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

December 28, 2012

David Weisman
Vertical Development LLC
7 Sycamore Way, Unit 1
Branford, CT 06405

RE: **EM-SPRINT-NEXTEL-005-121211** – Sprint Nextel Corporation notice of intent to modify an existing telecommunications facility located at 31 New Hartford Road, Barkhamsted, Connecticut.

Dear Mr. Weisman:

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

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

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated December 10, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/CDM/cm

c: The Honorable Donald S. Stein, First Selectman, Town of Barkhamsted
Debra Bryden, Zoning Enforcement Officer, Town of Barkhamsted

infinigy
engineering & surveying

EM-SPRINT-NEXTEL-005-121211

ꟸewell Mill Road, Suite 130
Marietta, Georgia 30062
Phone: (678) 444-4463
Fax: (678) 444-4472
www.infinigy.com

December 10, 2012

Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051
Attn: Ms. Linda Roberts, Executive Director

Re: 31 New Hartford Road, Barkhamsted, CT

Dear Ms. Roberts,

On behalf of Sprint Nextel Corporation ("Sprint"), enclosed for filing are an original and five (5) copies of Sprint's Notice of Exempt Modification for Proposed Modifications to an Existing Telecommunications Facility located at the above-referenced site.

I also enclose herewith a check in the amount of $625.00 representing the fee for the Notice of Exempt Modification.

If you have any questions, please feel free to contact me.

Thank you,

By: ______________________

Name: David Weisman
Vertical Development LLC, an authorized representative of Sprint Nextel
Vertical Development LLC
7 Sycamore Way, Unit 1
Branford, CT 06405
Phone – 401-743-9011
Fax – 401-633-6202

CC: Donald S. Stein, First Selectman
Town of Barkhamsted
67 Ripley Hill Road
P.O. Box 558
Pleasant Valley, CT 06063

Notice of Exempt Modification
31 New Hartford Road, Barkhamsted, CT

Sprint Nextel Corporation ("Sprint") submits this Notice of Exempt Modification to the Connecticut Siting Council ("Council") pursuant to Sections 16-50j-73 and 16-50j-72(b) of the Regulations of Connecticut State Agencies ("Regulations") in connection with Sprint's planned modification of antennas and associated equipment on an existing 144' monopole tower located at 31 New Hartford Road in the Town of Barkhamsted. More particularly, Sprint plans to upgrade this site by adding 4G LTE technology to its facilities. The proposed modifications will not increase the tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six (6) decibels, or add radio frequency sending or receiving capability which increases the total radio frequency electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to Connecticut General Statutes § 22a-162.

To better meet the growing voice and data demands of its wireless customers, Sprint is upgrading their network nationwide to include 4G technology, which will provide faster service and better overall performance. Pursuant to the 4G upgrade at this site, Sprint will add antennas, install RRHs and notch filters, and install related equipment to its equipment area within the fenced compound at the base of the tower.

The 144' monopole tower located at 31 New Hartford Road in the Town of Barkhamsted (lat. 41° 53' 37", long. 73° 53' 37") is owned by Verizon. It is in an approximately 2,500 square foot fenced compound. Sprint currently has six (6) antennas (two (2) per sector) with a centerline of 144' installed on the tower. Sprint's base station equipment is located adjacent to the base of the tower within the fenced compound. A site plan depicting this is attached.

Sprint plans to add three (3) RFS APXVSPP18-C-A20 antennas (one (1) per sector), all with a centerline of 144'. Connected to each new antenna will be one (1) ALU 800 MHz RRH with one (1) ALU 800 MHz notch filter attached to it and one (1) ALU 1900 MHz RRH, which will be located behind the antenna on a new ring mount.

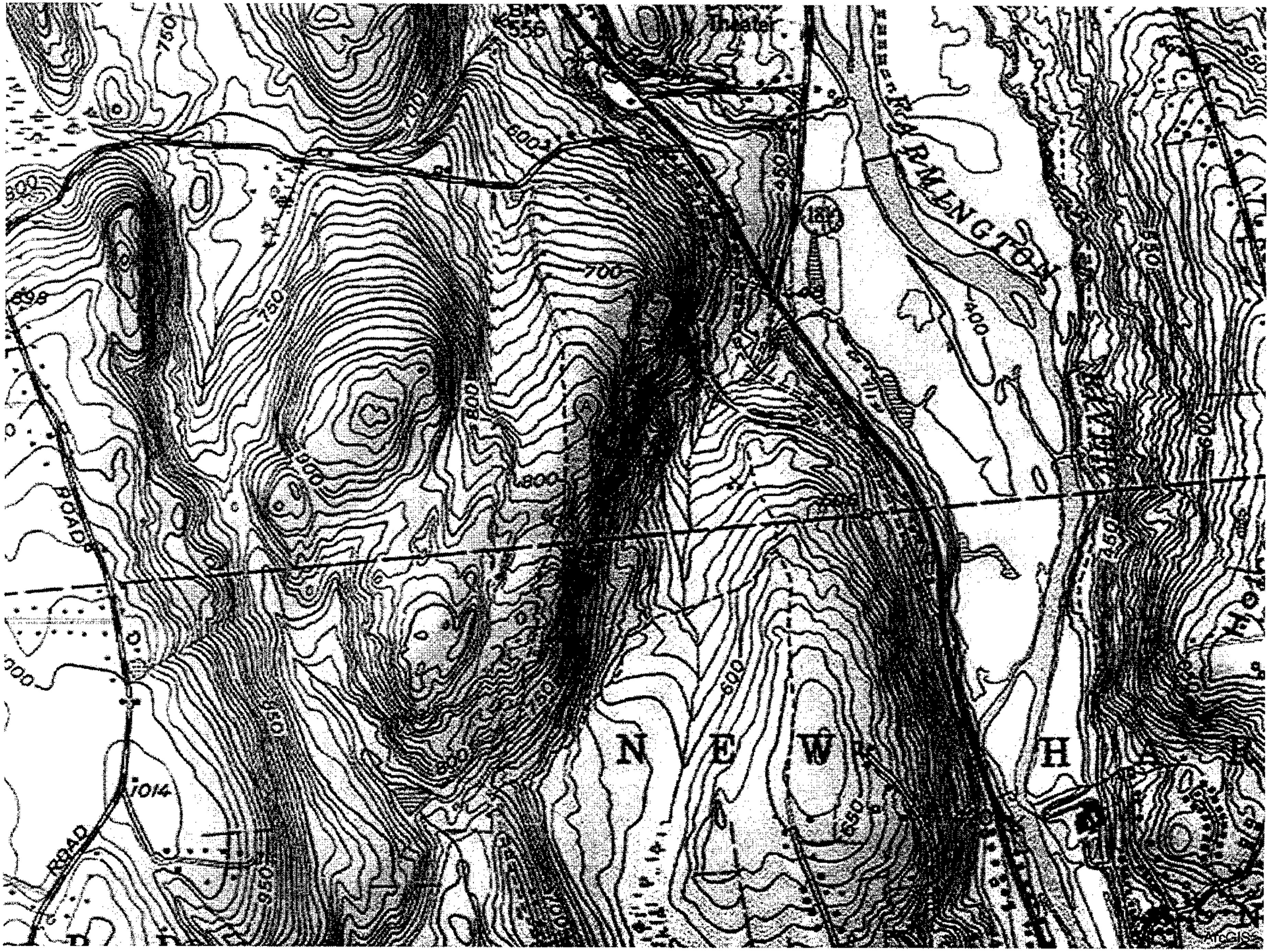
After the new antennas have been tested and are deployed on-air, the six (6) previously existing antennas will be removed. The height of the monopole will not need to be increased. Sprint also plans to install a new fiber junction box on a new H-frame and a new Ciena equipment enclosure into their equipment space within the tower compound's fenced border, and to retrofit or replace the existing BTS cabinet. The compound's boundaries will not need to be extended. Other than brief, construction-related noise, these modifications will not increase noise levels at the tower site boundary by six (6) decibels.

Sprint commissioned Centek Engineering to perform a structural analysis of the tower to verify that it can support Sprint's proposed loading. The analysis concluded that "[T]he subject tower is adequate to support the proposed modified antenna configuration" (see the eighth page of Structural Analysis Report, October 9, 2012). The tower passed at 85.8% (see the seventh page of Structural Analysis Report, October 9, 2012). The foundation and anchors passed at 86.7% (see the eighth page of Structural Analysis Report, October 9, 2012).

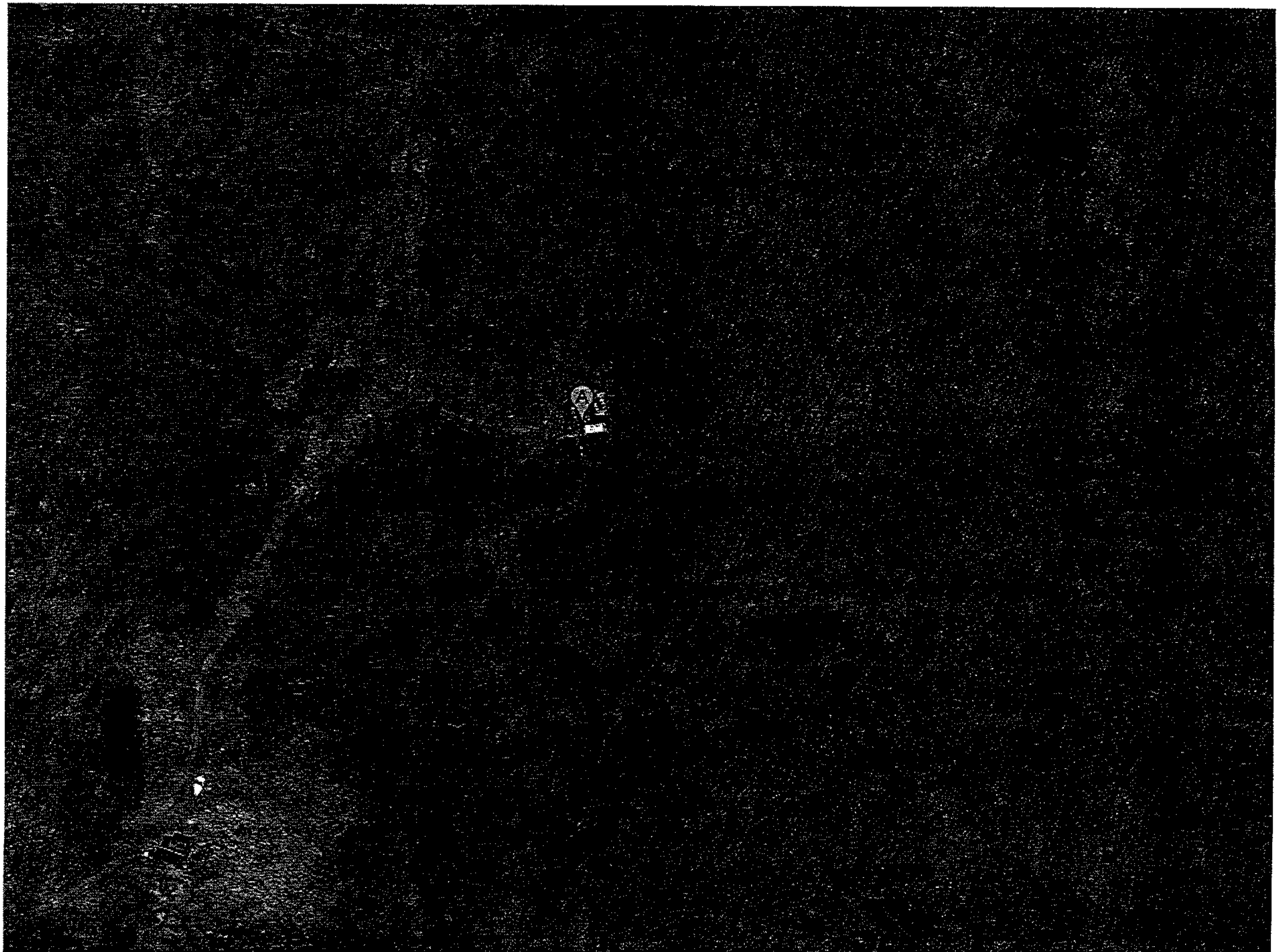
The proposed modifications will not add radio frequency sending or receiving capability which increases the total radio frequency electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to Connecticut General Statutes § 22a-162. A radio frequency emissions analysis prepared by EBI Consulting indicates that the proposed final configuration (including other carriers on the tower) will emit 57.042% of the allowable FCC established general public limit sampled at the ground level (see the 5th page of Radio Frequency Emissions Analysis Report - Evaluation of Human Exposure Potential to Non-Ionizing Emissions, September 2, 2012). Emission values for the Sprint antennas have been calculated from the sample point, which is the top of a six foot person standing at the base of the tower. Emissions values for additional carriers were based upon values listed in Connecticut Siting Council active database (see the 3rd and 4th page of Radio Frequency Emissions Analysis Report - Evaluation of Human Exposure Potential to Non-Ionizing Emissions, September 2, 2012). The information used in the 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 (see the second page of Radio Frequency Emissions Analysis Report - Evaluation of Human Exposure Potential to Non-Ionizing Emissions, September 2, 2012).

In conclusion, Sprint's proposed modifications do not constitute a modification subject to the Council's review because Sprint will not change the height of the tower, will not extend the boundaries of the compound, will not increase the noise levels at the site, and will not increase the total radio frequency electromagnetic radiation power density at the site to levels above applicable standards. Therefore, Sprint respectfully requests that the Council acknowledge that this Notice of Exempt Modification meets the Council's exemption criteria.



31 New Hartford Road, Barkhamsted, CT



31 New Hartford Road, Barkhamsted, CT

EBI Consulting

environmental | engineering | due diligence

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

Sprint Existing Facility

Site ID: CT33XC113

AT&T (Regional Refuse)
31 New Hartford Road
Barkhamsted, CT 06063

September 02, 2012

21 B Street Burlington, MA 01803 Tel: (781) 273 2500 Fax: (781) 273.3311

September 02, 2012

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

Re: Emissions Values for Site **CT33XC113 – AT&T (Regional Refuse)**

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 31 New Hartford Road, Barkhamsted, CT, for the purpose of determining whether the emissions from the proposed Sprint equipment upgrades on this property are within specified federal limits.

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

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

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

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

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

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 31 New Hartford Road, Barkhamsted, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario. Actual values seen from this site will be dramatically less than those shown in this report. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

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

6) The antenna mounting height centerline of the proposed antennas is **144.4 feet** above ground level (AGL)
7) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

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

Site ID	CT33XC113 - AT&T (Regional Refuse)
Site Addresss	31 New Hartford Road, Barkhamsted, CT 06063
Site Type	Monopole

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	15.9	144.4	138.4	1/2 "	0.5	0	1386.9474	26.03118	2.60312%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	144.4	138.4	1/2 "	0.5	0	389.96892	7.319203	1.29086%
												Sector total Power Density Value:			3.894%		

Sector 2

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	15.9	144.4	138.4	1/2 "	0.5	0	1386.9474	26.03118	2.60312%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	144.4	138.4	1/2 "	0.5	0	389.96892	7.319203	1.29086%
												Sector total Power Density Value:			3.894%		

Sector 3

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	15.9	144.4	138.4	1/2 "	0.5	0	1386.9474	26.03118	2.60312%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	144.4	138.4	1/2 "	0.5	0	389.96892	7.319203	1.29086%
												Sector total Power Density Value:			3.894%		

Site Composite MPE%

Carrier	MPE %
Sprint	11.682%
AT&T	10.300%
Pocket	7.870%
T-Mobile	4.690%
Nextel	3.540%
Verizon Wireless	18.960%
Total Site MPE %	**57.042%**

EBI Consulting
environmental | engineering | due diligence

Summary

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

The anticipated Maximum Composite contributions from the Sprint facility are **11.682% (3.894% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **57.042%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions

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

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

145-ft Existing Summit Monopine

Proposed Sprint
Antenna Upgrade

Sprint Site Ref: CT33XC113

Verizon Site Ref: Barkhamsted South

31 New Hartford Road (Rust Road)
Barkhamsted, CT

Centek Project No. 12115.CO1

Date: October 9, 2012

Prepared for:

Sprint Nextel
8 Airline Drive, Suite 105
Albany, NY 12205

Table of Contents

Introduction

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

The host tower is a 145-ft tall, four-section, eighteen sided, tapered monopole, originally manufactured by Summit Manufacturing and designed by Paul J. Ford and Company job no; 29200-1316, dated September 7, 2000. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural report prepared by Centek job no. 12063.CO13 dated August 28, 2012. Antenna and appurtenance information were obtained from the aforementioned Centek structural report, visual verification from grade by Centek personnel on June 6, 2012 and an Sprint tower site leasing form.

The tower is made up of four (4) tapered vertical sections consisting of A607-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 25.41-in at the top and 66.05-in at the base.

Sprint proposes the installation of three (3) panel antennas and six (6) Remote Radio Heads (RRH's) mounted to the existing three (3) T-Arms. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- VERIZON (RESERVED):
  Antennas: Six (6) Antel LPA-80063-6CF panel antennas, six (6) Antel BXA-70063-6CF panel antennas, six (6) LPA-171063-12CF panel antennas, six (6) RFS FD9R6004/2C-3L Diplexers and three (3) RRH's mounted on three (3) existing T-Arms with a RAD center elevation of 133-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and one (1) 1-1/4" ∅ fiber cable running on the inside of the existing tower.
- NEXTEL (EXISTING):
  Antennas: Twelve (12) Andrew DB844H90E-XY panel antennas mounted on three (3) existing T-Arms with a RAD center elevation of 124-ft above grade.
  Coax Cables: Twelve (12) 7/8" ∅ coax cables running on the inside of the existing tower.
- AT&T (EXISTING / RESERVED):
  Antennas: Six (6) Powerwave 7770 panel antennas, six (6) Powerwave LGP21401 TMA's, six (6) Powerwave LGP21901 Diplexers, two (2) KMW AM-X-CD-16-65-00T-RET panel antennas, one (1) Kathrein Scala 800-10764 panel antenna, six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted on three (3) existing T-Arms with a RAD center elevation of 114-ft above grade.
  Coax Cables: Twelve (12) 1-1/4" ∅ coax cables, one (1) fiber cable and two (2) dc control cables running on the inside of the existing tower.

- T-MOBILE (EXISTING):
  Antennas: Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas and six (6) TMA's mounted on three (3) existing T-Arms with a RAD center elevation of 103-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- T-MOBILE (RESERVED):
  Antennas: Six (6) RFS APX16DWV-16DWVS-E-A20 panel antennas mounted on three (3) existing T-Arms with a RAD center elevation of 103-ft above grade.
- METROPCS (EXISTING):
  Antennas: Three (3) RFS APXV18-206517-C panel antennas flush mounted with a RAD center elevation of 93-ft above grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- SPRINT (EXISTING TO REMAIN):
  Antennas: Six (6) Andrew DB980F90E-M panel antennas mounted on three (3) existing T-Arms with a RAD center elevation of 144-ft above grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- **SPRINT (PROPOSED):**
  Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas, three (3) ALU 1900 MHz RRH's, three (3) ALU 800 MHz RRH's and three (3) 800 MHz notch filters mounted on three (3) existing T-Arms with a RAD center elevation of 144-ft above grade.
  Coax Cables: Three (3) 1-1/4" ∅ Hybriflex cables running on the inside of the existing tower.

Primary Assumptions Used in the Analysis

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

Analysis

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

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

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

Tower Loading

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

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

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

Tower Capacity

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

- Calculated stresses were found to be within allowable limits. In Load Case 1, per RISATower "Section Capacity Table", this tower was found to be at **85.8%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L4)	1.00'-43.00'	85.8%	**PASS**

Foundation and Anchors

The existing foundation consists of a 8-ft square x 5.5-ft long reinforced concrete pier on a 31.5-ft square x 4.0-ft thick reinforced concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural report prepared by Centek job no. 12063.CO13 dated August 28, 2012. The base of the tower is connected to the foundation by means of (24) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

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

Location	Vector	Proposed Reactions
Base	Shear	59 kips
	Compression	56 kips
	Moment	6179 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)(1)	Proposed Loading (FS)(1)	Result
Reinforced Concrete Pad and Pier	OTM(2)	2.0	2.31	**PASS**

Note 1: FS denotes Factor of Safety.

Note 2: OTM denotes Overturning Moment

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Flange Bolts	Tension	73.0%	**PASS**
Flange Plate	Bending	27.8%	**PASS**
Anchor Bolts	Compression	86.7%	**PASS**
Base Plate	Bending	69.7%	**PASS**

Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo E. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT CARLO F. CENTORE No. 16634 LICENSED PROFESSIONAL ENGINEER

Prepared by:

Timothy J. Lynn, EIT
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

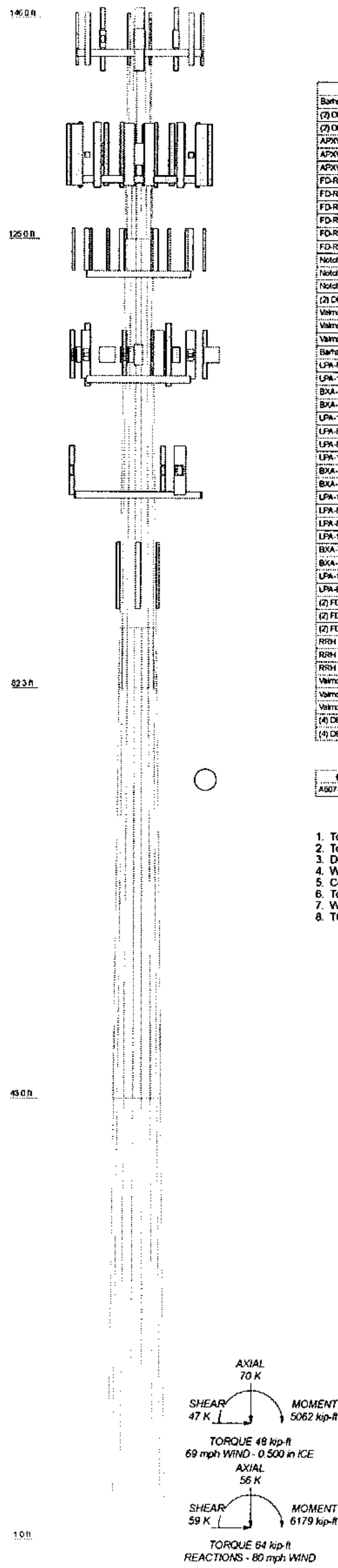
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

RISATower Features:

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

Section	4	3	2	1
Length (ft)	49.000	45.000	42.750	21.000
Number of Sides	18	18	18	18
Thickness (in)	0.500	0.438	0.375	0.250
Socket Length (ft)		7.000	5.750	
Top Dia (in)	52.154	42.251	32.508	25.410
Bot Dia (in)	66.050	55.014	44.632	32.506
Grade	A607-65			
Weight (K) 34.0	15.5	10.2	6.8	1.6



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Barhamsted Branch 1	153.26	(4) DB844H90E-XY (Nextel - Existing)	124
(2) DB980F90E-M (Sprint - Existing)	144	EEI 10' Universal T-Arm (Nextel - Existing)	122
(2) DB980F90E-M (Sprint - Existing)	144	EEI 10' Universal T-Arm (Nextel - Existing)	122
APXVSPP18-C-A20 (Sprint - Proposed)	144	EEI 10' Universal T-Arm (Nextel - Existing)	122
APXVSPP18-C-A20 (Sprint - Proposed)	144	Barhamsted Branch 3	121.39
APXVSPP18-C-A20 (Sprint - Proposed)	144	(2) RRUS-11 (AT&T - Reserved)	114
FD-RRH 2x50 800 (Sprint - Proposed)	144	DC6-48-60-18-8F Surge Arrestor (AT&T - Reserved)	114
FD-RRH 2x50 800 (Sprint - Proposed)	144	(2) 7770.00 (AT&T - Existing)	114
FD-RRH 2x50 800 (Sprint - Proposed)	144	(2) 7770.00 (AT&T - Existing)	114
FD-RRH 4x40 1900 (Sprint - Proposed)	144	(2) 7770.00 (AT&T - Existing)	114
FD-RRH 4x40 1900 (Sprint - Proposed)	144	(2) LGP21401 TMA (AT&T - Existing)	114
FD-RRH 4x40 1900 (Sprint - Proposed)	144	(2) LGP21401 TMA (AT&T - Existing)	114
Notch Filter (Sprint - Proposed)	144	(2) LGP21401 TMA (AT&T - Existing)	114
Notch Filter (Sprint - Proposed)	144	(2) LGP21901 Diplexer (AT&T - Existing)	114
Notch Filter (Sprint - Proposed)	144	(2) LGP21901 Diplexer (AT&T - Existing)	114
(2) DB980F90E-M (Sprint - Existing)	144	(2) LGP21901 Diplexer (AT&T - Existing)	114
Valmont T-Arm (1) (Sprint - Existing)	143	AM-X-CD-16-65-00T-RET(72") (AT&T - Reserved)	114
Valmont T-Arm (1) (Sprint - Existing)	143	AM-X-CD-16-65-00T-RET(72") (AT&T - Reserved)	114
Valmont T-Arm (1) (Sprint - Existing)	143	800-10764 (AT&T - Reserved)	114
Barhamsted Branch 2	138.16	(2) RRUS-11 (AT&T - Reserved)	114
LPA-80063/6CF (Verizon - Reserved)	133	(2) RRUS-11 (AT&T - Reserved)	114
LPA-171063-12CF (Verizon - Reserved)	133	EEI 10' Universal T-Arm (AT&T - Existing)	112
BXA-70063/6CF (Verizon - Reserved)	133	EEI 10' Universal T-Arm (AT&T - Existing)	112
BXA-70063/6CF (Verizon - Reserved)	133	EEI 10' Universal T-Arm (AT&T - Existing)	112
LPA-171063-12CF (Verizon - Reserved)	133	Barhamsted Branch 4	109.85
LPA-80063/6CF (Verizon - Reserved)	133	ATMAA1412D-1A20 TMA (T-Mobile - Existing)	103
LPA-80063/6CF (Verizon - Reserved)	133	ATMAA1412D-1A20 TMA (T-Mobile - Existing)	103
LPA-171063-12CF (Verizon - Reserved)	133	ATMAA1412D-1A20 TMA (T-Mobile - Existing)	103
BXA-70063/6CF (Verizon - Reserved)	133	ETW190VS12UB TMA (T-Mobile - Existing)	103
BXA-70063/6CF (Verizon - Reserved)	133	(2) APX16DWV-16DWVS-E-A20 (T-Mobile - Reserved)	103
LPA-171063-12CF (Verizon - Reserved)	133	(2) APX16DWV-16DWVS-E-A20 (T-Mobile - Reserved)	103
LPA-80063/6CF (Verizon - Reserved)	133	APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	103
LPA-80063/6CF (Verizon - Reserved)	133	APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	103
LPA-171063-12CF (Verizon - Reserved)	133	ETW190VS12UB TMA (T-Mobile - Existing)	103
BXA-70063/6CF (Verizon - Reserved)	133	(2) APX16DWV-16DWVS-E-A20 (T-Mobile - Reserved)	103
BXA-70063/6CF (Verizon - Reserved)	133	ETW190VS12UB TMA (T-Mobile - Existing)	103
LPA-171063-12CF (Verizon - Reserved)	133	APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	103
LPA-80063/6CF (Verizon - Reserved)	133	Valmont T-Arm (1) (T-Mobile - Existing)	101
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	133	Valmont T-Arm (1) (T-Mobile - Existing)	101
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	133	Valmont T-Arm (1) (T-Mobile - Existing)	101
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	133	Valmont Uni-Tri Bracket (MetroPCS - Existing)	93
RRH (Verizon - Reserved)	133	APXV18-206517-C (MetroPCS - Existing)	93
RRH (Verizon - Reserved)	133	APXV18-206517-C (MetroPCS - Existing)	93
RRH (Verizon - Reserved)	133	APXV18-206517-C (MetroPCS - Existing)	93
Valmont T-Arm (1) (Verizon - Existing)	131	Barhamsted Branch 5	91.6
Valmont T-Arm (1) (Verizon - Existing)	131	Barhamsted Branch 6	82.8
Valmont T-Arm (1) (Verizon - Existing)	131		
(4) DB844H90E-XY (Nextel - Existing)	124		
(4) DB844H90E-XY (Nextel - Existing)	124		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 85.8%

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

Job: **12115.CO1 - CT33XC113**			
Project: *145-ft Summit Monopine - Rust Rd, Barkhamsted, C*			
Client: Sprint	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 10/09/12	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

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

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

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
SR Members Have Cut Ends
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
Consider Feedline Torque
Include Angle Block Shear Check
Poles
√ Include Shear-Torsion Interaction
√ Always Use Sub-Critical Flow
Use Top Mounted Sockets

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	146.000-125.000	21.000	0.000	18	25.410	32.508	0.250	1.000	A607-65 (65 ksi)
L2	125.000-82.250	42.750	5.750	18	32.508	44.632	0.375	1.500	A607-65 (65 ksi)
L3	82.250-43.000	45.000	7.000	18	42.251	55.014	0.438	1.750	A607-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L4	43.000-1.000	49.000		18	52.154	66.050	0.500	2.000	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	25.802	19.964	1596.674	8.932	12.908	123.694	3195.449	9.984	4.032	16.129
	33.009	25.597	3365.090	11.452	16.514	203.771	6734.608	12.801	5.281	21.126
L2	33.009	38.246	4989.183	11.407	16.514	302.117	9984.932	19.127	5.061	13.497
	45.321	52.677	13035.316	15.711	22.673	574.925	26087.784	26.343	7.195	19.187
L3	44.559	58.064	12825.695	14.844	21.464	597.554	25668.266	29.037	6.666	15.237
	55.863	75.786	28519.340	19.375	27.947	1020.475	57076.207	37.900	8.912	20.371
L4	54.974	81.974	27632.387	18.337	26.494	1042.965	55301.134	40.995	8.299	16.598
	67.069	104.028	56471.908	23.270	33.553	1683.046	113018.124	52.024	10.745	21.49

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 146.000-125.000				1	1	1		
L2 125.000-82.250				1	1	1		
L3 82.250-43.000				1	1	1		
L4 43.000-1.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
1 5/8 (Sprint - Existing)	B	No	Inside Pole	145.000 - 4.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 5/8 (Verizon - Existing)	B	No	Inside Pole	134.000 - 4.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
7/8 (Nextel - Existing)	B	No	Inside Pole	125.000 - 4.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 1/4 (AT&T - Existing)	B	No	Inside Pole	115.000 - 4.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 5/8 (T-Mobile - Existing)	B	No	Inside Pole	104.000 - 4.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 5/8 (MetroPCS - Existing)	B	No	Inside Pole	94.000 - 4.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
RG6-Fiber (AT&T - Reserved)	C	No	Inside Pole	114.000 - 4.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
#8 AWG Copper Wire	C	No	Inside Pole	114.000 - 4.000	2	No Ice	0.000	0.000

