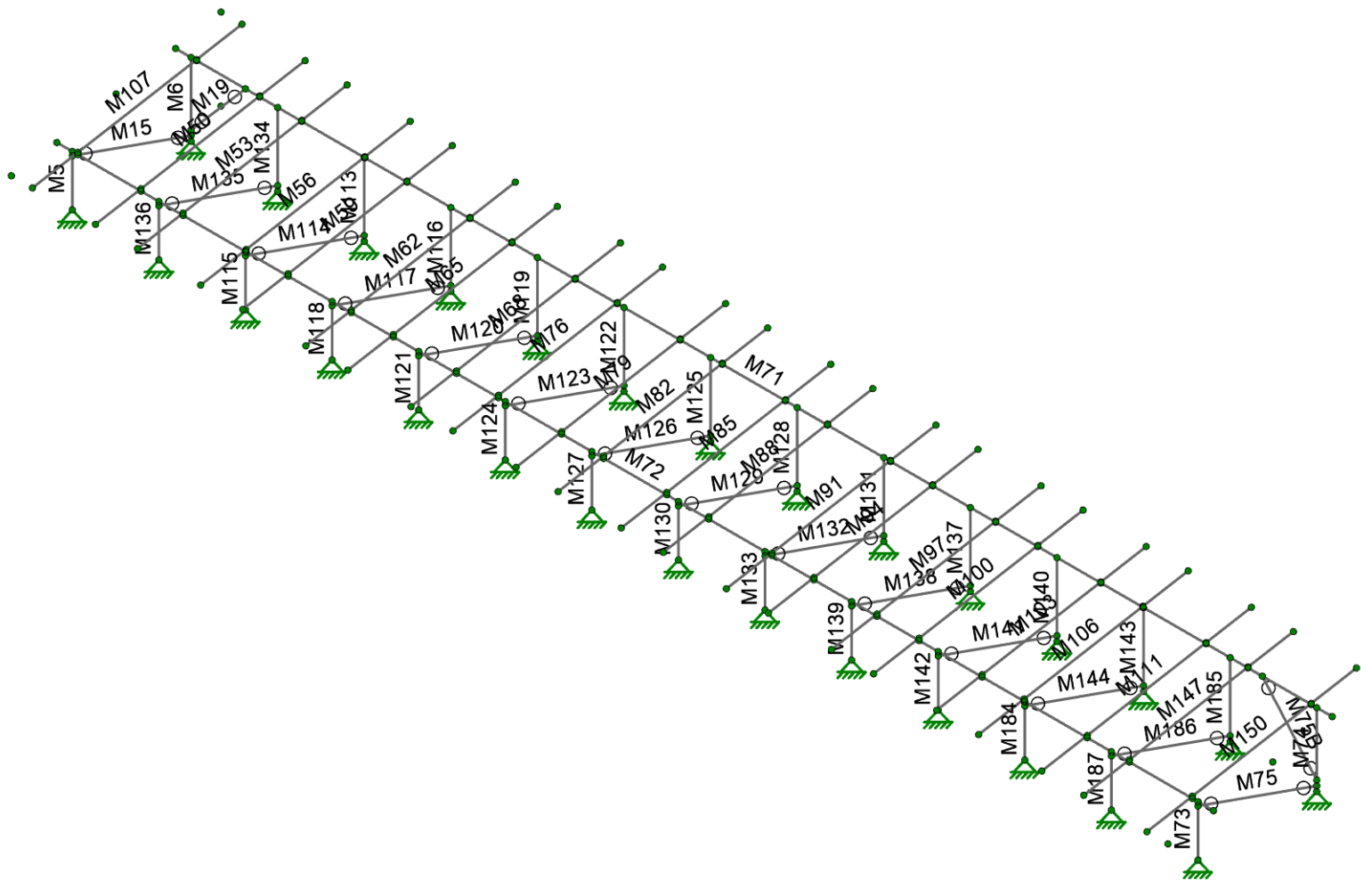
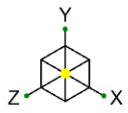
LF - 10 deg



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D6 Large Format Panels - 10 Degree Tilt

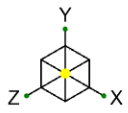
SK-1
May 20, 2024
Sunturf D6 - LF - 10deg.r3d



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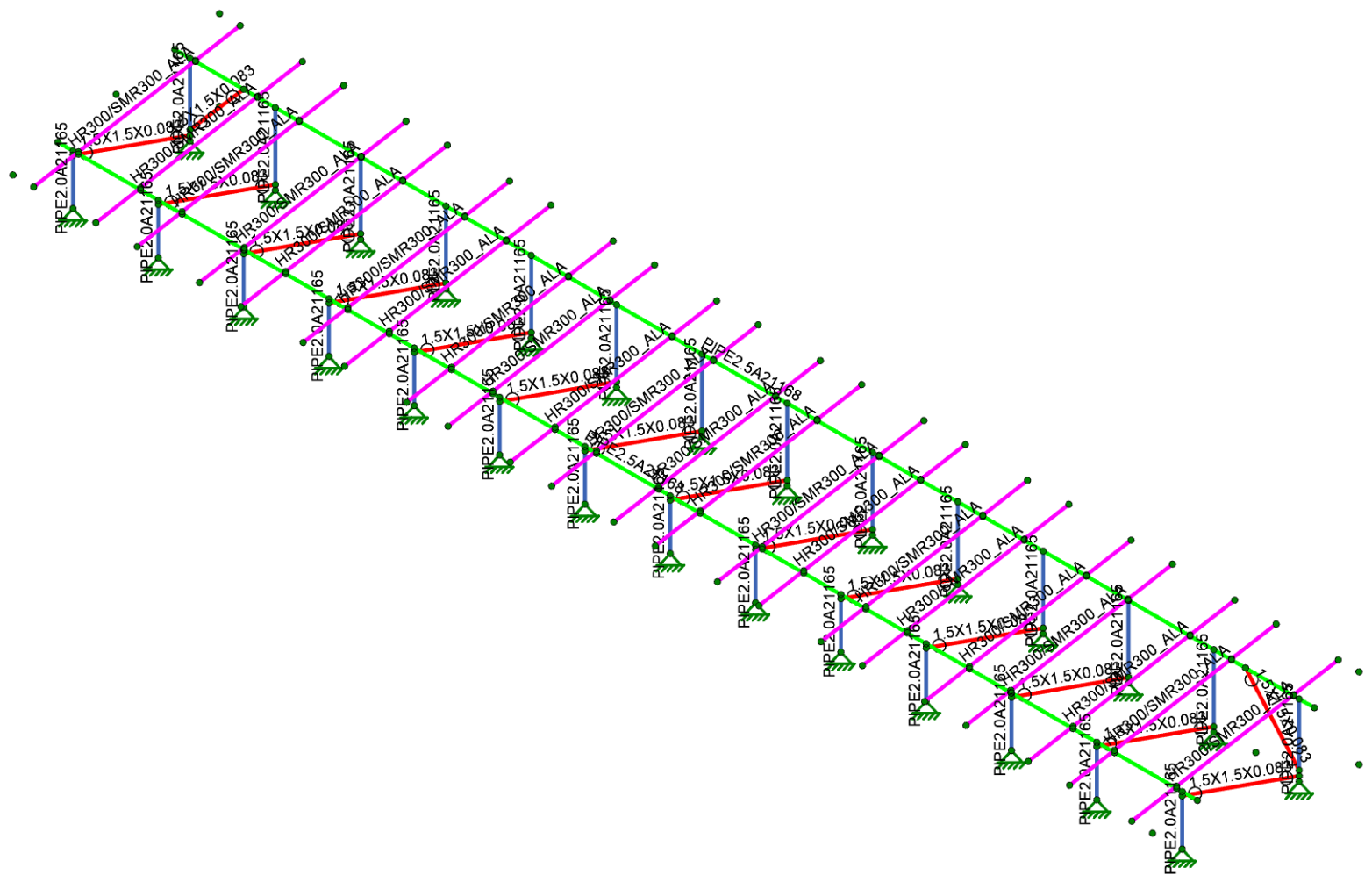
D6 Large Format Panels - 10 Degree Tilt

SK-2
May 20, 2024
Sunturf D6 - LF - 10deg.r3d



Section Sets

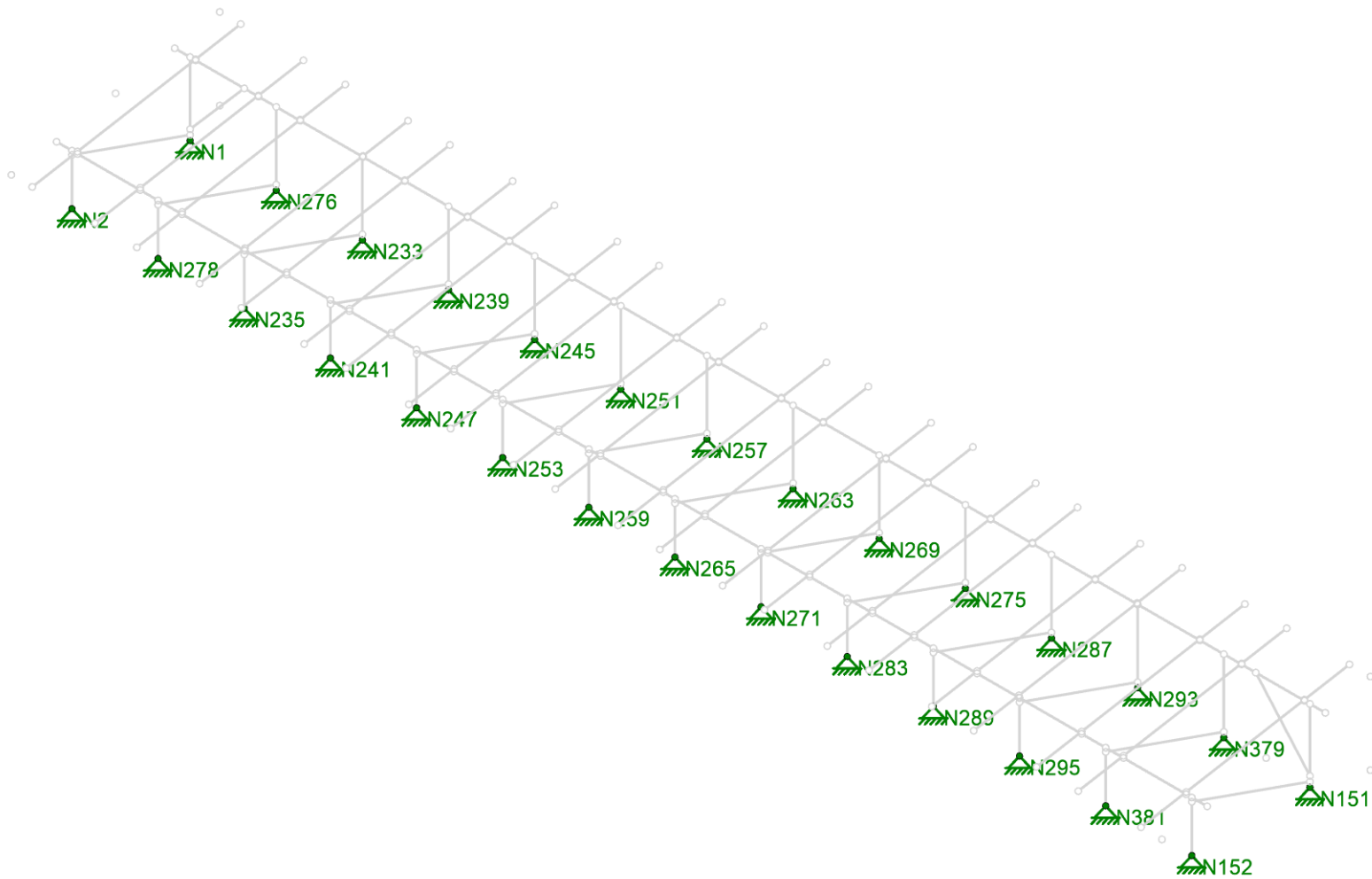
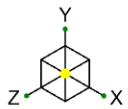
- Post
- Cross Beam
- Diagonal Brace
- RIGID
- AL Rails



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D6 Large Format Panels - 10 Degree Tilt

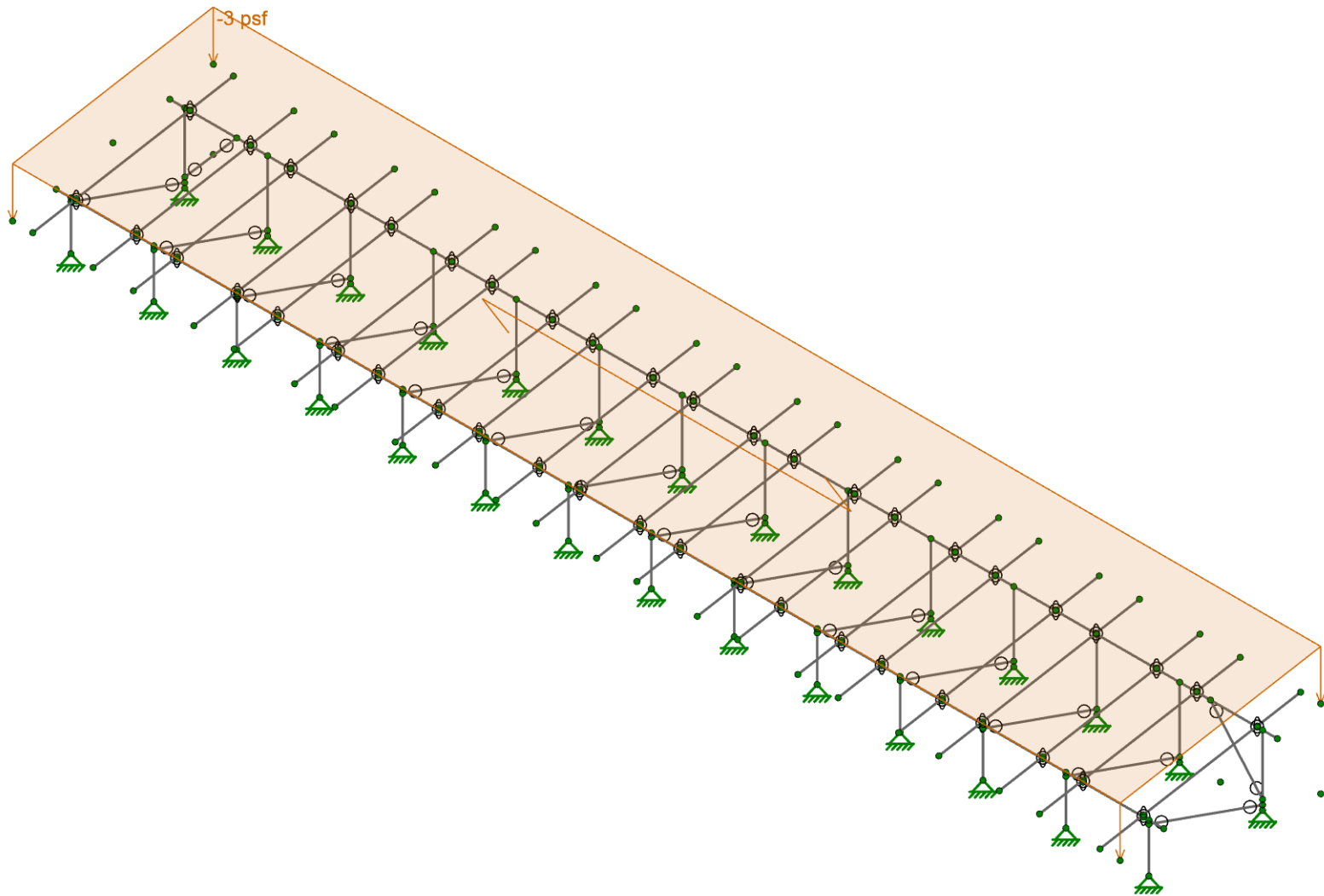
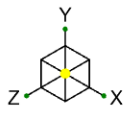
SK-3
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 Sunturf D6 - LF - 10deg.r3d



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D6 Large Format Panels - 10 Degree Tilt

SK-4
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Sunturf D6 - LF - 10deg.r3d



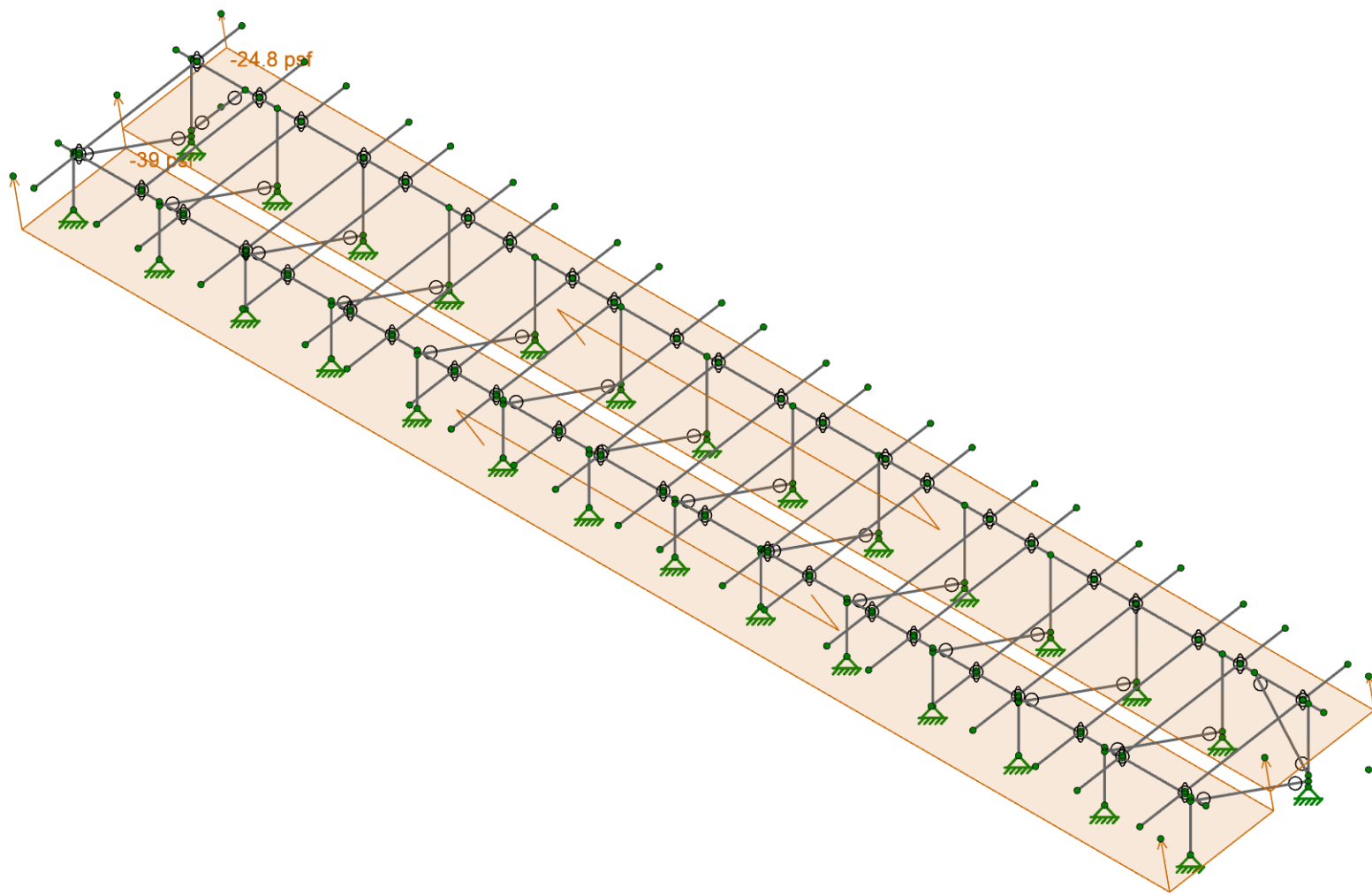
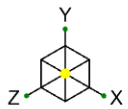
Loads: BLC 2, Solar Panel Weight



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D6 Large Format Panels - 10 Degree Tilt

SK-5
May 20, 2024
Sunturf D6 - LF - 10deg.r3d

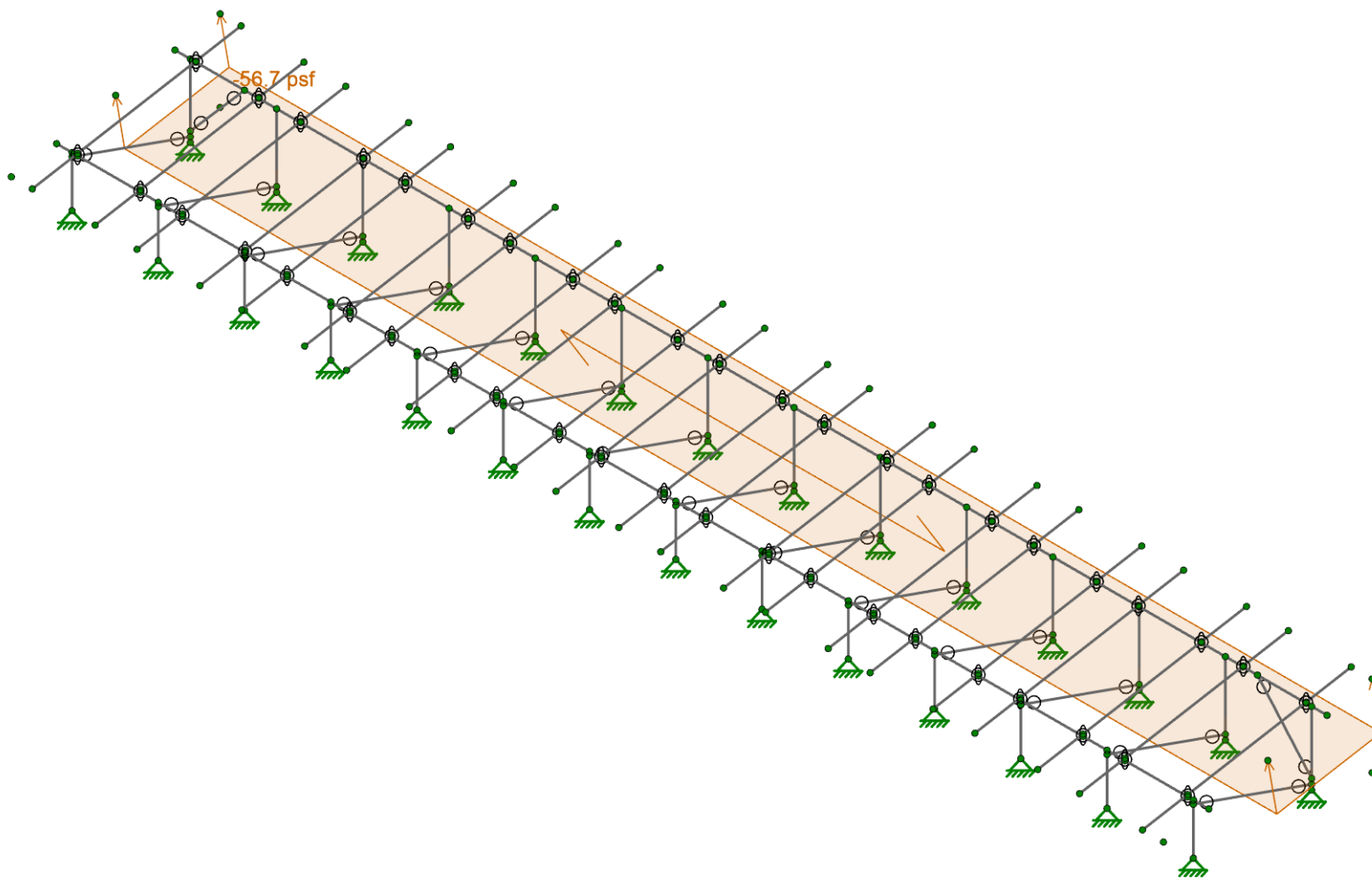
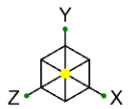


Loads: BLC 4, Wind A 0 deg

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D6 Large Format Panels - 10 Degree Tilt

SK-6
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Sunturf D6 - LF - 10deg.r3d



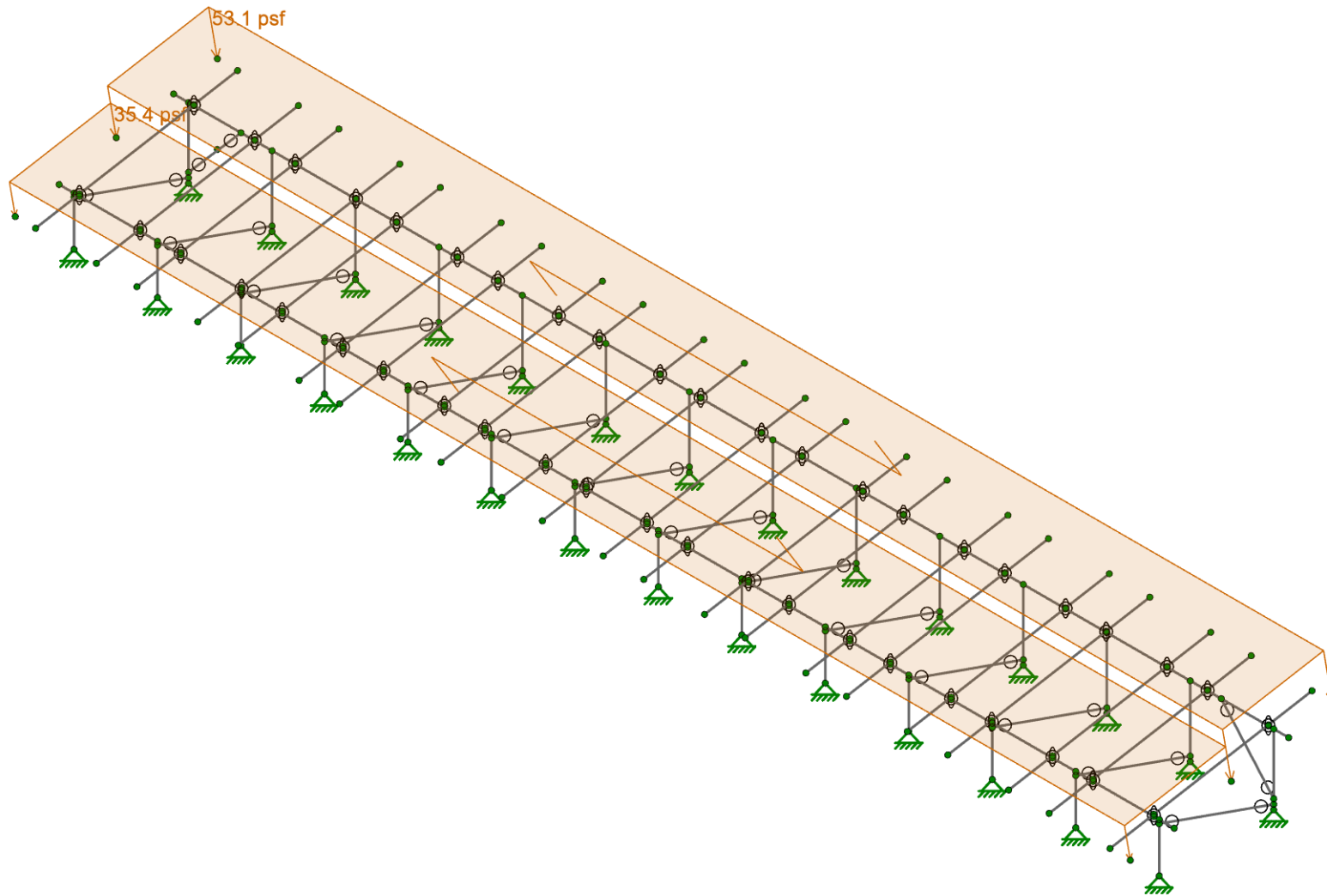
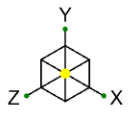
Loads: BLC 5, Wind B 0 deg



