Project Number: U2716-103-191

April 6, 2021

Sunmodo
14800 NE 65th Street
Vancouver, WA 98682

REFERENCE: Sunmodo Sunturf Ground Mount D1 (85x45)
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 Florida Building Code, 2017 Edition (2015 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. The following design parameters are used in our analysis:

- Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)
- Design wind speed for risk category I structures: 170 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	2059	1.5	3089
LATERAL	954	2	1908

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.

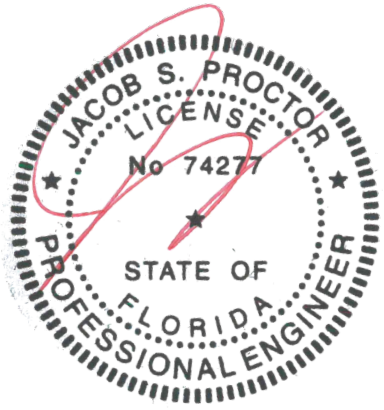
Very truly yours,

VECTOR STRUCTURAL ENGINEERING, LLC
Firm License: COA 26626

Jacob Proctor, P.E.
License: 74277 - Expires: 02/28/2023
Project Engineer

Enclosures

JSP/stb



04/06/2021

VECTOR ENGINEERS
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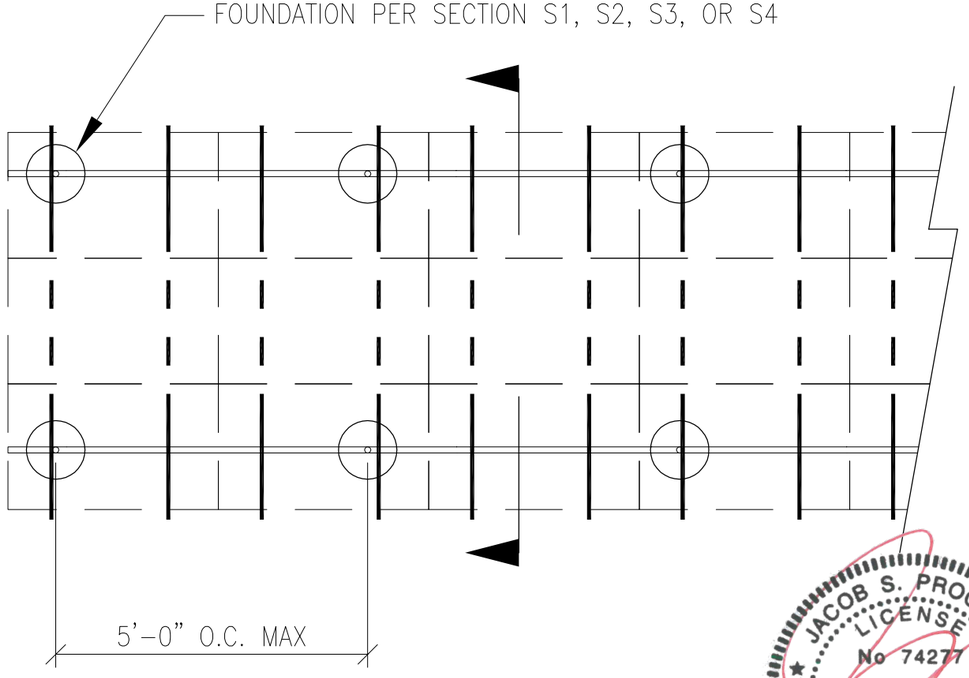
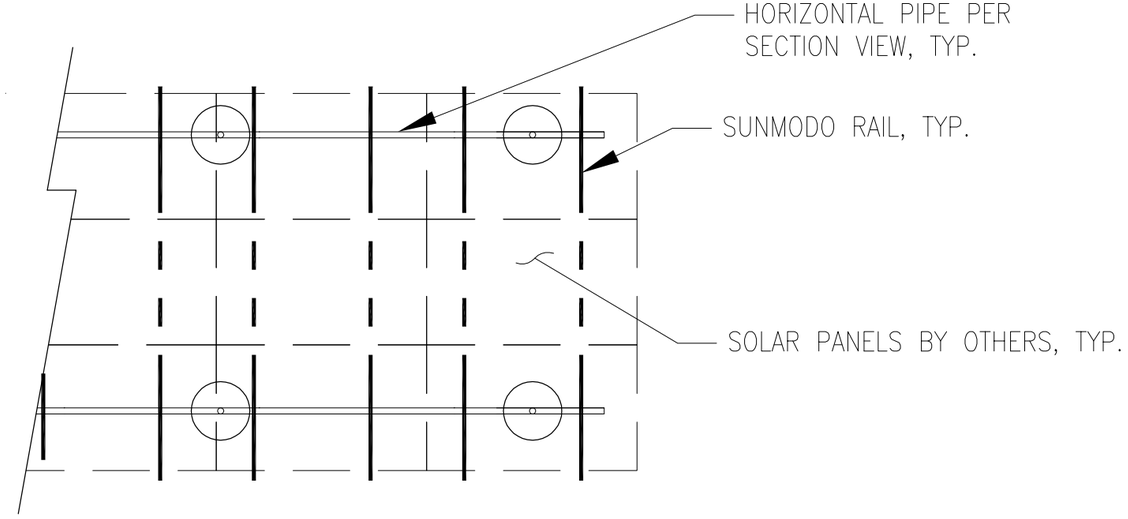
JOB NO. U2716-103-191

PROJECT SUNMODO SUNTURF GROUND MOUNTS D1

SUBJECT ALL OPTIONS





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04/06/2021

PV ARRAY PLAN

N.T.S.

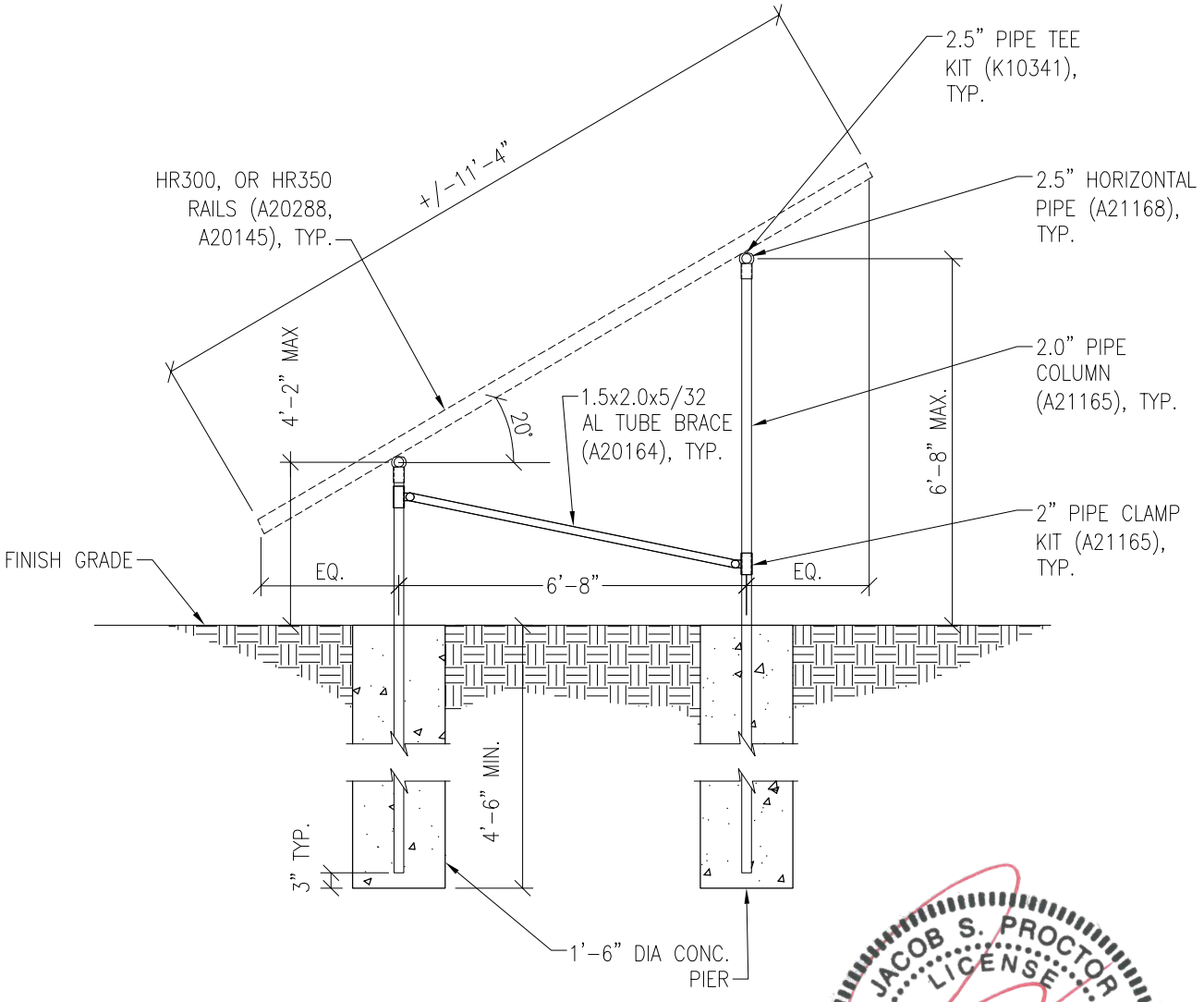
P1

VECTOR ENGINEERS

JOB NO. U2716-103-191

PROJECT SUNMODO SUNTURF GROUND MOUNTS D1

SUBJECT DRILLED PIER OPTION



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PV ARRAY SECTION

N.T.S.

S1

04/06/2021

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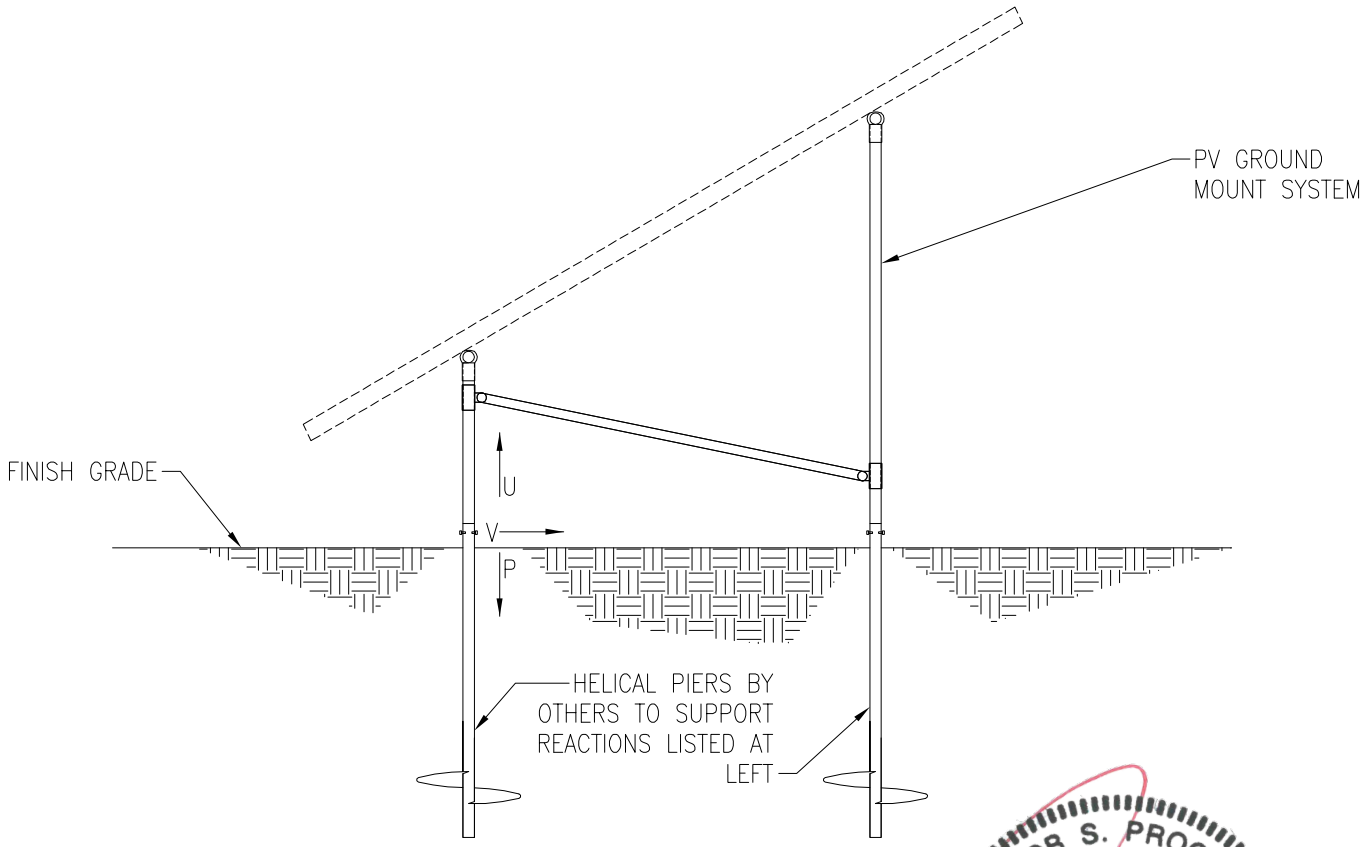
JOB NO. U2716-103-191

PROJECT SUNMODO SUNTURF GROUND MOUNTS D1

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 = 2,059 LBS
P = 2,206 LBS
V = 954 LBS

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PV ARRAY SECTION

N.T.S.

S2

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04/06/2021

VECTOR ENGINEERS

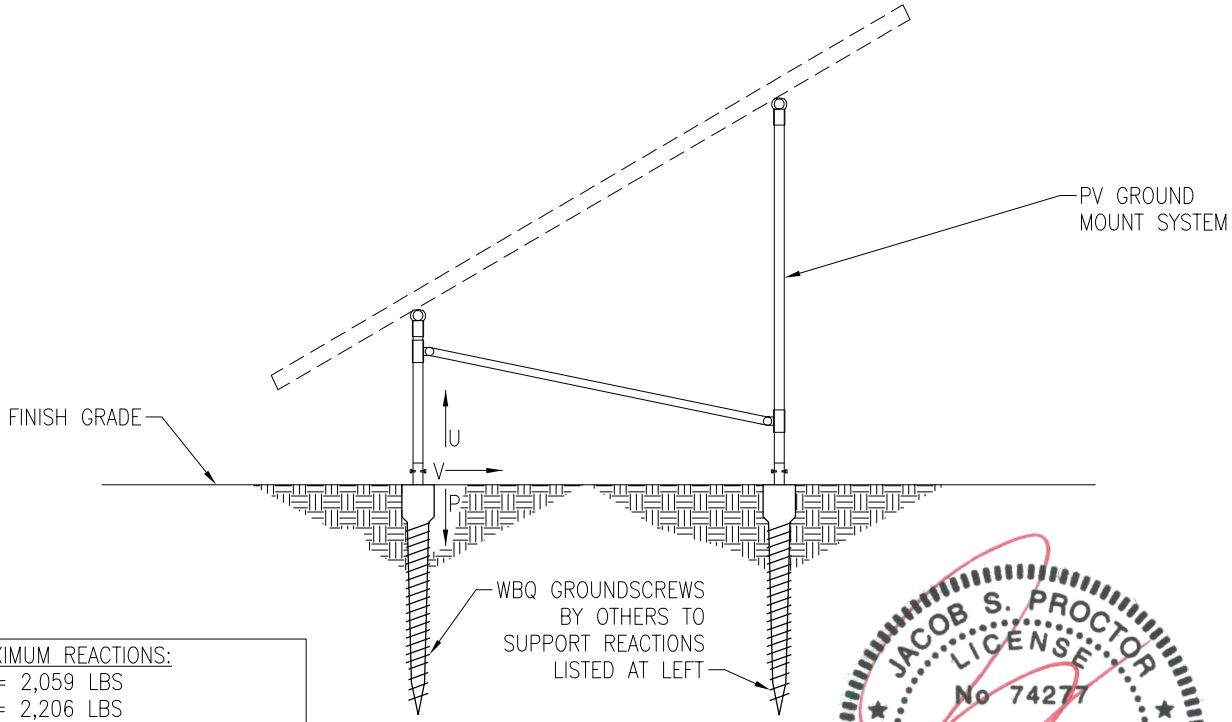
JOB NO. U2716-103-191

PROJECT SUNMODO SUNTURF GROUND MOUNTS D1

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 = 2,059 LBS
P = 2,206 LBS
V = 954 LBS

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PV ARRAY SECTION

N.T.S.

S3

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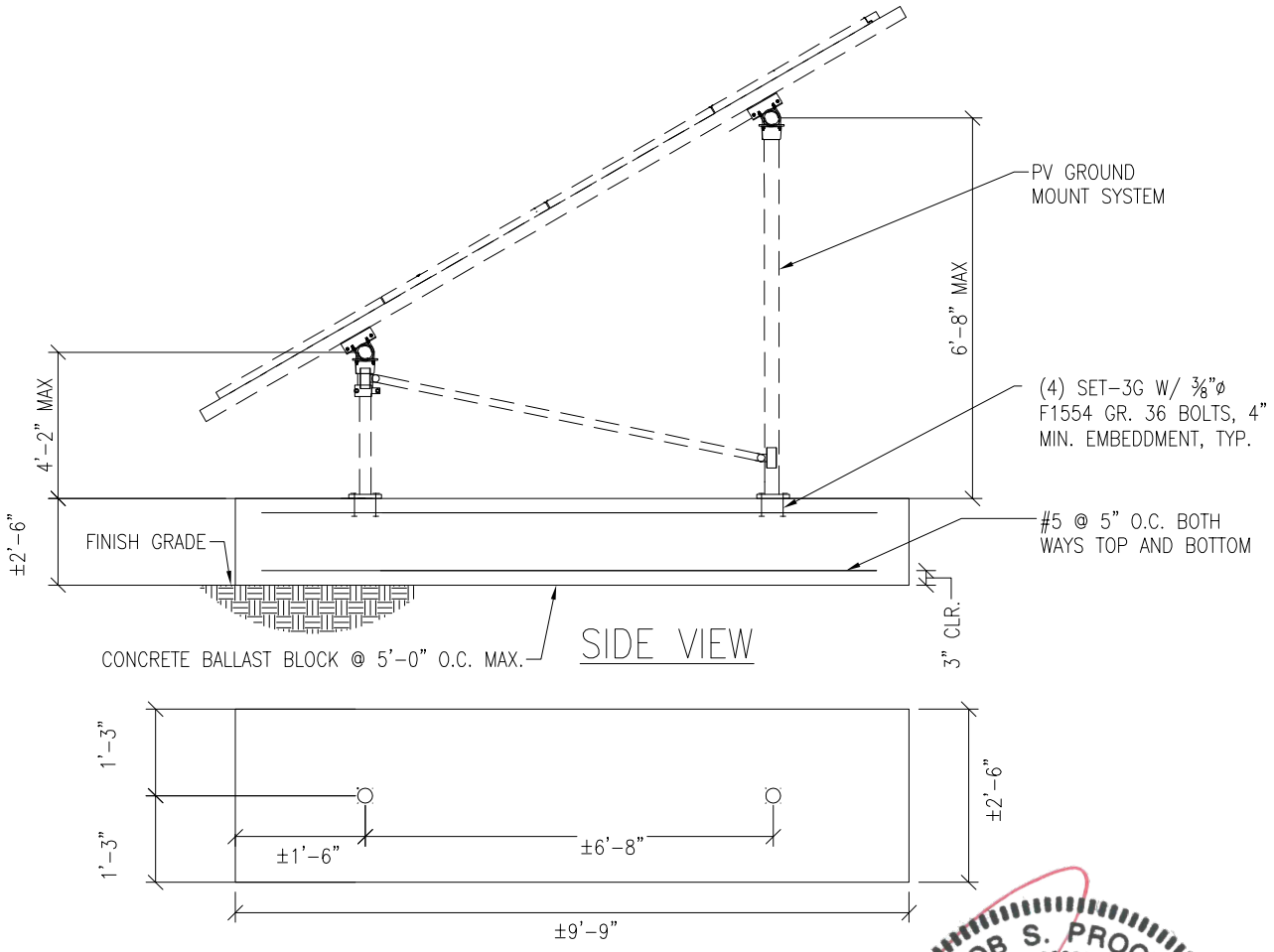
PROJECT SUNMODO SUNTURF GROUND MOUNTS D1

SUBJECT BALLASTED BLOCK OPTION

NOTES:

1. For ground mount components see Section S1.



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PV ARRAY SECTION

N.T.S.