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight klf
(AT&T - Reserved)						1/2" Ice	0.000	0.000
HYBRIFLEX 1-1/4"	C	No	Inside Pole	134.000 - 1.000	1	No Ice	0.000	0.001
(Verizon - Resevred)						1/2" Ice	0.000	0.001
HYBRIFLEX 1-1/4"	C	No	Inside Pole	145.000 - 4.000	3	No Ice	0.000	0.001
(Sprint - Proposed)						1/2" Ice	0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	146.000-125.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.237
		C	0.000	0.000	0.000	0.000	0.090
L2	125.000-82.250	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	1.681
		C	0.000	0.000	0.000	0.000	0.257
L3	82.250-43.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	2.035
		C	0.000	0.000	0.000	0.000	0.247
L4	43.000-1.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	2.022
		C	0.000	0.000	0.000	0.000	0.250

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	146.000-125.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.237
		C		0.000	0.000	0.000	0.000	0.090
L2	125.000-82.250	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	1.681
		C		0.000	0.000	0.000	0.000	0.257
L3	82.250-43.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	2.035
		C		0.000	0.000	0.000	0.000	0.247
L4	43.000-1.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	2.022
		C		0.000	0.000	0.000	0.000	0.250

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C_AA_A Front ft²	C_AA_A Side ft²	Weight K

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft²	*C_AA_A Side* ft²	*Weight* K
(2) DB980F90E-M	A	From Face	3.000	0.000	144.000	No Ice	3.896	2.292	0.009
(Sprint - Existing)			0.000			1/2" Ice	4.276	2.654	0.029
			0.000						
(2) DB980F90E-M	B	From Face	3.000	0.000	144.000	No Ice	3.896	2.292	0.009
(Sprint - Existing)			0.000			1/2" Ice	4.276	2.654	0.029
			0.000						
(2) DB980F90E-M	C	From Face	3.000	0.000	144.000	No Ice	3.896	2.292	0.009
(Sprint - Existing)			0.000			1/2" Ice	4.276	2.654	0.029
			0.000						
Valmont T-Arm (1)	A	From Face	2.000	0.000	143.000	No Ice	10.540	10.540	0.336
(Sprint - Existing)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000						
Valmont T-Arm (1)	B	From Face	2.000	0.000	143.000	No Ice	10.540	10.540	0.336
(Sprint - Existing)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000						
Valmont T-Arm (1)	C	From Face	2.000	0.000	143.000	No Ice	10.540	10.540	0.336
(Sprint - Existing)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000						
APXVSPP18-C-A20	A	From Face	3.000	0.000	144.000	No Ice	8.260	5.283	0.057
(Sprint - Proposed)			0.000			1/2" Ice	8.807	5.736	0.107
			0.000						
APXVSPP18-C-A20	B	From Face	3.000	0.000	144.000	No Ice	8.260	5.283	0.057
(Sprint - Proposed)			0.000			1/2" Ice	8.807	5.736	0.107
			0.000						
APXVSPP18-C-A20	C	From Face	3.000	0.000	144.000	No Ice	8.260	5.283	0.057
(Sprint - Proposed)			0.000			1/2" Ice	8.807	5.736	0.107
			0.000						
FD-RRH 2x50 800	A	From Face	3.000	0.000	144.000	No Ice	2.477	2.058	0.053
(Sprint - Proposed)			0.000			1/2" Ice	2.693	2.259	0.074
			0.000						
FD-RRH 2x50 800	B	From Face	3.000	0.000	144.000	No Ice	2.477	2.058	0.053
(Sprint - Proposed)			0.000			1/2" Ice	2.693	2.259	0.074
			0.000						
FD-RRH 2x50 800	C	From Face	3.000	0.000	144.000	No Ice	2.477	2.058	0.053
(Sprint - Proposed)			0.000			1/2" Ice	2.693	2.259	0.074
			0.000						
FD-RRH 4x40 1900	A	From Face	3.000	0.000	144.000	No Ice	2.822	2.822	0.044
(Sprint - Proposed)			0.000			1/2" Ice	3.062	3.062	0.069
			0.000						
FD-RRH 4x40 1900	B	From Face	3.000	0.000	144.000	No Ice	2.822	2.822	0.044
(Sprint - Proposed)			0.000			1/2" Ice	3.062	3.062	0.069
			0.000						
FD-RRH 4x40 1900	C	From Face	3.000	0.000	144.000	No Ice	2.822	2.822	0.044
(Sprint - Proposed)			0.000			1/2" Ice	3.062	3.062	0.069
			0.000						
Notch Filter	A	From Face	3.000	0.000	144.000	No Ice	0.865	0.375	0.010
(Sprint - Proposed)			0.000			1/2" Ice	0.992	0.465	0.016
			0.000						
Notch Filter	B	From Face	3.000	0.000	144.000	No Ice	0.865	0.375	0.010
(Sprint - Proposed)			0.000			1/2" Ice	0.992	0.465	0.016
			0.000						
Notch Filter	C	From Face	3.000	0.000	144.000	No Ice	0.865	0.375	0.010
(Sprint - Proposed)			0.000			1/2" Ice	0.992	0.465	0.016
			0.000						
Valmont T-Arm (1)	A	From Face	2.000	0.000	131.000	No Ice	10.540	10.540	0.336
(Verizon - Existing)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
Valmont T-Arm (1) (Verizon - Existing)	B	From Face	2.000 0.000 0.000	0.000	131.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (Verizon - Existing)	C	From Face	2.000 0.000 0.000	0.000	131.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
(4) DB844H90E-XY (Nextel - Existing)	A	From Face	3.000 0.000 0.000	0.000	124.000	No Ice 1/2" Ice	2.867 3.177	3.733 4.101	0.010 0.035
(4) DB844H90E-XY (Nextel - Existing)	B	From Face	3.000 0.000 0.000	0.000	124.000	No Ice 1/2" Ice	2.867 3.177	3.733 4.101	0.010 0.035
(4) DB844H90E-XY (Nextel - Existing)	C	From Face	3.000 0.000 0.000	0.000	124.000	No Ice 1/2" Ice	2.867 3.177	3.733 4.101	0.010 0.035
EEI 10' Universal T-Arm (Nextel - Existing)	A	None		0.000	122.000	No Ice 1/2" Ice	13.340 16.800	13.340 16.800	0.450 0.600
EEI 10' Universal T-Arm (Nextel - Existing)	B	None		0.000	122.000	No Ice 1/2" Ice	13.340 16.800	13.340 16.800	0.450 0.600
EEI 10' Universal T-Arm (Nextel - Existing)	C	None		0.000	122.000	No Ice 1/2" Ice	13.340 16.800	13.340 16.800	0.450 0.600
(2) 7770.00 (AT&T - Existing)	A	From Face	3.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) 7770.00 (AT&T - Existing)	B	From Face	3.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) 7770.00 (AT&T - Existing)	C	From Face	3.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) LGP21401 TMA (AT&T - Existing)	A	From Face	3.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	0.953 1.093	0.367 0.480	0.018 0.023
(2) LGP21401 TMA (AT&T - Existing)	B	From Face	3.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	0.953 1.093	0.367 0.480	0.018 0.023
(2) LGP21401 TMA (AT&T - Existing)	C	From Face	3.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	0.953 1.093	0.367 0.480	0.018 0.023
(2) LGP21901 Diplexer (AT&T - Existing)	A	From Face	3.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	0.233 0.302	0.117 0.166	0.006 0.008
(2) LGP21901 Diplexer (AT&T - Existing)	B	From Face	3.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	0.233 0.302	0.117 0.166	0.006 0.008
(2) LGP21901 Diplexer (AT&T - Existing)	C	From Face	3.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	0.233 0.302	0.117 0.166	0.006 0.008
EEI 10' Universal T-Arm (AT&T - Existing)	A	None		0.000	112.000	No Ice 1/2" Ice	13.340 16.800	13.340 16.800	0.450 0.600
EEI 10' Universal T-Arm (AT&T - Existing)	B	None		0.000	112.000	No Ice 1/2" Ice	13.340 16.800	13.340 16.800	0.450 0.600
EEI 10' Universal T-Arm (AT&T - Existing)	C	None		0.000	112.000	No Ice 1/2" Ice	13.340 16.800	13.340 16.800	0.450 0.600
AM-X-CD-16-65-00T-RET(72") (AT&T - Reserved)	A	From Face	3.000 -2.000 0.000	0.000	114.000	No Ice 1/2" Ice	8.260 8.807	4.642 5.088	0.050 0.096

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
AM-X-CD-16-65-00T-RET(72") (AT&T - Reserved)	B	From Face	3.000 -2.000 0.000	0.000	114.000	No Ice 1/2" Ice	8.260 8.807	4.642 5.088	0.050 0.096
800-10764 (AT&T - Reserved)	C	From Face	3.000 -2.000 0.000	0.000	114.000	No Ice 1/2" Ice	6.333 6.771	3.389 3.740	0.041 0.078
(2) RRUS-11 (AT&T - Reserved)	A	From Face	1.000 -2.000 0.000	0.000	114.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
(2) RRUS-11 (AT&T - Reserved)	B	From Face	1.000 -2.000 0.000	0.000	114.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
(2) RRUS-11 (AT&T - Reserved)	C	From Face	1.000 -2.000 0.000	0.000	114.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
DC6-48-60-18-8F Surge Arrestor (AT&T - Reserved)	C	From Face	0.500 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	2.228 2.447	2.228 2.447	0.020 0.039
APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	A	From Face	3.500 -4.000 0.000	0.000	103.000	No Ice 1/2" Ice	7.065 7.516	2.150 2.490	0.041 0.074
APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	B	From Face	3.500 -4.000 0.000	0.000	103.000	No Ice 1/2" Ice	7.065 7.516	2.150 2.490	0.041 0.074
APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	C	From Face	3.500 -4.000 0.000	0.000	103.000	No Ice 1/2" Ice	7.065 7.516	2.150 2.490	0.041 0.074
ATMAA1412D-1A20 TMA (T-Mobile - Existing)	A	From Face	3.500 -4.000 0.000	0.000	103.000	No Ice 1/2" Ice	1.167 1.314	0.467 0.575	0.013 0.021
ATMAA1412D-1A20 TMA (T-Mobile - Existing)	B	From Face	3.500 -4.000 0.000	0.000	103.000	No Ice 1/2" Ice	1.167 1.314	0.467 0.575	0.013 0.021
ATMAA1412D-1A20 TMA (T-Mobile - Existing)	C	From Face	3.500 -4.000 0.000	0.000	103.000	No Ice 1/2" Ice	1.167 1.314	0.467 0.575	0.013 0.021
ETW190VS12UB TMA (T-Mobile - Existing)	A	From Face	3.500 -4.000 0.000	0.000	103.000	No Ice 1/2" Ice	0.664 0.778	0.367 0.461	0.015 0.020
ETW190VS12UB TMA (T-Mobile - Existing)	B	From Face	3.500 -4.000 0.000	0.000	103.000	No Ice 1/2" Ice	0.664 0.778	0.367 0.461	0.015 0.020
ETW190VS12UB TMA (T-Mobile - Existing)	C	From Face	3.500 -4.000 0.000	0.000	103.000	No Ice 1/2" Ice	0.664 0.778	0.367 0.461	0.015 0.020
(2) APX16DWV-16DWVS-E-A20 (T-Mobile - Reserved)	A	None		0.000	103.000	No Ice 1/2" Ice	7.065 7.516	2.150 2.490	0.041 0.074
(2) APX16DWV-16DWVS-E-A20 (T-Mobile - Reserved)	B	None		0.000	103.000	No Ice 1/2" Ice	7.065 7.516	2.150 2.490	0.041 0.074
(2) APX16DWV-16DWVS-E-A20 (T-Mobile - Reserved)	C	None		0.000	103.000	No Ice 1/2" Ice	7.065 7.516	2.150 2.490	0.041 0.074

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
Valmont T-Arm (1) (T-Mobile - Existing)	A	From Face	2.000 0.000 0.000	0.000	101.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (T-Mobile - Existing)	B	From Face	2.000 0.000 0.000	0.000	101.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (T-Mobile - Existing)	C	From Face	2.000 0.000 0.000	0.000	101.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
APXV18-206517-C (MetroPCS - Existing)	A	From Face	0.500 0.000 0.000	0.000	93.000	No Ice 1/2" Ice	5.513 5.983	3.929 4.385	0.022 0.053
APXV18-206517-C (MetroPCS - Existing)	B	From Face	0.500 0.000 0.000	0.000	93.000	No Ice 1/2" Ice	5.513 5.983	3.929 4.385	0.022 0.053
APXV18-206517-C (MetroPCS - Existing)	C	From Face	0.500 0.000 0.000	0.000	93.000	No Ice 1/2" Ice	5.513 5.983	3.929 4.385	0.022 0.053
Valmont Uni-Tri Bracket (MetroPCS - Existing)	A	From Face	0.500 0.000 0.000	0.000	93.000	No Ice 1/2" Ice	1.750 1.940	1.750 1.940	0.290 0.306
Barhamsted Branch 1	A	From Face	3.000 0.000 0.000	0.000	153.260	No Ice 1/2" Ice	48.510 48.150	48.510 48.510	0.320 0.730
Barhamsted Branch 2	A	From Face	3.000 0.000 0.000	0.000	138.160	No Ice 1/2" Ice	120.490 120.490	120.490 120.490	2.290 3.830
Barhamsted Branch 3	A	From Face	3.000 0.000 0.000	0.000	121.390	No Ice 1/2" Ice	13.860 13.860	13.860 13.860	0.090 0.210
Barhamsted Branch 4	A	From Face	3.000 0.000 0.000	0.000	109.850	No Ice 1/2" Ice	134.660 134.660	134.660 134.660	2.560 4.280
Barhamsted Branch 5	A	From Face	3.000 0.000 0.000	0.000	91.600	No Ice 1/2" Ice	28.620 28.620	28.620 28.620	0.900 1.440
Barhamsted Branch 6	A	From Face	3.000 0.000 0.000	0.000	82.800	No Ice 1/2" Ice	22.070 22.070	22.070 22.070	0.770 1.300
LPA-80063/6CF (Verizon - Reserved)	A	From Face	3.000 6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
LPA-171063-12CF (Verizon - Reserved)	A	From Face	3.000 4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
BXA-70063/6CF (Verizon - Reserved)	A	From Face	3.000 1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-70063/6CF (Verizon - Reserved)	A	From Face	3.000 -1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
LPA-171063-12CF (Verizon - Reserved)	A	From Face	3.000 -4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
LPA-80063/6CF (Verizon - Reserved)	A	From Face	3.000 -6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* °	*Placement* *ft*		*C_AA_A Front* *ft²*	*C_AA_A Side* *ft²*	*Weight* *K*
LPA-80063/6CF (Verizon - Reserved)	B	From Face	3.000 6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
LPA-171063-12CF (Verizon - Reserved)	B	From Face	3.000 4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
BXA-70063/6CF (Verizon - Reserved)	B	From Face	3.000 1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-70063/6CF (Verizon - Reserved)	B	From Face	3.000 -1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
LPA-171063-12CF (Verizon - Reserved)	B	From Face	3.000 -4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
LPA-80063/6CF (Verizon - Reserved)	B	From Face	3.000 -6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
LPA-80063/6CF (Verizon - Reserved)	C	From Face	3.000 6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
LPA-171063-12CF (Verizon - Reserved)	C	From Face	3.000 4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
BXA-70063/6CF (Verizon - Reserved)	C	From Face	3.000 1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-70063/6CF (Verizon - Reserved)	C	From Face	3.000 -1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
LPA-171063-12CF (Verizon - Reserved)	C	From Face	3.000 -4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
LPA-80063/6CF (Verizon - Reserved)	C	From Face	3.000 -6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	A	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	0.367 0.451	0.085 0.136	0.003 0.005
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	B	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	0.367 0.451	0.085 0.136	0.003 0.005
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	C	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	0.367 0.451	0.085 0.136	0.003 0.005
RRH (Verizon - Reserved)	A	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	2.917 3.161	2.188 2.412	0.050 0.072
RRH (Verizon - Reserved)	B	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	2.917 3.161	2.188 2.412	0.050 0.072
RRH (Verizon - Reserved)	C	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	2.917 3.161	2.188 2.412	0.050 0.072

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 146.000-125.000	135.071	1.496	0.025	50.678	A	0.000	50.678	50.678	100.00	0.000	0.000
					B	0.000	50.678		100.00	0.000	0.000
					C	0.000	50.678		100.00	0.000	0.000
L2 125.000-82.250	102.819	1.384	0.023	137.406	A	0.000	137.406	137.406	100.00	0.000	0.000
					B	0.000	137.406		100.00	0.000	0.000
					C	0.000	137.406		100.00	0.000	0.000
L3 82.250-43.000	62.331	1.199	0.020	161.736	A	0.000	161.736	161.736	100.00	0.000	0.000
					B	0.000	161.736		100.00	0.000	0.000
					C	0.000	161.736		100.00	0.000	0.000
L4 43.000-1.000	21.306	1	0.016	210.331	A	0.000	210.331	210.331	100.00	0.000	0.000
					B	0.000	210.331		100.00	0.000	0.000
					C	0.000	210.331		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 146.000-125.000	135.071	1.496	0.018	0.500	52.428	A	0.000	52.428	52.428	100.00	0.000	0.000
						B	0.000	52.428		100.00	0.000	0.000
						C	0.000	52.428		100.00	0.000	0.000
L2 125.000-82.250	102.819	1.384	0.017	0.500	140.968	A	0.000	140.968	140.968	100.00	0.000	0.000
						B	0.000	140.968		100.00	0.000	0.000
						C	0.000	140.968		100.00	0.000	0.000
L3 82.250-43.000	62.331	1.199	0.015	0.500	165.007	A	0.000	165.007	165.007	100.00	0.000	0.000
						B	0.000	165.007		100.00	0.000	0.000
						C	0.000	165.007		100.00	0.000	0.000
L4 43.000-1.000	21.306	1	0.012	0.500	213.831	A	0.000	213.831	213.831	100.00	0.000	0.000
						B	0.000	213.831		100.00	0.000	0.000
						C	0.000	213.831		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 146.000-125.0	135.071	1.496	0.010	50.678	A	0.000	50.678	50.678	100.00	0.000	0.000
					B	0.000	50.678		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
00					C	0.000	50.678		100.00	0.000	0.000
L2	102.819	1.384	0.009	137.406	A	0.000	137.406	137.406	100.00	0.000	0.000
125.000-82.25					B	0.000	137.406		100.00	0.000	0.000
0					C	0.000	137.406		100.00	0.000	0.000
L3	62.331	1.199	0.008	161.736	A	0.000	161.736	161.736	100.00	0.000	0.000
82.250-43.000					B	0.000	161.736		100.00	0.000	0.000
					C	0.000	161.736		100.00	0.000	0.000
L4	21.306	1	0.006	210.331	A	0.000	210.331	210.331	100.00	0.000	0.000
43.000-1.000					B	0.000	210.331		100.00	0.000	0.000
					C	0.000	210.331		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.327	1.628	A	1	1.2	1	1	1	50.678	2.519	0.120	C
146.000-125.0			B	1	1.2	1	1	1	50.678			
00			C	1	1.2	1	1	1	50.678			
L2	1.939	6.613	A	1	1.2	1	1	1	137.406	6.305	0.147	C
125.000-82.25			B	1	1.2	1	1	1	137.406			
0			C	1	1.2	1	1	1	137.406			
L3	2.282	10.248	A	1	1.2	1	1	1	161.736	6.415	0.163	C
82.250-43.000			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4	2.271	15.507	A	1	1.2	1	1	1	210.331	6.989	0.166	C
43.000-1.000			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.819	33.996						OTM	1514.985 kip-ft	22.227		

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 klf	Ctrl. Face
L1	0.327	1.628	A	1	1.2	1	1	1	50.678	2.519	0.120	C
146.000-125.0			B	1	1.2	1	1	1	50.678			
00			C	1	1.2	1	1	1	50.678			
L2	1.939	6.613	A	1	1.2	1	1	1	137.406	6.305	0.147	C
125.000-82.25			B	1	1.2	1	1	1	137.406			
0			C	1	1.2	1	1	1	137.406			
L3	2.282	10.248	A	1	1.2	1	1	1	161.736	6.415	0.163	C
82.250-43.000			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4	2.271	15.507	A	1	1.2	1	1	1	210.331	6.989	0.166	C
43.000-1.000			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.819	33.996						OTM	1514.985 kip-ft	22.227		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	1.628	A	1	1.2	1	1	1	50.678	2.519	0.120	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.939	6.613	A	1	1.2	1	1	1	137.406	6.305	0.147	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.282	10.248	A	1	1.2	1	1	1	161.736	6.415	0.163	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.271	15.507	A	1	1.2	1	1	1	210.331	6.989	0.166	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.819	33.996						OTM	1514.985 kip-ft	22.227		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	1.628	A	1	1.2	1	1	1	50.678	2.519	0.120	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.939	6.613	A	1	1.2	1	1	1	137.406	6.305	0.147	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.282	10.248	A	1	1.2	1	1	1	161.736	6.415	0.163	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.271	15.507	A	1	1.2	1	1	1	210.331	6.989	0.166	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.819	33.996						OTM	1514.985 kip-ft	22.227		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	2.010	A	1	1.2	1	1	1	52.428	1.954	0.093	C
			B	1	1.2	1	1	1	52.428			
			C	1	1.2	1	1	1	52.428			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L2 125.000-82.250	1.939	7.644	A	1	1.2	1	1	1	140.968	4.851	0.113	C
			B	1	1.2	1	1	1	140.968			
			C	1	1.2	1	1	1	140.968			
L3 82.250-43.000	2.282	11.458	A	1	1.2	1	1	1	165.007	4.909	0.125	C
			B	1	1.2	1	1	1	165.007			
			C	1	1.2	1	1	1	165.007			
L4 43.000-1.000	2.271	17.077	A	1	1.2	1	1	1	213.831	5.329	0.127	C
			B	1	1.2	1	1	1	213.831			
			C	1	1.2	1	1	1	213.831			
Sum Weight:	6.819	38.189						OTM	1165.205 kip-ft	17.043		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	2.010	A	1	1.2	1	1	1	52.428	1.954	0.093	C
			B	1	1.2	1	1	1	52.428			
			C	1	1.2	1	1	1	52.428			
L2 125.000-82.250	1.939	7.644	A	1	1.2	1	1	1	140.968	4.851	0.113	C
			B	1	1.2	1	1	1	140.968			
			C	1	1.2	1	1	1	140.968			
L3 82.250-43.000	2.282	11.458	A	1	1.2	1	1	1	165.007	4.909	0.125	C
			B	1	1.2	1	1	1	165.007			
			C	1	1.2	1	1	1	165.007			
L4 43.000-1.000	2.271	17.077	A	1	1.2	1	1	1	213.831	5.329	0.127	C
			B	1	1.2	1	1	1	213.831			
			C	1	1.2	1	1	1	213.831			
Sum Weight:	6.819	38.189						OTM	1165.205 kip-ft	17.043		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	2.010	A	1	1.2	1	1	1	52.428	1.954	0.093	C
			B	1	1.2	1	1	1	52.428			
			C	1	1.2	1	1	1	52.428			
L2 125.000-82.250	1.939	7.644	A	1	1.2	1	1	1	140.968	4.851	0.113	C
			B	1	1.2	1	1	1	140.968			
			C	1	1.2	1	1	1	140.968			
L3 82.250-43.000	2.282	11.458	A	1	1.2	1	1	1	165.007	4.909	0.125	C
			B	1	1.2	1	1	1	165.007			
			C	1	1.2	1	1	1	165.007			
L4 43.000-1.000	2.271	17.077	A	1	1.2	1	1	1	213.831	5.329	0.127	C
			B	1	1.2	1	1	1	213.831			
			C	1	1.2	1	1	1	213.831			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
Sum Weight:	6.819	38.189						OTM	1165.205 kip-ft	17.043		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	2.010	A	1	1.2	1	1	1	52.428	1.954	0.093	C
			B	1	1.2	1	1	1	52.428			
			C	1	1.2	1	1	1	52.428			
L2 125.000-82.250	1.939	7.644	A	1	1.2	1	1	1	140.968	4.851	0.113	C
			B	1	1.2	1	1	1	140.968			
			C	1	1.2	1	1	1	140.968			
L3 82.250-43.000	2.282	11.458	A	1	1.2	1	1	1	165.007	4.909	0.125	C
			B	1	1.2	1	1	1	165.007			
			C	1	1.2	1	1	1	165.007			
L4 43.000-1.000	2.271	17.077	A	1	1.2	1	1	1	213.831	5.329	0.127	C
			B	1	1.2	1	1	1	213.831			
			C	1	1.2	1	1	1	213.831			
Sum Weight:	6.819	38.189						OTM	1165.205 kip-ft	17.043		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	1.628	A	1	1.2	1	1	1	50.678	0.984	0.047	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.939	6.613	A	1	1.2	1	1	1	137.406	2.463	0.058	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.282	10.248	A	1	1.2	1	1	1	161.736	2.506	0.064	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.271	15.507	A	1	1.2	1	1	1	210.331	2.730	0.065	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.819	33.996						OTM	591.791 kip-ft	8.682		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	1.628	A	1	1.2	1	1	1	50.678	0.984	0.047	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.939	6.613	A	1	1.2	1	1	1	137.406	2.463	0.058	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.282	10.248	A	1	1.2	1	1	1	161.736	2.506	0.064	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.271	15.507	A	1	1.2	1	1	1	210.331	2.730	0.065	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.819	33.996						OTM	591.791 kip-ft	8.682		

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 ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	1.628	A	1	1.2	1	1	1	50.678	0.984	0.047	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.939	6.613	A	1	1.2	1	1	1	137.406	2.463	0.058	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.282	10.248	A	1	1.2	1	1	1	161.736	2.506	0.064	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.271	15.507	A	1	1.2	1	1	1	210.331	2.730	0.065	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.819	33.996						OTM	591.791 kip-ft	8.682		

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 ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.327	1.628	A	1	1.2	1	1	1	50.678	0.984	0.047	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.939	6.613	A	1	1.2	1	1	1	137.406	2.463	0.058	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.282	10.248	A	1	1.2	1	1	1	161.736	2.506	0.064	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			

Section Elevation *ft*	Add Weight *K*	Self Weight *K*	Face	*e*	C_F	R_R	D_F	D_R	A_E ft^2	*F* *K*	*w* *klf*	Ctrl. Face
L4 43.000-1.000	2.271	15.507	A	1	1.2	1	1	1	210.331	2.730	0.065	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.819	33.996						OTM	591.791 kip-ft	8.682		

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	33.996					
Bracing Weight	0.000					
Total Member Self-Weight	33.996			-15.754	27.303	
Total Weight	56.263			-15.754	27.303	
Wind 0 deg - No Ice		0.000	-59.121	-6049.136	27.303	-56.200
Wind 30 deg - No Ice		29.574	-51.200	-5240.816	-2990.891	-64.874
Wind 45 deg - No Ice		41.824	-41.805	-4281.999	-4241.068	-62.654
Wind 60 deg - No Ice		51.224	-29.561	-3032.445	-5200.363	-56.165
Wind 90 deg - No Ice		59.148	0.000	-15.754	-6009.085	-32.406
Wind 120 deg - No Ice		51.224	29.561	3000.937	-5200.363	0.035
Wind 135 deg - No Ice		41.824	41.805	4250.491	-4241.068	16.824
Wind 150 deg - No Ice		29.574	51.200	5209.308	-2990.891	32.467
Wind 180 deg - No Ice		0.000	59.121	6017.628	27.303	56.200
Wind 210 deg - No Ice		-29.574	51.200	5209.308	3045.498	64.874
Wind 225 deg - No Ice		-41.824	41.805	4250.491	4295.675	62.654
Wind 240 deg - No Ice		-51.224	29.561	3000.937	5254.969	56.165
Wind 270 deg - No Ice		-59.148	0.000	-15.754	6063.692	32.406
Wind 300 deg - No Ice		-51.224	-29.561	-3032.445	5254.969	-0.035
Wind 315 deg - No Ice		-41.824	-41.805	-4281.999	4295.675	-16.824
Wind 330 deg - No Ice		-29.574	-51.200	-5240.816	3045.498	-32.467
Member Ice	4.193					
Total Weight Ice	69.621			-26.552	46.015	
Wind 0 deg - Ice		0.005	-47.365	-4904.500	45.250	-42.167
Wind 30 deg - Ice		23.694	-41.022	-4251.361	-2394.330	-48.673
Wind 45 deg - Ice		33.506	-33.496	-3476.322	-3404.758	-47.006
Wind 60 deg - Ice		41.035	-23.687	-2466.188	-4180.022	-42.137
Wind 90 deg - Ice		47.380	-0.005	-27.316	-4833.351	-24.310
Wind 120 deg - Ice		41.030	23.678	2411.760	-4179.258	0.030
Wind 135 deg - Ice		33.499	33.489	3422.138	-3403.677	12.626
Wind 150 deg - Ice		23.686	41.017	4197.493	-2393.006	24.362
Wind 180 deg - Ice		-0.005	47.365	4851.396	46.779	42.167
Wind 210 deg - Ice		-23.694	41.022	4198.257	2486.359	48.673
Wind 225 deg - Ice		-33.506	33.496	3423.219	3496.788	47.006
Wind 240 deg - Ice		-41.035	23.687	2413.084	4272.051	42.137
Wind 270 deg - Ice		-47.380	0.005	-25.787	4925.380	24.310
Wind 300 deg - Ice		-41.030	-23.678	-2464.864	4271.287	-0.030
Wind 315 deg - Ice		-33.499	-33.489	-3475.241	3495.707	-12.626
Wind 330 deg - Ice		-23.686	-41.017	-4250.596	2485.036	-24.362
Total Weight	56.263			-15.754	27.303	
Wind 0 deg - Service		0.000	-23.094	-2372.544	27.303	-21.953
Wind 30 deg - Service		11.552	-20.000	-2056.794	-1151.679	-25.341
Wind 45 deg - Service		16.337	-16.330	-1682.256	-1640.029	-24.474
Wind 60 deg - Service		20.009	-11.547	-1194.149	-2014.754	-21.939
Wind 90 deg - Service		23.105	0.000	-15.754	-2330.661	-12.659

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*
Wind 120 deg - Service		20.009	11.547	1162.641	-2014.754	0.014
Wind 135 deg - Service		16.337	16.330	1650.748	-1640.029	6.572
Wind 150 deg - Service		11.552	20.000	2025.286	-1151.679	12.683
Wind 180 deg - Service		0.000	23.094	2341.036	27.303	21.953
Wind 210 deg - Service		-11.552	20.000	2025.286	1206.286	25.341
Wind 225 deg - Service		-16.337	16.330	1650.748	1694.636	24.474
Wind 240 deg - Service		-20.009	11.547	1162.641	2069.360	21.939
Wind 270 deg - Service		-23.105	0.000	-15.754	2385.268	12.659
Wind 300 deg - Service		-20.009	-11.547	-1194.149	2069.360	-0.014
Wind 315 deg - Service		-16.337	-16.330	-1682.256	1694.636	-6.572
Wind 330 deg - Service		-11.552	-20.000	-2056.794	1206.286	-12.683

