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
U-CONN
82 North Eagleville Rd.
Storrs, CT 06269

RE: Sprint Spectrum L.P. notice of intent to modify an existing telecommunications facility located at 82 North Eagleville Rd. Storrs, CT 06269Known to Sprint Spectrum L.P. as site CT03XC214

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: CT03XC214

U-Conn

82 North Eaglesville Road
Storrs, CT 06269

January 21, 2015

EBI Project Number: 62143748

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

EBI Consulting
environmental | engineering | due diligence

January 21, 2015

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

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:
CT03XC214 - U-Conn

Site Total: 6.10% - MPE% in full compliance

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 82 North Eaglesville Road, Storrs, 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 82 North Eaglesville Road, Storrs, 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) 7 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, RFS APXV9ERR18-C-A20 and the RFS APXVTM14-C-I20. This is based on feedback from the carrier with regards to anticipated antenna selection. The RFS APXVSPP18-C-A20 has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. The RFS APXV9ERR18-C-A20 has a 14.9 dBd gain value at its main lobe at 1900 MHz and 11.9 dBd at its main lobe for 850 MHz. The RFS APXV9TM14-ALU-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 **247 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	CT03XC214 - U-Conn
Site Addresss	82 North Eaglesville Road, Storrs, CT, 06269
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	7	140	5.9	247	241	1/2 "	0.5	0	485.43	0.30%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	247	241	1/2 "	0.5	0	39.00	0.04%
1B	RFS	APXV9TM14-ALU-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	247	241	1/2 "	0.5	0	138.69	0.15%
														Sector total Power Density Value:		0.49%

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	APXV9ERR18-C-A20	RRH	1900 MHz	CDMA / LTE	20	7	140	4.9	247	241	1/2 "	0.5	0	385.59	0.24%
2a	RFS	APXV9ERR18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	1.9	247	241	1/2 "	0.5	0	27.61	0.03%
2B	RFS	APXV9TM14-ALU-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	247	241	1/2 "	0.5	0	138.69	0.15%
														Sector total Power Density Value:		0.42%

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	7	140	5.9	247	241	1/2 "	0.5	0	485.43	0.30%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	247	241	1/2 "	0.5	0	39.00	0.04%
3B	RFS	APXV9TM14-ALU-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	247	241	1/2 "	0.5	0	138.69	0.15%
														Sector total Power Density Value:		0.49%

Site Composite MPE %	
Carrier	MPE %
Sprint	1.41%
CT Broadcasting	1.66%
Uconn	2.14%
Uconn Fire	0.83%
T-Mobile	0.06%
Total Site MPE %	**6.10%**

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Summary

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

The anticipated Maximum Composite contributions from the Sprint facility are **1.41% (0.49% from sector 1, 0.42% from sector 2 and 0.49% 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 **6.10%** 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: U-CONN

SITE CASCADE: CT03XC214-P

SITE ADDRESS: 82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

SITE TYPE: 250'-0" SELF SUPPORT

SITE INFORMATION

PROPERTY OWNER:
UNIVERSITY OF CONNECTICUT
352 MANSFIELD ROAD, UNIT 2072
STORRS, CT 06269-2072

SITE ADDRESS:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 06269
TOLLAND COUNTY

GEOGRAPHIC COORDINATES:
LATITUDE: 41° 48' 52.02" N (41.81445°)
LONGITUDE: 72° 15' 35.6" W (-72.25989°)

ZONING JURISDICTION:
CONNECTICUT SITTING COUNCIL

ZONING DISTRICT:
RAR 40

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

AAV PROVIDER:
AT&T
PH.: (855) 275-9594

SPRINT CONSTRUCTION MANAGER:
NAME: MIKE DELIA
PHONE: (781) 316-6348
E-MAIL: michael.delia@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 EQUIPMENT IN EXISTING BTS CABINET
  *(1) RECTIFIER SHELF AND (3) RECTIFIERS
  *(1) BASE BAND UNIT
- INSTALL NEW BATTERY STRING(S) IN EXISTING BATTERY CABINET
- INSTALL (3) PANEL ANTENNAS
- INSTALL (3) RRH'S ON TOWER
- INSTALL (1) HYBRID CABLE AND (2) 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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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: 2/09/2015

MARK	DATE	DESCRIPTION
A	02/09/15	FINAL CD's ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 02/09/2015

PROJECT TITLE:
U-CONN
CT03XC214-P

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:
TITLE SHEET

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: T-1

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 ITS 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: 2/09/2015

MARK	DATE	DESCRIPTION
A	02/09/15	FINAL CD's ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 02/09/2015

PROJECT TITLE:
U-CONN
CT03XC214-P

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:
SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: SP-1

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 COAXCABLE 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 PERIMETER TO DETERMINE ANY EXISTING 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 REPRESENTS 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, RRUS, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

ANTENNAS AND RRU'S:

THE NUMBER AND TYPE OF ANTENNAS AND RRUS 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 RRUS 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 RRUS 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 MANUFACTURERS 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 MANUFACTURERS 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 MANUFACTURERS 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: 2/09/2015

MARK	DATE	DESCRIPTION
A	02/09/15	FINAL CD's ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 02/09/2015

PROJECT TITLE:

U-CONN
CT03XC214-P

PROJECT INFORMATION:

82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:

SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: SP-2

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 PLUSH 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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Signature: Date: 2/09/2015

MARK	DATE	DESCRIPTION
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ISSUE PHASE: FINAL
DATE ISSUED: 02/09/2015

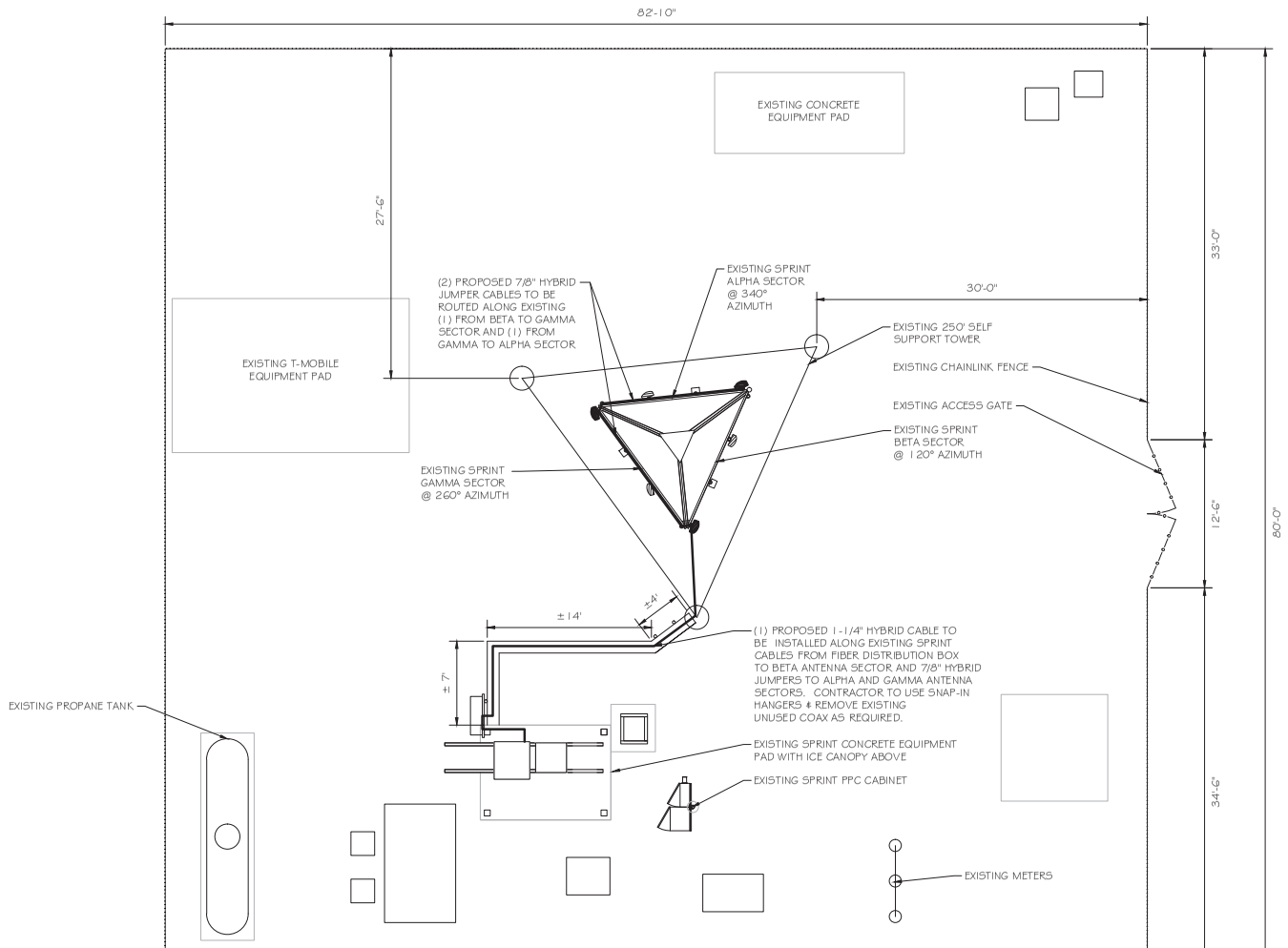
PROJECT TITLE:
U-CONN
CT03XC214-P

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:
SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 23003
SHEET NUMBER: SP-3



SITE PLAN
SCALE: 1" = 10'

NORTH

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U-CONN
CT03XC214-P

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:
SITE PLAN

0 5' 10' 20'
11" x 17" - 1" = 10'
22" x 34" - 1" = 5'

PROJECT NUMBER: 23003
SHEET NUMBER: A-1

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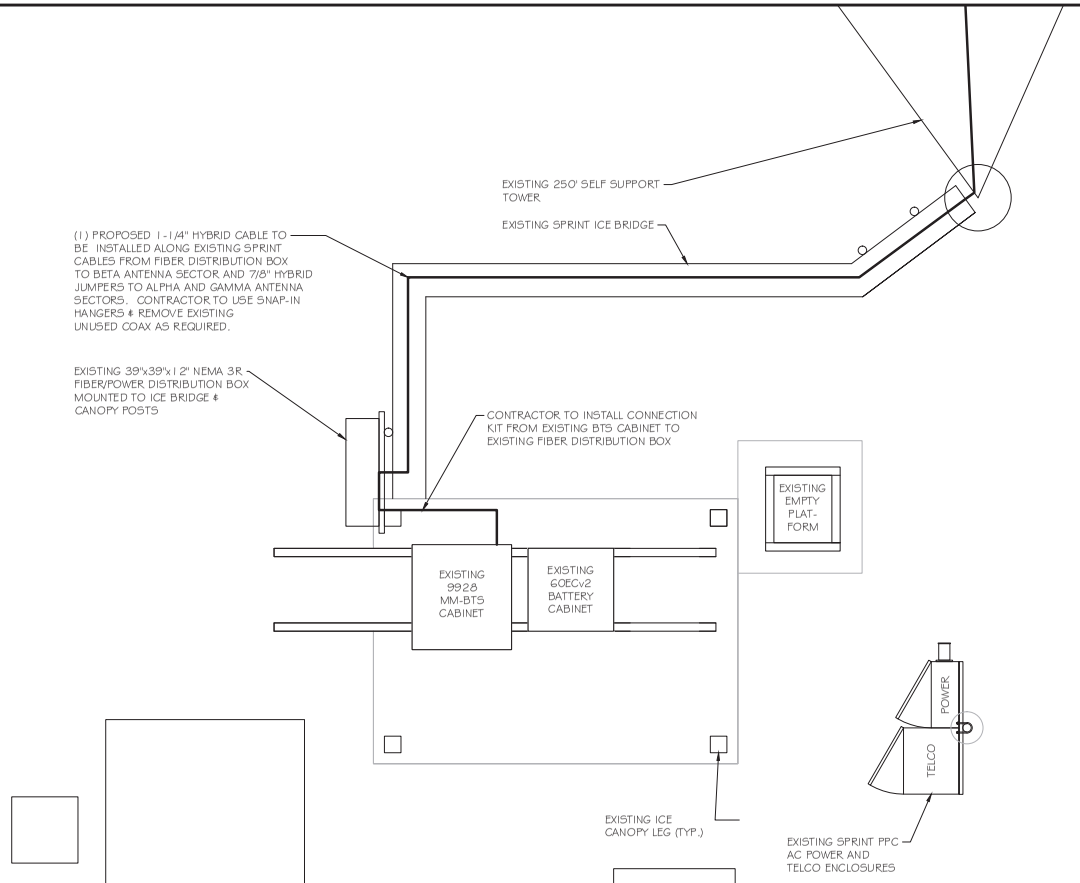

EQUIPMENT PLAN
SCALE: 1" = 3.75'

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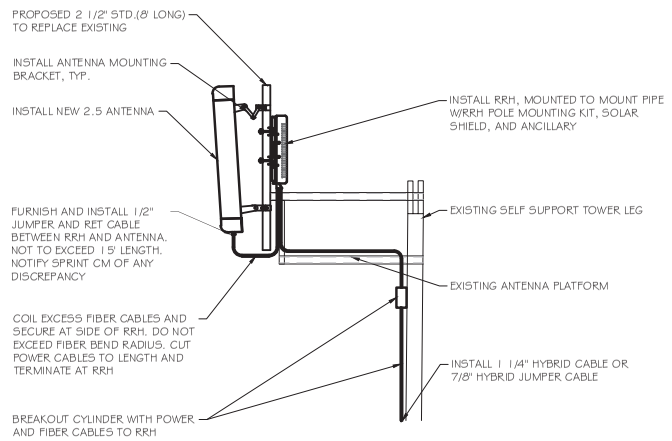
CT03XC214-P

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

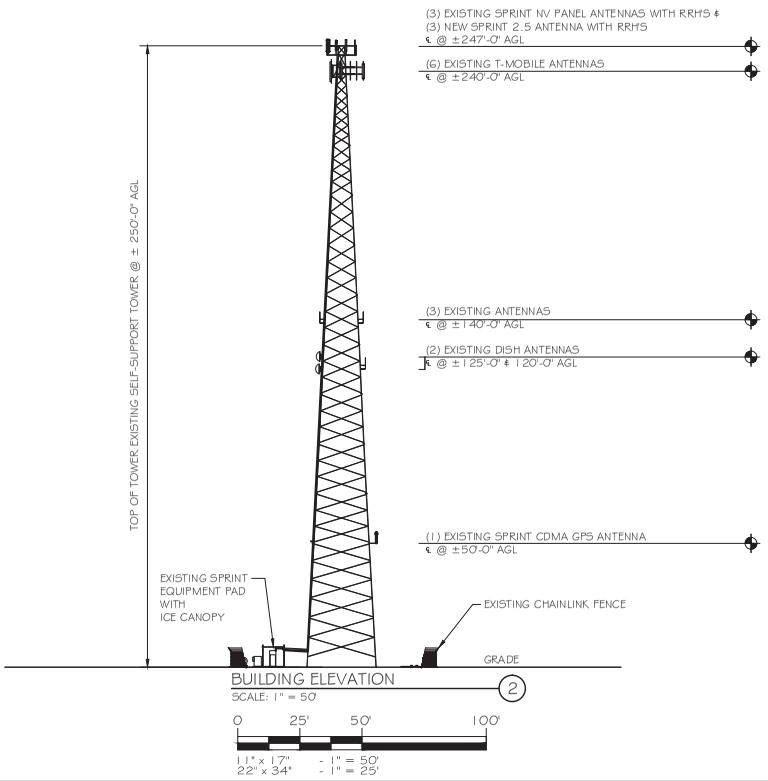
SHEET TITLE:
EQUIPMENT PLAN

0 1.875' 3.75' 7.5'
11" x 17" - 1" = 3.75'
22" x 34" - 1" = 1.875'

