STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

December 28, 2012

David Torres
Goodman Networks
4611 Bee Caves
Suite 211
Austin, TX 78746

RE: **EM-SPRINT-078-121213** – Sprint Spectrum notice of intent to modify an existing telecommunications facility located at 82 North Eagleville Road, Storrs (Mansfield), Connecticut.

Dear Mr. Torres:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not more than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated December 13, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut

State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

L Roberts

Linda Roberts
Executive Director

LR/CDM/cm

c: The Honorable Elizabeth Patterson, Mayor, Town of Mansfield
Linda M. Painter, Director of Planning and Development, Town of Mansfield

EM-SPRINT-078-121213

Goodman Network Knowledge.

December 13, 2012

Linda Roberts
Executive Director
Connecticut Siting Counsel
Ten Franklin Square
New Britain, CT 06051
Linda Roberts, Executive Director

ORIGINAL

RECEIVED
DEC 13 2012
CONNECTICUT
SITING COUNCIL

Re: Notice of Exempt Modification – Antenna Swap
82 North Eagleville Road, Storrs, Connecticut

Dear Ms. Roberts:

Sprint is planning to consolidate multiple network technologies into one seamless network with the goal of increasing efficiency and enhancing network coverage, call quality and data speeds for customers across Connecticut. Pursuant §16-50j-73 to of the Regulations of Connecticut State Agencies (RCSA), please accept this letter and attachments as notification of Sprint's intent to make exempt modifications, under RCSA §16-50j-72(b)(2), to its existing telecommunications facility at 82 North Eagleville Road in Storrs, Connecticut. In accordance with RCSA §16-50j-73, a copy of this letter is sent to Elizabeth C. Paterson, Mayor of the Town of Mansfield. A copy is also being sent to the Vice Chancellor for Business and Administration for the University of Connecticut, the owner of the property on which the tower is located.

Sprint currently maintains six (6) antennas at 247 feet on the existing 250 foot tower at the address referenced above. Sprint intends to replace its existing six (6) CDMA antennas with three (3) Multimodal antennas at their same current height of 247 feet. Sprint will a be replacing its existing six (6) lines of coaxial cable with three (3) smaller lines of Hybriflex cable and installing nine (9) RRH's and six (6) combiners. Sprint will also be replacing the existing four (4) ground cabinets with three (3) cabinets and one (1) fiber junction box. This work will result in a net reduction of antennas, from six (6) to three (3), and will not increase the height of the tower or the size compound. Please find included with this letter compound, elevation and overhead drawings which depict Sprint's proposed modifications.

Sprint's planned modifications fall squarely within the activities permitted in RCSA §16-50j-72(b)(2) in that:

1. The proposed modifications will not increase the existing tower height;

2. The proposed modifications will not extend the boundaries of the site by any dimension;

3. The proposed modifications will not increase the noise levels at the existing facility by six (6) decibels or more;

4. The proposed modifications will not increase the total radio frequency electromagnetic radiation power density to or above the standards adopted by the Federal Communications Commission. Please find included with this letter a Radio Frequency Emissions Analysis Report.

Also included with this letter is a Structural Assessment confirming that the foundation and tower are sufficient to support Sprint's proposed modifications.

For the foregoing reasons, Sprint respectfully submits that its proposed modifications to the existing tower located at the address referenced above constitute an exempt modification under RSCA §16-50j-72(b)(2).

Please do not hesitate to contact me at (214) 478-3516 or dtorres@goodmannetworks.com if you have any questions. Thank you for your consideration.

Respectfully,

David Torres
Goodman Networks

Attachments

Copy to:
Elizabeth C. Paterson, Mayor, Town of Mansfield
Vice Chancellor for Business and Administration, University of Connecticut

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

Sprint Existing Facility

Site ID: CT03XC214

Uconn
82 North Eagleville Road
Storrs, CT 06269

October 19, 2012

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

EBI Consulting
environmental | engineering | due diligence

October 19, 2012

Sprint
Attn: RF Engineering Manager
1 International Boulevard, Suite 800
Mahwah, NJ 07495

Re: Emissions Values for Site: **CT03XC214 – Uconn**

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 82 North Eagleville Road, Storrs, CT, for the purpose of determining whether the emissions from the proposed Sprint equipment upgrades on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the cellular band is approximately 567 $\mu W/cm^2$, and the general population exposure limit for the PCS band is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed upgrades to the existing Sprint Wireless antenna facility located at 82 North Eagleville Road, Storrs, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario. Actual values seen from this site will be dramatically less than those shown in this report. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

For all calculations, all emissions were calculated using the following assumptions:

1) 7 CDMA Carriers (1900 MHz) were considered for each sector of the proposed installation.
2) 1 CDMA Carrier (850 MHz) was considered for each sector of the proposed installation
3) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
4) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
5) The antenna used in this modeling is the APXVSPP18-C-A20. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario.

6) The antenna mounting height centerline of the proposed antennas is **247 feet** above ground level (AGL)
7) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculation were done with respect to uncontrolled / general public threshold limits

Site ID	CT03XC214 - Uconn
Site Addresss	82 North Eagleville Road, Storrs, CT, 06269
Site Type	Self Support Tower

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	7	140	15.9	247	241	1/2 "	0.5	0	4854.3159	30.04692	3.00469%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	247	241	1/2 "	0.5	0	389.96892	2.413803	0.42571%
														Sector total Power Density Value:			3.430%

Sector 2

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	7	140	15.9	247	241	1/2 "	0.5	0	4854.3159	30.04692	3.00469%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	247	241	1/2 "	0.5	0	389.96892	2.413803	0.42571%
														Sector total Power Density Value:			3.430%

Sector 3

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	7	140	15.9	247	241	1/2 "	0.5	0	4854.3159	30.04692	3.00469%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	247	241	1/2 "	0.5	0	389.96892	2.413803	0.42571%
														Sector total Power Density Value:			3.430%

Site Composite MPE %	
Carrier	MPE %
Sprint	10.291%
CT Public Broadcasting	1.660%
Uconn	2.970%
T-Mobile	1.040%
Total Site MPE %	15.961%

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Summary

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

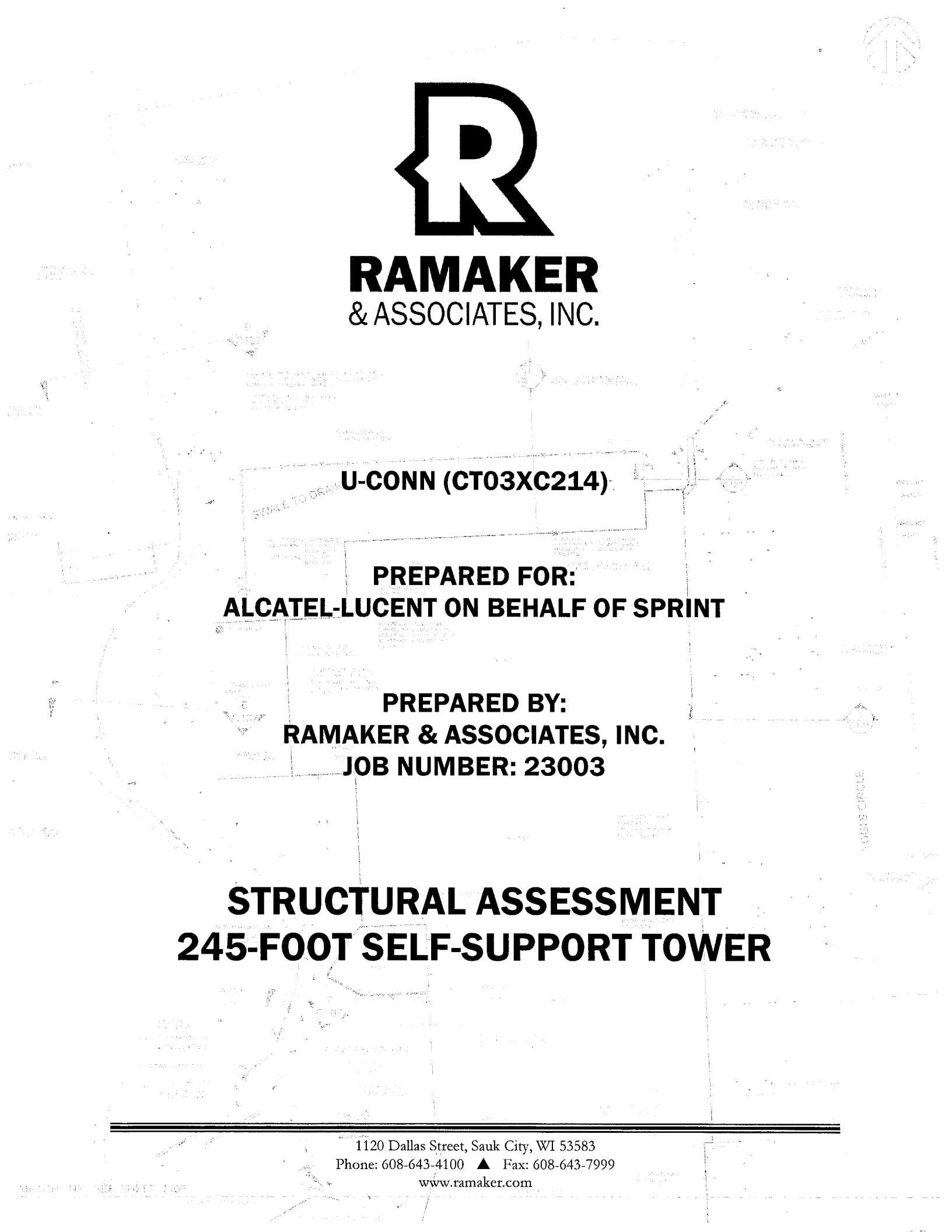
The anticipated Maximum Composite contributions from the Sprint facility are **10.291% (3.430% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **15.961% of** the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions

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

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803



RAMAKER
& ASSOCIATES, INC.

U-CONN (CT03XC214)

PREPARED FOR:
ALCATEL-LUCENT ON BEHALF OF SPRINT

PREPARED BY:
RAMAKER & ASSOCIATES, INC.
JOB NUMBER: 23003

STRUCTURAL ASSESSMENT
245-FOOT SELF-SUPPORT TOWER

1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 ▲ Fax: 608-643-7999
www.ramaker.com

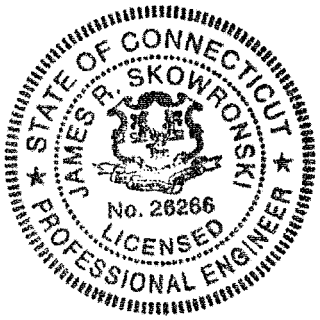
SITE:	U-Conn (CT03XC214) 82 North Eagleville Road Storrs, Tolland County, Connecticut 06269
CONTACT PERSON:	John Szilezy Alcatel-Lucent Site Acquisition Manager 600 Mountain Avenue, Murray Hill, NJ 07974 Email: john.szilezy@alcatel-lucent.com
PREPARED BY:	Ramaker & Associates, Inc. 1120 Dallas Street Sauk City, Wisconsin 53583 Telephone: (608) 643-4100 Facsimile: (608) 643-7999
RAMAKER JOB NUMBER:	23003
DATE OF REPORT ISSUANCE:	October 26, 2012

Thomas E. Moore
Structural Engineer

10/26/12
Date

James R. Skowronski, P.E.
Supervising Engineer

10/26/12
Date



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SECTION 1

EXECUTIVE SUMMARY

This report summarizes the structural analysis conducted by Ramaker & Associates, Inc. (Ramaker & Associates) for Alcatel-Lucent on behalf of Sprint, who intends to install additional equipment on an existing 245-foot self-support tower.

Alcatel-Lucent is proposing to install two (2) RFS APXVSPP18-C-A20 panel antennas, one (1) RFS APXV9ERR18-C-A20 panel antenna, six (6) Alcatel-Lucent 1900 MHz RRHs, three (3) Alcatel-Lucent 800 MHz RRHs, three (3) RFS IBC1900BB-1 Combiners, and three (3) RFS IBC1900HG-2A Combiners at a centerline elevation of 247-feet AGL. The proposed antennas shall be mounted to the existing Platform and fed with three (3) 1-1/4-inch fiber/power hybrid cables. The proposed hybrid cables were assumed to be routed up the tower next to the existing Sprint coax. The six (6) existing Sprint panel antennas and their corresponding coax at 247 feet AGL shall remain during the interim phase, and then shall be removed for the final antenna layout.

Results of our analysis show that the tower will be stressed to a maximum of 95.4 percent of capacity under proposed loading conditions. All model foundation reactions were found to be less than the original design reactions. The foundation was also analyzed under proposed loading conditions with the geotechnical report and it was determined to provide adequate strength.

In summary, the tower will pass the EIA/TIA-222-F code requirements under proposed loading conditions. The tower was previously analyzed by Ramaker according to the TIA-222-G code and it did not pass.

SECTION 2
INTRODUCTION

2.1 PROJECT INFORMATION

This report summarizes the structural analysis conducted by Ramaker & Associates, Inc. (Ramaker & Associates) for Alcatel-Lucent on behalf of Sprint, who intends to install additional equipment on an existing tower.

2.2 PURPOSE OF REPORT

The analysis activities of this report were conducted for the purposes of creating and analyzing a model of the subject structure under the required loading conditions. Base reactions from the resulting model were also determined for tower foundation and support development. Recommendations regarding the analysis results, loading configuration, and structural modifications are also provided.

2.3 SCOPE OF SERVICES

Ramaker & Associates developed a finite element model (FEM) of the tower, using tnxTower, for member force, joint deflection, and structure reaction determinations. Subsequently, this report was drafted to provide our engineering recommendations. All information contained herein is valid only for the described structure configuration and loading conditions. Ramaker & Associates reserves the right to modify our recommendations should alterations to the tower loading occur.

SECTION 3
MODEL DEVELOPMENT

3.1 INTRODUCTION

Ramaker & Associates developed a FEM of the tower superstructure using the tower drawings and site photos. Required static loads consisting of the antenna configuration, wind forces, ice loads, and linear appurtenances (including cable loads) were then applied to the FEM. As a result, all member forces, allowable capacities, and base reactions were computed.

3.2 EXISTING STRUCTURE INFORMATION

Tower information was gathered from the original tower drawings by Pirod Inc., engineering file number A-113846, drawing number 202932-B, and dated 9/23/97.

3.3 EXISTING TOWER LOADS

Ramaker & Associates understands that the existing antenna, cable, and appurtenance configurations are as shown in the following chart:

Elevation	Appurtenance	Mount	Coax
247	10' Lightning Rod	15' Rotatable Platform	—
	Large Beacon		1/2
	** (6) Decibel DB980H90E-M **		** (6) 1-5/8 **
232	(7) 6' x 1' Panel Antennas	(3) T-Frames	(21) 1-5/8
	(7) TMAs		
135	(2) 10' Omnis	(2) 4' Standoffs	(2) 7/8
125	20' Omni	6' Standoff	7/8
	(3) Small Beacons	Leg Mounted	1/2
110	10' Omni	4' Standoff	7/8
	4' Grid Dish	Leg Mounted	7/8
105	6' Dish w/radome	Leg Mounted	EW63
60	Camera	Leg Mounted	7/8
50	4' Omni	4' Standoff	7/8

The six (6) Decibel DB980H90E-M panel antennas and their corresponding coax at 247 feet AGL shall remain during the interim phase, and then shall be removed for the final antenna layout.

3.4 PROPOSED TOWER LOADS

Ramaker & Associates understands that the total antenna loading for the tower will consist of the aforementioned existing antennas and the following proposed antennas:

Elevation	Appurtenance	Mount	Coax
247	(2) RFS APXVSPP18-C-A20	Existing 15' Rotatable Platform	(3) 1-1/4 Hybrid Cables
	(1) RFS APXV9ERR18-C-A20		
	(6) ALU 1900MHz 4x40W RRH		
	(3) ALU 800MHz 2x50W RRH		
	(3) RFS IBC1900BB-1		
	(3) RFS IBC1900HG-2A		

Proposed hybrid cables were assumed to be routed up the tower adjacent to the existing Sprint coax.

3.5 WIND AND ICE LOAD

Wind forces used in model development are in compliance with the TIA/EIA-222-F Standard. These guidelines call for an analysis to be performed, which assumes a basic wind speed (fastest-mile) of 85 miles-per-hour (mph) without ice in Tolland County. The tower is also designed for a 50 mph basic wind speed with 0.50-inch of radial ice.

SECTION 4
ANALYSIS RESULTS

4.1 ANALYSIS RESULTS

The tower superstructure was analyzed with the combined existing and proposed antenna loading with and without radial ice. The computed maximum tower member stress capacities are as follows:

Component Type	Percent Capacity
Legs	95.4
Diagonals	80.0
Horizontals	33.0
Bolts	60.8
Anchor Bolts	25.4
RATING =	**95.4**

4.2 BASE REACTIONS

The computed maximum factored reactions correlated to maximum moment are as follows:

Load Type	Original Design	Proposed Model
Total Axial (k)	73.7	60.9
Total Shear (k)	72.4	47.7
Total Moment (k-ft)	9299.9	6187.7
Leg Uplift (k)	472.0	280.3
Leg Compression (k)	422.9	349.3
Leg Shear (k)	–	36.2

All model foundation reactions were found to be less than the original design reactions. The foundation was also analyzed under proposed loading conditions with the geotechnical report and it was determined to provide adequate strength.

SECTION 5
LIMITATIONS

The recommendations contained within this report were developed using general project information provided by the owner, tower manufacturer, general field observations, reference information and laboratory testing data, as applicable. All recommendations pertain only to the proposed tower construction, location, and loading as described in this report. Ramaker & Associates assumes no responsibility for failures caused by factors beyond our control. These include but are not limited to the following:

1. Missing, corroding, and/or deteriorating members
2. Improper manufacturing and/or construction
3. Improper maintenance

Ramaker & Associates assumes no responsibility for modifications completed prior to or hereafter in which Ramaker & Associates was not directly involved. These modifications include but are not limited to the following:

1. Replacing or strengthening bracing members
2. Reinforcing or extending vertical members
3. Installing or removing antenna mounting gates or side arms
4. Changing loading configurations

Furthermore, Ramaker & Associates hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations and conclusions are based on the information contained and set forth herein. If you are aware of any information contrary to that contained herein, or if you are aware of any defects arising from the original design, material, fabrication and erection deficiencies, you should disregard this report and immediately contact Ramaker & Associates. Ramaker & Associates isn't liable for any representation, recommendation or conclusion not expressly stated herein.

The tower owner is responsible for verifying that the existing loading on the tower is consistent with the loading applied to the tower within this report.

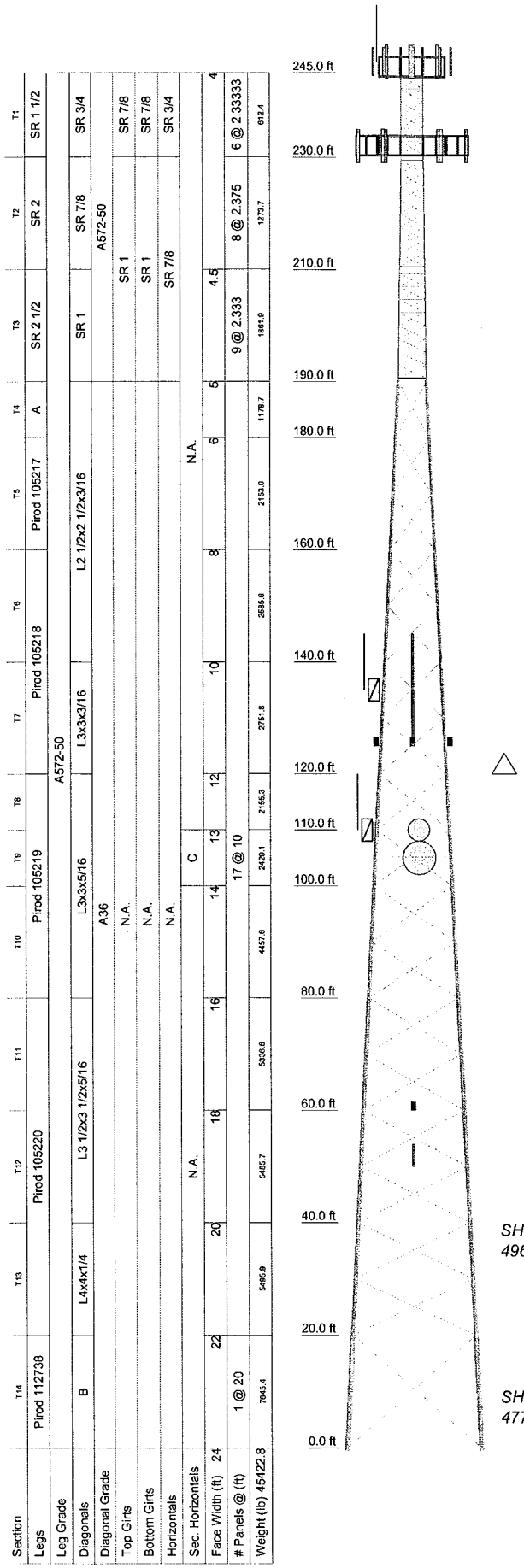
SECTION 6
REFERENCES

1. 2003 International Building Code.

2. Telecommunications Industry Association, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA Standard ANSI/TIA/EIA-222-F 1996, Washington, D.C.

APPENDIX A

TOWER FIGURES



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 2"x10'	247	(2) 6' x 1' Panel Antenna w/Mount Pipe	232
Large Beacon	247	(2) 6' x 1' Panel Antenna w/Mount Pipe	232
(2) DB980H90E-M w/Mount Pipe	247	(3) TMA	232
(2) DB980H90E-M w/Mount Pipe	247	(2) TMA	232
(2) DB980H90E-M w/Mount Pipe	247	(2) TMA	232
APXVSPP18-C w/Mount Pipe	247	Pirod 12' Universal T-Frame (3)	232
APXV9ERR18-C w/Mount Pipe	247	10' Omni	135
APXVSPP18-C w/Mount Pipe	247	4' Standoff	135
(2) 1900MHz 4x40W RRH	247	10' Omni	135
(2) 1900MHz 4x40W RRH	247	4' Standoff	135
(2) 1900MHz 4x40W RRH	247	20' Omni	125
800MHz 2x50W RRH	247	6' Standoff	125
800MHz 2x50W RRH	247	Small Beacon	125
800MHz 2x50W RRH	247	Small Beacon	125
IBC1900BB-1	247	Small Beacon	125
IBC1900BB-1	247	10' Omni	110
IBC1900BB-1	247	4' Standoff	110
IBC1900HG-2A	247	KP4F-23	110
IBC1900HG-2A	247	Andrew 6' w/Radome	105
IBC1900HG-2A	247	Camera and Mount	60
PiROD 15' Rotatable Platform (Lattice)	246	4' Standoff	50
(3) 6' x 1' Panel Antenna w/Mount Pipe	232	4' Omni	50

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirod 105245	C	L3x3x5/16
B	2L3 1/2x3 1/2x5/16x3/4		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Tolland County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 95.4%

MAX. CORNER REACTIONS AT BASE:
DOWN: 349289 lb
UPLIFT: -280336 lb
SHEAR: 36158 lb

AXIAL
97405 lb

SHEAR
49685 lb

MOMENT
6585100 lb-ft

TORQUE 35969 lb-ft
74 mph WIND - 0.5000 in ICE

AXIAL
60971 lb

SHEAR
47730 lb

MOMENT
6187666 lb-ft

TORQUE 32236 lb-ft
REACTIONS - 85 mph WIND

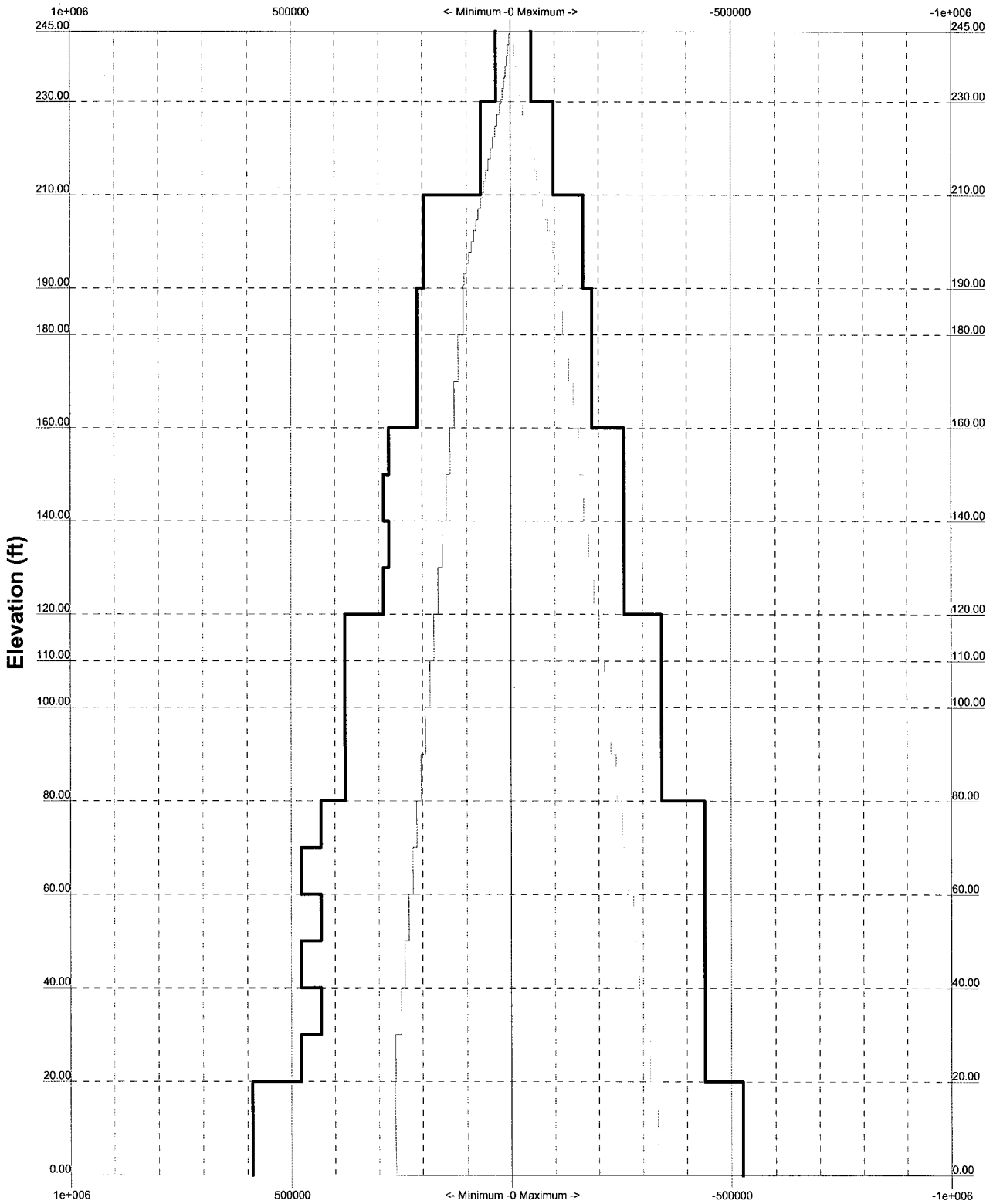
RAMAKER & ASSOCIATES, INC.
Consulting Engineers

Ramaker & Associates, Inc.
1120 Dallas Street
Sauk City, WI 53583
Phone: (608) 643-4100
FAX: (608) 643-7999

Job: *U-Conn (CT03XC214)*			
Project: *23003*			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA/EIA-222-F	Date: 10/26/12	Scale: NT	
Path: I:\23000\23003\Structural\Risa\23003 F.eri		Dwg No. E	

TIA/EIA-222-F - 85 mph/74 mph 0.5000 in Ice

Leg Capacity ——— Leg Compression (lb)



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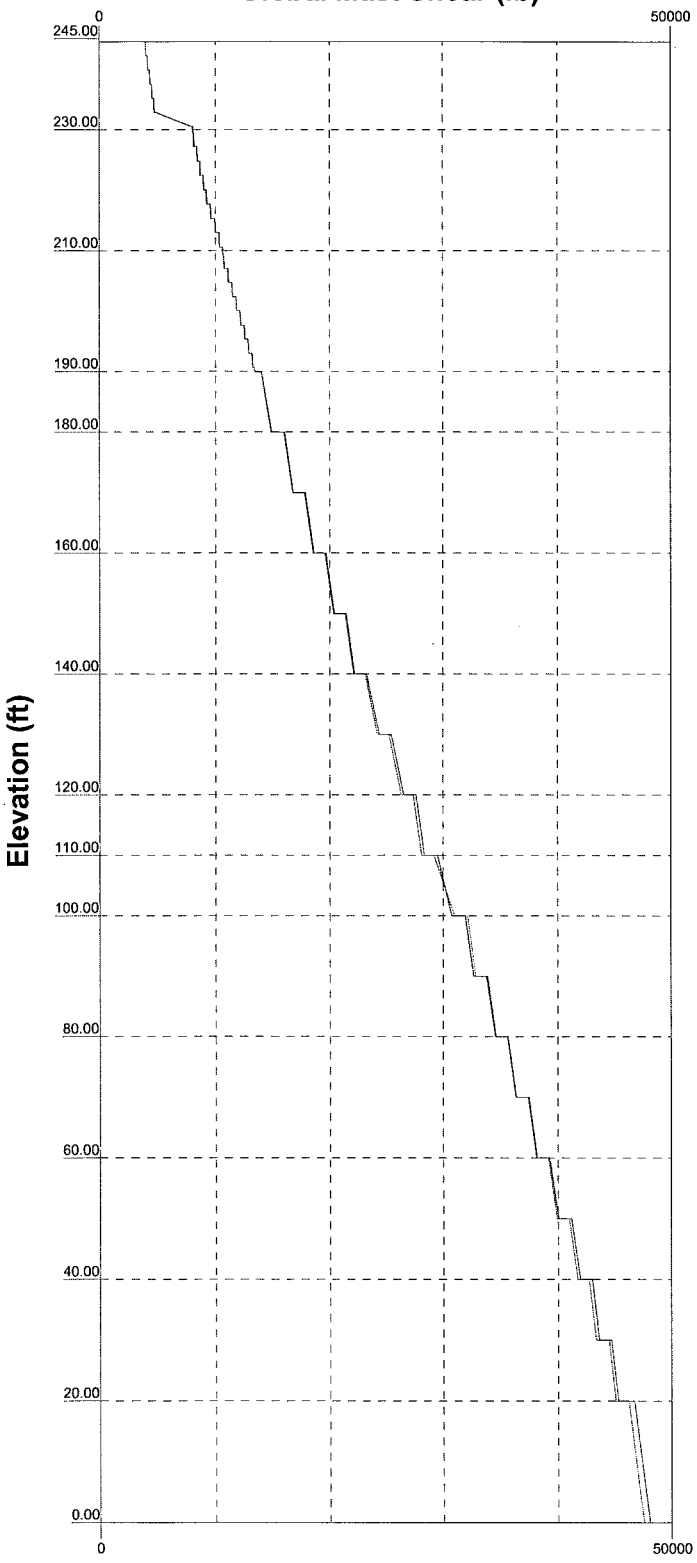
1120 Dallas Street
Sauk City, WI 53583
Phone: (608) 643-4100
FAX: (608) 643-7999

Job: *U-Conn (CT03XC214)*			
Project: *23003*			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA/EIA-222-F	Date: 10/26/12	Scale: NT	
Path: I:\23000\23003\Structural\Risa\23003 F.eri		Dwg No. E	

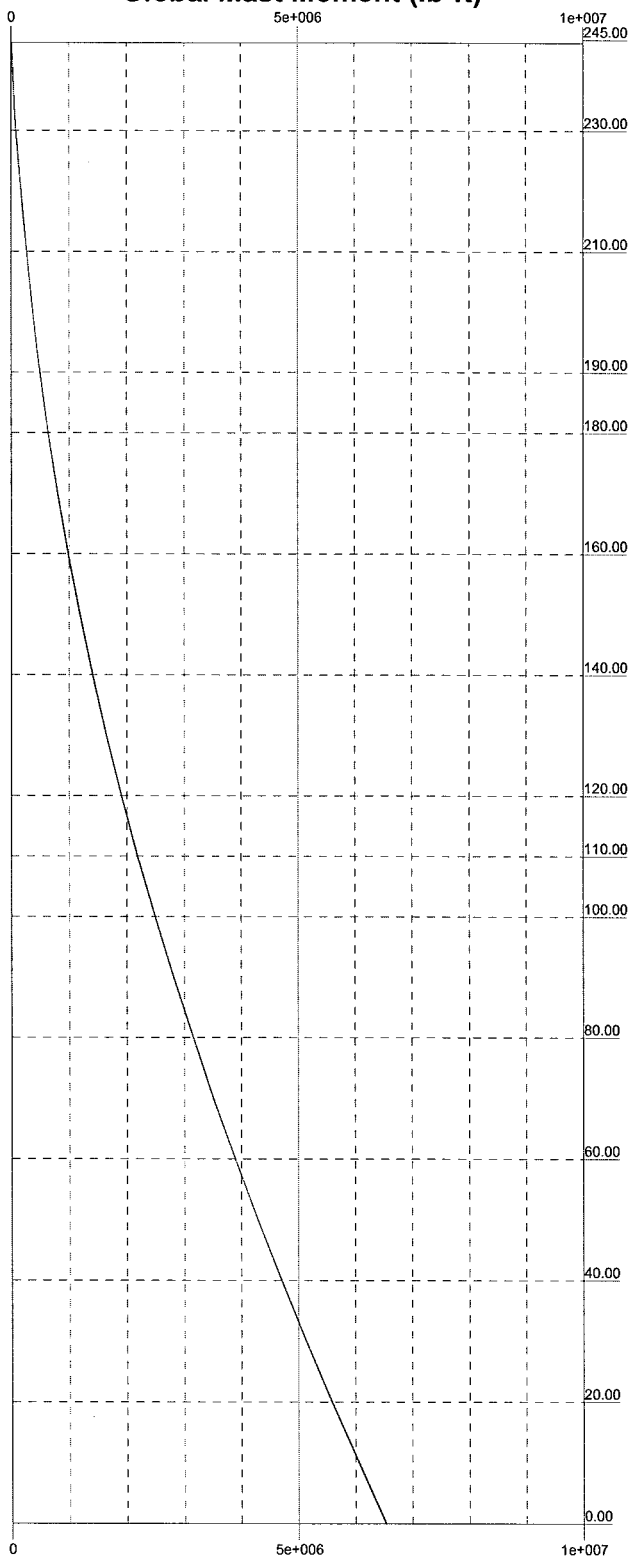
TIA/EIA-222-F - 85 mph/74 mph 0.5000 in Ice

Vx Vz Mx Mz

Global Mast Shear (lb)



Global Mast Moment (lb-ft)



