Project Number: U2716-0231-201

May 10, 2023

Sunmodo
14800 NE 65th Street
Vancouver, WA 98682

REFERENCE: Sunmodo Sunturf Ground Mount A5a
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 International Building Code, 2015 Edition. 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. The following design parameters are used in our analysis:

- Minimum Design Loads for Buildings and Other Structures (ASCE 7-16)
- Design wind speed for risk category I structures: 140 mph
- Wind exposure: B
- Ground snow load: 70 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	2320	1.5	3480
LATERAL	1690	2	3380

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 minimum of 6% entrained air 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

COMMONWEALTH OF MASSACHUSETTS
WELLS L. HOLMES
STRUCTURAL
No. 54240
REGISTERED PROFESSIONAL ENGINEER

Wells Holmes, S.E.
License: 54240 - Expires: 06/30/2024
Project Engineer

Enclosures

RNE/stb

05/10/2023

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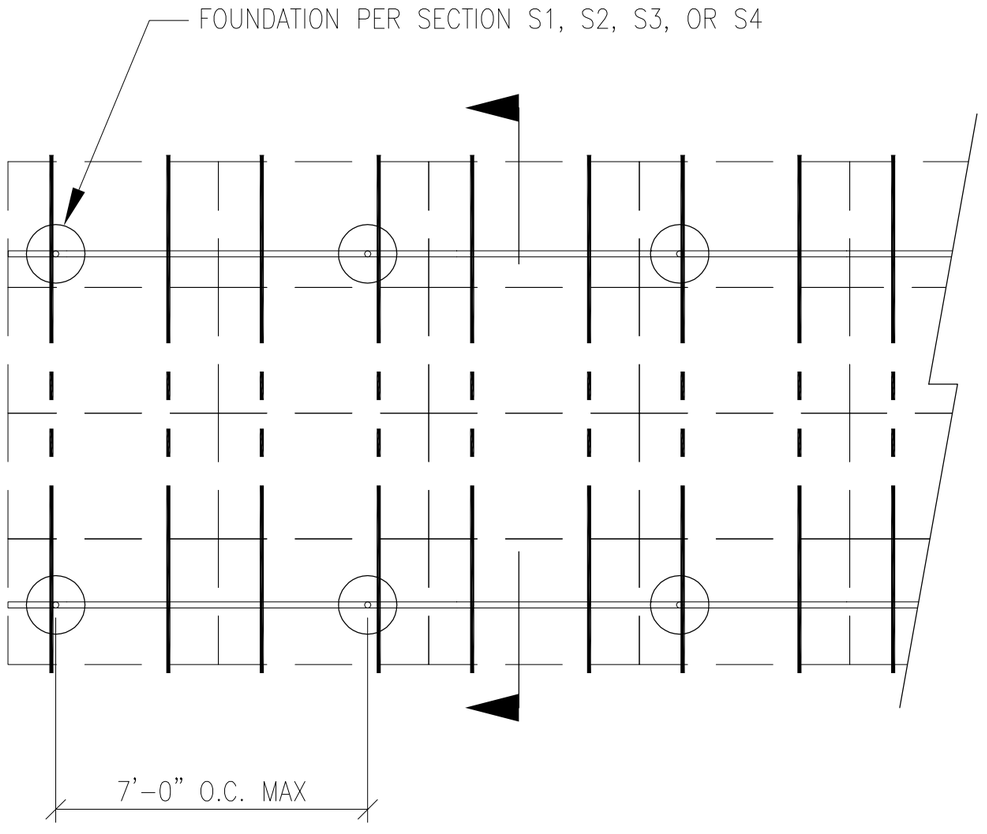
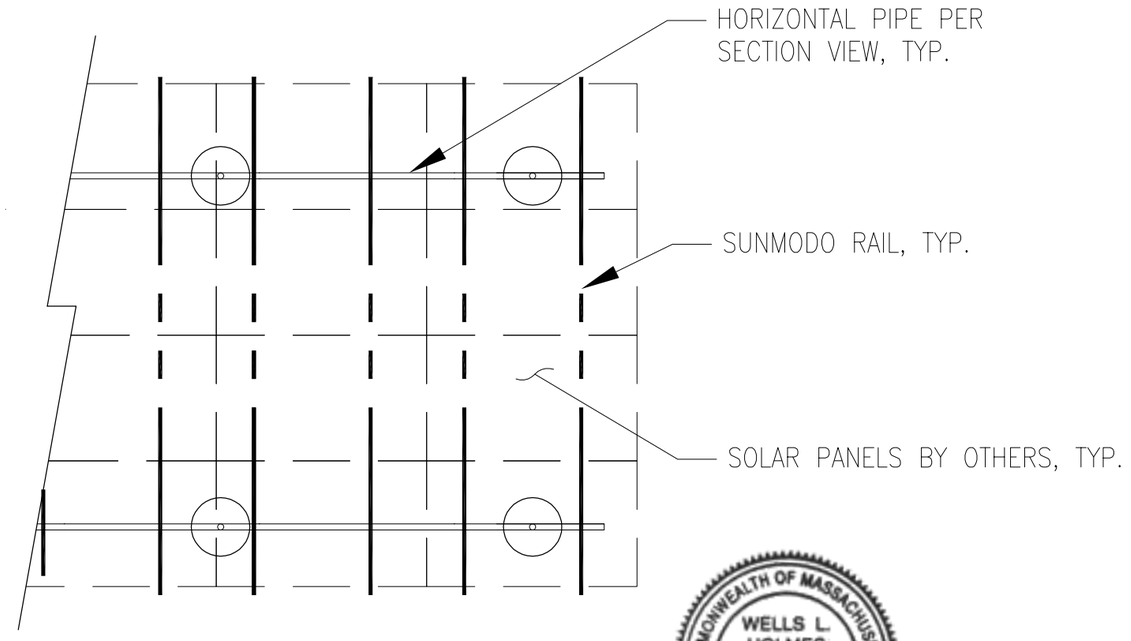
DRAPER, UTAH 84020 (801) 990-1776 FAX

JOB NO. U2716-0231-201

PROJECT SUNMODO SUNTURF GROUND MOUNTS A5a

SUBJECT ALL OPTIONS





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REGISTERED PROFESSIONAL ENGINEER

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PV ARRAY PLAN

N.T.S.

P1

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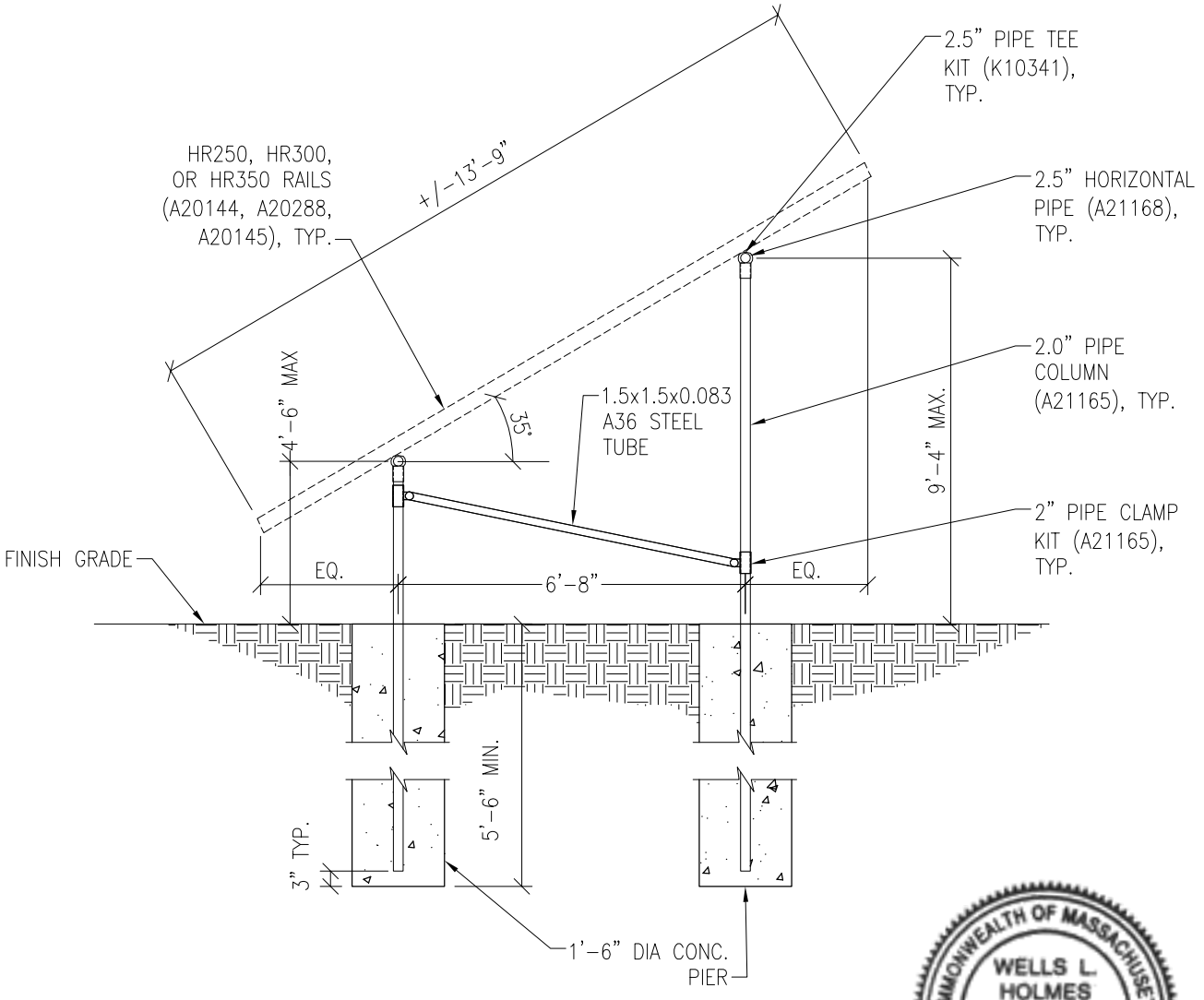
JOB NO. U2716-0231-201

PROJECT SUNMODO SUNTURF GROUND MOUNTS A5a

SUBJECT DRILLED PIER OPTION



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PV ARRAY SECTION S1

N.T.S.

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VECTOR ENGINEERS

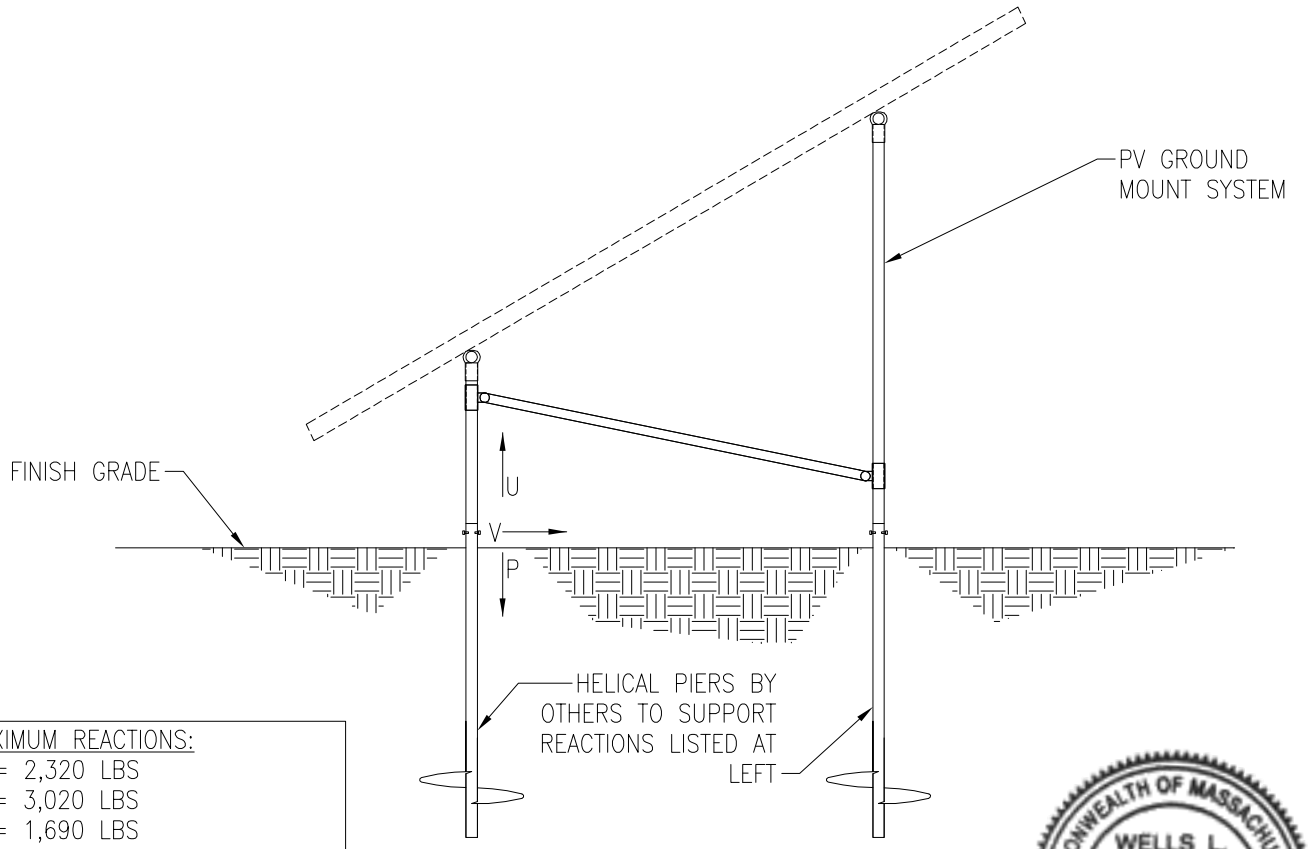
JOB NO. U2716-0231-201

PROJECT SUNMODO SUNTURF GROUND MOUNTS A5a

SUBJECT HELICAL PIER OPTION

NOTES:

1. For ground mount components see Section S1.
2. A minimum of (1) helical pier must be load-tested as follows:
   - 2.1. Safety factor for uplift = 1.5,
   - 2.2. Safety factor for lateral loads = 2.0
   - 2.3. Upward deflection limit = 1/2"
   - 2.4. Lateral deflection limit = 1"
   - 2.5. The load tests must be performed by an approved contractor.



MAXIMUM REACTIONS:
U = 2,320 LBS
P = 3,020 LBS
V = 1,690 LBS

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PV ARRAY SECTION S2

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VECTOR ENGINEERS

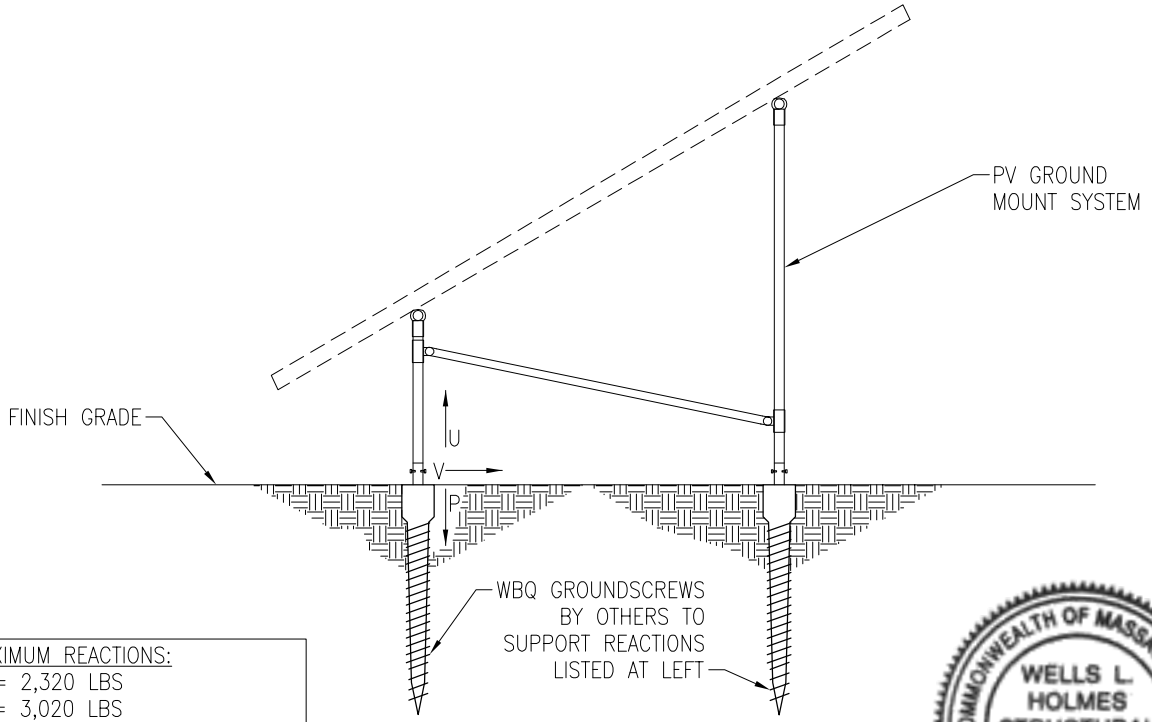
JOB NO. U2716-0231-201

PROJECT SUNMODO SUNTURF GROUND MOUNTS A5a

SUBJECT GROUND SCREW OPTION

NOTES:

1. For ground mount components see Section S1.
2. A minimum of (1) ground screw must be load-tested as follows:
   - 2.1. Safety factor for uplift = 1.5,
   - 2.2. Safety factor for lateral loads = 2.0
   - 2.3. Upward deflection limit = 1/2"
   - 2.4. Lateral deflection limit = 1"
   - 2.5. The load tests must be performed by an approved contractor.



MAXIMUM REACTIONS:
U = 2,320 LBS
P = 3,020 LBS
V = 1,690 LBS

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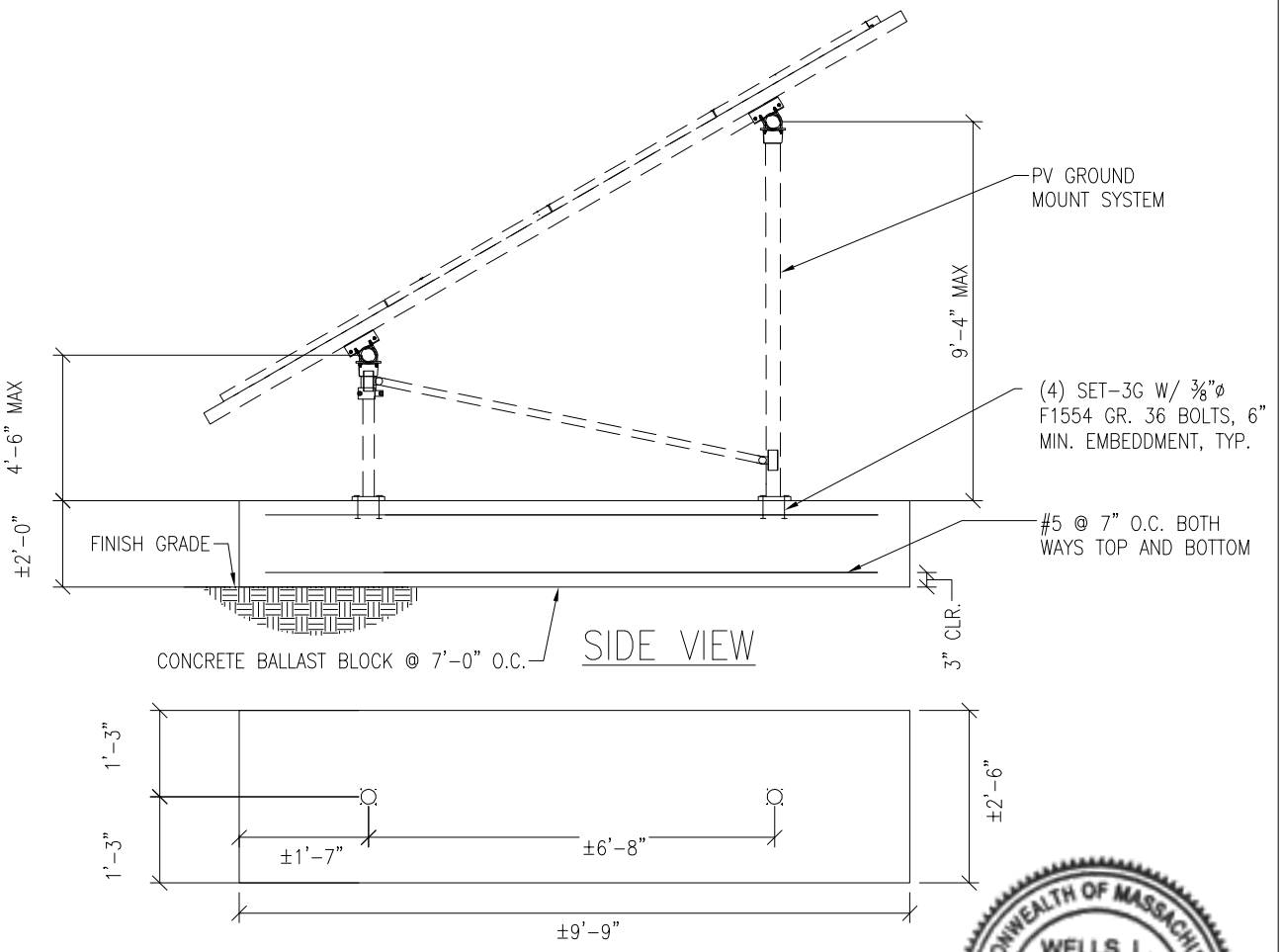
JOB NO. U2716-0231-201

PROJECT SUNMODO SUNTURF GROUND MOUNTS A5a

SUBJECT BALLASTED BLOCK OPTION

NOTES:
1. For ground mount components see Section S1.



