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

October 16, 2012

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

RE: **EM-SPRINT-NEXTEL-115-120919** – Sprint Nextel Corporation notice of intent to modify an existing telecommunications facility located at 15 Kluge Road, Prospect, Connecticut.

Dear Weisman:

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

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

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated September 17, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/CDM/jbw

c: The Honorable Robert J. Chatfield, Mayor, Town of Prospect
William J. Donovan, Zoning Enforcement Officer, Town of Prospect
Global Signal Acquisitions



CSC
CONNECTICUT SITING COUNCIL

infinigy
engineering & surveying

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

**EM-SPRINT-NEXTEL-115-120919**

ORIGINAL

RECEIVED
SEP 19 2012
CONNECTICUT
SITING COUNCIL

September 17, 2012

Department of Planning and Zoning
Ten Franklin Square
New Britain, CT 06051
Attn: Ms. Linda Roberts

**Re: Notice of Exempt Modification for 15 Kluge Road, Prospect, CT**

Dear Ms. Roberts,

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

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

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

Thank you,

By: _____

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

CC: Mayor Robert J. Chatfield
Town of Prospect
36 Center Street
Prospect, CT 06712

# Notice of Exempt Modification
# 15 Kluge Road, Prospect, 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 190' monopole tower located at 15 Kluge Road in the Town of Prospect. More particularly, Sprint plans to upgrade this site by adding 4G LTE technology to its facilities. The proposed modifications will not increase the tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six (6) decibels, or add radio frequency sending or receiving capability which increases the total radio frequency electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to Connecticut General Statutes § 22a-162.

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

The 190' monopole tower located at 15 Kluge Road in the Town of Prospect (lat. 41° 28' 16.43", long. 72° 58' 18.97") is owned by Global Signal Acquisitions II LLC. It is in an approximately 50 x 50 fenced compound within a 10,000 square foot area. Sprint currently has six (6) CDMA antennas (two (2) per sector) mounted at 190' installed on the tower. Sprint's base station equipment is located adjacent to the base of the tower within the fenced compound. A site plan depicting this is attached.

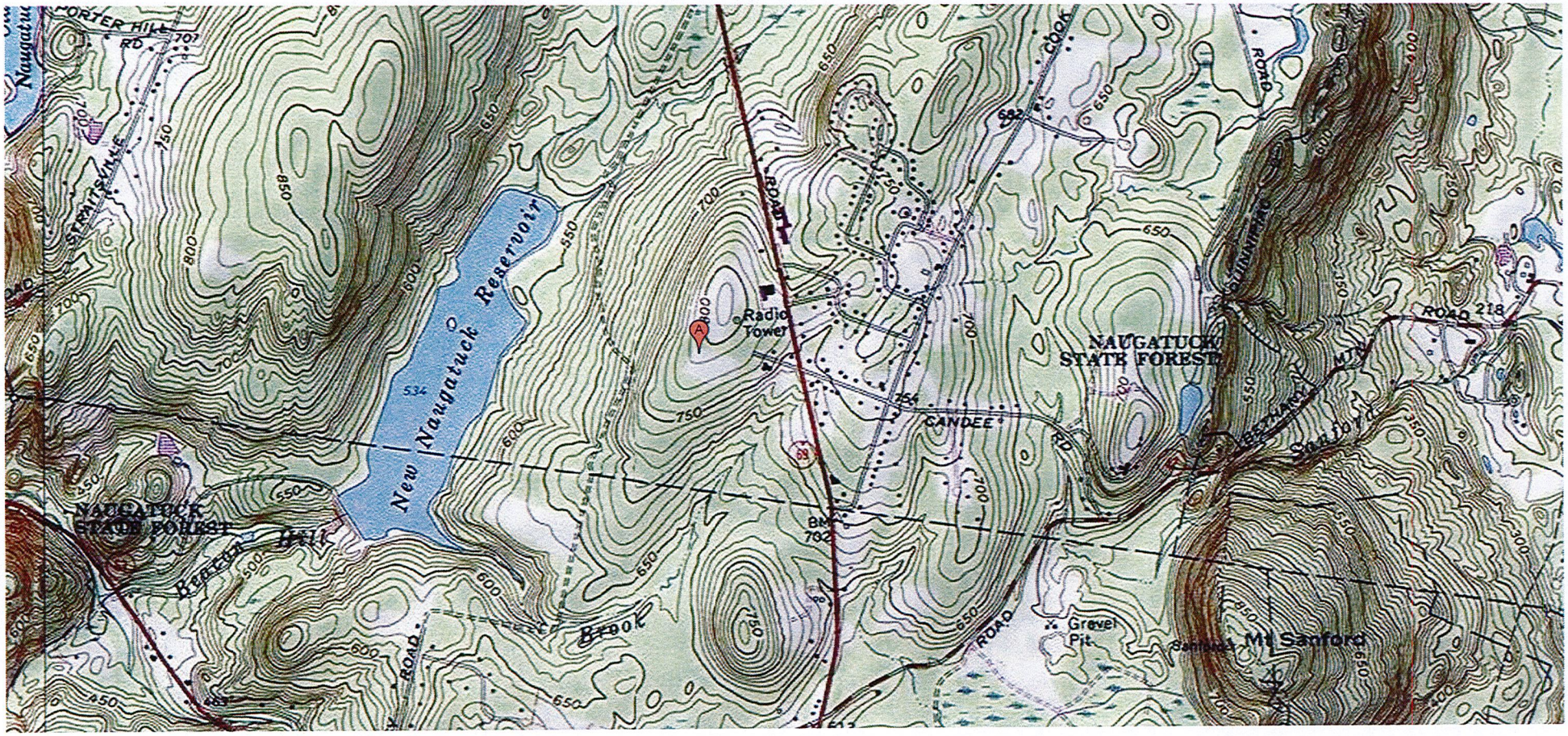
Sprint plans to add, in Sectors 1 and 3, one (1) RFS APXVSPP18-C-A20 per sector, and in Sector 2, one (1) RFS APXV9ERR18-C-A20, all mounted at 190'. Connected to each new RFS antenna will be one (1) ALU 800 MHz RRH with one (1) ALU 800 MHz notch filter attached to it and one (1) ALU 1900 MHz RRH, which will be located behind the antenna on a new ring mount +/- 1' from the existing platform. After the new antennas have been tested and are deployed on-air, the six (6) existing CDMA antennas will be removed. The height of the monopole will not need to be increased. Sprint also plans to install a new fiber junction box on a new H-frame and a new Ciena equipment enclosure into their equipment space within the tower compound's fenced border, and to replace the existing BTS cabinet. The compound's boundaries will not need to be extended. Other than brief, construction-related noise, these modifications will not increase noise levels at the tower site boundary by six (6) decibels.

Sprint commissioned Crown Castle to perform a structural analysis of the tower and foundation to verify that they can support the proposed loading. The tower and foundation were found to be of "Sufficient Capacity" (see the first page of Structural Analysis Report, June 7, 2012). The tower is rated at 76.8% of its capacity (see Page 5 of Structural Analysis Report, June 7, 2012). Sprint commissioned EBI Consulting to perform a structural assessment of the existing mounting system. They concluded that the existing mounting system is "[C]apable of supporting the existing and proposed equipment without causing an overstress condition in the mounting system" (see the second page of Structural Evaluation Letter, July 19, 2012).

The proposed modifications will not add radio frequency sending or receiving capability which increases the total radio frequency electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to Connecticut General Statutes § 22a-162. A radio frequency emissions analysis prepared by EBI Consulting indicates that the proposed final configuration (including other carriers on the tower) will emit 7.593% of

the allowable FCC established general public limit sampled at the ground level (see the 5th page of Radio Frequency Emissions Analysis Report - Evaluation of Human Exposure Potential to Non-Ionizing Emissions, September 5, 2012). Emission values for the Sprint antennas have been calculated from the sample point, which is the top of a six foot person standing at the base of the tower. Emissions values for additional carriers were based upon values listed in Connecticut Siting Council active database (see the 3rd and 4th page of Radio Frequency Emissions Analysis Report - Evaluation of Human Exposure Potential to Non-Ionizing Emissions, September 5, 2012). The information used in the report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1 (see the second page of Radio Frequency Emissions Analysis Report - Evaluation of Human Exposure Potential to Non-Ionizing Emissions, September 5, 2012).

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


New Naugatuck Reservoir
Radio Tower
NAUGATUCK STATE FOREST
CANDEE RD
ROAD
Gravel Pit
Mt Sanford
Beecher Hill Brook
STRATTSVILLE
ROAD 218

## SHEET INDEX

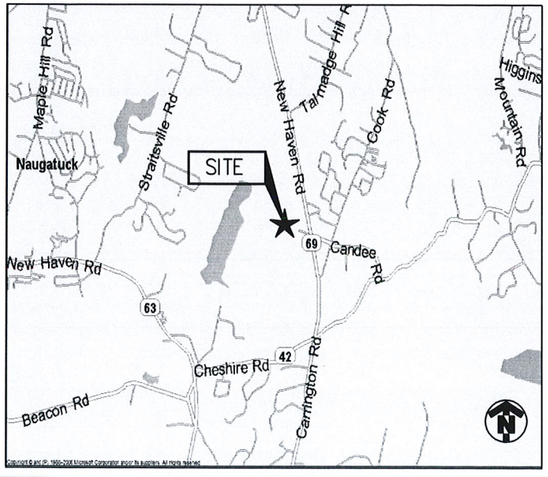
| NO. | DESCRIPTION |
|---|---|
| T1 | TITLE SHEET |
| AAV1 | OVERALL AND ENLARGED SITE PLANS |
| AAV2 | NOTES AND DETAILS |
| C1 | GENERAL NOTES |
| C2 | COMPOUND SITE PLAN |
| C3 | EQUIPMENT SITE PLANS |
| C4 | SITE ELEVATION AND ANTENNA/RRH DETAILS |
| C5 | ANTENNA PLANS |
| C6 | ANTENNA CABLE RISER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

## DRIVING DIRECTIONS

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

TURN RIGHT ONTO PARK LN. CONTINUE STRAIGHT ONTO LEISURE LN. SLIGHT RIGHT ONTO NJ-17 N .MERGE ONTO I-287 N/NJ-17 N VIA THE RAMP ON THE LEFT TO I-87/N Y. THRUWAY. KEEP RIGHT AT THE FORK, FOLLOW SIGNS FOR I-87 S/I-287/TAPPAN ZEE BR/NEW YORK CITY/NEW YORK THRUWAY AND MERGE ONTO I-287 E/I-87 N. CONTINUE TO FOLLOW I-87 N. TAKE EXIT 8A FOR NY-119/SAW MILL PKWY N TOWARD ELMSFORD. KEEP LEFT AT THE FORK AND MERGE ONTO SAW MILL PKWY N. TAKE THE EXIT TOWARD. KEEP LEFT AT THE FORK, FOLLOW SIGNS FOR I-684/BREWSTER AND MERGE ONTO I-684 N. TAKE EXIT 9E FOR INTERSTATE 84 E TOWARD DANBURY. MERGE ONTO I-84 E. SLIGHT RIGHT TO STAY ON I-84 E. TAKE EXIT 23 FOR CT-69 S TOWARD PROSPECT. TURN RIGHT ONTO CT-69 S/HAMILTON AVE. CONTINUE TO FOLLOW CT-69 S. CONTINUE ONTO NEW HAVEN RD. TURN RIGHT ONTO KLUGE RD. ARRIVE AT SITE

## VICINITY MAP




Sprint

NETWORK VISION MMBTS LAUNCH

# CONNECTICUT MARKET

SITE NAME

# NORTH BETHANY/DAVID KLUDGE

SITE NUMBER

## CT33XC514

SITE ADDRESS

15 KLUGE ROAD
PROSPECT, CT 06712

STRUCTURE TYPE

## MONOPOLE TOWER

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

## PROJECT TEAM

ALCATEL•LUCENT

808 AVIATION PARKWAY
SUITE 700
MORRISVILLE, NC 27650

PROJECT MANAGER

infinigy engineering

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

ENGINEER

## SCOPE OF WORK:

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

## PROJECT SUMMARY

| | | |
|---|---|---|
| SITE NAME: | NORTH BETHANY/DAVID KLUDGE | |
| SITE NO.: | CT33XC514 | |
| SITE ADDRESS: | 15 KLUGE ROAD<br>PROSPECT, CT 06712 | |
| COUNTY: | NEW HAVEN | |
| SITE COORDINATES: | | |
| LATITUDE: | 41° 28' 16.60" N | (NAD 83) |
| LONGITUDE: | 72° 58' 18.78" W | (NAD 83) |
| GROUND ELEV.: | ±804' | (AMSL) |
| JURISDICTION: | TOWN OF GILFORD | |
| APPLICANT: | SPRINT<br>1 INTERNATIONAL BLVD.<br>MAHWAH, NJ 07495 | |
| LAND LORD: | GLOBAL SIGNAL<br>2000 CORPORATE DRIVE<br>CANNONSBURG, PA 15317 | |
| CONSTRUCTION MANAGER: | TODD AMANN<br>914-715-9363 | |
| BUILDING CODE: | 2003 INTERNATIONAL BUILDING CODE<br>2005 CONNECTICUT BUILDING CODE<br>W/ 2009 AMENDMENT | |
| ELECTRICAL CODE: | 2005 NATIONAL ELECTRIC CODE | |

## ENGINEER'S LICENSE

CERTIFICATION STATEMENT:

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

LICENSED ENGINEER – STATE OF CONNECTICUT

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

## APPROVALS

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

A/E Consultant:

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



| No. | Submittal / Revision | App'd | Date |
|---|---|---|---|
| 4 | FINAL CD'S | EKM | 7/16/12 |
| 3 | REVISED PER COMMENTS | EKM | 6/21/12 |
| 2 | REVISED PER COMMENTS | EKM | 6/11/12 |
| 1 | REVISED PER COMMENTS | EKM | 5/04/12 |
| 0 | ISSUED FOR REVIEW | SKB | 4/25/12 |

Drawn: SKB Date: 4/25/12
Designed: EKM Date: 4/25/12
Checked: CJW Date: 4/25/12

Project Number: 286-045

Project Title:
CT33XC514
NORTH BETHANY / DAVID KLUDGE
15 KLUGE ROAD
PROSPECT, CT 06712

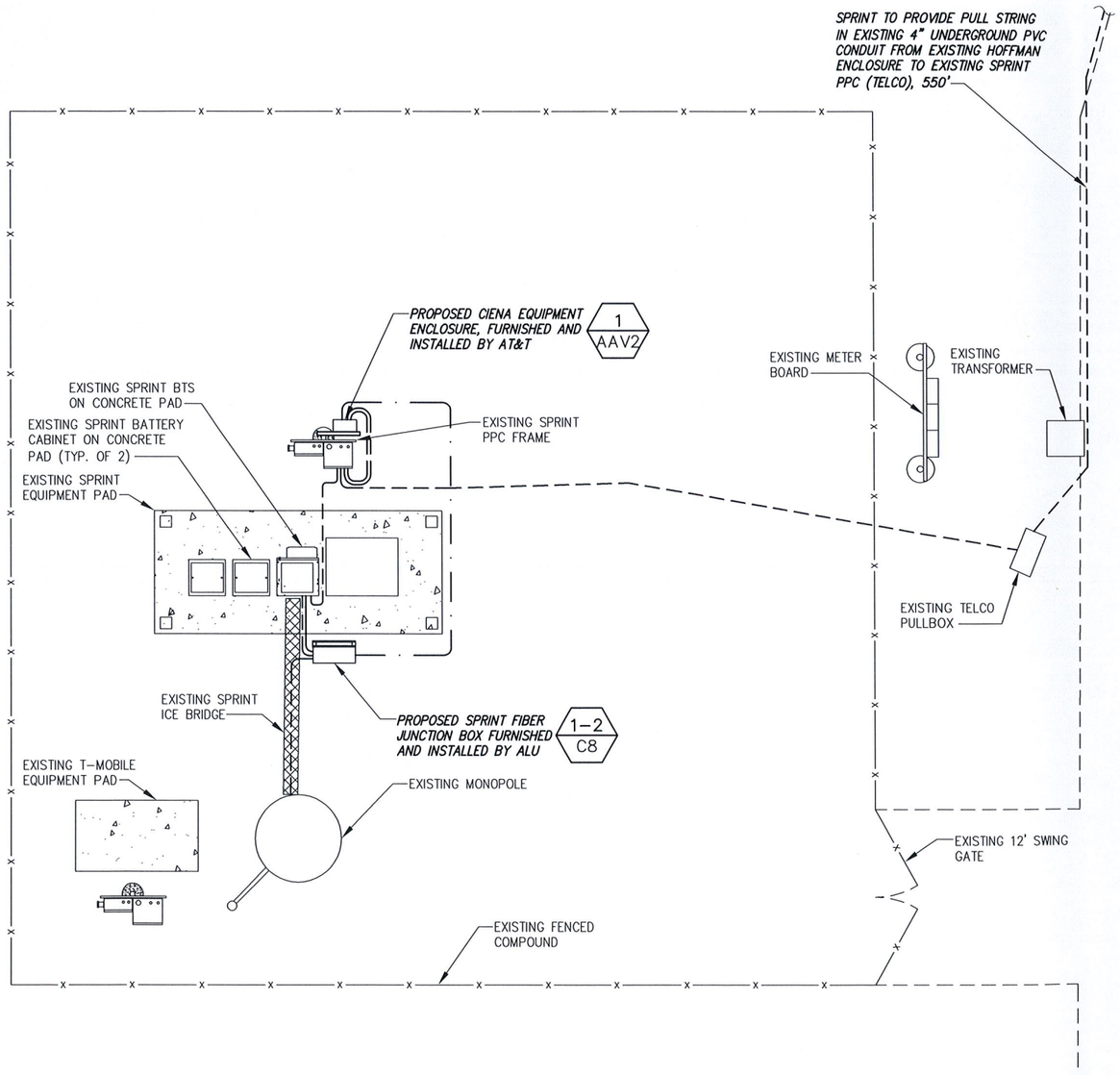
Client: Sprint, 1 INTERNATIONAL BLVD. MAHWAH, NJ 07495

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

Drawing Scale: AS NOTED
Date: 6/21/12

Drawing Title:
**TITLE SHEET**

Drawing Number:
**T1**

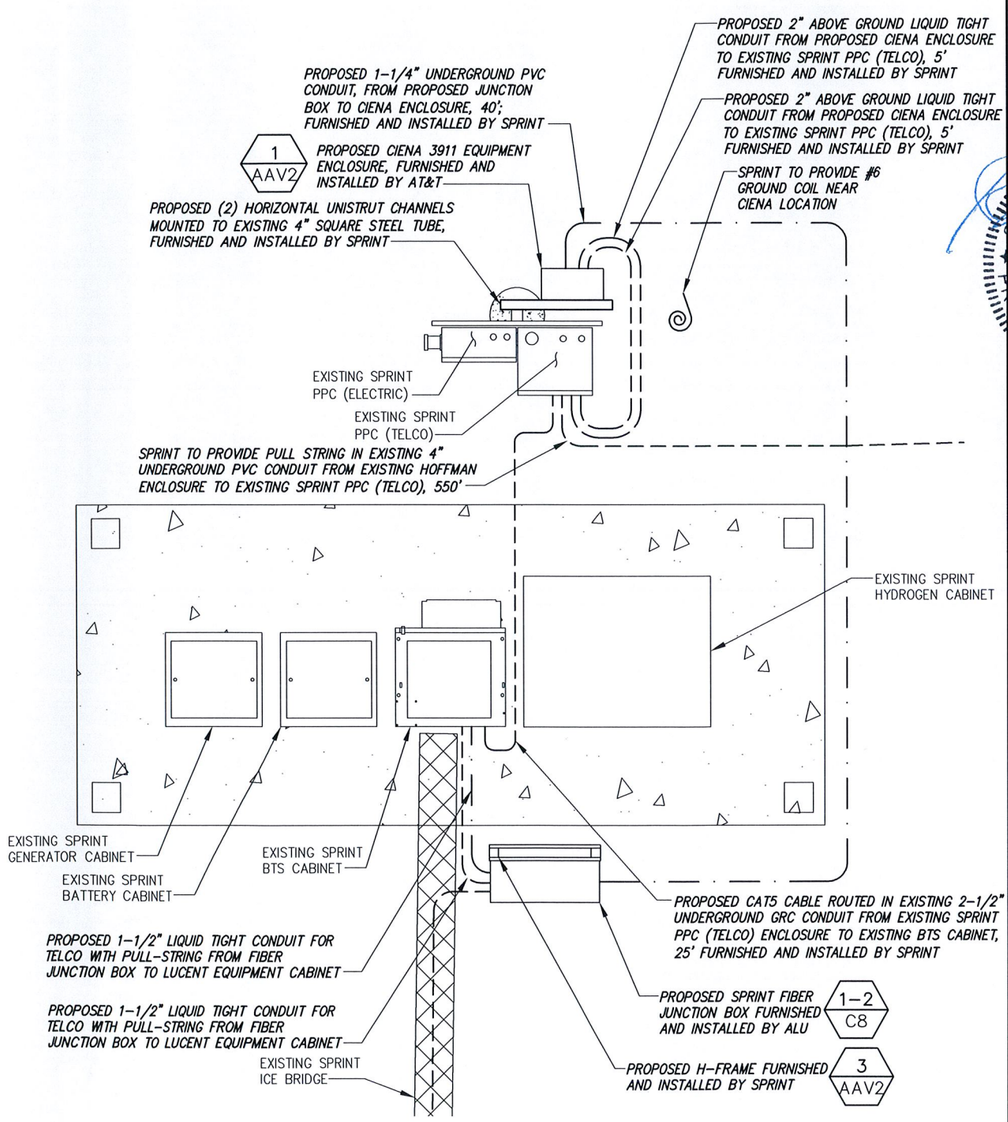



1 -- OVERALL SITE PLAN
SCALE:

CALLED NORTH

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

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




1 -- EQUIPMENT AREA
SCALE:

CALLED NORTH

1.5' 0 1.5' 3' 6'
( IN FEET )
SCALE: 24"X 36" SHEET 1"= 3'
SCALE: 11"X 17" SHEET 1"= 6'

