FEASIBILITY STRUCTURAL ANALYSIS REPORT

OF

EXISTING STRUCTURE, TECHNOLOGY & OTHER ASSETS

FOR

U.S Forest Service

Tower Location

Region 03, Forest 04
Arizona – Schnebly Hill
Coconino County, Arizona
Latitude: 34°53'9.68"N, Longitude: 111°40'47.01"W

Report Date

Jun-2026

Analysis and Report by:

Shawn Allred
Civil Engineer
FAA Mike Moroney Air Logistics Center
Oklahoma City, Oklahoma

Report Checked by:

Eric Trujillo
Civil Engineer
FAA Mike Moroney Air Logistics Center
Oklahoma City, Oklahoma

Table of Contents

Table of Contents 2
Executive Summary 4
Detailed Analysis Report 5
Results 8
Appendix A - Detailed Analysis Graphics 10
Appendix B – TNX Output Report 11

Tower Utilization with Current Configuration of Equipment/Structure	PASS	95.3%

Summary:

- This structure is recognized as a Self-Support Tower.
- Schnebly Hill Tower has a pass rating for the structure with the equipment currently installed.
- Plumb and twist data collection was unable to be performed due to the inaccessibility of all tower legs.
- 95.3% capacity rating on the diagonal components located in the fourth section of the tower, as listed in the Tower Summary Information (p. 46).

Notes:

- All other tower members are at or below the currently identified member with the highest utilization. Modifications to the tower can both change the member with the highest utilization and greatly increase the percentage of utilization.
- See section capacity table on (page 46) for specific member information.
- Structural analysis results are generated on an assumed tower structural integrity of 100% of perfect condition with no known damage.

Tower Utilization with Updated Configuration of Equipment/Structure	FAIL

Summary:

- Schnebly Hill Tower has failed the rating that allows it to handle two additional antennas.

Notes:

- Upon US Forest Service request, an additional structural analysis was run with two added antennas, (TeleWave ANT150F2) located at the highest available position. Results should be utilized to inform on the addition of new equipment to the tower, but not as justification to move forward with additions or modifications to the existing tower configuration. All additions or modifications should still receive a structural analysis to confirm the towers' ability to accept the proposed modifications and/or equipment.
- Structural analysis results are generated on an assumed tower structural integrity of 100% of perfect condition with no known damage.

Executive Summary

The analyzed tower is approximately 70.1667 feet Self-Support Tower is constructed of 6 sections supporting existing technology and other assets attached at multiple heights on the tower. The tower is located near Coconino County, Arizona and supports operational and functional capacity of the sector. Tower has been identified, and a structural analysis including two additional proposed antennas wouldn't be accepted. As a result, the current load rating in the latest update of the tower capacity does not include the two proposed antennas. A full tower assessment has not been completed, only the tower mapping and equipment inventory have been analyzed with current field notes which constitute the basis of the tower model and analysis.

All information not collected to complete the structural analysis will be derived from past experience, standard industry practice and other available information. Information not provided for incorporation into the structural analysis report will constitute a limiting factor for the operational (or functional) capacity of the tower structure. Completion of a structural analysis does not constitute a verification of the operational degradation of existing technology, appurtenances, and other assets due to potential increases in deflection tilt or twist of the tower structure.

This information was used to determine the tower rating and safe load capacity for the tower in accordance with the provisions contained in ANSI/TIA-222, "Structural Standard for Antenna Supporting Structures and Antennas". The tower was modeled with the currently recorded existing loading under the site-specific environmental loading for Coconino County, Arizona using a Type II Structure in a Class 2 Topography and Class B Exposure on a 6559.1667 FT elevation and 1 FT crest.

The Structural Analysis Report shows the Tower Rating of 95.3% (TIA-222-H, ASCE-7-22) for the existing physical condition of the tower and existing load configuration of attached assets and appurtenances. A tower rating exceeding 100% shows that a tower cannot accommodate the existing technology and other assets under the 222-H design standards.

For all future tower modifications, it is recommended that the tower regardless of rating receive an updated analysis to determine possible effects of the modification on the structure and existing equipment. This should be completed prior to modifications to include the addition or removal of equipment and/or structural components.

Detailed Analysis Report

Objective

Determine overall structural system adequacy for the existing load scenarios defined for the tower site.

Study Scope

FAA-AJW-L500 Structural Support Branch has completed a tower mapping and review of the current tower structure to do discrepancies with tower geometry among USFS service providers. The analysis performed represents the estimated tower capacity and utilization to determine an overall Rating and Pass/Fail result for the adequacy of the tower structure. The tower's structure has not been assessed for acceptable levels of twist, sway and deflection with the existing antennas and mounts attached. Nor have the foundation and soil been analyzed to determine their ability to safe load carrying capacity and utilization. The report for the tower at the above referenced site utilizes details and information from government furnished or collected information to construct the existing tower structure and site conditions. Government furnished or collected information has been referenced from tower mapping field notes and pictures. All information not provided or collected to complete the structural system analysis was derived from past experience, standard industry practice and other available information used from other comparable USFS Programs.

Applicable Codes, Standards and References

Document No.	Title or Nomenclature
ACI 301	American Concrete Institute (ACI) Specifications for Structural Concrete
ACI 318	ACI Building Code Requirements for Structural Concrete
AISC	American Institute of Steel Constructors (AISC) Steel Construction Manual
ASCE 7	American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures
IBC	International Building Code (IBC) and supporting local jurisdiction codes and standards
TIA-222-H	Telecommunications Industry Association (TIA) Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

Basis of Design

The tower is a Self-Support type structure made up of 6 sections up to the top of the structure. Each section is made of an Equal Angle leg section. The tower's current condition information and tower data were formally recorded through onsite photography and field notes collected during the tower mapping, which were subsequently input into the data sheets either in the field or upon the technicians' return to their base of operations. The location, asset inventory and physical condition were noted and used to create the original structural analysis mode.

Data	Document(s)
Tower	FAA Tower Mapping 2026
Loading	FAA Tower Mapping 2026
Soil	N/A
Foundation	N/A

Criteria, Assumptions, and Input

Assumptions

The current documents do not identify enough information or data to provide all of the required input to complete the structural analysis of the tower. The following assumptions were required to complete the structural model:

1. Tower Locality Input (Reference Previous sections)
2. Tower sections rigidly connected at all connection and joints.
3. Tower Coatings modeled through tower weight increases.
4. Tower and Foundation were installed according to and within manufacturer specifications.
5. Tower and Foundations were maintained in accordance with manufacturers specifications.
6. Tower and Foundation are in good working order and condition.
7. Appurtenances, mounts, and technology installed in accordance with manufacturer specifications.
8. Appurtenances, mounts, and technology able to withstand loading.
9. Elevation reference center of antennas and attachment points for mounts.
10. Weights and surface areas of mounts, hardware, feedlines, and other incidental assets are included in the weight and surface areas of the appurtenance and attachment unless otherwise modeled.

Limitations

1. Model may not accurately reflect designed tower and foundation due to construction eccentricities from craftsmanship and quality of materials incorporated into construction.
2. Model may not accurately reflect designed or constructed tower due to the maintenance and rehabilitation of the tower during the service life.
3. Model may not accurately affect actual condition of tower from exposure to non-static loading (i.e. dynamic loads or cyclical loads).
4. Model does not characterize or calculate factored loads on appurtenances, mounts and technology attached to tower for capacity results.

Input

The tower was loaded and modeled under existing loading and geometry noted in tower mapping and photography from 2026.

Analysis Method and Modeling

A three-dimensional finite element model of the tower in each scenario was created using TNX Tower® *Version 8.2.4.3 (Tower Numeric Inc.).* The model was used based on government furnished and collected information and the loading scenarios requested by USFS. The model was analyzed as a cantilever structure subject to wind and ice loads applied to all attached assets and appurtenances such as antennas, mounts, lightening protection, etc. normalized for site specific conditions. No additional environmental loads or miscellaneous construction eccentric loading was considered.

The tower was analyzed for linear first order effects to determine a failing element and corresponding load capacities. Load capacities and failing elements are identified after the model is analyzed and calculated for the resulting forces, moments and stresses. Additional analysis is conducted to estimate non-linear and second order effects on the tower. The effect of displacement on the member forces (P-Δ effects) is included to identify potential overstressing or local buckling.

After completion of the linear and non-linear idealization of the model a comparison is made of the calculated member stresses with the allowable values set forth in the design standard. All elements and members that exceed the allowable stresses are identified as failing elements. The highest utilized member load capacity governed the overall rating for the tower.

Results

The structural tower analysis yielded the following results:

Tower Strength Capacity Results

Load Scenario	Controlling Section & Member	Tower Rating (%)	PASS / FAIL
Existing	Diagonal (T3)	95.3%	PASS

Tower Service Results

Load Scenario	Tilt - (DEG)		Twist - (DEG)		Tilt PASS / FAIL	Twist PASS / FAIL
	ACTUAL	ALLOWED	ACTUAL	ALLOWED		
Existing	NOT CHECKED. TILT AND TWIST DATA NOT PROVIDED.					

Foundation Capacity Results

Load Scenario	Bending (KFT)		Shear (K)		PASS / FAIL
	ACTUAL	ALLOWED	ACTUAL	ALLOWED	
Existing	NOT CHECKED. FOUNDATION DESIGN NOT PROVIDED.				

Soil Capacity Results

Load Scenario	Overturning (KFT)		Bearing (KSF)		PASS / FAIL
	ACTUAL	ALLOWED	ACTUAL	ALLOWED	
Existing	NOT CHECKED. GEOTECHNICAL INVESTIAGATION NOT PROVIDED.				

