



Together with Nextel

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Mahwah, NJ 07430  
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Jennifer Notaro  
Real Estate Consultant

July 8, 2014

**Hand Delivered**

Ms. Melanie A. Bachman  
Acting Executive Director  
Connecticut Siting Council  
10 Franklin Square  
New Britain, CT 06051

CC to Property Owner  
Eastern Connecticut State University  
83 Windham Street, Willimantic, Connecticut 06226

RE: Sprint Spectrum L.P. notice of intent to modify an existing telecommunications facility located at 165 Windham Street, Willimantic, CT 06226. Known to Sprint Spectrum L.P. as site CT33XC614.

Dear Ms. Bachman:

In order to accommodate technological changes, implement Code Division Multiple Access (“CDMA”) and/or Long Term Evolution (“LTE”) capabilities, and enhance system performance in the state of Connecticut, Sprint Spectrum L.P. plans to modify the equipment configurations at many of its existing cell sites. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and its attachments is being sent to the chief elected official of the municipality in which affected cell site is located.

CDMA employs Spread-Spectrum technology and special coding scheme to allow multiple users to be multiplexed over the same physical channel.

LTE is a new high-performance air interface for cellular mobile communications. It is designed to increase the capacity and speed of mobile telephone networks.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in Sprint's operations at the site. Also included is documentation of the structural sufficiency of the tower to accommodate the revised antenna configuration.

The changes to the facility do not constitute modification as defined Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed or altered. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for the R.C.S.A. Section 16-50j-72(b)(2).

1. The height of the overall structure will not be affected.
2. The proposed changes will not extend the site boundaries. There will be no effect on the site compound.
3. The proposed changes will not increase the noise level at the existing facility by 6 decibels or more.
4. Radio Frequency power density may increase due to the use of one or more CDMA transmissions. Moreover, LTE will utilize additional radio frequencies newly licensed by the FCC for cellular mobile communications. However, the changes will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site.

For the foregoing reasons Sprint Spectrum L.P. respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me at (845)-499-4712 or email [JNotaro@Transcendwireless.com](mailto:JNotaro@Transcendwireless.com) with questions concerning this matter. Thank you for your consideration.

Sincerely,

Jennifer Notaro  
Real Estate Consultant

RADIO FREQUENCY FCC REGULATORY COMPLIANCE  
MAXIMUM PERMISSIBLE EXPOSURE (MPE) ASSESSMENT

Sprint Existing Facility

Site ID: CT33XC614

S. Willimantic / ECSU

165 Windham Street  
Willimantic, CT 06226

**July 3, 2014**

**EBI Project Number: 62143775**

July 3, 2014

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

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:  
**CT33XC614 - S. Willimantic / ECSU**

**Site Total: 80.51% - MPE% in full compliance**

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 165 Windham Street, Willimantic, CT, for the purpose of determining whether the radio frequency (RF) exposure levels 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The number of  $\mu\text{W}/\text{cm}^2$  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 ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limit for the cellular band (850 MHz Band) is approximately  $567 \mu\text{W}/\text{cm}^2$ , and the general population exposure limit for the 1900 MHz and 2500 MHz bands is  $1000 \mu\text{W}/\text{cm}^2$ . 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 165 Windham Street, Willimantic, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. All calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. 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) 3 channels in the 1900 MHz Band were considered for each sector of the proposed installation.
- 2) 1 channel in the 800 MHz Band was considered for each sector of the proposed installation
- 3) 2 channels in the 2500 MHz Band were considered for each sector of the proposed installation.
- 4) 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.
- 5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

- 6) The antennas used in this modeling are the RFS APXVSPP18-C-A20 and the RFS APXVTM14-C-I20. This is based on feedback from the carrier with regards to anticipated antenna selection. The RFS APXVSPP18-C-A20 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. The RFS APXVTM14-C-I20 has a 15.9 dBd gain value at its main lobe at 2500 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 7) The antenna mounting height centerline for the proposed antennas is **147 feet** above ground level (AGL).
- 8) 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	CT33XC614 - S. Willimantic / ECSU
Site Address	165 Windham Street, Willimantic, CT, 06226
Site Type	Monopole

**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 (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
1a	RFS	APXVSP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	3	60	5.9	147	141	1/2 "	0.5	0	208.04	0.38%
1a	RFS	APXVSP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	147	141	1/2 "	0.5	0	39.00	0.12%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	147	141	1/2 "	0.5	0	138.69	0.44%
Sector total Power Density Value:																0.94%

**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 (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
2a	RFS	APXVSP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	3	60	5.9	147	141	1/2 "	0.5	0	208.04	0.38%
2a	RFS	APXVSP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	147	141	1/2 "	0.5	0	39.00	0.12%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	147	141	1/2 "	0.5	0	138.69	0.44%
Sector total Power Density Value:																0.94%

**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 (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
3a	RFS	APXVSP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	3	60	5.9	147	141	1/2 "	0.5	0	208.04	0.38%
3a	RFS	APXVSP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	147	141	1/2 "	0.5	0	39.00	0.12%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	147	141	1/2 "	0.5	0	138.69	0.44%
Sector total Power Density Value:																0.94%

Site Composite MPE %	
Carrier	MPE %
Sprint	2.83%
FM Broadcast	52.80%
UHF Whip	0.17%
Parabolic Dish	0.06%
VHF Whip	0.45%
CPTV Microwave	0.90%
AT&T	18.31%
Nextel	4.72%
T-Mobile	0.27%
<b>Total Site MPE %</b>	<b>80.51%</b>

## Summary

All calculations performed for this analysis yielded results that were well within the allowable limits for general public Maximum Permissible Exposure (MPE) to radio frequency energy.

The anticipated Maximum Composite contributions from the Sprint facility are **2.83% (0.94% from sector 1, 0.94% from sector 2 and 0.94% from sector 3)** 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 **80.51%** of the allowable FCC established general public limit sampled at 6 feet above ground level. This total composite site value is based upon MPE 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





**STRUCTURAL ASSESSMENT**

**SITE:** S. Willimantic / ECSU (CT33XC614-A)  
165 Windham St.  
Willimantic, Windham County, Connecticut 06226

**PREPARED FOR:** Transcend Wireless

**CONTACT PERSON:** Mike Kithcart  
Transcend Wireless  
48 Spruce Street, Oakland, NJ 07436

**PREPARED BY:** Ramaker & Associates, Inc.  
1120 Dallas Street  
Sauk City, Wisconsin 53583  
Telephone: (608) 643-4100  
Facsimile: (608) 643-7999

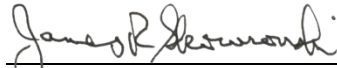
**RAMAKER JOB NUMBER:** 28741

**DATE OF REPORT ISSUANCE:** June 18, 2014



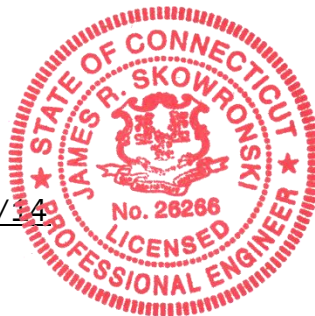
Thomas E. Moore  
Project Engineer

06/18/14  
Date



James R. Skowronski, P.E.  
Supervising Engineer

06/18/14  
Date



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## **SECTION 1**

### **EXECUTIVE SUMMARY**

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

The Sprint proposed loading includes installing three (3) RFS APXV9TM14-ALU-I20 panel antennas and three (3) Alcatel-Lucent TD-RRH8x20-25 RRH units on the existing platform at a centerline elevation of 147 feet AGL. The proposed antennas shall be fed with one (1) 1-1/4-inch hybrid cable that was assumed to be routed up inside the tower.

Results of our analysis show that the tower will be stressed to a maximum of 89.3 percent of capacity under proposed loading conditions. Therefore, it is anticipated that the existing tower will provide adequate strength under proposed under proposed loading conditions.

Original design foundation reactions were not available. However, when comparing results to the previous GPD and Malouf foundation analyses, all proposed model reactions are smaller. Therefore, it is anticipated that the existing foundation will provide adequate strength under proposed under proposed loading conditions.

Results of our mount assessment show that by engineering calculation and inspection, the antenna and RRH mounting structure is capable of supporting the existing and proposed Sprint 2.5 equipment deployment without causing an overstress condition in the antenna and RRH mounting structure.

In summary, the tower and foundations will pass the TIA/EIA-222-F code requirements under proposed loading conditions. The mounting structure will pass the TIA-222 code requirements under proposed loading conditions.

## **SECTION 2**

### **INTRODUCTION**

#### **2.1 PROJECT INFORMATION**

This report summarizes the structural analysis conducted by Ramaker & Associates, Inc. (RAMAKER) for Transcend Wireless 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 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 reserves the right to modify our recommendations should alterations to the tower loading occur.

**SECTION 3  
MODEL DEVELOPMENT**

**3.1 INTRODUCTION**

RAMAKER developed a FEM of the tower superstructure. 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. Additionally, potentially overstressed members were identified.

**3.2 EXISTING STRUCTURE INFORMATION**

Existing structure information was gathered from:

- Structural analysis by Hudson Design Group, Site No. CT1051, dated 9/24/12
- Structural analysis by Malouf, project ID CT01158M-08V0, dated 6/3/08
- Structural analysis by GPD, project 2014723.21.71313.01, dated 5/14/14

**3.3 TOWER LOADING**

RAMAKER understands that the tower loading to be used for this analysis will consist of the existing and proposed antenna, mount, and cable configurations as shown in the following chart:

Elevation	Appurtenance	Mount	Coax	Owner	Status
175	Lightning Rod	Top	---	---	Existing
173	Celwave BA6312	Low Profile Platform	(3) 7/8 (I)	Unknown	Existing
	10' Dipole				
	Celwave PD201				
170	6' Dish w/radome	Pipe Mount	EW52 (I)	Unknown	Existing
163	6' Grid Dish	Pipe Mount	1-5/8 (I)	Unknown	Existing
158	Decibel ASP682	6' Standoff	(2) 7/8 (I)	Unknown	Existing
	Scala MF-900B				Existing
147	(3) RFS APXVSP18-C-A20	Low Profile Platform	(3) 1-1/4 (I)	Sprint	Existing
	(3) ALU 1900MHz 4x40W RRH				
	(3) ALU 800MHz 2x50W RRH		(1) 1-1/4 (I)		Proposed
	(3) RFS APXV9TM14-ALU-I20				
	(3) ALU TD-RRH8x20-25				
135	(6) Powerwave 7770.00	Low Profile Platform	(12) 1-5/8 (I)	AT&T	Existing
	(3) KMW AM-X-CD-17-65-00T-RET				
	(3) Powerwave 7060.10				
	(6) Powerwave LGP214nn				
	(6) Powerwave LGP219nn				
	(3) Ericsson RRUS-11				
	(1) Raycap DC6-48-60-18-8F		2" Conduit (I) (3) 3/8 (I)		
125	---	Low Profile Platform	---	---	Existing
115	(3) EMS RV90-17-02DP	Low Profile Platform	(6) 1-5/8 (I)	Unknown	Existing
	(3) TMAs				
98	6' Yagi	Low Profile Platform	7/8 (I)	Unknown	Existing

I = Interior Coax, E = Exterior Coax

## **S. WILLIMANTIC / ECSU**

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The proposed equipment shall be fed with one (1) proposed hybrid cable that was assumed to be routed up inside of the tower.

### **3.4 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 of 85 miles-per-hour (mph) without ice in Windham County. The tower is also designed for a 74 mph basic wind speed with 1.0-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
Section 1	43.7
Section 2	79.1
Section 3	84.9
Section 4	81.0
Base Plate	68.6
Anchor Bolts	88.7
Stiffeners	89.3
<b>RATING =</b>	<b>89.3</b>

#### 4.2 BASE REACTIONS

The computed maximum reactions under the corresponding maximum moment are as follows:

Load Type	Original Design	GPD Model	Malouf Model	Proposed Model
Axial (k)	---	48.74	49	47.39
Shear (k)	---	36.23	33	31.63
Moment (k-ft)	---	4303.02	3823	3687.82

Original design foundation reactions were not available. However, when comparing results to the previous GPD and Malouf foundation analyses, all proposed model reactions are smaller. Therefore, it is anticipated that the existing foundation will provide adequate strength under proposed under proposed loading conditions.



### **4.3 MOUNT ASSESSMENT**

Results of our mount assessment show that by engineering calculation and inspection, the antenna and RRH mounting structure is capable of supporting the existing and proposed Sprint 2.5 equipment deployment without causing an overstress condition in the antenna and RRH mounting structure.

This assessment is inclusive of the entire antenna mounting structure, including tower platforms, arms, and all other aspects of the mounting structure that will support the Sprint 2.5 equipment deployment. This assessment assumes that the mounting structure(s) has been installed correctly, is free from deterioration, and is maintained properly.

## **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 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 assumes no responsibility for modifications completed prior to or hereafter in which RAMAKER 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 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. RAMAKER 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 Industries Association, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA Standard TIA/EIA-222-F 1996, Washington, D.C.

**APPENDIX A**  
**TOWER FIGURES**

## DESIGNED APPURTENANCE LOADING

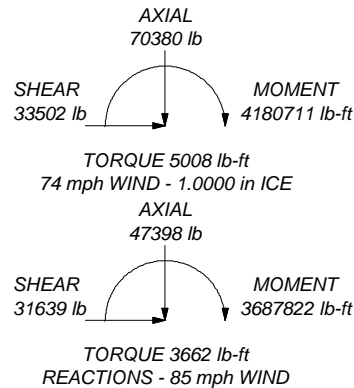
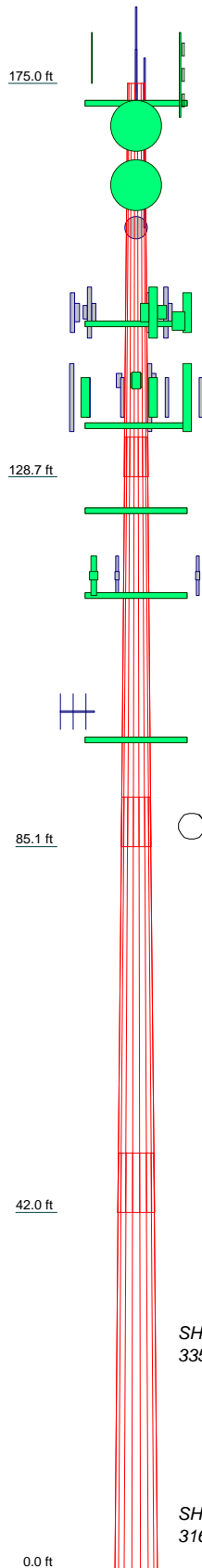
TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 1"x8'	175	AM-X-CD-17-65-00T-RET w/Mount Pipe	135
BA6312	173		
10' Dipole	173	AM-X-CD-17-65-00T-RET w/Mount Pipe	135
PD201	173		
(2) 4'x2" Pipe Mount	173	AM-X-CD-17-65-00T-RET w/Mount Pipe	135
8'x2" Pipe Mount	173		
Valmont 13'-5" Platform	173	7060.10	135
6'x4" Pipe Mount	170	7060.10	135
Andrew 6" w/Radome	170	7060.10	135
6'x4" Pipe Mount	163	(2) LGP214nn	135
KP6F-23	163	(2) LGP214nn	135
ASP682	158	(2) LGP214nn	135
6' Standoff	158	(2) LGP219nn	135
MF-900B	158	(2) LGP219nn	135
1900MHz 4x40W RRH	147	RRUS-11	135
1900MHz 4x40W RRH	147	RRUS-11	135
1900MHz 4x40W RRH	147	RRUS-11	135
800MHz 2x50W RRH	147	RRUS-11	135
800MHz 2x50W RRH	147	DC6-48-60-18-8F	135
800MHz 2x50W RRH	147	Valmont 13'-5" Platform	135
APXV9TM14-ALU-I20 w/Mount Pipe	147	7770.00 w/Mount Pipe	135
APXV9TM14-ALU-I20 w/Mount Pipe	147	7770.00 w/Mount Pipe	135
APXV9TM14-ALU-I20 w/Mount Pipe	147	7770.00 w/Mount Pipe	135
TD-RRH8x20-25	147	PIROD 13' Low Profile Platform	125
TD-RRH8x20-25	147	TMA	115
TD-RRH8x20-25	147	TMA	115
TD-RRH8x20-25	147	TMA	115
Valmont 13'-5" Platform	147	PIROD 13' Low Profile Platform	115
APXVSP18-C-A20 w/Mount Pipe	147	RV90-17-02DP w/Mount Pipe	115
APXVSP18-C-A20 w/Mount Pipe	147	RV90-17-02DP w/Mount Pipe	115
APXVSP18-C-A20 w/Mount Pipe	147	RV90-17-02DP w/Mount Pipe	115
7770.00 w/Mount Pipe	135	PIROD 13' Low Profile Platform	98
7770.00 w/Mount Pipe	135	6' Yagi	98
7770.00 w/Mount Pipe	135		

## MATERIAL STRENGTH


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

## TOWER DESIGN NOTES

1. Tower is located in Windham 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 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. TOWER RATING: 89.3%

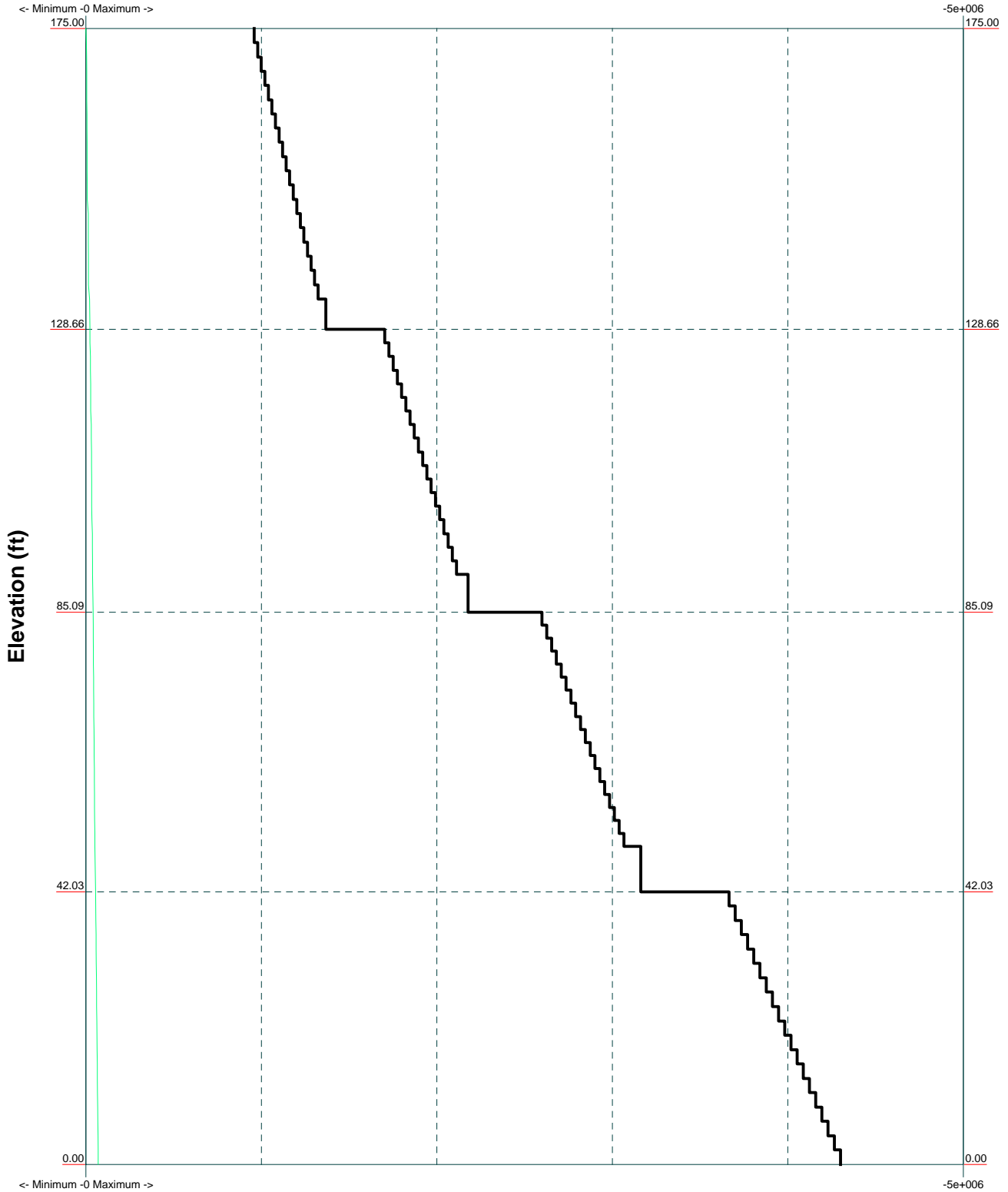



Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	46.34	18	0.2500	4.68	23.0000	33.3800		3495.9
2	46.25	18	0.3125	5.82	31.8317	42.5600	A572-65	6006.5
3	48.88	18	0.3750	6.94	40.6409	51.4700		9043.5
4	48.97	18	0.4375	49.1825	60.0000			12530.8
								31076.7

 <b>RAMAKER &amp; ASSOCIATES, INC.</b> Consulting Engineers	<b>Ramaker &amp; Associates, Inc.</b>		Job: <b>S.WILLIMANTIC / ECSU (CT33XC614-A)</b>			
	1120 Dallas Street		Project: <b>28741</b>			
	Sauk City, WI 53583		Client: Transcend Wireless	Drawn by: tmoore	App'd:	
	Phone: (608) 643-4100		Code: TIA/EIA-222-F	Date: 06/18/14	Scale: NTS	
FAX: (608) 643-7999		Path: \\28700\28741\Structural\TNX\28741.er			Dwg No. E-1	

TIA/EIA-222-F - 85 mph/74 mph 1.0000 in Ice

Leg Capacity ——— Leg Compression (lb)



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	<p>Project: <b>28741</b></p>			<p>Client: Transcend Wireless</p>		
	<p>Code: TIA/EIA-222-F</p>			<p>Drawn by: tmoore</p>		
	<p>Path: I:\28700\28741\Structural\TNX\28741.eri</p>			<p>Date: 06/18/14</p>		
				<p>App'd: _____ Scale: NTS Dwg No. E-3</p>		

Vx

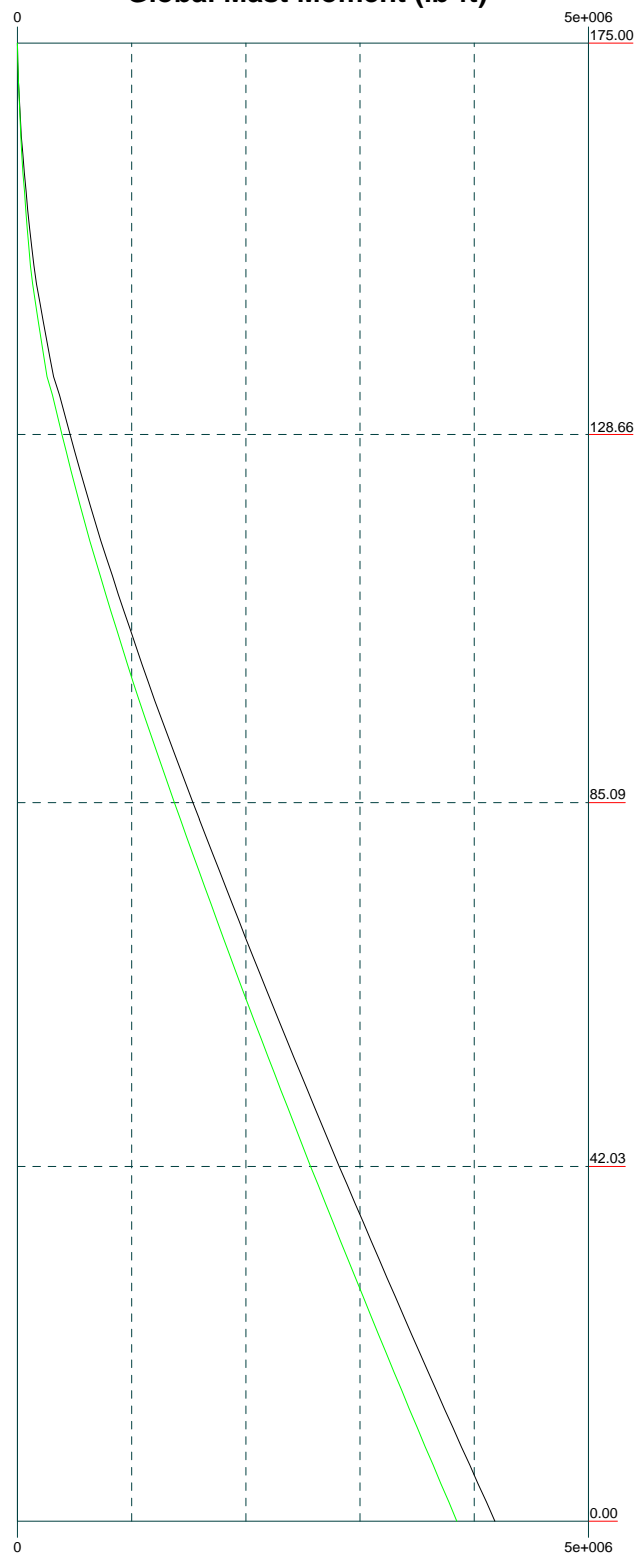
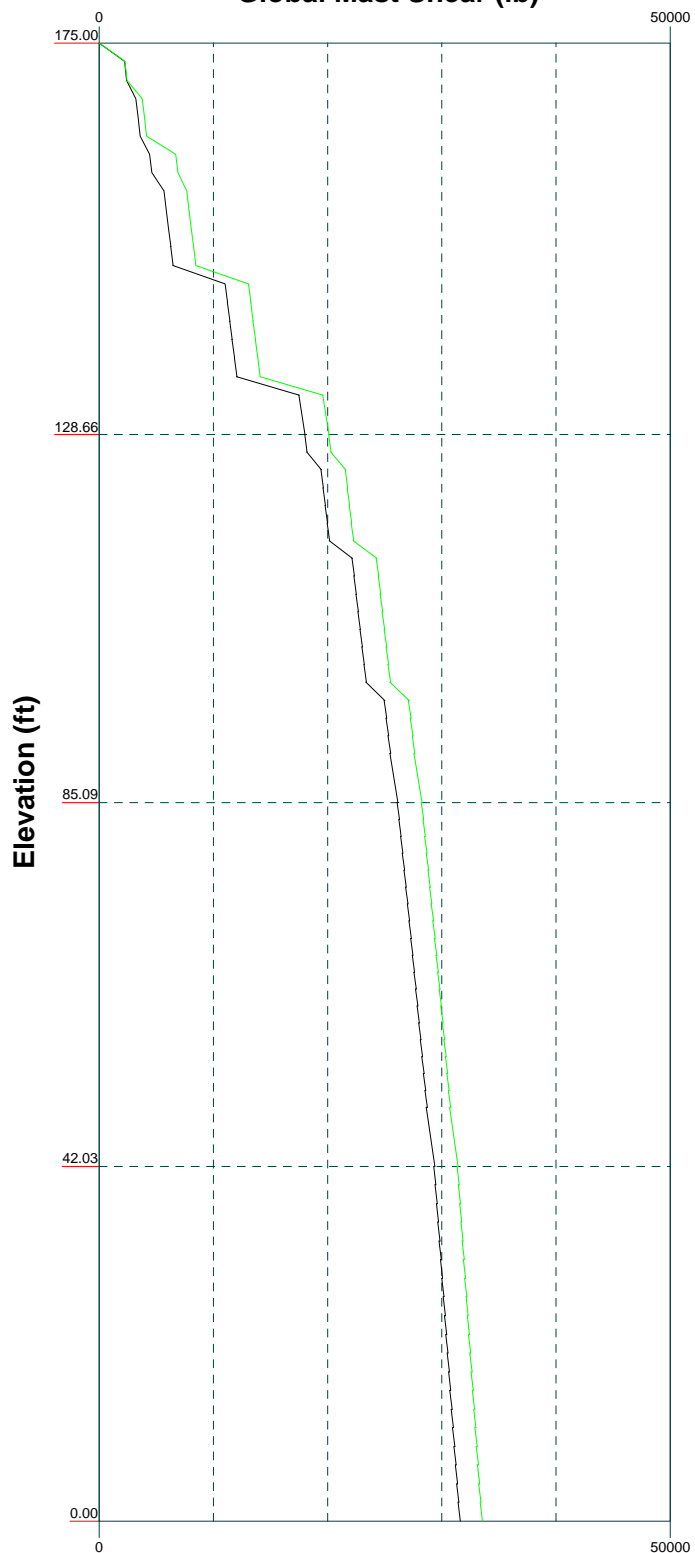
Vz

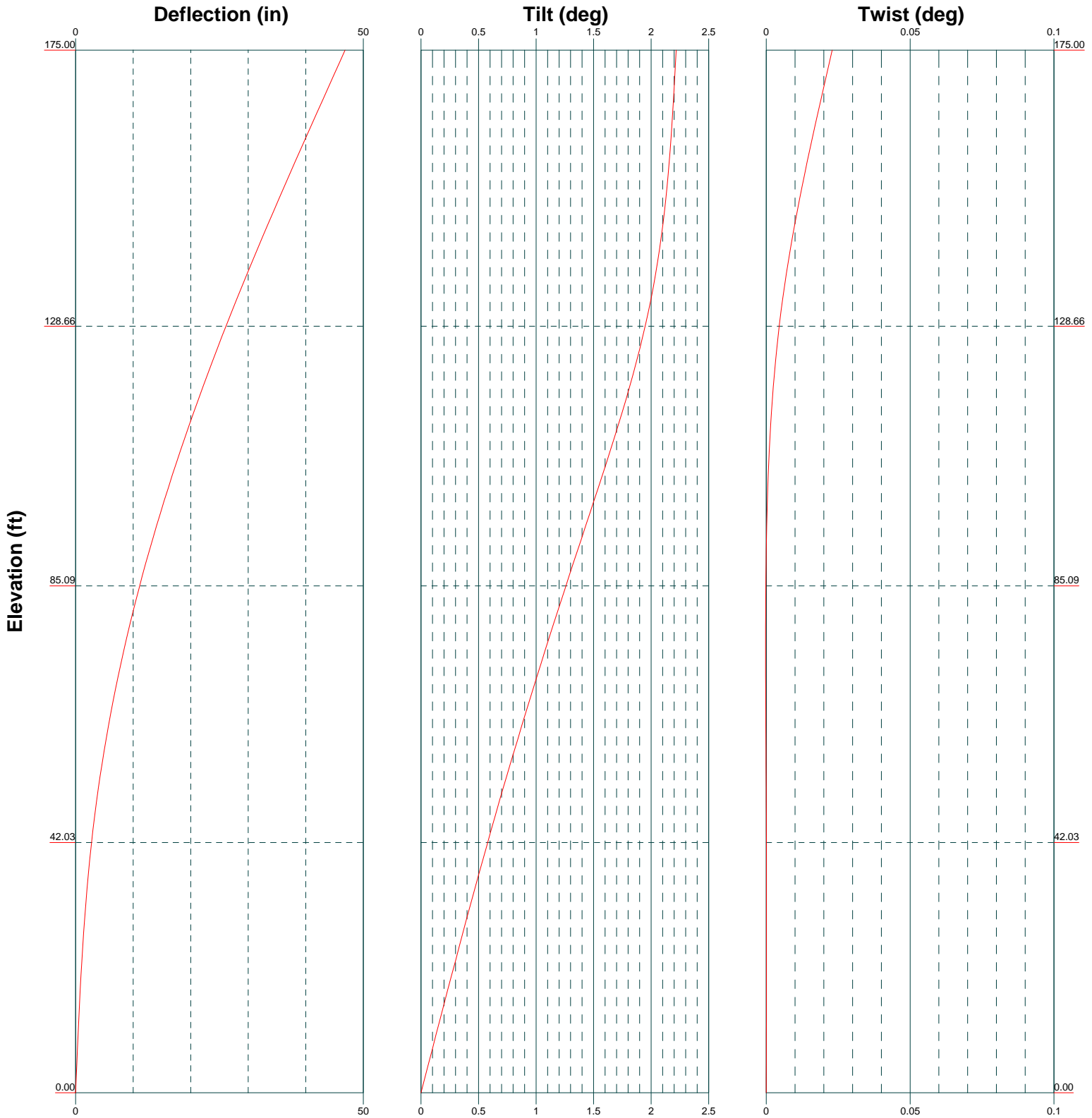
Mx

Mz

Global Mast Shear (lb)

Global Mast Moment (lb-ft)