S4

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04/06/2021

JOB NO.: U2716-103-191 **DESIGNED:** STB
DATE: 07/31/19

PROJECT: D1 - Florida GM **SUBJECT:** Dead Load

Design Weight:

Individual Panel Weight [lb]:	50.7
Panel Transverse Length (T5) [in]:	39.1
Panel Transverse Length (T5) [ft]:	3.3
Panel Longitudinal Length (L2) [in]:	77.0
Panel Longitudinal Length (L2) [ft]:	6.4
Individual Panel Area [ft^2]:	20.9
Individual Panel Weight [psf]:	2.4
# of Panels in Transverse Direction:	4
Approximate Transverse Length (T4) [ft]:	13.0
# of Panels in Longitudinal Direction:	12
Approximate Longitudinal Length (L1) [ft]:	77.0
Transverse Column Spacing (T1) [ft]:	7.8
Longitudinal Column Spacing (L3) [ft]:	5.0
# of Columns in Longitudinal Direction:	16
# of Columns in Transverse Direction:	2
Total Number of Columns:	32
Panel Slope from Horizontal (a) [°]:	20.0
Short Column Height (H1) [ft]:	4.0
Approximate Tall Column Height (H2) [ft]:	6.8
Transverse Brace between Columns :	Yes
Approximate Brace Length (B1) [ft]:	9.0
Weight of Columns [plf]:	3.7
Weight of Cross Pipe [plf]:	3.7
Weight of Brace [plf]:	3.7
Tributary Transverse Length per Column [ft]:	6.5
Tributary Longitudinal Length per Column [ft]:	5.0
Tributary Area per Column [ft^2]:	32.6
Rail Weight [plf]:	1.0
Transverse Rail Weight per Column [lb]:	13.0
Longitudinal Rail Weight per Column [lb]:	18.3
Tall Column Weight [lb]:	24.9
Panel Weight per Column [lb]:	79.0
Rail Weight per Column [lb]:	13.0
Cross Pipe Weight per Column [lb]:	18.3
Brace Weight per Column [lb]:	16.4
Total Weight per Column (1.0 D) [lb]:	**151.7**

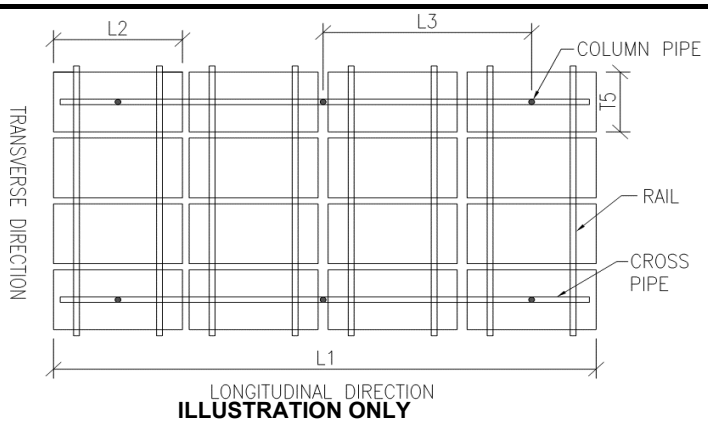
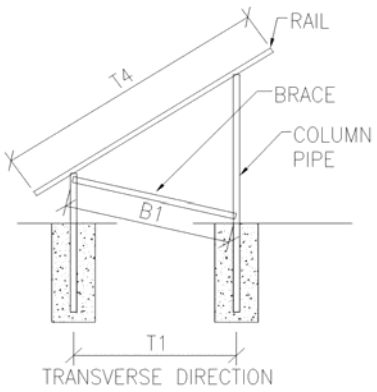


ILLUSTRATION ONLY



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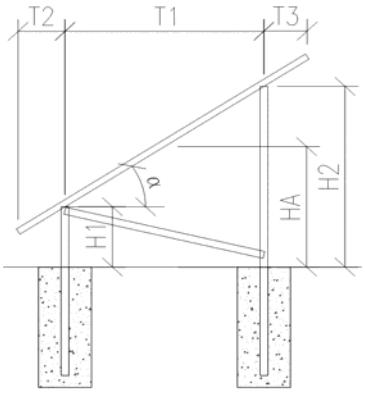


ILLUSTRATION ONLY

Assumptions:
- T2 = T3

JOB NO.: U2716-103-191 **DESIGNED:** STB
DATE: 07/31/19

PROJECT: D1 - Florida GM **SUBJECT:** Snow Load

SNOW LOAD (S):

ASCE 7 Standard:	10	
Panel Slope from Horizontal [°]:	20.0	
Snow Ground Load, p_g [psf]:	0.0	(Section 7.2)
Terrain Category:	C	(Table 7-2)
Exposure of Roof:	Fully Exposed	(Table 7-2)
Exposure Factor, C_e:	0.9	(Table 7-2)
Thermal Factor, C_t:	1.2	(Table 7-3)
Risk Category:	I	(Table 1.5-1)
Importance Factor, I_S:	0.8	(Table 1.5-2)
Flat Roof Snow Load, p_f [psf]:	0	(Equation 7.3-1)
Minimum Roof Snow Load, p_m [psf]:	0	(Section 7.3.4)
Unobstructed Slippery Surface?	Yes	(Section 7.4)
Slope Factor Figure:	Figure 7-2c	(Section 7.4)
Roof Slope Factor, C_s:	0.909	(Figure 7-2)
Sloped Roof Snow Load, p_s [psf]:	0	(Equation 7.4-1)
Design Snow Load, S [psf]:	0	
Tributary Transverse Length [ft]:	6.1	
Tributary Longitudinal Length [ft]:	5	
Tributary Area per Column [ft^2]:	30.6	
Snow Load per Column (1.0 S) [lb]:	**0.0**	

JOB NO.: U2716-103-191 **DESIGNED:** STB
DATE: 07/31/19

PROJECT: D1 - Florida GM **SUBJECT:** Wind Pressure

Design Wind Load:

ASCE 7 Standard:	10	
Basic Wind Speed, V [mph]:	170	
Risk Category:	I	
Exposure Category	C	(Section 26.7.3)
Velocity Pressure Exposure Coefficient, K_h:	0.85	(Table 27.3-1)
Topographic Factor, K_{ht}:	1.0	(Section 26.8.2)
Wind Directionality Factor, K_d:	0.85	(Table 26.6-1)
Internal Pressure Coefficient, GC_{pi} :	0.00	(Table 26.11-1)
Velocity Pressure, q_h [psf]:	53.5	(Equation 27.3-1)
Gust Effect Factor, G:	0.85	(Section 26.9.1)
Panel Slope [degrees]:	20.0	

Net Pressure Coefficients (C_N) per: (Figure 27.4-4)

Clear Wind Flow	C_{NW}	C_{NL}
Case 1 (γ = 0°, Load Case A)	-1.30	-1.50
Case 2 (γ = 0°, Load Case B)	-2.23	-0.20
Case 3 (γ = 180°, Load Case A)	1.57	1.73
Case 4 (γ = 180°, Load Case B)	2.07	0.67

Design Wind Pressures (p) [psf] per: (Equation 27.4-3)

Clear Wind Flow	q_hGC_{NW}	q_hGC_{NL}
Case 1 (γ = 0°, Load Case A)	-59.1	-68.2
Case 2 (γ = 0°, Load Case B)	-101.5	-9.1
Case 3 (γ = 180°, Load Case A)	71.2	78.8
Case 4 (γ = 180°, Load Case B)	93.9	30.3

Wind Pressure on Each Side of Panels [psf]

Clear Wind Flow	Short Col. Pressure	Long Col. Pressure
Case 1 (γ = 0°, Load Case A)	-68.2	-59.1
Case 2 (γ = 0°, Load Case B)	-9.1	-101.5
Case 3 (γ = 180°, Load Case A)	71.2	78.8
Case 4 (γ = 180°, Load Case B)	93.9	30.3

JOB NO.: U2716-103-191

PROJECT: D1 - Florida GM

SUBJECT: Open Building Wind Loads

Design Wind Load Per ASCE 7-10

$p = q_h G C_n$

Velocity Pressure Exposure Coefficient, K_h:	0.85	(Table 27.3-1)
Topographic Factor, K_{ht}:	1.0	(Section 26.8.2)
Wind Directionality Factor, K_d:	0.85	(Table 26.6-1)
Ultimate Wind Speed, V [mph]:	170	
Velocity Pressure, q_h [psf]:	53.5	(Equation 27.3-1)
Gust Effect Factor, G:	0.85	(Section 26.9.1)

$\gamma = 90^o$ or 270^o

Force Coefficient, C_N:

Horizontal Distance from Winward Edge	Roof angle	Load Case	Obstructed Wind Flow CN
<= h	20	A	-0.8
		B	0.8
> h, <= 2h	20	A	-0.6
		B	0.5
> 2h	20	A	-0.3
		B	0.3

Design Wind Pressure, p [psf]:

	Roof angle	Load Case	Obstructed Wind Flow
<= h	20	A	-36.3
		B	36.3
> h, <= 2h	20	A	-27.3
		B	22.7
> 2h	20	A	-13.6
		B	13.6

JOB NO.: U2716-103-191 **DESIGNED:** STB

Foundation Option 1: Drilled Concrete Pier

JOB NO.: U2716-103-191
SUBJECT: CONC. PIER

PROJECT: D1 - Sunturf Ground Mount

DRILLED CONCRETE PIER DESIGN

Column Reactions:

Max. Shear, V [k]:	1.0	Max. Down, P_d [k]:	2.2
Max. Moment, M [k-ft]:	0.0	Max. Uplift, P_u [k]:	2.1

Pier Properties:

Pier Shape:	Round		
Pier Diameter, b [ft]:	1.5	Volume of Concrete [ft^3]:	8
Top of Pier Elevation [ft]:	0.00	Volume of Concrete [yd^3]:	0.3
Pier Depth, d [ft]:	4.5	Weight of Concrete [k]:	1.2

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]:	5.3	**Bearing capacity OK.**

Check Uplift:

Uplift Capacity [k]:	6.4	**Uplift capacity OK.**

Check Lateral Bearing:

Top of Pier Constrained?:	No	IBC Section1807.3.2.1
Applied Lateral Force, P [lb]:	954	
Point of Application, h [ft]:	0.0	
S_{max} [psf]:		
S [psf]:	450	
A = 2.34*P/(Sb):	3.31	
Required Pier Depth, d_{reqd} [ft]:	3.30	IBC Eq. 18-1

Result: **Lateral bearing capacity OK.**

JOB NO.: U2716-103-191 **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	2059	1.5	3089
LATERAL	954	2	1908

JOB NO.: U2716-103-191 **DESIGNED:** STB

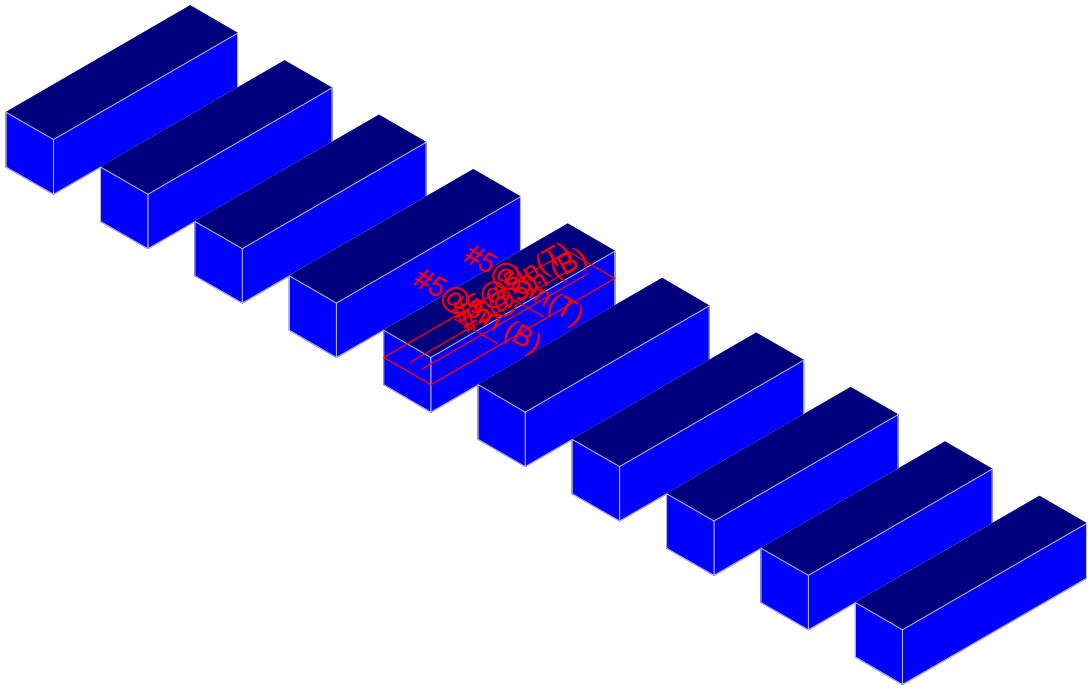
Foundation Option 3: Ground Screw

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	2059	1.5	3089
LATERAL	954	2	1908

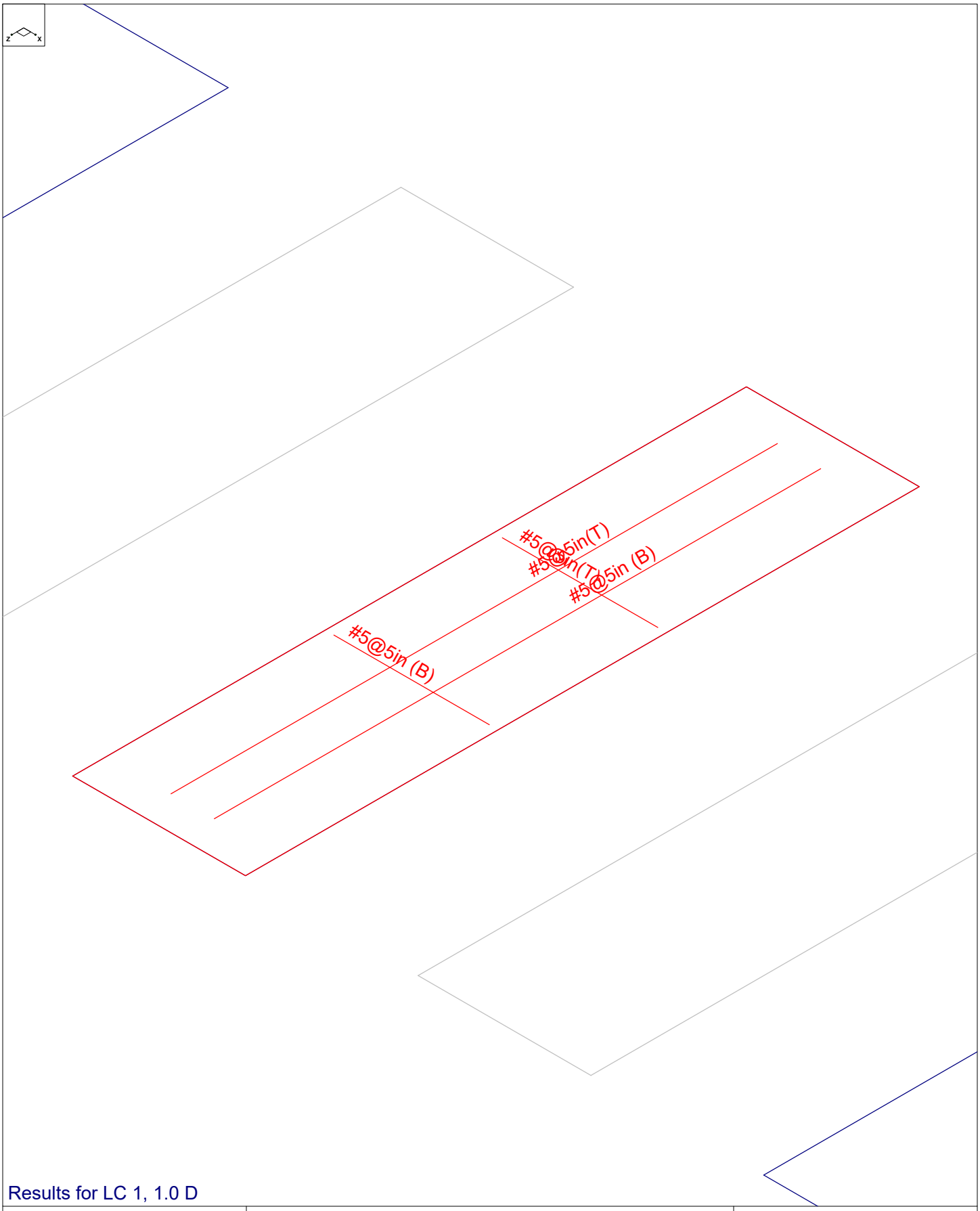
JOB NO.: U2716-103-191 **DESIGNED:** STB

Foundation Option 4: Ballasted Block



Results for LC 1, 1.0 D

Vector Structural Engineeri...		SK - 2
STB	Ground Mount	Apr 6, 2021 at 3:46 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...



Results for LC 1, 1.0 D

Vector Structural Engineeri...	Ground Mount	SK - 1
STB		Apr 6, 2021 at 3:46 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...

(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	5	5	5	5	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	X	-4.683
2	R3D_N1	Y	142.732
3	R3D_N2	X	2.573
4	R3D_N2	Y	117.681
5	R3D_N132	Y	136.914
6	R3D_N133	Y	125.902
7	R3D_N109	Y	129.582
8	R3D_N110A	Y	127.35

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

	Label	Direction	Magnitude[lb,lb-ft]
9	R3D_N121	Y	136.631
10	R3D_N122	X	-1.829
11	R3D_N122	Y	123.802
12	R3D_N133B	Y	130.489
13	R3D_N134B	Y	119.568
14	R3D_N151	Y	136.962
15	R3D_N152	Y	125.996
16	R3D_N157A_1	Y	130.684
17	R3D_N158A_1	Y	119.759
18	R3D_N155B_1	Y	136.18
19	R3D_N156B_1	X	1.8
20	R3D_N156B_1	Y	123.373
21	R3D_N167	Y	130.856
22	R3D_N168	Y	128.257
23	R3D_N179	X	4.672
24	R3D_N179	Y	140.105
25	R3D_N180	X	-2.317
26	R3D_N180	Y	115.378

Point Loads and Moments (Cat 16 : OL1)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1	X	82.314
2	R3D_N1	Y	-2653.524
3	R3D_N1	Z	1229.601
4	R3D_N2	X	-41.341
5	R3D_N2	Y	-683.242
6	R3D_N2	Z	-39.73
7	R3D_N132	X	-8.969
8	R3D_N132	Y	-2735.224
9	R3D_N132	Z	1333.352
10	R3D_N133	X	-17.038
11	R3D_N133	Y	-745.904
12	R3D_N133	Z	-41.549
13	R3D_N109	X	1.76
14	R3D_N109	Y	-2554.778
15	R3D_N109	Z	1265.706
16	R3D_N110A	X	-1.292
17	R3D_N110A	Y	-815.91
18	R3D_N110A	Z	-40.666
19	R3D_N121	X	16.144
20	R3D_N121	Y	-2738.005
21	R3D_N121	Z	1348.65
22	R3D_N122	X	30.461
23	R3D_N122	Y	-699.342
24	R3D_N122	Z	-41.44
25	R3D_N133B	X	-5.928
26	R3D_N133B	Y	-2468.262
27	R3D_N133B	Z	1169.176
28	R3D_N134B	X	-9.933
29	R3D_N134B	Y	-779.691
30	R3D_N134B	Z	-39.579
31	R3D_N151	X	8.06
32	R3D_N151	Y	-2730.432
33	R3D_N151	Z	1327.395
34	R3D_N152	X	16.583
35	R3D_N152	Y	-753.228

