REVIEWED FOR CODE COMPLIANCE
08/07/2024

Kimley»Horn

SAC Wireless
300 Airport Road, Building 1
Elgin, IL 60123
(815) 705-4782

Kevin Fraleigh, P.E.
3875 Embassy Pkwy #280
Akron, OH 44333
(216) 505-8256

Date: **July 20, 2022**
K-H Project #: KHCLE-26656

Comprehensive Structural Analysis Report

Carrier Designation:	**Client Project ID:** **Site Name:**	PR-91471 Oak Creek Coal
Analysis Criteria:	**Code Requirements:**	TIA-222-H, 2021 IBC, & ASCE 7-16 Ultimate Wind Speed: 112 mph w/ 0" Ice Wind Speed: 50 mph w/ 0.25" Ice
Site Data:		**29920 County Road 27, Hayden** **CO, 81639, Routt County** **Latitude *40.354108°*, Longitude *-107.072581°*** **80 Foot – Valmont Self-Support**

Mr. James Willard,

Kimley-Horn and Associates, Inc. is pleased to submit this **"Comprehensive Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

Existing+Phase 1:

Proposed Tower Rating:	86.5%	**Pass**
Proposed Foundation Rating:	57.0%	**Pass**

Existing+Phase 1+Phase 2:

Proposed Tower Rating:	82.1%	**Pass**
Proposed Foundation Rating:	52.7%	**Pass**

This analysis has been performed in accordance with the 2021 IBC based upon an ultimate 3-second gust wind speed of 112 mph. Applicable Standard references and design criteria are listed in Page 2 - Analysis Criteria.

Structural analysis prepared by: Elliot Ziebart, E.I.

Respectfully submitted by:

DocuSigned by:
Michael Oglesby
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COLORADO LICENSED PROFESSIONAL ENGINEER
MICHAEL LADD OGLESBY
48589
7/21/2022

Michael Oglesby, P.E.
Lic. #PE.0048589, Exp. 10/31/2023
Kimley-Horn and Associates, Inc.

▪ INTRODUCTION

At the request of SAC Wireless, Kimley-Horn and Associates, Inc. performed a structural analysis of the existing tower type structure located in Hayden, CO. The purpose of the analysis is to determine the adequacy of the tower to support the loading configuration outlined in Appendix A (Tower Analysis Summary Form), pursuant to the referenced standards.

▪ ANALYSIS CRITERIA

The analysis utilizes tnxTower v. 8.1, an industry-standard finite element analysis program used to create an elastic three-dimensional model considering second-order effects per ANSI/TIA-222 requirements. The program calculates member stresses for various loading cases and selected output from the analysis is included in the appendices.

The topographic factors and properties listed below were solely determined per directive of Union Wireless for the purpose of this analysis. A more rigorous procedure for determining topographic effects could be considered.

The proposed mounts considered in this analysis were chosen per directive by Union Wireless. The tiebacks must be attached to the adjacent tower legs in order for the results of this analysis to be valid.

The maximum vertical offset of the proposed equipment is 2'. If the vertical offset of the proposed loading exceeds 2', the results of this analysis are invalid.

TIA-222 Revision:	TIA-222-H
Risk Category:	III
Ultimate Wind Speed:	112 mph
Exposure Category:	C
Topographic Category:	3
Crest Height:	700 ft
Ice Thickness:	0.25 in
Wind Speed with Ice:	50 mph
Seismic Structure Class:	C
Seismic S_s:	0.550
Seismic S_1:	0.099

SUPPORTING DOCUMENTATION

Information on the current tower geometry, member sizes, foundation dimensions, soil properties, and antenna loading was obtained from the sources listed below. It is assumed that all information provided to Kimley-Horn & Associates, Inc. is accurate. In the absence of information to the contrary, we assume the structure has been properly erected and maintained per the original design drawings and the capacity has not significantly changed from the "as new" condition.

Tower Design	Valmont Drawing #: D-118598, dated 3/23/2004
Foundation Design	Valmont Microflect Drawing #: D-119403, dated 8/5/2004
Geotechnical Report	Not Provided
Previous Analysis	Valmont Analysis Order #: 441507-2, dated 12/30/2020
Tower Loading Data	Union Wireless RFDS, dated 12/28/2021 Union Wireless Loading Sheet, dated 05/23/2022

▪ RESULTS

The tables below show a maximum usage summary for each group of components in the structure. The usage of a component is the ratio of force in the member compared to its calculated capacity. A more detailed report of member usages can be found in the appendix at the end of this report. Usages greater than 100% indicate where the force in the member exceeds its capacity. Usages up to 105% are considered acceptable per industry standard practice.

Phase 1
Structure Usages:

Structure Component	Controlling Usage	Result
Legs	77.5%	Pass
Diagonals	86.5%	Pass
Horizontals/Girts	54.6%	Pass
Redundant/Inner Bracing Members	6.2%	Pass
Bolts	86.5%	Pass
Anchor Rods	38.7%	Pass

Foundation Usages:

Foundation	Controlling Usage	Result
*Base Foundation	57.0%	Pass

Phase 2
Structure Usages:

Structure Component	Controlling Usage	Result
Legs	70.7%	Pass
Diagonals	82.1%	Pass
Horizontals/Girts	50.5%	Pass
Redundant/Inner Bracing Members	5.2%	Pass
Bolts	82.1%	Pass
Anchor Rods	35.8%	Pass

Foundation Usages:

Foundation	Controlling Usage	Result
*Base Foundation	52.7%	Pass

*Soil information was assumed per TIA-222-H Annex F.

▪ CONCLUSIONS AND RECOMMENDATIONS

Per our structural analysis, the structure has been found to **pass**. The tower and foundation **can** support the referenced loading in accordance with the structural strength requirements of ANSI/TIA-222-H and 2021 International Building Code.

▪ ASSUMPTIONS AND LIMITATIONS

This report is not a condition assessment of the tower and foundation; It is an engineering analysis based upon the theoretical capacity of the structure. Unless told otherwise, we assume the tower and foundation to be in “like new” condition. It is the responsibility of our client and the tower owner to verify that the tower modeled and loading considered is accurate. If these assumptions are not accurate, Kimley-Horn & Associates, Inc. should be notified immediately to perform a revised analysis. This analysis assumes all antenna mounts are adequate to support the existing and proposed loads. It is the carrier’s responsibility to ensure antenna mount meets the structural requirements of ANSI/TIA-222. Kimley-Horn & Associates, Inc. did not analyze antenna supporting mounts as part of this structural analysis report.

All services are performed, results obtained, and recommendation made in accordance with generally accepted engineering principles and practices. Kimley-Horn & Associates, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information in this report.

Kimley-Horn makes no warranties, expressed or implied in connection with this report and disclaims any liability arising from original design, material, fabrication, and section deficiencies or corrosion of the tower.

APPENDIX A

Tower Analysis Summary Form

Tower Analysis Summary Form

General Info

Site Name	Oak Creek Coal
Client Project ID	PR-91471
Date of Analysis	7/20/22
Company Performing Analysis	Kimley-Horn

The information contained in this summary report is not to be used independently from the PE stamped tower analysis.

Tower Info	Description	Date
Tower Type (G, SST, MP)	SST	
Tower Height (top of steel AGL)	80'	
Tower Manufacturer	Valmont	
Tower Model	108-M840-80'	
Tower Design	Valmont Drawing #: D-118598	3/23/2004
Foundation Design	Valmont Microflect Drawing #: D-119403	8/5/2004
Geotech Report	N/A	
Previous Structural Analysis	Valmont Analysis Order #: 441507-2	12/30/2020

Design Parameters

Design Code Used	TIA-222-H, 2021 IBC & ASCE 7-16
Location of Tower (County, State)	Routt, CO
Ultimate Wind Speed (mph)	112
Ice Thickness (in)	0.25
Risk Category (I, II, III, IV)	III
Exposure Category (B, C, D)	C
Topographic Category (1 to 5)	3

Analysis Results (% Maximum Usage)

Existing + Phase 1 Scope	
Tower (%)	86.5%
Tower Base (%)	38.7%
Foundation (%)	57.0%
Foundation Adequate?	Yes

Analysis Results (% Maximum Usage)

Existing + Phase 1 + Phase 2 Scope	
Tower (%)	82.1%
Tower Base (%)	35.8%
Foundation (%)	52.7%
Foundation Adequate?	Yes

Steel Yield Strength (ksi)

Legs	46
Member Bracing	46/36
Member Bolts	A325
Anchor Rods	55

Existing / Reserved Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face
Union Wireless	78	80	6	Panel	Amphenol	CWX063X25M00	40/135/300	3	Sabre	12.5' Quick Tee Sector Frames	6	AVA7-50	1-5/8"	Face A
Union Wireless	78	80	6	Panel	Cellmax	12082x (Future)	40/135/300			on the same mounts				
Union Wireless	78	80	9	RRU	Nokia	AHLOA (Future)				on the same mounts				
Second Carrier	60	60	6	Panel	Commscope	NNH4-65C-R6-V3	40/135/300	3	Site Pro 1	VFA10-HD Sector Frames	3	Power	3/4"	Face A
Second Carrier	60	60	1	DC Unit	Raycap	DC9-48-60-24-8C-EV				on the same mounts	1	Fiber	3/8"	Face A
Second Carrier	60	60	3	RRH	Nokia	3JR80236AAAA		3	Rosenberger	Dual Clamp Mounts				
Second Carrier	60	60	3	RRH	Nokia	3JR80235AAAA				on the same mounts				
Union Wireless	35	35	1	MW Dish	Andrew	HPX8-65 (Future)	314.7	1	Unknown	Pipe Mount	6	Power Cabling	7mm	Face A
Union Wireless	35	35	2	MW Radio	Aviat	WTM4100				on the same mount				
Union Wireless	25	25	1	MW Dish	Andrew	HPX8-65	314.7	1	Unknown	Pipe Mount	2	EW63	Elliptical	Face A
Union Wireless	25	25	1	MW Dish	Andrew	USX6	13.492	1	Unknown	Pipe Mount	6	Power Cabling	7mm	Face A
Union Wireless	25	25	2	MW Radio	Aviat	WTM4100				on the same mount				
Third Carrier	20	20	1	Dish	Mimosa	B5 - 18" Diameter (Reserved)	74			tower mounted	2	CAT5	1/4"	Face A
Third Carrier	20	20	1	Dish	Mimosa	B5 - 18" Diameter (Reserved)	102			tower mounted	2	CAT5	1/4"	Face A

Phase 1 Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face
Union Wireless	78	80	6	Panel	Cellmax	CMA-UBTULBULBHH	40/135/300	3	Site Pro 1	VFA12-WLL Sector Frames	3	Power	#6 AWG	Face A
Union Wireless	78	80	3	RRU	Nokia	AHFIG				on the proposed mounts	3	Fiber	10 mm	Face A
Union Wireless	78	80	3	RRU	Nokia	AHLOA				on the proposed mounts				
Union Wireless	78	80	3	RRU	Nokia	AHCA				on the proposed mounts				
Union Wireless	78	80	3	OVP	Rosenberger	PR-UWPT612				tower mounted				
Union Wireless	78	80	3	OVP	Rosenberger	FB-L98B-A1041				tower mounted				

Note: (3) Sector Frames at 78' shall be removed prior to the installation of the proposed equipment and have not been considered in this analysis. All other existing/reserved loading shall be reused.

Phase 2 Loading

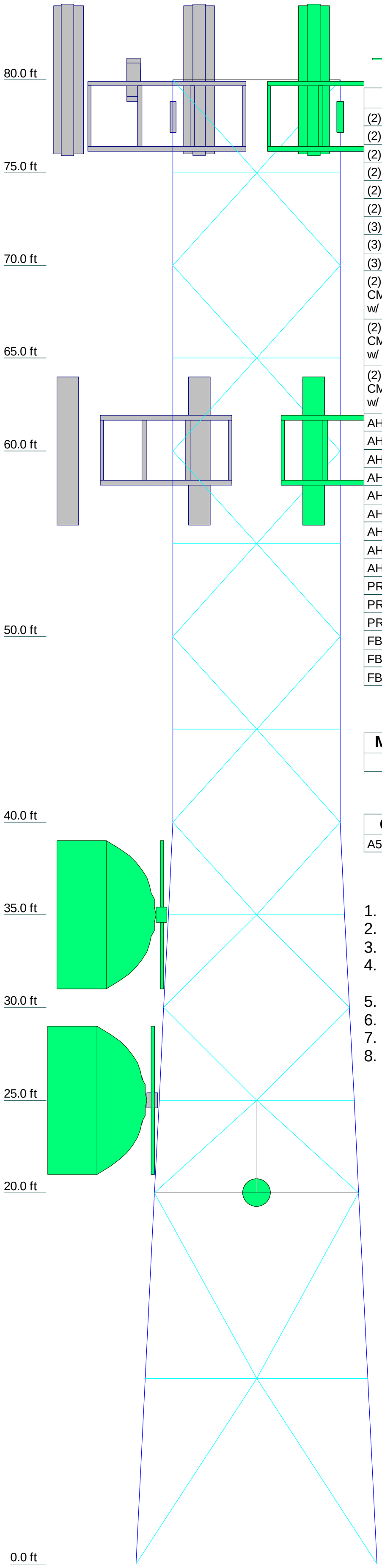
Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face
Union Wireless	78	80	3	Panel	CommScope	SS-65M-M	40/135/300			on the proposed mounts				
Union Wireless	78	80	3	RRU	Nokia	AZQC				on the proposed mounts				

Note: (6) Amphenol Panels at 80' shall be removed prior to the installation of the proposed equipment and have not been considered in this analysis. All other existing/reserved loading shall be reused.

APPENDIX B

tnxTower Output File – Phase 1

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	
Legs	P4.5 x 0.237									P5.5625 x 0.258		
Leg Grade	A500-46											
Diagonals	P1.5x.145				P2.5x.203						P3x.216	
Diagonal Grade	A500-46											
Top Girts	2L2x2x3/16x3/8	N.A.									2L2x2x1/8x3/8	
Horizontals	N.A.	A	N.A.	2L1 3/4x1 3/4x1/8			N.A.	A	N.A.		2L2x2x1/8	
Red. Verticals	N.A.									B	N.A.	
Inner Bracing	N.A.	L1 3/4x1 3/4x1/8	N.A.			L1 3/4x1 3/4x1/8	N.A.	L1 3/4x1 3/4x1/8				
Face Width (ft)	9							9.5	10	10.5	11	13
# Panels @ (ft)	12 @ 5										2 @ 10	
Weight (K)	0.6	0.5	0.4	0.5	1.2	1.3	0.6	0.7	0.6	0.9	3.1	10.4



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) CWX063X25XM00 w/ MP	78	Site Pro 1 VFA12-WLL	78
(2) CWX063X25XM00 w/ MP	78	Site Pro 1 VFA12-WLL	78
(2) CWX063X25XM00 w/ MP	78	Site Pro 1 VFA12-WLL	78
(2) 12082x w/ MP (Future)	78	(2) NNH4-65C-R6-V3 w/ Mount Pipe	60
(2) 12082x w/ MP (Future)	78	(2) NNH4-65C-R6-V3 w/ Mount Pipe	60
(2) 12082x w/ MP (Future)	78	(2) NNH4-65C-R6-V3 w/ Mount Pipe	60
(3) AHLOA (Future)	78	Nokia 3JR80236AAAA	60
(3) AHLOA (Future)	78	Nokia 3JR80236AAAA	60
(3) AHLOA (Future)	78	Nokia 3JR80236AAAA	60
(2) CMA-UBTULBULBHH/6517/17/21/21 w/ MP	78	Nokia 3JR80235AAAA	60
		Nokia 3JR80235AAAA	60
		Nokia 3JR80235AAAA	60
(2) CMA-UBTULBULBHH/6517/17/21/21 w/ MP	78	Rosenberger D218RRUDSM Clamp	60
		Rosenberger D218RRUDSM Clamp	60
		Rosenberger D218RRUDSM Clamp	60
(2) CMA-UBTULBULBHH/6517/17/21/21 w/ MP	78	DC9-48-60-24-8C-EV	60
		(2) 8' Pipe Mount (2SCH40)	60
AHFIG	78	(2) 8' Pipe Mount (2SCH40)	60
AHFIG	78	(2) 8' Pipe Mount (2SCH40)	60
AHFIG	78	Site Pro 1 VFA10-HD	60
AHLOA	78	Site Pro 1 VFA10-HD	60
AHLOA	78	Site Pro 1 VFA10-HD	60
AHLOA	78	8' Pipe Mount (2SCH40)	35
AHCA	78	(2) WTM4100	35
AHCA	78	HPX8-65 (Future)	35
AHCA	78	8' Pipe Mount (2SCH40)	25
PR-UWPT612	78	(2) WTM4100	25
PR-UWPT612	78	8' Pipe Mount (2SCH40)	25
PR-UWPT612	78	HPX8-65	25
FB-L98B-A1041	78	USX6	25
FB-L98B-A1041	78	B5 - 18" Diameter (Reserved)	20
FB-L98B-A1041	78	B5 - 18" Diameter (Reserved)	20

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	2L1 3/4x1 3/4x1/8	B	2L1 3/4x1 3/4x1/8x3/8

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-46	46 ksi	62 ksi			

TOWER DESIGN NOTES

1. Tower is located in Routt County, Colorado.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 112 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 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 III.
7. Topographic Category 3 with Crest Height of 700.00 ft
8. TOWER RATING: 86.5%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 126 K
SHEAR: 26 K

