8/25/2016

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Notice of Exempt Modification
181 Garden Circle, Waterbury, CT 06704
N 41* 34' 10.97"
W 72* 01' 01.57"

Dear Ms. Bachman:

T-Mobile currently maintains 6 antennas at the 182-foot level of the existing 279-foot monopole at 181 Garden Circle, Waterbury, CT 06704. The tower/property is owned by SBA Properties, LLC. T-Mobile now intends to add 3 new antennas for a total of 9 antennas. These antennas would be installed at the 182-foot level of the tower. The Structural Analysis is passing with tower components at 99.3% and a foundation usage at 78.6%

This facility was approved by the City of Waterbury however they have no record of the original zoning dockets number. The City of Waterbury Land Use Inspector Margaret Brown confirmed this on 8/25/2016.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies ~ 16- 50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. ~ 16-50j- 72(b)(2). In accordance with R.C.S.A. g 16-50j-73, a copy of this letter is being sent to City of Waterbury Mayor Neil M. O'Leary, as well as the tower/property owner SBA.

The planned modifications to the facility fall squarely within those activities explicitly provided fox its R.C.S:A. ~ 16-50j-72(b)(2}.

1. The proposed modifications will not result in an increase in the height of the existing structure.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels ox more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard,

5. The proposed modifications wall not cause a change or alteration in the physical ox environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. ~ 16-SOj-72(b}(2).

Sincerely,

Gregg Shappy
10 Industrial Ave.
Suite 3
Mahwah, NJ 07430
(845) 553-2045
gshappy@transcendwireless.com

Attachments
cc: City of Waterbury, Mayor Neil M. O'Leary
SBA Properties, LLC

FDH VELOCITEL
ENGINEERING INNOVATION

Structural Analysis for
SBA Network Services, Inc.

279.0' Guyed Tower (280.0' AGL)

SBA Site Name: Waterbury 2, CT
SBA Site ID: CT04877-A-23
T-Mobile Site ID: CT11392B
Site Address: 207 Garden Circle, Waterbury, CT 06704-2844

FDH Velocitel Project Number 16FAZL1400

Analysis Results

Tower Components	99.3%	Sufficient
Foundation	78.6%	Sufficient

Prepared By:

Matthew Layden, EI
Project Engineer I

Reviewed By:

Dennis D. Abel, PE
Director of Structural Engineering
CT License No. 23247

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive
Raleigh, NC, 27616
(919) 755-1012

STATE OF CONNECTICUT DENNIS D. ABEL No. 23247 LICENSED PROFESSIONAL ENGINEER
08-03-2016

August 03, 2016

Prepared pursuant to the ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas and the 2005 Connecticut State Building Code with 2009 Amendments

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EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Velocitel performed a structural analysis of the existing Guyed Tower located in Waterbury, CT to determine whether the tower is structurally adequate to support the antenna configuration in place per **Table 1** pursuant to the *ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas and the 2005 Connecticut State Building Code with 2009 Amendments*. Information pertaining to the antenna loading, current tower geometry, member sizes, and below grade parameters was obtained from:

Source	Document Type	Reference	Date
Stainless, Inc.	Tower & Foundation Drawings	Report No. 3329	May 2, 1987
Paul J. Ford and Co.	Modification Drawings	Job No. A00-T155	July 20, 2001
FDH Engineering, Inc.	Modification Drawings	Project No. 11-02333E S1	March 30, 2011
FDH Engineering, Inc.	Modification Inspection	Project No. 11-02333E S1	April 14, 2011
FDH Engineering, Inc.	Geotechnical Report	Project No. 12-09101EG1	October 23, 2012
FDH Engineering, Inc.	Modification Drawings	Project No. 12-09101E S3	March 21, 2013
FDH Engineering, Inc.	Modification Inspection	Project No. 1301631700	July 22, 2013
FDH Engineering, Inc.	TIA Inspection	Project No. 1301631700	July 22, 2013
FDH Velocitel	Modification Drawings	Project No. 16FAZL1400	August 03, 2016
SBA Network Services, Inc.	-	-	-

The analysis has been performed in accordance with the *TIA-222-G*, as allowed by *Sections 104.10* and *104.11* of the *2005 CT State Building Code with 2009 Amendments*, based upon a wind speed of 95 mph 3-second gust, exposure category B with Topographic Category 1 and Spectral Response Accelerations of S_S=0.249 and S_1=0.064.

Note: Per *Section 2.7.3* of the *ANSI/TIA-222-G* Standard, the seismic/earthquake loading effects can be ignored if the spectral response acceleration at short periods (S_S) is less than or equal to 1.00. The tower's location mandates a design S_S of less than 1.00, thus seismic loading was not considered as part of the analysis of this structure.

Conclusions

With the antenna configuration in place per **Table 1** we have determined the tower stress level to be sufficient and the foundations to be sufficient pursuant to the requirements stipulated by *ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas and the 2005 Connecticut State Building Code with 2009 Amendments* provided the **Recommendations** listed below are satisfied. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Velocitel is accurate (i.e., the structure member information, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the current analysis standards are met with the antenna configuration in place per **Table 1**, we have the following recommendations:

1. Feed lines must be installed as shown in **Figure 1** in the **Appendix**.
2. Modifications outlined in FDH Velocitel (Project No. 16FAZL4400) Modification Drawings for a 279' (280' A.G.L.) Guyed Tower dated August 03, 2016 must be installed as specified for this analysis to be valid.

APPURTENANCE LISTING

The antennas and equipment, with their corresponding feed lines, considered for this analysis are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Velocitel should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft.)	Description	Feed Lines	Carrier	Mount Elevation (ft.)	Mount Type
--	--	--	--	285[1]	(1) 1.5' Standoff[1]
--	--	--	--	284[1]	(1) 3.6' Pipe Mount[1]
--	--	--	--	283[1]	(1) 5' Pipe Mount[1]
--	--	--	--	280.5	(1) 8' Platform w/ Handrail
268.5	(1) Dielectric DCRT4	(1) 7/8"	Full Power Radio	268.5	Direct
257	(2) Celwave TDE6082A	(2) 7/8"	Campion Ambulance Service	250	(1) 4.7' Standoff
182	(3) Commscope LNX-6515DS (3) EMS APX16PV-16PVL (3) Ericsson Double TMA 17/21 (3) Ericsson KRY 112 144/1 (3) Kathrein 782 11056	(18) 1-5/8" (1) 1-5/8" Fiber	T-Mobile	181.5	(3) 8' T-Frames
135	(1) Andrew VHLP800-11-6GR	(1) 3/8"	North East Utilities	135	Direct Mount
132	(1) Telewave ANT150F2	(1) 7/8"		129	(1) 2' Standoff [Commscope S-200]
130	(1) RFS MA0528-28AN	(1) 3/8"		130	Direct Mount
127.5	(1) Telewave ANT150F2	(1) 7/8"		125	(1) 2' Standoff [Commscope S-200]
98	(1) RFS SP4-107BC1C1R	(1) EW65		97.5	(1) 4' Pipe Mount
97.6	(1) Decibel DB586-Y	(2) 7/8" (1) 1/2" (1) EW65		96.5	(1) 4' Standoff [Commscope S-400]
97.5	(1) Bird 422 series				
96	(1) RFS PAL8-65A				
92.5	(1) Decibel DB586-Y				
93	(1) RFS PAD6-107A	(1) EW65		93	(1) 4' Pipe Mount

1. Empty 1.5' Standoff, 3.6' Pipe Mount and (1) 4' x 2.4" ø with 5' Pipe mount are mounted on the 8' Platform w/ Handrails at 280.5'

Proposed Carrier Final Loading:

Antenna Elevation (ft.)	Description	Feed Lines	Carrier	Mount Elevation (ft.)	Mount Type
182	(3) Ericsson AIR 32 (3) Commscope LNX-6515DS (3) RFS APX16PV-16PVL (3) Ericsson Double TMA 17/21 (3) Ericsson KRY 112 144-1 (3) Ericsson RRUS 11 (Band 12) (3) Kathrein 782 11056	(18) 1-5/8" (2) 1-5/8" Fiber	T-Mobile	181.5	(3) 8' T-Frames

RESULTS

The following material grades for individual members were used for analysis:

Table 2 - Material Grade

Member Type	Material Grade
Legs	A36 (Assumed)
Bracing	A36 (Assumed) & A572-50

Table 3 and **Table 4** display the summary of capacities for the analyzed structure and its additional components. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. **Table 5** displays the maximum dish rotations at service winds speeds.

If the assumptions outlined in this report differ from actual field conditions, FDH Velocitel should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information.

Table 3 - Structure Member Capacities

Section No.	Elevation (ft.)	Component Type	Size	% Capacity	Pass / Fail
T1	280 - 260	Leg	2 1/4	18.7	Pass
T2	260 - 245	Leg	2 1/4	33.8 36.6 (b)	Pass
T3	245 - 240	Leg	2 1/4	34.2	Pass
T4	240 - 225	Leg	2 1/4	39.8	Pass
T5	225 - 185	Leg	2 1/4	43.8	Pass
T6	185 - 175	Leg	2 1/4	45.2	Pass
T7	175 - 155	Leg	2 1/2	46.7	Pass
T8	155 - 140	Leg	2 1/2	48.4	Pass
T9	140 - 125	Leg	2 1/2	48.1	Pass
T10	125 - 100	Leg	2 1/2	53.6	Pass
T11	100 - 75	Leg	2 1/2	54.7	Pass
T12	75 - 50	Leg	2 1/2	62.7	Pass
T13	50 - 45	Leg	2 1/2	64.5	Pass
T14	45 - 40	Leg	2 1/2	64.8	Pass
T15	40 - 35	Leg	2 1/2	66.0	Pass
T16	35 - 30	Leg	2 1/2	65.8	Pass
T17	30 - 25	Leg	2 1/2	66.6	Pass
T18	25 - 20	Leg	2 1/2	65.9	Pass
T19	20 - 15	Leg	2 1/2	66.3	Pass
T20	15 - 10	Leg	2 1/2	65.4	Pass
T21	10 - 5	Leg	2 1/2	65.3	Pass
T22	5 - 1	Leg	2 1/2	53.7	Pass
T1	280 - 260	Diagonal	2L2x2x3/16x3/8	16.6 25.2 (b)	Pass
T2	260 - 245	Diagonal	2L2x2x3/16x3/8	20.3 34.6 (b)	Pass
T3	245 - 240	Diagonal	2L2x2x3/16x3/8	16.6 29.4 (b)	Pass
T4	240 - 225	Diagonal	L2 1/2x2 1/2x3/16	41.7	Pass
T5	225 - 185	Diagonal	P1.5x0.120 (1.5 OD)	53.5	Pass
T6	185 - 175	Diagonal	L2 1/2x2 1/2x3/16	59.3	Pass
T7	175 - 155	Diagonal	2L2x2x3/16x3/8	34.5 47.7 (b)	Pass

Section No.	Elevation (ft.)	Component Type	Size	% Capacity	Pass / Fail
T8	155 - 140	Diagonal	2L2x2x3/16x3/8	33.6 51.8 (b)	Pass
T9	140 - 125	Diagonal	2L2x2x3/16x3/8	28.8 35.7 (b)	Pass
T10	125 - 100	Diagonal	P1.5x0.120 (1.5 OD)	71.6	Pass
T11	100 - 75	Diagonal	2L2x2x3/16x3/8	44.5 67.8 (b)	Pass
T12	75 - 50	Diagonal	2L2x2x3/16x3/8	35.5 48.4 (b)	Pass
T13	50 - 45	Diagonal	P1.5x0.120 (1.5 OD)	78.4	Pass
T14	45 - 40	Diagonal	L2x2x1/4	84.0	Pass
T15	40 - 35	Diagonal	P1.5x0.120 (1.5 OD)	62.7	Pass
T16	35 - 30	Diagonal	L2x2x1/4	82.6	Pass
T17	30 - 25	Diagonal	P1.5x0.120 (1.5 OD)	71.2	Pass
T18	25 - 20	Diagonal	L2x2x1/4	95.7	Pass
T19	20 - 15	Diagonal	P1.5x0.120 (1.5 OD)	88.1	Pass
T20	15 - 10	Diagonal	L2x2x3/8	74.3	Pass
T21	10 - 5	Diagonal	L2x2x3/8	59.1	Pass
T22	5 - 1	Diagonal	P1.5x0.120 (1.5 OD)	99.3	Pass
T1	280 - 260	Horizontal	P1.5x.120	4.1	Pass
T2	260 - 245	Horizontal	P1.5x.120	9.7 10.1 (b)	Pass
T4	240 - 225	Horizontal	P1.5x.120	4.6	Pass
T5	225 - 185	Horizontal	P1.5x.120	5.0	Pass
T6	185 - 175	Horizontal	P1.5x.120	7.0 7.1 (b)	Pass
T7	175 - 155	Horizontal	P1.5x.120	7.4	Pass
T8	155 - 140	Horizontal	P1.5x.120	7.7	Pass
T9	140 - 125	Horizontal	P1.5x.120	7.7	Pass
T10	125 - 100	Horizontal	P1.5x.120	8.5	Pass
T11	100 - 75	Horizontal	P1.5x.120	17.5 23.7 (b)	Pass
T12	75 - 50	Horizontal	P1.5x.120	9.9	Pass
T13	50 - 45	Horizontal	P1.5x.120	14.3	Pass
T18	25 - 20	Horizontal	P1.5x.120	14.8	Pass
T19	20 - 15	Horizontal	P1.5x.120	14.7	Pass
T20	15 - 10	Horizontal	P1.5x.120	14.7	Pass
T21	10 - 5	Horizontal	P1.5x.120	14.5	Pass
T22	5 - 1	Horizontal	P1.5x.120	14.5	Pass
T1	280 - 260	Top Girt	P1.5x0.120 (1.5 OD)	6.6	Pass
T14	45 - 40	Top Girt	P1.5x.120	2.5 4.3 (b)	Pass
T15	40 - 35	Top Girt	P1.5x.120	2.5 4.2 (b)	Pass
T16	35 - 30	Top Girt	P1.5x.120	2.5 4.2 (b)	Pass
T17	30 - 25	Top Girt	P1.5x.120	2.4 4.0 (b)	Pass
T22	5 - 1	Bottom Girt	2C6x8.2	0.9	Pass
T2	260 - 245	Guy A@250	3/4	40.7	Pass
T8	155 - 140	Guy A@155	7/8	48.1	Pass
T12	75 - 50	Guy A@75	9/16	65.1	Pass
T2	260 - 245	Guy B@250	3/4	41.0	Pass
T8	155 - 140	Guy B@155	7/8	48.1	Pass
T12	75 - 50	Guy B@75	9/16	64.2	Pass
T2	260 - 245	Guy C@250	3/4	41.5	Pass
T8	155 - 140	Guy C@155	7/8	48.2	Pass
T12	75 - 50	Guy C@75	9/16	64.7	Pass
T2	260 - 245	Top Guy Pull-Off@250	2L2x2x3/16x3/8	30.3	Pass

Section No.	Elevation (ft.)	Component Type	Size	% Capacity	Pass / Fail
				31.8 (b)	
T8	155 - 140	Top Guy Pull-Off@155	2L2x2x3/16x3/8	23.5 64.5 (b)	Pass
T12	75 - 50	Top Guy Pull-Off@75	2L2x2x3/16x3/8	18.6 50.9 (b)	Pass
T3	245 - 240	Bottom Guy Pull-Off@250	2L2x2x3/16x3/8	14.0	Pass
T2	260 - 245	Torque Arm Top@250	2L3x3x1/4x3/8	17.4	Pass
T2	260 - 245	Torque Arm Bottom@250	2L2 1/2x2x3/16x3/8	70.5	Pass

Table 4 – Additional Structure Component Capacities

Elevation (ft.)	Component	% Capacity	Pass / Fail	Notes
0	Base Foundation (Soil Interaction)	32.3	Pass	-
0	Base Foundation (Structural)	22.8	Pass	-
0	Guy Foundation (Soil Interaction)	78.6	Pass	-
0	Guy Foundation (Structural)	45.0	Pass	-

Table 5 - Maximum Dish Rotations at Service Wind Speeds

Centerline Elevation (ft.)	Dish	Tilt (deg)*	Twist (deg)*
135	(1) Andrew VHLP800-11-6GR Dish	0.0142	0.3515
98	(1) RFS SP4-107BC1C1R	0.0429	0.4496
96	(1) RFS PAL8-65A	0.0441	0.4435
93	(1) RFS PAD6-107A	0.0457	0.4293

*Allowable tilt and twist to be reviewed by the carrier.

Pre-Modification Installation

FDH Velocitel has considered the acceptability of the tower stress level with the existing and proposed loading prior to the installation of the proposed tower modifications referenced in this report. This opinion is consistent with section 4.5 of TIA-1019-A-2012, *Structural Standards for Installation, Alteration and Maintenance of Antenna Supporting Structures and Antennas*, using a non-operational, 3-second gust, basic design wind speed of 76 mph. This reduced loading is based upon the reduced statistical risk of a wind speed of that magnitude occurring for durations of up to 6 months.

FDH Velocitel has reviewed the tower and foundation per *ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas* with the loading listed in this structural analysis report and the specified wind speed with applicable reduction based on duration and has determined that the proposed loading may be installed on the tower prior to the installation of the proposed structural modifications. The proposed modifications must be installed within 6 months of the date of this report. It is the proposed Carrier's responsibility to have appropriate plans in place to install the full structural modifications before the onset of a forecasted wind event or hurricane. FDH Velocitel will not be liable or responsible for damage to the tower or any existing carrier's equipment.

GENERAL COMMENTS

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Velocitel should be notified immediately to perform a revised analysis.

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Velocitel.

APPENDIX

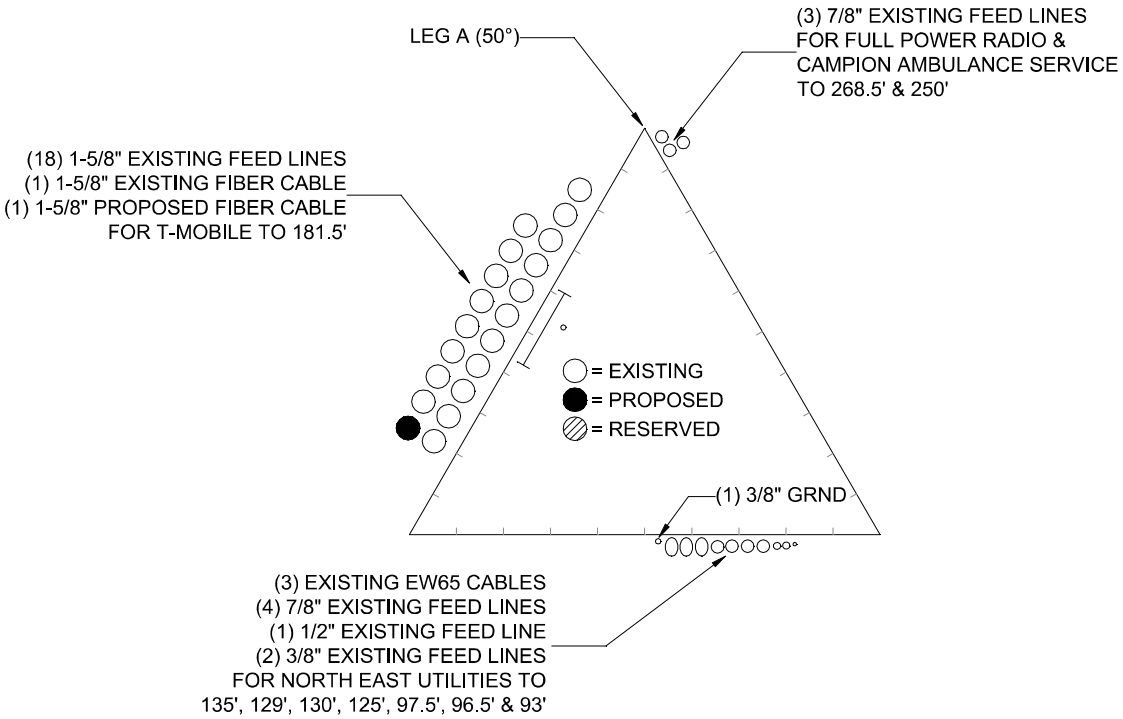
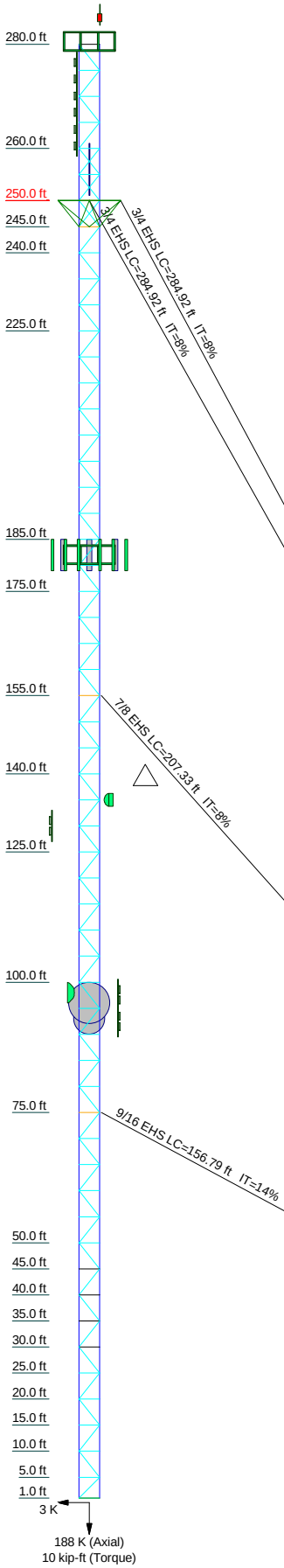
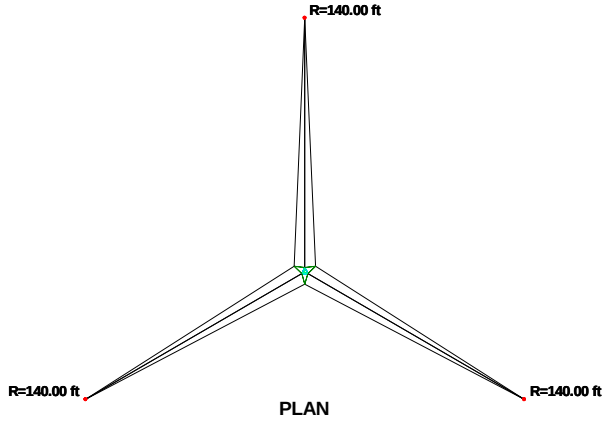


Figure 1 – Feed Line Layout

Section		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21	T22
Legs		SR 2 1/4										SR 2 1/2											
Leg Grade		A36																					
Diagonals	B				A	P1.5x0.120 (1.5 OD)																D	B
							A	2L2x2x3/16x3/8															
Diagonal Grade	A36																					E	A36
								A36															
Top Girts		N.A.																					
Bottom Girts		B																					F
Horizontals		N.A.							N.A.														
									P1.5x.120														
Top Guy Pull-Offs				N.A.					G														
								N.A.					2L2x2x3/16x3/8										
Bot Guy Pull-Offs				G																			
					N.A.						N.A.												
Face Width (ft)												4											
# Panels @ (ft)												55 @ 5											H
Weight (K)	19.3	1.3	1.9	0.4	0.8	2.1	0.6	1.5	1.1	1.1	1.5	1.8	1.9	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(1) 1.5' Standoff	285	Double TMA 17/21	182
3.6' x 2.4" Pipe Mount	284	KRY 112 114-1 Double TMA	182
Lightning Rod	283.7	KRY 112 114-1 Double TMA	182
Beacon	283.7	KRY 112 114-1 Double TMA	182
5'x2.4" Pipe Mount	283	782 11056	182
8' Platform w/handrail	280.5	782 11056	182
DCRT-4	268.5	782 11056	182
TDE6082A	250	(3) 8' T-Frames	182
(1) 4.7' Standoff	250	Andrew VHLP800-11-6GR Dish	135
AIR 32	182	MA0528-28AN	130
AIR 32	182	2' Standoff (Commscope S-200)	129
AIR 32	182	ANT150F2	129
RRUS 11 (Band 12) (55 lb)	182	ANT150F2	125
RRUS 11 (Band 12) (55 lb)	182	2' Standoff (Commscope S-200)	125
RRUS 11 (Band 12) (55 lb)	182	4' Pipe Mount	97.5
LNX-6515DS	182	SP4-107BC1C1R	97.5
LNX-6515DS	182	4' Standoff (Commscope S-400)	96.5
LNX-6515DS	182	Bird 422 Series	96.5
APX16PV-16PVL	182	DB586-Y	96.5
APX16PV-16PVL	182	DB586-Y	96.5
APX16PV-16PVL	182	PAL8-65A	96.5
Double TMA 17/21	182	4' Pipe Mount	93
Double TMA 17/21	182	PAD6-107A	93