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PV ARRAY SECTION
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S4

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JOB NO.: U2716.0231.201
SUBJECT: SNOW LOADS

PROJECT: Sunturf Package A5A Ground Mount

SNOW LOADS

Calculations Per:	ASCE 7-16	
Snow Ground Load, p_g [psf]:	70.0	(Section 7.2)
Risk Category:	I	(Table 1.5-1)
Importance Factor, I_S:	0.8	(Table 1.5-2)
Terrain Category:	B	(Section 26.7)
Exposure of Roof:	Fully Exposed	(Table 7-3.1)
Exposure Factor, C_e:	0.9	(Table 7-3.1)
Thermal Factor, C_t:	1.2	(Table 7-3.2)
Flat Roof Snow Load, p_f [psf]:	42	(Equation 7.3-1)
Min. Roof Snow Load, p_m [psf]:	0	(Section 7.3.4)
Panel Slope from Horizontal [°]:	35.0	
Unobstructed Slippery Surface?	Yes	(Section 7.4)
Slope Factor Figure:	Figure 7-2c	(of Figure 7.4-1 - See Section 7.4)
Roof Slope Factor, C_s:	0.64	
Sloped Roof Snow Load, p_s [psf]:	27	(Equation 7.4-1)
Design Snow Load, S [psf]:	27	(1.0 Snow)

JOB NO.: U2716.0231.201
SUBJECT: WIND PRESSURES

PROJECT: Sunturf Package A5A Ground Mount

WIND PRESSURES

Calculations per:	ASCE 7-16	
Design Wind Speed, V [mph]:	140	
Risk Category:	I	(Table 1.5-1)
Exposure Category:	B	(Section 26.7)
Ground Elevation Factor, K_e:	1.0	(Table 26.9-1)
α:	7.0	(Table 26.11-1)
z_g [ft]:	1200	(Table 26.11-1)
Velocity Pressure Exposure Coefficient, K_h:	0.57	(Table 26.10-1)
Topographic Factor, K_{ht}:	1.00	(Section 26.8)
Wind Directionality Factor, K_d:	0.85	(Table 26.6-1)
Internal Pressure Coefficient, GC_{pi} :	0.0	(Figure 26.13-1)
Velocity Pressure, q_h [psf]:	24.31	(Equation 26.10-1)
Gust Effect Factor, G:	0.85	(Section 26.11.4)
Panel Slope [degrees]:	35.0	
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 (γ = 0°, Load Case A)	-1.8	-1.8
Case 2 (γ = 0°, Load Case B)	-2.4	-0.6
Case 3 (γ = 180°, Load Case A)	2.1	2.1
Case 4 (γ = 180°, Load Case B)	2.7	1.1

Design Wind Pressures per Equation 27.3-2 [psf]

Clear Wind Flow	q_hGC_{NW}	q_hGC_{NL}
Case 1 (γ = 0°, Load Case A)	-37.2	-37.2
Case 2 (γ = 0°, Load Case B)	-49.6	-12.4
Case 3 (γ = 180°, Load Case A)	43.4	43.4
Case 4 (γ = 180°, Load Case B)	55.8	22.7
Case 5 (γ = 0°, 16 psf Min. Horiz.)	-16.0	-16.0
Case 6 (γ = 180°, 16 psf Min. Horiz)	16.0	16.0

Wind Pressures in Longitudinal (E-W) Direction

JOB NO.: U2716.0231.201
SUBJECT: WIND PRESSURES

PROJECT: Sunturf Package A5A Ground Mount

WIND PRESSURES

Net Pressure Coefficients per Figure 27.3-7

Clear Wind Flow	C_N
Case 1 (γ = 90°, d<h, Load Case A)	-0.80
Case 2 (γ = 90°, h<d<2h, Load Case A)	-0.60
Case 3 (γ = 90°, d>2h, Load Case A)	-0.30
Case 4 (γ = 90°, d<h, Load Case B)	0.80
Case 5 (γ = 90°, h<d<2h, Load Case B)	0.50
Case 6 (γ = 90°, d>2h, Load Case B)	0.30

Design Wind Pressures per Equation 27.3-2 [psf]

Clear Wind Flow	$q_h GC_N$
Case 1 (γ = 90°, d<h, Load Case A)	-16.5
Case 2 (γ = 90°, h<d<2h, Load Case A)	-12.4
Case 3 (γ = 90°, d>2h, Load Case A)	-6.2
Case 4 (γ = 90°, d<h, Load Case B)	16.5
Case 5 (γ = 90°, h<d<2h, Load Case B)	10.3
Case 6 (γ = 90°, d>2h, Load Case B)	6.2

Notation:

h = mean roof height, ft

d = horizontal disance from windward edge

JOB NO.: U2716-0231-201 **DESIGNED:** STB

Foundation Option 1: Drilled Concrete Pier

JOB NO.: U2716.0231.201
SUBJECT: CONC. PIER

PROJECT: Sunturf Package A5A Ground Mount

DRILLED CONCRETE PIER DESIGN

Column Reactions:

Max. Shear, V [k]:	1.7	Max. Down, P_d [k]:	3.0
Max. Moment, M [k-ft]:	0.0	Max. Uplift, P_u [k]:	2.3

Pier Properties:

Pier Shape:	Round		
Pier Diameter, b [ft]:	1.5	Volume of Concrete [ft^3]:	10
Top of Pier Elevation [ft]:	0.00	Volume of Concrete [yd^3]:	0.4
Pier Depth, d [ft]:	5.5	Weight of Concrete [k]:	1.5

Soil Properties:

Allow. Bearing Pressure [psf]:	1,500	Optional Parameters for Uplift:	
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		
1/3 increase for short term loads?	No	Combine w/ Bearing:	No
1/2" deflection at t/o pier allowed:	Yes		

*per IBC Section 1810.3.3.1.4

Check Bearing:

Bearing Capacity [k]:	6.5	**Bearing capacity OK.**

Check Uplift:

Uplift Capacity [k]:	7.8	**Uplift capacity OK.**

Check Lateral Bearing:

Top of Pier Constrained?:	No	IBC Section1807.3.2.1
Applied Lateral Force, P [lb]:	1,690	
Point of Application, h [ft]:	0.0	
$S_{\_max}$ [psf]:		
S [psf]:	550	
A = 2.34*P/(Sb):	4.79	
Required Pier Depth, d_{reqd} [ft]:	4.80	IBC Eq. 18-1

Result: **Lateral bearing capacity OK.**

JOB NO.: U2716-0231-201 **DESIGNED:** STB

Foundation Option 2: Helical Pier

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.

Load (ASD)	Value (lbs)	Factor of Safety	Test Value (lbs)
UPLIFT	2320	1.5	3480
LATERAL	1690	2	3380

JOB NO.: U2716-0231-201 **DESIGNED:** STB

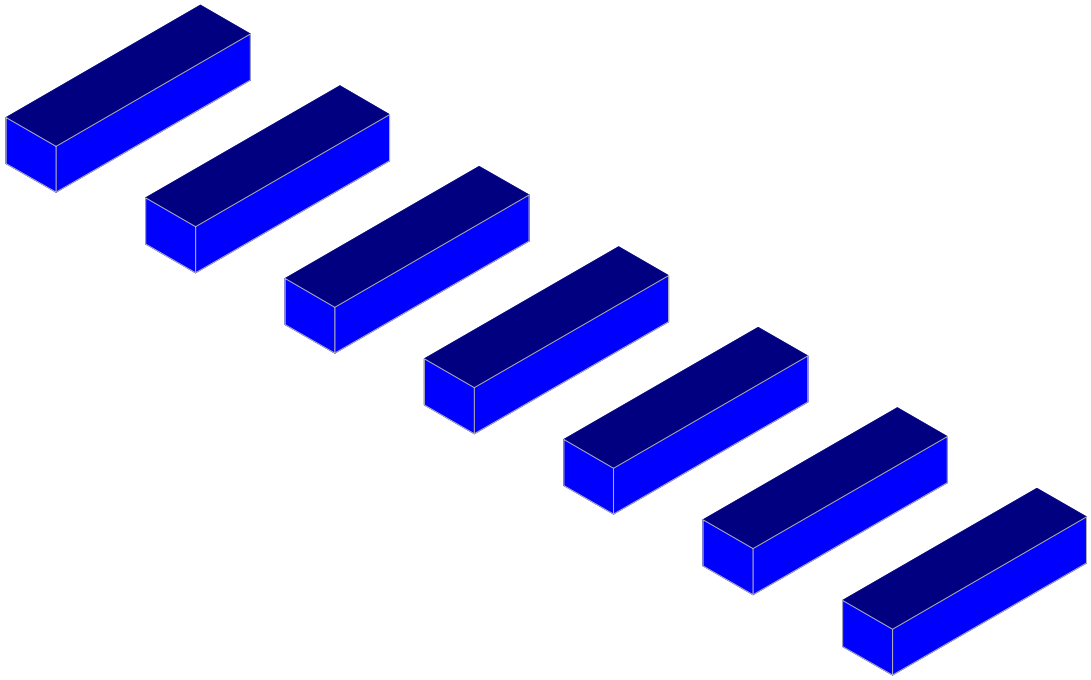
Foundation Option 3: Ground Screw

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.

Load (ASD)	Value (lbs)	Factor of Safety	Test Value (lbs)
UPLIFT	2320	1.5	3480
LATERAL	1690	2	3380

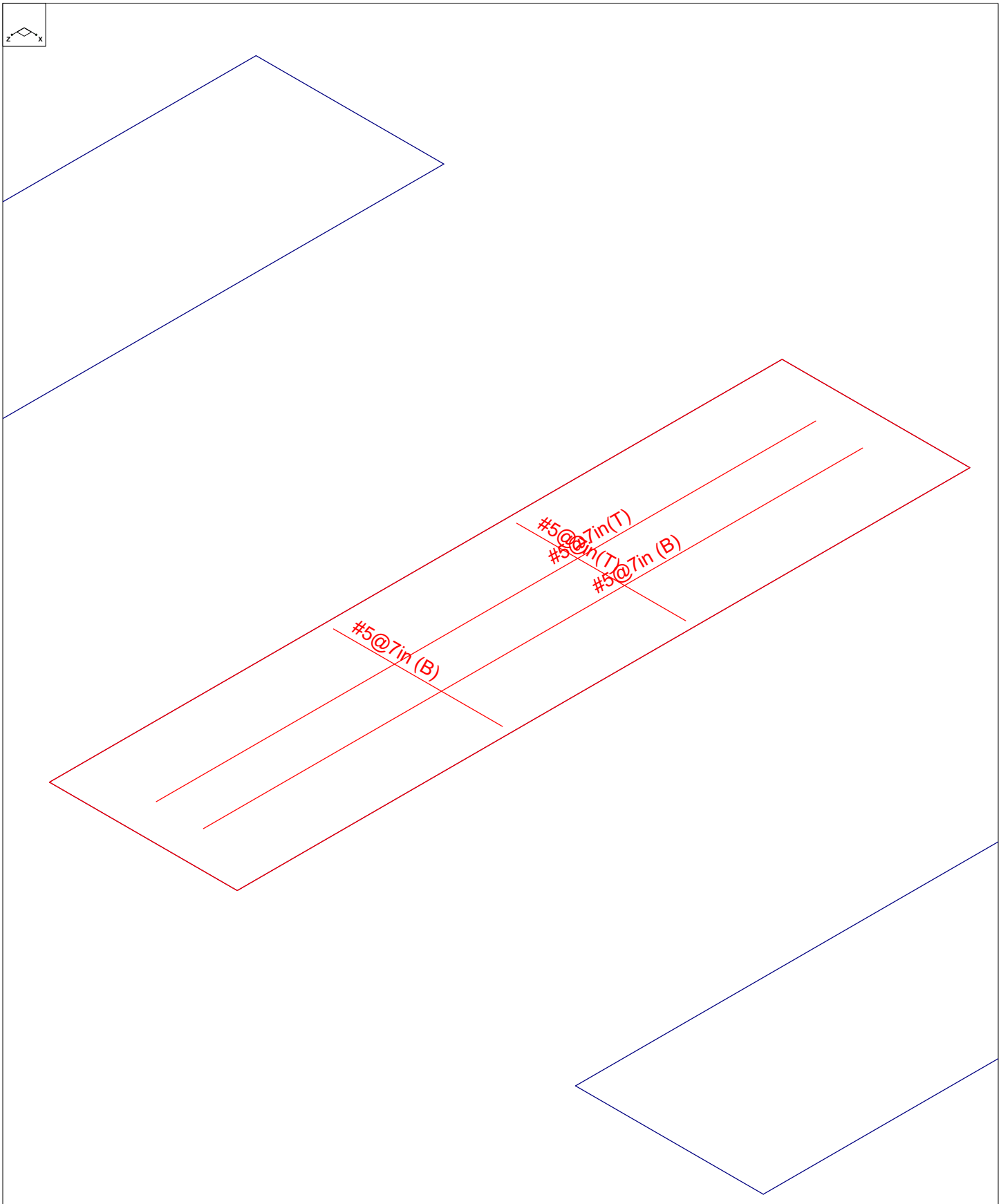
JOB NO.: U2716-0231-201 **DESIGNED:** STB

Foundation Option 4: Ballasted Block



Results for LC 1, 1.0 D

Vector Structural Engineeri...		SK - 2
STB	Ground Mount	July 22, 2020 at 10:33 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



Results for LC 1, 1.0 D

Vector Structural Engineeri...	Ground Mount	SK - 1
STB		July 22, 2020 at 10:33 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	100
Mesh Size (in)	12
Max Iterations	10
Merge Tolerance (in)	.12
Solver	Sparse Accelerated
Coefficient of Friction	.3
No. of Shear Regions	4
Shear Region Spacing Increment (in)	4
Min 1 Bar Dia Spacing for Beams?	No
Optimize footings for OTM / Sliding?	Yes
Parme Beta Factor	.65
Pile Safety Factor	3
Concrete Stress Block	0
Concrete Rebar Set	Rectangular
Concrete Code	ASTM A615
HR Steel Pile Code	ACI 318-14
Wood Pile Code	AISC 14th (360-10): ASD AWC NDS-15: ASD

Concrete Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/...	Density[lb/ft^3]	f'c[psi]	Lambda	Flex Stee...	Shear St...
1	Conc3000NW	3156	1372	.15	.6	145	3000	1	60000	60000
2	Conc3500NW	3409	1482	.15	.6	145	3500	1	60000	60000
3	Conc4000NW	3644	1584	.15	.6	145	4000	1	60000	60000
4	Conc3000LW	2085	907	.15	.6	109.999	3000	.75	60000	60000
5	Conc3500LW	2252	979	.15	.6	109.999	3500	.75	60000	60000
6	Conc4000LW	2408	1047	.15	.6	109.999	4000	.75	60000	60000
7	Conc2500NW	3156	1372	.15	.6	145	2500	1	60000	60000

General Design Parameters

	Label	Max Bending Chk	Max Shear Chk	Top Cover[in]	Bottom Cover[in]
1	Typical	1	1	3	3

Slab Rebar Parameters

	Label	Top Bar	Bottom Bar	Max Top Bar Sp...	Min Top Bar Sp...	Max Bot Bar Sp...	Min Bot Bar Sp...	Spacing Incr...	Rebar Options
1	Typical	#5	#5	18	3	18	3	1	Optimize

Soil Definitions

	Label	Subgrade Modulus[lb/ft^3]	Allowable Bearing[psf]	Depth Properties	Default?
1	Default	1e+5	1500	None	Yes

Point Loads and Moments (Cat 1 : DL)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1_1	X	-11.981
2	R3D_N1_1	Y	216.315
3	R3D_N2	Y	183.998
4	R3D_N132_2	Y	210.689
5	R3D_N133_1	X	-1.035
6	R3D_N133_1	Y	201.84
7	R3D_N109_1	Y	194.866
8	R3D_N110A_1	Y	206.883

Point Loads and Moments (Cat 1 : DL) (Continued)

	Label	Direction	Magnitude[lb,lb-ft]
9	R3D_N121_1	Y	213.292
10	R3D_N122_1	Y	204.065
11	R3D_N133B	Y	210.369
12	R3D_N134B_1	X	-1.088
13	R3D_N134B_1	Y	204.722
14	R3D_N151_1	Y	208.076
15	R3D_N152_1	X	-2.806
16	R3D_N152_1	Y	216.842
17	R3D_N143A	X	13.773
18	R3D_N143A	Y	172.004
19	R3D_N144A	X	6.043
20	R3D_N144A	Y	138.199

Point Loads and Moments (Cat 6 : RLL)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1_1	X	-67.331
2	R3D_N1_1	Y	1031.223
3	R3D_N2	X	-2.839
4	R3D_N2	Y	965.955
5	R3D_N132_2	X	-2.393
6	R3D_N132_2	Y	1044.539
7	R3D_N133_1	X	-6.442
8	R3D_N133_1	Y	1072.806
9	R3D_N109_1	X	-2.92
10	R3D_N109_1	Y	942.536
11	R3D_N109_1	Z	-1.733
12	R3D_N110A_1	Y	1106.213
13	R3D_N121_1	Y	1059.791
14	R3D_N121_1	Z	2.094
15	R3D_N122_1	X	-3.297
16	R3D_N122_1	Y	1086.093
17	R3D_N133B	X	-2.058
18	R3D_N133B	Y	1040.863
19	R3D_N133B	Z	-1.423
20	R3D_N134B_1	X	-6.539
21	R3D_N134B_1	Y	1090.394
22	R3D_N151_1	X	-2.829
23	R3D_N151_1	Y	1020.851
24	R3D_N152_1	X	-17.111
25	R3D_N152_1	Y	1164.394
26	R3D_N143A	X	78.066
27	R3D_N143A	Y	772.29
28	R3D_N144A	X	35.641
29	R3D_N144A	Y	694.667

Point Loads and Moments (Cat 16 : OL1)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1_1	X	121.18
2	R3D_N1_1	Y	-3361.819
3	R3D_N1_1	Z	1910.216
4	R3D_N2	X	12.423
5	R3D_N2	Y	568.067
6	R3D_N2	Z	-95.762
7	R3D_N132_2	X	3.763
8	R3D_N132_2	Y	-3551.734
9	R3D_N132_2	Z	2117.481

Point Loads and Moments (Cat 16 : OL1) (Continued)

	Label	Direction	Magnitude[lb,lb-ft]
10	R3D_N133_1	X	1.431
11	R3D_N133_1	Y	627.579
12	R3D_N133_1	Z	-102.734
13	R3D_N109_1	X	2.365
14	R3D_N109_1	Y	-3453.856
15	R3D_N109_1	Z	2210.996
16	R3D_N110A_1	X	6.64
17	R3D_N110A_1	Y	680.656
18	R3D_N110A_1	Z	-102.659
19	R3D_N121_1	Y	-3599.346
20	R3D_N121_1	Z	2143.35
21	R3D_N122_1	X	3.848
22	R3D_N122_1	Y	636.796
23	R3D_N122_1	Z	-103.219
24	R3D_N133B	X	2.595
25	R3D_N133B	Y	-3579.127
26	R3D_N133B	Z	2166.706
27	R3D_N134B_1	X	3.625
28	R3D_N134B_1	Y	647.146
29	R3D_N134B_1	Z	-103.532
30	R3D_N151_1	X	2.639
31	R3D_N151_1	Y	-3729.308
32	R3D_N151_1	Z	2375.203
33	R3D_N152_1	X	17.318
34	R3D_N152_1	Y	755.333
35	R3D_N152_1	Z	-101.362
36	R3D_N143A	X	-131.673
37	R3D_N143A	Y	-2443.918
38	R3D_N143A	Z	1359.813
39	R3D_N144A	X	-45.309
40	R3D_N144A	Y	386.94
41	R3D_N144A	Z	-78.339

Point Loads and Moments (Cat 17 : OL2)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1_1	X	155.556
2	R3D_N1_1	Y	-3751.678
3	R3D_N1_1	Z	1616.16
4	R3D_N2	X	4.573
5	R3D_N2	Y	1305.88
6	R3D_N2	Z	-80.939
7	R3D_N132_2	X	4.785
8	R3D_N132_2	Y	-3954.679
9	R3D_N132_2	Z	1788.55
10	R3D_N133_1	X	-4.396
11	R3D_N133_1	Y	1473.183
12	R3D_N133_1	Z	-86.691
13	R3D_N109_1	X	3.168
14	R3D_N109_1	Y	-3798.157
15	R3D_N109_1	Z	1860.522
16	R3D_N110A_1	X	12.662
17	R3D_N110A_1	Y	1561.76
18	R3D_N110A_1	Z	-86.49
19	R3D_N121_1	Y	-4007.832
20	R3D_N121_1	Z	1808.577
21	R3D_N122_1	Y	1491.677

Point Loads and Moments (Cat 17 : OL2) (Continued)

	Label	Direction	Magnitude[lb,lb-ft]
22	R3D_N122_1	Z	-87.013
23	R3D_N133B	X	3.417
24	R3D_N133B	Y	-3976.071
25	R3D_N133B	Z	1827.459
26	R3D_N134B_1	X	-2.612
27	R3D_N134B_1	Y	1509.57
28	R3D_N134B_1	Z	-87.308
29	R3D_N151_1	X	3.558
30	R3D_N151_1	Y	-4096.396
31	R3D_N151_1	Z	1998.467
32	R3D_N152_1	X	-1.054
33	R3D_N152_1	Y	1675.474
34	R3D_N152_1	Z	-85.392
35	R3D_N143A	X	-169.514
36	R3D_N143A	Y	-2738.27
37	R3D_N143A	Z	1151.658
38	R3D_N144A	X	-9.86
39	R3D_N144A	Y	923.433
40	R3D_N144A	Z	-66.309

Point Loads and Moments (Cat 18 : OL3)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1_1	X	-145.636
2	R3D_N1_1	Y	4019.844
3	R3D_N1_1	Z	-2265.412
4	R3D_N2	X	-14.517
5	R3D_N2	Y	-703.628
6	R3D_N2	Z	113.566
7	R3D_N132_2	X	-4.521
8	R3D_N132_2	Y	4246.608
9	R3D_N132_2	Z	-2511.109
10	R3D_N133_1	X	-1.493
11	R3D_N133_1	Y	-778.448
12	R3D_N133_1	Z	121.828
13	R3D_N109_1	X	-2.847
14	R3D_N109_1	Y	4127.857
15	R3D_N109_1	Z	-2621.754
16	R3D_N110A_1	X	-8.13
17	R3D_N110A_1	Y	-842.978
18	R3D_N110A_1	Z	121.735
19	R3D_N121_1	Y	4303.54
20	R3D_N121_1	Z	-2541.721
21	R3D_N122_1	X	-4.469
22	R3D_N122_1	Y	-789.767
23	R3D_N122_1	Z	122.401
24	R3D_N133B	X	-3.122
25	R3D_N133B	Y	4279.029
26	R3D_N133B	Z	-2569.388
27	R3D_N134B_1	X	-4.093
28	R3D_N134B_1	Y	-802.373
29	R3D_N134B_1	Z	122.773
30	R3D_N151_1	X	-3.178
31	R3D_N151_1	Y	4456.891
32	R3D_N151_1	Z	-2816.459
33	R3D_N152_1	X	-19.968
34	R3D_N152_1	Y	-933.374

Point Loads and Moments (Cat 18 : OL3) (Continued)

	Label	Direction	Magnitude[lb,lb-ft]
35	R3D_N152_1	Z	120.197
36	R3D_N143A	X	158.264
37	R3D_N143A	Y	2922.675
38	R3D_N143A	Z	-1612.706
39	R3D_N144A	X	52.702
40	R3D_N144A	Y	-480.508
41	R3D_N144A	Z	92.907

