PJF PAUL J. FORD & COMPANY

50 Years 1965 - 2015

Report Date: July 24, 2018

Client: Crawford Broadcasting
2821 S. Parker Rd
Aurora, CO 80014
Attn: Cris Alexander
(817) 295-8183

Structure: Existing 185-ft Guyed Tower
Site Name: WCHB Ferndale
Site Address: Woodward Heights
City, County, State: Ferndale, Oakland County, MI
Latitude, Longitude: 42.469717, 83.115128

PJF Project: A00018-0466.001.8161

Paul J. Ford and Company is pleased to submit this "**Structural Analysis Report**" to determine the tower stress level.

Analysis Criteria:

Reference Standard:	2015 International Building Code with the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1.
Ultimate Wind Speed:	115 mph 3-second gust wind speed without ice
Nominal Wind Speed:	89 mph 3-second gust wind speed without ice
Ice Wind Speed:	40 mph 3-second gust wind speed with 1" ice
Service Wind Speed:	60 mph (Serviceability) without ice
IBC Site Criteria:	Risk Category II, Topographic Category 1, Exposure Category C

Proposed Appurtenance Loads:
The structure was analyzed with the addition of the proposed appurtenance loads shown in Table 1.

Summary of Analysis Results:

Existing Structure:	Pass
Existing Foundation:	Unknown

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and Crawford Broadcasting. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully Submitted by:
Paul J. Ford and Company

Michael T Bange

Michael Bange
Structural Designer
mbange@pauljford.com

MRB

STATE OF MICHIGAN
JAMES R. ANTOSZEWSKI
No. 6201063289
LICENSED PROFESSIONAL ENGINEER

7/24/2018

JUL 25 2018

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 185 ft Guyed tower. The original design data was unavailable.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-H Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 89.1 mph with no ice, 40 mph with 1 inch ice thickness and 60 mph under service loads, exposure category C with topographic category 1 and crest height of 0 feet.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
185.0	185.0	1	kathreinscala	Kathrein Scala CL-FM	-	-	-
180.0	180.0	-	-	-	1	1/2	-
175.5	175.5	1	kathreinscala	Kathrein Scala CL-FM	-	-	-

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Photos	Crawford Broadcasting	-	Crawford Broadcasting
Section Drawing	Crawford Broadcasting	-	Crawford Broadcasting
Antenna Specifications	Kathrein	-	Crawford Broadcasting

3.1) Analysis Method

tnxTower (version 8.0.2.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Guyed tower was fabricated and installed in accordance with the manufacturer's specifications.
2) Guyed tower has been properly maintained in accordance with manufacturer's specifications.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J. Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 3 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	185 - 180	Leg	1 1/2" solid	2	-1.52	65.03	11.1 13.9 (b)	Pass
T2	180 - 170	Leg	1 1/2" solid	16	-2.83	53.22	17.4	Pass
T3	170 - 160	Leg	1 1/2" solid	37	-6.60	51.10	12.9 16.4 (b)	Pass
T4	160 - 150	Leg	1 1/2" solid	58	-6.52	50.80	12.8	Pass
T5	150 - 140	Leg	1 1/2" solid	80	-8.72	57.36	21.0 23.8 (b)	Pass
T6	140 - 130	Leg	1 1/2" solid	100	-12.24	40.45	32.2	Pass
T7	130 - 120	Leg	1 1/2" solid	121	-11.30	38.77	29.1	Pass
T8	120 - 110	Leg	1 1/2" solid	142	-11.69	38.87	30.1	Pass
T9	110 - 100	Leg	1 1/2" solid	163	-11.63	38.44	30.2	Pass
T10	100 - 90	Leg	1 1/2" solid	186	-13.67	40.32	35.5	Pass
T11	90 - 80	Leg	1 1/2" solid	206	-16.68	40.10	43.4	Pass
T12	80 - 70	Leg	1 1/2" solid	227	-15.84	39.02	40.6	Pass
T13	70 - 60	Leg	1 1/2" solid	248	-16.83	39.58	42.5	Pass
T14	60 - 50	Leg	1 1/2" solid	269	-16.91	39.56	42.7	Pass
T15	50 - 40	Leg	1 1/2" solid	291	-16.92	39.17	43.3	Pass
T16	40 - 30	Leg	1 1/2" solid	311	-19.04	52.53	36.2	Pass
T17	30 - 20	Leg	1 1/2" solid	332	-18.91	52.34	36.1 47.8 (b)	Pass
T18	20 - 10	Leg	1 1/2" solid	353	-19.25	52.37	36.8	Pass
T19	10 - 0	Leg	1 1/2" solid	374	-19.21	52.31	36.7	Pass
T1	185 - 180	Horizontal	PL 1/4 x 2	13	0.00	16.20	64.9	Pass
T2	180 - 170	Horizontal	PL 1/4 x 2	29	-0.01	6.57	45.4	Pass
T3	170 - 160	Horizontal	PL 1/4 x 2	48	-0.00	6.57	21.3	Pass
T4	160 - 150	Horizontal	PL 1/4 x 2	69	-0.00	6.57	38.7	Pass
T5	150 - 140	Horizontal	PL 1/4 x 2	88	-0.00	6.57	59.9	Pass
T6	140 - 130	Horizontal	PL 1/4 x 2	113	-0.00	6.57	49.6	Pass
T7	130 - 120	Horizontal	PL 1/4 x 2	140	0.01	16.20	33.7	Pass
T8	120 - 110	Horizontal	PL 1/4 x 2	161	-0.00	6.57	15.2	Pass
T9	110 - 100	Horizontal	PL 1/4 x 2	172	0.00	16.20	23.7	Pass
T10	100 - 90	Horizontal	PL 1/4 x 2	193	0.01	16.20	42.1	Pass
T11	90 - 80	Horizontal	PL 1/4 x 2	218	-0.00	6.57	47.6	Pass
T12	80 - 70	Horizontal	PL 1/4 x 2	245	-0.00	6.57	33.2	Pass
T13	70 - 60	Horizontal	PL 1/4 x 2	266	-0.00	6.57	16.0	Pass
T14	60 - 50	Horizontal	PL 1/4 x 2	277	-0.00	6.57	15.2	Pass
T15	50 - 40	Horizontal	PL 1/4 x 2	298	0.00	16.20	32.0	Pass
T16	40 - 30	Horizontal	PL 1/4 x 2	323	-0.00	6.57	32.7	Pass
T17	30 - 20	Horizontal	PL 1/4 x 2	350	-0.00	6.57	20.6	Pass
T18	20 - 10	Horizontal	PL 1/4 x 2	371	0.00	16.20	6.2	Pass
T19	10 - 0	Horizontal	PL 1/4 x 2	385	-0.00	6.57	17.5	Pass
T1	185 - 180	Top Girt	PL 1/4 x 2	6	-0.04	6.57	59.1	Pass
T2	180 - 170	Top Girt	PL 1/4 x 2	19	0.26	16.20	38.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T3	170 - 160	Top Girt	PL 1/4 x 2	41	-0.01	6.57	19.3	Pass
T4	160 - 150	Top Girt	PL 1/4 x 2	63	0.08	16.20	18.4	Pass
T5	150 - 140	Top Girt	PL 1/4 x 2	82	-0.05	6.57	34.6	Pass
T6	140 - 130	Top Girt	PL 1/4 x 2	103	-0.18	6.57	42.6	Pass
T7	130 - 120	Top Girt	PL 1/4 x 2	125	-0.07	6.57	27.2	Pass
T8	120 - 110	Top Girt	PL 1/4 x 2	146	-0.05	6.57	12.9	Pass
T9	110 - 100	Top Girt	PL 1/4 x 2	166	-0.01	6.57	10.2	Pass
T10	100 - 90	Top Girt	PL 1/4 x 2	187	-0.10	6.57	19.7	Pass
T11	90 - 80	Top Girt	PL 1/4 x 2	208	-0.10	6.57	31.6	Pass
T12	80 - 70	Top Girt	PL 1/4 x 2	230	-0.16	6.57	24.6	Pass
T13	70 - 60	Top Girt	PL 1/4 x 2	251	-0.04	6.57	14.3	Pass
T14	60 - 50	Top Girt	PL 1/4 x 2	271	-0.00	6.57	3.5	Pass
T15	50 - 40	Top Girt	PL 1/4 x 2	292	0.04	16.20	16.5	Pass
T16	40 - 30	Top Girt	PL 1/4 x 2	313	-0.14	6.57	20.9	Pass
T17	30 - 20	Top Girt	PL 1/4 x 2	335	-0.05	6.57	17.1	Pass
T18	20 - 10	Top Girt	PL 1/4 x 2	356	-0.04	6.57	6.2	Pass
T19	10 - 0	Top Girt	PL 1/4 x 2	376	0.01	16.20	7.7	Pass
T1	185 - 180	Bottom Girt	PL 1/4 x 2	7	-0.23	6.57	37.8	Pass
T2	180 - 170	Bottom Girt	PL 1/4 x 2	23	-0.01	6.57	22.5	Pass
T3	170 - 160	Bottom Girt	PL 1/4 x 2	45	-0.09	6.57	17.2	Pass
T4	160 - 150	Bottom Girt	PL 1/4 x 2	66	-0.10	6.57	31.5	Pass
T5	150 - 140	Bottom Girt	PL 1/4 x 2	85	-0.29	6.57	44.3	Pass
T6	140 - 130	Bottom Girt	PL 1/4 x 2	107	0.07	16.20	30.7	Pass
T7	130 - 120	Bottom Girt	PL 1/4 x 2	128	0.05	16.20	14.3	Pass
T8	120 - 110	Bottom Girt	PL 1/4 x 2	148	-0.02	6.57	7.2	Pass
T9	110 - 100	Bottom Girt	PL 1/4 x 2	169	-0.12	6.57	18.9	Pass
T10	100 - 90	Bottom Girt	PL 1/4 x 2	190	-0.11	6.57	33.1	Pass
T11	90 - 80	Bottom Girt	PL 1/4 x 2	212	0.15	16.20	25.2	Pass
T12	80 - 70	Bottom Girt	PL 1/4 x 2	233	0.04	16.20	16.9	Pass
T13	70 - 60	Bottom Girt	PL 1/4 x 2	254	-0.00	6.57	3.4	Pass
T14	60 - 50	Bottom Girt	PL 1/4 x 2	274	-0.04	6.57	13.5	Pass
T15	50 - 40	Bottom Girt	PL 1/4 x 2	295	-0.15	6.57	21.6	Pass
T16	40 - 30	Bottom Girt	PL 1/4 x 2	317	0.05	16.20	19.5	Pass
T17	30 - 20	Bottom Girt	PL 1/4 x 2	338	0.03	16.20	7.3	Pass
T18	20 - 10	Bottom Girt	PL 1/4 x 2	358	-0.02	6.57	5.4	Pass
T19	10 - 0	Bottom Girt	PL 1/4 x 2	379	-0.00	6.57	0.4	Pass
T2	180 - 170	Guy A@177.988	3/8	396	6.40	9.24	69.3	Pass
T6	140 - 130	Guy A@137.988	3/8	399	5.78	9.24	62.6	Pass
T11	90 - 80	Guy A@87.8	3/8	402	5.08	9.24	55.0	Pass
T16	40 - 30	Guy A@37.9875	3/8	405	4.45	9.24	48.2	Pass
T2	180 - 170	Guy B@177.988	3/8	395	6.40	9.24	69.2	Pass
T6	140 - 130	Guy B@137.988	3/8	398	5.78	9.24	62.6	Pass
T11	90 - 80	Guy B@87.8	3/8	401	5.08	9.24	55.0	Pass
T16	40 - 30	Guy B@37.9875	3/8	404	4.45	9.24	48.2	Pass
T2	180 - 170	Guy C@177.988	3/8	394	6.38	9.24	69.1	Pass
T6	140 - 130	Guy C@137.988	3/8	397	5.79	9.24	62.6	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T11	90 - 80	Guy C@87.8	3/8	400	5.09	9.24	55.1	Pass
T16	40 - 30	Guy C@37.9875	3/8	403	4.45	9.24	48.2	Pass
							Summary	
						Leg (T17)	47.8	Pass
						Horizontal (T1)	64.9	Pass
						Top Girt (T1)	59.1	Pass
						Bottom Girt (T5)	44.3	Pass
						Guy A (T2)	69.3	Pass
						Guy B (T2)	69.2	Pass
						Guy C (T2)	69.1	Pass
						Bolt Checks	47.8	Pass
						Rating =	69.3	Pass

