10 Industrial Ave, Suite 3
Mahwah, NJ 07430
Phone: (201)-704-8157
Jennifer Ardis
Real Estate Consultant

2/11/15

Hand Delivered

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

CC to Property Owner
MCM, Inc.
40 Woodland Street
Hartford, CT 06105

RE: Sprint Spectrum L.P. notice of intent to modify an existing telecommunications facility located at 184 Garden Circle Waterbury, CT 06704. Known to Sprint Spectrum L.P. as site CT03XC045.

Dear Ms. Bachman:

In order to accommodate technological changes, implement Code Division Multiple Access ("CDMA") and/or Long Term Evolution ("LTE") capabilities, and enhance system performance in the state of Connecticut, Sprint Spectrum L.P. plans to modify the equipment configurations at many of its existing cell sites. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and its attachments is being sent to the chief elected official of the municipality in which affected cell site is located.

CDMA employs Spread-Spectrum technology and special coding scheme to allow multiple users to be multiplexed over the same physical channel.

LTE is a new high-performance air interface for cellular mobile communications. It is designed to increase the capacity and speed of mobile telephone networks.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in Sprint's operations at the site. Also included is documentation of the structural sufficiency of the tower to accommodate the revised antenna configuration.

The changes to the facility do not constitute modification as defined Connecticut General Statues ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed or altered. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for the R.C.S.A. Section 16-50j-72(b)(2).

1. The height of the overall structure will not be affected.
2. The proposed changes will not extend the site boundaries. There will be no effect on the site compound.
3. The proposed changes will not increase the noise level at the existing facility by 6 decibels or more.
4. Radio Frequency power density may increase due to the use of one or more CDMA transmissions. Moreover, LTE will utilize additional radio frequencies newly licensed by the FCC for cellular mobile communications. However, the changes will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site.

For the foregoing reasons Sprint Spectrum L.P. respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me at (201)-704-8157 or email JArdis@Transcendwireless.com with questions concerning this matter.
Thank you for your consideration.

Sincerely,

Jennifer Ardis
Real Estate Consultant

EBI Consulting
environmental | engineering | due diligence

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

Sprint Existing Facility

Site ID: CT03XC045

Zip Call Tower

184 Garden Circle
Waterbury, CT 06704

February 11, 2015

EBI Project Number: 62151045

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

EBI Consulting
environmental | engineering | due diligence

February 11, 2015

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

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:
CT03XC045 - Zip Call Tower

Site Total: 6.89% - MPE% in full compliance

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at **184 Garden Circle, Waterbury, CT**, for the purpose of determining whether the radio frequency (RF) exposure levels from the proposed Sprint equipment upgrades on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed upgrades to the existing Sprint Wireless antenna facility located at **184 Garden Circle, Waterbury, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. All calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 8 channels in the 1900 MHz Band were considered for each sector of the proposed installation.

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

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

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

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

6) The antennas used in this modeling are the RFS APXVSPP18-C-A20 and the RFS APXV9M14-C-I20. This is based on feedback from the carrier with regards to anticipated antenna selection. The RFS APXVSPP18-C-A20 has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. The RFS APXV9M14-C-I20 has a 15.9 dBd gain value at its main lobe at 2500 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antenna mounting height centerline for the proposed antennas is **130 feet** above ground level (AGL).

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

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

Site ID	CT03XC045 - Zip Call Tower
Site Addresss	184 Garden Circle , Waterbury, CT, 06704
Site Type	Self Support Tower

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	8	160	5.9	130	124	1/2 "	0.5	0	554.78	1.30%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	130	124	1/2 "	0.5	0	39.00	0.16%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	130	124	1/2 "	0.5	0	138.69	0.57%
														Sector total Power Density Value:		2.03%

Sector 2

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	8	160	5.9	130	124	1/2 "	0.5	0	554.78	1.30%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	130	124	1/2 "	0.5	0	39.00	0.16%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	130	124	1/2 "	0.5	0	138.69	0.57%
														Sector total Power Density Value:		2.03%

Sector 3

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	8	160	5.9	130	124	1/2 "	0.5	0	554.78	1.30%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	130	124	1/2 "	0.5	0	39.00	0.16%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	130	124	1/2 "	0.5	0	138.69	0.57%
														Sector total Power Density Value:		2.03%

Site Composite MPE %	
Carrier	MPE %
Sprint	6.09%
Clearwire MW	0.80%
Total Site MPE %	**6.89%**

EBI Consulting
environmental | engineering | due diligence

Summary

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

The anticipated Maximum Composite contributions from the Sprint facility are **6.09% (2.03% from sector 1, 2.03% from sector 2 and 2.03% from sector 3)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **6.89%** of the allowable FCC established general public limit sampled at 6 feet above ground level. This total composite site value is based upon MPE values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803

Sprint®

PROJECT: 2.5 EQUIPMENT DEPLOYMENT

SITE NAME: ZIP CALL TOWER

SITE CASCADE: CT03XC045-B

SITE ADDRESS: 184 GARDEN CIRCLE
WATERBURY, CT 06704

SITE TYPE: 180'-0' SELF SUPPORT

Sprint
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

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

Transcend Wireless
48 SPRUCE STREET
OAKLAND, NJ 07346

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

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

Signature: Date: 1/12/2015

A	1/12/15	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL DATE ISSUED: 01/12/2015

PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
TITLE SHEET

SCALE: NONE

PROJECT NUMBER: 29427

SHEET NUMBER: T-1

SITE INFORMATION

PROPERTY OWNER:
WATER LLC
40 WOODLAND STREET
HARTFORD, CT 06105
PH.:

SITE ADDRESS:
184 GARDEN CIRCLE
WATERBURY, CT 06704
NEW HAVEN COUNTY

GEOGRAPHIC COORDINATES:
LATITUDE: 41.57027
LONGITUDE: -73.0167

ZONING JURISDICTION:
CONNECTICUT SITING COUNCIL & CITY OF WATERBURY

ZONING DISTRICT:
RL-LOW DENSITY RESIDENTIAL

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

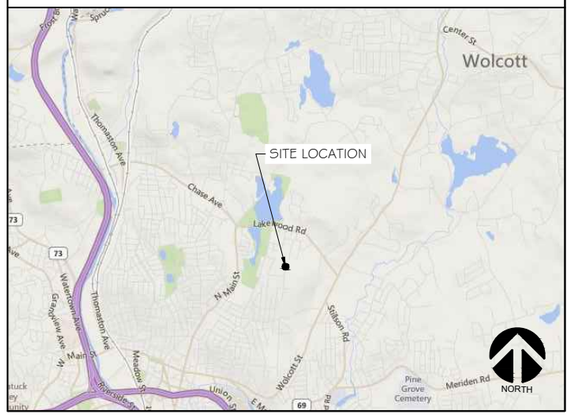
AAV PROVIDER:
AT&T
PH.: (888) 944-0447

SPRINT CONSTRUCTION MANAGER:
NAME: KEITH JOHNSON
PHONE: (603) 231-2384
E-MAIL: keith.2.johnson@sprint.com

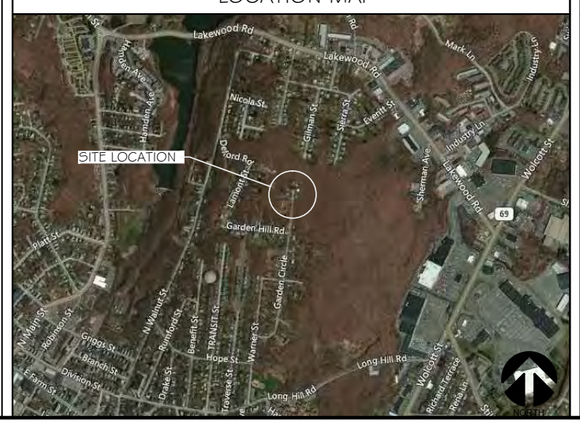
EQUIPMENT SUPPLIER:
ALCATEL-LUCENT
600-700 MOUNTAIN AVENUE
MURRAY HILL, NJ 07974
PH.: (908) 508-8080

PLANS PREPARED BY:
RAMAKER & ASSOCIATES, INC.
CONTACT: KEITH BOHNSACK, PROJECT MANAGER
PH.: (608) 643-4100
EMAIL: kbohnsack@ramaker.com

AREA MAP



LOCATION MAP



PROJECT DESCRIPTION

- INSTALL NEW 2.5 CABINET
- INSTALL NEW BATTERY STRING(5) IN EXISTING BATTERY CABINET
- INSTALL (3) PANEL ANTENNAS
- INSTALL (3) RRH'S ON TOWER
- INSTALL (1) FIBER CABLE AND (3) FIBER SECTOR JUMPERS
- INSTALL (27) ANTENNA / RRH JUMPERS

APPLICABLE CODES

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

1. INTERNATIONAL BUILDING CODE
2. ANSI/TIA-222 STRUCTURAL STANDARD FOR ANTENNA STRUCTURES
3. NFPA 780 - LIGHTNING PROTECTION CODE
4. NATIONAL ELECTRIC CODE

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SHEET INDEX

SHT NO:	SHEET TITLE:	REV:	ENGINEER:
T-1	TITLE SHEET	A	JRS
SP-1	SPRINT SPECIFICATIONS	A	JRS
SP-2	SPRINT SPECIFICATIONS	A	JRS
SP-3	SPRINT SPECIFICATIONS	A	JRS
A-1	SITE PLAN	A	JRS
A-2	EQUIPMENT PLAN	A	JRS
A-3	BUILDING ELEVATION & ANTENNA DETAILS	A	JRS
A-4	RF DATA SHEET	A	JRS
A-5	FIBER PLUMBING DIAGRAM	A	JRS
A-6	CABLE COLOR CODING	A	JRS
A-7	ANTENNA & HYBRID CABLE DETAILS	A	JRS
A-8	EQUIPMENT DETAILS	A	JRS
A-9	EQUIPMENT DETAILS	A	JRS
E-1	EQUIPMENT UTILITY & GROUNDING PLAN	A	JRS
E-2	GROUNDING DETAILS	A	JRS
E-3	DC POWER DETAILS & PANEL SCHEDULES	A	JRS

I:\29400\29427\CAD\29427 Sprint 2.5 CD for CT.dwg Printed by: tnelson on Jan 12, 2015 - 12:07pm

DRAWN BY: KJG CHECKED BY: KAB

SECTION 01 100 - SCOPE OF WORK

THE WORK:
THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE CONSTRUCTION DRAWINGS AND ASSOCIATED OUTLINE SPECIFICATIONS AND THE SITE SPECIFIC WORK ORDER, DESCRIBE THE WORK TO BE PERFORMED BY THIS CONSTRUCTION CONTRACTOR (SUPPLIER).

RELATED DOCUMENTS:
A. THE REQUIREMENTS OF EACH SECTION OF THIS SPECIFICATION APPLY TO ALL SECTIONS, INDIVIDUALLY AND COLLECTIVELY.
B. RELATED DOCUMENTS: THE CONTRACTOR SHALL COMPLY WITH THE MOST CURRENT VERSION OF THE FOLLOWING SUPPLEMENTAL REQUIREMENTS FOR INSTALLATION AND TESTING.
   1. EN-2012-001: (FIBER OPTIC, DC CABLE, AND DC CIRCUIT BREAKER TAGGING STANDARDS)
   2. TS-0200 - (TRANSMISSION ANTENNA LINE ACCEPTANCE STANDARDS)
   3. EL-0568: (FIBER TESTING POLICY)
   4. NP-312-201: (EXTERIOR GROUNDING SYSTEM TESTING)
   5. NP-760-500: ETHERNET, MICROWAVE, TESTING AND ACCEPTANCE

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

NATIONALLY RECOGNIZED CODES AND STANDARDS:
THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
A. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
B. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
C. GR-1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY -GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
D. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE - "NEC") AND NFPA 101 (LIFE SAFETY CODE).
E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
G. AMERICAN CONCRETE INSTITUTE (ACI)
H. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
I. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
J. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
K. PORTLAND CEMENT ASSOCIATION (PCA)
L. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
M. BRICK INDUSTRY ASSOCIATION (BIA)
N. AMERICAN WELDING SOCIETY (AWS)
O. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
P. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
Q. DOOR AND HARDWARE INSTITUTE (DHI)
R. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
S. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

DEFINITIONS:
A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
B. COMPANY: "SPRINT"; SPRINT NEXTEL CORPORATION AND IT'S OPERATING ENTITIES.
C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
D. CONTRACTOR: CONSTRUCTION CONTRACTOR, SUPPLIER, CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.
E. THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.
F. CONSTRUCTION MANAGER - ALL PROJECTS RELATED COMMUNICATION TO FLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT.

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

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

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

DRAWINGS REQUIRED AT JOBSITE:
THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS FOR WIRELESS SITES AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.
A. THE JOBSITE DRAWINGS SHALL BE CLEARLY MARKED DAILY IN RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS-BUILT" DRAWINGS.
B. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.

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

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

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

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

USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:
CONTRACTOR WILL UTILIZE ITS BEST EFFORTS TO WORK WITH SPRINT ELECTRONIC PROJECT MANAGEMENT SYSTEMS. CONTRACTOR UNDERSTANDS THAT SUFFICIENT INTERNET ACCESS, EQUIVALENT TO "BROADBAND" OR BETTER, IS REQUIRED TO TIMELY AND EFFECTIVELY UTILIZE SPRINT DATA AND DOCUMENT MANAGEMENT SYSTEMS AND AGREES TO MAINTAIN APPROPRIATE CONNECTIONS FOR CONTRACTOR'S STAFF AND OFFICES THAT ARE COMPATIBLE WITH SPRINT DATA AND DOCUMENT MANAGEMENT SYSTEMS

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

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

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

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

SECTION 01 200 - COMPANY FURNISHED MATERIAL AND EQUIPMENT

FURNISHED MATERIALS:
COMPANY FURNISHED MATERIALS AND EQUIPMENT TO BE INSTALLED BY THE CONTRACTOR (OFIC) IS IDENTIFIED ON THE RF DATA SHEET IN THE CONSTRUCTION DOCUMENTS.

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

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

SECTION 01 300 - CELL SITE CONSTRUCTION

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

GENERAL REQUIREMENTS FOR CONSTRUCTION:
A. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH. AT THE COMPLETION OF THE WORK, CONTRACTOR SHALL REMOVE FROM THE SITE ALL REMAINING RUBBISH, IMPLEMENTS, TEMPORARY FACILITIES, AND SURPLUS MATERIALS.
B. EQUIPMENT ROOMS SHALL AT ALL TIMES BE MAINTAINED "BROOM CLEAN" AND CLEAR OF DEBRIS.
C. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO DISCOVER AND LOCATE ANY HAZARDOUS CONDITION.
   1. IN THE EVENT CONTRACTOR ENCOUNTERS ANY HAZARDOUS CONDITION WHICH HAS NOT BEEN ABATED OR OTHERWISE MITIGATED, CONTRACTOR AND ALL OTHER PERSONS SHALL IMMEDIATELY STOP WORK IN THE AFFECTED AREA AND NOTIFY COMPANY IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT BE RESUMED EXCEPT BY WRITTEN NOTIFICATION BY COMPANY.
   2. CONTRACTOR AGREES TO USE CARE WHILE ON THE SITE AND SHALL NOT TAKE ANY ACTION THAT WILL OR MAY RESULT IN OR CAUSE THE HAZARDOUS CONDITION TO BE FURTHER RELEASED IN THE ENVIRONMENT, OR TO FURTHER EXPOSE INDIVIDUALS TO THE HAZARD.
D. CONTRACTOR'S ACTIVITIES SHALL BE RESTRICTED TO THE PROJECT LIMITS. SHOULD AREAS OUTSIDE THE PROJECT LIMITS BE AFFECTED BY CONTRACTOR'S ACTIVITIES, CONTRACTOR SHALL IMMEDIATELY RETURN THEM TO ORIGINAL CONDITION

FUNCTIONAL REQUIREMENTS:
A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. CONTRACTOR SHALL TAKE ALL ACTIONS AS NECESSARY TO SUCCESSFULLY COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.
B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.
C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES
D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   1. PERFORM ANY REQUIRED SITE ENVIRONMENTAL MITIGATION.
   2. PREPARE GROUND SITES; PROVIDE DE-GRUBBING; AND ROUGH AND FINAL GRADING, AND COMPOUND SURFACE TREATMENTS.
   3. MANAGE AND CONDUCT ALL ACTIVITIES FOR INSTALLATION OF UTILITIES INCLUDING ELECTRICAL AND BACKHAUL (FIBER, COPPER, OR MICROWAVE).
   4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
   5. INSTALL ABOVE GROUND GROUNDING SYSTEMS, CONDUIT AND BOXES.
   6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
   7. INSTALL "H-FRAMES", CABINETS AND PADS AND PLATFORMS AS INDICATED.
   8. INSTALL ROADS, ACCESS WAYS, CURBS AND DRAINS AS INDICATED.
   9. ACCOMPLISH REQUIRED MODIFICATION OF EXISTING FACILITIES.
   10. PROVIDE ANTENNA SUPPORT STRUCTURE FOUNDATIONS.
   11. PROVIDE SLABS AND EQUIPMENT PLATFORMS.
   12. INSTALL COMPOUND FENCING, SIGHT SHIELDING, LANDSCAPING AND ACCESS BARRIERS.
   13. PERFORM INSPECTION AND MATERIAL TESTING AS REQUIRED HEREINAFTER.
   14. CONDUCT SITE RESISTANCE TO EARTH TESTING AS REQUIRED HEREINAFTER
   15. INSTALL FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS.
   16. INSTALL TOWERS, ANTENNA SUPPORT STRUCTURES AND PLATFORMS ON EXISTING TOWERS AS REQUIRED.
   17. INSTALL CELL SITE RADIOS, MICROWAVE, GPS, COAXIAL MAINLINE, ANTENNAS, CROSS BAND COUPLERS, TOWER TOP AMPLIFIERS, LOW NOISE AMPLIFIERS AND RELATED EQUIPMENT.
   18. CONDUCT ALL REQUIRED TESTS AND INSPECTIONS
   19. PERFORM, DOCUMENT, AND CLOSE OUT ALL JURISDICTIONAL PERMITTING REQUIREMENTS AND ANY CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
   20. PERFORM ALL ADDITIONAL WORK AS IDENTIFIED IN SCOPE OF SERVICES ATTACHED TO THE SUPPLIER AGREEMENT FOR THIS PROJECT. THIS WORK MAY INCLUDE COMMISSIONING, INTEGRATION, SPECIAL WAREHOUSING, REVERSE LOGISTICS ACTIVITIES, ETC. PERFORM COMMISSIONING AND INTEGRATION ACTIVITIES PER APPLICABLE MOPS.

DELIVERABLES:
A. THE CONTRACTOR SHALL PROVIDE ALL REQUIRED TEST REPORTS AND DOCUMENTATION INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
   1. PRODUCT SPECIFICATIONS FOR MATERIALS OR SPECIAL CONSTRUCTION IF REQUESTED BY SPRINT
   2. ACTUALIZE ALL CONSTRUCTION RELATED MILESTONES IN SITERRA AND COMPLETE ALL ON-LINE FORMS AND COMPLETE DOCUMENT UP-LOADS. UPLOAD ALL REQUIRED CLOSEOUT DOCUMENTS AND FINAL SITE PHOTOS
   3. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT LEFT ON SITE INSIDE BASE OF MAIN RF CABINET IN A PROTECTIVE POUCH.
   4. ALL REQUIRED TEST REPORTS.
   5. REQUIRED CLOSEOUT DOCUMENTATION INCLUDING BUT NOT LIMITED TO:
      a. ALL JURISDICTIONAL PERMITTING AND OCCUPANCY INFORMATION
      b. PDF SCAN OF REDLINES PRODUCED IN THE FIELD
      c. ELECTRONIC AS-BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS
      d. LIEN WAIVERS
      e. FINAL PAYMENT APPLICATION
      f. REQUIRED FINAL CONSTRUCTION PHOTOS
      g. CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
      h. LISTS OF SUBCONTRACTORS
B. PROVIDE ADDITIONAL DOCUMENTATION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING. DOCUMENTATION SHALL BE FORWARDED IN ORIGINAL FORMAT AND/OR UPLOADED INTO SMS.
   1. ALL CORRESPONDENCE AND PRELIMINARY CONSTRUCTION REPORTS.
   2. PROJECT PROGRESS REPORTS.
   3. PRE-CONSTRUCTION MEETING NOTES.

SECTION 01 400 - TESTS, INSPECTIONS, SUBMITTALS, AND PROJECT CLOSEOUT

TESTS AND INSPECTIONS:
A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   1. COAX SWEEPS AND FIBER TESTS PER TS-0200 (CURRENT VERSION) ANTENNA LINE ACCEPTANCE STANDARDS
   2. POST CONSTRUCTION HEIGHT VERIFICATION, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE-FOR-THE-PURPOSE ANTENNA ALIGNMENT TOOL.
   3. CONCRETE BREAK TESTS
   4. SITE RESISTANCE TO EARTH TEST
   5. STRUCTURAL BACKFILL COMPACTION TESTS
   6. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.
   7. ADDITIONAL TESTING AS REQUIRED ELSEWHERE IN THIS SPECIFICATION.

SUBMITTALS:
A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.
B. UPLOAD THE FOLLOWING TO SITERRA AS APPLICABLE INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   1. CONCRETE MIX-DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
   2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
   3. CHEMICAL GROUNDING SYSTEM .
   4. REINFORCEMENT CERTIFICATIONS
   5. STRUCTURAL BACKFILL TEST RESULTS
   6. SWEEP AND FIBER TESTS
   7. ANTENNA AZIMUTH AND DOWN-TILT VERIFICATION
   8. POST CONSTRUCTION HEIGHT VERIFICATION
   9. ADDITIONAL SUBMITTALS MAY BE REQUIRED FOR SPECIAL CONSTRUCTION OR MINOR MATERIALS
C. ALTERNATES: AT THE COMPANY'S REQUEST, ANY ALTERNATIVES TO THE MATERIALS OR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO BEING SHIPPED TO SITE. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED. SUBMITTAL FOR APPROVAL SHALL INCLUDE A STATEMENT OF COST REDUCTION PROPOSED FOR USE OF ALTERNATE PRODUCT.

TESTING BY THIRD PARTY AGENCY:
A. EMPLOY AN AGENCY OF ENGINEERS AND SCIENTISTS WHO IS REGULARLY ENGAGED IN FIELD AND LABORATORY TESTING AND ANALYSIS. AGENCY SHALL HAVE BEEN IN BUSINESS A MINIMUM OF FIVE YEARS, AND BE LICENSED AS PROFESSIONAL ENGINEERS IN THE STATE WHERE THE PROJECT IS LOCATED. AGENCY IS SUBJECT TO APPROVAL BY COMPANY.
   1. AGENCY MUST HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
   2. AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
   3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
B. REQUIRED THIRD PARTY TESTS:
   1. SITE RESISTANCE TO EARTH TEST PER NP-312-201
   2. CONCRETE CYLINDER BREAK TESTS FOR TOWER PIER AND ANCHORS PER NATIONALLY RECOGNIZED STANDARDS
   3. STRUCTURAL SOILS COMPACTION TESTS PER NATIONALLY RECOGNIZED STANDARDS
   4. REBAR PLACEMENT VERIFICATION WITH REPORT
   5. TESTING TENSION STUDY FOR ROCK ANCHORS
   6. ALL THIRD PARTY TESTS AS REQUIRED BY LOCAL JURISDICTION
C. REQUIRED TESTS BY CONTRACTOR
   1. COAX SWEEP TESTS PER SPRINT STANDARD TS-0200
   2. FIBER TESTS PER SPRINT STANDARD EL-0568
   3. MICROWAVE LINK TESTS PER NP-760-500
   4. ANTENNA AZIMUTHS AND DOWN TILT USING ELECTRONIC ALIGNMENT TOOL PER ANTENNA INSTALLATION SPECIFICATION HEREIN.

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

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

Signature: Date: 1/12/2015

A	1/12/15	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 01/12/2015

PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 29427
SHEET NUMBER: SP-1

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DRAWN BY: KJG CHECKED BY: KAB

5. POST CONSTRUCTION HEIGHT VERIFICATION AS REQUIRED HEREWITH IN THE TOWER INSTALLATION SPECIFICATIONS.
6. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED HEREWITH IN THE ASPHALT PAVING SPECIFICATIONS.
7. FIELD QUALITY CONTROL TESTING AS SPECIFIED HEREWITH IN THE CONCRETE PAVING SPECIFICATIONS.
8. TESTING REQUIRED HEREWITH UNDER SPECIFICATIONS FOR AGGREGATE BASE FOR ROADWAYS
9. ALL OTHER TESTS REQUIRED BY LOCAL JURISDICTION

D. INSPECTIONS BY COMPANY: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN INSPECTION ACTIVITIES, FINAL ACCEPTANCE / PUNCH WALK REVIEW, AND/OR AS A RESULT OF TESTING

E. SPRINT RESERVES THE RIGHT TO INSPECT THE CONSTRUCTION SITE AT ANY TIME VIA SITE WALKS AND/OR PHOTO REVIEWS. CONTRACTOR SHALL GIVE SPRINT 24 HOURS NOTICE PRIOR TO THE COMMENCEMENT OF THE FOLLOWING CONSTRUCTION ACTIVITIES AND PHOTOGRAPHS OF THE IN-PROGRESS WORK.
1. GROUNDING SYSTEM AND BURIED UTILITIES INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
3. COMPACTION OF BACKFILL MATERIALS, AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS, ASPHALT PAVING, AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
4. PRE AND POST CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES. PRIOR TO CONSTRUCTION ACTIVITIES AND AFTER CONSTRUCTION IS COMPLETE, PROVIDE PHOTOGRAPHIC DOCUMENTATION OF ROOF, FLASHINGS, AND PARAPETS, BOTH BEFORE AND AFTER CONSTRUCTION IS COMPLETE.
5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
6. TOWER TOP AND INACCESSIBLE EQUIPMENT (RRUS, ANTENNAS, AND CABLING): PROVIDE PHOTOS OF THE BACKS OF ALL ANTENNAS, RRUS, COMBINERS, FILTERS, FIBER AND DC CABLING, CABLE COLOR CODING, EQUIPMENT GROUNDING AND CONNECTOR WATER PROOFING INCLUDING NAME PLATE AND SERIAL NUMBER FOR ALL SERIALIZED EQUIPMENT.

PROJECT CLOSEOUT:

A. FINAL ACCEPTANCE PUNCH WALK AND INSPECTION: AS IDENTIFIED IN THE SCOPE OF SERVICES, SPRINT WILL CONDUCT A FINAL PUNCH WALK OR FINAL DESK TOP PHOTO REVIEW (SITE MODIFICATIONS). PUNCH WALKS MUST BE SCHEDULED IN ADVANCE AS REQUIRED. AT THE PUNCH WALK / REVIEW, SPRINT MAY IDENTIFY CRITICAL DEFICIENCIES WHICH MUST BE CORRECTED PRIOR TO PUTTING SITE ON AIR. MINOR DEFICIENCIES MUST BE CORRECTED WITHIN 30 DAYS EXCEPT AS OTHERWISE REQUIRED. VERIFICATIONS OF CORRECTIONS MAY BE MADE BY COMPANY DURING A REPEAT SITE WALK OR DESK TOP PHOTO REVIEW AT COMPANY'S SOLE DISCRETION.

B. CLOSEOUT DOCUMENTATION: ALL CLOSEOUT DOCUMENTATION AND PHOTOGRAPHS SHALL BE UPLOADED PRIOR TO FINAL ACCEPTANCE. SPRINT WILL REVIEW CLOSEOUT DOCUMENTATION FOR PRESENCE AND CONTENT. CLOSEOUT DOCUMENTATION SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING AS APPLICABLE:
1. COAX SWEEP TESTS:
2. FIBER TESTS:
3. JURISDICTION FINAL INSPECTION DOCUMENTATION
4. REINFORCEMENT CERTIFICATION (MILL CERTIFICATION)
5. CONCRETE MIX DESIGN AND PRODUCT DATA (TOWER FOUNDATION)
6. LIEN WAIVERS AND RELEASES.
7. POST -CONSTRUCTION HEIGHT VERIFICATION
8. JURISDICTION CERTIFICATE OF OCCUPANCY
9. ELECTRONIC ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
10. STRUCTURAL BACKFILL TEST RESULTS (IF APPLICABLE)
11. CELL SITE UTILITY SETUP
12. AS-BUILT REDLINE CONSTRUCTION DRAWINGS (PDF SCAN OF FIELD MARKS)
13. AS-BUILT CONSTRUCTION DRAWINGS IN DWG AND PDF FORMATS
14. LIST OF SUB CONTRACTORS
15. APPROVED PERMITTING DOCUMENTS
16. FINAL SITE PHOTOS UP-LOADED TO SITERRA. INCLUDE THE FOLLOWING AS APPLICABLE:
    a. TOWER, ANTENNAS, RRUS, AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX/CABLE LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING - TOP AND BOTTOM; PHOTOS OF COAX GROUNDING--TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
    b. ROOF TOPS: PRE-CONSTRUCTION AND POST-CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;
    c. SITE LAYOUT - PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
    d. FINISHED UTILITIES: CLOSE-UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE-UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE-UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.