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

Comb. No.	Description
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
L1	146 - 125	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-11.884	16.628	9.600
			Max. Mx	14	-6.212	288.209	4.824
			Max. My	2	-6.219	8.357	284.219
			Max. Vy	14	-20.815	288.209	4.824
			Max. Vx	2	-20.813	8.357	284.219
			Max. Torque	3			29.064
L2	125 - 82.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-33.802	41.657	24.035
			Max. Mx	14	-21.650	1591.347	13.537
			Max. My	2	-21.661	23.461	1580.322
			Max. Vy	14	-45.174	1591.347	13.537
			Max. Vx	2	-45.143	23.461	1580.322
			Max. Torque	3			60.570
L3	82.25 - 43	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-47.857	47.872	27.623
			Max. Mx	14	-34.905	3452.618	16.027
			Max. My	2	-34.910	27.778	3439.071
			Max. Vy	14	-51.942	3452.618	16.027
			Max. Vx	2	-51.912	27.778	3439.071
			Max. Torque	3			64.486
L4	43 - 1	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-69.621	48.178	27.800
			Max. Mx	14	-56.227	6175.479	16.160
			Max. My	2	-56.227	28.009	6160.549
			Max. Vy	14	-59.182	6175.479	16.160
			Max. Vx	2	-59.155	28.009	6160.549
			Max. Torque	3			64.384

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	31	69.621	47.380	-0.005
	Max. H_x	14	56.263	59.148	0.000
	Max. H_z	2	56.263	0.000	59.121
	Max. M_x	2	6160.549	0.000	59.121
	Max. M_z	6	6119.335	-59.148	0.000

Location	*Condition*	*Gov. Load Comb.*	*Vertical* K	*Horizontal, X* K	*Horizontal, Z* K
	Max. Torsion	3	64.343	-29.574	51.200
	Min. Vert	1	56.263	0.000	0.000
	Min. H_x	6	56.263	-59.148	0.000
	Min. H_z	10	56.263	0.000	-59.121
	Min. M_x	10	-6128.154	0.000	-59.121
	Min. M_z	14	-6175.479	59.148	0.000
	Min. Torsion	11	-64.342	29.574	-51.200

Tower Mast Reaction Summary

Load Combination	*Vertical* K	*$Shear_x$* K	*$Shear_z$* K	*Overturning Moment, M_x* kip-ft	*Overturning Moment, M_z* kip-ft	*Torque* kip-ft
Dead Only	56.263	-0.000	-0.000	-16.251	28.164	0.000
Dead+Wind 0 deg - No Ice	56.263	-0.000	-59.121	-6160.549	27.999	-55.735
Dead+Wind 30 deg - No Ice	56.263	29.574	-51.200	-5337.321	-3045.706	-64.343
Dead+Wind 45 deg - No Ice	56.263	41.824	-41.805	-4360.853	-4318.860	-62.144
Dead+Wind 60 deg - No Ice	56.263	51.224	-29.561	-3088.311	-5295.776	-55.710
Dead+Wind 90 deg - No Ice	56.263	59.148	0.000	-16.158	-6119.335	-32.146
Dead+Wind 120 deg - No Ice	56.263	51.224	29.561	3055.975	-5295.739	0.035
Dead+Wind 135 deg - No Ice	56.263	41.824	41.805	4328.498	-4318.817	16.690
Dead+Wind 150 deg - No Ice	56.263	29.574	51.200	5304.945	-3045.668	32.207
Dead+Wind 180 deg - No Ice	56.263	-0.000	59.121	6128.154	28.002	55.745
Dead+Wind 210 deg - No Ice	56.263	-29.574	51.200	5305.009	3101.707	64.342
Dead+Wind 225 deg - No Ice	56.263	-41.824	41.805	4328.572	4374.891	62.138
Dead+Wind 240 deg - No Ice	56.263	-51.224	29.561	3056.040	5351.848	55.700
Dead+Wind 270 deg - No Ice	56.263	-59.148	0.000	-16.154	6175.479	32.136
Dead+Wind 300 deg - No Ice	56.263	-51.224	-29.561	-3088.370	5351.883	-0.035
Dead+Wind 315 deg - No Ice	56.263	-41.824	-41.805	-4360.923	4374.930	-16.683
Dead+Wind 330 deg - No Ice	56.263	-29.574	-51.200	-5337.381	3101.740	-32.196
Dead+Ice+Temp	69.621	-0.000	-0.000	-27.800	48.178	0.000
Dead+Wind 0 deg+Ice+Temp	69.621	0.005	-47.365	-5034.053	47.218	-41.856
Dead+Wind 30 deg+Ice+Temp	69.621	23.694	-41.022	-4363.704	-2456.560	-48.323
Dead+Wind 45 deg+Ice+Temp	69.621	33.506	-33.496	-3568.262	-3493.569	-46.673
Dead+Wind 60 deg+Ice+Temp	69.621	41.035	-23.687	-2531.541	-4289.220	-41.841
Dead+Wind 90 deg+Ice+Temp	69.621	47.380	-0.005	-28.496	-4959.718	-24.143
Dead+Wind 120 deg+Ice+Temp	69.621	41.030	23.678	2474.750	-4288.409	0.029
Dead+Wind 135 deg+Ice+Temp	69.621	33.499	33.489	3511.712	-3492.426	12.540
Dead+Wind 150 deg+Ice+Temp	69.621	23.686	41.017	4307.472	-2455.168	24.194
Dead+Wind 180 deg+Ice+Temp	69.621	-0.005	47.365	4978.600	48.804	41.871
Dead+Wind 210 deg+Ice+Temp	69.621	-23.694	41.022	4308.298	2552.582	48.323
Dead+Wind 225 deg+Ice+Temp	69.621	-33.506	33.496	3512.872	3589.607	46.664
Dead+Wind 240 deg+Ice+Temp	69.621	-41.035	23.687	2476.157	4385.282	41.827
Dead+Wind 270 deg+Ice+Temp	69.621	-47.380	0.005	-26.911	5055.821	24.129
Dead+Wind 300 deg+Ice+Temp	69.621	-41.030	-23.678	-2530.204	4384.512	-0.029
Dead+Wind 315 deg+Ice+Temp	69.621	-33.499	-33.489	-3567.183	3588.511	-12.531
Dead+Wind 330 deg+Ice+Temp	69.621	-23.686	-41.017	-4362.948	2551.230	-24.180
Dead+Wind 0 deg - Service	56.263	0.000	-23.094	-2417.970	28.187	-21.879
Dead+Wind 30 deg - Service	56.263	11.552	-20.000	-2096.197	-1173.261	-25.257
Dead+Wind 45 deg - Service	56.263	16.337	-16.330	-1714.520	-1670.914	-24.393
Dead+Wind 60 deg - Service	56.263	20.009	-11.547	-1217.111	-2052.776	-21.867
Dead+Wind 90 deg - Service	56.263	23.105	-0.000	-16.265	-2374.696	-12.617
Dead+Wind 120 deg - Service	56.263	20.009	11.547	1184.578	-2052.769	0.014
Dead+Wind 135 deg - Service	56.263	16.337	16.330	1681.984	-1670.906	6.551
Dead+Wind 150 deg - Service	56.263	11.552	20.000	2063.658	-1173.254	12.641
Dead+Wind 180 deg - Service	56.263	0.000	23.094	2385.429	28.188	21.880
Dead+Wind 210 deg - Service	56.263	-11.552	20.000	2063.669	1229.636	25.257

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 225 deg - Service	56.263	-16.337	16.330	1681.997	1727.294	24.392
Dead+Wind 240 deg - Service	56.263	-20.009	11.547	1184.589	2109.162	21.865
Dead+Wind 270 deg - Service	56.263	-23.105	-0.000	-16.263	2431.093	12.616
Dead+Wind 300 deg - Service	56.263	-20.009	-11.547	-1217.119	2109.166	-0.014
Dead+Wind 315 deg - Service	56.263	-16.337	-16.330	-1714.530	1727.299	-6.550
Dead+Wind 330 deg - Service	56.263	-11.552	-20.000	-2096.206	1229.640	-12.639

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-56.263	0.000	0.000	56.263	0.000	0.000%
2	0.000	-56.263	-59.121	0.000	56.263	59.121	0.000%
3	29.574	-56.263	-51.200	-29.574	56.263	51.200	0.000%
4	41.824	-56.263	-41.805	-41.824	56.263	41.805	0.000%
5	51.224	-56.263	-29.561	-51.224	56.263	29.561	0.000%
6	59.148	-56.263	0.000	-59.148	56.263	0.000	0.000%
7	51.224	-56.263	29.561	-51.224	56.263	-29.561	0.000%
8	41.824	-56.263	41.805	-41.824	56.263	-41.805	0.000%
9	29.574	-56.263	51.200	-29.574	56.263	-51.200	0.000%
10	0.000	-56.263	59.121	0.000	56.263	-59.121	0.000%
11	-29.574	-56.263	51.200	29.574	56.263	-51.200	0.000%
12	-41.824	-56.263	41.805	41.824	56.263	-41.805	0.000%
13	-51.224	-56.263	29.561	51.224	56.263	-29.561	0.000%
14	-59.148	-56.263	0.000	59.148	56.263	0.000	0.000%
15	-51.224	-56.263	-29.561	51.224	56.263	29.561	0.000%
16	-41.824	-56.263	-41.805	41.824	56.263	41.805	0.000%
17	-29.574	-56.263	-51.200	29.574	56.263	51.200	0.000%
18	0.000	-69.621	0.000	0.000	69.621	0.000	0.000%
19	0.005	-69.621	-47.365	-0.005	69.621	47.365	0.000%
20	23.694	-69.621	-41.022	-23.694	69.621	41.022	0.000%
21	33.506	-69.621	-33.496	-33.506	69.621	33.496	0.000%
22	41.035	-69.621	-23.687	-41.035	69.621	23.687	0.000%
23	47.380	-69.621	-0.005	-47.380	69.621	0.005	0.000%
24	41.030	-69.621	23.678	-41.030	69.621	-23.678	0.000%
25	33.499	-69.621	33.489	-33.499	69.621	-33.489	0.000%
26	23.686	-69.621	41.017	-23.686	69.621	-41.017	0.000%
27	-0.005	-69.621	47.365	0.005	69.621	-47.365	0.000%
28	-23.694	-69.621	41.022	23.694	69.621	-41.022	0.000%
29	-33.506	-69.621	33.496	33.506	69.621	-33.496	0.000%
30	-41.035	-69.621	23.687	41.035	69.621	-23.687	0.000%
31	-47.380	-69.621	0.005	47.380	69.621	-0.005	0.000%
32	-41.030	-69.621	-23.678	41.030	69.621	23.678	0.000%
33	-33.499	-69.621	-33.489	33.499	69.621	33.489	0.000%
34	-23.686	-69.621	-41.017	23.686	69.621	41.017	0.000%
35	0.000	-56.263	-23.094	0.000	56.263	23.094	0.000%
36	11.552	-56.263	-20.000	-11.552	56.263	20.000	0.000%
37	16.337	-56.263	-16.330	-16.337	56.263	16.330	0.000%
38	20.009	-56.263	-11.547	-20.009	56.263	11.547	0.000%
39	23.105	-56.263	0.000	-23.105	56.263	0.000	0.000%
40	20.009	-56.263	11.547	-20.009	56.263	-11.547	0.000%
41	16.337	-56.263	16.330	-16.337	56.263	-16.330	0.000%
42	11.552	-56.263	20.000	-11.552	56.263	-20.000	0.000%
43	0.000	-56.263	23.094	0.000	56.263	-23.094	0.000%
44	-11.552	-56.263	20.000	11.552	56.263	-20.000	0.000%
45	-16.337	-56.263	16.330	16.337	56.263	-16.330	0.000%
46	-20.009	-56.263	11.547	20.009	56.263	-11.547	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
47	-23.105	-56.263	0.000	23.105	56.263	0.000	0.000%
48	-20.009	-56.263	-11.547	20.009	56.263	11.547	0.000%
49	-16.337	-56.263	-16.330	16.337	56.263	16.330	0.000%
50	-11.552	-56.263	-20.000	11.552	56.263	20.000	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	5	0.00000001	0.00012597
3	Yes	5	0.00000001	0.00013617
4	Yes	5	0.00000001	0.00018432
5	Yes	5	0.00000001	0.00019739
6	Yes	5	0.00000001	0.00007268
7	Yes	5	0.00000001	0.00008812
8	Yes	5	0.00000001	0.00010541
9	Yes	5	0.00000001	0.00008253
10	Yes	5	0.00000001	0.00012587
11	Yes	5	0.00000001	0.00021766
12	Yes	5	0.00000001	0.00018510
13	Yes	5	0.00000001	0.00011934
14	Yes	5	0.00000001	0.00007280
15	Yes	5	0.00000001	0.00009245
16	Yes	5	0.00000001	0.00010945
17	Yes	5	0.00000001	0.00014969
18	Yes	4	0.00000001	0.00006339
19	Yes	5	0.00000001	0.00026102
20	Yes	5	0.00000001	0.00028717
21	Yes	5	0.00000001	0.00037150
22	Yes	5	0.00000001	0.00038703
23	Yes	5	0.00000001	0.00015677
24	Yes	5	0.00000001	0.00020636
25	Yes	5	0.00000001	0.00024464
26	Yes	5	0.00000001	0.00020132
27	Yes	5	0.00000001	0.00025755
28	Yes	5	0.00000001	0.00042801
29	Yes	5	0.00000001	0.00037766
30	Yes	5	0.00000001	0.00026361
31	Yes	5	0.00000001	0.00016049
32	Yes	5	0.00000001	0.00022927
33	Yes	5	0.00000001	0.00026912
34	Yes	5	0.00000001	0.00031779
35	Yes	5	0.00000001	0.00003624
36	Yes	5	0.00000001	0.00003670
37	Yes	5	0.00000001	0.00004128
38	Yes	5	0.00000001	0.00004157
39	Yes	4	0.00000001	0.00085990
40	Yes	4	0.00000001	0.00044800
41	Yes	4	0.00000001	0.00067703
42	Yes	4	0.00000001	0.00074168
43	Yes	5	0.00000001	0.00003538
44	Yes	5	0.00000001	0.00004770
45	Yes	5	0.00000001	0.00004193
46	Yes	5	0.00000001	0.00003173
47	Yes	4	0.00000001	0.00089884

48	Yes	4	0.00000001	0.00053689
49	Yes	4	0.00000001	0.00076843
50	Yes	5	0.00000001	0.00002912

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
L1	146 - 125	28.287	48	1.685	0.084
L2	125 - 82.25	21.046	48	1.574	0.058
L3	88 - 43	10.314	48	1.140	0.028
L4	50 - 1	3.223	48	0.603	0.011

Critical Deflections and Radius of Curvature - Service Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
153.260	Barhamsted Branch 1	48	28.287	1.685	0.084	25792
144.000	(2) DB980F90E-M	48	27.584	1.677	0.081	25792
143.000	Valmont T-Arm (1)	48	27.232	1.672	0.080	25792
138.160	Barhamsted Branch 2	48	25.537	1.651	0.074	16449
133.000	LPA-80063/6CF	48	23.749	1.625	0.067	9920
131.000	Valmont T-Arm (1)	48	23.064	1.614	0.065	8597
124.000	(4) DB844H90E-XY	48	20.715	1.566	0.057	6169
122.000	EEI 10' Universal T-Arm	48	20.061	1.550	0.055	5956
121.390	Barhamsted Branch 3	48	19.863	1.545	0.054	5910
114.000	(2) 7770.00	48	17.526	1.473	0.047	5478
112.000	EEI 10' Universal T-Arm	48	16.914	1.452	0.046	5373
109.850	Barhamsted Branch 4	48	16.266	1.427	0.044	5264
103.000	APX16DWV-16DWVS-E-A20	48	14.272	1.344	0.038	4945
101.000	Valmont T-Arm (1)	48	13.712	1.318	0.037	4859
93.000	APXV18-206517-C	48	11.569	1.210	0.031	4543
91.600	Barhamsted Branch 5	48	11.211	1.190	0.030	4492
82.800	Barhamsted Branch 6	48	9.083	1.066	0.025	4195

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
L1	146 - 125	71.044	15	4.201	0.213
L2	125 - 82.25	52.982	15	3.943	0.149
L3	88 - 43	26.057	15	2.871	0.072
L4	50 - 1	8.163	15	1.526	0.027

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
153.260	Barhamsted Branch 1	15	71.044	4.201	0.213	10882
144.000	(2) DB980F90E-M	15	69.292	4.182	0.207	10882
143.000	Valmont T-Arm (1)	15	68.416	4.172	0.204	10882
138.160	Barhamsted Branch 2	15	64.191	4.124	0.188	6940
133.000	LPA-80063/6CF	15	59.732	4.065	0.172	4184
131.000	Valmont T-Arm (1)	15	58.022	4.038	0.166	3626
124.000	(4) DB844H90E-XY	15	52.157	3.925	0.146	2595
122.000	EEI 10' Universal T-Arm	15	50.521	3.885	0.140	2499
121.390	Barhamsted Branch 3	15	50.025	3.873	0.139	2477
114.000	(2) 7770.00	15	44.175	3.698	0.121	2272
112.000	EEI 10' Universal T-Arm	15	42.641	3.645	0.116	2223
109.850	Barhamsted Branch 4	15	41.016	3.585	0.111	2172
103.000	APX16DWV-16DWVS-E-A20	15	36.012	3.378	0.098	2024
101.000	Valmont T-Arm (1)	15	34.603	3.314	0.094	1985
93.000	APXV18-206517-C	15	29.214	3.046	0.080	1841
91.600	Barhamsted Branch 5	15	28.313	2.997	0.077	1818
82.800	Barhamsted Branch 6	15	22.955	2.686	0.064	1687

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	146 - 125 (1)	TP32.508x25.41x0.25	21.000	0.000	0.0	39.000	25.597	-6.210	998.272	0.006
L2	125 - 82.25 (2)	TP44.632x32.508x0.375	42.750	0.000	0.0	39.000	50.736	-21.648	1978.700	0.011
L3	82.25 - 43 (3)	TP55.014x42.251x0.438	45.000	0.000	0.0	39.000	73.029	-34.904	2848.150	0.012
L4	43 - 1 (4)	TP66.05x52.154x0.5	49.000	0.000	0.0	39.000	104.028	-56.227	4057.090	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	146 - 125 (1)	TP32.508x25.41x0.25	289.308	17.037	39.000	0.437	0.000	0.000	39.000	0.000
L2	125 - 82.25 (2)	TP44.632x32.508x0.375	1594.94 2	35.897	39.000	0.920	0.000	0.000	39.000	0.000
L3	82.25 - 43 (3)	TP55.014x42.251x0.438	3456.50 0	43.785	39.000	1.123	0.000	0.000	39.000	0.000
L4	43 - 1 (4)	TP66.05x52.154x0.5	6179.05 0	44.056	39.000	1.130	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	146 - 125 (1)	TP32.508x25.41x0.25	20.816	0.813	26.000	0.063	7.519	0.216	26.000	0.008
L2	125 - 82.25 (2)	TP44.632x32.508x0.375	45.168	0.890	26.000	0.068	0.035	0.000	26.000	0.000
L3	82.25 - 43 (3)	TP55.014x42.251x0.438	51.936	0.711	26.000	0.055	0.035	0.000	26.000	0.000
L4	43 - 1 (4)	TP66.05x52.154x0.5	59.175	0.569	26.000	0.044	0.035	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	146 - 125 (1)	0.006	0.437	0.000	0.063	0.008	0.445 ✓	1.333	H1-3+VT ✓
L2	125 - 82.25 (2)	0.011	0.920	0.000	0.068	0.000	0.933 ✓	1.333	H1-3+VT ✓
L3	82.25 - 43 (3)	0.012	1.123	0.000	0.055	0.000	1.136 ✓	1.333	H1-3+VT ✓
L4	43 - 1 (4)	0.014	1.130	0.000	0.044	0.000	1.144 ✓	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF^*P_{allow} K	% Capacity	Pass Fail
L1	146 - 125	Pole	TP32.508x25.41x0.25	1	-6.210	1330.697	33.4	Pass
L2	125 - 82.25	Pole	TP44.632x32.508x0.375	2	-21.648	2637.607	70.0	Pass
L3	82.25 - 43	Pole	TP55.014x42.251x0.438	3	-34.904	3796.584	85.2	Pass
L4	43 - 1	Pole	TP66.05x52.154x0.5	4	-56.227	5408.101	85.8	Pass
							Summary	
						Pole (L4)	85.8	Pass
						RATING =	**85.8**	**Pass**

Flange Bolt and Flange Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 288 \cdot ft \cdot kips$	(Input From RisaTower)
Shear Force =	$Shear := 21 \cdot kips$	(Input From RisaTower)
Axial Force =	$Axial := 12 \cdot kips$	(Input From RisaTower)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts =	$N := 12$	(User Input)
Diameter of Bolt Circle =	$D_{bc} := 37.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 120 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 92 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Flange Bolts =	$D := 1.0 \cdot in$	(User Input)
Threads per Inch =	$n := 8$	(User Input)

Flange Plate Data:

Use ASTM A572 Mod 50

Plate Yield Strength =	$Fy_{bp} := 50 \cdot ksi$	(User Input)
Flange Plate Thickness =	$t_{bp} := 1.25 \cdot in$	(User Input)
Flange Plate Diameter =	$D_{bp} := 41.0 \cdot in$	(User Input)
Outer Pole Diameter =	$D_{pole} := 32.51 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 18.5 \cdot in$

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

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

$d_1 = 9.25 \cdot in$	$d_7 = -9.25 \cdot in$
$d_2 = 16.02 \cdot in$	$d_8 = -16.02 \cdot in$
$d_3 = 18.50 \cdot in$	$d_9 = -18.50 \cdot in$
$d_4 = 16.02 \cdot in$	$d_{10} = -16.02 \cdot in$
$d_5 = 9.25 \cdot in$	$d_{11} = -9.25 \cdot in$
$d_6 = 0.00 \cdot in$	$d_{12} = -0.00 \cdot in$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 16.3 \cdot in$

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

$MA_1 = 0.00 \cdot in$	$MA_7 = 0.00 \cdot in$
$MA_2 = 0.00 \cdot in$	$MA_8 = 0.00 \cdot in$
$MA_3 = 2.25 \cdot in$	$MA_9 = 0.00 \cdot in$
$MA_4 = 0.00 \cdot in$	$MA_{10} = 0.00 \cdot in$
$MA_5 = 0.00 \cdot in$	$MA_{11} = 0.00 \cdot in$
$MA_6 = 0.00 \cdot in$	$MA_{12} = 0.00 \cdot in$

Effective Width of Flangeplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 20 \cdot in$

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i (d_i)^2 = 2.053 \times 10^3 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.606 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.878 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.22 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.066 \cdot in^3$

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 30.1 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u\right) = 41.5 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Gross}} = 73 \cdot \%$

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

Condition1 = "OK"

Flange Plate Analysis:

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

$C_1 = 16.6 \cdot kips$ $C_7 = -14.6 \cdot kips$

$C_2 = 28.0 \cdot kips$ $C_8 = -26.0 \cdot kips$

$C_3 = 32.1 \cdot kips$ $C_9 = -30.1 \cdot kips$

$C_4 = 28.0 \cdot kips$ $C_{10} = -26.0 \cdot kips$

$C_5 = 16.6 \cdot kips$ $C_{11} = -14.6 \cdot kips$

$C_6 = 1.0 \cdot kips$ $C_{12} = 1.0 \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} t_{bp}^2\right)} = 13.9 \cdot ksi$$

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

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 27.8 \cdot \%$

Condition3 = $Condition2 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition2 = "Ok"

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 6179 \cdot ft \cdot kips$	(Input From RisaTower)
Shear Force =	$Shear := 59 \cdot kips$	(Input From RisaTower)
Axial Force =	$Axial := 56 \cdot kips$	(Input From RisaTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	$N := 24$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Base Plate Data:

Use ASTM A572 Gr. 55

Plate Yield Strength =	$Fy_{bp} := 55 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{bp} := 3.25 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 36.875in$ (User Input)

$d_2 := 35.75in$ (User Input)

$d_3 := 33.75in$ (User Input)

$d_4 := 15.125in$ (User Input)

$d_5 := 9.375in$ (User Input)

$d_6 := 3.0in$ (User Input)

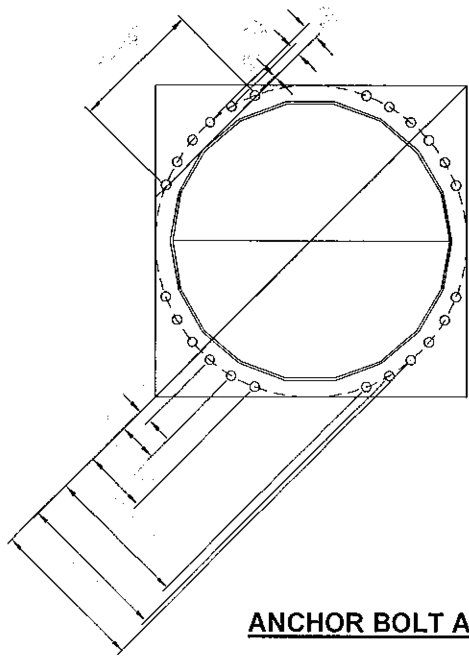
Critical Distances For Bending in Plate:

$ma_1 := 3.5in$ (User Input)

$ma_2 := 2.375in$ (User Input)

$ma_3 := 0.375in$ (User Input)

Effective Width of Baseplate for Bending = $B_{eff} := 30.875in$ (User Input)



ANCHOR BOLT AND PLATE GEOMETRY

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \left[(d_1)^2 \cdot 4 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 4 + (d_4)^2 \cdot 4 + (d_5)^2 \cdot 4 + (d_6)^2 \cdot 4\right] = 16410 \cdot in^2$

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

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

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

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

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

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_1}{I_p} - \frac{Axial}{N} = 164.3 \cdot kips$

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

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

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 84.3 \cdot \%$ Bolts are "upset bolts". Use net area per AISC

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

Condition1 = "OK" Note Shear stress is negligible

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N}\right) \cdot l = 0.615 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 8.9 \cdot ksi$

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

Check Combined Stress Requirement:

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

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

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

Check Anchor Bolt Compression/Combined Stress:

Applied Compressive Force = $C_{Max} := OM \cdot \frac{d_1}{I_p} + \frac{Axial}{N} = 168.9 \cdot kips$

Applied Compressive Stress = $f_a := \frac{C_{Max}}{A_n} = 52 \cdot ksi$

$K := 0.65$

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

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

Allowable Compressive Stress = $F_a := 1.333 \cdot F_a = 60 \cdot ksi$ (1.333 increase allowed per TIA/EIA)

Combined Stress % of Capacity = $\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) = 86.7 \cdot \%$

Condition 2 = $Condition2 := if\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts = $C_1 := \frac{OM \cdot d_1}{I_p} + \frac{Axial}{N} = 168.95 \cdot kips$

$C_2 := \frac{OM \cdot d_2}{I_p} + \frac{Axial}{N} = 163.867 \cdot kips$

$C_3 := \frac{OM \cdot d_3}{I_p} + \frac{Axial}{N} = 154.83 \cdot kips$

Applied Bending Stress in Plate = $f_{bp} := \frac{6 \cdot (2C_1 \cdot ma_1 + 2C_2 \cdot ma_2 + 2C_3 \cdot ma_3)}{B_{eff} \cdot t_{bp}^2} = 38.22 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 54.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 69.7 \cdot \%$

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

Condition3 = "Ok"

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 6179 \cdot ft \cdot kips$	(User Input from RISATower)
Shear Force =	$Shear := 59 \cdot kip$	(User Input from RISATower)
Axial Force =	$Axial := 56 \cdot kip$	(User Input from RISATower)
Tower Height =	$H_t := 145 \cdot ft$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 9.0 \cdot ft$	(User Input)
Length of Pier =	$L_p := 5.5 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)
Diameter of Pier =	$d_p := 8.0 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 4 \cdot ft$	(User Input)
Width of Footing =	$W_f := 31.5 \cdot ft$	(User Input)
Water Depth Below Grade =	$WD := 3.5 \cdot ft$	(User Input)

Anchor Bolt Data:

Length of Anchor Bolts =	$L_{st} := 96 \cdot in$	(User Input)
Projection of Anchor Bolts Above Pier =	$A_{BP} := 12 \cdot in$	(User Input)
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)
Base Plate Bolt Circle =	$MP := 74.0 \cdot in$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 1$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 11$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.41 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 60$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 11$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.41 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 48$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 11$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.41 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 48$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 1.561 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 1.561 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 1.561 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$

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

Adjusted Concrete Unit Weight = $\gamma_c := \text{if}(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 87.6 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 57.6 \cdot pcf$

Stability of Footing:

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 0.864 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 0.864 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.555 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.21 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 4$

$A_p := W_f \cdot T_p = 126$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 152.41 \cdot kip$

Weight of the Concrete Pier = $WTc_{pier} := \begin{cases} d_p^2 \cdot (L_p - L_{pag} - WD) \cdot \gamma_c + d_p^2 \cdot (L_{pag} + WD) \cdot \gamma_{conc} & \text{if } (D_f - T_f) > WD \\ d_p^2 \cdot (L_p) \cdot \gamma_{conc} & \text{if } D_f - T_f \le WD \end{cases} = 46.8 \cdot kips$

Weight of the Concrete Pad = $WTc_{pad} := \begin{cases} W_f^2 \cdot T_f \cdot \gamma_c & \text{if } (D_f - T_f) > WD \\ W_f^2 \cdot (D_f - WD) \cdot \gamma_c + W_f^2 \cdot [WD - (D_f - T_f)] \cdot \gamma_{conc} & \text{if } D_f - T_f \le WD < D_f \\ W_f^2 \cdot T_f \cdot \gamma_{conc} & \text{if } D_f \le WD \end{cases} = 347.7 \cdot kips$

Weight of the Soil Above Footing = $WT_{soil1} := \begin{cases} (W_f^2 - d_p^2) \cdot (D_f - T_f - WD) \cdot \gamma_s + (W_f^2 - d_p^2) \cdot (WD) \cdot \gamma_{soil} & \text{if } (D_f - T_f) > WD \\ \left[(W_f^2 - d_p^2) \cdot (|L_p - L_{pag} - n|)\right] \cdot \gamma_{soil} & \text{if } D_f - T_f \le WD \end{cases} = 470.1 \cdot kips$

Weight of the Soil Wedge at Back Face = $WT_{soil2} := \begin{cases} (WD) \tan(\Phi_s) \cdot (D_f - T_f - 0.5 \cdot WD) \cdot W_f \cdot \gamma_{soil} + \left[\frac{(D_f - T_f - WD)^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right] \cdot \gamma_s & \text{if } (D_f - T_f) > WD \\ \left[\frac{(D_f - T_f)^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right] \cdot \gamma_{soil} & \text{if } (D_f - T_f) \le WD \end{cases} = 26 \cdot kips$

