

STRUCTURAL ANALYSIS

149' SST

AT&T DESIGNATION: Site ID: 164472 (NEL02371)
Site FA: 14412481
Site Name: CNE_GOTHENBURG

ANALYSIS CRITERIA: Codes: TIA/EIA-222-F 85 mph Fastest-Mile
IBC 2006

SITE DATA: 1516 3Rd Ave, Gothenburg, NE 69138, Dawson County
Latitude 40.933658, Longitude -100.1731
Market: ND/SD/NE/MN/IA
149' SST

is pleased to submit this Structural Analysis Report to determine the structural integrity of the
aforementioned tower. The purpose of the analysis is to determine the suitability of the tower with the existing and proposed
loading configuration detailed in the analysis report.

Analysis Results

Tower Stress Level with Proposed Equipment:	91.50%	Pass
Connection Stress Level with Proposed Equipment:	81.70%	Pass
Foundation Ratio with Proposed Equipment:	51.20%	Pass

appreciate the opportunity of providing our continuing professional services to you. If you have
any questions or need further assistance on this or any other projects please give us a call.

Documents

[illegible]

Assumptions, Disclaimers, and Notes

1. This analysis was performed under the assumption that all information provided to _____ is current and correct. This is to include site data, existing/proposed appurtenance loading, tower/foundation details, and geotechnical data. If this information is not current and correct, this report should be considered obsolete and further analysis will be required.
2. This analysis assumes that the tower structural components and mounts, including all steel sections and attachment hardware, are in good working order and in their original state, free of rust or other forms of corrosion. Furthermore, it is assumed that the tower and the tower foundation have been properly maintained and monitored since the time of construction. This report should be considered obsolete and further analysis will be required if the tower and/or foundation does not meet all of the above specifications.
3. This analysis assumes that all existing and/or proposed equipment mounts on the tower will have adequate capacity to support the existing and proposed equipment loading.
4. Capacity of the structural members is based on theoretical values as shown in the attached TAS form.
5. When applicable, this structural analysis is only valid if the proposed coax cables are stacked as shown in the attached feedline sketch.

General Info	
Site Name	CNE_GOTHENBURG
Site Number	164472ATTNE-S (NEL02371)
FA Number	14412481
Date of Analysis	
Company Performing Analysis	

Tower Info	Description	Date
Tower Type (G, SST, MP)	SST	N/A
Tower Height (Top of Steel)	149 ft	N/A
Tower Manufacturer	Sabre Industries	N/A
Tower Model	S3TL-HD1	N/A
Tower Drawings	Sabre Industries	04/14/2014
Foundation Drawings	Sabre Industries	03/04/2014
Geotech Report	GSI Engineering Northern Division, LLC	02/10/2014
Tower Mapping	N/A	N/A
Previous Structural Analysis	N/A	N/A
Foundation Mapping	N/A	N/A

Legs	A572-50
Horizontals/Diagonals	A36
Bolts	A325/F 1554-105

Design Code Used	TIA/EIA-222-F IBC 2006
Location of Tower (County, State)	Dawson County, NE
Wind Speed (mph)	85
Ice Thickness (in)	0.5
Structure Classification (I, II, III)	
Exposure Category (B, C, D)	
Topographic Category (1 to 5)	

Existing/Reserved + Future + Proposed Conditions	
Tower (%)	
Bolt (%)	
Foundation (%)	
Foundation Adequate?	N/A

Analysis Results (% Maximum Usage)		
Existing/Reserved	REV G	REV F
Tower (%)		
Bolt (%)		
Foundation (%)		
Foundation Adequate?	N/A	N/A

Existing/Reserved + Proposed Condition	
Tower (%)	91.50%
Bolt (%)	81.70%
Foundation (%)	51.20%
Foundation Adequate?	Yes

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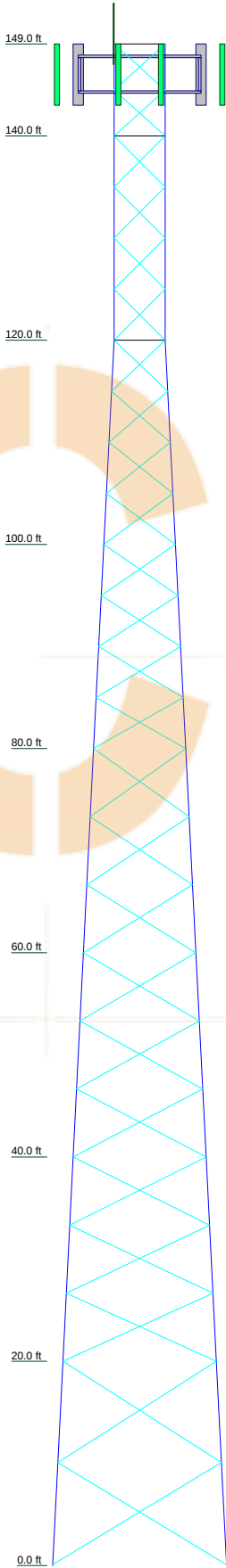
Proposed Loading

[illegible]

Future Loading

[illegible]

Section	T1	T2	T3	T4	T5	T6	T7	T8	
Legs	P2.375x0.154	Pipe 2.375" x 0.218" (2 EH)	P3.5x0.300	P4.5x.337	P5.563x.375	Pipe 5.563" x 0.500" (5 #120)		P8.625x.322	
Leg Grade					A572-50				
Diagonals									
Diagonal Grade									
Top Girts									
Face Width (ft)	5			7	9	11	13	15	17
# Panels @ (ft)	2 @ 4.5		12 @ 5	1.5	2.0	2.7	2.8	3.0	
Weight (K)	0.3	0.6	1.3						