Conclusions

The structural system analysis produced the following conclusions:

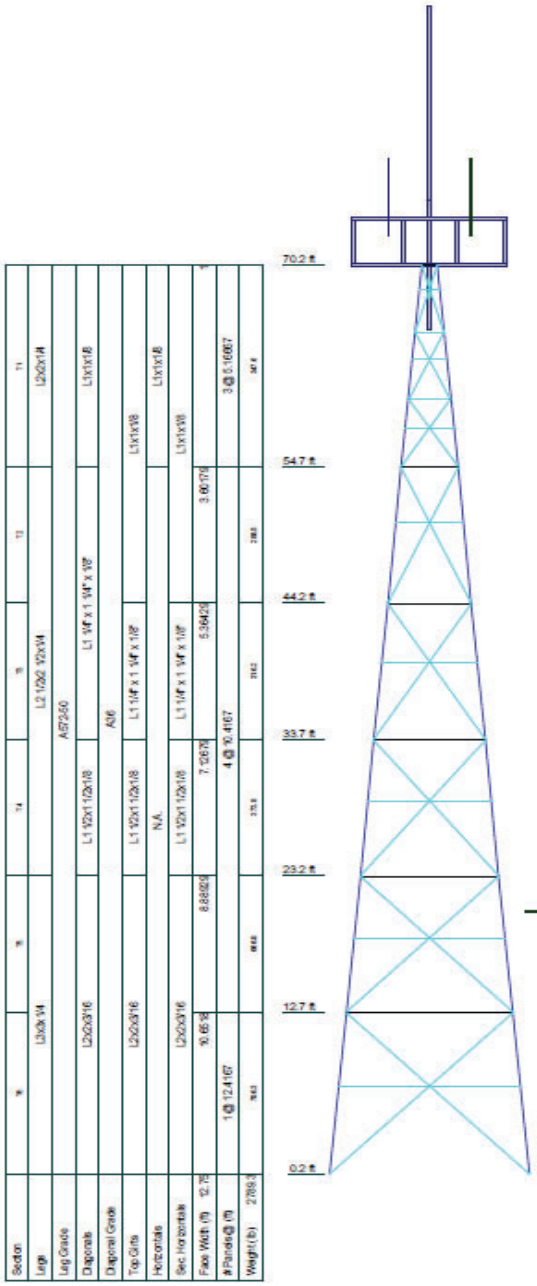
- Tower Strength Capacity Results Pass
- Tower Service Results N/A
- Foundation Capacity Results Not Checked
- Soil Capacity Results Not Checked

Recommendations

The following items are recommended:

1.) Verify the functional and operational performance of appurtenances and attachments.
2.) Recheck the Plumb and Twist during the next tower site inspection.
3.) Plumb and twist data collection was unable to be performed due to the inaccessibility of all tower legs. Continue to monitor the status of both the tilt & twist of the tower over the span of once every 5 years.

Appendix A - Detailed Analysis Graphics



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Platform - 6' x 6' x 3.5'	70.1667	AT - 4' Rod	70.1667
3' Dia 6' Omni	70.1667	20' Dipole	45.9997
3' Dia 6' Omni	70.1667	4.5' Yagi Antenna	20.4167
3' Dia 20' Omni	70.1667	Enclosure/Box - 28"x40"x8"	2.1667
Mounting Pipe - 2" x 10'	70.1667		

MATERIAL STRENGTH

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

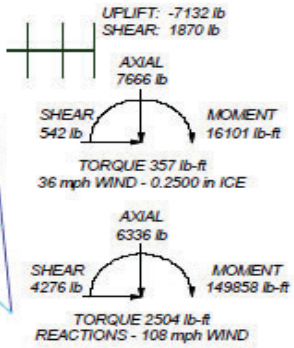
TOWER DESIGN NOTES

1. Tower is located in Coconino County, Arizona.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 108 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 36 mph basic wind with 0.25 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 2 with Crest Height of 1.00 ft
8. TOWER RATING: 95.3%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 9840 lb
SHEAR: 2575 lb

UPLIFT: -7132 lb
SHEAR: 1870 lb



Federal Aviation Administration 6500 S MacArthur Blvd. Oklahoma City, OK 73169 Phone: (405) 954-3011 FAX: (405) 954-3011	Job: 0304 Schnebly Hill Project: Structural Analysis Client: U.S. Forest Service — Drawn by: Eric Trujillo — App'd: Code: TIA-222-H — Date: 06/04/26 — Scale: NTS Path: — Dwg No. E-1

Appendix B – TNX Output Report

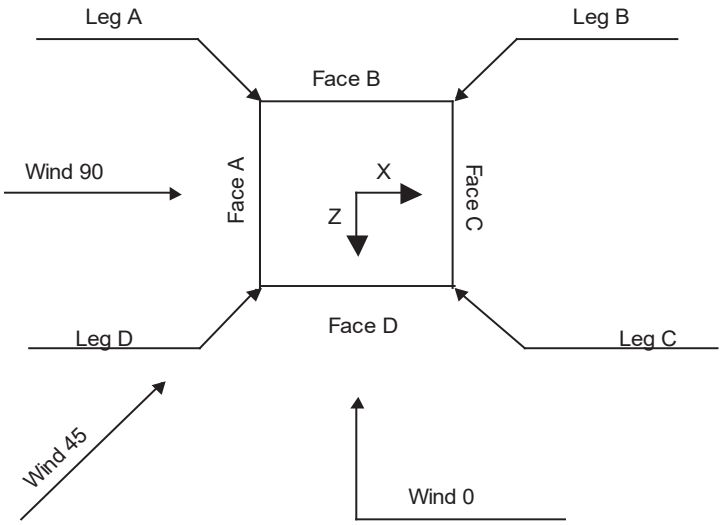
Tower Input Data

The main tower is a 4x free standing tower with an overall height of 70.17 ft above the ground line.
The base of the tower is set at an elevation of 0.17 ft above the ground line.
The face width of the tower is 1.00 ft at the top and 12.75 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

1. Tower is located in Coconino County, Arizona.
2. Tower base elevation above sea level: 6559.17 ft.
3. Basic wind speed of 108 mph.
4. Risk Category II.
5. Exposure Category B.
6. Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7. Topographic Category: 2.
8. Crest Height: 1.00 ft.
9. Nominal ice thickness of 0.2500 in.
10. Ice thickness is considered to increase with height.
11. Ice density of 56 pcf.
12. A wind speed of 36 mph is used in combination with ice.
13. Temperature drop of 50 °F.
14. Deflections calculated using a wind speed of 60 mph.
15. A non-linear (P-delta) analysis was used.
16. Pressures are calculated at each section.
17. Stress ratio used in tower member design is 1.
18. Tower analysis based on target reliabilities in accordance with Annex S.
19. Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
20. Maximum demand-capacity ratio is: 1.
21. Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Square Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	70.17-54.67			1.00	1	15.50
T2	54.67-44.17			3.60	1	10.50
T3	44.17-33.67			5.36	1	10.50
T4	33.67-23.17			7.13	1	10.50
T5	23.17-12.67			8.89	1	10.50
T6	12.67-0.17			10.65	1	12.50

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	70.17-54.67	5.17	X Brace	No	Yes	0.0000	0.0000
T2	54.67-44.17	10.42	X Brace	No	Yes	1.0000	0.0000
T3	44.17-33.67	10.42	X Brace	No	Yes	1.0000	0.0000
T4	33.67-23.17	10.42	X Brace	No	Yes	1.0000	0.0000
T5	23.17-12.67	10.42	X Brace	No	Yes	1.0000	0.0000
T6	12.67-0.17	12.42	X Brace	No	Yes	1.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 70.17-54.67	Equal Angle	L2x2x1/4	A572-50 (50 ksi)	Equal Angle	L1x1x1/8	A36 (36 ksi)
T2 54.67-44.17	Equal Angle	L2 1/2x2 1/2x1/4	A572-50 (50 ksi)	Equal Angle	L1 1/4" x 1 1/4" x 1/8"	A36 (36 ksi)
T3 44.17-33.67	Equal Angle	L2 1/2x2 1/2x1/4	A572-50 (50 ksi)	Equal Angle	L1 1/4" x 1 1/4" x 1/8"	A36 (36 ksi)
T4 33.67-23.17	Equal Angle	L2 1/2x2 1/2x1/4	A572-50 (50 ksi)	Equal Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T5 23.17-12.67	Equal Angle	L3x3x1/4	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T6 12.67-0.17	Equal Angle	L3x3x1/4	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	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 70.17-54.67	Equal Angle	L1x1x1/8	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T2 54.67-44.17	Equal Angle	L1x1x1/8	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T3 44.17-33.67	Equal Angle	L1 1/4" x 1 1/4" x 1/8"	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T4 33.67-23.17	Equal Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T5 23.17-12.67	Equal Angle	L2x2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T6 12.67-0.17	Equal Angle	L2x2x3/16	A36 (36 ksi)	Equal Angle		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 70.17-54.67	None	Solid Round		A36 (36 ksi)	Equal Angle	L1x1x1/8	A36 (36 ksi)
T2 54.67-44.17	None	Solid Round		A36 (36 ksi)	Equal Angle	L1x1x1/8	A36 (36 ksi)
T3 44.17-33.67	None	Solid Round		A36 (36 ksi)	Equal Angle	L1 1/4" x 1 1/4" x 1/8"	A36 (36 ksi)
T4 33.67-23.17	None	Solid Round		A36 (36 ksi)	Equal Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T5 23.17-12.67	None	Solid Round		A36 (36 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T6 12.67-0.17	None	Solid Round		A36 (36 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Secondary Horizontal Type*	*Secondary Horizontal Size*	*Secondary Horizontal Grade*	*Inner Bracing Type*	*Inner Bracing Size*	*Inner Bracing Grade*
T1 70.17-54.67	Equal Angle	L1x1x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T2 54.67-44.17	Equal Angle	L1x1x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T3 44.17-33.67	Equal Angle	L1 1/4" x 1 1/4" x 1/8"	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T4 33.67-23.17	Equal Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T5 23.17-12.67	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T6 12.67-0.17	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

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 70.17-54.67	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 54.67-44.17	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 44.17-33.67	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 33.67-23.17	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 23.17-12.67	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 12.67-0.17	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