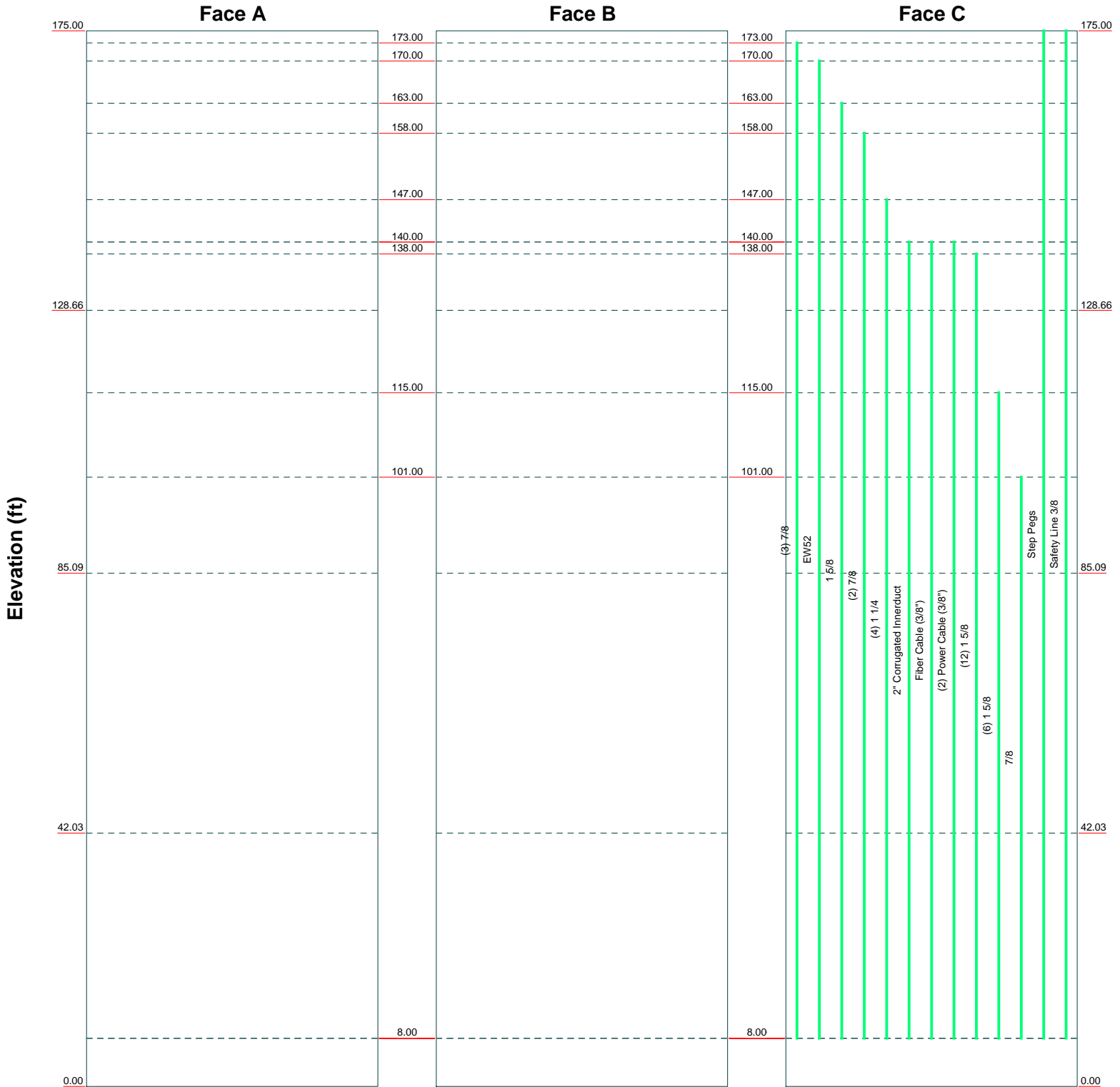




# Feed Line Distribution Chart

## 0' - 175'

— Round   
 — Flat   
 — App In Face   
 — App Out Face   
 — Truss Leg

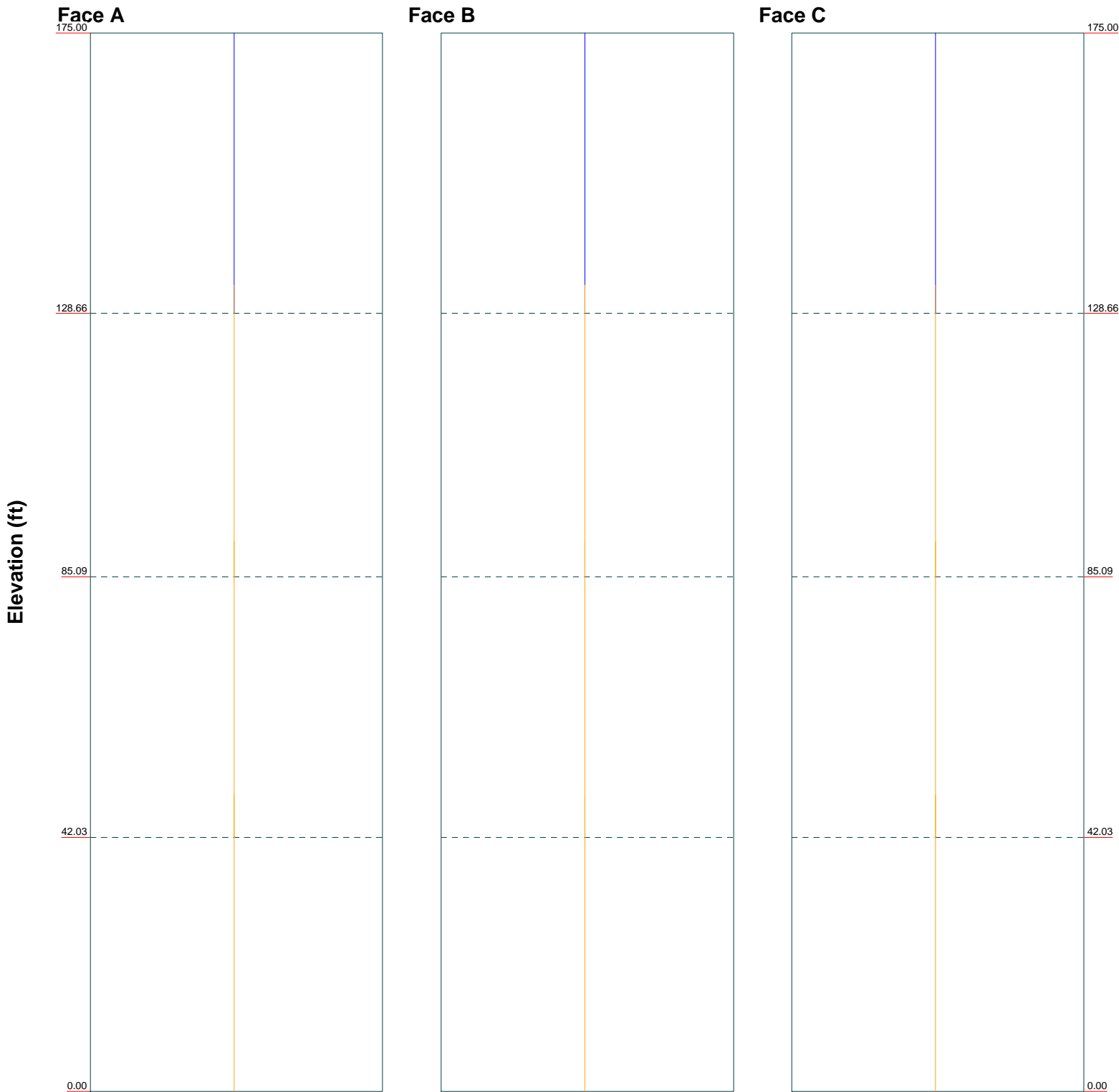



<p><b>RAMAKER &amp; ASSOCIATES, INC.</b> Consulting Engineers</p>	<b>Ramaker &amp; Associates, Inc.</b>		Job: <b>S.WILLIMANTIC / ECSU (CT33XC614-A)</b>		
	1120 Dallas Street		Project: <b>28741</b>		
	Sauk City, WI 53583		Client: Transcend Wireless	Drawn by: tmoore	App'd:
	Phone: (608) 643-4100		Code: TIA/EIA-222-F	Date: 06/18/14	Scale: NTS
	FAX: (608) 643-7999		Path: I:\28700\28741\Structural\TNX\28741.er		Dwg No. E-7

# Stress Distribution Chart

0' - 175'

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



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	Project: <b>28741</b>		
	Client: Transcend Wireless	Drawn by: tmoore	App'd:
	Code: TIA/EIA-222-F	Date: 06/18/14	Scale: NTS
	Path: I:\28700\28741\Structural\TNX\28741.eri		Dwg No. E-8

**APPENDIX B**  
**TOWER CALCULATIONS**

<b>tnxTower</b>  <b>Ramaker &amp; Associates, Inc.</b> 1120 Dallas Street Sauk City, WI 53583 Phone: (608) 643-4100 FAX: (608) 643-7999	<b>Job</b> S.WILLIMANTIC / ECSU (CT33XC614-A)	<b>Page</b> 1 of 18
	<b>Project</b> 28741	<b>Date</b> 09:18:48 06/18/14
	<b>Client</b> Transcend Wireless	<b>Designed by</b> tmoore

## Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in Windham County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 1.0000 in.

Ice thickness is considered to increase with height.

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 60 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	175.00-128.66	46.34	4.68	18	23.0000	33.3800	0.2500	1.0000	A572-65 (65 ksi)
L2	128.66-85.09	48.25	5.82	18	31.8317	42.5600	0.3125	1.2500	A572-65 (65 ksi)
L3	85.09-42.03	48.88	6.94	18	40.6409	51.4700	0.3750	1.5000	A572-65 (65 ksi)
L4	42.03-0.00	48.97		18	49.1825	60.0000	0.4375	1.7500	A572-65 (65 ksi)

## Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	I <sup>2</sup> /Q in <sup>2</sup>	w in	w/t
L1	23.3548	18.0521	1180.3983	8.0762	11.6840	101.0269	2362.3498	9.0278	3.6080	14.432
	33.8949	26.2887	3645.4294	11.7612	16.9570	214.9803	7295.6555	13.1468	5.4349	21.74
L2	33.3794	31.2631	3923.9168	11.1893	16.1705	242.6589	7852.9968	15.6345	5.0524	16.168
	43.2166	41.9042	9449.2522	14.9979	21.6205	437.0510	18910.9379	20.9561	6.9406	22.21
L3	42.5772	47.9265	9817.2295	14.2944	20.6456	475.5121	19647.3767	23.9678	6.4928	17.314
	52.2640	60.8158	20059.0726	18.1387	26.1468	767.1724	40144.5395	30.4137	8.3987	22.397
L4	51.4979	67.6885	20319.4645	17.3045	24.9847	813.2762	40665.6658	33.8507	7.8861	18.025
	60.9256	82.7100	37071.5875	21.1447	30.4800	1216.2594	74191.9547	41.3628	9.7900	22.377

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	<b>Client</b> Transcend Wireless	<b>Designed by</b> tmoore

Tower Elevation	Gusset Area (per face)	Gusset Thickness	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
ft	ft <sup>2</sup>	in						
L1 175.00-128.66				1	1	1		
L2 128.66-85.09				1	1	1		
L3 85.09-42.03				1	1	1		
L4 42.03-0.00				1	1	1		

### Monopole Base Plate Data

#### Base Plate Data

Base plate is square	
Base plate is grouted	
Anchor bolt grade	A615-75
Anchor bolt size	2.2500 in
Number of bolts	18
Embedment length	24.0000 in
$f_c$	4 ksi
Grout space	2.0000 in
Base plate grade	A572-60
Base plate thickness	2.0000 in
Bolt circle diameter	69.0000 in
Outer diameter	75.0000 in
Inner diameter	60.2500 in
Base plate type	Stiffened Plate
Bolts per stiffener	1
Stiffener thickness	0.5000 in
Stiffener height	8.0000 in

### Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	$C_{AA}$	Weight plf
						ft <sup>2</sup> /ft	
7/8	C	No	Inside Pole	173.00 - 8.00	3	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
						2" Ice	0.00
						4" Ice	0.00
EW52	C	No	Inside Pole	170.00 - 8.00	1	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
						2" Ice	0.00
						4" Ice	0.00
1 5/8	C	No	Inside Pole	163.00 - 8.00	1	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
						2" Ice	0.00
						4" Ice	0.00
7/8	C	No	Inside Pole	158.00 - 8.00	2	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
						2" Ice	0.00
						4" Ice	0.00
1 1/4	C	No	Inside Pole	147.00 - 8.00	4	No Ice	0.00
						1/2" Ice	0.00
						1/2" Ice	0.00

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C <sub>A</sub> A <sub>A</sub>		Weight
						ft <sup>2</sup> /ft	plf	
2" Corrugated Innerduct	C	No	Inside Pole	140.00 - 8.00	1	1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
						No Ice	0.00	0.22
						1/2" Ice	0.00	0.22
						1" Ice	0.00	0.22
Fiber Cable (3/8")	C	No	Inside Pole	140.00 - 8.00	1	2" Ice	0.00	0.22
						4" Ice	0.00	0.22
						No Ice	0.00	0.10
						1/2" Ice	0.00	0.10
						1" Ice	0.00	0.10
						2" Ice	0.00	0.10
Power Cable (3/8")	C	No	Inside Pole	140.00 - 8.00	2	4" Ice	0.00	0.10
						No Ice	0.00	0.30
						1/2" Ice	0.00	0.30
						1" Ice	0.00	0.30
						2" Ice	0.00	0.30
						4" Ice	0.00	0.30
1 5/8	C	No	Inside Pole	138.00 - 8.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	1.04
						No Ice	0.00	1.04
1 5/8	C	No	Inside Pole	115.00 - 8.00	6	1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	1.04
						No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
7/8	C	No	Inside Pole	101.00 - 8.00	1	1" Ice	0.00	0.54
						2" Ice	0.00	0.54
						4" Ice	0.00	0.54
						No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
						1" Ice	0.00	0.54
*****								
Step Pegs	C	No	CaAa (Out Of Face)	175.00 - 8.00	1	No Ice	0.08	2.72
						1/2" Ice	0.18	3.51
						1" Ice	0.28	4.92
						2" Ice	0.48	9.56
						4" Ice	0.88	26.18
						No Ice	0.04	0.22
Safety Line 3/8	C	No	CaAa (Out Of Face)	175.00 - 8.00	1	1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
						No Ice	0.04	0.22
						1/2" Ice	0.14	0.75

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight lb
L1	175.00-128.66	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.445	475.26
L2	128.66-85.09	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.119	1210.80
L3	85.09-42.03	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

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Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight lb
L4	42.03-0.00	C	0.000	0.000	0.000	5.060	1295.63
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.999	1023.93

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight lb
L1	175.00-128.66	A	1.200	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	27.686	679.11
L2	128.66-85.09	A	1.151	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	26.031	1402.46
L3	85.09-42.03	A	1.081	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	24.878	1472.96
L4	42.03-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	18.719	1150.63

### Feed Line Center of Pressure

Section	Elevation ft	CP <sub>X</sub> in	CP <sub>Z</sub> in	CP <sub>X</sub> Ice in	CP <sub>Z</sub> Ice in
L1	175.00-128.66	-0.1454	0.0839	-0.5794	0.3345
L2	128.66-85.09	-0.1471	0.0849	-0.6190	0.3574
L3	85.09-42.03	-0.1482	0.0855	-0.6266	0.3618
L4	42.03-0.00	-0.1192	0.0688	-0.5013	0.2894

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight lb	
Lightning Rod 1"x8'	A	From Leg	0.00	0.0000	175.00	No Ice	0.80	0.80	30.00
			0.00			1/2" Ice	1.62	1.62	37.43
			4.00			1" Ice	2.45	2.45	50.01
						2" Ice	3.78	3.78	91.19
						4" Ice	5.86	5.86	241.97
***** BA6312	A	From Leg	5.00	0.0000	173.00	No Ice	0.45	0.45	3.00

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Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Lateral	Vert					
			ft	ft	ft					
			0.00				1/2" Ice	1.09	1.09	7.00
			3.00				1" Ice	1.73	1.73	11.00
							2" Ice	3.01	3.01	19.00
							4" Ice	5.57	5.57	35.00
10' Dipole	B	From Leg	5.00	0.0000	173.00		No Ice	3.00	3.00	30.00
			0.00				1/2" Ice	4.03	4.03	51.79
			3.00				1" Ice	5.03	5.03	80.14
							2" Ice	6.26	6.26	157.16
							4" Ice	8.83	8.83	396.72
PD201	C	From Leg	5.00	0.0000	173.00		No Ice	0.68	0.68	4.00
			0.00				1/2" Ice	1.80	1.80	11.00
			5.00				1" Ice	2.92	2.92	18.00
							2" Ice	5.16	5.16	32.00
							4" Ice	9.64	9.64	60.00
(2) 4'x2" Pipe Mount	C	None		0.0000	173.00		No Ice	0.87	0.87	14.64
							1/2" Ice	1.11	1.11	21.95
							1" Ice	1.36	1.36	32.11
							2" Ice	1.90	1.90	61.54
							4" Ice	3.23	3.23	161.17
8'x2" Pipe Mount	C	None		0.0000	173.00		No Ice	1.90	1.90	30.00
							1/2" Ice	2.73	2.73	44.34
							1" Ice	3.40	3.40	63.96
							2" Ice	4.40	4.40	119.66
							4" Ice	6.50	6.50	301.15
Valmont 13'-5" Platform	C	None		0.0000	173.00		No Ice	18.43	18.43	1759.00
							1/2" Ice	22.32	22.32	2143.00
							1" Ice	26.21	26.21	2527.00
							2" Ice	33.99	33.99	3295.00
							4" Ice	49.55	49.55	4831.00
*****										
6'x4" Pipe Mount	C	From Face	0.00	0.0000	170.00		No Ice	2.25	2.25	64.74
			0.00				1/2" Ice	2.62	2.62	83.84
			0.00				1" Ice	3.00	3.00	107.21
							2" Ice	3.78	3.78	167.39
							4" Ice	5.56	5.56	345.79
6'x4" Pipe Mount	C	From Face	0.00	0.0000	163.00		No Ice	2.25	2.25	64.74
			0.00				1/2" Ice	2.62	2.62	83.84
			0.00				1" Ice	3.00	3.00	107.21
							2" Ice	3.78	3.78	167.39
							4" Ice	5.56	5.56	345.79
*****										
ASP682	A	From Leg	4.00	0.0000	158.00		No Ice	2.27	2.27	10.00
			1.00				1/2" Ice	3.46	3.46	15.00
			10.00				1" Ice	4.65	4.65	20.00
							2" Ice	7.03	7.03	30.00
							4" Ice	11.79	11.79	50.00
6' Standoff	A	From Leg	2.00	0.0000	158.00		No Ice	4.97	4.97	70.00
			1.00				1/2" Ice	6.12	6.12	130.00
			0.00				1" Ice	7.27	7.27	190.00
							2" Ice	9.57	9.57	310.00
							4" Ice	14.17	14.17	550.00
*****										
APXVSP18-C-A20 w/Mount Pipe	A	From Face	4.00	0.0000	147.00		No Ice	8.56	6.95	82.55
			-2.00				1/2" Ice	9.21	8.13	150.82
			1.00				1" Ice	9.83	9.03	227.06
							2" Ice	11.10	10.85	407.06
							4" Ice	13.75	14.86	911.21



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	<b>Client</b>	Transcend Wireless	<b>Designed by</b>	tmoore

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb
APXVSPP18-C-A20 w/Mount Pipe	B	From Face	4.00	0.0000	147.00	No Ice	8.56	6.95	82.55
			-2.00			1/2" Ice	9.21	8.13	150.82
			1.00			1" Ice	9.83	9.03	227.06
						2" Ice	11.10	10.85	407.06
						4" Ice	13.75	14.86	911.21
APXVSPP18-C-A20 w/Mount Pipe	C	From Face	4.00	0.0000	147.00	No Ice	8.56	6.95	82.55
			-2.00			1/2" Ice	9.21	8.13	150.82
			1.00			1" Ice	9.83	9.03	227.06
						2" Ice	11.10	10.85	407.06
						4" Ice	13.75	14.86	911.21
1900MHz 4x40W RRH	A	From Face	4.00	0.0000	147.00	No Ice	2.71	2.61	59.50
			-1.00			1/2" Ice	2.95	2.84	82.62
			1.00			1" Ice	3.20	3.09	108.98
						2" Ice	3.72	3.61	172.17
						4" Ice	4.86	4.74	345.91
1900MHz 4x40W RRH	B	From Face	4.00	0.0000	147.00	No Ice	2.71	2.61	59.50
			-1.00			1/2" Ice	2.95	2.84	82.62
			1.00			1" Ice	3.20	3.09	108.98
						2" Ice	3.72	3.61	172.17
						4" Ice	4.86	4.74	345.91
1900MHz 4x40W RRH	C	From Face	4.00	0.0000	147.00	No Ice	2.71	2.61	59.50
			-1.00			1/2" Ice	2.95	2.84	82.62
			1.00			1" Ice	3.20	3.09	108.98
						2" Ice	3.72	3.61	172.17
						4" Ice	4.86	4.74	345.91
800MHz 2x50W RRH	A	From Face	4.00	0.0000	147.00	No Ice	2.40	2.25	64.00
			-3.00			1/2" Ice	2.61	2.46	86.12
			1.00			1" Ice	2.83	2.68	111.30
						2" Ice	3.30	3.13	171.62
						4" Ice	4.34	4.15	337.52
800MHz 2x50W RRH	B	From Face	4.00	0.0000	147.00	No Ice	2.40	2.25	64.00
			-3.00			1/2" Ice	2.61	2.46	86.12
			1.00			1" Ice	2.83	2.68	111.30
						2" Ice	3.30	3.13	171.62
						4" Ice	4.34	4.15	337.52
800MHz 2x50W RRH	C	From Face	4.00	0.0000	147.00	No Ice	2.40	2.25	64.00
			-3.00			1/2" Ice	2.61	2.46	86.12
			1.00			1" Ice	2.83	2.68	111.30
						2" Ice	3.30	3.13	171.62
						4" Ice	4.34	4.15	337.52
APXV9TM14-ALU-I20 w/Mount Pipe	A	From Face	4.00	0.0000	147.00	No Ice	7.21	5.03	77.02
			-6.00			1/2" Ice	7.77	5.89	132.43
			1.00			1" Ice	8.31	6.63	194.59
						2" Ice	9.42	8.20	342.42
						4" Ice	11.77	11.67	762.71
APXV9TM14-ALU-I20 w/Mount Pipe	B	From Face	4.00	0.0000	147.00	No Ice	7.21	5.03	77.02
			-6.00			1/2" Ice	7.77	5.89	132.43
			1.00			1" Ice	8.31	6.63	194.59
						2" Ice	9.42	8.20	342.42
						4" Ice	11.77	11.67	762.71
APXV9TM14-ALU-I20 w/Mount Pipe	C	From Face	4.00	0.0000	147.00	No Ice	7.21	5.03	77.02
			-6.00			1/2" Ice	7.77	5.89	132.43
			1.00			1" Ice	8.31	6.63	194.59
						2" Ice	9.42	8.20	342.42
						4" Ice	11.77	11.67	762.71
TD-RRH8x20-25	A	From Face	4.00	0.0000	147.00	No Ice	4.72	1.70	70.00
			-5.00			1/2" Ice	5.01	1.92	97.14

<b>tnxTower</b>  <b>Ramaker &amp; Associates, Inc.</b> 1120 Dallas Street Sauk City, WI 53583 Phone: (608) 643-4100 FAX: (608) 643-7999	<b>Job</b>	S.WILLIMANTIC / ECSU (CT33XC614-A)	<b>Page</b>	7 of 18
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Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight lb
			Horz ft	Vert ft	Lateral ft					
										1.00
							1" Ice	5.32	2.14	127.80
							2" Ice	5.95	2.62	200.48
							4" Ice	7.31	3.68	396.71
TD-RRH8x20-25	B	From Face	4.00		0.0000	147.00	No Ice	4.72	1.70	70.00
			-5.00				1/2" Ice	5.01	1.92	97.14
			1.00				1" Ice	5.32	2.14	127.80
							2" Ice	5.95	2.62	200.48
							4" Ice	7.31	3.68	396.71
TD-RRH8x20-25	C	From Face	4.00		0.0000	147.00	No Ice	4.72	1.70	70.00
			-5.00				1/2" Ice	5.01	1.92	97.14
			0.00				1" Ice	5.32	2.14	127.80
							2" Ice	5.95	2.62	200.48
							4" Ice	7.31	3.68	396.71
Valmont 13'-5" Platform	C	None			0.0000	147.00	No Ice	18.43	18.43	1759.00
							1/2" Ice	22.32	22.32	2143.00
							1" Ice	26.21	26.21	2527.00
							2" Ice	33.99	33.99	3295.00
							4" Ice	49.55	49.55	4831.00
***** *****										
7770.00 w/Mount Pipe	A	From Face	4.00		0.0000	135.00	No Ice	6.98	5.06	59.85
			6.00				1/2" Ice	7.87	6.33	116.30
			3.00				1" Ice	8.77	7.63	179.86
							2" Ice	10.23	9.48	332.64
							4" Ice	13.30	13.52	781.75
7770.00 w/Mount Pipe	B	From Face	4.00		0.0000	135.00	No Ice	6.98	5.06	59.85
			6.00				1/2" Ice	7.87	6.33	116.30
			3.00				1" Ice	8.77	7.63	179.86
							2" Ice	10.23	9.48	332.64
							4" Ice	13.30	13.52	781.75
7770.00 w/Mount Pipe	C	From Face	4.00		0.0000	135.00	No Ice	6.98	5.06	59.85
			6.00				1/2" Ice	7.87	6.33	116.30
			3.00				1" Ice	8.77	7.63	179.86
							2" Ice	10.23	9.48	332.64
							4" Ice	13.30	13.52	781.75
7770.00 w/Mount Pipe	A	From Face	4.00		0.0000	135.00	No Ice	6.98	5.06	59.85
			-2.00				1/2" Ice	7.87	6.33	116.30
			3.00				1" Ice	8.77	7.63	179.86
							2" Ice	10.23	9.48	332.64
							4" Ice	13.30	13.52	781.75
7770.00 w/Mount Pipe	B	From Face	4.00		0.0000	135.00	No Ice	6.98	5.06	59.85
			-2.00				1/2" Ice	7.87	6.33	116.30
			3.00				1" Ice	8.77	7.63	179.86
							2" Ice	10.23	9.48	332.64
							4" Ice	13.30	13.52	781.75
7770.00 w/Mount Pipe	C	From Face	4.00		0.0000	135.00	No Ice	6.98	5.06	59.85
			-2.00				1/2" Ice	7.87	6.33	116.30
			3.00				1" Ice	8.77	7.63	179.86
							2" Ice	10.23	9.48	332.64
							4" Ice	13.30	13.52	781.75
AM-X-CD-17-65-00T-RET w/Mount Pipe	A	From Face	4.00		0.0000	135.00	No Ice	11.55	8.94	92.35
			-6.00				1/2" Ice	12.27	10.45	177.45
			3.00				1" Ice	13.00	11.99	272.40
							2" Ice	14.45	14.31	496.21
							4" Ice	17.71	19.14	1120.40
AM-X-CD-17-65-00T-RET w/Mount Pipe	B	From Face	4.00		0.0000	135.00	No Ice	11.55	8.94	92.35
			-6.00				1/2" Ice	12.27	10.45	177.45

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						ft
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb	
				3.00						
						1" Ice	13.00	11.99	272.40	
						2" Ice	14.45	14.31	496.21	
						4" Ice	17.71	19.14	1120.40	
AM-X-CD-17-65-00T-RET w/Mount Pipe	C	From Face	4.00		0.0000	135.00	No Ice	11.55	8.94	92.35
			-6.00				1/2" Ice	12.27	10.45	177.45
			3.00				1" Ice	13.00	11.99	272.40
							2" Ice	14.45	14.31	496.21
							4" Ice	17.71	19.14	1120.40
7060.10	A	From Face	4.00		0.0000	135.00	No Ice	0.11	0.07	1.65
			0.00				1/2" Ice	0.16	0.11	2.75
			3.00				1" Ice	0.22	0.16	4.60
							2" Ice	0.36	0.28	11.36
							4" Ice	0.74	0.63	42.49
7060.10	B	From Face	4.00		0.0000	135.00	No Ice	0.11	0.07	1.65
			0.00				1/2" Ice	0.16	0.11	2.75
			3.00				1" Ice	0.22	0.16	4.60
							2" Ice	0.36	0.28	11.36
							4" Ice	0.74	0.63	42.49
7060.10	C	From Face	4.00		0.0000	135.00	No Ice	0.11	0.07	1.65
			0.00				1/2" Ice	0.16	0.11	2.75
			3.00				1" Ice	0.22	0.16	4.60
							2" Ice	0.36	0.28	11.36
							4" Ice	0.74	0.63	42.49
(2) LGP214nn	A	From Face	4.00		0.0000	135.00	No Ice	1.30	0.23	14.10
			0.00				1/2" Ice	1.45	0.31	21.30
			3.00				1" Ice	1.62	0.40	30.39
							2" Ice	1.98	0.61	55.04
							4" Ice	2.80	1.12	135.66
(2) LGP214nn	B	From Face	4.00		0.0000	135.00	No Ice	1.30	0.23	14.10
			0.00				1/2" Ice	1.45	0.31	21.30
			3.00				1" Ice	1.62	0.40	30.39
							2" Ice	1.98	0.61	55.04
							4" Ice	2.80	1.12	135.66
(2) LGP214nn	C	From Face	4.00		0.0000	135.00	No Ice	1.30	0.23	14.10
			0.00				1/2" Ice	1.45	0.31	21.30
			3.00				1" Ice	1.62	0.40	30.39
							2" Ice	1.98	0.61	55.04
							4" Ice	2.80	1.12	135.66
(2) LGP219nn	A	From Face	4.00		0.0000	135.00	No Ice	0.27	0.18	11.00
			0.00				1/2" Ice	0.34	0.25	13.41
			3.00				1" Ice	0.43	0.32	16.91
							2" Ice	0.62	0.49	27.93
							4" Ice	1.10	0.94	71.52
(2) LGP219nn	B	From Face	4.00		0.0000	135.00	No Ice	0.27	0.18	11.00
			0.00				1/2" Ice	0.34	0.25	13.41
			3.00				1" Ice	0.43	0.32	16.91
							2" Ice	0.62	0.49	27.93
							4" Ice	1.10	0.94	71.52
(2) LGP219nn	C	From Face	4.00		0.0000	135.00	No Ice	0.27	0.18	11.00
			0.00				1/2" Ice	0.34	0.25	13.41
			3.00				1" Ice	0.43	0.32	16.91
							2" Ice	0.62	0.49	27.93
							4" Ice	1.10	0.94	71.52
RRUS-11	A	From Face	1.00		0.0000	135.00	No Ice	3.25	1.37	50.71
			0.00				1/2" Ice	3.49	1.55	71.49
			5.00				1" Ice	3.74	1.74	95.32
							2" Ice	4.27	2.14	152.85

<b>tnxTower</b>  <b>Ramaker &amp; Associates, Inc.</b> 1120 Dallas Street Sauk City, WI 53583 Phone: (608) 643-4100 FAX: (608) 643-7999	<b>Job</b>	S.WILLIMANTIC / ECSU (CT33XC614-A)	<b>Page</b>	9 of 18
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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						ft
					°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb	
RRUS-11	B	From Face	1.00		0.0000	135.00	4" Ice	5.42	3.04	312.87
			0.00				No Ice	3.25	1.37	50.71
			5.00				1/2" Ice	3.49	1.55	71.49
							1" Ice	3.74	1.74	95.32
							2" Ice	4.27	2.14	152.85
RRUS-11	C	From Face	1.00		0.0000	135.00	4" Ice	5.42	3.04	312.87
			0.00				No Ice	3.25	1.37	50.71
			5.00				1/2" Ice	3.49	1.55	71.49
							1" Ice	3.74	1.74	95.32
							2" Ice	4.27	2.14	152.85
DC6-48-60-18-8F	C	From Face	1.00		0.0000	135.00	4" Ice	5.42	3.04	312.87
			0.00				No Ice	1.47	1.47	32.80
			5.00				1/2" Ice	1.67	1.67	50.52
							1" Ice	1.88	1.88	70.72
							2" Ice	2.33	2.33	119.24
Valmont 13'-5" Platform	C	None			0.0000	135.00	4" Ice	3.38	3.38	252.92
							No Ice	18.43	18.43	1759.00
							1/2" Ice	22.32	22.32	2143.00
							1" Ice	26.21	26.21	2527.00
							2" Ice	33.99	33.99	3295.00
*****										
PiROD 13' Low Profile Platform	C	None			0.0000	125.00	4" Ice	49.55	49.55	4831.00
							No Ice	15.70	15.70	1300.00
							1/2" Ice	20.10	20.10	1765.00
							1" Ice	24.50	24.50	2230.00
							2" Ice	33.30	33.30	3160.00
*****										
RV90-17-02DP w/Mount Pipe	A	From Face	4.00		0.0000	115.00	4" Ice	9.81	10.47	609.50
			5.00				No Ice	4.91	3.64	43.55
			2.00				1/2" Ice	5.57	4.70	84.46
							1" Ice	6.14	5.48	131.77
							2" Ice	7.32	7.08	249.23
RV90-17-02DP w/Mount Pipe	B	From Face	4.00		0.0000	115.00	4" Ice	9.81	10.47	609.50
			5.00				No Ice	4.91	3.64	43.55
			2.00				1/2" Ice	5.57	4.70	84.46
							1" Ice	6.14	5.48	131.77
							2" Ice	7.32	7.08	249.23
RV90-17-02DP w/Mount Pipe	C	From Face	4.00		0.0000	115.00	4" Ice	9.81	10.47	609.50
			5.00				No Ice	4.91	3.64	43.55
			2.00				1/2" Ice	5.57	4.70	84.46
							1" Ice	6.14	5.48	131.77
							2" Ice	7.32	7.08	249.23
TMA	A	From Face	4.00		0.0000	115.00	4" Ice	9.81	10.47	609.50
			5.00				No Ice	1.40	0.70	5.00
			2.00				1/2" Ice	1.56	0.82	15.34
							1" Ice	1.73	0.95	27.81
							2" Ice	2.09	1.24	59.96
TMA	B	From Face	4.00		0.0000	115.00	4" Ice	2.92	1.91	158.48
			5.00				No Ice	1.40	0.70	5.00
			2.00				1/2" Ice	1.56	0.82	15.34
							1" Ice	1.73	0.95	27.81
							2" Ice	2.09	1.24	59.96
TMA	C	From Face	4.00		0.0000	115.00	4" Ice	2.92	1.91	158.48
			5.00				No Ice	1.40	0.70	5.00
			2.00				1/2" Ice	1.56	0.82	15.34
							1" Ice	1.73	0.95	27.81
							2" Ice	2.09	1.24	59.96

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Lateral					
PiROD 13' Low Profile Platform	C	None			0.0000	115.00	4" Ice 2.92	1.91	158.48
							No Ice 15.70	15.70	1300.00
							1/2" Ice 20.10	20.10	1765.00
							1" Ice 24.50	24.50	2230.00
							2" Ice 33.30	33.30	3160.00
							4" Ice 50.90	50.90	5020.00
*****									
6' Yagi	A	From Face	4.00		0.0000	98.00	No Ice 3.13	3.13	30.00
			0.00				1/2" Ice 8.14	8.14	64.43
			3.00				1" Ice 13.17	13.17	129.62
							2" Ice 23.28	23.28	352.88
							4" Ice 43.70	43.70	1175.25
PiROD 13' Low Profile Platform	C	None			0.0000	98.00	No Ice 15.70	15.70	1300.00
							1/2" Ice 20.10	20.10	1765.00
							1" Ice 24.50	24.50	2230.00
							2" Ice 33.30	33.30	3160.00
							4" Ice 50.90	50.90	5020.00

### Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight
				Horz	Lateral						
Andrew 6' w/Radome	C	Paraboloid w/Radome	From Face	3.00		0.0000		170.00	6.00	No Ice 28.27	380.00
				0.00						1/2" Ice 29.07	450.00
				0.00						1" Ice 29.86	520.00
										2" Ice 31.44	660.00
										4" Ice 34.60	940.00
KP6F-23	C	Grid	From Face	3.00		0.0000		163.00	6.00	No Ice 22.62	198.00
				0.00						1/2" Ice 29.05	347.13
				0.00						1" Ice 35.48	496.25
										2" Ice 48.34	794.50
										4" Ice 74.06	1391.01
MF-900B	A	Grid	From Leg	3.00		90.0000		158.00	2.72	No Ice 5.81	13.00
				0.00						1/2" Ice 6.17	21.11
				0.00						1" Ice 6.53	29.22
										2" Ice 7.25	45.44
										4" Ice 8.69	77.88

### Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M <sub>x</sub>	Sum of Overturning Moments, M <sub>z</sub>	Sum of Torques
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Leg Weight	31076.71					