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

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



| No. | Submittal / Revision | App'd | Date |
|---|---|---|---|
| 4 | FINAL CD'S | EKM | 7/16/12 |
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286-045

Project Title
CT33XC514
NORTH BETHANY / DAVID KLUDGE
15 KLUGE ROAD
PROSPECT, CT 06712

Client: Sprint
1 INTERNATIONAL BLVD. MAHWAH, NJ 07495

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

Drawing Scale:
AS NOTED

Date:
8/21/12

Drawing Title
OVERALL & ENLARGED SITE PLANS

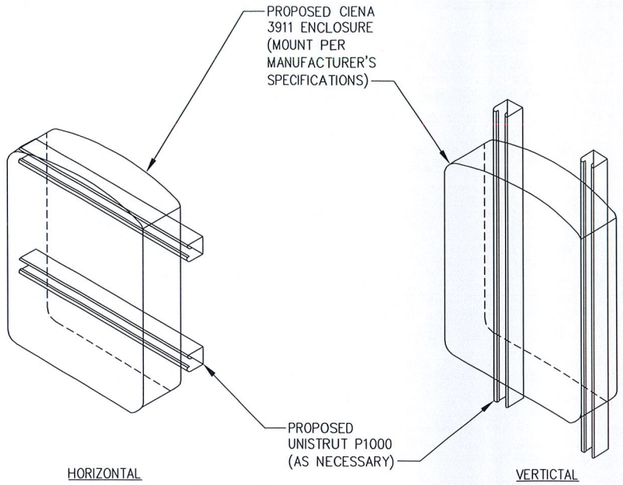
Drawing Number
AAV1

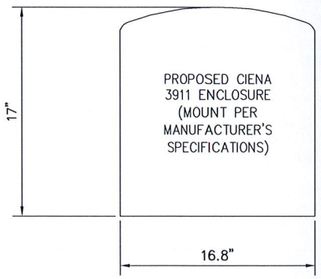
GENERAL NOTES:

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

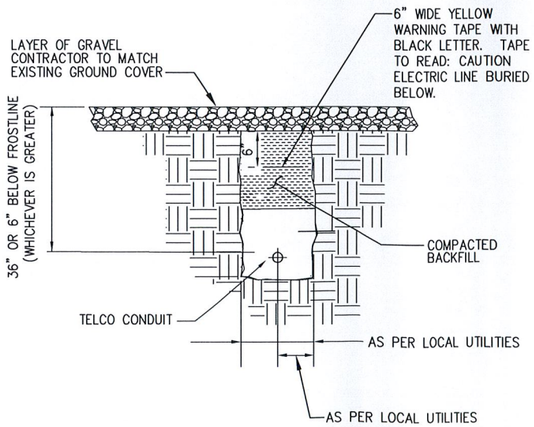
ELECTRICAL AND GROUNDING NOTES:

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



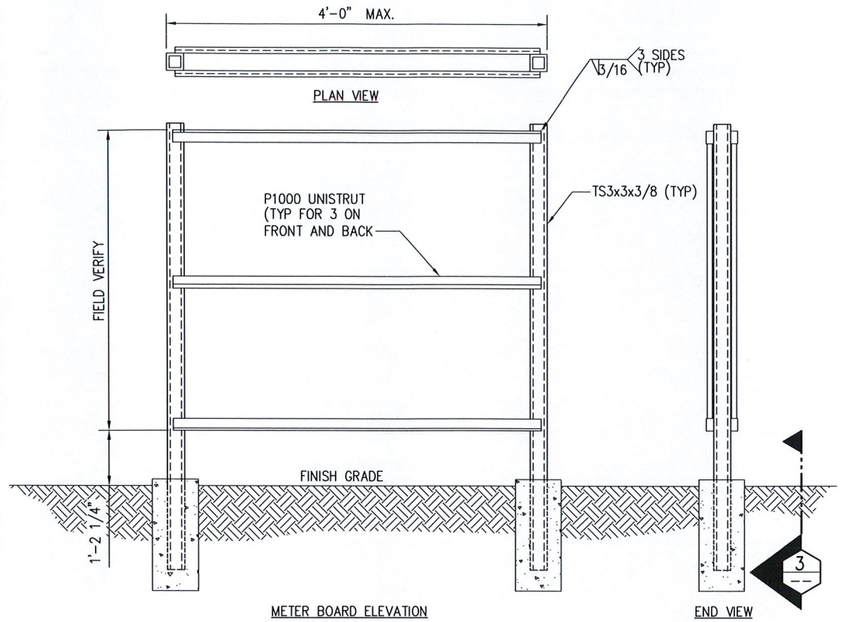




1 TYPICAL CIENA 3911 MOUNTING DETAIL
SCALE: NOT TO SCALE

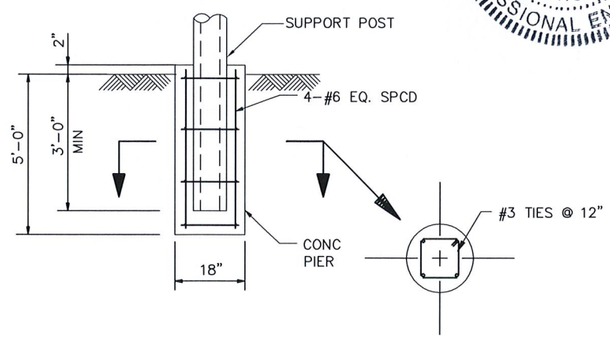



NOTE:
NUMBER AND SIZE OF CONDUITS MAY VARY. SEE DWG FOR CONDUIT SIZE AND LOCATION. CONFIRM CONDUIT SEPARATION AND DIMENSIONS SHOWN WITH LOCAL UTILITY COMPANY.

2 CONDUIT TRENCH DETAIL
NO SCALE




3 H-FRAME FABRICATION DETAIL
NOT TO SCALE




4 SUPPORT PIER
NOT TO SCALE

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


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




| No. | Submittal / Revision | App'd | Date |
|---|---|---|---|
| 4 | FINAL CD'S | EKM | 7/16/12 |
| 3 | REVISED PER COMMENTS | EKM | 6/21/12 |
| 2 | REVISED PER COMMENTS | EKM | 6/11/12 |
| 1 | REVISED PER COMMENTS | EKM | 5/04/12 |
| 0 | ISSUED FOR REVIEW | SKB | 4/25/12 |

Drawn: SKB Date: 4/25/12
Designed: EKM Date: 4/25/12
Checked: CJW Date: 4/25/12

Project Number
286-045

Project Title
CT33XC514
NORTH BETHANY / DAVID KLUDGE
15 KLUGE ROAD
PROSPECT, CT 06712

Client:
Sprint
1 INTERNATIONAL BLVD.
MAHWAH, NJ 07495

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

Drawing Scale:
AS NOTED

Date:
6/21/12

Drawing Title
NOTES & DETAILS

Drawing Number
AAV2

# GENERAL NOTES

## PART 1 – GENERAL REQUIREMENTS

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

A. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
B. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
C. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE – "NEC").
D. AND NFPA 101 (LIFE SAFETY CODE).
E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM).
F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE).

1.2 DEFINITIONS:

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

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

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

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

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

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

1.7 NOTICE TO PROCEED:

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

## PART 2 – EXECUTION

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

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

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

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

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

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

2.6 EXISTING CONDITIONS: NOTIFY THE COMPANY REPRESENTATIVE OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

## PART 3 – RECEIPT OF MATERIAL & EQUIPMENT

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

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

## PART 4 – GENERAL REQUIREMENTS FOR CONSTRUCTION

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

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

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

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

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

4.5 CONDUCT TESTING AS REQUIRED HEREIN.

## PART 5 – TESTS AND INSPECTIONS

5.1 TESTS AND INSPECTIONS:

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

## PART 6 – TRENCHING AND BACKFILLING

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

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

G. BACKFILLING OF TRENCHES. TRENCHES SHALL NOT BE BACKFILLED UNTIL ALL SPECIFIED TESTS HAVE BEEN PERFORMED AND ACCEPTED. WHERE COMPACTED BACKFILL IS NOT INDICATED THE TRENCHES SHALL BE CAREFULLY BACKFILLED WITH SELECT MATERIAL SUCH AS EXCAVATED SOILS THAT ARE FREE OF ROOTS, SOD, RUBBISH OR STONES, DEPOSITED IN 6 INCH LAYERS AND THOROUGHLY AND CAREFULLY RAMMED UNTIL THE CONDUIT OR CABLE HAS A COVER OF NOT LESS THAN 1 FOOT. THE REMAINDER OF THE BACKFILL MATERIAL SHALL BE GRANULAR IN NATURE AND SHALL NOT CONTAIN ROOTS, SOD, RUBBING, OR STONES OF 2-1/2 INCH MAXIMUM DIMENSION. BACKFILL SHALL BE CAREFULLY PLACED IN THE TRENCH AND IN 1 FOOT LAYERS AND EACH LAYER TAMPED. SETTLING THE BACKFILL WITH WATER WILL BE PERMITTED. THE SURFACE SHALL BE GRADED TO A REASONABLE UNIFORMITY AND THE MOUNDING OVER THE TRENCHES LEFT IN A UNIFORM AND NEAT CONDITION.

# PROJECT INFORMATION

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

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

NO WASTE WATER WILL BE GENERATED AT THIS LOCATION.

NO SOLID WASTE WILL BE GENERATED AT THIS LOCATION.

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

# LEGEND

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

# ABBREVIATIONS

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

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PROSPECT, CT 06712

Client: Sprint, 1 INTERNATIONAL BLVD. MAHWAH, NJ 07495

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

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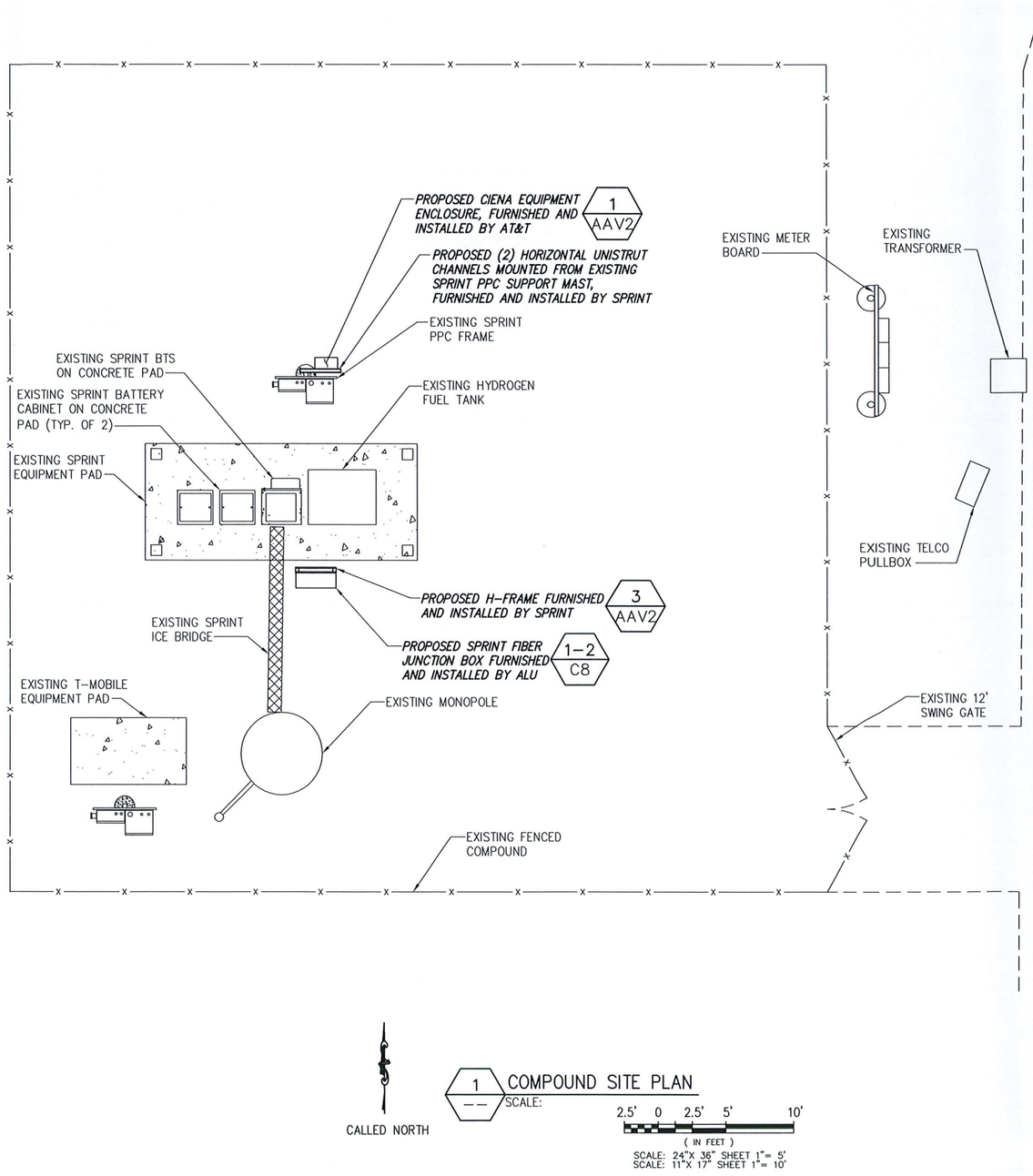
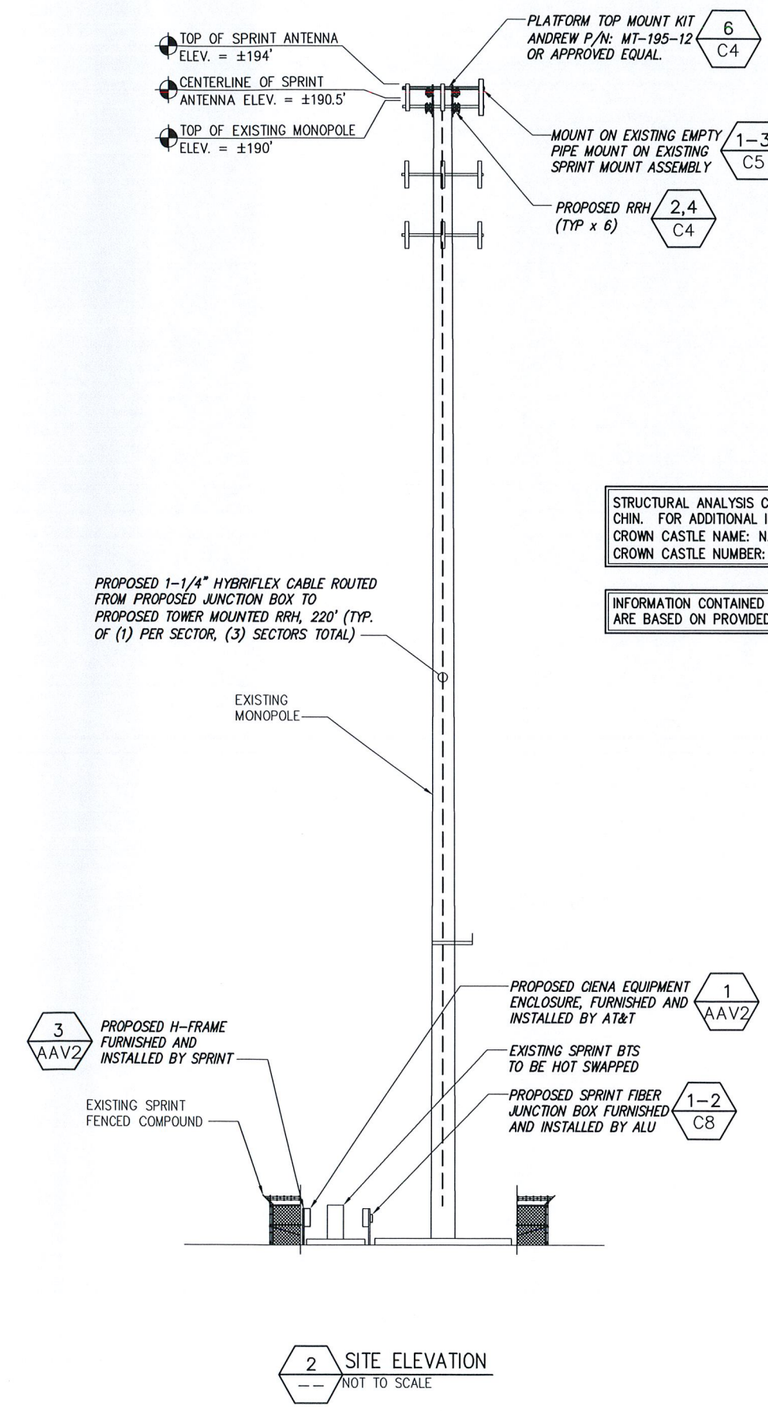
GENERAL NOTES

Drawing Number:
C1




2 -- SITE ELEVATION
NOT TO SCALE

STRUCTURAL ANALYSIS COMPLETED BY MING DONG CHIN. FOR ADDITIONAL INFORMATION, SEE REPORT: CROWN CASTLE NAME: N. BETHANY/DAVID KLUDGE, CROWN CASTLE NUMBER: 876378 DATED: 6/7/12.

INFORMATION CONTAINED WITHIN DRAWINGS ARE BASED ON PROVIDED INFORMATION.

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UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF APPLICABLE STATE AND/OR LOCAL LAWS

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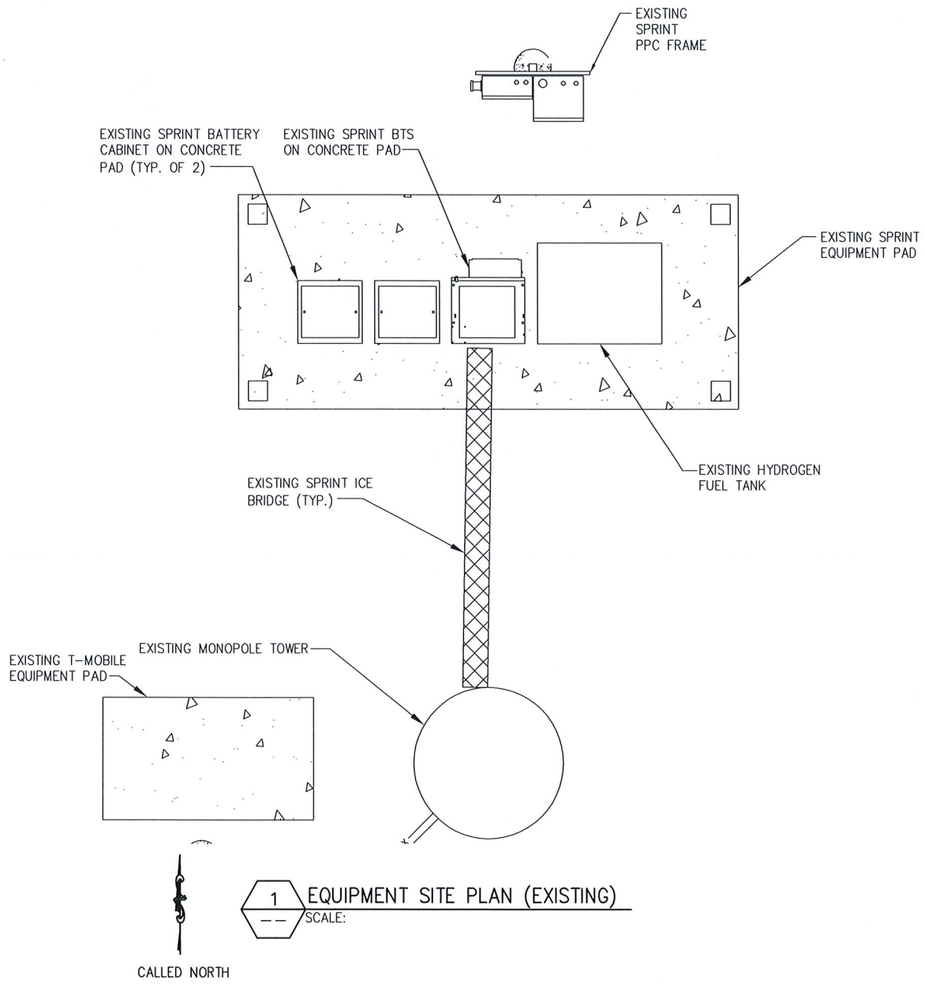
**COMPOUND SITE PLAN**

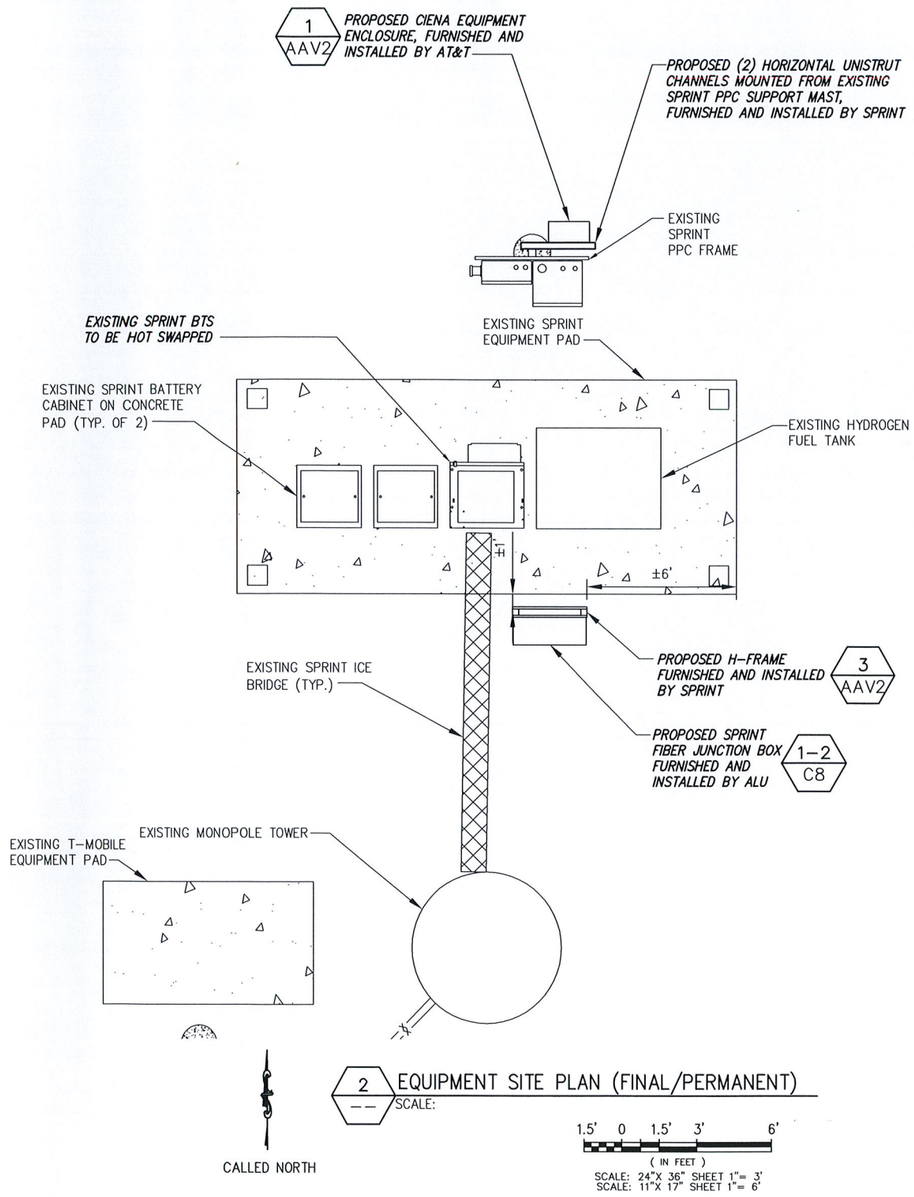
Drawing Number

**C2**




1 AAV2 EQUIPMENT SITE PLAN (EXISTING)

SCALE:




2 EQUIPMENT SITE PLAN (FINAL/PERMANENT)

SCALE:

1.5' 0 1.5' 3' 6'

( IN FEET )

SCALE: 24"X 36" SHEET 1"= 3'
SCALE: 11"X 17" SHEET 1"= 6'

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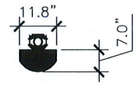
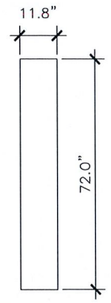
**EQUIPMENT SITE PLANS**

Drawing Number

**C3**

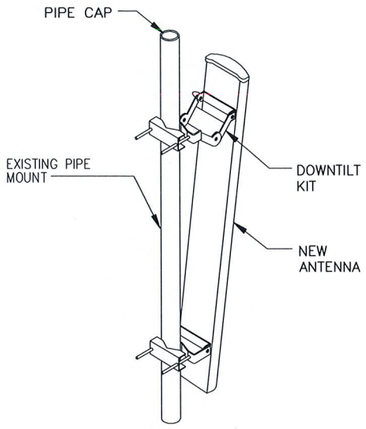



TOP VIEW




FRONT VIEW
800/1900
MULTI-MODE

1 ANTENNA DETAILS
NOT TO SCALE

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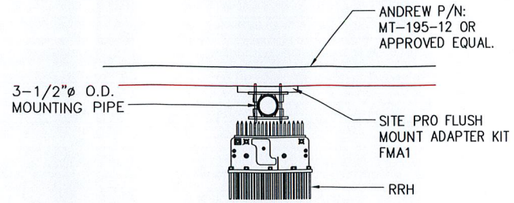
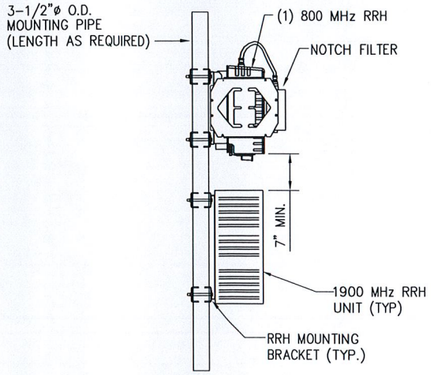
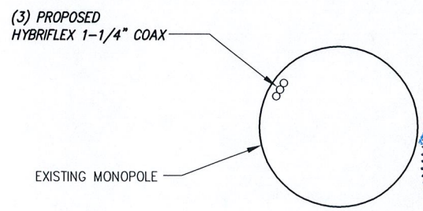


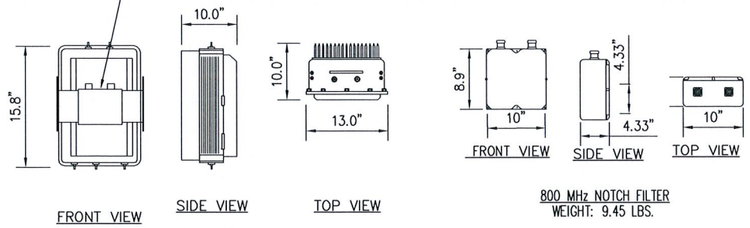




4 RRH
MOUNTING DETAIL
NOT TO SCALE



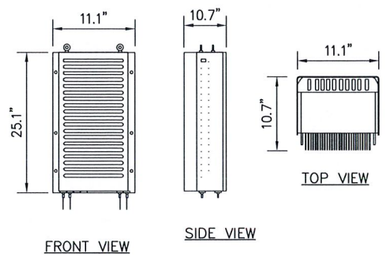

5 COAX ROUTING DETAIL
NOT TO SCALE

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




800 MHz NOTCH FILTER
WEIGHT: 9.45 LBS.

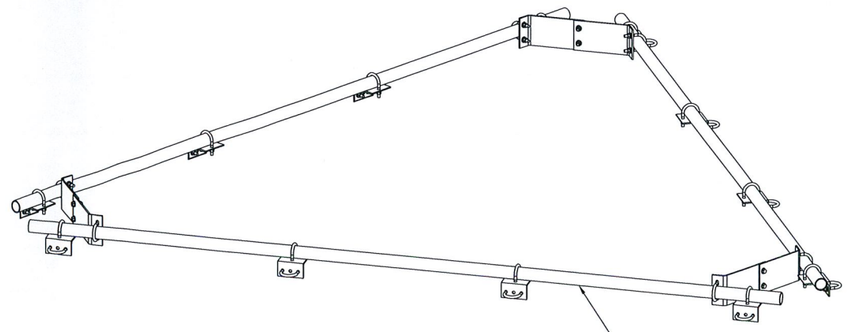
800 MHz RRH
(ALU)
WEIGHT = 50.6 LBS.




1900 MHZ RRH
(ALU)
WEIGHT = 60 LBS.

2 RRH EQUIPMENT DETAILS
NOT TO SCALE

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




6 PLATFORM TOP MOUNT KIT
NOT TO SCALE

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

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24703
LICENSED PROFESSIONAL ENGINEER



| No. | Submittal / Revision | App'd | Date |
|---|---|---|---|
| 4 | FINAL CD'S | EKM | 7/16/12 |
| 3 | REVISED PER COMMENTS | EKM | 6/21/12 |
| 2 | REVISED PER COMMENTS | EKM | 6/11/12 |
| 1 | REVISED PER COMMENTS | EKM | 5/04/12 |
| 0 | ISSUED FOR REVIEW | SKB | 4/25/12 |

Drawn: SKB Date: 4/25/12
Designed: EKM Date: 4/25/12
Checked: CJW Date: 4/25/12

Project Number
286-045

Project Title
**CT33XC514**
**NORTH BETHANY / DAVID KLUDGE**
**15 KLUGE ROAD**
**PROSPECT, CT 06712**

Client:
Sprint
1 INTERNATIONAL BLVD.
MAHWAH, NJ 07495

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

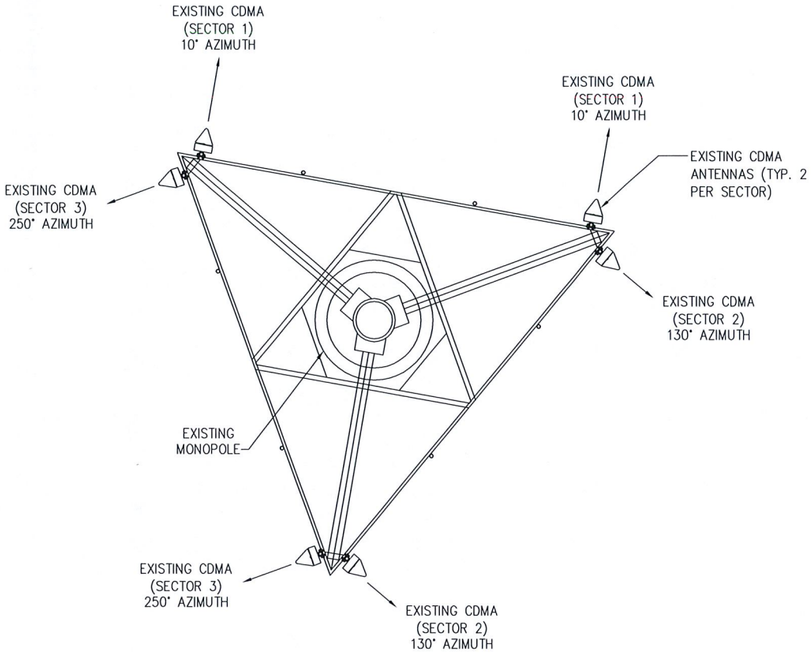
Drawing Scale:
AS NOTED

Date:
6/21/12

Drawing Title
**SITE ELEVATION & ANTENNA/RRH DETAILS**

Drawing Number
**C4**

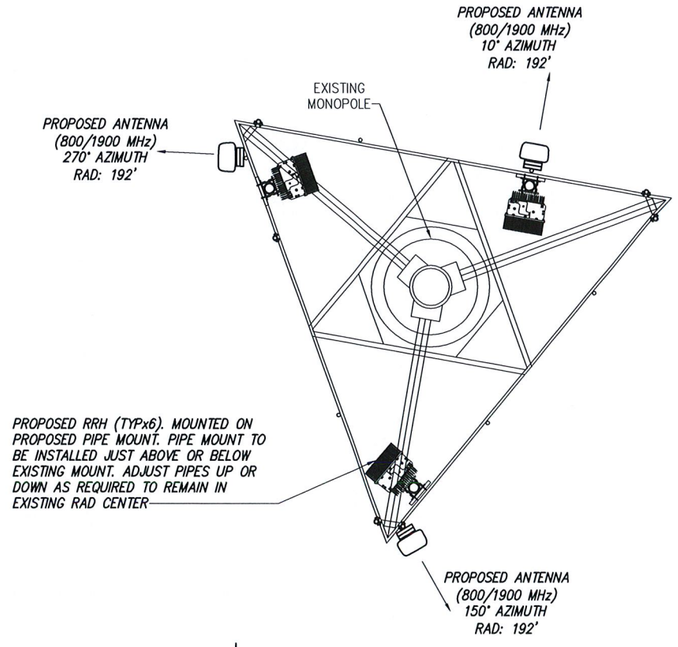
NOTE:
ORIENTATION AS SEEN FROM ABOVE.




CALLED NORTH

1 — NOT TO SCALE

## ANTENNA CONFIGURATION (EXISTING)

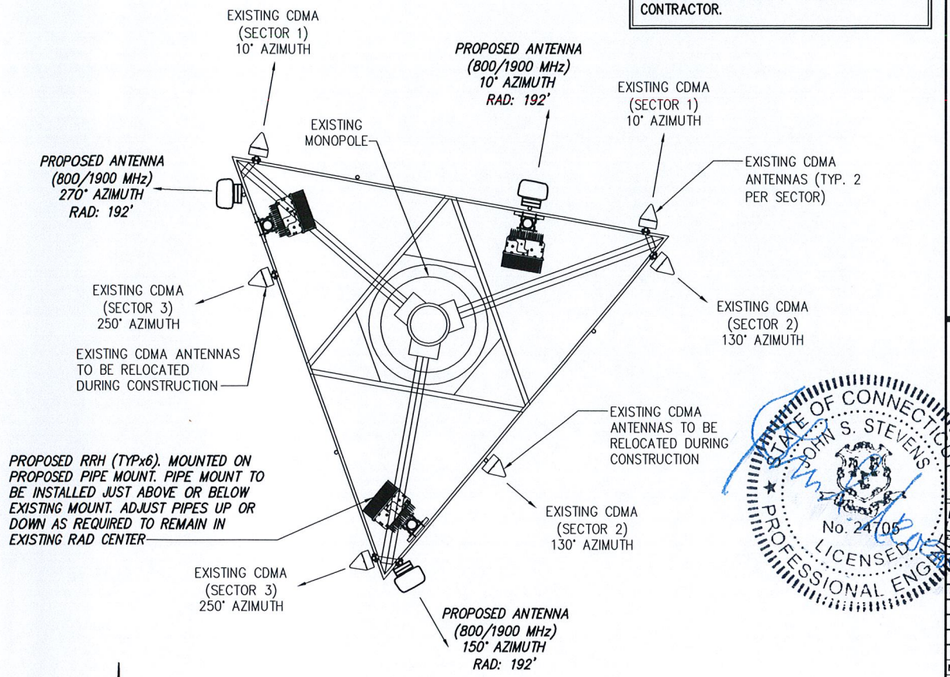



CALLED NORTH

3 — NOT TO SCALE

## ANTENNA CONFIGURATION (FINAL/PERMANENT)

NOTE:
REQUIRED PIPE MOUNTS TO BE SUPPLIED BY CONTRACTOR.




CALLED NORTH

2 — NOT TO SCALE

## ANTENNA CONFIGURATION (INTERIM/TEMPORARY)

**NOTES:**

EXISTING RF DATA PROVIDED BY SPRINT SITERRA, SPRINT SPECTRUM L.P. DRAWINGS TITLED, NORTH BETHANY, DATED 11-5-99.

**RRH NOTES:**

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

**GENERAL NOTES:**

1. NEW SPRINT PANEL ANTENNAS TO MEET RF DESIGN REQUIREMENTS PER EBTS, PER APPROVED STRUCTURAL ANALYSIS.
2. CONTRACTOR TO PROVIDE EXISTING ANTENNA VERIFICATION AND TO INCLUDE MOUNTING HEIGHT, RAD CENTER, TOP AND BOTTOM OF ANTENNA AND AZIMUTHS FOR ALL ANTENNAS.
3. CONTRACTOR SHALL VERIFY NEW PARTS BEFORE ORDERING.
4. REFER TO SHEET C7 FOR ANTENNAS SPECS.
5. CONTRACTOR TO USE PROPER TORQUE WHEN INSTALLING AND TIGHTENING CONNECTORS TO INSURE PROPER FIT.
6. ALL HYBRID CABLES SHALL BE MARKED WITHIN 24" OF THE END OF EACH CABLE WITH 2" WIDE VINYL TAPE. THIS INCLUDES ALL JUMPERS AND MAIN LINE HYBRID CABLE.
7. CDMA ANTENNAS SHALL NOT BE REMOVED UNTIL ALL NEW MULTI-MODE ANTENNAS ARE INSTALLED AND ON-AIR.

A/E Consultant:
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(518) 690-0790

STATE OF CONNECTICUT
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No. 24705
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Project Title

**CT33XC514**

**NORTH BETHANY / DAVID KLUDGE**

**15 KLUGE ROAD**
**PROSPECT, CT 06712**

Client: Sprint — 1 INTERNATIONAL BLVD. MAHWAH, NJ 07495

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

Drawing Scale: AS NOTED

Date: 6/21/12

Drawing Title

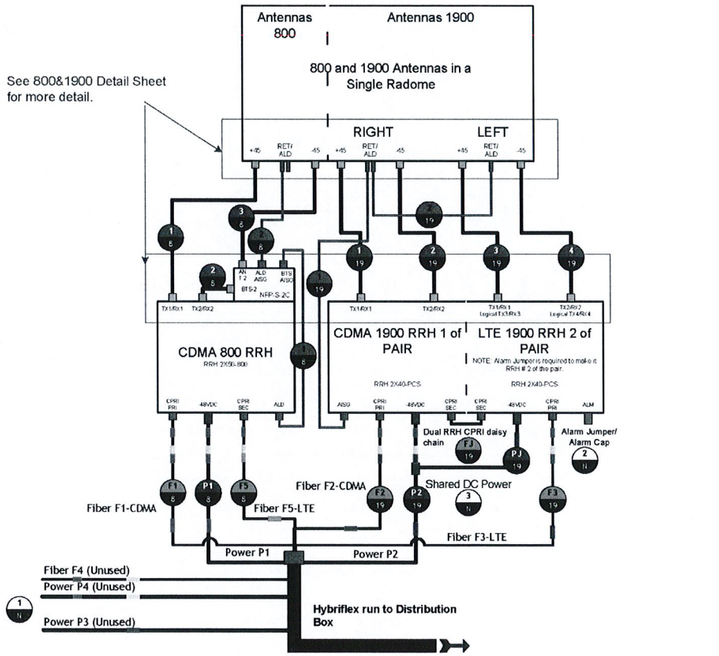
**ANTENNA PLANS**

Drawing Number

**C5**

# TOWER TOP SCENARIO 2

## 800 AND SINGLE 1900 RRH PAIR WITH SINGLE 800/1900 RADOME ANTENNA

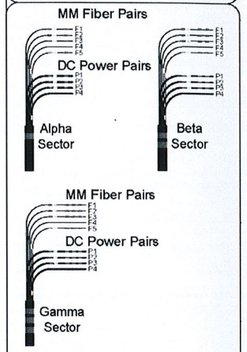



**Power Feed Polarity Definition:**
Black= -48VDC Feed (Battery)
Black/White Stripe= Return

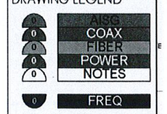
**NOTE:** For power feed use the same Hybriflex OEM color designator as the fiber.

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

**OEM COLOR CODE**
HYBRIFLEX




DRAWING LEGEND




SEE CONNECTION LEGEND FOR MORE DETAILS

**NOTES:**
CONTRACTOR TO FIELD VERIFY GPS LOCATION.

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

PLUMBING DIAGRAM VERSION 1.9

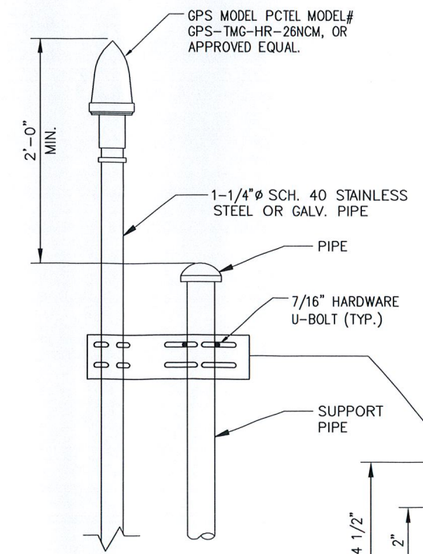
### WEATHERPROOFING CONNECTORS AND GROUND KITS NOTE:

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

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

### RRH JUMPERS NOTES:

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

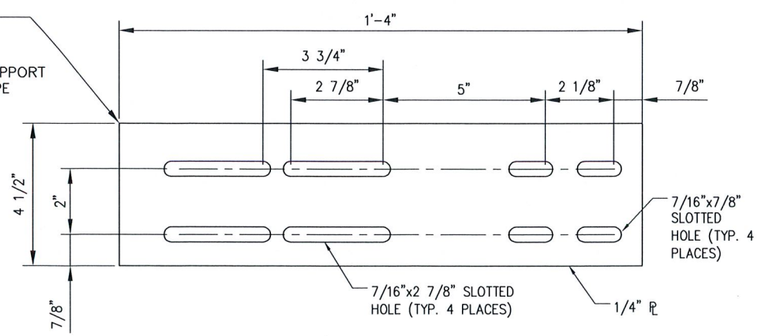



1 GPS ANTENNA DETAIL
NOT TO SCALE

### GPS MINIMUM SKY VIEW REQUIREMENTS

**NOTES:**

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




STATE OF CONNECTICUT
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NORTH BETHANY / DAVID KLUDGE
15 KLUGE ROAD
PROSPECT, CT 06712

Client: Sprint, 1 INTERNATIONAL BLVD. MAHWAH, NJ 07495

Implementation Team: ALCATEL·LUCENT, 808 AVIATION PARKWAY SUITE 100 MORRISVILLE, NC 27560

