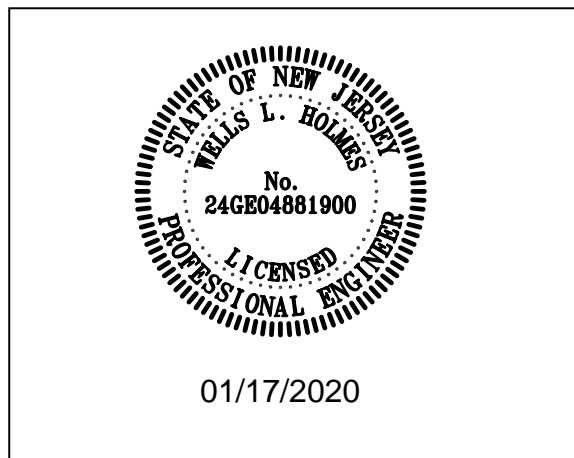




STRUCTURAL CALCULATIONS  
for  
NJCLT56LE  
100' MONOPOLE & LS-20  
at  
LONG HILL ROAD  
LONG HILL TOWNSHIP, NJ  
for  
T-MOBILE  
&  
CDMI



BY: WELLS HOLMES, P.E.  
PROJECT ENGINEER  
NJ Firm License #: COA - 24 GA 28120600  
PROJECT #: U1140.147.201  
DATE: January 17, 2020

DESIGNED BY YCA; CHECKED BY CMP

**NOTE:**

*The calculations presented in this package are intended for a single use at the location indicated above, for the client listed above. These calculations shall not be reproduced, reused, "card filed", sold to a third party, or altered in any way without the written authorization of Vector Structural Engineering, LLC and CDMI.*

Copyright © 2020 Vector Structural Engineering, LLC  
*This Excel workbook contains proprietary information belonging to Vector Structural Engineering, LLC, and may be neither wholly nor partially copied or reproduced without the prior written permission of Vector Structural Engineering, LLC.*



JOB NO.: U1140.147.201

Copyright © 2020 Vector Structural Engineering, LLC

*This Excel workbook contains proprietary information belonging to Vector Structural Engineering, LLC, and may be neither wholly nor partially copied or reproduced without the prior written permission of Vector Structural Engineering, LLC.*

PROJECT: NJCLT56LE

### **Design Criteria:**

**Code:** Structural design is based on the International Building Code, 2015 Edition (New Jersey Edition) and the TIA-222-G standard.

**Wind:** Basic wind speed = 104 mph (3-second gust) per the ASCE 7-10 standard  
 Risk Category / Structure Class: II  
 Wind exposure: C  
 Topographic category: 4  
 Crest height: 200 ft

**Ice:** 1" radial ice @ 50 mph basic wind speed (3-second gust) per the TIA-222-G standard

**Seismic:** Seismic importance factor,  $I = 1$   
 Risk Category / Structure Class: II  
 Mapped spectral response accelerations:  $S_s = 0.259g$   $S_1 = 0.07g$   
 Site class: D  
 Spectral response coefficients:  $S_{DS} = 0.275g$   $S_{D1} = 0.112g$   
 Seismic design category: B  
 Basic seismic-force-resisting-system: Telecommunication Tower: Steel Pole  
 Response modification factor,  $R = 1.5$   
 Analysis procedure: Equivalent Lateral Force

### **General Notes:**

- 1 The contractor shall verify dimensions, conditions and elevations before starting work. The engineer shall be notified immediately if any discrepancies are found.
- 2 The typical notes and details shall apply in all cases unless specifically detailed elsewhere. Where no detail is shown, the construction shall be as shown for other similar work and as required by the building code.
- 3 These calculations are limited to the structural members shown in these calculations only. The connection of the members shown in these calculations to the existing structure shall be by others, with the exception of those explicitly shown on the drawings.
- 4 The contractor shall be responsible for compliance with local construction safety orders. Approval of shop drawings by the architect or structural engineer shall not be construed as accepting this responsibility.
- 5 All structural framing members shall be adequately shored and braced during erection and until full lateral and vertical support is provided by adjoining members.

### **Structural Steel:**

- 1 All structural steel code checks based on the AISC-LRFD, 3rd Edition per the TIA-222-G standard
- 2 All other structural steel shapes & LS frame shall be per ASTM A572 GR. 65, 65 U.N.O.
- 3 All anchor bolts shall be per ASTM F1554 GR. 105, U.N.O.
- 4 All bolts for steel-to-steel connections shall be per ASTM F3125 GR. A325 U.N.O.
- 5 All bolted connections shall be tightened per the "turn-of-nut" method as defined by AISC.
- 6 All welding shall be performed by certified welders in accordance with the latest edition of the American Welding Society (AWS) D1.1
- 7 All steel surfaces shall be galvanized in accordance with ASTM A123 and ASTM F2329 standards, thoroughly coated with a zinc-rich primer, or otherwise protected as noted on the structural drawings.

**DESIGNED APPURTENANCE LOADING**

TYPE	ELEVATION	TYPE	ELEVATION
RFI BA40404040-67-DIN	107.5	Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	95
RFS APXVAARR24_43_U_NA20 (95.9"x24"x8.7", 154 lb) W/ MP	95	RFS APXVAARR24_43_U_NA20 (95.9"x24"x8.7", 154 lb) W/ MP	95
RFS APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	95	RFS APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	95
Ericsson RRUS 4449 B71+B12	95	Ericsson RRUS 4449 B71+B12	95
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	95	Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	95
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	95	Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	95
RFS APXVAARR24_43_U_NA20 (95.9"x24"x8.7", 154 lb) W/ MP	95	4'-6" T-arm EPA = 2.5 ft^2 (71 lbs)	95
RFS APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	95	4'-6" T-arm EPA = 2.5 ft^2 (71 lbs)	95
Ericsson RRUS 4449 B71+B12	95	4'-6" T-arm EPA = 2.5 ft^2 (71 lbs)	95
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	95		

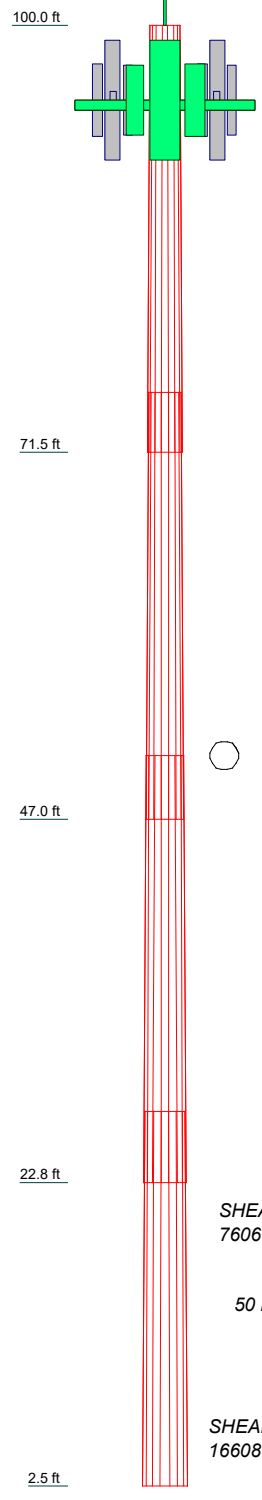
**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

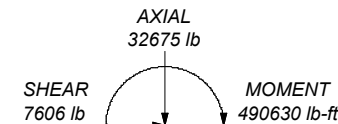
**TOWER DESIGN NOTES**

1. Tower is located in Morris County, New Jersey.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 104 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 4 with Crest Height of 200.00 ft
8. TOWER RATING: 91.9%

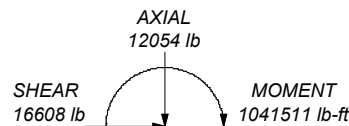
Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	28.50	18	0.1875	4.00	23.8693	27.7200	A572-65	1477.9
2	28.50	18	0.1875	4.25	26.8046	30.7000	A572-65	1648.6
3	28.50	18	0.2188	4.75	29.7441	33.6200	A572-65	2118.6
4	25.00	18	0.2188	32.5365	36.0000		A572-65	2011.1
								7256.2



ALL REACTIONS ARE FACTORED



TORQUE 946 lb-ft  
50 mph WIND - 1.0000 in ICE



TORQUE 1208 lb-ft  
REACTIONS - 104 mph WIND

<p><b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>		<p>Job: <b>NJCLT56LE</b></p>		
		<p>Project: <b>U1140-147-201</b></p>	<p>Client: <b>CDMI</b></p>	<p>Drawn by: <b>ycomposano</b></p>
<p>Vector Engineers</p>		<p>Code: <b>TIA-222-G</b></p>	<p>Date: <b>01/17/20</b></p>	<p>Scale: <b>NTS</b></p>
		<p>Path:</p>	<p>Dwg No. <b>E-1</b></p>	

<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vector Structural Engineering, LLC.</b></p> <p style="text-align: center;">651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>	<b>Job</b> <p style="text-align: center;">NJCLT56LE</p>	<b>Page</b> <p style="text-align: center;">Page 4 of 47 1 of 22</p>
	<b>Project</b> <p style="text-align: center;">U1140-147-201</p>	<b>Date</b> <p style="text-align: center;">14:25:31 01/17/20</p>
	<b>Client</b> <p style="text-align: center;">CDMI</p>	<b>Designed by</b> <p style="text-align: center;">ycamposano</p>

## Tower Input Data

The tower is a monopole.  
This tower is designed using the TIA-222-G standard.  
The following design criteria apply:

- Tower is located in Morris County, New Jersey.
- ASCE 7-10 Wind Data is used.
- Basic wind speed of 104 mph.
- Risk Category II.
- Exposure Category C.
- Topographic Category 4.
- Crest Height 200.00 ft.
- Nominal ice thickness of 1.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li>Consider Moments - Legs</li> <li>Consider Moments - Horizontals</li> <li>Consider Moments - Diagonals</li> <li>Use Moment Magnification</li> <li>√ Use Code Stress Ratios</li> <li>√ Use Code Safety Factors - Guys</li> <li>Escalate Ice</li> <li>Always Use Max Kz</li> <li>Use Special Wind Profile</li> <li>√ Include Bolts In Member Capacity</li> <li>√ Leg Bolts Are At Top Of Section</li> <li>√ Secondary Horizontal Braces Leg</li> <li>Use Diamond Inner Bracing (4 Sided)</li> <li>SR Members Have Cut Ends</li> <li>SR Members Are Concentric</li> </ul> | <ul style="list-style-type: none"> <li>Distribute Leg Loads As Uniform</li> <li>Assume Legs Pinned</li> <li>√ Assume Rigid Index Plate</li> <li>√ Use Clear Spans For Wind Area</li> <li>√ Use Clear Spans For KL/r</li> <li>√ Retension Guys To Initial Tension</li> <li>√ Bypass Mast Stability Checks</li> <li>√ Use Azimuth Dish Coefficients</li> <li>√ Project Wind Area of Appurt.</li> <li>√ Autocalc Torque Arm Areas</li> <li>Add IBC .6D+W Combination</li> <li>Sort Capacity Reports By Component</li> <li>√ Triangulate Diamond Inner Bracing</li> <li>Treat Feed Line Bundles As Cylinder</li> <li>Ignore KL/ry For 60 Deg. Angle Legs</li> </ul> | <ul style="list-style-type: none"> <li>Use ASCE 10 X-Brace Ly Rules</li> <li>√ Calculate Redundant Bracing Forces</li> <li>Ignore Redundant Members in FEA</li> <li>SR Leg Bolts Resist Compression</li> <li>√ All Leg Panels Have Same Allowable</li> <li>Offset Girt At Foundation</li> <li>Consider Feed Line Torque</li> <li>Include Angle Block Shear Check</li> <li>Use TIA-222-G Bracing Resist. Exemption</li> <li>Use TIA-222-G Tension Splice Exemption</li> <li style="text-align: center;">Poles</li> <li>Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> <li>Pole Without Linear Attachments</li> <li>Pole With Shroud Or No Appurtenances</li> <li>Outside and Inside Corner Radii Are Known</li> </ul> |
|--|---|---|

## Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> 5 of 47 2 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	100.00-71.50	28.50	4.00	18	23.8693	27.7200	0.1875	0.7500	A572-65 (65 ksi)
L2	71.50-47.00	28.50	4.25	18	26.8046	30.7000	0.1875	0.7500	A572-65 (65 ksi)
L3	47.00-22.75	28.50	4.75	18	29.7441	33.6200	0.2188	0.8750	A572-65 (65 ksi)
L4	22.75-2.50	25.00		18	32.5365	36.0000	0.2188	0.8750	A572-65 (65 ksi)

### Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	It/Q in <sup>2</sup>	w in	w/t
L1	24.2086	14.0936	998.5983	8.4070	12.1256	82.3545	1998.5106	7.0482	3.8710	20.645
	28.1187	16.3853	1569.2155	9.7740	14.0818	111.4360	3140.4958	8.1942	4.5487	24.26
L2	27.7443	15.8405	1417.8347	9.4491	13.6167	104.1246	2837.5350	7.9217	4.3876	23.401
	31.1447	18.1588	2135.8907	10.8319	15.5956	136.9547	4274.5918	9.0811	5.0732	27.057
L3	30.7561	20.4998	2257.7591	10.4815	15.1100	149.4215	4518.4890	10.2519	4.8500	22.171
	34.1049	23.1909	3268.7416	11.8574	17.0790	191.3900	6541.7844	11.5977	5.5321	25.29
L4	33.6729	22.4386	2960.8504	11.4728	16.5286	179.1355	5925.5968	11.2214	5.3414	24.418
	36.5216	24.8434	4018.4536	12.7023	18.2880	219.7317	8042.1948	12.4240	5.9510	27.205

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>f</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 100.00-71.50				1	1	1			
L2 71.50-47.00				1	1	1			
L3 47.00-22.75				1	1	1			
L4 22.75-2.50				1	1	1			

### Monopole Base Plate Data

Base Plate Data	
Base plate is square	√
Base plate is grouted	
Anchor bolt grade	F1554-105
Anchor bolt size	2.2500 in
Number of bolts	8
Embedment length	12.0000 in
f <sub>c</sub>	3 ksi
Grout space	3.0000 in
Base plate grade	A572-50
Base plate thickness	2.5000 in
Bolt circle diameter	42.0000 in
Outer diameter	45.0000 in
Inner diameter	28.0000 in
Base plate type	Plain Plate

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> 6 of 47 3 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

### Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	$C_{AA}$ ft <sup>2</sup> /ft	Weight plf
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Yes	Inside Pole	98.50 - 2.50	12	No Ice	0.00
							1/2" Ice	0.00
							1" Ice	0.00

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight lb
L1	100.00-71.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	233.28
L2	71.50-47.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	211.68
L3	47.00-22.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	209.52
L4	22.75-2.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	174.96

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight lb
L1	100.00-71.50	A	2.755	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	233.28
L2	71.50-47.00	A	2.766	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	211.68
L3	47.00-22.75	A	2.738	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	209.52
L4	22.75-2.50	A	2.583	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	174.96

### Shielding Factor Ka

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> Page 7 of 47 4 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
---------------	----------------------	-------------	-------------------------	-----------------------	--------------------

## Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight lb
			Horz ft	Lateral ft					
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	A	From Face	3.00	30.0000	95.00	No Ice	7.94	6.31	197.67
			-2.00			1/2" Ice	8.34	6.97	265.31
			0.00			1" Ice	8.75	7.65	339.98
RFS APXVAARR24_43_U_NA2 0 (95.9"x24"x8.7", 154 lb) W/ MP	A	From Face	3.00	30.0000	95.00	No Ice	20.24	10.79	183.20
			0.00			1/2" Ice	20.89	12.21	316.89
			0.00			1" Ice	21.55	13.49	461.20
RFS APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe	A	From Face	3.00	30.0000	95.00	No Ice	6.91	3.57	62.69
			2.00			1/2" Ice	7.39	4.41	112.11
			0.00			1" Ice	7.86	5.13	168.10
Ericsson RRUS 4449 B71+B12	A	From Face	3.00	30.0000	95.00	No Ice	1.02	1.79	77.98
			0.00			1/2" Ice	1.14	2.03	97.09
			0.00			1" Ice	1.28	2.28	119.49
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	A	From Face	3.00	30.0000	95.00	No Ice	1.84	0.82	46.00
			0.00			1/2" Ice	2.01	0.94	60.07
			0.00			1" Ice	2.19	1.07	76.66
***									
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	B	From Face	3.00	30.0000	95.00	No Ice	7.94	6.31	197.67
			-2.00			1/2" Ice	8.34	6.97	265.31
			0.00			1" Ice	8.75	7.65	339.98
RFS APXVAARR24_43_U_NA2 0 (95.9"x24"x8.7", 154 lb) W/ MP	B	From Face	3.00	30.0000	95.00	No Ice	20.24	10.79	183.20
			0.00			1/2" Ice	20.89	12.21	316.89
			0.00			1" Ice	21.55	13.49	461.20
RFS APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe	B	From Face	3.00	30.0000	95.00	No Ice	6.91	3.57	62.69
			2.00			1/2" Ice	7.39	4.41	112.11
			0.00			1" Ice	7.86	5.13	168.10
Ericsson RRUS 4449 B71+B12	B	From Face	3.00	30.0000	95.00	No Ice	1.02	1.79	77.98
			0.00			1/2" Ice	1.14	2.03	97.09
			0.00			1" Ice	1.28	2.28	119.49
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	B	From Face	3.00	30.0000	95.00	No Ice	1.84	0.82	46.00
			0.00			1/2" Ice	2.01	0.94	60.07
			0.00			1" Ice	2.19	1.07	76.66
***									
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	C	From Face	3.00	30.0000	95.00	No Ice	7.94	6.31	197.67
			-2.00			1/2" Ice	8.34	6.97	265.31
			0.00			1" Ice	8.75	7.65	339.98
RFS APXVAARR24_43_U_NA2 0 (95.9"x24"x8.7", 154 lb) W/ MP	C	From Face	3.00	30.0000	95.00	No Ice	20.24	10.79	183.20
			0.00			1/2" Ice	20.89	12.21	316.89
			0.00			1" Ice	21.55	13.49	461.20
RFS APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe	C	From Face	3.00	30.0000	95.00	No Ice	6.91	3.57	62.69
			2.00			1/2" Ice	7.39	4.41	112.11
			0.00			1" Ice	7.86	5.13	168.10
Ericsson RRUS 4449 B71+B12	C	From Face	3.00	30.0000	95.00	No Ice	1.02	1.79	77.98
			0.00			1/2" Ice	1.14	2.03	97.09
			0.00			1" Ice	1.28	2.28	119.49
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	C	From Face	3.00	30.0000	95.00	No Ice	1.84	0.82	46.00
			0.00			1/2" Ice	2.01	0.94	60.07
			0.00			1" Ice	2.19	1.07	76.66

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> Page 8 of 47 5 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			ft ft ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb
***								
RFI BA40404040-67-DIN	C	From Face	0.50 0.00 0.00	0.0000	107.50	No Ice 1/2" Ice 1" Ice	4.04 8.18 9.88	44.00 89.35 145.29
***								
4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	C	From Face	3.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice 1" Ice	2.50 2.82 3.14	71.00 157.70 250.24
4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	C	From Face	3.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice 1" Ice	2.50 2.82 3.14	71.00 157.70 250.24
4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	C	From Face	3.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice 1" Ice	2.50 2.82 3.14	71.00 157.70 250.24
***								
***								

### Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation	z	K <sub>Z</sub>	q <sub>z</sub>	A <sub>G</sub>	F <sub>a</sub>	A <sub>F</sub>	A <sub>R</sub>	A <sub>leg</sub>	Leg %	C <sub>AA</sub> In Face	C <sub>AA</sub> Out Face
ft	ft		psf	ft <sup>2</sup>	c	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>		ft <sup>2</sup>	ft <sup>2</sup>
L1 100.00-71.50	85.40	1.224	61	62.139	A	0.000	62.139	62.139	100.00	0.000	0.000
					B	0.000	62.139		100.00	0.000	0.000
					C	0.000	62.139		100.00	0.000	0.000
L2 71.50-47.00	59.01	1.133	64	60.116	A	0.000	60.116	60.116	100.00	0.000	0.000
					B	0.000	60.116		100.00	0.000	0.000
					C	0.000	60.116		100.00	0.000	0.000
L3 47.00-22.75	34.67	1.013	64	65.537	A	0.000	65.537	65.537	100.00	0.000	0.000
					B	0.000	65.537		100.00	0.000	0.000
					C	0.000	65.537		100.00	0.000	0.000
L4 22.75-2.50	12.49	0.85	61	59.227	A	0.000	59.227	59.227	100.00	0.000	0.000
					B	0.000	59.227		100.00	0.000	0.000
					C	0.000	59.227		100.00	0.000	0.000

### Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation	z	K <sub>Z</sub>	q <sub>z</sub>	t <sub>Z</sub>	A <sub>G</sub>	F <sub>a</sub>	A <sub>F</sub>	A <sub>R</sub>	A <sub>leg</sub>	Leg %	C <sub>AA</sub> In Face	C <sub>AA</sub> Out Face
ft	ft		psf	in	ft <sup>2</sup>	c	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>		ft <sup>2</sup>	ft <sup>2</sup>



<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> 9 of 47 6 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

Section Elevation <i>ft</i>	<i>z</i> <i>ft</i>	<i>K<sub>Z</sub></i>	<i>q<sub>z</sub></i> <i>psf</i>	<i>t<sub>z</sub></i> <i>in</i>	<i>A<sub>G</sub></i> <i>ft<sup>2</sup></i>	<i>F<sub>a c e</sub></i>	<i>A<sub>F</sub></i> <i>ft<sup>2</sup></i>	<i>A<sub>R</sub></i> <i>ft<sup>2</sup></i>	<i>A<sub>leg</sub></i> <i>ft<sup>2</sup></i>	<i>Leg %</i>	<i>C<sub>A A<sub>A</sub></sub></i> <i>In Face ft<sup>2</sup></i>	<i>C<sub>A A<sub>A</sub></sub></i> <i>Out Face ft<sup>2</sup></i>
L1 100.00-71.50	85.40	1.224	14	2.7550	75.225	A B C	0.000 0.000 0.000	75.225 75.225 75.225	75.225	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000
L2 71.50-47.00	59.01	1.133	15	2.7659	71.365	A B C	0.000 0.000 0.000	71.365 71.365 71.365	71.365	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000
L3 47.00-22.75	34.67	1.013	15	2.7379	76.716	A B C	0.000 0.000 0.000	76.716 76.716 76.716	76.716	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000
L4 22.75-2.50	12.49	0.85	14	2.5829	68.467	A B C	0.000 0.000 0.000	68.467 68.467 68.467	68.467	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000

**Tower Pressure - Service**

$G_H = 1.100$

Section Elevation <i>ft</i>	<i>z</i> <i>ft</i>	<i>K<sub>Z</sub></i>	<i>q<sub>z</sub></i> <i>psf</i>	<i>A<sub>G</sub></i> <i>ft<sup>2</sup></i>	<i>F<sub>a c e</sub></i>	<i>A<sub>F</sub></i> <i>ft<sup>2</sup></i>	<i>A<sub>R</sub></i> <i>ft<sup>2</sup></i>	<i>A<sub>leg</sub></i> <i>ft<sup>2</sup></i>	<i>Leg %</i>	<i>C<sub>A A<sub>A</sub></sub></i> <i>In Face ft<sup>2</sup></i>	<i>C<sub>A A<sub>A</sub></sub></i> <i>Out Face ft<sup>2</sup></i>
L1 100.00-71.50	85.40	1.224	18	62.139	A B C	0.000 0.000 0.000	62.139 62.139 62.139	62.139	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000
L2 71.50-47.00	59.01	1.133	19	60.116	A B C	0.000 0.000 0.000	60.116 60.116 60.116	60.116	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000
L3 47.00-22.75	34.67	1.013	19	65.537	A B C	0.000 0.000 0.000	65.537 65.537 65.537	65.537	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000
L4 22.75-2.50	12.49	0.85	18	59.227	A B C	0.000 0.000 0.000	59.227 59.227 59.227	59.227	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000

**Tower Forces - No Ice - Wind Normal To Face**

Section Elevation <i>ft</i>	<i>Add Weight</i> <i>lb</i>	<i>Self Weight</i> <i>lb</i>	<i>F<sub>a c e</sub></i>	<i>e</i>	<i>C<sub>F</sub></i>	<i>q<sub>z</sub></i> <i>psf</i>	<i>D<sub>F</sub></i>	<i>D<sub>R</sub></i>	<i>A<sub>E</sub></i> <i>ft<sup>2</sup></i>	<i>F</i> <i>lb</i>	<i>w</i> <i>plf</i>	<i>Ctrl. Face</i>
L1 100.00-71.50	233.28	1477.92	A B C	1 1 1	0.65 0.65 0.65	61	1 1 1	1 1 1	62.139 62.139 62.139	2722.66	95.53	C
L2 71.50-47.00	211.68	1648.62	A B C	1 1 1	0.65 0.65 0.65	64	1 1 1	1 1 1	60.116 60.116 60.116	2739.05	111.80	C
L3 47.00-22.75	209.52	2118.55	A B C	1 1 1	0.65 0.65 0.65	64	1 1 1	1 1 1	65.537 65.537 65.537	3018.64	124.48	C
L4 22.75-2.50	174.96	2011.14	A B C	1 1 1	0.65 0.65 0.65	61	1 1 1	1 1 1	59.227 59.227 59.227	2595.35	128.17	C

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> 10 of 47 7 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

Section Elevation <i>ft</i>	Add Weight <i>lb</i>	Self Weight <i>lb</i>	F a c e	e	C <sub>F</sub>	q <sub>z</sub> <i>psf</i>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> <i>ft<sup>2</sup></i>	F <i>lb</i>	w <i>plf</i>	Ctrl. Face
Sum Weight:	829.44	7256.22						OTM	503513.84 <i>lb-ft</i>	11075.70		

**Tower Forces - No Ice - Wind 60 To Face**

Section Elevation <i>ft</i>	Add Weight <i>lb</i>	Self Weight <i>lb</i>	F a c e	e	C <sub>F</sub>	q <sub>z</sub> <i>psf</i>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> <i>ft<sup>2</sup></i>	F <i>lb</i>	w <i>plf</i>	Ctrl. Face
L1 100.00-71.50	233.28	1477.92	A	1	0.65	61	1	1	62.139	2722.66	95.53	C
			B	1	0.65		1	1	62.139			
			C	1	0.65		1	1	62.139			
L2 71.50-47.00	211.68	1648.62	A	1	0.65	64	1	1	60.116	2739.05	111.80	C
			B	1	0.65		1	1	60.116			
			C	1	0.65		1	1	60.116			
L3 47.00-22.75	209.52	2118.55	A	1	0.65	64	1	1	65.537	3018.64	124.48	C
			B	1	0.65		1	1	65.537			
			C	1	0.65		1	1	65.537			
L4 22.75-2.50	174.96	2011.14	A	1	0.65	61	1	1	59.227	2595.35	128.17	C
			B	1	0.65		1	1	59.227			
			C	1	0.65		1	1	59.227			
Sum Weight:	829.44	7256.22						OTM	503513.84 <i>lb-ft</i>	11075.70		

**Tower Forces - No Ice - Wind 90 To Face**

Section Elevation <i>ft</i>	Add Weight <i>lb</i>	Self Weight <i>lb</i>	F a c e	e	C <sub>F</sub>	q <sub>z</sub> <i>psf</i>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> <i>ft<sup>2</sup></i>	F <i>lb</i>	w <i>plf</i>	Ctrl. Face
L1 100.00-71.50	233.28	1477.92	A	1	0.65	61	1	1	62.139	2722.66	95.53	C
			B	1	0.65		1	1	62.139			
			C	1	0.65		1	1	62.139			
L2 71.50-47.00	211.68	1648.62	A	1	0.65	64	1	1	60.116	2739.05	111.80	C
			B	1	0.65		1	1	60.116			
			C	1	0.65		1	1	60.116			
L3 47.00-22.75	209.52	2118.55	A	1	0.65	64	1	1	65.537	3018.64	124.48	C
			B	1	0.65		1	1	65.537			
			C	1	0.65		1	1	65.537			
L4 22.75-2.50	174.96	2011.14	A	1	0.65	61	1	1	59.227	2595.35	128.17	C
			B	1	0.65		1	1	59.227			
			C	1	0.65		1	1	59.227			
Sum Weight:	829.44	7256.22						OTM	503513.84 <i>lb-ft</i>	11075.70		

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> Page 11 of 47 8 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

**Tower Forces - With Ice - Wind Normal To Face**

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	q <sub>z</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	lb	lb				psf			ft <sup>2</sup>	lb	plf	
L1 100.00-71.50	233.28	4244.86	A	1	1.2	14	1	1	75.225	1406.48	49.35	C
			B	1	1.2		1	1	75.225			
			C	1	1.2		1	1	75.225			
L2 71.50-47.00	211.68	4307.82	A	1	1.2	15	1	1	71.365	1387.52	56.63	C
			B	1	1.2		1	1	71.365			
			C	1	1.2		1	1	71.365			
L3 47.00-22.75	209.52	4962.99	A	1	1.2	15	1	1	76.716	1507.83	62.18	C
			B	1	1.2		1	1	76.716			
			C	1	1.2		1	1	76.716			
L4 22.75-2.50	174.96	4411.46	A	1	1.2	14	1	1	68.467	1280.27	63.22	C
			B	1	1.2		1	1	68.467			
			C	1	1.2		1	1	68.467			
Sum Weight:	829.44	17927.13						OTM	256295.17 lb-ft	5582.10		

**Tower Forces - With Ice - Wind 60 To Face**

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	q <sub>z</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	lb	lb				psf			ft <sup>2</sup>	lb	plf	
L1 100.00-71.50	233.28	4244.86	A	1	1.2	14	1	1	75.225	1406.48	49.35	C
			B	1	1.2		1	1	75.225			
			C	1	1.2		1	1	75.225			
L2 71.50-47.00	211.68	4307.82	A	1	1.2	15	1	1	71.365	1387.52	56.63	C
			B	1	1.2		1	1	71.365			
			C	1	1.2		1	1	71.365			
L3 47.00-22.75	209.52	4962.99	A	1	1.2	15	1	1	76.716	1507.83	62.18	C
			B	1	1.2		1	1	76.716			
			C	1	1.2		1	1	76.716			
L4 22.75-2.50	174.96	4411.46	A	1	1.2	14	1	1	68.467	1280.27	63.22	C
			B	1	1.2		1	1	68.467			
			C	1	1.2		1	1	68.467			
Sum Weight:	829.44	17927.13						OTM	256295.17 lb-ft	5582.10		

**Tower Forces - With Ice - Wind 90 To Face**

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	q <sub>z</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	lb	lb				psf			ft <sup>2</sup>	lb	plf	
L1 100.00-71.50	233.28	4244.86	A	1	1.2	14	1	1	75.225	1406.48	49.35	C
			B	1	1.2		1	1	75.225			
			C	1	1.2		1	1	75.225			
L2	211.68	4307.82	A	1	1.2	15	1	1	71.365	1387.52	56.63	C

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> Page 12 of 47 9 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C <sub>F</sub>	q <sub>z</sub> psf	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> ft <sup>2</sup>	F lb	w plf	Ctrl. Face
71.50-47.00			B	1	1.2		1	1	71.365			
			C	1	1.2		1	1	71.365			
L3 47.00-22.75	209.52	4962.99	A	1	1.2	15	1	1	76.716	1507.83	62.18	C
			B	1	1.2		1	1	76.716			
			C	1	1.2		1	1	76.716			
L4 22.75-2.50	174.96	4411.46	A	1	1.2	14	1	1	68.467	1280.27	63.22	C
			B	1	1.2		1	1	68.467			
			C	1	1.2		1	1	68.467			
Sum Weight:	829.44	17927.13						OTM	256295.17 lb-ft	5582.10		

### Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C <sub>F</sub>	q <sub>z</sub> psf	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> ft <sup>2</sup>	F lb	w plf	Ctrl. Face
L1 100.00-71.50	233.28	1477.92	A	1	0.65	18	1	1	62.139	810.82	28.45	C
			B	1	0.65		1	1	62.139			
			C	1	0.65		1	1	62.139			
L2 71.50-47.00	211.68	1648.62	A	1	0.65	19	1	1	60.116	815.70	33.29	C
			B	1	0.65		1	1	60.116			
			C	1	0.65		1	1	60.116			
L3 47.00-22.75	209.52	2118.55	A	1	0.65	19	1	1	65.537	898.96	37.07	C
			B	1	0.65		1	1	65.537			
			C	1	0.65		1	1	65.537			
L4 22.75-2.50	174.96	2011.14	A	1	0.65	18	1	1	59.227	772.91	38.17	C
			B	1	0.65		1	1	59.227			
			C	1	0.65		1	1	59.227			
Sum Weight:	829.44	7256.22						OTM	149948.65 lb-ft	3298.39		

### Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C <sub>F</sub>	q <sub>z</sub> psf	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> ft <sup>2</sup>	F lb	w plf	Ctrl. Face
L1 100.00-71.50	233.28	1477.92	A	1	0.65	18	1	1	62.139	810.82	28.45	C
			B	1	0.65		1	1	62.139			
			C	1	0.65		1	1	62.139			
L2 71.50-47.00	211.68	1648.62	A	1	0.65	19	1	1	60.116	815.70	33.29	C
			B	1	0.65		1	1	60.116			
			C	1	0.65		1	1	60.116			
L3 47.00-22.75	209.52	2118.55	A	1	0.65	19	1	1	65.537	898.96	37.07	C
			B	1	0.65		1	1	65.537			
			C	1	0.65		1	1	65.537			
L4 22.75-2.50	174.96	2011.14	A	1	0.65	18	1	1	59.227	772.91	38.17	C
			B	1	0.65		1	1	59.227			
			C	1	0.65		1	1	59.227			

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> 13 of 47 10 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	q <sub>z</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	lb	lb				psf			ft <sup>2</sup>	lb	plf	
Sum Weight:	829.44	7256.22	C	1	0.65		1	1	59.227 149948.65 lb-ft	3298.39		

### Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	q <sub>z</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	lb	lb				psf			ft <sup>2</sup>	lb	plf	
L1 100.00-71.50	233.28	1477.92	A B C	1 1 1	0.65 0.65 0.65	18	1 1 1	1 1 1	62.139 62.139 62.139	810.82	28.45	C
L2 71.50-47.00	211.68	1648.62	A B C	1 1 1	0.65 0.65 0.65	19	1 1 1	1 1 1	60.116 60.116 60.116	815.70	33.29	C
L3 47.00-22.75	209.52	2118.55	A B C	1 1 1	0.65 0.65 0.65	19	1 1 1	1 1 1	65.537 65.537 65.537	898.96	37.07	C
L4 22.75-2.50	174.96	2011.14	A B C	1 1 1	0.65 0.65 0.65	18	1 1 1	1 1 1	59.227 59.227 59.227	772.91	38.17	C
Sum Weight:	829.44	7256.22						OTM	149948.65 lb-ft	3298.39		

### Discrete Appurtenance Pressures - No Ice G<sub>H</sub> = 1.100

Description	Aiming Azimuth °	Weight lb	Offset <sub>x</sub> ft	Offset <sub>z</sub> ft	z ft	K <sub>z</sub>	q <sub>z</sub> psf	C <sub>A</sub> C <sub>C</sub> Front ft <sup>2</sup>	C <sub>A</sub> C <sub>C</sub> Side ft <sup>2</sup>
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	330.0000	197.67	-4.48	-0.28	95.00	1.252	60	7.94	6.31
RFS APXVAARR24_43_U_NA20 (95.9"x24"x8.7", 154 lb) W/ MP	330.0000	183.20	-3.48	-2.01	95.00	1.252	60	20.24	10.79
RFS APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	330.0000	62.69	-2.48	-3.74	95.00	1.252	60	6.91	3.57
Ericsson RRUS 4449 B71+B12	330.0000	77.98	-3.48	-2.01	95.00	1.252	60	1.02	1.79
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	330.0000	46.00	-3.48	-2.01	95.00	1.252	60	1.84	0.82
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	90.0000	197.67	2.48	-3.74	95.00	1.252	60	7.94	6.31
RFS APXVAARR24_43_U	90.0000	183.20	3.48	-2.01	95.00	1.252	60	20.24	10.79

<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vector Structural Engineering, LLC.</b></p> <p style="text-align: center;">651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>	<p><b>Job</b></p> <p style="text-align: center;">NJCLT56LE</p>	<p><b>Page</b></p> <p style="text-align: center;">14 of 47 11 of 22</p>
	<p><b>Project</b></p> <p style="text-align: center;">U1140-147-201</p>	<p><b>Date</b></p> <p style="text-align: center;">14:25:31 01/17/20</p>
	<p><b>Client</b></p> <p style="text-align: center;">CDMI</p>	<p><b>Designed by</b></p> <p style="text-align: center;">ycamposano</p>

Description	Aiming Azimuth °	Weight lb	Offset <sub>x</sub> ft	Offset <sub>z</sub> ft	z ft	K <sub>z</sub>	q <sub>z</sub> psf	C <sub>AAc</sub> Front ft <sup>2</sup>	C <sub>AAc</sub> Side ft <sup>2</sup>
NA20 (95.9"x24"x8.7", 154 lb) W/ MP RFS	90.0000	62.69	4.48	-0.28	95.00	1.252	60	6.91	3.57
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe Ericsson RRUS 4449 B71+B12	90.0000	77.98	3.48	-2.01	95.00	1.252	60	1.02	1.79
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	90.0000	46.00	3.48	-2.01	95.00	1.252	60	1.84	0.82
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	210.0000	197.67	2.00	4.02	95.00	1.252	60	7.94	6.31
RFS APXVAARR24_43_U	210.0000	183.20	0.00	4.02	95.00	1.252	60	20.24	10.79
NA20 (95.9"x24"x8.7", 154 lb) W/ MP RFS	210.0000	62.69	-2.00	4.02	95.00	1.252	60	6.91	3.57
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe Ericsson RRUS 4449 B71+B12	210.0000	77.98	0.00	4.02	95.00	1.252	60	1.02	1.79
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	210.0000	46.00	0.00	4.02	95.00	1.252	60	1.84	0.82
RFI BA40404040-67-DIN	180.0000	44.00	0.00	1.49	107.50	1.285	59	4.04	4.04
4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	180.0000	71.00	0.00	4.02	95.00	1.252	60	2.50	1.24
4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	180.0000	71.00	0.00	4.02	95.00	1.252	60	2.50	1.24
4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	180.0000	71.00	0.00	4.02	95.00	1.252	60	2.50	1.24
Sum Weight:		1959.62							

**Discrete Appurtenance Pressures - With Ice** G<sub>H</sub> = 1.100

Description	Aiming Azimuth °	Weight lb	Offset <sub>x</sub> ft	Offset <sub>z</sub> ft	z ft	K <sub>z</sub>	q <sub>z</sub> psf	C <sub>AAc</sub> Front ft <sup>2</sup>	C <sub>AAc</sub> Side ft <sup>2</sup>	t <sub>z</sub> in
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	330.0000	697.23	-4.48	-0.28	95.00	1.252	14	10.27	10.23	2.7845
RFS APXVAARR24_43_U	330.0000	1111.06	-3.48	-2.01	95.00	1.252	14	23.96	17.55	2.7845
NA20 (95.9"x24"x8.7", 154 lb) W/ MP RFS	330.0000	456.89	-2.48	-3.74	95.00	1.252	14	9.61	7.86	2.7845
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe Ericsson RRUS 4449 B71+B12	330.0000	243.05	-3.48	-2.01	95.00	1.252	14	1.84	3.36	2.7845
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	330.0000	165.92	-3.48	-2.01	95.00	1.252	14	2.90	1.63	2.7845
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	90.0000	697.23	2.48	-3.74	95.00	1.252	14	10.27	10.23	2.7845
RFS APXVAARR24_43_U	90.0000	1111.06	3.48	-2.01	95.00	1.252	14	23.96	17.55	2.7845



<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vector Structural Engineering, LLC.</b></p> <p style="text-align: center;">651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>	<p><b>Job</b></p> <p style="text-align: center;">NJCLT56LE</p>	<p><b>Page</b></p> <p style="text-align: center;">Page 16 of 47 13 of 22</p>
	<p><b>Project</b></p> <p style="text-align: center;">U1140-147-201</p>	<p><b>Date</b></p> <p style="text-align: center;">14:25:31 01/17/20</p>
	<p><b>Client</b></p> <p style="text-align: center;">CDMI</p>	<p><b>Designed by</b></p> <p style="text-align: center;">ycamposano</p>

Description	Aiming Azimuth °	Weight lb	Offset <sub>x</sub> ft	Offset <sub>z</sub> ft	z ft	K <sub>z</sub>	q <sub>z</sub> psf	C <sub>Ac</sub> Front ft <sup>2</sup>	C <sub>Ac</sub> Side ft <sup>2</sup>
NA20 (95.9"x24"x8.7", 154 lb) W/ MP RFS	90.0000	62.69	4.48	-0.28	95.00	1.252	18	6.91	3.57
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe Ericsson RRUS 4449 B71+B12	90.0000	77.98	3.48	-2.01	95.00	1.252	18	1.02	1.79
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	90.0000	46.00	3.48	-2.01	95.00	1.252	18	1.84	0.82
Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	210.0000	197.67	2.00	4.02	95.00	1.252	18	7.94	6.31
RFS APXVAARR24_43_U	210.0000	183.20	0.00	4.02	95.00	1.252	18	20.24	10.79
NA20 (95.9"x24"x8.7", 154 lb) W/ MP RFS	210.0000	62.69	-2.00	4.02	95.00	1.252	18	6.91	3.57
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe Ericsson RRUS 4449 B71+B12	210.0000	77.98	0.00	4.02	95.00	1.252	18	1.02	1.79
Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	210.0000	46.00	0.00	4.02	95.00	1.252	18	1.84	0.82
RFI BA40404040-67-DIN	180.0000	44.00	0.00	1.49	107.50	1.285	18	4.04	4.04
4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	180.0000	71.00	0.00	4.02	95.00	1.252	18	2.50	1.24
4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	180.0000	71.00	0.00	4.02	95.00	1.252	18	2.50	1.24
4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	180.0000	71.00	0.00	4.02	95.00	1.252	18	2.50	1.24
Sum Weight:		1959.62							

### Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M <sub>x</sub> lb-ft	Sum of Overturning Moments, M <sub>z</sub> lb-ft	Sum of Torques lb-ft
Leg Weight	7256.22					
Bracing Weight	0.00					
Total Member Self-Weight	7256.22			922.60	0.00	
Total Weight	10045.28			922.60	0.00	
Wind 0 deg - No Ice		0.00	-16609.58	-1017752.45	0.00	0.00
Wind 30 deg - No Ice		8204.50	-14384.32	-881275.87	-500060.91	592.95
Wind 60 deg - No Ice		14210.61	-8304.79	-508414.93	-866130.91	1027.02
Wind 90 deg - No Ice		16409.00	0.00	922.60	-1000121.82	1185.90
Wind 120 deg - No Ice		14210.61	8304.79	510260.12	-866130.91	1027.02
Wind 150 deg - No Ice		8204.50	14384.32	883121.07	-500060.91	592.95
Wind 180 deg - No Ice		0.00	16609.58	1019597.64	0.00	0.00
Wind 210 deg - No Ice		-8204.50	14384.32	883121.07	500060.91	-592.95
Wind 240 deg - No Ice		-14210.61	8304.79	510260.12	866130.91	-1027.02
Wind 270 deg - No Ice		-16409.00	0.00	922.60	1000121.82	-1185.90
Wind 300 deg - No Ice		-14210.61	-8304.79	-508414.93	866130.91	-1027.02
Wind 330 deg - No Ice		-8204.50	-14384.32	-881275.87	500060.91	-592.95
Member Ice	10670.91					
Total Weight Ice	29170.04			8449.26	0.00	



<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vector Structural Engineering, LLC.</b></p> <p style="text-align: center;">651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>	<b>Job</b> <p style="text-align: center;">NJCLT56LE</p>	<b>Page</b> 17 of 47 14 of 22
	<b>Project</b> <p style="text-align: center;">U1140-147-201</p>	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> <p style="text-align: center;">CDMI</p>	<b>Designed by</b> ycamposano

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, $M_x$ lb-ft	Sum of Overturning Moments, $M_z$ lb-ft	Sum of Torques lb-ft
Wind 0 deg - Ice		0.00	-7606.02	-437876.51	0.00	0.00
Wind 30 deg - Ice		3786.58	-6587.00	-378080.19	-221643.36	419.31
Wind 60 deg - Ice		6558.55	-3803.01	-214713.62	-383897.55	726.26
Wind 90 deg - Ice		7573.16	0.00	8449.26	-443286.71	838.62
Wind 120 deg - Ice		6558.55	3803.01	231612.15	-383897.55	726.26
Wind 150 deg - Ice		3786.58	6587.00	394978.72	-221643.36	419.31
Wind 180 deg - Ice		0.00	7606.02	454775.03	0.00	0.00
Wind 210 deg - Ice		-3786.58	6587.00	394978.72	221643.36	-419.31
Wind 240 deg - Ice		-6558.55	3803.01	231612.15	383897.55	-726.26
Wind 270 deg - Ice		-7573.16	0.00	8449.26	443286.71	-838.62
Wind 300 deg - Ice		-6558.55	-3803.01	-214713.62	383897.55	-726.26
Wind 330 deg - Ice		-3786.58	-6587.00	-378080.19	221643.36	-419.31
Total Weight	10045.28			922.60	0.00	
Wind 0 deg - Service		0.00	-4946.41	-302443.34	0.00	0.00
Wind 30 deg - Service		2443.34	-4283.71	-261800.01	-148920.35	176.58
Wind 60 deg - Service		4231.98	-2473.20	-150760.37	-257937.61	305.85
Wind 90 deg - Service		4886.67	0.00	922.60	-297840.70	353.17
Wind 120 deg - Service		4231.98	2473.20	152605.56	-257937.61	305.85
Wind 150 deg - Service		2443.34	4283.71	263645.20	-148920.35	176.58
Wind 180 deg - Service		0.00	4946.41	304288.53	0.00	0.00
Wind 210 deg - Service		-2443.34	4283.71	263645.20	148920.35	-176.58
Wind 240 deg - Service		-4231.98	2473.20	152605.56	257937.61	-305.85
Wind 270 deg - Service		-4886.67	0.00	922.60	297840.70	-353.17
Wind 300 deg - Service		-4231.98	-2473.20	-150760.37	257937.61	-305.85
Wind 330 deg - Service		-2443.34	-4283.71	-261800.01	148920.35	-176.58

### Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp

<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vector Structural Engineering, LLC.</b></p> <p style="text-align: center;">651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>	<b>Job</b> <p style="text-align: center;">NJCLT56LE</p>	<b>Page</b> 18 of 47 <p style="text-align: center;">15 of 22</p>
	<b>Project</b> <p style="text-align: center;">U1140-147-201</p>	<b>Date</b> <p style="text-align: center;">14:25:31 01/17/20</p>
	<b>Client</b> <p style="text-align: center;">CDMI</p>	<b>Designed by</b> <p style="text-align: center;">ycamposano</p>

Comb. No.	Description
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

## Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	100 - 71.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-14933.12	0.00	-9054.55
			Max. Mx	20	-3606.98	139188.27	-1072.05
			Max. My	14	-3581.54	0.00	-144282.13
			Max. Vy	20	-7894.02	139188.27	-1072.05
			Max. Vx	14	8099.11	0.00	-144282.13
			Max. Torque	8			-1212.89
L2	71.5 - 47	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-20133.99	0.00	-9470.74
			Max. Mx	8	-5782.70	-362876.29	-1115.37
			Max. My	14	-5761.45	0.00	-372952.41
			Max. Vy	8	10584.99	-362876.29	-1115.37
			Max. Vx	14	10790.57	0.00	-372952.41
			Max. Torque	8			-1212.35
L3	47 - 22.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-26036.25	0.00	-9734.46
			Max. Mx	8	-8571.35	-647983.59	-1141.00
			Max. My	14	-8558.00	0.00	-662927.37
			Max. Vy	8	13437.53	-647983.59	-1141.00
			Max. Vx	14	13641.79	0.00	-662927.37
			Max. Torque	8			-1210.65
L4	22.75 - 2.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-32674.80	0.00	-9819.72
			Max. Mx	8	-12043.28	-1021515.9	-1145.49
			Max. My	14	-12042.86	0.00	-1041510.5
			Max. Vy	20	-16416.83	1021515.96	-1145.49
			Max. Vx	14	16616.05	0.00	-1041510.5
			Max. Torque	6			1

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b>	NJCLT56LE	<b>Page</b>	19 of 47 16 of 22
	<b>Project</b>	U1140-147-201	<b>Date</b>	14:25:31 01/17/20
	<b>Client</b>	CDMI	<b>Designed by</b>	ycamposano