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Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M <sub>x</sub> lb-ft	Sum of Overturning Moments, M <sub>z</sub> lb-ft	Sum of Torques lb-ft
Bracing Weight	0.00					
Total Member Self-Weight	31076.71			2603.28	655.22	
Total Weight	47397.58			2603.28	655.22	
Wind 0 deg - No Ice		14.43	-31623.40	-3564876.75	-1624.22	86.69
Wind 30 deg - No Ice		15781.16	-27422.96	-3092883.31	-1777759.72	2114.72
Wind 60 deg - No Ice		26909.84	-15778.65	-1775498.41	-3008445.96	3255.70
Wind 90 deg - No Ice		30751.49	-130.80	-20029.97	-3419828.26	3448.56
Wind 120 deg - No Ice		26690.44	15455.12	1725460.60	-2971178.12	3539.50
Wind 150 deg - No Ice		15557.66	27098.53	3042815.38	-1739978.02	2288.79
Wind 180 deg - No Ice		14.43	31446.18	3539497.50	-1624.22	-205.48
Wind 210 deg - No Ice		-15548.78	27099.64	3042990.72	1739885.73	-2600.63
Wind 240 deg - No Ice		-26686.00	15462.89	1726687.99	2971787.20	-3728.62
Wind 270 deg - No Ice		-30734.85	-130.80	-20029.97	3418508.58	-3517.09
Wind 300 deg - No Ice		-26905.40	-15786.42	-1776725.80	3009055.03	-3103.13
Wind 330 deg - No Ice		-15772.29	-27424.07	-3093058.65	1777667.43	-1875.98
Member Ice	10092.37					
Total Weight Ice	69267.37			4769.01	1895.88	
Wind 0 deg - Ice		2.87	-33502.93	-3946631.81	1442.36	-2123.76
Wind 30 deg - Ice		15657.06	-29368.53	-3474884.82	-1794953.50	-2651.90
Wind 60 deg - Ice		27295.18	-18023.50	-2177896.08	-3137440.19	-569.16
Wind 90 deg - Ice		31454.41	-133.66	-18068.95	-3611217.37	2965.73
Wind 120 deg - Ice		27426.52	16052.44	1864142.24	-3157641.55	5058.72
Wind 150 deg - Ice		16098.68	27990.42	3257873.93	-1865854.05	5137.54
Wind 180 deg - Ice		2.87	32607.38	3808833.64	1442.36	2100.12
Wind 210 deg - Ice		-16390.50	27937.80	3249559.45	1915753.38	-163.87
Wind 240 deg - Ice		-27617.88	15949.11	1847815.63	3191667.78	-2115.75
Wind 270 deg - Ice		-31575.92	-133.66	-18068.95	3634208.02	-2465.46
Wind 300 deg - Ice		-27486.54	-17920.16	-2161569.47	3171466.42	-798.17
Wind 330 deg - Ice		-15948.88	-29315.90	-3466570.34	1844852.82	81.07
Total Weight	47397.58			2603.28	655.22	
Wind 0 deg - Service		7.19	-15756.99	-1775382.00	-1203.47	43.19
Wind 30 deg - Service		7863.28	-13664.04	-1540201.88	-886198.32	1053.70
Wind 60 deg - Service		13408.36	-7862.03	-883788.64	-1499412.23	1622.22
Wind 90 deg - Service		15322.54	-65.18	-9091.56	-1704391.64	1718.31
Wind 120 deg - Service		13299.04	7700.82	860633.84	-1480842.79	1763.63
Wind 150 deg - Service		7751.91	13502.38	1517032.07	-867372.84	1140.43
Wind 180 deg - Service		7.19	15668.68	1764513.82	-1203.47	-102.38
Wind 210 deg - Service		-7747.49	13502.94	1517119.44	866538.51	-1295.81
Wind 240 deg - Service		-13296.83	7704.69	861245.41	1480357.93	-1857.86
Wind 270 deg - Service		-15314.25	-65.18	-9091.56	1702945.75	-1752.46
Wind 300 deg - Service		-13406.15	-7865.90	-884400.21	1498927.37	-1546.20
Wind 330 deg - Service		-7858.86	-13664.59	-1540289.25	885363.99	-934.75

**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
9	Dead+Wind 210 deg - No Ice

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Comb. No.	Description
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
L1	175 - 128.66	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21057.65	-314.20	-4525.32
			Max. Mx	24	-19809.20	306989.88	947.17
			Max. My	15	-19497.33	-311.32	368071.88
			Max. Vy	24	-17500.21	306989.88	947.17
			Max. Vx	15	-19591.02	-311.32	368071.88
			Max. Torque	23			7123.10
L2	128.66 - 85.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-38331.91	922.10	-4492.26
			Max. Mx	24	-37079.44	1224533.84	7109.42
			Max. My	15	-36839.46	692.27	1374313.85
			Max. Vy	24	-25517.97	1224533.84	7109.42
			Max. Vx	15	-27632.82	692.27	1374313.85
			Max. Torque	20			-4583.60
L3	85.09 - 42.03	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-51197.03	1411.31	-4756.55
			Max. Mx	24	-50476.69	2365762.53	12784.57
			Max. My	15	-50354.28	1109.10	2602284.49
			Max. Vy	24	-28729.62	2365762.53	12784.57
			Max. Vx	15	-30776.08	1109.10	2602284.49
			Max. Torque	20			-4804.27
L4	42.03 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-70379.69	1932.67	-5008.29
			Max. Mx	24	-70361.54	3847324.12	19217.27

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. My	15	-70358.75	1508.58	4180710.39
			Max. Vy	24	-31615.74	3847324.12	19217.27
			Max. Vx	15	-33546.20	1508.58	4180710.39
			Max. Torque	20			-5008.42

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	14	70379.69	-0.12	0.94
	Max. H <sub>x</sub>	24	70379.66	31575.38	133.65
	Max. H <sub>z</sub>	15	70379.65	-2.87	33502.34
	Max. M <sub>x</sub>	15	4180710.39	-2.87	33502.34
	Max. M <sub>z</sub>	18	3822855.74	-31453.87	133.65
	Max. Torsion	10	3662.04	26685.91	-15462.84
	Min. Vert	2	47397.37	-14.43	31618.76
	Min. H <sub>x</sub>	18	70379.66	-31453.87	133.65
	Min. H <sub>z</sub>	21	70379.65	-2.87	-32606.81
	Min. M <sub>x</sub>	21	-4034053.50	-2.87	-32606.81
	Min. M <sub>z</sub>	24	-3847324.12	31575.38	133.65
	Min. Torsion	20	-5008.43	-16098.64	-27990.35

### Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear <sub>x</sub> lb	Shear <sub>z</sub> lb	Overturning Moment, M <sub>x</sub> lb-ft	Overturning Moment, M <sub>z</sub> lb-ft	Torque lb-ft
Dead Only	47397.58	0.03	-0.58	2597.30	655.11	0.01
Dead+Wind 0 deg - No Ice	47397.37	14.43	-31618.76	-3684424.69	-1690.61	91.56
Dead+Wind 30 deg - No Ice	47397.58	15781.11	-27422.87	-3197211.48	-1837687.61	2076.11
Dead+Wind 60 deg - No Ice	47397.57	26909.61	-15778.52	-1835378.25	-3109473.10	3190.02
Dead+Wind 90 deg - No Ice	47397.51	30749.71	-130.78	-20832.93	-3534206.82	3375.61
Dead+Wind 120 deg - No Ice	47397.58	26690.35	15455.07	1783414.04	-3070811.97	3468.80
Dead+Wind 150 deg - No Ice	47397.57	15557.53	27098.30	3145269.93	-1798430.27	2241.09
Dead+Wind 180 deg - No Ice	47397.37	14.43	31441.57	3658157.44	-1689.97	-209.52
Dead+Wind 210 deg - No Ice	47397.57	-15548.65	27099.41	3145449.49	1798328.68	-2559.88
Dead+Wind 240 deg - No Ice	47397.58	-26685.91	15462.84	1784686.10	3071434.49	-3662.04
Dead+Wind 270 deg - No Ice	47397.51	-30733.07	-130.78	-20833.36	3532827.88	-3443.67
Dead+Wind 300 deg - No Ice	47397.57	-26905.17	-15786.29	-1836650.35	3110095.45	-3033.00
Dead+Wind 330 deg - No Ice	47397.58	-15772.23	-27423.98	-3197391.18	1837585.75	-1829.97
Dead+Ice+Temp	70379.69	0.12	-0.94	5008.29	1932.67	-0.12
Dead+Wind 0 deg+Ice+Temp	70379.65	2.87	-33502.34	-4180710.39	1508.19	-2078.17
Dead+Wind 30 deg+Ice+Temp	70379.69	15657.03	-29368.45	-3681729.54	-1899762.42	-2665.06
Dead+Wind 60 deg+Ice+Temp	70379.69	27295.11	-18023.45	-2309384.50	-3321059.72	-656.32
Dead+Wind 90 deg+Ice+Temp	70379.66	31453.87	-133.65	-19223.89	-3822855.74	2828.27
Dead+Wind 120 deg+Ice+Temp	70379.69	27426.45	16052.40	1974165.87	-3343027.04	4903.39
Dead+Wind 150 deg+Ice+Temp	70379.69	16098.64	27990.35	3450264.17	-1975822.66	5008.43
Dead+Wind 180 deg+Ice+Temp	70379.65	2.87	32606.81	4034053.50	1509.21	2056.93
Dead+Wind 210 deg+Ice+Temp	70379.69	-16390.46	27937.72	3441355.87	2029035.79	-111.84
Dead+Wind 240 deg+Ice+Temp	70379.69	-27617.80	15949.07	1956712.02	3379284.39	-2003.31
Dead+Wind 270 deg+Ice+Temp	70379.66	-31575.38	-133.65	-19217.67	3847324.12	-2330.80
Dead+Wind 300 deg+Ice+Temp	70379.69	-27486.47	-17920.11	-2291913.60	3357327.13	-672.52



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Load Combination	Vertical lb	Shear <sub>x</sub> lb	Shear <sub>z</sub> lb	Overturning Moment, M <sub>x</sub> lb-ft	Overturning Moment, M <sub>z</sub> lb-ft	Torque lb-ft
Dead+Wind 330 deg+Ice+Temp	70379.69	-15948.84	-29315.82	-3672807.93	1952998.36	156.91
Dead+Wind 0 deg - Service	47397.53	7.19	-15754.62	-1835668.96	-504.60	46.77
Dead+Wind 30 deg - Service	47397.56	7862.81	-13663.21	-1592636.27	-915879.83	1041.45
Dead+Wind 60 deg - Service	47397.56	13407.56	-7861.56	-913636.18	-1549898.17	1598.84
Dead+Wind 90 deg - Service	47397.53	15320.29	-65.16	-8987.24	-1761493.21	1690.53
Dead+Wind 120 deg - Service	47397.56	13298.25	7700.37	890493.37	-1530560.67	1736.98
Dead+Wind 150 deg - Service	47397.56	7751.45	13501.57	1569491.22	-896274.38	1122.16
Dead+Wind 180 deg - Service	47397.53	7.19	15666.32	1825336.35	-504.43	-105.88
Dead+Wind 210 deg - Service	47397.56	-7747.03	13502.12	1569581.33	896900.63	-1283.49
Dead+Wind 240 deg - Service	47397.56	-13296.04	7704.24	891128.60	1531549.32	-1834.61
Dead+Wind 270 deg - Service	47397.53	-15311.99	-65.16	-8987.33	1761482.44	-1724.63
Dead+Wind 300 deg - Service	47397.56	-13405.35	-7865.43	-914271.43	1550886.77	-1519.33
Dead+Wind 330 deg - Service	47397.56	-7858.38	-13663.76	-1592726.41	916505.99	-916.44

## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-47397.58	0.00	-0.03	47397.58	0.58	0.001%
2	14.43	-47397.58	-31623.40	-14.43	47397.37	31618.76	0.008%
3	15781.16	-47397.58	-27422.96	-15781.11	47397.58	27422.87	0.000%
4	26909.84	-47397.58	-15778.65	-26909.61	47397.57	15778.52	0.000%
5	30751.49	-47397.58	-130.80	-30749.71	47397.51	130.78	0.003%
6	26690.44	-47397.58	15455.12	-26690.35	47397.58	-15455.07	0.000%
7	15557.66	-47397.58	27098.53	-15557.53	47397.57	-27098.30	0.000%
8	14.43	-47397.58	31446.18	-14.43	47397.37	-31441.57	0.008%
9	-15548.78	-47397.58	27099.64	15548.65	47397.57	-27099.41	0.000%
10	-26686.00	-47397.58	15462.89	26685.91	47397.58	-15462.84	0.000%
11	-30734.85	-47397.58	-130.80	30733.07	47397.51	130.78	0.003%
12	-26905.40	-47397.58	-15786.42	26905.17	47397.57	15786.29	0.000%
13	-15772.29	-47397.58	-27424.07	15772.23	47397.58	27423.98	0.000%
14	0.00	-70379.69	0.00	-0.12	70379.69	0.94	0.001%
15	2.87	-70379.69	-33502.93	-2.87	70379.65	33502.34	0.001%
16	15657.06	-70379.69	-29368.53	-15657.03	70379.69	29368.45	0.000%
17	27295.18	-70379.69	-18023.50	-27295.11	70379.69	18023.45	0.000%
18	31454.41	-70379.69	-133.66	-31453.87	70379.66	133.65	0.001%
19	27426.52	-70379.69	16052.44	-27426.45	70379.69	-16052.40	0.000%
20	16098.68	-70379.69	27990.42	-16098.64	70379.69	-27990.35	0.000%
21	2.87	-70379.69	32607.38	-2.87	70379.65	-32606.81	0.001%
22	-16390.50	-70379.69	27937.80	16390.46	70379.69	-27937.72	0.000%
23	-27617.88	-70379.69	15949.11	27617.80	70379.69	-15949.07	0.000%
24	-31575.92	-70379.69	-133.66	31575.38	70379.66	133.65	0.001%
25	-27486.54	-70379.69	-17920.16	27486.47	70379.69	17920.11	0.000%
26	-15948.88	-70379.69	-29315.90	15948.84	70379.69	29315.82	0.000%
27	7.19	-47397.58	-15756.99	-7.19	47397.53	15754.62	0.005%
28	7863.28	-47397.58	-13664.04	-7862.81	47397.56	13663.21	0.002%
29	13408.36	-47397.58	-7862.03	-13407.56	47397.56	7861.56	0.002%
30	15322.54	-47397.58	-65.18	-15320.29	47397.53	65.16	0.005%
31	13299.04	-47397.58	7700.82	-13298.25	47397.56	-7700.37	0.002%
32	7751.91	-47397.58	13502.38	-7751.45	47397.56	-13501.57	0.002%
33	7.19	-47397.58	15668.68	-7.19	47397.53	-15666.32	0.005%
34	-7747.49	-47397.58	13502.94	7747.03	47397.56	-13502.12	0.002%
35	-13296.83	-47397.58	7704.69	13296.04	47397.56	-7704.24	0.002%
36	-15314.25	-47397.58	-65.18	15311.99	47397.53	65.16	0.005%
37	-13406.15	-47397.58	-7865.90	13405.35	47397.56	7865.43	0.002%
38	-7858.86	-47397.58	-13664.59	7858.38	47397.56	13663.76	0.002%

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### Non-Linear Convergence Results

<i>Load Combination</i>	<i>Converged?</i>	<i>Number of Cycles</i>	<i>Displacement Tolerance</i>	<i>Force Tolerance</i>
1	Yes	6	0.00000001	0.00000567
2	Yes	13	0.00011822	0.00014218
3	Yes	17	0.00000001	0.00006758
4	Yes	16	0.00000001	0.00014108
5	Yes	14	0.00004870	0.00011569
6	Yes	17	0.00000001	0.00006136
7	Yes	16	0.00000001	0.00014355
8	Yes	13	0.00011827	0.00014378
9	Yes	16	0.00000001	0.00014122
10	Yes	17	0.00000001	0.00006222
11	Yes	14	0.00004870	0.00011752
12	Yes	16	0.00000001	0.00014229
13	Yes	17	0.00000001	0.00006638
14	Yes	8	0.00000001	0.00000572
15	Yes	16	0.00000001	0.00007973
16	Yes	18	0.00000001	0.00007071
17	Yes	18	0.00000001	0.00007781
18	Yes	16	0.00000001	0.00007828
19	Yes	18	0.00000001	0.00006801
20	Yes	18	0.00000001	0.00006528
21	Yes	16	0.00000001	0.00007739
22	Yes	18	0.00000001	0.00006912
23	Yes	18	0.00000001	0.00006709
24	Yes	16	0.00000001	0.00007713
25	Yes	18	0.00000001	0.00007824
26	Yes	18	0.00000001	0.00007325
27	Yes	13	0.00012146	0.00008355
28	Yes	14	0.00000001	0.00013554
29	Yes	14	0.00000001	0.00009781
30	Yes	13	0.00012148	0.00010598
31	Yes	14	0.00000001	0.00012599
32	Yes	14	0.00000001	0.00010257
33	Yes	13	0.00012147	0.00008360
34	Yes	14	0.00000001	0.00009929
35	Yes	14	0.00000001	0.00013010
36	Yes	13	0.00012148	0.00010688
37	Yes	14	0.00000001	0.00009923
38	Yes	14	0.00000001	0.00012988

### Maximum Tower Deflections - Service Wind

<i>Section No.</i>	<i>Elevation ft</i>	<i>Horz. Deflection in</i>	<i>Gov. Load Comb.</i>	<i>Tilt °</i>	<i>Twist °</i>
L1	175 - 128.66	46.833	38	2.2176	0.0201
L2	133.34 - 85.09	28.063	38	2.0012	0.0074
L3	90.91 - 42.03	12.784	38	1.3581	0.0028
L4	48.97 - 0	3.646	38	0.6792	0.0010

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### Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
175.00	Lightning Rod 1"x8'	38	46.833	2.2176	0.0223	41914
173.00	BA6312	38	45.900	2.2119	0.0215	41914
170.00	Andrew 6' w/Radome	38	44.500	2.2038	0.0204	41914
163.00	KP6F-23	38	41.247	2.1829	0.0177	17464
158.00	MF-900B	38	38.943	2.1650	0.0159	12327
147.00	APXVSP18-C-A20 w/Mount Pipe	38	33.967	2.1109	0.0121	7483
135.00	7770.00 w/Mount Pipe	38	28.760	2.0177	0.0087	5255
125.00	PiROD 13' Low Profile Platform	38	24.661	1.9039	0.0066	4622
115.00	RV90-17-02DP w/Mount Pipe	38	20.819	1.7614	0.0051	4213
98.00	6' Yagi	38	14.955	1.4804	0.0035	3641

### Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	175 - 128.66	110.161	15	5.3046	0.0444
L2	133.34 - 85.09	65.461	15	4.7327	0.0183
L3	90.91 - 42.03	29.577	15	3.1694	0.0079
L4	48.97 - 0	8.367	15	1.5655	0.0030

### Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
175.00	Lightning Rod 1"x8'	15	110.161	5.3046	0.0447	16849
173.00	BA6312	15	107.931	5.2890	0.0431	16849
170.00	Andrew 6' w/Radome	15	104.590	5.2653	0.0408	16849
163.00	KP6F-23	15	96.826	5.2052	0.0359	7019
158.00	MF-900B	15	91.329	5.1554	0.0324	4954
147.00	APXVSP18-C-A20 w/Mount Pipe	15	79.477	5.0114	0.0254	3005
135.00	7770.00 w/Mount Pipe	15	67.112	4.7740	0.0190	2109
125.00	PiROD 13' Low Profile Platform	15	57.423	4.4917	0.0150	1874
115.00	RV90-17-02DP w/Mount Pipe	15	48.380	4.1430	0.0120	1727
98.00	6' Yagi	15	34.644	3.4631	0.0088	1523

### Base Plate Design Data

<b>tnxTower</b>  <b>Ramaker &amp; Associates, Inc.</b> 1120 Dallas Street Sauk City, WI 53583 Phone: (608) 643-4100 FAX: (608) 643-7999	<b>Job</b>	S.WILLIMANTIC / ECSU (CT33XC614-A)	<b>Page</b>	17 of 18
	<b>Project</b>	28741	<b>Date</b>	09:18:48 06/18/14
	<b>Client</b>	Transcend Wireless	<b>Designed by</b>	tmoore

Plate Thickness	Number of Anchor Bolts	Anchor Bolt Size	Actual	Actual	Actual	Actual	Controlling Condition	Ratio
			Allowable Ratio Bolt Tension lb	Allowable Ratio Bolt Compression lb	Allowable Ratio Plate Stress ksi	Allowable Ratio Stiffener Stress ksi		
in		in						
2.0000	18	2.2500	155209.88	163027.52	41.179	53.567	Stiff	1.19 ✓
			131210.58	217809.56	45.000	45.000		
			1.18	0.75	0.92	1.19		

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P lb	Allow. P <sub>a</sub> lb	Ratio P/P <sub>a</sub>
L1	175 - 128.66 (1)	TP33.38x23x0.25	46.34	0.00	0.0	39.000	25.4568	-19497.30	992816.00	0.020
L2	128.66 - 85.09 (2)	TP42.56x31.8317x0.3125	48.25	0.00	0.0	39.000	40.6207	-36839.50	1584210.00	0.023
L3	85.09 - 42.03 (3)	TP51.47x40.6409x0.375	48.88	0.00	0.0	39.000	58.9858	-50354.30	2300450.00	0.022
L4	42.03 - 0 (4)	TP60x49.1825x0.4375	48.97	0.00	0.0	39.000	82.7100	-70358.80	3225690.00	0.022

### Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M <sub>x</sub> lb-ft	Actual f <sub>bx</sub> ksi	Allow. F <sub>bx</sub> ksi	Ratio f <sub>bx</sub> /F <sub>bx</sub>	Actual M <sub>y</sub> lb-ft	Actual f <sub>by</sub> ksi	Allow. F <sub>by</sub> ksi	Ratio f <sub>by</sub> /F <sub>by</sub>
L1	175 - 128.66 (1)	TP33.38x23x0.25	368071.67	21.915	39.000	0.562	0.00	0.000	39.000	0.000
L2	128.66 - 85.09 (2)	TP42.56x31.8317x0.3125	1374316.67	40.166	39.000	1.030	0.00	0.000	39.000	0.000
L3	85.09 - 42.03 (3)	TP51.47x40.6409x0.375	2602283.33	43.279	39.000	1.110	0.00	0.000	39.000	0.000
L4	42.03 - 0 (4)	TP60x49.1825x0.4375	4180708.33	41.248	39.000	1.058	0.00	0.000	39.000	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V lb	Actual f <sub>v</sub> ksi	Allow. F <sub>v</sub> ksi	Ratio f <sub>v</sub> /F <sub>v</sub>	Actual T lb-ft	Actual f <sub>vt</sub> ksi	Allow. F <sub>vt</sub> ksi	Ratio f <sub>vt</sub> /F <sub>vt</sub>
L1	175 - 128.66 (1)	TP33.38x23x0.25	19591.00	0.770	26.000	0.060	777.60	0.023	26.000	0.001
L2	128.66 - 85.09 (2)	TP42.56x31.8317x0.3125	27632.80	0.680	26.000	0.052	1704.59	0.024	26.000	0.001
L3	85.09 - 42.03 (3)	TP51.47x40.6409x0.375	30776.10	0.522	26.000	0.040	1899.72	0.015	26.000	0.001
L4	42.03 - 0 (4)	TP60x49.1825x0.4375	33546.20	0.406	26.000	0.031	2078.17	0.010	26.000	0.000

### Pole Interaction Design Data

<b>tnxTower</b>  <b>Ramaker &amp; Associates, Inc.</b> 1120 Dallas Street Sauk City, WI 53583 Phone: (608) 643-4100 FAX: (608) 643-7999	<b>Job</b> S.WILLIMANTIC / ECSU (CT33XC614-A)	<b>Page</b> 18 of 18
	<b>Project</b> 28741	<b>Date</b> 09:18:48 06/18/14
	<b>Client</b> Transcend Wireless	<b>Designed by</b> tmoore

Section No.	Elevation ft	Ratio $P$	Ratio $f_{bx}$	Ratio $f_{by}$	Ratio $f_v$	Ratio $f_{vt}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_a$	$F_{bx}$	$F_{by}$	$F_v$	$F_{vt}$			
L1	175 - 128.66 (1)	0.020	0.562	0.000	0.060	0.001	0.583 ✓	1.333	H1-3+VT ✓
L2	128.66 - 85.09 (2)	0.023	1.030	0.000	0.052	0.001	1.054 ✓	1.333	H1-3+VT ✓
L3	85.09 - 42.03 (3)	0.022	1.110	0.000	0.040	0.001	1.132 ✓	1.333	H1-3+VT ✓
L4	42.03 - 0 (4)	0.022	1.058	0.000	0.031	0.000	1.080 ✓	1.333	H1-3+VT ✓

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P <sub>allow</sub> lb	% Capacity	Pass Fail	
L1	175 - 128.66	Pole	TP33.38x23x0.25	1	-19497.30	1323423.67	43.7	Pass	
L2	128.66 - 85.09	Pole	TP42.56x31.8317x0.3125	2	-36839.50	2111751.84	79.1	Pass	
L3	85.09 - 42.03	Pole	TP51.47x40.6409x0.375	3	-50354.30	3066499.72	84.9	Pass	
L4	42.03 - 0	Pole	TP60x49.1825x0.4375	4	-70358.80	4299844.59	81.0	Pass	
							Summary		
							Pole (L3)	84.9	Pass
							Base Plate	89.3	Pass
							<b>RATING =</b>	<b>89.3</b>	<b>Pass</b>

**APPENDIX C**  
**MOUNT CALCULATIONS**

## Search Results

Latitude: 41.7206  
Longitude: -72.2183

ASCE 7-10 Wind Speeds  
(3-sec peak gust MPH\*):

Risk Category I: 117  
Risk Category II: 128  
Risk Category III-IV: 138  
MRI\*\* 10 Year: 78  
MRI\*\* 25 Year: 88  
MRI\*\* 50 Year: 96  
MRI\*\* 100 Year: 103

ASCE 7-05: 105  
ASCE 7-93: 83



\*MPH(Miles per hour)

\*\*MRI Mean Recurrence Interval (years)

Users should consult with local building officials

to determine if there are community-specific wind speed requirements that govern.

### WIND SPEED WEB SITE DISCLAIMER:

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1120 Dallas Street  
 Sauk City, WI 53583  
 Office: (608) 643-4100

Job: 28741  
 Project: S. Willimantic / ECSU (CT33XC614-A)  
 By: JMO  
 Date: 6/18/2014

**Wind Load on Antennas TIA-222**

**2.6.9.6 Velocity Pressure**

$$q_z = 0.00256 K_z K_{zt} K_d V^2 I$$

Occupancy:	II	Classification of Structures (Table 2-1)
Exposure:	C	Exposure Category
V:	105 mph	Basic Wind Speed (Annex B)
z:	147 ft	Height above ground level to the center of the antenna
I:	1.00	Importance Factor (Table 2-3)
K <sub>z</sub> :	1.37	Velocity Pressure Coefficient (2.6.5.2)
K <sub>zt</sub> :	1	Topographic Factor (2.6.6.4)
K <sub>d</sub> :	0.95	Wind Direction Probability Factor (Table 2-2)

**q<sub>z</sub> = 36.8 psf**

G<sub>h</sub>: 1.00 Appurtenances and their Connections

**Mount & Antenna Wind Loads**

Appurtenance	Height	Width	h/D	Shape	C <sub>a</sub>	A <sub>f</sub>	F = q <sub>z</sub> G <sub>h</sub> C <sub>a</sub> A <sub>a</sub>	
Pipe2STD x 8 ft	96.0 in	2.4 in	40.3	Round	1.200	1.59 sf	<b>70.1 lb</b>	8.8 plf
L2X2X1/8 x 1 ft	12.0 in	2.0 in	6.0	Flat	1.356	0.17 sf	<b>8.3 lb</b>	8.3 plf
HSS4X4X3/16 x 15 ft	180.0 in	4.0 in	45.0	Flat	2.000	5.00 sf	<b>368.0 lb</b>	24.5 plf
HSS4X4X3/16 x 8.5 ft	102.0 in	4.0 in	25.5	Flat	2.000	2.83 sf	<b>208.5 lb</b>	24.5 plf
APXVSP18-C-A20	72.0 in	11.9 in	6.1	Flat	1.358	5.95 sf	<b>297.2 lb</b>	
1900MHz 4x40W RRH	25.1 in	11.1 in	2.3	Flat	1.200	1.93 sf	<b>85.4 lb</b>	
800MHz 2x50W RRH	19.0 in	13.0 in	1.5	Flat	1.200	1.72 sf	<b>75.8 lb</b>	
APXV9TM14-ALU-120	56.3 in	12.6 in	4.5	Flat	1.287	4.93 sf	<b>233.4 lb</b>	
TD-RRH8x20	26.1 in	18.6 in	1.4	Flat	1.200	3.37 sf	<b>148.9 lb</b>	





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**Wind Load on Antennas TIA-222**

**2.6.9.6 Velocity Pressure**

$$q_z = 0.00256 K_z K_{zt} K_d V^2 I$$

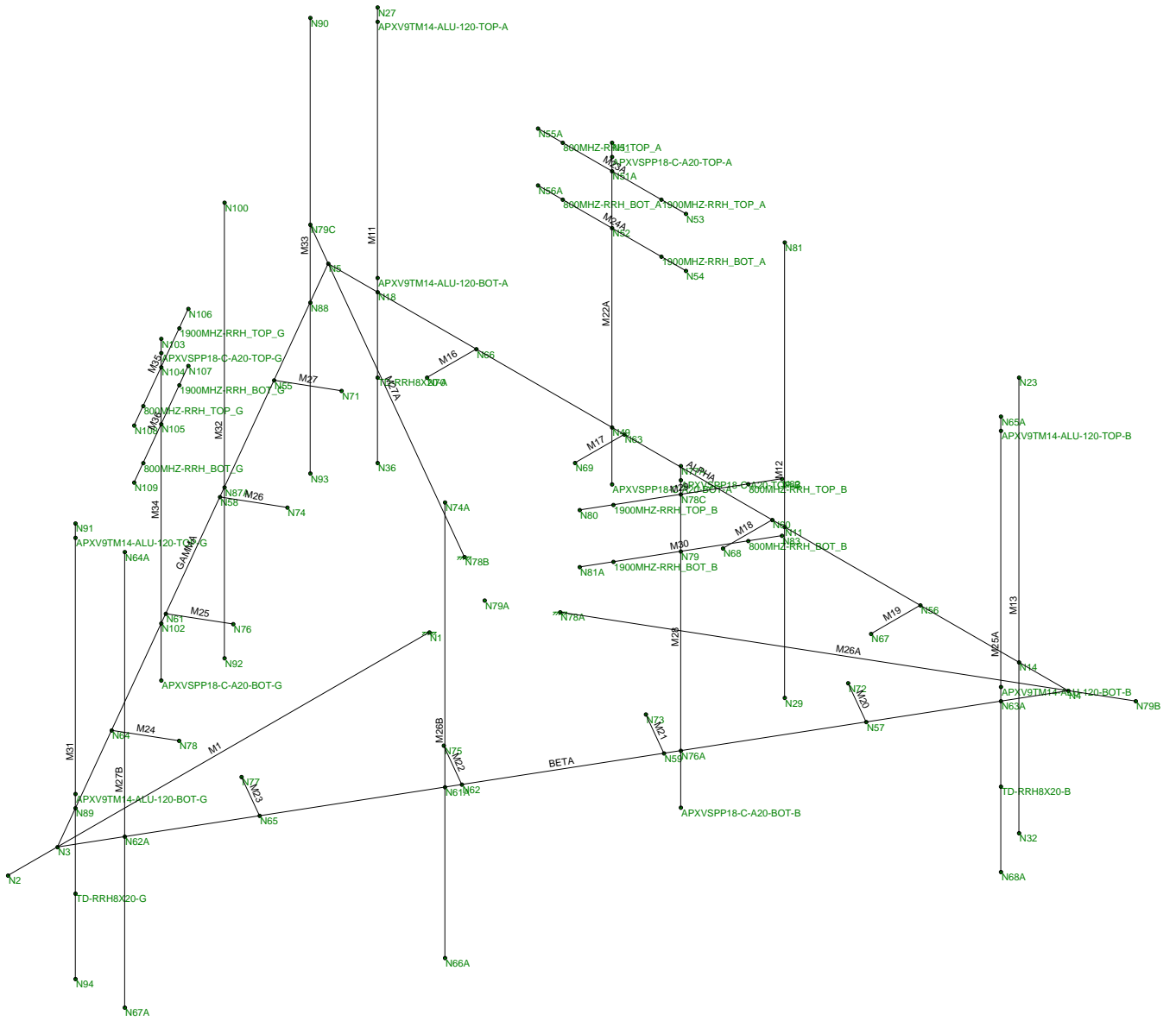
Occupancy:	II	Classification of Structures (Table 2-1)
Exposure:	C	Exposure Category
V:	105 mph	Basic Wind Speed (Annex B)
z:	147 ft	Height above ground level to the center of the antenna
I:	1.00	Importance Factor (Table 2-3)
K <sub>z</sub> :	1.37	Velocity Pressure Coefficient (2.6.5.2)
K <sub>zt</sub> :	1	Topographic Factor (2.6.6.4)
K <sub>d</sub> :	0.95	Wind Direction Probability Factor (Table 2-2)

**q<sub>z</sub> = 36.8 psf**

G<sub>h</sub>: 1.00 Appurtenances and their Connections

**Mount & Antenna Wind Loads**

Appurtenance	Height	Depth	h/D	Shape	C <sub>a</sub>	A <sub>f</sub>	F = q <sub>z</sub> G <sub>h</sub> C <sub>a</sub> A <sub>a</sub>	
Pipe2STD x 8 ft	96.0 in	2.4 in	40.3	Round	1.200	1.59 sf	<b>70.1 lb</b>	8.8 plf
L2X2X1/8 x 1 ft	12.0 in	2.0 in	6.0	Flat	1.356	0.17 sf	<b>8.3 lb</b>	8.3 plf
HSS4X4X3/16 x 15 ft	180.0 in	4.0 in	45.0	Flat	2.000	5.00 sf	<b>368.0 lb</b>	24.5 plf
HSS4X4X3/16 x 8.5 ft	102.0 in	4.0 in	25.5	Flat	2.000	2.83 sf	<b>208.5 lb</b>	24.5 plf
APXVSP18-C-A20	72.0 in	7.0 in	10.3	Flat	1.509	3.50 sf	<b>194.6 lb</b>	
1900MHz 4x40W RRH	25.1 in	10.7 in	2.3	Flat	1.200	1.86 sf	<b>82.3 lb</b>	
800MHz 2x50W RRH	19.0 in	12.2 in	1.6	Flat	1.200	1.61 sf	<b>71.1 lb</b>	
APXV9TM14-ALU-120	56.3 in	6.3 in	8.9	Flat	1.465	2.46 sf	<b>132.8 lb</b>	
TD-RRH8x20	26.1 in	6.7 in	3.9	Flat	1.262	1.21 sf	<b>56.4 lb</b>	