SYMBOL LIST

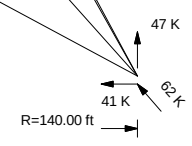
MARK	SIZE	MARK	SIZE
A	L2 1/2x2 1/2x3/16	E	A570-50
B	P1.5x0.120 (1.5 OD)	F	2C6x8.2
C	L2x2x1/4	G	2L2x2x3/16x3/8
D	L2x2x3/8	H	1 @ 4

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi	A570-50	50 ksi	65 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 95 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. Guy wire pull offs are assumed to be adequate to support the existing and proposed loading.
9. TOWER RATING: 99.3%



ALL REACTIONS ARE FACTORED

FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031

Tower Analysis

Job: Waterbury 2, CT04877-A-23			
Project: 16FAZL1400			
Client: SBA Network Services, Inc.	Drawn by: MLayden	App'd:	
Code: TIA-222-G	Date: 08/03/16	Scale: NTS	
Path:		Dwg No. E-1	

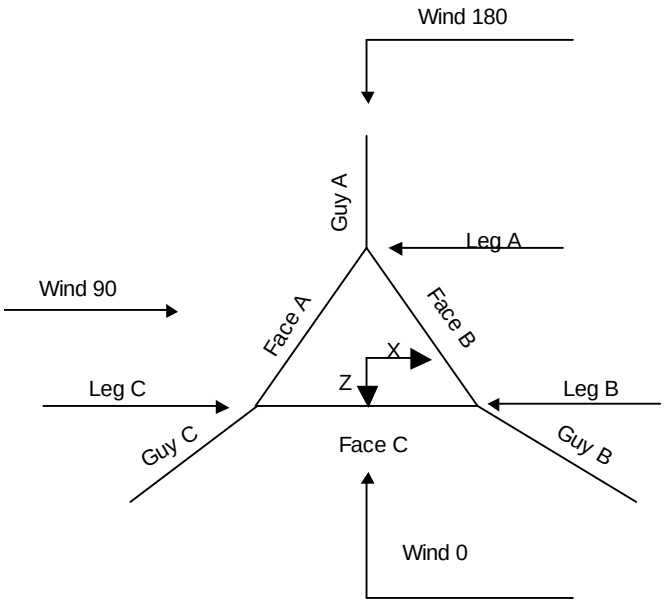
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 280.00 ft above the ground line.
The base of the tower is set at an elevation of 1.00 ft above the ground line.
The face width of the tower is 4.00 ft at the top and 4.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

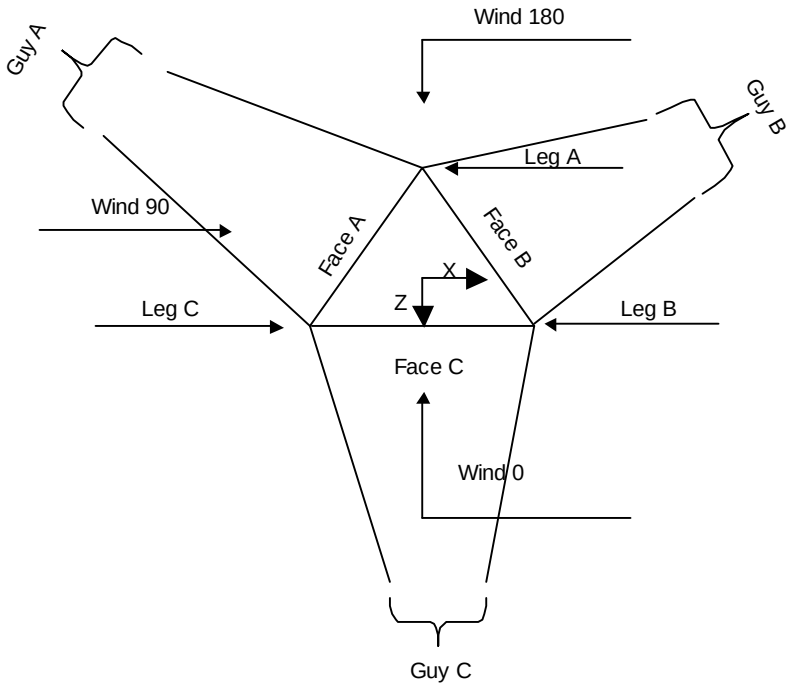
Tower is located in New Haven County, Connecticut.
Basic wind speed of 95 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Guy wire pull offs are assumed to be adeuate to support the existing and proposed loading..
Pressures are calculated at each section.
Safety factor used in guy design is 1.
Stress ratio used in tower member design is 1.
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				



Corner & Starmount Guyed Tower



Face Guyed

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	280.00-260.00			4.00	1	20.00
T2	260.00-245.00			4.00	1	15.00
T3	245.00-240.00			4.00	1	5.00
T4	240.00-225.00			4.00	1	15.00
T5	225.00-185.00			4.00	1	40.00
T6	185.00-175.00			4.00	1	10.00
T7	175.00-155.00			4.00	1	20.00
T8	155.00-140.00			4.00	1	15.00
T9	140.00-125.00			4.00	1	15.00
T10	125.00-100.00			4.00	1	25.00
T11	100.00-75.00			4.00	1	25.00
T12	75.00-50.00			4.00	1	25.00
T13	50.00-45.00			4.00	1	5.00
T14	45.00-40.00			4.00	1	5.00
T15	40.00-35.00			4.00	1	5.00
T16	35.00-30.00			4.00	1	5.00

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T17	30.00-25.00			4.00	1	5.00
T18	25.00-20.00			4.00	1	5.00
T19	20.00-15.00			4.00	1	5.00
T20	15.00-10.00			4.00	1	5.00
T21	10.00-5.00			4.00	1	5.00
T22	5.00-1.00			4.00	1	4.00

Tower Section Geometry *(cont'd)*

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
T1	280.00-260.00	5.00	K Brace Left	No	Yes	0.0000	0.0000
T2	260.00-245.00	5.00	X Brace	No	Yes	0.0000	0.0000
T3	245.00-240.00	5.00	K Brace Left	No	Yes	0.0000	0.0000
T4	240.00-225.00	5.00	K Brace Right	No	Yes	0.0000	0.0000
T5	225.00-185.00	5.00	K Brace Right	No	Yes	0.0000	0.0000
T6	185.00-175.00	5.00	K Brace Right	No	Yes	0.0000	0.0000
T7	175.00-155.00	5.00	K Brace Right	No	Yes	0.0000	0.0000
T8	155.00-140.00	5.00	K Brace Left	No	Yes	0.0000	0.0000
T9	140.00-125.00	5.00	K Brace Right	No	Yes	0.0000	0.0000
T10	125.00-100.00	5.00	K Brace Left	No	Yes	0.0000	0.0000
T11	100.00-75.00	5.00	K Brace Right	No	Yes	0.0000	0.0000
T12	75.00-50.00	5.00	K Brace Left	No	Yes	0.0000	0.0000
T13	50.00-45.00	5.00	Diag Down	No	Yes	0.0000	0.0000
T14	45.00-40.00	5.00	Diag Up	No	Yes	0.0000	0.0000
T15	40.00-35.00	5.00	Diag Down	No	Yes	0.0000	0.0000
T16	35.00-30.00	5.00	Diag Up	No	Yes	0.0000	0.0000
T17	30.00-25.00	5.00	Diag Down	No	Yes	0.0000	0.0000
T18	25.00-20.00	5.00	Diag Up	No	Yes	0.0000	0.0000
T19	20.00-15.00	5.00	Diag Down	No	Yes	0.0000	0.0000
T20	15.00-10.00	5.00	Diag Up	No	Yes	0.0000	0.0000
T21	10.00-5.00	5.00	Diag Down	No	Yes	0.0000	0.0000
T22	5.00-1.00	4.00	Diag Up	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 280.00-260.00	Solid Round	2 1/4	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8	A36 (36 ksi)
T2 260.00-245.00	Solid Round	2 1/4	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8	A36 (36 ksi)
T3 245.00-240.00	Solid Round	2 1/4	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8	A36 (36 ksi)
T4 240.00-225.00	Solid Round	2 1/4	A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 225.00-185.00	Solid Round	2 1/4	A36 (36 ksi)	Pipe	P1.5x0.120 (1.5 OD)	A36 (36 ksi)
T6 185.00-175.00	Solid Round	2 1/4	A36	Single Angle	L2 1/2x2 1/2x3/16	A36

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
			(36 ksi)			(36 ksi)
T7 175.00-155.00	Solid Round	2 1/2	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8	A36 (36 ksi)
T8 155.00-140.00	Solid Round	2 1/2	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8	A36 (36 ksi)
T9 140.00-125.00	Solid Round	2 1/2	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8	A36 (36 ksi)
T10 125.00-100.00	Solid Round	2 1/2	A36 (36 ksi)	Pipe	P1.5x0.120 (1.5 OD)	A36 (36 ksi)
T11 100.00-75.00	Solid Round	2 1/2	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8	A36 (36 ksi)
T12 75.00-50.00	Solid Round	2 1/2	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8	A36 (36 ksi)
T13 50.00-45.00	Solid Round	2 1/2	A36 (36 ksi)	Pipe	P1.5x0.120 (1.5 OD)	A36 (36 ksi)
T14 45.00-40.00	Solid Round	2 1/2	A36 (36 ksi)	Equal Angle	L2x2x1/4	A570-50 (50 ksi)
T15 40.00-35.00	Solid Round	2 1/2	A36 (36 ksi)	Pipe	P1.5x0.120 (1.5 OD)	A36 (36 ksi)
T16 35.00-30.00	Solid Round	2 1/2	A36 (36 ksi)	Equal Angle	L2x2x1/4	A570-50 (50 ksi)
T17 30.00-25.00	Solid Round	2 1/2	A36 (36 ksi)	Pipe	P1.5x0.120 (1.5 OD)	A36 (36 ksi)
T18 25.00-20.00	Solid Round	2 1/2	A36 (36 ksi)	Equal Angle	L2x2x1/4	A570-50 (50 ksi)
T19 20.00-15.00	Solid Round	2 1/2	A36 (36 ksi)	Pipe	P1.5x0.120 (1.5 OD)	A36 (36 ksi)
T20 15.00-10.00	Solid Round	2 1/2	A36 (36 ksi)	Equal Angle	L2x2x3/8	A570-50 (50 ksi)
T21 10.00-5.00	Solid Round	2 1/2	A36 (36 ksi)	Equal Angle	L2x2x3/8	A36 (36 ksi)
T22 5.00-1.00	Solid Round	2 1/2	A36 (36 ksi)	Pipe	P1.5x0.120 (1.5 OD)	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 280.00-260.00	Pipe	P1.5x0.120 (1.5 OD)	A36 (36 ksi)	Pipe		A36 (36 ksi)
T14 45.00-40.00	Pipe	P1.5x.120	A36 (36 ksi)	Pipe		A36 (36 ksi)
T15 40.00-35.00	Pipe	P1.5x.120	A36 (36 ksi)	Pipe		A36 (36 ksi)
T16 35.00-30.00	Pipe	P1.5x.120	A36 (36 ksi)	Pipe		A36 (36 ksi)
T17 30.00-25.00	Pipe	P1.5x.120	A36 (36 ksi)	Pipe		A36 (36 ksi)
T22 5.00-1.00	Pipe		A36 (36 ksi)	Double Channel	2C6x8.2	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 280.00-260.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T2 260.00-245.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T3 245.00-240.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T4 240.00-225.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T5 225.00-185.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T6 185.00-175.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T7 175.00-155.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T8 155.00-140.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T9 140.00-125.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T10 125.00-100.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T11 100.00-75.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T12 75.00-50.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T13 50.00-45.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T14 45.00-40.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T15 40.00-35.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T16 35.00-30.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T17 30.00-25.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T18 25.00-20.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T19 20.00-15.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T20 15.00-10.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T21 10.00-5.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	A36 (36 ksi)
T22 5.00-1.00	None	Flat Bar		A36 (36 ksi)	Pipe	P1.5x.120	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

Tower Elevation ft	Gusset Area (per face) ft²	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
T1 280.00-260.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 260.00-245.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 245.00-240.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 240.00-225.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 225.00-185.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 185.00-175.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 175.00-155.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 155.00-140.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 140.00-125.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T10 125.00-100.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T11 100.00-75.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T12 75.00-50.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T13 50.00-45.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T14 45.00-40.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T15 40.00-35.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T16 35.00-30.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T17 30.00-25.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T18 25.00-20.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T19 20.00-15.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T20 15.00-10.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T21 10.00-5.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T22 5.00-1.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 280.00-260.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T2	Yes	Yes	1	1	1	1	1	1	1	1
260.00-245.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
245.00-240.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
240.00-225.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
225.00-185.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
185.00-175.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
175.00-155.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
155.00-140.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
140.00-125.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
125.00-100.00				1	1	1	1	1	1	1
T11	Yes	Yes	1	1	1	1	1	1	1	1
100.00-75.00				1	1	1	1	1	1	1
T12	Yes	Yes	1	1	1	1	1	1	1	1
75.00-50.00				1	1	1	1	1	1	1
T13	Yes	Yes	1	1	1	1	1	1	1	1
50.00-45.00				1	1	1	1	1	1	1
T14	Yes	Yes	1	1	1	1	1	1	1	1
45.00-40.00				1	1	1	1	1	1	1
T15	Yes	Yes	1	1	1	1	1	1	1	1
40.00-35.00				1	1	1	1	1	1	1
T16	Yes	Yes	1	1	1	1	1	1	1	1
35.00-30.00				1	1	1	1	1	1	1
T17	Yes	Yes	1	1	1	1	1	1	1	1
30.00-25.00				1	1	1	1	1	1	1
T18	Yes	Yes	1	1	1	1	1	1	1	1
25.00-20.00				1	1	1	1	1	1	1
T19	Yes	Yes	1	1	1	1	1	1	1	1
20.00-15.00				1	1	1	1	1	1	1
T20	Yes	Yes	1	1	1	1	1	1	1	1
15.00-10.00				1	1	1	1	1	1	1
T21	Yes	Yes	1	1	1	1	1	1	1	1
10.00-5.00				1	1	1	1	1	1	1
T22 5.00-1.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

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
T1 280.00-260.00	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
T2 260.00-245.00	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 245.00-240.00	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 240.00-225.00	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 225.00-185.00	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 185.00-175.00	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 175.00-155.00	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 155.00-140.00	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
T9 140.00-125.00	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
T10 125.00-100.00	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
T11 100.00-75.00	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
T12 75.00-50.00	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
T13 50.00-45.00	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
T14 45.00-40.00	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
T15 40.00-35.00	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
T16 35.00-30.00	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
T17 30.00-25.00	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
T18 25.00-20.00	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
T19 20.00-15.00	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
T20 15.00-10.00	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
T21 10.00-5.00	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
T22 5.00-1.00	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 280.00-260.00	Flange	0.5000 A325N	3	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1	0.6250 A325N	0

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T2	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
260.00-245.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
245.00-240.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
240.00-225.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
225.00-185.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
185.00-175.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
175.00-155.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T8	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
155.00-140.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T9	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
140.00-125.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T10	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
125.00-100.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T11	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
100.00-75.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T12	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
75.00-50.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T13	Flange	0.5000	0	0.6250	1	0.6250	0	0.0000	0	0.6250	0	0.6250	1	0.6250	0
50.00-45.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T14	Flange	0.5000	0	0.6250	1	0.6250	1	0.0000	0	0.6250	0	0.6250	1	0.6250	0
45.00-40.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T15	Flange	0.5000	0	0.6250	1	0.6250	1	0.0000	0	0.6250	0	0.6250	1	0.6250	0
40.00-35.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T16	Flange	0.5000	0	0.6250	1	0.6250	1	0.0000	0	0.6250	0	0.6250	1	0.6250	0
35.00-30.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T17	Flange	0.5000	3	0.6250	1	0.6250	1	0.6250	0	0.6250	0	0.6250	1	0.6250	0
30.00-25.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T18	Flange	0.5000	0	0.6250	1	0.6250	0	0.0000	0	0.6250	0	0.6250	1	0.6250	0
25.00-20.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T19	Flange	0.5000	0	0.6250	1	0.6250	0	0.0000	0	0.6250	0	0.6250	1	0.6250	0
20.00-15.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T20	Flange	0.5000	0	0.6250	1	0.6250	0	0.0000	0	0.6250	0	0.6250	1	0.6250	0
15.00-10.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T21 10.00-5.00	Flange	0.5000	0	0.6250	1	0.6250	0	0.0000	0	0.6250	0	0.6250	1	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T22 5.00-1.00	Flange	0.5000	3	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension K	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
250	EHS	A	3/4	4.66	8%	19000	1.155	284.72	140.00	0.0000	0.00	100%
		B	3/4	4.66	8%	19000	1.155	284.72	140.00	0.0000	0.00	100%
		C	3/4	4.66	8%	19000	1.155	284.72	140.00	0.0000	0.00	100%

155	EHS	A	7/8	6.38	8%	19000	1.581	207.18	140.00	0.0000	0.00	100%
		B	7/8	6.38	8%	19000	1.581	207.18	140.00	0.0000	0.00	100%
		C	7/8	6.38	8%	19000	1.581	207.18	140.00	0.0000	0.00	100%
75	EHS	A	9/16	4.90	14%	21000	0.671	156.61	140.00	0.0000	0.00	100%
		B	9/16	4.90	14%	21000	0.671	156.61	140.00	0.0000	0.00	100%
		C	9/16	4.90	14%	21000	0.671	156.61	140.00	0.0000	0.00	100%

Guy Data*(cont'd)*

Guy Elevation ft	*Mount Type*	*Torque-Arm Spread ft*	*Torque-Arm Leg Angle °*	*Torque-Arm Style*	*Torque-Arm Grade*	*Torque-Arm Type*	*Torque-Arm Size*
250	Torque Arm	12.00	30.0000	Bat Ear	A36 (36 ksi)	Double Angle	2L3x3x1/4x3/8 2L2 1/2x2x3/16x3/8
155	Corner						
75	Corner						

Guy Data *(cont'd)*

Guy Elevation ft	*Diagonal Grade*	*Diagonal Type*	*Upper Diagonal Size*	*Lower Diagonal Size*	*Is Strap.*	*Pull-Off Grade*	*Pull-Off Type*	*Pull-Off Size*
250.00	A572-50 (50 ksi)	Solid Round			No	A36 (36 ksi)	Double Angle	2L2x2x3/16x3/8
155.00	A572-50 (50 ksi)	Solid Round			No	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8
75.00	A572-50 (50 ksi)	Solid Round			No	A36 (36 ksi)	Double Equal Angle	2L2x2x3/16x3/8

Guy Data *(cont'd)*

Guy Elevation ft	*Cable Weight A K*	*Cable Weight B K*	*Cable Weight C K*	*Cable Weight D K*	*Tower Intercept A ft*	*Tower Intercept B ft*	*Tower Intercept C ft*	*Tower Intercept D ft*
250	0.33	0.33	0.33		9.74 5.4 sec/pulse	9.74 5.4 sec/pulse	9.74 5.4 sec/pulse	
155	0.33	0.33	0.33		5.23 3.9 sec/pulse	5.23 3.9 sec/pulse	5.23 3.9 sec/pulse	
75	0.11	0.11	0.11		1.67 2.2 sec/pulse	1.67 2.2 sec/pulse	1.67 2.2 sec/pulse	

Guy Data *(cont'd)*

	Torque Arm	*Pull Off*	*Diagonal*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K_x	K_y	K_x	K_y	K_x	K_y
250	Yes	No	0.83	0.83	1	1	1	1
155	No	No			1	1	1	1
75	No	No			1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm				Pull Off				Diagonal			
	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U
250	0.0000 A325N	0	0.0000	1	0.6250 A325N	3	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
155	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	1	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
75	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	1	0.0000	0.75	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
250	A	125.00	21	6	1.7137
	B	125.00	21	6	1.7137
	C	125.00	21	6	1.7137
155	A	77.50	18	5	1.6337
	B	77.50	18	5	1.6337
	C	77.50	18	5	1.6337
75	A	37.50	15	4	1.5193
	B	37.50	15	4	1.5193
	C	37.50	15	4	1.5193

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Climbing Ladder	A	No	Af (CaAa)	280.00 - 1.00	-3.0000	0	1	1	0.5000	2.5000		7.90
Safety Line 3/8	A	No	Ar (CaAa)	280.00 - 1.00	-3.0000	0	1	1	0.3750	0.3750		0.22
Feedline Ladder (Af) 2"	A	No	Af (CaAa)	280.00 - 1.00	0.0000	0	1	1	2.0000	2.0000		6.30
Feedline Ladder (Af) 2"	B	No	Af (CaAa)	280.00 - 1.00	0.0000	0	1	1	2.0000	2.0000		6.30
Feedline Ladder (Af) 2" ***	C	No	Af (CaAa)	101.00 - 1.00	0.0000	0	1	1	2.0000	2.0000		6.30
(18) 1-5/8" (1)	A	No	Ar (CaAa)	181.50 - 1.00	0.0000	0	19	11	0.5000	1.9800		1.04

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1-5/8" Fiber												
***												
7/8	B	No	Ar (CaAa)	250.00 - 1.00	4.0000	-0.4	3	2	0.5000	1.1100		0.54
7/8	B	No	Ar (CaAa)	268.50 - 250.00	4.0000	-0.4	1	1	0.5000	1.1100		0.54
***												
EW65	C	No	Ar (CaAa)	93.00 - 1.00	0.0000	0.1	3	3	0.5000	1.4761		0.49
EW65	C	No	Ar (CaAa)	96.50 - 93.00	0.0000	0.1	2	2	0.5000	1.4761		0.49
EW65	C	No	Ar (CaAa)	97.50 - 96.50	0.0000	0.1	1	1	0.5000	1.4761		0.49
***												
AL5-50(7/8")	C	No	Ar (CaAa)	96.50 - 1.00	0.0000	-0.1	4	4	0.5000	1.1000		0.26
AL5-50(7/8")	C	No	Ar (CaAa)	125.00 - 96.50	0.0000	-0.1	2	2	0.5000	1.1000		0.26
AL5-50(7/8")	C	No	Ar (CaAa)	129.00 - 125.00	0.0000	-0.1	1	1	0.5000	1.1000		0.26
***												
3/8"	C	No	Ar (CaAa)	130.00 - 1.00	0.0000	-0.3	2	2	0.3750	0.3750		0.18
3/8"	C	No	Ar (CaAa)	135.00 - 130.00	0.0000	-0.3	1	1	0.3750	0.3750		0.18
***												
1/2"	C	No	Ar (CaAa)	96.50 - 1.00	0.0000	-0.25	1	1	0.5000	0.5800		0.25
***												
3/8"	C	No	Ar (CaAa)	280.00 - 1.00	0.0000	0.25	1	1	0.3750	0.3750		0.18
***												

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_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_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	280.00-260.00	A	0.000	0.000	15.750	0.000	0.29
		B	0.000	0.000	7.610	0.000	0.13
		C	0.000	0.000	0.750	0.000	0.00
T2	260.00-245.00	A	0.000	0.000	11.813	0.000	0.22
		B	0.000	0.000	7.775	0.000	0.11
		C	0.000	0.000	0.563	0.000	0.00
T3	245.00-240.00	A	0.000	0.000	3.938	0.000	0.07
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	0.188	0.000	0.00
T4	240.00-225.00	A	0.000	0.000	11.813	0.000	0.22
		B	0.000	0.000	9.995	0.000	0.12
		C	0.000	0.000	0.563	0.000	0.00
T5	225.00-185.00	A	0.000	0.000	31.500	0.000	0.58
		B	0.000	0.000	26.653	0.000	0.32
		C	0.000	0.000	1.500	0.000	0.01
T6	185.00-175.00	A	0.000	0.000	32.328	0.000	0.27
		B	0.000	0.000	6.663	0.000	0.08
		C	0.000	0.000	0.375	0.000	0.00
T7	175.00-155.00	A	0.000	0.000	90.990	0.000	0.68
		B	0.000	0.000	13.327	0.000	0.16
		C	0.000	0.000	0.750	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T8	155.00-140.00	A	0.000	0.000	68.243	0.000	0.51
		B	0.000	0.000	9.995	0.000	0.12
		C	0.000	0.000	0.563	0.000	0.00
T9	140.00-125.00	A	0.000	0.000	68.243	0.000	0.51
		B	0.000	0.000	9.995	0.000	0.12
		C	0.000	0.000	1.565	0.000	0.01
T10	125.00-100.00	A	0.000	0.000	113.738	0.000	0.85
		B	0.000	0.000	16.658	0.000	0.20
		C	0.000	0.000	8.646	0.000	0.03
T11	100.00-75.00	A	0.000	0.000	113.738	0.000	0.85
		B	0.000	0.000	16.658	0.000	0.20
		C	0.000	0.000	31.729	0.000	0.23
T12	75.00-50.00	A	0.000	0.000	113.738	0.000	0.85
		B	0.000	0.000	16.658	0.000	0.20
		C	0.000	0.000	34.667	0.000	0.24
T13	50.00-45.00	A	0.000	0.000	22.747	0.000	0.17
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	6.933	0.000	0.05
T14	45.00-40.00	A	0.000	0.000	22.747	0.000	0.17
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	6.933	0.000	0.05
T15	40.00-35.00	A	0.000	0.000	22.747	0.000	0.17
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	6.933	0.000	0.05
T16	35.00-30.00	A	0.000	0.000	22.747	0.000	0.17
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	6.933	0.000	0.05
T17	30.00-25.00	A	0.000	0.000	22.747	0.000	0.17
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	6.933	0.000	0.05
T18	25.00-20.00	A	0.000	0.000	22.747	0.000	0.17
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	6.933	0.000	0.05
T19	20.00-15.00	A	0.000	0.000	22.747	0.000	0.17
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	6.933	0.000	0.05
T20	15.00-10.00	A	0.000	0.000	22.747	0.000	0.17
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	6.933	0.000	0.05
T21	10.00-5.00	A	0.000	0.000	22.747	0.000	0.17
		B	0.000	0.000	3.332	0.000	0.04
		C	0.000	0.000	6.933	0.000	0.05
T22	5.00-1.00	A	0.000	0.000	18.198	0.000	0.14
		B	0.000	0.000	2.665	0.000	0.03
		C	0.000	0.000	5.547	0.000	0.04