Table 4 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
-	Base Foundation	0	Unknown	Unknown
-	Guy Anchor	0	Unknown	Unknown

Structure Rating (max from all components) =	69.3%

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower has sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

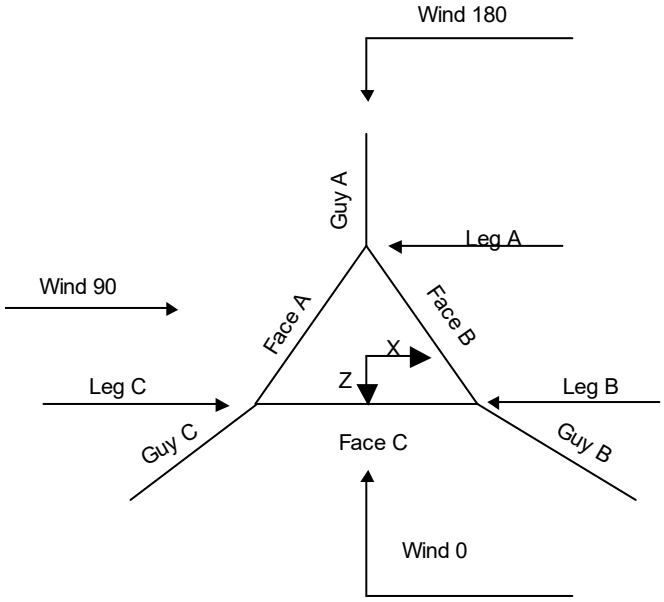
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 185.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 1.25 ft at the top and 1.25 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in Oakland County, Michigan.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 89.0 mph.
4) Structure Class II.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 1.0000 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 40.0 mph is used in combination with ice.
12) Temperature drop of 50 °F.
13) Deflections calculated using a wind speed of 60.0 mph.
14) Pressures are calculated at each section.
15) Safety factor used in guy design is 1.
16) Stress ratio used in tower member design is 1.
17) 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		Pole Without Linear Attachments
		Pole With Shroud Or No Appurtenances
		Outside and Inside Corner Radii Are Known



Corner & Starmount Guyed Tower

Tower Section Geometry

Tower Section	*Tower Elevation*	*Assembly Database*	*Description*	*Section Width*	*Number of Sections*	*Section Length*
	ft			*ft*		*ft*
T1	185.00-180.00			1.25	1	5.00
T2	180.00-170.00			1.25	1	10.00
T3	170.00-160.00			1.25	1	10.00
T4	160.00-150.00			1.25	1	10.00
T5	150.00-140.00			1.25	1	10.00
T6	140.00-130.00			1.25	1	10.00
T7	130.00-120.00			1.25	1	10.00
T8	120.00-110.00			1.25	1	10.00
T9	110.00-100.00			1.25	1	10.00
T10	100.00-90.00			1.25	1	10.00
T11	90.00-80.00			1.25	1	10.00
T12	80.00-70.00			1.25	1	10.00
T13	70.00-60.00			1.25	1	10.00
T14	60.00-50.00			1.25	1	10.00
T15	50.00-40.00			1.25	1	10.00
T16	40.00-30.00			1.25	1	10.00
T17	30.00-20.00			1.25	1	10.00
T18	20.00-10.00			1.25	1	10.00
T19	10.00-0.00			1.25	1	10.00

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	185.00-180.00	1.64	X Brace	No	Yes	0.0000	1.0000
T2	180.00-170.00	1.93	X Brace	No	Yes	1.0000	3.2500
T3	170.00-160.00	1.93	X Brace	No	Yes	3.2500	1.0000
T4	160.00-150.00	1.93	X Brace	No	Yes	1.0000	3.2500
T5	150.00-140.00	1.93	X Brace	No	Yes	3.2500	1.0000
T6	140.00-130.00	1.93	X Brace	No	Yes	1.0000	3.2500
T7	130.00-120.00	1.93	X Brace	No	Yes	3.2500	1.0000
T8	120.00-110.00	1.93	X Brace	No	Yes	1.0000	3.2500
T9	110.00-100.00	1.93	X Brace	No	Yes	3.2500	1.0000
T10	100.00-90.00	1.93	X Brace	No	Yes	1.0000	3.2500
T11	90.00-80.00	1.93	X Brace	No	Yes	3.2500	1.0000
T12	80.00-70.00	1.93	X Brace	No	Yes	1.0000	3.2500
T13	70.00-60.00	1.93	X Brace	No	Yes	3.2500	1.0000
T14	60.00-50.00	1.93	X Brace	No	Yes	1.0000	3.2500
T15	50.00-40.00	1.93	X Brace	No	Yes	3.2500	1.0000
T16	40.00-30.00	1.93	X Brace	No	Yes	1.0000	3.2500
T17	30.00-20.00	1.93	X Brace	No	Yes	3.2500	1.0000
T18	20.00-10.00	1.93	X Brace	No	Yes	1.0000	3.2500
T19	10.00-0.00	1.95	X Brace	No	Yes	3.2500	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 185.00-180.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T2 180.00-170.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T3 170.00-160.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T4 160.00-150.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T5 150.00-140.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T6 140.00-130.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T7 130.00-120.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T8 120.00-110.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T9 110.00-100.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T10 100.00-90.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T11 90.00-80.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T12 80.00-70.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T13 70.00-60.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T14 60.00-50.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T15 50.00-40.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T16 40.00-30.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T17 30.00-20.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T18 20.00-10.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T19 10.00-0.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 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 185.00-180.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T2 180.00-170.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T3 170.00-160.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T4 160.00-150.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T5 150.00-140.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T6 140.00-130.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T7 130.00-120.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T8 120.00-110.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T9 110.00-100.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T10 100.00-90.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T11 90.00-80.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T12 80.00-70.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T13 70.00-60.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T14 60.00-50.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T15 50.00-40.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T16 40.00-30.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T17 30.00-20.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T18 20.00-10.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T19 10.00-0.00	Flat Bar	PL 1/4 x 2	A36 (36 ksi)	Flat Bar	PL 1/4 x 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 185.00-180.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T2 180.00-170.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T3 170.00-160.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T4 160.00-150.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T5 150.00-140.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T6 140.00-130.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T7 130.00-120.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T8 120.00-110.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T9 110.00-100.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T10 100.00-90.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T11 90.00-80.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T12 80.00-70.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T13 70.00-60.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T14 60.00-50.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T15 50.00-40.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T16 40.00-30.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T17 30.00-20.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T18 20.00-10.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	A36 (36 ksi)
T19 10.00-0.00	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	PL 1/4 x 2	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
T1 185.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T2 180.00-170.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T3 170.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T4 160.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T5 150.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T6 140.00-130.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T7 130.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T8 120.00-110.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T9 110.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T10 100.00-90.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T11 90.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T12 80.00-70.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T13 70.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T14 60.00-50.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T15 50.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T16 40.00-30.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000

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
T17 30.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T18 20.00-10.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	36.0000	36.0000	36.0000
T19 10.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	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 185.00-180.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T2 180.00-170.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T3 170.00-160.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T4 160.00-150.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T5 150.00-140.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T6 140.00-130.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T7 130.00-120.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T8 120.00-110.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T9 110.00-100.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T10 100.00-90.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T11 90.00-80.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T12 80.00-70.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T13 70.00-60.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T14 60.00-50.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T15 50.00-40.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T16 40.00-30.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T17 30.00-20.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T18 20.00-10.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	1	1
T19 10.00-0.00	No	No	1	1	1	1	0.7	0.7	1	1
				1	1	1	0.7	0.7	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 185.00-180.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T2 180.00-170.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T3 170.00-160.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T4 160.00-150.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T5 150.00-140.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T6 140.00-130.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T7 130.00-120.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T8 120.00-110.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T9 110.00-100.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T10 100.00-90.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T11 90.00-80.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T12 80.00-70.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T13 70.00-60.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T14 60.00-50.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T15 50.00-40.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T16 40.00-30.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T17 30.00-20.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T18 20.00-10.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T19 10.00-0.00	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	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 185.00-180.00	Flange	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 180.00-170.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 170.00-160.00	Flange	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 160.00-150.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 150.00-140.00	Flange	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 140.00-130.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 130.00-120.00	Flange	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

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.
T8 120.00-110.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 110.00-100.00	Flange	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 100.00-90.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 90.00-80.00	Flange	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T12 80.00-70.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T13 70.00-60.00	Flange	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T14 60.00-50.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T15 50.00-40.00	Flange	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T16 40.00-30.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T17 30.00-20.00	Flange	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T18 20.00-10.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T19 10.00-0.00	Flange	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

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 %
177.988	EHS	A	3/8	1.54	10%	23000	0.27	214.08	120.00	0.0000	0.00	100%
		B	3/8	1.54	10%	23000	0.27	214.08	120.00	0.0000	0.00	100%
		C	3/8	1.54	10%	23000	0.27	214.08	120.00	0.0000	0.00	100%
137.988	EHS	A	3/8	1.54	10%	23000	0.27	182.24	120.00	0.0000	0.00	100%
		B	3/8	1.54	10%	23000	0.27	182.24	120.00	0.0000	0.00	100%
		C	3/8	1.54	10%	23000	0.27	182.24	120.00	0.0000	0.00	100%
87.8	EHS	A	3/8	1.54	10%	23000	0.27	147.99	120.00	0.0000	0.00	100%
		B	3/8	1.54	10%	23000	0.27	147.99	120.00	0.0000	0.00	100%
		C	3/8	1.54	10%	23000	0.27	147.99	120.00	0.0000	0.00	100%
37.9875	EHS	A	3/8	1.54	10%	23000	0.27	125.08	120.00	0.0000	0.00	100%
		B	3/8	1.54	10%	23000	0.27	125.08	120.00	0.0000	0.00	100%
		C	3/8	1.54	10%	23000	0.27	125.08	120.00	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
177.988	Corner						
137.988	Corner						
87.8	Corner						
37.9875	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
177.99	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
137.99	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
87.80	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
37.99	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	