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Torque	20			1208.89

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	26	32674.80	0.00	0.62
	Max. H <sub>x</sub>	20	12054.32	16408.72	-0.00
	Max. H <sub>z</sub>	3	9040.70	0.00	16608.30
	Max. M <sub>x</sub>	2	1039220.96	0.00	16607.79
	Max. M <sub>z</sub>	8	1021515.96	-16408.72	-0.00
	Max. Torsion	20	1208.09	16408.72	-0.00
	Min. Vert	15	9040.70	0.00	-16608.30
	Min. H <sub>x</sub>	8	12054.32	-16408.72	-0.00
	Min. H <sub>z</sub>	15	9040.70	0.00	-16608.30
	Min. M <sub>x</sub>	14	-1041510.51	0.00	-16607.78
	Min. M <sub>z</sub>	20	-1021515.96	16408.72	-0.00
Min. Torsion	8	-1208.09	-16408.72	-0.00	

### Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear <sub>x</sub> lb	Shear <sub>z</sub> lb	Overturning Moment, M <sub>x</sub> lb-ft	Overturning Moment, M <sub>z</sub> lb-ft	Torque lb-ft
Dead Only	10045.28	0.00	-0.18	923.32	0.00	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	12054.26	0.00	-16607.79	-1039220.96	0.00	0.00
0.9 Dead+1.0 Wind 0 deg - No Ice	9040.70	0.00	-16608.30	-1033756.93	0.00	0.00
1.2 Dead+1.0 Wind 30 deg - No Ice	12054.33	8204.48	-14384.28	-899962.93	-510751.88	604.92
0.9 Dead+1.0 Wind 30 deg - No Ice	9040.75	8204.49	-14384.29	-895236.09	-507913.14	601.18
1.2 Dead+1.0 Wind 60 deg - No Ice	12054.33	14210.58	-8304.77	-519120.32	-884665.87	1047.16
0.9 Dead+1.0 Wind 60 deg - No Ice	9040.75	14210.59	-8304.78	-516515.54	-879748.59	1040.70
1.2 Dead+1.0 Wind 90 deg - No Ice	12054.32	16408.72	0.00	1145.24	-1021515.96	1208.09
0.9 Dead+1.0 Wind 90 deg - No Ice	9040.73	16408.50	0.00	850.75	-1015820.26	1200.64
1.2 Dead+1.0 Wind 120 deg - No Ice	12054.33	14210.58	8304.77	521410.59	-884665.98	1045.15
0.9 Dead+1.0 Wind 120 deg - No Ice	9040.75	14210.59	8304.78	518216.59	-879748.68	1038.70
1.2 Dead+1.0 Wind 150 deg - No Ice	12054.33	8204.48	14384.28	902253.06	-510751.99	602.90
0.9 Dead+1.0 Wind 150 deg - No Ice	9040.75	8204.49	14384.29	896937.06	-507913.23	599.18
1.2 Dead+1.0 Wind 180 deg - No Ice	12054.26	0.00	16607.78	1041510.51	0.00	0.00

<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vector Structural Engineering, LLC.</b></p> <p style="text-align: center;">651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>	<b>Job</b>	NJCLT56LE	<b>Page</b>	Page 20 of 47 17 of 22
	<b>Project</b>	U1140-147-201	<b>Date</b>	14:25:31 01/17/20
	<b>Client</b>	CDMI	<b>Designed by</b>	ycamposano

<i>Load Combination</i>	<i>Vertical lb</i>	<i>Shear<sub>x</sub> lb</i>	<i>Shear<sub>z</sub> lb</i>	<i>Overturing Moment, M<sub>x</sub> lb-ft</i>	<i>Overturing Moment, M<sub>z</sub> lb-ft</i>	<i>Torque lb-ft</i>
0.9 Dead+1.0 Wind 180 deg - No Ice	9040.70	0.00	16608.30	1035457.59	0.00	0.00
1.2 Dead+1.0 Wind 210 deg - No Ice	12054.33	-8204.48	14384.28	902253.06	510751.99	-602.90
0.9 Dead+1.0 Wind 210 deg - No Ice	9040.75	-8204.49	14384.29	896937.06	507913.23	-599.18
1.2 Dead+1.0 Wind 240 deg - No Ice	12054.33	-14210.58	8304.77	521410.59	884665.98	-1045.15
0.9 Dead+1.0 Wind 240 deg - No Ice	9040.75	-14210.59	8304.78	518216.59	879748.68	-1038.70
1.2 Dead+1.0 Wind 270 deg - No Ice	12054.32	-16408.72	0.00	1145.24	1021515.96	-1208.09
0.9 Dead+1.0 Wind 270 deg - No Ice	9040.73	-16408.50	0.00	850.75	1015820.26	-1200.64
1.2 Dead+1.0 Wind 300 deg - No Ice	12054.33	-14210.58	-8304.77	-519120.32	884665.87	-1047.16
0.9 Dead+1.0 Wind 300 deg - No Ice	9040.75	-14210.59	-8304.78	-516515.54	879748.59	-1040.70
1.2 Dead+1.0 Wind 330 deg - No Ice	12054.33	-8204.48	-14384.28	-899962.93	510751.88	-604.92
0.9 Dead+1.0 Wind 330 deg - No Ice	9040.75	-8204.49	-14384.29	-895236.09	507913.14	-601.18
1.2 Dead+1.0 Ice+1.0 Temp	32674.80	0.00	-0.62	9819.72	0.00	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	32674.80	0.00	-7605.77	-470863.97	0.00	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	32674.80	3786.53	-6586.92	-406469.98	-238725.95	473.07
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	32674.80	6558.46	-3802.96	-230497.34	-413485.46	819.23
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	32674.80	7572.91	-0.01	9885.15	-477434.33	945.70
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	32674.80	6558.46	3802.95	250267.77	-413483.64	818.78
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	32674.80	3786.53	6586.91	426238.12	-238724.13	472.62
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	32674.80	0.00	7605.75	490629.64	0.00	0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	32674.80	-3786.53	6586.91	426238.12	238724.13	-472.62
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	32674.80	-6558.46	3802.95	250267.77	413483.64	-818.78
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	32674.80	-7572.91	-0.01	9885.15	477434.33	-945.70
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	32674.80	-6558.46	-3802.96	-230497.34	413485.46	-819.23
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	32674.80	-3786.53	-6586.92	-406469.98	238725.95	-473.07
Dead+Wind 0 deg - Service	10045.27	0.00	-4945.96	-307990.36	0.00	0.00
Dead+Wind 30 deg - Service	10045.27	2443.12	-4283.33	-266600.14	-151650.91	180.25
Dead+Wind 60 deg - Service	10045.27	4231.60	-2472.98	-153519.44	-262667.45	312.13
Dead+Wind 90 deg - Service	10045.27	4886.23	-0.00	952.38	-303302.45	360.31
Dead+Wind 120 deg - Service	10045.27	4231.60	2472.98	155424.17	-262667.41	311.94
Dead+Wind 150 deg - Service	10045.27	2443.12	4283.32	268504.81	-151650.86	180.06
Dead+Wind 180 deg - Service	10045.27	0.00	4945.95	309894.99	0.00	0.00
Dead+Wind 210 deg - Service	10045.27	-2443.12	4283.32	268504.81	151650.86	-180.06
Dead+Wind 240 deg - Service	10045.27	-4231.60	2472.98	155424.17	262667.41	-311.94
Dead+Wind 270 deg - Service	10045.27	-4886.23	-0.00	952.38	303302.45	-360.31
Dead+Wind 300 deg - Service	10045.27	-4231.60	-2472.98	-153519.44	262667.45	-312.13
Dead+Wind 330 deg - Service	10045.27	-2443.12	-4283.33	-266600.14	151650.91	-180.25

<p><b>tnxTower</b></p> <p><b>Vector Structural Engineering, LLC.</b></p> <p>651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>	<p><b>Job</b></p> <p>NJCLT56LE</p>	<p><b>Page</b></p> <p>Page 21 of 47 18 of 22</p>
	<p><b>Project</b></p> <p>U1140-147-201</p>	<p><b>Date</b></p> <p>14:25:31 01/17/20</p>
	<p><b>Client</b></p> <p>CDMI</p>	<p><b>Designed by</b></p> <p>ycamposano</p>

**Solution Summary**

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-10045.28	0.00	0.00	10045.28	0.18	0.002%
2	0.00	-12054.34	-16609.58	0.00	12054.26	16607.79	0.009%
3	0.00	-9040.75	-16609.58	0.00	9040.70	16608.30	0.007%
4	8204.50	-12054.34	-14384.32	-8204.48	12054.33	14384.28	0.000%
5	8204.50	-9040.75	-14384.32	-8204.49	9040.75	14384.29	0.000%
6	14210.61	-12054.34	-8304.79	-14210.58	12054.33	8304.77	0.000%
7	14210.61	-9040.75	-8304.79	-14210.59	9040.75	8304.78	0.000%
8	16409.00	-12054.34	0.00	-16408.72	12054.32	-0.00	0.001%
9	16409.00	-9040.75	0.00	-16408.50	9040.73	-0.00	0.003%
10	14210.61	-12054.34	8304.79	-14210.58	12054.33	-8304.77	0.000%
11	14210.61	-9040.75	8304.79	-14210.59	9040.75	-8304.78	0.000%
12	8204.50	-12054.34	14384.32	-8204.48	12054.33	-14384.28	0.000%
13	8204.50	-9040.75	14384.32	-8204.49	9040.75	-14384.29	0.000%
14	0.00	-12054.34	16609.58	0.00	12054.26	-16607.78	0.009%
15	0.00	-9040.75	16609.58	0.00	9040.70	-16608.30	0.007%
16	-8204.50	-12054.34	14384.32	8204.48	12054.33	-14384.28	0.000%
17	-8204.50	-9040.75	14384.32	8204.49	9040.75	-14384.29	0.000%
18	-14210.61	-12054.34	8304.79	14210.58	12054.33	-8304.77	0.000%
19	-14210.61	-9040.75	8304.79	14210.59	9040.75	-8304.78	0.000%
20	-16409.00	-12054.34	0.00	16408.72	12054.32	-0.00	0.001%
21	-16409.00	-9040.75	0.00	16408.50	9040.73	-0.00	0.003%
22	-14210.61	-12054.34	-8304.79	14210.58	12054.33	8304.77	0.000%
23	-14210.61	-9040.75	-8304.79	14210.59	9040.75	8304.78	0.000%
24	-8204.50	-12054.34	-14384.32	8204.48	12054.33	14384.28	0.000%
25	-8204.50	-9040.75	-14384.32	8204.49	9040.75	14384.29	0.000%
26	0.00	-32674.81	0.00	0.00	32674.80	0.62	0.002%
27	0.00	-32674.81	-7606.02	0.00	32674.80	7605.77	0.001%
28	3786.58	-32674.81	-6587.00	-3786.53	32674.80	6586.92	0.000%
29	6558.55	-32674.81	-3803.01	-6558.46	32674.80	3802.96	0.000%
30	7573.16	-32674.81	0.00	-7572.91	32674.80	0.01	0.001%
31	6558.55	-32674.81	3803.01	-6558.46	32674.80	-3802.95	0.000%
32	3786.58	-32674.81	6587.00	-3786.53	32674.80	-6586.91	0.000%
33	0.00	-32674.81	7606.02	0.00	32674.80	-7605.75	0.001%
34	-3786.58	-32674.81	6587.00	3786.53	32674.80	-6586.91	0.000%
35	-6558.55	-32674.81	3803.01	6558.46	32674.80	-3802.95	0.000%
36	-7573.16	-32674.81	0.00	7572.91	32674.80	0.01	0.001%
37	-6558.55	-32674.81	-3803.01	6558.46	32674.80	3802.96	0.000%
38	-3786.58	-32674.81	-6587.00	3786.53	32674.80	6586.92	0.000%
39	0.00	-10045.28	-4946.41	0.00	10045.27	4945.96	0.004%
40	2443.34	-10045.28	-4283.71	-2443.12	10045.27	4283.33	0.004%
41	4231.98	-10045.28	-2473.20	-4231.60	10045.27	2472.98	0.004%
42	4886.67	-10045.28	0.00	-4886.23	10045.27	0.00	0.004%
43	4231.98	-10045.28	2473.20	-4231.60	10045.27	-2472.98	0.004%
44	2443.34	-10045.28	4283.71	-2443.12	10045.27	-4283.32	0.004%
45	0.00	-10045.28	4946.41	0.00	10045.27	-4945.95	0.004%
46	-2443.34	-10045.28	4283.71	2443.12	10045.27	-4283.32	0.004%
47	-4231.98	-10045.28	2473.20	4231.60	10045.27	-2472.98	0.004%
48	-4886.67	-10045.28	0.00	4886.23	10045.27	0.00	0.004%
49	-4231.98	-10045.28	-2473.20	4231.60	10045.27	2472.98	0.004%
50	-2443.34	-10045.28	-4283.71	2443.12	10045.27	4283.33	0.004%

**Non-Linear Convergence Results**

<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vector Structural Engineering, LLC.</b></p> <p style="text-align: center;">651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>	<p><b>Job</b></p> <p style="text-align: center;">NJCLT56LE</p>	<p><b>Page</b> 22 of 47 19 of 22</p>
	<p><b>Project</b></p> <p style="text-align: center;">U1140-147-201</p>	<p><b>Date</b></p> <p style="text-align: center;">14:25:31 01/17/20</p>
	<p><b>Client</b></p> <p style="text-align: center;">CDMI</p>	<p><b>Designed by</b></p> <p style="text-align: center;">ycamposano</p>

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.0000001	0.0000001
2	Yes	13	0.00007925	0.00012747
3	Yes	13	0.00005638	0.00010346
4	Yes	17	0.0000001	0.00010825
5	Yes	17	0.0000001	0.00007959
6	Yes	17	0.0000001	0.00009831
7	Yes	17	0.0000001	0.00007224
8	Yes	15	0.0000001	0.00008578
9	Yes	14	0.0000001	0.00014964
10	Yes	17	0.0000001	0.00011126
11	Yes	17	0.0000001	0.00008174
12	Yes	17	0.0000001	0.00010183
13	Yes	17	0.0000001	0.00007458
14	Yes	13	0.00007924	0.00012797
15	Yes	13	0.00005637	0.00010376
16	Yes	17	0.0000001	0.00010183
17	Yes	17	0.0000001	0.00007458
18	Yes	17	0.0000001	0.00011126
19	Yes	17	0.0000001	0.00008174
20	Yes	15	0.0000001	0.00008578
21	Yes	14	0.0000001	0.00014964
22	Yes	17	0.0000001	0.00009831
23	Yes	17	0.0000001	0.00007224
24	Yes	17	0.0000001	0.00010825
25	Yes	17	0.0000001	0.00007959
26	Yes	11	0.0000001	0.00010206
27	Yes	16	0.0000001	0.00010345
28	Yes	17	0.0000001	0.00008054
29	Yes	17	0.0000001	0.00007481
30	Yes	16	0.0000001	0.00011711
31	Yes	17	0.0000001	0.00009202
32	Yes	17	0.0000001	0.00008469
33	Yes	16	0.0000001	0.00011188
34	Yes	17	0.0000001	0.00008469
35	Yes	17	0.0000001	0.00009202
36	Yes	16	0.0000001	0.00011711
37	Yes	17	0.0000001	0.00007481
38	Yes	17	0.0000001	0.00008054
39	Yes	13	0.0000001	0.00006204
40	Yes	13	0.0000001	0.00012558
41	Yes	13	0.0000001	0.00008640
42	Yes	13	0.0000001	0.00008341
43	Yes	13	0.0000001	0.00014074
44	Yes	13	0.0000001	0.00009565
45	Yes	13	0.0000001	0.00006277
46	Yes	13	0.0000001	0.00009565
47	Yes	13	0.0000001	0.00014074
48	Yes	13	0.0000001	0.00008341
49	Yes	13	0.0000001	0.00008640
50	Yes	13	0.0000001	0.00012558

**Maximum Tower Deflections - Service Wind**

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
-------------	--------------	---------------------	-----------------	--------	---------

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> Page 23 of 47 20 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 71.5	15.691	45	1.1990	0.0058
L2	75.5 - 47	9.680	45	1.1063	0.0036
L3	51.25 - 22.75	4.666	45	0.8240	0.0019
L4	27.5 - 2.5	1.355	45	0.4672	0.0009

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
107.50	RFI BA40404040-67-DIN	45	15.691	1.1990	0.0058	34213
95.00	Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	45	14.430	1.1893	0.0053	34213


### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 71.5	52.630	14	4.0150	0.0194
L2	75.5 - 47	32.499	14	3.7117	0.0121
L3	51.25 - 22.75	15.677	14	2.7678	0.0065
L4	27.5 - 2.5	4.553	14	1.5702	0.0029

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
107.50	RFI BA40404040-67-DIN	14	52.630	4.0150	0.0194	10428
95.00	Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	14	48.410	3.9844	0.0179	10428