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_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	280.00-260.00	A	1.851	0.000	0.000	37.960	0.000	0.85
		B		0.000	0.000	18.160	0.000	0.40
		C		0.000	0.000	8.153	0.000	0.10
T2	260.00-245.00	A	1.839	0.000	0.000	28.359	0.000	0.63
		B		0.000	0.000	20.957	0.000	0.39
		C		0.000	0.000	6.078	0.000	0.08
T3	245.00-240.00	A	1.831	0.000	0.000	9.431	0.000	0.21

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	9.139	0.000	0.15
		C		0.000	0.000	2.019	0.000	0.03
T4	240.00-225.00	A	1.823	0.000	0.000	28.223	0.000	0.63
		B		0.000	0.000	27.353	0.000	0.45
		C		0.000	0.000	6.033	0.000	0.08
T5	225.00-185.00	A	1.801	0.000	0.000	74.714	0.000	1.65
		B		0.000	0.000	72.436	0.000	1.18
		C		0.000	0.000	15.905	0.000	0.20
T6	185.00-175.00	A	1.777	0.000	0.000	44.032	0.000	0.94
		B		0.000	0.000	17.980	0.000	0.29
		C		0.000	0.000	3.930	0.000	0.05
T7	175.00-155.00	A	1.762	0.000	0.000	115.238	0.000	2.43
		B		0.000	0.000	35.790	0.000	0.58
		C		0.000	0.000	7.798	0.000	0.10
T8	155.00-140.00	A	1.742	0.000	0.000	86.162	0.000	1.80
		B		0.000	0.000	26.679	0.000	0.43
		C		0.000	0.000	5.789	0.000	0.07
T9	140.00-125.00	A	1.724	0.000	0.000	85.909	0.000	1.79
		B		0.000	0.000	26.525	0.000	0.42
		C		0.000	0.000	12.430	0.000	0.15
T10	125.00-100.00	A	1.696	0.000	0.000	142.549	0.000	2.95
		B		0.000	0.000	43.821	0.000	0.69
		C		0.000	0.000	52.117	0.000	0.49
T11	100.00-75.00	A	1.654	0.000	0.000	141.597	0.000	2.90
		B		0.000	0.000	43.239	0.000	0.68
		C		0.000	0.000	109.182	0.000	1.35
T12	75.00-50.00	A	1.599	0.000	0.000	140.360	0.000	2.83
		B		0.000	0.000	42.481	0.000	0.66
		C		0.000	0.000	114.334	0.000	1.38
T13	50.00-45.00	A	1.556	0.000	0.000	27.876	0.000	0.56
		B		0.000	0.000	8.376	0.000	0.13
		C		0.000	0.000	22.515	0.000	0.27
T14	45.00-40.00	A	1.538	0.000	0.000	27.799	0.000	0.55
		B		0.000	0.000	8.329	0.000	0.13
		C		0.000	0.000	22.376	0.000	0.26
T15	40.00-35.00	A	1.519	0.000	0.000	27.712	0.000	0.55
		B		0.000	0.000	8.276	0.000	0.13
		C		0.000	0.000	22.221	0.000	0.26
T16	35.00-30.00	A	1.498	0.000	0.000	27.615	0.000	0.54
		B		0.000	0.000	8.216	0.000	0.12
		C		0.000	0.000	22.046	0.000	0.26
T17	30.00-25.00	A	1.473	0.000	0.000	27.503	0.000	0.54
		B		0.000	0.000	8.147	0.000	0.12
		C		0.000	0.000	21.845	0.000	0.25
T18	25.00-20.00	A	1.444	0.000	0.000	27.371	0.000	0.53
		B		0.000	0.000	8.066	0.000	0.12
		C		0.000	0.000	21.607	0.000	0.25
T19	20.00-15.00	A	1.408	0.000	0.000	27.209	0.000	0.52
		B		0.000	0.000	7.967	0.000	0.12
		C		0.000	0.000	21.317	0.000	0.24
T20	15.00-10.00	A	1.361	0.000	0.000	26.999	0.000	0.51
		B		0.000	0.000	7.838	0.000	0.11
		C		0.000	0.000	20.940	0.000	0.23
T21	10.00-5.00	A	1.293	0.000	0.000	26.693	0.000	0.50
		B		0.000	0.000	7.651	0.000	0.11
		C		0.000	0.000	20.392	0.000	0.22
T22	5.00-1.00	A	1.180	0.000	0.000	20.946	0.000	0.38
		B		0.000	0.000	5.870	0.000	0.08
		C		0.000	0.000	15.582	0.000	0.16

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	280.00-260.00	-0.4839	-0.9579	-0.8224	-1.1606
T2	260.00-245.00	-0.3069	-1.1670	-0.6594	-1.2513
T3	245.00-240.00	-0.2020	-1.6184	-0.7025	-1.1223
T4	240.00-225.00	-0.2000	-1.6023	-0.7003	-1.1222
T5	225.00-185.00	-0.2112	-1.6920	-0.7063	-1.1264
T6	185.00-175.00	-1.7658	-1.7971	-1.3046	-1.2718
T7	175.00-155.00	-2.1215	-1.8450	-1.5151	-1.3229
T8	155.00-140.00	-2.1168	-1.8409	-1.5168	-1.3247
T9	140.00-125.00	-2.0680	-1.7831	-1.4063	-1.1985
T10	125.00-100.00	-1.9457	-1.5852	-1.2997	-1.0630
T11	100.00-75.00	-1.6793	-0.8774	-1.0103	-0.2939
T12	75.00-50.00	-1.6543	-0.8019	-0.9886	-0.2395
T13	50.00-45.00	-1.6710	-0.8100	-1.0015	-0.2460
T14	45.00-40.00	-1.6561	-0.8028	-0.9998	-0.2469
T15	40.00-35.00	-1.6710	-0.8100	-1.0080	-0.2505
T16	35.00-30.00	-1.6561	-0.8028	-1.0070	-0.2520
T17	30.00-25.00	-1.6710	-0.8100	-1.0165	-0.2563
T18	25.00-20.00	-1.6561	-0.8028	-1.0169	-0.2588
T19	20.00-15.00	-1.6710	-0.8100	-1.0288	-0.2647
T20	15.00-10.00	-1.6561	-0.8028	-1.0326	-0.2696
T21	10.00-5.00	-1.6561	-0.8028	-1.0461	-0.2789
T22	5.00-1.00	-1.5313	-0.7422	-0.9879	-0.2830

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	Climbing Ladder	260.00 - 280.00	0.6000	0.5769
T1	2	Safety Line 3/8	260.00 - 280.00	0.6000	0.5769
T1	3	Feedline Ladder (Af) 2"	260.00 - 280.00	0.6000	0.5769
T1	4	Feedline Ladder (Af) 2"	260.00 - 280.00	0.6000	0.5769
T1	10	7/8	260.00 - 268.50	0.6000	0.5769
T1	27	3/8"	260.00 - 280.00	0.6000	0.5769
T2	1	Climbing Ladder	245.00 - 260.00	0.6000	0.4476
T2	2	Safety Line 3/8	245.00 - 260.00	0.6000	0.4476
T2	3	Feedline Ladder (Af) 2"	245.00 - 260.00	0.6000	0.4476
T2	4	Feedline Ladder (Af) 2"	245.00 - 260.00	0.6000	0.4476
T2	9	7/8	245.00 - 250.00	0.6000	0.4476
T2	10	7/8	250.00 -	0.6000	0.4476

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	27	3/8"	260.00 245.00 - 260.00	0.6000	0.4476
T3	1	Climbing Ladder	240.00 - 245.00	0.6000	0.5724
T3	2	Safety Line 3/8	240.00 - 245.00	0.6000	0.5724
T3	3	Feedline Ladder (Af) 2"	240.00 - 245.00	0.6000	0.5724
T3	4	Feedline Ladder (Af) 2"	240.00 - 245.00	0.6000	0.5724
T3	9	7/8	240.00 - 245.00	0.6000	0.5724
T3	27	3/8"	240.00 - 245.00	0.6000	0.5724
T4	1	Climbing Ladder	225.00 - 240.00	0.6000	0.5692
T4	2	Safety Line 3/8	225.00 - 240.00	0.6000	0.5692
T4	3	Feedline Ladder (Af) 2"	225.00 - 240.00	0.6000	0.5692
T4	4	Feedline Ladder (Af) 2"	225.00 - 240.00	0.6000	0.5692
T4	9	7/8	225.00 - 240.00	0.6000	0.5692
T4	27	3/8"	225.00 - 240.00	0.6000	0.5692
T5	1	Climbing Ladder	185.00 - 225.00	0.6000	0.5948
T5	2	Safety Line 3/8	185.00 - 225.00	0.6000	0.5948
T5	3	Feedline Ladder (Af) 2"	185.00 - 225.00	0.6000	0.5948
T5	4	Feedline Ladder (Af) 2"	185.00 - 225.00	0.6000	0.5948
T5	9	7/8	185.00 - 225.00	0.6000	0.5948
T5	27	3/8"	185.00 - 225.00	0.6000	0.5948
T6	1	Climbing Ladder	175.00 - 185.00	0.6000	0.5752
T6	2	Safety Line 3/8	175.00 - 185.00	0.6000	0.5752
T6	3	Feedline Ladder (Af) 2"	175.00 - 185.00	0.6000	0.5752
T6	4	Feedline Ladder (Af) 2"	175.00 - 185.00	0.6000	0.5752
T6	7	(18) 1-5/8" (1) 1-5/8" Fiber	175.00 - 181.50	0.6000	0.5752
T6	9	7/8	175.00 - 185.00	0.6000	0.5752
T6	27	3/8"	175.00 - 185.00	0.6000	0.5752
T7	1	Climbing Ladder	155.00 - 175.00	0.6000	0.5822
T7	2	Safety Line 3/8	155.00 - 175.00	0.6000	0.5822
T7	3	Feedline Ladder (Af) 2"	155.00 - 175.00	0.6000	0.5822
T7	4	Feedline Ladder (Af) 2"	155.00 - 175.00	0.6000	0.5822
T7	7	(18) 1-5/8" (1) 1-5/8" Fiber	155.00 -	0.6000	0.5822

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			175.00		
T7	9	7/8	155.00 - 175.00	0.6000	0.5822
T7	27	3/8"	155.00 - 175.00	0.6000	0.5822
T8	1	Climbing Ladder	140.00 - 155.00	0.6000	0.5826
T8	2	Safety Line 3/8	140.00 - 155.00	0.6000	0.5826
T8	3	Feedline Ladder (Af) 2"	140.00 - 155.00	0.6000	0.5826
T8	4	Feedline Ladder (Af) 2"	140.00 - 155.00	0.6000	0.5826
T8	7	(18) 1-5/8" (1) 1-5/8" Fiber	140.00 - 155.00	0.6000	0.5826
T8	9	7/8	140.00 - 155.00	0.6000	0.5826
T8	27	3/8"	140.00 - 155.00	0.6000	0.5826
T9	1	Climbing Ladder	125.00 - 140.00	0.6000	0.5874
T9	2	Safety Line 3/8	125.00 - 140.00	0.6000	0.5874
T9	3	Feedline Ladder (Af) 2"	125.00 - 140.00	0.6000	0.5874
T9	4	Feedline Ladder (Af) 2"	125.00 - 140.00	0.6000	0.5874
T9	7	(18) 1-5/8" (1) 1-5/8" Fiber	125.00 - 140.00	0.6000	0.5874
T9	9	7/8	125.00 - 140.00	0.6000	0.5874
T9	20	AL5-50(7/8")	125.00 - 129.00	0.6000	0.5874
T9	22	3/8"	125.00 - 130.00	0.6000	0.5874
T9	23	3/8"	130.00 - 135.00	0.6000	0.5874
T9	27	3/8"	125.00 - 140.00	0.6000	0.5874
T10	1	Climbing Ladder	100.00 - 125.00	0.6000	0.6000
T10	2	Safety Line 3/8	100.00 - 125.00	0.6000	0.6000
T10	3	Feedline Ladder (Af) 2"	100.00 - 125.00	0.6000	0.6000
T10	4	Feedline Ladder (Af) 2"	100.00 - 125.00	0.6000	0.6000
T10	5	Feedline Ladder (Af) 2"	100.00 - 101.00	0.6000	0.6000
T10	7	(18) 1-5/8" (1) 1-5/8" Fiber	100.00 - 125.00	0.6000	0.6000
T10	9	7/8	100.00 - 125.00	0.6000	0.6000
T10	17	AL5-50(7/8")	100.00 - 125.00	0.6000	0.6000
T10	22	3/8"	100.00 - 125.00	0.6000	0.6000
T10	27	3/8"	100.00 - 125.00	0.6000	0.6000
T11	1	Climbing Ladder	75.00 - 100.00	0.6000	0.5967
T11	2	Safety Line 3/8	75.00 - 100.00	0.6000	0.5967
T11	3	Feedline Ladder (Af) 2"	75.00 - 100.00	0.6000	0.5967

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T11	4	Feedline Ladder (Af) 2"	75.00 - 100.00	0.6000	0.5967
T11	5	Feedline Ladder (Af) 2"	75.00 - 100.00	0.6000	0.5967
T11	7	(18) 1-5/8" (1) 1-5/8" Fiber	75.00 - 100.00	0.6000	0.5967
T11	9	7/8	75.00 - 100.00	0.6000	0.5967
T11	12	EW65	75.00 - 93.00	0.6000	0.5967
T11	13	EW65	93.00 - 96.50	0.6000	0.5967
T11	14	EW65	96.50 - 97.50	0.6000	0.5967
T11	16	AL5-50(7/8")	75.00 - 96.50	0.6000	0.5967
T11	17	AL5-50(7/8")	96.50 - 100.00	0.6000	0.5967
T11	22	3/8"	75.00 - 100.00	0.6000	0.5967
T11	25	1/2"	75.00 - 96.50	0.6000	0.5967
T11	27	3/8"	75.00 - 100.00	0.6000	0.5967
T12	1	Climbing Ladder	50.00 - 75.00	0.6000	0.6000
T12	2	Safety Line 3/8	50.00 - 75.00	0.6000	0.6000
T12	3	Feedline Ladder (Af) 2"	50.00 - 75.00	0.6000	0.6000
T12	4	Feedline Ladder (Af) 2"	50.00 - 75.00	0.6000	0.6000
T12	5	Feedline Ladder (Af) 2"	50.00 - 75.00	0.6000	0.6000
T12	7	(18) 1-5/8" (1) 1-5/8" Fiber	50.00 - 75.00	0.6000	0.6000
T12	9	7/8	50.00 - 75.00	0.6000	0.6000
T12	12	EW65	50.00 - 75.00	0.6000	0.6000
T12	16	AL5-50(7/8")	50.00 - 75.00	0.6000	0.6000
T12	22	3/8"	50.00 - 75.00	0.6000	0.6000
T12	25	1/2"	50.00 - 75.00	0.6000	0.6000
T12	27	3/8"	50.00 - 75.00	0.6000	0.6000
T13	1	Climbing Ladder	45.00 - 50.00	0.6000	0.6000
T13	2	Safety Line 3/8	45.00 - 50.00	0.6000	0.6000
T13	3	Feedline Ladder (Af) 2"	45.00 - 50.00	0.6000	0.6000
T13	4	Feedline Ladder (Af) 2"	45.00 - 50.00	0.6000	0.6000
T13	5	Feedline Ladder (Af) 2"	45.00 - 50.00	0.6000	0.6000
T13	7	(18) 1-5/8" (1) 1-5/8" Fiber	45.00 - 50.00	0.6000	0.6000
T13	9	7/8	45.00 - 50.00	0.6000	0.6000
T13	12	EW65	45.00 - 50.00	0.6000	0.6000
T13	16	AL5-50(7/8")	45.00 - 50.00	0.6000	0.6000
T13	22	3/8"	45.00 - 50.00	0.6000	0.6000
T13	25	1/2"	45.00 - 50.00	0.6000	0.6000
T13	27	3/8"	45.00 - 50.00	0.6000	0.6000
T14	1	Climbing Ladder	40.00 - 45.00	0.6000	0.6000
T14	2	Safety Line 3/8	40.00 - 45.00	0.6000	0.6000
T14	3	Feedline Ladder (Af) 2"	40.00 - 45.00	0.6000	0.6000
T14	4	Feedline Ladder (Af) 2"	40.00 - 45.00	0.6000	0.6000
T14	5	Feedline Ladder (Af) 2"	40.00 - 45.00	0.6000	0.6000
T14	7	(18) 1-5/8" (1) 1-5/8" Fiber	40.00 - 45.00	0.6000	0.6000
T14	9	7/8	40.00 - 45.00	0.6000	0.6000
T14	12	EW65	40.00 - 45.00	0.6000	0.6000
T14	16	AL5-50(7/8")	40.00 - 45.00	0.6000	0.6000
T14	22	3/8"	40.00 - 45.00	0.6000	0.6000
T14	25	1/2"	40.00 - 45.00	0.6000	0.6000
T14	27	3/8"	40.00 - 45.00	0.6000	0.6000
T15	1	Climbing Ladder	35.00 - 40.00	0.6000	0.6000
T15	2	Safety Line 3/8	35.00 - 40.00	0.6000	0.6000
T15	3	Feedline Ladder (Af) 2"	35.00 - 40.00	0.6000	0.6000
T15	4	Feedline Ladder (Af) 2"	35.00 - 40.00	0.6000	0.6000
T15	5	Feedline Ladder (Af) 2"	35.00 - 40.00	0.6000	0.6000
T15	7	(18) 1-5/8" (1) 1-5/8" Fiber	35.00 - 40.00	0.6000	0.6000
T15	9	7/8	35.00 - 40.00	0.6000	0.6000
T15	12	EW65	35.00 - 40.00	0.6000	0.6000
T15	16	AL5-50(7/8")	35.00 - 40.00	0.6000	0.6000
T15	22	3/8"	35.00 - 40.00	0.6000	0.6000
T15	25	1/2"	35.00 - 40.00	0.6000	0.6000
T15	27	3/8"	35.00 - 40.00	0.6000	0.6000
T16	1	Climbing Ladder	30.00 - 35.00	0.6000	0.6000
T16	2	Safety Line 3/8	30.00 - 35.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T16	3	Feedline Ladder (Af) 2"	30.00 - 35.00	0.6000	0.6000
T16	4	Feedline Ladder (Af) 2"	30.00 - 35.00	0.6000	0.6000
T16	5	Feedline Ladder (Af) 2"	30.00 - 35.00	0.6000	0.6000
T16	7	(18) 1-5/8" (1) 1-5/8" Fiber	30.00 - 35.00	0.6000	0.6000
T16	9	7/8	30.00 - 35.00	0.6000	0.6000
T16	12	EW65	30.00 - 35.00	0.6000	0.6000
T16	16	AL5-50(7/8")	30.00 - 35.00	0.6000	0.6000
T16	22	3/8"	30.00 - 35.00	0.6000	0.6000
T16	25	1/2"	30.00 - 35.00	0.6000	0.6000
T16	27	3/8"	30.00 - 35.00	0.6000	0.6000
T17	1	Climbing Ladder	25.00 - 30.00	0.6000	0.6000
T17	2	Safety Line 3/8	25.00 - 30.00	0.6000	0.6000
T17	3	Feedline Ladder (Af) 2"	25.00 - 30.00	0.6000	0.6000
T17	4	Feedline Ladder (Af) 2"	25.00 - 30.00	0.6000	0.6000
T17	5	Feedline Ladder (Af) 2"	25.00 - 30.00	0.6000	0.6000
T17	7	(18) 1-5/8" (1) 1-5/8" Fiber	25.00 - 30.00	0.6000	0.6000
T17	9	7/8	25.00 - 30.00	0.6000	0.6000
T17	12	EW65	25.00 - 30.00	0.6000	0.6000
T17	16	AL5-50(7/8")	25.00 - 30.00	0.6000	0.6000
T17	22	3/8"	25.00 - 30.00	0.6000	0.6000
T17	25	1/2"	25.00 - 30.00	0.6000	0.6000
T17	27	3/8"	25.00 - 30.00	0.6000	0.6000
T18	1	Climbing Ladder	20.00 - 25.00	0.6000	0.6000
T18	2	Safety Line 3/8	20.00 - 25.00	0.6000	0.6000
T18	3	Feedline Ladder (Af) 2"	20.00 - 25.00	0.6000	0.6000
T18	4	Feedline Ladder (Af) 2"	20.00 - 25.00	0.6000	0.6000
T18	5	Feedline Ladder (Af) 2"	20.00 - 25.00	0.6000	0.6000
T18	7	(18) 1-5/8" (1) 1-5/8" Fiber	20.00 - 25.00	0.6000	0.6000
T18	9	7/8	20.00 - 25.00	0.6000	0.6000
T18	12	EW65	20.00 - 25.00	0.6000	0.6000
T18	16	AL5-50(7/8")	20.00 - 25.00	0.6000	0.6000
T18	22	3/8"	20.00 - 25.00	0.6000	0.6000
T18	25	1/2"	20.00 - 25.00	0.6000	0.6000
T18	27	3/8"	20.00 - 25.00	0.6000	0.6000
T19	1	Climbing Ladder	15.00 - 20.00	0.6000	0.6000
T19	2	Safety Line 3/8	15.00 - 20.00	0.6000	0.6000
T19	3	Feedline Ladder (Af) 2"	15.00 - 20.00	0.6000	0.6000
T19	4	Feedline Ladder (Af) 2"	15.00 - 20.00	0.6000	0.6000
T19	5	Feedline Ladder (Af) 2"	15.00 - 20.00	0.6000	0.6000
T19	7	(18) 1-5/8" (1) 1-5/8" Fiber	15.00 - 20.00	0.6000	0.6000
T19	9	7/8	15.00 - 20.00	0.6000	0.6000
T19	12	EW65	15.00 - 20.00	0.6000	0.6000
T19	16	AL5-50(7/8")	15.00 - 20.00	0.6000	0.6000
T19	22	3/8"	15.00 - 20.00	0.6000	0.6000
T19	25	1/2"	15.00 - 20.00	0.6000	0.6000
T19	27	3/8"	15.00 - 20.00	0.6000	0.6000
T20	1	Climbing Ladder	10.00 - 15.00	0.6000	0.6000
T20	2	Safety Line 3/8	10.00 - 15.00	0.6000	0.6000
T20	3	Feedline Ladder (Af) 2"	10.00 - 15.00	0.6000	0.6000
T20	4	Feedline Ladder (Af) 2"	10.00 - 15.00	0.6000	0.6000
T20	5	Feedline Ladder (Af) 2"	10.00 - 15.00	0.6000	0.6000
T20	7	(18) 1-5/8" (1) 1-5/8" Fiber	10.00 - 15.00	0.6000	0.6000
T20	9	7/8	10.00 - 15.00	0.6000	0.6000
T20	12	EW65	10.00 - 15.00	0.6000	0.6000
T20	16	AL5-50(7/8")	10.00 - 15.00	0.6000	0.6000
T20	22	3/8"	10.00 - 15.00	0.6000	0.6000
T20	25	1/2"	10.00 - 15.00	0.6000	0.6000
T20	27	3/8"	10.00 - 15.00	0.6000	0.6000
T21	1	Climbing Ladder	5.00 - 10.00	0.6000	0.6000
T21	2	Safety Line 3/8	5.00 - 10.00	0.6000	0.6000
T21	3	Feedline Ladder (Af) 2"	5.00 - 10.00	0.6000	0.6000
T21	4	Feedline Ladder (Af) 2"	5.00 - 10.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T21	5	Feedline Ladder (Af) 2"	5.00 - 10.00	0.6000	0.6000
T21	7	(18) 1-5/8" (1) 1-5/8" Fiber	5.00 - 10.00	0.6000	0.6000
T21	9	7/8	5.00 - 10.00	0.6000	0.6000
T21	12	EW65	5.00 - 10.00	0.6000	0.6000
T21	16	AL5-50(7/8")	5.00 - 10.00	0.6000	0.6000
T21	22	3/8"	5.00 - 10.00	0.6000	0.6000
T21	25	1/2"	5.00 - 10.00	0.6000	0.6000
T21	27	3/8"	5.00 - 10.00	0.6000	0.6000
T22	1	Climbing Ladder	1.00 - 5.00	0.6000	0.4991
T22	2	Safety Line 3/8	1.00 - 5.00	0.6000	0.4991
T22	3	Feedline Ladder (Af) 2"	1.00 - 5.00	0.6000	0.4991
T22	4	Feedline Ladder (Af) 2"	1.00 - 5.00	0.6000	0.4991
T22	5	Feedline Ladder (Af) 2"	1.00 - 5.00	0.6000	0.4991
T22	7	(18) 1-5/8" (1) 1-5/8" Fiber	1.00 - 5.00	0.6000	0.4991
T22	9	7/8	1.00 - 5.00	0.6000	0.4991
T22	12	EW65	1.00 - 5.00	0.6000	0.4991
T22	16	AL5-50(7/8")	1.00 - 5.00	0.6000	0.4991
T22	22	3/8"	1.00 - 5.00	0.6000	0.4991
T22	25	1/2"	1.00 - 5.00	0.6000	0.4991
T22	27	3/8"	1.00 - 5.00	0.6000	0.4991