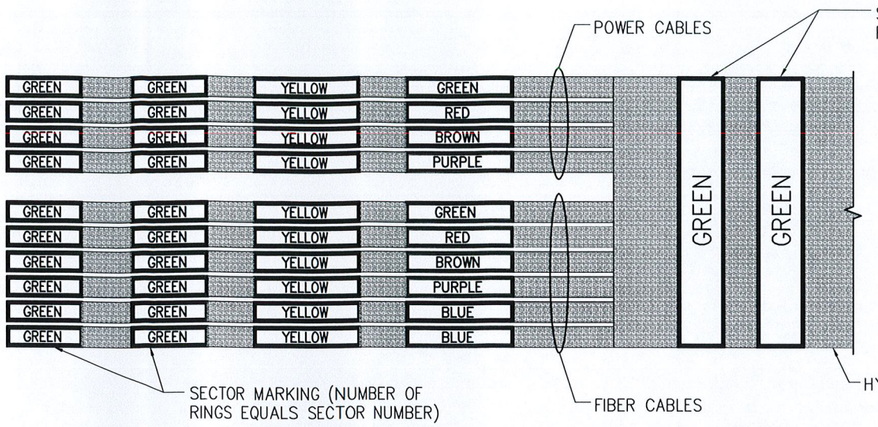
Drawing Scale: AS NOTED
Date: 6/21/12

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

Drawing Number
**C6**

| | Market | Southern Connecticut | | |
|---|---|---|---|---|
| | Cascade ID | CT33XC514 | | |
| | | SECTOR 1 | SECTOR 2 | SECTOR 3 |
| 1900 | Split sector present | No | No | No |
| | 1900MHz_Azimuth | 10 | 150 | 270 |
| | 1900MHz_No_of_Antennas | 1 | 1 | 1 |
| | 1900MHz_RADCenter(ft) | 190.5 | 190.5 | 190.5 |
| | 1900MHz_Antenna Make | RFS | RFS | RFS |
| | 1900MHz_Antenna Model | APXVSPP18-C-A20 | APXV9ERR18-C-A20 | APXVSPP18-C-A20 |
| | 1900MHz_Horizontal_Beamwidth | 65 | 80 | 65 |
| | 1900MHz_Vertical_Beamwidth | 5.5 | 5.5 | 5.5 |
| | 1900MHz_AntennaHeight (ft) | 6 | 6 | 6 |
| | 1900MHz_AntennaGain(dBd) | 15.9 | 14.9 | 15.9 |
| | 1900MHz_E_Tilt | -3 | -3 | -2 |
| | 1900MHz _M_Tilt | 0 | 0 | 0 |
| | 1900MHz_Carrier_Forecast_Year_2013 | 2 | 2 | 2 |
| | 1900MHz_RRH Manufacturer | ALU | ALU | ALU |
| | 1900MHz_RRH Model | RRH 1900 4X45 65MHz | RRH 1900 4X45 65MHz | RRH 1900 4X45 65MHz |
| | 1900MHz_RRH Count | 1 | 1 | 1 |
| | 1900MHz_RRH Location | Top of the Tower/Pole | Top of the Tower/Pole | Top of the Tower/Pole |
| | 1900MHz Combiner Model | No Combiner needed | No Combiner needed | No Combiner needed |
| | 1900MHz_Top_Jumper #1_Length (RRH or Combiner-to-Antenna, ft) | 10 | 10 | 10 |
| | 1900MHz_Top_Jumper #1_Cable_Model (RRH or Combiner-to-Antenna) | LCF12-50J | LCF12-50J | LCF12-50J |
| | 1900MHz_Top_Jumper #2_Length (RRH-to-Combiner, ft) | N/A | N/A | N/A |
| | 1900MHz_Top_Jumper #2_Cable_Model (RRH-to-Combiner) | N/A | N/A | N/A |
| | 1900MHz_Main_Coax_Cable_Length (ft) | N/A | N/A | N/A |
| | 1900MHz_Main_Coax_Cable_Model | N/A | N/A | N/A |
| | 1900MHz_Bottom_Jumper #1_Length (Ground-based-RRH-OR_Combiner-to-Main-Coax, ft) | N/A | N/A | N/A |
| | 1900MHz_Bottom_Jumper #1_Cable_Model (Ground-based-RRH-OR_Combiner-to-Main-Coax) | N/A | N/A | N/A |
| | 1900MHz_Bottom_Jumper #2_Length (Ground-based-Combiner-to-Main- | N/A | N/A | N/A |
| | 1900MHz_Bottom_Jumper #2_Cable_Model (Ground-based-Combiner-to-Main-Coax) | N/A | N/A | N/A |
| 800 | 800MHz_Azimuth | 10 | 150 | 270 |
| | 800MHz_No_of_Antennas | 0 | 0 | 0 |
| | 800MHz_RADCenter(ft) | 190.5 | 190.5 | 190.5 |
| | 800MHz_AntennaMake | RFS | RFS | RFS |
| | 800MHz_AntennaModel | APXVSPP18-C-A20 (Shared w/1900) | APXV9ERR18-C-A20 (Shared w/1900) | APXVSPP18-C-A20 (Shared w/1900) |
| | 800MHz_Horizontal_Beamwidth | 65 | 80 | 65 |
| | 800MHz_Vertical_Beamwidth | 11.5 | 10.5 | 11.5 |
| | 800MHz_AntennaHeight (ft) | 6 | 6 | 6 |
| | 800MHz_AntennaGain (dBd) | 13.4 | 11.9 | 13.4 |
| | 800MHz_E_Tilt | -8 | -7 | -8 |
| | 800MHz_M_Tilt | 0 | 0 | 0 |
| | 800MHz_RRH Manufacturer | ALU | ALU | ALU |
| | 800MHz_RRH Model | TBD | TBD | TBD |
| | 800MHz_RRH Count | 1 | 1 | 1 |
| | 800MHz_RRH Location | Top of the Tower/Pole | Top of the Tower/Pole | Top of the Tower/Pole |
| | 800MHz_Top_Jumper #1_Length (RRH or Combiner-to-Antenna, ft) | 10 | 10 | 10 |
| | 800MHz_Top_Jumper_Cable_Model (RRH or Combiner-to-Antenna) | LCF12-50J | LCF12-50J | LCF12-50J |
| | 800MHz_Main_Coax_Cable_Length (ft) | N/A | N/A | N/A |
| | 800MHz_Main_Coax_Cable_Model | N/A | N/A | N/A |
| | 800MHz_Bottom_Jumper #1_Length (Ground-based-RRH-Main-Coax, ft) | N/A | N/A | N/A |
| | 800MHz_Bottom_Jumper #1_Cable_Model (Ground-based-RRH-OR_Combiner-to-Main-Coax) | N/A | N/A | N/A |

1 SPRINT RFDS
NOT TO SCALE

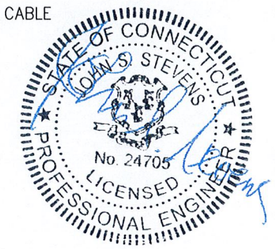



FREQUENCY LEGEND

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

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

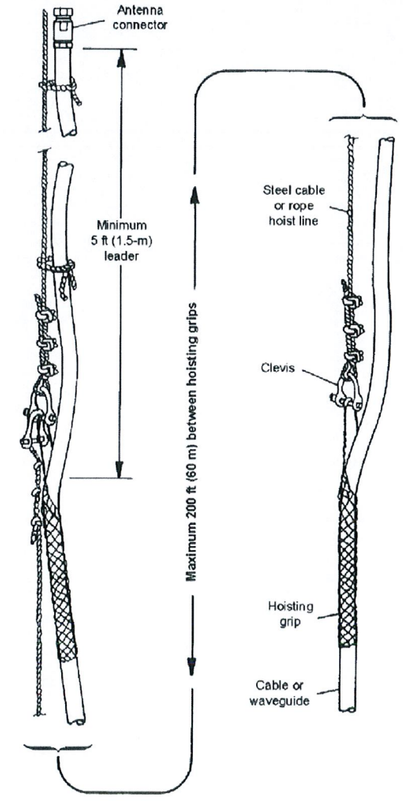
2 COLOR CODING
NOT TO SCALE




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

NOTE:
RFDS SHOWN PROVIDED BY SPRINT DATED 5/22/12.

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




2 HOIST GRIB DETAIL
NOT TO SCALE


A/E Consultant:
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Latham, NY 12110
(518) 690-0790




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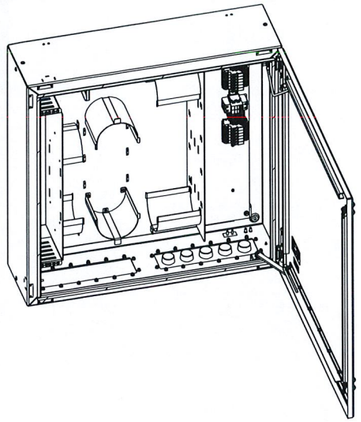
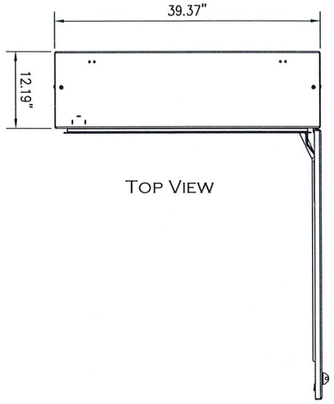
Implementation Team: ALCATEL-LUCENT, 808 AVIATION PARKWAY SUITE 700 MORRISVILLE, NC 27650

Drawing Scale: AS NOTED
Date: 6/21/12

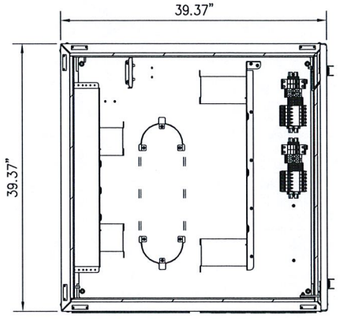
Drawing Title
RF AND CABLE DETAILS

Drawing Number
C7

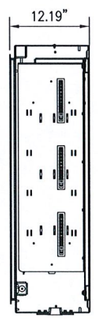





TOP VIEW

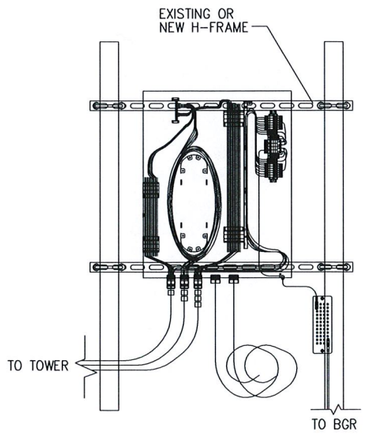



FRONT VIEW




SIDE VIEW

1 DISTRIBUTION BOX DETAIL
NOT TO SCALE




FRONT VIEW WITH DOOR REMOVED TO SHOW DETAIL

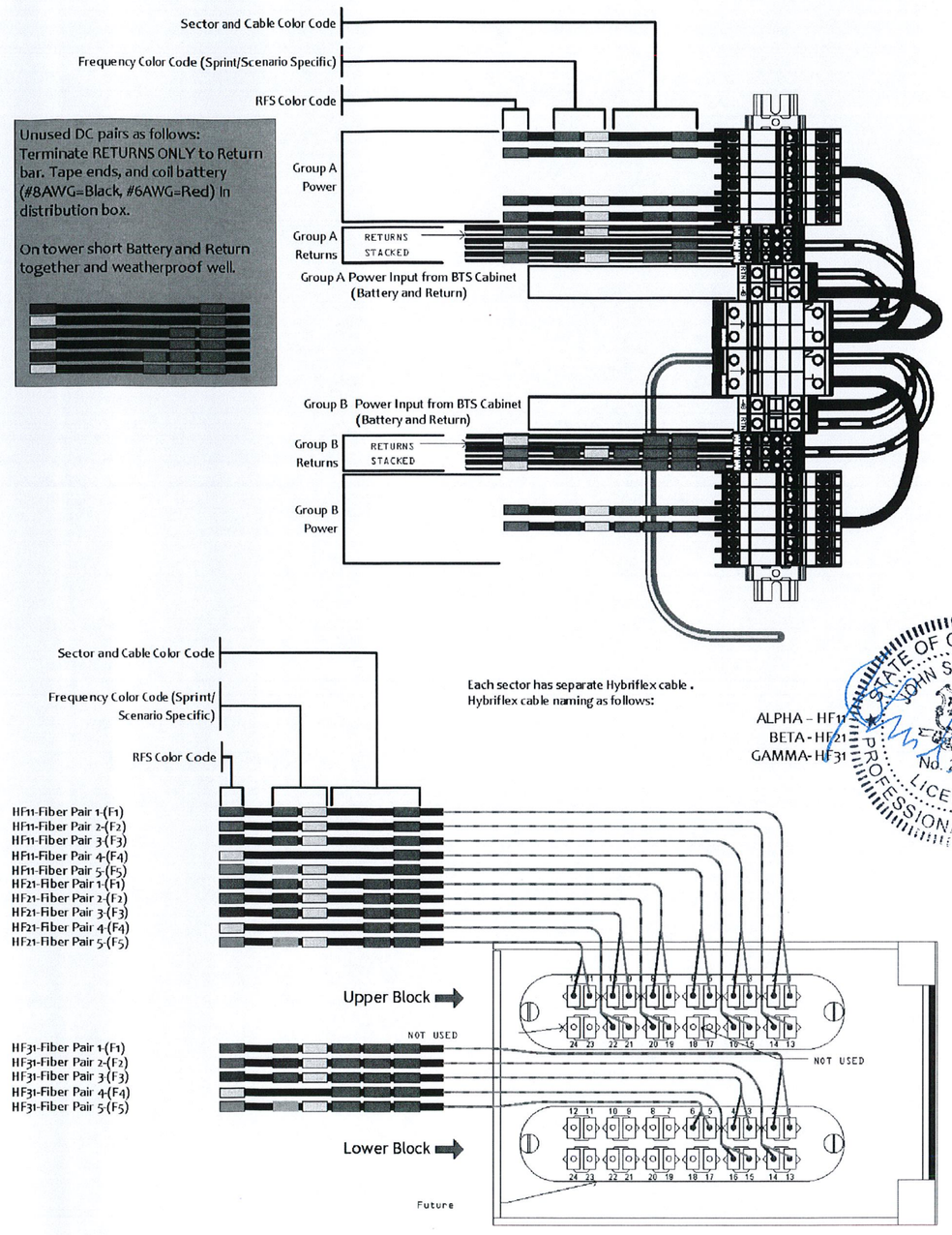
2 DISTRIBUTION BOX INSTALL COMPLETE VIEW
NOT TO SCALE

**NOTES:**

– DISTRIBUTION BOX IS ALU SUPPLIED WITH 1–1/2" LIQUID–TIGHT CONDUIT AND CONNECTORS. THIS SHOULD BE:
* SPLIT IN HALF,
* TERMINATED TO THE DISTRIBUTION BOX AS SHOWN,
* RAN TO AND COILED AS CLOSE TO WHERE THE CABINET IS GOING TO BE MOUNTED AS POSSIBLE.

– DISTRIBUTION BOX IS KITTED WITH 24AWG, POWER CABLE 27' x 2EA. RUNS RED AND 2EA. RUNS BLACK. THIS SHOULD BE COILED AND LEFT INSIDE DISTRIBUTION BOX.

– BTS INSTALLATION TEAM WILL TERMINATE LIQUID–TIGHT, RUN THE FIBER JUMPERS AND POWER CABLES FROM BTS CABINET TO DISTRIBUTION BOX.




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

3 FIBER & DC CONNECTION DETAILS
NOT TO SCALE

PLUMBING DIAGRAM VERSION 1.9


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

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| 0 | ISSUED FOR REVIEW | SKB | 4/25/12 |

Drawn: SKB Date: 4/25/12
Designed: EKM Date: 4/25/12
Checked: CJW Date: 4/25/12

Project Number
286-045

Project Title
CT33XC514
NORTH BETHANY / DAVID KLUDGE
15 KLUGE ROAD
PROSPECT, CT 06712

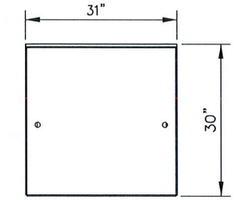
Client: Sprint, 1 INTERNATIONAL BLVD, MAHWAH, NJ 07495

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

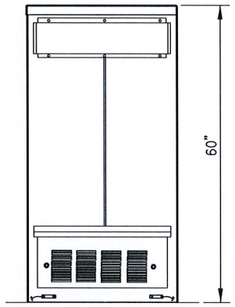
Drawing Scale: AS NOTED
Date: 6/21/12

Drawing Title
**JUNCTION BOX DETAILS**

Drawing Number
**C8**

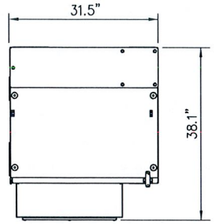



TOP VIEW

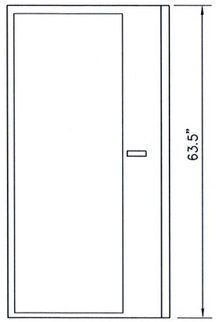



REAR VIEW

1 BATTERY CABINET PROFILE
NOT TO SCALE




TOP VIEW




FRONT VIEW

2 BTS CABINET PROFILE
NOT TO SCALE

DESIGN CRITERIA:

| | |
|---|---|
| 2009 INTERNATIONAL BUILDING CODE W/ STATE MODIFICATION | |
| WIND SPEED (ASCE-7-05) | 90 MPH |
| EXPOSURE B | |
| IMPORTANCE FACTOR | 1.0 |
| SEISMIC SITE CLASS | D |
| Ss=0.152 S¹ = 0.050 | |
| SEISMIC IMPORTANCE FACTOR | 1.0 |
| SEISMIC DESIGN CATEGORY | B |
| CABINET WEIGHT: | |
| 9927 MM BTS CABINET | 594 lbs. |
| 60EC V2 BATTERY CABINET | 2830 lbs. |

MATERIAL SPECIFICATIONS

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


A/E Consultant:
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11 Herbert Drive
Latham, NY 12110
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15 KLUGE ROAD
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Sprint
1 INTERNATIONAL BLVD.
MAHWAH, NJ 07495

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

Drawing Scale:
AS NOTED

Date:
6/21/12

Drawing Title

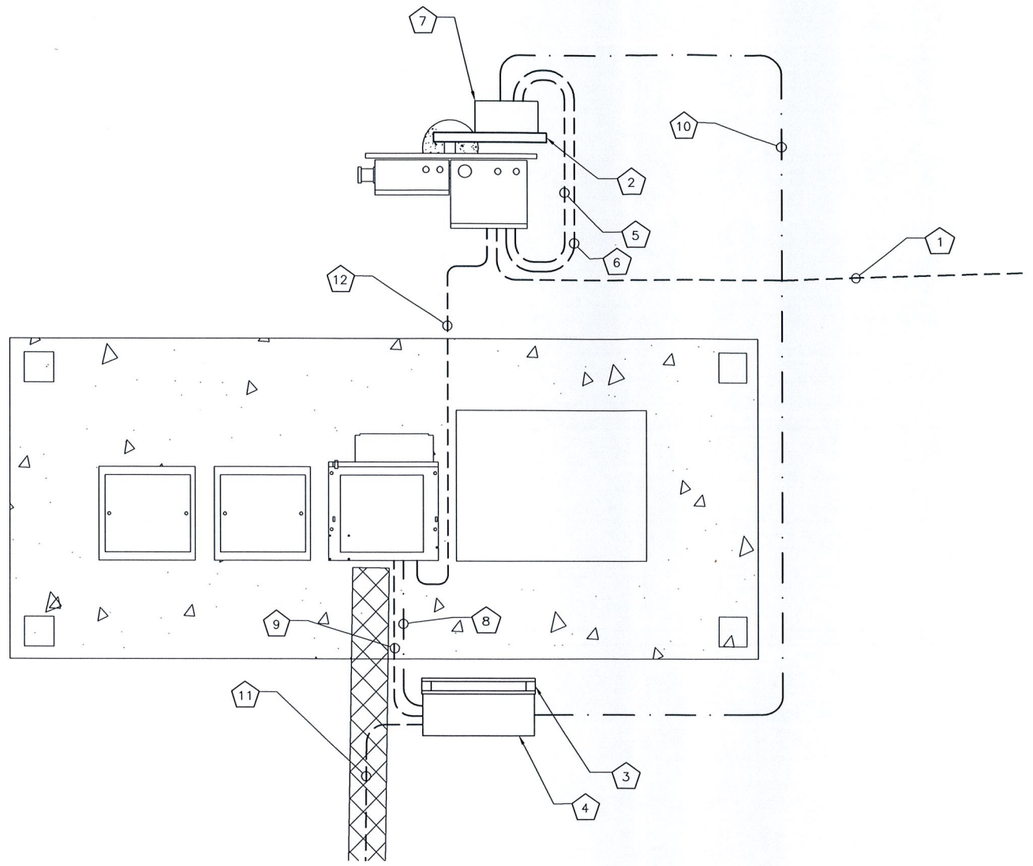
CABINET DETAILS

Drawing Number

C9

## CODED NOTES:

1. SPRINT TO PROVIDE PULL STRING IN EXISTING 4" UNDERGROUND PVC CONDUIT FROM EXISTING HOFFMAN ENCLOSURE TO EXISTING SPRINT PPC (TELCO), 550'
2. PROPOSED (2) HORIZONTAL UNISTRUT CHANNELS MOUNTED FROM EXISTING SPRINT PPC SUPPORT MAST
3. PROPOSED H-FRAME FURNISHED AND INSTALLED BY SPRINT
4. PROPOSED SPRINT FIBER JUNCTION BOX FURNISHED AND INSTALLED BY ALU
5. PROPOSED 2" ABOVE GROUND LIQUID TIGHT CONDUIT FROM PROPOSED CIENA ENCLOSURE TO EXISTING SPRINT PPC (TELCO), 5' FURNISHED AND INSTALLED BY SPRINT
6. PROPOSED 2" ABOVE GROUND LIQUID TIGHT CONDUIT FROM PROPOSED CIENA ENCLOSURE TO EXISTING SPRINT PPC (TELCO), 5' FURNISHED AND INSTALLED BY SPRINT
7. PROPOSED CIENA EQUIPMENT ENCLOSURE, FURNISHED AND INSTALLED BY AT&T
8. PROPOSED 2" LIQUID TIGHT CONDUIT FOR TELCO WITH PULL-STRING FROM FIBER JUNCTION BOX TO LUCENT EQUIPMENT CABINET
9. PROPOSED 1-1/2" LIQUID TIGHT CONDUIT FOR TELCO WITH PULL-STRING FROM FIBER JUNCTION BOX TO LUCENT EQUIPMENT CABINET
10. PROPOSED 1-1/2" LIQUID TIGHT CONDUIT FOR DC POWER FROM FIBER JUNCTION BOX TO LUCENT EQUIPMENT CABINET
11. PROPOSED 1-1/4" HYBRIFLEX CABLE ROUTED FROM PROPOSED JUNCTION BOX TO PROPOSED TOWER MOUNTED RRH, 210' (TYP. OF (1) PER SECTOR, (3) SECTORS TOTAL)
12. PROPOSED CAT5 CABLE ROUTED IN EXISTING 2-1/2" UNDERGROUND GRC CONDUIT FROM EXISTING SPRINT PPC (TELCO) ENCLOSURE TO EXISTING BTS CABINET, 25' FURNISHED AND INSTALLED BY SPRINT




CALLED NORTH

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

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

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

## ELECTRICAL NOTES:

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

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
LICENSED
PROFESSIONAL ENGINEER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Latham, NY 12110
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Implementation Team:
ALCATEL-LUCENT
808 AVIATION PARKWAY SUITE 700
MORRISVILLE, NC 27650

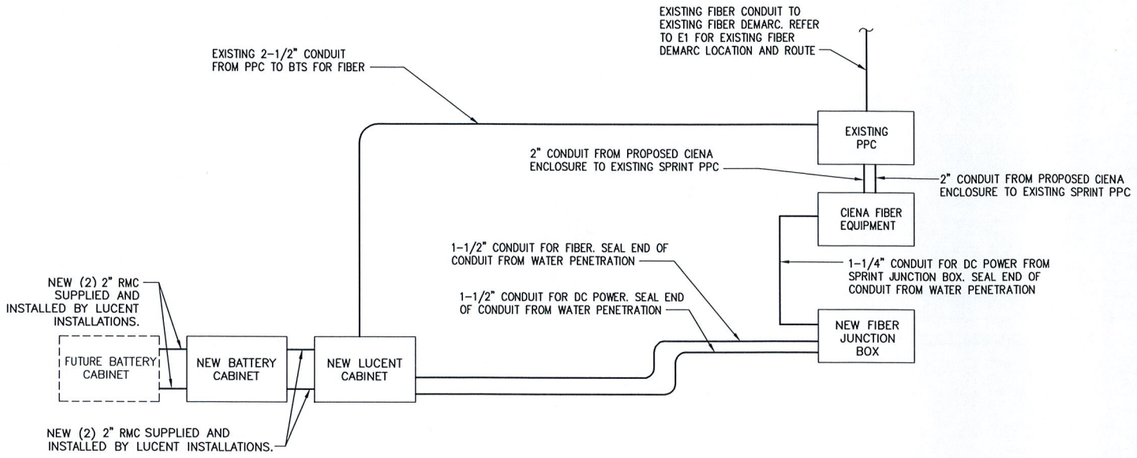
Drawing Scale: AS NOTED
Date: 6/21/12

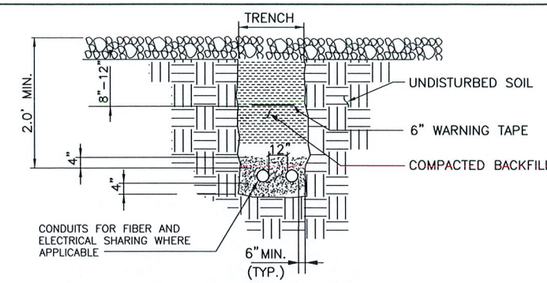
Drawing Title
UTILITY SITE PLAN

Drawing Number
E1

**GROUNDING NOTE:**

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

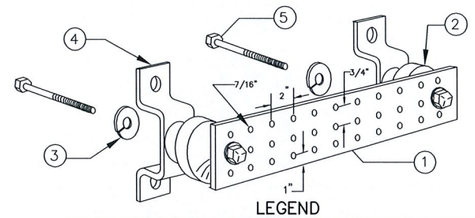



– SEPARATION DIMENSIONS MUST BE VERIFIED WITH LOCAL UTILITY CO. REQUIREMENTS.

