10 Industrial Ave, Suite 3
Mahwah, NJ 07430
Phone: (908)447-4716
Kyle Richers
Real Estate Consultant

February 20th, 2015

Hand Delivered

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

CC to Property Owner
Cromwell Fire District
1 West Street, Cromwell, CT 06416

RE: Sprint Spectrum L.P. notice of intent to modify an existing telecommunications facility located at 179 Shunpike Road, Cromwell, CT 06416. Known to Sprint Spectrum L.P. as site CT60XC931.

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 Statues ("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 (908)-447-4716 or email krichers@transcendwireless.com with questions concerning this matter.
Thank you for your consideration.

Sincerely,

Kyle Richers
Real Estate Consultant

EBI Consulting
environmental | engineering | due diligence

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

Sprint Existing Facility

Site ID: CT60XC931

Cromwell- Rt. 372

179 Shunpike Road
Cromwell, CT 06416

February 19, 2015

EBI Project Number: 62151104

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

EBI Consulting
environmental | engineering | due diligence

February 19, 2015

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

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:
CT60XC931 - Cromwell- Rt. 372

Site Total: 91.01% - MPE% in full compliance

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at **179 Shunpike Road, Cromwell, 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 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of μW/cm2 calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the cellular band (850 MHz Band) is approximately 567 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz and 2500 MHz bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed upgrades to the existing Sprint Wireless antenna facility located at **179 Shunpike Road, Cromwell, 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) 4 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 APXV9TM14-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 APXV9TM14-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 **170 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	CT60XC931 - Cromwell- Rt. 372
Site Addresss	179 Shunpike Road, Cromwell, CT, 06416
Site Type	Self Support Tower

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	4	80	5.9	170	164	1/2 "	0.5	0	277.39	0.37%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	170	164	1/2 "	0.5	0	39.00	0.09%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	170	164	1/2 "	0.5	0	138.69	0.33%
														Sector total Power Density Value:		0.79%

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	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	4	80	5.9	170	164	1/2 "	0.5	0	277.39	0.37%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	170	164	1/2 "	0.5	0	39.00	0.09%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	170	164	1/2 "	0.5	0	138.69	0.33%
														Sector total Power Density Value:		0.79%

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	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	4	80	5.9	170	164	1/2 "	0.5	0	277.39	0.37%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	170	164	1/2 "	0.5	0	39.00	0.09%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	170	164	1/2 "	0.5	0	138.69	0.33%
														Sector total Power Density Value:		0.79%

Site Composite MPE %	
Carrier	MPE %
Sprint	2.37%
AT&T	24.31%
T-Mobile	2.85%
Cromwell Police	2.13%
Cromwell Fire	2.18%
Cromwell Fire Alarm	3.63%
Clearwire	1.04%
Verizon Wireless	52.50%
Total Site MPE %	**91.01%**

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Summary

All calculations performed for this analysis yielded results that were 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 **2.37% (0.79% from sector 1, 0.79% from sector 2 and 0.79% 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 **91.01%** 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

DETAILED STRUCTURAL ANALYSIS AND REINFORCEMENT OF AN EXISTING 170' SELF SUPPORTING LATTICE TOWER AND FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENTS

Site ID:	**(Sprint)**	**CT60XC931**
	(T-Mobile)	**CT11059C**
Site Name:	**(Sprint)**	**Cromwell - Route 372**
	(T-Mobile)	**Rocky Hill / I-91 / X23**
Site Address:	**179 Shunpike Road**	
	Cromwell, CT	

prepared for

Sprint

Transcend Wireless
10 Industrial Ave.
Suite 3
Mahwah, NJ. 07430

T-Mobile

EBI Consulting
21 B Street
Burlington, MA 01803

prepared by

URS

URS CORPORATION
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CT 06067
TEL. 860-529-8882

36931260.00000
TWS-027 Rev. 1

September 23, 2014

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 170' self supporting lattice tower located at 179 Shunpike Road in Cromwell, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code which requires a three second gust wind speed of 100 mph which converts to an 80 mph fastest mile per 2003 IBC (Table 1609.3.1) and the TIA/EIA-222-F standard for a wind velocity of 85 mph (fastest mile). The wind speed from the Connecticut State Building Code governs the design at 85 mph (fastest mile) and 74 mph (fastest mile) concurrent with ½ " ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report.

The proposed Sprint and T-Mobile antenna modifications are listed below:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Install: **(3) RFS APXV9TM14-ALU-I20 Panel Antennas** **(3) TD-RRH8x20-25 RRH Units** **(1) 1 1/4" Hybrid Cable** **(27) 8' Jumper Cables** **(3) 8' AISG Cables**	**Sprint (Proposed)**	**@ 170'**
Install: **(3) Commscope LNX-6515DS-VTM Panel Antennas** **(3) Ericsson RRUS_11 RRH Unit** **(3) 6' Antenna Pipe Mount**	**T-Mobile (Proposed)**	**@ 125'**

The results of an initial analysis indicated the tower structure did not have sufficient capacity to support the proposed loadings without modification. The required modifications are shown in SK-1. **Once the modifications are performed, the tower, anchor bolts, and foundation are considered structurally adequate with the wind loading classification specified above and all the existing and proposed antenna loading. No installation of new antennas or equipment shall occur until the modifications have been completed.**

This analysis is based on:

1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Tower geometry, structural member sizes, and Foundation information taken from a tower report prepared by PiROD Inc., ENG. File No. A-116398, dated November 18, 1999.
3) Foundation modification drawings prepared by Tectonic, dated May 5, 2004.
4) Structural analysis and reinforcement performed by URS Corp. on behalf of Sprint and T-Mobile, project number 36922436, signed and sealed on September 9, 2013.
5) Structural analysis performed by URS Corp. on behalf of Verizon Wireless, project number VZ5-178 / 36917427, signed and sealed on August 12, 2014.
6) Structural analysis performed by URS Corp., on behalf of Sprint, project number TWS-027 / 36931260, signed and sealed on August 22, 2014.
7) T-Mobile RFDS dated July 17, 2014.
8) Previous structural analysis performed by URS Corporation, on behalf of T-Mobile, project number EBI-002 / 36931289, signed and sealed August 29, 2014.
9) Proposed additional antenna and mount configuration as specified in Section 2 of this report.

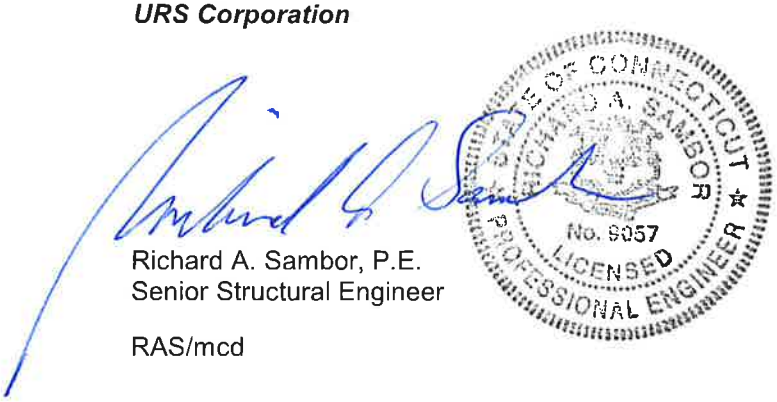
1. EXECUTIVE SUMMARY (continued)

This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration as well as the physical condition of the tower and connections. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,

URS Corporation



Richard A. Sambor, P.E.
Senior Structural Engineer

RAS/mcd

2. INTRODUCTION

The subject tower is located at 179 Shunpike Road in Cromwell, Connecticut. The structure is a 170' self supporting lattice tower designed and manufactured by PiROD Inc.

The current inventory with proposed modification is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(1) Tx Rx 101-90-08 antenna	Town (existing)	15' Mast pipe on 9 Arm Halo Mount	183'	(1) 7/8"
(1) 8 Bay Dipole (3" dia x 20')	Town (existing)	9 Arm Halo Mount	178'	(1) 7/8"
(1) 2 ½" dia x 20' Whip	Town (existing)	9 Arm Halo Mount	178'	(1) 1 1/2"
(3) 2 ½" dia x 15' Whip	Town (existing)	9 Arm Halo Mount	175'	(3) 7/8"
1 ½" dia x 12' Whip	Town (existing)	9 Arm Halo Mount	174'	(1) 7/8"
(3) RFS APXV9TM14-ALU-I20 Panel Antennas (3) TD-RRH8x20-25 RRH Units	**Sprint (Proposed)**	***See Mount Below***	**170'**	**(1) 1 1/4" Hybrid Cable (27) 8' Jumper Cables (3) 8' AISG Cables**
(3) RFS APXVSPP18-C-A20 Antennas (3) 1900 MHz RRH Units (3) 800 MHz RRH Units (3) 800 MHz Filters	Sprint (existing)	9 Arm Halo Mount	170'	(3) RFS HB114-1-0804-MSF Hybrid Cables
(1) Radiowaves HPD2-4.7 w/ Radome (1) Cambium PTP49600 Antenna	CPD (existing)	9 Arm Halo Mount	168'	(1) WB3176A – Copper Clad Outdoor Cable (2) 4' long 1/2" Jumper Cables
(1) SU-RA-HP-2.4 (1' x 1' Antenna)	Town (existing)	9 Arm Halo Mount	168'	(1) 3/8"
(3) APXV18-206517S	Unknown (existing)	Leg Mount	159'-6"	(6) 1 5/8"
(1) Sinclair SC420-HF1LDF Omni	CPD (existing)	Pipe mount	158'-6"	(1) 1 5/8" Low Density Foam Cable
(2) 3" dia x 20' Whip	Town (existing)	20' Platform	144'	(2) 7/8"
(1) 2 ½" x 20' Whip	Town (existing)	20' Platform	144'	(1) 1/2"
2" dia x 15' Whip	Town (existing)	20' Platform	141'	(1) 1/2"
(1) 1.5" dia x 10' Whip	Town (existing)	20' Platform	139'	(1) 1/2"
(1) 3.5" dia x 9' Whip	Town (existing)	20' Platform	138'-6"	---
(3) Argus LLPX310R antennas (3) Samsung Remote Radio Heads U-RAS	Clearwire (existing)	20' Platform	134'	(6) CAT 5 cable

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(3) Andrew VHLP2.5 dish (2.5' dia.) (1) Andrew VHLP2 dish (2' dia.) (Gamma Sector)	Clearwire (existing)	20' Platform	134'	(4) 1/2"
(3) Commscope LNX-6515DS-VTM Panel Antennas (3) Ericsson RRUS_11 RRH Unit	**T-Mobile (Proposed)**	**(3) Antenna Pipes attached with below**	**125'**	***See Below Cables***
(6) Ericsson AIR21 B4A|B2P Antennas (3) Twin PCS TMAs	T-Mobile (existing)	(3) Existing T-Frames	125'	(12) 1 5/8" (1) 1-5/8" Hybrid Cable
(6) Powerwave 7770 (12) TMA's (3) KMW AM-X-CD-16-65-00T-RET (6) RRU (1) Surge Suppressor	AT&T (existing)	(3) T-Frames	115'	(12) 1 5/8" (3) Optic Fiber & (6) DC Cables (Located within 3" dia Flex Conduit)
(1) HBX-6517DS-VTM_04DT_2110 Panel Antenna (Alpha Sector) (2) HBX-6517DS-VTM_02DT_2110 Panel Antennas (Beta & Gamma Sectors) (3) AWS RRH Units (1) DB-T1-6Z-8AB-0Z Distribution Box (1) LNX-6514DS-VTM_03DT_0850 Panel Antenna (Alpha Sector) (1) LNX-6514DS-VTM_04DT_0850 Panel Antenna (Beta Sector) (1) LNX-6514DS-VTM_05DT_0850 Panel Antenna (Gamma Sector) (2) SWCP 2x5514 antennas (Alpha & Gamma Sector) (1) BXA-70063-6CF-2 antenna (Beta Sector) (3) BXA-171063-12BF_2 antennas (6) FD9R6004/2C-3L Diplexers	Verizon (existing)	(3) T-Frames (PiROD part #800093)	101'	(1) 1 5/8" F.O Cable (12) 1 5/8"
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	Pipe Mount	87'	(2) CAT 5

Antenna Type	Carrier	Mount	Antenna Centerline Elevation	Cable
(1) 3' Dish (1) TMA	AT&T (existing)	3' Stand-off	83'	(2) CAT 5
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	3' Stand-off	80'	(2) CAT 5
(1) Camera	Unknown (existing)	Leg Mounted	30'	(2) 1/2" (estimated from photographs)
(1) 3' Yagi	Unknown (existing)	Leg Mounted	24'	(1) 1/2"

This structural analysis of the communications tower was performed by URS Corporation (URS) for Sprint and T-Mobile. The purpose of this analysis was to investigate the structural integrity of the reinforced tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the Connecticut State Building Code, TIA/EIA-222-F - Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, and the American Institute of Steel Construction (AISC) Manual of Steel Construction – Allowable Stress Design (ASD).

The analysis was conducted using TNX Tower 6.1.3.1. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Basic Wind Speed:

- Middlesex County; v = **85** mph (fastest mile) [Section 16 of TIA/EIA-222-F-1996]
- Cromwell; v = 100mph (3 second gust) equivalent to 80mph (fastest mile) [Appendix K, 2005 Connecticut State Building Code Supplement]

Loading Cases:

Load Condition 1 = 85 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 74 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

The combined axial and bending stresses on the tower structure were evaluated to compare with the allowable stress in accordance with AISC. The results of an initial analysis indicated that the tower structure required modification. The required modifications are shown in SK-1 located in Section 6 of this report. This analysis indicated that once these modifications are performed, the tower, anchor bolts and foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading. The table below summarizes the critical members for each tower component.

TABLE 1: Tower Component Stress vs. Capacity Summary:

Component/ (Section No.)	Existing Component Size	Controlling Component/Elevation	Percent Capacity	Pass/Fail
Tower Leg (T5)	PiROD Truss Leg	Compression 90'-100'	**92.4 %**	**Pass**
Diagonal (T7)	L3x3x3/8	Compression 60'-80'	**88.5 %**	**Pass**
Top Girt (T1)	7/8" SR	Compression 150'-170'	**9.5 %**	**Pass**
Bottom Girt (T1)	7/8" SR	Compression 150'-170'	**4.4 %**	**Pass**
Mid Girt (T4)	L3x3x3/16	Compression 100'-120'	**34.8 %**	**Pass**
Bolt Checks				
Tower Bolts	(1) 1" A325N Bolt / 140'	Member Bearing on Bolt	**83.5 %**	**Pass**
Anchor Bolts	(6) 1-1/4"	Tension	**77.0 %**	**Pass**

TABLE 2: Foundation Summary

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments:
Previously Modified Drilled Concrete Caisson	Uplift	89.9 %/2.22	**Pass**	Min. F.O.S of 2.0 req'd per IBC 2003 Section 3108.4.2

5. CONCLUSIONS AND RECOMMENDATIONS

The results of an initial analysis indicated the tower structure did not have sufficient capacity to support the proposed loadings without modification. The required modifications are shown in SK-1. **Once the modifications are performed, the tower, anchor bolts, and foundation are considered structurally adequate with the wind loading classification specified above and all the existing and proposed antenna loading. No installation of new antennas or equipment shall occur until the modification have been completed.**

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Foundations were properly constructed to support original design loads as specified in the original design documents.
10. All coaxial cable is installed as specified in Section 6 of this report.

URS is not responsible for any changes/alterations completed prior to or hereafter in which URS is not or was not directly involved. Changes/alterations include but are not limited to:

A. Adding antennas
B. Removing/replacing antennas
C. Adding coaxial cables

URS 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 upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact URS. URS disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

Ongoing and Periodic Inspection and Maintenance:

After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

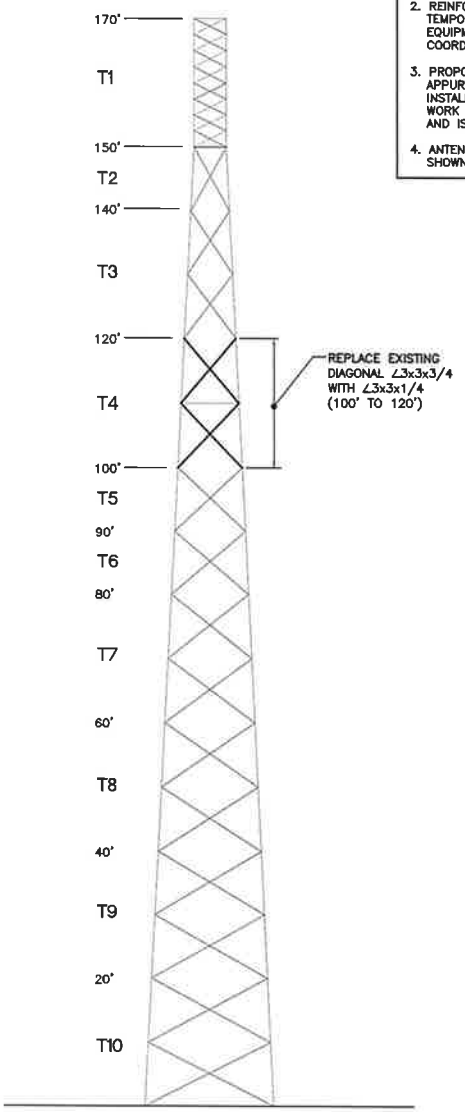
The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

TOWER REINFORCEMENT DRAWING SK-1

NOTES:

1. ALL PROPOSED DIAGONAL MEMBERS SHALL BE INSTALLED WITH A325-N BOLTS (THREADS EXCLUDED FROM SHEAR PLANE). SIZE SHALL MATCH EXISTING.
2. REINFORCEMENT MAY REQUIRE TEMPORARY REMOVAL OF EXISTING EQUIPMENT. CONTRACTOR SHALL COORDINATE WORK WITH OWNER.
3. PROPOSED ANTENNAS AND APPURTENANCES SHALL NOT BE INSTALLED UNTIL ALL REINFORCEMENT WORK HAS BEEN INSPECTED AND IS DEEMED COMPLETE.
4. ANTENNAS AND APPURTENANCES NOT SHOWN FOR CLARITY.



1 / SK-1 TOWER REINFORCEMENT
SCALE: 1" = 30'-0"

STRUCTURAL NOTES

TOWER DESIGN CRITERIA:

THIS TOWER IS DESIGNED AND REINFORCED IN ACCORDANCE WITH THE 2005 CONNECTICUT STATE BUILDING CODE, THE TIA/EIA-222-F FOR 90 MPH (FASTEST MILE) WIND SPEED CONCURRENT WITH 1/2" RADIAL ICE. ALLOWABLE STEEL STRESSES PER AISC ASD 9TH EDITION.

MATERIAL SPECIFICATIONS FOR REINFORCEMENT OF TOWER:

STRUCTURAL STEEL, PLATES, ANGLES	ASTM A36
SOLID ROUND (S.R.)	ASTM A572 GRADE 50
PIPE COLUMNS	ASTM A53 GRADE B
TUBE COLUMNS F=46.KSI	ASTM A500
BOLTS	ASTM 325-N (UNLESS NOTED OTHERWISE)
WELDING ELECTRODE	ASTM E 70

SHOP AND ERECTION DRAWINGS SHALL BE SUBMITTED FOR ALL STRUCTURAL STEEL WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. SUBMIT 6 SETS OF PRINTS TO THE ARCHITECT FOR REVIEW.

THE OMISSION OF ANY MATERIAL THAT WAS SHOWN ON THE CONTRACT DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR OF PROVIDING SAME.

STRUCTURAL STEEL SHALL CONFORM TO THE CURRENT "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", AND THE "AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES".

ALL WELDING SHALL BE DONE BY A CERTIFIED WELDER IN ACCORDANCE WITH A.W.S. STANDARDS.

CONNECTIONS SHALL CONFORM TO ALL REQUIREMENTS OF THE "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", LATEST EDITION, AND THE "SPECIFICATION FOR STRUCTURAL STEEL JOINTS USING ASTM A325 OR A490 BOLTS".

BOLT HOLES SHALL BE PUNCHED OR DRILLED. FLAME CUT HOLES ARE NOT ACCEPTABLE.

ALL A-325/A490 BOLTS ARE TO BE TIGHTENED TO A SNUG TIGHT CONDITION AS DEFINED BY AISC SPECIFICATION. USE LOCK NUT OR LOCKING DEVICE TO MATCH EXISTING.

ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND AWS D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION", 9TH EDITION. AT THE COMPLETION ALL WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

USE PRECAUTIONS & PROCEDURES PER AWS D1.1 WHEN WELDING GALVANIZED METALS.

TOUCH-UP ALL DAMAGED GALVANIZED STEEL WITH APPROVED COLD ZINC, "GALVANOX", "DRY GALV", "ZINC-IT", OR APPROVED EQUIVALENT, IN ACCORDANCE WITH MANUFACTURERS GUIDELINES. TOUCH-UP DAMAGED NON GALVANIZED STEEL WITH SAME PAINT APPLIED IN SHOP OR FIELD.

ALL STEEL WORK SHALL BE GALVANIZED AND IN ACCORDANCE WITH THE SPECIFICATION ASTM A123 UNLESS OTHERWISE NOTED. (AFTER FABRICATION)

COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

SPECIAL INSPECTIONS REQUIRED PER THE 2005 CONNECTICUT STATE BUILDING CODE FOR STRUCTURAL STEEL WORK.

INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, BE PAID BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. THE INSPECTOR SHALL OBSERVE INSTALLATION OF BOLTS AND TEST NOT LESS THAN 20% OF THE BOLTS AND NOT LESS THAN TWO BOLTS, SELECTED AT RANDOM, IN EACH CONNECTION.

FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

REINFORCEMENT NOTES:

EXISTING DIMENSIONS OF THE TOWER STRUCTURE WERE OBTAINED FROM MANUFACTURERS ORIGINAL DESIGN DOCUMENTS, PREPARED BY PIROD INC., ENG FILE No. A-116398, DATED NOVEMBER 18, 1999 AND ARE NOT GUARANTEED. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.

CONTRACTOR SHALL VISIT THE SITE PRIOR TO THE START OF WORK WITH SUFFICIENT RIGGING EQUIPMENT AND PERSONNEL TO OBTAIN DETAILED FABRICATION MEASUREMENTS OF EXISTING TOWER STEEL MEMBERS TO BE REPLACED.

TOWER REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS, TRANSMISSION LINES AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA

THE EXISTING COAXIAL CABLE AND ALL ACCESSORIES SHALL BE RELOCATED AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.

CONTRACTOR SHALL TAKE EXTREME CARE NOT TO DAMAGE THE EXISTING TOWER, THE EXISTING COMMUNICATION EQUIPMENT, COAXIAL CABLE AND THEIR COMPONENTS. IN THE EVENT THAT THE EXISTING COMMUNICATION EQUIPMENT IS DAMAGED DURING CONSTRUCTION THE CONTRACTOR SHALL REPAIR THE DAMAGE IMMEDIATELY (WITH THE APPROVAL OF THE COMMUNICATION CARRIER) AT NO ADDITIONAL COST TO THE CONTRACT

THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION. THE CONTRACTOR SHALL BE AWARE OF WEATHER & WIND CONDITIONS AND NOT PERFORM TOWER MEMBER REPLACEMENT IN THE WIND.

ALL REINFORCEMENT SHOWN FOR DIAGONALS AND HORIZONTALS APPLY TO ALL SIDES OF THE TOWER.

A&E FIRM
URS CORPORATION AES
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

