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April 9, 2014

VIA FEDERAL EXPRESS

Chairman Robin Stein and
Members of the Siting Council
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

Re: Tower Share Request - Docket 360
New Cingular Wireless PCS, LLC ("AT&T")
188 Route 7 South, Falls Village (Canaan), Connecticut

Dear Chairman Stein and Members of the Siting Council:

Pursuant to Connecticut General Statutes (C.G.S.) § 16-50aa, New Cingular Wireless PCS, LLC ("AT&T"), hereby requests an order from the Connecticut Siting Council (the "Council") to approve the proposed shared use of a wireless telecommunications facility located at 188 Route 7 South, Falls Village (Canaan), Connecticut (the "Site"). As set forth herein, AT&T's collocation satisfies all the criteria for tower sharing approval. Additionally, AT&T's proposed collocation qualifies as an eligible facility under federal law where state and local approvals are required. See 47 U.S.C. § 1455(a).

Existing Tower Facility

In Docket 360, the Siting Council issued a Certificate for the construction, maintenance and operation of a tower facility at the Site. The existing tower is located in the northwest corner of the future Falls Village Fire Department building and consists of a 150' tall monopole designed as a pine tree

("monopine") with its branches extending to approximately 157' above grade level ("AGL"). Verizon's antennas are mounted at a centerline height of 150' AGL on the tower. Verizon's equipment is located within a 50' by 75' fenced compound designed and approved as part of Docket 360. The tower facility is owned by Verizon.

AT&T's Proposed Collocation

AT&T is licensed by the Federal Communications Commission ("FCC") to provide wireless services in this area of the State of Connecticut. AT&T proposes to install 9 panel antennas and related equipment to the existing 157' tall monopine at a centerline height of approximately 140' AGL. AT&T's proposed 12' by 16' unmanned equipment shelter will be located within the existing fenced compound approved in Docket 360. Additionally, AT&T proposes to install a diesel fuel emergency backup generator inside the fenced compound. AT&T's proposed collocated facility is detailed in the drawing included in Attachment A, prepared by Centek Engineering, last revised March 26, 2014.

The Proposed Collocation Meets State and Federal Criteria for Approval

Connecticut General Statutes § 16-50aa provides that, upon written request for shared use approval, an order approving such use shall be issued, "if the council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns." (C.G.S. § 16-50aa(c)(1).) Further, upon approval of such shared use, it is exclusive and no local zoning or land use approvals are required. C.G.S. § 16-50x. Shared use of the Docket 360 Facility satisfies the approval criteria set forth in C.G.S. § 16-50aa and U.S.C § 1455(a) as follows:

A. Technical Feasibility AT&T has confirmed that the monopine tower is structurally capable of supporting the addition of AT&T's facility. Annexed hereto as Attachment B is a Structural Analysis, dated February 3, 2014, stamped by Carlo Centore, P.E., concluding that

the existing monopine and foundation have the necessary capacity to support existing antennas, AT&T's proposed antennas and equipment. The proposed shared use of this tower is therefore technically feasible.

B. Legal Feasibility Pursuant to C.G.S. § 16-50aa, the Council has been authorized to issue an order approving shared use of the existing Facility. (C.G.S. § 16-50aa(c)(1)). An order by the Council approving the shared use of a tower is required and would permit AT&T to obtain a building permit for the proposed installation.

C. Environmental Feasibility The proposed shared use would have a minimal effect for the following reasons:

1. The proposed installation would be consistent with Verizon's existing antenna installation and would not cause any significant change or alteration in the physical or environmental characteristics of the existing facility.
2. AT&T's proposed facility consists of antennas mounted on the existing monopine in accordance with the Council's Certificate conditions and proposes no increase in tower height. AT&T's equipment shelter will be located within the existing fenced compound consistent with the approved D&M Plan on file with the Council. All other facility improvements approved in Docket 360, including landscaping, will remain as approved.
3. The proposed installation would comply with noise standards as set forth in the report included in Exhibit C.
4. Operation of AT&T's equipment at the Site would not exceed the total radio frequency electromagnetic radiation power density level adopted by the FCC and Connecticut

Department of Health. A cumulative power density report is included in Attachment D.

D. Economic Feasibility AT&T and Verizon have entered into a mutual agreement to share use of the Facility on terms agreeable to both parties. Verizon's letter authorizing AT&T's collocation is included in Attachment E. The proposed tower sharing is therefore economically feasible.

E. Public Safety The addition of AT&T's services in this area of Canaan through shared use of the Facility is expected to enhance the safety and welfare of local residents and travelers resulting in an improvement to public safety.

As set forth herein, AT&T's proposed wireless facility is wholly consistent with legislative findings outlined in Section 16-50aa of the General Statutes of Connecticut that seek to avoid the unnecessary proliferation of towers in the State and further meets federal criteria that require approval of collocations of facilities such as proposed herein by AT&T.

Conclusion

The proposed shared use of the Site issued a Certificate in Docket 360 satisfies the criteria set forth in C.G.S. § 16-50aa, advances the General Assembly's and the Siting Council's goal of preventing the proliferation of towers in the State of Connecticut, and is an eligible facility request requiring approval as a matter of federal law. AT&T requests the Siting Council issue

an order approving the proposed shared use of the Site. Please do not hesitate to contact me if you should have any questions concerning this matter.

Respectfully Submitted,

Lucia Chiocchio

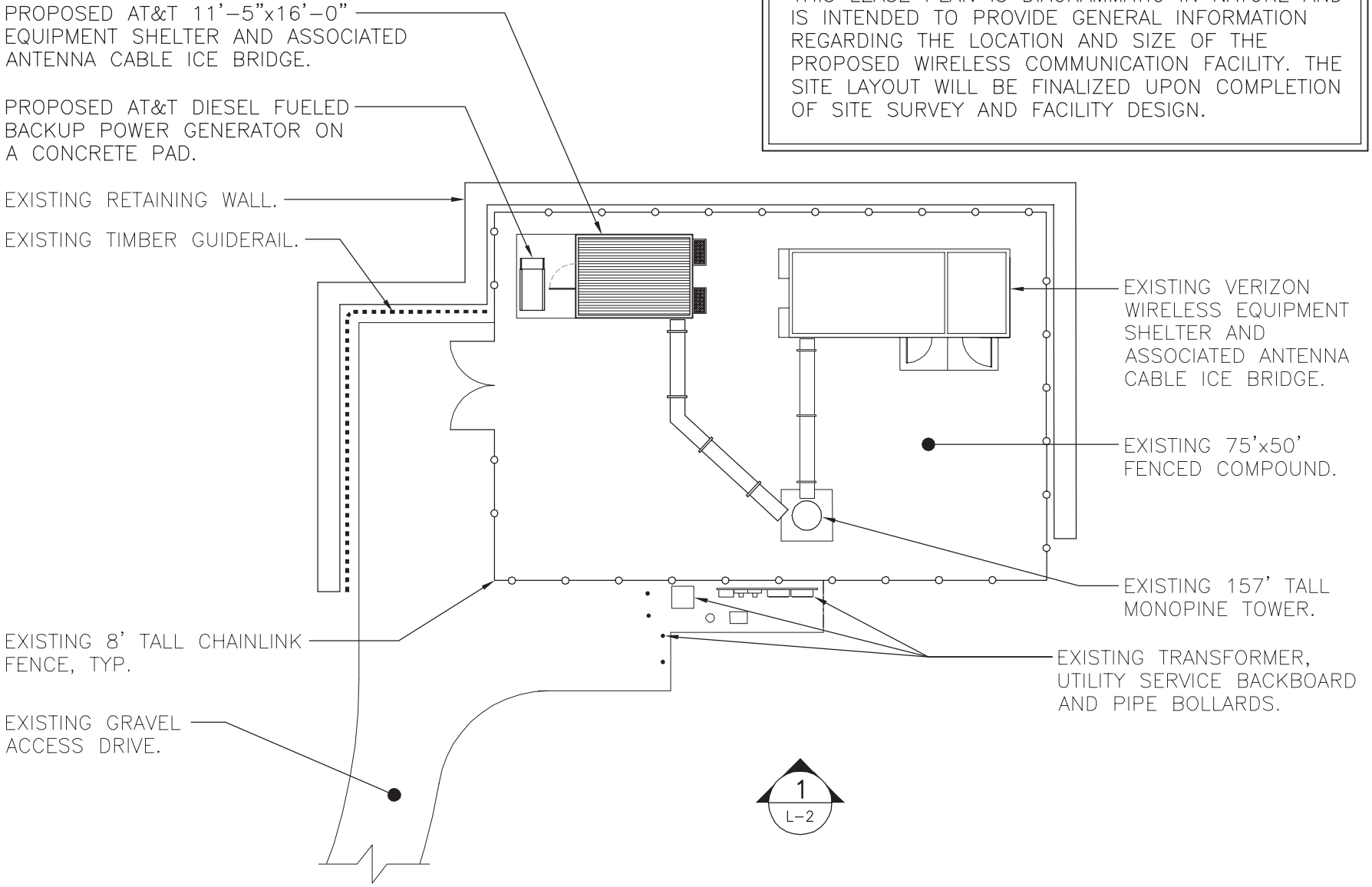
LC/cv

cc: Patricia Allyn Mechare, First Selectwoman
Michele Briggs, AT&T
David Vivian, SAI
Christopher B. Fisher, Esq.

ATTACHMENT A

LEASE EXHIBIT

THIS LEASE PLAN IS DIAGRAMMATIC IN NATURE AND IS INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION AND SIZE OF THE PROPOSED WIRELESS COMMUNICATION FACILITY. THE SITE LAYOUT WILL BE FINALIZED UPON COMPLETION OF SITE SURVEY AND FACILITY DESIGN.



1 / L-1 **COMPOUND PLAN**

SCALE: 1" = 20'-0"

APPOX. NORTH

GRAPHIC SCALE

20 0 10 20 40

(IN FEET)

1 inch = 20 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
3	03/26/14	HMR	DMD	REVISED LEASE EXHIBIT
2	01/17/14	HMR	DMD	REVISED LEASE EXHIBIT
1	01/13/14	HMR	DMD	LEASE EXHIBIT
0	11/07/13	HMR	DMD	LEASE EXHIBIT-CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

at&t

SAI communications

CENTEK engineering
Centered on Solutions℠

(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405

www.CentekEng.com

AT&T MOBILITY

SITE NUMBER: S2413

SITE NAME: CANAAN - ROUTE 7 SOUTH

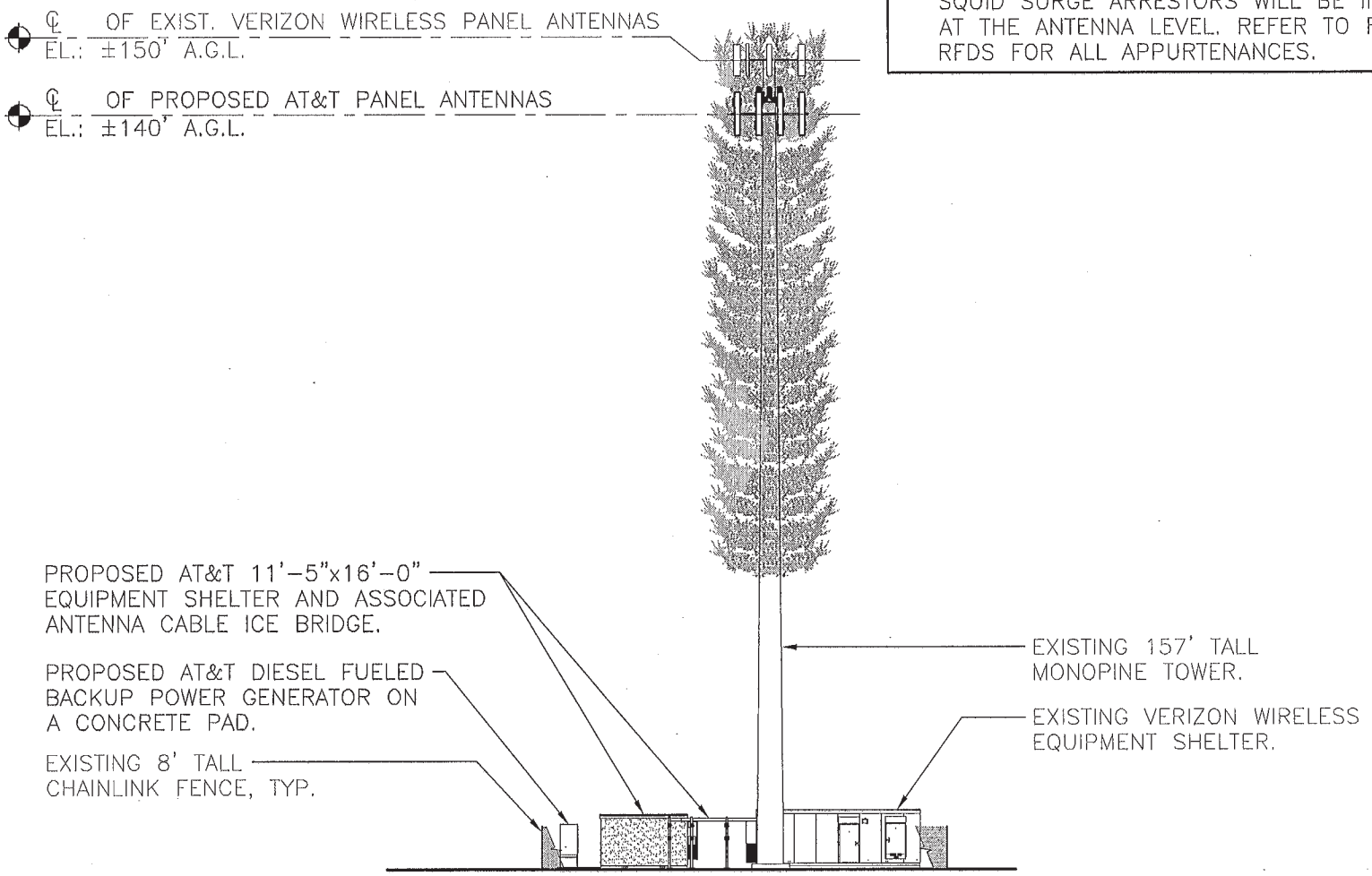
188 ROUTE 7 SOUTH
CANAAN, CT 06031

DATE: 11/06/13
SCALE: AS SHOWN
JOB NO. 13292.000

SHEET NO.
L-1

NOTES:

1. THE PROPOSED AT&T PANEL ANTENNA INSTALLATION TO CONSIST OF (3) SECTORS OF (3) ANTENNAS EACH FOR A TOTAL OF (9) ANTENNAS, ADDITIONALLY, (33) RRUs AND (4) SQUID SURGE ARRESTORS WILL BE INSTALLED AT THE ANTENNA LEVEL. REFER TO FINAL RFDS FOR ALL APPURTENANCES.



GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

1 / L-2 EAST ELEVATION
SCALE: 1"= 30'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
3	03/26/14	HMR	DMD	REVISED LEASE EXHIBIT
2	01/17/14	HMR	DMD	REVISED LEASE EXHIBIT
1	01/13/14	HMR	DMD	LEASE EXHIBIT
0	11/07/13	HMR	DMD	LEASE EXHIBIT-CLIENT REVIEW

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AT&T MOBILITY
SITE NUMBER: S2413
SITE NAME: CANAAN - ROUTE 7 SOUTH
188 ROUTE 7 SOUTH
CANAAN, CT 06031

DATE: 11/06/13
SCALE: AS SHOWN
JOB NO. 13292.000

SHEET NO.
L-2

ATTACHMENT B

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

157-ft Existing EEI Monopine

Proposed AT&T Mobility
Antenna Upgrade

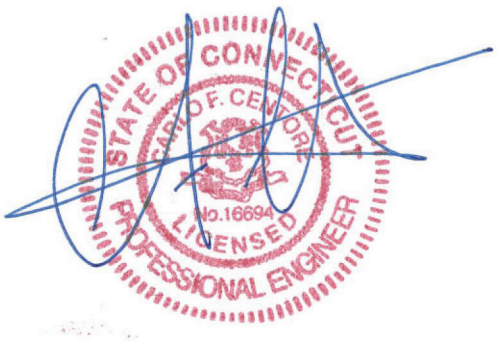
AT&T Site Ref: CT2413

Verizon Site Ref: Falls Village

188 Route 7
Falls Village (Canaan), CT

Centek Project No. 13292.000

~~Date: November 25, 2013~~
~~Rev 1: January 22, 2014~~
Rev 2: February 3, 2014



Prepared for:

AT&T Mobility
500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by AT&T Mobility on the existing monopine (tower) located in Canaan, CT.

The host tower is a 157-ft tall, three-section, eighteen sided, tapered monopine, originally designed and manufactured by Engineered Endeavors job no; 16975, dated February 6, 2013. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned design documents.

Antenna and appurtenance information were obtained from visual verification from grade conducted by Centek personnel on October 29, 2013 and a AT&T RF data sheet.

The tower is made up of three (3) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 25.00-in at the top and 58.50-in at the base.

AT&T Mobility proposes the installation of nine (9) panel antennas, twenty-four (24) remote radio heads, nine (9) A2's, six (6) diplexers and four (4) surge arrestors mounted on a proposed platform. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- VERIZON (Existing):
  Antennas: Six (6) Antel BXA-70063-6CF panel antennas, six (6) BXA-171063-12BF panel antennas, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads, three (3) Alcatel-Lucent RRH2x40-07-U Remote Radio Heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on a 10-ft T-arm array with a RAD center elevation of 147-ft above grade.
  Coax Cables: Two (2) 1-5/8" ∅ fiber cable running on the inside of the existing tower.
- **AT&T MOBILITY (Proposed):**
  Antennas: Six (6) CCI HPA-65R-BUU-H6 panel antennas, three (3) CCI OPA-65R-LCUU-H6 panel antennas, nine (9) Ericsson RRUS-11 remote radio units, nine (9) Ericsson RRUS-12 remote radio units, three (3) Ericsson RRUS-32 remote radio units, three (3) Ericsson RRUS-E2 remote radio units, nine (9) Ericsson A2 remote radio units, six (6) Kaelus DBC0062F1V diplexers and four (4) Raycap DC6-48-60-18-8F surge arrestors mounted on two (2) Site-Pro Monopole Triple T-Arm Kits (stacked) p/n RMV12-496 with a RAD center elevation of 137-ft above grade level.
  Coax Cables: Two (2) fiber trunks and eight (8) DC trunks running on the inside of the existing tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed as indicated in this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice on the tower structure and its components.

Basic Wind Speed:	Litchfield; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Canaan; v = 90 mph (3 second gust) equivalent to v = 75 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA-222-F wind speed controls.	
Load Cases:	Load Case 1; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

[1] The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **90.1%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L2)	47.70'-96.37'	90.1%	**PASS**

Foundation and Anchors

The existing foundation consists of an 7.0-ft square x 3.0-ft long reinforced concrete pier on a 30.0-ft square x 3.0-ft thick reinforced concrete pad bearing directly on existing sub grade. The sub-grade conditions used in the analysis of the existing foundation were obtained from the geotechnical report prepared by Terracon job no; J2095143 dated April 30, 2009. The base of the tower is connected to the foundation by means of (24) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 5-ft into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	50 kips
	Compression	50 kips
	Moment	5423 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Mat	OM[2]	2.0	2.01	**PASS**

Note 1: FS denotes Factor of Safety
Note 2: OM denotes Overturning Moment.

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Bending	85.4%	**PASS**
Base Plate	Bending	58.5%	**PASS**

Conclusion

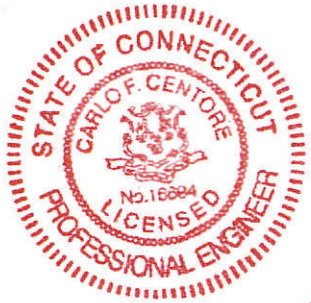
This analysis shows that the subject tower **is adequate** to support the proposed AT&T Mobility antenna configuration.