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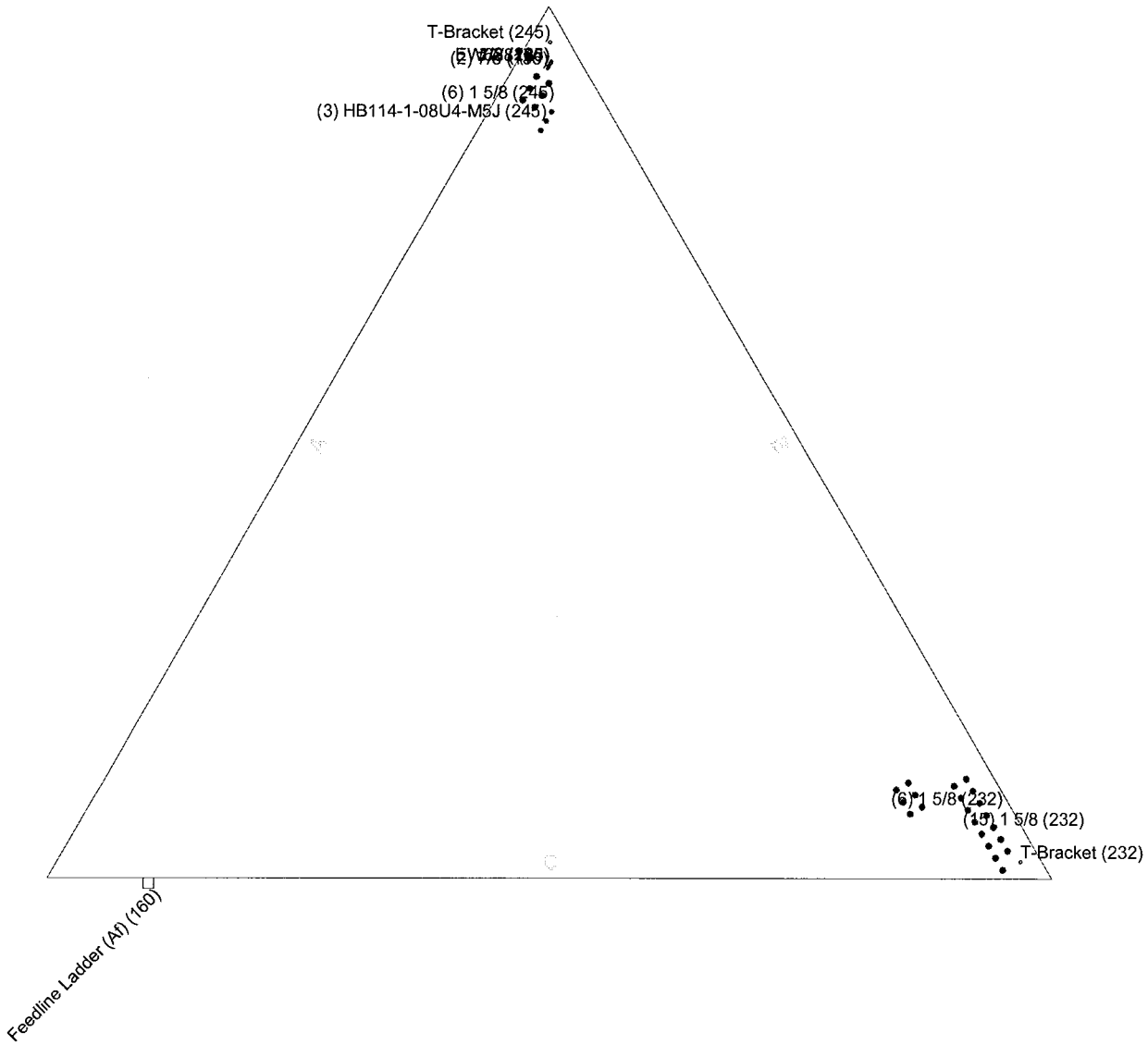
FAX: (608) 643-7999

Job: *U-Conn (CT03XC214)*			
Project: *23003*			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore		App'd:
Code: TIA/EIA-222-F	Date: 10/26/12		Scale: NT
Path: I:\23000\23003\Structural\Risa\23003 F.eri			Dwg No. E

Feedline Plan

Round Flat App In Face App Out Face Truss-Leg



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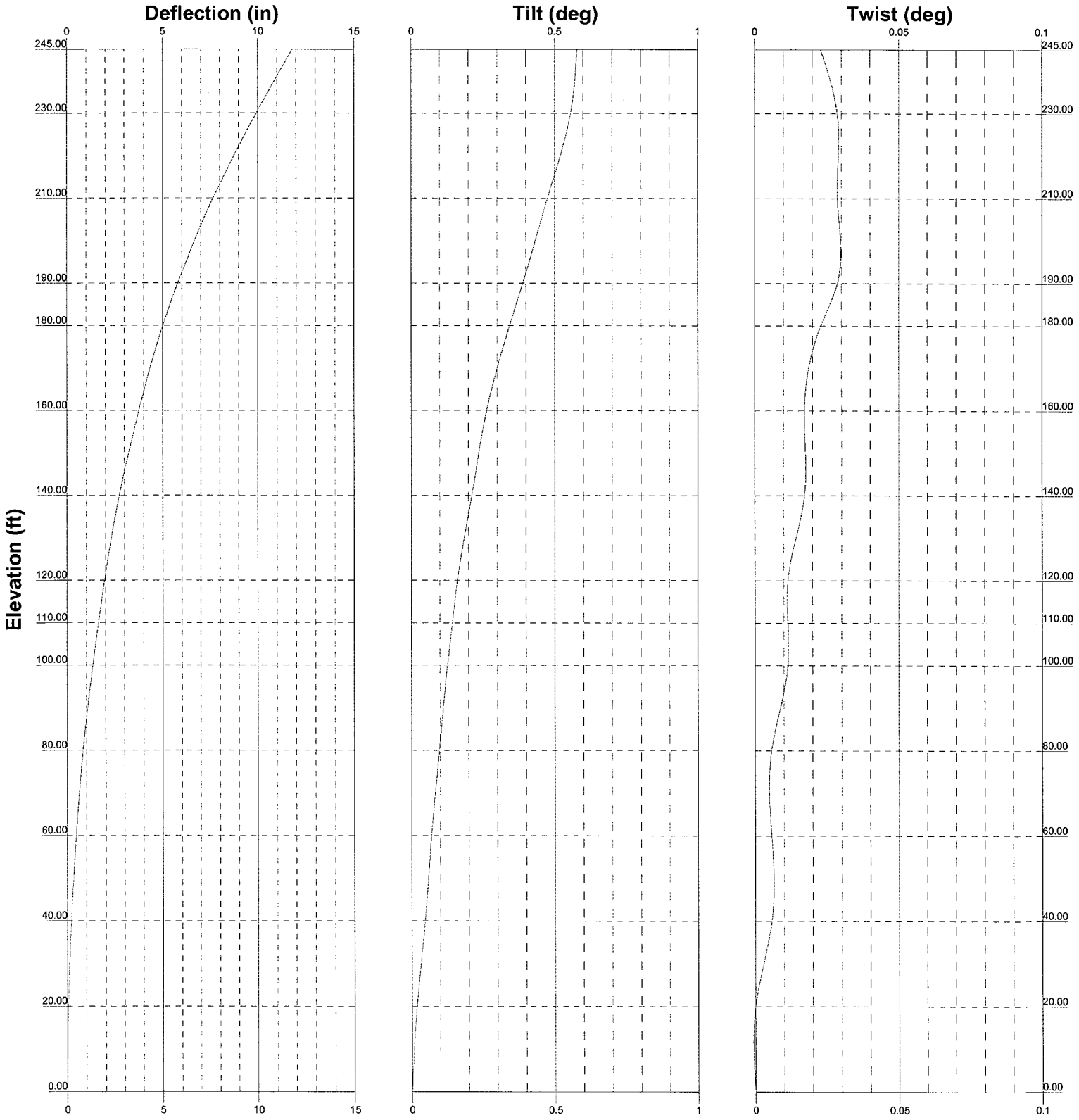
Project: *23003*			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA/EIA-222-F	Date: 10/26/12	Scale: NT	
Path: I:\23000\23003\Structural\Risa\23003 F.eri		Dwg No. E	

TIA/EIA-222-F - Service - 50 mph

Maximum Values



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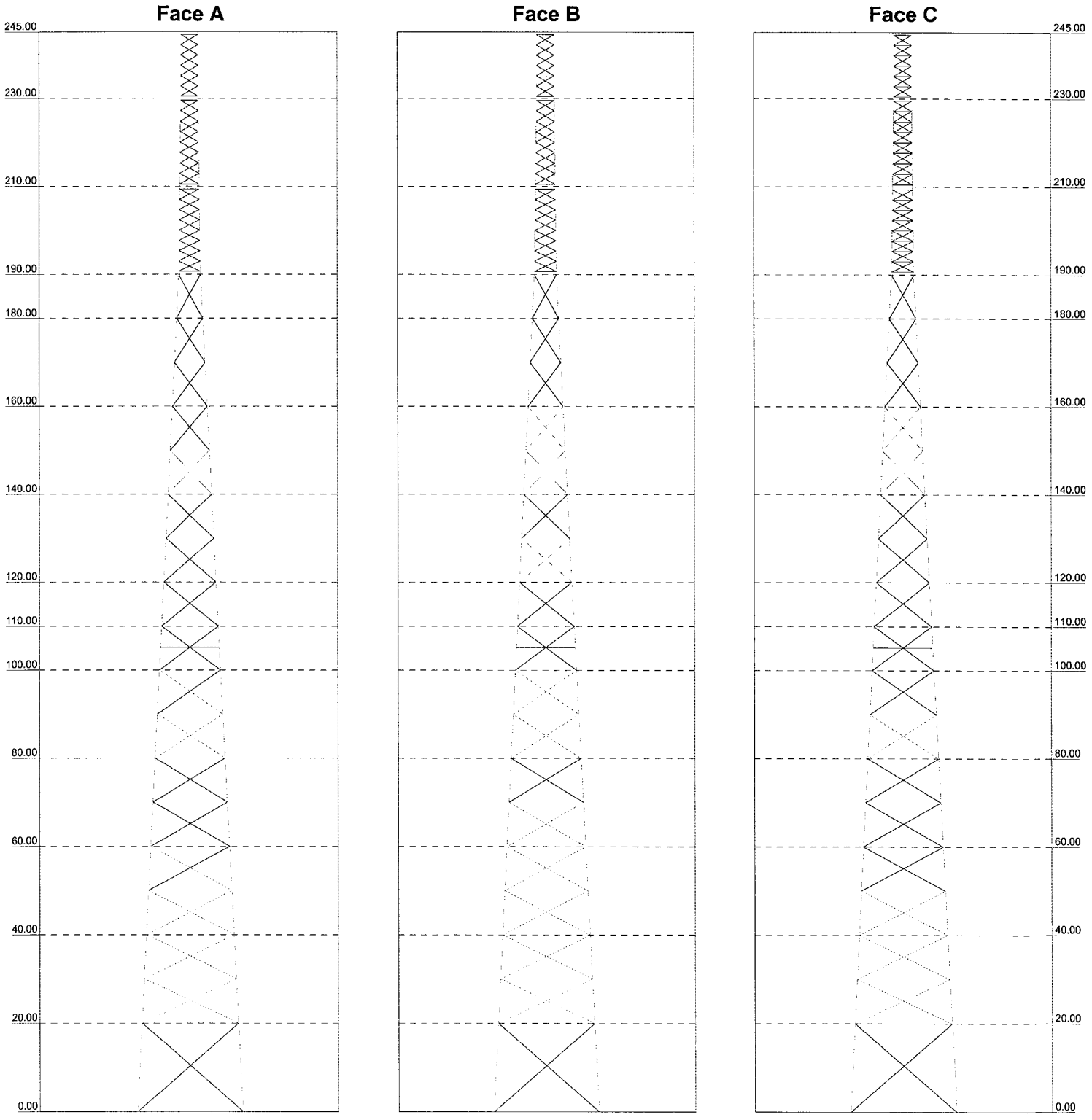
Project: *23003*			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA/EIA-222-F	Date: 10/26/12	Scale: NT	
Path: I:\23000\23003\Structural\Risa\23003 F.eri		Dwg No. E	

Stress Distribution Chart

0' - 245'

> 100% 90%-100% 75%-90% 50%-75% < 50% Overstress



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Project: *23003*			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore		App'd:
Code: TIA/EIA-222-F	Date: 10/26/12		Scale: NT
Path: I:\23000\23003\Structural\Risa\23003 F.eri			Dwg No. E

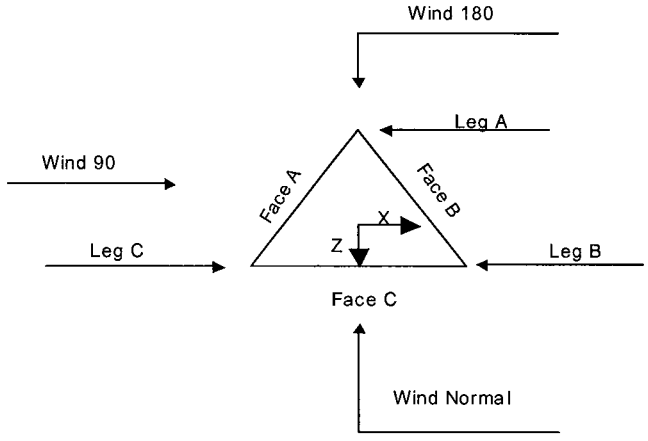
APPENDIX B

TOWER CALCULATIONS

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 245.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 4.00 ft at the top and 24.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Tolland County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	245.00-230.00			4.00	1	15.00
T2	230.00-210.00			4.00	1	20.00
T3	210.00-190.00			4.50	1	20.00
T4	190.00-180.00			5.00	1	10.00
T5	180.00-160.00			6.00	1	20.00
T6	160.00-140.00			8.00	1	20.00
T7	140.00-120.00			10.00	1	20.00
T8	120.00-110.00			12.00	1	10.00
T9	110.00-100.00			13.00	1	10.00
T10	100.00-80.00			14.00	1	20.00
T11	80.00-60.00			16.00	1	20.00
T12	60.00-40.00			18.00	1	20.00
T13	40.00-20.00			20.00	1	20.00
T14	20.00-0.00			22.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	245.00-230.00	2.33	X Brace	No	Steps	6.0000	6.0000
T2	230.00-210.00	2.38	X Brace	No	Steps	6.0000	6.0000
T3	210.00-190.00	2.33	X Brace	No	Steps	8.0160	8.0160
T4	190.00-180.00	10.00	X Brace	No	No	0.0000	0.0000
T5	180.00-160.00	10.00	X Brace	No	No	0.0000	0.0000
T6	160.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T7	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T8	120.00-110.00	10.00	X Brace	No	No	0.0000	0.0000
T9	110.00-100.00	10.00	X Brace	No	Yes	0.0000	0.0000
T10	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T11	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T12	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T13	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T14	20.00-0.00	20.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 245.00-230.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 230.00-210.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T3 210.00-190.00	Solid Round	2 1/2	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T4 190.00-180.00	Truss Leg	Pirod 105245	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 180.00-160.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 160.00-140.00	Truss Leg	Pirod 105218	A572-50	Equal Angle	L2 1/2x2 1/2x3/16	A36

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T7 140.00-120.00	Truss Leg	Pirod 105218	(50 ksi) A572-50 (50 ksi)	Equal Angle	L3x3x3/16	(36 ksi) A36 (36 ksi)
T8 120.00-110.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T9 110.00-100.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T10 100.00-80.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T11 80.00-60.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T12 60.00-40.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T13 40.00-20.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T14 20.00-0.00	Truss Leg	Pirod 112738	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x5/16x3/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 245.00-230.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 230.00-210.00	Solid Round	1	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T3 210.00-190.00	Solid Round	1	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 245.00-230.00	None	Flat Bar		A36 (36 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 230.00-210.00	None	Solid Round		A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T3 210.00-190.00	None	Solid Round		A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T9 110.00-100.00	Equal Angle	L3x3x5/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 245.00-230.00	0.00	0.0000	A36 (36 ksi)	1	1	1.02	36.0000	36.0000
T2 230.00-210.00	0.00	0.0000	A36 (36 ksi)	1	1	1.02	36.0000	36.0000
T3 210.00-190.00	0.00	0.0000	A36 (36 ksi)	1	1	1.02	36.0000	36.0000
T4 190.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 120.00-110.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 110.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T11 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T12 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T13 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T14 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 245.00-230.00	No	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T2 230.00-210.00	No	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T3 210.00-190.00	No	Yes	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors[1]: X Brace Diags X	X Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
				1	1	1	1	1	1	1	1	1	1	1	1
T4 190.00-180.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T5 180.00-160.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T6 160.00-140.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T7 140.00-120.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T8 120.00-110.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T9 110.00-100.00	No	Yes	1	1	1	1	1	1	1	1	1	0.5	1	1	1
				1	1	1	1	1	1	1	1	0.5	1	1	1
T10 100.00-80.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T11 80.00-60.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T12 60.00-40.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T13 40.00-20.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T14 20.00-0.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Truss-Leg K Factors: Truss-Legs Used As Leg Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals
T4 190.00-180.00	1	0.5	0.85	1	0.5	0.85
T5 180.00-160.00	1	0.5	0.85	1	0.5	0.85
T6 160.00-140.00	1	0.5	0.85	1	0.5	0.85
T7 140.00-120.00	1	0.5	0.85	1	0.5	0.85
T8 120.00-110.00	1	0.5	0.85	1	0.5	0.85
T9 110.00-100.00	1	0.5	0.85	1	0.5	0.85
T10 100.00-80.00	1	0.5	0.85	1	0.5	0.85
T11 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T12 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T13 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T14 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 245.00-230.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 230.00-210.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	0.75
T3 210.00-190.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	0.75
T4 190.00-180.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 120.00-110.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 110.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T12 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T13 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T14 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 245.00-230.00	Sleeve DS	0.6250 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 230.00-210.00	Sleeve DS	0.7500 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 210.00-190.00	Flange	1.0000 A325N	6	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 190.00-180.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 180.00-160.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 160.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 120.00-110.00	Flange	1.2500 A325N	0	1.2500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 110.00-100.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 100.00-80.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 80.00-60.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T12 60.00-40.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T13 40.00-20.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T14 20.00-0.00	Flange	2.0000 A687	6	1.0000 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (245)	A	Yes	Ar (CfAe)	245.00 - 0.00	-10.0000	0.42	6	3	1.9800	1.9800		1.04
HB114-1-08U4-M5J (245)	A	Yes	Ar (CfAe)	245.00 - 0.00	-15.0000	0.4	3	3	1.5400	1.5400		1.08
T-Bracket (245)	A	Yes	Af (CfAe)	245.00 - 0.00	-5.0000	0.47	1	1	0.7500	0.7500	3.0000	1.50
**********												
1 5/8 (232)	B	Yes	Ar (CfAe)	232.00 - 0.00	-10.0000	0.42	15	8	1.9800	1.9800		1.04
1 5/8 (232)	B	Yes	Ar (CfAe)	232.00 - 0.00	-25.0000	0.36	6	3	1.9800	1.9800		1.04
T-Bracket (232)	B	Yes	Af (CfAe)	232.00 - 0.00	-5.0000	0.47	1	1	0.7500	0.7500	3.0000	1.50
**********												
Feedline Ladder (Af) (160)	C	Yes	Af (CfAe)	160.00 - 0.00	0.0000	0.4	1	1	3.0000	3.0000	12.0000	8.40
**********												
1/2 (245)	A	Yes	Ar (CfAe)	245.00 - 0.00	-8.0000	0.45	1	1	0.5800	0.5800		0.25
7/8 (135)	A	Yes	Ar (CfAe)	135.00 - 0.00	-8.0000	0.45	2	2	1.1100	1.1100		0.54
7/8 (125)	A	Yes	Ar (CfAe)	125.00 - 0.00	-8.0000	0.45	1	1	1.1100	1.1100		0.54
1/2 (125)	A	Yes	Ar (CfAe)	125.00 - 0.00	-8.0000	0.45	1	1	0.5800	0.5800		0.25
7/8 (110)	A	Yes	Ar (CfAe)	110.00 - 0.00	-8.0000	0.45	2	2	1.1100	1.1100		0.54
EW63 (105)	A	Yes	Af (CfAe)	105.00 - 0.00	-8.0000	0.45	1	1	1.5742	1.5742	5.0668	0.51
7/8 (60)	A	Yes	Ar (CfAe)	60.00 - 0.00	-8.0000	0.45	1	1	1.1100	1.1100		0.54
7/8 (50)	A	Yes	Ar (CfAe)	50.00 - 0.00	-8.0000	0.45	1	1	1.1100	1.1100		0.54

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	245.00-230.00	A	13.925	0.938	0.000	0.000	168.45
		B	3.630	0.125	0.000	0.000	46.68
		C	0.000	0.000	0.000	0.000	0.00
T2	230.00-210.00	A	18.567	1.250	0.000	0.000	224.60
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	0.000	0.000	0.000	0.00
T3	210.00-190.00	A	18.567	1.250	0.000	0.000	224.60
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	0.000	0.000	0.000	0.00
T4	190.00-180.00	A	9.283	0.625	0.000	0.000	112.30
		B	18.150	0.625	0.000	0.000	233.40
		C	0.000	0.000	0.000	0.000	0.00
T5	180.00-160.00	A	18.567	1.250	0.000	0.000	224.60

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	0.000	0.000	0.000	0.00
T6	160.00-140.00	A	18.567	1.250	0.000	0.000	224.60
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	5.000	0.000	0.000	168.00
T7	140.00-120.00	A	22.046	1.250	0.000	0.000	244.75
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	5.000	0.000	0.000	168.00
T8	120.00-110.00	A	12.542	0.625	0.000	0.000	131.00
		B	18.150	0.625	0.000	0.000	233.40
		C	0.000	2.500	0.000	0.000	84.00
T9	110.00-100.00	A	14.392	1.281	0.000	0.000	144.35
		B	18.150	0.625	0.000	0.000	233.40
		C	0.000	2.500	0.000	0.000	84.00
T10	100.00-80.00	A	28.783	3.874	0.000	0.000	293.80
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	5.000	0.000	0.000	168.00
T11	80.00-60.00	A	28.783	3.874	0.000	0.000	293.80
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	5.000	0.000	0.000	168.00
T12	60.00-40.00	A	31.558	3.874	0.000	0.000	310.00
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	5.000	0.000	0.000	168.00
T13	40.00-20.00	A	32.483	3.874	0.000	0.000	315.40
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	5.000	0.000	0.000	168.00
T14	20.00-0.00	A	32.483	3.874	0.000	0.000	315.40
		B	36.300	1.250	0.000	0.000	466.80
		C	0.000	5.000	0.000	0.000	168.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	245.00-230.00	A	0.500	22.675	1.771	0.000	0.000	385.04
		B		5.463	0.236	0.000	0.000	112.21
		C		0.000	0.000	0.000	0.000	0.00
T2	230.00-210.00	A	0.500	30.233	2.361	0.000	0.000	513.39
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	0.000	0.000	0.000	0.00
T3	210.00-190.00	A	0.500	30.233	2.361	0.000	0.000	513.39
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	0.000	0.000	0.000	0.00
T4	190.00-180.00	A	0.500	15.117	1.181	0.000	0.000	256.69
		B		27.317	1.181	0.000	0.000	561.05
		C		0.000	0.000	0.000	0.000	0.00
T5	180.00-160.00	A	0.500	30.233	2.361	0.000	0.000	513.39
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	0.000	0.000	0.000	0.00
T6	160.00-140.00	A	0.500	30.233	2.361	0.000	0.000	513.39
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	6.111	0.000	0.000	222.03
T7	140.00-120.00	A	0.500	37.046	2.361	0.000	0.000	571.26
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	6.111	0.000	0.000	222.03
T8	120.00-110.00	A	0.500	21.708	1.181	0.000	0.000	311.49
		B		27.317	1.181	0.000	0.000	561.05

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		C		0.000	3.056	0.000	0.000	111.01
T9	110.00-100.00	A	0.500	25.225	2.114	0.000	0.000	351.28
		B		27.317	1.181	0.000	0.000	561.05
		C		0.000	3.056	0.000	0.000	111.01
T10	100.00-80.00	A	0.500	50.450	6.096	0.000	0.000	721.19
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	6.111	0.000	0.000	222.03
T11	80.00-60.00	A	0.500	50.450	6.096	0.000	0.000	721.19
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	6.111	0.000	0.000	222.03
T12	60.00-40.00	A	0.500	55.725	6.096	0.000	0.000	766.90
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	6.111	0.000	0.000	222.03
T13	40.00-20.00	A	0.500	57.483	6.096	0.000	0.000	782.13
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	6.111	0.000	0.000	222.03
T14	20.00-0.00	A	0.500	57.483	6.096	0.000	0.000	782.13
		B		54.633	2.361	0.000	0.000	1122.10
		C		0.000	6.111	0.000	0.000	222.03

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	245.00-230.00	A	1.005	3.876	0.000	0.000
		B	0.254	0.897	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	230.00-210.00	A	1.490	5.301	0.000	0.000
		B	2.823	9.203	0.000	0.000
		C	0.000	0.000	0.000	0.000
T3	210.00-190.00	A	1.637	5.478	0.000	0.000
		B	3.102	9.510	0.000	0.000
		C	0.000	0.000	0.000	0.000
T4	190.00-180.00	A	0.000	0.573	0.856	1.432
		B	0.000	0.994	1.622	2.485
		C	0.000	0.000	0.000	0.000
T5	180.00-160.00	A	0.000	0.967	1.445	2.417
		B	0.000	1.678	2.738	4.196
		C	0.000	0.000	0.000	0.000
T6	160.00-140.00	A	0.000	0.827	1.237	2.068
		B	0.000	1.436	2.343	3.591
		C	0.000	0.166	0.312	0.416
T7	140.00-120.00	A	0.000	0.901	1.576	2.703
		B	0.000	1.298	2.540	3.893
		C	0.000	0.150	0.338	0.451
T8	120.00-110.00	A	0.000	0.494	0.843	1.483
		B	0.000	0.614	1.202	1.842
		C	0.000	0.071	0.160	0.213
T9	110.00-100.00	A	0.000	0.807	1.367	2.421
		B	0.000	0.837	1.638	2.510
		C	0.000	0.097	0.218	0.291
T10	100.00-80.00	A	0.000	1.155	1.963	3.466
		B	0.000	1.153	2.257	3.460
		C	0.000	0.134	0.301	0.401
T11	80.00-60.00	A	0.000	1.115	2.211	3.903
		B	0.000	1.113	2.542	3.896

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
		C	0.000	0.129	0.338	0.451
T12	60.00-40.00	A	0.000	1.185	2.336	4.149
		B	0.000	1.084	2.476	3.794
		C	0.000	0.126	0.330	0.440
T13	40.00-20.00	A	0.000	1.194	2.685	4.777
		B	0.000	1.063	2.773	4.250
		C	0.000	0.123	0.369	0.492
T14	20.00-0.00	A	0.000	0.714	1.405	2.500
		B	0.000	0.635	1.451	2.224
		C	0.000	0.074	0.193	0.258

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	245.00-230.00	3.5088	-4.8077	2.8710	-4.1117
T2	230.00-210.00	5.9594	2.3703	5.2848	1.7574
T3	210.00-190.00	6.2671	2.0267	5.6601	1.4817
T4	190.00-180.00	5.0276	1.2262	4.7655	0.8813
T5	180.00-160.00	6.5964	0.9631	6.4091	0.5767
T6	160.00-140.00	7.0834	1.4915	7.1894	0.8432
T7	140.00-120.00	8.3000	0.0919	8.5062	-0.9529
T8	120.00-110.00	9.0349	-1.1800	9.2280	-2.6670
T9	110.00-100.00	8.6131	-2.9239	8.8105	-4.5755
T10	100.00-80.00	10.4807	-4.2544	10.6941	-6.2077
T11	80.00-60.00	10.8969	-4.6193	11.2876	-6.7573
T12	60.00-40.00	11.8235	-6.4508	12.2449	-9.0994
T13	40.00-20.00	12.1142	-7.1684	12.7428	-10.1573
T14	20.00-0.00	14.5671	-8.7595	15.2896	-12.3527

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	lb
Lightning Rod 2"x10'	C	From Leg	5.00 0.00 5.00	0.0000	247.00	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	40.00 55.50
Large Beacon	A	From Leg	0.00 0.00 0.00	0.0000	247.00	No Ice 1/2" Ice	2.50 2.76	2.50 2.76	28.00 58.19
**********									
(2) DB980H90E-M w/Mount Pipe	A	From Face	4.00 0.00 0.00	0.0000	247.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	34.05 69.84
(2) DB980H90E-M w/Mount Pipe	B	From Face	4.00 0.00	0.0000	247.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	34.05 69.84

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00						
(2) DB980H90E-M w/Mount Pipe	C	From Face	4.00	0.0000	247.00	No Ice	4.27	3.86	34.05
			0.00			1/2" Ice	4.86	4.95	69.84
			0.00						
APXVSPP18-C w/Mount Pipe	A	From Face	4.00	0.0000	247.00	No Ice	8.56	6.95	82.55
			0.00			1/2" Ice	9.21	8.13	147.99
			0.00						
APXV9ERR18-C w/Mount Pipe	B	From Face	4.00	0.0000	247.00	No Ice	8.56	6.95	33.05
			0.00			1/2" Ice	9.21	8.13	98.49
			0.00						
APXVSPP18-C w/Mount Pipe	C	From Face	4.00	0.0000	247.00	No Ice	8.56	6.95	82.55
			0.00			1/2" Ice	9.21	8.13	147.99
			0.00						
(2) 1900MHz 4x40W RRH	A	From Face	4.00	0.0000	247.00	No Ice	2.71	2.61	59.50
			0.00			1/2" Ice	2.95	2.84	82.62
			0.00						
(2) 1900MHz 4x40W RRH	B	From Face	4.00	0.0000	247.00	No Ice	2.71	2.61	59.50
			0.00			1/2" Ice	2.95	2.84	82.62
			0.00						
(2) 1900MHz 4x40W RRH	C	From Face	4.00	0.0000	247.00	No Ice	2.71	2.61	59.50
			0.00			1/2" Ice	2.95	2.84	82.62
			0.00						
800MHz 2x50W RRH	A	From Face	4.00	0.0000	247.00	No Ice	2.40	2.25	64.00
			0.00			1/2" Ice	2.61	2.46	86.12
			0.00						
800MHz 2x50W RRH	B	From Face	4.00	0.0000	247.00	No Ice	2.40	2.25	64.00
			0.00			1/2" Ice	2.61	2.46	86.12
			0.00						
800MHz 2x50W RRH	C	From Face	4.00	0.0000	247.00	No Ice	2.40	2.25	64.00
			0.00			1/2" Ice	2.61	2.46	86.12
			0.00						
IBC1900BB-1	A	From Face	4.00	0.0000	247.00	No Ice	1.13	0.53	22.00
			0.00			1/2" Ice	1.27	0.65	29.71
			0.00						
IBC1900BB-1	B	From Face	4.00	0.0000	247.00	No Ice	1.13	0.53	22.00
			0.00			1/2" Ice	1.27	0.65	29.71
			0.00						
IBC1900BB-1	C	From Face	4.00	0.0000	247.00	No Ice	1.13	0.53	22.00
			0.00			1/2" Ice	1.27	0.65	29.71
			0.00						
IBC1900HG-2A	A	From Face	4.00	0.0000	247.00	No Ice	1.13	0.53	22.00
			0.00			1/2" Ice	1.27	0.65	29.71
			0.00						
IBC1900HG-2A	B	From Face	4.00	0.0000	247.00	No Ice	1.13	0.53	22.00
			0.00			1/2" Ice	1.27	0.65	29.71
			0.00						
IBC1900HG-2A	C	From Face	4.00	0.0000	247.00	No Ice	1.13	0.53	22.00
			0.00			1/2" Ice	1.27	0.65	29.71
			0.00						
PiROD 15' Rotatable Platform (Lattice)	C	None		0.0000	246.00	No Ice	24.90	24.90	1810.00
						1/2" Ice	30.70	30.70	2435.00
**********									
(3) 6' x 1' Panel Antenna w/Mount Pipe	A	From Face	4.00	0.0000	232.00	No Ice	8.64	6.36	65.55
			0.00			1/2" Ice	9.29	7.54	128.50
			0.00						
(2) 6' x 1' Panel Antenna w/Mount Pipe	B	From Face	4.00	0.0000	232.00	No Ice	8.64	6.36	65.55
			0.00			1/2" Ice	9.29	7.54	128.50

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00						
(2) 6' x 1' Panel Antenna w/Mount Pipe	C	From Face	4.00 0.00 0.00	0.0000	232.00	No Ice 1/2" Ice	8.64 9.29	6.36 7.54	65.55 128.50
(3) TMA	A	From Face	4.00 0.00 0.00	0.0000	232.00	No Ice 1/2" Ice	1.40 1.56	0.70 0.82	5.00 15.34
(2) TMA	B	From Face	4.00 0.00 0.00	0.0000	232.00	No Ice 1/2" Ice	1.40 1.56	0.70 0.82	5.00 15.34
(2) TMA	C	From Face	4.00 0.00 0.00	0.0000	232.00	No Ice 1/2" Ice	1.40 1.56	0.70 0.82	5.00 15.34
Pirod 12' Universal T-Frame (3)	C	None		0.0000	232.00	No Ice 1/2" Ice	21.88 30.68	21.88 30.68	1069.00 1485.00
**********									
10' Omni	A	From Leg	4.00 0.00 5.00	0.0000	135.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	30.00 48.64
4' Standoff	A	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	50.00 89.00
**********									
10' Omni	C	From Leg	4.00 0.00 5.00	0.0000	135.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	30.00 48.64
4' Standoff	C	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	50.00 89.00
**********									
20' Omni	A	From Leg	6.00 0.00 10.00	0.0000	125.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	55.00 98.17
6' Standoff	A	From Leg	3.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
**********									
Small Beacon	A	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	0.31 0.40	0.31 0.40	7.00 11.00
Small Beacon	B	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	0.31 0.40	0.31 0.40	7.00 11.00
Small Beacon	C	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	0.31 0.40	0.31 0.40	7.00 11.00
**********									
10' Omni	C	From Leg	4.00 0.00 5.00	0.0000	110.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	30.00 48.64
4' Standoff	C	From Leg	2.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	50.00 89.00
**********									
Camera and Mount	A	From Leg	0.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	5.60 5.92	5.60 5.92	150.00 208.37

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 (lb)
**********									
4' Omni	A	From Leg	4.00 0.00 2.00	0.0000	50.00	No Ice 1/2" Ice	1.00 1.25	1.00 1.25	20.00 28.96
4' Standoff	A	From Leg	2.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	50.00 89.00

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral / Vert (ft)	Azimuth Adjustment (°)	3 dB Beam Width (°)	Elevation (ft)	Outside Diameter (ft)		Aperture Area (ft^2)	Weight (lb)
KP4F-23	B	Grid	From Face	1.00 -6.00 0.00	0.0000		110.00	4.00	No Ice 1/2" Ice	10.05 13.09	51.00 118.19
Andrew 6' w/Radome	B	Paraboloid w/Radome	From Face	1.00 -6.00 0.00	0.0000		105.00	6.00	No Ice 1/2" Ice	28.27 29.07	380.00 450.00

Truss-Leg Properties

Section Designation	Area (in^2)	Area Ice (in^2)	Self Weight (lb)	Ice Weight (lb)	Equiv. Diameter (in)	Equiv. Diameter Ice (in)	Leg Area (in^2)
Pirod 105245	1090.3344	1814.3549	644.58	218.92	7.5718	12.5997	5.3014
Pirod 105217	2312.6169	3662.4070	566.74	445.84	8.0299	12.7167	5.3014
Pirod 105218	2441.6826	3844.4876	695.44	460.88	8.4781	13.3489	7.2158
Pirod 105218	2441.6826	3844.4876	695.44	460.88	8.4781	13.3489	7.2158
Pirod 105219	2620.2715	4120.6531	1047.25	496.62	9.0982	14.3078	9.4248
Pirod 105219	2620.2715	4120.6531	1047.25	496.62	9.0982	14.3078	9.4248
Pirod 105219	2620.2715	4120.6531	1047.25	496.62	9.0982	14.3078	9.4248
Pirod 105220	2757.8509	4325.4038	1215.68	511.57	9.5759	15.0188	11.9282
Pirod 105220	2757.8509	4325.4038	1215.68	511.57	9.5759	15.0188	11.9282
Pirod 105220	2757.8509	4325.4038	1215.68	511.57	9.5759	15.0188	11.9282
Pirod 112738	3389.3479	5023.2440	1678.45	674.36	11.7686	17.4418	14.7262