Envelope Only Solution

Ramaker & Associates

JMO

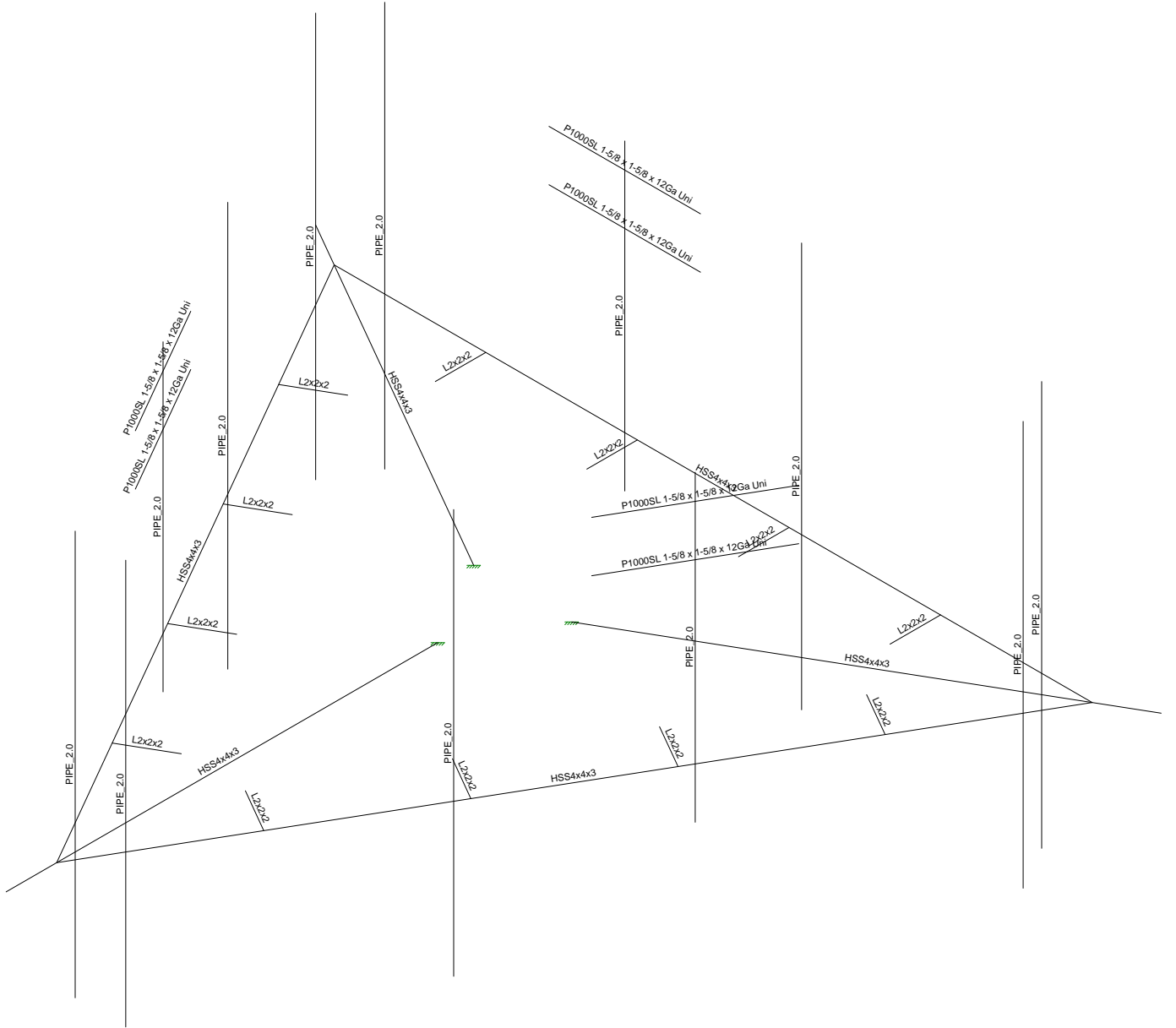
28741

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SK - 1

June 18, 2014 at 3:37 PM

28741 Mount.r3d



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28741

S. Willimantic / ECSU (CT33XC614-A)

SK - 2
June 18, 2014 at 3:38 PM
28741 Mount.r3d



### Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A53 Gr. B	29000	11154	.3	.65	.49	35	1.5	60	1.2
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	Gr. 33	29000	11154	.3	.65	.49	33	1.5	58	1.2
4	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
5	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
6	A500 Gr.42	29000	11154	.3	.65	.49	42	1.4	58	1.3
7	A500 Gr.46	29000	11154	.3	.65	.49	46	1.4	58	1.3

### Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	pipe mount	PIPE 2.0	Beam	Pipe	A53 Gr. B	Typical	1.02	.627	.627	1.25
2	grating angle	L2x2x2	Beam	Single Angle	A36 Gr.36	Typical	.491	.189	.189	.003
3	face/standoff	HSS4x4x3	Beam	SquareTube	A36 Gr.36	Typical	2.58	6.21	6.21	10
4	unistrut	P1000SL 1...	Beam	Channel	Gr. 33	Typical	.556	.238	.191	.002

### Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			face/standoff	Beam	SquareTube	A36 Gr.36	Typical
2	BETA	N4	N3			face/standoff	Beam	SquareTube	A36 Gr.36	Typical
3	GAMMA	N5	N3			face/standoff	Beam	SquareTube	A36 Gr.36	Typical
4	ALPHA	N4	N5			face/standoff	Beam	SquareTube	A36 Gr.36	Typical
5	M11	N27	N36			pipe mount	Beam	Pipe	A53 Gr. B	Typical
6	M12	N81	N29			pipe mount	Beam	Pipe	A53 Gr. B	Typical
7	M13	N23	N32			pipe mount	Beam	Pipe	A53 Gr. B	Typical
8	M16	N66	N70		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
9	M17	N63	N69		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
10	M18	N60	N68		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
11	M19	N56	N67		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
12	M20	N57	N72		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
13	M21	N59	N73		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
14	M22	N62	N75		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
15	M23	N65	N77		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
16	M24	N64	N78		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
17	M25	N61	N76		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
18	M26	N58	N74		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
19	M27	N55	N71		90	grating angle	Beam	Single Angle	A36 Gr.36	Typical
20	M26A	N78A	N79B			face/standoff	Beam	SquareTube	A36 Gr.36	Typical
21	M27A	N78B	N79C			face/standoff	Beam	SquareTube	A36 Gr.36	Typical
22	M22A	N51	APXVSP...			pipe mount	Beam	Pipe	A53 Gr. B	Typical
23	M23A	N55A	N53		180	unistrut	Beam	Channel	Gr. 33	Typical
24	M24A	N56A	N54		180	unistrut	Beam	Channel	Gr. 33	Typical
25	M25A	N65A	N68A			pipe mount	Beam	Pipe	A53 Gr. B	Typical
26	M26B	N74A	N66A			pipe mount	Beam	Pipe	A53 Gr. B	Typical
27	M27B	N64A	N67A			pipe mount	Beam	Pipe	A53 Gr. B	Typical
28	M28	N77A	APXVSP...			pipe mount	Beam	Pipe	A53 Gr. B	Typical
29	M29	N82	N80		180	unistrut	Beam	Channel	Gr. 33	Typical
30	M30	N83	N81A		180	unistrut	Beam	Channel	Gr. 33	Typical
31	M31	N91	N94			pipe mount	Beam	Pipe	A53 Gr. B	Typical
32	M32	N100	N92			pipe mount	Beam	Pipe	A53 Gr. B	Typical
33	M33	N90	N93			pipe mount	Beam	Pipe	A53 Gr. B	Typical
34	M34	N103	APXVSP...			pipe mount	Beam	Pipe	A53 Gr. B	Typical
35	M35	N108	N106		180	unistrut	Beam	Channel	Gr. 33	Typical
36	M36	N109	N107		180	unistrut	Beam	Channel	Gr. 33	Typical



**Joint Coordinates and Temperatures**

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	1.12	0	
2	N2	0	0	9.660254	0	
3	N3	0	0	8.660254	0	
4	N4	7.5	0	-4.330127	0	
5	N5	-7.5	0	-4.330127	0	
6	N11	1.75	0	-4.330127	0	
7	N14	6.5	0	-4.330127	0	
8	N18	-6.5	0	-4.330127	0	
9	N23	6.5	5	-4.330127	0	
10	N27	-6.5	5	-4.330127	0	
11	N29	1.75	-3	-4.330127	0	
12	N32	6.5	-3	-4.330127	0	
13	N36	-6.5	-3	-4.330127	0	
14	APXVSP18-C-A20-TOP-A	-1.75	4.75	-4.330127	0	
15	APXVSP18-C-A20-BOT-A	-1.75	-1	-4.330127	0	
16	APXV9TM14-ALU-120-TOP-A	-6.5	4.75	-4.330127	0	
17	APXV9TM14-ALU-120-BOT-A	-6.5	.25	-4.330127	0	
18	TD-RRH8X20-A	-6.5	-1.5	-4.330127	0	
19	N55	-6	0	-1.732051	0	
20	N56	4.5	0	-4.330127	0	
21	N57	6	0	-1.732051	0	
22	N58	-4.5	0	0.866025	0	
23	N59	4.5	0	0.866025	0	
24	N60	1.5	0	-4.330127	0	
25	N61	-3	0	3.464102	0	
26	N62	3	0	3.464102	0	
27	N63	-1.5	0	-4.330127	0	
28	N64	-1.5	0	6.062178	0	
29	N65	1.5	0	6.062178	0	
30	N66	-4.5	0	-4.330127	0	
31	N67	4.5	0	-3.330127	0	
32	N68	1.5	0	-3.330127	0	
33	N69	-1.5	0	-3.330127	0	
34	N70	-4.5	0	-3.330127	0	
35	N71	-5.133987	0	-2.2321	0	
36	N72	5.133987	0	-2.2321	0	
37	N73	3.633958	0	0.365959	0	
38	N74	-3.633958	0	0.365959	0	
39	N75	2.13393	0	2.964019	0	
40	N76	-2.13393	0	2.964019	0	
41	N77	0.633851	0	5.562165	0	
42	N78	-0.633851	0	5.562165	0	
43	N81	1.75	5	-4.330127	0	
44	N79A	0	0	-0.	0	
45	N78A	0.969948	0	-.56	0	
46	N79B	8.366025	0	-4.830127	0	
47	N78B	-0.969948	0	-.56	0	
48	N79C	-8.366025	0	-4.830127	0	
49	N49	-1.75	0	-4.330127	0	
50	N51	-1.75	5	-4.330127	0	
51	N51A	-1.75	4.5	-4.330127	0	
52	N52	-1.75	3.5	-4.330127	0	
53	N53	-.25	4.5	-4.330127	0	
54	N54	-.25	3.5	-4.330127	0	
55	N55A	-3.25	4.5	-4.330127	0	
56	N56A	-3.25	3.5	-4.330127	0	



**Joint Coordinates and Temperatures (Continued)**

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
57	800MHZ-RRH TOP A	-2.75	4.5	-4.330127	0	
58	800MHZ-RRH BOT A	-2.75	3.5	-4.330127	0	
59	1900MHZ-RRH TOP A	-.75	4.5	-4.330127	0	
60	1900MHZ-RRH BOT A	-.75	3.5	-4.330127	0	
61	N61A	2.875	0	3.680608	0	
62	N62A	0.5	0	7.794229	0	
63	N63A	7	0	-3.464102	0	
64	N64A	0.5	5	7.794229	0	
65	N65A	7	5	-3.464102	0	
66	N66A	2.875	-3	3.680608	0	
67	N67A	0.5	-3	7.794229	0	
68	N68A	7	-3	-3.464102	0	
69	APXVSPP18-C-A20-TOP-B	4.625	4.75	0.649519	0	
70	APXVSPP18-C-A20-BOT-B	4.625	-1	0.649519	0	
71	APXV9TM14-ALU-120-TOP-B	7	4.75	-3.464102	0	
72	APXV9TM14-ALU-120-BOT-B	7	.25	-3.464102	0	
73	TD-RRH8X20-B	7	-1.5	-3.464102	0	
74	N74A	2.875	5	3.680608	0	
75	N76A	4.625	0	0.649519	0	
76	N77A	4.625	5	0.649519	0	
77	N78C	4.625	4.5	0.649519	0	
78	N79	4.625	3.5	0.649519	0	
79	N80	3.875	4.5	1.948557	0	
80	N81A	3.875	3.5	1.948557	0	
81	N82	5.375	4.5	-0.649519	0	
82	N83	5.375	3.5	-0.649519	0	
83	800MHZ-RRH TOP B	5.125	4.5	-0.216506	0	
84	800MHZ-RRH BOT B	5.125	3.5	-0.216506	0	
85	1900MHZ-RRH TOP B	4.125	4.5	1.515544	0	
86	1900MHZ-RRH BOT B	4.125	3.5	1.515544	0	
87	N87A	-4.625	0	0.649519	0	
88	N88	-7	0	-3.464102	0	
89	N89	-0.5	0	7.794229	0	
90	N90	-7	5	-3.464102	0	
91	N91	-0.5	5	7.794229	0	
92	N92	-4.625	-3	0.649519	0	
93	N93	-7	-3	-3.464102	0	
94	N94	-0.5	-3	7.794229	0	
95	APXVSPP18-C-A20-TOP-G	-2.875	4.75	3.680608	0	
96	APXVSPP18-C-A20-BOT-G	-2.875	-1	3.680608	0	
97	APXV9TM14-ALU-120-TOP-G	-.5	4.75	7.794229	0	
98	APXV9TM14-ALU-120-BOT-G	-.5	.25	7.794229	0	
99	TD-RRH8X20-G	-.5	-1.5	7.794229	0	
100	N100	-4.625	5	0.649519	0	
101	N102	-2.875	0	3.680608	0	
102	N103	-2.875	5	3.680608	0	
103	N104	-2.875	4.5	3.680608	0	
104	N105	-2.875	3.5	3.680608	0	
105	N106	-3.625	4.5	2.38157	0	
106	N107	-3.625	3.5	2.38157	0	
107	N108	-2.125	4.5	4.979646	0	
108	N109	-2.125	3.5	4.979646	0	
109	800MHZ-RRH TOP G	-2.375	4.5	4.546633	0	
110	800MHZ-RRH BOT G	-2.375	3.5	4.546633	0	
111	1900MHZ-RRH TOP G	-3.375	4.5	2.814583	0	
112	1900MHZ-RRH BOT G	-3.375	3.5	2.814583	0	



**Joint Boundary Conditions**

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
2	N78A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
3	N78B	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	

**Joint Loads and Enforced Displacements (BLC 1 : DL)**

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*...]
1	APXVSP18-C-A20-TOP-A	L	Y	-28.5
2	APXVSP18-C-A20-BOT-A	L	Y	-28.5
3	APXV9TM14-ALU-120-TOP-A	L	Y	-27.5
4	APXV9TM14-ALU-120-BOT-A	L	Y	-27.5
5	TD-RRH8X20-A	L	Y	-70
6	1900MHZ-RRH TOP A	L	Y	-30
7	1900MHZ-RRH BOT A	L	Y	-30
8	800MHZ-RRH TOP A	L	Y	-32
9	800MHZ-RRH BOT A	L	Y	-32
10	APXVSP18-C-A20-TOP-B	L	Y	-28.5
11	APXVSP18-C-A20-BOT-B	L	Y	-28.5
12	APXV9TM14-ALU-120-TOP-B	L	Y	-27.5
13	APXV9TM14-ALU-120-BOT-B	L	Y	-27.5
14	TD-RRH8X20-B	L	Y	-70
15	800MHZ-RRH TOP B	L	Y	-32
16	800MHZ-RRH BOT B	L	Y	-32
17	1900MHZ-RRH TOP B	L	Y	-30
18	1900MHZ-RRH BOT B	L	Y	-30
19	APXVSP18-C-A20-TOP-G	L	Y	-28.5
20	APXVSP18-C-A20-BOT-G	L	Y	-28.5
21	APXV9TM14-ALU-120-TOP-G	L	Y	-27.5
22	APXV9TM14-ALU-120-BOT-G	L	Y	-27.5
23	TD-RRH8X20-G	L	Y	-70
24	800MHZ-RRH TOP G	L	Y	-32
25	800MHZ-RRH BOT G	L	Y	-32
26	1900MHZ-RRH TOP G	L	Y	-30
27	1900MHZ-RRH BOT G	L	Y	-30

**Joint Loads and Enforced Displacements (BLC 2 : WLz)**

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*...]
1	APXVSP18-C-A20-TOP-A	L	Z	-148.6
2	APXVSP18-C-A20-BOT-A	L	Z	-148.6
3	APXV9TM14-ALU-120-TOP-A	L	Z	-116.7
4	APXV9TM14-ALU-120-BOT-A	L	Z	-116.7
5	TD-RRH8X20-A	L	Z	-148.9
6	1900MHZ-RRH TOP A	L	Z	-42.7
7	1900MHZ-RRH BOT A	L	Z	-42.7
8	800MHZ-RRH TOP A	L	Z	-37.9
9	800MHZ-RRH BOT A	L	Z	-37.9
10	APXVSP18-C-A20-TOP-B	L	Z	-148.6
11	APXVSP18-C-A20-BOT-B	L	Z	-148.6
12	APXV9TM14-ALU-120-TOP-B	L	Z	-116.7
13	APXV9TM14-ALU-120-BOT-B	L	Z	-116.7
14	TD-RRH8X20-B	L	Z	-148.9
15	800MHZ-RRH TOP B	L	Z	-37.9
16	800MHZ-RRH BOT B	L	Z	-37.9
17	1900MHZ-RRH TOP B	L	Z	-42.7
18	1900MHZ-RRH BOT B	L	Z	-42.7

**Joint Loads and Enforced Displacements (BLC 2 : WLz) (Continued)**

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*...]
19	APXVSP18-C-A20-TOP-G	L	Z	-148.6
20	APXVSP18-C-A20-BOT-G	L	Z	-148.6
21	APXV9TM14-ALU-120-TOP-G	L	Z	-116.7
22	APXV9TM14-ALU-120-BOT-G	L	Z	-116.7
23	TD-RRH8X20-G	L	Z	-148.9
24	800MHZ-RRH TOP G	L	Z	-37.9
25	800MHZ-RRH BOT G	L	Z	-37.9
26	1900MHZ-RRH TOP G	L	Z	-42.7
27	1900MHZ-RRH BOT G	L	Z	-42.7

**Joint Loads and Enforced Displacements (BLC 3 : WLx)**

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*...]
1	APXVSP18-C-A20-TOP-A	L	X	-148.6
2	APXVSP18-C-A20-BOT-A	L	X	-148.6
3	APXV9TM14-ALU-120-TOP-A	L	X	-116.7
4	APXV9TM14-ALU-120-BOT-A	L	X	-116.7
5	TD-RRH8X20-A	L	X	-148.9
6	1900MHZ-RRH TOP A	L	X	-42.7
7	1900MHZ-RRH BOT A	L	X	-42.7
8	800MHZ-RRH TOP A	L	X	-37.9
9	800MHZ-RRH BOT A	L	X	-37.9
10	APXVSP18-C-A20-TOP-B	L	X	-148.6
11	APXVSP18-C-A20-BOT-B	L	X	-148.6
12	APXV9TM14-ALU-120-TOP-B	L	X	-116.7
13	APXV9TM14-ALU-120-BOT-B	L	X	-116.7
14	TD-RRH8X20-B	L	X	-148.9
15	800MHZ-RRH TOP B	L	X	-37.9
16	800MHZ-RRH BOT B	L	X	-37.9
17	1900MHZ-RRH TOP B	L	X	-42.7
18	1900MHZ-RRH BOT B	L	X	-42.7
19	APXVSP18-C-A20-TOP-G	L	X	-148.6
20	APXVSP18-C-A20-BOT-G	L	X	-148.6
21	APXV9TM14-ALU-120-TOP-G	L	X	-116.7
22	APXV9TM14-ALU-120-BOT-G	L	X	-116.7
23	TD-RRH8X20-G	L	X	-148.9
24	800MHZ-RRH TOP G	L	X	-37.9
25	800MHZ-RRH BOT G	L	X	-37.9
26	1900MHZ-RRH TOP G	L	X	-42.7
27	1900MHZ-RRH BOT G	L	X	-42.7

**Member Distributed Loads (BLC 1 : DL)**

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft.%]	End Location[ft.%]
1	M16	Y	-5	-5	0	0
2	M19	Y	-5	-5	0	0
3	M20	Y	-5	-5	0	0
4	M24	Y	-5	-5	0	0
5	M27	Y	-5	-5	0	0
6	M23	Y	-5	-5	0	0

**Member Distributed Loads (BLC 2 : WLz)**

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft.%]	End Location[ft.%]
1	M12	Z	-8.8	-8.8	0	0
2	M13	Z	-8.8	-8.8	0	0
3	M26B	Z	-8.8	-8.8	0	0





**Member Distributed Loads (BLC 2 : WLz) (Continued)**

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
4	M27B	Z	-8.8	-8.8	0	0
5	M32	Z	-8.8	-8.8	0	0
6	M33	Z	-8.8	-8.8	0	0
7	M1	PZ	-24.5	-24.5	0	0
8	BETA	PZ	-24.5	-24.5	0	0
9	GAMMA	PZ	-24.5	-24.5	0	0
10	ALPHA	PZ	-24.5	-24.5	0	0
11	M26A	PZ	-24.5	-24.5	0	0
12	M27A	PZ	-24.5	-24.5	0	0
13	M16	PZ	-8.3	-8.3	0	0
14	M17	PZ	-8.3	-8.3	0	0
15	M18	PZ	-8.3	-8.3	0	0
16	M19	PZ	-8.3	-8.3	0	0
17	M20	PZ	-8.3	-8.3	0	0
18	M21	PZ	-8.3	-8.3	0	0
19	M22	PZ	-8.3	-8.3	0	0
20	M23	PZ	-8.3	-8.3	0	0
21	M24	PZ	-8.3	-8.3	0	0
22	M25	PZ	-8.3	-8.3	0	0
23	M26	PZ	-8.3	-8.3	0	0
24	M27	PZ	-8.3	-8.3	0	0

**Member Distributed Loads (BLC 3 : WLx)**

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M12	X	-8.8	-8.8	0	0
2	M13	X	-8.8	-8.8	0	0
3	M26B	X	-8.8	-8.8	0	0
4	M27B	X	-8.8	-8.8	0	0
5	M32	X	-8.8	-8.8	0	0
6	M33	X	-8.8	-8.8	0	0
7	M1	PX	-24.5	-24.5	0	0
8	BETA	PX	-24.5	-24.5	0	0
9	GAMMA	PX	-24.5	-24.5	0	0
10	ALPHA	PX	-24.5	-24.5	0	0
11	M26A	PX	-24.5	-24.5	0	0
12	M27A	PX	-24.5	-24.5	0	0
13	M16	PX	-8.3	-8.3	0	0
14	M17	PX	-8.3	-8.3	0	0
15	M18	PX	-8.3	-8.3	0	0
16	M19	PX	-8.3	-8.3	0	0
17	M20	PX	-8.3	-8.3	0	0
18	M21	PX	-8.3	-8.3	0	0
19	M22	PX	-8.3	-8.3	0	0
20	M23	PX	-8.3	-8.3	0	0
21	M24	PX	-8.3	-8.3	0	0
22	M25	PX	-8.3	-8.3	0	0
23	M26	PX	-8.3	-8.3	0	0
24	M27	PX	-8.3	-8.3	0	0

**Member Distributed Loads (BLC 4 : LL1)**

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M16	Y	-25	-25	0	0
2	M19	Y	-25	-25	0	0
3	M20	Y	-25	-25	0	0
4	M24	Y	-25	-25	0	0
5	M27	Y	-25	-25	0	0



**Member Distributed Loads (BLC 4 : LL1) (Continued)**

Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
6 M23	Y	-25	-25	0	0

**Member Distributed Loads (BLC 6 : BLC 1 Transient Area Loads)**

Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1 M24	Y	-7.5	-7.5	1.861e-5	1
2 M25	Y	-15	-15	7.048e-6	1
3 M26	Y	-15	-15	0	1
4 M27	Y	-7.5	-7.5	1.147e-5	1
5 M20	Y	-7.5	-7.5	1.164e-5	1
6 M21	Y	-15.001	-15.001	7.99e-5	1
7 M22	Y	-15.001	-15.001	3.574e-5	1
8 M23	Y	-7.5	-7.5	0	1
9 M16	Y	-7.5	-7.5	2.685e-15	1
10 M17	Y	-15	-15	7.425e-16	1
11 M18	Y	-15	-15	1.943e-15	1
12 M19	Y	-7.5	-7.5	2.311e-15	1

**Member Distributed Loads (BLC 7 : BLC 4 Transient Area Loads)**

Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1 M24	Y	-37.502	-37.502	1.861e-5	1
2 M25	Y	-75.001	-75.001	7.048e-6	1
3 M26	Y	-75	-75	0	1
4 M27	Y	-37.502	-37.502	1.147e-5	1
5 M20	Y	-37.502	-37.502	1.164e-5	1
6 M21	Y	-75.006	-75.006	7.99e-5	1
7 M22	Y	-75.005	-75.005	3.574e-5	1
8 M23	Y	-37.501	-37.501	0	1
9 M16	Y	-37.5	-37.5	2.685e-15	1
10 M17	Y	-75	-75	7.425e-16	1
11 M18	Y	-75	-75	1.943e-15	1
12 M19	Y	-37.5	-37.5	2.311e-15	1

**Member Area Loads (BLC 1 : DL)**

Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1 N64	N55	N71	N78	Y	A-B	-5
2 N77	N72	N57	N65	Y	A-B	-5
3 N56	N66	N70	N67	Y	A-B	-5

**Member Area Loads (BLC 4 : LL1)**

Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1 N64	N55	N71	N78	Y	A-B	-25
2 N77	N72	N57	N65	Y	A-B	-25
3 N56	N66	N70	N67	Y	A-B	-25

**Basic Load Cases**

BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...)	Surface(P...
1 DL	DL		-1		27		6	3
2 WLz	WLZ				27		24	
3 WLx	WLX				27		24	
4 LL1	LL						6	3
5 LL2	None					2		
6 BLC 1 Transient Area L...	None						12	



**Basic Load Cases (Continued)**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(P...
7	BLC 4 Transient Area L...	None						12	

**Load Combinations**

	Description	Sol...	PDelta	SR...	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor
1	1.4DL	Yes	Y	DL	1.4										
2	1.2DL+1.6WLz	Yes	Y	DL	1.2	WLZ	1.6								
3	1.2DL-1.6WLz	Yes	Y	DL	1.2	WLZ	-1.6								
4	1.2DL+1.6WLx	Yes	Y	DL	1.2	WLX	1.6								
5	1.2DL-1.6WLx	Yes	Y	DL	1.2	WLX	-1.6								
6	1.2DL+1.6(0.75WLz+0.75...	Yes	Y	DL	1.2	WLZ	1.2	WLX	1.2						
7	1.2DL+1.6(0.75WLz-0.75...	Yes	Y	DL	1.2	WLZ	1.2	WLX	-1.2						
8	1.2DL-1.6(0.75WLz-0.75...	Yes	Y	DL	1.2	WLZ	-1.2	WLX	1.2						
9	1.2DL-1.6(0.75WLz+0.75...	Yes	Y	DL	1.2	WLZ	-1.2	WLX	-1.2						
10	1.2DL+1.5LLend	Yes	Y	DL	1.2	LL	1.5								
11	1.2DL+1.5LLmid	Yes	Y	DL	1.2	5	1.5								
12	1.2DL+1.5LL+10%1.6WLz	Yes	Y	DL	1.2	LL	1.5	WLZ	.16						
13	1.2DL+1.5LL-10%1.6WLz	Yes	Y	DL	1.2	LL	1.5	WLZ	-.16						
14	1.2DL+1.5LL+10%1.6WLx	Yes	Y	DL	1.2	LL	1.5	WLX	.16						
15	1.2DL+1.5LL-10%1.6WLx	Yes	Y	DL	1.2	LL	1.5	WLX	-.16						
16	1.2DL+1.5LL+10%1.6(0.7...	Yes	Y	DL	1.2	LL	1.5	WLZ	.12	WLX	.12				
17	1.2DL+1.5LL+10%1.6(0.7...	Yes	Y	DL	1.2	LL	1.5	WLZ	.12	WLX	-.12				
18	1.2DL+1.5LL-10%1.6(0.7...	Yes	Y	DL	1.2	LL	1.5	WLZ	-.12	WLX	.12				
19	1.2DL+1.5LL-10%1.6(0.7...	Yes	Y	DL	1.2	LL	1.5	WLZ	-.12	WLX	-.12				
20	1.2DL+1.5LL+10%1.6WLz	Yes	Y	DL	1.2	5	1.5	WLZ	.16						
21	1.2DL+1.5LL-10%1.6WLz	Yes	Y	DL	1.2	5	1.5	WLZ	-.16						
22	1.2DL+1.5LL+10%1.6WLx	Yes	Y	DL	1.2	5	1.5	WLX	.16						
23	1.2DL+1.5LL-10%1.6WLx	Yes	Y	DL	1.2	5	1.5	WLX	-.16						
24	1.2DL+1.5LL+10%1.6(0.7...	Yes	Y	DL	1.2	5	1.5	WLZ	.12	WLX	.12				
25	1.2DL+1.5LL+10%1.6(0.7...	Yes	Y	DL	1.2	5	1.5	WLZ	.12	WLX	-.12				
26	1.2DL+1.5LL-10%1.6(0.7...	Yes	Y	DL	1.2	5	1.5	WLZ	-.12	WLX	.12				
27	1.2DL+1.5LL-10%1.6(0.7...	Yes	Y	DL	1.2	5	1.5	WLZ	-.12	WLX	-.12				
28	DL		Y	DL	1										
29	WLz		Y	WLZ	1										
30	WLx		Y	WLX	1										

**Envelope Joint Reactions**

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N1	max	810.654	4	1479.31	3	3650.619	2	54.511	2	2281.687	4	1121.938	5
2		min	-810.737	5	195.043	2	-3657.943	3	-6969.674	3	-2282.697	5	-1192.809	4
3	N78A	max	3206.27	8	1494.106	7	2147.836	7	3770.616	7	1193.133	3	5955.736	7
4		min	-3209.232	7	178.352	8	-2133.4	8	-376.782	8	-1208.745	2	40.381	8
5	N78B	max	3180.375	6	1513.625	24	2252.604	6	3826.299	6	1334.686	2	-5.478	9
6		min	-3179.226	9	177.886	9	-2237.265	9	-322.431	9	-1320.607	3	-5991.587	24
7	Totals:	max	6505.447	4	3720.9	16	6559.064	2						
8		min	-6505.447	5	2483.344	9	-6559.064	3						

**Envelope AISC 13th(360-05): LRFD Steel Code Checks**

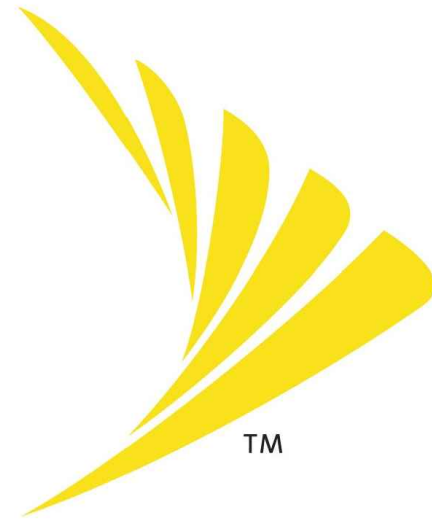
Member	Shape	Code Ch...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc ...	phi*Pnt [...]	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	M1	HSS4x4x3	.815	0	.179	0	y	4	66435.75	83592	9909	9909	2...	H1-1b
2	BETA	HSS4x4x3	.495	0	.282	0	z	6	41153.4...	83592	9909	9909	2...	H3-6
3	GAMMA	HSS4x4x3	.575	15	.294	15	z	7	41153.4...	83592	9909	9909	3	H3-6
4	ALPHA	HSS4x4x3	.514	15	.284	15	z	3	41153.4...	83592	9909	9909	2.7	H3-6



**Envelope AISC 13th(360-05): LRFD Steel Code Checks (Continued)**

Member	Shape	Code Ch...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc ...	phi*Pnt [...]	phi*Mn ...	phi*Mn ...	Cb	Eqn	
5	M11	PIPE 2.0	.534	5	6	.041	4.75		6	14916.0...	32130	1871.625	1871.625	1...	H1-1b
6	M12	PIPE 2.0	.101	5	6	.008	5		6	14916.0...	32130	1871.625	1871.625	2...	H1-1b
7	M13	PIPE 2.0	.101	5	7	.008	5		7	14916.0...	32130	1871.625	1871.625	2...	H1-1b
8	M16	L2x2x2	.144	0	14	.023	0	z	10	13860.6...	15908.4	402.563	844.628	2...	H2-1
9	M17	L2x2x2	.172	0	14	.027	0	z	13	13860.6...	15908.4	402.563	844.628	2...	H2-1
10	M18	L2x2x2	.172	0	14	.027	0	z	17	13860.6...	15908.4	402.563	844.628	2...	H2-1
11	M19	L2x2x2	.144	0	14	.023	0	z	19	13860.6...	15908.4	402.563	844.628	2...	H2-1
12	M20	L2x2x2	.144	0	12	.023	0	z	12	13860.6...	15908.4	402.563	844.628	2...	H2-1
13	M21	L2x2x2	.172	0	12	.027	0	z	10	13860.5...	15908.4	402.563	844.628	2...	H2-1
14	M22	L2x2x2	.172	0	12	.027	0	z	18	13860.5...	15908.4	402.563	844.628	2...	H2-1
15	M23	L2x2x2	.144	0	12	.023	0	z	12	13860.4...	15908.4	402.563	844.628	2...	H2-1
16	M24	L2x2x2	.144	0	13	.023	0	z	12	13860.4...	15908.4	402.563	844.628	2...	H2-1
17	M25	L2x2x2	.172	0	13	.027	0	z	16	13860.5...	15908.4	402.563	844.628	2...	H2-1
18	M26	L2x2x2	.172	0	13	.027	0	z	10	13860.5...	15908.4	402.563	844.628	2...	H2-1
19	M27	L2x2x2	.144	0	13	.023	0	z	12	13860.6...	15908.4	402.563	844.628	2...	H2-1
20	M26A	HSS4x4x3	.822	0	7	.190	0	y	9	66435.75	83592	9909	9909	2...	H1-1b
21	M27A	HSS4x4x3	.848	0	6	.182	0	y	8	66435.75	83592	9909	9909	2...	H1-1b
22	M22A	PIPE 2.0	1.254	5	6	.063	1.5		6	20866.7...	32130	1871.625	1871.625	1...	H1-1b
23	M23A	P1000SL 1-...	.136	1.5	3	.023	1.5	z	3	8841.674	16500.8...	853.479	732.127	1...	H1-1b
24	M24A	P1000SL 1-...	.136	1.5	2	.023	1.5	z	2	8841.674	16500.8...	853.479	732.127	1...	H1-1b
25	M25A	PIPE 2.0	.534	5	9	.041	4.75		9	14916.0...	32130	1871.625	1871.625	1...	H1-1b
26	M26B	PIPE 2.0	.101	5	9	.008	5		9	14916.0...	32130	1871.625	1871.625	2...	H1-1b
27	M27B	PIPE 2.0	.101	5	9	.008	5		9	14916.0...	32130	1871.625	1871.625	2...	H1-1b
28	M28	PIPE 2.0	1.255	5	9	.065	1.5		9	20866.7...	32130	1871.625	1871.625	1...	H1-1b
29	M29	P1000SL 1-...	.139	1.5	6	.024	1.5	z	6	8841.674	16500.8...	853.479	732.127	1...	H1-1b
30	M30	P1000SL 1-...	.139	1.5	6	.024	1.5	z	6	8841.674	16500.8...	853.479	732.127	1...	H1-1b
31	M31	PIPE 2.0	.534	5	8	.041	4.75		8	14916.0...	32130	1871.625	1871.625	1...	H1-1b
32	M32	PIPE 2.0	.101	5	8	.008	5		8	14916.0...	32130	1871.625	1871.625	2...	H1-1b
33	M33	PIPE 2.0	.101	5	8	.008	5		8	14916.0...	32130	1871.625	1871.625	2...	H1-1b
34	M34	PIPE 2.0	1.256	5	8	.065	1.5		8	20866.7...	32130	1871.625	1871.625	1...	H1-1b
35	M35	P1000SL 1-...	.139	1.5	8	.024	1.5	z	8	8841.674	16500.8...	853.479	732.127	1...	H1-1b
36	M36	P1000SL 1-...	.139	1.5	8	.024	1.5	z	8	8841.674	16500.8...	853.479	732.127	1...	H1-1b

