infinigy
engineering & surveying

2255 Sewell Mill Road, Suite 130
Marietta, Georgia 30062
Phone: (678) 444-4463
Fax: (678) 444-4472
www.infinigy.com

October 9, 2014

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

**Re: Notice of Exempt Modification Application**
**303 Boxwood Lane, Danbury, CT**

Dear Ms. Bachman,

On behalf of Sprint Nextel Corporation ("Sprint"), enclosed for filing are an original and two (2) 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

Vertical Development LLC
20 Commercial Street
Branford, CT 06405
Phone – 401-743-9011
Fax – 401-633-6202
DWeisman@verticaldevelopmentllc.com

CC: Mr. Mark D. Boughton, Mayor
Danbury City Hall
155 Deer Hill Avenue
Danbury, CT 06810

siting.council@ct.gov (electronic copy)

# Notice of Exempt Modification
# 303 Boxwood Lane, Danbury, CT

Sprint 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 100' self support tower located at 303 Boxwood Lane in the City of Danbury, CT. More particularly, Sprint plans to upgrade this site by adding 2.5 GHz technology to its facilities. The proposed modifications will not increase the tower height, cause a significant adverse change or alteration in the physical or environmental characteristics of the site, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six (6) decibels, 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 Federal Communications Commission pursuant to Section 704 of the Telecommunications Act of 1996, as amended, and the State Department of Energy and Environmental Protection, pursuant to Section 22a-162 of the Connecticut General Statutes, or impair the structural integrity of the facility, as determined in a certification provided by a professional engineer licensed in Connecticut.

To better meet the growing voice and data demands of its wireless customers, Sprint is upgrading their network nationwide to include 2.5 GHz technology, which will provide faster service and better overall performance. Pursuant to the 2.5 GHz technology upgrade at this site, Sprint will add panel antennas, install RRHs, and install related equipment to its equipment area within the fenced tower compound.

The 100' monopole tower located at 303 Boxwood Lane in the City of Danbury (lat. 41° 23' 41.93", long. -73° 29' 12.27") is owned by Western

Connecticut State University. It is located within a 5,625 square foot fenced compound. Sprint currently has three (3) antennas (one (1) per sector) with a centerline of 90' 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 relocate three (3) panel antennas (one per sector) and six (6) RRHs (two (2) per sector) which will be connected and located behind the existing panel antennas. Sprint further plans to add three (3) RFS APXVTM14-C-120 panel antennas, one (1) per sector. Connected to each new RFS antenna will be one (1) ALU TD-RRH8X20 RRH, which will be located behind the new antenna. The height of the tower will not need to be increased. Sprint also plans to install eight (8) batteries in the existing BBU cabinet, 3 rectifiers in the existing equipment cabinet, and one (1) fiber transmission cable on the existing Ice Bridge all within Sprint's leased Premises. The compound's boundaries will not need to be extended. The proposed modifications will not cause a significant adverse change or alteration in the physical or environmental characteristics of the site, since it is already a telecommunications installation and the modifications will be compatible with this. Other than brief, construction-related noise, these modifications will not increase noise levels at the tower site boundary by six (6) decibels.

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 Federal Communications Commission pursuant to Section 704 of the Telecommunications Act of 1996, as amended, and the State Department of Energy and Environmental Protection, pursuant to Section 22a-162 of the Connecticut General Statutes. A radio frequency emissions analysis prepared by EBI Consulting indicated that the proposed final configuration (including other carriers on the tower) will emit 24.06% of the allowable FCC established general public limits sampled at the ground level (see the 2nd and the 6th page of Radio Frequency FCC Regulatory Compliance Maximum

Permissible Exposure (MPE) Assessment dated September 13, 2014). Emissions values for additional carriers were based upon values listed in Connecticut Siting Council active database (see the 2 and 6 page of Radio Frequency FCC Regulatory Compliance Maximum Permissible Exposure (MPE) Assessment dated September 13, 2014). 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 97-01 and ANSI/IEEE Std C95.1 (see the 2nd page of the Radio Frequency FCC Regulatory Compliance Maximum Permissible Exposure (MPE) assessment dated September 13, 2014).

The proposed modifications will not impair the structural integrity of the facility. Sprint commissioned Infinigy to perform a structural analysis of the tower to verify that it can support the proposed loading. The structure and foundation were found to meet the specified TIA requirements and deemed adequate to support the existing and proposed loading, and was rated at 98.4% (see the first page of Tower Analysis Report dated September 24, 2014.)

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 cause a significant adverse change or alteration in the physical or environmental characteristics of the site, will not increase the noise levels at the site, will not increase the total radio frequency electromagnetic radiation power density at the site to levels above applicable standards, and will not impair the structural integrity of the facility. Therefore, Sprint respectfully requests that the Council acknowledge that this Notice of Exempt Modification meets the Council's exemption criteria.

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

Sprint Existing Facility

Site ID: CT43XC836

Danbury - W. CT University

303 Boxwood Lane
Danbury, CT 06810

**September 13, 2014**

**EBI Project Number: 62144673**

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 **303 Boxwood Lane, Danbury, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. All calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 5 channels in the 1900 MHz Band were considered for each sector of the proposed installation.

2) 1 channel in the 800 MHz Band was considered for each sector of the proposed installation.

3) 2 channels in the 2500 MHz Band were considered for each sector of the proposed installation.

4) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

6) The antennas used in this modeling are the RFS APXVSPP18-C-A20 and the RFS APXVTM14-C-I20. This is based on feedback from the carrier with regards to anticipated antenna selection. The RFS APXVSPP18-C-A20 has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. The RFS APXVTM14-C-I20 has a 15.9 dBd gain value at its main lobe at 2500 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antenna mounting height centerline for the proposed antennas is **90 feet** above ground level (AGL).

8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

| Site ID | CT43XC836 - Danbury - W. CT University |
|---|---|
| Site Addresss | 303 Boxwood Lane, Danbury, CT, 06810 |
| Site Type | Monopole |

**Sector 1**

| Antenna Number | Antenna Make | Antenna Model | Radio Type | Frequency Band | Technology | Power Out Per Channel (Watts) | Number of Channels | Composite Power | Antenna Gain (10 db reduction) | Antenna Height (ft) | analysis height | Cable Size | Cable Loss (dB) | Additional Loss (dB) | ERP | Power Density Percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a | RFS | APXVSPP18-C-A20 | RRH | 1900 MHz | CDMA / LTE | 20 | 5 | 100 | 5.9 | 90 | 84 | 1/2 " | 0.5 | 0 | 346.74 | 1.77% |
| 1a | RFS | APXVSPP18-C-A20 | RRH | 850 MHz | CDMA / LTE | 20 | 1 | 20 | 3.4 | 90 | 84 | 1/2 " | 0.5 | 0 | 39.00 | 0.35% |
| 1B | RFS | APXVTMM14-C-120 | RRH | 2500 MHz | CDMA / LTE | 20 | 2 | 40 | 5.9 | 90 | 84 | 1/2 " | 0.5 | 0 | 138.69 | 1.25% |
| | | | | | | | | | | | | | | Sector total Power Density Value: | | 3.36% |

**Sector 2**

| Antenna Number | Antenna Make | Antenna Model | Radio Type | Frequency Band | Technology | Power Out Per Channel (Watts) | Number of Channels | Composite Power | Antenna Gain (10 db reduction) | Antenna Height (ft) | analysis height | Cable Size | Cable Loss (dB) | Additional Loss (dB) | ERP | Power Density Percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2a | RFS | APXVSPP18-C-A20 | RRH | 1900 MHz | CDMA / LTE | 20 | 5 | 100 | 5.9 | 90 | 84 | 1/2 " | 0.5 | 0 | 346.74 | 1.77% |
| 2a | RFS | APXVSPP18-C-A20 | RRH | 850 MHz | CDMA / LTE | 20 | 1 | 20 | 3.4 | 90 | 84 | 1/2 " | 0.5 | 0 | 39.00 | 0.35% |
| 2B | RFS | APXVTMM14-C-120 | RRH | 2500 MHz | CDMA / LTE | 20 | 2 | 40 | 5.9 | 90 | 84 | 1/2 " | 0.5 | 0 | 138.69 | 1.25% |
| | | | | | | | | | | | | | | Sector total Power Density Value: | | 3.36% |

**Sector 3**

| Antenna Number | Antenna Make | Antenna Model | Radio Type | Frequency Band | Technology | Power Out Per Channel (Watts) | Number of Channels | Composite Power | Antenna Gain (10 db reduction) | Antenna Height (ft) | analysis height | Cable Size | Cable Loss (dB) | Additional Loss (dB) | ERP | Power Density Percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3a | RFS | APXVSPP18-C-A20 | RRH | 1900 MHz | CDMA / LTE | 20 | 5 | 100 | 5.9 | 90 | 84 | 1/2 " | 0.5 | 0 | 346.74 | 1.77% |
| 3a | RFS | APXVSPP18-C-A20 | RRH | 850 MHz | CDMA / LTE | 20 | 1 | 20 | 3.4 | 90 | 84 | 1/2 " | 0.5 | 0 | 39.00 | 0.35% |
| 3B | RFS | APXVTMM14-C-120 | RRH | 2500 MHz | CDMA / LTE | 20 | 2 | 40 | 5.9 | 90 | 84 | 1/2 " | 0.5 | 0 | 138.69 | 1.25% |
| | | | | | | | | | | | | | | Sector total Power Density Value: | | 3.36% |

| Site Composite MPE % | |
|---|---|
| Carrier | MPE % |
| Sprint | 10.09% |
| Nextel | 12.25% |
| T-Mobile | 0.44% |
| WCXI (WCSU) | 1.28% |
| **Total Site MPE %** | **24.06%** |

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## Summary

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

The anticipated Maximum Composite contributions from the Sprint facility are **10.09% (3.36% from sector 1, 3.36% from sector 2 and 3.36% from sector 3)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **24.06%** of the allowable FCC established general public limit sampled at 6 feet above ground level. This total composite site value is based upon MPE values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

**EBI Consulting**
21 B Street
Burlington, MA 01803

Sprint

| | |
|---|---|
| PROJECT: | 2.5 EQUIPMENT DEPLOYMENT |
| SITE NAME: | DANBURY-W. CT UNIVERSITY |
| SITE CASCADE: | CT43XC836 |
| SITE ADDRESS: | 303 BOXWOOD LANE<br>DANBURY, CT 06810 |
| SITE TYPE: | SELF SUPPORT TOWER |
| MARKET: | SOUTHERN CONNECTICUT |

## SITE INFORMATION

**PROPERTY OWNER:**
CT STATE UNIVERSITY SYSTEM. BOARD OF TRUSTEES MIDTOWN CAMPUS
181 WHITE ST
DANBURY, CT 06810

**LATITUDE (NAD83):**
41° 23' 42" N
41.395°

**LONGITUDE (NAD83):**
73° 29' 12.2928" W
-73.486748°

**COUNTY:**
FAIRFEILD

**ZONING JURISDICTION:**
DANBURY

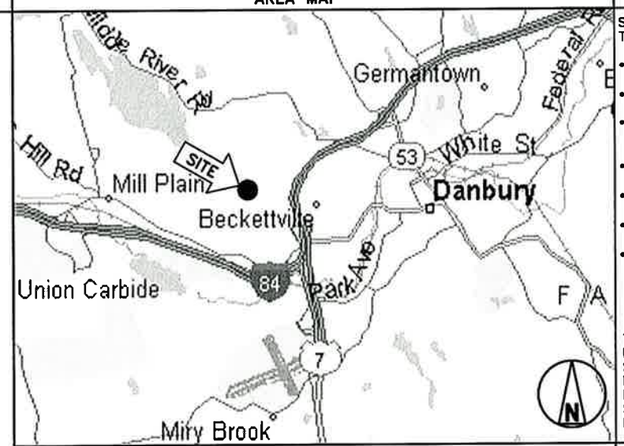
**ZONING DISTRICT:**
RA-40

**POWER COMPANY:**
CONNECTICUT LIGHT & POWER
(800) 286-2000

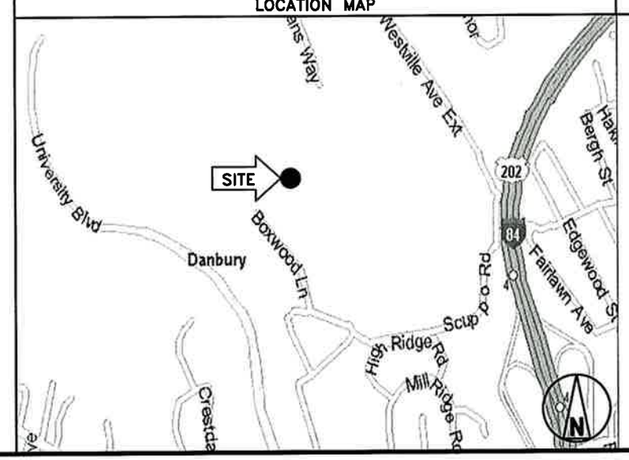
**AAV PROVIDER:**
AT&T
(800) 246-2020

**SPRINT CONSTRUCTION MANAGER:**
GARY WOOD
PHONE: (860) 940-9168
gary.wood@sprint.com

## AREA MAP




## LOCATION MAP




## PROJECT DESCRIPTION

SPRINT PROPOSES TO MODIFY AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY.

- INSTALL 2.5 EQUIPMENT IN EXISTING N.V. MMBS CABINET
- INSTALL (8) NEW BATTERIES IN EXISTING SPRINT BATTERY CABINET
- INSTALL EXISTING SPRINT ANTENNA MOUNT, REPLACE WITH NEW SECTOR FRAMES
- INSTALL (3) PANEL ANTENNAS
- INSTALL (3) RRU'S NEAR ANTENNAS
- INSTALL (27) JUMPER CABLES
- INSTALL (1) FIBER CABLE

THESE PLANS HAVE BEEN DEVELOPED FOR THE MODIFICATION OF AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY OWNED OR LEASED BY SPRINT IN ACCORDANCE WITH THE SCOPE OF WORK PROVIDED BY SPRINT. INFINIGY HAS INCORPORATED THIS SCOPE OF WORK IN THE PLANS. THESE PLANS ARE NOT FOR CONSTRUCTION UNLESS ACCOMPANIED BY A PASSING STRUCTURAL STABILITY ANALYSIS PREPARED BY A LICENSED STRUCTURAL ENGINEER. STRUCTURAL ANALYSIS MUST INCLUDE BOTH TOWER AND MOUNT.

## APPLICABLE CODES

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

1. INTERNATIONAL BUILDING CODE (2012 IBC)
2. TIA-EIA-222-G OR LATEST EDITION
3. NFPA 780 – LIGHTNING PROTECTION CODE
4. 2011 NATIONAL ELECTRIC CODE OR LATEST EDITION
5. ANY OTHER NATIONAL OR LOCAL APPLICABLE CODES, MOST RECENT EDITIONS
6. CT BUILDING CODE
7. LOCAL BUILDING CODE
8. CITY/COUNTY ORDINANCES

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## DRAWING INDEX

| SHEET NO. | SHEET TITLE | REV. |
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| SP-2 | SPRINT SPECIFICATIONS | 0 |
| SP-3 | SPRINT SPECIFICATIONS | 0 |
| | | |
| A-1 | SITE PLAN | 0 |
| A-1A | EXISTING EQUIPMENT DETAILS | 0 |
| A-2 | TOWER ELEVATION & CABLE PLAN | 0 |
| A-3 | ANTENNA LAYOUT & MOUNTING DETAILS | 0 |
| A-4 | COLOR CODING & NOTES | 0 |
| A-5 | EQUIPMENT & MOUNTING DETAILS | 0 |
| A-6 | CIVIL DETAILS | 0 |
| A-7 | PLUMBING DIAGRAM | 0 |
| | | |
| E-1 | ELECTRICAL & GROUNDING PLAN | 0 |
| E-2 | ELECTRICAL & GROUNDING DETAILS | 0 |

PLANS PREPARED FOR:
Sprint
6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:
INFINIGY Design. Build. Deliver.
1033 Watervliet Shaker Rd
Albany, NY 12205
Office # (518) 690-0790
Fax # (518) 690-0793
JOB NUMBER 333-000

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

DRAWING NOTICE:
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REVISIONS:

| DESCRIPTION | DATE | BY | REV |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| ISSUED FOR PERMIT | 10/07/14 | JLM | 0 |
| | | | |

SITE NAME:
DANBURY-W. CT UNIVERSITY

SITE CASCADE:
CT43XC836

SITE ADDRESS:
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:
TITLE SHEET & PROJECT DATA

SHEET NUMBER:
T-1

THESE OUTLINE SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS, INCLUDING CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

## SECTION 01 100 – SCOPE OF WORK

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT CONSTRUCTION STANDARDS FOR WIRELESS SITES, CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

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

1.4 NATIONALLY RECOGNIZED CODES AND STANDARDS:

A. THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:

1. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
5. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
3. GR-1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY –GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
4. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE – "NEC") AND NFPA 101 (LIFE SAFETY CODE).
5. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
6. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
7. AMERICAN CONCRETE INSTITUTE (ACI)
8. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
9. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
10. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
11. PORTLAND CEMENT ASSOCIATION (PCA)
12. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
13. BRICK INDUSTRY ASSOCIATION (BIA)
14. AMERICAN WELDING SOCIETY (AWS)
15. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
16. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
17. DOOR AND HARDWARE INSTITUTE (DHI)
18. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
19. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

1.5 DEFINITIONS:

A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.

B. COMPANY: SPRINT 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.

F. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT.

G. CONSTRUCTION MANAGER – ALL PROJECTS RELATED COMMUNICATION TO FLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT...

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

1.7 POINT OF CONTACT: COMMUNICATION BETWEEN SPRINT AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE SPRINT CONSTRUCTION MANAGER APPOINTED TO MANAGE THE PROJECT FOR SPRINT.

1.8 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.

1.9 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 RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS-BUILT" DRAWINGS.

B. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK. CONTRACTOR SHALL NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY VARIATIONS PRIOR TO PROCEEDING WITH THE WORK.

C. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.

1.10 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.

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

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

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

1.14 METHODS OF PROCEDURE (MOPS) FOR CONSTRUCTION: CONTRACTOR SHALL PERFORM WORK AS DESCRIBED IN THE FOLLOWING INSTALLATION AND COMMISSIONING MOPS.

NOTE: IN SHORT-FORM SPECIFICATIONS ON THE DRAWINGS, A/E TO INSERT LIST OF APPLICABLE MOPS INCLUDING EN-2012-001, EN-2013-002, EL-0568, AND TS-0193

1.15 USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 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.

3.2 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.

3.3 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.

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

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

## SECTION 01 200 – COMPANY FURNISHED MATERIAL AND EQUIPMENT

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 RECEIPT OF MATERIAL AND EQUIPMENT:

A. A COMPANY FURNISHED MATERIAL AND EQUIPMENT IS IDENTIFIED ON THE RF DATA SHEET IN THE CONSTRUCTION DOCUMENTS.

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

1 ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.

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

3.2 DELIVERABLES:

A. COMPLETE SHIPPING AND RECEIPT DOCUMENTATION IN ACCORDANCE WITH COMPANY PRACTICE.

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

C. UPLOAD DOCUMENTATION INTO SPRINT SITE MANAGEMENT SYSTEM (SMS) AND/OR PROVIDE HARD COPY DOCUMENTATION AS REQUESTED.

## SECTION 01 300 – CELL SITE CONSTRUCTION CO.

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 NOTICE TO PROCEED

A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED AND THE ISSUANCE OF THE WORK ORDER.

B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE SPRINT WITH AN OPERATIONAL WIRELESS FACILITY.

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 FUNCTIONAL REQUIREMENTS:

A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. THE ACTIVITIES DESCRIBED ARE NOT EXHAUSTIVE, AND CONTRACTOR SHALL TAKE ANY AND ALL ACTIONS AS NECESSARY TO SUCCESSFULLY COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.

B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.

C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES

D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

PLANS PREPARED FOR:

Sprint

6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

INFINIGY Design. Build. Deliver.

1033 Watervliet Shaker Rd
Albany, NY 12205
Office # (518) 690-0790
Fax # (518) 690-0793

JOB NUMBER 333-000

ENGINEERING LICENSE:

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

DRAWING NOTICE:

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SITE NAME:

DANBURY-W. CT UNIVERSITY

SITE CASCADE:

CT43XC836

SITE ADDRESS:

303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:

SPRINT SPECIFICATIONS

SHEET NUMBER:

SP-1

CONTINUE FROM SP-1

1. PERFORM ANY REQUIRED SITE ENVIRONMENTAL MITIGATION.
2. PREPARE GROUND SITES; PROVIDE DE-GRUBBING; AND ROUGH AND FINAL GRADING, AND COMPOUND SURFACE TREATMENTS.
3. MANAGE AND CONDUCT ALL ACTIVITIES FOR INSTALLATION OF UTILITIES INCLUDING ELECTRICAL AND TELCO BACKHAUL.
4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
5. INSTALL ABOVE GROUND GROUNDING SYSTEMS.
6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
7. INSTALL "H-FRAMES", CABINETS AND SHELTERS AS INDICATED.
8. INSTALL ROADS, ACCESS WAYS, CURBS AND DRAINS AS INDICATED.
9. ACCOMPLISH REQUIRED MODIFICATION OF EXISTING FACILITIES.
10. PROVIDE ANTENNA SUPPORT STRUCTURE FOUNDATIONS.
11. PROVIDE SLABS AND EQUIPMENT PLATFORMS.
12. INSTALL COMPOUND FENCING, SIGHT SHIELDING, LANDSCAPING AND ACCESS BARRIERS.
13. PERFORM INSPECTION AND MATERIAL TESTING AS REQUIRED HEREINAFTER.
14. CONDUCT SITE RESISTANCE TO EARTH TESTING AS REQUIRED HEREINAFTER
15. INSTALL FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS.
16. INSTALL TOWERS, ANTENNA SUPPORT STRUCTURES AND PLATFORMS ON EXISTING TOWERS AS REQUIRED.
17. INSTALL CELL SITE RADIOS, MICROWAVE, GPS, COAXIAL MAINLINE, ANTENNAS, CROSS BAND COUPLERS, TOWER TOP AMPLIFIERS, LOW NOISE AMPLIFIERS AND RELATED EQUIPMENT.
18. PERFORM, DOCUMENT, AND CLOSE OUT ANY CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
19. PERFORM ANTENNAL AND COAX SWEEP TESTING AND MAKE ANY AND ALL NECESSARY CORRECTIONS.
20. REMAIN ON SITE MOBILIZED THROUGHOUT HAND-OFF AND INTEGRATION TO ASSIST AS NEEDED UNTIL SITE IS DEEMED SUBSTANTIALLY COMPLETE AND PLACED "ON AIR."

3.2 GENERAL REQUIREMENTS FOR CIVIL CONSTRUCTION:

A. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH. AT THE COMPLETION OF THE WORK, CONTRACTOR SHALL REMOVE FROM THE SITE ALL REMAINING RUBBISH, IMPLEMENTS, TEMPORARY FACILITIES, AND SURPLUS MATERIALS.

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

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

1. IN THE EVENT CONTRACTOR ENCOUNTERS ANY HAZARDOUS CONDITION WHICH HAS NOT BEEN ABATED OR OTHERWISE MITIGATED, CONTRACTOR AND ALL OTHER PERSONS SHALL IMMEDIATELY STOP WORK IN THE AFFECTED AREA AND NOTIFY COMPANY IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT BE RESUMED EXCEPT BY WRITTEN NOTIFICATION BY COMPANY.
2. CONTRACTOR AGREES TO USE CARE WHILE ON THE SITE AND SHALL NOT TAKE ANY ACTION THAT WILL OR MAY RESULT IN OR CAUSE THE HAZARDOUS CONDITION TO BE FURTHER RELEASED IN THE ENVIRONMENT, OR TO FURTHER EXPOSE INDIVIDUALS TO THE HAZARD.

D. CONTRACTOR'S ACTIVITIES SHALL BE RESTRICTED TO THE PROJECT LIMITS. SHOULD AREAS OUTSIDE THE PROJECT LIMITS BE AFFECTED BY CONTRACTOR'S ACTIVITIES, CONTRACTOR SHALL IMMEDIATELY RETURN THEM TO ORIGINAL CONDITION

E. CONDUCT TESTING AS REQUIRED HEREIN.

3.3 DELIVERABLES:

A. CONTRACTOR SHALL REVIEW, APPROVE, AND SUBMIT TO SPRINT SHOP DRAWINGS, PRODUCT DATA, SAMPLES, AND SIMILAR SUBMITTALS AS REQUIRED HEREINAFTER

B. PROVIDE DOCUMENTATION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING. DOCUMENTATION SHALL BE FORWARDED IN ORIGINAL FORMAT AND/OR UPLOADED INTO SMS.

1. ALL CORRESPONDENCE AND PRELIMINARY CONSTRUCTION REPORTS.
2. PROJECT PROGRESS REPORTS.
3. CIVIL CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
4. ELECTRICAL SERVICE COMPLETION DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
5. LINES AND ANTENNA INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
6. POWER INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
7. TELCO READY DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
8. PPC (OR SHELTER) INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
9. TOWER CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
10. TOWER CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
11. BTS AND RADIO EQUIPMENT DELIVERED AT SITE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
12. NETWORK OPERATIONS HANDOFF CHECKLIST (HOC WALK) COMPLETE (UPLOAD FORM IN SMS)
13. CIVIL CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
14. SITE CONSTRUCTION PROGRESS PHOTOS UNLOADED INTO SMS.

## SECTION 01 400 – SUBMITTALS & TESTS

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 SUBMITTALS:

A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.

B. SUBMIT THE FOLLOWING TO COMPANY REPRESENTATIVE FOR APPROVAL.

1. CONCRETE MIX-DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
3. SPECIAL FINISHES FOR INTERIOR SPACES, IF ANY.
4. ALL EQUIPMENT AND MATERIALS SO IDENTIFIED ON THE CONSTRUCTION DRAWINGS.
5. CHEMICAL GROUNDING DESIGN

D. ALTERNATES: AT THE COMPANY'S REQUEST, ANY ALTERNATIVES TO THE MATERIALS OR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO BEING SHIPPED TO SITE. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED. SUBMITTAL FOR APPROVAL SHALL INCLUDE A STATEMENT OF COST REDUCTION PROPOSED FOR USE OF ALTERNATE PRODUCT.