*HAND DIG INSIDE COMPOUND

2 UTILITY TRENCH DETAIL
NOT TO SCALE

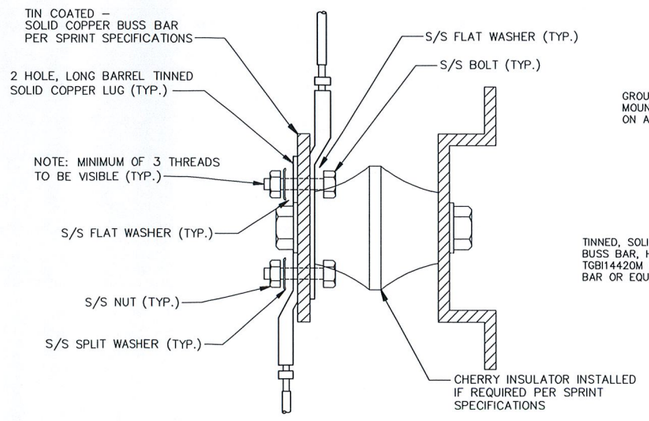


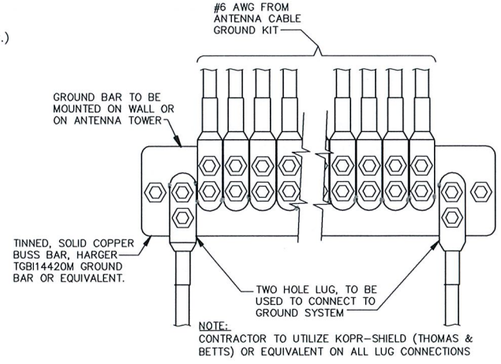

LEGEND

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

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

GROUND BAR




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

ANTENNA GROUND BAR

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

GROUND LUG

3 GROUND BAR DETAILS
NOT TO SCALE


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


STATE OF CONNECTICUT · JOHN S. STEVENS · No. 24795 · LICENSED PROFESSIONAL ENGINEER



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**15 KLUGE ROAD**
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Client: Sprint — 1 INTERNATIONAL BLVD. MAHWAH, NJ 07495

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

Drawing Scale: AS NOTED

Date: 6/21/12

Drawing Title

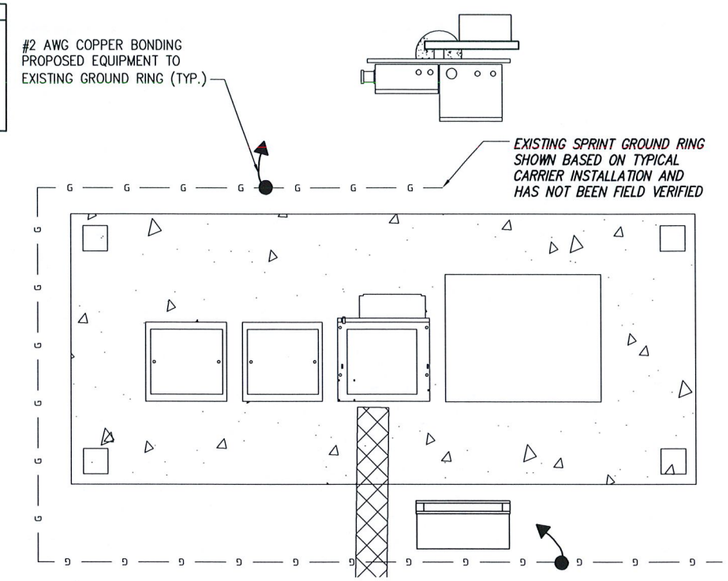
**ONE-LINE DIAGRAM AND DETAILS**

Drawing Number

**E2**

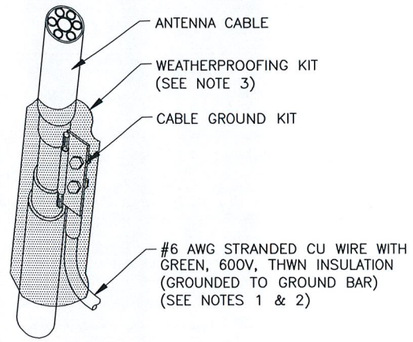
SYMBOL

- COPPER GROUND ROD
- CONNECT PER MANUFACTURER SPECS
- CADWELD CONNECTION
- GROUND BAR




1 EQUIPMENT GROUNDING PLAN
NOT TO SCALE

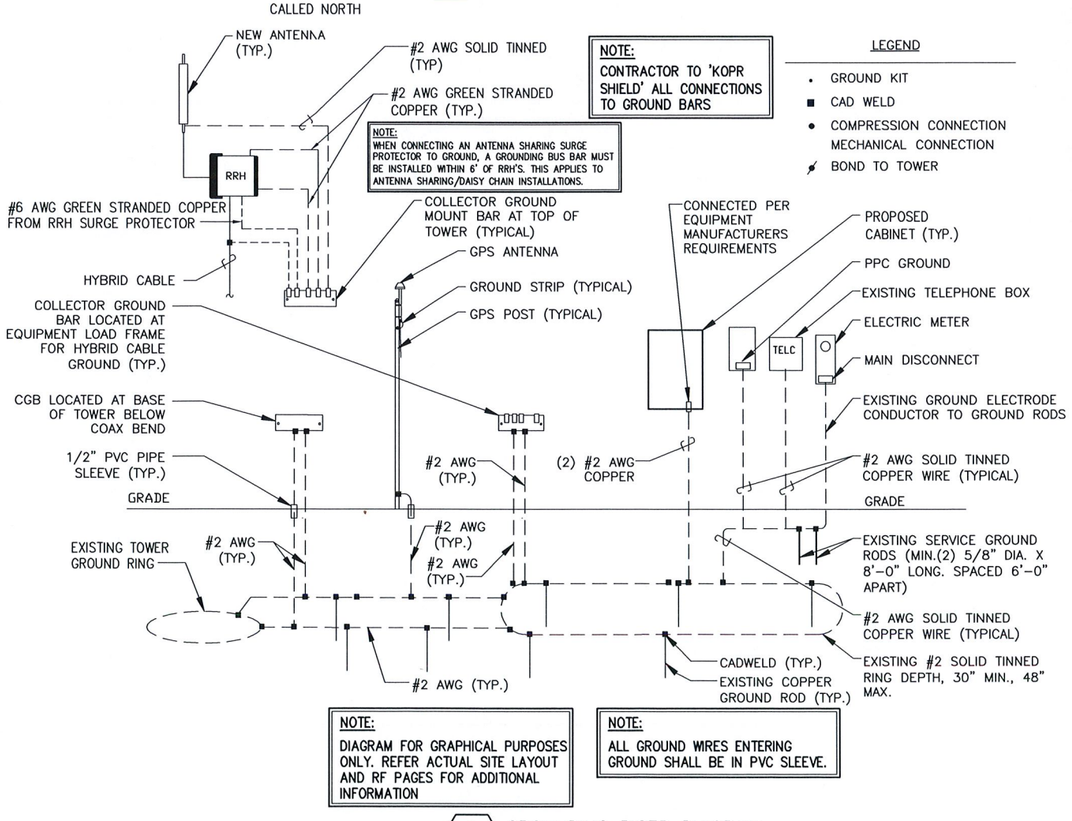
NOTES:
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHERPROOFING SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.




3 CONNECTION OF GROUND KIT TO ANTENNA CABLE
NOT TO SCALE

## GROUNDING NOTES:

1. ALL DOWN CONDUCTORS AND GROUND RING CONDUCTOR SHALL BE #2 AWG, SOLID, BARE, TINNED COPPER, UNO. ALL CONNECTIONS TO GROUND RING SHALL BE EXOTHERMICALLY WELDED. CONDUCTOR SHALL BE A MINIMUM DEPTH BELOW GRADE OF 30 INCHES OR TO THE LEDGE. MINIMUM BEND RADIUS SHALL BE 8 INCHES. CONDUCTOR SHALL BE AT LEAST 24 INCHES FROM ANY FOUNDATION, UNO.
2. WHERE MECHANICAL CONDUCTOR CONNECTIONS ARE SPECIFIED, BOLTED, COMPRESSION-TYPE CLAMPS OR SPLIT-BOLT TYPE CONNECTORS SHALL BE USED.
3. GRIND OFF GALVANIZING IN AFFECTED AREA. EXOTHERMICALLY WELD #2 CONDUCTOR AT 6 INCHES ABOVE GRADE OR FOUNDATION, WHICHEVER IS HIGHER. COLD-GALV AFTER. EXOTHERMICALLY WELD OTHER END TO GROUND.
4. GROUND CONDUCTORS ON EXTERIOR WALL OF SHELTER SHALL BE ENCASED IN 3/4" PVC CONDUIT TO GRADE. MOUNT PVC WITH GALVANIZED "C" CLAMPS. SEAL TOP ENDS.
5. FOLLOWING COMPLETION OF WORK, CONDUCT GROUND TEST. SUBMIT WRITTEN TEST TO CONSTRUCTION MANAGER AND PROJECT MANAGER.
6. ALL GROUNDING WORK SHALL COMPLY WITH CARRIER(S) STANDARDS.
7. GROUNDING REQUIREMENTS SHOWN ON THIS PLAN ARE FOR ITEMS THAT ARE LOCATED NEAR GRADE LEVEL AND THAT NEED TO BE TIED TO THE BELOW GRADE GROUND RING.
8. UNLESS NOTED OTHERWISE, ALL GROUNDING SHALL BE IN ACCORDANCE WITH SPRINT'S SSEO DOCUMENTS 3.018.02.004 "BONDING, GROUNDING AND TRANSIENT PROTECTION FOR CELL SITES", AND 3.018.10.002 "SITE RESISTANCE TO EARTH TESTING". ALL GROUNDING SHALL ALSO COMPLY WITH ALL STATE AND LOCAL CODES, AND THE NATIONAL ELECTRICAL CODE (NEC).
9. UNLESS NOTED OTHERWISE, ALL GROUNDING CONNECTIONS SHALL BE MADE BY AN EXOTHERMIC WELD.
10. RESISTANCE TO EARTH TESTING IS REQUIRED PER SPRINT STANDARDS ON ALL NEW SITES.




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

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

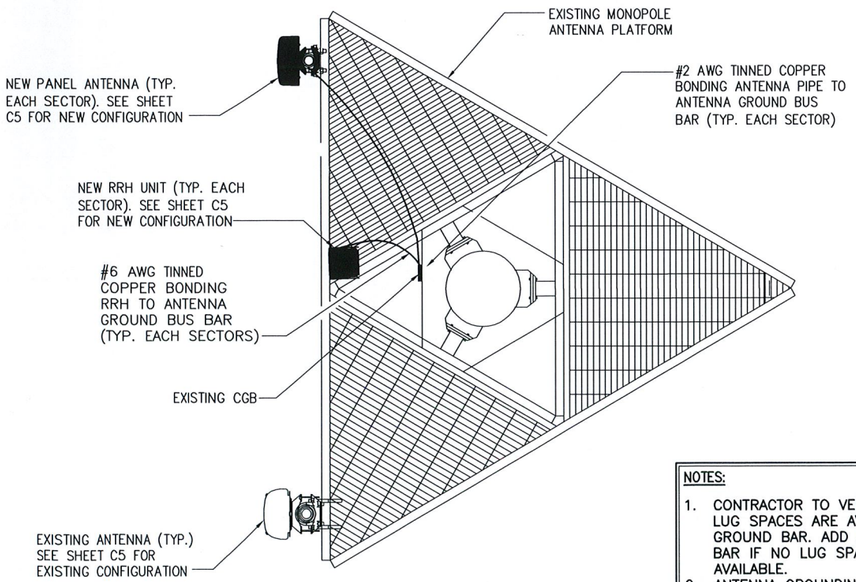
NOTE:
DIAGRAM FOR GRAPHICAL PURPOSES ONLY. REFER ACTUAL SITE LAYOUT AND RF PAGES FOR ADDITIONAL INFORMATION

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

LEGEND

- GROUND KIT
- CAD WELD
- COMPRESSION CONNECTION MECHANICAL CONNECTION
- BOND TO TOWER

2 GROUNDING RISER DIAGRAM
NOT TO SCALE




4 TYPICAL ANTENNA GROUNDING PLAN
NOT TO SCALE

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


A/E Consultant:
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Drawing Scale: AS NOTED

Date: 6/21/12

Drawing Title

**GROUNDING PLAN AND DETAILS**

Drawing Number

**E3**

Date: **June 06, 2012**

James Williams
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Crown Castle
2000 Corporate Dr.
Canonsburg, PA 15317
(724) 416-2093

**Subject:** **Structural Analysis Report**

| | | |
|---|---|---|
| ***Carrier Designation:*** | ***Sprint PCS* Co-Locate** | |
| | **Carrier Site Number:** | CT33XC514 |
| | **Carrier Site Name:** | N/A |
| ***Crown Castle Designation:*** | **Crown Castle BU Number:** | 876378 |
| | **Crown Castle Site Name:** | N. BETHANY / DAVID KLUDGE |
| | **Crown Castle JDE Job Number:** | 189141 |
| | **Crown Castle Work Order Number:** | 498722 |
| | **Crown Castle Application Number:** | 151606 Rev. 0 |
| ***Engineering Firm Designation:*** | **Crown Castle Project Number:** | 498722 |
| ***Site Data:*** | **15 Kluge Road, PROSPECT, New Haven County, CT**<br>**Latitude *41° 28' 16.05"*, Longitude *-72° 58' 20.55"***<br>**190 Foot - Monopole Tower** | |

Dear James Williams,

*Crown Castle* is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 498722, in accordance with application 151606, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code based upon a wind speed of 85 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at *Crown Castle* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Ming Deng Chin, EIT / CSV

Respectfully submitted by:

STATE OF CONNECTICUT
DOUGLAS K. PINEO
No. 21110
REGISTERED PROFESSIONAL ENGINEER
6/6/12

Douglas K. Pineo, P.E.
Manager Structural Design

## TABLE OF CONTENTS

## 1) INTRODUCTION

This tower is a 190 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in September of 2007. The tower was originally designed for a wind speed of 105 mph per TIA-222-G.

## 2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

**Table 1 - Proposed Antenna and Cable Information**

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model | Number of Feed Lines | Feed Line Size (in) | Note |
|---|---|---|---|---|---|---|---|
| 192.0 | 190.0 | 3 | alcatel lucent | 1900MHz RRH (65MHz) | 3 | 1-1/4 | - |
| | | 3 | alcatel lucent | 800 EXTERNAL NOTCH FILTER | | | |
| | | 3 | alcatel lucent | 800MHZ RRH | | | |
| | | 9 | rfs celwave | ACU-A20-N | | | |
| | | 1 | rfs celwave | APXV9ERR18-C-A20 w/ Mount Pipe | | | |
| | | 2 | rfs celwave | APXVSPP18-C-A20 w/ Mount Pipe | | | |

**Table 2 - Existing and Reserved Antenna and Cable Information**

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model | Number of Feed Lines | Feed Line Size (in) | Note |
|---|---|---|---|---|---|---|---|
| 192.0 | 192.0 | 6 | ems wireless | FV65-14-00NA2 w/ Mount Pipe | 6 | 1-5/8 | 2 |
| | | 1 | tower mounts | Platform Mount [LP 602-1] | - | - | 3 |
| 180.0 | 180.0 | 3 | ems wireless | DR65-19-02DPQ w/ Mount Pipe | 6 | 1-5/8 | 1 |
| | | 1 | tower mounts | Platform Mount [LP 305-1] | | | |

Notes:
1) Existing Equipment
2) Equipment To Be Removed
3) Adding handrail to existing platform

**Table 3 - Design Antenna and Cable Information**

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model | Number of Feed Lines | Feed Line Size (in) |
|---|---|---|---|---|---|---|
| 190 | 190 | 12 | Decibel | 980 | - | - |
| 180 | 180 | 12 | Decibel | 980 | - | - |
| 170 | 170 | 12 | Decibel | 980 | - | - |

## 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided**

| Document | Remarks | Reference | Source |
|---|---|---|---|
| 4-GEOTECHNICAL REPORTS | Carmichael Engineering, Inc. | 2200992 | CCISITES |
| 4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS | AW Solutions Incorporated | 2200999 | CCISITES |
| 4-TOWER MANUFACTURER DRAWINGS | Sabre Communications Corp. | 2200994 | CCISITES |

### 3.1) Analysis Method

tnxTower (version 6.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

### 3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle should be notified to determine the effect on the structural integrity of the tower.

## 4) ANALYSIS RESULTS

**Table 5 - Section Capacity (Summary)**

| Section No. | Elevation (ft) | Component Type | Size | Critical Element | P (K) | SF*P_allow (K) | % Capacity | Pass / Fail |
|---|---|---|---|---|---|---|---|---|
| L1 | 190 - 163.349 | Pole | TP24.4525x19.5x0.1875 | 1 | -4.19 | 730.28 | 35.4 | Pass |
| L2 | 163.349 - 126.956 | Pole | TP30.7144x23.4165x0.25 | 2 | -7.22 | 1224.01 | 52.7 | Pass |
| L3 | 126.956 - 86.5234 | Pole | TP37.6019x29.4219x0.3125 | 3 | -12.37 | 1873.81 | 55.6 | Pass |
| L4 | 86.5234 - 43.0651 | Pole | TP44.9268x36.0267x0.375 | 4 | -20.37 | 2687.55 | 54.2 | Pass |
| L5 | 43.0651 - 0 | Pole | TP52x43.0584x0.4375 | 5 | -33.09 | 3722.32 | 51.6 | Pass |
| | | | | | | | Summary | |
| | | | | | | Pole (L3) | 55.6 | Pass |
| | | | | | | Rating = | 55.6 | Pass |

**Table 6 - Tower Component Stresses vs. Capacity – LC5**

| Notes | Component | Elevation (ft) | % Capacity | Pass / Fail |
|---|---|---|---|---|
| 1 | Anchor Rods | 0 | 49.4 | Pass |
| 1 | Base Plate | 0 | 67.2 | Pass |
| 1 | Base Foundation | 0 | 55.4 | Pass |

| Structure Rating (max from all components) = | 67.2% |
|---|---|

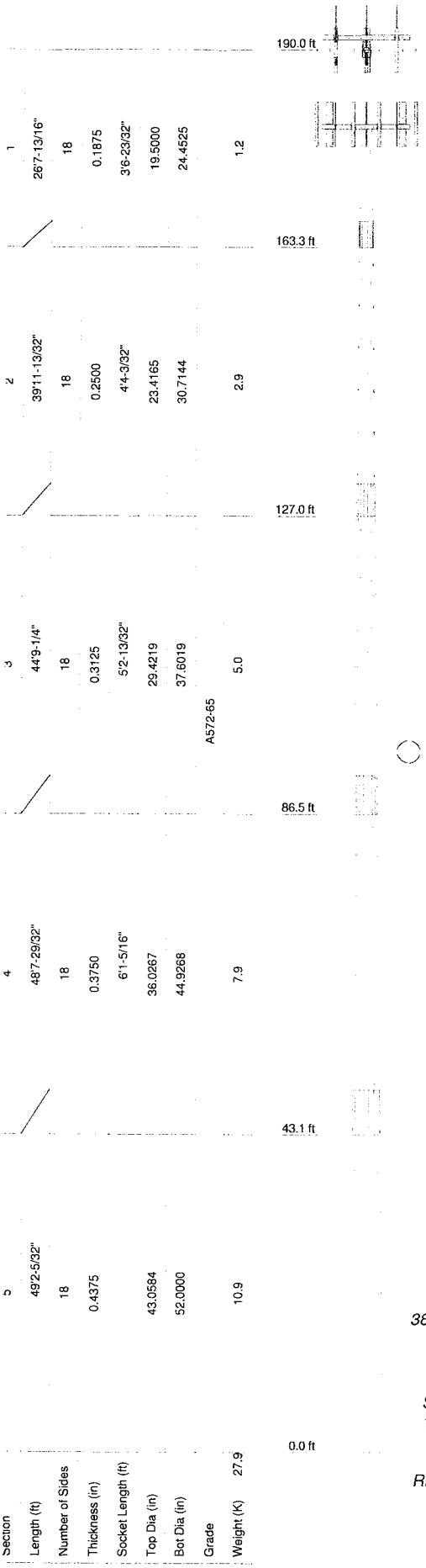
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