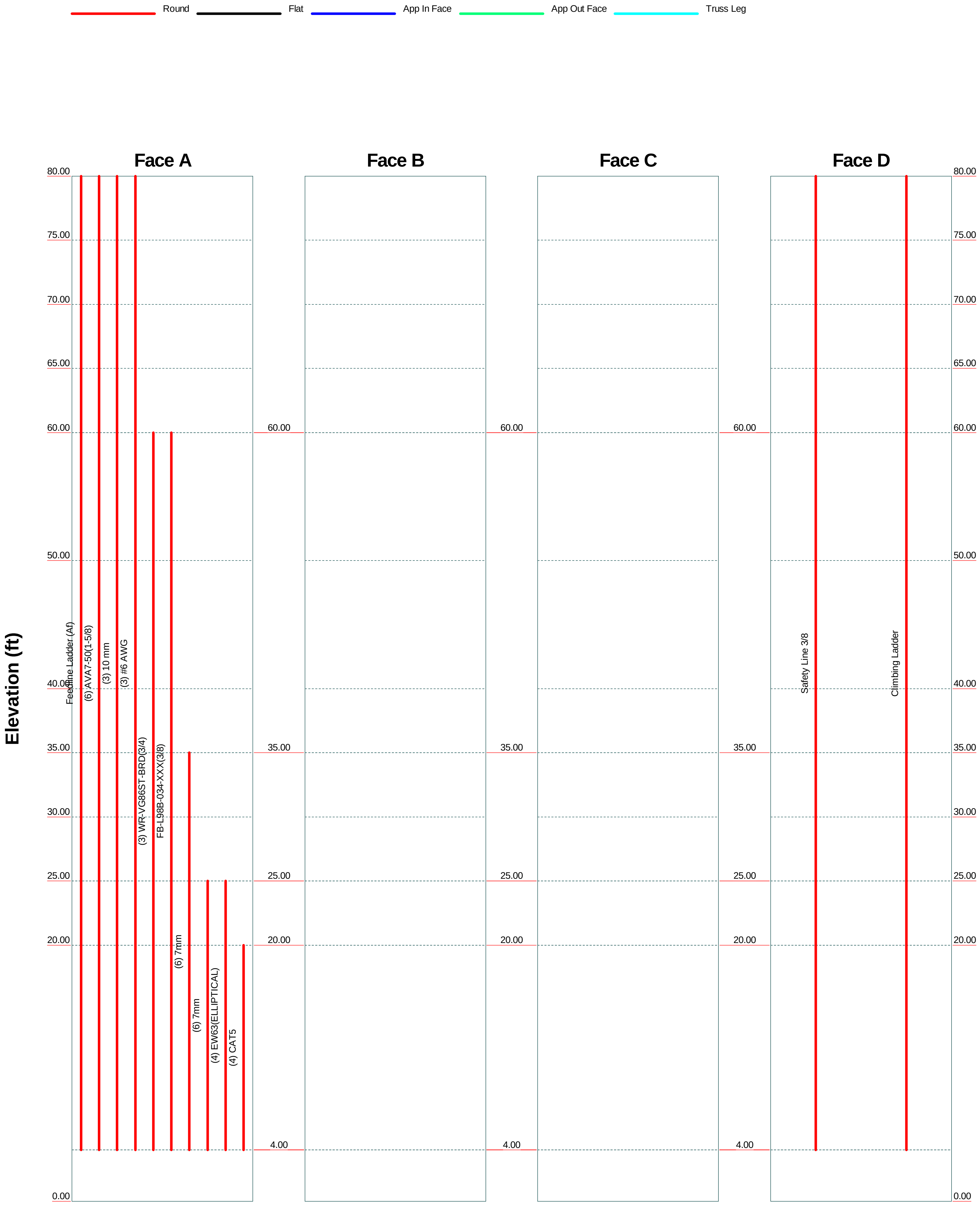
UPLIFT: -114 K
SHEAR: 23 K

AXIAL 37 K
SHEAR 9 K
MOMENT 502 kip-ft
TORQUE 4 kip-ft
50 mph WIND - 0.2500 in ICE

AXIAL 28 K
SHEAR 40 K
MOMENT 2188 kip-ft
TORQUE 14 kip-ft
REACTIONS - 112 mph WIND

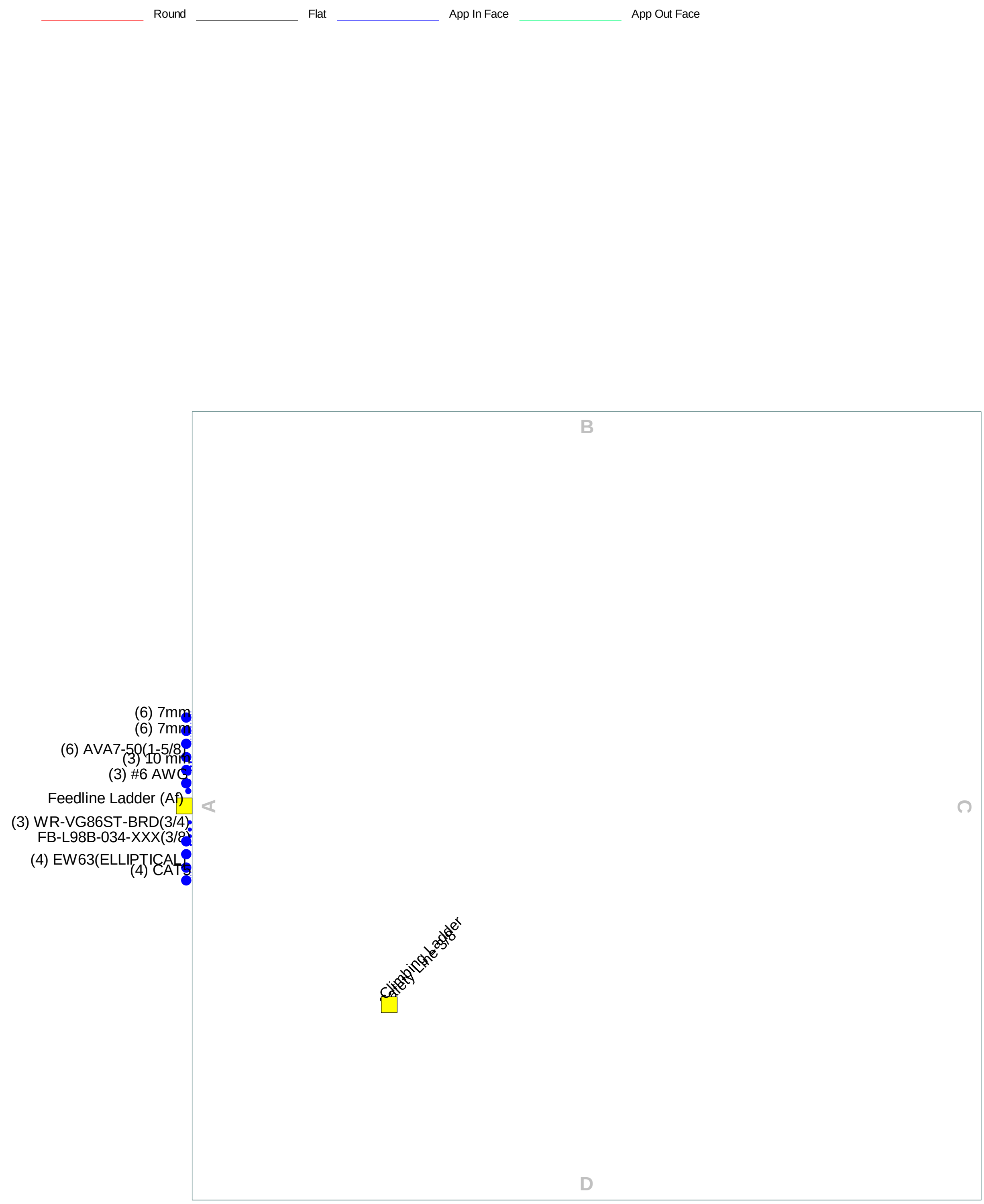
Kimley»Horn	**Kimley-Horn** 421 Fayetteville St., Suite 600 Raleigh, NC 27601 Phone: (919) 677-2000 FAX: (919) 677-2000	Job: **Oak Creek Coal**	
		Project: **PR-91471**	
		Client: SAC Wireless	Drawn by: Elliot Ziebart / App'd:
		Code: TIA-222-H	Date: 07/20/22 / Scale: NTS
		Path: C:\Users\elliot.ziebart\Desktop\tnxTowers_SAC-Union Wireless\Oak Creek Coal\Re-Run\Oak Creek Coal-Rerun.eri	Dwg No. E-1

Feed Line Distribution Chart
0' - 80'



Kimley-Horn 421 Fayetteville St., Suite 600 Raleigh, NC 27601 Phone: (919) 677-2000 FAX: (919) 677-2000	Job: ***Oak Creek Coal***	
	Project: ***PR-91471***	
	Client: SAC Wireless	Drawn by: Elliot Ziebart	App'd:
	Code: TIA-222-H	Date: 07/20/22	Scale: NTS
	Path:		Dwg No. E-7

Feed Line Plan



Kimley-Horn 421 Fayetteville St., Suite 600 Raleigh, NC 27601 Phone: (919) 677-2000 FAX: (919) 677-2000	Job: ***Oak Creek Coal***	
	Project: ***PR-91471***	
	Client: SAC Wireless	Drawn by: Elliot Ziebart	App'd:
	Code: TIA-222-H	Date: 07/20/22	Scale: NTS
	Path: C:\Users\elliot.ziebart\Desktop\tnxTowers_SAC-Union Wireless\Oak Creek Coal\Re-Run\Oak Creek Coal-Rerun.eri		Dwg No. E-7

Tower Input Data

The main tower is a 4x free standing tower with an overall height of 80.00 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 9.00 ft at the top and 13.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower is located in Routt County, Colorado.
- Tower base elevation above sea level: 7490.00 ft.
- Basic wind speed of 112 mph.
- Risk Category III.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 3.
- Crest Height: 700.00 ft.
- Nominal ice thickness of 0.2500 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

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*
Safety Line 3/8	D	No	No	Ar (CaAa)	80.00 - 4.00	-36.0000	0.25	1	1	0.3750	0.3750		0.22
Climbing Ladder	D	No	No	Af (CaAa)	80.00 - 4.00	-36.0000	0.25	1	1	3.0000	3.0000		7.90
Feedline Ladder (Af)	A	No	No	Af (CaAa)	80.00 - 4.00	0.0000	0	1	1	3.0000	3.0000		8.40
AVA7-50(1-5/8)	A	No	No	Ar (CaAa)	80.00 - 4.00	0.0000	0.07	6	6	0.5000	2.0100		0.70
10 mm	A	No	No	Ar (CaAa)	80.00 - 4.00	0.0000	0.05	3	3	0.3937	0.3937		0.01
#6 AWG	A	No	No	Ar (CaAa)	80.00 - 4.00	0.0000	0.03	3	3	0.5000	1.2720		1.55
WR-VG86ST-BRD(3/4)	A	No	No	Ar (CaAa)	60.00 - 4.00	0.0000	-0.03	3	3	0.5000	0.7950		0.58
FB-L98B-034-XXX(3/8)	A	No	No	Ar (CaAa)	60.00 - 4.00	0.0000	-0.05	1	1	0.3937	0.3937		0.06
7mm	A	No	No	Ar (CaAa)	35.00 - 4.00	0.0000	0.09	6	6	0.2756	0.2756		0.01
7mm	A	No	No	Ar (CaAa)	25.00 - 4.00	0.0000	0.11	6	6	0.2756	0.2756		0.01
EW63(ELLIPTICAL)	A	No	No	Ar (CaAa)	25.00 - 4.00	0.0000	-0.07	4	4	0.5000	2.0100		0.51
CAT5	A	No	No	Ar (CaAa)	20.00 - 4.00	0.0000	-0.09	4	4	0.2600	0.2600		0.10

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) CWX063X25XM00 w/ MP	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	11.81 12.44	10.20 11.64	0.10 0.20
(2) CWX063X25XM00 w/ MP	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	11.81 12.44	10.20 11.64	0.10 0.20
(2) CWX063X25XM00 w/ MP	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	11.81 12.44	10.20 11.64	0.10 0.20
(2) 12082x w/ MP (Future)	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	20.39 21.04	12.59 14.03	0.20 0.35
(2) 12082x w/ MP (Future)	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	20.39 21.04	12.59 14.03	0.20 0.35
(2) 12082x w/ MP (Future)	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	20.39 21.04	12.59 14.03	0.20 0.35
(3) AHLOA (Future)	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
(3) AHLOA (Future)	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
(3) AHLOA (Future)	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
(2) CMA-UBTULBULBHH/651 7/17/21/21 w/ MP	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	22.72 23.39	10.48 11.90	0.15 0.30
(2) CMA-UBTULBULBHH/651 7/17/21/21 w/ MP	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	22.72 23.39	10.48 11.90	0.15 0.30
(2) CMA-UBTULBULBHH/651 7/17/21/21 w/ MP	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	22.72 23.39	10.48 11.90	0.15 0.30
AHFIG	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	3.08 3.31	1.40 1.59	0.08 0.10
AHFIG	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	3.08 3.31	1.40 1.59	0.08 0.10
AHFIG	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	3.08 3.31	1.40 1.59	0.08 0.10
AHLOA	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
AHLOA	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
AHLOA	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* (ft ft ft)	*Azimuth Adjustment* (°)	*Placement* (ft)		*C_AA_A Front* (ft^2)	*C_AA_A Side* (ft^2)	*Weight* (K)
AHCA	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	1.29 1.43	0.72 0.83	0.04 0.05
AHCA	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	1.29 1.43	0.72 0.83	0.04 0.05
AHCA	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	1.29 1.43	0.72 0.83	0.04 0.05
PR-UWPT612	A	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
PR-UWPT612	B	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
PR-UWPT612	C	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
FB-L98B-A1041	A	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
FB-L98B-A1041	B	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
FB-L98B-A1041	C	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
Site Pro 1 VFA12-WLL	A	From Leg	0.50 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	13.20 19.50	9.20 14.60	0.66 0.80
Site Pro 1 VFA12-WLL	B	From Leg	0.50 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	13.20 19.50	9.20 14.60	0.66 0.80
Site Pro 1 VFA12-WLL	C	From Leg	0.50 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	13.20 19.50	9.20 14.60	0.66 0.80
(2) NNH4-65C-R6-V3 w/ Mount Pipe	A	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	17.31 18.04	10.34 11.86	0.16 0.28
(2) NNH4-65C-R6-V3 w/ Mount Pipe	B	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	17.31 18.04	10.34 11.86	0.16 0.28
(2) NNH4-65C-R6-V3 w/ Mount Pipe	C	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	17.31 18.04	10.34 11.86	0.16 0.28
Nokia 3JR80236AAAA	A	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Nokia 3JR80236AAAA	B	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Nokia 3JR80236AAAA	C	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Nokia 3JR80235AAAA	A	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
Nokia 3JR80235AAAA	B	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Nokia 3JR80235AAAA	C	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Rosenberger D218RRUDSM Clamp	A	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	3.60 0.00	3.60 0.00	0.07 0.00
Rosenberger D218RRUDSM Clamp	B	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	3.60 0.00	3.60 0.00	0.07 0.00
Rosenberger D218RRUDSM Clamp	C	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	3.60 0.00	3.60 0.00	0.07 0.00
DC9-48-60-24-8C-EV	A	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.74 2.96	4.78 5.06	0.03 0.06
(2) 8' Pipe Mount (2SCH40)	A	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
(2) 8' Pipe Mount (2SCH40)	B	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
(2) 8' Pipe Mount (2SCH40)	C	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
Site Pro 1 VFA10-HD	A	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	12.10 18.30	9.20 14.60	0.63 0.77
Site Pro 1 VFA10-HD	B	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	12.10 18.30	9.20 14.60	0.63 0.77
Site Pro 1 VFA10-HD	C	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	12.10 18.30	9.20 14.60	0.63 0.77
8' Pipe Mount (2SCH40)	D	From Leg	0.50 0.00 0.00	0.0000	35.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
(2) WTM4100	D	From Leg	0.50 0.00 0.00	0.0000	35.00	No Ice 1/2" Ice	0.38 0.64	0.38 0.64	0.01 0.02
8' Pipe Mount (2SCH40)	D	From Leg	0.50 0.00 0.00	0.0000	25.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
8' Pipe Mount (2SCH40)	A	From Leg	0.50 0.00 0.00	0.0000	25.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
(2) WTM4100	A	From Leg	0.50 0.00 0.00	0.0000	25.00	No Ice 1/2" Ice	0.38 0.64	0.38 0.64	0.01 0.02

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
HPX8-65 (Future)	D	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	44.7000		35.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.47 0.86
HPX8-65	D	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	44.7000		25.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.47 0.86
USX6	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	13.4920		25.00	6.23	No Ice 1/2" Ice	30.48 31.30	0.20 0.36
B5 - 18" Diameter (Reserved)		Paraboloid w/o Radome	None		0.0000		20.00	1.50	No Ice 1/2" Ice	1.77 0.00	0.05 0.00
B5 - 18" Diameter (Reserved)		Paraboloid w/o Radome	None		0.0000		20.00	1.50	No Ice 1/2" Ice	1.77 0.00	0.05 0.00

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	80 - 75	1.028	34	0.0925	0.0125
T2	75 - 70	0.928	34	0.0918	0.0118
T3	70 - 65	0.822	34	0.0909	0.0094
T4	65 - 60	0.718	34	0.0884	0.0079
T5	60 - 50	0.619	34	0.0860	0.0065
T6	50 - 40	0.436	34	0.0760	0.0046
T7	40 - 35	0.279	34	0.0611	0.0028
T8	35 - 30	0.211	34	0.0520	0.0018
T9	30 - 25	0.161	34	0.0423	0.0015
T10	25 - 20	0.112	30	0.0326	0.0011
T11	20 - 0	0.080	30	0.0249	0.0009

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
78.00	(2) CWX063X25XM00 w/ MP	34	0.988	0.0922	0.0124	49051
60.00	(2) NNH4-65C-R6-V3 w/ Mount Pipe	34	0.619	0.0860	0.0065	55066
35.00	HPX8-65 (Future)	34	0.211	0.0520	0.0018	17313
25.00	HPX8-65	30	0.112	0.0326	0.0011	18418
20.00	B5 - 18" Diameter (Reserved)	30	0.080	0.0249	0.0009	36138

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	80 - 75	3.519	16	0.3159	0.0436
T2	75 - 70	3.177	16	0.3134	0.0411
T3	70 - 65	2.815	16	0.3106	0.0330
T4	65 - 60	2.459	16	0.3022	0.0276
T5	60 - 50	2.118	16	0.2938	0.0227
T6	50 - 40	1.496	9	0.2599	0.0162
T7	40 - 35	0.960	9	0.2089	0.0097
T8	35 - 30	0.729	9	0.1779	0.0061
T9	30 - 25	0.556	9	0.1447	0.0051
T10	25 - 20	0.389	9	0.1115	0.0038
T11	20 - 0	0.276	9	0.0849	0.0031

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
78.00	(2) CWX063X25XM00 w/ MP	16	3.384	0.3148	0.0432	14705
60.00	(2) NNH4-65C-R6-V3 w/ Mount Pipe	16	2.118	0.2938	0.0227	16075
35.00	HPX8-65 (Future)	9	0.729	0.1779	0.0061	5055
25.00	HPX8-65	9	0.389	0.1115	0.0038	5393
20.00	B5 - 18" Diameter (Reserved)	9	0.276	0.0849	0.0031	10559

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	80	Diagonal	A325N	0.6250	1	3.34	12.95	0.258 ✔	1	Member Bearing
		Top Girt	A325N	0.6250	1	0.37	13.66	0.027 ✔	1	Member Block Shear
T2	75	Diagonal	A325N	0.6250	1	6.71	12.95	0.518 ✔	1	Member Bearing
		Horizontal	A325N	0.6250	1	2.34	7.75	0.302 ✔	1	Member Block Shear
T3	70	Diagonal	A325N	0.6250	1	6.45	12.95	0.498 ✔	1	Member Bearing
T4	65	Leg	A325N	0.6250	8	1.92	20.34	0.094 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	6.77	12.95	0.523 ✔	1	Member Bearing
		Horizontal	A325N	0.6250	1	0.30	7.75	0.038 ✔	1	Member Block Shear
T5	60	Diagonal	A325N	0.6250	1	9.91	13.81	0.718 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	1	0.58	7.75	0.075 ✔	1	Member Block Shear
T6	50	Leg	A325N	0.6250	8	6.11	20.34	0.300 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	10.84	13.81	0.785 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	1	0.84	7.75	0.109 ✔	1	Member Block