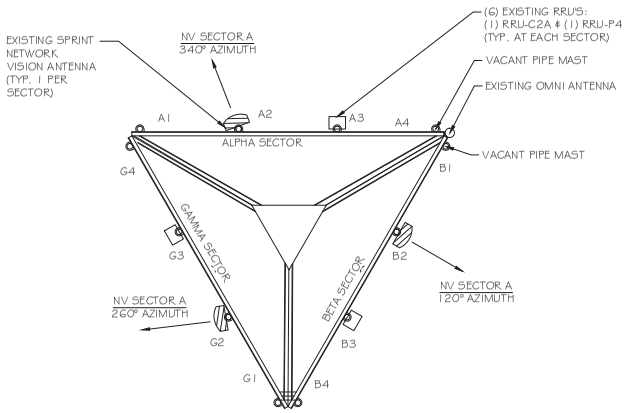
PROJECT NUMBER: 23003
SHEET NUMBER: A-2



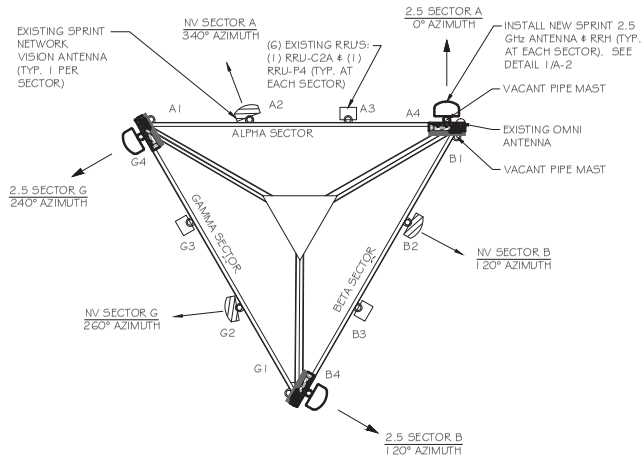
ANTENNA & RRH MOUNTING DETAILS (1)
SCALE: NTS



BUILDING ELEVATION (2)
SCALE: 1" = 50'



EXISTING ANTENNA ARRAY (3)
SCALE: NTS



PROPOSED ANTENNA ARRAY (4)
SCALE: NTS

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PROJECT TITLE:
U-CONN
CT03XC214-P

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:
BUILDING ELEVATIONS & ANTENNA DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 23003
SHEET NUMBER: A-3

RFDS Sheet

General Site Information

Site ID	CT03XC214	Equipment Vendor	Alcatel-Lucent
Market	Northern Connecticut	Lattitude	41.81436
Region	Northeast	Longitude	-72.26033
MLA	N/A	LL SITE ID	N/A
Structure Type	Guyed 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	None	Top Hat Weight (lbs)	N/A
Growth Cabinet Qty	N/A		
Growth Cabinet Dimensions	N/A		
Growth Cabinet Weight	N/A		

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 Hybrid Cable	
Cable Qty	1	
Weight per foot. Lbs.	0.992	
Diameter. Inches.	1.25	
Length Ft.	324	(calculated as antenna height plus 20%)
Coax Jumper	5/8"	
Coax Jumper Qty	27	
Coax Jumper Length. Feet.	8	
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. Feet.	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	247	247	247
Antenna Azimuth	0	120	240
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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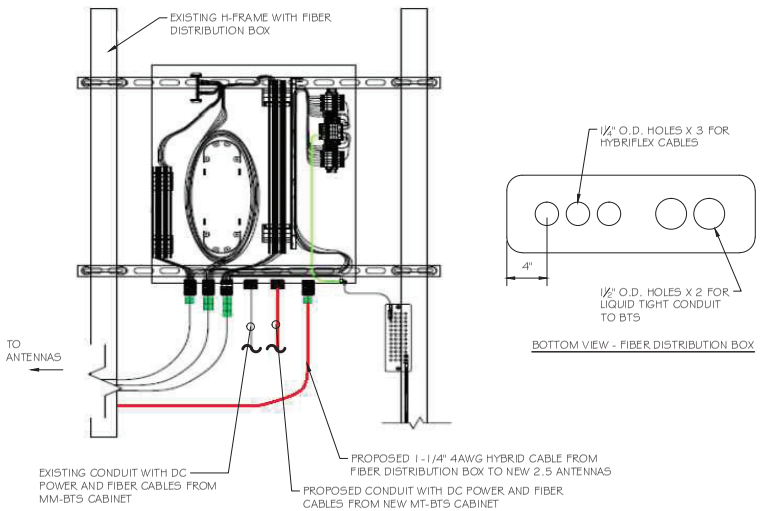
PROJECT TITLE:
U-CONN
CT03XC214-P

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

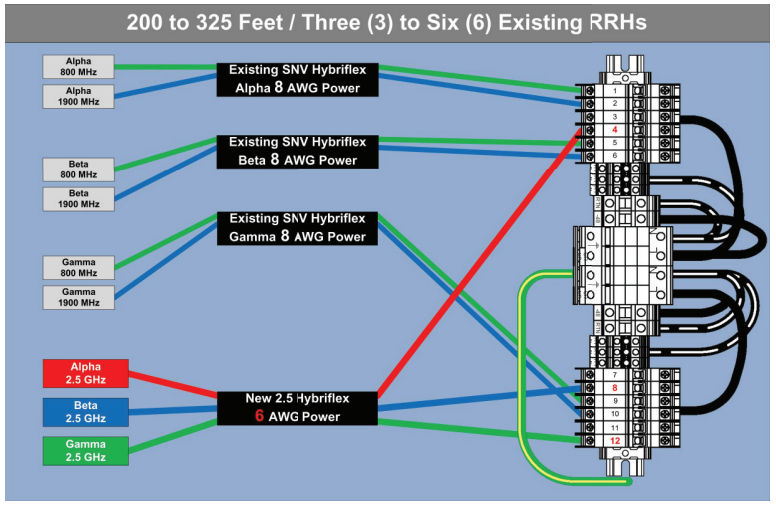
SHEET TITLE:
RF DATA SHEET

SCALE:
AS NOTED

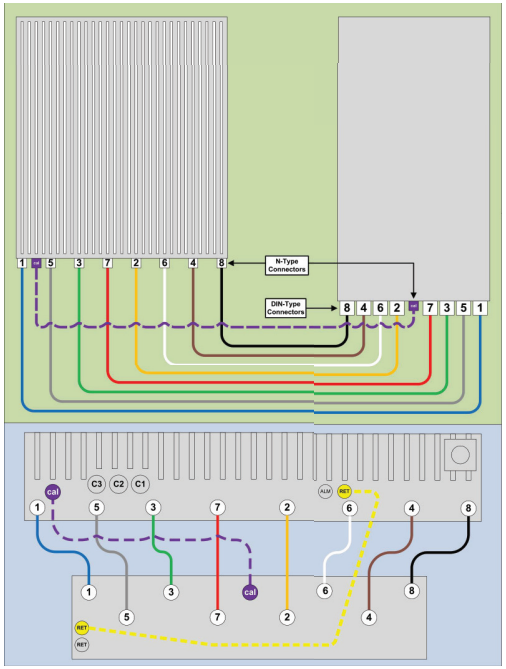
PROJECT NUMBER: 23003
SHEET NUMBER: A-4



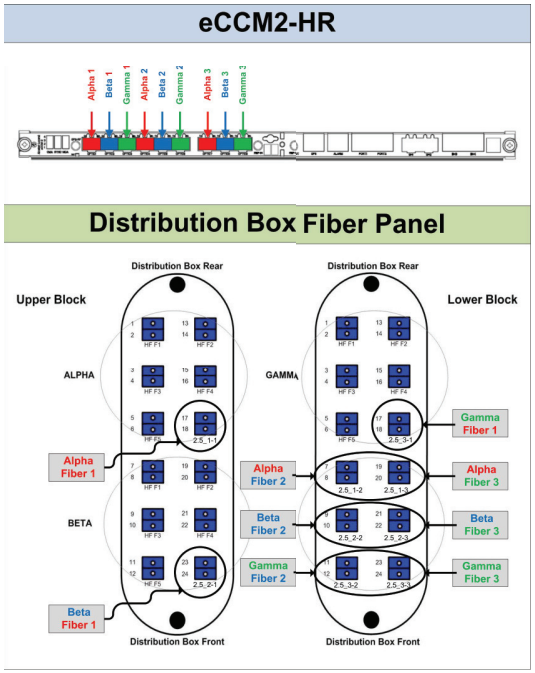
TYPICAL FIBER DISTRIBUTION BOX DETAIL (1)
SCALE: NTS



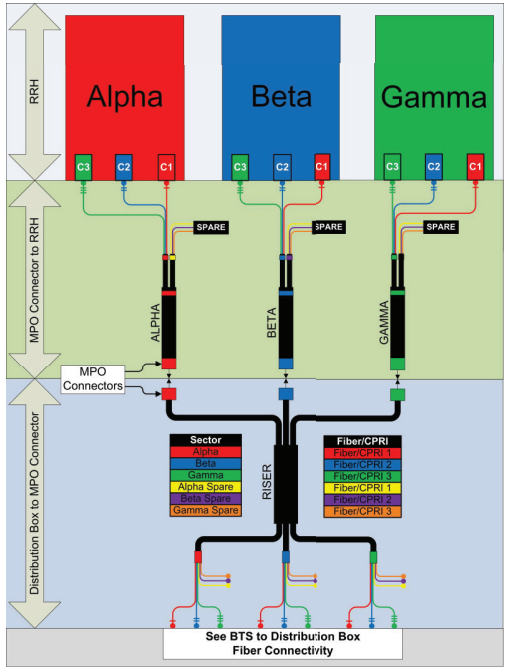
RRH TO DISTRIBUTION BOX POWER CONNECTIVITY DETAIL (2)
SCALE: NTS



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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PROJECT TITLE:
U-CONN
CT03XC214-P

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:
FIBER PLUMBING DIAGRAM

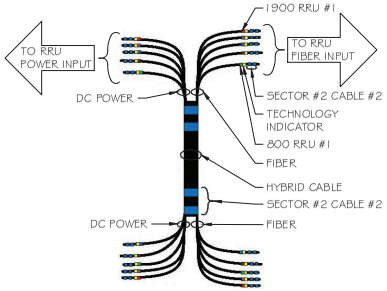
SCALE:
AS NOTED

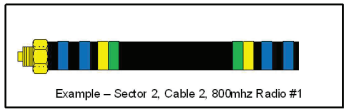
PROJECT NUMBER: 23003
SHEET NUMBER: A-5

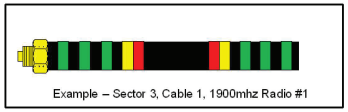
2.5 FREQUENCY	INDICATOR		ID
2500 -1	YEL	WHT	GRN
2500 -2	YEL	WHT	RED
2500 -3	YEL	WHT	BRN
2500 -4	YEL	WHT	BLU
2500 -5	YEL	WHT	SLT
2500 -6	YEL	WHT	ORG
2500 -7	YEL	WHT	WHT
2500 -8	YEL	WHT	PPL

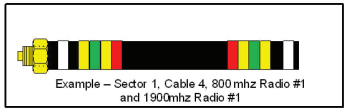
NV FREQUENCY	INDICATOR	ID
800-1	YEL	GRN
1900-1	YEL	RED
1900-2	YEL	BRN
1900-3	YEL	BLU
1900-4	YEL	SLT
800-1	YEL	ORG
RESERVED	YEL	WHT
RESERVED	YEL	PPL

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




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


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


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

COLOR CODING CHARTS
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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82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:
CABLE COLOR CODING

SCALE:
AS NOTED

PROJECT NUMBER: 23003
SHEET NUMBER: A-6

HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE
MANUF: RFS

CABLE	LENGTH	DC CONDUCTOR	CABLE DIAMETER
Fiber Only	Varies	Use NV Hybriflex	.58"
Hybriflex	<200'	8 AWG	1-1/4"
Hybriflex	225-300'	6 AWG	1-1/4"
Hybriflex	325-375'	4 AWG	1-1/4"

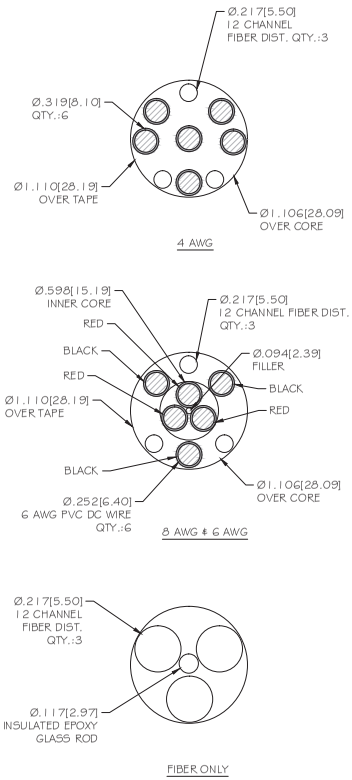
RFS HYBRIFLEX RISER CABLE SCHEDULE

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. 3 x 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. 1 x 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. 1 x 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. 1 x 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.