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
Beacon	B	From Leg	0.00 0.00 0.60	0.0000	283.70	No Ice 1/2" Ice 1" Ice	2.00 2.50 3.00	2.00 2.50 3.00	0.02 0.03 0.04
Lightning Rod	B	From Leg	0.00 0.00 2.00	0.0000	283.70	No Ice 1/2" Ice 1" Ice	0.50 1.02 1.43	0.50 1.02 1.43	0.01 0.01 0.02
***									
3.6' x 2.4" Pipe Mount	A	From Leg	1.50 0.00 0.00	0.0000	284.00	No Ice 1/2" Ice 1" Ice	0.65 0.86 1.07	0.65 0.86 1.07	0.01 0.02 0.02
(1) 1.5' Standoff	A	From Leg	0.75 0.00 0.00	0.0000	285.00	No Ice 1/2" Ice 1" Ice	2.96 4.10 5.24	2.11 2.93 3.75	0.10 0.12 0.14
***									
5'x2.4" Pipe Mount	A	From Leg	4.00 0.00 0.00	0.0000	283.00	No Ice 1/2" Ice 1" Ice	1.21 1.51 1.82	1.21 1.51 1.82	0.01 0.02 0.03
8' Platform w/handrail	C	None		0.0000	280.50	No Ice 1/2" Ice 1" Ice	34.80 39.90 45.00	34.80 39.90 45.00	1.21 1.99 2.77
***									
DCRT-4	C	From Leg	0.50 0.00 0.00	0.0000	268.50	No Ice 1/2" Ice 1" Ice	16.50 21.90 27.30	16.50 21.90 27.30	0.16 0.21 0.26

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***										
TDE6082A	A	From Leg	4.00		0.0000	250.00	No Ice	3.38	3.38	0.02
			0.00				1/2" Ice	4.90	4.90	0.05
			6.00				1" Ice	6.45	6.45	0.08
(1) 4.7' Standoff	A	From Leg	0.00		0.0000	250.00	No Ice	2.97	4.03	0.07
			0.00				1/2" Ice	4.39	6.12	0.11
			0.00				1" Ice	5.81	8.21	0.14
***										
AIR 32	A	From Leg	3.00		0.0000	182.00	No Ice	5.80	4.41	0.11
			0.00				1/2" Ice	6.16	4.75	0.15
			0.00				1" Ice	6.52	5.10	0.20
AIR 32	B	From Leg	3.00		0.0000	182.00	No Ice	5.80	4.41	0.11
			0.00				1/2" Ice	6.16	4.75	0.15
			0.00				1" Ice	6.52	5.10	0.20
AIR 32	C	From Leg	3.00		0.0000	182.00	No Ice	5.80	4.41	0.11
			0.00				1/2" Ice	6.16	4.75	0.15
			0.00				1" Ice	6.52	5.10	0.20
RRUS 11 (Band 12) (55 lb)	A	From Leg	3.00		0.0000	182.00	No Ice	2.52	1.07	0.06
			0.00				1/2" Ice	2.72	1.21	0.07
			0.00				1" Ice	2.92	1.36	0.10
RRUS 11 (Band 12) (55 lb)	B	From Leg	3.00		0.0000	182.00	No Ice	2.52	1.07	0.06
			0.00				1/2" Ice	2.72	1.21	0.07
			0.00				1" Ice	2.92	1.36	0.10
RRUS 11 (Band 12) (55 lb)	C	From Leg	3.00		0.0000	182.00	No Ice	2.52	1.07	0.06
			0.00				1/2" Ice	2.72	1.21	0.07
			0.00				1" Ice	2.92	1.36	0.10
LNX-6515DS	A	From Leg	3.00		0.0000	182.00	No Ice	11.45	7.70	0.05
			0.00				1/2" Ice	12.06	8.29	0.12
			0.00				1" Ice	12.69	8.89	0.19
LNX-6515DS	B	From Leg	3.00		0.0000	182.00	No Ice	11.45	7.70	0.05
			0.00				1/2" Ice	12.06	8.29	0.12
			0.00				1" Ice	12.69	8.89	0.19
LNX-6515DS	C	From Leg	3.00		0.0000	182.00	No Ice	11.45	7.70	0.05
			0.00				1/2" Ice	12.06	8.29	0.12
			0.00				1" Ice	12.69	8.89	0.19
APX16PV-16PVL	A	From Leg	3.00		0.0000	182.00	No Ice	6.04	1.98	0.04
			0.00				1/2" Ice	6.39	2.30	0.07
			0.00				1" Ice	6.76	2.63	0.11
APX16PV-16PVL	B	From Leg	3.00		0.0000	182.00	No Ice	6.04	1.98	0.04
			0.00				1/2" Ice	6.39	2.30	0.07
			0.00				1" Ice	6.76	2.63	0.11
APX16PV-16PVL	C	From Leg	3.00		0.0000	182.00	No Ice	6.04	1.98	0.04
			0.00				1/2" Ice	6.39	2.30	0.07
			0.00				1" Ice	6.76	2.63	0.11
Double TMA 17/21	A	From Leg	3.00		0.0000	182.00	No Ice	0.35	0.14	0.01
			0.00				1/2" Ice	0.43	0.19	0.01
			0.00				1" Ice	0.51	0.25	0.02
Double TMA 17/21	B	From Leg	3.00		0.0000	182.00	No Ice	0.35	0.14	0.01
			0.00				1/2" Ice	0.43	0.19	0.01
			0.00				1" Ice	0.51	0.25	0.02
Double TMA 17/21	C	From Leg	3.00		0.0000	182.00	No Ice	0.35	0.14	0.01
			0.00				1/2" Ice	0.43	0.19	0.01
			0.00				1" Ice	0.51	0.25	0.02
KRY 112 114-1 Double TMA	A	From Leg	3.00		0.0000	182.00	No Ice	0.35	0.14	0.01
			0.00				1/2" Ice	0.43	0.19	0.01
			0.00				1" Ice	0.51	0.25	0.02
KRY 112 114-1 Double TMA	B	From Leg	3.00		0.0000	182.00	No Ice	0.35	0.14	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	0.43	0.19	0.01
			0.00			1" Ice	0.51	0.25	0.02
KRY 112 114-1 Double TMA	C	From Leg	3.00	0.0000	182.00	No Ice	0.35	0.14	0.01
			0.00			1/2" Ice	0.43	0.19	0.01
			0.00			1" Ice	0.51	0.25	0.02
782 11056	A	From Leg	3.00	0.0000	182.00	No Ice	0.15	0.08	0.00
			0.00			1/2" Ice	0.20	0.13	0.00
			0.00			1" Ice	0.26	0.18	0.01
782 11056	B	From Leg	3.00	0.0000	182.00	No Ice	0.15	0.08	0.00
			0.00			1/2" Ice	0.20	0.13	0.00
			0.00			1" Ice	0.26	0.18	0.01
782 11056	C	From Leg	3.00	0.0000	182.00	No Ice	0.15	0.08	0.00
			0.00			1/2" Ice	0.20	0.13	0.00
			0.00			1" Ice	0.26	0.18	0.01
(3) 8' T-Frames	C	None		0.0000	182.00	No Ice	17.87	17.87	0.80
						1/2" Ice	25.31	25.31	1.16
						1" Ice	32.75	32.75	1.52
***									
***									
ANT150F2	B	From Leg	2.00	0.0000	129.00	No Ice	1.23	1.23	0.01
			0.00			1/2" Ice	1.53	1.53	0.02
			3.00			1" Ice	1.84	1.84	0.04
2' Standoff (Commscope S-200)	B	From Leg	1.00	0.0000	129.00	No Ice	2.96	2.53	0.11
			0.00			1/2" Ice	4.10	3.51	0.13
			0.00			1" Ice	5.24	4.49	0.16
***									
***									
ANT150F2	A	From Leg	2.00	0.0000	125.00	No Ice	1.23	1.23	0.01
			0.00			1/2" Ice	1.53	1.53	0.02
			2.50			1" Ice	1.84	1.84	0.04
2' Standoff (Commscope S-200)	A	From Leg	1.00	0.0000	125.00	No Ice	2.96	2.53	0.11
			0.00			1/2" Ice	4.10	3.51	0.13
			0.00			1" Ice	5.24	4.49	0.16
***									
4' Pipe Mount	C	From Leg	0.50	0.0000	97.50	No Ice	1.32	1.32	0.02
			0.00			1/2" Ice	1.58	1.58	0.03
			0.00			1" Ice	1.84	1.84	0.05
***									
DB586-Y	B	From Leg	4.00	0.0000	96.50	No Ice	1.01	1.01	0.01
			0.00			1/2" Ice	1.28	1.28	0.02
			1.10			1" Ice	1.56	1.56	0.03
Bird 422 Series	B	From Leg	4.00	0.0000	96.50	No Ice	3.45	1.36	0.05
			0.00			1/2" Ice	3.70	1.54	0.07
			1.00			1" Ice	3.96	1.74	0.09
DB586-Y	B	From Leg	4.00	0.0000	96.50	No Ice	1.01	1.01	0.01
			0.00			1/2" Ice	1.28	1.28	0.02
			-4.00			1" Ice	1.56	1.56	0.03
4' Standoff (Commscope S-400)	B	From Leg	2.00	0.0000	96.50	No Ice	0.98	2.18	0.04
			0.00			1/2" Ice	1.70	3.80	0.06
			0.00			1" Ice	2.42	5.42	0.08
***									
MA0528-28AN	C	From Leg	6.00	0.0000	130.00	No Ice	4.80	0.72	0.01
			0.00			1/2" Ice	5.07	0.87	0.04
			0.00			1" Ice	5.35	1.03	0.06
***									
4' Pipe Mount	C	From Leg	0.50	0.0000	93.00	No Ice	1.32	1.32	0.02
			0.00			1/2" Ice	1.58	1.58	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	1.84	1.84	0.05
***									
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Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
***											
Andrew VHLP800-11-6GR Dish	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	17.2450		135.00	2.58	No Ice 1/2" Ice 1" Ice	5.24 5.59 5.93	0.30 0.33 0.36
***											
SP4-107BC1C1R	C	Paraboloid w/o Radome	From Leg	1.00 0.00 0.50	-85.8870		97.50	4.00	No Ice 1/2" Ice 1" Ice	12.56 13.09 13.62	0.17 0.24 0.30
***											
PAL8-65A	A	Paraboloid w/o Radome	From Leg	4.00 0.00 -0.50	-76.8250		96.50	8.00	No Ice 1/2" Ice 1" Ice	50.30 51.29 52.28	0.25 0.51 0.78
***											
PAD6-107A	A	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		93.00	6.00	No Ice 1/2" Ice 1" Ice	28.27 29.05 29.83	0.14 0.29 0.44
***											
***											
***											

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2D+1.6W (pattern 1) 0 deg - No Ice+1.0 Guy
4	1.2D+1.6W (pattern 2) 0 deg - No Ice+1.0 Guy
5	1.2D+1.6W (pattern 3) 0 deg - No Ice+1.0 Guy
6	1.2D+1.6W (pattern 4) 0 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy

Comb. No.	*Description*
8	1.2D+1.6W (pattern 1) 30 deg - No Ice+1.0 Guy
9	1.2D+1.6W (pattern 2) 30 deg - No Ice+1.0 Guy
10	1.2D+1.6W (pattern 3) 30 deg - No Ice+1.0 Guy
11	1.2D+1.6W (pattern 4) 30 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
13	1.2D+1.6W (pattern 1) 60 deg - No Ice+1.0 Guy
14	1.2D+1.6W (pattern 2) 60 deg - No Ice+1.0 Guy
15	1.2D+1.6W (pattern 3) 60 deg - No Ice+1.0 Guy
16	1.2D+1.6W (pattern 4) 60 deg - No Ice+1.0 Guy
17	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
18	1.2D+1.6W (pattern 1) 90 deg - No Ice+1.0 Guy
19	1.2D+1.6W (pattern 2) 90 deg - No Ice+1.0 Guy
20	1.2D+1.6W (pattern 3) 90 deg - No Ice+1.0 Guy
21	1.2D+1.6W (pattern 4) 90 deg - No Ice+1.0 Guy
22	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
23	1.2D+1.6W (pattern 1) 120 deg - No Ice+1.0 Guy
24	1.2D+1.6W (pattern 2) 120 deg - No Ice+1.0 Guy
25	1.2D+1.6W (pattern 3) 120 deg - No Ice+1.0 Guy
26	1.2D+1.6W (pattern 4) 120 deg - No Ice+1.0 Guy
27	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
28	1.2D+1.6W (pattern 1) 150 deg - No Ice+1.0 Guy
29	1.2D+1.6W (pattern 2) 150 deg - No Ice+1.0 Guy
30	1.2D+1.6W (pattern 3) 150 deg - No Ice+1.0 Guy
31	1.2D+1.6W (pattern 4) 150 deg - No Ice+1.0 Guy
32	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
33	1.2D+1.6W (pattern 1) 180 deg - No Ice+1.0 Guy
34	1.2D+1.6W (pattern 2) 180 deg - No Ice+1.0 Guy
35	1.2D+1.6W (pattern 3) 180 deg - No Ice+1.0 Guy
36	1.2D+1.6W (pattern 4) 180 deg - No Ice+1.0 Guy
37	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
38	1.2D+1.6W (pattern 1) 210 deg - No Ice+1.0 Guy
39	1.2D+1.6W (pattern 2) 210 deg - No Ice+1.0 Guy
40	1.2D+1.6W (pattern 3) 210 deg - No Ice+1.0 Guy
41	1.2D+1.6W (pattern 4) 210 deg - No Ice+1.0 Guy
42	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
43	1.2D+1.6W (pattern 1) 240 deg - No Ice+1.0 Guy
44	1.2D+1.6W (pattern 2) 240 deg - No Ice+1.0 Guy
45	1.2D+1.6W (pattern 3) 240 deg - No Ice+1.0 Guy
46	1.2D+1.6W (pattern 4) 240 deg - No Ice+1.0 Guy
47	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
48	1.2D+1.6W (pattern 1) 270 deg - No Ice+1.0 Guy
49	1.2D+1.6W (pattern 2) 270 deg - No Ice+1.0 Guy
50	1.2D+1.6W (pattern 3) 270 deg - No Ice+1.0 Guy
51	1.2D+1.6W (pattern 4) 270 deg - No Ice+1.0 Guy
52	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
53	1.2D+1.6W (pattern 1) 300 deg - No Ice+1.0 Guy
54	1.2D+1.6W (pattern 2) 300 deg - No Ice+1.0 Guy
55	1.2D+1.6W (pattern 3) 300 deg - No Ice+1.0 Guy
56	1.2D+1.6W (pattern 4) 300 deg - No Ice+1.0 Guy
57	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
58	1.2D+1.6W (pattern 1) 330 deg - No Ice+1.0 Guy
59	1.2D+1.6W (pattern 2) 330 deg - No Ice+1.0 Guy
60	1.2D+1.6W (pattern 3) 330 deg - No Ice+1.0 Guy
61	1.2D+1.6W (pattern 4) 330 deg - No Ice+1.0 Guy
62	1.2 Dead+1.0 Ice+1.0 Temp+Guy
63	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
64	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
65	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
66	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
67	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
68	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
69	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy

Comb. No.	Description
70	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
71	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
72	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
73	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
74	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
75	Dead+Wind 0 deg - Service+Guy
76	Dead+Wind 30 deg - Service+Guy
77	Dead+Wind 60 deg - Service+Guy
78	Dead+Wind 90 deg - Service+Guy
79	Dead+Wind 120 deg - Service+Guy
80	Dead+Wind 150 deg - Service+Guy
81	Dead+Wind 180 deg - Service+Guy
82	Dead+Wind 210 deg - Service+Guy
83	Dead+Wind 240 deg - Service+Guy
84	Dead+Wind 270 deg - Service+Guy
85	Dead+Wind 300 deg - Service+Guy
86	Dead+Wind 330 deg - Service+Guy

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	280 - 260	1.978	85	0.0263	0.0825
T2	260 - 245	1.870	85	0.0192	0.0801
T3	245 - 240	1.834	85	0.0163	0.0799
T4	240 - 225	1.832	85	0.0165	0.1183
T5	225 - 185	1.825	85	0.0120	0.1228
T6	185 - 175	1.689	85	0.0283	0.2581
T7	175 - 155	1.625	79	0.0312	0.2764
T8	155 - 140	1.538	79	0.0193	0.3048
T9	140 - 125	1.530	79	0.0135	0.3573
T10	125 - 100	1.509	79	0.0193	0.3368
T11	100 - 75	1.377	79	0.0415	0.4522
T12	75 - 50	1.096	79	0.0535	0.3479
T13	50 - 45	0.814	79	0.0614	0.3126
T14	45 - 40	0.750	79	0.0649	0.2242
T15	40 - 35	0.680	79	0.0685	0.2504
T16	35 - 30	0.606	79	0.0723	0.1608
T17	30 - 25	0.528	79	0.0760	0.1876
T18	25 - 20	0.444	79	0.0794	0.1088
T19	20 - 15	0.358	79	0.0826	0.1243
T20	15 - 10	0.266	79	0.0852	0.0672
T21	10 - 5	0.173	79	0.0872	0.0696
T22	5 - 1	0.079	79	0.0884	0.0465

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
285.00	(1) 1.5' Standoff	85	1.978	0.0263	0.0825	225249
284.00	3.6' x 2.4" Pipe Mount	85	1.978	0.0263	0.0825	225249
283.70	Beacon	85	1.978	0.0263	0.0825	225249
283.00	5'x2.4" Pipe Mount	85	1.978	0.0263	0.0825	225249

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
280.50	8' Platform w/handrail	85	1.978	0.0263	0.0825	225249
268.50	DCRT-4	85	1.910	0.0245	0.0889	97935
250.00	Guy	85	1.840	0.0128	0.0760	52904
182.00	AIR 32	85	1.669	0.0297	0.2657	69080
155.00	Guy	79	1.538	0.0193	0.3048	32443
135.00	Andrew VHLP800-11-6GR Dish	79	1.527	0.0142	0.3515	78787
130.00	MA0528-28AN	79	1.520	0.0162	0.3398	80714
129.00	ANT150F2	79	1.518	0.0168	0.3380	81077
125.00	ANT150F2	79	1.509	0.0193	0.3368	78374
98.00	SP4-107BC1C1R	79	1.359	0.0429	0.4496	38349
97.50	4' Pipe Mount	79	1.354	0.0432	0.4484	39326
96.50	DB586-Y	79	1.344	0.0438	0.4453	41722
96.00	PAL8-65A	79	1.339	0.0441	0.4435	43142
93.00	PAD6-107A	79	1.307	0.0457	0.4293	54838
75.00	Guy	79	1.096	0.0535	0.3479	99812

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	280 - 260	17.085	4	0.2711	0.5073
T2	260 - 245	16.057	3	0.2440	0.4967
T3	245 - 240	15.585	3	0.1865	0.4955
T4	240 - 225	15.469	3	0.1849	0.5676
T5	225 - 185	15.168	22	0.1997	0.6462
T6	185 - 175	13.967	22	0.3009	1.1429
T7	175 - 155	13.484	22	0.3175	1.2118
T8	155 - 140	12.519	22	0.2747	1.3029
T9	140 - 125	12.023	22	0.2471	1.4257
T10	125 - 100	11.451	22	0.2578	1.4473
T11	100 - 75	10.105	26	0.3495	1.8096
T12	75 - 50	8.023	26	0.4167	1.4881
T13	50 - 45	5.776	26	0.4727	1.2286
T14	45 - 40	5.277	26	0.4912	1.0009
T15	40 - 35	4.754	26	0.5101	0.9701
T16	35 - 30	4.206	26	0.5290	0.7397
T17	30 - 25	3.639	26	0.5472	0.7091
T18	25 - 20	3.045	26	0.5640	0.4765
T19	20 - 15	2.438	26	0.5789	0.4459
T20	15 - 10	1.806	26	0.5913	0.2112
T21	10 - 5	1.173	26	0.6005	0.2130
T22	5 - 1	0.530	26	0.6061	0.1085

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
285.00	(1) 1.5' Standoff	4	17.085	0.2711	0.5073	56642
284.00	3.6' x 2.4" Pipe Mount	4	17.085	0.2711	0.5073	56642
283.70	Beacon	4	17.085	0.2711	0.5073	56642

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
283.00	5'x2.4" Pipe Mount	4	17.085	0.2711	0.5073	56642
280.50	8' Platform w/handrail	4	17.085	0.2711	0.5073	56642
268.50	DCRT-4	4	16.421	0.2645	0.5146	24627
250.00	Guy	3	15.720	0.2005	0.4653	13468
182.00	AIR 32	22	13.829	0.3081	1.1691	12909
155.00	Guy	22	12.519	0.2747	1.3029	7600
135.00	Andrew VHLP800-11-6GR Dish	22	11.850	0.2467	1.4287	13462
130.00	MA0528-28AN	22	11.660	0.2505	1.4262	13494
129.00	ANT150F2	22	11.619	0.2517	1.4276	13497
125.00	ANT150F2	22	11.451	0.2578	1.4473	13089
98.00	SP4-107BC1C1R	26	9.962	0.3576	1.8049	7212
97.50	4' Pipe Mount	26	9.925	0.3595	1.8022	7348
96.50	DB586-Y	26	9.851	0.3633	1.7951	7678
96.00	PAL8-65A	26	9.813	0.3652	1.7908	7870
93.00	PAD6-107A	26	9.578	0.3755	1.7557	9337
75.00	Guy	26	8.023	0.4167	1.4881	20379