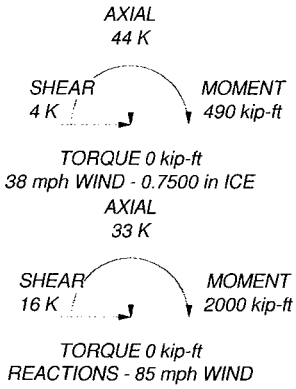
### 4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

## APPENDIX A

## TNXTOWER OUTPUT




## DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| Lighting Rod 3/4" x 4' | 194 | (3) ACU-A20-N | 192 |
| 1900MHz RRH (65MHz) | 192 | APXVSPP18-C-A20 w/ Mount Pipe | 192 |
| 800 EXTERNAL NOTCH FILTER | 192 | Platform Mount [LP 602-1] | 192 |
| 800MHZ RRH | 192 | (3) 8'x2" Antenna Mount Pipe | 192 |
| (3) ACU-A20-N | 192 | (3) 8'x2" Antenna Mount Pipe | 192 |
| APXVSPP18-C-A20 w/ Mount Pipe | 192 | (3) 8'x2" Antenna Mount Pipe | 192 |
| 1900MHz RRH (65MHz) | 192 | DR65-19-02DPQ w/ Mount Pipe | 180 |
| 800 EXTERNAL NOTCH FILTER | 192 | DR65-19-02DPQ w/ Mount Pipe | 180 |
| 800MHZ RRH | 192 | DR65-19-02DPQ w/ Mount Pipe | 180 |
| (3) ACU-A20-N | 192 | 6' x 2" Mount Pipe | 180 |
| APXV9ERR18-C-A20 w/ Mount Pipe | 192 | 6' x 2" Mount Pipe | 180 |
| 1900MHz RRH (65MHz) | 192 | 6' x 2" Mount Pipe | 180 |
| 800 EXTERNAL NOTCH FILTER | 192 | Platform Mount [LP 305-1] | 180 |
| 800MHZ RRH | 192 | | |

## MATERIAL STRENGTH

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

## TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 55.6%


CROWN CASTLE
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| | |
|---|---|
| Job: | **BU # 876378** |
| Project: | |
| Client: Crown Castle | Drawn by: cvolk App'd: |
| Code: TIA/EIA-222-F | Date: 06/06/12 Scale: N |
| Path: R:\SA Models - Letters\Work Area\MChin\876378\Final\876378.eri | Dwg No. |

# Tower Input Data

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

4) Tower is located in New Haven County, Connecticut.
5) Basic wind speed of 85 mph.
6) Nominal ice thickness of 0.7500 in.
7) Ice thickness is considered to increase with height.
8) Ice density of 56 pcf.
9) A wind speed of 38 mph is used in combination with ice.
10) Temperature drop of 50 °F.
11) Deflections calculated using a wind speed of 50 mph.
12) User specified elevation for calculation of $G_h$ is 0'.
13) A non-linear (P-delta) analysis was used.
14) Pressures are calculated at each section.
15) Stress ratio used in pole design is 1.333.
16) Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

# Options

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

# 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 | 190'-163'4-3/16" | 26'7-13/16" | 3'6-23/32" | 18 | 19.5000 | 24.4525 | 0.1875 | 0.7500 | A572-65 (65 ksi) |
| L2 | 163'4-3/16"-126'11-17/32" | 39'11-13/32" | 4'4-3/32" | 18 | 23.4165 | 30.7144 | 0.2500 | 1.0000 | A572-65 (65 ksi) |
| L3 | 126'11-17/32"-86'6-1/4" | 44'9-1/4" | 5'2-13/32" | 18 | 29.4219 | 37.6019 | 0.3125 | 1.2500 | A572-65 (65 ksi) |
| L4 | 86'6-1/4"-43'27/32" | 48'7-29/32" | 6'1-5/16" | 18 | 36.0267 | 44.9268 | 0.3750 | 1.5000 | A572-65 (65 ksi) |
| L5 | 43'27/32"-0' | 49'2-5/32" | | 18 | 43.0584 | 52.0000 | 0.4375 | 1.7500 | A572-65 (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 | 19.8008 | 11.4934 | 541.5782 | 6.8559 | 9.9060 | 54.6717 | 1083.8689 | 5.7478 | 3.1020 | 16.544 |
| | 24.8297 | 14.4407 | 1074.2034 | 8.6141 | 12.4219 | 86.4768 | 2149.8203 | 7.2217 | 3.9736 | 21.193 |
| L2 | 24.4375 | 18.3826 | 1246.4166 | 8.2241 | 11.8956 | 104.7800 | 2494.4733 | 9.1930 | 3.6813 | 14.725 |
| | 31.1882 | 24.1735 | 2834.4074 | 10.8149 | 15.6029 | 181.6588 | 5672.5443 | 12.0890 | 4.9657 | 19.863 |
| L3 | 30.6807 | 28.8728 | 3090.9524 | 10.3338 | 14.9463 | 206.8038 | 6185.9719 | 14.4392 | 4.6282 | 14.81 |
| | 38.1820 | 36.9864 | 6497.5642 | 13.2377 | 19.1018 | 340.1552 | 13003.678 1 | 18.4967 | 6.0679 | 19.417 |
| L4 | 37.5484 | 42.4345 | 6814.2333 | 12.6564 | 18.3016 | 372.3305 | 13637.433 0 | 21.2213 | 5.6807 | 15.149 |
| | 45.6199 | 53.0278 | 13297.543 1 | 15.8159 | 22.8228 | 582.6426 | 26612.583 4 | 26.5189 | 7.2471 | 19.326 |
| L5 | 44.8515 | 59.1844 | 13582.825 8 | 15.1304 | 21.8737 | 620.9671 | 27183.524 2 | 29.5978 | 6.8083 | 15.562 |
| | 52.8022 | 71.6010 | 24050.512 1 | 18.3047 | 26.4160 | 910.4525 | 48132.670 4 | 35.8073 | 8.3820 | 19.159 |

| 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 190'-163'4-3/16" | | | | 1 | 1 | 1 | | |
| L2 163'4-3/16"-126'11-17/32" | | | | 1 | 1 | 1 | | |
| L3 126'11-17/32"-86'6-1/4" | | | | 1 | 1 | 1 | | |
| L4 86'6-1/4"-43'27/32" | | | | 1 | 1 | 1 | | |
| L5 43'27/32"-0' | | | | 1 | 1 | 1 | | |

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

| Description | Face or Leg | Allow Shield | Component Type | Placement ft | Total Number | Number Per Row | Clear Spacing in | Width or Diameter in | Perimeter in | Weight plf |
|---|---|---|---|---|---|---|---|---|---|---|
| * | | | | | | | | | | |

## 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 plf |
|---|---|---|---|---|---|---|---|---|
| * | | | | | | | | |
| HB114-1-0813U4-M5J( 1 1/4") | B | No | Inside Pole | 190' - 0' | 3 | No Ice | 0.00 | 1.20 |
| | | | | | | 1/2" Ice | 0.00 | 1.20 |
| | | | | | | 1" Ice | 0.00 | 1.20 |
| | | | | | | 2" Ice | 0.00 | 1.20 |
| | | | | | | 4" Ice | 0.00 | 1.20 |
| * | | | | | | | | |
| LDF7-50A(1-5/8") | A | No | Inside Pole | 180' - 0' | 6 | No Ice | 0.00 | 0.82 |
| | | | | | | 1/2" Ice | 0.00 | 0.82 |
| | | | | | | 1" Ice | 0.00 | 0.82 |
| | | | | | | 2" Ice | 0.00 | 0.82 |
| | | | | | | 4" Ice | 0.00 | 0.82 |
| * | | | | | | | | |

## Feed Line/Linear Appurtenances Section Areas

| Tower Section | Tower Elevation ft | Face | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|
| L1 | 190'-163'4-3/16" | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.08 |
| | | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.10 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| L2 | 163'4-3/16"- | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.18 |
| | 126'11-17/32" | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.13 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| L3 | 126'11-17/32"- | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.20 |
| | 86'6-1/4" | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.15 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| L4 | 86'6-1/4"- | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.21 |
| | 43'27/32" | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.16 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| L5 | 43'27/32"-0' | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.21 |
| | | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.16 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |

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

| Tower Section | Tower Elevation ft | Face or Leg | Ice Thickness in | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|---|
| L1 | 190'-163'4-3/16" | A | 0.917 | 0.000 | 0.000 | 0.000 | 0.000 | 0.08 |
| | | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.10 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| L2 | 163'4-3/16"- | A | 0.895 | 0.000 | 0.000 | 0.000 | 0.000 | 0.18 |
| | 126'11-17/32" | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.13 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| L3 | 126'11-17/32"- | A | 0.863 | 0.000 | 0.000 | 0.000 | 0.000 | 0.20 |
| | 86'6-1/4" | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.15 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| L4 | 86'6-1/4"- | A | 0.813 | 0.000 | 0.000 | 0.000 | 0.000 | 0.21 |
| | 43'27/32" | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.16 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| L5 | 43'27/32"-0' | A | 0.750 | 0.000 | 0.000 | 0.000 | 0.000 | 0.21 |
| | | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.16 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |

## Feed Line Center of Pressure

| Section | Elevation ft | $CP_X$ in | $CP_Z$ in | $CP_X$ Ice in | $CP_Z$ Ice in |
|---|---|---|---|---|---|
| L1 | 190'-163'4-3/16" | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| L2 | 163'4-3/16"-126'11-17/32" | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| L3 | 126'11-17/32"-86'6-1/4" | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| L4 | 86'6-1/4"-43'27/32" | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| L5 | 43'27/32"-0' | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

## Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | | $C_AA_A$ Front<br>$ft^2$ | $C_AA_A$ Side<br>$ft^2$ | Weight<br>K |
|---|---|---|---|---|---|---|---|---|---|
| Lighting Rod 3/4" x 4' | C | None | | 0.0000 | 194' | No Ice | 0.30 | 0.30 | 0.03 |
| | | | | | | 1/2" Ice | 0.71 | 0.71 | 0.03 |
| | | | | | | 1" Ice | 1.00 | 1.00 | 0.04 |
| | | | | | | 2" Ice | 1.52 | 1.52 | 0.06 |
| | | | | | | 4" Ice | 2.72 | 2.72 | 0.14 |
| * | | | | | | | | | |
| 1900MHz RRH (65MHz) | A | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 2.70 | 2.77 | 0.06 |
| | | | | | | 1/2" Ice | 2.94 | 3.01 | 0.08 |
| | | | | | | 1" Ice | 3.18 | 3.26 | 0.11 |
| | | | | | | 2" Ice | 3.70 | 3.78 | 0.18 |
| | | | | | | 4" Ice | 4.85 | 4.93 | 0.35 |
| 800 EXTERNAL NOTCH FILTER | A | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 0.77 | 0.37 | 0.01 |
| | | | | | | 1/2" Ice | 0.89 | 0.46 | 0.02 |
| | | | | | | 1" Ice | 1.02 | 0.56 | 0.02 |
| | | | | | | 2" Ice | 1.30 | 0.79 | 0.04 |
| | | | | | | 4" Ice | 1.97 | 1.34 | 0.11 |
| 800MHZ RRH | A | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 2.49 | 2.07 | 0.05 |
| | | | | | | 1/2" Ice | 2.71 | 2.27 | 0.07 |
| | | | | | | 1" Ice | 2.93 | 2.48 | 0.10 |
| | | | | | | 2" Ice | 3.41 | 2.93 | 0.16 |
| | | | | | | 4" Ice | 4.46 | 3.93 | 0.32 |
| (3) ACU-A20-N | A | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 0.08 | 0.14 | 0.00 |
| | | | | | | 1/2" Ice | 0.12 | 0.19 | 0.00 |
| | | | | | | 1" Ice | 0.17 | 0.25 | 0.00 |
| | | | | | | 2" Ice | 0.30 | 0.40 | 0.01 |
| | | | | | | 4" Ice | 0.67 | 0.80 | 0.04 |
| APXVSPP18-C-A20 w/ Mount Pipe | A | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 8.50 | 6.95 | 0.08 |
| | | | | | | 1/2" Ice | 9.15 | 8.13 | 0.15 |
| | | | | | | 1" Ice | 9.77 | 9.02 | 0.22 |
| | | | | | | 2" Ice | 11.03 | 10.84 | 0.41 |
| | | | | | | 4" Ice | 13.68 | 14.85 | 0.91 |
| 1900MHz RRH (65MHz) | B | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 2.70 | 2.77 | 0.06 |
| | | | | | | 1/2" Ice | 2.94 | 3.01 | 0.08 |
| | | | | | | 1" Ice | 3.18 | 3.26 | 0.11 |
| | | | | | | 2" Ice | 3.70 | 3.78 | 0.18 |
| | | | | | | 4" Ice | 4.85 | 4.93 | 0.35 |
| 800 EXTERNAL NOTCH FILTER | B | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 0.77 | 0.37 | 0.01 |
| | | | | | | 1/2" Ice | 0.89 | 0.46 | 0.02 |
| | | | | | | 1" Ice | 1.02 | 0.56 | 0.02 |
| | | | | | | 2" Ice | 1.30 | 0.79 | 0.04 |
| | | | | | | 4" Ice | 1.97 | 1.34 | 0.11 |
| 800MHZ RRH | B | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 2.49 | 2.07 | 0.05 |
| | | | | | | 1/2" Ice | 2.71 | 2.27 | 0.07 |
| | | | | | | 1" Ice | 2.93 | 2.48 | 0.10 |
| | | | | | | 2" Ice | 3.41 | 2.93 | 0.16 |
| | | | | | | 4" Ice | 4.46 | 3.93 | 0.32 |
| (3) ACU-A20-N | B | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 0.08 | 0.14 | 0.00 |
| | | | | | | 1/2" Ice | 0.12 | 0.19 | 0.00 |
| | | | | | | 1" Ice | 0.17 | 0.25 | 0.00 |
| | | | | | | 2" Ice | 0.30 | 0.40 | 0.01 |
| | | | | | | 4" Ice | 0.67 | 0.80 | 0.04 |
| APXV9ERR18-C-A20 w/ Mount Pipe | B | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 8.50 | 7.47 | 0.09 |
| | | | | | | 1/2" Ice | 9.15 | 8.66 | 0.16 |
| | | | | | | 1" Ice | 9.77 | 9.56 | 0.23 |
| | | | | | | 1" Ice | 11.03 | 11.39 | 0.42 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2" Ice | 13.68 | 15.53 | 0.94 |
| | | | | | | 4" Ice | | | |
| 1900MHz RRH (65MHz) | C | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 2.70 | 2.77 | 0.06 |
| | | | | | | 1/2" Ice | 2.94 | 3.01 | 0.08 |
| | | | | | | 1" Ice | 3.18 | 3.26 | 0.11 |
| | | | | | | 2" Ice | 3.70 | 3.78 | 0.18 |
| | | | | | | 4" Ice | 4.85 | 4.93 | 0.35 |
| 800 EXTERNAL NOTCH FILTER | C | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 0.77 | 0.37 | 0.01 |
| | | | | | | 1/2" Ice | 0.89 | 0.46 | 0.02 |
| | | | | | | 1" Ice | 1.02 | 0.56 | 0.02 |
| | | | | | | 2" Ice | 1.30 | 0.79 | 0.04 |
| | | | | | | 4" Ice | 1.97 | 1.34 | 0.11 |
| 800MHZ RRH | C | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 2.49 | 2.07 | 0.05 |
| | | | | | | 1/2" Ice | 2.71 | 2.27 | 0.07 |
| | | | | | | 1" Ice | 2.93 | 2.48 | 0.10 |
| | | | | | | 2" Ice | 3.41 | 2.93 | 0.16 |
| | | | | | | 4" Ice | 4.46 | 3.93 | 0.32 |
| (3) ACU-A20-N | C | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 0.08 | 0.14 | 0.00 |
| | | | | | | 1/2" Ice | 0.12 | 0.19 | 0.00 |
| | | | | | | 1" Ice | 0.17 | 0.25 | 0.00 |
| | | | | | | 2" Ice | 0.30 | 0.40 | 0.01 |
| | | | | | | 4" Ice | 0.67 | 0.80 | 0.04 |
| APXVSPP18-C-A20 w/ Mount Pipe | C | From Leg | 4.00<br>0'<br>-2' | 0.0000 | 192' | No Ice | 8.50 | 6.95 | 0.08 |
| | | | | | | 1/2" Ice | 9.15 | 8.13 | 0.15 |
| | | | | | | 1" Ice | 9.77 | 9.02 | 0.22 |
| | | | | | | 2" Ice | 11.03 | 10.84 | 0.41 |
| | | | | | | 4" Ice | 13.68 | 14.85 | 0.91 |
| Platform Mount [LP 602-1] | C | None | | 0.0000 | 192' | No Ice | 32.03 | 32.03 | 1.34 |
| | | | | | | 1/2" Ice | 38.71 | 38.71 | 1.80 |
| | | | | | | 1" Ice | 45.39 | 45.39 | 2.26 |
| | | | | | | 2" Ice | 58.75 | 58.75 | 3.17 |
| | | | | | | 4" Ice | 85.47 | 85.47 | 5.00 |
| (3) 8'x2" Antenna Mount Pipe | A | From Leg | 4.00<br>0'<br>0' | 0.0000 | 192' | No Ice | 1.90 | 1.90 | 0.03 |
| | | | | | | 1/2" Ice | 2.73 | 2.73 | 0.04 |
| | | | | | | 1" Ice | 3.40 | 3.40 | 0.06 |
| | | | | | | 2" Ice | 4.40 | 4.40 | 0.12 |
| | | | | | | 4" Ice | 6.50 | 6.50 | 0.30 |
| (3) 8'x2" Antenna Mount Pipe | B | From Leg | 4.00<br>0'<br>0' | 0.0000 | 192' | No Ice | 1.90 | 1.90 | 0.03 |
| | | | | | | 1/2" Ice | 2.73 | 2.73 | 0.04 |
| | | | | | | 1" Ice | 3.40 | 3.40 | 0.06 |
| | | | | | | 2" Ice | 4.40 | 4.40 | 0.12 |
| | | | | | | 4" Ice | 6.50 | 6.50 | 0.30 |
| (3) 8'x2" Antenna Mount Pipe | C | From Leg | 4.00<br>0'<br>0' | 0.0000 | 192' | No Ice | 1.90 | 1.90 | 0.03 |
| | | | | | | 1/2" Ice | 2.73 | 2.73 | 0.04 |
| | | | | | | 1" Ice | 3.40 | 3.40 | 0.06 |
| | | | | | | 2" Ice | 4.40 | 4.40 | 0.12 |
| | | | | | | 4" Ice | 6.50 | 6.50 | 0.30 |
| * | | | | | | | | | |
| DR65-19-02DPQ w/ Mount Pipe | A | From Leg | 4.00<br>0'<br>0' | 0.0000 | 180' | No Ice | 8.64 | 5.20 | 0.05 |
| | | | | | | 1/2" Ice | 9.29 | 6.36 | 0.11 |
| | | | | | | 1" Ice | 9.91 | 7.24 | 0.18 |
| | | | | | | 2" Ice | 11.18 | 9.03 | 0.34 |
| | | | | | | 4" Ice | 13.83 | 12.81 | 0.81 |
| DR65-19-02DPQ w/ Mount Pipe | B | From Leg | 4.00<br>0' | 0.0000 | 180' | No Ice | 8.64 | 5.20 | 0.05 |
| | | | | | | 1/2" Ice | 9.29 | 6.36 | 0.11 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft / ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0' | | | Ice | 9.91 | 7.24 | 0.18 |
| | | | | | | 1" Ice | 11.18 | 9.03 | 0.34 |
| | | | | | | 2" Ice | 13.83 | 12.81 | 0.81 |
| | | | | | | 4" Ice | | | |
| DR65-19-02DPQ w/ Mount Pipe | C | From Leg | 4.00 | 0.0000 | 180' | No Ice | 8.64 | 5.20 | 0.05 |
| | | | 0' | | | 1/2" | 9.29 | 6.36 | 0.11 |
| | | | 0' | | | Ice | 9.91 | 7.24 | 0.18 |
| | | | | | | 1" Ice | 11.18 | 9.03 | 0.34 |
| | | | | | | 2" Ice | 13.83 | 12.81 | 0.81 |
| | | | | | | 4" Ice | | | |
| 6' x 2" Mount Pipe | A | From Leg | 4.00 | 0.0000 | 180' | No Ice | 1.43 | 1.43 | 0.02 |
| | | | 0' | | | 1/2" | 1.92 | 1.92 | 0.03 |
| | | | 0' | | | Ice | 2.29 | 2.29 | 0.05 |
| | | | | | | 1" Ice | 3.06 | 3.06 | 0.09 |
| | | | | | | 2" Ice | 4.70 | 4.70 | 0.23 |
| | | | | | | 4" Ice | | | |
| 6' x 2" Mount Pipe | B | From Leg | 4.00 | 0.0000 | 180' | No Ice | 1.43 | 1.43 | 0.02 |
| | | | 0' | | | 1/2" | 1.92 | 1.92 | 0.03 |
| | | | 0' | | | Ice | 2.29 | 2.29 | 0.05 |
| | | | | | | 1" Ice | 3.06 | 3.06 | 0.09 |
| | | | | | | 2" Ice | 4.70 | 4.70 | 0.23 |
| | | | | | | 4" Ice | | | |
| 6' x 2" Mount Pipe | C | From Leg | 4.00 | 0.0000 | 180' | No Ice | 1.43 | 1.43 | 0.02 |
| | | | 0' | | | 1/2" | 1.92 | 1.92 | 0.03 |
| | | | 0' | | | Ice | 2.29 | 2.29 | 0.05 |
| | | | | | | 1" Ice | 3.06 | 3.06 | 0.09 |
| | | | | | | 2" Ice | 4.70 | 4.70 | 0.23 |
| | | | | | | 4" Ice | | | |
| Platform Mount [LP 305-1] | C | None | | 0.0000 | 180' | No Ice | 18.01 | 18.01 | 1.12 |
| | | | | | | 1/2" | 23.33 | 23.33 | 1.35 |
| | | | | | | Ice | 28.65 | 28.65 | 1.58 |
| | | | | | | 1" Ice | 39.29 | 39.29 | 2.05 |
| | | | | | | 2" Ice | 60.57 | 60.57 | 2.97 |
| | | | | | | 4" Ice | | | |
| * | | | | | | | | | |