Sprint
10 INTERNATIONAL AVENUE
SUITE 3
MAHWAH, NJ 07430

T-Mobile
EBI CONSULTING
21 B STREET
BURLINGTON, MA 01803

A&E SEAL

URS PROJECT NUMBER: 36931260Z (TWS-027) | DRAWN BY: MD

NO.	DATE	ISSUED FOR
0	9/22/14	TWS-027 MOD

RELEASE BY | DATE

CT60XC931
CT11059C

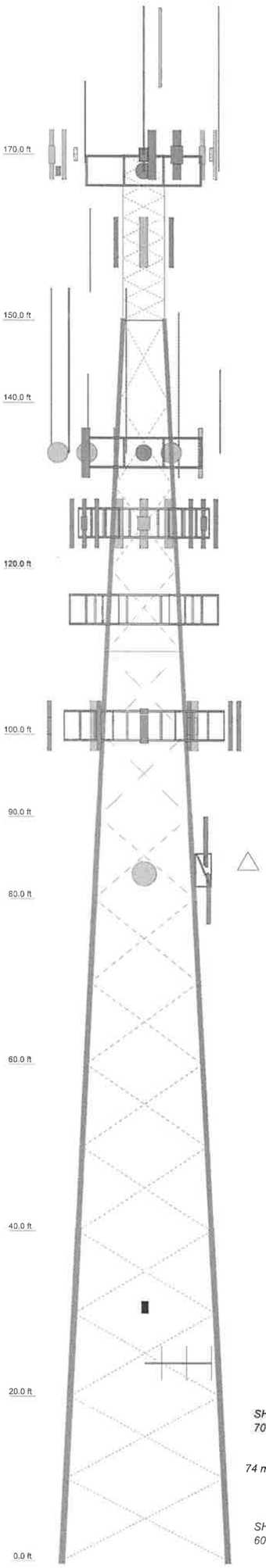
179 SHUNPIKE ROAD
CROMWELL, CT

SHEET TITLE
REINFORCEMENT DETAILS & NOTES

SHEET NUMBER
SK-1

TNX TOWER INPUT/OUTPUT SUMMARY

Section	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	Pirod 105220 reinf w/ 1" dia bar	Pirod 105219 reinf w/1" dia bar	Pirod 105219	Pirod 105218 reinf w/ 1" dia bar	A	Pirod 105217		Pirod 105216	Pirod 105244	SR 1 3/4
Leg Grade					A572-50					
Diagonals	L4x4x5/16	L3 1/2x3 1/2x3/8	L3 1/2x3 1/2x5/16	L3x3x3/8	L3x3x5/16	L3x3x1/4		L3x3x3/16	L2 1/2x2 1/2x3/16	SR 7/8
Diagonal Grade				A36					A572-50	
Top Girts				N.A.		L3x3x3/16			L3x3x3/16	SR 7/8
Mid Girts			N.A.					N.A.		
Bottom Girts				N.A.						SR 7/8
Face Width (ft)	20	16	14	12	11	10	8	6		5
# Panels @ (ft)			15 @ 10						8 @ 2.48958	
Weight (K)	30.7	6.1	5.4	4.9	1.6	1.5	2.8	2.1	1.1	1.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
101-90-08-0-01 (Municipal)	183	LNX-6515DS-VTM w/ 6' 2" sch 40 Pilipe Mount (T-Mobile)	125.5
15' Mount Pipe (Municipal)	179.75	LNX-6515DS-VTM w/ 6' 2" sch 40 Pilipe Mount (T-Mobile)	125.5
3" Dia 20' Omni (Municipal)	178	RRUS-11 (T-Mobile)	125.5
2.5" x 20'6" Whip (Municipal)	178	RRUS-11 (T-Mobile)	125.5
2.5" x 14' Omni (Municipal)	175	RRUS-11 (T-Mobile)	125.5
2.5" x 14' Omni (Municipal)	175	7770 (ATI)	115
2.5" x 14' Omni (Municipal)	175	7770 (ATI)	115
1.5" x 12' Omni (Municipal)	174	7770 (ATI)	115
APXV/SPP18-C-A20 (Sprint)	170	7770 (ATI)	115
APXV/SPP18-C-A20 (Sprint)	170	(2) TMA (shielded) (ATI)	115
APXV/SPP18-C-A20 (Sprint)	170	(2) TMA (shielded) (ATI)	115
Panasonic RRH 1900MHZ (Sprint)	170	(2) TMA (shielded) (ATI)	115
Panasonic RRH 1900MHZ (Sprint)	170	(2) TMA (shielded) (ATI)	115
Panasonic RRH 1900MHZ (Sprint)	170	(2) TMA (shielded) (ATI)	115
Andrew 800MHz RRH (Sprint)	170	(2) TMA (shielded) (ATI)	115
Andrew 800MHz RRH (Sprint)	170	PiROD 12' Lightweight T-Frame (ATI)	115
Andrew 800MHz RRH (Sprint)	170	PiROD 12' Lightweight T-Frame (ATI)	115
APXV9TM14-120 (Sprint)	170	PiROD 12' Lightweight T-Frame (ATI)	115
APXV9TM14-120 (Sprint)	170	7770 (ATI)	115
APXV9TM14-120 (Sprint)	170	7770 (ATI)	115
TD-RRH8x20-25 (Sprint)	170	(2) REMOTE RADIO HEAD (RRH) (ATI)	115
TD-RRH8x20-25 (Sprint)	170	Surge Suppressor (ATI)	115
TD-RRH8x20-25 (Sprint)	170	AM-X-CD-16-65-00T-RET (6') (ATI)	115
9 Arm Halo Mount (Municipal)	168	AM-X-CD-16-65-00T-RET (6') (ATI)	115
SU-RA-HP-2.4 Antenna (Municipal)	168	AM-X-CD-16-65-00T-RET (6') (ATI)	115
PTP49600 (CPD)	168	(2) REMOTE RADIO HEAD (RRH) (ATI)	115
HPD2-4.7	168	(2) REMOTE RADIO HEAD (RRH) (ATI)	115
APXV18-206517S-C w/ mounting hardware	159.5	RH_2X40-AWS (Verizon - AWS)	101
APXV18-206517S-C w/ mounting hardware	159.5	RH_2X40-AWS (Verizon - AWS)	101
APXV18-206517S-C w/ mounting hardware	159.5	BXA-171063-12BF (Verizon)	101
SC420-HF1LDF (Municipal)	158.5	SWCP 2x5514 (Verizon)	101
3" Dia 20' Omni (Municipal)	144	BXA-171063-12BF (Verizon)	101
3" Dia 20' Omni (Municipal)	144	BXA-171063-12BF (Verizon)	101
2.5" x 20'6" Whip (Municipal)	144	SWCP 2x5514 (Verizon)	101
2" Dia 15' Omni (Municipal)	141	PiROD 12' Lightweight T-Frame (Verizon)	101
1.5" x 10' Omni (Municipal)	139	PiROD 12' Lightweight T-Frame (Verizon)	101
9' Whip (Municipal)	138.5	PiROD 12' Lightweight T-Frame (Verizon)	101
Argus LLPX310R (Clearwire)	134	(2) Diplexer (Verizon)	101
Argus LLPX310R (Clearwire)	134	(2) Diplexer (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	(2) Diplexer (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	BXA-70063-6CF (Verizon)	101
PiROD 20' Universal Platform (Municipal)	134	HBX-6517DS-VTM (Verizon - AWS)	101
Argus LLPX310R (Clearwire)	134	HBX-6517DS-VTM (Verizon - AWS)	101
VHLP2.5-180 (Clearwire)	134	HBX-6517DS-VTM (Verizon - AWS)	101
VHLP2.5-180 (Clearwire)	134	RH_2X40-AWS (Verizon - AWS)	101
VHLP2.5-180 (Clearwire)	134	DB-T1-6Z-8AB-0Z (Verizon - AWS)	101
VHLP2-180 (Clearwire)	134	LNX-6514DS-T4M (Verizon - 850)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	LNX-6514DS-T4M (Verizon - 850)	101
PiROD 10' Lightweight T-Frame (T-Mobile)	125.5	LNX-6514DS-T4M (Verizon - 850)	101
PiROD 10' Lightweight T-Frame (T-Mobile)	125.5	3'x2'x22" Panel	87
PiROD 10' Lightweight T-Frame (T-Mobile)	125.5	TMA	84.5
AIR B2A/B4P (T-Mobile)	125.5	3' Stand-off	83.5
AIR B2A/B4P (T-Mobile)	125.5	3' Stand-off	83.5
AIR B2A/B4P (T-Mobile)	125.5	3' Dish	83
AIR B2A/B4P (T-Mobile)	125.5	TMA	83
AIR B2A/B4P (T-Mobile)	125.5	TMA	82.5
Twin PCS TMA (T-Mobile)	125.5	3'x2'x22" Panel	80
Twin PCS TMA (T-Mobile)	125.5	Camera	30
Twin PCS TMA (T-Mobile)	125.5	PC8013N	24
LNX-6515DS-VTM w/ 6' 2" sch 40 Pilipe Mount (T-Mobile)	125.5		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirod 105217 reinf w/ 1" dia bar		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 92.4%

MAX. CORNER REACTIONS AT BASE:
DOWN: 429 K
SHEAR: 38 K

UPLIFT: -366 K
SHEAR: 48 K

AXIAL
86 K

SHEAR
70 K

MOMENT
6930 kip-ft

TORQUE 27 kip-ft
74 mph WIND - 0.5000 in ICE

AXIAL
52 K

SHEAR
60 K

MOMENT
5744 kip-ft

TORQUE 25 kip-ft
REACTIONS - 85 mph WIND

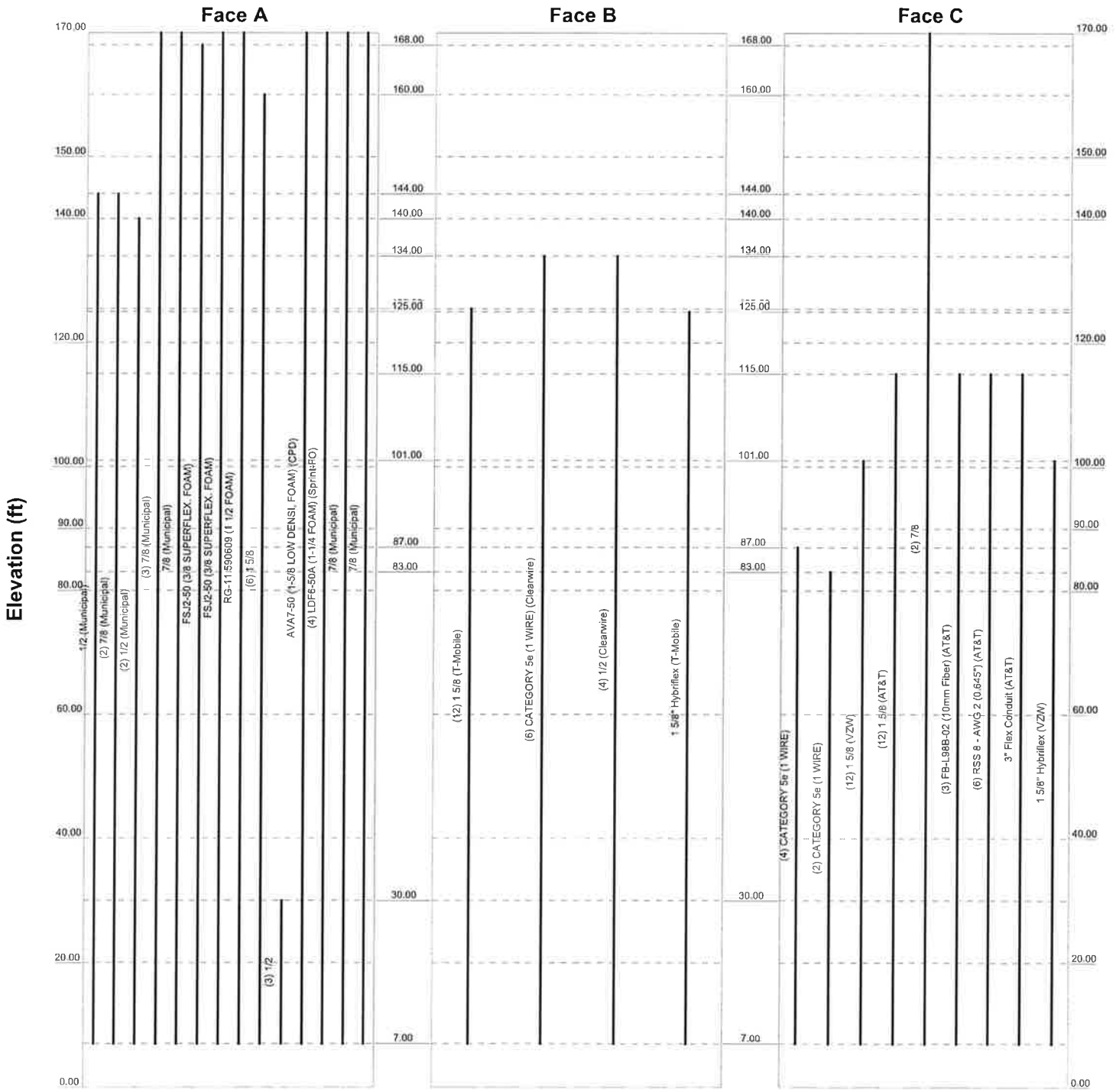
URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: 860-529-8882
FAX: 860-529-3991

Job:	***PiROD U20'-0"x170' Lattice Tower***
Project:	***TWS-027 Rev. 1 / Cromwell, CT Tower***
Client:	Sprint / T-Mobile (TWS-027)/(EBI-002)
Drawn by:	MCD
App'd:	
Code:	TIA/EIA-222-F
Date:	09/23/14
Scale:	NTS
Path:	
Dwg No.	E-1

TNX TOWER FEEDLINE DISTRIBUTION CHART

Feed Line Distribution Chart
0' - 170'

Round Flat App In Face App Out Face Truss Leg



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500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: 860-529-8882
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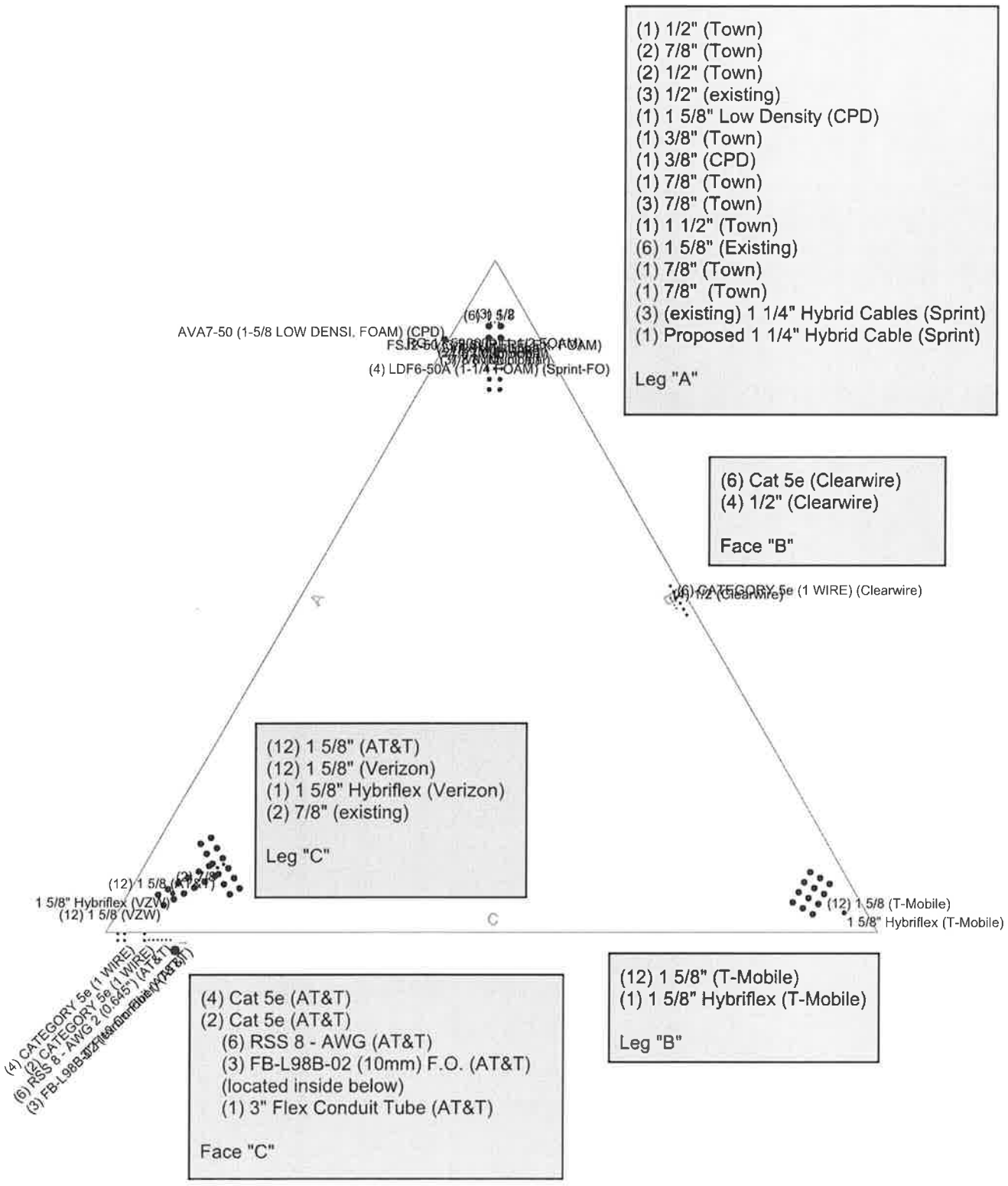
Job:	***PiROD U20'-0"x170' Lattice Tower***
Project:	***TWS-027 Rev. 1 / Cromwell, CT Tower***
Client: Sprint / T-Mobile (TWS-027)/(EBI-002)	Drawn by: MCD App'd:
Code: TIA/EIA-222-F	Date: 09/23/14 Scale: NTS
Path:	Dwg No. E-7

TNX TOWER FEEDLINE PLAN

Feed Line Plan

Round _____ Flat _____ App In Face _____ App Out Face _____ Truss-Leg



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500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: 860-529-8882
FAX: 860-529-3991

Job:	***PiROD U20'-0"x170' Lattice Tower***
Project:	***TWS-027 Rev. 1 / Cromwell, CT Tower***
Client:	Sprint / T-Mobile (TWS-027)/(EBI-002)
Drawn by:	MCD
App'd:	
Code:	TIA/EIA-222-F
Date:	09/23/14
Scale:	NTS
Path:	
Dwg No.	E-7

TNX TOWER DETAILED OUTPUT

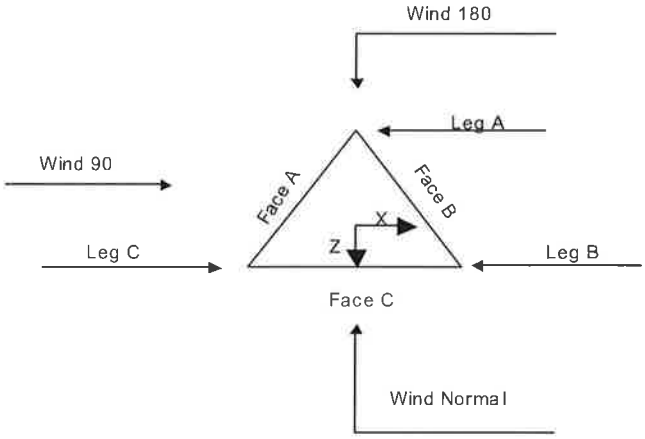
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 170.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.00 ft at the top and 20.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	√ Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	√ Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	√ All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	**Poles**
√ Leg Bolts Are At Top Of Section	√ SR Members Have Cut Ends	Include Shear-Torsion Interaction
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice Capacity Exemption	



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	170.00-150.00			5.00	1	20.00
T2	150.00-140.00		U6.0 105244	5.00	1	10.00
T3	140.00-120.00		U8.0 105216	6.00	1	20.00
T4	120.00-100.00		U10.0 105217 L3x3/16	8.00	1	20.00
T5	100.00-90.00		U12.0 105216	10.00	1	10.00
T6	90.00-80.00		U12.0 105216	11.00	1	10.00
T7	80.00-60.00		U14.0 105218	12.00	1	20.00
T8	60.00-40.00		U16.0 105219	14.00	1	20.00
T9	40.00-20.00		U18.0 105219	16.00	1	20.00
T10	20.00-0.00		U20.0 105219 L4x1/4	18.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	170.00-150.00	2.49	X Brace	No	No	0.0000	1.0000
T2	150.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T5	100.00-90.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T6	90.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T7	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T8	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T10	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 170.00-150.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 150.00-140.00	Truss Leg	Pirod 105244	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 140.00-120.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T4 120.00-100.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T5 100.00-90.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T6 90.00-80.00	Truss Leg	Pirod 105217 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T7 80.00-60.00	Truss Leg	Pirod 105218 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L3x3x3/8	A36 (36 ksi)
T8 60.00-40.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T9 40.00-20.00	Truss Leg	Pirod 105219 reinf w /1" dia bar	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x3/8	A36 (36 ksi)
T10 20.00-0.00	Truss Leg	Pirod 105220 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 170.00-150.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 150.00-140.00	Single Angle	L3x3x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T4 120.00-100.00	1	Single Angle	L3x3x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 170.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T2 150.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T5 100.00-90.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T6 90.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T7 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T8 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T9 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T10 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 170.00-150.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 150.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 100.00-90.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 90.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T7	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
20.00-0.00				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Truss-Leg K Factors: Truss-Legs Used As Leg Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals
T2	1	0.5	0.85	1	0.5	0.85
150.00-140.00						
T3	1	0.5	0.85	1	0.5	0.85
140.00-120.00						
T4	1	0.5	0.85	1	0.5	0.85
120.00-100.00						
T5	1	0.5	0.85	1	0.5	0.85
100.00-90.00						
T6	1	0.5	0.85	1	0.5	0.85
90.00-80.00						
T7	1	0.5	0.85	1	0.5	0.85
80.00-60.00						
T8	1	0.5	0.85	1	0.5	0.85
60.00-40.00						
T9	1	0.5	0.85	1	0.5	0.85
40.00-20.00						
T10	1	0.5	0.85	1	0.5	0.85
20.00-0.00						

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg: Net Width Deduct in	U	Diagonal: Net Width Deduct in	U	Top Girt: Net Width Deduct in	U	Bottom Girt: Net Width Deduct in	U	Mid Girt: Net Width Deduct in	U	Long Horizontal: Net Width Deduct in	U	Short Horizontal: Net Width Deduct in	U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
170.00-150.00														

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T2 150.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 100.00-90.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 90.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T10 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 170.00-150.00	Flange	0.7500 A325N	0	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 150.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-90.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 90.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 80.00-60.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 60.00-40.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 40.00-20.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 20.00-0.00	Flange	0.0000 A325N	0	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
CATEGORY	C	Yes	Ar (CfAe)	87.00 - 7.00	0.0000	0.48	4	2	1.0000	1.0000		0.21

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
5e (1 WIRE) CATEGORY	C	Yes	Ar (CfAe)	83.00 - 7.00	0.0000	0.45	2	1	1.0000	1.0000		0.21
5e (1 WIRE)												
1/2 (Municipal)	A	No	Ar (Leg)	144.00 - 7.00	0.0000	0.125	1	1	0.5800	0.5800		0.25
7/8 (Municipal)	A	No	Ar (Leg)	144.00 - 7.00	0.0000	0.125	2	1	1.0000	1.1100		0.54
1/2 (Municipal)	A	No	Ar (Leg)	140.00 - 7.00	0.0000	0.13	2	1	0.5800	0.5800		0.25
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.14	3	1	1.0000	1.1100		0.54
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.14	1	1	1.1100	1.1100		0.54
FSJ2-50 (3/8 SUPERFLEX. FOAM)	A	No	Ar (Leg)	168.00 - 7.00	0.0000	0.12	1	1	0.4300	0.4300		0.08
FSJ2-50 (3/8 SUPERFLEX. FOAM)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.12	1	1	0.4300	0.4300		0.08
RG-11 590609 (1 1/2 FOAM)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.12	1	1	1.5000	1.5900		0.94
1 5/8 (T-Mobile)	B	No	Ar (Leg)	125.50 - 7.00	0.0000	0.1	12	3	1.5000	1.9800		1.04
1 5/8 (VZW)	C	No	Ar (Leg)	101.00 - 7.00	0.0000	0.12	12	6	1.5000	1.9800		1.04
1 5/8 (AT&T)	C	No	Ar (Leg)	115.00 - 7.00	0.0000	0.17	12	2	1.5000	1.9800		1.04
7/8	C	No	Ar (Leg)	170.00 - 7.00	0.0000	0.17	2	2	1.0000	1.1100		0.54
1 5/8	A	No	Ar (Leg)	160.00 - 7.00	0.0000	0.1	6	3	1.5000	1.9800		1.04
CATEGORY 5e (1 WIRE) (Clearwire)	B	Yes	Ar (CfAe)	134.00 - 7.00	-2.0000	0	6	6	1.0000	1.0000		0.21
1/2 (Clearwire)	B	Yes	Ar (CfAe)	134.00 - 7.00	-4.0000	0	4	4	0.5800	0.5800		0.25
FB-L98B-02 (10mm Fiber) (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	3.0000	0.4	3	3	0.3937	0.3937		0.03
RSS 8 - AWG 2 (0.645") (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	2.0000	0.43	6	6	0.6450	0.6450		0.30
3" Flex Conduit (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	4.0000	0.41	1	1	0.0000	3.0000		3.00
1/2	A	No	Ar (Leg)	30.00 - 7.00	0.0000	0.08	3	1	0.5800	0.5800		0.25
AVA7-50 (1-5/8 LOW DENSI. FOAM) (CPD)	A	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0.38	1	1	1.5000	1.9800		0.72
1 5/8" Hybriflex (T-Mobile)	B	No	Ar (Leg)	125.00 - 7.00	0.0000	0.05	1	1	1.6250	1.6250		0.21
1 5/8" Hybriflex (VZW)	C	No	Ar (Leg)	101.00 - 7.00	0.0000	0.1	1	1	1.6250	1.6250		0.21
LDF6-50A (1-1/4 FOAM) (Sprint-FO)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.16	4	2	1.5500	1.5500		0.66
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.132	1	1	1.1100	1.1100		0.54
7/8	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.132	1	1	1.1100	1.1100		0.54

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(Municipal)												

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	170.00-150.00	A	40.136	0.000	0.000	0.000	0.22
		B	33.136	0.000	0.000	0.000	0.00
		C	3.700	0.000	0.000	0.000	0.02
T2	150.00-140.00	A	25.105	0.000	0.000	0.000	0.14
		B	21.605	0.000	0.000	0.000	0.00
		C	1.850	0.000	0.000	0.000	0.01
T3	140.00-120.00	A	54.943	0.000	0.000	0.000	0.32
		B	64.985	0.000	0.000	0.000	0.10
		C	11.035	0.000	0.000	0.000	0.02
T4	120.00-100.00	A	81.377	0.000	0.000	0.000	0.32
		B	88.730	0.000	0.000	0.000	0.30
		C	67.119	0.000	0.000	0.000	0.29
T5	100.00-90.00	A	61.700	0.000	0.000	0.000	0.16
		B	44.365	0.000	0.000	0.000	0.15
		C	56.248	0.000	0.000	0.000	0.31
T6	90.00-80.00	A	61.700	0.000	0.000	0.000	0.16
		B	44.365	0.000	0.000	0.000	0.15
		C	58.981	0.000	0.000	0.000	0.32
T7	80.00-60.00	A	123.400	0.000	0.000	0.000	0.32
		B	88.730	0.000	0.000	0.000	0.30
		C	122.210	0.000	0.000	0.000	0.65
T8	60.00-40.00	A	123.400	0.000	0.000	0.000	0.32
		B	88.730	0.000	0.000	0.000	0.30
		C	122.210	0.000	0.000	0.000	0.65
T9	40.00-20.00	A	124.850	0.000	0.000	0.000	0.32
		B	90.180	0.000	0.000	0.000	0.30
		C	122.210	0.000	0.000	0.000	0.65
T10	20.00-0.00	A	82.095	0.000	0.000	0.000	0.21
		B	59.559	0.000	0.000	0.000	0.19
		C	79.437	0.000	0.000	0.000	0.42

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	170.00-150.00	A	0.500	58.953	3.517	0.000	0.000	0.60
		B		50.470	0.000	0.000	0.000	0.00
		C		3.517	3.517	0.000	0.000	0.07
T2	150.00-140.00	A	0.500	36.013	1.758	0.000	0.000	0.39
		B		31.771	0.000	0.000	0.000	0.00
		C		1.758	1.758	0.000	0.000	0.03
T3	140.00-120.00	A	0.500	82.393	3.517	0.000	0.000	0.87
		B		86.296	15.727	0.000	0.000	0.34
		C		11.727	3.517	0.000	0.000	0.07
T4	120.00-100.00	A	0.500	110.244	3.517	0.000	0.000	0.87
		B		110.130	22.467	0.000	0.000	0.88

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C		70.420	13.548	0.000	0.000	0.75
T5	100.00-90.00	A	0.500	77.925	1.758	0.000	0.000	0.44
		B		55.065	11.233	0.000	0.000	0.44
		C		59.479	8.446	0.000	0.000	0.79
T6	90.00-80.00	A	0.500	77.925	1.758	0.000	0.000	0.44
		B		55.065	11.233	0.000	0.000	0.44
		C		61.646	10.096	0.000	0.000	0.83
T7	80.00-60.00	A	0.500	155.850	3.517	0.000	0.000	0.87
		B		110.130	22.467	0.000	0.000	0.88
		C		128.959	21.605	0.000	0.000	1.72
T8	60.00-40.00	A	0.500	155.850	3.517	0.000	0.000	0.87
		B		110.130	22.467	0.000	0.000	0.88
		C		128.959	21.605	0.000	0.000	1.72
T9	40.00-20.00	A	0.500	159.100	3.517	0.000	0.000	0.90
		B		113.380	22.467	0.000	0.000	0.88
		C		128.959	21.605	0.000	0.000	1.72
T10	20.00-0.00	A	0.500	105.527	2.286	0.000	0.000	0.60
		B		75.809	14.603	0.000	0.000	0.57
		C		83.823	14.043	0.000	0.000	1.12

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	170.00-150.00	A	0.239	0.771	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	150.00-140.00	A	0.000	0.106	0.184	0.277
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T3	140.00-120.00	A	0.000	0.145	0.289	0.435
		B	0.000	0.580	0.849	1.741
		C	0.000	0.000	0.000	0.000
T4	120.00-100.00	A	0.000	0.145	0.288	0.434
		B	0.000	0.828	1.212	2.484
		C	0.000	0.548	0.879	1.645
T5	100.00-90.00	A	0.000	0.057	0.114	0.171
		B	0.000	0.327	0.479	0.981
		C	0.000	0.289	0.463	0.867
T6	90.00-80.00	A	0.000	0.055	0.109	0.165
		B	0.000	0.314	0.459	0.942
		C	0.000	0.340	0.538	1.019
T7	80.00-60.00	A	0.000	0.105	0.208	0.314
		B	0.000	0.598	0.875	1.795
		C	0.000	0.739	1.163	2.216
T8	60.00-40.00	A	0.000	0.100	0.231	0.348
		B	0.000	0.570	0.973	1.994
		C	0.000	0.703	1.292	2.462
T9	40.00-20.00	A	0.000	0.096	0.223	0.336
		B	0.000	0.550	0.939	1.925
		C	0.000	0.679	1.247	2.377
T10	20.00-0.00	A	0.000	0.061	0.162	0.243
		B	0.000	0.348	0.679	1.393
		C	0.000	0.430	0.902	1.719