### Base Plate Design Data

Plate Thickness in	Number of Anchor Bolts	Anchor Bolt Size in	Actual Allowable Ratio Bolt Tension lb	Actual Allowable Ratio Bolt Compression lb	Actual Allowable Ratio Plate Stress ksi	Actual Allowable Ratio Stiffener Stress ksi	Controlling Condition	Ratio
2.5000	8	2.2500	145364.47	148375.19	20.151		Bolt T	0.52
			279568.00	464082.88	45.000			
			0.52	0.32	0.45			

<b>tnxTower</b>  <b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776	<b>Job</b> NJCLT56LE	<b>Page</b> Page 24 of 47 21 of 22
	<b>Project</b> U1140-147-201	<b>Date</b> 14:25:31 01/17/20
	<b>Client</b> CDMI	<b>Designed by</b> ycamposano

## Compression Checks

## Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
L1	100 - 71.5 (1)	TP27.72x23.8693x0.1875	28.50	0.00	0.0	16.0636	-3581.54	1062080.00	0.003
L2	71.5 - 47 (2)	TP30.7x26.8046x0.1875	28.50	0.00	0.0	17.8130	-5761.45	1125720.00	0.005
L3	47 - 22.75 (3)	TP33.62x29.7441x0.2188	28.50	0.00	0.0	22.7424	-8558.00	1479170.00	0.006
L4	22.75 - 2.5 (4)	TP36x32.5365x0.2188	25.00	0.00	0.0	24.8434	-12042.90	1551790.00	0.008

## Pole Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> lb-ft	φM <sub>ux</sub> lb-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M <sub>uy</sub> lb-ft	φM <sub>uy</sub> lb-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
L1	100 - 71.5 (1)	TP27.72x23.8693x0.1875	144282.50	590038.33	0.245	0.00	590038.33	0.000
L2	71.5 - 47 (2)	TP30.7x26.8046x0.1875	372952.50	693970.00	0.537	0.00	693970.00	0.000
L3	47 - 22.75 (3)	TP33.62x29.7441x0.2188	662927.50	997475.00	0.665	0.00	997475.00	0.000
L4	22.75 - 2.5 (4)	TP36x32.5365x0.2188	1041508.33	1143758.33	0.911	0.00	1143758.33	0.000

## Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V <sub>u</sub> lb	φV <sub>n</sub> lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T <sub>u</sub> lb-ft	φT <sub>n</sub> lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	100 - 71.5 (1)	TP27.72x23.8693x0.1875	8099.11	528995.00	0.015	0.00	1182758.33	0.000
L2	71.5 - 47 (2)	TP30.7x26.8046x0.1875	10790.60	561322.00	0.019	0.00	1390950.00	0.000
L3	47 - 22.75 (3)	TP33.62x29.7441x0.2188	13641.80	737679.00	0.018	0.00	1999400.00	0.000
L4	22.75 - 2.5 (4)	TP36x32.5365x0.2188	16616.10	774250.00	0.021	0.00	2292433.33	0.000

## Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	Ratio $\frac{M_{uy}}{\phi M_{uy}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	100 - 71.5 (1)	0.003	0.245	0.000	0.015	0.000	0.248	1.000	4.8.2 ✓
L2	71.5 - 47 (2)	0.005	0.537	0.000	0.019	0.000	0.543	1.000	4.8.2 ✓



<p><b>tnxTower</b></p> <p><b>Vector Structural Engineering, LLC.</b></p> <p>651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776</p>	<p><b>Job</b></p> <p>NJCLT56LE</p>	<p><b>Page</b></p> <p>Page 25 of 47 22 of 22</p>
	<p><b>Project</b></p> <p>U1140-147-201</p>	<p><b>Date</b></p> <p>14:25:31 01/17/20</p>
	<p><b>Client</b></p> <p>CDMI</p>	<p><b>Designed by</b></p> <p>ycamposano</p>

Section No.	Elevation ft	Ratio $P_u$	Ratio $M_{ux}$	Ratio $M_{uy}$	Ratio $V_u$	Ratio $T_u$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	47 - 22.75 (3)	0.006	0.665	0.000	0.018	0.000	0.671	1.000	4.8.2 ✓
L4	22.75 - 2.5 (4)	0.008	0.911	0.000	0.021	0.000	0.919 ✓	1.000	4.8.2 ✓

### Section Capacity Table

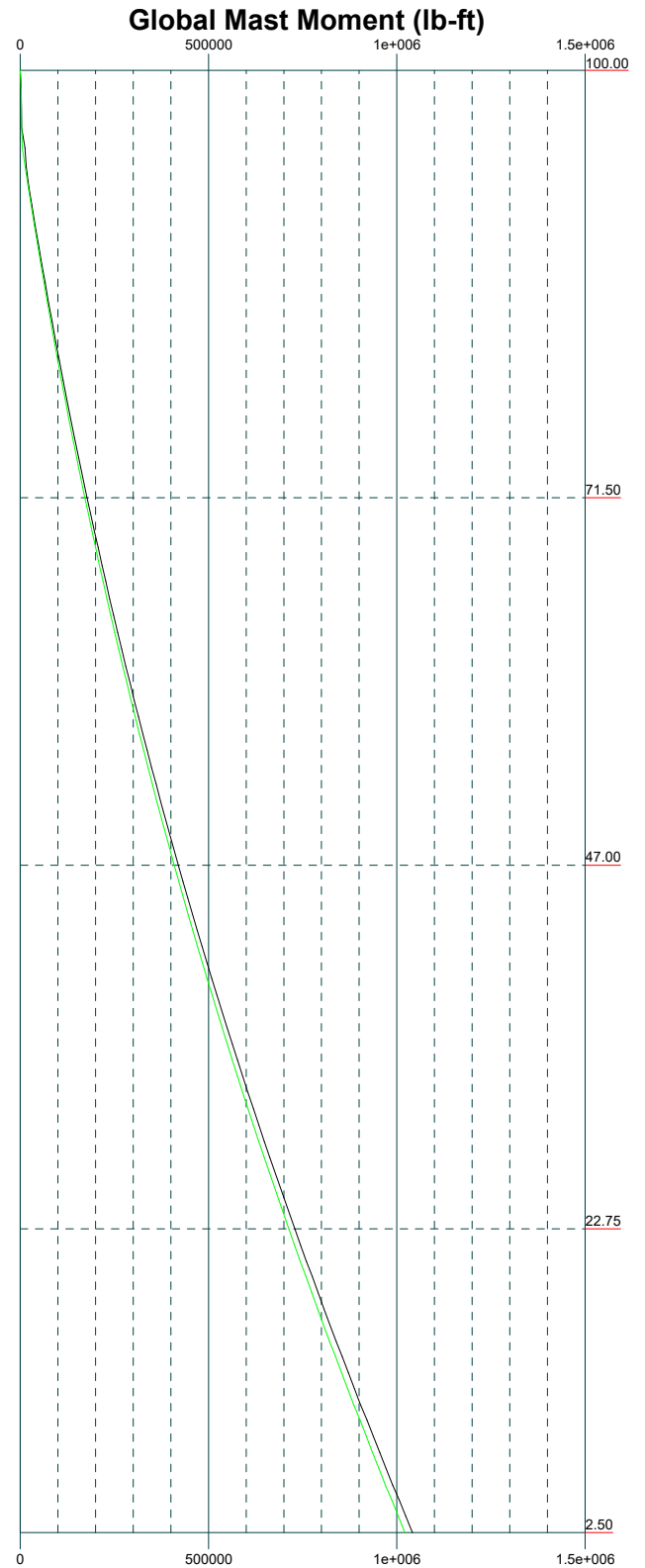
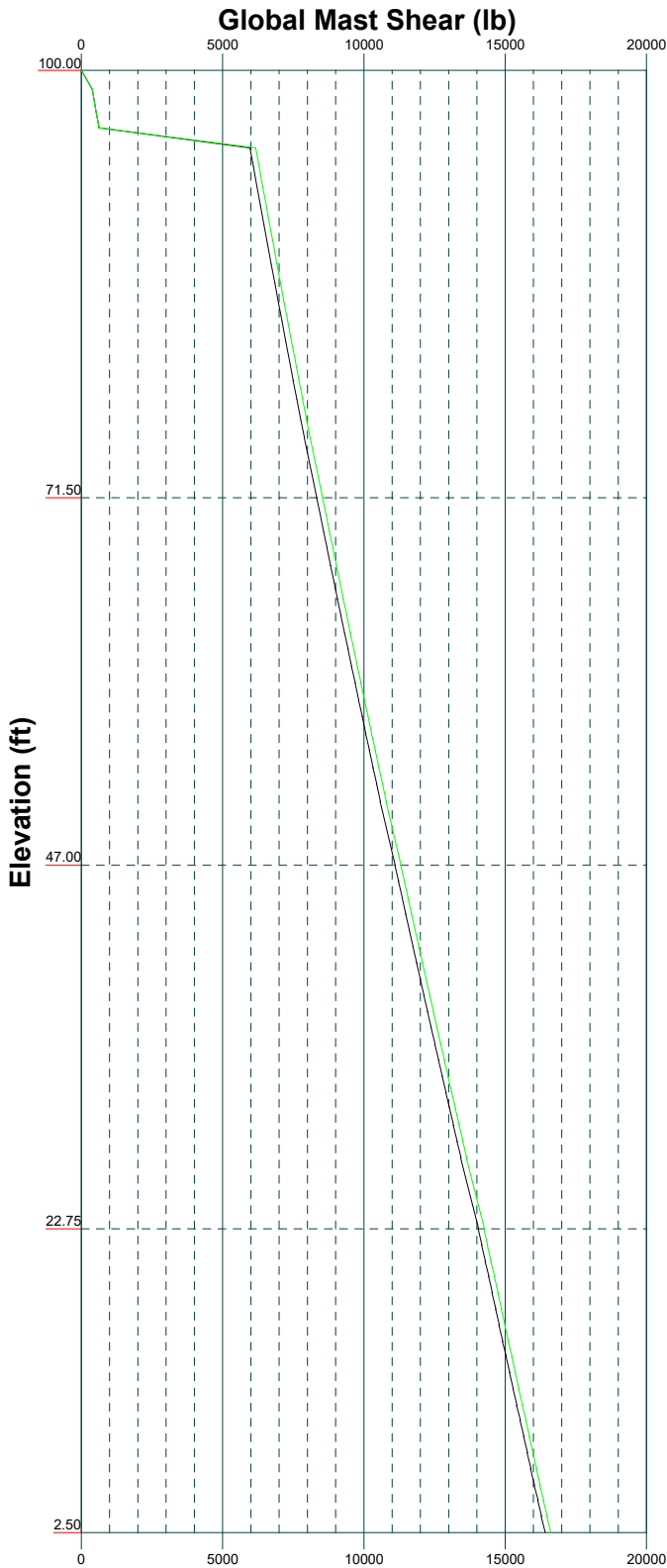
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$\phi P_{allow}$ lb	% Capacity	Pass Fail
L1	100 - 71.5	Pole	TP27.72x23.8693x0.1875	1	-3581.54	1062080.00	24.8	Pass
L2	71.5 - 47	Pole	TP30.7x26.8046x0.1875	2	-5761.45	1125720.00	54.3	Pass
L3	47 - 22.75	Pole	TP33.62x29.7441x0.2188	3	-8558.00	1479170.00	67.1	Pass
L4	22.75 - 2.5	Pole	TP36x32.5365x0.2188	4	-12042.90	1551790.00	91.9	Pass
Summary								
Pole (L4)							91.9	Pass
Base Plate							52.0	Pass
<b>RATING =</b>							<b>91.9</b>	<b>Pass</b>

Vx

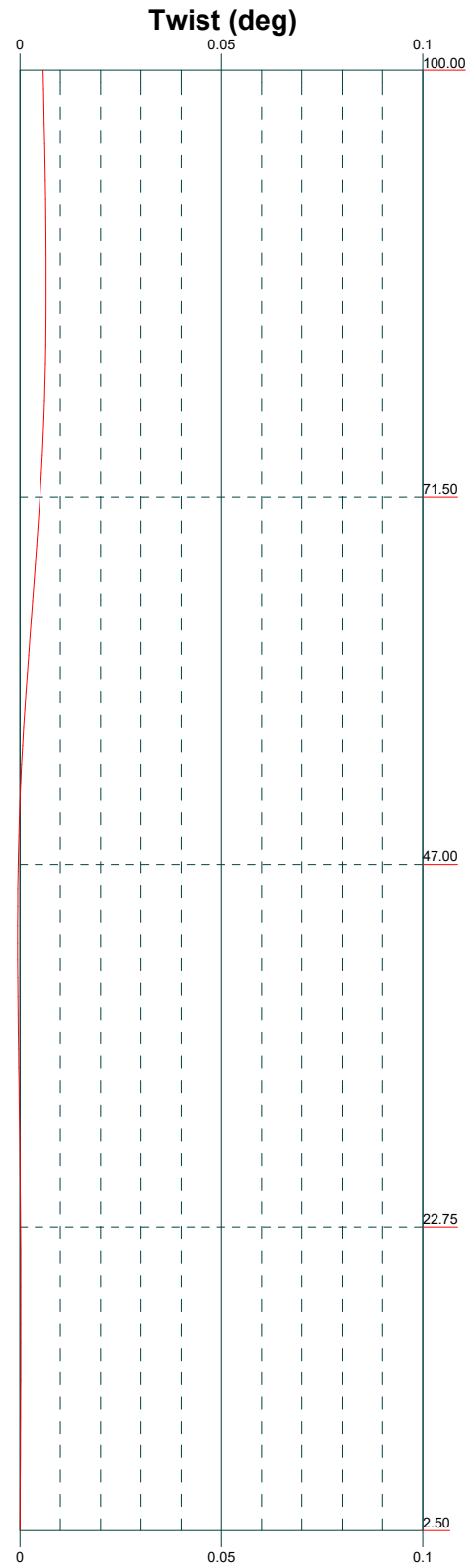
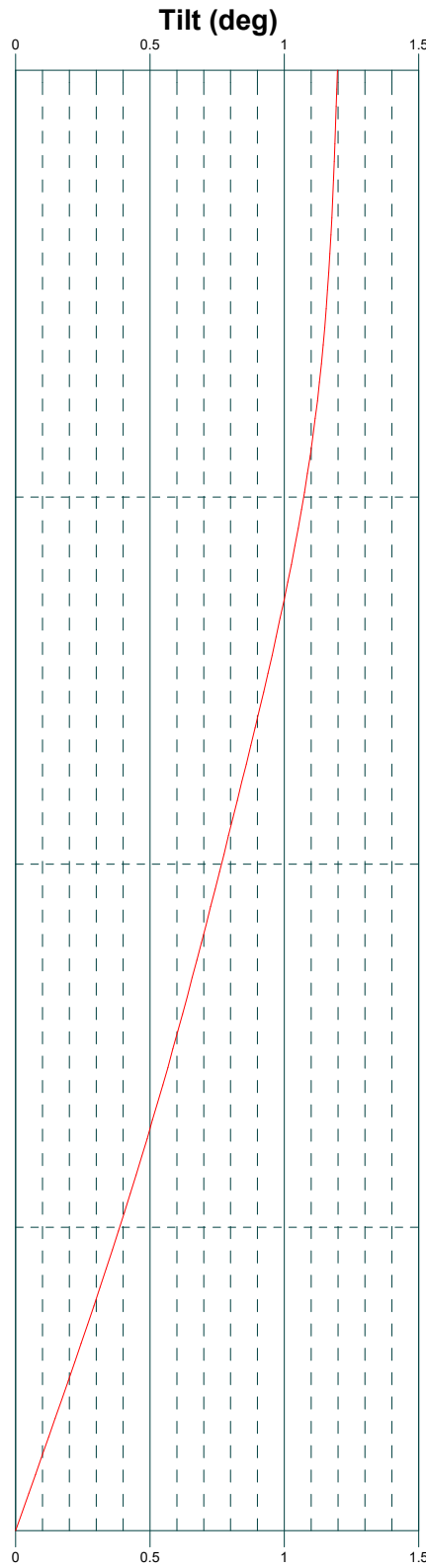
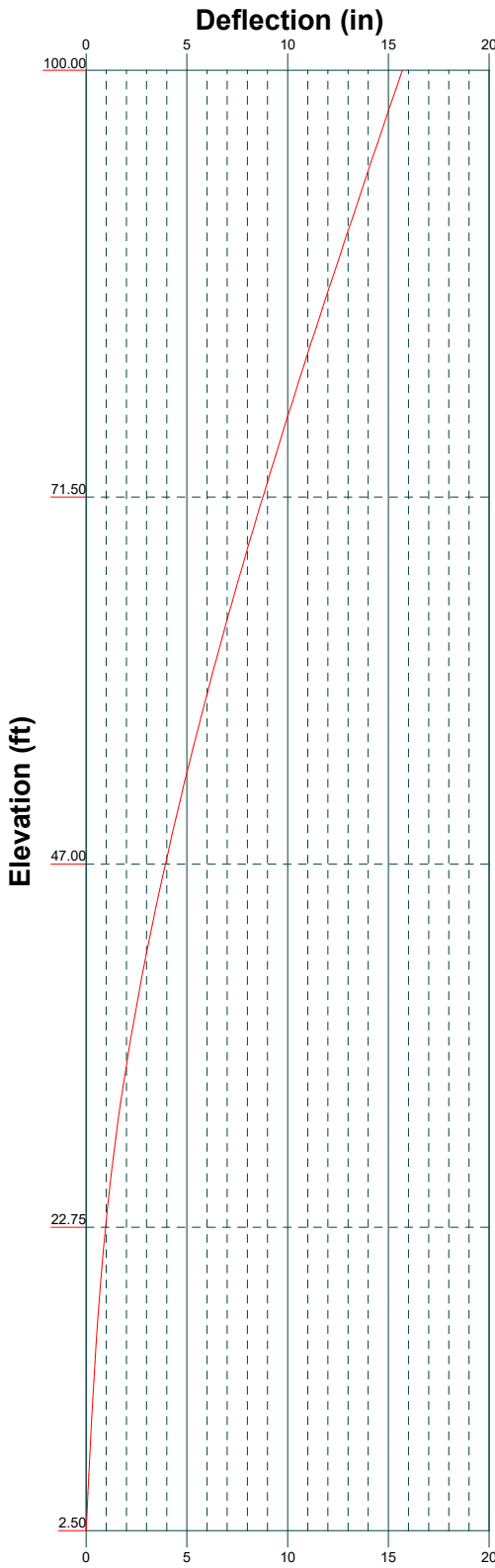
Vz

