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engineering & surveying

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www.infinigy.com

June 27, 2014

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

Re: 31 New Hartford Road – Pleasant Valley, 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: ' F. Sagristano

Name: Paul F. Sagristano
Vertical Development LLC, an authorized representative of Sprint Nextel
Vertical Development LLC
20 Commercial Street
Branford, CT 06405
Phone – 917-841-0247
Fax – 401-633-6202
psagristano@verticaldevelopmentllc.com

CC: Mr. Donald S. Stein, First Selectman
Barkhamsted Town Hall
67 Ripley Hill Road
Pleasant Valley, CT 06063

Regional Refuse Disposal District 1
Public Service Director
31 New Hartford Road
Pleasant Valley, CT 06063

Notice of Exempt Modification

31 New Hartford Road (Rust Road) Barkhamsted, CT

Sprint Nextel Corporation ("Sprint") submits this Notice of Exempt Modification to the Connecticut Siting Council ("Council") pursuant to Sections 16-50j-73 and 16-50j-72(b) of the Regulations of Connecticut State Agencies (“Regulations”) in connection with Sprint’s planned modification of antennas and associated equipment on an existing 347’ guyed tower located off 31 New Hartford Road (Rust Road) Barkhamsted, CT. More particularly, Sprint plans to upgrade this site by adding 4G LTE technology to its facilities. The proposed modifications will not increase the tower height, extend the boundaries of the tower site, cause a significant adverse change or alteration in the physical or environmental characteristics of the 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 4G technology, which will provide faster service and better overall performance. Pursuant to the 4G upgrade at this site, Sprint will add antennas, install RRHs, and install related equipment to its equipment area within the fenced tower compound.

The 145’ Monopole tower located off 31 New Hartford Road (Rust Road) Barkhamsted, CT (lat. 41°.8936 N, long. 72°.9964 W, is owned by Regional Refuse Disposal District 1. It is located on a 53.47 acre parcel. Sprint currently has three (3) antennas, one (1) antenna on each of three (3) sectors) with a centerline of 140’ installed on the tower. Sprint's base station equipment is located within a fenced compound close to the base of the tower. A site plan depicting this is attached.

Sprint plans to add three (3) RFS APXVTM-14-C-I20 panel antennas, one (1) per sector, all with a centerline of 210'. Connected to each new RFS antenna will be one (1) ALU TD RRH 8x20 RRH which will be located behind the antenna. The height of the tower will not need to be increased. The compound's boundaries will not 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 indicates that the proposed final configuration (including other carriers on the tower) will emit 3.08% of the allowable FCC established general public limit sampled at the ground level (see the 3rd page of Radio Frequency Emissions Analysis Report - Evaluation of Human Exposure Potential to Non-Ionizing Emissions, June 3, 2014). Emission values for the Sprint antennas have been calculated from the sample point, which is the top of a six foot person standing at the base of the tower. Emissions values for additional carriers were based upon values listed in Connecticut Siting Council active database (see the 3rd and 4th page of Radio Frequency Emissions Analysis Report - Evaluation of Human Exposure Potential to Non-Ionizing Emissions, June 3, 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 second page of Radio Frequency Emissions Analysis Report - Evaluation of Human Exposure Potential to Non-Ionizing Emissions, June 3, 2014).

The proposed modifications will not impair the structural integrity of the facility. Sprint commissioned Infinigy Engineering to perform a structural analysis of the tower to verify that it can support the proposed loading. The structure and foundation were found to be of “Sufficient Capacity” with the proposed modifications (see the first page of Post-Mod Tower Analysis Report, May 7, 2014). The tower is rated at 75% of its capacity with the proposed modifications (see the first page of Post-Mod Tower Analysis Report, May 7, 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.

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

Sprint

PROJECT:	2.5 EQUIPMENT DEPLOYMENT
SITE NAME:	REGIONAL REFUSE
SITE CASCADE:	CT33XC113
SITE ADDRESS:	31 NEW HARTFORD RD BARKHAMSTED, CT 06063
SITE TYPE:	MONOPINE TOWER
MARKET:	SOUTHERN CONNECTICUT

SITE INFORMATION

PROPERTY OWNER:
REGIONAL REFUSE DISPOSAL, DISTRICT 1
P.O. BOX 306
PLEASANT VALLEY, CT 06063

LATITUDE (NAD83):
41° 53' 37.1976" N
41.893666°

LONGITUDE (NAD83):
72° 59' 47.2986" W
-72.996472°

COUNTY:
LITCHFIELD

ZONING JURISDICTION:
CONNECTICUT SITING COUNCIL & TOWN OF BARKHAMSTED

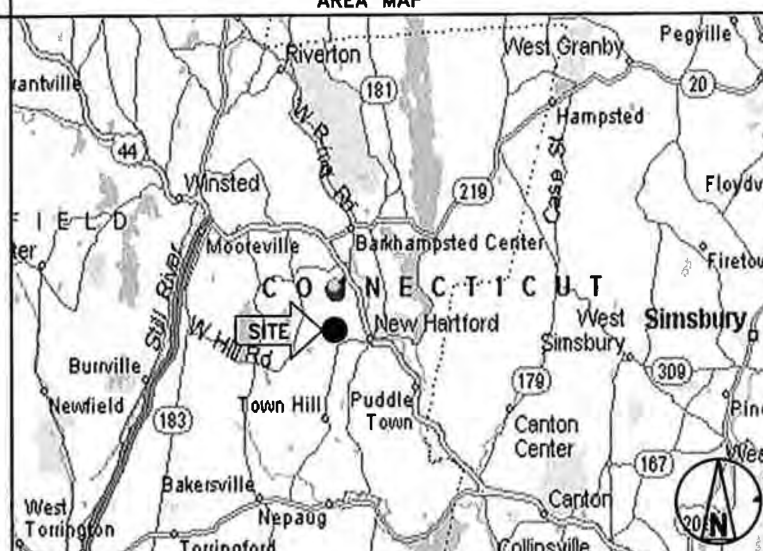
ZONING DISTRICT:
RA-1

POWER COMPANY:
TBD

AAV PROVIDER:
AT&T
(800) 288-2020

SPRINT CM:
GARY WOOD
(860) 940-9168
gary.wood@sprint.com

AREA MAP



LOCATION MAP

PROJECT DESCRIPTION

SPRINT PROPOSES TO MODIFY AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY.

- INSTALL (3) PANEL ANTENNAS
- INSTALL (3) RRU'S TO TOWER
- INSTALL (27) JUMPER CABLES
- INSTALL (1) HYBRID CABLE
- INSTALL NEW 2.5 EQUIPMENT IN EXISTING NV MMBS
- INSTALL (4) NEW BATTERIES IN EXISTING BBU CABINET

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-F 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

811 Know what's below. Call before you dig. www.call811.com

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ENGINEERING LICENSE:

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

DRAWING NOTICE:

THESE DOCUMENTS ARE CONFIDENTIAL AND ARE THE SOLE PROPERTY OF SPRINT AND MAY NOT BE REPRODUCED, DISSEMINATED OR REDISTRIBUTED WITHOUT THE EXPRESS WRITTEN CONSENT OF SPRINT.

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/30/14	JLM	2
ISSUED FOR CONSTRUCTION	5/2/14	MAP	1
ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

SITE NAME:
REGIONAL REFUSE

SITE CASCADE:
CT33XC113

SITE ADDRESS:
31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:
TITLE SHEET & PROJECT DATA

SHEET NUMBER:
T-1

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

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/30/14	JLM	2
ISSUED FOR CONSTRUCTION	5/2/14	MAP	1
ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

SITE NAME:
REGIONAL REFUSE

SITE CASCADE:
CT33XC113

SITE ADDRESS:
31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

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.

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JOB NUMBER 333-000

ENGINEERING LICENSE:

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

DRAWING NOTICE:

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/30/14	JLM	2
ISSUED FOR CONSTRUCTION	5/2/14	MAP	1
ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

SITE NAME:

REGIONAL REFUSE

SITE CASCADE:

CT33XC113

SITE ADDRESS:

31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:

SPRINT SPECIFICATIONS

SHEET NUMBER:

SP-2

CONTINUE FROM SP-2

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:

DRAWING NOTICE:

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/30/14	JLM	2
ISSUED FOR CONSTRUCTION	5/2/14	MAP	1
ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

SITE NAME: REGIONAL REFUSE

SITE CASCADE: CT33XC113

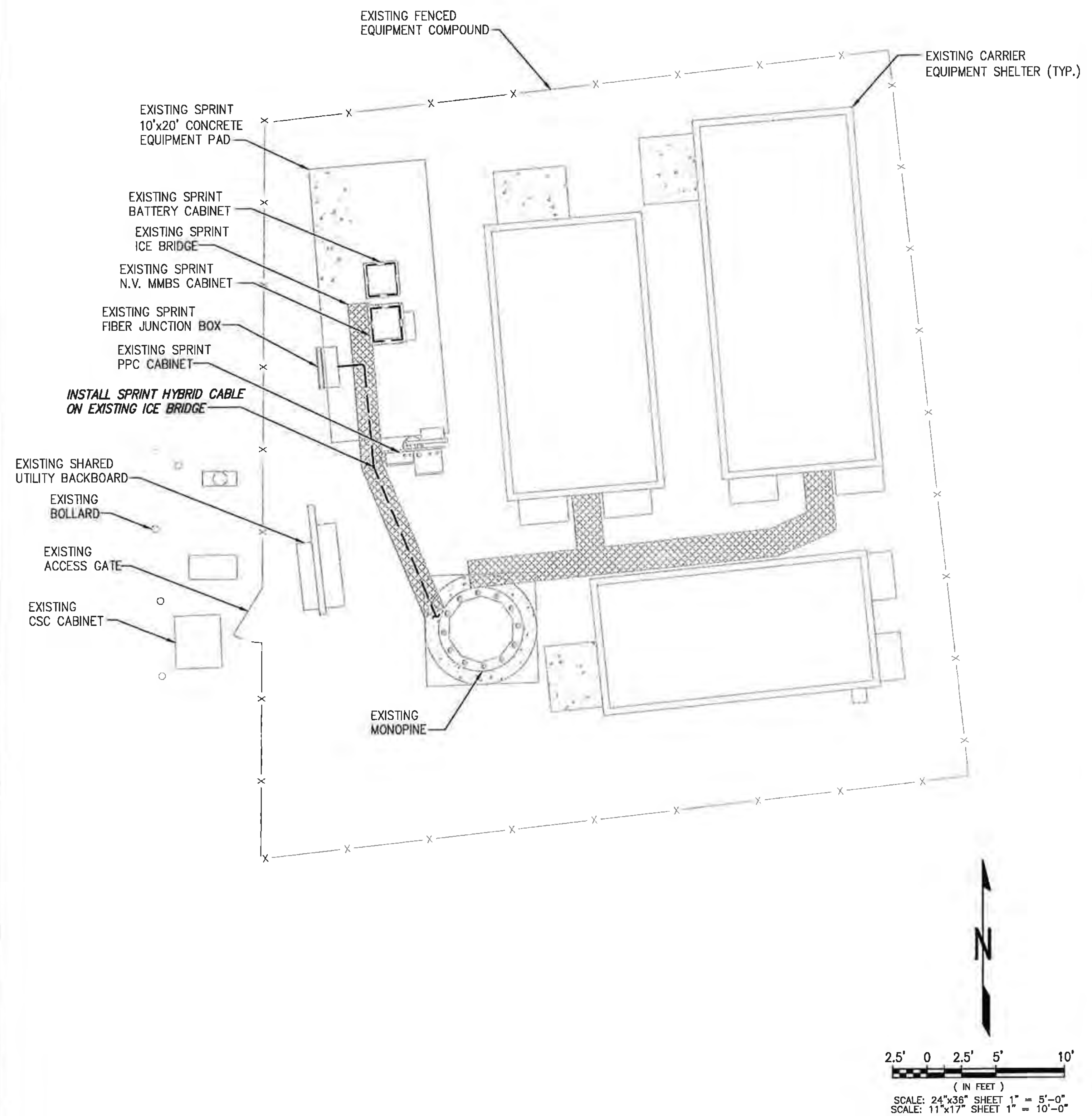
SITE ADDRESS: 31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION: SPRINT SPECIFICATIONS

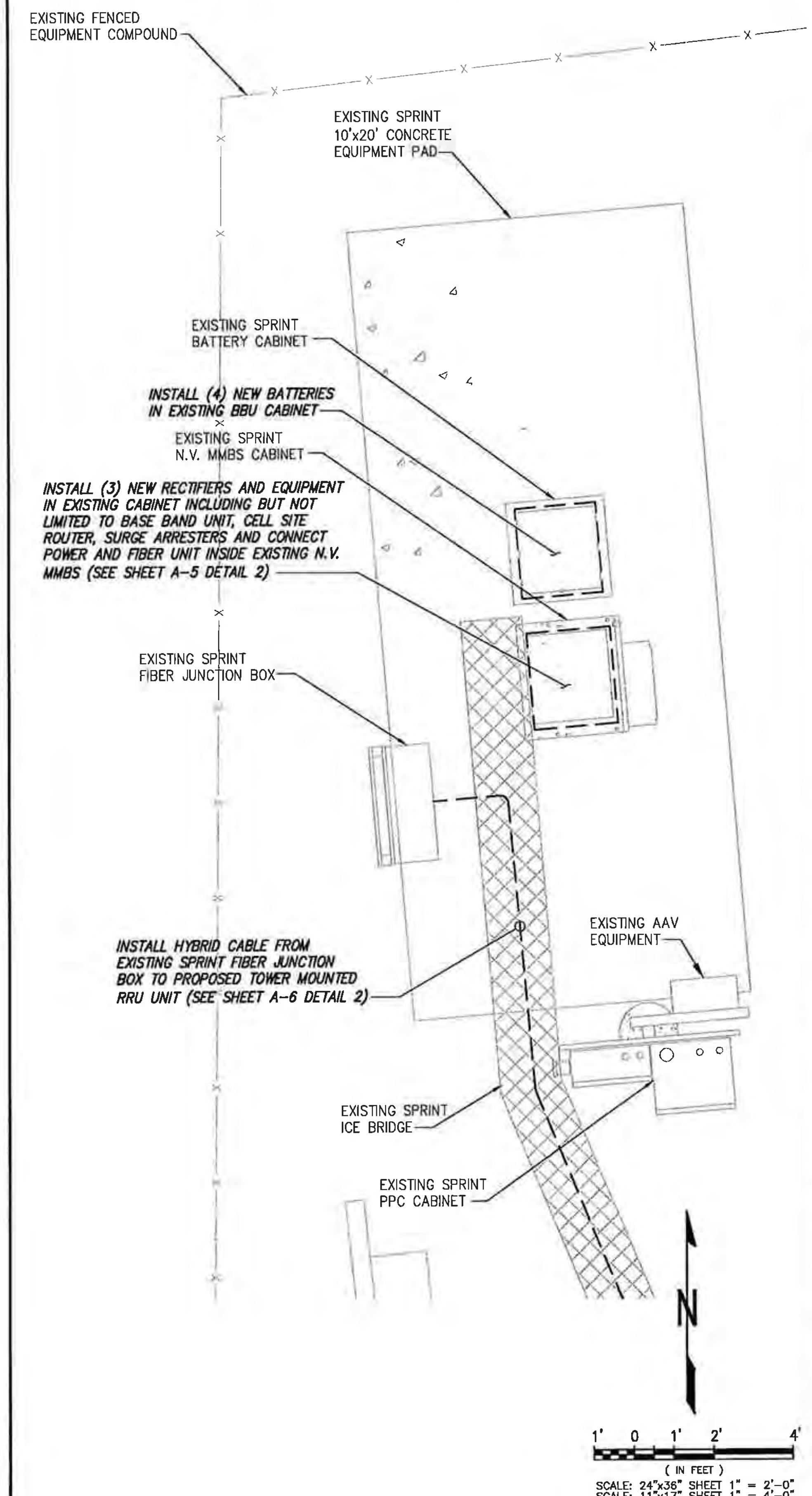
SHEET NUMBER: SP-3

FOR ADDITIONAL STRUCTURAL INFORMATION SEE STRUCTURAL ANALYSIS COMPLETED BY CENTEK ENGINEERING DATED: 5/7/14

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



OVERALL SITE PLAN | SCALE: AS NOTED | 1



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
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JOB NUMBER 333-000

ENGINEERING LICENSE:

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

DRAWING NOTICE:

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/30/14	JLM	2
ISSUED FOR CONSTRUCTION	5/2/14	MAP	1
ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

SITE NAME:

REGIONAL REFUSE

SITE CASCADE:

CT33XC113

SITE ADDRESS:

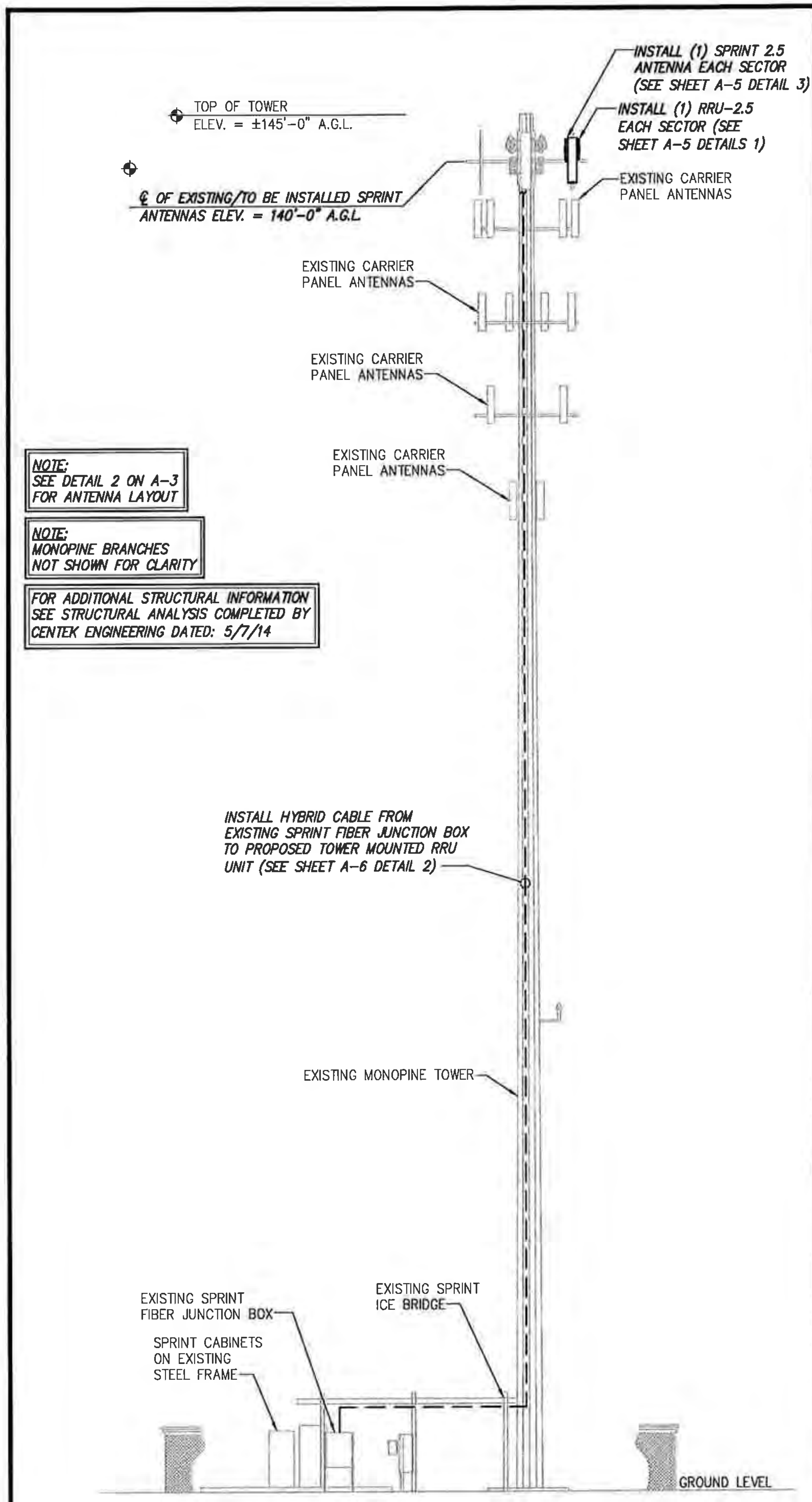
31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:

SITE PLAN

SHEET NUMBER:

A-1



TOWER ELEVATION — NO SCALE — 1

RFDS

CASCADE NUMBER:	CT33XC113
SITE NUMBER:	0
SITE NAME:	BARKHAMSTED PLEASANT V OEM ALU
99 MARKET NAME:	SOUTHERN CONNECTICUT
CLUSTER ID:	SOUTHERN CONNECTICUT25
ISSUE DATE:	03/07/2014
SOLUTION ID:	
PID:	25LTECT33XC113
REVISION:	1
REVISION DATE:	03/07/2014
STATUS:	DRAFT
NEEDED DATE:	
RFDS ENGINEER:	
SPRINT RF ENGINEER:	
RF ENGINEER PHONE:	
RF ENGINEER EMAIL:	
SPRINT RF MANAGER:	
RF MANAGER PHONE:	
RF MANAGER EMAIL:	

PROJECT DESCRIPTION

NEW 2.5G TDD LTE SERVICE AT EXISTING SITE. ADD NEW ANTENNAS, RRH AND RAN EQUIPMENT.
PROCESS INSTANCE ID 207325
LOCATION
LATITUDE (DECIMAL ONLY)
LONGITUDE (DECIMAL ONLY)
ADDRESS 31 NEW HARTFORD RD
CITY BARKHAMSTED
STATE CT ZIP CODE 6063
COUNTY LITCHFIELD
E911 PHASE

SITE LEVEL DESIGN – 2500 MHZ

	NUMBER OF SECTORS	CARRIER COUNT WHEN 2.5G IS ON AIR	TX AND RX START AND STOP FREQUENCIES
LTE 2500	3	3	2496 MHZ – 2690 MHZ

NEW GROWTH CABINET

MAKE/MODEL	NONE
NEW GROWTH CABINET QUANTITY	0
NEW TOP HAT MAKE/MODEL	NONE
NEW TOP HAT CABINET QUANTITY	0
INCREMENTAL CURRENT DRAW NEEDED BY NEW GROWTH CABINET OR TOP HAT (AMPS)	0
RADIO CONFIGURATION	8T8R
SPLIT MODE	0
RADIO SCENARIO	1
PLUMBING DIAGRAM FILE NAME	
RRH / RRU MODEL	TD-RRH8X20-25
RRH / RRU QTY	3
POWER JUNCTION CYLINDER MAKE/MODEL	
POWER JUNCTION CYLINDER QTY	0
OPTICAL JUNCTION CYLINDER MAKE/MODEL	N/A
OPTICAL JUNCTION CYLINDER QTY	0
USE EXISTING 1900MHZ POWER FOR RRH?	FALSE
USE EXISTING 1900MHZ FIBER FOR RRH?	FALSE
HYBRID/FIBER CABLE MAKE/MODEL	
HYBRID/FIBER QTY	0
HOMERUN COAX CABLE MAKE/MODEL	
HOMERUN COAX CABLE QTY	0
ADDITIONAL GPS ANTENNA REQUIRED?	FALSE

SECTOR AND ANTENNA – 2500 MHZ

FINAL/NEW CONFIGURATION	SECTOR 1	SECTOR 2	SECTOR 3
AZIMUTH	10	110	200
ANTENNA CENTER LINE (FT)			
ANTENNA MANUFACTURER	RFS	RFS	RFS
ANTENNA MODEL	APXVTM14-ALU-I20	APXVTM14-ALU-I20	APXVTM14-ALU-I20
ANTENNA QTY	1	1	1
ANTENNA MECHANICAL DOWNTILT	0	0	0
ANTENNA ELECTRICAL DOWNTILT	-2	-2	-2
COMBINED WITH			
UPPER SPLITTER MAKE/MODEL			
UPPER SPLITTER QTY	0	0	0
TOP JUMPER MAKE/MODEL	COAX JUMPER. MFG TBD.	COAX JUMPER. MFG TBD.	COAX JUMPER. MFG TBD.
TOP JUMPER QUANTITY (INDIVIDUAL JUMPERS, NOT BUNCH)	9	9	9
BOTTOM JUMPER MAKE/MODEL			
BOTTOM JUMPER QTY	0	0	0
SURGE ARRESTOR			
RF FILTER MAKE/MODEL	N/A	N/A	N/A
RF FILTER QTY	0	0	0

A&E DRAWING REQUIREMENTS

1) CALCULATE AND CALL-OUT HYBRID/FIBER/COAX MAIN LINE CABLE ROUTE AND LENGTHS. 2) CALCULATE AND CALL-OUT AISG CABLE ROUTE AND LENGTHS. 3) ALL ANTENNA HEIGHTS ARE TO CENTER OF HORIZONTAL ANTENNA. 4) VERIFY CL HEIGHT WITH AS-BUILT DRAWINGS IN SITERRA OR PER SPRINT SITE DEVELOPMENT. 5) NO OBJECT IS TO BE LOCATED 45 DEGREES LEFT AND RIGHT OF FRONT OF ANTENNA OR 67.5 DEGREES FROM HORIZONTAL FROM TOP AND BOTTOM OF ANTENNA. IF THIS IS NOT POSSIBLE, CONTACT RF ENGINEER FOR FURTHER INSTRUCTION. IN ADDITION, 2.5G ANTENNA IS NOT TO BE PLACED IN FRONT OF ANY OTHER ANTENNA USING THE SAME RULES AS ABOVE. REFERENCE SPRINT ANTENNA PLACEMENT GUIDELINES IN SITERRA GENERAL LIBRARY FOR MORE DETAILS. THIS INCLUDES SPRINT AND NON-SPRINT ANTENNAS. IF NECESSARY, 2.5G ANTENNA CAN BE PLACED AT FAR EDGE OF HORIZONTAL ANTENNA MOUNT MEMBER FOR CLEAR LINE OF SITE OR EVEN ON ANOTHER SECTOR MOUNT FOR CLEAR LINE OF SITE. 6) HORIZONTALLY, 2.5G ANTENNA MUST BE AT LEAST 18" FROM 1900MHZ ANTENNA, 30" FROM 800MHZ ANTENNA AND 30MHZ FROM DUAL BAND 1900MHZ AND 800MHZ ANTENNA. REFERENCE SPRINT ANTENNA PLACEMENT GUIDELINES IN SITERRA GENERAL LIBRARY FOR VERTICAL SPACING REQUIREMENTS.

SPECIAL CONSTRUCTION REQUIREMENTS

1) AISG TESTS TO VERIFY OPERATION IS TO BE PERFORMED AFTER FINAL INSTALLATION OF ANTENNAS AND AISG CABLES HAVE BEEN CONNECTED. VERFY OPERATION OF ALL EXISTING SPRINT AISG EQUIPMENT INCLUDING 800MHZ, 1.9GHZ AND 2.5G. TEST INCLUDE COMPLETE DOWNTILT, AZIMUTH (IF APPLICABLE) AND BEAMWIDTH SWINGS (IF APPLICABLE). DOCUMENT AISG TEST RESULTS IN COAX SWEEP TEST SPREADSHEET. 3) GENERAL CONTRACTOR MUST INSURE THAT NO OBJECT IS LOCATED IN FRONT OF ANTENNA. THIS MEANS NO OBJECT IS TO BE LOCATED 45 DEGREES LEFT AND RIGHT OF FRONT OF ANTENNA OR 67.5 DEGREES FROM HORIZONTAL FROM TOP AND BOTTOM OF ANTENNA. IF THIS IS NOT POSSIBLE, CONTACT RF ENGINEER FOR FURTHER INSTRUCTION. IN ADDITION, 2.5G ANTENNA IS NOT TO BE PLACED IN FRONT OF ANY OTHER ANTENNA USING THE SAME RULES AS ABOVE. THIS INCLUDES SPRINT AND NON- SPRINT ANTENNAS. 4) GENERAL CONTRACT IS REQUIRED TO USE A DIGITAL ALIGNMENT TOOL TO SET AZIMUTH, ROLL AND DOWNTILT. AZIMUTH ACCURACY IS TO BE WITHIN 3 DEGREES. DOWNTILT AND ROLL (LEFT TO RIGHT TILT) IS TO BE WITHIN 0.1 DEGREES. IF FOR SOME REASON THIS ACCURACY CANNOT BE ACHIEVED, UPDATE AS-BUILT DRAWINGS AND EMAIL SPRINT RF ENGINEER WITH AS-BUILT SETTINGS. USE 3Z RF ALIGNMENT TOOL OR EQUIVALENT TOOL. HTTP://WWW.3ZTELECOM.COM/ANTENNA-ALIGNMENT-TOOL/

ADDITIONAL RF NOTES

SITE DEVELOPMENT – IF NO CENTERLINE HEIGHT AND AZIMUTH EXISTS IN THIS RFDS, IT MEANS FINAL RFDS HAS NOT BEEN COMPLETED. IF SITE IS ALREADY LEASED AND ZONED, TURN SITE ON PER LEASE. IF NOT YET LEASED OR ZONED OR IF YOU CAN EASILY CHANGE THE RF CONFIGURATION, LEASE AND ZONE, USING ON-AIR 1900 CL HEIGHT AND AZIMUTH, MDT=0, EDT=-2 AND USE ANTENNA CALLED OUT IN THIS RFDS FOR LEASING AND ZONING. AT SOME POINT, THE FINAL RFDS WILL COME THROUGH. IF DIFFERENT THAN YOUR CURRENT CONFIGURATION, YOU NEED TO MAKE A JUDGMENT CALL. IF YOU CAN CHANGE THE CONFIGURATION WITHOUT MUCH DELAY IN TURNING THE SITE ON, THEN MAKE THE CHANGE. IF NOT, THE BUILD THE SITE WITH EXISTING CONFIGURATION. LATER ONE, YOU WILL RECEIVE FUNDING TO RELEASE, ZONE AND MODIFY SITE PER FINAL RFDS.

RFDS — 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
Fax # (518) 690-0793

JOB NUMBER 333-000

ENGINEERING LICENSE:

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

DRAWING NOTICE:

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/30/14	JLM	2
ISSUED FOR CONSTRUCTION	5/2/14	MAP	1
ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

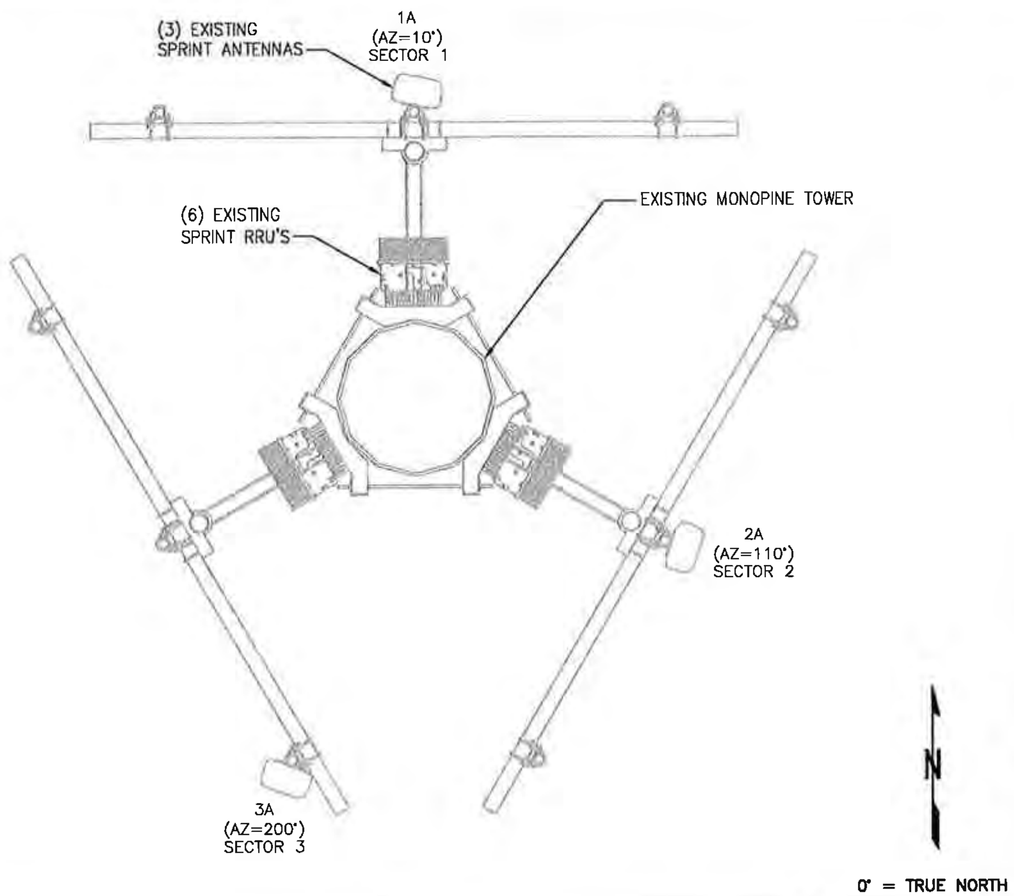
SITE NAME: REGIONAL REFUSE

SITE CASCADE: CT33XC113

SITE ADDRESS: 31 NEW HARTFORD RD BARKHAMSTED, CT 06063

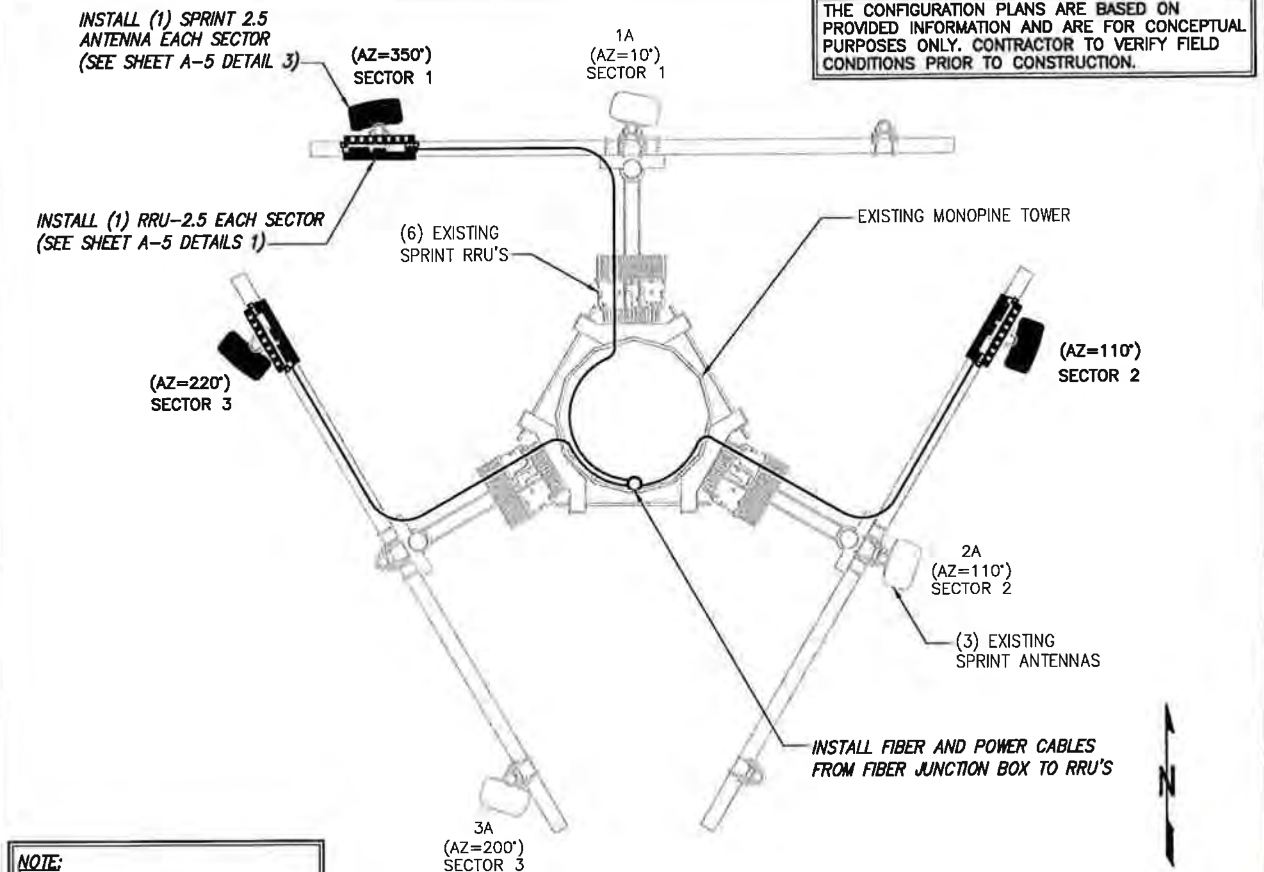
SHEET DESCRIPTION: TOWER ELEVATION & CABLE PLAN

SHEET NUMBER: A-2



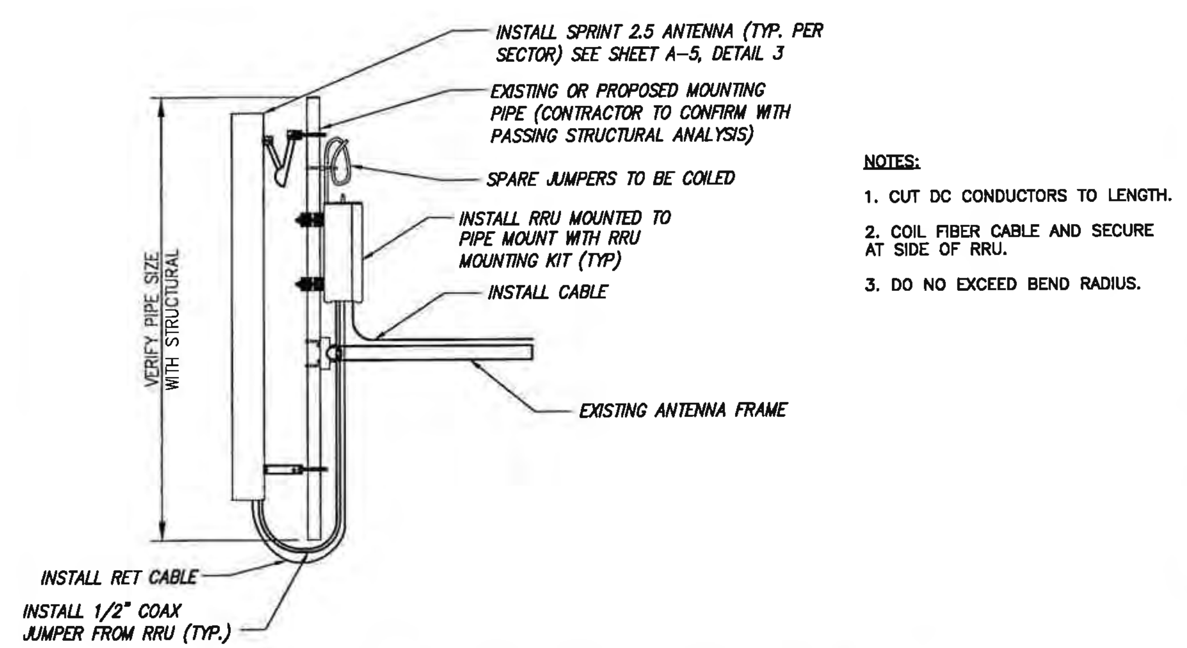
EXISTING ANTENNA & RRU LAYOUT	NO SCALE	1

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



NOTES:

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

NOTE:
CONTRACTOR TO POSITION RRU ON MOUNT BEHIND ANTENNA SUCH THAT THE RRU DOES NOT INTERFERE WITH THE EXISTING PLATFORM/T-ARM MOUNTING HARDWARE.