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	170.00-150.00	-0.7973	-8.0376	-0.4853	-7.4212
T2	150.00-140.00	-0.4988	-6.6293	-0.3283	-6.3594
T3	140.00-120.00	1.4194	-7.8403	1.2494	-8.0075
T4	120.00-100.00	-0.3302	-2.7146	-0.0626	-4.2227
T5	100.00-90.00	-5.2784	0.3685	-4.0917	-1.7690
T6	90.00-80.00	-6.3856	0.8722	-4.8612	-1.5653
T7	80.00-60.00	-7.6460	1.3464	-5.9655	-1.3222
T8	60.00-40.00	-8.5419	1.4777	-6.6864	-1.5207
T9	40.00-20.00	-9.4077	1.2998	-7.3405	-2.1935
T10	20.00-0.00	-8.2989	0.8730	-6.4327	-2.3698

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
101-90-08-0-01 (Municipal)	A	From Leg	9.00 2.00 0.00	0.0000	183.00	No Ice 1/2" Ice	3.33 4.31	3.33 4.31	0.04 0.06
15' Mount Pipe (Municipal)	A	From Leg	9.00 2.00 0.00	0.0000	179.75	No Ice 1/2" Ice	4.50 6.03	4.50 6.03	0.09 0.12
3" Dia 20' Omni (Municipal)	B	From Face	9.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	0.06 0.10
2.5" x 20'6" Whip (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice	5.14 7.24	5.14 7.24	0.15 0.19
2.5" x 14' Omni (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	3.50 4.93	3.50 4.93	0.03 0.06
2.5" x 14' Omni (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	3.50 4.93	3.50 4.93	0.03 0.06
2.5" x 14' Omni (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	3.50 4.93	3.50 4.93	0.03 0.06
1.5" x 12' Omni (Municipal)	A	From Face	9.00 4.00 0.00	0.0000	174.00	No Ice 1/2" Ice	1.50 2.52	1.50 2.52	0.06 0.07
9 Arm Halo Mount (Municipal)	C	None		0.0000	168.00	No Ice 1/2" Ice	62.60 80.40	62.60 80.40	3.60 4.80
SU-RA-HP-2.4 Antenna (Municipal)	B	From Face	9.00 2.50 0.00	0.0000	168.00	No Ice 1/2" Ice	0.80 0.93	0.37 0.47	0.00 0.01
PTP49600 (CPD)	C	From Leg	9.00 0.00	0.0000	168.00	No Ice 1/2" Ice	2.04 2.24	0.53 0.65	0.01 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert ft / ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
APXV18-206517S-C w/ mounting hardware	A	From Leg	1.00 0.00 0.00	0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware	B	From Leg	1.00 0.00 0.00	0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware	C	From Leg	1.00 0.00 0.00	0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
SC420-HF1LDF (Municipal)	A	From Face	6.00 0.00 0.00	0.0000	158.50	No Ice 1/2" Ice	2.14 3.02	2.14 3.02	0.02 0.03
3" Dia 20' Omni (Municipal)	C	From Face	6.00 9.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	0.06 0.10
3" Dia 20' Omni (Municipal)	A	From Face	6.00 -9.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	0.06 0.10
2.5" x 20'6" Whip (Municipal)	A	From Face	6.00 9.00 0.00	0.0000	144.00	No Ice 1/2" Ice	5.14 7.24	5.14 7.24	0.15 0.19
2" Dia 15' Omni (Municipal)	B	From Face	6.00 -5.00 0.00	0.0000	141.00	No Ice 1/2" Ice	3.20 4.83	3.20 4.83	0.04 0.06
1.5" x 10' Omni (Municipal)	B	From Face	6.00 5.00 0.00	0.0000	139.00	No Ice 1/2" Ice	1.50 2.52	1.50 2.52	0.06 0.07
9' Whip (Municipal)	A	From Face	6.00 0.00 0.00	0.0000	138.50	No Ice 1/2" Ice	5.85 7.66	5.85 7.66	0.12 0.17
PiROD 20' Universal Platform (Municipal)	C	None		0.0000	134.00	No Ice 1/2" Ice	33.10 47.10	33.10 47.10	2.27 2.70
Argus LLPX310R (Clearwire)	A	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
Argus LLPX310R (Clearwire)	B	From Face	6.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
Argus LLPX310R (Clearwire)	C	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
REMOTE RADIO HEAD (RRH) (Clearwire)	A	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
REMOTE RADIO HEAD (RRH) (Clearwire)	B	From Face	6.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
REMOTE RADIO HEAD (RRH) (Clearwire)	C	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
(2) TMA (shielded) (AT&T)	A	From Leg	4.00 6.00 0.00	0.0000	115.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.01 0.01
(2) TMA (shielded) (AT&T)	A	From Leg	4.00 -6.00	0.0000	115.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
(2) TMA (shielded)	B	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
(2) TMA (shielded)	B	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			-6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
(2) TMA (shielded)	C	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
(2) TMA (shielded)	C	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			-6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
PiROD 12' Lightweight	A	From Leg	2.00	0.0000	115.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(AT&T)			0.00						
PiROD 12' Lightweight	B	From Leg	2.00	0.0000	115.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(AT&T)			0.00						
PiROD 12' Lightweight	C	From Leg	2.00	0.0000	115.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(AT&T)			0.00						
7770	A	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	A	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			-6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	B	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	B	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			-6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	C	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	C	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			-6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
AM-X-CD-16-65-00T-RET	A	From Leg	4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(6')			0.00			1/2" Ice	8.81	5.09	0.10
(AT&T)			0.00						
AM-X-CD-16-65-00T-RET	B	From Leg	4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(6')			0.00			1/2" Ice	8.81	5.09	0.10
(AT&T)			0.00						
AM-X-CD-16-65-00T-RET	C	From Leg	4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(6')			0.00			1/2" Ice	8.81	5.09	0.10
(AT&T)			0.00						
(2) REMOTE RADIO HEAD	A	From Leg	0.00	0.0000	115.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(AT&T)			0.00						
(2) REMOTE RADIO HEAD	B	From Leg	0.00	0.0000	115.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(AT&T)			0.00						
(2) REMOTE RADIO HEAD	C	From Leg	0.00	0.0000	115.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T)			0.00						
Surge Suppressor	C	From Leg	0.00	0.0000	115.00	No Ice	0.80	0.80	0.03
(AT&T)			0.00			1/2" Ice	0.94	0.94	0.04
			0.00						
BXA-171063-12BF	A	From Leg	4.00	0.0000	101.00	No Ice	4.73	3.57	0.02
(Verizon)			0.00			1/2" Ice	5.18	4.01	0.04
			0.00						
SWCP 2x5514	A	From Leg	4.00	0.0000	101.00	No Ice	7.01	5.70	0.02
(Verizon)			-4.00			1/2" Ice	7.44	6.12	0.07
			0.00						
BXA-171063-12BF	B	From Leg	4.00	0.0000	101.00	No Ice	4.73	3.57	0.02
(Verizon)			0.00			1/2" Ice	5.18	4.01	0.04
			0.00						
BXA-171063-12BF	C	From Leg	4.00	0.0000	101.00	No Ice	4.73	3.57	0.02
(Verizon)			0.00			1/2" Ice	5.18	4.01	0.04
			0.00						
SWCP 2x5514	C	From Leg	4.00	0.0000	101.00	No Ice	7.01	5.70	0.02
(Verizon)			-4.00			1/2" Ice	7.44	6.12	0.07
			0.00						
PiROD 12' Lightweight	A	From Leg	2.00	0.0000	101.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(Verizon)			0.00						
PiROD 12' Lightweight	B	From Leg	2.00	0.0000	101.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(Verizon)			0.00						
PiROD 12' Lightweight	C	From Leg	2.00	0.0000	101.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(Verizon)			0.00						
(2) Diplexer	A	From Leg	4.00	0.0000	101.00	No Ice	0.23	0.17	0.01
(Verizon)			6.00			1/2" Ice	0.30	0.24	0.01
			0.00						
(2) Diplexer	B	From Leg	4.00	0.0000	101.00	No Ice	0.23	0.17	0.01
(Verizon)			6.00			1/2" Ice	0.30	0.24	0.01
			0.00						
(2) Diplexer	C	From Leg	4.00	0.0000	101.00	No Ice	0.23	0.17	0.01
(Verizon)			6.00			1/2" Ice	0.30	0.24	0.01
			0.00						
BXA-70063-6CF	B	From Leg	4.00	0.0000	101.00	No Ice	7.73	4.16	0.02
(Verizon)			-4.00			1/2" Ice	8.27	4.60	0.06
			0.00						
HBX-6517DS-VTM	A	From Leg	4.00	0.0000	101.00	No Ice	5.24	3.24	0.01
(Verizon - AWS)			6.00			1/2" Ice	5.71	3.69	0.04
			0.00						
HBX-6517DS-VTM	B	From Leg	4.00	0.0000	101.00	No Ice	5.24	3.24	0.01
(Verizon - AWS)			6.00			1/2" Ice	5.71	3.69	0.04
			0.00						
HBX-6517DS-VTM	C	From Leg	4.00	0.0000	101.00	No Ice	5.24	3.24	0.01
(Verizon - AWS)			6.00			1/2" Ice	5.71	3.69	0.04
			0.00						
RH_2X40-AWS	A	From Leg	4.00	0.0000	101.00	No Ice	2.52	1.59	0.04
(Verizon - AWS)			6.00			1/2" Ice	2.75	1.80	0.06
			0.00						
RH_2X40-AWS	B	From Leg	4.00	0.0000	101.00	No Ice	2.52	1.59	0.04
(Verizon - AWS)			6.00			1/2" Ice	2.75	1.80	0.06
			0.00						
RH_2X40-AWS	C	From Leg	4.00	0.0000	101.00	No Ice	2.52	1.59	0.04
(Verizon - AWS)			6.00			1/2" Ice	2.75	1.80	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
DB-T1-6Z-8AB-0Z	C	None		0.0000	101.00	No Ice	5.35	2.40	0.04
(Verizon - AWS)						1/2" Ice	5.75	2.72	0.07
LNX-6514DS-T4M	A	From Leg	4.00	0.0000	101.00	No Ice	8.38	5.41	0.04
(Verizon - 850)			-6.00			1/2" Ice	8.93	5.86	0.09
			0.00						
LNX-6514DS-T4M	B	From Leg	4.00	0.0000	101.00	No Ice	8.38	5.41	0.04
(Verizon - 850)			-6.00			1/2" Ice	8.93	5.86	0.09
			0.00						
LNX-6514DS-T4M	C	From Leg	4.00	0.0000	101.00	No Ice	8.38	5.41	0.04
(Verizon - 850)			-6.00			1/2" Ice	8.93	5.86	0.09
			0.00						
3"x2"x22" Panel	B	From Leg	2.00	0.0000	87.00	No Ice	0.65	0.47	0.05
			0.00			1/2" Ice	0.81	0.61	0.05
			0.00						
TMA	B	From Leg	2.00	0.0000	84.50	No Ice	1.06	0.45	0.02
			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
3' Stand-off	B	From Leg	1.50	0.0000	83.50	No Ice	1.00	2.00	0.05
			0.00			1/2" Ice	1.20	2.70	0.07
			0.00						
3' Stand-off	A	From Leg	1.50	0.0000	83.50	No Ice	1.00	2.00	0.05
			0.00			1/2" Ice	1.20	2.70	0.07
			0.00						
TMA	A	From Leg	2.00	0.0000	83.00	No Ice	1.06	0.45	0.02
			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
TMA	B	From Leg	2.00	0.0000	82.50	No Ice	1.06	0.45	0.02
			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
3"x2"x22" Panel	B	From Leg	2.00	0.0000	80.00	No Ice	0.65	0.47	0.05
			0.00			1/2" Ice	0.81	0.61	0.05
			0.00						
Camera	A	From Leg	0.00	0.0000	30.00	No Ice	0.50	0.50	0.01
			0.00			1/2" Ice	0.60	0.60	0.02
			0.00						
PC9013N	A	From Leg	1.00	0.0000	24.00	No Ice	0.46	0.46	0.00
			0.00			1/2" Ice	0.52	0.52	0.00
			0.00						
APXVSPP18-C-A20	A	From Face	9.00	0.0000	170.00	No Ice	8.40	5.28	0.06
(Sprint)			-1.00			1/2" Ice	8.95	5.74	0.11
			0.00						
APXVSPP18-C-A20	B	From Face	9.00	0.0000	170.00	No Ice	8.40	5.28	0.06
(Sprint)			-1.00			1/2" Ice	8.95	5.74	0.11
			0.00						
APXVSPP18-C-A20	C	From Face	9.00	0.0000	170.00	No Ice	8.40	5.28	0.06
(Sprint)			-1.00			1/2" Ice	8.95	5.74	0.11
			0.00						
Panasonic RRH 1900MHZ	A	From Face	8.00	0.0000	170.00	No Ice	2.49	3.06	0.09
(Sprint)			0.00			1/2" Ice	2.71	3.30	0.12
			0.00						
Panasonic RRH 1900MHZ	B	From Face	8.00	0.0000	170.00	No Ice	2.49	3.06	0.09
(Sprint)			0.00			1/2" Ice	2.71	3.30	0.12
			0.00						
Panasonic RRH 1900MHZ	C	From Face	8.00	0.0000	170.00	No Ice	2.49	3.06	0.09
(Sprint)			0.00			1/2" Ice	2.71	3.30	0.12
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Andrew 800MHz RRH (Sprint)	A	From Face	8.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.36 2.57	1.97 2.17	0.06 0.08
Andrew 800MHz RRH (Sprint)	B	From Face	8.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.36 2.57	1.97 2.17	0.06 0.08
Andrew 800MHz RRH (Sprint)	C	From Face	8.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.36 2.57	1.97 2.17	0.06 0.08
APXV9TM14-120 (Sprint)	A	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	6.90 7.35	3.61 3.97	0.07 0.11
APXV9TM14-120 (Sprint)	B	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	6.90 7.35	3.61 3.97	0.07 0.11
APXV9TM14-120 (Sprint)	C	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	6.90 7.35	3.61 3.97	0.07 0.11
TD-RRH8x20-25 (Sprint)	A	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.32 4.60	1.41 1.61	0.07 0.09
TD-RRH8x20-25 (Sprint)	B	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.32 4.60	1.41 1.61	0.07 0.09
TD-RRH8x20-25 (Sprint)	C	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.32 4.60	1.41 1.61	0.07 0.09
PiROD 10' Lightweight T-Frame (T-Mobile)	A	From Leg	2.00 0.00 0.00	0.0000	125.50	No Ice 1/2" Ice	9.30 14.50	9.30 14.50	0.25 0.34
PiROD 10' Lightweight T-Frame (T-Mobile)	B	From Leg	2.00 0.00 0.00	0.0000	125.50	No Ice 1/2" Ice	9.30 14.50	9.30 14.50	0.25 0.34
PiROD 10' Lightweight T-Frame (T-Mobile)	C	From Leg	2.00 0.00 0.00	0.0000	125.50	No Ice 1/2" Ice	9.30 14.50	9.30 14.50	0.25 0.34
AIR B2A/B4P (T-Mobile)	A	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	B	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	C	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	A	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	B	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	C	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
Twin PCS TMA (T-Mobile)	A	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	0.77 0.96	0.36 0.52	0.01 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Twin PCS TMA	B	From Leg	4.00		0.0000	125.50	No Ice	0.77	0.36	0.01
(T-Mobile)			3.00				1/2" Ice	0.96	0.52	0.02
			0.00							
Twin PCS TMA	C	From Leg	4.00		0.0000	125.50	No Ice	0.77	0.36	0.01
(T-Mobile)			3.00				1/2" Ice	0.96	0.52	0.02
			0.00							
LNX-6515DS-VTM w/ 6' 2"	A	From Leg	4.00		0.0000	125.50	No Ice	11.45	9.12	0.07
sch 40 Piipe Mount			0.00				1/2" Ice	12.06	10.21	0.15
(T-Mobile)			0.00							
LNX-6515DS-VTM w/ 6' 2"	B	From Leg	4.00		0.0000	125.50	No Ice	11.45	9.12	0.07
sch 40 Piipe Mount			0.00				1/2" Ice	12.06	10.21	0.15
(T-Mobile)			0.00							
LNX-6515DS-VTM w/ 6' 2"	C	From Leg	4.00		0.0000	125.50	No Ice	11.45	9.12	0.07
sch 40 Piipe Mount			0.00				1/2" Ice	12.06	10.21	0.15
(T-Mobile)			0.00							
RRUS-11	A	From Leg	4.00		0.0000	125.50	No Ice	3.26	1.38	0.05
(T-Mobile)			0.00				1/2" Ice	3.50	1.56	0.07
			0.00							
RRUS-11	B	From Leg	4.00		0.0000	125.50	No Ice	3.26	1.38	0.05
(T-Mobile)			0.00				1/2" Ice	3.50	1.56	0.07
			0.00							
RRUS-11	C	From Leg	4.00		0.0000	125.50	No Ice	3.26	1.38	0.05
(T-Mobile)			0.00				1/2" Ice	3.50	1.56	0.07
			0.00							

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
3' Dish	A	Paraboloid w/o Radome	From Leg	2.00		0.0000		83.00	3.00	No Ice	7.07	0.23
				0.00						1/2" Ice	7.47	0.27
				0.00								
VHLP2.5-180	A	Paraboloid w/o Radome	From Face	6.00		0.0000		134.00	2.50	No Ice	4.90	0.07
(Clearwire)				0.00						1/2" Ice	5.24	0.10
				0.00								
VHLP2.5-180	A	Paraboloid w/o Radome	From Face	6.00		0.0000		134.00	2.50	No Ice	4.90	0.07
(Clearwire)				-7.00						1/2" Ice	5.24	0.10
				0.00								
VHLP2.5-180	B	Paraboloid w/o Radome	From Face	6.00		0.0000		134.00	2.50	No Ice	4.90	0.07
(Clearwire)				-7.00						1/2" Ice	5.24	0.10
				0.00								
VHLP2-180	C	Paraboloid w/o Radome	From Face	6.00		0.0000		134.00	2.00	No Ice	3.14	0.03
(Clearwire)				0.00						1/2" Ice	3.41	0.04
				0.00								
HPD2-4.7	C	Paraboloid w/Radome	From Face	9.00		0.0000		168.00	2.00	No Ice	3.14	0.03
				0.00						1/2" Ice	3.41	0.04
				0.00								

Truss-Leg Properties

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in^2	in^2	K	K	in	in	in^2
Pirod 105244	1026.8606	1727.9786	0.56	0.21	7.1310	11.9999	3.6816
Pirod 105216	1998.0891	3357.4497	0.51	0.43	6.9378	11.6578	3.6816
Pirod 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirod 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirod 105217 reinf w/ 1" dia bar	2291.5652	3727.7657	0.79	0.46	7.9568	12.9436	7.6570
Pirod 105218 reinf w/ 1" dia bar	2425.8928	3907.6826	0.95	0.48	8.4232	13.5683	9.9280
Pirod 105219	2441.8688	3942.2854	0.94	0.49	8.4787	13.6885	9.4248
Pirod 105219 reinf w /1" dia bar	2571.0468	4121.6676	1.11	0.50	8.9272	14.3113	11.7803
Pirod 105220 reinf w/ 1" dia bar	2697.7688	4300.8949	1.29	0.51	9.3673	14.9337	14.2843

Tower Pressures - No Ice

$G_H = 1.125$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1	160.00	1.57	29	102.917	A	0.000	52.765	5.833	11.06	0.000	0.000
170.00-150.00					B	0.000	46.004		12.68	0.000	0.000
					C	0.000	16.568		35.21	0.000	0.000
T2	145.00	1.526	28	66.055	A	5.292	37.009	11.905	28.14	0.000	0.000
150.00-140.00					B	5.476	33.509		30.54	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3	130.00	1.48	27	162.111	A	10.178	78.107	23.165	26.24	0.000	0.000
140.00-120.00					B	9.618	88.149		23.69	0.000	0.000
					C	10.467	34.200		51.86	0.000	0.000
T4	110.00	1.411	26	202.528	A	13.676	106.080	24.703	20.63	0.000	0.000
120.00-100.00					B	12.753	113.432		19.58	0.000	0.000
					C	13.085	91.822		23.55	0.000	0.000
T5	95.00	1.353	25	116.264	A	6.447	74.051	12.351	15.34	0.000	0.000
100.00-90.00					B	6.082	56.716		19.67	0.000	0.000
					C	6.098	68.599		16.54	0.000	0.000
T6 90.00-80.00	85.00	1.31	24	126.517	A	6.849	74.983	13.283	16.23	0.000	0.000
					B	6.499	57.648		20.71	0.000	0.000
					C	6.420	72.265		16.88	0.000	0.000
T7 80.00-60.00	70.00	1.24	23	283.450	A	14.936	151.524	28.124	16.90	0.000	0.000
					B	14.269	116.854		21.45	0.000	0.000
					C	13.982	150.334		17.12	0.000	0.000
T8 60.00-40.00	50.00	1.126	21	323.362	A	19.403	151.709	28.309	16.54	0.000	0.000
					B	18.662	117.039		20.86	0.000	0.000
					C	18.343	150.519		16.76	0.000	0.000
T9 40.00-20.00	30.00	1	18	363.756	A	21.437	154.657	29.807	16.93	0.000	0.000
					B	20.722	119.987		21.18	0.000	0.000
					C	20.414	152.017		17.29	0.000	0.000
T10 20.00-0.00	10.00	1	18	404.134	A	26.964	113.371	31.276	22.29	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					B	26.446	90.836		26.67	0.000	0.000
					C	26.223	110.713		22.84	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.125$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 170.00-150.00	160.00	1.57	22	0.5000	104.583	A	3.517	82.422	9.167	10.67	0.000	0.000
						B	0.000	74.710		12.27	0.000	0.000
						C	3.517	27.757		29.31	0.000	0.000
T2 150.00-140.00	145.00	1.526	21	0.5000	66.890	A	6.957	58.049	20.033	30.82	0.000	0.000
						B	5.476	53.914		33.73	0.000	0.000
						C	7.234	23.901		64.34	0.000	0.000
T3 140.00-120.00	130.00	1.48	21	0.5000	163.780	A	13.549	124.661	38.924	28.16	0.000	0.000
						B	24.452	128.129		25.51	0.000	0.000
						C	13.984	54.140		57.14	0.000	0.000
T4 120.00-100.00	110.00	1.411	20	0.5000	204.197	A	17.047	155.568	40.814	23.64	0.000	0.000
						B	33.947	154.770		21.63	0.000	0.000
						C	25.867	115.341		28.90	0.000	0.000
T5 100.00-90.00	95.00	1.353	19	0.5000	117.098	A	8.148	100.462	20.407	18.79	0.000	0.000
						B	16.813	77.332		21.68	0.000	0.000
						C	14.140	81.784		21.27	0.000	0.000
T6 90.00-80.00	85.00	1.31	18	0.5000	127.351	A	8.553	101.798	21.609	19.58	0.000	0.000
						B	17.250	78.679		22.53	0.000	0.000
						C	16.035	85.234		21.34	0.000	0.000
T7 80.00-60.00	70.00	1.24	17	0.5000	285.119	A	18.347	206.096	45.303	20.18	0.000	0.000
						B	35.816	159.883		23.15	0.000	0.000
						C	34.534	178.571		21.26	0.000	0.000
T8 60.00-40.00	50.00	1.126	16	0.5000	325.031	A	22.803	207.064	45.704	19.88	0.000	0.000
						B	40.107	160.874		22.74	0.000	0.000
						C	38.778	179.569		20.93	0.000	0.000
T9 40.00-20.00	30.00	1	14	0.5000	365.425	A	24.841	212.976	47.784	20.09	0.000	0.000
						B	42.203	166.803		22.86	0.000	0.000
						C	40.890	182.252		21.41	0.000	0.000
T10 20.00-0.00	10.00	1	14	0.5000	405.803	A	29.168	162.109	49.862	26.07	0.000	0.000
						B	40.336	132.104		28.92	0.000	0.000
						C	39.449	140.036		27.78	0.000	0.000