1.4 TESTS AND INSPECTIONS:

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.

B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. COAX SWEEPS AND FIBER TESTS PER TS-0200 REV 4 ANTENNA LINE ACCEPTANCE STANDARDS.
2. AGL, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE-FOR-THE-PURPOSE ANTENNA ALIGNMENT TOOL.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.

C. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING;

1. AZIMUTH, DOWNTILT, AGL – UPLOAD REPORT FROM ANTENNA ALIGNMENT TOOL TO SITERRA TASK 465. INSTALLED AZIMUTH, DOWNTILT, AND AGL MUST CONFORM TO THE RF DATA SHEETS. SWEEP AND FIBER TESTS
2. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
3. ALL AVAILABLE JURISDICTIONAL INFORMATION
4. PDF SCAN OF REDLINES PRODUCED IN FIELD
5. ELECTRONIC AS-BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS. ANY FIELD CHANGE MUST BE REFLECTED BY MODIFYING THE PLANS, ELEVATIONS, AND DETAILS IN THE DRAWING SETS. GENERAL NOTES INDICATING MODIFICATIONS WILL NOT BE ACCEPTED. CHANGES SHALL BE HIGHLIGHTED AS "CLOUDS" IDENTIFIED AS THE "AS-BUILT" CONDITION.
6. LIEN WAIVERS
7. FINAL PAYMENT APPLICATION
8. REQUIRED FINAL CONSTRUCTION PHOTOS
9 . CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
10. ALL POST NTP TASKS INCLUDING DOCUMENT UPLOADS COMPLETED IN SITERRA (SPRINTS DOCUMENT REPOSITORY OF RECORD).

1.5 COMMISSIONING: PERFORM ALL COMMISSIONING AS REQUIRED BY APPLICABLE MOPs

1.6 INTEGRATION: PERFORM ALL INTEGRATION ACTIVITIES AS REQUIRED BY APPLICABLE MOPs

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 REQUIREMENTS FOR TESTING:

A. THIRD PARTY TESTING AGENCY:

1. 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.
2. 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.
3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
4. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.

3.2 REQUIRED TESTS:

A. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. CONCRETE CYLINDER BREAK TESTS FOR THE TOWER AND ANCHOR FOUNDATIONS AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
2. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED IN SECTION: HOT MIX ASPHALT PAVING.
3. FIELD QUALITY CONTROL TESTING AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
4. TESTING REQUIRED UNDER SECTION: AGGREGATE BASE FOR ACCESS ROADS, PADS AND ANCHOR LOCATIONS
5. STRUCTURAL BACKFILL COMPACTION TESTS FOR THE TOWER FOUNDATION.
6. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
7. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS.
8. GROUNDING AT ANTENNA MASTS FOR GPS AND ANTENNAS
9. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

3.3 REQUIRED INSPECTIONS

A. SCHEDULE INSPECTIONS WITH COMPANY REPRESENTATIVE.

B. CONDUCT INSPECTIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. GROUNDING SYSTEM INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
3. COMPACTION OF BACKFILL MATERIALS; AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS; ASPHALT PAVING; AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
4. PRE- AND POST-CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES.
5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
6. ANTENNA AZIMUTH , DOWN TILT AND PER SUNLIGHT TOOL SUNSIGHT INSTRUMENTS – ANTENNALIGN ALIGNMENT TOOL (AAT)

PLANS PREPARED FOR:

Sprint

6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

INFINIGY Design. Build. Deliver.

1033 Watervliet Shaker Rd
Albany, NY 12205
Office # (518) 690-0790
Fax # (518) 690-0793

JOB NUMBER 333-000

ENGINEERING LICENSE:

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

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SITE NAME:

DANBURY-W. CT UNIVERSITY

SITE CASCADE:

CT43XC836

SITE ADDRESS:

303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:

SPRINT SPECIFICATIONS

SHEET NUMBER:

SP-2

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7. VERIFICATION DOCUMENTED WITH THE ANTENNA CHECKLIST REPORT, BY A&E, SITE DEVELOPMENT REP, OR RF REP.
8. FINAL INSPECTION CHECKLIST AND HANDOFF WALK (HOC.). SIGNED FORM SHOWING ACCEPTANCE BY FIELD OPS IS TO BE UPLOADED INTO SMS.
9. COAX SWEEP AND FIBER TESTING DOCUMENTS SUBMITTED VIA SMS FOR RF APPROVAL.
10. SCAN–ABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
11. ALL AVAILABLE JURISDICTIONAL INFORMATION
12. PDF SCAN OF REDLINES PRODUCED IN FIELD

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.

D. CONSTRUCTION INSPECTIONS AND CORRECTIVE MEASURES SHALL BE DOCUMENTED BY THE CONTRACTOR WITH WRITTEN REPORTS AND PHOTOGRAPHS. PHOTOGRAPHS MUST BE DIGITAL AND OF SUFFICIENT QUALITY TO CLEARLY SHOW THE SITE CONSTRUCTION. PHOTOGRAPHS MUST CLEARLY IDENTIFY THE PHOTOGRAPHED ITEM AND BE LABELED WITH THE SITE CASCADE NUMBER, SITE NAME, DESCRIPTION, AND DATE.

3.4 DELIVERABLES: TEST AND INSPECTION REPORTS AND CLOSEOUT DOCUMENTATION SHALL BE UPLOADED TO THE SMS AND/OR FORWARDED TO SPRINT FOR INCLUSION INTO THE PERMANENT SITE FILES.

A. THE FOLLOWING TEST AND INSPECTION REPORTS SHALL BE PROVIDED AS APPLICABLE.

1. CONCRETE MIX AND CYLINDER BREAK REPORTS.
2. STRUCTURAL BACKFILL COMPACTION REPORTS.
3. SITE RESISTANCE TO EARTH TEST.
4. ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
5. TOWER ERECTION INSPECTIONS AND MEASUREMENTS DOCUMENTING TOWER INSTALLED PER SUPPLIER'S REQUIREMENTS AND THE APPLICABLE SECTIONS HEREIN.
6. COAX CABLE SWEEP TESTS PER COMPANY'S "ANTENNA LINE ACCEPTANCE STANDARDS".

B. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES THE FOLLOWING;

1. TEST WELLS AND TRENCHES: PHOTOGRAPHS OF ALL TEST WELLS; PHOTOGRAPHS SHOWING ALL OPEN EXCAVATIONS AND TRENCHING PRIOR TO BACKFILLING SHOWING A TAPE MEASURE VISIBLE IN THE EXCAVATIONS INDICATING DEPTH.
2. CONDUITS, CONDUCTORS AND GROUNDING: PHOTOGRAPHS SHOWING TYPICAL INSTALLATION OF CONDUCTORS AND CONNECTORS; PHOTOGRAPHS SHOWING TYPICAL BEND RADIUS OF INSTALLED GROUND WIRES AND GROUND ROD SPACING;
3. CONCRETE FORMS AND REINFORCING: CONCRETE FORMING AT TOWER AND EQUIPMENT/SHELTER PAD/FOUNDATIONS – PHOTOGRAPHS SHOWING ALL REINFORCING STEEL, UTILITY AND CONDUIT STUB OUTS; PHOTOGRAPHS SHOWING CONCRETE POUR OF SHELTER SLAB/FOUNDATION, TOWER FOUNDATION AND GUY ANCHORS WITH VIBRATOR IN USE; PHOTOGRAPHS SHOWING EACH ANCHOR ON GUYED TOWERS, BEFORE CONCRETE POUR.
4. TOWER, ANTENNAS AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING – TOP AND BOTTOM; PHOTOS OF COAX GROUNDING––TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
5. ROOF TOPS: PRE–CONSTRUCTION AND POST–CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;
6. SITE LAYOUT – PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
7. FINISHED UTILITIES: CLOSE–UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE–UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE–UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.
8. REQUIRED MATERIALS CERTIFICATIONS: CONCRETE MIX DESIGNS; MILL CERTIFICATION FOR ALL REINFORCING AND STRUCTURAL STEEL; AND ASPHALT PAVING MIX DESIGN.
9. ANY AND ALL SUBMITTALS BY THE JURISDICTION OR COMPANY.

## SECTION 01 400 – SUBMITTALS & TESTS

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 WEEKLY REPORTS:

A. CONTRACTOR SHALL PROVIDE SPRINT WITH WEEKLY REPORTS SHOWING PROJECT STATUS. THIS STATUS REPORT FORMAT WILL BE PROVIDED TO THE CONTRACTOR BY SPRINT. THE REPORT WILL CONTAIN SITE ID NUMBER, THE MILESTONES FOR EACH SITE, INCLUDING THE BASELINE DATE, ESTIMATED COMPLETION DATE AND ACTUAL COMPLETION DATE.

B. REPORT INFORMATION WILL BE TRANSMITTED TO SPRINT VIA ELECTRONIC MEANS AS REQUIRED. THIS INFORMATION WILL PROVIDE A BASIS FOR PROGRESS MONITORING AND PAYMENT.

3.2 PROJECT CONFERENCE CALLS:

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

3.3 PROJECT TRACKING IN SMS:

A. CONTRACTOR SHALL PROVIDE SCHEDULE UPDATES AND PROJECTIONS IN THE SMS SYSTEM ON A WEEKLY BASIS.

3.4 ADDITIONAL REPORTING:

A. ADDITIONAL OR ALTERNATE REPORTING REQUIREMENTS MAY BE ADDED TO THE REPORT AS DETERMINED TO BE REASONABLY NECESSARY BY COMPANY.

3.5 PROJECT PHOTOGRAPHS:

A. FILE DIGITAL PHOTOGRAPHS OF COMPLETED SITE IN JPEG FORMAT IN THE SMS PHOTO LIBRARY FOR THE RESPECTIVE SITE. PHOTOGRAPHS SHALL BE CLEARLY LABELED WITH SITE NUMBER, NAME AND DESCRIPTION, AND SHALL INCLUDE AT A MINIMUM THE FOLLOWING AS APPLICABLE:

1. 1SHELTER AND TOWER OVERVIEW.
2. TOWER FOUNDATION(S) – FORMS AND STEEL BEFORE POUR (EACH ANCHOR ON GUYED TOWERS).
3. TOWER FOUNDATION(S) POUR WITH VIBRATOR IN USE (EACH ANCHOR ON GUYED TOWERS).
4. TOWER STEEL AS BEING INSTALLED INTO HOLE (SHOW ANCHOR STEEL ON GUYED TOWERS).
5. PHOTOS OF TOWER SECTION STACKING.
6. CONCRETE TESTING / SAMPLES.
7. PLACING OF ANCHOR BOLTS IN TOWER FOUNDATION.
8. BUILDING/WATER TANK FROM ROAD FOR TENANT IMPROVEMENTS OR COMMENTS.
9. SHELTER FOUNDATION––FORMS AND STEEL BEFORE POURING.
10. SHELTER FOUNDATION POUR WITH VIBRATOR IN USE.
11. COAX CABLE ENTRY INTO SHELTER.
12. PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
13. ROOFTOP PRE AND POST CONSTRUCTION PHOTOS TO INCLUDE PENETRATIONS AND INTERIOR CEILING.
14. PHOTOS OF TOWER TOP COAX LINE COLOR CODING AND COLOR CODING AT GROUND LEVEL.
15. PHOTOS OF ALL APPROPRIATE COMPANY OR REGULATORY SIGNAGE.
16. PHOTOS OF EQUIPMENT BOLT DOWN INSIDE SHELTER.
17. POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE AND POWER AND TELCO SUPPLY LOCATIONS INCLUDING METER/DISCONNECT.
18. ELECTRICAL TRENCH(S) WITH ELECTRICAL / CONDUIT BEFORE BACKFILL.
19. ELECTRICAL TRENCH(S) WITH FOIL–BACKED TAPE BEFORE FURTHER BACKFILL.
20. TELCO TRENCH WITH TELEPHONE / CONDUIT BEFORE BACKFILL.
21. TELCO TRENCH WITH FOIL–BACKED TAPE BEFORE FURTHER BACKFILL.
22. SHELTER GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
23. TOWER GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
24. FENCE GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
25. ALL BTS GROUND CONNECTIONS.
26. ALL GROUND TEST WELLS.
27. ANTENNA GROUND BAR AND EQUIPMENT GROUND BAR.
28. ADDITIONAL GROUNDING POINTS ON TOWERS ABOVE 200'.
29. HVAC UNITS INCLUDING CONDENSERS ON SPLIT SYSTEMS.
30. GPS ANTENNAS.
31. CABLE TRAY AND/OR WAVEGUIDE BRIDGE.
32. DOGHOUSE/CABLE EXIT FROM ROOF.
33. EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA.
34. MASTER BUS BAR.
35. TELCO BOARD AND NIU.
36. ELECTRICAL DISTRIBUTION WALL.
37. CABLE ENTRY WITH SURGE SUPPRESSION.
38. ENTRANCE TO EQUIPMENT ROOM.
39. COAX WEATHERPROOFING–TOP AND BOTTOM OF TOWER.
40. COAX GROUNDING –TOP AND BOTTOM OF TOWER.
41. ANTENNA AND MAST GROUNDING.
42. LANDSCAPING – WHERE APPLICABLE.

3.6 FINAL PROJECT ACCEPTANCE: COMPLETE ALL REQUIRED REPORTING TASKS PER CONTRACT, CONTRACT DOCUMENTS OR THE SPRINT INTEGRATED CONSTRUCTION STANDARDS FOR WIRELESS SITES AND UPLOAD INTO SITERRA.

PLANS PREPARED FOR:
Sprint
6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:
INFINIGY Design. Build. Deliver.
1033 Watervliet Shaker Rd
Albany, NY 12205
Office # (518) 690-0790
Fax # (518) 690-0793
JOB NUMBER 333-000

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

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SITE NAME:
DANBURY-W. CT UNIVERSITY

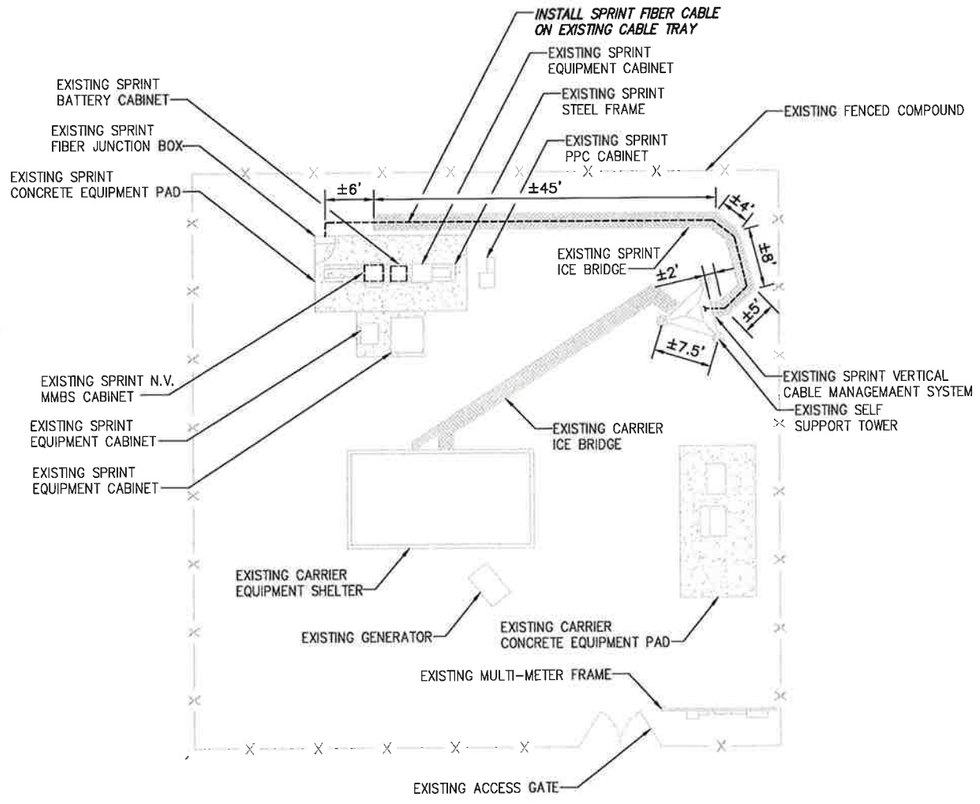
SITE CASCADE:
CT43XC836

SITE ADDRESS:
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:
SPRINT SPECIFICATIONS

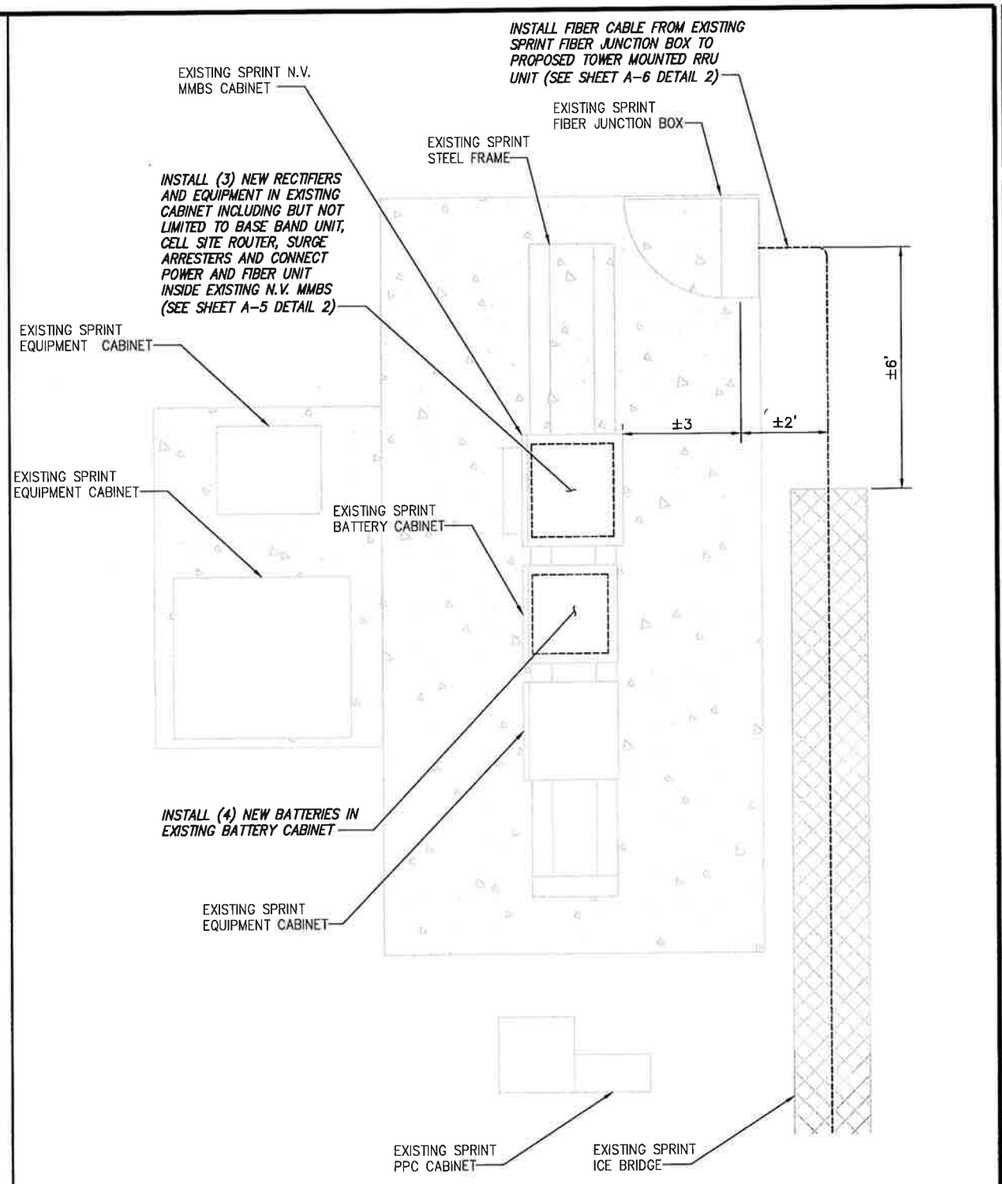
SHEET NUMBER:
SP-3

INFORMATION CONTAINED WITHIN DRAWINGS ARE BASED ON PROVIDED INFORMATION AND ARE NOT THE RESULT OF A FIELD SURVEY.




5' 0 5' 10' 20'
( IN FEET )
SCALE: 24"x36" SHEET 1" = 10'-0"
SCALE: 11"x17" SHEET 1" = 20'-0"

**OVERALL SITE PLAN** | SCALE: AS NOTED | 1




1' 0 1' 2' 4'
( IN FEET )
SCALE: 24"x36" SHEET 1" = 2'-0"
SCALE: 11"x17" SHEET 1" = 4'-0"

**SPRINT EQUIPMENT PLAN** | SCALE: AS NOTED | 2

PLANS PREPARED FOR:

Sprint
6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

INFINIGY Design. Build. Deliver.
1033 Watervliet Shaker Rd
Albany, NY 12205
Office # (518) 690-0790
Fax # (518) 690-0793

JOB NUMBER 333-000

ENGINEERING LICENSE:

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

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SITE NAME:

DANBURY-W. CT UNIVERSITY

SITE CASCADE:

CT43XC836

SITE ADDRESS:

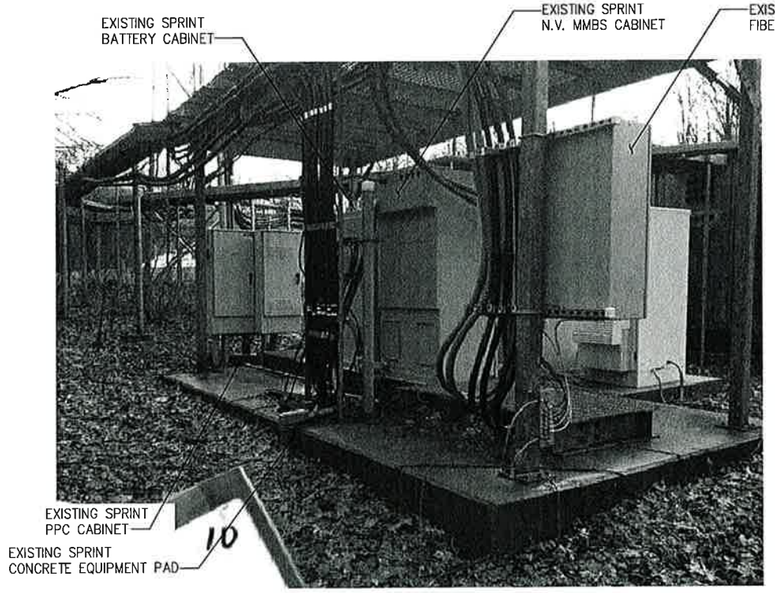
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:

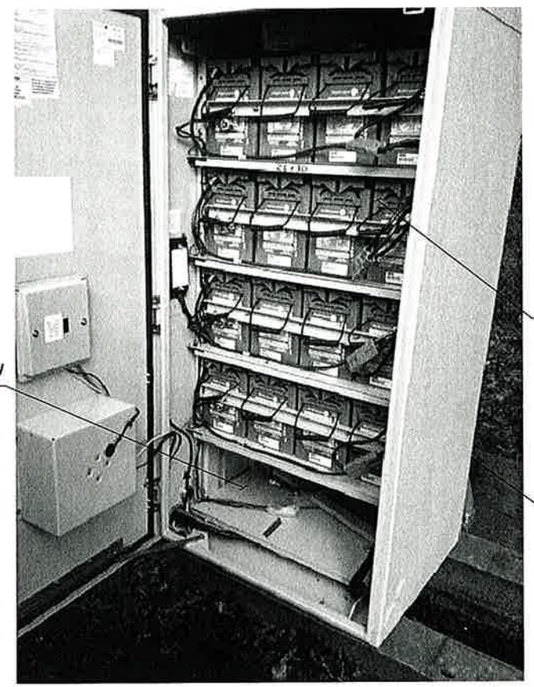
SITE PLAN

SHEET NUMBER:

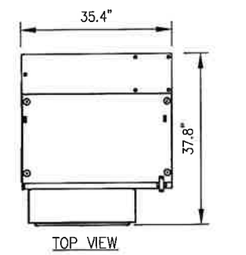
A-1



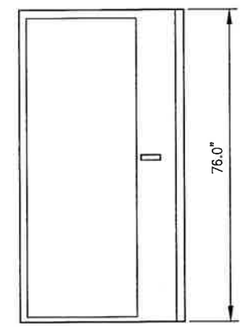

**CABINET LINEUP PHOTO** | SCALE: AS NOTED | 1




**EXISTING BATTERY CABINET PHOTO** | SCALE: AS NOTED | 2



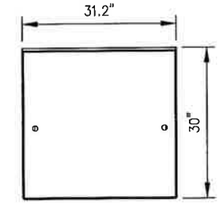

TOP VIEW



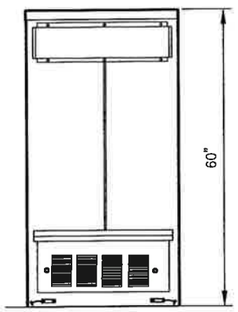

FRONT VIEW

MANUFACTURER: ALU
MODEL: 9928

N.V. MMBS CABINET




TOP VIEW




REAR VIEW

MANUFACTURER: TBD
MODEL: 60ECv2

BATTERY CABINET

**EXISTING EQUIPMENT DETAIL** | SCALE: AS NOTED | 3

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Sprint

6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

INFINIGY Design. Build. Deliver.