DESIGNED APPURTENANCE LOADING

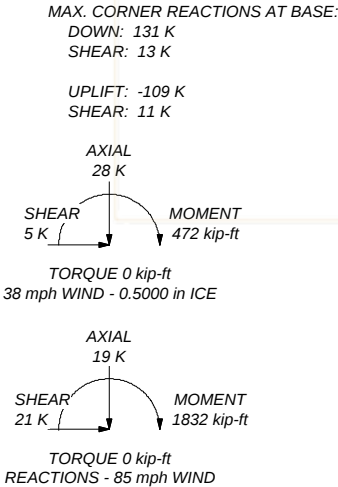
TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 5/8"x2" (Existing)	149	RRH2X60-1900 (ATI-Existing)	146
3' x 2" Pipe Mount (Existing)	149	RRH2X60-1900 (ATI-Existing)	146
(2) Beacon side markers (Existing)	149	RRH2X60-1900 (ATI-Existing)	146
Site Pro 1 VFA12-HD 12" Heavy Duty V-Frame (ATI-Existing)	146	AirScale Dual RRH 4T4R B12/14 320W AHLBA (ATI-Proposed)	146
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CWWX063X25G00 w/ Mount Pipe (ATI-Existing)	146	AIRSCALE DUAL RRH 4T4R B25/66 320W AHFIB (ATI-Proposed)	146
CWWX063X25G00 w/ Mount Pipe (ATI-Existing)	146	AIRSCALE DUAL RRH 4T4R B25/66 320W AHFIB (ATI-Proposed)	146
CWWX063X25G00 w/ Mount Pipe (ATI-Existing)	146	AIRSCALE DUAL RRH 4T4R B25/66 320W AHFIB (ATI-Proposed)	146
EPBQ-654L8H8-L2 w/ Mount Pipe (ATI-Proposed)	146	RRH4X25-WCS-4R (ATI-Proposed)	146
EPBQ-654L8H8-L2 w/ Mount Pipe (ATI-Proposed)	146	RRH4X25-WCS-4R (ATI-Proposed)	146
EPBQ-654L8H8-L2 w/ Mount Pipe (ATI-Proposed)	146	RRH4X25-WCS-4R (ATI-Proposed)	146
EPBQ-654L8H8-L2 w/ Mount Pipe (ATI-Proposed)	146	DC6-48-60-18-8F (ATI-Existing)	146
		DC6-48-60-18-8C (ATI-Proposed)	146
		DC6-48-60-0-8C (ATI-Proposed)	146

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Dawson County, Nebraska.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 91.5%



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	Client	AT&T		

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 149.00 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 5.00 ft at the top and 17.00 ft at the base.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in Dawson County, Nebraska.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 38 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

Pressures are calculated at each section.

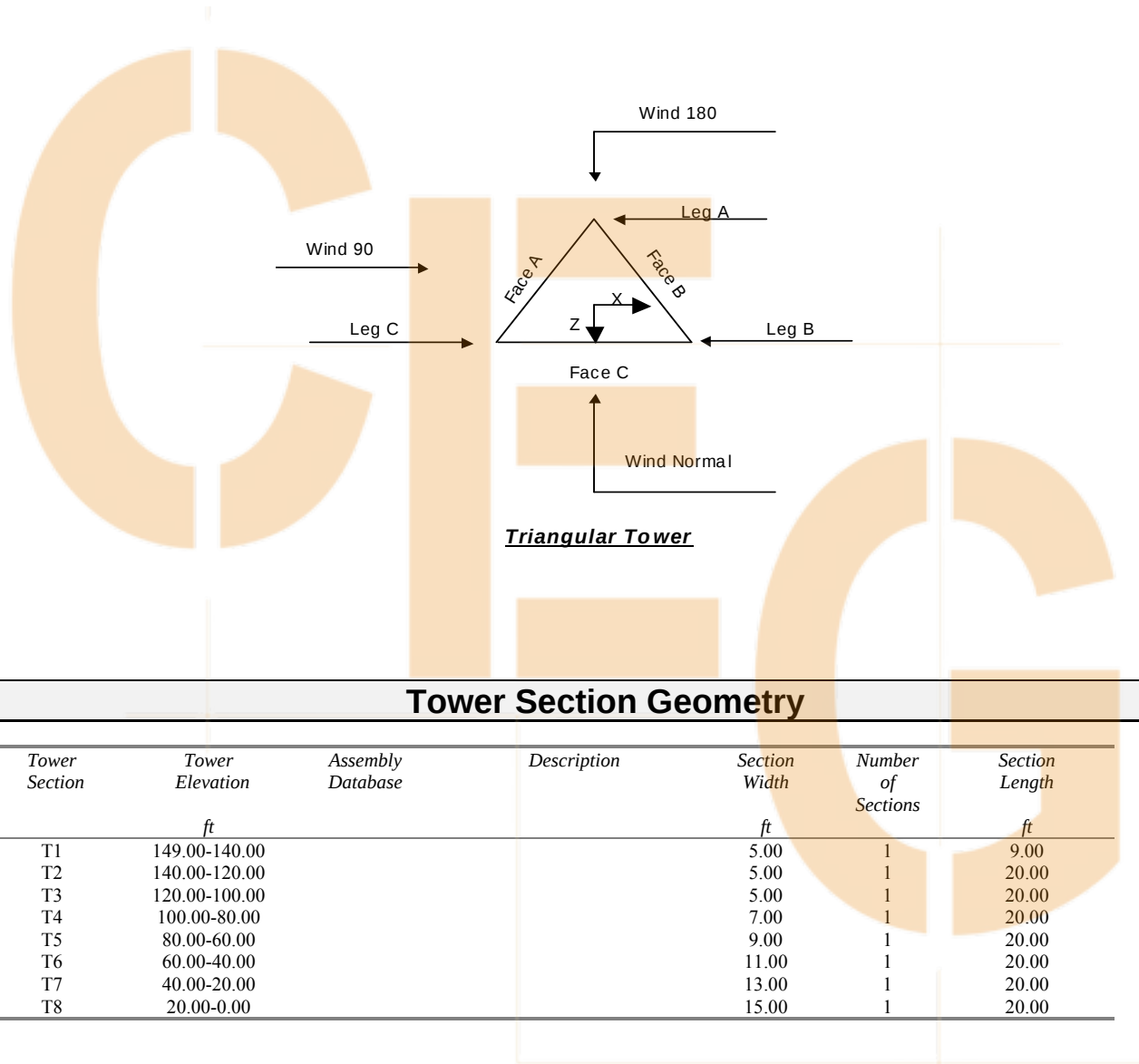
Stress ratio used in tower member design is 1.333.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	✓ Calculate Redundant Bracing Forces
Consider Moments - Diagonals	✓ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	✓ Use Clear Spans For Wind Area	✓ SR Leg Bolts Resist Compression
✓ Use Code Stress Ratios	✓ Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
✓ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	✓ Offset Girt At Foundation
✓ Escalate Ice	✓ Bypass Mast Stability Checks	Consider Feed Line Torque
Always Use Max Kz	✓ Use Azimuth Dish Coefficients	✓ Include Angle Block Shear Check
Use Special Wind Profile	✓ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
✓ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
✓ Secondary Horizontal Braces Leg	✓ Sort Capacity Reports By Component	Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
✓ SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric	Ignore KL/ry For 60 Deg. Angle Legs	Pole Without Linear Attachments
		Pole With Shroud Or No Appurtenances
		Outside and Inside Corner Radii Are
		Known