Point Loads and Moments (Cat 19 : OL4)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1_1	X	-78.781
2	R3D_N1_1	Y	2669.044
3	R3D_N1_1	Z	-1958.689
4	R3D_N2	X	-17.829
5	R3D_N2	Y	125.19
6	R3D_N2	Z	98.263
7	R3D_N132_2	X	-2.485
8	R3D_N132_2	Y	2827.487
9	R3D_N132_2	Z	-2173.76
10	R3D_N133_1	X	-6.275
11	R3D_N133_1	Y	164.455
12	R3D_N133_1	Z	105.536
13	R3D_N109_1	X	-1.424
14	R3D_N109_1	Y	2790.334
15	R3D_N109_1	Z	-2275.777
16	R3D_N110A_1	Y	147.48
17	R3D_N110A_1	Z	105.578
18	R3D_N121_1	Y	2865.271
19	R3D_N121_1	Z	-2201.88
20	R3D_N122_1	X	-6.171
21	R3D_N122_1	Y	164.176
22	R3D_N122_1	Z	106.11
23	R3D_N133B	X	-1.613
24	R3D_N133B	Y	2857.104
25	R3D_N133B	Z	-2226.582
26	R3D_N134B_1	X	-8.586
27	R3D_N134B_1	Y	161.397
28	R3D_N134B_1	Z	106.405
29	R3D_N151_1	X	-1.57
30	R3D_N151_1	Y	3016.873
31	R3D_N151_1	Z	-2444.995
32	R3D_N152_1	X	-31.225
33	R3D_N152_1	Y	114.24
34	R3D_N152_1	Z	104.248
35	R3D_N143A	X	85.183
36	R3D_N143A	Y	1930.916
37	R3D_N143A	Z	-1393.313
38	R3D_N144A	X	70.876
39	R3D_N144A	Y	114.369
40	R3D_N144A	Z	80.301

Point Loads and Moments (Cat 20 : OL5)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1_1	X	-41.31
2	R3D_N1_1	Y	1439.55
3	R3D_N1_1	Z	-830.591

Point Loads and Moments (Cat 20 : OL5) (Continued)

	Label	Direction	Magnitude[lb,lb-ft]
4	R3D_N2	X	-3.41
5	R3D_N2	Y	-246.747
6	R3D_N2	Z	38.587
7	R3D_N132_2	Y	597.561
8	R3D_N132_2	Z	-354.13
9	R3D_N133_1	X	-1.087
10	R3D_N133_1	Y	-103.648
11	R3D_N133_1	Z	17.626
12	R3D_N109_1	X	1.961
13	R3D_N109_1	Y	1281.27
14	R3D_N109_1	Z	-812.305
15	R3D_N110A_1	Y	-244.706
16	R3D_N110A_1	Z	35.398
17	R3D_N121_1	X	3.655
18	R3D_N121_1	Y	825.473
19	R3D_N121_1	Z	-494.165
20	R3D_N122_1	X	3.969
21	R3D_N122_1	Y	-146.97
22	R3D_N122_1	Z	25.742
23	R3D_N133B	Y	575.796
24	R3D_N133B	Z	-351.513
25	R3D_N134B_1	X	-2.755
26	R3D_N134B_1	Y	-103.56
27	R3D_N134B_1	Z	19.346
28	R3D_N151_1	X	1.565
29	R3D_N151_1	Y	602.525
30	R3D_N151_1	Z	-395.727
31	R3D_N152_1	X	-3.747
32	R3D_N152_1	Y	-125.869
33	R3D_N152_1	Z	17.016
34	R3D_N143A	X	32.509
35	R3D_N143A	Y	425.223
36	R3D_N143A	Z	-226.863
37	R3D_N144A	X	6.295
38	R3D_N144A	Y	-65.349
39	R3D_N144A	Z	13.101

Point Loads and Moments (Cat 21 : OL6)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1_1	X	39.808
2	R3D_N1_1	Y	-1430.726
3	R3D_N1_1	Z	825.71
4	R3D_N2	X	3.306
5	R3D_N2	Y	243.909
6	R3D_N2	Z	-37.239
7	R3D_N132_2	Y	-595.648
8	R3D_N132_2	Z	353.237
9	R3D_N133_1	X	1.139
10	R3D_N133_1	Y	103.968
11	R3D_N133_1	Z	-17.5
12	R3D_N109_1	X	-2.368
13	R3D_N109_1	Y	-1109.919
14	R3D_N109_1	Z	710.95
15	R3D_N110A_1	X	-2.739
16	R3D_N110A_1	Y	214.107
17	R3D_N110A_1	Z	-32.197

Point Loads and Moments (Cat 21 : OL6) (Continued)

	Label	Direction	Magnitude[lb,lb-ft]
18	R3D_N121_1	X	-2.569
19	R3D_N121_1	Y	-736.245
20	R3D_N121_1	Z	439.82
21	R3D_N122_1	Y	129.725
22	R3D_N122_1	Z	-23.495
23	R3D_N133B	Y	-587.782
24	R3D_N133B	Z	358.046
25	R3D_N134B_1	X	1.95
26	R3D_N134B_1	Y	105.589
27	R3D_N134B_1	Z	-18.85
28	R3D_N151_1	X	-1.449
29	R3D_N151_1	Y	-603.995
30	R3D_N151_1	Z	395.791
31	R3D_N152_1	X	3.636
32	R3D_N152_1	Y	125.795
33	R3D_N152_1	Z	-16.986
34	R3D_N143A	X	-31.833
35	R3D_N143A	Y	-424.075
36	R3D_N143A	Z	226.848
37	R3D_N144A	X	-6.393
38	R3D_N144A	Y	65.294
39	R3D_N144A	Z	-13.092

Slabs

	Label	Thickness [in]	Material	Local Axis Angle ...	Analysis Offset [in]	Passive Pressur...	Soil Overburden [psf]
1	S1	24	Conc2500NW	0	0	0	0
2	S2	24	Conc2500NW	0	0	0	0
3	S3	24	Conc2500NW	0	0	0	0
4	S4	24	Conc2500NW	0	0	0	0
5	S5	24	Conc2500NW	0	0	0	0
6	S6	24	Conc2500NW	0	0	0	0
7	S7	24	Conc2500NW	0	0	0	0

Load Combinations

	Label	Solve	Service	A...	SF	Cat...	Fa...	Cat...	Fa...	Cat...	Fa...	Cat...	Fa...	Cat...	Fa...	Cat...	Fa...	Cat...	Fa...	Cat...	Fa...	C...	F...	C...	F...
1	1.0 D	Yes	Yes		1.5	DL	1																		
2	1.0 D + 1....	Yes	Yes		1.5	DL	1	RLL	1																
3	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL		OL1	.6														
4	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL		OL2	.6														
5	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL		OL3	.6														
6	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL		OL4	.6														
7	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL		OL5	.6														
8	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL		OL6	.6														
9	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL	.75	OL1	.45														
10	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL	.75	OL2	.45														
11	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL	.75	OL3	.45														
12	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL	.75	OL4	.45														
13	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL	.75	OL5	.45														
14	1.0 D + 0....	Yes	Yes		1.5	DL	1	RLL	.75	OL6	.45														
15	0.6 D + 0....	Yes	Yes			DL	.6	RLL		OL1	.6														
16	0.6 D + 0....	Yes	Yes			DL	.6	RLL		OL2	.6														
17	0.6 D + 0....	Yes	Yes			DL	.6	RLL		OL3	.6														
18	0.6 D + 0....	Yes	Yes			DL	.6	RLL		OL4	.6														
19	0.6 D + 0....	Yes	Yes			DL	.6	RLL		OL5	.6														
20	0.6 D + 0....	Yes	Yes			DL	.6	RLL		OL6	.6														
21																									

Load Combinations (Continued)

	Label	Solve	Service	A..	SF	Cat..	Fa...	Cat..	Fa...	Cat..	Fa...	Cat..	Fa...	Cat..	Fa...	Cat..	Fa...	Cat..	Fa...	Cat..	Fa...	C...	F...	C...	F...
22	1.4D	Yes				DL	1.4																		
23	1.2D+1.6SL	Yes				DL	1.2	RLL	1.6																
24	1.2D+1.6S...	Yes				DL	1.2	RLL	1.6	OL1	.5														
25	1.2D+1.6S...	Yes				DL	1.2	RLL	1.6	OL2	.5														
26	1.2D+1.6S...	Yes				DL	1.2	RLL	1.6	OL3	.5														
27	1.2D+1.6S...	Yes				DL	1.2	RLL	1.6	OL4	.5														
28	1.2D+1.6S...	Yes				DL	1.2	RLL	1.6	OL5	.5														
29	1.2D+1.6S...	Yes				DL	1.2	RLL	1.6	OL6	.5														
30	1.2D+1.0...	Yes				DL	1.2			OL1	1														
31	1.2D-1.0Wx	Yes				DL	1.2			OL2	1														
32	1.2D+1.0...	Yes				DL	1.2			OL3	1														
33	1.2D-1.0Wz	Yes				DL	1.2			OL4	1														
34	1.2D+1.0...	Yes				DL	1.2			OL5	1														
35	1.2D-1.0...	Yes				DL	1.2			OL6	1														
36	.9D+1.0Wx	Yes				DL	.9			OL1	1														
37	.9D-1.0Wx	Yes				DL	.9			OL2	1														
38	.9D+1.0Wz	Yes				DL	.9			OL3	1														
39	.9D-1.0Wz	Yes				DL	.9			OL4	1														
40	.9D+1.0W...	Yes				DL	.9			OL5	1														
41	.9D-1.0W90	Yes				DL	.9			OL6	1														

Design Strips

	Label	Rebar Angle from Pl...	No. of Design Cuts	Design Rule
1	DS1	0	50	Typical
2	DS2	90	50	Typical

Load Categories

	Category	Point Loads	Line Loads	Area Loads
1	DL	20		
2	RLL	29		
3	OL1	41		
4	OL2	40		
5	OL3	41		
6	OL4	40		
7	OL5	39		
8	OL6	39		

Strip Reinforcing

	Label	UC Top	LC	Top Bars	Governing ...	UC Bot	LC	Bot B...	Gover...	UC Shear	LC	Governing De...
1	DS1	.018	26	#5@7in	DS1-X26	.036	37	#5@7in	DS1-...	.048	37	DS1-X45
2	DS2	.002	36	#5@7in	DS2-X25	.004	26	#5@7in	DS2-...	.008	26	DS2-X25

Slab Overturning Safety Factors

	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	1	S1	0	0	36320.752	0	9360.305	9.999+	9.999+
2	1	S2	0	0	36475.592	0	9338.138	9.999+	9.999+
3	1	S3	0	0	36481.521	0	9357.649	9.999+	9.999+
4	1	S4	0	0	36482.317	0	9356.994	9.999+	9.999+
5	1	S5	0	0	36459.047	0	9353.685	9.999+	9.999+
6	1	S6	0	0	36578.675	0	9372.713	9.999+	9.999+
7	1	S7	0	0	35872.755	0	9184.075	9.999+	9.999+
8	2	S1	0	0	45922.644	0	11997.118	9.999+	9.999+
9	2	S2	0	0	47090.722	0	11904.915	9.999+	9.999+
10	2	S3	0	0	47123.969	0	12046.598	9.999+	9.999+
11	2	S4	0	0	47123.243	0	12038.259	9.999+	9.999+

Slab Overturning Safety Factors (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
12	2	S5	0	0	46963.542	0	12018.037	9.999+	9.999+
13	2	S6	0	0	47801.268	0	12144.152	9.999+	9.999+
14	2	S7	0	0	42826.544	0	10790.358	9.999+	9.999+
15	3	S1	0	18139.031	36502.853	2255.637	9360.305	2.012	4.15
16	3	S2	0	18841.345	36362.012	2090.707	9338.138	1.93	4.466
17	3	S3	0	19511.873	36508.267	2226.53	9357.649	1.871	4.203
18	3	S4	0	19431.134	36485.382	2206.449	9356.994	1.878	4.241
19	3	S5	0	19256.408	36483.671	2199.349	9353.685	1.895	4.253
20	3	S6	0	20322.454	36484.836	2254.43	9372.713	1.795	4.157
21	3	S7	0	13164.748	36072.279	1755.112	9263.338	2.74	5.278
22	4	S1	0	19050.227	36502.853	2026.504	9360.305	1.916	4.619
23	4	S2	0	19334.253	36362.012	1696.293	9338.138	1.881	5.505
24	4	S3	0	20361.776	36508.267	1887.116	9357.649	1.793	4.959
25	4	S4	0	20212.348	36485.382	1850.843	9356.994	1.805	5.056
26	4	S5	0	20094.323	36483.671	1861.589	9353.685	1.816	5.025
27	4	S6	0	20860.137	36484.836	1818.697	9372.713	1.749	5.154
28	4	S7	0	13888.874	36072.279	1576.377	9263.338	2.597	5.876
29	5	S1	0	2246.331	36320.752	0	12039.651	9.999+	9.999+
30	5	S2	0	3251.309	36475.592	0	11814.97	9.999+	9.999+
31	5	S3	0	2724.178	36481.521	0	11998.341	9.999+	9.999+
32	5	S4	0	2842.615	36482.317	0	11973.144	9.999+	9.999+
33	5	S5	0	2686.185	36459.047	0	11962.022	9.999+	9.999+
34	5	S6	0	3621.676	36578.675	0	12043.127	9.999+	9.999+
35	5	S7	0	1425.741	35872.755	0	10762.541	9.999+	9.999+
36	6	S1	0	0	37243.514	0	11571.911	9.999+	9.999+
37	6	S2	0	0	37252.189	0	11543.208	9.999+	9.999+
38	6	S3	0	0	37501.266	0	11637.139	9.999+	9.999+
39	6	S4	0	0	37451.264	0	11633.11	9.999+	9.999+
40	6	S5	0	0	37477.337	0	11608.154	9.999+	9.999+
41	6	S6	0	0	37201.289	0	11760.403	9.999+	9.999+
42	6	S7	0	0	36697.63	0	10530.767	9.999+	9.999+
43	7	S1	0	804.236	36320.752	0	10308.572	9.999+	9.999+
44	7	S2	0	926.378	36475.592	0	10113.208	9.999+	9.999+
45	7	S3	0	505.412	36481.521	0	9857.377	9.999+	9.999+
46	7	S4	0	364.218	36482.317	0	9714.477	9.999+	9.999+
47	7	S5	0	349.179	36459.047	0	9725.425	9.999+	9.999+
48	7	S6	0	505.106	36578.675	0	9732.823	9.999+	9.999+
49	7	S7	0	176.031	35872.755	0	9407.415	9.999+	9.999+
50	8	S1	0	7737.221	36502.853	941.85	9360.305	4.718	9.938
51	8	S2	0	6060.419	36362.012	677.987	9338.138	6	9.999+
52	8	S3	0	3990.445	36508.267	457.973	9357.649	9.149	9.999+
53	8	S4	0	3192.145	36485.382	363.986	9356.994	9.999+	9.999+
54	8	S5	0	3227.996	36483.671	370.127	9353.685	9.999+	9.999+
55	8	S6	0	3300.934	36484.836	361.275	9372.713	9.999+	9.999+
56	8	S7	0	2275.714	36072.279	314.958	9263.338	9.999+	9.999+
57	9	S1	0	13604.274	43905.827	1691.728	11337.915	3.227	6.702
58	9	S2	0	14131.009	43382.164	1568.03	11263.22	3.07	7.183
59	9	S3	0	14633.905	44218.23	1669.897	11374.361	3.022	6.811
60	9	S4	0	14573.35	44089.527	1654.837	11367.942	3.025	6.87
61	9	S5	0	14442.306	44088.413	1649.511	11351.949	3.053	6.882
62	9	S6	0	15241.841	44047.529	1690.822	11451.292	2.89	6.773
63	9	S7	0	9873.561	41584.076	1316.334	10809.17	4.212	8.212
64	10	S1	0	14287.67	43905.827	1519.878	11337.915	3.073	7.46
65	10	S2	0	14500.69	43382.164	1272.22	11263.22	2.992	8.853
66	10	S3	0	15271.332	44218.23	1415.337	11364.469	2.896	8.03
67	10	S4	0	15159.261	44089.527	1386.682	11337.798	2.908	8.176
68	10	S5	0	15070.742	44088.413	1395.492	11321.302	2.925	8.113

Slab Overturning Safety Factors (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
69	10	S6	0	15645.102	44047.529	1359.516	11380.246	2.815	8.371
70	10	S7	0	10416.656	41584.076	1182.282	10809.17	3.992	9.143
71	11	S1	0	1684.748	43522.171	0	13347.424	9.999+	9.999+
72	11	S2	0	2438.482	44436.939	0	13120.844	9.999+	9.999+
73	11	S3	0	2043.134	44463.357	0	13354.88	9.999+	9.999+
74	11	S4	0	2131.961	44463.011	0	13330.055	9.999+	9.999+
75	11	S5	0	2014.639	44337.418	0	13308.201	9.999+	9.999+
76	11	S6	0	2716.257	44995.62	0	13454.102	9.999+	9.999+
77	11	S7	0	1069.306	41088.097	0	11572.636	9.999+	9.999+
78	12	S1	0	0	44214.243	0	12996.619	9.999+	9.999+
79	12	S2	0	0	45019.388	0	12917.023	9.999+	9.999+
80	12	S3	0	0	45228.166	0	13083.978	9.999+	9.999+
81	12	S4	0	0	45189.721	0	13075.029	9.999+	9.999+
82	12	S5	0	0	45101.136	0	13042.8	9.999+	9.999+
83	12	S6	0	0	45462.58	0	13242.059	9.999+	9.999+
84	12	S7	0	0	41706.753	0	11398.806	9.999+	9.999+
85	13	S1	0	603.177	43522.171	0	12049.114	9.999+	9.999+
86	13	S2	0	694.784	44436.939	0	11844.522	9.999+	9.999+
87	13	S3	0	379.059	44463.357	0	11749.157	9.999+	9.999+
88	13	S4	0	273.163	44463.011	0	11636.055	9.999+	9.999+
89	13	S5	0	261.884	44337.418	0	11630.754	9.999+	9.999+
90	13	S6	0	378.83	44995.62	0	11721.375	9.999+	9.999+
91	13	S7	0	132.023	41088.097	0	10556.292	9.999+	9.999+
92	14	S1	0	5802.916	43905.827	706.387	11337.915	7.566	9.999+
93	14	S2	0	4545.314	43382.164	508.49	11254.46	9.544	9.999+
94	14	S3	0	2992.834	44218.23	343.48	11364.469	9.999+	9.999+
95	14	S4	0	2394.109	44089.527	272.989	11367.942	9.999+	9.999+
96	14	S5	0	2420.997	44088.413	277.596	11351.949	9.999+	9.999+
97	14	S6	0	2475.7	44047.529	270.957	11451.292	9.999+	9.999+
98	14	S7	0	1706.786	41584.076	236.218	10809.17	9.999+	9.999+
99	15	S1	0	18139.031	21901.712	2255.637	5616.183	1.207	2.49
100	15	S2	0	18841.345	21817.207	2090.707	5602.883	1.158	2.68
101	15	S3	0	19511.873	21904.96	2226.53	5614.589	1.123	2.522
102	15	S4	0	19431.134	21891.229	2206.449	5614.196	1.127	2.544
103	15	S5	0	19256.408	21890.202	2199.349	5612.211	1.137	2.552
104	15	S6	0	20322.454	21890.902	2254.43	5623.628	1.077	2.494
105	15	S7	0	13164.748	21643.367	1755.112	5558.003	1.644	3.167
106	16	S1	0	19050.227	21901.712	2026.504	5616.183	1.15	2.771
107	16	S2	0	19334.253	21817.207	1696.293	5602.883	1.128	3.303
108	16	S3	0	20361.776	21904.96	1887.116	5614.589	1.076	2.975
109	16	S4	0	20212.348	21891.229	1850.843	5614.196	1.083	3.033
110	16	S5	0	20094.323	21890.202	1861.589	5612.211	1.089	3.015
111	16	S6	0	20860.137	21890.902	1818.697	5623.628	1.049	3.092
112	16	S7	0	13888.874	21643.367	1576.377	5558.003	1.558	3.526
113	17	S1	0	2246.331	21792.451	0	8295.529	9.701	9.999+
114	17	S2	0	3251.309	21885.355	0	8079.715	6.731	9.999+
115	17	S3	0	2724.178	21888.912	0	8255.282	8.035	9.999+
116	17	S4	0	2842.615	21889.39	0	8230.346	7.7	9.999+
117	17	S5	0	2686.185	21875.428	0	8220.548	8.144	9.999+
118	17	S6	0	3621.676	21947.205	0	8294.042	6.06	9.999+
119	17	S7	0	1425.741	21523.653	0	7088.911	9.999+	9.999+
120	18	S1	0	0	22715.213	0	7827.789	9.999+	9.999+
121	18	S2	0	0	22661.953	0	7807.953	9.999+	9.999+
122	18	S3	0	0	22908.658	0	7894.079	9.999+	9.999+
123	18	S4	0	0	22858.337	0	7890.312	9.999+	9.999+
124	18	S5	0	0	22893.718	0	7866.68	9.999+	9.999+
125	18	S6	0	0	22569.819	0	8011.317	9.999+	9.999+

Slab Overturning Safety Factors (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
126	18	S7	0	0	22348.528	0	6857.137	9.999+	9.999+
127	19	S1	0	804.236	21792.451	0	6564.449	9.999+	9.999+
128	19	S2	0	926.378	21885.355	0	6377.952	9.999+	9.999+
129	19	S3	0	505.412	21888.912	0	6114.317	9.999+	9.999+
130	19	S4	0	364.218	21889.39	0	5971.679	9.999+	9.999+
131	19	S5	0	349.179	21875.428	0	5983.951	9.999+	9.999+
132	19	S6	0	505.106	21947.205	0	5983.738	9.999+	9.999+
133	19	S7	0	176.031	21523.653	0	5733.785	9.999+	9.999+
134	20	S1	0	7737.221	21901.712	941.85	5616.183	2.831	5.963
135	20	S2	0	6060.419	21817.207	677.987	5602.883	3.6	8.264
136	20	S3	0	3990.445	21904.96	457.973	5614.589	5.489	9.999+
137	20	S4	0	3192.145	21891.229	363.986	5614.196	6.858	9.999+
138	20	S5	0	3227.996	21890.202	370.127	5612.211	6.781	9.999+
139	20	S6	0	3300.934	21890.902	361.275	5623.628	6.632	9.999+
140	20	S7	0	2275.714	21643.367	314.958	5558.003	9.511	9.999+