The analysis is based, in part, on the information provided to this office by AT&T Mobility. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer



Prepared by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

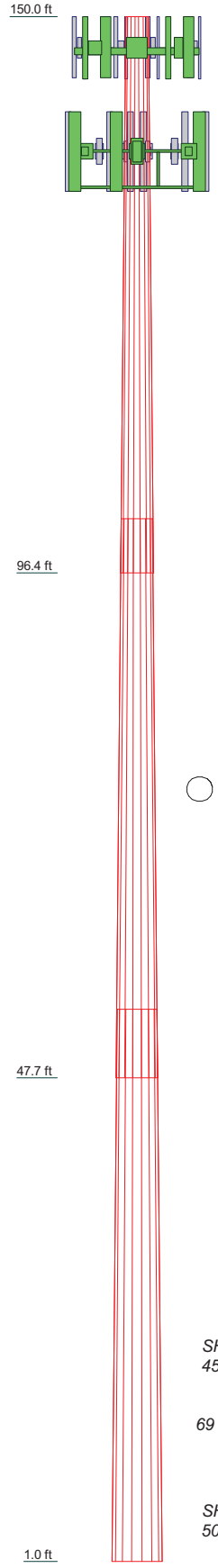
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

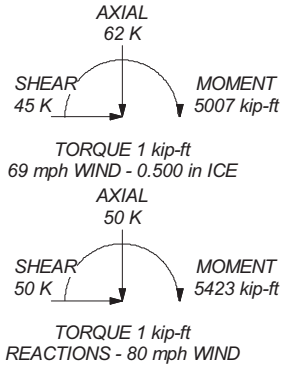
tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	53.630	18	0.313	5.250	25.000	37.690		5.6
2	53.920	18	0.438	6.583	35.823	48.450	A572-65	10.6
3	53.283	18	0.563		46.033	58.500		16.7
								33.0





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Falls Village Branch 1	147	DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	137
BXA-171063-12CF (Verizon - Existing)	147	(3) A2 (ATI - Proposed)	137
BXA-70063/6CF (Verizon - Existing)	147	HPA-65R-BUU-H8 (ATI - Proposed)	137
BXA-171063-12CF (Verizon - Existing)	147	Falls Village Branch 3	137
BXA-70063/6CF (Verizon - Existing)	147	OPA-65R-LCUU-H8 (ATI - Proposed)	137
BXA-171063-12CF (Verizon - Existing)	147	HPA-65R-BUU-H8 (ATI - Proposed)	137
BXA-70063/6CF (Verizon - Existing)	147	HPA-65R-BUU-H8 (ATI - Proposed)	137
BXA-171063-12CF (Verizon - Existing)	147	OPA-65R-LCUU-H8 (ATI - Proposed)	137
BXA-70063/6CF (Verizon - Existing)	147	HPA-65R-BUU-H8 (ATI - Proposed)	137
BXA-171063-12CF (Verizon - Existing)	147	HPA-65R-BUU-H8 (ATI - Proposed)	137
BXA-70063/6CF (Verizon - Existing)	147	OPA-65R-LCUU-H8 (ATI - Proposed)	137
BXA-171063-12CF (Verizon - Existing)	147	HPA-65R-BUU-H8 (ATI - Proposed)	137
BXA-70063/6CF (Verizon - Existing)	147	(3) RRUS-11 (ATI - Proposed)	137
RRH2x40-AWS (Verizon - Existing)	147	(3) RRUS-11 (ATI - Proposed)	137
RRH2x40-AWS (Verizon - Existing)	147	(3) RRUS-11 (ATI - Proposed)	137
RRH2x40-AWS (Verizon - Existing)	147	(3) RRUS-12 (ATI - Proposed)	137
RRH2x40-07-U (Verizon - Existing)	147	(3) RRUS-12 (ATI - Proposed)	137
RRH2x40-07-U (Verizon - Existing)	147	(3) RRUS-12 (ATI - Proposed)	137
DB-T1-6Z-8AB-0Z (Verizon - Existing)	147	RRUS-32 (ATI - Proposed)	137
EEI 10-ft T-Arm Array (Verizon - Existing)	147	RRUS-32 (ATI - Proposed)	137
		RRUS-32 (ATI - Proposed)	137
Site Pro RMV12 (ATI - Proposed)	139 - 138.5	RRUS-E2 (ATI - Proposed)	137
(3) A2 (ATI - Proposed)	137	RRUS-E2 (ATI - Proposed)	137
(3) A2 (ATI - Proposed)	137	RRUS-E2 (ATI - Proposed)	137
(2) DBC0062F1V (ATI - Proposed)	137	Site Pro RMV12-472 (ATI - Proposed)	135.5 - 135
(2) DBC0062F1V (ATI - Proposed)	137	Falls Village Branch 3	127
(2) DBC0062F1V (ATI - Proposed)	137	Falls Village Branch 3	117
DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	137	Falls Village Branch 2	107
		Falls Village Branch 2	97
DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	137	Falls Village Branch 2	87
		Falls Village Branch 2	77
DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	137	Falls Village Branch 1	67

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 90.1%

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job:	***13292.000 - CT2413***		
Project:	***157-ft EEI Monopine - 188 Route 7, Canaan, CT***		
Client: AT&T Mobility	Drawn by: TJL		App'd:
Code: TIA/EIA-222-F	Date: 02/03/14		Scale: NTS
Path: J:\Jobs\1329200.WI\04_Structural\Backup Documentation\CalcsRev (2)\ER Files\157' Monopine_Canaan, CT.eri			Dwg No. E-1

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 80 mph.
Nominal ice thickness of 0.500 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Treat Feedline Bundles As Cylinder
	Consider Moments - Horizontals		Assume Legs Pinned		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Calculate Redundant Bracing Forces
	Use Moment Magnification		Use Clear Spans For Wind Area		Ignore Redundant Members in FEA
√	Use Code Stress Ratios		Use Clear Spans For KL/r		SR Leg Bolts Resist Compression
	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		All Leg Panels Have Same Allowable
	Escalate Ice	√	Bypass Mast Stability Checks		Offset Girt At Foundation
	Always Use Max Kz		Use Azimuth Dish Coefficients		Consider Feedline Torque
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Include Angle Block Shear Check
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Poles
	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends	√	Include Shear-Torsion Interaction
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Always Use Sub-Critical Flow
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Use Top Mounted Sockets
	Add IBC .6D+W Combination				

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	150.000-96.370	53.630	5.250	18	25.000	37.690	0.313	1.250	A572-65 (65 ksi)
L2	96.370-47.700	53.920	6.583	18	35.823	48.450	0.438	1.750	A572-65 (65 ksi)
L3	47.700-1.000	53.283		18	46.033	58.500	0.563	2.250	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	25.386	24.487	1885.497	8.764	12.700	148.464	3773.474	12.246	3.850	12.32
	38.271	37.074	6543.727	13.269	19.147	341.771	13096.064	18.540	6.083	19.467
L2	37.624	49.137	7773.002	12.562	18.198	427.136	15556.232	24.573	5.535	12.651
	49.197	66.671	19417.146	17.044	24.613	788.911	38859.841	33.342	7.757	17.731
L3	48.307	81.183	21206.372	16.142	23.385	906.839	42440.648	40.599	7.112	12.643
	59.402	103.440	43867.830	20.568	29.718	1476.137	87793.383	51.730	9.306	16.544

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.000-96.370				1	1	1		
L2 96.370-47.700				1	1	1		
L3 47.700-1.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
Fiber Trunk	C	No	Inside Pole	137.000 - 4.000	2	No Ice	0.000	0.001
(AT&T - Proposed)						1/2" Ice	0.000	0.001
DC Trunk	C	No	Inside Pole	137.000 - 4.000	8	No Ice	0.000	0.000
(AT&T - Proposed)						1/2" Ice	0.000	0.000
HYBRIFLEX 1-5/8"	B	No	Inside Pole	147.000 - 4.000	2	No Ice	0.000	0.002
(Verizon - Existing)						1/2" Ice	0.000	0.002

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	150.000-96.370	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.192
		C	0.000	0.000	0.000	0.000	0.117
L2	96.370-47.700	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.185
		C	0.000	0.000	0.000	0.000	0.140
L3	47.700-1.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.166
		C	0.000	0.000	0.000	0.000	0.126

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	150.000-96.370	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.192
		C		0.000	0.000	0.000	0.000	0.117
L2	96.370-47.700	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.185
		C		0.000	0.000	0.000	0.000	0.140
L3	47.700-1.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.166
		C		0.000	0.000	0.000	0.000	0.126

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
HPA-65R-BUU-H8	A	From Face	3.000	0.000	137.000	No Ice	13.295	7.516	0.068
(AT&T - Proposed)			6.000			1/2" Ice	13.994	8.087	0.142
			0.000						
OPA-65R-LCUU-H8	A	From Face	3.000	0.000	137.000	No Ice	13.295	7.516	0.088
(AT&T - Proposed)			2.000			1/2" Ice	13.994	8.087	0.162
			0.000						
HPA-65R-BUU-H8	A	From Face	3.000	0.000	137.000	No Ice	13.295	7.516	0.068
(AT&T - Proposed)			-6.000			1/2" Ice	13.994	8.087	0.142
			0.000						
HPA-65R-BUU-H8	B	From Face	3.000	0.000	137.000	No Ice	13.295	7.516	0.068
(AT&T - Proposed)			6.000			1/2" Ice	13.994	8.087	0.142
			0.000						
OPA-65R-LCUU-H8	B	From Face	3.000	0.000	137.000	No Ice	13.295	7.516	0.088
(AT&T - Proposed)			2.000			1/2" Ice	13.994	8.087	0.162
			0.000						
HPA-65R-BUU-H8	B	From Face	3.000	0.000	137.000	No Ice	13.295	7.516	0.068
(AT&T - Proposed)			-6.000			1/2" Ice	13.994	8.087	0.142
			0.000						
HPA-65R-BUU-H8	C	From Face	3.000	0.000	137.000	No Ice	13.295	7.516	0.068
(AT&T - Proposed)			6.000			1/2" Ice	13.994	8.087	0.142
			0.000						
OPA-65R-LCUU-H8	C	From Face	3.000	0.000	137.000	No Ice	13.295	7.516	0.088
(AT&T - Proposed)			2.000			1/2" Ice	13.994	8.087	0.162
			0.000						
HPA-65R-BUU-H8	C	From Face	3.000	0.000	137.000	No Ice	13.295	7.516	0.068
(AT&T - Proposed)			-6.000			1/2" Ice	13.994	8.087	0.142
			0.000						
(3) RRUS-11	A	From Face	3.000	0.000	137.000	No Ice	2.994	1.246	0.050
(AT&T - Proposed)			0.000			1/2" Ice	3.226	1.412	0.070
			0.000						
(3) RRUS-11	B	From Face	3.000	0.000	137.000	No Ice	2.994	1.246	0.050
(AT&T - Proposed)			0.000			1/2" Ice	3.226	1.412	0.070
			0.000						

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)
(3) RRUS-11 (AT&T - Proposed)	C	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
(3) RRUS-12 (AT&T - Proposed)	A	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.000 0.000	1.488 1.673	0.058 0.081
(3) RRUS-12 (AT&T - Proposed)	B	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.000 0.000	1.488 1.673	0.058 0.081
(3) RRUS-12 (AT&T - Proposed)	C	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.000 0.000	1.488 1.673	0.058 0.081
RRUS-32 (AT&T - Proposed)	A	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	3.866 4.151	2.762 3.021	0.077 0.105
RRUS-32 (AT&T - Proposed)	B	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	3.866 4.151	2.762 3.021	0.077 0.105
RRUS-32 (AT&T - Proposed)	C	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	3.866 4.151	2.762 3.021	0.077 0.105
RRUS-E2 (AT&T - Proposed)	A	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.000 0.000	1.488 1.673	0.058 0.081
RRUS-E2 (AT&T - Proposed)	A	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.000 0.000	1.488 1.673	0.058 0.081
RRUS-E2 (AT&T - Proposed)	A	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.000 0.000	1.488 1.673	0.058 0.081
(3) A2 (AT&T - Proposed)	A	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.000 0.000	0.542 0.675	0.022 0.035
(3) A2 (AT&T - Proposed)	B	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.000 0.000	0.542 0.675	0.022 0.035
(3) A2 (AT&T - Proposed)	C	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.000 0.000	0.542 0.675	0.022 0.035
(2) DBC0062F1V (AT&T - Proposed)	A	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.830 0.954	0.245 0.329	0.010 0.015
(2) DBC0062F1V (AT&T - Proposed)	B	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.830 0.954	0.245 0.329	0.010 0.015
(2) DBC0062F1V (AT&T - Proposed)	C	From Face	3.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.830 0.954	0.245 0.329	0.010 0.015
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	A	From Face	0.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	2.228 2.447	2.228 2.447	0.020 0.039
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	B	From Face	0.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	2.228 2.447	2.228 2.447	0.020 0.039
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	C	From Face	0.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	2.228 2.447	2.228 2.447	0.020 0.039

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
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	C	From Face	0.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	2.228 2.447	2.228 2.447	0.020 0.039
Site Pro RMV12 (AT&T - Proposed)	C	None		0.000	139.000 - 138.500	No Ice 1/2" Ice	13.000 16.500	13.000 16.500	0.966 1.090
Site Pro RMV12-472 (AT&T - Proposed)	C	None		0.000	135.000 - 135.500	No Ice 1/2" Ice	24.000 32.500	24.000 32.500	1.265 1.515
Falls Village Branch 1	C	None		0.000	147.000	No Ice 1/2" Ice	45.000 60.000	45.000 60.000	0.600 0.900
Falls Village Branch 3	C	None		0.000	137.000	No Ice 1/2" Ice	80.000 107.000	80.000 107.000	1.200 1.800
Falls Village Branch 3	C	None		0.000	127.000	No Ice 1/2" Ice	80.000 107.000	80.000 107.000	1.200 1.800
Falls Village Branch 3	C	None		0.000	117.000	No Ice 1/2" Ice	80.000 107.000	80.000 107.000	1.200 1.800
Falls Village Branch 2	C	None		0.000	107.000	No Ice 1/2" Ice	90.000 120.000	90.000 120.000	1.200 1.800
Falls Village Branch 2	C	None		0.000	97.000	No Ice 1/2" Ice	90.000 120.000	90.000 120.000	1.200 1.800
Falls Village Branch 2	C	None		0.000	87.000	No Ice 1/2" Ice	90.000 120.000	90.000 120.000	1.200 1.800
Falls Village Branch 2	C	None		0.000	77.000	No Ice 1/2" Ice	90.000 120.000	90.000 120.000	1.200 1.800
Falls Village Branch 1	C	None		0.000	67.000	No Ice 1/2" Ice	45.000 60.000	45.000 60.000	0.600 0.900
BXA-171063-12CF (Verizon - Existing)	A	From Face	3.000 5.000 0.000	0.000	147.000	No Ice 1/2" Ice	4.791 5.242	3.618 4.058	0.015 0.042
BXA-70063/6CF (Verizon - Existing)	A	From Face	3.000 3.000 0.000	0.000	147.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-171063-12CF (Verizon - Existing)	A	From Face	3.000 -3.000 0.000	0.000	147.000	No Ice 1/2" Ice	4.791 5.242	3.618 4.058	0.015 0.042
BXA-70063/6CF (Verizon - Existing)	A	From Face	3.000 -5.000 0.000	0.000	147.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-171063-12CF (Verizon - Existing)	B	From Face	3.000 5.000 0.000	0.000	147.000	No Ice 1/2" Ice	4.791 5.242	3.618 4.058	0.015 0.042
BXA-70063/6CF (Verizon - Existing)	B	From Face	3.000 3.000 0.000	0.000	147.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-171063-12CF (Verizon - Existing)	B	From Face	3.000 -3.000 0.000	0.000	147.000	No Ice 1/2" Ice	4.791 5.242	3.618 4.058	0.015 0.042
BXA-70063/6CF (Verizon - Existing)	B	From Face	3.000 -5.000 0.000	0.000	147.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-171063-12CF (Verizon - Existing)	C	From Face	3.000 5.000 0.000	0.000	147.000	No Ice 1/2" Ice	4.791 5.242	3.618 4.058	0.015 0.042
BXA-70063/6CF (Verizon - Existing)	C	From Face	3.000 3.000 0.000	0.000	147.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-171063-12CF (Verizon - Existing)	C	From Face	3.000 -3.000	0.000	147.000	No Ice 1/2" Ice	4.791 5.242	3.618 4.058	0.015 0.042

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000						
BXA-70063/6CF	C	From Face	3.000	0.000	147.000	No Ice	7.731	4.158	0.017
(Verizon - Existing)			-5.000			1/2" Ice	8.268	4.595	0.059
			0.000						
RRH2x40-AWS	A	From Face	3.000	0.000	147.000	No Ice	2.522	1.589	0.044
(Verizon - Existing)			-4.000			1/2" Ice	2.753	1.795	0.061
			0.000						
RRH2x40-AWS	B	From Face	3.000	0.000	147.000	No Ice	2.522	1.589	0.044
(Verizon - Existing)			-4.000			1/2" Ice	2.753	1.795	0.061
			0.000						
RRH2x40-AWS	C	From Face	3.000	0.000	147.000	No Ice	2.522	1.589	0.044
(Verizon - Existing)			-4.000			1/2" Ice	2.753	1.795	0.061
			0.000						
RRH2x40-07-U	A	From Face	3.000	0.000	147.000	No Ice	2.246	1.228	0.050
(Verizon - Existing)			4.000			1/2" Ice	2.447	1.385	0.067
			0.000						
RRH2x40-07-U	B	From Face	3.000	0.000	147.000	No Ice	2.246	1.228	0.050
(Verizon - Existing)			4.000			1/2" Ice	2.447	1.385	0.067
			0.000						
RRH2x40-07-U	C	From Face	3.000	0.000	147.000	No Ice	2.246	1.228	0.050
(Verizon - Existing)			4.000			1/2" Ice	2.447	1.385	0.067
			0.000						
DB-T1-6Z-8AB-0Z	C	From Face	3.000	0.000	147.000	No Ice	5.600	2.333	0.044
(Verizon - Existing)			0.000			1/2" Ice	5.915	2.558	0.080
			0.000						
EEI 10-ft T-Arm Array	C	None		0.000	147.000	No Ice	23.000	23.000	1.600
(Verizon - Existing)						1/2" Ice	26.500	26.500	1.850