Mx

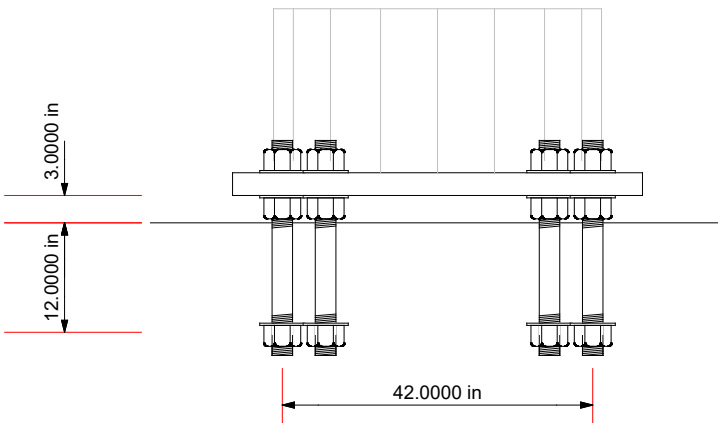
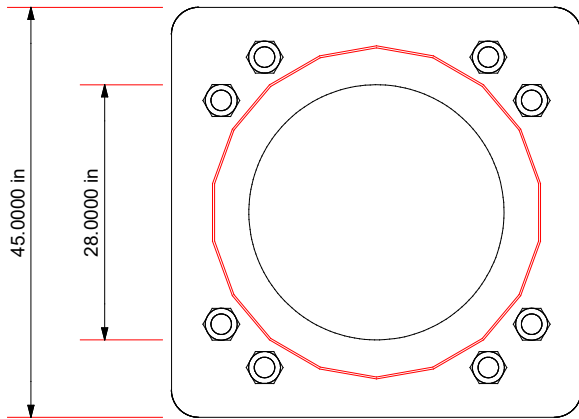
Mz



<p><b>Vector Structural Engineering, LLC.</b>                  651 W. Galena Park Blvd., Ste. 101                  Draper, UT 84020                  Phone: 801-990-1775                  FAX: 801-990-1776</p>		<p>Job: <b>NJCLT56LE</b></p>		
		<p>Project: <b>U1140-147-201</b></p>		
<p>Vector Engineers</p>		<p>Client: CDMI</p>	<p>Drawn by: ycamposano</p>	<p>App'd:</p>
		<p>Code: TIA-222-G</p>	<p>Date: 01/17/20</p>	<p>Scale: NTS</p>
		<p>Path:</p>	<p>Dwg No. E-4</p>	



<b>Vector Structural Engineering, LLC.</b> 651 W. Galena Park Blvd., Ste. 101 Draper, UT 84020 Phone: 801-990-1775 FAX: 801-990-1776  Vector Engineers	<b>Job: NJCLT56LE</b>		
	Project: <b>U1140-147-201</b>		
	Client: CDMI	Drawn by: ycamposano	App'd:
	Code: TIA-222-G	Date: 01/17/20	Scale: NTS
	Path:	Dwg No. E-5	



**FOUNDATION NOTES**

1. Plate thickness is 2.5000 in.
2. Plate grade is A572-50.
3. Anchor bolt grade is F1554-105.
4.  $f_c$  is 3 ksi.

<p><b>Vector Structural Engineering, LLC.</b>                  651 W. Galena Park Blvd., Ste. 101                  Draper, UT 84020                  Phone: 801-990-1775                  FAX: 801-990-1776</p>		<p>Job: <b>NJCLT56LE</b></p>	
		<p>Project: <b>U1140-147-201</b></p>	
<p>Vector Engineers</p>	<p>Client: CDMI</p>	<p>Drawn by: ycamposano</p>	<p>App'd:</p>
	<p>Code: TIA-222-G</p>	<p>Date: 01/17/20</p>	<p>Scale: NTS</p>
	<p>Path:</p>	<p>Dwg No. F-1</p>	



JOB NO.: U1140.147.201

Copyright © 2020 Vector Structural Engineering, LLC

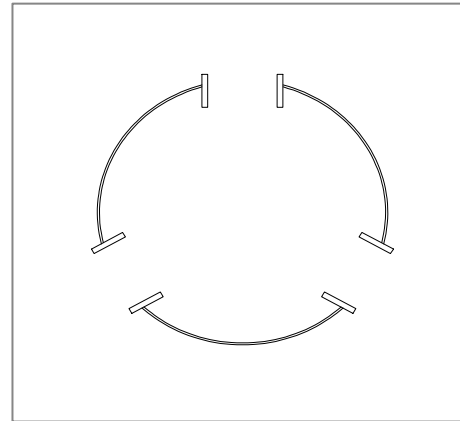
PROJECT: NJCLT56LE

## Port Design:

Label: Ports at 91.7 ft A.G.L.

### Geometry Input

Pole Diameter	25.06	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Effective Reinforcing Rims?	No	
Rim Yield Strength	50	ksi
# of Ports	3	



	Port 1	Port 2	Port 3
Azimuth (°)	0	120	240
Height (in)	13	13	13
Width (in)	7	7	7
Depth (in)	3.125	3.125	3.125
Thickness (in)	0.5	0.5	0.5
Projection (in)	0.5	0.5	0.5
Port Weight (lbs)	39		

### Composite Section Properties

	Original	w/ ports	
A	15	11	in <sup>2</sup>
Ixx	1134	823	in <sup>4</sup>
Iyy	1134	823	in <sup>4</sup>
Smin	90	63	in <sup>3</sup>

### Port Check

Pole unity at port location

from tower model: 25% (optional)

Rim Fy Reduction: 100% (rims not considered in section properties)

Result: 36%



JOB NO.: U1140.147.201

Copyright © 2020 Vector Structural Engineering, LLC

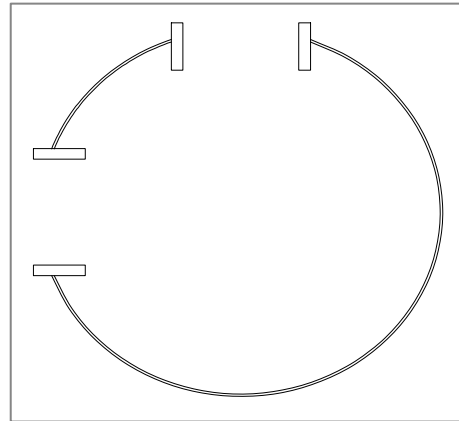
PROJECT: NJCLT56LE

## Port Design:

Label: Ports at 12.5 ft A.G.L.

### Geometry Input

Pole Diameter	34.80	in
Pole Thickness	0.2188	in
Pole Yield Strength	65	ksi
Effective Reinforcing Rims?	Yes	
Rim Yield Strength	65	ksi
# of Ports	2	



	Port 1	Port 2
Azimuth (°)	0	270
Height (in)	32	32
Width (in)	12	12
Depth (in)	4.5	4.5
Thickness (in)	1	1
Projection (in)	0.5	0.5
Port Weight (lbs)	175	

### Composite Section Properties

	Original	w/ ports	
A	24	36	in <sup>2</sup>
Ixx	3553	5209	in <sup>4</sup>
Iyy	3553	5209	in <sup>4</sup>
Smin	204	291	in <sup>3</sup>

### Port Check

Pole unity at port location		
from tower model:	25%	(optional)
Rim Fy Reduction:	100%	
Result:	<b>17%</b>	



JOB NO.: U1140.147.201

Copyright © 2020 Vector Structural Engineering, LLC

This Excel workbook contains proprietary information belonging to Vector Structural Engineering, LLC, and may be neither wholly nor partially copied or reproduced without the prior written permission of Vector Structural Engineering, LLC.

PROJECT: NJCLT56LE

## T-arm Analysis

### Design Criteria

ASCE 7 Standard Version:	ASCE 7-10
TIA-222 Standard Version:	G
Mount Enclosed?:	No
Number of Antennas per T-arm:	3
Min. Maintenance Load, $L_M$ [lb]:	500
Min. Maintenance Load, $L_V$ [lb]:	250

### Max. Discrete Loads Applied to (1) T-arm Sector from tnxTower Report:

Quantity	Appurtenance	$K_a$	Total per T-arm Sector							
			Dead + Wind (No Ice)			Maintenance		Dead +Ice+ Wind w/ Ice		
			Front $C_a A_a$ , [ft <sup>2</sup> ]	Side $C_a A_a$ , [ft <sup>2</sup> ]	Weight [lb]	Front $C_a A_a$ , [ft <sup>2</sup> ]	Side $C_a A_a$ , [ft <sup>2</sup> ]	Front $C_a A_a$ , [ft <sup>2</sup> ]	Side $C_a A_a$ , [ft <sup>2</sup> ]	Weight [lb]
1	4'-6" T-arm EPA = 2.5 ft <sup>2</sup> (71 lbs)	0.8	2.5	3.8	71.0	2.5	3.8	4.3	3.4	642.9
1	Ericsson Air 3246 B66 (58.10"x15.7"x9.4", 180lbs)	0.8	7.9	6.3	197.7	7.9	6.3	10.3	10.2	697.2
1	APXVAARR24 43 U NA20 (95.9"x24"x8.7", 154)	0.8	20.2	10.8	183.2	20.2	10.8	24.0	17.6	1111.1
1	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	0.8	6.9	3.6	62.7	6.9	3.6	9.6	7.9	456.9
1	Ericsson RRUS 4449 B71+B12	0.8	1.0	1.8	78.0	1.0	1.8	1.8	3.4	243.1
1	Ericsson RRUS-4415 B25 (16.5"x13.4"x5.9")	0.8	1.8	0.8	46.0	1.8	0.8	10.3	10.2	697.2
		0.0								
		0.0								
		0.0								
		0.0								
		0.0								
		0.0								
		0.0								

	No Ice	Maint.	Ice
Velocity Pressure, $q_z$ [psf]	60	4.5	14
Gust Effect Factor, $G_h$	1.1	1.1	1.1

From tnxTower. Maintenance  $q_z = (\text{Service } q_z)/4$   
(TIA-222-G Section 2.6.7.3)



JOB NO.: U1140.147.201

Copyright © 2020 Vector Structural Engineering, LLC

This Excel workbook contains proprietary information belonging to Vector Structural Engineering, LLC, and may be neither wholly nor partially copied or reproduced without the prior written permission of Vector Structural Engineering, LLC.

PROJECT: NJCLT56LE

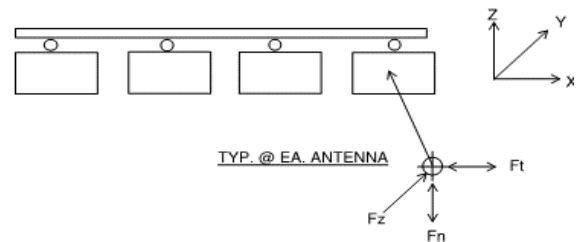
## T-arm Analysis

### Unfactored Loads on (1) T-arm Sector

Load Description	Unfactored Loads, (k)	
	w/ Mount	w/o Mount
Dead, D	0.6	0.6
Ice Weight, $D_i$	3.2	2.6
Front Wind, W	2.1	2.0
Side Wind, W	1.4	1.2
Front Ice Wind, $W_i$	0.7	0.7
Side Ice Wind, $W_i$	0.6	0.6
Front Maintenance Wind, $W_m$	0.2	0.2
Side Service Wind, $W_m$	0.1	0.1
Maintenance Load, $L_M$	0.5	0.5
Maintenance Load, $L_V$	0.3	0.3
Seismic, E	0.0	0.0

### Load Combos Considered:

LRFD	ASD
1.4D	1.0D
1.2D+1.5LM+1.0WM	1.0D+1.0LM+0.6WM
1.2D+1.5LV	1.0D+1.0LV
1.2D+1.0W	1.0D+0.6W
1.2D+1.0Di+1.0Wi	1.0D+1.0Di+0.6Wi



### Antenna Mount Pipe

Antenna Mount Pipe: 2" SCH 40 ( $F_y = 35$  ksi)

Antenna Mount Pipe Length [ft]: 8

Governing Load Combo: 1.2D+1.0W

Load Effect	Demand	Capacity	Ratio
Max. $M_z$ & $M_x$ (Any H. Axis) [kip-ft]	1.3	1.9	67.0%

OKAY



JOB NO.: U1140.147.201



Copyright © 2020 Vector Structural Engineering, LLC

This Excel workbook contains proprietary information belonging to Vector Structural Engineering, LLC, and may be neither wholly nor partially copied or reproduced without the prior written permission of Vector Structural Engineering, LLC.

PROJECT: NJCLT56LE

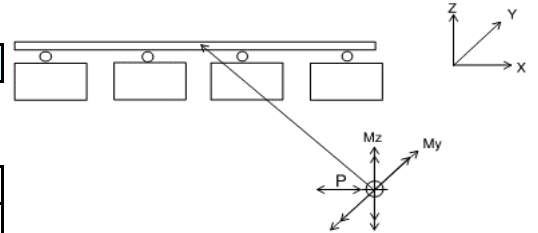
## T-arm Analysis

### Cross Arm Check

Cross Arm: 3" SCH 40 (Fy = 35 ksi)

Cross Arm Length (Center to Center) [ft]: 4

Cross Arm Length (Outside to Outside) [ft]: 4.5



Governing Load Combo: 1.2D+1.0Di+1.0Wi				
Load Effect	Demand	Capacity	Ratio	
Mz (H. Axis Perpendicular to Member) [k-ft]	2.7	5.8	46.1%	OKAY
My (V. Axis Perpendicular to Member) [k-ft]	0.5	5.8	8.6%	OKAY
Axial, P (Parallel to Member) [kip]	0.0	64.1	0.0%	OKAY
Governing Load Direction: Front Loading (AISC Equation H1-1b)			54.7%	OKAY

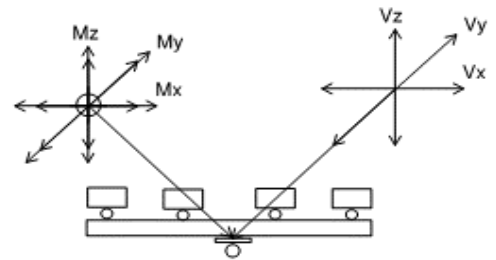
### U-Bolt Conn. Between Cross Arm and Standoff Arm Check

U-bolt Diameter: Ø5/8" U-bolts w/ Site Pro 1 Part SP216

Grade: A36

Dia. of Supporting Member [in]: 4.5 (Dia. of Vertical Pipe at End of Standoff Arm)

Governing Load Combo: 1.2D+1.0Di+1.0Wi				
Load	Demand	Capacity	Ratio	
Vy (Vertical) [k]	4.0			
Vz (Front) [k]	0.0			
Vx (Side) [k]	0.6			
My (V. Axis) [k-ft]	0.6			
Mx (H. Axis Parallel to Plate) [k-ft]	4.0			
Mz (H. Axis Perpendicular to Plate Face) [k-ft]	0.0			
Combined Shear Load per Bolt Shaft [k]	1.0	8.9	11.3%	OKAY
Combined Tension Load per Bolt Shaft [k]	4.1	9.4	44.2%	OKAY
U-bolt Bearing on Plate [k]	1.0	32.6	3.1%	OKAY
Combined V & T Load Effects (TIA-222-H Section 4.9.6 & 4.9.11.3)			20.8%	OKAY
Combined Sliding and Torsion Load Effects (TIA-222-H Section 4.9.11.3)			1.0%	OKAY





JOB NO.: U1140.147.201

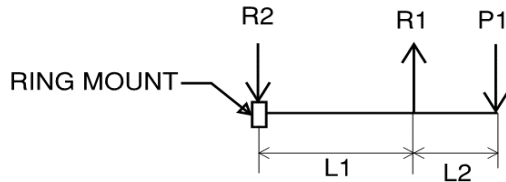
Copyright © 2020 Vector Structural Engineering, LLC

This Excel workbook contains proprietary information belonging to Vector Structural Engineering, LLC, and may be neither wholly nor partially copied or reproduced without the prior written permission of Vector Structural Engineering, LLC.