Tower Pressure - Service

$G_H = 1.125$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 170.00-150.00	160.00	1.57	10	102.917	A	0.000	52.765	5.833	11.06	0.000	0.000
					B	0.000	46.004		12.68	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face e	A_F ft²	A_R ft²	A_{Leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	16.568		35.21	0.000	0.000
T2	145.00	1.526	10	66.055	A	5.292	37.009	11.905	28.14	0.000	0.000
150.00-140.00					B	5.476	33.509		30.54	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3	130.00	1.48	9	162.111	A	10.178	78.107	23.165	26.24	0.000	0.000
140.00-120.00					B	9.618	88.149		23.69	0.000	0.000
					C	10.467	34.200		51.86	0.000	0.000
T4	110.00	1.411	9	202.528	A	13.676	106.080	24.703	20.63	0.000	0.000
120.00-100.00					B	12.753	113.432		19.58	0.000	0.000
					C	13.085	91.822		23.55	0.000	0.000
T5	95.00	1.353	9	116.264	A	6.447	74.051	12.351	15.34	0.000	0.000
100.00-90.00					B	6.082	56.716		19.67	0.000	0.000
					C	6.098	68.599		16.54	0.000	0.000
T6 90.00-80.00	85.00	1.31	8	126.517	A	6.849	74.983	13.283	16.23	0.000	0.000
					B	6.499	57.648		20.71	0.000	0.000
					C	6.420	72.265		16.88	0.000	0.000
T7 80.00-60.00	70.00	1.24	8	283.450	A	14.936	151.524	28.124	16.90	0.000	0.000
					B	14.269	116.854		21.45	0.000	0.000
					C	13.982	150.334		17.12	0.000	0.000
T8 60.00-40.00	50.00	1.126	7	323.362	A	19.403	151.709	28.309	16.54	0.000	0.000
					B	18.662	117.039		20.86	0.000	0.000
					C	18.343	150.519		16.76	0.000	0.000
T9 40.00-20.00	30.00	1	6	363.756	A	21.437	154.657	29.807	16.93	0.000	0.000
					B	20.722	119.987		21.18	0.000	0.000
					C	20.414	152.017		17.29	0.000	0.000
T10 20.00-0.00	10.00	1	6	404.134	A	26.964	113.371	31.276	22.29	0.000	0.000
					B	26.446	90.836		26.67	0.000	0.000
					C	26.223	110.713		22.84	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face e	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	1	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	1	1	30.910			
			C	0.161	2.732	0.583	1	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	□瘪1	1	34.128	1.93	193.38	A
150.00-140.00			B	0.59	1.81	0.748	1	1	30.529			
			C	0.291	2.32	0.613	1	1	13.910			
T3	0.44	2.09	A	0.545	1.849	0.721	1	1	66.514	4.23	211.37	B
140.00-120.00			B	0.603	1.802	0.755	1	1	76.214			
			C	0.276	2.363	0.609	1	1	31.285			
T4	0.91	2.80	A	0.591	1.81	0.748	1	1	93.057	5.25	262.50	B
120.00-100.00			B	0.623	1.792	0.768	1	1	99.866			
			C	0.518	1.878	0.707	1	1	77.988			
T5	0.62	1.48	A	0.692	1.776	0.814	1	1	66.761	3.34	333.60	A
100.00-90.00			B	0.54	1.853	0.719	1	1	46.850			
			C	0.642	1.784	0.781	1	1	59.641			
T6	0.63	1.76	A	0.647	1.782	0.783	1	1	65.589	3.19	318.69	A
90.00-80.00			B	0.507	1.891	0.701	1	1	46.917			
			C	0.622	1.792	0.767	1	1	61.867			
T7	1.26	4.33	A	0.587	1.812	0.746	1	1	127.956	5.98	299.04	A
80.00-60.00			B	0.463	1.953	0.679	1	1	93.629			
			C	0.58	1.818	0.741	1	1	125.437			
T8	1.26	4.45	A	0.529	1.865	0.713	1	1	127.543	5.57	278.60	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
60.00-40.00			B	0.42	2.026	0.66	1	1	95.887			
			C	0.522	1.873	0.709	1	1	125.073			
T9	1.27	5.44	A	0.484	1.922	0.69	1	1	128.076	5.12	255.98	A
40.00-20.00			B	0.387	2.091	0.646	1	1	98.271			
			C	0.474	1.936	0.685	1	1	124.485			
T10	0.83	6.08	A	0.347	2.178	0.631	1	1	98.557	4.47	223.27	A
20.00-0.00			B	0.29	2.322	0.613	1	1	82.124			
			C	0.339	2.198	0.629	1	1	95.812			
Sum Weight:	7.61	30.71						OTM	3256.52 kip-ft	41.36		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.825	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	0.825	1	30.910			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.825	1	33.202	1.88	188.14	A
150.00-140.00			B	0.59	1.81	0.748	0.825	1	29.570			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.44	2.09	A	0.545	1.849	0.721	0.825	1	64.733	4.13	206.70	B
140.00-120.00			B	0.603	1.802	0.755	0.825	1	74.531			
			C	0.276	2.363	0.609	0.825	1	29.454			
T4	0.91	2.80	A	0.591	1.81	0.748	0.825	1	90.664	5.13	256.63	B
120.00-100.00			B	0.623	1.792	0.768	0.825	1	97.634			
			C	0.518	1.878	0.707	0.825	1	75.698			
T5	0.62	1.48	A	0.692	1.776	0.814	0.825	1	65.632	3.28	327.96	A
100.00-90.00			B	0.54	1.853	0.719	0.825	1	45.785			
			C	0.642	1.784	0.781	0.825	1	58.574			
T6	0.63	1.76	A	0.647	1.782	0.783	0.825	1	64.390	3.13	312.87	A
90.00-80.00			B	0.507	1.891	0.701	0.825	1	45.780			
			C	0.622	1.792	0.767	0.825	1	60.743			
T7	1.26	4.33	A	0.587	1.812	0.746	0.825	1	125.342	5.86	292.93	A
80.00-60.00			B	0.463	1.953	0.679	0.825	1	91.132			
			C	0.58	1.818	0.741	0.825	1	122.990			
T8	1.26	4.45	A	0.529	1.865	0.713	0.825	1	124.147	5.42	271.18	A
60.00-40.00			B	0.42	2.026	0.66	0.825	1	92.621			
			C	0.522	1.873	0.709	0.825	1	121.863			
T9	1.27	5.44	A	0.484	1.922	0.69	0.825	1	124.325	4.97	248.49	A
40.00-20.00			B	0.387	2.091	0.646	0.825	1	94.645			
			C	0.474	1.936	0.685	0.825	1	120.912			
T10	0.83	6.08	A	0.347	2.178	0.631	0.825	1	93.838	4.25	212.58	A
20.00-0.00			B	0.29	2.322	0.613	0.825	1	77.496			
			C	0.339	2.198	0.629	0.825	1	91.223			
Sum Weight:	7.61	30.71						OTM	3190.95 kip-ft	40.35		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.8	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	0.8	1	30.910			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.8	1	33.069	1.87	187.39	A
150.00-140.00			B	0.59	1.81	0.748	0.8	1	29.433			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.44	2.09	A	0.545	1.849	0.721	0.8	1	64.478	4.12	206.03	B
140.00-120.00			B	0.603	1.802	0.755	0.8	1	74.291			
			C	0.276	2.363	0.609	0.8	1	29.192			
T4	0.91	2.80	A	0.591	1.81	0.748	0.8	1	90.322	5.12	255.80	B
120.00-100.00			B	0.623	1.792	0.768	0.8	1	97.316			
			C	0.518	1.878	0.707	0.8	1	75.371			
T5	0.62	1.48	A	0.692	1.776	0.814	0.8	1	65.471	3.27	327.16	A
100.00-90.00			B	0.54	1.853	0.719	0.8	1	45.633			
			C	0.642	1.784	0.781	0.8	1	58.421			
T6	0.63	1.76	A	0.647	1.782	0.783	0.8	1	64.219	3.12	312.03	A
90.00-80.00			B	0.507	1.891	0.701	0.8	1	45.617			
			C	0.622	1.792	0.767	0.8	1	60.583			
T7	1.26	4.33	A	0.587	1.812	0.746	0.8	1	124.968	5.84	292.06	A
80.00-60.00			B	0.463	1.953	0.679	0.8	1	90.775			
			C	0.58	1.818	0.741	0.8	1	122.641			
T8	1.26	4.45	A	0.529	1.865	0.713	0.8	1	123.662	5.40	270.13	A
60.00-40.00			B	0.42	2.026	0.66	0.8	1	92.154			
			C	0.522	1.873	0.709	0.8	1	121.404			
T9	1.27	5.44	A	0.484	1.922	0.69	0.8	1	123.789	4.95	247.41	A
40.00-20.00			B	0.387	2.091	0.646	0.8	1	94.127			
			C	0.474	1.936	0.685	0.8	1	120.402			
T10	0.83	6.08	A	0.347	2.178	0.631	0.8	1	93.164	4.22	211.05	A
20.00-0.00			B	0.29	2.322	0.613	0.8	1	76.835			
			C	0.339	2.198	0.629	0.8	1	90.567			
Sum Weight:	7.61	30.71						OTM	3181.59 kip-ft	40.20		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.85	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	0.85	1	30.910			
			C	0.161	2.732	0.583	0.85	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.85	1	33.334	1.89	188.89	A
150.00-140.00			B	0.59	1.81	0.748	0.85	1	29.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.44	2.09	A	0.545	1.849	0.721	0.85	1	64.987	4.15	207.37	B
140.00-120.00			B	0.603	1.802	0.755	0.85	1	74.772			
			C	0.276	2.363	0.609	0.85	1	29.715			
T4	0.91	2.80	A	0.591	1.81	0.748	0.85	1	91.006	5.15	257.47	B
120.00-100.00			B	0.623	1.792	0.768	0.85	1	97.953			
			C	0.518	1.878	0.707	0.85	1	76.025			
T5	0.62	1.48	A	0.692	1.776	0.814	0.85	1	65.794	3.29	328.77	A
100.00-90.00			B	0.54	1.853	0.719	0.85	1	45.937			
			C	0.642	1.784	0.781	0.85	1	58.726			
T6	0.63	1.76	A	0.647	1.782	0.783	0.85	1	64.561	3.14	313.70	A
90.00-80.00			B	0.507	1.891	0.701	0.85	1	45.942			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.622	1.792	0.767	0.85	1	60.904			
T7	1.26	4.33	A	0.587	1.812	0.746	0.85	1	125.715	5.88	293.80	A
80.00-60.00			B	0.463	1.953	0.679	0.85	1	91.488			
			C	0.58	1.818	0.741	0.85	1	123.340			
T8	1.26	4.45	A	0.529	1.865	0.713	0.85	1	124.632	5.44	272.24	A
60.00-40.00			B	0.42	2.026	0.66	0.85	1	93.087			
			C	0.522	1.873	0.709	0.85	1	122.322			
T9	1.27	5.44	A	0.484	1.922	0.69	0.85	1	124.860	4.99	249.56	A
40.00-20.00			B	0.387	2.091	0.646	0.85	1	95.163			
			C	0.474	1.936	0.685	0.85	1	121.422			
T10	0.83	6.08	A	0.347	2.178	0.631	0.85	1	94.512	4.28	214.10	A
20.00-0.00			B	0.29	2.322	0.613	0.85	1	78.157			
			C	0.339	2.198	0.629	0.85	1	91.878			
Sum Weight:	7.61	30.71						OTM	3200.32 kip-ft	40.49		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.67	1.49	A	0.822	1.834	0.914	1	1	78.881	3.54	177.15	A
170.00-150.00			B	0.714	1.778	0.83	1	1	62.028			
			C	0.299	2.299	0.616	1	1	20.604			
T2	0.43	1.64	A	0.972	2.044	1	1	1	65.006	3.16	316.37	A
150.00-140.00			B	0.888	1.907	0.972	1	1	57.882			
			C	0.465	1.949	0.68	1	1	23.498			
T3	1.28	3.77	A	0.844	1.855	0.933	1	1	129.881	6.95	347.34	B
140.00-120.00			B	0.932	1.972	1	1	1	152.582			
			C	0.416	2.033	0.658	1	1	49.621			
T4	2.50	4.64	A	0.845	1.857	0.934	1	1	162.417	8.14	407.09	B
120.00-100.00			B	0.924	1.96	1	1	1	188.717			
			C	0.692	1.776	0.814	1	1	119.741			
T5	1.67	2.39	A	0.928	1.966	1	1	1	108.610	4.51	450.57	A
100.00-90.00			B	0.804	1.819	0.9	1	1	86.385			
			C	0.819	1.831	0.912	1	1	88.747			
T6	1.71	2.70	A	0.867	1.88	0.953	1	1	105.559	4.06	405.79	A
90.00-80.00			B	0.753	1.789	0.859	1	1	84.866			
			C	0.795	1.813	0.892	1	1	92.106			
T7	3.48	6.30	A	0.787	1.807	0.886	1	1	200.955	7.02	351.19	A
80.00-60.00			B	0.686	1.776	0.81	1	1	165.364			
			C	0.747	1.786	0.855	1	1	187.195			
T8	3.48	6.58	A	0.707	1.777	0.825	1	1	193.648	6.04	302.22	A
60.00-40.00			B	0.618	1.794	0.765	1	1	163.176			
			C	0.672	1.777	0.8	1	1	182.461			
T9	3.51	7.67	A	0.651	1.781	0.786	1	1	192.241	5.34	267.14	A
40.00-20.00			B	0.572	1.824	0.737	1	1	165.109			
			C	0.611	1.798	0.76	1	1	179.432			
T10	2.30	8.52	A	0.471	1.94	0.683	1	1	139.939	4.24	211.79	A
20.00-0.00			B	0.425	2.017	0.662	1	1	127.801			
			C	0.442	1.986	0.67	1	1	133.241			
Sum Weight:	21.02	45.71						OTM	4593.81 kip-ft	53.01		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.67	1.49	A	0.822	1.834	0.914	0.825	1	78.265	3.52	175.77	A
170.00-150.00			B	0.714	1.778	0.83	0.825	1	62.028			
			C	0.299	2.299	0.616	0.825	1	19.988			
T2	0.43	1.64	A	0.972	2.044	1	0.825	1	63.789	3.10	310.45	A
150.00-140.00			B	0.888	1.907	0.972	0.825	1	56.923			
			C	0.465	1.949	0.68	0.825	1	22.232			
T3	1.28	3.77	A	0.844	1.855	0.933	0.825	1	127.510	6.75	337.60	B
140.00-120.00			B	0.932	1.972	1	0.825	1	148.302			
			C	0.416	2.033	0.658	0.825	1	47.174			
T4	2.50	4.64	A	0.845	1.857	0.934	0.825	1	159.433	7.89	394.28	B
120.00-100.00			B	0.924	1.96	1	0.825	1	182.776			
			C	0.692	1.776	0.814	0.825	1	115.214			
T5	1.67	2.39	A	0.928	1.966	1	0.825	1	107.184	4.45	444.65	A
100.00-90.00			B	0.804	1.819	0.9	0.825	1	83.443			
			C	0.819	1.831	0.912	0.825	1	86.273			
T6	1.71	2.70	A	0.867	1.88	0.953	0.825	1	104.062	4.00	400.04	A
90.00-80.00			B	0.753	1.789	0.859	0.825	1	81.847			
			C	0.795	1.813	0.892	0.825	1	89.300			
T7	3.48	6.30	A	0.787	1.807	0.886	0.825	1	197.745	6.91	345.58	A
80.00-60.00			B	0.686	1.776	0.81	0.825	1	159.096			
			C	0.747	1.786	0.855	0.825	1	181.152			
T8	3.48	6.58	A	0.707	1.777	0.825	0.825	1	189.657	5.92	295.99	A
60.00-40.00			B	0.618	1.794	0.765	0.825	1	156.157			
			C	0.672	1.777	0.8	0.825	1	175.675			
T9	3.51	7.67	A	0.651	1.781	0.786	0.825	1	187.894	5.22	261.10	A
40.00-20.00			B	0.572	1.824	0.737	0.825	1	157.723			
			C	0.611	1.798	0.76	0.825	1	172.276			
T10	2.30	8.52	A	0.471	1.94	0.683	0.825	1	134.834	4.08	204.06	A
20.00-0.00			B	0.425	2.017	0.662	0.825	1	120.742			
			C	0.442	1.986	0.67	0.825	1	126.338			
Sum Weight:	21.02	45.71						OTM	4497.51 kip-ft	51.84		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.67	1.49	A	0.822	1.834	0.914	0.8	1	78.177	3.51	175.57	A
170.00-150.00			B	0.714	1.778	0.83	0.8	1	62.028			
			C	0.299	2.299	0.616	0.8	1	19.901			
T2	0.43	1.64	A	0.972	2.044	1	0.8	1	63.615	3.10	309.60	A
150.00-140.00			B	0.888	1.907	0.972	0.8	1	56.786			
			C	0.465	1.949	0.68	0.8	1	22.051			
T3	1.28	3.77	A	0.844	1.855	0.933	0.8	1	127.171	6.72	336.21	B
140.00-120.00			B	0.932	1.972	1	0.8	1	147.691			
			C	0.416	2.033	0.658	0.8	1	46.824			
T4	2.50	4.64	A	0.845	1.857	0.934	0.8	1	159.007	7.85	392.45	B
120.00-100.00			B	0.924	1.96	1	0.8	1	181.928			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.692	1.776	0.814	0.8	1	114.568			
T5	1.67	2.39	A	0.928	1.966	1	0.8	1	106.980	4.44	443.81	A
100.00-90.00			B	0.804	1.819	0.9	0.8	1	83.022			
			C	0.819	1.831	0.912	0.8	1	85.919			
T6	1.71	2.70	A	0.867	1.88	0.953	0.8	1	103.848	3.99	399.21	A
90.00-80.00			B	0.753	1.789	0.859	0.8	1	81.415			
			C	0.795	1.813	0.892	0.8	1	88.899			
T7	3.48	6.30	A	0.787	1.807	0.886	0.8	1	197.286	6.90	344.78	A
80.00-60.00			B	0.686	1.776	0.81	0.8	1	158.201			
			C	0.747	1.786	0.855	0.8	1	180.289			
T8	3.48	6.58	A	0.707	1.777	0.825	0.8	1	189.087	5.90	295.10	A
60.00-40.00			B	0.618	1.794	0.765	0.8	1	155.155			
			C	0.672	1.777	0.8	0.8	1	174.705			
T9	3.51	7.67	A	0.651	1.781	0.786	0.8	1	187.273	5.20	260.23	A
40.00-20.00			B	0.572	1.824	0.737	0.8	1	156.668			
			C	0.611	1.798	0.76	0.8	1	171.254			
T10	2.30	8.52	A	0.471	1.94	0.683	0.8	1	134.105	4.06	202.96	A
20.00-0.00			B	0.425	2.017	0.662	0.8	1	119.734			
			C	0.442	1.986	0.67	0.8	1	125.352			
Sum Weight:	21.02	45.71						OTM	4483.75 kip-ft	51.67		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.67	1.49	A	0.822	1.834	0.914	0.85	1	78.353	3.52	175.96	A
170.00-150.00			B	0.714	1.778	0.83	0.85	1	62.028			
			C	0.299	2.299	0.616	0.85	1	20.076			
T2	0.43	1.64	A	0.972	2.044	1	0.85	1	63.963	3.11	311.30	A
150.00-140.00			B	0.888	1.907	0.972	0.85	1	57.060			
			C	0.465	1.949	0.68	0.85	1	22.413			
T3	1.28	3.77	A	0.844	1.855	0.933	0.85	1	127.849	6.78	338.99	B
140.00-120.00			B	0.932	1.972	1	0.85	1	148.914			
			C	0.416	2.033	0.658	0.85	1	47.523			
T4	2.50	4.64	A	0.845	1.857	0.934	0.85	1	159.860	7.92	396.11	B
120.00-100.00			B	0.924	1.96	1	0.85	1	183.625			
			C	0.692	1.776	0.814	0.85	1	115.861			
T5	1.67	2.39	A	0.928	1.966	1	0.85	1	107.387	4.45	445.50	A
100.00-90.00			B	0.804	1.819	0.9	0.85	1	83.863			
			C	0.819	1.831	0.912	0.85	1	86.626			
T6	1.71	2.70	A	0.867	1.88	0.953	0.85	1	104.276	4.01	400.86	A
90.00-80.00			B	0.753	1.789	0.859	0.85	1	82.278			
			C	0.795	1.813	0.892	0.85	1	89.701			
T7	3.48	6.30	A	0.787	1.807	0.886	0.85	1	198.203	6.93	346.38	A
80.00-60.00			B	0.686	1.776	0.81	0.85	1	159.991			
			C	0.747	1.786	0.855	0.85	1	182.015			
T8	3.48	6.58	A	0.707	1.777	0.825	0.85	1	190.227	5.94	296.88	A
60.00-40.00			B	0.618	1.794	0.765	0.85	1	157.160			
			C	0.672	1.777	0.8	0.85	1	176.644			
T9	3.51	7.67	A	0.651	1.781	0.786	0.85	1	188.515	5.24	261.96	A
40.00-20.00			B	0.572	1.824	0.737	0.85	1	158.778			
			C	0.611	1.798	0.76	0.85	1	173.298			
T10	2.30	8.52	A	0.471	1.94	0.683	0.85	1	135.564	4.10	205.17	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
20.00-0.00			B	0.425	2.017	0.662	0.85	1	121.751			
			C	0.442	1.986	0.67	0.85	1	127.324			
Sum Weight:	21.02	45.71						OTM	4511.26 kip-ft	52.01		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	1	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	1	1	30.910			
			C	0.161	2.732	0.583	1	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	1	1	34.128	0.67	66.92	A
150.00-140.00			B	0.59	1.81	0.748	1	1	30.529			
			C	0.291	2.32	0.613	1	1	13.910			
T3	0.44	2.09	A	0.545	1.849	0.721	1	1	66.514	1.46	73.14	B
140.00-120.00			B	0.603	1.802	0.755	1	1	76.214			
			C	0.276	2.363	0.609	1	1	31.285			
T4	0.91	2.80	A	0.591	1.81	0.748	1	1	93.057	1.82	90.83	B
120.00-100.00			B	0.623	1.792	0.768	1	1	99.866			
			C	0.518	1.878	0.707	1	1	77.988			
T5	0.62	1.48	A	0.692	1.776	0.814	1	1	66.761	1.15	115.43	A
100.00-90.00			B	0.54	1.853	0.719	1	1	46.850			
			C	0.642	1.784	0.781	1	1	59.641			
T6	0.63	1.76	A	0.647	1.782	0.783	1	1	65.589	1.10	110.27	A
90.00-80.00			B	0.507	1.891	0.701	1	1	46.917			
			C	0.622	1.792	0.767	1	1	61.867			
T7	1.26	4.33	A	0.587	1.812	0.746	1	1	127.956	2.07	103.47	A
80.00-60.00			B	0.463	1.953	0.679	1	1	93.629			
			C	0.58	1.818	0.741	1	1	125.437			
T8	1.26	4.45	A	0.529	1.865	0.713	1	1	127.543	1.93	96.40	A
60.00-40.00			B	0.42	2.026	0.66	1	1	95.887			
			C	0.522	1.873	0.709	1	1	125.073			
T9	1.27	5.44	A	0.484	1.922	0.69	1	1	128.076	1.77	88.58	A
40.00-20.00			B	0.387	2.091	0.646	1	1	98.271			
			C	0.474	1.936	0.685	1	1	124.485			
T10	0.83	6.08	A	0.347	2.178	0.631	1	1	98.557	1.55	77.25	A
20.00-0.00			B	0.29	2.322	0.613	1	1	82.124			
			C	0.339	2.198	0.629	1	1	95.812			
Sum Weight:	7.61	30.71						OTM	1126.82 kip-ft	14.31		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.825	1	37.149	0.79	39.55	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
170.00-150.00			B	0.447	1.978	0.672	0.825	1	30.910			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.825	1	33.202	0.65	65.10	A
150.00-140.00			B	0.59	1.81	0.748	0.825	1	29.570			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.44	2.09	A	0.545	1.849	0.721	0.825	1	64.733	1.43	71.52	B
140.00-120.00			B	0.603	1.802	0.755	0.825	1	74.531			
			C	0.276	2.363	0.609	0.825	1	29.454			
T4	0.91	2.80	A	0.591	1.81	0.748	0.825	1	90.664	1.78	88.80	B
120.00-100.00			B	0.623	1.792	0.768	0.825	1	97.634			
			C	0.518	1.878	0.707	0.825	1	75.698			
T5	0.62	1.48	A	0.692	1.776	0.814	0.825	1	65.632	1.13	113.48	A
100.00-90.00			B	0.54	1.853	0.719	0.825	1	45.785			
			C	0.642	1.784	0.781	0.825	1	58.574			
T6	0.63	1.76	A	0.647	1.782	0.783	0.825	1	64.390	1.08	108.26	A
90.00-80.00			B	0.507	1.891	0.701	0.825	1	45.780			
			C	0.622	1.792	0.767	0.825	1	60.743			
T7	1.26	4.33	A	0.587	1.812	0.746	0.825	1	125.342	2.03	101.36	A
80.00-60.00			B	0.463	1.953	0.679	0.825	1	91.132			
			C	0.58	1.818	0.741	0.825	1	122.990			
T8	1.26	4.45	A	0.529	1.865	0.713	0.825	1	124.147	1.88	93.84	A
60.00-40.00			B	0.42	2.026	0.66	0.825	1	92.621			
			C	0.522	1.873	0.709	0.825	1	121.863			
T9	1.27	5.44	A	0.484	1.922	0.69	0.825	1	124.325	1.72	85.98	A
40.00-20.00			B	0.387	2.091	0.646	0.825	1	94.645			
			C	0.474	1.936	0.685	0.825	1	120.912			
T10	0.83	6.08	A	0.347	2.178	0.631	0.825	1	93.838	1.47	73.56	A
20.00-0.00			B	0.29	2.322	0.613	0.825	1	77.496			
			C	0.339	2.198	0.629	0.825	1	91.223			
Sum Weight:	7.61	30.71						OTM	1104.14 kip-ft	13.96		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.8	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	0.8	1	30.910			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.8	1	33.069	0.65	64.84	A
150.00-140.00			B	0.59	1.81	0.748	0.8	1	29.433			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.44	2.09	A	0.545	1.849	0.721	0.8	1	64.478	1.43	71.29	B
140.00-120.00			B	0.603	1.802	0.755	0.8	1	74.291			
			C	0.276	2.363	0.609	0.8	1	29.192			
T4	0.91	2.80	A	0.591	1.81	0.748	0.8	1	90.322	1.77	88.51	B
120.00-100.00			B	0.623	1.792	0.768	0.8	1	97.316			
			C	0.518	1.878	0.707	0.8	1	75.371			
T5	0.62	1.48	A	0.692	1.776	0.814	0.8	1	65.471	1.13	113.20	A
100.00-90.00			B	0.54	1.853	0.719	0.8	1	45.633			
			C	0.642	1.784	0.781	0.8	1	58.421			
T6	0.63	1.76	A	0.647	1.782	0.783	0.8	1	64.219	1.08	107.97	A
90.00-80.00			B	0.507	1.891	0.701	0.8	1	45.617			
			C	0.622	1.792	0.767	0.8	1	60.583			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T7	1.26	4.33	A	0.587	1.812	0.746	0.8	1	124.968	2.02	101.06	A
80.00-60.00			B	0.463	1.953	0.679	0.8	1	90.775			
			C	0.58	1.818	0.741	0.8	1	122.641			
T8	1.26	4.45	A	0.529	1.865	0.713	0.8	1	123.662	1.87	93.47	A
60.00-40.00			B	0.42	2.026	0.66	0.8	1	92.154			
			C	0.522	1.873	0.709	0.8	1	121.404			
T9	1.27	5.44	A	0.484	1.922	0.69	0.8	1	123.789	1.71	85.61	A
40.00-20.00			B	0.387	2.091	0.646	0.8	1	94.127			
			C	0.474	1.936	0.685	0.8	1	120.402			
T10	0.83	6.08	A	0.347	2.178	0.631	0.8	1	93.164	1.46	73.03	A
20.00-0.00			B	0.29	2.322	0.613	0.8	1	76.835			
			C	0.339	2.198	0.629	0.8	1	90.567			
Sum Weight:	7.61	30.71						OTM	1100.90 kip-ft	13.91		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.85	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	0.85	1	30.910			
			C	0.161	2.732	0.583	0.85	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.85	1	33.334	0.65	65.36	A
150.00-140.00			B	0.59	1.81	0.748	0.85	1	29.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.44	2.09	A	0.545	1.849	0.721	0.85	1	64.987	1.44	71.75	B
140.00-120.00			B	0.603	1.802	0.755	0.85	1	74.772			
			C	0.276	2.363	0.609	0.85	1	29.715			
T4	0.91	2.80	A	0.591	1.81	0.748	0.85	1	91.006	1.78	89.09	B
120.00-100.00			B	0.623	1.792	0.768	0.85	1	97.953			
			C	0.518	1.878	0.707	0.85	1	76.025			
T5	0.62	1.48	A	0.692	1.776	0.814	0.85	1	65.794	1.14	113.76	A
100.00-90.00			B	0.54	1.853	0.719	0.85	1	45.937			
			C	0.642	1.784	0.781	0.85	1	58.726			
T6	0.63	1.76	A	0.647	1.782	0.783	0.85	1	64.561	1.09	108.55	A
90.00-80.00			B	0.507	1.891	0.701	0.85	1	45.942			
			C	0.622	1.792	0.767	0.85	1	60.904			
T7	1.26	4.33	A	0.587	1.812	0.746	0.85	1	125.715	2.03	101.66	A
80.00-60.00			B	0.463	1.953	0.679	0.85	1	91.488			
			C	0.58	1.818	0.741	0.85	1	123.340			
T8	1.26	4.45	A	0.529	1.865	0.713	0.85	1	124.632	1.88	94.20	A
60.00-40.00			B	0.42	2.026	0.66	0.85	1	93.087			
			C	0.522	1.873	0.709	0.85	1	122.322			
T9	1.27	5.44	A	0.484	1.922	0.69	0.85	1	124.860	1.73	86.35	A
40.00-20.00			B	0.387	2.091	0.646	0.85	1	95.163			
			C	0.474	1.936	0.685	0.85	1	121.422			
T10	0.83	6.08	A	0.347	2.178	0.631	0.85	1	94.512	1.48	74.08	A
20.00-0.00			B	0.29	2.322	0.613	0.85	1	78.157			
			C	0.339	2.198	0.629	0.85	1	91.878			
Sum Weight:	7.61	30.71						OTM	1107.38 kip-ft	14.01		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	19.74					
Bracing Weight	10.97					
Total Member Self-Weight	30.71			-2.00	10.22	
Total Weight	51.55			-2.00	10.22	
Wind 0 deg - No Ice		-0.03	-59.60	-5708.32	12.35	-22.92
Wind 30 deg - No Ice		29.27	-50.81	-4890.66	-2805.15	-22.82
Wind 45 deg - No Ice		41.56	-41.28	-3973.98	-3999.37	-20.02
Wind 60 deg - No Ice		50.83	-29.04	-2795.45	-4898.94	-15.82
Wind 90 deg - No Ice		58.77	0.23	26.18	-5648.79	-5.72
Wind 120 deg - No Ice		51.69	30.08	2874.97	-4945.01	6.21
Wind 135 deg - No Ice		41.56	41.56	3993.08	-4000.25	11.52
Wind 150 deg - No Ice		29.55	50.94	4892.75	-2842.34	16.76
Wind 180 deg - No Ice		0.21	58.66	5652.84	-15.14	24.54
Wind 210 deg - No Ice		-29.36	50.86	4884.68	2840.92	23.16
Wind 225 deg - No Ice		-41.43	41.46	3982.65	4006.43	20.78
Wind 240 deg - No Ice		-51.57	29.98	2864.78	4952.07	18.07
Wind 270 deg - No Ice		-58.70	0.09	11.35	5659.73	7.95
Wind 300 deg - No Ice		-50.74	-29.22	-2816.52	4905.15	-3.95
Wind 315 deg - No Ice		-41.50	-41.41	-3988.74	4008.72	-9.92
Wind 330 deg - No Ice		-29.33	-50.88	-4897.98	2829.75	-16.05
Member Ice	15.00					
Total Weight Ice	85.61			-2.54	25.10	
Wind 0 deg - Ice		-0.02	-69.88	-6864.28	26.49	-19.54
Wind 30 deg - Ice		34.37	-59.62	-5870.13	-3357.00	-25.65
Wind 45 deg - Ice		48.70	-48.47	-4773.44	-4775.85	-25.79
Wind 60 deg - Ice		59.54	-34.13	-3360.98	-5848.07	-24.11
Wind 90 deg - Ice		68.91	0.18	19.71	-6761.26	-17.16
Wind 120 deg - Ice		60.58	35.16	3446.86	-5927.99	-5.57
Wind 135 deg - Ice		48.70	48.69	4786.02	-4776.18	1.27
Wind 150 deg - Ice		34.59	59.71	5869.30	-3386.36	8.22
Wind 180 deg - Ice		0.16	68.72	6767.76	5.09	20.94
Wind 210 deg - Ice		-34.44	59.65	5863.16	3419.61	25.93
Wind 225 deg - Ice		-48.60	48.61	4778.12	4815.41	26.40
Wind 240 deg - Ice		-60.49	35.08	3439.26	5967.79	26.20
Wind 270 deg - Ice		-68.86	0.07	8.47	6803.85	18.94
Wind 300 deg - Ice		-59.46	-34.27	-3377.31	5886.54	7.00
Wind 315 deg - Ice		-48.65	-48.57	-4784.82	4816.70	0.01
Wind 330 deg - Ice		-34.41	-59.67	-5875.67	3409.98	-7.66
Total Weight	51.55			-2.00	10.22	
Wind 0 deg - Service		-0.01	-20.62	-1978.70	2.07	-7.93
Wind 30 deg - Service		10.13	-17.58	-1695.77	-972.85	-7.90
Wind 45 deg - Service		14.38	-14.28	-1378.58	-1386.07	-6.93
Wind 60 deg - Service		17.59	-10.05	-970.79	-1697.34	-5.47
Wind 90 deg - Service		20.33	0.08	5.56	-1956.81	-1.98
Wind 120 deg - Service		17.89	10.41	991.30	-1713.28	2.15
Wind 135 deg - Service		14.38	14.38	1378.19	-1386.38	3.99
Wind 150 deg - Service		10.23	17.63	1689.49	-985.71	5.80
Wind 180 deg - Service		0.07	20.30	1952.50	-7.45	8.49
Wind 210 deg - Service		-10.16	17.60	1686.70	980.81	8.01
Wind 225 deg - Service		-14.34	14.35	1374.58	1384.10	7.19
Wind 240 deg - Service		-17.85	10.37	987.77	1711.31	6.25
Wind 270 deg - Service		-20.31	0.03	0.42	1956.18	2.75
Wind 300 deg - Service		-17.56	-10.11	-978.08	1695.07	-1.37
Wind 315 deg - Service		-14.36	-14.33	-1383.69	1384.89	-3.43
Wind 330 deg - Service		-10.15	-17.61	-1698.30	976.95	-5.55