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D6 Large Format Panels - 10 Degree Tilt

SK-7
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Sunturf D6 - LF - 10deg.r3d



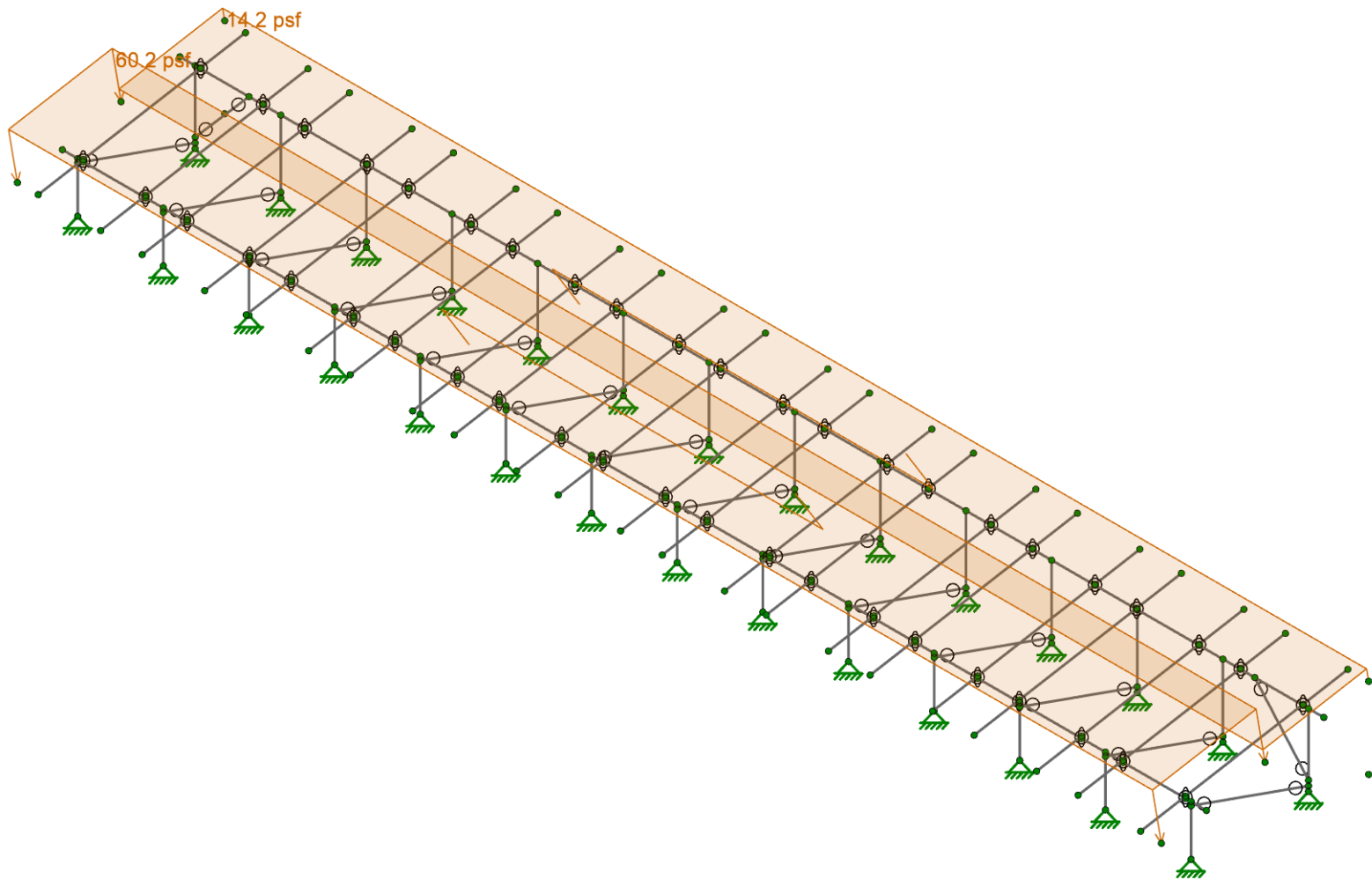
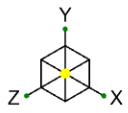
Loads: BLC 6, Wind A 180 deg




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D6 Large Format Panels - 10 Degree Tilt

SK-8
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Sunturf D6 - LF - 10deg.r3d

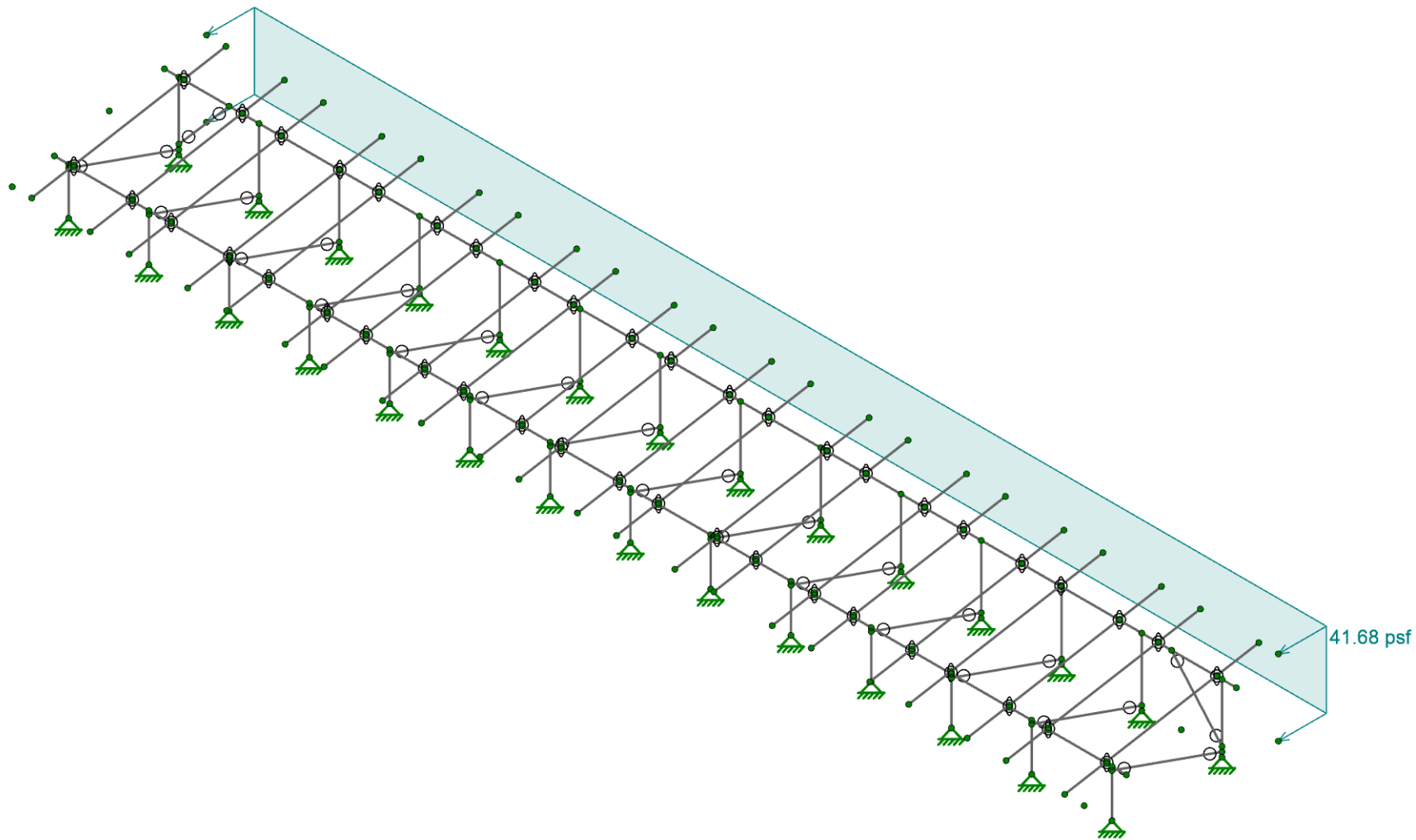
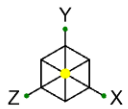


Loads: BLC 7, Wind B 180 deg

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D6 Large Format Panels - 10 Degree Tilt

SK-9
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Sunturf D6 - LF - 10deg.r3d



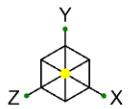
Loads: BLC 8, Wind Z



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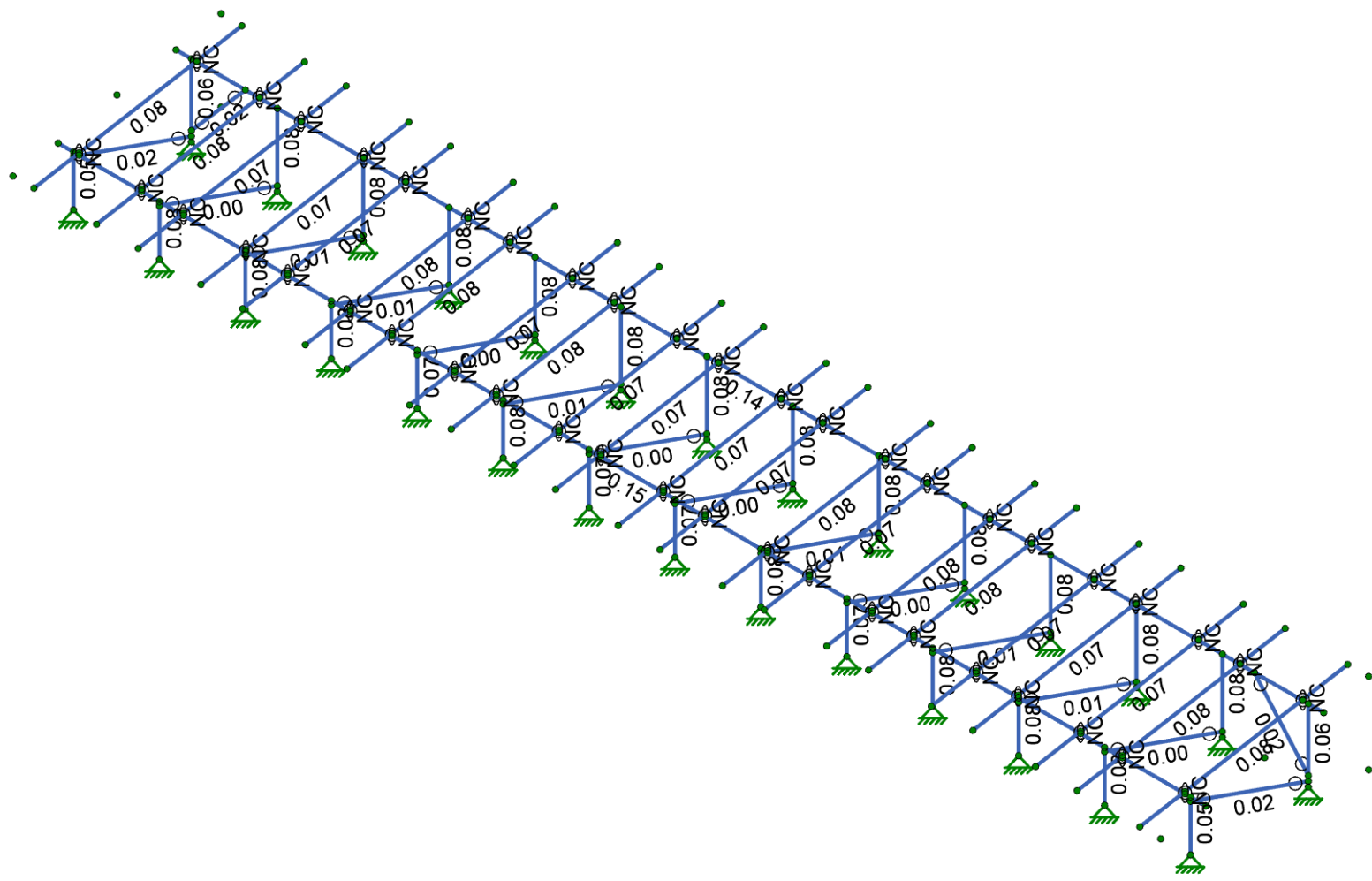
D6 Large Format Panels - 10 Degree Tilt

SK-10
May 20, 2024
Sunturf D6 - LF - 10deg.r3d




Shear Check (Env)

- No Calc
- > 1.0
- .90-1.0
- .75-.90
- .50-.75
- 0.-.50



Member Shear Checks Displayed (Enveloped)

 <p>IRISA A NEMETSCHKE COMPANY</p>	Vector Structural Engineering	D6 Large Format Panels - 10 Degree Tilt	SK-12
	CJT		May 20, 2024
	U2716.0388.241		Sunturf D6 - LF - 10deg.r3d

Model Settings

Number of Reported Sections	5
Number of Internal Sections	100
Member Area Load Mesh Size (in ²)	144
Consider Shear Deformation	Yes
Consider Torsional Warping	Yes
Approximate Mesh Size (in)	24
Transfer Forces Between Intersecting Wood Walls	Yes
Increase Wood Wall Nailing Capacity for Wind Loads	Yes
Include P-Delta for Walls	Yes
Optimize Masonry and Wood Walls	Yes
Maximum Number of Iterations	3
Single	No
Multiple (Optimum)	Yes
Maximum	No

Global Axis corresponding to vertical direction	Y
Convert Existing Data	Yes
Default Global Plane for z-axis	XZ
Plate Local Axis Orientation	Nodal

Hot Rolled Steel	AISC 15th (360-16): ASD
Stiffness Adjustment	Yes (Iterative)
Notional Annex	None
Connections	None
Cold Formed Steel	None
Stiffness Adjustment	Yes (Iterative)
Wood	None
Temperature	< 100F
Concrete	ACI 318-19
Masonry	None
Aluminum	AA ADM1-20: ASD
Structure Type	Building
Stiffness Adjustment	Yes (Iterative)
Stainless	None
Stiffness Adjustment	Yes (Iterative)

Compression Stress Block	Rectangular Stress Block
Analyze using Cracked Sections	No
Leave room for horizontal rebar splices (2*d bar spacing)	Yes
List forces which were ignored for design in the Detail Report	Yes

Column Min Steel	1
Column Max Steel	8
Rebar Material Spec	ASTM A615
Warn if beam-column framing arrangement is not understood	No
Number of Shear Regions	4
Region 2 & 3 Spacing Increase Increment (in)	3.999992

Code	None
Base Elevation (ft)	15600
Include the weight of the structure in base shear calcs	Yes



Company : Vector Structural Engineering
Designer : CJT
Job Number : U2716.0388.241
Model Name : D6 Large Format Panels - 10 De...

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3:39:27 PM
Checked By : MIH

Model Settings (Continued)

T Z (sec)	
T X (sec)	
C _Z	0.02
C _X	0.02
R Z	3
R X	3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e ⁶ F ⁻¹]	Density [lb/ft ³]	Yield [psi]	Ry	Fu [psi]	Rt
1	A992	29000	11154	0.3	0.65	490	50000	1.1	65000	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	490	36000	1.5	58000	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	490	50000	1.1	65000	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	527	42000	1.4	58000	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	527	46000	1.4	58000	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	490	35000	1.6	60000	1.2
7	A1085	29000	11154	0.3	0.65	490	50000	1.4	65000	1.3

Aluminum Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e ⁶ F ⁻¹]	Density [lb/ft ³]	Table B.4	kt	Ftu [psi]	Fty [psi]	Fcy [psi]	Fsu [psi]	Ct
1	3003-H14	10100	3787.5	0.33	1.3	172.8	Table B.4-1	1	19000	16000	13000	12000	141
2	6061-T6	10100	3787.5	0.33	1.3	172.8	Table B.4-2	1	38000	35000	35000	24000	141
3	6063-T5	10100	3787.5	0.33	1.3	172.8	Table B.4-2	1	22000	16000	16000	13000	141
4	6063-T6	10100	3787.5	0.33	1.3	172.8	Table B.4-2	1	30000	25000	25000	19000	141
5	5052-H34	10200	3787.5	0.33	1.3	172.8	Table B.4-1	1	34000	26000	24000	20000	141
6	6061-T6 W	10100	3787.5	0.33	1.3	172.8	Table B.4-1	1	24000	15000	15000	15000	141
7	6005-T5	10100	3787.5	0.33	1.3	172.8	Table B.4-1	1	38000	35000	35000	24000	141

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in ²]	Iyy [in ⁴]	Izz [in ⁴]	J [in ⁴]
1	Post	PIPE2.0A21165	Column	Pipe	A572 Gr.50	Typical	0.776	0.499	0.499	0.998
2	Cross Beam	PIPE2.5A21168	Beam	Wide Flange	A572 Gr.50	Typical	0.947	0.907	0.907	1.814
3	Diagonal Brace	1.5X1.5X0.083	HBrace	SquareTube	A572 Gr.50	Typical	0.47	0.158	0.158	0.236

Aluminum Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in ²]	Iyy [in ⁴]	Izz [in ⁴]	J [in ⁴]
1	AL Posts	2.375ODX0.188	Column	Pipe	6005-T5	Typical	1.29	0.778	0.778	1.54
2	AL Brace	RT1.5X2X0.15625	VBrace	Rectangular Tubes	6005-T5	Typical	0.996	0.327	0.524	0.602
3	AL Rails	HR300/SMR300 ALA	Beam	Rectangular Tubes	6005-T5	Typical	0.736	0.214	0.727	0.734
4	AL Cross Beam	CROSSRAIL	Beam	Rectangular Tubes	6005-T5	Typical	1.909	1.97	4.366	4.017

Basic Load Cases

	BLC Description	Category	Y Gravity	Distributed	Area(Member)
1	Self Weight	DL	-1.05		
2	Solar Panel Weight	DL			1
3	Roof Live/Snow	RLL			
4	Wind A 0 deg	OL1			2
5	Wind B 0 deg	OL2			2
6	Wind A 180 deg	OL3			2
7	Wind B 180 deg	OL4			2
8	Wind Z	WLZ			1
9	BLC 2 Transient Area Loads	None		46	
10	BLC 4 Transient Area Loads	None		152	
11	BLC 5 Transient Area Loads	None		76	
12	BLC 6 Transient Area Loads	None		152	
13	BLC 7 Transient Area Loads	None		152	
14	BLC 8 Transient Area Loads	None		96	

Member Area Loads (BLC 2 : Solar Panel Weight)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N199	N196	Y	A-B	-3	-3	-3	-3	Yes

Member Area Loads (BLC 4 : Wind A 0 deg)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N201	N198	Perp	A-B	-24.8	-24.8	-24.8	-24.8	Yes
2	N198	N201	N199	N196	Perp	A-B	-39	-39	-39	-39	Yes

Member Area Loads (BLC 5 : Wind B 0 deg)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N201	N198	Perp	A-B	-56.7	-56.7	-56.7	-56.7	Yes
2	N198	N201	N199	N196	Perp	A-B	0	0	0	0	Yes

Member Area Loads (BLC 6 : Wind A 180 deg)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N201	N198	Perp	A-B	53.1	53.1	53.1	53.1	Yes
2	N198	N201	N199	N196	Perp	A-B	35.4	35.4	35.4	35.4	Yes

Member Area Loads (BLC 7 : Wind B 180 deg)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N201	N198	Perp	A-B	14.2	14.2	14.2	14.2	Yes
2	N198	N201	N199	N196	Perp	A-B	60.2	60.2	60.2	60.2	Yes

Member Area Loads (BLC 8 : Wind Z)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N200	N197	N307	N308	Z	Open Structure	41.68	41.68	41.68	41.68	Yes

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	ASD Loads		Y								
2	1.0 D	Yes	Y	DL	1						
3	1.0 D + 1.0 S	Yes	Y	DL	1	RLL	1				
4	1.0 D + 0.6 W1	Yes	Y	DL	1	RLL		OL1	0.6	WLZ	0.6
5	1.0 D + 0.6 W2	Yes	Y	DL	1	RLL		OL2	0.6	WLZ	0.6
6	1.0 D + 0.6 W3	Yes	Y	DL	1	RLL		OL3	0.6	WLZ	-0.6
7	1.0 D + 0.6 W4	Yes	Y	DL	1	RLL		OL4	0.6	WLZ	-0.6
8	1.0 D + 0.45 W1 + 0.75 S	Yes	Y	DL	1	RLL	0.75	OL1	0.45	WLZ	0.45
9	1.0 D + 0.45 W2 + 0.75 S	Yes	Y	DL	1	RLL	0.75	OL2	0.45	WLZ	0.45
10	1.0 D + 0.45 W3 + 0.75 S	Yes	Y	DL	1	RLL	0.75	OL3	0.45	WLZ	-0.45
11	1.0 D + 0.45 W4 + 0.75 S	Yes	Y	DL	1	RLL	0.75	OL4	0.45	WLZ	-0.45
12	0.6 D + 0.6 W1	Yes	Y	DL	0.6	RLL		OL1	0.6	WLZ	0.6
13	0.6 D + 0.6 W2	Yes	Y	DL	0.6	RLL		OL2	0.6	WLZ	0.6
14	0.6 D + 0.6 W3	Yes	Y	DL	0.6	RLL		OL3	0.6	WLZ	-0.6
15	0.6 D + 0.6 W4	Yes	Y	DL	0.6	RLL		OL4	0.6	WLZ	-0.6
16			Y								
17	LRFD Loads		Y								
18	1.4 D		Y	DL	1.4	RLL					

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
19	1.2 D + 1.6 S + 0.5 W1		Y	DL	1.2	RLL	1.6	OL1	0.5		
20	1.2 D + 1.6 S + 0.5 W2		Y	DL	1.2	RLL	1.6	OL2	0.5		
21	1.2 D + 1.6 S + 0.5 W3		Y	DL	1.2	RLL	1.6	OL3	0.5		
22	1.2 D + 1.6 S + 0.5 W4		Y	DL	1.2	RLL	1.6	OL4	0.5		
23	1.2 D + 1.0 W1		Y	DL	1.2	RLL		OL1	1		
24	1.2 D + 1.0 W2		Y	DL	1.2	RLL		OL2	1		
25	1.2 D + 1.0 W3		Y	DL	1.2	RLL		OL3	1		
26	1.2 D + 1.0 W4		Y	DL	1.2	RLL		OL4	1		
27	0.9 D + 1.0 W1		Y	DL	0.9	RLL		OL1	1		
28	0.9 D + 1.0 W2		Y	DL	0.9	RLL		OL2	1		
29	0.9 D + 1.0 W3		Y	DL	0.9	RLL		OL3	1		
30	0.9 D + 1.0 W4		Y	DL	0.9	RLL		OL4	1		

Envelope Node Reactions

Node Label	X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N2	max	62.627	7	866.908	7	15.171	4	0	15	0	15
2		min	-32.538	12	-393.81	12	-22.848	6	0	2	0	2
3	N1	max	247.256	6	1288.003	6	345.534	14	0	15	0	15
4		min	-205.851	13	-1043.776	13	-272.961	4	0	2	0	2
5	N151	max	205.853	13	1288.04	6	345.548	14	0	15	0	15
6		min	-247.259	6	-1043.803	13	-272.968	4	0	2	0	2
7	N152	max	32.537	12	866.88	7	15.171	4	0	15	0	15
8		min	-62.626	7	-393.791	12	-22.849	6	0	2	0	2
9	N276	max	4.384	6	1628.17	6	576.203	6	0	15	0	15
10		min	-3.621	13	-1329.637	13	-451.079	12	0	2	0	2
11	N278	max	7.185	12	1488.938	7	22.233	4	0	15	0	15
12		min	-13.707	7	-697.339	12	-33.303	6	0	2	0	2
13	N233	max	12.589	6	1760.124	6	551.925	14	0	15	0	15
14		min	-10.381	13	-1444.942	13	-428.431	4	0	2	0	2
15	N235	max	28.926	7	1380.516	7	23.504	4	0	15	0	15
16		min	-15.806	12	-640.368	12	-35.05	6	0	2	0	2
17	N239	max	14.904	6	1708.434	6	538.697	6	0	15	0	15
18		min	-12.485	13	-1395.608	13	-421.459	4	0	2	0	2
19	N241	max	25.638	7	1369.146	7	22.914	4	0	15	0	15
20		min	-13.608	12	-638.558	12	-34.178	6	0	2	0	2
21	N245	max	7.516	13	1696.203	6	528.955	6	0	15	0	15
22		min	-8.686	6	-1383.905	13	-415.465	4	0	2	0	2
23	N247	max	7.842	12	1357.225	7	22.664	4	0	15	0	15
24		min	-14.76	7	-634.228	12	-33.772	6	0	2	0	2
25	N251	max	15.876	13	1747.397	6	560.309	6	0	15	0	15
26		min	-18.618	6	-1432.518	13	-434.507	4	0	2	0	2
27	N253	max	18.367	12	1387.969	7	23.79	4	0	15	0	15
28		min	-33.929	7	-643.612	12	-35.503	6	0	2	0	2
29	N257	max	3.036	13	1733.809	6	537.349	6	0	15	0	15
30		min	-3.546	6	-1419.646	13	-420.897	4	0	2	0	2
31	N259	max	4.649	12	1398.447	7	23.268	4	0	15	0	15
32		min	-8.056	7	-654.216	12	-34.582	6	0	2	0	2
33	N263	max	3.547	6	1733.81	6	537.337	6	0	15	0	15
34		min	-3.036	13	-1419.647	13	-420.889	4	0	2	0	2
35	N265	max	8.055	7	1398.444	7	23.268	4	0	15	0	15
36		min	-4.649	12	-654.216	12	-34.582	6	0	2	0	2
37	N269	max	18.618	6	1747.398	6	560.299	6	0	15	0	15
38		min	-15.875	13	-1432.519	13	-434.5	4	0	2	0	2
39	N271	max	33.929	7	1387.971	7	23.789	4	0	15	0	15
40		min	-18.367	12	-643.614	12	-35.502	6	0	2	0	2

Envelope Node Reactions (Continued)

Node Label	X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC		
41	N275	max	8.686	6	1696.188	6	528.933	6	0	15	0	15	0	15
42		min	-7.516	13	-1383.893	13	-415.451	4	0	2	0	2	0	2
43	N283	max	14.76	7	1357.243	7	22.663	4	0	15	0	15	0	15
44		min	-7.842	12	-634.241	12	-33.771	6	0	2	0	2	0	2
45	N287	max	12.484	13	1708.436	6	538.688	6	0	15	0	15	0	15
46		min	-14.904	6	-1395.61	13	-421.453	4	0	2	0	2	0	2
47	N289	max	13.609	12	1369.159	7	22.914	4	0	15	0	15	0	15
48		min	-25.639	7	-638.566	12	-34.177	6	0	2	0	2	0	2
49	N293	max	10.381	13	1760.121	6	551.916	14	0	15	0	15	0	15
50		min	-12.59	6	-1444.941	13	-428.425	4	0	2	0	2	0	2
51	N295	max	15.806	12	1380.519	7	23.504	4	0	15	0	15	0	15
52		min	-28.926	7	-640.371	12	-35.049	6	0	2	0	2	0	2
53	N379	max	3.62	13	1628.166	6	576.21	6	0	15	0	15	0	15
54		min	-4.383	6	-1329.628	13	-451.084	12	0	2	0	2	0	2
55	N381	max	13.707	7	1488.941	7	22.234	4	0	15	0	15	0	15
56		min	-7.184	12	-697.332	12	-33.304	6	0	2	0	2	0	2
57	Totals:	max	0.001	5	33911.391	6	6819.225	6						
58		min	0	14	-18224.506	12	-5382.22	12						