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

DETAIL NOT USED	NO SCALE	3

TYPICAL ANTENNA & RRU MOUNTING DETAILS	NO SCALE	4

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ENGINEERING LICENSE:

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

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SITE NAME:

REGIONAL REFUSE

SITE CASCADE:

CT33XC113

SITE ADDRESS:

31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:

ANTENNA LAYOUT & MOUNTING DETAILS

SHEET NUMBER:

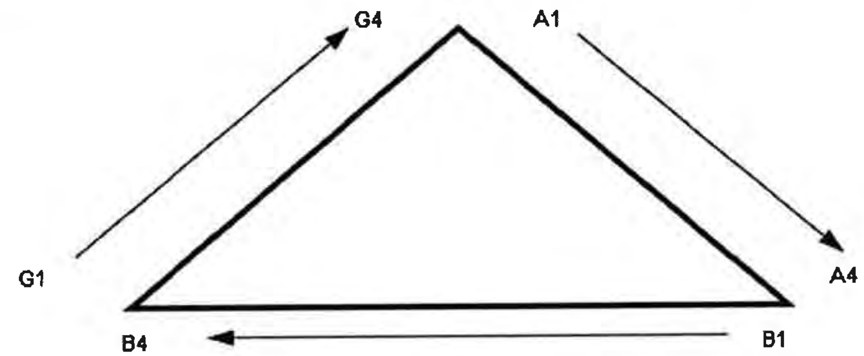
A-3

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	[illegible]	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	[illegible]	[illegible]	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	[illegible]	[illegible]	[illegible]
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

COLOR CODING AND NOTES

NO SCALE | 1

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SITE CASCADE:

CT33XC113

SITE ADDRESS:

31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:

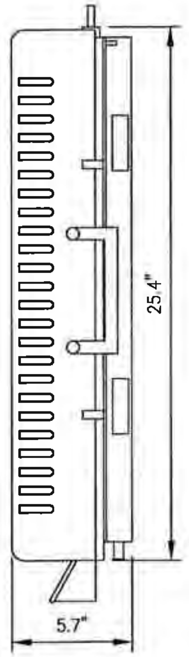
COLOR CODING AND NOTES

SHEET NUMBER:

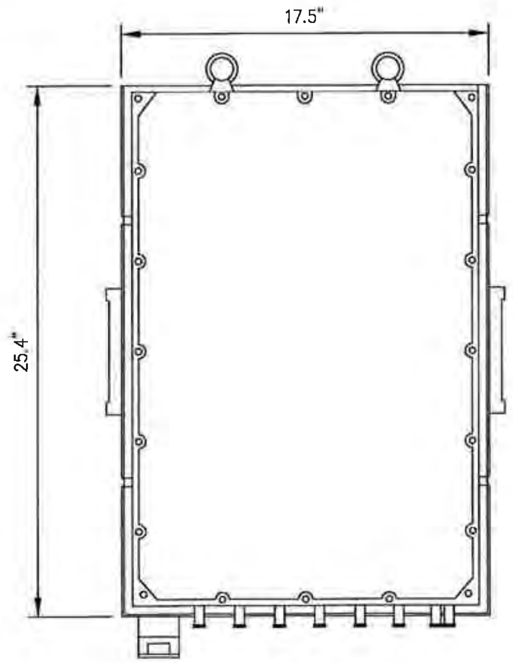
A-4

RRU: ALCATEL LUCENT TD-RRH8X20-25

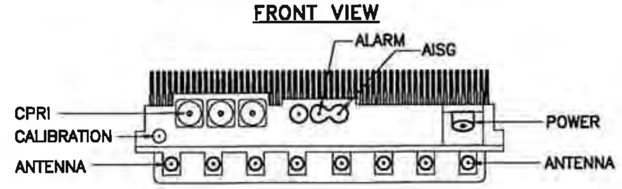
COLOR: LIGHT GREY
WEIGHT: 70 LBS.



SIDE VIEW



FRONT VIEW

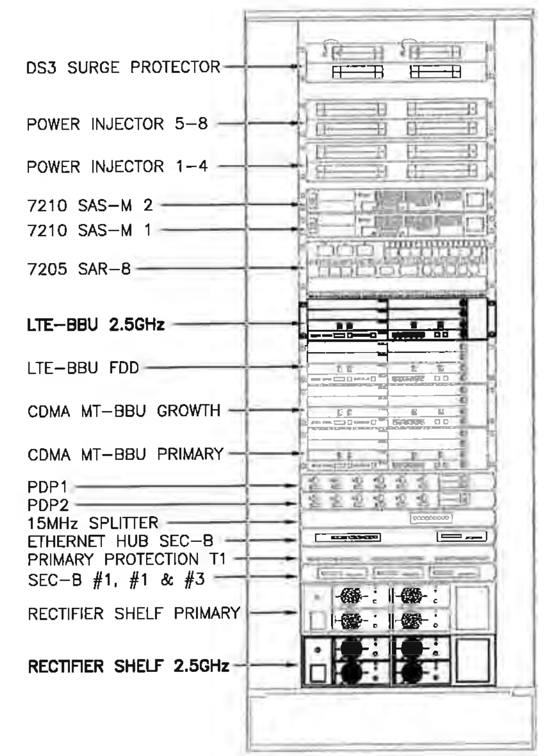


PLAN VIEW

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

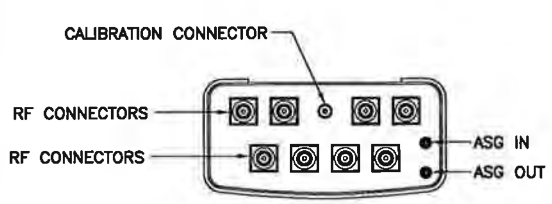


FRONT VIEW

2.5 EQUIPMENT IN EXISTING CABINET	NO SCALE	2

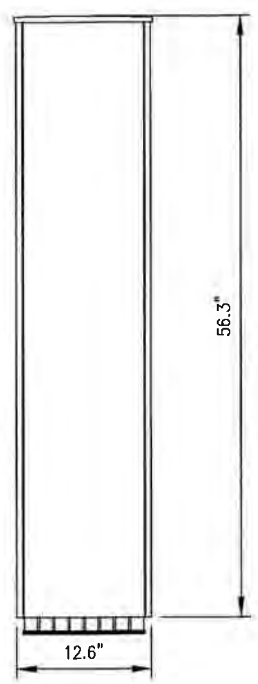
ANTENNA RFS APXVTM14-ALU-I20

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



PLAN VIEW

SIDE VIEW



FRONT VIEW

2.5 ANTENNA	NO SCALE	3

DETAIL NOT USED	NO SCALE	4

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ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

SITE NAME:

REGIONAL REFUSE

SITE CASCADE:

CT33XC113

SITE ADDRESS:

31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:

EQUIPMENT & MOUNTING DETAILS

SHEET NUMBER:

A-5

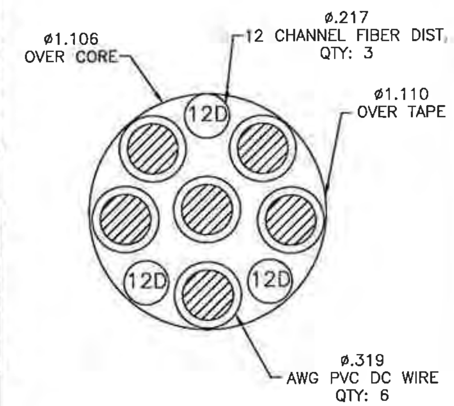
RFS HYBRIFLEX RISER CABLE SCHEDULE

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

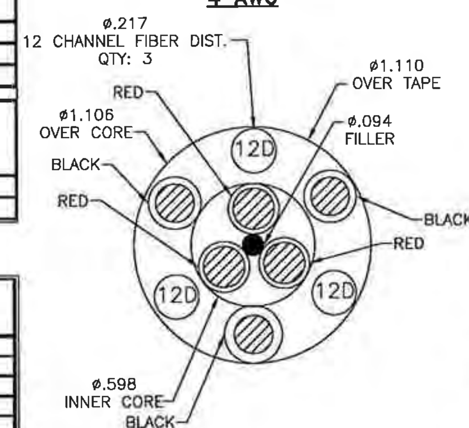
RFS HYBRIFLEX JUMPER CABLE SCHEDULE

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

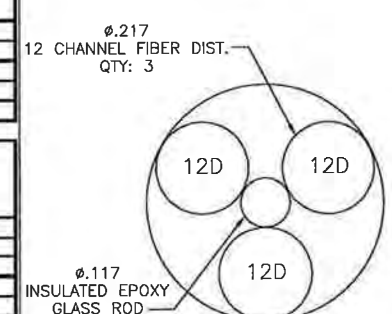
NOTE:
SPRINT CM TO CONFIRM HYBRID OR FIBER RISER CABLE AND HYBRID OR FIBER JUMPER CABLE MODEL NUMBERS IF HYBRID CABLES ARE REQUIRED BEFORE PREPARING BOM.



4 AWG

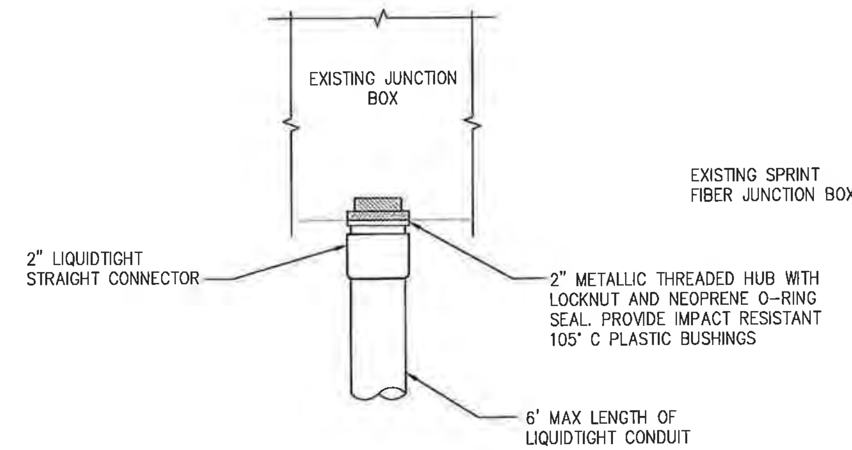


8 & 6 AWG



FIBER ONLY

2.5 CABLE CROSS SECTION DATA | NO SCALE | 1



FIBER JUNCTION BOX PENETRATION | NO SCALE | 2

DETAIL NOT USED | NO SCALE | 3

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DRAWING NOTICE:

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/30/14	JLM	2
ISSUED FOR CONSTRUCTION	5/2/14	MAP	1
ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

SITE NAME:

REGIONAL REFUSE

SITE CASCADE:

CT33XC113

SITE ADDRESS:

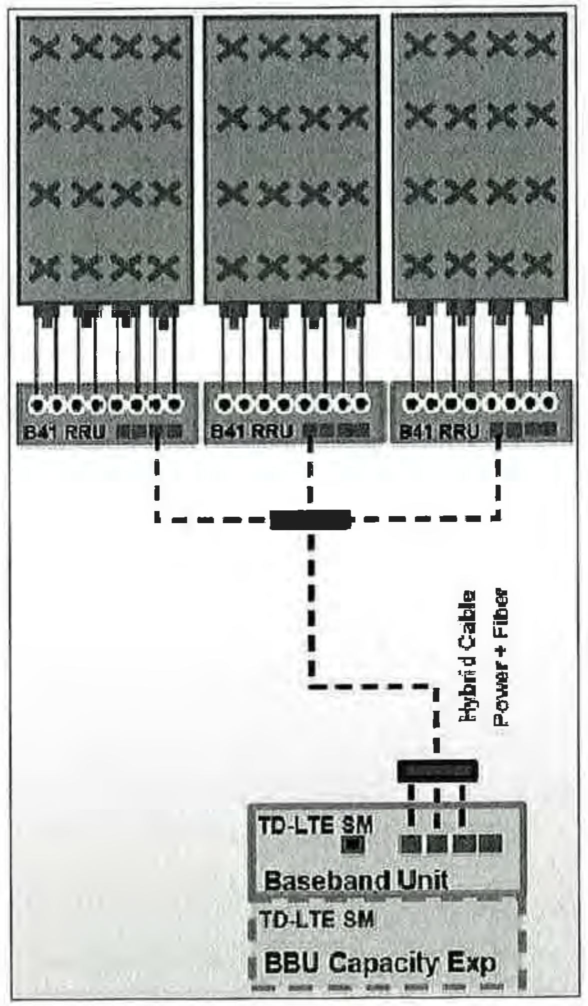
31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:

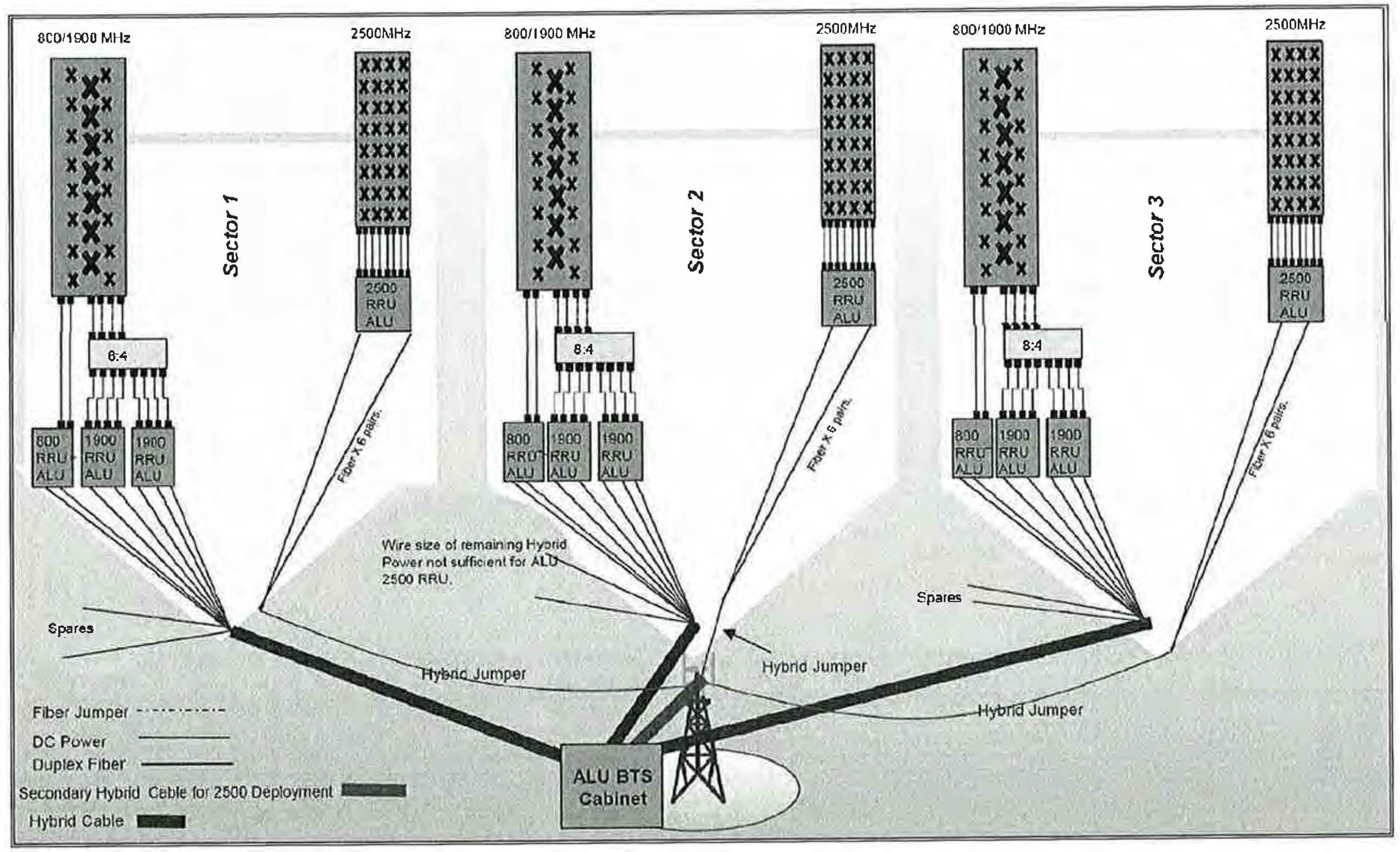
CIVIL DETAILS

SHEET NUMBER:

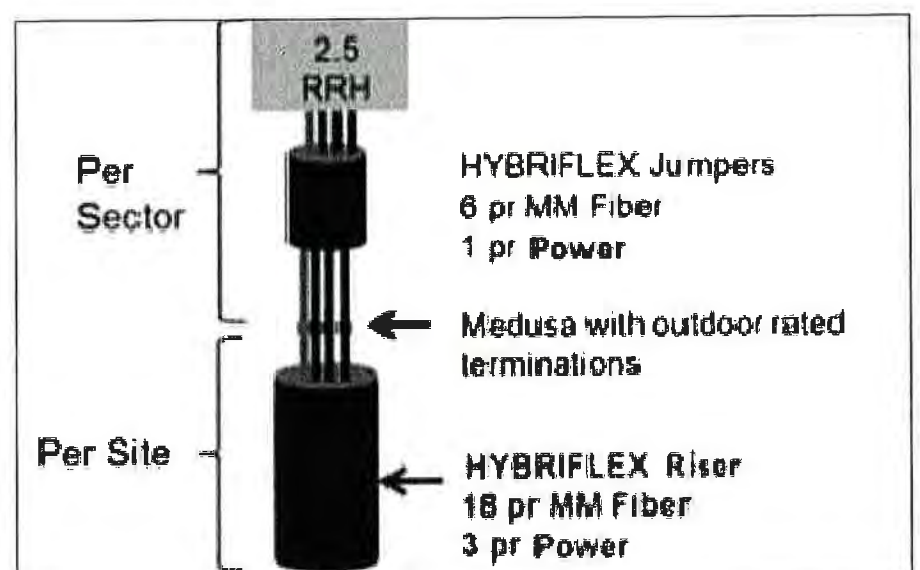
A-6



ALU 2.5 ALU SCENARIO 1



RAN WIRING DIAGRAM



RF 2.5 ALU SCENARIO 1

PLUMBING DIAGRAM

NO SCALE | 1

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

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ISSUED FOR CONSTRUCTION	5/30/14	JLM	2
ISSUED FOR CONSTRUCTION	5/2/14	MAP	1
ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

SITE NAME:

REGIONAL REFUSE

SITE CASCADE:

CT33XC113

SITE ADDRESS:

31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:

PLUMBING DIAGRAM

SHEET NUMBER:

A-7

PLAN NOT USED

NO SCALE | 1

LEGEND:

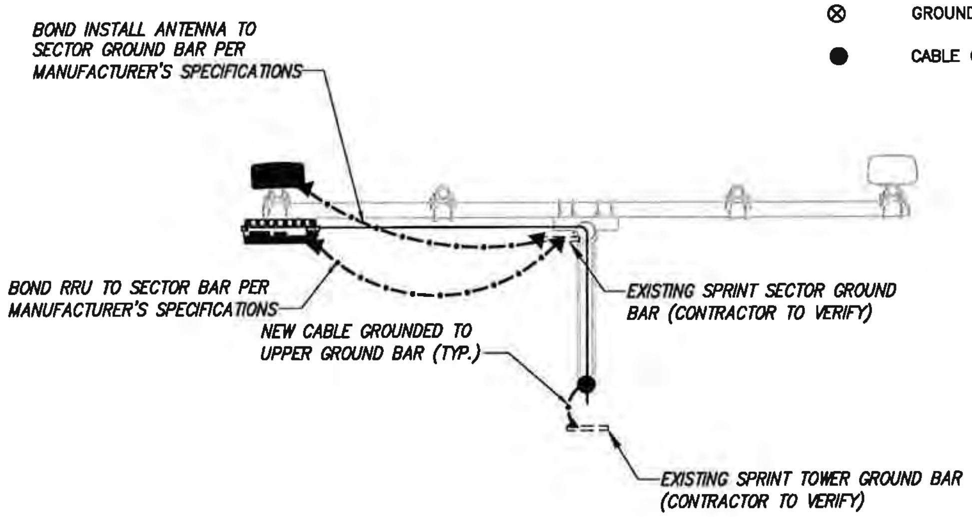
— G — EXISTING GROUND RING

■ CADWELD CONNECTION (EXOTHERMIC WELD)

▲ MECHANICAL CONNECTION

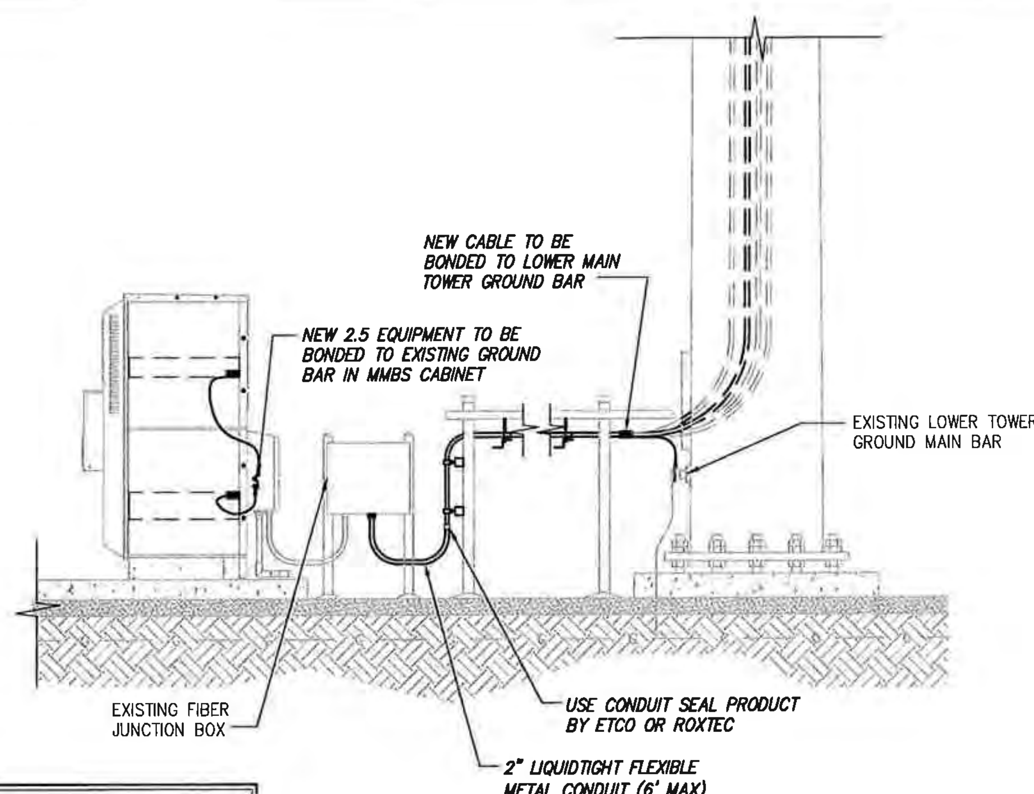
⊗ GROUND ROD

● 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:

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:

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/30/14	JLM	2
ISSUED FOR CONSTRUCTION	5/2/14	MAP	1
ISSUED FOR CONSTRUCTION	3/3/14	MAP	0

SITE NAME:
REGIONAL REFUSE

SITE CASCADE:
CT33XC113

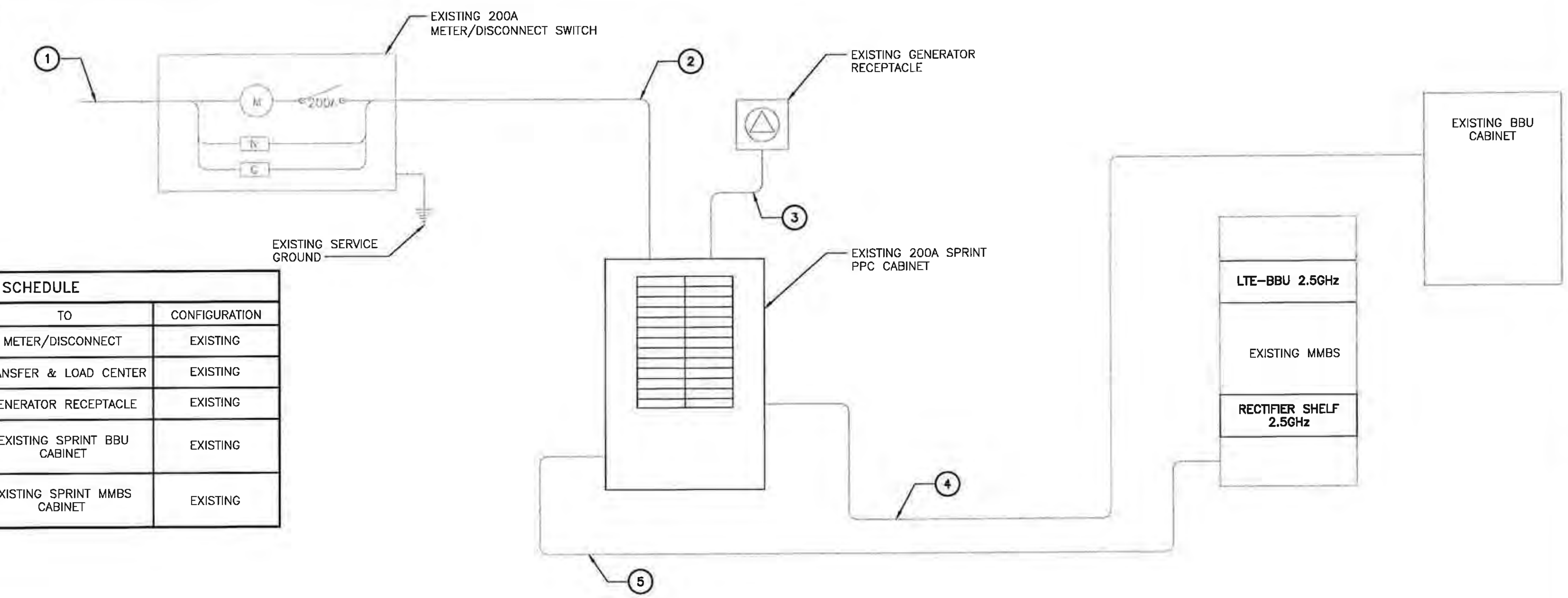
SITE ADDRESS:
31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:
ELECTRICAL & GROUNDING PLAN

SHEET NUMBER:
E-1

NOTES

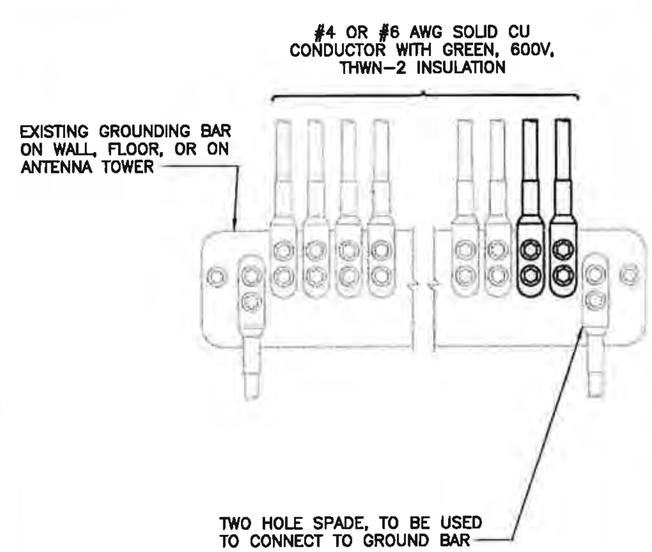
CG SHALL REFERENCE ALL SPECS FOR "CONNECTING THE POWER SUPPLY" OF THE NEW INSTALLATION DOCUMENTS, FOR ALL CONNECTION SPECIFICATIONS.



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 BBU CABINET	EXISTING
5	TRANSFER & LOAD CENTER	EXISTING SPRINT MMBS CABINET	EXISTING

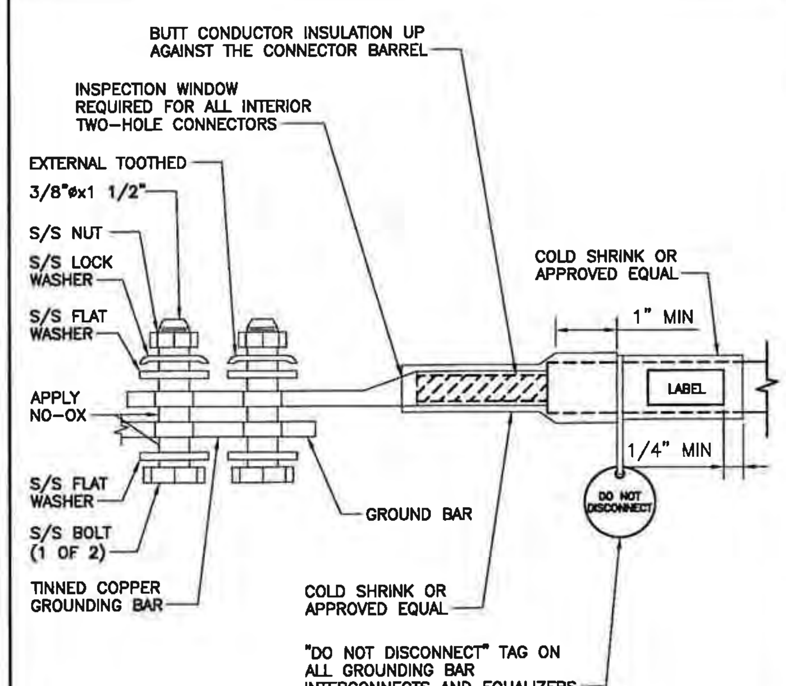
ELECTRICAL ONE-LINE DIAGRAM | NO SCALE | 1



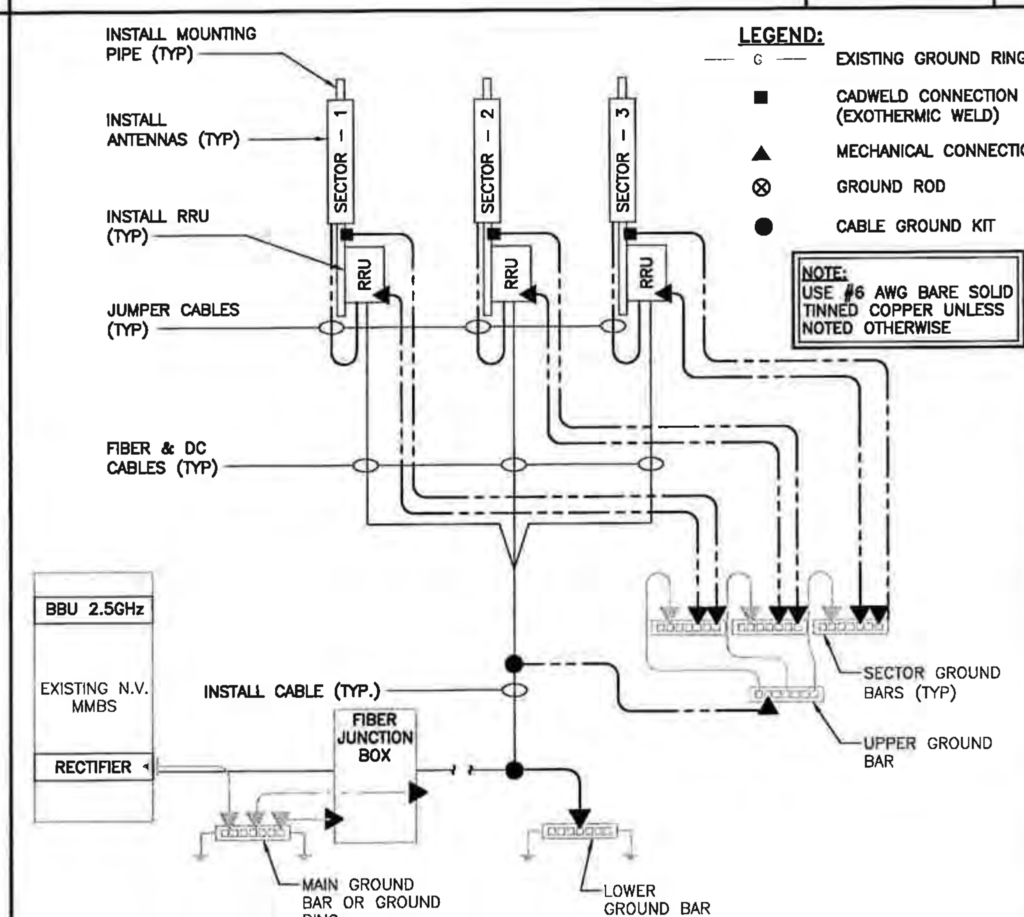
NOTES

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
Office # (518) 690-0790
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JOB NUMBER 333-000

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SITE NAME:

REGIONAL REFUSE

SITE CASCADE:

CT33XC113

SITE ADDRESS:

31 NEW HARTFORD RD
BARKHAMSTED, CT 06063

SHEET DESCRIPTION:

ELECTRICAL & GROUNDING DETAILS

SHEET NUMBER:

E-2

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

145-ft Existing Summit Monopine

Proposed Sprint
Antenna Upgrade

Sprint Site Ref: CT33XC113

Verizon Site Ref: Barkhamsted South

31 New Hartford Road (Rust Road)
Barkhamsted, CT

Centek Project No. 14033.006

Date: May 7, 2014

STATE OF CONNECTICUT
CARLO F. CENTORE
No.16694
LICENSED
PROFESSIONAL ENGINEER

Prepared for:
Sprint Nextel
8 Airline Drive, Suite 105
Albany, NY 12205

Table of Contents

Introduction

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

The host tower is a 125-ft tall, three-section, eighteen sided, tapered monopine, originally manufactured by Summit Manufacturing and designed by Paul J. Ford and Company job no; 29200-1316, dated September 7, 2000 with a 20-ft extension manufactured by Summit design no; 10916-D6 dated April 12, 2001. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural report prepared by Centek job no. 14033.004 dated March 4, 2014.

Antenna and appurtenance information were obtained from the aforementioned Centek structural report, a tower mapping report prepared by JWB Tower Services, LLC dated February 28, 2014 and a Sprint RF data sheet.

The tower consists of four (4) tapered vertical steel sections conforming to ASTM A607-65 (65ksi). The bottom three (3) sections are slip joint connected and the top section is flange connected. The diameter of the pole (flat-flat) is 25.41-in at the top and 66.05-in at the base.

Sprint proposes the installation of three (3) panel antennas and three (3) remote radio heads mounted to the existing three (3) T-Arms. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- VERIZON (Existing/Reserved):
  Antennas: Six (6) Antel LPA-80063-6CF panel antennas, six (6) Antel BXA-70063-6CF panel antennas, six (6) LPA-171063-12CF panel antennas, six (6) RFS FD9R6004/2C-3L Diplexers, six (6) RRH's and one (1) main distribution box mounted on three (3) existing T-Arms with a RAD center elevation of 133-ft above grade.
  Coax Cables: Eighteen (18) 1-5/8" ∅ coax cables and two (2) 1-5/8" ∅ fiber cable running on the inside of the existing tower.
- AT&T (Existing):
  Antennas: Six (6) Powerwave 7770 panel antennas, six (6) Powerwave TT19-08BP111-001 TMA's, two (2) KMW AM-X-CD-16-65-00T-RET panel antennas, one (1) Kathrein Scala 800-10764 panel antenna, six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted on three (3) existing T-Arms with a RAD center elevation of 113-ft above grade.
  Coax Cables: Twelve (12) 1-1/4" ∅ coax cables, one (1) fiber cable and two (2) dc control cables running on the inside of the existing tower.
- T-MOBILE (EXISTING):
  Antenna: Six (6) Ericsson AIR 21 panel antennas and three (3) Ericsson KRY 112 TMA's mounted on three (3) existing T-Arms with a RAD center elevation of 102-ft above grade.
  Coax Cable: Twelve (12) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ fiber cable running on the inside of the existing tower.

- METROPCS (EXISTING):
  Antennas: Three (3) RFS APXV18-206517-C panel antennas flush mounted with a RAD center elevation of 92-ft above grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- SPRINT (Existing to Remain):
  Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas, three (3) ALU 1900 MHz RRH's and three (3) ALU 800 MHz RRH's mounted on three (3) existing T-Arms with a RAD center elevation of 140-ft above grade.
  Coax Cables: Three (3) 1-1/4" ∅ Hybriflex cables running on the inside of the existing tower.
- **SPRINT (Proposed):**
  Antennas: Three (3) RFS APXVTM14-C-I20 panel antennas and three (3) ALU 2500 MHz RRH's mounted on three (3) existing T-Arms with a RAD center elevation of 140-ft above grade.

Primary Assumptions Used in the Analysis

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

Analysis

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

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

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

Tower Loading

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

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

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

Tower Capacity

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

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", the maximum tower steel usage was found to be at **79.8%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L1)	125.00'-146.00'	32.8%	**PASS**
Pole Shaft (L2)	82.25'-125.00'	64.8%	**PASS**
Pole Shaft (L3)	43.00'-82.25'	78.8%	**PASS**
Pole Shaft (L4)	1.0'-43.00'	79.8%	**PASS**

Foundation and Anchors

The existing foundation consists of a 8-ft square x 5.5-ft long reinforced concrete pier on a 31.5-ft square x 4.0-ft thick reinforced concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned Centek structural report. The base of the tower is connected to the foundation by means of (24) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

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

Location	Vector	Proposed Reactions
Base	Shear	56 kips
	Compression	55 kips
	Moment	5738 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)(1)	Proposed Loading (FS)(1)	Result
Reinforced Concrete Pad and Pier	OTM(2)	2.0	2.48	**PASS**

Note 1: FS denotes Factor of Safety.