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

	Label	Direction	Magnitude[lb,lb-ft]
36	R3D_N152	Z	-41.504
37	R3D_N157A_1	X	6.759
38	R3D_N157A_1	Y	-2478.353
39	R3D_N157A_1	Z	1176.259
40	R3D_N158A_1	X	12.584
41	R3D_N158A_1	Y	-776.476
42	R3D_N158A_1	Z	-39.646
43	R3D_N155B_1	X	-16.639
44	R3D_N155B_1	Y	-2725.095
45	R3D_N155B_1	Z	1342.683
46	R3D_N156B_1	X	-30.06
47	R3D_N156B_1	Y	-697.254
48	R3D_N156B_1	Z	-41.369
49	R3D_N167	X	-1.802
50	R3D_N167	Y	-2582.799
51	R3D_N167	Z	1276.59
52	R3D_N168	X	2.472
53	R3D_N168	Y	-822.633
54	R3D_N168	Z	-40.598
55	R3D_N179	X	-81.699
56	R3D_N179	Y	-2592.503
57	R3D_N179	Z	1201.749
58	R3D_N180	X	37.565
59	R3D_N180	Y	-666.94
60	R3D_N180	Z	-39.217

Point Loads and Moments (Cat 17 : OL2)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1	X	118.152
2	R3D_N1	Y	-3491.962
3	R3D_N1	Z	1036.151
4	R3D_N2	X	-2.017
5	R3D_N2	Y	568.882
6	R3D_N2	Z	-33.451
7	R3D_N132	X	-12.933
8	R3D_N132	Y	-3563.876
9	R3D_N132	Z	1148.566
10	R3D_N133	X	-2.514
11	R3D_N133	Y	629.736
12	R3D_N133	Z	-35.361
13	R3D_N109	X	3.674
14	R3D_N109	Y	-3259.136
15	R3D_N109	Z	1063.433
16	R3D_N110A	Y	539.789
17	R3D_N110A	Z	-34.392
18	R3D_N121	X	23.023
19	R3D_N121	Y	-3569.614
20	R3D_N121	Z	1167.154
21	R3D_N122	X	1.611
22	R3D_N122	Y	650.869
23	R3D_N122	Z	-35.25
24	R3D_N133B	X	-8.499
25	R3D_N133B	Y	-3190.949
26	R3D_N133B	Z	941.832
27	R3D_N134B	Y	445.367
28	R3D_N134B	Z	-32.85

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

	Label	Direction	Magnitude[lb,lb-ft]
29	R3D_N151	X	11.629
30	R3D_N151	Y	-3557.007
31	R3D_N151	Z	1139.845
32	R3D_N152	X	2.452
33	R3D_N152	Y	621.425
34	R3D_N152	Z	-35.292
35	R3D_N157A_1	X	9.706
36	R3D_N157A_1	Y	-3205.323
37	R3D_N157A_1	Z	951.322
38	R3D_N158A_1	Y	453.849
39	R3D_N158A_1	Z	-32.942
40	R3D_N155B_1	X	-23.757
41	R3D_N155B_1	Y	-3551.226
42	R3D_N155B_1	Z	1160.336
43	R3D_N156B_1	X	-1.548
44	R3D_N156B_1	Y	645.55
45	R3D_N156B_1	Z	-35.167
46	R3D_N167	X	-3.679
47	R3D_N167	Y	-3296.391
48	R3D_N167	Z	1072.263
49	R3D_N168	Y	543.564
50	R3D_N168	Z	-34.312
51	R3D_N179	X	-117.32
52	R3D_N179	Y	-3412.664
53	R3D_N179	Z	1013.155
54	R3D_N180	X	1.563
55	R3D_N180	Y	557.762
56	R3D_N180	Z	-33.043

Point Loads and Moments (Cat 18 : OL3)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1	X	-105.512
2	R3D_N1	Y	3343.441
3	R3D_N1	Z	-1442.99
4	R3D_N2	X	42.521
5	R3D_N2	Y	592.727
6	R3D_N2	Z	46.62
7	R3D_N132	X	11.507
8	R3D_N132	Y	3439.88
9	R3D_N132	Z	-1569.311
10	R3D_N133	X	17.831
11	R3D_N133	Y	645.502
12	R3D_N133	Z	48.823
13	R3D_N109	X	-2.466
14	R3D_N109	Y	3200.228
15	R3D_N109	Z	-1484.787
16	R3D_N110A	X	1.34
17	R3D_N110A	Y	733.312
18	R3D_N110A	Z	47.746
19	R3D_N121	X	-20.666
20	R3D_N121	Y	3443.763
21	R3D_N121	Z	-1588.305
22	R3D_N122	X	-31.353
23	R3D_N122	Y	594.166
24	R3D_N122	Z	48.692
25	R3D_N133B	X	7.597

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

	Label	Direction	Magnitude[lb,lb-ft]
26	R3D_N133B	Y	3099.56
27	R3D_N133B	Z	-1364.151
28	R3D_N134B	X	10.216
29	R3D_N134B	Y	713.63
30	R3D_N134B	Z	46.356
31	R3D_N151	X	-10.342
32	R3D_N151	Y	3433.739
33	R3D_N151	Z	-1561.644
34	R3D_N152	X	-17.357
35	R3D_N152	Y	654.488
36	R3D_N152	Z	48.764
37	R3D_N157A_1	X	-8.664
38	R3D_N157A_1	Y	3112.474
39	R3D_N157A_1	Z	-1373.106
40	R3D_N158A_1	X	-12.944
41	R3D_N158A_1	Y	708.803
42	R3D_N158A_1	Z	46.441
43	R3D_N155B_1	X	21.305
44	R3D_N155B_1	Y	3427.242
45	R3D_N155B_1	Z	-1580.975
46	R3D_N156B_1	X	30.932
47	R3D_N156B_1	Y	593.01
48	R3D_N156B_1	Z	48.604
49	R3D_N167	X	2.509
50	R3D_N167	Y	3235.604
51	R3D_N167	Z	-1497.498
52	R3D_N168	X	-2.6
53	R3D_N168	Y	739.477
54	R3D_N168	Z	47.662
55	R3D_N179	X	104.732
56	R3D_N179	Y	3266.738
57	R3D_N179	Z	-1410.391
58	R3D_N180	X	-38.588
59	R3D_N180	Y	578.137
60	R3D_N180	Z	46.022

Point Loads and Moments (Cat 19 : OL4)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1	X	-54.868
2	R3D_N1	Y	1941.593
3	R3D_N1	Z	-1217.193
4	R3D_N2	X	58.829
5	R3D_N2	Y	1300.795
6	R3D_N2	Z	39.345
7	R3D_N132	X	5.947
8	R3D_N132	Y	2020.795
9	R3D_N132	Z	-1306.266
10	R3D_N133	X	23.327
11	R3D_N133	Y	1424.831
12	R3D_N133	Z	40.939
13	R3D_N109	Y	1925.465
14	R3D_N109	Z	-1254.649
15	R3D_N110A	X	1.807
16	R3D_N110A	Y	1477.244
17	R3D_N110A	Z	40.188
18	R3D_N121	X	-10.843

Point Loads and Moments (Cat 19 : OL4) (Continued)

	Label	Direction	Magnitude[lb,lb-ft]
19	R3D_N121	Y	2021.694
20	R3D_N121	Z	-1318.303
21	R3D_N122	X	-43.278
22	R3D_N122	Y	1368.862
23	R3D_N122	Z	40.842
24	R3D_N133B	X	3.957
25	R3D_N133B	Y	1837.248
26	R3D_N133B	Z	-1181.055
27	R3D_N134B	X	14.135
28	R3D_N134B	Y	1373.228
29	R3D_N134B	Z	39.454
30	R3D_N151	X	-5.339
31	R3D_N151	Y	2017.595
32	R3D_N151	Z	-1302.388
33	R3D_N152	X	-22.702
34	R3D_N152	Y	1430.914
35	R3D_N152	Z	40.912
36	R3D_N157A_1	X	-4.502
37	R3D_N157A_1	Y	1844.034
38	R3D_N157A_1	Z	-1186.145
39	R3D_N158A_1	X	-17.905
40	R3D_N158A_1	Y	1373.195
41	R3D_N158A_1	Z	39.501
42	R3D_N155B_1	X	11.16
43	R3D_N155B_1	Y	2013.013
44	R3D_N155B_1	Z	-1313.372
45	R3D_N156B_1	X	42.731
46	R3D_N156B_1	Y	1362.935
47	R3D_N156B_1	Z	40.784
48	R3D_N167	Y	1945.761
49	R3D_N167	Z	-1265.61
50	R3D_N168	X	-3.344
51	R3D_N168	Y	1489.049
52	R3D_N168	Z	40.133
53	R3D_N179	X	54.43
54	R3D_N179	Y	1896.396
55	R3D_N179	Z	-1189.363
56	R3D_N180	X	-53.603
57	R3D_N180	Y	1271.099
58	R3D_N180	Z	38.824

Point Loads and Moments (Cat 20 : OL5)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1	X	-25.104
2	R3D_N1	Y	1632.075
3	R3D_N1	Z	-736.718
4	R3D_N2	X	31.658
5	R3D_N2	Y	349.128
6	R3D_N2	Z	21.681
7	R3D_N132	X	2.047
8	R3D_N132	Y	582.213
9	R3D_N132	Z	-274.17
10	R3D_N133	Y	127.422
11	R3D_N133	Z	9.716
12	R3D_N109	X	-3.781
13	R3D_N109	Y	1219.843

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

	Label	Direction	Magnitude[lb,lb-ft]
14	R3D_N109	Z	-586.988
15	R3D_N110A	X	-9.073
16	R3D_N110A	Y	338.335
17	R3D_N110A	Z	19.045
18	R3D_N121	X	-3.956
19	R3D_N121	Y	1144.505
20	R3D_N121	Z	-538.922
21	R3D_N122	X	-9.579
22	R3D_N122	Y	264.541
23	R3D_N122	Z	16.115
24	R3D_N133B	X	4.763
25	R3D_N133B	Y	696.868
26	R3D_N133B	Z	-319.94
27	R3D_N134B	X	4.871
28	R3D_N134B	Y	175.573
29	R3D_N134B	Z	11.734
30	R3D_N151	X	-1.09
31	R3D_N151	Y	610.188
32	R3D_N151	Z	-284.128
33	R3D_N152	X	-5.116
34	R3D_N152	Y	138.874
35	R3D_N152	Z	9.078
36	R3D_N157A_1	Y	548.808
37	R3D_N157A_1	Z	-249.951
38	R3D_N158A_1	X	-4.648
39	R3D_N158A_1	Y	143.55
40	R3D_N158A_1	Z	8.502
41	R3D_N155B_1	X	4.273
42	R3D_N155B_1	Y	607.123
43	R3D_N155B_1	Z	-286.638
44	R3D_N156B_1	X	3.912
45	R3D_N156B_1	Y	124.35
46	R3D_N156B_1	Z	8.838
47	R3D_N167	X	1.346
48	R3D_N167	Y	558.286
49	R3D_N167	Z	-271.537
50	R3D_N168	X	-2.832
51	R3D_N168	Y	156.244
52	R3D_N168	Z	8.662
53	R3D_N179	X	22.433
54	R3D_N179	Y	585.065
55	R3D_N179	Z	-256.886
56	R3D_N180	X	-9.015
57	R3D_N180	Y	118.915
58	R3D_N180	Z	8.365

Point Loads and Moments (Cat 21 : OL6)

	Label	Direction	Magnitude[lb,lb-ft]
1	R3D_N1	X	27.232
2	R3D_N1	Y	-1642.708
3	R3D_N1	Z	739.564
4	R3D_N2	X	-30.173
5	R3D_N2	Y	-352.788
6	R3D_N2	Z	-21.106
7	R3D_N132	X	-2.253
8	R3D_N132	Y	-588.633

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

	Label	Direction	Magnitude[lb,lb-ft]
9	R3D_N132	Z	276.726
10	R3D_N133	Y	-129.474
11	R3D_N133	Z	-9.45
12	R3D_N109	X	2.114
13	R3D_N109	Y	-1084.706
14	R3D_N109	Z	526.911
15	R3D_N110A	X	5.751
16	R3D_N110A	Y	-303.44
17	R3D_N110A	Z	-17.519
18	R3D_N121	X	3.507
19	R3D_N121	Y	-955.33
20	R3D_N121	Z	450.557
21	R3D_N122	X	9.28
22	R3D_N122	Y	-218.246
23	R3D_N122	Z	-14.202
24	R3D_N133B	X	-3.92
25	R3D_N133B	Y	-646.438
26	R3D_N133B	Z	295.71
27	R3D_N134B	X	-3.166
28	R3D_N134B	Y	-165.144
29	R3D_N134B	Z	-10.753
30	R3D_N151	X	1.068
31	R3D_N151	Y	-609.355
32	R3D_N151	Z	284.11
33	R3D_N152	X	5.331
34	R3D_N152	Y	-137.961
35	R3D_N152	Z	-9.01
36	R3D_N157A_1	Y	-548.927
37	R3D_N157A_1	Z	249.886
38	R3D_N158A_1	X	4.764
39	R3D_N158A_1	Y	-143.776
40	R3D_N158A_1	Z	-8.482
41	R3D_N155B_1	X	-4.323
42	R3D_N155B_1	Y	-607.18
43	R3D_N155B_1	Z	286.635
44	R3D_N156B_1	X	-3.778
45	R3D_N156B_1	Y	-124.302
46	R3D_N156B_1	Z	-8.833
47	R3D_N167	X	-1.418
48	R3D_N167	Y	-557.594
49	R3D_N167	Z	271.541
50	R3D_N168	X	2.966
51	R3D_N168	Y	-156.297
52	R3D_N168	Z	-8.66
53	R3D_N179	X	-22.877
54	R3D_N179	Y	-585.757
55	R3D_N179	Z	256.883
56	R3D_N180	X	9.128
57	R3D_N180	Y	-118.769
58	R3D_N180	Z	-8.365

Slabs

	Label	Thickness [in]	Material	Local Axis Angle ...	Analysis Offset [in]	Passive Pressur...	Soil Overburden [psf]
1	S1	30	Conc2500NW	0	0	0	0
2	S2	30	Conc2500NW	0	0	0	0
3	S3	30	Conc2500NW	0	0	0	0

Slabs (Continued)

	Label	Thickness [in]	Material	Local Axis Angle ...	Analysis Offset [in]	Passive Pressur...	Soil Overburden [psf]
4	S4	30	Conc2500NW	0	0	0	0
5	S5	30	Conc2500NW	0	0	0	0
6	S6	30	Conc2500NW	0	0	0	0
7	S7	30	Conc2500NW	0	0	0	0
8	S8	30	Conc2500NW	0	0	0	0
9	S9	30	Conc2500NW	0	0	0	0
10	S10	30	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																									
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	26		
2	OL1	60		
3	OL2	56		
4	OL3	60		
5	OL4	58		
6	OL5	58		
7	OL6	58		

Strip Reinforcing

	Label	UC Top	LC	Top Bars	Governing ...	UC Bot	LC	Bot B...	Gover...	UC Shear	LC	Governing De...
1	DS1	.009	32	#5@5in	DS1-X25	.011	37	#5@5in	DS1-...	.024	37	DS1-X15
2	DS2	.001	36	#5@5in	DS2-X25	.002	32	#5@5in	DS2-...	.005	32	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	44207.095	0	11375.733	9.999+	9.999+
2	1	S2	0	0	44266.914	0	11366.105	9.999+	9.999+
3	1	S3	0	0	44247.935	0	11375.055	9.999+	9.999+
4	1	S4	0	0	44205.873	0	11357.512	9.999+	9.999+
5	1	S5	0	0	44265.105	0	11373.46	9.999+	9.999+
6	1	S6	0	0	44265.922	0	11373.638	9.999+	9.999+
7	1	S7	0	0	44207.655	0	11357.994	9.999+	9.999+
8	1	S8	0	0	44243.897	0	11364.882	9.999+	9.999+
9	1	S9	0	0	44275.875	0	11368.833	9.999+	9.999+
10	1	S10	0	0	44185.175	0	11358.409	9.999+	9.999+
11	2	S1	0	0	44207.095	0	11375.733	9.999+	9.999+
12	2	S2	0	0	44266.914	0	11366.105	9.999+	9.999+
13	2	S3	0	0	44247.935	0	11375.055	9.999+	9.999+
14	2	S4	0	0	44205.873	0	11357.512	9.999+	9.999+
15	2	S5	0	0	44265.105	0	11373.46	9.999+	9.999+
16	2	S6	0	0	44265.922	0	11373.638	9.999+	9.999+
17	2	S7	0	0	44207.655	0	11357.994	9.999+	9.999+
18	2	S8	0	0	44243.897	0	11364.882	9.999+	9.999+
19	2	S9	0	0	44275.875	0	11368.833	9.999+	9.999+
20	2	S10	0	0	44185.175	0	11358.409	9.999+	9.999+
21	3	S1	0	15902.55	44482.616	2564.034	11375.733	2.797	4.437
22	3	S2	0	15595.939	44388.854	2528.718	11366.105	2.846	4.495
23	3	S3	0	16522.09	44441.981	2647.918	11375.055	2.69	4.296
24	3	S4	0	14977.834	44382.875	2459.756	11357.512	2.963	4.617
25	3	S5	0	16533.831	44448.033	2649.857	11373.46	2.688	4.292
26	3	S6	0	16508.453	44448.604	2649.71	11373.638	2.692	4.292
27	3	S7	0	15035.942	44384.851	2470.136	11357.994	2.952	4.598
28	3	S8	0	16445.863	44437.43	2636.811	11373.881	2.702	4.313
29	3	S9	0	15760.932	44401.171	2555.078	11368.833	2.817	4.45
30	3	S10	0	15536.267	44456.476	2510.783	11370.181	2.861	4.529
31	4	S1	0	18541.168	44482.616	2366.513	11375.733	2.399	4.807
32	4	S2	0	17435.452	44388.854	2045.021	11366.105	2.546	5.558
33	4	S3	0	19041.031	44441.981	2226.011	11375.055	2.334	5.11
34	4	S4	0	17010.162	44382.875	2071.934	11357.512	2.609	5.482
35	4	S5	0	19006.193	44448.033	2223.775	11373.46	2.339	5.114

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
36	4	S6	0	18967.254	44448.604	2222.808	11373.638	2.343	5.117
37	4	S7	0	17087.945	44384.851	2078.164	11357.994	2.597	5.465
38	4	S8	0	18943.652	44437.43	2217.213	11373.881	2.346	5.13
39	4	S9	0	17632.992	44401.171	2070.138	11368.833	2.518	5.492
40	4	S10	0	18118.504	44456.476	2314.81	11370.181	2.454	4.912
41	5	S1	0	0	47632.371	0	14422.345	9.999+	9.999+
42	5	S2	0	0	48191.423	0	14317.949	9.999+	9.999+
43	5	S3	0	0	47545.515	0	14481.531	9.999+	9.999+
44	5	S4	0	0	48134.244	0	14190.686	9.999+	9.999+
45	5	S5	0	0	47834.676	0	14393.488	9.999+	9.999+
46	5	S6	0	0	47885.126	0	14481.356	9.999+	9.999+
47	5	S7	0	0	48109.882	0	14256.364	9.999+	9.999+
48	5	S8	0	0	47533.569	0	14301.714	9.999+	9.999+
49	5	S9	0	0	48239.084	0	14350.28	9.999+	9.999+
50	5	S10	0	0	47527.061	0	14142.848	9.999+	9.999+
51	6	S1	0	0	50237.406	0	13801.581	9.999+	9.999+
52	6	S2	0	0	51076.357	0	13915.426	9.999+	9.999+
53	6	S3	0	0	50519.631	0	13999.154	9.999+	9.999+
54	6	S4	0	0	50554.757	0	13738.231	9.999+	9.999+
55	6	S5	0	0	50822.93	0	13913.769	9.999+	9.999+
56	6	S6	0	0	50856.161	0	14002.082	9.999+	9.999+
57	6	S7	0	0	50554.247	0	13804.527	9.999+	9.999+
58	6	S8	0	0	50487.504	0	13816.006	9.999+	9.999+
59	6	S9	0	0	51141.692	0	13949.956	9.999+	9.999+
60	6	S10	0	0	50077.748	0	13732.789	9.999+	9.999+
61	7	S1	0	0	46116.009	0	12851.805	9.999+	9.999+
62	7	S2	0	0	46014.875	0	12554.018	9.999+	9.999+
63	7	S3	0	0	45649.12	0	12452.14	9.999+	9.999+
64	7	S4	0	0	45143.804	0	11997.391	9.999+	9.999+
65	7	S5	0	0	44945.818	0	11902.615	9.999+	9.999+
66	7	S6	0	0	45008.09	0	11944.744	9.999+	9.999+
67	7	S7	0	0	44973.566	0	11884.234	9.999+	9.999+
68	7	S8	0	0	44909.774	0	11901.209	9.999+	9.999+
69	7	S9	0	0	45078.16	0	11906.959	9.999+	9.999+
70	7	S10	0	0	44851.235	0	11866.267	9.999+	9.999+
71	8	S1	0	9743.815	44482.616	1501.033	11365.18	4.565	7.572
72	8	S2	0	6560.484	44388.854	1052.907	11366.105	6.766	9.999+
73	8	S3	0	5708.12	44441.981	899.363	11375.055	7.786	9.999+
74	8	S4	0	3865.356	44382.875	619.315	11357.512	9.999+	9.999+
75	8	S5	0	3509.466	44448.033	541.96	11373.46	9.999+	9.999+
76	8	S6	0	3634.765	44448.604	570.087	11373.638	9.999+	9.999+
77	8	S7	0	3285.158	44384.851	526.674	11357.994	9.999+	9.999+
78	8	S8	0	3613.488	44437.43	560.762	11373.881	9.999+	9.999+
79	8	S9	0	3374.292	44401.171	537.74	11368.833	9.999+	9.999+
80	8	S10	0	3455.567	44456.476	549.018	11370.181	9.999+	9.999+
81	9	S1	0	11926.912	44482.616	1923.025	11375.733	3.73	5.916
82	9	S2	0	11696.954	44388.854	1896.539	11366.105	3.795	5.993
83	9	S3	0	12391.567	44441.981	1985.938	11375.055	3.586	5.728
84	9	S4	0	11233.376	44382.875	1844.817	11357.512	3.951	6.156
85	9	S5	0	12400.373	44448.033	1987.392	11373.46	3.584	5.723
86	9	S6	0	12381.34	44448.604	1987.282	11373.638	3.59	5.723
87	9	S7	0	11276.957	44384.851	1852.602	11357.994	3.936	6.131
88	9	S8	0	12334.397	44437.43	1977.608	11373.881	3.603	5.751
89	9	S9	0	11820.699	44401.171	1916.309	11368.833	3.756	5.933
90	9	S10	0	11652.2	44456.476	1883.087	11370.181	3.815	6.038
91	10	S1	0	13905.876	44482.616	1774.885	11375.733	3.199	6.409
92	10	S2	0	13076.589	44388.854	1533.766	11366.105	3.395	7.411