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Office # (518) 690-0790
Fax # (518) 690-0793

JOB NUMBER 333-000

ENGINEERING LICENSE:

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

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SITE NAME:

DANBURY-W. CT UNIVERSITY

SITE CASCADE:

CT43XC836

SITE ADDRESS:

303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:

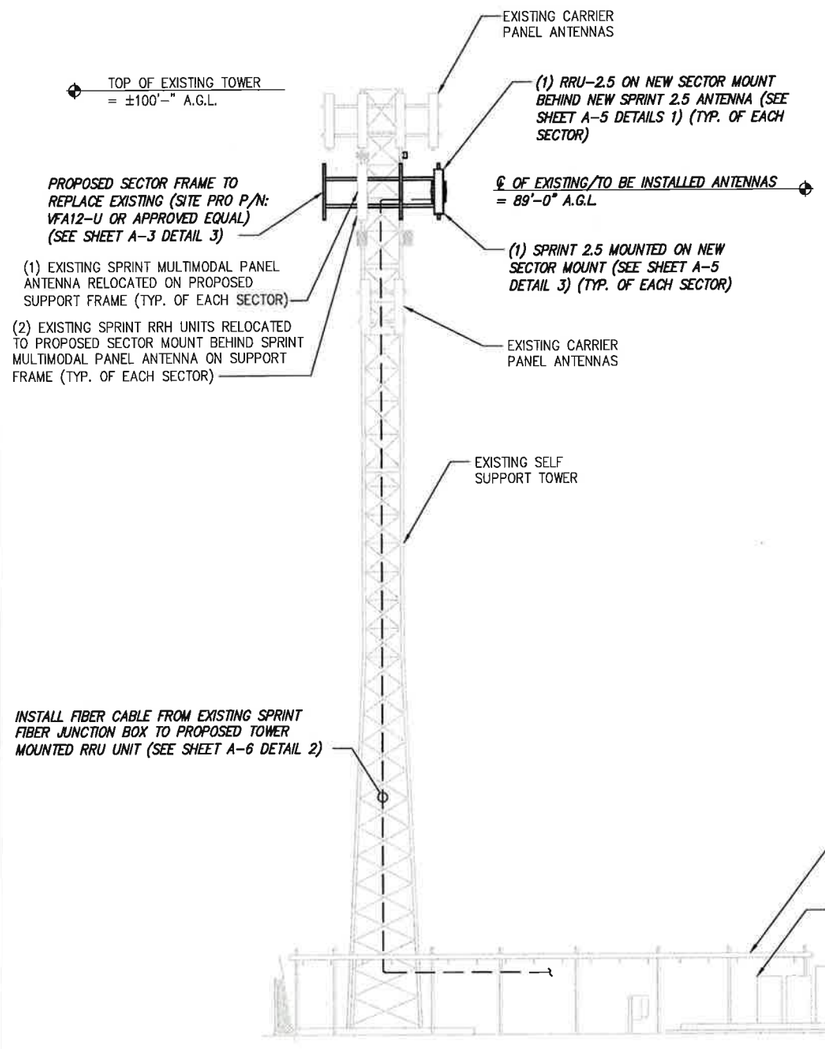
EXISTING EQUIPMENT DETAILS

SHEET NUMBER:

A-1A

**NOTE:**
BASED ON THE ANALYSIS PROVIDED BY INFINIGY, DATED 9/24/14. THE EXISTING STRUCTURE IS CAPABLE OF SUPPORTING THE PROPOSED EQUIPMENT CONFIGURATION. THE ANALYSIS INDICATES THE TOWER AND ITS FOUNDATION HAVE SUFFICIENT CAPACITY TO CARRY THE EXISTING, RESERVED, AND PROPOSED LOADS. NO MODIFICATIONS ARE REQUIRED AT THIS TIME.

**NOTE:**
SEE DETAIL 2 ON A-3 FOR ANTENNA LAYOUT




**TOWER ELEVATION** | NO SCALE | 1

PROPOSED SECTOR FRAME TO REPLACE EXISTING (SITE PRO P/N: VFA12-U OR APPROVED EQUAL) (SEE SHEET A-3 DETAIL 3) (TYP. OF (3) SECTORS)

**PHOTO** | NO SCALE | 2

PLANS PREPARED FOR:

Sprint
6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

INFINIGY Design. Build. Deliver.
1033 Watervliet Shaker Rd
Albany, NY 12205
Office # (518) 690-0790
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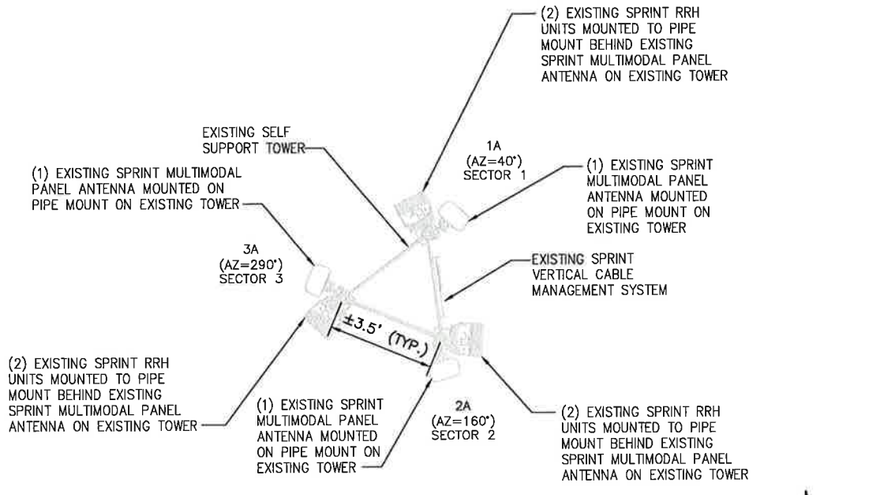
SITE NAME:
DANBURY-W. CT UNIVERSITY

SITE CASCADE:
CT43XC836

SITE ADDRESS:
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:
BUILDING ELEVATION & CABLE PLAN

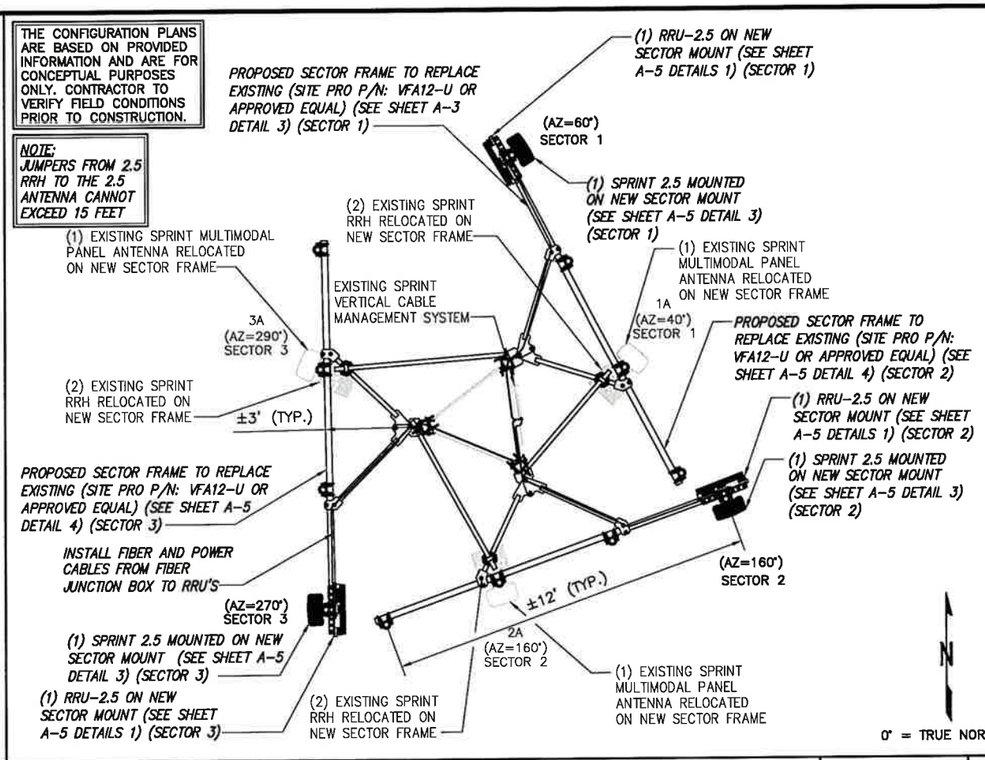
SHEET NUMBER:
A-2



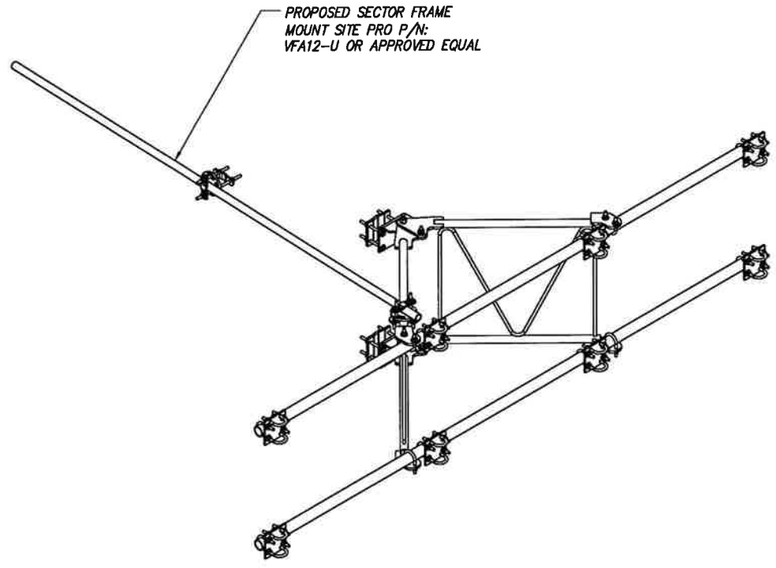

EXISTING ANTENNA & RRU LAYOUT | NO SCALE | 1

THE CONFIGURATION PLANS ARE BASED ON PROVIDED INFORMATION AND ARE FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR TO VERIFY FIELD CONDITIONS PRIOR TO CONSTRUCTION.

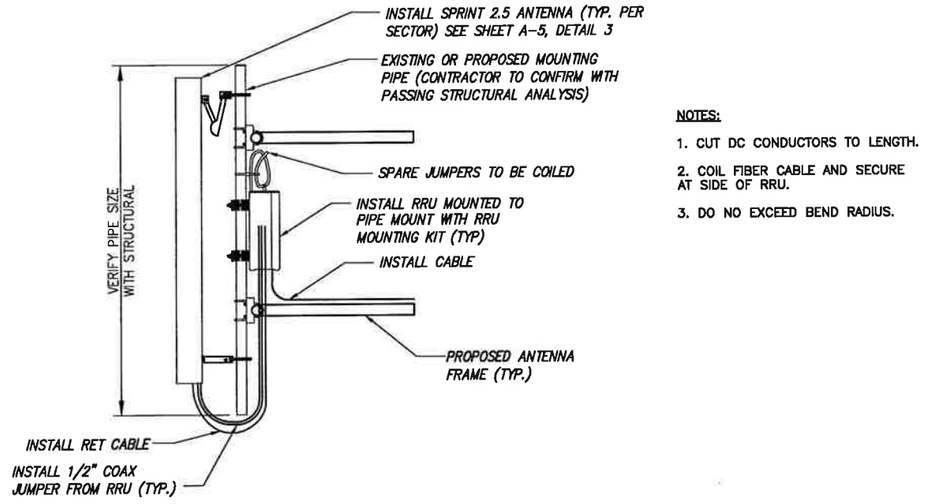
NOTE: JUMPERS FROM 2.5 RRH TO THE 2.5 ANTENNA CANNOT EXCEED 15 FEET




FINAL ANTENNA LAYOUT | NO SCALE | 2




SECTOR FRAME DETAIL | NO SCALE | 3




NOTES:

1. CUT DC CONDUCTORS TO LENGTH.
2. COIL FIBER CABLE AND SECURE AT SIDE OF RRU.
3. DO NO EXCEED BEND RADIUS.

NOTE: SPARE DC CABLES ARE COILED UP ON NV RRHS AT SPRINT ARRAY. THESE ARE TO BE USED TO POWER UP THE 2.5 RRHS AND TIED INTO EXISTING DC BREAKERS INSIDE THE FIBER JUNCTION BOX LOCATED AT EQUIPMENT.

NOTE: THE DIAGRAM IS FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR IS TO REFER TO PASSING STRUCTURAL ANALYSIS FOR ANTENNA AND RRU MOUNTING DETAILS

TYPICAL ANTENNA & RRU MOUNTING DETAILS | NO SCALE | 4

PLANS PREPARED FOR:

Sprint

6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

INFINIGY Design. Build. Deliver.
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Albany, NY 12205
Office # (518) 690-0790
Fax # (518) 690-0793

JOB NUMBER 333-000

ENGINEERING LICENSE:

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SITE NAME:

DANBURY-W. CT UNIVERSITY

SITE CASCADE:

CT43XC836

SITE ADDRESS:

303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:

ANTENNA LAYOUT & MOUNTING DETAILS

SHEET NUMBER:

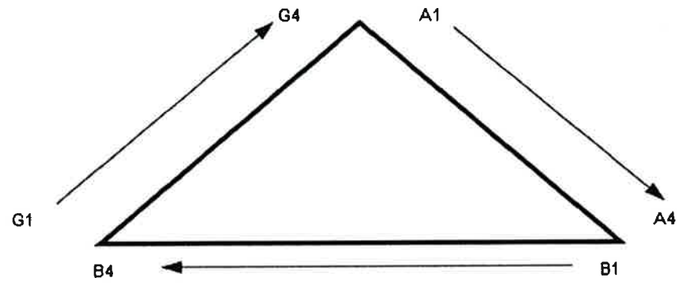
A-3

| NV CABLES | | | |
|---|---|---|---|
| BAND | INDICATOR | PORT | COLOR |
| 800-1 | YEL GRN | NV-1 | GRN |
| 1900-1 | YEL RED | NV-2 | BLU |
| 1900-2 | YEL BRN | NV-3 | BRN |
| 1900-3 | YEL BLU | NV-4 | WHT |
| 1900-4 | YEL SLT | NV-5 | RED |
| 800-2 | YEL ORG | NV-6 | SLT |
| SPARE | YEL WHT | NV-7 | PPL |
| 2500 | YEL PPL | NV-8 | ORG |

| HYBRID | |
|---|---|
| HYBRID | COLOR |
| 1 | GRN |
| 2 | BLU |
| 3 | BRN |
| 4 | WHT |
| 5 | RED |
| 6 | SLT |
| 7 | PPL |
| 8 | ORG |

| 2.5 Band | | |
|---|---|---|
| 2500 Radio 1 | | COLOR |
| YEL | WHT | GRN |
| YEL | WHT | BLU |
| YEL | WHT | BRN |
| YEL | WHT | WHT |
| YEL | WHT | RED |
| YEL | WHT | SLT |
| YEL | WHT | PPL |
| YEL | WHT | ORG |

**Figure 1: Antenna Orientation**




NOTES:

1. ALL CABLES SHALL BE MARKED WITH 2" WIDE, UV STABILIZED, UL APPROVED TAPE.

2. THE FIRST RING SHALL BE CLOSEST TO THE END OF THE CABLE AND SPACED APPROXIMATELY 2" FROM THE END CONNECTOR, WEATHERPROOFING, OR BREAK-OUT CYLINDER. THERE SHALL BE A 1" SPACE BETWEEN EACH RING FOR THE CABLE IDENTIFIER, AND NO SPACES BETWEEN THE FREQUENCY BANDS.

3. A 2" GAP SHALL SEPARATE THE CABLE COLOR CODE FROM THE FREQUENCY COLOR CODE. THE 2" COLOR RINGS FOR THE FREQUENCY CODE SHALL BE PLACED NEXT TO EACH OTHER WITH NO SPACES.

4. THE 2" COLORED TAPE(S) SHALL EACH BE WRAPPED A MINIMUM OF 3 TIMES AROUND THE INDIVIDUAL CABLES, AND THE TAPE SHALL BE KEPT IN THE SAME LOCATION AS MUCH AS POSSIBLE.

5. SITES WITH MORE THAN FOUR (4) SECTORS WILL REQUIRE ADDITIONAL RINGS FOR EACH SECTOR, FOLLOWING THE PATTERN. HIGH CAPACITY SITES WILL USE THE NEXT COLOR IN THE SEQUENCE FOR ADDITIONAL CABLES IN EACH SECTOR.

6. HYBRID FIBER CABLE SHALL BE SECTOR IDENTIFIED INSIDE THE CABINET ON FREQUENCY BUNDLES, ON THE SEALTITE, ON THE MAIN LINE UPON EXIT OF SEALTITE, AND BEFORE AND AFTER THE BREAKOUT UNIT (MEDUSA), AS WELL AS BEFORE AND AFTER ANY ENTRANCE OR EXIT.

7. HFC "MAIN TRUNK" WILL NOT BE MARKED WITH THE FREQUENCY CODES, AS IT CONTAINS ALL FREQUENCIES.

8. INDIVIDUAL POWER PAIRS AND FIBER BUNDLES SHALL BE LABELED WITH BOTH THE CABLE AND FREQUENCY.

| Sector | Cable | First Ring | Second Ring | Third Ring |
|---|---|---|---|---|
| 1 Alpha | 1 | Green | No Tape | No Tape |
| 1 | 2 | Red | No Tape | No Tape |
| 1 | 3 | Brown | No Tape | No Tape |
| 1 | 4 | White | No Tape | No Tape |
| 1 | 5 | Red | No Tape | No Tape |
| 1 | 6 | Grey | No Tape | No Tape |
| 1 | 7 | Purple | No Tape | No Tape |
| 1 | 8 | Orange | No Tape | No Tape |
| 2 Beta | 1 | Green | Green | No Tape |
| 2 | 2 | Red | Red | No Tape |
| 2 | 3 | Brown | Brown | No Tape |
| 2 | 4 | White | White | No Tape |
| 2 | 5 | Red | Red | No Tape |
| 2 | 6 | Grey | Grey | No Tape |
| 2 | 7 | Purple | Purple | No Tape |
| 2 | 8 | Orange | Orange | No Tape |
| 3 Gamma | 1 | Green | Green | Green |
| 3 | 2 | Red | Red | Red |
| 3 | 3 | Brown | Brown | Brown |
| 3 | 4 | White | White | White |
| 3 | 5 | Red | Red | Red |
| 3 | 6 | Grey | Grey | Grey |
| 3 | 7 | Purple | Purple | Purple |
| 3 | 8 | Orange | Orange | Orange |

| NV FREQUENCY | INDICATOR | ID |
|---|---|---|
| 800-1 | YEL | GRN |
| 1900-1 | YEL | RED |
| 1900-2 | YEL | BRN |
| 1900-3 | YEL | BLU |
| 1900-4 | YEL | SLT |
| 800-1 | YEL | ORG |
| RESERVED | YEL | WHT |
| RESERVED | YEL | PPL |

| 2.5 FREQUENCY | INDICATOR | | ID |
|---|---|---|---|
| 2500 -1 | YEL | WHT | GRN |
| 2500 -2 | YEL | WHT | RED |
| 2500 -3 | YEL | WHT | BRN |
| 2500 -4 | YEL | WHT | BLU |
| 2500 -5 | YEL | WHT | SLT |
| 2500 -6 | YEL | WHT | ORG |
| 2500 -7 | YEL | WHT | WHT |
| 2500 -8 | YEL | WHT | PPL |

Example – Sector 2, Cable 2, 800mhz Radio #1

Example – Sector 3, Cable 1, 1900mhz Radio #1

Example – Sector 1, Cable 4, 800 mhz Radio #1 and 1900mhz Radio #1



PLANS PREPARED FOR:
Sprint
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Overland Park, Kansas 66251

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

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SITE NAME:
DANBURY-W. CT UNIVERSITY

SITE CASCADE:
CT43XC836

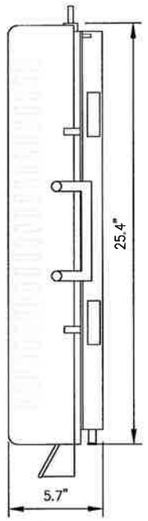
SITE ADDRESS:
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:
COLOR CODING & NOTES

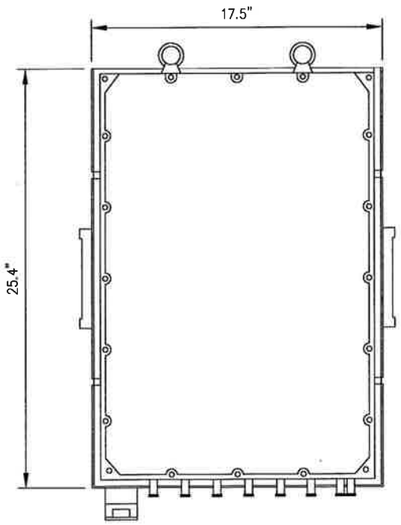
SHEET NUMBER:
A-4

## RRU: ALCATEL LUCENT TD-RRH8X20

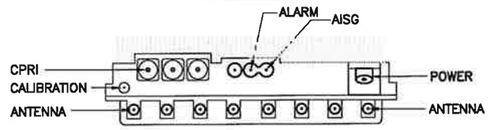
COLOR: LIGHT GREY
WEIGHT: 70 LBS.




SIDE VIEW




FRONT VIEW

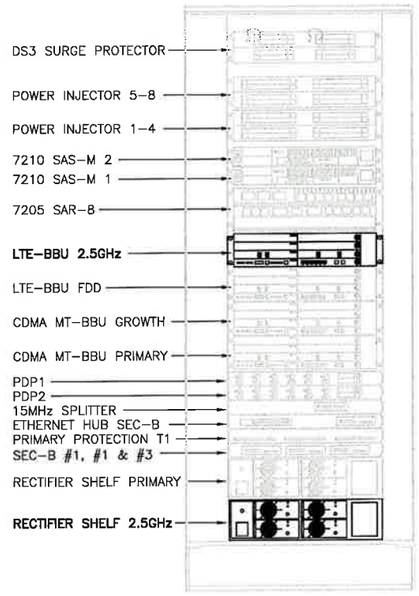



PLAN VIEW

**NOTES**

COMPLY WITH MANUFACTURERS INSTRUCTIONS TO ENSURE THAT ALL RRU'S RECEIVE ELECTRICAL POWER WITHIN 24 HOURS OF BEING REMOVED FROM THE MANUFACTURER'S PACKAGING. DO NOT OPEN RRU PACKAGES IN THE RAIN.

**2.5 RRU'S** | NO SCALE | 1

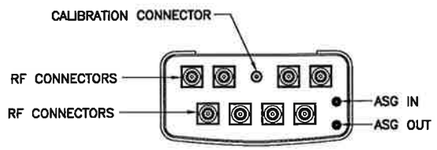



FRONT VIEW

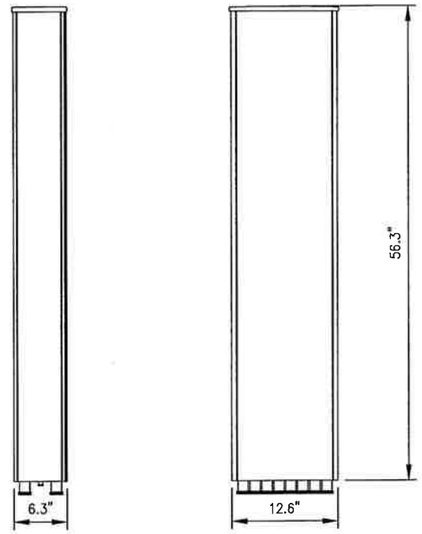
**2.5 EQUIPMENT IN EXISTING CABINET** | NO SCALE | 2

## ANTENNA RFS APXVTM14-C-I20

| | |
|---|---|
| RADOME MATERIAL: | ASA |
| RADOME COLOR: | LIGHT GREY |
| DIMENSIONS, HxWxD.In(mim): | 56.3"x12.6"x6.3" (1430x320x160mm) |
| WEIGHT: | 52.9 lbs |
| CONNECTORS: | (8) 4.1/9.5 DIN FEMALE<br>(1) NF – CALIBRATION CONNECTOR |

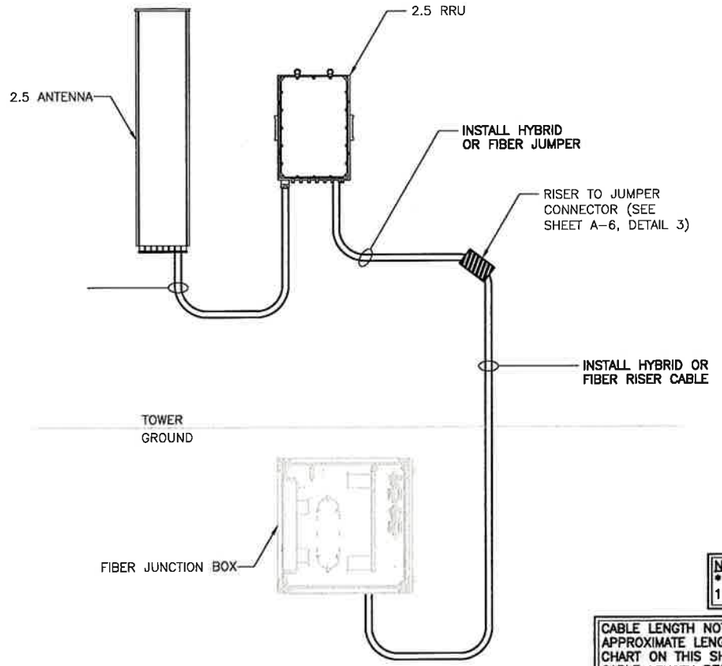



PLAN VIEW




SIDE VIEW FRONT VIEW

**2.5 ANTENNA** | NO SCALE | 3




**INFINIGY ESTIMATES**

| * | *Riser Cable Length Estimate | | |
|---|---|---|---|
| | | | Units |
| | At Grade | 74 | Feet |
| | Vertical Rise | 89 | Feet |
| | At Sprint Centerline | 0 | Feet |
| | Sub-Total | 163 | Feet |
| | 15% Buffer | 25 | Feet |
| | Total | 188 | Feet |

ABOVE LENGTH IS AN ESTIMATE AND SHOULD BE VERIFIED IN FIELD PRIOR TO ORDERING MATERIALS.

| ** | Hybrid/Fiber Jumper Length Estimate | | |
|---|---|---|---|
| | | | Units |
| | From Connector To RRU | 25 | Feet |

ABOVE LENGTH IS AN ESTIMATE AND SHOULD BE VERIFIED IN FIELD PRIOR TO ORDERING MATERIALS.

| Coax Jumper Length Estimate | | |
|---|---|---|
| | | Units |
| From RRU to Antenna | 5 | Feet |

ABOVE LENGTH IS AN ESTIMATE AND SHOULD BE VERIFIED IN FIELD PRIOR TO ORDERING MATERIALS.