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Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	149.00-140.00			5.00	1	9.00
T2	140.00-120.00			5.00	1	20.00
T3	120.00-100.00			5.00	1	20.00
T4	100.00-80.00			7.00	1	20.00
T5	80.00-60.00			9.00	1	20.00
T6	60.00-40.00			11.00	1	20.00
T7	40.00-20.00			13.00	1	20.00
T8	20.00-0.00			15.00	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	149.00-140.00	4.50	X Brace	No	No	0.0000	0.0000
T2	140.00-120.00	5.00	X Brace	No	No	0.0000	0.0000
T3	120.00-100.00	5.00	X Brace	No	No	0.0000	0.0000
T4	100.00-80.00	5.00	X Brace	No	No	0.0000	0.0000
T5	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T6	60.00-40.00	6.67	X Brace	No	No	0.0000	0.0000
T7	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000

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Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T8	20.00-0.00	9.96	X Brace	No	No	0.0000	1.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 149.00-140.00	Pipe	P2.375x0.154	A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T2 140.00-120.00	Pipe	Pipe 2.375" x 0.218" (2 EH)	A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T3 120.00-100.00	Pipe	P3.5x0.300	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T4 100.00-80.00	Pipe	P4.5x.337	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T5 80.00-60.00	Pipe	P5.563x.375	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 60.00-40.00	Pipe	Pipe 5.563" x 0.500" (5 #120)	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T7 40.00-20.00	Pipe	Pipe 5.563" x 0.500" (5 #120)	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T8 20.00-0.00	Pipe	P8.625x.322	A572-50 (50 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 149.00-140.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T2 140.00-120.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T3 120.00-100.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
149.00-140.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
140.00-120.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000

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Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T2 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 149.00-140.00	Flange	0.7500	6	0.6250	1	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T2 140.00-120.00	Flange	A325N 0.7500	6	A325N 0.6250	1	A325N 0.6250	1	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0
T3 120.00-100.00	Flange	A325N 1.0000	6	A325N 0.6250	1	A325N 0.6250	1	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0
T4 100.00-80.00	Flange	A325N 1.0000	6	A325N 0.6250	1	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0
T5 80.00-60.00	Flange	A325N 1.0000	6	A325N 0.6250	1	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0
T6 60.00-40.00	Flange	A325N 1.0000	6	A325N 0.6250	1	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0
T7 40.00-20.00	Flange	A325N 1.2500	6	A325N 0.7500	1	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0
T8 20.00-0.00	Flange	A325N 0.7500	0	A325N 0.7500	1	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0	A325N 0.6250	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8 (Existing) ***	A	Yes	Yes	Ar (CfAe)	149.00 - 0.00	1	1	0.3750	0.3750		0.22
Feedline Ladder (Af) ***	A	Yes	Yes	Af (CfAe)	149.00 - 0.00	1	1	3.0000	3.0000	12.0000	8.40
3/8" Fiber Cable (AT&T- Existing)	A	Yes	Yes	Ar (CfAe)	149.00 - 6.00	1	1	0.3937	0.3937		0.08

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Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
3/4" DC Cable (AT&T- Existing)	A	Yes	Yes	Ar (CfAe)	149.00 - 6.00	1	1	0.5000	0.7559		0.51
3/8" Fiber Cable (AT&T- Proposed)	A	Yes	Yes	Ar (CfAe)	149.00 - 6.00	1	1	0.3937	0.3937		0.08
1" DC Cable (AT&T- Proposed)	A	Yes	Yes	Ar (CfAe)	149.00 - 6.00	3	3	0.5000	1.0000		0.30

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	149.00-140.00	A	3.689	2.250	0.000	0.000	0.09
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	140.00-120.00	A	8.197	5.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	120.00-100.00	A	8.197	5.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T4	100.00-80.00	A	8.197	5.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T5	80.00-60.00	A	8.197	5.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T6	60.00-40.00	A	8.197	5.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T7	40.00-20.00	A	8.197	5.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T8	20.00-0.00	A	5.926	5.000	0.000	0.000	0.19
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

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Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	149.00-140.00	A	0.597	6.666	5.097	0.000	0.000	0.18
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	140.00-120.00	A	0.589	14.687	11.310	0.000	0.000	0.39
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T3	120.00-100.00	A	0.578	14.492	11.284	0.000	0.000	0.39
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T4	100.00-80.00	A	0.564	14.263	11.253	0.000	0.000	0.38
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T5	80.00-60.00	A	0.547	13.984	11.216	0.000	0.000	0.38
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T6	60.00-40.00	A	0.526	13.623	11.168	0.000	0.000	0.37
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T7	40.00-20.00	A	0.500	13.197	11.111	0.000	0.000	0.36
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T8	20.00-0.00	A	0.500	9.926	9.611	0.000	0.000	0.32
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Shielding

Section	Elevation ft	Face	A _R ft ²	A _R Ice ft ²	A _F ft ²	A _F Ice ft ²
T1	149.00-140.00	A	0.000	0.851	0.702	1.425
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	140.00-120.00	A	0.000	1.612	1.354	2.735
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T3	120.00-100.00	A	0.000	1.458	1.260	2.523
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T4	100.00-80.00	A	0.000	1.161	1.039	2.059
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T5	80.00-60.00	A	0.000	0.850	0.992	1.941
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T6	60.00-40.00	A	0.000	0.763	1.133	2.179
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T7	40.00-20.00	A	0.000	0.689	1.097	2.066
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T8	20.00-0.00	A	0.000	0.395	0.644	1.184
		B	0.000	0.000	0.000	0.000

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Section	Elevation	Face	A _R	A _R Ice	A _F	A _F Ice
	ft		ft ²	ft ²	ft ²	ft ²
		C	0.000	0.000	0.000	0.000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
Lightning Rod 5/8"x2' (Existing)	C	From Leg	0.00 0.00 1.00	0.00	149.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.13 0.28 0.41 0.72 1.53	0.13 0.28 0.41 0.72 1.53	0.00 0.00 0.01 0.02 0.06
3' x 2" Pipe Mount (Existing)	A	From Face	0.00 0.00 0.00	0.00	149.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.58 0.77 0.97 1.42 2.54	0.58 0.77 0.97 1.42 2.54	0.01 0.02 0.02 0.05 0.13
(2) Beacon side markers (Existing)	A	From Face	0.00 0.00 0.00	0.00	149.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.93 1.07 1.21 1.49 2.05	0.93 1.07 1.21 1.49 2.05	0.02 0.03 0.03 0.04 0.06