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	280	Leg	A325N	0.5000	3	0.49	13.25	0.037 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	3.77	14.99	0.252 ✔	1	Member Block Shear
		Horizontal	A325N	0.6250	1	0.44	12.43	0.035 ✔	1	Bolt Shear
		Top Girt	A325N	0.6250	1	0.70	12.43	0.056 ✔	1	Bolt Shear
T2	260	Leg	A325N	0.5000	3	4.84	13.25	0.366 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	5.18	14.99	0.346 ✔	1	Member Block Shear
		Horizontal	A325N	0.6250	1	1.26	12.43	0.101 ✔	1	Bolt Shear
		Top Guy Pull-Off@250	A325N	0.6250	3	3.79	11.89	0.318 ✔	1	Member Block Shear
T3	245	Leg	A325N	0.5000	3	2.69	13.25	0.203 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	4.41	14.99	0.294 ✔	1	Member Block Shear
		Bottom Guy Pull-Off@250	A325N	0.6250	3	1.28	24.85	0.052 ✔	1	Bolt Shear
T4	240	Leg	A325N	0.5000	3	2.85	13.25	0.215 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	3.65	9.53	0.383 ✔	1	Member Block Shear
		Horizontal	A325N	0.6250	1	0.49	12.43	0.039 ✔	1	Bolt Shear
T5	225	Leg	A325N	0.5000	3	3.24	13.25	0.244 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	2.90	12.43	0.234 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	1	0.54	12.43	0.043 ✔	1	Bolt Shear
T6	185	Leg	A325N	0.5000	3	3.53	13.25	0.266 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	5.37	9.53	0.563 ✔	1	Member Block Shear
		Horizontal	A325N	0.6250	1	0.88	12.43	0.071 ✔	1	Bolt Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T7	175	Leg	A325N	0.5000	3	3.58	13.25	0.270 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7.15	14.99	0.477 ✓	1	Member Block Shear
		Horizontal	A325N	0.6250	1	0.79	12.43	0.064 ✓	1	Bolt Shear
T8	155	Leg	A325N	0.5000	3	5.26	13.25	0.397 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7.76	14.99	0.518 ✓	1	Member Block Shear
		Horizontal	A325N	0.6250	1	0.82	12.43	0.066 ✓	1	Bolt Shear
		Top Guy Pull-Off@155	A325N	0.6250	1	8.81	13.66	0.645 ✓	1	Member Block Shear
T9	140	Leg	A325N	0.5000	3	4.92	13.25	0.371 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	5.35	14.99	0.357 ✓	1	Member Block Shear
		Horizontal	A325N	0.6250	1	0.82	12.43	0.066 ✓	1	Bolt Shear
T10	125	Leg	A325N	0.5000	3	5.34	13.25	0.403 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	3.86	12.43	0.310 ✓	1	Bolt Shear
		Horizontal	A325N	0.6250	1	0.91	12.43	0.073 ✓	1	Bolt Shear
T11	100	Leg	A325N	0.5000	3	5.86	13.25	0.442 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	10.16	14.99	0.678 ✓	1	Member Block Shear
		Horizontal	A325N	0.6250	1	2.94	12.43	0.237 ✓	1	Bolt Shear
T12	75	Leg	A325N	0.5000	3	6.17	13.25	0.465 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7.26	14.99	0.484 ✓	1	Member Block Shear
		Horizontal	A325N	0.6250	1	1.06	12.43	0.086 ✓	1	Bolt Shear
		Top Guy Pull-Off@75	A325N	0.6250	1	6.95	13.66	0.509 ✓	1	Member Block Shear
T13	50	Diagonal	A325N	0.6250	1	5.30	12.43	0.426 ✓	1	Bolt Shear
		Horizontal	A325N	0.6250	1	1.53	12.43	0.123 ✓	1	Bolt Shear
T14	45	Diagonal	A325N	0.6250	1	5.66	12.43	0.455 ✓	1	Bolt Shear
		Top Girt	A325N	0.6250	1	0.43	10.02	0.043 ✓	1	Member Bearing
T15	40	Diagonal	A325N	0.6250	1	4.55	12.43	0.366 ✓	1	Bolt Shear
		Top Girt	A325N	0.6250	1	0.42	10.02	0.042 ✓	1	Member Bearing
T16	35	Diagonal	A325N	0.6250	1	5.57	12.43	0.448 ✓	1	Bolt Shear
		Top Girt	A325N	0.6250	1	0.42	10.02	0.042 ✓	1	Member Bearing
T17	30	Leg	A325N	0.5000	3	7.24	13.25	0.547 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	5.24	12.43	0.422 ✓	1	Bolt Shear
		Top Girt	A325N	0.6250	1	0.40	10.02	0.040 ✓	1	Member Bearing
T18	25	Diagonal	A325N	0.6250	1	6.45	12.43	0.519 ✓	1	Bolt Shear
		Horizontal	A325N	0.6250	1	1.58	12.43	0.127 ✓	1	Bolt Shear
T19	20	Diagonal	A325N	0.6250	1	6.10	12.43	0.491 ✓	1	Bolt Shear
		Horizontal	A325N	0.6250	1	1.57	12.43	0.127 ✓	1	Bolt Shear
T20	15	Diagonal	A325N	0.6250	1	7.19	12.43	0.578 ✓	1	Bolt Shear
		Horizontal	A325N	0.6250	1	1.57	12.43	0.127 ✓	1	Bolt Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T21	10	Diagonal	A325N	0.6250	1	7.20	12.43	0.579 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	1	1.55	12.43	0.125 ✔	1	Bolt Shear
T22	5	Leg	A325N	0.5000	3	6.96	13.25	0.525 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	6.75	12.43	0.543 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	1	1.55	12.43	0.125 ✔	1	Bolt Shear

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
T2	250.00 (A) (427)	3/4 EHS	4.66	58.30	14.19	34.98	1.000	2.466 ✔
	250.00 (A) (428)	3/4 EHS	4.66	58.30	14.23	34.98	1.000	2.458 ✔
	250.00 (B) (421)	3/4 EHS	4.66	58.30	14.00	34.98	1.000	2.499 ✔
	250.00 (B) (422)	3/4 EHS	4.66	58.30	14.33	34.98	1.000	2.441 ✔
	250.00 (C) (415)	3/4 EHS	4.66	58.30	14.53	34.98	1.000	2.408 ✔
	250.00 (C) (416)	3/4 EHS	4.66	58.30	13.79	34.98	1.000	2.536 ✔
T8	155.00 (A) (435)	7/8 EHS	6.38	79.70	23.01	47.82	1.000	2.079 ✔
	155.00 (B) (434)	7/8 EHS	6.38	79.70	23.02	47.82	1.000	2.077 ✔
	155.00 (C) (433)	7/8 EHS	6.38	79.70	23.07	47.82	1.000	2.073 ✔
T12	75.00 (A) (438)	9/16 EHS	4.90	35.00	13.67	21.00	1.000	1.536 ✔
	75.00 (B) (437)	9/16 EHS	4.90	35.00	13.48	21.00	1.000	1.558 ✔
	75.00 (C) (436)	9/16 EHS	4.90	35.00	13.58	21.00	1.000	1.546 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	280 - 260	2 1/4	20.00	5.00	106.7 K=1.00	3.9761	-13.20	70.77	0.187 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	260 - 245	2 1/4	15.00	5.00	106.7 K=1.00	3.9761	-23.91	70.77	0.338 [1] ✔
T3	245 - 240	2 1/4	5.00	5.00	106.7 K=1.00	3.9761	-24.21	70.77	0.342 [1] ✔
T4	240 - 225	2 1/4	15.00	5.00	106.7 K=1.00	3.9761	-28.14	70.77	0.398 [1] ✔
T5	225 - 185	2 1/4	40.00	5.00	106.7 K=1.00	3.9761	-31.03	70.77	0.438 [1] ✔
T6	185 - 175	2 1/4	10.00	5.00	106.7 K=1.00	3.9761	-31.98	70.77	0.452 [1] ✔
T7	175 - 155	2 1/2	20.00	5.00	96.0 K=1.00	4.9087	-45.73	97.91	0.467 [1] ✔
T8	155 - 140	2 1/2	15.00	5.00	96.0 K=1.00	4.9087	-47.38	97.91	0.484 [1] ✔
T9	140 - 125	2 1/2	15.00	5.00	96.0 K=1.00	4.9087	-47.10	97.91	0.481 [1] ✔
T10	125 - 100	2 1/2	25.00	5.00	96.0 K=1.00	4.9087	-52.48	97.91	0.536 [1] ✔
T11	100 - 75	2 1/2	25.00	5.00	96.0 K=1.00	4.9087	-53.59	97.91	0.547 [1] ✔
T12	75 - 50	2 1/2	25.00	5.00	96.0 K=1.00	4.9087	-61.35	97.91	0.627 [1] ✔
T13	50 - 45	2 1/2	5.00	5.00	96.0 K=1.00	4.9087	-63.12	97.91	0.645 [1] ✔
T14	45 - 40	2 1/2	5.00	5.00	96.0 K=1.00	4.9087	-63.41	97.91	0.648 [1] ✔
T15	40 - 35	2 1/2	5.00	5.00	96.0 K=1.00	4.9087	-64.64	97.91	0.660 [1] ✔
T16	35 - 30	2 1/2	5.00	5.00	96.0 K=1.00	4.9087	-64.46	97.91	0.658 [1] ✔
T17	30 - 25	2 1/2	5.00	5.00	96.0 K=1.00	4.9087	-65.19	97.91	0.666 [1] ✔
T18	25 - 20	2 1/2	5.00	5.00	96.0 K=1.00	4.9087	-64.57	97.91	0.659 [1] ✔
T19	20 - 15	2 1/2	5.00	5.00	96.0 K=1.00	4.9087	-64.92	97.91	0.663 [1] ✔
T20	15 - 10	2 1/2	5.00	5.00	96.0 K=1.00	4.9087	-63.99	97.91	0.654 [1] ✔
T21	10 - 5	2 1/2	5.00	5.00	96.0 K=1.00	4.9087	-63.96	97.91	0.653 [1] ✔
T22	5 - 1	2 1/2	4.00	4.00	76.8 K=1.00	4.9087	-62.65	116.59	0.537 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	280 - 260	2L2x2x3/16x3/8	6.40	5.83	116.1 K=1.00	1.4300	-3.78	22.79	0.166 [1] ✔
T2	260 - 245	2L 'a' > 33.5183 in - 9 2L2x2x3/16x3/8	6.40	2.92	95.8 K=1.00	1.4300	-5.79	28.59	0.203 [1] ✔
T3	245 - 240	2L 'a' > 16.7591 in - 39 2L2x2x3/16x3/8	6.40	5.83	116.1 K=1.00	1.4300	-3.78	22.79	0.166 [1] ✔
T4	240 - 225	2L 'a' > 33.5183 in - 66 L2 1/2x2 1/2x3/16	6.40	5.83	141.4 K=1.00	0.9020	-4.25	10.19	0.417 [1] ✔
T5	225 - 185	P1.5x0.120 (1.5 OD)	6.40	6.10	149.5 K=1.00	0.5202	-2.81	5.26	0.535 [1] ✔
T6	185 - 175	L2 1/2x2 1/2x3/16	6.40	5.83	141.4 K=1.00	0.9020	-6.04	10.19	0.593 [1] ✔
T7	175 - 155	2L2x2x3/16x3/8	6.40	5.80	115.9 K=1.00	1.4300	-7.89	22.86	0.345 [1] ✔
T8	155 - 140	2L 'a' > 33.3266 in - 160 2L2x2x3/16x3/8	6.40	5.80	115.9 K=1.00	1.4300	-7.69	22.86	0.336 [1] ✔
T9	140 - 125	2L 'a' > 33.3266 in - 194 2L2x2x3/16x3/8	6.40	5.80	115.9 K=1.00	1.4300	-6.58	22.86	0.288 [1] ✔
T10	125 - 100	2L 'a' > 33.3266 in - 221 P1.5x0.120 (1.5 OD)	6.40	6.07	148.7 K=1.00	0.5202	-3.80	5.31	0.716 [1] ✔
T11	100 - 75	2L2x2x3/16x3/8	6.40	5.80	115.9 K=1.00	1.4300	-10.17	22.86	0.445 [1] ✔
T12	75 - 50	2L 'a' > 33.3266 in - 269 2L2x2x3/16x3/8	6.40	5.80	115.9 K=1.00	1.4300	-8.12	22.86	0.355 [1] ✔
T13	50 - 45	2L 'a' > 33.3266 in - 319 P1.5x0.120 (1.5 OD)	6.40	6.07	148.7 K=1.00	0.5202	-4.17	5.31	0.784 [1] ✔
T14	45 - 40	L2x2x1/4	6.40	5.78	177.3 K=1.00	0.9380	-5.66	6.74	0.840 [1] ✔
T15	40 - 35	P1.5x0.120 (1.5 OD)	6.40	6.07	148.7 K=1.00	0.5202	-3.33	5.31	0.627 [1] ✔
T16	35 - 30	L2x2x1/4	6.40	5.78	177.3 K=1.00	0.9380	-5.57	6.74	0.826 [1] ✔
T17	30 - 25	P1.5x0.120 (1.5 OD)	6.40	6.07	148.7 K=1.00	0.5202	-3.78	5.31	0.712 [1] ✔
T18	25 - 20	L2x2x1/4	6.40	5.78	177.3 K=1.00	0.9380	-6.45	6.74	0.957 [1] ✔
T19	20 - 15	P1.5x0.120 (1.5 OD)	6.40	6.07	148.7 K=1.00	0.5202	-4.68	5.31	0.881 [1] ✔
T20	15 - 10	L2x2x3/8	6.40	5.78	178.2 K=1.00	1.3600	-7.19	9.67	0.743 [1] ✔
T21	10 - 5	L2x2x3/8	6.40	5.78	178.2 K=1.00	1.3600	-5.72	9.67	0.591 [1] ✔
T22	5 - 1	P1.5x0.120 (1.5 OD)	5.66	5.36	131.4 K=1.00	0.5202	-6.75	6.79	0.993 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	280 - 260	P1.5x.120	4.00	3.81	93.4 K=1.00	0.5202	-0.44	10.65	0.041 [1] ✔
T2	260 - 245	P1.5x.120	4.00	3.81	93.4 K=1.00	0.5202	-1.04	10.65	0.097 [1] ✔
T4	240 - 225	P1.5x.120	4.00	3.81	93.4 K=1.00	0.5202	-0.49	10.65	0.046 [1] ✔
T5	225 - 185	P1.5x.120	4.00	3.81	93.4 K=1.00	0.5202	-0.54	10.65	0.050 [1] ✔
T6	185 - 175	P1.5x.120	4.00	3.81	93.4 K=1.00	0.5202	-0.75	10.65	0.070 [1] ✔
T7	175 - 155	P1.5x.120	4.00	3.81	93.4 K=1.00	0.5202	-0.79	10.65	0.074 [1] ✔
T8	155 - 140	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-0.82	10.70	0.077 [1] ✔
T9	140 - 125	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-0.82	10.70	0.077 [1] ✔
T10	125 - 100	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-0.91	10.70	0.085 [1] ✔
T11	100 - 75	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-1.62	10.70	0.152 [1] ✔
T12	75 - 50	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-1.06	10.70	0.099 [1] ✔
T13	50 - 45	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-1.53	10.70	0.143 [1] ✔
T18	25 - 20	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-1.58	10.70	0.148 [1] ✔
T19	20 - 15	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-1.57	10.70	0.147 [1] ✔
T20	15 - 10	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-1.57	10.70	0.147 [1] ✔
T21	10 - 5	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-1.55	10.70	0.145 [1] ✔
T22	5 - 1	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-1.55	10.70	0.145 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	280 - 260	P1.5x0.120 (1.5 OD)	4.00	3.81	93.4	0.5202	-0.70	10.65	0.066 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T14	45 - 40	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-0.08	10.70	0.008 [1] ✔
T15	40 - 35	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-0.06	10.70	0.006 [1] ✔
T16	35 - 30	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-0.08	10.70	0.007 [1] ✔
T17	30 - 25	P1.5x.120	4.00	3.79	92.9 K=1.00	0.5202	-0.04	10.70	0.004 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T22	5 - 1	2C6x8.2	4.00	3.79	61.4 K=1.00	4.8000	-1.13	127.56	0.009 [1] ✔

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	260 - 245	2L2x2x3/16x3/8 2L 'a' > 18.7381 in - 40	4.00	3.26	99.8 K=1.00	1.4300	-6.94	27.44	0.253 [1] ✔

[1] P_u / ϕP_n controls

Bottom Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	245 - 240	2L2x2x3/16x3/8 2L 'a' > 18.7381 in - 62	4.00	3.26	99.8 K=1.00	1.4300	-3.85	27.44	0.140 [1] ✔

[1] P_u / ϕP_n controls

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	260 - 245 (419)	2L2 1/2x2x3/16x3/8	7.90	7.77	118.9 K=0.83	1.6200	-17.57	24.93	0.705 [1] ✔
		2L 'a' > 31.2694 in - 419							
T2	260 - 245 (420)	2L2 1/2x2x3/16x3/8	7.90	7.77	118.9 K=0.83	1.6200	-17.03	24.93	0.683 [1] ✔
		2L 'a' > 31.2694 in - 420							
T2	260 - 245 (425)	2L2 1/2x2x3/16x3/8	7.90	7.77	118.9 K=0.83	1.6200	-17.11	24.93	0.686 [1] ✔
		2L 'a' > 31.2694 in - 425							
T2	260 - 245 (426)	2L2 1/2x2x3/16x3/8	7.90	7.77	118.9 K=0.83	1.6200	-17.46	24.93	0.700 [1] ✔
		2L 'a' > 31.2694 in - 426							
T2	260 - 245 (431)	2L2 1/2x2x3/16x3/8	7.90	7.77	118.9 K=0.83	1.6200	-17.40	24.93	0.698 [1] ✔
		2L 'a' > 31.2694 in - 431							
T2	260 - 245 (432)	2L2 1/2x2x3/16x3/8	7.90	7.77	118.9 K=0.83	1.6200	-17.33	24.93	0.695 [1] ✔
		2L 'a' > 31.2694 in - 432							

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	280 - 260	2 1/4	20.00	5.00	106.7	3.9761	10.85	128.82	0.084 [1] ✔
T2	260 - 245	2 1/4	15.00	5.00	106.7	3.9761	19.78	128.82	0.154 [1] ✔
T5	225 - 185	2 1/4	40.00	5.00	106.7	3.9761	1.72	128.82	0.013 [1] ✔
T7	175 - 155	2 1/2	20.00	5.00	96.0	4.9087	11.06	159.04	0.070 [1] ✔
T10	125 - 100	2 1/2	25.00	5.00	96.0	4.9087	4.49	159.04	0.028 [1] ✔
T11	100 - 75	2 1/2	25.00	5.00	96.0	4.9087	3.50	159.04	0.022 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	280 - 260	2L2x2x3/16x3/8	6.40	5.83	118.7	0.8616	3.77	37.48	0.101 [1] ✔
T2	260 - 245	2L 'a' > 33.5183 in - 9 2L2x2x3/16x3/8	6.40	2.92	59.3	0.8616	5.18	37.48	0.138 [1] ✔
T3	245 - 240	2L 'a' > 16.7591 in - 39 2L2x2x3/16x3/8	6.40	5.83	118.7	0.8616	4.41	37.48	0.118 [1] ✔
T4	240 - 225	2L 'a' > 33.5183 in - 66 L2 1/2x2 1/2x3/16	6.40	5.83	94.1	0.5710	3.65	24.84	0.147 [1] ✔
T5	225 - 185	P1.5x0.120 (1.5 OD)	6.40	6.10	149.5	0.5202	2.90	16.86	0.172 [1] ✔
T6	185 - 175	L2 1/2x2 1/2x3/16	6.40	5.83	94.1	0.5710	5.37	24.84	0.216 [1] ✔
T7	175 - 155	2L2x2x3/16x3/8	6.40	5.80	118.0	0.8616	7.15	37.48	0.191 [1] ✔
T8	155 - 140	2L 'a' > 33.3266 in - 160 2L2x2x3/16x3/8	6.40	5.80	118.0	0.8616	7.76	37.48	0.207 [1] ✔
T9	140 - 125	2L 'a' > 33.3266 in - 200 2L2x2x3/16x3/8	6.40	5.80	118.0	0.8616	5.35	37.48	0.143 [1] ✔
T10	125 - 100	2L 'a' > 33.3266 in - 215 P1.5x0.120 (1.5 OD)	6.40	6.07	148.7	0.5202	3.86	16.86	0.229 [1] ✔
T11	100 - 75	2L2x2x3/16x3/8	6.40	5.80	118.0	0.8616	10.16	37.48	0.271 [1] ✔
T12	75 - 50	2L 'a' > 33.3266 in - 263 2L2x2x3/16x3/8	6.40	5.80	118.0	0.8616	7.26	37.48	0.194 [1] ✔
T13	50 - 45	2L 'a' > 33.3266 in - 313 P1.5x0.120 (1.5 OD)	6.40	6.07	148.7	0.5202	5.30	16.86	0.314 [1] ✔
T14	45 - 40	L2x2x1/4	6.40	5.78	119.6	0.5629	3.37	27.44	0.123 [1] ✔
T15	40 - 35	P1.5x0.120 (1.5 OD)	6.40	6.07	148.7	0.5202	4.55	16.86	0.270 [1] ✔
T16	35 - 30	L2x2x1/4	6.40	5.78	119.6	0.5629	3.00	27.44	0.109 [1] ✔
T17	30 - 25	P1.5x0.120 (1.5 OD)	6.40	6.07	148.7	0.5202	5.24	16.86	0.311 [1] ✔
T18	25 - 20	L2x2x1/4	6.40	5.78	119.6	0.5629	3.86	27.44	0.141 [1] ✔
T19	20 - 15	P1.5x0.120 (1.5 OD)	6.40	6.07	148.7	0.5202	6.10	16.86	0.362 [1] ✔
T20	15 - 10	L2x2x3/8	6.40	5.78	122.6	0.8091	4.66	39.44	0.118 [1] ✔
T21	10 - 5	L2x2x3/8	6.40	5.78	122.6	0.8091	7.20	35.19	0.205 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T22	5 - 1	P1.5x0.120 (1.5 OD)	5.66	5.36	131.4	0.5202	4.47	16.86	0.265 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	280 - 260	P1.5x.120	4.00	3.81	93.4	0.5202	0.44	16.86	0.026 [1]
T2	260 - 245	P1.5x.120	4.00	3.81	93.4	0.5202	1.26	16.86	0.075 [1]
T4	240 - 225	P1.5x.120	4.00	3.81	93.4	0.5202	0.49	16.86	0.029 [1]
T5	225 - 185	P1.5x.120	4.00	3.81	93.4	0.5202	0.54	16.86	0.032 [1]
T6	185 - 175	P1.5x.120	4.00	3.81	93.4	0.5202	0.88	16.86	0.052 [1]
T7	175 - 155	P1.5x.120	4.00	3.81	93.4	0.5202	0.79	16.86	0.047 [1]
T8	155 - 140	P1.5x.120	4.00	3.79	92.9	0.5202	0.82	16.86	0.049 [1]
T9	140 - 125	P1.5x.120	4.00	3.79	92.9	0.5202	0.82	16.86	0.049 [1]
T10	125 - 100	P1.5x.120	4.00	3.79	92.9	0.5202	0.91	16.86	0.054 [1]
T11	100 - 75	P1.5x.120	4.00	3.79	92.9	0.5202	2.94	16.86	0.175 [1]
T12	75 - 50	P1.5x.120	4.00	3.79	92.9	0.5202	1.06	16.86	0.063 [1]
T13	50 - 45	P1.5x.120	4.00	3.79	92.9	0.5202	1.53	16.86	0.091 [1]
T18	25 - 20	P1.5x.120	4.00	3.79	92.9	0.5202	1.58	16.86	0.094 [1]
T19	20 - 15	P1.5x.120	4.00	3.79	92.9	0.5202	1.57	16.86	0.093 [1]
T20	15 - 10	P1.5x.120	4.00	3.79	92.9	0.5202	1.57	16.86	0.093 [1]
T21	10 - 5	P1.5x.120	4.00	3.79	92.9	0.5202	1.55	16.86	0.092 [1]
T22	5 - 1	P1.5x.120	4.00	3.79	92.9	0.5202	1.55	16.86	0.092 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	280 - 260	P1.5x0.120 (1.5 OD)	4.00	3.81	93.4	0.5202	0.70	16.86	0.042 [1] ✔
T14	45 - 40	P1.5x.120	4.00	3.79	92.9	0.5202	0.43	16.86	0.025 [1] ✔
T15	40 - 35	P1.5x.120	4.00	3.79	92.9	0.5202	0.42	16.86	0.025 [1] ✔
T16	35 - 30	P1.5x.120	4.00	3.79	92.9	0.5202	0.42	16.86	0.025 [1] ✔
T17	30 - 25	P1.5x.120	4.00	3.79	92.9	0.5202	0.40	16.86	0.024 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T22	5 - 1	2C6x8.2	4.00	3.79	61.4	4.8000	1.47	155.52	0.009 [1] ✔

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T2	260 - 245	2L2x2x3/16x3/8	4.00	3.26	74.1	0.8616	11.36	37.48	0.303 [1] ✔
T8	155 - 140	2L 'a' > 18.7381 in - 42 2L2x2x3/16x3/8	4.00	3.79	73.7	0.8616	8.81	37.48	0.235 [1] ✔
T12	75 - 50	2L 'a' > 21.7913 in - 185 2L2x2x3/16x3/8 2L 'a' > 21.7913 in - 293	4.00	3.79	73.7	0.8616	6.95	37.48	0.186 [1] ✔

[1] P_u / ϕP_n controls

Bottom Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	245 - 240	2L2x2x3/16x3/8	4.00	3.26	74.1	0.8616	0.40	37.48	0.011 [1] ✔
		2L 'a' > 18.7381 in - 62							