			K Factors[1]							
Tower Elevation *ft*	*Calc K Single Angles*	*Calc K Solid Rounds*	*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 70.17-54.67	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T2 54.67-44.17	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T3 44.17-33.67	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T4 33.67-23.17	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T5 23.17-12.67	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T6 12.67-0.17	No	No	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 70.17-54.67	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 54.67-44.17	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 44.17-33.67	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 33.67-23.17	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 23.17-12.67	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 12.67-0.17	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 Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	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 70.17-54.67	0.0000	0.75 (1)	0.0000	0.75 (1)	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75 (1)	0.0000	0.75 (1)
	0.0000	0.75 (2)	0.0000	0.75 (2)							0.0000	0.75 (2)	0.0000	0.75 (2)
	0.0000	0.75 (3)	0.0000	0.75 (3)							0.0000	0.75 (3)	0.0000	0.75 (3)
	0.0000	0.75 (4)	0.0000	0.75 (4)							0.0000	0.75 (4)	0.0000	0.75 (4)
T2 54.67-44.17	0.0000	0.75 (1)	0.0000	0.75 (1)	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75 (1)	0.0000	0.75 (1)
	0.0000	0.75 (2)	0.0000	0.75 (2)							0.0000	0.75 (2)	0.0000	0.75 (2)
	0.0000	0.75 (3)	0.0000	0.75 (3)							0.0000	0.75 (3)	0.0000	0.75 (3)
	0.0000	0.75 (4)	0.0000	0.75 (4)							0.0000	0.75 (4)	0.0000	0.75 (4)
T3 44.17-33.67	0.0000	0.75 (1)	0.0000	0.75 (1)	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75 (1)	0.0000	0.75 (1)
	0.0000	0.75 (2)	0.0000	0.75 (2)							0.0000	0.75 (2)	0.0000	0.75 (2)
	0.0000	0.75 (3)	0.0000	0.75 (3)							0.0000	0.75 (3)	0.0000	0.75 (3)
	0.0000	0.75 (4)	0.0000	0.75 (4)							0.0000	0.75 (4)	0.0000	0.75 (4)
T4 33.67-23.17	0.0000	0.75 (1)	0.0000	0.75 (1)	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75 (1)	0.0000	0.75 (1)
	0.0000	0.75 (2)	0.0000	0.75 (2)							0.0000	0.75 (2)	0.0000	0.75 (2)
	0.0000	0.75 (3)	0.0000	0.75 (3)							0.0000	0.75 (3)	0.0000	0.75 (3)
	0.0000	0.75 (4)	0.0000	0.75 (4)							0.0000	0.75 (4)	0.0000	0.75 (4)
T5 23.17-12.67	0.0000	0.75 (1)	0.0000	0.75 (1)	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75 (1)	0.0000	0.75 (1)
	0.0000	0.75 (2)	0.0000	0.75 (2)							0.0000	0.75 (2)	0.0000	0.75 (2)

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	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
	0.0000	0.75 (3)	0.0000	0.75 (3)							0.0000	0.75 (3)	0.0000	0.75 (3)
	0.0000	0.75 (4)	0.0000	0.75 (4)							0.0000	0.75 (4)	0.0000	0.75 (4)
T6 12.67-0.17	0.0000	0.75 (1)	0.0000	0.75 (1)	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75 (1)	0.0000	0.75 (1)
	0.0000	0.75 (2)	0.0000	0.75 (2)							0.0000	0.75 (2)	0.0000	0.75 (2)
	0.0000	0.75 (3)	0.0000	0.75 (3)							0.0000	0.75 (3)	0.0000	0.75 (3)
	0.0000	0.75 (4)	0.0000	0.75 (4)							0.0000	0.75 (4)	0.0000	0.75 (4)

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 70.17-54.67	Sleeve SS	0.5000 A325N	6	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.5000 A325N	1
T2 54.67-44.17	Sleeve SS	0.5000 A325N	6	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.5000 A325N	1
T3 44.17-33.67	Sleeve SS	0.5000 A325N	8	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.5000 A325N	1
T4 33.67-23.17	Sleeve SS	0.5000 A325N	8	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.5000 A325N	1
T5 23.17-12.67	Sleeve SS	0.6250 A325N	8	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1	0.6250 A325N	1
T6 12.67-0.17	Sleeve SS	0.6250 A325N	8	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1	0.6250 A325N	1

Feed Line/Linear Appurtenances - Entered as Round or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
********** ****													
5/8	A	No	No	Ar (CaAa)	70.17 - 6.67	0.5000	0	6	4	0.8800	0.8800		0.40
Safety Line 3/8	D	No	No	Ar (CaAa)	70.17 - 0.17	7.5000	0	1	1	0.3750	0.3750		0.22
Feedline Ladder (Af)	A	No	No	Af (CaAa)	70.17 - 6.67	0.5000	0	1	1	3.0000	3.0000		8.40
Climbing Ladder (Standard)	D	No	No	Af (CaAa)	70.17 - 0.17	7.0000	0	1	1	0.2500	2.2500		3.99

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 lb
T1	70.17-54.67	A	0.000	0.000	15.934	0.000	167.40
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
		D	0.000	0.000	6.394	0.000	65.25
T2	54.67-44.17	A	0.000	0.000	10.794	0.000	113.40
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
		D	0.000	0.000	4.331	0.000	44.20
T3	44.17-33.67	A	0.000	0.000	10.794	0.000	113.40
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
		D	0.000	0.000	4.331	0.000	44.20
T4	33.67-23.17	A	0.000	0.000	10.794	0.000	113.40
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
		D	0.000	0.000	4.331	0.000	44.20
T5	23.17-12.67	A	0.000	0.000	10.794	0.000	113.40
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
		D	0.000	0.000	4.331	0.000	44.20
T6	12.67-0.17	A	0.000	0.000	6.168	0.000	64.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
		D	0.000	0.000	5.156	0.000	52.62

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 lb
T1	70.17-54.67	A	0.226	0.000	0.000	20.849	0.000	213.43
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
		D		0.000	0.000	7.798	0.000	75.83
T2	54.67-44.17	A	0.221	0.000	0.000	14.046	0.000	143.75
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
		D		0.000	0.000	5.261	0.000	51.17
T3	44.17-33.67	A	0.216	0.000	0.000	13.970	0.000	142.93
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
		D		0.000	0.000	5.239	0.000	50.98
T4	33.67-23.17	A	0.209	0.000	0.000	13.871	0.000	141.89
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
		D		0.000	0.000	5.211	0.000	50.73
T5	23.17-12.67	A	0.200	0.000	0.000	13.733	0.000	140.43
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
		D		0.000	0.000	5.171	0.000	50.38
T6	12.67-0.17	A	0.180	0.000	0.000	7.683	0.000	78.55
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
		D		0.000	0.000	6.058	0.000	59.14

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	70.17-54.67	-5.3084	2.8443	-5.8975	2.9540
T2	54.67-44.17	-8.0819	3.8361	-9.0565	4.0189
T3	44.17-33.67	-10.1268	4.6072	-11.3186	4.8183
T4	33.67-23.17	-11.4246	5.0678	-12.8309	5.3332
T5	23.17-12.67	-11.2204	4.8942	-12.8269	5.2543
T6	12.67-0.17	-6.5896	6.1923	-7.5349	6.6825

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	4	5/8	54.67 - 70.17	1.0000	1.0000
T1	5	Safety Line 3/8	54.67 - 70.17	1.0000	1.0000
T1	6	Feedline Ladder (Af)	54.67 - 70.17	1.0000	1.0000
T1	7	Climbing Ladder (Standard)	54.67 - 70.17	1.0000	1.0000
T2	4	5/8	44.17 - 54.67	1.0000	1.0000
T2	5	Safety Line 3/8	44.17 - 54.67	1.0000	1.0000
T2	6	Feedline Ladder (Af)	44.17 - 54.67	1.0000	1.0000
T2	7	Climbing Ladder (Standard)	44.17 - 54.67	1.0000	1.0000
T3	4	5/8	33.67 - 44.17	1.0000	1.0000
T3	5	Safety Line 3/8	33.67 - 44.17	1.0000	1.0000
T3	6	Feedline Ladder (Af)	33.67 - 44.17	1.0000	1.0000
T3	7	Climbing Ladder (Standard)	33.67 - 44.17	1.0000	1.0000
T4	4	5/8	23.17 - 33.67	1.0000	1.0000
T4	5	Safety Line 3/8	23.17 - 33.67	1.0000	1.0000
T4	6	Feedline Ladder (Af)	23.17 - 33.67	1.0000	1.0000
T4	7	Climbing Ladder (Standard)	23.17 - 33.67	1.0000	1.0000
T5	4	5/8	12.67 - 23.17	1.0000	1.0000
T5	5	Safety Line 3/8	12.67 - 23.17	1.0000	1.0000
T5	6	Feedline Ladder (Af)	12.67 - 23.17	1.0000	1.0000
T5	7	Climbing Ladder (Standard)	12.67 - 23.17	1.0000	1.0000
T6	4	5/8	6.67 - 12.67	1.0000	1.0000
T6	5	Safety Line 3/8	0.17 - 12.67	1.0000	1.0000
T6	6	Feedline Ladder (Af)	6.67 - 12.67	1.0000	1.0000
T6	7	Climbing Ladder (Standard)	0.17 - 12.67	1.0000	1.0000

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horiz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* °	*Placement* *ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* *lb*
***									
Enclosure/Box - 28"x40"x8"	D	From Face	0.33 0.00 0.00	0.0000	2.17	No Ice 1/2" Ice	9.33 9.71	1.94 2.13	80.00 136.42
4.5' Yagi Antenna	C	From Leg	2.00 0.00 0.00	0.0000	20.42	No Ice 1/2" Ice	3.05 3.94	1.33 1.90	30.00 57.79
20' Dipole	B	From Face	0.20 0.00 9.00	0.0000	46.00	No Ice 1/2" Ice	2.00 3.00	2.00 3.00	22.00 50.00
Platform - 6' x 6' x 3.5'	B	From Centroid-Face	0.00 0.00 1.80	0.0000	70.17	No Ice 1/2" Ice	13.80 14.50	13.80 14.50	1271.80 1585.90
3" Dia 6' Omni	A	From Leg	3.00 0.00 5.25	0.0000	70.17	No Ice 1/2" Ice	1.77 2.13	1.77 2.13	7.00 20.24
3" Dia 6' Omni	C	From Leg	3.00 0.00 5.25	0.0000	70.17	No Ice 1/2" Ice	1.77 2.13	1.77 2.13	7.00 20.24
3" Dia 20' Omni	B	From Centroid-Face	0.00 0.00 10.00	0.0000	70.17	No Ice 1/2" Ice	4.00 6.00	4.00 6.00	55.00 100.00
Mounting Pipe - 2" x 10'	B	From Centroid-Face	0.00 0.00 0.00	0.0000	70.17	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	36.50 52.00
AT - 4' Rod	B	From Leg	3.00 0.00 5.50	0.0000	70.17	No Ice 1/2" Ice	0.15 0.56	0.15 0.56	0.82 3.01