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
177.988	0.06	0.06	0.06		4.00 3.5 sec/pulse	4.00 3.5 sec/pulse	4.00 3.5 sec/pulse	
137.988	0.05	0.05	0.05		2.91 2.9 sec/pulse	2.91 2.9 sec/pulse	2.91 2.9 sec/pulse	
87.8	0.04	0.04	0.04		1.93 2.4 sec/pulse	1.93 2.4 sec/pulse	1.93 2.4 sec/pulse	
37.9875	0.03	0.03	0.03		1.38 2.0 sec/pulse	1.38 2.0 sec/pulse	1.38 2.0 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
177.988	No	No			1	1	1	1
137.988	No	No			1	1	1	1
87.8	No	No			1	1	1	1
37.9875	No	No			1	1	1	1

Guy Data *(cont'd)*

	Torque-Arm				Pull Off				Diagonal			
Guy Elevation ft	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
177.988	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
137.988	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
87.8	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
37.9875	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	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
177.988	A	88.99	21	4	2.2086
	B	88.99	21	4	2.2086
	C	88.99	21	4	2.2086
137.988	A	68.99	20	4	2.1531
	B	68.99	20	4	2.1531
	C	68.99	20	4	2.1531
87.8	A	43.90	18	4	2.0579
	B	43.90	18	4	2.0579
	C	43.90	18	4	2.0579
37.9875	A	18.99	15	3	1.8925
	B	18.99	15	3	1.8925
	C	18.99	15	3	1.8925

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF4-50A(1/2") *	C	No	Ar (CaAa)	180.00 - 0.00	1	1	0.6250	0.6250		0.15

Discrete Tower Loads

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
Kathrein Scala CL-FM	C	From Leg	0.50 0.00 0.00	0.0000	185.00	No Ice 1/2" Ice 1" Ice	10.55 15.94 21.33	10.55 15.94 21.33	0.04 0.06 0.08
Kathrein Scala CL-FM ****	C	From Leg	0.50 0.00 0.00	0.0000	175.50	No Ice 1/2" Ice 1" Ice	10.55 15.94 21.33	10.55 15.94 21.33	0.04 0.06 0.08

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
5	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy

Comb. No.	Description
8	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
11	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
14	1.2 Dead+1.0 Ice+1.0 Temp+Guy
15	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
16	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
17	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
18	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
19	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
20	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
26	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	185 - 180	1.368	33	0.0634	3.8644
T2	180 - 170	1.271	33	0.0611	3.5952
T3	170 - 160	1.183	33	0.0588	3.2910
T4	160 - 150	1.061	29	0.0627	2.8578
T5	150 - 140	0.889	29	0.0625	2.4258
T6	140 - 130	0.685	29	0.0497	1.9705
T7	130 - 120	0.653	29	0.0334	1.7425
T8	120 - 110	0.637	29	0.0311	1.5370
T9	110 - 100	0.576	29	0.0349	1.3260
T10	100 - 90	0.467	29	0.0361	1.1107
T11	90 - 80	0.325	29	0.0265	0.8817
T12	80 - 70	0.338	29	0.0128	0.7651
T13	70 - 60	0.368	29	0.0132	0.6610
T14	60 - 50	0.351	27	0.0205	0.5525
T15	50 - 40	0.276	35	0.0270	0.4405
T16	40 - 30	0.158	33	0.0252	0.3217
T17	30 - 20	0.149	35	0.0190	0.2414
T18	20 - 10	0.143	35	0.0216	0.1630
T19	10 - 0	0.092	35	0.0278	0.0816

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	Kathrein Scala CL-FM	33	1.368	0.0634	3.8644	6365

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
177.99	Guy	33	1.245	0.0603	3.5174	7024
175.50	Kathrein Scala CL-FM	33	1.223	0.0594	3.4428	13191
137.99	Guy	29	0.665	0.0460	1.9075	5286
87.80	Guy	29	0.315	0.0231	0.8472	5824
37.99	Guy	33	0.148	0.0239	0.3027	7947

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	185 - 180	8.135	10	0.4519	10.6485
T2	180 - 170	7.552	10	0.4442	9.7092
T3	170 - 160	6.743	10	0.4357	8.8515
T4	160 - 150	5.791	10	0.4438	7.5709
T5	150 - 140	4.672	10	0.4291	6.2948
T6	140 - 130	3.475	10	0.3587	4.9422
T7	130 - 120	3.086	4	0.2701	4.3467
T8	120 - 110	2.891	4	0.2352	3.8282
T9	110 - 100	2.553	4	0.2235	3.2936
T10	100 - 90	2.058	4	0.2030	2.7469
T11	90 - 80	1.466	4	0.1425	2.1622
T12	80 - 70	1.449	4	0.0762	1.8822
T13	70 - 60	1.505	8	0.0717	1.6347
T14	60 - 50	1.396	8	0.0935	1.3747
T15	50 - 40	1.098	8	0.1134	1.1042
T16	40 - 30	0.652	8	0.1044	0.8147
T17	30 - 20	0.596	12	0.0800	0.6155
T18	20 - 10	0.542	12	0.0886	0.4176
T19	10 - 0	0.341	12	0.1095	0.2104

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	Kathrein Scala CL-FM	10	8.135	0.4519	10.6485	1976
177.99	Guy	10	7.361	0.4414	9.4605	2196
175.50	Kathrein Scala CL-FM	10	7.158	0.4384	9.2460	4241
137.99	Guy	10	3.327	0.3396	4.7653	1307
87.80	Guy	4	1.416	0.1248	2.0767	1510
37.99	Guy	8	0.611	0.0990	0.7680	2301

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	185	Leg	A325N	0.5000	1	1.84	13.25	0.139 ✔	1	Bolt Tension
T3	170	Leg	A325N	0.5000	1	2.18	13.25	0.164 ✔	1	Bolt Tension
T5	150	Leg	A325N	0.5000	1	3.16	13.25	0.238 ✔	1	Bolt Tension
T7	130	Leg	A325N	0.5000	1	3.79	13.25	0.286 ✔	1	Bolt Tension
T9	110	Leg	A325N	0.5000	1	3.88	13.25	0.293 ✔	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T11	90	Leg	A325N	0.5000	1	5.17	13.25	0.390 ✔	1	Bolt Tension
T13	70	Leg	A325N	0.5000	1	5.62	13.25	0.424 ✔	1	Bolt Tension
T15	50	Leg	A325N	0.5000	1	5.73	13.25	0.432 ✔	1	Bolt Tension
T17	30	Leg	A325N	0.5000	1	6.33	13.25	0.478 ✔	1	Bolt Tension

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	177.99 (A) (396)	3/8 EHS	1.54	15.40	6.40	9.24	1.000	1.443 ✔
	177.99 (B) (395)	3/8 EHS	1.54	15.40	6.40	9.24	1.000	1.444 ✔
	177.99 (C) (394)	3/8 EHS	1.54	15.40	6.38	9.24	1.000	1.448 ✔
T6	137.99 (A) (399)	3/8 EHS	1.54	15.40	5.78	9.24	1.000	1.598 ✔
	137.99 (B) (398)	3/8 EHS	1.54	15.40	5.78	9.24	1.000	1.598 ✔
	137.99 (C) (397)	3/8 EHS	1.54	15.40	5.79	9.24	1.000	1.596 ✔
T11	87.80 (A) (402)	3/8 EHS	1.54	15.40	5.08	9.24	1.000	1.818 ✔
	87.80 (B) (401)	3/8 EHS	1.54	15.40	5.08	9.24	1.000	1.818 ✔
	87.80 (C) (400)	3/8 EHS	1.54	15.40	5.09	9.24	1.000	1.816 ✔
T16	37.99 (A) (405)	3/8 EHS	1.54	15.40	4.45	9.24	1.000	2.076 ✔
	37.99 (B) (404)	3/8 EHS	1.54	15.40	4.45	9.24	1.000	2.076 ✔
	37.99 (C) (403)	3/8 EHS	1.54	15.40	4.45	9.24	1.000	2.076 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	Mast Stability Index	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	185 - 180	1 1/2" solid	5.00	1.64	52.4 K=1.00	1.7672	1.00	-1.52	65.03	0.023
T2	180 - 170	1 1/2" solid	10.00	1.93	61.7 K=1.00	1.7672	0.88	-2.83	53.22	0.053
T3	170 - 160	1 1/2" solid	10.00	1.93	61.7 K=1.00	1.7672	0.85	-6.60	51.10	0.129 [1]
T4	160 - 150	1 1/2" solid	10.00	1.93	61.7 K=1.00	1.7672	0.84	-6.52	50.80	0.128 [1]
T5	150 - 140	1 1/2" solid	10.00	1.93	61.7 K=1.00	1.7672	0.95	-8.72	57.36	0.152
T6	140 - 130	1 1/2" solid	10.00	1.93	61.7	1.7672	0.67	-12.24	40.45	0.303

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	Mast Stability Index	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	130 - 120	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.64	-11.30	38.77	0.291 [1]
T8	120 - 110	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.65	-11.69	38.87	0.301 [1]
T9	110 - 100	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.64	-11.63	38.44	0.302 [1]
T10	100 - 90	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.67	-13.67	40.32	0.339
T11	90 - 80	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.67	-16.68	40.10	0.416
T12	80 - 70	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.65	-15.84	39.02	0.406 [1]
T13	70 - 60	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.66	-16.83	39.58	0.425 [1]
T14	60 - 50	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.66	-16.91	39.56	0.427 [1]
T15	50 - 40	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.65	-16.92	39.17	0.432
T16	40 - 30	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.87	-19.04	52.53	0.362 [1]
T17	30 - 20	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.87	-18.91	52.34	0.361 [1]
T18	20 - 10	1 1/2" solid	10.00	1.93	K=1.00 61.7	1.7672	0.87	-19.25	52.37	0.368 [1]
T19	10 - 0	1 1/2" solid	10.00	1.95	K=1.00 62.3	1.7672	0.87	-19.21	52.31	0.367 [1]

[1] P_u / ϕP_n controls

Leg Bending Design Data (Compression)

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	185 - 180	1 1/2" solid	0.21	2.11	0.099	0.00	2.11	0.000
T2	180 - 170	1 1/2" solid	0.31	2.11	0.147	0.00	2.11	0.000
T3	170 - 160	1 1/2" solid	0.01	2.11	0.006	0.00	2.11	0.000
T4	160 - 150	1 1/2" solid	0.04	2.11	0.020	0.00	2.11	0.000
T5	150 - 140	1 1/2" solid	0.28	2.11	0.134	0.00	2.11	0.000
T6	140 - 130	1 1/2" solid	0.12	2.11	0.059	0.00	2.11	0.000
T7	130 - 120	1 1/2" solid	0.03	2.11	0.017	0.00	2.11	0.000
T8	120 - 110	1 1/2" solid	0.01	2.11	0.005	0.00	2.11	0.000
T9	110 - 100	1 1/2" solid	0.05	2.11	0.022	0.00	2.11	0.000
T10	100 - 90	1 1/2" solid	0.13	2.11	0.061	0.00	2.11	0.000
T11	90 - 80	1 1/2" solid	0.15	2.11	0.073	0.00	2.11	0.000
T12	80 - 70	1 1/2" solid	0.07	2.11	0.033	0.00	2.11	0.000
T13	70 - 60	1 1/2" solid	0.01	2.11	0.007	0.00	2.11	0.000
T14	60 - 50	1 1/2" solid	0.01	2.11	0.005	0.00	2.11	0.000
T15	50 - 40	1 1/2" solid	0.12	2.11	0.055	0.00	2.11	0.000
T16	40 - 30	1 1/2" solid	0.05	2.11	0.022	0.00	2.11	0.000
T17	30 - 20	1 1/2" solid	0.04	2.11	0.017	0.00	2.11	0.000
T18	20 - 10	1 1/2" solid	0.01	2.11	0.005	0.00	2.11	0.000
T19	10 - 0	1 1/2" solid	0.03	2.11	0.013	0.00	2.11	0.000

Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Size	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	185 - 180	1 1/2" solid	0.023	0.099	0.000	0.111 ✔	1.000	4.8.1 ✔
T2	180 - 170	1 1/2" solid	0.053	0.147	0.000	0.174 ✔	1.000	4.8.1 ✔
T3	170 - 160	1 1/2" solid	0.129	0.006	0.000	0.129 [1] ✔	1.000	4.8.1 ✔
T4	160 - 150	1 1/2" solid	0.128	0.020	0.000	0.128 [1] ✔	1.000	4.8.1 ✔
T5	150 - 140	1 1/2" solid	0.152	0.134	0.000	0.210 ✔	1.000	4.8.1 ✔
T6	140 - 130	1 1/2" solid	0.303	0.059	0.000	0.322 ✔	1.000	4.8.1 ✔
T7	130 - 120	1 1/2" solid	0.291	0.017	0.000	0.291 [1] ✔	1.000	4.8.1 ✔
T8	120 - 110	1 1/2" solid	0.301	0.005	0.000	0.301 [1] ✔	1.000	4.8.1 ✔
T9	110 - 100	1 1/2" solid	0.302	0.022	0.000	0.302 [1] ✔	1.000	4.8.1 ✔
T10	100 - 90	1 1/2" solid	0.339	0.061	0.000	0.355 ✔	1.000	4.8.1 ✔
T11	90 - 80	1 1/2" solid	0.416	0.073	0.000	0.434 ✔	1.000	4.8.1 ✔
T12	80 - 70	1 1/2" solid	0.406	0.033	0.000	0.406 [1] ✔	1.000	4.8.1 ✔
T13	70 - 60	1 1/2" solid	0.425	0.007	0.000	0.425 [1] ✔	1.000	4.8.1 ✔
T14	60 - 50	1 1/2" solid	0.427	0.005	0.000	0.427 [1] ✔	1.000	4.8.1 ✔
T15	50 - 40	1 1/2" solid	0.432	0.055	0.000	0.433 ✔	1.000	4.8.1 ✔
T16	40 - 30	1 1/2" solid	0.362	0.022	0.000	0.362 [1] ✔	1.000	4.8.1 ✔
T17	30 - 20	1 1/2" solid	0.361	0.017	0.000	0.361 [1] ✔	1.000	4.8.1 ✔
T18	20 - 10	1 1/2" solid	0.368	0.005	0.000	0.368 [1] ✔	1.000	4.8.1 ✔
T19	10 - 0	1 1/2" solid	0.367	0.013	0.000	0.367 [1] ✔	1.000	4.8.1 ✔

[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 P_u / ϕP_n
T1	185 - 180	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T2	180 - 170	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.01	6.57	0.001
T3	170 - 160	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T4	160 - 150	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.001
T5	150 - 140	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.001
T6	140 - 130	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	130 - 120	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T8	120 - 110	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T9	110 - 100	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T10	100 - 90	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T11	90 - 80	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T12	80 - 70	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T13	70 - 60	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T14	60 - 50	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T15	50 - 40	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T16	40 - 30	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T17	30 - 20	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T18	20 - 10	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T19	10 - 0	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000

Horizontal Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	185 - 180	PL 1/4 x 2	-0.19	0.68	0.289	-0.00	0.08	0.026
T2	180 - 170	PL 1/4 x 2	-0.24	0.68	0.349	-0.01	0.08	0.068
T3	170 - 160	PL 1/4 x 2	-0.14	0.68	0.205	0.00	0.08	0.007
T4	160 - 150	PL 1/4 x 2	-0.25	0.68	0.373	0.00	0.08	0.007
T5	150 - 140	PL 1/4 x 2	-0.37	0.68	0.555	0.00	0.08	0.027
T6	140 - 130	PL 1/4 x 2	-0.31	0.68	0.457	0.00	0.08	0.023
T7	130 - 120	PL 1/4 x 2	-0.22	0.68	0.332	-0.00	0.08	0.004
T8	120 - 110	PL 1/4 x 2	-0.09	0.68	0.135	-0.00	0.08	0.005
T9	110 - 100	PL 1/4 x 2	-0.15	0.68	0.229	0.00	0.08	0.002
T10	100 - 90	PL 1/4 x 2	-0.27	0.68	0.407	0.00	0.08	0.007
T11	90 - 80	PL 1/4 x 2	-0.31	0.68	0.456	0.00	0.08	0.009
T12	80 - 70	PL 1/4 x 2	-0.22	0.68	0.323	-0.00	0.08	0.002
T13	70 - 60	PL 1/4 x 2	-0.10	0.68	0.142	-0.00	0.08	0.002
T14	60 - 50	PL 1/4 x 2	-0.10	0.68	0.151	0.00	0.08	0.001
T15	50 - 40	PL 1/4 x 2	-0.21	0.68	0.316	0.00	0.08	0.004
T16	40 - 30	PL 1/4 x 2	-0.21	0.68	0.304	0.00	0.08	0.003
T17	30 - 20	PL 1/4 x 2	-0.12	0.68	0.181	-0.00	0.08	0.002
T18	20 - 10	PL 1/4 x 2	-0.04	0.68	0.059	-0.00	0.08	0.002
T19	10 - 0	PL 1/4 x 2	0.12	0.68	0.173	-0.00	0.08	0.002

Horizontal Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	185 - 180	PL 1/4 x 2	0.000	0.289	0.026	0.315 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	180 - 170	PL 1/4 x 2	0.001	0.349	0.068	0.418 ✔	1.000	4.8.1 ✔
T3	170 - 160	PL 1/4 x 2	0.000	0.205	0.007	0.213 ✔	1.000	4.8.1 ✔
T4	160 - 150	PL 1/4 x 2	0.001	0.373	0.007	0.380 ✔	1.000	4.8.1 ✔
T5	150 - 140	PL 1/4 x 2	0.001	0.555	0.027	0.583 ✔	1.000	4.8.1 ✔
T6	140 - 130	PL 1/4 x 2	0.000	0.457	0.023	0.480 ✔	1.000	4.8.1 ✔
T7	130 - 120	PL 1/4 x 2	0.000	0.332	0.004	0.337 ✔	1.000	4.8.1 ✔
T8	120 - 110	PL 1/4 x 2	0.000	0.135	0.005	0.141 ✔	1.000	4.8.1 ✔
T9	110 - 100	PL 1/4 x 2	0.000	0.229	0.002	0.231 ✔	1.000	4.8.1 ✔
T10	100 - 90	PL 1/4 x 2	0.000	0.407	0.007	0.414 ✔	1.000	4.8.1 ✔
T11	90 - 80	PL 1/4 x 2	0.000	0.456	0.009	0.466 ✔	1.000	4.8.1 ✔
T12	80 - 70	PL 1/4 x 2	0.000	0.323	0.002	0.325 ✔	1.000	4.8.1 ✔
T13	70 - 60	PL 1/4 x 2	0.000	0.142	0.002	0.144 ✔	1.000	4.8.1 ✔
T14	60 - 50	PL 1/4 x 2	0.000	0.151	0.001	0.152 ✔	1.000	4.8.1 ✔
T15	50 - 40	PL 1/4 x 2	0.000	0.316	0.004	0.320 ✔	1.000	4.8.1 ✔
T16	40 - 30	PL 1/4 x 2	0.000	0.304	0.003	0.308 ✔	1.000	4.8.1 ✔
T17	30 - 20	PL 1/4 x 2	0.000	0.181	0.002	0.183 ✔	1.000	4.8.1 ✔
T18	20 - 10	PL 1/4 x 2	0.000	0.059	0.002	0.062 ✔	1.000	4.8.1 ✔
T19	10 - 0	PL 1/4 x 2	0.000	0.173	0.002	0.175 ✔	1.000	4.8.1 ✔

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	185 - 180	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.04	6.57	0.006
T2	180 - 170	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.10	6.57	0.015
T3	170 - 160	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.01	6.57	0.002
T4	160 - 150	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.03	6.57	0.005
T5	150 - 140	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.05	6.57	0.008
T6	140 - 130	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.18	6.57	0.027
T7	130 - 120	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.07	6.57	0.011
T8	120 - 110	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.05	6.57	0.008
T9	110 - 100	PL 1/4 x 2	1.25	1.13	130.9	0.5000	-0.01	6.57	0.002

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T10	100 - 90	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.10	6.57	0.015
T11	90 - 80	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.10	6.57	0.015
T12	80 - 70	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.16	6.57	0.024
T13	70 - 60	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.04	6.57	0.007
T14	60 - 50	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.00	6.57	0.000
T15	50 - 40	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.00	6.57	0.001
T16	40 - 30	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.14	6.57	0.022
T17	30 - 20	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.05	6.57	0.008
T18	20 - 10	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.04	6.57	0.005
T19	10 - 0	PL 1/4 x 2	1.25	1.13	K=0.70 130.9	0.5000	-0.00	6.57	0.000

Top Girt Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	185 - 180	PL 1/4 x 2	-0.21	0.68	0.309	-0.02	0.08	0.217
T2	180 - 170	PL 1/4 x 2	-0.24	0.68	0.350	0.00	0.08	0.023
T3	170 - 160	PL 1/4 x 2	-0.10	0.68	0.151	-0.00	0.08	0.016
T4	160 - 150	PL 1/4 x 2	-0.12	0.68	0.173	-0.00	0.08	0.004
T5	150 - 140	PL 1/4 x 2	-0.22	0.68	0.331	-0.00	0.08	0.008
T6	140 - 130	PL 1/4 x 2	-0.25	0.68	0.366	0.00	0.08	0.043
T7	130 - 120	PL 1/4 x 2	-0.17	0.68	0.257	-0.00	0.08	0.000
T8	120 - 110	PL 1/4 x 2	-0.08	0.68	0.119	-0.00	0.08	0.002
T9	110 - 100	PL 1/4 x 2	-0.07	0.68	0.097	-0.00	0.08	0.004
T10	100 - 90	PL 1/4 x 2	-0.13	0.68	0.188	-0.00	0.08	0.002
T11	90 - 80	PL 1/4 x 2	-0.19	0.68	0.285	0.00	0.08	0.020
T12	80 - 70	PL 1/4 x 2	-0.16	0.68	0.234	-0.00	0.08	0.000
T13	70 - 60	PL 1/4 x 2	-0.09	0.68	0.138	-0.00	0.08	0.002
T14	60 - 50	PL 1/4 x 2	-0.02	0.68	0.033	-0.00	0.08	0.002
T15	50 - 40	PL 1/4 x 2	-0.11	0.68	0.162	-0.00	0.08	0.002
T16	40 - 30	PL 1/4 x 2	-0.13	0.68	0.191	0.00	0.08	0.007
T17	30 - 20	PL 1/4 x 2	-0.10	0.68	0.155	-0.00	0.08	0.001
T18	20 - 10	PL 1/4 x 2	-0.04	0.68	0.055	-0.00	0.08	0.001
T19	10 - 0	PL 1/4 x 2	-0.05	0.68	0.070	-0.00	0.08	0.002