## Load Combinations

| Comb. No. | Description |
|---|---|
| 1 | Dead Only |
| 2 | Dead+Wind 0 deg - No Ice |
| 3 | Dead+Wind 30 deg - No Ice |
| 4 | Dead+Wind 60 deg - No Ice |
| 5 | Dead+Wind 90 deg - No Ice |
| 6 | Dead+Wind 120 deg - No Ice |
| 7 | Dead+Wind 150 deg - No Ice |
| 8 | Dead+Wind 180 deg - No Ice |
| 9 | Dead+Wind 210 deg - No Ice |
| 10 | Dead+Wind 240 deg - No Ice |
| 11 | Dead+Wind 270 deg - No Ice |
| 12 | Dead+Wind 300 deg - No Ice |
| 13 | Dead+Wind 330 deg - No Ice |
| 14 | Dead+Ice+Temp |
| 15 | Dead+Wind 0 deg+Ice+Temp |
| 16 | Dead+Wind 30 deg+Ice+Temp |
| 17 | Dead+Wind 60 deg+Ice+Temp |
| 18 | Dead+Wind 90 deg+Ice+Temp |
| 19 | Dead+Wind 120 deg+Ice+Temp |

| Comb. No. | Description |
|---|---|
| 20 | Dead+Wind 150 deg+Ice+Temp |
| 21 | Dead+Wind 180 deg+Ice+Temp |
| 22 | Dead+Wind 210 deg+Ice+Temp |
| 23 | Dead+Wind 240 deg+Ice+Temp |
| 24 | Dead+Wind 270 deg+Ice+Temp |
| 25 | Dead+Wind 300 deg+Ice+Temp |
| 26 | Dead+Wind 330 deg+Ice+Temp |
| 27 | Dead+Wind 0 deg - Service |
| 28 | Dead+Wind 30 deg - Service |
| 29 | Dead+Wind 60 deg - Service |
| 30 | Dead+Wind 90 deg - Service |
| 31 | Dead+Wind 120 deg - Service |
| 32 | Dead+Wind 150 deg - Service |
| 33 | Dead+Wind 180 deg - Service |
| 34 | Dead+Wind 210 deg - Service |
| 35 | Dead+Wind 240 deg - Service |
| 36 | Dead+Wind 270 deg - Service |
| 37 | Dead+Wind 300 deg - Service |
| 38 | Dead+Wind 330 deg - Service |

## Maximum Member Forces

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Force K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|---|---|---|---|---|---|---|---|
| L1 | 190 - 163.349 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 14 | -8.08 | -0.04 | -0.02 |
| | | | Max. Mx | 5 | -4.20 | -123.20 | 0.19 |
| | | | Max. My | 8 | -4.19 | 0.17 | -123.42 |
| | | | Max. Vy | 5 | 6.48 | -123.20 | 0.19 |
| | | | Max. Vx | 8 | 6.49 | 0.17 | -123.42 |
| | | | Max. Torque | 3 | | | -0.10 |
| L2 | 163.349 - 126.956 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 14 | -12.29 | -0.04 | -0.02 |
| | | | Max. Mx | 5 | -7.22 | -387.84 | 0.51 |
| | | | Max. My | 8 | -7.22 | 0.50 | -388.44 |
| | | | Max. Vy | 5 | 8.41 | -387.84 | 0.51 |
| | | | Max. Vx | 8 | 8.42 | 0.50 | -388.44 |
| | | | Max. Torque | 3 | | | -0.10 |
| L3 | 126.956 - 86.5234 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 14 | -18.95 | -0.04 | -0.02 |
| | | | Max. Mx | 5 | -12.38 | -767.10 | 0.88 |
| | | | Max. My | 8 | -12.37 | 0.86 | -768.12 |
| | | | Max. Vy | 5 | 10.76 | -767.10 | 0.88 |
| | | | Max. Vx | 8 | 10.77 | 0.86 | -768.12 |
| | | | Max. Torque | 3 | | | -0.10 |
| L4 | 86.5234 - 43.0651 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 14 | -28.75 | -0.04 | -0.02 |
| | | | Max. Mx | 5 | -20.37 | -1279.56 | 1.27 |
| | | | Max. My | 8 | -20.37 | 1.25 | -1281.02 |
| | | | Max. Vy | 5 | 13.28 | -1279.56 | 1.27 |
| | | | Max. Vx | 8 | 13.29 | 1.25 | -1281.02 |
| | | | Max. Torque | 3 | | | -0.10 |
| L5 | 43.0651 - 0 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 14 | -43.68 | -0.04 | -0.02 |
| | | | Max. Mx | 5 | -33.09 | -1996.62 | 1.70 |
| | | | Max. My | 8 | -33.09 | 1.69 | -1998.60 |
| | | | Max. Vy | 5 | 15.85 | -1996.62 | 1.70 |
| | | | Max. Vx | 8 | 15.86 | 1.69 | -1998.60 |
| | | | Max. Torque | 3 | | | -0.10 |

# Maximum Reactions

| Location | Condition | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|---|---|---|---|---|---|
| Pole | Max. Vert | 21 | 43.68 | -0.00 | -3.59 |
| | Max. $H_x$ | 11 | 33.09 | 15.83 | -0.01 |
| | Max. $H_z$ | 2 | 33.09 | -0.01 | 15.84 |
| | Max. $M_x$ | 2 | 1998.54 | -0.01 | 15.84 |
| | Max. $M_z$ | 5 | 1996.62 | -15.83 | 0.01 |
| | Max. Torsion | 9 | 0.10 | 7.92 | -13.72 |
| | Min. Vert | 1 | 33.09 | 0.00 | 0.00 |
| | Min. $H_x$ | 5 | 33.09 | -15.83 | 0.01 |
| | Min. $H_z$ | 8 | 33.09 | 0.01 | -15.84 |
| | Min. $M_x$ | 8 | -1998.60 | 0.01 | -15.84 |
| | Min. $M_z$ | 11 | -1996.53 | 15.83 | -0.01 |
| | Min. Torsion | 3 | -0.10 | -7.92 | 13.72 |

# 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 | 33.09 | 0.00 | 0.00 | 0.02 | -0.04 | 0.00 |
| Dead+Wind 0 deg - No Ice | 33.09 | 0.01 | -15.84 | -1998.54 | -1.77 | 0.09 |
| Dead+Wind 30 deg - No Ice | 33.09 | 7.92 | -13.72 | -1731.66 | -999.83 | 0.10 |
| Dead+Wind 60 deg - No Ice | 33.09 | 13.71 | -7.93 | -1000.76 | -1730.00 | 0.09 |
| Dead+Wind 90 deg - No Ice | 33.09 | 15.83 | -0.01 | -1.70 | -1996.62 | 0.05 |
| Dead+Wind 120 deg - No Ice | 33.09 | 13.70 | 7.91 | 997.82 | -1728.28 | 0.00 |
| Dead+Wind 150 deg - No Ice | 33.09 | 7.91 | 13.71 | 1729.99 | -996.84 | -0.05 |
| Dead+Wind 180 deg - No Ice | 33.09 | -0.01 | 15.84 | 1998.60 | 1.69 | -0.09 |
| Dead+Wind 210 deg - No Ice | 33.09 | -7.92 | 13.72 | 1731.71 | 999.74 | -0.10 |
| Dead+Wind 240 deg - No Ice | 33.09 | -13.71 | 7.93 | 1000.81 | 1729.91 | -0.09 |
| Dead+Wind 270 deg - No Ice | 33.09 | -15.83 | 0.01 | 1.76 | 1996.53 | -0.05 |
| Dead+Wind 300 deg - No Ice | 33.09 | -13.70 | -7.91 | -997.77 | 1728.19 | 0.00 |
| Dead+Wind 330 deg - No Ice | 33.09 | -7.91 | -13.71 | -1729.94 | 996.75 | 0.05 |
| Dead+Ice+Temp | 43.68 | 0.00 | 0.00 | 0.02 | -0.04 | 0.00 |
| Dead+Wind 0 deg+Ice+Temp | 43.68 | 0.00 | -3.59 | -489.96 | -0.40 | 0.02 |
| Dead+Wind 30 deg+Ice+Temp | 43.68 | 1.79 | -3.11 | -424.49 | -245.14 | 0.02 |
| Dead+Wind 60 deg+Ice+Temp | 43.68 | 3.11 | -1.80 | -245.27 | -424.21 | 0.02 |
| Dead+Wind 90 deg+Ice+Temp | 43.68 | 3.59 | -0.00 | -0.33 | -489.62 | 0.01 |
| Dead+Wind 120 deg+Ice+Temp | 43.68 | 3.10 | 1.79 | 244.71 | -423.85 | 0.00 |
| Dead+Wind 150 deg+Ice+Temp | 43.68 | 1.79 | 3.11 | 424.19 | -244.53 | -0.01 |
| Dead+Wind 180 deg+Ice+Temp | 43.68 | -0.00 | 3.59 | 490.01 | 0.31 | -0.02 |
| Dead+Wind 210 deg+Ice+Temp | 43.68 | -1.79 | 3.11 | 424.54 | 245.05 | -0.02 |
| Dead+Wind 240 deg+Ice+Temp | 43.68 | -3.11 | 1.80 | 245.33 | 424.11 | -0.02 |
| Dead+Wind 270 deg+Ice+Temp | 43.68 | -3.59 | 0.00 | 0.38 | 489.53 | -0.01 |
| Dead+Wind 300 deg+Ice+Temp | 43.68 | -3.10 | -1.79 | -244.66 | 423.76 | 0.00 |
| Dead+Wind 330 deg+Ice+Temp | 43.68 | -1.79 | -3.11 | -424.13 | 244.43 | 0.01 |
| Dead+Wind 0 deg - Service | 33.09 | 0.00 | -5.48 | -692.21 | -0.65 | 0.03 |
| Dead+Wind 30 deg - Service | 33.09 | 2.74 | -4.75 | -599.77 | -346.34 | 0.03 |
| Dead+Wind 60 deg - Service | 33.09 | 4.75 | -2.74 | -346.61 | -599.24 | 0.03 |
| Dead+Wind 90 deg - Service | 33.09 | 5.48 | -0.00 | -0.57 | -691.59 | 0.02 |
| Dead+Wind 120 deg - Service | 33.09 | 4.74 | 2.74 | 345.63 | -598.64 | 0.00 |

| 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 150 deg - Service | 33.09 | 2.74 | 4.75 | 599.22 | -345.30 | -0.02 |
| Dead+Wind 180 deg - Service | 33.09 | -0.00 | 5.48 | 692.26 | 0.55 | -0.03 |
| Dead+Wind 210 deg - Service | 33.09 | -2.74 | 4.75 | 599.82 | 346.25 | -0.03 |
| Dead+Wind 240 deg - Service | 33.09 | -4.75 | 2.74 | 346.67 | 599.15 | -0.03 |
| Dead+Wind 270 deg - Service | 33.09 | -5.48 | 0.00 | 0.63 | 691.50 | -0.02 |
| Dead+Wind 300 deg - Service | 33.09 | -4.74 | -2.74 | -345.57 | 598.55 | 0.00 |
| Dead+Wind 330 deg - Service | 33.09 | -2.74 | -4.75 | -599.17 | 345.21 | 0.02 |

# 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 | 0.00 | -33.09 | 0.00 | 0.00 | 33.09 | 0.00 | 0.000% |
| 2 | 0.01 | -33.09 | -15.84 | -0.01 | 33.09 | 15.84 | 0.000% |
| 3 | 7.92 | -33.09 | -13.72 | -7.92 | 33.09 | 13.72 | 0.000% |
| 4 | 13.71 | -33.09 | -7.93 | -13.71 | 33.09 | 7.93 | 0.000% |
| 5 | 15.83 | -33.09 | -0.01 | -15.83 | 33.09 | 0.01 | 0.000% |
| 6 | 13.70 | -33.09 | 7.91 | -13.70 | 33.09 | -7.91 | 0.000% |
| 7 | 7.91 | -33.09 | 13.71 | -7.91 | 33.09 | -13.71 | 0.000% |
| 8 | -0.01 | -33.09 | 15.84 | 0.01 | 33.09 | -15.84 | 0.000% |
| 9 | -7.92 | -33.09 | 13.72 | 7.92 | 33.09 | -13.72 | 0.000% |
| 10 | -13.71 | -33.09 | 7.93 | 13.71 | 33.09 | -7.93 | 0.000% |
| 11 | -15.83 | -33.09 | 0.01 | 15.83 | 33.09 | -0.01 | 0.000% |
| 12 | -13.70 | -33.09 | -7.91 | 13.70 | 33.09 | 7.91 | 0.000% |
| 13 | -7.91 | -33.09 | -13.71 | 7.91 | 33.09 | 13.71 | 0.000% |
| 14 | 0.00 | -43.68 | 0.00 | 0.00 | 43.68 | 0.00 | 0.000% |
| 15 | 0.00 | -43.68 | -3.59 | -0.00 | 43.68 | 3.59 | 0.000% |
| 16 | 1.79 | -43.68 | -3.11 | -1.79 | 43.68 | 3.11 | 0.000% |
| 17 | 3.11 | -43.68 | -1.80 | -3.11 | 43.68 | 1.80 | 0.000% |
| 18 | 3.59 | -43.68 | -0.00 | -3.59 | 43.68 | 0.00 | 0.000% |
| 19 | 3.10 | -43.68 | 1.79 | -3.10 | 43.68 | -1.79 | 0.000% |
| 20 | 1.79 | -43.68 | 3.11 | -1.79 | 43.68 | -3.11 | 0.000% |
| 21 | -0.00 | -43.68 | 3.59 | 0.00 | 43.68 | -3.59 | 0.000% |
| 22 | -1.79 | -43.68 | 3.11 | 1.79 | 43.68 | -3.11 | 0.000% |
| 23 | -3.11 | -43.68 | 1.80 | 3.11 | 43.68 | -1.80 | 0.000% |
| 24 | -3.59 | -43.68 | 0.00 | 3.59 | 43.68 | -0.00 | 0.000% |
| 25 | -3.10 | -43.68 | -1.79 | 3.10 | 43.68 | 1.79 | 0.000% |
| 26 | -1.79 | -43.68 | -3.11 | 1.79 | 43.68 | 3.11 | 0.000% |
| 27 | 0.00 | -33.09 | -5.48 | -0.00 | 33.09 | 5.48 | 0.000% |
| 28 | 2.74 | -33.09 | -4.75 | -2.74 | 33.09 | 4.75 | 0.000% |
| 29 | 4.75 | -33.09 | -2.74 | -4.75 | 33.09 | 2.74 | 0.000% |
| 30 | 5.48 | -33.09 | -0.00 | -5.48 | 33.09 | 0.00 | 0.000% |
| 31 | 4.74 | -33.09 | 2.74 | -4.74 | 33.09 | -2.74 | 0.000% |
| 32 | 2.74 | -33.09 | 4.75 | -2.74 | 33.09 | -4.75 | 0.000% |
| 33 | -0.00 | -33.09 | 5.48 | 0.00 | 33.09 | -5.48 | 0.000% |
| 34 | -2.74 | -33.09 | 4.75 | 2.74 | 33.09 | -4.75 | 0.000% |
| 35 | -4.75 | -33.09 | 2.74 | 4.75 | 33.09 | -2.74 | 0.000% |
| 36 | -5.48 | -33.09 | 0.00 | 5.48 | 33.09 | -0.00 | 0.000% |
| 37 | -4.74 | -33.09 | -2.74 | 4.74 | 33.09 | 2.74 | 0.000% |
| 38 | -2.74 | -33.09 | -4.75 | 2.74 | 33.09 | 4.75 | 0.000% |

# Non-Linear Convergence Results

| Load Combination | Converged? | Number of Cycles | Displacement Tolerance | Force Tolerance |
|---|---|---|---|---|
| 1 | Yes | 4 | 0.00000001 | 0.00000001 |
| 2 | Yes | 4 | 0.00000001 | 0.00057875 |
| 3 | Yes | 6 | 0.00000001 | 0.00008179 |
| 4 | Yes | 6 | 0.00000001 | 0.00008106 |
| 5 | Yes | 4 | 0.00000001 | 0.00049318 |
| 6 | Yes | 6 | 0.00000001 | 0.00008100 |
| 7 | Yes | 6 | 0.00000001 | 0.00008123 |
| 8 | Yes | 4 | 0.00000001 | 0.00051119 |
| 9 | Yes | 6 | 0.00000001 | 0.00008104 |
| 10 | Yes | 6 | 0.00000001 | 0.00008168 |
| 11 | Yes | 4 | 0.00000001 | 0.00053435 |
| 12 | Yes | 6 | 0.00000001 | 0.00008096 |
| 13 | Yes | 6 | 0.00000001 | 0.00008082 |
| 14 | Yes | 4 | 0.00000001 | 0.00000001 |
| 15 | Yes | 5 | 0.00000001 | 0.00026451 |
| 16 | Yes | 5 | 0.00000001 | 0.00035637 |
| 17 | Yes | 5 | 0.00000001 | 0.00035545 |
| 18 | Yes | 5 | 0.00000001 | 0.00026433 |
| 19 | Yes | 5 | 0.00000001 | 0.00035492 |
| 20 | Yes | 5 | 0.00000001 | 0.00035525 |
| 21 | Yes | 5 | 0.00000001 | 0.00026458 |
| 22 | Yes | 5 | 0.00000001 | 0.00035542 |
| 23 | Yes | 5 | 0.00000001 | 0.00035609 |
| 24 | Yes | 5 | 0.00000001 | 0.00026421 |
| 25 | Yes | 5 | 0.00000001 | 0.00035457 |
| 26 | Yes | 5 | 0.00000001 | 0.00035448 |
| 27 | Yes | 4 | 0.00000001 | 0.00010257 |
| 28 | Yes | 5 | 0.00000001 | 0.00010197 |
| 29 | Yes | 5 | 0.00000001 | 0.00009999 |
| 30 | Yes | 4 | 0.00000001 | 0.00009635 |
| 31 | Yes | 5 | 0.00000001 | 0.00010021 |
| 32 | Yes | 5 | 0.00000001 | 0.00010080 |
| 33 | Yes | 4 | 0.00000001 | 0.00009973 |
| 34 | Yes | 5 | 0.00000001 | 0.00009988 |
| 35 | Yes | 5 | 0.00000001 | 0.00010171 |
| 36 | Yes | 4 | 0.00000001 | 0.00009801 |
| 37 | Yes | 5 | 0.00000001 | 0.00010006 |
| 38 | Yes | 5 | 0.00000001 | 0.00009962 |

## Maximum Tower Deflections - Service Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| L1 | 190 - 163.349 | 37.238 | 34 | 1.9109 | 0.0008 |
| L2 | 166.906 - 126.956 | 28.272 | 34 | 1.7521 | 0.0004 |
| L3 | 131.294 - 86.5234 | 16.702 | 34 | 1.3088 | 0.0002 |
| L4 | 91.724 - 43.0651 | 7.734 | 34 | 0.8323 | 0.0001 |
| L5 | 49.1797 - 0 | 2.151 | 34 | 0.4032 | 0.0000 |

## Critical Deflections and Radius of Curvature - Service Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 194' | Lighting Rod 3/4" x 4' | 34 | 37.238 | 1.9109 | 0.0008 | 23176 |
| 192' | 1900MHz RRH (65MHz) | 34 | 37.238 | 1.9109 | 0.0008 | 23176 |
| 180' | DR65-19-02DPQ w/ Mount Pipe | 34 | 33.281 | 1.8518 | 0.0006 | 11588 |

## Maximum Tower Deflections - Design Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| L1 | 190 - 163.349 | 107.276 | 8 | 5.5095 | 0.0024 |
| L2 | 166.906 - 126.956 | 81.482 | 9 | 5.0521 | 0.0012 |
| L3 | 131.294 - 86.5234 | 48.167 | 9 | 3.7753 | 0.0006 |
| L4 | 91.724 - 43.0651 | 22.316 | 9 | 2.4016 | 0.0003 |
| L5 | 49.1797 - 0 | 6.210 | 9 | 1.1639 | 0.0001 |

## Critical Deflections and Radius of Curvature - Design Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 194' | Lighting Rod 3/4" x 4' | 8 | 107.276 | 5.5095 | 0.0024 | 8178 |
| 192' | 1900MHz RRH (65MHz) | 8 | 107.276 | 5.5095 | 0.0024 | 8178 |
| 180' | DR65-19-02DPQ w/ Mount Pipe | 9 | 95.891 | 5.3392 | 0.0018 | 4088 |

## *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 | 190 - 163.349 (1) | TP24.4525x19.5x0.1875 | 26'7-13/16" | 0' | 0.0 | 39.000 | 14.0473 | -4.19 | 547.85 | 0.008 |
| L2 | 163.349 - 126.956 (2) | TP30.7144x23.4165x0.25 | 39'11-13/32" | 0' | 0.0 | 39.000 | 23.5446 | -7.22 | 918.24 | 0.008 |
| L3 | 126.956 - 86.5234 (3) | TP37.6019x29.4219x0.3125 | 44'9-1/4" | 0' | 0.0 | 39.000 | 36.0440 | -12.37 | 1405.71 | 0.009 |
| L4 | 86.5234 - 43.0651 (4) | TP44.9268x36.0267x0.375 | 48'7-29/32" | 0' | 0.0 | 39.000 | 51.6966 | -20.37 | 2016.17 | 0.010 |
| L5 | 43.0651 - 0 (5) | TP52x43.0584x0.4375 | 49'2-5/32" | 0' | 0.0 | 39.000 | 71.6010 | -33.09 | 2792.44 | 0.012 |