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	170 - 150	Leg	Max Tension	22	29.76	-0.04	0.05
			Max. Compression	19	-35.99	-0.00	0.45
			Max. Mx	24	-35.74	-0.38	-0.24
			Max. My	19	-35.99	-0.00	0.45
			Max. Vy	30	-3.91	0.05	-0.06
			Max. Vx	19	-4.53	-0.00	0.45
		Diagonal	Max Tension	26	3.41	0.00	0.00
			Max. Compression	26	-3.46	0.00	0.00
			Max. Mx	19	2.89	-0.00	0.00
			Max. My	22	-2.08	-0.00	0.00
			Max. Vy	19	0.01	-0.00	0.00
			Max. Vx	21	0.00	0.00	0.00
		Top Girt	Max Tension	7	0.30	0.00	0.00
			Max. Compression	15	-0.33	0.00	0.00
			Max. Mx	18	-0.01	0.01	0.00
			Max. My	31	0.01	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
		Bottom Girt	Max Tension	15	0.15	0.00	0.00
			Max. Compression	13	-0.15	0.00	0.00
			Max. Mx	18	-0.00	0.01	0.00
			Max. My	31	-0.01	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
T2	150 - 140	Leg	Max Tension	22	35.03	-0.42	0.02
			Max. Compression	19	-41.87	2.80	0.28
			Max. Mx	22	34.40	-3.29	0.23
			Max. My	34	-3.47	-0.26	4.03
			Max. Vy	27	0.63	-3.27	-0.36
			Max. Vx	30	0.87	-1.76	-3.61
		Diagonal	Max Tension	22	4.91	0.00	0.00
			Max. Compression	30	-5.45	0.00	0.00
			Max. Mx	22	4.33	0.05	0.00
			Max. My	21	-4.23	-0.02	0.02
			Max. Vy	22	0.02	0.05	0.00
			Max. Vx	21	-0.00	0.00	0.00
		Top Girt	Max Tension	5	0.42	0.00	0.00
			Max. Compression	2	-0.37	0.00	0.00
			Max. Mx	18	0.04	-0.02	0.00
			Max. My	30	0.22	0.00	0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	32	70.49	-3.70	-0.17
			Max. Compression	19	-84.43	3.69	0.03
			Max. Mx	32	69.34	-4.52	-0.16
			Max. My	31	-8.47	-0.42	-6.63
			Max. Vy	27	0.69	-4.46	-0.05
			Max. Vx	23	-0.99	-0.41	6.59
		Diagonal	Max Tension	28	9.08	0.00	0.00
			Max. Compression	29	-9.44	0.00	0.00
			Max. Mx	19	5.84	0.11	0.01
			Max. My	29	-7.63	-0.06	-0.02
			Max. Vy	19	-0.03	0.11	0.01
			Max. Vx	21	-0.00	0.00	0.00
T4	120 - 100	Leg	Max Tension	32	117.19	-5.13	-0.02
			Max. Compression	19	-138.35	3.39	0.04
			Max. Mx	19	-109.85	6.13	0.00
			Max. My	31	-11.38	-0.47	-7.36
			Max. Vy	32	0.98	-4.27	-0.10
			Max. Vx	31	1.72	-0.47	-7.36

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	21	11.55	0.00	0.00
			Max. Compression	29	-12.57	0.00	0.00
			Max. Mx	19	7.08	0.13	0.01
			Max. My	29	-12.53	-0.06	-0.05
			Max. Vy	32	0.04	0.12	-0.00
			Max. Vx	29	0.01	0.00	0.00
		Mid Girt	Max Tension	32	3.92	0.00	0.00
			Max. Compression	19	-3.17	0.00	0.00
			Max. Mx	18	0.41	-0.07	0.00
			Max. My	30	2.10	0.00	0.00
			Max. Vy	18	-0.03	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T5	100 - 90	Leg	Max Tension	32	144.94	-4.27	-0.10
			Max. Compression	19	-170.56	4.60	0.02
			Max. Mx	19	-170.56	4.60	0.02
			Max. My	31	-12.60	-0.47	-7.36
			Max. Vy	19	-0.25	4.60	0.02
			Max. Vx	31	-0.49	-0.47	-7.36
		Diagonal	Max Tension	28	13.49	0.00	0.00
			Max. Compression	28	-13.72	0.00	0.00
			Max. Mx	19	10.36	0.18	0.01
			Max. My	30	-0.61	0.09	-0.02
			Max. Vy	19	-0.05	0.18	0.01
			Max. Vx	30	-0.00	0.00	0.00
T6	90 - 80	Leg	Max Tension	32	173.18	-4.32	0.01
			Max. Compression	19	-202.06	5.78	0.05
			Max. Mx	30	-201.28	5.78	-0.12
			Max. My	31	-14.57	-0.00	-4.70
			Max. Vy	27	0.39	-5.71	-0.06
			Max. Vx	31	0.28	-0.00	-4.70
		Diagonal	Max Tension	28	13.38	0.00	0.00
			Max. Compression	28	-13.75	0.00	0.00
			Max. Mx	19	10.28	0.15	0.01
			Max. My	30	-0.77	0.08	-0.02
			Max. Vy	19	-0.05	0.15	0.01
			Max. Vx	30	0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	32	225.41	-5.01	0.02
			Max. Compression	19	-261.48	5.55	0.01
			Max. Mx	30	-230.77	5.78	-0.12
			Max. My	34	-15.61	-0.08	5.19
			Max. Vy	22	-0.22	-5.69	0.11
			Max. Vx	34	-0.21	-0.08	5.19
		Diagonal	Max Tension	28	13.78	0.00	0.00
			Max. Compression	28	-14.16	0.00	0.00
			Max. Mx	19	10.54	0.15	0.01
			Max. My	21	-13.53	0.02	0.02
			Max. Vy	32	0.05	0.15	-0.01
			Max. Vx	21	-0.00	0.00	0.00
T8	60 - 40	Leg	Max Tension	32	273.18	-5.02	0.02
			Max. Compression	30	-317.16	5.46	-0.09
			Max. Mx	32	272.62	-6.90	-0.01
			Max. My	34	-20.30	0.06	5.99
			Max. Vy	22	0.31	-6.89	0.07
			Max. Vx	26	0.22	0.05	-5.96
		Diagonal	Max Tension	28	13.88	0.00	0.00
			Max. Compression	28	-14.24	0.00	0.00
			Max. Mx	30	10.13	0.21	-0.01
			Max. My	21	-13.64	0.00	0.03
			Max. Vy	30	-0.06	0.21	-0.01
			Max. Vx	21	-0.00	0.00	0.00
T9	40 - 20	Leg	Max Tension	32	315.77	-3.05	0.03

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	30	-370.16	-0.26	0.02
			Max. Mx	32	315.12	-11.58	0.02
			Max. My	31	-21.23	-0.76	-5.82
			Max. Vy	22	0.97	-11.56	-0.01
			Max. Vx	34	0.25	2.49	5.73
		Diagonal	Max Tension	28	15.13	0.00	0.00
			Max. Compression	28	-14.76	0.00	0.00
			Max. Mx	30	10.20	0.23	-0.02
			Max. My	28	-13.32	0.04	-0.03
			Max. Vy	32	0.07	0.21	-0.02
			Max. Vx	21	-0.00	0.00	0.00
T10	20 - 0	Leg	Max Tension	32	352.05	3.77	0.03
			Max. Compression	30	-419.98	-0.00	-0.00
			Max. Mx	30	-391.92	15.47	0.01
			Max. My	31	-30.36	9.54	-9.86
			Max. Vy	22	-1.65	-11.56	-0.01
			Max. Vx	34	1.08	9.55	9.85
		Diagonal	Max Tension	21	18.81	0.00	0.00
			Max. Compression	20	-16.65	0.00	0.00
			Max. Mx	32	7.51	0.29	-0.02
			Max. My	21	-16.35	0.13	0.04
			Max. Vy	32	0.08	0.29	-0.02
			Max. Vx	21	-0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	428.62	32.54	-19.68
	Max. H_x	30	428.62	32.54	-19.68
	Max. H_z	21	-350.34	-39.23	24.55
	Min. Vert	22	-363.26	-40.90	24.42
	Min. H_x	22	-363.26	-40.90	24.42
	Min. H_z	30	428.62	32.54	-19.68
Leg B	Max. Vert	24	426.83	-32.87	-19.16
	Max. H_x	32	-365.67	41.18	24.03
	Max. H_z	32	-365.67	41.18	24.03
	Min. Vert	32	-365.67	41.18	24.03
	Min. H_x	7	348.76	-32.95	-18.84
	Min. H_z	24	426.83	-32.87	-19.16
Leg A	Max. Vert	19	427.25	-0.58	37.97
	Max. H_x	31	28.06	3.86	-5.11
	Max. H_z	19	427.25	-0.58	37.97
	Min. Vert	27	-364.57	0.59	-47.70
	Min. H_x	23	27.41	-3.86	-5.18
	Min. H_z	27	-364.57	0.59	-47.70

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	51.55	0.00	0.00	-2.00	10.22	-0.00
Dead+Wind 0 deg - No Ice	51.55	-0.03	-59.60	-5731.31	12.45	-22.98
Dead+Wind 30 deg - No Ice	51.55	29.27	-50.81	-4910.48	-2816.44	-22.88
Dead+Wind 45 deg - No Ice	51.55	41.56	-41.28	-3990.12	-4015.51	-20.09
Dead+Wind 60 deg - No Ice	51.55	50.83	-29.04	-2806.84	-4918.74	-15.89
Dead+Wind 90 deg - No Ice	51.55	58.77	0.23	26.20	-5671.60	-5.78
Dead+Wind 120 deg - No Ice	51.55	51.69	30.08	2886.46	-4964.91	6.19
Dead+Wind 135 deg - No Ice	51.55	41.56	41.56	4009.14	-4016.39	11.54
Dead+Wind 150 deg - No Ice	51.55	29.55	50.94	4912.46	-2853.77	16.79
Dead+Wind 180 deg - No Ice	51.55	0.21	58.66	5675.66	-15.12	24.59
Dead+Wind 210 deg - No Ice	51.55	-29.36	50.86	4904.32	2852.48	23.21
Dead+Wind 225 deg - No Ice	51.55	-41.43	41.46	3998.63	4022.68	20.84
Dead+Wind 240 deg - No Ice	51.55	-51.57	29.98	2876.19	4972.05	18.14
Dead+Wind 270 deg - No Ice	51.55	-58.70	0.09	11.33	5682.58	8.01
Dead+Wind 300 deg - No Ice	51.55	-50.74	-29.22	-2827.93	4924.98	-3.93
Dead+Wind 315 deg - No Ice	51.55	-41.50	-41.41	-4004.87	4024.93	-9.94
Dead+Wind 330 deg - No Ice	51.55	-29.33	-50.88	-4917.75	2841.20	-16.08
Dead+Ice+Temp	85.61	0.00	0.00	-2.59	25.14	0.00
Dead+Wind 0 deg+Ice+Temp	85.61	-0.02	-69.88	-6905.93	26.68	-19.68
Dead+Wind 30 deg+Ice+Temp	85.61	34.37	-59.62	-5905.89	-3377.35	-25.79
Dead+Wind 45 deg+Ice+Temp	85.61	48.70	-48.47	-4802.60	-4804.84	-25.94
Dead+Wind 60 deg+Ice+Temp	85.61	59.54	-34.13	-3381.60	-5883.60	-24.27
Dead+Wind 90 deg+Ice+Temp	85.61	68.91	0.18	19.61	-6802.32	-17.29
Dead+Wind 120 deg+Ice+Temp	85.61	60.58	35.16	3467.54	-5963.93	-5.59
Dead+Wind 135 deg+Ice+Temp	85.61	48.70	48.69	4814.91	-4805.18	1.31
Dead+Wind 150 deg+Ice+Temp	85.61	34.59	59.71	5904.80	-3406.90	8.32
Dead+Wind 180 deg+Ice+Temp	85.61	0.16	68.72	6808.78	5.20	21.08
Dead+Wind 210 deg+Ice+Temp	85.61	-34.44	59.65	5898.58	3440.45	26.07
Dead+Wind 225 deg+Ice+Temp	85.61	-48.60	48.61	4806.92	4844.71	26.55
Dead+Wind 240 deg+Ice+Temp	85.61	-60.49	35.08	3459.87	6003.99	26.35
Dead+Wind 270 deg+Ice+Temp	85.61	-68.86	0.07	8.33	6845.13	19.07
Dead+Wind 300 deg+Ice+Temp	85.61	-59.46	-34.27	-3397.94	5922.26	7.02
Dead+Wind 315 deg+Ice+Temp	85.61	-48.65	-48.57	-4813.96	4845.92	-0.04
Dead+Wind 330 deg+Ice+Temp	85.61	-34.41	-59.67	-5911.38	3430.67	-7.76
Dead+Wind 0 deg - Service	51.55	-0.01	-20.62	-1984.53	11.00	-7.95
Dead+Wind 30 deg - Service	51.55	10.13	-17.58	-1700.49	-967.87	-7.93
Dead+Wind 45 deg - Service	51.55	14.38	-14.28	-1382.01	-1382.78	-6.95
Dead+Wind 60 deg - Service	51.55	17.59	-10.05	-972.56	-1695.31	-5.50
Dead+Wind 90 deg - Service	51.55	20.33	0.08	7.75	-1955.82	-1.99
Dead+Wind 120 deg - Service	51.55	17.89	10.41	997.47	-1711.29	2.14
Dead+Wind 135 deg - Service	51.55	14.38	14.38	1385.94	-1383.08	3.98
Dead+Wind 150 deg - Service	51.55	10.23	17.63	1698.51	-980.78	5.80
Dead+Wind 180 deg - Service	51.55	0.07	20.30	1962.60	1.46	8.51
Dead+Wind 210 deg - Service	51.55	-10.16	17.60	1695.71	993.74	8.05
Dead+Wind 225 deg - Service	51.55	-14.34	14.35	1382.32	1398.66	7.22
Dead+Wind 240 deg - Service	51.55	-17.85	10.37	993.93	1727.18	6.28
Dead+Wind 270 deg - Service	51.55	-20.31	0.03	2.60	1973.05	2.76
Dead+Wind 300 deg - Service	51.55	-17.56	-10.11	-979.87	1710.89	-1.36
Dead+Wind 315 deg - Service	51.55	-14.36	-14.33	-1387.13	1399.44	-3.43
Dead+Wind 330 deg - Service	51.55	-10.15	-17.61	-1703.02	989.84	-5.55

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-51.55	0.00	0.00	51.55	0.00	0.000%
2	-0.03	-51.55	-59.60	0.03	51.55	59.60	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
3	29.27	-51.55	-50.81	-29.27	51.55	50.81	0.000%
4	41.56	-51.55	-41.28	-41.56	51.55	41.28	0.000%
5	50.83	-51.55	-29.04	-50.83	51.55	29.04	0.000%
6	58.77	-51.55	0.23	-58.77	51.55	-0.23	0.000%
7	51.69	-51.55	30.08	-51.69	51.55	-30.08	0.000%
8	41.56	-51.55	41.56	-41.56	51.55	-41.56	0.000%
9	29.55	-51.55	50.94	-29.55	51.55	-50.94	0.000%
10	0.21	-51.55	58.66	-0.21	51.55	-58.66	0.000%
11	-29.36	-51.55	50.86	29.36	51.55	-50.86	0.000%
12	-41.43	-51.55	41.46	41.43	51.55	-41.46	0.000%
13	-51.57	-51.55	29.98	51.57	51.55	-29.98	0.000%
14	-58.70	-51.55	0.09	58.70	51.55	-0.09	0.000%
15	-50.74	-51.55	-29.22	50.74	51.55	29.22	0.000%
16	-41.50	-51.55	-41.41	41.50	51.55	41.41	0.000%
17	-29.33	-51.55	-50.88	29.33	51.55	50.88	0.000%
18	0.00	-85.61	0.00	-0.00	85.61	0.00	0.000%
19	-0.02	-85.61	-69.88	0.02	85.61	69.88	0.000%
20	34.37	-85.61	-59.62	-34.37	85.61	59.62	0.000%
21	48.70	-85.61	-48.47	-48.70	85.61	48.47	0.000%
22	59.54	-85.61	-34.13	-59.54	85.61	34.13	0.000%
23	68.91	-85.61	0.18	-68.91	85.61	-0.18	0.000%
24	60.58	-85.61	35.16	-60.58	85.61	-35.16	0.000%
25	48.70	-85.61	48.69	-48.70	85.61	-48.69	0.000%
26	34.59	-85.61	59.71	-34.59	85.61	-59.71	0.000%
27	0.16	-85.61	68.72	-0.16	85.61	-68.72	0.000%
28	-34.44	-85.61	59.65	34.44	85.61	-59.65	0.000%
29	-48.60	-85.61	48.61	48.60	85.61	-48.61	0.000%
30	-60.49	-85.61	35.08	60.49	85.61	-35.08	0.000%
31	-68.86	-85.61	0.07	68.86	85.61	-0.07	0.000%
32	-59.46	-85.61	-34.27	59.46	85.61	34.27	0.000%
33	-48.65	-85.61	-48.57	48.65	85.61	48.57	0.000%
34	-34.41	-85.61	-59.67	34.41	85.61	59.67	0.000%
35	-0.01	-51.55	-20.62	0.01	51.55	20.62	0.000%
36	10.13	-51.55	-17.58	-10.13	51.55	17.58	0.000%
37	14.38	-51.55	-14.28	-14.38	51.55	14.28	0.000%
38	17.59	-51.55	-10.05	-17.59	51.55	10.05	0.000%
39	20.33	-51.55	0.08	-20.33	51.55	-0.08	0.000%
40	17.89	-51.55	10.41	-17.89	51.55	-10.41	0.000%
41	14.38	-51.55	14.38	-14.38	51.55	-14.38	0.000%
42	10.23	-51.55	17.63	-10.23	51.55	-17.63	0.000%
43	0.07	-51.55	20.30	-0.07	51.55	-20.30	0.000%
44	-10.16	-51.55	17.60	10.16	51.55	-17.60	0.000%
45	-14.34	-51.55	14.35	14.34	51.55	-14.35	0.000%
46	-17.85	-51.55	10.37	17.85	51.55	-10.37	0.000%
47	-20.31	-51.55	0.03	20.31	51.55	-0.03	0.000%
48	-17.56	-51.55	-10.11	17.56	51.55	10.11	0.000%
49	-14.36	-51.55	-14.33	14.36	51.55	14.33	0.000%
50	-10.15	-51.55	-17.61	10.15	51.55	17.61	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001

4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000081
20	Yes	4	0.00000001	0.00000109
21	Yes	4	0.00000001	0.00000130
22	Yes	4	0.00000001	0.00000120
23	Yes	4	0.00000001	0.00000130
24	Yes	4	0.00000001	0.00000083
25	Yes	4	0.00000001	0.00000099
26	Yes	4	0.00000001	0.00000122
27	Yes	4	0.00000001	0.00000116
28	Yes	4	0.00000001	0.00000109
29	Yes	4	0.00000001	0.00000096
30	Yes	4	0.00000001	0.00000096
31	Yes	4	0.00000001	0.00000130
32	Yes	4	0.00000001	0.00000116
33	Yes	4	0.00000001	0.00000119
34	Yes	4	0.00000001	0.00000122
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 150	5.771	35	0.3279	0.0280
T2	150 - 140	4.409	35	0.2984	0.0346
T3	140 - 120	3.790	35	0.2780	0.0332
T4	120 - 100	2.702	35	0.2252	0.0194
T5	100 - 90	1.823	46	0.1785	0.0127
T6	90 - 80	1.464	46	0.1509	0.0107
T7	80 - 60	1.155	46	0.1305	0.0089

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T8	60 - 40	0.649	46	0.0966	0.0064
T9	40 - 20	0.293	46	0.0583	0.0040
T10	20 - 0	0.086	46	0.0265	0.0020

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
183.00	101-90-08-0-01	35	5.771	0.3279	0.0280	88849
179.75	15' Mount Pipe	35	5.771	0.3279	0.0280	88849
178.00	3" Dia 20' Omni	35	5.771	0.3279	0.0280	88849
175.00	2.5" x 14' Omni	35	5.771	0.3279	0.0280	88849
174.00	1.5" x 12' Omni	35	5.771	0.3279	0.0280	88849
170.00	APXVSPP18-C-A20	35	5.771	0.3279	0.0280	88849
168.00	HPD2-4.7	35	5.631	0.3253	0.0289	88849
159.50	APXV18-206517S-C w/ mounting hardware	35	5.042	0.3135	0.0324	42309
158.50	SC420-HF1LDF	35	4.974	0.3121	0.0327	38630
144.00	3" Dia 20' Omni	35	4.032	0.2868	0.0343	23538
141.00	2" Dia 15' Omni	35	3.850	0.2803	0.0336	23984
139.00	1.5" x 10' Omni	35	3.731	0.2756	0.0327	24120
138.50	9' Whip	35	3.702	0.2743	0.0325	24128
134.00	VHLP2.5-180	35	3.443	0.2627	0.0298	23972
125.50	PiROD 10' Lightweight T-Frame	35	2.981	0.2396	0.0233	23558
115.00	(2) TMA (shielded)	46	2.463	0.2135	0.0167	22934
101.00	BXA-171063-12BF	46	1.862	0.1811	0.0129	22013
87.00	3"x2"x22" Panel	46	1.366	0.1440	0.0101	25066
84.50	TMA	46	1.288	0.1388	0.0097	27742
83.50	3' Stand-off	46	1.258	0.1369	0.0095	28975
83.00	3' Dish	46	1.243	0.1359	0.0094	29604
82.50	TMA	46	1.228	0.1350	0.0093	30229
80.00	3"x2"x22" Panel	46	1.155	0.1305	0.0089	32895
30.00	Camera	46	0.171	0.0414	0.0030	32720
24.00	PC9013N	46	0.116	0.0323	0.0024	33266

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 150	19.843	19	1.0972	0.1177
T2	150 - 140	15.281	19	1.0106	0.1336
T3	140 - 120	13.176	19	0.9488	0.1236
T4	120 - 100	9.436	30	0.7798	0.0756
T5	100 - 90	6.374	30	0.6219	0.0489
T6	90 - 80	5.118	30	0.5273	0.0403
T7	80 - 60	4.035	30	0.4569	0.0330
T8	60 - 40	2.263	30	0.3383	0.0223
T9	40 - 20	1.016	30	0.2040	0.0132
T10	20 - 0	0.296	30	0.0927	0.0064

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
183.00	101-90-08-0-01	19	19.843	1.0972	0.1177	30835
179.75	15' Mount Pipe	19	19.843	1.0972	0.1177	30835
178.00	3" Dia 20' Omni	19	19.843	1.0972	0.1177	30835
175.00	2.5" x 14' Omni	19	19.843	1.0972	0.1177	30835
174.00	1.5" x 12' Omni	19	19.843	1.0972	0.1177	30835
170.00	APXVSPP18-C-A20	19	19.843	1.0972	0.1177	30835
168.00	HPD2-4.7	19	19.377	1.0895	0.1203	30835
159.50	APXV18-206517S-C w/ mounting hardware	19	17.410	1.0553	0.1299	14683
158.50	SC420-HF1LDF	19	17.181	1.0510	0.1308	13406
144.00	3" Dia 20' Omni	19	14.000	0.9760	0.1294	8016
141.00	2" Dia 15' Omni	19	13.380	0.9560	0.1253	8024
139.00	1.5" x 10' Omni	19	12.974	0.9414	0.1218	7973
138.50	9' Whip	19	12.874	0.9376	0.1208	7953
134.00	VHLP2.5-180	30	11.986	0.9011	0.1107	7714
125.50	PiROD 10' Lightweight T-Frame	30	10.400	0.8266	0.0887	7254
115.00	(2) TMA (shielded)	30	8.604	0.7409	0.0663	6817
101.00	BXA-171063-12BF	30	6.510	0.6310	0.0498	6415
87.00	3"x2"x22" Panel	30	4.777	0.5034	0.0380	7279
84.50	TMA	30	4.504	0.4856	0.0361	8017
83.50	3' Stand-off	30	4.397	0.4789	0.0354	8355
83.00	3' Dish	30	4.345	0.4757	0.0350	8527
82.50	TMA	30	4.292	0.4724	0.0347	8697
80.00	3"x2"x22" Panel	30	4.035	0.4569	0.0330	9417
30.00	Camera	30	0.592	0.1447	0.0096	9288
24.00	PC9013N	30	0.399	0.1128	0.0077	9439