Top Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	185 - 180	PL 1/4 x 2	0.006	0.309	0.217	0.529 ✔	1.000	4.8.1 ✔
T2	180 - 170	PL 1/4 x 2	0.015	0.350	0.023	0.380 ✔	1.000	4.8.1 ✔
T3	170 - 160	PL 1/4 x 2	0.002	0.151	0.016	0.168 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T4	160 - 150	PL 1/4 x 2	0.005	0.173	0.004	0.179 ✔	1.000	4.8.1 ✔
T5	150 - 140	PL 1/4 x 2	0.008	0.331	0.008	0.343 ✔	1.000	4.8.1 ✔
T6	140 - 130	PL 1/4 x 2	0.027	0.366	0.043	0.422 ✔	1.000	4.8.1 ✔
T7	130 - 120	PL 1/4 x 2	0.011	0.257	0.000	0.262 ✔	1.000	4.8.1 ✔
T8	120 - 110	PL 1/4 x 2	0.008	0.119	0.002	0.124 ✔	1.000	4.8.1 ✔
T9	110 - 100	PL 1/4 x 2	0.002	0.097	0.004	0.102 ✔	1.000	4.8.1 ✔
T10	100 - 90	PL 1/4 x 2	0.015	0.188	0.002	0.197 ✔	1.000	4.8.1 ✔
T11	90 - 80	PL 1/4 x 2	0.015	0.285	0.020	0.312 ✔	1.000	4.8.1 ✔
T12	80 - 70	PL 1/4 x 2	0.024	0.234	0.000	0.246 ✔	1.000	4.8.1 ✔
T13	70 - 60	PL 1/4 x 2	0.007	0.138	0.002	0.143 ✔	1.000	4.8.1 ✔
T14	60 - 50	PL 1/4 x 2	0.000	0.033	0.002	0.035 ✔	1.000	4.8.1 ✔
T15	50 - 40	PL 1/4 x 2	0.001	0.162	0.002	0.165 ✔	1.000	4.8.1 ✔
T16	40 - 30	PL 1/4 x 2	0.022	0.191	0.007	0.209 ✔	1.000	4.8.1 ✔
T17	30 - 20	PL 1/4 x 2	0.008	0.155	0.001	0.161 ✔	1.000	4.8.1 ✔
T18	20 - 10	PL 1/4 x 2	0.005	0.055	0.001	0.059 ✔	1.000	4.8.1 ✔
T19	10 - 0	PL 1/4 x 2	0.000	0.070	0.002	0.071 ✔	1.000	4.8.1 ✔

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 $\frac{P_u}{\phi P_n}$
T1	185 - 180	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.23	6.57	0.035
T2	180 - 170	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.01	6.57	0.002
T3	170 - 160	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.09	6.57	0.013
T4	160 - 150	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.10	6.57	0.015
T5	150 - 140	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.29	6.57	0.044
T6	140 - 130	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.01	6.57	0.002
T7	130 - 120	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.02	6.57	0.002
T8	120 - 110	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.02	6.57	0.002
T9	110 - 100	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.12	6.57	0.019
T10	100 - 90	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.11	6.57	0.016
T11	90 - 80	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.01	6.57	0.002

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T12	80 - 70	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T13	70 - 60	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.001
T14	60 - 50	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.04	6.57	0.007
T15	50 - 40	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.15	6.57	0.024
T16	40 - 30	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T17	30 - 20	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.000
T18	20 - 10	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.02	6.57	0.003
T19	10 - 0	PL 1/4 x 2	1.25	1.13	130.9 K=0.70	0.5000	-0.00	6.57	0.001

Bottom Girt Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	185 - 180	PL 1/4 x 2	-0.21	0.68	0.315	0.00	0.08	0.021
T2	180 - 170	PL 1/4 x 2	-0.14	0.68	0.214	-0.00	0.08	0.011
T3	170 - 160	PL 1/4 x 2	-0.11	0.68	0.165	-0.00	0.08	0.000
T4	160 - 150	PL 1/4 x 2	-0.21	0.68	0.306	0.00	0.08	0.002
T5	150 - 140	PL 1/4 x 2	0.26	0.68	0.379	-0.00	0.08	0.042
T6	140 - 130	PL 1/4 x 2	-0.20	0.68	0.302	0.00	0.08	0.004
T7	130 - 120	PL 1/4 x 2	-0.10	0.68	0.142	-0.00	0.08	0.000
T8	120 - 110	PL 1/4 x 2	-0.05	0.68	0.070	0.00	0.08	0.000
T9	110 - 100	PL 1/4 x 2	0.12	0.68	0.179	0.00	0.08	0.001
T10	100 - 90	PL 1/4 x 2	0.20	0.68	0.303	-0.00	0.08	0.019
T11	90 - 80	PL 1/4 x 2	-0.17	0.68	0.251	-0.00	0.08	0.000
T12	80 - 70	PL 1/4 x 2	-0.11	0.68	0.168	0.00	0.08	0.000
T13	70 - 60	PL 1/4 x 2	-0.02	0.68	0.033	-0.00	0.08	0.001
T14	60 - 50	PL 1/4 x 2	0.08	0.68	0.125	0.00	0.08	0.000
T15	50 - 40	PL 1/4 x 2	0.13	0.68	0.197	-0.00	0.08	0.007
T16	40 - 30	PL 1/4 x 2	-0.13	0.68	0.195	0.00	0.08	0.000
T17	30 - 20	PL 1/4 x 2	-0.05	0.68	0.072	-0.00	0.08	0.000
T18	20 - 10	PL 1/4 x 2	0.04	0.68	0.053	0.00	0.08	0.000
T19	10 - 0	PL 1/4 x 2	-0.00	0.68	0.004	0.00	0.08	0.000

Bottom Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	185 - 180	PL 1/4 x 2	0.035	0.315	0.021	0.353 ✔	1.000	4.8.1 ✔
T2	180 - 170	PL 1/4 x 2	0.002	0.214	0.011	0.225 ✔	1.000	4.8.1 ✔
T3	170 - 160	PL 1/4 x 2	0.013	0.165	0.000	0.172 ✔	1.000	4.8.1 ✔
T4	160 - 150	PL 1/4 x 2	0.015	0.306	0.002	0.315 ✔	1.000	4.8.1 ✔
T5	150 - 140	PL 1/4 x 2	0.044	0.379	0.042	0.443 ✔	1.000	4.8.1 ✔
T6	140 - 130	PL 1/4 x 2	0.002	0.302	0.004	0.307 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T7	130 - 120	PL 1/4 x 2	0.002	0.142	0.000	0.143 ✔	1.000	4.8.1 ✔
T8	120 - 110	PL 1/4 x 2	0.002	0.070	0.000	0.072 ✔	1.000	4.8.1 ✔
T9	110 - 100	PL 1/4 x 2	0.019	0.179	0.001	0.189 ✔	1.000	4.8.1 ✔
T10	100 - 90	PL 1/4 x 2	0.016	0.303	0.019	0.331 ✔	1.000	4.8.1 ✔
T11	90 - 80	PL 1/4 x 2	0.002	0.251	0.000	0.252 ✔	1.000	4.8.1 ✔
T12	80 - 70	PL 1/4 x 2	0.000	0.168	0.000	0.169 ✔	1.000	4.8.1 ✔
T13	70 - 60	PL 1/4 x 2	0.001	0.033	0.001	0.034 ✔	1.000	4.8.1 ✔
T14	60 - 50	PL 1/4 x 2	0.007	0.125	0.000	0.128 ✔	1.000	4.8.1 ✔
T15	50 - 40	PL 1/4 x 2	0.024	0.197	0.007	0.216 ✔	1.000	4.8.1 ✔
T16	40 - 30	PL 1/4 x 2	0.000	0.195	0.000	0.195 ✔	1.000	4.8.1 ✔
T17	30 - 20	PL 1/4 x 2	0.000	0.072	0.000	0.073 ✔	1.000	4.8.1 ✔
T18	20 - 10	PL 1/4 x 2	0.003	0.053	0.000	0.054 ✔	1.000	4.8.1 ✔
T19	10 - 0	PL 1/4 x 2	0.001	0.004	0.000	0.004 ✔	1.000	4.8.1 ✔

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	185 - 180	1 1/2" solid	5.00	1.64	52.4	1.7672	1.44	79.52	0.018
T2	180 - 170	1 1/2" solid	10.00	1.93	61.7	1.7672	0.73	79.52	0.009
T5	150 - 140	1 1/2" solid	10.00	1.93	61.7	1.7672	2.45	79.52	0.031
T6	140 - 130	1 1/2" solid	10.00	1.93	61.7	1.7672	0.34	79.52	0.004
T11	90 - 80	1 1/2" solid	10.00	1.93	61.7	1.7672	0.36	79.52	0.005

Leg Bending Design Data (Tension)

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	185 - 180	1 1/2" solid	0.19	2.11	0.092	0.00	2.11	0.000
T2	180 - 170	1 1/2" solid	0.31	2.11	0.146	0.00	2.11	0.000
T5	150 - 140	1 1/2" solid	0.24	2.11	0.115	0.00	2.11	0.000
T6	140 - 130	1 1/2" solid	0.31	2.11	0.148	0.00	2.11	0.000
T11	90 - 80	1 1/2" solid	0.22	2.11	0.102	0.00	2.11	0.000

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $P_u / \phi P_n$	Ratio $M_{ux} / \phi M_{nx}$	Ratio $M_{uy} / \phi M_{ny}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	185 - 180	1 1/2" solid	0.018	0.092	0.000	0.101 ✔	1.000	4.8.1 ✔
T2	180 - 170	1 1/2" solid	0.009	0.146	0.000	0.150 ✔	1.000	4.8.1 ✔
T5	150 - 140	1 1/2" solid	0.031	0.115	0.000	0.130 ✔	1.000	4.8.1 ✔
T6	140 - 130	1 1/2" solid	0.004	0.148	0.000	0.150 ✔	1.000	4.8.1 ✔
T11	90 - 80	1 1/2" solid	0.005	0.102	0.000	0.105 ✔	1.000	4.8.1 ✔

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 $P_u / \phi P_n$
T1	185 - 180	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T2	180 - 170	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.000
T3	170 - 160	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T4	160 - 150	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.001
T5	150 - 140	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.001
T6	140 - 130	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T7	130 - 120	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T8	120 - 110	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T9	110 - 100	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T10	100 - 90	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.001
T11	90 - 80	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T12	80 - 70	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T13	70 - 60	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T14	60 - 50	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T15	50 - 40	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T16	40 - 30	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T17	30 - 20	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T18	20 - 10	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T19	10 - 0	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.000