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	121.790	1.452	0.024	140.086	A	0.000	140.086	140.086	100.00	0.000	0.000
150.000-96.37					B	0.000	140.086		100.00	0.000	0.000
0					C	0.000	140.086		100.00	0.000	0.000
L2	71.546	1.247	0.020	173.391	A	0.000	173.391	173.391	100.00	0.000	0.000
96.370-47.700					B	0.000	173.391		100.00	0.000	0.000
					C	0.000	173.391		100.00	0.000	0.000
L3	23.684	1	0.017	206.402	A	0.000	206.402	206.402	100.00	0.000	0.000
47.700-1.000					B	0.000	206.402		100.00	0.000	0.000
					C	0.000	206.402		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	121.790	1.452	0.018	0.500	144.555	A	0.000	144.555	144.555	100.00	0.000	0.000
150.000-96.370						B	0.000	144.555		100.00	0.000	0.000
						C	0.000	144.555		100.00	0.000	0.000
L2	71.546	1.247	0.015	0.500	177.447	A	0.000	177.447	177.447	100.00	0.000	0.000
96.370-47.700						B	0.000	177.447		100.00	0.000	0.000
						C	0.000	177.447		100.00	0.000	0.000
L3 47.700-1.000	23.684	1	0.012	0.500	210.293	A	0.000	210.293	210.293	100.00	0.000	0.000
						B	0.000	210.293		100.00	0.000	0.000
						C	0.000	210.293		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	121.790	1.452	0.009	140.086	A	0.000	140.086	140.086	100.00	0.000	0.000
150.000-96.37					B	0.000	140.086		100.00	0.000	0.000
0					C	0.000	140.086		100.00	0.000	0.000
L2	71.546	1.247	0.008	173.391	A	0.000	173.391	173.391	100.00	0.000	0.000
96.370-47.700					B	0.000	173.391		100.00	0.000	0.000
					C	0.000	173.391		100.00	0.000	0.000
L3	23.684	1	0.006	206.402	A	0.000	206.402	206.402	100.00	0.000	0.000
47.700-1.000					B	0.000	206.402		100.00	0.000	0.000
					C	0.000	206.402		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.309	5.617	A	1	0.65	1	1	1	140.086	3.653	0.068	C
150.000-96.37			B	1	0.65	1	1	1	140.086			
0			C	1	0.65	1	1	1	140.086			
L2	0.325	10.624	A	1	0.65	1	1	1	173.391	3.872	0.080	C
96.370-47.700			B	1	0.65	1	1	1	173.391			
			C	1	0.65	1	1	1	173.391			
L3	0.292	16.737	A	1	0.65	1	1	1	206.402	3.756	0.080	C
47.700-1.000			B	1	0.65	1	1	1	206.402			
			C	1	0.65	1	1	1	206.402			
Sum Weight:	0.926	32.978						OTM	799.660 kip-ft	11.282		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.309	5.617	A	1	0.65	1	1	1	140.086	3.653	0.068	C
150.000-96.37			B	1	0.65	1	1	1	140.086			
0			C	1	0.65	1	1	1	140.086			
L2	0.325	10.624	A	1	0.65	1	1	1	173.391	3.872	0.080	C
96.370-47.700			B	1	0.65	1	1	1	173.391			
			C	1	0.65	1	1	1	173.391			
L3	0.292	16.737	A	1	0.65	1	1	1	206.402	3.756	0.080	C
47.700-1.000			B	1	0.65	1	1	1	206.402			
			C	1	0.65	1	1	1	206.402			
Sum Weight:	0.926	32.978						OTM	799.660 kip-ft	11.282		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.309	5.617	A	1	0.65	1	1	1	140.086	3.653	0.068	C
150.000-96.37			B	1	0.65	1	1	1	140.086			
0			C	1	0.65	1	1	1	140.086			
L2	0.325	10.624	A	1	0.65	1	1	1	173.391	3.872	0.080	C
96.370-47.700			B	1	0.65	1	1	1	173.391			
			C	1	0.65	1	1	1	173.391			
L3	0.292	16.737	A	1	0.65	1	1	1	206.402	3.756	0.080	C
47.700-1.000			B	1	0.65	1	1	1	206.402			
			C	1	0.65	1	1	1	206.402			
Sum Weight:	0.926	32.978						OTM	799.660 kip-ft	11.282		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.309	5.617	A	1	0.65	1	1	1	140.086	3.653	0.068	C
150.000-96.37			B	1	0.65	1	1	1	140.086			
0			C	1	0.65	1	1	1	140.086			
L2	0.325	10.624	A	1	0.65	1	1	1	173.391	3.872	0.080	C
96.370-47.700			B	1	0.65	1	1	1	173.391			
			C	1	0.65	1	1	1	173.391			
L3	0.292	16.737	A	1	0.65	1	1	1	206.402	3.756	0.080	C
47.700-1.000			B	1	0.65	1	1	1	206.402			
			C	1	0.65	1	1	1	206.402			
Sum Weight:	0.926	32.978						OTM	799.660 kip-ft	11.282		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.309	6.671	A	1	0.65	1	1	1	144.555	2.827	0.053	C
150.000-96.37			B	1	0.65	1	1	1	144.555			
0			C	1	0.65	1	1	1	144.555			
L2	0.325	11.923	A	1	0.65	1	1	1	177.447	2.972	0.061	C
96.370-47.700			B	1	0.65	1	1	1	177.447			
			C	1	0.65	1	1	1	177.447			
L3	0.292	18.280	A	1	0.65	1	1	1	210.293	2.870	0.061	C
47.700-1.000			B	1	0.65	1	1	1	210.293			
			C	1	0.65	1	1	1	210.293			
Sum Weight:	0.926	36.875						OTM	616.300 kip-ft	8.670		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.309	6.671	A	1	0.65	1	1	1	144.555	2.827	0.053	C
150.000-96.37			B	1	0.65	1	1	1	144.555			
0			C	1	0.65	1	1	1	144.555			
L2	0.325	11.923	A	1	0.65	1	1	1	177.447	2.972	0.061	C
96.370-47.700			B	1	0.65	1	1	1	177.447			
			C	1	0.65	1	1	1	177.447			
L3	0.292	18.280	A	1	0.65	1	1	1	210.293	2.870	0.061	C
47.700-1.000			B	1	0.65	1	1	1	210.293			
			C	1	0.65	1	1	1	210.293			
Sum Weight:	0.926	36.875						OTM	616.300 kip-ft	8.670		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.309	6.671	A	1	0.65	1	1	1	144.555	2.827	0.053	C
150.000-96.37			B	1	0.65	1	1	1	144.555			
0			C	1	0.65	1	1	1	144.555			
L2	0.325	11.923	A	1	0.65	1	1	1	177.447	2.972	0.061	C
96.370-47.700			B	1	0.65	1	1	1	177.447			
			C	1	0.65	1	1	1	177.447			
L3	0.292	18.280	A	1	0.65	1	1	1	210.293	2.870	0.061	C
47.700-1.000			B	1	0.65	1	1	1	210.293			
			C	1	0.65	1	1	1	210.293			
Sum Weight:	0.926	36.875						OTM	616.300	8.670		

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
									kip-ft			

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.309	6.671	A	1	0.65	1	1	1	144.555	2.827	0.053	C
150.000-96.37			B	1	0.65	1	1	1	144.555			
0			C	1	0.65	1	1	1	144.555			
L2	0.325	11.923	A	1	0.65	1	1	1	177.447	2.972	0.061	C
96.370-47.700			B	1	0.65	1	1	1	177.447			
			C	1	0.65	1	1	1	177.447			
L3	0.292	18.280	A	1	0.65	1	1	1	210.293	2.870	0.061	C
47.700-1.000			B	1	0.65	1	1	1	210.293			
			C	1	0.65	1	1	1	210.293			
Sum Weight:	0.926	36.875						OTM	616.300 kip-ft	8.670		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.309	5.617	A	1	0.65	1	1	1	140.086	1.427	0.027	C
150.000-96.37			B	1	0.65	1	1	1	140.086			
0			C	1	0.65	1	1	1	140.086			
L2	0.325	10.624	A	1	0.65	1	1	1	173.391	1.513	0.031	C
96.370-47.700			B	1	0.65	1	1	1	173.391			
			C	1	0.65	1	1	1	173.391			
L3	0.292	16.737	A	1	0.65	1	1	1	206.402	1.467	0.031	C
47.700-1.000			B	1	0.65	1	1	1	206.402			
			C	1	0.65	1	1	1	206.402			
Sum Weight:	0.926	32.978						OTM	312.367 kip-ft	4.407		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.309	5.617	A	1	0.65	1	1	1	140.086	1.427	0.027	C
150.000-96.37			B	1	0.65	1	1	1	140.086			
0			C	1	0.65	1	1	1	140.086			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L2	0.325	10.624	A	1	0.65	1	1	1	173.391	1.513	0.031	C
96.370-47.700			B	1	0.65	1	1	1	173.391			
			C	1	0.65	1	1	1	173.391			
L3	0.292	16.737	A	1	0.65	1	1	1	206.402	1.467	0.031	C
47.700-1.000			B	1	0.65	1	1	1	206.402			
			C	1	0.65	1	1	1	206.402			
Sum Weight:	0.926	32.978						OTM	312.367 kip-ft	4.407		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.309	5.617	A	1	0.65	1	1	1	140.086	1.427	0.027	C
150.000-96.37			B	1	0.65	1	1	1	140.086			
0			C	1	0.65	1	1	1	140.086			
L2	0.325	10.624	A	1	0.65	1	1	1	173.391	1.513	0.031	C
96.370-47.700			B	1	0.65	1	1	1	173.391			
			C	1	0.65	1	1	1	173.391			
L3	0.292	16.737	A	1	0.65	1	1	1	206.402	1.467	0.031	C
47.700-1.000			B	1	0.65	1	1	1	206.402			
			C	1	0.65	1	1	1	206.402			
Sum Weight:	0.926	32.978						OTM	312.367 kip-ft	4.407		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.309	5.617	A	1	0.65	1	1	1	140.086	1.427	0.027	C
150.000-96.37			B	1	0.65	1	1	1	140.086			
0			C	1	0.65	1	1	1	140.086			
L2	0.325	10.624	A	1	0.65	1	1	1	173.391	1.513	0.031	C
96.370-47.700			B	1	0.65	1	1	1	173.391			
			C	1	0.65	1	1	1	173.391			
L3	0.292	16.737	A	1	0.65	1	1	1	206.402	1.467	0.031	C
47.700-1.000			B	1	0.65	1	1	1	206.402			
			C	1	0.65	1	1	1	206.402			
Sum Weight:	0.926	32.978						OTM	312.367 kip-ft	4.407		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	32.978					
Bracing Weight	0.000					
Total Member Self-Weight	32.978			-0.160	0.628	
Total Weight	50.241			-0.160	0.628	
Wind 0 deg - No Ice		0.080	-49.762	-5296.128	-10.300	-0.670
Wind 30 deg - No Ice		24.835	-43.135	-4592.067	-2640.392	-0.518
Wind 45 deg - No Ice		35.080	-35.244	-3752.703	-3728.682	-0.386
Wind 60 deg - No Ice		42.935	-24.950	-2657.609	-4562.825	-0.227
Wind 90 deg - No Ice		49.530	-0.080	-11.089	-5262.484	0.125
Wind 120 deg - No Ice		42.854	24.811	2638.360	-4551.897	0.443
Wind 135 deg - No Ice		34.966	35.130	3736.927	-3713.227	0.562
Wind 150 deg - No Ice		24.696	43.055	4580.819	-2621.464	0.643
Wind 180 deg - No Ice		-0.080	49.762	5295.808	11.557	0.670
Wind 210 deg - No Ice		-24.835	43.135	4591.747	2641.649	0.518
Wind 225 deg - No Ice		-35.080	35.244	3752.382	3729.939	0.386
Wind 240 deg - No Ice		-42.935	24.950	2657.288	4564.082	0.227
Wind 270 deg - No Ice		-49.530	0.080	10.768	5263.741	-0.125
Wind 300 deg - No Ice		-42.854	-24.811	-2638.680	4553.153	-0.443
Wind 315 deg - No Ice		-34.966	-35.130	-3737.248	3714.483	-0.562
Wind 330 deg - No Ice		-24.696	-43.055	-4581.139	2622.720	-0.643
Member Ice	3.896					
Total Weight Ice	61.544			-0.136	0.880	
Wind 0 deg - Ice		0.068	-45.270	-4849.380	-8.337	-0.565
Wind 30 deg - Ice		22.601	-39.239	-4204.313	-2418.603	-0.442
Wind 45 deg - Ice		31.928	-32.058	-3435.586	-3416.015	-0.333
Wind 60 deg - Ice		39.078	-22.694	-2432.740	-4180.571	-0.201
Wind 90 deg - Ice		45.085	-0.068	-9.352	-4822.123	0.094
Wind 120 deg - Ice		39.011	22.576	2416.505	-4171.355	0.364
Wind 135 deg - Ice		31.832	31.963	3422.281	-3402.981	0.466
Wind 150 deg - Ice		22.484	39.171	4194.825	-2402.640	0.537
Wind 180 deg - Ice		-0.068	45.270	4849.109	10.096	0.565
Wind 210 deg - Ice		-22.601	39.239	4204.041	2420.363	0.442
Wind 225 deg - Ice		-31.928	32.058	3435.315	3417.775	0.333
Wind 240 deg - Ice		-39.078	22.694	2432.468	4182.331	0.201
Wind 270 deg - Ice		-45.085	0.068	9.081	4823.883	-0.094
Wind 300 deg - Ice		-39.011	-22.576	-2416.776	4173.115	-0.364
Wind 315 deg - Ice		-31.832	-31.963	-3422.552	3404.741	-0.466
Wind 330 deg - Ice		-22.484	-39.171	-4195.096	2404.400	-0.537
Total Weight	50.241			-0.160	0.628	
Wind 0 deg - Service		0.031	-19.438	-2068.898	-3.641	-0.262
Wind 30 deg - Service		9.701	-16.850	-1793.874	-1031.020	-0.202
Wind 45 deg - Service		13.703	-13.767	-1465.997	-1456.133	-0.151
Wind 60 deg - Service		16.771	-9.746	-1038.226	-1781.971	-0.089
Wind 90 deg - Service		19.348	-0.031	-4.429	-2055.275	0.049
Wind 120 deg - Service		16.740	9.692	1030.512	-1777.702	0.173
Wind 135 deg - Service		13.659	13.723	1459.640	-1450.096	0.219
Wind 150 deg - Service		9.647	16.818	1789.285	-1023.626	0.251
Wind 180 deg - Service		-0.031	19.438	2068.577	4.897	0.262
Wind 210 deg - Service		-9.701	16.850	1793.554	1032.277	0.202
Wind 225 deg - Service		-13.703	13.767	1465.677	1457.390	0.151
Wind 240 deg - Service		-16.771	9.746	1037.906	1783.227	0.089
Wind 270 deg - Service		-19.348	0.031	4.109	2056.532	-0.049
Wind 300 deg - Service		-16.740	-9.692	-1030.832	1778.958	-0.173
Wind 315 deg - Service		-13.659	-13.723	-1459.960	1451.353	-0.219
Wind 330 deg - Service		-9.647	-16.818	-1789.605	1024.883	-0.251

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 96.37	Pole	Max Tension	6	0.000	0.000	0.000
			Max. Compression	18	-23.621	0.880	0.136
			Max. Mx	14	-15.351	920.439	-2.766
			Max. My	2	-15.320	-2.316	929.778
			Max. Vy	14	-31.199	920.439	-2.766
			Max. Vx	2	-31.438	-2.316	929.778
			Max. Torque	2			0.691
L2	96.37 - 47.7	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-41.263	0.880	0.136
			Max. Mx	14	-30.170	2832.485	-6.701
			Max. My	2	-30.152	-6.219	2853.139
			Max. Vy	14	-46.256	2832.485	-6.701
			Max. Vx	2	-46.494	-6.219	2853.139
			Max. Torque	2			0.690
L3	47.7 - 1	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-61.544	0.880	0.136
			Max. Mx	14	-50.203	5388.806	-11.055
			Max. My	2	-50.203	-10.568	5422.002
			Max. Vy	14	-49.568	5388.806	-11.055
			Max. Vx	2	-49.800	-10.568	5422.002
			Max. Torque	2			0.688

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	19	61.544	-0.068	45.270
	Max. H_x	14	50.241	49.530	-0.080
	Max. H_z	2	50.241	-0.080	49.762
	Max. M_x	2	5422.002	-0.080	49.762
	Max. M_z	6	5387.494	-49.530	0.080
	Max. Torsion	2	0.688	-0.080	49.762
	Min. Vert	1	50.241	0.000	0.000
	Min. H_x	6	50.241	-49.530	0.080
	Min. H_z	10	50.241	0.080	-49.762
	Min. M_x	10	-5421.667	0.080	-49.762
	Min. M_z	14	-5388.806	49.530	-0.080
	Min. Torsion	10	-0.686	0.080	-49.762

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	50.241	0.000	0.000	-0.160	0.628	0.000
Dead+Wind 0 deg - No Ice	50.241	0.080	-49.762	-5422.002	-10.568	-0.688
Dead+Wind 30 deg - No Ice	50.241	24.835	-43.135	-4701.227	-2703.095	-0.538
Dead+Wind 45 deg - No Ice	50.241	35.080	-35.244	-3841.934	-3817.229	-0.405
Dead+Wind 60 deg - No Ice	50.241	42.935	-24.950	-2720.829	-4671.193	-0.244
Dead+Wind 90 deg - No Ice	50.241	49.530	-0.080	-11.393	-5387.494	0.114
Dead+Wind 120 deg - No Ice	50.241	42.854	24.811	2701.075	-4660.012	0.441
Dead+Wind 135 deg - No Ice	50.241	34.966	35.130	3825.765	-3801.396	0.565

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 150 deg - No Ice	50.241	24.696	43.055	4689.710	-2683.680	0.650
Dead+Wind 180 deg - No Ice	50.241	-0.080	49.762	5421.667	11.879	0.686
Dead+Wind 210 deg - No Ice	50.241	-24.835	43.135	4700.892	2704.408	0.539
Dead+Wind 225 deg - No Ice	50.241	-35.080	35.244	3841.598	3818.542	0.407
Dead+Wind 240 deg - No Ice	50.241	-42.935	24.950	2720.492	4672.506	0.247
Dead+Wind 270 deg - No Ice	50.241	-49.530	0.080	11.055	5388.806	-0.112
Dead+Wind 300 deg - No Ice	50.241	-42.854	-24.811	-2701.413	4661.323	-0.442
Dead+Wind 315 deg - No Ice	50.241	-34.966	-35.130	-3826.101	3802.707	-0.567
Dead+Wind 330 deg - No Ice	50.241	-24.696	-43.055	-4690.046	2684.991	-0.653
Dead+Ice+Temp	61.544	0.000	0.000	-0.136	0.880	0.000
Dead+Wind 0 deg+Ice+Temp	61.544	0.068	-45.270	-5005.468	-8.620	-0.591
Dead+Wind 30 deg+Ice+Temp	61.544	22.601	-39.239	-4339.658	-2496.380	-0.470
Dead+Wind 45 deg+Ice+Temp	61.544	31.928	-32.058	-3546.208	-3525.864	-0.359
Dead+Wind 60 deg+Ice+Temp	61.544	39.078	-22.694	-2511.097	-4315.013	-0.224
Dead+Wind 90 deg+Ice+Temp	61.544	45.085	-0.068	-9.702	-4977.208	0.082
Dead+Wind 120 deg+Ice+Temp	61.544	39.011	22.576	2494.272	-4305.488	0.365
Dead+Wind 135 deg+Ice+Temp	61.544	31.832	31.963	3532.432	-3512.380	0.474
Dead+Wind 150 deg+Ice+Temp	61.544	22.484	39.171	4329.843	-2479.847	0.551
Dead+Wind 180 deg+Ice+Temp	61.544	-0.068	45.270	5005.179	10.492	0.590
Dead+Wind 210 deg+Ice+Temp	61.544	-22.601	39.239	4339.368	2498.253	0.471
Dead+Wind 225 deg+Ice+Temp	61.544	-31.928	32.058	3545.917	3527.737	0.361
Dead+Wind 240 deg+Ice+Temp	61.544	-39.078	22.694	2510.806	4316.885	0.226
Dead+Wind 270 deg+Ice+Temp	61.544	-45.085	0.068	9.410	4979.080	-0.081
Dead+Wind 300 deg+Ice+Temp	61.544	-39.011	-22.576	-2494.563	4307.358	-0.366
Dead+Wind 315 deg+Ice+Temp	61.544	-31.832	-31.963	-3532.722	3514.250	-0.476
Dead+Wind 330 deg+Ice+Temp	61.544	-22.484	-39.171	-4330.133	2481.718	-0.553
Dead+Wind 0 deg - Service	50.241	0.031	-19.438	-2119.976	-3.729	-0.271
Dead+Wind 30 deg - Service	50.241	9.701	-16.850	-1838.170	-1056.441	-0.212
Dead+Wind 45 deg - Service	50.241	13.703	-13.767	-1502.203	-1492.035	-0.160
Dead+Wind 60 deg - Service	50.241	16.771	-9.746	-1063.875	-1825.905	-0.096
Dead+Wind 90 deg - Service	50.241	19.348	-0.031	-4.558	-2105.944	0.045
Dead+Wind 120 deg - Service	50.241	16.740	9.692	1055.937	-1821.519	0.174
Dead+Wind 135 deg - Service	50.241	13.659	13.723	1495.661	-1485.830	0.222
Dead+Wind 150 deg - Service	50.241	9.647	16.818	1833.447	-1048.840	0.256
Dead+Wind 180 deg - Service	50.241	-0.031	19.438	2119.639	5.049	0.270
Dead+Wind 210 deg - Service	50.241	-9.701	16.850	1837.833	1057.761	0.212
Dead+Wind 225 deg - Service	50.241	-13.703	13.767	1501.866	1493.355	0.160
Dead+Wind 240 deg - Service	50.241	-16.771	9.746	1063.538	1827.225	0.097
Dead+Wind 270 deg - Service	50.241	-19.348	0.031	4.221	2107.264	-0.044
Dead+Wind 300 deg - Service	50.241	-16.740	-9.692	-1056.274	1822.838	-0.174
Dead+Wind 315 deg - Service	50.241	-13.659	-13.723	-1495.998	1487.150	-0.223
Dead+Wind 330 deg - Service	50.241	-9.647	-16.818	-1833.783	1050.160	-0.257