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks

Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	Pnc/om [lb]	Pnt/om [lb]	Mny/om [lb-ft]	Mnz/om [lb-ft]	Cb	Eqn	
1	M5	PIPE2.0A21165	0.183	37.901	7	0.048	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	
2	M6	PIPE2.0A21165	0.178	7.947	6	0.062	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
3	M15	1.5X1.5X0.083	0.166	101.804	6	0.018	101.804	y	6	2291.052	14085.15	624.421	624.421	1.136	H1-1b*
4	M19	1.5X1.5X0.083	0.08	67.119	6	0.016	67.119	y	6	5270.677	14085.15	624.421	624.421	1.136	H1-1b*
5	M73	PIPE2.0A21165	0.183	37.901	7	0.048	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	
6	M74	PIPE2.0A21165	0.178	7.947	6	0.062	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
7	M75	1.5X1.5X0.083	0.166	101.804	6	0.018	101.804	y	6	2291.063	14085.15	624.421	624.421	1.136	H1-1b*
8	M75B	1.5X1.5X0.083	0.08	67.119	6	0.016	67.119	y	6	5270.677	14085.15	624.421	624.421	1.136	H1-1b*
9	M71	PIPE2.5A21168	0.465	292.188	6	0.143	574.635	6	20336.2	28358.413	2081.747	2081.747	1	H1-1b	
10	M72	PIPE2.5A21168	0.489	642.813	7	0.151	574.635	7	20336.2	28358.413	2081.747	2081.747	1	H1-1b	
11	M134	PIPE2.0A21165	0.185	4.279	6	0.085	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
12	M135	1.5X1.5X0.083	0.302	51.962	6	0.003	101.804	y	5	2291.063	14085.15	624.421	624.421	1.136	H1-1a
13	M136	PIPE2.0A21165	0.129	37.901	7	0.081	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	
14	M113	PIPE2.0A21165	0.183	4.279	6	0.081	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
15	M114	1.5X1.5X0.083	0.29	51.962	6	0.007	101.804	y	7	2291.063	14085.15	624.421	624.421	1.136	H1-1a
16	M115	PIPE2.0A21165	0.146	37.901	7	0.078	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	
17	M116	PIPE2.0A21165	0.179	4.279	6	0.079	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
18	M117	1.5X1.5X0.083	0.283	51.962	6	0.006	101.804	y	7	2291.063	14085.15	624.421	624.421	1.136	H1-1a
19	M118	PIPE2.0A21165	0.14	37.901	7	0.075	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	
20	M119	PIPE2.0A21165	0.177	4.279	6	0.078	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
21	M120	1.5X1.5X0.083	0.278	51.962	6	0.004	101.804	y	7	2291.063	14085.15	624.421	624.421	1.136	H1-1a
22	M121	PIPE2.0A21165	0.127	37.901	7	0.074	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	
23	M122	PIPE2.0A21165	0.185	4.279	6	0.082	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
24	M123	1.5X1.5X0.083	0.294	51.962	6	0.008	101.804	y	6	2291.063	14085.15	624.421	624.421	1.136	H1-1a
25	M124	PIPE2.0A21165	0.155	37.901	7	0.079	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	
26	M125	PIPE2.0A21165	0.179	4.279	6	0.079	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
27	M126	1.5X1.5X0.083	0.282	51.962	6	0.004	101.804	y	6	2291.063	14085.15	624.421	624.421	1.136	H1-1a
28	M127	PIPE2.0A21165	0.124	37.901	7	0.075	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	
29	M128	PIPE2.0A21165	0.179	4.279	6	0.079	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
30	M129	1.5X1.5X0.083	0.282	51.962	6	0.004	101.804	y	6	2291.063	14085.15	624.421	624.421	1.136	H1-1a
31	M130	PIPE2.0A21165	0.124	37.901	7	0.075	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	
32	M131	PIPE2.0A21165	0.185	4.279	6	0.082	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
33	M132	1.5X1.5X0.083	0.294	51.962	6	0.008	101.804	y	6	2291.063	14085.15	624.421	624.421	1.136	H1-1a
34	M133	PIPE2.0A21165	0.155	37.901	7	0.079	37.901	6	19212.951	23232.186	1397.505	1397.505	1	H1-1b	

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks (Continued)

Member	Shape	Code Check	Loc[in]	LC Shear Check	Loc[in]	DirLC Pnc/om [lb]	Pnt/om [lb]	Mnyy/om [lb-ft]	Mnzz/om [lb-ft]	Cb	Eqn				
35	M137	PIPE2.0A21165	0.177	4.279	6	0.078	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
36	M138	1.5X1.5X0.083	0.278	51.962	6	0.004	101.804	y	7	2291.063	14085.15	624.421	624.421	1.136	H1-1a
37	M139	PIPE2.0A21165	0.127	37.901	7	0.074	37.901		6	19212.951	23232.186	1397.505	1397.505	1	H1-1b
38	M140	PIPE2.0A21165	0.179	4.279	6	0.079	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
39	M141	1.5X1.5X0.083	0.283	51.962	6	0.006	101.804	y	7	2291.063	14085.15	624.421	624.421	1.136	H1-1a
40	M142	PIPE2.0A21165	0.14	37.901	7	0.075	37.901		6	19212.951	23232.186	1397.505	1397.505	1	H1-1b
41	M143	PIPE2.0A21165	0.183	4.279	6	0.081	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
42	M144	1.5X1.5X0.083	0.29	51.962	6	0.007	101.804	y	7	2291.063	14085.15	624.421	624.421	1.136	H1-1a
43	M184	PIPE2.0A21165	0.146	37.901	7	0.078	37.901		6	19212.951	23232.186	1397.505	1397.505	1	H1-1b
44	M185	PIPE2.0A21165	0.185	4.279	6	0.085	0	6	15707.118	23232.186	1397.505	1397.505	1	H1-1b	
45	M186	1.5X1.5X0.083	0.302	51.962	6	0.003	101.804	y	5	2291.063	14085.15	624.421	624.421	1.136	H1-1a
46	M187	PIPE2.0A21165	0.129	37.901	7	0.081	37.901		6	19212.951	23232.186	1397.505	1397.505	1	H1-1b

Envelope AA ADM1-20: ASD - BUILDING Member Aluminum Code Checks

Member	Shape	Code Check	Loc[in]	LC Shear Check	Loc[in]	DirLC Pnc/Om[lb]	Pnt/Om[lb]	Mny/Om[lb-ft]	Mnz/Om[lb-ft]	Vny/Om[lb]	Vnz/Om[lb]	Cb	Eqn				
1	M107	HR300/SMR300_ALA	0.651	37.625	7	0.076	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.927	H.1-1
2	M50	HR300/SMR300_ALA	0.715	37.625	7	0.078	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.99	H.1-1
3	M53	HR300/SMR300_ALA	0.673	37.625	7	0.073	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.848	H.1-1
4	M56	HR300/SMR300_ALA	0.668	37.625	7	0.074	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.838	H.1-1
5	M59	HR300/SMR300_ALA	0.675	37.625	7	0.072	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.852	H.1-1
6	M62	HR300/SMR300_ALA	0.671	37.625	7	0.078	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.843	H.1-1
7	M65	HR300/SMR300_ALA	0.673	37.625	7	0.077	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.846	H.1-1
8	M68	HR300/SMR300_ALA	0.675	37.625	7	0.074	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.851	H.1-1
9	M76	HR300/SMR300_ALA	0.668	37.625	7	0.076	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.838	H.1-1
10	M79	HR300/SMR300_ALA	0.674	37.625	7	0.073	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.85	H.1-1
11	M82	HR300/SMR300_ALA	0.67	37.625	7	0.073	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.843	H.1-1
12	M85	HR300/SMR300_ALA	0.67	37.625	7	0.073	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.843	H.1-1
13	M88	HR300/SMR300_ALA	0.674	37.625	7	0.073	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.85	H.1-1
14	M91	HR300/SMR300_ALA	0.668	37.625	7	0.076	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.838	H.1-1
15	M94	HR300/SMR300_ALA	0.675	37.625	7	0.074	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.851	H.1-1
16	M97	HR300/SMR300_ALA	0.673	37.625	7	0.077	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.846	H.1-1
17	M100	HR300/SMR300_ALA	0.671	37.625	7	0.078	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.843	H.1-1
18	M103	HR300/SMR300_ALA	0.675	37.625	7	0.072	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.852	H.1-1
19	M106	HR300/SMR300_ALA	0.668	37.625	7	0.074	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.838	H.1-1
20	M111	HR300/SMR300_ALA	0.673	37.625	7	0.073	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.848	H.1-1
21	M147	HR300/SMR300_ALA	0.715	37.625	7	0.078	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.99	H.1-1
22	M150	HR300/SMR300_ALA	0.651	37.625	7	0.076	37.625	y	7	3928.719	14342.564	533.921	934.619	7307.692	3206.154	1.926	H.1-1



JOB NO.: U2716.0388.241

PROJECT: SunTurf Package D6

SUBJECT: CALCULATIONS LF 10

DESIGN APPROACH ASD

CONNECTION CAPACITY

Location: Column Base (set screws)

Connection Type: M16 Conical Set Screws

Tensile Capacity: 2600 lbs

Tension Load: 1445 lbs

Check Connection: 55.6%

Result: **Select M16 Conical Set Screws**

Note: Uplift capacity. FOS of (2)

CONNECTION CAPACITY

Location: Column to Cross Beam

Connection Type: K10341-002

Tensile Capacity: 2195 lbs

Tension Load: 1310 lbs

Check Connection: 59.7%

Result: **Select K10341-002**

Note: Uplift capacity. FOS of (2)



JOB NO.: U2716.0388.241

PROJECT: SunTurf Package D6

SUBJECT: CALCULATIONS LF 10

CONNECTION CAPACITY

Location: Brace to Column

Connection Type: K10219-001

Capacity: 1483 lbs

Tension Load: 649 lbs

Check Connection: 43.8%

Result: **Select K10219-001**

Note: Axial capacity. FOS of (2)

BOLTED TENSION CONNECTION

Location: Rail to Cross Beam

Bolt Grade: A304 SS (A2-70)

Bolt Diameter: 0.375 in

Number of Bolts: 2

Bolt Capacity: 8410 lbs (AISC Equation J3-1)

Tension Load: 807 lbs

Check Bolt: 9.6%

Result: **Select (2) 0.375 in. dia. A304 SS (A2-70) bolts.**

Note:

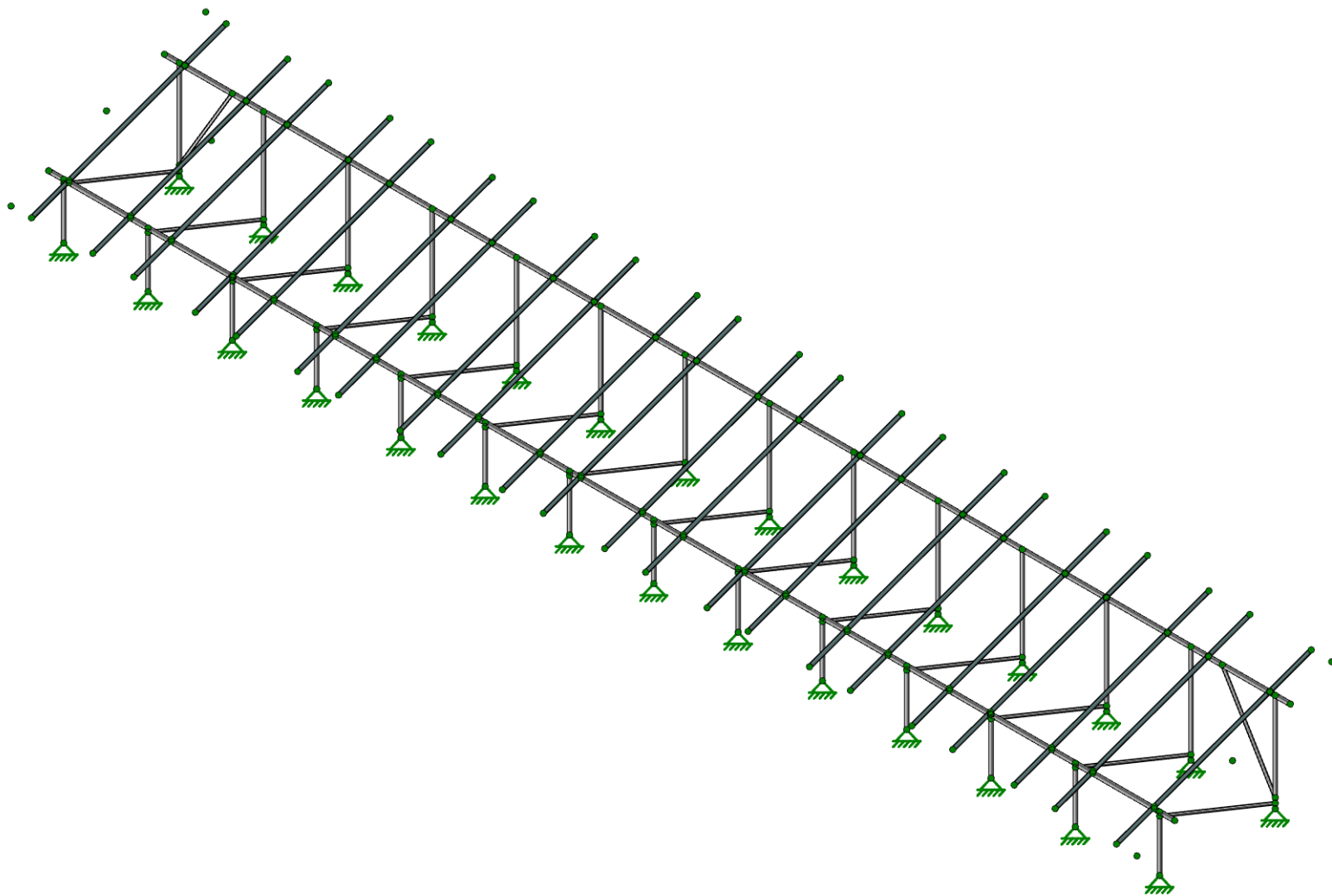
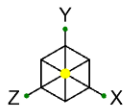


JOB NO.: U2716.0388.241

PROJECT: Sunturf Package D6 Ground Mount

Framing Analysis

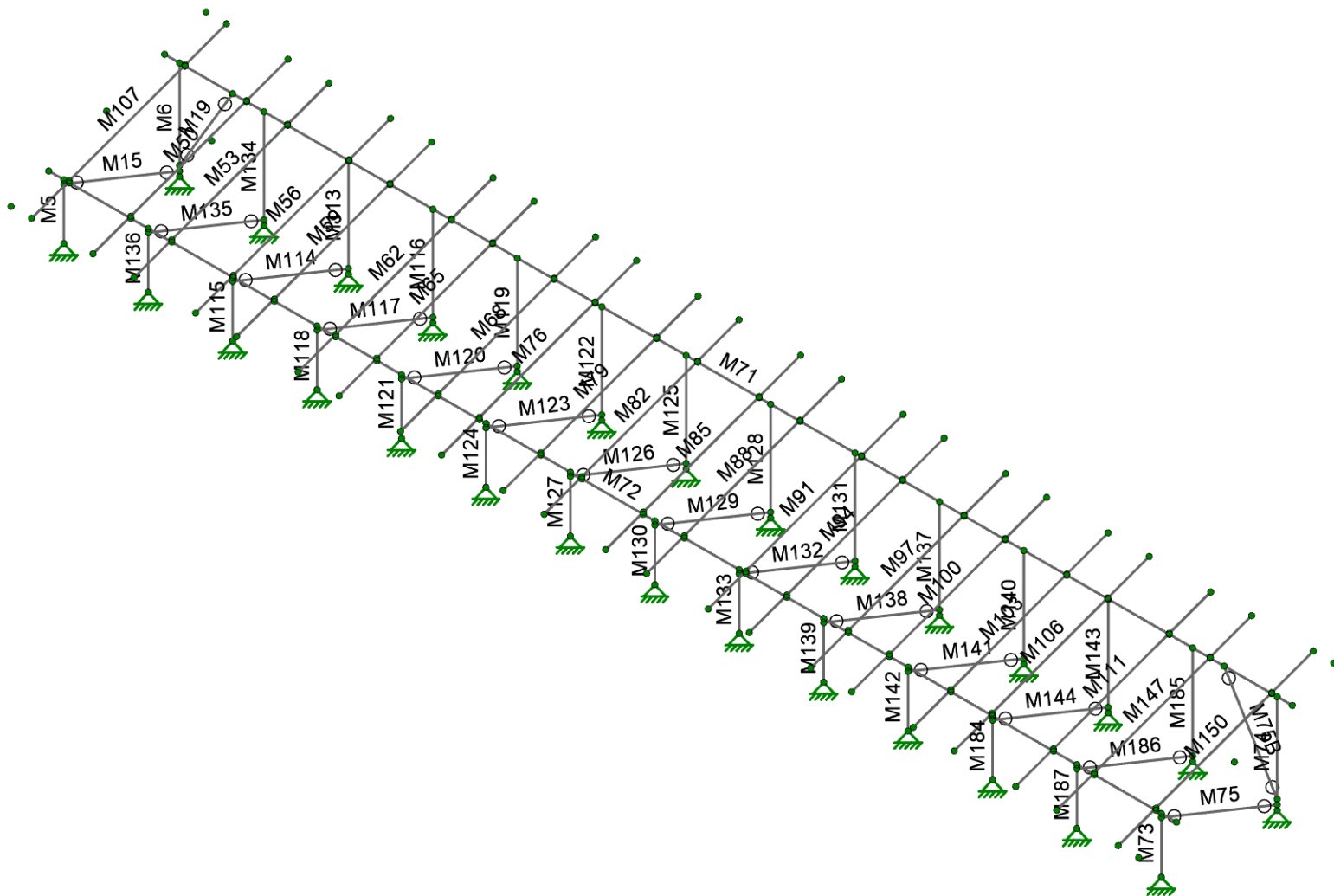
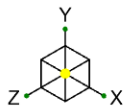
LF - 20 deg



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U2716.0388.241

D6 Large Format Panels - 20 Degree Tilt

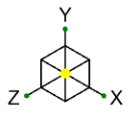
SK-1
May 20, 2024
Sunturf D6 - LF - 20deg.r3d



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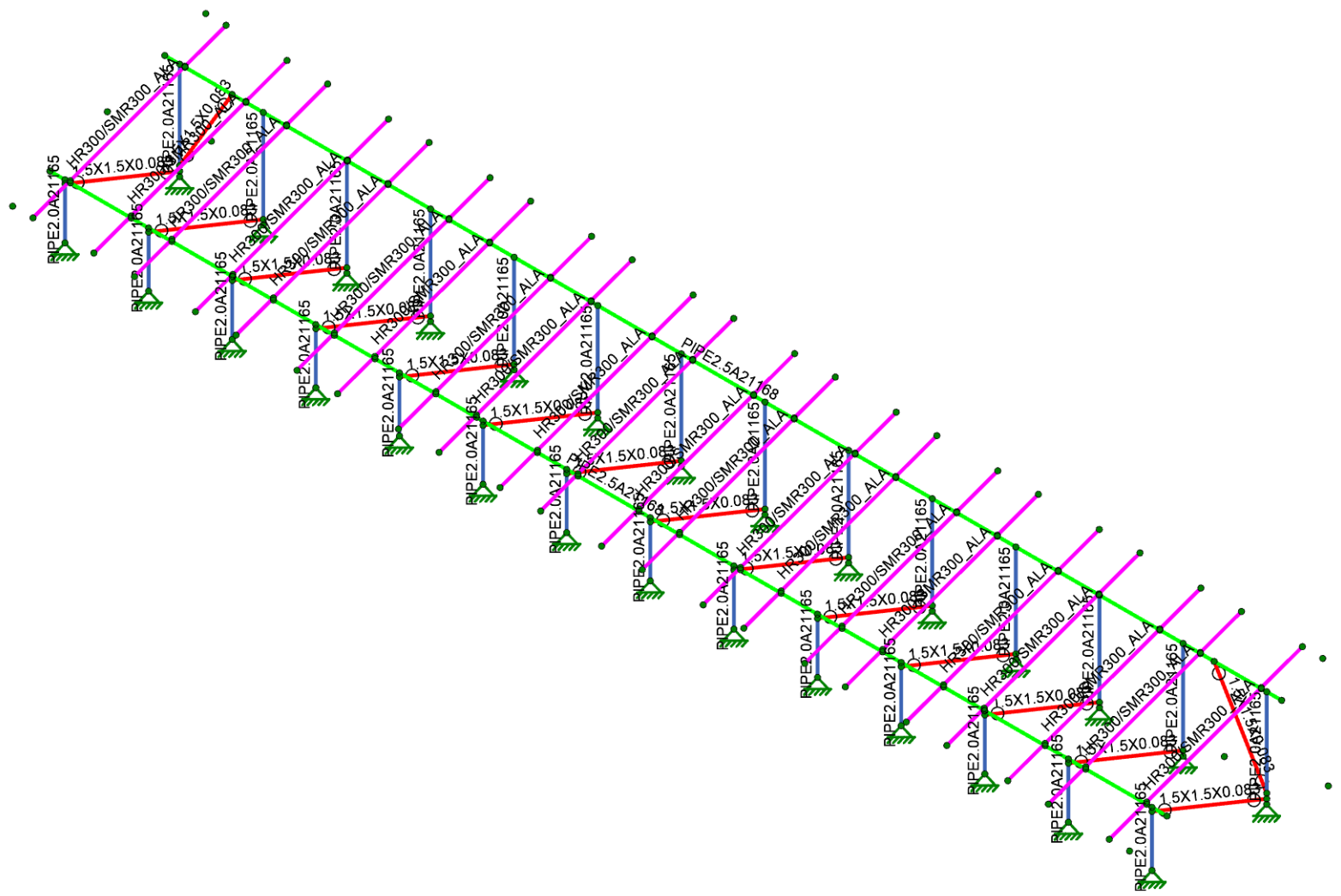
D6 Large Format Panels - 20 Degree Tilt

SK-2
May 20, 2024
Sunturf D6 - LF - 20deg.r3d



Section Sets

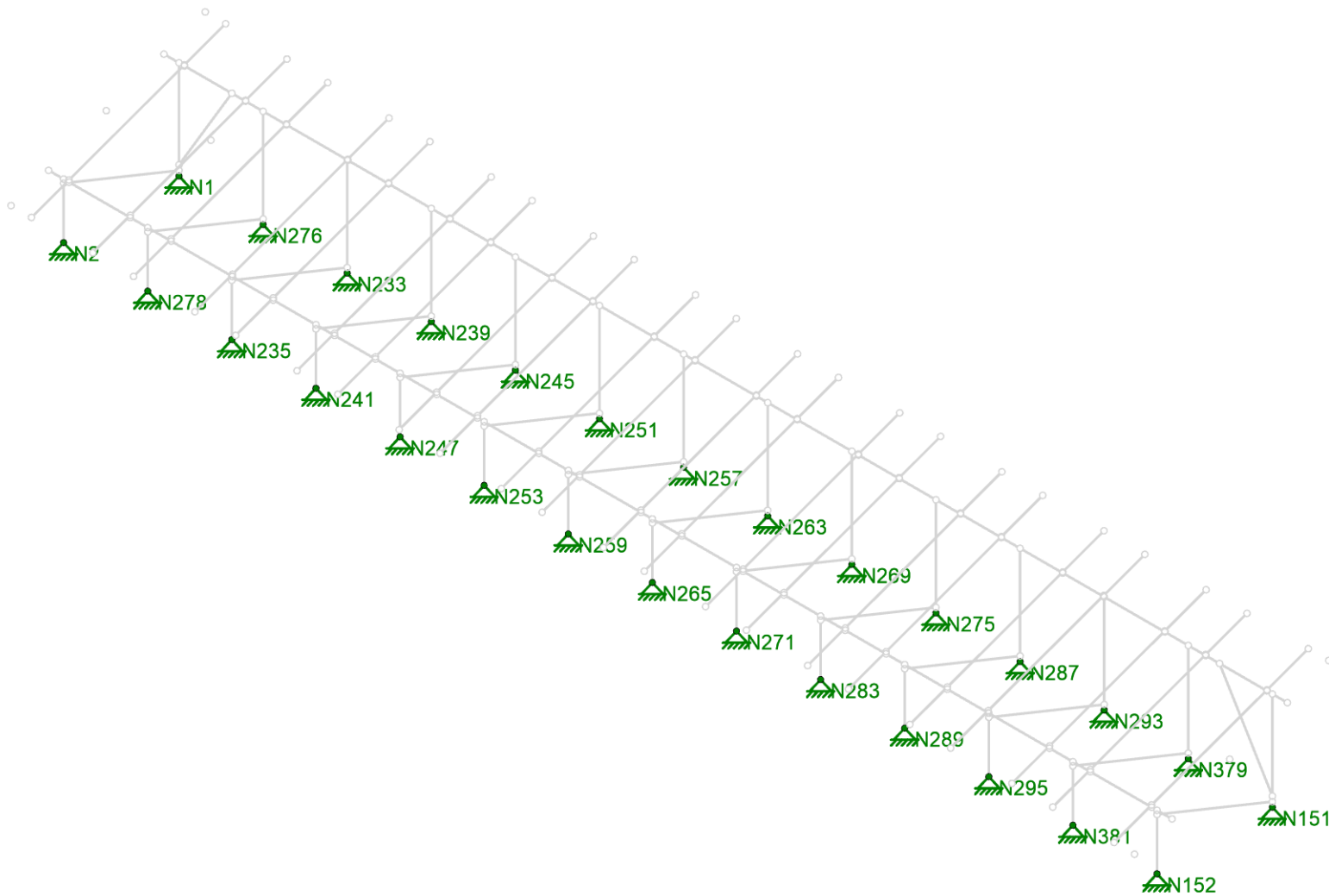
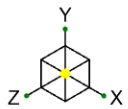
- █ Post
- █ Cross Beam
- █ Diagonal Brace
- █ RIGID
- █ AL Rails



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D6 Large Format Panels - 20 Degree Tilt