Note 2: OTM denotes Overturning Moment

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Flange Bolts	Tension	71.0%	**PASS**
Flange Plate	Bending	27.4%	**PASS**

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Bending	80.6%	**PASS**
Base Plate	Bending	64.7%	**PASS**

C o n c l u s i o n

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

Prepared by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

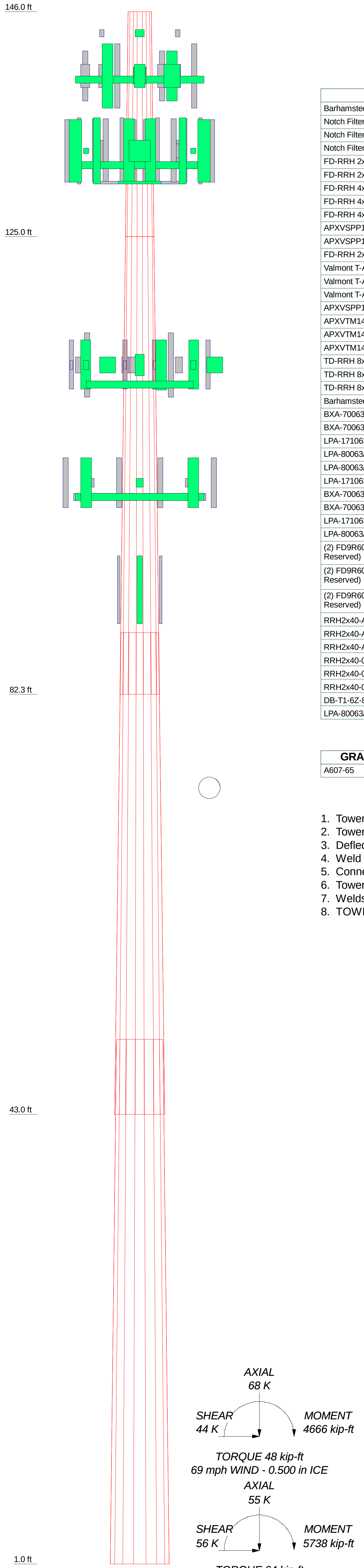
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

tnxTower Features:

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

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	21.000	18	0.250		25.410	32.508	A607-65	1.6
2	42.750	18	0.375	5.750	32.508	44.632	A607-65	6.6
3	45.000	18	0.438	7.000	42.251	55.014	A607-65	10.2
4	49.000	18	0.500		52.154	66.050	A607-65	15.5
								34.0



AXIAL 68 K
SHEAR 44 K
MOMENT 4666 kip-ft
TORQUE 48 kip-ft
69 mph WIND - 0.500 in ICE

AXIAL 55 K
SHEAR 56 K
MOMENT 5738 kip-ft
TORQUE 64 kip-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Barhamsted Branch 1	153.26	LPA-171063-12CF (Verizon - Reserved)	133
Notch Filter (Sprint - Existing)	144	LPA-171063-12CF (Verizon - Reserved)	133
Notch Filter (Sprint - Existing)	144	BXA-70063/6CF (Verizon - Reserved)	133
Notch Filter (Sprint - Existing)	144	BXA-70063/6CF (Verizon - Reserved)	133
FD-RRH 2x50 800 (Sprint - Existing)	140	LPA-171063-12CF (Verizon - Reserved)	133
FD-RRH 2x50 800 (Sprint - Existing)	140	LPA-80063/6CF (Verizon - Reserved)	133
FD-RRH 4x45 1900 (Sprint - Existing)	140	LPA-80063/6CF (Verizon - Reserved)	133
FD-RRH 4x45 1900 (Sprint - Existing)	140	Valmont T-Arm (1) (Verizon - Existing)	132
FD-RRH 4x45 1900 (Sprint - Existing)	140	Valmont T-Arm (1) (Verizon - Existing)	132
APXVSPP18-C-A20 (Sprint - Existing)	140	Valmont T-Arm (1) (Verizon - Existing)	132
APXVSPP18-C-A20 (Sprint - Existing)	140	4-ft Standoff (Empty)	130
FD-RRH 2x50 800 (Sprint - Existing)	140	4-ft Standoff (Empty)	130
Valmont T-Arm (1) (Sprint - Existing)	140	4-ft Standoff (Empty)	130
Valmont T-Arm (1) (Sprint - Existing)	140	Barhamsted Branch 3	121.39
Valmont T-Arm (1) (Sprint - Existing)	140	(2) RRUS-11 (ATT - Existing)	113
APXVSPP18-C-A20 (Sprint - Existing)	140	(2) RRUS-11 (ATT - Existing)	113
APXVTM14-C-I20 (Sprint - Proposed)	140	(2) RRUS-11 (ATT - Existing)	113
APXVTM14-C-I20 (Sprint - Proposed)	140	DC6-48-60-18-8F Surge Arrestor (ATT - Existing)	113
APXVTM14-C-I20 (Sprint - Proposed)	140	(2) 7770.00 (ATT - Existing)	113
TD-RRH 8x20 2500 (Sprint - Proposed)	140	(2) TT19-08BP111-001 TMA (ATT - Existing)	113
TD-RRH 8x20 2500 (Sprint - Proposed)	140	800-10764 (ATT - Existing)	113
TD-RRH 8x20 2500 (Sprint - Proposed)	140	(2) TT19-08BP111-001 TMA (ATT - Existing)	113
Barhamsted Branch 2	138.16	(2) TT19-08BP111-001 TMA (ATT - Existing)	113
BXA-70063/6CF (Verizon - Reserved)	133	AM-X-CD-16-65-00T-RET(72") (ATT - Existing)	113
BXA-70063/6CF (Verizon - Reserved)	133	AM-X-CD-16-65-00T-RET(72") (ATT - Existing)	113
LPA-171063-12CF (Verizon - Reserved)	133	(2) 7770.00 (ATT - Existing)	113
LPA-80063/6CF (Verizon - Reserved)	133	(2) 7770.00 (ATT - Existing)	113
LPA-80063/6CF (Verizon - Reserved)	133	EEI 10' Universal T-Arm (ATT - Existing)	111.5
LPA-171063-12CF (Verizon - Reserved)	133	EEI 10' Universal T-Arm (ATT - Existing)	111.5
BXA-70063/6CF (Verizon - Reserved)	133	EEI 10' Universal T-Arm (ATT - Existing)	111.5
BXA-70063/6CF (Verizon - Reserved)	133	Barhamsted Branch 4	109.85
LPA-171063-12CF (Verizon - Reserved)	133	(2) AIR21 (T-Mobile - Existing)	102
LPA-80063/6CF (Verizon - Reserved)	133	(2) AIR21 (T-Mobile - Existing)	102
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	133	(2) AIR21 (T-Mobile - Existing)	102
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	133	KRY 112 TMA (T-Mobile - Existing)	102
		KRY 112 TMA (T-Mobile - Existing)	102
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	133	KRY 112 TMA (T-Mobile - Existing)	102
		Valmont T-Arm (1) (T-Mobile - Existing)	101
RRH2x40-AWS (Verizon - Reserved)	133	Valmont T-Arm (1) (T-Mobile - Existing)	101
RRH2x40-AWS (Verizon - Reserved)	133	Valmont T-Arm (1) (T-Mobile - Existing)	101
RRH2x40-AWS (Verizon - Reserved)	133	APXV18-206517-C (MetroPCS - Existing)	92
RRH2x40-07-U (Verizon - Reserved)	133	APXV18-206517-C (MetroPCS - Existing)	92
RRH2x40-07-U (Verizon - Reserved)	133	Valmont Uni-Tri Bracket (MetroPCS - Existing)	92
RRH2x40-07-U (Verizon - Reserved)	133	APXV18-206517-C (MetroPCS - Existing)	92
DB-T1-6Z-8AB-0Z (Verizon - Reserved)	133	Barhamsted Branch 5	91.6
LPA-80063/6CF (Verizon - Reserved)	133	Barhamsted Branch 6	82.8

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 79.8%

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

Job: **14033.006 - CT33XC113**		
Project: **145-ft Summit Monopine - Rust Rd., Barkhamsted, CT**		
Client: Sprint	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 05/07/14	Scale: NTS
Path: C:\Users\Path\Desktop\Tim - Work\CT33XC113\145' Summit Monopine_Barkhamsted CT.eri		Dwg No. E-1

Tower Input Data

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

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

Options

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

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

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
Consider Feedline Torque
Include Angle Block Shear Check

Poles

√ Include Shear-Torsion Interaction
√ Always Use Sub-Critical Flow
Use Top Mounted Sockets

Tapered Pole Section Geometry

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

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

Tapered Pole Properties

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

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
HYBRIFLEX 1-1/4" (Sprint - Existing)	C	No	Inside Pole	141.000 - 4.000	3	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 5/8 (Verizon - Existing)	B	No	Inside Pole	134.000 - 4.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 5/8 (Verizon - Reserved)	B	No	Inside Pole	134.000 - 4.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
HYBRIFLEX 1-5/8" (Verizon - Reserved)	C	No	Inside Pole	134.000 - 1.000	2	No Ice	0.000	0.002
						1/2" Ice	0.000	0.002
1 1/4 (AT&T - Existing)	B	No	Inside Pole	115.000 - 4.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
RG6-Fiber (AT&T - Existing)	C	No	Inside Pole	114.000 - 4.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
#8 AWG Copper WIre (AT&T - Existing)	C	No	Inside Pole	114.000 - 4.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
1 5/8	B	No	Inside Pole	104.000 - 4.000	12	No Ice	0.000	0.001

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight klf
(T-Mobile - Existing)						1/2" Ice	0.000	0.001
1 5/8	B	No	Inside Pole	94.000 - 4.000	6	No Ice	0.000	0.001
(MetroPCS - Existing)						1/2" Ice	0.000	0.001
HYBRIFLEX 1-5/8"	B	No	Inside Pole	104.000 - 4.000	1	No Ice	0.000	0.002
(T-Mobile - Existing)						1/2" Ice	0.000	0.002

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	146.000-125.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.168
		C	0.000	0.000	0.000	0.000	0.097
L2	125.000-82.250	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	1.446
		C	0.000	0.000	0.000	0.000	0.364
L3	82.250-43.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	1.855
		C	0.000	0.000	0.000	0.000	0.345
L4	43.000-1.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	1.843
		C	0.000	0.000	0.000	0.000	0.355

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	146.000-125.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.168
		C		0.000	0.000	0.000	0.000	0.097
L2	125.000-82.250	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	1.446
		C		0.000	0.000	0.000	0.000	0.364
L3	82.250-43.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	1.855
		C		0.000	0.000	0.000	0.000	0.345
L4	43.000-1.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	1.843
		C		0.000	0.000	0.000	0.000	0.355

Discrete Tower Loads

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

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert*	*Azimuth Adjustment*	*Placement*		*C_AA_A Front*	*C_AA_A Side*	*Weight*
			ft ft ft	*°*	*ft*		*ft²*	*ft²*	*K*
APXVSPP18-C-A20 (Sprint - Existing)	A	From Face	3.000 3.000 0.000	0.000	140.000	No Ice 1/2" Ice	8.260 8.807	5.283 5.736	0.057 0.107
APXVSPP18-C-A20 (Sprint - Existing)	B	From Face	3.000 3.000 0.000	0.000	140.000	No Ice 1/2" Ice	8.260 8.807	5.283 5.736	0.057 0.107
APXVSPP18-C-A20 (Sprint - Existing)	C	From Face	3.000 3.000 0.000	0.000	140.000	No Ice 1/2" Ice	8.260 8.807	5.283 5.736	0.057 0.107
FD-RRH 2x50 800 (Sprint - Existing)	A	From Face	3.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	2.401 2.613	2.254 2.460	0.064 0.086
FD-RRH 2x50 800 (Sprint - Existing)	B	From Face	3.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	2.401 2.613	2.254 2.460	0.064 0.086
FD-RRH 2x50 800 (Sprint - Existing)	C	From Face	3.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	2.401 2.613	2.254 2.460	0.064 0.086
FD-RRH 4x45 1900 (Sprint - Existing)	A	From Face	3.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	2.705 2.944	2.781 3.022	0.060 0.084
FD-RRH 4x45 1900 (Sprint - Existing)	B	From Face	3.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	2.705 2.944	2.781 3.022	0.060 0.084
FD-RRH 4x45 1900 (Sprint - Existing)	C	From Face	3.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	2.705 2.944	2.781 3.022	0.060 0.084
Notch Filter (Sprint - Existing)	A	From Face	3.000 0.000 0.000	0.000	144.000	No Ice 1/2" Ice	0.865 0.992	0.375 0.465	0.010 0.016
Notch Filter (Sprint - Existing)	B	From Face	3.000 0.000 0.000	0.000	144.000	No Ice 1/2" Ice	0.865 0.992	0.375 0.465	0.010 0.016
Notch Filter (Sprint - Existing)	C	From Face	3.000 0.000 0.000	0.000	144.000	No Ice 1/2" Ice	0.865 0.992	0.375 0.465	0.010 0.016
Valmont T-Arm (1) (Sprint - Existing)	A	From Face	2.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (Sprint - Existing)	B	From Face	2.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (Sprint - Existing)	C	From Face	2.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
LPA-80063/6CF (Verizon - Reserved)	A	From Face	3.000 6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
LPA-171063-12CF (Verizon - Reserved)	A	From Face	3.000 4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
BXA-70063/6CF (Verizon - Reserved)	A	From Face	3.000 1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-70063/6CF (Verizon - Reserved)	A	From Face	3.000 -1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
LPA-171063-12CF (Verizon - Reserved)	A	From Face	3.000 -4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
LPA-80063/6CF (Verizon - Reserved)	A	From Face	3.000 -6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
LPA-80063/6CF (Verizon - Reserved)	B	From Face	3.000 6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
LPA-171063-12CF (Verizon - Reserved)	B	From Face	3.000 4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
BXA-70063/6CF (Verizon - Reserved)	B	From Face	3.000 1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-70063/6CF (Verizon - Reserved)	B	From Face	3.000 -1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
LPA-171063-12CF (Verizon - Reserved)	B	From Face	3.000 -4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
LPA-80063/6CF (Verizon - Reserved)	B	From Face	3.000 -6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
LPA-80063/6CF (Verizon - Reserved)	C	From Face	3.000 6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
LPA-171063-12CF (Verizon - Reserved)	C	From Face	3.000 4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
BXA-70063/6CF (Verizon - Reserved)	C	From Face	3.000 1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
BXA-70063/6CF (Verizon - Reserved)	C	From Face	3.000 -1.000 0.000	0.000	133.000	No Ice 1/2" Ice	7.731 8.268	4.158 4.595	0.017 0.059
LPA-171063-12CF (Verizon - Reserved)	C	From Face	3.000 -4.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.994 6.462	6.054 6.523	0.012 0.055
LPA-80063/6CF (Verizon - Reserved)	C	From Face	3.000 -6.000 0.000	0.000	133.000	No Ice 1/2" Ice	10.308 10.868	9.005 9.554	0.027 0.101
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	A	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	0.367 0.451	0.085 0.136	0.003 0.005
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	B	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	0.367 0.451	0.085 0.136	0.003 0.005
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	C	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	0.367 0.451	0.085 0.136	0.003 0.005
RRH2x40-AWS (Verizon - Reserved)	A	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	2.522 2.753	1.589 1.795	0.044 0.061
RRH2x40-AWS (Verizon - Reserved)	B	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	2.522 2.753	1.589 1.795	0.044 0.061

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
RRH2x40-AWS (Verizon - Reserved)	C	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	2.522 2.753	1.589 1.795	0.044 0.061
RRH2x40-07-U (Verizon - Reserved)	A	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	2.246 2.447	1.228 1.385	0.050 0.067
RRH2x40-07-U (Verizon - Reserved)	B	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	2.246 2.447	1.228 1.385	0.050 0.067
RRH2x40-07-U (Verizon - Reserved)	C	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	2.246 2.447	1.228 1.385	0.050 0.067
DB-T1-6Z-8AB-0Z (Verizon - Reserved)	C	From Face	3.000 0.000 0.000	0.000	133.000	No Ice 1/2" Ice	5.600 5.915	2.333 2.558	0.044 0.080
Valmont T-Arm (1) (Verizon - Existing)	A	From Face	2.000 0.000 0.000	0.000	132.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (Verizon - Existing)	B	From Face	2.000 0.000 0.000	0.000	132.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (Verizon - Existing)	C	From Face	2.000 0.000 0.000	0.000	132.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
4-ft Standoff (Empty)	A	From Face	2.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice	1.400 1.735	0.087 0.131	0.030 0.041
4-ft Standoff (Empty)	B	From Face	2.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice	1.400 1.735	0.087 0.131	0.030 0.041
4-ft Standoff (Empty)	C	From Face	2.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice	1.400 1.735	0.087 0.131	0.030 0.041
(2) 7770.00 (AT&T - Existing)	A	From Face	3.000 0.000 0.000	0.000	113.000	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) 7770.00 (AT&T - Existing)	B	From Face	3.000 0.000 0.000	0.000	113.000	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) 7770.00 (AT&T - Existing)	C	From Face	3.000 0.000 0.000	0.000	113.000	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) TT19-08BP111-001 TMA (AT&T - Existing)	A	From Face	3.000 0.000 0.000	0.000	113.000	No Ice 1/2" Ice	0.645 0.757	0.520 0.623	0.016 0.022
(2) TT19-08BP111-001 TMA (AT&T - Existing)	B	From Face	3.000 0.000 0.000	0.000	113.000	No Ice 1/2" Ice	0.645 0.757	0.520 0.623	0.016 0.022
(2) TT19-08BP111-001 TMA (AT&T - Existing)	C	From Face	3.000 0.000 0.000	0.000	113.000	No Ice 1/2" Ice	0.645 0.757	0.520 0.623	0.016 0.022
AM-X-CD-16-65-00T-RET(72") (AT&T - Existing)	A	From Face	3.000 -2.000 0.000	0.000	113.000	No Ice 1/2" Ice	8.260 8.807	4.642 5.088	0.050 0.096
AM-X-CD-16-65-00T-RET(72") (AT&T - Existing)	B	From Face	3.000 -2.000 0.000	0.000	113.000	No Ice 1/2" Ice	8.260 8.807	4.642 5.088	0.050 0.096

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
800-10764 (AT&T - Existing)	C	From Face	3.000 -2.000 0.000	0.000	113.000	No Ice 1/2" Ice	6.333 6.771	3.389 3.740	0.041 0.078
(2) RRUS-11 (AT&T - Existing)	A	From Face	1.000 -2.000 0.000	0.000	113.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
(2) RRUS-11 (AT&T - Existing)	B	From Face	1.000 -2.000 0.000	0.000	113.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
(2) RRUS-11 (AT&T - Existing)	C	From Face	1.000 -2.000 0.000	0.000	113.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
DC6-48-60-18-8F Surge Arrestor (AT&T - Existing)	C	From Face	0.500 0.000 0.000	0.000	113.000	No Ice 1/2" Ice	2.228 2.447	2.228 2.447	0.020 0.039
EEI 10' Universal T-Arm (AT&T - Existing)	A	None		0.000	111.500	No Ice 1/2" Ice	13.340 16.800	13.340 16.800	0.450 0.600
EEI 10' Universal T-Arm (AT&T - Existing)	B	None		0.000	111.500	No Ice 1/2" Ice	13.340 16.800	13.340 16.800	0.450 0.600
EEI 10' Universal T-Arm (AT&T - Existing)	C	None		0.000	111.500	No Ice 1/2" Ice	13.340 16.800	13.340 16.800	0.450 0.600
(2) AIR21 (T-Mobile - Existing)	A	From Face	3.500 0.000 0.000	0.000	102.000	No Ice 1/2" Ice	6.533 6.978	4.356 4.775	0.083 0.125
(2) AIR21 (T-Mobile - Existing)	B	From Face	3.500 0.000 0.000	0.000	102.000	No Ice 1/2" Ice	6.533 6.978	4.356 4.775	0.083 0.125
(2) AIR21 (T-Mobile - Existing)	C	From Face	3.500 0.000 0.000	0.000	102.000	No Ice 1/2" Ice	6.533 6.978	4.356 4.775	0.083 0.125
KRY 112 TMA (T-Mobile - Existing)	A	From Face	3.500 0.000 0.000	0.000	102.000	No Ice 1/2" Ice	0.778 0.899	0.486 0.588	0.025 0.031
KRY 112 TMA (T-Mobile - Existing)	B	From Face	3.500 0.000 0.000	0.000	102.000	No Ice 1/2" Ice	0.778 0.899	0.486 0.588	0.025 0.031
KRY 112 TMA (T-Mobile - Existing)	C	From Face	3.500 0.000 0.000	0.000	102.000	No Ice 1/2" Ice	0.778 0.899	0.486 0.588	0.025 0.031
Valmont T-Arm (1) (T-Mobile - Existing)	A	From Face	2.000 0.000 0.000	0.000	101.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (T-Mobile - Existing)	B	From Face	2.000 0.000 0.000	0.000	101.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (T-Mobile - Existing)	C	From Face	2.000 0.000 0.000	0.000	101.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
APXV18-206517-C (MetroPCS - Existing)	A	From Face	0.500 0.000 0.000	0.000	92.000	No Ice 1/2" Ice	5.513 5.983	3.929 4.385	0.022 0.053
APXV18-206517-C (MetroPCS - Existing)	B	From Face	0.500 0.000 0.000	0.000	92.000	No Ice 1/2" Ice	5.513 5.983	3.929 4.385	0.022 0.053
APXV18-206517-C (MetroPCS - Existing)	C	From Face	0.500 0.000 0.000	0.000	92.000	No Ice 1/2" Ice	5.513 5.983	3.929 4.385	0.022 0.053