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
93	10	S3	0	14280.774	44441.981	1669.508	11375.055	3.112	6.813
94	10	S4	0	12757.622	44382.875	1553.95	11357.512	3.479	7.309
95	10	S5	0	14254.645	44448.033	1667.831	11373.46	3.118	6.819
96	10	S6	0	14225.44	44448.604	1667.106	11373.638	3.125	6.822
97	10	S7	0	12815.958	44384.851	1558.623	11357.994	3.463	7.287
98	10	S8	0	14207.739	44437.43	1662.91	11373.881	3.128	6.84
99	10	S9	0	13224.744	44401.171	1552.604	11368.833	3.357	7.322
100	10	S10	0	13588.878	44456.476	1736.108	11370.181	3.272	6.549
101	11	S1	0	0	46776.052	0	13660.692	9.999+	9.999+
102	11	S2	0	0	47210.296	0	13579.988	9.999+	9.999+
103	11	S3	0	0	46721.12	0	13704.912	9.999+	9.999+
104	11	S4	0	0	47152.151	0	13482.393	9.999+	9.999+
105	11	S5	0	0	46942.284	0	13638.481	9.999+	9.999+
106	11	S6	0	0	46980.325	0	13704.426	9.999+	9.999+
107	11	S7	0	0	47134.325	0	13531.771	9.999+	9.999+
108	11	S8	0	0	46711.151	0	13567.506	9.999+	9.999+
109	11	S9	0	0	47248.282	0	13604.918	9.999+	9.999+
110	11	S10	0	0	46691.589	0	13446.738	9.999+	9.999+
111	12	S1	0	0	48729.829	0	13195.119	9.999+	9.999+
112	12	S2	0	0	49373.996	0	13278.095	9.999+	9.999+
113	12	S3	0	0	48951.707	0	13343.129	9.999+	9.999+
114	12	S4	0	0	48967.536	0	13143.051	9.999+	9.999+
115	12	S5	0	0	49183.474	0	13278.692	9.999+	9.999+
116	12	S6	0	0	49208.602	0	13344.971	9.999+	9.999+
117	12	S7	0	0	48967.599	0	13192.894	9.999+	9.999+
118	12	S8	0	0	48926.602	0	13203.225	9.999+	9.999+
119	12	S9	0	0	49425.238	0	13304.675	9.999+	9.999+
120	12	S10	0	0	48604.605	0	13139.194	9.999+	9.999+
121	13	S1	0	0	45638.781	0	12482.787	9.999+	9.999+
122	13	S2	0	0	45577.885	0	12257.04	9.999+	9.999+
123	13	S3	0	0	45298.824	0	12182.869	9.999+	9.999+
124	13	S4	0	0	44909.321	0	11837.422	9.999+	9.999+
125	13	S5	0	0	44775.64	0	11770.326	9.999+	9.999+
126	13	S6	0	0	44822.548	0	11801.967	9.999+	9.999+
127	13	S7	0	0	44782.089	0	11752.674	9.999+	9.999+
128	13	S8	0	0	44743.305	0	11767.128	9.999+	9.999+
129	13	S9	0	0	44877.589	0	11772.428	9.999+	9.999+
130	13	S10	0	0	44684.72	0	11739.302	9.999+	9.999+
131	14	S1	0	7307.861	44482.616	1125.775	11365.18	6.087	9.999+
132	14	S2	0	4920.363	44388.854	789.68	11366.105	9.021	9.999+
133	14	S3	0	4281.09	44441.981	674.522	11375.055	9.999+	9.999+
134	14	S4	0	2899.017	44382.875	464.486	11357.512	9.999+	9.999+
135	14	S5	0	2632.099	44448.033	406.47	11373.46	9.999+	9.999+
136	14	S6	0	2726.074	44448.604	427.565	11373.638	9.999+	9.999+
137	14	S7	0	2463.869	44384.851	395.005	11357.994	9.999+	9.999+
138	14	S8	0	2710.116	44437.43	420.572	11373.881	9.999+	9.999+
139	14	S9	0	2530.719	44401.171	403.305	11368.833	9.999+	9.999+
140	14	S10	0	2591.675	44456.476	411.764	11370.181	9.999+	9.999+
141	15	S1	0	15902.55	26689.569	2564.034	6825.44	1.678	2.662
142	15	S2	0	15595.939	26633.313	2528.718	6819.663	1.708	2.697
143	15	S3	0	16522.09	26665.189	2647.918	6825.033	1.614	2.578
144	15	S4	0	14977.834	26629.725	2459.756	6814.507	1.778	2.77
145	15	S5	0	16533.831	26668.82	2649.857	6824.076	1.613	2.575
146	15	S6	0	16508.453	26669.163	2649.71	6824.183	1.615	2.575
147	15	S7	0	15035.942	26630.911	2470.136	6814.797	1.771	2.759
148	15	S8	0	16445.863	26662.458	2636.811	6824.328	1.621	2.588
149	15	S9	0	15760.932	26640.703	2555.078	6821.3	1.69	2.67

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
150	15	S10	0	15536.267	26673.886	2510.783	6822.109	1.717	2.717
151	16	S1	0	18541.168	26689.569	2366.513	6825.44	1.439	2.884
152	16	S2	0	17435.452	26633.313	2045.021	6819.663	1.528	3.335
153	16	S3	0	19041.031	26665.189	2226.011	6825.033	1.4	3.066
154	16	S4	0	17010.162	26629.725	2071.934	6814.507	1.566	3.289
155	16	S5	0	19006.193	26668.82	2223.775	6824.076	1.403	3.069
156	16	S6	0	18967.254	26669.163	2222.808	6824.183	1.406	3.07
157	16	S7	0	17087.945	26630.911	2078.164	6814.797	1.558	3.279
158	16	S8	0	18943.652	26662.458	2217.213	6824.328	1.407	3.078
159	16	S9	0	17632.992	26640.703	2070.138	6821.3	1.511	3.295
160	16	S10	0	18118.504	26673.886	2314.81	6822.109	1.472	2.947
161	17	S1	0	0	29949.533	0	9872.052	9.999+	9.999+
162	17	S2	0	0	30484.657	0	9771.508	9.999+	9.999+
163	17	S3	0	0	29846.341	0	9931.509	9.999+	9.999+
164	17	S4	0	0	30451.895	0	9647.681	9.999+	9.999+
165	17	S5	0	0	30128.634	0	9844.104	9.999+	9.999+
166	17	S6	0	0	30178.757	0	9931.901	9.999+	9.999+
167	17	S7	0	0	30426.82	0	9713.166	9.999+	9.999+
168	17	S8	0	0	29836.01	0	9755.762	9.999+	9.999+
169	17	S9	0	0	30528.734	0	9802.747	9.999+	9.999+
170	17	S10	0	0	29852.991	0	9599.485	9.999+	9.999+
171	18	S1	0	0	32554.568	0	9251.288	9.999+	9.999+
172	18	S2	0	0	33369.591	0	9368.984	9.999+	9.999+
173	18	S3	0	0	32820.456	0	9449.132	9.999+	9.999+
174	18	S4	0	0	32872.408	0	9195.226	9.999+	9.999+
175	18	S5	0	0	33116.888	0	9364.385	9.999+	9.999+
176	18	S6	0	0	33149.793	0	9452.627	9.999+	9.999+
177	18	S7	0	0	32871.184	0	9261.329	9.999+	9.999+
178	18	S8	0	0	32789.945	0	9270.053	9.999+	9.999+
179	18	S9	0	0	33431.343	0	9402.423	9.999+	9.999+
180	18	S10	0	0	32403.677	0	9189.425	9.999+	9.999+
181	19	S1	0	0	28433.171	0	8301.511	9.999+	9.999+
182	19	S2	0	0	28308.109	0	8007.576	9.999+	9.999+
183	19	S3	0	0	27949.946	0	7902.119	9.999+	9.999+
184	19	S4	0	0	27461.455	0	7454.386	9.999+	9.999+
185	19	S5	0	0	27239.776	0	7353.231	9.999+	9.999+
186	19	S6	0	0	27301.721	0	7395.289	9.999+	9.999+
187	19	S7	0	0	27290.504	0	7341.037	9.999+	9.999+
188	19	S8	0	0	27212.216	0	7355.256	9.999+	9.999+
189	19	S9	0	0	27367.811	0	7359.426	9.999+	9.999+
190	19	S10	0	0	27177.164	0	7322.903	9.999+	9.999+
191	20	S1	0	9743.815	26689.569	1501.033	6819.108	2.739	4.543
192	20	S2	0	6560.484	26633.313	1052.907	6819.663	4.06	6.477
193	20	S3	0	5708.12	26665.189	899.363	6825.033	4.671	7.589
194	20	S4	0	3865.356	26629.725	619.315	6814.507	6.889	9.999+
195	20	S5	0	3509.466	26668.82	541.96	6824.076	7.599	9.999+
196	20	S6	0	3634.765	26669.163	570.087	6824.183	7.337	9.999+
197	20	S7	0	3285.158	26630.911	526.674	6814.797	8.106	9.999+
198	20	S8	0	3613.488	26662.458	560.762	6824.328	7.379	9.999+
199	20	S9	0	3374.292	26640.703	537.74	6821.3	7.895	9.999+
200	20	S10	0	3455.567	26673.886	549.018	6822.109	7.719	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	2.111	2728.91	0	2728.91	9.999+	9.999+
2	1	S2	0	0	2727.865	0	2727.865	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
3	1	S3	0	1.829	2728.916	0	2728.916	9.999+	9.999+
4	1	S4	0	0	2725.803	0	2725.803	9.999+	9.999+
5	1	S5	0	0	2729.63	0	2729.63	9.999+	9.999+
6	1	S6	0	0	2729.673	0	2729.673	9.999+	9.999+
7	1	S7	0	0	2725.919	0	2725.919	9.999+	9.999+
8	1	S8	0	1.8	2728.652	0	2728.652	9.999+	9.999+
9	1	S9	0	0	2728.52	0	2728.52	9.999+	9.999+
10	1	S10	0	2.355	2727.431	0	2727.431	9.999+	9.999+
11	2	S1	0	2.111	2728.91	0	2728.91	9.999+	9.999+
12	2	S2	0	0	2727.865	0	2727.865	9.999+	9.999+
13	2	S3	0	1.829	2728.916	0	2728.916	9.999+	9.999+
14	2	S4	0	0	2725.803	0	2725.803	9.999+	9.999+
15	2	S5	0	0	2729.63	0	2729.63	9.999+	9.999+
16	2	S6	0	0	2729.673	0	2729.673	9.999+	9.999+
17	2	S7	0	0	2725.919	0	2725.919	9.999+	9.999+
18	2	S8	0	1.8	2728.652	0	2728.652	9.999+	9.999+
19	2	S9	0	0	2728.52	0	2728.52	9.999+	9.999+
20	2	S10	0	2.355	2727.431	0	2727.431	9.999+	9.999+
21	3	S1	0	22.473	2128.292	713.923	2128.292	9.999+	2.981
22	3	S2	0	.281	2121.141	735.024	2121.141	9.999+	2.886
23	3	S3	0	26.134	2110.194	784.326	2110.194	9.999+	2.69
24	3	S4	0	9.516	2141.171	677.758	2141.171	9.999+	3.159
25	3	S5	0	15.604	2103.027	775.082	2103.027	9.999+	2.713
26	3	S6	0	14.786	2102.614	771.535	2102.614	9.999+	2.725
27	3	S7	0	11.605	2140.049	681.968	2140.049	9.999+	3.138
28	3	S8	0	26.22	2112.629	780.789	2112.629	9.999+	2.706
29	3	S9	0	.402	2115.542	741.596	2115.542	9.999+	2.853
30	3	S10	0	24.126	2140.731	697.519	2140.731	9.999+	3.069
31	4	S1	0	67.571	2202.755	601.62	2202.755	9.999+	3.661
32	4	S2	0	2.205	2238.383	617.424	2238.383	9.999+	3.625
33	4	S3	0	12.952	2203.542	679.142	2203.542	9.999+	3.245
34	4	S4	0	5.099	2231.598	545.389	2231.598	9.999+	4.092
35	4	S5	0	9.268	2201.485	667.923	2201.485	9.999+	3.296
36	4	S6	0	8.449	2201.268	662.732	2201.268	9.999+	3.322
37	4	S7	0	5.823	2230.653	551.028	2230.653	9.999+	4.048
38	4	S8	0	13.383	2205.63	675.102	2205.63	9.999+	3.267
39	4	S9	0	2.207	2233.011	622.771	2233.011	9.999+	3.586
40	4	S10	0	67.099	2213.549	588.067	2213.549	9.999+	3.764
41	5	S1	0	39.905	3437.42	837.823	3437.42	9.999+	4.103
42	5	S2	0	.676	3435.902	862.225	3435.902	9.999+	3.985
43	5	S3	0	33.04	3455.743	923.768	3455.743	9.999+	3.741
44	5	S4	0	10.688	3412.177	790.677	3412.177	9.999+	4.316
45	5	S5	0	17.603	3464.999	912.293	3464.999	9.999+	3.798
46	5	S6	0	16.619	3465.554	907.728	3465.554	9.999+	3.818
47	5	S7	0	12.965	3413.749	795.999	3413.749	9.999+	4.289
48	5	S8	0	33.142	3452.297	919.423	3452.297	9.999+	3.755
49	5	S9	0	.054	3444.034	869.902	3444.034	9.999+	3.959
50	5	S10	0	42.041	3419.508	818.621	3419.508	9.999+	4.177
51	6	S1	0	.266	3312.539	706.709	3312.539	9.999+	4.687
52	6	S2	0	1.084	3340.353	728.677	3340.353	9.999+	4.584
53	6	S3	0	34.301	3339.216	766.476	3339.216	9.999+	4.357
54	6	S4	0	10.855	3303.689	684.96	3303.689	9.999+	4.823
55	6	S5	0	17.564	3349.843	759.196	3349.843	9.999+	4.412
56	6	S6	0	16.825	3350.405	756.886	3350.405	9.999+	4.427
57	6	S7	0	13.444	3305.02	687.987	3305.02	9.999+	4.804
58	6	S8	0	34.135	3336.322	763.553	3336.322	9.999+	4.369
59	6	S9	0	2.006	3346.785	735.286	3346.785	9.999+	4.552

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
60	6	S10	0	2.851	3297.58	690.324	3297.58	9.999+	4.777
61	7	S1	0	1.822	3085.526	429.022	3085.526	9.999+	7.192
62	7	S2	0	7.712	3008.337	340.766	3008.337	9.999+	8.828
63	7	S3	0	9.949	2982.544	313.684	2982.544	9.999+	9.508
64	7	S4	0	5.781	2882.842	184.924	2882.842	9.999+	9.999+
65	7	S5	0	1.228	2857.365	158.673	2857.365	9.999+	9.999+
66	7	S6	0	3.724	2864.504	165.03	2864.504	9.999+	9.999+
67	7	S7	0	2.789	2850.543	144.869	2850.543	9.999+	9.999+
68	7	S8	0	6.711	2860.317	166.68	2860.317	9.999+	9.999+
69	7	S9	0	.892	2857.135	157.725	2857.135	9.999+	9.999+
70	7	S10	0	10.405	2854.147	149.113	2854.147	9.999+	9.999+
71	8	S1	0	3.875	2369.72	431.075	2369.72	9.999+	5.497
72	8	S2	0	4.719	2477.999	305.635	2477.999	9.999+	8.108
73	8	S3	0	5.844	2517.672	261.813	2517.672	9.999+	9.616
74	8	S4	0	4.252	2579.718	170.974	2579.718	9.999+	9.999+
75	8	S5	0	1.352	2600.371	160.365	2600.371	9.999+	9.999+
76	8	S6	0	3.84	2595.156	165.06	2595.156	9.999+	9.999+
77	8	S7	0	2.859	2601.232	144.842	2601.232	9.999+	9.999+
78	8	S8	0	3.061	2596.985	166.681	2596.985	9.999+	9.999+
79	8	S9	0	.929	2600.019	157.729	2600.019	9.999+	9.999+
80	8	S10	0	5.895	2600.616	149.111	2600.616	9.999+	9.999+
81	9	S1	0	16.327	2278.446	535.442	2278.446	9.999+	4.255
82	9	S2	0	.211	2272.822	551.268	2272.822	9.999+	4.123
83	9	S3	0	19.144	2264.874	588.245	2264.874	9.999+	3.85
84	9	S4	0	7.137	2287.329	508.318	2287.329	9.999+	4.5
85	9	S5	0	11.703	2259.678	581.312	2259.678	9.999+	3.887
86	9	S6	0	11.089	2259.379	578.651	2259.379	9.999+	3.905
87	9	S7	0	8.704	2286.517	511.476	2286.517	9.999+	4.47
88	9	S8	0	19.215	2266.634	585.592	2266.634	9.999+	3.871
89	9	S9	0	.301	2268.786	556.197	2268.786	9.999+	4.079
90	9	S10	0	17.506	2287.406	523.139	2287.406	9.999+	4.372
91	10	S1	0	50.15	2334.294	451.215	2334.294	9.999+	5.173
92	10	S2	0	1.653	2360.753	463.068	2360.753	9.999+	5.098
93	10	S3	0	9.257	2334.885	509.357	2334.885	9.999+	4.584
94	10	S4	0	3.824	2355.149	409.042	2355.149	9.999+	5.758
95	10	S5	0	6.951	2333.522	500.942	2333.522	9.999+	4.658
96	10	S6	0	6.336	2333.37	497.049	2333.37	9.999+	4.694
97	10	S7	0	4.368	2354.47	413.271	2354.47	9.999+	5.697
98	10	S8	0	9.587	2336.385	506.326	2336.385	9.999+	4.614
99	10	S9	0	1.655	2356.888	467.078	2356.888	9.999+	5.046
100	10	S10	0	49.736	2342.019	441.05	2342.019	9.999+	5.31
101	11	S1	0	30.456	3260.292	628.367	3260.292	9.999+	5.189
102	11	S2	0	.507	3258.893	646.669	3258.893	9.999+	5.04
103	11	S3	0	25.238	3274.036	692.826	3274.036	9.999+	4.726
104	11	S4	0	8.016	3240.584	593.008	3240.584	9.999+	5.465
105	11	S5	0	13.202	3281.157	684.22	3281.157	9.999+	4.795
106	11	S6	0	12.464	3281.584	680.796	3281.584	9.999+	4.82
107	11	S7	0	9.723	3241.791	596.999	3241.791	9.999+	5.43
108	11	S8	0	25.306	3271.385	689.567	3271.385	9.999+	4.744
109	11	S9	0	.041	3265.156	652.426	3265.156	9.999+	5.005
110	11	S10	0	32.119	3246.489	613.966	3246.489	9.999+	5.288
111	12	S1	0	.328	3166.632	530.032	3166.632	9.999+	5.974
112	12	S2	0	.813	3187.231	546.507	3187.231	9.999+	5.832
113	12	S3	0	26.183	3186.641	574.857	3186.641	9.999+	5.543
114	12	S4	0	8.142	3159.217	513.72	3159.217	9.999+	6.15
115	12	S5	0	13.173	3194.79	569.397	3194.79	9.999+	5.611
116	12	S6	0	12.619	3195.222	567.665	3195.222	9.999+	5.629