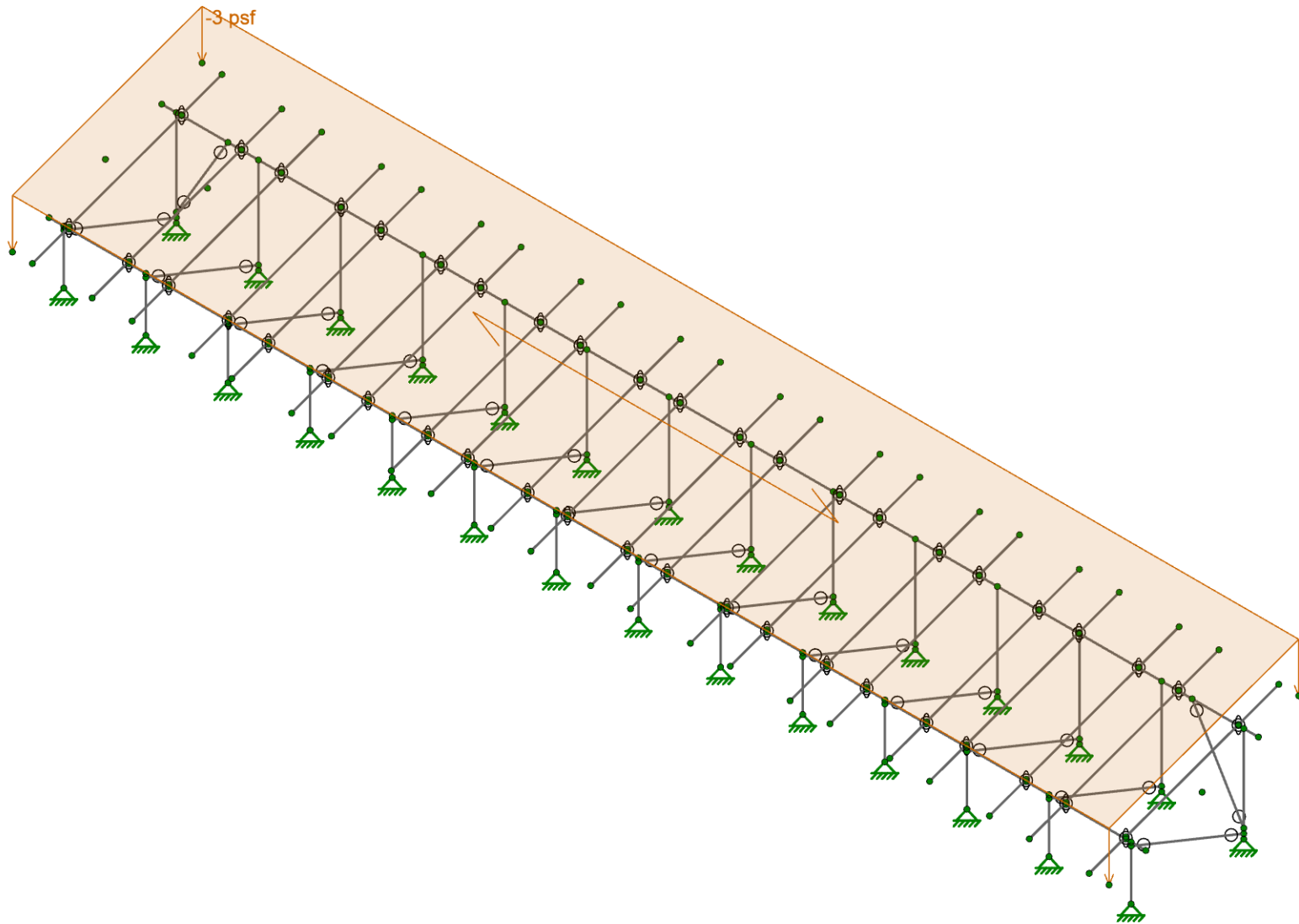
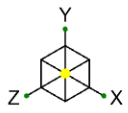
SK-3
 May 20, 2024
 Sunturf D6 - LF - 20deg.r3d



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U2716.0388.241

D6 Large Format Panels - 20 Degree Tilt

SK-4
May 20, 2024
Sunturf D6 - LF - 20deg.r3d



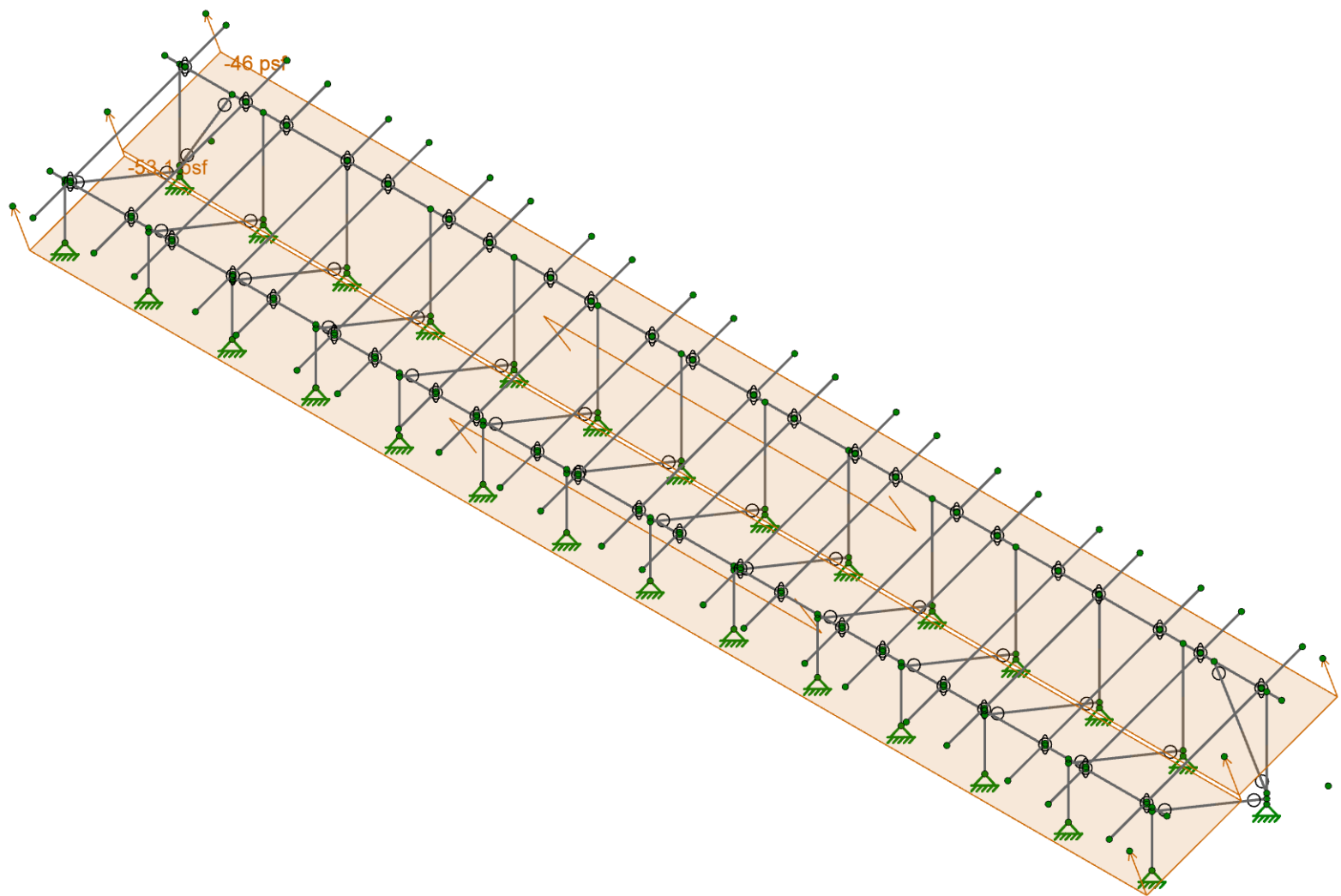
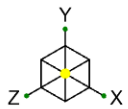
Loads: BLC 2, Solar Panel Weight



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D6 Large Format Panels - 20 Degree Tilt

SK-5
May 20, 2024
Sunturf D6 - LF - 20deg.r3d



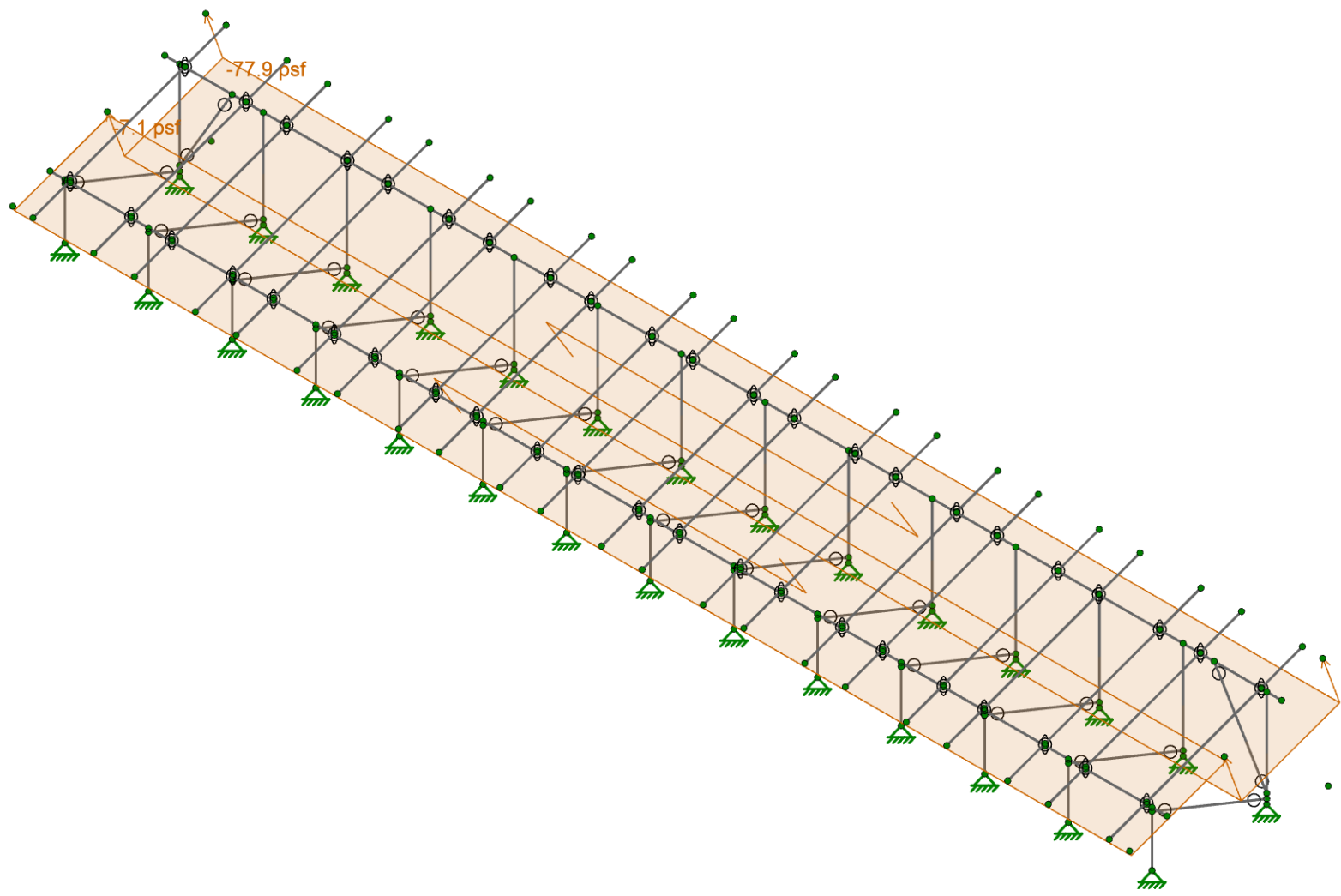
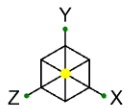
Loads: BLC 4, Wind A 0 deg



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D6 Large Format Panels - 20 Degree Tilt

SK-6
May 20, 2024
Sunturf D6 - LF - 20deg.r3d



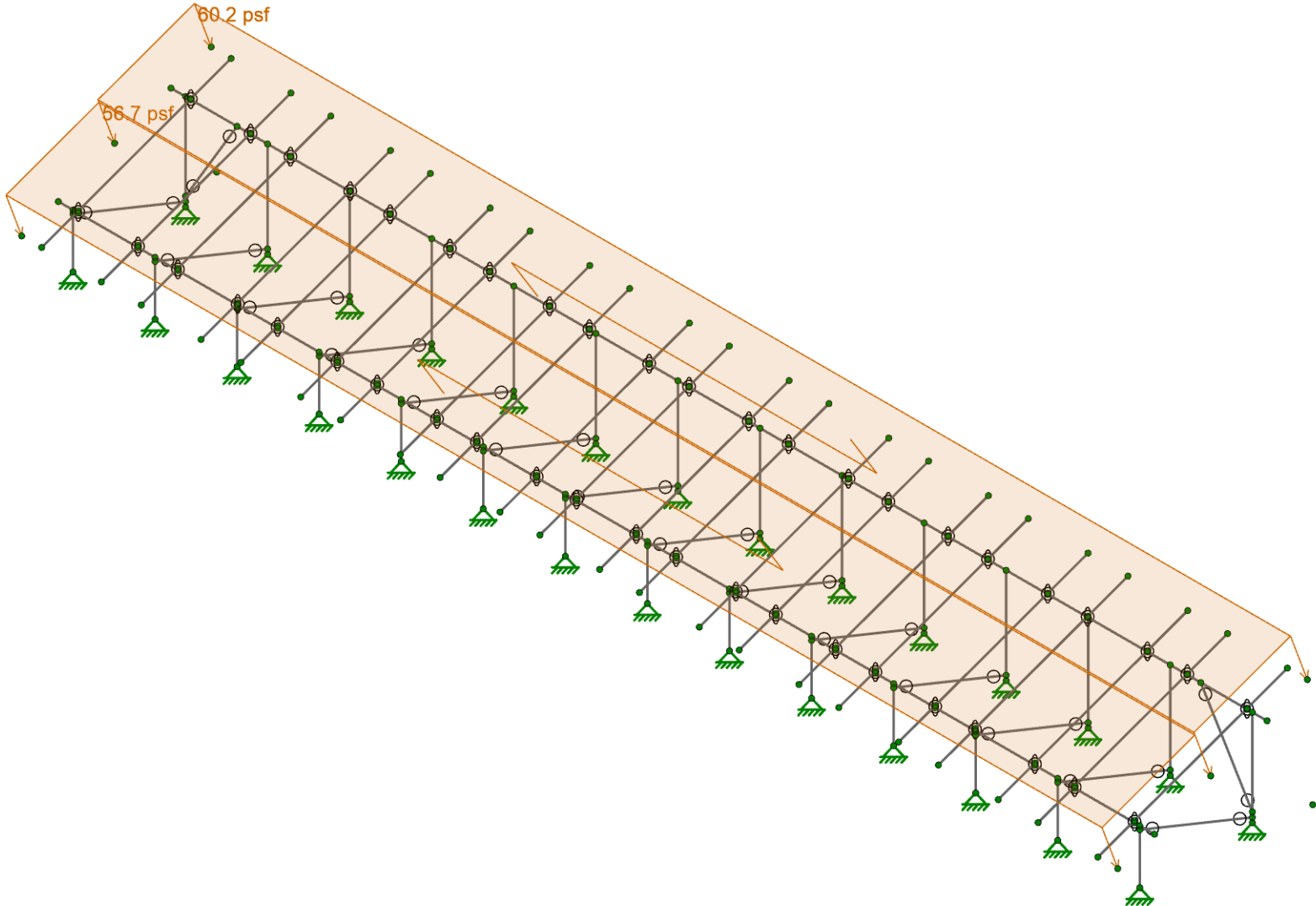
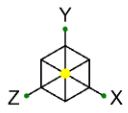
Loads: BLC 5, Wind B 0 deg



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D6 Large Format Panels - 20 Degree Tilt

SK-7
May 20, 2024
Sunturf D6 - LF - 20deg.r3d



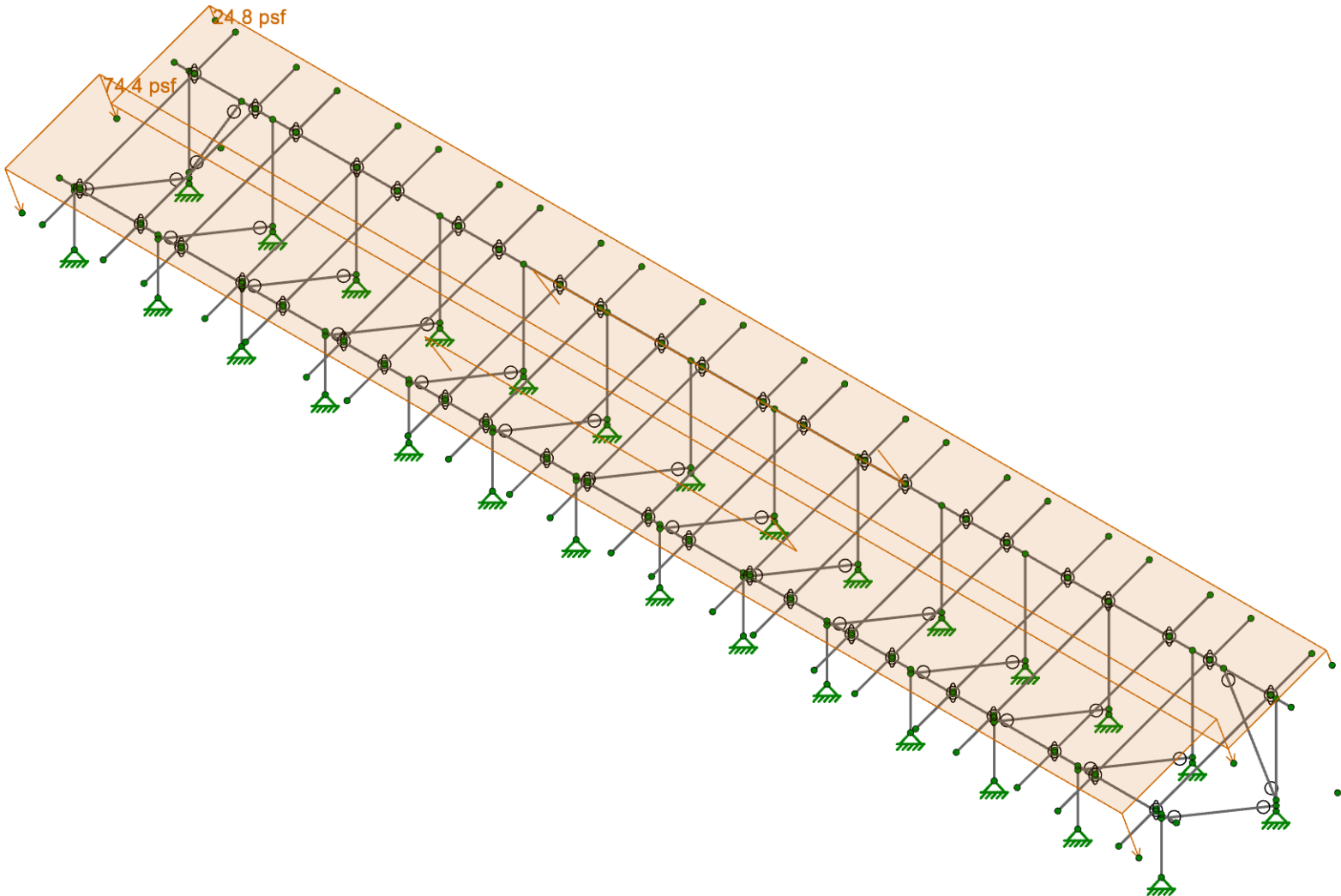
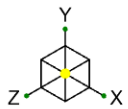
Loads: BLC 6, Wind A 180 deg




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D6 Large Format Panels - 20 Degree Tilt

SK-8
May 20, 2024
Sunturf D6 - LF - 20deg.r3d

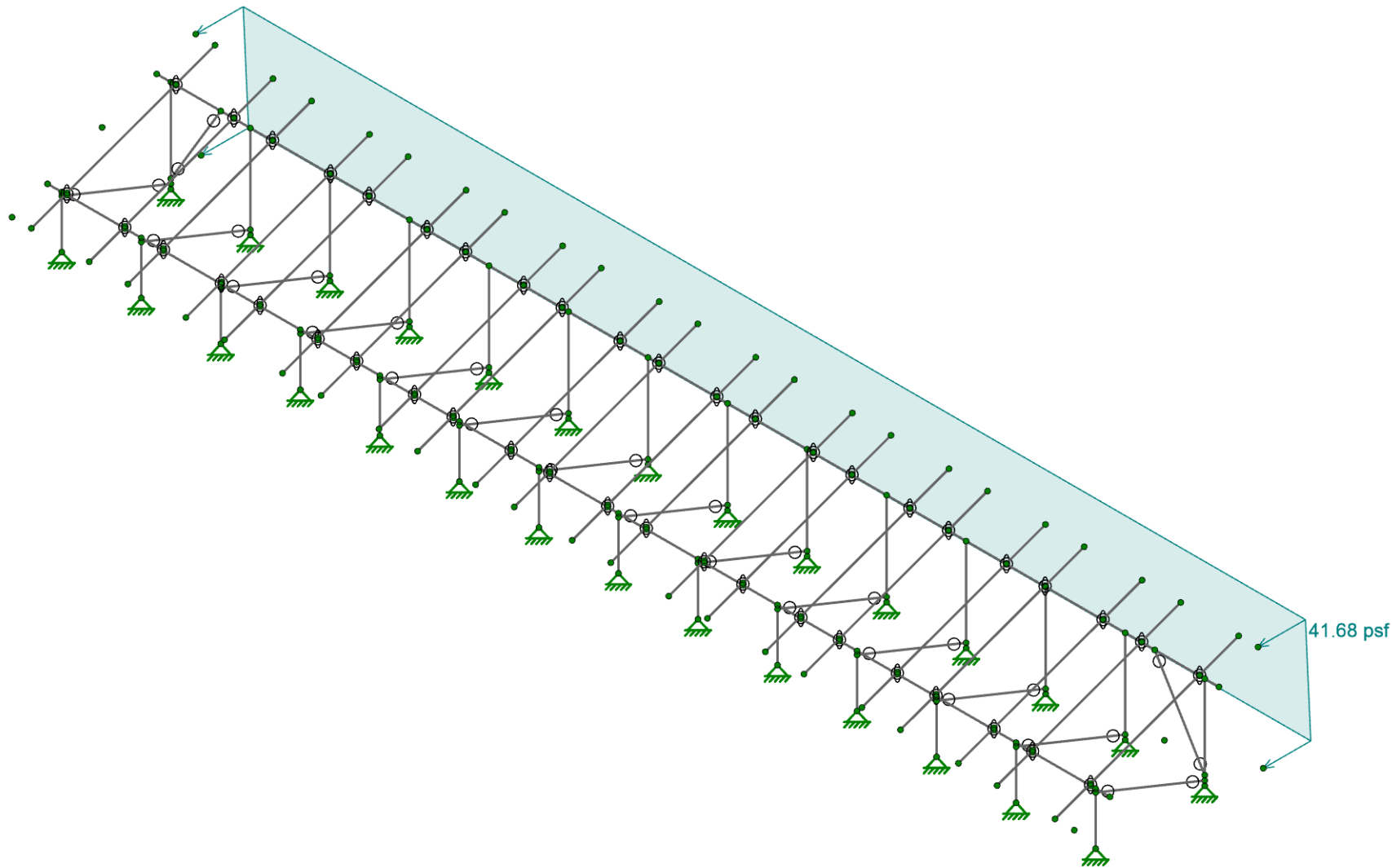
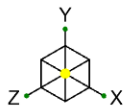


Loads: BLC 7, Wind B 180 deg

 IRISA A NEMETSCHKE COMPANY	Vector Structural Engineering
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D6 Large Format Panels - 20 Degree Tilt

SK-9
May 20, 2024
Sunturf D6 - LF - 20deg.r3d



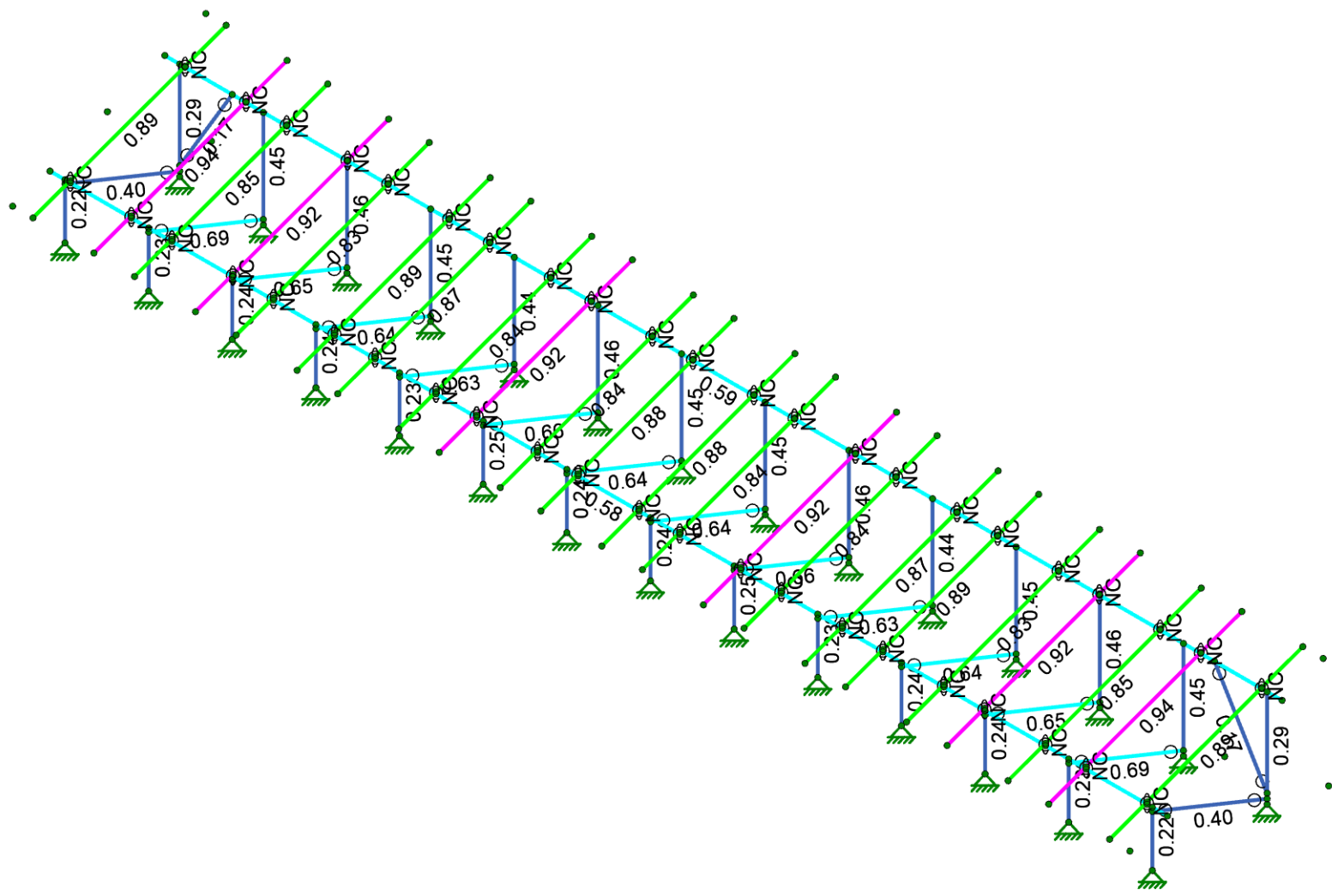
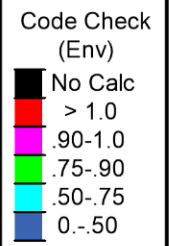
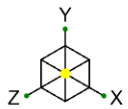
Loads: BLC 8, Wind Z



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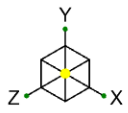
D6 Large Format Panels - 20 Degree Tilt