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* *K*
Valmont Uni-Tri Bracket (MetroPCS - Existing)	A	From Face	0.500 0.000 0.000	0.000	92.000	No Ice 1/2" Ice	1.750 1.940	1.750 1.940	0.290 0.306
Barhamsted Branch 1	A	From Face	3.000 0.000 0.000	0.000	153.260	No Ice 1/2" Ice	48.510 48.150	48.510 48.510	0.320 0.730
Barhamsted Branch 2	A	From Face	3.000 0.000 0.000	0.000	138.160	No Ice 1/2" Ice	120.490 120.490	120.490 120.490	2.290 3.830
Barhamsted Branch 3	A	From Face	3.000 0.000 0.000	0.000	121.390	No Ice 1/2" Ice	13.860 13.860	13.860 13.860	0.090 0.210
Barhamsted Branch 4	A	From Face	3.000 0.000 0.000	0.000	109.850	No Ice 1/2" Ice	134.660 134.660	134.660 134.660	2.560 4.280
Barhamsted Branch 5	A	From Face	3.000 0.000 0.000	0.000	91.600	No Ice 1/2" Ice	28.620 28.620	28.620 28.620	0.900 1.440
Barhamsted Branch 6	A	From Face	3.000 0.000 0.000	0.000	82.800	No Ice 1/2" Ice	22.070 22.070	22.070 22.070	0.770 1.300
APXVTM14-C-I20 (Sprint - Proposed)	A	From Face	3.000 -3.000 0.000	0.000	140.000	No Ice 1/2" Ice	6.806 7.254	3.562 3.919	0.060 0.099
APXVTM14-C-I20 (Sprint - Proposed)	B	From Face	3.000 -3.000 0.000	0.000	140.000	No Ice 1/2" Ice	6.806 7.254	3.562 3.919	0.060 0.099
APXVTM14-C-I20 (Sprint - Proposed)	C	From Face	3.000 -3.000 0.000	0.000	140.000	No Ice 1/2" Ice	6.806 7.254	3.562 3.919	0.060 0.099
TD-RRH 8x20 2500 (Sprint - Proposed)	A	From Face	3.000 -3.000 0.000	0.000	140.000	No Ice 1/2" Ice	4.720 5.014	1.700 1.917	0.070 0.097
TD-RRH 8x20 2500 (Sprint - Proposed)	B	From Face	3.000 -3.000 0.000	0.000	140.000	No Ice 1/2" Ice	4.720 5.014	1.700 1.917	0.070 0.097
TD-RRH 8x20 2500 (Sprint - Proposed)	C	From Face	3.000 -3.000 0.000	0.000	140.000	No Ice 1/2" Ice	4.720 5.014	1.700 1.917	0.070 0.097

Tower Pressures - No Ice

G_H = 1.690

Section Elevation *ft*	*z* *ft*	K_Z	q_z *ksf*	A_G ft^2	*Face*	A_F ft^2	A_R ft^2	A_{leg} ft^2	*Leg %*	C_AA_A *In Face* ft^2	C_AA_A *Out Face* ft^2
L1 146.000-125.0	135.071	1.496	0.025	50.678	A B	0.000 0.000	50.678 50.678	50.678	100.00 100.00	0.000 0.000	0.000 0.000

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
00					C	0.000	50.678		100.00	0.000	0.000
L2	102.819	1.384	0.023	137.406	A	0.000	137.406	137.406	100.00	0.000	0.000
125.000-82.25					B	0.000	137.406		100.00	0.000	0.000
0					C	0.000	137.406		100.00	0.000	0.000
L3	62.331	1.199	0.020	161.736	A	0.000	161.736	161.736	100.00	0.000	0.000
82.250-43.000					B	0.000	161.736		100.00	0.000	0.000
					C	0.000	161.736		100.00	0.000	0.000
L4	21.306	1	0.016	210.331	A	0.000	210.331	210.331	100.00	0.000	0.000
43.000-1.000					B	0.000	210.331		100.00	0.000	0.000
					C	0.000	210.331		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

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

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	135.071	1.496	0.010	50.678	A	0.000	50.678	50.678	100.00	0.000	0.000
146.000-125.0					B	0.000	50.678		100.00	0.000	0.000
00					C	0.000	50.678		100.00	0.000	0.000
L2	102.819	1.384	0.009	137.406	A	0.000	137.406	137.406	100.00	0.000	0.000
125.000-82.25					B	0.000	137.406		100.00	0.000	0.000
0					C	0.000	137.406		100.00	0.000	0.000
L3	62.331	1.199	0.008	161.736	A	0.000	161.736	161.736	100.00	0.000	0.000
82.250-43.000					B	0.000	161.736		100.00	0.000	0.000
					C	0.000	161.736		100.00	0.000	0.000
L4	21.306	1	0.006	210.331	A	0.000	210.331	210.331	100.00	0.000	0.000
43.000-1.000					B	0.000	210.331		100.00	0.000	0.000
					C	0.000	210.331		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.265	1.628	A	1	1.2	1	1	1	50.678	2.519	0.120	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.810	6.613	A	1	1.2	1	1	1	137.406	6.305	0.147	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.200	10.248	A	1	1.2	1	1	1	161.736	6.415	0.163	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.198	15.507	A	1	1.2	1	1	1	210.331	6.989	0.166	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.473	33.996						OTM	1514.985 kip-ft	22.227		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.265	1.628	A	1	1.2	1	1	1	50.678	2.519	0.120	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.810	6.613	A	1	1.2	1	1	1	137.406	6.305	0.147	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.200	10.248	A	1	1.2	1	1	1	161.736	6.415	0.163	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.198	15.507	A	1	1.2	1	1	1	210.331	6.989	0.166	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.473	33.996						OTM	1514.985 kip-ft	22.227		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.265	1.628	A	1	1.2	1	1	1	50.678	2.519	0.120	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2	1.810	6.613	A	1	1.2	1	1	1	137.406	6.305	0.147	C

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

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
125.000-82.25			B	1	1.2	1	1	1	137.406			
0			C	1	1.2	1	1	1	137.406			
L3	2.200	10.248	A	1	1.2	1	1	1	161.736	6.415	0.163	C
82.250-43.000			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4	2.198	15.507	A	1	1.2	1	1	1	210.331	6.989	0.166	C
43.000-1.000			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.473	33.996						OTM	1514.985 kip-ft	22.227		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.265	1.628	A	1	1.2	1	1	1	50.678	2.519	0.120	C
146.000-125.0			B	1	1.2	1	1	1	50.678			
00			C	1	1.2	1	1	1	50.678			
L2	1.810	6.613	A	1	1.2	1	1	1	137.406	6.305	0.147	C
125.000-82.25			B	1	1.2	1	1	1	137.406			
0			C	1	1.2	1	1	1	137.406			
L3	2.200	10.248	A	1	1.2	1	1	1	161.736	6.415	0.163	C
82.250-43.000			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4	2.198	15.507	A	1	1.2	1	1	1	210.331	6.989	0.166	C
43.000-1.000			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.473	33.996						OTM	1514.985 kip-ft	22.227		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.265	2.010	A	1	1.2	1	1	1	52.428	1.954	0.093	C
146.000-125.0			B	1	1.2	1	1	1	52.428			
00			C	1	1.2	1	1	1	52.428			
L2	1.810	7.644	A	1	1.2	1	1	1	140.968	4.851	0.113	C
125.000-82.25			B	1	1.2	1	1	1	140.968			
0			C	1	1.2	1	1	1	140.968			
L3	2.200	11.458	A	1	1.2	1	1	1	165.007	4.909	0.125	C
82.250-43.000			B	1	1.2	1	1	1	165.007			
			C	1	1.2	1	1	1	165.007			
L4	2.198	17.077	A	1	1.2	1	1	1	213.831	5.329	0.127	C
43.000-1.000			B	1	1.2	1	1	1	213.831			
			C	1	1.2	1	1	1	213.831			
Sum Weight:	6.473	38.189						OTM	1165.205	17.043		

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
									kip-ft			

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.265	2.010	A	1	1.2	1	1	1	52.428	1.954	0.093	C
146.000-125.0			B	1	1.2	1	1	1	52.428			
00			C	1	1.2	1	1	1	52.428			
L2	1.810	7.644	A	1	1.2	1	1	1	140.968	4.851	0.113	C
125.000-82.25			B	1	1.2	1	1	1	140.968			
0			C	1	1.2	1	1	1	140.968			
L3	2.200	11.458	A	1	1.2	1	1	1	165.007	4.909	0.125	C
82.250-43.000			B	1	1.2	1	1	1	165.007			
			C	1	1.2	1	1	1	165.007			
L4	2.198	17.077	A	1	1.2	1	1	1	213.831	5.329	0.127	C
43.000-1.000			B	1	1.2	1	1	1	213.831			
			C	1	1.2	1	1	1	213.831			
Sum Weight:	6.473	38.189						OTM	1165.205 kip-ft	17.043		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.265	2.010	A	1	1.2	1	1	1	52.428	1.954	0.093	C
146.000-125.0			B	1	1.2	1	1	1	52.428			
00			C	1	1.2	1	1	1	52.428			
L2	1.810	7.644	A	1	1.2	1	1	1	140.968	4.851	0.113	C
125.000-82.25			B	1	1.2	1	1	1	140.968			
0			C	1	1.2	1	1	1	140.968			
L3	2.200	11.458	A	1	1.2	1	1	1	165.007	4.909	0.125	C
82.250-43.000			B	1	1.2	1	1	1	165.007			
			C	1	1.2	1	1	1	165.007			
L4	2.198	17.077	A	1	1.2	1	1	1	213.831	5.329	0.127	C
43.000-1.000			B	1	1.2	1	1	1	213.831			
			C	1	1.2	1	1	1	213.831			
Sum Weight:	6.473	38.189						OTM	1165.205 kip-ft	17.043		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	R_R	D_F	D_R	A_E ft^2	*F* *K*	*w* *klf*	*Ctrl. Face*
L1 146.000-125.000	0.265	2.010	A	1	1.2	1	1	1	52.428	1.954	0.093	C
			B	1	1.2	1	1	1	52.428			
			C	1	1.2	1	1	1	52.428			
L2 125.000-82.250	1.810	7.644	A	1	1.2	1	1	1	140.968	4.851	0.113	C
			B	1	1.2	1	1	1	140.968			
			C	1	1.2	1	1	1	140.968			
L3 82.250-43.000	2.200	11.458	A	1	1.2	1	1	1	165.007	4.909	0.125	C
			B	1	1.2	1	1	1	165.007			
			C	1	1.2	1	1	1	165.007			
L4 43.000-1.000	2.198	17.077	A	1	1.2	1	1	1	213.831	5.329	0.127	C
			B	1	1.2	1	1	1	213.831			
			C	1	1.2	1	1	1	213.831			
Sum Weight:	6.473	38.189						OTM	1165.205 kip-ft	17.043		

Tower Forces - Service - Wind Normal To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	R_R	D_F	D_R	A_E ft^2	*F* *K*	*w* *klf*	*Ctrl. Face*
L1 146.000-125.000	0.265	1.628	A	1	1.2	1	1	1	50.678	0.984	0.047	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.810	6.613	A	1	1.2	1	1	1	137.406	2.463	0.058	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.200	10.248	A	1	1.2	1	1	1	161.736	2.506	0.064	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.198	15.507	A	1	1.2	1	1	1	210.331	2.730	0.065	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.473	33.996						OTM	591.791 kip-ft	8.682		

Tower Forces - Service - Wind 45 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	R_R	D_F	D_R	A_E ft^2	*F* *K*	*w* *klf*	*Ctrl. Face*
L1 146.000-125.000	0.265	1.628	A	1	1.2	1	1	1	50.678	0.984	0.047	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.810	6.613	A	1	1.2	1	1	1	137.406	2.463	0.058	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.200	10.248	A	1	1.2	1	1	1	161.736	2.506	0.064	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L4 43.000-1.000	2.198	15.507	A	1	1.2	1	1	1	210.331	2.730	0.065	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.473	33.996						OTM	591.791 kip-ft	8.682		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.265	1.628	A	1	1.2	1	1	1	50.678	0.984	0.047	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.810	6.613	A	1	1.2	1	1	1	137.406	2.463	0.058	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.200	10.248	A	1	1.2	1	1	1	161.736	2.506	0.064	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.198	15.507	A	1	1.2	1	1	1	210.331	2.730	0.065	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.473	33.996						OTM	591.791 kip-ft	8.682		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 146.000-125.000	0.265	1.628	A	1	1.2	1	1	1	50.678	0.984	0.047	C
			B	1	1.2	1	1	1	50.678			
			C	1	1.2	1	1	1	50.678			
L2 125.000-82.250	1.810	6.613	A	1	1.2	1	1	1	137.406	2.463	0.058	C
			B	1	1.2	1	1	1	137.406			
			C	1	1.2	1	1	1	137.406			
L3 82.250-43.000	2.200	10.248	A	1	1.2	1	1	1	161.736	2.506	0.064	C
			B	1	1.2	1	1	1	161.736			
			C	1	1.2	1	1	1	161.736			
L4 43.000-1.000	2.198	15.507	A	1	1.2	1	1	1	210.331	2.730	0.065	C
			B	1	1.2	1	1	1	210.331			
			C	1	1.2	1	1	1	210.331			
Sum Weight:	6.473	33.996						OTM	591.791 kip-ft	8.682		

Force Totals

Load Case	*Vertical Forces* *K*	*Sum of Forces X* *K*	*Sum of Forces Z* *K*	*Sum of Overturning Moments, M_x* *kip-ft*	*Sum of Overturning Moments, M_z* *kip-ft*	*Sum of Torques* *kip-ft*
Leg Weight	33.996					
Bracing Weight	0.000					
Total Member Self-Weight	33.996			-15.569	27.306	
Total Weight	55.202			-15.569	27.306	
Wind 0 deg - No Ice		0.000	-55.581	-5629.184	27.306	-56.200
Wind 30 deg - No Ice		27.736	-48.134	-4877.102	-2772.097	-64.669
Wind 45 deg - No Ice		39.225	-39.302	-3984.994	-3931.648	-62.365
Wind 60 deg - No Ice		48.041	-27.790	-2822.376	-4821.403	-55.811
Wind 90 deg - No Ice		55.473	0.000	-15.569	-5571.501	-31.998
Wind 120 deg - No Ice		48.041	27.790	2791.239	-4821.403	0.389
Wind 135 deg - No Ice		39.225	39.302	3953.856	-3931.648	17.113
Wind 150 deg - No Ice		27.736	48.134	4845.964	-2772.097	32.671
Wind 180 deg - No Ice		0.000	55.581	5598.046	27.306	56.200
Wind 210 deg - No Ice		-27.736	48.134	4845.964	2826.710	64.669
Wind 225 deg - No Ice		-39.225	39.302	3953.856	3986.261	62.365
Wind 240 deg - No Ice		-48.041	27.790	2791.239	4876.015	55.811
Wind 270 deg - No Ice		-55.473	0.000	-15.569	5626.113	31.998
Wind 300 deg - No Ice		-48.041	-27.790	-2822.376	4876.015	-0.389
Wind 315 deg - No Ice		-39.225	-39.302	-3984.994	3986.261	-17.113
Wind 330 deg - No Ice		-27.736	-48.134	-4877.102	2826.710	-32.671
Member Ice	4.193					
Total Weight Ice	67.914			-26.213	46.018	
Wind 0 deg - Ice		0.005	-44.242	-4531.923	45.253	-42.166
Wind 30 deg - Ice		22.081	-38.318	-3928.655	-2201.342	-48.504
Wind 45 deg - Ice		31.225	-31.288	-3212.772	-3131.833	-46.769
Wind 60 deg - Ice		38.240	-22.126	-2279.730	-3845.759	-41.846
Wind 90 deg - Ice		44.153	-0.005	-26.978	-4447.378	-23.975
Wind 120 deg - Ice		38.235	22.117	2225.980	-3844.995	0.321
Wind 135 deg - Ice		31.217	31.281	3159.264	-3130.752	12.864
Wind 150 deg - Ice		22.072	38.313	3875.464	-2200.018	24.530
Wind 180 deg - Ice		-0.005	44.242	4479.497	46.782	42.166
Wind 210 deg - Ice		-22.081	38.318	3876.228	2293.378	48.504
Wind 225 deg - Ice		-31.225	31.288	3160.345	3223.869	46.769
Wind 240 deg - Ice		-38.240	22.126	2227.304	3937.795	41.846
Wind 270 deg - Ice		-44.153	0.005	-25.449	4539.414	23.975
Wind 300 deg - Ice		-38.235	-22.117	-2278.406	3937.031	-0.321
Wind 315 deg - Ice		-31.217	-31.281	-3211.691	3222.788	-12.864
Wind 330 deg - Ice		-22.072	-38.313	-3927.891	2292.054	-24.530
Total Weight	55.202			-15.569	27.306	
Wind 0 deg - Service		0.000	-21.711	-2208.387	27.306	-21.953
Wind 30 deg - Service		10.834	-18.802	-1914.605	-1066.211	-25.261
Wind 45 deg - Service		15.322	-15.352	-1566.125	-1519.160	-24.361
Wind 60 deg - Service		18.766	-10.856	-1111.978	-1866.721	-21.801
Wind 90 deg - Service		21.669	0.000	-15.569	-2159.728	-12.499
Wind 120 deg - Service		18.766	10.856	1080.840	-1866.721	0.152
Wind 135 deg - Service		15.322	15.352	1534.988	-1519.160	6.685
Wind 150 deg - Service		10.834	18.802	1883.468	-1066.211	12.762
Wind 180 deg - Service		0.000	21.711	2177.249	27.306	21.953
Wind 210 deg - Service		-10.834	18.802	1883.468	1120.823	25.261
Wind 225 deg - Service		-15.322	15.352	1534.988	1573.773	24.361
Wind 240 deg - Service		-18.766	10.856	1080.840	1921.333	21.801
Wind 270 deg - Service		-21.669	0.000	-15.569	2214.340	12.499
Wind 300 deg - Service		-18.766	-10.856	-1111.978	1921.333	-0.152
Wind 315 deg - Service		-15.322	-15.352	-1566.125	1573.773	-6.685
Wind 330 deg - Service		-10.834	-18.802	-1914.605	1120.823	-12.762