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.000	-50.241	0.000	0.000	50.241	0.000	0.000%
2	0.080	-50.241	-49.762	-0.080	50.241	49.762	0.000%
3	24.835	-50.241	-43.135	-24.835	50.241	43.135	0.000%
4	35.080	-50.241	-35.244	-35.080	50.241	35.244	0.000%
5	42.935	-50.241	-24.950	-42.935	50.241	24.950	0.000%
6	49.530	-50.241	-0.080	-49.530	50.241	0.080	0.000%
7	42.854	-50.241	24.811	-42.854	50.241	-24.811	0.000%
8	34.966	-50.241	35.130	-34.966	50.241	-35.130	0.000%
9	24.696	-50.241	43.055	-24.696	50.241	-43.055	0.000%
10	-0.080	-50.241	49.762	0.080	50.241	-49.762	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
11	-24.835	-50.241	43.135	24.835	50.241	-43.135	0.000%
12	-35.080	-50.241	35.244	35.080	50.241	-35.244	0.000%
13	-42.935	-50.241	24.950	42.935	50.241	-24.950	0.000%
14	-49.530	-50.241	0.080	49.530	50.241	-0.080	0.000%
15	-42.854	-50.241	-24.811	42.854	50.241	24.811	0.000%
16	-34.966	-50.241	-35.130	34.966	50.241	35.130	0.000%
17	-24.696	-50.241	-43.055	24.696	50.241	43.055	0.000%
18	0.000	-61.544	0.000	0.000	61.544	0.000	0.000%
19	0.068	-61.544	-45.270	-0.068	61.544	45.270	0.000%
20	22.601	-61.544	-39.239	-22.601	61.544	39.239	0.000%
21	31.928	-61.544	-32.058	-31.928	61.544	32.058	0.000%
22	39.078	-61.544	-22.694	-39.078	61.544	22.694	0.000%
23	45.085	-61.544	-0.068	-45.085	61.544	0.068	0.000%
24	39.011	-61.544	22.576	-39.011	61.544	-22.576	0.000%
25	31.832	-61.544	31.963	-31.832	61.544	-31.963	0.000%
26	22.484	-61.544	39.171	-22.484	61.544	-39.171	0.000%
27	-0.068	-61.544	45.270	0.068	61.544	-45.270	0.000%
28	-22.601	-61.544	39.239	22.601	61.544	-39.239	0.000%
29	-31.928	-61.544	32.058	31.928	61.544	-32.058	0.000%
30	-39.078	-61.544	22.694	39.078	61.544	-22.694	0.000%
31	-45.085	-61.544	0.068	45.085	61.544	-0.068	0.000%
32	-39.011	-61.544	-22.576	39.011	61.544	22.576	0.000%
33	-31.832	-61.544	-31.963	31.832	61.544	31.963	0.000%
34	-22.484	-61.544	-39.171	22.484	61.544	39.171	0.000%
35	0.031	-50.241	-19.438	-0.031	50.241	19.438	0.000%
36	9.701	-50.241	-16.850	-9.701	50.241	16.850	0.000%
37	13.703	-50.241	-13.767	-13.703	50.241	13.767	0.000%
38	16.771	-50.241	-9.746	-16.771	50.241	9.746	0.000%
39	19.348	-50.241	-0.031	-19.348	50.241	0.031	0.000%
40	16.740	-50.241	9.692	-16.740	50.241	-9.692	0.000%
41	13.659	-50.241	13.723	-13.659	50.241	-13.723	0.000%
42	9.647	-50.241	16.818	-9.647	50.241	-16.818	0.000%
43	-0.031	-50.241	19.438	0.031	50.241	-19.438	0.000%
44	-9.701	-50.241	16.850	9.701	50.241	-16.850	0.000%
45	-13.703	-50.241	13.767	13.703	50.241	-13.767	0.000%
46	-16.771	-50.241	9.746	16.771	50.241	-9.746	0.000%
47	-19.348	-50.241	0.031	19.348	50.241	-0.031	0.000%
48	-16.740	-50.241	-9.692	16.740	50.241	9.692	0.000%
49	-13.659	-50.241	-13.723	13.659	50.241	13.723	0.000%
50	-9.647	-50.241	-16.818	9.647	50.241	16.818	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00005898
3	Yes	5	0.00000001	0.00011274
4	Yes	5	0.00000001	0.00012508
5	Yes	5	0.00000001	0.00011372
6	Yes	4	0.00000001	0.00003954
7	Yes	5	0.00000001	0.00011300
8	Yes	5	0.00000001	0.00012409
9	Yes	5	0.00000001	0.00011149
10	Yes	4	0.00000001	0.00009828
11	Yes	5	0.00000001	0.00011448

12	Yes	5	0.00000001	0.00012518
13	Yes	5	0.00000001	0.00011307
14	Yes	4	0.00000001	0.00005063
15	Yes	5	0.00000001	0.00011176
16	Yes	5	0.00000001	0.00012426
17	Yes	5	0.00000001	0.00011370
18	Yes	4	0.00000001	0.00000001
19	Yes	5	0.00000001	0.00007225
20	Yes	5	0.00000001	0.00027157
21	Yes	5	0.00000001	0.00030659
22	Yes	5	0.00000001	0.00027310
23	Yes	5	0.00000001	0.00007201
24	Yes	5	0.00000001	0.00027102
25	Yes	5	0.00000001	0.00030415
26	Yes	5	0.00000001	0.00026886
27	Yes	5	0.00000001	0.00007236
28	Yes	5	0.00000001	0.00027432
29	Yes	5	0.00000001	0.00030696
30	Yes	5	0.00000001	0.00027231
31	Yes	5	0.00000001	0.00007207
32	Yes	5	0.00000001	0.00026958
33	Yes	5	0.00000001	0.00030467
34	Yes	5	0.00000001	0.00027221
35	Yes	4	0.00000001	0.00002674
36	Yes	4	0.00000001	0.00042271
37	Yes	4	0.00000001	0.00049233
38	Yes	4	0.00000001	0.00042986
39	Yes	4	0.00000001	0.00002219
40	Yes	4	0.00000001	0.00042593
41	Yes	4	0.00000001	0.00048545
42	Yes	4	0.00000001	0.00041492
43	Yes	4	0.00000001	0.00002940
44	Yes	4	0.00000001	0.00043615
45	Yes	4	0.00000001	0.00049368
46	Yes	4	0.00000001	0.00042558
47	Yes	4	0.00000001	0.00002275
48	Yes	4	0.00000001	0.00041757
49	Yes	4	0.00000001	0.00048765
50	Yes	4	0.00000001	0.00043196

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 96.37	33.349	44	1.891	0.001
L2	101.62 - 47.7	15.498	44	1.473	0.001
L3	54.283 - 1	4.242	44	0.732	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.000	Falls Village Branch 1	44	32.167	1.871	0.001	37169
139.000	Site Pro RMV12	44	29.027	1.817	0.001	16895

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
138.750	Site Pro RMV12	44	28.930	1.815	0.001	16519
138.500	Site Pro RMV12	44	28.832	1.813	0.001	16160
137.000	HPA-65R-BUU-H8	44	28.248	1.803	0.001	14295
135.500	Site Pro RMV12-472	44	27.666	1.792	0.001	12816
135.250	Site Pro RMV12-472	44	27.569	1.790	0.001	12599
135.000	Site Pro RMV12-472	44	27.472	1.789	0.001	12389
127.000	Falls Village Branch 3	44	24.414	1.728	0.001	8079
117.000	Falls Village Branch 3	44	20.728	1.641	0.001	5630
107.000	Falls Village Branch 2	44	17.255	1.538	0.001	4320
97.000	Falls Village Branch 2	44	14.060	1.412	0.000	3740
87.000	Falls Village Branch 2	44	11.184	1.266	0.000	3541
77.000	Falls Village Branch 2	44	8.648	1.106	0.000	3362
67.000	Falls Village Branch 1	44	6.469	0.940	0.000	3200

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 96.37	85.167	2	4.831	0.003
L2	101.62 - 47.7	39.599	2	3.765	0.001
L3	54.283 - 1	10.846	11	1.873	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.000	Falls Village Branch 1	2	82.149	4.780	0.004	14726
139.000	Site Pro RMV12	2	74.136	4.642	0.003	6693
138.750	Site Pro RMV12	2	73.887	4.638	0.003	6544
138.500	Site Pro RMV12	2	73.638	4.633	0.003	6402
137.000	HPA-65R-BUU-H8	2	72.148	4.606	0.003	5663
135.500	Site Pro RMV12-472	2	70.662	4.579	0.003	5076
135.250	Site Pro RMV12-472	2	70.415	4.575	0.003	4990
135.000	Site Pro RMV12-472	2	70.168	4.570	0.003	4907
127.000	Falls Village Branch 3	2	62.360	4.416	0.003	3199
117.000	Falls Village Branch 3	2	52.951	4.195	0.002	2227
107.000	Falls Village Branch 2	2	44.086	3.930	0.002	1707
97.000	Falls Village Branch 2	2	35.927	3.610	0.001	1476
87.000	Falls Village Branch 2	11	28.584	3.236	0.001	1395
77.000	Falls Village Branch 2	11	22.105	2.827	0.001	1322
67.000	Falls Village Branch 1	11	16.537	2.403	0.001	1256

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	150 - 96.37 (1)	TP37.69x25x0.313	53.630	0.000	0.0	39.000	35.842	-15.319	1397.820	0.011
L2	96.37 - 47.7 (2)	TP48.45x35.823x0.438	53.920	0.000	0.0	39.000	64.531	-30.152	2516.690	0.012
L3	47.7 - 1 (3)	TP58.5x46.033x0.563	53.283	0.000	0.0	39.000	103.440	-50.203	4034.170	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	150 - 96.37 (1)	TP37.69x25x0.313	929.867	34.942	39.000	0.896	0.000	0.000	39.000	0.000
L2	96.37 - 47.7 (2)	TP48.45x35.823x0.438	2853.800	46.350	39.000	1.188	0.000	0.000	39.000	0.000
L3	47.7 - 1 (3)	TP58.5x46.033x0.563	5423.300	44.088	39.000	1.130	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	150 - 96.37 (1)	TP37.69x25x0.313	31.450	0.877	26.000	0.067	0.541	0.010	26.000	0.000
L2	96.37 - 47.7 (2)	TP48.45x35.823x0.438	46.506	0.721	26.000	0.055	0.540	0.004	26.000	0.000
L3	47.7 - 1 (3)	TP58.5x46.033x0.563	49.812	0.482	26.000	0.037	0.539	0.002	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 96.37 (1)	0.011	0.896	0.000	0.067	0.000	0.908 ✔	1.333	H1-3+VT ✔
L2	96.37 - 47.7 (2)	0.012	1.188	0.000	0.055	0.000	1.201 ✔	1.333	H1-3+VT ✔
L3	47.7 - 1 (3)	0.012	1.130	0.000	0.037	0.000	1.143 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	150 - 96.37	Pole	TP37.69x25x0.313	1	-15.319	1863.294	68.1	Pass
L2	96.37 - 47.7	Pole	TP48.45x35.823x0.438	2	-30.152	3354.748	90.1	Pass
L3	47.7 - 1	Pole	TP58.5x46.033x0.563	3	-50.203	5377.548	85.8	Pass
							Summary	
						Pole (L2)	90.1	Pass
						RATING =	**90.1**	**Pass**

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Subject:		Anchor Bolt and Baseplate Analysis
Location:		157-ft EEI Monopine Canaan, CT
Rev. 2: 2/03/14		Prepared by: T.J.L. Checked by: C.F.C. Job No. 13292

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 5423 \cdot ft \cdot kips$	(Input From RisaTower)
Shear Force =	$Shear := 50 \cdot kips$	(Input From RisaTower)
Axial Force =	$Axial := 50 \cdot kips$	(Input From RisaTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	$N := 24$	(User Input)
Diameter of Bolt Circle =	$D_{bc} := 66 \cdot in$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strenght =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yeild Strenght =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Base Plate Data:

Use ASTM A572 Grade 50

Plate Yield Strength =	$Fy_{bp} := 50 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{bp} := 3.0 \cdot in$	(User Input)
Base Plate Diameter =	$D_{bp} := 72 \cdot in$	(User Input)
Outer Pole Diameter =	$D_{pole} := 58.5 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 33 \cdot in$

Distance to Bolts = $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N} \right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 8.54 \cdot in$ $d_7 = 31.88 \cdot in$

$d_2 = 16.50 \cdot in$ $d_8 = 28.58 \cdot in$

$d_3 = 23.33 \cdot in$ $d_9 = 23.33 \cdot in$

$d_4 = 28.58 \cdot in$ $d_{10} = 16.50 \cdot in$

$d_5 = 31.88 \cdot in$ $d_{11} = 8.54 \cdot in$

$d_6 = 33.00 \cdot in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 29.3 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 2.63 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 0.00 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 0.00 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 2.63 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 3.75 \cdot in$ etc

Effective Width of Baseplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 33.6 \cdot in$

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 1.307 \times 10^4 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 162.3 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u\right) = 174.9 \cdot kips$ (1.333 increase allowed per TIA/EIA)

$T_{ALL.Net} := 1.333 \cdot \left(0.60 \cdot A_n \cdot F_y\right) = 194.812 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 83.3 \cdot \%$ Bolts are "upset bolts". Use net area per AISC

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Net}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N}\right) \cdot l = 0.521 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 7.6 \cdot ksi$

Allowable Bending Stress = $F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot ksi$ (1.333 increase allowed per TIA/EIA)

Check Combined Stress Requirement:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required.

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot in$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot ksi$$

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{R_{bc}}{l_p} + \frac{Axial}{N} = 166.4 \cdot kips$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 51.2 \cdot ksi$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^{\,2}}\right] \cdot F_y}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^{\,3}}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} = 45 \cdot ksi$$

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \cdot ksi$$

(1.333 increase allowed per TIA/EIA)

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) = 85.4 \cdot \%$$

Condition 2 =

$$Condition2 := if\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$$

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 44.6 \cdot kips$ $C_7 = 160.8 \cdot kips$

$C_2 = 84.2 \cdot kips$ $C_8 = 144.4 \cdot kips$

$C_3 = 118.3 \cdot kips$ $C_9 = 118.3 \cdot kips$

$C_4 = 144.4 \cdot kips$ $C_{10} = 84.2 \cdot kips$

$C_5 = 160.8 \cdot kips$ $C_{11} = 44.6 \cdot kips$

$C_6 = 166.4 \cdot kips$ etc.

Maximum Bending Stress in Plate = $f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} \cdot t_{bp}^2\right)} = 29.2 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 49.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 58.5 \cdot \%$

Condition3 = $Condition3 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

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Subject:	Foundation Analysis
Location:	157-ft EEI Monopine Canaan, CT
Rev. 2: 2/03/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 13292

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 5423 \cdot ft \cdot kips$	(User Input from RISATower)	
Shear Force =	$Shear := 50 \cdot kip$	(User Input from RISATower)	
Axial Force =	$Axial := 50 \cdot kip$	(User Input from RISATower)	
Tower Height =	$H_t := 157 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 5.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 3.0 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 1.0 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 7.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 3.0 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 30.0 \cdot ft$	(User Input)	

Anchor Bolt Data:

Length of Anchor Bolts =	$L_{st} := 72 \cdot in$	(User Input)	
Projection of Anchor Bolts Above Pier =	$A_{BP} := 12.0 \cdot in$	(User Input)	
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)	
Base Plate Bolt Circle =	$MP := 66.0 \cdot in$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 5000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 53$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.5 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 7$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.875 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 46$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 7$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 0.875 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 90$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =
$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$$

Pad Top Reinforcement Bar Area =
$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.601 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =
$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.601 \cdot in^2$$

Coefficient of Lateral Soil Pressure =
$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$$

Load Factor =
$$LF := \begin{cases} 1.333 & \text{if } H_t \le 700 \cdot ft \\ 1.7 & \text{if } H_t \ge 1200 \cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft}\right) \cdot 0.4 & \text{otherwise} \end{cases} = 1.333$$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if\left(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}\right) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if\left(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}\right) = 120 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot \left(D_f - T_f\right) + c \cdot 2 \cdot \sqrt{K_p} = 0.849 \cdot ksf$

$P_{top} := if\left[n < \left(D_f - T_f\right), P_{pt}, P_{pn}\right] = 0.849 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.122 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.486 \cdot ksf$

$T_p := if\left[n < \left(D_f - T_f\right), T_f, \left(D_f - n\right)\right] = 3$

$A_p := W_f \cdot T_p = 90$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 133.704 \cdot kip$

Weight of Concrete Pad = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 \cdot L_p\right] \cdot \gamma_c = 427.05 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left(W_f^2 - d_p^2\right) \cdot \begin{cases} \left(L_p - L_{pag} - n\right) & \text{if } \left(L_p - L_{pag} - n\right) \geq 0 \\ 0 & \text{if } \left(L_p - L_{pag} - n\right) \leq 0 \end{cases}\right] \cdot \gamma_s = 204.24 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left(\frac{D_f^2 \cdot \tan\left(\Phi_s\right)}{2} \cdot W_f\right) \cdot \gamma_s = 30.353 \cdot kip$

Weight of Soil Wedge at back face Corners = $WT_{s3} := 2 \cdot \left[\left(D_f\right)^3 \cdot \frac{\tan\left(\Phi_s\right)}{3}\right] \cdot \gamma_s = 6.745 \cdot kips$

Total Weight = $WT_{tot} := WT_c + WT_{s1} + Axial = 681.29 \cdot kip$

Resisting Moment = $M_r := \left(WT_{tot}\right) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + \left[\left(WT_{s2} + WT_{s3}\right) \cdot \left(W_f + \frac{D_f \cdot \tan\left(\Phi_s\right)}{3}\right)\right] = 11508 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + Shear \cdot \left(L_p + T_f\right) = 5723 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.01$

Factor of Safety Required = $FS_{req} := 2$

$OverTurning\_Moment\_Check := if\left(FS \geq FS_{req}, "Okay", "No Good"\right)$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{\mu \cdot WT_{tot}}{FS_{req}} = 153.29 \cdot kips$

$Shear\_Check := if(S_p > Shear, "Okay", "No Good")$

$Shear\_Check = "Okay"$

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^2 = 900$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 4500 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{(WT_c + Axial)}{A_{mat}} + \frac{M_{ot}}{S} = 1.802 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < q_s, "Okay", "No Good")$

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{(WT_c + Axial)}{A_{mat}} - \frac{M_{ot}}{S} = -0.742 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < q_s), "Okay", "No Good"]$

$Min\_Pressure\_Check = "No Good"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 7.084$

Distance to Kern = $X_k := \frac{W_f}{6} = 5$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 8.4$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot (WT_c + Axial)}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.606 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 1.606 \cdot ksf$

$Pressure\_Check := if(q_{adj} < q_s, "Okay", "No Good")$

$Pressure\_Check = "Okay"$

Section 1 - RFDS GENERAL INFORMATION

RFDS NAME:	s2413	DATE:	2/3/2013	RF DESIGN ENG:	Radu Alecsandru	RF PERF ENG:	
ISSUE:	Pre-construction	Approved? (Y/N)	Y	RF DESIGN PHONE:	ra9161@att.com	RF PERF PHONE:	
REVISION:	V04	RF MANAGER:	Cameron Syme	RF DESIGN EMAIL:	860-513-7598	RF PERF EMAIL:	
INITIATIVE / PROJECT:	Pre-construction RFDS for leasing and zoning purposes, general design. It is not the finalized location, CL and azimuths. RRU positioning may be different based on the structural analysis.					TRIDENT:	
						GSM FREQUENCY:	
						UMTS FREQUENCY:	
						LTE FREQUENCY:	
						I-PLAN JOB NUMBER:	

Section 2 - LOCATION INFORMATION

USID:		FA LOCATION CODE:		LOCATION NAME:	Canaan - Route 7 South	ORACLE PROJECT #:	
REGION:	NE	MARKET CLUSTER:	CT	MARKET:	NER	SEARCH RING NAME:	Canaan - Route 7 South
ADDRESS:.	188 Route 7 South	CITY:	Canaan	STATE:	CT	SEARCH RING ID:	s2413
ZIP CODE:		COUNTY:		MSA/RSA:		BTA:	
LATITUDE (D-M-S):	41°56'40.4"N	LONGITUDE (D-M-S):	73°21'37.7"W	LAT (DEC. DEG.):		LONG (DEC. DEG.):	
DIRECTIONS, ACCESS AND EQUIPMENT LOCATION:						BORDER CELL WITH CONTOUR COORD:	
						AM STUDY REQ'D (Y/N):	
						FREQ COORD:	

Section 3 - LICENSE COVERAGE/FILING INFORMATION

CGSA - NO FILING TRIGGERED:		CGSA LOSS:		PCS REDUCED - UPS ZIP:	
CGSA - MINOR FILING NEEDED:		CGSA EXT AGMT NEEDED:		PCS POPS REDUCED:	
CGSA - MAJOR FILING NEEDED:		CGSA SCORECARD UPDATED:			