Horizontal Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $M_{ux} / \phi M_{nx}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $M_{uy} / \phi M_{ny}$
T1	185 - 180	PL 1/4 x 2	-0.36	0.68	0.537	-0.01	0.08	0.112
T2	180 - 170	PL 1/4 x 2	-0.25	0.68	0.375	-0.01	0.08	0.078
T3	170 - 160	PL 1/4 x 2	-0.14	0.68	0.201	0.00	0.08	0.009
T4	160 - 150	PL 1/4 x 2	0.26	0.68	0.380	-0.00	0.08	0.007
T5	150 - 140	PL 1/4 x 2	0.39	0.68	0.572	-0.00	0.08	0.027
T6	140 - 130	PL 1/4 x 2	0.32	0.68	0.469	-0.00	0.08	0.027
T7	130 - 120	PL 1/4 x 2	-0.22	0.68	0.326	-0.00	0.08	0.002
T8	120 - 110	PL 1/4 x 2	-0.10	0.68	0.147	-0.00	0.08	0.005
T9	110 - 100	PL 1/4 x 2	0.16	0.68	0.234	-0.00	0.08	0.003
T10	100 - 90	PL 1/4 x 2	0.28	0.68	0.410	-0.00	0.08	0.011
T11	90 - 80	PL 1/4 x 2	0.31	0.68	0.465	-0.00	0.08	0.011
T12	80 - 70	PL 1/4 x 2	-0.22	0.68	0.329	-0.00	0.08	0.003
T13	70 - 60	PL 1/4 x 2	-0.11	0.68	0.157	-0.00	0.08	0.003
T14	60 - 50	PL 1/4 x 2	0.10	0.68	0.141	-0.00	0.08	0.001
T15	50 - 40	PL 1/4 x 2	-0.21	0.68	0.315	0.00	0.08	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T16	40 - 30	PL 1/4 x 2	0.22	0.68	0.324	-0.00	0.08	0.003
T17	30 - 20	PL 1/4 x 2	-0.14	0.68	0.203	-0.00	0.08	0.002
T18	20 - 10	PL 1/4 x 2	0.03	0.68	0.052	0.00	0.08	0.003
T19	10 - 0	PL 1/4 x 2	0.11	0.68	0.163	-0.00	0.08	0.005

Horizontal Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	185 - 180	PL 1/4 x 2	0.000	0.537	0.112	0.649 ✔	1.000	4.8.1 ✔
T2	180 - 170	PL 1/4 x 2	0.000	0.375	0.078	0.454 ✔	1.000	4.8.1 ✔
T3	170 - 160	PL 1/4 x 2	0.000	0.201	0.009	0.210 ✔	1.000	4.8.1 ✔
T4	160 - 150	PL 1/4 x 2	0.001	0.380	0.007	0.387 ✔	1.000	4.8.1 ✔
T5	150 - 140	PL 1/4 x 2	0.001	0.572	0.027	0.599 ✔	1.000	4.8.1 ✔
T6	140 - 130	PL 1/4 x 2	0.000	0.469	0.027	0.496 ✔	1.000	4.8.1 ✔
T7	130 - 120	PL 1/4 x 2	0.000	0.326	0.002	0.328 ✔	1.000	4.8.1 ✔
T8	120 - 110	PL 1/4 x 2	0.000	0.147	0.005	0.152 ✔	1.000	4.8.1 ✔
T9	110 - 100	PL 1/4 x 2	0.000	0.234	0.003	0.237 ✔	1.000	4.8.1 ✔
T10	100 - 90	PL 1/4 x 2	0.001	0.410	0.011	0.421 ✔	1.000	4.8.1 ✔
T11	90 - 80	PL 1/4 x 2	0.000	0.465	0.011	0.476 ✔	1.000	4.8.1 ✔
T12	80 - 70	PL 1/4 x 2	0.000	0.329	0.003	0.332 ✔	1.000	4.8.1 ✔
T13	70 - 60	PL 1/4 x 2	0.000	0.157	0.003	0.160 ✔	1.000	4.8.1 ✔
T14	60 - 50	PL 1/4 x 2	0.000	0.141	0.001	0.142 ✔	1.000	4.8.1 ✔
T15	50 - 40	PL 1/4 x 2	0.000	0.315	0.000	0.315 ✔	1.000	4.8.1 ✔
T16	40 - 30	PL 1/4 x 2	0.000	0.324	0.003	0.327 ✔	1.000	4.8.1 ✔
T17	30 - 20	PL 1/4 x 2	0.000	0.203	0.002	0.206 ✔	1.000	4.8.1 ✔
T18	20 - 10	PL 1/4 x 2	0.000	0.052	0.003	0.054 ✔	1.000	4.8.1 ✔
T19	10 - 0	PL 1/4 x 2	0.000	0.163	0.005	0.168 ✔	1.000	4.8.1 ✔

Top Girt 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	185 - 180	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.06	16.20	0.004

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	180 - 170	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.26	16.20	0.016
T3	170 - 160	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.001
T4	160 - 150	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.08	16.20	0.005
T5	150 - 140	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.09	16.20	0.006
T6	140 - 130	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.31	16.20	0.019
T7	130 - 120	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.001
T8	120 - 110	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.02	16.20	0.001
T9	110 - 100	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.001
T10	100 - 90	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.12	16.20	0.007
T11	90 - 80	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.12	16.20	0.008
T12	80 - 70	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.02	16.20	0.001
T13	70 - 60	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T14	60 - 50	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T15	50 - 40	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.04	16.20	0.002
T16	40 - 30	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T17	30 - 20	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T18	20 - 10	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T19	10 - 0	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.001

Top Girt Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	185 - 180	PL 1/4 x 2	-0.23	0.68	0.344	-0.02	0.08	0.245
T2	180 - 170	PL 1/4 x 2	-0.21	0.68	0.310	0.00	0.08	0.023
T3	170 - 160	PL 1/4 x 2	-0.12	0.68	0.174	-0.00	0.08	0.019
T4	160 - 150	PL 1/4 x 2	-0.12	0.68	0.178	-0.00	0.08	0.004
T5	150 - 140	PL 1/4 x 2	-0.23	0.68	0.334	-0.00	0.08	0.010
T6	140 - 130	PL 1/4 x 2	0.25	0.68	0.374	-0.00	0.08	0.042
T7	130 - 120	PL 1/4 x 2	-0.18	0.68	0.271	-0.00	0.08	0.001
T8	120 - 110	PL 1/4 x 2	-0.09	0.68	0.127	-0.00	0.08	0.002
T9	110 - 100	PL 1/4 x 2	-0.07	0.68	0.098	-0.00	0.08	0.004
T10	100 - 90	PL 1/4 x 2	0.13	0.68	0.191	0.00	0.08	0.002
T11	90 - 80	PL 1/4 x 2	0.20	0.68	0.293	-0.00	0.08	0.019
T12	80 - 70	PL 1/4 x 2	-0.16	0.68	0.238	0.00	0.08	0.000
T13	70 - 60	PL 1/4 x 2	-0.09	0.68	0.138	-0.00	0.08	0.002
T14	60 - 50	PL 1/4 x 2	-0.02	0.68	0.030	-0.00	0.08	0.001
T15	50 - 40	PL 1/4 x 2	0.10	0.68	0.152	0.00	0.08	0.002
T16	40 - 30	PL 1/4 x 2	-0.14	0.68	0.200	0.00	0.08	0.007
T17	30 - 20	PL 1/4 x 2	-0.11	0.68	0.169	-0.00	0.08	0.001
T18	20 - 10	PL 1/4 x 2	-0.04	0.68	0.061	-0.00	0.08	0.001
T19	10 - 0	PL 1/4 x 2	0.05	0.68	0.075	0.00	0.08	0.002

Top Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	185 - 180	PL 1/4 x 2	0.004	0.344	0.245	0.591 ✔	1.000	4.8.1 ✔
T2	180 - 170	PL 1/4 x 2	0.016	0.310	0.023	0.340 ✔	1.000	4.8.1 ✔
T3	170 - 160	PL 1/4 x 2	0.001	0.174	0.019	0.193 ✔	1.000	4.8.1 ✔
T4	160 - 150	PL 1/4 x 2	0.005	0.178	0.004	0.184 ✔	1.000	4.8.1 ✔
T5	150 - 140	PL 1/4 x 2	0.006	0.334	0.010	0.346 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T6	140 - 130	PL 1/4 x 2	0.019	0.374	0.042	0.426 ✔	1.000	4.8.1 ✔
T7	130 - 120	PL 1/4 x 2	0.001	0.271	0.001	0.272 ✔	1.000	4.8.1 ✔
T8	120 - 110	PL 1/4 x 2	0.001	0.127	0.002	0.129 ✔	1.000	4.8.1 ✔
T9	110 - 100	PL 1/4 x 2	0.001	0.098	0.004	0.102 ✔	1.000	4.8.1 ✔
T10	100 - 90	PL 1/4 x 2	0.007	0.191	0.002	0.197 ✔	1.000	4.8.1 ✔
T11	90 - 80	PL 1/4 x 2	0.008	0.293	0.019	0.316 ✔	1.000	4.8.1 ✔
T12	80 - 70	PL 1/4 x 2	0.001	0.238	0.000	0.238 ✔	1.000	4.8.1 ✔
T13	70 - 60	PL 1/4 x 2	0.000	0.138	0.002	0.140 ✔	1.000	4.8.1 ✔
T14	60 - 50	PL 1/4 x 2	0.000	0.030	0.001	0.031 ✔	1.000	4.8.1 ✔
T15	50 - 40	PL 1/4 x 2	0.002	0.152	0.002	0.155 ✔	1.000	4.8.1 ✔
T16	40 - 30	PL 1/4 x 2	0.000	0.200	0.007	0.207 ✔	1.000	4.8.1 ✔
T17	30 - 20	PL 1/4 x 2	0.000	0.169	0.001	0.171 ✔	1.000	4.8.1 ✔
T18	20 - 10	PL 1/4 x 2	0.000	0.061	0.001	0.062 ✔	1.000	4.8.1 ✔
T19	10 - 0	PL 1/4 x 2	0.001	0.075	0.002	0.077 ✔	1.000	4.8.1 ✔

Bottom Girt 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	185 - 180	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.09	16.20	0.005
T2	180 - 170	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.01	16.20	0.001
T3	170 - 160	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.10	16.20	0.006
T4	160 - 150	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.06	16.20	0.004
T5	150 - 140	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.16	16.20	0.010
T6	140 - 130	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.07	16.20	0.004
T7	130 - 120	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.05	16.20	0.003
T8	120 - 110	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.02	16.20	0.001
T9	110 - 100	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.10	16.20	0.006
T10	100 - 90	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.09	16.20	0.005
T11	90 - 80	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.15	16.20	0.009
T12	80 - 70	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.04	16.20	0.002
T13	70 - 60	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T14	60 - 50	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000
T15	50 - 40	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.13	16.20	0.008
T16	40 - 30	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.05	16.20	0.003
T17	30 - 20	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.03	16.20	0.002
T18	20 - 10	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.02	16.20	0.001
T19	10 - 0	PL 1/4 x 2	1.25	1.13	187.1	0.5000	0.00	16.20	0.000

Bottom Girt Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	185 - 180	PL 1/4 x 2	-0.24	0.68	0.354	0.00	0.08	0.021
T2	180 - 170	PL 1/4 x 2	-0.13	0.68	0.189	-0.00	0.08	0.009
T3	170 - 160	PL 1/4 x 2	-0.11	0.68	0.159	0.00	0.08	0.001
T4	160 - 150	PL 1/4 x 2	-0.20	0.68	0.300	0.00	0.08	0.003
T5	150 - 140	PL 1/4 x 2	-0.25	0.68	0.371	0.00	0.08	0.042
T6	140 - 130	PL 1/4 x 2	-0.19	0.68	0.287	0.00	0.08	0.004
T7	130 - 120	PL 1/4 x 2	-0.09	0.68	0.132	-0.00	0.08	0.001
T8	120 - 110	PL 1/4 x 2	-0.05	0.68	0.068	0.00	0.08	0.000
T9	110 - 100	PL 1/4 x 2	-0.12	0.68	0.176	-0.00	0.08	0.001
T10	100 - 90	PL 1/4 x 2	-0.20	0.68	0.295	0.00	0.08	0.020
T11	90 - 80	PL 1/4 x 2	-0.17	0.68	0.246	-0.00	0.08	0.001
T12	80 - 70	PL 1/4 x 2	-0.11	0.68	0.166	-0.00	0.08	0.001
T13	70 - 60	PL 1/4 x 2	-0.02	0.68	0.027	-0.00	0.08	0.000
T14	60 - 50	PL 1/4 x 2	-0.09	0.68	0.134	-0.00	0.08	0.001
T15	50 - 40	PL 1/4 x 2	-0.13	0.68	0.195	0.00	0.08	0.007
T16	40 - 30	PL 1/4 x 2	-0.12	0.68	0.179	-0.00	0.08	0.000
T17	30 - 20	PL 1/4 x 2	-0.04	0.68	0.065	-0.00	0.08	0.001
T18	20 - 10	PL 1/4 x 2	-0.03	0.68	0.048	-0.00	0.08	0.000
T19	10 - 0	PL 1/4 x 2	-0.00	0.68	0.003	-0.00	0.08	0.000