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
117	12	S7	0	10.083	3160.245	515.99	3160.245	9.999+	6.125
118	12	S8	0	26.051	3184.404	572.664	3184.404	9.999+	5.561
119	12	S9	0	1.505	3192.219	551.465	3192.219	9.999+	5.789
120	12	S10	0	2.727	3155.042	517.743	3155.042	9.999+	6.094
121	13	S1	0	.839	2996.372	321.767	2996.372	9.999+	9.312
122	13	S2	0	5.784	2938.219	255.575	2938.219	9.999+	9.999+
123	13	S3	0	7.919	2919.137	235.263	2919.137	9.999+	9.999+
124	13	S4	0	4.336	2843.582	138.693	2843.582	9.999+	9.999+
125	13	S5	0	.921	2825.431	119.004	2825.431	9.999+	9.999+
126	13	S6	0	2.793	2830.796	123.773	2830.796	9.999+	9.999+
127	13	S7	0	2.092	2819.387	108.652	2819.387	9.999+	9.999+
128	13	S8	0	5.483	2827.4	125.01	2827.4	9.999+	9.999+
129	13	S9	0	.669	2824.981	118.294	2824.981	9.999+	9.999+
130	13	S10	0	8.393	2822.468	111.834	2822.468	9.999+	9.999+
131	14	S1	0	3.434	2459.518	323.306	2459.518	9.999+	7.607
132	14	S2	0	3.539	2540.465	229.227	2540.465	9.999+	9.999+
133	14	S3	0	3.926	2570.483	196.36	2570.483	9.999+	9.999+
134	14	S4	0	3.189	2616.24	128.231	2616.24	9.999+	9.999+
135	14	S5	0	1.014	2632.686	120.274	2632.686	9.999+	9.999+
136	14	S6	0	2.88	2628.785	123.795	2628.785	9.999+	9.999+
137	14	S7	0	2.144	2632.404	108.632	2632.404	9.999+	9.999+
138	14	S8	0	1.846	2629.901	125.011	2629.901	9.999+	9.999+
139	14	S9	0	.697	2632.145	118.297	2632.145	9.999+	9.999+
140	14	S10	0	3.833	2632.32	111.833	2632.32	9.999+	9.999+
141	15	S1	0	23.317	1036.728	713.923	1036.728	9.999+	1.452
142	15	S2	0	.281	1029.995	735.024	1029.995	9.999+	1.401
143	15	S3	0	26.866	1018.627	784.326	1018.627	9.999+	1.299
144	15	S4	0	9.516	1050.85	677.758	1050.85	9.999+	1.55
145	15	S5	0	15.604	1011.175	775.082	1011.175	9.999+	1.305
146	15	S6	0	14.786	1010.745	771.535	1010.745	9.999+	1.31
147	15	S7	0	11.605	1049.682	681.968	1049.682	9.999+	1.539
148	15	S8	0	26.94	1021.168	780.789	1021.168	9.999+	1.308
149	15	S9	0	.402	1024.134	741.596	1024.134	9.999+	1.381
150	15	S10	0	25.068	1049.759	697.519	1049.759	9.999+	1.505
151	16	S1	0	68.415	1111.191	601.62	1111.191	9.999+	1.847
152	16	S2	0	2.205	1147.237	617.424	1147.237	9.999+	1.858
153	16	S3	0	13.683	1111.975	679.142	1111.975	9.999+	1.637
154	16	S4	0	5.099	1141.277	545.389	1141.277	9.999+	2.093
155	16	S5	0	9.268	1109.633	667.923	1109.633	9.999+	1.661
156	16	S6	0	8.449	1109.399	662.732	1109.399	9.999+	1.674
157	16	S7	0	5.823	1140.286	551.028	1140.286	9.999+	2.069
158	16	S8	0	14.103	1114.169	675.102	1114.169	9.999+	1.65
159	16	S9	0	2.207	1141.603	622.771	1141.603	9.999+	1.833
160	16	S10	0	68.041	1122.576	588.067	1122.576	9.999+	1.909
161	17	S1	0	39.061	2345.856	837.823	2345.856	9.999+	2.8
162	17	S2	0	.676	2344.756	862.225	2344.756	9.999+	2.719
163	17	S3	0	32.309	2364.177	923.768	2364.177	9.999+	2.559
164	17	S4	0	10.688	2321.856	790.677	2321.856	9.999+	2.937
165	17	S5	0	17.603	2373.147	912.293	2373.147	9.999+	2.601
166	17	S6	0	16.619	2373.685	907.728	2373.685	9.999+	2.615
167	17	S7	0	12.965	2323.381	795.999	2323.381	9.999+	2.919
168	17	S8	0	32.422	2360.836	919.423	2360.836	9.999+	2.568
169	17	S9	0	.054	2352.627	869.902	2352.627	9.999+	2.704
170	17	S10	0	41.099	2328.536	818.621	2328.536	9.999+	2.844
171	18	S1	0	1.111	2220.976	706.709	2220.976	9.999+	3.143
172	18	S2	0	1.084	2249.207	728.677	2249.207	9.999+	3.087
173	18	S3	0	33.57	2247.65	766.476	2247.65	9.999+	2.932

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
174	18	S4	0	10.855	2213.367	684.96	2213.367	9.999+	3.231
175	18	S5	0	17.564	2257.991	759.196	2257.991	9.999+	2.974
176	18	S6	0	16.825	2258.536	756.886	2258.536	9.999+	2.984
177	18	S7	0	13.444	2214.653	687.987	2214.653	9.999+	3.219
178	18	S8	0	33.415	2244.861	763.553	2244.861	9.999+	2.94
179	18	S9	0	2.006	2255.378	735.286	2255.378	9.999+	3.067
180	18	S10	0	1.909	2206.607	690.324	2206.607	9.999+	3.196
181	19	S1	0	2.666	1993.962	429.022	1993.962	9.999+	4.648
182	19	S2	0	7.712	1917.191	340.766	1917.191	9.999+	5.626
183	19	S3	0	9.218	1890.978	313.684	1890.978	9.999+	6.028
184	19	S4	0	5.781	1792.521	184.924	1792.521	9.999+	9.693
185	19	S5	0	1.228	1765.513	158.673	1765.513	9.999+	9.999+
186	19	S6	0	3.724	1772.635	165.03	1772.635	9.999+	9.999+
187	19	S7	0	2.789	1760.176	144.869	1760.176	9.999+	9.999+
188	19	S8	0	5.991	1768.856	166.68	1768.856	9.999+	9.999+
189	19	S9	0	.892	1765.727	157.725	1765.727	9.999+	9.999+
190	19	S10	0	9.463	1763.175	149.113	1763.175	9.999+	9.999+
191	20	S1	0	3.031	1278.156	431.075	1278.156	9.999+	2.965
192	20	S2	0	4.719	1386.853	305.635	1386.853	9.999+	4.538
193	20	S3	0	6.575	1426.106	261.813	1426.106	9.999+	5.447
194	20	S4	0	4.252	1489.397	170.974	1489.397	9.999+	8.711
195	20	S5	0	1.352	1508.519	160.365	1508.519	9.999+	9.407
196	20	S6	0	3.84	1503.287	165.06	1503.287	9.999+	9.107
197	20	S7	0	2.859	1510.865	144.842	1510.865	9.999+	9.999+
198	20	S8	0	3.78	1505.524	166.681	1505.524	9.999+	9.032
199	20	S9	0	.929	1508.612	157.729	1508.612	9.999+	9.565
200	20	S10	0	6.837	1509.644	149.111	1509.644	9.999+	9.999+

Envelope Slab Soil Pressures

	Label	UC	LC	Soil Pressure[psf]	Allowable Bearing[psf]	Point
1	S1	.415	5	622.308	1500	N282
2	S2	.404	5	606.136	1500	N289
3	S3	.419	5	629.027	1500	N296
4	S4	.399	5	599.177	1500	N303
5	S5	.418	5	627.572	1500	N310
6	S6	.418	5	626.905	1500	N317
7	S7	.4	5	600.299	1500	N324
8	S8	.418	5	627.732	1500	N331
9	S9	.406	5	608.869	1500	N338
10	S10	.411	5	616.438	1500	N345

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): 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): 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

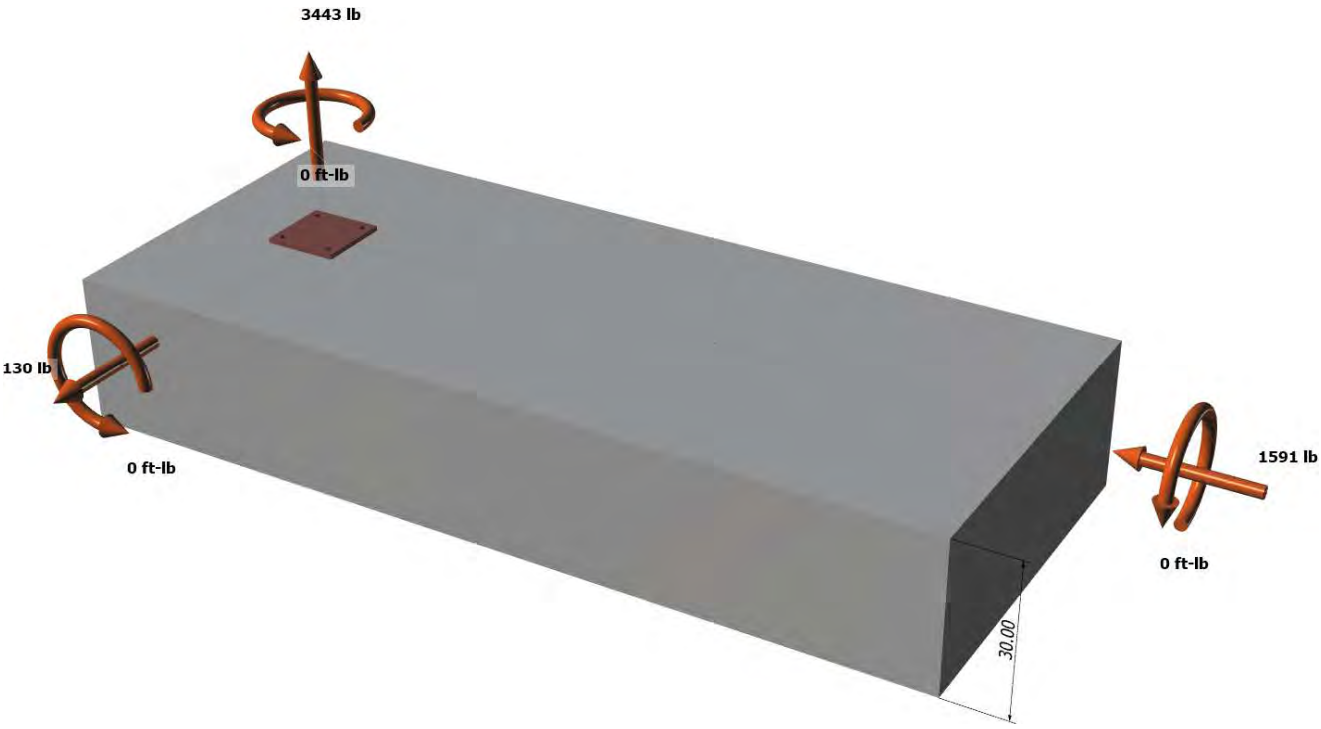
Recommended Anchor
Anchor Name: SET-3G - SET-3G w/ 3/8"Ø F1554 Gr. 36
Code Report: ICC-ES ESR-4057

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]: 3443
V_{uax} [lb]: 130
V_{uay} [lb]: -1591
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



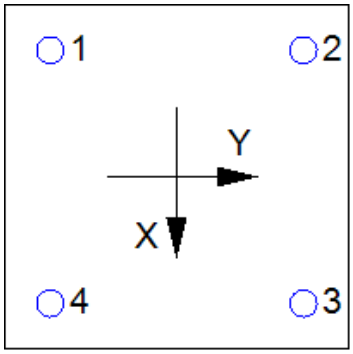
<Figure 2>

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	860.8	32.5	-397.8	399.1
2	860.8	32.5	-397.8	399.1
3	860.8	32.5	-397.8	399.1
4	860.8	32.5	-397.8	399.1
Sum	3443.0	130.0	-1591.0	1596.3

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 3443
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	4.000	6800

$\phi N_{cbg} = \phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (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)
240.25	144.00	7.25	1.000	1.000	1.00	1.000	6800	0.65	7374

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	4.000	6343

$\phi N_{ag} = \phi (A_{Na} / A_{Na0}) \Psi_{ec,Na} \Psi_{ed,Na} \Psi_{cp,Na} N_{ba}$ (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	6343	0.55	6176

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} (in²)	A_{Vco} (in²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{ec,Na}$	$\Psi_{cp,Na}$	N_{ba} (lb)	N_a (lb)
2.0	198.45	112.09	1.000	1.000	1.000	6343	11230

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
240.25	144.00	1.000	1.000	1.000	1.000	6800	11345	0.70

ϕV_{cpg} (lb)
15722

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.6.)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	861	3394	0.25	Pass
Concrete breakout	3443	7374	0.47	Pass
Adhesive	**3443**	**6176**	**0.56**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	399	1765	0.23	Pass
T Concrete breakout x+	130	7103	0.02	Pass
T Concrete breakout y-	1591	5313	0.30	Pass
|| Concrete breakout y-	65	9797	0.01	Pass
|| Concrete breakout x-	796	12680	0.06	Pass
Concrete breakout, combined	**-**	**-**	**0.30**	**Pass (Governs)**
Pryout	1596	15722	0.10	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.6..1	0.56	0.00	55.7%	1.0	Pass

SET-3G w/ 3/8"Ø F1554 Gr. 36 with hef = 4.000 inch meets the selected design criteria.

12. Warnings

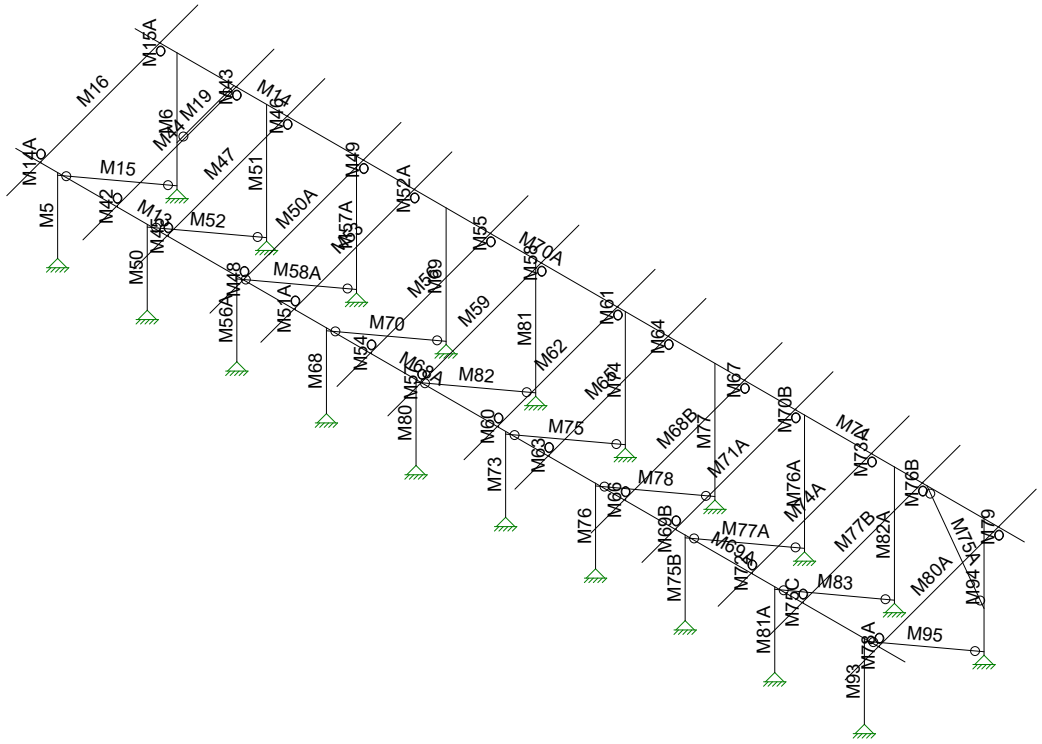
- Designer must exercise own judgement to determine if this design is suitable.

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

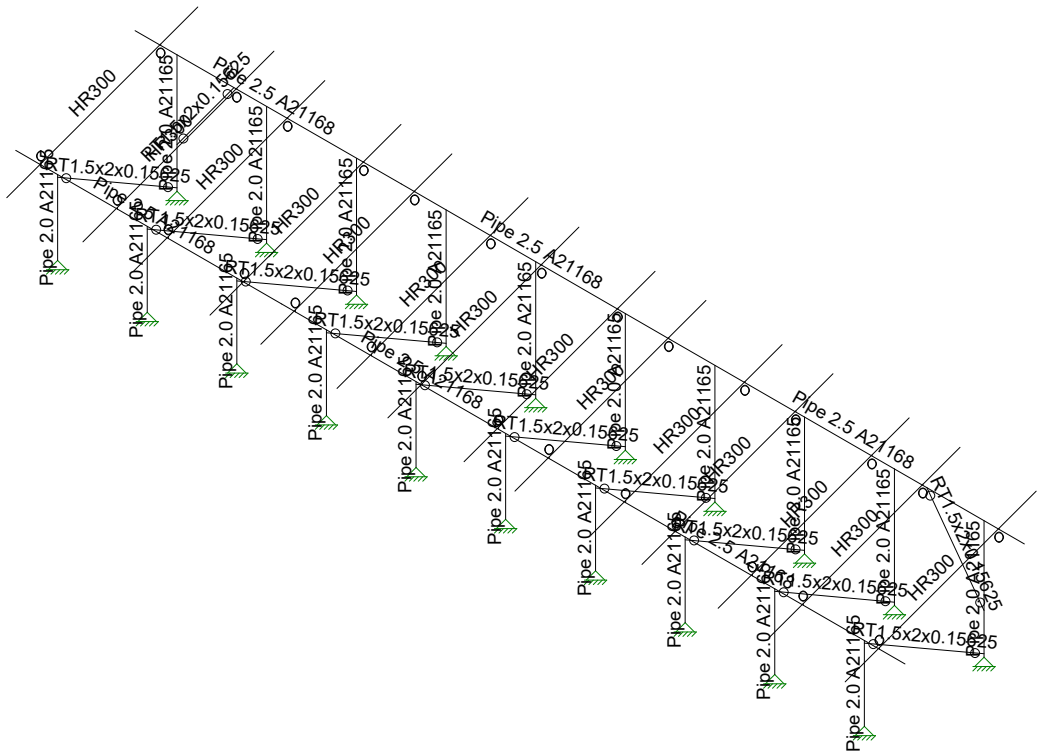
VECTOR ENGINEERS

JOB NO.: U2716-103-191 **DESIGNED:** STB

Framing Analysis



Vector Structural Engineeri...		SK - 3
STB	Ground Mount	Apr 6, 2021 at 3:35 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...