Section 4 - TOWER/REGULATORY INFORMATION

STRUCTURE AT&T OWNED?:		GROUND ELEVATION:		STRUCTURE TYPE:		MARKET LOCATION 850 MHZ CALL SIGN(S):	
ADDTIONAL REGULATORY?:		HEIGHT OVERALL:		FCC ASR NUMBER:		MARKET LOCATION 1900 MHZ CALL SIGN(S):	
SUB-LEASE RIGHTS?:		STRUCTURE HEIGHT:				MARKET LOCATION 700 MHZ CALL SIGN(S):	
LIGHTING TYPE:						MARKET LOCATION AWS MHZ CALL SIGN(S):	

Section 5 - E-911 INFORMATION

	PSAP NAME:	PSAP ID:	E911 PHASE:	MPC SVC PROVIDER:	LMU REQUIRED:	ESRN:	DATE LIVE PH1:	DATE LIVE PH2:
ALPHA								
BETA								
GAMMA								
DELTA								
EPSILON								
PSI								

Section 6 - RBS GENERAL INFORMATION

4-DIGIT SITE ID:	s2413	COW OR TOY?:	No	CELLULAR NETWORK:		DISASTER PRIORITY:	
CELL SITE TYPE:	Sectorized	SITE TYPE:		OPS DISTRICT:		OPS ZONE:	
BTS LOCATION ID:		ORIGINATING CO:		RF DISTRICT:		RF ZONE:	

Section 7 - RBS SPECIFIC INFORMATION

	GSM RBSs	UMTS 1ST CARRIER RBSs	UMTS 2ND CARRIER RBSs	UMTS 3RD CARRIER RBSs	UMTS 4TH CARRIER RBSs	LTE RBSs
MSC						
BSC/RNC						
LAC						
RAC						
EQUIPMENT VENDOR						
EQUIPMENT TYPE						
LOCATION						
CABINET LOCATION						

Section 8 - RBS INDIVIDUAL INFORMATION

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
CELL ID/BCF												
CTS COMMON ID												

Section 9 - SOFT SECTOR ID

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
ALPHA (OR OMNI)												
BETA												
GAMMA												
DELTA												
EPSILON												
PSI												

Section 10 - CID/SAC

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
ALPHA (OR OMNI)												
BETA												
GAMMA												
DELTA												
EPSILON												
PSI												

Section 11 - CURRENT RADIO COUNTS (Existing)

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
ALPHA (OR OMNI)												
BETA												
GAMMA												
DELTA												
EPSILON												
PSI												

Section 12 - CURRENT T1 COUNTS (Existing)

	GSM 1st Cabinet	GSM 2nd Cabinet	UMTS 1st Cabinet	UMTS 2nd Cabinet	LTE 1st Cabinet	LTE 2nd Cabinet
# T1s						
LINK PROFILE						
FIBER or ETHERNET?						
Tx Board Model						
Tx Board QTY						
RAX/ECU Board Model						
RAX/ECU Board QTY						
BBU Board Model						
BBU Board QTY						
RRU - location						

Section 13 - NEW/PROPOSED RADIO COUNTS

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
ALPHA (OR OMNI)												
BETA												
GAMMA												
DELTA												
EPSILON												
PSI												

Section 14 - NEW/PROPOSED T1 COUNTS

	GSM 1st Cabinet	GSM 2nd Cabinet	UMTS 1st Cabinet	UMTS 2nd Cabinet	LTE 1st Cabinet	LTE 2nd Cabinet
# T1s						
LINK PROFILE						
FIBER or ETHERNET?						
Tx Board Model						
Tx Board QTY						
RAX/ECU Board Model						
RAX/ECU Board QTY						
BBU Board Model						
BBU Board QTY						
RRU - location						

Section 15A - CURRENT SECTOR/CELL INFORMATION - ALPHA (OR OMNI)

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?					
TECHNOLOGY					
FEEDERS (# /TYPE/LENGTH)					
ANTENNA MAKE - MODEL					
ANTENNA VENDOR					
ANTENNA SIZE H"xW"xD"					
ANTENNA WEIGHT					
ANTENNA GAIN					
AZIMUTH					
RADIATION CENTER					
ANTENNA TIP HEIGHT					
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)					
MECHANICAL DOWNTILT					
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
TMA/LNA (TYPE/MODEL)					
CURRENT INJECTORS FOR TMA					
CURRENT INJCTR POWER CABLE					
ANTENNA SHARING KIT?					
BAS Filter					
DIPLEXER (QTY/MODEL)					
DUPLEXER (QTY/MODEL)					
SURGE ARRESTOR (QTY/MODEL)					
DC BLOCK (QTY/MODEL)					
RET EQUIPMENT (QTY/MODEL)					
1900 PDU FOR TMAS					

Section 15B - CURRENT SECTOR/CELL INFORMATION - BETA

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?					
TECHNOLOGY					
FEEDERS (# /TYPE/LENGTH)					
ANTENNA MAKE - MODEL					
ANTENNA VENDOR					
ANTENNA SIZE H"xW"xD"					
ANTENNA WEIGHT					
ANTENNA GAIN					
AZIMUTH					
RADIATION CENTER					
ANTENNA TIP HEIGHT					
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)					
MECHANICAL DOWNTILT					
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
TMA/LNA (TYPE/MODEL)					
CURRENT INJECTORS FOR TMA					
CURRENT INJCTR POWER CABLE					
ANTENNA SHARING KIT?					
BAS Filter					
DIPLEXER (QTY/MODEL)					
DUPLEXER (QTY/MODEL)					
SURGE ARRESTOR (QTY/MODEL)					
DC BLOCK (QTY/MODEL)					
RET EQUIPMENT (QTY/MODEL)					
1900 PDU FOR TMAS					

Section 15C - CURRENT SECTOR/CELL INFORMATION - GAMMA

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?					
TECHNOLOGY					
FEEDERS (# /TYPE/LENGTH)					
ANTENNA MAKE - MODEL					
ANTENNA VENDOR					
ANTENNA SIZE H"xW"xD"					
ANTENNA WEIGHT					
ANTENNA GAIN					
AZIMUTH					
RADIATION CENTER					
ANTENNA TIP HEIGHT					
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)					
MECHANICAL DOWNTILT					
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
TMA/LNA (TYPE/MODEL)					
CURRENT INJECTORS FOR TMA					
CURRENT INJCTR POWER CABLE					
ANTENNA SHARING KIT?					
BAS Filter					
DIPLEXER (QTY/MODEL)					
DUPLEXER (QTY/MODEL)					
SURGE ARRESTOR (QTY/MODEL)					
DC BLOCK (QTY/MODEL)					
RET EQUIPMENT (QTY/MODEL)					
1900 PDU FOR TMAS					

Section 15D - CURRENT SECTOR/CELL INFORMATION - DELTA										
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?										
TECHNOLOGY										
FEEDERS (# /TYPE/LENGTH)										
ANTENNA MAKE - MODEL										
ANTENNA VENDOR										
ANTENNA SIZE H"xW"xD"										
ANTENNA WEIGHT										
ANTENNA GAIN										
AZIMUTH										
RADIATION CENTER										
ANTENNA TIP HEIGHT										
MAGNETIC DECLINATION										
ELECTRICAL TILT (700/850/1900/AWS)										
MECHANICAL DOWNTILT										
SCPA/MCPA?										
MCPA MODULES										
HATCHPLATE POWER (Watts)										
ERP (Watts)										
NARROW BAND LLC (QTY/MODEL)										
HYBRID COMBINER (QTY/MODEL)										
TMA/LNA (TYPE/MODEL)										
CURRENT INJECTORS FOR TMA										
CURRENT INJCTR POWER CABLE										
ANTENNA SHARING KIT?										
BAS Filter										
DIPLEXER (QTY/MODEL)										
DUPLEXER (QTY/MODEL)										
SURGE ARRESTOR (QTY/MODEL)										
DC BLOCK (QTY/MODEL)										
RET EQUIPMENT (QTY/MODEL)										
1900 PDU FOR TMAS										

Section 15E - CURRENT SECTOR/CELL INFORMATION - EPSILON										
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?										
TECHNOLOGY										
FEEDERS (# /TYPE/LENGTH)										
ANTENNA MAKE - MODEL										
ANTENNA VENDOR										
ANTENNA SIZE H"xW"xD"										
ANTENNA WEIGHT										
ANTENNA GAIN										
AZIMUTH										
RADIATION CENTER										
ANTENNA TIP HEIGHT										
MAGNETIC DECLINATION										
ELECTRICAL TILT (700/850/1900/AWS)										
MECHANICAL DOWNTILT										
SCPA/MCPA?										
MCPA MODULES										
HATCHPLATE POWER (Watts)										
ERP (Watts)										
NARROW BAND LLC (QTY/MODEL)										
HYBRID COMBINER (QTY/MODEL)										
TMA/LNA (TYPE/MODEL)										
CURRENT INJECTORS FOR TMA										
CURRENT INJCTR POWER CABLE										
ANTENNA SHARING KIT?										
BAS Filter										
DIPLEXER (QTY/MODEL)										
DUPLEXER (QTY/MODEL)										
SURGE ARRESTOR (QTY/MODEL)										
DC BLOCK (QTY/MODEL)										
RET EQUIPMENT (QTY/MODEL)										
1900 PDU FOR TMAS										

Section 15F - CURRENT SECTOR/CELL INFORMATION - ZETA										
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?										
TECHNOLOGY										
FEEDERS (# /TYPE/LENGTH)										
ANTENNA MAKE - MODEL										
ANTENNA VENDOR										
ANTENNA SIZE H"xW"xD"										
ANTENNA WEIGHT										
ANTENNA GAIN										
AZIMUTH										
RADIATION CENTER										
ANTENNA TIP HEIGHT										
MAGNETIC DECLINATION										
ELECTRICAL TILT (700/850/1900/AWS)										
MECHANICAL DOWNTILT										
SCPA/MCPA?										
MCPA MODULES										
HATCHPLATE POWER (Watts)										
ERP (Watts)										
NARROW BAND LLC (QTY/MODEL)										
HYBRID COMBINER (QTY/MODEL)										
TMA/LNA (TYPE/MODEL)										
CURRENT INJECTORS FOR TMA										
CURRENT INJCTR POWER CABLE										
ANTENNA SHARING KIT?										
BAS Filter										
DIPLEXER (QTY/MODEL)										
DUPLEXER (QTY/MODEL)										
SURGE ARRESTOR (QTY/MODEL)										
DC BLOCK (QTY/MODEL)										
RET EQUIPMENT (QTY/MODEL)										
1900 PDU FOR TMAS										

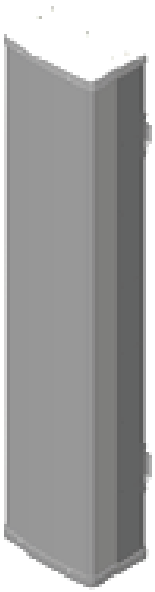
Section 16A - NEW/PROPOSED SECTOR/CELL INFORMATION - ALPHA (OR OMNI)					
ANTENNA CONFIG (FROM BACK):	**ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**
TX/RX?	TBD | TBD	TBD | TBD		TBD | TBD	
TECHNOLOGY	UMTS-DB	LTE-DB		LTE-DB	
FEEDERS (# /TYPE/LENGTH)	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site		2 Optic Fiber w 8 DC lines per site	
ANTENNA MAKE - MODEL	HPA-65R-BUU-H8	OPA-65R-LCUU-H8		HPA-65R-BUU-H8	
ANTENNA VENDOR	CCI	CCI		CCI	
ANTENNA SIZE H"xW"xD"	93 x 15 x 7	93 x 15 x 7		93 x 15 x 7	
ANTENNA WEIGHT	68	95		68	
ANTENNA GAIN	17.4 dBi (high band)	17.4 dBi (high band)		17.4 dBi (high band)	
AZIMUTH	30 °	30 °		30 °	
RADIATION CENTER	140	140 '		140 '	
ANTENNA TIP HEIGHT	144 '	144 '		144 '	
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)	0 °	0 °		0 °	
MECHANICAL DOWNTILT	0 °	0 °		0 °	
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
RRH	850 RRUS11/1900 RRUS12/1900 RRUS-A2	850 RRUS11/700 RRUS-E2/WCS RRUS32/AWS RRUS12/AWS RRUS-A2		700 RRUS11/1900 RRUS12/1900 RRUS-A2	
CURRENT INJECTORS FOR TMA	n/a	n/a		n/a	
CURRENT INJCTR POWER CABLE	n/a	n/a		n/a	
ANTENNA SHARING KIT?	n/a	n/a		n/a	
BAS Filter	n/a	n/a		n/a	
DIPLEXER (QTY/MODEL)	n/a	Kaleus DBC0062F1Vxx-1 x2		n/a	
DUPLEXER (QTY/MODEL)	n/a	n/a		n/a	
SURGE ARRESTOR (QTY/MODEL)	SQUID x 4 per site	SQUID x 4 per site		SQUID x 4 per site	
DC BLOCK (QTY/MODEL)	n/a	n/a		n/a	
RET EQUIPMENT (QTY/MODEL)	Home Run RET cable	n/a		n/a	
1900 PDU FOR TMAS	CCU - Kathrein 860 10006	n/a		n/a	

Section 16B - NEW/PROPOSED SECTOR/CELL INFORMATION - BETA					
ANTENNA CONFIG (FROM BACK):	**ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**
TX/RX?	TBD | TBD	TBD | TBD		TBD | TBD	
TECHNOLOGY	UMTS-DB	LTE-DB		LTE-DB	
FEEDERS (# /TYPE/LENGTH)	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site		2 Optic Fiber w 8 DC lines per site	
ANTENNA MAKE - MODEL	HPA-65R-BUU-H8	OPA-65R-LCUU-H8		HPA-65R-BUU-H8	
ANTENNA VENDOR	CCI	CCI		CCI	
ANTENNA SIZE H"xW"xD"	93 x 15 x 7	93 x 15 x 7		93 x 15 x 7	
ANTENNA WEIGHT	68	95		68	
ANTENNA GAIN	17.4 dBi (high band)	17.4 dBi (high band)		17.4 dBi (high band)	
AZIMUTH	180 °	180 °		180 °	
RADIATION CENTER	140 '	140 '		140 '	
ANTENNA TIP HEIGHT	144 '	144 '		144 '	
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)	0 °	0 °		0 °	
MECHANICAL DOWNTILT	0 °	0 °		0 °	
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
RRH	850 RRUS11/1900 RRUS12/1900 RRUS-A2	850 RRUS11/700 RRUS-E2/WCS RRUS32/AWS RRUS12/AWS RRUS-A2		700 RRUS11/1900 RRUS12/1900 RRUS-A2	
CURRENT INJECTORS FOR TMA	n/a	n/a		n/a	
CURRENT INJCTR POWER CABLE	n/a	n/a		n/a	
ANTENNA SHARING KIT?	n/a	n/a		n/a	
BAS Filter	n/a	n/a		n/a	
DIPLEXER (QTY/MODEL)	n/a	Kaleus DBC0062F1Vxx-1 x2		n/a	
DUPLEXER (QTY/MODEL)	n/a	n/a		n/a	
SURGE ARRESTOR (QTY/MODEL)	SQUID x 4 per site	SQUID x 4 per site		SQUID x 4 per site	
DC BLOCK (QTY/MODEL)	n/a	n/a		n/a	
RET EQUIPMENT (QTY/MODEL)	Home Run RET cable	n/a		n/a	
1900 PDU FOR TMAS	CCU - Kathrein 860 10006	n/a		n/a	

Section 16C - NEW/PROPOSED SECTOR/CELL INFORMATION - GAMMA					
ANTENNA CONFIG (FROM BACK):	**ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**	**ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)**
TX/RX?	TBD | TBD	TBD | TBD		TBD | TBD	
TECHNOLOGY	UMTS-DB	LTE-DB		LTE-DB	
FEEDERS (# /TYPE/LENGTH)	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site		2 Optic Fiber w 8 DC lines per site	
ANTENNA MAKE - MODEL	HPA-65R-BUU-H8	OPA-65R-LCUU-H8		HPA-65R-BUU-H8	
ANTENNA VENDOR	CCI	CCI		CCI	
ANTENNA SIZE H"xW"xD"	93 x 15 x 7	93 x 15 x 7		93 x 15 x 7	
ANTENNA WEIGHT	68	95		68	
ANTENNA GAIN	17.4 dBi (high band)	17.4 dBi (high band)		17.4 dBi (high band)	
AZIMUTH	290 °	290 °		290 °	
RADIATION CENTER	140 '	140 '		140 '	
ANTENNA TIP HEIGHT	144 '	144 '		144 '	
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)	0 °	0 °		0 °	
MECHANICAL DOWNTILT	0 °	0 °		0 °	
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
RRH	850 RRUS11/1900 RRUS12/1900 RRUS-A2	850 RRUS11/700 RRUS-E2/WCS RRUS32/AWS RRUS12/AWS RRUS-A2		700 RRUS11/1900 RRUS12/1900 RRUS-A2	
CURRENT INJECTORS FOR TMA	n/a	n/a		n/a	
CURRENT INJCTR POWER CABLE	n/a	n/a		n/a	
ANTENNA SHARING KIT?	n/a	n/a		n/a	
BAS Filter	n/a	n/a		n/a	
DIPLEXER (QTY/MODEL)	n/a	Kaleus DBC0062F1Vxx-1 x2		n/a	
DUPLEXER (QTY/MODEL)	n/a	n/a		n/a	
SURGE ARRESTOR (QTY/MODEL)	SQUID x 4 per site	SQUID x 4 per site		SQUID x 4 per site	
DC BLOCK (QTY/MODEL)	n/a	n/a		n/a	
RET EQUIPMENT (QTY/MODEL)	Home Run RET cable	n/a		n/a	
1900 PDU FOR TMAS	CCU - Kathrein 860 10006	n/a		n/a	

HexPort Multi-Band Antenna

Model HPA-65R-BUU-H6



The CCI Hexport Multi-Band Antenna Array is an industry first 6-port antenna with full WCS Band Coverage. With four high band ports and two low band ports, our hexport antenna is ready for 4X4 high band MIMO.

Modern networks demand high performance, consequently CCI has incorporated several new and innovative design techniques to provide an antenna with excellent side-lobe performance, sharp elevation beams, and high front to back ratio.

Multiple networks can now be connected to a single antenna, reducing tower loading and leasing expense, while decreasing deployment time and installation cost.

Full band capability for 700 MHz , Cellular 850 MHz, PCS 1900 MHz, AWS 1710/2170 MHz and WCS 2300 MHz coverage in a single enclosure.