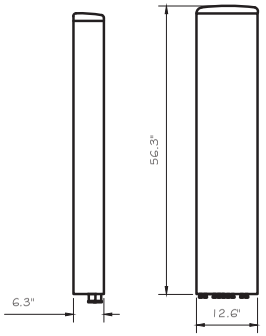
HYBRID CABLE CROSS SECTION & DATA (1)
SCALE: NTS

RFS: APXV9TM14-ALU-120

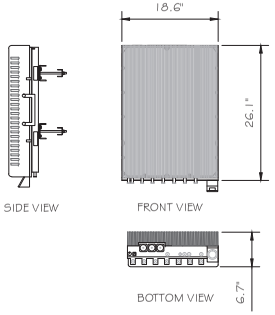
DIMENSIONS, HxWxD: 56.3" x 12.6" x 6.3"

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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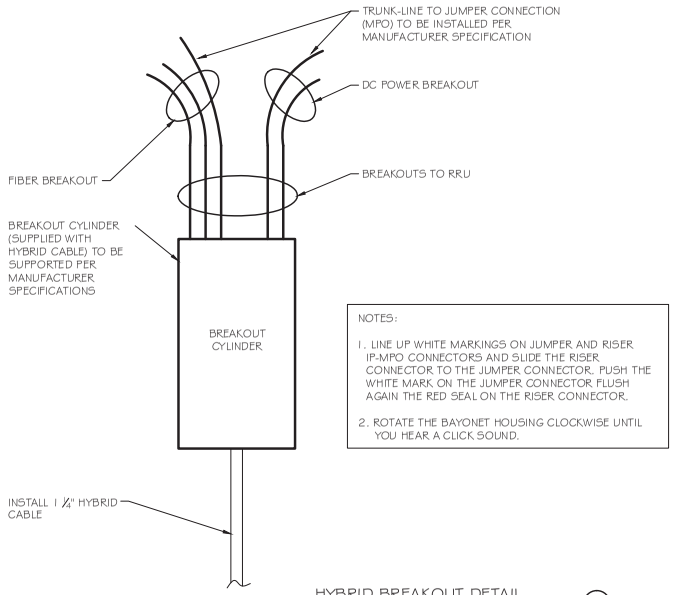
PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:
ANTENNA & HYBRID CABLE DETAILS

SCALE:
AS NOTED

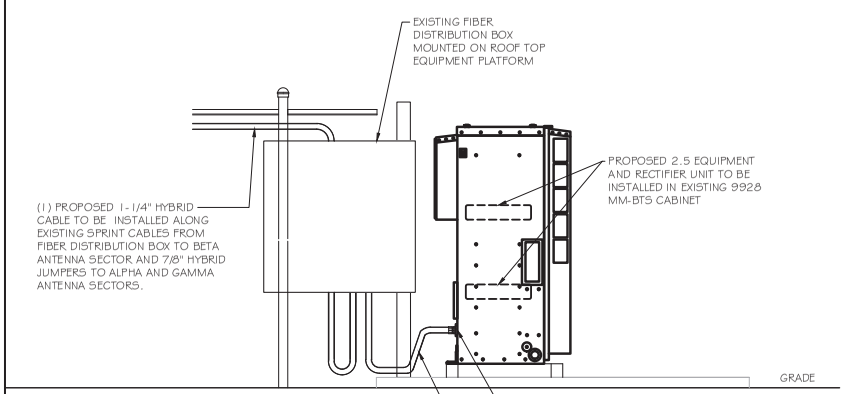
PROJECT NUMBER: 23003
SHEET NUMBER: A-7



NOTES:

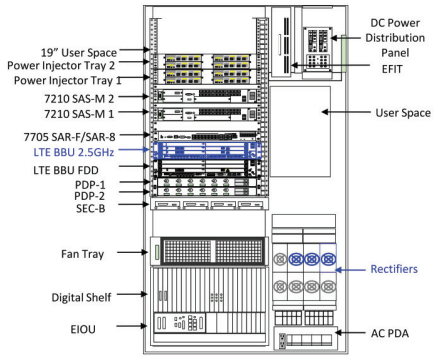
1. LINE UP WHITE MARKINGS ON JUMPER AND RISER IP-MPO CONNECTORS AND SLIDE THE RISER CONNECTOR TO THE JUMPER CONNECTOR. PUSH THE WHITE MARK ON THE JUMPER CONNECTOR FLUSH AGAIN THE RED SEAL ON THE RISER CONNECTOR.
2. ROTATE THE BAYONET HOUSING CLOCKWISE UNTIL YOU HEAR A CLICK SOUND.

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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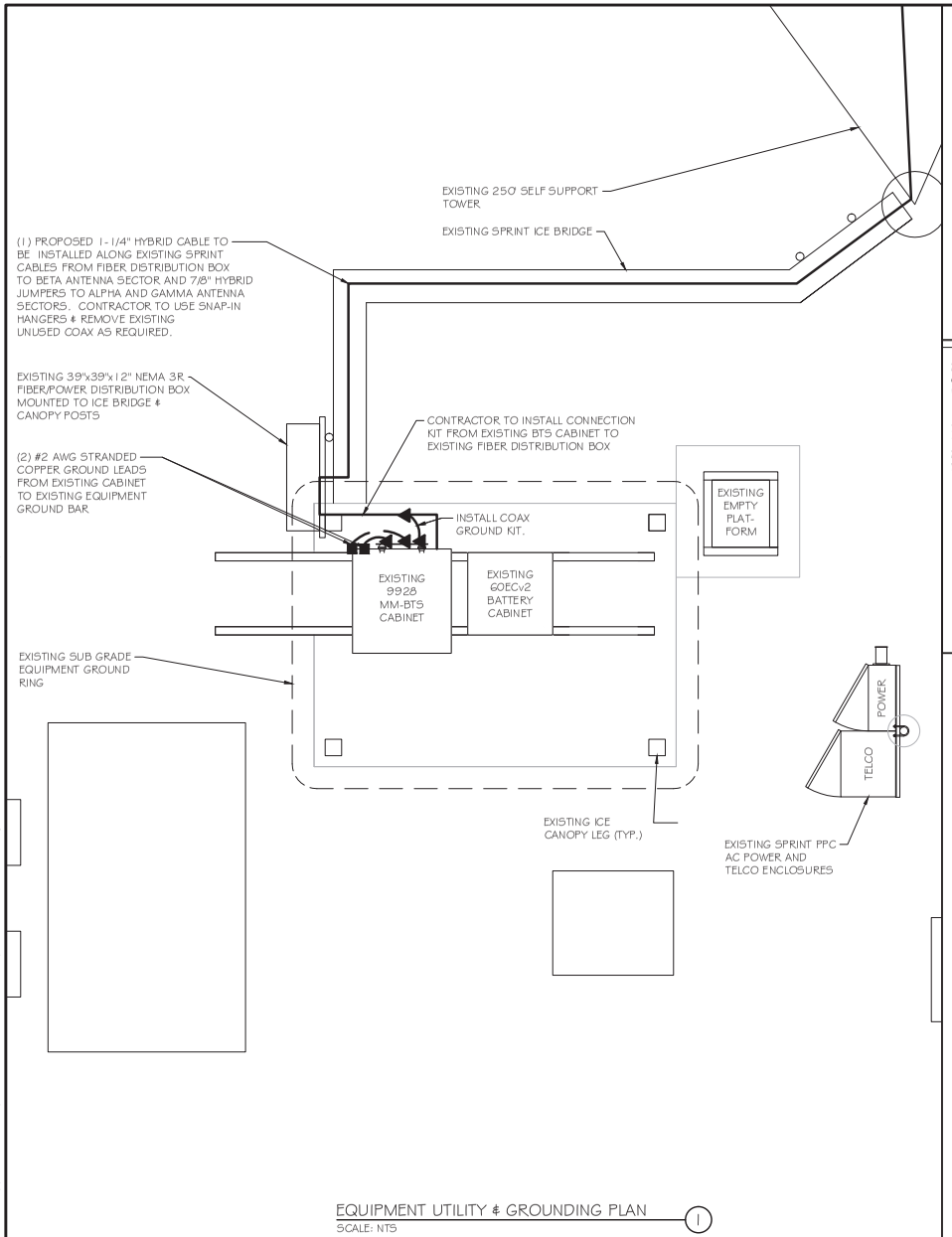
TOLLAND COUNTY

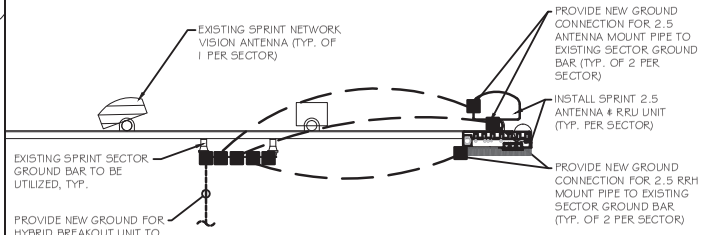
SHEET TITLE:
EQUIPMENT DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 23003
SHEET NUMBER: A-8



EQUIPMENT UTILITY & GROUNDING PLAN
SCALE: NTS (1)



ANTENNA GROUNDING DETAIL
SCALE: NTS (2)

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

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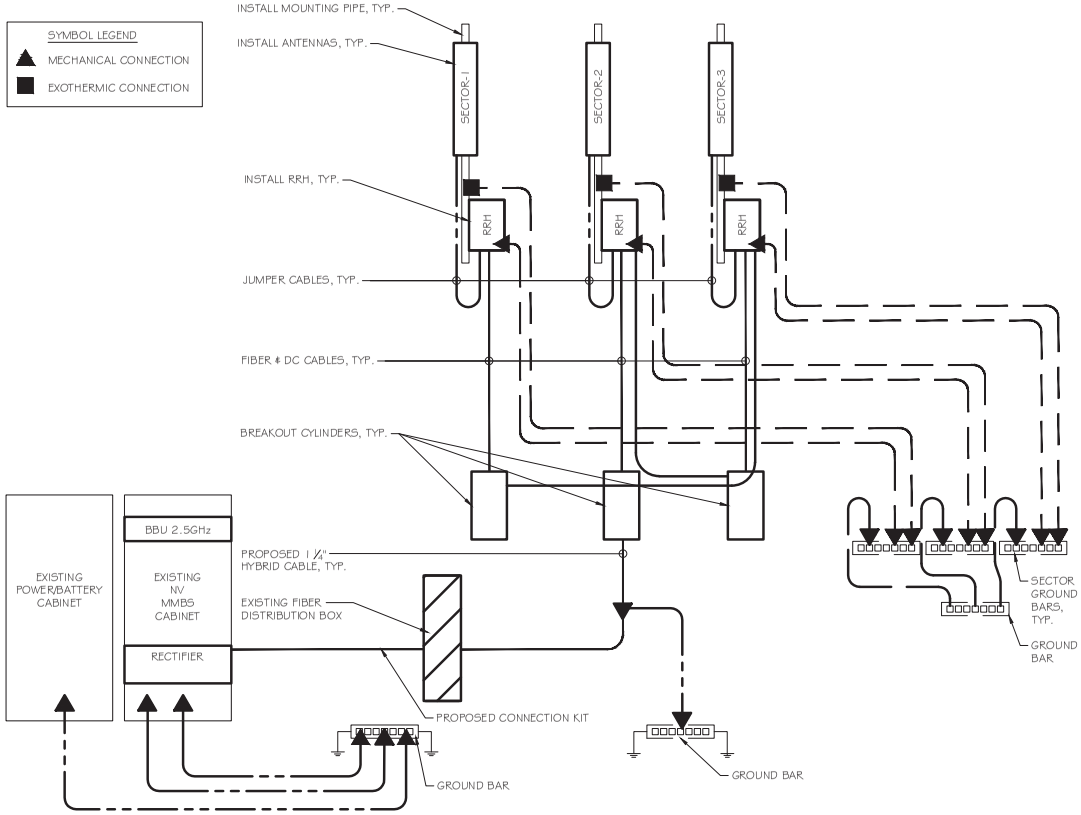
TOLLAND COUNTY

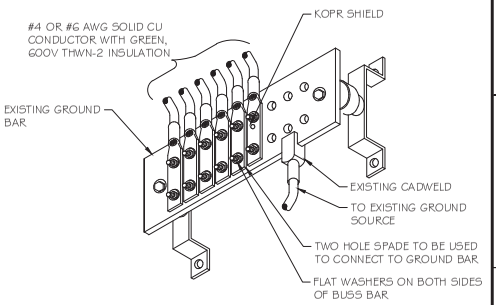
SHEET TITLE:
EQUIPMENT UTILITY & GROUNDING PLAN

SCALE:
AS NOTED

PROJECT NUMBER: 23003
SHEET NUMBER: E-1



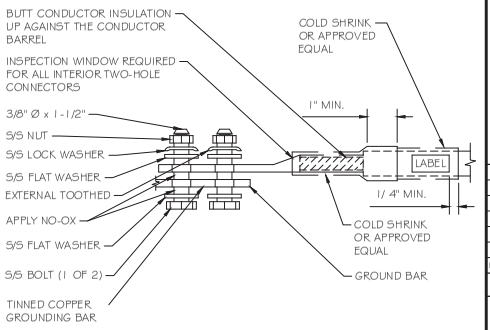
GROUNDING RISER DIAGRAM (1)
SCALE: NTS



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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SHEET TITLE:
GROUNDING DETAILS

SCALE:
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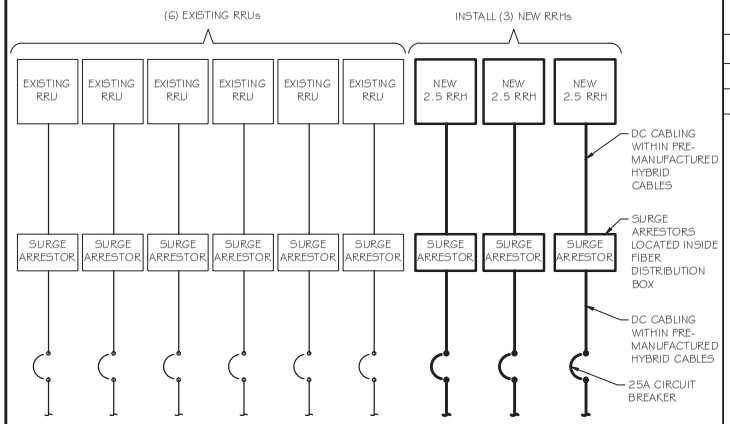
PROJECT NUMBER: 23003
SHEET NUMBER: E-2