NOTE:
* & **: REFERENCE SHEET A-6, DETAIL 1 FOR CORRESPONDING PART NUMBERS.

CABLE LENGTH NOTE:
APPROXIMATE LENGTH OF NEW CABLE IS SHOWN IN CHART ON THIS SHEET. CONTRACTOR TO CONFIRM EXACT CABLE LENGTH REQUIRED PRIOR TO ORDERING MATERIALS.

**CABLING SCHEMATIC** | NO SCALE | 4

PLANS PREPARED FOR:

Sprint
6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

INFINIGY Design. Build. Deliver.
1033 Watervliet Shaker Rd
Albany, NY 12205
Office # (518) 690-0790
Fax # (518) 690-0793

JOB NUMBER 333-000

ENGINEERING LICENSE:

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| DESCRIPTION | DATE | BY | REV |
|---|---|---|---|
| ISSUED FOR PERMIT | 10/07/14 | JLM | 0 |

SITE NAME:
DANBURY-W. CT UNIVERSITY

SITE CASCADE:
CT43XC836

SITE ADDRESS:
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:
EQUIPMENT & MOUNTING DETAILS

SHEET NUMBER:
A-5

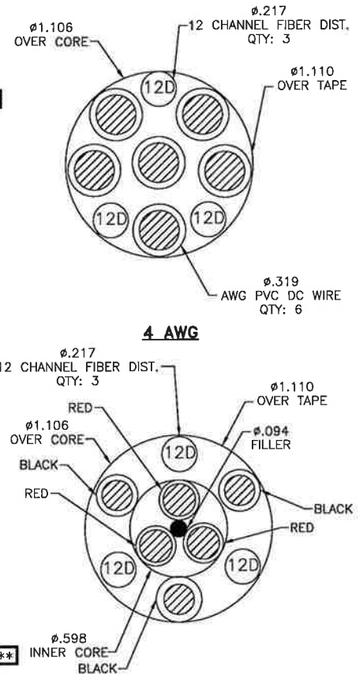
## RFS HYBRIFLEX RISER CABLE SCHEDULE

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

## RFS HYBRIFLEX JUMPER CABLE SCHEDULE

| | | | |
|---|---|---|---|
| Fiber Only | **Hybrid Jumper cable**<br>MN: HBF012-M3-5F1<br>5 ft, 3x multi-mode fiber pairs, Outdoor & LC connectors, 1/2 cable | 5 ft | |
| | MN: HBF012-M3-10F1 | 10 ft | |
| | MN: HBF012-M3-15F1 | 15 ft | |
| | MN: HBF012-M3-20F1 | 20 ft | |
| | MN: HBF012-M3-25F1 | 25 ft | ** |
| | MN: HBF012-M3-30F1 | 30 ft | |
| 8 AWG Power | **Hybrid Jumper cable**<br>MN: HBF058-08U1M3-5F1<br>5 ft, 1x 8 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable | 5 ft | |
| | MN: HBF058-08U1M3-10F1 | 10 ft | |
| | MN: HBF058-08U1M3-15F1 | 15 ft | |
| | MN: HBF058-08U1M3-20F1 | 20 ft | |
| | MN: HBF058-08U1M3-25F1 | 25 ft | |
| | MN: HBF058-08U1M3-30F1 | 30 ft | |
| 6 AWG Power | **Hybrid Jumper cable**<br>MN: HBF058-13U1M3-5F1<br>5 ft, 1x 6 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable | 5 ft | |
| | MN: HBF058-13U1M3-10F1 | 10 ft | |
| | MN: HBF058-13U1M3-15F1 | 15 ft | |
| | MN: HBF058-13U1M3-20F1 | 20 ft | |
| | MN: HBF058-13U1M3-25F1 | 25 ft | |
| | MN: HBF058-13U1M3-30F1 | 30 ft | |
| 4 AWG Power | **Hybrid Jumper cable**<br>MN: HBF078-21U1M3-5F1<br>5 ft, 1x 4 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 7/8 cable | 5 ft | |
| | MN: HBF078-21U1M3-10F1 | 10 ft | |
| | MN: HBF078-21U1M3-15F1 | 15 ft | |
| | MN: HBF078-21U1M3-20F1 | 20 ft | |
| | MN: HBF078-21U1M3-25F1 | 25 ft | |
| | MN: HBF078-21U1M3-30F1 | 30 ft | |

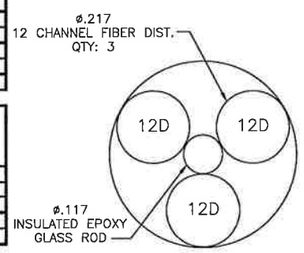
NOTE:
SPRINT CM TO CONFIRM HYBRID OR FIBER RISER CABLE AND HYBRID OR FIBER JUMPER CABLE MODEL NUMBERS IF HYBRID CABLES ARE REQUIRED BEFORE PREPARING BOM.




4 AWG

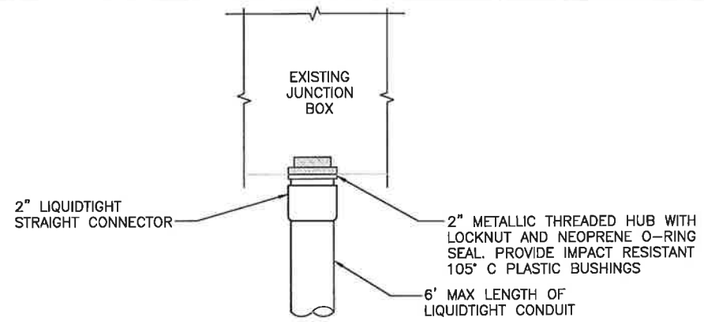



8 & 6 AWG



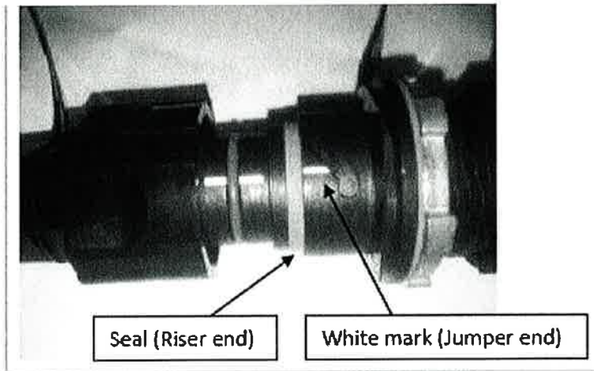

FIBER ONLY

## 2.5 CABLE CROSS SECTION DATA | NO SCALE | 1

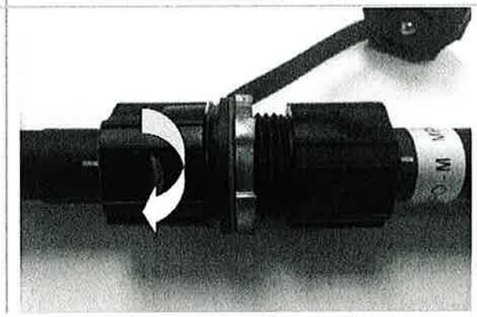



## FIBER JUNCTION BOX PENETRATION | NO SCALE | 2

IMPORTANT!! Line up white markings on jumper and riser IP-MPO connectors and slide the riser connector to the jumper connector. Push the white mark on the jumper connector flush again the red seal on the riser connector.

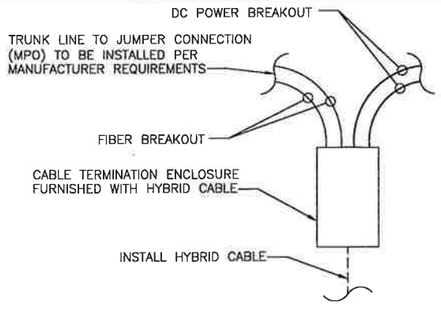



IMPORTANT!! Rotate the bayonet housing clock wise until you hear a click sound (means a good connection is in place).

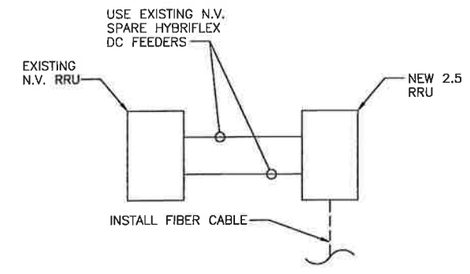


INFORMATION BASED ON PROVIDED INFORMATION FROM ALCATEL-LUCENT 2.5 GHz UPGRADE INSTALLATION GUIDE.

## HYBRIFLEX RISER/JUMPER CONNECTION DETAIL | NO SCALE | 3




2.5 HYBRID RISER CABLE (FIBER AND DC FEEDERS)




FIBER ONLY RISER CABLE

## TRUNK LINE DETAIL (TYP.) | NO SCALE | 4

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Sprint
6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

INFINIGY Design. Build. Deliver.
1033 Watervliet Shaker Rd
Albany, NY 12205
Office # (518) 690-0790
Fax # (518) 690-0793

JOB NUMBER 333-000

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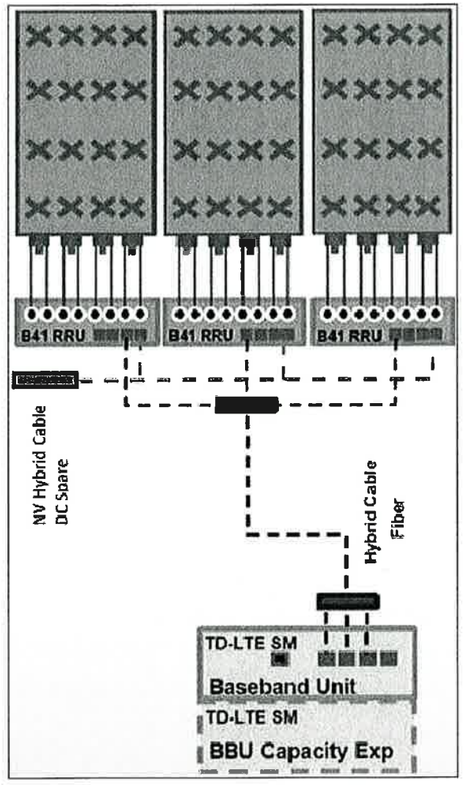
SITE NAME:
DANBURY-W. CT UNIVERSITY

SITE CASCADE:
CT43XC836

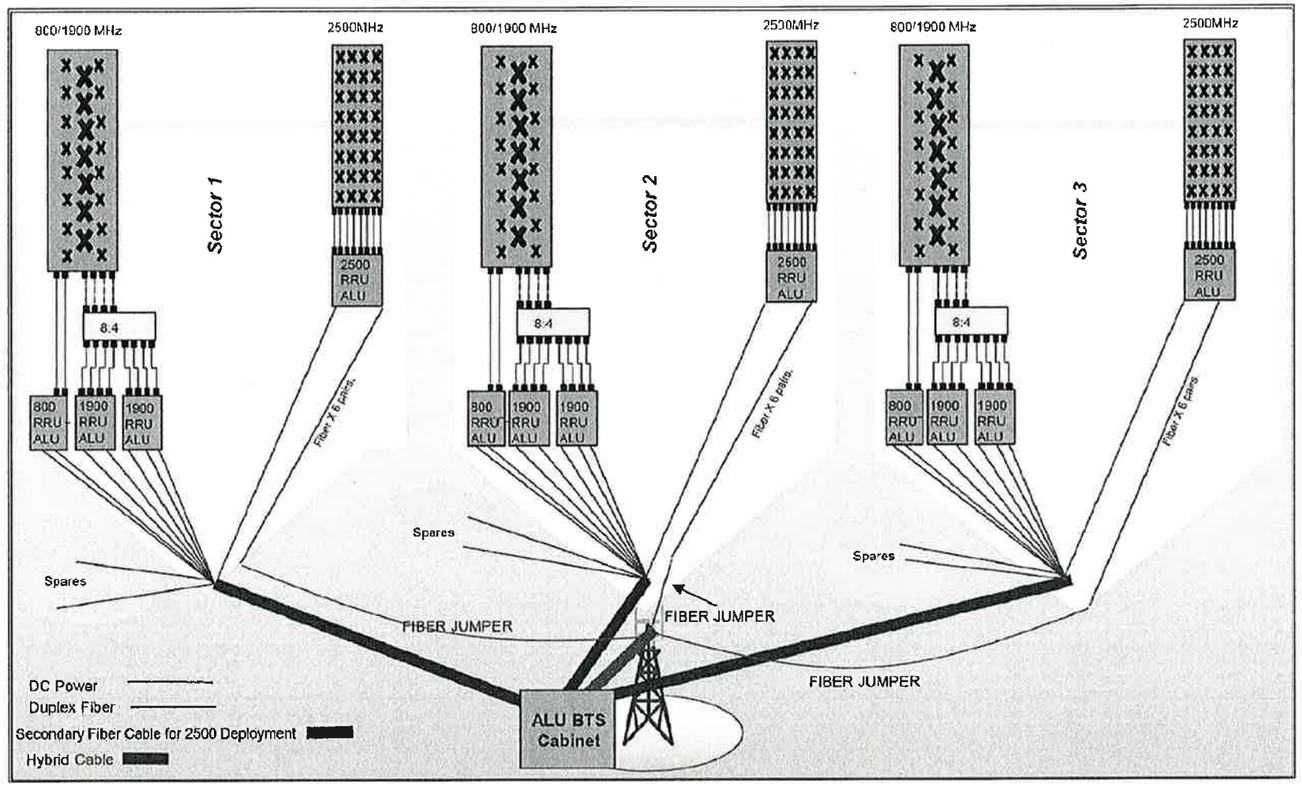
SITE ADDRESS:
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:
CIVIL DETAILS

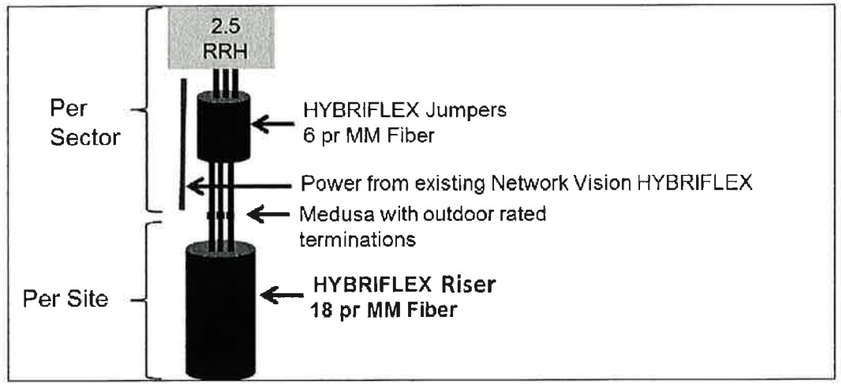
SHEET NUMBER:
A-6




ALU 2.5 ALU SCENARIO 1




RAN WIRING DIAGRAM




RF 2.5 ALU SCENARIO 1

PLUMBING DIAGRAM | NO SCALE | 1

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Overland Park, Kansas 66251

PLANS PREPARED BY:

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Albany, NY 12205
Office # (518) 690-0790
Fax # (518) 690-0793

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SITE CASCADE:

CT43XC836

SITE ADDRESS:

303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:

PLUMBING DIAGRAM

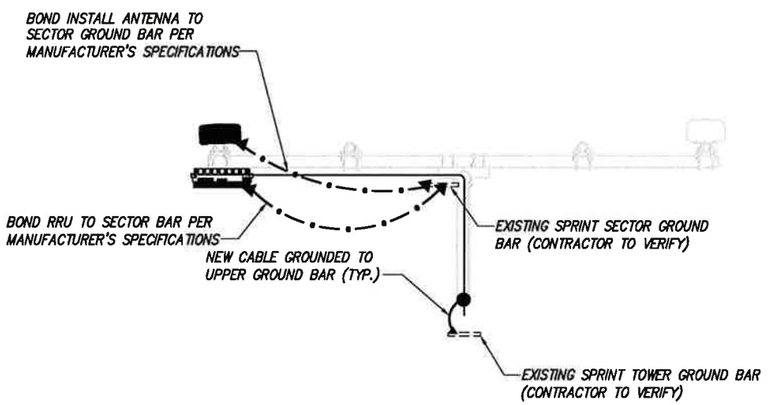
SHEET NUMBER:

A-7

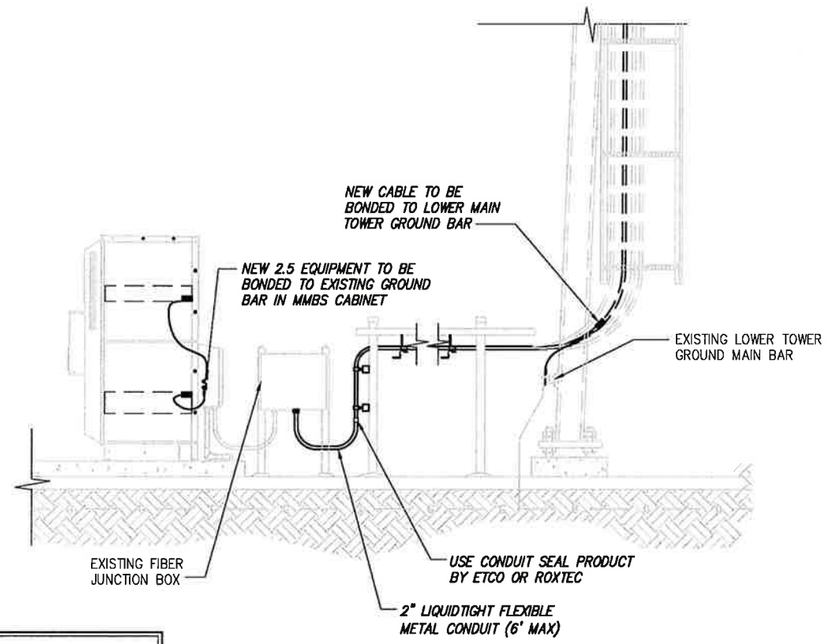
PLAN NOT USED | NO SCALE | 1

**LEGEND:**

- EXISTING GROUND RING
- CADWELD CONNECTION (EXOTHERMIC WELD)
- MECHANICAL CONNECTION
- GROUND ROD
- CABLE GROUND KIT




TYPICAL ANTENNA GROUNDING PLAN | NO SCALE | 2




NOTE:
DEPICTION IS FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR IS TO FIELD VERIFY PRIOR TO CONSTRUCTION

TYPICAL EQUIPMENT GROUNDING PLAN (ELEVATION) | NO SCALE | 3

PLANS PREPARED FOR:

Sprint

6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

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SITE NAME:

DANBURY-W. CT UNIVERSITY

SITE CASCADE:

CT43XC836

SITE ADDRESS:

303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:

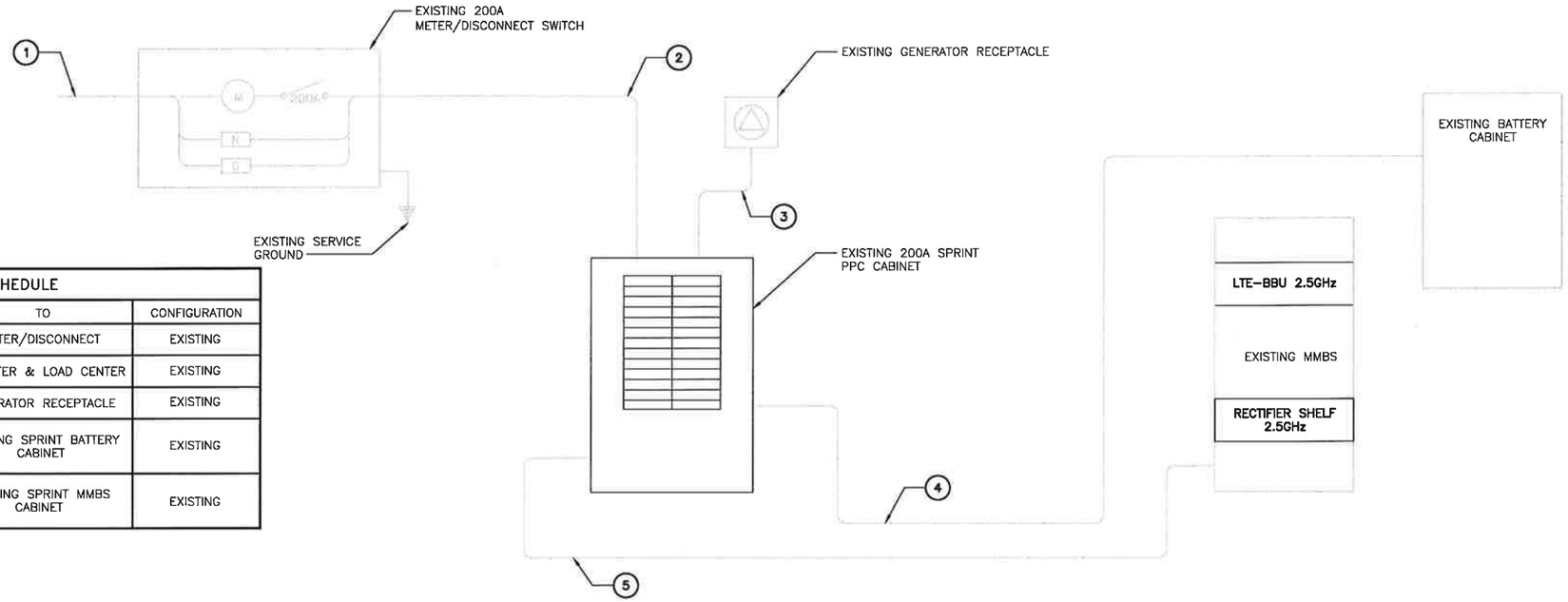
ELECTRICAL & GROUNDING PLAN

SHEET NUMBER:

E-1

**NOTES**

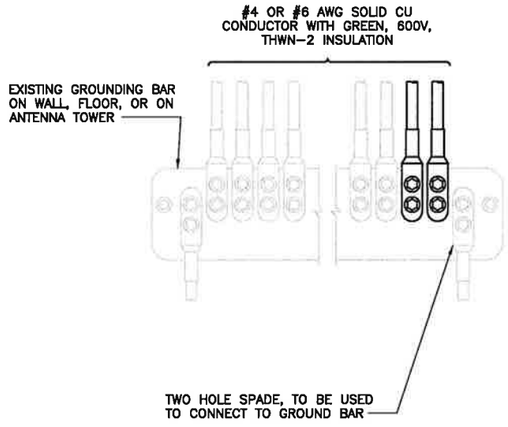
CG SHALL REFERENCE ALL SPECS FOR "CONNECTING THE POWER SUPPLY" OF THE NEW INSTALLATION DOCUMENTS, FOR ALL CONNECTION SPECIFICATIONS.




CIRCUIT SCHEDULE

| NO | FROM | TO | CONFIGURATION |
|---|---|---|---|
| 1 | UTILITY SOURCE | METER/DISCONNECT | EXISTING |
| 2 | METER/DISCONNECT | TRANSFER & LOAD CENTER | EXISTING |
| 3 | TRANSFER & LOAD CENTER | GENERATOR RECEPTACLE | EXISTING |
| 4 | TRANSFER & LOAD CENTER | EXISTING SPRINT BATTERY CABINET | EXISTING |
| 5 | TRANSFER & LOAD CENTER | EXISTING SPRINT MMBS CABINET | EXISTING |

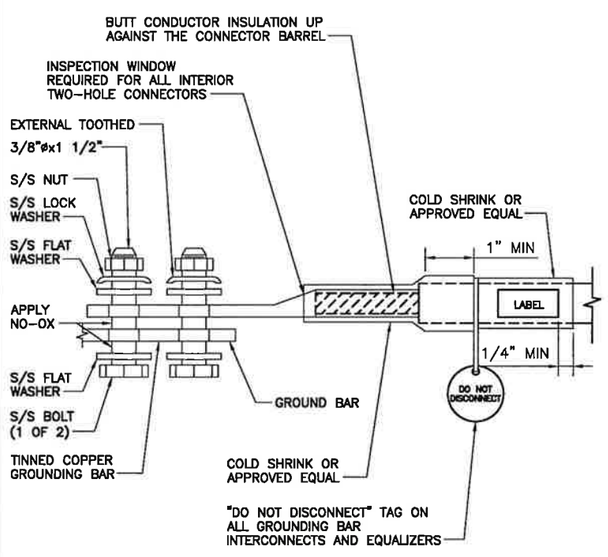
ELECTRICAL ONE–LINE DIAGRAM — NO SCALE — 1



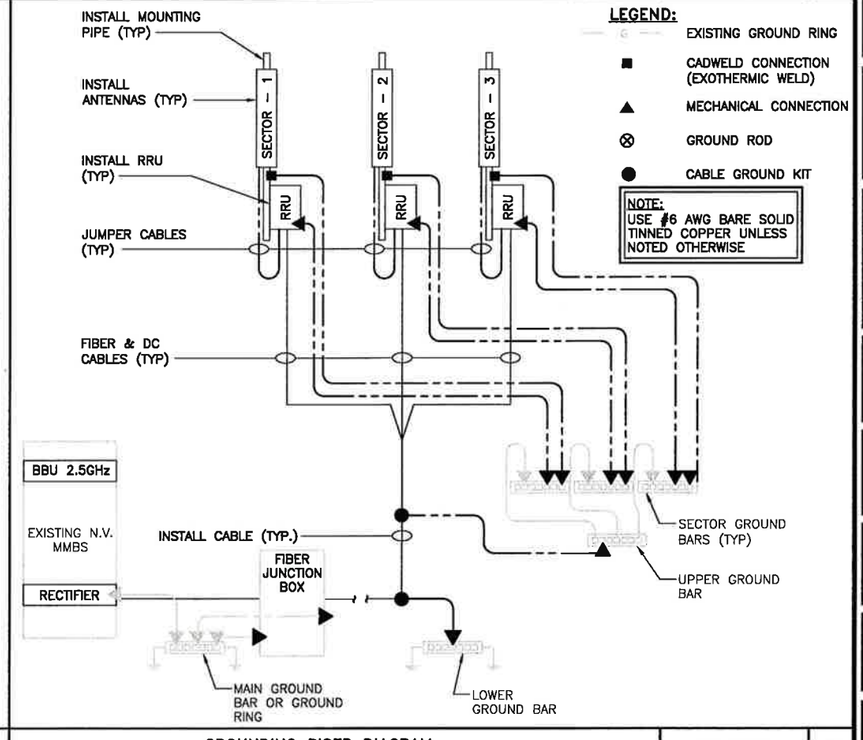

**NOTES**

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

INSTALLATION OF GROUNDING CONDUCTOR TO GROUNDING BAR — NO SCALE — 2




TWO HOLE LUG — NO SCALE — 3




GROUNDING RISER DIAGRAM — NO SCALE — 4


PLANS PREPARED FOR:

Sprint

6580 Sprint Parkway
Overland Park, Kansas 66251

PLANS PREPARED BY:

INFINIGY Design. Build. Deliver.