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
T7	40	Diagonal	A325N	0.6250	1	7.90	13.81	0.573 ✔	1	Shear Bolt Shear
T8	35	Diagonal	A325N	0.6250	1	8.21	13.81	0.595 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	1	1.61	7.75	0.207 ✔	1	Member Block Shear
T9	30	Leg	A325N	0.7500	8	10.18	30.10	0.338 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7.29	13.81	0.528 ✔	1	Bolt Shear
T10	25	Diagonal	A325N	0.6250	1	8.11	13.81	0.588 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	1	2.02	9.11	0.221 ✔	1	Member Block Shear
T11	20	Diagonal	A325N	0.6250	2	11.94	13.81	0.865 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	2	0.68	8.22	0.083 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	2	4.49	8.22	0.546 ✔	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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	P4.5 x 0.237	5.00	5.00	39.7 K=1.00	3.1741	-8.65	118.16	0.073 [1] ✔
T2	75 - 70	P4.5 x 0.237	5.00	5.00	39.7 K=1.00	3.1741	-8.70	118.16	0.074 [1] ✔
T3	70 - 65	P4.5 x 0.237	5.00	5.00	39.7 K=1.00	3.1741	-19.37	118.16	0.164 [1] ✔
T4	65 - 60	P4.5 x 0.237	5.00	5.00	39.7 K=1.00	3.1741	-19.48	118.16	0.165 [1] ✔
T5	60 - 50	P4.5 x 0.237	10.00	5.00	39.7 K=1.00	3.1741	-38.67	118.16	0.327 [1] ✔
T6	50 - 40	P4.5 x 0.237	10.00	5.00	39.7 K=1.00	3.1741	-56.29	118.16	0.476 [1] ✔
T7	40 - 35	P4.5 x 0.237	5.01	5.01	39.8 K=1.00	3.1741	-72.72	118.09	0.616 [1] ✔
T8	35 - 30	P4.5 x 0.237	5.01	5.01	39.8 K=1.00	3.1741	-72.93	118.09	0.618 [1] ✔
T9	30 - 25	P4.5 x 0.237	5.01	5.01	39.8 K=1.00	3.1741	-91.47	118.09	0.775 [1] ✔
T10	25 - 20	P5.5625 x 0.258	5.01	5.01	32.0 K=1.00	4.2995	-91.93	166.13	0.553 [1] ✔
T11	20 - 0	P5.5625 x 0.258	20.05	10.03	64.1 K=1.00	4.2995	-86.62	135.05	0.641 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	P1.5x.145	6.73	6.45	124.3 K=1.00	0.7995	-3.24	11.70	0.277 [1]
T2	75 - 70	P1.5x.145	6.73	6.45	124.3 K=1.00	0.7995	-6.74	11.70	0.576 [1]
T3	70 - 65	P1.5x.145	6.73	6.45	124.3 K=1.00	0.7995	-6.57	11.70	0.562 [1]
T4	65 - 60	P1.5x.145	6.73	6.45	124.3 K=1.00	0.7995	-6.96	11.70	0.595 [1]
T5	60 - 50	P2.5x.203	6.73	6.45	81.7 K=1.00	1.7040	-9.91	45.05	0.220 [1]
T6	50 - 40	P2.5x.203	6.73	6.45	81.7 K=1.00	1.7040	-10.84	45.05	0.241 [1]
T7	40 - 35	P2.5x.203	6.73	6.45	81.7 K=1.00	1.7040	-7.90	45.02	0.176 [1]
T8	35 - 30	P2.5x.203	7.08	6.81	86.3 K=1.00	1.7040	-8.21	42.77	0.192 [1]
T9	30 - 25	P2.5x.203	7.08	6.81	86.3 K=1.00	1.7040	-6.87	42.77	0.161 [1]
T10	25 - 20	P2.5x.203	7.44	7.12	90.2 K=1.00	1.7040	-8.06	40.80	0.198 [1]
T11	20 - 0	P3x.216	11.94	11.51	118.7 K=1.00	2.2285	-23.89	35.71	0.669 [1]

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	75 - 70	2L1 3/4x1 3/4x1/8	9.00	4.19	92.2 K=1.00	0.8438	-2.28	22.26	0.102 [1]
T4	65 - 60	2L1 3/4x1 3/4x1/8	9.00	8.39	138.0 K=1.00	0.8438	-0.29	12.68	0.023 [1]
T5	60 - 50	2L1 3/4x1 3/4x1/8	9.00	6.35	138.0 K=1.00	0.8438	-0.58	12.68	0.046 [1]
T6	50 - 40	2L1 3/4x1 3/4x1/8	9.00	4.19	92.2 K=1.00	0.8438	-0.84	22.26	0.038 [1]
T8	35 - 30	2L1 3/4x1 3/4x1/8	9.50	4.44	97.7	0.8438	-1.58	21.26	0.074 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
					K=1.00				
T10	25 - 20	2L2x2x1/8	10.50	4.90	93.9 K=1.00	0.9600	-1.95	24.45	0.080 [1]
T11	20 - 0	2L2x2x1/8	12.00	5.57	106.8 K=1.00	0.9600	-1.36	21.82	0.062 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	2L2x2x3/16x3/8	9.00	8.39	163.1 K=1.00	1.4300	-0.47	15.39	0.031 [1]
T11	20 - 0	2L2x2x1/8x3/8	11.00	5.07	99.1 K=1.00	0.9600	-8.02	20.98	0.382 [1]
		2L 'a' > 29.0126 in - 201							

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	75 - 70	L1 3/4x1 3/4x1/8	6.36	6.36	220.2 K=1.00	0.4219	-0.01	2.49	0.003 [1]
T6	50 - 40	L1 3/4x1 3/4x1/8	6.36	6.36	220.2 K=1.00	0.4219	-0.04	2.49	0.015 [1]
T8	35 - 30	L1 3/4x1 3/4x1/8	6.72	6.72	232.4 K=1.00	0.4219	-0.05	2.24	0.021 [1]
T9	30 - 25	L1 3/4x1 3/4x1/8	7.42	7.42	256.9 K=1.00	0.4219	-0.04	1.83	0.019 [1]
		KL/R > 250 (C) - 171							
T10	25 - 20	L1 3/4x1 3/4x1/8	7.78	7.78	269.1 K=1.00	0.4219	-0.02	1.67	0.011 [1]
		KL/R > 250 (C) - 190							
T11	20 - 0	L1 3/4x1 3/4x1/8	12.00	12.00	415.2 K=1.00	0.4219	-0.04	0.70	0.062 [1]
		KL/R > 250 (C) - 218							

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	P4.5 x 0.237	5.00	5.00	39.7	3.1741	4.57	131.41	0.035 [1] ✔
T2	75 - 70	P4.5 x 0.237	5.00	5.00	39.7	3.1741	4.56	131.41	0.035 [1] ✔
T3	70 - 65	P4.5 x 0.237	5.00	5.00	39.7	3.1741	15.39	131.41	0.117 [1] ✔
T4	65 - 60	P4.5 x 0.237	5.00	5.00	39.7	3.1741	15.36	131.41	0.117 [1] ✔
T5	60 - 50	P4.5 x 0.237	10.00	5.00	39.7	3.1741	32.45	131.41	0.247 [1] ✔
T6	50 - 40	P4.5 x 0.237	10.00	5.00	39.7	3.1741	48.90	131.41	0.372 [1] ✔
T7	40 - 35	P4.5 x 0.237	5.01	5.01	39.8	3.1741	64.99	131.41	0.495 [1] ✔
T8	35 - 30	P4.5 x 0.237	5.01	5.01	39.8	3.1741	64.78	131.41	0.493 [1] ✔
T9	30 - 25	P4.5 x 0.237	5.01	5.01	39.8	3.1741	81.41	131.41	0.620 [1] ✔
T10	25 - 20	P5.5625 x 0.258	5.01	5.01	32.0	4.2995	81.24	178.00	0.456 [1] ✔
T11	20 - 0	P5.5625 x 0.258	20.05	10.03	64.1	4.2995	79.39	178.00	0.446 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	P1.5x.145	6.73	6.45	124.3	0.7995	3.34	33.10	0.101 [1] ✔
T2	75 - 70	P1.5x.145	6.73	6.45	124.3	0.7995	6.71	33.10	0.203 [1] ✔
T3	70 - 65	P1.5x.145	6.73	6.45	124.3	0.7995	6.45	33.10	0.195 [1] ✔
T4	65 - 60	P1.5x.145	6.73	6.45	124.3	0.7995	6.77	33.10	0.204 [1] ✔
T5	60 - 50	P2.5x.203	6.73	6.45	81.7	1.7040	9.81	70.55	0.139 [1] ✔
T6	50 - 40	P2.5x.203	6.73	6.45	81.7	1.7040	10.47	70.55	0.148 [1] ✔
T7	40 - 35	P2.5x.203	6.73	6.45	81.7	1.7040	7.23	70.55	0.103 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T8	35 - 30	P2.5x.203	7.08	6.81	86.3	1.7040	7.54	70.55	0.107 [1] ✔
T9	30 - 25	P2.5x.203	7.08	6.81	86.3	1.7040	7.29	70.55	0.103 [1] ✔
T10	25 - 20	P2.5x.203	7.44	7.12	90.2	1.7040	8.11	70.55	0.115 [1] ✔
T11	20 - 0	P3x.216	11.94	11.51	118.7	2.2285	21.14	92.26	0.229 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	75 - 70	2L1 3/4x1 3/4x1/8	9.00	4.19	94.8	0.4922	2.34	21.41	0.109 [1] ✔
T4	65 - 60	2L1 3/4x1 3/4x1/8	9.00	8.39	106.4	0.4922	0.30	21.41	0.014 [1] ✔
T5	60 - 50	2L1 3/4x1 3/4x1/8	9.00	6.35	106.4	0.4922	0.58	21.41	0.027 [1] ✔
T6	50 - 40	2L1 3/4x1 3/4x1/8	9.00	4.19	94.8	0.4922	0.84	21.41	0.039 [1] ✔
T8	35 - 30	2L1 3/4x1 3/4x1/8	9.50	4.44	100.3	0.4922	1.61	21.41	0.075 [1] ✔
T10	25 - 20	2L2x2x1/8	10.50	4.90	96.2	0.5794	2.02	25.20	0.080 [1] ✔
T11	20 - 0	2L2x2x1/8	12.00	5.57	110.6	0.5794	1.36	25.20	0.054 [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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	2L2x2x3/16x3/8	9.00	8.39	167.7	0.8616	0.37	37.48	0.010 [1] ✔
T11	20 - 0	2L2x2x1/8x3/8	11.00	5.07	101.0	0.5794	8.98	25.20	0.356 [1] ✔
		2L 'a' > 29.0126 in - 199							

[1] P_u / ϕP_n controls

Redundant Vertical 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 $P_u / \phi P_n$
T10	25 - 20	2L1 3/4x1 3/4x1/8x3/8 2L 'a' > 28.6358 in - 183	5.01	5.01	110.1	0.8438	0.11	27.34	0.004 [1] ✔

[1] P_u / ϕP_n controls

Inner Bracing 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 $P_u / \phi P_n$
T2	75 - 70	L1 3/4x1 3/4x1/8	6.36	6.36	139.9	0.4219	0.01	13.67	0.000 [1] ✔
T6	50 - 40	L1 3/4x1 3/4x1/8	6.36	6.36	139.9	0.4219	0.04	13.67	0.003 [1] ✔
T8	35 - 30	L1 3/4x1 3/4x1/8	6.72	6.72	147.7	0.4219	0.03	13.67	0.002 [1] ✔
T9	30 - 25	L1 3/4x1 3/4x1/8	7.42	7.42	163.3	0.4219	0.03	13.67	0.002 [1] ✔
T10	25 - 20	L1 3/4x1 3/4x1/8	7.78	7.78	171.0	0.4219	0.02	13.67	0.001 [1] ✔
T11	20 - 0	L1 3/4x1 3/4x1/8	12.00	12.00	263.9	0.4219	0.05	13.67	0.004 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

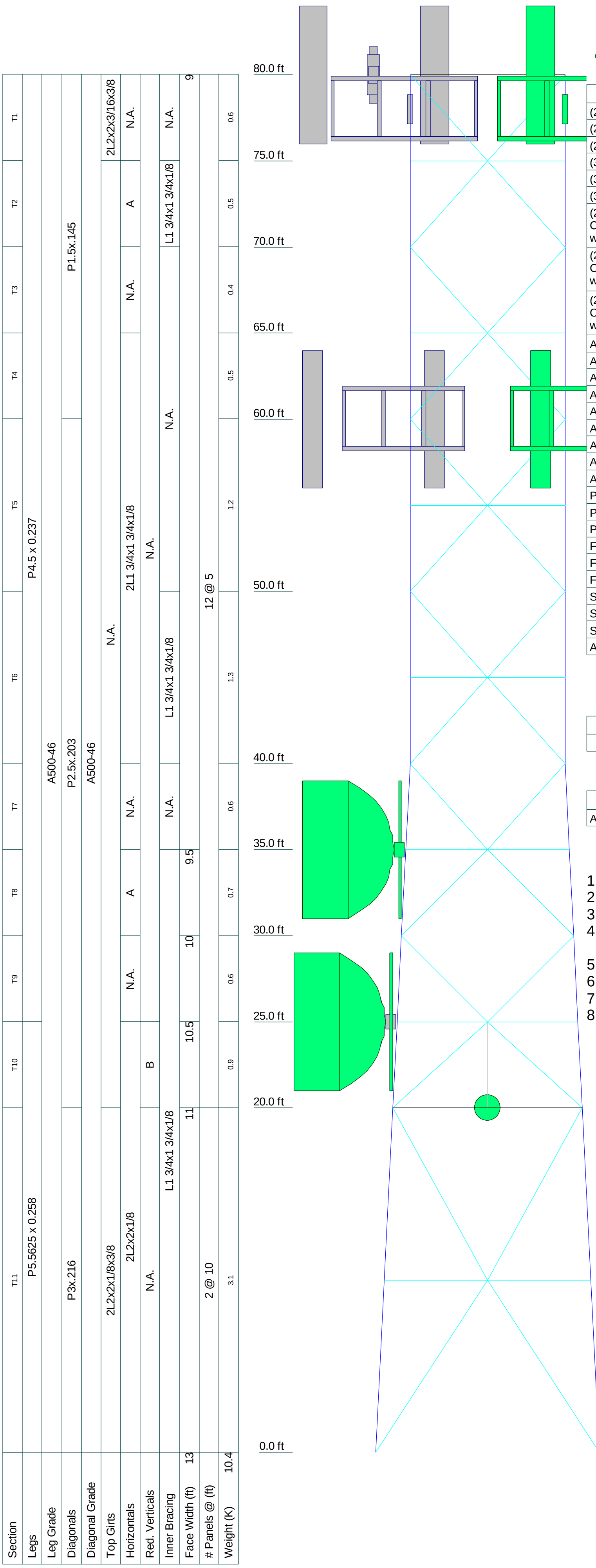
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
T1	80 - 75	Leg	P4.5 x 0.237	3	-8.65	118.16	7.3	Pass
T2	75 - 70	Leg	P4.5 x 0.237	23	-8.70	118.16	7.4	Pass
T3	70 - 65	Leg	P4.5 x 0.237	41	-19.37	118.16	16.4	Pass
T4	65 - 60	Leg	P4.5 x 0.237	57	-19.48	118.16	16.5	Pass
T5	60 - 50	Leg	P4.5 x 0.237	69	-38.67	118.16	32.7	Pass
T6	50 - 40	Leg	P4.5 x 0.237	93	-56.29	118.16	47.6	Pass
T7	40 - 35	Leg	P4.5 x 0.237	122	-72.72	118.09	61.6	Pass
T8	35 - 30	Leg	P4.5 x 0.237	138	-72.93	118.09	61.8	Pass
T9	30 - 25	Leg	P4.5 x 0.237	155	-91.47	118.09	77.5	Pass
T10	25 - 20	Leg	P5.5625 x 0.258	176	-91.93	166.13	55.3	Pass
T11	20 - 0	Leg	P5.5625 x 0.258	197	-86.62	135.05	64.1	Pass
T1	80 - 75	Diagonal	P1.5x.145	17	-3.24	11.70	27.7	Pass
T2	75 - 70	Diagonal	P1.5x.145	29	-6.74	11.70	57.6	Pass
T3	70 - 65	Diagonal	P1.5x.145	49	-6.57	11.70	56.2	Pass
T4	65 - 60	Diagonal	P1.5x.145	63	-6.96	11.70	59.5	Pass
T5	60 - 50	Diagonal	P2.5x.203	77	-9.91	45.05	22.0	Pass

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P K*	*øP$_{allow}$ K*	*% Capacity*	*Pass Fail*
							71.8 (b)	
T6	50 - 40	Diagonal	P2.5x.203	102	-10.84	45.05	24.1 78.5 (b)	Pass
T7	40 - 35	Diagonal	P2.5x.203	130	-7.90	45.02	17.6 57.3 (b)	Pass
T8	35 - 30	Diagonal	P2.5x.203	144	-8.21	42.77	19.2 59.5 (b)	Pass
T9	30 - 25	Diagonal	P2.5x.203	164	-6.87	42.77	16.1 52.8 (b)	Pass
T10	25 - 20	Diagonal	P2.5x.203	184	-8.06	40.80	19.8 58.8 (b)	Pass
T11	20 - 0	Diagonal	P3x.216	204	-23.89	35.71	66.9 86.5 (b)	Pass
T2	75 - 70	Horizontal	2L1 3/4x1 3/4x1/8	15	2.34	21.41	10.9 30.2 (b)	Pass
T4	65 - 60	Horizontal	2L1 3/4x1 3/4x1/8	48	-0.29	12.68	2.3 3.8 (b)	Pass
T5	60 - 50	Horizontal	2L1 3/4x1 3/4x1/8	76	-0.58	12.68	4.6 7.5 (b)	Pass
T6	50 - 40	Horizontal	2L1 3/4x1 3/4x1/8	100	0.84	21.41	3.9 10.9 (b)	Pass
T8	35 - 30	Horizontal	2L1 3/4x1 3/4x1/8	123	1.61	21.41	7.5 20.7 (b)	Pass
T10	25 - 20	Horizontal	2L2x2x1/8	156	2.02	25.20	8.0 22.1 (b)	Pass
T11	20 - 0	Horizontal	2L2x2x1/8	208	-1.36	21.82	6.2 8.3 (b)	Pass
T1	80 - 75	Top Girt	2L2x2x3/16x3/8	8	-0.47	15.39	3.1	Pass
T11	20 - 0	Top Girt	2L2x2x1/8x3/8	201	-8.02	20.98	38.2 54.6 (b)	Pass
T10	25 - 20	Redund Vert Bracing	2L1 3/4x1 3/4x1/8x3/8	183	0.11	27.34	0.4	Pass
T2	75 - 70	Inner Bracing	L1 3/4x1 3/4x1/8	37	-0.00	1.25	0.3	Pass
T6	50 - 40	Inner Bracing	L1 3/4x1 3/4x1/8	107	-0.04	2.49	1.5	Pass
T8	35 - 30	Inner Bracing	L1 3/4x1 3/4x1/8	148	-0.05	2.24	2.1	Pass
T9	30 - 25	Inner Bracing	L1 3/4x1 3/4x1/8	171	-0.04	1.83	1.9	Pass
T10	25 - 20	Inner Bracing	L1 3/4x1 3/4x1/8	190	-0.02	1.67	1.1	Pass
T11	20 - 0	Inner Bracing	L1 3/4x1 3/4x1/8	218	-0.04	0.70	6.2	Pass

Summary	ELC:	Existing + Phase 1
Leg (T9)	77.5	Pass
Diagonal (T11)	86.5	Pass
Horizontal (T2)	30.2	Pass
Top Girt (T11)	54.6	Pass
Redund Vert Bracing (T10)	0.4	Pass
Inner Bracing (T11)	6.2	Pass
Bolt Checks	86.5	Pass
Rating =	86.5	Pass