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	31100.84					
Bracing Weight	14322.00					
Total Member Self-Weight	45422.83			-3943.82	-16809.33	
Total Weight	60970.66			-3943.82	-16809.33	
Wind 0 deg - No Ice		-44.84	-47301.95	-6123883.81	-6418.46	27320.42
Wind 30 deg - No Ice		23038.18	-39830.51	-5211886.92	-3028132.82	12235.40
Wind 60 deg - No Ice		39568.14	-22791.81	-2991616.52	-5212852.35	-5048.44
Wind 90 deg - No Ice		46092.62	9.39	2766.14	-6051078.31	-19973.81
Wind 120 deg - No Ice		41033.83	23689.81	3065024.92	-5332879.51	-30251.70
Wind 150 deg - No Ice		22895.00	39747.21	5200735.32	-3022959.06	-31083.10
Wind 180 deg - No Ice		-61.90	45556.10	5978246.11	-16033.52	-24304.55
Wind 210 deg - No Ice		-23143.58	40026.93	5224646.42	3005541.89	-10905.77
Wind 240 deg - No Ice		-41361.21	23827.04	3069594.82	5327957.87	5510.09
Wind 270 deg - No Ice		-46315.42	-16.32	-11427.07	6040854.47	20918.05
Wind 300 deg - No Ice		-39575.26	-22724.44	-2994366.92	5185549.15	29831.20
Wind 330 deg - No Ice		-23053.89	-39655.48	-5199064.37	3005896.38	32183.88
Member Ice	21131.89					
Total Weight Ice	97405.24			-10697.06	-50378.30	
Wind 0 deg - Ice		-1.21	-49130.39	-6484269.99	-46835.69	28075.96
Wind 30 deg - Ice		24159.49	-41789.79	-5555327.92	-3255026.27	11240.18
Wind 60 deg - Ice		41635.53	-24005.08	-3200860.61	-5589245.09	-8281.39
Wind 90 deg - Ice		48320.56	0.92	-7017.47	-6466047.49	-24524.22
Wind 120 deg - Ice		42605.06	24566.24	3229157.39	-5668227.05	-34775.55
Wind 150 deg - Ice		23987.78	41648.03	5522090.63	-3242909.28	-34365.87
Wind 180 deg - Ice		-408.72	48023.60	6377336.33	-9272.78	-23213.35
Wind 210 deg - Ice		-24497.02	41944.86	5550252.53	3190961.61	-8107.25
Wind 240 deg - Ice		-43045.61	24819.20	3250250.14	5611089.39	9760.16
Wind 270 deg - Ice		-48623.63	213.86	9240.11	6397769.31	25829.49
Wind 300 deg - Ice		-41851.52	-23657.84	-3169115.34	5515715.11	35822.90
Wind 330 deg - Ice		-24124.17	-41569.29	-5535233.12	3156444.94	35310.80
Total Weight	60970.66			-3943.82	-16809.33	
Wind 0 deg - Service		-15.52	-16367.46	-2124709.14	5177.12	9453.43
Wind 30 deg - Service		7971.69	-13782.18	-1809139.28	-1040398.78	4233.70
Wind 60 deg - Service		13691.40	-7886.44	-1040879.63	-1796357.10	-1746.87
Wind 90 deg - Service		15949.00	3.25	-4761.06	-2086400.68	-6911.35
Wind 120 deg - Service		14198.56	8197.17	1054844.06	-1837888.98	-10467.72
Wind 150 deg - Service		7922.15	13753.36	1793844.20	-1038608.55	-10755.40
Wind 180 deg - Service		-21.42	15763.36	2062879.07	1850.11	-8409.88
Wind 210 deg - Service		-8008.16	13850.15	1802117.93	1047377.93	-3773.62
Wind 240 deg - Service		-14311.84	8244.65	1056425.34	1850982.08	1906.60
Wind 270 deg - Service		-16026.10	-5.65	-9672.20	2097659.10	7238.08
Wind 300 deg - Service		-13693.86	-7863.13	-1041831.32	1801705.71	10322.21
Wind 330 deg - Service		-7977.12	-13721.62	-1804702.41	1047500.60	11136.29

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 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	245 - 230	Leg	Max Tension	12	20879.94	-594.86	-358.79
			Max. Compression	10	-24161.61	637.17	-450.24
			Max. Mx	11	-21152.31	723.26	-106.97
			Max. My	2	-24061.60	-55.19	780.91
			Max. Vy	11	-2787.16	723.26	-106.97
			Max. Vx	2	-2986.39	-55.19	780.91
		Diagonal	Max Tension	9	3382.90	0.00	0.00
			Max. Compression	3	-3367.93	0.00	0.00
			Max. Mx	20	2030.43	-3.07	-0.12
			Max. My	9	-3338.53	-0.19	1.23
			Max. Vy	20	-3.64	-3.07	-0.12
			Max. Vx	9	-0.53	-0.19	1.23
		Horizontal	Max Tension	8	556.43	0.00	0.00
			Max. Compression	2	-454.26	0.00	0.00
			Max. Mx	15	-261.29	4.59	0.00
			Max. My	25	-158.80	0.00	-0.00
			Max. Vy	15	4.59	0.00	0.00
			Max. Vx	25	-0.00	0.00	0.00
		Top Girt	Max Tension	6	956.24	0.00	0.00
			Max. Compression	12	-1016.44	0.00	0.00
			Max. Mx	14	-3.73	5.85	0.00
			Max. My	19	-391.37	0.00	0.00
			Max. Vy	14	5.85	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vx	19	0.00	0.00	0.00
		Bottom Girt	Max Tension	12	1678.01	0.00	0.00
			Max. Compression	6	-1784.00	0.00	0.00
			Max. Mx	14	10.51	5.85	0.00
			Max. My	25	-543.11	0.00	-0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	25	0.00	0.00	0.00
T2	230 - 210	Leg	Max Tension	12	64556.41	1180.36	18.84
			Max. Compression	6	-69387.80	443.43	21.07
			Max. Mx	6	-23937.09	2074.58	46.31
			Max. My	5	-1757.65	-20.49	1926.82
			Max. Vy	15	-3482.44	468.92	-4.15
			Max. Vx	24	2767.42	3.57	-305.65
		Diagonal	Max Tension	3	4396.17	0.00	0.00
			Max. Compression	9	-4502.31	0.00	0.00
			Max. Mx	19	-159.71	-5.34	0.29
			Max. My	3	-4424.25	-0.04	-2.56
			Max. Vy	26	-5.29	-5.05	0.36
			Max. Vx	3	1.10	0.00	0.00
		Horizontal	Max Tension	8	1266.22	0.00	0.00
			Max. Compression	2	-1120.98	0.00	0.00
			Max. Mx	14	129.21	7.17	0.00
			Max. My	25	-435.74	0.00	-0.00
			Max. Vy	14	6.48	0.00	0.00
			Max. Vx	25	0.00	0.00	0.00
		Top Girt	Max Tension	6	2049.08	0.00	0.00
			Max. Compression	12	-1944.29	0.00	0.00
			Max. Mx	14	-0.43	7.33	0.00
			Max. My	26	-211.79	0.00	0.00
			Max. Vy	14	-7.31	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
		Bottom Girt	Max Tension	21	2109.10	0.00	0.00
			Max. Compression	15	-2087.61	0.00	0.00
			Max. Mx	14	29.60	9.17	0.00
			Max. My	26	285.66	0.00	0.00
			Max. Vy	14	-8.17	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
T3	210 - 190	Leg	Max Tension	12	108240.30	267.22	-2.48
			Max. Compression	19	-118471.61	2891.47	68.15
			Max. Mx	19	-118471.61	2891.47	68.15
			Max. My	24	-3832.93	-2.36	-2154.32
			Max. Vy	19	-4869.40	2891.47	68.15
			Max. Vx	24	2769.09	-2.36	-2154.32
		Diagonal	Max Tension	26	4867.20	0.00	0.00
			Max. Compression	20	-5075.60	0.00	0.00
			Max. Mx	20	2398.30	-8.57	-0.42
			Max. My	18	-4876.47	-0.07	2.73
			Max. Vy	20	-7.52	-8.57	-0.42
			Max. Vx	18	-1.08	0.00	0.00
		Horizontal	Max Tension	21	1531.19	0.00	0.00
			Max. Compression	2	-1358.48	0.00	0.00
			Max. Mx	14	99.02	8.87	0.00
			Max. My	25	-616.43	0.00	-0.00
			Max. Vy	14	-7.21	0.00	0.00
			Max. Vx	25	0.00	0.00	0.00
		Top Girt	Max Tension	19	1786.55	0.00	0.00
			Max. Compression	25	-1662.68	0.00	0.00
			Max. Mx	14	16.21	9.29	0.00
			Max. My	26	-279.10	0.00	0.00
			Max. Vy	14	-8.23	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
		Bottom Girt	Max Tension	21	1489.63	0.00	0.00
			Max. Compression	2	-1358.28	0.00	0.00
			Max. Mx	14	41.48	11.31	0.00
			Max. My	26	-60.39	0.00	0.00
			Max. Vy	14	-9.08	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
T4	190 - 180	Leg	Max Tension	17	107686.36	-2700.65	-40.33
			Max. Compression	19	-118562.04	5189.71	-7.55
			Max. Mx	17	107424.39	-5629.19	-83.12
			Max. My	18	-4752.29	-259.11	9064.55
			Max. Vy	25	451.69	-5614.69	-17.73
			Max. Vx	16	928.92	-226.78	-9001.85
		Diagonal	Max Tension	22	4283.03	0.00	0.00
			Max. Compression	16	-4825.25	0.00	0.00
			Max. Mx	21	2875.02	87.14	-6.55
			Max. My	26	-2848.42	-56.20	-26.46
			Max. Vy	21	22.31	87.14	-6.55
			Max. Vx	26	5.49	0.00	0.00
T5	180 - 160	Leg	Max Tension	17	127752.19	-5492.83	-55.58
			Max. Compression	19	-142969.62	5161.65	7.42
			Max. Mx	17	118697.53	-5629.22	-83.12
			Max. My	18	-5811.42	-259.27	9064.52
			Max. Vy	25	-175.05	-5479.57	-23.53
			Max. Vx	16	-535.22	-226.95	-9001.82
		Diagonal	Max Tension	26	4012.11	0.00	0.00
			Max. Compression	26	-4437.20	0.00	0.00
			Max. Mx	19	3202.87	88.08	4.44
			Max. My	21	2771.55	72.74	8.74
			Max. Vy	19	-24.29	88.08	4.44
			Max. Vx	21	-1.99	0.00	0.00
T6	160 - 140	Leg	Max Tension	17	146133.90	-4920.64	-44.42
			Max. Compression	19	-166046.74	5107.66	28.62
			Max. Mx	17	137277.62	-5214.64	-50.61
			Max. My	16	-10700.12	-8.29	-5044.38
			Max. Vy	25	-174.83	-5195.32	-20.50
			Max. Vx	16	197.98	-8.29	-5044.38
		Diagonal	Max Tension	26	4310.63	0.00	0.00
			Max. Compression	26	-4649.41	0.00	0.00
			Max. Mx	19	2991.57	61.74	4.07
			Max. My	21	-3862.59	3.40	7.96
			Max. Vy	17	21.70	58.64	-5.36
			Max. Vx	15	-1.82	0.00	0.00
T7	140 - 120	Leg	Max Tension	17	164716.18	-4489.66	56.45
			Max. Compression	19	-189703.81	5310.05	191.81
			Max. Mx	19	-189703.81	5310.05	191.81
			Max. My	18	-11512.34	-52.38	5778.08
			Max. Vy	21	269.98	-5255.67	133.13
			Max. Vx	24	378.58	-30.26	-5741.97
		Diagonal	Max Tension	26	4920.85	0.00	0.00
			Max. Compression	26	-5246.71	0.00	0.00
			Max. Mx	19	3408.31	92.69	5.95
			Max. My	21	-4272.71	-0.26	10.46
			Max. Vy	17	30.54	88.67	6.43
			Max. Vx	21	-2.19	0.00	0.00
T8	120 - 110	Leg	Max Tension	17	174454.48	-5248.24	33.64
			Max. Compression	19	-202029.15	2442.36	37.31
			Max. Mx	19	-201056.67	5310.00	191.82
			Max. My	18	-12086.47	-52.44	5778.06
			Max. Vy	15	388.69	5271.24	-128.64
			Max. Vx	25	-212.74	2593.82	-5077.98
		Diagonal	Max Tension	26	5673.91	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Compression	26	-5959.40	0.00	0.00
			Max. Mx	19	3771.77	123.10	11.59
			Max. My	20	2211.79	101.68	14.96
			Max. Vy	19	-42.49	123.10	11.59
			Max. Vx	20	-2.96	0.00	0.00
T9	110 - 100	Leg	Max Tension	17	183517.53	-3179.35	-41.35
			Max. Compression	19	-213801.01	2480.21	51.67
			Max. Mx	19	-213289.66	9123.25	-270.10
			Max. My	18	-14640.62	-323.90	5737.10
			Max. Vy	19	-1432.26	9123.25	-270.10
			Max. Vx	24	-1660.84	-288.33	-4979.20
		Diagonal	Max Tension	25	6025.06	0.00	0.00
			Max. Compression	19	-6518.42	0.00	0.00
			Max. Mx	17	5129.54	119.00	9.29
			Max. My	25	-4570.85	33.36	-15.05
			Max. Vy	17	44.48	119.00	9.29
			Max. Vx	25	2.91	0.00	0.00
		Secondary Horizontal	Max Tension	19	3707.76	0.00	0.00
			Max. Compression	19	-3707.76	0.00	0.00
			Max. Mx	14	273.66	-199.21	0.00
			Max. My	25	1937.04	0.00	5.75
			Max. Vy	14	59.11	0.00	0.00
			Max. Vx	25	-1.71	0.00	0.00
T10	100 - 80	Leg	Max Tension	17	203819.10	-4170.96	-32.53
			Max. Compression	19	-240669.04	4635.38	65.62
			Max. Mx	19	-240669.04	4635.38	65.62
			Max. My	18	-15557.48	-323.94	5737.08
			Max. Vy	15	-259.31	4058.60	17.21
			Max. Vx	16	-266.21	-75.76	-5115.65
		Diagonal	Max Tension	26	6535.11	0.00	0.00
			Max. Compression	26	-6803.98	0.00	0.00
			Max. Mx	19	4443.42	132.45	11.95
			Max. My	25	-5555.00	45.32	-20.21
			Max. Vy	17	48.66	128.44	13.30
			Max. Vx	25	3.47	0.00	0.00
T11	80 - 60	Leg	Max Tension	17	222791.04	-4087.86	-17.91
			Max. Compression	19	-266317.88	4203.14	-22.53
			Max. Mx	19	-252500.07	4635.35	65.62
			Max. My	18	-19339.44	-23.74	4091.02
			Max. Vy	25	-196.14	-4563.00	-75.77
			Max. Vx	22	-160.65	-13.84	4049.52
		Diagonal	Max Tension	26	7065.98	0.00	0.00
			Max. Compression	26	-7279.46	0.00	0.00
			Max. Mx	17	5270.07	170.95	16.12
			Max. My	25	-6196.26	84.36	-22.46
			Max. Vy	17	62.53	170.95	16.12
			Max. Vx	25	3.75	0.00	0.00
T12	60 - 40	Leg	Max Tension	17	241584.19	-4629.75	-35.55
			Max. Compression	19	-291751.74	5226.53	-54.35
			Max. Mx	19	-291751.74	5226.53	-54.35
			Max. My	18	-24470.19	1957.99	5404.83
			Max. Vy	21	-513.69	-4601.83	25.37
			Max. Vx	18	-249.13	1957.99	5404.83
		Diagonal	Max Tension	26	7414.76	0.00	0.00
			Max. Compression	26	-8150.63	0.00	0.00
			Max. Mx	17	5276.77	190.02	19.94
			Max. My	25	-6606.84	99.42	-25.06
			Max. Vy	17	68.02	190.02	19.94
			Max. Vx	25	3.96	0.00	0.00
T13	40 - 20	Leg	Max Tension	17	262480.91	-10261.98	-5.03
			Max. Compression	19	-317228.16	13017.26	451.31

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Mx	23	-315207.84	13110.46	-164.12
			Max. My	18	-26578.24	6461.51	19275.72
			Max. Vy	23	-1316.21	13110.46	-164.12
			Max. Vx	18	-2420.91	6461.51	19275.72
		Diagonal	Max Tension	26	9126.22	0.00	0.00
			Max. Compression	25	-10104.55	0.00	0.00
			Max. Mx	18	-1833.68	281.05	-33.26
			Max. My	25	-10052.76	185.94	-64.83
			Max. Vy	18	78.66	281.05	-33.26
			Max. Vx	25	7.28	0.00	0.00
T14	20 - 0	Leg	Max Tension	17	263313.62	164.82	64.74
			Max. Compression	19	-335648.94	0.00	-0.25
			Max. Mx	23	-331471.41	13110.45	-164.12
			Max. My	18	-33514.67	6461.36	19275.77
			Max. Vy	23	830.05	13110.45	-164.12
			Max. Vx	18	1228.87	6461.36	19275.77
		Diagonal	Max Tension	25	17019.16	0.00	0.00
			Max. Compression	6	-14831.69	0.00	0.00
			Max. Mx	18	11786.40	-508.07	-102.23
			Max. My	19	6274.89	-488.30	-109.24
			Max. Vy	18	-150.65	-508.07	-102.23
			Max. Vx	19	11.61	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	23	347388.96	28410.92	-16647.28
	Max. H_x	10	317924.29	30908.12	-17997.71
	Max. H_z	17	-280335.71	-31199.29	18275.46
	Min. Vert	17	-280335.71	-31199.29	18275.46
	Min. H_x	17	-280335.71	-31199.29	18275.46
	Min. H_z	10	317924.29	30908.12	-17997.71
Leg B	Max. Vert	19	349288.98	-27902.06	-17134.27
	Max. H_x	25	-276484.29	30804.02	18731.03
	Max. H_z	25	-276484.29	30804.02	18731.03
	Min. Vert	25	-276484.29	30804.02	18731.03
	Min. H_x	6	318027.18	-30451.95	-18439.64
	Min. H_z	6	318027.18	-30451.95	-18439.64
Leg A	Max. Vert	15	347362.59	749.49	32645.73
	Max. H_x	17	187906.95	1597.11	14933.75
	Max. H_z	2	316700.93	672.60	35510.62
	Min. Vert	21	-277283.40	-487.70	-36042.09
	Min. H_x	23	-125391.00	-1380.28	-19566.35
	Min. H_z	21	-277283.40	-487.70	-36042.09

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	60970.66	-0.00	0.01	-3736.02	-16809.77	0.02

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 0 deg - No Ice	60970.62	-44.84	-47298.95	-6160088.46	-6483.76	27415.11
Dead+Wind 30 deg - No Ice	60970.62	23036.37	-39827.85	-5242825.36	-3046224.69	12335.08
Dead+Wind 60 deg - No Ice	60970.61	39565.16	-22790.11	-3009286.36	-5244078.06	-5004.08
Dead+Wind 90 deg - No Ice	60970.62	46089.39	9.60	3040.24	-6087289.76	-19998.04
Dead+Wind 120 deg - No Ice	60970.62	41031.21	23688.30	3083450.04	-5364656.58	-30304.84
Dead+Wind 150 deg - No Ice	60970.62	22893.57	39744.32	5232095.71	-3041210.75	-31138.68
Dead+Wind 180 deg - No Ice	60970.61	-61.92	45552.68	6014323.72	-16241.77	-24396.38
Dead+Wind 210 deg - No Ice	60970.62	-23142.17	40024.04	5256066.86	3023478.10	-11000.93
Dead+Wind 240 deg - No Ice	60970.62	-41358.60	23825.54	3087985.30	5359568.90	5468.35
Dead+Wind 270 deg - No Ice	60970.62	-46312.20	-16.09	-11329.18	6076977.69	20940.79
Dead+Wind 300 deg - No Ice	60970.61	-39572.28	-22722.73	-3012216.47	5216657.30	29878.66
Dead+Wind 330 deg - No Ice	60970.62	-23052.09	-39652.81	-5230091.51	3023870.54	32236.22
Dead+Ice+Temp	97405.24	-1.02	-0.14	-10416.00	-50278.71	0.19
Dead+Wind 0 deg+Ice+Temp	97405.19	-1.22	-49127.48	-6544952.86	-47225.95	28371.66
Dead+Wind 30 deg+Ice+Temp	97405.19	24157.82	-41787.23	-5607410.38	-3285727.59	11529.07
Dead+Wind 60 deg+Ice+Temp	97405.19	41632.75	-24003.50	-3230729.69	-5642035.91	-8135.83
Dead+Wind 90 deg+Ice+Temp	97405.19	48317.50	1.06	-6712.84	-6527091.23	-24562.13
Dead+Wind 120 deg+Ice+Temp	97405.19	42602.52	24564.78	3259918.22	-5721579.40	-34928.26
Dead+Wind 150 deg+Ice+Temp	97405.18	23986.60	41645.46	5574736.17	-3273674.84	-34590.01
Dead+Wind 180 deg+Ice+Temp	97405.19	-408.74	48020.41	6438070.17	-9593.09	-23507.12
Dead+Wind 210 deg+Ice+Temp	97405.19	-24495.64	41942.15	5603024.10	3220964.88	-8393.42
Dead+Wind 240 deg+Ice+Temp	97405.19	-43043.10	24817.74	3281045.89	5663780.69	9615.26
Dead+Wind 270 deg+Ice+Temp	97405.19	-48620.60	214.01	9461.55	6458204.39	25865.67
Dead+Wind 300 deg+Ice+Temp	97405.19	-41848.77	-23656.25	-3199042.73	5567896.17	35968.79
Dead+Wind 330 deg+Ice+Temp	97405.17	-24122.53	-41566.47	-5587384.53	3186379.46	35514.29
Dead+Wind 0 deg - Service	60970.66	-15.52	-16366.36	-2134060.40	-13271.56	9487.52
Dead+Wind 30 deg - Service	60970.66	7971.10	-13781.23	-1816656.23	-1065147.21	4263.85
Dead+Wind 60 deg - Service	60970.66	13690.40	-7885.87	-1043769.63	-1825686.37	-1732.05
Dead+Wind 90 deg - Service	60970.66	15947.88	3.27	-1393.89	-2117469.40	-6915.43
Dead+Wind 120 deg - Service	60970.66	14197.60	8196.62	1064551.69	-1867404.06	-10487.21
Dead+Wind 150 deg - Service	60970.66	7921.60	13752.38	1808055.02	-1063395.60	-10781.90
Dead+Wind 180 deg - Service	60970.66	-21.43	15762.22	2078724.94	-16651.20	-8442.18
Dead+Wind 210 deg - Service	60970.66	-8007.63	13849.17	1816339.37	1035188.26	-3803.25
Dead+Wind 240 deg - Service	60970.66	-14310.89	8244.10	1066105.82	1843557.60	1892.01
Dead+Wind 270 deg - Service	60970.66	-16024.98	-5.62	-6365.80	2091807.75	7242.15
Dead+Wind 300 deg - Service	60970.66	-13692.88	-7862.56	-1044770.35	1794113.47	10339.54
Dead+Wind 330 deg - Service	60970.66	-7976.55	-13720.67	-1812234.94	1035340.28	11162.40

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	0.00	-60970.66	-0.00	0.00	60970.66	-0.01	0.000%
2	-44.84	-60970.66	-47301.95	44.84	60970.62	47298.95	0.004%
3	23038.18	-60970.66	-39830.51	-23036.37	60970.62	39827.85	0.004%
4	39568.14	-60970.66	-22791.81	-39565.16	60970.61	22790.11	0.005%
5	46092.62	-60970.66	9.39	-46089.39	60970.62	-9.60	0.004%
6	41033.83	-60970.66	23689.81	-41031.21	60970.62	-23688.30	0.004%
7	22895.00	-60970.66	39747.21	-22893.57	60970.62	-39744.32	0.004%
8	-61.90	-60970.66	45556.10	61.92	60970.61	-45552.68	0.004%
9	-23143.58	-60970.66	40026.93	23142.17	60970.62	-40024.04	0.004%
10	-41361.21	-60970.66	23827.04	41358.60	60970.62	-23825.54	0.004%
11	-46315.42	-60970.66	-16.32	46312.20	60970.62	16.09	0.004%
12	-39575.26	-60970.66	-22724.44	39572.28	60970.61	22722.73	0.005%
13	-23053.89	-60970.66	-39655.48	23052.09	60970.62	39652.81	0.004%
14	0.00	-97405.24	-0.00	1.02	97405.24	0.14	0.001%
15	-1.21	-97405.24	-49130.39	1.22	97405.19	49127.48	0.003%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
16	24159.49	-97405.24	-41789.79	-24157.82	97405.19	41787.23	0.003%
17	41635.53	-97405.24	-24005.08	-41632.75	97405.19	24003.50	0.003%
18	48320.56	-97405.24	0.92	-48317.50	97405.19	-1.06	0.003%
19	42605.06	-97405.24	24566.24	-42602.52	97405.19	-24564.78	0.003%
20	23987.78	-97405.24	41648.03	-23986.60	97405.18	-41645.46	0.003%
21	-408.72	-97405.24	48023.60	408.74	97405.19	-48020.41	0.003%
22	-24497.02	-97405.24	41944.86	24495.64	97405.19	-41942.15	0.003%
23	-43045.61	-97405.24	24819.20	43043.10	97405.19	-24817.74	0.003%
24	-48623.63	-97405.24	213.86	48620.60	97405.19	-214.01	0.003%
25	-41851.52	-97405.24	-23657.84	41848.77	97405.19	23656.25	0.003%
26	-24124.17	-97405.24	-41569.29	24122.53	97405.17	41566.47	0.003%
27	-15.52	-60970.66	-16367.46	15.52	60970.66	16366.36	0.002%
28	7971.69	-60970.66	-13782.18	-7971.10	60970.66	13781.23	0.002%
29	13691.40	-60970.66	-7886.44	-13690.40	60970.66	7885.87	0.002%
30	15949.00	-60970.66	3.25	-15947.88	60970.66	-3.27	0.002%
31	14198.56	-60970.66	8197.17	-14197.60	60970.66	-8196.62	0.002%
32	7922.15	-60970.66	13753.36	-7921.60	60970.66	-13752.38	0.002%
33	-21.42	-60970.66	15763.36	21.43	60970.66	-15762.22	0.002%
34	-8008.16	-60970.66	13850.15	8007.63	60970.66	-13849.17	0.002%
35	-14311.84	-60970.66	8244.65	14310.89	60970.66	-8244.10	0.002%
36	-16026.10	-60970.66	-5.65	16024.98	60970.66	5.62	0.002%
37	-13693.86	-60970.66	-7863.13	13692.88	60970.66	7862.56	0.002%
38	-7977.12	-60970.66	-13721.62	7976.55	60970.66	13720.67	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00006604	0.00011214
3	Yes	15	0.00007143	0.00012109
4	Yes	15	0.00007632	0.00012921
5	Yes	15	0.00007143	0.00012110
6	Yes	15	0.00006611	0.00011225
7	Yes	15	0.00007145	0.00012115
8	Yes	15	0.00007641	0.00012932
9	Yes	15	0.00007150	0.00012112
10	Yes	15	0.00006609	0.00011212
11	Yes	15	0.00007151	0.00012120
12	Yes	15	0.00007640	0.00012938
13	Yes	15	0.00007147	0.00012121
14	Yes	6	0.00000001	0.00008150
15	Yes	16	0.00006123	0.00010524
16	Yes	16	0.00006473	0.00011103
17	Yes	16	0.00006793	0.00011635
18	Yes	16	0.00006472	0.00011105
19	Yes	16	0.00006130	0.00010538
20	Yes	16	0.00006526	0.00011116
21	Yes	16	0.00006803	0.00011651
22	Yes	16	0.00006480	0.00011110
23	Yes	16	0.00006127	0.00010525
24	Yes	16	0.00006475	0.00011106
25	Yes	16	0.00006799	0.00011646
26	Yes	16	0.00006516	0.00011107
27	Yes	15	0.00000001	0.00011589
28	Yes	15	0.00000001	0.00011897

29	Yes	15	0.00000001	0.00012186
30	Yes	15	0.00000001	0.00011912
31	Yes	15	0.00000001	0.00011616
32	Yes	15	0.00000001	0.00011921
33	Yes	15	0.00000001	0.00012201
34	Yes	15	0.00000001	0.00011907
35	Yes	15	0.00000001	0.00011595
36	Yes	15	0.00000001	0.00011909
37	Yes	15	0.00000001	0.00012198
38	Yes	15	0.00000001	0.00011907

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	245 - 230	11.793	31	0.5812	0.0253
T2	230 - 210	9.923	31	0.5535	0.0264
T3	210 - 190	7.666	31	0.4772	0.0296
T4	190 - 180	5.791	31	0.3871	0.0278
T5	180 - 160	5.019	31	0.3411	0.0243
T6	160 - 140	3.746	31	0.2617	0.0189
T7	140 - 120	2.741	31	0.2103	0.0149
T8	120 - 110	1.941	31	0.1629	0.0120
T9	110 - 100	1.613	31	0.1455	0.0110
T10	100 - 80	1.318	31	0.1285	0.0099
T11	80 - 60	0.832	31	0.0951	0.0075
T12	60 - 40	0.469	31	0.0694	0.0055
T13	40 - 20	0.210	31	0.0443	0.0033
T14	20 - 0	0.046	35	0.0194	0.0010

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
247.00	Lightning Rod 2"x10'	31	11.793	0.5812	0.0253	47065
246.00	PiROD 15' Rotatable Platform (Lattice)	31	11.793	0.5812	0.0253	47065
232.00	(3) 6' x 1' Panel Antenna w/Mount Pipe	31	10.167	0.5585	0.0264	18310
135.00	10' Omni	31	2.523	0.1979	0.0141	24581
125.00	20' Omni	31	2.123	0.1735	0.0127	24002
110.00	KP4F-23	31	1.613	0.1455	0.0110	38623
105.00	Andrew 6' w/Radome	31	1.461	0.1371	0.0104	36767
60.00	Camera and Mount	31	0.469	0.0694	0.0055	45912
50.00	4' Omni	31	0.328	0.0571	0.0044	52718

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	245 - 230	35.810	19	1.7219	0.0817
T2	230 - 210	30.285	19	1.6479	0.0967
T3	210 - 190	23.543	19	1.4376	0.1065
T4	190 - 180	17.864	19	1.1794	0.0955
T5	180 - 160	15.503	19	1.0450	0.0812
T6	160 - 140	11.580	19	0.8077	0.0621
T7	140 - 120	8.466	19	0.6509	0.0478
T8	120 - 110	5.987	19	0.5044	0.0394
T9	110 - 100	4.969	19	0.4505	0.0363
T10	100 - 80	4.056	19	0.3975	0.0326
T11	80 - 60	2.553	19	0.2938	0.0244
T12	60 - 40	1.436	19	0.2142	0.0177
T13	40 - 20	0.640	23	0.1364	0.0107
T14	20 - 0	0.140	23	0.0596	0.0033

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
247.00	Lightning Rod 2"x10'	19	35.810	1.7219	0.0817	16525
246.00	PiROD 15' Rotatable Platform (Lattice)	19	35.810	1.7219	0.0817	16525
232.00	(3) 6' x 1' Panel Antenna w/Mount Pipe	19	31.006	1.6615	0.0942	6427
135.00	10' Omni	19	7.789	0.6128	0.0448	7935
125.00	20' Omni	19	6.549	0.5375	0.0410	7718
110.00	KP4F-23	19	4.969	0.4505	0.0363	12381
105.00	Andrew 6' w/Radome	19	4.500	0.4243	0.0345	11778
60.00	Camera and Mount	19	1.436	0.2142	0.0177	14778
50.00	4' Omni	19	1.002	0.1759	0.0144	16913

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	245	Leg	A325N	0.6250	5	4175.99	12885.40	0.324 ✓	1.333	Bolt DS
T2	230	Leg	A325N	0.7500	5	12911.30	18555.00	0.696 ✓	1.333	Bolt DS
T3	210	Leg	A325N	1.0000	6	18040.10	34526.80	0.522 ✓	1.333	Bolt Tension
T4	190	Leg	A325N	1.0000	6	17947.70	34557.20	0.519 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4283.03	6932.81	0.618 ✓	1.333	Member Block Shear
T5	180	Leg	A325N	1.0000	6	21292.00	34557.50	0.616 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4012.11	6932.81	0.579 ✓	1.333	Member Block Shear
T6	160	Leg	A325N	1.0000	6	24355.70	34557.50	0.705 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4310.63	6932.81	0.622 ✓	1.333	Member Block Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T7	140	Leg	A325N	1.0000	6	27452.70	34557.40	0.794 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4920.85	7612.50	0.646 ✓	1.333	Member Block Shear
T8	120	Diagonal	A325N	1.2500	1	5673.91	13593.80	0.417 ✓	1.333	Member Block Shear
T9	110	Leg	A325N	1.2500	6	30482.20	53995.10	0.565 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	6025.06	13593.80	0.443 ✓	1.333	Member Block Shear
T10	100	Leg	A325N	1.2500	6	33969.90	53996.10	0.629 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	6535.11	13593.80	0.481 ✓	1.333	Member Block Shear
T11	80	Leg	A325N	1.2500	6	37131.80	53996.10	0.688 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	7065.98	15859.40	0.446 ✓	1.333	Member Block Shear
T12	60	Leg	A325N	1.2500	6	40266.30	53995.90	0.746 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	7414.76	15859.40	0.468 ✓	1.333	Member Block Shear
T13	40	Leg	A325N	1.2500	6	43746.80	53994.60	0.810 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	9126.22	12687.50	0.719 ✓	1.333	Member Block Shear
T14	20	Leg	A687	2.0000	6	43885.60	155509.00	0.282 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	2	8509.58	25148.40	0.338 ✓	1.333	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio P / P_a
T1	245 - 230	1 1/2	15.00	2.33	74.7 K=1.00	20.058	1.7672	-24161.60	35444.50	0.682 ✓
T2	230 - 210	2	20.00	2.38	57.0 K=1.00	23.222	3.1416	-69387.80	72954.00	0.951 ✓
T3	210 - 190	2 1/2	20.00	2.33	44.8 K=1.00	25.141	4.9087	-118472.00	123409.00	0.960 ✓
T4	190 - 180	Pirod 105245	10.02	10.02	37.8 K=1.00	26.132	5.3014	-118562.00	138539.00	0.856 ✓
T5	180 - 160	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-142970.00	138539.00	1.032 ✓
T6	160 - 140	Pirod 105218	20.03	10.02	32.4 K=1.00	26.848	7.2158	-166047.00	193727.00	0.857 ✓
T7	140 - 120	Pirod 105218	20.03	10.02	32.4 K=1.00	26.848	7.2158	-189704.00	193727.00	0.979 ✓
T8	120 - 110	Pirod 105219	10.02	10.02	28.4 K=1.00	27.351	9.4248	-202029.00	257781.00	0.784 ✓
T9	110 - 100	Pirod 105219	10.02	5.19	28.4 K=1.00	27.351	9.4248	-213801.00	257781.00	0.829 ✓
T10	100 - 80	Pirod 105219	20.03	10.02	28.4	27.351	9.4248	-240669.00	257781.00	0.934

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
					K=1.00					✓
T11	80 - 60	Pirod 105220	20.03	10.02	25.2 K=1.00	27.723	11.9282	-266318.00	330691.00	0.805 ✓
T12	60 - 40	Pirod 105220	20.03	10.02	25.2 K=1.00	27.723	11.9282	-291752.00	330691.00	0.882 ✓
T13	40 - 20	Pirod 105220	20.03	10.02	25.2 K=1.00	27.723	11.9282	-317228.00	330691.00	0.959 ✓
T14	20 - 0	Pirod 112738	20.03	20.03	32.6 K=1.00	26.826	14.7262	-335649.00	395045.00	0.850 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V lb	Allow. V_a lb	Stress Ratio
T4	190 - 180	0.5	1.47	120.0	10.366	0.1963	930.02	2278.10	0.408 ✓
T5	180 - 160	0.5	1.47	120.0	10.279	0.1963	537.82	2258.95	0.238 ✓
T6	160 - 140	0.5	1.46	119.0	10.423	0.1963	206.61	2290.46	0.090 ✓
T7	140 - 120	0.5	1.46	119.0	10.423	0.1963	382.63	2290.46	0.167 ✓
T8	120 - 110	0.625	1.45	94.4	13.671	0.3068	390.68	4694.36	0.083 ✓
T9	110 - 100	0.625	1.45	94.4	13.671	0.3068	1695.30	4694.36	0.361 ✓
T10	100 - 80	0.625	1.45	94.4	13.671	0.3068	268.93	4694.36	0.057 ✓
T11	80 - 60	0.625	1.43	93.6	13.766	0.3068	199.39	4726.89	0.042 ✓
T12	60 - 40	0.625	1.43	93.6	13.766	0.3068	475.61	4726.89	0.101 ✓
T13	40 - 20	0.625	1.43	93.6	13.766	0.3068	2675.58	4726.89	0.566 ✓
T14	20 - 0	0.75	1.73	93.9	16.080	0.4418	1290.19	9783.96	0.132 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	245 - 230	3/4	4.63	2.24	107.7 K=0.75	12.882	0.4418	-3367.93	5691.19	0.592 ✓
T2	230 - 210	7/8	5.05	2.45	100.7 K=0.75	14.540	0.6013	-4164.67	8743.38	0.476 ✓