PROJECT PHOTOGRAPHS:

A. PROVIDE PROJECT CLOSEOUT GENERAL ARRANGEMENT PHOTOS OF ALL NEW WORK. THE FOLLOWING LIST REFRESENTS MINIMUM REQUIREMENTS AND MINIMUM QUANTITY. ADDITIONAL PHOTOS MAY BE REQUIRED TO ADEQUATELY DOCUMENT THE WORK.
1. ASR AND RF MPE SIGNAGE (IF NOT IN PLACE, SUPPLIER NOTIFIES EMS FIELD REPRESENTATIVE)
2. BACK OF ANTENNAS AND RRUS (1 EACH SECTOR)
3. BACK OF ANTENNAS AND RRUS (1 EACH SECTOR) CLOSE UP SHOWING WEATHERPROOFING AND GROUNDING (AS REQUIRED). CLOSE-UP OF BACK SIDE OF EACH PERMANENT RRU SHOWING SERIAL NUMBER/BAR CODE.
4. VIEW (1 EACH SECTOR) ALONG THE AZIMUTH AND TILT OF THE ANTENNAS
5. TOP OF TOWER FROM GROUND, 1 EACH SECTOR
6. MAINLINE HYBRID CABLE ROUTE DOWN TOWER SHOWING FASTENERS AND SUPPORT
7. MAINLINE/HYBRID CABLE ROUTE ALONG ICE BRIDGE OR IN CABLE TRAY SHOWING FASTENERS AND SUPPORT
8. GROUND MOUNTED RRU RACKS (FRONT AND BACK)
9. FRONT, SIDE AND BACK ELEVATIONS OF ALL GROUND CABINETS
10. VIEW OF COMPOUND FROM A DISTANCE
11. VIEW OF EACH GROUND CABINET (POWER, RF, FIBER SPOOL, PPC POWER, PPC TELCO WITH DOOR OPEN)
12. BACKHAUL FIBER MEET-ME-POINT AND CONDUIT ROUTE (MICROWAVE INSTALLATION IF NOT FIBER)
13. AAV NETWORK INTERFACE DEVICE OR MICROWAVE RADIO INSTALLATION

DEFICIENCY CORRECTIONS:

CONTRACTOR IS RESPONSIBLE FOR ALL CORRECTIONS TO DEFICIENCIES IDENTIFIED THROUGH TESTING, REVIEW OF SUBMITTALS, INSPECTIONS AND CLOSEOUT REVIEWS.

SECTION 01 500 - PROJECT REPORTING

WEEKLY REPORTS:

A. CONTRACTOR SHALL REPORT TO SPRINT AT MINIMUM ON A WEEKLY BASIS VIA SITERRA BY UPDATING ALL APPLICABLE POST END KEEPING MILESTONES WITH ACTUAL AND FORECASTED COMPLETION DATES.

B. ADDITIONAL REQUIREMENTS FOR REPORTING MAY BE IDENTIFIED ELSEWHERE OR REQUIRED BY THE SCOPE OF SERVICES OR SPRINTS LOCAL MARKET CONSTRUCTION MANAGER. THIS INFORMATION WILL PROVIDE A BASIS FOR PROGRESS MONITORING AND PAYMENT.

PROJECT CONFERENCE CALLS:

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

FINAL PROJECT ACCEPTANCE: PRIOR TO SPRINTS FINAL PROJECT ACCEPTANCE. ALL REQUIRED MILESTONE ACTUALS MUST BE UPDATED IN SITERRA AND ALL REQUIRED REPORTING TASKS MUST BE COMPLETE.

SECTION 11 700 - ANTENNA ASSEMBLY, REMOTE RADIO UNITS AND CABLE INSTALLATION

SUMMARY:

THIS SECTION SPECIFIES INSTALLATION OF ANTENNAS, RRU'S, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

ANTENNAS AND RRU'S:

THE NUMBER AND TYPE OF ANTENNAS AND RRU'S TO BE INSTALLED IS DETAILED ON THE CONSTRUCTION DRAWINGS.

HYBRID CABLE:

HYBRID CABLE WILL BE DC/FIBER AND FURNISHED FOR INSTALLATION AT EACH SITE. CABLE SHALL BE INSTALLED PER THE CONSTRUCTION DRAWINGS AND THE APPLICABLE MANUFACTURER'S REQUIREMENTS.

JUMPERS AND CONNECTORS:

FURNISH AND INSTALL 1/2" COAX JUMPER CABLES BETWEEN THE RRU'S AND ANTENNAS. JUMPERS SHALL BE TYPE LDF 4, FLC 12-50, CR 540, OR FXL 540. SUPER-FLEX CABLES ARE NOT ACCEPTABLE. JUMPERS BETWEEN THE RRU'S AND ANTENNAS OR TOWER TOP AMPLIFIERS SHALL CONSIST OF 1/2 INCH FOAM DIELECTRIC, OUTDOOR RATED COAXIAL CABLE, MIN. LENGTH FOR JUMPER SHALL BE 10'-0".

REMOTE ELECTRICAL TILT (RET) CABLES:

MISCELLANEOUS:

INSTALL SPLITTERS, COMBINERS, FILTERS PER RF DATA SHEET, FURNISHED BY SPRINT.

ANTENNA INSTALLATION:

THE CONTRACTOR SHALL ASSEMBLE ALL ANTENNAS ONSITE IN ACCORDANCE WITH THE INSTRUCTIONS SUPPLIED BY THE MANUFACTURER. ANTENNA HEIGHT, AZIMUTH, AND FEED ORIENTATION INFORMATION SHALL BE A DESIGNATED ON THE CONSTRUCTION DRAWINGS.

A. THE CONTRACTOR SHALL POSITION THE ANTENNA ON TOWER PIPE MOUNTS SO THAT THE BOTTOM STRUT IS LEVEL. THE PIPE MOUNTS SHALL BE PLUMB TO WITHIN 1 DEGREE.

B. ANTENNA MOUNTING REQUIREMENTS: PROVIDE ANTENNA MOUNTING HARDWARE AS INDICATED ON THE DRAWINGS.

HYBRID CABLE INSTALLATION:

A. THE CONTRACTOR SHALL ROUTE, TEST, AND INSTALL ALL CABLES AS INDICATED ON THE CONSTRUCTION DRAWINGS AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. THE INSTALLED RADIUS OF THE CABLES SHALL NOT BE LESS THAN THE MANUFACTURER'S SPECIFICATIONS FOR BENDING RADII.

C. EXTREME CARE SHALL BE TAKEN TO AVOID DAMAGE TO THE CABLES DURING HANDLING AND INSTALLATION.

1. FASTENING MAIN HYBRID CABLES: ALL CABLES SHALL BE INSTALLED INSIDE MONOPOLE WITH CABLE SUPPORT GRIPS AS REQUIRED BY THE MANUFACTURER.
2. FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA), WITHIN THE MMBS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES:
    a. FIBER: SUPPORT FIBER BUNDLES USING 1/2" VELCRO STRAPS OF THE REQUIRED LENGTH AT 18" O.C. STRAPS SHALL BE UV, OIL AND WATER RESISTANT AND SUITABLE FOR INDUSTRIAL INSTALLATIONS AS MANUFACTURED BY TEXTOL OR APPROVED EQUAL.
    b. DC: SUPPORT DC BUNDLES WITH ZIP TIES OF THE ADEQUATE LENGTH. ZIP TIES TO BE UV STABILIZED, BLACK NYLON, WITH TENSILE STRENGTH AT 12,000 PSI AS MANUFACTURED BY NELCO PRODUCTS OR EQUAL.
3. FASTENING JUMPERS: SECURE JUMPERS TO THE SIDE ARMS OR HEAD FRAMES USING STAINLESS STEEL TIE WRAPS OR STAINLESS STEEL BUTTERFLY CLIPS.
4. CABLE INSTALLATION:
    a. INSPECT CABLE PRIOR TO USE FOR SHIPPING DAMAGE, NOTIFY THE CONSTRUCTION MANAGER.
    b. CABLE ROUTING: CABLE INSTALLATION SHALL BE PLANNED TO ENSURE THAT THE LINES WILL BE PROPERLY ROUTED IN THE CABLE ENVELOP AS INDICATED ON THE DRAWINGS. AVOID TWISTING AND CROSSOVERS.
    c. HOIST CABLE USING PROPER HOISTING GRIPS. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM BEND RADIUS.
5. GROUNDING OF TRANSMISSION LINES: ALL TRANSMISSION LINES SHALL BE GROUNDED AS INDICATED ON DRAWINGS.
6. HYBRID CABLE COLOR CODING: ALL COLOR CODING SHALL BE AS REQUIRED IN TS 0200 (CURRENT VERSION).
7. HYBRID CABLE LABELING: INDIVIDUAL HYBRID AND DC BUNDLES SHALL BE LABELED ALPHA-NUMERICALLY ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE - EN 2012-001, REV 1

WEATHERPROOFING EXTERIOR CONNECTORS AND HYBRID CABLE GROUND KITS:

A. ALL FIBER & COAX CONNECTORS AND GROUND KITS SHALL BE WEATHERPROOFED.

B. WEATHERPROOFED USING ONE OF THE FOLLOWING METHODS. ALL INSTALLATIONS MUST BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INDUSTRY BEST PRACTICES.
1. COLD SHRINK: ENCOMPASS CONNECTOR IN COLD SHRINK TUBING AND PROVIDE A DOUBLE WRAP OF 2" ELECTRICAL TAPE EXTENDING 2" BEYOND TUBING. PROVIDE 3M COLD SHRINK CXS SERIES OR EQUAL.
2. SELF-AMALGAMATING TAPE: CLEAN SURFACES. APPLY A DOUBLE WRAP OF SELF-AMALGAMATING TAPE 2" BEYOND CONNECTOR. APPLY A SECOND WRAP OF SELF-AMALGAMATING TAPE IN OPPOSITE DIRECTION. APPLY DOUBLE WRAP OF 2" WIDE ELECTRICAL TAPE EXTENDING 2" BEYOND THE SELF-AMALGAMATING TAPE.
3. 3M SLIM LOCK CLOSURE 716: SUBSTITUTIONS WILL NOT BE ALLOWED.
4. OPEN FLAME ON JOB SITE IS NOT ACCEPTABLE

SECTION 11 800 - INSTALLATION OF MULTIMODAL BASE STATIONS (MMBS) AND RELATED EQUIPMENT

SUMMARY:

A. THIS SECTION SPECIFIES MMBS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BY NOT LIMITED TO RECTIFIERS, POWER DISTRIBUTION UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFCI).

B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND AS REQUIRED BY THE APPLICABLE INSTALLATION MOPS.

C. COMPLY WITH MANUFACTURER'S INSTALLATION AND START-UP REQUIREMENTS.

DC CIRCUIT BREAKER LABELING

A. NEW DC CIRCUIT IS REQUIRED IN MMBS CABINET SHALL BE CLEARLY IDENTIFIED AS TO RRU BEING SERVICED.

SECTION 26 100 - BASIC ELECTRICAL REQUIREMENTS

SUMMARY:

THIS SECTION SPECIFIES BASIC ELECTRICAL REQUIREMENTS FOR SYSTEMS AND COMPONENTS

QUALITY ASSURANCE:

A. ALL EQUIPMENT FURNISHED UNDER DIVISION 26 SHALL CARRY UL LABELS AND LISTINGS WHERE SUCH LABELS AND LISTINGS ARE AVAILABLE IN THE INDUSTRY.

B. MANUFACTURERS OF EQUIPMENT SHALL HAVE A MINIMUM OF THREE YEARS EXPERIENCE WITH THEIR EQUIPMENT INSTALLED AND OPERATING IN THE FIELD IN A USE SIMILAR TO THE PROPOSED USE FOR THIS PROJECT.

C. MATERIALS AND EQUIPMENT: ALL MATERIALS AND EQUIPMENT SPECIFIED IN DIVISION 26 OF THE SAME TYPE SHALL BE OF THE SAME MANUFACTURER AND SHALL BE NEW, OF THE BEST QUALITY AND DESIGN, AND FREE FROM DEFECTS.

SUPPORTING DEVICES:

A. MANUFACTURED STRUCTURAL SUPPORT MATERIALS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE FOLLOWING:
1. ALLIED TUBE AND CONDUIT.
2. B-LINE SYSTEM.
3. UNISTRUT DIVERSIFIED PRODUCTS.
4. THOMAS & BETTS.

B. FASTENERS: TYPES, MATERIALS, AND CONSTRUCTION FEATURES AS FOLLOWS:
1. EXPANSION ANCHORS: CARBON STEEL WEDGE OR SLEEVE TYPE.
2. POWER-DRIVEN THREADED STUDS: HEAT-TREATED STEEL, DESIGNED SPECIFICALLY FOR THE INTENDED SERVICE.
3. FASTEN BY MEANS OF WOOD SCREWS ON WOOD.
4. TOGGLE BOLTS ON HOLLOW MASONRY UNITS.
5. CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE OR SOLID MASONRY.
6. MACHINE SCREWS, WELDED THREADED STUDS, OR SPRING-TENSION CLAMPS ON STEEL.
7. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE SHALL NOT BE PERMITTED.
8. DO NOT WELD CONDUIT, PIPE STRAPS, OR ITEMS OTHER THAN THREADED STUDS TO STEEL STRUCTURES.
9. IN PARTITIONS OF LIGHT STEEL CONSTRUCTION, USE SHEET METAL SCREWS.

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

Signature: Date: 1/12/2015

A	1/12/15	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL DATE ISSUED: 01/12/2015

PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 29427
SHEET NUMBER: SP-2

DRAWN BY: KJG CHECKED BY: KAB

SUPPORTING DEVICES:

A. INSTALL SUPPORTING DEVICES TO FASTEN ELECTRICAL COMPONENTS SECURELY AND PERMANENTLY IN ACCORDANCE WITH NEC.

B. COORDINATE WITH THE BUILDING STRUCTURAL SYSTEM AND WITH OTHER TRADES.

C. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTING HARDWARE SECURELY TO THE STRUCTURE IN ACCORDANCE WITH THE FOLLOWING:

1. ENSURE THAT THE LOAD APPLIED BY ANY FASTENER DOES NOT EXCEED 25 PERCENT OF THE PROOF TEST LOAD.

2. USE VIBRATION AND SHOCK-RESISTANT FASTENERS FOR ATTACHMENTS TO CONCRETE SLABS.

ELECTRICAL IDENTIFICATION:

A. UPDATE AND PROVIDE TYPED CIRCUIT BREAKER SCHEDULES IN THE MOUNTING BRACKET, INSIDE DOORS OF AC PANEL BOARDS WITH ANY CHANGES MADE TO THE AC SYSTEM.

B. BRANCH CIRCUITS FEEDING AVIATION OBSTRUCTION LIGHTING EQUIPMENT SHALL BE CLEARLY IDENTIFIED AS SUCH AT THE BRANCH CIRCUIT PANELBOARD.

SECTION 26 200 - ELECTRICAL MATERIALS AND EQUIPMENT

A. RIGID GALVANIZED STEEL (RGS) CONDUIT SHALL BE USED FOR EXTERIOR LOCATIONS ABOVE GROUND AND IN UNFINISHED INTERIOR LOCATIONS AND FOR UNDERGROUND RUNS. RIGID CONDUIT AND FITTINGS SHALL BE STEEL, COATED WITH ZINC EXTERIOR AND INTERIOR BY THE HOT DIP GALVANIZING PROCESS. CONDUIT SHALL BE PRODUCED TO ANSI SPECIFICATIONS C80.1, FEDERAL SPECIFICATION WW-C-581 AND SHALL BE LISTED WITH THE UNDERWRITERS' LABORATORIES. FITTINGS SHALL BE THREADED - SET SCREW OR COMPRESSION FITTINGS WILL NOT BE ACCEPTABLE. RGS CONDUITS SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND.

B. UNDERGROUND CONDUIT IN CONCRETE SHALL BE POLYVINYLCHLORIDE (PVC) SUITABLE FOR DIRECT BURIAL AS APPLICABLE. JOINTS SHALL BE BELLED, AND FLUSH SOLVENT WELDED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. CONDUIT SHALL BE CARLON ELECTRICAL PRODUCTS OR APPROVED EQUAL.

C. TRANSITIONS BETWEEN PVC AND RIGID (RGS) SHALL BE MADE WITH PVC COATED METALLIC LONG SWEEP RADIUS ELBOWS.

D. EMT OR RIGID GALVANIZED STEEL CONDUIT MAY BE USED IN FINISHED SPACES CONCEALED IN WALLS AND CEILINGS. EMT SHALL BE MILD STEEL, ELECTRICALLY WELDED, ELECTRO-GALVANIZED OR HOT-DIPPED GALVANIZED AND PRODUCED TO ANSI SPECIFICATION C80.3, FEDERAL SPECIFICATION WW-C-563, AND SHALL BE UL LISTED. EMT SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND, OR APPROVED EQUAL. FITTINGS SHALL BE METALLIC COMPRESSION. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE.

E. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FINAL CONNECTION TO EQUIPMENT. FITTINGS SHALL BE METALLIC GLAND TYPE COMPRESSION FITTINGS, MAINTAINING THE INTEGRITY OF CONDUIT SYSTEM. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE. MAXIMUM LENGTH OF FLEXIBLE CONDUIT SHALL NOT EXCEED 6-FEET. LFMC SHALL BE PROTECTED AND SUPPORTED AS REQUIRED BY NEC. MANUFACTURERS OF FLEXIBLE CONDUITS SHALL BE CAROL, ANACONDA METAL HOSE OR UNIVERSAL METAL HOSE, OR APPROVED EQUAL.

F. MINIMUM SIZE CONDUIT SHALL BE 3/4 INCH (21MM).

HUBS AND BOXES:

A. AT ENTRANCES TO CABINETS OR OTHER EQUIPMENT NOT HAVING INTEGRAL THREADED HUBS PROVIDE METALLIC THREADED HUBS OF THE SIZE AND CONFIGURATION REQUIRED. HUB SHALL INCLUDE LOCKNUT AND NEOPRENE O-RING SEAL. PROVIDE IMPACT RESISTANT 105 DEGREE C PLASTIC BUSHINGS TO PROTECT CABLE INSULATION.

B. CABLE TERMINATION FITTINGS FOR CONDUIT

1. CABLE TERMINATORS FOR RGS CONDUITS SHALL BE TYPE CRC BY O-Z/GEDNEY OR EQUAL BY ROXTEC.

2. CABLE TERMINATORS FOR LFMC SHALL BE ETCO - CL2075; OR MADE FOR THE PURPOSE PRODUCTS BY ROXTEC.

C. EXTERIOR PULL BOXES AND PULL BOXES IN INTERIOR INDUSTRIAL AREAS SHALL BE PLATED CAST ALLOY, HEAVY DUTY, WEATHERPROOF, DUST PROOF, WITH GASKET, PLATED IRON ALLOY COVER AND STAINLESS STEEL COVER SCREWS, CROUSE-HINDS WAB SERIES OR EQUAL.

D. CONDUIT OUTLET BODIES SHALL BE PLATED CAST ALLOY WITH SIMILAR GASKET COVERS. OUTLET BODIES SHALL BE OF THE CONFIGURATION AND SIZE SUITABLE FOR THE APPLICATION. PROVIDE CROUSE-HINDS FORM 8 OR EQUAL.

E. MANUFACTURER FOR BOXES AND COVERS SHALL BE HOFFMAN, SQUARE "D", CROUSE-HINDS, COOPER, ADALET, APPLETON, O-Z GEDNEY, RACO, OR APPROVED EQUAL.

SUPPLEMENTAL GROUNDING SYSTEM:

A. FURNISH AND INSTALL A SUPPLEMENTAL GROUNDING SYSTEM TO THE EXTENT INDICATED ON THE DRAWINGS. SUPPORT SYSTEM WITH NON-MAGNETIC STAINLESS STEEL CLIPS WITH RUBBER GROMMETS. GROUNDING CONNECTORS SHALL BE TINNED COPPER WIRE, SIZES AS INDICATED ON THE DRAWINGS. PROVIDE STRANDED OR SOLID BARE OR INSULATED CONDUCTORS EXCEPT AS OTHERWISE NOTED.

B. SUPPLEMENTAL GROUNDING SYSTEM: ALL CONNECTIONS TO BE MADE WITH CAD WELDS, EXCEPT AT EQUIPMENT USE LUGS OR OTHER AVAILABLE GROUNDING MEANS AS REQUIRED BY MANUFACTURER; AT GROUND BARS USE TWO HOLE SPADES WITH NO-OX.

C. STOLEN GROUND-BARS: IN THE EVENT OF STOLEN GROUND BARS, CONTACT SPRINT CM FOR REPLACEMENT INSTRUCTION USING THREADED ROD KITS.

EXISTING STRUCTURE:

A. EXISTING EXPOSED WIRING AND ALL EXPOSED OUTLETS, RECEPTACLES, SWITCHES, DEVICES, BOXES, AND OTHER EQUIPMENT THAT ARE NOT TO BE UTILIZED IN THE COMPLETED PROJECT SHALL BE REMOVED OR DE-ENERGIZED AND CAPPED IN THE WALL, CEILING, OR FLOOR SO THAT THEY ARE CONCEALED AND SAFE. WALL, CEILING, OR FLOOR SHALL BE PATCHED TO MATCH THE ADJACENT CONSTRUCTION.

CONDUIT AND CONDUCTOR INSTALLATION:

A. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER, PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.

B. CONDUCTORS SHALL BE PULLED IN ACCORDANCE WITH ACCEPTED GOOD PRACTICE.

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

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ISSUE PHASE: FINAL DATE ISSUED: 01/12/2015

PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

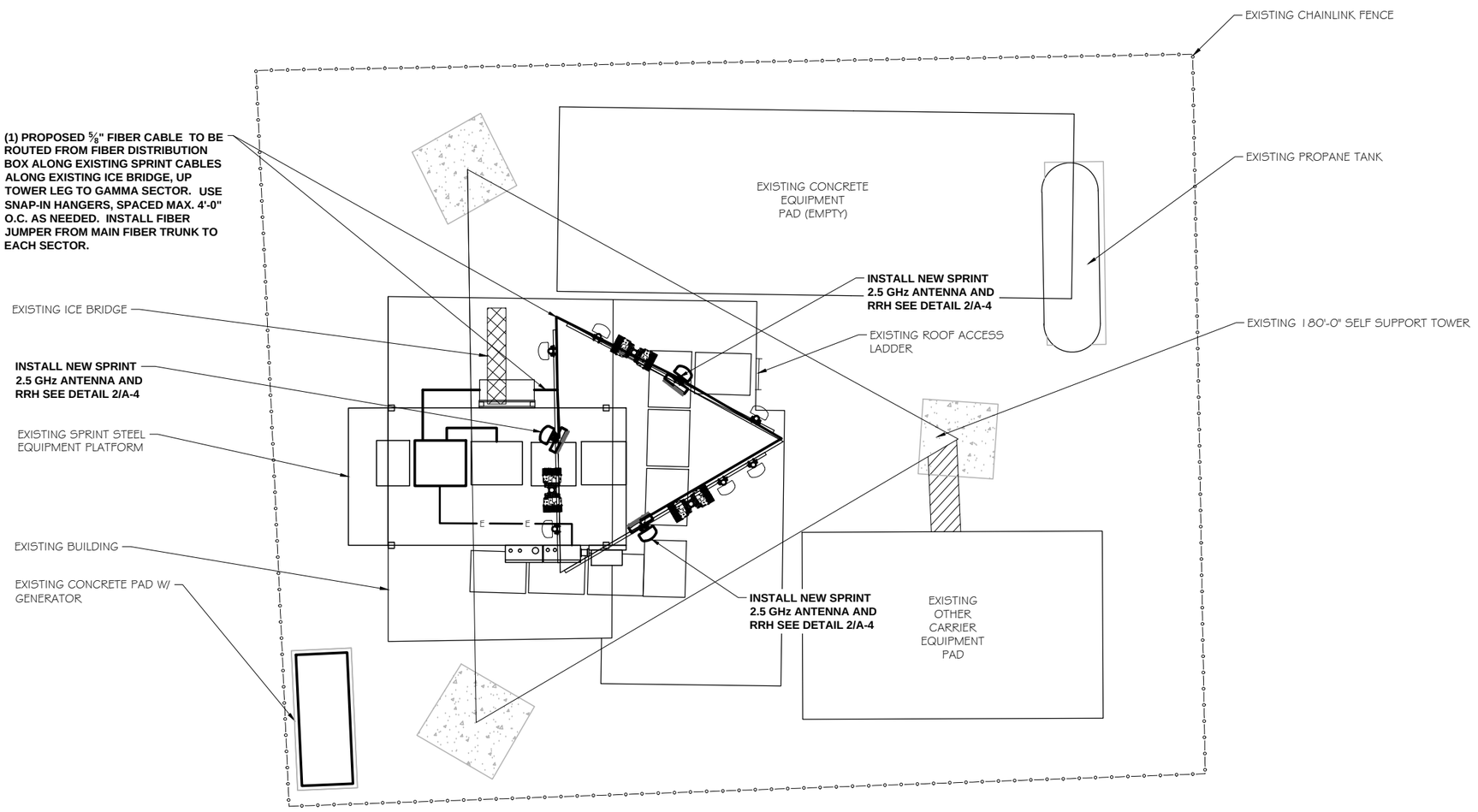
SHEET TITLE:
SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 29427
SHEET NUMBER: SP-3

I:\29400\29427\CAD\29427 Sprint 2.5 CD for CT.dwg Printed by: tnelson on Jan 12, 2015 - 12:07pm

DRAWN BY: KJG CHECKED BY: KAB



SITE PLAN
SCALE: 1" = 7.5'
1

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ISSUE PHASE: FINAL
DATE ISSUED: 01/12/2015

PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
SITE PLAN

0 3.75' 7.5' 15'
11" x 17" - 1" = 7.5'
22" x 34" - 1" = 3.75'

PROJECT NUMBER: 29427
SHEET NUMBER: A-1

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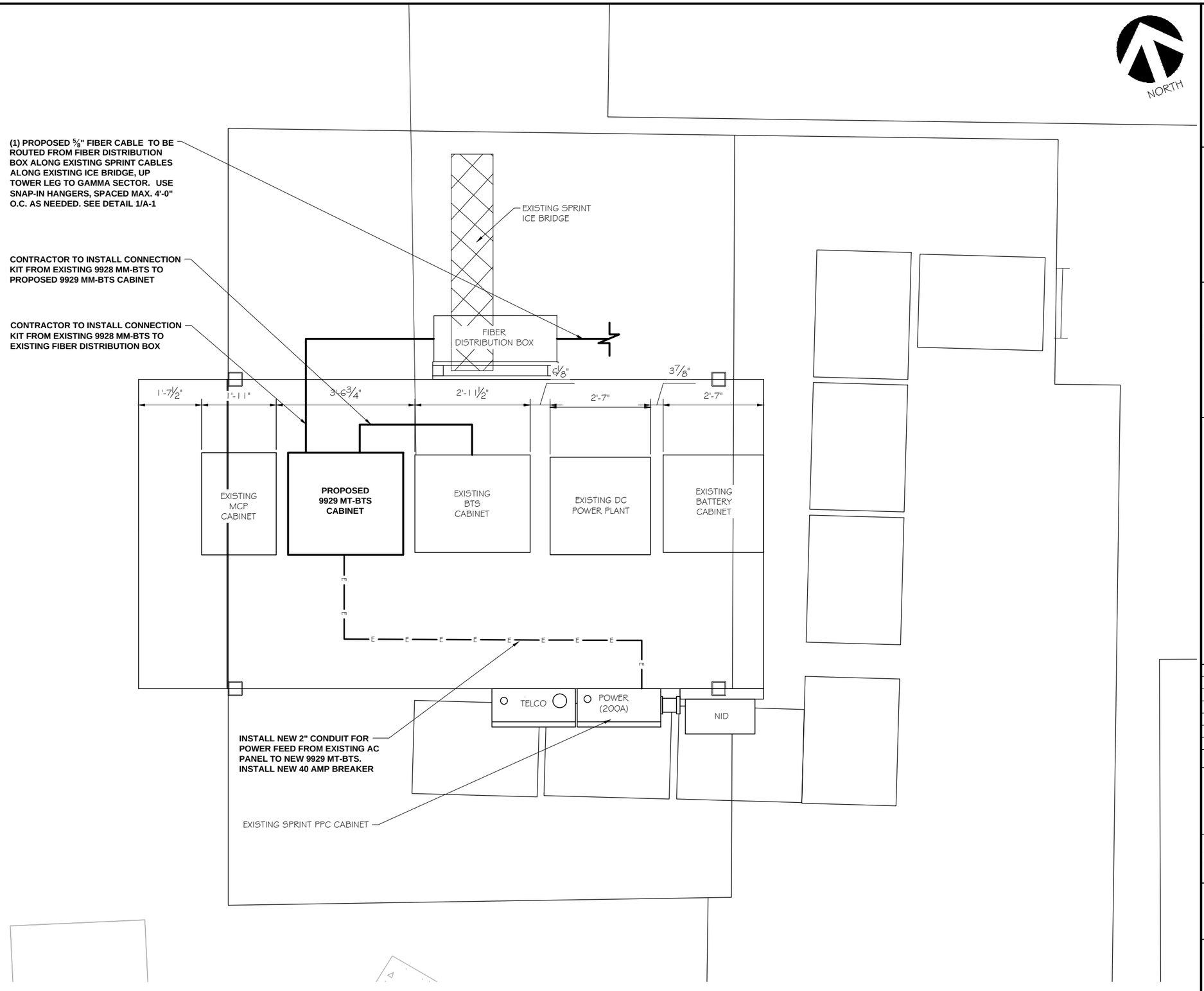

EQUIPMENT PLAN
SCALE: 1" = 2.5'
1

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PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