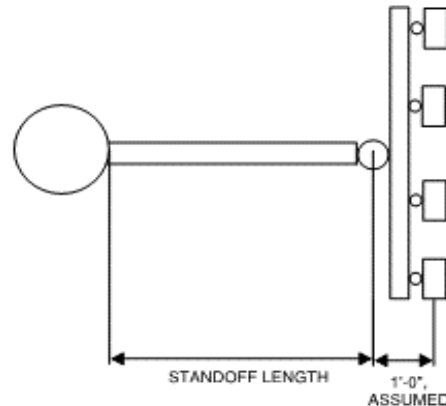
PROJECT: NJCLT56LE

## T-arm Analysis

### Required Chain Working Load Limit (Only Calc in ASD)



Standoff Length (L1+L2), [ft]	3
L2, [ft]	1



Governing Load Combo: 1.0D+1.0Di+0.6Wi	
Load	Demand
P1 [kip]	3.8
L1 [ft]	2.00
L2 [ft]	1.00
R1 [kip]	5.8
R2 [kip]	1.9
Chain Tension (Req'd WLL) [kip]	8.2

### Standoff Arm w/ Chain Check

Standoff Arm: HSS4x4x1/4 (Fy = 46 ksi)

Governing Load Combo: 1.2D+1.0Di+1.0Wi			
Load	Demand	Capacity	Ratio
Vy (Vertical) [k]	6.0	148.6	4.0%
Vz (Side) [k]	0.0	148.6	0.0%
Px (Front) [k]	0.7	120.0	0.6%
My (V. Axis) [k-ft]	0.0	16.2	0.0%
Mz (H. Axis Perpendicular to Standoff Arm) [k-ft]	4.0	16.2	24.5%
Mx (H. Axis Parallel to Standoff Arm) [k-ft]	0.0	104.6	0.0%
Unity Check - (AISC Equation H3-6)			25.3%

OKAY

### Ring-Mount w/ Chain on Standoff Arm Check

Ring Mount: Site Pro 1 Part LWRM

Governing Load Combo: 1.2D+1.0W			
Load	Demand	Capacity	Ratio
Vy (Vertical) [k]	0.4	4.1	9.4%
Vz (Side) [k]	1.4	10.2	14.0%
Px (Front) [k]	0.0	16.2	0.0%
My (V. Axis) [k-ft]	5.7	7.7	74.4%
Mz (H. Axis Perpendicular to Standoff Arm) [k-ft]	0.0	3.1	0.0%

OKAY

OKAY

OKAY

OKAY

OKAY

Capacity derived from Site Pro 1 Letter Dated 02/22/2010.



JOB NO.: U1140.147.201

PROJECT: NJCLT56LE

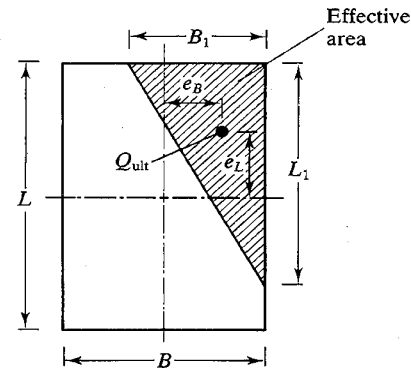
## LS-20 Foundation Design (Resultant Lies Outside Footing Kern)

### Design Loads (Factored / $\phi_s$ ):

Max. Base Shear, $V_u / 0.75$ :	22.2	k
Max. Overturning Moment, $M_u / 0.75$ :	1,466.7	k-ft
Max. Down, $P_{u-down} / 0.75$ :	43.6	k
Structure Weight:	10.0	k
Moment Components, $M_y = M_x$ :	1037.1	k-ft

### Mat Properties:

Mat Width, $L = B$ :	20.0	ft
Mat Thickness, $t$ :	0.0	ft
Pier Diameter, $b$ :	0.0	ft
Height of Pier:	2.0	ft
Depth of Soil Above Mat:	0.0	ft



Volume of Concrete:	0	ft <sup>3</sup>
Volume of Concrete:	0.0	yd <sup>3</sup>
Weight of Ballast:	100.0	k
LS-20 weight	19.0	k

### Soil Properties:

Allow. Bearing Pressure:	1,500	psf
Factor of Safety:	2	
1/3 increase for short term loads?	No	
Passive Pressure:	0	pcf
Factor of Safety:	1	
Max. Passive Pressure (opt'l):	0	psf
1/3 increase for short term loads?	No	
Top Depth to Ignore:	0.0	ft

Eff. Bearing Pressure:	3000	psf
Coefficient of Friction:	0.30	
Factor of Safety:	2	
% Passive for Sliding:	100.00	
% Friction for Sliding:	100.00	

### Check Bearing:

Total Moment, $M_y = M_x$ :	1,068.4	k-ft
Total Axial Load, $Q$ :	234.0	k
Load eccentricity, $e_L = e_B$ :	4.57	ft
Effective Mat Brg Width, $B_1 = L_1$ :	16.30	ft
Effective Area, $A' = 1/2(B_1)(L_1)$ :	132.85	ft <sup>2</sup>
Allowable axial load:	399	k

**Bearing Capacity OK.**



JOB NO.: U1140.147.201

PROJECT: NJCLT56LE

## LS-20 Foundation Design (cont.)

### Check Overturning:

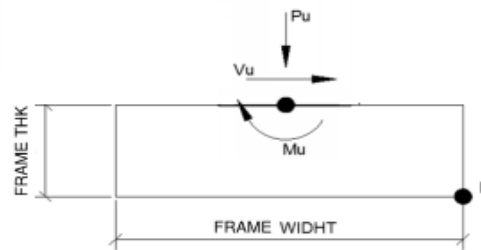
Base Shear (1.0W), $V_u$ :	16.6	k
Overturning Moment (1.0W), $M_u$ :	1,100.0	k-ft
Down (0.9 D), $P_u$ :	9.0	k
OTM about point P (1.0W):	1133.2322	k-ft
Resisting Moment (0.9D):	1161.3	k-ft

Overturning OK.

### Check Sliding:

Sliding Resistance from Friction:	69.7	k
Sliding Resistance from Passive:	0.0	k
Total Sliding Resistance:	69.7	k

Sliding resistance OK.



**(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): LRFD
Adjust Stiffness?	Yes(Iterative)
RISACONNECTION CODE	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-12: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-13: ASD
Aluminum Code	AA ADM1-10: 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
Parame Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
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)	Not Entered
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

**Joint Loads and Enforced Displacements (BLC 1 : DL)**

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N279	L	Y	-32675

**Joint Loads and Enforced Displacements (BLC 3 : wlx)**

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N279	L	Mz	1042
2	N279	L	X	-16608

**Joint Loads and Enforced Displacements (BLC 4 : wlz)**

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N279	L	Z	-16608
2	N279	L	Mx	-1042

**Basic Load Cases**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me... Surface(...
1	DL	DL		-1		1		
2	ballast	DL						2664
3	wlx	WLX				2		
4	wlz	WLZ				2		

**Load Combinations**

	Description	So..P...	S...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...
1	1.2dl		Y	DL	1.2							
2	1.2dl+1.0wlx		Y	DL	1.2	W...	1					
3	1.2dl+1.0wlz		Y	DL	1.2	W...	1					
4	.9dl+1.0wlx	Yes	Y	DL	.9	W...	1					
5	.9dl+1.0wlz		Y	DL	.9	W...	1					

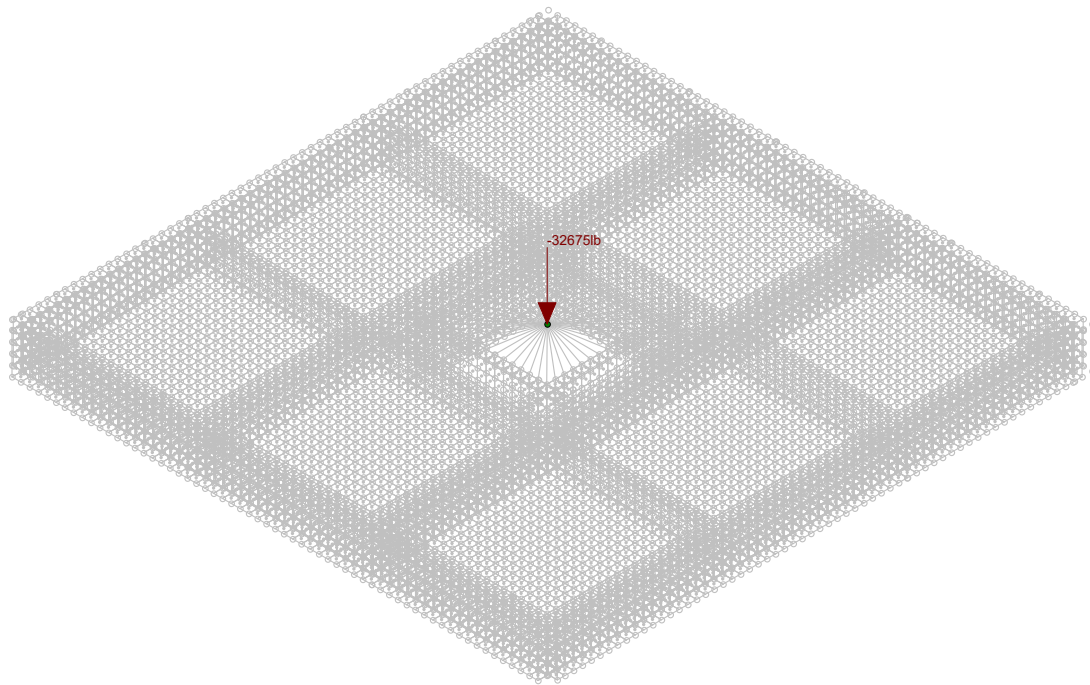


Company : VSE  
 Designer : YCA  
 Job Number : U1140-147-201  
 Model Name : NJCLT56LE LS-20

Page 39 of 47  
 Jan 16, 2020  
 10:25 AM  
 Checked By: CMP

**Load Combinations (Continued)**

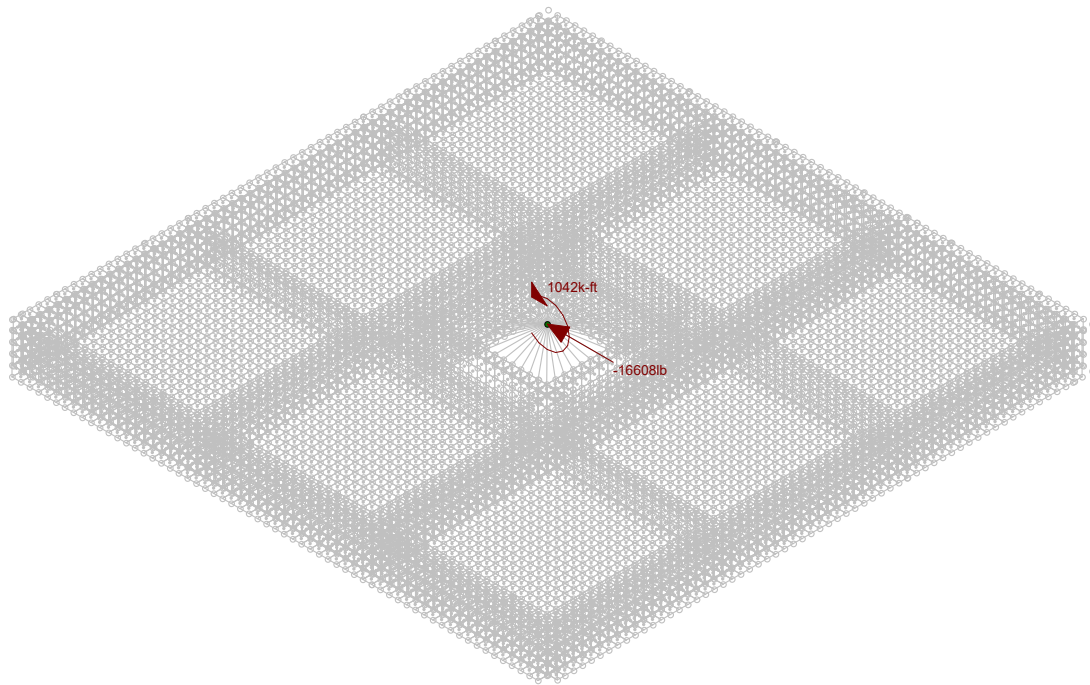
	Description	So..	P...	S...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...
6	1		Y		1	1									
7	2		Y		2	1									
8	1.2dl+.707wlx+.707wlz		Y		DL	1.2	W...	.707	W...	.707					
9	.9dl+.707wlx+.707wlz	Yes	Y		DL	.9	W...	.707	W...	.707					



Loads: BLC 1, DL  
Envelope Only Solution

VSE	NJCLT56LE LS-20	SK - 1
YCA		Jan 16, 2020 at 10:27 AM
U1140-147-201		LS-20 with pole centered A325x 11...



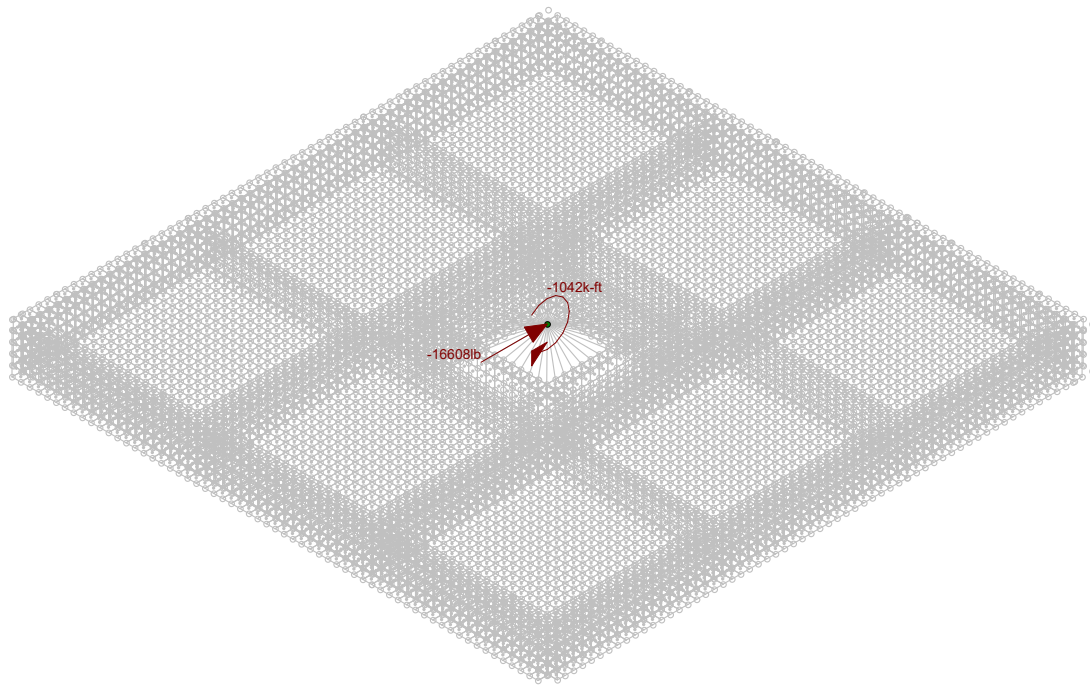


Loads: BLC 3, wlx  
Envelope Only Solution

VSE
YCA
U1140-147-201

NJCLT56LE LS-20
-----------------

SK - 2
Jan 16, 2020 at 10:27 AM
LS-20 with pole centered A325x 11...