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T3	210 - 190	1	5.11	2.46	90.0 K=0.76	16.944	0.7854	-5075.60	13307.70	0.381 ✓
T4	190 - 180	L2 1/2x2 1/2x3/16	11.42	5.19	125.8 K=1.00	9.431	0.9020	-4825.25	8506.47	0.567 ✓
T5	180 - 160	L2 1/2x2 1/2x3/16	12.50	5.84	141.5 K=1.00	7.462	0.9020	-4437.20	6730.52	0.659 ✓
T6	160 - 140	L2 1/2x2 1/2x3/16	13.80	6.54	158.4 K=1.00	5.949	0.9020	-4649.41	5366.22	0.866 ✓
T7	140 - 120	L3x3x3/16	15.24	7.29	146.8 K=1.00	6.931	1.0900	-5246.71	7555.12	0.694 ✓
T8	120 - 110	L3x3x5/16	16.01	7.69	156.6 K=1.00	6.091	1.7800	-5959.40	10842.60	0.550 ✓
T9	110 - 100	L3x3x5/16	16.80	8.09	164.8 K=1.00	5.496	1.7800	-6518.42	9783.69	0.666 ✓
T10	100 - 80	L3x3x5/16	18.45	8.93	181.9 K=1.00	4.515	1.7800	-6803.98	8036.48	0.847 ✓
T11	80 - 60	L3 1/2x3 1/2x5/16	20.16	9.79	170.3 K=1.00	5.150	2.0900	-7279.46	10764.20	0.676 ✓
T12	60 - 40	L3 1/2x3 1/2x5/16	21.92	10.68	185.7 K=1.00	4.331	2.0900	-8150.63	9051.23	0.900 ✓
T13	40 - 20	L4x4x1/4	23.71	11.58	174.8 K=1.00	4.887	1.9400	-10104.60	9480.37	1.066 ✓
T14	20 - 0	2L3 1/2x3 1/2x5/16x3/4 2L 'a' > 85.7408 in - 319	30.49	14.91	165.7 K=1.00	5.440	4.1800	-14831.70	22739.10	0.652 ✓

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	245 - 230	3/4	4.00	3.88	173.6 K=0.70	4.955	0.4418	-454.26	2189.09	0.208 ✓
T2	230 - 210	7/8	4.07	3.91	150.0 K=0.70	6.640	0.6013	-1120.98	3993.06	0.281 ✓
T3	210 - 190	7/8	4.58	4.37	167.7 K=0.70	5.311	0.6013	-1358.48	3193.67	0.425 ✓

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T9	110 - 100	L3x3x5/16	13.48	12.48	127.1 K=0.50	9.237	1.7800	-3707.76	16442.50	0.225 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	245 - 230	7/8	4.00	3.88	148.8 K=0.70	6.744	0.6013	-1016.44	4055.56	0.251 ✓
T2	230 - 210	1	4.01	3.85	129.2 K=0.70	8.943	0.7854	-1944.29	7023.95	0.277 ✓
T3	210 - 190	1	4.52	4.31	144.8 K=0.70	7.126	0.7854	-1662.68	5596.77	0.297 ✓

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	245 - 230	7/8	4.00	3.88	148.8 K=0.70	6.744	0.6013	-1784.00	4055.56	0.440 ✓
T2	230 - 210	1	4.49	4.32	145.2 K=0.70	7.085	0.7854	-2087.61	5564.52	0.375 ✓
T3	210 - 190	1	4.98	4.77	160.4 K=0.70	5.801	0.7854	-1358.28	4556.40	0.298 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	245 - 230	1 1/2	15.00	2.33	74.7	32.500	0.7732	20879.90	25130.10	0.831 ✓
T2	230 - 210	2	20.00	2.38	57.0	32.500	1.5625	64556.40	50780.20	1.271 ✓
T3	210 - 190	2 1/2	20.00	2.33	44.8	30.000	4.9087	108240.00	147262.00	0.735 ✓
T4	190 - 180	Pirod 105245	10.02	10.02	37.8	30.000	5.3014	107686.00	159043.00	0.677 ✓
T5	180 - 160	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	127752.00	159043.00	0.803 ✓
T6	160 - 140	Pirod 105218	20.03	10.02	32.4	30.000	7.2158	146134.00	216475.00	0.675 ✓
T7	140 - 120	Pirod 105218	20.03	10.02	32.4	30.000	7.2158	164716.00	216475.00	0.761 ✓
T8	120 - 110	Pirod 105219	10.02	10.02	28.4	30.000	9.4248	174454.00	282743.00	0.617 ✓

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T9	110 - 100	Pirod 105219	10.02	5.19	28.4	30.000	9.4248	183518.00	282743.00	0.649 ✓
T10	100 - 80	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	203819.00	282743.00	0.721 ✓
T11	80 - 60	Pirod 105220	20.03	10.02	25.2	30.000	11.9282	222791.00	357847.00	0.623 ✓
T12	60 - 40	Pirod 105220	20.03	10.02	25.2	30.000	11.9282	241598.00	357847.00	0.675 ✓
T13	40 - 20	Pirod 105220	20.03	10.02	25.2	30.000	11.9282	262481.00	357847.00	0.734 ✓
T14	20 - 0	Pirod 112738	20.03	20.03	32.6	30.000	14.7262	263314.00	441786.00	0.596 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V lb	Allow. V_a lb	Stress Ratio
T4	190 - 180	0.5	1.47	120.0	10.366	0.1963	930.02	2278.10	0.408 ✓
T5	180 - 160	0.5	1.47	120.0	10.279	0.1963	537.82	2258.95	0.238 ✓
T6	160 - 140	0.5	1.46	119.0	10.423	0.1963	206.61	2290.46	0.090 ✓
T7	140 - 120	0.5	1.46	119.0	10.423	0.1963	382.63	2290.46	0.167 ✓
T8	120 - 110	0.625	1.45	94.4	13.671	0.3068	390.68	4694.36	0.083 ✓
T9	110 - 100	0.625	1.45	94.4	13.671	0.3068	1695.30	4694.36	0.361 ✓
T10	100 - 80	0.625	1.45	94.4	13.671	0.3068	268.93	4694.36	0.057 ✓
T11	80 - 60	0.625	1.43	93.6	13.766	0.3068	199.39	4726.89	0.042 ✓
T12	60 - 40	0.625	1.43	93.6	13.766	0.3068	475.61	4726.89	0.101 ✓
T13	40 - 20	0.625	1.43	93.6	13.766	0.3068	2675.58	4726.89	0.566 ✓
T14	20 - 0	0.75	1.73	93.9	16.080	0.4418	1290.19	9783.96	0.132 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	245 - 230	3/4	4.63	2.24	143.6	30.000	0.4418	3382.90	13253.60	0.255

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T2	230 - 210	7/8	4.69	2.27	124.4	30.000	0.6013	4396.17	18039.60	0.244 ✓
T3	210 - 190	1	5.11	2.46	117.9	30.000	0.7854	4867.20	23561.90	0.207 ✓
T4	190 - 180	L2 1/2x2 1/2x3/16	11.42	5.19	80.1	29.000	0.5183	4283.03	15030.60	0.285 ✓
T5	180 - 160	L2 1/2x2 1/2x3/16	11.93	5.59	86.2	29.000	0.5183	4012.11	15030.60	0.267 ✓
T6	160 - 140	L2 1/2x2 1/2x3/16	13.80	6.54	100.8	29.000	0.5183	4310.63	15030.60	0.287 ✓
T7	140 - 120	L3x3x3/16	15.24	7.29	93.2	29.000	0.6593	4920.85	19119.60	0.257 ✓
T8	120 - 110	L3x3x5/16	16.01	7.69	100.0	29.000	1.0127	5673.91	29369.30	0.193 ✓
T9	110 - 100	L3x3x5/16	16.80	8.09	105.3	29.000	1.0127	6025.06	29369.30	0.205 ✓
T10	100 - 80	L3x3x5/16	18.45	8.93	116.2	29.000	1.0127	6535.11	29369.30	0.223 ✓
T11	80 - 60	L3 1/2x3 1/2x5/16	20.16	9.79	108.8	29.000	1.2452	7065.98	36111.80	0.196 ✓
T12	60 - 40	L3 1/2x3 1/2x5/16	21.92	10.68	118.6	29.000	1.2452	7414.76	36111.80	0.205 ✓
T13	40 - 20	L4x4x1/4	22.81	11.13	106.9	29.000	1.1972	9126.22	34718.40	0.263 ✓
T14	20 - 0	2L3 1/2x3 1/2x5/16x3/4	30.49	14.91	165.7	29.000	2.6077	17019.20	75622.00	0.225 ✓
		2L 'a' > 85.7408 in - 319								

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	245 - 230	3/4	4.00	3.88	248.0	30.000	0.4418	556.43	13253.60	0.042 ✓
T2	230 - 210	7/8	4.07	3.91	214.2	30.000	0.6013	1266.22	18039.60	0.070 ✓
T3	210 - 190	7/8	4.58	4.37	239.5	30.000	0.6013	1531.19	18039.60	0.085 ✓

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T9	110 - 100	L3x3x5/16	13.48	12.48	162.4	21.600	1.7800	3707.76	38448.00	0.096

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
										✓

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	245 - 230	7/8	4.00	3.88	212.6	30.000	0.6013	956.24	18039.60	0.053 ✓
T2	230 - 210	1	4.01	3.85	184.6	30.000	0.7854	2049.08	23561.90	0.087 ✓
T3	210 - 190	1	4.52	4.31	206.8	30.000	0.7854	1786.55	23561.90	0.076 ✓

Bottom Girt Design Data (Tension)

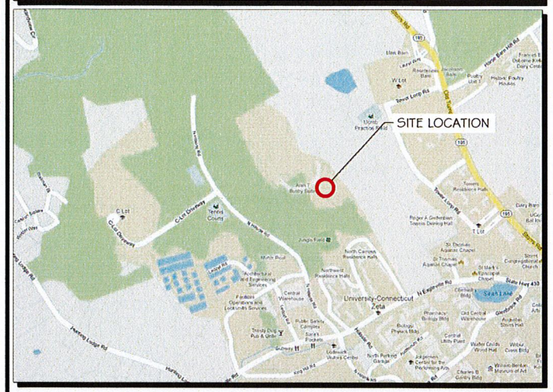
Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	245 - 230	7/8	4.00	3.88	212.6	30.000	0.6013	1678.01	18039.60	0.093 ✓
T2	230 - 210	1	4.49	4.32	207.4	30.000	0.7854	2109.10	23561.90	0.090 ✓
T3	210 - 190	1	4.98	4.77	229.2	30.000	0.7854	1489.63	23561.90	0.063 ✓

Section Capacity Table

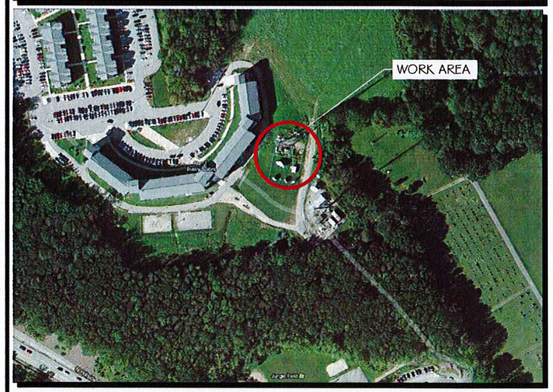
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	245 - 230	Leg	1 1/2	2	20879.90	33498.42	62.3	Pass
		Diagonal	3/4	14	-3367.93	7586.36	44.4	Pass
		Horizontal	3/4	23	-454.26	2918.06	15.6	Pass
		Top Girt	7/8	6	-1016.44	5406.06	18.8	Pass
		Bottom Girt	7/8	9	-1784.00	5406.06	33.0	Pass
T2	230 - 210	Leg	2	52	64556.40	67690.00	95.4	Pass
		Diagonal	7/8	62	-4164.67	11654.92	35.7	Pass
		Horizontal	7/8	108	-1120.98	5322.75	21.1	Pass
		Top Girt	1	56	-1944.29	9362.93	20.8	Pass
		Bottom Girt	1	57	-2087.61	7417.50	28.1	Pass
T3	210 - 190	Leg	2 1/2	116	-118472.00	164504.19	72.0	Pass
		Diagonal	1	175	-5075.60	17739.16	28.6	Pass
		Horizontal	7/8	172	-1358.48	4257.16	31.9	Pass
		Top Girt	1	120	-1662.68	7460.49	22.3	Pass
		Bottom Girt	1	121	-1358.28	6073.68	22.4	Pass
T4	190 - 180	Leg	Pirod 105245	180	-118562.00	184672.48	64.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
		Diagonal	L2 1/2x2 1/2x3/16	185	-4825.25	11339.12	42.6	Pass
T5	180 - 160	Leg	Pirod 105217	189	-142970.00	184672.48	77.4	Pass
		Diagonal	L2 1/2x2 1/2x3/16	194	-4437.20	8971.78	49.5	Pass
T6	160 - 140	Leg	Pirod 105218	204	-166047.00	258238.08	64.3	Pass
		Diagonal	L2 1/2x2 1/2x3/16	209	-4649.41	7153.17	65.0	Pass
T7	140 - 120	Leg	Pirod 105218	219	-189704.00	258238.08	73.5	Pass
		Diagonal	L3x3x3/16	224	-5246.71	10070.97	52.1	Pass
T8	120 - 110	Leg	Pirod 105219	234	-202029.00	343622.06	58.8	Pass
		Diagonal	L3x3x5/16	239	-5959.40	14453.18	41.2	Pass
T9	110 - 100	Leg	Pirod 105219	243	-213801.00	343622.06	62.2	Pass
		Diagonal	L3x3x5/16	247	-6518.42	13041.66	50.0	Pass
		Secondary Horizontal	L3x3x5/16	251	-3707.76	21917.85	16.9	Pass
T10	100 - 80	Leg	Pirod 105219	255	-240669.00	343622.06	70.0	Pass
		Diagonal	L3x3x5/16	260	-6803.98	10712.63	63.5	Pass
T11	80 - 60	Leg	Pirod 105220	270	-266318.00	440811.08	60.4	Pass
		Diagonal	L3 1/2x3 1/2x5/16	275	-7279.46	14348.68	50.7	Pass
T12	60 - 40	Leg	Pirod 105220	285	-291752.00	440811.08	66.2	Pass
		Diagonal	L3 1/2x3 1/2x5/16	290	-8150.63	12065.29	67.6	Pass
T13	40 - 20	Leg	Pirod 105220	300	-317228.00	440811.08	72.0	Pass
		Diagonal	L4x4x1/4	305	-10104.60	12637.33	80.0	Pass
T14	20 - 0	Leg	Pirod 112738	315	-335649.00	526594.96	63.7	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/4	319	-14831.70	30311.22	48.9	Pass
							Summary	
						Leg (T2)	95.4	Pass
						Diagonal (T13)	80.0	Pass
						Horizontal (T3)	31.9	Pass
						Secondary Horizontal (T9)	16.9	Pass
						Top Girt (T3)	22.3	Pass
						Bottom Girt (T1)	33.0	Pass
						Bolt Checks	60.8	Pass
						RATING =	**95.4**	**Pass**

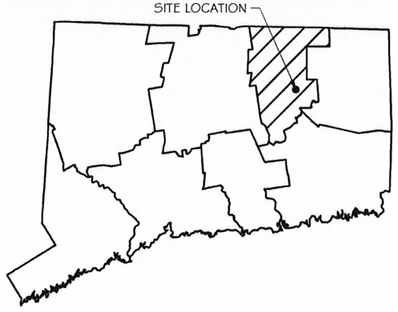
VICINITY MAP



AERIAL VIEW OF SITE



GENERAL LOCATION



DRIVING DIRECTIONS:

TAKE I-91 N TO I-84 EAST TO ROUTE 384 EAST (EXIT 59), FOLLOW TO THE END. TAKE ROUTE 44 EAST. FOLLOW INTO MANSFIELD. ONCE IN MANSFIELD TAKE A RIGHT ONTO ROUTE 195 SOUTH (STORRS ROAD) FOLLOW APPROXIMATELY 1 MI. TO UCONN. TAKE A RIGHT ONTO NORTH EAGLEVILLE ROAD TAKE THE RIGHT AFTER CEMETERY (UP BEHIND DORMITORIES) PAVED ROAD AT REAR OF LOT LEADS TO THE TOWER. SPRINT IS ON THE SECOND TOWER ON THE HILL. THERE IS METHANE MONITORING OCCURRING AT THIS SITE. OBEY SIGNS. USE CAUTION AS STUDENTS COULD BE WALKING ON THE PATH.

CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL COVERING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.

1. INTERNATIONAL BUILDING CODE 2009
2. ACCESSIBILITY CODE IBC 2009, CHAPTER 11 & ICC/ ANSI A117.1-2003
3. 2008 NATIONAL ELECTRIC CODE
4. FIRE/ LIFE SAFETY CODE- IFC 2009
5. ENERGY CODE IECC 2009

PROJECT NOTES

1. THIS IS AN UNMANNED TELECOMMUNICATIONS FACILITY CONSISTING OF BTS EQUIPMENT AND ANTENNAS.
2. SIGNALS FROM THE ANTENNA SHALL NOT INTERFERE WITH ANY EXISTING COMMUNICATION SITES. ALL ITEMS SHOWN HEREON ARE EXISTING UNLESS OTHERWISE NOTED.
3. THE PROPOSED ANTENNAS ARE ATTACHED TO EITHER BUILDING OR ANTENNA FRAME OR TO BOTH.
4. THE PROPOSED WORK WILL HAVE NO EFFECT ON STRUCTURAL STABILITY. ALL WORK SHALL BE PERFORMED IN STRICT ADHERENCE WITH OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS.
5. REFERENCE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES FOR GENERAL REQUIREMENTS.
6. THIS IS AN UNMANNED FACILITY- NO SOLID WASTE. THE SITE WILL CREATE NO TRASH, THUS REQUIRES NO DUMPSTER.
7. EQUIPMENT IS UNMANNED AND NOT FOR HUMAN HABITATION. HANDICAP ACCESS IS THEREFORE NOT REQUIRED.
8. OWNER & TENANT MAY, FROM TIME TO TIME AT TENANT'S OPTION, REPLACE THIS EXHIBIT WITH AN EXHIBIT SETTING FORTH THE LEGAL DESCRIPTION OF THE SITE, OR WITH ENGINEERED OR AS-BUILT DRAWING DEPICTING THE SITE OR ILLUSTRATING STRUCTURAL MODIFICATIONS OR CONSTRUCTION PLANS OF THE SITE. ANY VISUAL OR TEXTUAL REPRESENTATION OF THE EQUIPMENT LOCATED WITHIN THE SITE CONTAINED IN THESE OTHER DOCUMENTS IS ILLUSTRATIVE ONLY, AND DOES NOT LIMIT THE RIGHTS OF SPRINT AS PROVIDED FOR IN THE AGREEMENT. THE LOCATIONS OF ANY ACCESS AND UTILITY EASEMENTS ARE ILLUSTRATIVE ONLY. ACTUAL LOCATIONS MAY BE DETERMINED BY TENANT AND/OR THE SERVICING UTILITY COMPANY IN COMPLIANCE WITH LOCAL LAWS AND REGULATIONS.

PROJECT DESCRIPTION

APPLICANT PROPOSED TO INSTALL ANTENNAS AND WEATHERPROOF EQUIPMENT CABINETS FOR AN UNMANNED PERSONAL COMMUNICATIONS SYSTEM WIRELESS CALL SITE AT AN EXISTING TELECOMMUNICATIONS FACILITY. PROPOSED FACILITY IS NOT STAFFED AND IS VISITED ONCE A MONTH FOR MAINTENANCE PURPOSES ONLY; THEREFORE, SANITARY, SEWER, GAS, POTABLE WATER AND PLUMBING ARE NOT REQUIRED.

TO OBTAIN LOCATION OF PARTICIPANTS' UNDERGROUND FACILITIES BEFORE YOU DIG IN CONNECTICUT

CALL BEFORE YOU DIG 811 OR 1-800-922-4455

CONNECTICUT PUBLIC ACT 87-71 REQUIRES MIN. 2 WORKING DAYS NOTICE BEFORE YOU EXCAVATE.

DO NOT SCALE DRAWINGS:

CONTRACTOR SHALL VERIFY ALL PLANS & EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

APPROVALS

CONSTRUCTION PROJECT MANAGER: _____

SITE ACQUISITION: _____

SPRINT REPRESENTATIVE: _____

RF ENGINEER: _____

LANDLORD/ OWNER: _____

CONSTRUCTION DRAWINGS

Sprint

U-CONN
SITE #: CT03XC214
82 NORTH EAGLEVILLE ROAD.
STORRS, CT 06269
TOLLAND COUNTY

SELF SUPPORT TOWER

SHEET INDEX

PROJECT INFORMATION

APPLICANT ID:

SITE NAME: U-CONN
SITE #: CT03XC214

PROPERTY LANDLORD:

UNIVERSITY OF CONNECTICUT
352 MANSFIELD ROAD, UNIT 2072
STORRS, CT 06269-2072

SITE ADDRESS:

82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY
ZONING CLASSIFICATION: RAR 40

SITE DATA:

LATITUDE: 41°-48'-52.02" N (41.81445°)
LONGITUDE: 72°-15'-35.61" W (-72.25989°)
GROUND ELEVATION: 714 FT AMSL

POWER COMPANY:

CONNECTICUT LIGHT & POWER
PH.: (800) 286-2000

TELEPHONE COMPANY:

SAGE TELECOM
PH.: (866) 870-7482

HOSPITAL

NATCHAUG HOSPITAL
189 STORRS ROAD
MANSFIELD CENTER, CT 06250
PH.:(860) 456-1311

FIRE HOUSE

EAGLEVILLE FIRE DEPARTMENT 2
1722 STORRS ROAD
STORRS, CT 06268
PH.: (860) 429-0035

APPLICANT:

SPRINT
6391 SPRINT PARKWAY
OVERLAND PARK, KS 66251

PLANS PREPARED BY:

RAMAKER & ASSOCIATES, INC.
1120 DALLAS STREET
SAUK CITY, WI 53583
CONTACT: KEITH BOHNSACK, P.E., PROJECT MANAGER
PH.: (608) 643-4100
FAX: (608) 643-7999

Sprint
6391 Sprint Parkway
Overland Park, KS 66251

Alcatel·Lucent

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 Fax: 608-643-7999
www.Ramaker.com

NETWORK VISION
MMBTS LAUNCH
NORTHERN CT MARKET

Certification & Seal:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT
JAMES R SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: Date: 10/25/2012

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CDS
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:
U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:
TITLE SHEET

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: T-1

I:\23000\23003\CAD\Telecom\Working\23003 Vision Project-CT.dwg Printed by: steves on Dec 11, 2012 - 12:18pm

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01100 - SCOPE OF WORK

PART 1 - GENERAL

1.1 THE WORK: These Standard Construction Specifications in conjunction with the other Contract Documents and the Construction Drawings describe the Work to be performed by the Contractor.

1.3 PRECEDENCE: Should conflicts occur between the Standard Construction Specifications for Wireless Sites including the Standard Construction Details for Wireless Sites and the Construction Drawings, information on the Construction Drawings shall take precedence. Notify Company designated representative of conflicts prior to construction.

1.4 NATIONALLY RECOGNIZED CODES AND STANDARDS:

A. The Work shall comply with applicable national codes and standards, latest edition, and portions thereof, included but not limited to the following:

1. GR-63-CORE NEBS Requirements: Physical Protection
2. GR-78-CORE Generic Requirements for the Physical Design and Manufacture of Telecommunications Equipment.
3. National Fire Protection Association Codes and Standards (NFPA) including NFPA 70 (National Electrical Code - "NEC") and NFPA 101 (Life Safety Code).
4. American Society for Testing of Materials (ASTM)
5. Institute of Electronic and Electrical Engineers (IEEE)
6. American Concrete Institute (ACI)
7. American Wire Producers Association (AWPA)
8. Concrete Reinforcing Steel Institute (CRSI)
9. American Association of State Highway and Transportation Officials (AASHTO)
10. Portland Cement Association (PCA)
11. National Concrete Masonry Association (NCMA)
12. Brick Industry Association (BIA)
13. American Welding Society (AWS)
14. National Roofing Contractors Association (NRCA)
15. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
16. Door and Hardware Institute (DHI)
17. Occupational Safety and Health Act (OSHA)
18. Applicable building codes including Uniform Building Code, Southern Building Code, BOCA, and the International Building Code.

SECTION 01300 - CELL SITE CONSTRUCTION

3.1 GENERAL REQUIREMENTS FOR CIVIL CONSTRUCTION:

A. Contractor shall keep the site free from accumulating waste material, debris, and trash. At the completion of the work, Contractor shall remove from the site all remaining rubbish, implements, temporary facilities, and surplus materials.

B. Equipment rooms shall at all times be maintained "broom clean" and clear of debris.

C. Contractor shall take all reasonable precautions to discover and locate any Hazardous Condition.

1. In the event Contractor encounters any hazardous condition which has not been abated or otherwise mitigated, Contractor and all other persons shall immediately stop Work in the affected area and notify Company in writing. The Work in the affected area shall not be resumed except by written notification by Company.
2. Contractor agrees to use care while on the Site and shall not take any action that will or may result in or cause the hazardous condition to be further released in the environment, or to further expose individuals to the hazard.

D. Contractor's activities shall be restricted to the project limits. Should areas outside the project limits be affected by Contractor's activities, Contractor shall immediately return them to original condition

E. Conduct testing as required herein.

DIVISION 2 - SITE CONSTRUCTION

SECTION 02300 - EARTHWORK

PART 3 - EXECUTION

3.4 TRENCHING AND BACKFILLING: The Contractor shall perform all excavation of every description and of whatever substances encountered, to the depths indicated on the Construction Drawings or as otherwise specified.

A. Protection of Existing Utilities: The Contractor shall check with the local utilities and the respective utility locator companies prior to starting excavation operations in each respective area to ascertain the locations of known utility lines. The locations, number and types of existing utility lines detailed on the Construction Drawings are approximate and do not represent exact information. The Contractor shall be responsible for repairing all lines damaged during excavation and all associated operations. All utility lines uncovered during the excavation operations, shall be protected from damage during excavation and associated operations. All repairs shall be approved by the utility company.

B. Hand Digging: Unless approved in writing otherwise, all digging within an existing cell site compound is to be done by hand.

C. During excavation, material suitable for backfilling shall be stockpiled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill shall be removed and disposed of at the Contractor's expense.

D. Grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved method.

E. Sheeting and shoring shall be done as necessary for the protection of the work and for the safety of personnel. Unless otherwise indicated, excavation shall be by open cut, except that short sections of a trench may be tunneled if, the conduit can be safely and properly installed and backfill can be properly tamped in such tunnel sections. Earth excavation shall comprise all materials and shall include clay, silt, sand, muck, gravel, hardpan, loose shale, and loose stone.

F. Trenches shall be of necessary width for the proper laying of the conduit or cable, and the banks shall be as nearly vertical as practicable. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of the conduit or cable on undisturbed soil at every point along its entire length. Except where rock is encountered, care shall be taken not to excavate below the depths indicated. Where rock excavations are necessary, the rock shall be excavated to a minimum over depth of 6 inches below the trench depths indicated on the Construction Drawings or specified. Over depths in the rock excavation and unauthorized over depths shall be thoroughly back filled and tamped to the appropriate grade. Whenever wet or otherwise unstable soil that is incapable of properly supporting the conduit or cable is encountered in the bottom of the trench, such solid shall be removed to a minimum over depth of 6 inches and the trench backfilled to the proper grade with earth of other suitable material, as hereinafter specified.

G. Backfilling of Trenches. Trenches shall not be backfilled until all specified tests have been performed and accepted. Where compacted backfill is not indicated the trenches shall be carefully backfilled with select material such as excavated soils that are free of roots, sod, rubbish or stones, deposited in 6 inch layers and thoroughly and carefully rammed until the conduit or cable has a cover of not less than 1 foot. The remainder of the backfill material shall be granular in nature and shall not contain roots, sod, rubbing, or stones of 2-1/2 inch maximum dimension. Backfill shall be carefully placed in the trench and in 1 foot layers and each layer tamped. Settling the backfill with water will be permitted. The surface shall be graded to a reasonable uniformity and the mounding over the trenches left in a uniform and neat condition.

H. Except as otherwise required, compacted backfill shall be used under concrete pads, walkways, concrete paving, and asphalt concrete paving. The first 1 foot cover shall be of select materials such as excavated soils that are free of roots, sod, rubbish, or stones. The Company may reject any onsite or borrow materials which are considered unsuitable for the intended use of the fill.

I. All fills shall be compacted to a dry density equal to at least 90 percent of the maximum dry density determined in accordance with ASTM D1557. The maximum density and optimum moisture content shall be determined by the Contractor on basis of laboratory tests conducted on the materials used in the fill.

J. Adequacy of compaction shall be determined on the basis of in-place density determinations that shall be conducted by the Contractor while the fills are being placed. The results of these tests shall be the basis on which satisfactory completion of the work is judged. If the fills fail to meet the specified densities, the Contractor shall remove and recompact the soils until the specified densities are achieved.

3.6 REMOVAL OF WATER: The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and ground water entering excavations and other parts of the work. Each excavation shall be kept dry during sub-grade preparation and continually thereafter until the construction to be provided therein is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result. Ground water level shall be maintained at least 12 inches below the bottom of each excavation. Removal of water shall be in accordance with all state, federal, and local regulations. Contractor shall submit water removal plan to the Company.

3.10 UNAUTHORIZED EXCAVATION: Except where otherwise authorized, indicated, or specified, all material excavated below the bottom of concrete structures which will be supported by the sub-grade shall be replaced with concrete placed monolithic with the concrete above. Material excavated below structures supported on piers shall be replaced with approved material. The material shall be compacted to a density equal to or greater than the density of the adjacent undisturbed soil.

3.11 STRUCTURE EXCAVATION: Excavation for structures shall be done to lines and elevations indicated on the Construction Drawings and to the limits required to perform the construction work.

A. Excavated materials free of trash, rocks, roots, and other foreign materials, and which meet the specified requirements, may be used as required for the fills, embankments, and backfills constructed under these specifications.

3.12 STABILIZATION: Sub-grades for structures and the bottom of trenches shall be firm, dense, and thoroughly compacted.

A. Trench sub-grades which run beneath roads, or pass through structural backfill, shall be compacted to 95 percent of maximum density as determined by ASTM D1557.

B. Sub-grades for structures and trench bottoms which are otherwise solid, but which become soft on top due to construction operations, shall be reinforced with one or more layers of crushed rock or gravel.

3.13 STRUCTURE BACKFILL: Backfill around and outside of structures shall be deposited in layers not to exceed 6 inches in uncompacted thickness and mechanically compacted, using acceptable compaction techniques, to at least 95 percent of maximum density as determined by ASTM D1557, with a moisture content of plus or minus 3 percent of optimum, as determined by ASTM D698 when that test is appropriate, or to 70 percent relative density as determined by ASTM D4253 and D4254 when those tests are appropriate. Compaction of structure backfill by rolling will be permitted provided the desired compaction is obtained and damage to the structure is prevented. Compaction of structure backfill by inundation with water will not be permitted.

A. Material for structure backfill shall be composed of earth only and shall contain no wood, grass, roots, broken concrete, stones, trash, or debris of any kind.

B. No backfill shall be deposited or compacted in water.

C. All backfill material shall consist of loose earth having a moisture content such that the required density of the compacted soil will be obtained with the compaction method used. Moisture content shall be distributed uniformly, and water for correction of moisture content shall be added sufficiently in advance so proper moisture distribution and compaction will be obtained. Granular material shall be wet, not just damp, when compacted.

D. Particular care shall be taken to compact structure backfill which will be beneath pipes, drives, roads, or other surface construction or structures. In addition, wherever a trench will pass through structure backfill, the structure backfill shall be placed and compacted to an elevation at least 12 inches above the top of the pipe before the trench is excavated.

3.18 DISPOSITION OF MATERIALS: Excess excavated earth and construction material shall be removed from the job site and legally disposed of by the Contractor.

DIVISION 3 - CONCRETE

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

Contact engineer or construction manager for complete concrete specifications if such work is required.

SECTION 03600 - GROUT

PART 1- GENERAL

Contact engineer or construction manager for complete grout specifications if such work is required.

DIVISION 5 - METALS

SECTION 05120 - ICE BRIDGE AND OTHER STRUCTURAL STEEL

PART 2 - PRODUCTS

2.1 ICE BRIDGE MATERIALS:

A. Ice Bridge posts shall be fabricated of 3-inch schedule 40 galvanized steel, ASTM A-53, Grade B (seamless). Posts shall be installed a minimum of 3 feet 6 inches below finish grade and backfilled with 3000 p.s.i concrete. Post tops shall be capped with steel pipe caps. Maximum horizontal separation between posts shall be 8 feet on center.

B. Ice Bridge material shall be McNichols "Grip Strut" 10 diamond plank, 24 inches wide and 3 inches deep; part number 103014 or approved equal.

C. Ice Bridge components shall be hot dip galvanized and connected in an electrically continuous fashion per the manufacturer's recommendations. Any site penetrations or saw cuts to galvanized metal shall be treated with two coats of a zinc rich cold galvanizing paint as per ASTM A 780 standards.

2.2 STRUCTURAL STEEL MATERIALS: Conform to the latest edition of applicable standards and to all applicable codes and requirements of local authorities having jurisdiction, whichever is more stringent. All structural steel shall be in accordance with the latest applicable requirements of AISC, ASTM, ACI, CRSI, AWS and all other applicable standards.

2.3 All steel shall be galvanized in accordance with ASTM A36 unless noted on the construction drawings.

2.4 Rolled steel shapes, plates and bars shall be no less than 3/16 inches in thickness and shall comply with ASTM A-36 as a minimum.

2.5 Steel pipe shall comply with ASTM A-501 or ASTM A-53, Type E or S, Grade B. A-500 Grade B steel may be substituted.

2.6 Steel tube shall comply with ASTM A-500, Grade B.

2.7 Galvanized steel grating shall be a minimum 3/4 inch x 1/8 inch at 3 /16 inches on center.

2.8 Galvanized checkered plate shall be a minimum 3/16 inch.

PART 3 - EXECUTION

3.1 ICE BRIDGE:

A. The Contractor is responsible for installing an Ice Bridge and support posts between the BTS radio equipment and the tower. At no point shall the Ice Bridge structure be mechanically connected to the tower. Cabling supports shall be designed to accept snap-in type hangers and accommodate a minimum coax or waveguide bending radius of 20 inches.

B. Each tier shall be vertically and horizontally aligned with the cable entry ports on the shelter consisting of three tiers capable of holding 5 runs of 1-5/8 inch coaxial cable each for a total of 15 coaxial cables. The cover shall be aligned to allow for easy access to the cabling and be of sufficient width and durability to prevent damage to the cable that might otherwise be caused by falling ice, bolts, nuts or hand tools. The entire structure, including cover, shall be sufficiently rigid to prevent cable damage caused by movement of the structure. Cover shall continue to within 2 inches of shelter wall and waveguide ladder.

C. Provision shall be made to ground the Ice Bridge structure as specified in Division 16.

3.2 STRUCTURAL STEEL FABRICATION: All shop fabrication and assembly of structural steel shall be in accordance with AISC specifications and as indicated on the approved shop drawings. All materials shall be properly marked for field assembly and for identification as to the location for which it is intended. Materials shall be fabricated and delivered in an order to expedite erection and minimize field handling of materials.

3.3 WELDING:

A. Welding shall be performed by a certified welder and shall conform to requirements for shielded metal arc welding of the Standard Code for Arc and Gas Welding of the American Welding Society (AWS D1.1)

B. Electrodes shall comply with AWS Code and shall be classified E-70 electrodes as a minimum. Where finishing is required, complete the assembly, including welding of units, before the start of finishing operations. Provide finish surfaces of exposed members that are free from markings, burrs and other defects.

C. Welded construction shall comply with AWS Code for procedures, appearance and quality of welds and methods used in correcting welded work. Assemble and weld built-up sections by methods that will produce correct dimensions without warp.

3.4 CONNECTIONS:

A. Contractor shall provide all hardware required to complete field erection of structure as indicated by Contract Documents or these specifications.

B. High strength threaded fasteners shall be installed in accordance with AISC Specifications for Structural Joints Using ASTM A-325 or A-490 Bolts. Use A-325N bearing-type connection bolts unless noted otherwise.

C. Grating and plates shall be fastened with saddle clips. The necessary holes to complete all phases of construction shall be provided and called out on the approved shop drawings. All holes shall be drilled or punched perpendicular to metal surfaces, flame cut or burned holes will not be permitted.

D. All unfinished threaded fasteners shall comply with ASTM A-307, Grade A, regular low-carbon steel bolts and nuts with hexagonal heads.