1033 Watervliet Shaker Rd
Albany, NY 12205
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DANBURY-W. CT UNIVERSITY

SITE CASCADE:

CT43XC836

SITE ADDRESS:

303 BOXWOOD LANE
DANBURY, CT 06810

SHEET DESCRIPTION:

ELECTRICAL & GROUNDING DETAILS

SHEET NUMBER:

E-2

INFINIGY Design. Build. Deliver.

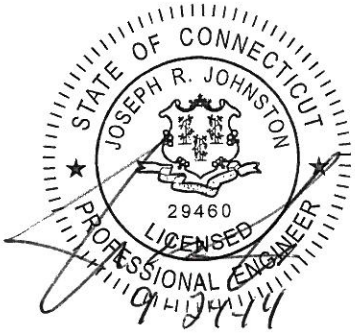
2255 Sewell Mill Road, Suite 130
Marietta, Georgia 30062
Phone: (678) 444-4463
Fax: (678) 444-4472
www.infinigy.com

# Tower Analysis Report

**September 24, 2014**

| | |
|---|---|
| Site Name | CT43XC836 Danbury-W. C.T. University |
| Infinigy Job Number | 333-315 |
| Client | Sprint |
| Proposed Carrier | Sprint |
| Site Location | 303 Boxwood Lane, Danbury, CT 06810<br>Fairfield County<br>41° 23' 42.00" N NAD83<br>73° 29' 12.29" W NAD83 |
| Structure Type | 100' Self Supporting Tower |
| Structural Usage Ratio | **98.4%** |
| Overall Result | **Pass** |

Upon reviewing the results of this analysis, it is our opinion that the structure meets the specified TIA code requirements. The tower and foundations are therefore deemed adequate to support the existing and proposed loading as listed in this report.




Maxwell R. Becker, E.I.T.
Structural Engineer I

## Contents

## Introduction

Infinigy Engineering has been requested to perform a structural analysis on the existing 100' Nudd Self Support tower. All supporting documents have been obtained from the client and are assumed to be accurate and applicable to this site. The tower was analyzed using tnxTower version 6.1.3.1 tower analysis software.

## Supporting Documentation

| | |
|---|---|
| **Design Drawings** | Fred A. Nudd Drawing # 96-4992-1, dated January 21, 1997 |
| **Foundation Drawings** | Fred A. Nudd Drawing # 96-4992-2, dated January 21, 1997 |
| **Mod Drawings** | Centek Engineering project # 10106, date July 23, 2010 |
| **Construction Drawings** | Infinigy Engineering Job # 333-315, dated May 13, 2014 |
| **Previous Analysis** | KM Consulting Engineers Job # CT43XC836, dated December 6, 2013 |

## Analysis Code Requirements

| | |
|---|---|
| Wind Speed | 100 mph (3-Second Gust) |
| Wind Speed w/ ice | 40 mph (3-Second Gust) w/ 3/4" ice |
| TIA Revision | ANSI/TIA-222-G |
| Adopted IBC | 2003 IBC w/ 2005 CT Supplement & 2013 CT Amendment |
| Structure Class | 2 |
| Exposure Category | B |
| Topographic Category | 1 |
| Calculated Crest Height | 0 ft |

## Conclusion

Upon reviewing the results of this analysis, it is our opinion that the structure meets the specified TIA code requirements. The tower and foundations are therefore deemed adequate to support the existing and proposed loading as listed in this report.

If you have any questions, require additional information, or actual conditions differ from those as detailed in this report please contact me via the information below:

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## Existing and Reserved Loading

| Mount Height (ft) | Qty. | Appurtenance | Mount Type | Coax& Lines | Carrier |
|---|---|---|---|---|---|
| 98.0 | 8 | Decibel DB844H90 | Sector Frames | (16) 7/8”<br>(6) 1-5/8” | -- |
| | 2 | 60”x12” Panel | | | |
| | 2 | 72”x12” Panel | | | |
| 96.0 | 1 | 2’x4’ Grid Dish | Pipe | (1) 1-5/8” | |
| 89.0 | 3 | RFS APXVSPP18-C-A20 | Sector Frames | (3) 1-1/4” Hybriflex<br>(1) 0.3” | Sprint |
| | 6 | Alcatel-Lucent 1900 MHz RRH | | | |
| | 3 | Alcatel-Lucent 800 MHz RRH | | | |
| 83.0 | 3 | RFS APX16PV-16PVL | Pipes | (12) 1-5/8” | T-Mobile |
| 80.0 | 4 | RFS ATMAA1412D-1A20 TMA | | | |
| 65.0 | 1 | Shively Labs 6810 | Leg | (1) ½” | -- |
| 30.0 | 1 | GPS | Side Arm | -- | |

## Proposed Loading

| Mount Height (ft) | Qty. | Appurtenance | Mount Type | Coax& Lines* | Carrier |
|---|---|---|---|---|---|
| 89.0 | 3 | RFS APXVTM14-C-120 | Sector Frames | (1) 1-1/4” Hybrid | Sprint |
| | 3 | Alcatel-Lucent TD-RRH8X20 | | | |

* Proposed coax to be installed alongside existing coax.

## Structure Usages

| | | |
|---|---|---|
| Leg (T7) | 96.6 | Pass |
| Diagonal (T12) | 89.8 | Pass |
| Horizontal (T1) | 89.5 | Pass |
| Secondary Horizontal (T11) | 3.0 | Pass |
| Top Girt (T7) | 98.4 | Pass |
| Bottom Girt (T1) | 68.6 | Pass |
| Bolt Checks | 74.6 | Pass |
| **RATING =** | **98.4** | **Pass** |

## Foundation Reactions

| Reaction Data | Design Reactions | Analysis Reactions | Result |
|---|---|---|---|
| Moment (kip-ft) | -- | 995.9 | |
| Shear (kip) | -- | 14.9 | -- |
| Axial (kip) | -- | 41.6 | -- |

Tower base reactions are acceptable per rigorous structural analysis.

## Deflection, Twist, and Sway

| Antenna Elevation (ft) | Deflection (in) | Twist (°) | Sway (°) |
|---|---|---|---|
| 89.0 | 4.04 | 0.04 | 0.44 |

*Per ANSI/TIA-222-G Section 2.8.2 maximum serviceability structural deflection limit is 3% of structure height.
*Per ANSI/TIA-222-G Section 2.8.2 maximum serviceability structural twist and sway limit is 4 degrees.
*Per ANSI/TIA-222-G Section 2.8.3 deflection, Twist, and sway values were calculated using a basic 3-second gust wind speed of 60 mph.
*It is the responsibility of the client to ensure their proposed and/or existing equipment will meet ANSI/TIA-222-G Annex D or other appropriate microwave signal degradation limits based on the provided values above.

## Assumptions and Limitations

All engineering services are completed assuming all information provided to Infinigy Engineering is current and correct. If actual conditions differ from those described in this report we should be notified immediately to complete a revised evaluation.

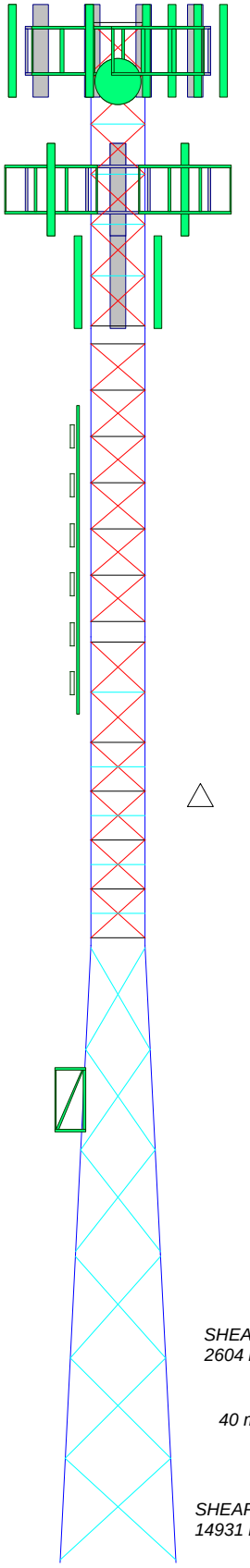
It is the responsibility of the client to ensure that the information provided to Infinigy Engineering is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the design drawings and specifications that have been supplied.

All calculations are completed in accordance with generally accepted engineering principles and practices. Infinigy Engineering is not responsible the conclusions, opinions, and recommendations made by others based on the information we supply.

This report is an evaluation of the tower structure only and does not reflect adequacy of any existing antenna mounts, mount connections, or coax mounting attachments. These elements are assumed to be adequate for the purposes of this analysis and are assumed to have been installed per their manufacturer requirements.

| Section | T14 | T13 | T12 | T11 | T10 | T9 | T8 | T7 | T6 | T5 | T4 | T3 | T2 | T1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Legs | P5x.375 GR | | A | | | P3x.3 GR | | | | P2.5x.276 GR | | | | P2.5x.276 |
| Leg Grade | A500-42 | | | | | A500M-61 | | | | A500-50 | | | | |
| Diagonals | L2 1/2x2 1/2x3/16 | L2x2x3/16 | | | SR 3/4 | | | SR 1 1/4 | | | | | SR 5/8 | |
| Diagonal Grade | | A36 | | | | | | | | | | | | |
| Top Girts | | N.A. | | | | | 2L1 1/2x1 1/2x3/16x3/8 | | | | | | | L1 1/2x1 1/2x3/16 |
| Bottom Girts | | N.A. | B | | N.A. | | | B | | | N.A. | | | L1 1/2x1 1/2x3/16 |
| Horizontals | | N.A. | | | | | B | | | | N.A. | | | L1 1/2x1 1/2x3/16 |
| Sec. Horizontals | | N.A. | | | | 2L2 1/2x2 1/2x5/16x3/8 | | | | | | | N.A. | |
| Face Width (ft) 7.5 | 5.5 | | | 4 @ 3.16667 | | | 2 @ 3.25 | | | 6 @ 3 | | | 6 @ 3.27778 | 3.5 |
| # Panels @ (ft) | 6 @ 6.55556 | | | | | | | | | | | | | |
| Weight (lb) 6756.4 | 1760.4 | 1598.7 | 335.5 | 282.4 | 282.4 | 282.4 | 371.9 | 282.9 | 222.2 | 135.6 | 135.6 | 135.6 | 158.6 | 772.2 |

100.0 ft
80.0 ft
76.0 ft
73.0 ft
70.0 ft
67.0 ft
64.0 ft
60.0 ft
53.2 ft
50.0 ft
46.8 ft
43.7 ft
40.0 ft
20.0 ft
0.0 ft



## DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| Angle Sector Frame | 98 | APXVTM14-C-120 (Sprint) | 89 |
| Angle Sector Frame | 98 | APXVTM14-C-120 (Sprint) | 89 |
| Angle Sector Frame | 98 | APXVTM14-C-120 (Sprint) | 89 |
| (4) DB844H90 | 98 | TD-RRH8X20 (Sprint) | 89 |
| (4) DB844H90 | 98 | TD-RRH8X20 (Sprint) | 89 |
| (2) 60"x12" Panel | 98 | TD-RRH8X20 (Sprint) | 89 |
| (2) 72" x 12" Panel | 98 | APXVSPP18-C-A20 (Sprint) | 89 |
| Dish Pipe Mount | 96 | APX16PV-16PVL (T-Mobile) | 83 |
| 2' x 4' Rectangular Grid Dish | 96 | APX16PV-16PVL (T-Mobile) | 83 |
| APXVSPP18-C-A20 (Sprint) | 89 | APX16PV-16PVL (T-Mobile) | 83 |
| APXVSPP18-C-A20 (Sprint) | 89 | Antenna Pipe Mount (T-Mobile) | 81 |
| (2) 1900 MHz RRH (Sprint) | 89 | Antenna Pipe Mount (T-Mobile) | 81 |
| (2) 1900 MHz RRH (Sprint) | 89 | (2) ATMAA1412D-1A20 TMA (T-Mobile) | 80 |
| (2) 1900 MHz RRH (Sprint) | 89 | | |
| 800 MHz RRH (Sprint) | 89 | (2) ATMAA1412D-1A20 TMA (T-Mobile) | 80 |
| 800 MHz RRH (Sprint) | 89 | | |
| 800 MHz RRH (Sprint) | 89 | 6810 | 65 |
| Pipe Sector Frame (Sprint) | 89 | Angle Side Arm (Sprint) | 30 |
| Pipe Sector Frame (Sprint) | 89 | GPS (Sprint) | 30 |
| Pipe Sector Frame (Sprint) | 89 | | |

## SYMBOL LIST

| MARK | SIZE | MARK | SIZE |
|---|---|---|---|
| A | P3x.3 GR w/ .75 TR | B | 2L1 1/2x1 1/2x3/16x3/8 |

## MATERIAL STRENGTH

| GRADE | Fy | Fu | GRADE | Fy | Fu |
|---|---|---|---|---|---|
| A500-50 | 50 ksi | 62 ksi | A500M-61 | 61 ksi | 75 ksi |
| A36 | 36 ksi | 58 ksi | A500-42 | 42 ksi | 58 ksi |

## TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 100 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 40 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 98.4%

*ALL REACTIONS ARE FACTORED*

*MAX. CORNER REACTIONS AT BASE:*
*DOWN: 158753 lb*
*SHEAR: 10834 lb*

*UPLIFT: -145912 lb*
*SHEAR: 9960 lb*

*AXIAL 41566 lb*
*SHEAR 2604 lb* *MOMENT 185996 lb-ft*
*TORQUE 688 lb-ft*
*40 mph WIND - 0.7500 in ICE*
*AXIAL 16286 lb*
*SHEAR 14931 lb* *MOMENT 995873 lb-ft*
*TORQUE 2354 lb-ft*
*REACTIONS - 100 mph WIND*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Phone: (678) 444-4463
FAX: (678)444-4472


Job: **333-315**
Project: **CT43XC836 - Danbury-W. CT. University**
Client: Sprint | Drawn by: MBecker | App'd:
Code: TIA-222-G | Date: 09/24/14 | Scale: NTS
Path: N:\Sprint\2.5\Sprint Direct\Southern CT\CT43XC836\Structural\JOEJ Files\CT43XC836.eri | Dwg No. E-1

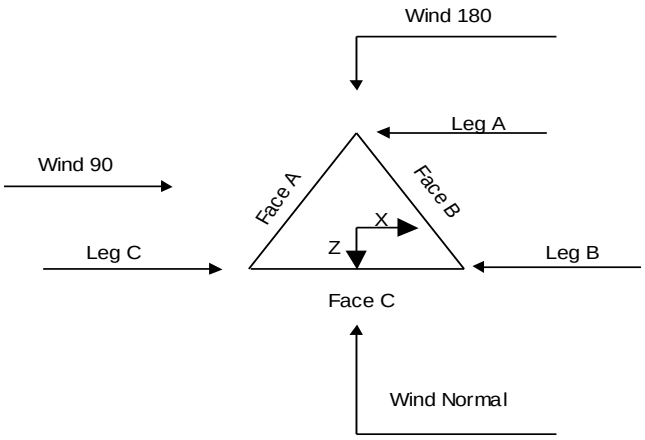
# Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.50 ft at the top and 7.50 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Fairfield County, Connecticut.
Basic wind speed of 100 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 40 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Tension only take-up is 0.0313 in.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

# Options

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




***Triangular Tower***

## Tower Section Geometry

| Tower Section | Tower Elevation | Assembly Database | Description | Section Width | Number of Sections | Section Length |
|---|---|---|---|---|---|---|
| | ft | | | ft | | ft |
| T1 | 100.00-80.00 | | | 3.50 | 1 | 20.00 |
| T2 | 80.00-76.00 | | | 3.50 | 1 | 4.00 |
| T3 | 76.00-73.00 | | | 3.50 | 1 | 3.00 |
| T4 | 73.00-70.00 | | | 3.50 | 1 | 3.00 |
| T5 | 70.00-67.00 | | | 3.50 | 1 | 3.00 |
| T6 | 67.00-64.00 | | | 3.50 | 1 | 3.00 |
| T7 | 64.00-60.00 | | | 3.50 | 1 | 4.00 |
| T8 | 60.00-53.17 | | | 3.50 | 1 | 6.83 |
| T9 | 53.17-50.00 | | | 3.50 | 1 | 3.17 |
| T10 | 50.00-46.83 | | | 3.50 | 1 | 3.17 |
| T11 | 46.83-43.67 | | | 3.50 | 1 | 3.17 |
| T12 | 43.67-40.00 | | | 3.50 | 1 | 3.67 |
| T13 | 40.00-20.00 | | | 3.50 | 1 | 20.00 |
| T14 | 20.00-0.00 | | | 5.50 | 1 | 20.00 |

## Tower Section Geometry *(cont'd)*

| Tower Section | Tower Elevation | Diagonal Spacing | Bracing Type | Has K Brace End Panels | Has Horizontals | Top Girt Offset | Bottom Girt Offset |
|---|---|---|---|---|---|---|---|
| | ft | ft | | | | in | in |
| T1 | 100.00-80.00 | 3.28 | TX Brace | No | Yes | 1.9999 | 1.9999 |

| Tower Section | Tower Elevation ft | Diagonal Spacing ft | Bracing Type | Has K Brace End Panels | Has Horizontals | Top Girt Offset in | Bottom Girt Offset in |
|---|---|---|---|---|---|---|---|
| T2 | 80.00-76.00 | 3.00 | TX Brace | No | Yes | 12.0000 | 0.0000 |
| T3 | 76.00-73.00 | 3.00 | TX Brace | No | Yes | 0.0000 | 0.0000 |
| T4 | 73.00-70.00 | 3.00 | TX Brace | No | Yes | 0.0000 | 0.0000 |
| T5 | 70.00-67.00 | 3.00 | TX Brace | No | Yes | 0.0000 | 0.0000 |
| T6 | 67.00-64.00 | 3.00 | TX Brace | No | Yes | 0.0000 | 0.0000 |
| T7 | 64.00-60.00 | 3.00 | TX Brace | No | Yes | 0.0000 | 12.0000 |
| T8 | 60.00-53.17 | 3.25 | TX Brace | No | Yes | 3.9996 | 0.0000 |
| T9 | 53.17-50.00 | 3.17 | TX Brace | No | Yes | 0.0000 | 0.0000 |
| T10 | 50.00-46.83 | 3.17 | TX Brace | No | Yes | 0.0000 | 0.0000 |
| T11 | 46.83-43.67 | 3.17 | TX Brace | No | Yes | 0.0000 | 0.0000 |
| T12 | 43.67-40.00 | 3.17 | TX Brace | No | Yes | 0.0000 | 6.0002 |
| T13 | 40.00-20.00 | 6.56 | X Brace | No | No | 1.9999 | 1.9999 |
| T14 | 20.00-0.00 | 6.56 | X Brace | No | No | 1.9999 | 1.9999 |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Leg Type | Leg Size | Leg Grade | Diagonal Type | Diagonal Size | Diagonal Grade |
|---|---|---|---|---|---|---|
| T1 100.00-80.00 | Pipe | P2.5x.276 | A500-50 (50 ksi) | Solid Round | 5/8 | A36 (36 ksi) |
| T2 80.00-76.00 | Pipe | P2.5x.276 GR | A500-50 (50 ksi) | Solid Round | 5/8 | A36 (36 ksi) |
| T3 76.00-73.00 | Pipe | P2.5x.276 GR | A500-50 (50 ksi) | Solid Round | 5/8 | A36 (36 ksi) |
| T4 73.00-70.00 | Pipe | P2.5x.276 GR | A500-50 (50 ksi) | Solid Round | 5/8 | A36 (36 ksi) |
| T5 70.00-67.00 | Pipe | P2.5x.276 GR | A500-50 (50 ksi) | Solid Round | 5/8 | A36 (36 ksi) |
| T6 67.00-64.00 | Pipe | P2.5x.276 GR | A500-50 (50 ksi) | Solid Round | 1 1/4 | A36 (36 ksi) |
| T7 64.00-60.00 | Pipe | P2.5x.276 GR | A500-50 (50 ksi) | Solid Round | 1 1/4 | A36 (36 ksi) |
| T8 60.00-53.17 | Pipe | P3x.3 GR | A500M-61 (61 ksi) | Solid Round | 3/4 | A36 (36 ksi) |
| T9 53.17-50.00 | Pipe | P3x.3 GR | A500M-61 (61 ksi) | Solid Round | 3/4 | A36 (36 ksi) |
| T10 50.00-46.83 | Pipe | P3x.3 GR | A500M-61 (61 ksi) | Solid Round | 3/4 | A36 (36 ksi) |
| T11 46.83-43.67 | Pipe | P3x.3 GR w/ .75 TR | A500M-61 (61 ksi) | Solid Round | 3/4 | A36 (36 ksi) |
| T12 43.67-40.00 | Pipe | P3x.3 GR w/ .75 TR | A500M-61 (61 ksi) | Solid Round | 3/4 | A36 (36 ksi) |
| T13 40.00-20.00 | Pipe | P5x.375 GR | A500-42 (42 ksi) | Single Angle | L2x2x3/16 | A36 (36 ksi) |
| T14 20.00-0.00 | Pipe | P5x.375 GR | A500-42 (42 ksi) | Single Angle | L2 1/2x2 1/2x3/16 | A36 (36 ksi) |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Top Girt Type | Top Girt Size | Top Girt Grade | Bottom Girt Type | Bottom Girt Size | Bottom Girt Grade |
|---|---|---|---|---|---|---|
| T1 100.00-80.00 | Single Angle | L1 1/2x1 1/2x3/16 | A36 (36 ksi) | Single Angle | L1 1/2x1 1/2x3/16 | A36 (36 ksi) |
| T2 80.00-76.00 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T3 76.00-73.00 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T4 73.00-70.00 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T5 70.00-67.00 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T6 67.00-64.00 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T7 64.00-60.00 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T8 60.00-53.17 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T9 53.17-50.00 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T10 50.00-46.83 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T11 46.83-43.67 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T12 43.67-40.00 | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | No. of Mid Girts | Mid Girt Type | Mid Girt Size | Mid Girt Grade | Horizontal Type | Horizontal Size | Horizontal Grade |
|---|---|---|---|---|---|---|---|
| T1 100.00-80.00 | None | Flat Bar | | A36 (36 ksi) | Single Angle | L1 1/2x1 1/2x3/16 | A36 (36 ksi) |
| T2 80.00-76.00 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T3 76.00-73.00 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T4 73.00-70.00 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T5 70.00-67.00 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T6 67.00-64.00 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T7 64.00-60.00 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T8 60.00-53.17 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T9 53.17-50.00 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T10 50.00-46.83 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T11 46.83-43.67 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |
| T12 43.67-40.00 | None | Flat Bar | | A36 (36 ksi) | Double Angle | 2L1 1/2x1 1/2x3/16x3/8 | A36 (36 ksi) |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Secondary Horizontal Type | Secondary Horizontal Size | Secondary Horizontal Grade | Inner Bracing Type | Inner Bracing Size | Inner Bracing Grade |
|---|---|---|---|---|---|---|
| T9 53.17-50.00 | Double Angle | 2L2 1/2x2 1/2x5/16x3/8 | A36 (36 ksi) | Solid Round | | A572-50 (50 ksi) |
| T10 50.00-46.83 | Double Angle | 2L2 1/2x2 1/2x5/16x3/8 | A36 (36 ksi) | Solid Round | | A572-50 (50 ksi) |
| T11 46.83-43.67 | Double Angle | 2L2 1/2x2 1/2x5/16x3/8 | A36 (36 ksi) | Solid Round | | A572-50 (50 ksi) |
| T12 43.67-40.00 | Double Angle | 2L2 1/2x2 1/2x5/16x3/8 | A36 (36 ksi) | Solid Round | | A572-50 (50 ksi) |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Gusset Area (per face) $ft^2$ | Gusset Thickness in | Gusset Grade | Adjust. Factor $A_f$ | Adjust. Factor $A_r$ | Weight Mult. | Double Angle Stitch Bolt Spacing Diagonals in | Double Angle Stitch Bolt Spacing Horizontals in |
|---|---|---|---|---|---|---|---|---|
| T1 100.00-80.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T2 80.00-76.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T3 76.00-73.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T4 73.00-70.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T5 70.00-67.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T6 67.00-64.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T7 64.00-60.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T8 60.00-53.17 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T9 53.17-50.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T10 50.00-46.83 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T11 46.83-43.67 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T12 43.67-40.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T13 40.00-20.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |
| T14 20.00-0.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | Mid-Pt |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Calc K Single Angles | Calc K Solid Rounds | K Factors[1] Legs | X Brace Diags X Y | K Brace Diags X Y | Single Diags X Y | Girts X Y | Horiz. X Y | Sec. Horiz. X Y | Inner Brace X Y |
|---|---|---|---|---|---|---|---|---|---|---|
| T1 | No | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 100.00-80.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T2 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 80.00-76.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T3 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 76.00-73.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T4 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 73.00-70.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T5 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 70.00-67.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T6 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 67.00-64.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T7 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 64.00-60.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T8 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 60.00-53.17 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T9 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 53.17-50.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T10 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 50.00-46.83 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T11 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 46.83-43.67 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T12 | No | Yes | 0.85 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 43.67-40.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T13 | Yes | Yes | 0.01 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 40.00-20.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T14 | Yes | Yes | 0.01 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 20.00-0.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