APPENDIX C

tnxTower Output File – Phase 2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 12082x w/ MP (Future)	78	AZQC	78
(2) 12082x w/ MP (Future)	78	AZQC	78
(2) 12082x w/ MP (Future)	78	Site Pro 1 VFA12-WLL	78
(3) AHLOA (Future)	78	Site Pro 1 VFA12-WLL	78
(3) AHLOA (Future)	78	Site Pro 1 VFA12-WLL	78
(3) AHLOA (Future)	78	(2) NNH4-65C-R6-V3 w/ Mount Pipe	60
(2) CMA-UBTULBULBHH/6517/17/21/21 w/ MP	78	(2) NNH4-65C-R6-V3 w/ Mount Pipe	60
		(2) NNH4-65C-R6-V3 w/ Mount Pipe	60
		Nokia 3JR80236AAAA	60
(2) CMA-UBTULBULBHH/6517/17/21/21 w/ MP	78	Nokia 3JR80236AAAA	60
		Nokia 3JR80236AAAA	60
		Nokia 3JR80235AAAA	60
(2) CMA-UBTULBULBHH/6517/17/21/21 w/ MP	78	Nokia 3JR80235AAAA	60
		Nokia 3JR80235AAAA	60
AHFIG	78	Rosenberger D218RRUDSM Clamp	60
AHFIG	78	Rosenberger D218RRUDSM Clamp	60
AHFIG	78	Rosenberger D218RRUDSM Clamp	60
AHLOA	78	DC9-48-60-24-8C-EV	60
AHLOA	78	(2) 8' Pipe Mount (2SCH40)	60
AHLOA	78	(2) 8' Pipe Mount (2SCH40)	60
AHCA	78	(2) 8' Pipe Mount (2SCH40)	60
AHCA	78	Site Pro 1 VFA10-HD	60
AHCA	78	Site Pro 1 VFA10-HD	60
PR-UWPT612	78	Site Pro 1 VFA10-HD	60
PR-UWPT612	78	8' Pipe Mount (2SCH40)	35
PR-UWPT612	78	(2) WTM4100	35
FB-L98B-A1041	78	HPX8-65 (Future)	35
FB-L98B-A1041	78	8' Pipe Mount (2SCH40)	25
FB-L98B-A1041	78	(2) WTM4100	25
SS-65M-M w/ MP	78	8' Pipe Mount (2SCH40)	25
SS-65M-M w/ MP	78	HPX8-65	25
SS-65M-M w/ MP	78	USX6	25
AZQC	78	B5 - 18" Diameter (Reserved)	20
		B5 - 18" Diameter (Reserved)	20

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	2L1 3/4x1 3/4x1/8	B	2L1 3/4x1 3/4x1/8x3/8

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-46	46 ksi	62 ksi			

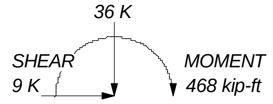
TOWER DESIGN NOTES

1. Tower is located in Routt County, Colorado.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 112 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 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 III.
7. Topographic Category 3 with Crest Height of 700.00 ft
8. TOWER RATING: 82.1%;

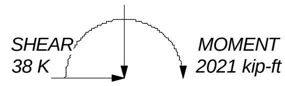
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 117 K
SHEAR: 24 K

UPLIFT: -105 K
SHEAR: 22 K



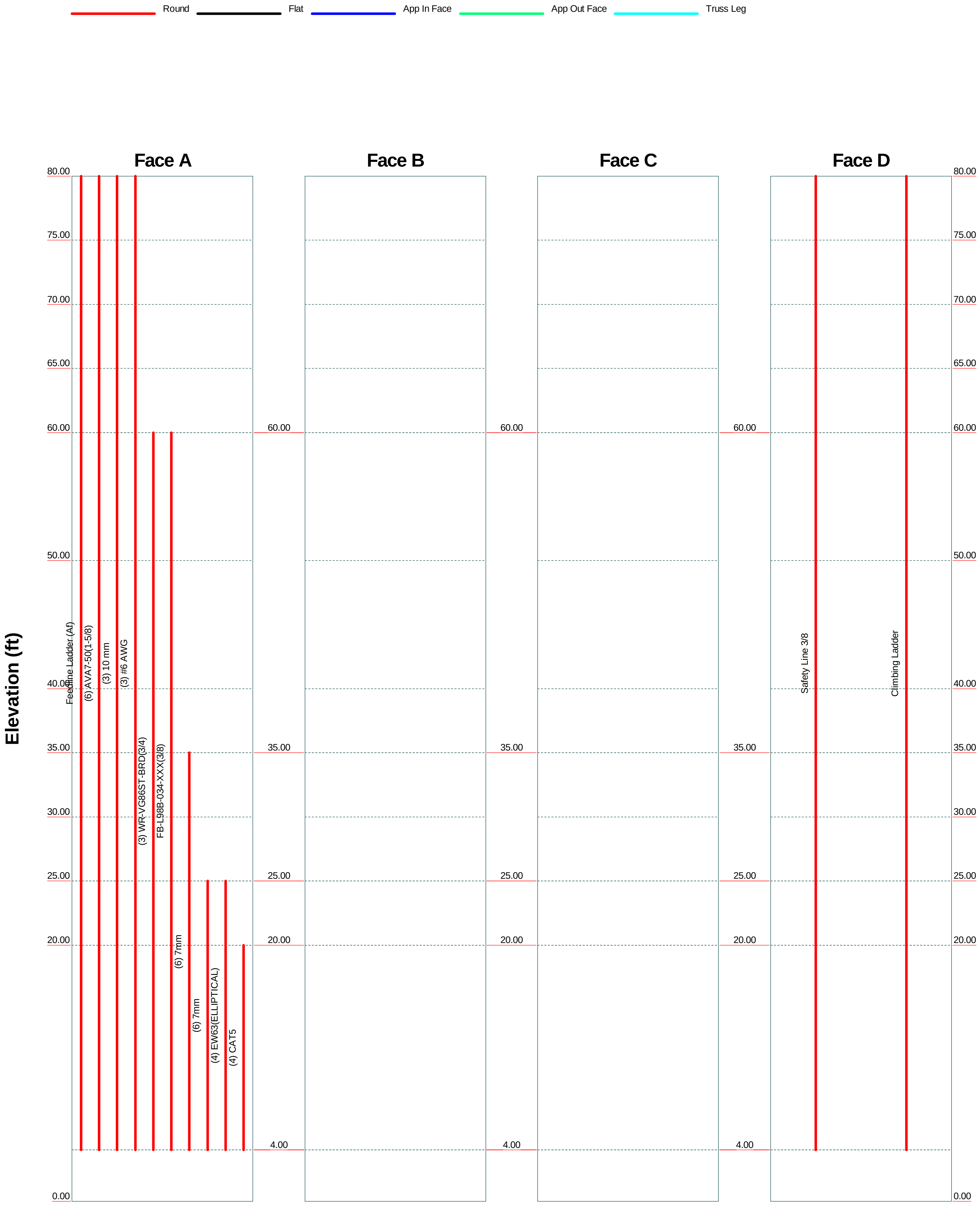
50 mph WIND - 0.2500 in ICE



REACTIONS - 112 mph WIND

Kimley»Horn	**Kimley-Horn** 421 Fayetteville St., Suite 600 Raleigh, NC 27601 Phone: (919) 677-2000 FAX: (919) 677-2000	Job: **Oak Creek Coal**
		Project: **PR-91471**
		Client: SAC Wireless — Drawn by: Elliot Ziebart — App'd:
		Code: TIA-222-H — Date: 07/20/22 — Scale: NTS
		Path: — Dwg No. E-1

Feed Line Distribution Chart
0' - 80'

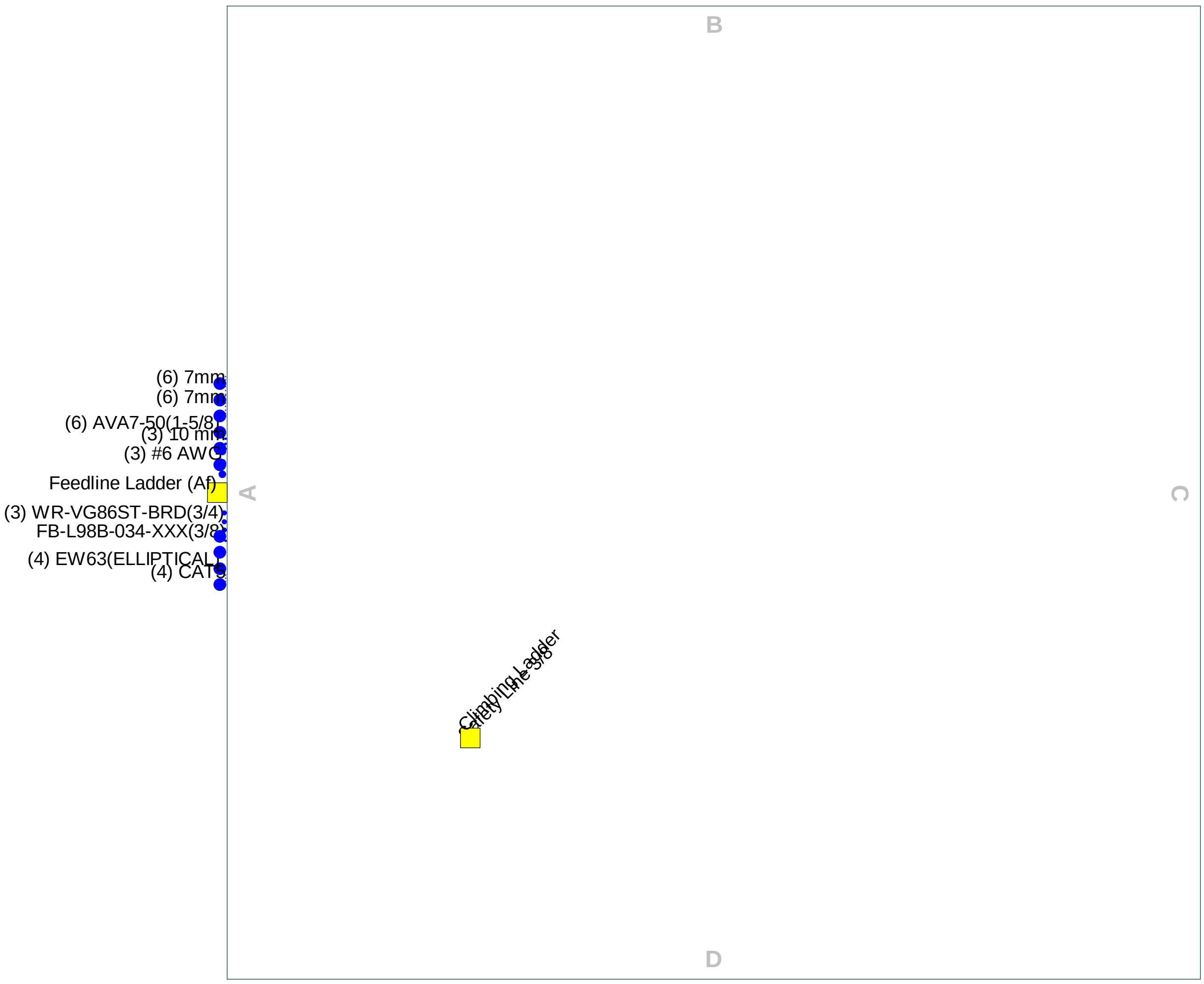


Kimley-Horn
421 Fayetteville St., Suite 600
Raleigh, NC 27601
Phone: (919) 677-2000
FAX: (919) 677-2000

Job: **Oak Creek Coal**		
Project: **PR-91471**		
Client: SAC Wireless	Drawn by: Elliot Ziebart	App'd:
Code: TIA-222-H	Date: 07/20/22	Scale: NTS
Path: C:\Users\elliot.ziebart\Desktop\tnxTower_SAC-Union Wireless\Oak Creek Coal\Re-Run\Oak Creek Coal-Rerun.eri		Dwg No. E-7

Feed Line Plan

Round   Flat   App In Face   App Out Face



Kimley-Horn 421 Fayetteville St., Suite 600 Raleigh, NC 27601 Phone: (919) 677-2000 FAX: (919) 677-2000	Job: ***Oak Creek Coal***		
	Project: ***PR-91471***		
	Client: SAC Wireless	Drawn by: Elliot Ziebart	App'd:
	Code: TIA-222-H	Date: 07/20/22	Scale: NTS
	Path:		Dwg No. E-7

Tower Input Data

The main tower is a 4x free standing tower with an overall height of 80.00 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 9.00 ft at the top and 13.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in Routt County, Colorado.
Tower base elevation above sea level: 7490.00 ft.
Basic wind speed of 112 mph.
Risk Category III.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 3.
Crest Height: 700.00 ft.
Nominal ice thickness of 0.2500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

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*
Safety Line 3/8	D	No	No	Ar (CaAa)	80.00 - 4.00	-36.0000	0.25	1	1	0.3750	0.3750		0.22
Climbing Ladder	D	No	No	Af (CaAa)	80.00 - 4.00	-36.0000	0.25	1	1	3.0000	3.0000		7.90
Feedline Ladder (Af)	A	No	No	Af (CaAa)	80.00 - 4.00	0.0000	0	1	1	3.0000	3.0000		8.40
AVA7-50(1-5/8)	A	No	No	Ar (CaAa)	80.00 - 4.00	0.0000	0.07	6	6	0.5000	2.0100		0.70
10 mm	A	No	No	Ar (CaAa)	80.00 - 4.00	0.0000	0.05	3	3	0.3937	0.3937		0.01
#6 AWG	A	No	No	Ar (CaAa)	80.00 - 4.00	0.0000	0.03	3	3	0.5000	1.2720		1.55
WR-VG86ST-BRD(3/4)	A	No	No	Ar (CaAa)	60.00 - 4.00	0.0000	-0.03	3	3	0.5000	0.7950		0.58
FB-L98B-034-XXX(3/8)	A	No	No	Ar (CaAa)	60.00 - 4.00	0.0000	-0.05	1	1	0.3937	0.3937		0.06
7mm	A	No	No	Ar (CaAa)	35.00 - 4.00	0.0000	0.09	6	6	0.2756	0.2756		0.01
7mm	A	No	No	Ar (CaAa)	25.00 - 4.00	0.0000	0.11	6	6	0.2756	0.2756		0.01
EW63(ELLIPTICAL)	A	No	No	Ar (CaAa)	25.00 - 4.00	0.0000	-0.07	4	4	0.5000	2.0100		0.51
CAT5	A	No	No	Ar (CaAa)	20.00 - 4.00	0.0000	-0.09	4	4	0.2600	0.2600		0.10

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) 12082x w/ MP (Future)	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	20.39 21.04	12.59 14.03	0.20 0.35
(2) 12082x w/ MP (Future)	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	20.39 21.04	12.59 14.03	0.20 0.35
(2) 12082x w/ MP (Future)	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	20.39 21.04	12.59 14.03	0.20 0.35
(3) AHLOA (Future)	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
(3) AHLOA (Future)	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
(3) AHLOA (Future)	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
(2) CMA-UBTULBULBHH/651 7/17/21/21 w/ MP	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	22.72 23.39	10.48 11.90	0.15 0.30
(2) CMA-UBTULBULBHH/651 7/17/21/21 w/ MP	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	22.72 23.39	10.48 11.90	0.15 0.30
(2) CMA-UBTULBULBHH/651 7/17/21/21 w/ MP	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	22.72 23.39	10.48 11.90	0.15 0.30
AHFIG	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	3.08 3.31	1.40 1.59	0.08 0.10
AHFIG	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	3.08 3.31	1.40 1.59	0.08 0.10
AHFIG	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	3.08 3.31	1.40 1.59	0.08 0.10
AHLOA	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
AHLOA	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
AHLOA	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	2.23 2.42	1.39 1.55	0.08 0.10
AHCA	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	1.29 1.43	0.72 0.83	0.04 0.05
AHCA	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	1.29 1.43	0.72 0.83	0.04 0.05
AHCA	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	1.29 1.43	0.72 0.83	0.04 0.05

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
PR-UWPT612	A	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
PR-UWPT612	B	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
PR-UWPT612	C	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
FB-L98B-A1041	A	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
FB-L98B-A1041	B	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
FB-L98B-A1041	C	From Leg	0.00 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	1.02 1.16	0.67 0.81	0.02 0.03
SS-65M-M w/ MP	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	3.82 4.57	3.97 5.06	0.06 0.10
SS-65M-M w/ MP	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	3.82 4.57	3.97 5.06	0.06 0.10
SS-65M-M w/ MP	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	3.82 4.57	3.97 5.06	0.06 0.10
AZQC	A	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	1.03 1.16	0.30 0.38	0.02 0.02
AZQC	B	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	1.03 1.16	0.30 0.38	0.02 0.02
AZQC	C	From Leg	3.00 0.00 2.00	0.0000	78.00	No Ice 1/2" Ice	1.03 1.16	0.30 0.38	0.02 0.02
Site Pro 1 VFA12-WLL	A	From Leg	0.50 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	13.20 19.50	9.20 14.60	0.66 0.80
Site Pro 1 VFA12-WLL	B	From Leg	0.50 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	13.20 19.50	9.20 14.60	0.66 0.80
Site Pro 1 VFA12-WLL	C	From Leg	0.50 0.00 0.00	0.0000	78.00	No Ice 1/2" Ice	13.20 19.50	9.20 14.60	0.66 0.80
(2) NNH4-65C-R6-V3 w/ Mount Pipe	A	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	17.31 18.04	10.34 11.86	0.16 0.28
(2) NNH4-65C-R6-V3 w/ Mount Pipe	B	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	17.31 18.04	10.34 11.86	0.16 0.28
(2) NNH4-65C-R6-V3 w/ Mount Pipe	C	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	17.31 18.04	10.34 11.86	0.16 0.28
Nokia 3JR80236AAAA	A	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert*	*Azimuth Adjustment*	*Placement*		*C_AA_A Front*	*C_AA_A Side*	*Weight*
			ft ft ft	*°*	*ft*		*ft²*	*ft²*	*K*
Nokia 3JR80236AAAA	B	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Nokia 3JR80236AAAA	C	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Nokia 3JR80235AAAA	A	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Nokia 3JR80235AAAA	B	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Nokia 3JR80235AAAA	C	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.12 0.00	1.29 0.00	0.05 0.00
Rosenberger D218RRUDSM Clamp	A	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	3.60 0.00	3.60 0.00	0.07 0.00
Rosenberger D218RRUDSM Clamp	B	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	3.60 0.00	3.60 0.00	0.07 0.00
Rosenberger D218RRUDSM Clamp	C	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	3.60 0.00	3.60 0.00	0.07 0.00
DC9-48-60-24-8C-EV	A	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	2.74 2.96	4.78 5.06	0.03 0.06
(2) 8' Pipe Mount (2SCH40)	A	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
(2) 8' Pipe Mount (2SCH40)	B	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
(2) 8' Pipe Mount (2SCH40)	C	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
Site Pro 1 VFA10-HD	A	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	12.10 18.30	9.20 14.60	0.63 0.77
Site Pro 1 VFA10-HD	B	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	12.10 18.30	9.20 14.60	0.63 0.77
Site Pro 1 VFA10-HD	C	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	12.10 18.30	9.20 14.60	0.63 0.77
8' Pipe Mount (2SCH40)	D	From Leg	0.50 0.00 0.00	0.0000	35.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
(2) WTM4100	D	From Leg	0.50 0.00 0.00	0.0000	35.00	No Ice 1/2" Ice	0.38 0.64	0.38 0.64	0.01 0.02
8' Pipe Mount (2SCH40)	D	From Leg	0.50 0.00 0.00	0.0000	25.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04
8' Pipe Mount (2SCH40)	A	From Leg	0.50 0.00 0.00	0.0000	25.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	0.03 0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) WTM4100	A	From Leg	0.50 0.00 0.00	0.0000	25.00	No Ice 1/2" Ice	0.38 0.64	0.38 0.64	0.01 0.02