Site Pro 1 VFA12-HD 12' Heavy Duty V-Frame (AT&T-Proposed)	A	From Leg	0.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	13.20 19.50 25.80 38.40 63.60	9.20 14.60 19.50 30.80 52.40	0.66 0.80 1.01 1.24 1.83
Site Pro 1 VFA12-HD 12' Heavy Duty V-Frame (AT&T- Proposed)	B	From Leg	0.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	13.20 19.50 25.80 38.40 63.60	9.20 14.60 19.50 30.80 52.40	0.66 0.80 1.01 1.24 1.83
Site Pro 1 VFA12-HD 12' Heavy Duty V-Frame (AT&T- Proposed)	C	From Leg	0.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	13.20 19.50 25.80 38.40 63.60	9.20 14.60 19.50 30.80 52.40	0.66 0.80 1.01 1.24 1.83
CWWX063X25G00 w/ Mount Pipe (AT&T-Existing)	A	From Leg	3.00 6.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	12.09 12.82 13.57 15.03 18.36	10.12 11.68 13.26 15.70 20.67	0.08 0.17 0.27 0.51 1.17
CWWX063X25G00 w/ Mount Pipe (AT&T-Existing)	B	From Leg	3.00 6.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	12.09 12.82 13.57 15.03 18.36	10.12 11.68 13.26 15.70 20.67	0.08 0.17 0.27 0.51 1.17
CWWX063X25G00 w/ Mount Pipe (AT&T-Existing)	C	From Leg	3.00 6.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	12.09 12.82 13.57 15.03 18.36	10.12 11.68 13.26 15.70 20.67	0.08 0.17 0.27 0.51 1.17

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
EPBQ-654L8H8-L2 w/ Mount Pipe (AT&T-Proposed)	A	From Leg	3.00 -6.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	19.84 20.70 21.58 23.27 26.77	9.17 10.68 12.22 14.55 19.39	0.12 0.24 0.36 0.65 1.42
EPBQ-654L8H8-L2 w/ Mount Pipe (AT&T-Proposed)	B	From Leg	3.00 -6.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	19.84 20.70 21.58 23.27 26.77	9.17 10.68 12.22 14.55 19.39	0.12 0.24 0.36 0.65 1.42
EPBQ-654L8H8-L2 w/ Mount Pipe (AT&T-Proposed)	C	From Leg	3.00 -6.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	19.84 20.70 21.58 23.27 26.77	9.17 10.68 12.22 14.55 19.39	0.12 0.24 0.36 0.65 1.42
RRH2X60-1900 (AT&T-Existing)	A	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.19 2.39 2.61 3.07 4.08	1.41 1.59 1.78 2.18 3.10	0.04 0.06 0.08 0.12 0.26
RRH2X60-1900 (AT&T-Existing)	B	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.19 2.39 2.61 3.07 4.08	1.41 1.59 1.78 2.18 3.10	0.04 0.06 0.08 0.12 0.26
RRH2X60-1900 (AT&T-Existing)	C	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.19 2.39 2.61 3.07 4.08	1.41 1.59 1.78 2.18 3.10	0.04 0.06 0.08 0.12 0.26
AirScale Dual RRH 4T4R B12/14 320W AHLBA (AT&T-Proposed)	A	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.30 4.59 4.89 5.51 6.86	2.62 2.87 3.13 3.68 4.87	0.10 0.13 0.16 0.24 0.45
AirScale Dual RRH 4T4R B12/14 320W AHLBA (AT&T-Proposed)	B	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.30 4.59 4.89 5.51 6.86	2.62 2.87 3.13 3.68 4.87	0.10 0.13 0.16 0.24 0.45
AirScale Dual RRH 4T4R B12/14 320W AHLBA (AT&T-Proposed)	C	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.30 4.59 4.89 5.51 6.86	2.62 2.87 3.13 3.68 4.87	0.10 0.13 0.16 0.24 0.45
AIRSCALE DUAL RRH 4T4R B25/66 320W AHFIB (AT&T-Proposed)	A	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.39 3.66 3.94 4.52 5.78	1.64 1.87 2.10 2.61 3.71	0.09 0.11 0.13 0.19 0.35
AIRSCALE DUAL RRH 4T4R B25/66 320W AHFIB (AT&T-Proposed)	B	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.39 3.66 3.94 4.52 5.78	1.64 1.87 2.10 2.61 3.71	0.09 0.11 0.13 0.19 0.35
AIRSCALE DUAL RRH 4T4R B25/66 320W AHFIB	C	From Leg	3.00 0.00	0.00	146.00	No Ice 1/2" Ice	3.39 3.66	1.64 1.87	0.09 0.11

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
(AT&T-Proposed)			0.00			1" Ice 3.94 2" Ice 4.52 4" Ice 5.78 No Ice 3.67	2.10 2.61 3.71 2.66	0.13 0.19 0.35 0.07
RRH4X25-WCS-4R (AT&T-Proposed)	A	From Leg	3.00 0.00 0.00	0.00	146.00	1/2" Ice 3.96 1" Ice 4.26 2" Ice 4.87 4" Ice 6.21	2.93 3.20 3.78 5.03	0.10 0.13 0.20 0.39
RRH4X25-WCS-4R (AT&T-Proposed)	B	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 3.67 1/2" Ice 3.96 1" Ice 4.26 2" Ice 4.87 4" Ice 6.21	2.66 2.93 3.20 3.78 5.03	0.07 0.10 0.13 0.20 0.39
RRH4X25-WCS-4R (AT&T-Proposed)	C	From Leg	3.00 0.00 0.00	0.00	146.00	No Ice 3.67 1/2" Ice 3.96 1" Ice 4.26 2" Ice 4.87 4" Ice 6.21	2.66 2.93 3.20 3.78 5.03	0.07 0.10 0.13 0.20 0.39
DC6-48-60-18-8F (AT&T-Existing)	A	From Leg	1.00 0.00 0.00	0.00	146.00	No Ice 1.47 1/2" Ice 1.67 1" Ice 1.88 2" Ice 2.33 4" Ice 3.38	1.47 1.67 1.88 2.33 3.38	0.02 0.04 0.06 0.11 0.24
DC6-48-60-18-8C (AT&T-Proposed)	B	From Leg	1.00 0.00 0.00	0.00	146.00	No Ice 1.79 1/2" Ice 2.02 1" Ice 2.27 2" Ice 2.80 4" Ice 3.99	1.79 2.02 2.27 2.80 3.99	0.03 0.05 0.07 0.13 0.28
DC6-48-60-0-8C (AT&T-Proposed)	C	From Leg	1.00 0.00 0.00	0.00	146.00	No Ice 2.38 1/2" Ice 2.60 1" Ice 2.83 2" Ice 3.31 4" Ice 4.38	2.38 2.60 2.83 3.31 4.38	0.02 0.04 0.06 0.12 0.29