Total Weight = $WT_{tot} := WTc_{pier} + WTc_{pad} + WT_{soil1} + Axial = 920.6 \cdot kips$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + \left[(WT_{soil2}) \cdot \left[W_f + \frac{(D_f - T_f) \cdot \tan(\Phi_s)}{3}\right]\right] = 15546 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + Shear \cdot (L_p + T_f) = 6740 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.31$

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

OverTurning_Moment_Check := if(FS ≥ FS_{req}, "Okay", "No Good")

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 283.331 \cdot kips$

Shear_Check := if(S_p > Shear, "Okay", "No Good")

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^2 = 992.25$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 5209.31 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.221 \cdot ksf$

Max_Pressure_Check := if($P_{max} < q_s$, "Okay", "No Good")

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.366 \cdot ksf$

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

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.015$

Distance to Kern = $X_k := \frac{W_f}{6} = 5.25$

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

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 7.321$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.311 \cdot ksf$

$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 2.311 \cdot ksf$

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

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.2 \times 10^4 \cdot kips$ (ACI-2008 10.14)

Bearing_Check := if(P_b > LF·Axial, "Okay", "No Good")

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot}$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$

$V_{req} := LF \cdot \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d$ (ACI-2008 11.2.1.1)

Beam_Shear_Check := if(V_req < V_Avail, "Okay", "No Good")

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 36.5$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 106.3$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 886$

Guess Value = $v_u := 1ksf$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := \text{Find}(v_u) = 6.9 \cdot ksf$

$V_u := v_u \cdot d \cdot W_f = 793.5 \cdot kips$

Required Shear Strength = $V_{req} := LF \cdot V_u = 1.1 \times 10^3 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 3559.8 \cdot kip$ (ACI-2008 11.11.2.1)

Punching_Shear_Check := if($V_{req} < V_{Avail}$, "Okay", "No Good")

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$q_b := q_{adj} - d_1 \cdot Slope = 1.237 \cdot ksf$

Maximum Bending at Face of Pier = $M_n := \frac{1}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 4719.6 \cdot kip \cdot ft$

$$\beta := \begin{cases} 0.85 \text{ if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 \text{ if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000 \right)}{1000} \right] \cdot 0.5 \right] \text{ otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$$R_u := \frac{M_n}{\phi_m \cdot W_f \cdot d^2} = 87.6 \cdot psi$$

$$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_u}{0.85 \cdot f_c}} \right) = 0.0015$$

$$\rho_{min} := 1.333 \cdot \rho = 0.00198$$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \ge 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases}$$ (ACI -2008 7.12.2.1)

Check Bottom Bars:

$$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 32.644 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 74.9 \cdot in^2$$

Pad_Reinforcement_Bot := if(As$_{prov}$ > As, "Okay", "No Good")

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := \rho_{sh} \cdot \left(W_f \cdot \frac{d}{2} \right) = 14.8 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 74.9 \cdot in^2$$

Pad_Reinforcement_Top := if(As$_{prov}$ > As, "Okay", "No Good")

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 6.47 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2} \right) = 3 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0$$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 54.4 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in$$ (ACI-2008 12.2.1)

$L_{dbtCheck}$:= if($L_{dbt} \ge L_{dbmin}$, "Use L.dbt", "Use L.dbmin")

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 138 \cdot in$$

Lpad_Check := if($L_{Pad} > L_{dbt}$, "Okay", "No Good")

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 7238.23 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.05 \cdot A_p = 3.62 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 93.69 \cdot in^2$

Steel_Area_Check := if($A_{sprov} > A_{smin}$, "Okay", "No Good")

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 3.617 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 90 \cdot in$

Maximum Moment in Pier = $M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] \cdot LF = 1 \times 10^5 \cdot in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

$$\begin{pmatrix} D & N & n & P_u & M_{xu} \end{pmatrix} := \begin{pmatrix} d_p \cdot 12 & NB_{pier} & BS_{pier} & \frac{Axial \cdot 1.333}{kips} & \frac{M_p}{in \cdot kips} \end{pmatrix}$$

$$\begin{pmatrix} D & N & n & P_u & M_{xu} \end{pmatrix} = \begin{pmatrix} 96 & 60 & 11 & 74.6 & 1 \times 10^5 \end{pmatrix}$$

$$\begin{pmatrix} \phi P_n & \phi M_{xn} & f_{sp} & \rho \end{pmatrix} := \begin{pmatrix} 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} \phi P_n & \phi M_{xn} & f_{sp} & \rho \end{pmatrix} := \phi P'_n(D, N, n, P_u, M_{xu})^T$$

$$\begin{pmatrix} \phi P_n & \phi M_{xn} & f_{sp} & \rho \end{pmatrix} = \begin{pmatrix} 136 & 1.9 \times 10^5 & -60 & 0 \end{pmatrix}$$

Axial_Load_Check := if($\phi P_n \geq P_u$, "Okay", "No Good")

Axial_Load_Check = "Okay"

Bending_Check := if($\phi M_{xn} \geq M_{xu}$, "Okay", "No Good")

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$$L_{pier} := L_p - Cvr_{pier} = 63 \cdot in$$

$$L_{pad} := T_f - Cvr_{pad} = 45 \cdot in$$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 1.808 \cdot in$$

Transverse Reinforcement =

$$k_{tr} := 0$$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 90.33 \cdot in$$

Minimum Development Length =

$$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 21.624 \cdot in$$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$$L_{db} := max\left(L_{dbt}, L_{dbmin}\right)$$

$$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, \text{"Okay"}, \text{"No Good"}\right)$$

$$L_{tension\_Check} = \text{"Okay"}$$

Compression: (ACI-2008 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 30.892 \cdot in$$

$$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 25.38 \cdot in$$

$$L_{dbc} := if\left(L_{dbc1} \ge L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 30.892 \cdot in$$

$$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, \text{"Okay"}, \text{"No Good"}\right)$$

$$L_{compression\_Check} = \text{"Okay"}$$

Tie Size and Spacing in Column:

Minimum Tie Size = $Tie_{min} := if(BS_{pier} \le 10, 3, 4) = 4$

Used #3 Ties

Seismic Factor = $z := if(Z \le 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 22.56 \cdot in$

$$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 18 \cdot in$$

$s_{lim3} := D_f \cdot z = 108 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing = $s_{tie} := min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) = 18 \cdot in$

Number of Ties Required = $n_{tie} := \dfrac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 4.333$

Check Anchor Steel Embedment:

Depth Available = $D_{ab} := L_{st} - A_{BP} = 7 \cdot ft$

Length of Anchor Bolt = $L_{anchor} := \dfrac{(0.11 \cdot f_{ya}) \cdot in}{\sqrt{f_c \cdot psi}} = 12.552 \cdot ft$

$Depth\_Check := if(D_{ab} \ge L_{anchor}, \text{"Okay"}, \text{"No Good"})$

$Depth\_Check = \text{"No Good"}$

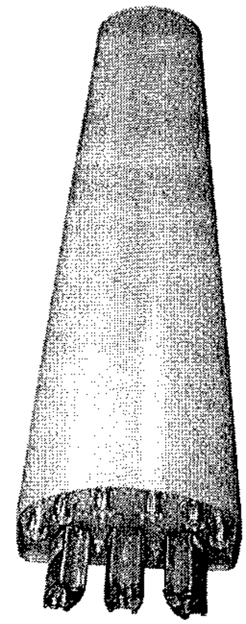
Note: Anchor plate is provided

Product Data Sheet | APXVSPP18-C

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

Product Description

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



Features/Benefits

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

Technical Specifications

Electrical Specifications

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

Mechanical Specifications

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

Ordering Information

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

Sprint

NETWORK VISION MMBTS LAUNCH
CONNECTICUT MARKET

SITE NAME

VERIZON (REGIONAL REFUSE)

SITE NUMBER

CT33XC113

SITE ADDRESS

31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

STRUCTURE TYPE

145' MONOPOLE TOWER

UNDERGROUND SERVICE ALERT
CALL TOLL FREE
1-800-922-4455
THREE WORKING DAYS BEFORE YOU DIG

SHEET INDEX

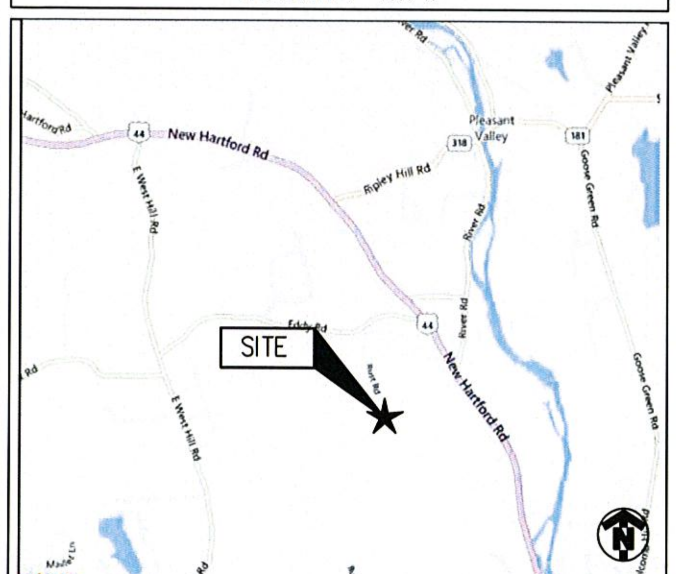
NO.	DESCRIPTION
T1	TITLE SHEET
AAV1	OVERALL AND ENLARGED SITE PLANS
AAV2	NOTES AND DETAILS
C1	GENERAL NOTES
C2	COMPOUND SITE PLAN / SITE ELEVATION
C3	EQUIPMENT SITE PLANS
C4	ANTENNA/RRH DETAILS
C5	ANTENNA PLANS
C6	ANTENNA CABLE RISER DETAILS
C7	RF AND CABLE DETAILS
C8	JUNCTION BOX DETAILS
C9	DETAILS
E1	UTILITY SITE PLAN
E2	ONE-LINE DIAGRAMS AND DETAILS
E3	GROUNDING PLAN AND DETAILS

DRIVING DIRECTIONS

DEPART FROM SPRINT:
1 INTERNATIONAL BLVD. MAHWAH, NJ 07495

1. DEPART INTERNATIONAL BLVD TOWARD CHURCHHILL RD
2. EXIT ROUNDABOUT AT 3RD EXIT ONTO LEISURE LN
3. TAKE RAMP RIGHT ONTO RT-17 NORTH
4. BEAR RIGHT ONTO I-287 NORTH/RT-17 NORTH
5. TAKE RAMP RIGHT FOR I-87 S/I-287 TOWARD NYC/TAPPAN ZEE
6. BEAR RIGHT ONTO I-87 SOUTH/NYS THRUWAY SOUTH
7. AT EXIT #8A, TAKE RAMP RIGHT FOR SAW MILL RIVER PKWY NORTH TOWARD KATONAH
8. TAKE RAMP LEFT FOR I-684 TOWARD BREWSTER
9. AT EXIT #9E, TAKE RAMP RIGHT FOR I-84 EAST TOWARD DANBURY, KEEP RIGHT TO STAY ON I-84 EAST/US-6 EAST
10. AT EXIT #20, TAKE RAMP LEFT FOR CT-8 NORTH TOWARD TORRINGTON – GO 28.1 MI
11. TAKE RAMP FOR CT-183 SOUTH / US-44 EAST TOWARD NEW HARTFORD – GO 0.2 MI
12. TURN LEFT ONTO US-44/CT-8/CT-183/S MAIN ST – GO 3.9 MI
13. TURN RIGHT ONTO EDDY ROAD – GO 0.3 MI
14. TURN LEFT ONTO OLD COUNTY RD, AND IMMEDIATELY RIGHT ONTO RUST RD
15. FOLLOW TO END OF ROAD – ARRIVE AT SITE

VICINITY MAP



PROJECT TEAM

ALCATEL•LUCENT
808 AVIATION PARKWAY
SUITE 700
MORRISVILLE, NC 27650

PROJECT MANAGER

infinigy engineering
11 Herbert Drive
Latham, NY 12110
OFFICE #: (518) 690-0790
FAX #: (518) 690-0793

ENGINEER

SCOPE OF WORK:

- HANDICAP ACCESS REQUIREMENTS ARE NOT REQUIRED
- FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
- FACILITY HAS NO PLUMBING OR REFRIGERANTS
- THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATORY REQUIREMENTS
- ALL NEW MATERIAL SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR UNLESS NOTED OTHERWISE. CABINETS, ANTENNAS/RRU AND CABLES FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR
- INSTALL NEW ANTENNAS/RRH'S ON EXISTING TOWER
- INSTALL NEW BTS OR RETROFIT EXISTING BTS IN EXISTING EQUIPMENT AREA
- REMOVE EXISTING CDMA ANTENNAS AND COAX CABLES
- SPRINT TO REPLACE EXISTING POWER CABINET WITH NEW SECOND BATTERY CABINET OR INSTALL NEW SECOND BATTERY CABINET IF THERE IS AVAILABLE SPACE IN EXISTING SPRINT LEASE AREA.

PROJECT SUMMARY

SITE NAME:	VERIZON (REGIONAL REFUSE)
SITE NO.:	CT33XC113
SITE ADDRESS:	31 NEW HARTFORD ROAD BARKHAMSTED, CT 06063
COUNTY:	LITCHFIELD
SITE COORDINATES:	
LATITUDE:	41.893677 N (NAD 83)
LONGITUDE:	72.996483 W (NAD 83)
GROUND ELEV.:	±792' (AMSL)
JURISDICTION:	CONNECTICUT SITING COUNCIL & TOWN OF BARKHAMSTED
APPLICANT:	SPRINT 1 INTERNATIONAL BLVD. MAHWAH, NJ 07495
LAND OWNER:	REGIONAL REFUSE DISPOSAL DISTRICT ONE P.O. BOX 306 PLEASANT VALLEY, CT 06063
CONSTRUCTION MANAGER:	TODD AMANN 914-715-9363
BUILDING CODE:	2003 INTERNATIONAL BUILDING CODE 2005 CONNECTICUT BUILDING CODE W/ 2009 AMENDMENT
ELECTRICAL CODE:	2005 NATIONAL ELECTRIC CODE

ENGINEER'S LICENSE

CERTIFICATION STATEMENT:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF CONNECTICUT.

LICENSED ENGINEER – STATE OF CONNECTICUT

STATE OF CONNECTICUT · JOHN S. STEVENS · No. 24705 · LICENSED PROFESSIONAL ENGINEER

APPROVALS

SPRINT CONST.		DATE
ALU RF		DATE
ALU LEASING/SITE ACQ.		DATE
IN-MARKET CONSTRUCTION LEAD		DATE
SITE OWNER	NAME/COMPANY: TITLE:	DATE

A/E Consultant:
infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

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No.	Submittal / Revision	App'd	Date
0	FINAL CDs	·	12/3/12
B	ISSUED FOR REVIEW	·	5/23/12
A	ISSUED FOR REVIEW	·	4/13/12

Drawn: SEP Date: 4/13/12
Designed: · Date: ·
Checked: · Date: ·

Project Number: 286-043

Project Title:
CT33XC113
VERIZON
(REGIONAL REFUSE)
31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client:
Sprint
3401 INTERNATIONAL AIRPORT DRIVE
CHARLOTTE, NC 28208

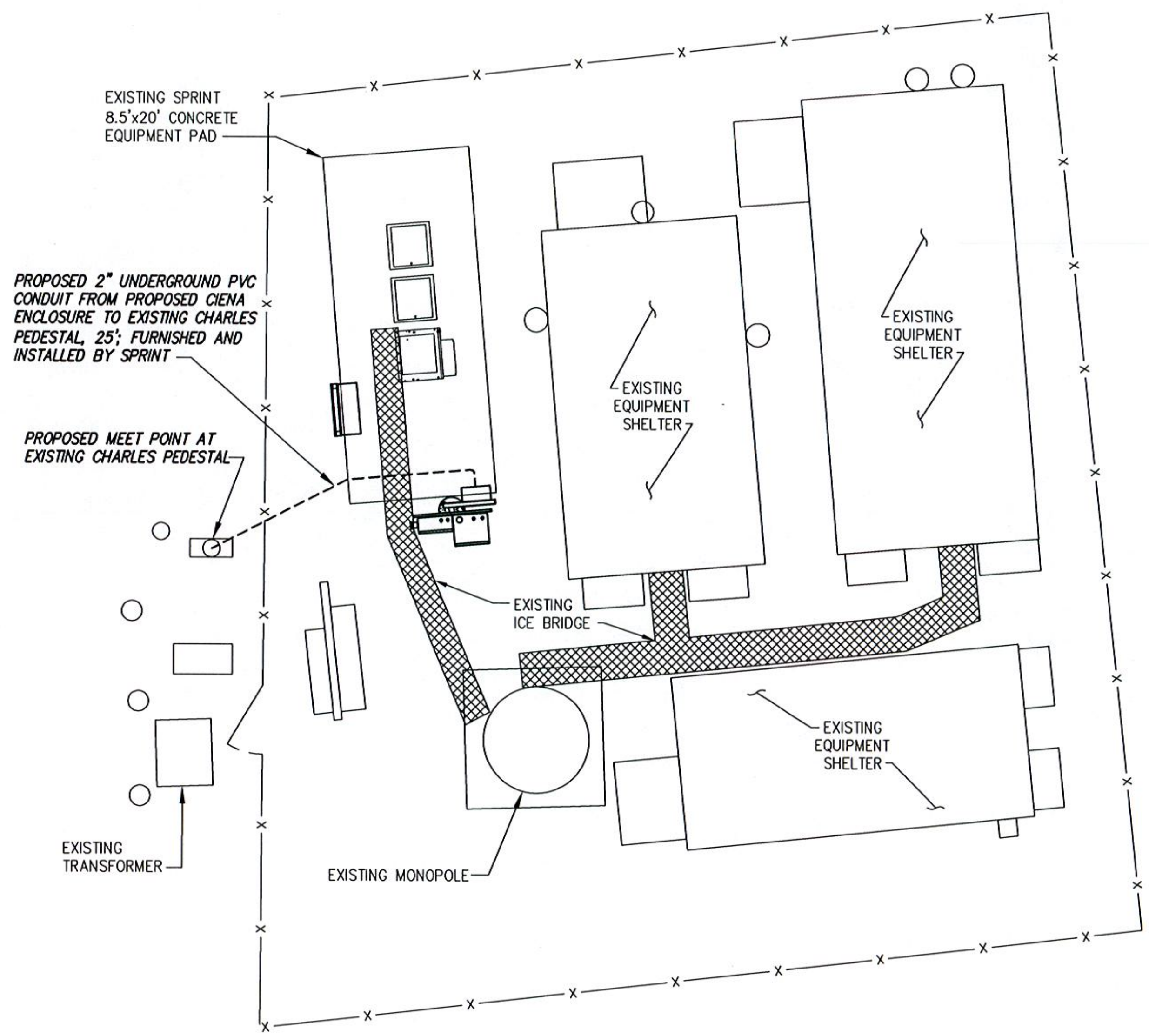
Implementation Team:
ALCATEL•LUCENT
808 AVIATION PARKWAY
SUITE 700
MORRISVILLE, NC 27650

Drawing Scale: AS NOTED

Date: 12/03/12

Drawing Title: TITLE SHEET

Drawing Number: T1



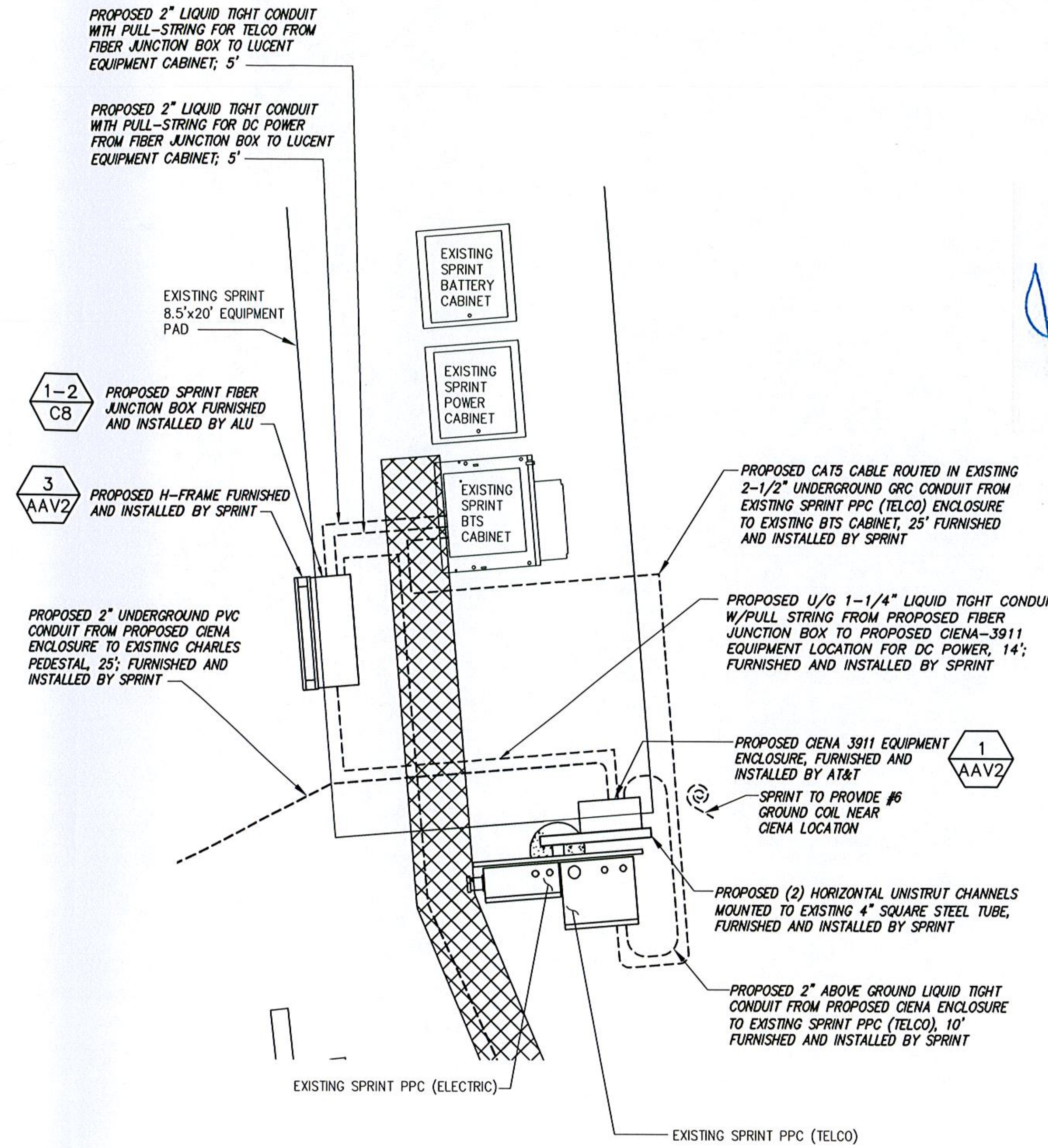
BASEMAPPING PREPARED FROM A SITE VISIT PERFORMED BY INFINIGY ENGINEERING, AND INFORMATION PROVIDED BY SPRINT NEXTEL, AND DOES NOT REPRESENT AN ACTUAL FIELD SURVEY.

CALLED NORTH

1 — OVERALL SITE PLAN

SCALE: 2.5' 0 2.5' 5' 10' (IN FEET)

SCALE: 24"X 36" SHEET 1"= 5'
SCALE: 11"X 17" SHEET 1"= 10'



CALLED NORTH

1 — EQUIPMENT AREA

SCALE: 1' 0 1' 2' 4' (IN FEET)

SCALE: 24"X 36" SHEET 1"= 2'
SCALE: 11"X 17" SHEET 1"= 4'

A/E Consultant:

infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

STATE OF CONNECTICUT — JOHN S. STEVENS — No. 24705 — LICENSED PROFESSIONAL ENGINEER

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Drawn: SEP Date: 4/13/12
Designed: - Date: -
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Project Number: 286-043

Project Title:
CT33XC113
VERIZON
(REGIONAL REFUSE)

31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client: Sprint — 3401 INTERNATIONAL AIRPORT DRIVE CHARLOTTE, NC 28208

Implementation Team: ALCATEL·LUCENT — 808 AVIATION PARKWAY SUITE 700 MORRISVILLE, NC 27650

Drawing Scale: AS NOTED

Date: 12/03/12

Drawing Title:
OVERALL & ENLARGED SITE PLANS

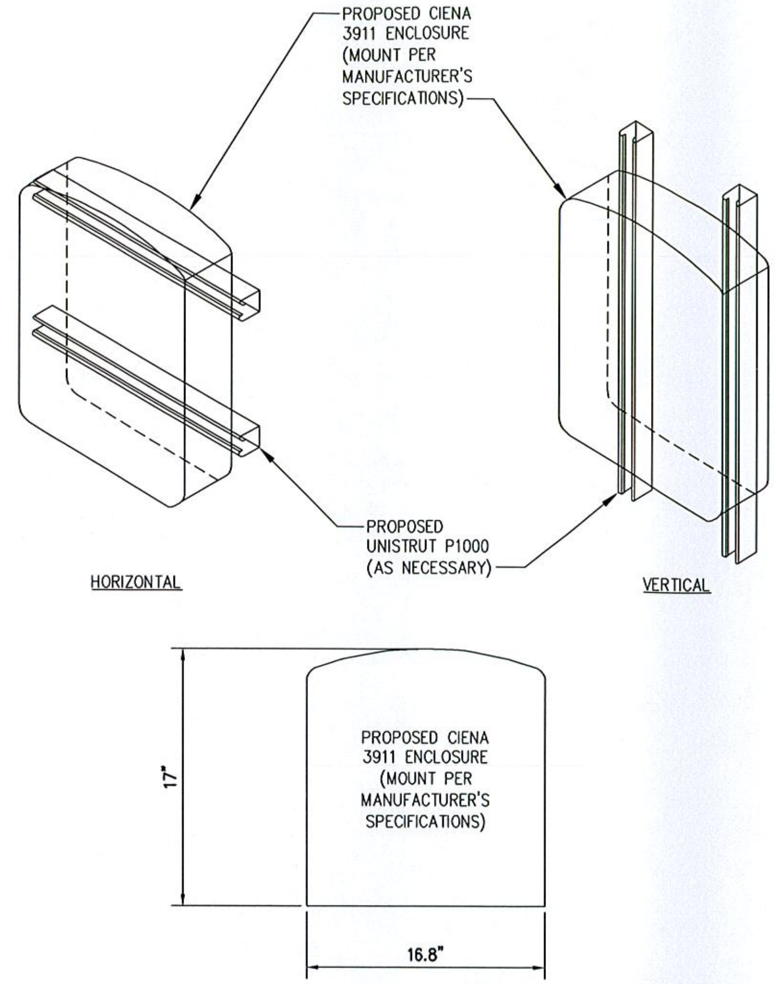
Drawing Number:
AAV1

GENERAL NOTES:

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.
4. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OF PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
5. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS/CONTRACT DOCUMENTS.
6. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S/VENDORS SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
7. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
8. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
10. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
11. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
12. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.
13. THE CONTRACTOR SHALL NOTIFY THE REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE REPRESENTATIVE.
14. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.
15. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD OR VIA A REPRESENTATIVE. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK. SEE UNDERGROUND UTILITY COMPANY SHEET T-1 (DIG SAFE, MISS UTILITY, ETC.)
16. IF ASSUMED EXISTING CONDITION DIFFERS, ENGINEER MUST BE INFORMED OF ACTUAL FIELD CONDITION.
17. REFER TO THE SITE PLAN FOR APPROXIMATE LENGTH OF ALL U/G WORK AND LOCATION. FINAL LOCATION TO BE DETERMINED BY CLIENT. ALL MATERIALS TO BE USED AS ACCORDING TO DETAIL INSTRUCTIONS. ALL MATERIALS NOT INCLUDED IN THE DETAILS SHALL BE USED ACCORDING TO CODE AND/OR LOCAL JURISDICTION REGULATIONS INCLUDING MATERIALS, PREPARATION, EXACERBATION, EQUIPMENT AND INSTALLATION FOR UNDERGROUND WORK.
18. CONTRACTOR TO COORDINATE WITH SPRINT & PROVIDE GROUND BOND PER NE-250 & SPRINT STANDARDS FOR CLIENT EQUIPMENT AS REQUIRED.
19. ALL ELECTRICAL SPECIFICATIONS SHALL BE IN STRICT ACCORDANCE TO SECTIONS 16010, 16075, 16110, 16120, 16410 AND 16450 OF THE N.E.C.

ELECTRICAL AND GROUNDING NOTES:

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AN PROCURED PER SPECIFICATION REQUIREMENTS. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
3. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIREMENT IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS
4. PROVISION OF AC/DC POWER IS UNDER SEPARATE SCOPE OF WORK
5. GROUNDING SHALL COMPLY WITH NEC ART. 250. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION FITTINGS. TEST COMPLETED GROUND SYSTEM AND ENSURE ADEQUACY.
6. CONTRACTOR TO PROVIDE GALV. P1000 UNISTRUT FRAMING AND 3/8" GALV. U-BOLTS/BOLTS AS NECESSARY FOR EXISTING CONDITIONS AND TO VERIFY SPACE IS APPROVED BY ALL NECESSARY PARTIES.



1 TYPICAL CIENA 3911 MOUNTING DETAIL
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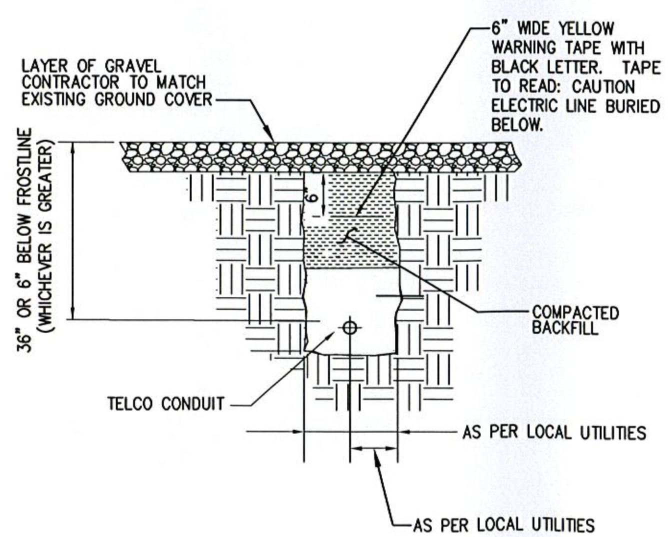

NOTE:
NUMBER AND SIZE OF CONDUITS MAY VARY. SEE DWG FOR CONDUIT SIZE AND LOCATION. CONFIRM CONDUIT SEPARATION AND DIMENSIONS SHOWN WITH LOCAL UTILITY COMPANY.