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
HPX8-65 (Future)	D	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	44.7000		35.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.47 0.86
HPX8-65	D	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	44.7000		25.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.47 0.86
USX6	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	13.4920		25.00	6.23	No Ice 1/2" Ice	30.48 31.30	0.20 0.36
B5 - 18" Diameter (Reserved)		Paraboloid w/o Radome	None		0.0000		20.00	1.50	No Ice 1/2" Ice	1.77 0.00	0.05 0.00
B5 - 18" Diameter (Reserved)		Paraboloid w/o Radome	None		0.0000		20.00	1.50	No Ice 1/2" Ice	1.77 0.00	0.05 0.00

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	80 - 75	0.934	34	0.0835	0.0093
T2	75 - 70	0.844	34	0.0828	0.0089
T3	70 - 65	0.749	34	0.0820	0.0075
T4	65 - 60	0.655	34	0.0799	0.0064
T5	60 - 50	0.565	34	0.0778	0.0053
T6	50 - 40	0.400	34	0.0690	0.0037
T7	40 - 35	0.257	34	0.0556	0.0021
T8	35 - 30	0.195	34	0.0475	0.0012
T9	30 - 25	0.149	34	0.0387	0.0012
T10	25 - 20	0.105	30	0.0299	0.0013
T11	20 - 0	0.075	30	0.0228	0.0009

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
78.00	(2) 12082x w/ MP (Future)	34	0.898	0.0832	0.0092	57128
60.00	(2) NNH4-65C-R6-V3 w/ Mount Pipe	34	0.565	0.0778	0.0053	65048
35.00	HPX8-65 (Future)	34	0.195	0.0475	0.0012	19326
25.00	HPX8-65	30	0.105	0.0299	0.0013	20467
20.00	B5 - 18" Diameter (Reserved)	30	0.075	0.0228	0.0009	39743

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	80 - 75	3.192	16	0.2843	0.0326
T2	75 - 70	2.885	16	0.2822	0.0309
T3	70 - 65	2.560	16	0.2797	0.0261
T4	65 - 60	2.240	16	0.2725	0.0223
T5	60 - 50	1.933	16	0.2653	0.0184
T6	50 - 40	1.370	9	0.2354	0.0128
T7	40 - 35	0.884	9	0.1899	0.0072
T8	35 - 30	0.673	9	0.1620	0.0043
T9	30 - 25	0.515	9	0.1321	0.0042
T10	25 - 20	0.362	9	0.1020	0.0046
T11	20 - 0	0.258	9	0.0779	0.0032

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
78.00	(2) 12082x w/ MP (Future)	16	3.071	0.2834	0.0323	17163
60.00	(2) NNH4-65C-R6-V3 w/ Mount Pipe	16	1.933	0.2653	0.0184	19050
35.00	HPX8-65 (Future)	9	0.673	0.1620	0.0043	5654
25.00	HPX8-65	9	0.362	0.1020	0.0046	6007
20.00	B5 - 18" Diameter (Reserved)	9	0.258	0.0779	0.0032	11634

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	80	Diagonal	A325N	0.6250	1	2.85	12.95	0.220 ✔	1	Member Bearing
		Top Girt	A325N	0.6250	1	0.33	13.66	0.024 ✔	1	Member Block Shear
T2	75	Diagonal	A325N	0.6250	1	5.68	12.95	0.439 ✔	1	Member Bearing
		Horizontal	A325N	0.6250	1	1.97	7.75	0.255 ✔	1	Member Block

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
										Shear
T3	70	Diagonal	A325N	0.6250	1	5.54	12.95	0.428	1	Member Bearing
T4	65	Leg	A325N	0.6250	8	1.63	20.34	0.080	1	Bolt Tension
		Diagonal	A325N	0.6250	1	5.83	12.95	0.450	1	Member Bearing
		Horizontal	A325N	0.6250	1	0.27	7.75	0.035	1	Member Block Shear
T5	60	Diagonal	A325N	0.6250	1	8.96	13.81	0.649	1	Bolt Shear
		Horizontal	A325N	0.6250	1	0.52	7.75	0.067	1	Member Block Shear
T6	50	Leg	A325N	0.6250	8	5.42	20.34	0.266	1	Bolt Tension
		Diagonal	A325N	0.6250	1	9.87	13.81	0.715	1	Bolt Shear
		Horizontal	A325N	0.6250	1	0.76	7.75	0.098	1	Member Block Shear
T7	40	Diagonal	A325N	0.6250	1	7.21	13.81	0.522	1	Bolt Shear
T8	35	Diagonal	A325N	0.6250	1	7.63	13.81	0.553	1	Bolt Shear
		Horizontal	A325N	0.6250	1	1.56	7.75	0.201	1	Member Block Shear
T9	30	Leg	A325N	0.7500	8	9.20	30.10	0.306	1	Bolt Tension
		Diagonal	A325N	0.6250	1	6.82	13.81	0.494	1	Bolt Shear
T10	25	Diagonal	A325N	0.6250	1	7.61	13.81	0.551	1	Bolt Shear
		Horizontal	A325N	0.6250	1	1.95	9.11	0.215	1	Member Block Shear
T11	20	Diagonal	A325N	0.6250	2	11.33	13.81	0.821	1	Bolt Shear
		Horizontal	A325N	0.6250	2	0.63	8.22	0.076	1	Member Block Shear
		Top Girt	A325N	0.6250	2	4.15	8.22	0.505	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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	P4.5 x 0.237	5.00	5.00	39.7 K=1.00	3.1741	-7.65	118.16	0.065 [1]
T2	75 - 70	P4.5 x 0.237	5.00	5.00	39.7 K=1.00	3.1741	-7.70	118.16	0.065 [1]
T3	70 - 65	P4.5 x 0.237	5.00	5.00	39.7 K=1.00	3.1741	-16.91	118.16	0.143 [1]
T4	65 - 60	P4.5 x 0.237	5.00	5.00	39.7 K=1.00	3.1741	-17.02	118.16	0.144 [1]
T5	60 - 50	P4.5 x 0.237	10.00	5.00	39.7 K=1.00	3.1741	-34.40	118.16	0.291 [1]

Section No.	Elevation (ft)	Size	L (ft)	L_u (ft)	Kl/r	A (in^2)	P_u (K)	ϕP_n (K)	Ratio $\frac{P_u}{\phi P_n}$
T6	50 - 40	P4.5 x 0.237	10.00	5.00	39.7 K=1.00	3.1741	-50.61	118.16	0.428 [1]
T7	40 - 35	P4.5 x 0.237	5.01	5.01	39.8 K=1.00	3.1741	-65.88	118.09	0.558 [1]
T8	35 - 30	P4.5 x 0.237	5.01	5.01	39.8 K=1.00	3.1741	-66.09	118.09	0.560 [1]
T9	30 - 25	P4.5 x 0.237	5.01	5.01	39.8 K=1.00	3.1741	-83.47	118.09	0.707 [1]
T10	25 - 20	P5.5625 x 0.258	5.01	5.01	32.0 K=1.00	4.2995	-83.93	166.13	0.505 [1]
T11	20 - 0	P5.5625 x 0.258	20.05	10.03	64.1 K=1.00	4.2995	-79.87	135.05	0.591 [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 (K)	ϕP_n (K)	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	P1.5x.145	6.73	6.45	124.3 K=1.00	0.7995	-2.76	11.70	0.236 [1]
T2	75 - 70	P1.5x.145	6.73	6.45	124.3 K=1.00	0.7995	-5.71	11.70	0.488 [1]
T3	70 - 65	P1.5x.145	6.73	6.45	124.3 K=1.00	0.7995	-5.66	11.70	0.484 [1]
T4	65 - 60	P1.5x.145	6.73	6.45	124.3 K=1.00	0.7995	-6.01	11.70	0.514 [1]
T5	60 - 50	P2.5x.203	6.73	6.45	81.7 K=1.00	1.7040	-8.96	45.05	0.199 [1]
T6	50 - 40	P2.5x.203	6.73	6.45	81.7 K=1.00	1.7040	-9.87	45.05	0.219 [1]
T7	40 - 35	P2.5x.203	6.73	6.45	81.7 K=1.00	1.7040	-7.21	45.02	0.160 [1]
T8	35 - 30	P2.5x.203	7.08	6.81	86.3 K=1.00	1.7040	-7.63	42.77	0.179 [1]
T9	30 - 25	P2.5x.203	7.08	6.81	86.3 K=1.00	1.7040	-6.41	42.77	0.150 [1]
T10	25 - 20	P2.5x.203	7.44	7.12	90.2 K=1.00	1.7040	-7.58	40.80	0.186 [1]
T11	20 - 0	P3x.216	11.94	11.51	118.7 K=1.00	2.2285	-22.66	35.71	0.634 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	75 - 70	2L1 3/4x1 3/4x1/8	9.00	4.19	92.2 K=1.00	0.8438	-1.92	22.26	0.086 [1] ✔
T4	65 - 60	2L1 3/4x1 3/4x1/8	9.00	8.39	138.0 K=1.00	0.8438	-0.26	12.68	0.020 [1] ✔
T5	60 - 50	2L1 3/4x1 3/4x1/8	9.00	6.35	138.0 K=1.00	0.8438	-0.52	12.68	0.041 [1] ✔
T6	50 - 40	2L1 3/4x1 3/4x1/8	9.00	4.19	92.2 K=1.00	0.8438	-0.76	22.26	0.034 [1] ✔
T8	35 - 30	2L1 3/4x1 3/4x1/8	9.50	4.44	97.7 K=1.00	0.8438	-1.50	21.26	0.071 [1] ✔
T10	25 - 20	2L2x2x1/8	10.50	4.90	93.9 K=1.00	0.9600	-1.85	24.45	0.075 [1] ✔
T11	20 - 0	2L2x2x1/8	12.00	5.57	106.8 K=1.00	0.9600	-1.25	21.82	0.057 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	2L2x2x3/16x3/8	9.00	8.39	163.1 K=1.00	1.4300	-0.42	15.39	0.028 [1] ✔
T11	20 - 0	2L2x2x1/8x3/8 2L 'a' > 29.0126 in - 201	11.00	5.07	99.1 K=1.00	0.9600	-7.34	20.98	0.350 [1] ✔

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	75 - 70	L1 3/4x1 3/4x1/8	6.36	6.36	220.2 K=1.00	0.4219	-0.01	2.49	0.003 [1] ✔
T6	50 - 40	L1 3/4x1 3/4x1/8	6.36	6.36	220.2 K=1.00	0.4219	-0.03	2.49	0.011 [1] ✔
T8	35 - 30	L1 3/4x1 3/4x1/8	6.72	6.72	232.4 K=1.00	0.4219	-0.04	2.24	0.018 [1] ✔
T9	30 - 25	L1 3/4x1 3/4x1/8 KL/R > 250 (C) - 171	7.42	7.42	256.9 K=1.00	0.4219	-0.03	1.83	0.016 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T10	25 - 20	L1 3/4x1 3/4x1/8 KL/R > 250 (C) - 190	7.78	7.78	269.1 K=1.00	0.4219	-0.02	1.67	0.009 [1] ✔
T11	20 - 0	L1 3/4x1 3/4x1/8 KL/R > 250 (C) - 218	12.00	12.00	415.2 K=1.00	0.4219	-0.04	0.70	0.052 [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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	P4.5 x 0.237	5.00	5.00	39.7	3.1741	3.79	131.41	0.029 [1] ✔
T2	75 - 70	P4.5 x 0.237	5.00	5.00	39.7	3.1741	3.78	131.41	0.029 [1] ✔
T3	70 - 65	P4.5 x 0.237	5.00	5.00	39.7	3.1741	13.11	131.41	0.100 [1] ✔
T4	65 - 60	P4.5 x 0.237	5.00	5.00	39.7	3.1741	13.08	131.41	0.100 [1] ✔
T5	60 - 50	P4.5 x 0.237	10.00	5.00	39.7	3.1741	28.38	131.41	0.216 [1] ✔
T6	50 - 40	P4.5 x 0.237	10.00	5.00	39.7	3.1741	43.40	131.41	0.330 [1] ✔
T7	40 - 35	P4.5 x 0.237	5.01	5.01	39.8	3.1741	58.31	131.41	0.444 [1] ✔
T8	35 - 30	P4.5 x 0.237	5.01	5.01	39.8	3.1741	58.10	131.41	0.442 [1] ✔
T9	30 - 25	P4.5 x 0.237	5.01	5.01	39.8	3.1741	73.64	131.41	0.560 [1] ✔
T10	25 - 20	P5.5625 x 0.258	5.01	5.01	32.0	4.2995	73.47	178.00	0.413 [1] ✔
T11	20 - 0	P5.5625 x 0.258	20.05	10.03	64.1	4.2995	72.76	178.00	0.409 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	P1.5x.145	6.73	6.45	124.3	0.7995	2.85	33.10	0.086 [1] ✔
T2	75 - 70	P1.5x.145	6.73	6.45	124.3	0.7995	5.68	33.10	0.172 [1] ✔
T3	70 - 65	P1.5x.145	6.73	6.45	124.3	0.7995	5.54	33.10	0.167 [1] ✔
T4	65 - 60	P1.5x.145	6.73	6.45	124.3	0.7995	5.83	33.10	0.176 [1] ✔
T5	60 - 50	P2.5x.203	6.73	6.45	81.7	1.7040	8.86	70.55	0.126 [1] ✔
T6	50 - 40	P2.5x.203	6.73	6.45	81.7	1.7040	9.51	70.55	0.135 [1] ✔
T7	40 - 35	P2.5x.203	6.73	6.45	81.7	1.7040	6.56	70.55	0.093 [1] ✔
T8	35 - 30	P2.5x.203	7.08	6.81	86.3	1.7040	6.90	70.55	0.098 [1] ✔
T9	30 - 25	P2.5x.203	7.08	6.81	86.3	1.7040	6.82	70.55	0.097 [1] ✔
T10	25 - 20	P2.5x.203	7.44	7.12	90.2	1.7040	7.61	70.55	0.108 [1] ✔
T11	20 - 0	P3x.216	11.94	11.51	118.7	2.2285	19.92	92.26	0.216 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	75 - 70	2L1 3/4x1 3/4x1/8	9.00	4.19	94.8	0.4922	1.97	21.41	0.092 [1] ✔
T4	65 - 60	2L1 3/4x1 3/4x1/8	9.00	8.39	106.4	0.4922	0.27	21.41	0.013 [1] ✔
T5	60 - 50	2L1 3/4x1 3/4x1/8	9.00	6.35	106.4	0.4922	0.52	21.41	0.024 [1] ✔
T6	50 - 40	2L1 3/4x1 3/4x1/8	9.00	4.19	94.8	0.4922	0.76	21.41	0.035 [1] ✔
T8	35 - 30	2L1 3/4x1 3/4x1/8	9.50	4.44	100.3	0.4922	1.56	21.41	0.073 [1] ✔
T10	25 - 20	2L2x2x1/8	10.50	4.90	96.2	0.5794	1.95	25.20	0.078 [1] ✔
T11	20 - 0	2L2x2x1/8	12.00	5.57	110.6	0.5794	1.25	25.20	0.050 [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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	80 - 75	2L2x2x3/16x3/8	9.00	8.39	167.7	0.8616	0.33	37.48	0.009 [1]
T11	20 - 0	2L2x2x1/8x3/8	11.00	5.07	101.0	0.5794	8.30	25.20	0.330 [1]
		2L 'a' > 29.0126 in - 199							

[1] P_u / ϕP_n controls

Redundant Vertical 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 $\frac{P_u}{\phi P_n}$
T10	25 - 20	2L1 3/4x1 3/4x1/8x3/8	5.01	5.01	110.1	0.8438	0.11	27.34	0.004 [1]
		2L 'a' > 28.6358 in - 183							

[1] P_u / ϕP_n controls

Inner Bracing 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 $\frac{P_u}{\phi P_n}$
T2	75 - 70	L1 3/4x1 3/4x1/8	6.36	6.36	139.9	0.4219	0.01	13.67	0.000 [1]
T6	50 - 40	L1 3/4x1 3/4x1/8	6.36	6.36	139.9	0.4219	0.03	13.67	0.002 [1]
T8	35 - 30	L1 3/4x1 3/4x1/8	6.72	6.72	147.7	0.4219	0.02	13.67	0.002 [1]
T9	30 - 25	L1 3/4x1 3/4x1/8	7.42	7.42	163.3	0.4219	0.02	13.67	0.002 [1]
T10	25 - 20	L1 3/4x1 3/4x1/8	7.78	7.78	171.0	0.4219	0.01	13.67	0.001 [1]
T11	20 - 0	L1 3/4x1 3/4x1/8	12.00	12.00	263.9	0.4219	0.04	13.67	0.003 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
T1	80 - 75	Leg	P4.5 x 0.237	3	-7.65	118.16	6.5	Pass
T2	75 - 70	Leg	P4.5 x 0.237	23	-7.70	118.16	6.5	Pass
T3	70 - 65	Leg	P4.5 x 0.237	41	-16.91	118.16	14.3	Pass
T4	65 - 60	Leg	P4.5 x 0.237	57	-17.02	118.16	14.4	Pass
T5	60 - 50	Leg	P4.5 x 0.237	69	-34.40	118.16	29.1	Pass
T6	50 - 40	Leg	P4.5 x 0.237	93	-50.61	118.16	42.8	Pass
T7	40 - 35	Leg	P4.5 x 0.237	122	-65.88	118.09	55.8	Pass
T8	35 - 30	Leg	P4.5 x 0.237	138	-66.09	118.09	56.0	Pass
T9	30 - 25	Leg	P4.5 x 0.237	155	-83.47	118.09	70.7	Pass
T10	25 - 20	Leg	P5.5625 x 0.258	176	-83.93	166.13	50.5	Pass
T11	20 - 0	Leg	P5.5625 x 0.258	197	-79.87	135.05	59.1	Pass
T1	80 - 75	Diagonal	P1.5x.145	17	-2.76	11.70	23.6	Pass
T2	75 - 70	Diagonal	P1.5x.145	29	-5.71	11.70	48.8	Pass
T3	70 - 65	Diagonal	P1.5x.145	49	-5.66	11.70	48.4	Pass
T4	65 - 60	Diagonal	P1.5x.145	63	-6.01	11.70	51.4	Pass
T5	60 - 50	Diagonal	P2.5x.203	77	-8.96	45.05	19.9 64.9 (b)	Pass
T6	50 - 40	Diagonal	P2.5x.203	102	-9.87	45.05	21.9 71.5 (b)	Pass
T7	40 - 35	Diagonal	P2.5x.203	130	-7.21	45.02	16.0 52.2 (b)	Pass
T8	35 - 30	Diagonal	P2.5x.203	144	-7.63	42.77	17.9 55.3 (b)	Pass
T9	30 - 25	Diagonal	P2.5x.203	164	-6.41	42.77	15.0 49.4 (b)	Pass
T10	25 - 20	Diagonal	P2.5x.203	184	-7.58	40.80	18.6 55.1 (b)	Pass
T11	20 - 0	Diagonal	P3x.216	204	-22.66	35.71	63.4 82.1 (b)	Pass
T2	75 - 70	Horizontal	2L1 3/4x1 3/4x1/8	15	1.97	21.41	9.2 25.5 (b)	Pass
T4	65 - 60	Horizontal	2L1 3/4x1 3/4x1/8	48	-0.26	12.68	2.0 3.5 (b)	Pass
T5	60 - 50	Horizontal	2L1 3/4x1 3/4x1/8	76	-0.52	12.68	4.1 6.7 (b)	Pass
T6	50 - 40	Horizontal	2L1 3/4x1 3/4x1/8	100	0.76	21.41	3.5 9.8 (b)	Pass
T8	35 - 30	Horizontal	2L1 3/4x1 3/4x1/8	123	1.56	21.41	7.3 20.1 (b)	Pass
T10	25 - 20	Horizontal	2L2x2x1/8	156	1.95	25.20	7.8 21.5 (b)	Pass
T11	20 - 0	Horizontal	2L2x2x1/8	208	-1.25	21.82	5.7 7.6 (b)	Pass
T1	80 - 75	Top Girt	2L2x2x3/16x3/8	8	-0.42	15.39	2.8	Pass
T11	20 - 0	Top Girt	2L2x2x1/8x3/8	201	-7.34	20.98	35.0 50.5 (b)	Pass
T10	25 - 20	Redund Vert Bracing	2L1 3/4x1 3/4x1/8x3/8	183	0.11	27.34	0.4	Pass
T2	75 - 70	Inner Bracing	L1 3/4x1 3/4x1/8	37	-0.00	1.25	0.3	Pass
T6	50 - 40	Inner Bracing	L1 3/4x1 3/4x1/8	107	-0.03	2.49	1.1	Pass
T8	35 - 30	Inner Bracing	L1 3/4x1 3/4x1/8	148	-0.04	2.24	1.8	Pass
T9	30 - 25	Inner Bracing	L1 3/4x1 3/4x1/8	171	-0.03	1.83	1.6	Pass
T10	25 - 20	Inner Bracing	L1 3/4x1 3/4x1/8	190	-0.02	1.67	0.9	Pass
T11	20 - 0	Inner Bracing	L1 3/4x1 3/4x1/8	218	-0.04	0.70	5.2	Pass