Slab Sliding Safety Factors

	LC	Slab	Angle[deg]	Va-xx[lb]	Vr-xx[lb]	Va-zz[lb]	Vr-zz[lb]	SR-xx	SR-zz
1	1	S1	0	11.981	2240.722	0	2240.722	9.999+	9.999+
2	1	S2	0	0	2241.153	0	2241.153	9.999+	9.999+
3	1	S3	0	0	2245.836	0	2245.836	9.999+	9.999+
4	1	S4	0	1.088	2245.156	0	2245.156	9.999+	9.999+
5	1	S5	0	1.035	2244.387	0	2244.387	9.999+	9.999+
6	1	S6	0	2.806	2248.104	0	2248.104	9.999+	9.999+
7	1	S7	0	19.816	2213.69	0	2213.69	9.999+	9.999+
8	2	S1	0	82.15	2839.876	0	2839.876	9.999+	9.999+
9	2	S2	0	2.92	2855.778	1.733	2855.778	9.999+	9.999+
10	2	S3	0	3.297	2889.601	2.094	2889.601	9.999+	9.999+
11	2	S4	0	9.685	2884.533	1.423	2884.533	9.999+	9.999+
12	2	S5	0	9.87	2879.591	0	2879.591	9.999+	9.999+
13	2	S6	0	22.747	2903.678	0	2903.678	9.999+	9.999+
14	2	S7	0	133.522	2653.777	0	2653.777	9.999+	9.999+
15	3	S1	0	68.181	1737.847	1088.672	1737.847	9.999+	1.596
16	3	S2	0	5.403	1741.977	1265.002	1741.977	9.999+	1.377
17	3	S3	0	2.309	1712.577	1224.078	1712.577	9.999+	1.399
18	3	S4	0	2.644	1717.4	1237.904	1717.4	9.999+	1.387
19	3	S5	0	2.081	1718.04	1208.848	1718.04	9.999+	1.421
20	3	S6	0	9.168	1712.789	1364.305	1712.789	9.999+	1.255
21	3	S7	0	86.373	1843.433	768.884	1843.433	9.999+	2.398
22	4	S1	0	84.097	1800.479	921.133	1800.479	9.999+	1.955
23	4	S2	0	9.498	1838.602	1064.419	1838.602	9.999+	1.727
24	4	S3	0	0	1792.928	1032.938	1792.928	9.999+	1.736
25	4	S4	0	.605	1801.186	1044.09	1801.186	9.999+	1.725
26	4	S5	0	.802	1797.718	1021.115	1797.718	9.999+	1.761
27	4	S6	0	1.304	1812.338	1147.845	1812.338	9.999+	1.579
28	4	S7	0	87.809	1887.019	651.209	1887.019	9.999+	2.898
29	5	S1	0	108.073	2837.641	1291.108	2837.641	9.999+	2.198
30	5	S2	0	6.587	2832.431	1500.011	2832.431	9.999+	1.888
31	5	S3	0	2.681	2878.315	1451.592	2878.315	9.999+	1.983
32	5	S4	0	5.417	2870.954	1467.969	2870.954	9.999+	1.956
33	5	S5	0	4.644	2868.656	1433.569	2868.656	9.999+	2.001
34	5	S6	0	16.694	2882.337	1617.758	2882.337	9.999+	1.782
35	5	S7	0	146.395	2653.28	911.88	2653.28	9.999+	2.91
36	6	S1	0	69.946	2743.684	1116.256	2743.684	9.999+	2.458
37	6	S2	0	.855	2769.96	1302.119	2769.96	9.999+	2.127
38	6	S3	0	3.702	2791.136	1257.462	2791.136	9.999+	2.22

Slab Sliding Safety Factors (Continued)

	LC	Slab	Angle[deg]	Va-xx[lb]	Vr-xx[lb]	Va-zz[lb]	Vr-zz[lb]	SR-xx	SR-zz
39	6	S4	0	7.208	2788.486	1272.106	2788.486	9.999+	2.192
40	6	S5	0	6.291	2782.937	1240.934	2782.937	9.999+	2.243
41	6	S6	0	22.483	2811.705	1404.448	2811.705	9.999+	2.002
42	6	S7	0	113.451	2581.841	787.807	2581.841	9.999+	3.277
43	7	S1	0	38.813	2455.427	475.203	2455.427	9.999+	5.167
44	7	S2	0	1.177	2427.735	466.144	2427.735	9.999+	5.208
45	7	S3	0	4.575	2367.966	281.054	2367.966	9.999+	8.425
46	7	S4	0	2.741	2330.159	199.3	2330.159	9.999+	9.999+
47	7	S5	0	1.687	2333.292	201.903	2333.292	9.999+	9.999+
48	7	S6	0	4.115	2333.902	227.226	2333.902	9.999+	9.999+
49	7	S7	0	43.098	2278.467	128.257	2278.467	9.999+	9.999+
50	8	S1	0	13.888	2027.095	473.083	2027.095	9.999+	4.285
51	8	S2	0	3.064	2079.907	407.252	2079.907	9.999+	5.107
52	8	S3	0	1.541	2136.662	249.795	2136.662	9.999+	8.554
53	8	S4	0	.082	2158.361	203.517	2158.361	9.999+	9.999+
54	8	S5	0	.352	2155.885	201.442	2155.885	9.999+	9.999+
55	8	S6	0	1.493	2162.028	227.283	2162.028	9.999+	9.512
56	8	S7	0	3.12	2149.109	128.254	2149.109	9.999+	9.999+
57	9	S1	0	4.487	2312.931	816.504	2312.931	9.999+	2.833
58	9	S2	0	1.862	2327.74	947.452	2327.74	9.999+	2.457
59	9	S3	0	.741	2328.715	919.63	2328.715	9.999+	2.532
60	9	S4	0	4.737	2328.871	927.361	2328.871	9.999+	2.511
61	9	S5	0	5.325	2326.029	906.636	2326.029	9.999+	2.566
62	9	S6	0	8.781	2338.298	1023.229	2338.298	9.999+	2.285
63	9	S7	0	25.454	2266.063	576.663	2266.063	9.999+	3.93
64	10	S1	0	7.45	2359.905	690.85	2359.905	9.999+	3.416
65	10	S2	0	4.933	2400.208	797.015	2400.208	9.999+	3.011
66	10	S3	0	2.473	2388.979	776.275	2388.979	9.999+	3.077
67	10	S4	0	7.174	2391.711	782	2391.711	9.999+	3.058
68	10	S5	0	7.487	2385.788	765.836	2385.788	9.999+	3.115
69	10	S6	0	16.635	2412.96	860.884	2412.96	9.999+	2.803
70	10	S7	0	24.377	2298.752	488.407	2298.752	9.999+	4.707
71	11	S1	0	136.677	3137.777	968.331	3137.777	9.999+	3.24
72	11	S2	0	7.13	3145.58	1126.308	3145.58	9.999+	2.793
73	11	S3	0	4.484	3203.019	1087.123	3203.019	9.999+	2.946
74	11	S4	0	10.783	3194.037	1102.044	3194.037	9.999+	2.898
75	11	S5	0	10.368	3188.992	1075.176	3188.992	9.999+	2.966
76	11	S6	0	28.177	3215.459	1213.318	3215.459	9.999+	2.65
77	11	S7	0	200.03	2873.447	683.91	2873.447	9.999+	4.202
78	12	S1	0	108.082	3067.309	837.192	3067.309	9.999+	3.664
79	12	S2	0	2.831	3098.727	977.889	3098.727	9.999+	3.169
80	12	S3	0	5.25	3137.635	941.526	3137.635	9.999+	3.333
81	12	S4	0	12.126	3132.187	955.147	3132.187	9.999+	3.279
82	12	S5	0	11.604	3124.702	930.701	3124.702	9.999+	3.357
83	12	S6	0	32.52	3162.485	1053.336	3162.485	9.999+	3.002
84	12	S7	0	175.322	2819.868	590.855	2819.868	9.999+	4.773
85	13	S1	0	84.732	2851.116	356.402	2851.116	9.999+	8
86	13	S2	0	1.307	2842.058	350.908	2842.058	9.999+	8.099
87	13	S3	0	.958	2820.257	209.22	2820.257	9.999+	9.999+
88	13	S4	0	8.776	2788.441	150.543	2788.441	9.999+	9.999+
89	13	S5	0	8.151	2787.469	151.427	2787.469	9.999+	9.999+
90	13	S6	0	18.744	2804.133	170.42	2804.133	9.999+	9.999+
91	13	S7	0	122.558	2592.338	96.193	2592.338	9.999+	9.999+
92	14	S1	0	45.207	2529.867	354.812	2529.867	9.999+	7.13
93	14	S2	0	4.488	2581.187	304.139	2581.187	9.999+	8.487
94	14	S3	0	3.629	2646.779	188.917	2646.779	9.999+	9.999+
95	14	S4	0	6.658	2659.593	151.57	2659.593	9.999+	9.999+

Slab Sliding Safety Factors (Continued)

	LC	Slab	Angle[deg]	Va-xx[lb]	Vr-xx[lb]	Va-zz[lb]	Vr-zz[lb]	SR-xx	SR-zz
96	14	S5	0	7.149	2654.413	151.082	2654.413	9.999+	9.999+
97	14	S6	0	16.777	2675.227	170.462	2675.227	9.999+	9.999+
98	14	S7	0	87.894	2495.319	96.19	2495.319	9.999+	9.999+
99	15	S1	0	72.973	841.558	1088.672	841.558	9.999+	.773
100	15	S2	0	5.403	845.516	1265.002	845.516	9.999+	.668
101	15	S3	0	2.309	814.243	1224.078	814.243	9.999+	.665
102	15	S4	0	3.079	819.337	1237.904	819.337	9.999+	.662
103	15	S5	0	2.495	820.285	1208.848	820.285	9.999+	.679
104	15	S6	0	10.291	813.547	1364.305	813.547	9.999+	.596
105	15	S7	0	94.3	957.958	768.884	957.958	9.999+	1.246
106	16	S1	0	88.889	904.19	921.133	904.19	9.999+	.982
107	16	S2	0	9.498	942.14	1064.419	942.14	9.999+	.885
108	16	S3	0	0	894.594	1032.938	894.594	9.999+	.866
109	16	S4	0	.17	903.123	1044.09	903.123	9.999+	.865
110	16	S5	0	.388	899.963	1021.115	899.963	9.999+	.881
111	16	S6	0	.181	913.096	1147.845	913.096	9.999+	.795
112	16	S7	0	95.735	1001.543	651.209	1001.543	9.999+	1.538
113	17	S1	0	103.28	1941.352	1291.108	1941.352	9.999+	1.504
114	17	S2	0	6.587	1935.97	1500.011	1935.97	9.999+	1.291
115	17	S3	0	2.681	1979.981	1451.592	1979.981	9.999+	1.364
116	17	S4	0	4.982	1972.892	1467.969	1972.892	9.999+	1.344
117	17	S5	0	4.23	1970.901	1433.569	1970.901	9.999+	1.375
118	17	S6	0	15.571	1983.096	1617.758	1983.096	9.999+	1.226
119	17	S7	0	138.469	1767.804	911.88	1767.804	9.999+	1.939
120	18	S1	0	65.154	1847.395	1116.256	1847.395	9.999+	1.655
121	18	S2	0	.855	1873.499	1302.119	1873.499	9.999+	1.439
122	18	S3	0	3.702	1892.802	1257.462	1892.802	9.999+	1.505
123	18	S4	0	6.773	1890.424	1272.106	1890.424	9.999+	1.486
124	18	S5	0	5.877	1885.182	1240.934	1885.182	9.999+	1.519
125	18	S6	0	21.361	1912.463	1404.448	1912.463	9.999+	1.362
126	18	S7	0	105.525	1696.365	787.807	1696.365	9.999+	2.153
127	19	S1	0	34.021	1559.138	475.203	1559.138	9.999+	3.281
128	19	S2	0	1.177	1531.273	466.144	1531.273	9.999+	3.285
129	19	S3	0	4.575	1469.632	281.054	1469.632	9.999+	5.229
130	19	S4	0	2.306	1432.096	199.3	1432.096	9.999+	7.186
131	19	S5	0	1.273	1435.537	201.903	1435.537	9.999+	7.11
132	19	S6	0	2.993	1434.661	227.226	1434.661	9.999+	6.314
133	19	S7	0	35.172	1392.991	128.257	1392.991	9.999+	9.999+
134	20	S1	0	18.68	1130.806	473.083	1130.806	9.999+	2.39
135	20	S2	0	3.064	1183.446	407.252	1183.446	9.999+	2.906
136	20	S3	0	1.541	1238.328	249.795	1238.328	9.999+	4.957
137	20	S4	0	.517	1260.299	203.517	1260.299	9.999+	6.193
138	20	S5	0	.062	1258.13	201.442	1258.13	9.999+	6.246
139	20	S6	0	.371	1262.786	227.283	1262.786	9.999+	5.556
140	20	S7	0	11.047	1263.633	128.254	1263.633	9.999+	9.853

Envelope Slab Soil Pressures

	Label	UC	LC	Soil Pressure[psf]	Allowable Bearing[psf]	Point
1	S1	.415	5	622.568	1500	N198
2	S2	.42	5	630.45	1500	N205
3	S3	.43	5	644.419	1500	N212
4	S4	.428	5	642.547	1500	N219
5	S5	.426	5	639.715	1500	N226
6	S6	.466	16	698.629	1500	N38
7	S7	.355	5	532.632	1500	N240

Company:		Date:	5/14/2018
Engineer:		Page:	1/6
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Bonded anchor
Material: F1554 Grade 36
Diameter (inch): 0.375
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: ICC-ES ESR-4057
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 7.25
c_{ac} (inch): 10.99
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 30.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental 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
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

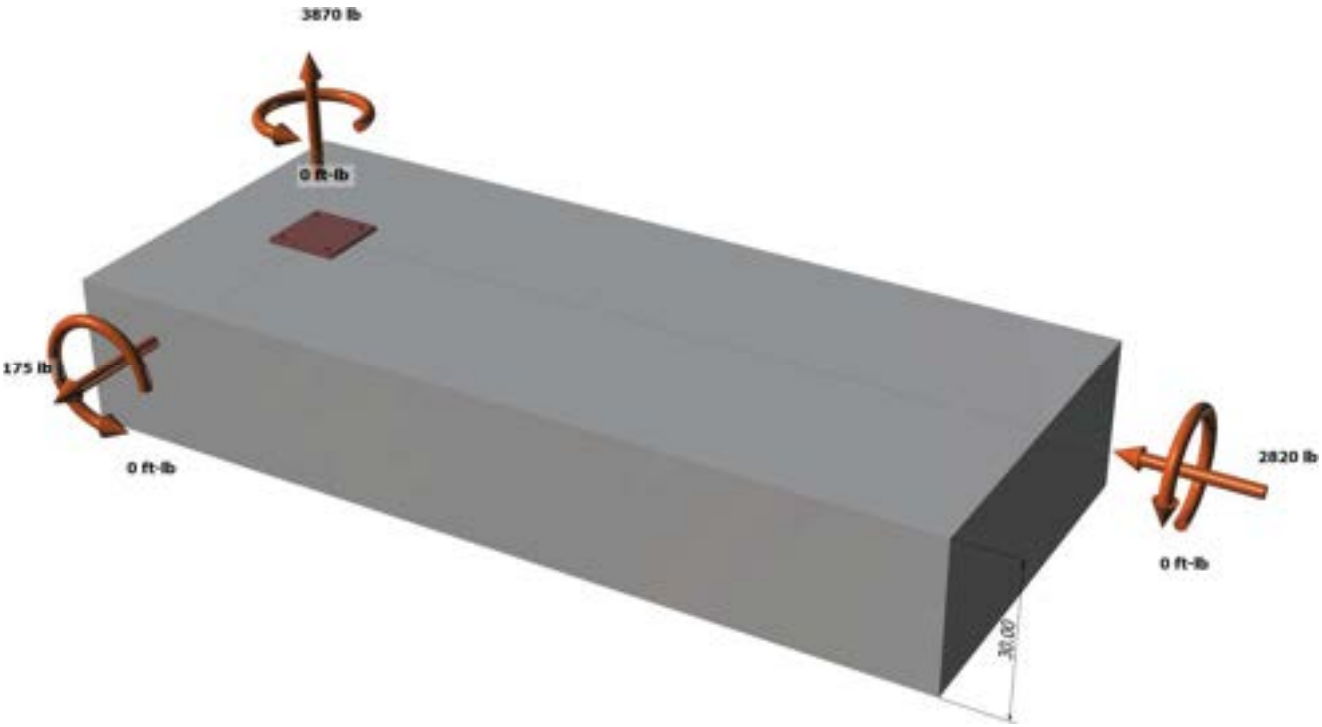
Recommended Anchor
Anchor Name: SET-3G - SET-3G w/ 3/8"Ø F1554 Gr. 36
Code Report: ICC-ES ESR-4057

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]: 3870
V_{uax} [lb]: 175
V_{uay} [lb]: -2820
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



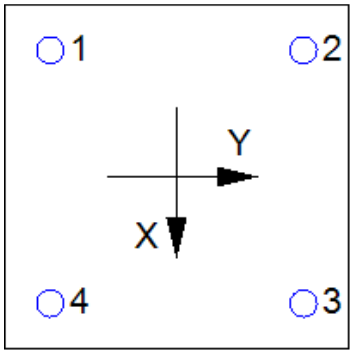
<Figure 2>

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	967.5	43.8	-705.0	706.4
2	967.5	43.8	-705.0	706.4
3	967.5	43.8	-705.0	706.4
4	967.5	43.8	-705.0	706.4
Sum	3870.0	175.0	-2820.0	2825.4

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 3870
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. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
4525	0.75	3394

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.4.2.2a)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	6.000	12492

$\phi N_{cbg} = \phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.4.2.1b)

A_{Nc} (in²)	A_{Nco} (in²)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
424.63	324.00	7.25	1.000	0.942	1.00	1.000	12492	0.65	10021

6. Adhesive Strength of Anchor in Tension (Sec. 17.4.5)

$\tau_{k,cr} = \tau_{k,cr} f_{short\text{-}term} K_{sat} (f'_c / 2{,}500)^n$

$\tau_{k,cr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	f'_c (psi)	n	$\tau_{k,cr}$ (psi)
1346	1.00	1.00	2500	0.24	1346

$N_{ba} = \lambda_a \tau_{cr} \pi d_a h_{ef}$ (Eq. 17.4.5.2)

λ_a	τ_{cr} (psi)	d_a (in)	h_{ef} (in)	N_{ba} (lb)
1.00	1346	0.38	6.000	9514

$\phi N_{ag} = \phi (A_{Na} / A_{Na0}) \Psi_{ec,Na} \Psi_{ed,Na} \Psi_{cp,Na} N_{ba}$ (Sec. 17.3.1 & Eq. 17.4.5.1b)

A_{Na} (in²)	A_{Na0} (in²)	c_{Na} (in)	$c_{a,min}$ (in)	$\Psi_{ec,Na}$	$\Psi_{ed,Na}$	$\Psi_{cp,Na}$	N_{ba}(lb)	ϕ	ϕN_{ag} (lb)
198.45	112.09	5.29	7.25	1.000	1.000	1.000	9514	0.55	9265

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
2715	1.0	0.65	1765

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

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. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
3.00	0.375	1.00	2500	13.75	16564

$\phi V_{cbgx} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1b)

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)
647.11	850.78	1.000	0.805	1.000	1.000	16564	0.70	7103

Shear perpendicular 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. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
3.00	0.375	1.00	2500	10.75	11450

$\phi V_{cbgy} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.3.1 & Eq. 17.5.2.1b)

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)
387.00	520.03	1.000	0.891	1.000	1.000	11450	0.70	5313

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. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
3.00	0.375	1.00	2500	7.25	6342

$\phi V_{cbgx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1b)

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)
261.00	236.53	1.000	1.000	1.000	1.000	6342	0.70	9797

Shear parallel to edge in y-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. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
3.00	0.375	1.00	2500	10.25	10661

$\phi V_{cbgy} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1b)

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_{cbgy} (lb)
401.67	472.78	1.000	1.000	1.000	1.000	10661	0.70	12680

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cpg} = \phi \min|k_{cp}N_{ag}\ ;\ k_{cp}N_{cbg}| = \phi \min|k_{cp}(A_{Na} / A_{Na0})\,\Psi_{ec,Na}\Psi_{ed,Na}\Psi_{cp,Na}N_{ba}\ ;\ k_{cp}(A_{Nc} / A_{Nco})\,\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

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	9514	16845

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
424.63	324.00	1.000	0.942	1.000	1.000	12492	15417	0.70

ϕV_{cpg} (lb)
21584

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.6)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	968	3394	0.29	Pass
Concrete breakout	3870	10021	0.39	Pass
Adhesive	**3870**	**9265**	**0.42**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	706	1765	0.40	Pass
T Concrete breakout x+	175	7103	0.02	Pass
T Concrete breakout y-	2820	5313	0.53	Pass
|| Concrete breakout y-	88	9797	0.01	Pass
|| Concrete breakout x-	1410	12680	0.11	Pass
Concrete breakout, combined	**-**	**-**	**0.53**	**Pass (Governs)**
Pryout	2825	21584	0.13	Pass

Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Combined Ratio	Permissible	Status
Sec. R17.6	0.23	0.35	58.2%	1.0	Pass

SET-3G w/ 3/8"Ø F1554 Gr. 36 with hef = 6.000 inch meets the selected design criteria.

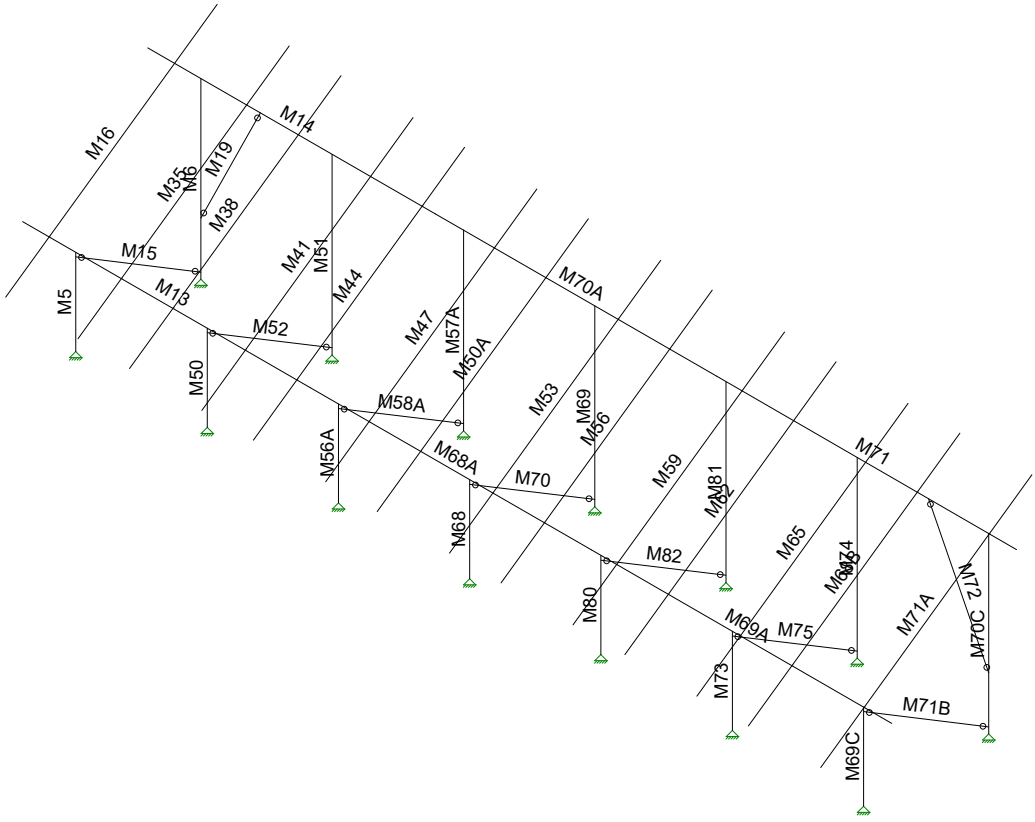
12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.