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	170	Diagonal	A325N	0.6250	1	3.46	6.44	0.537 ✓	1.333	Bolt Shear
T2	150	Leg	A325N	1.0000	6	5.84	34.56	0.169 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.91	8.16	0.602 ✓	1.333	Member Bearing
		Top Girt	A325N	1.0000	1	0.42	8.16	0.052 ✓	1.333	Member Bearing
T3	140	Leg	A325N	1.0000	6	8.57	34.56	0.248 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9.08	8.16	1.114 ✓	1.333	Member Bearing
T4	120	Leg	A325N	1.0000	6	15.41	34.56	0.446 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	11.55	10.88	1.062 ✓	1.333	Member Bearing
		Mid Girt	A325N	1.0000	1	3.92	8.16	0.480 ✓	1.333	Member Bearing
T5	100	Leg	A325N	1.0000	6	24.16	34.56	0.699 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	13.49	13.59	0.992 ✓	1.333	Member Bearing
T6	90	Leg	A325N	1.0000	6	28.86	34.56	0.835 ✓	1.333	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325N	1.0000	1	13.38	13.59	0.984 ✔	1.333	Member Bearing
T7	80	Leg	A325N	1.0000	6	33.26	34.56	0.963 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	14.16	16.49	0.859 ✔	1.333	Bolt Shear
T8	60	Leg	A325N	1.2500	6	41.67	54.00	0.772 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	13.88	16.99	0.817 ✔	1.333	Member Bearing
T9	40	Leg	A325N	1.2500	6	49.37	54.00	0.914 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	15.13	20.39	0.742 ✔	1.333	Member Bearing
T10	20	Diagonal	A325N	1.2500	1	18.81	16.99	1.107 ✔	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	170 - 150	1 3/4	20.00	2.49	68.3 K=1.00	21.253	2.4053	-35.99	51.12	0.704 ✔
T2	150 - 140	Pirod 105244	10.02	10.02	45.4 K=1.00	25.051	3.6816	-41.87	92.23	0.454 ✔
T3	140 - 120	Pirod 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-84.43	92.23	0.915 ✔
T4	120 - 100	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-138.35	138.54	0.999 ✔
T5	100 - 90	Pirod 105217	10.02	10.02	37.8 K=1.00	26.132	5.3014	-170.56	138.54	1.231 ✔
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5 K=1.00	26.968	7.6570	-202.06	206.49	0.979 ✔
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6 K=1.00	27.439	9.9280	-261.48	272.41	0.960 ✔
T8	60 - 40	Pirod 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-317.16	257.78	1.230 ✔
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4 K=1.00	27.705	11.7803	-370.16	326.37	1.134 ✔
T10	20 - 0	Pirod 105220 reinf w/ 1" dia bar	20.03	10.02	24.3 K=1.00	27.824	14.2843	-419.98	397.44	1.057 ✔

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T2	150 - 140	0.5	1.48	121.0	10.193	0.1963	0.94	2.24	0.418 ✔
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.99	2.23	0.446 ✔
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.73	2.26	0.764 ✔
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.50	2.26	0.219 ✔
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.39	2.30	0.172 ✔
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.23	2.33	0.097 ✔
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.32	4.69	0.067 ✔
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.175 ✔
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.71	4.75	0.360 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.59	2.71	111.6 K=0.75	12.001	0.6013	-3.46	7.22	0.480 ✔
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.02	121.8 K=1.00	10.024	0.9020	-5.45	9.04	0.602 ✔
T3	140 - 120	L3x3x3/16	12.50	5.67	115.6 K=1.01	10.799	1.0900	-9.44	11.77	0.802 ✔
T4	120 - 100	L3x3x1/4	13.80	6.37	129.1 K=1.00	8.961	1.4400	-12.57	12.90	0.974 ✔
T5	100 - 90	L3x3x5/16	14.50	6.74	137.3 K=1.00	7.920	1.7800	-13.72	14.10	0.973 ✔
T6	90 - 80	L3x3x5/16	15.24	7.12	145.1 K=1.00	7.090	1.7800	-13.75	12.62	1.090 ✔
T7	80 - 60	L3x3x3/8	16.80	7.92	162.0 K=1.00	5.691	2.1100	-14.16	12.01	1.179 ✔
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.73	151.8 K=1.00	6.480	2.0900	-14.22	13.54	1.050 ✔
T9	40 - 20	L3 1/2x3 1/2x3/8	19.30	9.17	160.1 K=1.00	5.825	2.4800	-14.76	14.45	1.021 ✔
T10	20 - 0	L4x4x5/16	21.03	10.04	152.3 K=1.00	6.437	2.4000	-16.65	15.45	1.078 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.33	2.58	0.127 ✔
T2	150 - 140	L3x3x3/16	5.00	4.52	105.5 K=1.16	12.079	1.0900	-0.37	13.17	0.028 ✔

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.15	2.58	0.059 ✔

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T4	120 - 100	L3x3x3/16	9.00	7.67	154.4 K=1.00	6.267	1.0900	-3.17	6.83	0.464 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	1 3/4	20.00	2.49	68.3	30.000	2.4053	29.76	72.16	0.412 ✔
T2	150 - 140	Pirod 105244	10.02	10.02	45.4	30.000	3.6816	35.03	110.45	0.317 ✔
T3	140 - 120	Pirod 105216	20.03	10.02	45.4	30.000	3.6816	70.49	110.45	0.638 ✔
T4	120 - 100	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	117.19	159.04	0.737 ✔
T5	100 - 90	Pirod 105217	10.02	10.02	37.8	30.000	5.3014	144.94	159.04	0.911 ✔
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5	30.000	7.6570	173.18	229.71	0.754 ✔
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6	30.000	9.9280	225.41	297.84	0.757 ✔
T8	60 - 40	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	273.19	282.74	0.966

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4	30.000	11.7803	315.77	353.41	0.894
T10	20 - 0	Pirod 105220 reinf w/ 1" dia bar	20.03	10.02	24.3	30.000	14.2843	352.06	428.53	0.822

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T2	150 - 140	0.5	1.48	121.0	10.193	0.1963	0.94	2.24	0.418
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.99	2.23	0.446
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.73	2.26	0.764
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.50	2.26	0.219
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.39	2.30	0.172
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.23	2.33	0.097
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.32	4.69	0.067
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.175
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.71	4.75	0.360

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	170 - 150	7/8	5.59	2.71	148.7	30.000	0.6013	3.41	18.04	0.189
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.02	80.1	21.600	0.9020	4.91	19.48	0.252
T3	140 - 120	L3x3x3/16	12.50	5.67	74.6	21.600	1.0900	9.08	23.54	0.386
T4	120 - 100	L3x3x1/4	13.80	6.37	84.3	21.600	1.4400	11.55	31.10	0.371
T5	100 - 90	L3x3x5/16	14.50	6.74	89.9	21.600	1.7800	13.49	38.45	0.351
T6	90 - 80	L3x3x5/16	15.24	7.12	94.9	21.600	1.7800	13.38	38.45	0.348

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T7	80 - 60	L3x3x3/8	16.01	7.54	101.2	21.600	2.1100	13.78	45.58	0.302
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.73	99.2	21.600	2.0900	13.88	45.14	0.307
T9	40 - 20	L3 1/2x3 1/2x3/8	20.16	9.59	109.8	21.600	2.4800	15.13	53.57	0.282
T10	20 - 0	L4x4x5/16	21.92	10.48	103.3	21.600	2.4000	18.81	51.84	0.363

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.30	18.04	0.016
T2	150 - 140	L3x3x3/16	5.00	4.52	62.0	21.600	1.0900	0.42	23.54	0.018

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.15	18.04	0.008

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T4	120 - 100	L3x3x3/16	9.00	7.67	102.2	21.600	1.0900	3.92	23.54	0.166

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	170 - 150	Leg	1 3/4	3	-35.99	68.14	52.8	Pass
T2	150 - 140	Leg	Pirod 105244	60	-41.87	122.94	34.1	Pass
T3	140 - 120	Leg	Pirod 105216	72	-84.43	122.94	68.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P_{allow} K	% Capacity	Pass Fail
T4	120 - 100	Leg	Pirod 105217	87	-138.35	184.67	74.9	Pass
T5	100 - 90	Leg	Pirod 105217	105	-170.56	184.67	92.4	Pass
T6	90 - 80	Leg	Pirod 105217 reinf w/ 1" dia bar	114	-202.06	275.26	73.4	Pass
T7	80 - 60	Leg	Pirod 105218 reinf w/ 1" dia bar	123	-261.48	363.13	72.0	Pass
T8	60 - 40	Leg	Pirod 105219	136	-317.16	343.62	92.3	Pass
T9	40 - 20	Leg	Pirod 105219 reinf w /1" dia bar	151	-370.16	435.06	85.1	Pass
T10	20 - 0	Leg	Pirod 105220 reinf w/ 1" dia bar	166	-419.98	529.79	79.3	Pass
T1	170 - 150	Diagonal	7/8	12	-3.46	9.62	36.0	Pass
T2	150 - 140	Diagonal	L2 1/2x2 1/2x3/16	69	-5.45	12.05	45.2	Pass
T3	140 - 120	Diagonal	L3x3x3/16	78	-9.44	15.69	60.2	Pass
T4	120 - 100	Diagonal	L3x3x1/4	96	-12.57	17.20	73.1	Pass
T5	100 - 90	Diagonal	L3x3x5/16	111	-13.72	18.79	73.0	Pass
T6	90 - 80	Diagonal	L3x3x5/16	120	-13.75	16.82	81.7	Pass
T7	80 - 60	Diagonal	L3x3x3/8	129	-14.16	16.01	88.5	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x5/16	144	-14.22	18.05	78.8	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x3/8	165	-14.76	19.26	76.6	Pass
T10	20 - 0	Diagonal	L4x4x5/16	179	-16.65	20.59	80.9	Pass
T1	170 - 150	Top Girt	7/8	6	-0.33	3.45	9.5	Pass
T2	150 - 140	Top Girt	L3x3x3/16	61	-0.37	17.55	2.1	Pass
T1	170 - 150	Bottom Girt	7/8	8	-0.15	3.45	4.4	Pass
T4	120 - 100	Mid Girt	L3x3x3/16	88	-3.17	9.11	34.8	Pass
							Summary	
						Leg (T5)	92.4	Pass
						Diagonal (T7)	88.5	Pass
						Top Girt (T1)	9.5	Pass
						Bottom Girt (T1)	4.4	Pass
						Mid Girt (T4)	34.8	Pass
						Bolt Checks	83.5	Pass
						RATING =	**92.4**	**Pass**

ANCHOR BOLT EVALUATION

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	$Uplift := 366 \cdot kips$	*user input*	
Shear:	$Shear := 48 \cdot kips$	*user input*	
Compression:	$Compression := 429 \cdot kips$	*user input*	

Anchor Bolt Data:

Use ASTM A687 Grade

Number of Anchor Bolts = N	$N := 6$	*user input*	
Bolt Ultimate Strength:	$F_u := 150 \cdot ksi$	*user input*	
Bolt Yield Strength:	$Fy := 105 \cdot ksi$	*user input*	
Bolt Modulus:	$E := 29000 \cdot ksi$	*user input*	
Thickness of Anchor Bolts	$D := 1.25in$	*user input*	
Threads per Inch:	$n := 7$	*user input*	
Coefficient of Friction:	$\mu := 0.55$	*user input*	(for baseplate with grout ASCE 10-97)

Anchor Bolt Area:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 1.227 \cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 \qquad A_n = 0.969 \cdot in^2$$

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$AllowableTension := 1.33 \cdot \left(0.33 \cdot A_g \cdot F_u \right) \qquad AllowableTension = 80.8 \cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.33 \cdot \left(0.60 \cdot A_n \cdot Fy \right) \qquad F_{net.area} = 81.2 \cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 61.0 \cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.75$$

$$Condition1 := if\left(\frac{MaxTension}{F_{net.area}} \le 1.00, "OK", "Overstressed" \right)$$

Condition1 = "OK"

Check Anchor Bolt Area:

Based on the ASCE 10-97 Design of Latticed Stell Transmission Structures

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 4.5 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 1.6 \cdot in^2$$

Provided Area:

$$A_{sprovided} := A_n \cdot N \qquad A_{sprovided} = 5.8 \cdot in^2$$

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.77$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.28$$

Condition3 = "OK"

FOUNDATION EVALUATION

FOUNDATION ANALYSIS

Input Data

Maximum Pier Reactions:

Compression: $C_t := 429\,kips$ *user input*

Uplift: $U_t := 366\,kips$ *user input*

Material Properties:

Unit Weight of Concrete: $\gamma c := 150pcf$ *user input*

Unit Weight of Water: $\gamma w := 62.4pcf$ *user input*

Unit Weight of Soil: $\gamma s := 100pcf$ *user input*

Allowable Soil Bearing Capacity (Allowable Bearing Pressure at Depth 41'): $q_s := 6 \cdot ksf$ *user input*

Water Table Below Grade: $Wd := 41 \cdot ft$ *user input*

Average Allowable Shear: $fl := 859\,psf$ *user input*

Depth Neglected for Skin Friction at Top: $Depthunbond := 4 \cdot ft$ *user input*

Foundation Dimensions:

Drilled Caisson Length: $C_{Length} := 41.5\,ft$ *user input*

Diameter of Pier: $d_p := 5.5ft$ *user input*

Extension of Pier Above Grade: $L_{pag} := 0.5ft$ *user input*

Additional Concrete $Conc_{addl} := 5ft \cdot \left(13ft \cdot 13ft - \frac{\pi \cdot d_p^{\,2}}{4} \right)$

$Conc_{addl} = 726.2\,ft^3$

Foundation reinforcement per drawings by Tectonic, dated May 5, 2004

Loading:

$$TotalDownLoad := C_t + \pi \cdot \frac{d_p^{\,2}}{4} \cdot \left[L_{pag} \cdot \gamma c + \left[\gamma c \cdot \left(C_{Length} - L_{pag} \right) \right] \right]$$

$TotalDownLoad = 576.9\,kips$

$$PierWeight := \pi \cdot \frac{d_p^{\,2}}{4} \cdot \left[\left(Wd + L_{pag} \right) \cdot \gamma c + \left(C_{Length} - Wd - L_{pag} \right) \cdot (\gamma c - \gamma w) \right] + Conc_{addl} \cdot \gamma c$$

$PierWeight = 256.8 \cdot kips$

$SoilShear := \pi\, d_p \cdot \left[fl \cdot \left(C_{Length} - Depthunbond \right) \right]$

$SoilShear = 556.6 \cdot kips$

Compression Capacity:

$$\text{TotalDownLoadCapacity} := \text{SoilShear} + q_s \cdot \left(\pi \cdot \frac{d_p^{\,2}}{4} \right)$$

$\text{TotalDownLoadCapacity} = 699.1 \cdot \text{kips}$

$\text{CheckDownLoadCapacity} := \text{if}(\text{TotalDownLoad} < \text{TotalDownLoadCapacity}, \text{"Okay"}, \text{"No Good"})$

$\text{CheckDownLoadCapacity} = \text{"Okay"}$

Tension Capacity:

$\text{TotalUpLiftCapacity} := \text{SoilShear} + \text{PierWeight}$

$\text{TotalUpLiftCapacity} = 813.4 \cdot \text{kips}$

$\text{CheckUpLiftCapacity} := \text{if}\left(U_t < \text{TotalUpLiftCapacity}, \text{"Okay"}, \text{"No Good"}\right)$

$\text{CheckUpLiftCapacity} = \text{"Okay"}$

$$\text{SafetyFactor}_{\text{provided}} := \frac{\text{TotalUpLiftCapacity}}{U_t}$$

$\text{SafetyFactor}_{\text{provided}} = 2.22$

Check Cone Failure:

$$\text{ConeFailureCapacity} := \frac{\left[\left(C_{\text{Length}} - L_{\text{pag}}\right) \cdot \tan(30\text{deg}) \cdot 2 + d_p\right]^2 \cdot \pi}{4} \cdot \frac{C_{\text{Length}} - L_{\text{pag}}}{3} \cdot \gamma_s$$

$\text{ConeFailureCapacity} = 2997.25 \cdot \text{kips}$

$\text{CheckConeFailureCapacity} := \text{if}\left(U_t < \text{ConeFailureCapacity}, \text{"Okay"}, \text{"No Good"}\right)$

$\text{CheckConeFailureCapacity} = \text{"Okay"}$

$$\text{ConeSafetyFactor}_{\text{provided}} := \frac{\text{ConeFailureCapacity}}{U_t}$$

$\text{ConeSafetyFactor}_{\text{provided}} = 8.19$

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PROJECT: 2.5 EQUIPMENT DEPLOYMENT

SITE NAME: CROMWELL - RT. 372

SITE CASCADE: CT60XC931-A

SITE ADDRESS: 179 SHUNPIKE ROAD
CROMWELL, CT 06416

SITE TYPE: 170'-0" SELF SUPPORT

SITE INFORMATION

PROPERTY OWNER:
CROMWELL FIRE DEPARTMENT
1 WEST STREET
CROMWELL, CT 06416

SITE ADDRESS:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

GEOGRAPHIC COORDINATES:
LATITUDE: 41° 37' 23.74" N (41.623261° N)
LONGITUDE: -72° 40' 45.62" W (-72.679339° W)

ZONING JURISDICTION:
CROMWELL

ZONING DISTRICT:
A-25 RESIDENTIAL

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

AAV PROVIDER:
AT&T
PH.: (888) 949-0447

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 (1) EQUIPMENT CABINET
- INSTALL NEW BATTERY STRING(S) IN EXISTING BATTERY CABINET
- INSTALL (3) PANEL ANTENNAS
- INSTALL (3) RRH'S ON TOWER
- INSTALL (1) HYBRID CABLE AND (2) SECTOR 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

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SHEET INDEX

SHT NO:	SHEET TITLE:	REV:	ENGINEER:
T-1	TITLE SHEET	A	JRS
SP-1	SPRINT SPECIFICATIONS	A	JRS
SP-2	SPRINT SPECIFICATIONS	A	JRS
SP-3	SPRINT SPECIFICATIONS	A	JRS
A-1	SITE PLAN	A	JRS
A-2	EQUIPMENT PLAN	A	JRS
A-3	TOWER ELEVATION	B	JRS
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A-5	RF DATA SHEET	A	JRS
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A-7	CABLE COLOR CODING	A	JRS
A-8	ANTENNA & HYBRID CABLE DETAILS	A	JRS
A-9	EQUIPMENT DETAILS	A	JRS
A-10	EQUIPMENT DETAILS	A	JRS
E-1	EQUIPMENT UTILITY & GROUNDING PLAN	A	JRS
E-2	GROUNDING DETAILS	A	JRS
E-3	DC POWER DETAILS & PANEL SCHEDULES	A	JRS

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www.Ramaker.com

Transcend Wireless
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.

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

Signature: 2/05/2015 Date:

MARK	DATE	DESCRIPTION
A	2.5.15	FINAL CD'S ISSUED

ISSUE PHASE: FINAL DATE ISSUED: 02.05.2015

PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
TITLE SHEET

SCALE: NONE

PROJECT NUMBER: 29431
SHEET NUMBER: T-1

DRAWN BY: SLS CHECKED BY: KAB

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-2012-001: (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)
S. 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 IT'S 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, AASJTO, 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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Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: 2/05/2015 Date:

MARK	DATE	DESCRIPTION
A	2.5.15	FINAL CD'S ISSUED

ISSUE PHASE: FINAL DATE ISSUED: 02.05.2015

PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 29431
SHEET NUMBER: SP-1

DRAWN BY: SLS CHECKED BY: KAB

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, RRU'S, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

ANTENNAS AND RRU'S:

THE NUMBER AND TYPE OF ANTENNAS AND RRU'S 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 RRU'S AND ANTENNAS. JUMPERS SHALL BE TYPE LDF 4, FLC 12-50, CR 540, OR FXL 540. SUPER-FLEX CABLES ARE NOT ACCEPTABLE. JUMPERS BETWEEN THE RRU'S 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 CXS 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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Certification & Seal:

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

STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: 2/05/2015 Date:

MARK	DATE	DESCRIPTION
A	2.5.15	FINAL CD'S ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 02.05.2015

PROJECT TITLE:

CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:

SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 29431
SHEET NUMBER: SP-2

DRAWN BY: SLS CHECKED BY: KAB

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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OAKLAND, NJ 07346

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STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: 2/05/2015 Date:

MARK	DATE	DESCRIPTION
A	2.5.15	FINAL CD'S ISSUED

ISSUE PHASE: FINAL DATE ISSUED: 02.05.2015

PROJECT TITLE:

CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

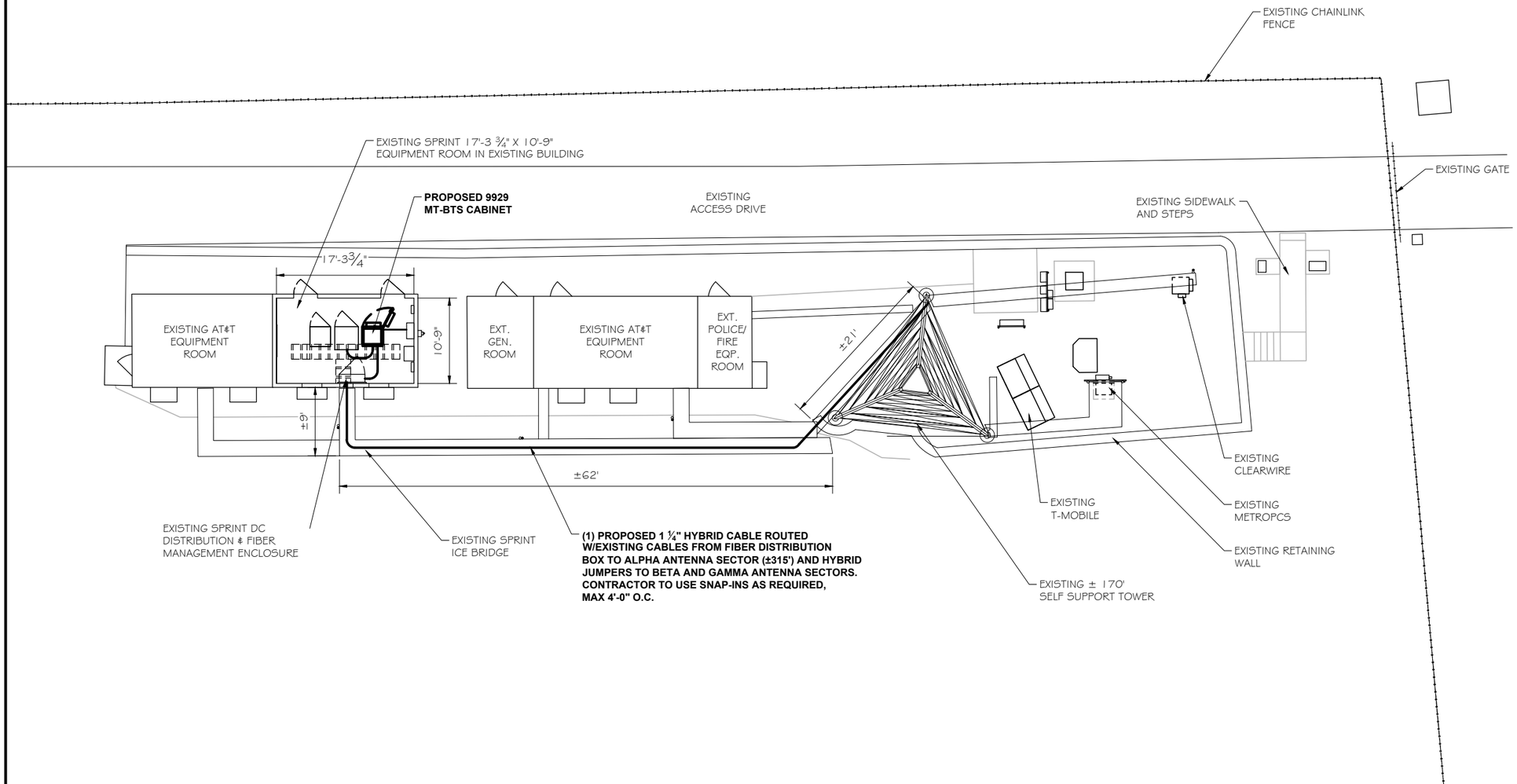
SHEET TITLE:

SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 29431

SHEET NUMBER: SP-3



SITE PLAN
SCALE: 1" = 15'
1

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ISSUE PHASE: FINAL
DATE ISSUED: 02.05.2015

PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

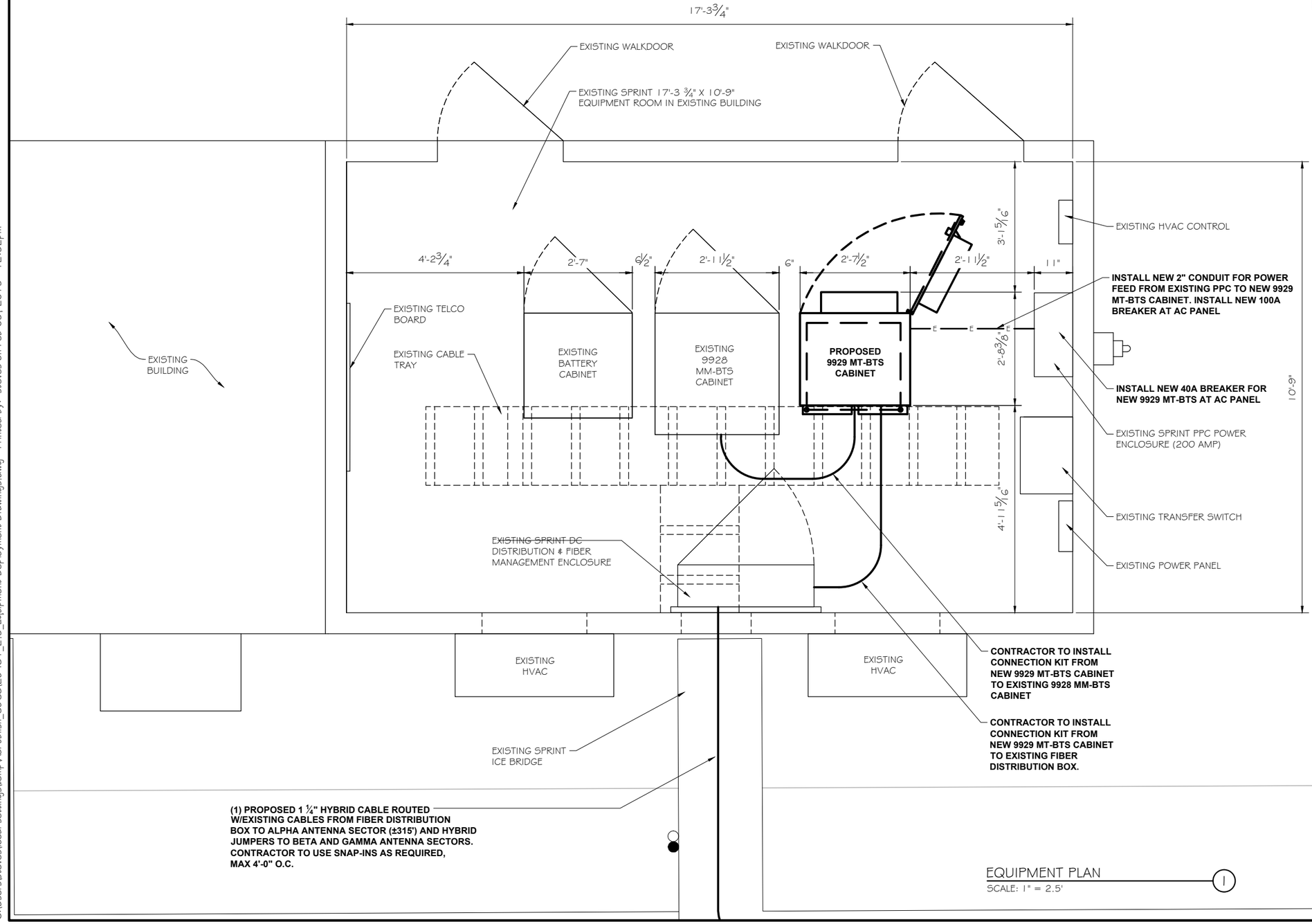
PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
SITE PLAN