Summary	ELC:	Phase 1 + Phase 2
Leg (T9)	70.7	Pass
Diagonal (T11)	82.1	Pass
Horizontal	25.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
						(T2)		
						Top Girt (T11)	50.5	Pass
						Redund Vert Bracing (T10)	0.4	Pass
						Inner Bracing (T11)	5.2	Pass
						Bolt Checks	82.1	Pass
						Rating =	82.1	Pass

APPENDIX D

Base Plate & Anchor Rod Calculations

Self Support Anchor Rod Capacity - Phase 1

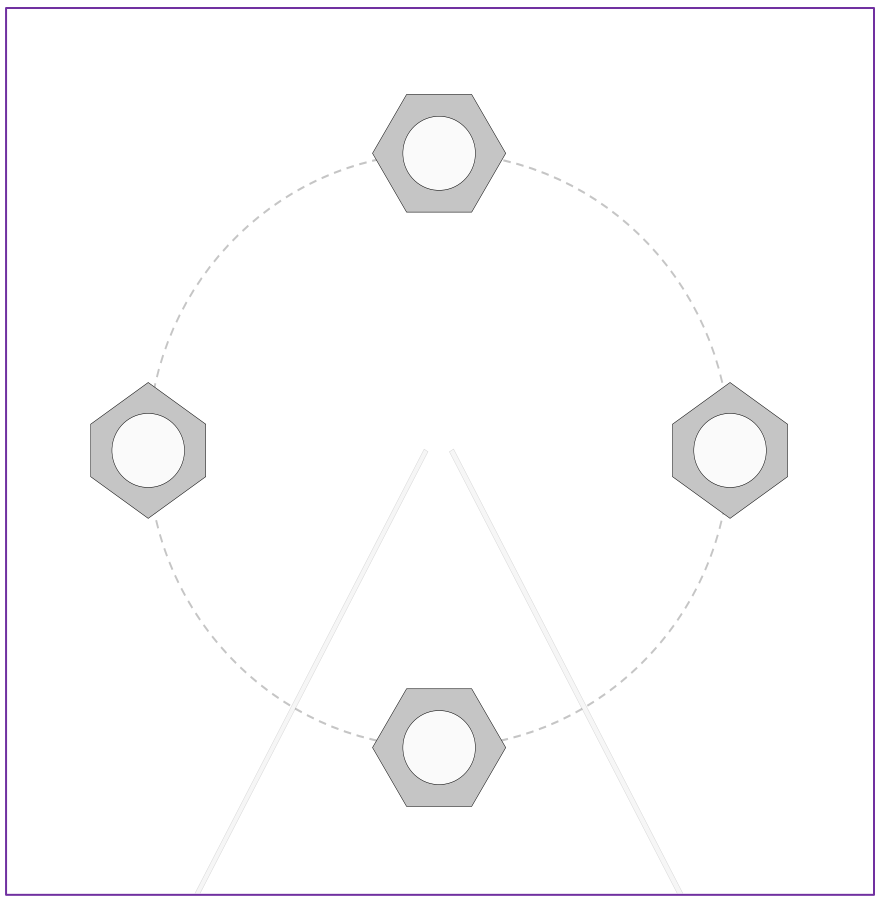
Site Info	
Client Project ID	PR-91471
Site Name	Oak Creek Coal
Order #	KHCLE-26656

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	0
I_{ar} (in)	0

Applied Loads		
	Comp.	Uplift
Axial Force (kips)	126.00	114.00
Shear Force (kips)	26.00	23.00

Considered Eccentricity	
Leg Mod Eccentricity (in)	0.000
Anchor Rod N.A Shift (in)	0.000
Total Eccentricity (in)	0.000

**Anchor Rod Eccentricity Applied*



Connection Properties

Anchor Rod Data

(4) 1-1/2" ø bolts (F1554-55 N; Fy=55 ksi, Fu=75 ksi)

I_{ar} (in): 0

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 31.5	#DIV/0!	**Stress Rating**
Vu = 6.5	ϕVn = 39.36	**38.7%**
Mu = n/a	ϕMn = n/a	Pass

Self Support Anchor Rod Capacity - Phase 2

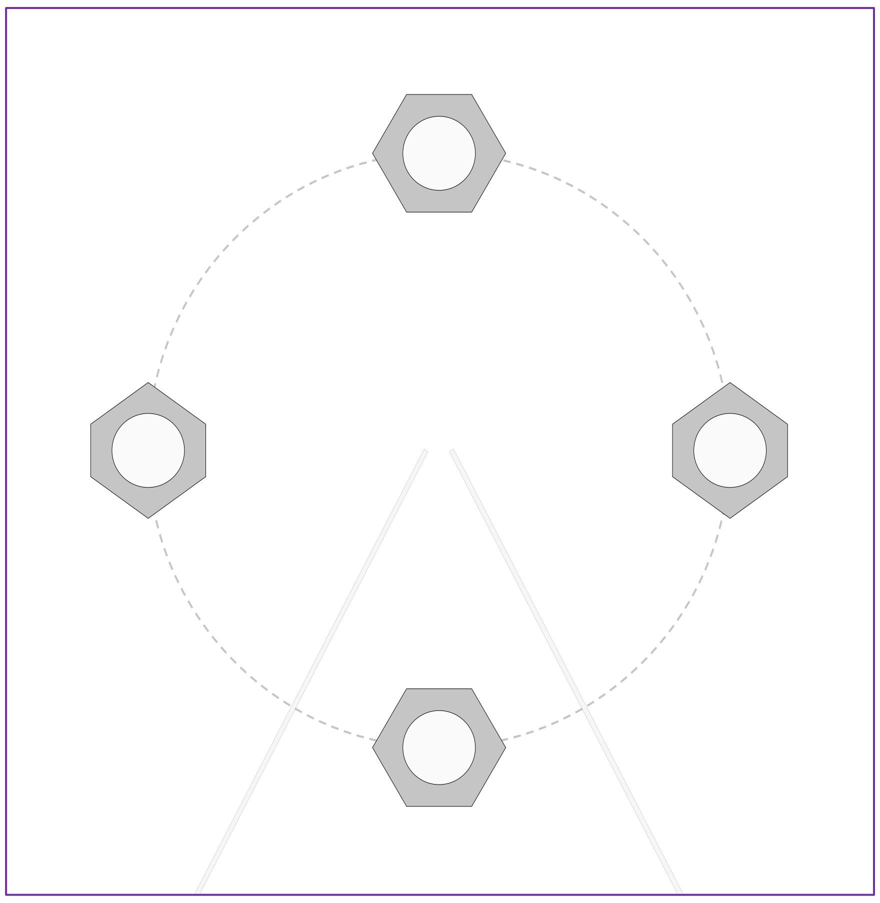
Site Info	
Client Project ID	PR-91471
Site Name	Oak Creek Coal
Order #	KHCLE-26656

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	0
I_{ar} (in)	0

Applied Loads		
	Comp.	Uplift
Axial Force (kips)	117.00	105.00
Shear Force (kips)	24.00	22.00

Considered Eccentricity	
Leg Mod Eccentricity (in)	0.000
Anchor Rod N.A Shift (in)	0.000
Total Eccentricity (in)	0.000

**Anchor Rod Eccentricity Applied*



Connection Properties

Anchor Rod Data

(4) 1-1/2" ø bolts (F1554-55 N; Fy=55 ksi, Fu=75 ksi)

I_{ar} (in): 0

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 29.25	#DIV/0!	**Stress Rating**
Vu = 6	ϕVn = 39.36	**35.8%**
Mu = n/a	ϕMn = n/a	**Pass**

APPENDIX E

Foundation Calculations

SST Unit Base Foundation - Phase 1

Client Project ID:	PR-91471
Site Name:	Oak Creek Coal
JIRA #:	KHCLE-26656
TIA-222 Revision:	H

Top & Bot. Pad Rein. Different?:	☑
Tower Centroid Offset?:	☐
Block Foundation?:	☑
Rectangular Pad?:	☐

Superstructure Analysis Reactions		
Global Moment, **M**:	2188	ft-kips
Global Axial, **P**:	28	kips
Global Shear, **V**:	40	kips
Leg Compression, $\mathbf{P_{comp}}$:	126	kips
Leg Comp. Shear, $\mathbf{V_{u\_comp}}$:	26	kips
Leg Uplift, $\mathbf{P_{uplift}}$:	114	kips
Leg Uplift. Shear, $\mathbf{V_{u\_uplift}}$:	23	kips
Tower Height, **H**:	80	ft
Base Face Width, **BW**:	13	ft
BP Dist. Above Fdn, $\mathbf{bp_{dist}}$:	3	in
Anchor Bolt Circle, **BC**:	12	in

Foundation Analysis Checks	Capacity	Demand	Rating	Check
Lateral (Sliding) (kips)	105.38	40.00	**38.0%**	**Pass**
Bearing Pressure (ksf)	3.29	1.33	**40.5%**	**Pass**
*Overturning (kip*ft)*	4139.80	2358.00	**57.0%**	**Pass**
*Pad Flexure (kip*ft)*	2236.48	688.51	**30.8%**	**Pass**
Pad Shear - 1-way (kips)	1124.67	95.12	**8.5%**	**Pass**
Pad Shear - Comp 2-way (ksi)	0.164	0.013	**7.9%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	1014.64	0.00	**0.0%**	**Pass**
Pad Shear - Tension 2-way (ksi)	0.164	0.012	**7.1%**	**Pass**
*Flexural 2-way (Tension) (kip*ft)*	1014.64	0.00	**0.0%**	**Pass**

Structural Rating:	**30.8%**
Soil Rating:	**57.0%**

Pad Properties		
Depth, **D**:	3.50	ft
Pad Width, $\mathbf{W_1}$:	26.00	ft
Pad Thickness, **T**:	4.00	ft
Pad Rebar Size (Top dir.2), $\mathbf{Sp_{top2}}$:	6	
Pad Rebar Quantity (Top dir. 2), $\mathbf{mp_{top2}}$:	21	
Pad Rebar Size (Bottom dir. 2), $\mathbf{Sp_2}$:	6	
Pad Rebar Quantity (Bottom dir. 2), $\mathbf{mp_2}$:	26	
Pad Clear Cover, $\mathbf{cc_{pad}}$:	3	in

Material Properties		
Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	3	ksi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	110	pcf
Ultimate Net Bearing, Qnet:	4.000	ksf
Cohesion, **Cu**:		ksf
Friction Angle, φ:	30	degrees
SPT Blow Count, $\mathbf{N_{blows}}$:	10	
Base Friction, μ:		
Neglected Depth, **N**:	4.0	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	N/A	ft

<-- Toggle between Gross and Net

Version 4.0.3

SST Unit Base Foundation - Phase 2

Client Project ID:	PR-91471
Site Name:	Oak Creek Coal
JIRA #:	KHCLE-26656
TIA-222 Revision:	H

Top & Bot. Pad Rein. Different?:	☑
Tower Centroid Offset?:	☐
Block Foundation?:	☑
Rectangular Pad?:	☐

Superstructure Analysis Reactions		
Global Moment, **M**:	2021	ft-kips
Global Axial, **P**:	28	kips
Global Shear, **V**:	38	kips
Leg Compression, $\mathbf{P_{comp}}$:	117	kips
Leg Comp. Shear, $\mathbf{V_{u\_comp}}$:	24	kips
Leg Uplift, $\mathbf{P_{uplift}}$:	105	kips
Leg Uplift. Shear, $\mathbf{V_{u\_uplift}}$:	22	kips
Tower Height, **H**:	80	ft
Base Face Width, **BW**:	13	ft
BP Dist. Above Fdn, $\mathbf{bp_{dist}}$:	3	in
Anchor Bolt Circle, **BC**:	12	in

Foundation Analysis Checks	Capacity	Demand	Rating	Check
Lateral (Sliding) (kips)	105.38	38.00	**36.1%**	**Pass**
Bearing Pressure (ksf)	3.29	1.29	**39.2%**	**Pass**
*Overturning (kip*ft)*	4139.80	2182.50	**52.7%**	**Pass**
*Pad Flexure (kip*ft)*	2236.48	624.39	**27.9%**	**Pass**
Pad Shear - 1-way (kips)	1124.67	86.17	**7.7%**	**Pass**
Pad Shear - Comp 2-way (ksi)	0.164	0.012	**7.3%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	1014.64	0.00	**0.0%**	**Pass**
Pad Shear - Tension 2-way (ksi)	0.164	0.011	**6.6%**	**Pass**
*Flexural 2-way (Tension) (kip*ft)*	1014.64	0.00	**0.0%**	**Pass**

Structural Rating:	**27.9%**
Soil Rating:	**52.7%**

Pad Properties		
Depth, **D**:	3.50	ft
Pad Width, $\mathbf{W_1}$:	26.00	ft
Pad Thickness, **T**:	4.00	ft
Pad Rebar Size (Top dir.2), $\mathbf{Sp_{top2}}$:	6	
Pad Rebar Quantity (Top dir. 2), $\mathbf{mp_{top2}}$:	21	
Pad Rebar Size (Bottom dir. 2), $\mathbf{Sp_2}$:	6	
Pad Rebar Quantity (Bottom dir. 2), $\mathbf{mp_2}$:	26	
Pad Clear Cover, $\mathbf{cc_{pad}}$:	3	in

Material Properties		
Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	3	ksi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties			
Total Soil Unit Weight, γ:	110	pcf	
Ultimate Net Bearing, Qnet:	4.000	ksf	<-- Toggle between Gross and Net
Cohesion, **Cu**:		ksf	
Friction Angle, φ:	30	degrees	
SPT Blow Count, $\mathbf{N_{blows}}$:	10		
Base Friction, μ:			
Neglected Depth, **N**:	4.0	ft	
Foundation Bearing on Rock?	No		
Groundwater Depth, **gw**:	N/A	ft	

Version 4.0.3

APPENDIX F

RFDS/Loading Sheet

Site Name	Oak Creek Coal	**Tower Type**	Self Supporting Lattice	**Review Date**	10/11/2021
County	Routt	**# Legs**	4	**Elevation**	7490
State	Colorado	**Tower Height**	80	**Latitude**	40°21'14.8"N
TIA 222 Version	Rev H	**Tower:**	108-M840-80	**Longitude**	107°4'21.3"W
Class	III	**Valmont S.O.:**	D-118598		
		Foundation:	Slab on Grade		

Loading:

Owner	Category	Height	Manufacturer	Model	Azimuth	Quantity	Location	Purpose
	Sector Frame	80	Sabre	12'-6" Quick Tee	40	1	Existing	NA
Union	Panel Antenna	80	Amphenol	CWX063X25M00	40	1	Existing	X Sector
Union	Panel Antenna	80	Amphenol	CWX063X25M00	40	1	Existing	A Sector
Union	Coax	0-80	Andrew	AVA7-50	NA	2	Existing	X Sector
Union	Sector Frame	80	Valmont	VFA12-HD 12' Frame	40	1	NEW	A Sector
Union	Panel Antenna	80	CellMax	12045x	40	2	NEW	A Sector
Union	Panel Antenna	80	CellMax	12045x	40	2	FUTURE	A Sector
Union	RRU	80	Nokia	Union RRUs: UMTS/LTE	40	3	NEW	A Sector
Union	RRU	80	Nokia	Union RRUs: UMTS/LTE	40	3	FUTURE	A Sector
Union	BOX	80	Raycap	RCKD6140PF48	40	2	NEW	A Sector
Union	FTTA	0-80	Rosenberger	7/8" Power/Fiber Cable	NA	2	NEW	A Sector
Union	FTTA	0-80	Rosenberger	1-5/8" Power/Fiber Cable	NA	2	NEW	A Sector
Union	Sector Frame	80	Sabre	12'-6" Quick Tee	135	1	Existing	NA
Union	Panel Antenna	80	Amphenol	CWX063X25M00	135	1	Existing	Y Sector
Union	Panel Antenna	80	Amphenol	CWX063X25M00	135	1	Existing	B Sector
Union	Coax	0-80	Andrew	AVA7-50	NA	2	Existing	Y Sector
Union	Sector Frame	80	Valmont	VFA12-HD 12' Frame	135	1	NEW	B Sector
Union	Panel Antenna	80	CellMax	12045x	135	2	NEW	B Sector
Union	Panel Antenna	80	CellMax	12045x	135	2	FUTURE	B Sector
Union	RRU	80	Nokia	Union RRUs: UMTS/LTE	135	3	NEW	B Sector
Union	RRU	80	Nokia	Union RRUs: UMTS/LTE	135	3	FUTURE	B Sector
Union	BOX	80	Raycap	RCKD6140PF48	135	2	NEW	B Sector
Union	FTTA	0-80	Rosenberger	7/8" Power/Fiber Cable	NA	2	NEW	B Sector
Union	FTTA	0-80	Rosenberger	1-5/8" Power/Fiber Cable	NA	2	NEW	B Sector
Union	Sector Frame	80	Sabre	12'-6" Quick Tee	300	1	Existing	NA
Union	Panel Antenna	80	Amphenol	CWX063X25M00	300	1	Existing	Z Sector
Union	Panel Antenna	80	Amphenol	CWX063X25M00	300	1	Existing	G Sector
Union	Coax	0-80	Andrew	AVA7-50	NA	2	Existing	Z Sector
Union	Sector Frame	80	Valmont	VFA12-HD 12' Frame	300	1	NEW	G Sector
Union	Panel Antenna	80	CellMax	12045x	300	2	NEW	G Sector
Union	Panel Antenna	80	CellMax	12045x	300	2	FUTURE	G Sector
Union	RRU	80	Nokia	Union RRUs: UMTS/LTE	300	3	NEW	G Sector
Union	RRU	80	Nokia	Union RRUs: UMTS/LTE	300	3	FUTURE	G Sector
Union	BOX	80	Raycap	RCKD6140PF48	300	2	NEW	G Sector
Union	FTTA	0-80	Rosenberger	7/8" Power/Fiber Cable	NA	2	NEW	G Sector
Union	FTTA	0-80	Rosenberger	1-5/8" Power/Fiber Cable	NA	2	NEW	G Sector
Union	MW Dish	25	Andrew	HPX8-65	314.7	1	Existing	Hayden
Union	Waveguide	0-25	Andrew	EW63	NA	2	Existing	Hayden
Union	MW Dish	35	Andrew	HPX8-65	314.7	1	FUTURE	Hayden
Union	MW Radio	35	Aviat	WTM4100	NA	2	FUTURE	Hayden
Union	Cabling	0-35	Various	7mm cables	NA	6	FUTURE	Hayden
Union	MW Dish	25	Andrew	USX6	13.492	1	Existing	North Clark
Union	MW Radio	25	Aviat	WTM4100	NA	2	Existing	North Clark
Union	Cabling	0-25	Various	7mm cables	NA	6	Existing	North Clark
Collo 1	Sector Frame	60	Valmont	VFA10-HD FRAMES	40	1	Existing	NA
Collo 1	Panel Antenna	60	CommScope	NNH4-65C-R6-V3	40	1	Existing	A Sector
Collo 1	Panel Antenna	60	CommScope	NNH4-65C-R6-V3	40	1	FUTURE	A Sector
Collo 1	DUAL CLAMP MOUNT	60	Rosenberger	D218RRUDSM	40	1	Existing	A Sector
Collo 1	RRH	60	Nokia	3JR80236AAAA	40	1	Existing	A Sector