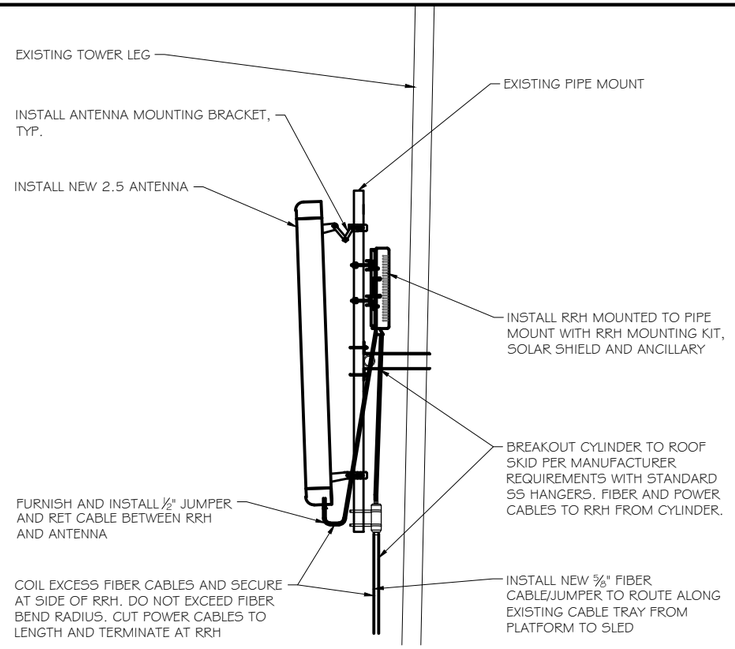
PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
EQUIPMENT PLAN

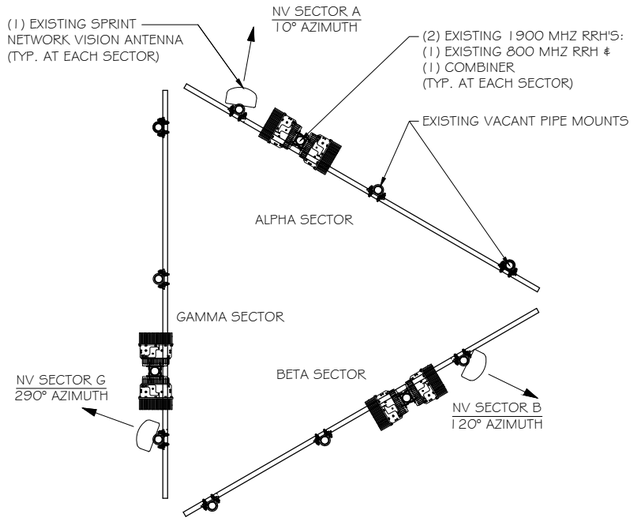
0 1.25' 2.5' 5'
11" x 17" - 1" = 2.5'
22" x 34" - 1" = 1.25'

PROJECT NUMBER: 29427
SHEET NUMBER: A-2

I:\29400\29427\CAD\29427 Sprint 2.5 CD for CT.dwg Printed by: tnelson on Jan 12, 2015 - 12:07pm

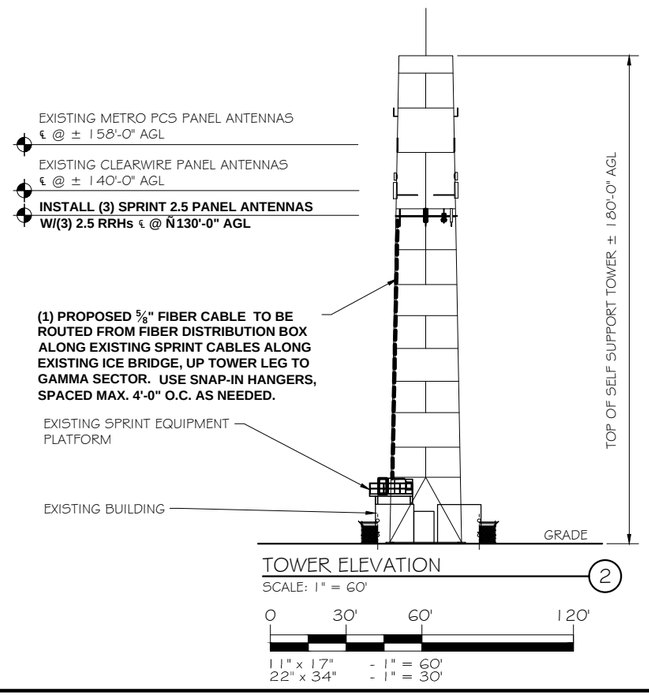


ANTENNA & RRH MOUNTING DETAILS (1)
SCALE: NTS



NORTH

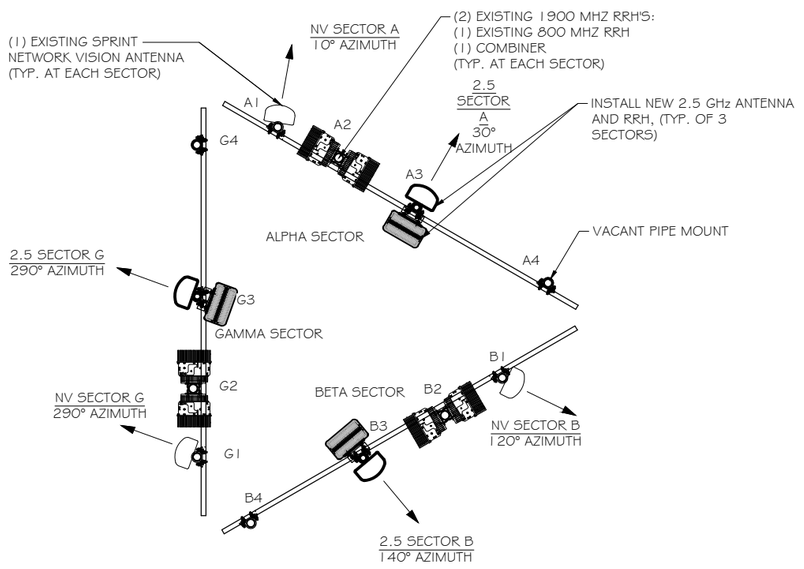
EXISTING ANTENNA ARRAY (3)
SCALE: NTS



TOWER ELEVATION (2)
SCALE: 1" = 60'

0 30' 60' 120'

11" x 17" - 1" = 60'
22" x 34" - 1" = 30'



NORTH

PROPOSED ANTENNA ARRAY (4)
SCALE: NTS

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PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
BUILDING ELEVATIONS & ANTENNA DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 29427
SHEET NUMBER: A-3

Sprint

RFDS Sheet

General Site Information

Site ID	CT03XC045-B	Equipment Vendor	Alcatel-Lucent
Market	Southern Connecticut	Lattitude	41.570271
Region	Northeast	Longitude	-73.01667
MLA	N/A	LL SITE ID	N/A
Structure Type	Self support tower		
BTS Type			

Solution ID		Siterra SR Equipment type	
		Equipment Vendor	Alcatel-Lucent

Incremental Power Draw needed by added Equipment: N/A

Base Equipment

BBU Kit	ALU BBU Kit	Top Hat	None
BBU Kit Qty	1	Top Hat Qty	N/A
		Top Hat Dimenstions	N/A
Growth Cabinet	ALU Growth Cabinet 9929	Top Hat Weight (lbs)	N/A
Growth Cabinet Qty	1		
Growth Cabinet Dimensions	63.65" X 31.5" X 35.5"		
Growth Cabinet Weight	1000		

RF Path Information

RRH	TD-RRH8x20-25	
RRH Qty	3	
RRH Dimensions	26.1"x18.6"x6.7"	
RRH Weight. lbs.	70	
RRH Mount Weight. Lbs.	10	
Power and Fiber Cable	ALU Fiber Only	
Cable Qty	1	
Weight per foot. Lbs.	0.242	
Diameter. Inches.	0.73	
Length Ft.	170	(calculated as coax run plus 20%)
Coax Jumper	TBD	
Coax Jumper Qty	27	
Coax Jumper Length. Feet.	15	
Coax Jumper Weight	1.7	
Coax Jumper Diameter. Inches	0.5	
AISG Cable	Commscope ATCB-B01-006	
AISG Cable Qty	3	
AISG Diameter. Inches.	0.315	
AISG Cable length.	8'	
Weight of entire AISG cable. Lbs.	1.3	

Antenna Sector Information

	Sector 1	Sector 2	Sector 3
Antenna make/model	RFS APXV9TM14-ALU-I20	RFS APXV9TM14-ALU-I20	RFS APXV9TM14-ALU-I20
Antenna qty	1	1	1
Antenna Dimensions. Inches	56.3"x12.6"x6.3"	56.3"x12.6"x6.3"	56.3"x12.6"x6.3"
Antenna Weight. Lbs	55.12	55.12	55.12
Antenna Mounting Kit Weight. Lbs.	11.5	11.5	11.5
CL Height	130*	130*	130*
Antenna Azimuth	30	140	290
Antenna Mechanical Downtilt	0	0	0
Antenna etilt	-2	-2	-2

*RFDS SHEET WAS GENERATED BY RAMAKER & ASSOCIATES FROM PLAN OF RECORD (POR) PROVIDED BY SPRINT. CONTRACTOR SHALL VERIFY AND OBTAIN FINAL RFDS FROM SPRINT CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION.

NOTES:

1. GENERAL CONTRACTOR TO FIELD VERIFY AZIMUTH AND C/L HEIGHT AND MECHANICAL DOWNTILT. IF DIFFERENT THAN CALLED OUT BELOW, HALT ANTENNA WORK FOR ONE HOUR, CALL SPRINT RF ENGINEER (OR MANAGER IF RF ENGINEER DOES NOT ANSWER, BUT STILL LEAVE A MESSAGE TO RF ENGINEER) USING CONTACT INFORMATION ABOVE FOR FURTHER INSTRUCTIONS. IF SPRINT DOES NOT RESPOND WITHIN ONE HOUR, PLACE 2.5GHZ ANTENNA AT SAME C/L HEIGHT AS 1.9GHZ ANTENNA AND EMAIL CORRECT C/L HEIGHT AND AZIMUTH TO SPRINT RF ENGINEER. UPDATE AS-BUILD DRAWING WITH CORRECT C/L HEIGHT. ALSO EMAIL CORRECT 1.9GHZ AND 800MHZ ANTENNA C/L HEIGHT, AZIMUTH AND MECHANICAL DOWNTILT TO RF ENGINEER.
2. AISG TESTS TO VERIFY OPERATION IS TO BE PERFORMED AFTER FINAL INSTALLATION OF ANTENNAS AND AISG CABLES HAVE BEEN CONNECTED. VERIFY OPERATION OF ALL EXISTING SPRINT AISG EQUIPMENT INCLUDING 800MHZ, 1.9GHZ AND 2.5GHZ. TEST TO INCLUDE COMPLETE DOWNTILT, AZIMUTH (IF APPLICABLE) AND BEAMWIDTH SWINGS (IF APPLICABLE). DOCUMENT AISG TEST RESULTS IN COAX SWEEP TEST SPREADSHEET.
3. GENERAL CONTRACTOR MUST ENSURE THAT NO OBJECT IS LOCATED WITHIN 45 DEGREES OF LEFT AND RIGHT OF FRONT OF ANTENNA OR 7 DEGREES UP AND DOWN FROM CENTER OF ANTENNA. IF THIS IS NOT POSSIBLE, CONTACT RF ENGINEER FOR FURTHER INSTRUCTION. IN ADDITION, 2.5GHZ ANTENNA IS NOT TO BE PLACED IN FRONT OF ANY OTHER ANTENNA USING THE SAME 45 DEGREE RULE. THIS INCLUDES SPRINT AND NON-SPRINT ANTENNAS.
4. 2.5GHZ ANTENNA MUST BE AT LEAST 6' FROM 1.9GHZ ANTENNA, 30' FROM 800MHZ ANTENNA AND 30' FROM DUAL BAND 1.9GHZ AND 800MHZ ANTENNA.
5. GENERAL CONTRACT IS REQUIRED TO USE A DIGITAL ALIGNMENT TOOL TO SET AZIMUTH, ROLL AND DOWNTILT. AZIMUTH ACCURACY IS TO BE WITHIN 1 DEGREE. DOWNTILT AND ROLL (LEFT TO RIGHT TILT) IS TO BE WITHIN 0.1 DEGREES. IF FOR SOME REASON THIS ACCURACY CANNOT BE ACHIEVED, UPDATE AS-BUILT DRAWINGS AND EMAIL SPRINT RF ENGINEER WITH AS-BUILT SETTINGS. USE 3Z RF ALIGNMENT TOOL OR EQUIVALENT TOOL.

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CT03XC045-B

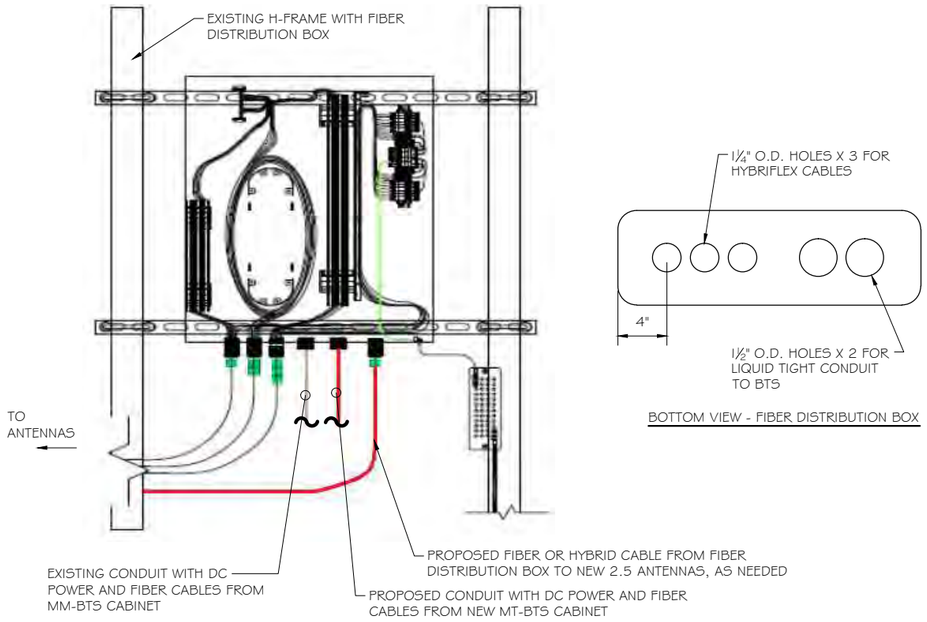
PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
RF DATA SHEET

SCALE:
AS NOTED

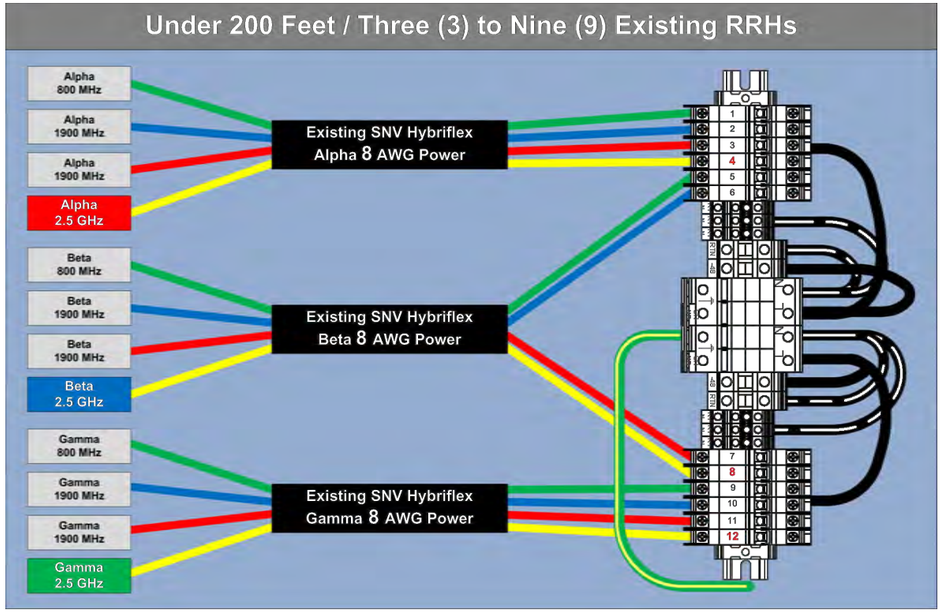
PROJECT NUMBER: 29427
SHEET NUMBER: A-4

DRAWN BY: KJG CHECKED BY: KAB

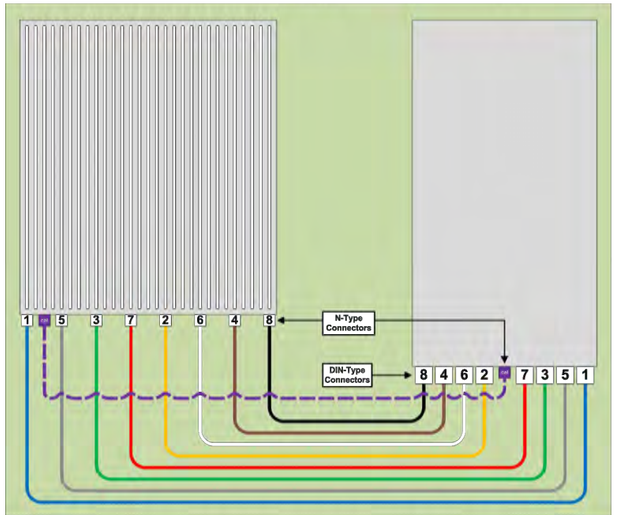


TYPICAL FIBER DISTRIBUTION BOX DETAIL (1)
SCALE: NTS

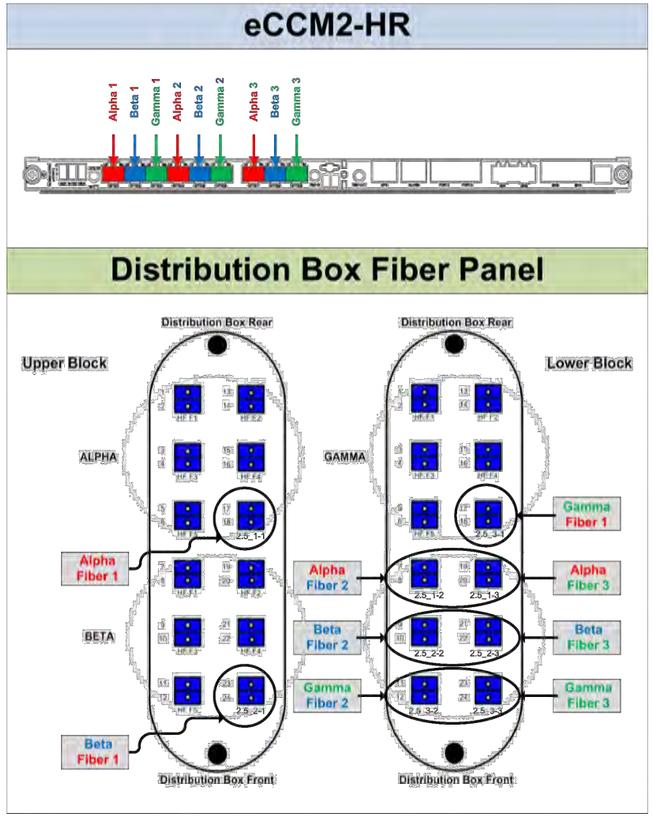
BOTTOM VIEW - FIBER DISTRIBUTION BOX



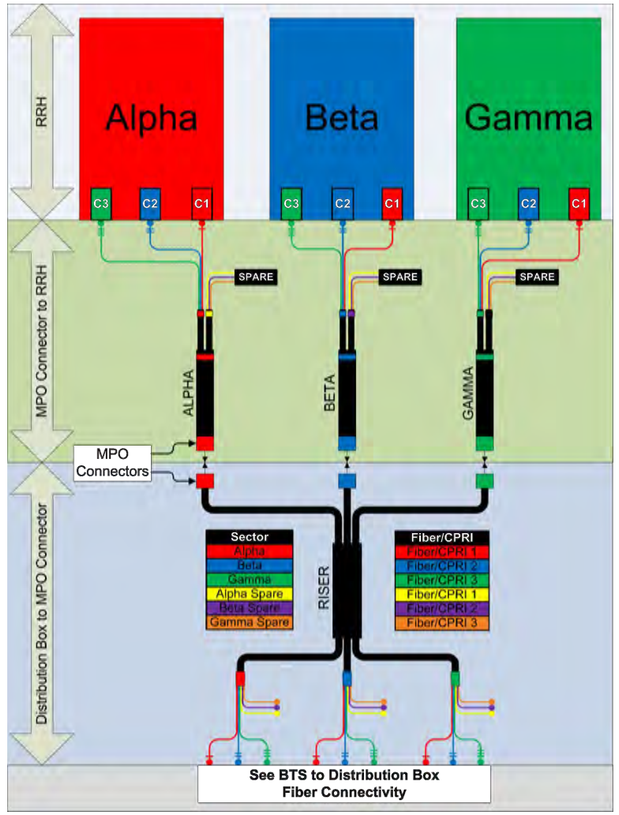
RRH TO DISTRIBUTION BOX POWER CONNECTIVITY DETAIL (2)
SCALE: NTS



8T8R DETAIL (3)
SCALE: NTS



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



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

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OAKLAND, NJ 07346

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

Signature: Date: 1/12/2015

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ISSUE PHASE: FINAL
DATE ISSUED: 01/12/2015

PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

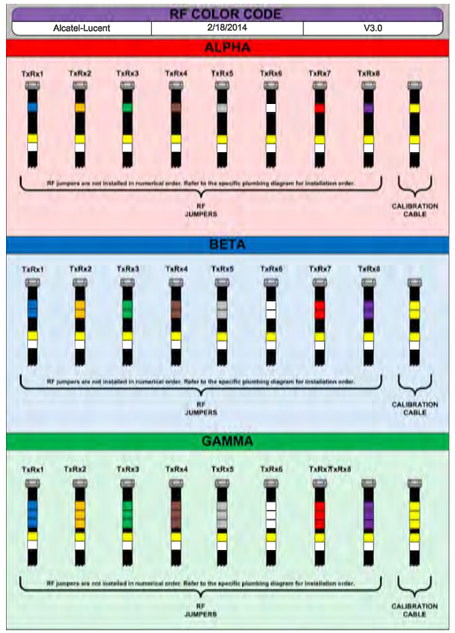
PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
FIBER PLUMBING DIAGRAM

SCALE:
AS NOTED

PROJECT NUMBER: 29427
SHEET NUMBER: A-5

I:\29400\29427\CAD\29427 Sprint 2.5 CD for CT.dwg Printed by: tnelson on Jan 12, 2015 - 12:07pm



SECTOR COLOR CODING AND BANDING (1)
SCALE: NTS

2.5 Coaxial Cable Color Code (Radio#1)

Sector	Cable	Start at Connector Side	Wrap2	Wrap3	Wrap4	Wrap5
1 Alpha	1	Blue			Yellow	White
1	2	Orange			Yellow	White
1	3	Green			Yellow	White
1	4	Brown			Yellow	White
1	5	Slate			Yellow	White
1	6	White			Yellow	White
1	7	Red			Yellow	White
1	8	Violet			Yellow	White
1	Calibration Cable	Yellow			Yellow	White
2 Beta	1	Blue	Blue		Yellow	White
2	2	Orange	Orange		Yellow	White
2	3	Green	Green		Yellow	White
2	4	Brown	Brown		Yellow	White
2	5	Slate	Slate		Yellow	White
2	6	White	White		Yellow	White
2	7	Red	Red		Yellow	White
2	8	Violet	Violet		Yellow	White
2	Calibration Cable	Yellow	Yellow		Yellow	White
3 Gamma	1	Blue	Blue	Blue	Yellow	White
3	2	Orange	Orange	Orange	Yellow	White
3	3	Green	Green	Green	Yellow	White
3	4	Brown	Brown	Brown	Yellow	White
3	5	Slate	Slate	Slate	Yellow	White
3	6	White	White	White	Yellow	White
3	7	Red	Red	Red	Yellow	White
3	8	Violet	Violet	Violet	Yellow	White
3	Calibration Cable	Yellow	Yellow	Yellow	Yellow	White

2.5 Coaxial Cable Color Code (Radio#2)

Sector	Cable	Start at Connector Side	Wrap2	Wrap3	Wrap4	Wrap5
1 Alpha	1	Blue			Yellow	Violet
1	2	Orange			Yellow	Violet
1	3	Green			Yellow	Violet
1	4	Brown			Yellow	Violet
1	5	Slate			Yellow	Violet
1	6	White			Yellow	Violet
1	7	Red			Yellow	Violet
1	8	Violet			Yellow	Violet
1	Calibration Cable	Yellow			Yellow	Violet
2 Beta	1	Blue	Blue		Yellow	Violet
2	2	Orange	Orange		Yellow	Violet
2	3	Green	Green		Yellow	Violet
2	4	Brown	Brown		Yellow	Violet
2	5	Slate	Slate		Yellow	Violet
2	6	White	White		Yellow	Violet
2	7	Red	Red		Yellow	Violet
2	8	Violet	Violet		Yellow	Violet
2	Calibration Cable	Yellow	Yellow		Yellow	Violet
3 Gamma	1	Blue	Blue	Blue	Yellow	Violet
3	2	Orange	Orange	Orange	Yellow	Violet
3	3	Green	Green	Green	Yellow	Violet
3	4	Brown	Brown	Brown	Yellow	Violet
3	5	Slate	Slate	Slate	Yellow	Violet
3	6	White	White	White	Yellow	Violet
3	7	Red	Red	Red	Yellow	Violet
3	8	Violet	Violet	Violet	Yellow	Violet
3	Calibration Cable	Yellow	Yellow	Yellow	Yellow	Violet

2.5 COAXIAL CABLE COLOR CODE (2)
SCALE: NTS

CABLE MARKING NOTES

1. ALL CABLES SHALL BE MARKED WITH 2" WIDE, UV STABILIZED, UL APPROVED TAPE.
2. THE FIRST RING SHALL BE CLOSEST TO THE END OF THE CABLE AND SPACED APPROXIMATELY 2" FROM THE END CONNECTOR, WEATHERPROOFING, OR BREAKOUT UNIT. THERE SHALL BE 1" SPACE BETWEEN EACH RING.
3. A 2" GAP SHALL SEPARATE THE CABLE COLOR CODE FROM THE FREQUENCY COLOR CODE. THE 2" COLOR RINGS FOR THE FREQUENCY CODE SHALL BE PLACED NEXT TO EACH OTHER WITH NO SPACES.
4. THE 2" COLORED TAPE(S) SHALL BE WRAPPED A MINIMUM OF 3 TIMES AROUND THE INDIVIDUAL CABLES, AND THE TAPE SHALL BE KEPT IN THE SAME LOCATION AS MUCH AS POSSIBLE.
5. SITES WITH MORE THAN FOUR (4) SECTORS WILL REQUIRE ADDITIONAL RINGS FOR EACH SECTOR, FOLLOWING THE PATTERN. HIGH CAPACITY SITES WILL USE THE SECOND CABLE IDENTIFIED BY BLUE BANDS OF TAPE
6. HYBRID FIBER CABLE SHALL BE SECTOR IDENTIFIED INSIDE THE CABINET ON FREQUENCY BUNDLES, ON THE SEALTITE, ON THE MAIN LINE UPON EXIT OF SEALTITE, AND BEFORE AND AFTER THE BREAKOUT UNIT (MEDUSA), AS WELL AS BEFORE AND AFTER ANY ENTRANCE OR EXIT.
7. HFC "MAIN TRUNK" WILL NOT BE MARKED WITH THE FREQUENCY CODES, AS IT CONTAINS ALL FREQUENCIES.
8. INDIVIDUAL POWER PAIRS AND FIBER BUNDLES SHALL BE LABELED WITH BOTH THE CABLE AND FREQUENCY.