Vector Structural Engineeri...		SK - 4
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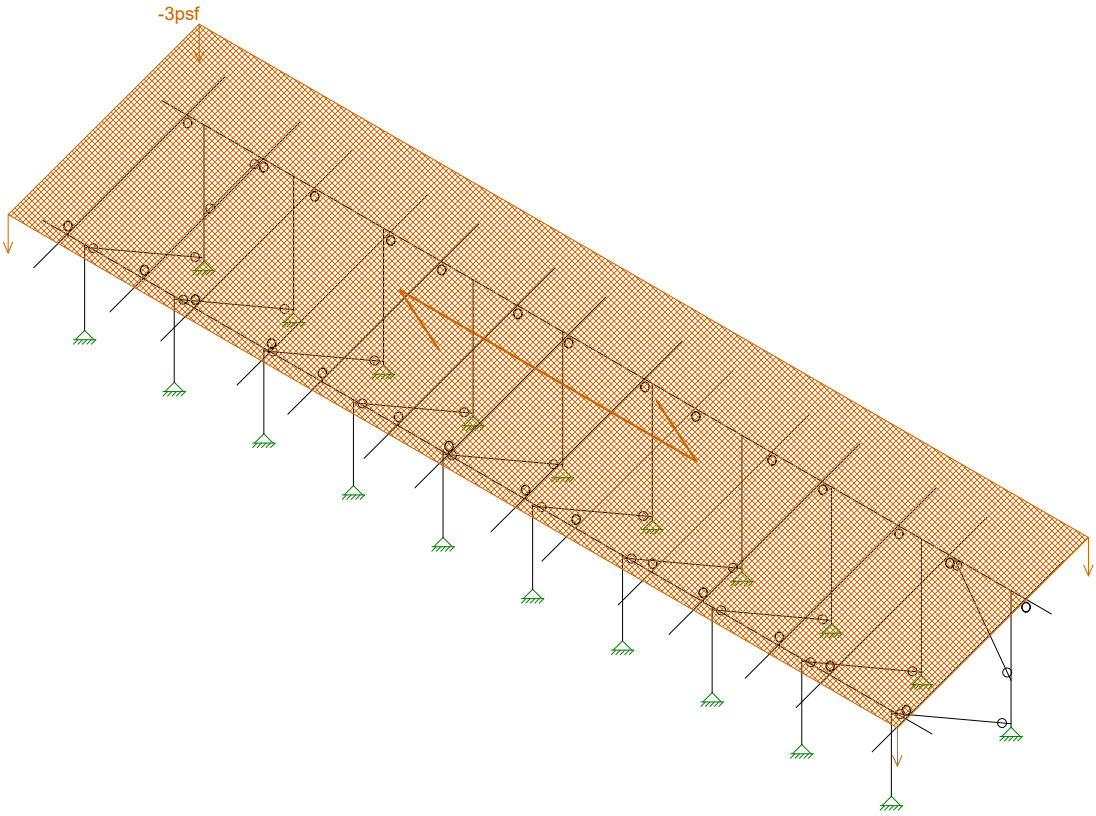
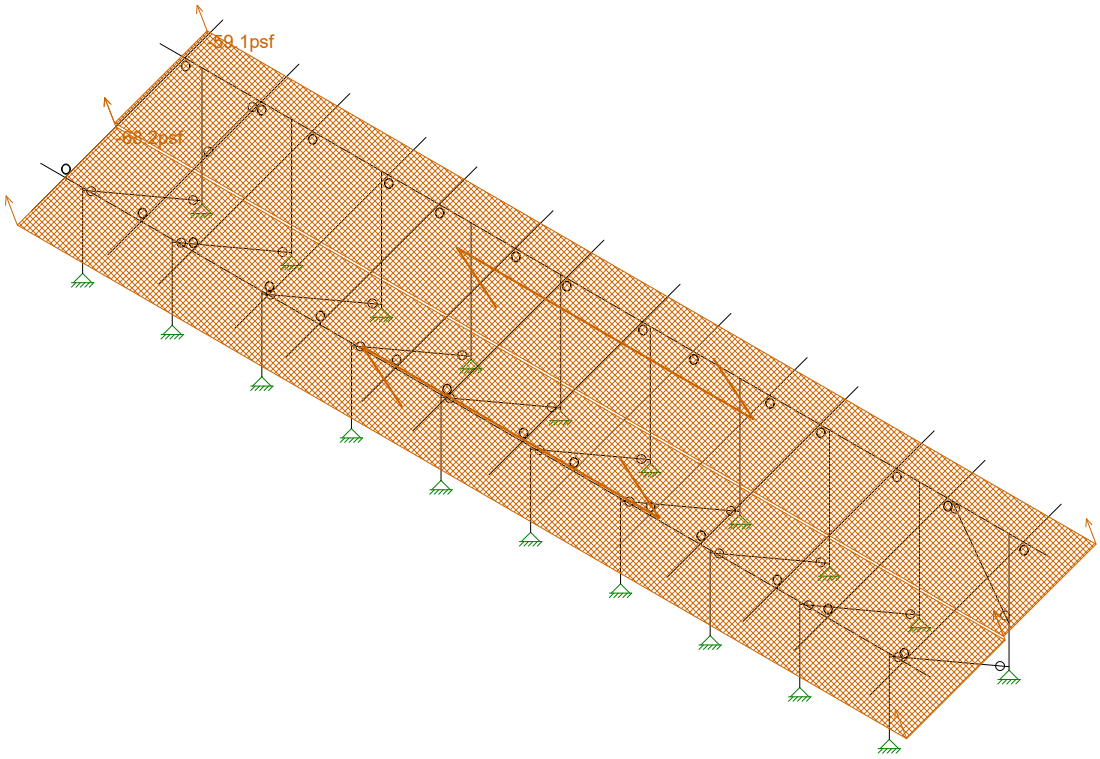


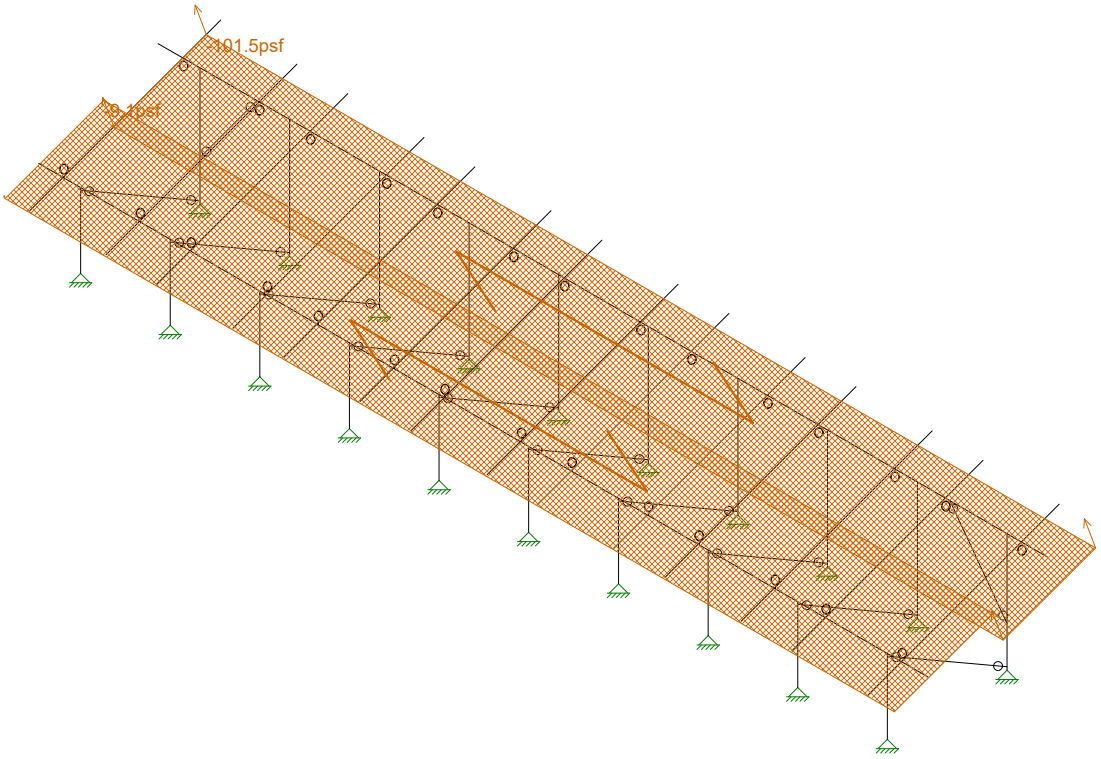
Loads: BLC 2, Solar Panel Weight

Vector Structural Engineeri...		SK - 5
STB	Ground Mount	Apr 6, 2021 at 3:36 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...



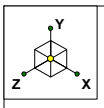
Loads: BLC 4, Wind A 0 deg

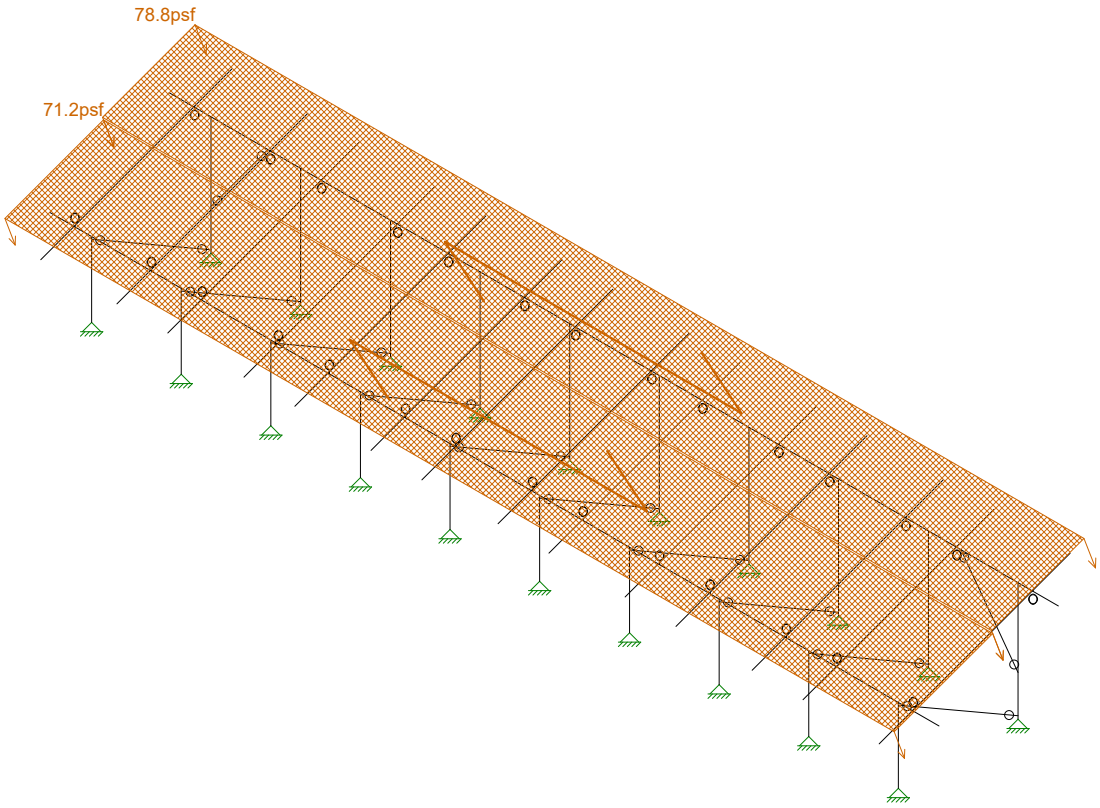
Vector Structural Engineeri...		SK - 6
STB	Ground Mount	Apr 6, 2021 at 3:36 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...



Loads: BLC 5, Wind B 0 deg

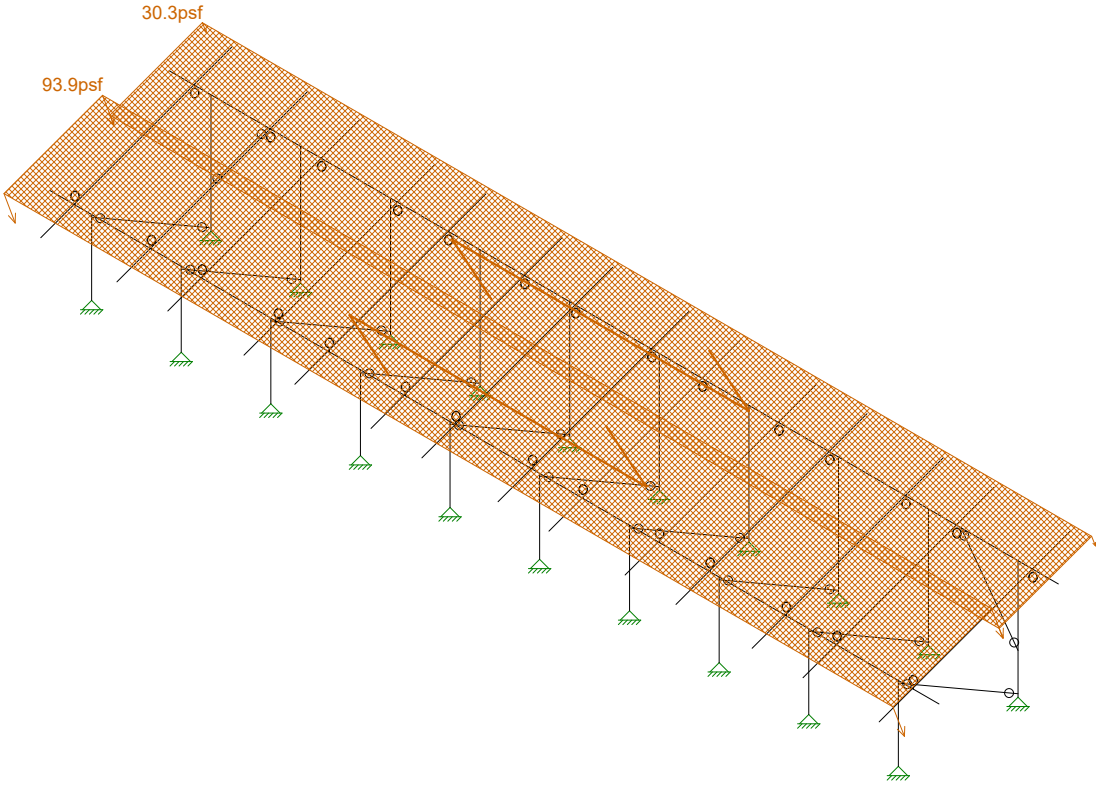
Vector Structural Engineeri...		SK - 7
STB	Ground Mount	Apr 6, 2021 at 3:36 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...





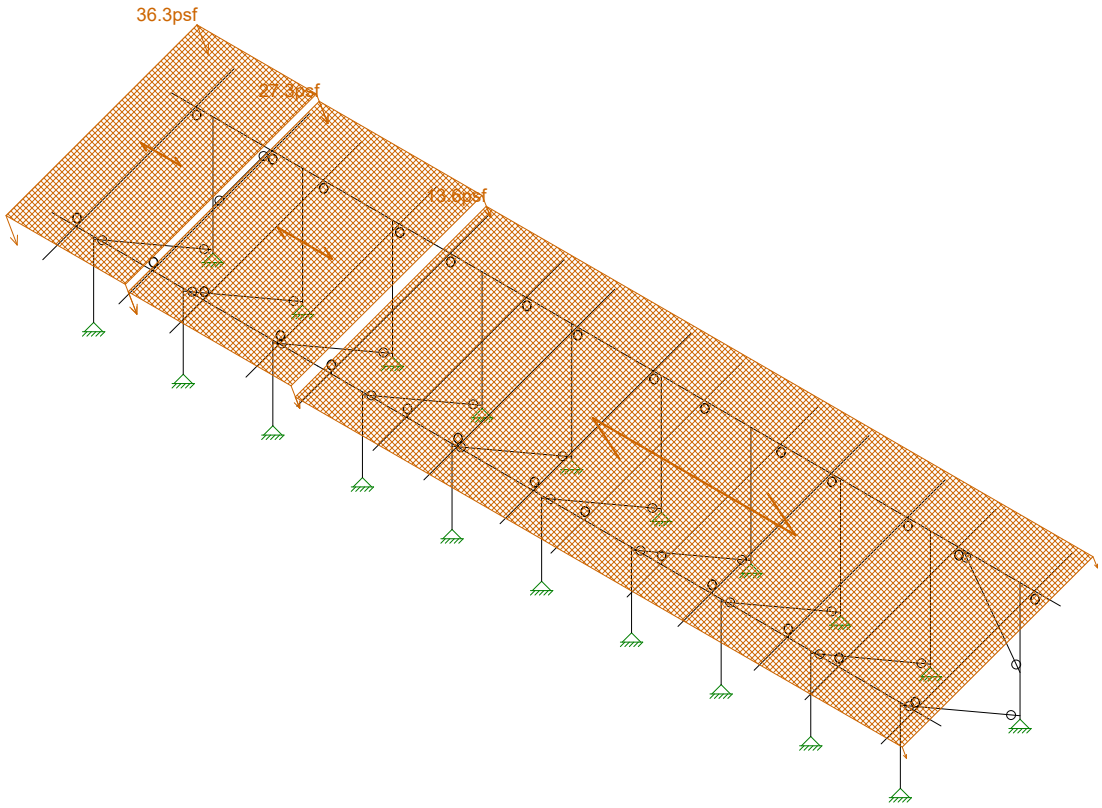
Loads: BLC 6, Wind A 180 deg

Vector Structural Engineeri...		SK - 8
STB	Ground Mount	Apr 6, 2021 at 3:36 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...



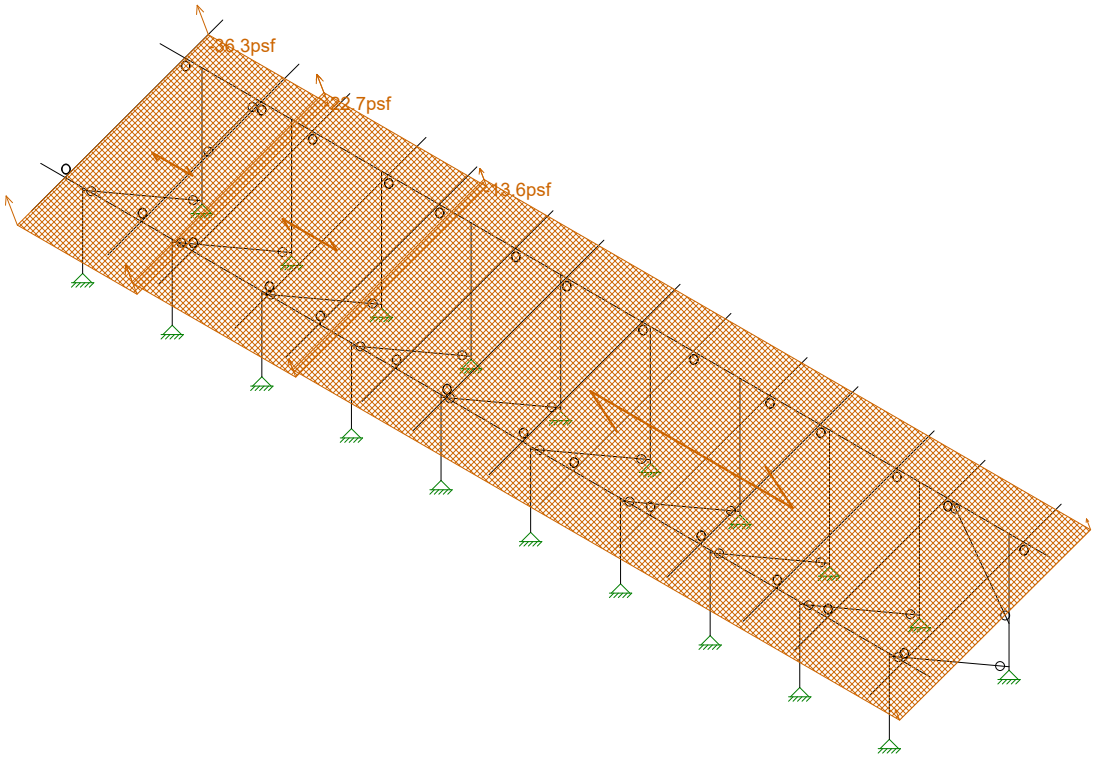
Loads: BLC 7, Wind B 180 deg

Vector Structural Engineeri...	Ground Mount	SK - 9
STB		Apr 6, 2021 at 3:36 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...



Loads: BLC 8, Wind A 90

Vector Structural Engineeri...		SK - 10
STB	Ground Mount	Apr 6, 2021 at 3:36 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...