E. All high strength threaded fasteners shall be heavy hexagonal bolts and nuts with hardened washers, all from quenched and tempered medium carbon steel complying with ASTM A-325.

3.5 REPAIR: Repair all damaged galvanized steel with "Galvanox," "Dry Galv," or "Zinc-It.", or approved equal, per the manufacturer's instructions.

SECTION 07500 - ROOF CUTTING, PATCHING AND REPAIR

PART 1 - GENERAL

1.4 SUBMITTALS:

A. Pre-Construction Roof Condition Analysis Reports: Complete a roof inspection and report prior to the installation of Sprint equipment on any rooftop build requiring roof penetration. At a minimum inspect all areas impacted by the addition of the Sprint equipment.

Roof inspection reports should be uploaded into SMS using task # 234.

B. New Roofing Material Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

C. Shop Drawings: Provide large scale shop drawings for installation of all parts of the work. Provide plans, and details of seams, connections and accessory items. Show layouts of tapered insulation and locations of drains. Show interfaces and relationships to work of other trades.

D. Certification and Warranty:

1. Upon completion of work of this Section, submit certification by existing roof manufacturer acknowledging that all work performed is acceptable and that the entire roof remains under warranty.
2. Maintain existing warranty if applicable. Take no action which would void existing warranty.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Existing Roof Materials and Compatibility: Furnish specific product acceptable to manufacturer of roofing membrane which will not compromise the roofing manufacturer's warranty.

B. Substrate Board: Glass-mat, water-resistant gypsum ASTM C 1177 or match existing.

C. Vapor Retarder: Match existing.

D. Insulation: Extruded polystyrene board insulation, or match existing.

E. Tapered Insulation: Fabricated to provide proper drainage.

F. Recovery Board over Insulation: Match existing, mechanically fastened.

G. Membrane and Flashing: Match existing.

H. Sheet Metal Accessories: Follow SMACNA and NRCA recommendations. Materials and finishes to match existing.

I. Ballast: Match existing.

J. Walkway Protection Board: Compatible with membrane.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Inspect substrate and report unsatisfactory conditions in writing. Beginning work on site means Contractor's acceptance of existing roof conditions.

B. Comply with roof system manufacturer's instructions and recommendations on any penetrations, repairs, etc.

C. Install insulation with tightly butted joints and neatly fitted around penetrations.

D. Where applicable, distribute ballast uniformly to 10 pounds per square foot or more as required by Factory Mutual. Obtain approval of ballast weight from the building owner before loading roof.

E. Install walkway protection over an additional layer of membrane at locations indicated and where required to provide access to roof mounted equipment.

F. Restore or replace damaged components. Protect work from damage.

SECTION 07840 - FIRESTOPPING

PART 1 - GENERAL

1.5 QUALITY ASSURANCE:

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Fire Performance: ASTM E 119, ASTM E 814, and local regulations.

Sprint®

6391 Sprint Parkway
Overland Park, KS 66251

Alcatel·Lucent

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 Fax: 608-643-7999
www.Ramaker.com

NETWORK VISION
MMBTS LAUNCH
NORTHERN CT MARKET

Certification & Seal:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT * JAMES R. SKOWRONSKI * 26266 LICENSED PROFESSIONAL ENGINEER

Signature: 12/11/2012 Date:

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CDS
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY — DATE ISSUED: 10/25/2012

PROJECT TITLE:

U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:

SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: SP-1

SECTION 09910 - PAINTING

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Manufacturers: Benjamin Moore, ICI Devoe Coatings, PPG, Sherwin Williams or approved equal. Provide premium grade, professional-quality products for coating systems.

B. PAINT SCHEDULE:

1. Interior Gypsum Drywall Walls and Ceilings: One coat latex primer plus two coats latex eggshell finish.
2. Exterior and Interior Steel Doors, Frames and Ferrous Metals: One coat rust-inhibiting primer, plus two coats alkyd enamel semi-gloss finish.
3. Exterior Antennae: One coat of primer and two finish coats. Paint for antennae shall be non-metallic based and contain no metallic particles. Submit MSDS sheet to the Owner for approval. Provide colors and patterns as required to mask appearance of antennae on adjacent building surfaces and as acceptable to the Owner. Refer to antenna manufacturer's instructions whenever possible.

SECTION 11007 - ANTENNA ASSEMBLY AND INSTALLATION

PART 2 - PRODUCTS

2.1 MATERIALS: Panel and Microwave Antennas: Refer to the Drawings for types and quantities. The following paragraphs outline the materials used for an Omni site and a sectored site.

B. Sectored Site:

1. ESMR (Enhanced Specialized Mobile Radio) Panels: Located per project requirements.
2. Microwave: High performance type, located per project requirements.
3. GPS: Located on the south side of obstructions.

C. Antenna Mounts:

1. Ballast mounts for rooftop applications shall be Valmont/Microflect No. 31-99540 (12 foot separation) or approved equal.
2. Facade-mounted antennas shall comply with site-specific mounting requirements indicated on the Drawings.

D. Surge Arrestors:

1. Refer to the drawings for types and quantities. All surge arrestors shall be models that are approved by the Company before installation.
2. All surge arrestors for ESMR antennas shall terminate in 7/16 DIN connectors with MALE connectors toward the antenna and FEMALE toward equipment.
3. All surge arrestors for GPS and microwave antennas shall be Type N with MALE connectors toward the antenna and FEMALE toward equipment.
4. Surge arrestors shall be mounted on a trapeze or other grounding arrangement to ensure that surge currents are properly grounded.

E. Cross-Band Couplers: Refer to drawings for types and quantities. All couplers shall be models that are approved by the Company before installation.

F. Tower-Mounted Amplifiers (TMA or TTA): Refer to drawings for types, quantities, and mounting methods. All tower-mounted amplifiers shall be models that are approved by the Company before installation.

G. Low Noise Amplifiers (LNA): Refer to drawings for types, quantities, and mounting methods. All LNAs amplifiers shall be models that are approved by the Company before installation.

H. Connect antenna, coax, GPS, etc. to grounding system as indicated on the site plans and as indicated in Division 16.

PART 3 - EXECUTION

3.4 ANTENNA INSTALLATION:

A. The Contractor shall assemble all antennas onsite in accordance with the instructions supplied by the manufacturer. Antenna height, azimuth, and feed orientation information shall be a designated on the Construction Drawings. Azimuth delineation will be determined by appropriate RF Engineer.

B. Remote tilt antenna assemblies are to be completely assembled on the ground, run through their full range of motion using the controller and full cable assembly before being placed on the tower. Once installed, they are to be run through this process again prior to the tower crew leaving the site.

C. The serial numbers, azimuths, and downtilts are to be recorded and the information left on site for the RF and start up crew to use at the time of hand over to Field Operations.

D. The Contractor shall install all antennas and side struts in accordance with the Construction Drawings and the manufacturer's recommendations.

E. The Contractor shall position the antenna on tower pipe mounts so that the bottom strut is level. The pipe mounts shall be plumb.

F. Antenna Mounting Requirements: Refer to the Job Specifications for site specific antenna mounting details such as radiation centerlines, azimuths and antenna mount designs. Provide U-bolts and brackets to fasten antennas to side arms on pipe mounts. All mounts and mounting hardware shall be hot dipped galvanized or stainless steel material. All antenna installations shall conform to the following specifications.

1. Panel Antennas: Panel antennas shall be fastened to the vertical pipe mounts on the sector head frame supplied with the tower. Adjust pipe mounts, as necessary, on the sector headframe to provide 12 feet of horizontal separation between the outer most panel antennas unless otherwise specified. If necessary, raise or lower the headframe to achieve the correct radiation centerline as per the Drawings.

G. Ballast Mounts: Install ballast mounts in accordance with manufacturer's specifications and per the Construction Drawings and Details.

H. All unused antenna ports shall be terminated with a terminating load.

I. GPS antennas shall be installed at a location identified on the construction drawings. Effort should be made to locate GPS antennas on either the shelter or the ice bridge.

3.5 Coaxial Cables and Waveguide Installation:

A. The Contractor shall route, test, and install all coaxial cables as indicated on the Construction Drawings and in accordance with the manufacturer's recommendations.

B. The routing of the coax shall be checked for interference with other tower appurtenances before installation and vertical waveguide/coax hangers shall be installed on the tower waveguide ladder.

C. The coax shall be hoisted, connected to the antenna feed, secured to the hangers, and oriented to provide the correct entrance plane to the equipment cabinet. The waveguide/coax shall then be cut to the appropriate length to reach the equipment.

D. The waveguide/coax shall be grounded in accordance with the Construction Drawings and the Company grounding specifications Division 16.

E. The waveguide/coax shall be routed in accordance with the structural requirements. If possible, coax shall be routed on the inside of monopoles or down the waveguide ladder in a manner that will prevent obstruction of the climbing ladder. Additionally, the waveguide/coax shall be positioned in the best possible location to protect it from damage. The bending radius of the coax shall not be less than the manufacturer's specifications.

F. Extreme care shall be taken to avoid damage to the waveguide/coax during handling and installation. The Company will furnish to the Contractor port assignments, if applicable, prior to waveguide installation.

1. Waveguide Ladder (Lattice towers only: Waveguide ladders shall be used to support all coaxial cable, microwave waveguide cable and any baseband cable on the tower). One ladder, 18 cables wide, shall be mounted on the tower per the tower structural requirements. The rungs on the waveguide ladders shall be spaced a maximum of 4 feet apart.
2. Ice Bridge: An Ice Bridge will be installed between the tower and the shelter to support all cabling. Use stainless steel snap-in type hangers to support cables on the Ice Bridge. Provide a drip loop in all cabling between the base of the tower and the Ice Bridge. Install in accordance with manufacturer's specifications.
3. Fastening Cables: Waveguide and coaxial cable lines shall be raised on the tower using properly sized split type, lace-up hoisting socks attached to each cable every 200ft. All cables shall be permanently fastened to the tower using a hoisting sock at the top of the tower. Use stainless steel snap in type cable hangers at each wave guide ladder rung (on lattice towers only). Do not drill holes in tower members, use angle member adapters and stainless steel butterfly clips, to attach cabling to tower. Make sure that there is no strain on any cable connector due to the cable weight.
4. Jumpers: Jumpers between the feed lines and antennas or tower top amplifiers shall consist of 1/2 inch foam dielectric, outdoor rated coaxial cable. Do not use Superflex outdoors. Secure jumpers to the side arms or head frames using stainless steel tie wraps or stainless steel butterfly clips. Be certain that there is no strain on any connector due to the weight of the jumper cable, or its method of installation.
5. Bending Radius: Cables shall not exceed the minimum bending radius as determined by the cable manufacturer.
6. Cable Installation:
   a. Inspect cable prior to use for shipping damage, notify the Company Representative of any damage. Any cable ends cut shall be covered to protect them from weather and entry of foreign matter. If using bulk cable, field attach antenna connector before hoisting cable.
   b. Cable Routing: Cable installation shall be planned to ensure that the lines will be properly routed in a neat and orderly manner. Avoid twisting and crossovers in the building, along the tower face, and waveguide raceways. Secure cable at maximum spacing of 4 feet on center making sure that the cable weight is equally distributed and no strain is placed on connectors or antennas.
   c. Hoist cable using proper hoisting grips. Hoist slowly and carefully. Prevent kinking and snags when around tower members. Bend cable slowly at the maximum practical bend radius consistent with good installation practice. Avoid using minimum cable bends.
7. Termination at Shelter and Entry Plate:
   a. All cabling shall enter the building through the waveguide entry plate and be properly weather sealed with a cable boot fabricated for the size of the cable. Cable boots are not to be cut to fit in the field. Coaxial cables shall be terminated within 18 inches inside the shelter and fitted with a surge suppressor.
   b. Coax Port Assignments for Shelter Sites: The coax will be installed and marked per the Antenna Transmission Line Acceptance Standards and the Detail - Coax Port Assignments.
8. Grounding of transmission lines: All transmission lines shall be grounded in accordance with the Company grounding standards.
9. Labeling Coaxial Cables: All cables shall be marked with 2 inch UV resistant colored tape and stencil tagged per the latest version of the RF Antenna Transmission Line Acceptance Standards. All coaxial cables shall be at the top, bottom, both sides of the entry port and all locations where the cable penetrates a wall, ceiling or floor. Antenna locations should be determined from the reference point of standing in the center of the tower looking out. Labeling should be adherent with industry standard for T1 transmit and receive.
10. Cable Connections:
    a. Use only cable connectors recommended by the cable manufacturer.
    b. Connectors for all main station antenna cables shall be 7/16 DIN.
    c. Connectors for GPS antennas shall be Type N.
    d. Connectors for microwave antennas, unless otherwise noted, shall be Type N.
    e. Install and tighten connectors per manufacturer's instructions.
    f. All exterior connectors, connector splices, jumpers, ground kits, etc., shall be weatherproofed using connector/splice weather proofing kits. Weatherproofing shall be installed in strict accordance with manufacturer's instructions.

3.6 WEATHERPROOFING CONNECTORS AND GROUND KITS:

A. All connectors and ground kits shall be weatherproofed using butyl rubber weatherproofing and tape. This installation must be done in accordance with the manufacturer's recommendation or as shown on the construction drawings (whichever is greater). If no direction is provided, weatherproofing must be done per Sprint Standard Construction Specification for Wireless Sites Section 11007-3.6 A-D.

SECTION 11008 - BASE TRANSCEIVER STATIONS (BTS) AND RELATED EQUIPMENT INSTALLATION

PART 3 - EXECUTION

3.1 GENERAL: The Contractor shall install the BTS and associated equipment at the locations shown on the Construction Drawings and in accordance with the manufacturer's recommendations. Minimum requirements for performance of the work are:

A. Contractor shall be responsible for all services associated with the delivery, bolt-down and installation of Sprint Nextel's radio equipment.

B. Equipment installation procedures shall fully comply and strictly adhere to original equipment manufacturer's installation instructions. Contractor shall immediately cease any work if inconsistencies are found between Sprint Nextel Standards and the manufacturer's documentation. Contractor shall seek guidance from Sprint Nextel or its designated project representative for resolution.

C. Contractor shall provide a fully functioning and operable radio system at the wireless facility. Contractor shall complete and provide all documentation of the Work.

3.1 CONTRACTOR PROVIDED MATERIAL: Contractor shall obtain by any means necessary the original equipment manufacturer specifications and strictly adhere to them. Contractor shall provide all required tools, test equipment, materials, labor, and equipment including anchor kits and external mounting hardware for positioning and securing final bolt-down of the radio equipment. Contractor shall furnish all necessary grounding products to successfully bond the radio equipment to the site ground ring or shelter grounding system in accordance with the construction drawings.

3.2 WORK SCHEDULING: Contractor shall provide and coordinate scheduling of licensed electrician qualified to perform the work of connecting the power and grounding to the radio equipment along with any other connections or installations of radio equipment requiring a licensed electrician per the manufacturer specifications.

3.3 MISC WORKS:

A. Contractor shall remove radio equipment from crates, wrapping, or pallets and properly dispose of all packaging materials. Contractor shall verify the proper radio equipment is being installed at the correct site. The equipment is assigned a site specific asset number and must be installed at the designated location.

B. Contractor shall measure equipment platform, pad, interior space or shelter space and verify exact equipment layout in accordance with the construction drawings and set the radio equipment accordingly. Contractor shall set equipment cabinets and racks in the locations indicated on the construction drawings or as otherwise directed by Sprint Nextel or its designated project representative in writing.

C. Contractor shall install batteries, rectifiers, additional RF carriers, EV-DO cards, amplifiers, circuit packs, and all other radio equipment for the site as required by the manufacturer specifications.

D. Contractor shall ensure GPS is installed and ready for connection to the BTS. Contractor shall install or coordinate for the installation of the Global Positioning System (GPS) antenna via the construction contractor and as specified by the manufacturer as applicable.

E. Contractor shall procure and install:

1. DC wiring with conduit or cable tray as indicated between power supply cabinets and radio cabinets as shown on the Construction Drawings.
2. AC wiring from Load center to power supply or radio cabinet in conduit or cable tray as indicated in the manufacturer specifications.
3. Circuit breakers in spare sockets in the Load Center as indicated in the manufacturer specifications.
4. Alarm cabling from radio equipment to telco alarm terminal strip in conduit or cable tray. Contractor shall be responsible to extend conduit or cable tray as necessary to successfully complete the work.
5. T1 and alarm cables extending conduit or cable tray as necessary to successfully complete the work.
6. Jumpers from the coax main line feeds to the radio equipment. Contractor is to perform Sweep testing of lines or coordinate with construction contractor to perform this activity.

F. Contractor shall energize the equipment according to manufacturer specifications and conduct functionality tests of the AC and DC power systems correcting any deficiencies in the work as applicable.

DIVISION 16 - ELECTRICAL

SECTION 16000 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.4 CODES AND STANDARDS:

A. The codes and standards referenced in Division 16 shall be the most current revision, regardless of the actual year indicated hereinafter, except as otherwise required by Division 1.

B. The entire electrical installation shall comply fully with the requirements of all authorities having jurisdiction.

C. The Work shall comply with applicable requirements of the following:

1. U.S. National Electrical Code (NEC),
2. U.S. National Fire Protection Association (NFPA) codes and standards,
3. U.S. Occupational Safety and Health Act (OSHA),
4. Other Codes and Standards as referenced in the individual technical sections of Division 16.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT: All materials and equipment specified in Division 16 of the same type shall be of the same manufacturer and shall be new, of the best quality and design, and free from defects.

2.2 FIRESTOPPING MATERIAL:

A. Firestopping Material: Subject to compliance with requirements. Provide one or more of the following:

1. Spec Seal PEN 300 Sealant by STI
2. Spec Seal "Type SSP100" Firestop Mastic/Putty by STI
3. Spec Seal "Type SSB" Firestop Pillows by STI
4. Similar products by Nelson or 3M

PART 3 - EXECUTION

3.3 INSTALLATION:

A. Verify all dimensions by field measurements.

B. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to the closing of a structure.

C. All cutting and channeling shall be accomplished in a neat and workmanlike manner, without the removal of excess materials. Contractor shall patch, replace and repair all cut and channeled areas with material similar to adjacent construction.

D. Coordinate connection of systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies and controlling agencies. Provide required connection for each service.

E. Coordinate location of all equipment, boards, lights, outlets, switches, boxes, conduits, electrical trays with other services and utilities. Locate all equipment, fixtures and conduits to clear windows, door openings and other services and utilities. Route conduits so as to clear valves and other similar obstructions requiring access. Follow manufacturer's recommendations for installation methods not otherwise specified.

F. Equipment shall be installed at locations shown on the drawings. Any changes to locations of installed equipment, facilities, or other appurtenances shall be noted as "Red-Lines" and submitted with "As-Built" package upon project completion. All changes require appropriate Project Manager pre-approval

G. Working spaces and accessibility shall not be less than specified in the National Electrical Code for all voltages and equipment specified.

3.4 FIRESTOPPING: Apply firestopping material as recommended by the manufacturer to maintain the fire resistance rating of the barrier being penetrated. Utilize suitable templates or dams to properly retain material in large openings.

3.5 SUPPORTING DEVICES:

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC.

B. Coordinate with the building structural system and with other trades.

C. Raceway supports shall conform to the manufacturer's recommendations for selection and installation of supports.

D. The strength of each support shall be adequate to carry the present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 pounds, provide additional strength until there is a minimum of 200 pounds safety allowance in the strength of each support.

E. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support the raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.

F. Support parallel runs of horizontal raceways together on trapeze-type hangers.

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Certification & Seal:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

Signature: 12/11/2012 Date:

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CD'S
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:

U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:

SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: SP-2

G. Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers and other devices.

H. In open overhead spaces, cast boxes threaded to raceways need not be supported separately except where used for fixture support. Support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with a listed type of fastener not more than 24" (600 mm) from the box.

I. Install conduit sealing fittings for conduit penetrations of concrete wall exterior or below grade as specified or required by code.

J. Unless otherwise indicated on the drawings, fasten electrical items and their supporting hardware securely to the structure in accordance with the following:

1. Fasten by means of wood screws on wood,
2. Toggle bolts on hollow masonry units,
3. Concrete inserts or expansion bolts on concrete or solid masonry,
4. Machine screws, welded threaded studs, or spring-tension clamps on steel,
5. Explosive devices for attaching hangers to structure shall not be permitted.
6. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures.
7. In partitions of light steel construction, use sheet metal screws.

K. Ensure that the load applied by any fastener does not exceed 25 percent of the proof test load.

L. Use vibration and shock-resistant fasteners for attachments to concrete slabs.

SECTION 16001 - ELECTRICAL MATERIALS AND EQUIPMENT

PART 2 - PRODUCTS

2.1 DISCONNECT SWITCHES:

A. Furnish and install externally operated, quick-make, quick-break, safety, fused and non-fused heavy duty disconnect switches where shown on the drawings and where required by NEC. Switches shall be safety type as manufactured by Square "D", I-T-E, Cutler-Hammer/Westinghouse, GE, or approved equal.

B. Switches shall be rated for horsepower of motors controlled. Indoor switches shall be mounted in NEMA 1 enclosures, except as indicated. Switches located exterior to building shall be mounted in NEMA 3R enclosures except as indicated. Switches utilized as service entrance equipment shall be so labeled.

C. Disconnect switches shall be provided at all equipment.

D. Furnish Class R fuse kits for all fused switches utilizing RK-1 or RK-5 fuses.

2.2 CIRCUIT BREAKERS FOR INSTALLATION INTO PANELBOARDS:

A. For application in panelboards, provide circuit breakers of the same manufacturer as the Original Equipment Manufacturer (OEM) panel, integral to the cabinet.

B. Circuit breaker configuration (bolt-on or clip-on) shall match that of breakers installed and shipped with the cabinet.

C. Amps Interrupting Capacity (AIC) of field supplied and installed circuit breakers shall not be less than the printed withstand and interrupting rating of the load center.

2.3 SEPARATELY ENCLOSED CIRCUIT BREAKERS:

A. Furnish and install where indicated molded case circuit breakers, trip indicating, trip free, thermal magnetic type with electrical characteristics and ratings as indicated. Short circuit withstand and interrupting rating shall be as required by the fault current indicated.

B. Provide NEMA 1 enclosures indoor, NEMA 3R outdoor enclosure except as otherwise indicated. Circuit breaker handles shall be lockable in the OFF position.

C. Provide service entrance label where indicated.

D. Provide equipment by Square "D", General Electric, Siemens, or Cutler-Hammer/Westinghouse.

2.7 CABLE TRAY:

A. Furnish and install a complete cable tray system as indicated on the drawings and as manufactured by B-Line Systems, Inc., Square "D" Company or approved equal.

B. Cable tray, fittings and accessories shall be steel, hot-dipped galvanized after fabrication or aluminum as indicated.

C. Cable tray shall be ladder-type, trough-type, channel-type, or as indicated.

D. Cable tray system shall be furnished with all dimensions, covers, necessary tees, crosses, risers, elbows, connectors, hangers, etc. of same material as cable tray and as shown on drawings and as required by cable tray manufacturer.

E. Barriers shall be installed in cable tray to separate cables of different systems such as low and high voltage, telephone, data, etc. Barriers shall be of same material as cable tray.

F. Cable tray shall be installed level and, plumb in accordance with manufacturer's instructions.

2.9 COMMUNICATION CABLING FOR CELL SITE T1 CIRCUITS:

A. This specification applies to the T1 circuit to be installed by this Contractor between the Network Interface Unit (NIU) and the Company radio equipment.

B. In indoor locations and in underground conduits in dry climates cabling shall be PVC-insulated tinned solid copper 24 - 24 AWG twisted pairs, UL Type CMR, with overall braided shield and PVC jacket, except as otherwise recommended by the manufacturer.

C. In underground conduits in wet climates, provide Outdoor plant cable, gel filled, 24 - 24AWG twisted pairs.

D. Exception: In all cases for installations in Lucent BTS markets, utilize the T1 cable shipped with the BTS, whenever the cable length is sufficient for the installation.

E. Adhere to Bellcore standards for cable color coding.

2.12 GROUNDING ELECTRODES AND CONDUCTORS:

A. Comply with Exhibit C - Cell Site Grounding Design.

B. Equipment Grounding Conductor:

1. Bare copper conductor or insulated green wire ground as specified herein.

2.13 BOXES AND COVERS:

A. Pull and junction boxes shall be sized in accordance with NEC requirements and shall be installed so that the conductors in them are accessible without removing any part of the structure.

B. Interior switch and outlet boxes flush mounted in finished areas shall be code gauge pressed plated steel, Midland Ross or approved equal, suitable for the device to be installed. Covers shall be as hereinafter specified in paragraph "Device Plates in Finished Areas."

C. Device and pull boxes surface-mounted above accessible ceilings and within unfinished enclosed Mechanical rooms shall be as specified above sized for the conductors within and shall have pressed plated steel screw attached covers.

D. Interior switch, pull, junction and outlet boxes surface mounted in unfinished industrial areas shall be (cast aluminum or) plated cast alloy, threaded, suitable for the device to be installed, Crouse-Hinds FS/FD series or approved equal. Covers shall be screw attached plated iron alloy suitable for the box and device. Switch plate covers shall be "guarded" style.

E. Pull boxes exterior to the building and in interior industrial areas shall be plated cast alloy, heavy duty, weatherproof, dust proof, with gasket, plated iron alloy cover and stainless steel cover screws, Crouse-Hinds WAB series or equal.

F. Conduit outlet bodies shall be plated cast alloy with similar gasketed covers. Outlet bodies shall be of the configuration and size suitable for the application. Provide Crouse-Hinds Form 8 or equal.

G. Exterior switch and outlet boxes shall be recessed mounted except as noted, cast aluminum or plated cast alloy with wet location, Crouse-Hinds series WLRD covers, or equal. Masonry boxes mounted recessed in exterior wall shall be furnished with weatherproof covers.

H. Manufacturer for boxes and covers shall be Hoffman, Square "D", Crouse-Hinds, Cooper, Adalet, Appleton, O-Z Gedney, Raco, or approved equal.

2.21 LIGHTNING PROTECTION:

A. Comply with the latest revisions of Exhibit D - Cell Site Lightning - Surge Protection and Exhibit C - Cell Site Grounding Design.

2.26 SURGE SUPPRESSION

A. Except as otherwise required, surge suppression devices are Company furnished materials

PART 3 - EXECUTION

3.1 GROUNDING:

A. Electrical services, circuits and systems, enclosures and equipment shall be grounded in accordance with Article 250 of the National Electrical Code.

B. Grounding shall be provided as indicated for feeder, branch circuit, control, and instrument circuits.

C. Equipment Grounding Conductor: Furnish and install a separate insulated green wire grounding conductor with circuit conductors for all feeders and branch circuits.

D. Furnish and install an insulated green wire grounding conductor in non-metallic raceways unless designated otherwise for telephone or data cables.

E. Telephone and communication system services, circuits, enclosures and equipment shall be grounded in accordance with paragraph 800-33 and paragraph 800-40 of the National Electrical Code.

F. Separately derived AC systems that are required to be grounded by the NEC shall be grounded in accordance with paragraph 250-26 of the NEC.

G. Furnish and install insulated copper ground conductors in conduit from main electrical service equipment or electrical room ground bus and connect to main metallic water service entrance (if available) with ground clamps. Connect ground conductor to the street side of water main where a dielectric main water fitting is installed.

H. Furnish and install ground fault protection where required by code and as required by the specifications and drawings. Installation of ground fault protection shall be in accordance with NEC.

3.3 CONDUIT AND CONDUCTOR INSTALLATION:

A. Conduit and conductors shall be sized as required by NEC and shall be installed continuous and complete from outlet to outlet, panels and junction boxes.

1. In order to closely follow the lines of the structure, maintain close proximity to the structure and keep conduits in tight envelopes. Changes in direction to route around obstacles shall be made with conduit outlet bodies in exposed locations except as otherwise indicated, and in accordance with good construction practice.
2. Other changes in direction shall be made with trade elbows, keeping conduits grouped in tight envelopes following the lines of the structure and maintaining close proximity to the structure except as otherwise indicated, and in accordance with good construction practice.
3. Route conduits according to the envelopes, areas, details and sections, if any, identified on the drawings.

B. Conduits shall be fastened securely in place with approved non-perforated straps and hangers. Explosive devices for attaching hangers to structure will not be permitted. Conduits shall be concealed in finished areas. Conduit shall be exposed in unfinished areas.

C. Conduit shall be installed in a neat and workmanlike manner, parallel and perpendicular to structure wall and ceiling lines. Conduit shall be installed as required by the design of the structure and placed in concrete forms so as not to interfere with reinforcing or strength of slabs, joists or beams. Conduit shall clear all pipes and ducts and depressions in floors. Permission of Engineer shall be obtained as to location of conduit in reinforced concrete slabs, joists and beams.

D. All conduit shall be fished to clear obstructions. Ends of conduits shall be temporarily capped to prevent concrete, plaster or dirt from entering.

E. Conduits shall be rigidly clamped to boxes by galvanized malleable iron bushing on inside and galvanized malleable iron locknut on outside and inside.

F. EMT conduits (if allowed) shall have approved EMT threaded type box connectors and couplings. Set screw connectors and couplings shall not be acceptable.

G. Conductors shall be pulled in accordance with accepted good practice. Where more than one conductor is installed in the same conduit all conductors within the conduit shall be pulled simultaneously. Pull shall not deform conductors. Approved type lubricant may be used in pulling conductors where required.

H. Splices and taps shall be kept to a minimum and made in accordance with the NEC.

I. Where conduit crosses an expansion joint, an expansion and deflection fitting shall be installed in the conduit.

J. Conduit Entrance Seals:

1. All conduits penetrating new concrete walls exterior or below grade shall be sealed at penetrations with conduit entrance seal, Type FSK by O-Z/Gedney or approved equal.
2. All conduit penetrating existing concrete walls exterior or below grade shall be sealed on both sides with O-Z/Gedney Type CSML seals.

K. Conduits and cables passing through all floors, fire rated walls, and smoke partitions shall be sealed in accordance with NEC-300-21. Furnish and install O-Z/Gedney fire seal fittings or approved equal at those locations. At the Contractor's option, Specified Technologies Inc. Model PEN200, UL-Listed fire resistant silicone foam sealant installed in accordance with the manufacturer's recommendations may be utilized. All unused openings and sleeves shall be sealed as herein specified.

L. A #16 gauge (1.3 mm2) steel pull wire shall be left in all empty conduits.

M. PVC conduits shall be installed using fittings, solvents, glues, and methodology as recommended by the manufacturer.

N. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Do not bend conductors sharper than eight times the cable outside diameter. Make terminations so there is no bare conductor at the terminal. Bundle multiple conductors, with conductors larger than No. 10 AWG in individual circuit bundles.

O. Tighten electrical connectors and terminals, including screws and bolts, in accordance with the manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and 486B.

P. Utilize flexible liquid tight conduit for final connection in exterior, damp wet, or corrosive locations, and elsewhere as indicated on the drawings.

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Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

Signature: Date: 12/11/2012

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CD'S
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:
U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:
SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: SP-3

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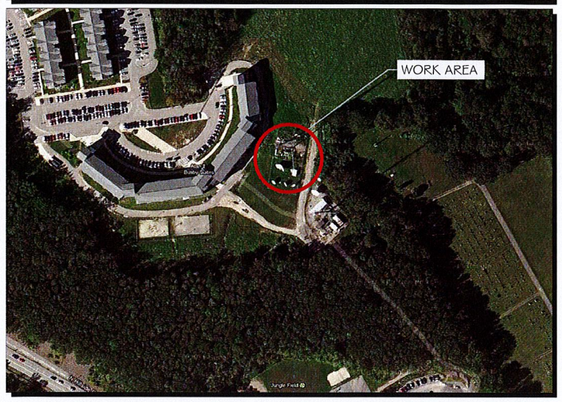
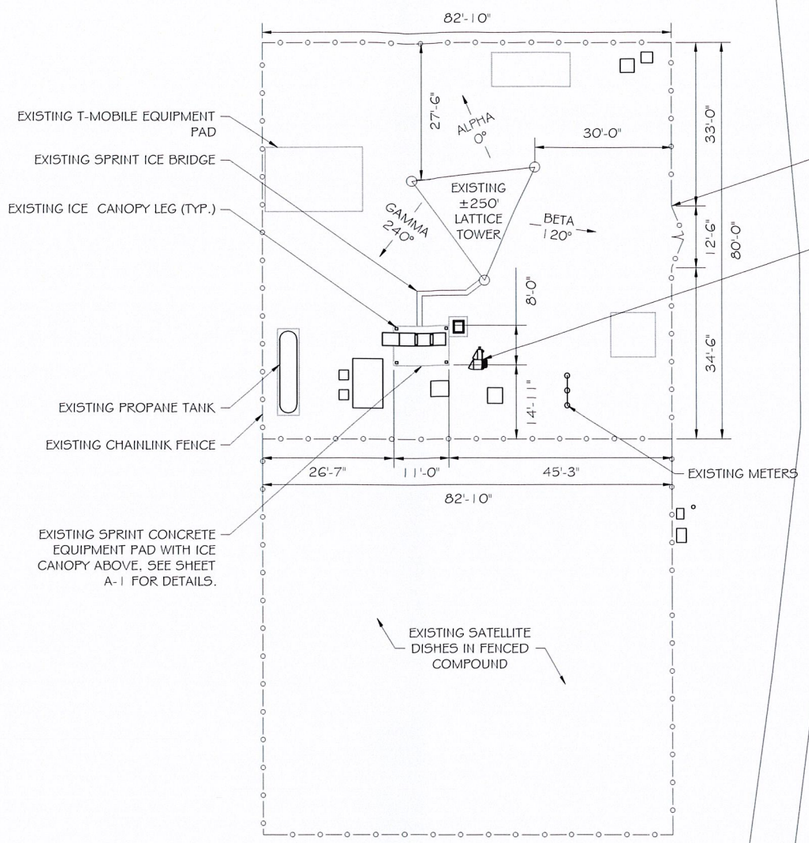
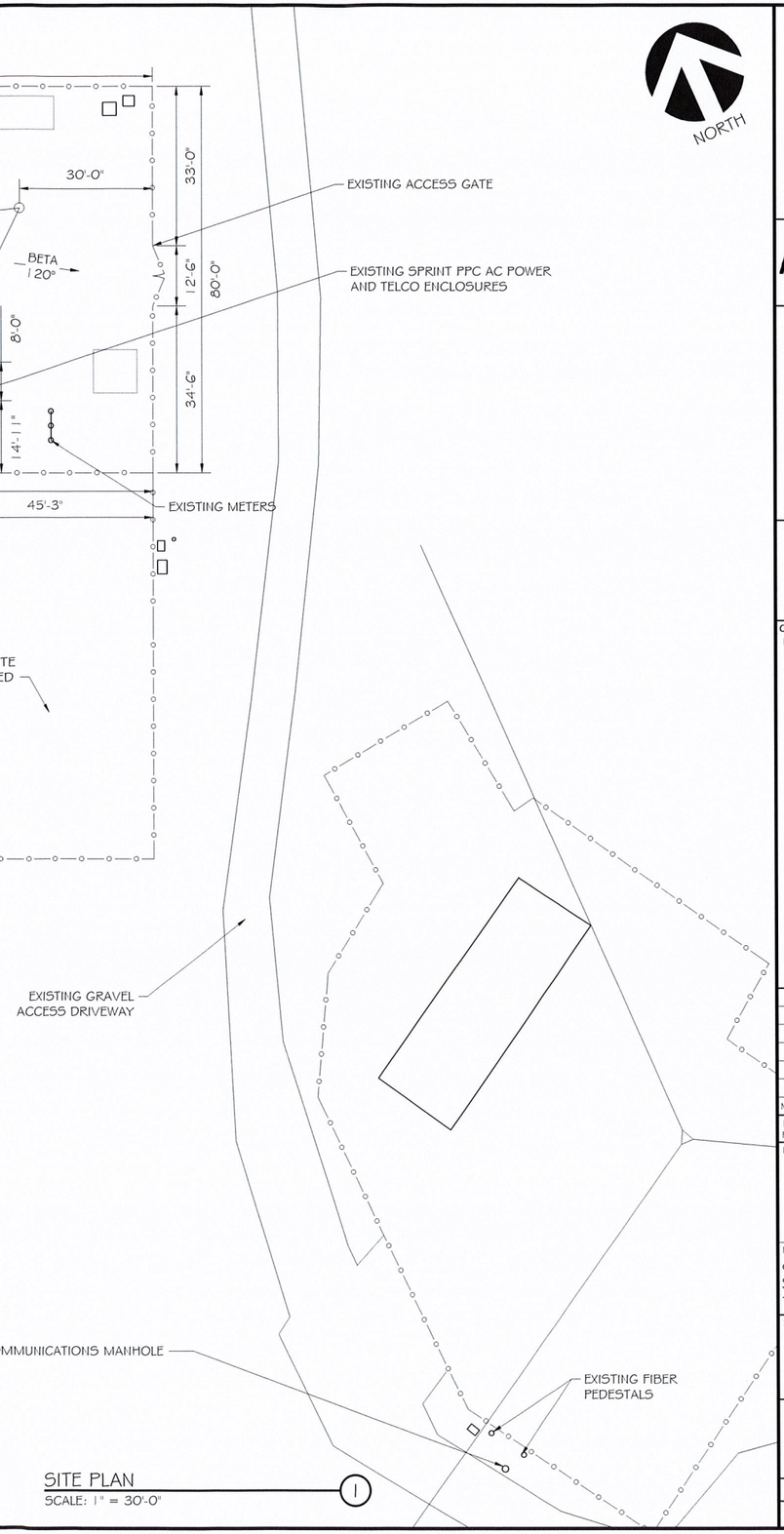
VICINITY MAP



GENERAL NOTES:

1. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES ORDINANCES, LAWS, AND REGULATIONS OF ALL MUNICIPALITIES, UTILITIES COMPANY, OR OTHER PUBLIC AUTHORITIES.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS THAT MAY BE REQUIRED BY ANY FEDERAL, STATE, COUNTY, OR MUNICIPAL AUTHORITIES.
3. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER, IN WRITING, OF ANY CONFLICTS, ERRORS OR OMISSIONS PRIOR TO THE SUBMISSION OF BIDS OR PERFORMANCE OF WORK. MINOR OMISSIONS OR ERRORS IN THE BID DOCUMENTS SHALL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR THE OVERALL INTENT OF THESE DRAWINGS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING SITE IMPROVEMENTS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED AS A RESULT OF CONSTRUCTION OF THE FACILITY.
5. THE SCOPE OF WORK FOR THIS PROJECT SHALL INCLUDE PROVIDING ALL MATERIALS, EQUIPMENT, AND LABOR REQUIRED TO COMPLETE THIS PROJECT. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
6. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO SUBMITTING A BID TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
7. CONTRACTOR SHALL VERIFY ANTENNA ELEVATION AND AZIMUTH WITH RF ENGINEERING PRIOR TO INSTALLATION.
8. TRANSMITTER EQUIPMENT AND ANTENNAS ARE DESIGNED TO MEET ANSI/EIA/TIA 222-G REQUIREMENTS.
9. ALL STRUCTURAL ELEMENTS SHALL BE HOT DIPPED GALVANIZED STEEL.
10. CONTRACTOR SHALL MAKE A UTILITY "ONE-CALL" TO LOCATE ALL UTILITIES PRIOR TO EXCAVATING.
11. IF ANY UNDERGROUND UTILITIES OR STRUCTURES EXIST BENEATH THE PROJECT AREA, CONTRACTOR MUST LOCATE IT AND CONTACT THE APPLICANT & THE OWNER'S REPRESENTATIVE.
12. OCCUPANCY IS LIMITED TO PERIODIC MAINTENANCE AND INSPECTION BY TECHNICIANS APPROXIMATELY 2 TIMES PER MONTH.
13. RAMAKER & ASSOCIATES HAS NOT PERFORMED A STRUCTURAL ANALYSIS FOR THIS PROJECT. PRIOR TO THE INSTALLATION OF THE PROPOSED EQUIPMENT OR MODIFICATION OF THE EXISTING STRUCTURE, A STRUCTURAL ANALYSIS SHALL BE PERFORMED BY SPRINT'S AGENT TO CERTIFY THAT THE EXISTING/PROPOSED COMMUNICATION STRUCTURE AND COMPONENTS ARE STRUCTURALLY ADEQUATE TO SUPPORT ALL EXISTING AND PROPOSED ANTENNAS, COAXIAL CABLES, AND OTHER APPURTENANCES.
14. PROPERTY LINE INFORMATION WAS PREPARED USING DEEDS, TAX MAPS, AND PLANS OF RECORD AND SHOULD NOT BE CONSTRUED AS AN ACCURATE BOUNDARY SURVEY.
15. THIS PLAN IS SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD.
16. THE PROPOSED FACILITY WILL CAUSE ONLY A "DE MINIMIS" INCREASE IN STORMWATER RUNOFF; THEREFORE, NO DRAINAGE STRUCTURES ARE PROPOSED.
17. NO SIGNIFICANT NOISE, SMOKE, DUST, OR ODOR WILL RESULT FROM THIS FACILITY.
18. THE FACILITY IS UNMANNED AND NOT INTENDED FOR HUMAN HABITATION (NO HANDICAP ACCESS REQUIRED).
19. POWER TO THE FACILITY WILL BE MONITORED BY A SEPARATE METER.