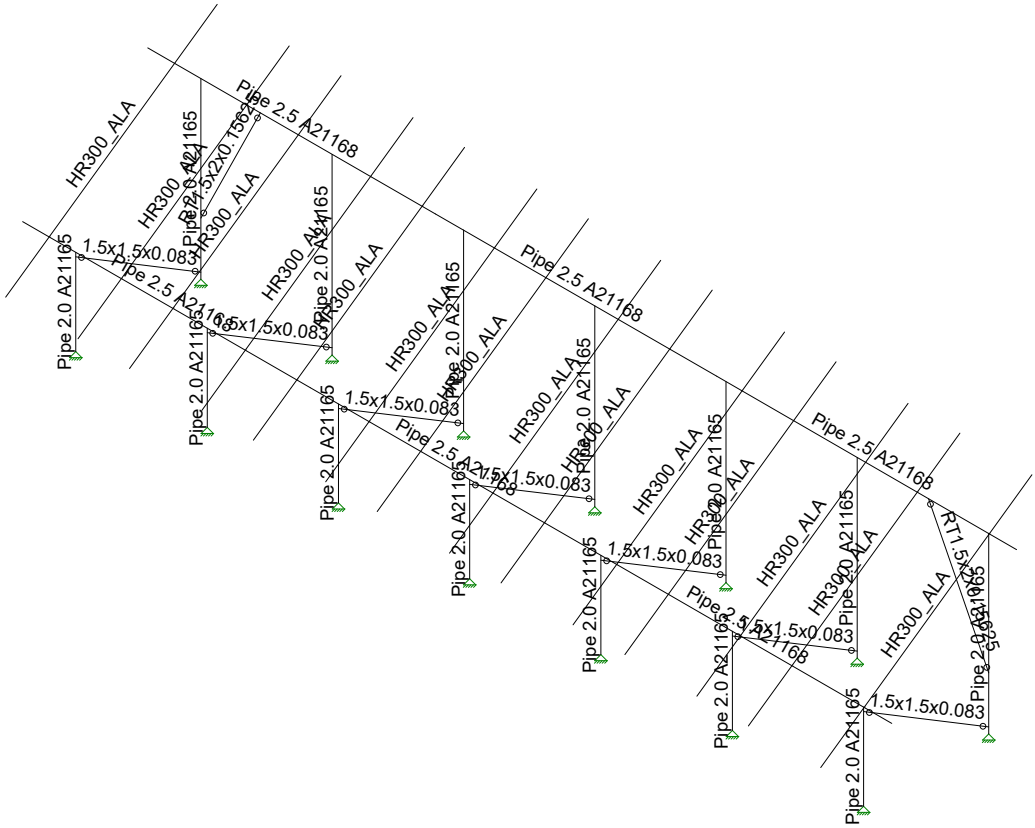
- Refer to manufacturer's product literature for hole cleaning and installation instructions.

JOB NO.: U2716-0231-201 **DESIGNED:** STB

Framing Analysis



Vector Structural Engineeri...		SK - 3
STB	Ground Mount	July 22, 2020 at 10:29 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



Vector Structural Engineeri...		SK - 4
STB	Ground Mount	July 22, 2020 at 10:29 AM
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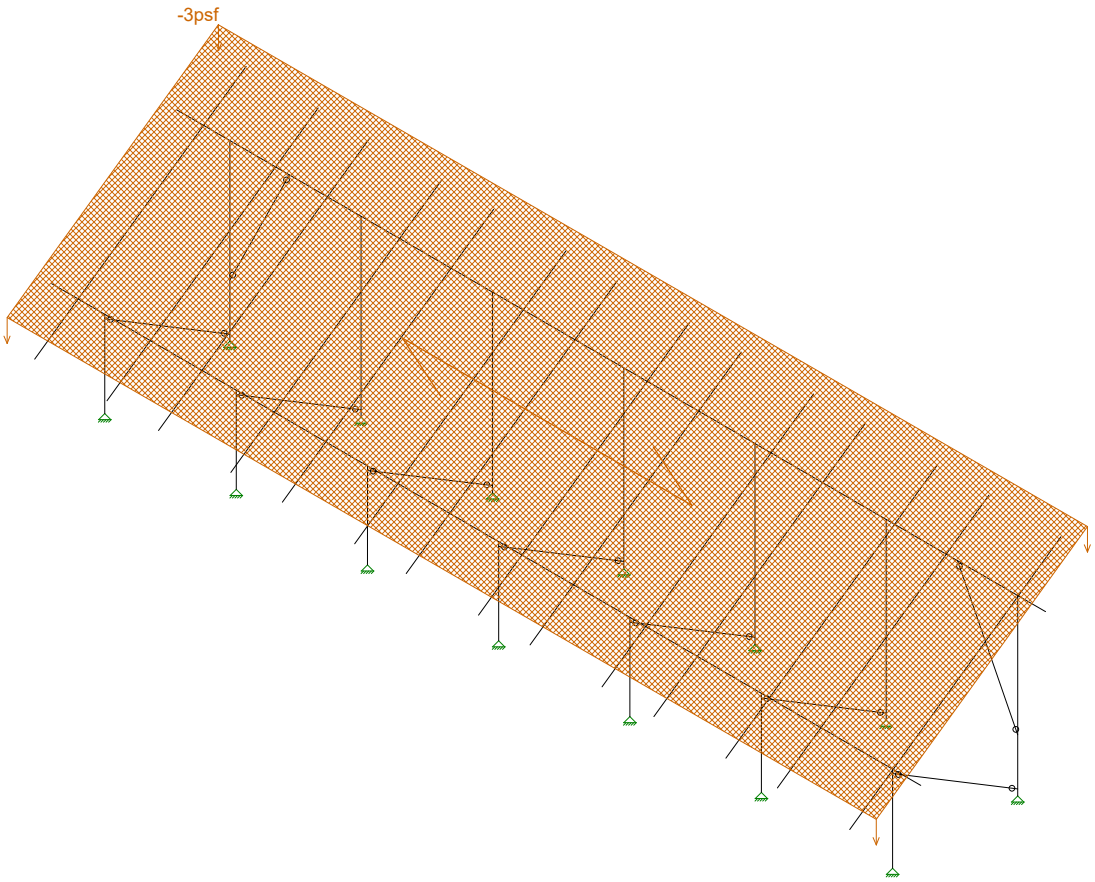
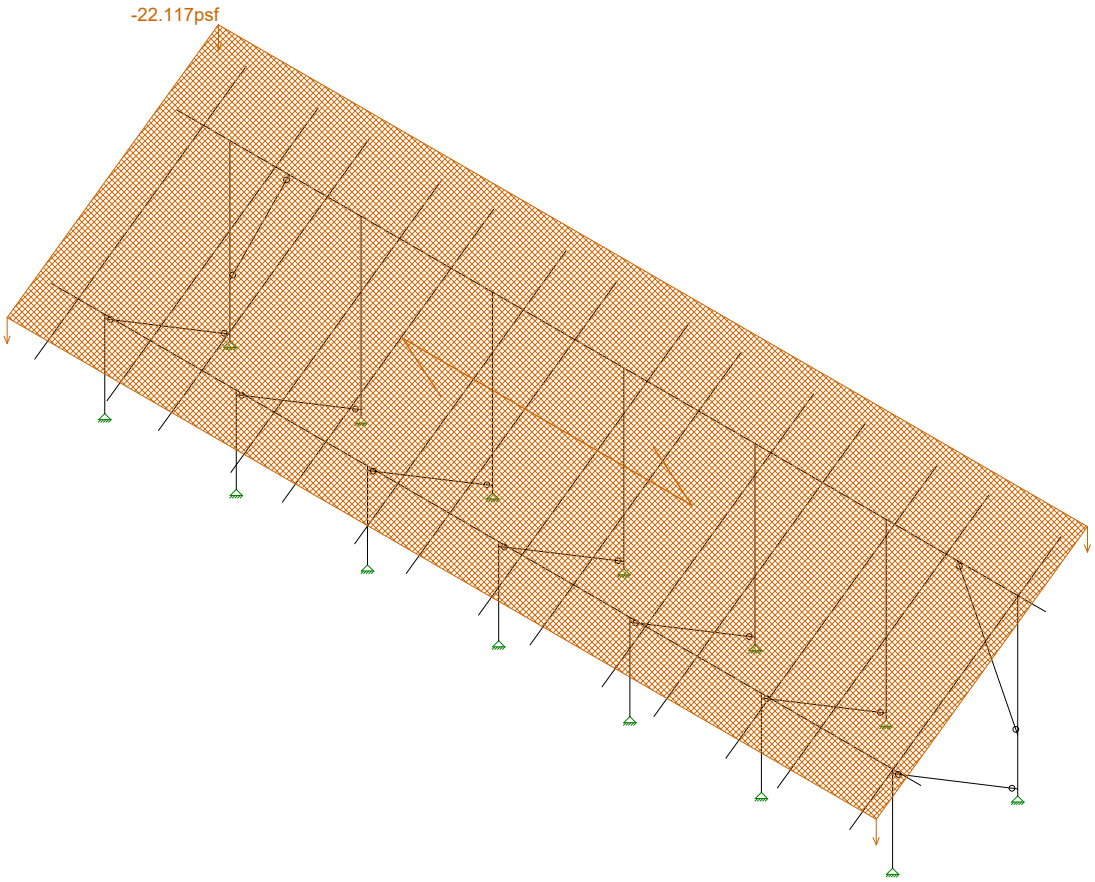


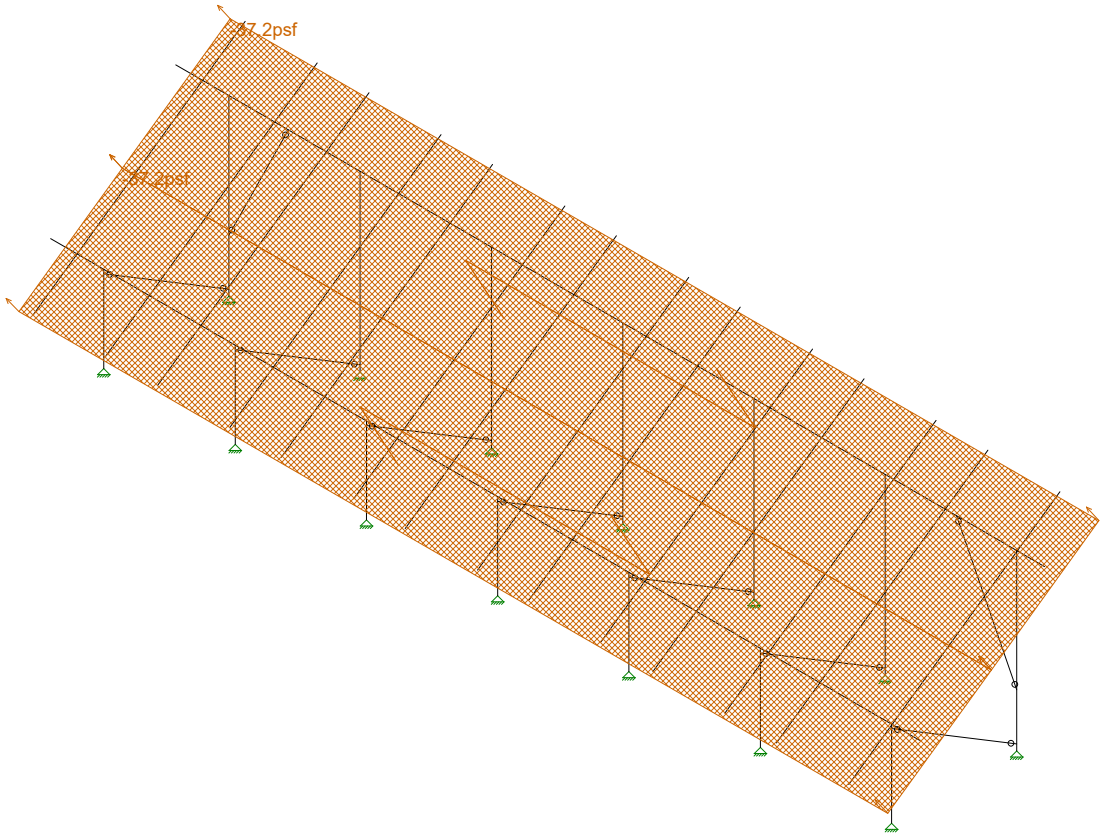
Loads: BLC 2, Solar Panel Weight

Vector Structural Engineeri...		SK - 5
STB	Ground Mount	July 22, 2020 at 10:29 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



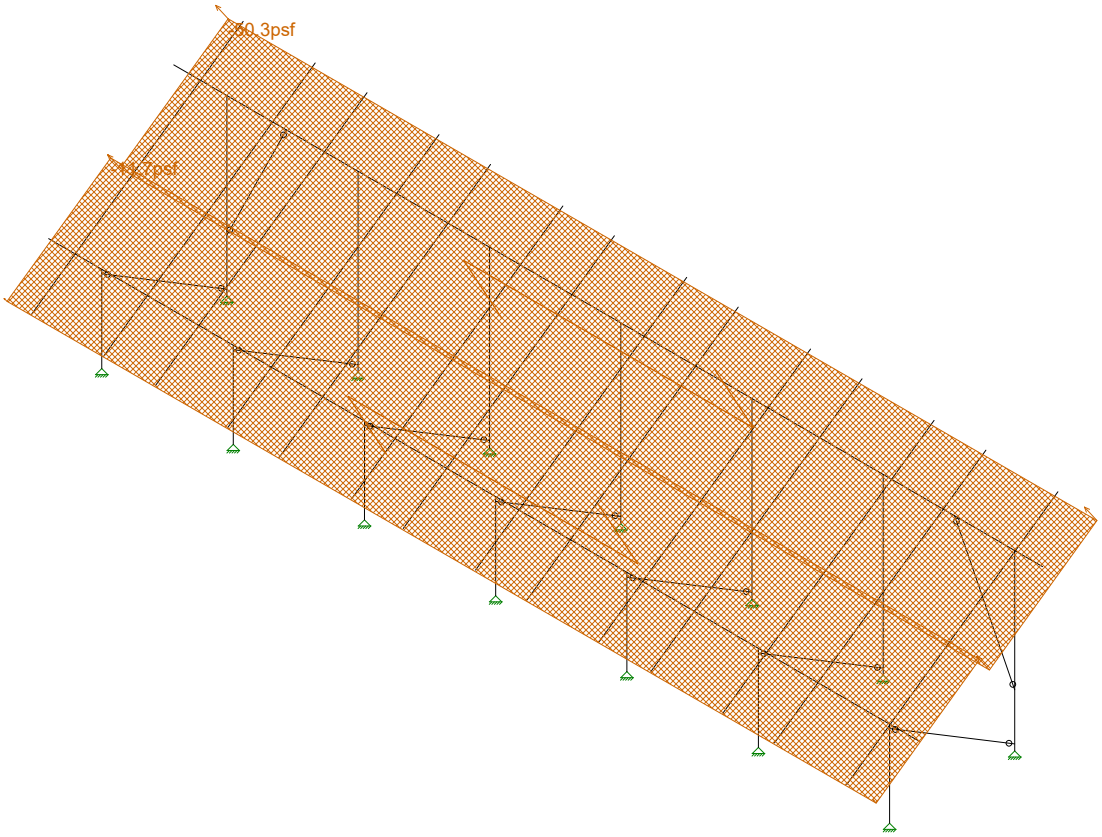
Loads: BLC 3, Roof Live/Snow

Vector Structural Engineeri...		SK - 6
STB	Ground Mount	July 22, 2020 at 10:29 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



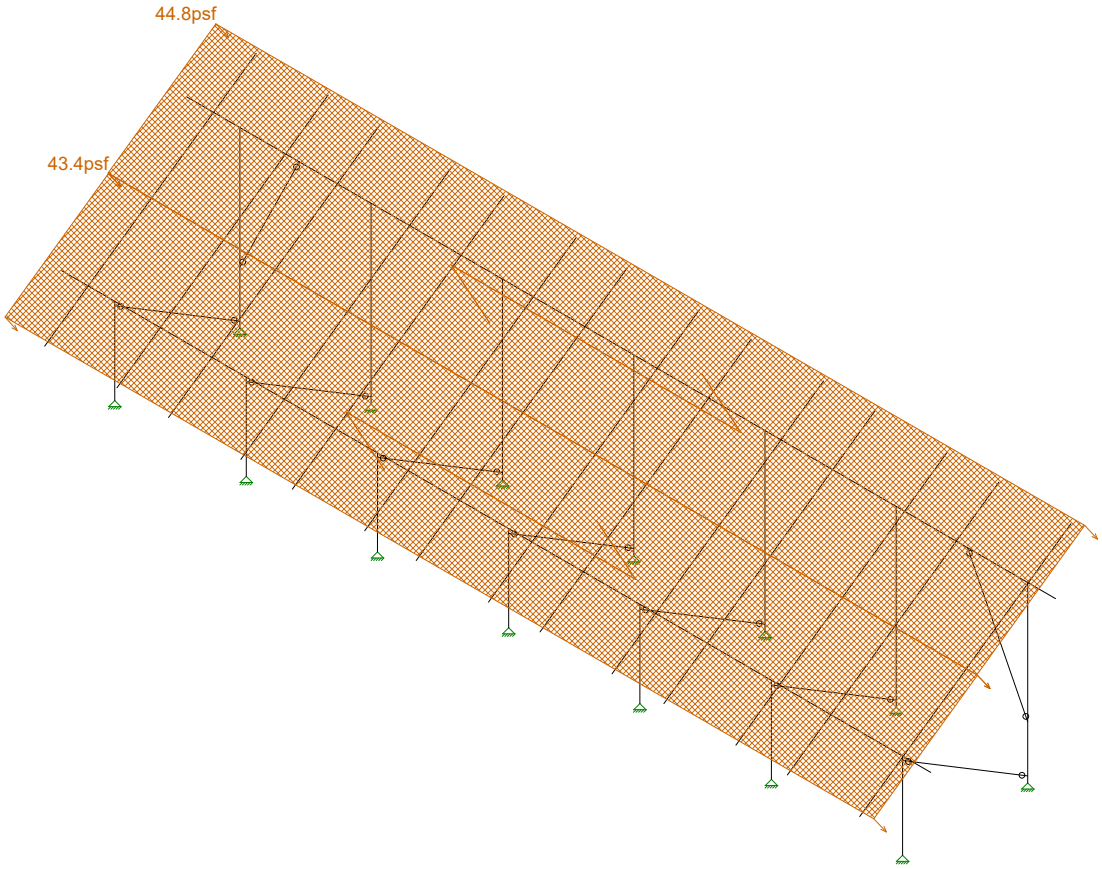
Loads: BLC 4, Wind A 0 deg

Vector Structural Engineeri...		SK - 7
STB	Ground Mount	July 22, 2020 at 10:29 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



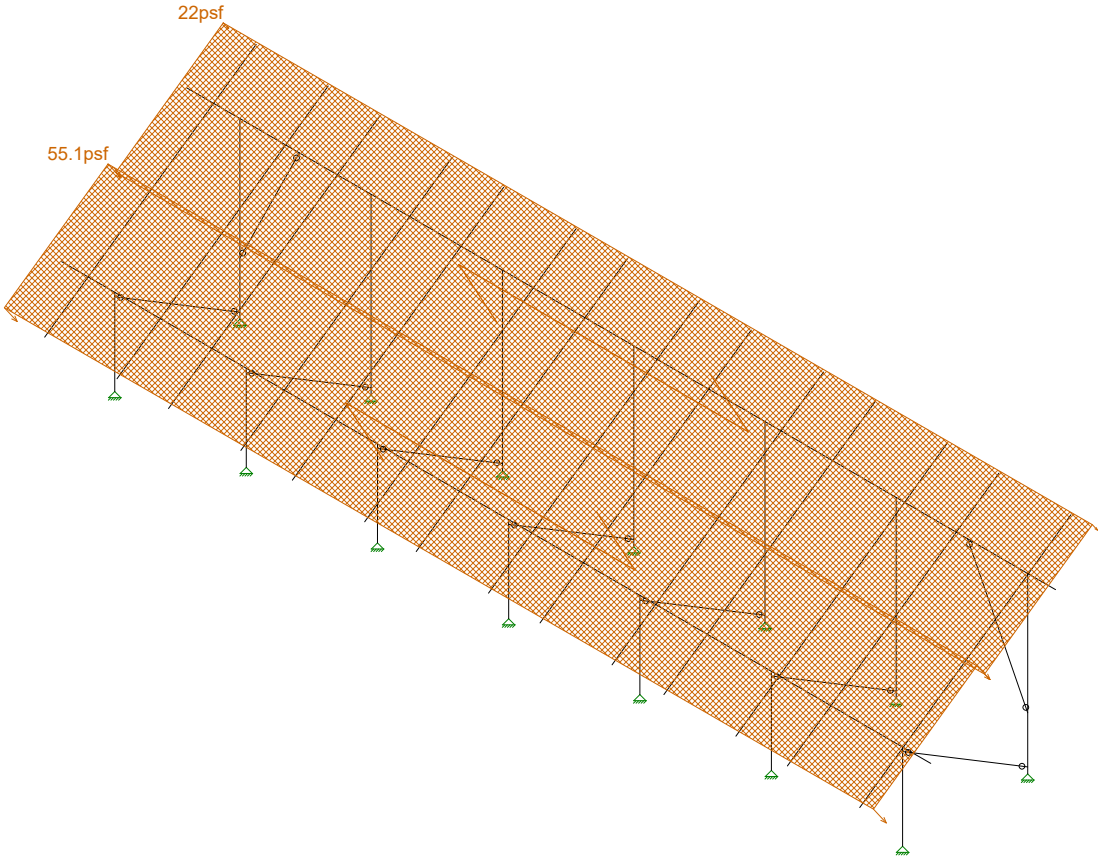
Loads: BLC 5, Wind B 0 deg

Vector Structural Engineeri...		SK - 8
STB	Ground Mount	July 22, 2020 at 10:29 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