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 70.17-54.67	62.42	0.864	16	37.196	A	8.774	0.000	5.203	59.30	15.934	0.000
					B	8.774	0.000		59.30	0.000	0.000
					C	8.774	0.000		59.30	0.000	0.000
					D	8.774	0.000		59.30	6.394	0.000
T2 54.67-44.17	49.42	0.808	15	48.329	A	7.295	0.000	4.406	60.40	10.794	0.000
					B	7.295	0.000		60.40	0.000	0.000
					C	7.295	0.000		60.40	0.000	0.000
					D	7.295	0.000		60.40	4.331	0.000
T3 44.17-33.67	38.92	0.755	14	66.835	A	8.015	0.000	4.406	54.97	10.794	0.000
					B	8.015	0.000		54.97	0.000	0.000
					C	8.015	0.000		54.97	0.000	0.000
					D	8.015	0.000		54.97	4.331	0.000
T4 33.67-23.17	28.42	0.7	13	85.341	A	9.444	0.000	4.406	46.65	10.794	0.000
					B	9.444	0.000		46.65	0.000	0.000
					C	9.444	0.000		46.65	0.000	0.000
					D	9.444	0.000		46.65	4.331	0.000
T5 23.17-12.67	17.92	0.7	13	104.085	A	12.954	0.000	5.287	40.81	10.794	0.000
					B	12.954	0.000		40.81	0.000	0.000
					C	12.954	0.000		40.81	0.000	0.000
					D	12.954	0.000		40.81	4.331	0.000
T6 12.67-0.17	6.42	0.7	13	148.040	A	15.502	0.000	6.294	40.60	6.168	0.000
					B	15.502	0.000		40.60	0.000	0.000
					C	15.502	0.000		40.60	0.000	0.000
					D	15.502	0.000		40.60	5.156	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 70.17-54.67	62.42	0.864	2	0.2265	37.783	A	8.774	2.796	6.381	55.16	20.849	0.000
						B	8.774	2.796		55.16	0.000	0.000
						C	8.774	2.796		55.16	0.000	0.000
						D	8.774	2.796		55.16	7.798	0.000
T2 54.67-44.17	49.42	0.808	2	0.2213	48.717	A	7.295	1.858	5.186	56.66	14.046	0.000
						B	7.295	1.858		56.66	0.000	0.000
						C	7.295	1.858		56.66	0.000	0.000
						D	7.295	1.858		56.66	5.261	0.000
T3 44.17-33.67	38.92	0.755	2	0.2160	67.214	A	8.015	2.009	5.167	51.55	13.970	0.000
						B	8.015	2.009		51.55	0.000	0.000
						C	8.015	2.009		51.55	0.000	0.000
						D	8.015	2.009		51.55	5.239	0.000
T4 33.67-23.17	28.42	0.7	1	0.2093	85.709	A	9.444	2.144	5.144	44.39	13.871	0.000
						B	9.444	2.144		44.39	0.000	0.000
						C	9.444	2.144		44.39	0.000	0.000
						D	9.444	2.144		44.39	5.211	0.000
T5 23.17-12.67	17.92	0.7	1	0.1999	104.436	A	12.954	2.237	5.991	39.44	13.733	0.000
						B	12.954	2.237		39.44	0.000	0.000
						C	12.954	2.237		39.44	0.000	0.000
						D	12.954	2.237		39.44	5.171	0.000
T6 12.67-0.17	6.42	0.7	1	0.1804	148.417	A	15.502	2.418	7.051	39.35	7.683	0.000
						B	15.502	2.418		39.35	0.000	0.000
						C	15.502	2.418		39.35	0.000	0.000
						D	15.502	2.418		39.35	6.058	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 70.17-54.67	62.42	0.864	5	37.196	A	8.774	0.000	5.203	59.30	15.934	0.000
					B	8.774	0.000		59.30	0.000	0.000
					C	8.774	0.000		59.30	0.000	0.000
					D	8.774	0.000		59.30	6.394	0.000
T2 54.67-44.17	49.42	0.808	5	48.329	A	7.295	0.000	4.406	60.40	10.794	0.000
					B	7.295	0.000		60.40	0.000	0.000
					C	7.295	0.000		60.40	0.000	0.000
					D	7.295	0.000		60.40	4.331	0.000
T3 44.17-33.67	38.92	0.755	5	66.835	A	8.015	0.000	4.406	54.97	10.794	0.000
					B	8.015	0.000		54.97	0.000	0.000
					C	8.015	0.000		54.97	0.000	0.000
					D	8.015	0.000		54.97	4.331	0.000
T4 33.67-23.17	28.42	0.7	4	85.341	A	9.444	0.000	4.406	46.65	10.794	0.000
					B	9.444	0.000		46.65	0.000	0.000
					C	9.444	0.000		46.65	0.000	0.000
					D	9.444	0.000		46.65	4.331	0.000
T5 23.17-12.67	17.92	0.7	4	104.085	A	12.954	0.000	5.287	40.81	10.794	0.000
					B	12.954	0.000		40.81	0.000	0.000
					C	12.954	0.000		40.81	0.000	0.000
					D	12.954	0.000		40.81	4.331	0.000
T6 12.67-0.17	6.42	0.7	4	148.040	A	15.502	0.000	6.294	40.60	6.168	0.000
					B	15.502	0.000		40.60	0.000	0.000
					C	15.502	0.000		40.60	0.000	0.000
					D	15.502	0.000		40.60	5.156	0.000

Tower Forces - No Ice - Wind Normal to Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E *ft²*	*F* *lb*	*w* *plf*	*Ctrl. Face*
T1 70.17-	232.66	347.58	A	0.236	2.831	16	1	1	8.774	658.46	42.48	D
54.67			B	0.236	2.831		1	1	8.774			
			C	0.236	2.831		1	1	8.774			
			D	0.236	2.831		1	1	8.774			
T2 54.67-	157.60	288.52	A	0.151	3.201	15	1	1	7.295	502.43	47.85	D
44.17			B	0.151	3.201		1	1	7.295			
			C	0.151	3.201		1	1	7.295			
			D	0.151	3.201		1	1	7.295			
T3 44.17-	157.60	316.21	A	0.12	3.35	14	1	1	8.015	512.01	48.76	D
33.67			B	0.12	3.35		1	1	8.015			
			C	0.12	3.35		1	1	8.015			
			D	0.12	3.35		1	1	8.015			
T4 33.67-	157.60	373.80	A	0.111	3.396	13	1	1	9.444	534.02	50.86	D
23.17			B	0.111	3.396		1	1	9.444			
			C	0.111	3.396		1	1	9.444			
			D	0.111	3.396		1	1	9.444			
T5 23.17-	157.60	666.88	A	0.124	3.328	13	1	1	12.954	658.84	62.75	D
12.67			B	0.124	3.328		1	1	12.954			
			C	0.124	3.328		1	1	12.954			
			D	0.124	3.328		1	1	12.954			
T6 12.67-0.17	117.42	796.35	A	0.105	3.426	13	1	1	15.502	729.04	58.32	D
			B	0.105	3.426		1	1	15.502			
			C	0.105	3.426		1	1	15.502			
			D	0.105	3.426		1	1	15.502			
Sum Weight:	980.50	2789.34						OTM	116910.81 lb-ft	3594.80		

Tower Forces - No Ice - Wind 45 to Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1 70.17-54.67	232.66	347.58	A	0.236	2.831	16	1.177	1.177	10.326	719.80	46.44	D
			B	0.236	2.831		1.177	1.177	10.326			
			C	0.236	2.831		1.177	1.177	10.326			
			D	0.236	2.831		1.177	1.177	10.326			
T2 54.67-44.17	157.60	288.52	A	0.151	3.201	15	1.113	1.113	8.120	536.94	51.14	D
			B	0.151	3.201		1.113	1.113	8.120			
			C	0.151	3.201		1.113	1.113	8.120			
			D	0.151	3.201		1.113	1.113	8.120			
T3 44.17-33.67	157.60	316.21	A	0.12	3.35	14	1.09	1.09	8.736	541.47	51.57	D
			B	0.12	3.35		1.09	1.09	8.736			
			C	0.12	3.35		1.09	1.09	8.736			
			D	0.12	3.35		1.09	1.09	8.736			
T4 33.67-23.17	157.60	373.80	A	0.111	3.396	13	1.083	1.083	10.228	564.14	53.73	D
			B	0.111	3.396		1.083	1.083	10.228			
			C	0.111	3.396		1.083	1.083	10.228			
			D	0.111	3.396		1.083	1.083	10.228			
T5 23.17-12.67	157.60	666.88	A	0.124	3.328	13	1.093	1.093	14.163	704.36	67.08	D
			B	0.124	3.328		1.093	1.093	14.163			
			C	0.124	3.328		1.093	1.093	14.163			
			D	0.124	3.328		1.093	1.093	14.163			
T6 12.67-0.17	117.42	796.35	A	0.105	3.426	13	1.079	1.079	16.720	776.23	62.10	D
			B	0.105	3.426		1.079	1.079	16.720			
			C	0.105	3.426		1.079	1.079	16.720			
			D	0.105	3.426		1.079	1.079	16.720			
Sum Weight:	980.50	2789.34						OTM	125524.54 lb-ft	3842.95		