# Sprint®



PROJECT: 2.5 EQUIPMENT DEPLOYMENT

SITE NAME: S.WILLIMANTIC/ECSU

SITE CASCADE: CT33XC614-A

SITE ADDRESS: 165 WINDHAM ST.  
WILLIMANTIC, CT 06226

SITE TYPE: 175'-0" MONOPOLE



6580 SPRINT PARKWAY  
OVERLAND PARK, KANSAS 66251



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



48 SPRUCE STREET  
OAKLAND, NJ 07346

**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.



*James R. Skowronski* Signature: \_\_\_\_\_ Date: 6/19/2014

MARK	DATE	DESCRIPTION
A	06/19/14	REDLINES # FINAL CONSTRUCTION DRAWINGS
ISSUE PHASE	FINAL	DATE ISSUED 06/19/2014

PROJECT TITLE:  
**S.WILLIMANTIC/ECSU  
SITE#:CT33XC614-A**

PROJECT INFORMATION:  
165 WINDHAM STREET  
WILLIMANTIC, CT 06226  
WINDHAM COUNTY

SHEET TITLE:  
**TITLE SHEET**

SCALE: NONE

PROJECT NUMBER: 28741  
SHEET NUMBER: T-1

**SITE INFORMATION**

**PROPERTY OWNER:**  
EASTERN CT STATE UNIVERSITY  
165 WINDHAM ST.  
WILLIMANTIC, CT 06226  
PH.:(860)465-5000

**SITE ADDRESS:**  
165 WINDHAM ST.  
WILLIMANTIC, CT 06226  
WINDHAM COUNTY

**GEOGRAPHIC COORDINATES:**  
LATITUDE: 41.720556°, 41° 43' 14.0016" N  
LONGITUDE: -72.218333°, 72° 13' 5.9988" W

**ZONING JURISDICTION:**  
CONNECTICUT SITING COUNCIL

**ZONING DISTRICT:**  
RG-RESIDENTIAL/PROFESSIONAL OFFICE

**POWER COMPANY:**  
CONN. LIGHT AND POWER  
PH.: (800) 286-2000

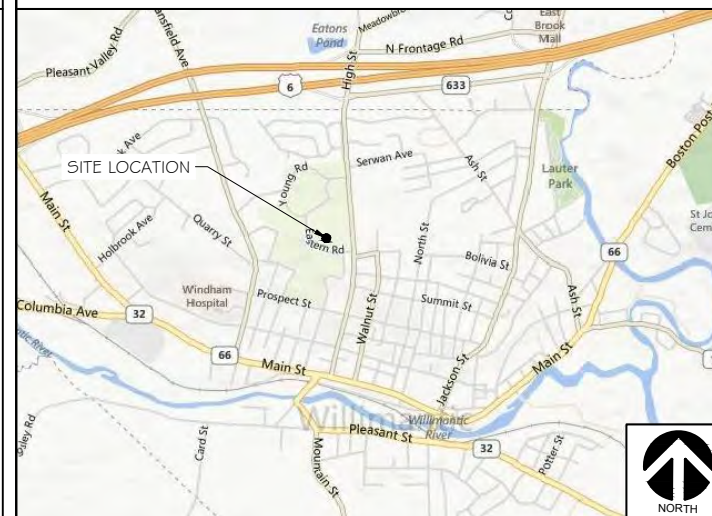
**AAV PROVIDER:**  
AT&T  
PH.: (210) 821-4105

**SPRINT CONSTRUCTION MANAGER:**  
NAME: MIKE DELIA  
PHONE: (781) 316-6348  
E-MAIL: michael.delia@sprint.com

**EQUIPMENT SUPPLIER:**  
ALCATEL-LUCENT  
600-700 MOUNTAIN AVENUE  
MURRAY HILL, NJ 07974  
PH.: (908) 508-8080

**PLANS PREPARED BY:**  
RAMAKER & ASSOCIATES, INC.  
CONTACT: KEITH BOHNSACK, PROJECT MANAGER  
PH.: (608) 643-4100  
EMAIL: kbohnsack@ramaker.com

**AREA MAP**



**LOCATION MAP**



**PROJECT DESCRIPTION**

- INSTALL NEW 2.5 EQUIPMENT IN EXISTING BTS CABINET  
\*(1) RECTIFIER SHELF AND (3) RECTIFIERS  
\*(1) BASE BAND UNIT
- INSTALL (2) NEW BATTERY STRINGS IN EXISTING BATTERY CABINET
- INSTALL (3) PANEL ANTENNAS
- INSTALL (3) RRH'S ON TOWER
- INSTALL (1) FIBER CABLE AND (2) FIBER JUMPERS
- INSTALL (27) ANTENNA / RRH JUMPERS

**APPLICABLE CODES**

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

1. INTERNATIONAL BUILDING CODE
2. ANSI/TIA-222 STRUCTURAL STANDARD FOR ANTENNA STRUCTURES
3. NFPA 780 - LIGHTNING PROTECTION CODE
4. NATIONAL ELECTRIC CODE



**SECTION 01 100 - SCOPE OF WORK**

**THE WORK:**  
THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE CONSTRUCTION DRAWINGS AND ASSOCIATED OUTLINE SPECIFICATIONS AND THE SITE SPECIFIC WORK ORDER, DESCRIBE THE WORK TO BE PERFORMED BY THIS CONSTRUCTION CONTRACTOR (SUPPLIER).

**RELATED DOCUMENTS:**

- A. THE REQUIREMENTS OF EACH SECTION OF THIS SPECIFICATION APPLY TO ALL SECTIONS, INDIVIDUALLY AND COLLECTIVELY.
- B. RELATED DOCUMENTS: THE CONTRACTOR SHALL COMPLY WITH THE MOST CURRENT VERSION OF THE FOLLOWING SUPPLEMENTAL REQUIREMENTS FOR INSTALLATION AND TESTING.
  - 1. EN-201 2-001 : (FIBER OPTIC, DC CABLE, AND DC CIRCUIT BREAKER TAGGING STANDARDS)
  - 2. TS-0200 - (TRANSMISSION ANTENNA LINE ACCEPTANCE STANDARDS)
  - 3. EL-0568: (FIBER TESTING POLICY)
  - 4. NP-312-201 : (EXTERIOR GROUNDING SYSTEM TESTING)
  - 5. NP-760-500: ETHERNET, MICROWAVE, TESTING AND ACCEPTANCE

**PRECEDENCE:**

SHOULD CONFLICTS OCCUR BETWEEN THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AND THE CONSTRUCTION DRAWINGS, INFORMATION ON THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE. NOTIFY SPRINT CONSTRUCTION MANAGER IF THIS OCCURS.

**NATIONALLY RECOGNIZED CODES AND STANDARDS:**

- THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
- A. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
  - B. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
  - C. GR-1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY -GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
  - D. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE - "NEC") AND NFPA 101 (LIFE SAFETY CODE).
  - E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
  - F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
  - G. AMERICAN CONCRETE INSTITUTE (ACI)
  - H. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
  - I. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
  - J. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
  - K. PORTLAND CEMENT ASSOCIATION (PCA)
  - L. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
  - M. BRICK INDUSTRY ASSOCIATION (BIA)
  - N. AMERICAN WELDING SOCIETY (AWS)
  - O. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
  - P. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
  - Q. DOOR AND HARDWARE INSTITUTE (DHI)
  - R. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
  - 5. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

**DEFINITIONS:**

- A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
- B. COMPANY: "SPRINT"; SPRINT NEXTEL CORPORATION AND ITS OPERATING ENTITIES.
- C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
- D. CONTRACTOR: CONSTRUCTION CONTRACTOR, SUPPLIER, CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.
- E. THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.
- F. CONSTRUCTION MANAGER - ALL PROJECTS RELATED COMMUNICATION TO FLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT.

**SITE FAMILIARITY:**

CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE SPRINT CONSTRUCTION MANAGER PRIOR TO THE COMMENCEMENT OF WORK. NO COMPENSATION WILL BE AWARDED BASED ON CLAIM OF LACK OF KNOWLEDGE OR FIELD CONDITIONS.

**POINT OF CONTACT:**

COMMUNICATION BETWEEN SPRINT AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE SPRINT CONSTRUCTION MANAGER APPOINTED TO MANAGE THE PROJECT FOR SPRINT.

**ON-SITE SUPERVISION:**

THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL EMPLOY A COMPETENT SUPERINTENDENT WHO SHALL BE IN ATTENDANCE AT THE SITE AT ALL TIMES DURING PERFORMANCE OF THE WORK.

**DRAWINGS REQUIRED AT JOBSITE:**

- THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS FOR WIRELESS SITES AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.
- A. THE JOBSITE DRAWINGS SHALL BE CLEARLY MARKED DAILY IN RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS-BUILT" DRAWINGS.
  - B. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.

**USE OF JOB SITE:**

THE CONTRACTOR SHALL CONFINE ALL CONSTRUCTION AND RELATED OPERATIONS INCLUDING STAGING AND STORAGE OF MATERIALS AND EQUIPMENT, PARKING, TEMPORARY FACILITIES, AND WASTE STORAGE TO THE LEASE PARCEL UNLESS OTHERWISE PERMITTED BY THE CONTRACT DOCUMENTS.

**UTILITY SERVICES:**

WHERE NECESSARY TO CUT EXISTING PIPES, ELECTRICAL WIRES, CONDUITS, CABLES, ETC., OF UTILITY SERVICES, OR OF FIRE PROTECTION OR COMMUNICATIONS SYSTEMS, THEY SHALL BE CUT AND CAPPED AT SUITABLE PLACES OR WHERE SHOWN. ALL SUCH ACTIONS SHALL BE COORDINATED WITH THE UTILITY COMPANY INVOLVED:

**PERMITS/FEES:**

WHEN REQUIRED THAT A PERMIT OR CONNECTION FEE BE PAID TO A PUBLIC UTILITY PROVIDER FOR NEW SERVICE TO THE CONSTRUCTION PROJECT, PAYMENT OF SUCH FEE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

**CONTRACTOR:**

CONTRACTOR SHALL TAKE ALL MEASURES AND PROVIDE ALL MATERIAL NECESSARY FOR PROTECTING EXISTING EQUIPMENT AND PROPERTY.

**USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:**

CONTRACTOR WILL UTILIZE ITS BEST EFFORTS TO WORK WITH SPRINT ELECTRONIC PROJECT MANAGEMENT SYSTEMS. CONTRACTOR UNDERSTANDS THAT SUFFICIENT INTERNET ACCESS, EQUIVALENT TO "BROADBAND" OR BETTER, IS REQUIRED TO TIMELY AND EFFECTIVELY UTILIZE SPRINT DATA AND DOCUMENT MANAGEMENT SYSTEMS AND AGREES TO MAINTAIN APPROPRIATE CONNECTIONS FOR CONTRACTOR'S STAFF AND OFFICES THAT ARE COMPATIBLE WITH SPRINT DATA AND DOCUMENT MANAGEMENT SYSTEMS

**TEMPORARY UTILITIES AND FACILITIES:**

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY UTILITIES AND FACILITIES NECESSARY EXCEPT AS OTHERWISE INDICATED IN THE CONSTRUCTION DOCUMENTS. TEMPORARY UTILITIES AND FACILITIES INCLUDE POTABLE WATER, HEAT, HVAC, ELECTRICITY, SANITARY FACILITIES, WASTE DISPOSAL FACILITIES, AND TELEPHONE/COMMUNICATION SERVICES. PROVIDE TEMPORARY UTILITIES AND FACILITIES IN ACCORDANCE WITH OSHA AND THE AUTHORITY HAVING JURISDICTION. CONTRACTOR MAY UTILIZE THE COMPANY ELECTRICAL SERVICE IN THE COMPLETION OF THE WORK WHEN IT BECOMES AVAILABLE. USE OF THE LESSOR'S OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN THE CONTRACT DOCUMENTS.

**ACCESS TO WORK:**

THE CONTRACTOR SHALL PROVIDE ACCESS TO THE JOB SITE FOR AUTHORIZED COMPANY PERSONNEL AND AUTHORIZED REPRESENTATIVES OF THE ARCHITECT/ENGINEER DURING ALL PHASES OF THE WORK.

**DIMENSIONS:**

VERIFY DIMENSIONS INDICATED ON DRAWINGS WITH FIELD DIMENSIONS BEFORE FABRICATION OR ORDERING OF MATERIALS. DO NOT SCALE DRAWINGS.

**EXISTING CONDITIONS:**

NOTIFY THE SPRINT CONSTRUCTION MANAGER OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

**SECTION 01 200 - COMPANY FURNISHED MATERIAL AND EQUIPMENT**

**FURNISHED MATERIALS:**

COMPANY FURNISHED MATERIALS AND EQUIPMENT TO BE INSTALLED BY THE CONTRACTOR (OFIC) IS IDENTIFIED ON THE RF DATA SHEET IN THE CONSTRUCTION DOCUMENTS.

**RECEIPT OF MATERIAL AND EQUIPMENT:**

A. THE CONTRACTOR IS RESPONSIBLE FOR SPRINT PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:

- 1. ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.
  - 2. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES.
  - 3. TAKE RESPONSIBILITY FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT.
- B. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY-FOUR HOURS AFTER RECEIPT, REPORT TO SPRINT OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
- C. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
- D. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF-LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

**DELIVERABLES:**

- A. COMPLETE SHIPPING AND RECEIPT DOCUMENTATION IN ACCORDANCE WITH COMPANY PRACTICE.
- B. IF APPLICABLE, COMPLETE LOST/STOLEN/DAMAGED DOCUMENTATION REPORT AS NECESSARY IN ACCORDANCE WITH COMPANY PRACTICE, AND AS DIRECTED BY COMPANY.

**SECTION 01 300 - CELL SITE CONSTRUCTION**

**NOTICE TO PROCEED:**

- A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S ISSUANCE OF THE WORK ORDER.
- B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE SPRINT WITH AN OPERATIONAL WIRELESS FACILITY.

**GENERAL REQUIREMENTS FOR 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

**FUNCTIONAL REQUIREMENTS:**

- A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. CONTRACTOR SHALL TAKE ALL ACTIONS AS NECESSARY TO SUCCESSFULLY COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.
- B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.
- C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES
- D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - 1. PERFORM ANY REQUIRED SITE ENVIRONMENTAL MITIGATION.
  - 2. PREPARE GROUND SITES; PROVIDE DE-GRUBBING; AND ROUGH AND FINAL GRADING, AND COMPOUND SURFACE TREATMENTS.
  - 3. MANAGE AND CONDUCT ALL ACTIVITIES FOR INSTALLATION OF UTILITIES INCLUDING ELECTRICAL AND BACKHAUL (FIBER, COPPER, OR MICROWAVE).
  - 4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
  - 5. INSTALL ABOVE GROUND GROUNDING SYSTEMS, CONDUIT AND BOXES.
  - 6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
  - 7. INSTALL "H-FRAMES", CABINETS AND PADS AND PLATFORMS AS INDICATED.
  - 8. INSTALL ROADS, ACCESS WAYS, CURBS AND DRAINS AS INDICATED.
  - 9. ACCOMPLISH REQUIRED MODIFICATION OF EXISTING FACILITIES.

- 10. PROVIDE ANTENNA SUPPORT STRUCTURE FOUNDATIONS.
- 11. PROVIDE SLABS AND EQUIPMENT PLATFORMS.
- 12. INSTALL COMPOUND FENCING, SIGHT SHIELDING, LANDSCAPING AND ACCESS BARRIERS.
- 13. PERFORM INSPECTION AND MATERIAL TESTING AS REQUIRED HEREINAFTER.
- 14. CONDUCT SITE RESISTANCE TO EARTH TESTING AS REQUIRED HEREINAFTER.
- 15. INSTALL FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS.
- 16. INSTALL TOWERS, ANTENNA SUPPORT STRUCTURES AND PLATFORMS ON EXISTING TOWERS AS REQUIRED.
- 17. INSTALL CELL SITE RADIOS, MICROWAVE, GPS, COAXIAL MAINLINE, ANTENNAS, CROSS BAND COUPLERS, TOWER TOP AMPLIFIERS, LOW NOISE AMPLIFIERS AND RELATED EQUIPMENT.
- 18. CONDUCT ALL REQUIRED TESTS AND INSPECTIONS
- 19. PERFORM, DOCUMENT, AND CLOSE OUT ALL JURISDICTIONAL PERMITTING REQUIREMENTS AND ANY CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
- 20. PERFORM ALL ADDITIONAL WORK AS IDENTIFIED IN SCOPE OF SERVICES ATTACHED TO THE SUPPLIER AGREEMENT FOR THIS PROJECT. THIS WORK MAY INCLUDE COMMISSIONING, INTEGRATION, SPECIAL WAREHOUSING, REVERSE LOGISTICS ACTIVITIES, ETC. PERFORM COMMISSIONING AND INTEGRATION ACTIVITIES PER APPLICABLE MOPS.

**DELIVERABLES:**

- A. THE CONTRACTOR SHALL PROVIDE ALL REQUIRED TEST REPORTS AND DOCUMENTATION INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
  - 1. PRODUCT SPECIFICATIONS FOR MATERIALS OR SPECIAL CONSTRUCTION IF REQUESTED BY SPRINT
  - 2. ACTUALIZE ALL CONSTRUCTION RELATED MILESTONES IN SITERRA AND COMPLETE ALL ON-LINE FORMS AND COMPLETE DOCUMENT UP-LOADS. UPLOAD ALL REQUIRED CLOSEOUT DOCUMENTS AND FINAL SITE PHOTOS
  - 3. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT LEFT ON SITE INSIDE BASE OF MAIN RF CABINET IN A PROTECTIVE POUCH.
  - 4. ALL REQUIRED TEST REPORTS.
  - 5. REQUIRED CLOSEOUT DOCUMENTATION INCLUDING BUT NOT LIMITED TO:
    - a. ALL JURISDICTIONAL PERMITTING AND OCCUPANCY INFORMATION
    - b. PDF SCAN OF REDLINES PRODUCED IN THE FIELD
    - c. ELECTRONIC AS-BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS
    - d. LIEN WAIVERS
    - e. FINAL PAYMENT APPLICATION
    - f. REQUIRED FINAL CONSTRUCTION PHOTOS
    - g. CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
    - h. LISTS OF SUBCONTRACTORS
- B. PROVIDE ADDITIONAL DOCUMENTATION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING. DOCUMENTATION SHALL BE FORWARDED IN ORIGINAL FORMAT AND/OR UPLOADED INTO SMS.
  - 1. ALL CORRESPONDENCE AND PRELIMINARY CONSTRUCTION REPORTS.
  - 2. PROJECT PROGRESS REPORTS.
  - 3. PRE-CONSTRUCTION MEETING NOTES.

**SECTION 01 400 - TESTS, INSPECTIONS, SUBMITTALS, AND PROJECT CLOSEOUT**

**TESTS AND INSPECTIONS:**

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
- B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - 1. COAX SWEEPS AND FIBER TESTS PER TS-0200 (CURRENT VERSION) ANTENNA LINE ACCEPTANCE STANDARDS
  - 2. POST CONSTRUCTION HEIGHT VERIFICATION, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE-FOR-THE-PURPOSE ANTENNA ALIGNMENT TOOL.
  - 3. CONCRETE BREAK TESTS
  - 4. SITE RESISTANCE TO EARTH TEST
  - 5. STRUCTURAL BACKFILL COMPACTION TESTS
  - 6. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.
  - 7. ADDITIONAL TESTING AS REQUIRED ELSEWHERE IN THIS SPECIFICATION.

**SUBMITTALS:**

- A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.
- B. UPLOAD THE FOLLOWING TO SITERRA AS APPLICABLE INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - 1. CONCRETE MIX-DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
  - 2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
  - 3. CHEMICAL GROUNDING SYSTEM .
  - 4. REINFORCEMENT CERTIFICATIONS
  - 5. STRUCTURAL BACKFILL TEST RESULTS
  - 6. SWEEP AND FIBER TESTS
  - 7. ANTENNA AZIMUTH AND DOWN-TILT VERIFICATION
  - 8. POST CONSTRUCTION HEIGHT VERIFICATION
  - 9. ADDITIONAL SUBMITTALS MAY BE REQUIRED FOR SPECIAL CONSTRUCTION OR MINOR MATERIALS
- C. ALTERNATES: AT THE COMPANY'S REQUEST, ANY ALTERNATIVES TO THE MATERIALS OR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO BEING SHIPPED TO SITE. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED. SUBMITTAL FOR APPROVAL SHALL INCLUDE A STATEMENT OF COST REDUCTION PROPOSED FOR USE OF ALTERNATE PRODUCT.

**TESTING BY THIRD PARTY AGENCY:**

- A. EMPLOY AN AGENCY OF ENGINEERS AND SCIENTISTS WHO IS REGULARLY ENGAGED IN FIELD AND LABORATORY TESTING AND ANALYSIS. AGENCY SHALL HAVE BEEN IN BUSINESS A MINIMUM OF FIVE YEARS, AND BE LICENSED AS PROFESSIONAL ENGINEERS IN THE STATE WHERE THE PROJECT IS LOCATED. AGENCY IS SUBJECT TO APPROVAL BY COMPANY.
  - 1. AGENCY MUST HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
  - 2. AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
  - 3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASHTO, AND OTHER METHODS IS NEEDED.
- B. REQUIRED THIRD PARTY TESTS:
  - 1. SITE RESISTANCE TO EARTH TEST PER NP-312-201
  - 2. CONCRETE CYLINDER BREAK TESTS FOR TOWER PIER AND ANCHORS PER NATIONALLY RECOGNIZED STANDARDS
  - 3. STRUCTURAL SOILS COMPACTION TESTS PER NATIONALLY RECOGNIZED STANDARDS
  - 4. REBAR PLACEMENT VERIFICATION WITH REPORT
  - 5. TESTING TENSION STUDY FOR ROCK ANCHORS
  - 6. ALL THIRD PARTY TESTS AS REQUIRED BY LOCAL JURISDICTION
- C. REQUIRED TESTS BY CONTRACTOR
  - 1. COAX SWEEP TESTS PER SPRINT STANDARD TS-0200
  - 2. FIBER TESTS PER SPRINT STANDARD EL-0568
  - 3. MICROWAVE LINK TESTS PER NP-760-500
  - 4. ANTENNA AZIMUTHS AND DOWN TILT USING ELECTRONIC ALIGNMENT TOOL PER ANTENNA INSTALLATION SPECIFICATION HEREIN.



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OAKLAND, NJ 07346

**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.



Signature: *James R. Skowronski* Date: 6/19/2014

MARK	DATE	DESCRIPTION
A	06/19/14	REDLINES & FINAL CONSTRUCTION DRAWINGS

ISSUE PHASE	FINAL	DATE ISSUED	06/19/2014
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PROJECT TITLE:  
**S.WILLIMANTIC/ECSU  
SITE#:CT33XC614-A**

PROJECT INFORMATION:  
165 WINDHAM STREET  
WILLIMANTIC, CT 06226  
WINDHAM COUNTY

SHEET TITLE:  
**SPRINT SPECIFICATIONS**

SCALE: NONE

PROJECT NUMBER	28741
SHEET NUMBER	SP-1

5. POST CONSTRUCTION HEIGHT VERIFICATION AS REQUIRED HERewith IN THE TOWER INSTALLATION SPECIFICATIONS.
  6. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED HERewith IN THE ASPHALT PAVING SPECIFICATIONS.
  7. FIELD QUALITY CONTROL TESTING AS SPECIFIED HERewith IN THE CONCRETE PAVING SPECIFICATIONS.
  8. TESTING REQUIRED HERewith UNDER SPECIFICATIONS FOR AGGREGATE BASE FOR ROADWAYS
  9. ALL OTHER TESTS REQUIRED BY LOCAL JURISDICTION
- D. INSPECTIONS BY COMPANY: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN INSPECTION ACTIVITIES, FINAL ACCEPTANCE / PUNCH WALK REVIEW, AND/OR AS A RESULT OF TESTING
- E. SPRINT RESERVES THE RIGHT TO INSPECT THE CONSTRUCTION SITE AT ANY TIME VIA SITE WALKS AND/OR PHOTO REVIEWS. CONTRACTOR SHALL GIVE SPRINT 24 HOURS NOTICE PRIOR TO THE COMMENCEMENT OF THE FOLLOWING CONSTRUCTION ACTIVITIES AND PHOTOGRAPHS OF THE IN-PROGRESS WORK.
1. GROUNDING SYSTEM AND BURIED UTILITIES INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
  2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
  3. COMPACTION OF BACKFILL MATERIALS, AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS, ASPHALT PAVING, AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
  4. PRE AND POST CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES. PRIOR TO CONSTRUCTION ACTIVITIES AND AFTER CONSTRUCTION IS COMPLETE. PROVIDE PHOTOGRAPHIC DOCUMENTATION OF ROOF, FLASHINGS, AND PARAPETS, BOTH BEFORE AND AFTER CONSTRUCTION IS COMPLETE.
  5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
  6. TOWER TOP AND INACCESSIBLE EQUIPMENT (RRUS, ANTENNAS, AND CABLING): PROVIDE PHOTOS OF THE BACKS OF ALL ANTENNAS, RRUS, COMBINERS, FILTERS, FIBER AND DC CABLING, CABLE COLOR CODING, EQUIPMENT GROUNDING AND CONNECTOR WATER PROOFING INCLUDING NAME PLATE AND SERIAL NUMBER FOR ALL SERIALIZED EQUIPMENT.

**PROJECT CLOSEOUT:**

- A. FINAL ACCEPTANCE PUNCH WALK AND INSPECTION: AS IDENTIFIED IN THE SCOPE OF SERVICES, SPRINT WILL CONDUCT A FINAL PUNCH WALK OR FINAL DESK TOP PHOTO REVIEW (SITE MODIFICATIONS). PUNCH WALKS MUST BE SCHEDULED IN ADVANCE AS REQUIRED. AT THE PUNCH WALK REVIEW, SPRINT MAY IDENTIFY CRITICAL DEFICIENCIES WHICH MUST BE CORRECTED PRIOR TO PUTTING SITE ON AIR. MINOR DEFICIENCIES MUST BE CORRECTED WITHIN 30 DAYS EXCEPT AS OTHERWISE REQUIRED. VERIFICATIONS OF CORRECTIONS MAY BE MADE BY COMPANY DURING A REPEAT SITE WALK OR DESK TOP PHOTO REVIEW AT COMPANY'S SOLE DISCRETION.
- B. CLOSEOUT DOCUMENTATION: ALL CLOSEOUT DOCUMENTATION AND PHOTOGRAPHS SHALL BE UPLOADED PRIOR TO FINAL ACCEPTANCE. SPRINT WILL REVIEW CLOSEOUT DOCUMENTATION FOR PRESENCE AND CONTENT. CLOSEOUT DOCUMENTATION SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING AS APPLICABLE:
1. COAX SWEEP TESTS:
  2. FIBER TESTS:
  3. JURISDICTION FINAL INSPECTION DOCUMENTATION
  4. REINFORCEMENT CERTIFICATION (MILL CERTIFICATION)
  5. CONCRETE MIX DESIGN AND PRODUCT DATA (TOWER FOUNDATION)
  6. LIEN WAIVERS AND RELEASES.
  7. POST -CONSTRUCTION HEIGHT VERIFICATION
  8. JURISDICTION CERTIFICATE OF OCCUPANCY
  9. ELECTRONIC ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
  10. STRUCTURAL BACKFILL TEST RESULTS (IF APPLICABLE)
  11. CELL SITE UTILITY SETUP
  12. AS-BUILT REDLINE CONSTRUCTION DRAWINGS (PDF SCAN OF FIELD MARKS)
  13. AS-BUILT CONSTRUCTION DRAWINGS IN DWG AND PDF FORMATS
  14. LIST OF SUB CONTRACTORS
  15. APPROVED PERMITTING DOCUMENTS
  16. FINAL SITE PHOTOS UP-LOADED TO SITERRA. INCLUDE THE FOLLOWING AS APPLICABLE:
    - a. TOWER, ANTENNAS, RRUS, AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX/CABLE LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING - TOP AND BOTTOM; PHOTOS OF COAX GROUNDING--TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
    - b. ROOF TOPS: PRE-CONSTRUCTION AND POST-CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;
    - c. SITE LAYOUT - PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
    - d. FINISHED UTILITIES: CLOSE-UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE-UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE-UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.

**PROJECT PHOTOGRAPHS:**

- A. PROVIDE PROJECT CLOSEOUT GENERAL ARRANGEMENT PHOTOS OF ALL NEW WORK. THE FOLLOWING LIST REPRESENTS MINIMUM REQUIREMENTS AND MINIMUM QUANTITY. ADDITIONAL PHOTOS MAY BE REQUIRED TO ADEQUATELY DOCUMENT THE WORK.
1. ASR AND RF MPE SIGNAGE (IF NOT IN PLACE, SUPPLIER NOTIFIES EMS FIELD REPRESENTATIVE)
  2. BACK OF ANTENNAS AND RRUS (1 EACH SECTOR)
  3. BACK OF ANTENNAS AND RRUS (1 EACH SECTOR) CLOSE UP SHOWING WEATHERPROOFING AND GROUNDING (AS REQUIRED). CLOSE-UP OF BACK SIDE OF EACH PERMANENT RRU SHOWING SERIAL NUMBER/BAR CODE.
  4. VIEW (1 EACH SECTOR) ALONG THE AZIMUTH AND TILT OF THE ANTENNAS
  5. TOP OF TOWER FROM GROUND, 1 EACH SECTOR
  6. MAINLINE HYBRID CABLE ROUTE DOWN TOWER SHOWING FASTENERS AND SUPPORT
  7. MAINLINE/HYBRID CABLE ROUTE ALONG ICE BRIDGE OR IN CABLE TRAY SHOWING FASTENERS AND SUPPORT
  8. GROUND MOUNTED RRU RACKS (FRONT AND BACK)
  9. FRONT, SIDE AND BACK ELEVATIONS OF ALL GROUND CABINETS
  10. VIEW OF COMPOUND FROM A DISTANCE
  11. VIEW OF EACH GROUND CABINET (POWER, RF, FIBER SPOOL, PPC POWER, PPC TELCO WITH DOOR OPEN)
  12. BACKHAUL FIBER MEET-ME POINT AND CONDUIT ROUTE (MICROWAVE INSTALLATION IF NOT FIBER)
  13. AAV NETWORK INTERFACE DEVICE OR MICROWAVE RADIO INSTALLATION

**DEFICIENCY CORRECTIONS:**

CONTRACTOR IS RESPONSIBLE FOR ALL CORRECTIONS TO DEFICIENCIES IDENTIFIED THROUGH TESTING, REVIEW OF SUBMITTALS, INSPECTIONS AND CLOSEOUT REVIEWS.

**SECTION 01 500 - PROJECT REPORTING**

**WEEKLY REPORTS:**

- A. CONTRACTOR SHALL REPORT TO SPRINT AT MINIMUM ON A WEEKLY BASIS VIA SITERRA BY UPDATING ALL APPLICABLE POST END KEEPING MILESTONES WITH ACTUAL AND FORECASTED COMPLETION DATES.
- B. ADDITIONAL REQUIREMENTS FOR REPORTING MAY BE IDENTIFIED ELSEWHERE OR REQUIRED BY THE SCOPE OF SERVICES OR SPRINTS LOCAL MARKET CONSTRUCTION MANAGER. THIS INFORMATION WILL PROVIDE A BASIS FOR PROGRESS MONITORING AND PAYMENT.

**PROJECT CONFERENCE CALLS:**

SPRINT MAY HOLD PERIODIC PROJECT CONFERENCE CALLS. CONTRACTOR WILL BE REQUIRED TO COMMUNICATE SITE STATUS, MILESTONE COMPLETIONS AND UPCOMING MILESTONE PROJECTIONS, AND ANSWER ANY OTHER SITE STATUS QUESTIONS AS NECESSARY.

**FINAL PROJECT ACCEPTANCE:** PRIOR TO SPRINTS FINAL PROJECT ACCEPTANCE. ALL REQUIRED MILESTONE ACTUALS MUST BE UPDATED IN SITERRA AND ALL REQUIRED REPORTING TASKS MUST BE COMPLETE.

**SECTION 11 700 - ANTENNA ASSEMBLY, REMOTE RADIO UNITS AND CABLE INSTALLATION**

**SUMMARY:**

THIS SECTION SPECIFIES INSTALLATION OF ANTENNAS, RRUS, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

**ANTENNAS AND RRUS:**

THE NUMBER AND TYPE OF ANTENNAS AND RRUS TO BE INSTALLED IS DETAILED ON THE CONSTRUCTION DRAWINGS.

**HYBRID CABLE:**

HYBRID CABLE WILL BE DC/FIBER AND FURNISHED FOR INSTALLATION AT EACH SITE. CABLE SHALL BE INSTALLED PER THE CONSTRUCTION DRAWINGS AND THE APPLICABLE MANUFACTURER'S REQUIREMENTS.

**JUMPERS AND CONNECTORS:**

FURNISH AND INSTALL 1/2" COAX JUMPER CABLES BETWEEN THE RRUS AND ANTENNAS. JUMPERS SHALL BE TYPE LDF 4, FLC 1 2-50, CR 540, OR FXL 540. SUPER-FLEX CABLES ARE NOT ACCEPTABLE. JUMPERS BETWEEN THE RRUS AND ANTENNAS OR TOWER TOP AMPLIFIERS SHALL CONSIST OF 1/2 INCH FOAM DIELECTRIC, OUTDOOR RATED COAXIAL CABLE, MIN. LENGTH FOR JUMPER SHALL BE 10'-0".

**REMOTE ELECTRICAL TILT (RET) CABLES:**

**MISCELLANEOUS:**

INSTALL SPLITTERS, COMBINERS, FILTERS PER RF DATA SHEET, FURNISHED BY SPRINT.

**ANTENNA INSTALLATION:**

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.

A. THE CONTRACTOR SHALL POSITION THE ANTENNA ON TOWER PIPE MOUNTS SO THAT THE BOTTOM STRUT IS LEVEL. THE PIPE MOUNTS SHALL BE PLUMB TO WITHIN 1 DEGREE.

B. ANTENNA MOUNTING REQUIREMENTS: PROVIDE ANTENNA MOUNTING HARDWARE AS INDICATED ON THE DRAWINGS.

**HYBRID CABLE INSTALLATION:**

A. THE CONTRACTOR SHALL ROUTE, TEST, AND INSTALL ALL CABLES AS INDICATED ON THE CONSTRUCTION DRAWINGS AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. THE INSTALLED RADIUS OF THE CABLES SHALL NOT BE LESS THAN THE MANUFACTURER'S SPECIFICATIONS FOR BENDING RADII.