SITE PLAN
SCALE: 1" = 30'-0"

Sprint
6391 Sprint Parkway
Overland Park, KS 66251

Alcatel·Lucent

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 Fax: 608-643-7999
www.Ramaker.com

NETWORK VISION
MMBTS LAUNCH
NORTHERN CT MARKET

Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED PROFESSIONAL ENGINEER

Signature: James R. Skowronski Date: 12/11/2012

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CD'S
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

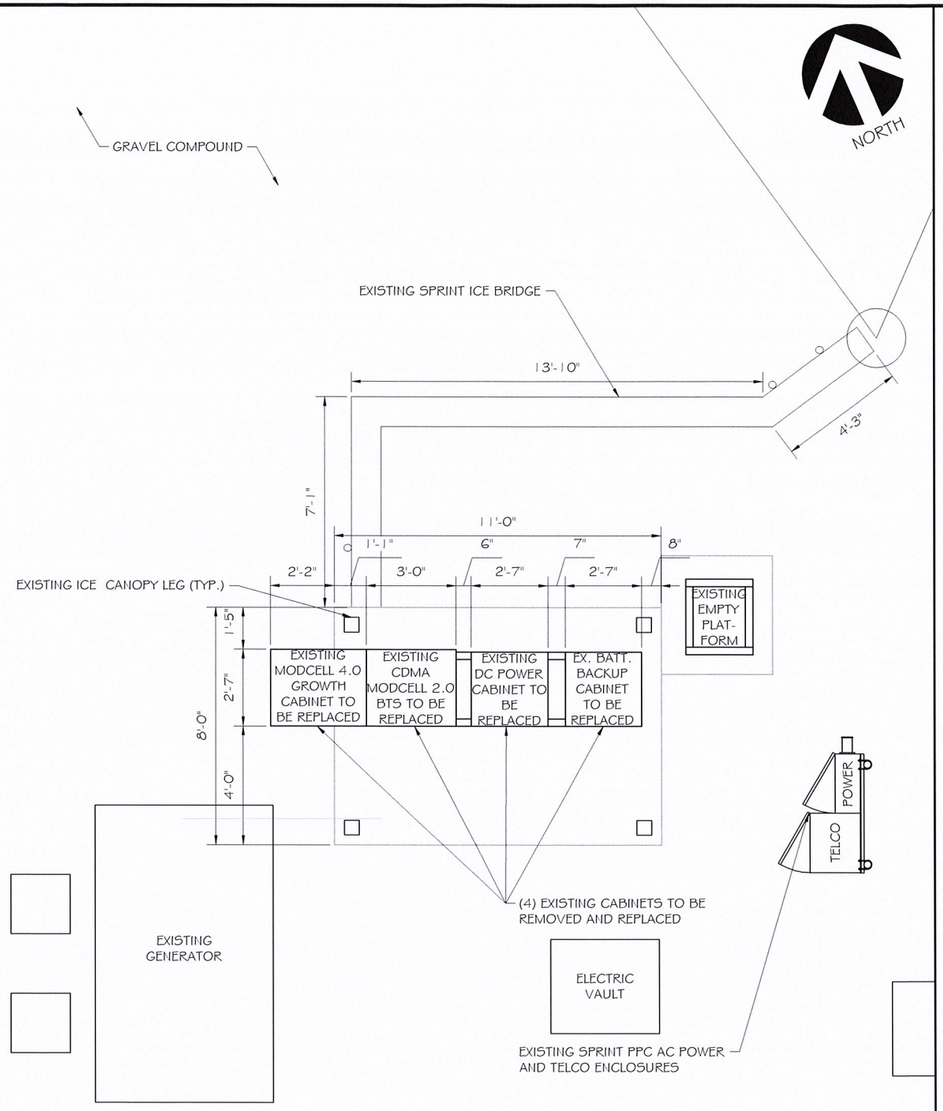
PROJECT TITLE:
U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

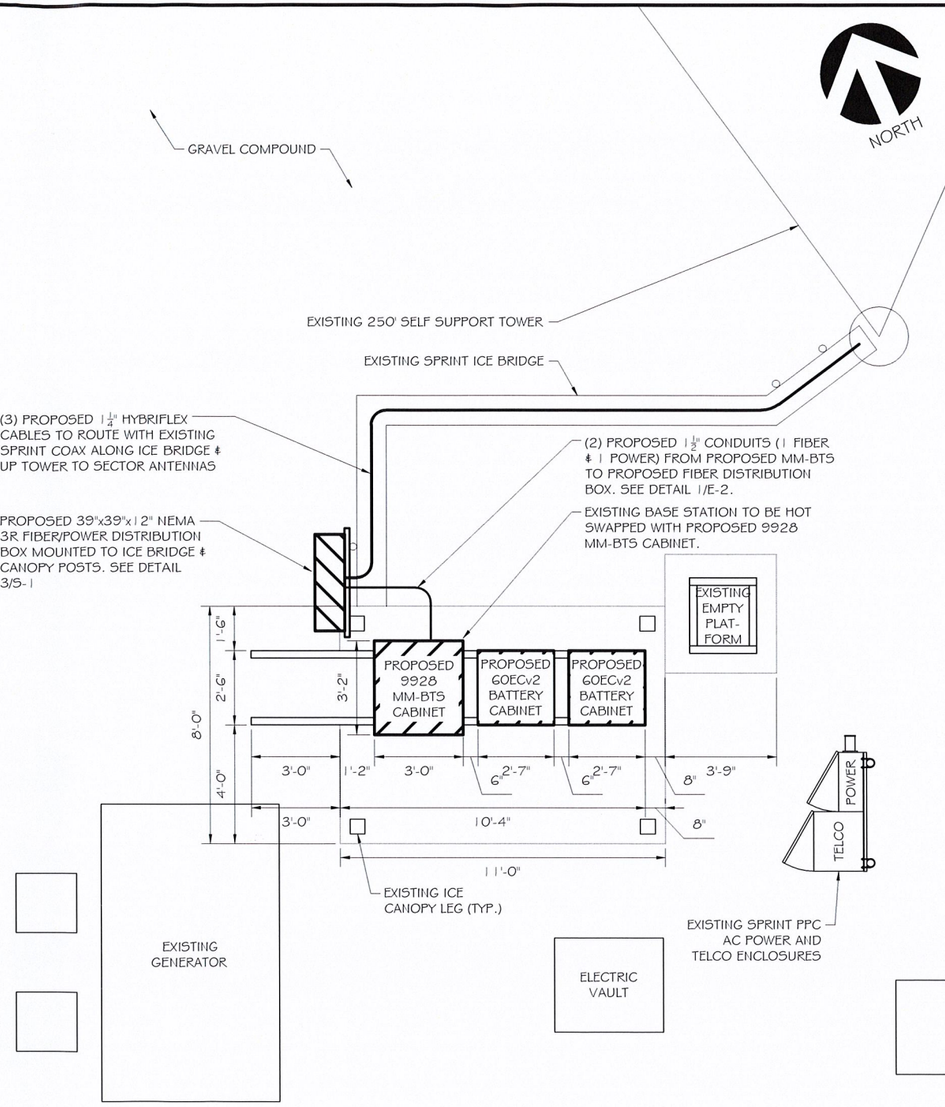
SHEET TITLE:
OVERALL SITE PLAN

0 15' 30' 60'
11"x17" - 1" = 30'
22"x34" - 1" = 15'

PROJECT NUMBER: 23003
SHEET NUMBER: C-1



EXISTING EQUIPMENT PLAN (1)
SCALE: 1" = 5'-0"



PROPOSED EQUIPMENT PLAN (2)
SCALE: 1" = 5'-0"

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STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: James R Skowronski Date: 12/11/2012

MARK	DATE	DESCRIPTION
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A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:
U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:
EQUIPMENT PLAN

0 2.5' 5' 10'
11"x17" - 1" = 5'
22"x34" - 1" = 2.5'

PROJECT NUMBER: 23003
SHEET NUMBER: A-1

I:\23000\23003\CAD\Telecom\Working\23003 Vision Project-CT.dwg Printed by: steves on Dec 11, 2012 - 1:19pm

NOTES:

I. SCOPE

A. THIS SECTION COVERS THE SPECIFICATIONS FOR ANTENNA AND COAXIAL CABLE INSTALLATION OF: ANTENNAS, COAXIAL, CONNECTIONS, AND ICE BRIDGE.

B. REFERENCE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES FOR GENERAL REQUIREMENTS.

II. ANTENNAS:

A. ANTENNAS SHALL BE PLUMB AND INSTALLED SO THAT THE ENTIRE WHIP EXTENDS ABOVE VERTICAL PIPE MOUNT. DIRECTIONAL ANTENNAS SHALL BE ORIENTED TO PROPER AZIMUTH, PROVIDED ON THE RF SPECIFICATION SHEET. NOTE: THE ANTENNA MAY BE ORIENTED USING THE REFLECTOR AS THE REFERENCE, ADJUSTING ITS AZIMUTH 180 DEGREES FROM MAXIMUM ANTENNA RADIATION.

B. MICROWAVE ANTENNAS (DISHES) SHALL BE ASSEMBLED PER MANUFACTURER'S DRAWINGS. STIFF ARMS AND RADOMES SHALL BE INSTALLED WITH POLARIZATION PROVIDED BY RF SPECIFICATION SHEET. IF PATH IS NOT READY TO ALIGN, DISH SHOULD BE POINTED TOWARD CALCULATED AZIMUTH, OR DIRECTION OF FIELD STAKE DENOTING OPPOSITE END. 2 STIFF ARMS SHALL BE PROVIDED FOR MICROWAVE DISHES 6'-0" IN DIAMETER OR GREATER.

C. A TRANSIT SHALL BE USED TO PROPERLY ALIGN CELLULAR AND MICROWAVE ANTENNAS.

III. COAXIAL CABLE:

A. COAXIAL CABLE SHALL BE SUPPORTED WITH SNAP-IN HANGERS. SNAP-IN HANGERS SHOULD BE USED EVERY 3 FEET THE ENTIRE HEIGHT OF THE TOWER. ANGLE ADAPTERS OR ROUND MEMBER ADAPTERS WITH BUTTERFLY CLAMPS SHALL BE USED ELSEWHERE, I.E. SIDEARMS, PLATFORMS, AND MICROWAVE MOUNTS.

B. COAXIAL CABLE SHALL ALSO BE SUPPORTED WITH HOISTING GRIPS, INSTALLED AT MAXIMUM INTERVALS OF 200 FEET. HOISTING GRIPS SHALL BE ATTACHED WITH SHACKLES, BOLTED IN THE 7/8" HOLE OF WAVEGUIDE LADDER.

C. ALL JUMPERS USED BETWEEN COAXIAL CABLE AND ANTENNA SHALL BE SUPPORTED WITHIN 18 INCHES OF ANTENNA, USING BUTTERFLY CLAMPS WITH ANGLE ADAPTERS OR ROUND MEMBER ADAPTERS AROUND PIPES. CELLULAR ANTENNAS TYPICALLY USE 6' JUMPERS; MICROWAVE DISHES USE 3' JUMPERS.

D. COAXIAL CABLE SHALL BE NEATLY BENT WHEN REQUIRED, USING A MINIMUM BENDING RADIUS OF 10 TIMES THE DIAMETER OF THE COAXIAL CABLE. DRIP LOOPS SHOULD BEGIN AT THE ICE BRIDGE. THE END IN THE COAXIAL CABLE SHOULD BE AT A LOWER HEIGHT THAN THE ENTRY PORT.

E. COAXIAL CABLE SHALL BE SUPPORTED WITH SNAP-IN HANGERS ON THE WAVEGUIDE LADDER UNDER ICE BRIDGE. COAXIAL CABLE SHOULD BE NEATLY CUT 16" INSIDE BUILDING AND TERMINATED AT THE QUARTER WAVE SHORTS.

F. CONNECTORS WILL NORMALLY BE PROVIDED FIRST OFF REEL FROM FACTORY. CONNECTORS TERMINATED IN BUILDING SHALL BE NEATLY INSTALLED PER MANUFACTURER'S SPECIFICATIONS.

G. COAXIAL CABLES SHOULD BE LABELED WITH TAGS INSIDE THE BUILDING.

H. USE 2" WIDE COLORED TAPE TO INDICATE SECTORS. CONTRACTOR TO USE SECTOR COLOR CODING AS INDICATED IN THESE DRAWINGS OR AS PROVIDED BY SPRINT.

I. ALL EXCEPTIONS NEED TO BE VERIFIED WITH THE PROJECT MANAGER.

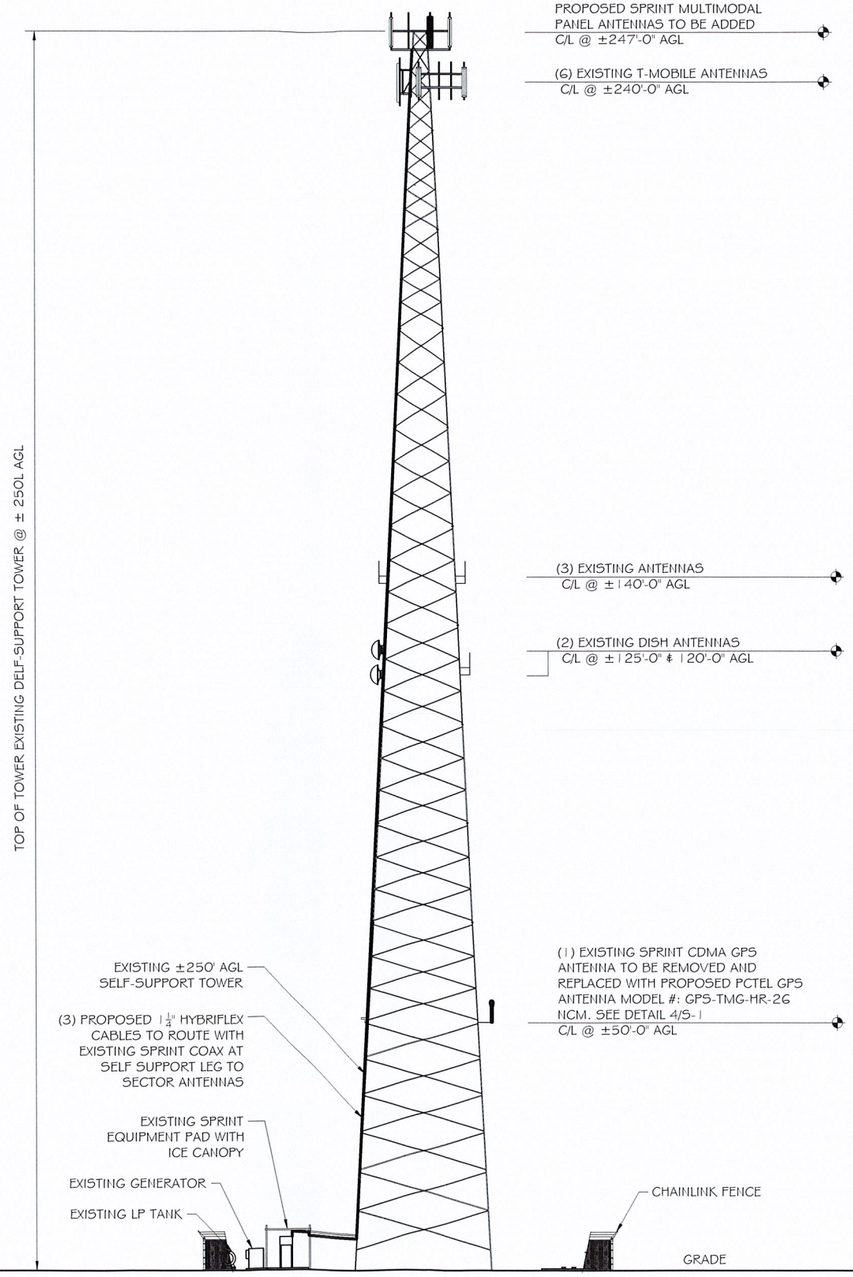
IV. CONNECTORS:

A. ALL CONNECTIONS AND GROUNDING KITS SHALL BE WEATHERPROOFED USING COLD SHRINK OR ANDREW APPROVED WEATHER STRIPPING. NOTE: NO PORTION OF CONNECTOR SHALL BE EXPOSED TO THE ELEMENTS.

B. COAXIAL CABLE SHALL BE GROUNDED USING GROUNDING KITS AT THE TOP (BELOW THE BEND), BOTTOM (ABOVE THE BEND ON TOWER GROUND BAR), AND ON BUILDING GROUND BAR BEFORE ENTRY INTO WAVEGUIDE PORTS. 4" CABLE BOOTS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

C. GROUNDING KITS SHALL BE NEATLY INSTALLED SO THAT THE JUMPER RUNS IN THE SAME DIRECTION AS THE COAXIAL AND GROUND BAR. JUMPER WIRE SHOULD RUN IN A DIRECT PATH TO THE GROUND BAR/ TOWER LADDER, BUT HAVE ADEQUATE SLACK FOR EXPANSION, CONTRACTION, AND REPAIR. NON-OXIDE GREASE SHOULD BE APPLIED BETWEEN LUG AND BAR/TOWER.

D. TOWER GROUND BAR SHALL BE INSTALLED ON THE ANGLE BEHIND THE FIRST DIAGONAL WAVEGUIDE LADDER RUNG, ABOVE 8'-6". GROUND BAR SHALL BE ISOLATED FROM ANGLE USING NEWTON BUSHINGS PROVIDED.



ELEVATION 1
SCALE: 1"= 30'-0"

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STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

Signature: James R Skowronski Date: 12/11/2012

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CDS
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:

U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

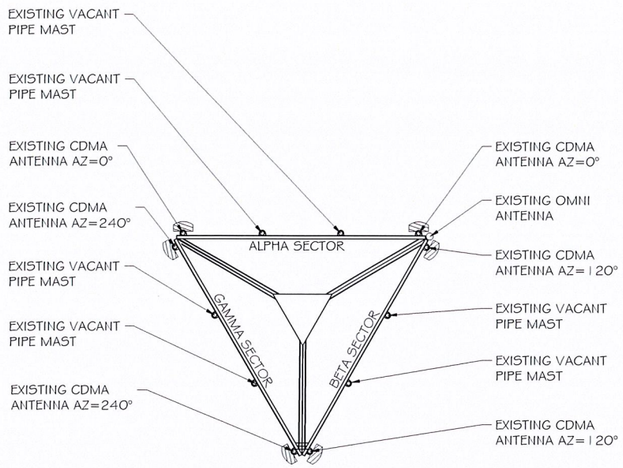
SHEET TITLE:

SITE ELEVATION & NOTES

0 15' 30' 60'
11" x 17" - 1" = 30'
22" x 34" - 1" = 15'

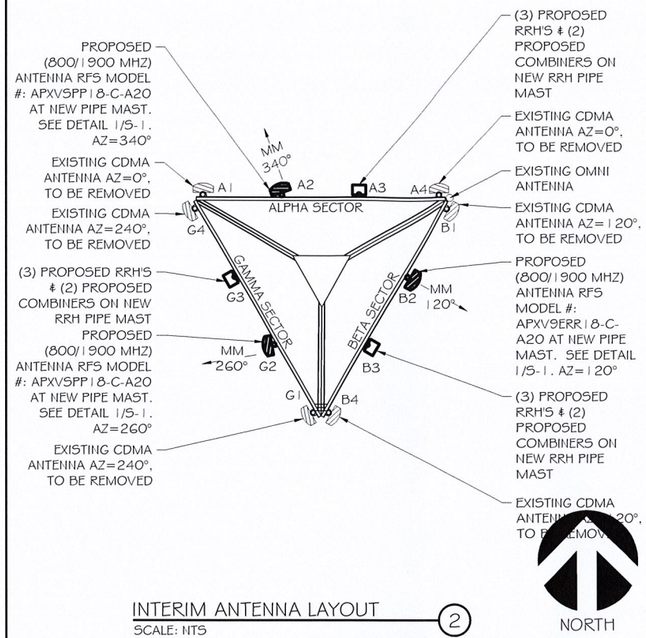
PROJECT NUMBER: 23003
SHEET NUMBER: A-2

DRAWN BY: KJG CHECKED BY: KAB



EXISTING ANTENNA LAYOUT (1)
SCALE: NTS

NOTE:
PROPOSED (2) 1900 & (1) 800 MHZ RRH UNITS AND (2) COMBINERS AT PROPOSED RRH PIPE MAST. SEE DETAIL 2/S-1.



INTERIM ANTENNA LAYOUT (2)
SCALE: NTS

NOTE:
PROPOSED (2) 1900 & (1) 800 MHZ RRH UNITS AND (2) COMBINERS AT PROPOSED RRH PIPE MAST. SEE DETAIL 2/S-1.

FINAL ANTENNA LAYOUT (3)
SCALE: NTS

ANTENNA AND COAXIAL CABLE SCHEDULE

SECTOR	POS.	AZIMUTH	ANTENNA CENTERLINE	ANTENNA STATUS	TECH.	ANTENNA MAKE/ MODEL	MECH. DOWNTILT (°)	ELEC. DOWNTILT (°)	RRHs	CABLE SIZE	CABLE LENGTH
ALPHA	A-1	0°	247'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
	A-2	340°	247'-0"	PROPOSED	MULTIMODAL	RFS/APXV9PP18-C-A20	1900(0), 800(0)	1900(-1), 800(0)	(2) 1900, (1) 800 & (2) COMBINERS	(1) 1 5/8" HYBRIFLEX HYBRID CABLE RFS #HB114-1-08U4-M5J	±275'-0"
	A-3	-	247'-0"	PROPOSED RRH'S	-	-	-	-	-	-	-
	A-4	0°	247'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
BETA	B-1	120°	247'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
	B-2	120°	247'-0"	PROPOSED	MULTIMODAL	RFS/APXV9ERR18-C-A20	1900(0), 800(0)	1900 (-4), 800(-2)	(2) 1900, (1) 800 & (2) COMBINERS	(1) 1 5/8" HYBRIFLEX HYBRID CABLE RFS #HB114-1-08U4-M5J	±275'-0"
	B-3	-	247'-0"	PROPOSED RRH'S	-	-	-	-	-	-	-
	B-4	120°	247'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
GAMMA	G-1	240°	247'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
	G-2	260°	247'-0"	PROPOSED	MULTIMODAL	RFS/APXV9PP18-C-A20	1900(0), 800(0)	1900 (-2), 800 (-1)	(2) 1900, (1) 800 & (2) COMBINERS	(1) 1 5/8" HYBRIFLEX HYBRID CABLE RFS #HB114-1-08U4-M5J	±275'-0"
	G-3	-	247'-0"	PROPOSED RRH'S	-	-	-	-	-	-	-
	G-4	240°	247'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-

Sprint
6391 Sprint Parkway
Overland Park, KS 66251

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NETWORK VISION MMBTS LAUNCH NORTHERN CT MARKET

Certification & Seal:
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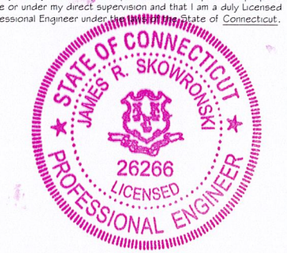


12/11/2012
Signature: Date:

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CD'S
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:
U-CONN
SITE #: CT03XC214

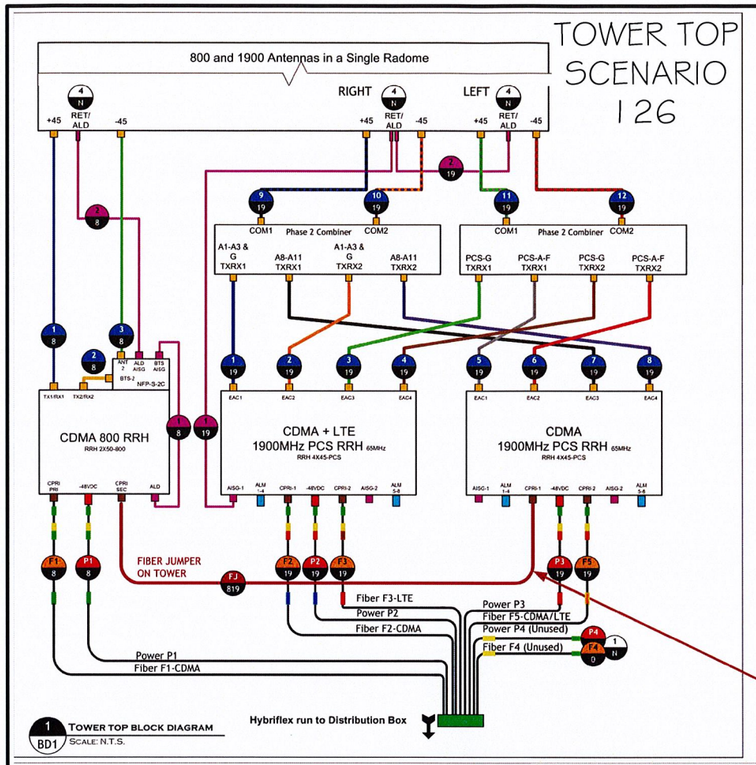
PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:
ANTENNA DETAILS & COAX SCHEDULE

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: A-3

TOWER TOP SCENARIO 126



1 BD1 TOWER TOP BLOCK DIAGRAM
SCALE: N.T.S.

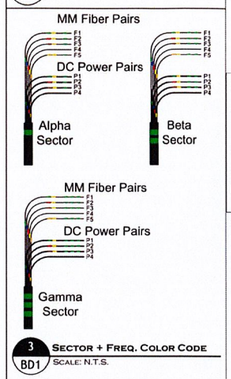
Power Feed Polarity Definition:
IF wires are BLACK AND BLACK/ WHITE STRIPE:
Black= -48VDC Feed (Battery)
Black/White Stripe= Return

IF wires are RED AND BLACK:
Red= -48VDC Feed (Battery)
Black= Return

NOTE: For power feed use the same Hybriflex OEM color designator as the fiber.

MM Pair 1= F1= Green= P1(Green)
MM Pair 2= F2= Blue= P2(Blue)
MM Pair 3= F3= Red= P3(Red)
MM Pair 4= F4= Yellow= P4(Yellow)
MM Pair 5= F5= Orange= (No P5 power feed)

2 BD1 HYBRIFLEX OEM COLOR CODE
SCALE: N.T.S.



3 BD1 SECTOR + FREQ. COLOR CODE
SCALE: N.T.S.

4 BD1 DIAGRAM LEGEND
SCALE: N.T.S.

800Mhz CPRI Sec port is jumpered to 1900Mhz PCS RRH # 2 On tower

ANTENNA PLUMBING DIAGRAM (1)
SCALE: NTS

Product Data Sheet APXV9ERR18-C

RFS

Triple Band Dual Polarized Antenna, 806-1995, 80deg, 14-17dBi, 1.8m, VET, 0-10deg, 0.5m AISG Cable

Product Description

This antenna is an ideal choice for dual band site upgrade for high traffic areas. It features 4 ports in 1900 MHz and 2 ports in 800 MHz.

Features/Benefits

- Variable electrical downtilt – provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.
- High suppression of all upper sidelobes (Typically < 18 dB)
- Independent control of electrical downtilt for 800 and PCS bands
- Low profile for low visual impact
- Quick and easy to adjust
- High front-to-back ratio
- AISG compatible remote tilt available – Add suffix -A20 to the model number

Technical Specifications

Electrical Specifications

Frequency Range, MHz	806-869	1850-1995	1850-1995
Horizontal Beamwidth, deg	80	80	80
Vertical Beamwidth, deg	11.5	5.5	5.5
Electrical Downtilt, deg		0-10	
Gain, dBi (dBd)	14 (11.9)	17 (14.9)	17 (14.9)
1st Upper Sidelobe Suppression, dB, typ. @ T0° & T8°		>18	
Front-To-Back Ratio, dB, @ 180° ± 15°	>30	>27	>27
Polarization		Dual pol +/-45°	
Return Loss, dB		> 14	
Isolation between Ports, dB		>28	
3rd Order IMP @ 2 x 43 dBm, @ 2 min. duration		>110	
Cross Polar Discrimination (XPD) 0°, dB	>20	>20	>20
Cross Polar Discrimination (XPD) ± 60°, dB	>5	>11	>11
HBW Squint across same band ports, °	±5	±5	
Impedance, Ohms		50	
Maximum Power Input, W		250	
Lightning Protection		Direct Ground	
Connector Type		(6) 7-16 DIN Female	

Mechanical Specifications

Dimensions - HxWxD, mm (in)	1829 x 302 x 200 (72.0 x 11.8 x 7.9)
Weight w/o Mtg Hardware, kg (lb)	28.2 (62)
Rated Wind Speed, km/h (mph)	241 (150)
Radome Material	ASA
Radome Color	Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum and Galvanized Steel

Ordering Information

Mounting Hardware	APM40-2 Downtilt Kit
AISG System Cable	0.5 m, included
Mounting Pipe Diameter, mm (in)	60-120 (2.4-4.7)
Mounting Hardware Weight, kg (lb)	3.4 (7.5)

Product Data Sheet APXVSPP18-C

RFS

Triple Band Dual Polarized Antenna, 806-1995, 65deg, 16-18dBi, 1.8m, VET, 0-10deg, 0.5m AISG Cable

Product Description

This antenna is an ideal choice for dual band site upgrade for high traffic areas. It features 4 ports in 1900 MHz and 2 ports in 800 MHz.