Bottom Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	185 - 180	PL 1/4 x 2	0.005	0.354	0.021	0.378 ✔	1.000	4.8.1 ✔
T2	180 - 170	PL 1/4 x 2	0.001	0.189	0.009	0.199 ✔	1.000	4.8.1 ✔
T3	170 - 160	PL 1/4 x 2	0.006	0.159	0.001	0.162 ✔	1.000	4.8.1 ✔
T4	160 - 150	PL 1/4 x 2	0.004	0.300	0.003	0.305 ✔	1.000	4.8.1 ✔
T5	150 - 140	PL 1/4 x 2	0.010	0.371	0.042	0.419 ✔	1.000	4.8.1 ✔
T6	140 - 130	PL 1/4 x 2	0.004	0.287	0.004	0.293 ✔	1.000	4.8.1 ✔
T7	130 - 120	PL 1/4 x 2	0.003	0.132	0.001	0.135 ✔	1.000	4.8.1 ✔
T8	120 - 110	PL 1/4 x 2	0.001	0.068	0.000	0.069 ✔	1.000	4.8.1 ✔
T9	110 - 100	PL 1/4 x 2	0.006	0.176	0.001	0.180 ✔	1.000	4.8.1 ✔
T10	100 - 90	PL 1/4 x 2	0.005	0.295	0.020	0.317 ✔	1.000	4.8.1 ✔
T11	90 - 80	PL 1/4 x 2	0.009	0.246	0.001	0.251 ✔	1.000	4.8.1 ✔
T12	80 - 70	PL 1/4 x 2	0.002	0.166	0.001	0.168 ✔	1.000	4.8.1 ✔
T13	70 - 60	PL 1/4 x 2	0.000	0.027	0.000	0.027 ✔	1.000	4.8.1 ✔
T14	60 - 50	PL 1/4 x 2	0.000	0.134	0.001	0.135 ✔	1.000	4.8.1 ✔
T15	50 - 40	PL 1/4 x 2	0.008	0.195	0.007	0.206 ✔	1.000	4.8.1 ✔
T16	40 - 30	PL 1/4 x 2	0.003	0.179	0.000	0.181 ✔	1.000	4.8.1 ✔
T17	30 - 20	PL 1/4 x 2	0.002	0.065	0.001	0.067 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $P_u / \phi P_n$	Ratio $M_{ux} / \phi M_{nx}$	Ratio $M_{uy} / \phi M_{ny}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T18	20 - 10	PL 1/4 x 2	0.001	0.048	0.000	0.049 ✔	1.000	4.8.1 ✔
T19	10 - 0	PL 1/4 x 2	0.000	0.003	0.000	0.004 ✔	1.000	4.8.1 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	185 - 180	Leg	1 1/2" solid	2	-1.52	65.03	11.1 13.9 (b)	Pass
T2	180 - 170	Leg	1 1/2" solid	16	-2.83	53.22	17.4	Pass
T3	170 - 160	Leg	1 1/2" solid	37	-6.60	51.10	12.9 16.4 (b)	Pass
T4	160 - 150	Leg	1 1/2" solid	58	-6.52	50.80	12.8	Pass
T5	150 - 140	Leg	1 1/2" solid	80	-8.72	57.36	21.0 23.8 (b)	Pass
T6	140 - 130	Leg	1 1/2" solid	100	-12.24	40.45	32.2	Pass
T7	130 - 120	Leg	1 1/2" solid	121	-11.30	38.77	29.1	Pass
T8	120 - 110	Leg	1 1/2" solid	142	-11.69	38.87	30.1	Pass
T9	110 - 100	Leg	1 1/2" solid	163	-11.63	38.44	30.2	Pass
T10	100 - 90	Leg	1 1/2" solid	186	-13.67	40.32	35.5	Pass
T11	90 - 80	Leg	1 1/2" solid	206	-16.68	40.10	43.4	Pass
T12	80 - 70	Leg	1 1/2" solid	227	-15.84	39.02	40.6	Pass
T13	70 - 60	Leg	1 1/2" solid	248	-16.83	39.58	42.5	Pass
T14	60 - 50	Leg	1 1/2" solid	269	-16.91	39.56	42.7	Pass
T15	50 - 40	Leg	1 1/2" solid	291	-16.92	39.17	43.3	Pass
T16	40 - 30	Leg	1 1/2" solid	311	-19.04	52.53	36.2	Pass
T17	30 - 20	Leg	1 1/2" solid	332	-18.91	52.34	36.1 47.8 (b)	Pass
T18	20 - 10	Leg	1 1/2" solid	353	-19.25	52.37	36.8	Pass
T19	10 - 0	Leg	1 1/2" solid	374	-19.21	52.31	36.7	Pass
T1	185 - 180	Horizontal	PL 1/4 x 2	13	0.00	16.20	64.9	Pass
T2	180 - 170	Horizontal	PL 1/4 x 2	29	-0.01	6.57	45.4	Pass
T3	170 - 160	Horizontal	PL 1/4 x 2	48	-0.00	6.57	21.3	Pass
T4	160 - 150	Horizontal	PL 1/4 x 2	69	-0.00	6.57	38.7	Pass
T5	150 - 140	Horizontal	PL 1/4 x 2	88	-0.00	6.57	59.9	Pass
T6	140 - 130	Horizontal	PL 1/4 x 2	113	-0.00	6.57	49.6	Pass
T7	130 - 120	Horizontal	PL 1/4 x 2	140	0.01	16.20	33.7	Pass
T8	120 - 110	Horizontal	PL 1/4 x 2	161	-0.00	6.57	15.2	Pass
T9	110 - 100	Horizontal	PL 1/4 x 2	172	0.00	16.20	23.7	Pass
T10	100 - 90	Horizontal	PL 1/4 x 2	193	0.01	16.20	42.1	Pass
T11	90 - 80	Horizontal	PL 1/4 x 2	218	-0.00	6.57	47.6	Pass
T12	80 - 70	Horizontal	PL 1/4 x 2	245	-0.00	6.57	33.2	Pass
T13	70 - 60	Horizontal	PL 1/4 x 2	266	-0.00	6.57	16.0	Pass
T14	60 - 50	Horizontal	PL 1/4 x 2	277	-0.00	6.57	15.2	Pass
T15	50 - 40	Horizontal	PL 1/4 x 2	298	0.00	16.20	32.0	Pass
T16	40 - 30	Horizontal	PL 1/4 x 2	323	-0.00	6.57	32.7	Pass
T17	30 - 20	Horizontal	PL 1/4 x 2	350	-0.00	6.57	20.6	Pass
T18	20 - 10	Horizontal	PL 1/4 x 2	371	0.00	16.20	6.2	Pass
T19	10 - 0	Horizontal	PL 1/4 x 2	385	-0.00	6.57	17.5	Pass
T1	185 - 180	Top Girt	PL 1/4 x 2	6	-0.04	6.57	59.1	Pass
T2	180 - 170	Top Girt	PL 1/4 x 2	19	0.26	16.20	38.0	Pass
T3	170 - 160	Top Girt	PL 1/4 x 2	41	-0.01	6.57	19.3	Pass
T4	160 - 150	Top Girt	PL 1/4 x 2	63	0.08	16.20	18.4	Pass
T5	150 - 140	Top Girt	PL 1/4 x 2	82	-0.05	6.57	34.6	Pass
T6	140 - 130	Top Girt	PL 1/4 x 2	103	-0.18	6.57	42.6	Pass
T7	130 - 120	Top Girt	PL 1/4 x 2	125	-0.07	6.57	27.2	Pass
T8	120 - 110	Top Girt	PL 1/4 x 2	146	-0.05	6.57	12.9	Pass
T9	110 - 100	Top Girt	PL 1/4 x 2	166	-0.01	6.57	10.2	Pass
T10	100 - 90	Top Girt	PL 1/4 x 2	187	-0.10	6.57	19.7	Pass
T11	90 - 80	Top Girt	PL 1/4 x 2	208	-0.10	6.57	31.6	Pass
T12	80 - 70	Top Girt	PL 1/4 x 2	230	-0.16	6.57	24.6	Pass
T13	70 - 60	Top Girt	PL 1/4 x 2	251	-0.04	6.57	14.3	Pass