C. EXTREME CARE SHALL BE TAKEN TO AVOID DAMAGE TO THE CABLES DURING HANDLING AND INSTALLATION.

1. FASTENING MAIN HYBRID CABLES: ALL CABLES SHALL BE INSTALLED INSIDE MONOPOLE WITH CABLE SUPPORT GRIPS AS REQUIRED BY THE MANUFACTURER.
2. FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA), WITHIN THE MMBS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES:
  - a. FIBER: SUPPORT FIBER BUNDLES USING 1/2" VELCRO STRAPS OF THE REQUIRED LENGTH AT 18" O.C. STRAPS SHALL BE UV, OIL AND WATER RESISTANT AND SUITABLE FOR INDUSTRIAL INSTALLATIONS AS MANUFACTURED BY TEXTOL OR APPROVED EQUAL.
  - b. DC: SUPPORT DC BUNDLES WITH ZIP TIES OF THE ADEQUATE LENGTH. ZIP TIES TO BE UV STABILIZED, BLACK NYLON, WITH TENSILE STRENGTH AT 12,000 PSI AS MANUFACTURED BY NELCO PRODUCTS OR EQUAL.
3. FASTENING JUMPERS: SECURE JUMPERS TO THE SIDE ARMS OR HEAD FRAMES USING STAINLESS STEEL TIE WRAPS OR STAINLESS STEEL BUTTERFLY CLIPS.
4. CABLE INSTALLATION:
  - a. INSPECT CABLE PRIOR TO USE FOR SHIPPING DAMAGE, NOTIFY THE CONSTRUCTION MANAGER.
  - b. CABLE ROUTING: CABLE INSTALLATION SHALL BE PLANNED TO ENSURE THAT THE LINES WILL BE PROPERLY ROUTED IN THE CABLE ENVELOP AS INDICATED ON THE DRAWINGS. AVOID TWISTING AND CROSSOVERS.
  - c. HOIST CABLE USING PROPER HOISTING GRIPS. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM BEND RADIUS.
5. GROUNDING OF TRANSMISSION LINES: ALL TRANSMISSION LINES SHALL BE GROUNDED AS INDICATED ON DRAWINGS.
6. HYBRID CABLE COLOR CODING: ALL COLOR CODING SHALL BE AS REQUIRED IN TS 0200 (CURRENT VERSION).
7. HYBRID CABLE LABELING: INDIVIDUAL HYBRID AND DC BUNDLES SHALL BE LABELED ALPHA-NUMERICALLY ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE - EN 2012-001, REV 1

**WEATHERPROOFING EXTERIOR CONNECTORS AND HYBRID CABLE GROUND KITS:**

A. ALL FIBER & COAX CONNECTORS AND GROUND KITS SHALL BE WEATHERPROOFED.

B. WEATHERPROOFED USING ONE OF THE FOLLOWING METHODS. ALL INSTALLATIONS MUST BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INDUSTRY BEST PRACTICES.

1. COLD SHRINK: ENCOMPASS CONNECTOR IN COLD SHRINK TUBING AND PROVIDE A DOUBLE WRAP OF 2" ELECTRICAL TAPE EXTENDING 2" BEYOND TUBING. PROVIDE 3M COLD SHRINK CX5 SERIES OR EQUAL.
2. SELF-AMALGAMATING TAPE: CLEAN SURFACES. APPLY A DOUBLE WRAP OF SELF-AMALGAMATING TAPE 2" BEYOND CONNECTOR. APPLY A SECOND WRAP OF SELF-AMALGAMATING TAPE IN OPPOSITE DIRECTION. APPLY DOUBLE WRAP OF 2" WIDE ELECTRICAL TAPE EXTENDING 2" BEYOND THE SELF-AMALGAMATING TAPE.
3. 3M SLIM LOCK CLOSURE 716: SUBSTITUTIONS WILL NOT BE ALLOWED.
4. OPEN FLAME ON JOB SITE IS NOT ACCEPTABLE

**SECTION 11 800 - INSTALLATION OF MULTIMODAL BASE STATIONS (MMBS) AND RELATED EQUIPMENT**

**SUMMARY:**

A. THIS SECTION SPECIFIES MMBS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BY NOT LIMITED TO RECTIFIERS, POWER DISTRIBUTION UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFCI).

B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND AS REQUIRED BY THE APPLICABLE INSTALLATION MOPS.

C. COMPLY WITH MANUFACTURER'S INSTALLATION AND START-UP REQUIREMENTS.

**DC CIRCUIT BREAKER LABELING**

A. NEW DC CIRCUIT IS REQUIRED IN MMBS CABINET SHALL BE CLEARLY IDENTIFIED AS TO RRU BEING SERVICED.

**SECTION 26 100 - BASIC ELECTRICAL REQUIREMENTS**

**SUMMARY:**

THIS SECTION SPECIFIES BASIC ELECTRICAL REQUIREMENTS FOR SYSTEMS AND COMPONENTS

**QUALITY ASSURANCE:**

A. ALL EQUIPMENT FURNISHED UNDER DIVISION 26 SHALL CARRY UL LABELS AND LISTINGS WHERE SUCH LABELS AND LISTINGS ARE AVAILABLE IN THE INDUSTRY.

B. MANUFACTURERS OF EQUIPMENT SHALL HAVE A MINIMUM OF THREE YEARS EXPERIENCE WITH THEIR EQUIPMENT INSTALLED AND OPERATING IN THE FIELD IN A USE SIMILAR TO THE PROPOSED USE FOR THIS PROJECT.

C. MATERIALS AND EQUIPMENT: ALL MATERIALS AND EQUIPMENT SPECIFIED IN DIVISION 26 OF THE SAME TYPE SHALL BE OF THE SAME MANUFACTURER AND SHALL BE NEW, OF THE BEST QUALITY AND DESIGN, AND FREE FROM DEFECTS.

**SUPPORTING DEVICES:**

A. MANUFACTURED STRUCTURAL SUPPORT MATERIALS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE FOLLOWING:

1. ALLIED TUBE AND CONDUIT.
2. B-LINE SYSTEM.
3. UNISTRUT DIVERSIFIED PRODUCTS.
4. THOMAS & BETTS.

B. FASTENERS: TYPES, MATERIALS, AND CONSTRUCTION FEATURES AS FOLLOWS:

1. EXPANSION ANCHORS: CARBON STEEL WEDGE OR SLEEVE TYPE.
2. POWER-DRIVEN THREADED STUDS: HEAT-TREATED STEEL, DESIGNED SPECIFICALLY FOR THE INTENDED SERVICE.
3. FASTEN BY MEANS OF WOOD SCREWS ON WOOD.
4. TOGGLE BOLTS ON HOLLOW MASONRY UNITS.
5. CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE OR SOLID MASONRY.
6. MACHINE SCREWS, WELDED THREADED STUDS, OR SPRING-TENSION CLAMPS ON STEEL.
7. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE SHALL NOT BE PERMITTED.
8. DO NOT WELD CONDUIT, PIPE STRAPS, OR ITEMS OTHER THAN THREADED STUDS TO STEEL STRUCTURES.
9. IN PARTITIONS OF LIGHT STEEL CONSTRUCTION, USE SHEET METAL SCREWS.



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Signature: *James R. Skowronski* Date: 6/19/2014


A	06/19/14	REDLINES & FINAL CONSTRUCTION DRAWINGS
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MARK	DATE	DESCRIPTION
ISSUE PHASE	FINAL	DATE ISSUED 06/19/2014

PROJECT TITLE:

S.WILLIMANTIC/ECSU  
SITE#:CT33XC614-A

PROJECT INFORMATION:  
165 WINDHAM STREET  
WILLIMANTIC, CT 06226  
WINDHAM COUNTY

SHEET TITLE:

SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER	28741
SHEET NUMBER	SP-2

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. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTING HARDWARE SECURELY TO THE STRUCTURE IN ACCORDANCE WITH THE FOLLOWING:
  - 1. ENSURE THAT THE LOAD APPLIED BY ANY FASTENER DOES NOT EXCEED 25 PERCENT OF THE PROOF TEST LOAD.
  - 2. USE VIBRATION AND SHOCK-RESISTANT FASTENERS FOR ATTACHMENTS TO CONCRETE SLABS.

ELECTRICAL IDENTIFICATION:

- A. UPDATE AND PROVIDE TYPED CIRCUIT BREAKER SCHEDULES IN THE MOUNTING BRACKET, INSIDE DOORS OF AC PANEL BOARDS WITH ANY CHANGES MADE TO THE AC SYSTEM.
- B. BRANCH CIRCUITS FEEDING AVIATION OBSTRUCTION LIGHTING EQUIPMENT SHALL BE CLEARLY IDENTIFIED AS SUCH AT THE BRANCH CIRCUIT PANELBOARD.

SECTION 26 200 - ELECTRICAL MATERIALS AND EQUIPMENT

- A. RIGID GALVANIZED STEEL (RGS) CONDUIT SHALL BE USED FOR EXTERIOR LOCATIONS ABOVE GROUND AND IN UNFINISHED INTERIOR LOCATIONS AND FOR UNDERGROUND RUNS. RIGID CONDUIT AND FITTINGS SHALL BE STEEL, COATED WITH ZINC EXTERIOR AND INTERIOR BY THE HOT DIP GALVANIZING PROCESS. CONDUIT SHALL BE PRODUCED TO ANSI SPECIFICATIONS C80.1, FEDERAL SPECIFICATION WW-C-581 AND SHALL BE LISTED WITH THE UNDERWRITERS' LABORATORIES. FITTINGS SHALL BE THREADED - SET SCREW OR COMPRESSION FITTINGS WILL NOT BE ACCEPTABLE. RGS CONDUITS SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND.
- B. UNDERGROUND CONDUIT IN CONCRETE SHALL BE POLYVINYLCHLORIDE (PVC) SUITABLE FOR DIRECT BURIAL AS APPLICABLE. JOINTS SHALL BE BELLED, AND FLUSH SOLVENT WELDED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. CONDUIT SHALL BE CARLON ELECTRICAL PRODUCTS OR APPROVED EQUAL.
- C. TRANSITIONS BETWEEN PVC AND RIGID (RGS) SHALL BE MADE WITH PVC COATED METALLIC LONG SWEEP RADIUS ELBOWS.
- D. EMT OR RIGID GALVANIZED STEEL CONDUIT MAY BE USED IN FINISHED SPACES CONCEALED IN WALLS AND CEILINGS. EMT SHALL BE MILD STEEL, ELECTRICALLY WELDED, ELECTRO-GALVANIZED OR HOT-DIPPED GALVANIZED AND PRODUCED TO ANSI SPECIFICATION C80.3, FEDERAL SPECIFICATION WW-C-563, AND SHALL BE UL LISTED. EMT SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND, OR APPROVED EQUAL. FITTINGS SHALL BE METALLIC COMPRESSION. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE.
- E. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FINAL CONNECTION TO EQUIPMENT. FITTINGS SHALL BE METALLIC GLAND TYPE COMPRESSION FITTINGS, MAINTAINING THE INTEGRITY OF CONDUIT SYSTEM. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE. MAXIMUM LENGTH OF FLEXIBLE CONDUIT SHALL NOT EXCEED 6-FEET. LFMC SHALL BE PROTECTED AND SUPPORTED AS REQUIRED BY NEC. MANUFACTURERS OF FLEXIBLE CONDUITS SHALL BE CAROL, ANACONDA METAL HOSE OR UNIVERSAL METAL HOSE, OR APPROVED EQUAL.
- F. MINIMUM SIZE CONDUIT SHALL BE 3/4 INCH (21MM).

HUBS AND BOXES:

- A. AT ENTRANCES TO CABINETS OR OTHER EQUIPMENT NOT HAVING INTEGRAL THREADED HUBS PROVIDE METALLIC THREADED HUBS OF THE SIZE AND CONFIGURATION REQUIRED. HUB SHALL INCLUDE LOCKNUT AND NEOPRENE O-RING SEAL. PROVIDE IMPACT RESISTANT 105 DEGREE C PLASTIC BUSHINGS TO PROTECT CABLE INSULATION.
- B. CABLE TERMINATION FITTINGS FOR CONDUIT
  - 1. CABLE TERMINATORS FOR RGS CONDUITS SHALL BE TYPE CRC BY O-Z/GEDNEY OR EQUAL BY ROXTEC.
  - 2. CABLE TERMINATORS FOR LFMC SHALL BE ETCO - CL2075; OR MADE FOR THE PURPOSE PRODUCTS BY ROXTEC.
- C. EXTERIOR PULL BOXES AND PULL BOXES 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.
- D. CONDUIT OUTLET BODIES SHALL BE PLATED CAST ALLOY WITH SIMILAR GASKET COVERS. OUTLET BODIES SHALL BE OF THE CONFIGURATION AND SIZE SUITABLE FOR THE APPLICATION. PROVIDE CROUSE-HINDS FORM 8 OR EQUAL.
- E. MANUFACTURER FOR BOXES AND COVERS SHALL BE HOFFMAN, SQUARE "D", CROUSE-HINDS, COOPER, ADALET, APPLETON, O-Z GEDNEY, RACO, OR APPROVED EQUAL.

SUPPLEMENTAL GROUNDING SYSTEM:

- A. FURNISH AND INSTALL A SUPPLEMENTAL GROUNDING SYSTEM TO THE EXTENT INDICATED ON THE DRAWINGS. SUPPORT SYSTEM WITH NON-MAGNETIC STAINLESS STEEL CLIPS WITH RUBBER GROMMETS. GROUNDING CONNECTORS SHALL BE TINNED COPPER WIRE, SIZES AS INDICATED ON THE DRAWINGS. PROVIDE STRANDED OR SOLID BARE OR INSULATED CONDUCTORS EXCEPT AS OTHERWISE NOTED.
- B. SUPPLEMENTAL GROUNDING SYSTEM: ALL CONNECTIONS TO BE MADE WITH CAD WELDS, EXCEPT AT EQUIPMENT USE LUGS OR OTHER AVAILABLE GROUNDING MEANS AS REQUIRED BY MANUFACTURER; AT GROUND BARS USE TWO HOLE SPADES WITH NO-OX.
- C. STOLEN GROUND-BARS: IN THE EVENT OF STOLEN GROUND BARS, CONTACT SPRINT CM FOR REPLACEMENT INSTRUCTION USING THREADED ROD KITS.

EXISTING STRUCTURE:

- A. EXISTING EXPOSED WIRING AND ALL EXPOSED OUTLETS, RECEPTACLES, SWITCHES, DEVICES, BOXES, AND OTHER EQUIPMENT THAT ARE NOT TO BE UTILIZED IN THE COMPLETED PROJECT SHALL BE REMOVED OR DE-ENERGIZED AND CAPPED IN THE WALL, CEILING, OR FLOOR SO THAT THEY ARE CONCEALED AND SAFE. WALL, CEILING, OR FLOOR SHALL BE PATCHED TO MATCH THE ADJACENT CONSTRUCTION.

CONDUIT AND CONDUCTOR INSTALLATION:

- A. 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. 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. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER, PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.
- B. CONDUCTORS SHALL BE PULLED IN ACCORDANCE WITH ACCEPTED GOOD PRACTICE.



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*James R. Skowronski*  
 Signature: \_\_\_\_\_ Date: 6/19/2014


A	06/19/14	REDLINES # FINAL CONSTRUCTION DRAWINGS
MARK	DATE	DESCRIPTION

ISSUE	FINAL	DATE	06/19/2014
PHASE		ISSUED	

PROJECT TITLE:  
**S.WILLIMANTIC/ECSU  
 SITE#:CT33XC614-A**

PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:  
**SPRINT SPECIFICATIONS**

SCALE: NONE

PROJECT NUMBER	28741
SHEET NUMBER	SP-3





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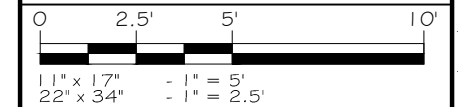
MARK	DATE	DESCRIPTION
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ISSUE PHASE: FINAL DATE ISSUED: 06/19/2014

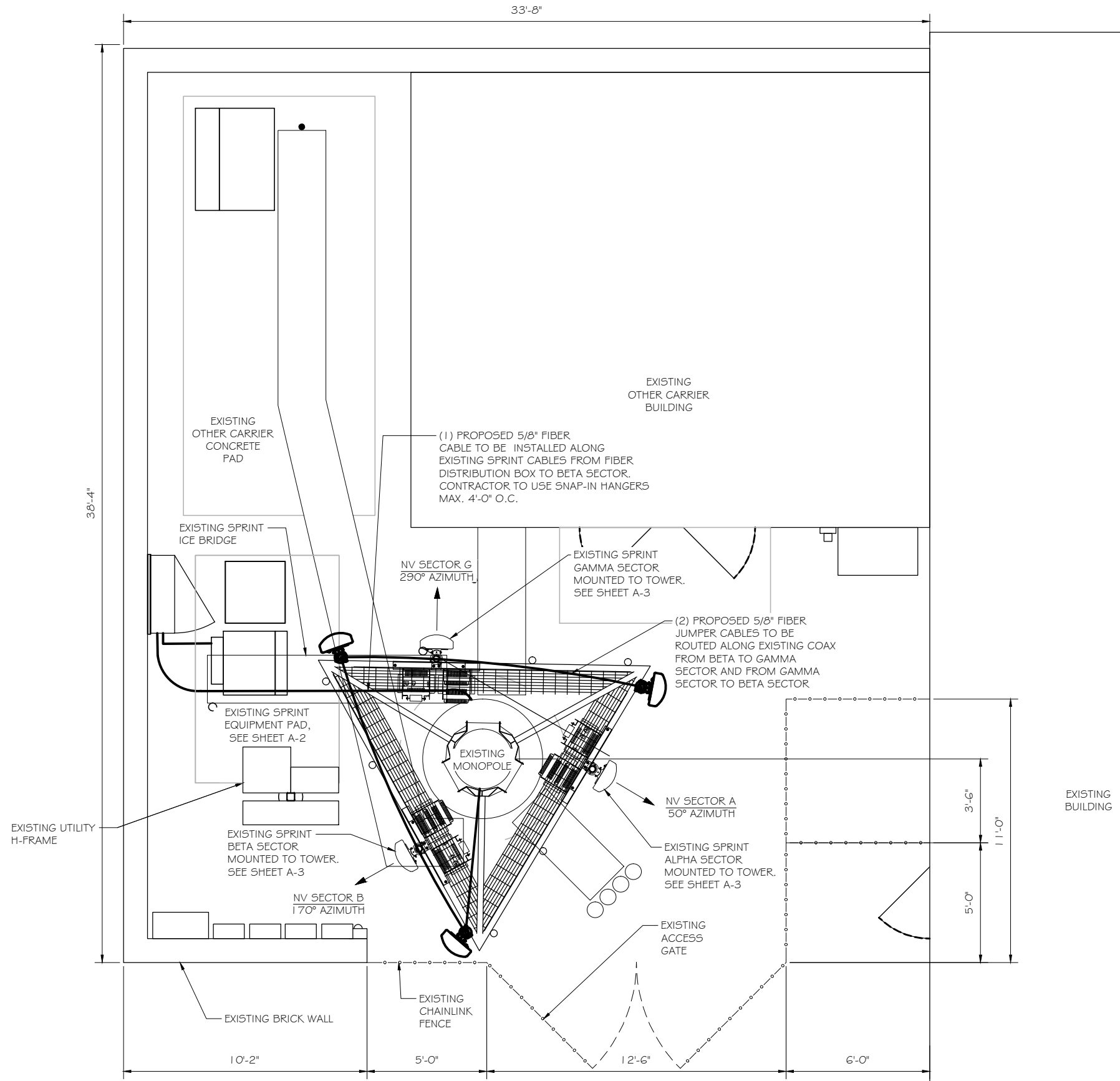
PROJECT TITLE:  
**S.WILLIMANTIC/ECSU  
 SITE#:CT33XC614-A**

PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:  
**SITE PLAN**



PROJECT NUMBER: 28741  
 SHEET NUMBER: A-1



**SITE PLAN**  
 SCALE: 1" = 5'

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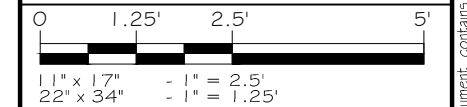
*James R. Skowronski*  
 Signature: \_\_\_\_\_ Date: 6/19/2014

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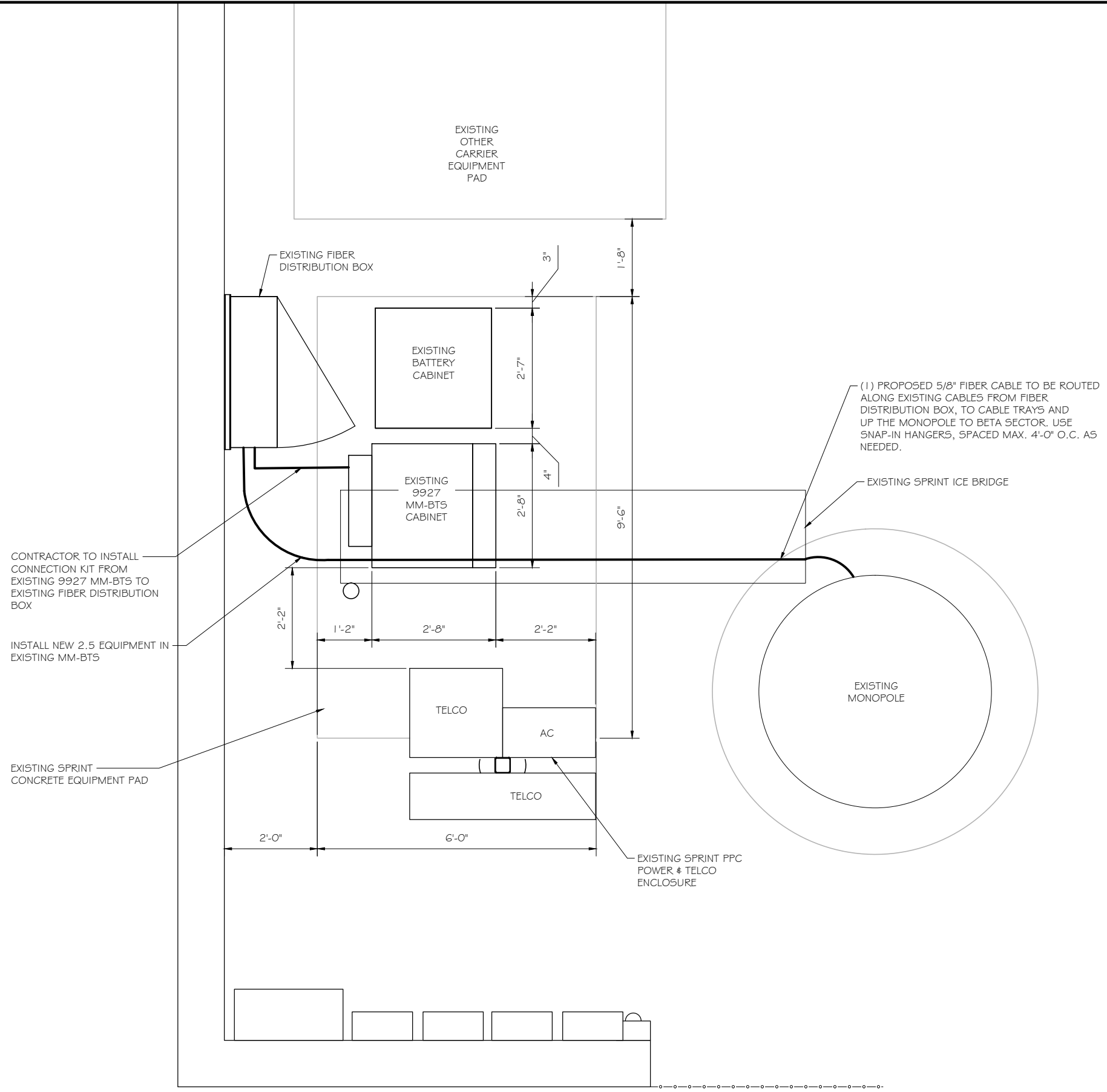
ISSUE PHASE: FINAL DATE ISSUED: 06/19/2014  
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**S.WILLIMANTIC/ECSU  
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PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:  
**EQUIPMENT PLAN**

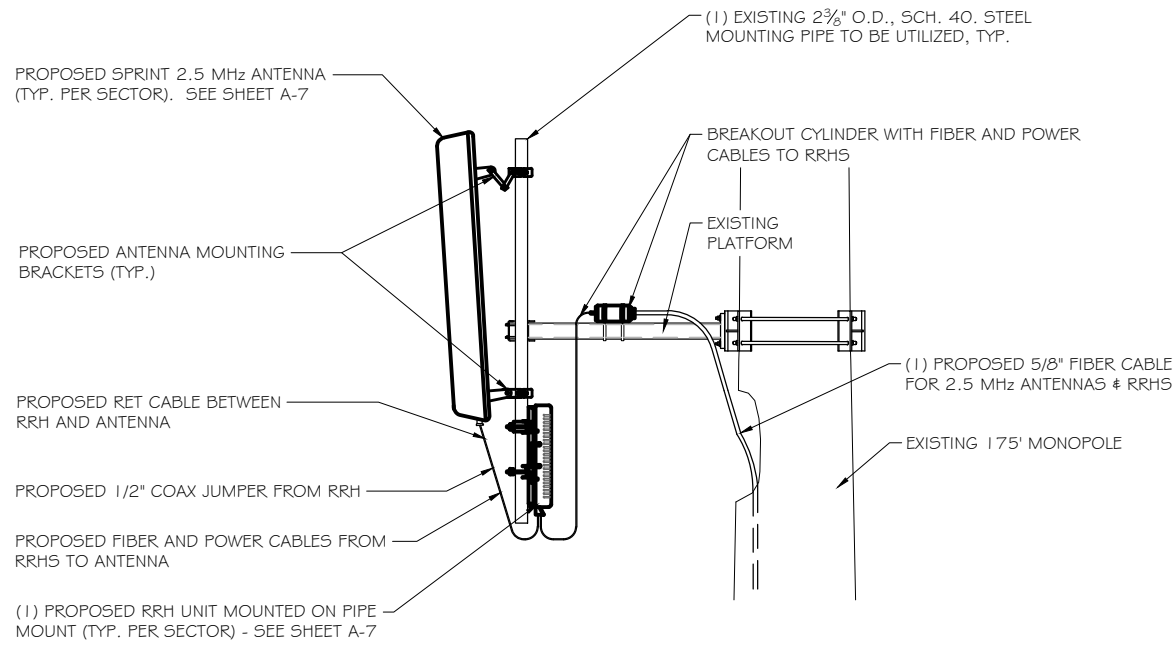


PROJECT NUMBER: 28741  
 SHEET NUMBER: A-2

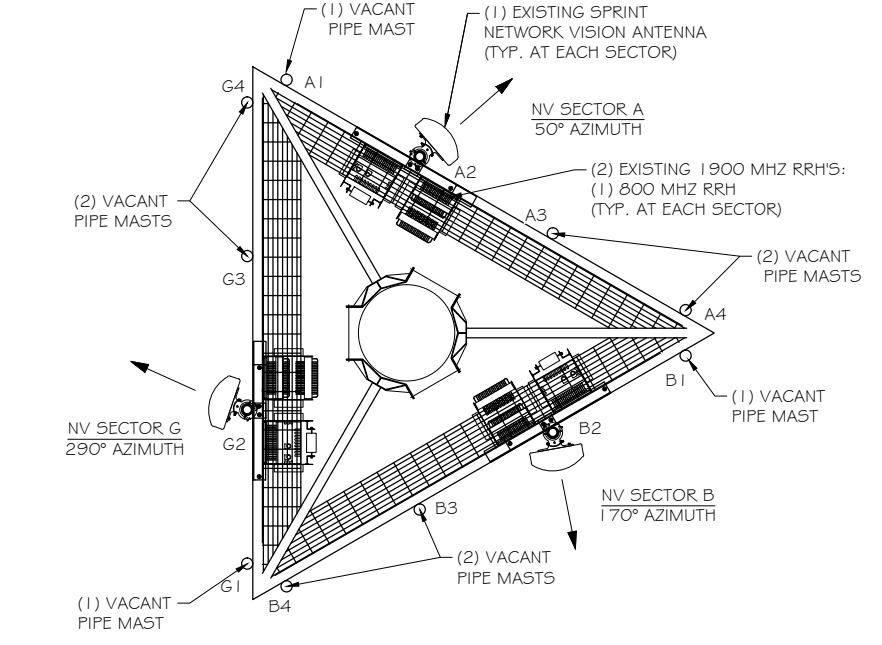


**EQUIPMENT PLAN**  
 SCALE: 1" = 2.5'

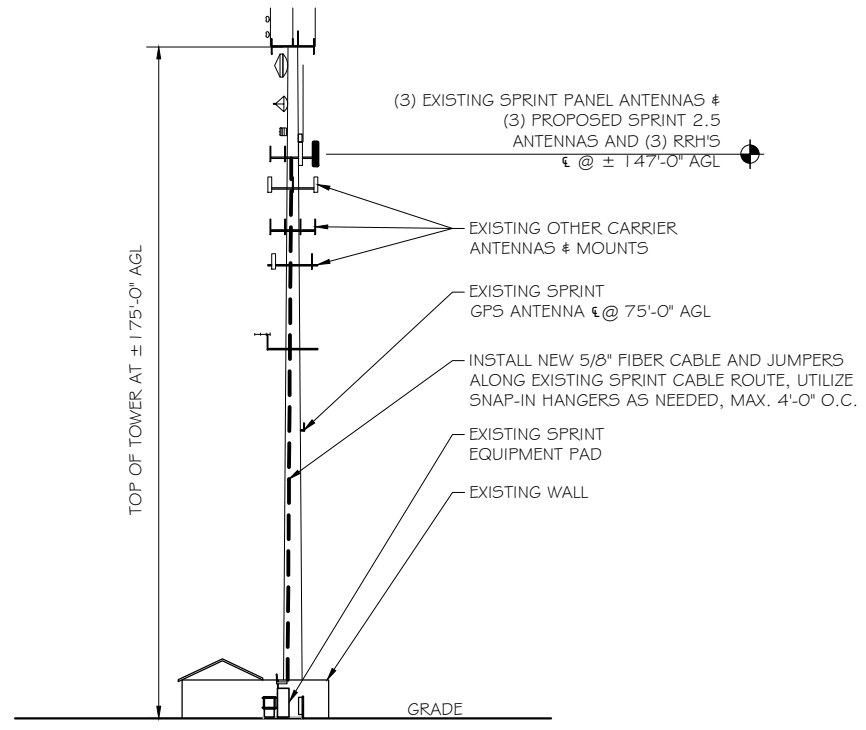
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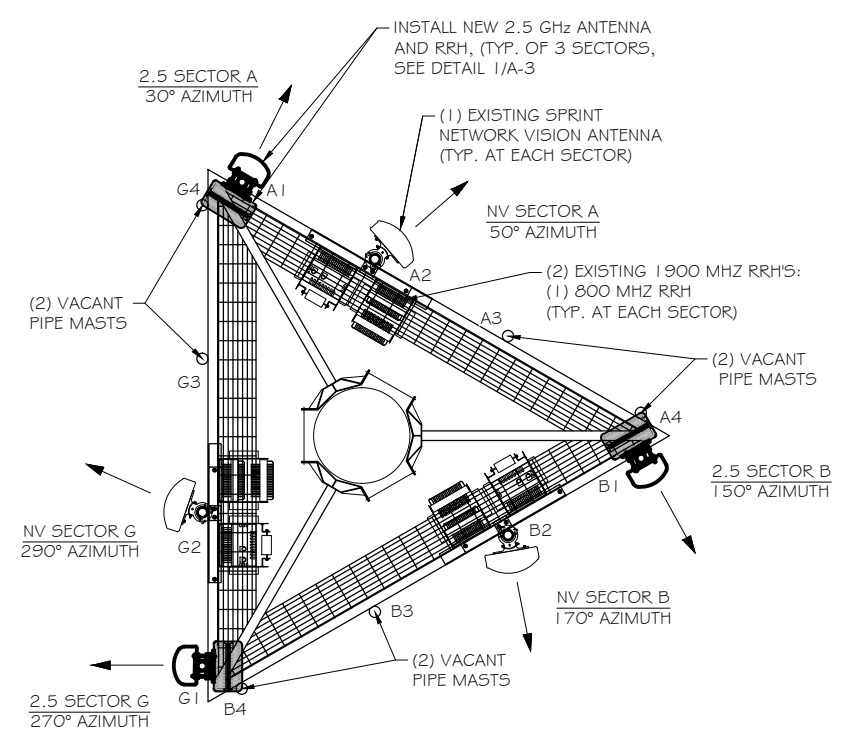
ANTENNA & RRH MOUNTING DETAILS  
 SCALE: NTS



EXISTING ANTENNA ARRAY  
 SCALE: NTS



BUILDING ELEVATION  
 SCALE: 1" = 50'



PROPOSED ANTENNA ARRAY  
 SCALE: NTS



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PROJECT TITLE:  
 S.WILLIMANTIC/ECSU  
 SITE#:CT33XC614-A

PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:  
 BUILDING ELEVATIONS &  
 ANTENNA DETAILS

SCALE:  
 AS NOTED

PROJECT NUMBER	28741
SHEET NUMBER	A-3



### RFDS Sheet

#### General Site Information

Site ID	CT33XC614	Equipment Vendor	Alcatel-Lucent
Market	Northern Connecticut	Latitude	41.720556
Region	Northeast	Longitude	-72.218333
MLA	N/A	LL SITE ID	N/A
Structure Type	MONOPOLE		
BTS Type			
Solution ID		Siterra SR Equipment type	
		Equipment Vendor	Alcatel-Lucent

Incremental Power Draw needed by added Equipment	N/A
--	-----

#### Base Equipment

BBU Kit	ALU BBU Kit	Top Hat	None
BBU Kit Qty	1	Top Hat Qty	N/A
Growth Cabinet	None	Top Hat Dimensions	N/A
Growth Cabinet Qty	N/A	Top Hat Weight (lbs)	N/A
Growth Cabinet Dimensions	N/A		
Growth Cabinet Weight	N/A		

#### RF Path Information

RRH	TD-RRH8x20-25
RRH Qty	3
RRH Dimensions	26.1"x18.6"x6.7"
RRH Weight, lbs.	70
RRH Mount Weight, Lbs.	10
Power and Fiber Cable	ALU Fiber only
Cable Qty	1
Weight per foot, Lbs.	0.242
Diameter, Inches.	0.73
Length Ft.	175 (calculated as antenna height plus 20%)
Coax Jumper	15'
Coax Jumper Qty	27
Coax Jumper Length, Feet.	8
Coax Jumper Weight	1.7
Coax Jumper Diameter, Inches	0.5
AISG Cable	COMMSCOPE ATCB-B01-006
AISG Cable Qty	3
AISG Diameter, Inches.	0.315
AISG Cable length.	8'
Weight of entire AISG cable, Lbs.	1.3

#### Antenna Sector Information

	Sector 1	Sector 2	Sector 3
Antenna make/model	RFS APXV9TM14-ALU-I20	RFS APXV9TM14-ALU-I20	RFS APXV9TM14-ALU-I20
Antenna qty	1	1	1
Antenna Dimensions, Inches	56.3"x12.6"x6.3"	56.3"x12.6"x6.3"	56.3"x12.6"x6.3"
Antenna Weight, Lbs	55.12	55.12	55.12
Antenna Mounting Kit Weight, Lbs.	11.5	11.5	11.5
CL Height	140	140	140
Antenna Azimuth	30	150	270
Antenna Mechanical Downtilt	0	0	0
Antenna etilt	-2	-2	-2

\*RFDS SHEET WAS GENERATED BY RAMAKER & ASSOCIATES FROM PLAN OF RECORD (POR) PROVIDED BY SPRINT. CONTRACTOR SHALL VERIFY AND OBTAIN FINAL RFDS FROM SPRINT CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION.