Hexport Multi-Band Antenna Array

Benefits

- **Includes WCS Band**
- **Reduces tower loading**
- **Frees up space for tower mounted E-nodes**
- **Single radome with six ports**
- **All Band design simplifies radio assignments**
- **Sharp elevation beam eases network planning**

Features

- High Band Ports include WCS Band
- Four High Band ports with two Low Band ports in one antenna
- Sharp elevation beam
- Excellent elevation side-lobe performance
- Excellent MIMO performance due to array spacing
- Excellent PIM Performance
- A multi-network solution in one radome

Applications

- 4x4 MIMO on High Band and 2x2 MIMO on Low Band
- Adding additional capacity without adding additional antennas
- Adding WCS Band without increasing antenna count

ISO 9001:2008
Quality Management Systems
Système de Qualité
www.ca.sgs.com

HexPort Multi-Band Antenna

Model HPA-65R-BUU-H6

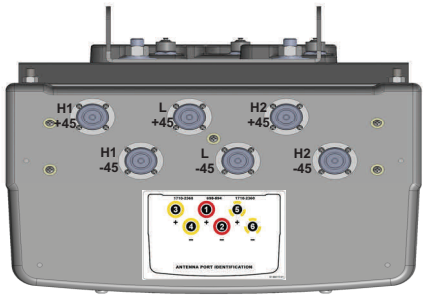
HPA-65R Multi-Band Antenna

Electrical Specifications

Frequency Range	2 X Low Band Ports which cover the full range from 698-894 MHz		4 X High Band Ports which cover the full range from 1710-2360 MHz			
	698-806 MHz	824-894 MHz	1850-1990 MHz	1710-1755/2110-2170 MHz		2305-2360 MHz
Gain	14.1 dBi	14.8 dBi	16.9 dBi	16.3 dBi	17.2 dBi	17.4 dBi
Azimuth Beamwidth (-3dB)	66°	65°	61°	66°	62°	57°
Elevation Beamwidth (-3dB)	12.5°	10.5°	5.7°	6.3°	5.1°	4.5°
Electrical Downtilt	0° to 10°	0° to 10°	0° to 8°	0° to 8°	0° to 8°	0° to 8°
Elevation Sidelobes (1st Upper)	< -17 dB	< -19 dB	< -19 dB	< -18 dB	< -18 dB	< -17 dB
Front-to-Back Ratio @180°	> 30 dB	> 30 dB	> 30 dB	> 30 dB	> 30 dB	> 30 dB
Front-to-Back Ratio over ± 20°	> 30 dB	> 30 dB	> 30 dB	> 30 dB	> 30 dB	> 30 dB
Cross-Polar Discrimination (at Peak)	> 25 dB	> 20 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB
Cross-Polar Discrimination (at ± 60°)	> 17 dB	> 14 dB	> 17 dB	> 17 dB	> 17 dB	> 17 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB	> 26 dB	> 25 dB	> 26 dB	> 26 dB
VSWR	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -150dBc	≤ -150dBc	≤ -150dBc	≤ -150dBc	≤ -150dBc	≤ -150dBc
Input Power	500 Watts CW	500 Watts CW	300 Watts CW	300 Watts CW	300 Watts CW	300 Watts CW
Polarization	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°
Input Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Lightning Protection	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground

Mechanical Specifications

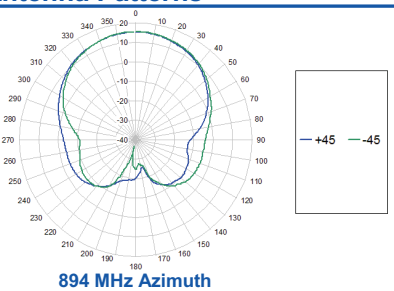
Dimensions (LxWxD)	72.0 x 14.8 x 9.0 inches (1828 x 376 x 229 mm)
Survival Wind Speed	> 150 mph
Front Wind Load	247 lbs (1099 N) @ 100 mph (161 kph)
Side Wind Load	165 lbs (735 N) @ 100 mph (161 kph)
Equivalent Flat Plate Area	9.7 ft^2 (0.90 m^2)
Weight (without Mounting)	51 lbs (23 kg)
RET System Weight	5.0 lbs (2.3 kg)
Connector	6; 7-16 DIN female long neck
Mounting Pole	2-5 inches (5-12 cm)



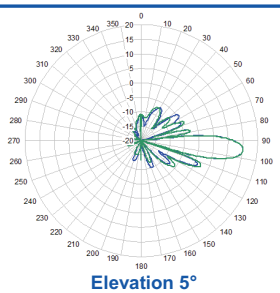
Bottom View

Rear View

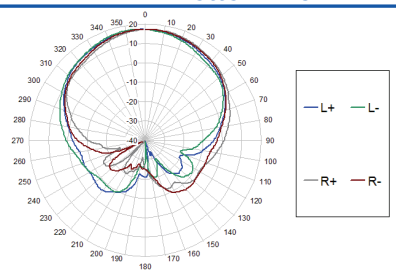
Antenna Patterns*



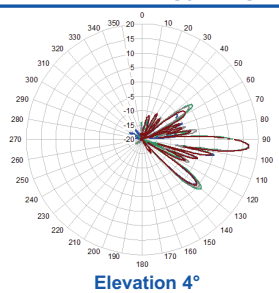
894 MHz Azimuth



Elevation 5°



1920 MHz Azimuth



Elevation 4°

*Typical antenna patterns. For detail information on antenna pattern, please contact us at info@cciproducts.com. All specifications are subject to change without notice.

65° OctoPort Multi-Band Antenna

Model OPA-65R-LCUU-H8

Octoport Multi-Band Antenna Array

The CCI Octoport Multi-Band Antenna Array is an industry first 8-port antenna with full WCS Band Coverage. With four high band ports covering PCS, AWS and WCS bands, two 700 MHZ ports, and two 850 MHz ports our octoport antenna is ready for 4X4 high band MIMO.

Modern networks demand high performance, consequently CCI has incorporated several new and innovative design techniques to provide an antenna with excellent side-lobe performance, sharp elevation beams, and high front to back ratio.

Multiple networks can now be connected to a single antenna, reducing tower loading and leasing expense, while decreasing deployment time and installation cost.

Full band capability for 700 MHz , Cellular 850 MHz, PCS 1900 MHz, AWS 1710/2155 MHz and WCS 2300 MHz coverage in a single enclosure.

All CCI antennas are manufactured under ISO 9001.

Benefits

- **RET System allows Independent Tilt of each band specific paired port**
- **Reduces tower loading**
- **Frees up space for tower mounted Remote Radio Heads**
- **Single radome with eight ports**
- **All Band design simplifies radio assignments**
- **Sharp elevation beam eases network planning**

Features

- High Band Ports include WCS Band
- Four High Band ports with four Low Band ports in one antenna
- Sharp elevation beam
- Excellent elevation side-lobe performance
- Excellent MIMO performance due to array spacing
- Excellent PIM Performance
- A multi-network solution in one radome

Applications

- 4x4 MIMO on High Band and Dual 2x2 MIMO on 700 & 850 Low Bands
- Adding additional capacity without adding additional antennas
- Adding WCS Band without increasing antenna count

65° OctoPort Multi-Band Antenna

Model OPA-65R-LCUU-H8

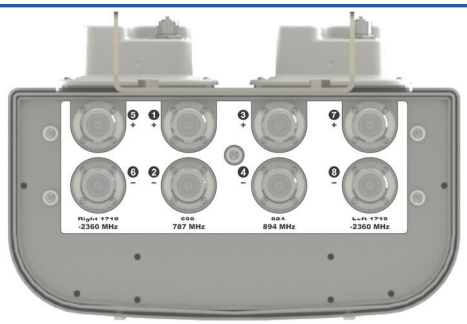
OPA-65R Multi-Band Antenna

Electrical Specifications

Frequency Range	2 X Low Band Ports (L) which cover the range from 698-787 MHz	2 X Low Band Ports (C) which cover the range from 824-894 MHz	4 X High Band Ports (H1 & H2) which cover the full range from 1710-2360 MHz			
			1850-1990 MHz	1710-1755/2110-2170 MHz	2305-2360 MHz	
Gain	14.7 dBi	15.5 dBi	17.0 dBi	16.5 dBi	17.2 dBi	17.1 dBi
Azimuth Beamwidth (-3dB)	65°	61°	62°	67°	64°	61°
Elevation Beamwidth (-3dB)	10.1°	8.5°	5.6°	6.2°	5.0°	4.5°
Electrical Downtilt	2° to 10°	2° to 10°	0° to 8°	0° to 8°	0° to 8°	0° to 8°
Elevation Sidelobes (1st Upper)	< -17 dB	< -17 dB	< -19 dB	< -18 dB	< -18 dB	< -17 dB
Front-to-Back Ratio @180°	> 28 dB	> 28 dB	> 35 dB	> 35 dB	> 35 dB	> 35 dB
Front-to-Back Ratio over ± 20°	> 28 dB	> 27 dB	> 28 dB	> 27 dB	> 27 dB	> 28 dB
Cross-Polar Discrimination (at Peak)	> 24 dB	> 20 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB
Cross-Polar Discrimination (at ± 60°)	> 16 dB	> 14 dB	> 18 dB	> 18 dB	> 18 dB	> 18 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB
VSWR	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc
Input Power	500 Watts CW	500 Watts CW	300 Watts CW	300 Watts CW	300 Watts CW	300 Watts CW
Polarization	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°
Input Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Lightning Protection	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground

Mechanical Specifications

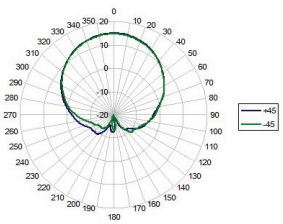
Dimensions (LxWxD)	92.7 x 14.4 x 7.0 inches (2355 x 366 x 179 mm)
Survival Wind Speed	> 150 mph
Front Wind Load	327 lbs (1453 N) @ 100 mph (161 kph)
Side Wind Load	186 lbs (829 N) @ 100 mph (161 kph)
Equivalent Flat Plate Area	12.9 ft^2 (1.2 m^2)
Weight (w/o RET/Mounting)	88 lbs (40 kg)
RET System Weight	7.0 lbs (3.0 kg)
Connector	8; 7-16 DIN female long neck
Mounting Pole	2-5 inches (5-12 cm)



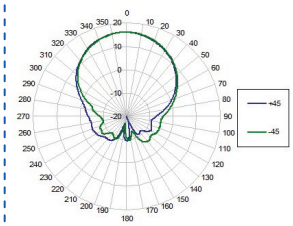
Bottom View

Rear View

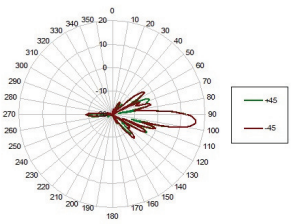
Antenna Patterns*



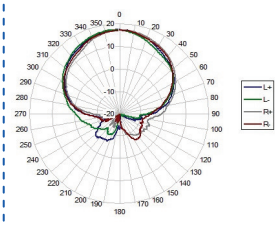
737 MHz Azimuth



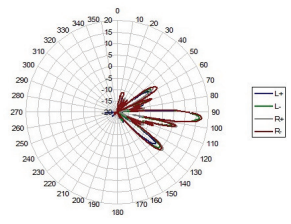
887 MHz Azimuth



Elevation 5°



1920 MHz Azimuth



Elevation 4°

*Typical antenna patterns. For detail information on antenna pattern, please contact us at info@cciproducts.com. All specifications are subject to change without notice.

DBC0062F1Vxx-1

| 1710-2170 / 2302-2690 DUAL BAND COMBINER

Kaelus world-proven outdoor solutions provide strong RF performance coupled with rugged operation. The DBC0062 provides the following features:

PRODUCT FEATURES

- Enables feeder sharing of various technologies including PCS/WCS, AWS/WCS, 1800/2300TDD and 2100/2600
- low insertion loss and high isolation
- Field configurable DC switch.
- Low passive IM performance

TECHNICAL SPECIFICATIONS |

| 1800-2100 CHANNEL

Passband		1710 – 2170MHz
Insertion loss		0.15dB typ
Return loss		18dB min
Attenuation:	2302 - 2690MHz	50dB min
Maximum input power		200W (avg) / 2kW (PEP)

| 2300-2600 CHANNEL

Passband		2302 – 2690MHz
Insertion loss		0.15dB typ
Return loss		18dB min
Attenuation:	1710 – 2170MHz	50dB min
Maximum input power		200W (avg) / 2kW (PEP)

| GENERAL SPECIFICATIONS

Impedance	50Ohms
Intermodulation products	-153dBc max all ports with 2 x 20W carriers

TECHNICAL SPECIFICATIONS CONTINUED |

| DC/AISG

A field selectable DC/AISG path is achieved via mechanical links on a IEC60130-9, 8-pin female connector (see mechanical diagram). It is Kaelus's recommendation that due to AISG link budget reasons that a maximum of 2 DC/AISG paths are activated simultaneously without active repeating of the AISG signal

Passband	0 – 3MHz
Insertion loss	1dB max single DC/AISG pass
Return loss	12dB min single DC/AISG pass
Insertion loss	4.5dB typical two DC/AISG pass
Return loss	9dB typical two DC/AISG pass
Input voltage range	± 31V
DC current rating	2A continuous, 4A peak

| ENVIRONMENTAL

For further details of environmental compliance, please contact Kaelus.

Operating temperature range	-20ºC to +65ºC | -4ºF to 149ºF
Ingress protection	IP67
Lightning protection	RF port: ±5kA max (8/20us), IEC61312-1
MTBF	>1,000,000 hours
Compliance	ETSI EN 300 019 class 4.1, RoHS

| MECHANICAL

Dimensions H x D x W	246 x 223 x 66mm / 9.7 x 8.8 x 2.6in
Weight, (kg | lb)	3kg | 6.6lbs estimated
Finish	Painted, light grey (RAL7035)
Connectors	RF: DIN 7-16 (F) x 6 long neck
Mounting	Pole/wall bracket supplied with two metal clamps for 45-178 mm diameter poles

ORDERING INFORMATION |

Kaelus Part Number	Kaelus Description
DBC0062F1V51-1	1710-2170 / 2302-2690 dual band combiner, twin unit, With DC switch
DBC0062F1V1-1	1710-2170 / 2302-2690 dual band combiner, twin unit, No DC through
DBC0062F1V2-1	1710-2170 / 2302-2690 dual band combiner, twin unit DC/AISG path from common to 1800-2100 port only
DBC0062F1Vxx-1	Various DC/AISG configuration available

RRUS 11

Frequency (AT&T)
- ✓ Band 12 (Lower 700 MHz)
- ✓ Band 4 (AWS, 17/2100 MHz) — 2Q2011

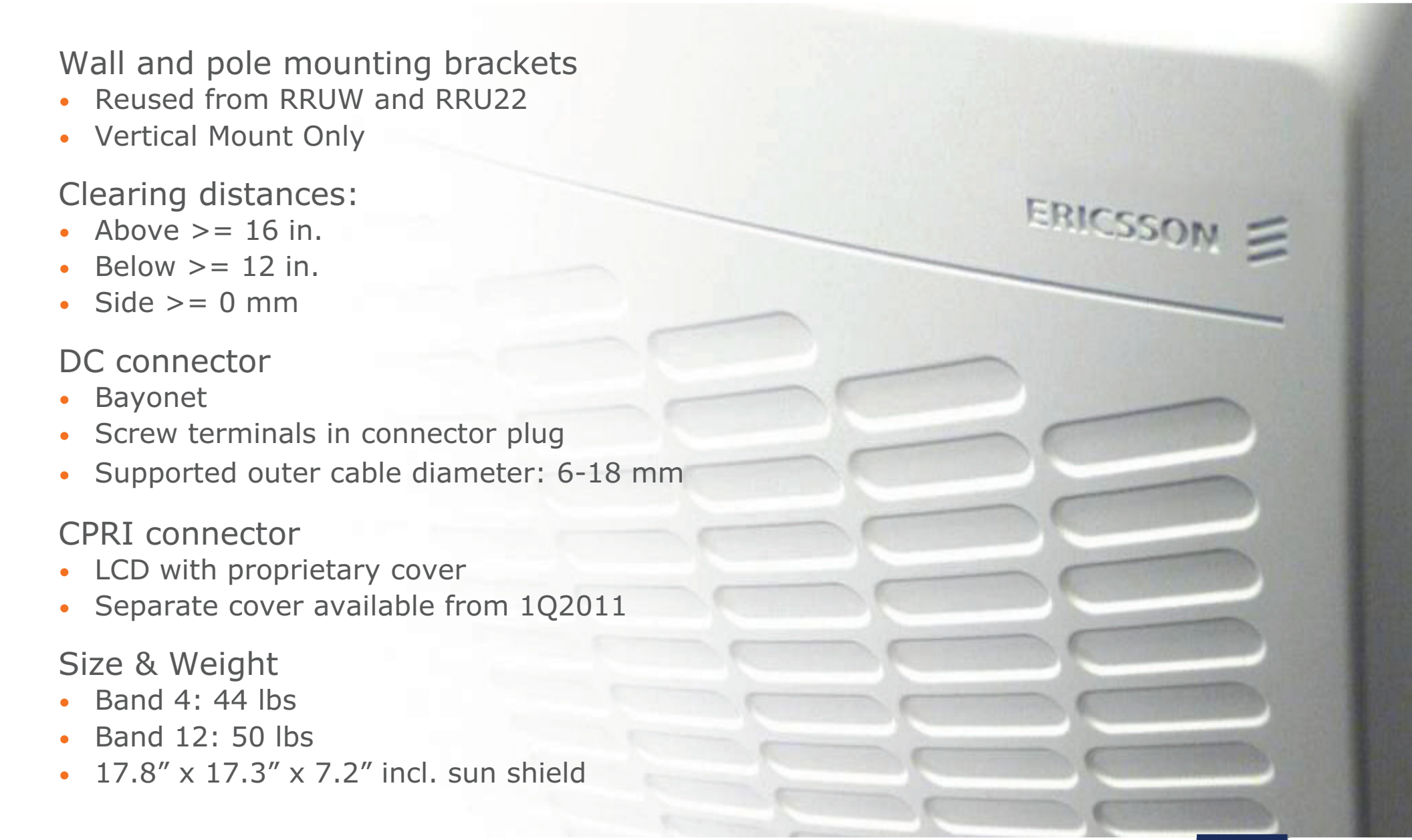
RF Characteristics
- ✓ Output power: 2x30 Watts
- ✓ 2x2 MIMO Capable
- ✓ IBW of 20 MHz
- ✓ Rx Sens.: Better than -105 dBm (5 MHz)

RET/TMA Support
- ✓ AISG 2.0 Compatible
- ✓ Via RET Port and Centre Conductor
- ✓ Cascading
- ✓ 30 VDC Bias

Environmental
- ✓ Self Convection
- ✓ Temperature -40 to 131 F

Power
- ✓ Input voltage: -48 VDC or AC (exemption)
- ✓ Fuse size: 13 – 32 A
  - Recommended: 25 A
- ✓ Power Consumption:
  - Typical 200 Watts
  - Max 310 Watts
  - Excl. RET and TMA load

RRUS 11 Mechanics



Wall and pole mounting brackets
- Reused from RRUW and RRU22
- Vertical Mount Only

Clearing distances:
- Above >= 16 in.
- Below >= 12 in.
- Side >= 0 mm

DC connector
- Bayonet
- Screw terminals in connector plug
- Supported outer cable diameter: 6-18 mm

CPRI connector
- LCD with proprietary cover
- Separate cover available from 1Q2011

Size & Weight
- Band 4: 44 lbs
- Band 12: 50 lbs
- 17.8” x 17.3” x 7.2” incl. sun shield

POWER

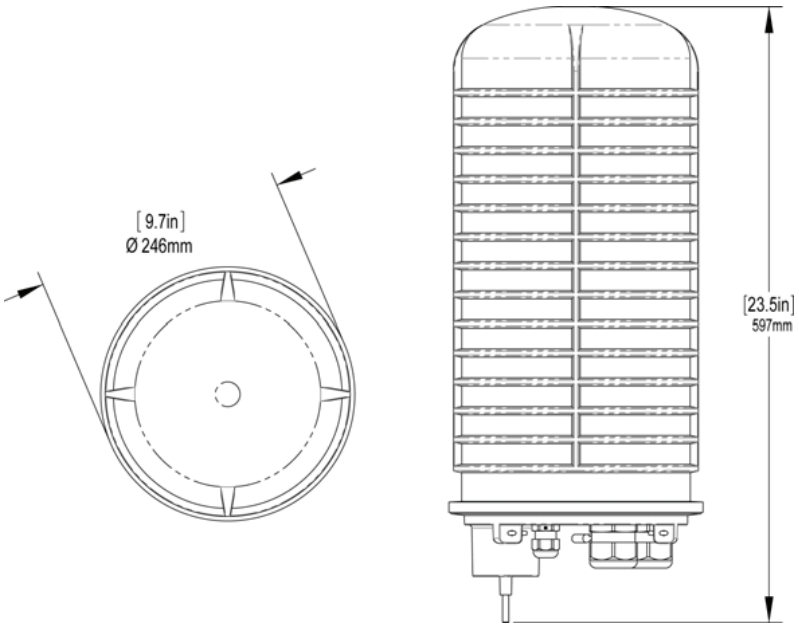
DC6-48-60-18-8F

DC Surge Suppression Solution

The DC6-48-60-18 is a dual chambered, DC surge suppression system for use in multi-circuit, Distributed Antenna Systems. The system will protect up to 6 Remote Radio Heads from voltage surges and lightning, and connect up to 18 fiber pairs. The system is enclosed in a NEMA 4 rated, waterproof enclosure.

FEATURES

- Protects up to 6 Remote Radio Heads, each with its own protection circuit.
- Flexible design allows for installation at the top of a tower for Remote Radio Head protection.
- Includes fiber connections for up to 18 pairs of fiber.
- LED indicators on individual circuits provide visual indication of suppressor status.
- Form 'C' relays allow for remote monitoring of the suppressor status.
- Patented Strikesorb technology provides over 60 kA of surge current capacity per circuit.
- Strikesorb suppression modules are fully recognized to UL 1449-3rd Edition Safety Standard, meeting all intermediate and high current fault requirements to facilitate use in OEM applications.
- Raycap recommends that DC protection system be installed within 2 meters or 6 feet of the radio.
- Dome design is lightweight and aerodynamic providing maximum flexibility for installation on top of towers.