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	146 - 125	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-12.688	16.631	9.259
			Max. Mx	14	-6.897	282.413	4.725
			Max. My	2	-6.891	8.470	279.328
			Max. Vy	14	-21.415	282.413	4.725
			Max. Vx	2	-21.548	8.470	279.328
			Max. Torque	11			-29.092
L2	125 - 82.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-32.268	41.607	23.657
			Max. Mx	14	-21.109	1469.470	13.396
			Max. My	2	-21.106	23.530	1464.457
			Max. Vy	14	-41.377	1469.470	13.396
			Max. Vx	2	-41.484	23.530	1464.457
			Max. Torque	11			-60.451
L3	82.25 - 43	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-46.239	47.792	27.222
			Max. Mx	14	-34.131	3186.723	15.839
			Max. My	2	-34.128	27.781	3184.437
			Max. Vy	14	-48.172	3186.723	15.839
			Max. Vx	2	-48.280	27.781	3184.437
			Max. Torque	11			-64.364
L4	43 - 1	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-67.914	48.088	27.391
			Max. Mx	14	-55.171	5726.737	15.967
			Max. My	2	-55.171	28.006	5729.759
			Max. Vy	14	-55.504	5726.737	15.967
			Max. Vx	2	-55.612	28.006	5729.759
			Max. Torque	11			-64.277

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	31	67.914	44.153	-0.005
	Max. H_x	14	55.202	55.473	0.000
	Max. H_z	2	55.202	0.000	55.581
	Max. M_x	2	5729.759	0.000	55.581
	Max. M_z	6	5670.604	-55.473	0.000
	Max. Torsion	3	64.238	-27.736	48.134
	Min. Vert	1	55.202	0.000	0.000
	Min. H_x	6	55.202	-55.473	0.000
	Min. H_z	10	55.202	0.000	-55.581
	Min. M_x	10	-5697.756	0.000	-55.581
	Min. M_z	14	-5726.737	55.473	0.000
	Min. Torsion	11	-64.242	27.736	-48.134

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	55.202	-0.000	-0.000	-16.042	28.138	0.000

Load Combination	*Vertical* *K*	*Shear$_x$* *K*	*Shear$_z$* *K*	*Overturning Moment, M_x* *kip-ft*	*Overturning Moment, M_z* *kip-ft*	*Torque* *kip-ft*
Dead+Wind 0 deg - No Ice	55.202	-0.000	-55.581	-5729.759	27.997	-55.819
Dead+Wind 30 deg - No Ice	55.202	27.736	-48.134	-4964.228	-2821.329	-64.238
Dead+Wind 45 deg - No Ice	55.202	39.225	-39.302	-4056.195	-4001.548	-61.954
Dead+Wind 60 deg - No Ice	55.202	48.041	-27.790	-2872.833	-4907.156	-55.446
Dead+Wind 90 deg - No Ice	55.202	55.473	0.000	-15.965	-5670.604	-31.794
Dead+Wind 120 deg - No Ice	55.202	48.041	27.790	2840.884	-4907.121	0.381
Dead+Wind 135 deg - No Ice	55.202	39.225	39.302	4024.228	-4001.507	16.997
Dead+Wind 150 deg - No Ice	55.202	27.736	48.134	4932.242	-2821.293	32.454
Dead+Wind 180 deg - No Ice	55.202	-0.000	55.581	5697.756	28.000	55.829
Dead+Wind 210 deg - No Ice	55.202	-27.736	48.134	4932.302	2877.326	64.242
Dead+Wind 225 deg - No Ice	55.202	-39.225	39.302	4024.297	4057.574	61.952
Dead+Wind 240 deg - No Ice	55.202	-48.041	27.790	2840.945	4963.222	55.440
Dead+Wind 270 deg - No Ice	55.202	-55.473	0.000	-15.962	5726.737	31.785
Dead+Wind 300 deg - No Ice	55.202	-48.041	-27.790	-2872.888	4963.254	-0.384
Dead+Wind 315 deg - No Ice	55.202	-39.225	-39.302	-4056.260	4057.611	-16.995
Dead+Wind 330 deg - No Ice	55.202	-27.736	-48.134	-4964.284	2877.357	-32.448
Dead+Ice+Temp	67.914	-0.000	-0.000	-27.391	48.088	0.000
Dead+Wind 0 deg+Ice+Temp	67.914	0.005	-44.242	-4646.717	47.157	-41.918
Dead+Wind 30 deg+Ice+Temp	67.914	22.081	-38.318	-4028.212	-2256.092	-48.230
Dead+Wind 45 deg+Ice+Temp	67.914	31.225	-31.288	-3294.264	-3210.041	-46.509
Dead+Wind 60 deg+Ice+Temp	67.914	38.240	-22.126	-2337.682	-3941.961	-41.619
Dead+Wind 90 deg+Ice+Temp	67.914	44.153	-0.005	-28.104	-4558.732	-23.851
Dead+Wind 120 deg+Ice+Temp	67.914	38.235	22.117	2281.677	-3941.151	0.312
Dead+Wind 135 deg+Ice+Temp	67.914	31.217	31.281	3238.500	-3208.900	12.788
Dead+Wind 150 deg+Ice+Temp	67.914	22.072	38.313	3972.765	-2254.702	24.392
Dead+Wind 180 deg+Ice+Temp	67.914	-0.005	44.242	4592.049	48.740	41.932
Dead+Wind 210 deg+Ice+Temp	67.914	-22.081	38.318	3973.589	2351.989	48.232
Dead+Wind 225 deg+Ice+Temp	67.914	-31.225	31.288	3239.657	3305.955	46.504
Dead+Wind 240 deg+Ice+Temp	67.914	-38.240	22.126	2283.081	4037.898	41.607
Dead+Wind 270 deg+Ice+Temp	67.914	-44.153	0.005	-26.521	4654.709	23.838
Dead+Wind 300 deg+Ice+Temp	67.914	-38.235	-22.117	-2336.346	4037.128	-0.313
Dead+Wind 315 deg+Ice+Temp	67.914	-31.217	-31.281	-3293.186	3304.859	-12.782
Dead+Wind 330 deg+Ice+Temp	67.914	-22.072	-38.313	-4027.456	2350.638	-24.380
Dead+Wind 0 deg - Service	55.202	0.000	-21.711	-2249.247	28.163	-21.897
Dead+Wind 30 deg - Service	55.202	10.834	-18.802	-1950.052	-1085.475	-25.199
Dead+Wind 45 deg - Service	55.202	15.322	-15.352	-1595.155	-1546.757	-24.302
Dead+Wind 60 deg - Service	55.202	18.766	-10.856	-1132.647	-1900.710	-21.749
Dead+Wind 90 deg - Service	55.202	21.669	-0.000	-16.058	-2199.104	-12.470
Dead+Wind 120 deg - Service	55.202	18.766	10.856	1100.528	-1900.704	0.150
Dead+Wind 135 deg - Service	55.202	15.322	15.352	1563.034	-1546.750	6.667
Dead+Wind 150 deg - Service	55.202	10.835	18.802	1917.927	-1085.469	12.730
Dead+Wind 180 deg - Service	55.202	0.000	21.711	2217.121	28.165	21.899
Dead+Wind 210 deg - Service	55.202	-10.834	18.802	1917.937	1141.803	25.200
Dead+Wind 225 deg - Service	55.202	-15.322	15.352	1563.045	1603.090	24.302
Dead+Wind 240 deg - Service	55.202	-18.766	10.856	1100.539	1957.049	21.748
Dead+Wind 270 deg - Service	55.202	-21.669	-0.000	-16.057	2255.452	12.469
Dead+Wind 300 deg - Service	55.202	-18.766	-10.856	-1132.655	1957.053	-0.150
Dead+Wind 315 deg - Service	55.202	-15.322	-15.352	-1595.164	1603.094	-6.667
Dead+Wind 330 deg - Service	55.202	-10.834	-18.802	-1950.060	1141.807	-12.729

Solution Summary

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX* *K*	*PY* *K*	*PZ* *K*	*PX* *K*	*PY* *K*	*PZ* *K*	*% Error*
1	0.000	-55.202	0.000	0.000	55.202	0.000	0.000%
2	0.000	-55.202	-55.581	0.000	55.202	55.581	0.000%
3	27.736	-55.202	-48.134	-27.736	55.202	48.134	0.000%

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX K*	*PY K*	*PZ K*	*PX K*	*PY K*	*PZ K*	*% Error*
4	39.225	-55.202	-39.302	-39.225	55.202	39.302	0.000%
5	48.041	-55.202	-27.790	-48.041	55.202	27.790	0.000%
6	55.473	-55.202	0.000	-55.473	55.202	0.000	0.000%
7	48.041	-55.202	27.790	-48.041	55.202	-27.790	0.000%
8	39.225	-55.202	39.302	-39.225	55.202	-39.302	0.000%
9	27.736	-55.202	48.134	-27.736	55.202	-48.134	0.000%
10	0.000	-55.202	55.581	0.000	55.202	-55.581	0.000%
11	-27.736	-55.202	48.134	27.736	55.202	-48.134	0.000%
12	-39.225	-55.202	39.302	39.225	55.202	-39.302	0.000%
13	-48.041	-55.202	27.790	48.041	55.202	-27.790	0.000%
14	-55.473	-55.202	0.000	55.473	55.202	0.000	0.000%
15	-48.041	-55.202	-27.790	48.041	55.202	27.790	0.000%
16	-39.225	-55.202	-39.302	39.225	55.202	39.302	0.000%
17	-27.736	-55.202	-48.134	27.736	55.202	48.134	0.000%
18	0.000	-67.914	0.000	0.000	67.914	0.000	0.000%
19	0.005	-67.914	-44.242	-0.005	67.914	44.242	0.000%
20	22.081	-67.914	-38.318	-22.081	67.914	38.318	0.000%
21	31.225	-67.914	-31.288	-31.225	67.914	31.288	0.000%
22	38.240	-67.914	-22.126	-38.240	67.914	22.126	0.000%
23	44.153	-67.914	-0.005	-44.153	67.914	0.005	0.000%
24	38.235	-67.914	22.117	-38.235	67.914	-22.117	0.000%
25	31.217	-67.914	31.281	-31.217	67.914	-31.281	0.000%
26	22.072	-67.914	38.313	-22.072	67.914	-38.313	0.000%
27	-0.005	-67.914	44.242	0.005	67.914	-44.242	0.000%
28	-22.081	-67.914	38.318	22.081	67.914	-38.318	0.000%
29	-31.225	-67.914	31.288	31.225	67.914	-31.288	0.000%
30	-38.240	-67.914	22.126	38.240	67.914	-22.126	0.000%
31	-44.153	-67.914	0.005	44.153	67.914	-0.005	0.000%
32	-38.235	-67.914	-22.117	38.235	67.914	22.117	0.000%
33	-31.217	-67.914	-31.281	31.217	67.914	31.281	0.000%
34	-22.072	-67.914	-38.313	22.072	67.914	38.313	0.000%
35	0.000	-55.202	-21.711	0.000	55.202	21.711	0.000%
36	10.834	-55.202	-18.802	-10.834	55.202	18.802	0.000%
37	15.322	-55.202	-15.352	-15.322	55.202	15.352	0.000%
38	18.766	-55.202	-10.856	-18.766	55.202	10.856	0.000%
39	21.669	-55.202	0.000	-21.669	55.202	0.000	0.000%
40	18.766	-55.202	10.856	-18.766	55.202	-10.856	0.000%
41	15.322	-55.202	15.352	-15.322	55.202	-15.352	0.000%
42	10.834	-55.202	18.802	-10.835	55.202	-18.802	0.000%
43	0.000	-55.202	21.711	0.000	55.202	-21.711	0.000%
44	-10.834	-55.202	18.802	10.834	55.202	-18.802	0.000%
45	-15.322	-55.202	15.352	15.322	55.202	-15.352	0.000%
46	-18.766	-55.202	10.856	18.766	55.202	-10.856	0.000%
47	-21.669	-55.202	0.000	21.669	55.202	0.000	0.000%
48	-18.766	-55.202	-10.856	18.766	55.202	10.856	0.000%
49	-15.322	-55.202	-15.352	15.322	55.202	15.352	0.000%
50	-10.834	-55.202	-18.802	10.834	55.202	18.802	0.000%

Non-Linear Convergence Results

Load Combination	*Converged?*	*Number of Cycles*	*Displacement Tolerance*	*Force Tolerance*
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00011493
3	Yes	5	0.00000001	0.00012262
4	Yes	5	0.00000001	0.00016031

5	Yes	5	0.00000001	0.00016945
6	Yes	5	0.00000001	0.00006517
7	Yes	5	0.00000001	0.00007041
8	Yes	5	0.00000001	0.00008625
9	Yes	5	0.00000001	0.00006990
10	Yes	5	0.00000001	0.00011468
11	Yes	5	0.00000001	0.00018877
12	Yes	5	0.00000001	0.00016166
13	Yes	5	0.00000001	0.00010672
14	Yes	5	0.00000001	0.00006543
15	Yes	5	0.00000001	0.00007337
16	Yes	5	0.00000001	0.00009028
17	Yes	5	0.00000001	0.00012725
18	Yes	4	0.00000001	0.00005999
19	Yes	5	0.00000001	0.00022572
20	Yes	5	0.00000001	0.00024285
21	Yes	5	0.00000001	0.00030369
22	Yes	5	0.00000001	0.00031323
23	Yes	5	0.00000001	0.00013300
24	Yes	5	0.00000001	0.00015854
25	Yes	5	0.00000001	0.00018967
26	Yes	5	0.00000001	0.00016139
27	Yes	5	0.00000001	0.00022224
28	Yes	5	0.00000001	0.00035045
29	Yes	5	0.00000001	0.00030988
30	Yes	5	0.00000001	0.00022056
31	Yes	5	0.00000001	0.00013674
32	Yes	5	0.00000001	0.00017603
33	Yes	5	0.00000001	0.00021023
34	Yes	5	0.00000001	0.00025489
35	Yes	5	0.00000001	0.00003164
36	Yes	5	0.00000001	0.00003221
37	Yes	5	0.00000001	0.00003528
38	Yes	5	0.00000001	0.00003501
39	Yes	4	0.00000001	0.00075941
40	Yes	4	0.00000001	0.00035180
41	Yes	4	0.00000001	0.00056595
42	Yes	4	0.00000001	0.00067214
43	Yes	5	0.00000001	0.00003084
44	Yes	5	0.00000001	0.00004059
45	Yes	5	0.00000001	0.00003595
46	Yes	5	0.00000001	0.00002777
47	Yes	4	0.00000001	0.00079696
48	Yes	4	0.00000001	0.00041605
49	Yes	4	0.00000001	0.00064383
50	Yes	5	0.00000001	0.00002449

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* ft	*Horz. Deflection* in	*Gov. Load Comb.*	*Tilt* °	*Twist* °
L1	146 - 125	26.239	48	1.566	0.083
L2	125 - 82.25	19.503	48	1.464	0.058
L3	88 - 43	9.554	48	1.055	0.028
L4	50 - 1	2.988	49	0.559	0.011

Critical Deflections and Radius of Curvature - Service Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* *°*	*Twist* *°*	*Radius of Curvature* *ft*
153.260	Barhamsted Branch 1	48	26.239	1.566	0.083	26937
144.000	Notch Filter	48	25.585	1.558	0.081	26937
140.000	APXVSPP18-C-A20	48	24.279	1.543	0.076	22447
138.160	Barhamsted Branch 2	48	23.680	1.535	0.074	17179
133.000	LPA-80063/6CF	48	22.017	1.511	0.067	10360
132.000	Valmont T-Arm (1)	48	21.697	1.506	0.066	9620
130.000	4-ft Standoff	48	21.063	1.495	0.064	8417
121.390	Barhamsted Branch 3	48	18.404	1.436	0.054	6200
113.000	(2) 7770.00	48	15.951	1.358	0.046	5743
111.500	EEI 10' Universal T-Arm	48	15.527	1.343	0.045	5669
109.850	Barhamsted Branch 4	48	15.067	1.325	0.044	5590
102.000	(2) AIR21	48	12.959	1.234	0.037	5242
101.000	Valmont T-Arm (1)	48	12.700	1.222	0.037	5200
92.000	APXV18-206517-C	48	10.478	1.107	0.031	4856
91.600	Barhamsted Branch 5	48	10.384	1.102	0.030	4842
82.800	Barhamsted Branch 6	48	8.414	0.986	0.025	4533

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* *°*	*Twist* *°*
L1	146 - 125	65.852	16	3.898	0.213
L2	125 - 82.25	49.069	16	3.663	0.148
L3	88 - 43	24.128	16	2.656	0.072
L4	50 - 1	7.567	17	1.413	0.027

Critical Deflections and Radius of Curvature - Design Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* *°*	*Twist* *°*	*Radius of Curvature* *ft*
153.260	Barhamsted Branch 1	16	65.852	3.898	0.213	11375
144.000	Notch Filter	16	64.223	3.882	0.206	11375
140.000	APXVSPP18-C-A20	16	60.971	3.847	0.194	9479
138.160	Barhamsted Branch 2	16	59.481	3.830	0.188	7254
133.000	LPA-80063/6CF	16	55.337	3.775	0.172	4374
132.000	Valmont T-Arm (1)	16	54.542	3.764	0.169	4061
130.000	4-ft Standoff	16	52.960	3.738	0.163	3553
121.390	Barhamsted Branch 3	16	46.326	3.597	0.139	2601
113.000	(2) 7770.00	16	40.188	3.408	0.118	2382
111.500	EEI 10' Universal T-Arm	16	39.127	3.370	0.115	2347
109.850	Barhamsted Branch 4	16	37.974	3.326	0.111	2309
102.000	(2) AIR21	16	32.685	3.102	0.095	2146
101.000	Valmont T-Arm (1)	16	32.036	3.071	0.094	2126
92.000	APXV18-206517-C	16	26.453	2.787	0.078	1968
91.600	Barhamsted Branch 5	16	26.216	2.774	0.077	1961
82.800	Barhamsted Branch 6	16	21.258	2.484	0.064	1825

Compression Checks

Pole Design Data

Section No.	Elevation (ft)	Size	L (ft)	L_u (ft)	Kl/r	F_a (ksi)	A (in^2)	Actual P (K)	Allow. P_a (K)	Ratio $\frac{P}{P_a}$
L1	146 - 125 (1)	TP32.508x25.41x0.25	21.000	0.000	0.0	39.000	25.597	-6.889	998.272	0.007
L2	125 - 82.25 (2)	TP44.632x32.508x0.375	42.750	0.000	0.0	39.000	50.736	-21.102	1978.700	0.011
L3	82.25 - 43 (3)	TP55.014x42.251x0.438	45.000	0.000	0.0	39.000	73.029	-34.127	2848.150	0.012
L4	43 - 1 (4)	TP66.05x52.154x0.5	49.000	0.000	0.0	39.000	104.028	-55.171	4057.090	0.014

Pole Bending Design Data

Section No.	Elevation (ft)	Size	Actual M_x (kip-ft)	Actual f_{bx} (ksi)	Allow. F_{bx} (ksi)	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y (kip-ft)	Actual f_{by} (ksi)	Allow. F_{by} (ksi)	Ratio $\frac{f_{by}}{F_{by}}$
L1	146 - 125 (1)	TP32.508x25.41x0.25	283.924	16.720	39.000	0.429	0.000	0.000	39.000	0.000
L2	125 - 82.25 (2)	TP44.632x32.508x0.375	1474.900	33.196	39.000	0.851	0.000	0.000	39.000	0.000
L3	82.25 - 43 (3)	TP55.014x42.251x0.438	3194.658	40.469	39.000	1.038	0.000	0.000	39.000	0.000
L4	43 - 1 (4)	TP66.05x52.154x0.5	5737.883	40.911	39.000	1.049	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation (ft)	Size	Actual V (K)	Actual f_v (ksi)	Allow. F_v (ksi)	Ratio $\frac{f_v}{F_v}$	Actual T (kip-ft)	Actual f_{vt} (ksi)	Allow. F_{vt} (ksi)	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	146 - 125 (1)	TP32.508x25.41x0.25	21.483	0.839	26.000	0.065	7.813	0.225	26.000	0.009
L2	125 - 82.25 (2)	TP44.632x32.508x0.375	41.434	0.817	26.000	0.063	16.014	0.176	26.000	0.007
L3	82.25 - 43 (3)	TP55.014x42.251x0.438	48.228	0.660	26.000	0.051	17.007	0.105	26.000	0.004
L4	43 - 1 (4)	TP66.05x52.154x0.5	55.585	0.534	26.000	0.041	32.448	0.113	26.000	0.004