Features/Benefits

- Variable electrical downtilt – provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.
- High suppression of all upper sidelobes (Typically < 18 dB)
- Independent control of electrical downtilt for 800 and PCS bands
- Low profile for low visual impact
- Quick and easy to adjust
- High front-to-back ratio
- AISG compatible remote tilt available – Add suffix -A20 to the model number

Technical Specifications

Electrical Specifications

Frequency Range, MHz	806-869	1850-1995	1850-1995
Horizontal Beamwidth, deg	65	65	65
Vertical Beamwidth, deg	11.5	5.5	5.5
Electrical Downtilt, deg		0-10	
Gain, dBi (dBd)	15.5 (13.4)	18.0 (15.9)	18.0 (15.9)
1st Upper Sidelobe Suppression, dB, typ. @ T0° & T8°		>18	
Front-To-Back Ratio, dB, @ 180° ± 15°	>30	>27	>27
Polarization		Dual pol +/-45°	
Return Loss, dB		> 14	
Isolation between Ports, dB		>28	
3rd Order IMP @ 2 x 43 dBm, @ 2 min. duration		>110	
Cross Polar Discrimination (XPD) 0°, dB	>15	>20	>20
Cross Polar Discrimination (XPD) ± 60°, dB	>9.5	>11	>11
HBW Squint across same band ports, °		±5	
Impedance, Ohms		50	
Maximum Power Input, W		250	
Lightning Protection		Direct Ground	
Connector Type		(6) 7-16 DIN Female	

Mechanical Specifications

Dimensions - HxWxD, mm (in)	1829 x 302 x 178 (72.0 x 11.8 x 7)
Weight w/o Mtg Hardware, kg (lb)	25.8 (57)
Rated Wind Speed, km/h (mph)	241 (150)
Radome Material	ASA
Radome Color	Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum and Galvanized Steel

Ordering Information

Mounting Hardware	APM40-2 Downtilt Kit
AISG System Cable	0.5 m, included
Mounting Pipe Diameter, mm (in)	60-120 (2.4-4.7)
Mounting Hardware Weight, kg (lb)	3.4 (7.5)

ANTENNA SPECIFICATIONS (2)
SCALE: NTS

Sprint
6391 Sprint Parkway
Overland Park, KS 66251

Alcatel·Lucent

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 Fax: 608-643-7999
www.Ramaker.com

NETWORK VISION
MMBTS LAUNCH
NORTHERN CT MARKET

Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: James R. Skowronski Date: 12/11/2012

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CD'S
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:
U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:
ANTENNA PLUMBING DIAGRAM & SPECIFICATIONS

SCALE: NONE

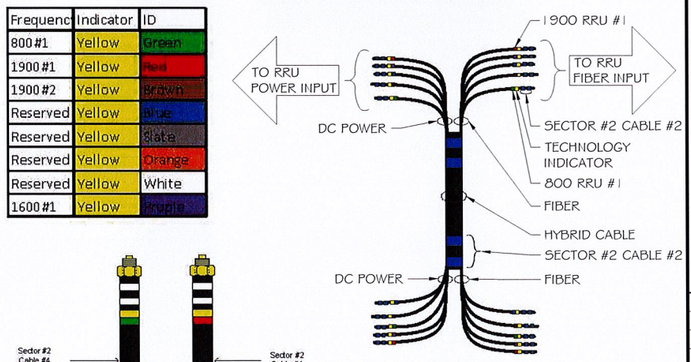
PROJECT NUMBER: 23003
SHEET NUMBER: A-4

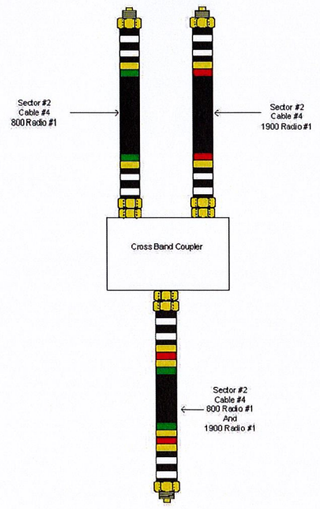
		Market	Northern Connecticut		
		Cascade ID	CT03XC214		
			SECTOR 1	SECTOR 2	SECTOR 3
	Split sector present		NO	NO	NO
1900	1900MHz_Azimuth		340	120	260
	1900MHz_No_of_Antennas		1	1	1
	1900MHz_RADCenter(ft)		247	247	247
	1900MHz_Antenna Make		RFS	RFS	RFS
	1900MHz_Antenna Model		APXVSPP18-C-A20	APXV9ERR18-C-A20	APXVSPP18-C-A20
	1900MHz_Horizontal_Beamwidth		65	80	65
	1900MHz_Vertical_Beamwidth		5.5	5.5	5.5
	1900MHz_AntennaHeight (ft)		6	6	6
	1900MHz_AntennaGain(dBd)		15.9	14.9	15.9
	1900MHz_E_Tilt		-1	-4	-2
	1900MHz _M_Tilt		0	0	0
	1900MHz_Carrier_Forecast_Year_2013		7	7	7
	1900MHz_RRH Manufacturer		ALU	ALU	ALU
	1900MHz_RRH Model		RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz
	1900MHz_RRH Count		2	2	2
	1900MHz_RRH Location		Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	1900MHz Combiner Model		IBC1900BB-1 & IBC1900HG-2A	IBC1900BB-1 & IBC1900HG-2A	IBC1900BB-1 & IBC1900HG-2A
	1900MHz_Top_Jumper #1_Length (RRH or Combiner-to-Antenna, ft)		10	10	10
	1900MHz_Top_Jumper #1_Cable_Model (RRH or Combiner-to-Antenna)		LCF12-50J	LCF12-50J	LCF12-50J
	1900MHz_Top_Jumper #2_Length (RRH-to-Combiner, ft)		6	6	6
	1900MHz_Top_Jumper #2_Cable_Model (RRH-to-Combiner)		LCF12-50J	LCF12-50J	LCF12-50J
	1900MHz_Main_Coax_Cable_Length (ft)		N/A	N/A	N/A
	1900MHz_Main_Coax_Cable_Model		N/A	N/A	N/A
	1900MHz_Bottom_Jumper #1_Length (Ground-based-RRH-OR_Combiner-to-Main-Coax, ft)		0	0	0
	1900MHz_Bottom_Jumper #1_Cable_Model (Ground-based-RRH-OR_Combiner-to-Main-Coax)		0	0	0
	1900MHz_Bottom_Jumper #2_Length (Ground-based-Combiner-to-Main-		0	0	0
	1900MHz_Bottom_Jumper #2_Cable_Model (Ground-based-Combiner-to-Main-Coax)		0	0	0
800	800MHz_Azimuth		340	120	260
	800MHz_No_of_Antennas		0	0	0
	800MHz_RADCenter(ft)		247	247	247
	800MHz_AntennaMake		RFS	RFS	RFS
	800MHz_AntennaModel		APXVSPP18-C-A20 (Shared w/1900)	APXV9ERR18-C-A20 (Shared w/1900)	APXVSPP18-C-A20 (Shared w/1900)
	800MHz_Horizontal_Beamwidth		65	80	65
	800MHz_Vertical_Beamwidth		11.5	10.5	11.5
	800MHz_AntennaHeight (ft)		6	6	6
	800MHz_AntennaGain (dBd)		13.4	11.9	13.4
	800MHz_E_Tilt		0	-2	-1
	800MHz_M_Tilt		0	0	0
	800MHz_RRH Manufacturer		ALU	ALU	ALU
	800MHz_RRH Model		800 MHz RRH 2x50W	800 MHz RRH 2x50W	800 MHz RRH 2x50W
	800MHz_RRH Count		1	1	1
	800MHz_RRH Location		Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	800MHz_Top_Jumper #1_Length (RRH or Combiner-to-Antenna, ft)		10	10	10
	800MHz_Top_Jumper_Cable_Model (RRH or Combiner-to-Antenna)		LCF12-50J	LCF12-50J	LCF12-50J
	800MHz_Main_Coax_Cable_Length (ft)		N/A	N/A	N/A
	800MHz_Main_Coax_Cable_Model		N/A	N/A	N/A
	800MHz_Bottom_Jumper #1_Length (Ground-based-RRH-Main-Coax, ft)		N/A	N/A	N/A
	800MHz_Bottom_Jumper #1_Cable_Model (Ground-based-RRH-OR_Combiner-to-Main-Coax)		N/A	N/A	N/A
Comments	9/7/2012				

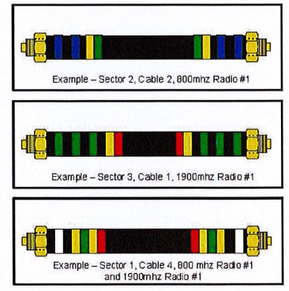
RF INFORMATION
SCALE: NTS (1)

Sector	Cable	First Ring	Second Ring	Third Ring
1 Alpha	1	Green	No Tape	No Tape
1	2	Blue	No Tape	No Tape
1	3	Brown	No Tape	No Tape
1	4	White	No Tape	No Tape
1	5	Red	No Tape	No Tape
1	6	Slate	No Tape	No Tape
1	7	Purple	No Tape	No Tape
1	8	Orange	No Tape	No Tape
2 Beta	1	Green	Green	No Tape
2	2	Blue	Blue	No Tape
2	3	Brown	Brown	No Tape
2	4	White	White	No Tape
2	5	Red	Red	No Tape
2	6	Slate	Slate	No Tape
2	7	Purple	Purple	No Tape
2	8	Orange	Orange	No Tape
3 Gamm	1	Green	Green	Green
3	2	Blue	Blue	Blue
3	3	Brown	Brown	Brown
3	4	White	White	White
3	5	Red	Red	Red
3	6	Slate	Slate	Slate
3	7	Purple	Purple	Purple
3	8	Orange	Orange	Orange

Frequenc	Indicator	ID
800 #1	Yellow	Green
1900 #1	Yellow	Red
1900 #2	Yellow	Brown
Reserved	Yellow	Blue
Reserved	Yellow	Slate
Reserved	Yellow	Orange
Reserved	Yellow	White
1600 #1	Yellow	Purple







COLOR CODING CHARTS
SCALE: NTS (2)

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STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

Signature: 12/11/2012 Date:

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SITE #: CT03XC214

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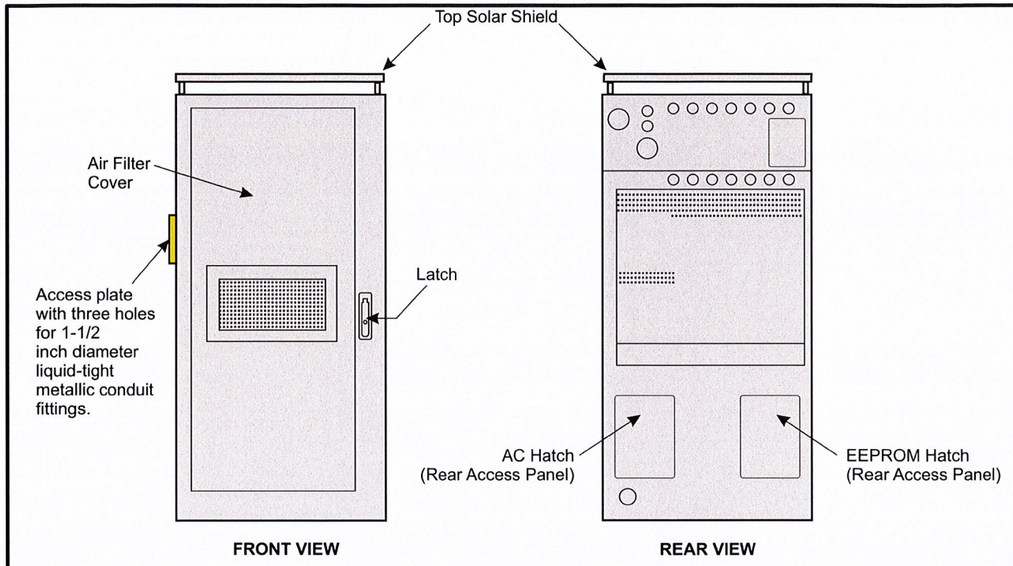
STORRS, CT 06269
TOLLAND COUNTY

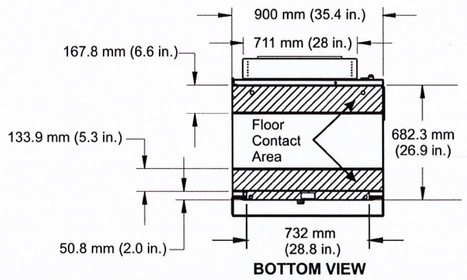
SHEET TITLE:
RF INFORMATION & COAX COLOR CODING

SCALE: NONE

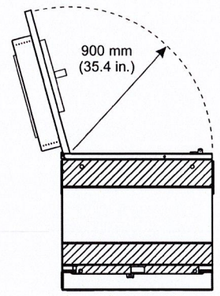
PROJECT NUMBER: 23003
SHEET NUMBER: A-5



FRONT VIEW **REAR VIEW**



BOTTOM VIEW

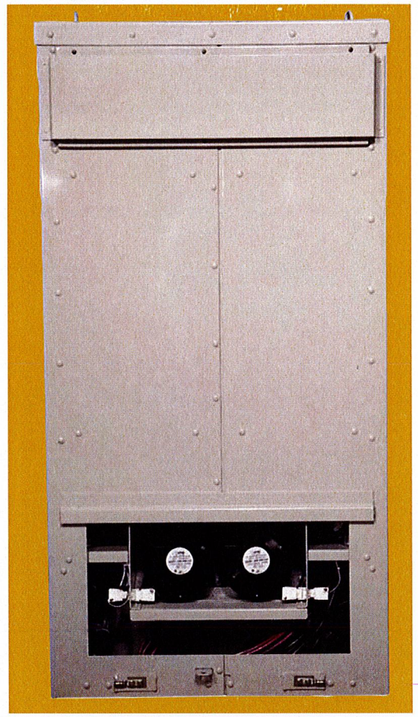


BOTTOM VIEW - CLEARANCE FOR FRONT DOOR

Cabinets	Configuration	Shipped Weight including pallet (estimate)	Maximum Installed Weight (estimate)	Reference Dimensions (Width x Depth x Height)
9928 Distributed Base Station Outdoor Cabinet with Integrated Power	Half loaded • CDMA • One BBU • One 7210 • One SAR 8 • Three DC-DC convertors	470 kg (1033 lbs)	430 kg (945 lbs)	900 mm x 960 mm x 1925 mm (35.4 inches x 37.8 inches x 75.8 inches)
	Fully loaded • CDMA • Four BBUs • Two 7210s • One SAR 8 • Six DC-DC convertors • 8 Injectors	529 kg (1162 lbs)	489 kg (1074 lbs)	

9928 DISTRIBUTED BASE STATION OUTDOOR CABINET DETAIL (1)
SCALE: NTS

FRONT VIEW
GOECv2 BATTERY CABINET
(FRONT DOOR REMOVED)



REAR VIEW
GOECv2 BATTERY CABINET
(REAR PANEL REMOVED)

General Specifications

Cabinet Dimensions:	Height: 60 in. (152.4 cm) Width: 31 in. (78.7 cm) Depth: 30 in. (76.2 cm)
Approximate Weight:	425 lbs., (Empty)
Cabinet Operating Temperature Range:	-40°C to 46°C

BATTERY CABINET DETAILS (2)
SCALE: NTS

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STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
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LICENSED PROFESSIONAL ENGINEER

James R Skowronski 12/11/2012
Signature: Date:

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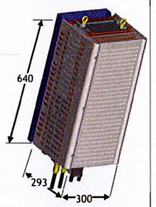
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:
EQUIPMENT DETAILS & SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: A-6

1900MHz 4X40W Remote Radio Head (RRH)



Capacity & Features

CDMA / LTE Multi technology RRH 65MHz bandwidth (PCS A-G Band)

- Sprint is free to deploy any combination of CDMA (1XRTT or EVDO) and LTE carriers in Sprint's spectrum up to 160 Watts of RF power.
- E.g. "A block" and "G block" both with 4 branch MIMO (4Tx & 4Rx)

2 CPRI Optical Connections for multi-carrier LTE and CDMA (1X & DO)

Power Supply: -48 VDC

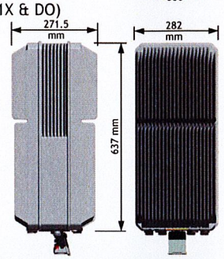
Power Consumption: 700W Typical

Dimensions:

- Size: 282 x 271.5 x 637mm (11.1" x 10.69" x 25.1")
- Volume: 49 Liter
  56 liters with solar shield & mounting OD

Weight: 27 kg (59.5 lbs)

Operating Temp range -40°C/+55°C



Alcatel-Lucent's 65MHz RRH satisfies Sprint's requirements.

Alcatel·Lucent

800MHz 2X50W Remote Radio Head (RRH)

Simultaneous CDMA & LTE Multi technology RRH 862-869 MHz

- Any combination of CDMA and LTE carriers supported by 100W RF Power

2 CPRI-like Optical Connections for daisy chaining

Software Switchable External Filter for use before Public Safety is cleared

Dimensions: w/o Filter w/ Filter

- Height: 480 mm (19") 480 mm (19")
- Width: 330 mm (13") 330 mm (13")
- Depth: 218 mm (8.6") 310 (12.2")
- Weight: 24 kg (53 lbs) 29 kg (64 lbs)
- 49 liters, <29kg

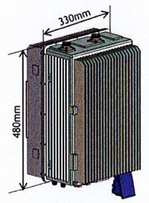
Power Supply: -48 VDC

Power Consumption: <400W Typical

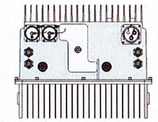
Operating Temp range -40°C to +55°C

Option to mount on Ground at tower base

Front/Top View



Bottom View



Alcatel-Lucent's 800 RRH satisfies Sprint's requirements.

Alcatel·Lucent

RRH UNIT DETAILS
SCALE: NTS
1

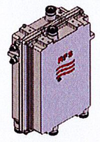
Product Data Sheet IBC1900BB-1 RFS

PCS In-Band Combiner, B8-11 (Tx & Rx) blocks & B1-3 and G (Tx & Rx) blocks

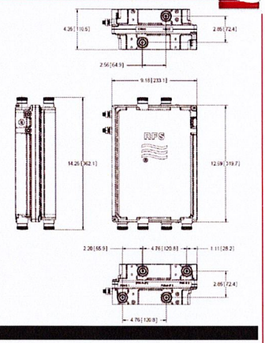
Product Description

The RFS low loss In-Band PCS combiner is designed to combine four signals operating in the B and G blocks into two common ports. Very low insertion loss guarantees minimum impact on system performance. The combiner is rugged, made of cast aluminum, and designed for tower mounting right next to the RRH units.

Features/Benefits



- **Low insertion loss minimizes impact on link budget**
- **Long-neck DIN 7/16 connectors for easy connection and waterproofing**
- **Exceptional reliability and environmental protection (IP67)**
- **High power handling capability**



Technical Specifications

Electrical Specifications – PCS B-Low & G Rx

Frequency Band, MHz	1850-1874.375, 1910-1915
Insertion Loss, dB, max.	0.5 @ band edge; 0.25 @ 1910-1915 MHz
Return Loss, dB, min.	18; 16 @ 1910-1915 MHz
Isolation between ports, dB. min.	30

Electrical Specifications – PCS B-High Rx

Frequency Band, MHz	1879.375-1884.375
Insertion Loss, dB, max.	0.5 over any 1.25 MHz; 0.6
Return Loss, dB, min.	18
Isolation between ports, dB. min.	30

Electrical Specifications – PCS B-Low & G Tx

Frequency Band, MHz	1930-1954.375, 1990-1995
Insertion Loss, dB, max.	0.5 @ band edge; 0.25 @ 1990-1995 MHz
Return Loss, dB, min.	18; 16@ 1990-1995 MHz
Continuous Average Power, W	100
Peak Envelope Power, kW	3
Intermodulation. 2x43 dBm Tx Carriers at BTS port	-112 dBm max in RX bands
Isolation between ports, dB. min.	30

Electrical Specifications – PCS B-High Tx

Frequency Band, MHz	1959.375-1964.375
Insertion Loss, dB, max.	0.5 over any 1.25 MHz; 0.6
Return Loss, dB, min.	18
Continuous Average Power, W	100
Peak Envelope Power, kW	3
Intermodulation. 2x43 dBm Tx Carriers at BTS port	-112 dBm max in RX bands
Isolation between combined bands, dB. min.	30

Environmental Specifications

Operating Temperature, °C, °F	-40 to +65 (-40 to +149)
Environmental Sealing - Housing	IP67

Mechanical Specifications

Dimensions, H x W x D, mm (in)	320 x 233 x 111 (12.6 x 9.2 x 4.35)
Weight, kg (lb)	10 (22)
Color	Light Grey
Housing	Aluminum
RF Connector	6x 7/16 DIN Female
Mounting	Pole Mount

* This data is provisional and subject to change.

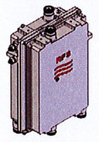
Product Data Sheet IBC1900HG-2A RFS

PCS In-Band Combiner, A-F & G Block

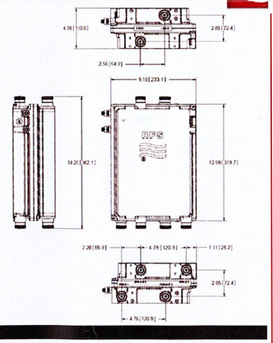
Product Description

The RFS low loss In-Band PCS A-F & G Combiner is designed to combine two 4-port RRH units into one 4-port antenna. The unit allows utilization of the full A and G blocks. Very low insertion loss guarantees minimum impact on system performance. The combiner is rugged, made of cast aluminum, and designed for tower mounting right next to the RRH units.

Features/Benefits



- **Low insertion loss minimizes impact on link budget**
- **Allows full utilization of PCS A-F and G bands with one antenna and two Remote Radio Head (RRH) units**
- **Long-neck DIN 7/16 connectors for easy connection and waterproofing**
- **Exceptional reliability and environmental protection (IP67)**
- **High power handling capability**



Technical Specifications

Electrical Specifications – PCS ABCDEF-band Tx and Rx

Frequency Band, MHz	1850-1905; 1930-1985
Insertion Loss, dB, max.	0.2 @1850-1895, 1930-1975; 0.4 over any 1.25 MHz channel
Return Loss, dB, min.	20 typ.; 18 over temperature
Continuous Average Power, W	100
Peak Envelope Power, kW	3
Intermodulation. 2x43 dBm Tx Carriers at BTS port	-117 dBm @ RFS factory; -112 dBm in the field
Isolation between A-band and G-band, dB, min.	30

Electrical Specifications – PCS G-band Tx and Rx

Frequency Band, MHz	1990.25-1994.75; 1910.25-1914.75
Insertion Loss, dB	0.5 max. over any 1.25 MHz channel; 0.6 dB @ band edge
Return Loss, dB, min.	20 typ.; 18 over temperature
Continuous Average Power, W	100
Peak Envelope Power, kW	3
Intermodulation. 2x43 dBm Tx Carriers at BTS port	-117 dBm @ RFS factory; -112 dBm in the field
Isolation between combined bands, dB. min.	30

Environmental Specifications

Operating Temperature, °C, °F	-40 to +65 (-40 to +149)
Environmental Sealing - Housing	IP67

Mechanical Specifications

Dimensions, H x W x D, mm (in)	320 x 233 x 111 (12.6 x 9.2 x 4.35)
Weight, kg (lb)	10 (22)
Color	Light Grey
Housing	Aluminum
RF Connector	6x Din 7/16 female
Mounting	Pole Mount

* This data is provisional and subject to change.

COMBINER DETAIL
SCALE: NTS
2

Product Data Sheet HB114-1-0813U4-M5J RFS

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-1/4", Multi-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Features/Benefits

- **Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding**
- **Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs**
- **Lightweight solution and compact design – Decreases tower loading**
- **Robust cabling – Eliminates need for expensive cable trays and ducts**
- **Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection**
- **Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements**
- **Outdoor polyethylene jacket – Ensures long-lasting cable protection**

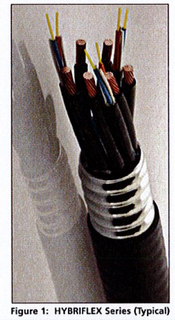


Figure 1: HYBRIFLEX Series (Typical)

Technical Specifications

Structure			
Outer Conductor Armor:	Corrugated Aluminum	[mm (in)]	36.0 (1.42)
Jacket:	Polyethylene, PE	[mm (in)]	39.0 (1.54)
UV-Protection:	Individual and External Jacket		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	1.78 (1.20)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	0.9 (0.27)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.64)
Fiber Optic Properties			
Version			Multi-mode
Quantity, Fiber Count			5 pairs
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power Cable Properties			
Size		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count			4 (2 pairs)
Size		[mm² (AWG)]	13.3 (6)
Quantity, Wire Count			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.1 (0.24)
Standards (Meets or exceeds)			ICEA S-95-658, T-29-520 UL Type XHHW-2, VW-1 IEEE-383 (1974) RoHS Compliant
Environment			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

* This data is provisional and subject to change.

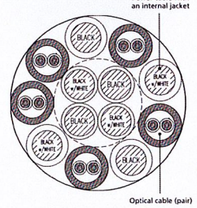


Figure 2: Construction Detail

HYBRID CABLE SPECIFICATIONS
SCALE: NTS
3

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Certification & Seal:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

James R. Skowronski 2/11/2012
Signature: Date:

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CDS
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:
U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

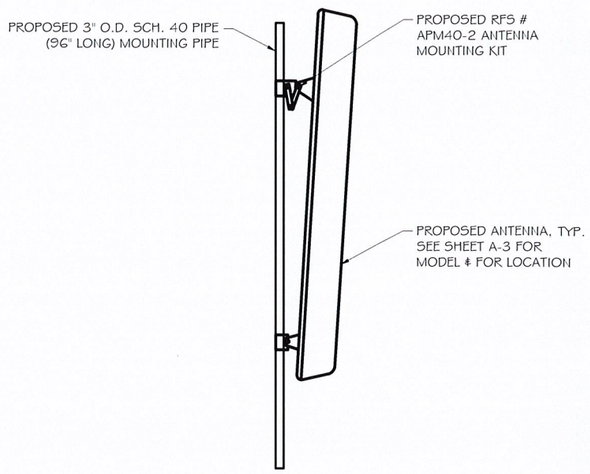
SHEET TITLE:
EQUIPMENT DETAILS & SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: A-7

STRUCTURAL NOTES

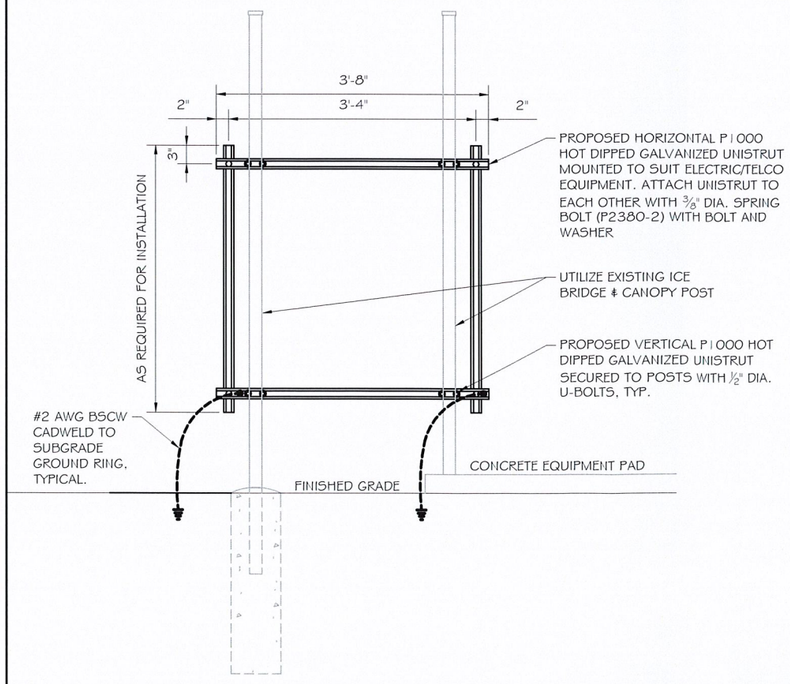
1. DESIGN REQUIREMENTS PER INTERNATIONAL BUILDING CODE 2009 AND THE TIA-222-G STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES.
2. INFORMATION SHOWN ON THESE DRAWINGS WAS OBTAINED BY FIELD MEASUREMENTS AND FROM THE EXISTING STRUCTURAL DRAWINGS. THE GENERAL CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIALS OR PROCEEDING WITH CONSTRUCTION.
3. THE GENERAL CONTRACTOR AND HIS SUB-CONSULTANTS SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK.
4. STRUCTURAL STEEL SHALL CONFORM TO THE LATEST EDITION OF THE AISC SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS- ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN INCLUDING THE COMMENTARY AND THE AISC CODE FOR STANDARD PRACTICE.
5. STRUCTURAL STEEL PLATES AND SHAPES SHALL CONFORM TO ASTM A992. ALL STRUCTURAL STEEL PIPES SHALL CONFORM TO ASTM A53 GRADE B. ALL STRUCTURAL STEEL COMPONENTS AND FABRICATED ASSEMBLIES SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
6. WELDING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF AMERICAN WELDING SOCIETY (AWS) STRUCTURAL WELDING CODE- STEEL WELD ELECTRODES SHALL BE E70XX.
7. ALL COAXIAL CABLE CONNECTORS AND TRANSMITTER EQUIPMENT SHALL BE AS SPECIFIED BY THE OWNER AND IS NOT INCLUDED IN THESE CONSTRUCTION DOCUMENTS. THE CONTRACTOR SHALL FURNISH ALL CONNECTION HARDWARE REQUIRED TO SECURE THE CABLES. CONNECTION HARDWARE SHALL BE STAINLESS STEEL.
8. ALL THREADED STRUCTURAL FASTENERS FOR ANTENNA SUPPORT ASSEMBLIES SHALL CONFORM TO ASTM A193 OR GR. B7. ALL STRUCTURAL FASTENERS FOR STRUCTURAL STEEL FRAMING SHALL CONFORM TO ASTM A325. FASTENERS SHALL BE 5/8" MIN. DIAMETER BEARING TYPE CONNECTIONS WITH THREADS INCLUDED IN THE SHEAR PLANE. ALL EXPOSED FASTENERS, NUTS, AND WASHERS SHALL BE GALVANIZED UNLESS OTHERWISE NOTES. CONCRETE EXPANSION ANCHORS SHALL BE HILTI KWIK BOLTS UNLESS OTHERWISE NOTED.
9. LUMBER (IF APPLICABLE) SHALL COMPLY WITH THE REQUIREMENTS OF AMERICAN INSTITUTE OF TIMBER CONSTRUCTION AND THE NATIONAL FOREST PRODUCTS ASSOCIATION'S NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION. ALL LUMBER SHALL BE PRESSURE TREATED AND SHALL BE STRUCTURAL GRADE NO. 2 OR BETTER.
10. IF APPLICABLE, ROOF PROTECTION PADS UNDER THE CONCRETE PAVERS AND WAVEGUIDE SUPPORTS SHALL BE 0.30" THICK RUBBER FIRESTONE PROTECTION PADS. THE ROOF PROTECTION PADS SHALL EXTEND A MINIMUM OF TWO INCHES BEYOND THE PERIMETER OF THE PAVERS AND THE WOOD SLEEPERS AND SHALL BE PLACED WITH A MINIMUM ½" SPACE BETWEEN ADJACENT PADS TO FACILITATE DRAINAGE. PROVIDE A 28 LB. INORGANIC PAD DIRECTLY ON THE ROOF. REMOVE ALL LOOSE STONES PRIOR TO PLACING THE SEPARATOR SHEET.
11. NORTH ARROW SHOWN ON PLANS REFERS TO TRUE NORTH. CONTRACTOR SHALL VERIFY TRUE NORTH AND INFORM CONSTRUCTION MANAGER OF ANY DISCREPANCY BEFORE STARTING CONSTRUCTION.



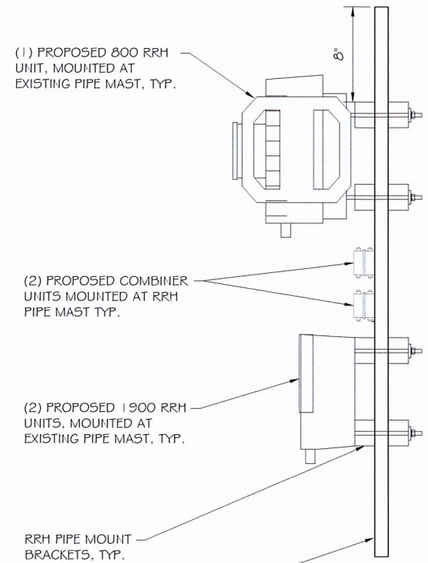
NOTE:

FINAL ANTENNA MOUNT DESIGN AND/OR MODIFICATIONS PENDING STRUCTURAL ANALYSIS.

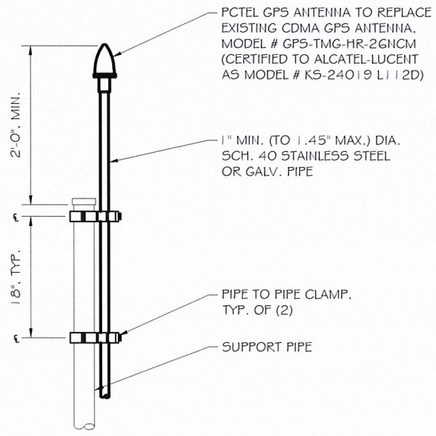
ANTENNA MOUNTING DETAIL (1)
SCALE: NTS



FIBER BOX MOUNTING FRAME (3)
SCALE: NTS



RRH MOUNTING DETAIL (2)
SCALE: NTS



GPS MOUNTING DETAIL (4)
SCALE: NTS

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Certification & Seal:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: Date: 12/11/2012

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CDS
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY — DATE ISSUED: 10/25/2012

PROJECT TITLE:

U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:

STRUCTURAL DETAILS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: S-1

I:\23000\23003\CAD\Telecom\Working\23003 Vision Project-CT.dwg Printed by: steves on Dec 11, 2012 - 1:20pm

DRAWN BY: KJG CHECKED BY: KAB

GENERAL NOTES:

1. OBTAIN PERMITS AND PAY FEES RELATED TO ELECTRICAL WORK PERFORMED ON THIS PROJECT. DELIVER COPIES OF ALL PERMITS TO SPRINT.

2. SCHEDULE AND ATTEND INSPECTIONS RELATED TO ELECTRICAL WORK REQUIRED BY JURISDICTION HAVING AUTHORITY. CORRECT AND PAY FOR ANY WORK REQUIRED TO PASS ANY FAILED INSPECTION.

3. REDLINED AS-BUILTS ARE TO BE DELIVERED TO SPRINT REPRESENTATIVE.

4. PROVIDE TWO COPIES OF OPERATION AND MAINTENANCE MANUALS IN THREE-RING BINDER.

5. FURNISH AND INSTALL THE COMPLETE ELECTRICAL SYSTEM, TELCO SYSTEM, AND THE GROUNDING SYSTEM AS SHOWN ON THESE DRAWINGS.

6. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH ALL APPLICABLE BUILDING CODES AND LOCAL ORDINANCES, INSTALLED IN A NEAT MANNER AND SHALL BE SUBJECT TO APPROVAL BY SPRINT.

7. CONDUCT A PRE-CONSTRUCTION SITE VISIT AND VERIFY EXISTING SITE CONDITIONS AFFECTING THIS WORK. REPORT ANY OMISSIONS OR DISCREPANCIES FOR CLARIFICATION PRIOR TO THE START OF CONSTRUCTION.

8. PROTECT ADJACENT STRUCTURES AND FINISHES FROM DAMAGE. REPAIR TO ORIGINAL CONDITION ANY DAMAGED AREA.

9. REMOVE DEBRIS ON A DAILY BASIS. DEBRIS NOT REMOVED IN A TIMELY FASHION WILL BE REMOVED BY OTHERS AND THE RESPONSIBLE SUBCONTRACTOR SHALL BE CHARGED ACCORDINGLY. REMOVAL OF DEBRIS SHALL BE COORDINATED WITH THE SITE OWNERS REPRESENTATIVE. DEBRIS SHALL BE REMOVED FROM THE PROPERTY AND DISPOSED OF LEGALLY. USE OF THE PROPERTY'S DUMPSTER IS PROHIBITED.

10. CONTRACTOR TO CONFIRM AVAILABLE CAPACITY AT EXISTING UTILITY PEDESTAL AND ADVISE ENGINEER OF SERVICE SIZE AND FAULT CURRENT LEVEL.

11. IF PEDESTAL DOES NOT HAVE ADEQUATE CAPACITY, CONTRACTOR TO SUBMIT COST QUOTATION TO UPGRADE. UPON APPROVAL OF SUBMITTED COST QUOTATION, THE CONTRACTOR SHALL PROVIDE NEW SERVICE AND/OR UPGRADE SERVICE. FEEDERS AND EQUIPMENT/ELECTRODE GROUNDING CONDUCTORS SIZE ACCORDINGLY.

12. CONTRACTOR SHALL VERIFY SEPARATION DIMENSION BETWEEN POWER COMPANY ELECTRICAL CONDUITS AND LP GAS PIPES AS PER UTILITY COMPANY. LOCAL CODES, NEC, NFPA, AND GAS TANK MANUFACTURER'S SPECIFICATION.

13. CONTRACTOR SHALL VERIFY THAT THE TOTAL NUMBER OF SERVICE ENTRANCE DISCONNECTS IN THE EXISTING UTILITY COMPANY PEDESTAL MUST NOT EXCEED SIX. IF THE NEW SERVICE ADDED EXCEEDS THIS VALUE, CONTRACTOR MUST COORDINATE WITH THE UTILITY COMPANY AND AUTHORITY HAVING JURISDICTION. THE RUNNING OF AN ADDITIONAL EXCLUSIVE AND DEDICATED SERVICE LATERAL SET FOR THE NEW LOAD ADDED TO THE COMPOUND AS PER NEC ARTICLE 230-2(B).

14. THE EQUIPMENT/PROTECTIONS MUST BE RATED FOR STANDARD AIC RATE HIGHER THAN INCOMING EQUIPMENT AND/OR UTILITY COMPANY AIC RATE.