SK-10
May 20, 2024
Sunturf D6 - LF - 20deg.r3d



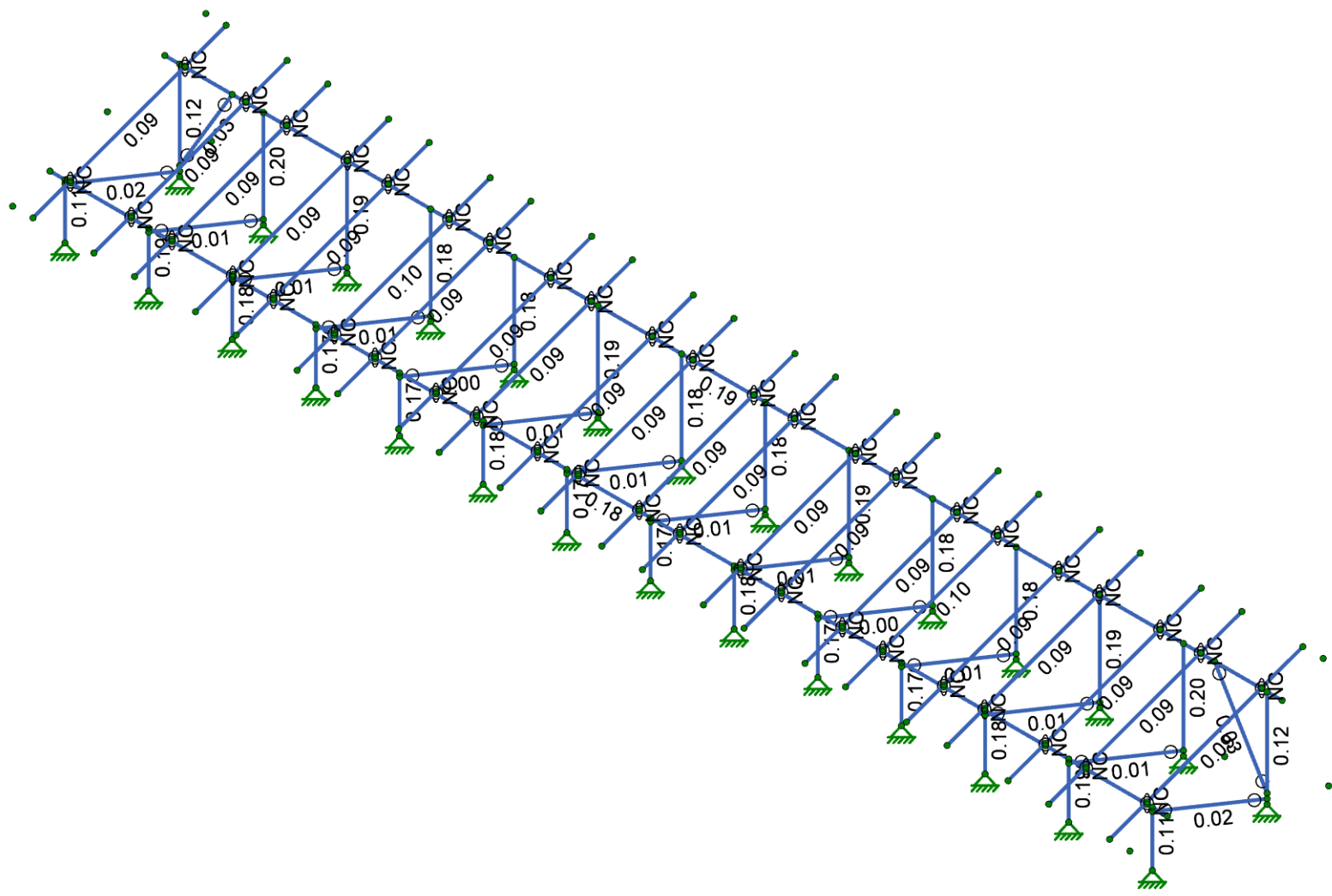
Member Code Checks Displayed (Enveloped)

	Vector Structural Engineering	D6 Large Format Panels - 20 Degree Tilt	SK-11
	CJT		May 20, 2024
	U2716.0388.241		Sunturf D6 - LF - 20deg.r3d




Shear Check (Env)

- No Calc
- > 1.0
- .90-1.0
- .75-.90
- .50-.75
- 0-.50



Member Shear Checks Displayed (Enveloped)

 <p>IRISA A NEMETSCHKE COMPANY</p>	Vector Structural Engineering	D6 Large Format Panels - 20 Degree Tilt	SK-12
	CJT		May 20, 2024
	U2716.0388.241		Sunturf D6 - LF - 20deg.r3d

Model Settings

Number of Reported Sections	5
Number of Internal Sections	100
Member Area Load Mesh Size (in ²)	144
Consider Shear Deformation	Yes
Consider Torsional Warping	Yes
Approximate Mesh Size (in)	24
Transfer Forces Between Intersecting Wood Walls	Yes
Increase Wood Wall Nailing Capacity for Wind Loads	Yes
Include P-Delta for Walls	Yes
Optimize Masonry and Wood Walls	Yes
Maximum Number of Iterations	3
Single	No
Multiple (Optimum)	Yes
Maximum	No

Global Axis corresponding to vertical direction	Y
Convert Existing Data	Yes
Default Global Plane for z-axis	XZ
Plate Local Axis Orientation	Nodal

Hot Rolled Steel	AISC 15th (360-16): ASD
Stiffness Adjustment	Yes (Iterative)
Notional Annex	None
Connections	None
Cold Formed Steel	None
Stiffness Adjustment	Yes (Iterative)
Wood	None
Temperature	< 100F
Concrete	ACI 318-19
Masonry	None
Aluminum	AA ADM1-20: ASD
Structure Type	Building
Stiffness Adjustment	Yes (Iterative)
Stainless	None
Stiffness Adjustment	Yes (Iterative)

Compression Stress Block	Rectangular Stress Block
Analyze using Cracked Sections	No
Leave room for horizontal rebar splices (2*d bar spacing)	Yes
List forces which were ignored for design in the Detail Report	Yes

Column Min Steel	1
Column Max Steel	8
Rebar Material Spec	ASTM A615
Warn if beam-column framing arrangement is not understood	No
Number of Shear Regions	4
Region 2 & 3 Spacing Increase Increment (in)	3.999992

Code	None
Base Elevation (ft)	15600
Include the weight of the structure in base shear calcs	Yes



Company : Vector Structural Engineering
Designer : CJT
Job Number : U2716.0388.241
Model Name : D6 Large Format Panels - 20 De...

5/20/2024
3:47:36 PM
Checked By : MIH

Model Settings (Continued)

T Z (sec)	
T X (sec)	
C _Z	0.02
C _X	0.02
R Z	3
R X	3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e ⁶ F ⁻¹]	Density [lb/ft ³]	Yield [psi]	Ry	Fu [psi]	Rt
1	A992	29000	11154	0.3	0.65	490	50000	1.1	65000	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	490	36000	1.5	58000	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	490	50000	1.1	65000	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	527	42000	1.4	58000	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	527	46000	1.4	58000	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	490	35000	1.6	60000	1.2
7	A1085	29000	11154	0.3	0.65	490	50000	1.4	65000	1.3

Aluminum Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e ⁶ F ⁻¹]	Density [lb/ft ³]	Table B.4	kt	Ftu [psi]	Fty [psi]	Fcy [psi]	Fsu [psi]	Ct
1	3003-H14	10100	3787.5	0.33	1.3	172.8	Table B.4-1	1	19000	16000	13000	12000	141
2	6061-T6	10100	3787.5	0.33	1.3	172.8	Table B.4-2	1	38000	35000	35000	24000	141
3	6063-T5	10100	3787.5	0.33	1.3	172.8	Table B.4-2	1	22000	16000	16000	13000	141
4	6063-T6	10100	3787.5	0.33	1.3	172.8	Table B.4-2	1	30000	25000	25000	19000	141
5	5052-H34	10200	3787.5	0.33	1.3	172.8	Table B.4-1	1	34000	26000	24000	20000	141
6	6061-T6 W	10100	3787.5	0.33	1.3	172.8	Table B.4-1	1	24000	15000	15000	15000	141
7	6005-T5	10100	3787.5	0.33	1.3	172.8	Table B.4-1	1	38000	35000	35000	24000	141

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in ²]	Iyy [in ⁴]	Izz [in ⁴]	J [in ⁴]
1	Post	PIPE2.0A21165	Column	Pipe	A572 Gr.50	Typical	0.776	0.499	0.499	0.998
2	Cross Beam	PIPE2.5A21168	Beam	Wide Flange	A572 Gr.50	Typical	0.947	0.907	0.907	1.814
3	Diagonal Brace	1.5X1.5X0.083	HBrace	SquareTube	A572 Gr.50	Typical	0.47	0.158	0.158	0.236

Aluminum Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in ²]	Iyy [in ⁴]	Izz [in ⁴]	J [in ⁴]
1	AL Posts	2.375ODX0.188	Column	Pipe	6005-T5	Typical	1.29	0.778	0.778	1.54
2	AL Brace	RT1.5X2X0.15625	VBrace	Rectangular Tubes	6005-T5	Typical	0.996	0.327	0.524	0.602
3	AL Rails	HR300/SMR300 ALA	Beam	Rectangular Tubes	6005-T5	Typical	0.736	0.214	0.727	0.734
4	AL Cross Beam	CROSSRAIL	Beam	Rectangular Tubes	6005-T5	Typical	1.909	1.97	4.366	4.017

Basic Load Cases

	BLC Description	Category	Y Gravity	Distributed	Area(Member)
1	Self Weight	DL	-1.05		
2	Solar Panel Weight	DL			1
3	Roof Live/Snow	RLL			
4	Wind A 0 deg	OL1			2
5	Wind B 0 deg	OL2			2
6	Wind A 180 deg	OL3			2
7	Wind B 180 deg	OL4			2
8	Wind Z	WLZ			1
9	BLC 2 Transient Area Loads	None		46	
10	BLC 4 Transient Area Loads	None		152	
11	BLC 5 Transient Area Loads	None		152	
12	BLC 6 Transient Area Loads	None		152	
13	BLC 7 Transient Area Loads	None		152	
14	BLC 8 Transient Area Loads	None		96	

Member Area Loads (BLC 2 : Solar Panel Weight)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N199	N196	Y	A-B	-3	-3	-3	-3	Yes

Member Area Loads (BLC 4 : Wind A 0 deg)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N201	N198	Perp	A-B	-46	-46	-46	-46	Yes
2	N198	N201	N199	N196	Perp	A-B	-53.1	-53.1	-53.1	-53.1	Yes

Member Area Loads (BLC 5 : Wind B 0 deg)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N201	N198	Perp	A-B	-77.9	-77.9	-77.9	-77.9	Yes
2	N198	N201	N199	N196	Perp	A-B	-7.1	-7.1	-7.1	-7.1	Yes

Member Area Loads (BLC 6 : Wind A 180 deg)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N201	N198	Perp	A-B	60.2	60.2	60.2	60.2	Yes
2	N198	N201	N199	N196	Perp	A-B	56.7	56.7	56.7	56.7	Yes

Member Area Loads (BLC 7 : Wind B 180 deg)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N197	N200	N201	N198	Perp	A-B	24.8	24.8	24.8	24.8	Yes
2	N198	N201	N199	N196	Perp	A-B	74.4	74.4	74.4	74.4	Yes

Member Area Loads (BLC 8 : Wind Z)

Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces	
1	N200	N197	N307	N308	Z	Open Structure	41.68	41.68	41.68	41.68	Yes

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	ASD Loads		Y								
2	1.0 D	Yes	Y	DL	1						
3	1.0 D + 1.0 S	Yes	Y	DL	1	RLL	1				
4	1.0 D + 0.6 W1	Yes	Y	DL	1	RLL		OL1	0.6	WLZ	0.6
5	1.0 D + 0.6 W2	Yes	Y	DL	1	RLL		OL2	0.6	WLZ	0.6
6	1.0 D + 0.6 W3	Yes	Y	DL	1	RLL		OL3	0.6	WLZ	-0.6
7	1.0 D + 0.6 W4	Yes	Y	DL	1	RLL		OL4	0.6	WLZ	-0.6
8	1.0 D + 0.45 W1 + 0.75 S	Yes	Y	DL	1	RLL	0.75	OL1	0.45	WLZ	0.45
9	1.0 D + 0.45 W2 + 0.75 S	Yes	Y	DL	1	RLL	0.75	OL2	0.45	WLZ	0.45
10	1.0 D + 0.45 W3 + 0.75 S	Yes	Y	DL	1	RLL	0.75	OL3	0.45	WLZ	-0.45
11	1.0 D + 0.45 W4 + 0.75 S	Yes	Y	DL	1	RLL	0.75	OL4	0.45	WLZ	-0.45
12	0.6 D + 0.6 W1	Yes	Y	DL	0.6	RLL		OL1	0.6	WLZ	0.6
13	0.6 D + 0.6 W2	Yes	Y	DL	0.6	RLL		OL2	0.6	WLZ	0.6
14	0.6 D + 0.6 W3	Yes	Y	DL	0.6	RLL		OL3	0.6	WLZ	-0.6
15	0.6 D + 0.6 W4	Yes	Y	DL	0.6	RLL		OL4	0.6	WLZ	-0.6
16			Y								
17	LRFD Loads		Y								
18	1.4 D		Y	DL	1.4	RLL					

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
19	1.2 D + 1.6 S + 0.5 W1		Y	DL	1.2	RLL	1.6	OL1	0.5		
20	1.2 D + 1.6 S + 0.5 W2		Y	DL	1.2	RLL	1.6	OL2	0.5		
21	1.2 D + 1.6 S + 0.5 W3		Y	DL	1.2	RLL	1.6	OL3	0.5		
22	1.2 D + 1.6 S + 0.5 W4		Y	DL	1.2	RLL	1.6	OL4	0.5		
23	1.2 D + 1.0 W1		Y	DL	1.2	RLL		OL1	1		
24	1.2 D + 1.0 W2		Y	DL	1.2	RLL		OL2	1		
25	1.2 D + 1.0 W3		Y	DL	1.2	RLL		OL3	1		
26	1.2 D + 1.0 W4		Y	DL	1.2	RLL		OL4	1		
27	0.9 D + 1.0 W1		Y	DL	0.9	RLL		OL1	1		
28	0.9 D + 1.0 W2		Y	DL	0.9	RLL		OL2	1		
29	0.9 D + 1.0 W3		Y	DL	0.9	RLL		OL3	1		
30	0.9 D + 1.0 W4		Y	DL	0.9	RLL		OL4	1		

Envelope Node Reactions

	Node Label	X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC	
1	N379	max	4.674	13	2246.348	6	1306.862	6	0	15	0	15	0	15
2		min	-4.784	6	-2135.214	13	-1124.784	4	0	2	0	2	0	2
3	N276	max	4.784	6	2246.328	6	1306.854	6	0	15	0	15	0	15
4		min	-4.673	13	-2135.205	13	-1124.777	4	0	2	0	2	0	2
5	N251	max	13.342	13	2463.823	6	1263.022	6	0	15	0	15	0	15
6		min	-12.89	6	-2362.304	13	-1084.78	4	0	2	0	2	0	2
7	N269	max	12.89	6	2463.822	6	1263.019	6	0	15	0	15	0	15
8		min	-13.341	13	-2362.303	13	-1084.778	4	0	2	0	2	0	2
9	N233	max	7.964	6	2483.048	6	1243.071	6	0	15	0	15	0	15
10		min	-7.754	13	-2387.539	13	-1068.558	4	0	2	0	2	0	2
11	N293	max	7.754	13	2483.065	6	1243.07	6	0	15	0	15	0	15
12		min	-7.964	6	-2387.558	13	-1068.556	4	0	2	0	2	0	2
13	N239	max	11.293	6	2395.578	6	1217.77	6	0	15	0	15	0	15
14		min	-11.41	13	-2283.097	13	-1048.262	4	0	2	0	2	0	2
15	N287	max	11.409	13	2395.565	6	1217.747	6	0	15	0	15	0	15
16		min	-11.292	6	-2283.086	13	-1048.244	4	0	2	0	2	0	2
17	N263	max	1.543	6	2420.393	6	1214.447	6	0	15	0	15	0	15
18		min	-1.548	13	-2314.222	13	-1046.41	4	0	2	0	2	0	2
19	N257	max	1.547	13	2420.365	6	1214.439	6	0	15	0	15	0	15
20		min	-1.542	6	-2314.195	13	-1046.403	4	0	2	0	2	0	2
21	N275	max	6.377	6	2375.38	6	1196.353	6	0	15	0	15	0	15
22		min	-6.753	13	-2259.958	13	-1031.201	4	0	2	0	2	0	2
23	N245	max	6.752	13	2375.387	6	1196.349	6	0	15	0	15	0	15
24		min	-6.377	6	-2259.965	13	-1031.198	4	0	2	0	2	0	2
25	N1	max	252.831	6	1826.427	6	766.18	14	0	15	0	15	0	15
26		min	-261.229	13	-1750.679	13	-663.193	4	0	2	0	2	0	2
27	N151	max	261.229	13	1826.459	6	766.166	14	0	15	0	15	0	15
28		min	-252.832	6	-1750.7	13	-663.182	4	0	2	0	2	0	2
29	N253	max	16.169	12	1177.233	7	61.524	4	0	15	0	15	0	15
30		min	-28.684	7	-430.966	12	-78.12	6	0	2	0	2	0	2
31	N271	max	28.686	7	1177.247	7	61.524	4	0	15	0	15	0	15
32		min	-16.169	12	-430.975	12	-78.12	6	0	2	0	2	0	2
33	N235	max	25.858	7	1170.709	7	60.758	4	0	15	0	15	0	15
34		min	-15.697	12	-428.964	12	-77.018	6	0	2	0	2	0	2
35	N295	max	15.697	12	1170.71	7	60.758	4	0	15	0	15	0	15
36		min	-25.858	7	-428.964	12	-77.018	6	0	2	0	2	0	2
37	N265	max	8.067	7	1204.996	7	60.405	4	0	15	0	15	0	15
38		min	-6.077	12	-467.658	12	-76.817	6	0	2	0	2	0	2
39	N259	max	6.077	12	1205.005	7	60.405	4	0	15	0	15	0	15
40		min	-8.067	7	-467.665	12	-76.817	6	0	2	0	2	0	2

Envelope Node Reactions (Continued)

Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC	
41	N241	max	20.536	7	1176.088	7	59.724	4	0	15	0	15	0	15
42		min	-10.345	12	-451.679	12	-76.145	6	0	2	0	2	0	2
43	N289	max	10.344	12	1176.079	7	59.724	4	0	15	0	15	0	15
44		min	-20.535	7	-451.679	12	-76.144	6	0	2	0	2	0	2
45	N247	max	5.778	12	1171.308	7	59.25	4	0	15	0	15	0	15
46		min	-11.67	7	-457.576	12	-75.634	6	0	2	0	2	0	2
47	N283	max	11.667	7	1171.295	7	59.25	4	0	15	0	15	0	15
48		min	-5.776	12	-457.567	12	-75.634	6	0	2	0	2	0	2
49	N381	max	12.671	7	1305.703	7	57.715	4	0	15	0	15	0	15
50		min	-6.595	12	-510.713	12	-73.863	6	0	2	0	2	0	2
51	N278	max	6.596	12	1305.713	7	57.714	4	0	15	0	15	0	15
52		min	-12.672	7	-510.729	12	-73.862	6	0	2	0	2	0	2
53	N2	max	54.916	7	730.477	7	42.608	4	0	15	0	15	0	15
54		min	-29.904	12	-258.02	12	-53.395	6	0	2	0	2	0	2
55	N152	max	29.902	12	730.445	7	42.607	4	0	15	0	15	0	15
56		min	-54.915	7	-257.998	12	-53.393	6	0	2	0	2	0	2
57	Totals:	max	0	5	41635.004	6	15393.346	14						
58		min	0	12	-28271.923	12	-13330.362	4						

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks

Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	DirLC	Pnc/om [lb]	Pnt/om [lb]	Mnny/om [lb-ft]	Mnzz/om [lb-ft]	Cb	Eqn		
1	M5	PIPE2.0A21165	0.222	42.93	7	0.106	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
2	M6	PIPE2.0A21165	0.29	7.65	6	0.12	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1b	
3	M15	1.5X1.5X0.083	0.404	52.849	6	0.021	103.542	y	6	2214.796	14085.15	624.421	624.421	1.136	H1-1a
4	M19	1.5X1.5X0.083	0.168	85.746	6	0.031	85.746	y	6	3229.532	14085.15	624.421	624.421	1.136	H1-1b*
5	M73	PIPE2.0A21165	0.222	42.93	7	0.106	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
6	M74	PIPE2.0A21165	0.29	7.65	6	0.12	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1b	
7	M75	1.5X1.5X0.083	0.404	52.849	6	0.021	103.541	y	6	2214.808	14085.15	624.421	624.421	1.136	H1-1a
8	M75B	1.5X1.5X0.083	0.168	85.746	6	0.031	85.746	y	6	3229.532	14085.15	624.421	624.421	1.136	H1-1b*
9	M71	PIPE2.5A21168	0.595	292.188	13	0.189	360.365	13	20336.2	28358.413	2081.747	2081.747	1	H1-1b	
10	M72	PIPE2.5A21168	0.577	292.188	7	0.178	574.635	7	20336.2	28358.413	2081.747	2081.747	1	H1-1b	
11	M134	PIPE2.0A21165	0.451	3.4	6	0.195	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
12	M135	1.5X1.5X0.083	0.686	52.849	6	0.005	103.541	y	5	2214.808	14085.15	624.421	624.421	1.136	H1-1a
13	M136	PIPE2.0A21165	0.232	42.93	6	0.185	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
14	M113	PIPE2.0A21165	0.462	3.4	6	0.187	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
15	M114	1.5X1.5X0.083	0.653	52.849	6	0.007	103.541	y	6	2214.808	14085.15	624.421	624.421	1.136	H1-1a
16	M115	PIPE2.0A21165	0.243	42.93	6	0.175	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
17	M116	PIPE2.0A21165	0.45	3.4	6	0.183	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
18	M117	1.5X1.5X0.083	0.639	52.849	6	0.005	103.541	y	7	2214.808	14085.15	624.421	624.421	1.136	H1-1a
19	M118	PIPE2.0A21165	0.238	42.93	6	0.171	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
20	M119	PIPE2.0A21165	0.444	3.4	6	0.18	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
21	M120	1.5X1.5X0.083	0.628	52.849	6	0.004	103.541	y	7	2214.808	14085.15	624.421	624.421	1.136	H1-1a
22	M121	PIPE2.0A21165	0.234	42.93	6	0.168	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
23	M122	PIPE2.0A21165	0.464	3.4	6	0.19	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
24	M123	1.5X1.5X0.083	0.663	52.849	6	0.008	103.541	y	6	2214.808	14085.15	624.421	624.421	1.136	H1-1a
25	M124	PIPE2.0A21165	0.247	42.93	6	0.178	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
26	M125	PIPE2.0A21165	0.451	3.4	6	0.182	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
27	M126	1.5X1.5X0.083	0.637	52.849	6	0.005	103.541	y	6	2214.808	14085.15	624.421	624.421	1.136	H1-1a
28	M127	PIPE2.0A21165	0.238	42.93	6	0.17	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
29	M128	PIPE2.0A21165	0.451	3.4	6	0.182	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
30	M129	1.5X1.5X0.083	0.637	52.849	6	0.005	103.541	y	6	2214.808	14085.15	624.421	624.421	1.136	H1-1a
31	M130	PIPE2.0A21165	0.238	42.93	6	0.17	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
32	M131	PIPE2.0A21165	0.464	3.4	6	0.19	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
33	M132	1.5X1.5X0.083	0.663	52.849	6	0.008	103.541	y	6	2214.808	14085.15	624.421	624.421	1.136	H1-1a
34	M133	PIPE2.0A21165	0.247	42.93	6	0.178	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks (Continued)

Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	Pnc/om [lb]	Pnt/om [lb]	Mnyy/om [lb-ft]	Mnzz/om [lb-ft]	Cb	Eqn	
35	M137	PIPE2.0A21165	0.444	3.4	6	0.18	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
36	M138	1.5X1.5X0.083	0.628	52.849	6	0.004	103.541	y	7	2214.808	14085.15	624.421	624.421	1.136	H1-1a
37	M139	PIPE2.0A21165	0.234	42.93	6	0.168	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
38	M140	PIPE2.0A21165	0.45	3.4	6	0.183	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
39	M141	1.5X1.5X0.083	0.639	52.849	6	0.005	103.541	y	7	2214.808	14085.15	624.421	624.421	1.136	H1-1a
40	M142	PIPE2.0A21165	0.238	42.93	6	0.171	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
41	M143	PIPE2.0A21165	0.462	3.4	6	0.187	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
42	M144	1.5X1.5X0.083	0.653	52.849	6	0.007	103.541	y	6	2214.808	14085.15	624.421	624.421	1.136	H1-1a
43	M184	PIPE2.0A21165	0.243	42.93	6	0.175	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	
44	M185	PIPE2.0A21165	0.451	3.4	6	0.195	0	6	10900.918	23232.186	1397.505	1397.505	1	H1-1a	
45	M186	1.5X1.5X0.083	0.686	52.849	6	0.005	103.541	y	5	2214.808	14085.15	624.421	624.421	1.136	H1-1a
46	M187	PIPE2.0A21165	0.232	42.93	6	0.185	42.93	6	18305.78	23232.186	1397.505	1397.505	1	H1-1b	

Envelope AA ADM1-20: ASD - BUILDING Member Aluminum Code Checks

Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	Pnc/Om[lb]	Pnt/Om[lb]	Mny/Om[lb-ft]	Mnz/Om[lb-ft]	Vny/Om[lb]	Vnz/Om[lb]	Cb	Eqn	
1	M107	HR300/SMR300_ALA	0.888	134.375	13	0.089	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.979	H.1-1
2	M50	HR300/SMR300_ALA	0.94	134.375	13	0.093	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	2.052	H.1-1
3	M53	HR300/SMR300_ALA	0.849	134.375	13	0.087	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.794	H.1-1
4	M56	HR300/SMR300_ALA	0.915	134.375	13	0.088	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.757	H.1-1
5	M59	HR300/SMR300_ALA	0.829	134.375	13	0.087	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.804	H.1-1
6	M62	HR300/SMR300_ALA	0.89	134.375	13	0.097	134.375	y	13	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.774	H.1-1
7	M65	HR300/SMR300_ALA	0.87	134.375	13	0.095	134.375	y	13	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.785	H.1-1
8	M68	HR300/SMR300_ALA	0.837	134.375	13	0.088	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.801	H.1-1
9	M76	HR300/SMR300_ALA	0.918	134.375	13	0.093	134.375	y	13	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.757	H.1-1
10	M79	HR300/SMR300_ALA	0.837	134.375	13	0.088	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.8	H.1-1
11	M82	HR300/SMR300_ALA	0.882	134.375	13	0.087	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.776	H.1-1
12	M85	HR300/SMR300_ALA	0.882	134.375	13	0.087	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.776	H.1-1
13	M88	HR300/SMR300_ALA	0.837	134.375	13	0.088	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.8	H.1-1
14	M91	HR300/SMR300_ALA	0.918	134.375	13	0.093	134.375	y	13	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.757	H.1-1
15	M94	HR300/SMR300_ALA	0.837	134.375	13	0.088	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.801	H.1-1
16	M97	HR300/SMR300_ALA	0.87	134.375	13	0.095	134.375	y	13	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.785	H.1-1
17	M100	HR300/SMR300_ALA	0.89	134.375	13	0.097	134.375	y	13	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.774	H.1-1
18	M103	HR300/SMR300_ALA	0.829	134.375	13	0.087	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.804	H.1-1
19	M106	HR300/SMR300_ALA	0.915	134.375	13	0.088	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.757	H.1-1
20	M111	HR300/SMR300_ALA	0.849	134.375	13	0.087	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.794	H.1-1
21	M147	HR300/SMR300_ALA	0.94	134.375	13	0.093	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	2.052	H.1-1
22	M150	HR300/SMR300_ALA	0.888	134.375	13	0.089	34.042	y	7	3577.006	14342.564	533.921	934.619	7307.692	3206.154	1.98	H.1-1



JOB NO.: U2716.0388.241

PROJECT: SunTurf Package D6

SUBJECT: CALCULATIONS LF 20

DESIGN APPROACH ASD

CONNECTION CAPACITY

Location: Column Base (set screws)

Connection Type: M16 Conical Set Screws

Tensile Capacity: 2600 lbs

Tension Load: 2388 lbs

Check Connection: 91.8%

Result: **Select M16 Conical Set Screws**

Note: Uplift capacity. FOS of (2)

CONNECTION CAPACITY

Location: Column to Cross Beam

Connection Type: K10341-002

Tensile Capacity: 2195 lbs

Tension Load: 2000 lbs

Check Connection: 91.1%

Result: **Select K10341-002**

Note: Uplift capacity. FOS of (2)



JOB NO.: U2716.0388.241

PROJECT: SunTurf Package D6

SUBJECT: CALCULATIONS LF 20

CONNECTION CAPACITY

Location: Brace to Column

Connection Type: K10219-001

Capacity: 1581 lbs

Tension Load: 1477 lbs

Check Connection: 93.4%

Result: **Select K10219-001**

Note: Axial capacity. FOS of (2)

BOLTED TENSION CONNECTION

Location: Rail to Cross Beam

Bolt Grade: A304 SS (A2-70)

Bolt Diameter: 0.375 in

Number of Bolts: 2

Bolt Capacity: 8410 lbs (AISC Equation J3-1)

Tension Load: 1246 lbs

Check Bolt: 14.8%

Result: **Select (2) 0.375 in. dia. A304 SS (A2-70) bolts.**

Note:



JOB NO.: U2716.0388.241

PROJECT: Sunturf Package D6 Ground Mount

ALTERNATE FOUNDATION OPTION 1: DRILLED CONCRETE PIER



PROJECT: Sunturf Package D6 Ground Mount

DRILLED CONCRETE PIER DESIGN

Column Reactions:

Max. Shear, V [k]:	1.4	Max. Down, P _d [k]:	2.5
Max. Moment, M [k-ft]:	0.0	Max. Uplift, P _u [k]:	2.4

Pier Properties:

Pier Shape:	Round	Volume of Concrete [ft ³]:	9
Pier Diameter, b [ft]:	1.5	Volume of Concrete [yd ³]:	0.3
Top of Pier Elevation [ft]:	0.00	Weight of Concrete [k]:	1.3
Pier Depth, d [ft]:	5.0		

Soil Properties:

Allow. Bearing Pressure [psf]:	1,500	<u>Optional Parameters for Uplift:</u>	
1/3 increase for short term loads?	No	Skin Friction* [psf]:	250
Lateral Bearing, S [pcf]:	150	Top Length to Ignore [ft]:	0
Max. Lateral Bearing (opt'l) [psf]:		1/3 increase for short term loads?	No
Top Depth to Ignore [ft]:	0	Combine w/ Bearing:	No
1/3 increase for short term loads?	No		
1/2" deflection at t/o pier allowed:	Yes		

*per IBC Section 1810.3.3.1.4

Check Bearing:

Bearing Capacity [k]:	5.9
-----------------------	-----

Bearing capacity OK.