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CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
CABLE COLOR CODING

SCALE:
AS NOTED

PROJECT NUMBER: 29427
SHEET NUMBER: A-6

HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE
MANUF:RFS

CABLE	LENGTH	DC CONDUCTOR	CABLE DIAMETER
Fiber Only	Varies	Use NV Hybriflex	5/8"
Hybriflex	<200'	8 AWG	1-1/4"
Hybriflex	225-300'	6 AWG	1-1/4"
Hybriflex	325-375'	4 AWG	1-1/4"

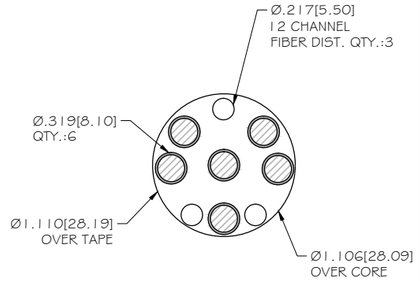
RFS HYBRIFLEX RISER CABLE SCHEDULE

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

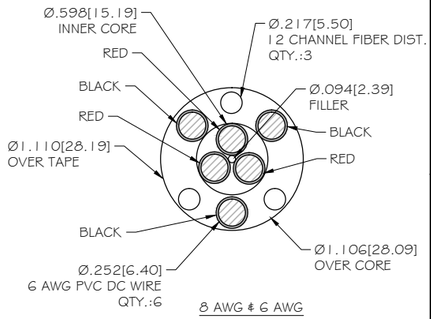
RFS HYBRIFLEX JUMPER CABLE SCHEDULE

FIBER ONLY	Hybrid Jumper cable MN:HBF012-M3-5F1 5 ft, 3x multi-mode fiber pairs, Outdoor & LC connectors, 1/2 cable	5 ft
	MN:HBF012-M3-10F1	10 ft
	MN:HBF012-M3-15F1	15 ft
	SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15' NOTIFY SPRINT CM OF ANY DISCREPANCY	
8 AWG POWER	Hybrid Jumper cable MN:HBF058-08U1M3-5F1 5 ft, 1x 8 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC connectors, 5/8 cable	5 ft
	MN:HBF058-08U1M3-10F1	10 ft
	MN:HBF058-08U1M3-15F1	15 ft
	SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15' NOTIFY SPRINT CM OF ANY DISCREPANCY	
6 AWG POWER	Hybrid Jumper cable MN:HBF058-13U1M3-5F1 5 ft, 1x 6 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC connectors, 5/8 cable	5 ft
	MN:HBF058-13U1M3-10F1	10 ft
	MN:HBF058-13U1M3-15F1	15 ft
	SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15' NOTIFY SPRINT CM OF ANY DISCREPANCY	
4 AWG POWER	Hybrid Jumper cable MN:HBF078-21U1M3-5F1 5 ft, 1x 4 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC connectors, 7/8 cable	5 ft
	MN:HBF078-21U1M3-10F1	10 ft
	MN:HBF078-21U1M3-15F1	15 ft
	SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15' NOTIFY SPRINT CM OF ANY DISCREPANCY	

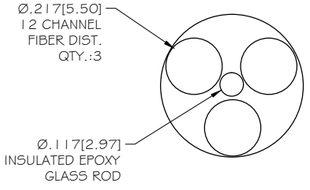
*NOTE: SPRINT CM TO CONFIRM HYBRID/FIBER RISER CABLE & HYBRID/FIBER JUMPER CABLE MODEL NUMBERS BEFORE PREPARING BOM.



4 AWG



8 AWG & 6 AWG

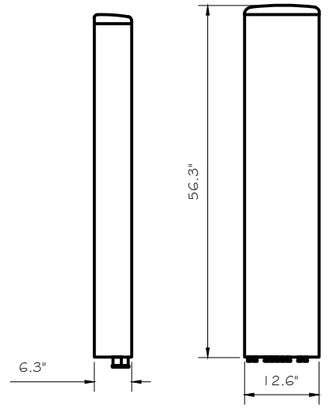


FIBER ONLY

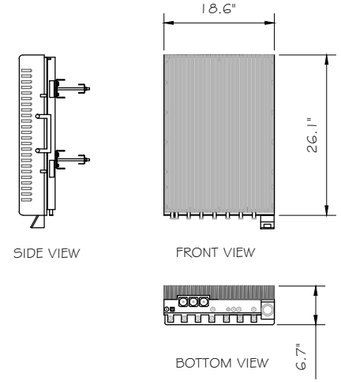
HYBRID CABLE CROSS SECTION & DATA (1)
SCALE: NTS

RFS: APXV9TM14-ALU-120

DIMENSIONS, HxWxD:	56.3" x 12.6" x 6.3"
WEIGHT, WITHOUT PRE-MOUNTED BRACKETS:	55.12 lbs.
CONNECTOR:	(9) XX" MINI-DIN FEMALE/BOTTOM



2.5 ANTENNA DETAIL (2)
SCALE: NTS



ALCATEL-LUCENT: TD-RRH8x20

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

WEIGHT = 70 lbs.

2.5 RRH DETAIL (3)
SCALE: NTS

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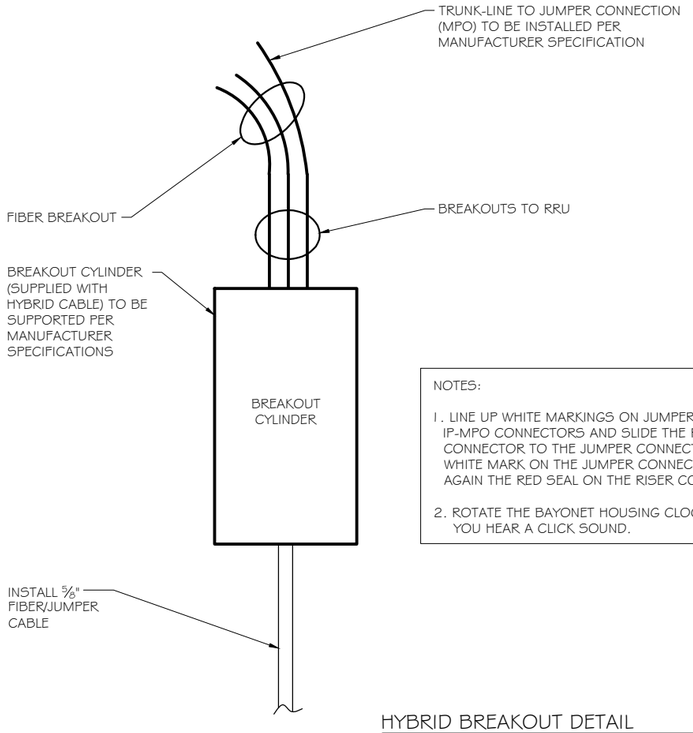
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
ANTENNA & HYBRID CABLE DETAILS

SCALE:
AS NOTED

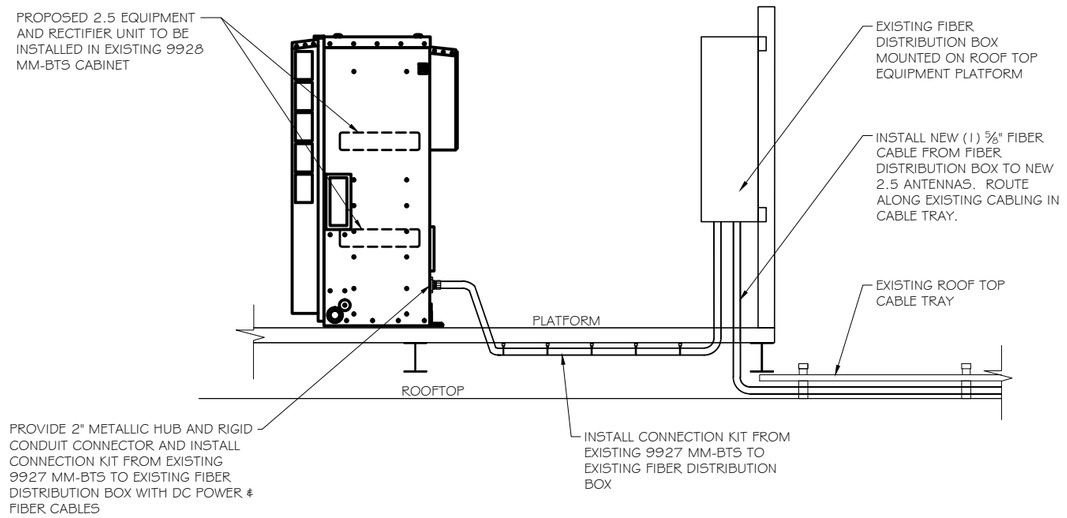
PROJECT NUMBER: 29427
SHEET NUMBER: A-7



NOTES:

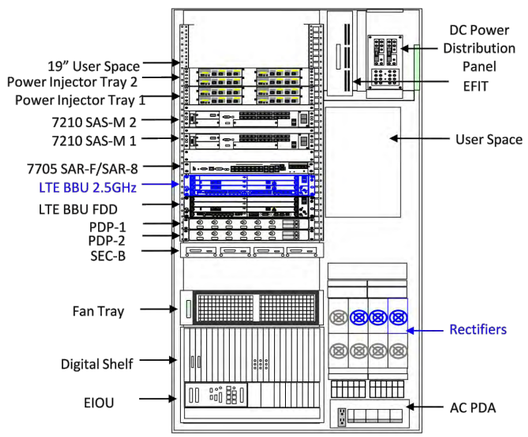
1. LINE UP WHITE MARKINGS ON JUMPER AND RISER IP-MPO CONNECTORS AND SLIDE THE RISER CONNECTOR TO THE JUMPER CONNECTOR. PUSH THE WHITE MARK ON THE JUMPER CONNECTOR FLUSH AGAIN THE RED SEAL ON THE RISER CONNECTOR.
2. ROTATE THE BAYONET HOUSING CLOCKWISE UNTIL YOU HEAR A CLICK SOUND.

HYBRID BREAKOUT DETAIL (1)
SCALE: NTS



CABLE ROUTE FROM CABINET (2)
SCALE: NTS

EXISTING BBU CABINET (3)
SCALE: NTS



EXISTING MMBS CABINET (4)
SCALE: NTS

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WATERBURY, CT 09704
NEW HAVEN COUNTY

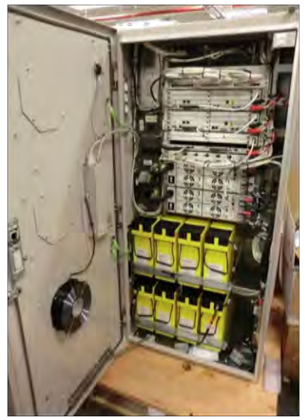
SHEET TITLE:
EQUIPMENT DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 29427
SHEET NUMBER: A-8

ALCATEL-LUCENT
9929 MULTI TECHNOLOGY BTS
OUTDOOR CABINET

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



9929 MT-BTS OUTDOOR CABINET

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

FEATURES

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

TECHNICAL SPECIFICATIONS

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

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

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

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

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

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

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

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

AT THE SPEED OF IDEAS™ Alcatel·Lucent

Alcatel·Lucent

PROPOSED 9929 MT-BTS
OUTDOOR CABINET
SCALE: NTS

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SCALE:
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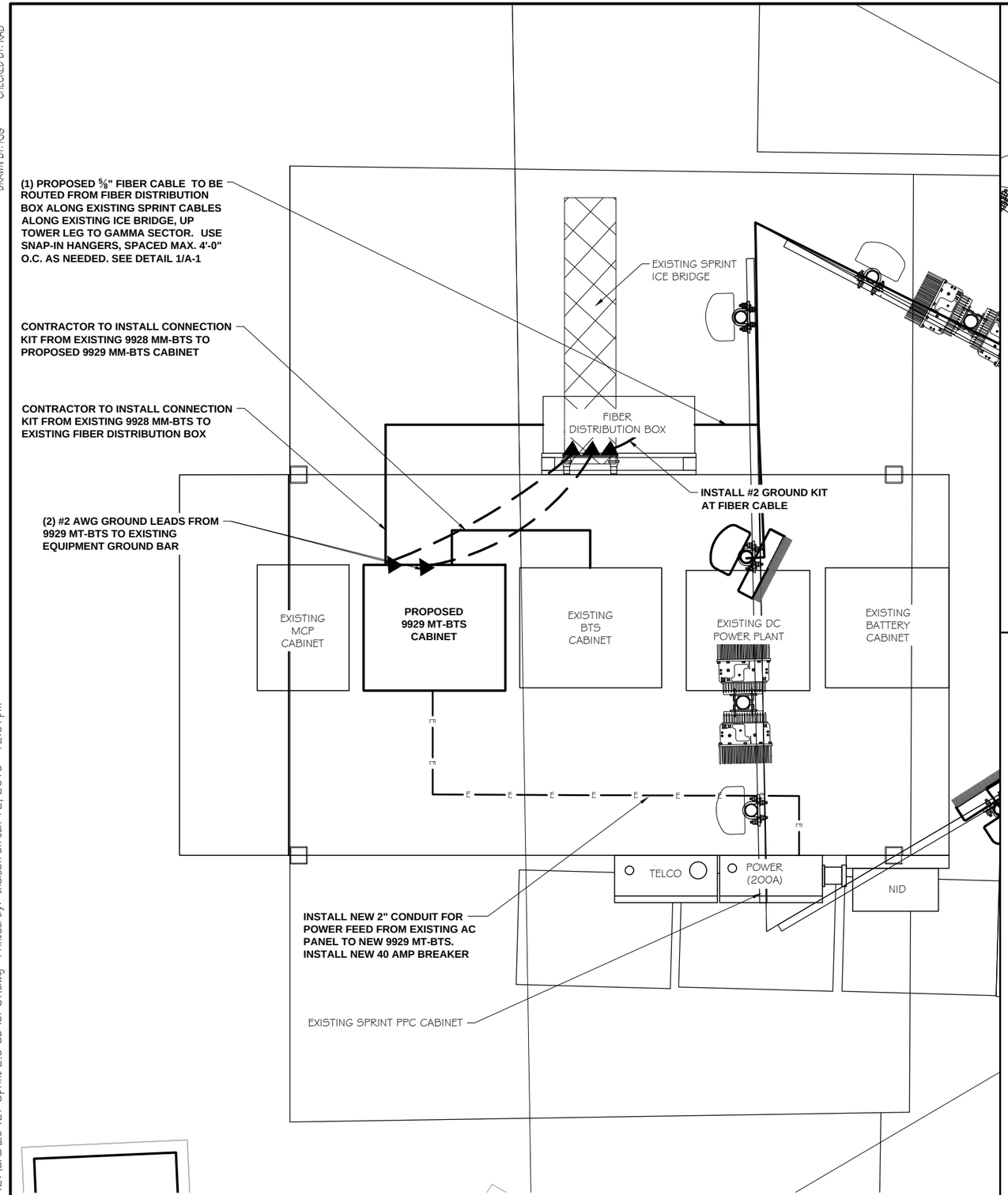
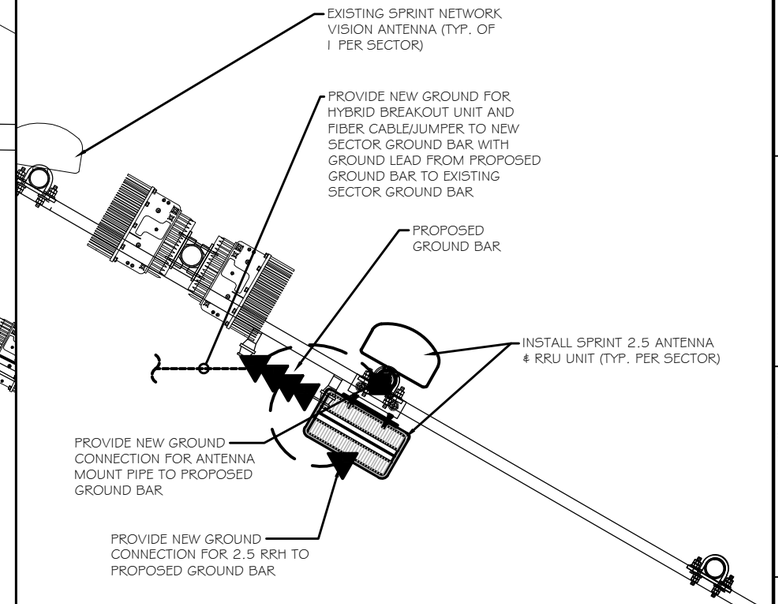
SHEET NUMBER: A-9

DRAWN BY: KJG CHECKED BY: KAB



EQUIPMENT UTILITY & GROUNDING PLAN (1)
SCALE: NTS



ANTENNA GROUNDING DETAIL (2)
SCALE: NTS

GROUNDING NOTES:

1. CONTRACTOR TO ENSURE PROPER SEQUENCING OF GROUNDING AND UNDERGROUND CONDUIT INSTALLATION TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM AND/OR DAMAGE TO THE CONDUIT.
2. ALL EXTERIOR GROUND CONDUCTORS SHALL BE #2 AWG SOLID TINNED COPPER UNLESS NOTED OTHERWISE.
3. ALL GROUND CONNECTIONS BELOW GRADE SHALL BE EXOTHERMIC (CADWELD).
4. ALL GROUND CONNECTIONS ABOVE GRADE AND/OR INTERIOR SHALL BE COMPRESSION TYPE, TWO-HOLE LUGS OR DOUBLE-CRIMP "C" TAPS.
5. CONTACT AREAS WHERE CONNECTIONS ARE MADE SHALL BE PREPARED TO A BARE BRIGHT FINISH AND COATED WITH AN ANTI-OXIDATION MATERIAL BEFORE CONNECTIONS ARE MADE.
6. MAXIMUM RESISTANCE OF THE COMPLETED GROUND SYSTEM SHALL NOT EXCEED 5 OHMS.
7. WHERE GROUNDING CONNECTIONS ARE MADE TO PAINTED METAL SURFACES, PAINT SHALL BE REMOVED TO BEAR METAL TO ENSURE PROPER CONTACT AND RESTORED/PAINTED TO ORIGINAL FINISH.
8. GROUND DEPTH SHALL BE 30" MINIMUM BELOW FINISHED GRADE, OR 6" BELOW FROST LINE, WHICHEVER IS GREATER.

LEGEND:	
- - - - - - - - - - - - -	EXISTING GROUND CABLE
▬▬▬▬▬▬▬▬▬▬▬▬	PROPOSED GROUND CABLE
▲	MECHANICAL CONNECTION
■	EXOTHERMIC CONNECTION
—E—E—E—E—	PROPOSED ELECTRIC

Sprint

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RAMAKER & ASSOCIATES, INC.
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www.Ramaker.com

Transcend Wireless

48 SPRUCE STREET
OAKLAND, NJ 07346

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

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

Signature: James R. Skowronski Date: 1/12/2015

A	1/12/15	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL DATE ISSUED: 01/12/2015

PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
EQUIPMENT UTILITY & GROUNDING PLAN

SCALE:
AS NOTED

PROJECT NUMBER: 29427
SHEET NUMBER: E-1

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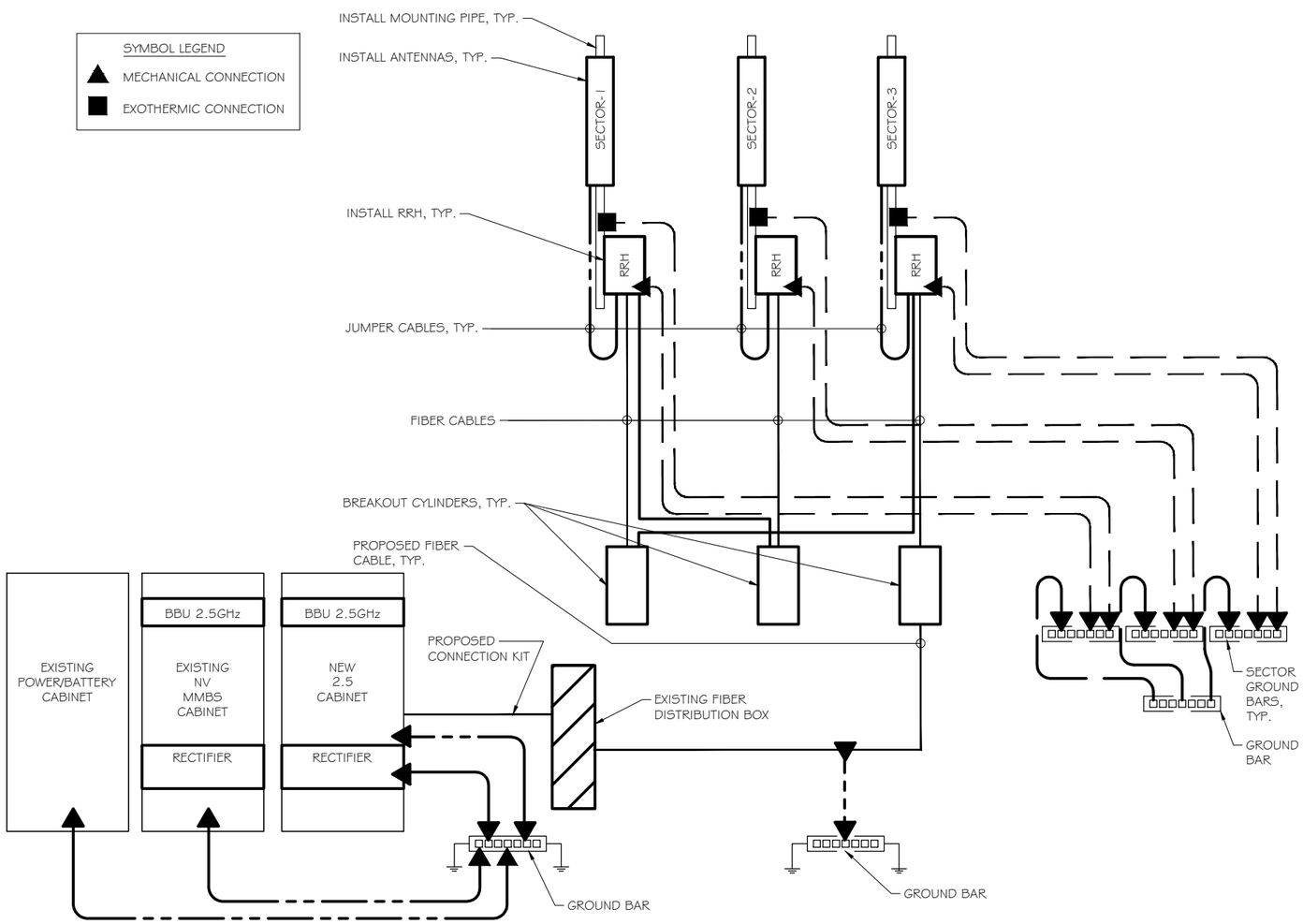
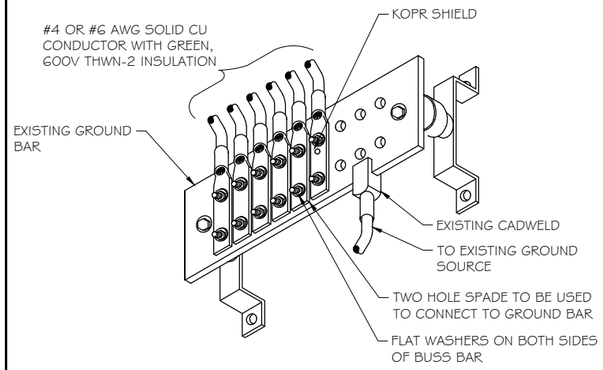
DRAWN BY: KJG CHECKED BY: KAB

SYMBOL LEGEND
- MECHANICAL CONNECTION
- EXOTHERMIC CONNECTION



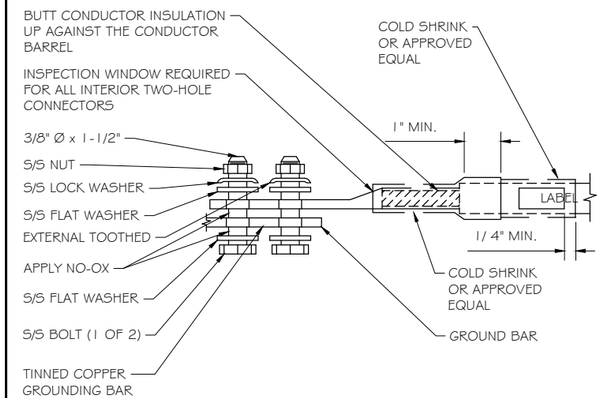
GROUNDING RISER DIAGRAM (1)
SCALE: NTS



NOTES:
1. APPLY NO-OX TO LUG AND GROUND BAR CONTACT SURFACE. DO NOT COAT INLINE LUG.

2. IF STOLEN GROUND BARS ARE ENCOUNTERED, CONTACT SPRINT CM FOR REPLACEMENT THREADED ROD KIT.

GROUNDING CONDUCTOR INSTALLATION (2)
SCALE: NTS



TWO-HOLE LUG (3)
SCALE: NTS

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Transcend Wireless
48 SPRUCE STREET
OAKLAND, NJ 07346

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

Signature: Date: 1/12/2015

A	1/12/15	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 01/12/2015

PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
GROUNDING DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 29427
SHEET NUMBER: E-2

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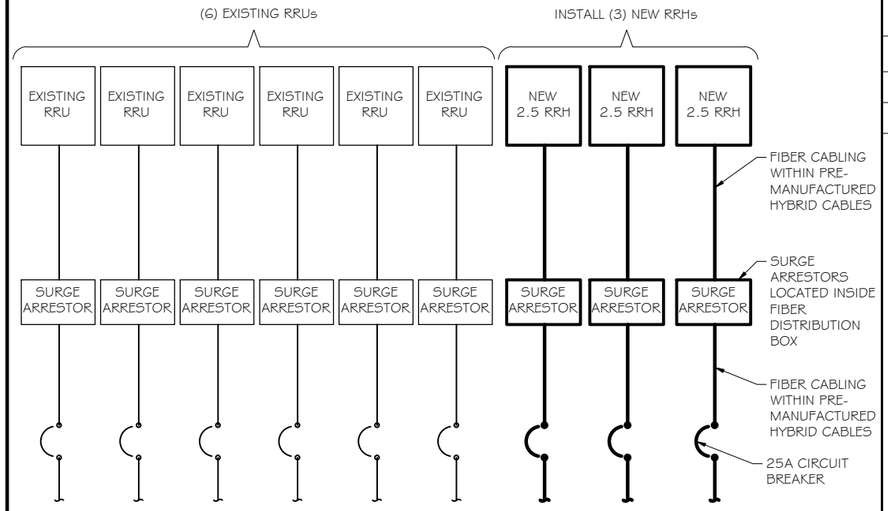


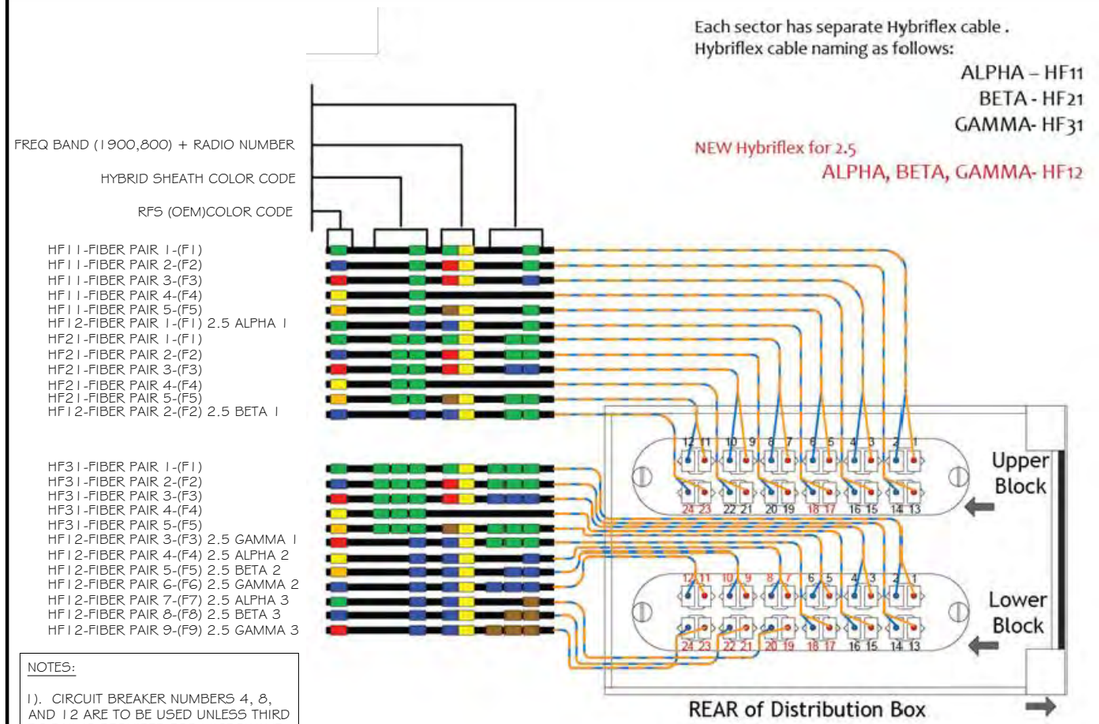
DC ONE-LINE DIAGRAM (1)
SCALE: NTS

A/C PANEL SCHEDULE

VOLTAGE:	240V/120	PANEL STATUS:	EXISTING	N TO GROUND BOND:	YES
MAIN BREAKER:	200 AMP	MODEL NUMBER:	TBD	INTERNAL TVSS:	YES
MOUNT:	ROOFTOP	PHASE:	1	WIRE:	3
ENCLOSURE TYPE:	NEMA 3R	BUSS RATING:	200 AMP	GROUND BAR:	YES
		NEUTRAL BAR:	YES		

CKT	DESCRIPTION	BREAKER AMPS	BREAKER POLES	BREAKER STATUS	PHASE A VA	PHASE B VA	BREAKER STATUS	BREAKER POLES	BREAKER AMPS	DESCRIPTION	CKT
1	UNMARKED	60	2	ON			ON	1	10	UNMARKED	13
2							ON	1	10	UNMARKED	14
3	UNMARKED	80	2	ON			ON	2	70	UNMARKED	15
4											16
5	UNMARKED	50	2	OFF			ON	2	80	UNMARKED	17
6											18
7	**NEW 2.5 CABINET**	**40**	**2**	**ON**			-	-	-	BLANK (UNUSED)	19
8							-	-	-	BLANK (UNUSED)	20
9	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	21
10	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	22
11	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	23
12	BLANK (UNUSED)	-	-	-			-	-	-	BLANK (UNUSED)	24