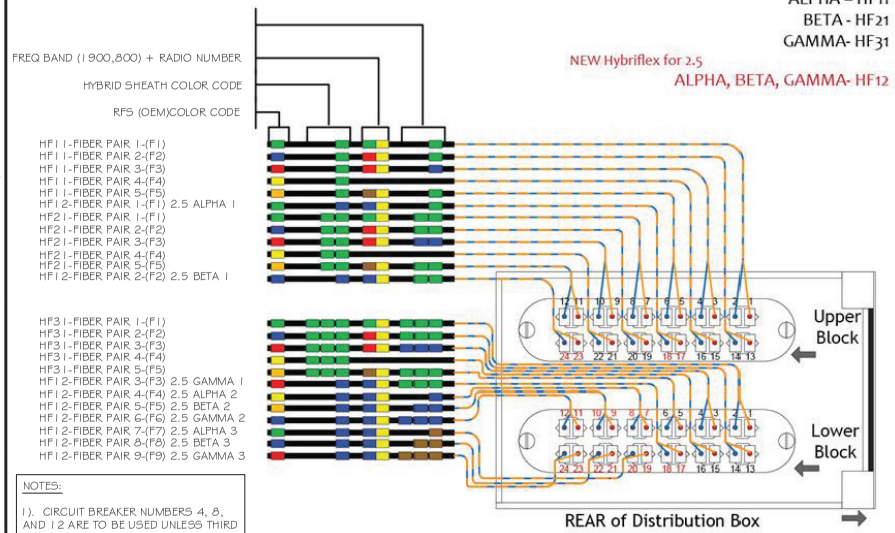
DC ONE-LINE DIAGRAM ①
SCALE: NTS

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:	OUTDOOR		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	CIRCUIT #1	80	2	OFF			ON	2	60	SURGE PROTECTOR	7
2											8
3	CIRCUIT #2	80	2	OFF			ON	2	20 / 20	TOWER LIGHT / GEN OUTLET	9
4							ON	1	20	GEN OUTLET	10
5	MMBTS	100	2	ON			ON	1	15	TELCO OUTLET	11
6							ON	1	10	TELCO FAN	12

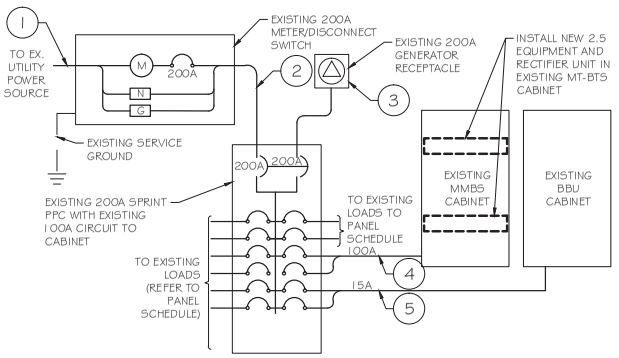
AC PANEL SCHEDULE ②
SCALE: NTS



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 DC POWER 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

ELECTRICAL ONE-LINE DIAGRAM ④
SCALE: NTS

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: 2/09/2015

MARK	DATE	DESCRIPTION
A	02/09/15	FINAL CD's ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 02/09/2015

PROJECT TITLE:
U-CONN
CT03XC214-P

PROJECT INFORMATION:
82 NORTH EAGLEVILLE ROAD
STORRS, CT 062269
TOLLAND COUNTY

SHEET TITLE:
DC POWER DETAILS & PANEL SCHEDULES

SCALE:
AS NOTED

PROJECT NUMBER: 23003
SHEET NUMBER: E-3

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 245' SELF SUPPORTING LATTICE TOWER AND FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENTS

Site ID: CT03XC214
Site Name: UCONN
Site Address: 82 North Eagleville Road
Storrs, CT

prepared for

Sprint

Transcend Wireless
10 Industrial Ave.
Suite 3
Mahwah, NJ. 07430

prepared by

URS

URS CORPORATION
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CT 06067
TEL. 860-529-8882

36932110.00000
TWS-019

December 30, 2014

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 245' self-supporting tower located at the campus of the University of Connecticut, on North Eagleville Road in Storrs, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code which requires a three second gust wind speed of 100 mph which converts to an 80 mph fastest mile per 2003 IBC (Table 1609.3.1) and the TIA/EIA-222-F standard for a wind velocity of 85 mph (fastest mile). The wind speed from the TIA/EIA-222-F standard governs the design at 85 mph (fastest mile) and 74 mph (fastest mile) concurrence 1/2" ice.

The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report. The proposed Sprint modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Install: **(3) APXV9TM14-ALU-I20 Panel Antennas** **(3) Alcatel-Lucent TD-RRH 8x20 RRH Units** **(1) Alcatel-Lucent ALU Hybrid Cable** **(2) Sector Jumper Cables** **(27) RRH Jumper Cables**	**Sprint (Proposed)**	**@ 247'**

The results of the analysis indicate that the tower and foundation components has the capacity to support the proposed loading conditions. **The tower and its foundation components are considered structurally adequate with the wind load classification specified above with the existing and proposed antenna loading.**

1. **EXECUTIVE SUMMARY** *(continued)*

This analysis is based on:

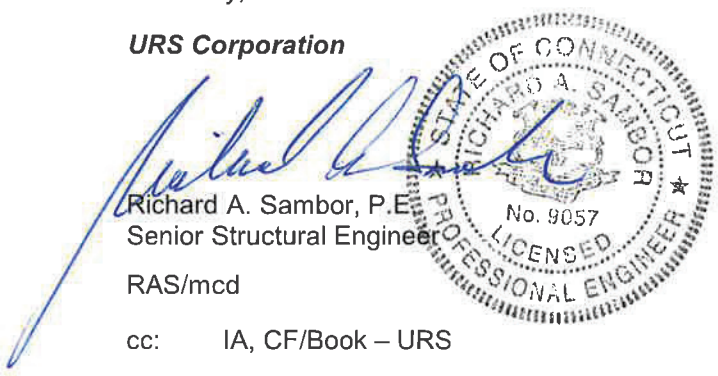
1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Tower foundation, geometry and structural member sizes taken from the manufacturers original design documents prepared by Pirod Inc., drawing number 202932-B, dated September 23, 1997.
3) Existing antenna, mount and coaxial cable quantities taken from structural report performed by Atlantis Group, on behalf of T-Mobile, dated May 23, 2012.
4) Existing antenna, mount and coaxial cable quantities and locations taken from structural analysis performed by Ramaker & Associates, Inc, on behalf of Sprint, project number 23003, signed and sealed October 26, 2012.
5) Preliminary construction drawings for proposed Sprint antenna upgrades provided from Ramaker & Associates, dated June 17, 2014.
6) Antenna and mount configuration as specified on the following page of this report.

This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration as well as the physical condition of the tower and connections. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,

URS Corporation



Richard A. Sambor, P.E.
Senior Structural Engineer

RAS/mcd

cc: IA, CF/Book – URS

2. INTRODUCTION

The subject tower is located on 82 North Eagleville Road in Storrs, Connecticut. The structure is a 245' self-supporting tower designed and manufactured by Pirod, Inc.

The tower geometry and structural member sizes taken from original construction drawings (Pirod Drawing #: 202932-B) prepared by Pirod, dated September 23, 1997.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
Lightning Rod	Tower (existing)	15' Rotatable Platform	247'	---
Flash Beacon	Tower (existing)	*See Above Mount*	247'	(1) 1/2" DC cable
(3) APXV9TM14-ALU-I20 Panel Antennas (3) Alcatel-Lucent TD-RRH 8x20 RRH Units (2) Sector Jumper Cables (27) RRH Jumper Cables	**Sprint (Proposed)**	***See Above Mount***	**247'**	**(1) Alcatel-Lucent ALU Hybrid Cable**
(2) APXVSPP18-C-A20 (Alpha & Gamma) (1) RFS APX9ERR18-C-A20 (Beta) (6) 1900 MHz RRH Units (3) 800 MHz RRH Units (3) IBC1900BB-1 (3) IBC1900HG-2A	Sprint (existing)	*See Above Mount*	247'	(3) 1-1/4" Hybrid Cables
(3) AIR21 B2A/B4P (3) AIR21 B4A/B2P (1) ADFD1820-80B-R2DM (3) TMA Units	T-Mobile (existing)	(3) Sector Mounts	232'	(21) 1-5/8" coax cables
(2) 10' Omni Antennas	Unknown (existing)	(2) 4' Standoff	135'	(2) 7/8" coax cables
(1) 20' Omni Antenna	Unknown (existing)	6' Standoff	125'	(1) 7/8" coax cable
(3) L-810 Obstruction Lights	Tower (existing)	Leg mounted	125'	(1) 1/2" DC cable
(1) 10' Omni Antenna	Unknown (existing)	4' Standoff	110'	(1) 7/8" coax cable
4' Grid Dish	Unknown (existing)	Leg mounted	110'	(1) 7/8" coax cable
(1) 6' Dish w/ Radome	Unknown (existing)	Leg mounted	105'	(1) EW63 cable
(1) Camera	Unknown (existing)	Leg mounted	60'	(1) 7/8" coax cable
(1) 4' Omni	Unknown (existing)	4' Standoff	50'	(1) 7/8" coax cable

This structural analysis of the communications tower was performed by URS Corporation (URS) for Sprint. The purpose of this analysis was to investigate the structural integrity of the existing tower with its existing, proposed and future antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the 2005 Connecticut State Building Code, TIA/EIA-222-F—Structural Standard for Steel Antenna Towers and Antenna Supporting Structures and the American Institute of Steel Construction (AISC) Manual of Steel Construction—Allowable Stress Design (ASD).

The analysis was conducted using TNX Tower 6.1.3.1. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

The Connecticut State Building Code required a three second wind speed of 100 mph which converts to a 80 mph fastest mile per IBC (Table 1609.3.1). The TIA/EIA-222-F requires a basic wind speed of 85 mph (fastest mile). In this case the wind speed from the TIA/EIA-222-F governs the design.

Load Condition 1 = 85 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 74 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25% reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

Stresses on the tower structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were BELOW the allowable stresses. Detailed analysis and calculations for the proposed load condition are provided in Section 6 of this report. The foundation caisson and tower anchor bolts were found to be structurally adequate.

Tower Reactions

Component	Value (kips)
Base Shear	36
Base Compression	377
Anchor Uplift	310
Anchor Shear	34

Tower Component Stress vs. Capacity Summary:

Component/ (Section No.)	Existing Component Size	Controlling Component/Elevation	Stress (% capacity)	Pass/Fail
Tower Leg (T2)	2" SR	Compression / 230' – 210'	99.1 %	**Pass**
Diagonal (T11)	L3x3x5/16	Compression / 80' – 60'	90.1 %	**Pass**
Secondary Horizontal (T9)	L3x3x5/16	Compression / 110' – 100'	72.5 %	**Pass**
Top Grit (T3)	1" SR	Compression / 210' – 190'	46.1 %	**Pass**
Bottom Girt (T1)	7/8" SR	Compression / 245' – 230'	64.4 %	**Pass**
Bolt Checks				
Anchor Bolts	(6) 2" Dia. Bolts	Tension	68%	**Pass**

Foundation Summary:

Foundation	Component	Stress (% capacity/Factor of Safety)	Pass/Fail	Comments:
Drilled Concrete Caisson	Uplift	98.0% / 2.04	**Pass**	Min. FOS of 2.0 req'd per IBC 2003 Section 3108.4.2

5. CONCLUSIONS

The results of the analysis indicate that the tower and foundation components have the capacity to support the proposed loading conditions. **The tower and its foundation components are considered structurally adequate with the wind load classification specified with the existing and proposed antenna loading.**

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Foundations were properly constructed to support original design loads as specified in the original design documents.
10. All coaxial cable is installed as specified in Section 6 of this report.

URS is not responsible for any modifications completed prior to or hereafter in which URS is not or was not directly involved. Modifications include but are not limited to:

A. Adding antennas
B. Removing/replacing antennas
C. Adding coaxial cables

URS 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 upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact URS. URS disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

Ongoing and Periodic Inspection and Maintenance:

After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

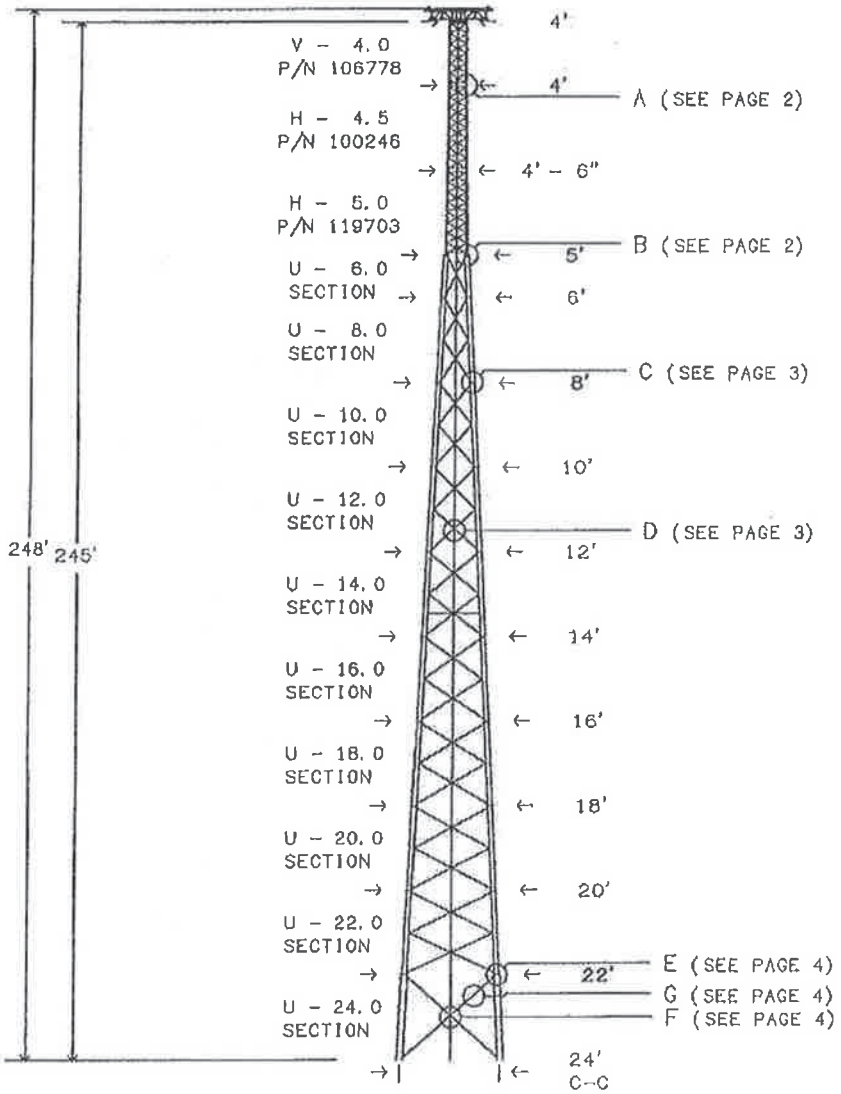
ORIGINAL TOWER MANUFACTURER DRAWINGS

TOP VIEW
(ENLARGED)

ROTATABLE TOP
(REF ASSEMBLY
DWG # 122379)

SIDE VIEW
(ENLARGED)

SHOP WELD TOP PLATE P/N
121018 AT TOP OF TOP SECTION.