Check Uplift:

Uplift Capacity [k]:	7.1
----------------------	-----

Uplift capacity OK.

Check Lateral Bearing:

Top of Pier Constrained?:	No	IBC Section 1807.3.2.1
Applied Lateral Force, P [lb]:	1,400	
Point of Application, h [ft]:	0.0	
S _{max} [psf]:		
S [psf]:	500	
A = 2.34*P/(S _b):	4.37	
Required Pier Depth, d _{reqd} [ft]:	4.40	IBC Eq. 18-1

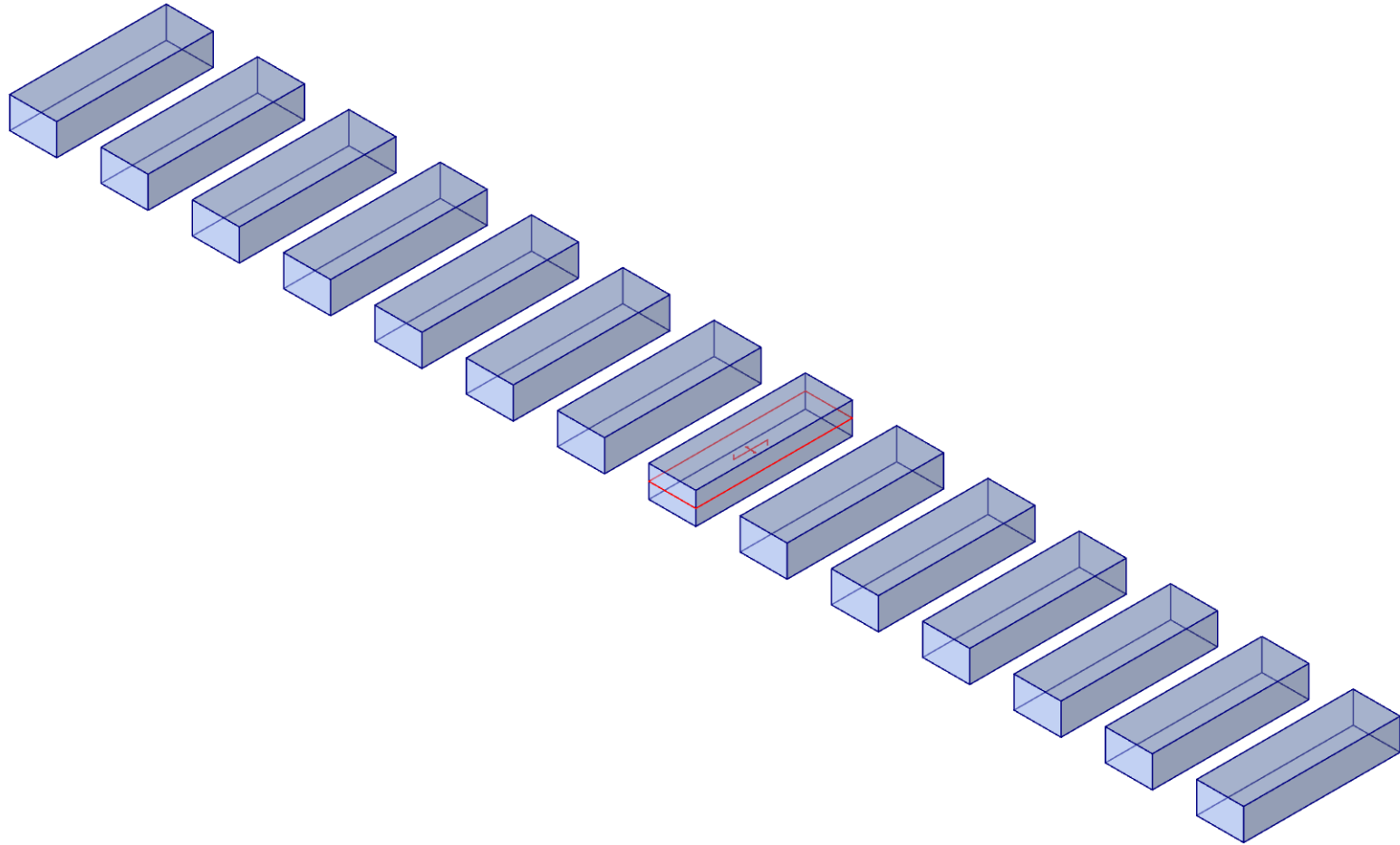
Result: **Lateral bearing capacity OK.**



JOB NO.: U2716.0388.241

PROJECT: Sunturf Package D6 Ground Mount

ALTERNATE FOUNDATION OPTION 2: CONCRETE BALLAST BLOCK



Vector Structural Engineering
CJT
U2716.0388.241

Ground Mount

SK-1
May 20, 2024
Sunturf D6 - LF - 20deg.r3d

Concrete Properties

Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [$1e^{-5}F^{-1}$]	Density [lb/ft ³]	fc [psi]	Lambda	Flex Steel [psi]	Shear Steel [psi]
1 Conc3000NW	3156	1372	0.15	0.6	145	3000	1	60000	60000
2 Conc3500NW	3409	1482	0.15	0.6	145	3500	1	60000	60000
3 Conc4000NW	3644	1584	0.15	0.6	145	4000	1	60000	60000
4 Conc3000LW	2085	907	0.15	0.6	109.999	3000	0.75	60000	60000
5 Conc3500LW	2252	979	0.15	0.6	109.999	3500	0.75	60000	60000
6 Conc4000LW	2408	1047	0.15	0.6	109.999	4000	0.75	60000	60000
7 Conc2500NW	3156	1372	0.15	0.6	145	2500	1	60000	60000

Design Rules - Mat Slab

Label	Max Bending Chk	Max Shear Chk	Top Bar	Bottom Bar	Min Top Bar Spacing [in]	Max Top Bar Spacing [in]	Min Bot Bar Spacing [in]	Max Bot Bar Spacing [in]	Spacing Increment [in]	Top Cover [in]	Bottom Cover [in]	Side Cover [in]	Rebar Options
1 Typical	1	1	#5	#5	3	12	3	12	1	3	3	0	Optimize

Soil Definitions

Label	Layers	Subgrade Modulus [lb/ft ³]	Allowable Bearing [psf]	Default
1 Default	Single	1e+5	1499.99999	Yes

Slab

Label	Thickness [in]	Material	Local Axis Angle [deg]	Analysis Offset [in]	Passive Pressure [psf]	Soil Overburden [psf]	Icr Factor
1 S1	24	Conc3000NW	0	0	0	0	0.25
2 S2	24	Conc3000NW	0	0	0	0	0.25
3 S3	24	Conc3000NW	0	0	0	0	0.25
4 S4	24	Conc3000NW	0	0	0	0	0.25
5 S5	24	Conc3000NW	0	0	0	0	0.25
6 S6	24	Conc3000NW	0	0	0	0	0.25
7 S7	24	Conc3000NW	0	0	0	0	0.25
8 S8	24	Conc3000NW	0	0	0	0	0.25
9 S9	24	Conc3000NW	0	0	0	0	0.25
10 S10	24	Conc3000NW	0	0	0	0	0.25
11 S11	24	Conc3000NW	0	0	0	0	0.25
12 S12	24	Conc3000NW	0	0	0	0	0.25
13 S13	24	Conc3000NW	0	0	0	0	0.25
14 S14	24	Conc3000NW	0	0	0	0	0.25

Load Category

Category	Node Loads
1 DL	42
2 WLZ	58
3 OL1	84
4 OL2	82
5 OL3	84
6 OL4	84

Load Combination

Label	Solve	Service	SF	Category	Factor	Category	Factor	Category	Factor
1 ASD Loads									
2 1.0 D	Yes	Yes	1.5	DL	1				
3 1.0 D + 1.0 S	Yes	Yes	1.5	DL	1	RLL	1		
4 1.0 D + 0.6 W1	Yes	Yes	1.5	DL	1	RLL		OL1	0.6

Load Combination (Continued)

	Label	Solve	Service	SF	Category	Factor	Category	Factor	Category	Factor
5	1.0 D + 0.6 W2	Yes	Yes	1.5	DL	1	RLL		OL2	0.6
6	1.0 D + 0.6 W3	Yes	Yes	1.5	DL	1	RLL		OL3	0.6
7	1.0 D + 0.6 W4	Yes	Yes	1.5	DL	1	RLL		OL4	0.6
8	1.0 D + 0.45 W1 + 0.75 S	Yes	Yes	1.5	DL	1	RLL	0.75	OL1	0.45
9	1.0 D + 0.45 W2 + 0.75 S	Yes	Yes	1.5	DL	1	RLL	0.75	OL2	0.45
10	1.0 D + 0.45 W3 + 0.75 S	Yes	Yes	1.5	DL	1	RLL	0.75	OL3	0.45
11	1.0 D + 0.45 W4 + 0.75 S	Yes	Yes	1.5	DL	1	RLL	0.75	OL4	0.45
12	0.6 D + 0.6 W1	Yes	Yes		DL	0.6	RLL		OL1	0.6
13	0.6 D + 0.6 W2	Yes	Yes		DL	0.6	RLL		OL2	0.6
14	0.6 D + 0.6 W3	Yes	Yes		DL	0.6	RLL		OL3	0.6
15	0.6 D + 0.6 W4	Yes	Yes		DL	0.6	RLL		OL4	0.6
16										
17	LRFD Loads									
18	1.4 D	Yes			DL	1.4	RLL			
19	1.2 D + 1.6 S + 0.5 W1	Yes			DL	1.2	RLL	1.6	OL1	0.5
20	1.2 D + 1.6 S + 0.5 W2	Yes			DL	1.2	RLL	1.6	OL2	0.5
21	1.2 D + 1.6 S + 0.5 W3	Yes			DL	1.2	RLL	1.6	OL3	0.5
22	1.2 D + 1.6 S + 0.5 W4	Yes			DL	1.2	RLL	1.6	OL4	0.5
23	1.2 D + 1.0 W1	Yes			DL	1.2	RLL		OL1	1
24	1.2 D + 1.0 W2	Yes			DL	1.2	RLL		OL2	1
25	1.2 D + 1.0 W3	Yes			DL	1.2	RLL		OL3	1
26	1.2 D + 1.0 W4	Yes			DL	1.2	RLL		OL4	1
27	0.9 D + 1.0 W1	Yes			DL	0.9	RLL		OL1	1
28	0.9 D + 1.0 W2	Yes			DL	0.9	RLL		OL2	1
29	0.9 D + 1.0 W3	Yes			DL	0.9	RLL		OL3	1
30	0.9 D + 1.0 W4	Yes			DL	0.9	RLL		OL4	1

Design Strips

	Label	Rebar Angle from Plan Horizontal (deg)	No. of Design Cuts	Design Rule
1	DS1	0	50	Typical
2	DS2	90	50	Typical

Strip Reinforcing

	Label	UC Top	LC Top	Top Bars	Gov Design Cut	UC Top	UC Bot	LC Bot	Bot Bars	Gov Design Cut	UC Bot	UC Shear	LC Gov Design Cut	UC Shear
1	DS1	0.019	25	#5@6in	DS1-X25	0.027	28	#5@6in	DS1-X25	0.042	28	DS1-X10		
2	DS2	0.003	27	#5@7in	DS2-X26	0.004	25	#5@7in	DS2-X26	0.006	25	DS2-X24		

Slab Soil Pressures

	LC	Label	UC	Soil Pressure[psf]	Allowable Bearing[psf]	Node
1	2	S1	0.202	303.313	1500	N372
2	2	S2	0.202	303.705	1500	N379
3	2	S3	0.202	303.284	1500	N386
4	2	S4	0.202	303.298	1500	N393
5	2	S5	0.202	303.442	1500	N400
6	2	S6	0.202	303.418	1500	N407
7	2	S7	0.202	303.418	1500	N414
8	2	S8	0.202	303.442	1500	N421
9	2	S9	0.202	303.298	1500	N428
10	2	S10	0.202	303.705	1500	N435
11	2	S11	0.202	302.614	1500	N440
12	2	S12	0.202	303.313	1500	N449
13	2	S13	0.202	303.284	1500	N456

Slab Soil Pressures (Continued)

	LC	Label	UC	Soil Pressure[psf]	Allowable Bearing[psf]	Node
14	2	S14	0.202	302.614	1500	N461
15	3	S1	0.202	303.313	1500	N372
16	3	S2	0.202	303.705	1500	N379
17	3	S3	0.202	303.284	1500	N386
18	3	S4	0.202	303.298	1500	N393
19	3	S5	0.202	303.442	1500	N400
20	3	S6	0.202	303.418	1500	N407
21	3	S7	0.202	303.418	1500	N414
22	3	S8	0.202	303.442	1500	N421
23	3	S9	0.202	303.298	1500	N428
24	3	S10	0.202	303.705	1500	N435
25	3	S11	0.202	302.614	1500	N440
26	3	S12	0.202	303.313	1500	N449
27	3	S13	0.202	303.284	1500	N456
28	3	S14	0.202	302.614	1500	N461
29	4	S1	0.206	308.966	1500	N28
30	4	S2	0.207	309.88	1500	N32
31	4	S3	0.204	305.285	1500	N36
32	4	S4	0.203	304.155	1500	N40
33	4	S5	0.206	309.179	1500	N44
34	4	S6	0.203	304.217	1500	N47
35	4	S7	0.203	304.219	1500	N52
36	4	S8	0.206	309.178	1500	N56
37	4	S9	0.203	304.156	1500	N60
38	4	S10	0.207	309.88	1500	N63
39	4	S11	0.196	294.706	1500	N68
40	4	S12	0.206	308.97	1500	N72
41	4	S13	0.204	305.285	1500	N84
42	4	S14	0.196	294.703	1500	N88
43	5	S1	0.266	398.884	1500	N370
44	5	S2	0.298	447.26	1500	N377
45	5	S3	0.292	438.349	1500	N384
46	5	S4	0.29	435.221	1500	N391
47	5	S5	0.298	446.784	1500	N398
48	5	S6	0.293	439.73	1500	N405
49	5	S7	0.293	439.731	1500	N412
50	5	S8	0.298	446.783	1500	N419
51	5	S9	0.29	435.221	1500	N426
52	5	S10	0.298	447.261	1500	N433
53	5	S11	0.291	436.884	1500	N440
54	5	S12	0.266	398.887	1500	N447
55	5	S13	0.292	438.348	1500	N454
56	5	S14	0.291	436.882	1500	N461
57	6	S1	0.311	466.556	1500	N372
58	6	S2	0.35	524.707	1500	N379
59	6	S3	0.343	514.157	1500	N386
60	6	S4	0.341	511.793	1500	N393
61	6	S5	0.348	522.333	1500	N400
62	6	S6	0.344	516.171	1500	N407
63	6	S7	0.344	516.175	1500	N414
64	6	S8	0.348	522.333	1500	N421
65	6	S9	0.341	511.793	1500	N428
66	6	S10	0.35	524.709	1500	N435
67	6	S11	0.329	493.833	1500	N442
68	6	S12	0.311	466.561	1500	N449

Slab Soil Pressures (Continued)

	LC	Label	UC	Soil Pressure[psf]	Allowable Bearing[psf]	Node
69	6	S13	0.343	514.156	1500	N456
70	6	S14	0.329	493.83	1500	N463
71	7	S1	0.248	371.398	1500	N372
72	7	S2	0.263	393.943	1500	N379
73	7	S3	0.259	389.249	1500	N386
74	7	S4	0.259	388.378	1500	N393
75	7	S5	0.262	392.752	1500	N400
76	7	S6	0.26	389.458	1500	N407
77	7	S7	0.26	389.461	1500	N414
78	7	S8	0.262	392.751	1500	N421
79	7	S9	0.259	388.379	1500	N428
80	7	S10	0.263	393.944	1500	N435
81	7	S11	0.259	388.51	1500	N440
82	7	S12	0.248	371.403	1500	N449
83	7	S13	0.259	389.248	1500	N456
84	7	S14	0.259	388.512	1500	N461
85	8	S1	0.204	305.559	1500	N28
86	8	S2	0.205	307.553	1500	N32
87	8	S3	0.203	304.121	1500	N36
88	8	S4	0.202	303.245	1500	N40
89	8	S5	0.205	307.075	1500	N44
90	8	S6	0.202	303.362	1500	N47
91	8	S7	0.202	303.363	1500	N52
92	8	S8	0.205	307.074	1500	N56
93	8	S9	0.202	303.245	1500	N60
94	8	S10	0.205	307.554	1500	N63
95	8	S11	0.198	296.682	1500	N68
96	8	S12	0.204	305.562	1500	N72
97	8	S13	0.203	304.121	1500	N84
98	8	S14	0.198	296.68	1500	N88
99	9	S1	0.249	372.998	1500	N370
100	9	S2	0.274	410.59	1500	N377
101	9	S3	0.269	403.921	1500	N384
102	9	S4	0.268	401.545	1500	N391
103	9	S5	0.274	410.279	1500	N398
104	9	S6	0.27	404.997	1500	N405
105	9	S7	0.27	404.999	1500	N412
106	9	S8	0.274	410.279	1500	N419
107	9	S9	0.268	401.545	1500	N426
108	9	S10	0.274	410.591	1500	N433
109	9	S11	0.269	403.316	1500	N440
110	9	S12	0.249	373	1500	N447
111	9	S13	0.269	403.92	1500	N454
112	9	S14	0.269	403.315	1500	N461
113	10	S1	0.284	425.745	1500	N372
114	10	S2	0.313	469.457	1500	N379
115	10	S3	0.308	461.439	1500	N386
116	10	S4	0.306	459.669	1500	N393
117	10	S5	0.312	467.611	1500	N400
118	10	S6	0.309	462.983	1500	N407
119	10	S7	0.309	462.985	1500	N414
120	10	S8	0.312	467.61	1500	N421
121	10	S9	0.306	459.669	1500	N428
122	10	S10	0.313	469.458	1500	N435
123	10	S11	0.297	445.625	1500	N442

Slab Soil Pressures (Continued)

	LC	Label	UC	Soil Pressure[psf]	Allowable Bearing[psf]	Node
124	10	S12	0.284	425.749	1500	N449
125	10	S13	0.308	461.438	1500	N456
126	10	S14	0.297	445.623	1500	N463
127	11	S1	0.236	354.377	1500	N372
128	11	S2	0.248	371.383	1500	N379
129	11	S3	0.245	367.758	1500	N386
130	11	S4	0.245	367.108	1500	N393
131	11	S5	0.247	370.424	1500	N400
132	11	S6	0.245	367.948	1500	N407
133	11	S7	0.245	367.95	1500	N414
134	11	S8	0.247	370.424	1500	N421
135	11	S9	0.245	367.108	1500	N428
136	11	S10	0.248	371.384	1500	N435
137	11	S11	0.245	367.036	1500	N440
138	11	S12	0.236	354.38	1500	N449
139	11	S13	0.245	367.757	1500	N456
140	11	S14	0.245	367.037	1500	N461
141	12	S1	0.127	190.831	1500	N28
142	12	S2	0.126	189.649	1500	N32
143	12	S3	0.123	185.033	1500	N36
144	12	S4	0.123	183.95	1500	N40
145	12	S5	0.126	188.875	1500	N44
146	12	S6	0.123	183.9	1500	N47
147	12	S7	0.123	183.901	1500	N52
148	12	S8	0.126	188.874	1500	N56
149	12	S9	0.123	183.951	1500	N60
150	12	S10	0.126	189.65	1500	N63
151	12	S11	0.116	173.663	1500	N67
152	12	S12	0.127	190.835	1500	N72
153	12	S13	0.123	185.033	1500	N84
154	12	S14	0.116	173.66	1500	N88
155	13	S1	0.19	284.899	1500	N370
156	13	S2	0.281	420.826	1500	N377
157	13	S3	0.254	380.432	1500	N384
158	13	S4	0.248	372.498	1500	N391
159	13	S5	0.276	413.347	1500	N398
160	13	S6	0.26	390.416	1500	N405
161	13	S7	0.26	390.425	1500	N412
162	13	S8	0.276	413.346	1500	N419
163	13	S9	0.248	372.497	1500	N426
164	13	S10	0.281	420.833	1500	N433
165	13	S11	0.236	354.175	1500	N440
166	13	S12	0.19	284.903	1500	N447
167	13	S13	0.254	380.427	1500	N454
168	13	S14	0.236	354.172	1500	N461
169	14	S1	0.23	345.231	1500	N372
170	14	S2	0.269	403.225	1500	N379
171	14	S3	0.262	392.843	1500	N386
172	14	S4	0.26	390.474	1500	N393
173	14	S5	0.267	400.956	1500	N400
174	14	S6	0.263	394.804	1500	N407
175	14	S7	0.263	394.807	1500	N414
176	14	S8	0.267	400.956	1500	N421
177	14	S9	0.26	390.474	1500	N428
178	14	S10	0.269	403.227	1500	N435

Slab Soil Pressures (Continued)

	LC	Label	UC	Soil Pressure[psf]	Allowable Bearing[psf]	Node
179	14	S11	0.249	373.433	1500	N442
180	14	S12	0.23	345.236	1500	N449
181	14	S13	0.262	392.842	1500	N456
182	14	S14	0.249	373.43	1500	N463
183	15	S1	0.167	250.073	1500	N372
184	15	S2	0.182	272.461	1500	N379
185	15	S3	0.179	267.935	1500	N386
186	15	S4	0.178	267.059	1500	N393
187	15	S5	0.181	271.375	1500	N400
188	15	S6	0.179	268.091	1500	N407
189	15	S7	0.179	268.093	1500	N414
190	15	S8	0.181	271.374	1500	N421
191	15	S9	0.178	267.059	1500	N428
192	15	S10	0.182	272.462	1500	N435
193	15	S11	0.178	267.464	1500	N440
194	15	S12	0.167	250.077	1500	N449
195	15	S13	0.179	267.935	1500	N456
196	15	S14	0.178	267.467	1500	N461

Slab Stability - Overturning

	LC	Slab	Angle[deg]	Mo-xx[lb-ft]	Ms-xx[lb-ft]	Mo-zz[lb-ft]	Ms-zz[lb-ft]	Ms-xx/Mo-xx	Ms-zz/Mo-zz
1	2	S1	0	0	44675.245	0	13524.454	9.99+	9.99+
2	2	S2	0	0	45214.842	0	13592.409	9.99+	9.99+
3	2	S3	0	0	45199.95	0	13583.959	9.99+	9.99+
4	2	S4	0	0	45189	0	13575.807	9.99+	9.99+
5	2	S5	0	0	45220.606	0	13581.783	9.99+	9.99+
6	2	S6	0	0	45222.778	0	13586.851	9.99+	9.99+
7	2	S7	0	0	45222.776	0	13586.853	9.99+	9.99+
8	2	S8	0	0	45220.616	0	13591.509	9.99+	9.99+
9	2	S9	0	0	45188.99	0	13580.093	9.99+	9.99+
10	2	S10	0	0	45214.84	0	13584.284	9.99+	9.99+
11	2	S11	0	0	45285.999	0	13575.466	9.99+	9.99+
12	2	S12	0	0	44675.201	0	13402.604	9.99+	9.99+
13	2	S13	0	0	45199.935	0	13576.502	9.99+	9.99+
14	2	S14	0	0	45285.95	0	13571.43	9.99+	9.99+
15	3	S1	0	0	44675.245	0	13524.454	9.99+	9.99+
16	3	S2	0	0	45214.842	0	13592.409	9.99+	9.99+
17	3	S3	0	0	45199.95	0	13583.959	9.99+	9.99+
18	3	S4	0	0	45189	0	13575.807	9.99+	9.99+
19	3	S5	0	0	45220.606	0	13581.783	9.99+	9.99+
20	3	S6	0	0	45222.778	0	13586.851	9.99+	9.99+
21	3	S7	0	0	45222.776	0	13586.853	9.99+	9.99+
22	3	S8	0	0	45220.616	0	13591.509	9.99+	9.99+
23	3	S9	0	0	45188.99	0	13580.093	9.99+	9.99+
24	3	S10	0	0	45214.84	0	13584.284	9.99+	9.99+
25	3	S11	0	0	45285.999	0	13575.466	9.99+	9.99+
26	3	S12	0	0	44675.201	0	13402.604	9.99+	9.99+
27	3	S13	0	0	45199.935	0	13576.502	9.99+	9.99+
28	3	S14	0	0	45285.95	0	13571.43	9.99+	9.99+
29	4	S1	0	12774.306	45081.643	2884.753	13524.454	3.529	4.688
30	4	S2	0	18035.218	45374.13	3579.582	13592.409	2.516	3.797
31	4	S3	0	17458.944	45334.928	3505.543	13583.959	2.597	3.875
32	4	S4	0	17298.804	45330.679	3470.731	13580.097	2.62	3.913
33	4	S5	0	17946.664	45357.027	3572.696	13591.507	2.527	3.804
34	4	S6	0	17642.571	45356.226	3536.121	13586.851	2.571	3.842