2 CONDUIT TRENCH DETAIL
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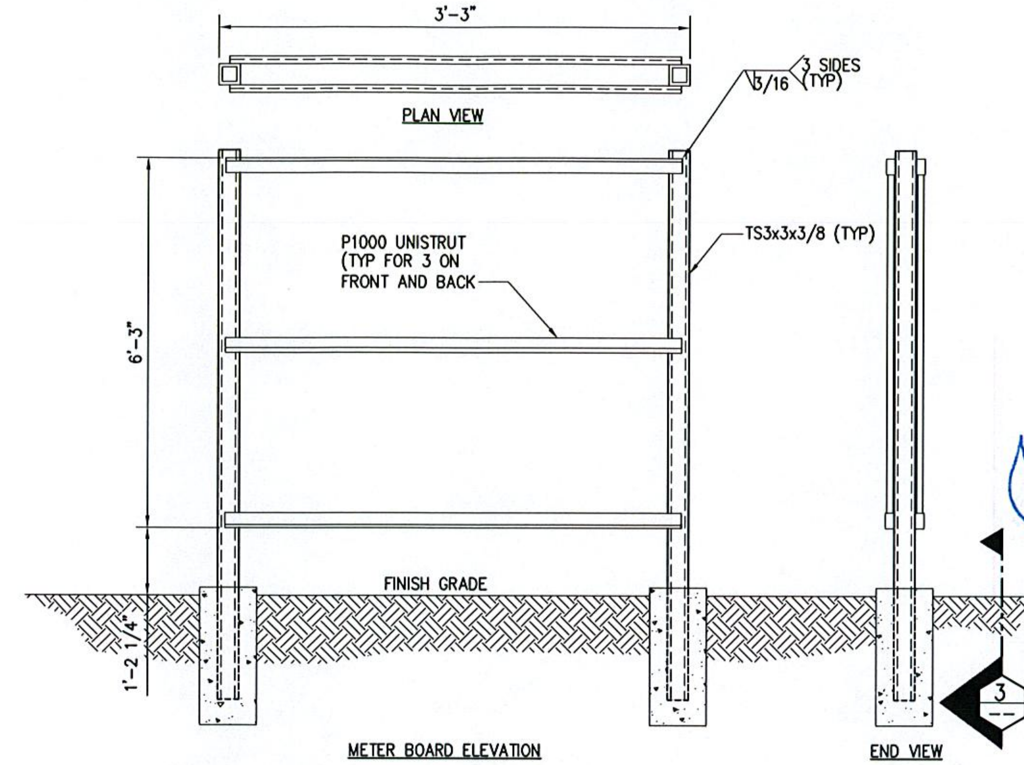
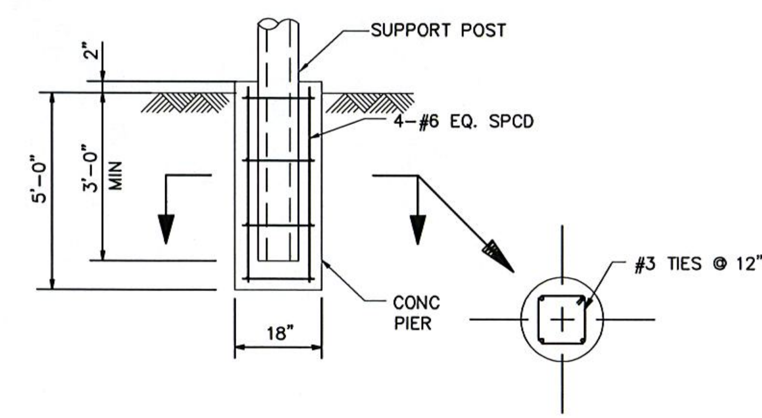


3 3'-0" WIDE H-FRAME FABRICATION DETAIL
NOT TO SCALE



4 SUPPORT PIER
NOT TO SCALE

A/E Consultant:

infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
LICENSED PROFESSIONAL ENGINEER

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Project Number
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Project Title

CT33XC113
VERIZON
(REGIONAL REFUSE)

31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client:
Sprint
6391 INTERNATIONAL AIRPORT DRIVE CHARLOTTE, NC 28208

Implementation Team:
ALCATEL-LUCENT
808 AVIATION PARKWAY SUITE 700 MORRISVILLE, NC 27650

Drawing Scale:
AS NOTED

Date:
12/03/12

Drawing Title

NOTES & DETAILS

Drawing Number

AAV2

GENERAL NOTES

PART 1 – GENERAL REQUIREMENTS

1.1 THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL 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. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE – "NEC").
D. AND NFPA 101 (LIFE SAFETY CODE).
E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM).
F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE).

1.2 DEFINITIONS:

A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
B. COMPANY: SPRINT NEXTEL CORPORATION
C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
D. CONTRACTOR: CONSTRUCTION CONTRACTOR; 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.

1.3 POINT OF CONTACT: COMMUNICATION BETWEEN THE COMPANY AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE COMPANY SITE DEVELOPMENT SPECIALIST OR OTHER PROJECT COORDINATOR APPOINTED TO MANAGE THE PROJECT FOR THE COMPANY.

1.4 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.

1.5 DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE: THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS, STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES, AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.

A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN 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.

1.6 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.

1.7 NOTICE TO PROCEED:

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

PART 2 – EXECUTION

2.1 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 LESSORS OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN THE CONTRACT DOCUMENTS.

2.2 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.

2.3 TESTING: REQUIREMENTS FOR TESTING BY THIS CONTRACTOR SHALL BE AS INDICATED HEREWITH, ON THE CONSTRUCTION DRAWINGS, AND IN THE INDIVIDUAL SECTIONS OF THESE SPECIFICATIONS. SHOULD COMPANY CHOOSE TO ENGAGE ANY THIRD-PARTY TO CONDUCT ADDITIONAL TESTING, THE CONTRACTOR SHALL COOPERATE WITH AND PROVIDE A WORK AREA FOR COMPANY'S TEST AGENCY.

2.4 COMPANY FURNISHED MATERIAL AND EQUIPMENT: ALL HANDLING, STORAGE AND INSTALLATION OF COMPANY FURNISHED MATERIAL AND EQUIPMENT SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.

A. CONTRACTOR SHALL PROCURE ALL OTHER REQUIRED WORK RELATED MATERIALS NOT PROVIDED BY SPRINT NEXTEL TO SUCCESSFULLY CONSTRUCT A WIRELESS FACILITY.

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

2.6 EXISTING CONDITIONS: NOTIFY THE COMPANY REPRESENTATIVE 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.

PART 3 – RECEIPT OF MATERIAL & EQUIPMENT

3.1 RECEIPT OF MATERIAL AND EQUIPMENT: CONTRACTOR IS RESPONSIBLE FOR SPRINT NEXTEL PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:

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

PART 4 – GENERAL REQUIREMENTS FOR CONSTRUCTION

4.1 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.

4.2 EQUIPMENT ROOMS SHALL AT ALL TIMES BE MAINTAINED "BROOM CLEAN" AND CLEAR OF DEBRIS.

4.3 CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO DISCOVER AND LOCATE ANY HAZARDOUS CONDITION.

A. 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.
B. 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.

4.4 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

4.5 CONDUCT TESTING AS REQUIRED HEREIN.

PART 5 – TESTS AND INSPECTIONS

5.1 TESTS AND INSPECTIONS:

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
B. CONTRACTOR SHALL COORDINATE TEST AND INSPECTION SCHEDULES WITH COMPANY'S REPRESENTATIVE WHO MUST BE ON SITE TO WITNESS SUCH TESTS AND INSPECTIONS.
C. WHEN THE USE OF A THIRD PARTY INDEPENDENT TESTING AGENCY IS REQUIRED, THE AGENCY THAT IS SELECTED MUST PERFORM SUCH WORK ON A REGULAR BASIS IN THE STATE WHERE THE PROJECT IS LOCATED AND HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
D. THE THIRD PARTY TESTING 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.
E. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
F. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS. HYBRIFLEX TESTING NOT LIMITED TO COAX SWEEPS.
G. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

PART 6 – TRENCHING AND BACKFILLING

6.1 TRENCHING AND BACKFILLING: THE CONTRACTOR SHALL PERFORM ALL EXCAVATION OF EVERY DESCRIPTION AND OF WHATEVER SUBSTANCES ENCOUNTERED, TO THE DEPTHS INDICATED ON THE CONSTRUCTION DRAWINGS OR AS OTHERWISE SPECIFIED.

A. PROTECTION OF EXISTING UTILITIES: THE CONTRACTOR SHALL CHECK WITH THE LOCAL UTILITIES AND THE RESPECTIVE UTILITY LOCATOR COMPANIES PRIOR TO STARTING EXCAVATION OPERATIONS IN EACH RESPECTIVE AREA TO ASCERTAIN THE LOCATIONS OF KNOWN UTILITY LINES. THE LOCATIONS, NUMBER AND TYPES OF EXISTING UTILITY LINES DETAILED ON THE CONSTRUCTION DRAWINGS ARE APPROXIMATE AND DO NOT REPRESENT EXACT INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL LINES DAMAGED DURING EXCAVATION AND ALL ASSOCIATED OPERATIONS. ALL UTILITY LINES UNCOVERED DURING THE EXCAVATION OPERATIONS, SHALL BE PROTECTED FROM DAMAGE DURING EXCAVATION AND ASSOCIATED OPERATIONS. ALL REPAIRS SHALL BE APPROVED BY THE UTILITY COMPANY.
B. HAND DIGGING: UNLESS APPROVED IN WRITING OTHERWISE, ALL DIGGING WITHIN AN EXISTING CELL SITE COMPOUND IS TO BE DONE BY HAND.
C. DURING EXCAVATION, MATERIAL SUITABLE FOR BACKFILLING SHALL BE STOCKPILED IN AN ORDERLY MANNER A SUFFICIENT DISTANCE FROM THE BANKS OF THE TRENCH TO AVOID OVERLOADING AND TO PREVENT SLIDES OR CAVE-INS. ALL EXCAVATED MATERIALS NOT REQUIRED OR SUITABLE FOR BACKFILL SHALL BE REMOVED AND DISPOSED OF AT THE CONTRACTOR'S EXPENSE.
D. GRADING SHALL BE DONE AS MAY BE NECESSARY TO PREVENT SURFACE WATER FROM FLOWING INTO TRENCHES OR OTHER EXCAVATIONS, AND ANY WATER ACCUMULATING THEREIN SHALL BE REMOVED BY PUMPING OR BY OTHER APPROVED METHOD.
E. SHEETING AND SHORING SHALL BE DONE AS NECESSARY FOR THE PROTECTION OF THE WORK AND FOR THE SAFETY OF PERSONNEL. UNLESS OTHERWISE INDICATED, EXCAVATION SHALL BE BY OPEN CUT, EXCEPT THAT SHORT SECTIONS OF A TRENCH MAY BE TUNNELED IF, THE CONDUIT CAN BE SAFELY AND PROPERLY INSTALLED AND BACKFILL CAN BE PROPERLY TAMPED IN SUCH TUNNEL SECTIONS. EARTH EXCAVATION SHALL COMPRISE ALL MATERIALS AND SHALL INCLUDE CLAY, SILT, SAND, MUCK, GRAVEL, HARDPAN, LOOSE SHALE, AND LOOSE STONE.
F. TRENCHES SHALL BE OF NECESSARY WIDTH FOR THE PROPER LAYING OF THE CONDUIT OR CABLE, AND THE BANKS SHALL BE AS NEARLY VERTICAL AS PRACTICABLE. THE BOTTOM OF THE TRENCHES SHALL BE ACCURATELY GRADED TO PROVIDE UNIFORM BEARING AND SUPPORT FOR EACH SECTION OF THE CONDUIT OR CABLE ON UNDISTURBED SOIL AT EVERY POINT ALONG ITS ENTIRE LENGTH. EXCEPT WHERE ROCK IS ENCOUNTERED, CARE SHALL BE TAKEN NOT TO EXCAVATE BELOW THE DEPTHS INDICATED. WHERE ROCK EXCAVATIONS ARE NECESSARY, THE ROCK SHALL BE EXCAVATED TO A MINIMUM OVER DEPTH OF 6 INCHES BELOW THE TRENCH DEPTHS INDICATED ON THE CONSTRUCTION DRAWINGS OR SPECIFIED. OVER DEPTHS IN THE ROCK EXCAVATION AND UNAUTHORIZED OVER DEPTHS SHALL BE THOROUGHLY BACK FILLED AND TAMPED TO THE APPROPRIATE GRADE. WHENEVER WET OR OTHERWISE UNSTABLE SOIL THAT IS INCAPABLE OF PROPERLY SUPPORTING THE CONDUIT OR CABLE IS ENCOUNTERED IN THE BOTTOM OF THE TRENCH, SUCH SOLID SHALL BE REMOVED TO A MINIMUM OVER DEPTH OF 6 INCHES AND THE TRENCH BACKFILLED TO THE PROPER GRADE WITH EARTH OF OTHER SUITABLE MATERIAL, AS HEREINAFTER SPECIFIED.
G. BACKFILLING OF TRENCHES. TRENCHES SHALL NOT BE BACKFILLED UNTIL ALL SPECIFIED TESTS HAVE BEEN PERFORMED AND ACCEPTED. WHERE COMPACTED BACKFILL IS NOT INDICATED THE TRENCHES SHALL BE CAREFULLY BACKFILLED WITH SELECT MATERIAL SUCH AS EXCAVATED SOILS THAT ARE FREE OF ROOTS, SOD, RUBBISH OR STONES, DEPOSITED IN 6 INCH LAYERS AND THOROUGHLY AND CAREFULLY RAMMED UNTIL THE CONDUIT OR CABLE HAS A COVER OF NOT LESS THAN 1 FOOT. THE REMAINDER OF THE BACKFILL MATERIAL SHALL BE GRANULAR IN NATURE AND SHALL NOT CONTAIN ROOTS, SOD, RUBBING, OR STONES OF 2-1/2 INCH MAXIMUM DIMENSION. BACKFILL SHALL BE CAREFULLY PLACED IN THE TRENCH AND IN 1 FOOT LAYERS AND EACH LAYER TAMPED. SETTLING THE BACKFILL WITH WATER WILL BE PERMITTED. THE SURFACE SHALL BE GRADED TO A REASONABLE UNIFORMITY AND THE MOUNDING OVER THE TRENCHES LEFT IN A UNIFORM AND NEAT CONDITION.

PROJECT INFORMATION

THIS IS AN UNMANNED AND RESTRICTED ACCESS EQUIPMENT FACILITY AND WILL BE USED FOR THE TRANSMISSION OF RADIO SIGNALS FOR THE PURPOSE OF PROVIDING PUBLIC WIRELESS COMMUNICATIONS SERVICE.

NO POTABLE WATER SUPPLY IS TO BE PROVIDED AT THIS LOCATION.

NO WASTE WATER WILL BE GENERATED AT THIS LOCATION.

NO SOLID WASTE WILL BE GENERATED AT THIS LOCATION.

SPRINT MAINTENANCE CREW (TYPICALLY ONE PERSON) WILL MAKE AN AVERAGE OF ONE TRIP PER MONTH AT ONE HOUR PER VISIT.

LEGEND

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
	NON-FUSIBLE DISCONNECT SWITCH
	FUSIBLE DISCONNECT SWITCH
	SURFACE MOUNTED PANEL BOARD
T	TRANSFORMER
	KILOWATT HOUR METER
JB	JUNCTION BOX
PB	PULL BOX TO NEC/TELCO STANDARDS
	UNDERGROUND UTILITIES
#	DENOTES REFERENCE NOTE
●	EXOTHERMIC WELD CONNECTION
■	MECHANICAL CONNECTION
OR	GROUND ROD
OR	GROUND ROD WITH INSPECTION SLEEVE
	GROUND BAR
	PIN AND SLEEVE RECEPTACLE
	120AC DUPLEX RECEPTACLE
G OR	GROUND CONDUCTOR
# / #	REPRESENTS DETAIL NUMBER / REF. DRAWING NUMBER

ABBREVIATIONS

CIGBE	COAX ISOLATED GROUND BAR EXTERNAL
MIGB	MASTER ISOLATED GROUND BAR
SST	SELF SUPPORTING TOWER
GPS	GLOBAL POSITIONING SYSTEM
TYP.	TYPICAL
DWG	DRAWING
BCW	BARE COPPER WIRE
BFG	BELOW FINISH GRADE
PVC	POLYVINYL CHLORIDE
CAB	CABINET
C	CONDUIT
SS	STAINLESS STEEL
G	GROUND
AWG	AMERICAN WIRE GAUGE
RGS	RIGID GALVANIZED STEEL
AHJ	AUTHORITY HAVING JURISDICTION
TTLNA	TOWER TOP LOW NOISE AMPLIFIER
UNO	UNLESS NOTED OTHERWISE
EMT	ELECTRICAL METALLIC TUBING
AGL	ABOVE GROUND LEVEL
PVC	POLYVINYL CHLORIDE

A/E Consultant:

infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
LICENSED PROFESSIONAL ENGINEER

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Project Number 286-043

Project Title

CT33XC113
VERIZON
(REGIONAL REFUSE)

31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client:

Sprint
3401 INTERNATIONAL AIRPORT DRIVE
CHARLOTTE, NC 28208

Implementation Team:

ALCATEL-LUCENT
808 AVIATION PARKWAY
SUITE 700
MORRISVILLE, NC 27560

Drawing Scale: AS NOTED

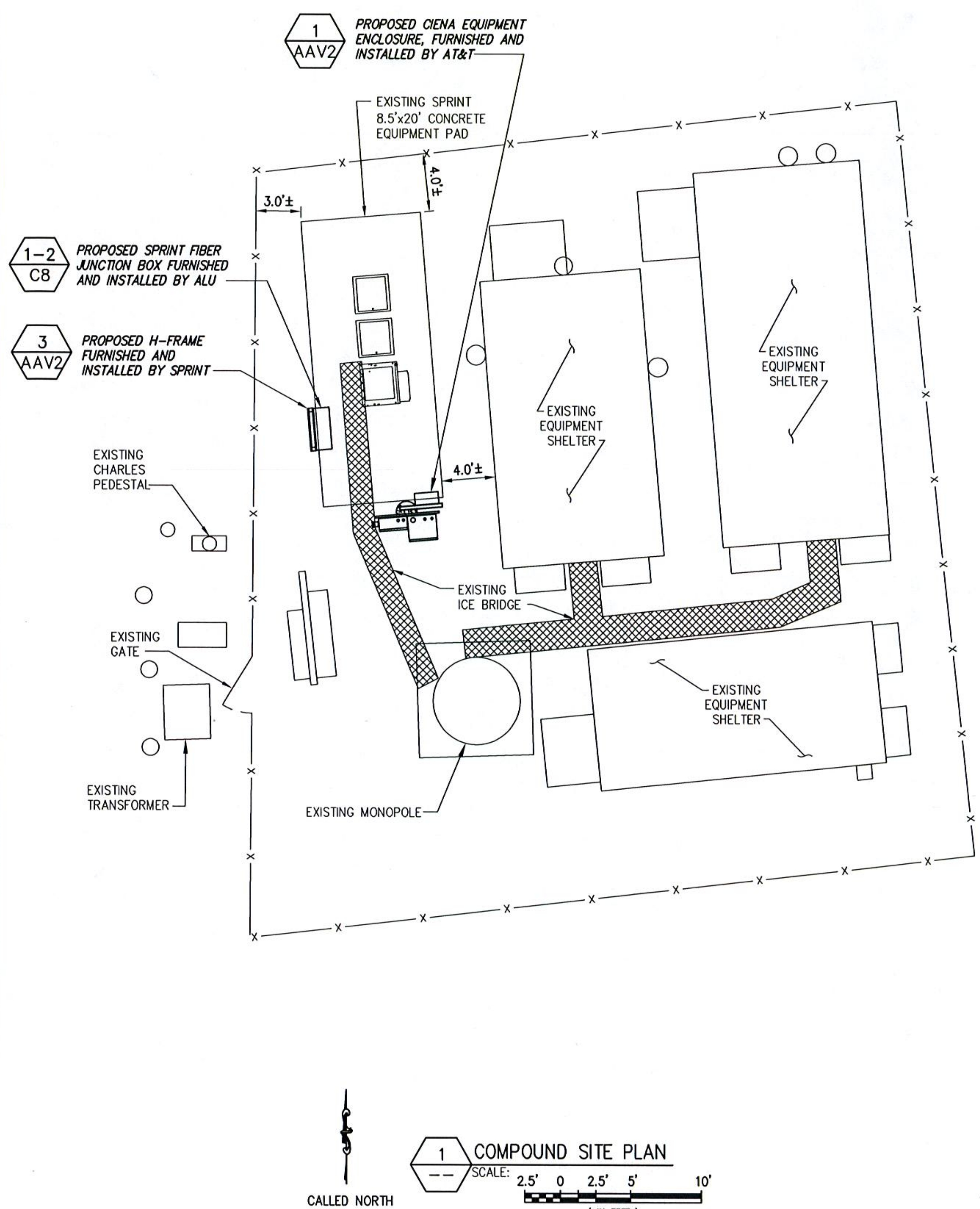
Date: 12/03/12

Drawing Title

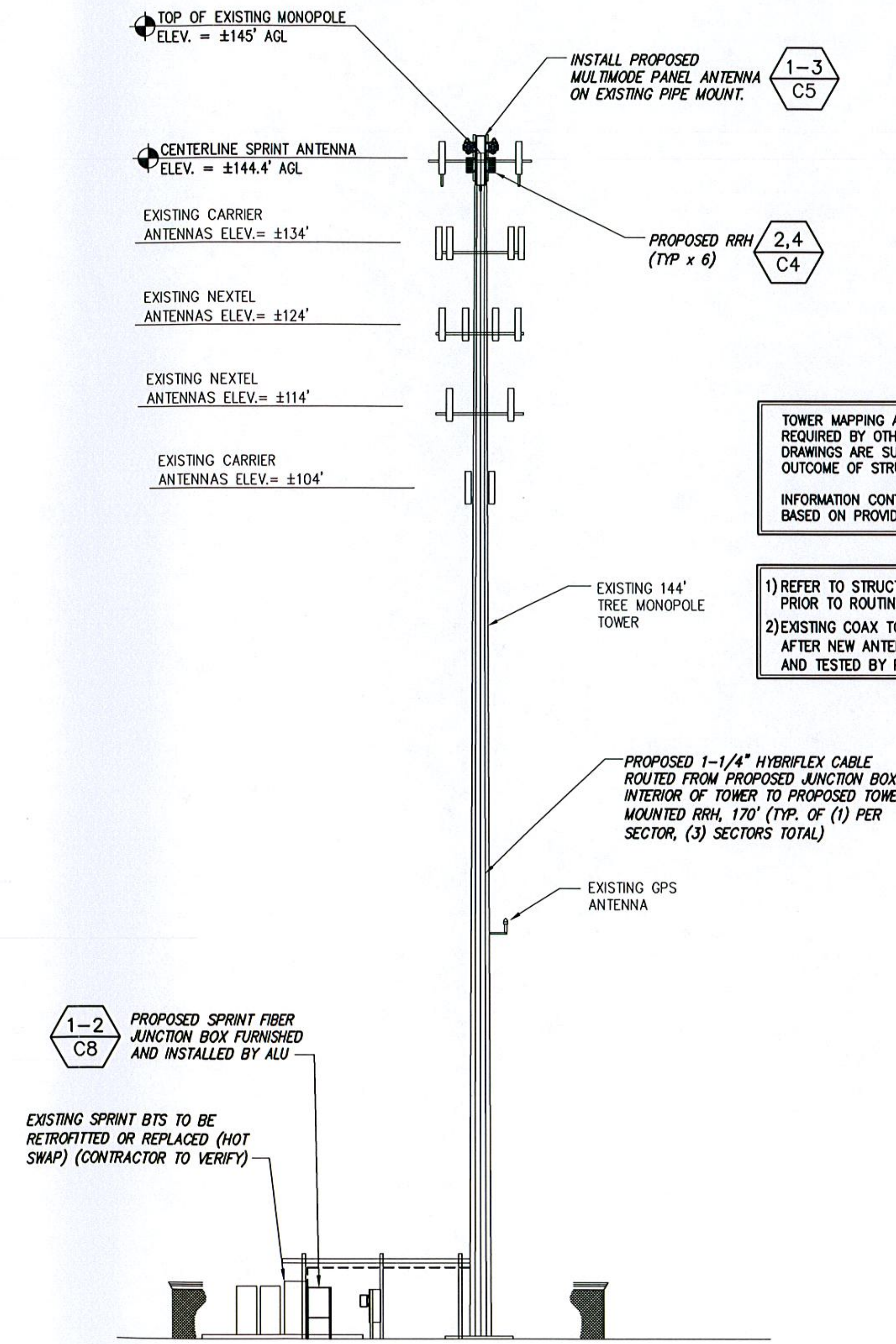
GENERAL NOTES

Drawing Number

C1



1 — COMPOUND SITE PLAN
SCALE: 2.5' 0 2.5' 5' 10' (IN FEET)
SCALE: 24"X 36" SHEET 1"= 5'
SCALE: 11"X 17" SHEET 1"= 10'



2 — SITE ELEVATION
SCALE: 5' 0 5' 10' 20' (IN FEET)
SCALE: 24"X 36" SHEET 1"= 10'
SCALE: 11"X 17" SHEET 1"= 20'

TOWER MAPPING AND STRUCTURAL ANALYSIS ARE REQUIRED BY OTHERS PRIOR TO CONSTRUCTION. DRAWINGS ARE SUBJECT TO CHANGE PENDING OUTCOME OF STRUCTURAL ANALYSIS.

INFORMATION CONTAINED WITHIN DRAWINGS ARE BASED ON PROVIDED INFORMATION.

1) REFER TO STRUCTURAL ANALYSIS BY OTHERS PRIOR TO ROUTING CABLE ON SITE.
2) EXISTING COAX TO BE REMOVED AFTER 6 MONTHS AFTER NEW ANTENNA(S) HAVE BEEN APPROVED AND TESTED BY PM AND/OR SPRINT.

A/E Consultant:
infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

STATE OF CONNECTICUT JOHN S. STEVENS No. 24705 LICENSED PROFESSIONAL ENGINEER

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31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client: Sprint, 3401 INTERNATIONAL AIRPORT DRIVE, CHARLOTTE, NC 28208

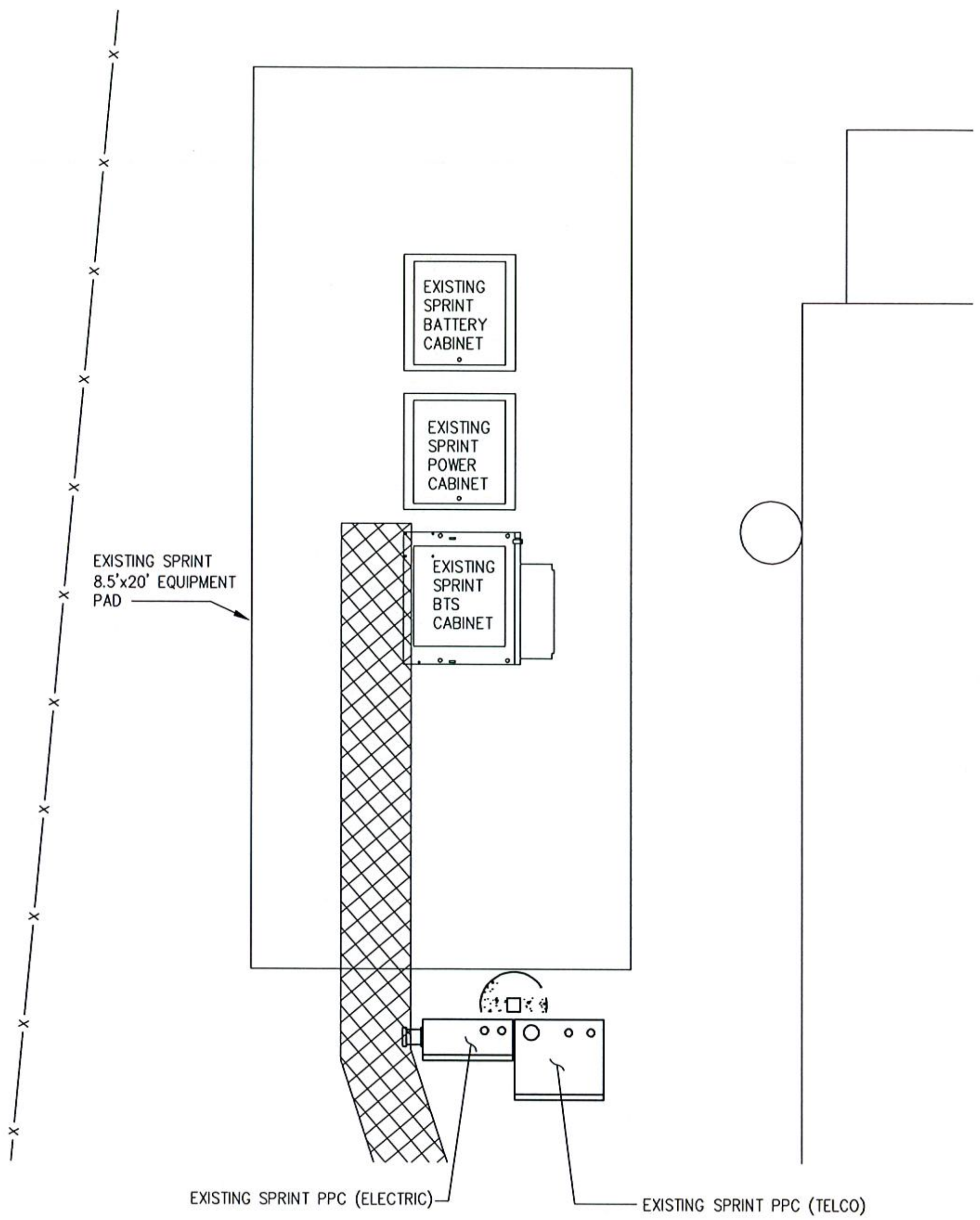
Implementation Team: ALCATEL·LUCENT, 808 AVIATION PARKWAY, SUITE 700, MORRISVILLE, NC 27650