0 7.5' 15' 30'
11" x 17" - 1" = 15'
22" x 34" - 1" = 7.5'

PROJECT NUMBER: 29431
SHEET NUMBER: A-1

DRAWN BY: SLS CHECKED BY: KAB



EQUIPMENT PLAN
SCALE: 1" = 2.5'
1

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ISSUE PHASE: FINAL
DATE ISSUED: 02.05.2015

PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

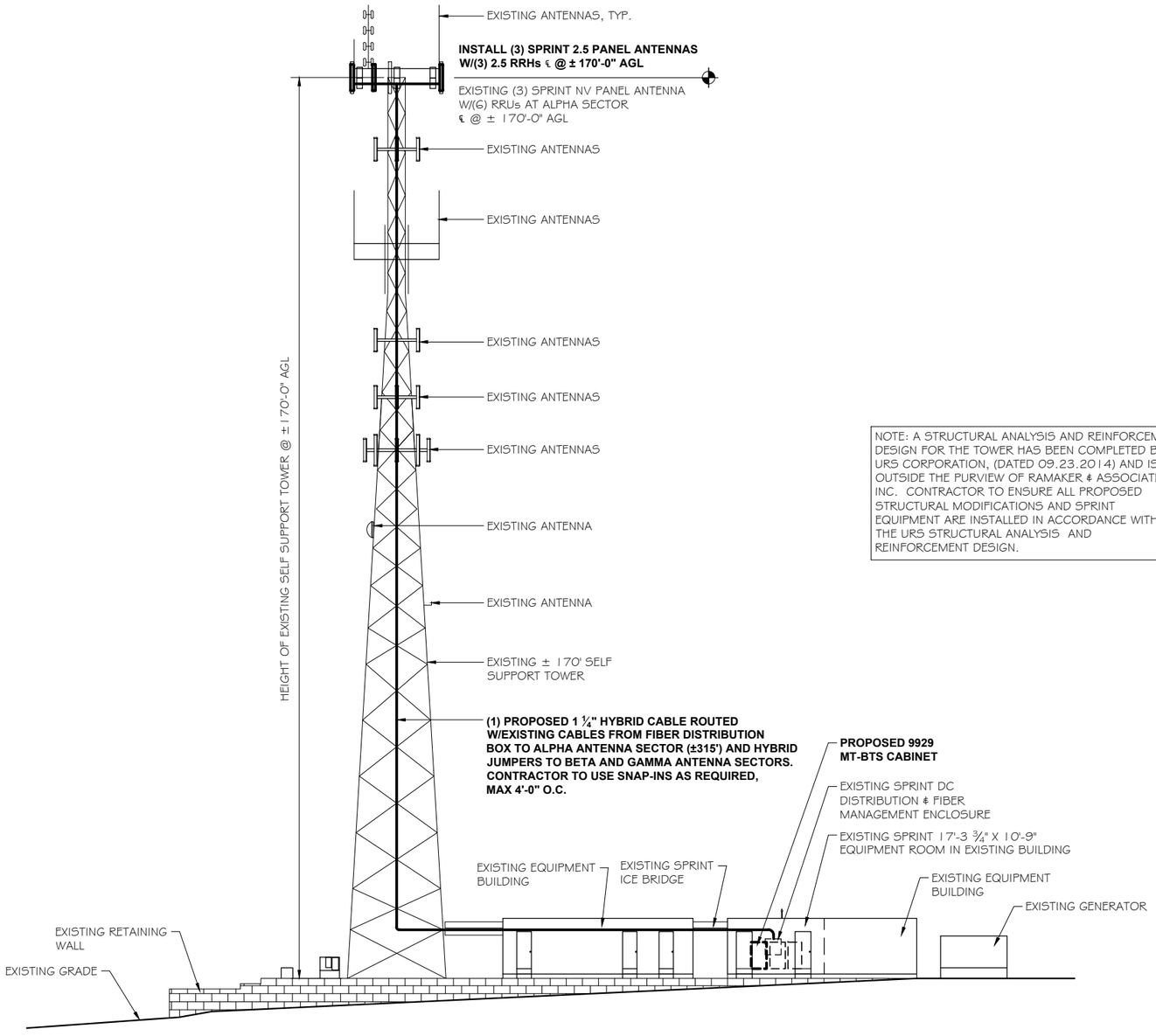
PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
EQUIPMENT PLAN

0 1.25' 2.5' 5'
11" x 17" - 1" = 2.5'
22" x 34" - 1" = 1.25'

PROJECT NUMBER: 29431
SHEET NUMBER: A-2

DRAWN BY: SLS CHECKED BY: KAB



BUILDING ELEVATION 1
SCALE: 1" = 25'

NOTE: A STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN FOR THE TOWER HAS BEEN COMPLETED BY URS CORPORATION, (DATED 09.23.2014) AND IS OUTSIDE THE PURVIEW OF RAMAKER & ASSOCIATES, INC. CONTRACTOR TO ENSURE ALL PROPOSED STRUCTURAL MODIFICATIONS AND SPRINT EQUIPMENT ARE INSTALLED IN ACCORDANCE WITH THE URS STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN.

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ISSUE PHASE: FINAL
DATE ISSUED: 02.05.2015

PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

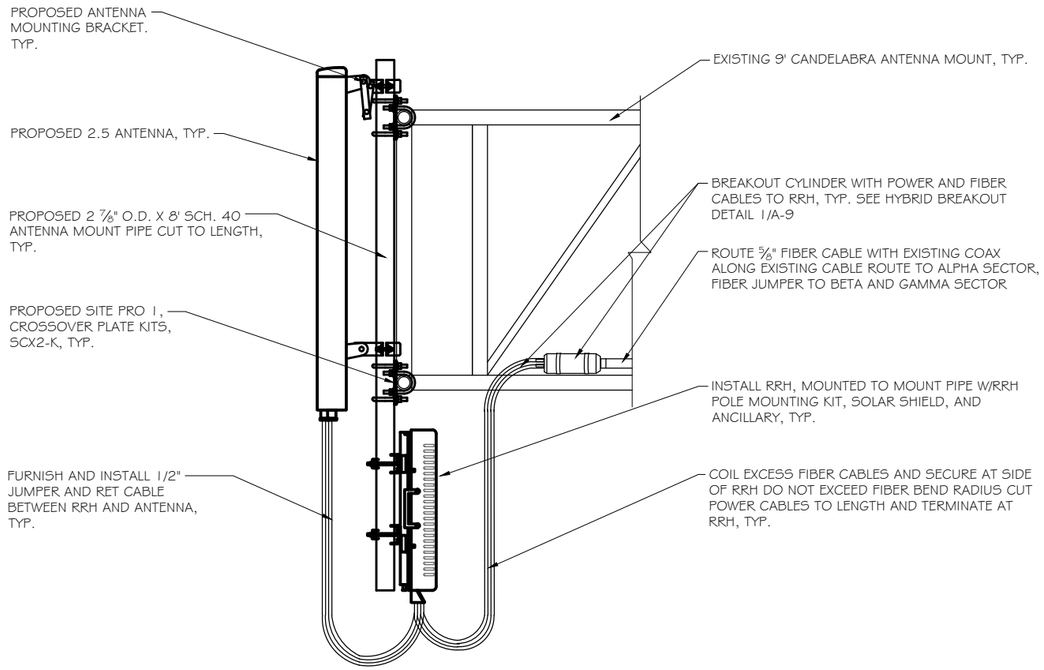
PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
TOWER ELEVATION

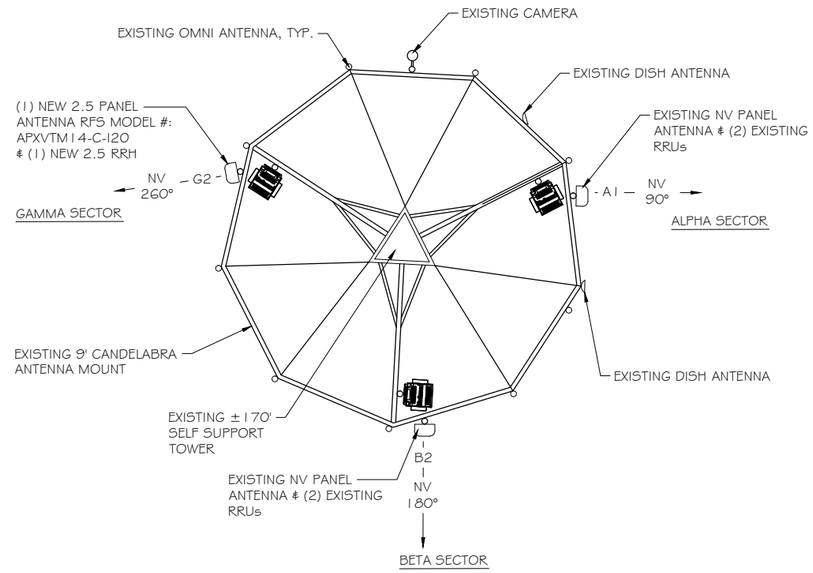
0 12.5' 25' 50'
11" x 17" - 1" = 25'
22" x 34" - 1" = 12.5'

PROJECT NUMBER: 29431
SHEET NUMBER: A-3

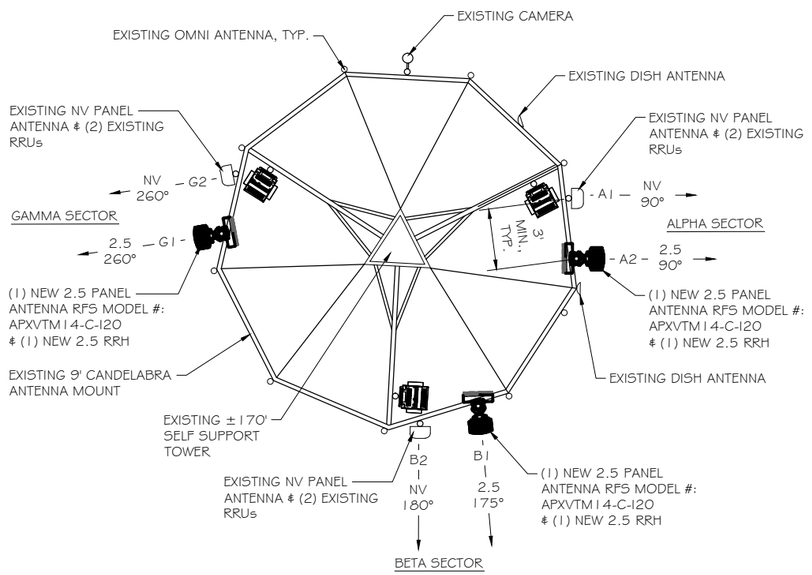
DRAWN BY: SLS CHECKED BY: KAB



ANTENNA & RRH MOUNTING DETAILS (1)
SCALE: NTS



EXISTING ANTENNA ARRAY (2)
SCALE: NTS



PROPOSED ANTENNA ARRAY (3)
SCALE: NTS

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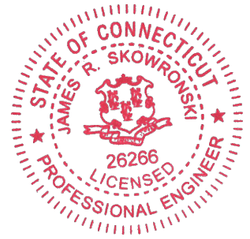

Signature: Date: 2/05/2015

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A	2.5.15	FINAL CD'S ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 02.05.2015

PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
ANTENNA DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 29431
SHEET NUMBER: A-4

RFDS Sheet

General Site Information

Site ID	**CT60XC931**	Equipment Vendor	Alcatel-Lucent
Market	Southern Connecticut	ıde	41.623261
Region	Northeast	Longitude	-72.679339
MLA	N/A	LL SITE ID	N/A
Structure Type	Self Support		
BTS Type			
Solution ID		Siterra SR Equipment type	
		Equipment Vendor	Alcatel-Lucent

Incremental Power Draw needed by added Equipment: 40 amp

Base Equipment

BBU Kit	ALU BBU Kit	Top Hat	None
BBU Kit Qty	1	Top Hat Qty	N/A
		Top Hat Dimenstions	N/A
Growth Cabinet	9929 MT-BTS	Top Hat Weight (lbs)	N/A
Growth Cabinet Qty	1		
Growth Cabinet Dimensions	63.65"x31.5"x35.5"		
Growth Cabinet Weight	1600 lbs		

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 Hybrid Cable
Cable Qty	1
Weight per foot. Lbs.	0.992
Diameter. Inches.	1.25
Length Ft.	315 (calculated as coax run & antenna height plus 20%)
Coax Jumper	0.625
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-120	RFS APXV9TM14-ALU-120	RFS APXV9TM14-ALU-120
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	170'-0"	170'-0"	170'-0"
Antenna Azimuth	90	175	260
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:

1. 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-BUILD DRAWING WITH CORRECT C/L HEIGHT. ALSO EMAIL CORRECT 1.9GHZ AND 800MHZ ANTENNA C/L HEIGHT, AZIMUTH AND MECHANICAL DOWNTILT TO RF ENGINEER.
2. 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.
3. 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.
4. 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.
5. GENERAL CONTRACT 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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STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

Signature: James R. Skowronski Date: 2/05/2015

MARK	DATE	DESCRIPTION
A	2.5.15	FINAL CD'S ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 02.05.2015

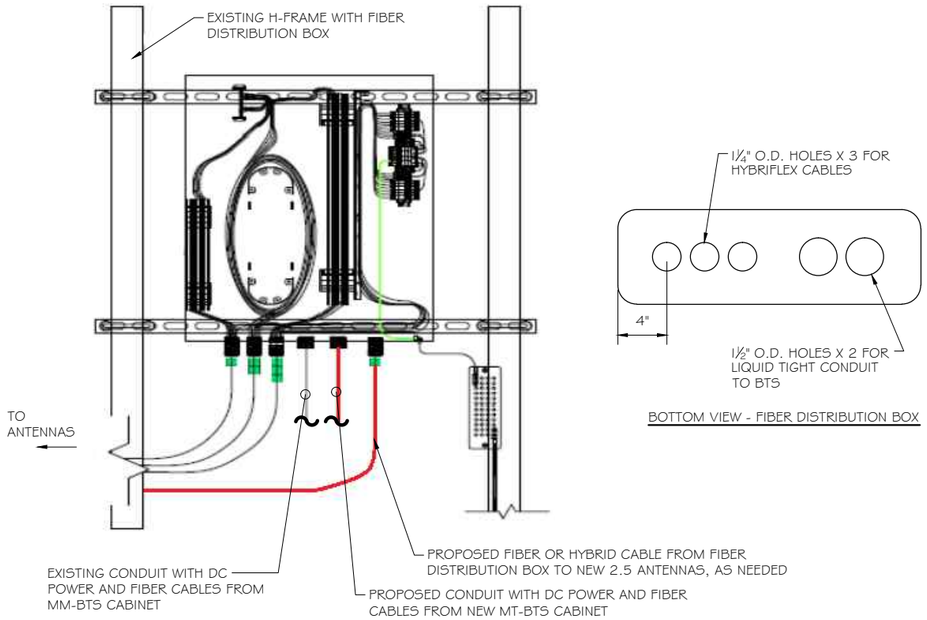
PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

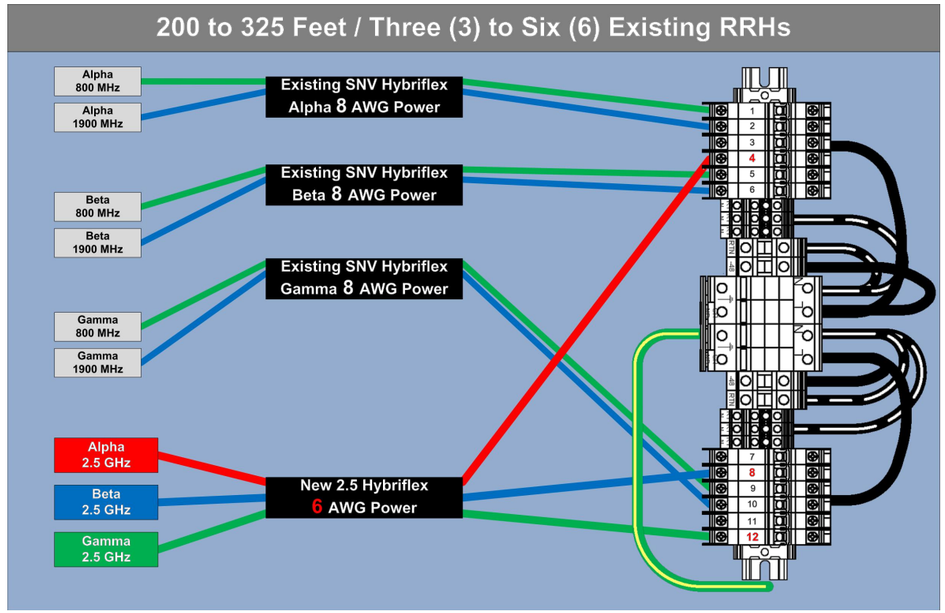
SHEET TITLE:
RF DATA SHEET

SCALE:
AS NOTED

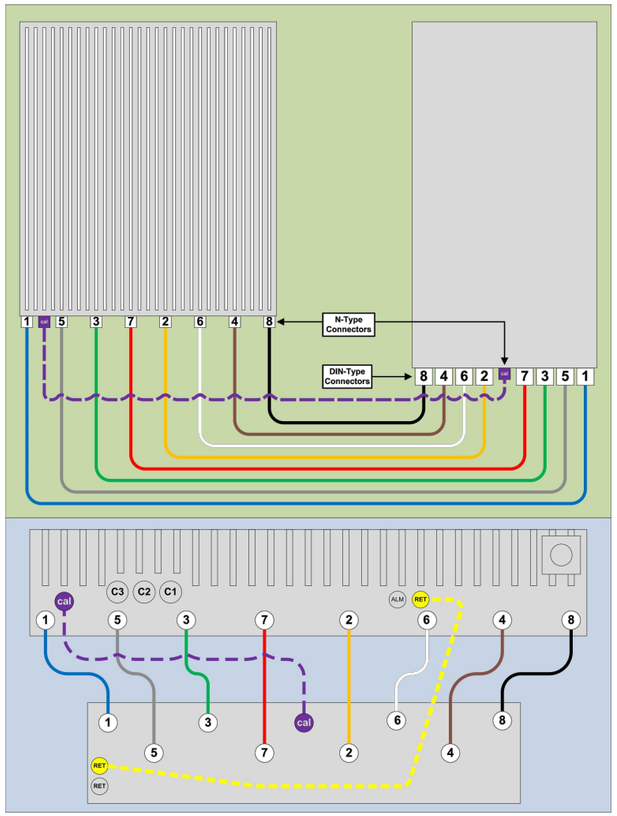
PROJECT NUMBER: 29431
SHEET NUMBER: A-5



TYPICAL FIBER DISTRIBUTION BOX DETAIL (1)
SCALE: NTS

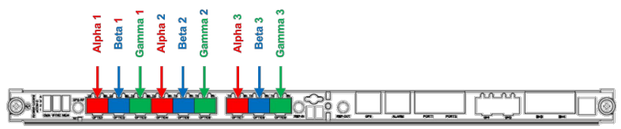


RRH TO DISTRIBUTION BOX POWER CONNECTIVITY DETAIL (2)
SCALE: NTS

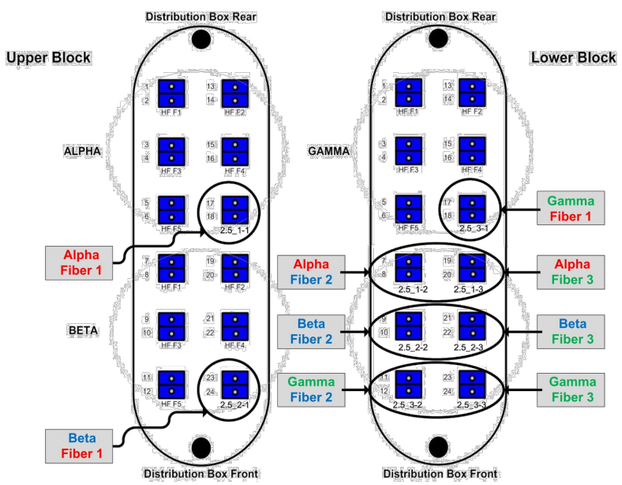


8T8R DETAIL (3)
SCALE: NTS

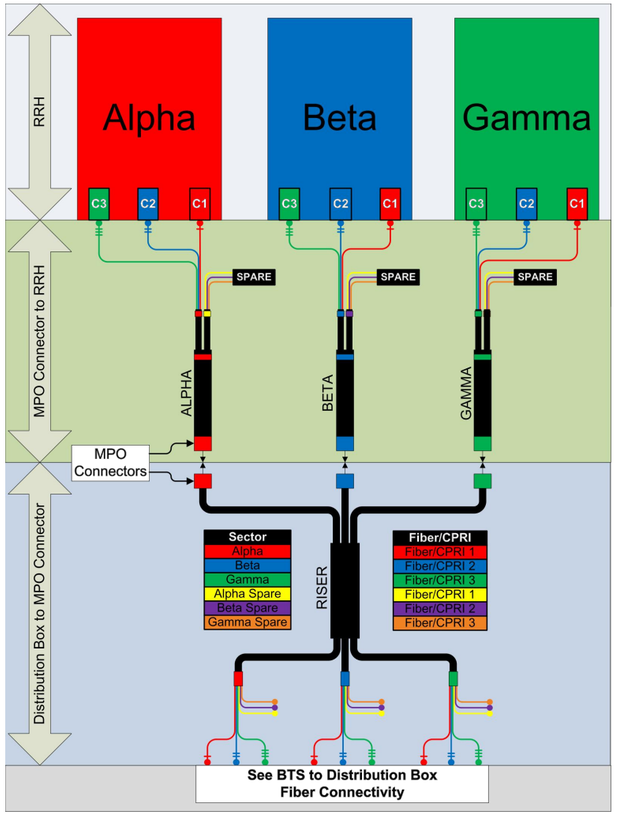
eCCM2-HR



Distribution Box Fiber Panel



BTS TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL (4)
SCALE: NTS



RRH TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL (5)
SCALE: NTS

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DATE ISSUED: 02.05.2015

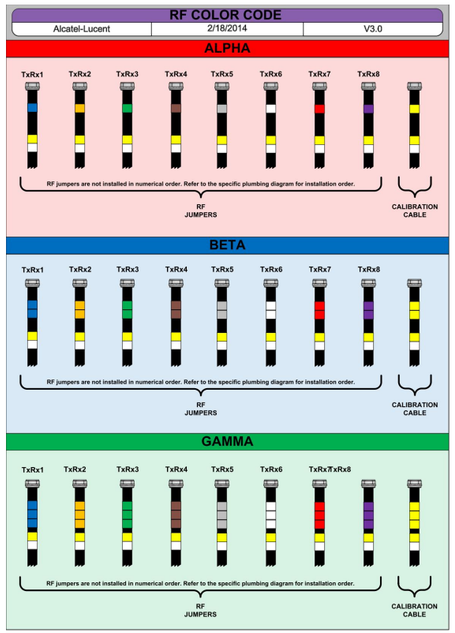
PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
FIBER PLUMBING DIAGRAM

SCALE:
AS NOTED

PROJECT NUMBER: 29431
SHEET NUMBER: A-6



SECTOR COLOR CODING AND BANDING (1)
SCALE: NTS

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 (2)
SCALE: NTS

CABLE MARKING NOTES

1. ALL CABLES SHALL BE MARKED WITH 2" WIDE, UV STABILIZED, UL APPROVED TAPE.
2. 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.
3. 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.
4. 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.
5. 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
6. 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.
7. HFC "MAIN TRUNK" WILL NOT BE MARKED WITH THE FREQUENCY CODES, AS IT CONTAINS ALL FREQUENCIES.
8. INDIVIDUAL POWER PAIRS AND FIBER BUNDLES SHALL BE LABELED WITH BOTH THE CABLE AND FREQUENCY.

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

Signature: James R. Skowronski Date: 2/05/2015

MARK	DATE	DESCRIPTION
A	2.5.15	FINAL CD'S ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 02.05.2015

PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
CABLE COLOR CODING

SCALE:
AS NOTED

PROJECT NUMBER: 29431
SHEET NUMBER: A-7

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"

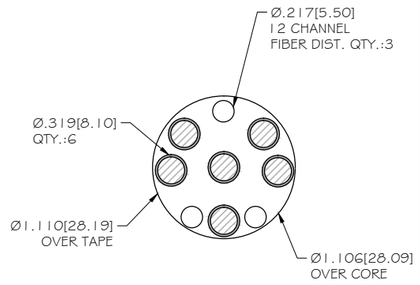
RFS HYBRIFLEX RISER CABLE SCHEDULE

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
	MN:HB058-M12-175F	175 ft
	MN:HB058-M12-200F	200 ft
8 AWG Power	Hybrid cable 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
6 AWG Power	Hybrid cable 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
4 AWG Power	Hybrid cable 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

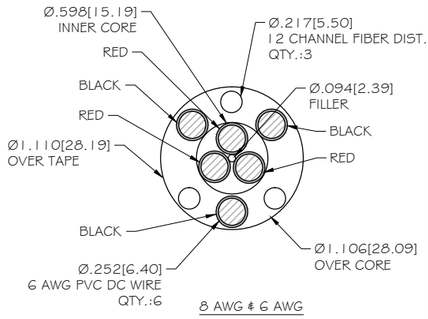
RFS HYBRIFLEX JUMPER CABLE SCHEDULE

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
	MN:HBF012-M3-15F1	15 ft
	SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15' NOTIFY SPRINT CM OF ANY DISCREPANCY	
8 AWG POWER	Hybrid Jumper cable 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	
6 AWG POWER	Hybrid Jumper cable 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	
4 AWG POWER	Hybrid Jumper cable 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	

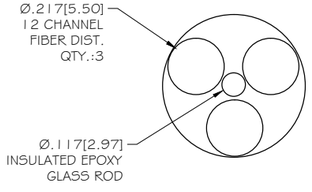
*NOTE: SPRINT CM TO CONFIRM HYBRID/FIBER RISER CABLE & HYBRID/FIBER JUMPER CABLE MODEL NUMBERS BEFORE PREPARING BOM.



4 AWG



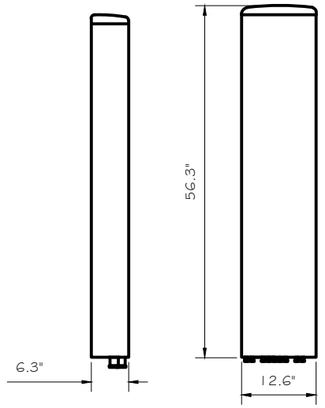
8 AWG & 6 AWG



FIBER ONLY

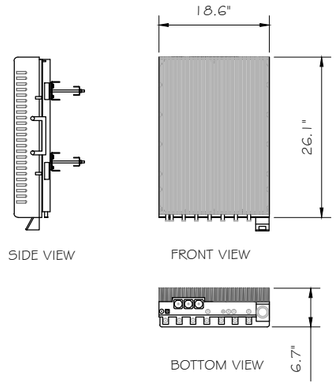
HYBRID CABLE CROSS SECTION & DATA (1)
SCALE: NTS

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 (2)
SCALE: NTS



ALCATEL-LUCENT: TD-RRH8x20

HxWxD = (26.1" x 18.6" x 6.7")

WEIGHT = 70 lbs.