Slab Stability - Overturning (Continued)

	LC	Slab	Angle[deg]	Mo-xx[lb-ft]	Ms-xx[lb-ft]	Mo-zz[lb-ft]	Ms-zz[lb-ft]	Ms-xx/Mo-xx	Ms-zz/Mo-zz
35	4	S7	0	17642.749	45356.244	3536.14	13586.853	2.571	3.842
36	4	S8	0	17946.664	45357.031	3572.711	13591.509	2.527	3.804
37	4	S9	0	17298.757	45330.669	3470.706	13580.093	2.62	3.913
38	4	S10	0	18035.326	45374.144	3579.601	13592.411	2.516	3.797
39	4	S11	0	16735.373	45203.689	3422.564	13575.466	2.701	3.966
40	4	S12	0	12774.52	45081.627	2884.756	13524.445	3.529	4.688
41	4	S13	0	17458.826	45334.927	3505.523	13583.957	2.597	3.875
42	4	S14	0	16735.237	45203.665	3422.56	13575.455	2.701	3.966
43	5	S1	0	16774.034	45081.643	2905.438	13524.454	2.688	4.655
44	5	S2	0	22960.667	45374.13	3131.705	13592.409	1.976	4.34
45	5	S3	0	22031.249	45334.928	3039.988	13583.959	2.058	4.468
46	5	S4	0	21821.483	45330.679	3027.776	13580.097	2.077	4.485
47	5	S5	0	22746.925	45357.027	3094.341	13591.507	1.994	4.392
48	5	S6	0	22300.219	45356.226	3079.026	13586.851	2.034	4.413
49	5	S7	0	22300.471	45356.244	3079.061	13586.853	2.034	4.413
50	5	S8	0	22746.921	45357.031	3094.346	13591.509	1.994	4.392
51	5	S9	0	21821.415	45330.669	3027.756	13580.093	2.077	4.485
52	5	S10	0	22960.848	45374.144	3131.735	13592.411	1.976	4.34
53	5	S11	0	20701.83	45203.689	2754.411	13571.44	2.184	4.927
54	5	S12	0	16774.198	45081.627	2905.439	13524.445	2.688	4.655
55	5	S13	0	22031.145	45334.927	3039.99	13583.957	2.058	4.468
56	5	S14	0	20701.748	45203.665	2754.406	13571.43	2.184	4.927
57	6	S1	0	0	48362.111	0	16993.942	9.99+	9.99+
58	6	S2	0	0	50658.741	0	17824.43	9.99+	9.99+
59	6	S3	0	0	50818.24	0	17724.286	9.99+	9.99+
60	6	S4	0	0	50881.38	0	17626.912	9.99+	9.99+
61	6	S5	0	0	50630.525	0	17677.614	9.99+	9.99+
62	6	S6	0	0	51048.045	0	17731.608	9.99+	9.99+
63	6	S7	0	0	51047.982	0	17765.254	9.99+	9.99+
64	6	S8	0	0	50630.64	0	17810.449	9.99+	9.99+
65	6	S9	0	0	50881.256	0	17682.051	9.99+	9.99+
66	6	S10	0	0	50658.758	0	17714.958	9.99+	9.99+
67	6	S11	0	0	51223.387	0	17580.606	9.99+	9.99+
68	6	S12	0	0	48361.845	0	15829.35	9.99+	9.99+
69	6	S13	0	0	50818.245	0	17627.052	9.99+	9.99+
70	6	S14	0	0	51223.454	0	17564.001	9.99+	9.99+
71	7	S1	0	0	50653.197	0	16173.857	9.99+	9.99+
72	7	S2	0	0	54592.969	0	17141.655	9.99+	9.99+
73	7	S3	0	0	54564.432	0	17074.683	9.99+	9.99+
74	7	S4	0	0	54517.825	0	16965.31	9.99+	9.99+
75	7	S5	0	0	54613.106	0	17009.612	9.99+	9.99+
76	7	S6	0	0	54844.138	0	17068.734	9.99+	9.99+
77	7	S7	0	0	54844.069	0	17101.115	9.99+	9.99+
78	7	S8	0	0	54613.228	0	17151.681	9.99+	9.99+
79	7	S9	0	0	54517.705	0	17026.191	9.99+	9.99+
80	7	S10	0	0	54592.983	0	17022.468	9.99+	9.99+
81	7	S11	0	0	55520.687	0	17116.606	9.99+	9.99+
82	7	S12	0	0	50652.953	0	15418.284	9.99+	9.99+
83	7	S13	0	0	54564.348	0	16968.164	9.99+	9.99+
84	7	S14	0	0	55520.758	0	17073.979	9.99+	9.99+
85	8	S1	0	9580.729	45081.643	2163.565	13524.454	4.705	6.251
86	8	S2	0	13526.413	45374.13	2684.686	13592.409	3.354	5.063
87	8	S3	0	13094.208	45334.928	2629.157	13583.959	3.462	5.167
88	8	S4	0	12974.103	45330.679	2603.048	13580.097	3.494	5.217
89	8	S5	0	13459.998	45357.027	2679.522	13591.507	3.37	5.072

Slab Stability - Overturning (Continued)

	LC	Slab	Angle[deg]	Mo-xx[lb-ft]	Ms-xx[lb-ft]	Mo-zz[lb-ft]	Ms-zz[lb-ft]	Ms-xx/Mo-xx	Ms-zz/Mo-zz
90	8	S6	0	13231.928	45356.226	2652.091	13586.851	3.428	5.123
91	8	S7	0	13232.062	45356.244	2652.105	13586.853	3.428	5.123
92	8	S8	0	13459.998	45357.031	2679.533	13591.509	3.37	5.072
93	8	S9	0	12974.068	45330.669	2603.029	13580.093	3.494	5.217
94	8	S10	0	13526.495	45374.144	2684.7	13592.411	3.354	5.063
95	8	S11	0	12551.529	45203.689	2566.923	13575.466	3.601	5.289
96	8	S12	0	9580.89	45081.627	2163.567	13524.445	4.705	6.251
97	8	S13	0	13094.119	45334.927	2629.142	13583.957	3.462	5.167
98	8	S14	0	12551.428	45203.665	2566.92	13575.455	3.601	5.289
99	9	S1	0	12580.525	45081.643	2179.078	13524.454	3.583	6.207
100	9	S2	0	17220.5	45374.13	2348.778	13592.409	2.635	5.787
101	9	S3	0	16523.437	45334.928	2279.991	13583.959	2.744	5.958
102	9	S4	0	16366.112	45330.679	2270.832	13580.097	2.77	5.98
103	9	S5	0	17060.193	45357.027	2320.756	13591.507	2.659	5.856
104	9	S6	0	16725.164	45356.226	2309.269	13586.851	2.712	5.884
105	9	S7	0	16725.353	45356.244	2309.296	13586.853	2.712	5.884
106	9	S8	0	17060.191	45357.031	2320.76	13591.509	2.659	5.856
107	9	S9	0	16366.061	45330.669	2270.817	13580.093	2.77	5.98
108	9	S10	0	17220.636	45374.144	2348.801	13592.411	2.635	5.787
109	9	S11	0	15526.373	45203.689	2065.809	13571.44	2.911	6.57
110	9	S12	0	12580.648	45081.627	2179.079	13524.445	3.583	6.206
111	9	S13	0	16523.359	45334.927	2279.993	13583.957	2.744	5.958
112	9	S14	0	15526.311	45203.665	2065.804	13571.43	2.911	6.57
113	10	S1	0	0	47440.394	0	16126.57	9.99+	9.99+
114	10	S2	0	0	49297.766	0	16766.425	9.99+	9.99+
115	10	S3	0	0	49413.668	0	16689.204	9.99+	9.99+
116	10	S4	0	0	49458.285	0	16614.136	9.99+	9.99+
117	10	S5	0	0	49278.045	0	16653.656	9.99+	9.99+
118	10	S6	0	0	49591.728	0	16695.419	9.99+	9.99+
119	10	S7	0	0	49591.68	0	16720.654	9.99+	9.99+
120	10	S8	0	0	49278.134	0	16755.714	9.99+	9.99+
121	10	S9	0	0	49458.19	0	16656.561	9.99+	9.99+
122	10	S10	0	0	49297.778	0	16682.289	9.99+	9.99+
123	10	S11	0	0	49739.04	0	16579.321	9.99+	9.99+
124	10	S12	0	0	47440.184	0	15222.663	9.99+	9.99+
125	10	S13	0	0	49413.668	0	16614.415	9.99+	9.99+
126	10	S14	0	0	49739.078	0	16565.858	9.99+	9.99+
127	11	S1	0	0	49158.709	0	15511.506	9.99+	9.99+
128	11	S2	0	0	52248.438	0	16254.343	9.99+	9.99+
129	11	S3	0	0	52223.311	0	16202.002	9.99+	9.99+
130	11	S4	0	0	52185.619	0	16117.934	9.99+	9.99+
131	11	S5	0	0	52264.981	0	16152.654	9.99+	9.99+
132	11	S6	0	0	52438.798	0	16198.263	9.99+	9.99+
133	11	S7	0	0	52438.746	0	16222.549	9.99+	9.99+
134	11	S8	0	0	52265.075	0	16261.638	9.99+	9.99+
135	11	S9	0	0	52185.526	0	16164.667	9.99+	9.99+
136	11	S10	0	0	52248.447	0	16162.922	9.99+	9.99+
137	11	S11	0	0	52962.015	0	16231.321	9.99+	9.99+
138	11	S12	0	0	49158.515	0	14914.364	9.99+	9.99+
139	11	S13	0	0	52223.245	0	16120.248	9.99+	9.99+
140	11	S14	0	0	52962.056	0	16198.341	9.99+	9.99+
141	12	S1	0	12774.306	27048.986	2884.753	8114.672	2.117	2.813
142	12	S2	0	18035.218	27224.478	3579.582	8155.445	1.51	2.278
143	12	S3	0	17458.944	27200.957	3505.543	8150.376	1.558	2.325
144	12	S4	0	17298.804	27198.407	3470.731	8148.058	1.572	2.348

Slab Stability - Overturning (Continued)

	LC	Slab	Angle[deg]	Mo-xx[lb-ft]	Ms-xx[lb-ft]	Mo-zz[lb-ft]	Ms-zz[lb-ft]	Ms-xx/Mo-xx	Ms-zz/Mo-zz
145	12	S5	0	17946.664	27214.216	3572.696	8154.904	1.516	2.283
146	12	S6	0	17642.571	27213.736	3536.121	8152.11	1.543	2.305
147	12	S7	0	17642.749	27213.746	3536.14	8152.112	1.542	2.305
148	12	S8	0	17946.664	27214.218	3572.711	8154.905	1.516	2.283
149	12	S9	0	17298.757	27198.401	3470.706	8148.056	1.572	2.348
150	12	S10	0	18035.326	27224.486	3579.601	8155.446	1.51	2.278
151	12	S11	0	16735.373	27122.213	3422.564	8145.28	1.621	2.38
152	12	S12	0	12774.52	27048.976	2884.756	8114.667	2.117	2.813
153	12	S13	0	17458.826	27200.956	3505.523	8150.374	1.558	2.325
154	12	S14	0	16735.237	27122.199	3422.56	8145.273	1.621	2.38
155	13	S1	0	16774.034	27048.986	2905.438	8114.672	1.613	2.793
156	13	S2	0	22960.667	27224.478	3131.705	8155.445	1.186	2.604
157	13	S3	0	22031.249	27200.957	3039.988	8150.376	1.235	2.681
158	13	S4	0	21821.483	27198.407	3027.776	8148.058	1.246	2.691
159	13	S5	0	22746.925	27214.216	3094.341	8154.904	1.196	2.635
160	13	S6	0	22300.219	27213.736	3079.026	8152.11	1.22	2.648
161	13	S7	0	22300.471	27213.746	3079.061	8152.112	1.22	2.648
162	13	S8	0	22746.921	27214.218	3094.346	8154.905	1.196	2.635
163	13	S9	0	21821.415	27198.401	3027.756	8148.056	1.246	2.691
164	13	S10	0	22960.848	27224.486	3131.735	8155.446	1.186	2.604
165	13	S11	0	20701.83	27122.213	2754.411	8142.864	1.31	2.956
166	13	S12	0	16774.198	27048.976	2905.439	8114.667	1.613	2.793
167	13	S13	0	22031.145	27200.956	3039.99	8150.374	1.235	2.681
168	13	S14	0	20701.748	27122.199	2754.406	8142.858	1.31	2.956
169	14	S1	0	0	30492.012	0	11584.161	9.99+	9.99+
170	14	S2	0	0	32572.804	0	12387.466	9.99+	9.99+
171	14	S3	0	0	32738.26	0	12290.702	9.99+	9.99+
172	14	S4	0	0	32805.78	0	12196.59	9.99+	9.99+
173	14	S5	0	0	32542.282	0	12244.901	9.99+	9.99+
174	14	S6	0	0	32958.934	0	12296.868	9.99+	9.99+
175	14	S7	0	0	32958.872	0	12330.513	9.99+	9.99+
176	14	S8	0	0	32542.394	0	12373.846	9.99+	9.99+
177	14	S9	0	0	32805.66	0	12250.014	9.99+	9.99+
178	14	S10	0	0	32572.822	0	12281.244	9.99+	9.99+
179	14	S11	0	0	33108.987	0	12150.42	9.99+	9.99+
180	14	S12	0	0	30491.764	0	10468.309	9.99+	9.99+
181	14	S13	0	0	32738.271	0	12196.452	9.99+	9.99+
182	14	S14	0	0	33109.074	0	12135.429	9.99+	9.99+
183	15	S1	0	0	32783.099	0	10764.075	9.99+	9.99+
184	15	S2	0	0	36507.032	0	11704.691	9.99+	9.99+
185	15	S3	0	0	36484.452	0	11641.1	9.99+	9.99+
186	15	S4	0	0	36442.225	0	11534.988	9.99+	9.99+
187	15	S5	0	0	36524.863	0	11576.898	9.99+	9.99+
188	15	S6	0	0	36755.027	0	11633.994	9.99+	9.99+
189	15	S7	0	0	36754.959	0	11666.374	9.99+	9.99+
190	15	S8	0	0	36524.982	0	11715.077	9.99+	9.99+
191	15	S9	0	0	36442.108	0	11594.154	9.99+	9.99+
192	15	S10	0	0	36507.047	0	11588.754	9.99+	9.99+
193	15	S11	0	0	37406.287	0	11686.42	9.99+	9.99+
194	15	S12	0	0	32782.873	0	10057.243	9.99+	9.99+
195	15	S13	0	0	36484.374	0	11537.563	9.99+	9.99+
196	15	S14	0	0	37406.377	0	11645.407	9.99+	9.99+

Slab Stability - Sliding

	LC	Slab	Angle[deg]	Va-xx[lb]	Vr-xx[lb]	Va-zz[lb]	Vr-zz[lb]	SR-xx	SR-zz
1	2	S1	0	30.46	2692.707	0	2692.707	9.99+	9.99+
2	2	S2	0	2.032	2717.669	0	2717.669	9.99+	9.99+
3	2	S3	0	1.864	2716.046	0	2716.046	9.99+	9.99+
4	2	S4	0	1.072	2715.59	0	2715.59	9.99+	9.99+
5	2	S5	0	2.431	2717.329	0	2717.329	9.99+	9.99+
6	2	S6	0	0	2717.37	0	2717.37	9.99+	9.99+
7	2	S7	0	0	2717.371	0	2717.371	9.99+	9.99+
8	2	S8	0	2.431	2717.329	0	2717.329	9.99+	9.99+
9	2	S9	0	1.072	2715.59	0	2715.59	9.99+	9.99+
10	2	S10	0	2.032	2717.669	0	2717.669	9.99+	9.99+
11	2	S11	0	1.007	2714.691	0	2714.691	9.99+	9.99+
12	2	S12	0	30.46	2692.705	0	2692.705	9.99+	9.99+
13	2	S13	0	1.864	2716.046	0	2716.046	9.99+	9.99+
14	2	S14	0	1.006	2714.688	0	2714.688	9.99+	9.99+
15	3	S1	0	30.46	2692.707	0	2692.707	9.99+	9.99+
16	3	S2	0	2.032	2717.669	0	2717.669	9.99+	9.99+
17	3	S3	0	1.864	2716.046	0	2716.046	9.99+	9.99+
18	3	S4	0	1.072	2715.59	0	2715.59	9.99+	9.99+
19	3	S5	0	2.431	2717.329	0	2717.329	9.99+	9.99+
20	3	S6	0	0	2717.37	0	2717.37	9.99+	9.99+
21	3	S7	0	0	2717.371	0	2717.371	9.99+	9.99+
22	3	S8	0	2.431	2717.329	0	2717.329	9.99+	9.99+
23	3	S9	0	1.072	2715.59	0	2715.59	9.99+	9.99+
24	3	S10	0	2.032	2717.669	0	2717.669	9.99+	9.99+
25	3	S11	0	1.007	2714.691	0	2714.691	9.99+	9.99+
26	3	S12	0	30.46	2692.705	0	2692.705	9.99+	9.99+
27	3	S13	0	1.864	2716.046	0	2716.046	9.99+	9.99+
28	3	S14	0	1.006	2714.688	0	2714.688	9.99+	9.99+
29	4	S1	0	178.51	2199.344	510.372	2199.344	9.99+	4.309
30	4	S2	0	20.652	2010.826	858.509	2010.826	9.99+	2.342
31	4	S3	0	18.254	2022.985	843.384	2022.985	9.99+	2.399
32	4	S4	0	10.355	2026.015	828.203	2026.015	9.99+	2.446
33	4	S5	0	24.991	2013.759	873.509	2013.759	9.99+	2.305
34	4	S6	0	7.309	2013.069	840.641	2013.069	9.99+	2.395
35	4	S7	0	7.309	2013.066	840.647	2013.066	9.99+	2.395
36	4	S8	0	24.991	2013.756	873.506	2013.756	9.99+	2.305
37	4	S9	0	10.353	2026.019	828.205	2026.019	9.99+	2.446
38	4	S10	0	20.652	2010.823	858.508	2010.823	9.99+	2.342
39	4	S11	0	2.992	2031.777	915.487	2031.777	9.99+	2.219
40	4	S12	0	178.509	2199.341	510.363	2199.341	9.99+	4.309
41	4	S13	0	18.253	2022.988	843.368	2022.988	9.99+	2.399
42	4	S14	0	2.993	2031.776	915.482	2031.776	9.99+	2.219
43	5	S1	0	240.607	2220.046	449.877	2220.046	9.227	4.935
44	5	S2	0	8.264	2095.446	767.222	2095.446	9.99+	2.731
45	5	S3	0	7.03	2111.606	730.389	2111.606	9.99+	2.891
46	5	S4	0	3.813	2111.989	711.678	2111.989	9.99+	2.968
47	5	S5	0	11.274	2103.943	776.283	2103.943	9.99+	2.71
48	5	S6	0	4.864	2103.51	728.301	2103.51	9.99+	2.888
49	5	S7	0	4.864	2103.504	728.307	2103.504	9.99+	2.888
50	5	S8	0	11.273	2103.942	776.28	2103.942	9.99+	2.71
51	5	S9	0	3.813	2111.993	711.682	2111.993	9.99+	2.968
52	5	S10	0	8.264	2095.441	767.222	2095.441	9.99+	2.731
53	5	S11	0	7.787	2166.521	784.155	2166.521	9.99+	2.763
54	5	S12	0	240.606	2220.043	449.869	2220.043	9.227	4.935
55	5	S13	0	7.03	2111.605	730.373	2111.605	9.99+	2.891

Slab Stability - Sliding (Continued)

	LC	Slab	Angle[deg]	Va-xx[lb]	Vr-xx[lb]	Va-zz[lb]	Vr-zz[lb]	SR-xx	SR-zz
56	5	S14	0	7.786	2166.519	784.153	2166.519	9.99+	2.763
57	6	S1	0	291.147	3282.33	603.915	3282.33	9.99+	5.435
58	6	S2	0	27.374	3553.936	1017.478	3553.936	9.99+	3.493
59	6	S3	0	24.304	3535.136	995.951	3535.136	9.99+	3.55
60	6	S4	0	13.793	3530.9	977.164	3530.9	9.99+	3.613
61	6	S5	0	33.204	3548.804	1034.584	3548.804	9.99+	3.43
62	6	S6	0	8.404	3549.683	992.757	3549.683	9.99+	3.576
63	6	S7	0	8.405	3549.689	992.764	3549.689	9.99+	3.576
64	6	S8	0	33.205	3548.808	1034.581	3548.808	9.99+	3.43
65	6	S9	0	13.791	3530.894	977.168	3530.894	9.99+	3.613
66	6	S10	0	27.375	3553.941	1017.477	3553.941	9.99+	3.493
67	6	S11	0	4.147	3514.463	1079.758	3514.463	9.99+	3.255
68	6	S12	0	291.146	3282.329	603.905	3282.329	9.99+	5.435
69	6	S13	0	24.303	3535.131	995.932	3535.131	9.99+	3.55
70	6	S14	0	4.148	3514.459	1079.752	3514.459	9.99+	3.255
71	7	S1	0	188.892	3159.215	504.188	3159.215	9.99+	6.266
72	7	S2	0	29.8	3416.411	842.32	3416.411	9.99+	4.056
73	7	S3	0	26.623	3404.287	840.365	3404.287	9.99+	4.051
74	7	S4	0	15.228	3399.153	828.313	3399.153	9.99+	4.104
75	7	S5	0	35.512	3416.127	859.436	3416.127	9.99+	3.975
76	7	S6	0	8.092	3416.984	837.474	3416.984	9.99+	4.08
77	7	S7	0	8.093	3416.986	837.48	3416.986	9.99+	4.08
78	7	S8	0	35.513	3416.131	859.435	3416.131	9.99+	3.975
79	7	S9	0	15.225	3399.148	828.315	3399.148	9.99+	4.104
80	7	S10	0	29.8	3416.414	842.319	3416.414	9.99+	4.056
81	7	S11	0	10.652	3419.06	917.006	3419.06	9.99+	3.729
82	7	S12	0	188.892	3159.213	504.18	3159.213	9.99+	6.266
83	7	S13	0	26.622	3404.281	840.351	3404.281	9.99+	4.051
84	7	S14	0	10.653	3419.057	916.999	3419.057	9.99+	3.729
85	8	S1	0	126.267	2322.685	382.779	2322.685	9.99+	6.068
86	8	S2	0	14.981	2187.537	643.882	2187.537	9.99+	3.397
87	8	S3	0	13.225	2196.25	632.538	2196.25	9.99+	3.472
88	8	S4	0	7.498	2198.409	621.152	2198.409	9.99+	3.539
89	8	S5	0	18.135	2189.651	655.131	2189.651	9.99+	3.342
90	8	S6	0	5.481	2189.145	630.481	2189.145	9.99+	3.472
91	8	S7	0	5.482	2189.142	630.485	2189.142	9.99+	3.472
92	8	S8	0	18.136	2189.649	655.13	2189.649	9.99+	3.342
93	8	S9	0	7.497	2198.412	621.154	2198.412	9.99+	3.539
94	8	S10	0	14.981	2187.534	643.881	2187.534	9.99+	3.397
95	8	S11	0	1.993	2202.506	686.615	2202.506	9.99+	3.208
96	8	S12	0	126.267	2322.682	382.772	2322.682	9.99+	6.068
97	8	S13	0	13.224	2196.252	632.526	2196.252	9.99+	3.472
98	8	S14	0	1.994	2202.504	686.612	2202.504	9.99+	3.208
99	9	S1	0	172.84	2338.211	337.408	2338.211	9.99+	6.93
100	9	S2	0	5.69	2251.002	575.417	2251.002	9.99+	3.912
101	9	S3	0	4.807	2262.716	547.792	2262.716	9.99+	4.131
102	9	S4	0	2.592	2262.89	533.758	2262.89	9.99+	4.24
103	9	S5	0	7.848	2257.289	582.212	2257.289	9.99+	3.877
104	9	S6	0	3.648	2256.975	546.226	2256.975	9.99+	4.132
105	9	S7	0	3.648	2256.971	546.23	2256.971	9.99+	4.132
106	9	S8	0	7.847	2257.289	582.21	2257.289	9.99+	3.877
107	9	S9	0	2.592	2262.892	533.762	2262.892	9.99+	4.24
108	9	S10	0	5.69	2250.998	575.417	2250.998	9.99+	3.912
109	9	S11	0	6.092	2303.563	588.116	2303.563	9.99+	3.917
110	9	S12	0	172.839	2338.209	337.402	2338.209	9.99+	6.93

Slab Stability - Sliding (Continued)