Pole Interaction Design Data

Section No.	Elevation (ft)	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	146 - 125 (1)	0.007	0.429	0.000	0.065	0.009	0.437 ✔	1.333	H1-3+VT ✔
L2	125 - 82.25 (2)	0.011	0.851	0.000	0.063	0.007	0.863	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	82.25 - 43 (3)	0.012	1.038	0.000	0.051	0.004	1.051 ✔	1.333	H1-3+VT ✔
L4	43 - 1 (4)	0.014	1.049	0.000	0.041	0.004	1.063 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF^*P_{allow} K	% Capacity	Pass Fail
L1	146 - 125	Pole	TP32.508x25.41x0.25	1	-6.889	1330.697	32.8	Pass
L2	125 - 82.25	Pole	TP44.632x32.508x0.375	2	-21.102	2637.607	64.8	Pass
L3	82.25 - 43	Pole	TP55.014x42.251x0.438	3	-34.127	3796.584	78.8	Pass
L4	43 - 1	Pole	TP66.05x52.154x0.5	4	-55.171	5408.101	79.8	Pass
							Summary	
						Pole (L4)	79.8	Pass
						RATING =	**79.8**	**Pass**

Flange Bolt and Flange Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 283 \cdot ft \cdot kips$	(Input From tnxTower)
Shear Force =	$Shear := 22 \cdot kips$	(Input From tnxTower)
Axial Force =	$Axial := 12.7 \cdot kips$	(Input From tnxTower)

Flange Bolt Data:

Use ASTM A325

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

Flange Plate Data:

Use ASTM A572 Mod 50

Plate Yield Strength =	$Fy_{bp} := 50 \cdot ksi$	(User Input)
Flange Plate Thickness =	$t_{bp} := 1.25 \cdot in$	(User Input)
Flange Plate Diameter =	$D_{bp} := 41.0 \cdot in$	(User Input)
Outer Pole Diameter =	$D_{pole} := 32.508 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

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

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

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

$d_1 = 9.25 \cdot in$ | $d_7 = -9.25 \cdot in$

$d_2 = 16.02 \cdot in$ | $d_8 = -16.02 \cdot in$

$d_3 = 18.50 \cdot in$ | $d_9 = -18.50 \cdot in$

$d_4 = 16.02 \cdot in$ | $d_{10} = -16.02 \cdot in$

$d_5 = 9.25 \cdot in$ | $d_{11} = -9.25 \cdot in$

$d_6 = 0.00 \cdot in$ | $d_{12} = -0.00 \cdot in$

Critical Distances For Bending in Plate:

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

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

$MA_1 = 0.00 \cdot in$ | $MA_7 = 0.00 \cdot in$

$MA_2 = 0.00 \cdot in$ | $MA_8 = 0.00 \cdot in$

$MA_3 = 2.25 \cdot in$ | $MA_9 = 0.00 \cdot in$

$MA_4 = 0.00 \cdot in$ | $MA_{10} = 0.00 \cdot in$

$MA_5 = 0.00 \cdot in$ | $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.00 \cdot in$ | $MA_{12} = 0.00 \cdot in$

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

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

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

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

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

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

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

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

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 29.5 \cdot kips$

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

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Gross}} = 71 \cdot \%$

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

Condition1 = "OK"

Flange Plate Analysis:

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

$C_1 = 16.4 \cdot kips$	$C_7 = -14.2 \cdot kips$
$C_2 = 27.6 \cdot kips$	$C_8 = -25.4 \cdot kips$
$C_3 = 31.7 \cdot kips$	$C_9 = -29.5 \cdot kips$
$C_4 = 27.6 \cdot kips$	$C_{10} = -25.4 \cdot kips$
$C_5 = 16.4 \cdot kips$	$C_{11} = -14.2 \cdot kips$
$C_6 = 1.1 \cdot kips$	$C_{12} = 1.1 \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} \cdot t_{bp}^2\right)} = 13.7 \cdot ksi$$

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

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 27.4 \cdot \%$

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

$Condition2 = \text{"Ok"}$

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 5738 \cdot ft \cdot kips$	(Input From tnxTower)
Shear Force =	$Shear := 56 \cdot kips$	(Input From tnxTower)
Axial Force =	$Axial := 55 \cdot kips$	(Input From tnxTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

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

Base Plate Data:

Use ASTM A572 Gr. 55

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

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 36.875\text{in}$ (User Input)

$d_2 := 35.75\text{in}$ (User Input)

$d_3 := 33.75\text{in}$ (User Input)

$d_4 := 15.125\text{in}$ (User Input)

$d_5 := 9.375\text{in}$ (User Input)

$d_6 := 3.0\text{in}$ (User Input)

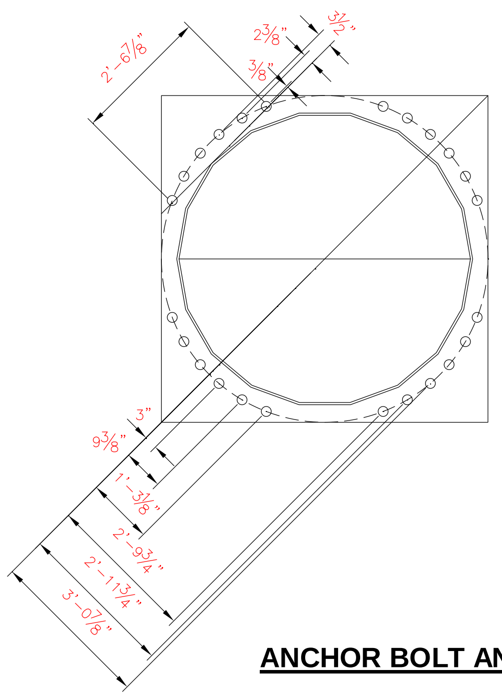
Critical Distances For Bending in Plate:

$ma_1 := 3.5\text{in}$ (User Input)

$ma_2 := 2.375\text{in}$ (User Input)

$ma_3 := 0.375\text{in}$ (User Input)

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



ANCHOR BOLT AND PLATE GEOMETRY

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

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

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

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

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

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

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

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_1}{I_p} - \frac{Axial}{N} = 152.4 \cdot kips$

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

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

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 78.2 \cdot \%$ Bolts are "upset bolts". Use net area per AISC

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

Condition1 = "OK"

Note Shear stress is negligible

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N}\right) \cdot l = 0.583 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 8.5 \cdot ksi$

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

Check Combined Stress Requirement:

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

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

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

Check Anchor Bolt Compression/Combined Stress:

Applied Compressive Force = $C_{Max} := OM \cdot \frac{d_1}{I_p} + \frac{Axial}{N} = 157 \cdot kips$

Applied Compressive Stress = $f_a := \frac{C_{Max}}{A_n} = 48.3 \cdot ksi$

$K := 0.65$

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

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

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

Combined Stress % of Capacity = $\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) = 80.6 \cdot \%$

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

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts =

$$C_1 := \frac{OM \cdot d_1}{I_p} + \frac{Axial}{N} = 157.017 \cdot kips$$

$$C_2 := \frac{OM \cdot d_2}{I_p} + \frac{Axial}{N} = 152.296 \cdot kips$$

$$C_3 := \frac{OM \cdot d_3}{I_p} + \frac{Axial}{N} = 143.904 \cdot kips$$

Applied Bending Stress in Plate =

$$f_{bp} := \frac{6 \cdot \left(2C_1 \cdot ma_1 + 2C_2 \cdot ma_2 + 2C_3 \cdot ma_3\right)}{B_{eff} \cdot t_{bp}^{\ 2}} = 35.52 \cdot ksi$$

Allowable Bending Stress in Plate =

$$F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 54.9 \cdot ksi$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} = 64.7 \cdot \%$$

Condition3 =

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

Condition3 = "Ok"

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 5738 \cdot ft \cdot kips$	(User Input from tnxTower)
Shear Force =	$Shear := 56 \cdot kip$	(User Input from tnxTower)
Axial Force =	$Axial := 55 \cdot kip$	(User Input from tnxTower)
Tower Height =	$H_t := 145 \cdot ft$	(User Input)

Footing Data:

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

Anchor Bolt Data:

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

Material Properties:

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

Pier Reinforcement:

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

Pad Reinforcement:

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

Calculated Factors:

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

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

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

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

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

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

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

Stability of Footing:

Passive Pressure =

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

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

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

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

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

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

$$A_p := W_f \cdot T_p = 126$$

Ultimate Shear =

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

Weight of the Concrete Pier =

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

Weight of the Concrete Pad =

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

Weight of the Soil Above Footing =

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

Weight of the Soil Wedge at Back Face =

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

Total Weight =

$$WT_{tot} := WTc_{pier} + WTc_{pad} + WT_{soil1} + Axial = 919.6 \cdot kips$$

Resisting Moment =

$$M_r := (WT_{tot}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + \left[(WT_{soil2}) \cdot \left[W_f + \frac{(D_f - T_f) \cdot \tan(\Phi_s)}{3}\right]\right] = 15530 \cdot kip \cdot ft$$

Overturning Moment =

$$M_{ot} := OM + Shear \cdot (L_p + T_f) = 6270 \cdot kip \cdot ft$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 2.48$$

Factor of Safety Required =

$$FS_{req} := 2$$

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

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 283.106 \cdot kips$

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

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

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

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

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.13 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.277 \cdot ksf$

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

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.292$

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

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

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 6.818$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.179 \cdot ksf$

$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 2.179 \cdot ksf$

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

Pressure_Check = "Okay"

Concrete Bearing Capacity:

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

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

$Bearing\_Check := if(P_b > LF \cdot Axial, "Okay", "No Good")$

$Bearing\_Check = "Okay"$

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

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

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

$d_2 := d_1 - d$

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

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

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

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

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

$Beam\_Shear\_Check = "Okay"$

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

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

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

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

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

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

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

$V_u := v_u \cdot d \cdot W_f = 792.6 \cdot \text{kips}$

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

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

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

$q_b := q_{adj} - d_1 \cdot \text{Slope} = 1.223 \cdot \text{ksf}$

Maximum Bending at Face of Pier = $M_n := \frac{1}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^{\,2}}{3} + q_b \cdot \frac{d_1^{\,2}}{2} \right] \cdot W_f = 4495.1 \cdot \text{kip} \cdot \text{ft}$

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

(ACI-200810.2.7.3)

$R_u := \frac{M_n}{\phi_m \cdot W_f \cdot d^2} = 83.4 \cdot \text{psi}$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_u}{0.85 \cdot f_c}} \right) = 0.0014$

$\rho_{min} := 1.333 \cdot \rho = 0.00189$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 31.064 \cdot in^2$

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

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

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

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

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

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

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

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

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

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

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

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

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

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

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

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

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

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 36.19 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

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

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

Steel_Area_Check = "Okay"

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

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

Maximum Moment in Pier = $M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] \cdot LF = 97159.7 \cdot in \cdot kips$

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

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

$$\begin{pmatrix} D & N & n & P_u & M_{xu} \end{pmatrix} = \begin{pmatrix} 96 & 60 & 11 & 73.3 & 97159.7 \end{pmatrix}$$

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

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

$$\begin{pmatrix} \phi P_n & \phi M_{xn} & f_{sp} & \rho \end{pmatrix} = \begin{pmatrix} 143.7 & 1.9 \times 10^5 & -60 & 0 \end{pmatrix}$$

Axial_Load_Check := $if(\phi P_n \ge P_u, \text{"Okay"}, \text{"No Good"})$

Axial_Load_Check = "Okay"

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

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

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

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

Tension: (ACI-2008 12.2.3)

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

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

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

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

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

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

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

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

Compression: (ACI-2008 12.3.2)

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

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

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

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

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

Tie Size and Spacing in Column:

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

Used #3 Ties

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

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

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

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

$s_{lim4} := 18in$

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

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

Check Anchor Steel Embedment:

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

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

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

Depth_Check = "No Good"

Note: Anchor plate is provided

RFDS

Cascade Number	CT33XC113
Site Number	0
Site Name	Barkhamsted Pleasant V
OEM	ALU
99 Market Name	Southern Connecticut
Cluster ID	Southern Connecticut25
Issue Date	03/07/2014
Solution ID	
PID	25LTECT33XC113
Revision	1
Revision Date	03/07/2014
Status	Draft
Needed Date	
RFDS Engineer	
Sprint RF Engineer	
RF Engineer Phone	
RF Engineer Email	
Sprint RF Manager	
RF Manager Phone	
RF Manager Email	
Project Description	New 2.5G TDD LTE service at existing site. Add new antennas, RRH and RAN equipment.
Process Instance ID	207325

Location

Latitude (decimal only)	
Longitude (decimal only)	
Address	31 New Hartford Rd
City	Barkhamsted
State	CT
Zip Code	6063
County	Litchfield
E911 Phase	

Site Level Design - 2500 MHz

	Number of Sectors	Carrier Count when 2.5G is on air	Tx and Rx start and stop frequencies
LTE 2500	3	3	2496 MHz - 2690 MHz

New Growth Cabinet

Make/Model	None
New Growth Cabinet Quantity	0
New Top Hat Make/Model	None
New Top Hat Cabinet Quantity	0
Incremental Current Draw needed by new Growth Cabinet or Top Hat (amps)	0
Radio Configuration	8T8R
Split Mode	0
Radio Scenario	1
Plumbing Diagram File Name	
RRH / RRU Model	TD-RRH8x20-25
RRH / RRU Qty	3
Power Junction Cylinder Make/Model	None
Power Junction Cylinder Qty	0
Optical Junction Cylinder Make/Model	N/A
Optical Junction Cylinder Qty	0
Use existing 1900Mhz Power for RRH?	false
Use existing 1900Mhz fiber for RRH?	false
Hybrid/Fiber Cable Make/Model	
Hybrid/Fiber Qty	0
Homerun Coax Cable Make/Model	
Homerun Coax Cable Qty	0
Additional GPS antenna required?	false
A&E Drawing Requirements	1) Calculate and call-out hybrid/fiber/coax main line cable route and lengths. 2) Calculate and call-out AISG cable route and lengths. 3) All antenna heights are to center of horizontal antennna. 4) Verify CL height with as-built drawings in Siterra or per Sprint site development. 5) No object is to be located 45 degrees left and right of front of antenna or 67.5 degress from horizontal from top and bottom of antenna. If this is not possible, contact RF Engineer for further instruction. In addition, 2.5G antenna is not to be placed in front of any other antenna using the same rules as above. Reference Sprint Antenna Placement Guidelines in Siterra General Library for more details. This includes Sprint and non-Sprint antennas. If necessary, 2.5G antenna can be placed at far edge of horizontal antenna mount member for clear Line Of Site or even on another sector mount for clear Line Of Site. 6) Horizontally, 2.5G antenna must be at least 18" from 1900Mhz antenna, 30" from 800Mhz antenna and 30Mhz from dual band 1900Mhz and 800Mhz antenna. Reference Sprint Antenna

	Placement Guidelines in Siterra General Library for vertical spacing requirements.
Special Construction Requirements	1) AISG tests to verify operation is to be performed AFTER final installation of antennas and AISG cables have been connected. Verfy operation of ALL existing Sprint AISG equipment including 800Mhz, 1.9Ghz and 2.5G. Test include complete downtilt, azimuth (if applicable) and beamwidth swings (if applicable). Document AISG test results in Coax Sweep Test spreadsheet. 3) General Contractor must insure that no object is located in front of antenna. This means no object is to be located 45 degrees left and right of front of antenna or 67.5 degress from horizontal from top and bottom of antenna. If this is not possible, contact RF Engineer for further instruction. In addition, 2.5G antenna is not to be placed in front of any other antenna using the same rules as above. This includes Sprint and non-Sprint antennas. 4) General Contract is required to use a digital alignment tool to set azimuth, roll and downtilt. Azimuth accuracy is to be within 3 degrees. Downtilt and roll (left to right tilt) is to be within 0.1 degrees. If for some reason this accuracy cannot be achieved, update as-built drawings and email Sprint RF Engineer with as-built settings. Use 3Z RF alignment tool or equivalent tool. http://www.3ztelecom.com/antenna-alignment-tool/
Additional RF Notes	Site development - if no centerline height and azimuth exists in this RFDS, it means final RFDS has not been completed. If site is already leased and zoned, turn site on per lease. If not yet leased or zoned or if you can easily change the RF configuration, lease and zone, using on-air 1900 CL height and azimuth, mDT=0, eDT=-2 and use antenna called out in this RFDS for leasing and zoning. At some point, the final RFDS will come through. If different than your current configuration, you need to make a judgment call. If you can change the configuration without much delay in turning the site on, then make the change. If not, the build the site with existing configuration. Later one, you will receive funding to release, zone and modify site per final RFDS.

Sector and Antenna - 2500 MHz

Final/New Configuration	Sector 1	Sector 2	Sector 3
Azimuth	10	110	200
Antenna Center Line (ft)			
Antenna Manufacturer	RFS	RFS	RFS
Antenna Model	APXVTM14-ALU-I20	APXVTM14-ALU-I20	APXVTM14-ALU-I20
Antenna Qty	1	1	1
Antenna Mechanical Downtilt	0	0	0
Antenna Electrical Downtilt	-2	-2	-2
Combined with			
Upper Splitter Make/Model			
Upper Splitter Qty	0	0	0
Top Jumper Make/Model	Coax Jumper. Mfg TBD.	Coax Jumper. Mfg TBD.	Coax Jumper. Mfg TBD.
Top Jumper Quantity (individual jumpers, not bunch)	9	9	9
Bottom Jumper Make/Model			
Bottom Jumper Qty	0	0	0
Surge Arrestor			
RF Filter Make/Model	N/A	N/A	N/A
RF Filter Qty	0	0	0

EBI Consulting
environmental | engineering | due diligence

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

Sprint Existing Facility

Site ID: CT33XC113

Regional Refuse

31 New Hartford Road
Barkhampsted, CT 06063

June 3, 2014

EBI Project Number: 62143253

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

June 3, 2014

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

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:
CT33XC113 - Regional Refuse

Site Total: 56.81% - MPE% in full compliance

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 31 New Hartford Road, Barkhampsted, CT, for the purpose of determining whether the radio frequency (RF) exposure levels from the proposed Sprint equipment upgrades on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed upgrades to the existing Sprint Wireless antenna facility located at 31 New Hartford Road, Barkhampsted, 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) 2 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 **140 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	CT33XC113 - Regional Refuse
Site Addresss	31 New Hartford Road, Barkhampsted, CT, 06063
Site Type	Monopole

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (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	2	40	5.9	140	134	1/2 "	0.5	3	69.51	0.14%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	140	134	1/2 "	0.5	3	19.54	0.07%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	140	134	1/2 "	0.5	3	69.51	0.25%
														Sector total Power Density Value:	0.45%	

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	2	40	5.9	140	134	1/2 "	0.5	3	69.51	0.14%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	140	134	1/2 "	0.5	3	19.54	0.07%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	140	134	1/2 "	0.5	3	69.51	0.25%
														Sector total Power Density Value:	0.45%	

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	2	40	5.9	140	134	1/2 "	0.5	3	69.51	0.14%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	140	134	1/2 "	0.5	3	19.54	0.07%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	140	134	1/2 "	0.5	3	69.51	0.25%
														Sector total Power Density Value:	0.45%	

Site Composite MPE %

Carrier	MPE %
Sprint	1.36%
AT&T	24.74%
MetroPCS	7.87%
T-Mobile	0.34%
Nextel	3.54%
Verizon Wireless	18.96%
Total Site MPE %	**56.81%**

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 **1.36% (0.45% from sector 1, 0.45% from sector 2 and 0.45% 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 **56.81%** 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

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