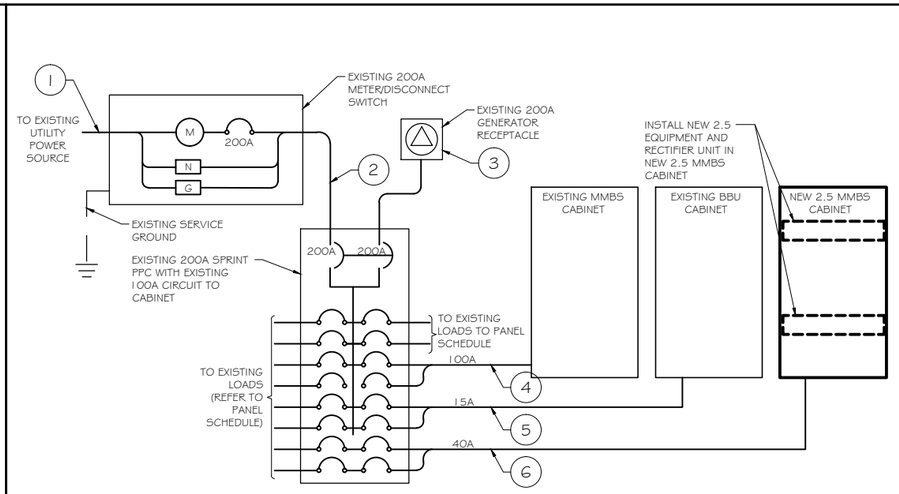
AC PANEL SCHEDULE (2)
SCALE: NTS



NOTES:

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

TYPICAL FIBER DISTRIBUTION (3)
SCALE: NTS



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

ELECTRICAL ONE-LINE DIAGRAM (4)
SCALE: NTS

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Certification & Seal:
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STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED
PROFESSIONAL ENGINEER

Signature: Date: 1/12/2015

A	1/12/15	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 01/12/2015

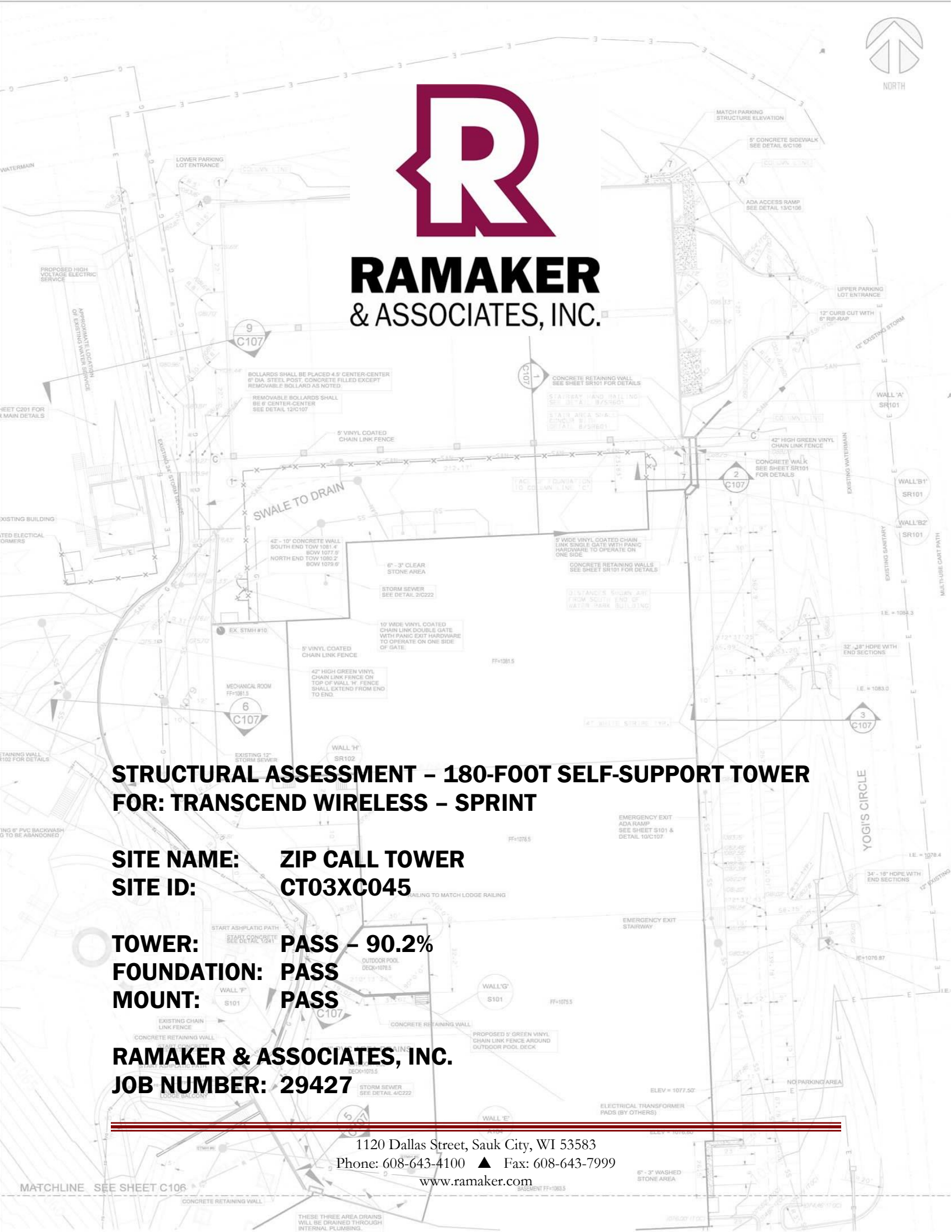
PROJECT TITLE:
ZIP CALL TOWER
CT03XC045-B

PROJECT INFORMATION:
184 GARDEN CIRCLE
WATERBURY, CT 09704
NEW HAVEN COUNTY

SHEET TITLE:
DC POWER DETAILS & PANEL SCHEDULES

SCALE:
AS NOTED

PROJECT NUMBER: 29427
SHEET NUMBER: E-3



RAMAKER
& ASSOCIATES, INC.

STRUCTURAL ASSESSMENT – 180-FOOT SELF-SUPPORT TOWER
FOR: TRANSCEND WIRELESS – SPRINT

SITE NAME: ZIP CALL TOWER
SITE ID: CT03XC045

TOWER: PASS – 90.2%
FOUNDATION: PASS
MOUNT: PASS

RAMAKER & ASSOCIATES, INC.
JOB NUMBER: 29427

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Phone: 608-643-4100 ▲ Fax: 608-643-7999
www.ramaker.com

STRUCTURAL ASSESSMENT

SITE: Zip Call Tower (CT03XC045)
184 Garden Circle
Waterbury, New Haven County, Connecticut, 06704

PREPARED FOR: Transcend Wireless

CONTACT PERSON: Mike Kithcart
Transcend Wireless
48 Spruce Street, Oakland, NJ 07436

PREPARED BY: Ramaker & Associates, Inc.
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RAMAKER JOB NUMBER: 29427

DATE OF REPORT ISSUANCE: September 18, 2014

Thomas E. Moore
Project Engineer

9/18/14
Date

James R. Skowronski, P.E.
Supervising Engineer

9/18/14
Date

TABLE OF CONTENTS

LIST OF APPENDICES

SECTION 1

EXECUTIVE SUMMARY

This report summarizes the structural analysis conducted by Ramaker & Associates, Inc. (RAMAKER) for Transcend Wireless on behalf of Sprint, who intends to install additional equipment on an existing tower.

The Sprint proposed loading includes installing three (3) RFS APXV9TM14-ALU-120 panel antennas and three (3) ALU TD-RRH 8x20 units on the existing three (3) face mount pipes at a centerline elevation of 131 feet AGL. The proposed antennas shall be fed with the proposed RFS 1-1/4-inch hybrid cable.

Results of our tower analysis show that the tower will be stressed to a maximum of 90.2 percent of capacity under proposed loading conditions. All proposed model foundation reactions are less than the original design reactions. Therefore, it is anticipated that the existing foundation will provide adequate strength under proposed loading conditions.

Results of our mount assessment show that by engineering calculation and inspection, the antenna and RRH mounting structure is capable of supporting the existing and proposed Sprint 2.5 equipment deployment without causing an overstress condition in the antenna and RRH mounting structure.

In summary, the tower and foundations will pass the TIA/EIA-222-F code requirements under proposed loading conditions. The mounting structure will pass the TIA-222 code requirements under proposed loading conditions.

SECTION 2
INTRODUCTION

2.1 PROJECT INFORMATION

This report summarizes the structural analysis conducted by Ramaker & Associates, Inc. (RAMAKER) for Transcend Wireless on behalf of Sprint, who intends to install additional equipment on an existing tower.

2.2 PURPOSE OF REPORT

The analysis activities of this report were conducted for the purposes of creating and analyzing a model of the subject structure under the required loading conditions. Base reactions from the resulting model were also determined for tower foundation and support development. Recommendations regarding the analysis results, loading configuration, and structural modifications are also provided.

2.3 SCOPE OF SERVICES

RAMAKER developed a finite element model (FEM) of the tower, using tnxTower, for member force, joint deflection, and structure reaction determinations. Subsequently, this report was drafted to provide our engineering recommendations. All information contained herein is valid only for the described structure configuration and loading conditions. RAMAKER reserves the right to modify our recommendations should alterations to the tower loading occur.

SECTION 3
MODEL DEVELOPMENT

3.1 INTRODUCTION

RAMAKER developed a FEM of the tower superstructure. Required static loads consisting of the antenna configuration, wind forces, ice loads, and linear appurtenances (including cable loads) were then applied to the FEM. As a result, all member forces, allowable capacities, and base reactions were computed. Additionally, potentially overstressed members were identified.

3.2 EXISTING STRUCTURE INFORMATION

Existing structure information was gathered from:

- Structural analysis by CHA, project No. 17181.3003.1203, dated November 12, 2007.
- Structural analysis by Armor Tower, dated December 12, 2013.

3.3 TOWER LOADING

RAMAKER understands that the tower loading to be used for this analysis will consist of the existing and proposed antenna, mount, and cable configurations as shown in the following chart:

Elevation	Appurtenance	Mount	Coax	Owner	Status
185	(1) 5' Omni Antenna	Leg Mount	-	-	Existing
158	(3) RFS APXV18-206517S	Leg Pipe Mount	(6) 1-5/8	Metro PCS	Existing
154	(1) 10' Omni Antenna	4' Stand-off	(1) 1-5/8	Unknown	Existing
140	(3) Argus LLPX310R	(3) V-Frame	(2) 2-1/4	Clearwire	Existing
	(3) Alcatel-Lucent RRH Units				
	(4) 2.5' Microwave Dish		(4) 1/2		
130	(3) RFS APXVSPP18-C	(3) Pipe Mounts	(3) 1-5/8	Sprint	Existing
	(6) Alcatel Lucent 1900 MHz RRH				
	(3) Alcatel Lucent 800 MHz RRH				
	(6) RFS IBC1900HB-2				
	(3) RFS APXV9TM14-ALU-120		**(1) Hybrid**		**Proposed**
	(3) ALU TD-RRH 8x20				
35	(1) 20' Omni	Tower Face	-	-	Existing
17	(1) 4' Dish	Tower Leg	(1) 1-1/4	Unknown	Existing

3.4 WIND AND ICE LOAD

Wind forces used in model development are in compliance with the TIA/EIA-222-F Standard. These guidelines call for an analysis to be performed which assumes a basic wind speed of 85 miles-per-hour (mph) without ice in New Haven County. The tower is also designed for a 74 mph basic wind speed with 0.50-inch of radial ice.

SECTION 4
ANALYSIS RESULTS

4.1 ANALYSIS RESULTS

The tower superstructure was analyzed with the combined existing and proposed antenna loading with and without radial ice. The computed maximum tower member stress capacities are as follows:

Component Type	Percent Capacity
Leg	65.9
Diagonal	90.2
Horizontal	66.0
Redundant Diagonal	61.5
RATING =	**90.2**

4.2 BASE REACTIONS

The computed maximum reactions under the corresponding maximum moment are as follows:

Load Type	Original Design	Proposed Model
Total Axial (k)	-	34.5
Total Shear (k)	-	38.0
Total Moment (k-ft)	4382	3660.8
Leg Uplift (k)	157.3	115.9
Leg Compression (k)	186.1	155.4
Leg Shear (k)	31.4	22.5

All proposed model foundation reactions are less than the original design reactions. Therefore, it is anticipated that the existing foundation will provide adequate strength under proposed loading conditions.

4.3 MOUNT ASSESSMENT

By engineering calculation and inspection, the antenna mounting structure is capable of supporting the existing and proposed Sprint 2.5 equipment deployment without causing an overstress condition in the antenna mounting structure.

This assessment is inclusive of the entire antenna mounting structure, including tower platforms, arms, and all other aspects of the mounting structure that will support the Sprint 2.5 equipment deployment. This assessment assumes that the mounting structure(s) has been installed correctly, is free from deterioration, and is maintained properly.

SECTION 5
LIMITATIONS

The recommendations contained within this report were developed using general project information provided by the owner, tower manufacturer, general field observations, reference information and laboratory testing data, as applicable. All recommendations pertain only to the proposed tower construction, location, and loading as described in this report. RAMAKER assumes no responsibility for failures caused by factors beyond our control. These include but are not limited to the following:

1. Missing, corroding, and/or deteriorating members
2. Improper manufacturing and/or construction
3. Improper maintenance

RAMAKER assumes no responsibility for modifications completed prior to or hereafter in which RAMAKER was not directly involved. These modifications include but are not limited to the following:

1. Replacing or strengthening bracing members
2. Reinforcing or extending vertical members
3. Installing or removing antenna mounting gates or side arms
4. Changing loading configurations

Furthermore, RAMAKER hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations and conclusions are based on the information contained and set forth herein. If you are aware of any information contrary to that contained herein, or if you are aware of any defects arising from the original design, material, fabrication and erection deficiencies, you should disregard this report and immediately contact RAMAKER. RAMAKER isn't liable for any representation, recommendation or conclusion not expressly stated herein.

The tower owner is responsible for verifying that the existing loading on the tower is consistent with the loading applied to the tower within this report.

SECTION 6

REFERENCES

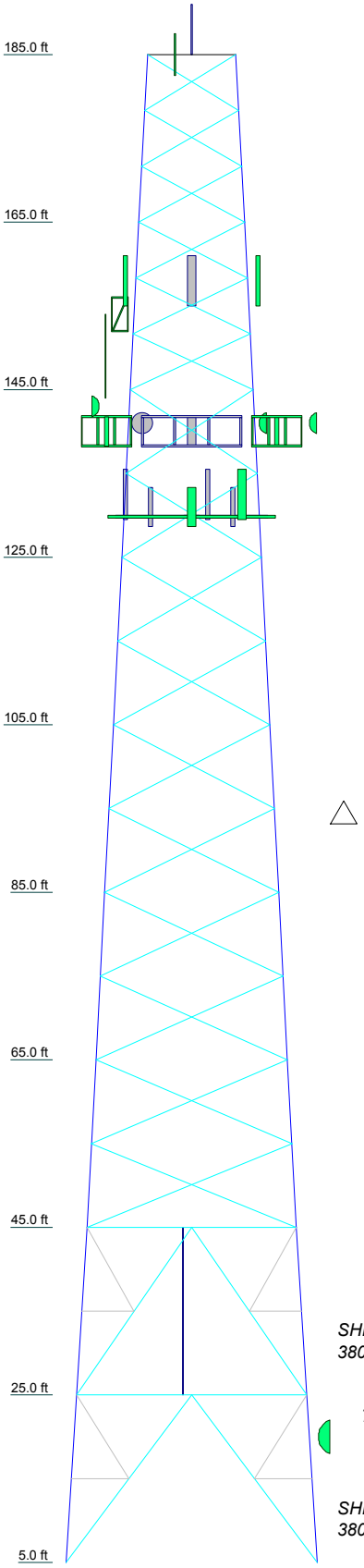
1. 2003 International Building Code.

2. Telecommunications Industries Association, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA Standard TIA/EIA-222-F 1996, Washington, D.C.

APPENDIX A

TOWER FIGURES

Section	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	ROHN 6 EHS		ROHN 5 EH			ROHN 4 EH	ROHN 3.5 EH	ROHN 3 STD	ROHN 2.5 EH
Leg Grade					A572-50				
Diagonals	ROHN 3 STD	ROHN 2.5 STD	L4x4x5/16	L4x4x1/4	L3 1/2x3 1/2x1/4		L3x3x3/16	L2 1/2x2 1/2x3/16	L2x2x1/8
Diagonal Grade	A572-50					A36			
Top Girts					N.A.				L2x2x1/8
Horizontals	P2.5x.203					N.A.			
Red. Horizontals	ROHN 1.5 STD					N.A.			
Red. Diagonals	ROHN 1.5 STD					N.A.			
Red. Hips	ROHN 1.5 STD					N.A.			
Inner Bracing	ROHN 3 STD	ROHN 2.5 EH				N.A.			
Face Width (ft)	27.54	25.04	22.81	20.77	18.73	16.69	14.65	12.6	10.56
# Panels @ (ft)	2 @ 20				10 @ 10			6 @ 6.66667	
Weight (lb)	24141.5	4227.5	3681.7	3981.5	3306.9	2550.8	2420.4	1658.9	1358.7	955.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
5'x2" Pipe Mount (Empty Mount)	185	1900MHz 4x40W RRH (Sprint)	130
6' Omni (Disconnected)	185	1900MHz 4x40W RRH (Sprint)	130
APXV18-206517S-C-A20 w/ Mount Pipe (Metro PCS)	158	1900MHz 4x40W RRH (Sprint)	130
		1900MHz 4x40W RRH (Sprint)	130
APXV18-206517S-C-A20 w/ Mount Pipe (Metro PCS)	158	1900MHz 4x40W RRH (Sprint)	130
		800MHz 2x50W RRH (Sprint)	130
APXV18-206517S-C-A20 w/ Mount Pipe (Metro PCS)	158	800MHz 2x50W RRH (Sprint)	130
		800MHz 2x50W RRH (Sprint)	130
4' Standoff	154	IBC1900HB-2 (Sprint)	130
10' Omni	154	IBC1900HB-2 (Sprint)	130
Andrew 12'-6" V-Sector Frame (Clearwire)	140	IBC1900HB-2 (Sprint)	130
		IBC1900HB-2 (Sprint)	130
Andrew 12'-6" V-Sector Frame (Clearwire)	140	IBC1900HB-2 (Sprint)	130
		IBC1900HB-2 (Sprint)	130
Andrew 12'-6" V-Sector Frame (Clearwire)	140	IBC1900HB-2 (Sprint)	130
LLPX310R w/Mount Pipe (Clearwire)	140	APXV9TM14-ALU-I20 w/Mount Pipe (Sprint (new))	130
LLPX310R w/Mount Pipe (Clearwire)	140	APXV9TM14-ALU-I20 w/Mount Pipe (Sprint (new))	130
LLPX310R w/Mount Pipe (Clearwire)	140		
Alcatel Lucent RRH (Clearwire)	140	APXV9TM14-ALU-I20 w/Mount Pipe (Sprint (new))	130
Alcatel Lucent RRH (Clearwire)	140		
Alcatel Lucent RRH (Clearwire)	140	TD-RRH8x20 (Sprint (new))	130
2.5' MW Dish (clearwire)	140	TD-RRH8x20 (Sprint (new))	130
2.5' MW Dish (clearwire)	140	TD-RRH8x20 (Sprint (new))	130
2.5' MW Dish (clearwire)	140	15'x2-1/2" Pipe Mount (Horiz. Face Mount Bar)	130
2.5' MW Dish (clearwire)	140		
APXVSPP18-C w/Mount Pipe (Sprint)	130	15'x2-1/2" Pipe Mount (Horiz. Face Mount Bar)	130
APXVSPP18-C w/Mount Pipe (Sprint)	130	15'x2-1/2" Pipe Mount (Horiz. Face Mount Bar)	130
7' x 2" Pipe Mount (Sprint)	130		
7' x 2" Pipe Mount (Sprint)	130	APXVSPP18-C w/Mount Pipe (Sprint)	130
7' x 2" Pipe Mount (Sprint)	130	20' Omni (unk.)	35
1900MHz 4x40W RRH (Sprint)	130	4' Dish (unk.)	17

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 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 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 90.2%

MAX. CORNER REACTIONS AT BASE:

DOWN: 155407 lb
SHEAR: 22590 lb

UPLIFT: -115949 lb
SHEAR: 18093 lb

AXIAL
49770 lb

SHEAR
38049 lb

MOMENT
3606772 lb-ft

TORQUE 30664 lb-ft
74 mph WIND - 0.5000 in ICE

AXIAL
34555 lb

SHEAR
38065 lb

MOMENT
3660818 lb-ft

TORQUE 31485 lb-ft
REACTIONS - 85 mph WIND

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Consulting Engineers

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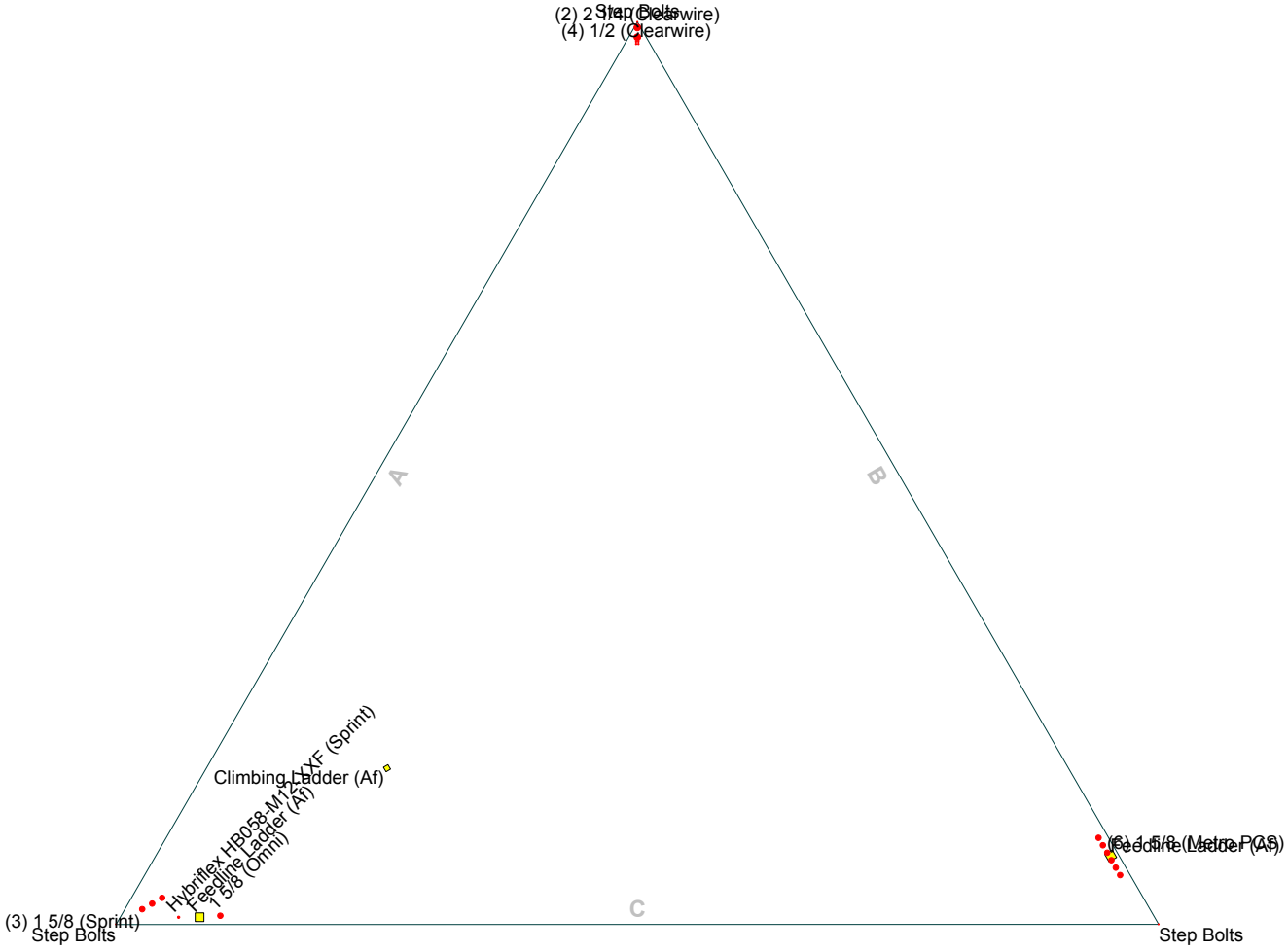
Job: *Zip Call Tower (CT03XC045-B)*			
Project: *29427*			
Client: Transcend Wireless / Sprint	Drawn by: tmoore	App'd:	
Code: TIA/EIA-222-F	Date: 09/12/14	Scale: NTS	
Path: I:\29400\29427\Structural\tnx\29427.eri		Dwg No. E-1	

Feed Line Plan

Round Flat App In Face App Out Face



RAMAKER & ASSOCIATES, INC.
Consulting Engineers

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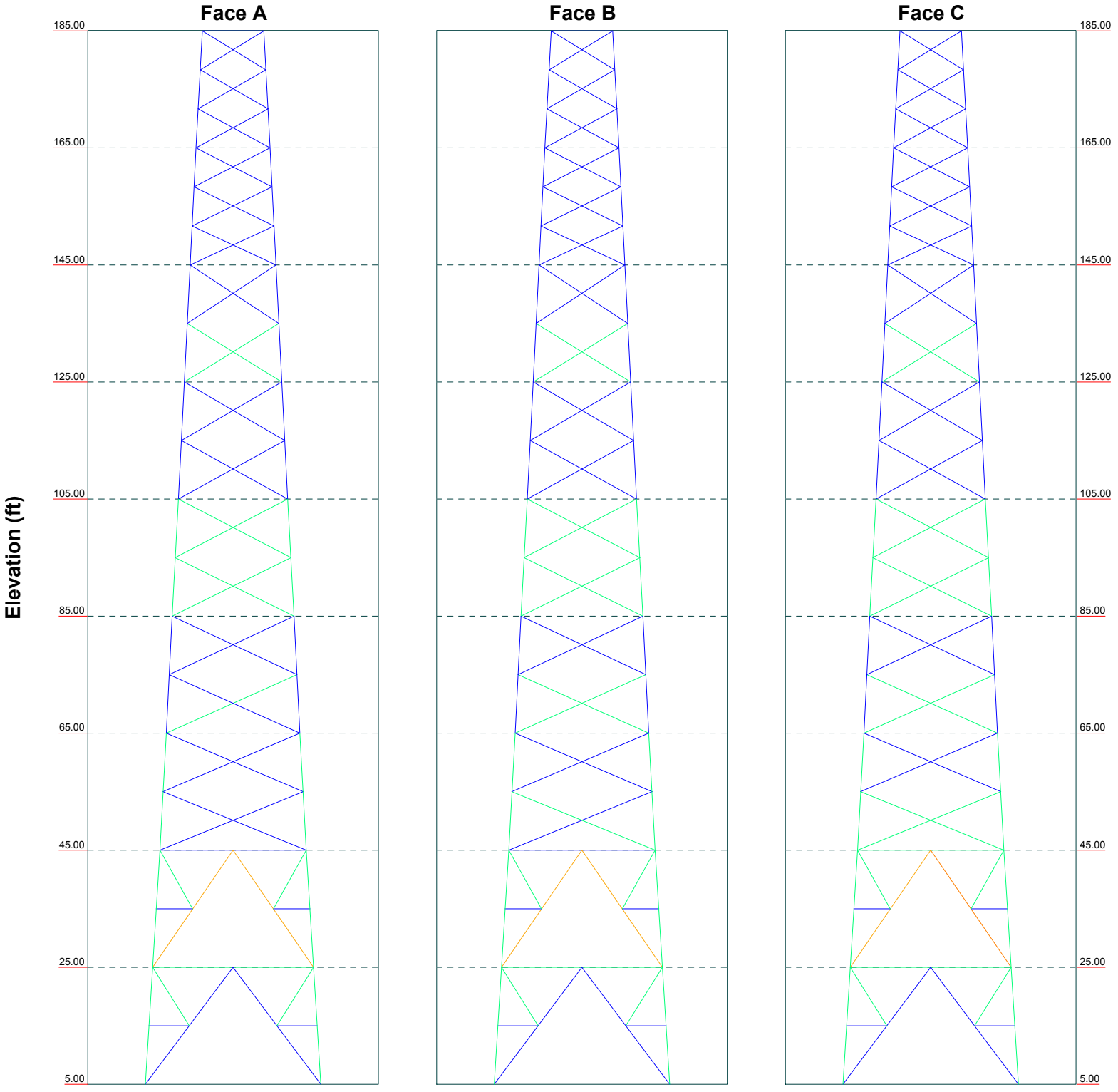
Job: ***Zip Call Tower (CT03XC045-B)***			
Project: ***29427***			
Client: Transcend Wireless / Sprint	Drawn by: tmoore	App'd:	
Code: TIA/EIA-222-F	Date: 09/12/14	Scale: NTS	
Path: I:\29400\29427\Structural\tnx\29427.eri		Dwg No. E-7	

Stress Distribution Chart
5' - 185'

> 100% | 90%-100% | 75%-90% | 50%-75% | < 50% Overstress



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Job: ***Zip Call Tower (CT03XC045-B)***			
Project: ***29427***			
Client: Transcend Wireless / Sprint	Drawn by: tmoore	App'd:	
Code: TIA/EIA-222-F	Date: 09/12/14	Scale: NTS	
Path: I:\29400\29427\Structural\tnx\29427.eri		Dwg No. E-8	