BECHTEL NATIONAL, INC.
STORRS #C214, CT
U - 24.0 X 248' SELF-SUPPORTING TOWER

REV	DESCRIPTION OF REVISIONS	INI	DATE
A	ADDED FOUNDATIONS PER SOIL REPORT	WLH	09/23/1997

APPROVED/ENG.	WLH	9/23/1997
APPROVED/FOUND.	N/A	
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ENG. FILE NO.	A-113846-Q-69379	
ARCHIVE		

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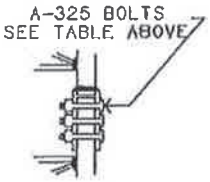
Plymouth, IN 46563-0128
219-936-4221

DRAWING NO. 202932-B
PAGE 1 OF 9

From 69370.DFT - 09/23/97 10:26
Printed from 202932_D10A.DWG - 09/23/1997 15:00 & 12/19/2014 14:21

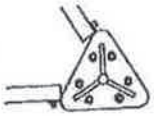
FABRICATED SECTION DATA 190' - 245' ELEVATION								
SECT LEN	SEC #	SECTION PART#	LEG SIZE	BRACE SIZE	SECT WT. *	BOLTS AT BOTTOM DIAM	LENGTH	#
15'	V- 4.0	106778+	1- 1/2 "	3/4 "	602#	5/8"	4-1/2"	15
20'	H- 4.5	100246	2 "	7/8 "	1190#	3/4"	5"	15
20'	H- 5.0	119703	2- 1/2 "	1 "	1802#	1 "	3-1/2"	18

*THE WEIGHTS LISTED ARE THEORETICAL. THE ACTUAL WEIGHTS WILL VARY. ALL WEIGHTS SHOULD BE CONFIRMED IN THE FIELD PRIOR TO ERECTION.
+WELD TOP PLATE P/N 121018 AT TOP OF TOP SECTION.

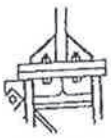


VIEW A
TYPICAL LEG CONNECTION
FOR FABRICATED SECTIONS

THE MARKED LEG OF EACH SECTION IS STAMPED WITH THE LAST 3 DIGITS OF THE TOWER SERIAL #. ASSEMBLE THE TOWER WITH MARKED LEGS TOGETHER. THE MARKED LEG MAY ALSO CONTAIN JOINT NUMBERS. IF SO, ASSEMBLE SECTIONS WITH JOINTS IN THE PROPER SEQUENCE.



TOP VIEW @ B



VIEW B

LEG CONNECTION AT 190 FT.
USE 1 FLATWASHER UNDER EACH LOCKNUT, FOR LEG CONNECTION ONLY.

BECHTEL NATIONAL, INC.
STORRS #C214, CT
U - 24.0 X 248' SELF-SUPPORTING TOWER

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APPROVED/FOUND.	N/A	
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1545 Pidco Dr.
Plymouth, IN 46563-0128
219-936-4221

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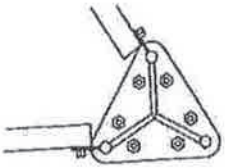
DRAWING NO. 202932-B
PAGE 2 OF 9

BREAKDOWN SECTION DATA (12" LEG) 20' - 190' ELEVATION														
SEC #	SECTION LENGTH	LEG SIZE	LEG PART#	TOP DIAG PART#	BOT DIAG PART#	DIAGONAL ANGLE FACE	DIAGONAL ANGLE THICK	QTY HOR	SECTION WEIGHT	LEG CONNECT+ DIAM	LEG CONNECT+ LENGTH	DIAG CONNECT DIAM	DIAG CONNECT LENGTH
U- 6.0	10'	1- 1/2"	105245		105556	2-1/2"	3/16"		1047#	1 "	3-1/2"	1 "	2-1/4"
U- 8.0	20'	1- 1/2"	105217	105558	105561	2-1/2"	3/16"		2118#	1 "	3-1/2"	1 "	2-1/4"
U-10.0	20'	1- 3/4"	105218	105564	105567	2-1/2"	3/16"		2548#	1 "	3-1/2"	1 "	2-1/4"
U-12.0	20'	1- 3/4"	105218	105571	105574	3"	3/16"		2698#	1 "	4-1/2"	1 "	2-1/4"
U-14.0	20'	2 "	105219	113409	113410	3"	5/16"	1	4065#	1-1/4"	4-1/2"	1-1/4"	2-3/4"
U-16.0	20'	2 "	105219	113411	113412	3"	5/16"		3913#	1-1/4"	4-1/2"	1-1/4"	2-3/4"
U-18.0	20'	2- 1/4"	105220	127370	127371	3-1/2"	5/16"		4770#	1-1/4"	4-1/2"	1-1/4"	2-3/4"
U-20.0	20'	2- 1/4"	105220	105598	105601	3-1/2"	5/16"		4920#	1-1/4"	4-1/2"	1-1/4"	2-3/4"
U-22.0	20'	2- 1/4"	105220	105604	105607	4"	1/4"		4922#	1-1/4"	5"	1-1/4"	2-3/4"

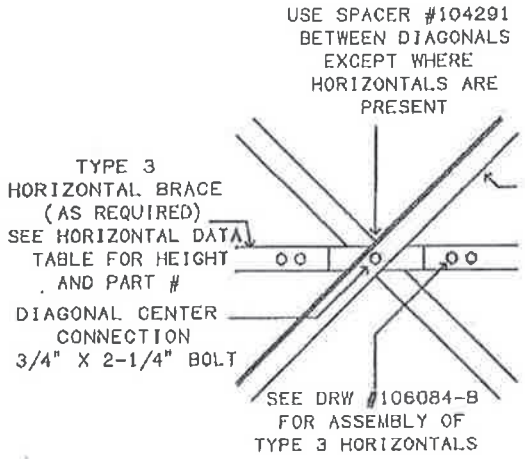
* THE WEIGHTS LISTED ARE THEORETICAL. THE ACTUAL WEIGHTS WILL VARY. ALL WEIGHTS SHOULD BE CONFIRMED IN THE FIELD PRIOR TO ERECTION.

+ USE 1 FLATWASHER UNDER EACH LOCKNUT, FOR LEG CONNECTION ONLY. ALSO USE 1 FLATWASHER UNDER EACH BOLT HEAD WHERE BUSHINGS ARE REQUIRED.

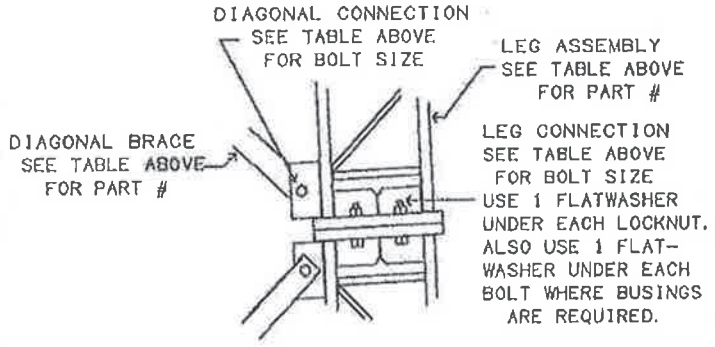
ANGLE HORIZONTAL DATA (12" LEG)					
HORIZ HT	IN SEC#	HORIZ PART#	HORIZ TYPE	BOLTS DIAM	BOLTS LENGTH
105	U-14.0	106207	3	SEE # 106084-B	



TOP VIEW @ C



VIEW D (SEE PAGE 1 FOR VIEW DEFINITION)
TYPICAL BRACE CONNECTION
#12 SECTIONS



VIEW C
TYPICAL LEG CONNECTION
#12 SECTIONS

BECHTEL NATIONAL, INC.
STORRS #C214, CT
U - 24.0 X 248' SELF-SUPPORTING TOWER

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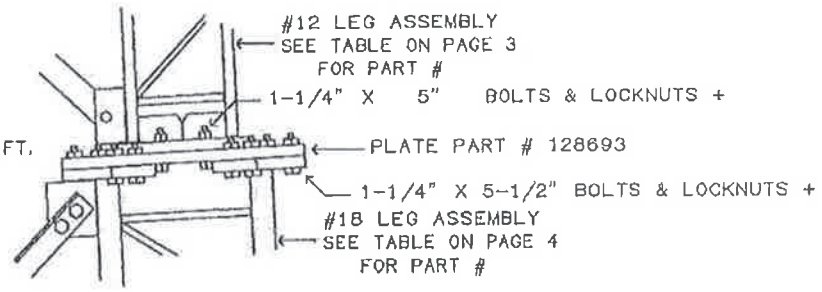
ARCHIVE Q-69379

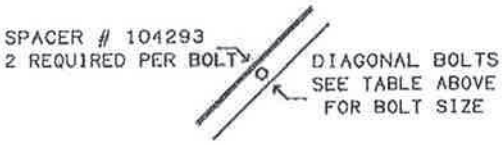
DRAWING NO. 202932-B
PAGE 3 OF 9



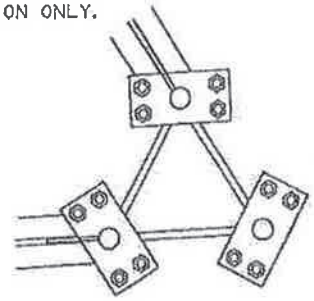
VIEW E
LEG CONNECTION AT 20 FT.

BREAKDOWN SECTION DATA (18" LEG - DOUBLE ANGLE DIAGONALS) 0' - 20' ELEVATION													
SEC #	SECTION LENGTH	LEG SIZE	LEG PART#	DIAGONAL PART #			DIAG ANGLE		SECTION WEIGHT	LEG CONNECT+		DIAG CONNECT	
				UPPER	LOWER	LONG	FACE	THICK		DIAM	LENGTH	DIAM	LENGTH
U-24.0	20'	2- 1/2"	112738	112889	112885	112807	3-1/2"	5/16"	7275#			1 "	3-1/2"

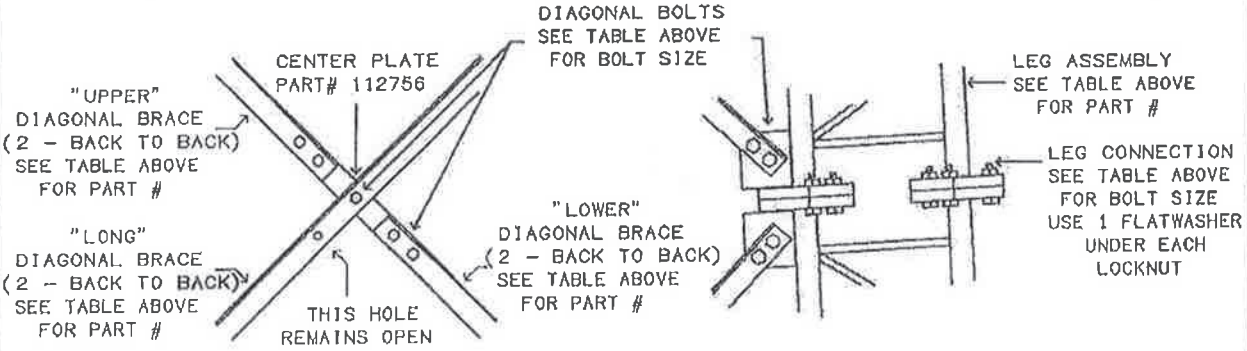
* THE WEIGHTS LISTED ARE THEORETICAL. THE ACTUAL WEIGHTS WILL VARY. ALL WEIGHTS SHOULD BE CONFIRMED IN THE FIELD PRIOR TO ERECTION.
+ USE 1 FLATWASHER UNDER EACH LOCKNUT, FOR LEG CONNECTION ONLY.



VIEW G
TYPICAL SPACER INSTALLATION
#18 SECTIONS - DOUBLE ANGLE BRACES
(4 PLACES EACH SECTION PER FACE)



TOP VIEW @



VIEW F (SEE PAGE 1 FOR VIEW DEFINITION) VIEW

TYPICAL BRACE CONNECTION
#18 SECTIONS - DOUBLE ANGLE BRACES

TYPICAL LEG CONNECTION
#18 SECTIONS - DOUBLE ANGLE BRACES

BECHTEL NATIONAL, INC.
STORRS #C214, CT
U - 24.0 X 248' SELF-SUPPORTING TOWER

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GENERAL NOTES

1. TOWER DESIGN CONFORMS TO STANDARD EIA/TIA-222-F FOR 90 MPH BASIC WIND SPEED WITH NO ICE.
   TOWER DESIGN CONFORMS TO STANDARD EIA/TIA-222-F FOR 90 MPH BASIC WIND SPEED WITH .50" RADIAL ICE WITH LOAD DUE TO WIND REDUCED BY 25% WHEN CONSIDERED SIMULTANEOUSLY WITH ICE.

2. MATERIAL: (A) SOLID RODS CONFORM TO ASTM A-572 GRADE 50 REQUIREMENTS.
   (B) ANGLES CONFORM TO ASTM A-36 REQUIREMENTS.
   (C) PIPE CONFORMS TO ASTM A-53 TYPE E, GRADE B REQUIREMENTS. (MIN YIELD STRENGTH=42 KSI)
   (D) ALL STEEL PLATES CONFORM TO ASTM A-36 REQUIREMENTS.

3. BASE REACTIONS PER EIA/TIA-222-F FOR 90 MPH BASIC WIND SPEED WITH NO ICE.
   TOTAL WEIGHT = 52.0 KIPS. MAXIMUM COMPRESSION = 454.9 KIPS PER LEG.
   MOMENT = 9094.3 KIP-FT. MAXIMUM UPLIFT = 420.2 KIPS PER LEG.
   MAXIMUM SHEAR = 71.3 KIPS TOTAL.

4. BASE REACTIONS PER EIA/TIA-222-F FOR 90 MPH BASIC WIND SPEED WITH .50" RADIAL ICE:
   TOTAL WEIGHT = 73.7 KIPS. MAXIMUM COMPRESSION = 472.0 KIPS PER LEG.
   MOMENT = 9299.9 KIP-FT. MAXIMUM UPLIFT = 422.9 KIPS PER LEG.
   MAXIMUM SHEAR = 72.4 KIPS TOTAL.

5. FINISH: HOT DIPPED GALVANIZED AFTER FABRICATION.

6. ANTENNAS: 247' (12) DB980 WITH 1 5/8" LINES MOUNTED ON A ROTATABLE PLATFORM.
   225' (12) ALP9212 WITH 1 5/8" LINES MOUNTED ON UNIVERSAL T-FRAMES.
   120' (1) DB201 WITH 7/8" LINE MOUNTED ON A 3' STANDOFF.
   115' (2) DB201 WITH 7/8" LINES MOUNTED ON 3' STANDOFFS.
   115' (1) 4' GRID DISH WITH 7/8" LINE.
   103' (1) 6' SOLID DISH WITH RADOME AND 7/8" LINE.
   65' (1) CAMERA. (CoAa= 4 SQ.FT.)
   50' (1) GPS ANTENNA & MOUNT. (TOTAL CoAa= 14 SQ.FT.)