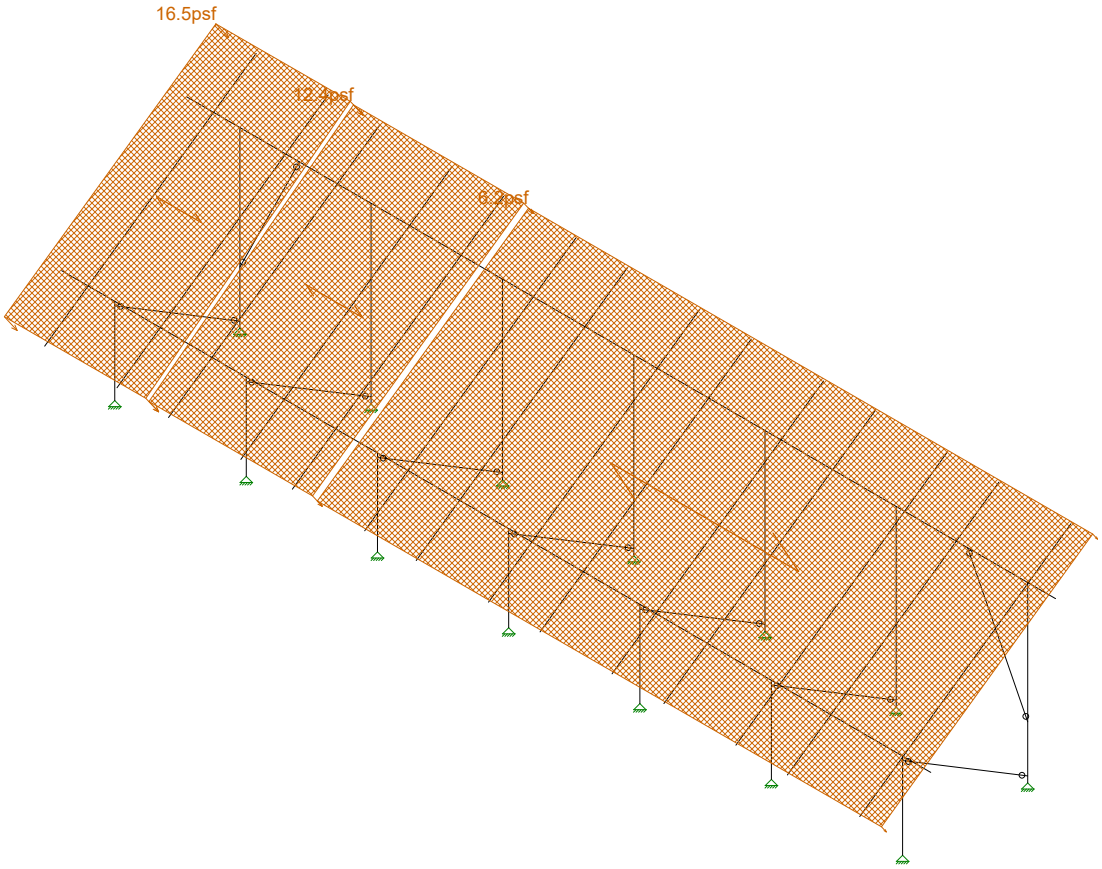
Loads: BLC 6, Wind A 180 deg

Vector Structural Engineeri...		SK - 9
STB	Ground Mount	July 22, 2020 at 10:29 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



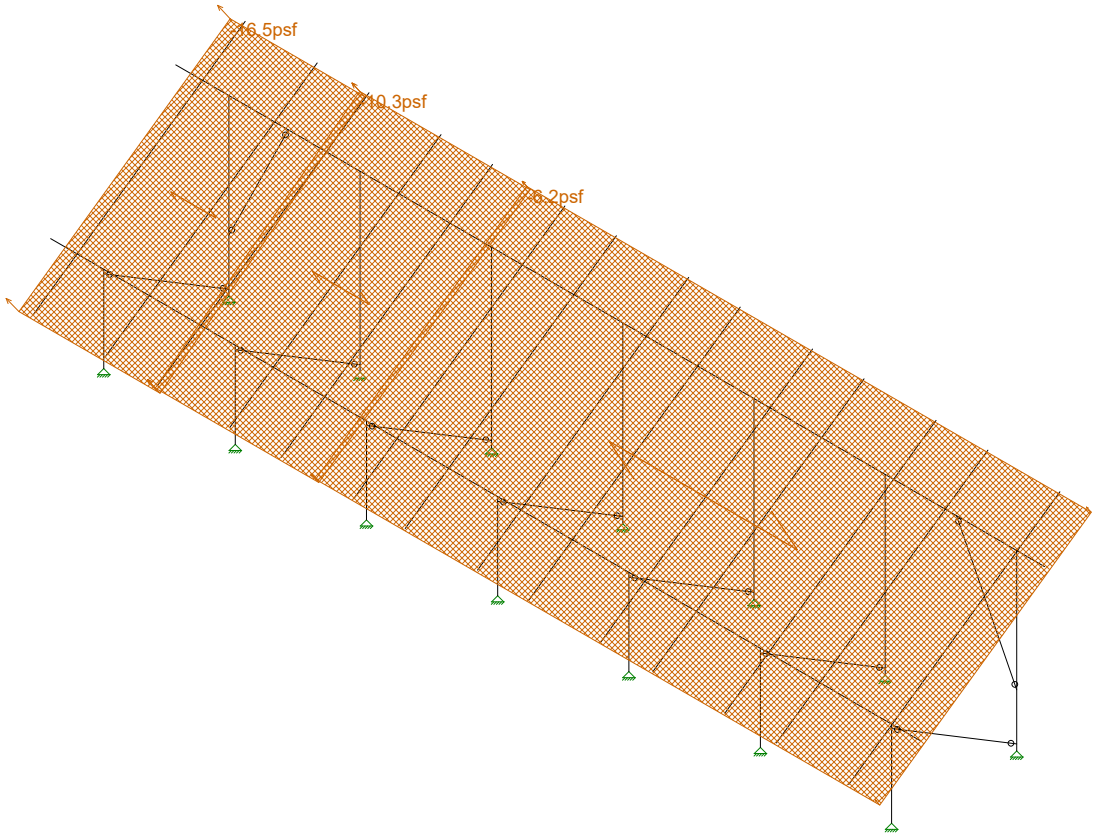
Loads: BLC 7, Wind B 180 deg

Vector Structural Engineeri...		SK - 10
STB	Ground Mount	July 22, 2020 at 10:30 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



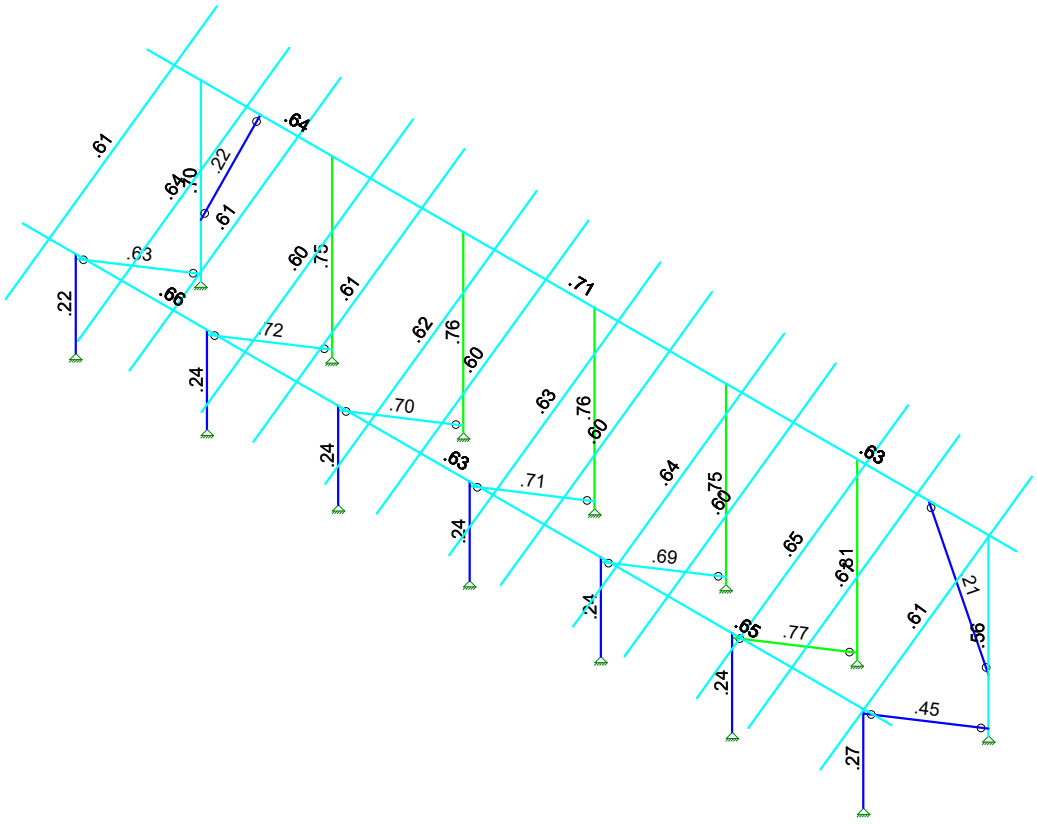
Loads: BLC 8, Wind A 90

Vector Structural Engineeri...		SK - 11
STB	Ground Mount	July 22, 2020 at 10:30 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



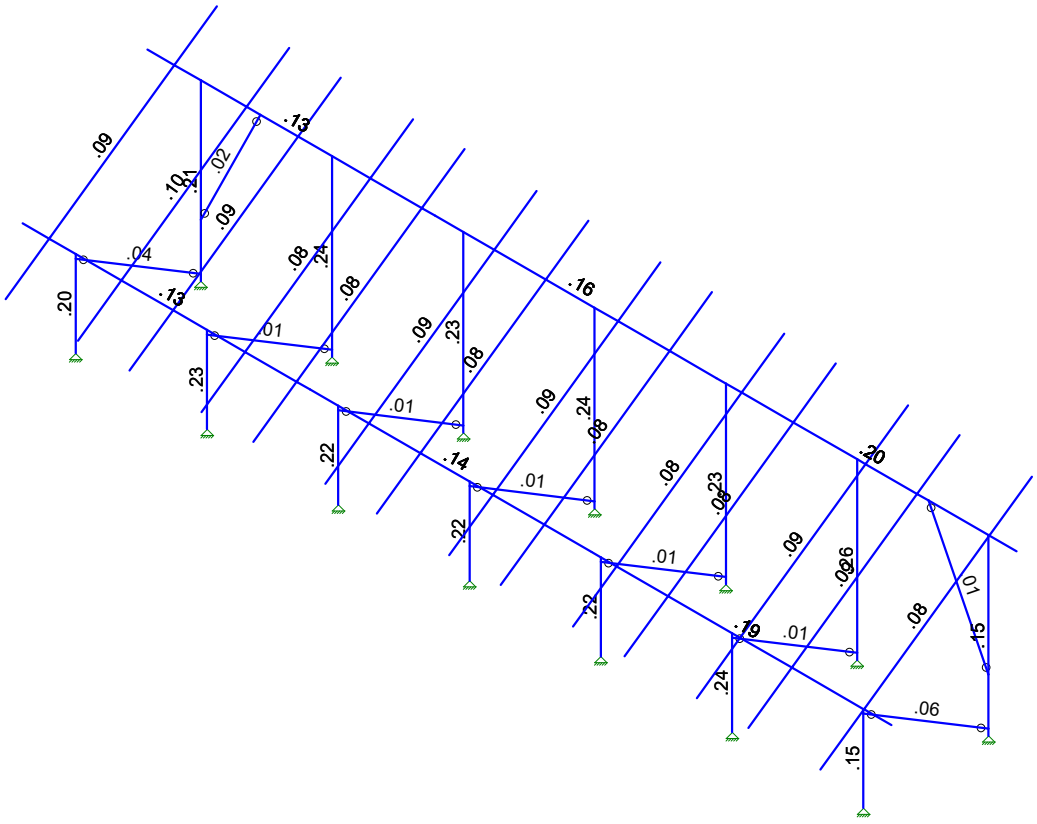
Loads: BLC 9, Wind B 90

Vector Structural Engineeri...		SK - 12
STB	Ground Mount	July 22, 2020 at 10:30 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Vector Structural Engineeri...		SK - 1
STB	Ground Mount	July 22, 2020 at 10:28 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Vector Structural Engineeri...		SK - 2
STB	Ground Mount	July 22, 2020 at 10:28 AM
U2716.0231.201		Sunmodo Sunturf A5a.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 15th(360-16): ASD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 15th(360-16): ASD
Cold Formed Steel Code	AISI S100-16: ASD
Wood Code	AWC NDS-18: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	TMS 402-16: ASD
Aluminum Code	AA ADM1-15: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-16
Seismic Base Elevation (in)	15600
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Density[lb/ft^3]	Yield[psi]	Ry	Fu[psi]	Rt
1	A992	29000	11154	.3	.65	490	50000	1.1	65000	1.1
2	A36 Gr.36	29000	11154	.3	.65	490	36000	1.5	58000	1.2
3	A572 Gr.50	29000	11154	.3	.65	490	50000	1.1	65000	1.1
4	A500 Gr.B R...	29000	11154	.3	.65	527	42000	1.4	58000	1.3
5	A500 Gr.B Re...	29000	11154	.3	.65	527	46000	1.4	58000	1.3
6	A53 Gr.B	29000	11154	.3	.65	490	35000	1.6	60000	1.2
7	A1085	29000	11154	.3	.65	490	50000	1.4	65000	1.3

Aluminum Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (...	Density[...	Table B.4	kt	Ftu[psi]	Fty[psi]	Fcy[psi]	Fsu[psi]	Ct
1	3003-H14	10100	3787.5	.33	1.3	172.8	Table B.4-1	1	19000	16000	13000	12000	141
2	6061-T6	10100	3787.5	.33	1.3	172.8	Table B.4-2	1	38000	35000	35000	24000	141
3	6063-T5	10100	3787.5	.33	1.3	172.8	Table B.4-2	1	22000	16000	16000	13000	141
4	6063-T6	10100	3787.5	.33	1.3	172.8	Table B.4-2	1	30000	25000	25000	19000	141
5	5052-H34	10200	3787.5	.33	1.3	172.8	Table B.4-1	1	34000	26000	24000	20000	141
6	6061-T6 W	10100	3787.5	.33	1.3	172.8	Table B.4-1	1	24000	15000	15000	15000	141
7	6005-T5	10100	3787.5	.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 R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Post	Pipe 2.0 A21165	Column	Pipe	A572 Gr.50	Typical	.776	.499	.499	.998
2	Cross Beam	Pipe 2.5 A21168	Beam	Wide Flange	A572 Gr.50	Typical	.947	.907	.907	1.814
3	Diagonal Brace	1.5x1.5x0.083	HBrace	SquareTube	A572 Gr.50	Typical	.47	.158	.158	.236

Aluminum Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	AL Posts	2.375ODX0.188	Column	Pipe	6005-T5	Typical	1.29	.778	.778	1.54
2	AL Brace	RT1.5x2x0.15625	VBrace	Rectangular Tubes	6005-T5	Typical	.996	.327	.524	.602
3	AL Rails	HR300 ALA	Beam	Rectangular Tubes	6005-T5	Typical	.736	.214	.727	.614
4	AL Cross Beam	Cross Rail	Beam	Rectangular Tubes	6005-T5	Typical	1.909	1.97	4.366	4.017

Member Area Loads (BLC 2 : Solar Panel Weight)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N197	N200	N199	N196	Y	A-B	-3

Member Area Loads (BLC 3 : Roof Live/Snow)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N197	N200	N199	N196	PY	A-B	-27

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

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N197	N200	N201	N198	Perp	A-B	-37.2
2	N198	N201	N199	N196	Perp	A-B	-37.2

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

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N197	N200	N201	N198	Perp	A-B	-50.3
2	N198	N201	N199	N196	Perp	A-B	-11.7

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

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N197	N200	N201	N198	Perp	A-B	44.8
2	N198	N201	N199	N196	Perp	A-B	43.4

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

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N197	N200	N201	N198	Perp	A-B	22
2	N198	N201	N199	N196	Perp	A-B	55.1

Member Area Loads (BLC 8 : Wind A 90)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N197	N203	N202	N196	Perp	A-B	16.5
2	N203	N209	N208	N202	Perp	A-B	12.4
3	N209	N200	N199	N208	Perp	A-B	6.2

Member Area Loads (BLC 9 : Wind B 90)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N197	N203	N202	N196	Perp	A-B	-16.5
2	N203	N209	N208	N202	Perp	A-B	-10.3
3	N209	N200	N199	N208	Perp	A-B	-6.2

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(M...	Surface...
1	Self Weight	DL		-1.05						
2	Solar Panel Weight	DL							1	

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(M...	Surface...
3	Roof Live/Snow	RLL							1	
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 A 90	OL5							3	
9	Wind B 90	OL6							3	
10	BLC 2 Transient Area ...	None						34		
11	BLC 3 Transient Area ...	None						34		
12	BLC 4 Transient Area ...	None						120		
13	BLC 5 Transient Area ...	None						120		
14	BLC 6 Transient Area ...	None						120		
15	BLC 7 Transient Area ...	None						120		
16	BLC 8 Transient Area ...	None						98		
17	BLC 9 Transient Area ...	None						98		

Load Combinations

	Description	S...	PD...	SRSS	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.0 D	Yes	Y		DL	1																		
2	1.0 D + 1.0 S	Yes	Y		DL	1	RLL	1																
3	1.0 D + 0.6 W1	Yes	Y		DL	1	RLL		OL1	.6														
4	1.0 D + 0.6 W2	Yes	Y		DL	1	RLL		OL2	.6														
5	1.0 D + 0.6 W3	Yes	Y		DL	1	RLL		OL3	.6														
6	1.0 D + 0.6 W4	Yes	Y		DL	1	RLL		OL4	.6														
7	1.0 D + 0.6 W5	Yes	Y		DL	1	RLL		OL5	.6														
8	1.0 D + 0.6 W6	Yes	Y		DL	1	RLL		OL6	.6														
9	1.0 D + 0.45 W1 + 0....	Yes	Y		DL	1	RLL	.75	OL1	.45														
10	1.0 D + 0.45 W2 + 0....	Yes	Y		DL	1	RLL	.75	OL2	.45														
11	1.0 D + 0.45 W3 + 0....	Yes	Y		DL	1	RLL	.75	OL3	.45														
12	1.0 D + 0.45 W4 + 0....	Yes	Y		DL	1	RLL	.75	OL4	.45														
13	1.0 D + 0.45 W5 + 0....	Yes	Y		DL	1	RLL	.75	OL5	.45														
14	1.0 D + 0.45 W6 + 0....	Yes	Y		DL	1	RLL	.75	OL6	.45														
15	0.6 D + 0.6 W1	Yes	Y		DL	.6	RLL		OL1	.6														
16	0.6 D + 0.6 W2	Yes	Y		DL	.6	RLL		OL2	.6														
17	0.6 D + 0.6 W3	Yes	Y		DL	.6	RLL		OL3	.6														
18	0.6 D + 0.6 W4	Yes	Y		DL	.6	RLL		OL4	.6														
19	0.6 D + 0.6 W5	Yes	Y		DL	.6	RLL		OL5	.6														
20	0.6 D + 0.6 W6	Yes	Y		DL	.6	RLL		OL6	.6														

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-...	LC	MZ [lb-ft]	LC
1	N2	max	11.451	6	1496.245	10	58.446	3	0	20	0	20	0	20
2		min	-7.151	15	-324.72	17	-67.668	5	0	1	0	1	0	1
3	N1	max	116.118	11	2791.861	11	1358.6...	5	0	20	0	20	0	20
4		min	-90.024	16	-2122.994	16	-1147....	3	0	1	0	1	0	1
5	N132	max	3.578	11	2908.206	11	1506.61	5	0	20	0	20	0	20
6		min	-2.294	16	-2244.568	16	-1271....	3	0	1	0	1	0	1
7	N133	max	8.939	12	1670.564	10	62.775	3	0	20	0	20	0	20
8		min	-.462	15	-354.343	17	-73.021	5	0	1	0	1	0	1
9	N109	max	3.499	14	2791.778	11	1574.4...	5	0	20	0	20	0	20
10		min	-1.579	16	-2148.827	16	-1327....	3	0	1	0	1	0	1
11	N110A	max	4.552	5	1742.059	10	62.784	3	0	20	0	20	0	20
12		min	-8.127	4	-391.168	17	-73.136	5	0	1	0	1	0	1
13	N121	max	1.689	8	2949.253	11	1523.7...	5	0	20	0	20	0	20

Envelope Joint Reactions (Continued)

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-...	LC	MZ [lb-ft]	LC
14		min	-1.945	19	-2274.39	16	-1287....	3	0	1	0	1	0	1
15	N122	max	6.223	12	1691.661	10	63.102	3	0	20	0	20	0	20
16		min	-2.133	15	-360.184	17	-73.405	5	0	1	0	1	0	1
17	N133B	max	2.832	11	2928.258	11	1541.6...	5	0	20	0	20	0	20
18		min	-1.436	16	-2254.267	16	-1301....	3	0	1	0	1	0	1
19	N134B	max	10.194	12	1703.534	10	63.325	3	0	20	0	20	0	20
20		min	-1.721	15	-368.173	17	-73.541	5	0	1	0	1	0	1
21	N151	max	4.182	11	3013.052	11	1689	5	0	20	0	20	0	20
22		min	-1.189	16	-2319.256	16	-1426....	3	0	1	0	1	0	1
23	N152	max	30.296	12	1845.549	10	62.377	3	0	20	0	20	0	20
24		min	-8.746	15	-437.71	17	-71.617	5	0	1	0	1	0	1
25	N143A	max	98.796	16	2049.977	11	968.029	5	0	20	0	20	0	20
26		min	-130.72	11	-1545.649	16	-816.1...	3	0	1	0	1	0	1
27	N144A	max	23.183	15	1076.121	10	47.422	3	0	20	0	20	0	20
28		min	-64.677	12	-210.865	17	-55.787	5	0	1	0	1	0	1
29	Totals:	max	.021	19	23713.032	11	9673.8...	5						
30		min	-.042	14	-9980.659	15	-8157....	15						