Drawing Scale: AS NOTED

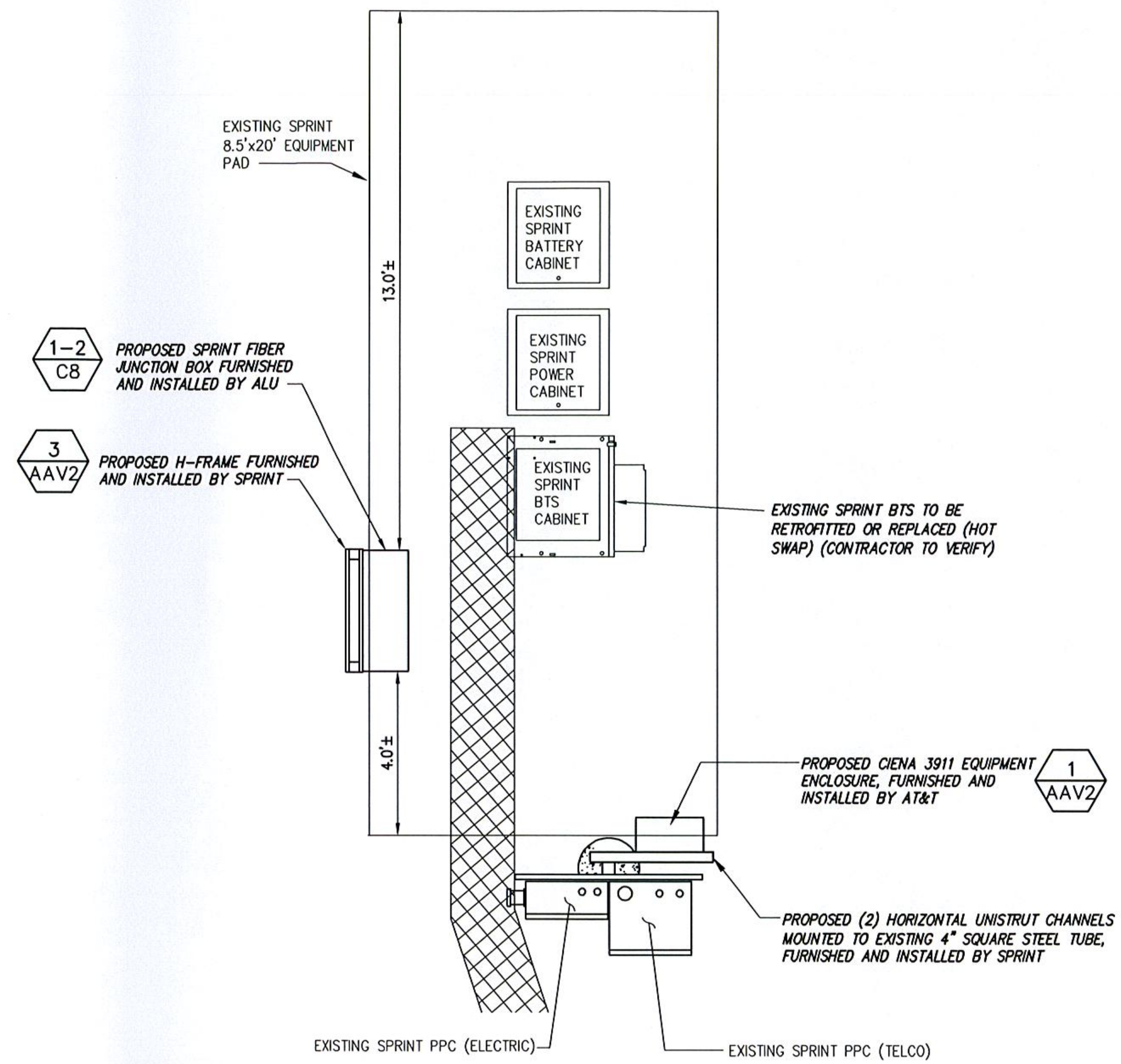
Date: 12/03/12

Drawing Title:
COMPOUND SITE PLAN

Drawing Number: **C2**



1 — EQUIPMENT SITE PLAN (EXISTING)
SCALE: — —



2 — EQUIPMENT SITE PLAN (FINAL/PERMANENT)
SCALE: — —

A/E Consultant:

infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

STATE OF CONNECTICUT — JOHN S. STEVENS — No. 24705 — LICENSED PROFESSIONAL ENGINEER

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Drawing Scale:
AS NOTED

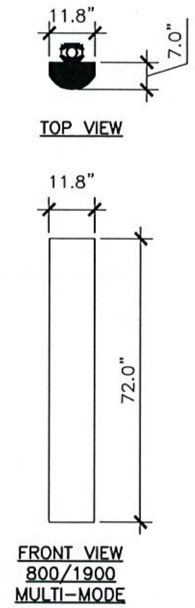
Date:
12/03/12

Drawing Title

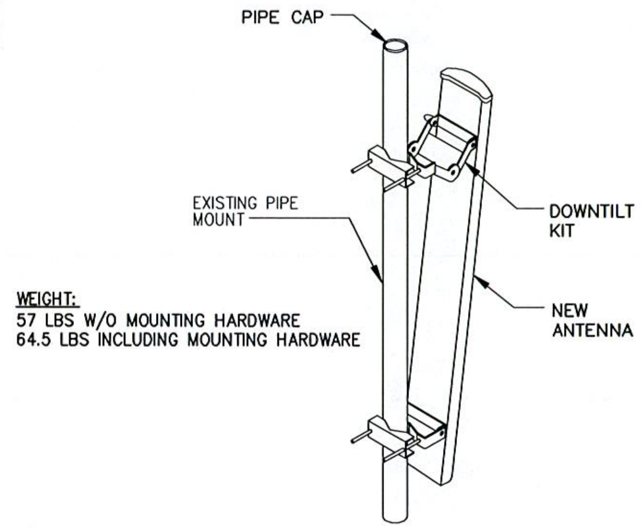
EQUIPMENT SITE PLANS

Drawing Number

C3

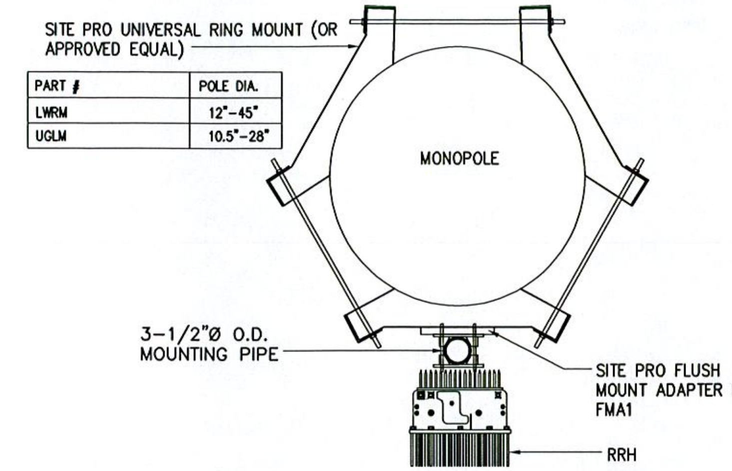


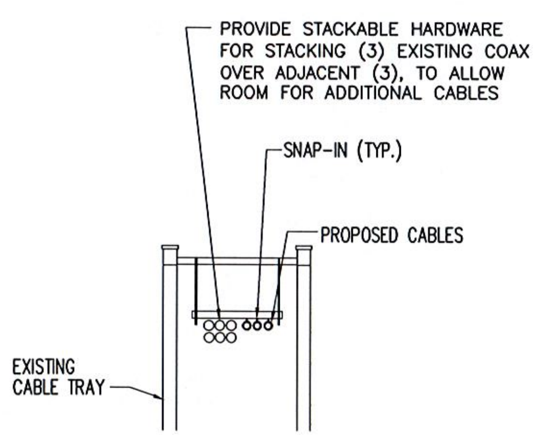
2 ANTENNA DETAILS
NOT TO SCALE



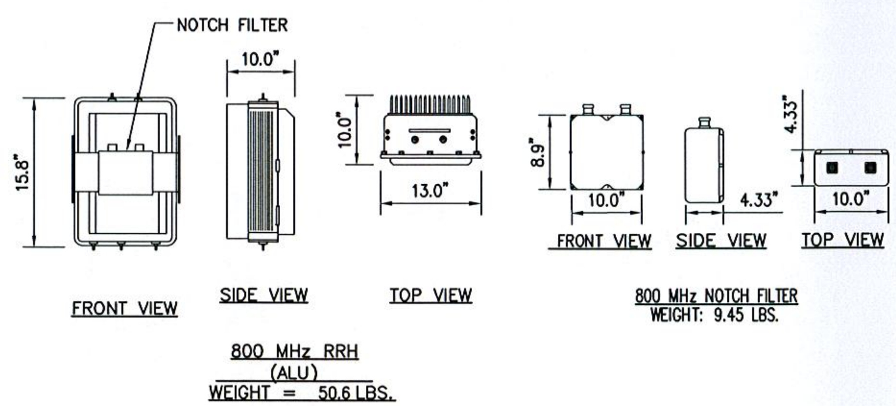
4 PANEL ANTENNA MOUNT DETAIL
NOT TO SCALE

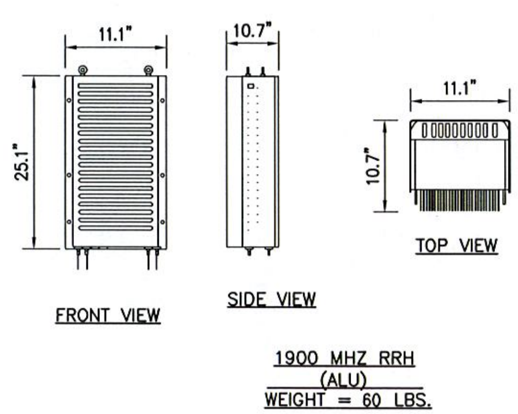
PART #	POLE DIA.
LWRM	12"-45"
UGLM	10.5"-28"





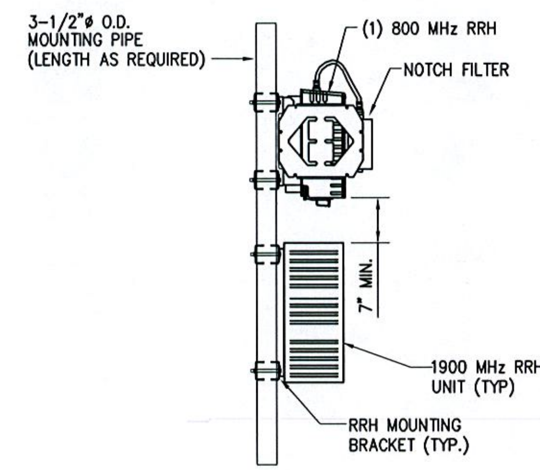
6 EXISTING CABLE TRAY DETAIL
NOT TO SCALE



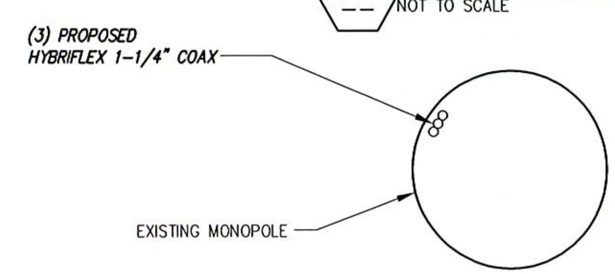


2 RRH EQUIPMENT DETAILS
NOT TO SCALE

NOTE:
REFER TO R.F. SYSTEM SCHEDULE FOR EXACT RRH SPECIFICATIONS AND QUANTITIES.



4 RRH MOUNTING DETAIL (TYP.)
NOT TO SCALE



5 COAX ROUTING DETAIL
NOT TO SCALE

NOTE:
1. SUBCONTRACTOR SHALL REFERENCE THE TOWER STRUCTURAL ANALYSIS/DESIGN DRAWINGS FOR DIRECTIONS ON CABLE DISTRIBUTION/ROUTING.

A/E Consultant:
infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
LICENSED PROFESSIONAL ENGINEER

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Drawn: SEP Date: 4/13/12
Designed: - Date: -
Checked: - Date: -

Project Number: 286-043

Project Title:
CT33XC113
VERIZON
(REGIONAL REFUSE)
31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client: Sprint
6401 INTERNATIONAL AIRPORT DRIVE CHARLOTTE, NC 28208

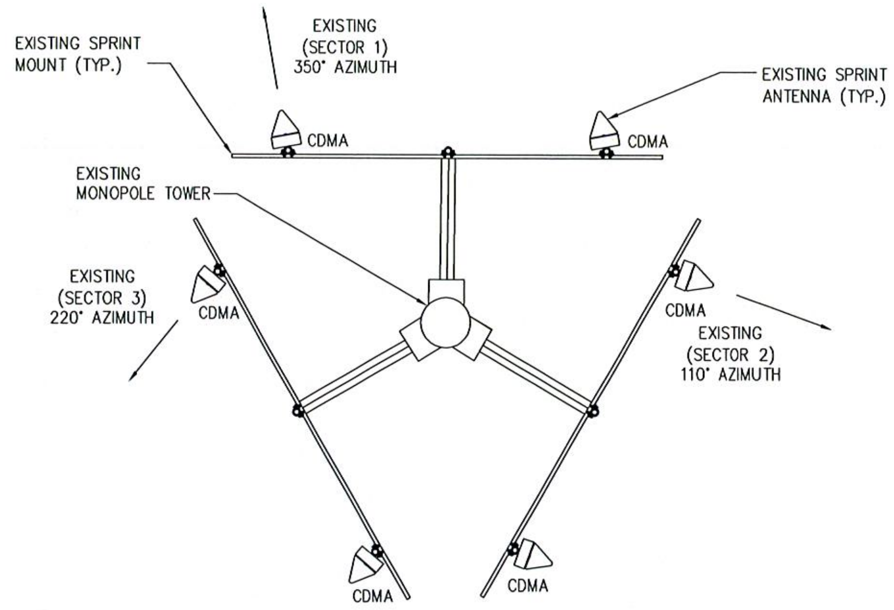
Implementation Team: ALCATEL-LUCENT
808 AVIATION PARKWAY SUITE 700 MORRISVILLE, NC 27650

Drawing Scale: AS NOTED
Date: 12/03/12

Drawing Title:
SITE ELEVATION & ANTENNA/RRH DETAILS

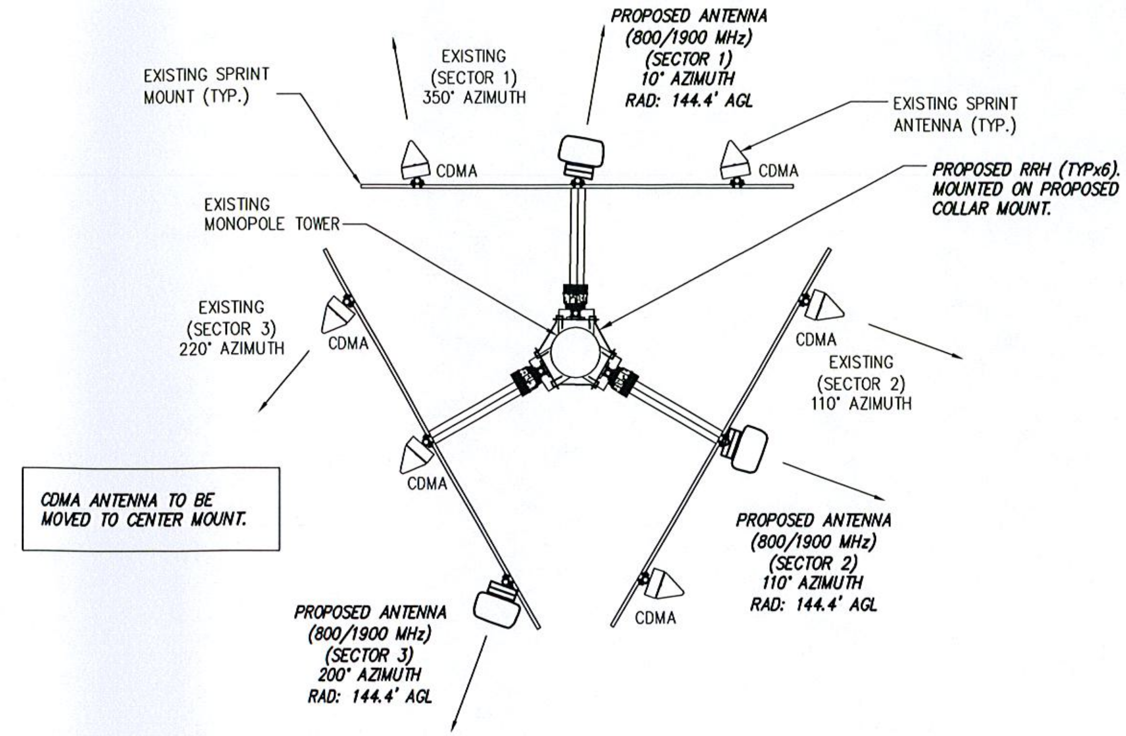
Drawing Number: **C4**

NOTE:
REQUIRED PIPE MOUNTS TO BE SUPPLIED BY CONTRACTOR.



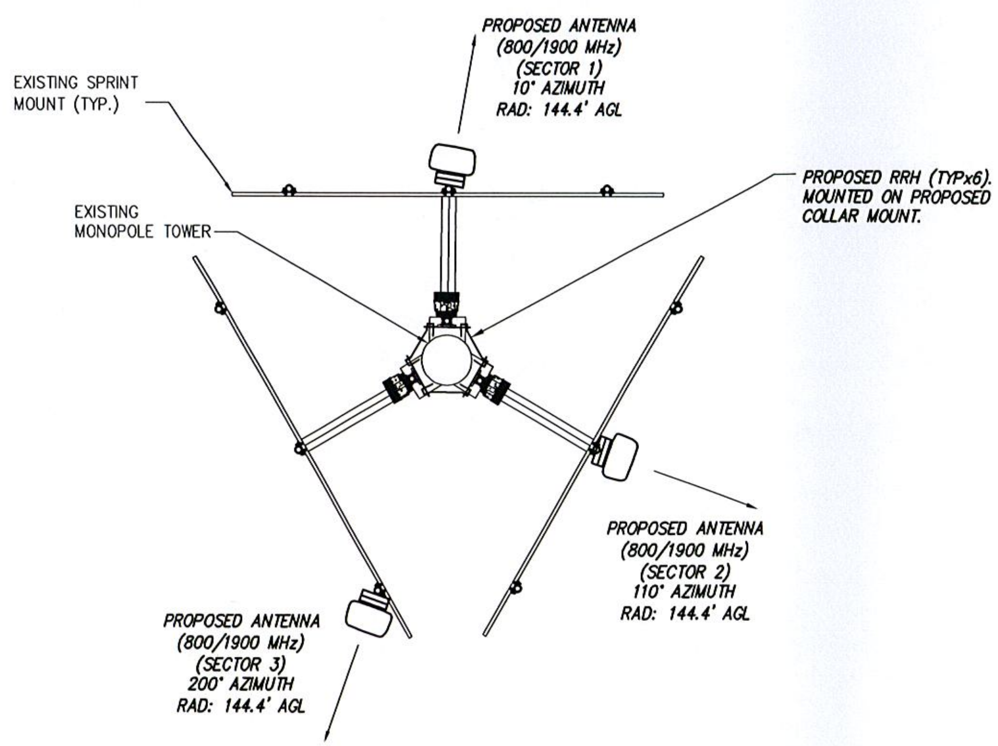
CALLED NORTH

1 — ANTENNA CONFIGURATION (EXISTING)
NOT TO SCALE



CALLED NORTH

2 — ANTENNA CONFIGURATION (INTERIM/TEMPORARY)
NOT TO SCALE



CALLED NORTH

3 — ANTENNA CONFIGURATION (FINAL/PERMANENT)
NOT TO SCALE

NOTES:

EXISTING RF DATA PROVIDED BY SPRINT SITERRA, SPRINT DRAWINGS TITLED, SITE NO: CT33XC087 GUILFORD, DATED 02/26/03.

RRH NOTES:

- SEE PAGE C4 FOR RRH MOUNTING INFORMATION (TYP. ALL SECTORS).
- REFER TO RF SCHEDULE ON SHEET C7 FOR RRH UNIT SPECS AND QUANTITIES.

GENERAL NOTES:

1. NEW SPRINT PANEL ANTENNAS TO MEET RF DESIGN REQUIREMENTS PER EBTS, PER APPROVED TOWER STRUCTURAL ANALYSIS.
2. CONTRACTOR TO PROVIDE EXISTING ANTENNA VERIFICATION AND TO INCLUDE MOUNTING HEIGHT, RAD CENTER, TOP AND BOTTOM OF ANTENNA AND AZIMUTHS FOR ALL ANTENNAS.
3. CONTRACTOR SHALL VERIFY NEW PARTS BEFORE ORDERING.
4. REFER TO SHEET C7 FOR ANTENNAS SPECS.
5. CONTRACTOR TO USE PROPER TORQUE WRENCH WHEN INSTALLING AND TIGHTENING CONNECTORS TO INSURE PROPER FIT.
6. ALL HYBRID CABLES SHALL BE MARKED WITHIN 24" OF THE END OF EACH CABLE WITH 2" WIDE VINYL TAPE. THIS INCLUDES ALL JUMPERS AND MAIN LINE HYBRID CABLE.
7. WHERE APPLICABLE, NEW PIPES TO BE 2-1/2" ø SCHEDULE 40, GALVANIZED MOUNTING PIPES (TYP.). COORDINATE PIPE LENGTH IN FIELD AS REQUIRED (MIN. LENGTH: 72")
8. CDMA ANTENNAS SHALL NOT BE REMOVED UNTIL ALL NEW MULTI-MODE ANTENNAS ARE INSTALLED AND ON-AIR.

A/E Consultant:
infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

STATE OF CONNECTICUT — JOHN S. STEVENS — No. 24705 — LICENSED PROFESSIONAL ENGINEER

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Project Title:
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VERIZON
(REGIONAL REFUSE)

31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client: Sprint — 3401 INTERNATIONAL AIRPORT DRIVE CHARLOTTE, NC 28208

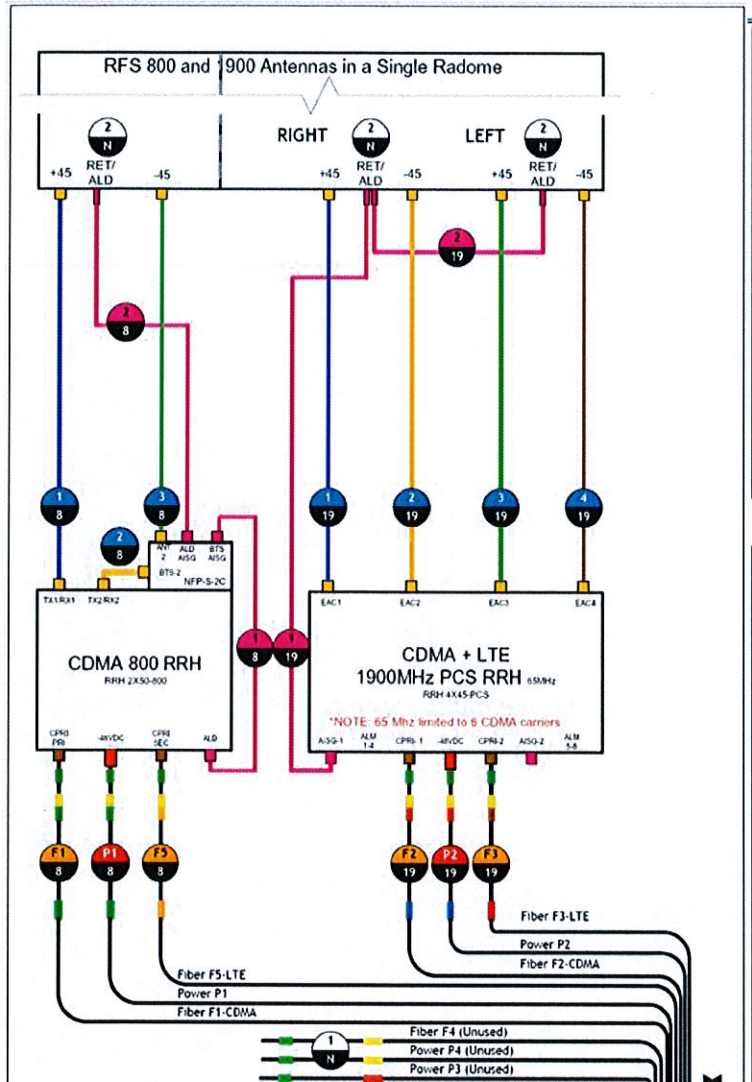
Implementation Team: ALCATEL•LUCENT — 808 AVIATION PARKWAY SUITE 700 MORRISVILLE, NC 27650

Drawing Scale: AS NOTED

Date: 12/03/12

Drawing Title: **ANTENNA PLANS**

Drawing Number: **C5**



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

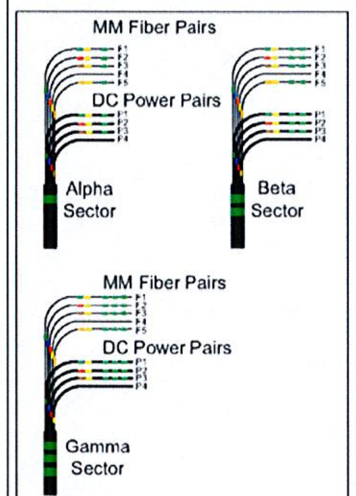
Power Feed Polarity Definition:
IF wires are BLACK AND BLACK/ WHITE STRIPE:
- Black= -48VDC Feed (Battery)
- Black/White Stripe= Return

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

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

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

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



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

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

PLUMBING SCENARIO 124 v1.7

WEATHERPROOFING CONNECTORS AND GROUND KITS NOTE:

A. ALL CONNECTORS AND GROUND KITS SHALL BE WEATHERPROOFED USING BUTYL RUBBER WEATHERPROOFING AND TAPE, THIS INSTALLATION MUST BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION OR PER THE FOLLOWING INSTRUCTIONS (WHICHEVER IS GREATER):

1. THE COAXIAL CABLE CONNECTION OR GROUND KIT CAN BE ENCOMPASSED INTO COLD SHRINK AND COMPLETELY WRAPPED WITH 2 IN. WIDE ELECTRICAL TAPE OVERLAPPING EACH ROW BY APPROXIMATELY 1/2" AND EXTENDING PAST THE CONNECTION BY TWO INCHES AS DISCUSSED BELOW; OR
2. THE COAXIAL CABLE CONNECTION OR GROUND KIT CAN BE WRAPPED WITH LAYERS OR ELECTRICAL/BUTYL RUBBER/ELECTRICAL TAPE AS DISCUSSED BELOW; OR
3. THE COAXIAL CABLE CONNECTION OR GROUND KIT CAN BE WRAPPED WITH TWO LAYERS OF 1.5 INCH WIDE SELF-AMALGAMATING TAPE COVERED WITH TWO LAYERS OF ELECTRICAL TAPE.

RRH JUMPERS NOTES:

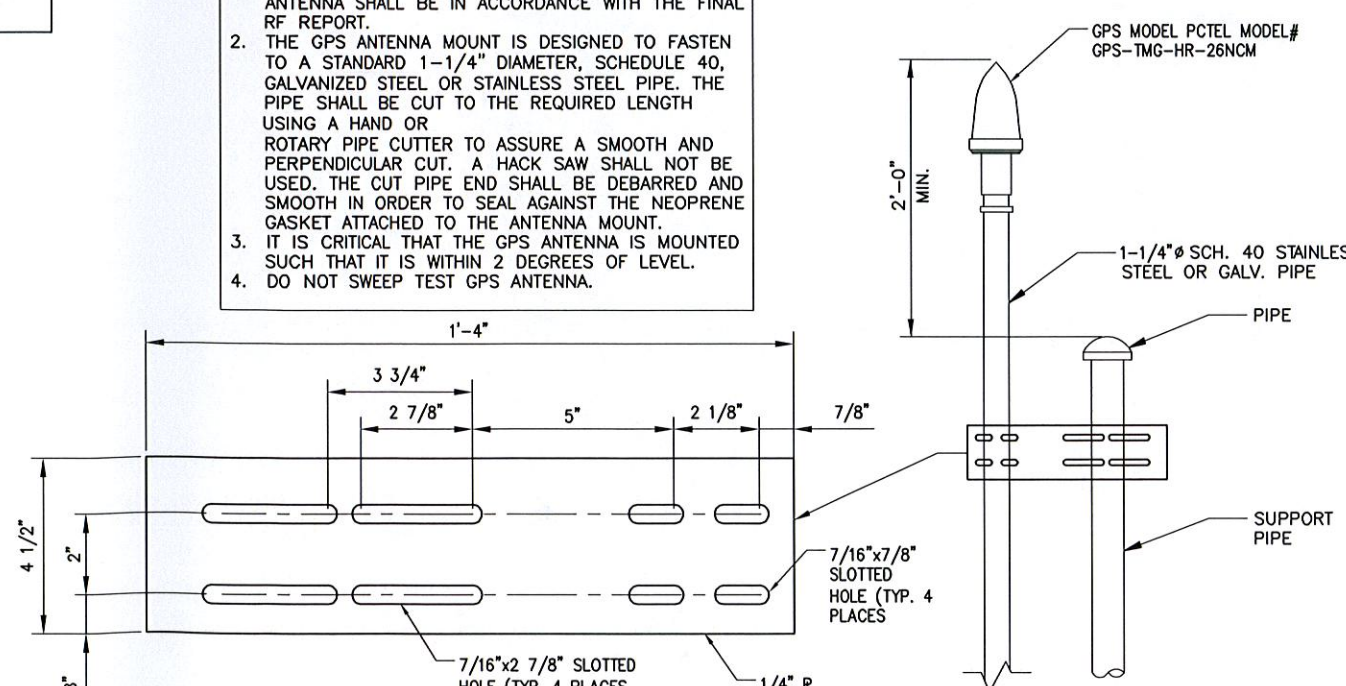
1. FOR DISTANCES BETWEEN RRH'S AND ANTENNAS LESS THAN 10'-0" USE A 1/2" JUMPER.
2. FOR DISTANCES BETWEEN RRH'S AND ANTENNAS GREATER THAN 10'-0" USE A 7/8" JUMPER.

GPS MINIMUM SKY VIEW REQUIREMENTS

NOTES:

1. THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT.
2. THE GPS ANTENNA MOUNT IS DESIGNED TO FASTEN TO A STANDARD 1-1/4" DIAMETER, SCHEDULE 40, GALVANIZED STEEL OR STAINLESS STEEL PIPE. THE PIPE SHALL BE CUT TO THE REQUIRED LENGTH USING A HAND OR ROTARY PIPE CUTTER TO ASSURE A SMOOTH AND PERPENDICULAR CUT. A HACK SAW SHALL NOT BE USED. THE CUT PIPE END SHALL BE DEBARRED AND SMOOTH IN ORDER TO SEAL AGAINST THE NEOPRENE GASKET ATTACHED TO THE ANTENNA MOUNT.
3. IT IS CRITICAL THAT THE GPS ANTENNA IS MOUNTED SUCH THAT IT IS WITHIN 2 DEGREES OF LEVEL.
4. DO NOT SWEEP TEST GPS ANTENNA.

NOTES:
CONTRACTOR TO FIELD VERIFY GPS LOCATION.