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice

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<i>Comb. No.</i>	<i>Description</i>
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

<i>Section No.</i>	<i>Elevation ft</i>	<i>Component Type</i>	<i>Condition</i>	<i>Gov. Load Comb.</i>	<i>Force K</i>	<i>Major Axis Moment kip-ft</i>	<i>Minor Axis Moment kip-ft</i>
T1	149 - 140	Leg	Max Tension	12	2.88	0.63	0.36
			Max. Compression	10	-5.36	-0.15	0.08
			Max. Mx	5	-1.66	1.13	-0.00
			Max. My	8	-1.52	0.00	1.14
			Max. Vy	11	-1.24	0.72	0.00
			Max. Vx	2	-1.24	-0.01	0.72
		Diagonal	Max Tension	9	2.67	0.00	0.00
			Max. Compression	2	-2.82	0.00	0.00
			Max. Mx	21	0.59	0.01	-0.00
			Max. My	3	2.66	0.00	0.00
			Max. Vy	21	-0.01	0.01	-0.00
			Max. Vx	3	0.00	0.00	0.00
		Top Girt	Max Tension	12	0.04	0.00	0.00
			Max. Compression	10	-0.12	0.00	0.00
			Max. Mx	14	-0.07	-0.01	0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max Tension	12	30.93	0.02	0.01
			Max. Compression	10	-34.87	0.14	-0.08
T2	140 - 120	Leg	Max. Mx	11	-1.35	-0.18	0.01
			Max. My	2	4.23	-0.00	-0.18
			Max. Vy	11	-0.08	0.12	-0.01
			Max. Vx	2	-0.08	0.02	0.12
		Diagonal	Max Tension	9	3.30	0.02	0.01
			Max. Compression	9	-3.35	0.00	0.00
			Max. Mx	10	2.67	0.03	0.01
			Max. My	13	-3.28	-0.02	0.01
			Max. Vy	10	-0.01	0.03	0.01

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T8	20 - 0	Diagonal	Max. Mx	25	17.93	-1.64	0.00
			Max. My	13	-4.79	-0.00	0.34
			Max. Vy	25	0.39	-1.64	0.00
			Max. Vx	13	0.06	-0.00	0.34
			Max Tension	3	2.97	0.00	0.00
			Max. Compression	3	-2.99	0.00	0.00
		Leg	Max. Mx	25	0.16	0.06	0.01
			Max. My	22	-0.09	0.03	-0.01
			Max. Vy	25	0.03	0.06	0.01
			Max. Vx	22	0.00	0.00	0.00
			Max Tension	12	109.73	0.40	-0.00
			Max. Compression	10	-131.44	0.00	0.00
		Diagonal	Max. Mx	23	-41.49	2.26	0.00
			Max. My	11	-5.80	-0.08	-1.84
			Max. Vy	6	-5.69	0.00	0.00
			Max. Vx	7	1.17	0.00	-0.00
			Max Tension	3	3.79	0.00	0.00
			Max. Compression	2	-3.94	0.00	0.00
			Max. Mx	25	-0.60	0.10	0.01
			Max. My	26	2.37	0.05	0.01
			Max. Vy	25	0.04	0.10	0.01
			Max. Vx	26	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	10	130.89	11.48	-6.63
	Max. H _x	10	130.89	11.48	-6.63
	Max. H _z	4	-109.27	-9.65	5.57
	Min. Vert	4	-109.27	-9.65	5.57
	Min. H _x	4	-109.27	-9.65	5.57
	Min. H _z	10	130.89	11.48	-6.63
Leg B	Max. Vert	6	130.89	-11.48	-6.62
	Max. H _x	12	-109.27	9.65	5.57
	Max. H _z	12	-109.27	9.65	5.57
	Min. Vert	12	-109.27	9.65	5.57
	Min. H _x	6	130.89	-11.48	-6.62
	Min. H _z	6	130.89	-11.48	-6.62
Leg A	Max. Vert	2	130.89	-0.01	13.25
	Max. H _x	11	6.44	1.16	0.51
	Max. H _z	2	130.89	-0.01	13.25
	Min. Vert	8	-109.27	0.01	-11.14
	Min. H _x	5	6.44	-1.16	0.51
	Min. H _z	8	-109.27	0.01	-11.14

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	19.31	0.00	0.00	-0.01	0.03	0.00