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

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Leg | | Diagonal | | Top Girt | | Bottom Girt | | Mid Girt | | Long Horizontal | | Short Horizontal | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U |
| T1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| 100.00-80.00 | | | | | | | | | | | | | | |
| T2 80.00-76.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T3 76.00-73.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T4 73.00-70.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T5 70.00-67.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T6 67.00-64.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T7 64.00-60.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T8 60.00-53.17 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T9 53.17-50.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |

| Tower Elevation ft | Leg | | Diagonal | | Top Girt | | Bottom Girt | | Mid Girt | | Long Horizontal | | Short Horizontal | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U |
| T10 50.00-46.83 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T11 46.83-43.67 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T12 43.67-40.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T13 40.00-20.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T14 20.00-0.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Leg Connection Type | Leg | | Diagonal | | Top Girt | | Bottom Girt | | Mid Girt | | Long Horizontal | | Short Horizontal | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. |
| T1 100.00-80.00 | Flange | 0.7500 A325N | 4 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T2 80.00-76.00 | Flange | 0.7500 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T3 76.00-73.00 | Flange | 0.7500 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T4 73.00-70.00 | Flange | 0.7500 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T5 70.00-67.00 | Flange | 0.7500 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T6 67.00-64.00 | Flange | 0.7500 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T7 64.00-60.00 | Flange | 0.7500 A325N | 4 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T8 60.00-53.17 | Flange | 0.7500 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T9 53.17-50.00 | Flange | 0.7500 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T10 50.00-46.83 | Flange | 0.7500 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T11 46.83-43.67 | Flange | 0.7500 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T12 43.67-40.00 | Flange | 1.0000 A325N | 4 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T13 40.00-20.00 | Flange | 1.0000 A325N | 6 | 0.6250 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T14 20.00-0.00 | Flange | 1.5000 A36 | 4 | 0.6250 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |

## Feed Line/Linear Appurtenances - Entered As Round Or Flat

| Description | Face or Leg | Allow Shield | Component Type | Placement ft | Face Offset in | Lateral Offset (Frac FW) | # | # Per Row | Clear Spacing in | Width or Diameter in | Perimeter in | Weight plf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/8 | A | No | Ar (CaAa) | 98.00 - 10.00 | 0.0000 | 0.1 | 16 | 9 | 0.0000 | 1.1100 | | 0.54 |
| 1 5/8 | A | No | Ar (CaAa) | 98.00 - 10.00 | -2.0000 | 0.12 | 6 | 6 | 0.0000 | 1.9800 | | 1.04 |
| 1 5/8 | A | No | Ar (CaAa) | 96.00 - 10.00 | 0.0000 | 0.22 | 1 | 1 | 0.0000 | 1.9800 | | 1.04 |
| 1/2 | A | No | Ar (CaAa) | 65.00 - 10.00 | 0.0000 | 0.26 | 1 | 1 | 0.0000 | 0.5800 | | 0.25 |
| 1 5/8 (T-Mobile) | C | No | Ar (CaAa) | 83.00 - 10.00 | 0.0000 | 0 | 12 | 6 | 0.0000 | 1.9800 | | 1.04 |
| 1 1/4" Hybriflex Cable (Sprint) | B | No | Ar (CaAa) | 89.00 - 10.00 | 0.0000 | 0.25 | 3 | 3 | 0.0000 | 1.5400 | | 1.00 |
| 0.3" (Sprint) *** | B | No | Ar (CaAa) | 89.00 - 10.00 | 0.0000 | 0.1 | 1 | 1 | 0.0000 | 0.6960 | | 0.30 |
| 1-1/4" Hybrid (Sprint) | B | No | Ar (CaAa) | 89.00 - 10.00 | 0.0000 | -0.1 | 1 | 1 | 0.0000 | 1.2500 | | 0.83 |

## Feed Line/Linear Appurtenances Section Areas

| Tower Section | Tower Elevation ft | Face | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|
| T1 | 100.00-80.00 | A | 0.000 | 0.000 | 56.520 | 0.000 | 284.48 |
| | | B | 0.000 | 0.000 | 5.909 | 0.000 | 37.20 |
| | | C | 0.000 | 0.000 | 7.128 | 0.000 | 37.44 |
| T2 | 80.00-76.00 | A | 0.000 | 0.000 | 12.648 | 0.000 | 63.68 |
| | | B | 0.000 | 0.000 | 2.626 | 0.000 | 16.53 |
| | | C | 0.000 | 0.000 | 9.504 | 0.000 | 49.92 |
| T3 | 76.00-73.00 | A | 0.000 | 0.000 | 9.486 | 0.000 | 47.76 |
| | | B | 0.000 | 0.000 | 1.970 | 0.000 | 12.40 |
| | | C | 0.000 | 0.000 | 7.128 | 0.000 | 37.44 |
| T4 | 73.00-70.00 | A | 0.000 | 0.000 | 9.486 | 0.000 | 47.76 |
| | | B | 0.000 | 0.000 | 1.970 | 0.000 | 12.40 |
| | | C | 0.000 | 0.000 | 7.128 | 0.000 | 37.44 |
| T5 | 70.00-67.00 | A | 0.000 | 0.000 | 9.486 | 0.000 | 47.76 |
| | | B | 0.000 | 0.000 | 1.970 | 0.000 | 12.40 |
| | | C | 0.000 | 0.000 | 7.128 | 0.000 | 37.44 |
| T6 | 67.00-64.00 | A | 0.000 | 0.000 | 9.544 | 0.000 | 48.01 |
| | | B | 0.000 | 0.000 | 1.970 | 0.000 | 12.40 |
| | | C | 0.000 | 0.000 | 7.128 | 0.000 | 37.44 |
| T7 | 64.00-60.00 | A | 0.000 | 0.000 | 12.880 | 0.000 | 64.68 |
| | | B | 0.000 | 0.000 | 2.626 | 0.000 | 16.53 |
| | | C | 0.000 | 0.000 | 9.504 | 0.000 | 49.92 |
| T8 | 60.00-53.17 | A | 0.000 | 0.000 | 22.003 | 0.000 | 110.49 |
| | | B | 0.000 | 0.000 | 4.487 | 0.000 | 28.24 |
| | | C | 0.000 | 0.000 | 16.236 | 0.000 | 85.28 |
| T9 | 53.17-50.00 | A | 0.000 | 0.000 | 10.197 | 0.000 | 51.21 |
| | | B | 0.000 | 0.000 | 2.079 | 0.000 | 13.09 |
| | | C | 0.000 | 0.000 | 7.524 | 0.000 | 39.52 |
| T10 | 50.00-46.83 | A | 0.000 | 0.000 | 10.197 | 0.000 | 51.21 |
| | | B | 0.000 | 0.000 | 2.079 | 0.000 | 13.09 |
| | | C | 0.000 | 0.000 | 7.524 | 0.000 | 39.52 |
| T11 | 46.83-43.67 | A | 0.000 | 0.000 | 10.197 | 0.000 | 51.21 |
| | | B | 0.000 | 0.000 | 2.079 | 0.000 | 13.09 |
| | | C | 0.000 | 0.000 | 7.524 | 0.000 | 39.52 |
| T12 | 43.67-40.00 | A | 0.000 | 0.000 | 11.807 | 0.000 | 59.29 |
| | | B | 0.000 | 0.000 | 2.408 | 0.000 | 15.15 |
| | | C | 0.000 | 0.000 | 8.712 | 0.000 | 45.76 |

| Tower Section | Tower Elevation ft | Face | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|
| T13 | 40.00-20.00 | A | 0.000 | 0.000 | 64.400 | 0.000 | 323.40 |
| | | B | 0.000 | 0.000 | 13.132 | 0.000 | 82.66 |
| | | C | 0.000 | 0.000 | 47.520 | 0.000 | 249.60 |
| T14 | 20.00-0.00 | A | 0.000 | 0.000 | 32.200 | 0.000 | 161.70 |
| | | B | 0.000 | 0.000 | 6.566 | 0.000 | 41.33 |
| | | C | 0.000 | 0.000 | 23.760 | 0.000 | 124.80 |

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

| Tower Section | Tower Elevation ft | Face or Leg | Ice Thickness in | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|
| T1 | 100.00-80.00 | A | 1.658 | 0.000 | 0.000 | 77.112 | 0.000 | 1148.41 |
| | | B | | 0.000 | 0.000 | 18.189 | 0.000 | 230.79 |
| | | C | | 0.000 | 0.000 | 6.318 | 0.000 | 116.32 |
| T2 | 80.00-76.00 | A | 1.635 | 0.000 | 0.000 | 17.292 | 0.000 | 255.79 |
| | | B | | 0.000 | 0.000 | 8.014 | 0.000 | 100.81 |
| | | C | | 0.000 | 0.000 | 8.393 | 0.000 | 153.61 |
| T3 | 76.00-73.00 | A | 1.627 | 0.000 | 0.000 | 12.950 | 0.000 | 191.09 |
| | | B | | 0.000 | 0.000 | 5.994 | 0.000 | 75.19 |
| | | C | | 0.000 | 0.000 | 6.287 | 0.000 | 114.86 |
| T4 | 73.00-70.00 | A | 1.621 | 0.000 | 0.000 | 12.933 | 0.000 | 190.43 |
| | | B | | 0.000 | 0.000 | 5.979 | 0.000 | 74.82 |
| | | C | | 0.000 | 0.000 | 6.281 | 0.000 | 114.55 |
| T5 | 70.00-67.00 | A | 1.614 | 0.000 | 0.000 | 12.915 | 0.000 | 189.73 |
| | | B | | 0.000 | 0.000 | 5.963 | 0.000 | 74.43 |
| | | C | | 0.000 | 0.000 | 6.274 | 0.000 | 114.22 |
| T6 | 67.00-64.00 | A | 1.606 | 0.000 | 0.000 | 13.276 | 0.000 | 193.56 |
| | | B | | 0.000 | 0.000 | 5.947 | 0.000 | 74.03 |
| | | C | | 0.000 | 0.000 | 6.266 | 0.000 | 113.88 |
| T7 | 64.00-60.00 | A | 1.598 | 0.000 | 0.000 | 18.677 | 0.000 | 268.86 |
| | | B | | 0.000 | 0.000 | 7.904 | 0.000 | 98.06 |
| | | C | | 0.000 | 0.000 | 8.344 | 0.000 | 151.30 |
| T8 | 60.00-53.17 | A | 1.583 | 0.000 | 0.000 | 31.802 | 0.000 | 455.56 |
| | | B | | 0.000 | 0.000 | 13.428 | 0.000 | 165.70 |
| | | C | | 0.000 | 0.000 | 14.220 | 0.000 | 256.92 |
| T9 | 53.17-50.00 | A | 1.569 | 0.000 | 0.000 | 14.689 | 0.000 | 209.38 |
| | | B | | 0.000 | 0.000 | 6.188 | 0.000 | 75.95 |
| | | C | | 0.000 | 0.000 | 6.575 | 0.000 | 118.35 |
| T10 | 50.00-46.83 | A | 1.559 | 0.000 | 0.000 | 14.657 | 0.000 | 208.21 |
| | | B | | 0.000 | 0.000 | 6.165 | 0.000 | 75.38 |
| | | C | | 0.000 | 0.000 | 6.564 | 0.000 | 117.86 |
| T11 | 46.83-43.67 | A | 1.548 | 0.000 | 0.000 | 14.622 | 0.000 | 206.97 |
| | | B | | 0.000 | 0.000 | 6.140 | 0.000 | 74.78 |
| | | C | | 0.000 | 0.000 | 6.553 | 0.000 | 117.35 |
| T12 | 43.67-40.00 | A | 1.536 | 0.000 | 0.000 | 16.885 | 0.000 | 238.00 |
| | | B | | 0.000 | 0.000 | 7.077 | 0.000 | 85.79 |
| | | C | | 0.000 | 0.000 | 7.573 | 0.000 | 135.19 |
| T13 | 40.00-20.00 | A | 1.486 | 0.000 | 0.000 | 91.051 | 0.000 | 1261.12 |
| | | B | | 0.000 | 0.000 | 37.856 | 0.000 | 450.14 |
| | | C | | 0.000 | 0.000 | 40.974 | 0.000 | 721.97 |
| T14 | 20.00-0.00 | A | 1.331 | 0.000 | 0.000 | 43.919 | 0.000 | 575.10 |
| | | B | | 0.000 | 0.000 | 17.781 | 0.000 | 198.82 |
| | | C | | 0.000 | 0.000 | 19.974 | 0.000 | 337.64 |

## Feed Line Center of Pressure

| Section | Elevation | $CP_X$ | $CP_Z$ | $CP_X$ Ice | $CP_Z$ Ice |
|---|---|---|---|---|---|
| | ft | in | in | in | in |
| T1 | 100.00-80.00 | -0.8307 | -1.2840 | -0.3323 | -0.7397 |
| T2 | 80.00-76.00 | -0.4035 | -0.1615 | -0.1212 | -0.3890 |
| T3 | 76.00-73.00 | -0.3971 | -0.1589 | -0.1335 | -0.3835 |
| T4 | 73.00-70.00 | -0.3971 | -0.1589 | -0.1338 | -0.3832 |
| T5 | 70.00-67.00 | -0.3971 | -0.1589 | -0.1341 | -0.3830 |
| T6 | 67.00-64.00 | -0.3873 | -0.1664 | -0.1509 | -0.4133 |
| T7 | 64.00-60.00 | -0.3941 | -0.1916 | -0.1717 | -0.4805 |
| T8 | 60.00-53.17 | -0.3981 | -0.1935 | -0.1690 | -0.4870 |
| T9 | 53.17-50.00 | -0.3790 | -0.1842 | -0.1800 | -0.4505 |
| T10 | 50.00-46.83 | -0.3790 | -0.1842 | -0.1804 | -0.4505 |
| T11 | 46.83-43.67 | -0.3790 | -0.1842 | -0.1807 | -0.4505 |
| T12 | 43.67-40.00 | -0.3759 | -0.1827 | -0.1831 | -0.4438 |
| T13 | 40.00-20.00 | -0.4863 | -0.2668 | -0.2148 | -0.6256 |
| T14 | 20.00-0.00 | -0.5042 | -0.3024 | -0.2344 | -0.6208 |

## Shielding Factor Ka

| Tower Section | Feed Line Record No. | Description | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---|---|---|---|---|---|
| T1 | 1 | 7/8 | 80.00 - 98.00 | 0.6000 | 0.4098 |
| T1 | 2 | 1 5/8 | 80.00 - 98.00 | 0.5000 | 0.5000 |
| T1 | 3 | 1 5/8 | 80.00 - 96.00 | 0.6000 | 0.4098 |
| T1 | 5 | 1 5/8 | 80.00 - 83.00 | 0.6000 | 0.4098 |
| T1 | 6 | 1 1/4" Hybriflex Cable | 80.00 - 89.00 | 0.6000 | 0.4098 |
| T1 | 7 | 0.3" | 80.00 - 89.00 | 0.6000 | 0.4098 |
| T1 | 9 | 1-1/4" Hybrid | 80.00 - 89.00 | 0.6000 | 0.4098 |
| T2 | 1 | 7/8 | 76.00 - 80.00 | 0.6000 | 0.4903 |
| T2 | 2 | 1 5/8 | 76.00 - 80.00 | 0.5000 | 0.5000 |
| T2 | 3 | 1 5/8 | 76.00 - 80.00 | 0.6000 | 0.4903 |
| T2 | 5 | 1 5/8 | 76.00 - 80.00 | 0.6000 | 0.4903 |
| T2 | 6 | 1 1/4" Hybriflex Cable | 76.00 - 80.00 | 0.6000 | 0.4903 |
| T2 | 7 | 0.3" | 76.00 - 80.00 | 0.6000 | 0.4903 |
| T2 | 9 | 1-1/4" Hybrid | 76.00 - 80.00 | 0.6000 | 0.4903 |
| T3 | 1 | 7/8 | 73.00 - 76.00 | 0.6000 | 0.4072 |
| T3 | 2 | 1 5/8 | 73.00 - 76.00 | 0.5000 | 0.5000 |
| T3 | 3 | 1 5/8 | 73.00 - 76.00 | 0.6000 | 0.4072 |
| T3 | 5 | 1 5/8 | 73.00 - 76.00 | 0.6000 | 0.4072 |
| T3 | 6 | 1 1/4" Hybriflex Cable | 73.00 - 76.00 | 0.6000 | 0.4072 |
| T3 | 7 | 0.3" | 73.00 - 76.00 | 0.6000 | 0.4072 |
| T3 | 9 | 1-1/4" Hybrid | 73.00 - 76.00 | 0.6000 | 0.4072 |
| T4 | 1 | 7/8 | 70.00 - 73.00 | 0.6000 | 0.4087 |
| T4 | 2 | 1 5/8 | 70.00 - 73.00 | 0.5000 | 0.5000 |
| T4 | 3 | 1 5/8 | 70.00 - 73.00 | 0.6000 | 0.4087 |
| T4 | 5 | 1 5/8 | 70.00 - 73.00 | 0.6000 | 0.4087 |
| T4 | 6 | 1 1/4" Hybriflex Cable | 70.00 - 73.00 | 0.6000 | 0.4087 |
| T4 | 7 | 0.3" | 70.00 - 73.00 | 0.6000 | 0.4087 |
| T4 | 9 | 1-1/4" Hybrid | 70.00 - 73.00 | 0.6000 | 0.4087 |
| T5 | 1 | 7/8 | 67.00 - 70.00 | 0.6000 | 0.4102 |
| T5 | 2 | 1 5/8 | 67.00 - 70.00 | 0.5000 | 0.5000 |
| T5 | 3 | 1 5/8 | 67.00 - 70.00 | 0.6000 | 0.4102 |
| T5 | 5 | 1 5/8 | 67.00 - 70.00 | 0.6000 | 0.4102 |
| T5 | 6 | 1 1/4" Hybriflex Cable | 67.00 - 70.00 | 0.6000 | 0.4102 |

| Tower Section | Feed Line Record No. | Description | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---|---|---|---|---|---|
| T5 | 7 | 0.3" | 67.00 - 70.00 | 0.6000 | 0.4102 |
| T5 | 9 | 1-1/4" Hybrid | 67.00 - 70.00 | 0.6000 | 0.4102 |
| T6 | 1 | 7/8 | 64.00 - 67.00 | 0.6000 | 0.3746 |
| T6 | 2 | 1 5/8 | 64.00 - 67.00 | 0.5000 | 0.5000 |
| T6 | 3 | 1 5/8 | 64.00 - 67.00 | 0.6000 | 0.3746 |
| T6 | 4 | 1/2 | 64.00 - 65.00 | 0.6000 | 0.3746 |
| T6 | 5 | 1 5/8 | 64.00 - 67.00 | 0.6000 | 0.3746 |
| T6 | 6 | 1 1/4" Hybriflex Cable | 64.00 - 67.00 | 0.6000 | 0.3746 |
| T6 | 7 | 0.3" | 64.00 - 67.00 | 0.6000 | 0.3746 |
| T6 | 9 | 1-1/4" Hybrid | 64.00 - 67.00 | 0.6000 | 0.3746 |
| T7 | 1 | 7/8 | 60.00 - 64.00 | 0.6000 | 0.3897 |
| T7 | 2 | 1 5/8 | 60.00 - 64.00 | 0.5000 | 0.5000 |
| T7 | 3 | 1 5/8 | 60.00 - 64.00 | 0.6000 | 0.3897 |
| T7 | 4 | 1/2 | 60.00 - 64.00 | 0.6000 | 0.3897 |
| T7 | 5 | 1 5/8 | 60.00 - 64.00 | 0.6000 | 0.3897 |
| T7 | 6 | 1 1/4" Hybriflex Cable | 60.00 - 64.00 | 0.6000 | 0.3897 |
| T7 | 7 | 0.3" | 60.00 - 64.00 | 0.6000 | 0.3897 |
| T7 | 9 | 1-1/4" Hybrid | 60.00 - 64.00 | 0.6000 | 0.3897 |
| T8 | 1 | 7/8 | 53.17 - 60.00 | 0.6000 | 0.4298 |
| T8 | 2 | 1 5/8 | 53.17 - 60.00 | 0.5000 | 0.5000 |
| T8 | 3 | 1 5/8 | 53.17 - 60.00 | 0.6000 | 0.4298 |
| T8 | 4 | 1/2 | 53.17 - 60.00 | 0.6000 | 0.4298 |
| T8 | 5 | 1 5/8 | 53.17 - 60.00 | 0.6000 | 0.4298 |
| T8 | 6 | 1 1/4" Hybriflex Cable | 53.17 - 60.00 | 0.6000 | 0.4298 |
| T8 | 7 | 0.3" | 53.17 - 60.00 | 0.6000 | 0.4298 |
| T8 | 9 | 1-1/4" Hybrid | 53.17 - 60.00 | 0.6000 | 0.4298 |
| T9 | 1 | 7/8 | 50.00 - 53.17 | 0.6000 | 0.2947 |
| T9 | 2 | 1 5/8 | 50.00 - 53.17 | 0.5000 | 0.5000 |
| T9 | 3 | 1 5/8 | 50.00 - 53.17 | 0.6000 | 0.2947 |
| T9 | 4 | 1/2 | 50.00 - 53.17 | 0.6000 | 0.2947 |
| T9 | 5 | 1 5/8 | 50.00 - 53.17 | 0.6000 | 0.2947 |
| T9 | 6 | 1 1/4" Hybriflex Cable | 50.00 - 53.17 | 0.6000 | 0.2947 |
| T9 | 7 | 0.3" | 50.00 - 53.17 | 0.6000 | 0.2947 |
| T9 | 9 | 1-1/4" Hybrid | 50.00 - 53.17 | 0.6000 | 0.2947 |
| T10 | 1 | 7/8 | 46.83 - 50.00 | 0.6000 | 0.2971 |
| T10 | 2 | 1 5/8 | 46.83 - 50.00 | 0.5000 | 0.5000 |
| T10 | 3 | 1 5/8 | 46.83 - 50.00 | 0.6000 | 0.2971 |
| T10 | 4 | 1/2 | 46.83 - 50.00 | 0.6000 | 0.2971 |
| T10 | 5 | 1 5/8 | 46.83 - 50.00 | 0.6000 | 0.2971 |
| T10 | 6 | 1 1/4" Hybriflex Cable | 46.83 - 50.00 | 0.6000 | 0.2971 |
| T10 | 7 | 0.3" | 46.83 - 50.00 | 0.6000 | 0.2971 |
| T10 | 9 | 1-1/4" Hybrid | 46.83 - 50.00 | 0.6000 | 0.2971 |
| T11 | 1 | 7/8 | 43.67 - 46.83 | 0.6000 | 0.2998 |
| T11 | 2 | 1 5/8 | 43.67 - 46.83 | 0.5000 | 0.5000 |
| T11 | 3 | 1 5/8 | 43.67 - 46.83 | 0.6000 | 0.2998 |
| T11 | 4 | 1/2 | 43.67 - 46.83 | 0.6000 | 0.2998 |
| T11 | 5 | 1 5/8 | 43.67 - 46.83 | 0.6000 | 0.2998 |
| T11 | 6 | 1 1/4" Hybriflex Cable | 43.67 - 46.83 | 0.6000 | 0.2998 |
| T11 | 7 | 0.3" | 43.67 - 46.83 | 0.6000 | 0.2998 |
| T11 | 9 | 1-1/4" Hybrid | 43.67 - 46.83 | 0.6000 | 0.2998 |
| T12 | 1 | 7/8 | 40.00 - 43.67 | 0.6000 | 0.2786 |
| T12 | 2 | 1 5/8 | 40.00 - 43.67 | 0.5000 | 0.5000 |
| T12 | 3 | 1 5/8 | 40.00 - 43.67 | 0.6000 | 0.2786 |
| T12 | 4 | 1/2 | 40.00 - 43.67 | 0.6000 | 0.2786 |
| T12 | 5 | 1 5/8 | 40.00 - 43.67 | 0.6000 | 0.2786 |
| T12 | 6 | 1 1/4" Hybriflex Cable | 40.00 - 43.67 | 0.6000 | 0.2786 |
| T12 | 7 | 0.3" | 40.00 - 43.67 | 0.6000 | 0.2786 |
| T12 | 9 | 1-1/4" Hybrid | 40.00 - 43.67 | 0.6000 | 0.2786 |
| T13 | 1 | 7/8 | 20.00 - 40.00 | 0.6000 | 0.5564 |
| T13 | 2 | 1 5/8 | 20.00 - 40.00 | 0.5000 | 0.5000 |
| T13 | 3 | 1 5/8 | 20.00 - 40.00 | 0.6000 | 0.5564 |
| T13 | 4 | 1/2 | 20.00 - 40.00 | 0.6000 | 0.5564 |

| Tower Section | Feed Line Record No. | Description | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---|---|---|---|---|---|
| T13 | 5 | 1 5/8 | 20.00 - 40.00 | 0.6000 | 0.5564 |
| T13 | 6 | 1 1/4" Hybriflex Cable | 20.00 - 40.00 | 0.6000 | 0.5564 |
| T13 | 7 | 0.3" | 20.00 - 40.00 | 0.6000 | 0.5564 |
| T13 | 9 | 1-1/4" Hybrid | 20.00 - 40.00 | 0.6000 | 0.5564 |
| T14 | 1 | 7/8 | 10.00 - 20.00 | 0.6000 | 0.6000 |
| T14 | 2 | 1 5/8 | 10.00 - 20.00 | 0.5000 | 0.5000 |
| T14 | 3 | 1 5/8 | 10.00 - 20.00 | 0.6000 | 0.6000 |
| T14 | 4 | 1/2 | 10.00 - 20.00 | 0.6000 | 0.6000 |
| T14 | 5 | 1 5/8 | 10.00 - 20.00 | 0.6000 | 0.6000 |
| T14 | 6 | 1 1/4" Hybriflex Cable | 10.00 - 20.00 | 0.6000 | 0.6000 |
| T14 | 7 | 0.3" | 10.00 - 20.00 | 0.6000 | 0.6000 |
| T14 | 9 | 1-1/4" Hybrid | 10.00 - 20.00 | 0.6000 | 0.6000 |

## Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft / ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|
| Angle Sector Frame | A | From Leg | 1.00 | 0.0000 | 98.00 | No Ice | 17.90 | 8.95 | 400.00 |
| | | | 0.00 | | | 1/2" Ice | 22.20 | 13.00 | 510.00 |
| | | | 0.00 | | | 1" Ice | 26.50 | 17.05 | 620.00 |
| Angle Sector Frame | B | From Leg | 1.00 | 0.0000 | 98.00 | No Ice | 17.90 | 8.95 | 400.00 |
| | | | 0.00 | | | 1/2" Ice | 22.20 | 13.00 | 510.00 |
| | | | 0.00 | | | 1" Ice | 26.50 | 17.05 | 620.00 |
| Angle Sector Frame | C | From Leg | 1.00 | 0.0000 | 98.00 | No Ice | 17.90 | 8.95 | 400.00 |
| | | | 0.00 | | | 1/2" Ice | 22.20 | 13.00 | 510.00 |
| | | | 0.00 | | | 1" Ice | 26.50 | 17.05 | 620.00 |
| (4) DB844H90 | A | From Leg | 3.00 | 0.0000 | 98.00 | No Ice | 2.87 | 3.97 | 10.00 |
| | | | 0.00 | | | 1/2" Ice | 3.18 | 4.34 | 36.27 |
| | | | 0.00 | | | 1" Ice | 3.52 | 4.72 | 66.78 |
| (4) DB844H90 | B | From Leg | 3.00 | 0.0000 | 98.00 | No Ice | 2.87 | 3.97 | 10.00 |
| | | | 0.00 | | | 1/2" Ice | 3.18 | 4.34 | 36.27 |
| | | | 0.00 | | | 1" Ice | 3.52 | 4.72 | 66.78 |
| (2) 60"x12" Panel | C | From Leg | 3.00 | 0.0000 | 98.00 | No Ice | 7.00 | 3.75 | 40.00 |
| | | | 0.00 | | | 1/2" Ice | 7.47 | 4.13 | 79.89 |
| | | | 0.00 | | | 1" Ice | 7.95 | 4.51 | 125.04 |
| (2) 72" x 12" Panel | C | From Leg | 3.00 | 0.0000 | 98.00 | No Ice | 8.40 | 4.70 | 45.00 |
| | | | 0.00 | | | 1/2" Ice | 8.95 | 5.15 | 92.28 |
| | | | 0.00 | | | 1" Ice | 9.51 | 5.60 | 145.59 |
| *** | | | | | | | | | |
| Dish Pipe Mount | C | From Leg | 1.00 | 0.0000 | 96.00 | No Ice | 2.09 | 2.09 | 54.66 |
| | | | 0.00 | | | 1/2" Ice | 2.46 | 2.46 | 80.59 |
| | | | 0.00 | | | 1" Ice | 2.85 | 2.85 | 110.49 |
| *** | | | | | | | | | |
| APXVSPP18-C-A20 (Sprint) | A | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 8.26 | 5.28 | 57.00 |
| | | | 0.00 | | | 1/2" Ice | 8.81 | 5.74 | 106.52 |
| | | | 0.00 | | | 1" Ice | 9.36 | 6.20 | 162.12 |
| APXVSPP18-C-A20 (Sprint) | B | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 8.26 | 5.28 | 57.00 |
| | | | 0.00 | | | 1/2" Ice | 8.81 | 5.74 | 106.52 |
| | | | 0.00 | | | 1" Ice | 9.36 | 6.20 | 162.12 |
| APXVSPP18-C-A20 | C | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 8.26 | 5.28 | 57.00 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft / ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|
| (Sprint) | | | 0.00 | | | 1/2" Ice | 8.81 | 5.74 | 106.52 |
| | | | 0.00 | | | 1" Ice | 9.36 | 6.20 | 162.12 |
| (2) 1900 MHz RRH | A | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 2.73 | 1.45 | 44.09 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 2.96 | 1.64 | 62.32 |
| | | | 0.00 | | | 1" Ice | 3.20 | 1.84 | 83.43 |
| (2) 1900 MHz RRH | B | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 2.73 | 1.45 | 44.09 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 2.96 | 1.64 | 62.32 |
| | | | 0.00 | | | 1" Ice | 3.20 | 1.84 | 83.43 |
| (2) 1900 MHz RRH | C | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 2.73 | 1.45 | 44.09 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 2.96 | 1.64 | 62.32 |
| | | | 0.00 | | | 1" Ice | 3.20 | 1.84 | 83.43 |
| 800 MHz RRH | A | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 2.25 | 2.40 | 64.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 2.46 | 2.61 | 86.12 |
| | | | 0.00 | | | 1" Ice | 2.68 | 2.83 | 111.30 |
| 800 MHz RRH | B | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 2.25 | 2.40 | 64.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 2.46 | 2.61 | 86.12 |
| | | | 0.00 | | | 1" Ice | 2.68 | 2.83 | 111.30 |
| 800 MHz RRH | C | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 2.25 | 2.40 | 64.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 2.46 | 2.61 | 86.12 |
| | | | 0.00 | | | 1" Ice | 2.68 | 2.83 | 111.30 |
| *** | | | | | | | | | |
| APX16PV-16PVL | A | From Leg | 1.00 | 0.0000 | 83.00 | No Ice | 6.80 | 3.31 | 46.95 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 7.27 | 3.94 | 93.66 |
| | | | 0.00 | | | 1" Ice | 7.75 | 4.58 | 147.19 |
| APX16PV-16PVL | B | From Leg | 1.00 | 0.0000 | 83.00 | No Ice | 6.80 | 3.31 | 46.95 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 7.27 | 3.94 | 93.66 |
| | | | 0.00 | | | 1" Ice | 7.75 | 4.58 | 147.19 |
| APX16PV-16PVL | C | From Leg | 1.00 | 0.0000 | 83.00 | No Ice | 6.80 | 3.31 | 46.95 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 7.27 | 3.94 | 93.66 |
| | | | 0.00 | | | 1" Ice | 7.75 | 4.58 | 147.19 |
| (2) ATMAA1412D-1A20 | A | From Leg | 1.00 | 0.0000 | 80.00 | No Ice | 1.17 | 0.47 | 13.00 |
| TMA | | | 0.00 | | | 1/2" Ice | 1.31 | 0.57 | 20.62 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 1.47 | 0.69 | 30.11 |
| (2) ATMAA1412D-1A20 | B | From Leg | 1.00 | 0.0000 | 80.00 | No Ice | 1.17 | 0.47 | 13.00 |
| TMA | | | 0.00 | | | 1/2" Ice | 1.31 | 0.57 | 20.62 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 1.47 | 0.69 | 30.11 |
| Antenna Pipe Mount | A | From Leg | 1.00 | 0.0000 | 81.00 | No Ice | 0.87 | 0.87 | 14.60 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 1.12 | 1.12 | 25.30 |
| | | | 0.00 | | | 1" Ice | 1.39 | 1.39 | 37.43 |
| Antenna Pipe Mount | B | From Leg | 1.00 | 0.0000 | 81.00 | No Ice | 0.87 | 0.87 | 14.60 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 1.12 | 1.12 | 25.30 |
| | | | 0.00 | | | 1" Ice | 1.39 | 1.39 | 37.43 |
| *** | | | | | | | | | |
| 6810 | C | From Leg | 1.00 | 0.0000 | 65.00 | No Ice | 22.30 | 22.30 | 354.00 |
| | | | 0.00 | | | 1/2" Ice | 40.14 | 40.14 | 460.20 |
| | | | 0.00 | | | 1" Ice | 57.98 | 57.98 | 566.40 |
| *** | | | | | | | | | |
| Angle Side Arm | C | From Leg | 1.00 | 0.0000 | 30.00 | No Ice | 6.30 | 2.14 | 150.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 7.00 | 2.60 | 230.00 |
| | | | 0.00 | | | 1" Ice | 7.70 | 3.06 | 310.00 |
| GPS | C | From Leg | 2.00 | 0.0000 | 30.00 | No Ice | 0.50 | 0.50 | 10.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 0.63 | 0.63 | 15.96 |
| | | | 0.00 | | | 1" Ice | 0.78 | 0.78 | 23.49 |
| *** | | | | | | | | | |
| *** | | | | | | | | | |
| *** | | | | | | | | | |
| Pipe Sector Frame | A | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 14.40 | 7.20 | 300.00 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft / ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|
| (Sprint) | | | 0.00 | | | 1/2" Ice | 19.50 | 10.50 | 415.00 |
| | | | 0.00 | | | 1" Ice | 24.60 | 13.80 | 530.00 |
| Pipe Sector Frame | B | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 14.40 | 7.20 | 300.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 19.50 | 10.50 | 415.00 |
| | | | 0.00 | | | 1" Ice | 24.60 | 13.80 | 530.00 |
| Pipe Sector Frame | C | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 14.40 | 7.20 | 300.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 19.50 | 10.50 | 415.00 |
| | | | 0.00 | | | 1" Ice | 24.60 | 13.80 | 530.00 |
| APXVTM14-C-120 | A | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 6.53 | 3.38 | 52.90 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 6.96 | 3.72 | 90.49 |
| | | | 0.00 | | | 1" Ice | 7.40 | 4.07 | 132.96 |
| APXVTM14-C-120 | B | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 6.53 | 3.38 | 52.90 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 6.96 | 3.72 | 90.49 |
| | | | 0.00 | | | 1" Ice | 7.40 | 4.07 | 132.96 |
| APXVTM14-C-120 | C | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 6.53 | 3.38 | 52.90 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 6.96 | 3.72 | 90.49 |
| | | | 0.00 | | | 1" Ice | 7.40 | 4.07 | 132.96 |
| TD-RRH8X20 | A | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 4.32 | 1.41 | 66.14 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 4.60 | 1.61 | 90.08 |
| | | | 0.00 | | | 1" Ice | 4.89 | 1.83 | 117.36 |
| TD-RRH8X20 | B | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 4.32 | 1.41 | 66.14 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 4.60 | 1.61 | 90.08 |
| | | | 0.00 | | | 1" Ice | 4.89 | 1.83 | 117.36 |
| TD-RRH8X20 | C | From Leg | 3.00 | 0.0000 | 89.00 | No Ice | 4.32 | 1.41 | 66.14 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 4.60 | 1.61 | 90.08 |
| | | | 0.00 | | | 1" Ice | 4.89 | 1.83 | 117.36 |

## Dishes

| Description | Face or Leg | Dish Type | Offset Type | Offsets: Horz Lateral ft / Vert ft | Azimuth Adjustment ° | 3 dB Beam Width ° | Elevation ft | Outside Diameter ft | | Aperture Area $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2' x 4' Rectangular Grid Dish | | Grid | None | | 0.0000 | | 96.00 | 3.00 | No Ice | 7.07 | 40.00 |
| | | | | | | | | | 1/2" Ice | 7.47 | 78.35 |
| | | | | | | | | | 1" Ice | 7.86 | 116.69 |

## Load Combinations

| Comb. No. | Description |
|---|---|
| 1 | Dead Only |
| 2 | 1.2 Dead+1.6 Wind 0 deg - No Ice |
| 3 | 1.2D+1.6W (pattern 1) 0 deg - No Ice |
| 4 | 1.2D+1.6W (pattern 2) 0 deg - No Ice |
| 5 | 0.9 Dead+1.6 Wind 0 deg - No Ice |
| 6 | 1.2 Dead+1.6 Wind 30 deg - No Ice |

| Comb. No. | Description |
|---|---|
| 7 | 1.2D+1.6W (pattern 1) 30 deg - No Ice |
| 8 | 1.2D+1.6W (pattern 2) 30 deg - No Ice |
| 9 | 0.9 Dead+1.6 Wind 30 deg - No Ice |
| 10 | 1.2 Dead+1.6 Wind 60 deg - No Ice |
| 11 | 1.2D+1.6W (pattern 1) 60 deg - No Ice |
| 12 | 1.2D+1.6W (pattern 2) 60 deg - No Ice |
| 13 | 0.9 Dead+1.6 Wind 60 deg - No Ice |
| 14 | 1.2 Dead+1.6 Wind 90 deg - No Ice |
| 15 | 1.2D+1.6W (pattern 1) 90 deg - No Ice |
| 16 | 1.2D+1.6W (pattern 2) 90 deg - No Ice |
| 17 | 0.9 Dead+1.6 Wind 90 deg - No Ice |
| 18 | 1.2 Dead+1.6 Wind 120 deg - No Ice |
| 19 | 1.2D+1.6W (pattern 1) 120 deg - No Ice |
| 20 | 1.2D+1.6W (pattern 2) 120 deg - No Ice |
| 21 | 0.9 Dead+1.6 Wind 120 deg - No Ice |
| 22 | 1.2 Dead+1.6 Wind 150 deg - No Ice |
| 23 | 1.2D+1.6W (pattern 1) 150 deg - No Ice |
| 24 | 1.2D+1.6W (pattern 2) 150 deg - No Ice |
| 25 | 0.9 Dead+1.6 Wind 150 deg - No Ice |
| 26 | 1.2 Dead+1.6 Wind 180 deg - No Ice |
| 27 | 1.2D+1.6W (pattern 1) 180 deg - No Ice |
| 28 | 1.2D+1.6W (pattern 2) 180 deg - No Ice |
| 29 | 0.9 Dead+1.6 Wind 180 deg - No Ice |
| 30 | 1.2 Dead+1.6 Wind 210 deg - No Ice |
| 31 | 1.2D+1.6W (pattern 1) 210 deg - No Ice |
| 32 | 1.2D+1.6W (pattern 2) 210 deg - No Ice |
| 33 | 0.9 Dead+1.6 Wind 210 deg - No Ice |
| 34 | 1.2 Dead+1.6 Wind 240 deg - No Ice |
| 35 | 1.2D+1.6W (pattern 1) 240 deg - No Ice |
| 36 | 1.2D+1.6W (pattern 2) 240 deg - No Ice |
| 37 | 0.9 Dead+1.6 Wind 240 deg - No Ice |
| 38 | 1.2 Dead+1.6 Wind 270 deg - No Ice |
| 39 | 1.2D+1.6W (pattern 1) 270 deg - No Ice |
| 40 | 1.2D+1.6W (pattern 2) 270 deg - No Ice |
| 41 | 0.9 Dead+1.6 Wind 270 deg - No Ice |
| 42 | 1.2 Dead+1.6 Wind 300 deg - No Ice |
| 43 | 1.2D+1.6W (pattern 1) 300 deg - No Ice |
| 44 | 1.2D+1.6W (pattern 2) 300 deg - No Ice |
| 45 | 0.9 Dead+1.6 Wind 300 deg - No Ice |
| 46 | 1.2 Dead+1.6 Wind 330 deg - No Ice |
| 47 | 1.2D+1.6W (pattern 1) 330 deg - No Ice |
| 48 | 1.2D+1.6W (pattern 2) 330 deg - No Ice |
| 49 | 0.9 Dead+1.6 Wind 330 deg - No Ice |
| 50 | 1.2 Dead+1.0 Ice+1.0 Temp |
| 51 | 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp |
| 52 | 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp |
| 53 | 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp |
| 54 | 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp |
| 55 | 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp |
| 56 | 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp |
| 57 | 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp |
| 58 | 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp |
| 59 | 1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp |
| 60 | 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp |
| 61 | 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp |
| 62 | 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp |
| 63 | Dead+Wind 0 deg - Service |
| 64 | Dead+Wind 30 deg - Service |
| 65 | Dead+Wind 60 deg - Service |
| 66 | Dead+Wind 90 deg - Service |
| 67 | Dead+Wind 120 deg - Service |
| 68 | Dead+Wind 150 deg - Service |

| Comb. No. | Description |
|---|---|
| 69 | Dead+Wind 180 deg - Service |
| 70 | Dead+Wind 210 deg - Service |
| 71 | Dead+Wind 240 deg - Service |
| 72 | Dead+Wind 270 deg - Service |
| 73 | Dead+Wind 300 deg - Service |
| 74 | Dead+Wind 330 deg - Service |

## Maximum Tower Deflections - Service Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| T1 | 100 - 80 | 5.059 | 71 | 0.4422 | 0.0458 |
| T2 | 80 - 76 | 3.207 | 71 | 0.4201 | 0.0420 |
| T3 | 76 - 73 | 2.840 | 71 | 0.4072 | 0.0411 |
| T4 | 73 - 70 | 2.582 | 71 | 0.3949 | 0.0407 |
| T5 | 70 - 67 | 2.332 | 71 | 0.3804 | 0.0403 |
| T6 | 67 - 64 | 2.091 | 71 | 0.3636 | 0.0400 |
| T7 | 64 - 60 | 1.867 | 71 | 0.3448 | 0.0397 |
| T8 | 60 - 53.1667 | 1.574 | 71 | 0.3149 | 0.0348 |
| T9 | 53.1667 - 50 | 1.138 | 71 | 0.2682 | 0.0272 |
| T10 | 50 - 46.8334 | 0.963 | 71 | 0.2428 | 0.0243 |
| T11 | 46.8334 - 43.6667 | 0.804 | 71 | 0.2148 | 0.0214 |
| T12 | 43.6667 - 40 | 0.666 | 71 | 0.1843 | 0.0186 |
| T13 | 40 - 20 | 0.531 | 71 | 0.1456 | 0.0148 |
| T14 | 20 - 0 | 0.117 | 71 | 0.0592 | 0.0033 |

## Critical Deflections and Radius of Curvature - Service Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 98.00 | Angle Sector Frame | 71 | 4.875 | 0.4416 | 0.0455 | 252848 |
| 96.00 | 2' x 4' Rectangular Grid Dish | 71 | 4.690 | 0.4409 | 0.0452 | 252848 |
| 89.00 | APXVSPP18-C-A20 | 71 | 4.044 | 0.4363 | 0.0440 | 114931 |
| 83.00 | APX16PV-16PVL | 71 | 3.487 | 0.4272 | 0.0428 | 94449 |
| 81.00 | Antenna Pipe Mount | 71 | 3.300 | 0.4227 | 0.0423 | 71254 |
| 80.00 | (2) ATMAA1412D-1A20 TMA | 71 | 3.207 | 0.4201 | 0.0420 | 28418 |
| 65.00 | 6810 | 71 | 1.941 | 0.3515 | 0.0401 | 12287 |
| 30.00 | Angle Side Arm | 71 | 0.267 | 0.0833 | 0.0072 | 10589 |

## Maximum Tower Deflections - Design Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| T1 | 100 - 80 | 22.192 | 34 | 1.9333 | 0.2774 |
| T2 | 80 - 76 | 14.108 | 37 | 1.8410 | 0.2556 |
| T3 | 76 - 73 | 12.498 | 37 | 1.7848 | 0.2460 |
| T4 | 73 - 70 | 11.373 | 37 | 1.7310 | 0.2436 |
| T5 | 70 - 67 | 10.279 | 37 | 1.6675 | 0.2391 |

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load Comb. | Tilt<br>° | Twist<br>° |
|---|---|---|---|---|---|
| T6 | 67 - 64 | 9.224 | 37 | 1.5937 | 0.2356 |
| T7 | 64 - 60 | 8.245 | 37 | 1.5115 | 0.2341 |
| T8 | 60 - 53.1667 | 6.964 | 37 | 1.3813 | 0.2115 |
| T9 | 53.1667 - 50 | 5.035 | 37 | 1.1778 | 0.1687 |
| T10 | 50 - 46.8334 | 4.257 | 37 | 1.0663 | 0.1495 |
| T11 | 46.8334 - 43.6667 | 3.554 | 37 | 0.9437 | 0.1267 |
| T12 | 43.6667 - 40 | 2.932 | 37 | 0.8098 | 0.0997 |
| T13 | 40 - 20 | 2.339 | 34 | 0.6398 | 0.0664 |
| T14 | 20 - 0 | 0.517 | 34 | 0.2608 | 0.0146 |

## Critical Deflections and Radius of Curvature - Design Wind

| Elevation<br>ft | Appurtenance | Gov. Load Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of Curvature<br>ft |
|---|---|---|---|---|---|---|
| 98.00 | Angle Sector Frame | 34 | 21.386 | 1.9312 | 0.2768 | 56175 |
| 96.00 | 2' x 4' Rectangular Grid Dish | 34 | 20.579 | 1.9287 | 0.2761 | 56175 |
| 89.00 | APXVSPP18-C-A20 | 37 | 17.762 | 1.9103 | 0.2715 | 25534 |
| 83.00 | APX16PV-16PVL | 37 | 15.332 | 1.8719 | 0.2627 | 21108 |
| 81.00 | Antenna Pipe Mount | 37 | 14.517 | 1.8523 | 0.2582 | 18393 |
| 80.00 | (2) ATMAA1412D-1A20 TMA | 37 | 14.108 | 1.8410 | 0.2556 | 6721 |
| 65.00 | 6810 | 37 | 8.567 | 1.5406 | 0.2359 | 2763 |
| 30.00 | Angle Side Arm | 34 | 1.177 | 0.3660 | 0.0325 | 2322 |

## Bolt Design Data

| Section No. | Elevation<br>ft | Component Type | Bolt Grade | Bolt Size<br>in | Number Of Bolts | Maximum Load per Bolt<br>lb | Allowable Load<br>lb | Ratio Load / Allowable | Allowable Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 100 | Leg | A325N | 0.7500 | 4 | 0.46 | 29820.60 | 0.000 ✔ | 1 | Bolt Tension |
| T7 | 64 | Leg | A325N | 0.7500 | 4 | 14379.00 | 29820.60 | 0.482 ✔ | 1 | Bolt Tension |
| T12 | 43.6667 | Leg | A325N | 1.0000 | 4 | 32412.40 | 53014.40 | 0.611 ✔ | 1 | Bolt Tension |
| T13 | 40 | Leg | A325N | 1.0000 | 6 | 24078.40 | 53014.40 | 0.454 ✔ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.6250 | 1 | 3001.40 | 6830.86 | 0.439 ✔ | 1 | Member Block Shear |
| T14 | 20 | Leg | A36 | 1.5000 | 4 | 35596.50 | 47712.90 | 0.746 ✔ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.6250 | 1 | 1644.63 | 7830.00 | 0.210 ✔ | 1 | Member Bearing |

## *Compression Checks*

## Leg Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 100 - 80 | P2.5x.276 | 20.00 | 3.28 | 42.6<br>K=1.00 | 2.2535 | -31983.50 | 88826.50 | 0.360 [1] ✔ |
| T2 | 80 - 76 | P2.5x.276 GR | 4.00 | 3.00 | 33.1<br>K=0.85 | 2.2535 | -41373.10 | 93595.70 | 0.442 [1] ✔ |
| T3 | 76 - 73 | P2.5x.276 GR | 3.00 | 3.00 | 33.1<br>K=0.85 | 2.2535 | -49159.60 | 93595.70 | 0.525 [1] ✔ |
| T4 | 73 - 70 | P2.5x.276 GR | 3.00 | 3.00 | 33.1<br>K=0.85 | 2.2535 | -56676.60 | 93595.70 | 0.606 [1] ✔ |
| T5 | 70 - 67 | P2.5x.276 GR | 3.00 | 3.00 | 33.1<br>K=0.85 | 2.2535 | -64252.30 | 93595.70 | 0.686 [1] ✔ |
| T6 | 67 - 64 | P2.5x.276 GR | 3.00 | 3.00 | 33.1<br>K=0.85 | 2.2535 | -79929.30 | 93595.70 | 0.854 [1] ✔ |
| T7 | 64 - 60 | P2.5x.276 GR | 4.00 | 3.00 | 33.1<br>K=0.85 | 2.2535 | -90404.00 | 93595.70 | 0.966 [1] ✔ |
| T8 | 60 - 53.1667 | P3x.3 GR | 6.83 | 3.25 | 29.2<br>K=0.85 | 3.0159 | -108935.00 | 153470.00 | 0.710 [1] ✔ |
| T9 | 53.1667 - 50 | P3x.3 GR | 3.17 | 1.58 | 14.2<br>K=0.85 | 3.0159 | -119589.00 | 162618.00 | 0.735 [1] ✔ |
| T10 | 50 - 46.8334 | P3x.3 GR | 3.17 | 1.58 | 14.2<br>K=0.85 | 3.0159 | -130626.00 | 162618.00 | 0.803 [1] ✔ |
| T11 | 46.8334 - 43.6667 | P3x.3 GR w/ .75 TR | 3.17 | 1.58 | 14.2<br>K=0.85 | 3.0159 | -141856.00 | 162618.00 | 0.872 [1] ✔ |
| T12 | 43.6667 - 40 | P3x.3 GR w/ .75 TR | 3.67 | 1.58 | 14.2<br>K=0.85 | 3.0159 | -153963.00 | 162618.00 | 0.947 [1] ✔ |
| T13 | 40 - 20 | P5x.375 GR | 20.03 | 6.57 | 0.4<br>K=0.01 | 6.1114 | -154086.00 | 231008.00 | 0.667 [1] ✔ |
| T14 | 20 - 0 | P5x.375 GR | 20.03 | 6.57 | 0.4<br>K=0.01 | 6.1114 | -159113.00 | 231008.00 | 0.689 [1] ✔ |