Raycap

Phone 208.777.1166 Toll Free 800.890.2569 Fax 208.777.4466 www.raycapsurgeprotection.com

DC6-48-60-18-8F

DC Power Surge Protection

Electrical Specifications	
Model Number	DC6-48-60-18-8F
Nominal Operating Voltage	48 VDC
Nominal Discharge Current (I_n)	20 kA 8/20 µs
Maximum Discharge Current (I_{max}) per NEMA LS-1	60 kA 8/20 µs
Maximum Continuous Operating Voltage (U_c)	75 VDC
Voltage Protection Rating	400 V

Mechanical Specifications	
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum
Fiber Connection Method	LC-LC Single mode duplex
Environmental Rating	IP 68, 7m 72hrs
Operating Temperature	-40° C to + 80° C
Storage Temperature	-70° C to + 80° C
Cold Temperature Cycling	IEC 61300-2-22e -30° C to + 60° C 200 hrs @ 5 psi
Resistance to Aggressive Materials	CEI IEC 61073-2 including acids and bases
UV Protection	ISO 4892-2 Method A Xenon-Arc 2160 hrs
Weight	20 lbs without Mounting Bracket

STANDARDS

Strikesorb modules are compliant to the following Surge Protection Device (SPD) Standards:

- ANSI/UL 1449 – 3rd Edition
- IEEE C62.41
- NEMA LS-1, IEC 61643-1:2005 2nd Edition:2005
- IEC 61643-12
- EN 61643-11:2002 (including A11:2007)

GS-07F-0435V

Certified to ISO 9001:2000

TÜV Rheinland of North America

Raycap, Inc. 806 W. Clearwater Loop • Post Falls • Idaho • 83854 • USA
Phone 208.777.1166 • Toll Free 800.890.2569 • Fax 208.777.4466 • www.raycapsurgeprotection.com

Rosenberger
Rosenberger Site Solutions, LLC

AT&T LTE FIBER INSTALLATION MATERIALS

12 PAIR FIBER TRUNK

FTTA fiber trunks are fiber optical cable assemblies connecting base stations and remote radio heads in telecommunication applications. They can be used indoor and outdoor, are UV protected and riser rated. Connectors and fan-out are IP67 protected. This ensures easy handling in an outdoor environment. A pulling sock eases cable hoisting.

Part #	Diameter	Description	QTY
FB-L98B-002-15000 CEQ.32135	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 15 meter length.	Each
FB-L98B-002-30000 CEQ.32194	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 30 meter length.	Each
FB-L98B-002-50000 CEQ.32193	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 50 meter length.	Each
FB-L98B-002-75000 CEQ.32192	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 75 meter length.	Each
FB-L98B-002-100000 CEQ.32191	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 100 meter length.	Each
FB-L98B-002-125000 CEQ.32190	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 125 meter length.	Each

6 CONDUCTOR (3 PAIR) POWER CABLE

600 Volts Power Cable. UL Approved for direct burial or sunlight applications.

Part #	Diameter	Description	QTY
WR-VG86T CEQ.32182	19.2 mm	RSS 8-AWG 6 - Conductor Unshielded 600 Volts Power Cable -# 8 Tinned Copper (three traced red/black pairs) w/ #10 Bare Ground Wire.	Per FT
WR-VG86ST-BRD CEQ.32181	19.7 mm	RSS 8-AWG 6 - Conductor Shielded (Tinned Copper Braid and Aluminum Tape w/ Drain Wire) 600 Volts Power Cable -# 8 Tinned Copper (three traced red/black pairs) w/ #10 Bare Ground Wire.	Per FT

2 CONDUCTOR (SINGLE PAIR) SHIELDED POWER CABLE

600 Volts Power Cable. UL Approved for direct burial or sunlight applications.

Part #	Diameter	Description	QTY
WR-VG122ST-BRDA CEQ.10224	9.8mm	RSS 12-AWG 2 – Flexible Conductor Shielded (Tinned Copper Braid and Aluminum Tape w/ Drain Wire) 600 Volts Power Cable -# 12 AWG 65 Strands Tinned Copper (red and black) w/ #12 Bare Ground Wire.	Per FT
WR-VG102ST-BRDA CEQ.10225	11.6mm	RSS 10-AWG 2 – Flexible Conductor Shielded (Tinned Copper Braid and Aluminum Tape w/ Drain Wire) 600 Volts Power Cable -# 10 AWG 105 Strands Tinned Copper (red and black) w/ #10 Bare Ground Wire.	Per FT
WR-VG82ST-BRDA CEQ.10226	15.4mm	RSS 8-AWG 2 – Flexible Conductor Shielded (Tinned Copper Braid and Aluminum Tape w/ Drain Wire) 600 Volts Power Cable -# 8 AWG 168 Strands Tinned Copper (red and black) w/ #10 Bare Ground Wire.	Per FT

▪P.O. Box 8817 ▪ Lake Charles, LA 70606 ▪ Ph. 337.598.5250 ▪ Fax: 337.598.5290 ▪rlss@rlss.us ▪ www.RLSS.us

Rev. Date: 9/10/2010

Product Specifications

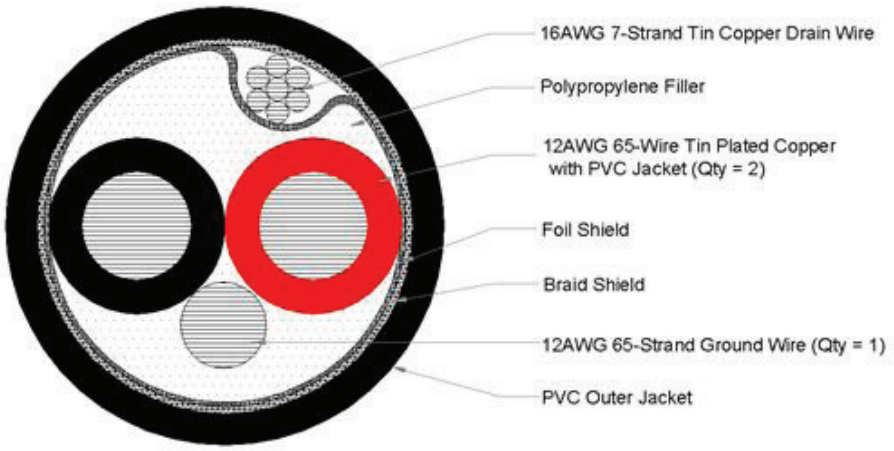
COMMSCOPE®

POWERED BY ANDREW®

PWRT-212-S

Remote Radio Head Power Cable, 2 conductor with shield, 12 AWG (3.31 mm2)

Cross Section Drawing



Construction Materials

Construction Type	Non-armored
Conductor Material	Tinned copper
Dielectric Material	PVC
Drain Wire Material	Tinned copper
Filler Material	Polypropylene
Ground Wire Material	Tinned copper
Insulation Material, singles	PVC
Jacket Material	PVC
Outer Shield (Braid) Coverage	65 %
Outer Shield (Braid) Gauge	36 AWG
Outer Shield (Braid) Material	Tinned copper
Outer Shield (Tape) Material	Aluminum/Poly, non-bonded

Dimensions

Cable Weight	0.16 kg/m | 0.11 lb/ft
Diameter Over Conductor, singles	2.5654 mm per 65 strand 0.1010 in per 65 strand
Diameter Over Dielectric	3.5814 mm | 0.1410 in
Diameter Over Drain Wire	1.5200 mm per 7 strand 0.0598 in per 7 strand
Diameter Over Ground Wire	2.565 mm | 0.101 in
Diameter Over Jacket	10.109 mm | 0.398 in

Product Specifications

PWRT-212-S

Diameter Over Shield (Braid)	7.823 mm | 0.308 in
Jacket Thickness	1.143 mm | 0.045 in

Electrical Specifications

Conductor dc Resistance	1.68 ohms/kft | 5.51 ohms/km
Conductor dc Resistance Note	Maximum value based on a standard condition of 20 °C (68 °F)
Safety Voltage Rating	600 V

Environmental Specifications

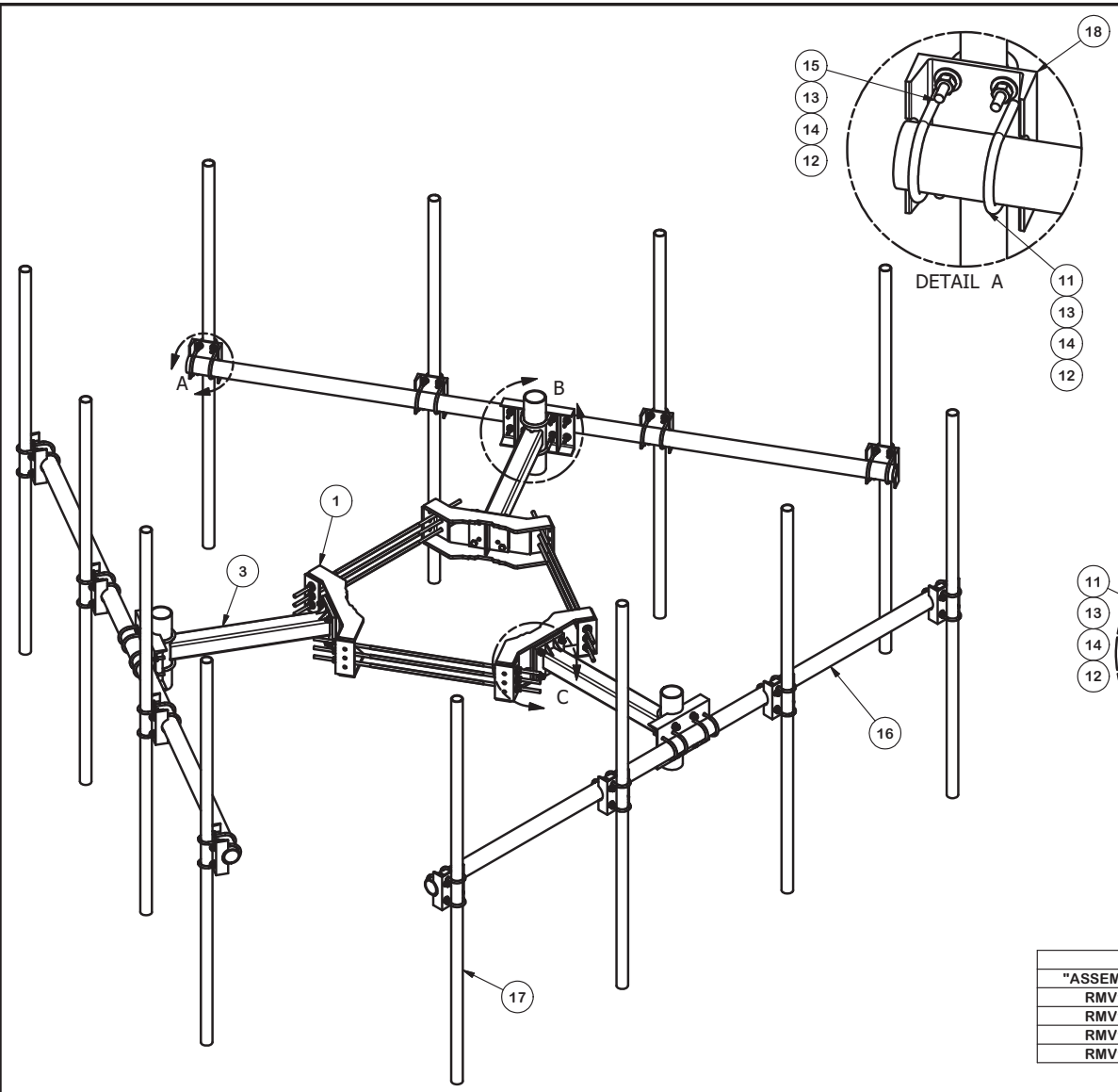
Environmental Space	UV resistant for outdoor and/or direct burial installations
Operating Temperature	-40 °C to +90 °C (-40 °F to +194 °F)
Safety Standard	NEC Article 336 (Type TC)

General Specifications

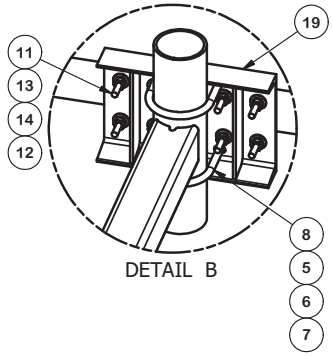
Application	Industrial
Cable Type	Power
Jacket Color	Black
Conductor Gauge, singles	12 AWG
Conductor Type, singles	Stranded
Conductors, quantity	2
Drain Wire Gauge	16 AWG
Ground Wire Gauge	12 AWG
Ground Wire Type	Stranded
Jacket Color, singles	Black | Red

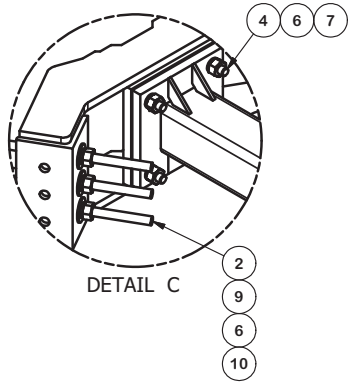
Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system



PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	3	X-LWRM	RING MOUNT WELDMENT		68.16	204.48
2	9	G58R-24	5/8" x 24" THREADED ROD (HDG.)		0.35	3.16
2	9	G58R-48	5/8" X 48" GALV THREADED ROD		4.18	37.63
3	3	X-SV197-36	SUPPORT ARM WELDMENT - 36"		67.29	201.88
4	12	A58234	5/8" x 2-3/4" HDG A325 HEX BOLT	2.75	0.36	4.27
5	12	A58FW	5/8" HDG A325 FLATWASHER		0.03	0.41
6	42	G58LW	5/8" HDG LOCKWASHER		0.03	1.10
7	24	A58NUT	5/8" HDG A325 HEX NUT		0.13	3.12
8	6	X-UB5458	5/8" X 4-5/8" X 7" X 3' U-BOLT (HDG.)		0.66	3.94
9	18	G58FW	5/8" HDG USS FLATWASHER		0.07	1.27
10	18	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	2.34
11	36	X-UB1306	1/2" X 3-5/8" X 6" X 3" U-BOLT (HDG.)		0.66	23.63
12	114	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	8.17
13	114	G12FW	1/2" HDG USS FLATWASHER		0.03	3.89
14	114	G12LW	1/2" HDG LOCKWASHER		0.01	1.59
15	24	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" U-BOLT (HDG.)		0.63	15.00
16	3	P3150	3-1/2" X 150" SCH 40 GALVANIZED PIPE	150.000 in	94.92	284.76
17	12	A	B	C	D	
18	12	X-SP219	SMALL SUPPORT CROSS PLATE	8.250 in	8.61	103.33
19	3	X-SP216	LARGE SUPPORT CROSS PLATE		20.83	62.48





ANTENNA PIPES					
"ASSEMBLY NO."	PART NO. "A"	PART DESCRIPTION "B"	LENGTH "C"	UNIT WT. "D"	TOTAL WT.
RMV12-463	P263	2-3/8" O.D. SCH. 40 PIPE	63"	19.22	1,219.29
RMV12-472	P272	2-3/8" O.D. SCH. 40 PIPE	72"	23.07	1,265.49
RMV12-484	P284	2-3/8" O.D. SCH. 40 PIPE	84"	26.91	1,311.57
RMV12-496	P296	2-3/8" O.D. SCH. 40 PIPE	96"	30.76	1,357.77

REVISION HISTORY				
RE	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	REMOVED FLATWASHERS FROM ARM TO CLAMP RING CONNECTION	4516	CEK	11/4/2011

TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

DESCRIPTION
MONOPOLE TRIPLE T-ARM
FOR 12 ANTENNAS

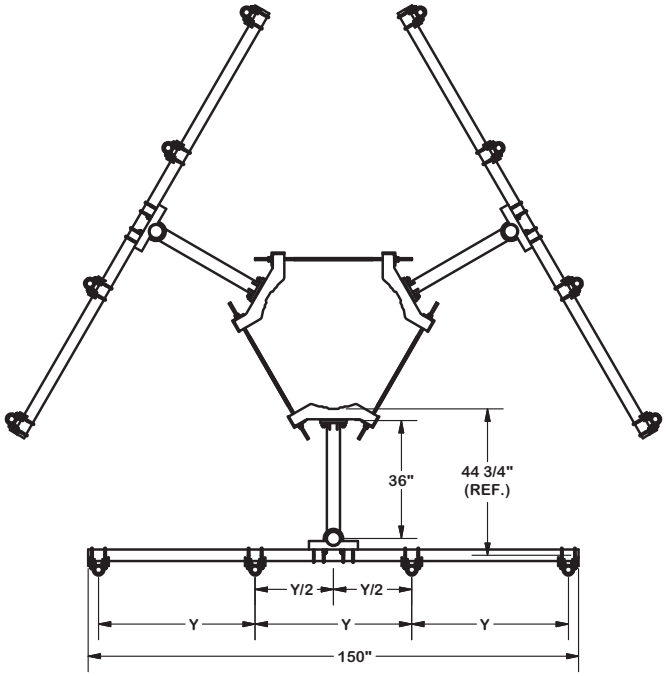
SITE PRO 1 — A valmont COMPANY

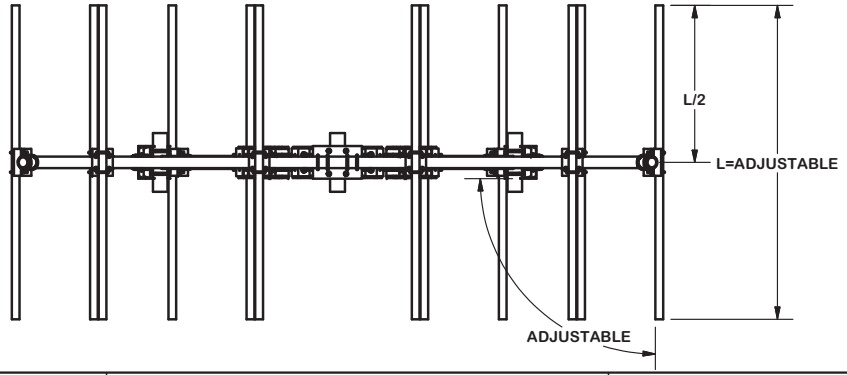
Engineering Support Team: 1-888-753-7446

Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
4516	CEK 4/15/2011		SEE "ASSEMBLY NO."

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 4/28/2011	RMV12-4XX





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DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

RE	DESCRIPTION OF REVISIONS	CPD	BY	DATE
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REVISION HISTORY

DESCRIPTION
MONOPOLE TRIPLE T-ARM
FOR 12 ANTENNAS

SITE PRO 1
A valmont COMPANY
Engineering Support Team:
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CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
4516	CEK 4/15/2011		SEE "ASSEMBLY NO."

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 4/28/2011	RMV12-4XX

ATTACHMENT C

HMB

HMB Acoustics LLC 3 Cherry Tree Lane, Avon, Ct. 06001 860-677-5955

November 27, 2013

Harry M. Rocheville, EIT
Civil Engineer
Centek Engineering, Inc.
63-2 North Branford Road
Branford, Ct. 06405

Subject: Canaan Route 7 South - Noise Compliance Study

Dear Mr. Rocheville:

The noise levels for the A1, A2, V1 and V2 wall mounted HVAC units were calculated while they were running simultaneously. The combined noise level was then projected to each property line. The resultant noise level was compared to the State of Ct. Noise Regulation. The Regulation allows a noise level of 55 dBA (daytime) and 45 dBA (nighttime), when measured at a Residential Receptor's property line. I found that the four (4) units met the conditions for compliance as set forth in the Regulation at all property lines.