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Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead+Wind 0 deg - No Ice	19.31	0.00	-21.03	-1832.31	0.03	-0.17
Dead+Wind 30 deg - No Ice	19.31	9.82	-17.01	-1503.12	-867.78	-0.14
Dead+Wind 60 deg - No Ice	19.31	16.60	-9.59	-851.72	-1475.17	-0.06
Dead+Wind 90 deg - No Ice	19.31	19.64	0.00	-0.01	-1735.60	0.03
Dead+Wind 120 deg - No Ice	19.31	18.21	10.52	916.13	-1586.78	0.11
Dead+Wind 150 deg - No Ice	19.31	9.82	17.01	1503.09	-867.78	0.16
Dead+Wind 180 deg - No Ice	19.31	0.00	19.17	1703.41	0.03	0.17
Dead+Wind 210 deg - No Ice	19.31	-9.82	17.01	1503.09	867.85	0.14
Dead+Wind 240 deg - No Ice	19.31	-18.21	10.52	916.13	1586.85	0.06
Dead+Wind 270 deg - No Ice	19.31	-19.64	0.00	-0.01	1735.67	-0.03
Dead+Wind 300 deg - No Ice	19.31	-16.60	-9.59	-851.72	1475.24	-0.11
Dead+Wind 330 deg - No Ice	19.31	-9.82	-17.01	-1503.12	867.85	-0.16
Dead+Ice+Temp	28.19	0.00	0.00	-0.02	0.08	0.00
Dead+Wind 0 deg+Ice+Temp	28.19	0.00	-5.35	-471.75	0.08	-0.04
Dead+Wind 30 deg+Ice+Temp	28.19	2.52	-4.36	-389.75	-224.93	-0.03
Dead+Wind 60 deg+Ice+Temp	28.19	4.27	-2.47	-221.41	-383.39	-0.02
Dead+Wind 90 deg+Ice+Temp	28.19	5.04	0.00	-0.02	-449.95	0.01
Dead+Wind 120 deg+Ice+Temp	28.19	4.63	2.68	235.85	-408.45	0.03
Dead+Wind 150 deg+Ice+Temp	28.19	2.52	4.36	389.72	-224.93	0.04
Dead+Wind 180 deg+Ice+Temp	28.19	0.00	4.94	442.77	0.08	0.04
Dead+Wind 210 deg+Ice+Temp	28.19	-2.52	4.36	389.72	225.09	0.03
Dead+Wind 240 deg+Ice+Temp	28.19	-4.63	2.68	235.85	408.61	0.02
Dead+Wind 270 deg+Ice+Temp	28.19	-5.04	0.00	-0.02	450.10	-0.01
Dead+Wind 300 deg+Ice+Temp	28.19	-4.27	-2.47	-221.41	383.54	-0.03
Dead+Wind 330 deg+Ice+Temp	28.19	-2.52	-4.36	-389.75	225.09	-0.04
Dead+Wind 0 deg - Service	19.31	0.00	-7.28	-634.03	0.03	-0.06
Dead+Wind 30 deg - Service	19.31	3.40	-5.88	-520.12	-300.25	-0.05
Dead+Wind 60 deg - Service	19.31	5.74	-3.32	-294.72	-510.42	-0.02
Dead+Wind 90 deg - Service	19.31	6.79	0.00	-0.01	-600.53	0.01
Dead+Wind 120 deg - Service	19.31	6.30	3.64	316.99	-549.04	0.04
Dead+Wind 150 deg - Service	19.31	3.40	5.88	520.09	-300.25	0.06
Dead+Wind 180 deg - Service	19.31	0.00	6.63	589.40	0.03	0.06
Dead+Wind 210 deg - Service	19.31	-3.40	5.88	520.09	300.32	0.05
Dead+Wind 240 deg - Service	19.31	-6.30	3.64	316.99	549.10	0.02
Dead+Wind 270 deg - Service	19.31	-6.79	0.00	-0.01	600.60	-0.01
Dead+Wind 300 deg - Service	19.31	-5.74	-3.32	-294.72	510.49	-0.04
Dead+Wind 330 deg - Service	19.31	-3.40	-5.88	-520.12	300.32	-0.06

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-19.31	0.00	0.00	19.31	0.00	0.000%
2	0.00	-19.31	-21.03	0.00	19.31	21.03	0.000%
3	9.82	-19.31	-17.01	-9.82	19.31	17.01	0.000%
4	16.60	-19.31	-9.59	-16.60	19.31	9.59	0.000%
5	19.64	-19.31	0.00	-19.64	19.31	0.00	0.000%
6	18.21	-19.31	10.52	-18.21	19.31	-10.52	0.000%
7	9.82	-19.31	17.01	-9.82	19.31	-17.01	0.000%
8	0.00	-19.31	19.17	0.00	19.31	-19.17	0.000%
9	-9.82	-19.31	17.01	9.82	19.31	-17.01	0.000%
10	-18.21	-19.31	10.52	18.21	19.31	-10.52	0.000%
11	-19.64	-19.31	0.00	19.64	19.31	0.00	0.000%
12	-16.60	-19.31	-9.59	16.60	19.31	9.59	0.000%
13	-9.82	-19.31	-17.01	9.82	19.31	17.01	0.000%
14	0.00	-28.19	0.00	0.00	28.19	0.00	0.000%
15	0.00	-28.19	-5.35	0.00	28.19	5.35	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
16	2.52	-28.19	-4.36	-2.52	28.19	4.36	0.000%
17	4.27	-28.19	-2.47	-4.27	28.19	2.47	0.000%
18	5.04	-28.19	0.00	-5.04	28.19	0.00	0.000%
19	4.63	-28.19	2.68	-4.63	28.19	-2.68	0.000%
20	2.52	-28.19	4.36	-2.52	28.19	-4.36	0.000%
21	0.00	-28.19	4.94	0.00	28.19	-4.94	0.000%
22	-2.52	-28.19	4.36	2.52	28.19	-4.36	0.000%
23	-4.63	-28.19	2.68	4.63	28.19	-2.68	0.000%
24	-5.04	-28.19	0.00	5.04	28.19	0.00	0.000%
25	-4.27	-28.19	-2.47	4.27	28.19	2.47	0.000%
26	-2.52	-28.19	-4.36	2.52	28.19	4.36	0.000%
27	0.00	-19.31	-7.28	0.00	19.31	7.28	0.000%
28	3.40	-19.31	-5.88	-3.40	19.31	5.88	0.000%
29	5.74	-19.31	-3.32	-5.74	19.31	3.32	0.000%
30	6.79	-19.31	0.00	-6.79	19.31	0.00	0.000%
31	6.30	-19.31	3.64	-6.30	19.31	-3.64	0.000%
32	3.40	-19.31	5.88	-3.40	19.31	-5.88	0.000%
33	0.00	-19.31	6.63	0.00	19.31	-6.63	0.000%
34	-3.40	-19.31	5.88	3.40	19.31	-5.88	0.000%
35	-6.30	-19.31	3.64	6.30	19.31	-3.64	0.000%
36	-6.79	-19.31	0.00	6.79	19.31	0.00	0.000%
37	-5.74	-19.31	-3.32	5.74	19.31	3.32	0.000%
38	-3.40	-19.31	-5.88	3.40	19.31	5.88	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	149 - 140	3.51	35	0.27	0.00
T2	140 - 120	2.99	35	0.26	0.00
T3	120 - 100	1.97	35	0.19	0.00
T4	100 - 80	1.27	35	0.13	0.00
T5	80 - 60	0.79	35	0.09	0.00
T6	60 - 40	0.44	35	0.06	0.00
T7	40 - 20	0.21	35	0.04	0.00
T8	20 - 0	0.06	35	0.02	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.00	Lightning Rod 5/8"x2'	35	3.51	0.27	0.00	96936
146.00	Site Pro 1 VFA12-HD 12' Heavy Duty V-Frame	35	3.33	0.27	0.00	96936

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Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	149 - 140	10.13	10	0.78	0.01
T2	140 - 120	8.65	10	0.76	0.01
T3	120 - 100	5.69	10	0.56	0.00
T4	100 - 80	3.68	10	0.38	0.00
T5	80 - 60	2.27	10	0.27	0.00
T6	60 - 40	1.29	10	0.18	0.00
T7	40 - 20	0.60	10	0.12	0.00
T8	20 - 0	0.17	10	0.06	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.00	Lightning Rod 5/8"x2'	10	10.13	0.78	0.01	33675
146.00	Site Pro 1 VFA12-HD 12' Heavy Duty V-Frame	10	9.63	0.77	0.01	33675