## 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 | 190 - 163.349 (1) | TP24.4525x19.5x0.1875 | 123.52 | 18.117 | 39.000 | 0.465 | 0.00 | 0.000 | 39.000 | 0.000 |
| L2 | 163.349 - 126.956 (2) | TP30.7144x23.4165x0.25 | 388.73 | 27.074 | 39.000 | 0.694 | 0.00 | 0.000 | 39.000 | 0.000 |
| L3 | 126.956 - 86.5234 (3) | TP37.6019x29.4219x0.3125 | 768.62 | 28.558 | 39.000 | 0.732 | 0.00 | 0.000 | 39.000 | 0.000 |
| L4 | 86.5234 - 43.0651 (4) | TP44.9268x36.0267x0.375 | 1281.75 | 27.782 | 39.000 | 0.712 | 0.00 | 0.000 | 39.000 | 0.000 |
| L5 | 43.0651 - 0 | TP52x43.0584x0.4375 | 1999.5 | 26.355 | 39.000 | 0.676 | 0.00 | 0.000 | 39.000 | 0.000 |

| 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 $\frac{f_{by}}{F_{by}}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | (5) | | 8 | | | | | | | |

## 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 | 190 - 163.349 (1) | TP24.4525x19.5x0.1875 | 6.49 | 0.462 | 26.000 | 0.036 | 0.10 | 0.007 | 26.000 | 0.000 |
| L2 | 163.349 - 126.956 (2) | TP30.7144x23.4165x0.25 | 8.42 | 0.358 | 26.000 | 0.028 | 0.10 | 0.003 | 26.000 | 0.000 |
| L3 | 126.956 - 86.5234 (3) | TP37.6019x29.4219x0.3125 | 10.77 | 0.299 | 26.000 | 0.023 | 0.10 | 0.002 | 26.000 | 0.000 |
| L4 | 86.5234 - 43.0651 (4) | TP44.9268x36.0267x0.375 | 13.29 | 0.257 | 26.000 | 0.020 | 0.10 | 0.001 | 26.000 | 0.000 |
| L5 | 43.0651 - 0 (5) | TP52x43.0584x0.4375 | 15.86 | 0.222 | 26.000 | 0.017 | 0.10 | 0.001 | 26.000 | 0.000 |

## Pole Interaction Design Data

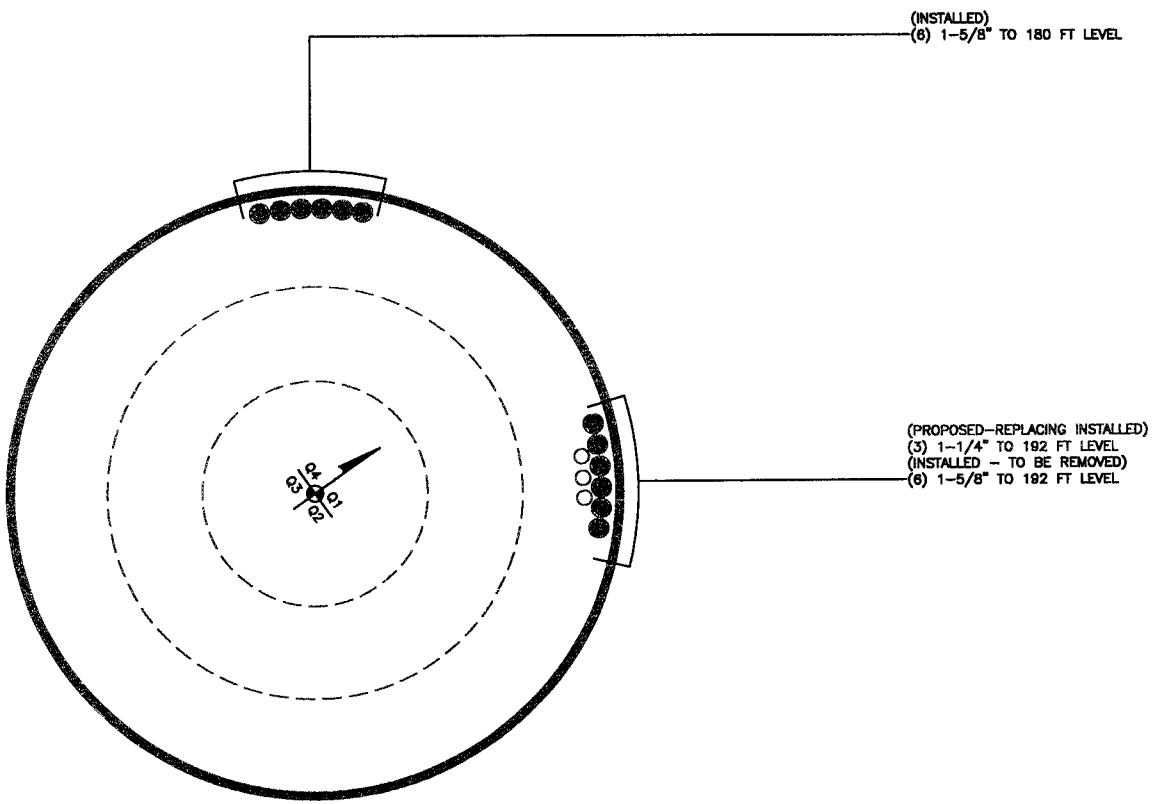
| Section No. | Elevation ft | Ratio $\frac{P}{P_a}$ | Ratio $\frac{f_{bx}}{F_{bx}}$ | Ratio $\frac{f_{by}}{F_{by}}$ | Ratio $\frac{f_v}{F_v}$ | Ratio $\frac{f_{vt}}{F_{vt}}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 190 - 163.349 (1) | 0.008 | 0.465 | 0.000 | 0.036 | 0.000 | 0.473 ✓ | 1.333 | H1-3+VT ✓ |
| L2 | 163.349 - 126.956 (2) | 0.008 | 0.694 | 0.000 | 0.028 | 0.000 | 0.702 ✓ | 1.333 | H1-3+VT ✓ |
| L3 | 126.956 - 86.5234 (3) | 0.009 | 0.732 | 0.000 | 0.023 | 0.000 | 0.741 ✓ | 1.333 | H1-3+VT ✓ |
| L4 | 86.5234 - 43.0651 (4) | 0.010 | 0.712 | 0.000 | 0.020 | 0.000 | 0.723 ✓ | 1.333 | H1-3+VT ✓ |
| L5 | 43.0651 - 0 (5) | 0.012 | 0.676 | 0.000 | 0.017 | 0.000 | 0.688 ✓ | 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 | 190 - 163.349 | Pole | TP24.4525x19.5x0.1875 | 1 | -4.19 | 730.28 | 35.4 | Pass |
| L2 | 163.349 - 126.956 | Pole | TP30.7144x23.4165x0.25 | 2 | -7.22 | 1224.01 | 52.7 | Pass |
| L3 | 126.956 - 86.5234 | Pole | TP37.6019x29.4219x0.3125 | 3 | -12.37 | 1873.81 | 55.6 | Pass |
| L4 | 86.5234 - 43.0651 | Pole | TP44.9268x36.0267x0.375 | 4 | -20.37 | 2687.55 | 54.2 | Pass |
| L5 | 43.0651 - 0 | Pole | TP52x43.0584x0.4375 | 5 | -33.09 | 3722.32 | 51.6 | Pass |
| | | | | | | | Summary | |
| | | | | | | Pole (L3) | 55.6 | Pass |
| | | | | | | **RATING =** | **55.6** | **Pass** |

## APPENDIX B

## BASE LEVEL DRAWING




BUSINESS UNIT: 876378 TOWER ID: C_BASELEVEL

# APPENDIX C

# ADDITIONAL CALCULATIONS

# Monopole Pier and Pad Foundation

**BU # :** 876378
**Site Name:** N. BETHANY / DAVIE
**App. Number:** 151606, Rev 0

TIA-222 Revision: F

| Design Reactions | | |
|---|---|---|
| Shear, **S**: | 16 | kips |
| Moment, **M**: | 2000 | ft-kips |
| Tower Height, **H**: | 190 | ft |
| Tower Weight, **Wt**: | 33 | kips |
| Base Diameter, **BD**: | 4.33 | ft |

| Foundation Dimensions | | |
|---|---|---|
| Depth, **D**: | 5 | ft |
| Pad Width, **W**: | 24.5 | ft |
| Neglected Depth, **N**: | 3.33 | ft |
| Thickness, **T**: | 2.50 | ft |
| Pier Diameter, **Pd**: | 7.00 | ft |
| Ext. Above Grade, **E**: | 1.00 | ft |
| BP Dist. Above Pier: | 2.5 | in. |
| Clear Cover, **Cc**: | 3.0 | in |

| Soil Properties | | |
|---|---|---|
| Soil Unit Weight, γ: | 0.122 | kcf |
| Ult. Bearing Capacity, Bc: | 15.0 | ksf |
| Angle of Friction, Φ: | 39 | deg |
| Cohesion, **Co**: | 0.000 | ksf |
| Passive Pressure, **Pp**: | 0.250 | kcf |
| Base Friction, μ: | 0.30 | |

| Material Properties | | |
|---|---|---|
| Rebar Yield Strength, **Fy**: | 60000 | psi |
| Concrete Strength, **F'c**: | 4000 | psi |
| Concrete Unit Weight, δc: | 0.150 | kcf |
| Seismic Zone, **z**: | 1 | |

| Rebar Properties | | |
|---|---|---|
| Pier Rebar Size, **Sp**: | 8 | |
| Pier Rebar Quanity, **mp**: | 46 | 36 |
| Pad Rebar Size, **Spad**: | 8 | |
| Pad Rebar Quanity, **mpad**: | 40 | 20 |
| Pier Tie Size, **St**: | 4 | 3 |
| Tie Quanity, **mt**: | 4 | 5 |

| Design Checks | Capacity/ Availability | Demand/ Limits | Check |
|---|---|---|---|
| *Req'd Pier Diam.(ft)* | 7 | 5.83 | OK |
| *Overturning (ft-kips)* | 3611.81 | 2000.00 | **55.4%** |
| *Shear Capacity (kips)* | 77.35 | 16.00 | **20.7%** |
| *Bearing (ksf)* | 11.25 | 1.84 | **16.3%** |
| *Pad Shear - 1-way (kips)* | 985.49 | 397.30 | **40.3%** |
| *Pad Shear - 2-way (kips)* | 2327.28 | 731.01 | **31.4%** |
| *Pier Rebar Area ($in^2$)* | 36.34 | 27.71 | OK |
| *Pad Rebar Area ($in^2$)* | 31.60 | 15.16 | OK |
| *Pier Moment Capacity (k-ft)* | 4556.81 | 2056.00 | **45.1%** |
| *Pier Bar Spacing (in)* | 4.33 | 18 > s > 2 | OK |
| *Pad Bar Spacing (in)* | 6.36 | 12 > s > 4.5 | OK |

☐ Modifications

# Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

**TIA Rev F**

**Site Data**

BU#: *876378*
Site Name: *N. BETHANY / DAVID KLU*
App #: *151606, Rev 0*

| Pole Manufacturer: | *Other* |
|---|---|

| Reactions | | |
|---|---|---|
| Moment: | 2000 | ft-kips |
| Axial: | 33 | kips |
| Shear: | 16 | kips |

| Anchor Rod Data | | |
|---|---|---|
| Qty: | 16 | |
| Diam: | 2.25 | in |
| Rod Material: | A615-J | |
| Strength (Fu): | 100 | ksi |
| Yield (Fy): | 75 | ksi |
| Bolt Circle: | 61 | in |

| Plate Data | | |
|---|---|---|
| Diam: | 67 | in |
| Thick: | 2 | in |
| Grade: | 60 | ksi |
| Single-Rod B-eff: | 10.32 | in |

| Stiffener Data (Welding at both sides) | | |
|---|---|---|
| Config: | 0 | * |
| Weld Type: | | |
| Groove Depth: | | in ** |
| Groove Angle: | | degrees |
| Fillet H. Weld: | | <-- Disregard |
| Fillet V. Weld: | | in |
| Width: | | in |
| Height: | | in |
| Thick: | | in |
| Notch: | | in |
| Grade: | | ksi |
| Weld str.: | | ksi |

| Pole Data | | |
|---|---|---|
| Diam: | 52 | in |
| Thick: | 0.4375 | in |
| Grade: | 65 | ksi |
| # of Sides: | 18 | "0" IF Round |
| Fu | 80 | ksi |
| Reinf. Fillet Weld | 0 | "0" if None |

| Stress Increase Factor | | |
|---|---|---|
| ASIF: | 1.333 | |

| If No stiffeners, Criteria: | AISC ASD | <-Only Applcable to Unstiffened Cases |
|---|---|---|

**Anchor Rod Results**

| | | |
|---|---|---|
| Maximum Rod Tension: | 96.3 Kips | Rigid |
| Allowable Tension: | 195.0 Kips | Service, ASD |
| Anchor Rod Stress Ratio: | 49.4% | Fty*ASIF |

**Base Plate Results**

| | Flexural Check | |
|---|---|---|
| Base Plate Stress: | 40.3 ksi | Rigid |
| Allowable Plate Stress: | 60.0 ksi | Service ASD |
| Base Plate Stress Ratio: | 67.2% | 0.75*Fy*ASIF |
| | | Y.L. Length: 31.89 |

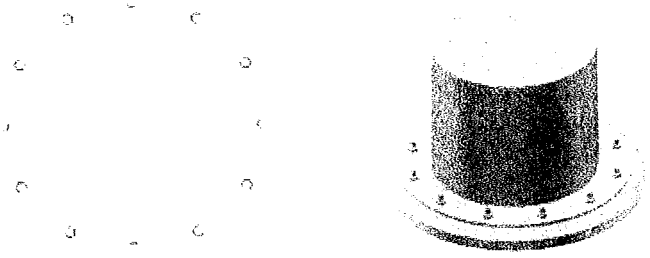
n/a

**Stiffener Results**

| | |
|---|---|
| Horizontal Weld : | n/a |
| Vertical Weld: | n/a |
| Plate Flex+Shear, fb/Fb+(fv/Fv)^2: | n/a |
| Plate Tension+Shear, ft/Ft+(fv/Fv)^2: | n/a |
| Plate Comp. (AISC Bracket): | n/a |

**Pole Results**

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

EBI Consulting
environmental | engineering | due diligence

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Burlington, MA 01803
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www.ebiconsulting.com

# STRUCTURAL EVALUATION LETTER

July 19, 2012

| | |
|---|---|
| Site Number: | CT33XC514 |
| Site Name: | North Bethany/David Kludge |
| Crown Castle Site ID: | 876378 |
| Site Address: | 15 Kluge Road, Prospect, CT 06712 |
| Project Number: | 81121461 |
| Project Name: | Sprint Network Vision – Southern Connecticut Market |

This letter is to confirm EBI's structural assessment of the existing Sprint antenna mounting system on the above listed site located in the Sprint Network Vision – Region 1, Southern Connecticut market. The intent of this review is to determine if the proposed modification of antennas and equipment will exceed the structural capacity of the existing mounting system.

The existing antenna mounting system has been categorized as a *Flat Low Profile Platform.* Sprint currently has (6) CDMA panel antennas and (6) 1-5/8" coax mounted to the platform at a centerline elevation of 190'-6" above ground level. Sprint is proposing the following two steps to complete the equipment upgrade:

- Step 1 – Interim Configuration
  Sprint is proposing to install (2) RFS APXVSPP18-C-A20 panel antennas, (1) APXV9ERR18-C-A20 panel antennas (3) 800 MHz ALU RRHs, (3) 1900 MHz ALU RRHs, (3) 800MHz Filters, and (3) fiber cables. The proposed panel antennas are to be installed on existing empty pipe masts on the existing platform. The RRHs and filters are to be installed on a new ring mount +/- 1' from the existing platform. *Note: The Construction Drawings by Infinigy Engineering, Revision 3, dated 6/21/12 shows the proposed RRHs located behind the proposed antennas or on separate pipe mounts on the existing platform rather than on a separate ring mount.*

- Step 2 – Final Configuration
  After interim configuration is completed, Sprint is proposing to remove the (6) existing Sprint CDMA panel antennas and (6) 1-5/8" coax.

The generic *Flat Low Profile Platform* antenna mounting system has the following assumed characteristics:

- Triangular in plan with a nominal face width of between 12'-0" and 13'-0".
- Horizontal platform perimeter members are made from L4x4x1/4" angles, L3x3x1/4" angles, or HSS3x2.5x3/16" minimum.
- Supported by L3x3x1/4" angles minimum attached to a triangular plate 1" thick minimum, bolted to the top flange of the monopole with at least (10) 3/4" minimum diameter bolts.
- Platform walking/standing surface consists of either 1"x3/16" steel bar or expanded metal grating.

EBI Consulting
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Burlington, MA 01803
Tel: (781) 273-2500
Fax: (781) 273-3311
www.ebiconsulting.com

This analysis of the existing mounting system is in compliance with ANSI/TIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, using a basic design wind speed of 85 mph with no ice and 37.6 mph with 0.75" of ice.

**By engineering analysis and/or comparison, the existing antenna mounting system is capable of supporting the existing and proposed equipment without causing an overstress condition in the mounting system.**

This certification is based on the physical platform characteristics as described above and as determined through site specific photos and other available site specific information. This certification also assumes that all structural members and connections have been properly designed and remain in good condition. Prior to installation of any new antennas and/or RRHs, contractor shall inspect the condition of all relevant members and connectors. The contractor shall be responsible for the means and methods of construction and reporting to EBI Consulting if mount members are found to be smaller than assumed above, prior to placement of proposed appurtenances.

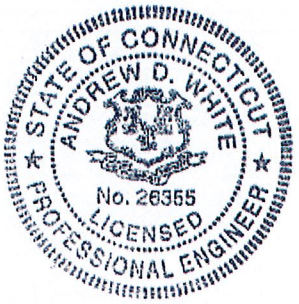
Analysis and certification of the existing tower structure may be performed by others and will be submitted separately.

Please contact us at 781-273-2500 if you have any questions.

Sincerely yours,
EBI Consulting

Kelly Shanahan, E.I.T.
Project Engineer

Andrew White, P.E., SECB
Professional Engineer



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

Sprint Existing Facility

Site ID: CT33XC514

North Bethany / David Kludge
15 Kludge Road
Prospect, CT 06712

**September 05, 2012**

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

EBI Consulting
environmental | engineering | due diligence

September 05, 2012

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

Re: Emissions Values for Site **CT33XC514 – North Bethany / David Kludge**

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 15 Kludge Road, Prospect, CT, for the purpose of determining whether the emissions from the proposed Sprint equipment upgrades on this property are within specified federal limits.

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

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

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

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

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

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

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

6) The antenna mounting height centerline of the proposed antennas is **190.5 feet** above ground level (AGL)
7) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

| Site ID | CT33XC514 - North Bethany / David Kludge |
|---|---|
| Site Addresss | 15 Kludge Road, Prospect, CT 06712 |
| Site Type | Monopole |

**Sector 1**

| Antenna Number | Antenna Make | Antenna Model | Radio Type | Frequency Band | Technology | Power Out Per Channel (Watts) | Number of Channels | Composite Power | Antenna Gain in direction of sample point (dBd) | Antenna Height (ft) | analysis height | Cable Size | Cable Loss (dB) | Additional Loss | ERP | Power Density Value | Power Density Percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a | RFS | APXVSPP18-C-A20 | RRH | 1900 MHz | CDMA / LTE | 20 | 2 | 40 | 15.9 | 190.5 | 184.5 | 1/2 " | 0.5 | 0 | 1386.9474 | 14.64783 | 1.46478% |
| 1a | RFS | APXVSPP18-C-A20 | RRH | 850 MHz | CDMA / LTE | 20 | 1 | 20 | 13.4 | 190.5 | 184.5 | 1/2 " | 0.5 | 0 | 389.96892 | 4.118539 | 0.72637% |
| | | | | | | | | | | | | | | Sector total Power Density Value: | | 2.191% | |

**Sector 2**

| Antenna Number | Antenna Make | Antenna Model | Radio Type | Frequency Band | Technology | Power Out Per Channel (Watts) | Number of Channels | Composite Power | Antenna Gain in direction of sample point (dBd) | Antenna Height (ft) | analysis height | Cable Size | Cable Loss (dB) | Additional Loss | ERP | Power Density Value | Power Density Percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2a | RFS | APXVSPP18-C-A20 | RRH | 1900 MHz | CDMA / LTE | 20 | 2 | 40 | 15.9 | 190.5 | 184.5 | 1/2 " | 0.5 | 0 | 1386.9474 | 14.64783 | 1.46478% |
| 2a | RFS | APXVSPP18-C-A20 | RRH | 850 MHz | CDMA / LTE | 20 | 1 | 20 | 13.4 | 190.5 | 184.5 | 1/2 " | 0.5 | 0 | 389.96892 | 4.118539 | 0.72637% |
| | | | | | | | | | | | | | | Sector total Power Density Value: | | 2.191% | |

**Sector 3**

| Antenna Number | Antenna Make | Antenna Model | Radio Type | Frequency Band | Technology | Power Out Per Channel (Watts) | Number of Channels | Composite Power | Antenna Gain in direction of sample point (dBd) | Antenna Height (ft) | analysis height | Cable Size | Cable Loss (dB) | Additional Loss | ERP | Power Density Value | Power Density Percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3a | RFS | APXVSPP18-C-A20 | RRH | 1900 MHz | CDMA / LTE | 20 | 2 | 40 | 15.9 | 190.5 | 184.5 | 1/2 " | 0.5 | 0 | 1386.9474 | 14.64783 | 1.46478% |
| 3a | RFS | APXVSPP18-C-A20 | RRH | 850 MHz | CDMA / LTE | 20 | 1 | 20 | 13.4 | 190.5 | 184.5 | 1/2 " | 0.5 | 0 | 389.96892 | 4.118539 | 0.72637% |
| | | | | | | | | | | | | | | Sector total Power Density Value: | | 2.191% | |

| Site Composite MPE % | |
|---|---|
| Carrier | MPE % |
| Sprint | 6.573% |
| T-Mobile | 1.020% |
| | |
| | |
| | |
| | |
| | |
| | |
| **Total Site MPE %** | **7.593%** |

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environmental | engineering | due diligence

## Summary

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

The anticipated Maximum Composite contributions from the Sprint facility are **6.573% (2.191% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **7.593%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions

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

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