Collo 1	RRH	60	Nokia	3JR80235AAAA	40	1	Existing	A Sector
Collo 1	Sector Frame	60	Valmont	VFA10-HD FRAMES	135	1	Existing	NA
Collo 1	Panel Antenna	60	CommScope	NNH4-65C-R6-V3	135	1	Existing	B Sector
Collo 1	Panel Antenna	60	CommScope	NNH4-65C-R6-V3	135	1	FUTURE	B Sector
Collo 1	DUAL CLAMP MOUNT	60	Rosenberger	D218RRUDSM	135	1	Existing	B Sector
Collo 1	RRH	60	Nokia	3JR80236AAAA	135	1	Existing	B Sector
Collo 1	RRH	60	Nokia	3JR80235AAAA	135	1	Existing	B Sector
Collo 1	Sector Frame	60	Valmont	VFA10-HD FRAMES	300	1	Existing	NA
Collo 1	Panel Antenna	60	CommScope	NNH4-65C-R6-V3	300	1	Existing	G Sector
Collo 1	Panel Antenna	60	CommScope	NNH4-65C-R6-V3	300	1	FUTURE	G Sector
Collo 1	DUAL CLAMP MOUNT	60	Rosenberger	D218RRUDSM	300	1	Existing	G Sector
Collo 1	RRH	60	Nokia	3JR80236AAAA	300	1	Existing	G Sector
Collo 1	RRH	60	Nokia	3JR80235AAAA	300	1	Existing	G Sector
Collo 1	Power Trunk	0-60	Rosenberger	WR-VG86ST-BRD	NA	3	Existing	All Sectors
Collo 1	Fiber Feed	0-60	Rosenberger	FB-L98B-235-75000	NA	1	Existing	All Sectors
Collo 1	Dist. Box	60	Raycap	DC9-48-60-24-8C-EV	NA	1	Existing	All Sectors
Collo 2	Dish	20	Mimosa	B5 - 18" Diameter	74	1	LEASED	Colocator
Collo 2	Waveguide	0-20	Unknown	CAT5 - .25" Diameter	NA	2	LEASED	Colocator
Collo 2	Dish	20	Mimosa	B5 - 18" Diameter	102	1	LEASED	Colocator
Collo 2	Waveguide	0-20	Unknown	CAT5 - .25" Diameter	NA	2	LEASED	Colocator

RF DESIGN AND ENGINEERING SHEET - FUTURE / TARGETED - NEW TOWER

SITE INFORMATION			
Market / Call Sign	US-Union		
FCC #/Site Identifier	315		
Engineer	Karthik Kumar		
Date (mm/dd/yy)	12/28/2021		
Candidate Sheet Information		Revision #	Rev 0
Modified By		Customer reviewer	John Chizmar

SITE NAME	Oak Creek Coal	STATE	CO	COUNTY	Routt		
LOCATION INFORMATION							
Latitude Deg	40	Lat Min	21	Lat Sec	14.79	Lat Decimal	40.354108
Longitude Deg	107	Long Min	4	Long Sec	21.29	Long Decimal	-107.072581
Ground Elev (ft)	7498	Structure Type	Self-Supporting Lattice			Structure Ht (ft)	80

SYSTEM INFORMATION								
Antenna Position	EA1,EA4,EB1,EB4,EG1,EG4							
Technology	UMTS							
BTS Vendor	Huawei							
BTS Model / RRU model	RRU3908V2							
Radios on Tower or at Base	Base							
Feeder Type	Coax							
Feeder length (ft)	100							
Frequency Band	CLR							
Channel/Carrier Totals Per Sector	1 Carrier							
Carrier Bandwidth (LTE)	1x 5MHz							
MIMO	n/a							
Equipment Site Totals	Base Cabinets	RRU's or RRH's	Antennas	Coax Lines/Jumpers	Power Lines (8,6,4,)	Fiber Lines	TMAs	Squids/OVPs
	1	3	6					

Site Address

29920 County Road 27, Hayden, Routt, CO, 81639

Site Notes / Project Description

Change History

Rev 0: First version of file.

Sector Information

Note that all port-specific and cabling information will be on next tab in Plumbing Diagram

Sector 1 - Color Code Orange

Antenna Number	Antenna 1	Antenna 2
Antenna Model	CWX063X25M00	CWX063X25M00
Antenna Position	EA4	EA1
Antenna Manufacturer	Amphenol	Amphenol
Antenna Type (panel,omni)	Panel	Panel
RET capable	0-10	0-10
Antenna Center Line (ft)	80	80
Antenna Azimuth	40	40
RRU / RRH Mounting Height (ft)	0	0

Sector 2 - Color Code Blue

Antenna Number	Antenna 1	Antenna 2
Antenna Model	CWX063X25M00	CWX063X25M00
Antenna Position	EB4	EB1
Antenna Manufacturer	Amphenol	Amphenol
Antenna Type (panel,omni)	Panel	Panel
RET capable	0-10	0-10
Antenna Center Line (ft)	80	80
Antenna Azimuth	135	135
RRU / RRH Mounting Height (ft)	0	0

Sector 3 - Color Code Green

Antenna Number	Antenna 1	Antenna 2
Antenna Model	CWX063X25M00	CWX063X25M00
Antenna Position	EG4	EG1
Antenna Manufacturer	Amphenol	Amphenol
Antenna Type (panel,omni)	Panel	Panel
RET capable	0-10	0-10
Antenna Center Line (ft)	80	80
Antenna Azimuth	300	300
RRU / RRH Mounting Height (ft)	0	0

Site Information Existing Tower

RF DESIGN AND ENGINEERING SHEET - FUTURE / TARGETED - NEW TOWER

SITE INFORMATION			
Market / Call Sign	US-Union		
FCC #/Site Identifier	315		
Engineer	Karthik Kumar		
Date (mm/dd/yy)	12/28/2021		
Candidate Sheet Information		Revision #	Rev 0
Modified By		Customer reviewer	John Chizmar

SITE NAME	Oak Creek Coal	STATE	CO	COUNTY	Routt

LOCATION INFORMATION							
Latitude Deg	40	Lat Min	21	Lat Sec	14.79	Lat Decimal	40.354108
Longitude Deg	107	Long Min	4	Long Sec	21.29	Long Decimal	-107.072581
Ground Elev (ft)	7498	Structure Type	Self-Supporting Lattice			Structure Ht (ft)	80

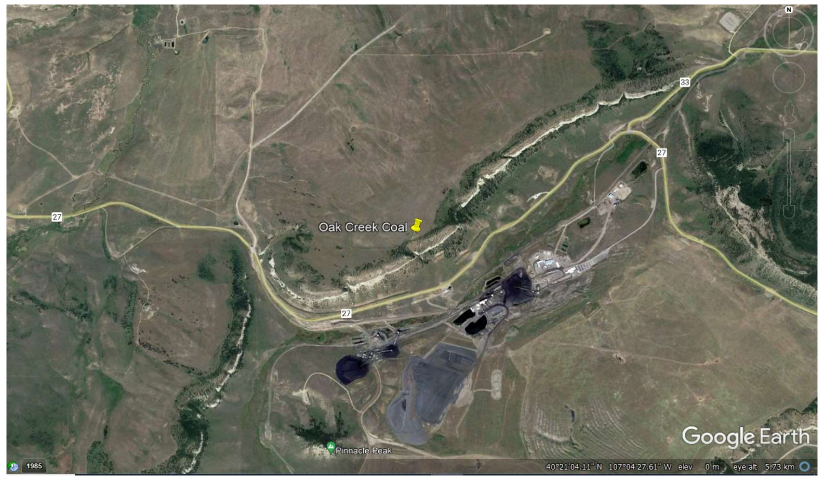
SYSTEM INFORMATION

Antenna Position	EA1,EA4,EB1,EB4,EG1,EG4	A3,B3,G3	A3,B3,G3	A2,B2,G2
Technology	UMTS	LTE-FDD	LTE-FDD	LTE-FDD
BTS Vendor	Huawei	Nokia	Nokia	Nokia
BTS Model / RRU model	RRU3908V2	AirScale / AHFIG	AirScale / AHLOA	AirScale / AHCA
Radios on Tower or at Base	Base	Tower	Tower	Tower
Feeder Type	Coax	Fiber	Fiber	Fiber
Feeder length (ft)	100	120	120	120
Frequency Band	CLR	PCS-D / AWS-A	700-C	CLR
Channel/Carrier Totals Per Sector	1 Carrier	2 Carriers	1 Carrier	2 Carriers
Carrier Bandwidth (LTE)	1x 5MHz	1x 5MHz / 1x 10MHz	1x 5MHz	1x 10MHz + CAT-M
EARFCN	1062	775 / 2000	5150	2560 / 2640
MIMO	n/a	4x4	4x4	4x4

Equipment Site Totals	Base Cabinets	RRU's or RRH's	Antennas	Coax Lines/Jumpers	Power Lines (8,6,4,)	Fiber Lines	TMAs	Squids/OVPs
	2	12	12	6	(3) #6 AWG Power Trunks	(3) 10mm Fiber Trunks	0	(3) OVPs (Rosenberger-(PR-UWPT612) (3) OVPs (Rosenberger FB

Site Address

29920 County Road 27, Hayden, Routt, CO, 81639



Site Notes / Project Description

Tower Scope Phase (1):
Add (3) CellMax CMA-UBTULBULBHH antennas to P2. Add (3) AHCA Radios.
Add (3) CellMax CMA-UBTULBULBHH antennas to P3. Add (3) AHFIG Radios to P3. Add (3) AHLOA Radios to P3.
Add (3) #6 AWG Power Trunks with (3) OVPs (Rosenberger-(PR-UWPT612)
Add (3) Fiber Trunks with (3) OVPs (Rosenberger FB-L98B-A1041)

Ground Scope Phase (1):
Add (1) Rosenberger SLODF049-036 36 Port Fiber Patch Panel LC 1U Rack Mount Single mode
Add (1) AMIA with (1) ASIB and (2) ABIO
Add (1) New Rack
Add (1) ABB CC109145463 Micro-BDCBB DC Battery Distribution Circuit Breaker Bay (23" unit)
Add (1) Rosenberger SLPDU025-18-503210 Indoor 19" mount OVP with 2 x 50A, 3 x 32A, 1 x 10A Breakers
Add Batteries

Change History

Rev 0: First version of file.

Sector Information

Note that all port-specific and cabling information will be on next tab in Plumbing Diagram

Sector 1 - Color Code Orange

Antenna Number	Antenna 1	Antenna 2	Antenna 3	Antenna 4
Antenna Model	CWX063X25M00	CMA-UBTULBULBHH	CMA-UBTULBULBHH	CWX063X25M00
Antenna Position	EA4	A3	A2	EA1
Antenna Manufacturer	Amphenol	Cellmax	Cellmax	Amphenol
Antenna Type (panel,omni)	Panel	Panel	Panel	Panel
RET capable	0-10	2-12	2-12	0-10
Antenna Center Line (ft)	80	80	80	80
Antenna Azimuth	40	40	40	40
RRU / RRH Mounting Height (ft)	0	80	80	0

Sector 2 - Color Code Blue

Antenna Number	Antenna 1	Antenna 2	Antenna 3	Antenna 4
Antenna Model	CWX063X25M00	CMA-UBTULBULBHH	CMA-UBTULBULBHH	CWX063X25M00
Antenna Position	EB4	B3	B2	EB1
Antenna Manufacturer	Amphenol	Cellmax	Cellmax	Amphenol
Antenna Type (panel,omni)	Panel	Panel	Panel	Panel
RET capable	0-10	2-12	2-12	0-10
Antenna Center Line (ft)	80	80	80	80
Antenna Azimuth	135	135	135	135
RRU / RRH Mounting Height (ft)	0	80	80	0

Sector 3 - Color Code Green

Antenna Number	Antenna 1	Antenna 2	Antenna 3	Antenna 4
Antenna Model	CWX063X25M00	CMA-UBTULBULBHH	CMA-UBTULBULBHH	CWX063X25M00
Antenna Position	EG4	G3	G2	EG1
Antenna Manufacturer	Amphenol	Cellmax	Cellmax	Amphenol
Antenna Type (panel,omni)	Panel	Panel	Panel	Panel
RET capable	0-10	2-12	2-12	0-10
Antenna Center Line (ft)	80	80	80	80
Antenna Azimuth	300	300	300	300
RRU / RRH Mounting Height (ft)	0	80	80	0

Site Information Future Tower

RF DESIGN AND ENGINEERING SHEET - FUTURE / TARGETED - NEW TOWER

SITE INFORMATION			
Market / Call Sign	US-Union		
FCC #/Site Identifier	315		
Engineer	Karthik Kumar		
Date (mm/dd/yy)	12/28/2021		
Candidate Sheet Information		Revision #	Rev 0
Modified By		Customer reviewer	John Chizmar

SITE NAME	Oak Creek Coal	STATE	CO	COUNTY	Routt

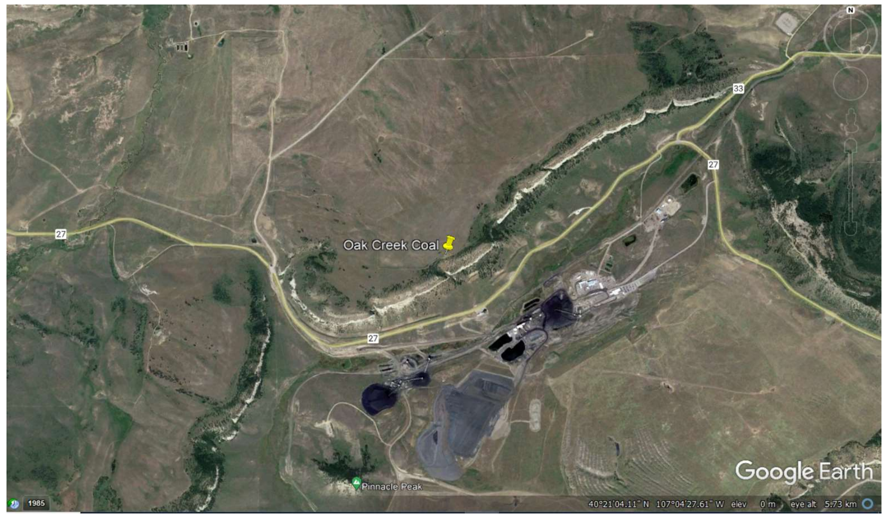
LOCATION INFORMATION							
Latitude Deg	40	Lat Min	21	Lat Sec	14.79	Lat Decimal	40.354108
Longitude Deg	107	Long Min	4	Long Sec	21.29	Long Decimal	-107.072581
Ground Elev (ft)	7498	Structure Type	Self-Supporting Lattice			Structure Ht (ft)	80

SYSTEM INFORMATION

Antenna Position	A3,B3,G3	A3,B3,G3	A2,B2,G2	A1,B1,G1				
Technology	LTE-FDD	LTE-FDD	LTE-FDD	LTE-TDD				
BTS Vendor	Nokia	Nokia	Nokia	Nokia				
BTS Model / RRU model	AirScale / AHFIG	AirScale / AHLOA	AirScale / AHCA	AirScale/AZQC				
Radios on Tower or at Base	Tower	Tower	Tower	Tower				
Feeder Type	Fiber	Fiber	Fiber	Fiber				
Feeder length (ft)	120	120	120	120				
Frequency Band	PCS-D / AWS-A	700-C	CLR	CBRS (3.5)				
Channel/Carrier Totals Per Sector	2 Carriers	1 Carrier	2 Carriers	3 Carriers				
Carrier Bandwidth (LTE)	1x 5MHz / 1x 10MHz	1x 5MHz	1x 10MHz + CAT-M	3x 20MHz				
EARFCN	775 / 2000	5150	2560 / 2640	TBD				
MIMO	4x4	4x4	4x4	4x4				
Equipment Site Totals	Base Cabinets	RRU's or RRH's	Antennas	Coax Lines/Jumpers	Power Lines (8,6,4,)	Fiber Lines	TMAs	Squids/OVPs
	2	12	9	0	3) #6 AWG Power Trunk	) 10mm Fiber Trun	0	(Rosenberger-(PR-UWPT612)

Site Address

29920 County Road 27, Hayden, Routt, CO, 81639



Site Notes / Project Description

Tower Scope Phase (2)
Remove (3) existing P4 Antennas
Replace (3) existing P1 antennas with (3) Commscope SS-65M-M antennas. Add (3) AZQC Radios

Ground Scope Phase (2): TBD
Remove existing radios - ground

Change History

Rev 0: First version of file.