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

	Member	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	Pnc/om [...	Pnt/om [lb]	Mnyy/om...	Mnzz/om...	Cb	Eqn
1	M5	Pipe 2.0 A2...	.222	52.073	17	.201	52.645		5	16486.797	23232.186	1397.505	1397.505	1....	H1-1b
2	M6	Pipe 2.0 A2...	.703	3.477	5	.210	0		5	6062.107	23232.186	1397.505	1397.505	1....	H1-1a
3	M13	Pipe 2.5 A2...	.656	118....	12	.128	116....		12	11641.036	28358.413	2081.747	2081.747	2....	H1-1b
4	M14	Pipe 2.5 A2...	.639	118....	11	.127	116....		11	11641.036	28358.413	2081.747	2081.747	2....	H1-1b
5	M15	1.5x1.5x0.083	.626	48.694	5	.039	93.493	y	11	2716.455	14085.15	624.421	624.421	1....	H1-1a
6	M80	Pipe 2.0 A2...	.237	52.073	17	.217	52.645		5	16486.797	23232.186	1397.505	1397.505	1....	H1-1b
7	M81	Pipe 2.0 A2...	.752	3.477	5	.230	0		5	6062.107	23232.186	1397.505	1397.505	1....	H1-1a
8	M82	1.5x1.5x0.083	.691	48.694	5	.010	93.493	y	10	2716.455	14085.15	624.421	624.421	1....	H1-1a
9	M50	Pipe 2.0 A2...	.239	52.073	17	.227	52.645		5	16486.797	23232.186	1397.505	1397.505	1....	H1-1b
10	M51	Pipe 2.0 A2...	.754	3.477	5	.241	0		5	6062.107	23232.186	1397.505	1397.505	1....	H1-1a
11	M52	1.5x1.5x0.083	.722	48.694	5	.007	93.493	y	14	2716.455	14085.15	624.421	624.421	1....	H1-1a
12	M56A	Pipe 2.0 A2...	.239	52.073	17	.220	52.645		5	16486.797	23232.186	1397.505	1397.505	1....	H1-1b
13	M57A	Pipe 2.0 A2...	.762	3.477	5	.234	0		5	6062.107	23232.186	1397.505	1397.505	2....	H1-1a
14	M58A	1.5x1.5x0.083	.699	48.694	5	.007	93.493	y	4	2716.455	14085.15	624.421	624.421	1....	H1-1a
15	M68	Pipe 2.0 A2...	.239	52.073	17	.222	52.645		5	16486.797	23232.186	1397.505	1397.505	1....	H1-1b
16	M69	Pipe 2.0 A2...	.763	3.477	5	.236	0		5	6062.107	23232.186	1397.505	1397.505	1....	H1-1a
17	M70	1.5x1.5x0.083	.707	48.694	5	.009	0	y	10	2716.455	14085.15	624.421	624.421	1....	H1-1a
18	M68A	Pipe 2.5 A2...	.635	18.75	12	.138	103....		12	11641.036	28358.413	2081.747	2081.747	2....	H1-1b
19	M69A	Pipe 2.5 A2...	.652	90	12	.193	90		12	11641.036	28358.413	2081.747	2081.747	1....	H1-1b
20	M70A	Pipe 2.5 A2...	.707	18.75	11	.161	103....		11	11641.036	28358.413	2081.747	2081.747	2....	H1-1b
21	M71	Pipe 2.5 A2...	.632	6	11	.196	90		11	11641.036	28358.413	2081.747	2081.747	2....	H1-1b
22	M73	Pipe 2.0 A2...	.240	52.073	17	.245	52.645		5	16486.797	23232.186	1397.505	1397.505	1....	H1-1b
23	M74	Pipe 2.0 A2...	.811	3.477	5	.258	0		5	6062.107	23232.186	1397.505	1397.505	1....	H1-1a
24	M75	1.5x1.5x0.083	.774	48.694	5	.011	0	y	10	2716.455	14085.15	624.421	624.421	1....	H1-1a
25	M69C	Pipe 2.0 A2...	.274	52.645	12	.146	52.645		5	16486.797	23232.186	1397.505	1397.505	1....	H1-1b
26	M70C	Pipe 2.0 A2...	.561	33.608	11	.147	0		5	6062.107	23232.186	1397.505	1397.505	1....	H1-1a
27	M71B	1.5x1.5x0.083	.448	48.694	5	.063	0	y	11	2716.455	14085.15	624.421	624.421	1....	H1-1a

Envelope AA ADM1-15: ASD - Building Aluminum Code Checks

	Member	Shape	Code C...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	Pnc/O...	Pnt/Om...	Mny/O...	Mnz/O...	Vny/O...	Vnz/O...	Cb	Eqn
1	M19	RT1.5x2x...	.222	52.977	11	.023	0	z	5	2260.001	19411....	770.742	927.083	5889.423	3966.346	1....	H.1-1
2	M16	HR300_A...	.615	82.515	11	.085	36.1	y	11	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
3	M35	HR300_A...	.635	80.796	11	.095	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
4	M38	HR300_A...	.615	84.234	11	.089	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1

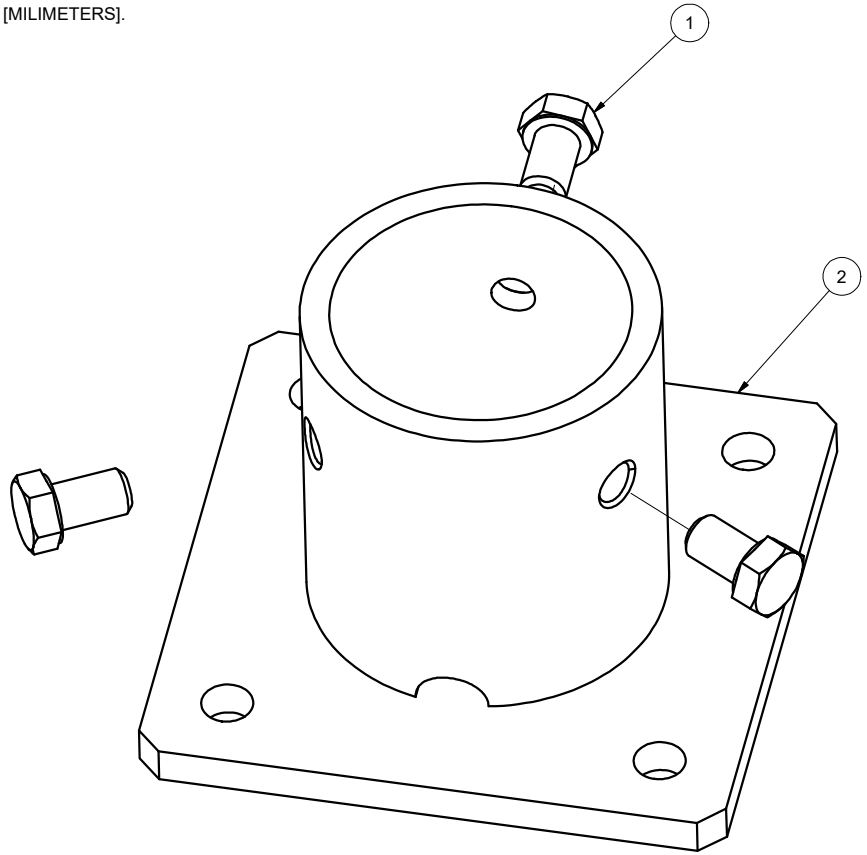
Envelope AA ADM1-15: ASD - Building Aluminum Code Checks (Continued)

	Member	Shape	Code C...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	Pnc/O...	Pnt/Om...	Mny/O...	Mnz/O...	Vny/O...	Vnz/O...	Cb	Eqn
5	M41	HR300_A...	.604	84.234	11	.084	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
6	M44	HR300_A...	.606	84.234	11	.084	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
7	M47	HR300_A...	.619	84.234	11	.085	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
8	M50A	HR300_A...	.597	34.381	12	.084	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
9	M53	HR300_A...	.630	84.234	11	.085	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
10	M56	HR300_A...	.597	34.381	12	.084	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
11	M59	HR300_A...	.638	84.234	11	.084	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
12	M62	HR300_A...	.597	34.381	12	.084	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
13	M65	HR300_A...	.646	84.234	11	.089	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
14	M68B	HR300_A...	.611	80.796	11	.094	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
15	M71A	HR300_A...	.607	84.234	11	.083	36.1	y	12	3887.213	14342....	494.953	934.619	6030.769	2749.538	1	H.1-1
16	M72	RT1.5x2x...	.208	53.045	11	.012	0	z	5	2254.199	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1

REVISIONS			
REV	DESCRIPTION	BY	DATE
A	INITIAL RELEASE	LWF	10/20/2016

NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].



ITEM	PART NUMBER	DESCRIPTION	QTY
2	A21120-001	2" PIPE BASE	1
1	B15018-011	HEX CAP SCREW 3/8-16 X 5/8	3

MATERIAL: SEE NOTES

Third Angle Projection:

GENERAL SPECIFICATIONS
All Dimensions in inches [millimeters]
Tolerances
X.XXX ±0.01 [0.25mm]
X.XX ±0.02 [0.50mm]
X.X ±0.039 [1.0mm]
Unless otherwise spec'd
Break all sharp edges .010-.020 unless otherwise specified.

DRAWN BY: LWF
DATE: 10/20/2016
CHECKED BY:
APPROVALS:

Sunmodo Corp.

1905 E 5TH STREET, STE A, VANCOUVER, WA 98661

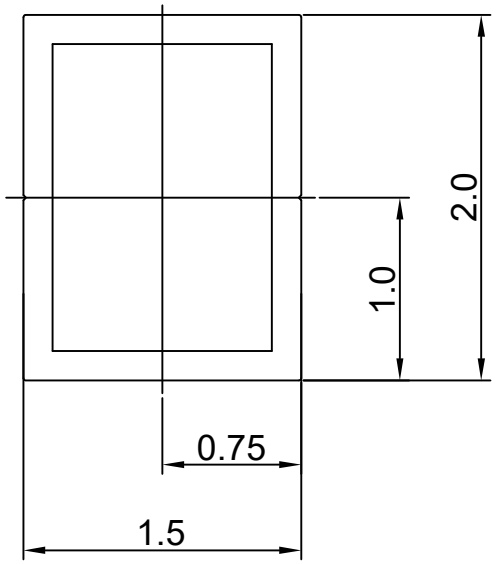
TITLE: 2" PIPE BASE KIT

B | DRAWING NUMBER: K10268-001

SCALE: NONE | SHEET 1 of 1

NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].
2. MATERAIL: ALUMINUM 6005-T5.
   FINISH: CLEAR ANODIZED 10 ųm THICK.
3. THE UNSPECIFIED DIMENSIONS ARE SPECIFIED BY 2D CAD FILE.



Section properties:

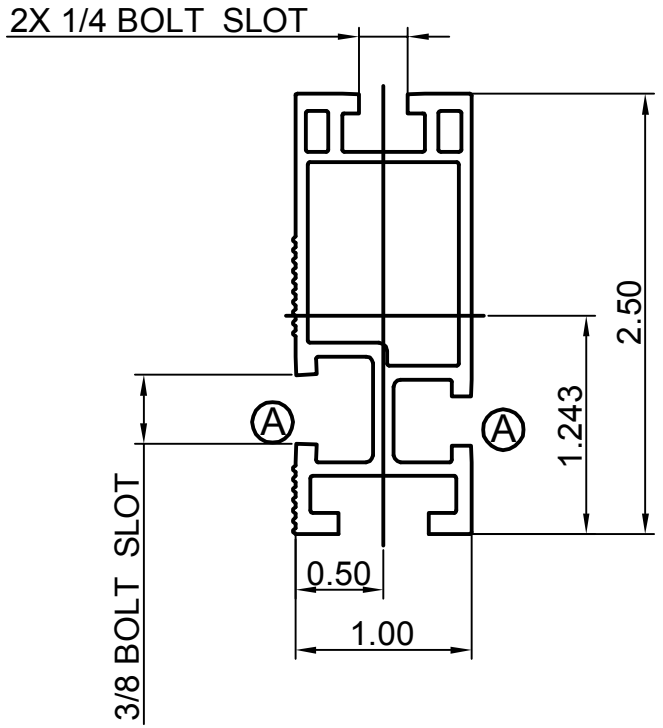
Weight: 1.156 lbs/ft
Area: 0.992 in^2
Perimeter: 12.601 in
Bounding Box: X: -1.000,1.000
Y: -0.750, 0.750
Centroid:(0.000,0.000)
Moments of Inertia(in^4): Ix=0.506,Iy=0.322
Section modulus in bending(in^3): Wx=0.675,Wy=0.322
Radii of Gyration: X: 0.714, Y: 0.570

MATERIAL: SEE NOTES		**Sunmodo Corp.**
Third Angle Projection:		1905 E 5TH STREET, SUITE A, VANCOUVER, WA 98661
GENERAL SPECIFICATIONS All Dimensions in inches [millimeters] Tolerances X.XXX ± 0.01 [0.25mm] X.XX ± 0.02 [0.50mm] X.X ± 0.039 [1.0mm] Unless otherwise spec'd	Break all sharp edges .010-.020 unless otherwise specified.	TITLE: 1.5X2 AL TUBE BRACE EXTRUSION
DRAWN BY: zcg	DATE: 03/12/2014	B — DRAWING NUMBER: A20164
CHECKED BY		
APPROVALS		SCALE: NONE — SHEET 1 of 1

REVISIONS			
REV	DESCRIPTON	BY	DATE
A	ADDED BOTTOM CHANNEL & CHANGED ONE 3/8 CHANNEL TO 1/4	zcg	02/21/2013

NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].
2. MATERAIL: ALUMINUM 6005-T5.
   FINISH: CLEAR ANODIZED 15 µm THICK.
3. THE UNSPECIFIED DIMENSIONS ARE SPECIFIED BY 2D CAD FILE.



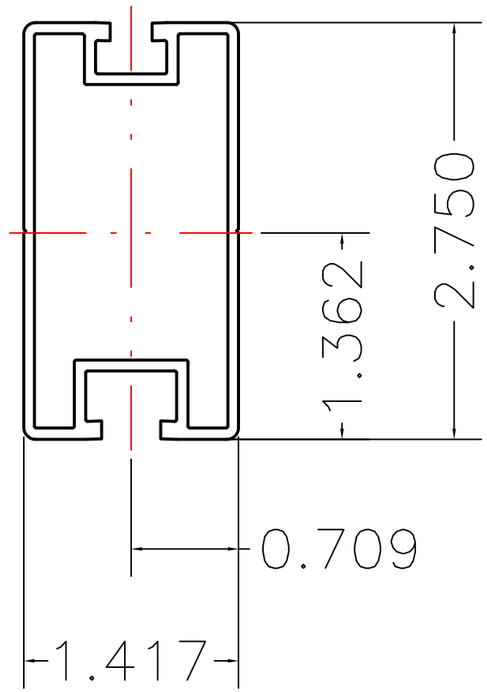
Section properties:

Weight: 0.850 lbs/ft
Area: 0.723 in^2
Perimeter: 17.325 in
Bounding Box: X: -0.500,0.500
Y: -1.243,1.257
Centroid:(0.000,0.000)
Moments of Incertia(in^4): Ix=0.486,Iy=0.095
Section modulus in bending(in^3): Wx=0.387,Wy=0.190
Radii of Gyration: X: 0.820, Y: 0.363

MATERIAL: SEE NOTES		**Sunmodo Corp.**	
Third Angle Projection:		1905 E 5TH STREET, SUITE A, VANCOUVER, WA 98661	
GENERAL SPECIFICATIONS All Dimensions in inches [millimeters] Tolerances X.XXX ± 0.01 [0.25mm] X.XX ± 0.02 [0.50mm] X.X ± 0.039 [1.0mm] Unless otherwise spec'd Break all sharp edges .010-.020 unless otherwise specified.		TITLE: HELIO STANDARD RAIL	
DRAWN BY: zcg	DATE: 02/21/2013	B	DRAWING NUMBER: A20144
CHECKED BY			
APPROVALS		SCALE: NONE	SHEET 1 of 1

NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].
2. MATERIAL: 6005-T5.
   FINISH: CLEAR ANODIZED 10um THICK.
3. THE UNSPECIFIED RADII ARE .02" MAX.
4. THE UNSPECIFIED DIMENSIONS ARE SPECIFIED BY 2D CAD FILE.



Section properties:

Weight: 0.862 lbs/ft
Area: 0.736 in^2
Perimeter: 19.824 in
Bounding Box: X: -0.709,0.709
Y: -1.362,1.388
Centroid:(0.000,0.000)
Moments of Incertia(in^4): Ix=0.727,Iy=0.214
Section modulus in bending(in^3): Wx=0.524,Wy=0.302
Radii of Gyration: X: 994, Y: 0.539

MATERIAL	SEE NOTES
Third Angle Projection:	
GENERAL SPECIFICATIONS	All Dimensions in Inches [millimeters]
Tolerances	X.XXX ±0.01 [0.25mm] X.XX ±0.02 [0.50mm] X.X ±0.039 [1.0mm] Unless otherwise spec'd
	Break all sharp edges .010-.020 unless otherwise specified.
DRAWN BY	KYY
DATE	01/18/2018
CHECKED BY	
APPROVALS	

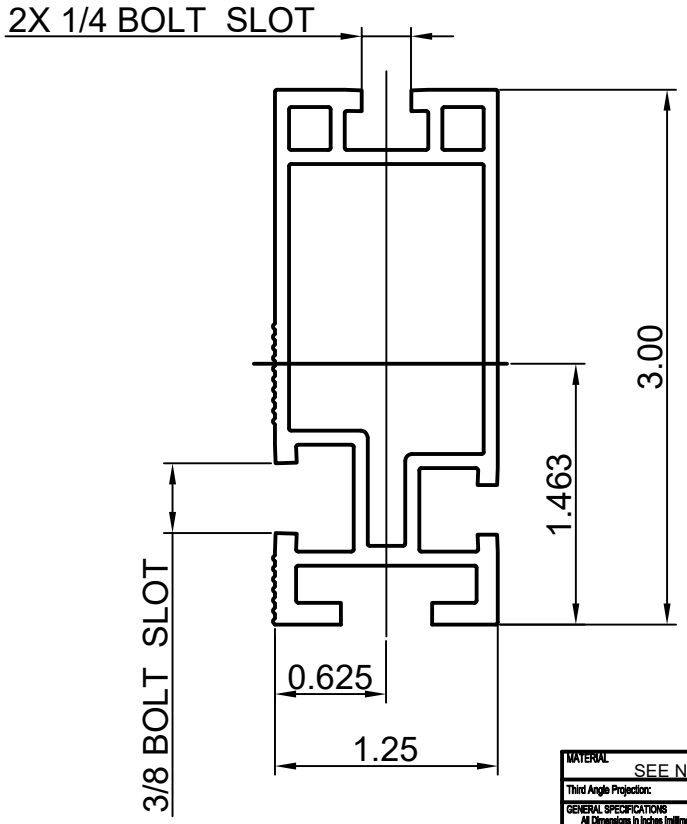
SunModo Corp.
14800 NE 65TH STREET, VANCOUVER WA 98682

TITLE	RAIL, HR300 (SUNRAY), EXTRUSION
B	DRAWING NUMBER A20288
SCALE:	NONE
SHEET	1 of 1

REV	DESCRIPTON	BY	DATE
A	0.44 WAS 0.41, 0.44 WAS 0.33	LWF	11/30/2015

NOTES: UNLESS OTHERWISE SPECIFIED

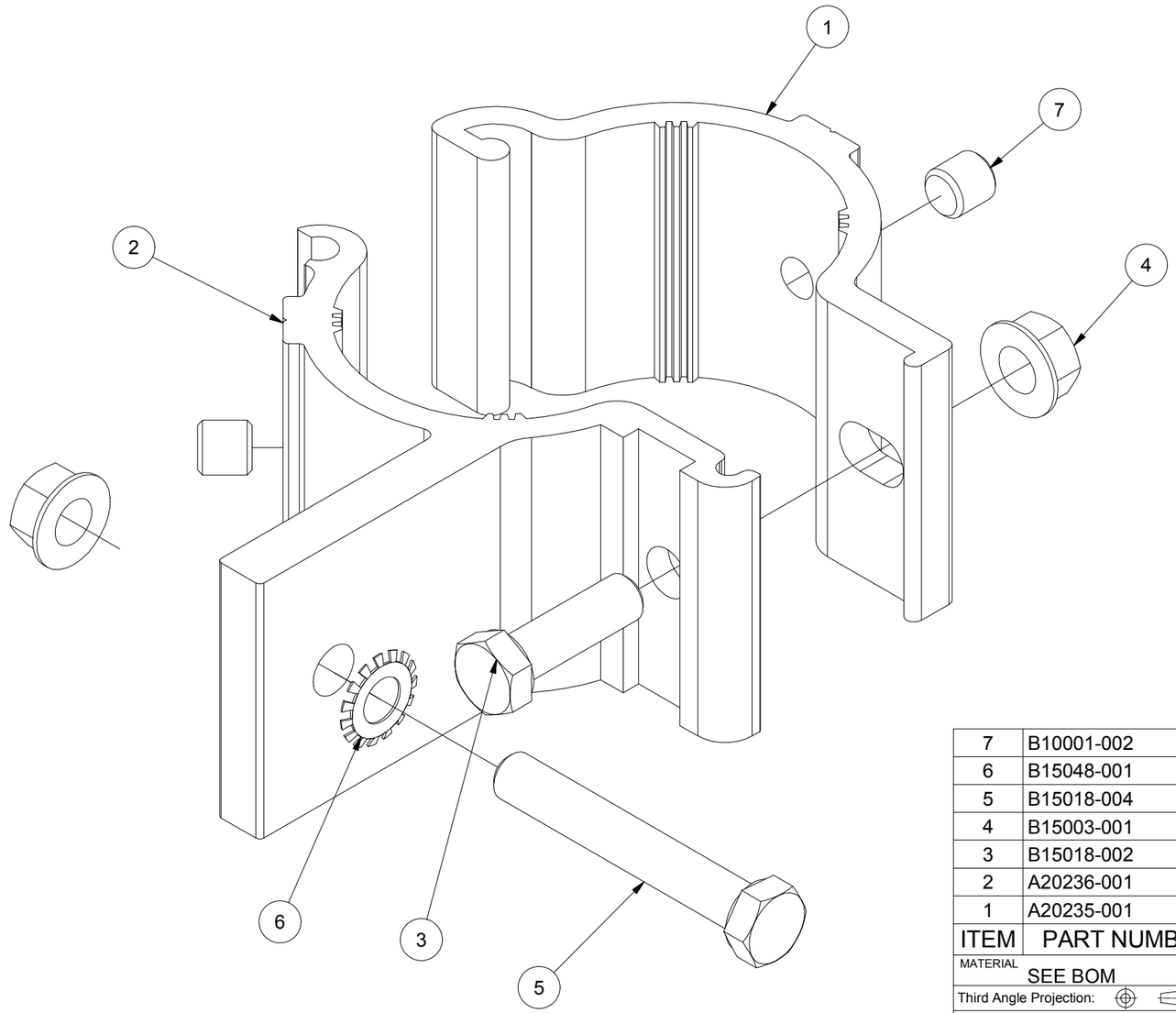
1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].
2. MATERAIL: ALUMINUM 6005-T5.
   FINISH: CLEAR ANODIZED 15 ųm THICK.
3. THE UNSPECIFIED DIMENSIONS ARE SPECIFIED BY 2D CAD FILE.