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria
T1	149	Leg	A325N	0.7500	6	0.48	19.44	0.025	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2.67	3.04	0.879	1.333	Member Block Shear
T2	140	Top Girt	A325N	0.6250	1	0.12	5.44	0.023	1.333	Member Bearing
		Leg	A325N	0.7500	6	5.15	19.44	0.265	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3.30	3.04	1.089	1.333	Member Block Shear
T3	120	Top Girt	A325N	0.6250	1	0.59	3.04	0.193	1.333	Member Block Shear
		Leg	A325N	1.0000	6	8.13	34.56	0.235	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2.05	6.44	0.318	1.333	Bolt Shear
T4	100	Top Girt	A325N	0.6250	1	0.27	6.44	0.042	1.333	Bolt Shear
		Leg	A325N	1.0000	6	10.28	34.56	0.297	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	1.92	4.55	0.421	1.333	Member Block Shear
T5	80	Leg	A325N	1.0000	6	12.18	34.56	0.352	1.333	Bolt Tension
T6	60	Diagonal	A325N	0.6250	1	2.35	5.10	0.461	1.333	Member Bearing
		Leg	A325N	1.0000	6	14.12	34.56	0.409	1.333	Bolt Tension
T7	40	Diagonal	A325N	0.6250	1	2.69	5.10	0.528	1.333	Member Bearing
		Leg	A325N	1.2500	6	16.03	54.00	0.297	1.333	Bolt Tension
T8	20	Diagonal	A325N	0.7500	1	2.97	6.12	0.485	1.333	Member Bearing
		Diagonal	A325N	0.7500	1	3.79	8.16	0.465	1.333	Member Bearing

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Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	149 - 140	P2.375x0.154	9.00	4.50	68.6 K=1.00	21.195	1.0745	-5.36	22.77	0.235
T2	140 - 120	Pipe 2.375" x 0.218" (2 EH)	20.00	5.00	78.3 K=1.00	19.354	1.4773	-34.87	28.59	1.220
T3	120 - 100	P3.5x0.300	20.03	5.01	52.9 K=1.00	23.894	3.0159	-54.81	72.06	0.761
T4	100 - 80	P4.5x.337	20.03	5.01	40.7 K=1.00	25.733	4.4074	-70.00	113.42	0.617
T5	80 - 60	P5.563x.375	20.03	6.68	43.6 K=1.00	25.320	6.1120	-83.91	154.76	0.542
T6	60 - 40	Pipe 5.563" x 0.500" (5 #120)	20.03	6.68	44.5 K=1.00	25.177	7.9529	-98.74	200.23	0.493
T7	40 - 20	Pipe 5.563" x 0.500" (5 #120)	20.03	6.68	44.5 K=1.00	25.177	7.9529	-113.63	200.23	0.567
T8	20 - 0	P8.625x.322	20.03	9.97	40.7 K=1.00	25.727	8.3993	-126.99	216.09	0.588

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	149 - 140	L2x2x1/8	6.73	3.11	100.4 K=1.07	12.696	0.4844	-2.82	6.15	0.458
T2	140 - 120	L2x2x1/8	7.07	3.28	104.2 K=1.05	12.245	0.4844	-3.35	5.93	0.565
T3	120 - 100	L2x2x1/4	8.40	4.06	124.5 K=1.00	9.636	0.9380	-1.81	9.04	0.201
T4	100 - 80	L2x2x3/16	10.08	4.85	147.6 K=1.00	6.850	0.7150	-1.92	4.90	0.392
T5	80 - 60	L2 1/2x2 1/2x3/16	12.58	6.09	147.7 K=1.00	6.843	0.9020	-2.37	6.17	0.385
T6	60 - 40	L3x3x3/16	14.32	6.96	140.2 K=1.00	7.595	1.0900	-2.71	8.28	0.328
T7	40 - 20	L3x3x3/16	16.11	7.85	158.0 K=1.00	5.979	1.0900	-2.99	6.52	0.459
T8	20 - 0	L3x3x1/4	19.27	9.37	189.9 K=1.00	4.139	1.4400	-3.94	5.96	0.661

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	149 - 140	L2x2x1/8	5.00	4.56	137.7	7.873	0.4844	-0.12	3.81	0.033

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T2	140 - 120	L2x2x1/8	5.00	4.56	K=1.00 137.7	7.873	0.4844	-0.49	3.81	0.128
T3	120 - 100	L2x2x1/4	5.00	4.56	K=1.00 140.0	7.616	0.9380	-0.27	7.14	0.038

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	149 - 140	P2.375x0.154	9.00	4.50	68.6	30.000	1.0745	2.88	32.24	0.089
T2	140 - 120	Pipe 2.375" x 0.218" (2 EH)	20.00	5.00	78.3	30.000	1.4773	30.93	44.32	0.698
T3	120 - 100		20.03	5.01	52.9	30.000	3.0159	48.75	90.48	0.539
T4	100 - 80	P4.5x.337	20.03	5.01	40.7	30.000	4.4074	61.68	132.22	0.466
T5	80 - 60	P5.563x.375	20.03	6.68	43.6	30.000	6.1120	73.08	183.36	0.399
T6	60 - 40	Pipe 5.563" x 0.500" (5 #120)	20.03	6.68	44.5	30.000	7.9529	84.72	238.59	0.355
T7	40 - 20	Pipe 5.563" x 0.500" (5 #120)	20.03	6.68	44.5	30.000	7.9529	96.19	238.59	0.403
T8	20 - 0	P8.625x.322	20.03	0.08	0.3	30.000	8.3993	109.73	251.98	0.435

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	149 - 140	L2x2x1/8	6.73	3.11	61.9	29.000	0.2930	2.67	8.50	0.314
T2	140 - 120	L2x2x1/8	7.07	3.28	65.1	29.000	0.2930	3.30	8.50	0.389
T3	120 - 100	L2x2x1/4	7.62	3.68	74.8	29.000	0.5629	1.88	16.32	0.115
T4	100 - 80	L2x2x3/16	10.08	4.85	96.6	29.000	0.4308	1.92	12.49	0.153
T5	80 - 60	L2 1/2x2 1/2x3/16	12.58	6.09	95.8	29.000	0.5710	2.35	16.56	0.142
T6	60 - 40		14.32	6.96	90.5	29.000	0.7120	2.69	20.65	0.130
T7	40 - 20	L3x3x3/16	16.11	7.85	102.0	29.000	0.6945	2.97	20.14	0.147
T8	20 - 0	L3x3x1/4	19.27	9.37	122.7	29.000	0.9159	3.79	26.56	0.143