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	260 - 245 (417)	2L3x3x1/4x3/8	6.11	6.02	77.6	2.8800	15.83	93.31	0.170 [1] ✔
		2L 'a' > 28.6083 in - 417							
T2	260 - 245 (418)	2L3x3x1/4x3/8	6.11	6.02	77.6	2.8800	16.01	93.31	0.172 [1] ✔
		2L 'a' > 28.6083 in - 418							
T2	260 - 245 (423)	2L3x3x1/4x3/8	6.11	6.02	77.6	2.8800	15.64	93.31	0.168 [1] ✔
		2L 'a' > 28.6083 in - 423							
T2	260 - 245 (424)	2L3x3x1/4x3/8	6.11	6.02	77.6	2.8800	15.87	93.31	0.170 [1] ✔
		2L 'a' > 28.6083 in - 424							
T2	260 - 245 (429)	2L3x3x1/4x3/8	6.11	6.02	77.6	2.8800	15.50	93.31	0.166 [1] ✔
		2L 'a' > 28.6083 in - 429							
T2	260 - 245 (430)	2L3x3x1/4x3/8	6.11	6.02	77.6	2.8800	16.21	93.31	0.174 [1] ✔
		2L 'a' > 28.6083 in - 430							

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	280 - 260	Leg	2 1/4	1	-13.20	70.77	18.7	Pass
T2	260 - 245	Leg	2 1/4	30	-23.91	70.77	33.8 36.6 (b)	Pass
T3	245 - 240	Leg	2 1/4	60	-24.21	70.77	34.2	Pass
T4	240 - 225	Leg	2 1/4	69	-28.14	70.77	39.8	Pass
T5	225 - 185	Leg	2 1/4	88	-31.03	70.77	43.8	Pass
T6	185 - 175	Leg	2 1/4	140	-31.98	70.77	45.2	Pass
T7	175 - 155	Leg	2 1/2	154	-45.73	97.91	46.7	Pass
T8	155 - 140	Leg	2 1/2	182	-47.38	97.91	48.4	Pass
T9	140 - 125	Leg	2 1/2	203	-47.10	97.91	48.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T10	125 - 100	Leg	2 1/2	223	-52.48	97.91	53.6	Pass
T11	100 - 75	Leg	2 1/2	258	-53.59	97.91	54.7	Pass
T12	75 - 50	Leg	2 1/2	291	-61.35	97.91	62.7	Pass
T13	50 - 45	Leg	2 1/2	324	-63.12	97.91	64.5	Pass
T14	45 - 40	Leg	2 1/2	333	-63.41	97.91	64.8	Pass
T15	40 - 35	Leg	2 1/2	342	-64.64	97.91	66.0	Pass
T16	35 - 30	Leg	2 1/2	351	-64.46	97.91	65.8	Pass
T17	30 - 25	Leg	2 1/2	360	-65.19	97.91	66.6	Pass
T18	25 - 20	Leg	2 1/2	369	-64.57	97.91	65.9	Pass
T19	20 - 15	Leg	2 1/2	376	-64.92	97.91	66.3	Pass
T20	15 - 10	Leg	2 1/2	387	-63.99	97.91	65.4	Pass
T21	10 - 5	Leg	2 1/2	394	-63.96	97.91	65.3	Pass
T22	5 - 1	Leg	2 1/2	405	-62.65	116.59	53.7	Pass
T1	280 - 260	Diagonal	2L2x2x3/16x3/8	9	-3.78	22.79	16.6	Pass
							25.2 (b)	
T2	260 - 245	Diagonal	2L2x2x3/16x3/8	39	-5.79	28.59	20.3	Pass
							34.6 (b)	
T3	245 - 240	Diagonal	2L2x2x3/16x3/8	66	-3.78	22.79	16.6	Pass
							29.4 (b)	
T4	240 - 225	Diagonal	L2 1/2x2 1/2x3/16	87	-4.25	10.19	41.7	Pass
T5	225 - 185	Diagonal	P1.5x0.120 (1.5 OD)	132	-2.81	5.26	53.5	Pass
T6	185 - 175	Diagonal	L2 1/2x2 1/2x3/16	145	-6.04	10.19	59.3	Pass
T7	175 - 155	Diagonal	2L2x2x3/16x3/8	160	-7.89	22.86	34.5	Pass
							47.7 (b)	
T8	155 - 140	Diagonal	2L2x2x3/16x3/8	194	-7.69	22.86	33.6	Pass
							51.8 (b)	
T9	140 - 125	Diagonal	2L2x2x3/16x3/8	221	-6.58	22.86	28.8	Pass
							35.7 (b)	
T10	125 - 100	Diagonal	P1.5x0.120 (1.5 OD)	248	-3.80	5.31	71.6	Pass
T11	100 - 75	Diagonal	2L2x2x3/16x3/8	269	-10.17	22.86	44.5	Pass
							67.8 (b)	
T12	75 - 50	Diagonal	2L2x2x3/16x3/8	319	-8.12	22.86	35.5	Pass
							48.4 (b)	
T13	50 - 45	Diagonal	P1.5x0.120 (1.5 OD)	328	-4.17	5.31	78.4	Pass
T14	45 - 40	Diagonal	L2x2x1/4	337	-5.66	6.74	84.0	Pass
T15	40 - 35	Diagonal	P1.5x0.120 (1.5 OD)	346	-3.33	5.31	62.7	Pass
T16	35 - 30	Diagonal	L2x2x1/4	357	-5.57	6.74	82.6	Pass
T17	30 - 25	Diagonal	P1.5x0.120 (1.5 OD)	366	-3.78	5.31	71.2	Pass
T18	25 - 20	Diagonal	L2x2x1/4	375	-6.45	6.74	95.7	Pass
T19	20 - 15	Diagonal	P1.5x0.120 (1.5 OD)	384	-4.68	5.31	88.1	Pass
T20	15 - 10	Diagonal	L2x2x3/8	393	-7.19	9.67	74.3	Pass
T21	10 - 5	Diagonal	L2x2x3/8	402	-5.72	9.67	59.1	Pass
T22	5 - 1	Diagonal	P1.5x0.120 (1.5 OD)	414	-6.75	6.79	99.3	Pass
T1	280 - 260	Horizontal	P1.5x.120	18	-0.44	10.65	4.1	Pass
T2	260 - 245	Horizontal	P1.5x.120	33	-1.04	10.65	9.7	Pass
							10.1 (b)	
T4	240 - 225	Horizontal	P1.5x.120	77	-0.49	10.65	4.6	Pass
T5	225 - 185	Horizontal	P1.5x.120	91	-0.54	10.65	5.0	Pass
T6	185 - 175	Horizontal	P1.5x.120	149	-0.75	10.65	7.0	Pass
							7.1 (b)	
T7	175 - 155	Horizontal	P1.5x.120	157	-0.79	10.65	7.4	Pass
T8	155 - 140	Horizontal	P1.5x.120	196	-0.82	10.70	7.7	Pass
T9	140 - 125	Horizontal	P1.5x.120	205	-0.82	10.70	7.7	Pass
T10	125 - 100	Horizontal	P1.5x.120	228	-0.91	10.70	8.5	Pass
T11	100 - 75	Horizontal	P1.5x.120	285	2.94	16.86	17.5	Pass
							23.7 (b)	
T12	75 - 50	Horizontal	P1.5x.120	305	-1.06	10.70	9.9	Pass
T13	50 - 45	Horizontal	P1.5x.120	326	-1.53	10.70	14.3	Pass
T18	25 - 20	Horizontal	P1.5x.120	371	-1.58	10.70	14.8	Pass
T19	20 - 15	Horizontal	P1.5x.120	379	-1.57	10.70	14.7	Pass
T20	15 - 10	Horizontal	P1.5x.120	388	-1.57	10.70	14.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T21	10 - 5	Horizontal	P1.5x.120	399	-1.55	10.70	14.5	Pass
T22	5 - 1	Horizontal	P1.5x.120	406	-1.55	10.70	14.5	Pass
T1	280 - 260	Top Girt	P1.5x0.120 (1.5 OD)	5	-0.70	10.65	6.6	Pass
T14	45 - 40	Top Girt	P1.5x.120	336	0.43	16.86	2.5 4.3 (b)	Pass
T15	40 - 35	Top Girt	P1.5x.120	343	0.42	16.86	2.5 4.2 (b)	Pass
T16	35 - 30	Top Girt	P1.5x.120	354	0.42	16.86	2.5 4.2 (b)	Pass
T17	30 - 25	Top Girt	P1.5x.120	361	0.40	16.86	2.4 4.0 (b)	Pass
T22	5 - 1	Bottom Girt	2C6x8.2	411	1.47	155.52	0.9	Pass
T2	260 - 245	Guy A@250	3/4	428	14.23	34.98	40.7	Pass
T8	155 - 140	Guy A@155	7/8	435	23.01	47.82	48.1	Pass
T12	75 - 50	Guy A@75	9/16	438	13.67	21.00	65.1	Pass
T2	260 - 245	Guy B@250	3/4	422	14.33	34.98	41.0	Pass
T8	155 - 140	Guy B@155	7/8	434	23.02	47.82	48.1	Pass
T12	75 - 50	Guy B@75	9/16	437	13.48	21.00	64.2	Pass
T2	260 - 245	Guy C@250	3/4	415	14.53	34.98	41.5	Pass
T8	155 - 140	Guy C@155	7/8	433	23.07	47.82	48.2	Pass
T12	75 - 50	Guy C@75	9/16	436	13.58	21.00	64.7	Pass
T2	260 - 245	Top Guy Pull-Off@250	2L2x2x3/16x3/8	42	11.36	37.48	30.3 31.8 (b)	Pass
T8	155 - 140	Top Guy Pull-Off@155	2L2x2x3/16x3/8	185	8.81	37.48	23.5 64.5 (b)	Pass
T12	75 - 50	Top Guy Pull-Off@75	2L2x2x3/16x3/8	293	6.95	37.48	18.6 50.9 (b)	Pass
T3	245 - 240	Bottom Guy Pull-Off@250	2L2x2x3/16x3/8	62	-3.85	27.44	14.0	Pass
T2	260 - 245	Torque Arm Top@250	2L3x3x1/4x3/8	430	16.21	93.31	17.4	Pass
T2	260 - 245	Torque Arm Bottom@250	2L2 1/2x2x3/16x3/8	419	-17.57	24.93	70.5	Pass

Summary		
Leg (T17)	66.6	Pass
Diagonal (T22)	99.3	Pass
Horizontal (T11)	23.7	Pass
Top Girt (T1)	6.6	Pass
Bottom Girt (T22)	0.9	Pass
Guy A (T12)	65.1	Pass
Guy B (T12)	64.2	Pass
Guy C (T12)	64.7	Pass
Top Guy Pull-Off (T8)	64.5	Pass
Bottom Guy Pull-Off (T3)	14.0	Pass
Torque Arm Top (T2)	17.4	Pass
Torque Arm Bottom (T2)	70.5	Pass
Bolt Checks	67.8	Pass
RATING =	**99.3**	**Pass**

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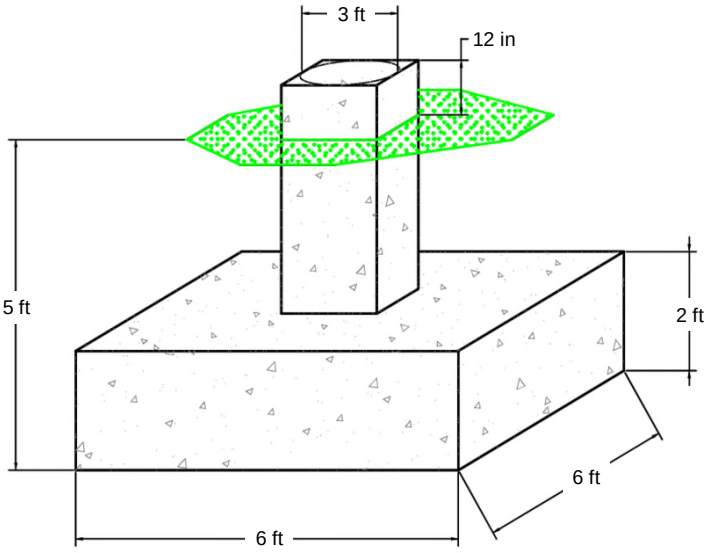
Version: 3.6
Version Date: 5/20/2016

Guyed Tower Pad & Pier Calculator

Project & Site Details			
Project No.	16BJWL1400	Rev.	0
Project Name	Waterbury 2, CT		
Site ID	CT04877-A		
Date	Wednesday, August 03, 2016		
Code	ANSI/TIA-222-G		
Overstress Capacity, Soil	100%		
Overstress Capacity, Steel	100%		

Tower Reactions		
Shear Load, V_{TNX}	3	k
Axial Load, P_{TNX}	188	k

Foundation Information		
Density Concrete	0.15	kcf
Pier Shape	Square	ft
Pier Width, d	3	ft
Pier Height Above Grade, ext	1	ft
Pad Length, L	6	ft
Pad Width, W	6	ft
Pad Thickness, T	2	ft
Pad Bearing Depth, D	5	ft
Has is been Modified?	No	-



Soil Information			
Ultimate Bearing Capacity, Net	30.0	ksf	Boring Log
# of Layers Above Pad	2	-	SB-4
Average Soil Unit Weight	123.333333	pcf	
Soil Layer stop at Top of Pad	TRUE	Depth	3'

Layer	Depth at Bottom (ft)	Unit Weight (pcf)	Layer Thickness (ft)
1	2	125	2
2	3	120	1

Soil Bearing Capacity		
Weight of Concrete	16.2	k
Axial Force, P_u	191.5	k
Axial Bearing Stress, q_u	5.8	ksf
Allowable Bearing Stress, Φq_n	18.0	ksf
Bearing Capacity	**32.3%**	**PASS**

Pad Steel Information		
Horizontal Bar Size	#5	-
Pad Bar Diameter, d_b	0.625	in
Number of Horizontal Bars, n	6	-
Strength of Concrete, f_c'	3000	psi
Clear Cover, cc_{pad}	3	in
Yield Strength of Steel, F_y	60	ksi

Pad Steel Capacities		
One-Way Critical Shear, V_{crit}	Negligible	k
Nominal Shear Strength, ΦV_n	118.7	k
One-Way Shear Capacity	**OK**	**PASS**
Two-Way Critical Shear, V_{crit}	18.5	k
Nominal Shear Strength, ΦV_n	184.8	k
Two-Way Shear Capacity	**10.0%**	**PASS**
Moment at Edge of Pier, M_u	37.3	k-ft
Nominal Flexural Strength, ΦM_n	163.7	k-ft
Steel Yielding?	**OK**	
Pad Flexural Capacity	**22.8%**	**PASS**

Pier Steel Information		
Vertical Bar Size	#5	-
Pier Bar Diameter, d_v	0.625	in
Number of Vertical Bars, n_v	8	-
Tie Size	#3	-
Tie Bar Diameter, d_t	0.375	in
Clear Cover, cc_{pier}	3	in

Pier Steel Capacities		
Axial Compressive Load, P_u	188.0	k
Nominal Compressive Strength, ΦP_n	1791.8	k
Compressive Capacity	**10.5%**	**PASS**
Reinforcement Stress, f_t	8.2	ksi
Allowable Stress, F_t	54.0	ksi
Bending Capacity	**15.2%**	**PASS**

Legend	Rock Anchor Spreadsheet (v1.11)	
Input	Site ID:	CT04877-A
Output	Site Name:	Waterbury 2
Calculated Value	Project ID:	16FAZL1400
Passing Result	Design Code:	G
Failing Result	Sheet Type:	Analysis

Notes
Length of anchor is measured from top of soil profile (ie. layer depth = 0 ft.)
For single anchors, leave anchor spacing blank or set to 0 ft.
Spreadsheet is setup for weight of soil to control anchor capacity.
Concrete bearing check is also dependent on the plate width.
Maximum soil layer depth and length of anchor is 50 ft.

Soil Properties

Depth to Bottom of Layer (ft)	Layer Thickness (ft)	Layer Number	Layer Density (pcf)	Layer Failure Cone Angle (deg)	Allowable Layer Weight (kips)	Ultimate Grout to Soil Skin Friction (psi)	Skin Friction Grouping Factor	Allowable Grout to Soil Skin Friction (psf)
2.5	2.5	1	115	31	30.8	150	1	112.5
5	2.5	2	169	45	25.8	150	1	112.5
15	10	3	170	45	8.0	150	1	112.5

General Anchor Inputs		
Length of Rock Anchor:	15	ft
Bore Hole Diameter:	3	in
Grout Type:	Cement Grout	
Lt, Soil Profile to Top Development Length:	2.5	ft
Ldv, Development Length:	12.5	ft
Lwr, Soil Failure Cone Length:	8.8	ft

Weight of Soil Check		
Anchor Spacing:	6	ft
Anchor Pattern:	1	
Average Volume Reduction Factor:	0.82	
Weight of Soil Safety Factor:	0.9	
Allowable Weight of Soil:	64.6	kips
Weight of Soil Percent Capacity:	100.0%	OK

Skin Friction Uplift Check		
Skin Friction Safety Factor:	0.75	
Allowable Grout to Soil Skin Friction:	190.9	kips
Grout to Soil Skin Friction Percent Capacity:	40.3%	OK

Skin Friction Compression Check		
Allowable Grout to Soil Skin Friction:	190.9	kips
Grout to Soil Skin Friction Percent Capacity:	100.0%	OK

Rod Tension Check		
Rod Grade:	Williams A615 (Fu=124)	
Rod Yield Strength:	91	ksi
Rod Ultimate Strength:	124	ksi
Rod Thread Form:	Upset (Fu=124)	
Rod Nominal Diameter:	2	in
Rod Gross Area:	3.14	in^2
Rod Net Area:	2.43	in^2
Rod Tension Safety Factor:	0.75	
Williams Design Safety Factor:	1	
Allowable Rod Tension:	165.8	kips
Rod Tensile Percent Capacity:	38.9%	OK

Rod Compression Check		
Rod Compression Safety Factor:	0.90	
Allowable Rod Compression:	257.3	kips
Rod Compression Percent Capacity:	74.2%	OK

Solve

Bond Strength Check		
Grout Ultimate Bond Strength:	0.51	ksi
Rod Solid Diameter:	2.00	in
Bond Strength Safety Factor:	0.50	
Allowable Grout to Steel Bond Strength:	239.4	kips
Grout to Steel Percent Capacity:	27.0%	OK

Plate Shear Check		
Plate Width:	9	in
Plate Thickness:	1	in
Plate Grade:	A36	
Plate Yield Stress:	36	ksi
Maximum Shear:	95.4	kips
Plate Shear Safety Factor:	0.9	
Allowable Shear Capacity:	174.96	kips
Equivalent Allowable Point Load:	349.9	kips
Plate Percent Capacity:	54.5%	OK

Concrete Bearing Check		
Concrete Compressive Strength:	3	ksi
Min. Top/Bot. of Concrete To Plate Center:	42	in
Minimum Anchor Edge Distance:	18	in
Effective Concrete Depth:	41.5	in
Maximum Bearing Load:	190.9	kips
Concrete Bearing Safety Factor:	0.65	
Allowable Concrete Bearing:	268.5	kips
Concrete Bearing Percent Capacity:	71.1%	OK

Analysis Summary		
Plate:	PL 9'' x 9'' x 1'' A36 with 2-2/16'' Ø Hole	
Anchor Rod:	2'' Ø (Williams A615 (Fu=124))	
Grout Column:	3'' Ø Bore Hole with Cement Grout	
Length of Anchor:	15	ft
Allowable Anchor Uplift Capacity:	64.6	kips
Allowable Anchor Compression Capacity:	190.9	kips
Micropile Verification Testing Design Load:	35.9	kips

Ultimate Capacities		
Weight of Soil:	71.7	kips
Skin Friction Uplift:	213.8	kips
Skin Friction Compression:	254.5	kips
Rod Tension:	221.1	kips
Rod Compression:	285.9	kips
Bond Strength:	478.8	kips
Plate Shear (Equivalent Point Load):	388.8	kips
Concrete Bearing:	413.1	kips

Legend	Rock Anchor Spreadsheet (v1.11)	
Input	Site ID:	CT04877-A
Output	Site Name:	Waterbury 2
Calculated Value	Project ID:	16FAZL1400
Passing Result	Design Code:	G
Failing Result	Sheet Type:	Analysis

Notes
Length of anchor is measured from top of soil profile (ie. layer depth = 0 ft.)
For single anchors, leave anchor spacing blank or set to 0 ft.
Spreadsheet is setup for weight of soil to control anchor capacity.
Concrete bearing check is also dependent on the plate width.
Maximum soil layer depth and length of anchor is 50 ft.

Soil Properties

Depth to Bottom of Layer	Layer Thickness	Layer Number	Layer Density	Layer Failure Cone Angle	Allowable Layer Weight	Ultimate Grout to Soil Skin Friction	Skin Friction Grouping Factor	Allowable Grout to Soil Skin Friction
(ft)	(ft)		(pcf)	(deg)	(kips)	(psi)		(psf)
2	2	1	110	30	16.6	0	1	0
3	1	2	135	40	7.4	0	1	0
4	1	3	135	40	5.2	150	1	112.5
4.5	0.5	4	135	40	1.9	150	1	112.5
9	4.5	5	164	45	4.2	150	1	112.5
13	4	6	165	45	0.0	150	1	112.5

General Anchor Inputs		
Length of Rock Anchor:	13	ft
Bore Hole Diameter:	3	in
Grout Type:	Cement Grout	
Lt, Soil Profile to Top Development Length:	2.0	ft
Ldv, Development Length:	11.0	ft
Lwr, Soil Failure Cone Length:	7.5	ft

Weight of Soil Check		
Anchor Spacing:	6	ft
Anchor Pattern:	1	
Average Volume Reduction Factor:	0.87	
Weight of Soil Safety Factor:	0.9	
Allowable Weight of Soil:	35.3	kips
Weight of Soil Percent Capacity:	100.0%	OK

Skin Friction Uplift Check		
Skin Friction Safety Factor:	0.75	
Allowable Grout to Soil Skin Friction:	128.5	kips
Grout to Soil Skin Friction Percent Capacity:	27.4%	OK

Skin Friction Compression Check		
Allowable Grout to Soil Skin Friction:	128.5	kips
Grout to Soil Skin Friction Percent Capacity:	100.0%	OK

Rod Tension Check		
Rod Grade:	Williams A615 (Fu=124)	
Rod Yield Strength:	91	ksi
Rod Ultimate Strength:	124	ksi
Rod Thread Form:	Upset (Fu=124)	
Rod Nominal Diameter:	2	in
Rod Gross Area:	3.14	in^2
Rod Net Area:	2.43	in^2
Rod Tension Safety Factor:	0.75	
Williams Design Safety Factor:	1	
Allowable Rod Tension:	165.8	kips
Rod Tensile Percent Capacity:	21.3%	OK

Rod Compression Check		
Rod Compression Safety Factor:	0.90	
Allowable Rod Compression:	257.3	kips
Rod Compression Percent Capacity:	49.9%	OK

Solve

Bond Strength Check		
Grout Ultimate Bond Strength:	0.51	ksi
Rod Solid Diameter:	2.00	in
Bond Strength Safety Factor:	0.50	
Allowable Grout to Steel Bond Strength:	210.7	kips
Grout to Steel Percent Capacity:	16.7%	OK

Plate Shear Check		
Plate Width:	9	in
Plate Thickness:	1	in
Plate Grade:	A36	
Plate Yield Stress:	36	ksi
Maximum Shear:	64.3	kips
Plate Shear Safety Factor:	0.9	
Allowable Shear Capacity:	174.96	kips
Equivalent Allowable Point Load:	349.9	kips
Plate Percent Capacity:	36.7%	OK

Concrete Bearing Check		
Concrete Compressive Strength:	3	ksi
Min. Top/Bot. of Concrete To Plate Center:	42	in
Minimum Anchor Edge Distance:	18	in
Effective Concrete Depth:	41.5	in
Maximum Bearing Load:	128.5	kips
Concrete Bearing Safety Factor:	0.65	
Allowable Concrete Bearing:	268.5	kips
Concrete Bearing Percent Capacity:	47.9%	OK

Analysis Summary		
Plate:	PL 9'' x 9'' x 1'' A36 with 2-2/16'' Ø Hole	
Anchor Rod:	2'' Ø (Williams A615 (Fu=124))	
Grout Column:	3'' Ø Bore Hole with Cement Grout	
Length of Anchor:	13	ft
Allowable Anchor Uplift Capacity:	35.3	kips
Allowable Anchor Compression Capacity:	128.5	kips
Micropile Verification Testing Design Load:	19.6	kips

Ultimate Capacities		
Weight of Soil:	39.2	kips
Skin Friction Uplift:	171.3	kips
Skin Friction Compression:	171.3	kips
Rod Tension:	221.1	kips
Rod Compression:	285.9	kips
Bond Strength:	421.3	kips
Plate Shear (Equivalent Point Load):	388.8	kips
Concrete Bearing:	413.1	kips

Legend	Rock Anchor Spreadsheet (v1.11)	
Input	Site ID:	CT04877-A
Output	Site Name:	Waterbury 2
Calculated Value	Project ID:	16FAZL1400
Passing Result	Design Code:	G
Failing Result	Sheet Type:	Analysis

Notes
Length of anchor is measured from top of soil profile (ie. layer depth = 0 ft.)
For single anchors, leave anchor spacing blank or set to 0 ft.
Spreadsheet is setup for weight of soil to control anchor capacity.
Concrete bearing check is also dependent on the plate width.
Maximum soil layer depth and length of anchor is 50 ft.