Section properties:

Weight: 1.151 lbs/ft
Area: 0.980 in^2
Perimeter: 22.104 in
Bounding Box: X: -0.625,0.625
Y: -1.463,1.537
Centroid:(0.000,0.000)
Moments of Inertia(in^4): Ix=1.047,Iy=0.207
Section modulus in bending(in^3): Wx=0.681,Wy=0.331
Radii of Gyration: X: 1.034, Y: 0.460

MATERIAL: SEE NOTES		**Sunmodo Corp.**	
Third Angle Projection:		1905 E 5TH STREET, SUITE A, VANCOUVER, WA 98661	
GENERAL SPECIFICATIONS: All Dimensions in Inches [millimeters]; Tolerances: X.XXX ±0.01 [0.25mm], X.XX ±0.02 [0.50mm], X.X ±0.039 [1.0mm], Unless otherwise specfd; Break all sharp edges .010-.020 unless otherwise specified.		TITLE: HELIO HEAVY RAIL	
DRAWN BY: zcg	DATE: 02/21/2013	B	DRAWING NUMBER: A20145
CHECKED BY		SCALE: NONE	SHEET 1 of 1
APPROVALS			



ITEM	PART NUMBER	DESCRIPTION	QTY
7	B10001-002	SET SCREW M10X10	2
6	B15048-001	STAR WASHER FOR 3/8 BOLT	1
5	B15018-004	HEX CAP SCREW 3/8-16 X2.5	1
4	B15003-001	FLANGE NUT 3/8-16	2
3	B15018-002	HEX CAP SCREW 3/8-16 X 1.25	1
2	A20236-001	2 AL PIPE CLAMP, FEMALE	1
1	A20235-001	2 AL PIPE CLAMP, MALE	1

MATERIAL: SEE BOM

Third Angle Projection:

GENERAL SPECIFICATIONS
All Dimensions in inches [millimeters]
Tolerances
X.XXX ±0.01 [0.25mm]
X.XX ±0.02 [0.50mm]
X.X ±0.039 [1.0mm]
Unless otherwise spec'd

Break all sharp edges .010-.020 unless otherwise specified.

DRAWN BY: zcg
DATE: 08/12/2015
CHECKED BY:
APPROVALS:

Sunmodo Corp.

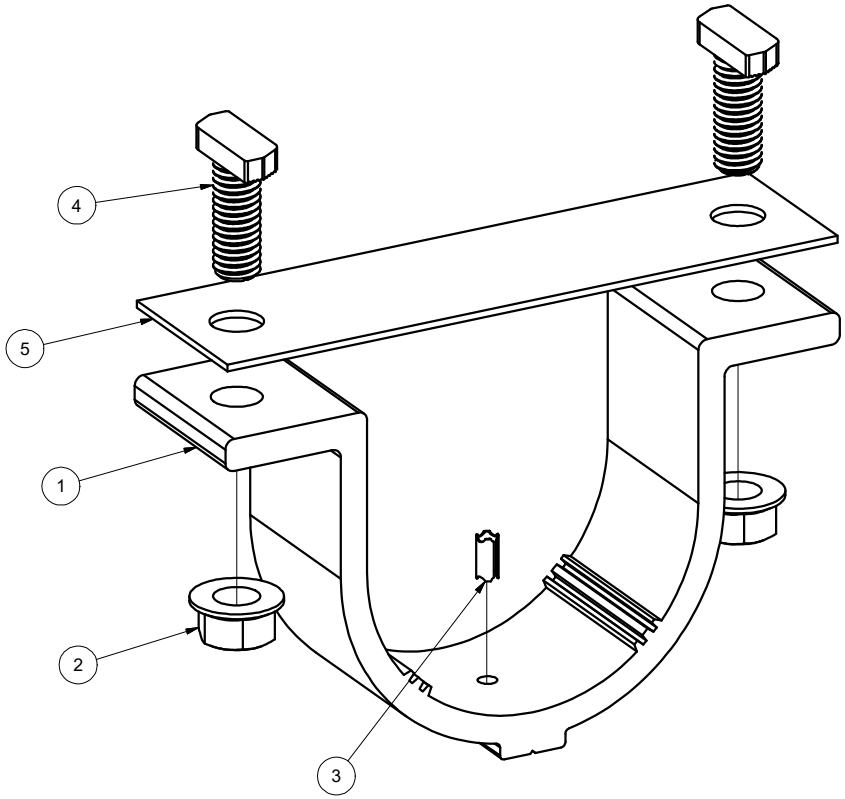
1905 E 5TH STREET, STE A, VANCOUVER, WA 98661

TITLE: 2 AL PIPE CLAMP KIT

B | DRAWING NUMBER: K10219-001

SCALE: NONE | SHEET 1 of 1

REVISIONS			
REV	DESCRIPTION	BY	DATE
A	INITIAL RELEASE	LWF	06/12/2018
B	ADD C10005-006	LWF	06/27/2018



ITEM	PART NUMBER	DESCRIPTION	QTY
5	C10005-006	PVC GASKTE T=1.5mm	1
4	B50033-001	T-BOLT, RAIL BOTTOM SLOT, 3/8-16 X 1"	2
3	B20018-002	GROUNDING PIN	1
2	B15003-001	FLANGE NUT 3/8-16	2
1	A20329-001	2.5" AL PIPE U-BOLT	1

MATERIAL: SEE NOTES

Third Angle Projection:

GENERAL SPECIFICATIONS
All Dimensions in inches [millimeters]
Tolerances
X.XXX ±0.01 [0.25mm]
X.XX ±0.02 [0.50mm]
X.X ±0.039 [1.0mm]
Unless otherwise spec'd
Break all sharp edges .010-.020 unless otherwise specified.

DRAWN BY: KYY
DATE: 06/12/2018
CHECKED BY:
APPROVALS:

SunModo Corp.

14800 NE 65TH STREET, VANCOUVER WA 98682

TITLE: 2.5" AL PIPE U-CLAMP KIT

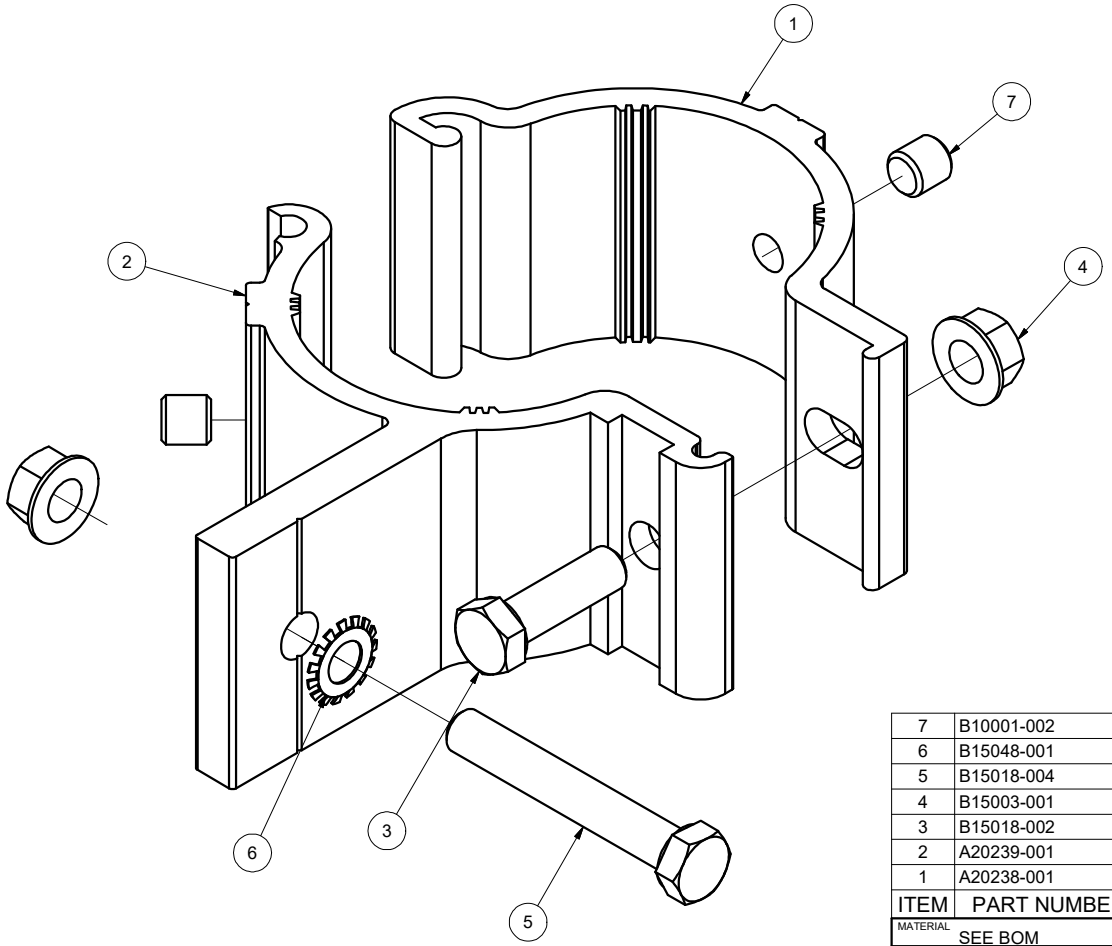
B

DRAWING NUMBER: K10343-001

SCALE: NONE

SHEET 1 of 1

REVISIONS			
REV	DESCRIPTION	BY	DATE
A	INITIAL RELEASE	zcg	09/25/2015



ITEM	PART NUMBER	DESCRIPTION	QTY
7	B10001-002	SET SCREW M10X10	2
6	B15048-001	STAR WASHER FOR 3/8 BOLT	1
5	B15018-004	HEX CAP SCREW 3/8-16 X2.5	1
4	B15003-001	FLANGE NUT 3/8-16	2
3	B15018-002	HEX CAP SCREW 3/8-16 X 1.25	1
2	A20239-001	2.5 AL PIPE CLAMP, FEMALE	1
1	A20238-001	2.5 AL PIPE CLAMP, MALE	1

MATERIAL: SEE BOM

Third Angle Projection:

GENERAL SPECIFICATIONS
All Dimensions in inches [millimeters]
Tolerances
X.XXX ±0.01 [0.25mm]
X.XX ±0.02 [0.50mm]
X.X ±0.039 [1.0mm]
Unless otherwise spec'd
Break all sharp edges .010-.020 unless otherwise specified.

DRAWN BY: LWF
DATE: 08/21/2015
CHECKED BY:
APPROVALS:

Sunmodo Corp.

1905 E 5TH STREET, STE A, VANCOUVER, WA 98661

TITLE: 2.5 AL PIPE CLAMP KIT

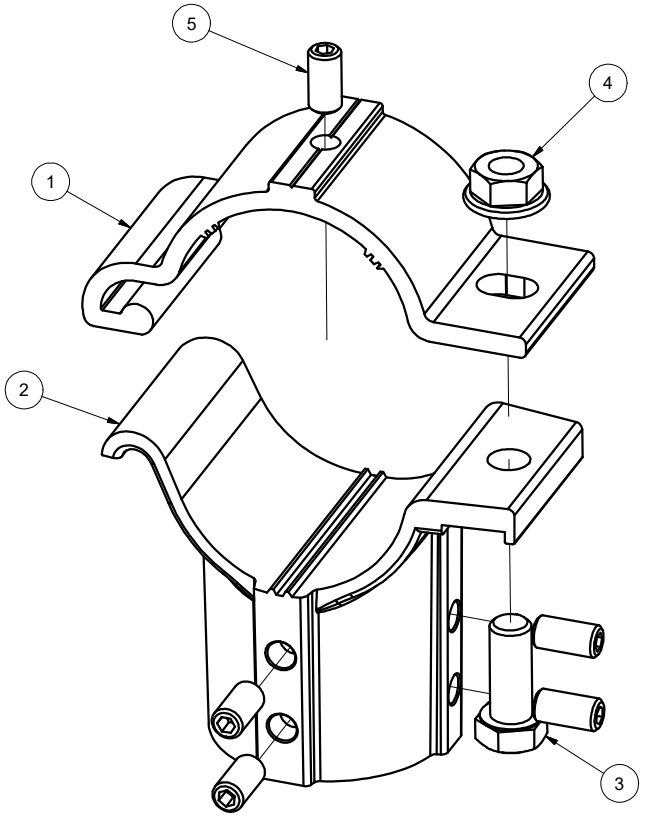
B

DRAWING NUMBER: K10222-001

SCALE: NONE

SHEET 1 of 1

REVISIONS			
REV	DESCRIPTION	BY	DATE
A	INITIAL RELEASE	LWF	06/12/2018



ITEM	PART NUMBER	DESCRIPTION	QTY
5	B10001-001	SET SCREW M10X20	5
4	B15020-001	FLANGE NUT 1/2-13	1
3	B15014-005	HEX CAP SCREW 1/2-13 X 1.25", 304 SS	1
2	A20327-001	2.5" AL PIPE TEE, FEMALE	1
1	A20326-001	2.5" AL PIPE TEE, MALE	1

MATERIAL: SEE NOTES

Third Angle Projection:

GENERAL SPECIFICATIONS
All Dimensions in inches [millimeters]
Tolerances
X.XXX ±0.01 [0.25mm]
X.XX ±0.02 [0.50mm]
X.X ±0.039 [1.0mm]
Unless otherwise spec'd
Break all sharp edges .010-.020 unless otherwise specified.

DRAWN BY: LWF
DATE: 06/12/2018
CHECKED BY:
APPROVALS:

SunModo Corp.

14800 NE 65TH STREET, VANCOUVER WA 98682

TITLE: 2.5" PIPE TEE KIT

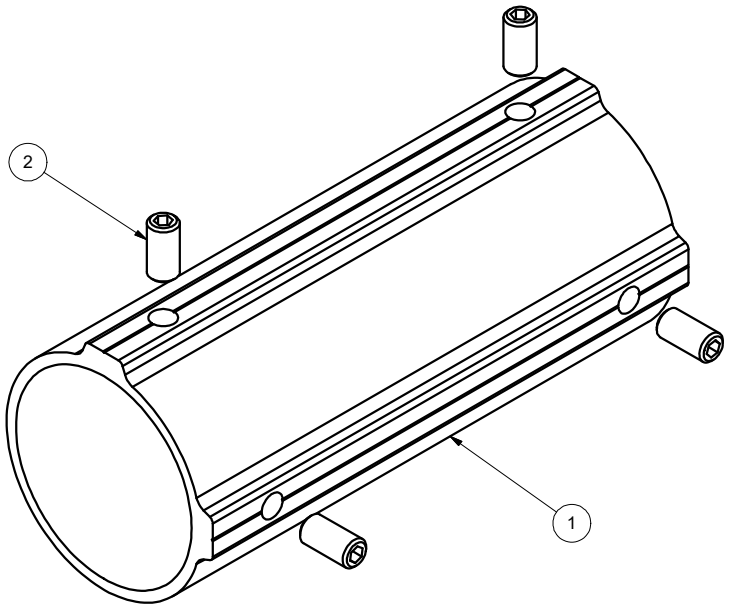
B

DRAWING NUMBER: K10341-001

SCALE: NONE

SHEET 1 of 1

REVISIONS			
REV	DESCRIPTION	BY	DATE
A	INITIAL RELEASE	LWF	06/12/2018



ITEM	PART NUMBER	DESCRIPTION	QTY
2	B10001-001	SET SCREW M10X20	4
1	A20328-001	2.5" PIPE SPLICE	1

MATERIAL: SEE NOTES

Third Angle Projection:

GENERAL SPECIFICATIONS
All Dimensions in inches [millimeters]
Tolerances
X.XXX ±0.01 [0.25mm]
X.XX ±0.02 [0.50mm]
X.X ±0.039 [1.0mm]
Unless otherwise spec'd
Break all sharp edges .010-.020 unless otherwise specified.

DRAWN BY: LWF
DATE: 06/12/2018
CHECKED BY:
APPROVALS:

SunModo Corp.

14800 NE 65TH STREET, VANCOUVER WA 98682

TITLE: 2.5" PIPE SPLICE KIT

B | DRAWING NUMBER: K10342-001

SCALE: NONE | SHEET 1 of 1

NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].

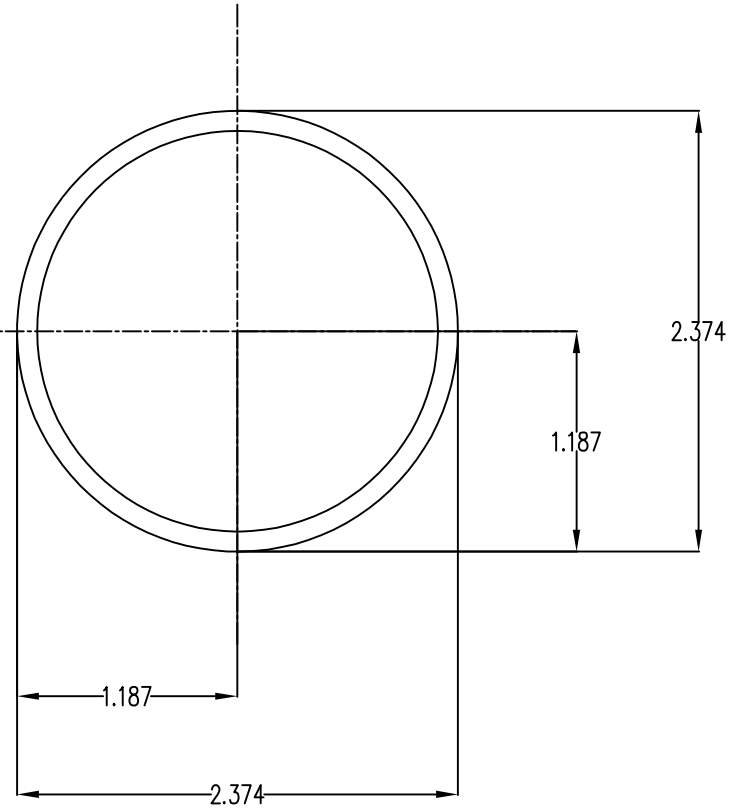
2. MATERAIL:HIGH STRENGTH STEEL PIPE OR TUBE.

3. FINISH: HOT DIP GALVANIZE PER ASTM A123 / A123M - 02.

   MINIMUM 50 KSI YIELD STRESS.

4. BREAK ALL BURRS AND SHARP EDGES.

5. ALL WELDING MUST BE IN COMPLIANCE WITH AWS CODE D1;1.



Section properties:

Weight: 2.641 lbs/ft
Area: 0.776 in^2
Perimeter: 14.238 in
Bounding Box: X: -1.187,1.187
Y: -1.187,1.187
Centroid:(0.000,0.000)
Moments of Inertia(in^4): Ix=0.499,Iy=0.499
Section modulus in bending(in^3): Wx=0.420,Wy=0.420
Radii of Gyration: X: 0.802, Y: 0.802

MATERIAL: SEE NOTES		**Sunmodo Corp.**	
Third Angle Projection:		14800 NE 65TH STREET, VANCOUVER WA 98682	
GENERAL SPECIFICATIONS: All Dimensions in Inches [millimeters]; Tolerances: XXXX ±0.01 [0.25mm], XXX ±0.02 [0.50mm], XX ±0.039 [1.0mm], Unless otherwise spec'd. Break all sharp edges .010-.020 unless otherwise specified.		TITLE: PIPE, HSS, 2.375" OD X 12 GAUGE,L=XXX	
DRAWN BY: LWF	DATE: 04/03/2019	B	DRAWING NUMBER: A21165
CHECKED BY			
APPROVALS		SCALE: NONE	SHEET 1 of 1

NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].

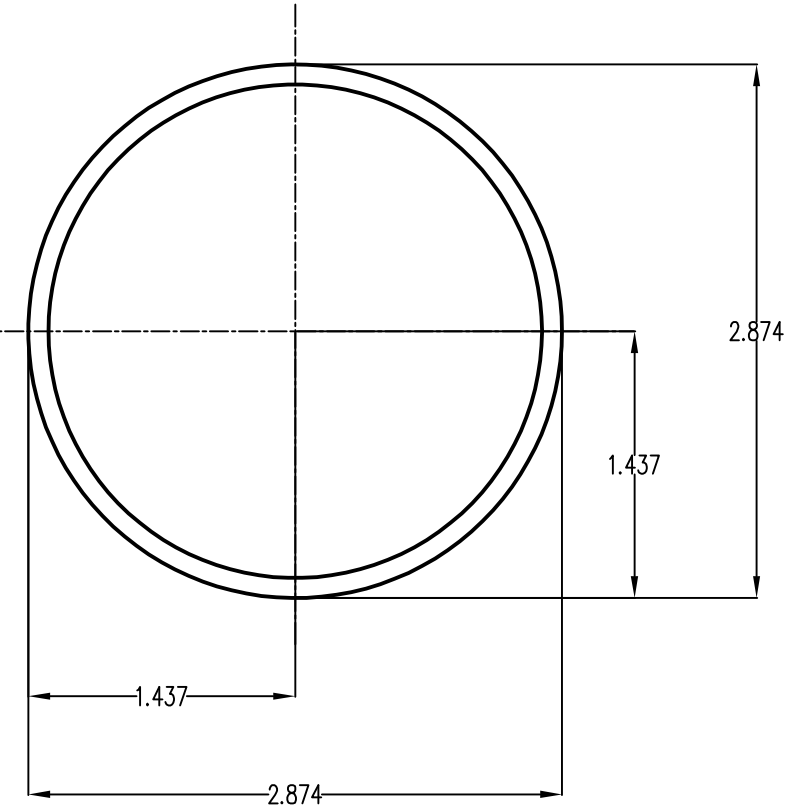
2. MATERAIL:HIGH STRENGTH STEEL PIPE OR TUBE.

3. FINISH: HOT DIP GALVANIZE PER ASTM A123 / A123M - 02.

   MINIMUM 50 KSI YIELD STRESS.

4. BREAK ALL BURRS AND SHARP EDGES.

5. ALL WELDING MUST BE IN COMPLIANCE WITH AWS CODE D1;1.



Section properties:

Weight: 3.201 lbs/ft
Area: 0.941 in^2
Perimeter: 17.378 in
Bounding Box: X: -1.437,1.437
Y: -1.437,1.437
Centroid:(0.000,0.000)
Moments of Inertia(in^4): Ix=0.901,Iy=0.901
Section modulus in bending(in^3): Wx=0.627,Wy=0.627
Radii of Gyration: X: 0.979, Y: 0.979

MATERIAL: SEE NOTES		**Sunmodo Corp.**	
Third Angle Projection:		14800 NE 65TH STREET, VANCOUVER WA 98682	
GENERAL SPECIFICATIONS All Dimensions in Inches [millimeters] Tolerances X.XXX ±0.01 [0.25mm] X.XX ±0.02 [0.50mm] X.X ±0.039 [1.0mm] Unless otherwise spec'd Break all sharp edges .010-.020 unless otherwise specified.		TITLE: PIPE, HSS, 2.875" OD X 12 GAUGE,L=XXX	
DRAWN BY: LWF	DATE: 04/03/2019	B	DRAWING NUMBER: A21168
CHECKED BY			
APPROVALS		SCALE: NONE	SHEET 1 of 1