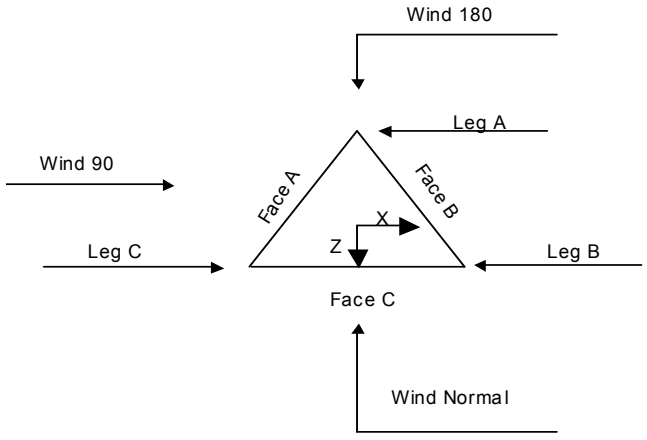
APPENDIX B

TOWER CALCULATIONS

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 185.00 ft above the ground line.
The base of the tower is set at an elevation of 5.00 ft above the ground line.
The face width of the tower is 10.56 ft at the top and 30.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	185.00-165.00			10.56	1	20.00
T2	165.00-145.00			12.60	1	20.00
T3	145.00-125.00			14.65	1	20.00
T4	125.00-105.00			16.69	1	20.00
T5	105.00-85.00			18.73	1	20.00
T6	85.00-65.00			20.77	1	20.00
T7	65.00-45.00			22.81	1	20.00
T8	45.00-25.00			25.04	1	20.00
T9	25.00-5.00			27.54	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	185.00-165.00	6.67	X Brace	No	No	0.0000	0.0000
T2	165.00-145.00	6.67	X Brace	No	No	0.0000	0.0000
T3	145.00-125.00	10.00	X Brace	No	No	0.0000	0.0000
T4	125.00-105.00	10.00	X Brace	No	No	0.0000	0.0000
T5	105.00-85.00	10.00	X Brace	No	No	0.0000	0.0000
T6	85.00-65.00	10.00	X Brace	No	No	0.0000	0.0000
T7	65.00-45.00	10.00	X Brace	No	No	0.0000	0.0000
T8	45.00-25.00	20.00	K1 Down	No	Yes	0.0000	0.0000
T9	25.00-5.00	20.00	K1 Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 185.00-165.00	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T2 165.00-145.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 145.00-125.00	Pipe	ROHN 3.5 EH	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T4 125.00-105.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T5 105.00-85.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T6 85.00-65.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T7 65.00-45.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L4x4x5/16	A36 (36 ksi)
T8 45.00-25.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T9 25.00-5.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Top Girt Type*	*Top Girt Size*	*Top Girt Grade*	*Bottom Girt Type*	*Bottom Girt Size*	*Bottom Girt Grade*
T1 185.00-165.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*No. of Mid Girts*	*Mid Girt Type*	*Mid Girt Size*	*Mid Girt Grade*	*Horizontal Type*	*Horizontal Size*	*Horizontal Grade*
T8 45.00-25.00	None	Solid Round		A572-50 (50 ksi)	Pipe	P2.5x.203	A36 (36 ksi)
T9 25.00-5.00	None	Solid Round		A572-50 (50 ksi)	Pipe	P2.5x.203	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Secondary Horizontal Type*	*Secondary Horizontal Size*	*Secondary Horizontal Grade*	*Inner Bracing Type*	*Inner Bracing Size*	*Inner Bracing Grade*
T8 45.00-25.00	Pipe		A36 (36 ksi)	Pipe	ROHN 2.5 EH	A36 (36 ksi)
T9 25.00-5.00	Pipe		A36 (36 ksi)	Pipe	ROHN 3 STD	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Redundant Bracing Grade*		*Redundant Type*	*Redundant Size*	*K Factor*
T8 45.00-25.00	A36 (36 ksi)	Horizontal (1)	Pipe	ROHN 1.5 STD	1
		Diagonal (1)	Pipe	ROHN 1.5 STD	1
		Hip (1)	Pipe	ROHN 1.5 STD	1
		Hip Diagonal		ROHN 2.5 X-STR	1
T9 25.00-5.00	A36 (36 ksi)	Horizontal (1)	Pipe	ROHN 1.5 STD	1
		Diagonal (1)	Pipe	ROHN 1.5 STD	1
		Hip (1)	Pipe	ROHN 1.5 STD	1
		Hip Diagonal		ROHN 3 STD	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 185.00-165.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000
T2 165.00-145.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000
T3 145.00-125.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000
T4 125.00-105.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000
T5 105.00-85.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000
T6 85.00-65.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000
T7 65.00-45.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000
T8 45.00-25.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000
T9 25.00-5.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 185.00-165.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T2 165.00-145.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T3 145.00-125.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T4 125.00-105.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T5 105.00-85.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T6 85.00-65.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T7 65.00-45.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T8 45.00-25.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T9 25.00-5.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 185.00-165.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 165.00-145.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 145.00-125.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 125.00-105.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 105.00-85.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 85.00-65.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 65.00-45.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 45.00-25.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 25.00-5.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Feedline Ladder (Af)	C	Yes	Af (CfAe)	180.00 - 5.00	-1.0000	0.42	1	1	3.0000	3.0000	12.0000	8.40
Feedline Ladder (Af)	B	Yes	Af (CfAe)	185.00 - 5.00	-1.0000	0.42	1	1	3.0000	3.0000	12.0000	8.40
Climbing Ladder (Af)	C	No	Af (Leg)	185.00 - 5.00	0.0000	0.3	1	1	1.8000	1.8000	7.2000	7.90
Step Bolts	A	No	Ar (Leg)	145.00 - 5.00	0.0000	0	1	1	0.2920	0.4000		1.00
Step Bolts	B	No	Ar (Leg)	145.00 - 5.00	0.0000	0	1	1	0.2920	0.4000		1.00
Step Bolts	C	No	Ar (Leg)	185.00 - 5.00	0.0000	0	1	1	0.2920	0.4000		1.00
******												
1 5/8 (Metro PCS)	B	Yes	Ar (CfAe)	158.00 - 5.00	-2.0000	0.42	6	6	1.0000	1.9800		1.04
******												
1 5/8 (Omni)	C	Yes	Ar (CfAe)	154.00 - 5.00	-2.0000	0.4	1	1	1.9800	1.9800		1.04
******												
2 1/4 (Clearwire)	A	No	Ar (Leg)	5.00 - 5.00	0.0000	0.01	2	2	1.0000	2.3800		1.16
1/2 (Clearwire)	A	No	Ar (Leg)	5.00 - 5.00	0.0000	0.02	4	2	0.2500	0.5800		0.25
******												
1 5/8 (Sprint)	C	No	Ar (Leg)	131.00 - 5.00	0.0000	0.04	3	3	1.9800	1.9800		1.04
Hybriflex HB058-M12-XXF (Sprint)	C	Yes	Ar (CfAe)	131.00 - 5.00	-2.0000	0.44	1	1	0.8400	0.8400		0.24

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	185.00-165.00	A	0.667	3.000	0.000	0.000	0.00
		B	0.000	5.000	0.000	0.000	168.00
		C	0.667	6.750	0.000	0.000	304.00
T2	165.00-145.00	A	0.667	3.000	0.000	0.000	0.00
		B	12.870	5.000	0.000	0.000	249.12

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		C	2.152	8.000	0.000	0.000	355.36
T3	145.00-125.00	A	4.303	3.000	0.000	0.000	20.00
		B	21.133	5.000	0.000	0.000	312.80
		C	8.023	8.000	0.000	0.000	386.97
T4	125.00-105.00	A	11.233	3.000	0.000	0.000	20.00
		B	21.133	5.000	0.000	0.000	312.80
		C	15.933	8.000	0.000	0.000	434.04
T5	105.00-85.00	A	11.233	3.000	0.000	0.000	20.00
		B	21.133	5.000	0.000	0.000	312.80
		C	15.933	8.000	0.000	0.000	434.04
T6	85.00-65.00	A	11.233	3.000	0.000	0.000	20.00
		B	21.133	5.000	0.000	0.000	312.80
		C	15.933	8.000	0.000	0.000	434.04
T7	65.00-45.00	A	11.233	3.000	0.000	0.000	20.00
		B	21.133	5.000	0.000	0.000	312.80
		C	15.933	8.000	0.000	0.000	434.04
T8	45.00-25.00	A	11.233	3.000	0.000	0.000	20.00
		B	21.133	5.000	0.000	0.000	312.80
		C	15.933	8.000	0.000	0.000	434.04
T9	25.00-5.00	A	11.233	3.000	0.000	0.000	20.00
		B	21.133	5.000	0.000	0.000	312.80
		C	15.933	8.000	0.000	0.000	434.04

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	185.00-165.00	A	0.500	2.333	4.111	0.000	0.000	0.00
		B		0.000	6.111	0.000	0.000	222.03
		C		2.333	8.694	0.000	0.000	390.88
T2	165.00-145.00	A	0.500	2.333	4.111	0.000	0.000	0.00
		B		3.228	22.253	0.000	0.000	469.49
		C		4.568	10.222	0.000	0.000	469.38
T3	145.00-125.00	A	0.500	9.137	4.111	0.000	0.000	31.00
		B		9.633	30.944	0.000	0.000	633.73
		C		15.023	10.222	0.000	0.000	549.83
T4	125.00-105.00	A	0.500	19.567	4.111	0.000	0.000	31.00
		B		9.633	30.944	0.000	0.000	633.73
		C		27.600	10.222	0.000	0.000	671.99
T5	105.00-85.00	A	0.500	19.567	4.111	0.000	0.000	31.00
		B		9.633	30.944	0.000	0.000	633.73
		C		27.600	10.222	0.000	0.000	671.99
T6	85.00-65.00	A	0.500	19.567	4.111	0.000	0.000	31.00
		B		9.633	30.944	0.000	0.000	633.73
		C		27.600	10.222	0.000	0.000	671.99
T7	65.00-45.00	A	0.500	19.567	4.111	0.000	0.000	31.00
		B		9.633	30.944	0.000	0.000	633.73
		C		27.600	10.222	0.000	0.000	671.99
T8	45.00-25.00	A	0.500	19.567	4.111	0.000	0.000	31.00
		B		9.633	30.944	0.000	0.000	633.73
		C		27.600	10.222	0.000	0.000	671.99
T9	25.00-5.00	A	0.500	19.567	4.111	0.000	0.000	31.00
		B		9.633	30.944	0.000	0.000	633.73
		C		27.600	10.222	0.000	0.000	671.99

Feed Line Shielding

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T1	185.00-165.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.220	0.330	0.440
		C	0.000	0.165	0.248	0.330
T2	165.00-145.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.725	1.244	1.812
		C	0.000	0.248	0.451	0.620
T3	145.00-125.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.721	1.472	2.164
		C	0.000	0.248	0.517	0.745
T4	125.00-105.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.698	1.662	2.444
		C	0.000	0.281	0.650	0.985
T5	105.00-85.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.681	1.622	2.385
		C	0.000	0.275	0.634	0.961
T6	85.00-65.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.669	1.819	2.675
		C	0.000	0.270	0.712	1.078
T7	65.00-45.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.659	1.792	2.635
		C	0.000	0.266	0.701	1.062
T8	45.00-25.00	A	0.000	0.000	0.000	0.000
		B	1.416	2.963	0.000	0.000
		C	0.554	1.194	0.000	0.000
T9	25.00-5.00	A	0.000	0.000	0.000	0.000
		B	1.465	2.997	0.000	0.000
		C	0.573	1.208	0.000	0.000

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	185.00-165.00	-0.7425	4.0752	-1.5890	3.8706
T2	165.00-145.00	5.2799	8.1791	3.5397	7.6363
T3	145.00-125.00	6.3382	11.4912	4.5063	10.5258
T4	125.00-105.00	1.5163	12.8266	-0.7223	12.4914
T5	105.00-85.00	1.6826	13.8165	-0.7275	13.4926
T6	85.00-65.00	1.5649	13.1049	-0.7630	13.1961
T7	65.00-45.00	1.6922	13.8810	-0.7725	14.0120
T8	45.00-25.00	2.2365	16.9180	-0.7585	16.2335
T9	25.00-5.00	2.1744	16.3988	-0.7452	16.1621

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
5'x2" Pipe Mount	C	From Face	0.00	0.0000	185.00	No Ice	1.19	1.19	18.25
(Empty Mount)			2.00			1/2" Ice	1.50	1.50	27.32
			0.00						
6' Omni	A	From Leg	0.00	0.0000	185.00	No Ice	2.11	2.11	37.30
(Disconnected)			0.00			1/2" Ice	2.60	2.60	56.00
			3.00						
*******									
APXV18-206517S-C-A20 w/ Mount Pipe	A	From Leg	1.50	0.0000	158.00	No Ice	5.32	4.70	50.85
(Metro PCS)			0.00			1/2" Ice	5.87	5.86	95.57
			0.00						
APXV18-206517S-C-A20 w/ Mount Pipe	B	From Leg	1.50	0.0000	158.00	No Ice	5.32	4.70	50.85
(Metro PCS)			0.00			1/2" Ice	5.87	5.86	95.57
			0.00						
APXV18-206517S-C-A20 w/ Mount Pipe	C	From Leg	1.50	0.0000	158.00	No Ice	5.32	4.70	50.85
(Metro PCS)			0.00			1/2" Ice	5.87	5.86	95.57
			0.00						
*******									
4' Standoff	C	From Leg	2.00	0.0000	154.00	No Ice	2.72	2.72	50.00
			0.00			1/2" Ice	4.91	4.91	89.00
			0.00						
10' Omni	C	From Leg	4.00	0.0000	154.00	No Ice	2.75	2.75	30.00
			0.00			1/2" Ice	3.78	3.78	50.21
			-5.00						
*******									
Andrew 12'-6" V-Sector Frame	A	From Leg	3.00	0.0000	140.00	No Ice	18.20	18.20	450.00
(Clearwire)			0.00			1/2" Ice	23.60	23.60	600.00
			0.00						
Andrew 12'-6" V-Sector Frame	B	From Leg	3.00	0.0000	140.00	No Ice	18.20	18.20	450.00
(Clearwire)			0.00			1/2" Ice	23.60	23.60	600.00
			0.00						
Andrew 12'-6" V-Sector Frame	C	From Leg	3.00	0.0000	140.00	No Ice	18.20	18.20	450.00
(Clearwire)			0.00			1/2" Ice	23.60	23.60	600.00
			0.00						
LLPX310R w/Mount Pipe	A	From Leg	3.00	0.0000	140.00	No Ice	5.22	3.16	45.81
(Clearwire)			0.00			1/2" Ice	5.66	3.74	85.21
			0.00						
LLPX310R w/Mount Pipe	B	From Leg	3.00	0.0000	140.00	No Ice	5.22	3.16	45.81
(Clearwire)			0.00			1/2" Ice	5.66	3.74	85.21
			0.00						
LLPX310R w/Mount Pipe	C	From Leg	3.00	0.0000	140.00	No Ice	5.22	3.16	45.81
(Clearwire)			0.00			1/2" Ice	5.66	3.74	85.21
			0.00						
Alcatel Lucent RRH	A	From Leg	3.00	0.0000	140.00	No Ice	1.72	1.46	40.00
(Clearwire)			0.00			1/2" Ice	1.91	1.64	54.46
			0.00						
Alcatel Lucent RRH	B	From Leg	3.00	0.0000	140.00	No Ice	1.72	1.46	40.00
(Clearwire)			0.00			1/2" Ice	1.91	1.64	54.46
			0.00						
Alcatel Lucent RRH	C	From Leg	3.00	0.0000	140.00	No Ice	1.72	1.46	40.00
(Clearwire)			0.00			1/2" Ice	1.91	1.64	54.46
			0.00						
*******									
15'x2-1/2" Pipe Mount	A	From Face	0.00	0.0000	130.00	No Ice	4.32	4.32	87.00
(Horiz. Face Mount Bar)			0.00			1/2" Ice	5.85	5.85	118.35
			0.00						
15'x2-1/2" Pipe Mount	B	From Face	0.00	0.0000	130.00	No Ice	4.32	4.32	87.00
(Horiz. Face Mount Bar)			0.00			1/2" Ice	5.85	5.85	118.35

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00						
15'x2-1/2" Pipe Mount	C	From Face	0.00	0.0000	130.00	No Ice	4.32	4.32	87.00
(Horiz. Face Mount Bar)			0.00			1/2" Ice	5.85	5.85	118.35
			0.00						
APXVSPP18-C w/Mount Pipe	A	From Face	1.00	0.0000	130.00	No Ice	8.56	6.95	82.55
(Sprint)			-6.00			1/2" Ice	9.21	8.13	150.82
			2.50						
APXVSPP18-C w/Mount Pipe	B	From Face	1.00	0.0000	130.00	No Ice	8.56	6.95	82.55
(Sprint)			-6.00			1/2" Ice	9.21	8.13	150.82
			2.50						
APXVSPP18-C w/Mount Pipe	C	From Face	1.00	0.0000	130.00	No Ice	8.56	6.95	82.55
(Sprint)			-6.00			1/2" Ice	9.21	8.13	150.82
			2.50						
7' x 2" Pipe Mount	A	From Face	1.00	0.0000	130.00	No Ice	1.66	1.66	25.55
(Sprint)			-4.00			1/2" Ice	2.39	2.39	38.13
			2.50						
7' x 2" Pipe Mount	B	From Face	1.00	0.0000	130.00	No Ice	1.66	1.66	25.55
(Sprint)			-4.00			1/2" Ice	2.39	2.39	38.13
			2.50						
7' x 2" Pipe Mount	C	From Face	1.00	0.0000	130.00	No Ice	1.66	1.66	25.55
(Sprint)			-4.00			1/2" Ice	2.39	2.39	38.13
			2.50						
1900MHz 4x40W RRH	A	From Face	1.00	0.0000	130.00	No Ice	2.71	2.61	59.50
(Sprint)			-3.00			1/2" Ice	2.95	2.84	82.62
			3.50						
1900MHz 4x40W RRH	B	From Face	1.00	0.0000	130.00	No Ice	2.71	2.61	59.50
(Sprint)			-3.00			1/2" Ice	2.95	2.84	82.62
			3.50						
1900MHz 4x40W RRH	C	From Face	1.00	0.0000	130.00	No Ice	2.71	2.61	59.50
(Sprint)			-3.00			1/2" Ice	2.95	2.84	82.62
			3.50						
1900MHz 4x40W RRH	A	From Face	1.00	0.0000	130.00	No Ice	2.71	2.61	59.50
(Sprint)			-5.00			1/2" Ice	2.95	2.84	82.62
			3.50						
1900MHz 4x40W RRH	B	From Face	1.00	0.0000	130.00	No Ice	2.71	2.61	59.50
(Sprint)			-5.00			1/2" Ice	2.95	2.84	82.62
			3.50						
1900MHz 4x40W RRH	C	From Face	1.00	0.0000	130.00	No Ice	2.71	2.61	59.50
(Sprint)			-5.00			1/2" Ice	2.95	2.84	82.62
			3.50						
800MHz 2x50W RRH	A	From Face	1.00	0.0000	130.00	No Ice	2.40	2.25	64.00
(Sprint)			-4.00			1/2" Ice	2.61	2.46	86.12
			-1.00						
800MHz 2x50W RRH	B	From Face	1.00	0.0000	130.00	No Ice	2.40	2.25	64.00
(Sprint)			-4.00			1/2" Ice	2.61	2.46	86.12
			-1.00						
800MHz 2x50W RRH	C	From Face	1.00	0.0000	130.00	No Ice	2.40	2.25	64.00
(Sprint)			-4.00			1/2" Ice	2.61	2.46	86.12
			-1.00						
IBC1900HB-2	A	From Face	1.00	0.0000	130.00	No Ice	1.31	0.33	40.00
(Sprint)			-3.00			1/2" Ice	1.48	0.41	49.10
			-1.00						
IBC1900HB-2	B	From Face	1.00	0.0000	130.00	No Ice	1.31	0.33	40.00
(Sprint)			-3.00			1/2" Ice	1.48	0.41	49.10
			-1.00						
IBC1900HB-2	C	From Face	1.00	0.0000	130.00	No Ice	1.31	0.33	40.00
(Sprint)			-3.00			1/2" Ice	1.48	0.41	49.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			-1.00						
IBC1900HB-2	A	From Face	1.00	0.0000	130.00	No Ice	1.31	0.33	40.00
(Sprint)			-5.00			1/2" Ice	1.48	0.41	49.10
			-1.00						
IBC1900HB-2	B	From Face	1.00	0.0000	130.00	No Ice	1.31	0.33	40.00
(Sprint)			-5.00			1/2" Ice	1.48	0.41	49.10
			-1.00						
IBC1900HB-2	C	From Face	1.00	0.0000	130.00	No Ice	1.31	0.33	40.00
(Sprint)			-5.00			1/2" Ice	1.48	0.41	49.10
			-1.00						
***									
APXV9TM14-ALU-I20 w/Mount Pipe	A	From Face	1.00	0.0000	130.00	No Ice	7.21	5.03	77.02
(Sprint (new))			0.00			1/2" Ice	7.77	5.89	132.43
			1.00						
APXV9TM14-ALU-I20 w/Mount Pipe	B	From Face	1.00	0.0000	130.00	No Ice	7.21	5.03	77.02
(Sprint (new))			0.00			1/2" Ice	7.77	5.89	132.43
			1.00						
APXV9TM14-ALU-I20 w/Mount Pipe	C	From Face	1.00	0.0000	130.00	No Ice	7.21	5.03	77.02
(Sprint (new))			0.00			1/2" Ice	7.77	5.89	132.43
			1.00						
TD-RRH8x20	A	From Face	1.00	0.0000	130.00	No Ice	4.72	1.70	70.00
(Sprint (new))			0.00			1/2" Ice	5.01	1.92	97.14
			1.00						
TD-RRH8x20	B	From Face	1.00	0.0000	130.00	No Ice	4.72	1.70	70.00
(Sprint (new))			0.00			1/2" Ice	5.01	1.92	97.14
			1.00						
TD-RRH8x20	C	From Face	1.00	0.0000	130.00	No Ice	4.72	1.70	70.00
(Sprint (new))			0.00			1/2" Ice	5.01	1.92	97.14
			1.00						
*******									
20' Omni	A	From Face	0.00	0.0000	35.00	No Ice	5.50	5.50	55.00
(unk.)			11.00			1/2" Ice	7.53	7.53	95.06
			0.00						

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
2.5' MW Dish	A	Paraboloid w/o Radome	From Leg	4.00	0.0000		140.00	2.50	No Ice	4.91	25.00
(clearwire)				-6.00					1/2" Ice	5.24	51.90
				1.00							
2.5' MW Dish	B	Paraboloid w/o Radome	From Leg	4.00	0.0000		140.00	2.50	No Ice	4.91	25.00
(clearwire)				6.00					1/2" Ice	5.24	51.90
				1.00							
2.5' MW Dish	B	Paraboloid w/o Radome	From Leg	4.00	0.0000		140.00	2.50	No Ice	4.91	25.00
(clearwire)				-6.00					1/2" Ice	5.24	51.90
				1.00							
2.5' MW Dish	C	Paraboloid w/o Radome	From Leg	4.00	0.0000		140.00	2.50	No Ice	4.91	25.00

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
(clearwire)				0.00 3.00					1/2" Ice	5.24	51.90
*****											
4' Dish	B	Paraboloid w/o Radome	From Leg	1.00	0.0000		17.00	4.00	No Ice	12.57	150.00
(unk.)				0.00 3.00					1/2" Ice	13.10	217.25

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	9027.36					
Bracing Weight	15114.19					
Total Member Self-Weight	24141.55			28151.46	1038.10	
Total Weight	34554.73			28151.46	1038.10	
Wind 0 deg - No Ice		-541.04	-38056.57	-3651604.99	33018.41	4902.51
Wind 30 deg - No Ice		17672.12	-30361.63	-2900529.09	-1709121.91	19481.22
Wind 60 deg - No Ice		29857.43	-17158.08	-1627013.92	-2874113.85	28812.61
Wind 90 deg - No Ice		35346.24	-98.75	12945.67	-3403321.39	31421.56
Wind 120 deg - No Ice		32965.81	19031.88	1867841.60	-3186428.36	26336.23
Wind 150 deg - No Ice		17587.72	30659.34	2983523.14	-1688049.09	9707.09
Wind 180 deg - No Ice		69.28	34435.75	3345323.70	-3056.69	-5512.28
Wind 210 deg - No Ice		-17458.20	30484.81	2973206.81	1682469.14	-18762.81
Wind 240 deg - No Ice		-33228.90	18559.04	1839892.15	3204055.30	-29165.07
Wind 270 deg - No Ice		-35539.07	-451.92	-7929.97	3416795.62	-28501.36
Wind 300 deg - No Ice		-30155.05	-17409.91	-1641899.09	2893782.34	-22711.47
Wind 330 deg - No Ice		-18160.78	-30551.48	-2911750.84	1740082.09	-11922.31
Member Ice	8934.25					
Total Weight Ice	49769.89			49272.08	-7935.45	
Wind 0 deg - Ice		-426.66	-38042.31	-3564997.30	17565.92	-1114.22
Wind 30 deg - Ice		17396.39	-29933.54	-2800662.28	-1668781.11	14195.07
Wind 60 deg - Ice		29216.04	-16804.71	-1553394.47	-2790471.31	25098.10
Wind 90 deg - Ice		34791.92	-79.28	37097.69	-3316815.04	30564.47
Wind 120 deg - Ice		32951.80	19023.98	1856255.48	-3138546.64	29296.15
Wind 150 deg - Ice		17327.40	30169.70	2920538.45	-1651892.78	14620.52
Wind 180 deg - Ice		54.63	33703.72	3260059.89	-11200.67	254.69
Wind 210 deg - Ice		-17225.26	30032.07	2912312.12	1629916.80	-13620.05
Wind 240 deg - Ice		-33159.27	18651.10	1833968.35	3135076.04	-26522.15
Wind 270 deg - Ice		-34943.98	-357.78	20451.28	3310033.03	-28265.70
Wind 300 deg - Ice		-29450.74	-17003.30	-1565264.03	2788628.66	-24881.46
Wind 330 deg - Ice		-17781.74	-30083.25	-2809610.61	1675942.54	-16355.02
Total Weight	34554.73			28151.46	1038.10	
Wind 0 deg - Service		-187.21	-13168.36	-1272298.18	9532.06	1696.37
Wind 30 deg - Service		6114.92	-10505.75	-1012410.33	-593284.66	6740.91
Wind 60 deg - Service		10331.29	-5937.05	-571747.64	-996396.06	9969.76
Wind 90 deg - Service		12230.53	-34.17	-4287.58	-1179512.86	10872.51
Wind 120 deg - Service		11406.86	6585.43	637544.93	-1104463.36	9112.88
Wind 150 deg - Service		6085.72	10608.77	1023593.90	-585993.03	3358.86
Wind 180 deg - Service		23.97	11915.49	1148784.41	-2950.68	-1907.36
Wind 210 deg - Service		-6040.90	10548.38	1020024.24	580276.25	-6492.32
Wind 240 deg - Service		-11497.89	6421.81	627873.84	1106776.66	-10091.72
Wind 270 deg - Service		-12297.26	-156.37	-11510.98	1180389.23	-9862.06
Wind 300 deg - Service		-10434.27	-6024.19	-576898.22	999415.77	-7858.64

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 330 deg - Service		-6284.01	-10571.45	-1016293.29	600211.53	-4125.37

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
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 lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	185 - 165	Leg	Max Tension	8	1332.19	-43.60	-3.68
			Max. Compression	23	-2568.96	23.36	11.38
			Max. Mx	2	-291.25	53.88	0.84

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. My	3	-458.58	-4.37	-73.75
			Max. Vy	6	69.61	0.00	-0.00
			Max. Vx	5	79.59	-0.00	-0.00
		Diagonal	Max Tension	5	742.46	0.00	0.00
			Max. Compression	6	-761.79	0.00	0.00
			Max. Mx	19	24.48	21.25	3.03
			Max. My	20	-367.15	21.00	-3.22
			Max. Vy	20	14.51	21.17	2.83
			Max. Vx	20	0.85	0.00	0.00
		Top Girt	Max Tension	2	42.80	0.00	0.00
			Max. Compression	25	-73.37	0.00	0.00
			Max. Mx	14	-23.08	-51.11	0.00
			Max. My	19	-49.23	0.00	1.50
			Max. Vy	14	-19.36	0.00	0.00
			Max. Vx	19	0.57	0.00	0.00
T2	165 - 145	Leg	Max Tension	8	6243.78	-540.72	26.14
			Max. Compression	23	-9822.89	506.20	45.12
			Max. Mx	12	5934.99	-579.66	10.66
			Max. My	13	-1335.16	45.88	515.55
			Max. Vy	4	-249.33	-138.95	-21.23
			Max. Vx	13	254.13	2.10	112.02
		Diagonal	Max Tension	5	1877.58	0.00	0.00
			Max. Compression	18	-1905.99	0.00	0.00
			Max. Mx	23	1380.42	42.93	5.29
			Max. My	19	-156.98	40.31	-6.57
			Max. Vy	23	25.66	42.93	5.29
			Max. Vx	19	1.49	0.00	0.00
T3	145 - 125	Leg	Max Tension	8	15202.89	-1628.96	34.14
			Max. Compression	19	-23947.25	737.10	-34.27
			Max. Mx	12	8530.02	-1670.02	27.71
			Max. My	13	-2678.89	-16.55	1641.41
			Max. Vy	12	-651.96	-1670.02	27.71
			Max. Vx	3	-664.01	-62.02	-1623.48
		Diagonal	Max Tension	5	4731.51	0.00	0.00
			Max. Compression	5	-4842.87	0.00	0.00
			Max. Mx	21	3812.29	72.40	8.98
			Max. My	18	-4574.08	56.96	-10.98
			Max. Vy	21	35.00	72.40	8.98
			Max. Vx	19	2.08	0.00	0.00
T4	125 - 105	Leg	Max Tension	8	31896.20	43.62	2.61
			Max. Compression	19	-44406.93	258.92	-45.20
			Max. Mx	4	22711.99	-896.73	-44.63
			Max. My	9	-3659.85	-27.54	892.47
			Max. Vy	2	169.30	869.19	-5.35
			Max. Vx	9	173.00	-27.54	892.47
		Diagonal	Max Tension	5	5946.84	0.00	0.00
			Max. Compression	5	-5999.22	0.00	0.00
			Max. Mx	20	4978.29	127.93	-15.96
			Max. My	18	-5350.42	80.84	-19.60
			Max. Vy	20	54.84	127.93	-15.96
			Max. Vx	18	3.31	0.00	0.00
T5	105 - 85	Leg	Max Tension	8	49124.43	-136.54	5.07
			Max. Compression	19	-65754.47	298.94	-47.88
			Max. Mx	2	-63551.48	318.04	-9.39
			Max. My	9	-5540.34	-35.88	296.94
			Max. Vy	2	-96.53	318.04	-9.39
			Max. Vx	10	113.37	-100.36	296.58
		Diagonal	Max Tension	5	6644.60	0.00	0.00
			Max. Compression	5	-6731.80	0.00	0.00
			Max. Mx	19	5066.35	156.18	-18.11
			Max. My	18	-5949.04	96.67	-23.65