ELECTRICAL NOTES:

1. REFERENCE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES FOR GENERAL ELECTRICAL REQUIREMENTS.

2. WIRING SHALL BE AWG STRANDED COPPER WITH THHN OR EQUIVALENT INSULATION. #12 MINIMUM INSTALLED IN " MINIMUM CONDUIT. SIGNAL WIRING SHALL BE INSULATED #22 AWG. NO BX OR ROMEX CABLE IS PERMITTED. CONDUITS SHALL BE SURFACE MOUNTED.

3. WIRING DEVICES AND EQUIPMENT SHALL BE UL LISTED SPECIFICATIONS GRADE.

4. MATERIALS SHALL BE NEW AND CONFORM TO THE APPLICABLE STANDARDS ESTABLISHED FOR EACH ITEM BY THE ORGANIZATIONS LISTED BELOW.
- AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM) - UNDERWRITER'S LABORATORY (UL) - NATIONAL ELECTRICAL MANUFACTURING ASSOCIATION (NEMA) - AMERICAN STANDARDS ASSOCIATION (ASA) - NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

5. INSTALLATION OF MATERIALS SHALL COMPLY WITH REGULATIONS OF: - THE NATIONAL ELECTRIC CODE (NFPA 70) - THE NATIONAL ELECTRICAL SAFETY CODE (ANSI C-2) - THE LIFE SAFETY CODE (NFPA 101) - LOCAL BUILDING CODES

6. THE ENTIRE SYSTEM SHALL BE SOLIDLY GROUNDED USING LOCKOUTS AND BONDING NUTS ON CONDUITS AND PROPERLY BONDED GROUND CONDUCTOR. RECEPTACLES AND EQUIPMENT BRANCH CIRCUITS SHALL BE GROUNDED WITH A FULL-SIZED EQUIPMENT GROUNDING CONDUCTOR RUN IN THE CIRCUITS CONDUIT.

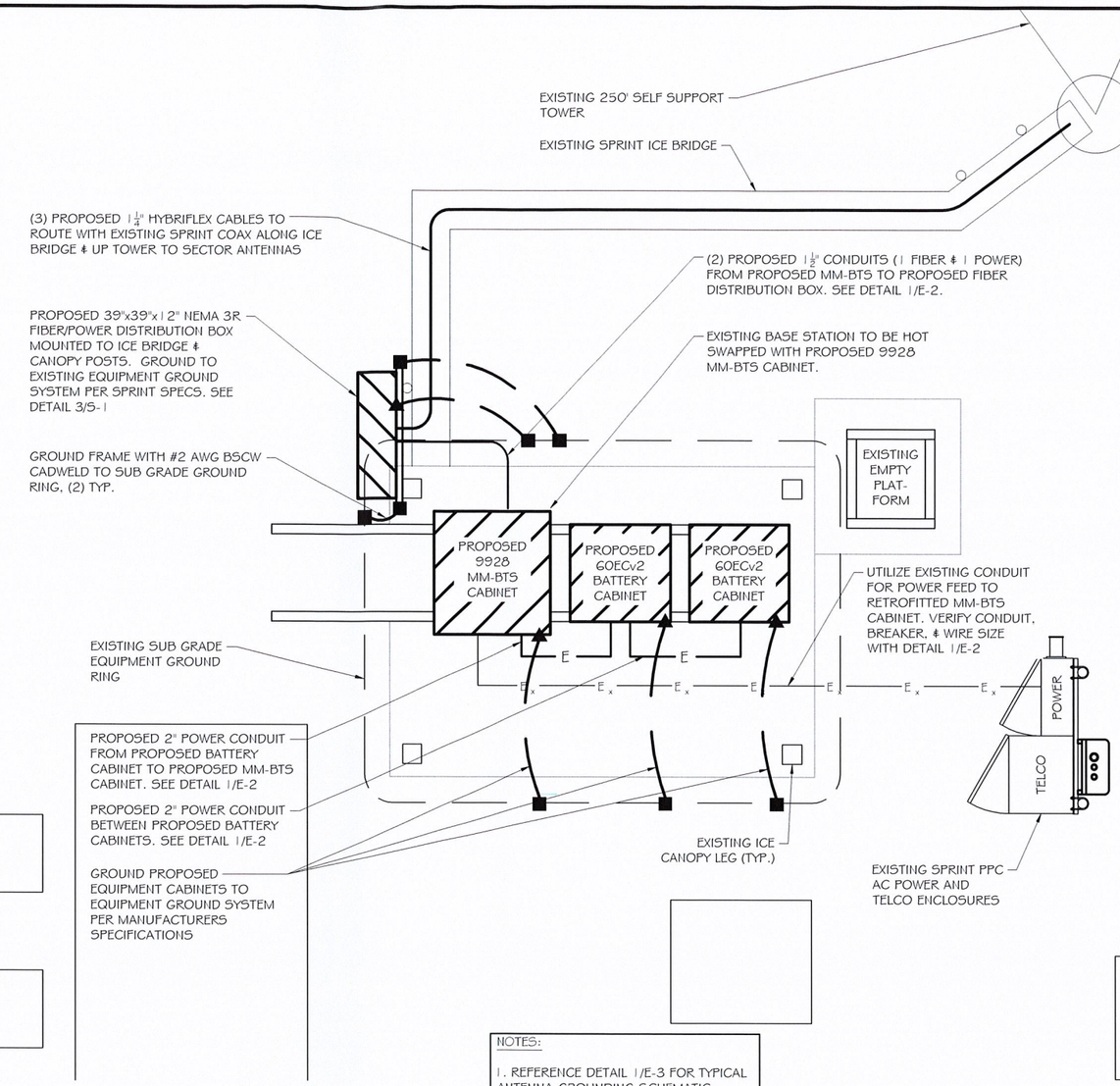
7. OUTLET AND JUNCTION BOXES SHALL BE ZINC-COATED OR CADMIUM PLATED STEEL NOT LESS THAN 4" SQUARE AND SUITABLE FOR THE TYPE SERVICE AND OUTLET. OUTLET AND JUNCTION BOXES SHALL BE SURFACE MOUNTED AND LABELED WITH BRANCH CIRCUIT BREAKER NUMBER.

8. LABEL ALL EQUIPMENT SERVED FROM SPRINT PANEL BOARD WITH PHENOLIC LABELS SIZED IN RELATION TO USAGE.

9. INDOOR CONDUCTORS SHALL BE INSTALLED IN EMT UNLESS NOTED OTHERWISE. OUTDOOR CONDUCTORS SHALL BE INSTALLED IN RIGID GALVANIZED STEEL UNLESS NOTED OTHERWISE. WHERE EMT IS USED. IT SHALL BE WITH ONLY LISTED COMPRESSION FITTINGS. NO SET SCREW FITTINGS SHALL BE ALLOWED.

10. CONTRACTOR TO PROVIDE AND INSTALL ENGRAVED LABEL ON THE SPRINT METER SOCKET ENCLOSURE.

11. CONTRACTOR IS TO OBTAIN ALL PERMITS, PAY PERMIT FEES, AND BE RESPONSIBLE FOR SCHEDULING INSPECTIONS. THE CONTRACTOR IS TO OBTAIN LOCAL POWER AND TELEPHONE COMPANY APPROVAL & COORDINATE WITH UTILITY COMPANIES SERVICE ENTRANCE REQUIREMENTS.



LEGEND:

— — — — — — —	EXISTING GROUND CABLE
▬ ▬ ▬ ▬ ▬ ▬ ▬	PROPOSED GROUND CABLE
▲	MECHANICAL CONNECTION
■	EXOTHERMIC CONNECTION
	UTILITY POLE
——— – – ———	EASEMENT
—— E —— E ——	PROPOSED ELECTRIC
—— T —— T ——	PROPOSED TELCO
——— FO ———	PROPOSED FIBER
——— FO_x ———	EXISTING FIBER
——— OHEx ———	OVERHEAD ELECTRIC
——E_x——E_x——	ELECTRIC LINE
——T_x——T_x——	TELEPHONE LINE

NOTES:

1. REFERENCE DETAIL 1/E-3 FOR TYPICAL ANTENNA GROUNDING SCHEMATIC.

2. GPS SURGE SUPPRESSOR MODEL #: KS24577 TO BE ADDED AT BTS AND GROUNDED TO THE MAIN BUSS BAR

3. ONLY VELCRO STRAPS TO BE USED ON ALL FIBER CABLES.

UTILITY & GROUNDING SITE PLAN (1)
SCALE: 1" = 3.75'

NOTE:

UTILITY/GROUNDING LINES ARE SHOWN FOR SCHEMATIC PURPOSES ONLY & DO NOT REPRESENT THE EXACT LOCATION OF THE RUN. CONTRACTOR SHALL FIELD VERIFY PROPOSED & EXISTING SERVICE LOCATIONS. NOTIFY CONSTRUCTION/ PROJECT MANAGER IMMEDIATELY OF ANY DISCREPANCIES.

TO OBTAIN LOCATION OF PARTICIPANTS' UNDERGROUND FACILITIES BEFORE YOU DIG IN CONNECTICUT
CALL BEFORE YOU DIG 811 OR 1-800-922-4455
CONNECTICUT PUBLIC ACT 87-71 REQUIRES MIN. 2 WORKING DAYS NOTICE BEFORE YOU EXCAVATE.

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STATE OF CONNECTICUT JAMES R. SKOWRONSKI 26266 LICENSED PROFESSIONAL ENGINEER

James R Skowronski 12/11/2012
Signature: Date:

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CD'S
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:
U-CONN
SITE #: CT03XC214

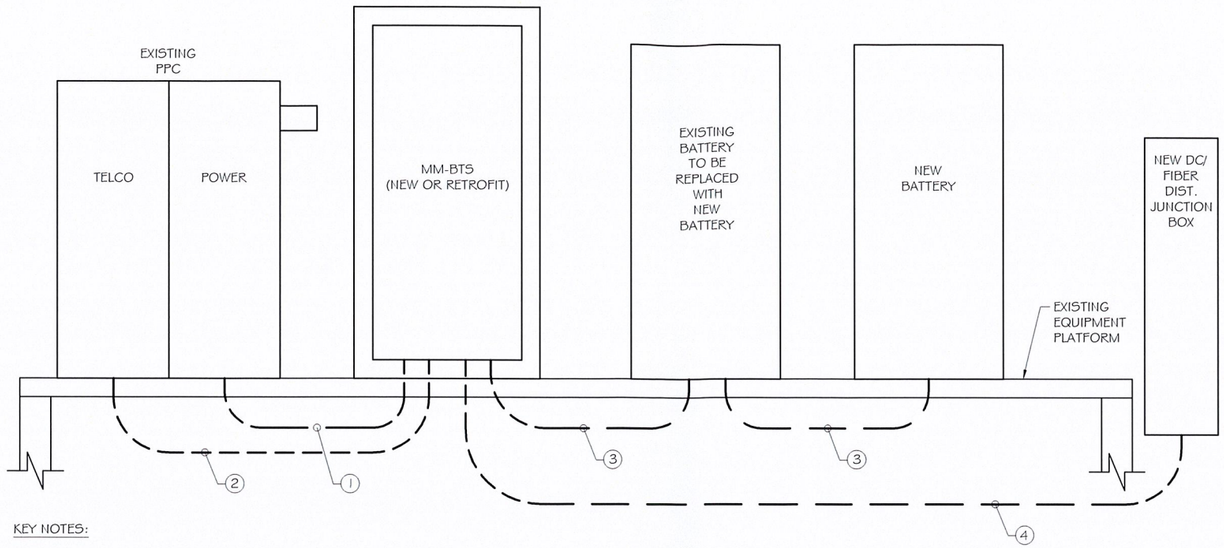
PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:
UTILITY & GROUNDING SITE PLAN & NOTES

0 1.875' 3.75' 7.5'
11"x17" - 1" = 3.75'
22"x34" - 1" = 1.875'

PROJECT NUMBER: 23003
SHEET NUMBER: E-1

DRAWN BY: KJG CHECKED BY: KAB



KEY NOTES:

1. CONTRACTOR TO USE EXISTING 100A, 2 POLE BREAKER IN EXISTING PPC. VERIFY EXISTING CONDUCTORS ARE (3) #3 AWG OR LARGER. IF NOT, CONTRACTOR TO REPLACE UNDERSIZED ITEM(S).
NOTE: #1 AWG REQUIRED IF TERMINALS ON EACH END OF INPUT CONDUCTORS ARE NOT MARKED "75° C".

2. CONTRACTOR TO PROVIDE (1) 2" EMPTY CONDUIT WITH HEAVY DUTY PULLSTRING FROM EXISTING PPC TO EXISTING BTS.

3. CONTRACTOR TO PROVIDE (1) 2" SEAL-TIGHT CONDUIT WITH (2) #3 DLO.

4. (2) PROPOSED 1½" PVC CONDUITS (1 POWER, 1 FIBER). GALVANIZED STEEL OR LIQUID-TIGHT FLEXIBLE CONDUITS ACCEPTABLE AT CM'S DISCRETION. LIQUID-TIGHT CONDUIT LENGTHS NOT TO EXCEED 6'-0".

SINGLE LINE DIAGRAM (1)
SCALE: NTS

MAIN: 200 AMP MAIN BREAKER
VOLTAGE: 240/120
LOCATION: PPC CABINET

ELECTRICAL PANEL SCHEDULE

PHASE: 1
WIRE: 3
MOUNT: SURFACE

CIRCUIT	LOAD DESCRIPTION	BREAKER AMPS	BREAKER POLES	PHASE A	PHASE B	BREAKER POLES	BREAKER AMPS	LOAD DESCRIPTION	CIRCUIT
1	CIRCUIT #1	80	2			2	60	SURGE ARRESTOR	7
2									8
3	CIRCUIT #2	80	2			1	20	TOWER LIGHTS	9
						1	20	GEN OUTLET	
4						1	20	GEN OUTLET (TRIPPED)	10
5	CIRCUIT #3	80	2			1	15	TELCO OUTLET	11
6						1	10	TELCO FAN	12

EXISTING PANEL SCHEDULE (2)
SCALE: NTS

DIAGRAM TBD

NOTE:

INSTALLER MUST ENSURE THAT ANY EXISTING ALARMS ARE TRANSFERRED TO NEW EQUIPMENT, MONITORED, AND IN PROPER WORKING ORDER DURING MM-BTS INSTALLATION.

STANDARD ALARM BLOCK TEMPLATE WIRING DIAGRAM (3)
SCALE: NTS

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STATE OF CONNECTICUT
JAMES R. SKRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: James R Skronski Date: 12/11/2012

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ISSUE PHASE: FINAL PRELIMINARY
DATE ISSUED: 10/25/2012

PROJECT TITLE:
U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

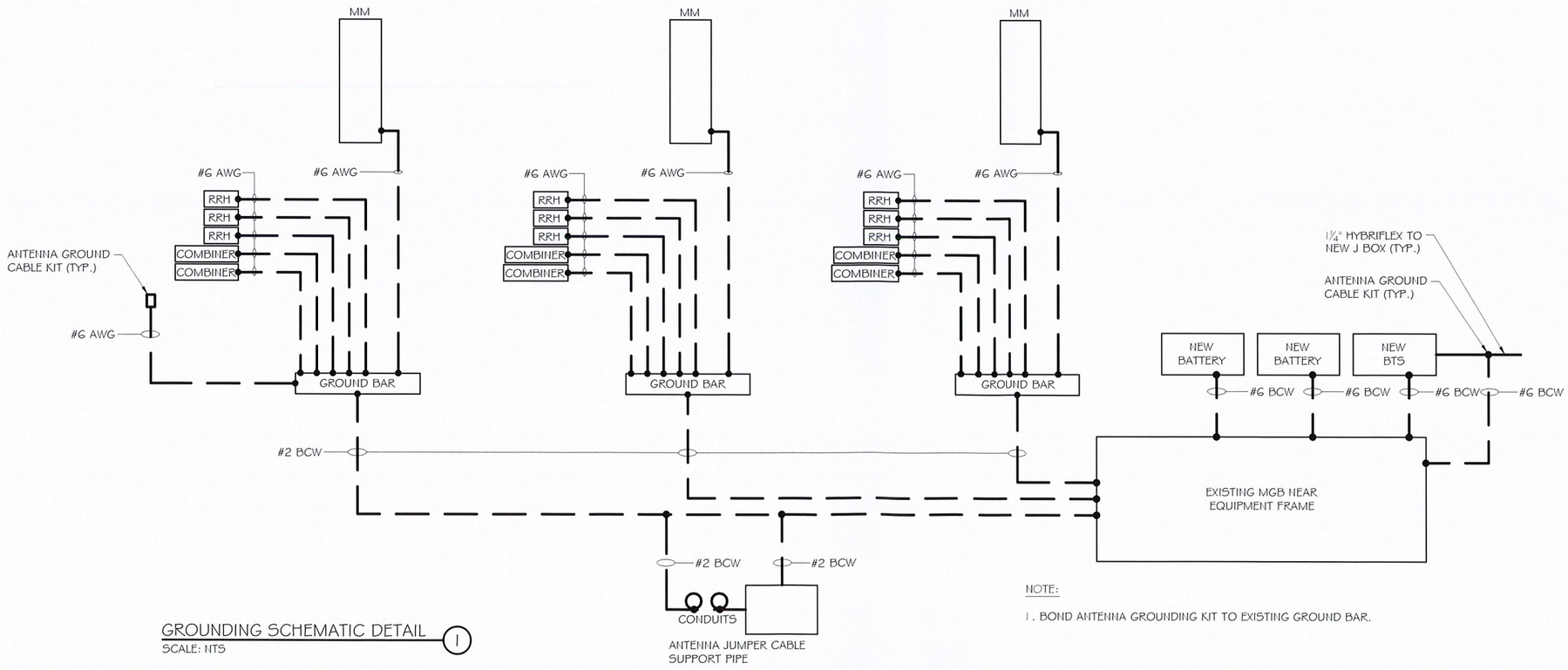
SHEET TITLE:
UTILITY DETAILS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: E-2

GROUNDING SPECIFICATIONS:

1. REFERENCE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AND SPRINT EXTERIOR GROUNDING SYSTEM DESIGN (REV 06/29/05) FOR GENERAL GROUNDING REQUIREMENTS.
2. GROUNDING SHALL COMPLY WITH ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE. ALL GROUNDING DEVICES SHALL BE U.L. APPROVED OR LISTED FOR THEIR INTENDED USE.
3. GROUND WIRES SHALL BE TINNED #2 AWG BARE SOLID COPPER UNLESS NOTED OTHERWISE.
4. GROUNDING CONNECTIONS SHALL BE EXOTHERMIC (CADWELD) NOTED OTHERWISE. CLEAN SURFACES TO SHINE METAL. WHERE GROUND WIRES ARE CADWELD TO GALVANIZED SURFACES. SPRAY CADWELD WITH GALVANIZING PAINT.
5. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE. BEND GROUNDING LEADS WITH A MINIMUM 8" RADIUS.
6. PRIOR TO INSTALLING LUGS ON GROUND WIRES, APPLY THOMAS & BETSS KOPR-SHIELD (TM OF JET LUBE, INC.). PRIOR TO BOLTING GROUND WIRE LUGS TO GROUND BARS, APPLY KOPR-SHIELD OR EQUAL.
7. WHERE BARE COPPER GROUND WIRES ARE ROUTED FROM ANY CONNECTION ABOVE GRADE TO GROUND RING, INSTALL WIRE IN ¾" PVC SLEEVE, FROM 1'-0" MIN. ABOVE GRADE AND SEAL TOP WITH SILICONE MATERIAL.
8. PREPARE ALL BONDING SURFACES FOR GROUNDING CONNECTIONS BY REMOVING ALL PAINT AND CORROSION DOWN TO SHINY METAL. FOLLOWING CONNECTION, APPLY APPROPRIATE ANTI-OXIDIZATION PAINT.
9. GROUNDING WIRE CONNECTIONS SHALL BE 3-CRIMP C-TAP COMPRESSION TYPE. SPLIT BOLTS ARE NOT ACCEPTABLE.
10. GROUND RODS SHALL BE COPPER CLAD STEEL ⅝" x 10' SPACE NOT LESS THAN 10' O.C.
11. CONNECTORS SHALL BE CRIMPED USING HYDRAULIC CRIMPING TOOLS.
12. SURFACE CONNECTIONS SHALL BE MADE TO BARE METAL. PAINTED SURFACES SHALL BE FILED TO ENSURE PROPER CONTACT. APPLY NON-OXIDIZING AGENT TO CONNECTIONS.
13. COPPER BUSES SHALL BE CLEANED, POLISHED AND A NON-OXIDIZING AGENT APPLIED. NO FINGERPRINTS OR DISCOLORED COPPER WILL BE PERMITTED.
14. GROUNDING CONDUCTORS SHALL BE RUN THROUGH PVC SLEEVE WHERE ROUTED THROUGH WALLS, FLOORS, AND CEILINGS. ENDS OF CONDUIT SHALL BE GROUNDED. SEAL BOTH ENDS OF CONDUIT WITH SILICONE CAULK.
15. HARDWARE (I.E. NUTS, BOLTS, WASHERS, ETC.) TO BE STAINLESS STEEL.
16. EXOTHERMIC WELDS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
17. THE ENTIRE SYSTEM SHALL BE SOLIDLY GROUNDED USING LOCKNUTS AND BONDING NUTS ON CONDUITS AND PROPERLY BONDED GROUND CONDUCTORS, RECEPTACLES AND EQUIPMENT BRANCH CIRCUITS SHALL BE GROUNDED WITH A FULL SIZED EQUIPMENT GROUNDING CONDUCTOR RUN IN THE CIRCUIT'S CONDUIT.
18. INSTALL GROUND BUSHINGS ON ALL METALLIC CONDUITS AND BOND TO THE EQUIPMENT GROUND BUS IN THE PANEL BOARD.
19. GROUND BARS (SECTOR, COLLECTOR, MASTER) SHALL BE MIN. BARE ¼" x 4" COPPER AND LARGE ENOUGH TO ACCOMMODATE THE REQUIRED NUMBER OF GROUND CONNECTIONS. THE HARDWARE SECURING THE MASTER GROUND BAR (MGB) SHALL ELECTRICALLY INSULATE THE MGB FROM ANY STRUCTURE TO WHICH IT IS FASTENED.
20. APPLY THOMAS & BETSS KOPR-SHIELD OR APPROVED EQUIVALENT PRIOR TO MAKING MECHANICAL CONNECTIONS. CONNECTIONS SHALL BE MADE WITH STAINLESS STEEL BOLTS, NUTS AND LOCK WASHERS ⅜" DIAMETER, MIN. WHERE GALVANIZING IS REMOVED FROM METAL IT SHALL BE PAINTED OR TOUCHED UP WITH 'GALVONOX' OR EQUAL.
21. ALL TERMINATIONS AT EQUIPMENT ENCLOSURES, PANELS, FRAMES OF EQUIPMENT AND WHERE EXPOSED FOR GROUNDING CONDUCTOR TERMINATION SHALL BE PERFORMED UTILIZING TWO HOLE BOLTED TONGUE COMPRESSION TYPE WITH STAINLESS STEEL SELF-TAPPING SCREWS.
22. ALL CLAMPS AND SUPPORTS USED TO SUPPORT THE GROUNDING SYSTEM CONDUCTOR AND PVC CONDUITS SHALL BE PVC TYPE (NON-CONDUCTIVE). DO NOT USE METAL BRACKETS OR SUPPORTS WHICH WOULD FORM A COMPLETE RING AROUND ANY GROUNDING CONDUCTOR.
23. ALL BOLTS, WASHERS, AND NUTS USED ON GROUNDING CONNECTIONS SHALL BE STAINLESS STEEL.
24. THE CONTRACTOR SHALL ENGAGE AN INDEPENDENT ELECTRICAL TESTING FIRM TO TEST AND VERIFY THAT RESISTANCE TO EARTH DOES NOT EXCEED 5.0 OHMS. PROVIDE A COPY OF TESTING REPORT, INCLUDING THE METHOD AND INSTRUMENTS USED TO VERIFY RESISTANCE TO SPRINT REPRESENTATIVE.
25. COAX CABLE SHALL BE GROUNDED AT ANTENNA LEVEL WITHIN 5' OF ANTENNA, COAX WILL ADDITIONALLY BE GROUNDED AT THE BASE OF THE TOWER 18" BEFORE THE CABLE REACHES A HORIZONTAL PLANE. IF EQUIPMENT CABINET IS MORE THAN 15' FROM THE TOWER AN ADDITIONAL GROUND KIT WILL BE ADDED 24" BEFORE CABLE ENTERS CABINET.
26. ALL COAX GROUND KITS WILL BE ANDREW 'COMPACT SURE GROUND' OR APPROVED EQUIVALENT.
27. VERIFY THE GROUNDING CONTINUITY BETWEEN THE TOWER BASE AND THE NEW SPRINT CABINET GROUND BAR. CONTRACTOR SHALL ENSURE THAT ALL METALLIC OBJECTS WITHIN 6' FROM CABINET HAVE GROUNDING CONTINUITY. THE CONTRACTOR SHALL CORRECT ANY DEFECTS BE ADDING GROUNDING CONDUCTOR TO ENSURE CONTINUITY.
28. GROUNDING CONDUCTORS SHALL BE COPPER ONLY. EITHER SOLID OR STRANDED CONDUCTORS ARE PERMITTED. ALL EXTERNAL BURIED CONDUCTORS MUST BE BARE. EQUIPMENT GROUND LEADS IN CABLE TRAYS MUST BE GREEN INSULATED.
29. CONTRACTOR TO PROVIDE GROUND WIRES, BARS, AND CONNECTIONS AS SHOWN ON GROUNDING RISER DIAGRAM.



GROUNDING SCHEMATIC DETAIL (1)
SCALE: NTS

NOTE:

1. BOND ANTENNA GROUNDING KIT TO EXISTING GROUND BAR.

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Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: 12/11/2012 Date:

MARK	DATE	DESCRIPTION
B	10/25/12	FINAL PRELIMINARY CD'S
A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

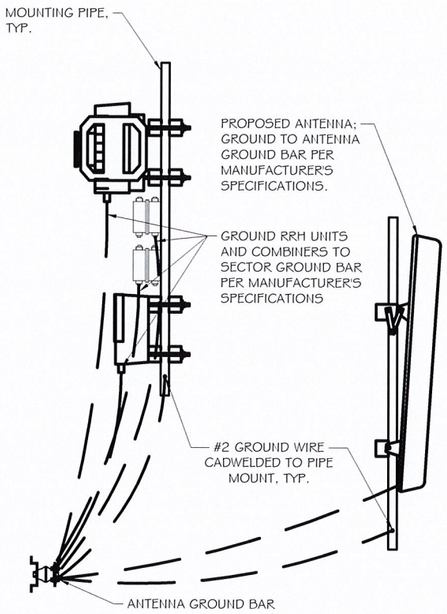
PROJECT TITLE:
U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

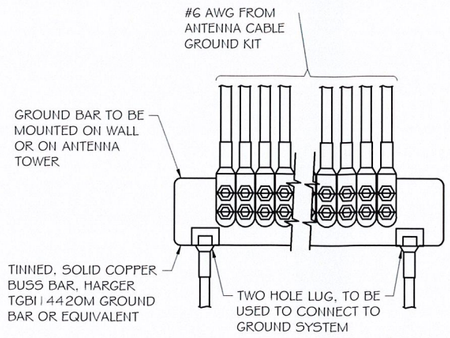
SHEET TITLE:
GROUNDING DETAIL & NOTES

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: E-3

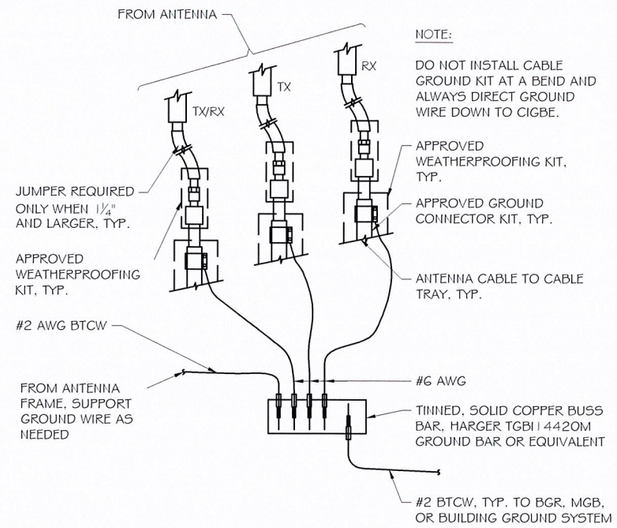


TYPICAL ANTENNA GROUNDING DETAIL
SCALE: NTS — 1

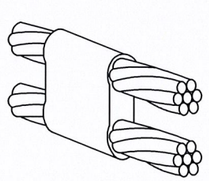


NOTE:
CONTRACTOR TO UTILIZE KOPR-SHIELD (THOMAS & BETTS) OR EQUIVALENT ON ALL LUG CONNECTIONS

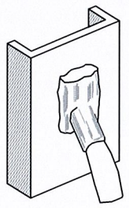
GROUND LEADS TO GROUND BAR
SCALE: NTS — 2



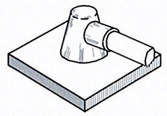
ANTENNA GROUND WIRES TO GROUND BAR
SCALE: NTS — 3



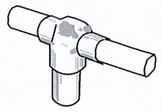
TYPE PT (PARALLEL HORIZ. COND.)
PARALLEL THROUGH CONNECTION OF HORIZONTAL CABLES



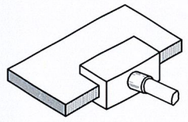
TYPE VS (VERT. STEEL SURFACE)
CABLE TAP DOWN AT 45° TO VERTICAL STEEL SURFACE INCLUDING PIPE



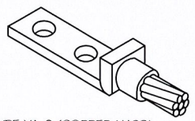
TYPE HS (HORIZ. STEEL SURFACE)
TO FLAT STEEL SURFACE OR HORIZONTAL PIPE



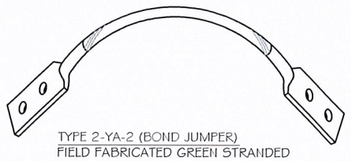
TYPE GT (THROUGH CABLE TO GROUND ROD)
THROUGH CABLE TO TOP OF GROUND ROD



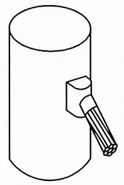
TYPE LJ (FLAT BUSBAR)
TAP OF HORIZONTAL CABLE TO EDGE OF HORIZONTAL



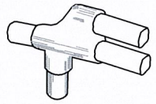
TYPE YA-2 (COPPER LUGS)
TWO HOLE- LONG BARREL LENGTH



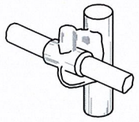
TYPE 2-YA-2 (BOND JUMPER)
FIELD FABRICATED GREEN STRANDED INSULATED



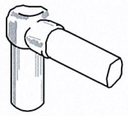
TYPE VS (VERTICAL PIPE)
CABLE TAP DOWN AT 45° TO RANGE OF VERTICAL PIPES



TYPE NC
THROUGH AND TAP CABLES TO GROUND ROD

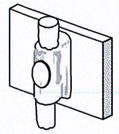


TYPE GY
THROUGH CABLE TO SIDE OF GROUND ROD



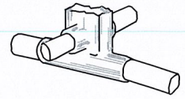
TYPE GR
CABLE TAP TO TOP OF GROUND ROD

TYPE TA
TEE OF HORIZONTAL RUN AND TAP CABLES



TYPE W
THROUGH VERTICAL CABLE TO VERTICAL STEEL SURFACE OR TO THE SIDE OF EITHER HORIZONTAL OR VERTICAL PIPE

TYPE FC
PARALLEL TAP CABLES



TYPE XB
CROSS OF HORIZONTAL CABLES. LAPPED AND NOT CUT.

TYPICAL CADWELD TYPES
SCALE: NTS — 4

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Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 LICENSED PROFESSIONAL ENGINEER

Signature: James R. Skowronski Date: 12/11/2012

MARK	DATE	DESCRIPTION
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A	10/04/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 10/25/2012

PROJECT TITLE:
U-CONN
SITE #: CT03XC214

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SHEET TITLE:
GROUNDING DETAILS

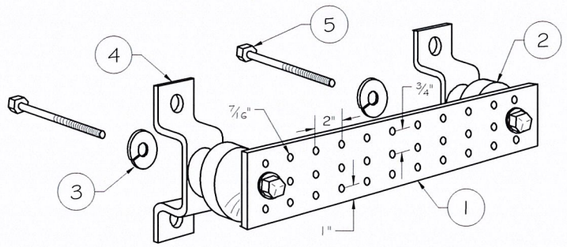
SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: E-4

DRAWN BY: KJG CHECKED BY: KAB

NOTES:

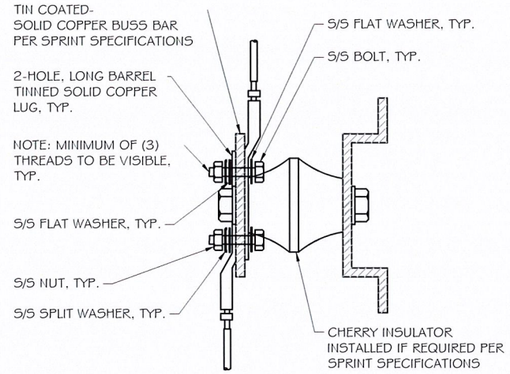
1. ALL MOUNTING HARDWARE CAN BE USED ON 6", 12", 18", ETC. GROUND BARS.
2. ENTIRE ASSEMBLY AVAILABLE FROM NEWTON INSTRUMENT CO. CAT. NO. 2106060010 OR AS HARGER TGB1144 20M.



LEGEND

1. TINNED COPPER GROUND BAR, 1/4" x 4" x 20", NEWTON CO., HARGER TGB1144 20M, OR EQUIVALENT. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.
2. INSULATORS. INSTRUMENT CO. CAT. NO. 3061-4 OR HARGER EQUIVALENT.
3. 5/8" LOCKWASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8 OR EQUIVALENT.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT. NO. A-6056 OR HARGER EQUIVALENT.
5. 5/8" x 1" H.H.C.S. BOLTS, NEWTON INSTRUMENT CO. CAT. NO. 3012-1 OR HARGER EQUIVALENT.

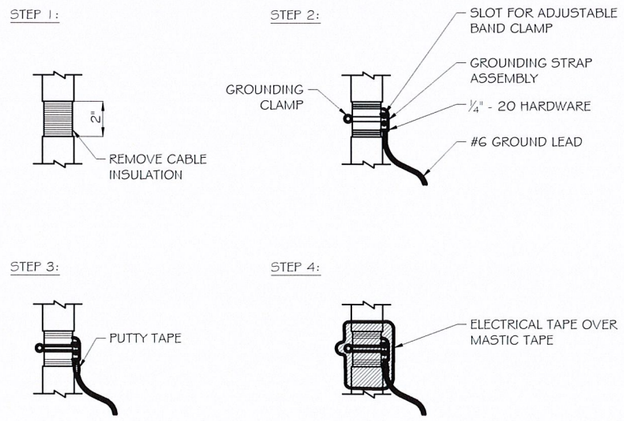
GROUND BAR DETAIL (1)
SCALE: NTS



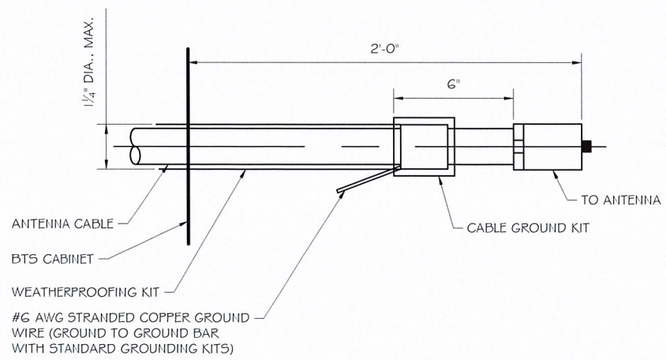
NOTES:

1. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING SPLIT WASHERS.
2. COAT WIRE END WITH ANTI-OCIDATION COMPOUND PRIOR TO INSERTION INTO LUG BARREL AND CRIMPING.
3. APPLY ANTI-OXIDATION COMPOUND BETWEEN ALL LUGS AND BUSS BARS PRIOR TO MATING AND BOLTING.

GENERAL LUG DETAIL (2)
SCALE: NTS



TYP. COAX CABLE WEATHERPROOFING (3)
SCALE: NTS



GROUND KIT DETAIL (4)
SCALE: NTS

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STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
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LICENSED
PROFESSIONAL ENGINEER

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TOLLAND COUNTY

SHEET TITLE:
GROUNDING DETAILS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: E-5

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