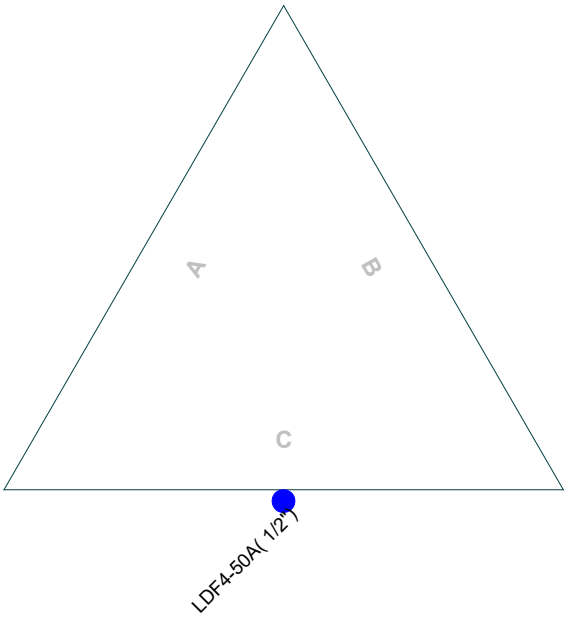
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T14	60 - 50	Top Girt	PL 1/4 x 2	271	-0.00	6.57	3.5	Pass
T15	50 - 40	Top Girt	PL 1/4 x 2	292	0.04	16.20	16.5	Pass
T16	40 - 30	Top Girt	PL 1/4 x 2	313	-0.14	6.57	20.9	Pass
T17	30 - 20	Top Girt	PL 1/4 x 2	335	-0.05	6.57	17.1	Pass
T18	20 - 10	Top Girt	PL 1/4 x 2	356	-0.04	6.57	6.2	Pass
T19	10 - 0	Top Girt	PL 1/4 x 2	376	0.01	16.20	7.7	Pass
T1	185 - 180	Bottom Girt	PL 1/4 x 2	7	-0.23	6.57	37.8	Pass
T2	180 - 170	Bottom Girt	PL 1/4 x 2	23	-0.01	6.57	22.5	Pass
T3	170 - 160	Bottom Girt	PL 1/4 x 2	45	-0.09	6.57	17.2	Pass
T4	160 - 150	Bottom Girt	PL 1/4 x 2	66	-0.10	6.57	31.5	Pass
T5	150 - 140	Bottom Girt	PL 1/4 x 2	85	-0.29	6.57	44.3	Pass
T6	140 - 130	Bottom Girt	PL 1/4 x 2	107	0.07	16.20	30.7	Pass
T7	130 - 120	Bottom Girt	PL 1/4 x 2	128	0.05	16.20	14.3	Pass
T8	120 - 110	Bottom Girt	PL 1/4 x 2	148	-0.02	6.57	7.2	Pass
T9	110 - 100	Bottom Girt	PL 1/4 x 2	169	-0.12	6.57	18.9	Pass
T10	100 - 90	Bottom Girt	PL 1/4 x 2	190	-0.11	6.57	33.1	Pass
T11	90 - 80	Bottom Girt	PL 1/4 x 2	212	0.15	16.20	25.2	Pass
T12	80 - 70	Bottom Girt	PL 1/4 x 2	233	0.04	16.20	16.9	Pass
T13	70 - 60	Bottom Girt	PL 1/4 x 2	254	-0.00	6.57	3.4	Pass
T14	60 - 50	Bottom Girt	PL 1/4 x 2	274	-0.04	6.57	13.5	Pass
T15	50 - 40	Bottom Girt	PL 1/4 x 2	295	-0.15	6.57	21.6	Pass
T16	40 - 30	Bottom Girt	PL 1/4 x 2	317	0.05	16.20	19.5	Pass
T17	30 - 20	Bottom Girt	PL 1/4 x 2	338	0.03	16.20	7.3	Pass
T18	20 - 10	Bottom Girt	PL 1/4 x 2	358	-0.02	6.57	5.4	Pass
T19	10 - 0	Bottom Girt	PL 1/4 x 2	379	-0.00	6.57	0.4	Pass
T2	180 - 170	Guy A@177.988	3/8	396	6.40	9.24	69.3	Pass
T6	140 - 130	Guy A@137.988	3/8	399	5.78	9.24	62.6	Pass
T11	90 - 80	Guy A@87.8	3/8	402	5.08	9.24	55.0	Pass
T16	40 - 30	Guy A@37.9875	3/8	405	4.45	9.24	48.2	Pass
T2	180 - 170	Guy B@177.988	3/8	395	6.40	9.24	69.2	Pass
T6	140 - 130	Guy B@137.988	3/8	398	5.78	9.24	62.6	Pass
T11	90 - 80	Guy B@87.8	3/8	401	5.08	9.24	55.0	Pass
T16	40 - 30	Guy B@37.9875	3/8	404	4.45	9.24	48.2	Pass
T2	180 - 170	Guy C@177.988	3/8	394	6.38	9.24	69.1	Pass
T6	140 - 130	Guy C@137.988	3/8	397	5.79	9.24	62.6	Pass
T11	90 - 80	Guy C@87.8	3/8	400	5.09	9.24	55.1	Pass
T16	40 - 30	Guy C@37.9875	3/8	403	4.45	9.24	48.2	Pass
							Summary	
						Leg (T17)	47.8	Pass
						Horizontal (T1)	64.9	Pass
						Top Girt (T1)	59.1	Pass
						Bottom Girt (T5)	44.3	Pass
						Guy A (T2)	69.3	Pass
						Guy B (T2)	69.2	Pass
						Guy C (T2)	69.1	Pass
						Bolt Checks	47.8	Pass
						RATING =	**69.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

Feed Line Plan

Round Flat App In Face App Out Face

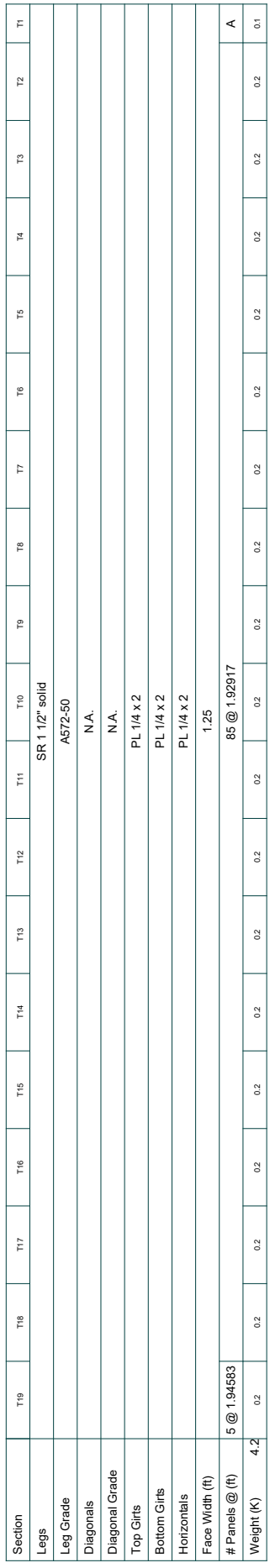


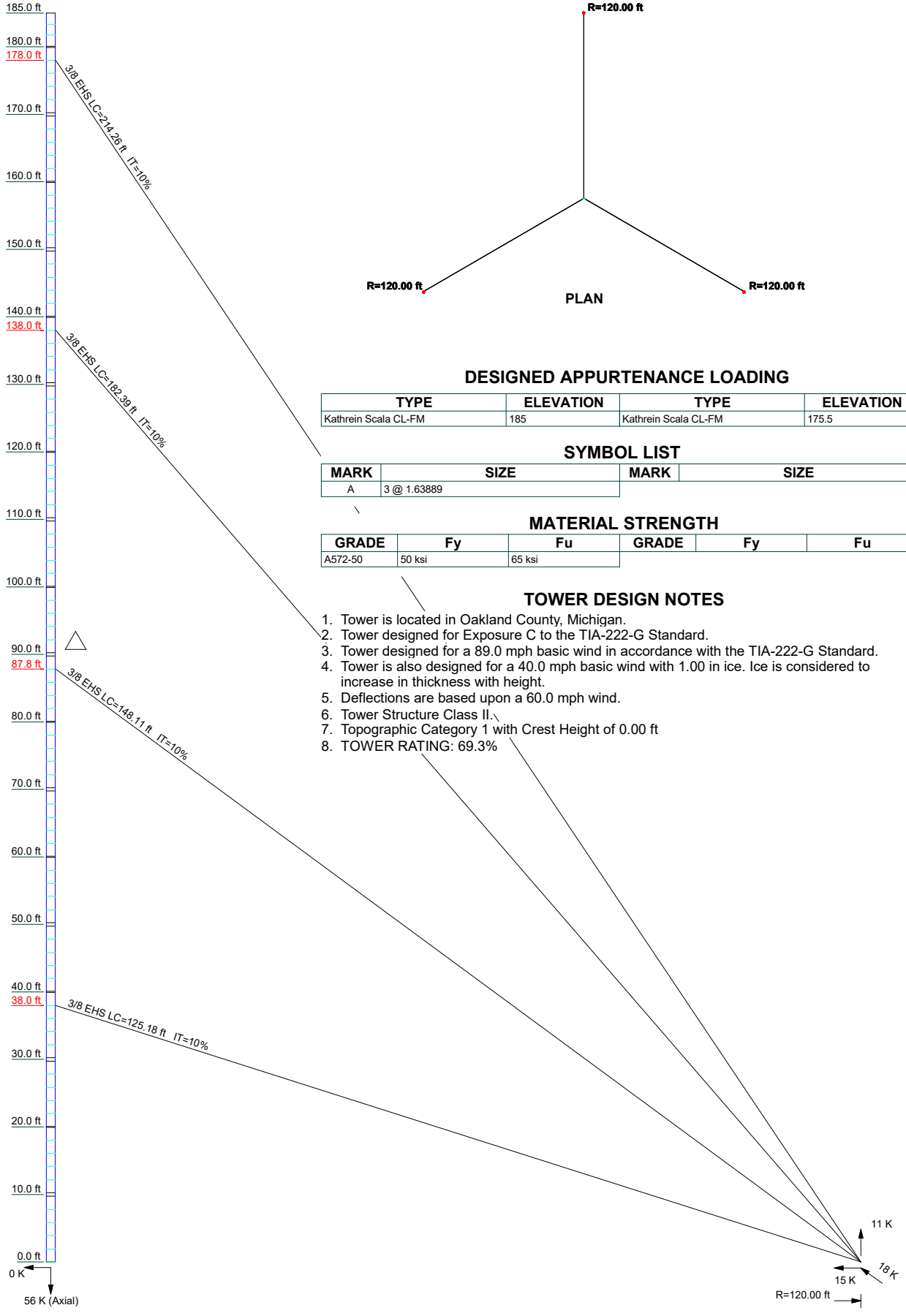
Paul J. Ford and Company
250 East Broad st., Suite 600
Columbus, OH 43215
Phone: (614) 221-6679
FAX:

Job: ***185 ft Guyed Tower, Ferndale MI***			
Project: ***00018-0466***			
Client: Crawford Brodcasting	Drawn by: mbange	App'd:	
Code: TIA-222-G	Date: 07/25/18	Scale: NTS	
Path: G:\TOWER\000_Misc\2018\00018-0466 Ferndale WCHB\TNX\00018-0466.001.8161.eri		Dwg No. E-7	

APPENDIX C

ADDITIONAL CALCULATIONS





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Kathrein Scala CL-FM	185	Kathrein Scala CL-FM	175.5

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	3 @ 1.63889		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi			

TOWER DESIGN NOTES

1. Tower is located in Oakland County, Michigan.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 89.0 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 40.0 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.0 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 69.3%

ALL REACTIONS ARE FACTORED

Paul J. Ford and Company
250 East Broad st., Suite 600
Columbus, OH 43215
Phone: (614) 221-6679
FAX:

Job: 185 ft Guyed Tower, Ferndale MI			
Project: 00018-0466			
Client: Crawford Brodcasting	Drawn by: mbange	App'd:	
Code: TIA-222-G	Date: 07/25/18	Scale: NTS	
Path: G:\TOWER\000_Misc\2018\00018-0466 Ferndale WCHB\TNX\00018-0466.001.8161.eti		Dwg No. E-1	

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES BY PAUL J. FORD AND COMPANY

1) Paul J. Ford and Company has not made a field inspection to verify the tower member sizes or the antenna/coax loading. If the existing conditions are not as represented on these drawings, we should be contacted immediately to evaluate the significance of the deviation.

2) No allowance was made for any damaged, missing, or rusted members. The analysis of this tower assumes that no physical deterioration has occurred in any of the structural components of the tower and that all the tower members have the same load carrying capacity as the day the tower was erected.

3) It is not possible to have all the detailed information to perform a thorough analysis of every structural sub-component of an existing tower. The structural analysis by Paul J. Ford and Company verifies the adequacy of the main structural members of the tower. Paul J. Ford and Company provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc.

4) The structural integrity of the existing tower foundation can only be verified if exact foundation sizes and soil conditions are known. Paul J. Ford and Company will not accept any responsibility for the adequacy of the existing foundations unless the foundation sizes and a soils report are provided.

5) This tower has been analyzed according to the minimum design wind loads recommended by the Telecommunications Industry Association Standard ANSI/TIA-222-G. If the owner or local or state agencies require a higher design wind load, Paul J. Ford and Company should be made aware of this requirement.

6) The enclosed sketches are a schematic representation of the tower that we have analyzed. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions and for the proper fit and clearance in the field.

7) Miscellaneous items such as antenna mounts etc. have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.