Tower Forces - With Ice - Wind Normal to Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E *ft²*	*F* *lb*	*w* *plf*	*Ctrl. Face*
T1 70.17-	289.26	484.78	A	0.306	2.568	2	1	1	10.454	86.08	5.55	D
54.67			B	0.306	2.568		1	1	10.454			
			C	0.306	2.568		1	1	10.454			
			D	0.306	2.568		1	1	10.454			
T2 54.67-	194.92	394.44	A	0.188	3.033	2	1	1	8.358	64.80	6.17	D
44.17			B	0.188	3.033		1	1	8.358			
			C	0.188	3.033		1	1	8.358			
			D	0.188	3.033		1	1	8.358			
T3 44.17-	193.91	433.21	A	0.149	3.209	2	1	1	9.155	65.85	6.27	D
33.67			B	0.149	3.209		1	1	9.155			
			C	0.149	3.209		1	1	9.155			
			D	0.149	3.209		1	1	9.155			
T4 33.67-	192.61	513.04	A	0.135	3.275	1	1	1	10.658	67.88	6.46	D
23.17			B	0.135	3.275		1	1	10.658			
			C	0.135	3.275		1	1	10.658			
			D	0.135	3.275		1	1	10.658			
T5 23.17-	190.81	852.50	A	0.145	3.226	1	1	1	14.222	81.45	7.76	D
12.67			B	0.145	3.226		1	1	14.222			
			C	0.145	3.226		1	1	14.222			
			D	0.145	3.226		1	1	14.222			
T6 12.67-0.17	137.69	995.24	A	0.121	3.346	1	1	1	16.869	88.23	7.06	D
			B	0.121	3.346		1	1	16.869			
			C	0.121	3.346		1	1	16.869			
			D	0.121	3.346		1	1	16.869			
Sum Weight:	1199.20	3673.21						OTM	15016.49 lb-ft	454.29		

Tower Forces - With Ice - Wind 45 to Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
T1 70.17-	289.26	484.78	A	0.306	2.568	2	1.2	1.2	12.544	94.41	6.09	D
54.67			B	0.306	2.568		1.2	1.2	12.544			
			C	0.306	2.568		1.2	1.2	12.544			
			D	0.306	2.568		1.2	1.2	12.544			
T2 54.67-	194.92	394.44	A	0.188	3.033	2	1.141	1.141	9.536	69.98	6.66	D
44.17			B	0.188	3.033		1.141	1.141	9.536			
			C	0.188	3.033		1.141	1.141	9.536			
			D	0.188	3.033		1.141	1.141	9.536			
T3 44.17-	193.91	433.21	A	0.149	3.209	2	1.112	1.112	10.179	70.31	6.70	D
33.67			B	0.149	3.209		1.112	1.112	10.179			
			C	0.149	3.209		1.112	1.112	10.179			
			D	0.149	3.209		1.112	1.112	10.179			
T4 33.67-	192.61	513.04	A	0.135	3.275	1	1.101	1.101	11.739	72.33	6.89	D
23.17			B	0.135	3.275		1.101	1.101	11.739			
			C	0.135	3.275		1.101	1.101	11.739			
			D	0.135	3.275		1.101	1.101	11.739			
T5 23.17-	190.81	852.50	A	0.145	3.226	1	1.109	1.109	15.774	87.75	8.36	D
12.67			B	0.145	3.226		1.109	1.109	15.774			
			C	0.145	3.226		1.109	1.109	15.774			
			D	0.145	3.226		1.109	1.109	15.774			
T6 12.67-0.17	137.69	995.24	A	0.121	3.346	1	1.091	1.091	18.396	94.66	7.57	D
			B	0.121	3.346		1.091	1.091	18.396			
			C	0.121	3.346		1.091	1.091	18.396			
			D	0.121	3.346		1.091	1.091	18.396			
Sum Weight:	1199.20	3673.21						OTM	16240.42 lb-ft	489.43		

Tower Forces - Service - Wind Normal to Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
T1 70.17-	232.66	347.58	A	0.236	2.831	5	1	1	8.774	213.92	13.80	D
54.67			B	0.236	2.831		1	1	8.774			
			C	0.236	2.831		1	1	8.774			
			D	0.236	2.831		1	1	8.774			
T2 54.67-	157.60	288.52	A	0.151	3.201	5	1	1	7.295	163.23	15.55	D
44.17			B	0.151	3.201		1	1	7.295			
			C	0.151	3.201		1	1	7.295			
			D	0.151	3.201		1	1	7.295			
T3 44.17-	157.60	316.21	A	0.12	3.35	5	1	1	8.015	166.35	15.84	D
33.67			B	0.12	3.35		1	1	8.015			
			C	0.12	3.35		1	1	8.015			
			D	0.12	3.35		1	1	8.015			
T4 33.67-	157.60	373.80	A	0.111	3.396	4	1	1	9.444	173.50	16.52	D
23.17			B	0.111	3.396		1	1	9.444			
			C	0.111	3.396		1	1	9.444			
			D	0.111	3.396		1	1	9.444			
T5 23.17-	157.60	666.88	A	0.124	3.328	4	1	1	12.954	214.05	20.39	D
12.67			B	0.124	3.328		1	1	12.954			
			C	0.124	3.328		1	1	12.954			
			D	0.124	3.328		1	1	12.954			
T6 12.67-0.17	117.42	796.35	A	0.105	3.426	4	1	1	15.502	236.86	18.95	D
			B	0.105	3.426		1	1	15.502			
			C	0.105	3.426		1	1	15.502			
			D	0.105	3.426		1	1	15.502			
Sum Weight:	980.50	2789.34						OTM	37982.72 lb-ft	1167.90		

Tower Forces - Service - Wind 45 to Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1 70.17-54.67	232.66	347.58	A	0.236	2.831	5	1.177	1.177	10.326	233.85	15.09	D
			B	0.236	2.831		1.177	1.177	10.326			
			C	0.236	2.831		1.177	1.177	10.326			
			D	0.236	2.831		1.177	1.177	10.326			
T2 54.67-44.17	157.60	288.52	A	0.151	3.201	5	1.113	1.113	8.120	174.44	16.61	D
			B	0.151	3.201		1.113	1.113	8.120			
			C	0.151	3.201		1.113	1.113	8.120			
			D	0.151	3.201		1.113	1.113	8.120			
T3 44.17-33.67	157.60	316.21	A	0.12	3.35	5	1.09	1.09	8.736	175.92	16.75	D
			B	0.12	3.35		1.09	1.09	8.736			
			C	0.12	3.35		1.09	1.09	8.736			
			D	0.12	3.35		1.09	1.09	8.736			
T4 33.67-23.17	157.60	373.80	A	0.111	3.396	4	1.083	1.083	10.228	183.28	17.46	D
			B	0.111	3.396		1.083	1.083	10.228			
			C	0.111	3.396		1.083	1.083	10.228			
			D	0.111	3.396		1.083	1.083	10.228			
T5 23.17-12.67	157.60	666.88	A	0.124	3.328	4	1.093	1.093	14.163	228.84	21.79	D
			B	0.124	3.328		1.093	1.093	14.163			
			C	0.124	3.328		1.093	1.093	14.163			
			D	0.124	3.328		1.093	1.093	14.163			
T6 12.67-0.17	117.42	796.35	A	0.105	3.426	4	1.079	1.079	16.720	252.19	20.18	D
			B	0.105	3.426		1.079	1.079	16.720			
			C	0.105	3.426		1.079	1.079	16.720			
			D	0.105	3.426		1.079	1.079	16.720			
Sum Weight:	980.50	2789.34						OTM	40781.20 lb-ft	1248.52		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	1167.04					
Bracing Weight	1622.30					
Total Member Self-Weight	2789.34			1832.22	2097.55	
Total Weight	5279.96			1832.22	2097.55	
Wind 0 deg - No Ice		-8.26	-4072.33	-142252.03	2264.88	-2502.62
Wind 45 deg - No Ice		2998.89	-3049.19	-106023.23	-105657.29	-698.16
Wind 90 deg - No Ice		4001.18	8.26	1999.55	-141844.41	1515.27
Member Ice	883.87					
Total Weight Ice	6610.12			2152.97	2589.95	
Wind 0 deg - Ice		-0.99	-512.05	-16199.22	2609.98	-356.74
Wind 45 deg - Ice		380.58	-386.22	-11675.28	-11227.03	-111.91
Wind 90 deg - Ice		504.08	0.99	2173.00	-15746.30	198.48
Total Weight	5279.96			1832.22	2097.55	
Wind 0 deg - Service		-2.68	-1323.04	-46167.51	-130.48	-813.07
Wind 45 deg - Service		974.30	-990.64	-34397.27	-35192.91	-226.82
Wind 90 deg - Service		1299.93	2.68	697.85	-46949.61	492.29