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	20	60.91	155.10	-18.53
			Max. Vx	18	3.65	0.00	0.00
T6	85 - 65	Leg	Max Tension	8	66449.71	-215.59	4.12
			Max. Compression	19	-87983.44	407.83	-50.47
			Max. Mx	2	-85235.21	426.75	-7.95
			Max. My	9	-6952.40	-57.82	476.45
			Max. Vy	2	-113.26	426.75	-7.95
			Max. Vx	10	140.01	-154.07	457.46
		Diagonal	Max Tension	5	7404.17	0.00	0.00
			Max. Compression	5	-7508.53	0.00	0.00
			Max. Mx	19	5608.53	209.16	-25.09
			Max. My	18	-6597.94	133.46	-30.31
			Max. Vy	20	76.07	207.46	-25.21
			Max. Vx	18	4.39	0.00	0.00
T7	65 - 45	Leg	Max Tension	8	83396.87	-316.20	3.37
			Max. Compression	19	-110523.68	-474.23	-41.62
			Max. Mx	19	-110523.68	-474.23	-41.62
			Max. My	9	-8904.98	-105.94	673.76
			Max. Vy	2	151.89	315.85	-6.58
			Max. Vx	10	-130.11	-195.79	428.40
		Diagonal	Max Tension	5	7925.86	0.00	0.00
			Max. Compression	5	-7971.25	0.00	0.00
			Max. Mx	19	7238.36	287.27	34.36
			Max. My	18	-7462.01	195.77	-45.54
			Max. Vy	20	96.49	283.16	-37.33
			Max. Vx	18	6.06	0.00	0.00
T8	45 - 25	Leg	Max Tension	8	86842.11	189.08	10.89
			Max. Compression	19	-116907.06	-1350.73	-141.23
			Max. Mx	19	-116542.88	1682.61	53.15
			Max. My	13	-10715.50	-238.84	1525.36
			Max. Vy	6	399.75	1676.42	50.77
			Max. Vx	9	-289.14	-275.73	1514.37
		Diagonal	Max Tension	5	12397.53	-88.10	42.88
			Max. Compression	5	-12932.67	0.00	0.00
			Max. Mx	24	4897.34	-120.23	10.27
			Max. My	24	-12568.99	-46.12	-49.82
			Max. Vy	24	38.03	-120.22	10.36
			Max. Vx	24	-4.13	0.00	0.00
		Horizontal	Max Tension	11	7101.02	-124.38	0.09
			Max. Compression	11	-7056.95	-124.47	0.13
			Max. Mx	21	-1040.76	-199.90	-9.65
			Max. My	2	223.71	-87.94	11.01
			Max. Vy	21	66.99	-199.90	-9.65
			Max. Vx	15	-0.94	-131.78	10.90
		Redund Horz 1 Bracing	Max Tension	19	2028.84	0.00	0.00
			Max. Compression	19	-2028.84	0.00	0.00
			Max. Mx	14	246.18	21.17	0.00
			Max. My	19	2028.84	0.00	0.00
			Max. Vy	14	-13.53	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	19	1860.96	0.00	0.00
			Max. Compression	19	-1860.96	0.00	0.00
			Max. Mx	19	1860.96	35.16	0.00
			Max. My	18	1520.99	0.00	-0.10
			Max. Vy	19	-12.25	0.00	0.00
			Max. Vx	18	-0.03	0.00	0.00
		Redund Hip 1 Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-30.37	0.00	0.00
			Max. Mx	14	-6.43	21.17	0.00
			Max. My	23	-23.04	0.00	-0.00
			Max. Vy	14	-13.53	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vx	23	0.00	0.00	0.00
		Redund Hip Diagonal Bracing	Max Tension	18	79.89	0.00	0.00
			Max. Compression	23	-69.47	0.00	0.00
			Max. Mx	19	76.82	213.38	0.00
			Max. My	23	56.34	0.00	0.25
			Max. Vy	19	-56.79	0.00	0.00
			Max. Vx	23	-0.07	0.00	0.00
		Inner Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-13.37	0.00	0.00
			Max. Mx	14	-8.07	198.16	0.00
			Max. My	23	-5.13	0.00	0.30
			Max. Vy	14	-63.31	0.00	0.00
			Max. Vx	23	-0.10	0.00	0.00
T9	25 - 5	Leg	Max Tension	8	101252.40	827.37	62.40
			Max. Compression	19	-136968.13	-0.00	0.08
			Max. Mx	10	-133899.78	2414.55	-1.81
			Max. My	13	-11808.63	-238.88	1525.31
			Max. Vy	10	-487.76	2414.55	-1.81
			Max. Vx	13	334.95	-238.88	1525.31
		Diagonal	Max Tension	5	12621.24	-142.81	66.10
			Max. Compression	5	-13226.36	0.00	0.00
			Max. Mx	24	5021.67	-189.86	21.88
			Max. My	24	-12963.59	-44.81	-79.13
			Max. Vy	24	54.29	-189.85	21.96
			Max. Vx	24	-6.36	0.00	0.00
		Horizontal	Max Tension	11	7531.01	-148.56	0.17
			Max. Compression	5	-7617.55	-149.57	-0.01
			Max. Mx	21	-1217.80	-210.80	-9.94
			Max. My	15	614.10	-153.76	11.52
			Max. Vy	21	71.42	-210.80	-9.94
			Max. Vx	15	-0.89	-153.76	11.52
		Redund Horz 1 Bracing	Max Tension	19	2376.83	0.00	0.00
			Max. Compression	19	-2376.83	0.00	0.00
			Max. Mx	25	1161.89	25.61	0.00
			Max. My	24	-291.93	0.00	0.00
			Max. Vy	25	-14.88	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	19	2038.25	0.00	0.00
			Max. Compression	19	-2038.25	0.00	0.00
			Max. Mx	19	2038.25	40.13	0.00
			Max. My	24	551.06	0.00	0.06
			Max. Vy	19	-13.59	0.00	0.00
			Max. Vx	24	-0.02	0.00	0.00
		Redund Hip 1 Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-33.18	0.00	0.00
			Max. Mx	14	-7.35	25.61	0.00
			Max. My	23	-7.94	0.00	0.00
			Max. Vy	14	-14.88	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
		Redund Hip Diagonal Bracing	Max Tension	18	79.66	0.00	0.00
			Max. Compression	23	-70.51	0.00	0.00
			Max. Mx	21	63.10	253.56	0.00
			Max. My	17	68.56	0.00	-0.13
			Max. Vy	21	-63.99	0.00	0.00
			Max. Vx	17	0.03	0.00	0.00
		Inner Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-13.99	0.00	0.00
			Max. Mx	14	-9.43	246.63	0.00
			Max. My	23	-7.54	0.00	0.19
			Max. Vy	14	71.64	0.00	0.00
			Max. Vx	23	0.05	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	23	154861.62	19845.53	-10768.59
	Max. H_x	23	154861.62	19845.53	-10768.59
	Max. H_z	3	-100147.54	-12945.22	9321.66
	Min. Vert	4	-114300.70	-15923.88	8550.29
	Min. H_x	4	-114300.70	-15923.88	8550.29
	Min. H_z	23	154861.62	19845.53	-10768.59
Leg B	Max. Vert	19	155406.81	-19848.70	-10786.52
	Max. H_x	12	-115244.46	16033.80	8763.51
	Max. H_z	13	-101397.53	13113.34	9575.66
	Min. Vert	12	-115244.46	16033.80	8763.51
	Min. H_x	19	155406.81	-19848.70	-10786.52
	Min. H_z	19	155406.81	-19848.70	-10786.52
Leg A	Max. Vert	15	152275.26	45.92	22528.04
	Max. H_x	24	15800.00	3405.24	1712.28
	Max. H_z	15	152275.26	45.92	22528.04
	Min. Vert	8	-115949.02	-118.53	-18092.70
	Min. H_x	18	15157.91	-3329.70	1567.82
	Min. H_z	8	-115949.02	-118.53	-18092.70

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	34554.73	-0.00	0.00	28152.07	1038.56	-0.16
Dead+Wind 0 deg - No Ice	34554.73	-541.04	-38056.57	-3617597.88	33064.29	4894.80
Dead+Wind 30 deg - No Ice	34554.73	17672.12	-30361.63	-2871213.79	-1692277.28	19504.13
Dead+Wind 60 deg - No Ice	34554.73	29857.43	-17158.08	-1610100.23	-2844976.45	28862.22
Dead+Wind 90 deg - No Ice	34554.73	35346.24	-98.75	13000.16	-3369574.88	31485.45
Dead+Wind 120 deg - No Ice	34554.73	32965.81	19031.88	1850936.01	-3156998.76	26399.82
Dead+Wind 150 deg - No Ice	34554.73	17587.72	30659.34	2954354.93	-1671136.79	9742.98
Dead+Wind 180 deg - No Ice	34554.73	69.28	34435.75	3311696.65	-3058.55	-5504.83
Dead+Wind 210 deg - No Ice	34554.73	-17458.20	30484.81	2944026.71	1665553.98	-18785.36
Dead+Wind 240 deg - No Ice	34554.73	-33228.90	18559.04	1822939.37	3174662.82	-29221.65
Dead+Wind 270 deg - No Ice	34554.73	-35539.07	-451.92	-7908.62	3383073.76	-28567.54
Dead+Wind 300 deg - No Ice	34554.73	-30155.05	-17409.91	-1625016.67	2864677.14	-22768.90
Dead+Wind 330 deg - No Ice	34554.73	-18160.78	-30551.48	-2882458.15	1723285.14	-11957.93
Dead+Ice+Temp	49769.89	0.00	0.00	49274.04	-7933.23	0.05
Dead+Wind 0 deg+Ice+Temp	49769.89	-426.66	-38042.31	-3525207.42	17606.87	-1102.44
Dead+Wind 30 deg+Ice+Temp	49769.89	17396.39	-29933.54	-2768199.88	-1650165.64	14251.24
Dead+Wind 60 deg+Ice+Temp	49769.89	29216.04	-16804.71	-1535003.22	-2758878.24	25185.03
Dead+Wind 90 deg+Ice+Temp	49769.89	34791.92	-79.28	37205.74	-3279514.49	30663.53
Dead+Wind 120 deg+Ice+Temp	49769.89	32951.81	19023.98	1836543.23	-3104176.75	29381.55
Dead+Wind 150 deg+Ice+Temp	49769.89	17327.40	30169.70	2888338.47	-1633205.69	14657.13
Dead+Wind 180 deg+Ice+Temp	49769.89	54.63	33703.72	3223630.73	-11204.16	237.13
Dead+Wind 210 deg+Ice+Temp	49769.89	-17225.26	30032.07	2880091.61	1611213.36	-13676.47
Dead+Wind 240 deg+Ice+Temp	49769.89	-33159.27	18651.10	1814206.17	3100717.34	-26621.06

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 270 deg+Ice+Temp	49769.89	-34943.98	-357.78	20523.96	3272732.60	-28366.08
Dead+Wind 300 deg+Ice+Temp	49769.89	-29450.74	-17003.30	-1546897.61	2757039.09	-24962.52
Dead+Wind 330 deg+Ice+Temp	49769.89	-17781.74	-30083.25	-2777168.62	1657349.60	-16393.20
Dead+Wind 0 deg - Service	34554.73	-187.21	-13168.36	-1233327.25	12124.37	1691.40
Dead+Wind 30 deg - Service	34554.73	6114.92	-10505.75	-975086.16	-584865.73	6750.63
Dead+Wind 60 deg - Service	34554.73	10331.29	-5937.05	-538682.72	-983740.48	9983.46
Dead+Wind 90 deg - Service	34554.73	12230.53	-34.17	22927.39	-1165264.10	10894.86
Dead+Wind 120 deg - Service	34554.73	11406.86	6585.43	658897.43	-1091711.36	9131.85
Dead+Wind 150 deg - Service	34554.73	6085.72	10608.77	1040707.33	-577573.04	3369.85
Dead+Wind 180 deg - Service	34554.73	23.97	11915.49	1164346.33	-376.18	-1906.53
Dead+Wind 210 deg - Service	34554.73	-6040.90	10548.38	1037131.45	577024.73	-6503.73
Dead+Wind 240 deg - Service	34554.73	-11497.89	6421.81	649208.32	1099187.30	-10112.61
Dead+Wind 270 deg - Service	34554.73	-12297.26	-156.37	15696.61	1171299.68	-9883.40
Dead+Wind 300 deg - Service	34554.73	-10434.27	-6024.19	-543849.82	991919.67	-7879.96
Dead+Wind 330 deg - Service	34554.73	-6284.01	-10571.45	-978976.14	596965.09	-4141.37

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	-0.00	-34554.73	0.00	0.00	34554.73	-0.00	0.000%
2	-541.04	-34554.73	-38056.57	541.04	34554.73	38056.57	0.000%
3	17672.12	-34554.73	-30361.63	-17672.12	34554.73	30361.63	0.000%
4	29857.43	-34554.73	-17158.08	-29857.43	34554.73	17158.08	0.000%
5	35346.24	-34554.73	-98.75	-35346.24	34554.73	98.75	0.000%
6	32965.81	-34554.73	19031.88	-32965.81	34554.73	-19031.88	0.000%
7	17587.72	-34554.73	30659.34	-17587.72	34554.73	-30659.34	0.000%
8	69.28	-34554.73	34435.75	-69.28	34554.73	-34435.75	0.000%
9	-17458.20	-34554.73	30484.81	17458.20	34554.73	-30484.81	0.000%
10	-33228.90	-34554.73	18559.04	33228.90	34554.73	-18559.04	0.000%
11	-35539.07	-34554.73	-451.92	35539.07	34554.73	451.92	0.000%
12	-30155.05	-34554.73	-17409.91	30155.05	34554.73	17409.91	0.000%
13	-18160.78	-34554.73	-30551.48	18160.78	34554.73	30551.48	0.000%
14	0.00	-49769.89	0.00	-0.00	49769.89	-0.00	0.000%
15	-426.66	-49769.89	-38042.31	426.66	49769.89	38042.31	0.000%
16	17396.39	-49769.89	-29933.54	-17396.39	49769.89	29933.54	0.000%
17	29216.04	-49769.89	-16804.71	-29216.04	49769.89	16804.71	0.000%
18	34791.92	-49769.89	-79.28	-34791.92	49769.89	79.28	0.000%
19	32951.80	-49769.89	19023.98	-32951.81	49769.89	-19023.98	0.000%
20	17327.40	-49769.89	30169.70	-17327.40	49769.89	-30169.70	0.000%
21	54.63	-49769.89	33703.72	-54.63	49769.89	-33703.72	0.000%
22	-17225.26	-49769.89	30032.07	17225.26	49769.89	-30032.07	0.000%
23	-33159.27	-49769.89	18651.10	33159.27	49769.89	-18651.10	0.000%
24	-34943.98	-49769.89	-357.78	34943.98	49769.89	357.78	0.000%
25	-29450.74	-49769.89	-17003.30	29450.74	49769.89	17003.30	0.000%
26	-17781.74	-49769.89	-30083.25	17781.74	49769.89	30083.25	0.000%
27	-187.21	-34554.73	-13168.36	187.21	34554.73	13168.36	0.000%
28	6114.92	-34554.73	-10505.75	-6114.92	34554.73	10505.75	0.000%
29	10331.29	-34554.73	-5937.05	-10331.29	34554.73	5937.05	0.000%
30	12230.53	-34554.73	-34.17	-12230.53	34554.73	34.17	0.000%
31	11406.86	-34554.73	6585.43	-11406.86	34554.73	-6585.43	0.000%
32	6085.72	-34554.73	10608.77	-6085.72	34554.73	-10608.77	0.000%
33	23.97	-34554.73	11915.49	-23.97	34554.73	-11915.49	0.000%
34	-6040.90	-34554.73	10548.38	6040.90	34554.73	-10548.38	0.000%
35	-11497.89	-34554.73	6421.81	11497.89	34554.73	-6421.81	0.000%
36	-12297.26	-34554.73	-156.37	12297.26	34554.73	156.37	0.000%
37	-10434.27	-34554.73	-6024.19	10434.27	34554.73	6024.19	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
38	-6284.01	-34554.73	-10571.45	6284.01	34554.73	10571.45	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	185 - 165	2.420	35	0.0940	0.0126
T2	165 - 145	2.020	35	0.0933	0.0126

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T3	145 - 125	1.625	35	0.0890	0.0118
T4	125 - 105	1.241	35	0.0829	0.0103
T5	105 - 85	0.891	35	0.0729	0.0090
T6	85 - 65	0.588	35	0.0585	0.0075
T7	65 - 45	0.342	35	0.0456	0.0060
T8	45 - 25	0.158	31	0.0305	0.0047
T9	25 - 5	0.044	27	0.0151	0.0020

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	5'x2" Pipe Mount	35	2.420	0.0940	0.0126	Inf
158.00	APXV18-206517S-C-A20 w/ Mount Pipe	35	1.881	0.0921	0.0124	805835
154.00	4' Standoff	35	1.802	0.0913	0.0123	801565
143.00	2.5' MW Dish	35	1.586	0.0885	0.0117	507496
141.00	2.5' MW Dish	35	1.547	0.0879	0.0115	389974
140.00	Andrew 12'-6" V-Sector Frame	35	1.527	0.0877	0.0114	346376
130.00	15'x2-1/2" Pipe Mount	35	1.335	0.0847	0.0107	162966
35.00	20' Omni	27	0.091	0.0227	0.0034	60734
20.00	4' Dish	27	0.028	0.0113	0.0014	68835

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	185 - 165	6.919	10	0.2673	0.0373
T2	165 - 145	5.780	10	0.2656	0.0367
T3	145 - 125	4.654	10	0.2538	0.0343
T4	125 - 105	3.557	10	0.2367	0.0300
T5	105 - 85	2.555	10	0.2082	0.0263
T6	85 - 65	1.689	10	0.1672	0.0219
T7	65 - 45	0.985	10	0.1304	0.0176
T8	45 - 25	0.456	6	0.0872	0.0138
T9	25 - 5	0.125	2	0.0434	0.0060

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	5'x2" Pipe Mount	10	6.919	0.2673	0.0373	Inf
158.00	APXV18-206517S-C-A20 w/ Mount Pipe	10	5.384	0.2625	0.0361	321229
154.00	4' Standoff	10	5.159	0.2601	0.0357	325859
143.00	2.5' MW Dish	10	4.542	0.2524	0.0339	197967

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
141.00	2.5' MW Dish	10	4.430	0.2509	0.0335	147224
140.00	Andrew 12'-6" V-Sector Frame	10	4.375	0.2501	0.0333	129197
130.00	15'x2-1/2" Pipe Mount	10	3.825	0.2417	0.0311	57864
35.00	20' Omni	2	0.262	0.0651	0.0101	21272
20.00	4' Dish	15	0.080	0.0325	0.0043	23967

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	185 - 165	ROHN 2.5 EH	20.03	6.68	86.7 K=1.00	17.634	2.2535	-2568.96	39739.10	0.065 ✔
T2	165 - 145	ROHN 3 STD	20.03	6.68	68.9 K=1.00	21.145	2.2285	-9822.89	47122.10	0.208 ✔
T3	145 - 125	ROHN 3.5 EH	20.03	10.02	92.0 K=1.00	16.505	3.6784	-23947.30	60711.50	0.394 ✔
T4	125 - 105	ROHN 4 EH	20.03	10.02	81.4 K=1.00	18.730	4.4074	-44406.90	82551.20	0.538 ✔
T5	105 - 85	ROHN 4 EH	20.03	10.02	81.4 K=1.00	18.730	4.4074	-65754.50	82551.20	0.797 ✔
T6	85 - 65	ROHN 5 EH	20.03	10.02	65.4 K=1.00	21.781	6.1120	-87983.40	133123.00	0.661 ✔
T7	65 - 45	ROHN 5 EH	20.04	10.02	65.4 K=1.00	21.777	6.1120	-110524.00	133099.00	0.830 ✔
T8	45 - 25	ROHN 5 EH	20.05	10.03	65.4 K=1.00	21.771	6.1120	-116907.00	133061.00	0.879 ✔
T9	25 - 5	ROHN 6 EHS	20.05	10.03	54.1 K=1.00	23.705	6.7133	-136968.00	159141.00	0.861 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	185 - 165	L2x2x1/8	13.96	7.04	190.4 K=0.90	4.118	0.4844	-761.79	1994.69	0.382 ✔
T2	165 - 145	L2 1/2x2 1/2x3/16	15.79	7.92	174.9 K=0.91	4.881	0.9020	-1905.99	4402.33	0.433 ✔
T3	145 - 125	L3x3x3/16	19.02	9.62	176.1 K=0.91	4.814	1.0900	-4842.87	5247.42	0.923 ✔
T4	125 - 105	L3 1/2x3 1/2x1/4	20.79	10.47	166.6 K=0.92	5.383	1.6900	-5999.22	9097.99	0.659 ✔
T5	105 - 85	L3 1/2x3 1/2x1/4	22.60	11.37	178.4	4.689	1.6900	-6731.80	7925.22	0.849

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
					K=0.91					✔
T6	85 - 65	L4x4x1/4	24.44	12.25	169.5	5.201	1.9400	-7508.53	10089.10	0.744
					K=0.92					✔
T7	65 - 45	L4x4x5/16	26.45	13.27	182.1	4.505	2.4000	-7971.25	10813.10	0.737
					K=0.90					✔
T8	45 - 25	ROHN 2.5 STD	24.29	12.15	153.8	6.309	1.7040	-12932.70	10751.30	1.203
					K=1.00					✔
T9	25 - 5	ROHN 3 STD	25.01	12.51	129.0	8.979	2.2285	-13226.40	20008.60	0.661
					K=1.00					✔

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	P2.5x.203	25.04	12.29	155.6	6.164	1.7040	-7056.95	10504.50	0.672
					K=1.00					✔
T9	25 - 5	P2.5x.203	27.54	13.54	171.5	5.079	1.7040	-7617.55	8654.28	0.880
					K=1.00					✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	185 - 165	L2x2x1/8	10.56	10.32	237.8	2.641	0.4844	-73.37	1279.23	0.057
					K=0.76					✔
		KL/R > 200 (C) - 6								

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	ROHN 1.5 STD	6.26	6.03	116.2	10.822	0.7995	-2028.84	8652.01	0.234
					K=1.00					✔
T9	25 - 5	ROHN 1.5 STD	6.89	6.61	127.4	9.203	0.7995	-2376.83	7357.60	0.323
					K=1.00					✔

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	ROHN 1.5 STD	11.48	11.01	212.3 K=1.00	3.315	0.7995	-1860.96	2649.85	0.702 ✔
T9	25 - 5	ROHN 1.5 STD	11.81	11.37	219.2 K=1.00	3.108	0.7995	-2038.25	2484.76	0.820 ✔

Redundant Hip (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	ROHN 1.5 STD	6.26	6.26	120.7 K=1.00	10.188	0.7995	-30.37	8145.15	0.004 ✔
T9	25 - 5	ROHN 1.5 STD	6.89	6.89	132.7 K=1.00	8.480	0.7995	-33.18	6779.45	0.005 ✔

Redundant Hip Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	ROHN 2.5 X-STR	15.03	15.03	195.2 K=1.00	3.920	2.2535	-54.62	8833.12	0.006* ✔
T9	25 - 5	ROHN 3 STD	15.85	15.85	163.4 K=1.00	5.590	2.2285	-56.28	12456.50	0.005* ✔

* DL controls

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	ROHN 2.5 EH	12.52	12.52	162.6 K=1.00	5.649	2.2535	-13.37	12730.30	0.001 ✔
T9	25 - 5	ROHN 3 STD	13.77	13.77	142.0 K=1.00	7.405	2.2285	-13.99	16501.30	0.001 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	185 - 165	ROHN 2.5 EH	20.03	6.68	86.7	30.000	2.2535	1332.19	67606.20	0.020 ✔
T2	165 - 145	ROHN 3 STD	20.03	6.68	68.9	30.000	2.2285	6243.78	66854.10	0.093 ✔
T3	145 - 125	ROHN 3.5 EH	20.03	10.02	92.0	30.000	3.6784	15202.90	110352.00	0.138 ✔
T4	125 - 105	ROHN 4 EH	20.03	10.02	81.4	30.000	4.4074	31896.20	132223.00	0.241 ✔
T5	105 - 85	ROHN 4 EH	20.03	10.02	81.4	30.000	4.4074	49124.40	132223.00	0.372 ✔
T6	85 - 65	ROHN 5 EH	20.03	10.02	65.4	30.000	6.1120	66449.70	183359.00	0.362 ✔
T7	65 - 45	ROHN 5 EH	20.04	10.02	65.4	30.000	6.1120	83396.90	183359.00	0.455 ✔
T8	45 - 25	ROHN 5 EH	20.05	10.03	65.4	30.000	6.1120	86842.10	183359.00	0.474 ✔
T9	25 - 5	ROHN 6 EHS	20.05	10.03	54.1	30.000	6.7133	101252.00	201398.00	0.503 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	185 - 165	L2x2x1/8	13.96	7.04	134.8	21.600	0.4844	742.46	10462.50	0.071 ✔
T2	165 - 145	L2 1/2x2 1/2x3/16	15.79	7.92	122.2	21.600	0.9020	1877.58	19483.20	0.096 ✔
T3	145 - 125	L3x3x3/16	19.02	9.62	122.9	21.600	1.0900	4731.51	23544.00	0.201 ✔
T4	125 - 105	L3 1/2x3 1/2x1/4	20.79	10.47	115.3	21.600	1.6900	5946.84	36504.00	0.163 ✔
T5	105 - 85	L3 1/2x3 1/2x1/4	22.60	11.37	125.2	21.600	1.6900	6644.60	36504.00	0.182 ✔
T6	85 - 65	L4x4x1/4	24.44	12.25	117.6	21.600	1.9400	7404.17	41904.00	0.177 ✔
T7	65 - 45	L4x4x5/16	26.45	13.27	128.5	21.600	2.4000	7925.86	51840.00	0.153 ✔
T8	45 - 25	ROHN 2.5 STD	24.29	12.15	153.8	30.000	1.7040	12397.50	51121.50	0.243 ✔
T9	25 - 5	ROHN 3 STD	25.01	12.51	129.0	30.000	2.2285	12621.20	66854.10	0.189 ✔

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	P2.5x.203	25.04	12.29	155.6	21.600	1.7040	7101.02	36807.50	0.193 ✔
T9	25 - 5	P2.5x.203	27.54	13.54	171.5	21.600	1.7040	7531.01	36807.50	0.205 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	185 - 165	L2x2x1/8	10.56	10.32	197.8	21.600	0.4844	42.80	10462.50	0.004 ✔

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	ROHN 1.5 STD	6.26	6.03	116.2	21.600	0.7995	2028.84	17268.30	0.117 ✔
T9	25 - 5	ROHN 1.5 STD	6.89	6.61	127.4	21.600	0.7995	2376.83	17268.30	0.138 ✔

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	ROHN 1.5 STD	11.48	11.01	212.3	21.600	0.7995	1860.96	17268.30	0.108 ✔
T9	25 - 5	ROHN 1.5 STD	11.81	11.37	219.2	21.600	0.7995	2038.25	17268.30	0.118 ✔

Redundant Hip Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	45 - 25	ROHN 2.5 X-STR	15.03	15.03	195.2	21.600	2.2535	79.89	48676.50	0.002 ✔
T9	25 - 5	ROHN 3 STD	15.85	15.85	163.4	21.600	2.2285	79.66	48134.90	0.002