7. REMOVE FOUNDATION TEMPLATE PRIOR TO ERECTING TOWER. INSTALL BASE SECTION WITH MINIMUM OF 2" CLEARANCE ABOVE CONCRETE. GROUT NUTS BELOW BASE SECTION WITH NON-SHRINK GROUT AFTER LEVELING TOWER.

8. MIN. WELDS 5/16" UNLESS OTHERWISE SPECIFIED. ALL WELDING TO CONFORM TO AWS SPECIFICATIONS.

9. ALL BOLTS AND NUTS MUST BE IN PLACE BEFORE THE ADJOINING SECTION(S) ARE INSTALLED.

10. ALL A-325 BOLTS SHALL BE PRE-TENSIONED PER AISC SPECIFICATIONS. REFER TO DRAWING # 123107-A ("BOLT PRE-TENSIONING GUIDELINES".)

11. EIA GROUNDING FOR TOWER.

12. DUAL LIGHT KIT (151' - 350')

BECHTEL NATIONAL, INC.
STORRS #C214, CT
U - 24.0 X 248' SELF-SUPPORTING TOWER

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PAGE 5 OF 9

FOUNDATION NOTES

1. SOIL AS PER REPORT BY CLOUGH, HARBOUR, AND ASSOCIATES, LLC, DATED 6/06/97 (FILE #5835.07.64).
2. CONCRETE TO BE 3000 PSI @ 28 DAYS. REINFORCING BAR TO CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS. CONCRETE INSTALLATION TO CONFORM TO ACI-318 BUILDING REQUIREMENTS FOR REINFORCED CONCRETE. ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH FREE OF WATER AND ALL FOREIGN OBJECTS AND MATERIALS. A MINIMUM OF THREE INCHES OF CONCRETE SHALL COVER ALL REINFORCEMENT. WELDING OF REBAR NOT PERMITTED.
3. A COLD JOINT IS PERMISSIBLE UPON CONSULTATION WITH PIROD. ALL COLD JOINTS SHALL BE COATED WITH BONDING AGENTS PRIOR TO SECOND POUR.
4. ALL REINFORCING STEEL TO BE FORMED INTO A CAGE PRIOR TO SETTING INTO POSITION IN THE EXCAVATED PIER.
5. PERMANENT STEEL CASING SHALL NOT BE USED WITHOUT CONSENT FROM FOUNDATION DESIGNERS.
6. CROWN TOP OF FOUNDATION FOR PROPER DRAINAGE.
7. A TEMPORARY STEEL CASING IS REQUIRED FOR INSTALLATION.
8. CONCRETE MUST BE PLACED BY TREMIE METHODS.

REV	DESCRIPTION OF REVISIONS	INI	DATE
A	ADDED FOUNDATIONS PER SOIL REPORT	MLH	09/23/1997

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STORRS #C214, CT
U - 24.0 X 248' SELF-SUPPORTING TOWER

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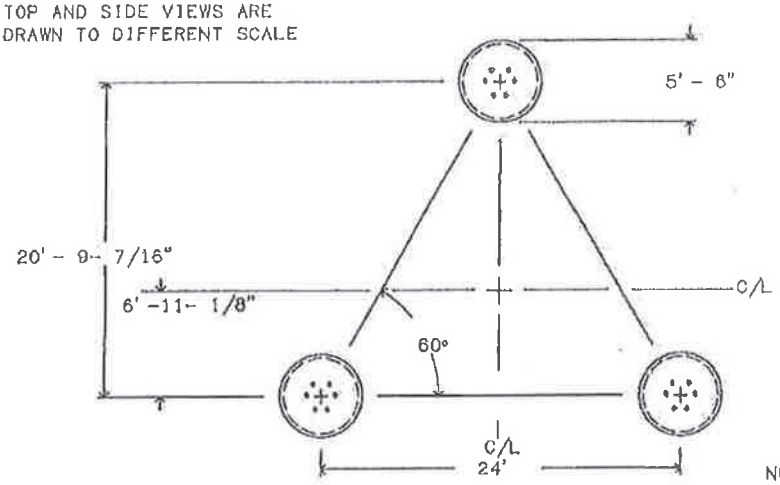
DRAWING NO. 202932-B
PAGE 6 OF 9

TOP VIEW

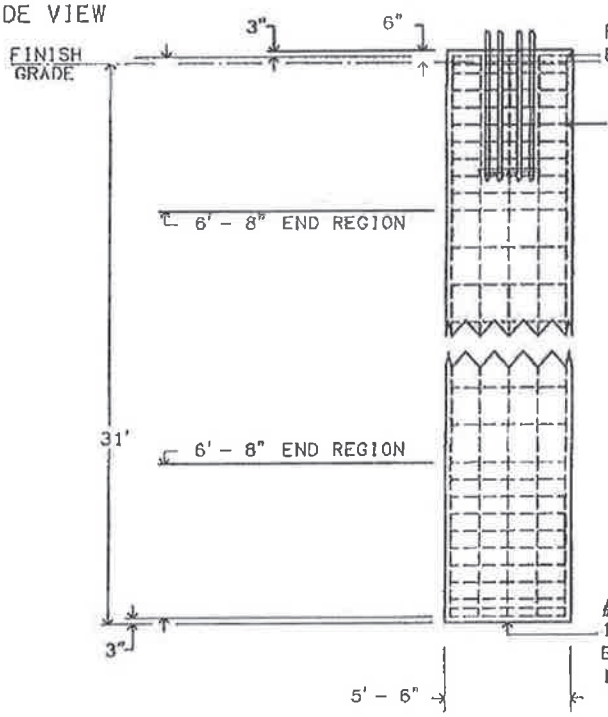
TOP AND SIDE VIEWS ARE DRAWN TO DIFFERENT SCALE



NOTE: ALL REBAR REQUIRES MINIMUM 3" CONCRETE COVERAGE

FOR ANCHOR STEEL IDENTIFICATION AND PLACEMENT INFORMATION, SEE PAGE 9.

SIDE VIEW



FOR DETAIL VIEW OF REBAR CAGE END AREA, SEE (E) ON PAGE 8.

5 HORIZONTAL TIES - SEE (B) ON PAGE 8. 33 PIECES REQUIRED PER PIER. PLACE TIES AT 9" NOMINAL SPACING WITHIN END REGIONS, AND 1' - 6" NOMINAL SPACING IN REMAINDER OF PIER.

9 VERTICAL REBAR - SEE (A) ON PAGE 8. 18 PIECES REQUIRED PER PIER, EQUALLY SPACED, TO BE PLACED INSIDE TIES.

TOWER FOUNDATION

THREE PIERS REQUIRED
27.7 CUBIC YARDS CONCRETE REQUIRED EACH PIER

FOR INSTALLATION SPECIFICATIONS AND ADDITIONAL INFORMATION, SEE PAGE 6 OF THIS DRAWING.

BECHTEL NATIONAL, INC.
STORRS #C214, CT
U - 24.0 X 248' BASE FOUNDATION

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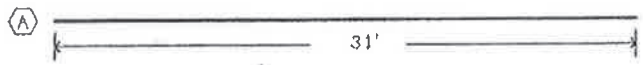
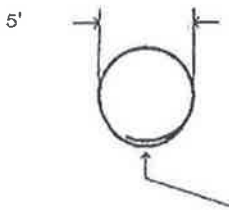


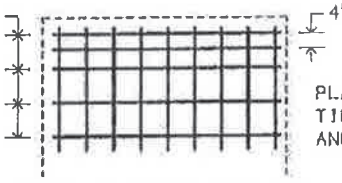
(A) # 9 REBAR - 54 PIECES REQ. TOTAL
APPROX WT = 105.4# EACH, 5692# TOTAL



(B) # 5 REBAR - 99 PIECES REQUIRED TOTAL
APPROX UNBENT LENGTH = 17'-11- 1/4"
APPROX WT = 18.7# EACH, 1851# TOTAL

LAP DIMENSION: 2'-2- 3/4"
PLACE CIRCULAR TIES SO THAT LAPS ON ADJACENT TIES ARE 180 DEGREES APART.

PLACE 10 CIRCULAR TIES WITHIN EACH END REGION (TOP AND BOTTOM). PLACE FIRST TIE AT END OF VERTICAL BARS AND CONTINUE SPACING AS SHOWN. SEE PAGE 7 FOR REGION DEFINITION.



DETAIL OF REBAR CAGE END
(E)

PLACE AN ADDITIONAL CIRCULAR TIE 4" FROM THE END TIE (TOP AND BOTTOM) AS SHOWN.

REBAR DETAIL

TOTAL APPROX REBAR WEIGHT = 7543#
REINFORCING BAR TO CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS.

				BECHTEL NATIONAL, INC. STORRS #C214, CT U - 24.0 X 248' REBAR DETAIL		
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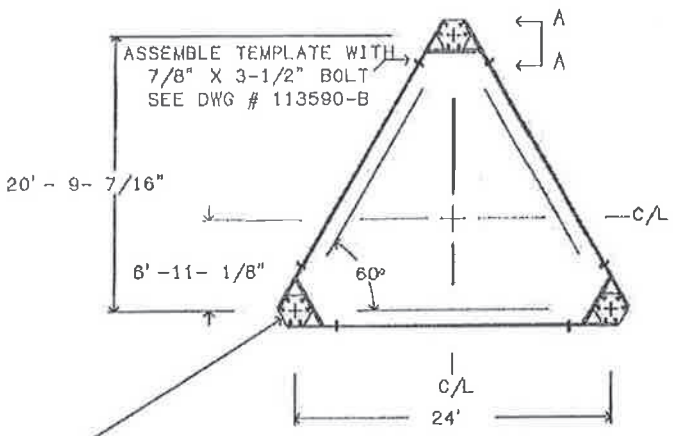
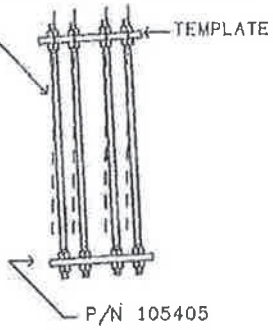
EACH LEG MUST BE CENTERED IN PIER
WITHIN +/- 10% OF PIER DIAMETER

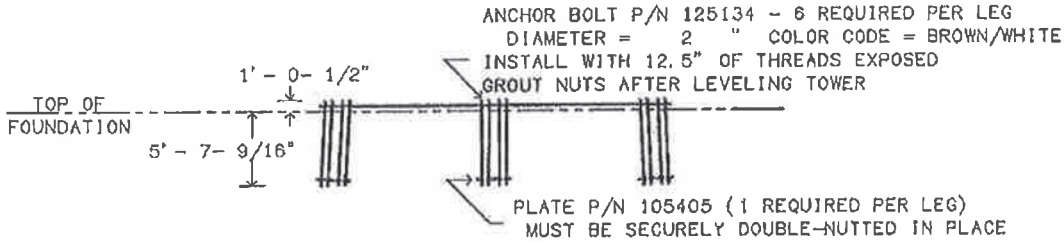


REFERENCE ANGLE = 3.30 DEGREES
TEMPLATE MUST BE UTILIZED TO
INSURE CORRECT PLACEMENT



VIEW A - A

TEMPLATE P/N 103620 IS REQUIRED FOR INSTALLATION. COLOR CODE OF TEMPLATE MUST MATCH COLOR CODE OF ANCHOR BOLTS. TEMPLATE MUST BE SECURELY DOUBLE-NUTTED TO ANCHOR BOLTS DURING CONCRETE INSTALLATION AND MUST BE LEVEL +/- 1/2".
INSTALL TEMPLATE WITH WELDED LIFTING ANGLES FACING UPWARD.
INSTALL TEMPLATE WITH SUFFICIENT SPACE BENEATH TO PERMIT FINISHING OF CONCRETE, AND TO FACILITATE TEMPLATE REMOVAL PRIOR TO TOWER ERECTION.



ATTENTION INSTALLER

2" DIAMETER ANCHOR STEEL

THE ANCHOR BOLTS PROVIDED FOR THIS PROJECT ARE 2" DIA. AND COLOR CODED BROWN & WHITE. THE CORNER TEMPLATE IS PART NUMBER 103620 FOR A TAPERED TOWER AND SHOULD HAVE THREE SETS OF 2-1/16" DIA. HOLES ON 10" CENTERS. EMBEDMENT PLATES ARE PART NUMBER 105405.

IF THERE ARE ANY DISCREPANCIES, PLEASE NOTIFY PIROD, INC., PRIOR TO INSTALLATION.

TOWER ANCHOR STEEL PLACEMENT

BECHTEL NATIONAL, INC.
STORRS #C214, CT
U - 24.0 X 248' ANCHOR INSTALLATION

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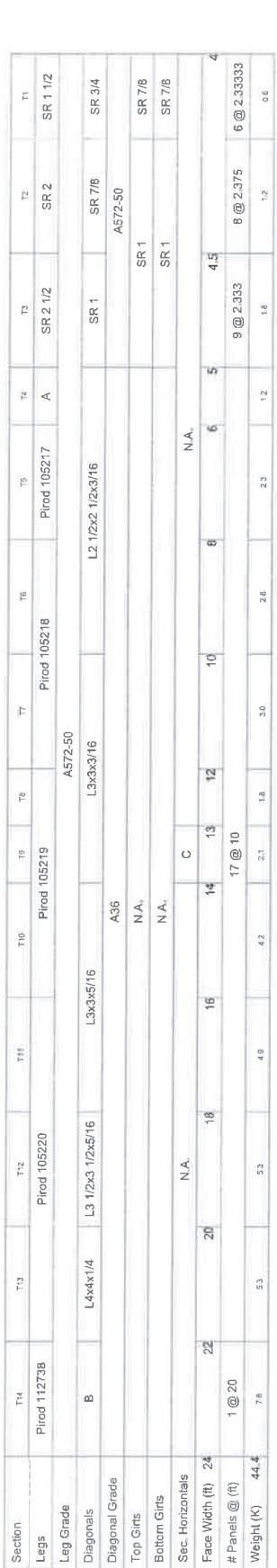
TNX TOWER INPUT/OUTPUT SUMMARY