#### NOTES:

- GENERAL CONTRACTOR TO FIELD VERIFY AZIMUTH AND C/L HEIGHT AND MECHANICAL DOWNTILT. IF DIFFERENT THAN CALLED OUT BELOW, HALT ANTENNA WORK FOR ONE HOUR, CALL SPRINT RF ENGINEER (OR MANAGER IF RF ENGINEER DOES NOT ANSWER, BUT STILL LEAVE A MESSAGE TO RF ENGINEER) USING CONTACT INFORMATION ABOVE FOR FURTHER INSTRUCTIONS. IF SPRINT DOES NOT RESPOND WITHIN ONE HOUR, PLACE 2.5GHZ ANTENNA AT SAME C/L HEIGHT AS 1.9GHZ ANTENNA AND EMAIL CORRECT C/L HEIGHT AND AZIMUTH TO SPRINT RF ENGINEER. UPDATE AS-BUILT DRAWING WITH CORRECT C/L HEIGHT. ALSO EMAIL CORRECT 1.9GHZ AND 800MHZ ANTENNA C/L HEIGHT, AZIMUTH AND MECHANICAL DOWNTILT TO RF ENGINEER.
- AISG TESTS TO VERIFY OPERATION IS TO BE PERFORMED AFTER FINAL INSTALLATION OF ANTENNAS AND AISG CABLES HAVE BEEN CONNECTED. VERIFY OPERATION OF ALL EXISTING SPRINT AISG EQUIPMENT INCLUDING 800MHZ, 1.9GHZ AND 2.5GHZ. TEST TO INCLUDE COMPLETE DOWNTILT, AZIMUTH (IF APPLICABLE) AND BEAMWIDTH SWINGS (IF APPLICABLE). DOCUMENT AISG TEST RESULTS IN COAX SWEEP TEST SPREADSHEET.
- GENERAL CONTRACTOR MUST ENSURE THAT NO OBJECT IS LOCATED WITHIN 45 DEGREES OF LEFT AND RIGHT OF FRONT OF ANTENNA OR 7 DEGREES UP AND DOWN FROM CENTER OF ANTENNA. IF THIS IS NOT POSSIBLE, CONTACT RF ENGINEER FOR FURTHER INSTRUCTION. IN ADDITION, 2.5GHZ ANTENNA IS NOT TO BE PLACED IN FRONT OF ANY OTHER ANTENNA USING THE SAME 45 DEGREE RULE. THIS INCLUDES SPRINT AND NON-SPRINT ANTENNAS.
- 2.5GHZ ANTENNA MUST BE AT LEAST 6" FROM 1.9GHZ ANTENNA, 30" FROM 800MHZ ANTENNA AND 30" FROM DUAL BAND 1.9GHZ AND 800MHZ ANTENNA.
- GENERAL CONTRACTOR IS REQUIRED TO USE A DIGITAL ALIGNMENT TOOL TO SET AZIMUTH, ROLL AND DOWNTILT. AZIMUTH ACCURACY IS TO BE WITHIN 1 DEGREE. DOWNTILT AND ROLL (LEFT TO RIGHT TILT) IS TO BE WITHIN 0.1 DEGREES. IF FOR SOME REASON THIS ACCURACY CANNOT BE ACHIEVED, UPDATE AS-BUILT DRAWINGS AND EMAIL SPRINT RF ENGINEER WITH AS-BUILT SETTINGS. USE 3Z RF ALIGNMENT TOOL OR EQUIVALENT TOOL.



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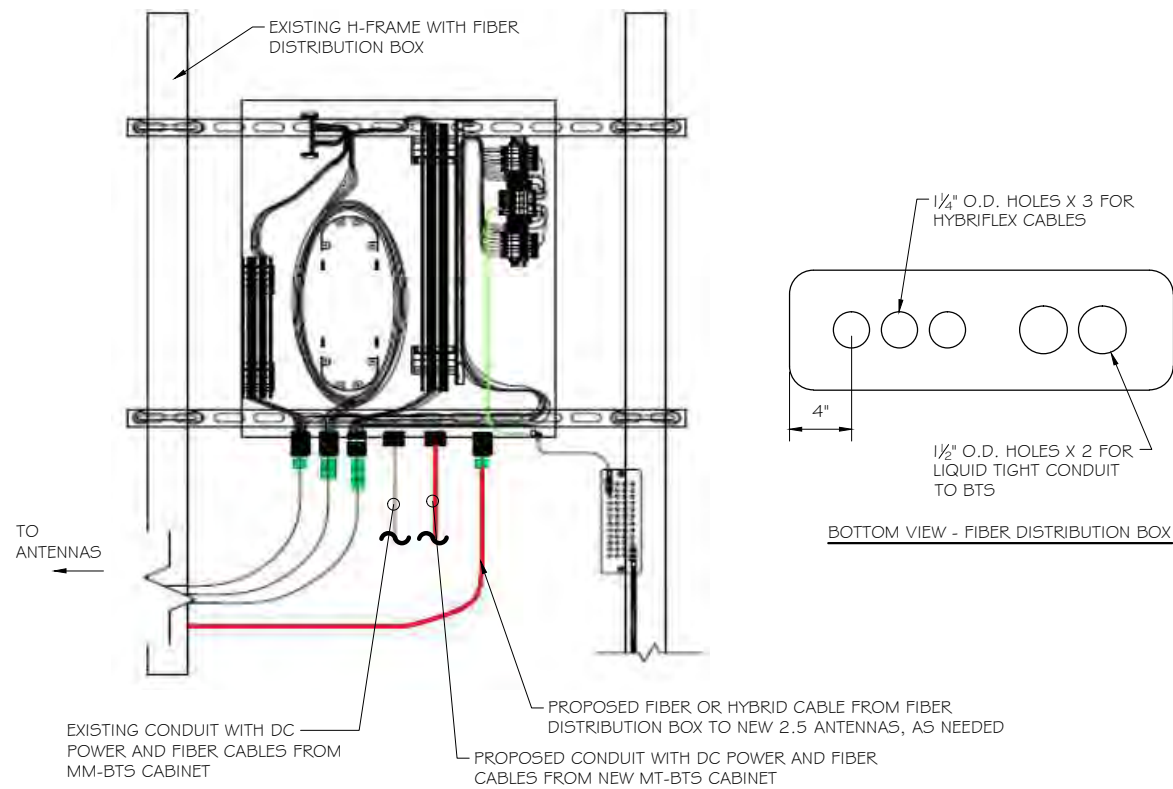
PROJECT TITLE:  
**S.WILLIMANTIC/ECSU  
 SITE#:CT33XC614-A**

PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

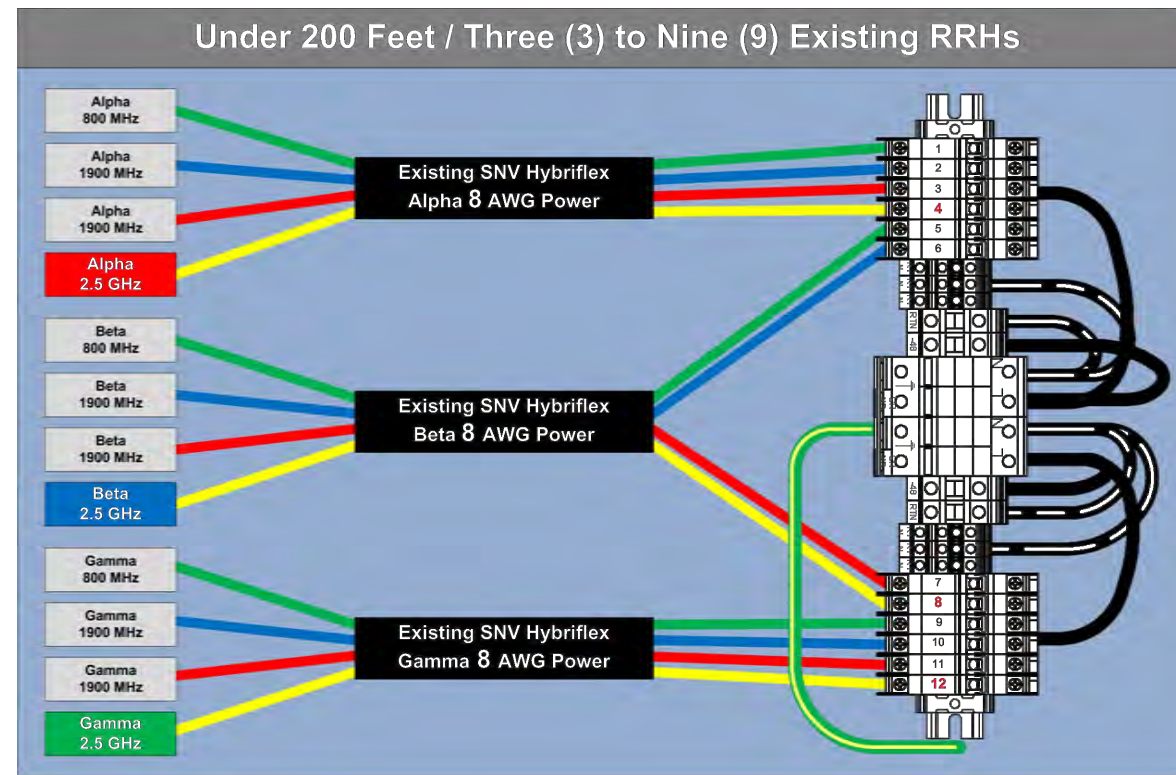
SHEET TITLE:  
**RF DATA SHEET**

SCALE:  
**AS NOTED**

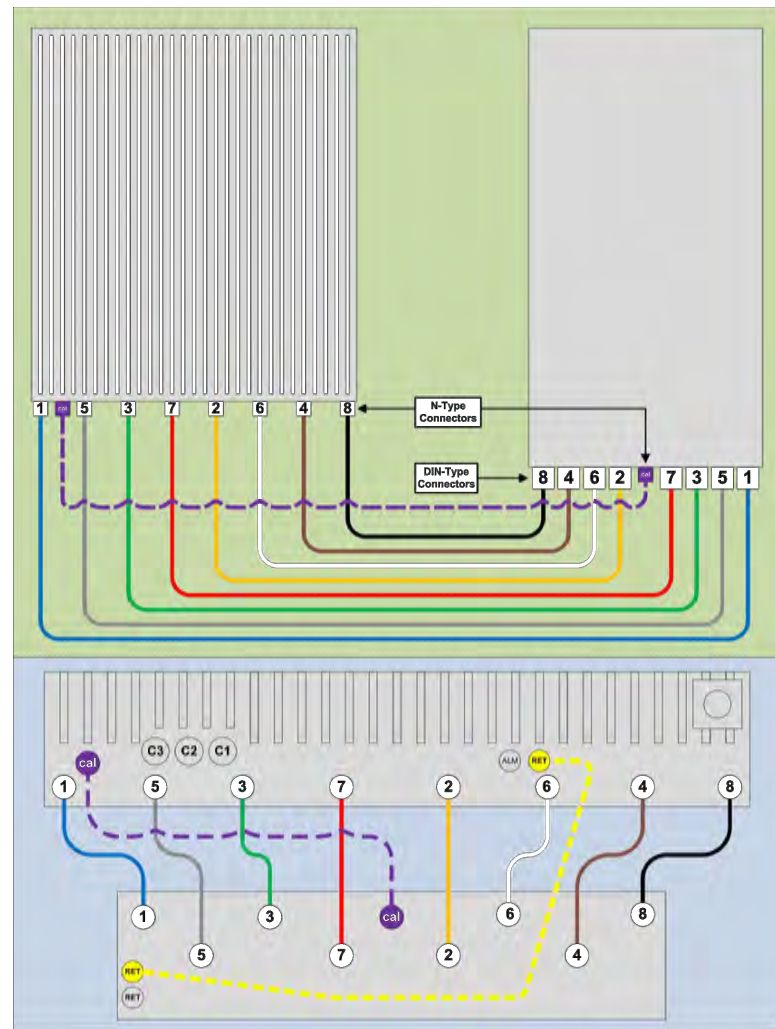
PROJECT NUMBER: 28741  
 SHEET NUMBER: A-4



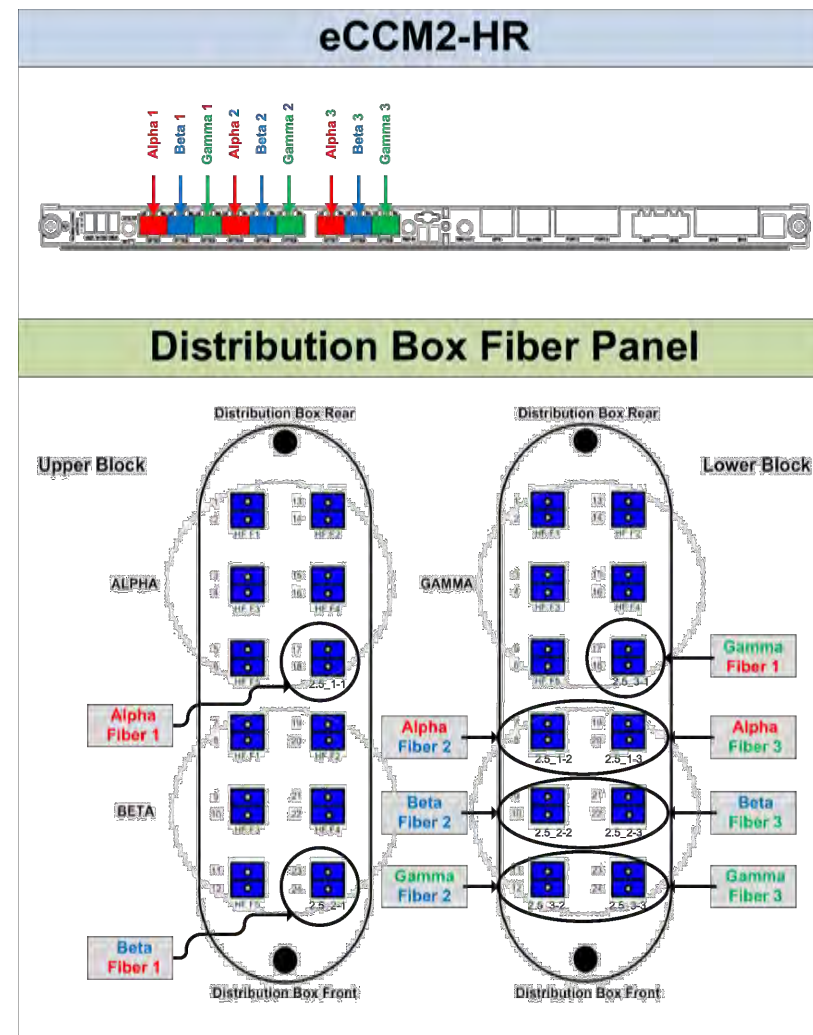
TYPICAL FIBER DISTRIBUTION BOX DETAIL  
 SCALE: NTS



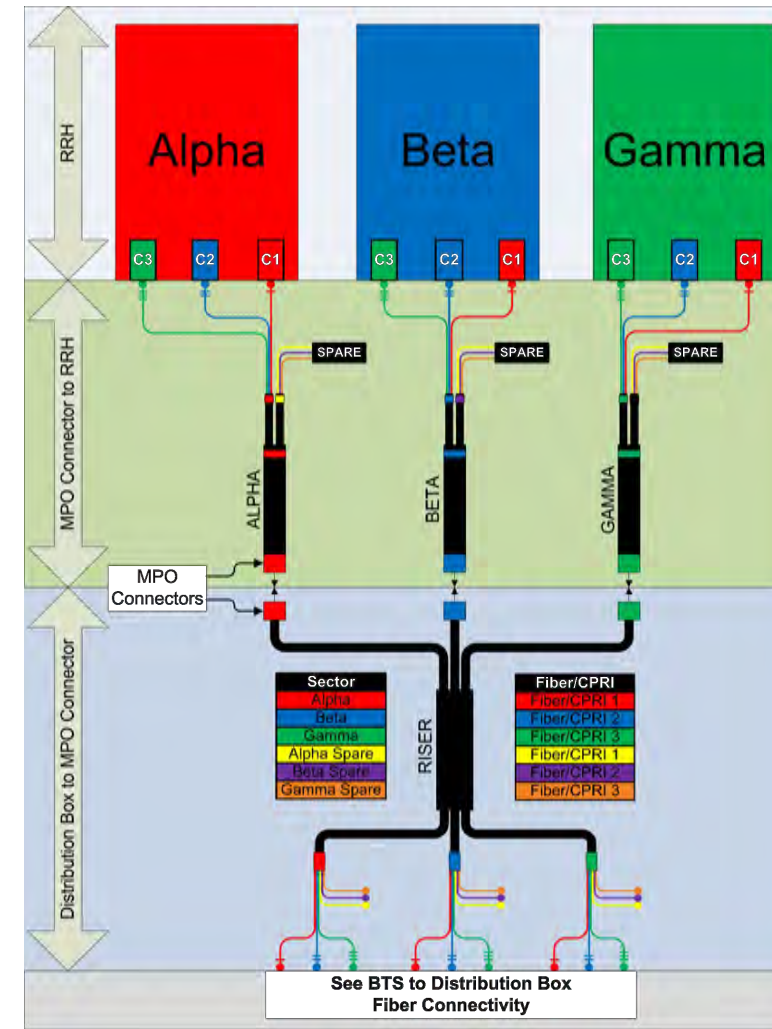
RRH TO DISTRIBUTION BOX POWER CONNECTIVITY DETAIL  
 SCALE: NTS



8T8R DETAIL  
 SCALE: NTS



BTS TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL  
 SCALE: NTS



RRH TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL  
 SCALE: NTS



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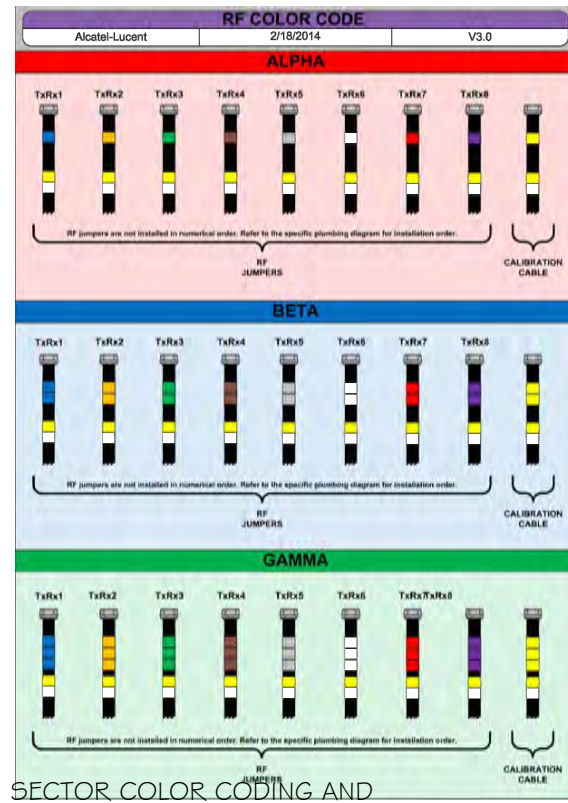
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 S.WILLIMANTIC/ECSU  
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 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:  
 FIBER PLUMBING DIAGRAM

SCALE:  
 AS NOTED

PROJECT NUMBER 28741  
 SHEET NUMBER A-5



SECTOR COLOR CODING AND BANDING  
 SCALE: NTS

1

2.5 Coaxial Cable Color Code (Radio#1)

Sector	Cable	Start at Connector Side	Wrap2	Wrap3	Wrap4	Wrap5
1 Alpha	1	Blue			Yellow	White
1	2	Orange			Yellow	White
1	3	Green			Yellow	White
1	4	Brown			Yellow	White
1	5	Slate			Yellow	White
1	6	White			Yellow	White
1	7	Red			Yellow	White
1	8	Violet			Yellow	White
1	Calibration Cable	Yellow			Yellow	White
2 Beta	1	Blue	Blue		Yellow	White
2	2	Orange	Orange		Yellow	White
2	3	Green	Green		Yellow	White
2	4	Brown	Brown		Yellow	White
2	5	Slate	Slate		Yellow	White
2	6	White	White		Yellow	White
2	7	Red	Red		Yellow	White
2	8	Violet	Violet		Yellow	White
2	Calibration Cable	Yellow	Yellow		Yellow	White
3 Gamma	1	Blue	Blue	Blue	Yellow	White
3	2	Orange	Orange	Orange	Yellow	White
3	3	Green	Green	Green	Yellow	White
3	4	Brown	Brown	Brown	Yellow	White
3	5	Slate	Slate	Slate	Yellow	White
3	6	White	White	White	Yellow	White
3	7	Red	Red	Red	Yellow	White
3	8	Violet	Violet	Violet	Yellow	White
3	Calibration Cable	Yellow	Yellow	Yellow	Yellow	White

2.5 Coaxial Cable Color Code (Radio#2)

Sector	Cable	Start at Connector Side	Wrap2	Wrap3	Wrap4	Wrap5
1 Alpha	1	Blue			Yellow	Violet
1	2	Orange			Yellow	Violet
1	3	Green			Yellow	Violet
1	4	Brown			Yellow	Violet
1	5	Slate			Yellow	Violet
1	6	White			Yellow	Violet
1	7	Red			Yellow	Violet
1	8	Violet			Yellow	Violet
1	Calibration Cable	Yellow			Yellow	Violet
2 Beta	1	Blue	Blue		Yellow	Violet
2	2	Orange	Orange		Yellow	Violet
2	3	Green	Green		Yellow	Violet
2	4	Brown	Brown		Yellow	Violet
2	5	Slate	Slate		Yellow	Violet
2	6	White	White		Yellow	Violet
2	7	Red	Red		Yellow	Violet
2	8	Violet	Violet		Yellow	Violet
2	Calibration Cable	Yellow	Yellow		Yellow	Violet
3 Gamma	1	Blue	Blue	Blue	Yellow	Violet
3	2	Orange	Orange	Orange	Yellow	Violet
3	3	Green	Green	Green	Yellow	Violet
3	4	Brown	Brown	Brown	Yellow	Violet
3	5	Slate	Slate	Slate	Yellow	Violet
3	6	White	White	White	Yellow	Violet
3	7	Red	Red	Red	Yellow	Violet
3	8	Violet	Violet	Violet	Yellow	Violet
3	Calibration Cable	Yellow	Yellow	Yellow	Yellow	Violet

2.5 COAXIAL CABLE COLOR CODE  
 SCALE: NTS

2

CABLE MARKING NOTES

- ALL CABLES SHALL BE MARKED WITH 2" WIDE, UV STABILIZED, UL APPROVED TAPE.
- THE FIRST RING SHALL BE CLOSEST TO THE END OF THE CABLE AND SPACED APPROXIMATELY 2" FROM THE END CONNECTOR, WEATHERPROOFING, OR BREAKOUT UNIT. THERE SHALL BE 1" SPACE BETWEEN EACH RING.
- A 2" GAP SHALL SEPARATE THE CABLE COLOR CODE FROM THE FREQUENCY COLOR CODE. THE 2" COLOR RINGS FOR THE FREQUENCY CODE SHALL BE PLACED NEXT TO EACH OTHER WITH NO SPACES.
- THE 2" COLORED TAPE(S) SHALL BE WRAPPED A MINIMUM OF 3 TIMES AROUND THE INDIVIDUAL CABLES, AND THE TAPE SHALL BE KEPT IN THE SAME LOCATION AS MUCH AS POSSIBLE.
- SITES WITH MORE THAN FOUR (4) SECTORS WILL REQUIRE ADDITIONAL RINGS FOR EACH SECTOR, FOLLOWING THE PATTERN. HIGH CAPACITY SITES WILL USE THE SECOND CABLE IDENTIFIED BY BLUE BANDS OF TAPE
- HYBRID FIBER CABLE SHALL BE SECTOR IDENTIFIED INSIDE THE CABINET ON FREQUENCY BUNDLES, ON THE SEALTITE, ON THE MAIN LINE UPON EXIT OF SEALTITE, AND BEFORE AND AFTER THE BREAKOUT UNIT (MEDUSA), AS WELL AS BEFORE AND AFTER ANY ENTRANCE OR EXIT.
- HFC "MAIN TRUNK" WILL NOT BE MARKED WITH THE FREQUENCY CODES, AS IT CONTAINS ALL FREQUENCIES.
- INDIVIDUAL POWER PAIRS AND FIBER BUNDLES SHALL BE LABELED WITH BOTH THE CABLE AND FREQUENCY.



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Signature: *James R. Skowronski* Date: 6/19/2014

A 06/19/14 REDLINES & FINAL CONSTRUCTION DRAWINGS

MARK DATE DESCRIPTION

ISSUE PHASE FINAL DATE ISSUED 06/19/2014

PROJECT TITLE:

S.WILLIMANTIC/ECSU  
 SITE#:CT33XC614-A

PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:

CABLE COLOR CODING

SCALE:  
 AS NOTED

PROJECT NUMBER 28741  
 SHEET NUMBER A-6

HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE  
 MANUF:RFS

CABLE	LENGTH	DC CONDUCTOR	CABLE DIAMETER
*Fiber Only	Varies	Use NV Hybriflex	5/8"
Hybriflex	<200'	8 AWG	1-1/4"
Hybriflex	225-300'	6 AWG	1-1/4"
Hybriflex	325-375'	4 AWG	1-1/4"

RFS HYBRIFLEX RISER CABLE SCHEDULE

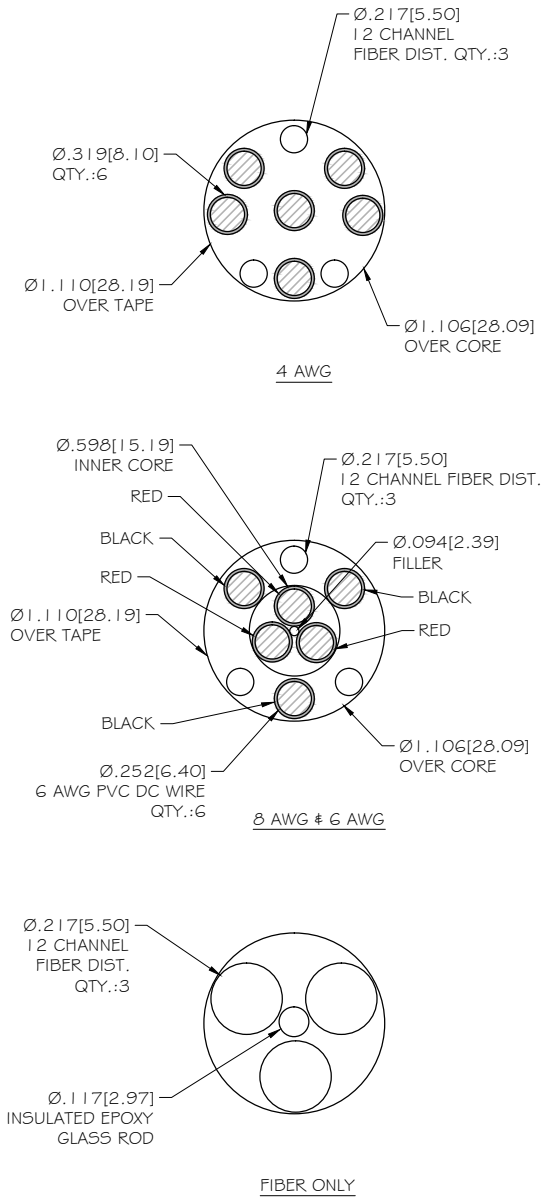
FIBER ONLY (EXISTING DC POWER)	Hybrid cable	
MN-HB058-M12-050F	12x multi-mode fiber pairs, Top/Outdoor protected connectors, Bottom/LC Connectors, 5/8 cable, 50 ft	50 ft
MN-HB058-M12-075F		75 ft
MN-HB058-M12-100F		100 ft
MN-HB058-M12-125F		125 ft
MN-HB058-M12-150F		150 ft
<b>MN-HB058-M12-175F</b>		<b>175 ft</b>
MN-HB058-M12-200F		200 ft
<b>8 AWG Power</b>	<b>Hybrid cable</b>	
MN-HB114-08U3M12-050F	3x 8 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC connectors, 1 1/4 cable, 50 ft	50 ft
MN-HB114-08U3M12-075F		75 ft
MN-HB114-08U3M12-100F		100 ft
MN-HB114-08U3M12-125F		125 ft
MN-HB114-08U3M12-150F		150 ft
MN-HB114-08U3M12-175F		175 ft
MN-HB114-08U3M12-200F		200 ft
<b>6 AWG Power</b>	<b>Hybrid cable</b>	
MN-HB114-13U3M12-225F	3x 6 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC connectors, 1 1/4 cable, 225 ft	225 ft
MN-HB114-13U3M12-250F		250 ft
MN-HB114-13U3M12-275F		275 ft
MN-HB114-13U3M12-300F		300 ft
<b>4 AWG Power</b>	<b>Hybrid cable</b>	
MN-HB114-21U3M12-325F	3x 4 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC connectors, 1 1/4 cable, 325 ft	325 ft
MN-HB114-21U3M12-350F		350 ft
MN-HB114-21U3M12-375F		375 ft

RFS HYBRIFLEX JUMPER CABLE SCHEDULE

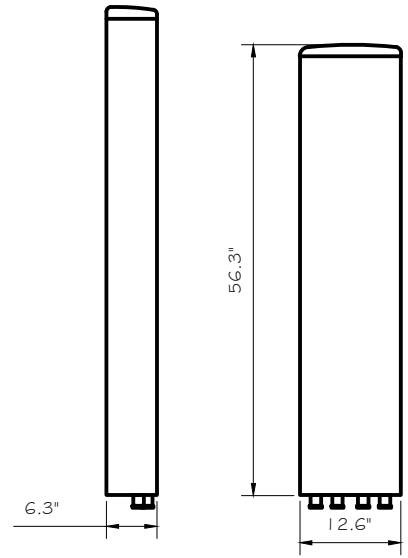
FIBER ONLY	Hybrid Jumper cable	
MN-HBF012-M3-5F1	5 ft, 3x multi-mode fiber pairs, Outdoor & LC connectors, 1/2 cable	5 ft
MN-HBF012-M3-10F1		10 ft
<b>MN-HBF012-M3-15F1</b>		<b>15 ft</b>
SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15' NOTIFY SPRINT CM OF ANY DISCREPANCY		
<b>8 AWG POWER</b>	<b>Hybrid Jumper cable</b>	
MN-HBF058-08U1M3-5F1	5 ft, 1x 8 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC connectors, 5/8 cable	5 ft
MN-HBF058-08U1M3-10F1		10 ft
MN-HBF058-08U1M3-15F1		15 ft
SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15' NOTIFY SPRINT CM OF ANY DISCREPANCY		
<b>6 AWG POWER</b>	<b>Hybrid Jumper cable</b>	
MN-HBF058-13U1M3-5F1	5 ft, 1x 6 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC connectors, 5/8 cable	5 ft
MN-HBF058-13U1M3-10F1		10 ft
MN-HBF058-13U1M3-15F1		15 ft
SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15' NOTIFY SPRINT CM OF ANY DISCREPANCY		
<b>4 AWG POWER</b>	<b>Hybrid Jumper cable</b>	
MN-HBF078-21U1M3-5F1	5 ft, 1x 4 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC connectors, 7/8 cable	5 ft
MN-HBF078-21U1M3-10F1		10 ft
MN-HBF078-21U1M3-15F1		15 ft
SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15' NOTIFY SPRINT CM OF ANY DISCREPANCY		

\*NOTE: SPRINT CM TO CONFIRM HYBRID/FIBER RISER CABLE & HYBRID/FIBER JUMPER CABLE MODEL NUMBERS BEFORE PREPARING BOM.

FIBER CABLE CROSS SECTION & DATA  
 SCALE: NTS

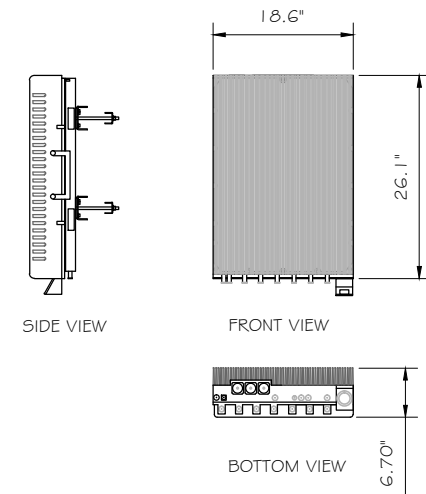


RFS: APXV9TM14-ALU-120



DIMENSIONS, HxWxD: 56.3" x 12.6" x 6.3"  
 WEIGHT, WITHOUT PRE-MOUNTED BRACKETS: 55.12 lbs.  
 CONNECTOR: (9) XX\* MINI-DIN FEMALE/BOTTOM

2.5 ANTENNA DETAIL  
 SCALE: NTS



ALCATEL-LUCENT: TD-RRHx20-25  
 HxWxD = (26.1" x 18.6" x 6.7")  
 WEIGHT = 70 lbs.