Sector Information

Note that all port-specific and cabling information will be on next tab in Plumbing Diagram

Sector 1 - Color Code Orange			
Antenna Number	Antenna 1	Antenna 2	Antenna 3
Antenna Model	CMA-UBTULBULBHH	CMA-UBTULBULBHH	SS-65M-M
Antenna Position	A3	A2	A1
Antenna Manufacturer	Cellmax	Cellmax	CommScope
Antenna Type (panel,omni)	Panel	Panel	Panel
RET capable	2-12	2-12	0-10
Antenna Center Line (ft)	80	80	80
Antenna Azimuth	40	40	40
RRU / RRH Mounting Height (ft)	80	80	80

Sector 2 - Color Code Blue			
Antenna Number	Antenna 1	Antenna 2	Antenna 3
Antenna Model	CMA-UBTULBULBHH	CMA-UBTULBULBHH	SS-65M-M
Antenna Position	B3	B2	B1
Antenna Manufacturer	Cellmax	Cellmax	CommScope
Antenna Type (panel,omni)	Panel	Panel	Panel
RET capable	2-12	2-12	0-10
Antenna Center Line (ft)	80	80	80
Antenna Azimuth	135	135	135
RRU / RRH Mounting Height (ft)	80	80	80

Sector 3 - Color Code Green			
Antenna Number	Antenna 1	Antenna 2	Antenna 3
Antenna Model	CMA-UBTULBULBHH	CMA-UBTULBULBHH	SS-65M-M
Antenna Position	G3	G2	G1
Antenna Manufacturer	Cellmax	Cellmax	CommScope
Antenna Type (panel,omni)	Panel	Panel	Panel
RET capable	2-12	2-12	0-10
Antenna Center Line (ft)	80	80	80
Antenna Azimuth	300	300	300
RRU / RRH Mounting Height (ft)	80	80	80

Site Information Future Tower

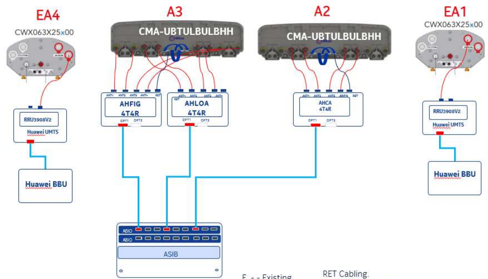
Site Name	Oak Creek Coal
State	CO
County	Routt
Date	12/28/2021
Revision	Rev 0

Union NOKIA

Port Specific Information - Sector 1

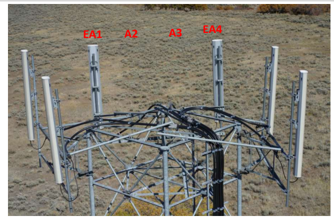
	Antenna 3								Antenna 2							
Antenna Model	CMA-UBTULBULBHH								CMA-UBTULBULBHH							
Antenna Port Number/Designation	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Frequency Band (MHz)	700/700	700/700	700/700	700/700	PCS/AWS	PCS/AWS	PCS/AWS	PCS/AWS	CLR	CLR	CLR	CLR	n/a	n/a	n/a	n/a
Antenna Beamwidth	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
Antenna Gain (dBi)	17	17	17	17	21	21	21	21	17	17	17	17	21	21	21	21
Electrical Tilt (degrees)	2	2	2	2	2	2	2	2	2	2	2	2	n/a	n/a	n/a	n/a
Mechanical Tilt (degrees)	0	0	0	0	0	0	0	0	0	0	0	0	n/a	n/a	n/a	n/a
Number of TRX/Carriers	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0
Technology	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	n/a	n/a	n/a	n/a
RRU Port Designation	ANT1	ANT2	ANT3	ANT4	ANT5	ANT6	ANT7	ANT8	ANT1	ANT2	ANT3	ANT4	n/a	n/a	n/a	n/a
Transmit Power / radio (Watts)	30.0	30.0	30.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	n/a	n/a	n/a	n/a
Transmit Power / radio (dBm)	44.8	44.8	44.8	44.8	46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0	n/a	n/a	n/a	n/a
EIRP (Watts)	1349.0	1349.0	1349.0	1349.0	4466.8	4466.8	4466.8	4466.8	1778.3	1778.3	1778.3	1778.3	n/a	n/a	n/a	n/a
EIRP (dBm)	61.3	61.3	61.3	61.3	66.5	66.5	66.5	66.5	62.5	62.5	62.5	62.5	n/a	n/a	n/a	n/a
MIMO	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	n/a	n/a	n/a	n/a
Capped Ports													Capped	Capped	Capped	Capped

Sector 1 Plumbing Diagram



E - - Existing
A -- Alpha

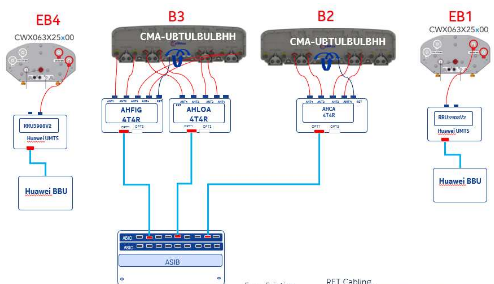
RET Cabling.
24x RET cables at the site, 8x per sector: 2x RETs cables from RF Module to Antennas and 6x RETs cable doing daisy chain



Port Specific Information - Sector 2

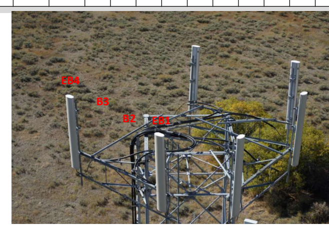
	Antenna 3								Antenna 2							
Antenna Model	CMA-UBTULBULBHH								CMA-UBTULBULBHH							
Antenna Port Number/Designation	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Frequency Band (MHz)	700/700	700/700	700/700	700/700	PCS/AWS	PCS/AWS	PCS/AWS	PCS/AWS	CLR	CLR	CLR	CLR	n/a	n/a	n/a	n/a
Antenna Beamwidth	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
Antenna Gain (dBi)	17	17	17	17	21	21	21	21	17	17	17	17	21	21	21	21
Electrical Tilt (degrees)	7	7	7	7	7	7	7	7	7	7	7	7	n/a	n/a	n/a	n/a
Mechanical Tilt (degrees)	0	0	0	0	0	0	0	0	0	0	0	0	n/a	n/a	n/a	n/a
Number of TRX/Carriers	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0
Technology	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	n/a	n/a	n/a	n/a
RRU Port Designation	ANT1	ANT2	ANT3	ANT4	ANT5	ANT6	ANT7	ANT8	ANT1	ANT2	ANT3	ANT4	n/a	n/a	n/a	n/a
Transmit Power / radio (Watts)	30.0	30.0	30.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	n/a	n/a	n/a	n/a
Transmit Power / radio (dBm)	44.8	44.8	44.8	44.8	46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0	n/a	n/a	n/a	n/a
EIRP (Watts)	1349.0	1349.0	1349.0	1349.0	4466.8	4466.8	4466.8	4466.8	1778.3	1778.3	1778.3	1778.3	n/a	n/a	n/a	n/a
EIRP (dBm)	61.3	61.3	61.3	61.3	66.5	66.5	66.5	66.5	62.5	62.5	62.5	62.5	n/a	n/a	n/a	n/a
MIMO	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	n/a	n/a	n/a	n/a
Capped Ports													Capped	Capped	Capped	Capped

Sector 2 Plumbing Diagram



E - - Existing
B -- Beta

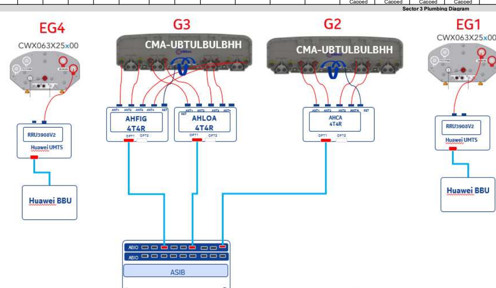
RET Cabling.
24x RET cables at the site, 8x per sector: 2x RETs cables from RF Module to Antennas and 6x RETs cable doing daisy chain



Port Specific Information - Sector 3

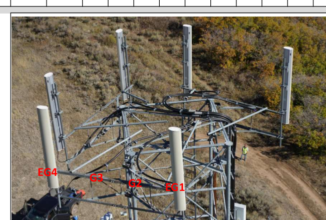
	Antenna 3								Antenna 2							
Antenna Model	CMA-UBTULBULBHH								CMA-UBTULBULBHH							
Antenna Port Number/Designation	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Frequency Band (MHz)	700/700	700/700	700/700	700/700	PCS/AWS	PCS/AWS	PCS/AWS	PCS/AWS	CLR	CLR	CLR	CLR	n/a	n/a	n/a	n/a
Antenna Beamwidth	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
Antenna Gain (dBi)	17	17	17	17	21	21	21	21	17	17	17	17	21	21	21	21
Electrical Tilt (degrees)	3	3	3	3	3	3	3	3	3	3	3	3	n/a	n/a	n/a	n/a
Mechanical Tilt (degrees)	0	0	0	0	0	0	0	0	0	0	0	0	n/a	n/a	n/a	n/a
Number of TRX/Carriers	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0
Technology	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	n/a	n/a	n/a	n/a
RRU Port Designation	ANT1	ANT2	ANT3	ANT4	ANT5	ANT6	ANT7	ANT8	ANT1	ANT2	ANT3	ANT4	n/a	n/a	n/a	n/a
Transmit Power / radio (Watts)	30.0	30.0	30.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	n/a	n/a	n/a	n/a
Transmit Power / radio (dBm)	44.8	44.8	44.8	44.8	46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0	n/a	n/a	n/a	n/a
EIRP (Watts)	1349.0	1349.0	1349.0	1349.0	4466.8	4466.8	4466.8	4466.8	1778.3	1778.3	1778.3	1778.3	n/a	n/a	n/a	n/a
EIRP (dBm)	61.3	61.3	61.3	61.3	66.5	66.5	66.5	66.5	62.5	62.5	62.5	62.5	n/a	n/a	n/a	n/a
MIMO	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	n/a	n/a	n/a	n/a
Capped Ports													Capped	Capped	Capped	Capped

Sector 3 Plumbing Diagram



E - - Existing
G -- Gamma

RET Cabling.
24x RET cables at the site, 8x per sector: 2x RETs cables from RF Module to Antennas and 6x RETs cable doing daisy chain



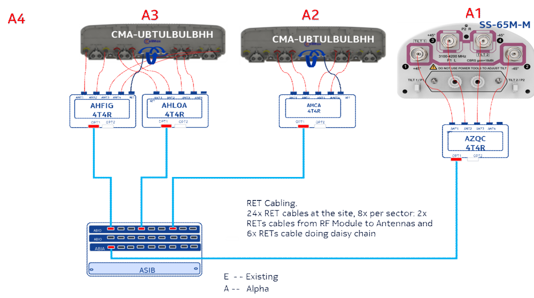
Plumbing Diagram

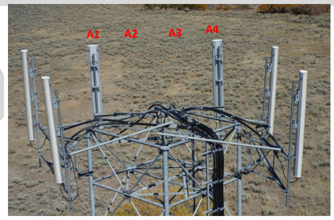
Site Name	Oak Creek Coal
State	CO
County	Routt
Date	12/28/2021
Revision	Rev 0

Port Specific Information - Sector 1

Antenna Model	Antenna 3 CMA-UBTULBULBHH								Antenna 2 CMA-UBTULBULBHH								Antenna 1 SS-65M-M			
Antenna Port Number/Designation	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4
Frequency Band (MHz)	700/700	700/700	700/700	700/700	PCS/AWS	PCS/AWS	PCS/AWS	PCS/AWS	CLR	CLR	CLR	CLR	n/a	n/a	n/a	n/a	CBRS	CBRS	CBRS	CBRS
Antenna Beamwidth	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	67	67	67	67
Antenna Gain (dBi)	17	17	17	17	21	21	21	21	17	17	17	17	21	21	21	21	18.3	18.3	18.3	18.3
Electrical Tilt (degrees)	2	2	2	2	2	2	2	2	2	2	2	2	n/a	n/a	n/a	n/a	TBD	TBD	TBD	TBD
Mechanical Tilt (degrees)	0	0	0	0	0	0	0	0	0	0	0	0	n/a	n/a	n/a	n/a	0	0	0	0
Number of TRX/Carriers	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	3	3	3	3
Technology	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	n/a	n/a	n/a	n/a	LTE	LTE	LTE	LTE
RRU Port Designation	ANT1	ANT2	ANT3	ANT4	ANT5	ANT6	ANT7	ANT8	ANT1	ANT2	ANT3	ANT4	n/a	n/a	n/a	n/a	ANT1	ANT2	ANT3	ANT4
Transmit Power / radio (Watts)	30.0	30.0	30.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	n/a	n/a	n/a	n/a	1.0	1.0	1.0	1.0
Transmit Power / radio (dBm)	44.8	44.8	44.8	44.8	46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0	n/a	n/a	n/a	n/a	30.0	30.0	30.0	30.0
EIRP (Watts)	1349.0	1349.0	1349.0	1349.0	4466.8	4466.8	4466.8	4466.8	1778.3	1778.3	1778.3	1778.3	n/a	n/a	n/a	n/a	60.3	60.3	60.3	60.3
EIRP (dBm)	61.3	61.3	61.3	61.3	66.5	66.5	66.5	66.5	62.5	62.5	62.5	62.5	n/a	n/a	n/a	n/a	47.8	47.8	47.8	47.8
MIMO	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	n/a	n/a	n/a	n/a	4x4	4x4	4x4	4x4
Capped Ports													Capped	Capped	Capped	Capped				

Sector 1 Plumbing Diagram

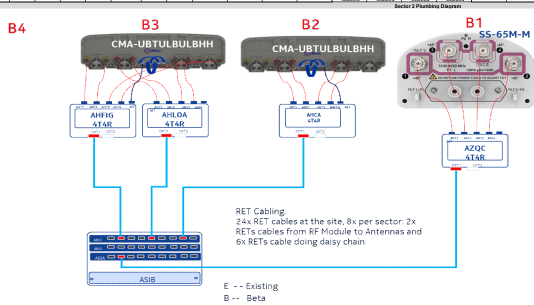


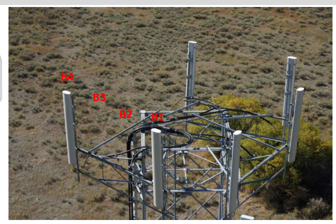


Port Specific Information - Sector 2

Antenna Model	Antenna 3 CMA-UBTULBULBHH								Antenna 2 CMA-UBTULBULBHH								Antenna 1 SS-65M-M			
Antenna Port Number/Designation	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4
Frequency Band (MHz)	700/700	700/700	700/700	700/700	PCS/AWS	PCS/AWS	PCS/AWS	PCS/AWS	CLR	CLR	CLR	CLR	n/a	n/a	n/a	n/a	CBRS	CBRS	CBRS	CBRS
Antenna Beamwidth	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	67	67	67	67
Antenna Gain (dBi)	17	17	17	17	21	21	21	21	17	17	17	17	21	21	21	21	18.3	18.3	18.3	18.3
Electrical Tilt (degrees)	7	7	7	7	7	7	7	7	7	7	7	7	n/a	n/a	n/a	n/a	TBD	TBD	TBD	TBD
Mechanical Tilt (degrees)	0	0	0	0	0	0	0	0	0	0	0	0	n/a	n/a	n/a	n/a	0	0	0	0
Number of TRX/Carriers	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	3	3	3	3
Technology	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	n/a	n/a	n/a	n/a	LTE	LTE	LTE	LTE
RRU Port Designation	ANT1	ANT2	ANT3	ANT4	ANT5	ANT6	ANT7	ANT8	ANT1	ANT2	ANT3	ANT4	n/a	n/a	n/a	n/a	ANT1	ANT2	ANT3	ANT4
Transmit Power / radio (Watts)	30.0	30.0	30.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	n/a	n/a	n/a	n/a	1.0	1.0	1.0	1.0
Transmit Power / radio (dBm)	44.8	44.8	44.8	44.8	46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0	n/a	n/a	n/a	n/a	30.0	30.0	30.0	30.0
EIRP (Watts)	1349.0	1349.0	1349.0	1349.0	4466.8	4466.8	4466.8	4466.8	1778.3	1778.3	1778.3	1778.3	n/a	n/a	n/a	n/a	60.3	60.3	60.3	60.3
EIRP (dBm)	61.3	61.3	61.3	61.3	66.5	66.5	66.5	66.5	62.5	62.5	62.5	62.5	n/a	n/a	n/a	n/a	47.8	47.8	47.8	47.8
MIMO	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	n/a	n/a	n/a	n/a	4x4	4x4	4x4	4x4
Capped Ports													Capped	Capped	Capped	Capped				

Sector 2 Plumbing Diagram

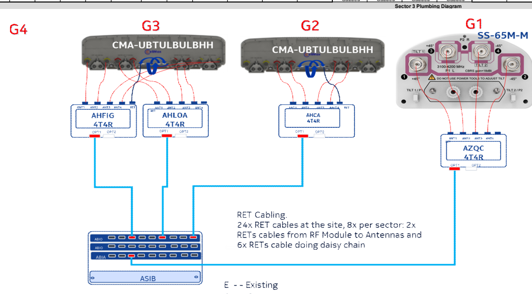


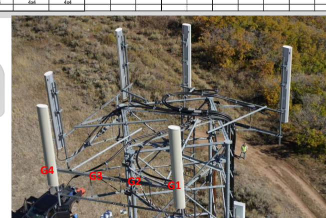


Port Specific Information - Sector 3

Antenna Model	Antenna 3 CMA-UBTULBULBHH								Antenna 2 CMA-UBTULBULBHH								Antenna 1 SS-65M-M			
Antenna Port Number/Designation	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4
Frequency Band (MHz)	700/700	700/700	700/700	700/700	PCS/AWS	PCS/AWS	PCS/AWS	PCS/AWS	CLR	CLR	CLR	CLR	n/a	n/a	n/a	n/a	CBRS	CBRS	CBRS	CBRS
Antenna Beamwidth	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	67	67	67	67
Antenna Gain (dBi)	17	17	17	17	21	21	21	21	17	17	17	17	21	21	21	21	18.3	18.3	18.3	18.3
Electrical Tilt (degrees)	3	3	3	3	3	3	3	3	3	3	3	3	n/a	n/a	n/a	n/a	TBD	TBD	TBD	TBD
Mechanical Tilt (degrees)	0	0	0	0	0	0	0	0	0	0	0	0	n/a	n/a	n/a	n/a	0	0	0	0
Number of TRX/Carriers	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	3	3	3	3
Technology	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	LTE	n/a	n/a	n/a	n/a	LTE	LTE	LTE	LTE
RRU Port Designation	ANT1	ANT2	ANT3	ANT4	ANT5	ANT6	ANT7	ANT8	ANT1	ANT2	ANT3	ANT4	n/a	n/a	n/a	n/a	ANT1	ANT2	ANT3	ANT4
Transmit Power / radio (Watts)	30.0	30.0	30.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	n/a	n/a	n/a	n/a	1.0	1.0	1.0	1.0
Transmit Power / radio (dBm)	44.8	44.8	44.8	44.8	46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0	n/a	n/a	n/a	n/a	30.0	30.0	30.0	30.0
EIRP (Watts)	1349.0	1349.0	1349.0	1349.0	4466.8	4466.8	4466.8	4466.8	1778.3	1778.3	1778.3	1778.3	n/a	n/a	n/a	n/a	60.3	60.3	60.3	60.3
EIRP (dBm)	61.3	61.3	61.3	61.3	66.5	66.5	66.5	66.5	62.5	62.5	62.5	62.5	n/a	n/a	n/a	n/a	47.8	47.8	47.8	47.8
MIMO	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	n/a	n/a	n/a	n/a	4x4	4x4	4x4	4x4
Capped Ports													Capped	Capped	Capped	Capped				

Sector 3 Plumbing Diagram





Plumbing Diagram