Soil Properties

Depth to Bottom of Layer	Layer Thickness	Layer Number	Layer Density	Layer Failure Cone Angle	Allowable Layer Weight	Ultimate Grout to Soil Skin Friction	Skin Friction Grouping Factor	Allowable Grout to Soil Skin Friction
(ft)	(ft)		(pcf)	(deg)	(kips)	(psi)		(psf)
2	2	1	115	32	22.7	150	1	112.5
4	2	2	135	40	17.7	150	1	112.5
5	1	3	135	40	5.3	150	1	112.5
6.5	1.5	4	155	45	5.0	150	1	112.5
9	2.5	5	170	45	1.3	150	1	112.5
15	6	6	169	45	0.0	150	1	112.5

General Anchor Inputs		
Length of Rock Anchor:	15	ft
Bore Hole Diameter:	3	in
Grout Type:	Cement Grout	
Lt, Soil Profile to Top Development Length:	2.0	ft
Ldv, Development Length:	13.0	ft
Lwr, Soil Failure Cone Length:	8.5	ft

Weight of Soil Check		
Anchor Spacing:	6	ft
Anchor Pattern:	1	
Average Volume Reduction Factor:	0.84	
Weight of Soil Safety Factor:	0.9	
Allowable Weight of Soil:	52.1	kips
Weight of Soil Percent Capacity:	100.0%	OK

Skin Friction Uplift Check		
Skin Friction Safety Factor:	0.75	
Allowable Grout to Soil Skin Friction:	166.7	kips
Grout to Soil Skin Friction Percent Capacity:	31.3%	OK

Skin Friction Compression Check		
Allowable Grout to Soil Skin Friction:	190.9	kips
Grout to Soil Skin Friction Percent Capacity:	100.0%	OK

Rod Tension Check		
Rod Grade:	Williams A615 (Fu=124)	
Rod Yield Strength:	91	ksi
Rod Ultimate Strength:	124	ksi
Rod Thread Form:	Upset (Fu=124)	
Rod Nominal Diameter:	2	in
Rod Gross Area:	3.14	in^2
Rod Net Area:	2.43	in^2
Rod Tension Safety Factor:	0.75	
Williams Design Safety Factor:	1	
Allowable Rod Tension:	165.8	kips
Rod Tensile Percent Capacity:	31.4%	OK

Rod Compression Check		
Rod Compression Safety Factor:	0.90	
Allowable Rod Compression:	257.3	kips
Rod Compression Percent Capacity:	74.2%	OK

Solve

Bond Strength Check		
Grout Ultimate Bond Strength:	0.51	ksi
Rod Solid Diameter:	2.00	in
Bond Strength Safety Factor:	0.50	
Allowable Grout to Steel Bond Strength:	249.0	kips
Grout to Steel Percent Capacity:	20.9%	OK

Plate Shear Check		
Plate Width:	9	in
Plate Thickness:	1	in
Plate Grade:	A36	
Plate Yield Stress:	36	ksi
Maximum Shear:	95.4	kips
Plate Shear Safety Factor:	0.9	
Allowable Shear Capacity:	174.96	kips
Equivalent Allowable Point Load:	349.9	kips
Plate Percent Capacity:	54.5%	OK

Concrete Bearing Check		
Concrete Compressive Strength:	3	ksi
Min. Top/Bot. of Concrete To Plate Center:	42	in
Minimum Anchor Edge Distance:	18	in
Effective Concrete Depth:	41.5	in
Maximum Bearing Load:	190.9	kips
Concrete Bearing Safety Factor:	0.65	
Allowable Concrete Bearing:	268.5	kips
Concrete Bearing Percent Capacity:	71.1%	OK

Analysis Summary		
Plate:	PL 9'' x 9'' x 1'' A36 with 2-2/16'' Ø Hole	
Anchor Rod:	2'' Ø (Williams A615 (Fu=124))	
Grout Column:	3'' Ø Bore Hole with Cement Grout	
Length of Anchor:	15	ft
Allowable Anchor Uplift Capacity:	52.1	kips
Allowable Anchor Compression Capacity:	190.9	kips
Micropile Verification Testing Design Load:	29.0	kips

Ultimate Capacities		
Weight of Soil:	57.9	kips
Skin Friction Uplift:	222.2	kips
Skin Friction Compression:	254.5	kips
Rod Tension:	221.1	kips
Rod Compression:	285.9	kips
Bond Strength:	497.9	kips
Plate Shear (Equivalent Point Load):	388.8	kips
Concrete Bearing:	413.1	kips

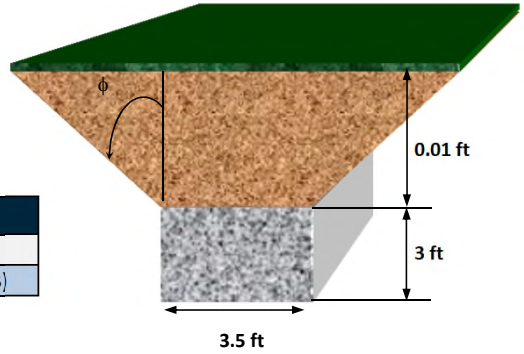
FDH VELOCITEL
ENGINEERING INNOVATION

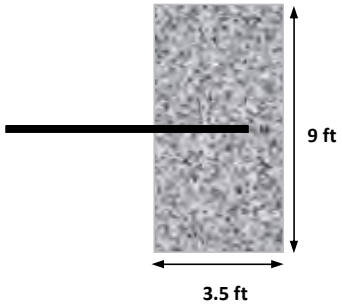
Version:	2.0
Version Date:	6/24/2015

FDH Velocitel -- 6521 Meridien Drive, Raleigh, NC 27616 -- Ph. 919.755.1012 -- Fax 919.755.1031

Guy Anchor Block Foundation Calculator

Project & Site Details	
Project No.	16FAZL1400
Project Name	Waterbury 2, CT
Site ID	CT04877-A
Date	Wednesday, August 03, 2016
Code	ANSI/TIA-222-G





Anchor Block Information			
Density Concrete	150	pcf	Anchor
Length	9	ft	Outer (B)
Width	3.5	ft	
Thickness	3	ft	
Depth to Top of Block	0.01	ft	
Anchor Angle from Grade	49	º	

Soil Information			
Frost Depth	3.33	ft	Boring Log
Water Table Depth	50	ft	SB3
Consider Lateral Passive Pressure within the Frost Depth?	Partial		
# of Layers Above Anchor:	1	Must Be Int. >=1,<=7	
# of Layers Adjacent Anchor:	2	Must Be Int. >=1,<=7	Soil Layers OK?
Total # of Layers:	3	Must Be Int. >=2,<=8	Yes

Layer	Depth at Bottom (ft)	Soil Type (C/S)	Unit Weight (pcf)	Thickness (ft)	Friction Angle (°)	Cohesion (psf)
1	0.01	S	0	0.01	0	0
2	2	C	110	1.99	30	0
3	3.01	C	135	1.01	40	0

Uplift Capacity		
Anchor Uplift	11.7	k
TNX Uplift Reaction	47	k
Modification Allowable	35.3	k
Allowable Uplift Load	14.9	k
Capacity	78.6%	Pass

Lateral Capacity		
Anchor Lateral	-	k
Allowable Lateral Load	6.71	k

Anchor Shaft Capacity		
Anchor Tension	62	k
No. of Anchors	2	-
Anchor Type	Channel	-
Cross Sectional Area	2.39	in^2
Yield Strength, F_y	36	ksi
Factor (LRFD)	0.8	-
Allowable Tension	137.7	k
Capacity	45.0%	Pass

Rock Anchors

A % Capacity$_{UPLIFT}$ = $\frac{\phi P_{UTNX}}{\phi P_{NRA} + \phi W_c}$ = $\frac{47k}{64.6k + 14.9k}$ = 59.1%

C % Capacity$_{UPLIFT}$ = " = $\frac{47}{52.1 + 14.9}$ = 70.1%

Rock Anchor Check

$\phi = 0.75$

$F_{Vb} = 124$ ksi

$A_{NET} = 2.43$ in^2

$A_b = 3.14$ in^2

$V_{TNX} = 41$ k

$T_{TNX} = 47$ k

$\phi R_{NV} = \phi\ 0.45\ F_{Vb}\ A_b$

$= (0.75)(0.45)(124)(3.14)$

$= 131.4$ k

$\frac{41\text{ k}}{2\text{ ANCHORS}} = 20.5$ k/ANCHOR

$\frac{20.5\text{ k}}{131.4\text{ k}} = 15.6\%$

INTERACTION

$\left(\frac{V_{TNX}}{\phi R_{NV}}\right)^2 + \left(\frac{T_{TNX}}{\phi R_{NT}}\right)^2 \leq 1$

$\left(\frac{41\text{ k}}{131.4\text{ k}}\right)^2 + \left(\frac{47k}{165.8\text{ k}}\right)^2 \leq 1$

$0.178 \leq 1$ ✓

SITE NUMBER: CT11392B

181 GARDEN CIRLCE
WATERBURY, CT 06704
NEW HAVEN COUNTY

SITE NAME: WATERBURY/ HILL STREET

RF DESIGN GUIDELINE: 794DB

T-MOBILE TECHNICIAN SITE SAFETY NOTES	
LOCATION	SPECIAL RESTRICTIONS
SECTOR A: ANTENNA/TMA/RRH	ACCESS NOT PERMITTED
SECTOR B: ANTENNA/TMA/RRH	ACCESS NOT PERMITTED
SECTOR C: ANTENNA/TMA/RRH	ACCESS NOT PERMITTED
GPS/LMU:	UNRESTRICTED
RADIO CABINETS:	UNRESTRICTED
PPC DISCONNECT:	UNRESTRICTED
MAIN CIRCUIT D/C:	UNRESTRICTED
NIU/T DEMARC:	UNRESTRICTED
OTHER/SPECIAL:	NONE

GENERAL NOTES

THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF T–MOBILE. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.

THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.

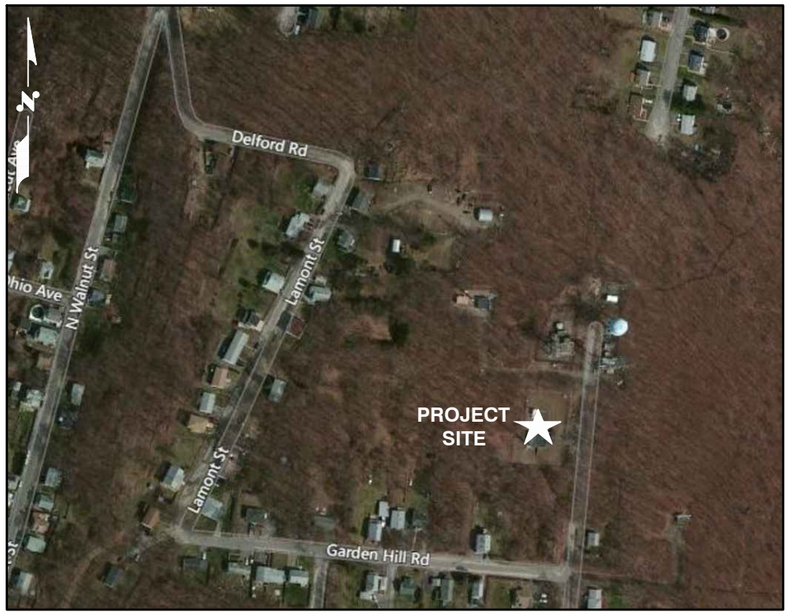
CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE T–MOBILE NORTHEAST, LLC REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

SPECIAL STRUCTURAL NOTES

TOWER OWNER SHALL PROVIDE GLOBAL STRUCTURAL STABILITY ANALYSIS OF EXISTING ANTENNA SUPPORT STRUCTURE. GENERAL CONTRACTOR SCOPE OF WORK SHALL INCLUDE ALL REQUIRED STRUCTURAL MODIFICATIONS, RE–BUNDLING OF COAXIAL CABLES OR OTHER SPECIAL MODIFICATIONS AS OUTLINED THEREIN.

STRUCTURAL DESIGNS AND DETAILS FOR ANTENNA MOUNTS COMPLETED BY HUDSON DESIGN ON BEHALF OF T–MOBILE ARE INCLUSIVE OF THE ENTIRE ANTENNA SUPPORT STRUCTURE (GLOBAL STRUCTURAL STABILITY ANALYSIS BY OTHERS), EXISTING TOWER PLATFORM, EXISTING ANTENNA MOUNTS AND ALL OTHER ASPECTS OF THE STRUCTURE THAT WILL SUPPORT THE T–MOBILE MODERNIZATION EQUIPMENT DEPLOYMENT AS DEPICTED HEREIN.

HUDSON DESIGN ASSUMES THAT THE TOWER IS PROPERLY CONSTRUCTED AND MAINTAINED. ALL STRUCTURAL MEMBERS AND THEIR CONNECTION ARE ASSUMED TO BE IN GOOD CONDITION AND ARE FREE FROM DEFECTS WITH NO DETERIORATION TO ITS MEMBER CAPACITIES



PROJECT SUMMARY

SCOPE OF WORK:	UNMANNED TELECOMMUNICATIONS FACILITY T–MOBILE EQUIPMENT INSTALLATION
ZONING JURISDICTION: (CITY OF WATERBURY, CT)	BASED ON INFORMATION PROVIDED BY T–MOBILE, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS AN ELIGIBLE FACILITY UNDER THE TAX RELIEF ACT OF 2012, 47 USC 1455(A), AND IS SUBJECT TO AN EXPEDITED ELIGIBLE FACILITIES REQUEST/REVIEW AND ZONING PRE–EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW).
SITE ADDRESS:	181 GARDEN CIRLCE WATERBURY, CT 06704
LATITUDE:	41° 34' 10.97" N
LONGITUDE:	73° 01' 01.57" W
JURISDICTION:	NATIONAL, STATE & LOCAL CODES OR ORDINANCES
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
TOWER OWNER:	SBA COMMUNICATIONS CORPORATION 8051 CONGRESS AVENUE BOCA RATON, FL 33487–1307
SITE ID:	CT04877–A
SITE NAME:	WATERBURY 2, CT

APPROVALS

PROJECT MANAGER	DATE
CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING / SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE

DRIVING DIRECTIONS:

HEAD NORTHEAST ON GRIFFIN ROAD SOUTH TOWARD WEST NEWBERRY ROAD. TURN RIGHT ONTO DAY HILL ROAD. USE THE RIGHT LANE TO MERGE ONTO I–91 SOUTH VIA THE RAMP TO HARTFORD. MERGE ONTO I–91 SOUTH. TAKE EXIT 32A–32B FOR I–84 WEST TOWARD WATERBURY. MERGE ONTO I–84. KEEP LEFT TO STAY ON I–84. TAKE EXIT 22 FOR UNION STREET TOWARD DOWNTOWN/WATERBURY. CONTINUE ONTO BRASS MILL DRIVE (SIGNS FOR DOWNTOWN/UCONN WATERBURY CAMPUS). CONTINUE STRAIGHT ONTO WELTON STREET. TURN RIGHT ONTO WALNUT STREET. TURN LEFT ONTO LONG HILL ROAD. TURN RIGHT TO STAY ON LONG HILL ROAD. TURN LEFT ONTO WARNER STREET. TURN RIGHT ONTO GARDEN CIRCLE. DESTINATION WILL BE ON THE LEFT.

ARRIVE AT 181 GARDEN CIRLCE, WATERBURY, CT 06704.

CALL BEFORE YOU DIG
CALL TOLL FREE 1–800–922–4455 OR CALL 811
UNDERGROUND SERVICE ALERT

DRAWING INDEX

SHEET NO.	DESCRIPTION	REV.
T–1	TITLE SHEET	0
GN–1	GENERAL NOTES	0
A–1	COMPOUND PLAN & EQUIPMENT PLAN	0
A–2	ANTENNA LAYOUT & ELEVATION	0
A–3	DETAILS	0
E–1	GROUNDING DIAGRAM	0

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FAX: (978) 336-5586

CHECKED BY: DR

APPROVED BY: DPH

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SBA SITE ID:
CT04877–A
SITE NAME:
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SITE ADDRESS:
181 GARDEN CIRLCE
WATERBURY, CT 06704
NEW HAVEN COUNTY

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

GROUNDING NOTES

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS 2 AWG STRANDED COPPER FOR OUTDOOR BTS.
6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO GROUND BAR.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
11. METAL CONDUIT SHALL BE MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWS COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
12. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/2 IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

   CONTRACTOR – TRANSCEND WIRELESS
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T-MOBILE

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.
7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.
10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.
14. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS. ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
16. CONSTRUCTION SHALL COMPLY WITH SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF T-MOBILE SITES."
17. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
18. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
19. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.
20. APPLICABLE BUILDING CODES:
    SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.
    BUILDING CODE: 2003 IBC WITH 2005 CT SUPPLEMENT, + 2009 & 2013 CT AMENDMENTS
    ELECTRICAL CODE: REFER TO ELECTRICAL DRAWINGS
    LIGHTENING CODE: REFER TO ELECTRICAL DRAWINGS

    SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

    AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;

    AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

    MANUAL OF STEEL CONSTRUCTION, ASD, FOURTEENTH EDITION;

    TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-F, STRUCTURAL STANDARDS FOR STEEL

    EQUIPMENT AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

ABBREVIATIONS

AGL	ABOVE GRADE LEVEL	EQ	EQUAL	REQ	REQUIRED
AWG	AMERICAN WIRE GAUGE	GC	GENERAL CONTRACTOR	RF	RADIO FREQUENCY
BBU	BATTERY BACKUP UNIT	GRC	GALVANIZED RIGID CONDUIT	TBD	TO BE DETERMINED
BTCW	BARE TINNED SOLID COPPER WIRE	MGB	MASTER GROUND BAR	TBR	TO BE REMOVED
BGR	BURIED GROUND RING	MIN	MINIMUM	TBRR	TO BE REMOVED AND REPLACED
BTS	BASE TRANSCEIVER STATION	P	PROPOSED	TYP	TYPICAL
E	EXISTING	NTS	NOT TO SCALE	UG	UNDER GROUND
EGB	EQUIPMENT GROUND BAR	RAD	RADIATION CENTER LINE (ANTENNA)	VIF	VERIFY IN FIELD
EGR	EQUIPMENT GROUND RING	REF	REFERENCE		

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SHEET TITLE
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SHEET NUMBER
GN-1

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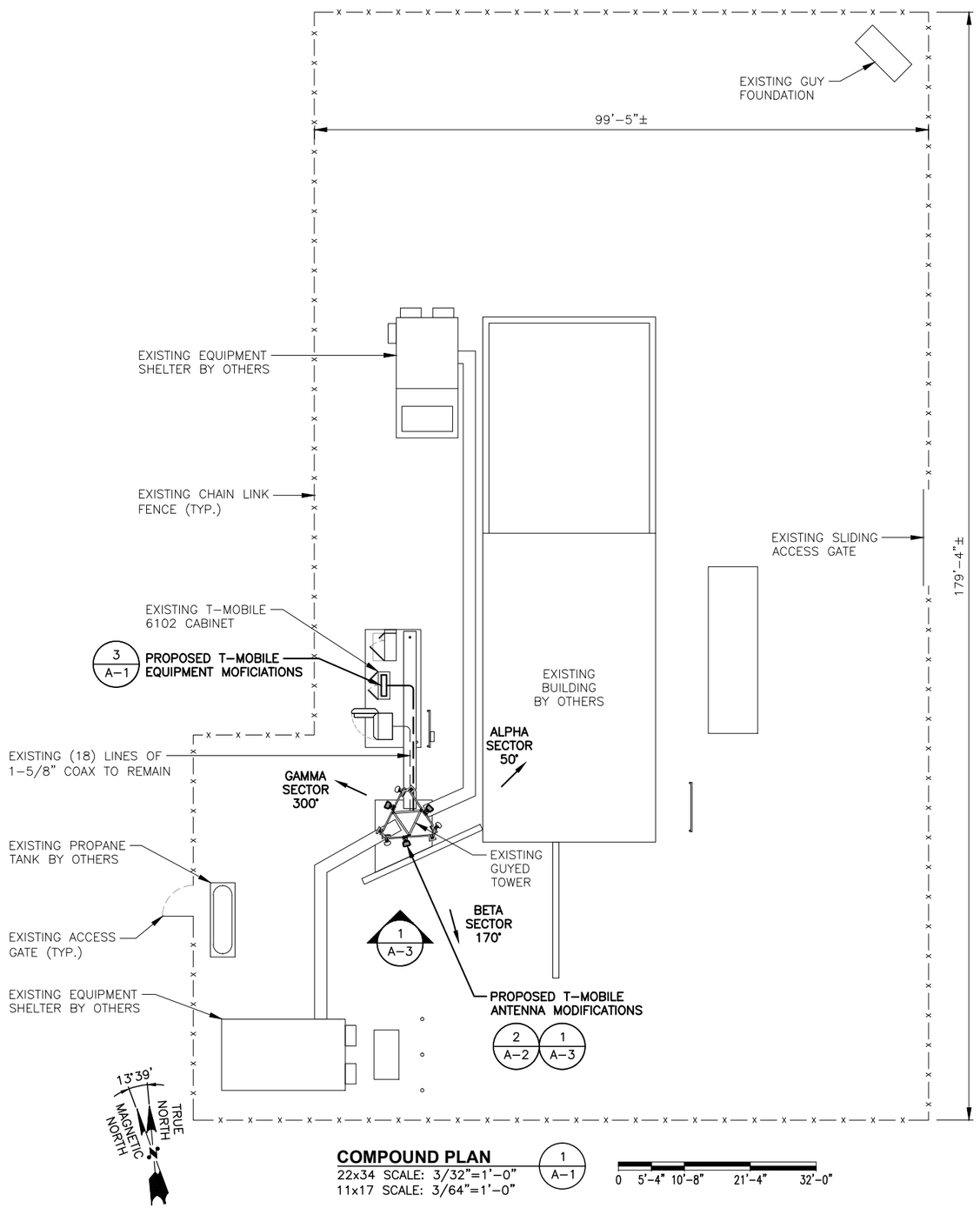
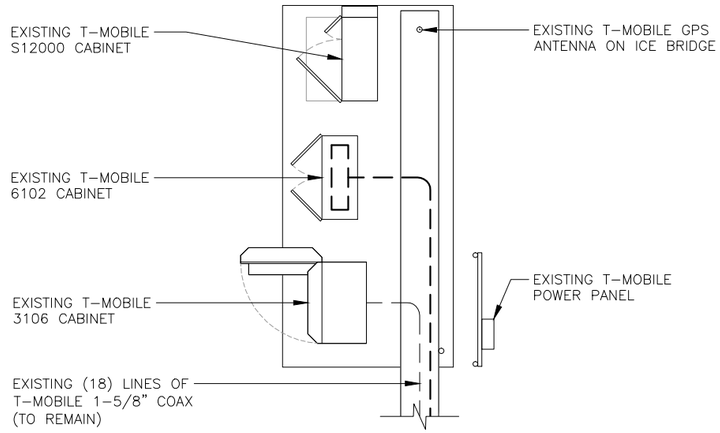
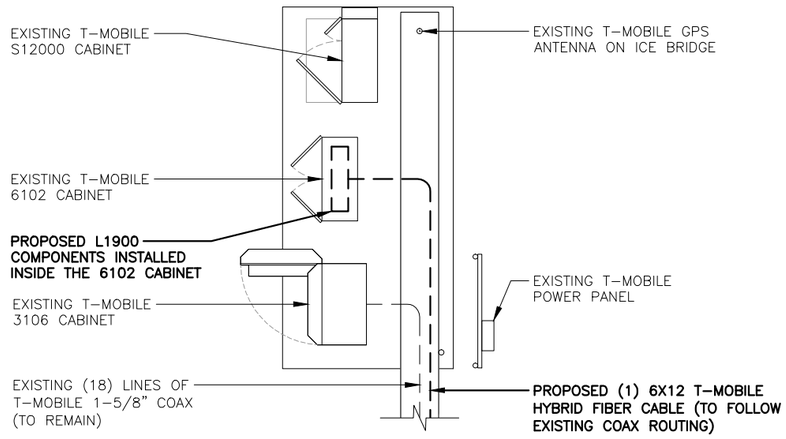


COMPOUND PLAN 1 A-1
22x34 SCALE: 3/32"=1'-0"
11x17 SCALE: 3/64"=1'-0"
0 5'-4" 10'-8" 21'-4" 32'-0"