3 GPS ANTENNA DETAIL
NOT TO SCALE

A/E Consultant:

infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

JOHN S. STEVENS · STATE OF CONNECTICUT · No. 24705 · LICENSED PROFESSIONAL ENGINEER

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VERIZON
(REGIONAL REFUSE)
31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client: Sprint, 3401 INTERNATIONAL AIRPORT DRIVE, CHARLOTTE, NC 28208

Implementation Team: ALCATEL·LUCENT, 808 AVIATION PARKWAY, SUITE 700, MORRISVILLE, NC 27650

Drawing Scale: AS NOTED

Date: 12/03/12

Drawing Title: **ANTENNA CABLE RISER AND H-FRAME DETAILS**

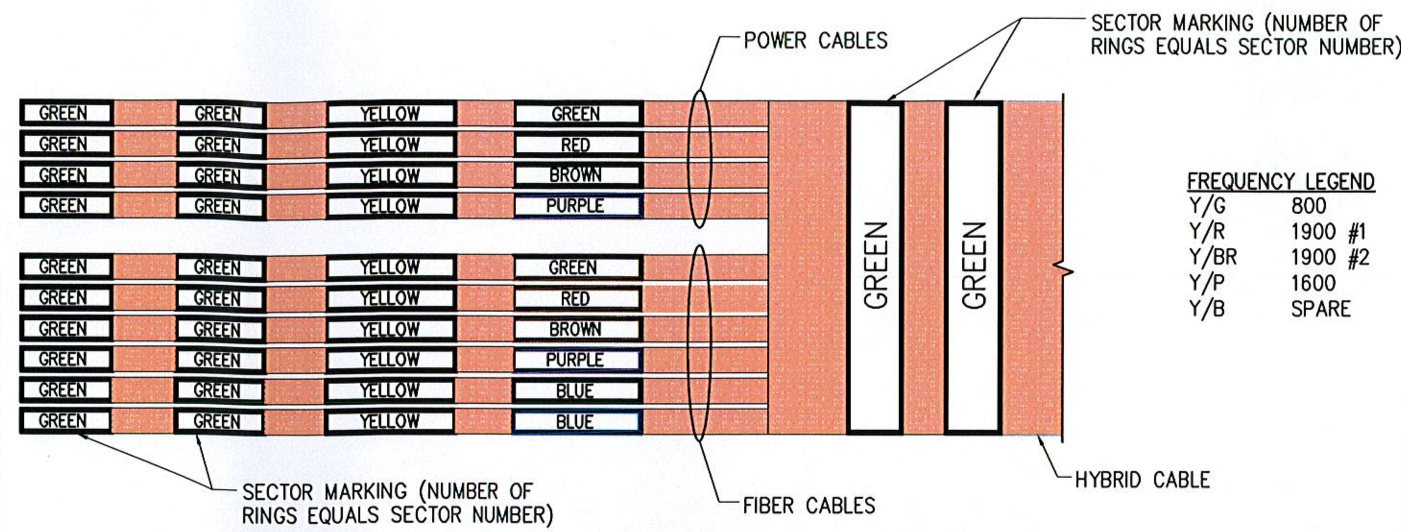
Drawing Number: **C6**

		Market	Southern Connecticut		
		Cascade ID	CT33XC113		
			SECTOR 1	SECTOR 2	SECTOR 3
	Split sector present		No	No	No
1900	1900MHz_Azimuth		10	110	200
1900	1900MHz_No_of_Antennas		1	1	1
1900	1900MHz_RADCenter(ft)		144.4	144.4	144.4
1900	1900MHz_Antenna Make		RFS	RFS	RFS
1900	1900MHz_Antenna Model		APXVSPP18-C-A20	APXVSPP18-C-A20	APXVSPP18-C-A20
1900	1900MHz_Horizontal_Beamwidth		65	65	65
1900	1900MHz_Vertical_Beamwidth		5.5	5.5	5.5
1900	1900MHz_AntennaHeight (ft)		6	6	6
1900	1900MHz_AntennaGain(dBd)		15.9	15.9	15.9
1900	1900MHz_E_Tilt		-1	0	0
1900	1900MHz _M_Tilt		0	0	0
1900	1900MHz_Carrier_Forecast_Year_2013		2	2	2
1900	1900MHz_RRH Manufacturer		ALU	ALU	ALU
1900	1900MHz_RRH Model		RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz
1900	1900MHz_RRH Count		1	1	1
1900	1900MHz_RRH Location		Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
1900	1900MHz Combiner Model		No Combiner Required	No Combiner Required	No Combiner Required
1900	1900MHz_Top_Jumper #1_Length (RRH or Combiner-to-Antenna for TT or Main Coax to		10	10	10
1900	1900MHz_Top_Jumper #1_Cable_Model (RRH or Combiner-to-Antenna for TT or Main Coax		LCF12-50J	LCF12-50J	LCF12-50J
1900	1900MHz_Top_Jumper #2_Length (RRH to Combiner for TT if applicable, ft)		N/A	N/A	N/A
1900	1900MHz_Top_Jumper #2_Cable_Model (RRH to Combiner for TT if applicable)		N/A	N/A	N/A
1900	1900MHz_Main_Coax_Cable_Length (ft)		N/A	N/A	N/A
1900	1900MHz_Main_Coax_Cable_Model		N/A	N/A	N/A
1900	1900MHz_Bottom_Jumper #1_Length (Ground based RRH to Combiner-OR-Main Coax, ft)		N/A	N/A	N/A
1900	1900MHz_Bottom_Jumper #1_Cable_Model (Ground based RRH to Combiner-OR-Main Coax)		N/A	N/A	N/A
1900	1900MHz_Bottom_Jumper #2_Length (Ground based-Combiner to Main Coax, ft)		N/A	N/A	N/A
1900	1900MHz_Bottom_Jumper #2_Cable_Model (Ground based-Combiner to Main Coax)		N/A	N/A	N/A
800	800MHz_Azimuth		10	110	200
800	800MHz_No_of_Antennas		0	0	0
800	800MHz_RADCenter(ft)		144.4	144.4	144.4
800	800MHz_AntennaMake		RFS	RFS	RFS
800	800MHz_AntennaModel		APXVSPP18-C-A20 (Shared w/1900)	APXVSPP18-C-A20 (Shared w/1900)	APXVSPP18-C-A20 (Shared w/1900)
800	800MHz_Horizontal_Beamwidth		65	65	65
800	800MHz_Vertical_Beamwidth		11.5	11.5	11.5
800	800MHz_AntennaHeight (ft)		6	6	6
800	800MHz_AntennaGain (dBd)		13.4	13.4	13.4
800	800MHz_E_Tilt		0	-8	0
800	800MHz_M_Tilt		0	0	0
800	800MHz_RRH Manufacturer		ALU	ALU	ALU
800	800MHz_RRH Model		RRH 800 MHz 2x50W	RRH 800 MHz 2x50W	RRH 800 MHz 2x50W
800	800MHz_RRH Count		1	1	1
800	800MHz_RRH Location		Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
800	800_Top_Jumper #1_Length (RRH to Antenna for TT or Main Coax to Antenna for GM)		10	10	10
800	800_Top_Jumper_Cable_Model (RRH to Antenna for TT or Main Coax to Antenna for GM)		LCF12-50J	LCF12-50J	LCF12-50J
800	800MHz_Main_Coax_Cable_Length (ft)		N/A	N/A	N/A
800	800MHz_Main_Coax_Cable_Model		N/A	N/A	N/A
800	800_Bottom_Jumper #1_Length (Ground based RRH to Main Coax)		N/A	N/A	N/A
800	800_Bottom_Jumper #1_Cable_Model (Ground based RRH to Main Coax)		N/A	N/A	N/A
	Plumbing Scenario *		124	124	124
Comments	* If plumbing scenario does not match the material received, please contact your Construction Manager				
Comments	11/9/2012				

1 SPRINT RFDS
NOT TO SCALE

NOTE:
COORDINATE RF ANTENNA INSTALLATION WITH FINAL SPRINT RFDS. COORDINATE RF MW DISH (IF APPLICABLE) INSTALLATION WITH FINAL SPRINT RFDS.

NOTE:
RFDS SHOWN PROVIDED BY SPRINT DATED 11/09/12.



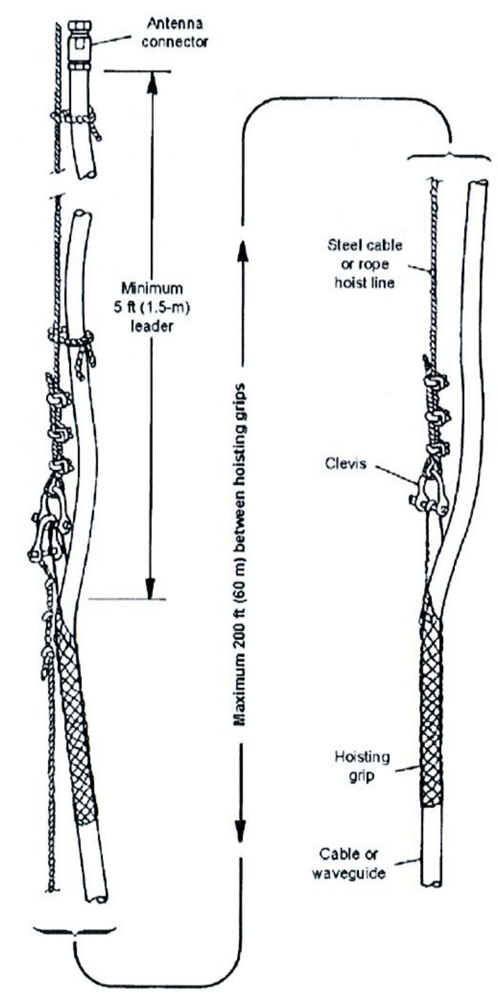
FREQUENCY LEGEND

Y/G	800
Y/R	1900 #1
Y/BR	1900 #2
Y/P	1600
Y/B	SPARE

HYBRID CABLE WILL BE MARKED IN A SIMILAR MANNER AS COAX CABLES. THE MAIN TRUNK OF THE HYBRID CABLE IS TO BE MARKED WITH THE SECTOR MARKINGS ONLY. THE INDIVIDUAL POWER PAIRS AND FIBER CABLES WILL BE LABELED WITH BOTH THE SECTOR CABLE MARKINGS AND FREQUENCY (EXAMPLE ABOVE IS FOR SECTOR 2)

2 COLOR CODING
NOT TO SCALE

1. DO NOT USE ONE HOISTING GRIP FOR HOISTING TWO OR MORE CABLES OR ICE BRIDGES. THIS CAN CAUSE THE HOISTING GRIP TO BREAK OR THE CABLES OR WAVE-GUIDES TO FALL.
2. DO NOT USE THE HOISTING GRIP FOR LOWERING CABLE OR ICE BRIDGE. SNAGGING OF THE CABLE OR ICE BRIDGE MAY LOOSEN THE GRIP AND POSSIBLY CAUSE THE CABLE TO ICE BRIDGE TO SWAY OR FALL.
3. DO NOT REUSE HOISTING GRIPS. USED GRIPS MAY HAVE LOST ELASTICITY, STRETCHED, OR BECOME WEAK-ENED. REUSING A GRIP CAN CAUSE THE CABLE OR ICE BRIDGE TO SLIP, BREAK, OR FALL.
4. USE HOISTING GRIPS AT INTERVALS OF NO MORE THAN 200 FT (60 M).
5. MAKE SURE THAT THE PROPER HOISTING GRIP IS USED FOR THE CABLE OR ICE BRIDGE BEING INSTALLED. SLIPPAGE OR INSUFFICIENT GRIPPING STRENGTH WILL RESULT IF YOU ARE USING THE WRONG HOISTING GRIP.



2 HOIST GRIB DETAIL
NOT TO SCALE

A/E Consultant:

infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

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3401 INTERNATIONAL AIRPORT DRIVE CHARLOTTE, NC 28208

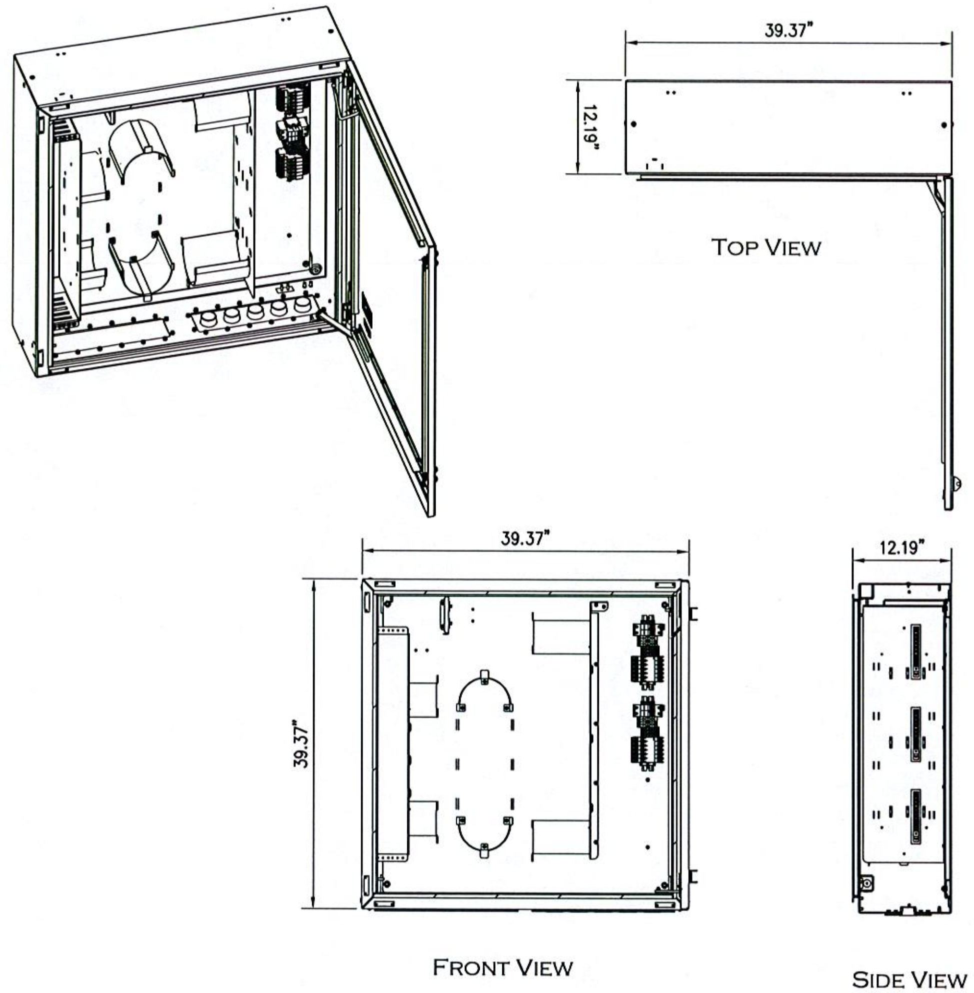
Implementation Team:
ALCATEL·LUCENT
808 AVIATION PARKWAY SUITE 700 MORRISVILLE, NC 27650

Drawing Scale:
AS NOTED

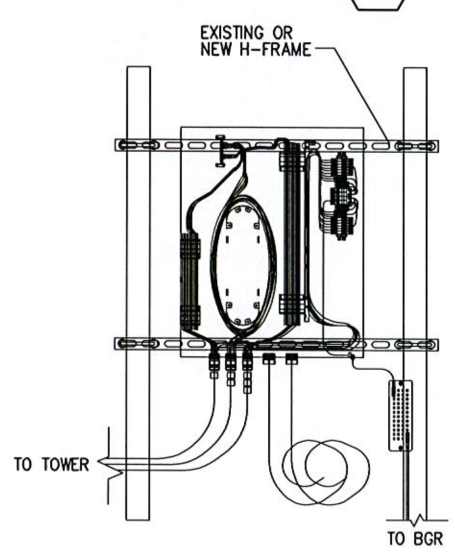
Date:
12/03/12

Drawing Title
RF AND CABLE DETAILS

Drawing Number
C7



1 DISTRIBUTION BOX DETAIL
NOT TO SCALE

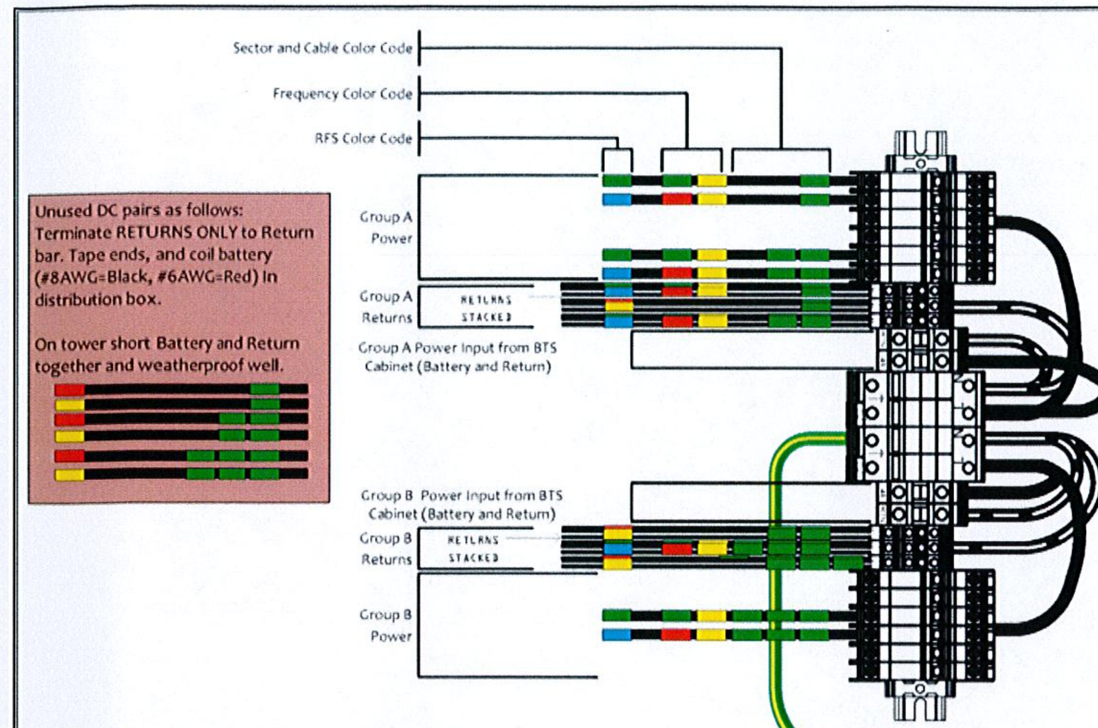


FRONT VIEW WITH DOOR REMOVED TO SHOW DETAIL

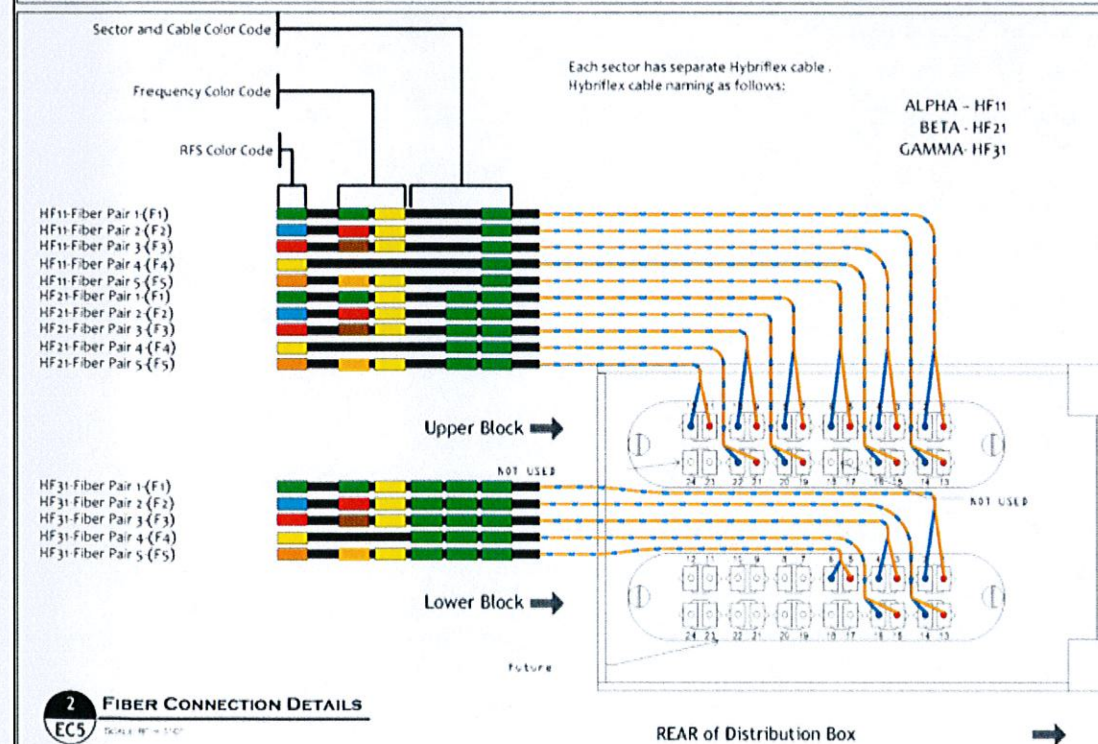
2 DISTRIBUTION BOX INSTALL COMPLETE VIEW
NOT TO SCALE

NOTES:

- DISTRIBUTION BOX IS KITTED WITH 2" LIQUID-TIGHT CONDUIT AND CONNECTORS. THIS SHOULD BE:
  * SPLIT IN HALF,
  * TERMINATED TO THE DISTRIBUTION BOX AS SHOWN,
  * RAN TO AND COILED AS CLOSE TO WHERE THE CABINET IS GOING TO BE MOUNTED AS POSSIBLE.
- DISTRIBUTION BOX IS KITTED WITH 24AWG, POWER CABLE 27' x 2EA. RUNS RED AND 2EA. RUNS BLACK. THIS SHOULD BE COILED AND LEFT INSIDE DISTRIBUTION BOX.
- BTS INSTALLATION TEAM WILL TERMINATE LIQUID-TIGHT, RUN THE FIBER JUMPERS AND POWER CABLES FROM BTS CABINET TO DISTRIBUTION BOX.



1 EC5 DC POWER CONNECTION DETAILS



2 EC5 FIBER CONNECTION DETAILS

SCENARIO 124 v1.7

INSTALLER VERIFY LATEST PLUMBING/WIRING DIAGRAMS, PRIOR TO INSTALLATION.

3 FIBER & DC CONNECTION DETAILS
NOT TO SCALE

A/E Consultant:
infinigy engineering
11 Herbert Drive
Latham, NY 12110
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CHARLOTTE, NC 28208

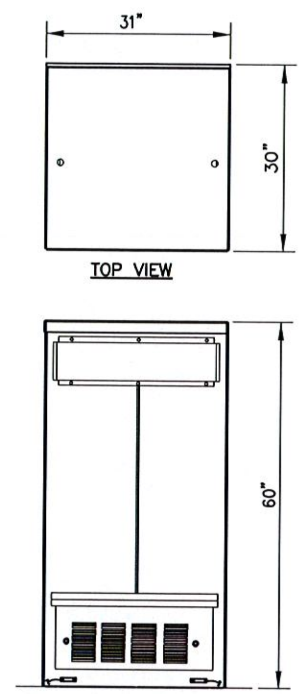
Implementation Team: ALCATEL-LUCENT
808 AVIATION PARKWAY
SUITE 700
MORRISVILLE, NC 27650

Drawing Scale: AS NOTED

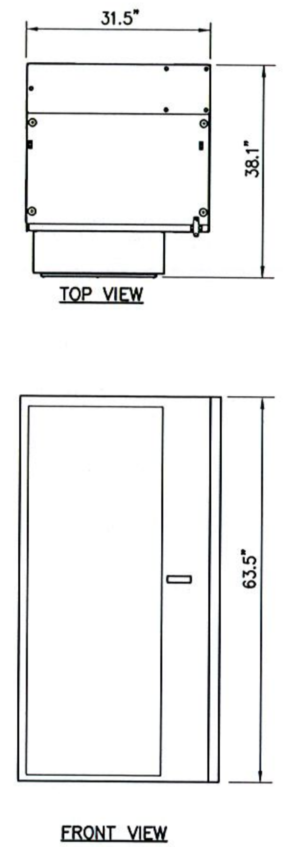
Date: 12/03/12

Drawing Title
JUNCTION BOX DETAILS

Drawing Number
C8



1 BATTERY CABINET PROFILE
NOT TO SCALE



2 CABINET PROFILE
NOT TO SCALE

DESIGN CRITERIA:

2009 INTERNATIONAL BUILDING CODE W/ STATE MODIFICATION	
WIND SPEED (ASCE-7-05)	90 MPH
EXPOSURE B	
IMPORTANCE FACTOR	1.0
SEISMIC SITE CLASS Ss=0.152 S' = 0.050	D
SEISMIC IMPORTANCE FACTOR	1.0
SEISMIC DESIGN CATEGORY	B
CABINET WEIGHT:	
9927 MM BTS CABINET	594 lbs.
60EC V2 BATTERY CABINET	2830 lbs.

MATERIAL SPECIFICATIONS

C-, M-, AND ANGLE SHAPES:	ASTM A36
HIGH-STRENGTH BOLTS:	ASTM A325SC OR (A325N
STRUCTURAL WF SHAPES:	ASTM A572-GR50
TUBE STEEL & PIPE COLUMNS:	ASTM A500, GRADE B
WELDING ELECTRODES:	E70XX
W - SHAPES:	ASTM A992, GRADE 50
U-BOLTS:	ASTM A36

A/E Consultant:

infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
LICENSED PROFESSIONAL ENGINEER

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Project Number
286-043

Project Title

CT33XC113
VERIZON
(REGIONAL REFUSE)

31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client:
Sprint
3401 INTERNATIONAL AIRPORT DRIVE
CHARLOTTE, NC 28208

Implementation Team:
ALCATEL•LUCENT
808 AVIATION PARKWAY
SUITE 700
MORRISVILLE, NC 27650

Drawing Scale:
AS NOTED

Date:
12/03/12

Drawing Title

DETAILS

Drawing Number

C9

CODED NOTES:

(1) PROPOSED 2" UNDERGROUND PVC CONDUIT FROM PROPOSED CIENA ENCLOSURE TO EXISTING CHARLES PEDESTAL, 25'; FURNISHED AND INSTALLED BY SPRINT

(2) PROPOSED H-FRAME FURNISHED AND INSTALLED BY SPRINT

(3) PROPOSED SPRINT FIBER JUNCTION BOX FURNISHED AND INSTALLED BY ALU

(4) PROPOSED U/G 1-1/4" LIQUID TIGHT CONDUIT W/PULL STRING FROM PROPOSED FIBER JUNCTION BOX TO PROPOSED CIENA-3911 EQUIPMENT LOCATION FOR DC POWER, 14'; FURNISHED AND INSTALLED BY SPRINT

(5) PROPOSED CIENA EQUIPMENT ENCLOSURE, FURNISHED AND INSTALLED BY AT&T

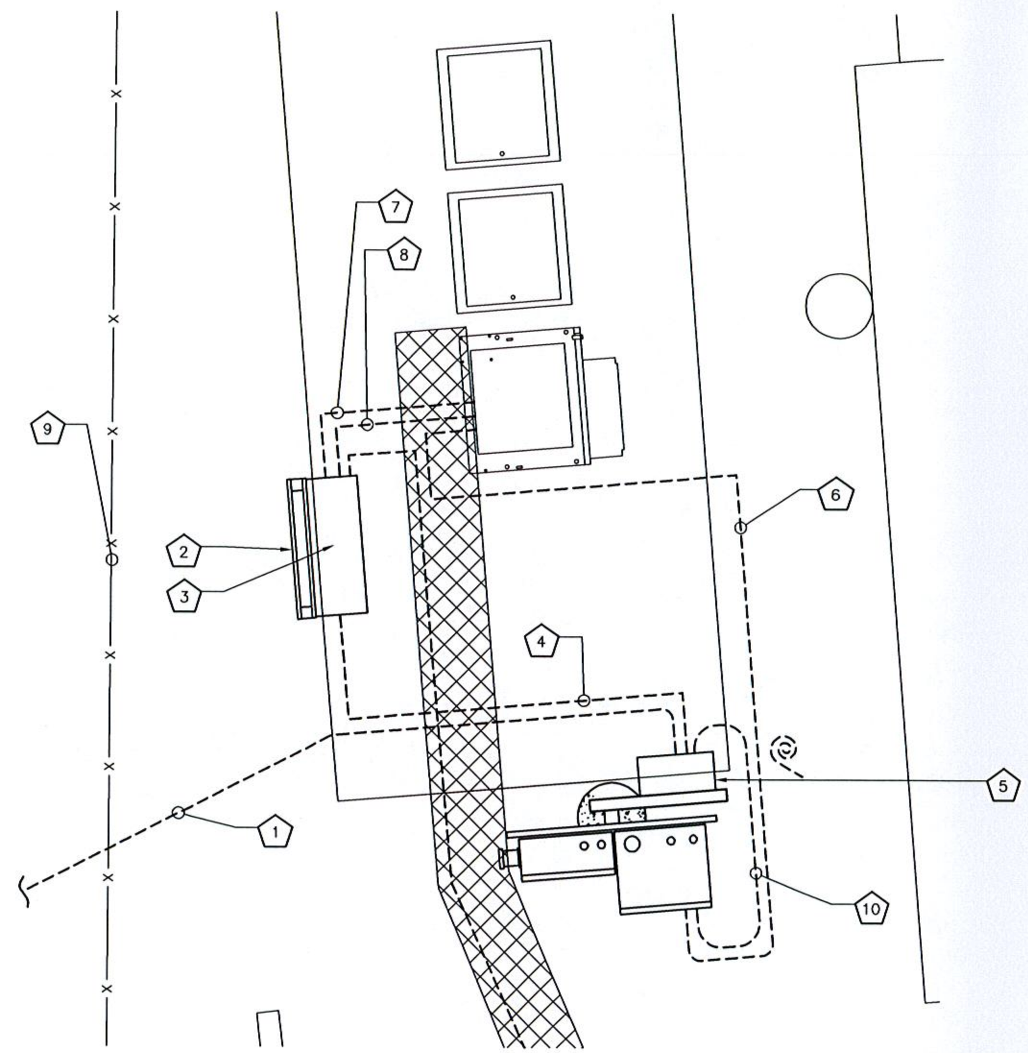
(6) PROPOSED CAT5 CABLE ROUTED IN EXISTING 2-1/2" UNDERGROUND GRC CONDUIT FROM EXISTING SPRINT PPC (TELCO) ENCLOSURE TO EXISTING BTS CABINET, 25' FURNISHED AND INSTALLED BY SPRINT

(7) PROPOSED 2" LIQUID TIGHT CONDUIT WITH PULL-STRING FOR TELCO FROM FIBER JUNCTION BOX TO LUCENT EQUIPMENT CABINET; 5'

(8) PROPOSED 2" LIQUID TIGHT CONDUIT WITH PULL-STRING FOR DC POWER FROM FIBER JUNCTION BOX TO LUCENT EQUIPMENT CABINET; 5'