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 2"x10' (Tower)	247	TMA (T-Mobile)	232
Flash Beacon Lighting (Tower)	247	PiROD 12' Universal T-Frame (3) (T-Mobile)	232
APXVSPP18-C-A20 w/ Mounting Pipe (Sprint)	247	AIR B2A/B4P w/ 6' Sch 40 Pipe Mount (T-Mobile)	232
APXV9ERR18-C-A20 w/ 6' Mount Pipe (Sprint)	247	AIR B2A/B4P w/ 6' Sch 40 Pipe Mount (T-Mobile)	232
APXVSPP18-C-A20 w/ Mounting Pipe (Sprint)	247	AIR B2A/B4P w/ 6' Sch 40 Pipe Mount (T-Mobile)	232
(2) Panasonic RRH 1900MHZ (Sprint)	247	AIR B2A/B4P w/ 6' Sch 40 Pipe Mount (T-Mobile)	232
(2) Panasonic RRH 1900MHZ (Sprint)	247	AIR B2A/B4P w/ 6' Sch 40 Pipe Mount (T-Mobile)	232
(2) Panasonic RRH 1900MHZ (Sprint)	247	AIR B2A/B4P w/ 6' Sch 40 Pipe Mount (T-Mobile)	232
Andrew 800MHz RRH (Sprint)	247	2.5" Dia. 12' OMNI	135
Andrew 800MHz RRH (Sprint)	247	4' Standoff Mount	135
Andrew 800MHz RRH (Sprint)	247	2.5" Dia. 12' OMNI	135
IBC1900BB-1 Combiner (Sprint)	247	4' Standoff Mount	135
IBC1900BB-1 Combiner (Sprint)	247	20' Omni	125
IBC1900BB-1 Combiner (Sprint)	247	6' Standoff Mount	125
IBC1900HG-2A Combiner (Sprint)	247	(3) L-810 Obstruction Lights w/ Mount Kit (Tower)	125
IBC1900HG-2A Combiner (Sprint)	247	4' Standoff Mount	110
IBC1900HG-2A Combiner (Sprint)	247	2.5" Dia. 12' OMNI	110
PiROD Rotatable Platform #122379 (Sprint)	247	KP4F-23	110
APXV9TM14-120 (Sprint)	247	Andrew 6' w/Radome	105
APXV9TM14-120 (Sprint)	247	Camera with Mount	60
APXV9TM14-120 (Sprint)	247	4' Standoff Mount	50
TD-RRH 8x20 (Sprint)	247	1.5" Dia 4' Omni w/Pipe Mount	50
TD-RRH 8x20 (Sprint)	247		
TD-RRH 8x20 (Sprint)	247		
TMA (T-Mobile)	232		
TMA (T-Mobile)	232		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirod 105245	C	L3x3x5/16
B	2L3 1/2x3 1/2x5/16x3/4		

MATERIAL STRENGTH

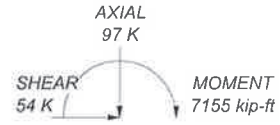
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

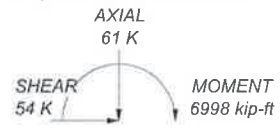
1. Tower is located in Tolland County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 99.1%

MAX. CORNER REACTIONS AT BASE:
DOWN: 377 K
SHEAR: 36 K

UPLIFT: -310 K
SHEAR: 34 K



TORQUE 41 kip-ft
74 mph WIND - 0.5000 in ICE



TORQUE 39 kip-ft
REACTIONS - 85 mph WIND

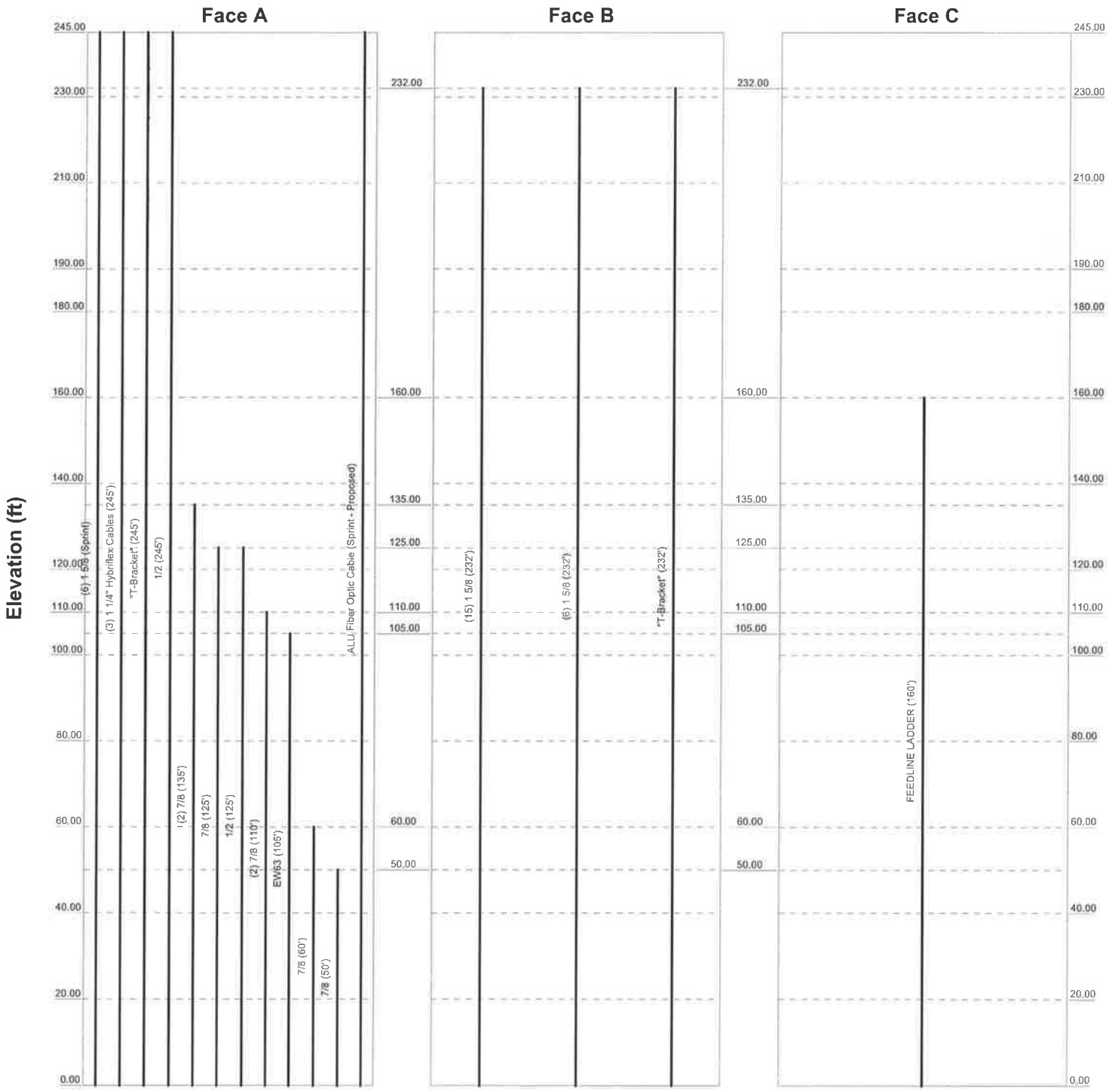
URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: 860-529-8882
FAX: 860-529-3991

Job: ***Structural Analysis - Tower***			
Project: ***Mansfield (UCONN), CT (Site #: CT03XC214)***			
Client: Sprint - TWS-019	Drawn by: MCD	App'd:	
Code: TIA/EIA-222-F	Date: 12/30/14	Scale: NTS	
Path:		Dwg No. E-1	

TNX TOWER FEEDLINE DISTRIBUTION

Feed Line Distribution Chart
0' - 245'

_____ Round _____ Flat _____ App In Face _____ App Out Face _____ Truss Leg



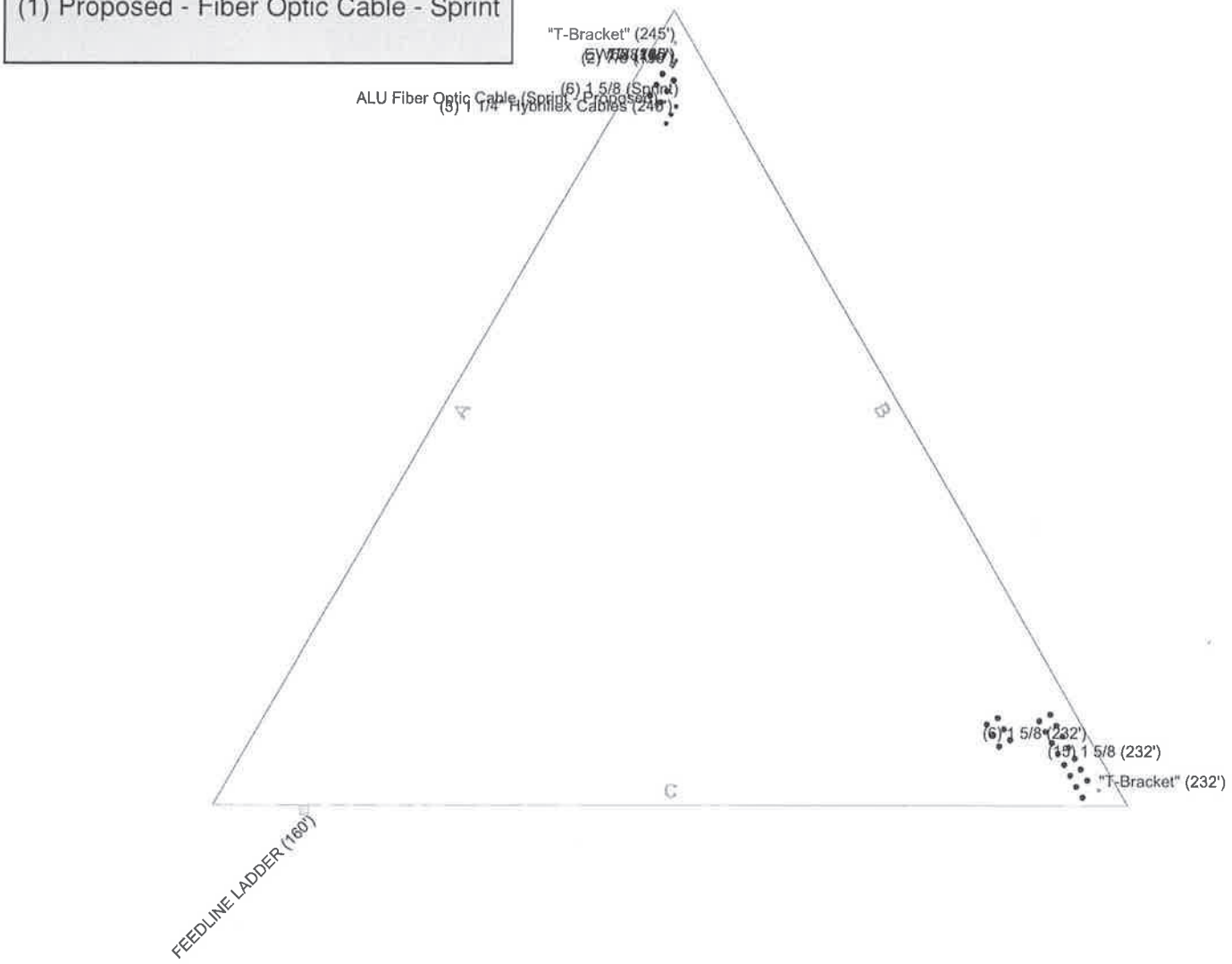
URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	Job: ***Structural Analysis - Tower***		
	Project: ***Mansfield (UCONN), CT (Site #: CT03XC214)***		
	Client: Sprint - TWS-019	Drawn by: MCD	App'd:
	Code: TIA/EIA-222-F	Date: 12/30/14	Scale: NTS
	Path:		Dwg No. E-7

TNX TOWER FEEDLINE PLAN

Feed Line Plan

Round Flat App In Face App Out Face Truss-Leg

(6) 1-5/8" coax cables - Sprint
(3) 1-1/4" Hybrid cables - Sprint
(1) "T-Bracket"
(2) 1/2" DC cables
(7) 7/8" coax cables
(1) EW63 Elliptical cable
(1) Proposed - Fiber Optic Cable - Sprint



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500 Enterprise Drive, Suite 3B
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Phone: 860-529-8882
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Job:	***Structural Analysis - Tower***		
Project:	***Mansfield (UCONN), CT (Site #: CT03XC214)***		
Client: Sprint - TWS-019		Drawn by: MCD	App'd:
Code: TIA/EIA-222-F		Date: 12/30/14	Scale: NTS
Path:			Dwg No. E-7

TNX TOWER DETAILED OUTPUT

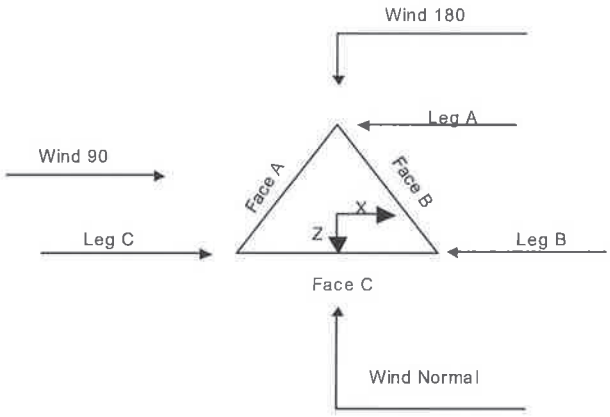
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 245.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 4.00 ft at the top and 24.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Tolland 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.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	245.00-230.00			4.00	1	15.00
T2	230.00-210.00			4.00	1	20.00
T3	210.00-190.00			4.50	1	20.00
T4	190.00-180.00		U6.0 105245	5.00	1	10.00
T5	180.00-160.00		U8.0 105217	6.00	1	20.00
T6	160.00-140.00		U10.0 105216	8.00	1	20.00
T7	140.00-120.00		U12.0 105218	10.00	1	20.00
T8	120.00-110.00		U14.0 105218	12.00	1	10.00
T9	110.00-100.00		U14.0 105218	13.00	1	10.00
T10	100.00-80.00		U16.0 105219	14.00	1	20.00
T11	80.00-60.00		U18.0 105219	16.00	1	20.00
T12	60.00-40.00		U20.0 105219 L3.5x5/16	18.00	1	20.00
T13	40.00-20.00		U22.0 105220 L4x1/4	20.00	1	20.00
T14	20.00-0.00		U24.0 105220	22.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	245.00-230.00	2.33	X Brace	No	Steps	6.0000	6.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T2	230.00-210.00	2.38	X Brace	No	Steps	6.0000	6.0000
T3	210.00-190.00	2.33	X Brace	No	Steps	8.0160	8.0160
T4	190.00-180.00	10.00	X Brace	No	No	0.0000	0.0000
T5	180.00-160.00	10.00	X Brace	No	No	0.0000	0.0000
T6	160.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T7	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T8	120.00-110.00	10.00	X Brace	No	No	0.0000	0.0000
T9	110.00-100.00	10.00	X Brace	No	Yes	0.0000	0.0000
T10	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T11	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T12	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T13	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T14	20.00-0.00	20.00	X Brace	No	No	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 245.00-230.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 230.00-210.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T3 210.00-190.00	Solid Round	2 1/2	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T4 190.00-180.00	Truss Leg	Pirod 105245	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 180.00-160.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 160.00-140.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 140.00-120.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T8 120.00-110.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T9 110.00-100.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T10 100.00-80.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T11 80.00-60.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T12 60.00-40.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T13 40.00-20.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T14 20.00-0.00	Truss Leg	Pirod 112738	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x5/16x3/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 245.00-230.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 230.00-210.00	Solid Round	1	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T3 210.00-190.00	Solid Round	1	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T9 110.00-100.00	Equal Angle	L3x3x5/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	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 245.00-230.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T2 230.00-210.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T3 210.00-190.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T4 190.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T5 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T6 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T7 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T8 120.00-110.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T9 110.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T10 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T11 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T12 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T13 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T14 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	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	X Brace Diags Y	K Bracing Single Diags X	K Bracing Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
245.00-230.00				1	1	1	1	1	1	1	1	1	1	1	1
T2	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
230.00-210.00				1	1	1	1	1	1	1	1	1	1	1	1
T3	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
210.00-190.00				1	1	1	1	1	1	1	1	1	1	1	1
T4	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
190.00-180.00				1	1	1	1	1	1	1	1	1	1	1	1
T5	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1	1	1	1	1	1
T6	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1	1	1	1	1	1
T7	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1	1	1	1	1	1
T8	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
120.00-110.00				1	1	1	1	1	1	1	1	1	1	1	1
T9	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
110.00-100.00				1	1	1	1	1	1	1	1	1	1	1	1
T10	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1	1	1	1	1	1
T11	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1	1	1	1	1
T12	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1	1	1	1	1
T13	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1	1	1	1	1
T14	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1
20.00-0.00				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	Truss-Leg K Factors: Truss-Legs Used As Leg Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals
T4	1	0.5	0.85	1	0.5	0.85
190.00-180.00						
T5	1	0.5	0.85	1	0.5	0.85
180.00-160.00						
T6	1	0.5	0.85	1	0.5	0.85
160.00-140.00						
T7	1	0.5	0.85	1	0.5	0.85
140.00-120.00						
T8	1	0.5	0.85	1	0.5	0.85
120.00-110.00						