	LC	Slab	Angle[deg]	Va-xx[lb]	Vr-xx[lb]	Va-zz[lb]	Vr-zz[lb]	SR-xx	SR-zz
111	9	S13	0	4.806	2262.715	547.78	2262.715	9.99+	4.131
112	9	S14	0	6.091	2303.562	588.114	2303.562	9.99+	3.917
113	10	S1	0	225.975	3134.924	452.936	3134.924	9.99+	6.921
114	10	S2	0	21.039	3344.869	763.109	3344.869	9.99+	4.383
115	10	S3	0	18.694	3330.363	746.963	3330.363	9.99+	4.459
116	10	S4	0	10.613	3327.072	732.873	3327.072	9.99+	4.54
117	10	S5	0	25.511	3340.936	775.938	3340.936	9.99+	4.306
118	10	S6	0	6.303	3341.605	744.568	3341.605	9.99+	4.488
119	10	S7	0	6.304	3341.609	744.573	3341.609	9.99+	4.488
120	10	S8	0	25.511	3340.938	775.936	3340.938	9.99+	4.306
121	10	S9	0	10.611	3327.068	732.876	3327.068	9.99+	4.54
122	10	S10	0	21.039	3344.873	763.108	3344.873	9.99+	4.383
123	10	S11	0	3.362	3314.52	809.818	3314.52	9.99+	4.093
124	10	S12	0	225.975	3134.923	452.929	3134.923	9.99+	6.921
125	10	S13	0	18.693	3330.36	746.949	3330.36	9.99+	4.459
126	10	S14	0	3.362	3314.517	809.814	3314.517	9.99+	4.093
127	11	S1	0	149.284	3042.588	378.141	3042.588	9.99+	8.046
128	11	S2	0	22.858	3241.725	631.74	3241.725	9.99+	5.131
129	11	S3	0	20.433	3232.227	630.274	3232.227	9.99+	5.128
130	11	S4	0	11.689	3228.262	621.235	3228.262	9.99+	5.197
131	11	S5	0	27.242	3241.428	644.577	3241.428	9.99+	5.029
132	11	S6	0	6.069	3242.08	628.106	3242.08	9.99+	5.162
133	11	S7	0	6.069	3242.082	628.11	3242.082	9.99+	5.162
134	11	S8	0	27.243	3241.431	644.576	3241.431	9.99+	5.029
135	11	S9	0	11.687	3228.259	621.236	3228.259	9.99+	5.197
136	11	S10	0	22.858	3241.728	631.739	3241.728	9.99+	5.131
137	11	S11	0	8.241	3242.968	687.754	3242.968	9.99+	4.715
138	11	S12	0	149.284	3042.586	378.135	3042.586	9.99+	8.046
139	11	S13	0	20.432	3232.222	630.263	3232.222	9.99+	5.128
140	11	S14	0	8.241	3242.965	687.75	3242.965	9.99+	4.715
141	12	S1	0	190.694	1122.261	510.372	1122.261	5.885	2.199
142	12	S2	0	21.464	923.758	858.509	923.758	9.99+	1.076
143	12	S3	0	19	936.566	843.384	936.566	9.99+	1.11
144	12	S4	0	10.784	939.779	828.203	939.779	9.99+	1.135
145	12	S5	0	25.963	926.827	873.509	926.827	9.99+	1.061
146	12	S6	0	7.309	926.121	840.641	926.121	9.99+	1.102
147	12	S7	0	7.309	926.118	840.647	926.118	9.99+	1.102
148	12	S8	0	25.963	926.824	873.506	926.824	9.99+	1.061
149	12	S9	0	10.782	939.783	828.205	939.783	9.99+	1.135
150	12	S10	0	21.464	923.755	858.508	923.755	9.99+	1.076
151	12	S11	0	3.395	945.901	915.487	945.901	9.99+	1.033
152	12	S12	0	190.693	1122.26	510.363	1122.26	5.885	2.199
153	12	S13	0	18.999	936.57	843.368	936.57	9.99+	1.111
154	12	S14	0	3.396	945.901	915.482	945.901	9.99+	1.033
155	13	S1	0	252.791	1142.963	449.877	1142.963	4.521	2.541
156	13	S2	0	9.077	1008.379	767.222	1008.379	9.99+	1.314
157	13	S3	0	7.776	1025.188	730.389	1025.188	9.99+	1.404
158	13	S4	0	4.242	1025.753	711.678	1025.753	9.99+	1.441
159	13	S5	0	12.246	1017.011	776.283	1017.011	9.99+	1.31
160	13	S6	0	4.864	1016.562	728.301	1016.562	9.99+	1.396
161	13	S7	0	4.864	1016.556	728.307	1016.556	9.99+	1.396
162	13	S8	0	12.246	1017.01	776.28	1017.01	9.99+	1.31
163	13	S9	0	4.242	1025.757	711.682	1025.757	9.99+	1.441
164	13	S10	0	9.077	1008.373	767.222	1008.373	9.99+	1.314
165	13	S11	0	7.385	1080.644	784.155	1080.644	9.99+	1.378

Slab Stability - Sliding (Continued)

	LC	Slab	Angle[deg]	Va-xx[lb]	Vr-xx[lb]	Va-zz[lb]	Vr-zz[lb]	SR-xx	SR-zz
166	13	S12	0	252.79	1142.962	449.869	1142.962	4.521	2.541
167	13	S13	0	7.775	1025.187	730.373	1025.187	9.99+	1.404
168	13	S14	0	7.384	1080.644	784.153	1080.644	9.99+	1.378
169	14	S1	0	278.963	2205.247	603.915	2205.247	7.905	3.652
170	14	S2	0	26.562	2466.869	1017.478	2466.869	9.99+	2.424
171	14	S3	0	23.559	2448.717	995.951	2448.717	9.99+	2.459
172	14	S4	0	13.364	2444.663	977.164	2444.663	9.99+	2.502
173	14	S5	0	32.232	2461.873	1034.584	2461.873	9.99+	2.38
174	14	S6	0	8.404	2462.735	992.757	2462.735	9.99+	2.481
175	14	S7	0	8.405	2462.741	992.764	2462.741	9.99+	2.481
176	14	S8	0	32.232	2461.876	1034.581	2461.876	9.99+	2.38
177	14	S9	0	13.362	2444.658	977.168	2444.658	9.99+	2.502
178	14	S10	0	26.562	2466.874	1017.477	2466.874	9.99+	2.424
179	14	S11	0	3.744	2428.586	1079.758	2428.586	9.99+	2.249
180	14	S12	0	278.962	2205.247	603.905	2205.247	7.905	3.652
181	14	S13	0	23.557	2448.713	995.932	2448.713	9.99+	2.459
182	14	S14	0	3.745	2428.584	1079.752	2428.584	9.99+	2.249
183	15	S1	0	176.708	2082.132	504.188	2082.132	9.99+	4.13
184	15	S2	0	28.988	2329.343	842.32	2329.343	9.99+	2.765
185	15	S3	0	25.878	2317.869	840.365	2317.869	9.99+	2.758
186	15	S4	0	14.799	2312.917	828.313	2312.917	9.99+	2.792
187	15	S5	0	34.54	2329.195	859.436	2329.195	9.99+	2.71
188	15	S6	0	8.092	2330.036	837.474	2330.036	9.99+	2.782
189	15	S7	0	8.093	2330.038	837.48	2330.038	9.99+	2.782
190	15	S8	0	34.541	2329.199	859.435	2329.199	9.99+	2.71
191	15	S9	0	14.796	2312.912	828.315	2312.912	9.99+	2.792
192	15	S10	0	28.987	2329.346	842.319	2329.346	9.99+	2.765
193	15	S11	0	10.25	2333.184	917.006	2333.184	9.99+	2.544
194	15	S12	0	176.707	2082.132	504.18	2082.132	9.99+	4.13
195	15	S13	0	25.876	2317.863	840.351	2317.863	9.99+	2.758
196	15	S14	0	10.251	2333.182	916.999	2333.182	9.99+	2.544



JOB NO.: U2716.0388.241

PROJECT: Sunturf Package D6 Ground Mount

ANCHORAGE DESIGN FOR CONCRETE BALLAST BLOCK

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	ASD Loads		Y								
2	1.0 D		Y	DL	1						
3	1.0 D + 1.0 S		Y	DL	1	RLL	1				
4	1.0 D + 0.6 W1		Y	DL	1	RLL		OL1	0.6	WLZ	0.6
5	1.0 D + 0.6 W2		Y	DL	1	RLL		OL2	0.6	WLZ	0.6
6	1.0 D + 0.6 W3		Y	DL	1	RLL		OL3	0.6	WLZ	-0.6
7	1.0 D + 0.6 W4		Y	DL	1	RLL		OL4	0.6	WLZ	-0.6
8	1.0 D + 0.45 W1 + 0.75 S		Y	DL	1	RLL	0.75	OL1	0.45	WLZ	0.45
9	1.0 D + 0.45 W2 + 0.75 S		Y	DL	1	RLL	0.75	OL2	0.45	WLZ	0.45
10	1.0 D + 0.45 W3 + 0.75 S		Y	DL	1	RLL	0.75	OL3	0.45	WLZ	-0.45
11	1.0 D + 0.45 W4 + 0.75 S		Y	DL	1	RLL	0.75	OL4	0.45	WLZ	-0.45
12	0.6 D + 0.6 W1		Y	DL	0.6	RLL		OL1	0.6	WLZ	0.6
13	0.6 D + 0.6 W2		Y	DL	0.6	RLL		OL2	0.6	WLZ	0.6
14	0.6 D + 0.6 W3		Y	DL	0.6	RLL		OL3	0.6	WLZ	-0.6
15	0.6 D + 0.6 W4		Y	DL	0.6	RLL		OL4	0.6	WLZ	-0.6
16			Y								
17	LRFD Loads		Y								
18	1.4 D	Yes	Y	DL	1.4	RLL					
19	1.2 D + 1.6 S + 0.5 W1	Yes	Y	DL	1.2	RLL	1.6	OL1	0.5		
20	1.2 D + 1.6 S + 0.5 W2	Yes	Y	DL	1.2	RLL	1.6	OL2	0.5		
21	1.2 D + 1.6 S + 0.5 W3	Yes	Y	DL	1.2	RLL	1.6	OL3	0.5		
22	1.2 D + 1.6 S + 0.5 W4	Yes	Y	DL	1.2	RLL	1.6	OL4	0.5		
23	1.2 D + 1.0 W1	Yes	Y	DL	1.2	RLL		OL1	1		
24	1.2 D + 1.0 W2	Yes	Y	DL	1.2	RLL		OL2	1		
25	1.2 D + 1.0 W3	Yes	Y	DL	1.2	RLL		OL3	1		
26	1.2 D + 1.0 W4	Yes	Y	DL	1.2	RLL		OL4	1		
27	0.9 D + 1.0 W1	Yes	Y	DL	0.9	RLL		OL1	1		
28	0.9 D + 1.0 W2	Yes	Y	DL	0.9	RLL		OL2	1		
29	0.9 D + 1.0 W3	Yes	Y	DL	0.9	RLL		OL3	1		
30	0.9 D + 1.0 W4	Yes	Y	DL	0.9	RLL		OL4	1		

Envelope Node Reactions

	Node Label	X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N151	max	432.776	28	2864.849	25	1098.1	29	0	30	0	30	0
2		min	-404.437	25	-2832.286	28	-926.374	23	0	18	0	18	0
3	N1	max	404.435	25	2864.794	25	1098.12	29	0	30	0	30	0
4		min	-432.776	28	-2832.248	28	-926.389	23	0	18	0	18	0
5	N2	max	90.696	26	1262.16	26	75.016	23	0	30	0	30	0
6		min	-51.944	27	-537.343	27	-92.82	25	0	18	0	18	0
7	N152	max	51.941	27	1262.108	26	75.015	23	0	30	0	30	0
8		min	-90.693	26	-537.304	27	-92.818	25	0	18	0	18	0
9	N271	max	47.642	26	2025.607	26	103.142	23	0	30	0	30	0
10		min	-28.177	27	-876.567	27	-130.596	25	0	18	0	18	0
11	N253	max	28.175	27	2025.585	26	103.142	23	0	30	0	30	0
12		min	-47.639	26	-876.551	27	-130.596	25	0	18	0	18	0
13	N235	max	42.413	26	2014.558	26	101.971	23	0	30	0	30	0
14		min	-26.64	27	-872.727	27	-128.879	25	0	18	0	18	0
15	N295	max	26.64	27	2014.559	26	101.971	23	0	30	0	30	0
16		min	-42.413	26	-872.728	27	-128.878	25	0	18	0	18	0
17	N241	max	34.581	26	2016.534	26	100.526	23	0	30	0	30	0
18		min	-18.648	27	-902.515	27	-127.619	25	0	18	0	18	0
19	N289	max	18.646	27	2016.516	26	100.526	23	0	30	0	30	0
20		min	-34.579	26	-902.512	27	-127.618	25	0	18	0	18	0
21	N251	max	22.046	28	3876.131	25	1855.433	25	0	30	0	30	0

Envelope Node Reactions (Continued)

Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC	
22		min	-20.723	25	-3814.893	28	-1558.686	23	0	18	0	18	0	18
23	N269	max	20.722	25	3876.13	25	1855.428	25	0	30	0	30	0	30
24		min	-22.045	28	-3814.892	28	-1558.682	23	0	18	0	18	0	18
25	N278	max	11.281	27	2233.243	26	97.575	23	0	30	0	30	0	30
26		min	-20.827	26	-1008.27	27	-124.173	25	0	18	0	18	0	18
27	N381	max	20.826	26	2233.225	26	97.576	23	0	30	0	30	0	30
28		min	-11.28	27	-1008.246	27	-124.174	25	0	18	0	18	0	18
29	N247	max	10.479	27	2005.982	26	99.841	23	0	30	0	30	0	30
30		min	-19.687	26	-909.009	27	-126.846	25	0	18	0	18	0	18
31	N283	max	19.682	26	2005.961	26	99.841	23	0	30	0	30	0	30
32		min	-10.476	27	-908.994	27	-126.846	25	0	18	0	18	0	18
33	N239	max	18.046	25	3771.116	25	1787.961	25	0	30	0	30	0	30
34		min	-18.704	28	-3690.649	28	-1505.873	23	0	18	0	18	0	18
35	N287	max	18.703	28	3771.096	25	1787.927	25	0	30	0	30	0	30
36		min	-18.045	25	-3690.634	28	-1505.847	23	0	18	0	18	0	18
37	N293	max	12.957	28	3906.967	25	1824.306	25	0	30	0	30	0	30
38		min	-12.934	25	-3856.694	28	-1533.241	23	0	18	0	18	0	18
39	N233	max	12.934	25	3906.938	25	1824.308	25	0	30	0	30	0	30
40		min	-12.957	28	-3856.662	28	-1533.242	23	0	18	0	18	0	18
41	N259	max	9.822	27	2064.052	26	101.55	23	0	30	0	30	0	30
42		min	-12.823	26	-930.174	27	-128.62	25	0	18	0	18	0	18
43	N265	max	12.823	26	2064.038	26	101.551	23	0	30	0	30	0	30
44		min	-9.822	27	-930.164	27	-128.621	25	0	18	0	18	0	18
45	N275	max	10.181	25	3740.156	25	1755.331	25	0	30	0	30	0	30
46		min	-11.072	28	-3654.701	28	-1480.292	23	0	18	0	18	0	18
47	N245	max	11.071	28	3740.168	25	1755.325	25	0	30	0	30	0	30
48		min	-10.18	25	-3654.714	28	-1480.288	23	0	18	0	18	0	18
49	N379	max	7.666	28	3530.336	25	1925.04	25	0	30	0	30	0	30
50		min	-7.63	25	-3442.888	28	-1622.464	27	0	18	0	18	0	18
51	N276	max	7.63	25	3530.304	25	1925.029	25	0	30	0	30	0	30
52		min	-7.666	28	-3442.874	28	-1622.455	27	0	18	0	18	0	18
53	N263	max	2.609	25	3811.187	25	1782.739	25	0	30	0	30	0	30
54		min	-2.72	28	-3742.046	28	-1502.889	23	0	18	0	18	0	18
55	N257	max	2.719	28	3811.143	25	1782.727	25	0	30	0	30	0	30
56		min	-2.608	25	-3742.003	28	-1502.879	23	0	18	0	18	0	18
57	Totals:	max	0.001	24	67147.318	25	22338.633	29						
58		min	0	27	-47600.802	27	-18900.321	23						



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Project:	Sunturf Ground Mount D6		
Address:			
Phone:			
E-mail:			

1. Project information

Customer company: SunModo
 Customer contact name:
 Customer e-mail:
 Comment:

Project description:
 Location:
 Fastening description: Anchorage to concrete ballast block

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
 Units: Imperial units

Anchor Information:

Anchor type: Bonded anchor
 Material: F593 304/316SS
 Diameter (inch): 0.375
 Effective Embedment depth, h_{ef} (inch): 4.000
 Code report: ICC-ES ESR-4057
 Anchor category: -
 Anchor ductility: Yes
 h_{min} (inch): 5.25
 c_{ac} (inch): 7.12
 C_{min} (inch): 1.75
 S_{min} (inch): 1.00

Base Material

Concrete: Normal-weight
 Concrete thickness, h (inch): 24.00
 State: Cracked
 Compressive strength, f'_c (psi): 2500
 $\Psi_{c,v}$: 1.0
 Reinforcement condition: Supplementary reinforcement not present
 Supplemental edge reinforcement: Not applicable
 Reinforcement provided at corners: No
 Ignore concrete breakout in tension: No
 Ignore concrete breakout in shear: No
 Hole condition: Dry concrete
 Inspection: Periodic
 Temperature range, Short/Long: 150/110°F
 Reduced installation torque (for AT-3G): Not applicable
 Ignore 6do requirement: Not applicable
 Build-up grout pad: No

Base Plate

Length x Width x Thickness (inch): 4.75 x 4.75 x 0.31

Recommended Anchor

Anchor Name: SET-3G™ - SET-3G w/ 3/8"Ø F593 CW (304/316SS)
 Code Report: ICC-ES ESR-4057





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Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: No

Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 3857

V_{uax} [lb]: 433

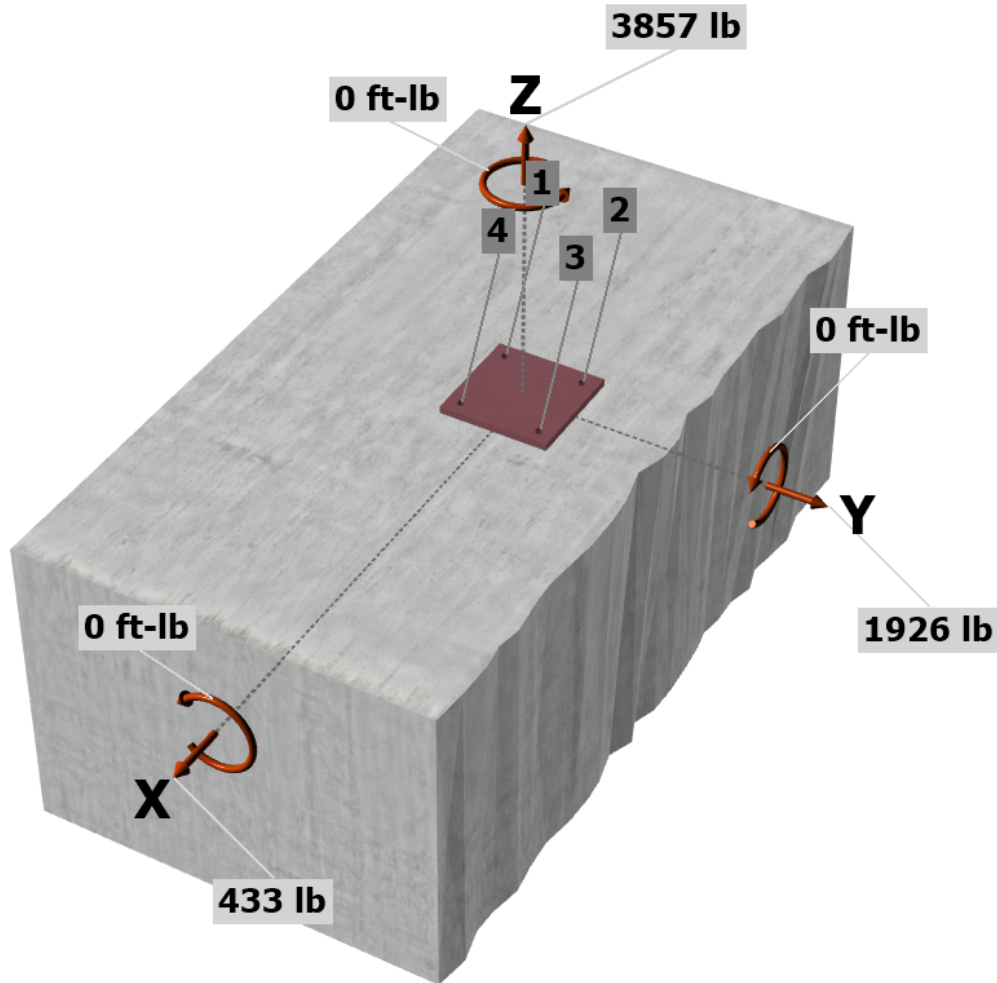
V_{uay} [lb]: 1926

M_{ux} [ft-lb]: 0

M_{uy} [ft-lb]: 0

M_{uz} [ft-lb]: 0

<Figure 1>





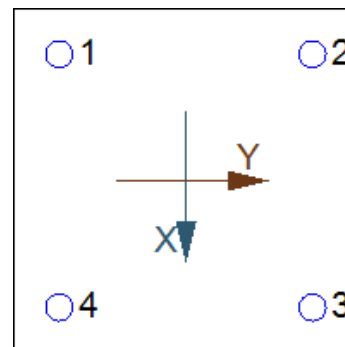
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3. Resulting Anchor Forces

Anchor	Tension load, N _{ua} (lb)	Shear load x, V _{uax} (lb)	Shear load y, V _{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	964.3	108.2	481.5	493.5
2	964.3	108.3	481.5	493.6
3	964.3	108.3	481.5	493.5
4	964.3	108.2	481.5	493.5
Sum	3857.0	433.0	1926.0	1974.1

Maximum concrete compression strain (%): 0.00
 Maximum concrete compression stress (psi): 0
 Resultant tension force (lb): 3857
 Resultant compression force (lb): 0
 Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
 Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
 Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
 Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N _{sa} (lb)	φ	φN _{sa} (lb)
7800	0.75	5850

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$$N_b = K_c \lambda_a \sqrt{f_c} h_{ef}^{1.5} \text{ (Eq. 17.6.2.2.1)}$$

K _c	λ _a	f _c (psi)	h _{ef} (in)	N _b (lb)
17.0	1.00	2500	4.000	6800

$$\phi N_{cbg} = \phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \text{ (Sec. 17.5.1.2 \& Eq. 17.6.2.1a)}$$

A _{Nc} (in ²)	A _{Nco} (in ²)	C _{a,min} (in)	Ψ _{ec,N}	Ψ _{ed,N}	Ψ _{c,N}	Ψ _{cp,N}	N _b (lb)	φ	φN _{cbg} (lb)
240.25	144.00	10.25	1.000	1.000	1.00	1.000	6800	0.65	7374

6. Adhesive Strength of Anchor in Tension (Sec. 17.6.5)

$$\tau_{k,cr} = \tau_{k,cr,short-term} K_{sat} (f_c / 2,500)^0$$

τ _{k,cr} (psi)	f _{short-term}	K _{sat}	f _c (psi)	n	τ _{k,cr} (psi)
1346	1.00	1.00	2500	0.24	1346

$$N_{ba} = \lambda_a \tau_{cr} \pi d_a h_{ef} \text{ (Eq. 17.6.5.2.1)}$$

λ _a	τ _{cr} (psi)	d _a (in)	h _{ef} (in)	N _{ba} (lb)
1.00	1346	0.38	4.000	6343

$$\phi N_{ag} = \phi (A_{Na} / A_{Na0}) \Psi_{ec,Na} \Psi_{ed,Na} \Psi_{cp,Na} N_{ba} \text{ (Sec. 17.5.1.2 \& Eq. 17.6.5.1b)}$$

A _{Na} (in ²)	A _{Na0} (in ²)	C _{Na} (in)	C _{a,min} (in)	Ψ _{ec,Na}	Ψ _{ed,Na}	Ψ _{cp,Na}	N _{ba} (lb)	φ	φN _{ag} (lb)
198.45	112.09	5.29	10.25	1.000	1.000	1.000	6343	0.55	6176

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.



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8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
4680	1.0	0.65	3042

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.7.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2} \sqrt{d_a} \lambda_a \sqrt{f_c} c_{a1}^{1.5}; 9 \lambda_a \sqrt{f_c} c_{a1}^{1.5}|$ (Eq. 17.7.2.2.1a & Eq. 17.7.2.2.1b)

l_e (in)	d_a (in)	λ_a	f_c (psi)	c_{a1} (in)	V_{bx} (lb)
3.00	0.375	1.00	2500	19.12	27160

$\phi V_{cbgx} = \phi (A_{vc} / A_{vco}) \psi_{ec,v} \psi_{ed,v} \psi_{c,v} \psi_{h,v} V_{bx}$ (Sec. 17.5.1.2 & Eq. 17.7.2.1b)

A_{vc} (in ²)	A_{vco} (in ²)	$\psi_{ec,v}$	$\psi_{ed,v}$	$\psi_{c,v}$	$\psi_{h,v}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
1018.32	1645.08	1.000	0.807	1.000	1.093	27160	0.70	10385

Shear parallel to edge in y-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2} \sqrt{d_a} \lambda_a \sqrt{f_c} c_{a1}^{1.5}; 9 \lambda_a \sqrt{f_c} c_{a1}^{1.5}|$ (Eq. 17.7.2.2.1a & Eq. 17.7.2.2.1b)

l_e (in)	d_a (in)	λ_a	f_c (psi)	c_{a1} (in)	V_{by} (lb)
3.00	0.375	1.00	2500	10.25	10661

$\phi V_{cbgy} = \phi (2)(A_{vc} / A_{vco}) \psi_{ec,v} \psi_{ed,v} \psi_{c,v} \psi_{h,v} V_{by}$ (Sec. 17.5.1.2, 17.7.2.1(c) & Eq. 17.7.2.1b)

A_{vc} (in ²)	A_{vco} (in ²)	$\psi_{ec,v}$	$\psi_{ed,v}$	$\psi_{c,v}$	$\psi_{h,v}$	V_{by} (lb)	ϕ	ϕV_{cbgy} (lb)
526.59	472.78	1.000	1.000	1.000	1.000	10661	0.70	16624

Shear parallel to edge in x-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2} \sqrt{d_a} \lambda_a \sqrt{f_c} c_{a1}^{1.5}; 9 \lambda_a \sqrt{f_c} c_{a1}^{1.5}|$ (Eq. 17.7.2.2.1a & Eq. 17.7.2.2.1b)

l_e (in)	d_a (in)	λ_a	f_c (psi)	c_{a1} (in)	V_{by} (lb)
3.00	0.375	1.00	2500	15.62	20055

$\phi V_{cbgx} = \phi (2)(A_{vc} / A_{vco}) \psi_{ec,v} \psi_{ed,v} \psi_{c,v} \psi_{h,v} V_{by}$ (Sec. 17.5.1.2, 17.7.2.1(c) & Eq. 17.7.2.1b)

A_{vc} (in ²)	A_{vco} (in ²)	$\psi_{ec,v}$	$\psi_{ed,v}$	$\psi_{c,v}$	$\psi_{h,v}$	V_{by} (lb)	ϕ	ϕV_{cbgx} (lb)
871.13	1097.93	1.000	1.000	1.000	1.000	20055	0.70	22277

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi \min|k_{cp} N_{ag}; k_{cp} N_{cbg}| = \phi \min|k_{cp} (A_{Na} / A_{Na0}) \psi_{ec,Na} \psi_{ed,Na} \psi_{cp,Na} N_{ba}; k_{cp} (A_{Nc} / A_{Nco}) \psi_{ec,N} \psi_{ed,N} \psi_{cp,N} N_{b}|$ (Sec. 17.5.1.2 & Eq. 17.7.3.1b)

k_{cp}	A_{Na} (in ²)	A_{Na0} (in ²)	$\psi_{ed,Na}$	$\psi_{ec,Na}$	$\psi_{cp,Na}$	N_{ba} (lb)	N_a (lb)
2.0	198.45	112.09	1.000	1.000	1.000	6343	11229

A_{Nc} (in ²)	A_{Nco} (in ²)	$\psi_{ec,N}$	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
240.25	144.00	1.000	1.000	1.000	1.000	6800	11345	0.70

$\phi V_{cp} =$
15721

11. Results

Interaction of Tension and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
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Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.



Anchor Designer™
Software
Version 3.1.2303.1

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Steel	964	5850	0.16	Pass
Concrete breakout	3857	7374	0.52	Pass
Adhesive	3857	6176	0.62	Pass (Governs)

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	494	3042	0.16	Pass (Governs)
T Concrete breakout x+	433	10385	0.04	Pass
Concrete breakout y-	216	16624	0.01	Pass
Concrete breakout x-	963	22277	0.04	Pass
Concrete breakout, combined	-	-	0.05	Pass
Pryout	1974	15721	0.13	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.8.1	0.62	0.00	62.4%	1.0	Pass

SET-3G w/ 3/8"Ø F593 CW (304/316SS) with hef = 4.000 inch meets the selected design criteria.

12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.