2.5 RRH DETAIL  
 SCALE: NTS



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ISSUE PHASE	FINAL	DATE ISSUED 06/19/2014

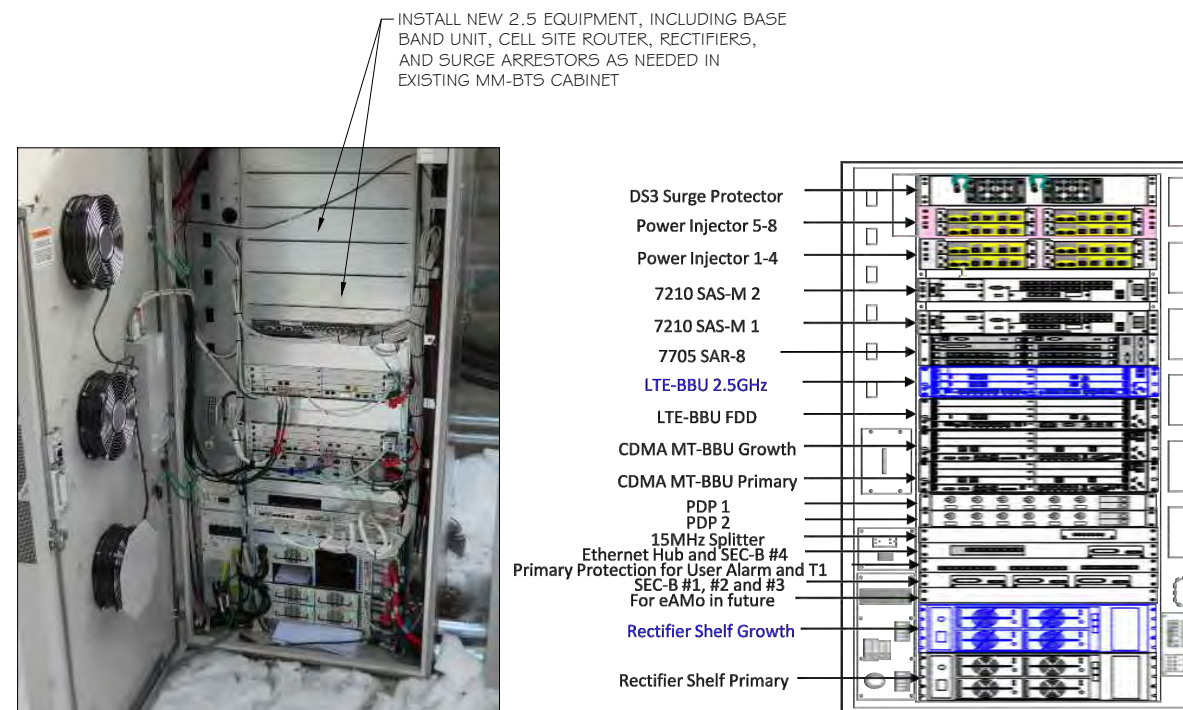
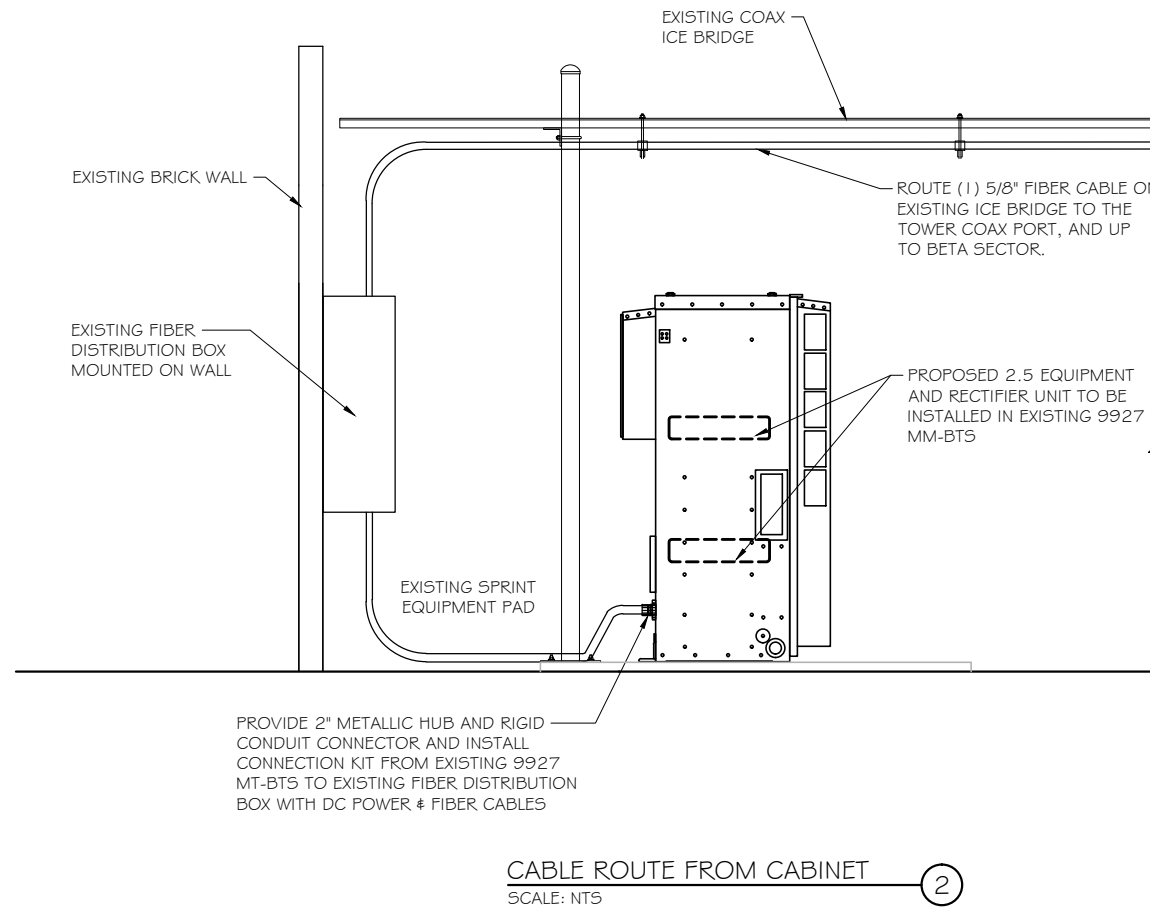
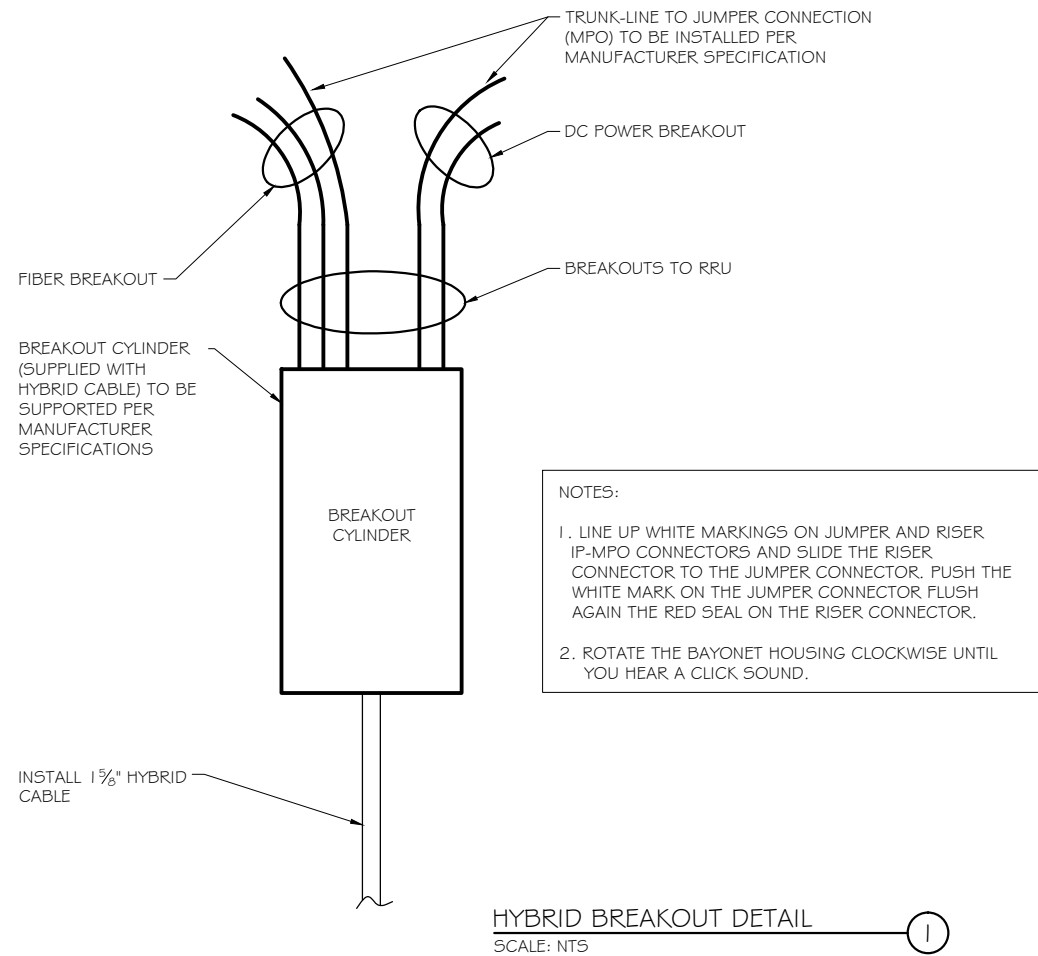
PROJECT TITLE:  
 S.WILLIMANTIC/ECSU  
 SITE#:CT33XC614-A

PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:  
 ANTENNA & HYBRID CABLE  
 DETAILS

SCALE:  
 AS NOTED

PROJECT NUMBER	28741
SHEET NUMBER	A-7



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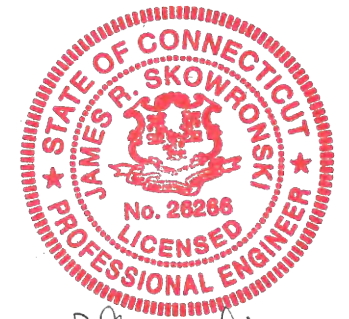


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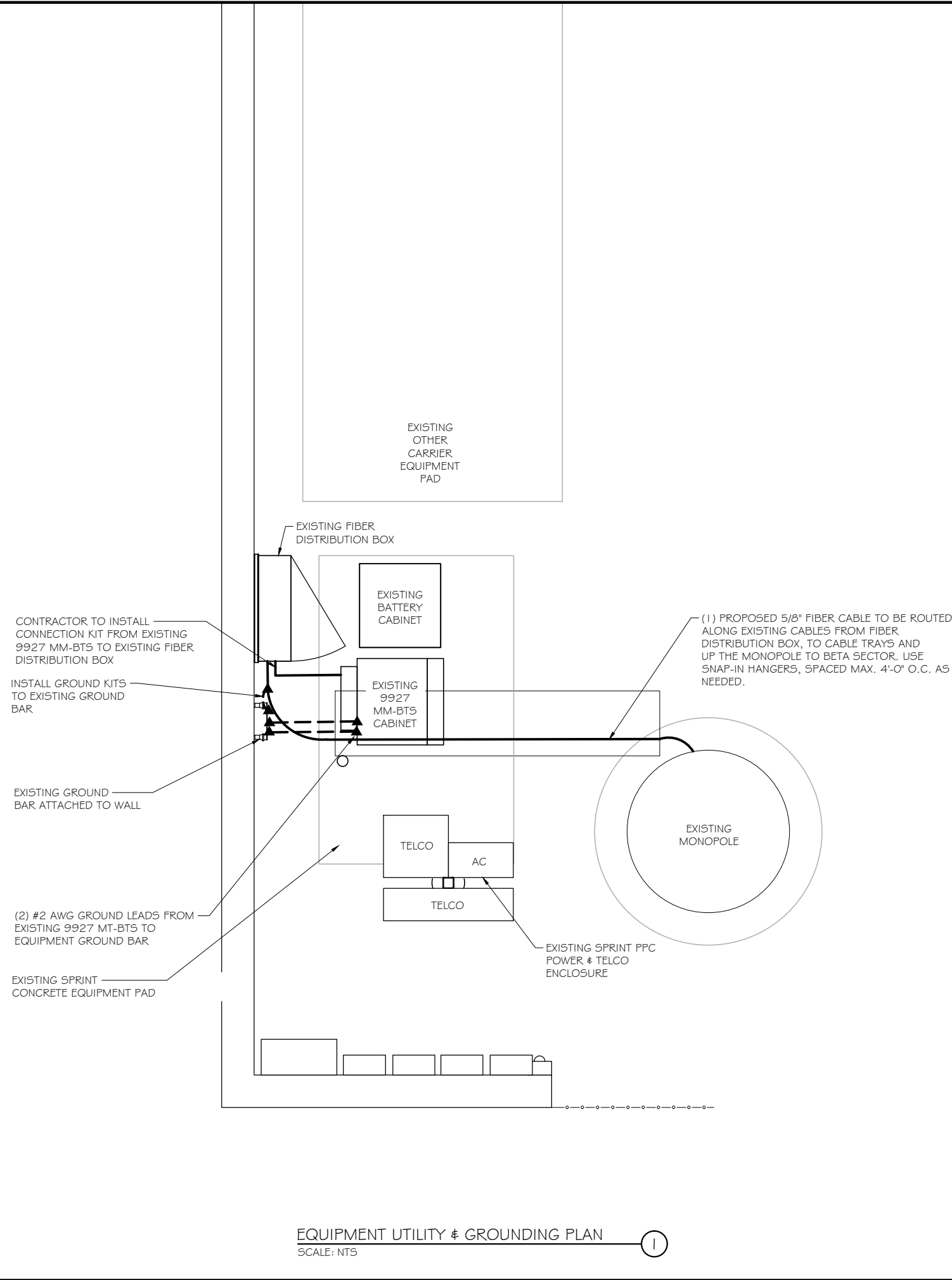
PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:  
**EQUIPMENT DETAILS**

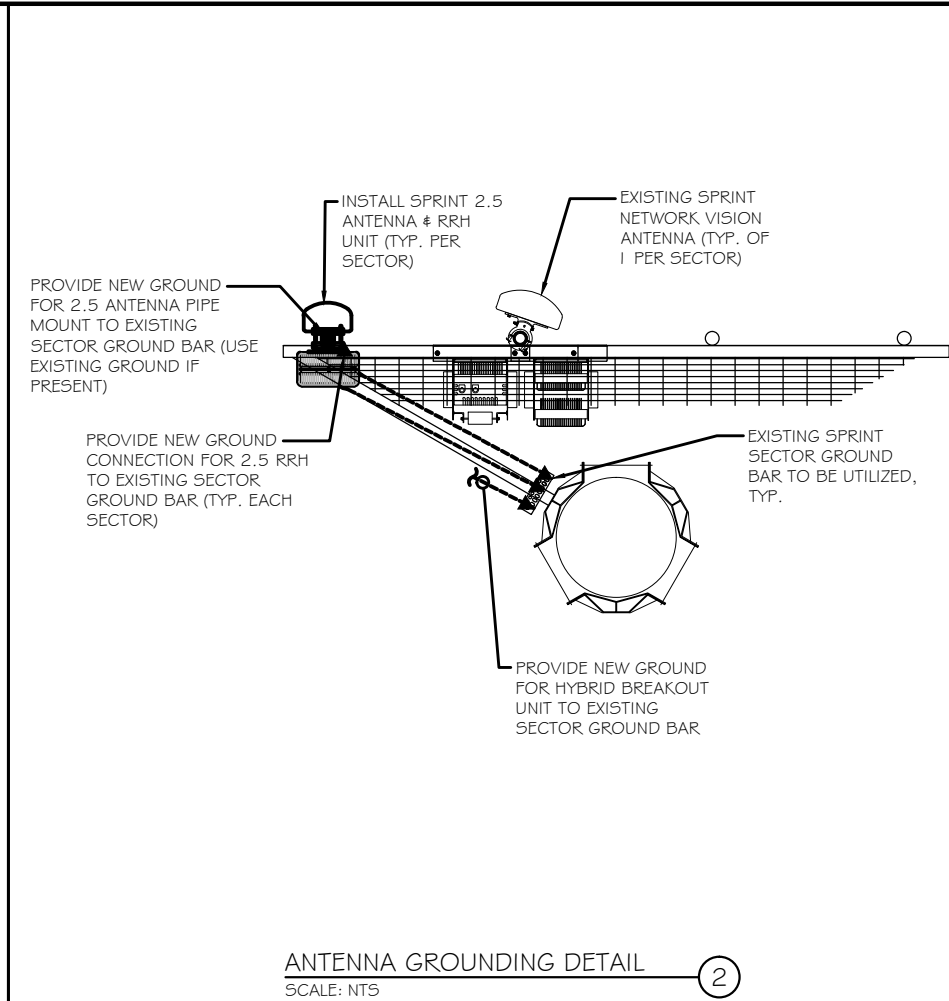
SCALE:  
 AS NOTED

PROJECT NUMBER: 28741  
 SHEET NUMBER: A-8





EQUIPMENT UTILITY & GROUNDING PLAN  
 SCALE: NTS



ANTENNA GROUNDING DETAIL  
 SCALE: NTS

GROUNDING NOTES:

1. CONTRACTOR TO ENSURE PROPER SEQUENCING OF GROUNDING AND UNDERGROUND CONDUIT INSTALLATION TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM AND/OR DAMAGE TO THE CONDUIT.
2. ALL EXTERIOR GROUND CONDUCTORS SHALL BE #2 AWG SOLID TINNED COPPER UNLESS NOTED OTHERWISE.
3. ALL GROUND CONNECTIONS BELOW GRADE SHALL BE EXOTHERMIC (CADWELD).
4. ALL GROUND CONNECTIONS ABOVE GRADE AND/OR INTERIOR SHALL BE COMPRESSION TYPE, TWO-HOLE LUGS OR DOUBLE-CRIMP "C" TAPS.
5. CONTACT AREAS WHERE CONNECTIONS ARE MADE SHALL BE PREPARED TO A BARE BRIGHT FINISH AND COATED WITH AN ANTI-OXIDATION MATERIAL BEFORE CONNECTIONS ARE MADE.
6. MAXIMUM RESISTANCE OF THE COMPLETED GROUND SYSTEM SHALL NOT EXCEED 5 OHMS.
7. WHERE GROUNDING CONNECTIONS ARE MADE TO PAINTED METAL SURFACES, PAINT SHALL BE REMOVED TO BEAR METAL TO ENSURE PROPER CONTACT AND RESTORED/PAINTED TO ORIGINAL FINISH.
8. GROUND DEPTH SHALL BE 30" MINIMUM BELOW FINISHED GRADE, OR 6" BELOW FROST LINE, WHICHEVER IS GREATER.

LEGEND:	
---	EXISTING GROUND CABLE
----	PROPOSED GROUND CABLE
▲	MECHANICAL CONNECTION
■	EXOTHERMIC CONNECTION
—E—E—E—E—E—	PROPOSED ELECTRIC



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ISSUE PHASE	FINAL	DATE ISSUED 06/19/2014

PROJECT TITLE:  
**S.WILLIMANTIC/ECSU  
 SITE#:CT33XC614-A**

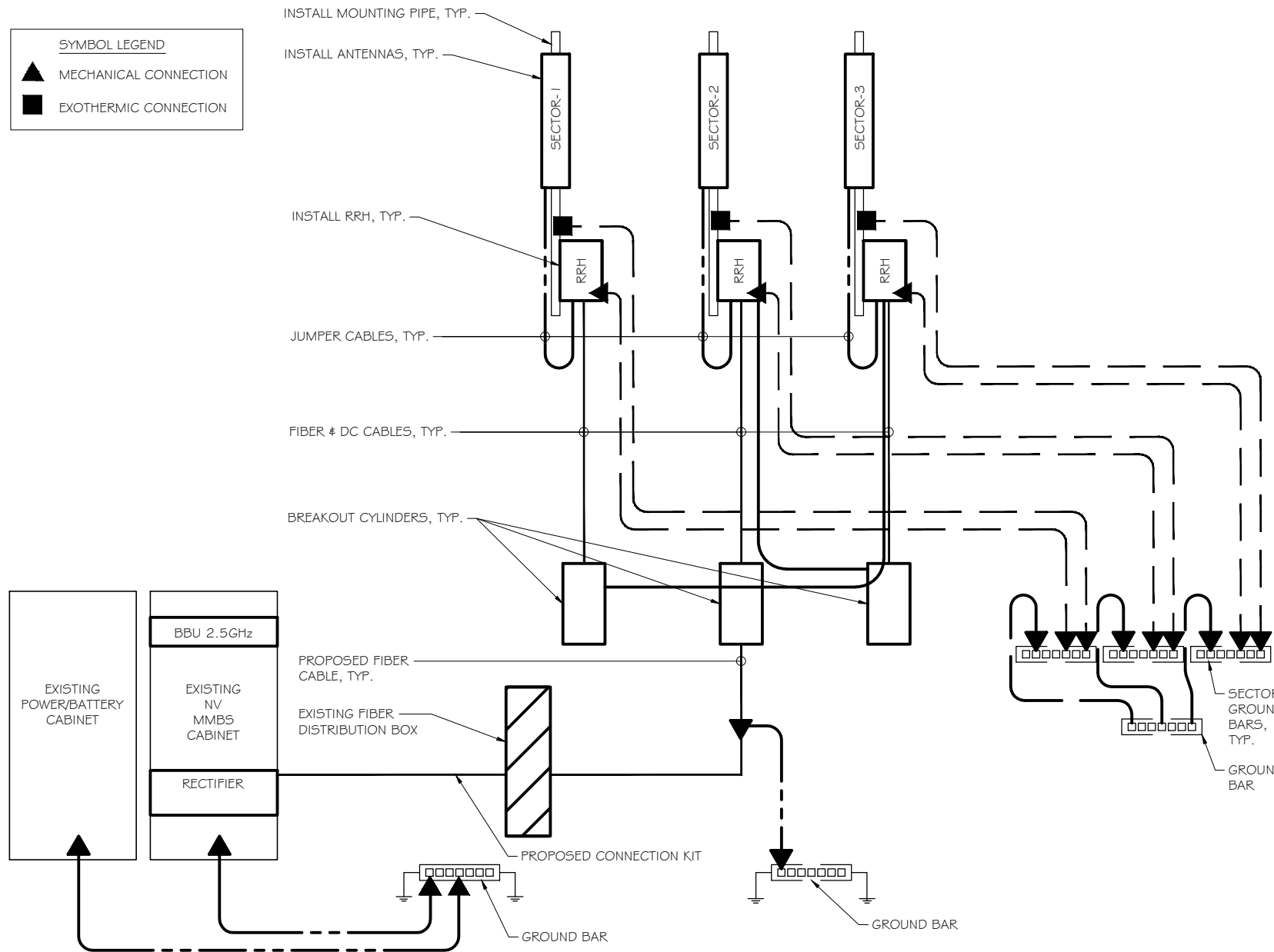
PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:  
**EQUIPMENT UTILITY &  
 GROUNDING PLAN**

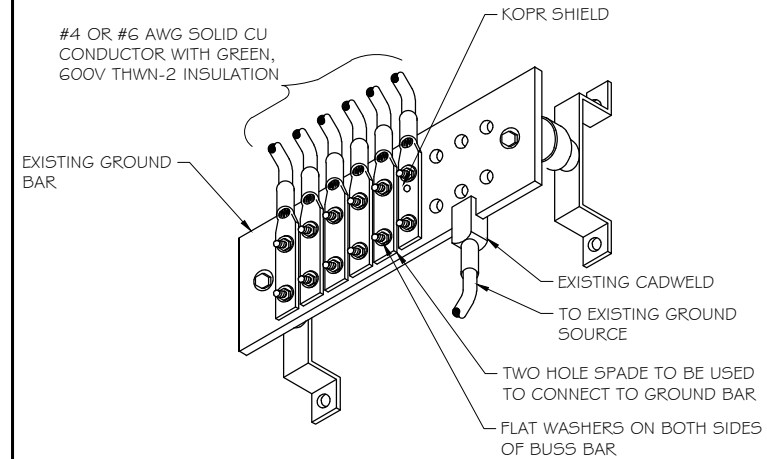
SCALE:  
 AS NOTED

PROJECT NUMBER	28741
SHEET NUMBER	E-1

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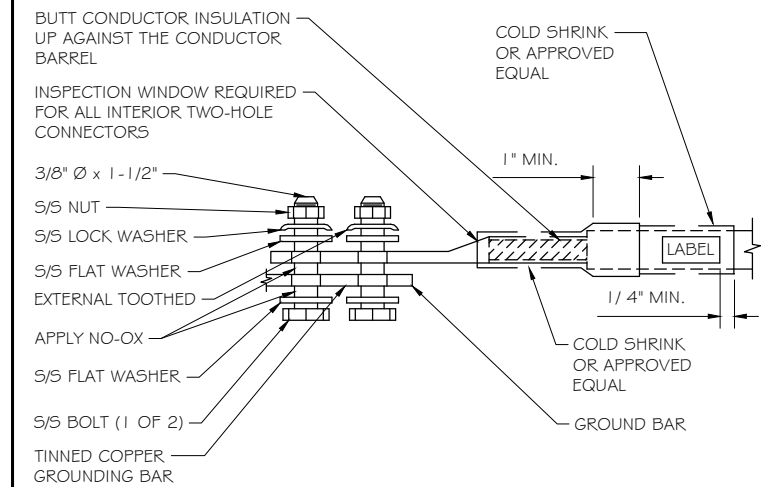


GROUNDING RISER DIAGRAM  
 SCALE: NTS



- NOTES:
1. APPLY NO-OX TO LUG AND GROUND BAR CONTACT SURFACE. DO NOT COAT INLINE LUG.
  2. IF STOLEN GROUND BARS ARE ENCOUNTERED, CONTACT SPRINT CM FOR REPLACEMENT THREADED ROD KIT.

GROUNDING CONDUCTOR INSTALLATION  
 SCALE: NTS



TWO-HOLE LUG  
 SCALE: NTS



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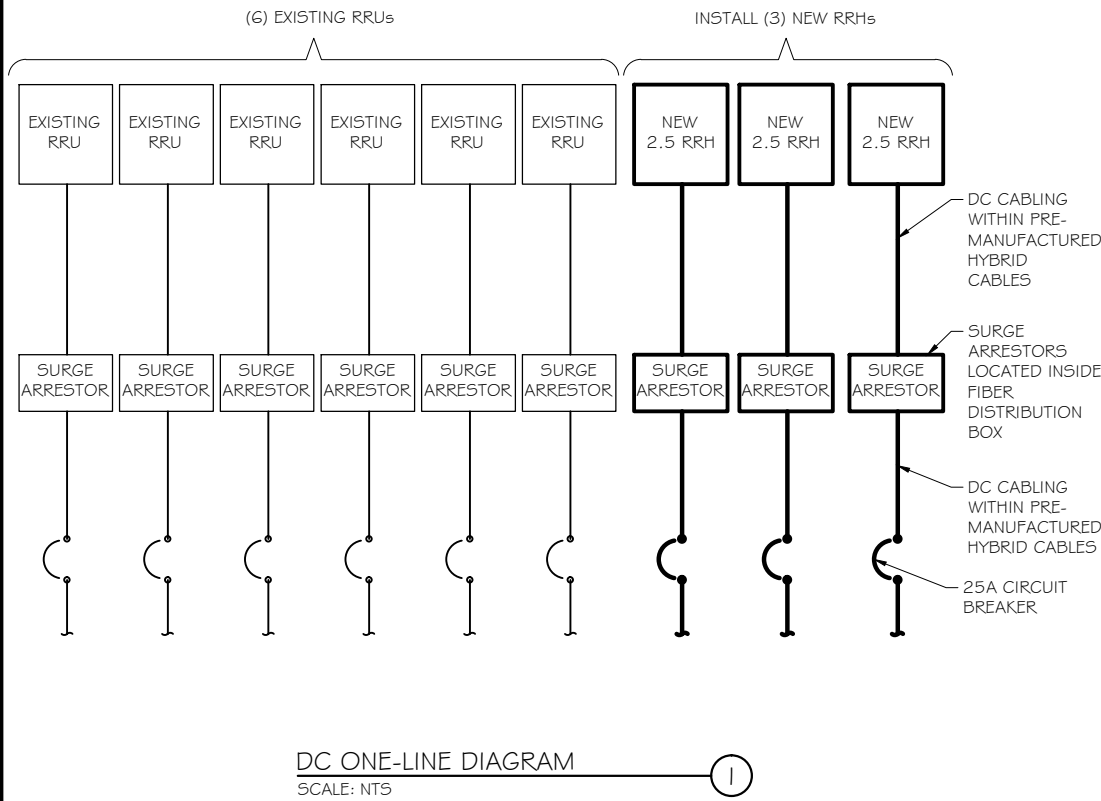
PROJECT TITLE:  
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 SITE#:CT33XC614-A**

PROJECT INFORMATION:  
 165 WINDHAM STREET  
 WILLIMANTIC, CT 06226  
 WINDHAM COUNTY

SHEET TITLE:  
**GROUNDING DETAILS**

SCALE:  
 AS NOTED

PROJECT NUMBER: 28741  
 SHEET NUMBER: E-2



### A/C PANEL SCHEDULE

VOLTAGE:	240V/1 20	PANEL STATUS:	EXISTING	N TO GROUND BOND:	YES
MAIN BREAKER:	200 AMP	MODEL NUMBER:	TBD	INTERNAL TVSS:	YES
MOUNT:	GROUND	PHASE:	1	WIRE:	3
ENCLOSURE TYPE:	NEMA 3R	BUSS RATING:	200 AMP	GROUND BAR:	YES
		NEUTRAL BAR:	YES		

CKT	DESCRIPTION	BREAKER AMPS	BREAKER POLES	BREAKER STATUS	PHASE A VA	PHASE B VA	BREAKER STATUS	BREAKER POLES	BREAKER AMPS	DESCRIPTION	CKT
1	NOT LEGIBLE	100	2	ON			ON	2	60	NOT LEGIBLE	7
2	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	8
3	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	9
4	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	10
5	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	11
6	NOT LEGIBLE	10	1	ON			ON	1	15	NOT LEGIBLE	12

A/C PANEL SCHEDULE  
 SCALE: NTS



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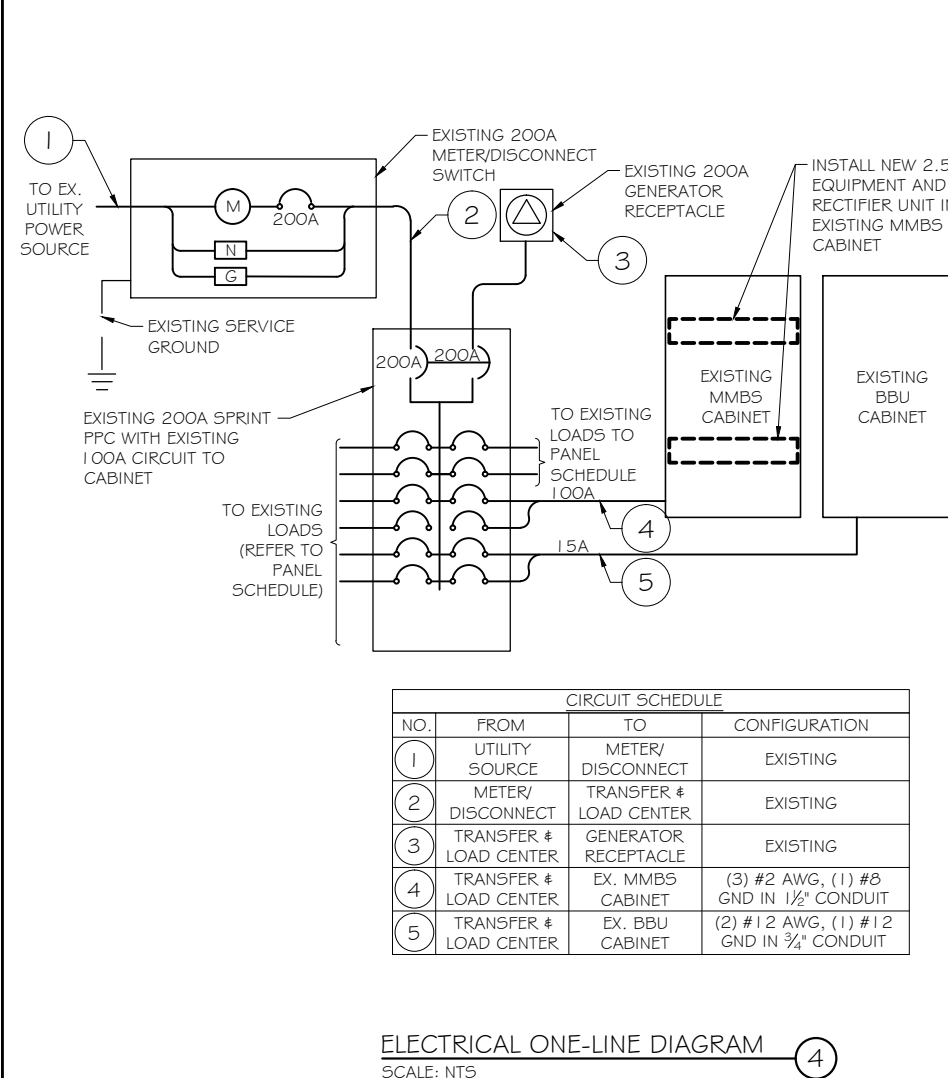
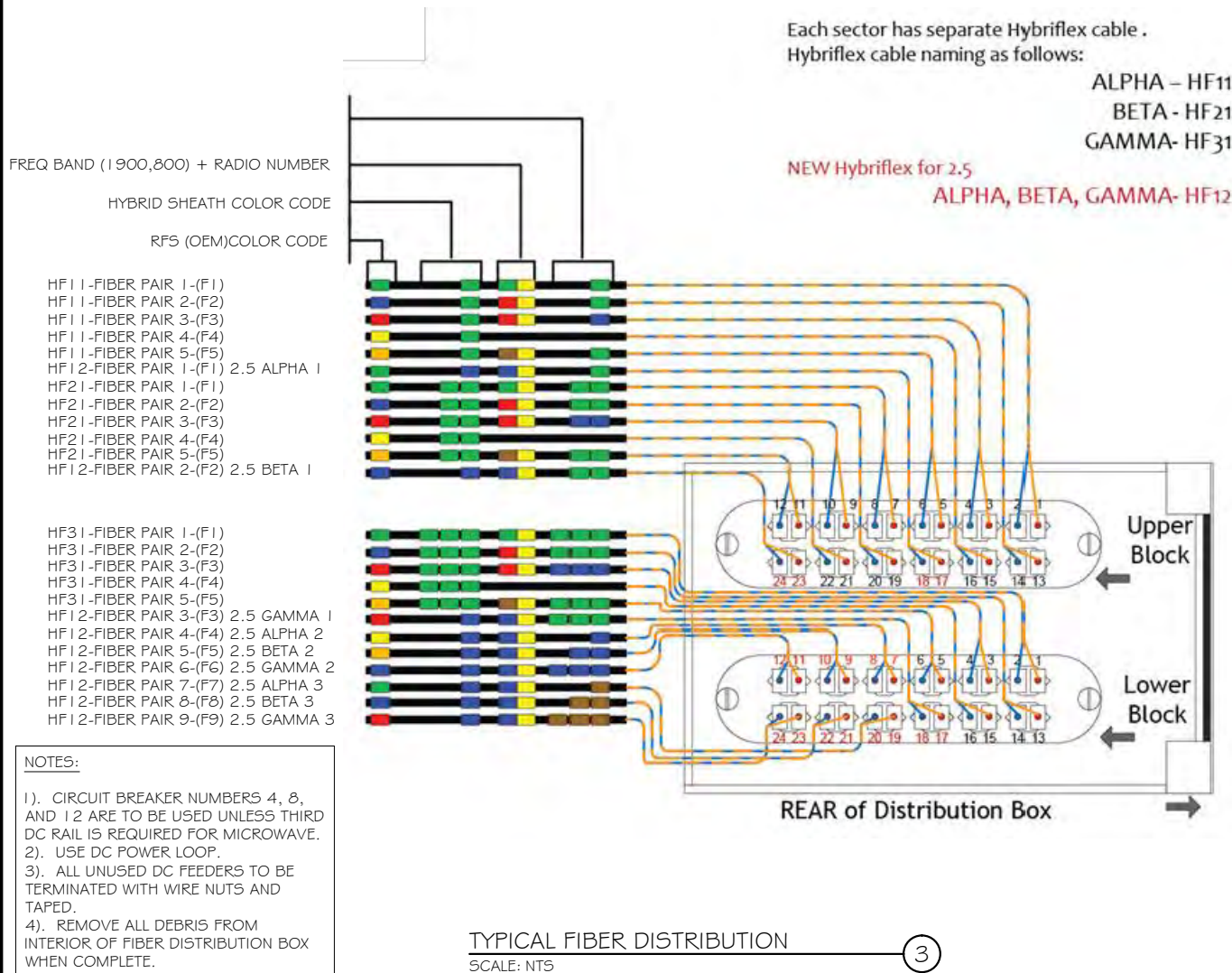


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PROJECT INFORMATION: 165 WINDHAM STREET WILLIMANTIC, CT 06226 WINDHAM COUNTY		
SHEET TITLE: DC POWER DETAILS & PANEL SCHEDULES		
SCALE:	AS NOTED	
PROJECT NUMBER	28741	
SHEET NUMBER	E-3	