[1] $P_u$ / $\phi P_n$ controls

## Diagonal Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T13 | 40 - 20 | L2x2x3/16 | 7.60 | 3.63 | 112.9<br>K=1.02 | 0.7150 | -3491.24 | 11837.70 | 0.295 [1] ✔ |
| T14 | 20 - 0 | L2 1/2x2 1/2x3/16 | 9.71 | 4.64 | 114.4<br>K=1.02 | 0.9020 | -1875.85 | 14675.40 | 0.128 [1] ✔ |

[1] $P_u$ / $\phi P_n$ controls

## Horizontal Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 100 - 80 | L1 1/2x1 1/2x3/16 | 3.50 | 3.26 | 133.4<br>K=1.00 | 0.5273 | -5992.93 | 6697.95 | 0.895 [1] ✔ |
| T8 | 60 - 53.1667 | 2L1 1/2x1 1/2x3/16x3/8<br>2L 'a' > 18.5481 in - 149 | 3.50 | 3.21 | 84.3<br>K=1.00 | 1.0547 | -12810.00 | 23505.80 | 0.545 [1] ✔ |

[1] $P_u$ / $\phi P_n$ controls

## Secondary Horizontal Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T9 | 53.1667 - 50 | 2L2 1/2x2 1/2x5/16x3/8<br>2L 'a' > 18.5544 in - 170 | 3.50 | 3.21 | 50.8<br>K=1.00 | 2.9300 | -1718.66 | 82879.60 | 0.021 [1] ✔ |
| T10 | 50 - 46.8334 | 2L2 1/2x2 1/2x5/16x3/8<br>2L 'a' > 18.5544 in - 185 | 3.50 | 3.21 | 50.8<br>K=1.00 | 2.9300 | -2367.78 | 82879.60 | 0.029 [1] ✔ |
| T11 | 46.8334 - 43.6667 | 2L2 1/2x2 1/2x5/16x3/8<br>2L 'a' > 18.5544 in - 200 | 3.50 | 3.21 | 50.8<br>K=1.00 | 2.9300 | -2468.66 | 82879.60 | 0.030 [1] ✔ |
| T12 | 43.6667 - 40 | 2L2 1/2x2 1/2x5/16x3/8<br>2L 'a' > 18.5544 in - 218 | 3.50 | 3.21 | 50.8<br>K=1.00 | 2.9300 | -1845.98 | 82879.60 | 0.022 [1] ✔ |

[1] $P_u$ / $\phi P_n$ controls

## Top Girt Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 100 - 80 | L1 1/2x1 1/2x3/16 | 3.50 | 3.26 | 133.4<br>K=1.00 | 0.5273 | -3119.49 | 6697.95 | 0.466 [1] ✔ |
| T2 | 80 - 76 | 2L1 1/2x1 1/2x3/16x3/8<br>2L 'a' > 18.8492 in - 65 | 3.50 | 3.26 | 85.7<br>K=1.00 | 1.0547 | -4382.27 | 23219.70 | 0.189 [1] ✔ |
| T3 | 76 - 73 | 2L1 1/2x1 1/2x3/16x3/8<br>2L 'a' > 18.8492 in - 77 | 3.50 | 3.26 | 85.7<br>K=1.00 | 1.0547 | -8552.41 | 23219.70 | 0.368 [1] ✔ |
| T4 | 73 - 70 | 2L1 1/2x1 1/2x3/16x3/8<br>2L 'a' > 18.8492 in - 89 | 3.50 | 3.26 | 85.7<br>K=1.00 | 1.0547 | -8196.18 | 23219.70 | 0.353 [1] ✔ |
| T5 | 70 - 67 | 2L1 1/2x1 1/2x3/16x3/8<br>2L 'a' > 18.8492 in - 101 | 3.50 | 3.26 | 85.7<br>K=1.00 | 1.0547 | -8227.96 | 23219.70 | 0.354 [1] ✔ |
| T6 | 67 - 64 | 2L1 1/2x1 1/2x3/16x3/8 | 3.50 | 3.26 | 85.7 | 1.0547 | -15207.50 | 23219.70 | 0.655 [1] |

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | K=1.00 | | | | ✔ |
| T7 | 64 - 60 | 2L 'a' > 18.8492 in - 113<br>2L1 1/2x1 1/2x3/16x3/8 | 3.50 | 3.26 | 85.7<br>K=1.00 | 1.0547 | -22847.60 | 23219.70 | 0.984 [1]<br>✔ |
| T8 | 60 - 53.1667 | 2L 'a' > 18.8492 in - 125<br>2L1 1/2x1 1/2x3/16x3/8 | 3.50 | 3.21 | 84.3<br>K=1.00 | 1.0547 | -5133.18 | 23505.80 | 0.218 [1]<br>✔ |
| T9 | 53.1667 - 50 | 2L 'a' > 18.5481 in - 141<br>2L1 1/2x1 1/2x3/16x3/8 | 3.50 | 3.21 | 84.3<br>K=1.00 | 1.0547 | -11565.70 | 23505.80 | 0.492 [1]<br>✔ |
| T10 | 50 - 46.8334 | 2L 'a' > 18.5481 in - 161<br>2L1 1/2x1 1/2x3/16x3/8 | 3.50 | 3.21 | 84.3<br>K=1.00 | 1.0547 | -10933.70 | 23505.80 | 0.465 [1]<br>✔ |
| T11 | 46.8334 - 43.6667 | 2L 'a' > 18.5481 in - 176<br>2L1 1/2x1 1/2x3/16x3/8 | 3.50 | 3.21 | 84.3<br>K=1.00 | 1.0547 | -11144.60 | 23505.80 | 0.474 [1]<br>✔ |
| T12 | 43.6667 - 40 | 2L 'a' > 18.5481 in - 191<br>2L1 1/2x1 1/2x3/16x3/8 | 3.50 | 3.21 | 84.3<br>K=1.00 | 1.0547 | -12063.20 | 23505.80 | 0.513 [1]<br>✔ |
| | | 2L 'a' > 18.5481 in - 206 | | | | | | | |

[1] $P_u / \phi P_n$ controls

## Bottom Girt Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 100 - 80 | L1 1/2x1 1/2x3/16 | 3.50 | 3.26 | 133.4<br>K=1.00 | 0.5273 | -4596.48 | 6697.95 | 0.686 [1]<br>✔ |
| T7 | 64 - 60 | 2L1 1/2x1 1/2x3/16x3/8 | 3.50 | 3.26 | 85.7<br>K=1.00 | 1.0547 | -14122.30 | 23219.70 | 0.608 [1]<br>✔ |
| T12 | 43.6667 - 40 | 2L 'a' > 18.8492 in - 128<br>2L1 1/2x1 1/2x3/16x3/8 | 3.50 | 3.21 | 84.3<br>K=1.00 | 1.0547 | -5821.61 | 23505.80 | 0.248 [1]<br>✔ |
| | | 2L 'a' > 18.5481 in - 209 | | | | | | | |

[1] $P_u / \phi P_n$ controls

## *Tension Checks*

## Leg Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 100 - 80 | P2.5x.276 | 20.00 | 3.28 | 42.6 | 2.2535 | 27257.10 | 101409.00 | 0.269 [1] ✔ |
| T2 | 80 - 76 | P2.5x.276 GR | 4.00 | 3.00 | 39.0 | 2.2535 | 27257.10 | 101409.00 | 0.269 [1] ✔ |
| T3 | 76 - 73 | P2.5x.276 GR | 3.00 | 3.00 | 39.0 | 2.2535 | 34551.30 | 101409.00 | 0.341 [1] ✔ |
| T4 | 73 - 70 | P2.5x.276 GR | 3.00 | 3.00 | 39.0 | 2.2535 | 41739.90 | 101409.00 | 0.412 [1] ✔ |
| T5 | 70 - 67 | P2.5x.276 GR | 3.00 | 3.00 | 39.0 | 2.2535 | 49866.60 | 101409.00 | 0.492 [1] ✔ |
| T6 | 67 - 64 | P2.5x.276 GR | 3.00 | 3.00 | 39.0 | 2.2535 | 49413.50 | 101409.00 | 0.487 [1] ✔ |
| T7 | 64 - 60 | P2.5x.276 GR | 4.00 | 3.00 | 39.0 | 2.2535 | 77251.80 | 101409.00 | 0.762 [1] ✔ |
| T8 | 60 - 53.1667 | P3x.3 GR | 6.83 | 3.25 | 34.3 | 3.0159 | 87714.40 | 165575.00 | 0.530 [1] ✔ |
| T9 | 53.1667 - 50 | P3x.3 GR | 3.17 | 1.58 | 16.7 | 3.0159 | 97708.10 | 165575.00 | 0.590 [1] ✔ |
| T10 | 50 - 46.8334 | P3x.3 GR | 3.17 | 1.58 | 16.7 | 3.0159 | 108176.00 | 165575.00 | 0.653 [1] ✔ |
| T11 | 46.8334 - 43.6667 | P3x.3 GR w/ .75 TR | 3.17 | 1.58 | 16.7 | 3.0159 | 118996.00 | 165575.00 | 0.719 [1] ✔ |
| T12 | 43.6667 - 40 | P3x.3 GR w/ .75 TR | 3.67 | 1.58 | 16.7 | 3.0159 | 144349.00 | 165575.00 | 0.872 [1] ✔ |
| T13 | 40 - 20 | P5x.375 GR | 20.03 | 6.57 | 42.9 | 6.1114 | 144470.00 | 231010.00 | 0.625 [1] ✔ |
| T14 | 20 - 0 | P5x.375 GR | 20.03 | 6.57 | 42.9 | 6.1114 | 146248.00 | 231010.00 | 0.633 [1] ✔ |

[1] $P_u / \phi P_n$ controls

## Diagonal Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 100 - 80 | 5/8 | 4.80 | 4.47 | 343.1 | 0.3068 | 7797.94 | 9940.20 | 0.784 [1] ✔ |
| T2 | 80 - 76 | 5/8 | 4.61 | 4.29 | 329.8 | 0.3068 | 8645.54 | 9940.20 | 0.870 [1] ✔ |
| T3 | 76 - 73 | 5/8 | 4.61 | 4.29 | 329.8 | 0.3068 | 7648.01 | 9940.20 | 0.769 [1] ✔ |
| T4 | 73 - 70 | 5/8 | 4.61 | 4.29 | 329.8 | 0.3068 | 8085.82 | 9940.20 | 0.813 [1] ✔ |
| T5 | 70 - 67 | 5/8 | 4.61 | 4.29 | 329.8 | 0.3068 | 7768.93 | 9940.20 | 0.782 [1] ✔ |
| T6 | 67 - 64 | 1 1/4 | 4.61 | 4.29 | 164.9 | 1.2272 | 15975.60 | 39760.80 | 0.402 [1] ✔ |
| T7 | 64 - 60 | 1 1/4 | 4.61 | 4.29 | 164.9 | 1.2272 | 18330.60 | 39760.80 | 0.461 [1] ✔ |

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T8 | 60 - 53.1667 | 3/4 | 4.78 | 4.38 | 280.2 | 0.4418 | 12493.20 | 14313.90 | 0.873 [1] |
| T9 | 53.1667 - 50 | 3/4 | 4.72 | 4.33 | 276.9 | 0.4418 | 11564.60 | 14313.90 | 0.808 [1] |
| T10 | 50 - 46.8334 | 3/4 | 4.72 | 4.33 | 276.9 | 0.4418 | 11831.00 | 14313.90 | 0.827 [1] |
| T11 | 46.8334 - 43.6667 | 3/4 | 4.72 | 4.33 | 276.9 | 0.4418 | 12010.20 | 14313.90 | 0.839 [1] |
| T12 | 43.6667 - 40 | 3/4 | 4.72 | 4.33 | 276.9 | 0.4418 | 12852.70 | 14313.90 | 0.898 [1] |
| T13 | 40 - 20 | L2x2x3/16 | 7.60 | 3.63 | 72.9 | 0.4308 | 3001.40 | 18739.00 | 0.160 [1] |
| T14 | 20 - 0 | L2 1/2x2 1/2x3/16 | 9.71 | 4.64 | 73.4 | 0.5710 | 1644.63 | 24839.90 | 0.066 [1] |

[1] $P_u / \phi P_n$ controls

## Secondary Horizontal Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T9 | 53.1667 - 50 | 2L2 1/2x2 1/2x5/16x3/8 | 3.50 | 3.21 | 50.6 | 2.9300 | 72.59 | 94932.00 | 0.001 [1] |
| T10 | 50 - 46.8334 | 2L 'a' > 18.5544 in - 170<br>2L2 1/2x2 1/2x5/16x3/8 | 3.50 | 3.21 | 50.6 | 2.9300 | 177.62 | 94932.00 | 0.002 [1] |
| T11 | 46.8334 - 43.6667 | 2L 'a' > 18.5544 in - 185<br>2L2 1/2x2 1/2x5/16x3/8 | 3.50 | 3.21 | 50.6 | 2.9300 | 292.51 | 94932.00 | 0.003 [1] |
| T12 | 43.6667 - 40 | 2L 'a' > 18.5544 in - 200<br>2L2 1/2x2 1/2x5/16x3/8<br>2L 'a' > 18.5544 in - 218 | 3.50 | 3.21 | 50.6 | 2.9300 | 309.37 | 94932.00 | 0.003 [1] |

[1] $P_u / \phi P_n$ controls

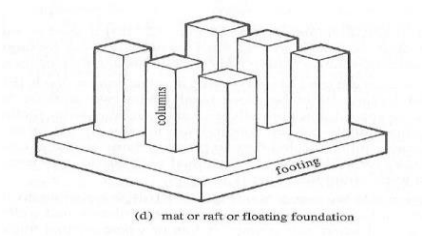
## Section Capacity Table

| Section No. | Elevation ft | Component Type | Size | Critical Element | P lb | $\phi P_{allow}$ lb | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| T1 | 100 - 80 | Leg | P2.5x.276 | 1 | -31983.50 | 88826.50 | 36.0 | Pass |
| | | Diagonal | 5/8 | 15 | 7797.94 | 9940.20 | 78.4 | Pass |
| | | Horizontal | L1 1/2x1 1/2x3/16 | 53 | -5992.93 | 6697.95 | 89.5 | Pass |
| | | Top Girt | L1 1/2x1 1/2x3/16 | 5 | -3119.49 | 6697.95 | 46.6 | Pass |
| | | Bottom Girt | L1 1/2x1 1/2x3/16 | 8 | -4596.48 | 6697.95 | 68.6 | Pass |
| T2 | 80 - 76 | Leg | P2.5x.276 GR | 61 | -41373.10 | 93595.70 | 44.2 | Pass |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P lb | $\phi P_{allow}$ lb | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| | | Diagonal | 5/8 | 72 | 8645.54 | 9940.20 | 87.0 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 65 | -4382.27 | 23219.70 | 18.9 | Pass |
| T3 | 76 - 73 | Leg | P2.5x.276 GR | 73 | -49159.60 | 93595.70 | 52.5 | Pass |
| | | Diagonal | 5/8 | 84 | 7648.01 | 9940.20 | 76.9 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 77 | -8552.41 | 23219.70 | 36.8 | Pass |
| T4 | 73 - 70 | Leg | P2.5x.276 GR | 85 | -56676.60 | 93595.70 | 60.6 | Pass |
| | | Diagonal | 5/8 | 96 | 8085.82 | 9940.20 | 81.3 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 89 | -8196.18 | 23219.70 | 35.3 | Pass |
| T5 | 70 - 67 | Leg | P2.5x.276 GR | 97 | -64252.30 | 93595.70 | 68.6 | Pass |
| | | Diagonal | 5/8 | 108 | 7768.93 | 9940.20 | 78.2 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 101 | -8227.96 | 23219.70 | 35.4 | Pass |
| T6 | 67 - 64 | Leg | P2.5x.276 GR | 109 | -79929.30 | 93595.70 | 85.4 | Pass |
| | | Diagonal | 1 1/4 | 117 | 15975.60 | 39760.80 | 40.2 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 113 | -15207.50 | 23219.70 | 65.5 | Pass |
| T7 | 64 - 60 | Leg | P2.5x.276 GR | 121 | -90404.00 | 93595.70 | 96.6 | Pass |
| | | Diagonal | 1 1/4 | 134 | 18330.60 | 39760.80 | 46.1 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 125 | -22847.60 | 23219.70 | 98.4 | Pass |
| | | Bottom Girt | 2L1 1/2x1 1/2x3/16x3/8 | 128 | -14122.30 | 23219.70 | 60.8 | Pass |
| T8 | 60 - 53.1667 | Leg | P3x.3 GR | 136 | -108935.00 | 153470.00 | 71.0 | Pass |
| | | Diagonal | 3/4 | 155 | 12493.20 | 14313.90 | 87.3 | Pass |
| | | Horizontal | 2L1 1/2x1 1/2x3/16x3/8 | 149 | -12810.00 | 23505.80 | 54.5 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 141 | -5133.18 | 23505.80 | 21.8 | Pass |
| T9 | 53.1667 - 50 | Leg | P3x.3 GR | 157 | -119589.00 | 162618.00 | 73.5 | Pass |
| | | Diagonal | 3/4 | 167 | 11564.60 | 14313.90 | 80.8 | Pass |
| | | Secondary Horizontal | 2L2 1/2x2 1/2x5/16x3/8 | 170 | -1718.66 | 82879.60 | 2.1 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 161 | -11565.70 | 23505.80 | 49.2 | Pass |
| T10 | 50 - 46.8334 | Leg | P3x.3 GR | 172 | -130626.00 | 162618.00 | 80.3 | Pass |
| | | Diagonal | 3/4 | 182 | 11831.00 | 14313.90 | 82.7 | Pass |
| | | Secondary Horizontal | 2L2 1/2x2 1/2x5/16x3/8 | 185 | -2367.78 | 82879.60 | 2.9 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 176 | -10933.70 | 23505.80 | 46.5 | Pass |
| T11 | 46.8334 - 43.6667 | Leg | P3x.3 GR w/ .75 TR | 187 | -141856.00 | 162618.00 | 87.2 | Pass |
| | | Diagonal | 3/4 | 197 | 12010.20 | 14313.90 | 83.9 | Pass |
| | | Secondary Horizontal | 2L2 1/2x2 1/2x5/16x3/8 | 200 | -2468.66 | 82879.60 | 3.0 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 191 | -11144.60 | 23505.80 | 47.4 | Pass |
| T12 | 43.6667 - 40 | Leg | P3x.3 GR w/ .75 TR | 202 | -153963.00 | 162618.00 | 94.7 | Pass |
| | | Diagonal | 3/4 | 215 | 12852.70 | 14313.90 | 89.8 | Pass |
| | | Secondary Horizontal | 2L2 1/2x2 1/2x5/16x3/8 | 218 | -1845.98 | 82879.60 | 2.2 | Pass |
| | | Top Girt | 2L1 1/2x1 1/2x3/16x3/8 | 206 | -12063.20 | 23505.80 | 51.3 | Pass |
| | | Bottom Girt | 2L1 1/2x1 1/2x3/16x3/8 | 209 | -5821.61 | 23505.80 | 24.8 | Pass |
| T13 | 40 - 20 | Leg | P5x.375 GR | 220 | -154086.00 | 231008.00 | 66.7 | Pass |
| | | Diagonal | L2x2x3/16 | 236 | -3491.24 | 11837.70 | 29.5<br>43.9 (b) | Pass |
| T14 | 20 - 0 | Leg | P5x.375 GR | 241 | -159113.00 | 231008.00 | 68.9<br>74.6 (b) | Pass |
| | | Diagonal | L2 1/2x2 1/2x3/16 | 248 | -1875.85 | 14675.40 | 12.8<br>21.0 (b) | Pass |
| | | | | | | Summary | | |
| | | | | | | Leg (T7) | 96.6 | Pass |
| | | | | | | Diagonal (T12) | 89.8 | Pass |
| | | | | | | Horizontal (T1) | 89.5 | Pass |
| | | | | | | Secondary Horizontal (T11) | 3.0 | Pass |
| | | | | | | Top Girt (T7) | 98.4 | Pass |
| | | | | | | Bottom Girt (T1) | 68.6 | Pass |
| | | | | | | Bolt Checks | 74.6 | Pass |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P lb | $\phi P_{allow}$ lb | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| | | | | | | **RATING =** | **98.4** | **Pass** |

| | |
|---|---|
| Date: | 9/24/2014 |
| Site Name: | Danbury-W C.T. University |
| Client: | Sprint |
| Infinigy Job #: | 333-315 |
| Analysis/Design: | Analysis |
| Column Shape: | Circle |
| Footing Shape: | Square |
| Tower Type: | Self Support |



(d) mat or raft or floating foundation

Infinigy Engineering PLLC
Mat Calculations
ACI 318-11

| Loading Data | | |
|---|---|---|
| TIA Code Revision: | ANSI/TIA-222-G | |
| Uplift/Leg: | 145.9 | kips |
| Compression/Leg: | 158.8 | kips |
| Total Axial: | 16.286 | kips |
| Total Shear: | 14.931 | kips |
| Overturning Moment: | 995.9 | k-ft |
| Vertical Tower Eccentricity: | 0 | ft |
| Tower Face Width: | 7.5 | ft |
| Diagonal Shear Width: | 14.14 | ft |
| Diagonal Shear Arm: | 7.14 | ft |

| Column Data | | |
|---|---|---|
| Concrete Strength: | 4000 | psi |
| Column Diameter: | 2 | ft |
| Column Total Length: | 4.25 | ft |
| Column Height above ground: | 0.25 | ft |
| Vertical Rebar Strength: | 60000 | psi |
| Vertical Rebar Size: | #8 | (#10) max. |
| Vertical Rebar Quantity: | 8 | (4) min. |
| Tie Rebar Strength: | 60000 | psi |
| Tie Rebar Size: | #4 | (#3) max. |
| Tie Rebar Spacing: | 8 | in |
| Rebar Clear Distance: | 3 | in |

| Soil Data | | |
|---|---|---|
| Soil Type: | Sand | |
| Water Table Depth: | 10 | ft |
| Soil Dry Unit Weight: | 110 | pcf |
| ø Angle: | 30 | deg |
| Cohesion: | 0 | psf |
| Ultimate Skin Friction: | 500 | psf |
| Friction Coefficient: | 0.35 | |
| Ultimate Bearing Pressure: | 15000 | psf |

| Footing Data | | |
|---|---|---|
| Concrete Strength: | 4000 | psi |
| Footing Length: | 14.5 | ft |
| Footing Width: | 14.5 | ft |
| Footing Thickness: | 3 | ft |
| Horizontal Rebar Strength: | 60000 | psi |
| Horizontal Rebar Size: | #8 | |
| Horizontal Rebar Quantity: | 15 | |
| Rebar Clear Distance: | 3 | in |
| Dowel Strength: | | psi |
| Dowel Size: | | (#11) max. |
| Dowel Development Length: | | in |
| Dowel Quantity: | | |

| Concrete Strength Check | | |
|---|---|---|
| Footing One-Way Shear Ratio: | 8.77 | % |
| Footing Two-Way Shear Ratio: | 13.01 | % |
| Footing Moment Ratio: | 12.8 | % |
| Column Tension Ratio: | 42.75 | % |
| Column Shear Strength Ratio: | 5.08 | % |
| Column Moment Ratio: | 18.59 | % |
| Column Tension Interaction Equation: | 61.34 | % |

| Soil Stability Check | | |
|---|---|---|
| ϕs Bearing: | 0.75 | |
| ϕs Uplift: | 0.75 | |
| Uplift Ratio: | 69.87 | % |
| Bearing Ratio: | 59.06 | % |
| Sliding Ratio: | 20.48 | % |
| Toe Pressure Ratio: | 0.07 | % |
| Overturning Ratio: | 98.92 | % |

INFINIGY Design. Build. Deliver.

1033 Watervliet Shaker Road
Albany, NY 12205
Phone: 518-690-0790 | Fax: 518-690-0793
www.infinigy.com

**October 7, 2014**

Gary Wood
Construction Project Manager III
Southern Connecticut
9 Barnes Industrial Road South
Wallingford, CT 06492

**RE: Sprint 2.5 Project Antenna and RRH Support Evaluation**

| | |
|---|---|
| Sprint Site Number: | CT43XC836 |
| Sprint Site Name: | DANBURY-W. CT UNIVERSITY |
| Site Address: | 303 Boxwood Lane, Danbury, CT 06810 |
| Jurisdiction: | Fairfield County |

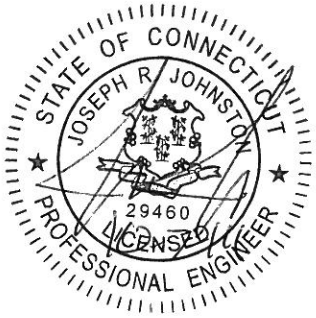
Dear Mr. Wood

Per your request, Infinigy Engineering has reviewed the adequacy of the antenna and RRH supports at the above referenced site for the Sprint 2.5 Project. The purpose of this review was to determine if the existing and/or proposed mounts to be used are in conformance with the governing International Building Code (2003) and the applicable industry standard TIA-222-G 2005 (Structural Standard for Antenna Supporting Structures and Antennas).

Based on a review of the information from the Tower Analysis Report (dated 09/24/14) provided by Infinigy Engineering (Project Number 333-315) and Infinigy Engineering Construction Drawings (dated 05/13/14), we have concluded that **the antenna and RRH supports are adequate** to support the Sprint 2.5 equipment to be deployed at this site.

This certification assumes that all structural members are in good condition and have not been altered from the manufacturer's original design. Prior to installation of any new antennas and/or RRHs, the contractor shall inspect the condition of all relevant members and connections. The contractor shall be responsible for the means and methods of construction.

Should there be any questions, please do not hesitate to contact us.




Sincerely,

Joseph R. Johnston, P.E.
Department Manager - Structural
Connecticut PE License Number: 29460