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
										✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	185 - 165	Leg	ROHN 2.5 EH	1	-2568.96	52972.22	4.8	Pass
		Diagonal	L2x2x1/8	8	-761.79	2658.92	28.7	Pass
		Top Girt	L2x2x1/8	6	-73.37	1705.21	4.3	Pass
T2	165 - 145	Leg	ROHN 3 STD	25	-9822.89	62813.76	15.6	Pass
		Diagonal	L2 1/2x2 1/2x3/16	29	-1905.99	5868.31	32.5	Pass
T3	145 - 125	Leg	ROHN 3.5 EH	47	-23947.30	80928.43	29.6	Pass
		Diagonal	L3x3x3/16	50	-4842.87	6994.81	69.2	Pass
T4	125 - 105	Leg	ROHN 4 EH	62	-44406.90	110040.75	40.4	Pass
		Diagonal	L3 1/2x3 1/2x1/4	65	-5999.22	12127.62	49.5	Pass
T5	105 - 85	Leg	ROHN 4 EH	77	-65754.50	110040.75	59.8	Pass
		Diagonal	L3 1/2x3 1/2x1/4	80	-6731.80	10564.32	63.7	Pass
T6	85 - 65	Leg	ROHN 5 EH	92	-87983.40	177452.95	49.6	Pass
		Diagonal	L4x4x1/4	95	-7508.53	13448.77	55.8	Pass
T7	65 - 45	Leg	ROHN 5 EH	107	-110524.00	177420.96	62.3	Pass
		Diagonal	L4x4x5/16	110	-7971.25	14413.86	55.3	Pass
T8	45 - 25	Leg	ROHN 5 EH	122	-116907.00	177370.31	65.9	Pass
		Diagonal	ROHN 2.5 STD	128	-12932.70	14331.48	90.2	Pass
		Horizontal	P2.5x.203	124	-7056.95	14002.50	50.4	Pass
		Redund Horz 1 Bracing	ROHN 1.5 STD	129	-2028.84	11533.13	17.6	Pass
		Redund Diag 1 Bracing	ROHN 1.5 STD	134	-1860.96	3532.25	52.7	Pass
		Redund Hip 1 Bracing	ROHN 1.5 STD	149	-30.37	10857.48	0.3	Pass
		Redund Hip Diagonal Bracing	ROHN 2.5 X-STR	148	-54.62	8833.12	0.6	Pass
		Inner Bracing	ROHN 2.5 EH	153	-13.37	16969.49	0.4	Pass
T9	25 - 5	Leg	ROHN 6 EHS	155	-136968.00	212134.94	64.6	Pass
		Diagonal	ROHN 3 STD	161	-13226.40	26671.46	49.6	Pass
		Horizontal	P2.5x.203	157	-7617.55	11536.16	66.0	Pass
		Redund Horz 1 Bracing	ROHN 1.5 STD	162	-2376.83	9807.68	24.2	Pass
		Redund Diag 1 Bracing	ROHN 1.5 STD	163	-2038.25	3312.18	61.5	Pass
		Redund Hip 1 Bracing	ROHN 1.5 STD	182	-33.18	9037.01	0.4	Pass
		Redund Hip Diagonal Bracing	ROHN 3 STD	181	-56.28	12456.50	0.5	Pass
		Inner Bracing	ROHN 3 STD	184	-9.43	16501.30	0.5	Pass
							Summary	
						Leg (T8)	65.9	Pass
						Diagonal (T8)	90.2	Pass
						Horizontal (T9)	66.0	Pass
						Top Girt (T1)	4.3	Pass
						Redund Horz 1 Bracing (T9)	24.2	Pass
						Redund Diag 1 Bracing (T9)	61.5	Pass
						Redund Hip 1 Bracing (T9)	0.4	Pass
						Redund Hip Diagonal Bracing (T8)	0.6	Pass
						Inner Bracing (T9)	0.5	Pass
						RATING =	**90.2**	**Pass**

APPENDIX C

MOUNT CALCULATIONS

WINDSPEED BY LOCATION

Applied Technology Council

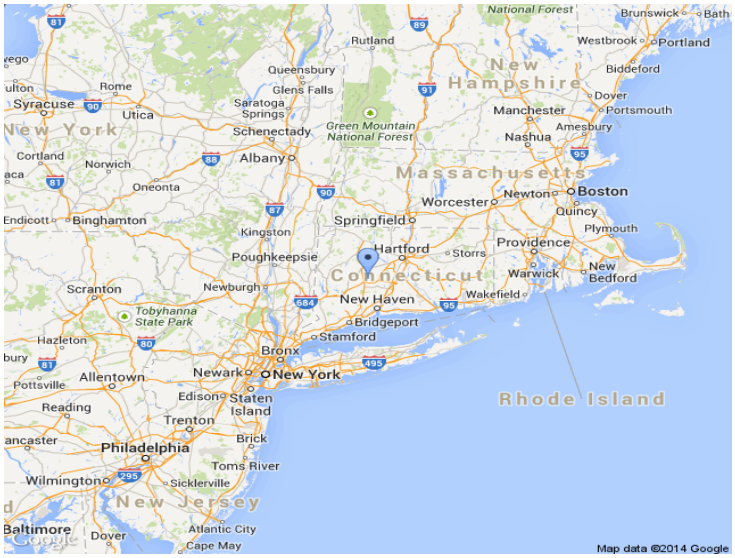
Search Results

Latitude: 41.5703
Longitude: -73.0167

ASCE 7-10 Wind Speeds (3-sec peak gust MPH*):

Risk Category I: 110
Risk Category II: 121
Risk Category III-IV: 130
MRI 10 Year:** 76
MRI 25 Year:** 86
MRI 50 Year:** 92
MRI 100 Year:** 98

ASCE 7-05: 100
ASCE 7-93: 79



*MPH(Miles per hour)

**MRI Mean Recurrence Interval (years)

Users should consult with local building officials to determine if there are community-specific wind speed requirements that govern.

Sponsored by the ATC Endowment Fund Applied Technology Council 201 Redwood Shores Parkway, Suite 240 Redwood City, California 94065 (650) 595-1542

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street
Sauk City, WI 53583
Office: (608) 643-4100

Job:	29427
Project:	Zip Call Tower (CT03XC045)
By:	JMO
Date:	09/18/14

Topographic Effects TIA-222

2.6.6.2 Topographic Categories

The topographic category for a structure shall be assessed as being one of the following:

1. Category 1: No abrupt changes in general topography, e.g. flat or rolling terrain, no wind speed-up consideration shall be required.
2. Category 2: Structures located at or near the crest of an escarpment. Wind speed-up shall be considered to occur in all directions. Structures located vertically on the lower half of an escarpment or horizontally beyond 8 times the height of the escarpment from its crest, shall be permitted to be considered as Topographic Category 1.
3. Category 3: Structures located in the upper half of a hill. Wind speed-up shall be considered to occur in all directions. Structures located vertically on the lower half of a hill shall be permitted to be considered as Topographic Category 1.
4. Category 4: Structures located in the upper half of a ridge. Wind speed-up shall be considered to occur in all directions. Structures located vertically on the lower half of a ridge shall be permitted to be considered as Topographic Category 1.

Topographic Category	3		
H =	360	ft	height of hill
Exposure Category	B		
z =	130	ft	height of antennas above ground level
Ke =	0.90		
Kt =	0.53		
f =	2.00		
Kh =	2.06		
Kzt =	**1.52**		

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Wind Load on Antennas TIA-222

2.6.9.6 Velocity Pressure

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

Occupancy:	II		Classification of Structures (Table 2-1)
Exposure:	B		Exposure Category
V:	100	mph	Basic Wind Speed (Annex B)
z:	130	ft	Height above ground level to the center of the antenna
I:	1.00		Importance Factor (Table 2-3)
K_z:	1.07		Velocity Pressure Coefficient (2.6.5.2)
K_{zt}:	1.517		Topographic Factor (2.6.6.4)
K_d:	0.95		Wind Direction Probability Factor (Table 2-2)
q_z =	**39.3**	**psf**	

G_h:	1.00	Strength Design of Appurtenances and their Connections

Mount & Antenna Wind Loads

Appurtenance	Height	Width	h/D	Shape	C_a	A_f	**$F = q_z G_h C_a A_a$**	
Pipe4STD x 19 ft	228.0 in	4.5 in	50.7	Round	0.806	7.13 sf	**225.6 lb**	11.9 plf
Pipe2STD x 6 ft	72.0 in	2.4 in	30.3	Round	1.200	1.19 sf	**56.1 lb**	9.4 plf
Pipe3STD x 10 ft	120.0 in	3.5 in	34.3	Round	1.036	2.92 sf	**118.7 lb**	11.9 plf
APXV9TM14-ALU-I20	56.3 in	12.6 in	4.5	Flat	1.287	4.93 sf	**249.2 lb**	
TD-RRH8x20-25	26.1 in	18.6 in	1.4	Flat	1.200	3.37 sf	**159.0 lb**	
APXVSPP18-C-A20	72.0 in	11.9 in	6.1	Flat	1.358	5.95 sf	**317.3 lb**	
1900MHz 4x40W RRH	25.1 in	11.1 in	2.3	Flat	1.200	1.93 sf	**91.2 lb**	
800MHz 2x50W RRH	19.0 in	13.0 in	1.5	Flat	1.200	1.72 sf	**80.9 lb**	
IBC1900HG-2A	12.6 in	9.2 in	1.4	Flat	1.200	0.80 sf	**37.8 lb**	
IBC1900BB-1	12.6 in	9.2 in	1.4	Flat	1.200	0.80 sf	**37.8 lb**	

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street
Sauk City, WI 53583
Office: (608) 643-4100

Job:	29427
Project:	Zip Call Tower (CT03XC045)
By:	JMO
Date:	09/18/14

Wind Load on Antennas TIA-222

2.6.9.6 Velocity Pressure

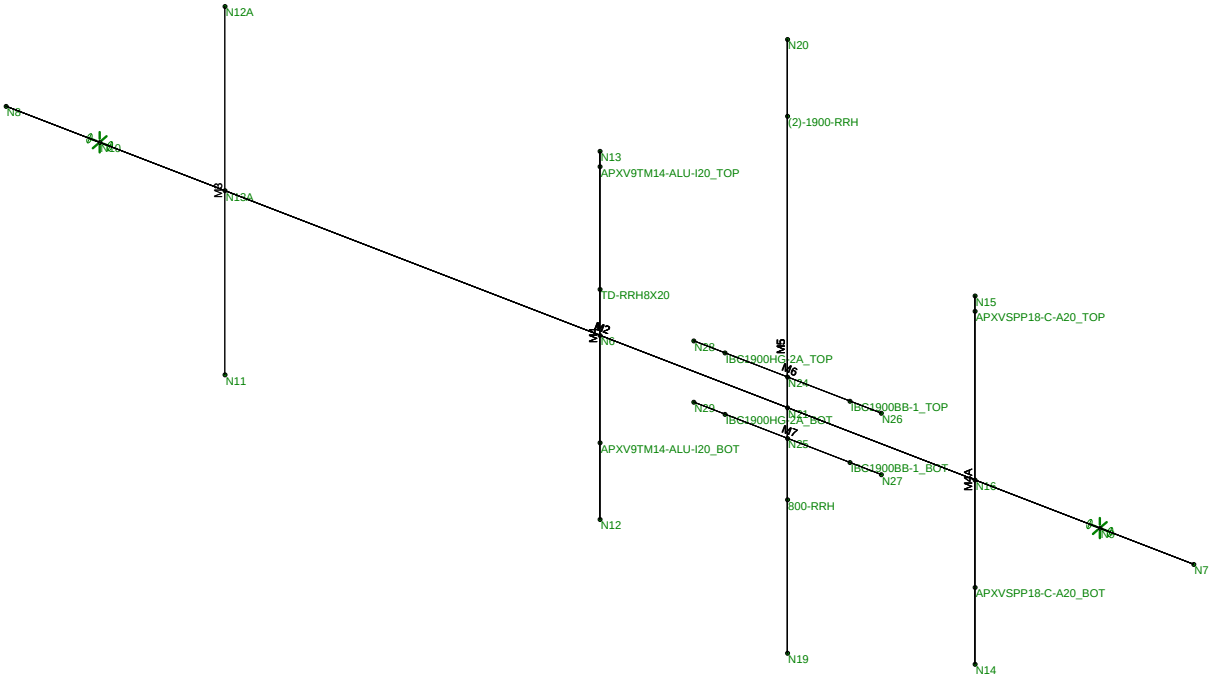
$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

Occupancy:	II		Classification of Structures (Table 2-1)
Exposure:	B		Exposure Category
V:	100	mph	Basic Wind Speed (Annex B)
z:	130	ft	Height above ground level to the center of the antenna
I:	1.00		Importance Factor (Table 2-3)
K_z:	1.07		Velocity Pressure Coefficient (2.6.5.2)
K_{zt}:	1.517		Topographic Factor (2.6.6.4)
K_d:	0.95		Wind Direction Probability Factor (Table 2-2)
q_z =	**39.3**	**psf**	

G_h:	1.00	Strength Design of Appurtenances and their Connections

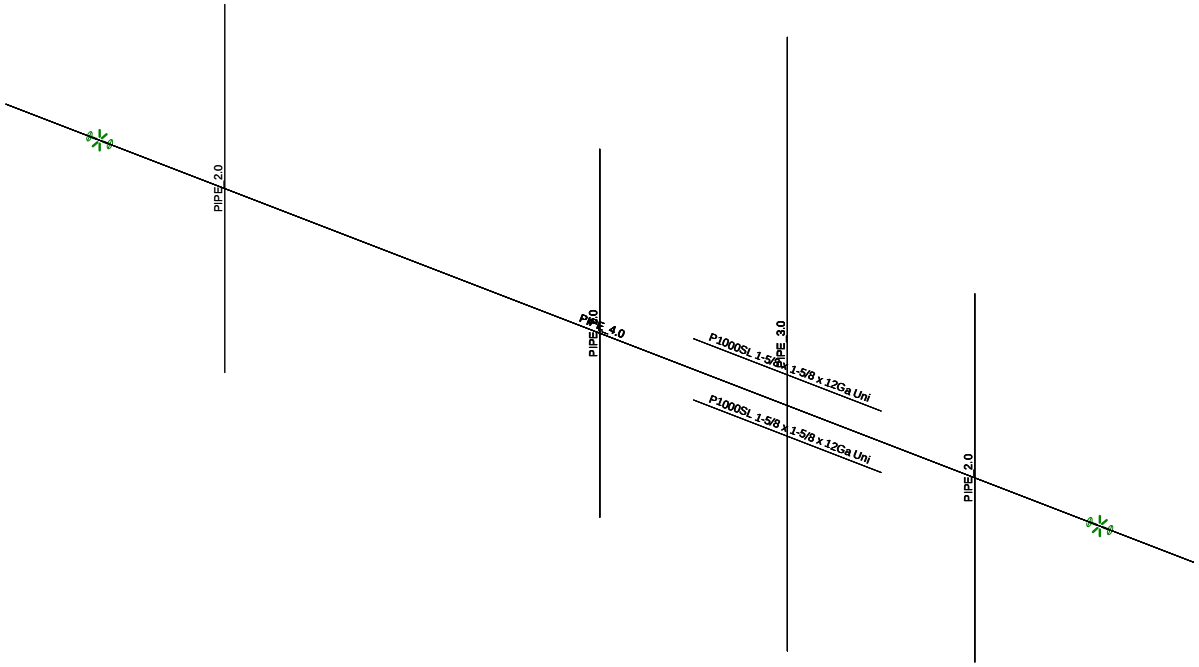
Mount & Antenna Wind Loads

Appurtenance	Height	Depth	h/D	Shape	C_a	A_f	**$F = q_z G_h C_a A_a$**	
Pipe4STD x 19 ft	228.0 in	4.5 in	50.7	Round	0.806	7.13 sf	**225.6 lb**	11.9 plf
Pipe2STD x 6 ft	72.0 in	2.4 in	30.3	Round	1.200	1.19 sf	**56.1 lb**	9.4 plf
Pipe3STD x 10 ft	120.0 in	3.5 in	34.3	Round	1.036	2.92 sf	**118.7 lb**	11.9 plf
APXV9TM14-ALU-I20	56.3 in	6.3 in	8.9	Flat	1.465	2.46 sf	**141.8 lb**	
TD-RRH8x20-25	26.1 in	6.7 in	3.9	Flat	1.262	1.21 sf	**60.2 lb**	
APXVSPP18-C-A20	72.0 in	7.0 in	10.3	Flat	1.509	3.50 sf	**207.8 lb**	
1900MHz 4x40W RRH	25.1 in	10.7 in	2.3	Flat	1.200	1.86 sf	**87.9 lb**	
800MHz 2x50W RRH	19.0 in	12.2 in	1.6	Flat	1.200	1.61 sf	**75.9 lb**	
IBC1900HG-2A	12.6 in	4.4 in	2.9	Flat	1.218	0.38 sf	**18.2 lb**	
IBC1900BB-1	12.6 in	4.4 in	2.9	Flat	1.218	0.38 sf	**18.2 lb**	



Envelope Only Solution

Ramaker & Associates	Zip Call Tower (CT03XC045)	SK - 1
JMO		Sept 18, 2014 at 12:40 PM
29427		29427 Mount.r3d



Envelope Only Solution

Ramaker & Associates	Zip Call Tower (CT03XC045)	SK - 2
JMO		Sept 18, 2014 at 12:41 PM
29427		29427 Mount.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	Gr. 33	29000	11154	.3	.65	.49	33	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
5	A500 Gr.42	29000	11154	.3	.65	.49	42	1.4	58	1.3
6	A500 Gr.46	29000	11154	.3	.65	.49	46	1.4	58	1.3
7	A53 Gr. B	29000	11154	.3	.65	.49	35	1.5	60	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	pipe 2.0	PIPE_2.0	Beam	Pipe	A53 Gr. B	Typical	1.02	.627	.627	1.25
2	pipe 3.0	PIPE_3.0	Beam	Pipe	A53 Gr. B	Typical	2.07	2.85	2.85	5.69
3	pipe 4.0	PIPE_4.0	Beam	Pipe	A53 Gr. B	Typical	2.96	6.82	6.82	13.6
4	Unistrut	P1000SL 1...	Beam	Channel	Gr. 33	Typical	.556	.238	.191	.002

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M4	N13	N12			pipe 2.0	Beam	Pipe	A53 Gr. B	Typical
2	M2	N8	N7			pipe 4.0	Beam	Pipe	A53 Gr. B	Typical
3	M3	N12A	N11			pipe 2.0	Beam	Pipe	A53 Gr. B	Typical
4	M4A	N15	N14			pipe 2.0	Beam	Pipe	A53 Gr. B	Typical
5	M5	N20	N19			pipe 3.0	Beam	Pipe	A53 Gr. B	Typical
6	M6	N28	N26		180	Unistrut	Beam	Channel	Gr. 33	Typical
7	M7	N29	N27		180	Unistrut	Beam	Channel	Gr. 33	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N12	11.875	-2.25	.83	0	
2	N13	11.875	3.75	.83	0	
3	APXV9TM14-ALU-I20_TOP	11.875	3.5	.83	0	
4	APXV9TM14-ALU-I20_BOT	11.875	-1	.83	0	
5	TD-RRH8X20	11.875	1.5	.83	0	
6	N6	11.875	.75	.83	0	
7	N7	21.375	.75	.83	0	
8	N8	2.375	.75	.83	0	
9	N9	19.875	.75	.83	0	
10	N10	3.875	.75	.83	0	
11	N11	5.875	-2.25	.83	0	
12	N12A	5.875	3.75	.83	0	
13	N13A	5.875	.75	.83	0	
14	N14	17.875	-2.25	.83	0	
15	N15	17.875	3.75	.83	0	
16	N16	17.875	.75	.83	0	
17	APXVSPP18-C-A20_TOP	17.875	3.5	.83	0	
18	APXVSPP18-C-A20_BOT	17.875	-1	.83	0	
19	N19	14.875	-3.25	.83	0	
20	N20	14.875	6.75	.83	0	
21	N21	14.875	.75	.83	0	
22	(2)-1900-RRH	14.875	5.5	.83	0	
23	800-RRH	14.875	-.75	.83	0	
24	N24	14.875	1.25	.83	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
25	N25	14.875	.25	.83	0	
26	N26	16.375	1.25	.83	0	
27	N27	16.375	.25	.83	0	
28	N28	13.375	1.25	.83	0	
29	N29	13.375	.25	.83	0	
30	IBC1900BB-1_TOP	15.875	1.25	.83	0	
31	IBC1900BB-1_BOT	15.875	.25	.83	0	
32	IBC1900HG-2A_TOP	13.875	1.25	.83	0	
33	IBC1900HG-2A_BOT	13.875	.25	.83	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	N12							
2	N13							
3	APXV9TM14-ALU-...							
4	APXV9TM14-ALU-...							
5	TD-RRH8X20							
6	N6							
7	N7							
8	N8							
9	N9	Reaction	Reaction	Reaction	Reaction			
10	N10	Reaction	Reaction	Reaction	Reaction			
11	N11							
12	N12A							
13	N13A							
14	N14							
15	N15							
16	N16							
17	APXVSPP18-C-A2...							
18	APXVSPP18-C-A2...							
19	N19							
20	N20							
21	N21							
22	(2)-1900-RRH							
23	800-RRH							
24	N24							
25	N25							
26	N26							
27	N27							
28	N28							
29	N29							
30	IBC1900BB-1_TOP							
31	IBC1900BB-1_BOT							
32	IBC1900HG-2A_T...							
33	IBC1900HG-2A_B...							

Joint Loads and Enforced Displacements (BLC 1 : DL)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*...
1	APXV9TM14-ALU-I20_TOP	L	Y	-27.5
2	APXV9TM14-ALU-I20_BOT	L	Y	-27.5
3	TD-RRH8X20	L	Y	-70
4	APXVSPP18-C-A20_TOP	L	Y	-28.5
5	APXVSPP18-C-A20_BOT	L	Y	-28.5
6	IBC1900BB-1_TOP	L	Y	-11

Joint Loads and Enforced Displacements (BLC 1 : DL) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*...
7	IBC1900BB-1_BOT	L	Y	-11
8	IBC1900HG-2A_TOP	L	Y	-11
9	IBC1900HG-2A_BOT	L	Y	-11
10	800-RRH	L	Y	-64
11	(2)-1900-RRH	L	Y	-120

Joint Loads and Enforced Displacements (BLC 2 : WLz)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*...
1	APXV9TM14-ALU-I20_TOP	L	Z	-124.6
2	APXV9TM14-ALU-I20_BOT	L	Z	-124.6
3	TD-RRH8X20	L	Z	-159
4	APXVSPP18-C-A20_TOP	L	Z	-158.6
5	APXVSPP18-C-A20_BOT	L	Z	-158.6
6	IBC1900BB-1_TOP	L	Z	-18.9
7	IBC1900BB-1_BOT	L	Z	-18.9
8	IBC1900HG-2A_TOP	L	Z	-18.9
9	IBC1900HG-2A_BOT	L	Z	-18.9
10	800-RRH	L	Z	-80.9
11	(2)-1900-RRH	L	Z	-182.4

Joint Loads and Enforced Displacements (BLC 3 : WLx)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*...
1	APXV9TM14-ALU-I20_TOP	L	X	-70.9
2	APXV9TM14-ALU-I20_BOT	L	X	-70.9
3	TD-RRH8X20	L	X	-60.2
4	APXVSPP18-C-A20_TOP	L	X	-103.9
5	APXVSPP18-C-A20_BOT	L	X	-103.9
6	IBC1900BB-1_TOP	L	X	-9.1
7	IBC1900BB-1_BOT	L	X	-9.1
8	IBC1900HG-2A_TOP	L	X	-9.1
9	IBC1900HG-2A_BOT	L	X	-9.1
10	800-RRH	L	X	-75.9
11	(2)-1900-RRH	L	X	-87.9

Member Distributed Loads (BLC 2 : WLz)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M3	Z	-9.4	-9.4	0	0
2	M2	Z	-11.9	-11.9	0	0
3	M5	Z	-11.9	-11.9	0	6
4	M5	Z	-11.9	-11.9	8	10

Member Distributed Loads (BLC 3 : WLx)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M4	X	-9.4	-9.4	0	0
2	M3	X	-9.4	-9.4	0	0
3	M4A	X	-9.4	-9.4	0	0
4	M5	X	-11.9	-11.9	2	10

Member Area Loads

Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
No Data to Print ...						

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	DL	DL		-1		11				
2	WLz	WLZ				11		4		
3	WLx	WLX				11		4		
4	LL1	LL					1			
5	LL2	None					1			

Load Combinations

	Description	Sol..	PDelta	SR..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact...
1	1.4DL	Yes	Y		DL	1.4														
2	1.2DL+1.6WLz	Yes	Y		DL	1.2	WLZ	1.6												
3	1.2DL-1.6WLz	Yes	Y		DL	1.2	WLZ	-1.6												
4	1.2DL+1.6WLx	Yes	Y		DL	1.2	W...	1.6												
5	1.2DL-1.6WLx	Yes	Y		DL	1.2	W...	-1.6												
6	1.2DL+1.6(0.75WLz+0.75WLx)	Yes	Y		DL	1.2	WLZ	1.2	W...	1.2										
7	1.2DL+1.6(0.75WLz-0.75WLx)	Yes	Y		DL	1.2	WLZ	1.2	W...	-1.2										
8	1.2DL-1.6(0.75WLz-0.75WLx)	Yes	Y		DL	1.2	WLZ	-1.2	W...	1.2										
9	1.2DL-1.6(0.75WLz+0.75WLx)	Yes	Y		DL	1.2	WLZ	-1.2	W...	-1.2										
10	1.2DL+1.5LLend	Yes	Y		DL	1.2	LL	1.5												
11	1.2DL+1.5LLmid	Yes	Y		DL	1.2	5	1.5												
12	1.2DL+1.5LL+10%1.6WLz	Yes	Y		DL	1.2	LL	1.5	WLZ	.16										
13	1.2DL+1.5LL-10%1.6WLz	Yes	Y		DL	1.2	LL	1.5	WLZ	-.16										
14	1.2DL+1.5LL+10%1.6WLx	Yes	Y		DL	1.2	LL	1.5	W...	.16										
15	1.2DL+1.5LL-10%1.6WLx	Yes	Y		DL	1.2	LL	1.5	W...	-.16										
16	1.2DL+1.5LL+10%1.6(0.75WLz+...	Yes	Y		DL	1.2	LL	1.5	WLZ	.12	W...	.12								
17	1.2DL+1.5LL+10%1.6(0.75WLz-...	Yes	Y		DL	1.2	LL	1.5	WLZ	.12	W...	-.12								
18	1.2DL+1.5LL-10%1.6(0.75WLz-0...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.12	W...	.12								
19	1.2DL+1.5LL-10%1.6(0.75WLz+...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.12	W...	-.12								
20	1.2DL+1.5LL+10%1.6WLz	Yes	Y		DL	1.2	5	1.5	WLZ	.16										
21	1.2DL+1.5LL-10%1.6WLz	Yes	Y		DL	1.2	5	1.5	WLZ	-.16										
22	1.2DL+1.5LL+10%1.6WLx	Yes	Y		DL	1.2	5	1.5	W...	.16										
23	1.2DL+1.5LL-10%1.6WLx	Yes	Y		DL	1.2	5	1.5	W...	-.16										
24	1.2DL+1.5LL+10%1.6(0.75WLz+...	Yes	Y		DL	1.2	5	1.5	WLZ	.12	W...	.12								
25	1.2DL+1.5LL+10%1.6(0.75WLz-...	Yes	Y		DL	1.2	5	1.5	WLZ	.12	W...	-.12								
26	1.2DL+1.5LL-10%1.6(0.75WLz-0...	Yes	Y		DL	1.2	5	1.5	WLZ	-.12	W...	.12								
27	1.2DL+1.5LL-10%1.6(0.75WLz+...	Yes	Y		DL	1.2	5	1.5	WLZ	-.12	W...	-.12								
28	DL		Y		DL	1														
29	WLz		Y		WLZ	1														
30	Service WLz		Y		WLZ	.298														
31	WLx		Y		W...	1														

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N9	max	912.82	4	910.704	15	1440.31	2	1401.407	2	0	1	0	1
2		min	-912.82	5	493.425	4	-1440.31	3	-1401.407	3	0	1	0	1
3	N10	max	486.22	4	544.66	22	866.89	2	674.324	2	0	1	0	1
4		min	-486.22	5	302.444	5	-866.89	3	-674.324	3	0	1	0	1
5	Totals:	max	1399.04	4	1269.753	22	2307.2	2						
6		min	-1399.04	5	894.753	5	-2307.2	3						

Envelope AISC 13th(360-05): LRFD Steel Code Checks

	Member	Shape	Code Ch...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc ...	phi*Pnt [...	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	M4	PIPE_2.0	.399	3	2	.047	2.25		2	20866.7...	32130	1871.625	1871.625	1....	H1-1b
2	M2	PIPE_4.0	.558	9.5	2	.201	17.417		2	29638.3...	93240	10631.25	10631.25	1....	H1-1b
3	M3	PIPE_2.0	.039	3	7	.005	3		7	20866.7...	32130	1871.625	1871.625	1....	H1-1b
4	M4A	PIPE_2.0	.375	3	2	.026	.25		2	20866.7...	32130	1871.625	1871.625	1....	H1-1b
5	M5	PIPE_3.0	.306	5.938	2	.024	5.938		2	38176.7	65205	5748.75	5748.75	1....	H1-1b
6	M6	P1000SL 1-...	.057	1.5	2	.010	1.5	z	2	8841.674	16500.8...	853.479	732.127	1....	H1-1b
7	M7	P1000SL 1-...	.057	1.5	2	.010	.5	z	2	8841.674	16500.8...	853.479	732.127	1....	H1-1b