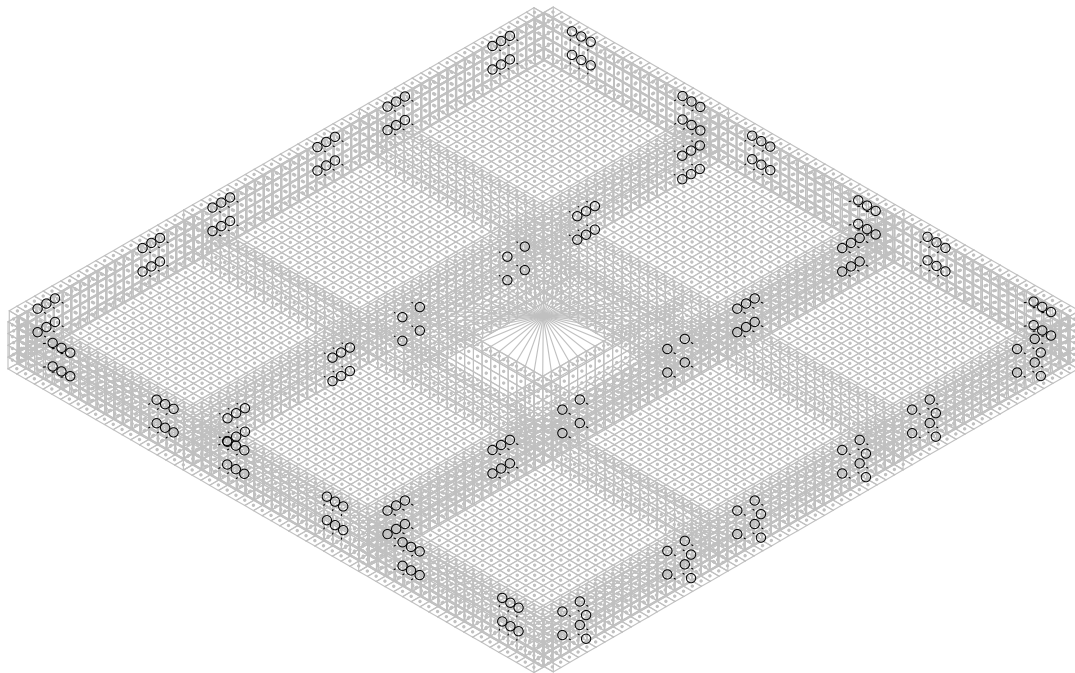


Loads: BLC 4, w/z  
Envelope Only Solution

VSE	NJCLT56LE LS-20	SK - 3
YCA		Jan 16, 2020 at 10:27 AM
U1140-147-201		LS-20 with pole centered A325x 11...



bolt locations



Loads: BLC 6,  
Envelope Only Solution

VSE
YCA
U1140-147-1

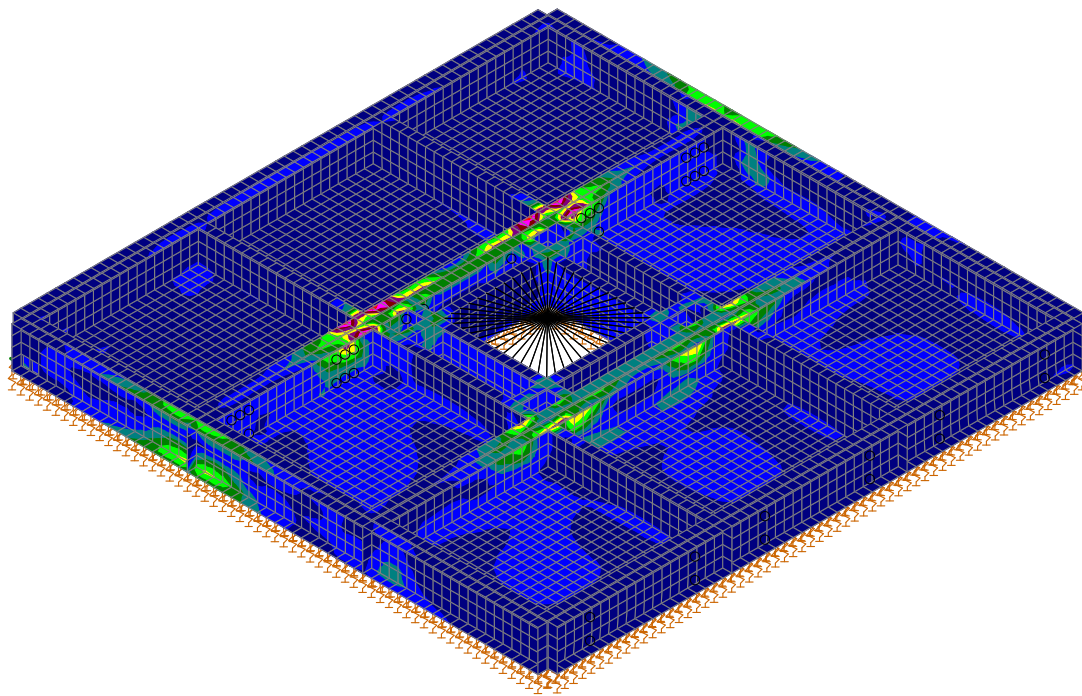
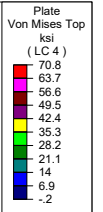
NJCLT56LE LS-20
-----------------

SK - 4
Jan 16, 2020 at 10:28 AM
LS-20 with pole centered A325x 11...

worst case bolt forces

**Envelope Member Section Forces**

Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[...]	LC	y-y Mo...	LC	z-z Mo...	LC	
1	M199	1	max	2408.581	9	-15362.523	9	43463.859	4	-0.43	9	0	9	0	9
2			min	-2.147	4	-16777.071	4	32792.161	9	-0.47	4	0	4	0	4
3		2	max	2408.581	9	-15362.548	9	43463.859	4	-0.43	9	.457	4	.176	4
4			min	-2.147	4	-16777.096	4	32792.161	9	-0.47	4	.345	9	.161	9
5		3	max	2408.581	9	-15362.573	9	43463.859	4	-0.43	9	.914	4	.353	4
6			min	-2.147	4	-16777.122	4	32792.161	9	-0.47	4	.689	9	.323	9
7		4	max	2408.581	9	-15362.598	9	43463.859	4	-0.43	9	1.37	4	.529	4
8			min	-2.147	4	-16777.147	4	32792.161	9	-0.47	4	1.034	9	.484	9
9		5	max	2408.581	9	-15362.624	9	43463.859	4	-0.43	9	1.827	4	.705	4
10			min	-2.147	4	-16777.172	4	32792.161	9	-0.47	4	1.379	9	.646	9
11	M195	1	max	2633.577	9	-16288.83	9	-30259.157	9	.052	4	0	9	0	9
12			min	-351.536	4	-18714.689	4	-42050.768	4	.045	9	0	4	0	4
13		2	max	2633.577	9	-16288.855	9	-30259.157	9	.052	4	-.318	9	.197	4
14			min	-351.536	4	-18714.714	4	-42050.768	4	.045	9	-.442	4	.171	9
15		3	max	2633.577	9	-16288.88	9	-30259.157	9	.052	4	-.636	9	.393	4
16			min	-351.536	4	-18714.74	4	-42050.768	4	.045	9	-.884	4	.342	9
17		4	max	2633.577	9	-16288.906	9	-30259.157	9	.052	4	-.954	9	.59	4
18			min	-351.536	4	-18714.765	4	-42050.768	4	.045	9	-1.326	4	.514	9
19		5	max	2633.577	9	-16288.931	9	-30259.157	9	.052	4	-1.272	9	.787	4
20			min	-351.536	4	-18714.79	4	-42050.768	4	.045	9	-1.768	4	.685	9
21	M22	1	max	-3552.544	9	-4868.344	4	41534.675	4	-0.07	4	0	9	0	9
22			min	-4326.357	4	-6156.677	9	32013.254	9	-0.09	9	0	4	0	4
23		2	max	-3552.544	9	-4868.37	4	41534.675	4	-0.07	4	.434	4	.064	9
24			min	-4326.357	4	-6156.702	9	32013.254	9	-0.09	9	.334	9	.051	4
25		3	max	-3552.544	9	-4868.395	4	41534.675	4	-0.07	4	.867	4	.129	9
26			min	-4326.357	4	-6156.727	9	32013.254	9	-0.09	9	.668	9	.102	4
27		4	max	-3552.544	9	-4868.42	4	41534.675	4	-0.07	4	1.301	4	.193	9
28			min	-4326.357	4	-6156.752	9	32013.254	9	-0.09	9	1.003	9	.152	4
29		5	max	-3552.544	9	-4868.445	4	41534.675	4	-0.07	4	1.735	4	.257	9
30			min	-4326.357	4	-6156.777	9	32013.254	9	-0.09	9	1.337	9	.203	4
31	M164	1	max	-683.604	9	14328.957	4	-8835.886	9	0	9	0	9	0	9
32			min	-4931.207	4	237.336	9	-40255.54	4	-.04	4	0	4	0	4
33		2	max	-683.604	9	14328.931	4	-8835.886	9	0	9	-.093	9	-.002	9
34			min	-4931.207	4	237.31	9	-40255.54	4	-.04	4	-.423	4	-.151	4
35		3	max	-683.604	9	14328.906	4	-8835.886	9	0	9	-.186	9	-.005	9
36			min	-4931.207	4	237.285	9	-40255.54	4	-.04	4	-.846	4	-.301	4
37		4	max	-683.604	9	14328.881	4	-8835.886	9	0	9	-.279	9	-.007	9
38			min	-4931.207	4	237.26	9	-40255.54	4	-.04	4	-1.269	4	-.452	4
39		5	max	-683.604	9	14328.856	4	-8835.886	9	0	9	-.371	9	-.01	9
40			min	-4931.207	4	237.235	9	-40255.54	4	-.04	4	-1.692	4	-.602	4
41	M171	1	max	-416.436	9	16986.723	4	39989.763	4	.047	4	0	9	0	9
42			min	-5214.214	4	2935.541	9	8300.901	9	.008	9	0	4	0	4
43		2	max	-416.436	9	16986.698	4	39989.763	4	.047	4	.42	4	-.031	9
44			min	-5214.214	4	2935.516	9	8300.901	9	.008	9	.087	9	-.179	4
45		3	max	-416.436	9	16986.673	4	39989.763	4	.047	4	.841	4	-.062	9
46			min	-5214.214	4	2935.491	9	8300.901	9	.008	9	.174	9	-.357	4
47		4	max	-416.436	9	16986.647	4	39989.763	4	.047	4	1.261	4	-.093	9
48			min	-5214.214	4	2935.465	9	8300.901	9	.008	9	.262	9	-.536	4
49		5	max	-416.436	9	16986.622	4	39989.763	4	.047	4	1.681	4	-.123	9
50			min	-5214.214	4	2935.44	9	8300.901	9	.008	9	.349	9	-.714	4



Loads: BLC 6,  
Results for LC 4, .9dl+1.0wlx

VSE	NJCLT56LE LS-20	SK - 5
YCA		Jan 16, 2020 at 10:33 AM
U1140-147-201		LS-20 with pole centered A325x 11...

**Envelope Plate/Shell Principal Stresses**

worst case plate stresses

	Plate	Surf...	Sigma1 [ksi]	LC	Sigma2 [ksi]	LC	Tau Max [ksi]	LC	Angle [rad]	LC	Von Mises [ksi]	LC
1	P3215	max	82.578	4	40.718	4	20.93	4	-.065	4	71.517	4
2		min	38.852	9	18.124	9	10.364	9	-.205	9	33.672	9
3		max	-21.359	9	-38.805	9	15.642	4	1.776	9	76.853	4
4		min	-56.277	4	-87.562	4	8.723	9	1.596	4	33.663	9
5	P3163	max	82.744	4	40.799	4	20.972	4	.068	4	71.66	4
6		min	65.055	9	31.109	9	16.973	9	-.017	9	56.358	9
7		max	-53.042	9	-71.167	9	15.83	4	1.651	9	76.502	4
8		min	-55.59	4	-87.25	4	9.062	9	1.545	4	64.057	9
9	P3219	max	72.101	4	29.87	4	21.115	4	-.261	9	62.746	4
10		min	32.894	9	15.359	9	8.767	9	-.285	4	28.508	9
11		max	-23.366	9	-31.456	9	6.995	4	1.55	4	67.7	4
12		min	-59.612	4	-73.602	4	4.045	9	1.481	9	28.292	9
13	P3159	max	72.06	4	29.861	4	21.099	4	.284	4	62.71	4
14		min	56.547	9	20.862	9	17.842	9	.26	9	49.529	9
15		max	-54.161	9	-61.84	9	7.081	4	1.598	4	67.18	4
16		min	-58.97	4	-73.132	4	3.84	9	1.138	9	58.381	9
17	P3167	max	70.332	4	18.821	4	25.755	4	.044	4	63.064	4
18		min	53.457	9	8.714	9	22.372	9	-.019	9	49.676	9
19		max	-33.406	9	-58.561	9	17.647	4	1.82	9	63.88	4
20		min	-38.447	4	-73.74	4	12.578	9	1.669	4	50.883	9
21	P3211	max	69.811	4	18.087	4	25.862	4	-.044	4	62.754	4
22		min	34.271	9	9.133	9	12.569	9	-.167	9	30.739	9
23		max	-15.501	9	-33.815	9	17.498	4	1.704	9	63.67	4
24		min	-38.495	4	-73.491	4	9.157	9	1.476	4	29.318	9
25	P1029	max	22.316	4	-38.534	4	31.346	9	-.299	9	56.12	9
26		min	17.138	9	-45.553	9	30.425	4	-.382	4	53.317	4
27		max	-12.785	9	-61.448	4	27.085	9	.01	4	61.566	9
28		min	-14.712	4	-66.955	9	23.368	4	.004	9	55.572	4
29	P1208	max	-1.278	9	-15.387	4	14.914	9	.493	9	30.487	9
30		min	-1.487	4	-31.106	9	6.95	4	.409	4	14.701	4
31		max	4.911	9	-42.497	4	30.633	9	.465	4	58.964	9
32		min	3.55	4	-56.355	9	23.023	4	.446	9	44.378	4
33	P3135	max	53.082	4	21.324	4	15.879	4	.189	9	46.266	4
34		min	42.763	9	11.717	9	15.523	9	.09	4	38.274	9
35		max	-38.075	9	-60.196	9	14.253	4	1.472	4	58.655	4
36		min	-38.954	4	-67.46	4	11.061	9	1.414	9	52.738	9
37	P3243	max	52.781	4	20.919	4	15.931	4	.02	9	46.036	4
38		min	23.922	9	12.984	9	5.469	9	-.094	4	20.742	9
39		max	-13.826	9	-27.562	9	14.153	4	1.672	4	58.405	4
40		min	-38.858	4	-67.165	4	6.868	9	1.631	9	23.87	9



JOB NO.: U1140.147.201  
DATE: 01/17/20

DESIGNED: YCA  
CHECKED: CMP

PROJECT: NJCLT56LE

## FINITE ELEMENT MODEL PLATE STRESS CHECK

Design Methodology:	LRFD				
Connection Under Consideration:					
Element Description:					
Element Yield Stress, $F_y$ (ksi):	65				
Max. Von Mises Stress (ksi):	76.853				
Corresponding RISA Plate I.D.:	P3215				
Allowable Stress <sup>1</sup> (ksi):	87.75				
Element Unity Check:	0.88				
	OKAY	OKAY	OKAY	OKAY	OKAY

Note 1: Allowable stress based on the following formulas derived from the AISC Specification, Section F11:

$$\text{ASD: Allowable Stress} = (Z/S)F_y/\Omega = (1.5)F_y/1.67 = 0.90F_y$$

$$\text{LRFD: Allowable Stress} = \phi(Z/S)F_y = 0.9(1.5)F_y = 1.35F_y$$

### Bolt Check

LRFD Tensio (kips): 24.1 kips  
Corresponding LRFD Shear (kips): 43.50 kips

Bolt Designation:	A325N		
Bolt Diameter (in):	1 1/4		
$\phi T_n$ (kips):	82.8	29%	AISC Eq. J3-2
$\phi V_n$ (kips):	49.7	88%	AISC Eq. J3-2
Combined Tension and Shear:	N/A	N/A	AISC Eq. J3-3a