Loads: BLC 9, Wind B 90

Vector Structural Engineeri...		SK - 11
STB	Ground Mount	Apr 6, 2021 at 3:36 PM
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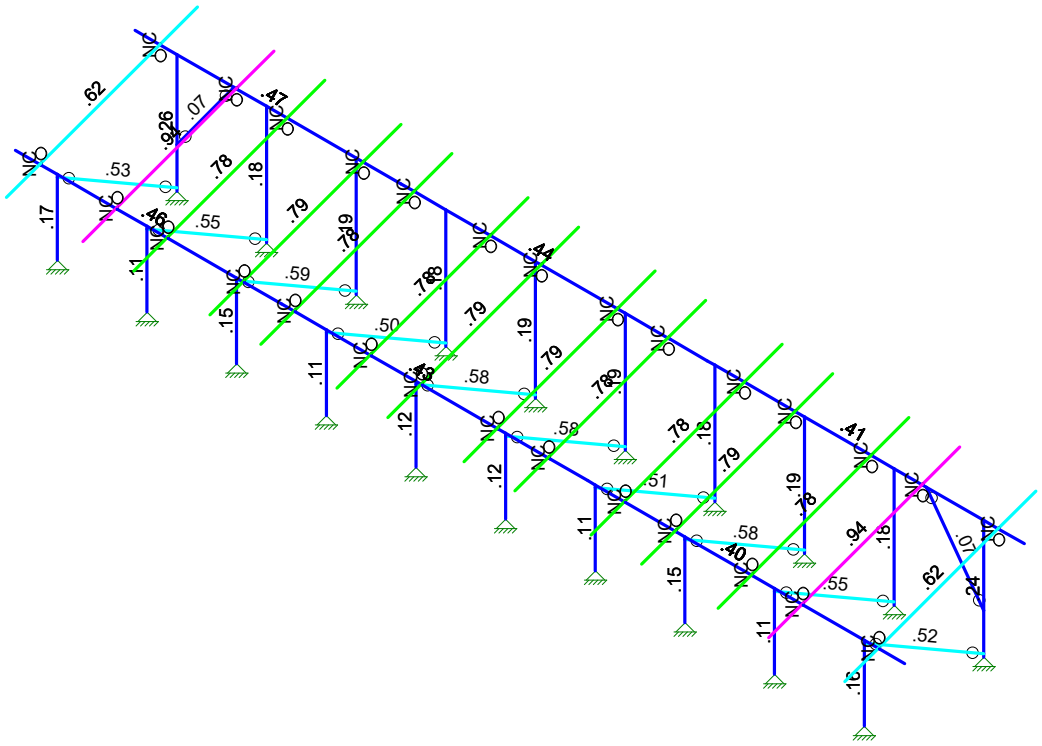
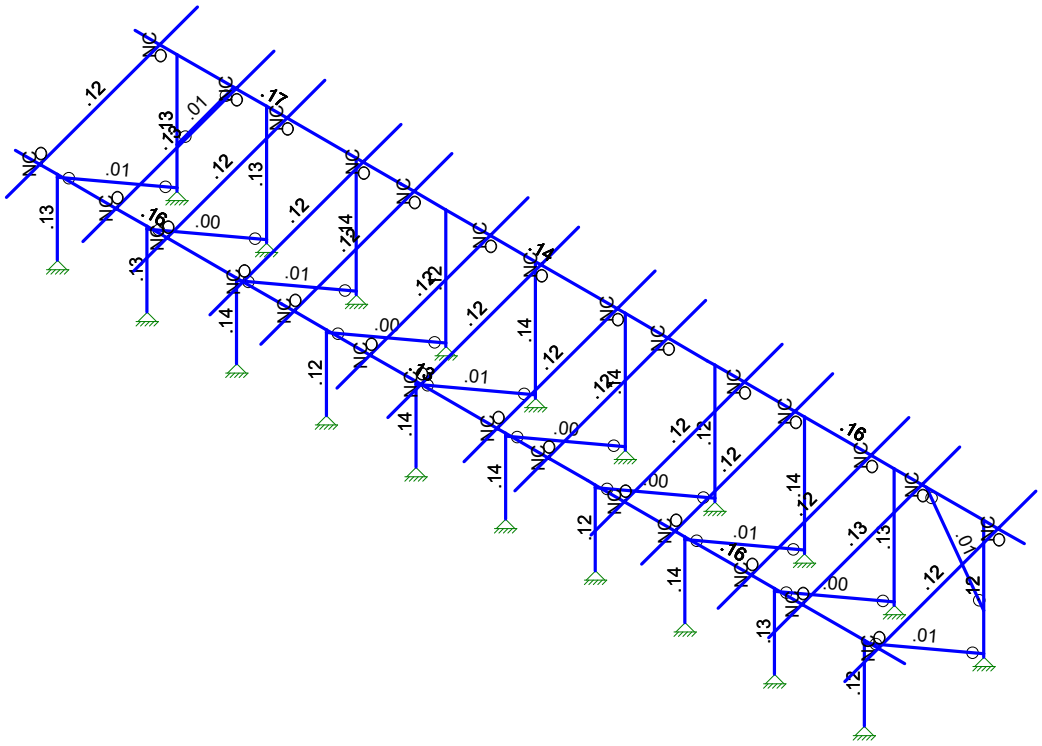


Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Vector Structural Engineeri...		SK - 1
STB	Ground Mount	Apr 6, 2021 at 3:35 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Vector Structural Engineeri...		SK - 2
STB	Ground Mount	Apr 6, 2021 at 3:35 PM
U2716.103.191		Sunmodo Sunturf D1 GM v7 85x45...

(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 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-16: ASD
Wood Code	AWC NDS-15: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	ACI 530-13: 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 7-10
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

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	Beam	Rectangular Tubes	6005-T5	Typical	.74	.253	.727	.578
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	0

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	-59.1
2	N198	N201	N199	N196	Perp	A-B	-68.2

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	-101.5
2	N198	N201	N199	N196	Perp	A-B	-9.1

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	78.8
2	N198	N201	N199	N196	Perp	A-B	71.2

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	30.3
2	N198	N201	N199	N196	Perp	A-B	93.9

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	36.3
2	N203	N209	N208	N202	Perp	A-B	27.3
3	N209	N200	N199	N208	Perp	A-B	13.6

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	-36.3
2	N203	N209	N208	N202	Perp	A-B	-22.7
3	N209	N200	N199	N208	Perp	A-B	-13.6

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						30		
11	BLC 3 Transient Area ...	None								
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						86		
17	BLC 9 Transient Area ...	None						86		

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...	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	23.26	15	895.899	6	23.512	3	0	20	0	20	0	20
2		min	-37.856	6	-341.718	15	-28.566	5	0	1	0	1	0	1
3	N1	max	65.824	5	2149.779	5	866.338	5	0	20	0	20	0	20
4		min	-70.073	16	-2010.44	16	-737.4...	15	0	1	0	1	0	1
5	N132	max	7.504	16	2204.364	5	942.546	5	0	20	0	20	0	20
6		min	-7.349	5	-2054.598	16	-799.4...	3	0	1	0	1	0	1
7	N133	max	9.678	15	978.261	6	24.555	3	0	20	0	20	0	20
8		min	-14.873	6	-374.3	15	-29.958	5	0	1	0	1	0	1
9	N109	max	2.403	7	2057.326	5	891.577	17	0	20	0	20	0	20
10		min	-2.195	16	-1872.48	16	-759.2...	3	0	1	0	1	0	1
11	N110A	max	5.369	19	1010.538	6	23.999	3	0	20	0	20	0	20
12		min	-3.565	8	-415.732	15	-29.363	5	0	1	0	1	0	1
13	N121	max	13.233	5	2206.014	5	954.106	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	-13.267	16	-2058.558	16	-808.4...	15	0	1	0	1	0	1
15	N122	max	27.739	6	942.774	6	24.499	3	0	20	0	20	0	20
16		min	-17.206	15	-347.56	15	-29.87	5	0	1	0	1	0	1
17	N133B	max	4.939	16	1994.609	5	818.568	17	0	20	0	20	0	20
18		min	-4.842	5	-1833.737	16	-701.5...	3	0	1	0	1	0	1
19	N134B	max	5.616	15	941.071	6	23.372	3	0	20	0	20	0	20
20		min	-9.035	6	-398.51	15	-28.48	5	0	1	0	1	0	1
21	N151	max	6.623	5	2200.728	5	937.919	5	0	20	0	20	0	20
22		min	-6.709	16	-2050.439	16	-795.8...	3	0	1	0	1	0	1
23	N152	max	14.515	6	981.977	6	24.526	3	0	20	0	20	0	20
24		min	-9.412	15	-378.647	15	-29.926	5	0	1	0	1	0	1
25	N157A	max	5.541	5	2002.543	5	823.959	17	0	20	0	20	0	20
26		min	-5.603	16	-1842.268	16	-705.8...	3	0	1	0	1	0	1
27	N158A	max	11.497	6	941.254	6	23.413	3	0	20	0	20	0	20
28		min	-7.106	15	-396.468	15	-28.531	5	0	1	0	1	0	1
29	N155B	max	13.734	16	2195.735	5	949.755	5	0	20	0	20	0	20
30		min	-13.623	5	-2047.721	16	-804.8...	15	0	1	0	1	0	1
31	N156B	max	16.986	15	938.74	6	24.457	3	0	20	0	20	0	20
32		min	-27.347	6	-346.607	15	-29.816	5	0	1	0	1	0	1
33	N167	max	2.232	16	2079.778	5	899.13	17	0	20	0	20	0	20
34		min	-1.522	5	-1894.209	16	-765.7...	3	0	1	0	1	0	1
35	N168	max	2.187	6	1018.59	6	23.956	3	0	20	0	20	0	20
36		min	-1.669	20	-419.221	15	-29.316	5	0	1	0	1	0	1
37	N179	max	69.54	16	2100.958	5	846.792	5	0	20	0	20	0	20
38		min	-65.375	5	-1964.419	16	-720.6...	15	0	1	0	1	0	1
39	N180	max	34.484	6	875.733	6	23.219	3	0	20	0	20	0	20
40		min	-21.146	15	-333.197	15	-28.181	5	0	1	0	1	0	1
41	Totals:	max	.003	7	26311.752	5	8638.4...	5						
42		min	-.003	20	-18672.839	15	-7359....	15						

Envelope AISC 14th(360-10): 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...	.166	48.151	6	.126	48.151		5	17544.805	23232.186	1397.505	1397.505	1....	H1-1b
2	M6	Pipe 2.0 A2...	.258	79.224	5	.128	0		5	11383.922	23232.186	1397.505	1397.505	2....	H1-1b
3	M13	Pipe 2.5 A2...	.463	27.813	6	.161	148....		6	11641.036	28358.413	2081.747	2081.747	1....	H1-1b
4	M14	Pipe 2.5 A2...	.465	27.813	16	.168	152....		16	11641.036	28358.413	2081.747	2081.747	1	H1-1b
5	M80	Pipe 2.0 A2...	.124	48.151	6	.137	48.151		5	17544.805	23232.186	1397.505	1397.505	1....	H1-1b
6	M81	Pipe 2.0 A2...	.194	0	5	.138	0		5	11383.922	23232.186	1397.505	1397.505	1....	H1-1b*
7	M50	Pipe 2.0 A2...	.114	48.151	5	.128	48.151		5	17544.805	23232.186	1397.505	1397.505	1....	H1-1b
8	M51	Pipe 2.0 A2...	.181	0	5	.130	0		5	11383.922	23232.186	1397.505	1397.505	1....	H1-1b*
9	M56A	Pipe 2.0 A2...	.148	48.151	6	.139	48.151		5	17544.805	23232.186	1397.505	1397.505	1....	H1-1b
10	M57A	Pipe 2.0 A2...	.194	0	5	.140	0		5	11383.922	23232.186	1397.505	1397.505	1....	H1-1b*
11	M68	Pipe 2.0 A2...	.112	48.151	5	.118	48.151		5	17544.805	23232.186	1397.505	1397.505	1....	H1-1b
12	M69	Pipe 2.0 A2...	.175	0	5	.120	0		5	11383.922	23232.186	1397.505	1397.505	1....	H1-1b*
13	M68A	Pipe 2.5 A2...	.434	30	6	.135	90		6	11641.036	28358.413	2081.747	2081.747	2....	H1-1b
14	M69A	Pipe 2.5 A2...	.405	29.638	6	.158	88.913		6	11641.036	28358.413	2081.747	2081.747	2....	H1-1b
15	M70A	Pipe 2.5 A2...	.438	30	16	.144	90		16	11641.036	28358.413	2081.747	2081.747	1	H1-1b
16	M71	Pipe 2.5 A2...	.410	29.638	16	.165	86.443		16	11641.036	28358.413	2081.747	2081.747	1	H1-1b
17	M73	Pipe 2.0 A2...	.124	48.151	6	.136	48.151		5	17544.805	23232.186	1397.505	1397.505	1....	H1-1b
18	M74	Pipe 2.0 A2...	.193	0	5	.137	0		5	11383.922	23232.186	1397.505	1397.505	1....	H1-1b*
19	M76	Pipe 2.0 A2...	.115	48.151	6	.118	48.151		5	17544.805	23232.186	1397.505	1397.505	1....	H1-1b
20	M77	Pipe 2.0 A2...	.176	0	5	.121	0		5	11383.922	23232.186	1397.505	1397.505	1....	H1-1b*
21	M75B	Pipe 2.0 A2...	.147	48.151	6	.138	48.151		5	17544.805	23232.186	1397.505	1397.505	1....	H1-1b
22	M76A	Pipe 2.0 A2...	.193	0	5	.139	0		5	11383.922	23232.186	1397.505	1397.505	1....	H1-1b*
23	M81A	Pipe 2.0 A2...	.114	48.151	5	.129	48.151		5	17544.805	23232.186	1397.505	1397.505	1....	H1-1b

Envelope AISC 14th(360-10): ASD Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	Pnc/om [..	Pnt/om [lb]	Mnyy/om..	Mnzz/om..	Cb	Eqn
24	M82A	Pipe 2.0 A2...	.183	0	5	.132	0		5	11383.922	23232.186	1397.505	1397.505	1...	H1-1b*
25	M93	Pipe 2.0 A2...	.157	48.151	6	.123	48.151		5	17544.805	23232.186	1397.505	1397.505	1...	H1-1b
26	M94	Pipe 2.0 A2...	.243	79.224	5	.125	0		5	11383.922	23232.186	1397.505	1397.505	2...	H1-1b

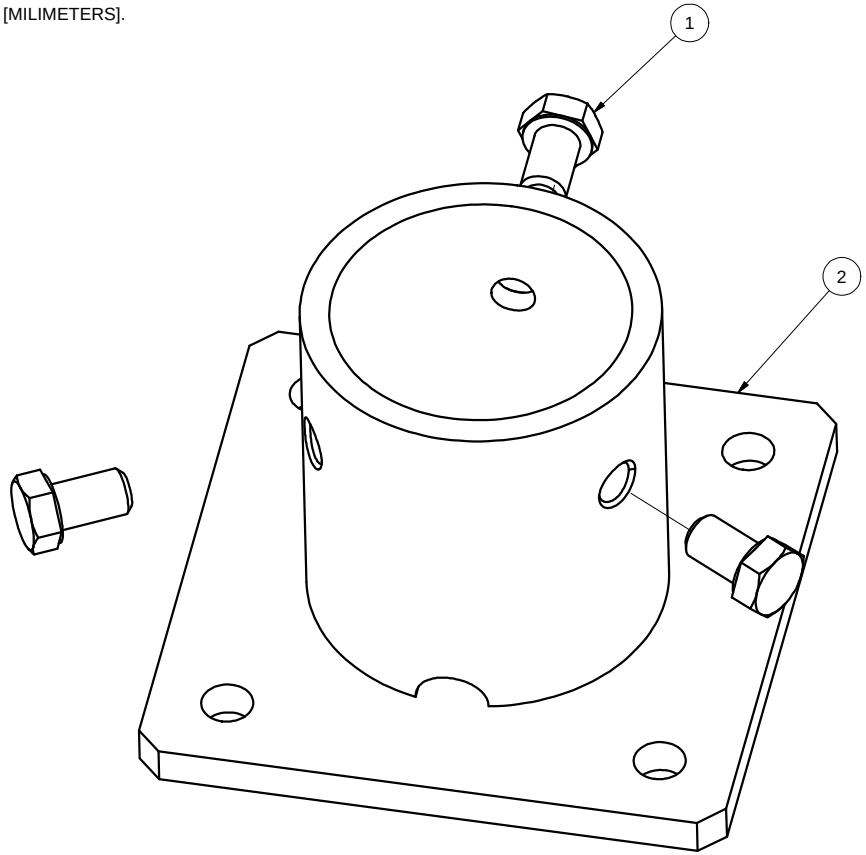
Envelope AA ADM1-15: ASD - Building Aluminum Code Checks

	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	M15	RT1.5x2x...	.532	49.066	5	.008	0	z	4	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
2	M19	RT1.5x2x...	.071	36.351	5	.008	0	z	17	4020.953	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
3	M16	HR300	.622	109.1...	16	.121	109.1...	y	16	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
4	M82	RT1.5x2x...	.578	49.066	5	.005	0	y	5	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
5	M52	RT1.5x2x...	.547	49.066	5	.002	92.359	y	7	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
6	M58A	RT1.5x2x...	.585	49.066	5	.006	0	y	5	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
7	M70	RT1.5x2x...	.502	49.066	5	.002	0	y	7	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
8	M75	RT1.5x2x...	.575	49.066	5	.005	0	y	5	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
9	M75A	RT1.5x2x...	.069	36.434	5	.007	0	z	17	4002.623	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
10	M78	RT1.5x2x...	.505	49.066	5	.002	92.359	y	6	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
11	M77A	RT1.5x2x...	.582	49.066	5	.006	0	y	5	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
12	M83	RT1.5x2x...	.551	49.066	5	.002	0	y	6	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
13	M95	RT1.5x2x...	.520	49.066	5	.008	0	z	4	1968.636	19411....	770.742	927.083	5889.423	3966.346	1...	H.1-1
14	M44	HR300	.942	66.598	5	.129	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
15	M47	HR300	.784	66.598	5	.117	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
16	M50A	HR300	.793	66.598	5	.119	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
17	M53	HR300	.779	66.598	5	.118	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
18	M56	HR300	.779	66.598	5	.116	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
19	M59	HR300	.789	66.598	5	.116	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
20	M62	HR300	.789	66.598	5	.116	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
21	M65	HR300	.779	66.598	5	.116	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
22	M68B	HR300	.779	66.598	5	.119	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
23	M71A	HR300	.792	66.598	5	.119	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
24	M74A	HR300	.784	66.598	5	.117	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
25	M77B	HR300	.940	66.598	5	.129	25.505	y	6	5148.207	14429....	560.361	934.132	5656.689	2605.145	1...	H.1-1
26	M80A	HR300	.620	109.1...	16	.118	109.1...	y	16	5148.207	14429....	560.361	934.132	5656.689	2605.145	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

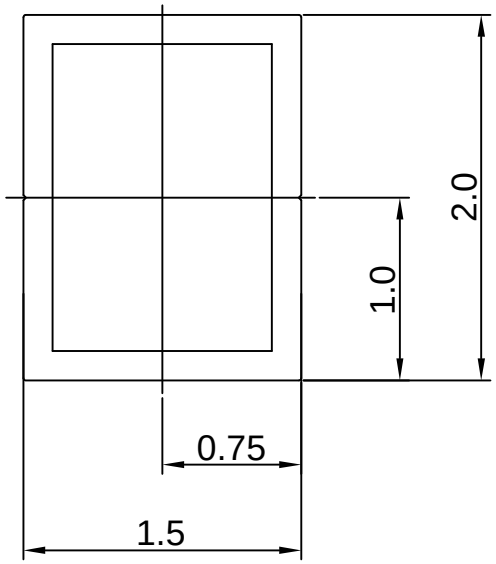
B
DRAWING NUMBER: K10268-001

SCALE: NONE
SHEET 1 of 1

THIS DRAWING IS CONFIDENTIAL PROPERTY OF SUNMODO AND ITS CONTENTS MAY NOT BE DISCLOSED WITHOUT THE PRIOR WRITTEN CONSENT OF SUNMODO CORP.