Load Combinations

Comb. No.	*Description*
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 45 deg - No Ice
5	0.9 Dead+1.0 Wind 45 deg - No Ice
6	1.2 Dead+1.0 Wind 90 deg - No Ice
7	0.9 Dead+1.0 Wind 90 deg - No Ice
8	1.2 Dead+1.0 Ice+1.0 Temp
9	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
10	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
11	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
12	Dead+Wind 0 deg - Service
13	Dead+Wind 45 deg - Service
14	Dead+Wind 90 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	70.1667 - 54.6667	Leg	Max Tension	5	1543.36	1.54	0.31
			Max. Compression	4	-2318.12	0.67	-0.68
			Max. Mx	6	-1734.95	-9.25	0.03
			Max. My	2	-1761.29	0.49	-9.47
			Max. Vy	4	96.11	-0.00	-0.00
			Max. Vx	4	94.89	-0.00	-0.00
		Diagonal	Max Tension	5	257.54	0.76	0.17
			Max. Compression	4	-379.52	0.00	0.00
			Max. Mx	9	-57.34	1.07	-0.03
			Max. My	2	87.94	0.38	0.32
			Max. Vy	9	1.57	1.07	-0.03
			Max. Vx	9	0.25	0.57	0.14
		Horizontal	Max Tension	2	221.05	0.00	0.00
			Max. Compression	3	-122.35	0.00	0.00
			Max. Mx	8	65.92	-1.31	0.00
			Max. My	9	60.91	0.00	0.11
			Max. Vy	8	1.92	0.00	0.00
			Max. Vx	9	0.16	0.00	0.00
		Secondary Horizontal	Max Tension	3	20.74	-0.03	0.27
			Max. Compression	2	-22.54	0.53	0.50
			Max. Mx	2	-20.57	0.75	0.21
			Max. My	9	-0.71	0.42	0.67
			Max. Vy	2	-1.47	0.75	0.21
			Max. Vx	9	-0.52	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	11	-14.58	0.00	0.00
			Max. Mx	8	-13.35	-0.18	0.00
			Max. My	9	-14.40	0.00	0.01
			Max. Vy	8	0.70	0.00	0.00
			Max. Vx	9	-0.06	0.00	0.00
T2	54.6667 - 44.1667	Leg	Max Tension	5	2084.45	6.84	5.39
			Max. Compression	4	-2976.37	-6.55	-8.29
			Max. Mx	2	1120.83	27.78	-4.41
			Max. My	6	1120.89	-1.00	24.37
			Max. Vy	4	167.74	-6.55	-8.29
			Max. Vx	4	183.36	-6.55	-8.29
		Diagonal	Max Tension	5	501.16	2.26	0.27
			Max. Compression	4	-679.18	0.00	0.00
			Max. Mx	9	-76.81	3.97	0.03
			Max. My	9	-168.02	3.96	0.88
			Max. Vy	9	2.92	3.97	0.03
			Max. Vx	9	0.51	0.00	0.00
		Secondary Horizontal	Max Tension	3	36.75	-0.03	1.04
			Max. Compression	2	-46.18	1.02	1.52
			Max. Mx	2	-46.18	1.02	1.52
			Max. My	9	-4.72	0.85	2.11
			Max. Vy	9	-1.91	0.88	2.10
			Max. Vx	9	1.10	0.00	0.00
		Top Girt	Max Tension	2	289.17	0.00	0.00
			Max. Compression	3	-175.17	0.00	0.00
			Max. Mx	8	77.73	-2.28	0.00
			Max. My	9	69.72	0.00	0.19

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	8	2.52	0.00	0.00
			Max. Vx	9	-0.21	0.00	0.00
T3	44.1667 - 33.6667	Leg	Max Tension	5	3071.38	21.91	14.44
			Max. Compression	4	-4199.03	-13.74	-21.80
			Max. Mx	2	1730.51	28.52	-3.50
			Max. My	3	-2880.21	6.20	-26.84
			Max. Vy	6	229.91	-22.80	-0.48
			Max. Vx	4	254.41	-13.74	-21.80
		Diagonal	Max Tension	5	558.55	3.09	0.20
			Max. Compression	4	-747.51	0.00	0.00
			Max. Mx	9	-80.54	5.33	-0.15
			Max. My	9	-183.78	5.29	1.00
			Max. Vy	9	3.85	5.33	-0.15
			Max. Vx	9	0.54	0.00	0.00
		Secondary Horizontal	Max Tension	3	28.84	0.63	1.63
			Max. Compression	2	-37.27	1.85	2.37
			Max. Mx	11	-9.22	2.09	3.26
			Max. My	9	-4.00	2.02	3.28
			Max. Vy	11	3.33	2.09	3.26
			Max. Vx	9	-1.29	0.00	0.00
		Top Girt	Max Tension	2	371.86	0.00	0.00
			Max. Compression	3	-242.11	0.00	0.00
			Max. Mx	8	90.60	-6.25	0.00
			Max. My	8	90.60	0.00	0.52
			Max. Vy	8	4.65	0.00	0.00
			Max. Vx	8	-0.39	0.00	0.00
T4	33.6667 - 23.1667	Leg	Max Tension	5	4016.90	22.59	17.52
			Max. Compression	4	-5453.99	-18.24	-24.03
			Max. Mx	2	2273.82	28.84	-1.61
			Max. My	2	-3893.45	3.07	-28.66
			Max. Vy	4	329.60	-18.24	-24.03
			Max. Vx	4	365.91	-18.24	-24.03
		Diagonal	Max Tension	5	638.61	5.08	-0.06
			Max. Compression	4	-863.08	0.00	0.00
			Max. Mx	9	-66.20	8.29	0.95
			Max. My	9	-215.26	8.20	1.73
			Max. Vy	9	5.70	8.29	0.95
			Max. Vx	9	0.77	0.00	0.00
		Secondary Horizontal	Max Tension	3	24.73	1.71	2.40
			Max. Compression	2	-34.10	3.33	3.58
			Max. Mx	9	-9.74	4.08	4.82
			Max. My	9	-3.97	4.00	4.83
			Max. Vy	9	-5.10	4.08	4.82
			Max. Vx	9	-1.56	0.00	0.00
		Top Girt	Max Tension	2	553.49	0.00	0.00
			Max. Compression	3	-368.41	0.00	0.00
			Max. Mx	8	127.15	-13.11	0.00
			Max. My	8	127.15	0.00	1.10
			Max. Vy	8	7.34	0.00	0.00
			Max. Vx	8	-0.62	0.00	0.00
T5	23.1667 - 12.6667	Leg	Max Tension	5	4949.80	-1.23	-2.92
			Max. Compression	4	-6748.57	-29.56	-34.97
			Max. Mx	3	3046.09	37.01	1.23
			Max. My	2	-4762.32	-3.11	-39.78

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	4	460.79	-29.56	-34.97
			Max. Vx	4	504.53	-29.56	-34.97
		Diagonal	Max Tension	5	771.37	13.59	-0.64
			Max. Compression	4	-1085.97	0.00	0.00
			Max. Mx	10	-195.78	19.21	-3.03
			Max. My	4	-1069.41	12.12	4.43
			Max. Vy	10	12.17	19.21	-3.03
			Max. Vx	10	1.62	0.00	0.00
		Secondary Horizontal	Max Tension	3	34.06	5.69	5.44
			Max. Compression	2	-46.02	9.09	8.61
			Max. Mx	10	-11.55	11.20	10.44
			Max. My	10	-10.97	11.20	10.44
			Max. Vy	10	-11.15	11.20	10.44
			Max. Vx	10	2.90	0.00	0.00
		Top Girt	Max Tension	2	821.62	0.00	0.00
			Max. Compression	3	-557.42	0.00	0.00
			Max. Mx	8	262.61	-36.13	0.00
			Max. My	8	262.61	0.00	3.03
			Max. Vy	8	16.23	0.00	0.00
			Max. Vx	8	-1.36	0.00	0.00
T6	12.6667 - 0.1667	Leg	Max Tension	5	5982.61	-16.83	-16.99
			Max. Compression	4	-8231.23	-27.49	-34.04
			Max. Mx	2	3213.13	-53.38	-3.14
			Max. My	2	3391.99	0.53	-47.13
			Max. Vy	4	672.04	-27.49	-34.04
			Max. Vx	4	714.73	-27.49	-34.04
		Diagonal	Max Tension	5	1083.30	17.89	-1.83
			Max. Compression	4	-1535.80	0.00	0.00
			Max. Mx	4	974.65	23.24	2.74
			Max. My	9	579.19	21.63	6.37
			Max. Vy	9	13.73	21.87	4.99
			Max. Vx	9	1.96	0.00	0.00
		Secondary Horizontal	Max Tension	3	42.25	8.65	8.34
			Max. Compression	2	-61.92	13.07	11.94
			Max. Mx	4	-37.02	13.40	11.95
			Max. My	4	-42.75	12.33	12.02
			Max. Vy	10	-12.25	10.91	11.18
			Max. Vx	10	-2.80	0.00	0.00
		Top Girt	Max Tension	2	1301.88	0.00	0.00
			Max. Compression	3	-866.04	0.00	0.00
			Max. Mx	8	-375.17	-50.77	0.00
			Max. My	8	-375.17	0.00	4.26
			Max. Vy	8	-19.04	0.00	0.00
			Max. Vx	8	-1.60	0.00	0.00

Maximum Reactions

Location	*Condition*	*Gov. Load Comb.*	*Vertical lb*	*Horizontal, X lb*	*Horizontal, Z lb*
Leg D	Max. Vert	8	2133.35	-267.48	259.08
	Max. H_x	1	1474.11	252.40	-257.71
	Max. H_z	5	-7132.18	-1304.47	1339.43
	Min. Vert	5	-7132.18	-1304.47	1339.43
	Min. H_x	5	-7132.18	-1304.47	1339.43
	Min. H_z	1	1474.11	252.40	-257.71
Leg C	Max. Vert	6	7219.15	-1333.75	-1302.79
	Max. H_x	3	-4474.74	884.07	766.86
	Max. H_z	3	-4474.74	884.07	766.86
	Min. Vert	3	-4474.74	884.07	766.86
	Min. H_x	6	7219.15	-1333.75	-1302.79
	Min. H_z	6	7219.15	-1333.75	-1302.79
Leg B	Max. Vert	4	9839.78	-1831.58	1810.16
	Max. H_x	8	1699.77	296.64	-305.04
	Max. H_z	4	9839.78	-1831.58	1810.16
	Min. Vert	1	1165.84	-231.06	225.75
	Min. H_x	4	9839.78	-1831.58	1810.16
	Min. H_z	8	1699.77	296.64	-305.04
Leg A	Max. Vert	2	7249.78	1290.09	1377.27
	Max. H_x	2	7249.78	1290.09	1377.27
	Max. H_z	2	7249.78	1290.09	1377.27
	Min. Vert	7	-4450.29	-763.64	-859.58
	Min. H_x	7	-4450.29	-763.64	-859.58
	Min. H_z	7	-4450.29	-763.64	-859.58