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	149 - 140	L2x2x1/8	5.00	4.56	92.0	29.000	0.2930	0.04	8.50	0.004
T2	140 - 120	L2x2x1/8	5.00	4.56	92.0	29.000	0.2930	0.59	8.50	0.069
T3	120 - 100	L2x2x1/4	5.00	4.56	94.6	29.000	0.5629	0.24	16.32	0.015

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
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Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
T1	149 - 140	Leg	P2.375x0.154	1	-5.36	30.36	17.7	Pass
T2	140 - 120	Leg	Pipe 2.375" x 0.218" (2 EH)	19	-34.87	38.11	91.5	Pass
T3	120 - 100	Leg	P3.5x0.300	49	-54.81	96.06	57.1	Pass
T4	100 - 80	Leg	P4.5x.337	79	-70.00	151.19	46.3	Pass
T5	80 - 60	Leg	P5.563x.375	106	-83.91	206.29	40.7	Pass
T6	60 - 40	Leg	Pipe 5.563" x 0.500" (5 #120)	127	-98.74	266.91	37.0	Pass
T7	40 - 20	Leg	Pipe 5.563" x 0.500" (5 #120)	148	-113.63	266.91	42.6	Pass
T8	20 - 0	Leg	P8.625x.322	169	-126.99	288.05	44.1	Pass
T1	149 - 140	Diagonal	L2x2x1/8	11	-2.82	8.20	34.4	Pass
							66.0 (b)	
T2	140 - 120	Diagonal	L2x2x1/8	29	-3.35	7.91	42.4	Pass
							81.7 (b)	
T3	120 - 100	Diagonal	L2x2x1/4	59	-1.81	12.05	15.0	Pass
							23.8 (b)	
T4	100 - 80	Diagonal	L2x2x3/16	86	-1.92	6.53	29.4	Pass
							31.6 (b)	
T5	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	113	-2.37	8.23	28.9	Pass
							34.6 (b)	
T6	60 - 40	Diagonal	L3x3x3/16	134	-2.71	11.04	24.6	Pass
							39.6 (b)	
T7	40 - 20	Diagonal	L3x3x3/16	155	-2.99	8.69	34.5	Pass
							36.4 (b)	
T8	20 - 0	Diagonal	L3x3x1/4	176	-3.94	7.95	49.6	Pass
T1	149 - 140	Top Girt	L2x2x1/8	5	-0.12	5.08	2.5	Pass
T2	140 - 120	Top Girt	L2x2x1/8	24	-0.49	5.08	9.6	Pass
							14.5 (b)	
T3	120 - 100	Top Girt	L2x2x1/4	53	-0.27	9.52	2.8	Pass
							3.2 (b)	
							Summary	
						Leg (T2)	91.5	Pass
						Diagonal (T2)	81.7	Pass
						Top Girt (T2)	14.5	Pass
						Bolt Checks	81.7	Pass
						RATING =	91.5	Pass

Project Information

Project #	129049
Site Name	CNE_GOTHENBURG
Order #	164472ATTNE-S

Tower Information

Tower Type	Self Support
TIA-222 Rev	F
ASIF	1.333

Applied Loads

	Comp.	Uplift
Axial (k)	131.00	109.00
Shear (k)	13.00	11.00

Anchor Rod Data

Quantity:	6
Diameter (in):	1.5
Material Grade:	F1554-105
Grout Considered:	No
l_{ar} (in):	0
Eta Factor, η :	0.5
Thread Type:	N-Included
Configuration:	Symmetrical

Fy=105 ksi Fu=125 ksi

Anchor Rod Results

Axial, P_u (kips)	18.17
Shear, V_u (kips)	-
Moment, M_u (kip-in)	-
Axial Cap., ϕP_n (kips)	97.19
Shear Cap., ϕV_n (kips)	-
Moment Cap., ϕM_n (kip-in)	-
Stress Rating	18.7%

Pass

Drilled Pier Foundation

BU # : 129049
 Site Name: CNE_GOTHENBURG
 Order Number: 164472ATTNE-S

TIA-222 Revision: F
 Tower Type: Self Support

Applied Loads		
	Comp.	Uplift
Moment (kip-ft)	0	0
Axial Force (kips)	131	109
Shear Force (kips)	13	11

Material Properties		
Concrete Strength, f _c :	4	ksi
Rebar Strength, F _y :	60	ksi

Pier Design Data		
Depth	43	ft
Ext. Above Grade	0.5	ft
Pier Section 1		
From 0.5' above grade to 43' below grade		
Pier Diameter	4.5	ft
Rebar Quantity	20	
Rebar Size	7	
Clear Cover to Ties	3	in
Tie Size	4	

Analysis Results		
Soil Lateral Capacity		
	Compression	Uplift
D _{v=0} (ft from TOC)	24.64	24.64
Soil Safety Factor	47.28	55.87
Max Moment (kip-ft)	234.90	198.76
Rating	4.2%	3.6%
Soil Vertical Capacity		
	Compression	Uplift
Skin Friction (kips)	222.66	167.00
End Bearing (kips)	159.04	-
Weight of Concrete (kips)	64.57	51.66
Total Capacity (kips)	381.70	218.66
Axial (kips)	195.57	109.00
Rating	51.2%	49.9%
Reinforced Concrete Capacity		
	Compression	Uplift
Critical Depth (ft from TOC)	24.73	23.71
Critical Moment (kip-ft)	305.36	257.79
Critical Moment Capacity	1509.07	1108.12
Rating	20.2%	23.3%
Soil Interaction Rating		
		51.2%
Structural Foundation Rating		
		23.3%

Check Limitation	
N/A	

Soil Profile									
Groundwater Depth	3.5	ft	# of Layers	5					

Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ _{soil} (pcf)	γ _{concrete} (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3.5	3.5	110	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	3.5	8.5	5	37.6	87.6	0	0	0.000	0.000	0.00	0.00			Cohesionless
3	8.5	13.5	5	57.6	87.6	0	25	0.000	0.000	0.20	0.15			Cohesionless
4	13.5	28.5	15	62.6	87.6	0	29	0.000	0.000	0.68	0.51			Cohesionless
5	28.5	43	14.5	77.6	87.6	0	42	0.000	0.000	1.40	1.05	20		Cohesionless