(9) PROPOSED 1-1/4" HYBRIFLEX CABLE ROUTED FROM PROPOSED JUNCTION BOX TO PROPOSED TOWER MOUNTED RRH, 170' (TYP. OF (1) PER SECTOR, (3) SECTORS TOTAL)

(10) PROPOSED 2" ABOVE GROUND LIQUID TIGHT CONDUIT FROM PROPOSED CIENA ENCLOSURE TO EXISTING SPRINT PPC (TELCO), 10' FURNISHED AND INSTALLED BY SPRINT



CALLED NORTH

1 UTILITY SITE PLAN
SCALE:
1' 0 1' 2' 4'
(IN FEET)
SCALE: 24"X 36" SHEET 1"= 2'
SCALE: 11"X 17" SHEET 1"= 4'

ELECTRICAL NOTES:

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (N.E.C.), AND APPLICABLE LOCAL CODES
2. GROUNDING SHALL COMPLY WITH ARTICLE 250 OF NATIONAL ELECTRICAL CODE.
3. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED.
4. ALL WIRES SHALL BE AWG MIN #12 THHN COPPER UNLESS NOTED.
5. CONDUCTORS SHALL BE INSTALLED IN SCHEDULE 40 PVC CONDUIT UNLESS NOTED OTHERWISE.
6. LABEL SPRINT SERVICE DISCONNECT SWITCH AND PPC CABINET WITH ENGRAVED LAMACOID LABELS, LETTERS 1" IN HEIGHT.
7. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE. BEND GROUNDING LEADS WITH A MINIMUM 8" RADIUS.
8. ENGAGE AN INDEPENDENT TESTING FIRM TO TEST AND VERIFY THAT RESISTANCE DOES NOT EXCEED 5 OHMS TO GROUND. TEST GROUND RING RESISTANCE PRIOR TO MAKING FINAL GROUND CONNECTIONS TO INFRASTRUCTURE AND EQUIPMENT. GROUNDING AND OTHER OPERATIONAL TESTING SHALL BE WITNESSED BY SPRINTS REPRESENTATIVE.
9. PROVIDE PULL BOXES AND JUNCTION BOXES WHERE REQUIRED SO THAT CONDUIT BENDS DO NOT EXCEED 360°.
10. OBTAIN PERMITS AND PAY FEES RELATED TO ELECTRICAL WORK PERFORMED ON THIS PROJECT. DELIVER COPIES OF ALL PERMITS TO SPRINT REPRESENTATIVE.
11. SCHEDULE AND ATTEND INSPECTIONS RELATED TO ELECTRICAL WORK REQUIRED BY JURISDICTION HAVING AUTHORITY. CORRECT AND PAY FOR ANY WORK REQUIRED TO PASS ANY FAILED INSPECTION.
12. REDLINED AS-BUILTS ARE TO BE DELIVERED TO SPRINT REPRESENTATIVE.
13. PROVIDE TWO COPIES OF OPERATION AND MAINTENANCE MANUALS IN THREE-RING BINDER.
14. FURNISH AND INSTALL THE COMPLETE ELECTRICAL SERVICE, TELCO CONDUIT, AND THE COMPLETE GROUNDING SYSTEM.
15. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH ALL APPLICABLE BUILDING CODES AND LOCAL ORDINANCES, INSTALLED IN A NEAT MANNER, AND SHALL BE SUBJECT TO APPROVAL BY SPRINT REPRESENTATIVE.
16. CONDUCT A PRE-CONSTRUCTION SITE VISIT AND VERIFY EXISTING SITE CONDITIONS AFFECTING THIS WORK. REPORT ANY OMISSIONS OR DISCREPANCIES FOR CLARIFICATION PRIOR TO THE START OF CONSTRUCTION.
17. PROJECT ADJACENT STRUCTURES AND FINISHES FROM DAMAGE. REPAIR TO ORIGINAL CONDITION ANY DAMAGED AREA.
18. REMOVE DEBRIS ON A DAILY BASIS. DEBRIS NOT REMOVED IN A TIMELY FASHION WILL BE REMOVED BY OTHERS AND THE RESPONSIBLE SUBCONTRACTOR SHALL BE CHARGED ACCORDINGLY. REMOVAL OF DEBRIS SHALL BE COORDINATED WITH THE OWNER'S REPRESENTATIVE. DEBRIS SHALL BE REMOVED FROM THE PROPERTY AND DISPOSED OF LEGALLY.
19. UPON COMPLETION OF WORK, THE SITE SHALL BE CLEAN AND FREE OF DUST AND FINGERPRINTS.
20. PRIOR TO ANY TRENCHING, CONTACT LOCAL UTILITY TO VERIFY LOCATION OF ANY EXISTING BURIED SERVICE CONDUITS.
21. DOCUMENT GROUND RING INSTALLATION AND CONNECTIONS TO IT WITH PHOTOGRAPHS PRIOR TO BACKFILLING SITE. PRESENT PHOTO ARCHIVE AT SITE "PUNCH LIST" WALK TO SPRINT'S REPRESENTATIVE.
22. ALL ABOVE GRADE CONDUIT TO BE RIGID METALLIC.

NOTES:

1. CONTRACTOR TO USE EXISTING SPARE CONDUITS, IF AVAILABLE. CONDUIT SIZES MUST BE EQUAL TO OR GREATER THAN THAT ALLOWED BY CODE.
2. EXISTING ALARMS NEED TO BE RE-ROUTED AND VERIFIED IN PROPER WORKING CONDITION WHEN NEW MMBTS EQUIPMENT IS INSTALLED.
3. REMAINING GROUND LEADS FROM REMOVED CABINETS TO BE COILED (NOT ON WALKING SURFACE).
4. REMAINING UNUSED CONDUITS FROM EXISTING CABINETS TO BE COVERED WITH WATERPROOF CAPS (NOT DUCT TAPE).

UNDERGROUND SERVICE ALERT
CALL TOLL FREE
1-800-922-4455
THREE WORKING DAYS BEFORE YOU DIG

A/E Consultant:
infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

STATE OF CONNECTICUT JOHN S. STEVENS No. 24705 LICENSED PROFESSIONAL ENGINEER

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CT33XC113
VERIZON
(REGIONAL REFUSE)
31 NEW HARTFORD ROAD
BARKHAMSTED, CT 06063

Client: Sprint, 3401 INTERNATIONAL AIRPORT DRIVE CHARLOTTE, NC 28208

Implementation Team: ALCATEL·LUCENT, 808 AVIATION PARKWAY SUITE 700 MORRISVILLE, NC 27650

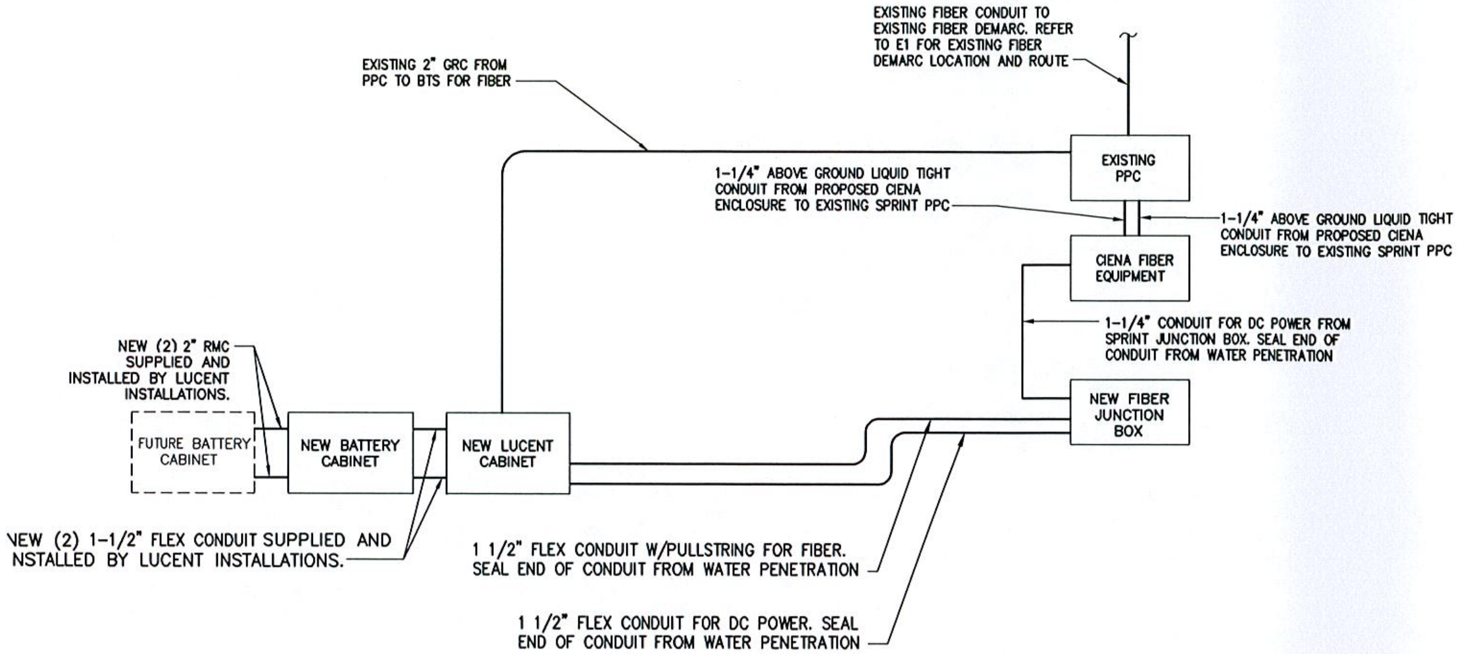
Drawing Scale: AS NOTED
Date: 12/03/12

Drawing Title:
UTILITY SITE PLAN

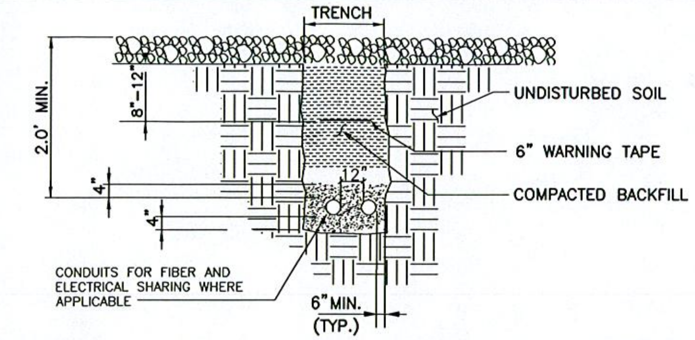
Drawing Number:
E1

GROUNDING NOTE:

IN ADDITION TO POWER SERVICE GROUNDING AS REQUIRED BY NEC. CONTRACTOR SHALL BE RESPONSIBLE TO COORD AND INSTALL ALL SURGE AND LIGHTING PROTECTION GROUNDING AS REQUIRED AND SPECIFIED BY SPRINT



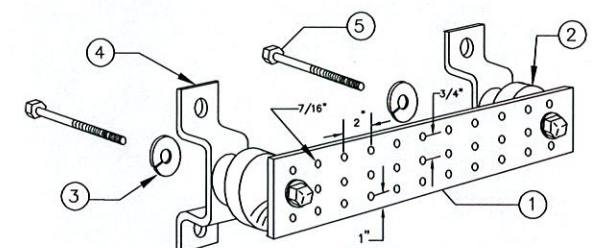
1 ONE-LINE DIAGRAM
-- NOT TO SCALE



- SEPARATION DIMENSIONS MUST BE VERIFIED WITH LOCAL UTILITY CO. REQUIREMENTS.

*HAND DIG INSIDE COMPOUND

2 UTILITY TRENCH DETAIL
-- NOT TO SCALE

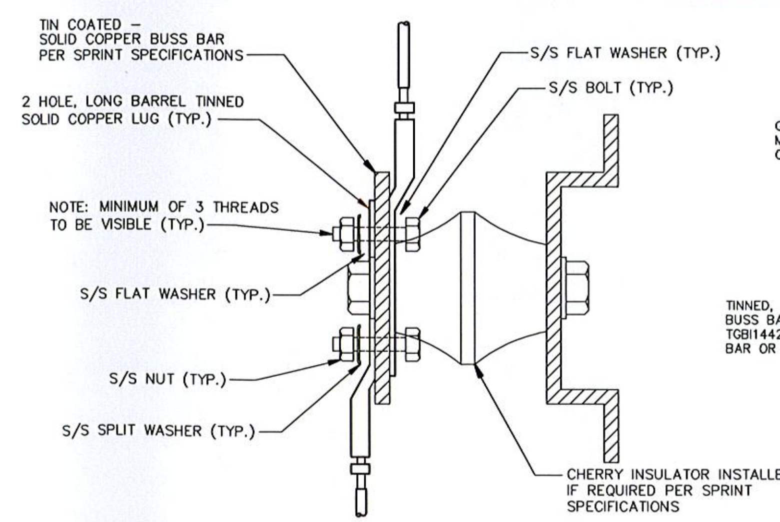


LEGEND

1. TINNED COPPER GROUND BAR, ¼" x 4" x 20", NEWTON INSTRUMENT Co., HARGER TGBI14420M, OR EQUIVALENT. HOLE CENTERS TO MATCH
2. NEMA DOUBLE LUG CONFIGURATION.
3. INSULATORS, NEWTON INSTRUMENT Co. CAT. NO. 3061-4 OR HARGER
4. EQUIVALENT.
5. 5/8" LOCKWASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8 OR EQUIVALENT.
   WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT. NO. A-6056 OR HARGER EQUIVALENT.
   5/8-11 x 1" H.H.C.S. BOLTS, NEWTON INSTRUMENT CO. CAT. NO. 3012-1 OR HARGER EQUIVALENT.

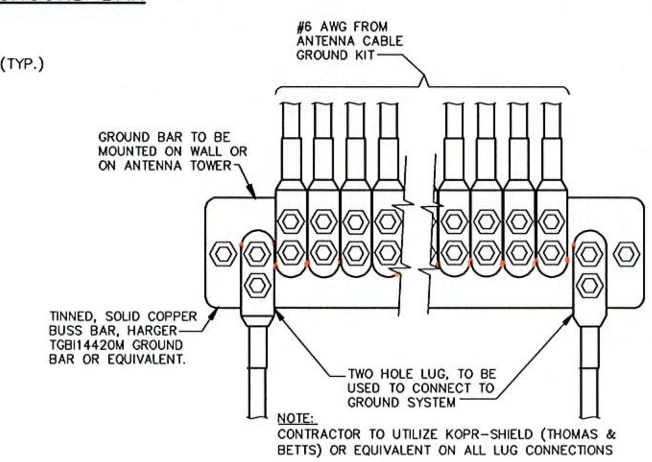
NOTE:
1) ALL MOUNTING HARDWARE CAN ALSO BE USED ON 6", 12", 18", ETC. GROUND BARS.
2) ENTIRE ASSEMBLY AVAILABLE FROM NEWTON INSTRUMENT CO. CAT. NO. 2106060010 OR AS HARGER TGBI14420M.

GROUND BAR



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

GROUND LUG



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

ANTENNA GROUND BAR

3 GROUND BAR DETAILS
-- NOT TO SCALE

A/E Consultant:

infinigy engineering
11 Herbert Drive
Latham, NY 12110
(518) 690-0790

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3401 INTERNATIONAL AIRPORT DRIVE CHARLOTTE, NC 28208

Implementation Team:
ALCATEL-LUCENT
808 AVIATION PARKWAY SUITE 700 MORRISVILLE, NC 27650

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AS NOTED

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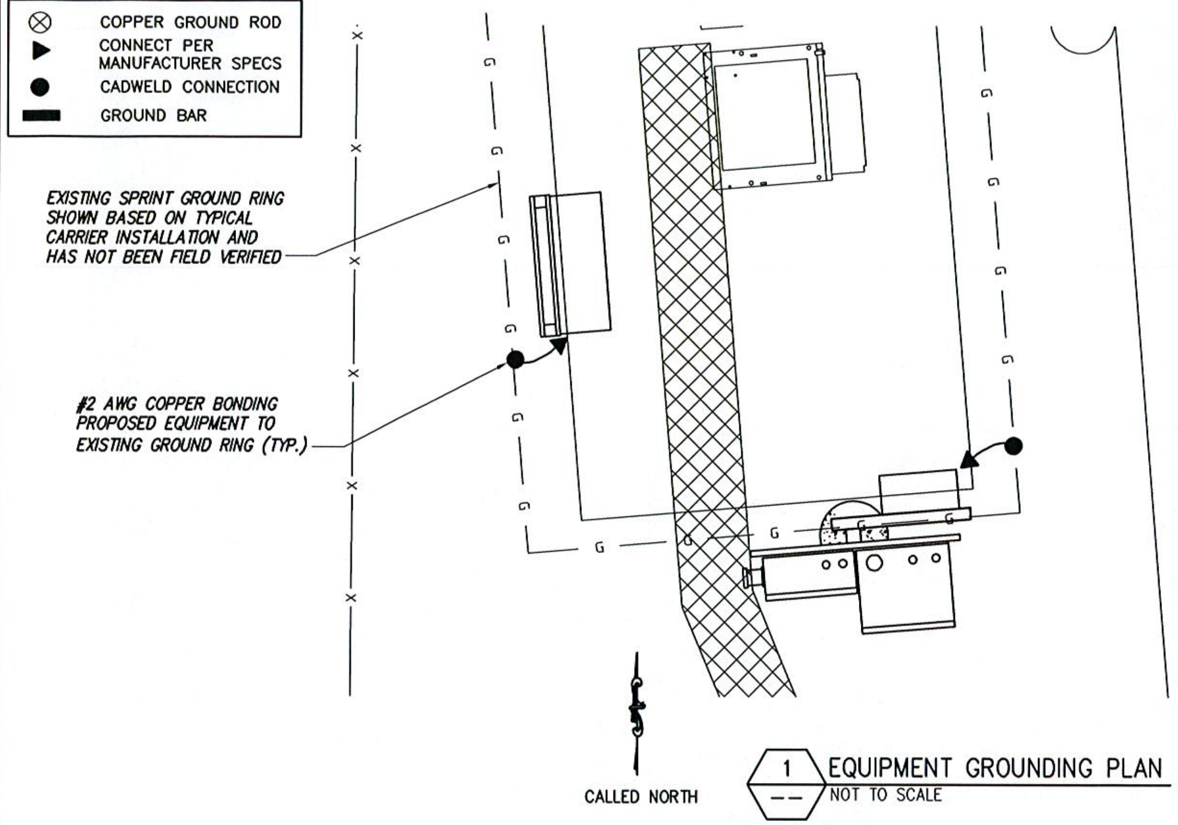
Drawing Title

ONE-LINE DIAGRAM AND DETAILS

Drawing Number

E2

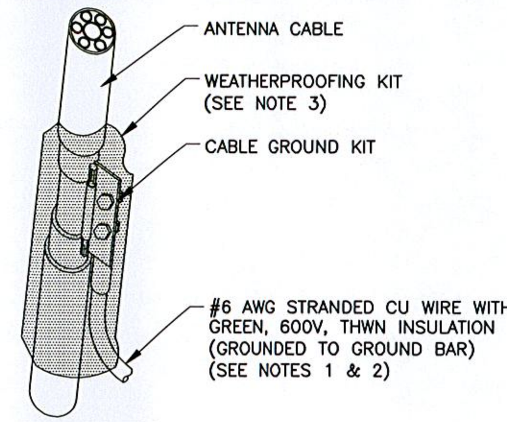
SYMBOL	
⊗	COPPER GROUND ROD
▶	CONNECT PER MANUFACTURER SPECS
●	CADWELD CONNECTION
▬	GROUND BAR



1 EQUIPMENT GROUNDING PLAN
NOT TO SCALE

NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHERPROOFING SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.



3 CONNECTION OF GROUND KIT TO ANTENNA CABLE
NOT TO SCALE

GROUNDING NOTES:

1. ALL DOWN CONDUCTORS AND GROUND RING CONDUCTOR SHALL BE #2 AWG, SOLID, BARE, TINNED COPPER, UNO. ALL CONNECTIONS TO GROUND RING SHALL BE EXOTHERMICALLY WELDED. CONDUCTOR SHALL BE A MINIMUM DEPTH BELOW GRADE OF 30 INCHES OR TO THE LEDGE. MINIMUM BEND RADIUS SHALL BE 8 INCHES. CONDUCTOR SHALL BE AT LEAST 24 INCHES FROM ANY FOUNDATION, UNO.

2. WHERE MECHANICAL CONDUCTOR CONNECTIONS ARE SPECIFIED, BOLTED, COMPRESSION-TYPE CLAMPS OR SPLIT-BOLT TYPE CONNECTORS SHALL BE USED.

3. GRIND OFF GALVANIZING IN AFFECTED AREA. EXOTHERMICALLY WELD #2 CONDUCTOR AT 6 INCHES ABOVE GRADE OR FOUNDATION, WHICHEVER IS HIGHER. COLD-GALV AFTER. EXOTHERMICALLY WELD OTHER END TO GROUND.

4. GROUND CONDUCTORS ON EXTERIOR WALL OF SHELTER SHALL BE ENCASED IN 3/4" PVC CONDUIT TO GRADE. MOUNT PVC WITH GALVANIZED "C" CLAMPS. SEAL TOP ENDS.

5. FOLLOWING COMPLETION OF WORK, CONDUCT GROUND TEST. SUBMIT WRITTEN TEST TO CONSTRUCTION MANAGER AND PROJECT MANAGER.

6. ALL GROUNDING WORK SHALL COMPLY WITH CARRIER(S) STANDARDS.

7. GROUNDING REQUIREMENTS SHOWN ON THIS PLAN ARE FOR ITEMS THAT ARE LOCATED NEAR GRADE LEVEL AND THAT NEED TO BE TIED TO THE BELOW GRADE GROUND RING.

8 UNLESS NOTED OTHERWISE, ALL GROUNDING SHALL BE IN ACCORDANCE WITH SPRINT'S SSEO DOCUMENTS 3.018.02.004 "BONDING, GROUNDING AND TRANSIENT PROTECTION FOR CELL SITES", AND 3.018.10.002 "SITE RESISTANCE TO EARTH TESTING". ALL GROUNDING SHALL ALSO COMPLY WITH ALL STATE AND LOCAL CODES, AND THE NATIONAL ELECTRICAL CODE (NEC).

9. UNLESS NOTED OTHERWISE, ALL GROUNDING CONNECTIONS SHALL BE MADE BY AN EXOTHERMIC WELD.

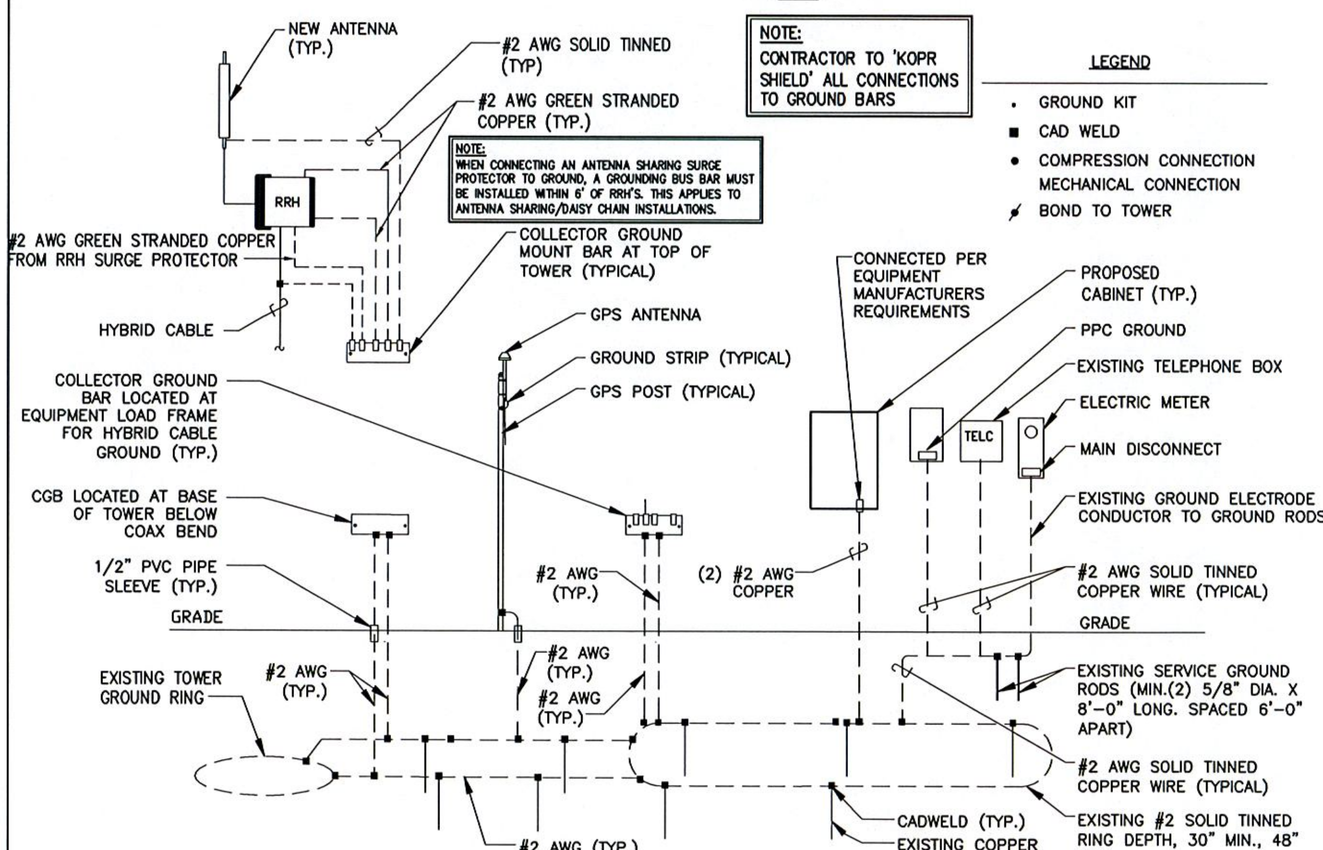
10. RESISTANCE TO EARTH TESTING IS REQUIRED PER SPRINT STANDARDS ON ALL NEW SITES.

NOTE:
CONTRACTOR TO 'KOPR SHIELD' ALL CONNECTIONS TO GROUND BARS

NOTE:
WHEN CONNECTING AN ANTENNA SHARING SURGE PROTECTOR TO GROUND, A GROUNDING BUS BAR MUST BE INSTALLED WITHIN 6' OF RRH'S. THIS APPLIES TO ANTENNA SHARING/DAISY CHAIN INSTALLATIONS.

LEGEND

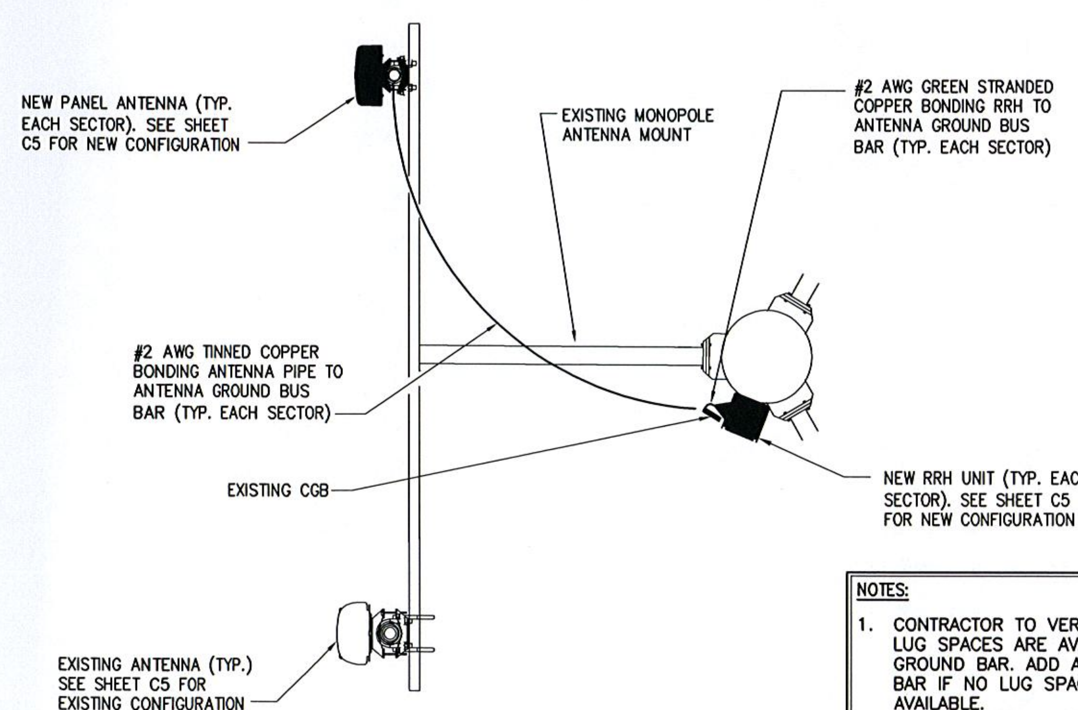
- . GROUND KIT
- ■ CAD WELD
- ● COMPRESSION CONNECTION MECHANICAL CONNECTION
- ⚡ BOND TO TOWER



NOTE:
DIAGRAM FOR GRAPHICAL PURPOSES ONLY. REFER ACTUAL SITE LAYOUT AND RF PAGES FOR ADDITIONAL INFORMATION

NOTE:
ALL GROUND WIRES ENTERING GROUND SHALL BE IN PVC SLEEVE.

2 GROUNDING RISER DIAGRAM
NOT TO SCALE



4 TYPICAL ANTENNA GROUNDING PLAN
NOT TO SCALE

NOTES:

1. CONTRACTOR TO VERIFY EXISTING LUG SPACES ARE AVAILABLE ON GROUND BAR. ADD ADDITIONAL BUS BAR IF NO LUG SPACES ARE AVAILABLE.
2. ANTENNA GROUNDING CONNECTIONS SHOWN ARE NOT EXACT TO THIS SITE. FOR EXACT ANTENNA LAYOUT REFER TO SHEET C5.

A/E Consultant:

infinigy engineering
11 Herbert Drive
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12/03/12

Drawing Title
GROUNDING PLAN AND DETAILS

Drawing Number
E3

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

December 11, 2012

The Honorable Donald S. Stein
First Selectman
Town of Barkhamsted
P. O. Box 558
Pleasant Valley, CT 06063

RE: **EM-SPRINT-NEXTEL-005-121211** – Sprint Nextel Corporation notice of intent to modify an existing telecommunications facility located at 31 New Hartford Road, Barkhamsted, Connecticut.

Dear First Selectman Stein:

The Connecticut Siting Council (Council) received a request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72, a copy of which has already been provided to you.

If you have any questions or comments regarding the proposal, please call me or inform the Council by December 26, 2012.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts
Executive Director

LR/cm

c: Debra Bryden, Zoning Enforcement Officer, Town of Barkhamsted