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:

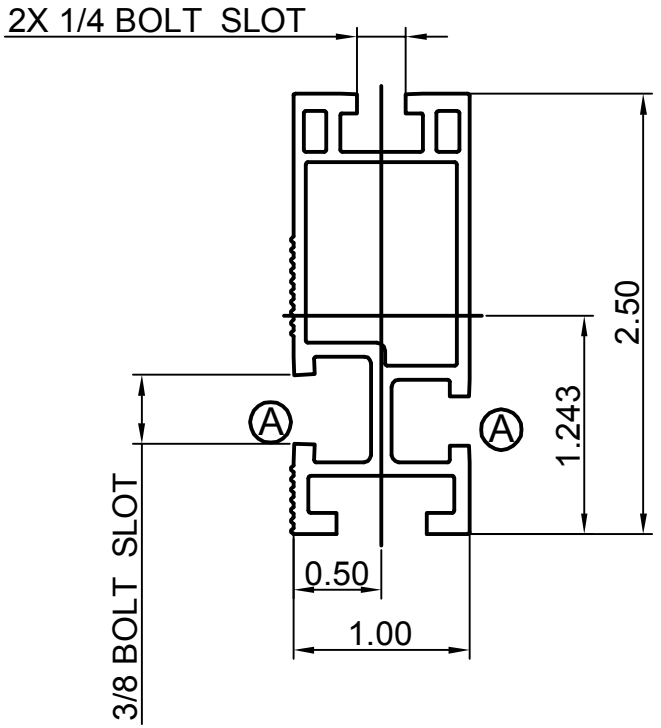
Weight: 1.156 lbs/ft
Area: 0.992 in^2
Perimeter: 12.601 in
Bounding Box: X: -1.000,1.000
Y: -0.750, 0.750
Centroid:(0.000,0.000)
Moments of Inertia(in^4): Ix=0.506,Iy=0.322
Section modulus in bending(in^3): Wx=0.675,Wy=0.322
Radii of Gyration: X: 0.714, Y: 0.570

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.



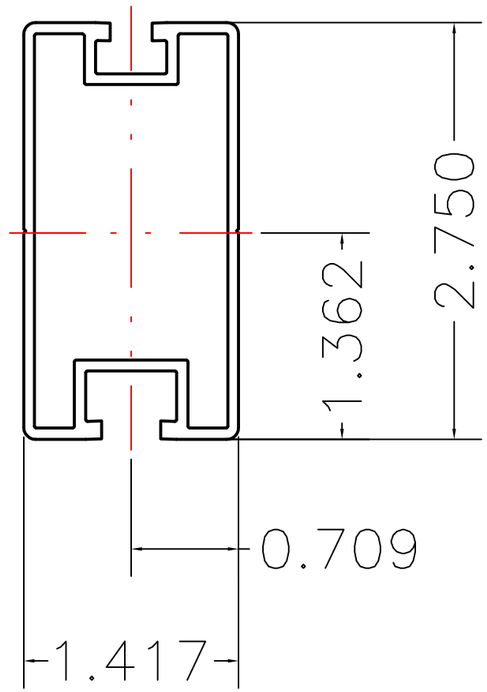
Section properties:

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

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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	

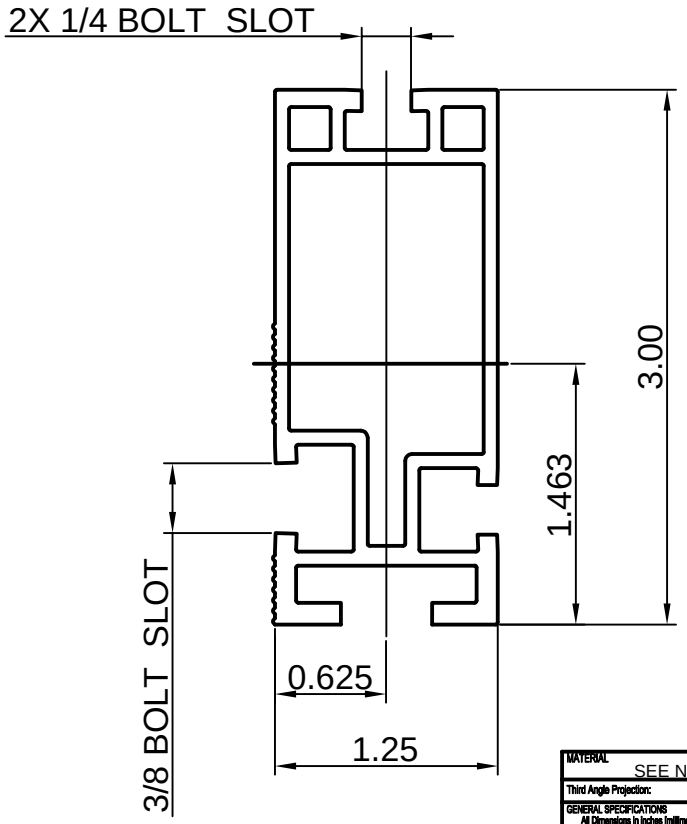
SunModo Corp.
14800 NE 65TH STREET, VANCOUVER WA 98682

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:

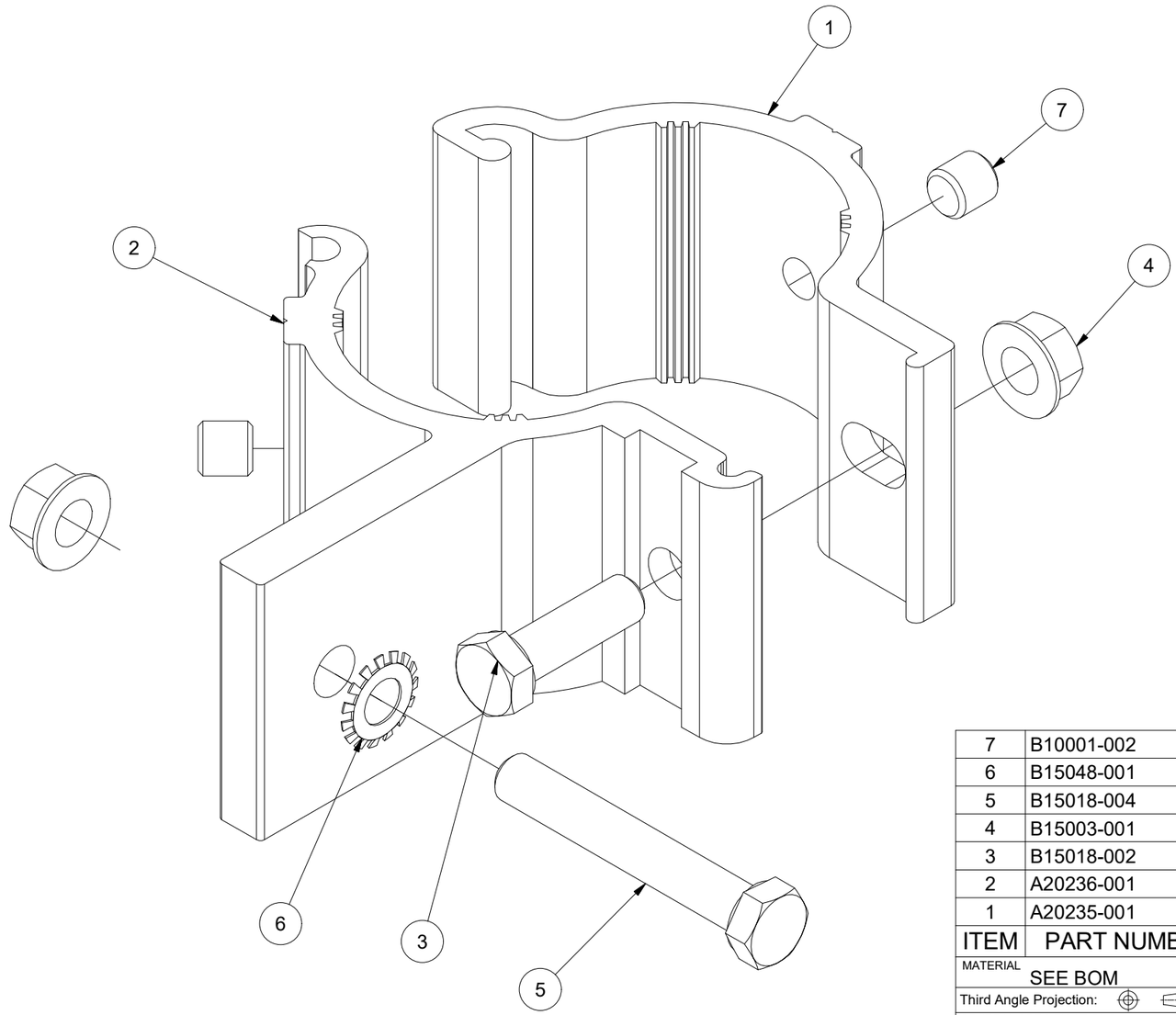
Weight: 1.151 lbs/ft
Area: 0.980 in^2
Perimeter: 22.104 in
Bounding Box: X: -0.625,0.625
Y: -1.463,1.537
Centroid:(0.000,0.000)
Moments of Inertia(in^4): Ix=1.047,Iy=0.207
Section modulus in bending(in^3): Wx=0.681,Wy=0.331
Radii of Gyration: X: 1.034, Y: 0.460

MATERIAL	SEE NOTES
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 specfd	Break all sharp edges .010-.020 unless otherwise specified.
DRAWN BY: zcg	DATE: 02/21/2013
CHECKED BY	
APPROVALS	

Sunmodo Corp.

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

TITLE	HELIO HEAVY RAIL
B	DRAWING NUMBER A20145
SCALE: NONE	SHEET 1 of 1



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

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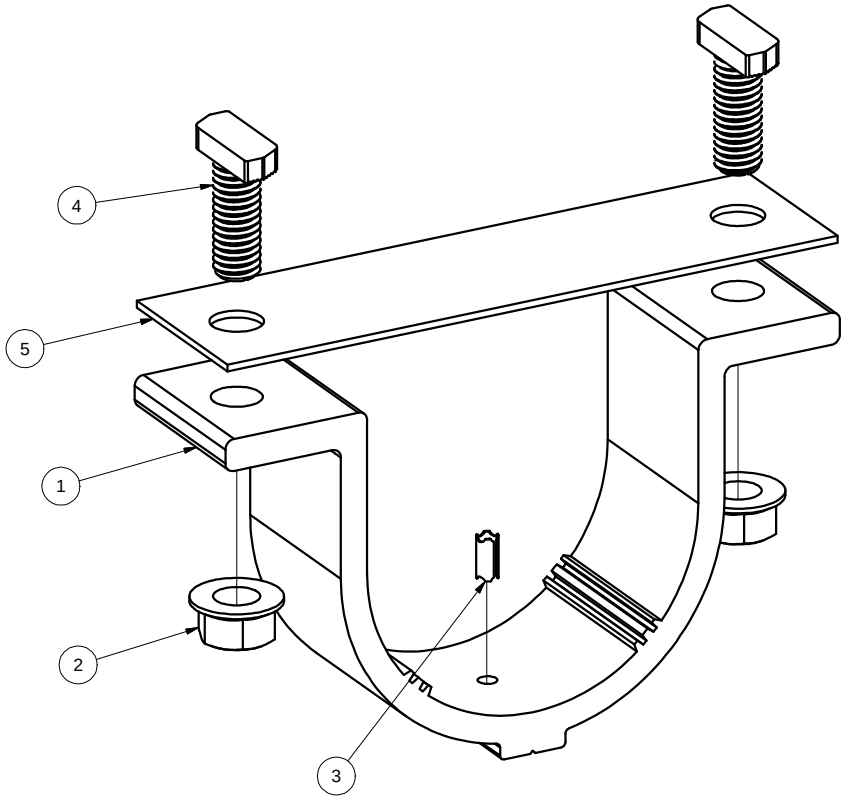
REVISIONS			
REV	DESCRIPTION	BY	DATE
A	INITIAL RELEASE	LWF	06/12/2018
B	ADD C10005-006	LWF	06/27/2018



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

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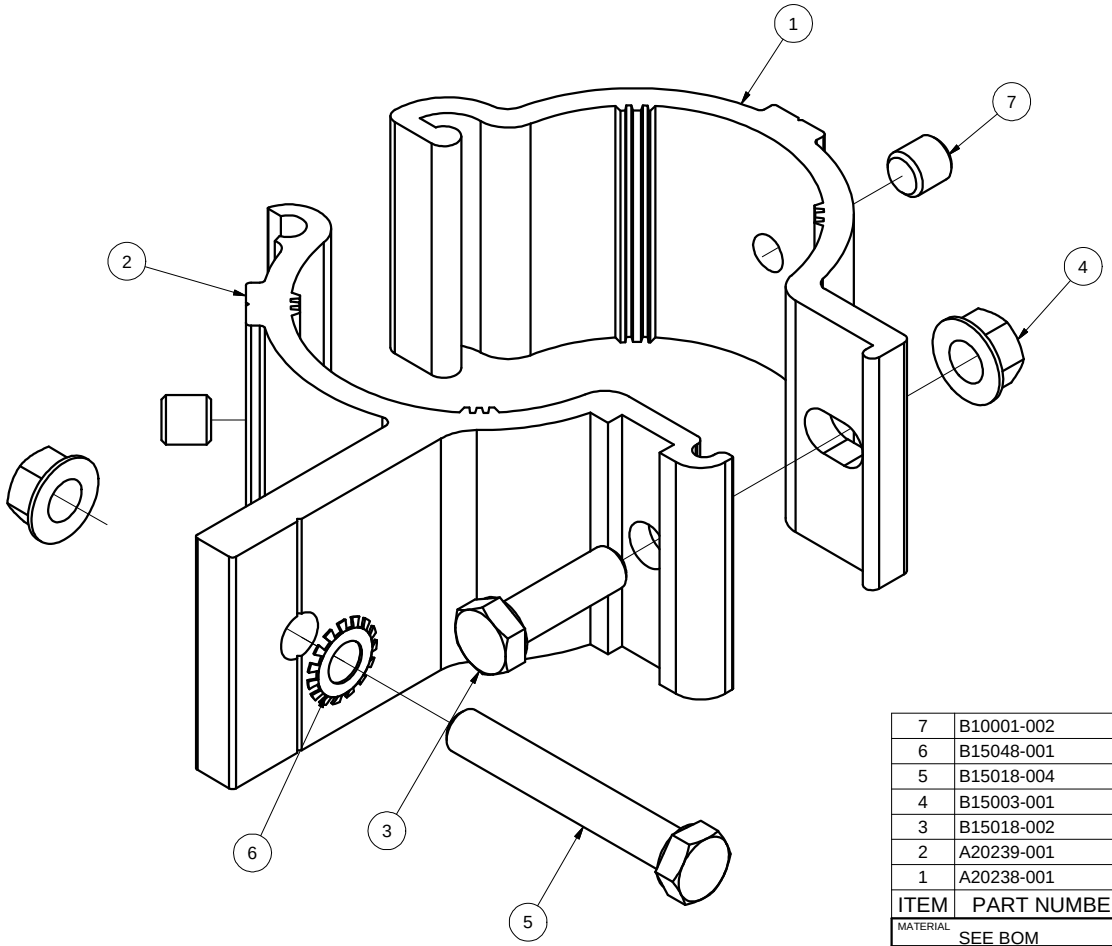
REVISIONS			
REV	DESCRIPTION	BY	DATE
A	INITIAL RELEASE	zcg	09/25/2015



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

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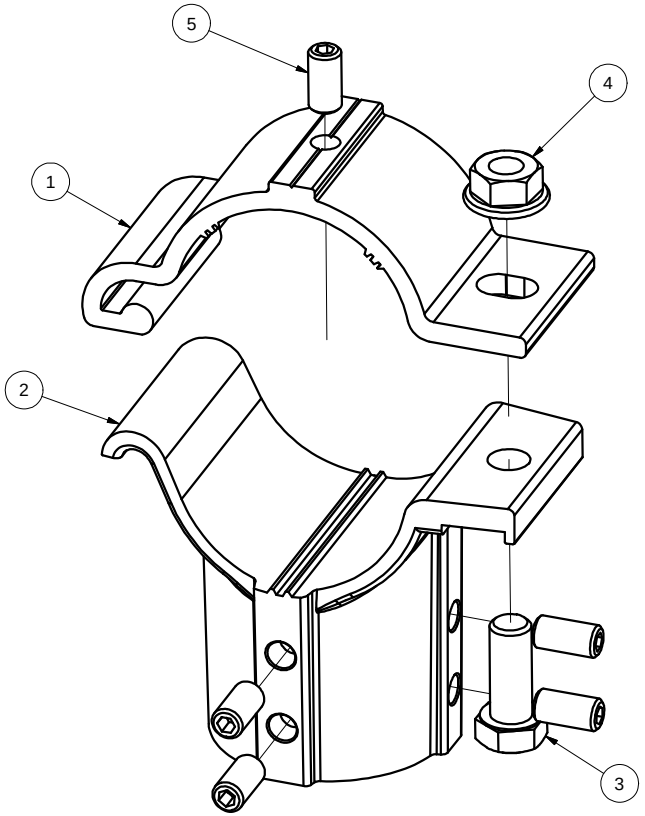
REVISIONS			
REV	DESCRIPTION	BY	DATE
A	INITIAL RELEASE	LWF	06/12/2018



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

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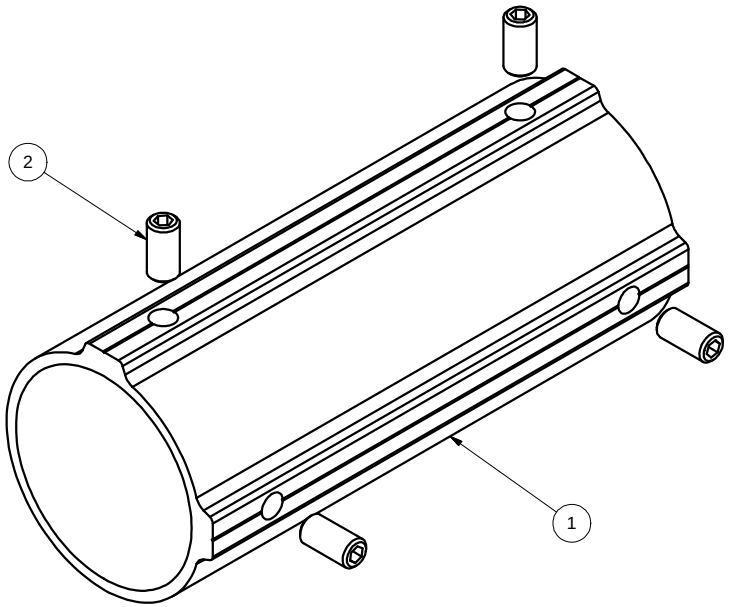
REVISIONS			
REV	DESCRIPTION	BY	DATE
A	INITIAL RELEASE	LWF	06/12/2018



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

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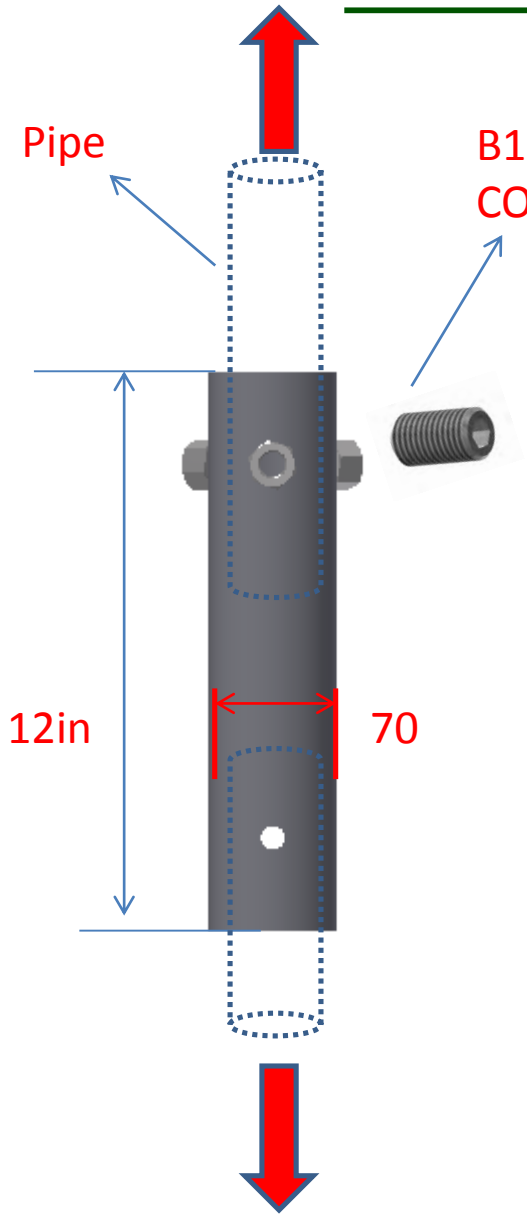

B10051-002, SET SCREW M16X30
CONE TIPPED SET SCRE M16X30

Conditions for load test：

1. The helical auger and ground screw use the same top section, so only one was used for testing
2. A 12 inch section from the top of the auger/ground screw was used
3. Three tests on each pipe type was used
4. The auger/screw material supplied by the auger/screw supplier.