Tower Mast Reaction Summary

Load Combination	*Vertical*	*Shear$_x$*	*Shear$_z$*	*Overturning Moment, M_x*	*Overturning Moment, M_z*	*Torque*
	lb	*lb*	*lb*	*lb-ft*	*lb-ft*	*lb-ft*
Dead Only	5279.90	-0.02	0.02	1832.36	2098.15	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	6335.79	-8.35	-4071.53	-141791.52	2688.78	-2504.44
0.9 Dead+1.0 Wind 0 deg - No Ice	4751.84	-8.35	-4071.70	-142338.47	2059.02	-2503.78
1.2 Dead+1.0 Wind 45 deg - No Ice	6335.78	2998.27	-3048.62	-105588.75	-105167.02	-698.72
0.9 Dead+1.0 Wind 45 deg - No Ice	4751.84	2998.41	-3048.76	-106136.64	-105794.66	-698.61
1.2 Dead+1.0 Wind 90 deg - No Ice	6335.79	4000.40	8.30	2367.77	-141330.34	1516.21
0.9 Dead+1.0 Wind 90 deg - No Ice	4751.85	4000.55	8.31	1817.79	-141956.95	1515.74
1.2 Dead+1.0 Ice+1.0 Temp	7666.23	-0.04	0.02	2518.80	3009.43	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	7666.22	-0.98	-511.99	-15813.27	3028.76	-357.00
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	7666.22	380.56	-386.18	-11294.56	-10792.94	-112.03
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	7666.22	504.06	0.99	2538.38	-15307.10	198.62
Dead+Wind 0 deg - Service	5279.89	-2.68	-1322.81	-44946.51	2152.76	-813.66
Dead+Wind 45 deg - Service	5279.89	974.13	-990.45	-33185.60	-32886.98	-227.25
Dead+Wind 90 deg - Service	5279.89	1299.71	2.69	1886.61	-44633.74	492.64

Solution Summary

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX*	*PY*	*PZ*	*PX*	*PY*	*PZ*	*% Error*
	lb	*lb*	*lb*	*lb*	*lb*	*lb*	
1	-0.00	-5279.96	0.00	0.02	5279.90	-0.02	0.001%
2	-8.26	-6335.95	-4072.33	8.35	6335.79	4071.53	0.011%
3	-8.26	-4751.96	-4072.33	8.35	4751.84	4071.70	0.010%
4	2998.89	-6335.95	-3049.19	-2998.27	6335.78	3048.62	0.011%
5	2998.89	-4751.96	-3049.19	-2998.41	4751.84	3048.76	0.010%
6	4001.18	-6335.95	8.26	-4000.40	6335.79	-8.30	0.011%
7	4001.18	-4751.96	8.26	-4000.55	4751.85	-8.31	0.010%
8	-0.00	-7666.12	0.00	0.04	7666.23	-0.02	0.002%
9	-0.99	-7666.12	-512.05	0.98	7666.22	511.99	0.002%
10	380.58	-7666.12	-386.22	-380.56	7666.22	386.18	0.002%
11	504.08	-7666.12	0.99	-504.06	7666.22	-0.99	0.001%
12	-2.68	-5279.96	-1323.04	2.68	5279.89	1322.81	0.004%
13	974.30	-5279.96	-990.64	-974.13	5279.89	990.45	0.005%
14	1299.93	-5279.96	2.68	-1299.71	5279.89	-2.69	0.004%

Non-Linear Convergence Results

Load Combination	*Converged?*	*Number of Cycles*	*Displacement Tolerance*	*Force Tolerance*
1	Yes	50	0.00000001	0.00000001
2	Yes	50	0.00000001	0.00003082
3	Yes	50	0.00000001	0.00000001
4	Yes	50	0.00000001	0.00004695
5	Yes	50	0.00000001	0.00004287
6	Yes	50	0.00000001	0.00003064
7	Yes	50	0.00000001	0.00000001
8	Yes	50	0.00000001	0.00000001
9	Yes	50	0.00000001	0.00000001
10	Yes	50	0.00000001	0.00000001
11	Yes	50	0.00000001	0.00000001
12	Yes	50	0.00000001	0.00000001
13	Yes	50	0.00000001	0.00000001
14	Yes	50	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horiz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	70.1667 - 54.6667	0.203	13	0.0256	0.0070
T2	54.6667 - 44.1667	0.126	13	0.0186	0.0043
T3	44.1667 - 33.6667	0.084	13	0.0153	0.0024
T4	33.6667 - 23.1667	0.049	13	0.0116	0.0012
T5	23.1667 - 12.6667	0.024	13	0.0075	0.0006
T6	12.6667 - 0.1667	0.009	13	0.0040	0.0003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
70.17	Platform - 6' x 6' x 3.5'	13	0.203	0.0256	0.0070	373517
46.00	20' Dipole	13	0.090	0.0159	0.0027	171002
20.42	4.5' Yagi Antenna	13	0.019	0.0066	0.0005	132228
2.17	Enclosure/Box - 28"x40"x8"	13	0.001	0.0006	0.0000	400962

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horiz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	70.1667 - 54.6667	0.651	5	0.0829	0.0215
T2	54.6667 - 44.1667	0.402	5	0.0604	0.0131
T3	44.1667 - 33.6667	0.265	5	0.0496	0.0073
T4	33.6667 - 23.1667	0.155	5	0.0373	0.0038
T5	23.1667 - 12.6667	0.075	5	0.0243	0.0017
T6	12.6667 - 0.1667	0.027	5	0.0129	0.0009

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
70.17	Platform - 6' x 6' x 3.5'	5	0.651	0.0829	0.0215	116912
46.00	20' Dipole	5	0.287	0.0515	0.0082	52586
20.42	4.5' Yagi Antenna	5	0.059	0.0211	0.0014	41678
2.17	Enclosure/Box - 28"x40"x8"	4	0.003	0.0021	0.0002	122917

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	70.1667	Leg	A325N	0.5000	6	771.37	8835.73	0.087 ✔	1	Bolt SS
		Diagonal	A325N	0.5000	1	257.54	1767.19	0.146 ✔	1	Member Block Shear
		Horizontal	A325N	0.5000	1	221.05	1767.19	0.125 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.5000	1	37.52	1767.19	0.021 ✔	1	Member Block Shear
		Top Girt	A325N	0.5000	1	37.52	1767.19	0.021 ✔	1	Member Block Shear
T2	54.6667	Leg	A325N	0.5000	6	981.36	8835.73	0.111 ✔	1	Bolt SS
		Diagonal	A325N	0.5000	1	501.16	2446.88	0.205 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.5000	1	63.63	1767.19	0.036 ✔	1	Member Block Shear
		Top Girt	A325N	0.5000	1	289.17	1767.19	0.164 ✔	1	Member Block Shear
T3	44.1667	Leg	A325N	0.5000	8	1036.79	8835.73	0.117 ✔	1	Bolt SS
		Diagonal	A325N	0.5000	1	558.55	2446.88	0.228 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.5000	1	86.60	2446.88	0.035 ✔	1	Member Block Shear
		Top Girt	A325N	0.5000	1	371.86	2446.88	0.152 ✔	1	Member Block Shear
T4	33.6667	Leg	A325N	0.5000	8	1331.71	8835.73	0.151 ✔	1	Bolt SS
		Diagonal	A325N	0.5000	1	638.61	3126.56	0.204 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.5000	1	110.18	3126.56	0.035 ✔	1	Member Block Shear
		Top Girt	A325N	0.5000	1	553.49	3126.56	0.177 ✔	1	Member Block Shear
T5	23.1667	Leg	A325N	0.6250	8	1634.47	13805.80	0.118 ✔	1	Bolt SS
		Diagonal	A325N	0.6250	1	771.37	6830.86	0.113 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.6250	1	117.09	6830.86	0.017 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	821.62	6830.86	0.120 ✔	1	Member Block Shear
T6	12.6667	Leg	A325N	0.6250	8	1918.48	13805.80	0.139 ✔	1	Bolt SS
		Diagonal	A325N	0.6250	1	1083.30	6830.86	0.159 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.6250	1	162.25	6830.86	0.024 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	1301.88	6830.86	0.191 ✔	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L2x2x1/4	15.61	3.39	104.0 K=1.00	0.9380	-2318.12	24750.40	0.094 [1] ✔
T2	54.6667 - 44.1667	L2 1/2x2 1/2x1/4	10.57	6.27	153.1 K=1.00	1.1900	-2976.37	14522.70	0.205 [1] ✔
T3	44.1667 - 33.6667	KL/R > 150 (C) - 55/2 L2 1/2x2 1/2x1/4	10.57	5.98	146.1 K=1.00	1.1900	-4199.03	15955.00	0.263 [1] ✔
T4	33.6667 - 23.1667	L2 1/2x2 1/2x1/4	10.57	5.82	142.2 K=1.00	1.1900	-5453.99	16851.90	0.324 [1] ✔
T5	23.1667 - 12.6667	L3x3x1/4	10.57	5.71	115.8 K=1.00	1.4400	-6748.57	30724.30	0.220 [1] ✔
T6	12.6667 - 0.1667	L3x3x1/4	12.59	6.81	138.0 K=1.00	1.4400	-8231.23	21639.70	0.380 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L1x1x1/8	6.08	3.30	202.2 K=1.00	0.2344	-379.52	1640.52	0.231 [1] ✔
T2	54.6667 - 44.1667	KL/R > 200 (C) - 13 L1 1/4" x 1 1/4" x 1/8"	11.38	6.54	319.2 K=1.00	0.2969	-679.18	833.83	0.815 [1] ✔
T3	44.1667 - 33.6667	KL/R > 200 (C) - 65 L1 1/4" x 1 1/4" x 1/8"	12.18	6.74	329.2 K=1.00	0.2969	-747.51	784.14	0.953 [1] ✔
T4	33.6667 - 23.1667	KL/R > 200 (C) - 85 L1 1/2x1 1/2x1/8	13.17	7.13	289.0 K=1.00	0.3594	-863.08	1231.12	0.701 [1] ✔
T5	23.1667 - 12.6667	KL/R > 200 (C) - 105 L2x2x3/16	14.31	7.61	231.9 K=1.00	0.7150	-1085.97	3805.15	0.285 [1] ✔
T6	12.6667 - 0.1667	KL/R > 200 (C) - 125 L2x2x3/16	17.10	9.13	278.0 K=1.00	0.7150	-1535.80	2647.78	0.580 [1] ✔
		KL/R > 200 (C) - 145							