Allan Smardin
HMB Acoustics LLC

PROJECT INFORMATION	Centek Job #:13292.000
Applicant:	AT&T Mobility
Applicant Site ID:	CT2413 -- Canaan - Route 7 South
Site Owner:	Verizon Wireless
Site Address:	188 Route 7, Falls Village, CT
Subject Zoning District:	Residential
Abutting Zoning District(s):	Residential (All abutters)

APPLICANT EQUIPMENT

ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West
A-1	Wall Mounted HVAC	Marvair ASDCA60	331	334	242	206
A-2	Wall Mounted HVAC	Marvair ASDCA60	331	336	236	212

EXISTING COLOCATORS:

☐	AT&T	☐	Metro PCS	☒	Other: Verizon Wireless
☐	Sprint	☐	T Mobile	☐	Other:
☐	Nextel	☐	None	☐	Other:

EXISTING COLOCATOR EQUIPMENT OWNER — **Verizon Wireless**

ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West
V-1	Wall Mounted HVAC	Bard/W61A1-A05EPXXXJ	321	344	240	205
V-2	Wall Mounted HVAC	Bard/W61A1-A05EPXXXJ	322	346	234	211

EXISTING COLOCATOR EQUIPMENT OWNER

ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West

EXISTING COLOCATOR EQUIPMENT OWNER						
ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West

EXISTING COLOCATOR EQUIPMENT OWNER						
ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West

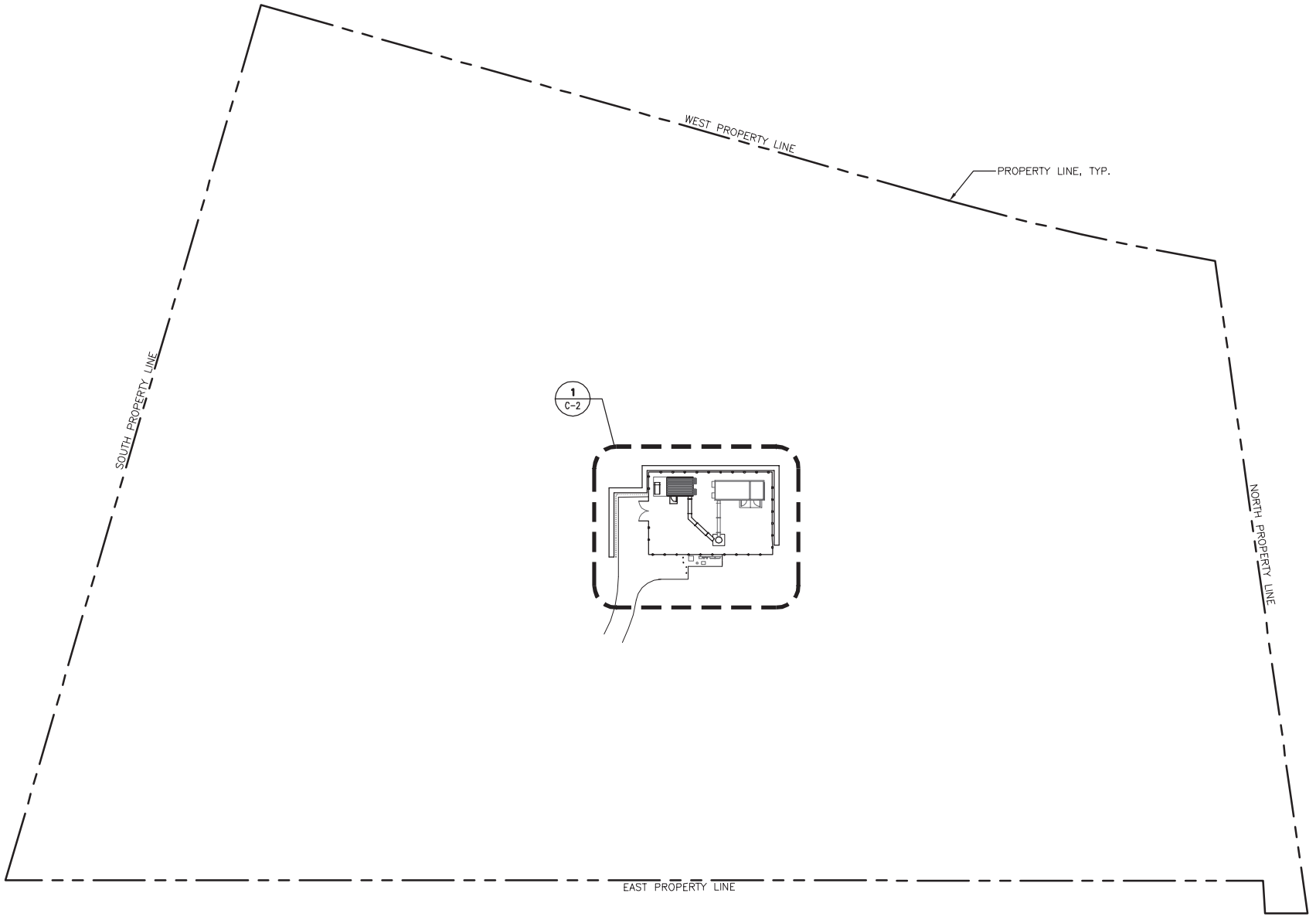
EXISTING COLOCATOR EQUIPMENT OWNER						
ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West

CONCLUSION			
Daytime Regulation:	55 dBa	**Nighttime Regulation:**	45 dBa
Compliance:	☒ Yes ☐ No	**Compliance:**	☒ Yes ☐ No

BASIS OF FINDINGS:

The Combined Noise Level From A1 and A2:
North property line = 25 dBa; South property line = 24 dBa; East property line = 39 dBa;
West property line = 41 dBa.
The Combined Noise Level From V1 and V2:
North property line = 26 dBa; South property line = 23 dBa; East property line = 39 dBa;
West property line = 41 dBa.
All 4 HVAC units running simultaneously will result in a 2 dBa increase in all directions
(N, S, E, W).
The dBa level in the North and South direction takes into account the effect from the
acoustical shielding provided by the two equipment shelters.

Prepared By: Alan Smardin, HMB ACOUSTICS LLC   Date: 11/27/13



1 / C-1 **SITE LOCATION PLAN**
SCALE: 1" = 90'-0"

TRUE NORTH

GRAPHIC SCALE
0 45 90
(IN FEET)
1 inch = 90 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	11/26/13	HMR	DMD	NOISE EMMITTER INFORMATION

at&t

CENTEK engineering
Centered on Solutions℠
www.CentekEng.com
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road, Branford, CT 06405

Cellco Partnership d/b/a Verizon Wireless

CANAAN - ROUTE 7 SOUTH

188 ROUTE 7 SOUTH
CANAAN, CT 06031

DATE: 11/25/13
SCALE: AS NOTED
JOB NO. 13292.000

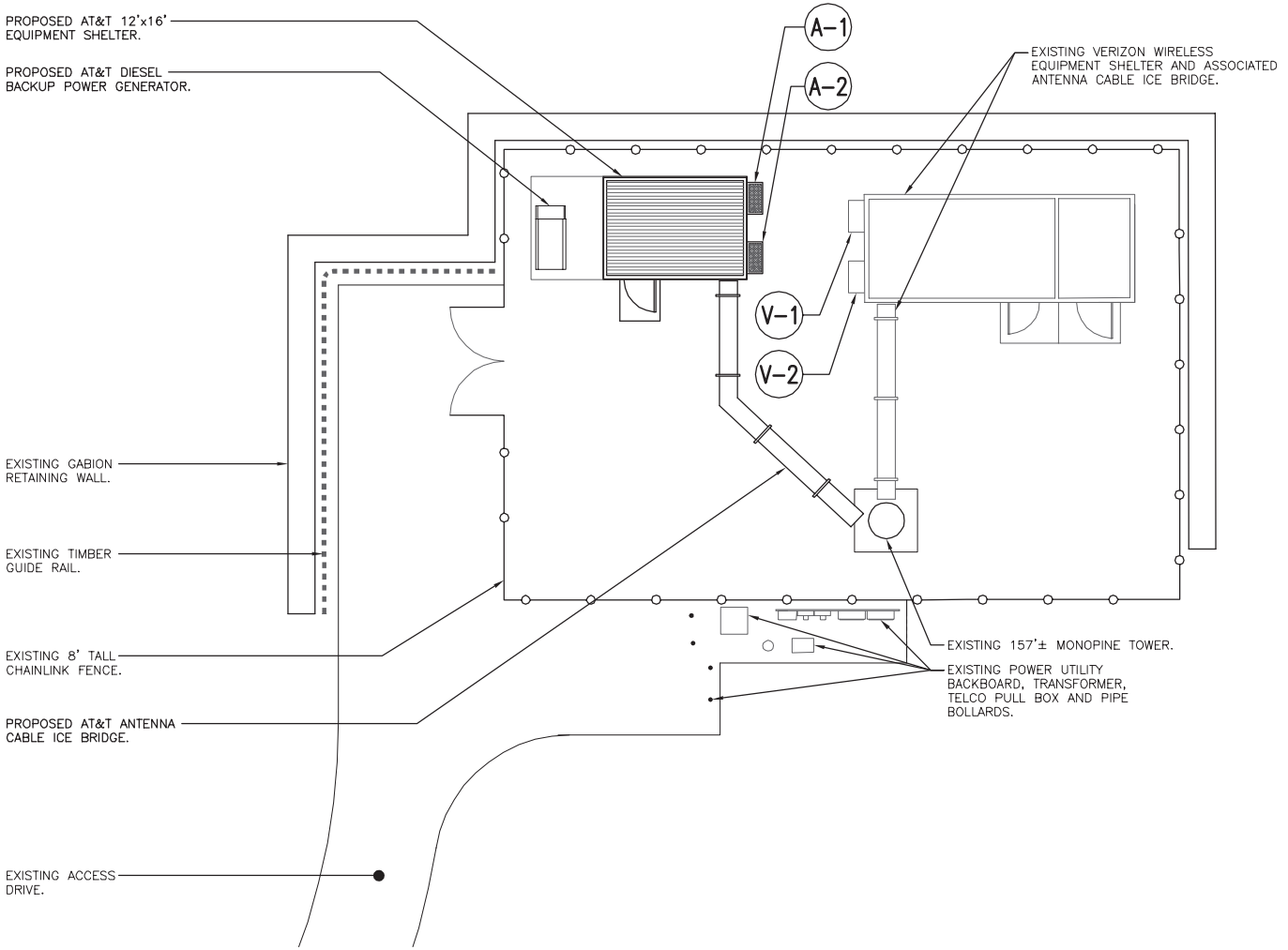
SITE LOCATION PLAN

C-1

DWG. 1 OF 2

NOISE EMMITTER INFORMATION

(A-1)	WALL MOUNTED HVAC UNIT,	MAKE: MARVAIR,	MODEL: ASDCA60.
(A-2)	WALL-MOUNTED HVAC UNIT,	MAKE: MARVAIR,	MODEL: ASDCA60.
(V-1)	WALL MOUNTED HVAC UNIT,	MAKE: BARD,	MODEL: W61A1-A05EPXXXJ
(V-2)	WALL MOUNTED HVAC UNIT,	MAKE: BARD,	MODEL: W61A1-A05EPXXXJ



1 / C-2 COMPOUND PLAN - PROPOSED
SCALE: 1" = 20'

APPROXIMATE NORTH

GRAPHIC SCALE
0 10 20
(IN FEET)
1 inch = 20 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	11/26/13	HMR	DMD	NOISE EMMITTER INFORMATION

at&t

CENTEK engineering
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63-2 North Branford Road, Branford, CT 06405

Cellco Partnership d/b/a Verizon Wireless

CANAAN - ROUTE 7 SOUTH

188 ROUTE 7 SOUTH
CANAAN, CT 06031

DATE: 11/25/13
SCALE: AS NOTED
JOB NO. 13292.000

COMPOUND PLAN

C-2

DWG. 2 OF 2

HMB

HMB Acoustics LLC 3 CherryTree Lane, Avon, Ct. 06001 860-677-5955

Noise Evaluation Report

AT&T Diesel Backup Power Generator
188 Route 7 South
Canaan, Ct.

April 5, 2014

Prepared For:
Harry M. Rocheville, EIT
Civil Engineer
Centek Engineering, Inc.
63-2 North Branford Road
Branford, Ct.

Prepared By:
Allan Smardin
HMB Acoustics LLC
3 Cherry Tree Lane
Avon, Ct.

Introduction

AT&T has proposed a diesel backup power generator to be located on a concrete pad at 188 Route 7 South, Canaan, Ct. The backup generator will run only when commercial power to the site is interrupted. It is important to note that the generator operates approximately 15-20 minutes each week for testing. All testing is done during the daytime hours. Other than these testing periods, the generator runs only in times of emergency, when commercial power to the facility is interrupted.

The purpose of this evaluation is to determine the anticipated noise level of the emergency backup generator. This report utilizes a dBA scale. This scale is used because it closely approximates the response characteristic of the human ear to loudness, and is the scale most commonly used in the measurement of community noise.

Noise Regulations

The State of Ct. has enacted regulations which limit the amount of noise which may be transferred from one property to another. In pertinent part, the Regulations provide an exemption per Section 22a-69-1.8 for noise emitted from the emergency generator.

Noise Evaluation Results

The noise levels listed below represent the calculated noise levels at each property line. These levels also take into account the effect of acoustical shielding, in the Northerly direction, provided by the proposed AT&T equipment shelter.

Property Line	dBA Noise Level
North	46
East	59
South	56
West	62

ATTACHMENT D

Tony Wells
C Squared Systems
65 Dartmouth Drive
Auburn, NH 03032
603-644-2800
Tony.Wells@csquaredsystems.com

C Squared Systems, LLC

February 25, 2014

Connecticut Siting Council

Subject: New Cingular Wireless PCS, LLC ("AT&T") – 188 Route 7, Canaan, CT

Dear Connecticut Siting Council:

C Squared Systems has been retained by New Cingular Wireless PCS, LLC ("AT&T") to investigate RF Power Density levels for the AT&T antenna arrays, to be installed on the existing monopole tower, located at 188 Route 7 in Canaan, CT.

Calculations were done in accordance with FCC OET Bulletin 65. These worst-case calculations assume that all transmitters are simultaneously operating at full power and that there is 0 dB of cable loss. The calculation point is 6 feet above ground level to model the RF power density at the head of a person standing at the base of the tower.

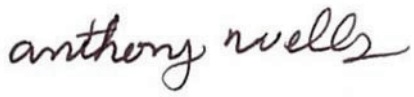
Due to the directional nature of the proposed AT&T antennas, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to the Attachment for the vertical patterns of the proposed AT&T antennas. The calculated results below include a nominal 10 dB off-beam pattern loss to account for the lower relative gain directly below the antennas.

Location	Carrier	Vertical Distance to Antenna (Ft.)	Operating Frequency (MHz)	Number of Trans.	Effective Radiated Power (ERP) Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	%MPE
Ground Level	AT&T UMTS	140	880	1	1028	0.0021	0.5867	0.35%
	AT&T UMTS	140	1900	1	1265	0.0025	1.0000	0.25%
	AT&T LTE	140	710	2	1254	0.0050	0.4733	1.06%
	AT&T LTE	140	880	1	1543	0.0031	0.5867	0.53%
	AT&T LTE	140	1900	2	1897	0.0076	1.0000	0.76%
	AT&T LTE	140	2300	1	2179	0.0044	1.0000	0.44%
							Total	**3.39%**

Summary: Under worst-case assumptions, RF Power Density levels for the proposed AT&T antenna arrays will not exceed **4.23%**[1] of the FCC MPE limit for General Public/Uncontrolled Environments.

Combined with the 2.33% of the FCC MPE limit produced by Verizon's existing installation, this gives a cumulative RF Power Density level of **6.56%** of the FCC MPE limit for General Public/Uncontrolled Environments.

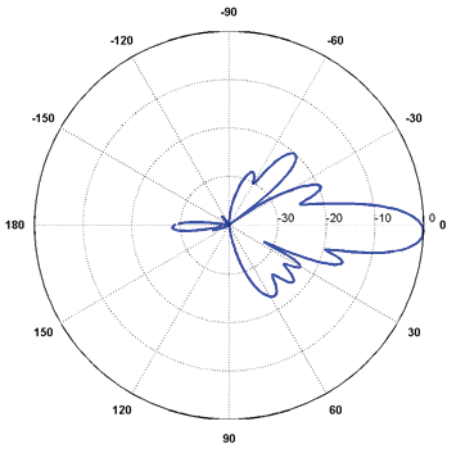
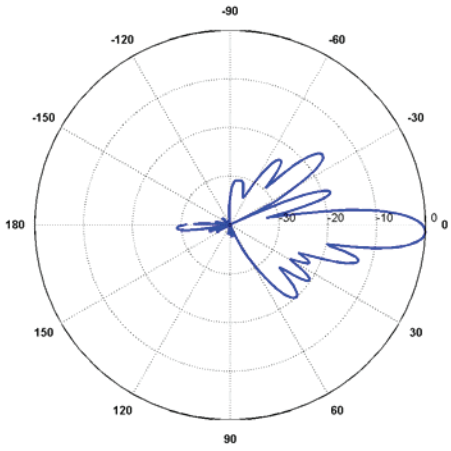
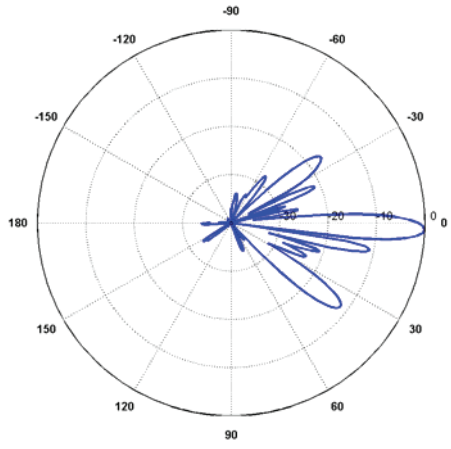
Sincerely,



Anthony Wells
Managing Partner

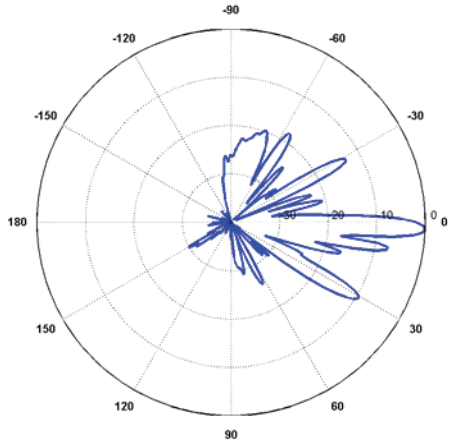
[1] The total %MPE is a summation of each unrounded contribution. Therefore, summing each rounded value may not reflect the total value listed in the table.

Attachment: AT&T's Antenna Data Sheets and Electrical Patterns

750 MHz Manufacturer: CCI Model #: HPA-65R-BUU-H8 Frequency Band: 698-806 MHz Gain: 13.2 dBd Vertical Beamwidth: 10.1° Horizontal Beamwidth: 65° Polarization: Dual Pol ± 45° Size L x W x D: 92.4" x 14.8" x 7.4"	
850 MHz Manufacturer: CCI Model #: HPA-65R-BUU-H8 Frequency Band: 824-894 MHz Gain: 14.1 dBd Vertical Beamwidth: 8.4° Horizontal Beamwidth: 61° Polarization: Dual Pol ± 45° Size L x W x D: 92.4" x 14.8" x 7.4"	
1900 MHz Manufacturer: CCI Model #: HPA-65R-BUU-H8 Frequency Band: 1850-1990 MHz Gain: 15.0 dBd Vertical Beamwidth: 5.6° Horizontal Beamwidth: 62° Polarization: Dual Pol ± 45° Size L x W x D: 92.4" x 14.8" x 7.4"	

2300 MHz

Manufacturer:	CCI
Model #:	HPA-65R-BUU-H8
Frequency Band:	2305-2360 MHz
Gain:	15.6 dBd
Vertical Beamwidth:	4.5°
Horizontal Beamwidth:	60°
Polarization:	Dual Pol ± 45°
Size L x W x D:	92.4” x 14.8” x 7.4”



ATTACHMENT E

verizonwireless

March 14, 2014

David Vivian, consultant for
New Cingular Wireless PCS, LLC
500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

RE: Cellco Partnership d/b/a Verizon Wireless
Telecommunication Facility at 188 Rt 7, Falls Village, CT

Dear Mr. Vivian:

Cellco Partnership d/b/a Verizon Wireless, as owner of the above-referenced property, hereby authorizes New Cingular Wireless PCS and/or its agent to apply for and obtain all necessary permits and approvals from all applicable Town of Falls Village or State of CT boards, agencies and commissions for the proposed installation of New Cingular Wireless PCS equipment.

Please contact us should you have any questions.

Sincerely

By: _____

Title: NETWORK REAL ESTATE SPECIALIST

10246399-v1