2.5 RRH DETAIL (3)
SCALE: NTS

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CROMWELL - RT. 372
CT60XC931-A

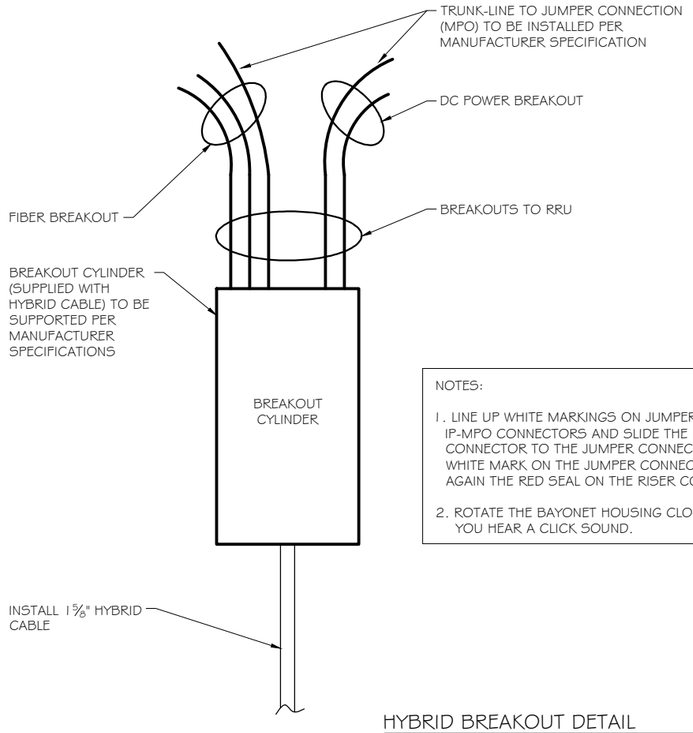
PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
ANTENNA & HYBRID CABLE DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 29431
SHEET NUMBER: A-8

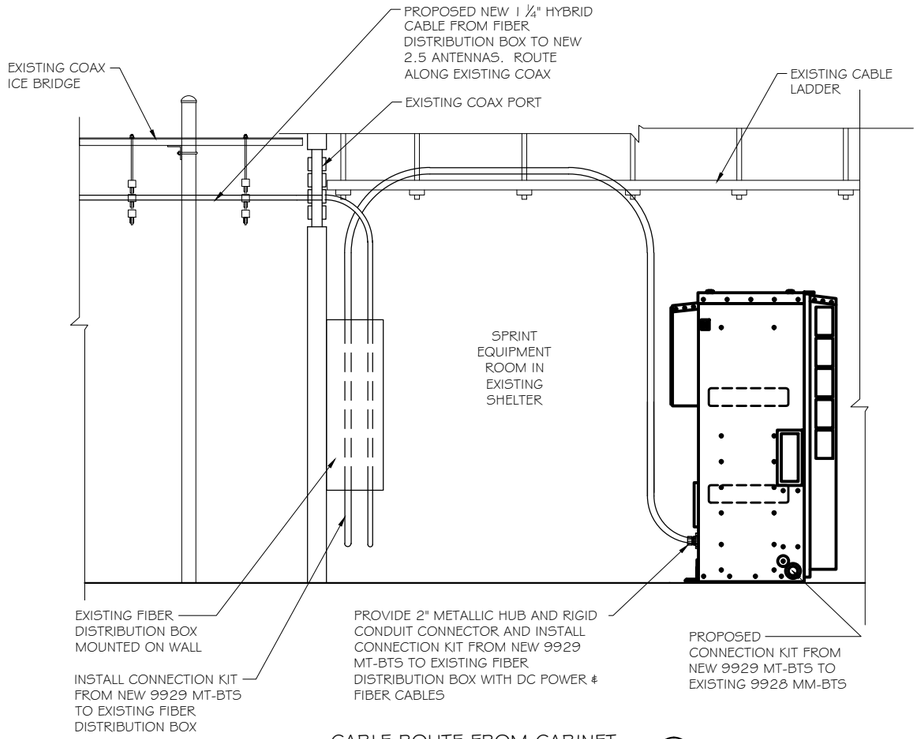
DRAWN BY: SLS CHECKED BY: KAB



NOTES:

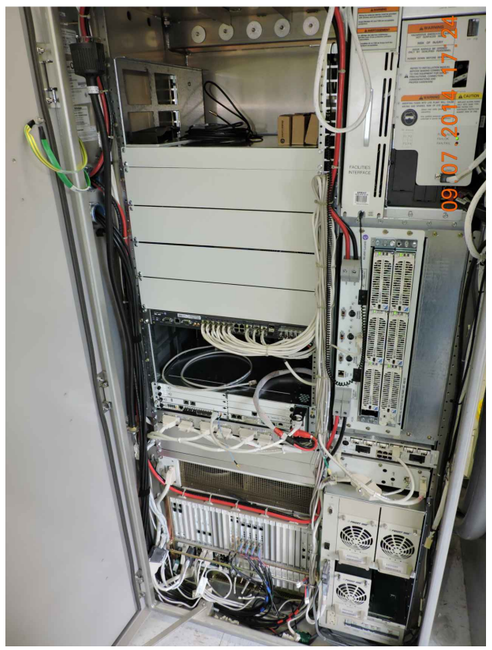
1. LINE UP WHITE MARKINGS ON JUMPER AND RISER IP-MPO CONNECTORS AND SLIDE THE RISER CONNECTOR TO THE JUMPER CONNECTOR. PUSH THE WHITE MARK ON THE JUMPER CONNECTOR FLUSH AGAIN THE RED SEAL ON THE RISER CONNECTOR.
2. ROTATE THE BAYONET HOUSING CLOCKWISE UNTIL YOU HEAR A CLICK SOUND.

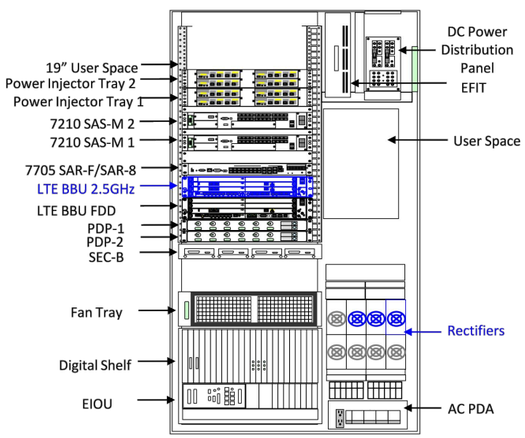
HYBRID BREAKOUT DETAIL 1
SCALE: NTS



CABLE ROUTE FROM CABINET 2
SCALE: NTS

EXISTING BBU CABINET 3
SCALE: NTS





EXISTING MMBS CABINET 4
SCALE: NTS

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

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CT60XC931-A

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179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

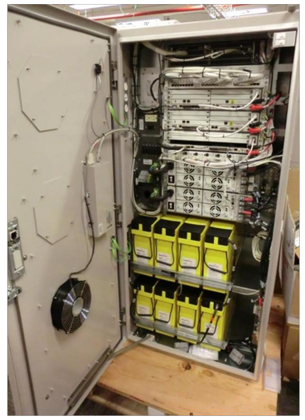
SHEET TITLE:
EQUIPMENT DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 29431
SHEET NUMBER: A-9

ALCATEL-LUCENT
9929 MULTI TECHNOLOGY BTS
OUTDOOR CABINET

In order to help network operators to improve TCO for distributed radio based sites with extended battery backup requirements, Alcatel-Lucent proposes the 9929 Multi Technology Outdoor Cabinet for CDMA/LTE/WCDMA multi-standard configurations



9929 MT-BTS OUTDOOR CABINET

- The 9929 MT-BTS cabinet is designed to provide, in a single footprint, a full site support with a capability to host 3G and 4G Telecom equipment with internal power and battery support.
- The 9929 MT-BTS Outdoor Cabinet offers 17.5 U of user space capable of hosting 19" rack based telecom equipment and rectification. The 9929 MT-BTS supports distributed RF deployment scenarios with the hosting of Digital base band unit and transport equipment.
- The 9929 MT-BTS cabinet can host up of 2 strings of batteries.
- The 9929 MT-BTS is AC powered and can deliver up to 10.5kW of -48V DC power thanks to its internal N+1 redundant rectifier.
- The 19" modules could have either front-back or side-side cooling. The cabinet uses direct air-cooling (fresh air filter) technology on front door to provide 8000 W of cooling capacity. A wide temperature operating range (-40°C to +50°C full operation) allows the deployment of this cabinet in various locations.
- The 9929 MT-BTS cabinet is compliant with Zone 4 earthquake regulations.
- As an matter of example the following configuration is supported by the cabinet:
  - ✓ Distributed configuration: AC configuration with up to 10.5kW DC Power, up to 3 baseband units, 2U service aggregation router, 2U of microwave transport equipment, up to 2 battery of 190AH.

FEATURES

- Can host BBU(s) for CDMA/WCDMA/LTE
- Supports standard 19" Telecom equipment
- Uses Direct Air Cooling (no air conditioning) with fan speed control based upon temperature
- Support of up to two 190 Ah or up to two 145AH battery strings that can provide backup for 8 hours for up to 2375 W, or 4 hour backup for up to 4150
- Convenience AC outlet (2)

TECHNICAL SPECIFICATIONS

INTERFACE:
¬ CPRI (up to 9 RRH modules)
¬ Backhaul (Gigabit Ethernet or T1)
¬ External user alarms (up to 32 user alarms)
¬ AC Power input
¬ DC Power input for RRH (up to 9 RRH's)

PHYSICAL DIMENSIONS
¬ Height: 1617 mm (63.65 in)
¬ Width: 800 mm (31.5 in)
¬ Depth: 900 mm (35.5 in)

WEIGHT
¬ 197 kg (434 lbs) unloaded
¬ Up to 725 kg (1600 lbs) fully loaded

POWER
Power supply:
¬ -48 VDC
¬ 230V AC (single phase or 3 phases)
Rectifier:
¬ up to 10.5kW DC -48V output power
¬ Rectifier redundancy N+1

SUPPORTED TELECOM EQUIPMENT
¬ LTE 9926 BBU
¬ CDMA 9926 BBU
¬ WDMA 9926 BBU
¬ SAR Aggregation router
¬ Microwave Indoor Unit

OPERATING ENVIRONMENT
¬ Outdoor temperature range: -40°C to +50°C
¬ Direct Air Cooling
¬ Enclosure:
¬ IP55 (International Protection rating)
¬ Zone 4 Earthquake

STANDARDS COMPLIANCY
¬ UL 60950-1 / CAN/CSA C22.2 No. 60950-1-07
¬ UL 50/50E CSA C22.2 No. 94.1- 07/94.2-07
¬ EN50272-2
¬ EIA-310-D

EMC& ENVIRONNEMENTAL CONDITIONS
¬ FCC Part 15 class B
¬ GR-63-CORE,
¬ GR-487-CORE,
¬ GR-1089-CORE

AT THE SPEED OF IDEAS™ Alcatel·Lucent

Alcatel·Lucent

PROPOSED 9929 MT-BTS
OUTDOOR CABINET
SCALE: NTS

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179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
EQUIPMENT DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 29431
SHEET NUMBER: A-10

DRAWN BY: SJS CHECKED BY: KAB

Printed by: steves on Feb 05, 2015 - 12:52pm

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EXISTING HVAC CONTROL

INSTALL NEW 40A BREAKER FOR NEW 9929 MT-BTS AT AC PANEL

NORTH

EXISTING SPRINT PPC POWER ENCLOSURE (200 AMP)

INSTALL NEW 2" CONDUIT FOR POWER FEED FROM EXISTING PPC TO NEW 9929 MT-BTS CABINET. INSTALL NEW 100A BREAKER AT AC PANEL

EXISTING WALKDOOR

EXISTING WALKDOOR

EXISTING SPRINT
17'-3 3/4" X 10'-9"
EQUIPMENT ROOM
IN EXISTING BUILDING

EXISTING
BATTERY
CABINET

EXISTING
9928
MM-BTS
CABINET

**PROPOSED
9929 MT-BTS
CABINET**

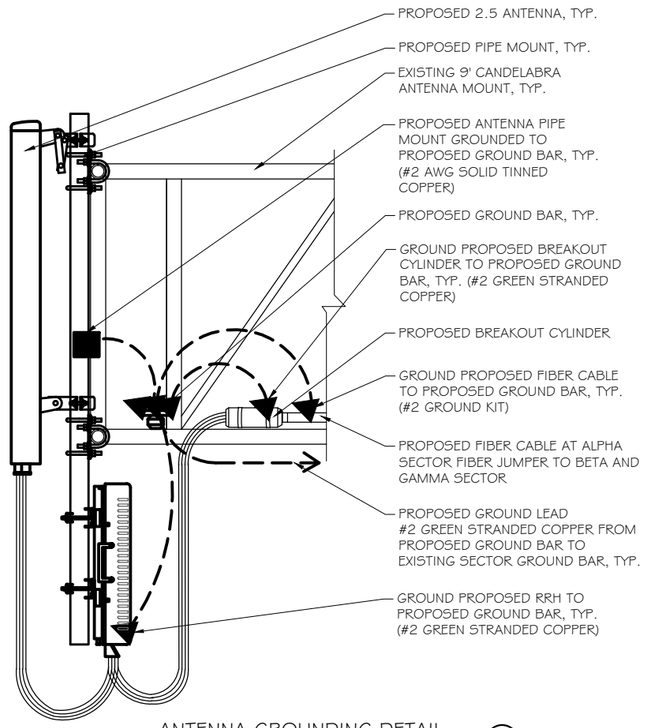
NG SPRINT DC
IBUTION & FIBER
GEMENT ENCLOSURE

EXISTING
TRANSFER
SWITCH

EXISTING
POWER
PANEL

EQUIPMENT UTILITY & GROUNDING PLAN
SCALE: NTS

**CONTRACTOR TO
CONNECTION KIT
NEW 9929 MT-BTS**



ANTENNA GROUNDING DETAIL (2)
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—	PROPOSED ELECTRIC

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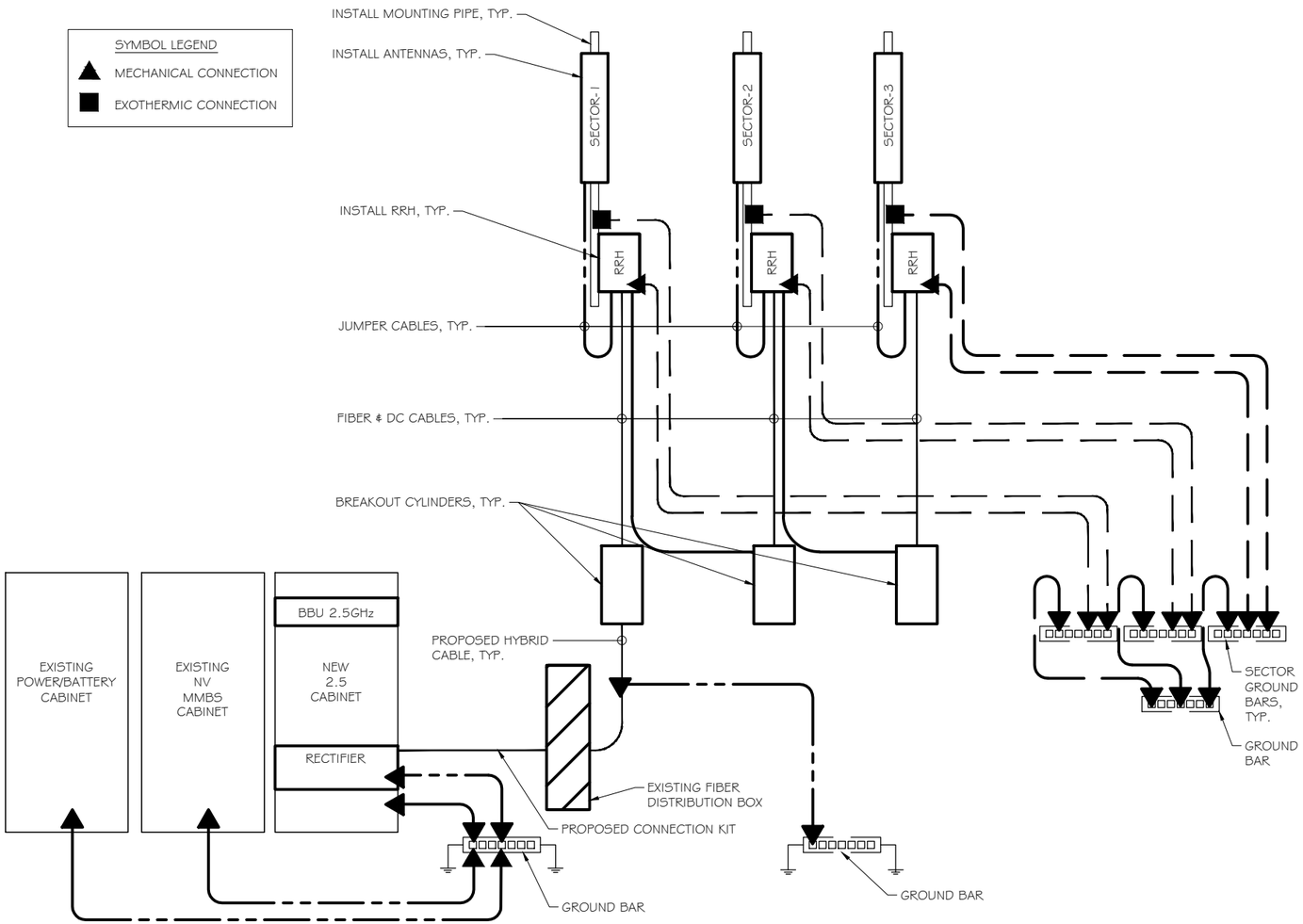
MIDDLESEX COUNTY

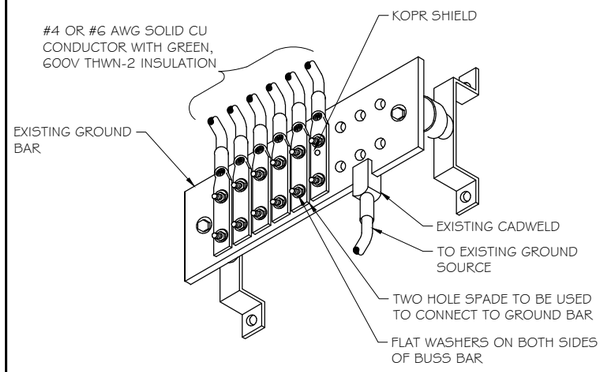
SHEET TITLE:
EQUIPMENT UTILITY & GROUNDING PLAN

SCALE:
AS NOTED

PROJECT NUMBER: 29431
SHEET NUMBER: E-1



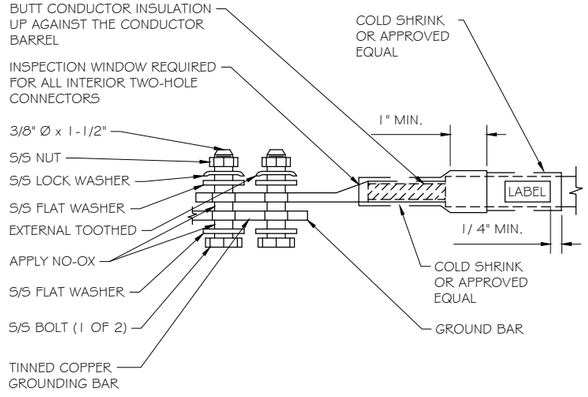
GROUNDING RISER DIAGRAM (1)
SCALE: NTS



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 (2)
SCALE: NTS



TWO-HOLE LUG (3)
SCALE: NTS

Sprint
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

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

Transcend Wireless
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.

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

Signature: James R. Skowronski Date: 2/05/2015

MARK	DATE	DESCRIPTION
A	2.5.15	FINAL CD'S ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 02.05.2015

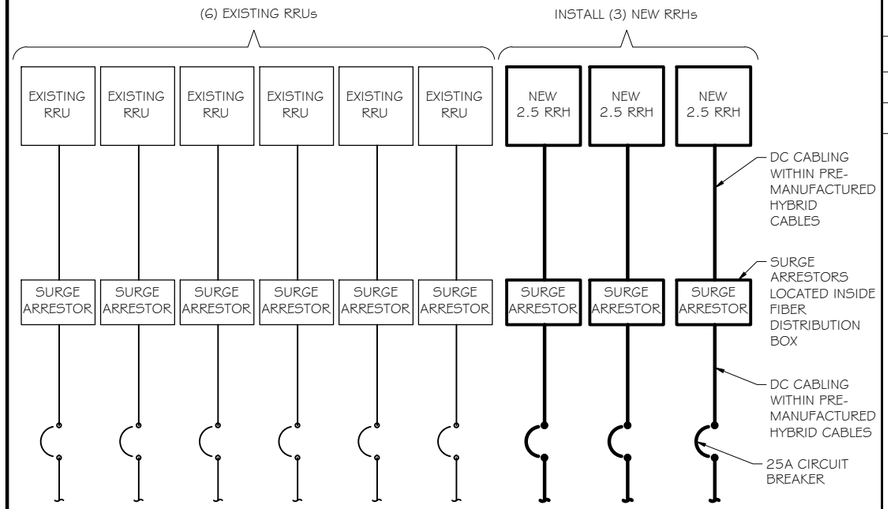
PROJECT TITLE:
CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:
GROUNDING DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 29431
SHEET NUMBER: E-2



DC ONE-LINE DIAGRAM (1)
SCALE: NTS

A/C PANEL SCHEDULE

VOLTAGE:	240V/120		PANEL STATUS:	EXISTING		N TO GROUND BOND:	YES
MAIN BREAKER:	200 AMP		MODEL NUMBER:	TBD		INTERNAL TVSS:	YES
MOUNT:	SHELTER		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	SURGE	60	2	ON			OFF	1	10	SPARE	13
2							ON	1	15	GFI	14
3	RADIO 1	80	2	ON			ON	2	60	HVAC 1	15
4											16
5	RADIO 2	80	2	ON			ON	2	60	HVAC 2	17
6											18
7	**NEW 2.5 CABINET**	**40**	**2**	**ON**			OFF	2	30	SPARE	19
8											20
9	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	21
10	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	22
11	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	23
12	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	24

AC PANEL SCHEDULE (2)
SCALE: NTS

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Signature: 2/05/2015 Date:

MARK	DATE	DESCRIPTION
A	2.5.15	FINAL CD'S ISSUED

ISSUE PHASE: FINAL — DATE ISSUED: 02.05.2015

PROJECT TITLE:

CROMWELL - RT. 372
CT60XC931-A

PROJECT INFORMATION:
179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

SHEET TITLE:

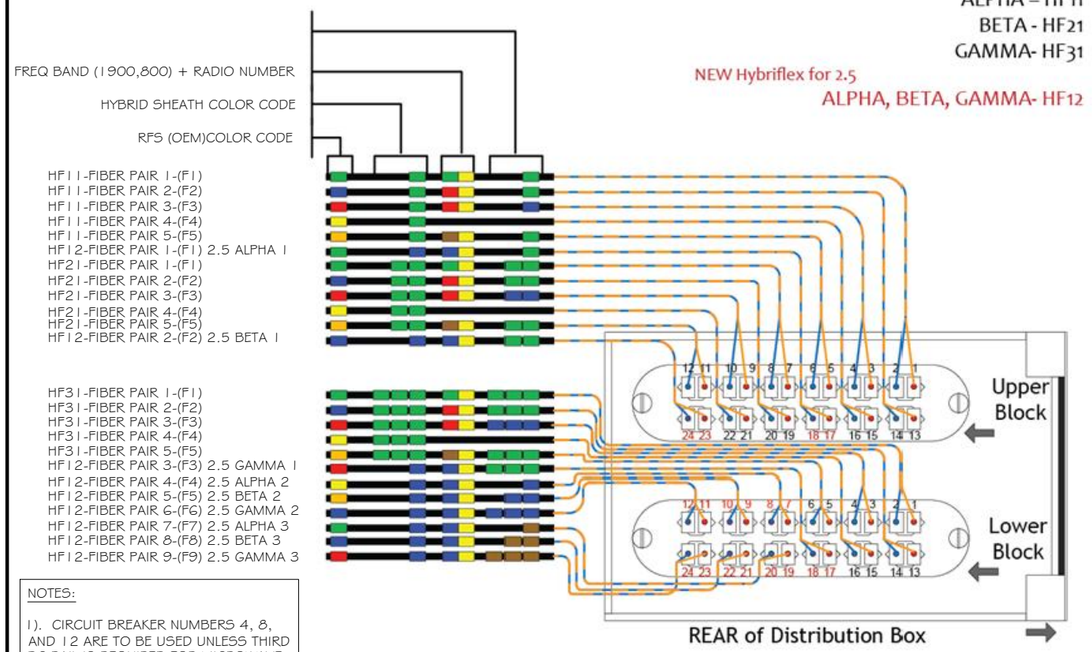
DC POWER DETAILS & PANEL SCHEDULES

SCALE: AS NOTED

PROJECT NUMBER: 29431
SHEET NUMBER: E-3

Each sector has separate Hybriflex cable .
Hybriflex cable naming as follows:
ALPHA – HF11
BETA - HF21
GAMMA- HF31

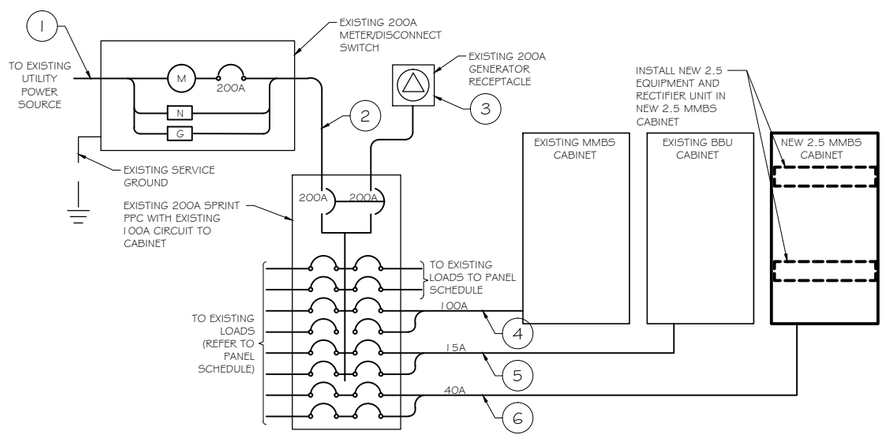
NEW Hybriflex for 2.5
ALPHA, BETA, GAMMA- HF12



NOTES:

1). CIRCUIT BREAKER NUMBERS 4, 8, AND 12 ARE TO BE USED UNLESS THIRD DC RAIL IS REQUIRED FOR MICROWAVE.
2). USE DC POWER LOOP.
3). ALL UNUSED DC FEEDERS TO BE TERMINATED WITH WIRE NUTS AND TAPED.
4). REMOVE ALL DEBRIS FROM INTERIOR OF FIBER DISTRIBUTION BOX WHEN COMPLETE.

TYPICAL FIBER DISTRIBUTION (3)
SCALE: NTS



CIRCUIT SCHEDULE

NO.	FROM	TO	CONFIGURATION
1	UTILITY SOURCE	METER/ DISCONNECT	EXISTING
2	METER/ DISCONNECT	TRANSFER & LOAD CENTER	EXISTING
3	TRANSFER & LOAD CENTER	GENERATOR RECEPTACLE	EXISTING
4	TRANSFER & LOAD CENTER	EX. MMBS CABINET	(3) #2 AWG, (1) #8 GND IN 1½" CONDUIT
5	TRANSFER & LOAD CENTER	EX. BBU CABINET	(2) #12 AWG, (1) #12 GND IN ¾" CONDUIT
6	**TRANSFER & LOAD CENTER**	**NEW 2.5 MMBS CABINET**	**(3) #2 AWG, (1) #8 GND IN 1½" CONDUIT**

ELECTRICAL ONE-LINE DIAGRAM (4)
SCALE: NTS