EXISTING EQUIPMENT PLAN 2 A-1
22x34 SCALE: 1/4"=1'-0"
11x17 SCALE: 1/8"=1'-0"
0 2'-0" 4'-0" 8'-0" 12'-0"



PROPOSED EQUIPMENT PLAN 3 A-1
22x34 SCALE: 1/4"=1'-0"
11x17 SCALE: 1/8"=1'-0"
0 2'-0" 4'-0" 8'-0" 12'-0"

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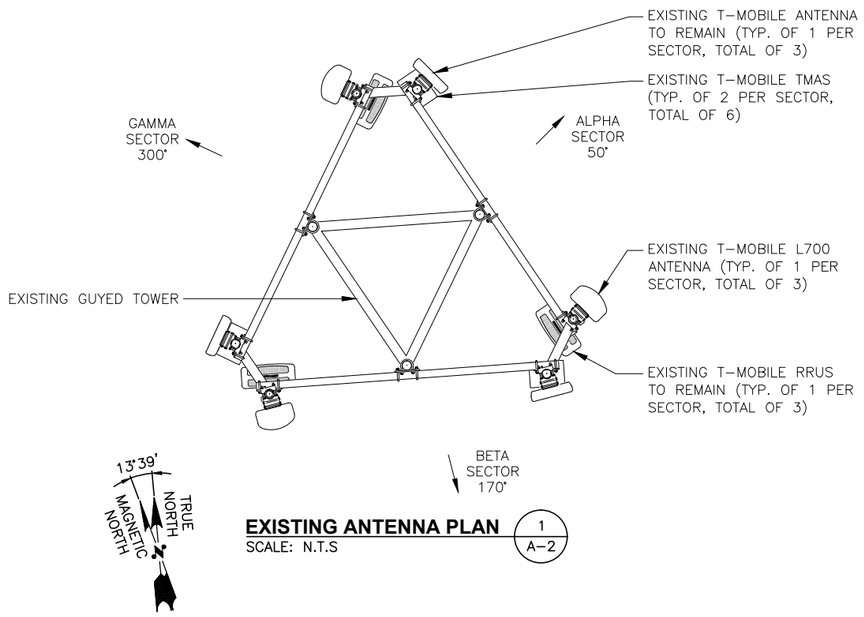
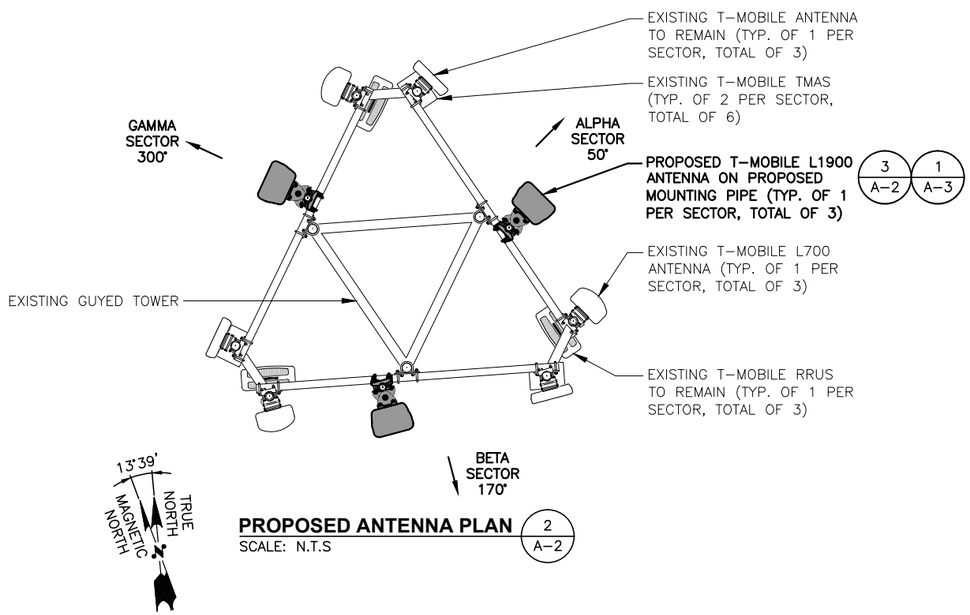
NOTE:

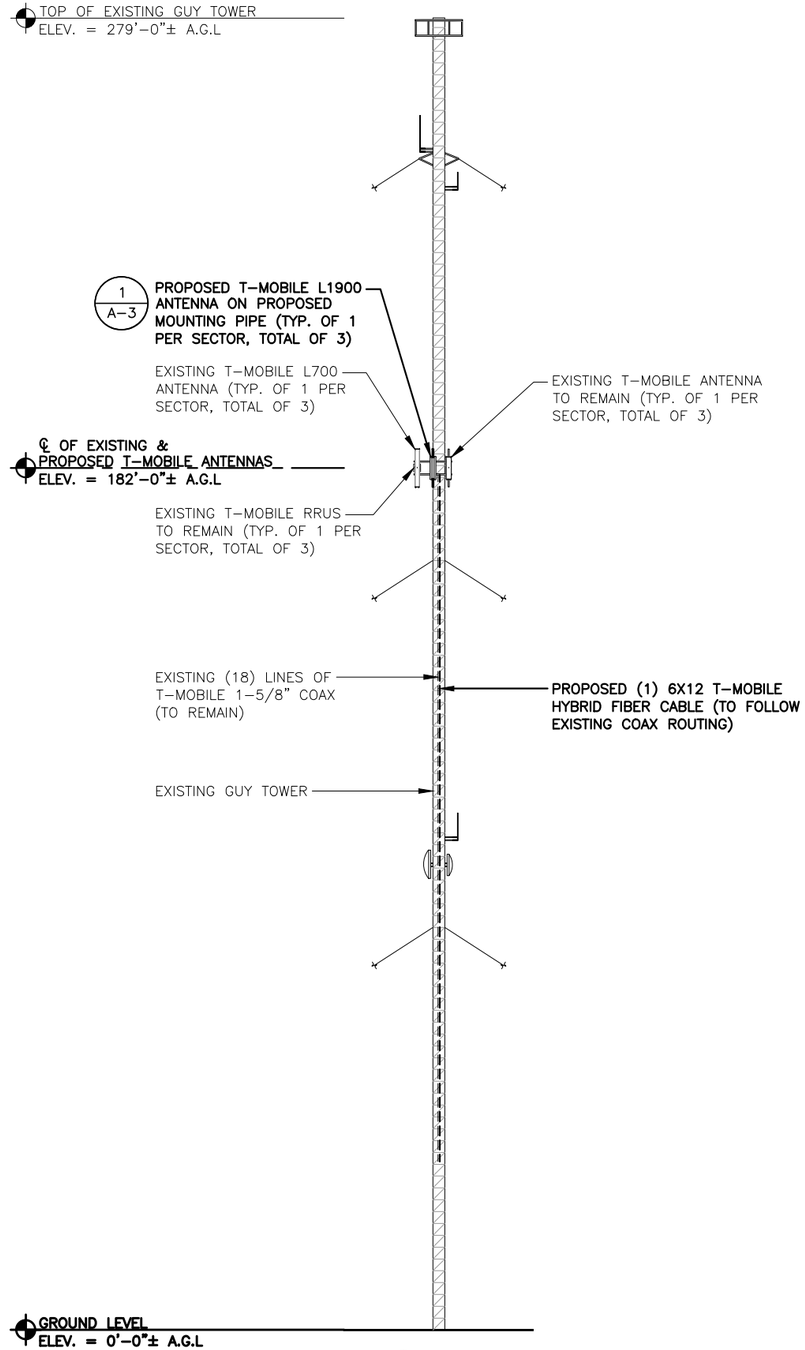
*RF DATA BASED ON PRELIMINARY INFORMATION. REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.



EXISTING ANTENNA PLAN (1 / A-2)
SCALE: N.T.S



PROPOSED ANTENNA PLAN (2 / A-2)
SCALE: N.T.S



SOUTH ELEVATION (3 / A-2)
SCALE: N.T.S

0 16'-0" 32'-0" 64'-0" 96'-0"

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BLOOMFIELD, CT 06002
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1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

CHECKED BY: DR

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	05/05/16	ISSUED FOR REVIEW	MC

SITE NUMBER:
CT11392B
SBA SITE ID:
CT04877-A
SITE NAME:
WATERBURY/ HILL STREET
SITE ADDRESS:
181 GARDEN CIRLCE
WATERBURY, CT 06704
NEW HAVEN COUNTY

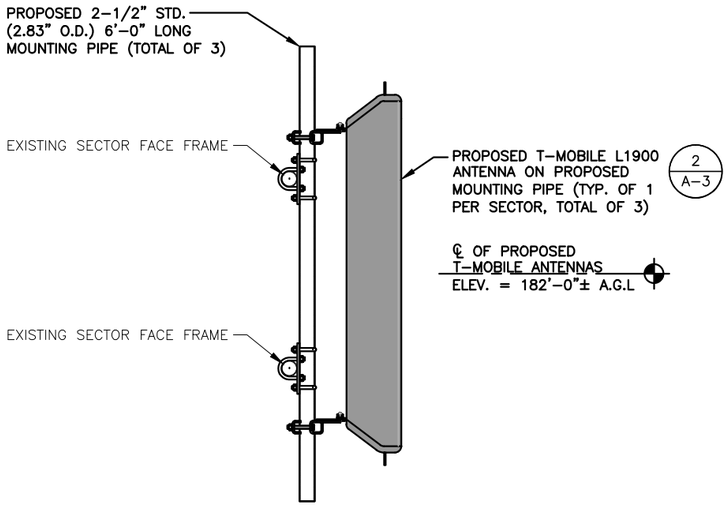
SHEET TITLE
ANTENNA LAYOUT & ELEVATION

SHEET NUMBER
A-2

STRUCTURAL NOTES:
PRIOR TO COMMENCING CONSTRUCTION, GC SHALL REFER TO STRUCTURAL ANALYSIS PROVIDED BY TOWER OWNER TO DETERMINE IF THERE ANY SUPPLEMENTAL OR SPECIAL INSTALLATION REQUIREMENTS, OR RELOCATION ARRANGEMENTS.

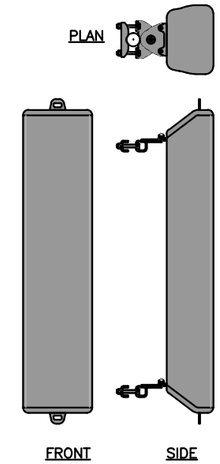
NOTE:

*RF DATA BASED ON PRELIMINARY INFORMATION. REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

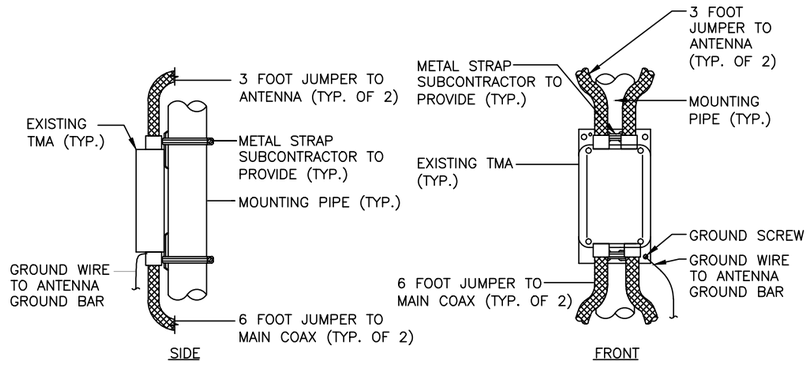


PROPOSED L1900 ANTENNA MOUNT (1 / A–3)
SCALE: N.T.S

L1900 ANTENNA DIMENSIONS	
MODEL #	AIR 32 B66Aa/B2a
MANUF.	ERICSSON
WIDTH	12.9"
DEPTH	8.7"
HEIGHT	56.6"
WEIGHT	132.2 LBS



L1900 ANTENNA DETAIL (2 / A–3)
SCALE: N.T.S



TMA MOUNTING DETAIL (3 / A–3)
SCALE: N.T.S

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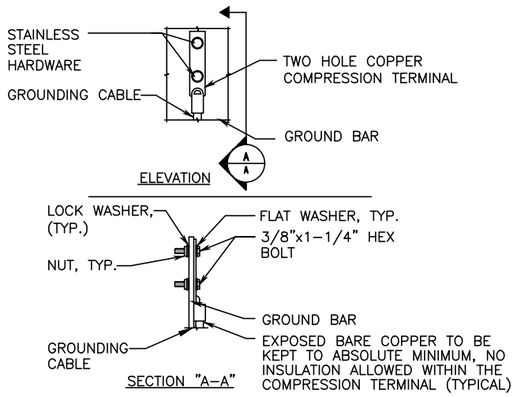
WATERBURY, CT 06704
NEW HAVEN COUNTY

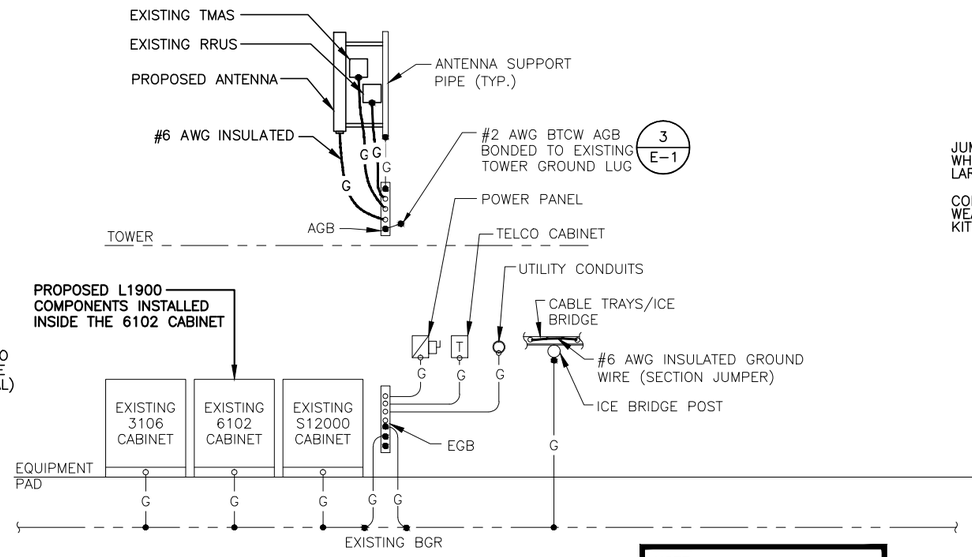
SHEET TITLE
DETAILS

SHEET NUMBER
A-3



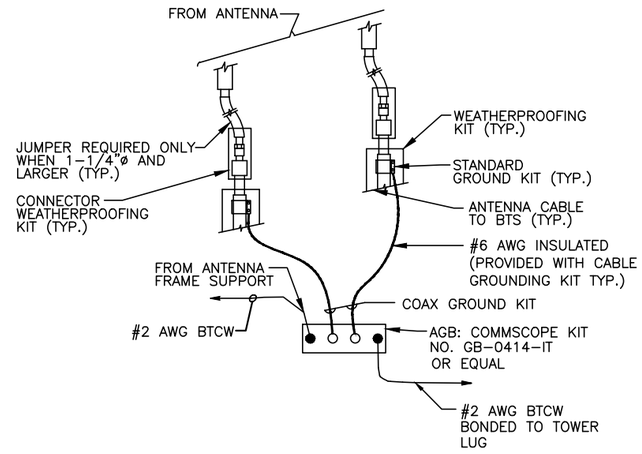
NOTE:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER AGB/EGB, LOWER EGB, AND MGB.

TYPICAL GROUND BAR CONNECTION DETAIL 1 E-1
SCALE: N.T.S



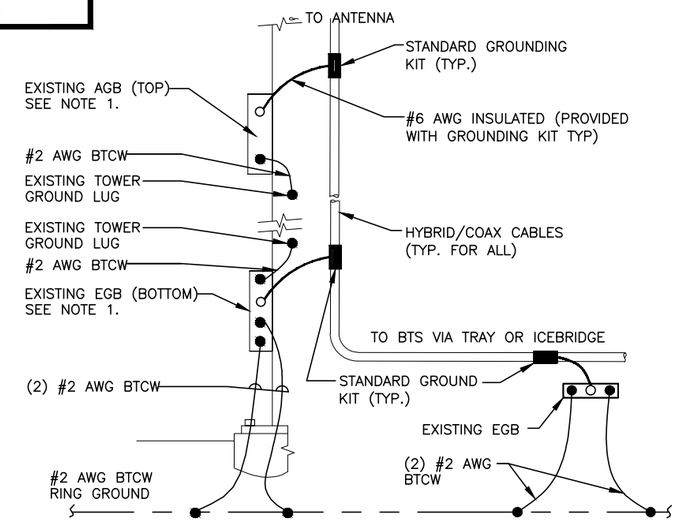
TYPICAL GROUNDING RISER DIAGRAM 2 E-1
SCALE: N.T.S

NOTE:
UNLESS OTHERWISE NOTED, ALL GROUNDING CONDUCTORS ARE #2 AWG BTCW



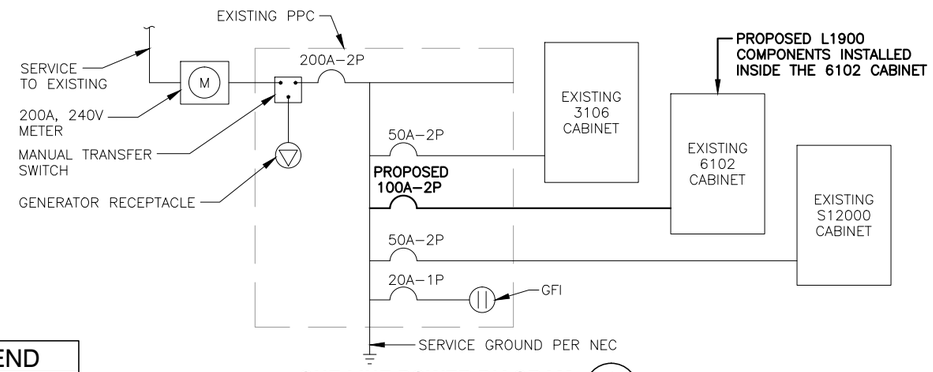
NOTE:
INSTALL CABLE GROUND KIT ABOVE HORIZONTAL BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO AGB/EGB.

TOWER TOP CABLE GROUNDING DETAIL 3 E-1
SCALE: N.T.S



NOTE:
1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER. ANTENNA LOCATION AND CONNECTION ORIENTATION. PROVIDE ADDITIONAL AGB/EGB AS REQUIRED.
2. A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED.

TOWER BOTTOM CABLE GROUNDING DETAIL 5 E-1
SCALE: N.T.S



ONE LINE POWER DIAGRAM 4 E-1
SCALE: N.T.S

ELECTRICAL LEGEND

A	AMPERE
V	VOLT
KWH	KILOWATT - HOUR
C	CONDUIT
GRC	GALVANIZED RIGID CONDUIT
BTCW	BARE TINNED (SOLID) COPPER WIRE (#2 AWG, UNLESS NOTES OTHERWISE)
G	GROUND
MGB	GROUND
	MASTER GROUND BAR — MECHANICAL CONNECTION / CADWELD CONNECTION
AGB/EGB	EQUIPMENT GROUND BAR/ANTENNA GROUND BAR
G	GROUND COPPER WIRE, SIZE AS NOTED
	EXPOSED WIRING
	INSULATED GROUNDING CONDUCTOR(#6 AWG STRANDED, UNLESS NOTED OTHERWISE)
	5/8"x8' COPPER CLAD STAINLESS STEEL GROUND ROD
	EXOTHERMIC (CAD WELD) OR — MECHANICAL (COMPRESSION TYPE) CONNECTION
PPC	POWER PROTECTION CABINET
	OMNI-DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALL

ELECTRICAL & GROUNDING NOTES:

ELECTRICAL & GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL ROOM AND PROPOSED CELL SITE POWER PEDESTAL AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROPOSED CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON DRAWING A-1. PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
11. GROUNDING SHALL COMPLY WITH NEC ART. 250.
12. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
13. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.
14. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
15. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
16. CONNECTIONS TO MGB SHALL BE ARRANGED IN THREE MAIN GROUPS: SURGE PRODUCERS (COAXIAL CABLE GROUND KITS, TELCO AND POWER PANEL GROUND); (GROUNDING ELECTRODE RING OR BUILDING STEEL); NON-SURGING OBJECTS (EGB GROUND IN BTS UNIT).
17. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
18. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
19. BOND ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND ALNA TO EGB PLACED NEAR THE ANTENNA LOCATION.
20. BOND ANTENNA EGB'S AND MGB TO WATER MAIN.
21. TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION.
22. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
23. VERIFY PROPOSED SERVICE UPGRADE WITH LOCAL UTILITY COMPANY PRIOR TO CONSTRUCTION.

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NEW HAVEN COUNTY

SHEET TITLE
GROUNDING DIAGRAM

SHEET NUMBER
E-1

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RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11392B

Waterbury/ Hill St.
181 Garden Circle
Waterbury, CT 06704

August 22, 2016

EBI Project Number: 6216003688

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	3.85 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

August 22, 2016

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11392B – Waterbury/ Hill St.**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **181 Garden Circle, Waterbury, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **181 Garden Circle, Waterbury, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel

6) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

7) Since some of the radios are ground mounted there are additional cabling losses accounted for. For each ground mounted RF path the following losses were calculated. 1.11 dB of additional cable loss for all ground mounted 700 MHz Channels, 2.06 dB of additional cable loss for all ground mounted 1900 MHz channels and 2.12 dB of additional cable loss for all ground mounted 2100 MHz channels. This is based on manufacturers Specifications for 200 feet of 1-5/8" coax cable on each path.

8) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

9) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antennas used in this modeling are the **Ericsson AIR32 B66Aa/B2A** & **RFS APX16PV-16PVL** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR32 B66Aa/B2A** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **RFS APX16PV-16PVL** has a maximum gain of **16.3 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

11) The antenna mounting height centerline of the proposed antennas is **181.5 feet** above ground level (AGL).

12) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

13) All calculations were done with respect to uncontrolled / general public threshold limits.

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR32 B66Aa/B2A	Make / Model:	Ericsson AIR32 B66Aa/B2A	Make / Model:	Ericsson AIR32 B66Aa/B2A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	181.5	Height (AGL):	181.5	Height (AGL):	181.5
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08
Antenna A1 MPE%	1.09	Antenna B1 MPE%	1.09	Antenna C1 MPE%	1.09
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APX16PV-16PVL	Make / Model:	RFS APX16PV-16PVL	Make / Model:	RFS APX16PV-16PVL
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	181.5	Height (AGL):	181.5	Height (AGL):	181.5
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	Channel Count	6
Total TX Power(W):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	4,756.44	ERP (W):	4,756.44	ERP (W):	4,756.44
Antenna A2 MPE%	0.56	Antenna B2 MPE%	0.56	Antenna C2 MPE%	0.56
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	181.5	Height (AGL):	181.5	Height (AGL):	181.5
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	670.07	ERP (W):	670.07	ERP (W):	670.07
Antenna A3 MPE%	0.17	Antenna B3 MPE%	0.17	Antenna C3 MPE%	0.17

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**1.81 %**
Sky Tel 1	0.04 %
Sky Tel 2	0.04 %
Sky Tel 3	0.04 %
Bell South	0.02 %
Arch 1	0.07 %
Arch 2	0.06 %
Mobile com 1	0.08 %
Mobile Com 2	0.08 %
Fedex	0.02%
#7	0.01%
CL&P	1.07%
MediaFLO	0.52 %
Site Total MPE %:	**3.85 %**

T-Mobile Sector A Total:	1.81 %
T-Mobile Sector B Total:	1.81 %
T-Mobile Sector C Total:	1.81 %
Site Total:	3.85 %

T-Mobile Max Power Values Per Sector

T-Mobile _Max Values per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	181.5	5.45	AWS - 2100 MHz	1000	0.54%
T-Mobile PCS - 1900 MHz LTE	2	2,334.27	181.5	5.45	PCS - 1900 MHz	1000	0.54%
T-Mobile AWS - 2100 MHz UMTS	2	785.45	181.5	1.83	AWS - 2100 MHz	1000	0.18%
T-Mobile PCS - 1950 MHz UMTS	2	796.38	181.5	1.86	PCS - 1950 MHz	1000	0.19%
T-Mobile PCS - 1950 MHz GSM	2	796.38	181.5	1.86	PCS - 1950 MHz	1000	0.19%
T-Mobile 700 MHz LTE	1	670.07	181.5	0.78	700 MHz	467	0.17%
						Total:*	**1.81%**

*NOTE: Totals may vary by 0.01% due to summing of remainders

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	1.81 %
Sector B:	1.81 %
Sector C:	1.81 %
T-Mobile Per Sector Maximum:	1.81 %
Site Total:	3.85 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **3.85%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.