[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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L1x1x1/8	2.73	2.57	157.6 K=1.00	0.2344	-122.35	2702.07	0.045 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L1x1x1/8	3.11	2.94	116.0 K=1.00	0.2344	-37.52	4869.63	0.008 [1] ✔
T2	54.6667 - 44.1667	L1x1x1/8	4.32	4.11	162.1 K=1.00	0.2344	-63.63	2554.41	0.025 [1] ✔
T3	44.1667 - 33.6667	L1 1/4" x 1 1/4" x 1/8"	6.13	5.92	184.7 K=1.00	0.2969	-86.60	2490.74	0.035 [1] ✔
T4	33.6667 - 23.1667	L1 1/2x1 1/2x1/8	7.92	7.71	198.9 K=1.00	0.3594	-110.18	2599.32	0.042 [1] ✔
T5	23.1667 - 12.6667	L2x2x3/16	9.70	9.45	183.8 K=1.00	0.7150	-117.09	6059.08	0.019 [1] ✔
T6	12.6667 - 0.1667	L2x2x3/16	11.62	11.37	221.0 K=1.00	0.7150	-162.25	4188.54	0.039 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L1x1x1/8	1.00	0.83	51.1 K=1.00	0.2344	-37.52	7743.81	0.005 [1] ✔
T2	54.6667 - 44.1667	L1x1x1/8	3.62	3.41	209.1 K=1.00	0.2344	-175.17	1534.55	0.114 [1] ✔
T3	44.1667 - 33.6667	KL/R > 200 (C) - 57 L1 1/4" x 1 1/4" x 1/8"	5.38	5.17	252.5 K=1.00	0.2969	-242.11	1333.06	0.182 [1] ✔
T4	33.6667 - 23.1667	KL/R > 200 (C) - 77 L1 1/2x1 1/2x1/8	7.14	6.93	280.9 K=1.00	0.3594	-368.41	1303.90	0.283 [1] ✔
T5	23.1667 - 12.6667	KL/R > 200 (C) - 97 L2x2x3/16	8.90	8.65	263.6 K=1.00	0.7150	-557.42	2946.27	0.189 [1] ✔
T6	12.6667 - 0.1667	KL/R > 200 (C) - 117 L2x2x3/16 KL/R > 200 (C) - 137	10.67	10.42	317.2 K=1.00	0.7150	-866.04	2033.53	0.426 [1] ✔

[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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L2x2x1/4	15.61	3.39	66.8	0.6255	1543.36	30493.10	0.051 [1] ✔
T2	54.6667 - 44.1667	L2 1/2x2 1/2x1/4	10.57	6.27	97.8	0.8775	2084.45	42778.10	0.049 [1] ✔
T3	44.1667 - 33.6667	L2 1/2x2 1/2x1/4	10.57	5.98	93.3	0.8775	3071.38	42778.10	0.072 [1] ✔
T4	33.6667 - 23.1667	L2 1/2x2 1/2x1/4	10.57	5.82	90.8	0.8775	4016.90	42778.10	0.094 [1] ✔
T5	23.1667 - 12.6667	L3x3x1/4	10.57	5.71	73.7	1.0650	4949.80	51918.80	0.095 [1] ✔
T6	12.6667 - 0.1667	L3x3x1/4	12.59	6.81	87.9	1.0650	5982.61	51918.80	0.115 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L1x1x1/8	6.08	3.30	129.9	0.1172	257.54	5097.66	0.051 [1] ✔
T2	54.6667 - 44.1667	L1 1/4" x 1 1/4" x 1/8"	11.38	6.54	203.9	0.1641	501.16	7136.72	0.070 [1] ✔
T3	44.1667 - 33.6667	L1 1/4" x 1 1/4" x 1/8"	12.18	6.74	210.2	0.1641	558.55	7136.72	0.078 [1] ✔
T4	33.6667 - 23.1667	L1 1/2x1 1/2x1/8	13.17	7.13	184.0	0.2109	638.61	9175.78	0.070 [1] ✔
T5	23.1667 - 12.6667	L2x2x3/16	14.31	7.61	148.1	0.4308	771.37	18739.00	0.041 [1] ✔
T6	12.6667 - 0.1667	L2x2x3/16	17.10	9.13	177.5	0.4308	1083.30	18739.00	0.058 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L1x1x1/8	2.73	2.57	101.2	0.1172	221.05	5097.66	0.043 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L1x1x1/8	3.11	2.94	116.0	0.1172	37.52	5097.66	0.007 [1] ✔
T2	54.6667 - 44.1667	L1x1x1/8	4.32	4.11	162.1	0.1172	63.63	5097.66	0.012 [1] ✔
T3	44.1667 - 33.6667	L1 1/4" x 1 1/4" x 1/8"	6.13	5.92	184.7	0.1641	86.60	7136.72	0.012 [1] ✔
T4	33.6667 - 23.1667	L1 1/2x1 1/2x1/8	7.92	7.71	198.9	0.2109	110.18	9175.78	0.012 [1] ✔
T5	23.1667 - 12.6667	L2x2x3/16	9.70	9.45	183.8	0.4308	117.09	18739.00	0.006 [1] ✔
T6	12.6667 - 0.1667	L2x2x3/16	11.62	11.37	221.0	0.4308	162.25	18739.00	0.009 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	70.1667 - 54.6667	L1x1x1/8	1.00	0.83	32.8	0.1172	37.52	5097.66	0.007 [1] ✔
T2	54.6667 - 44.1667	L1x1x1/8	3.62	3.41	134.3	0.1172	289.17	5097.66	0.057 [1] ✔
T3	44.1667 - 33.6667	L1 1/4" x 1 1/4" x 1/8"	5.38	5.17	161.2	0.1641	371.86	7136.72	0.052 [1] ✔
T4	33.6667 - 23.1667	L1 1/2x1 1/2x1/8	7.14	6.93	178.8	0.2109	553.49	9175.78	0.060 [1] ✔
T5	23.1667 - 12.6667	L2x2x3/16	8.90	8.65	168.3	0.4308	821.62	18739.00	0.044 [1] ✔
T6	12.6667 - 0.1667	L2x2x3/16	10.67	10.42	202.6	0.4308	1301.88	18739.00	0.069 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$øP_{allow}$ lb	% Capacity	Pass Fail
T1	70.1667 - 54.6667	Leg	L2x2x1/4	3	-2318.12	24750.40	9.4	Pass
T2	54.6667 - 44.1667	Leg	L2 1/2x2 1/2x1/4	55	-2976.37	14522.70	20.5	Pass
T3	44.1667 - 33.6667	Leg	L2 1/2x2 1/2x1/4	75	-4199.03	15955.00	26.3	Pass
T4	33.6667 - 23.1667	Leg	L2 1/2x2 1/2x1/4	95	-5453.99	16851.90	32.4	Pass
T5	23.1667 - 12.6667	Leg	L3x3x1/4	115	-6748.57	30724.30	22.0	Pass
T6	12.6667 - 0.1667	Leg	L3x3x1/4	135	-8231.23	21639.70	38.0	Pass
T1	70.1667 - 54.6667	Diagonal	L1x1x1/8	13	-379.52	1640.52	23.1	Pass
T2	54.6667 - 44.1667	Diagonal	L1 1/4" x 1 1/4" x 1/8"	65	-679.18	833.83	81.5	Pass
T3	44.1667 - 33.6667	Diagonal	L1 1/4" x 1 1/4" x 1/8"	85	-747.51	784.14	95.3	Pass
T4	33.6667 - 23.1667	Diagonal	L1 1/2x1 1/2x1/8	105	-863.08	1231.12	70.1	Pass
T5	23.1667 - 12.6667	Diagonal	L2x2x3/16	125	-1085.97	3805.15	28.5	Pass
T6	12.6667 - 0.1667	Diagonal	L2x2x3/16	145	-1535.80	2647.78	58.0	Pass
T1	70.1667 - 54.6667	Horizontal	L1x1x1/8	17	-122.35	2702.07	4.5 12.5 (b)	Pass
T1	70.1667 - 54.6667	Secondary Horizontal	L1x1x1/8	22	-37.52	4869.63	0.8 2.1 (b)	Pass
T2	54.6667 - 44.1667	Secondary Horizontal	L1x1x1/8	70	-63.63	2554.41	2.5 3.6 (b)	Pass
T3	44.1667 - 33.6667	Secondary Horizontal	L1 1/4" x 1 1/4" x 1/8"	90	-86.60	2490.74	3.5 3.5 (b)	Pass
T4	33.6667 - 23.1667	Secondary Horizontal	L1 1/2x1 1/2x1/8	110	-110.18	2599.32	4.2	Pass
T5	23.1667 - 12.6667	Secondary Horizontal	L2x2x3/16	130	-117.09	6059.08	1.9	Pass
T6	12.6667 - 0.1667	Secondary Horizontal	L2x2x3/16	150	-162.25	4188.54	3.9	Pass
T1	70.1667 - 54.6667	Top Girt	L1x1x1/8	6	37.52	5097.66	0.7 2.1 (b)	Pass
T2	54.6667 - 44.1667	Top Girt	L1x1x1/8	57	-175.17	1534.55	11.4 16.4 (b)	Pass
T3	44.1667 - 33.6667	Top Girt	L1 1/4" x 1 1/4" x 1/8"	77	-242.11	1333.06	18.2	Pass
T4	33.6667 - 23.1667	Top Girt	L1 1/2x1 1/2x1/8	97	-368.41	1303.90	28.3	Pass
T5	23.1667 - 12.6667	Top Girt	L2x2x3/16	117	-557.42	2946.27	18.9	Pass
T6	12.6667 - 0.1667	Top Girt	L2x2x3/16	137	-866.04	2033.53	42.6	Pass
						Summary		
						Leg (T6)	38.0	Pass
						Diagonal (T3)	95.3	Pass
						Horizontal (T1)	12.5	Pass
						Secondary Horizontal (T4)	4.2	Pass
						Top Girt (T6)	42.6	Pass
						Bolt Checks	22.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$øP_{allow}$ lb	% Capacity	Pass Fail
						RATING =	**95.3**	**Pass**