T9 110.00-100.00	1	0.5	0.85	1	0.5	0.85
T10 100.00-80.00	1	0.5	0.85	1	0.5	0.85
T11 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T12 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T13 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T14 20.00-0.00	1	0.5	0.85	1	0.5	0.85

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 245.00-230.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 230.00-210.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 210.00-190.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 190.00-180.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 180.00-160.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 160.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 120.00-110.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 110.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T10 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T11 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T12 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T13 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T14 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 245.00-230.00	Sleeve DS	0.6250 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 230.00-210.00	Sleeve DS	0.7500 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 210.00-190.00	Flange	1.0000 A325N	6	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 190.00-180.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 180.00-160.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 160.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 120.00-110.00	Flange	1.0000 A325N	0	1.2500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 110.00-100.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 100.00-80.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 80.00-60.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T12 60.00-40.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T13 40.00-20.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T14 20.00-0.00	Flange	1.2500 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Sprint)	A	Yes	Ar (CaAa)	245.00 - 0.00	-10.0000	0.42	6	3	1.9800	1.9800		1.04
1 1/4" Hybriflex Cables (245')	A	Yes	Ar (CfAe)	245.00 - 0.00	-15.0000	0.4	3	3	1.5400	1.5400		1.08
"T-Bracket" (245')	A	Yes	Af (CfAe)	245.00 - 0.00	-5.0000	0.47	1	1	0.7500	0.7500	3.0000	1.50
1 5/8 (232')	B	Yes	Ar (CfAe)	232.00 - 0.00	-10.0000	0.42	15	8	1.9800	1.9800		1.04
1 5/8 (232')	B	Yes	Ar (CfAe)	232.00 - 0.00	-25.0000	0.36	6	3	1.9800	1.9800		1.04
"T-Bracket" (232')	B	Yes	Af (CfAe)	232.00 - 0.00	-5.0000	0.47	1	1	0.7500	0.7500	3.0000	1.50
FEEDLINE LADDER (160')	C	Yes	Af (CfAe)	160.00 - 0.00	0.0000	0.4	1	1	3.0000	3.0000	12.0000	8.40
1/2 (245')	A	Yes	Ar (CfAe)	245.00 - 0.00	-8.0000	0.45	1	1	0.5800	0.5800		0.25
7/8	A	Yes	Ar (CfAe)	135.00 - 0.00	-8.0000	0.45	2	2	1.1100	1.1100		0.54

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
(135') 7/8	A	Yes	Ar (CfAe)	125.00 - 0.00	-8.0000	0.45	1	1	1.1100	1.1100		0.54
(125') 1/2	A	Yes	Ar (CfAe)	125.00 - 0.00	-8.0000	0.45	1	1	0.5800	0.5800		0.25
(125') 7/8	A	Yes	Ar (CfAe)	110.00 - 0.00	-8.0000	0.45	2	2	1.1100	1.1100		0.54
(110') EW63	A	Yes	Af (CfAe)	105.00 - 0.00	-8.0000	0.45	1	1	1.5742	1.5742	5.0668	0.51
(105') 7/8	A	Yes	Ar (CfAe)	60.00 - 0.00	-8.0000	0.45	1	1	1.1100	1.1100		0.54
(60') 7/8	A	Yes	Ar (CfAe)	50.00 - 0.00	-8.0000	0.45	1	1	1.1100	1.1100		0.54
(50') ALU Fiber Optic Cable (Sprint - Proposed)	A	Yes	Ar (CfAe)	245.00 - 0.00	-10.0000	0.4	1	1	1.2500	1.2500		0.99

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	245.00-230.00	A	8.063	0.938	16.252	0.000	0.18
		B	3.630	0.125	0.000	0.000	0.05
		C	0.000	0.000	0.000	0.000	0.00
T2	230.00-210.00	A	10.750	1.250	21.670	0.000	0.24
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	0.000	0.000	0.000	0.00
T3	210.00-190.00	A	10.750	1.250	21.670	0.000	0.24
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	0.000	0.000	0.000	0.00
T4	190.00-180.00	A	5.375	0.625	10.835	0.000	0.12
		B	18.150	0.625	0.000	0.000	0.23
		C	0.000	0.000	0.000	0.000	0.00
T5	180.00-160.00	A	10.750	1.250	21.670	0.000	0.24
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	0.000	0.000	0.000	0.00
T6	160.00-140.00	A	10.750	1.250	21.670	0.000	0.24
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	5.000	0.000	0.000	0.17
T7	140.00-120.00	A	14.229	1.250	21.670	0.000	0.26
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	5.000	0.000	0.000	0.17
T8	120.00-110.00	A	8.633	0.625	10.835	0.000	0.14
		B	18.150	0.625	0.000	0.000	0.23
		C	0.000	2.500	0.000	0.000	0.08
T9	110.00-100.00	A	10.483	1.281	10.835	0.000	0.15
		B	18.150	0.625	0.000	0.000	0.23
		C	0.000	2.500	0.000	0.000	0.08
T10	100.00-80.00	A	20.967	3.874	21.670	0.000	0.31
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	5.000	0.000	0.000	0.17
T11	80.00-60.00	A	20.967	3.874	21.670	0.000	0.31
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	5.000	0.000	0.000	0.17
T12	60.00-40.00	A	23.742	3.874	21.670	0.000	0.33

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	5.000	0.000	0.000	0.17
T13	40.00-20.00	A	24.667	3.874	21.670	0.000	0.34
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	5.000	0.000	0.000	0.17
T14	20.00-0.00	A	24.667	3.874	21.670	0.000	0.34
		B	36.300	1.250	0.000	0.000	0.47
		C	0.000	5.000	0.000	0.000	0.17

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	245.00-230.00	A	0.500	14.313	1.771	17.752	0.000	0.42
		B		5.463	0.236	0.000	0.000	0.11
		C		0.000	0.000	0.000	0.000	0.00
T2	230.00-210.00	A	0.500	19.083	2.361	23.670	0.000	0.55
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	0.000	0.000	0.000	0.00
T3	210.00-190.00	A	0.500	19.083	2.361	23.670	0.000	0.55
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	0.000	0.000	0.000	0.00
T4	190.00-180.00	A	0.500	9.542	1.181	11.835	0.000	0.28
		B		27.317	1.181	0.000	0.000	0.56
		C		0.000	0.000	0.000	0.000	0.00
T5	180.00-160.00	A	0.500	19.083	2.361	23.670	0.000	0.55
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	0.000	0.000	0.000	0.00
T6	160.00-140.00	A	0.500	19.083	2.361	23.670	0.000	0.55
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	6.111	0.000	0.000	0.22
T7	140.00-120.00	A	0.500	25.896	2.361	23.670	0.000	0.61
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	6.111	0.000	0.000	0.22
T8	120.00-110.00	A	0.500	16.133	1.181	11.835	0.000	0.33
		B		27.317	1.181	0.000	0.000	0.56
		C		0.000	3.056	0.000	0.000	0.11
T9	110.00-100.00	A	0.500	19.650	2.114	11.835	0.000	0.37
		B		27.317	1.181	0.000	0.000	0.56
		C		0.000	3.056	0.000	0.000	0.11
T10	100.00-80.00	A	0.500	39.300	6.096	23.670	0.000	0.76
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	6.111	0.000	0.000	0.22
T11	80.00-60.00	A	0.500	39.300	6.096	23.670	0.000	0.76
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	6.111	0.000	0.000	0.22
T12	60.00-40.00	A	0.500	44.575	6.096	23.670	0.000	0.81
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	6.111	0.000	0.000	0.22
T13	40.00-20.00	A	0.500	46.333	6.096	23.670	0.000	0.82
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	6.111	0.000	0.000	0.22
T14	20.00-0.00	A	0.500	46.333	6.096	23.670	0.000	0.82
		B		54.633	2.361	0.000	0.000	1.12
		C		0.000	6.111	0.000	0.000	0.22

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	245.00-230.00	A	1.110	4.314	0.000	0.000
		B	0.254	0.897	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	230.00-210.00	A	1.646	5.901	0.000	0.000
		B	2.823	9.203	0.000	0.000
		C	0.000	0.000	0.000	0.000
T3	210.00-190.00	A	1.809	6.098	0.000	0.000
		B	3.102	9.510	0.000	0.000
		C	0.000	0.000	0.000	0.000
T4	190.00-180.00	A	0.000	0.637	0.946	1.594
		B	0.000	0.994	1.622	2.485
		C	0.000	0.000	0.000	0.000
T5	180.00-160.00	A	0.000	1.076	1.597	2.690
		B	0.000	1.678	2.738	4.196
		C	0.000	0.000	0.000	0.000
T6	160.00-140.00	A	0.000	0.921	1.367	2.302
		B	0.000	1.436	2.343	3.591
		C	0.000	0.166	0.312	0.416
T7	140.00-120.00	A	0.000	0.986	1.717	2.957
		B	0.000	1.298	2.540	3.893
		C	0.000	0.150	0.338	0.451
T8	120.00-110.00	A	0.000	0.534	0.910	1.603
		B	0.000	0.614	1.202	1.842
		C	0.000	0.071	0.160	0.213
T9	110.00-100.00	A	0.000	0.861	1.458	2.584
		B	0.000	0.837	1.638	2.510
		C	0.000	0.097	0.218	0.291
T10	100.00-80.00	A	0.000	1.231	2.088	3.692
		B	0.000	1.153	2.257	3.460
		C	0.000	0.134	0.301	0.401
T11	80.00-60.00	A	0.000	1.188	2.016	3.563
		B	0.000	1.113	2.179	3.339
		C	0.000	0.129	0.290	0.387
T12	60.00-40.00	A	0.000	1.256	2.473	4.396
		B	0.000	1.084	2.476	3.794
		C	0.000	0.126	0.330	0.440
T13	40.00-20.00	A	0.000	1.264	2.839	5.054
		B	0.000	1.063	2.773	4.250
		C	0.000	0.123	0.369	0.492
T14	20.00-0.00	A	0.000	0.756	1.486	2.645
		B	0.000	0.635	1.451	2.224
		C	0.000	0.074	0.193	0.258

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	245.00-230.00	2.0901	-4.0440	2.0049	-3.5868
T2	230.00-210.00	3.7501	-0.4007	3.7743	0.0508
T3	210.00-190.00	4.0220	-0.6905	4.0905	-0.2060

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T4	190.00-180.00	3.6349	-0.8813	3.7417	-0.4080
T5	180.00-160.00	4.8067	-1.5711	5.0281	-0.9759
T6	160.00-140.00	5.1904	-1.7387	5.6740	-1.1254
T7	140.00-120.00	6.1134	-3.2176	6.7468	-2.8409
T8	120.00-110.00	6.7189	-4.4539	7.4087	-4.4038
T9	110.00-100.00	6.5671	-5.7738	7.2004	-5.9769
T10	100.00-80.00	7.8382	-7.3344	8.6371	-7.6433
T11	80.00-60.00	8.6018	-8.2417	9.4943	-8.6048
T12	60.00-40.00	9.0169	-9.8116	10.0355	-10.5926
T13	40.00-20.00	9.3532	-10.6906	10.5194	-11.7251
T14	20.00-0.00	10.7777	-12.2738	12.2636	-13.7062

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 K
Lightning Rod 2"x10' (Tower)	C	From Leg	5.00 0.00 5.00	0.0000	247.00	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	0.04 0.06
Flash Beacon Lighting (Tower)	A	From Leg	0.00 0.00 0.00	0.0000	247.00	No Ice 1/2" Ice	2.50 2.76	2.50 2.76	0.03 0.06
APXVSPP18-C-A20 w/ Mounting Pipe (Sprint)	A	From Face	4.00 -2.00 0.00	0.0000	247.00	No Ice 1/2" Ice	8.56 9.21	6.95 8.13	0.08 0.15
APXV9ERR18-C-A20 w/ 6' Mount Pipe (Sprint)	B	From Face	4.00 -2.00 0.00	0.0000	247.00	No Ice 1/2" Ice	10.35 10.97	6.37 7.37	0.06 0.13
APXVSPP18-C-A20 w/ Mounting Pipe (Sprint)	C	From Face	4.00 -2.00 0.00	0.0000	247.00	No Ice 1/2" Ice	8.56 9.21	6.95 8.13	0.08 0.15
(2) Panasonic RRH 1900MHZ (Sprint)	A	From Face	4.00 2.00 0.00	0.0000	247.00	No Ice 1/2" Ice	2.71 2.95	2.61 2.84	0.06 0.08
(2) Panasonic RRH 1900MHZ (Sprint)	B	From Face	4.00 2.00 0.00	0.0000	247.00	No Ice 1/2" Ice	2.71 2.95	2.61 2.84	0.06 0.08
(2) Panasonic RRH 1900MHZ (Sprint)	C	From Face	4.00 2.00 0.00	0.0000	247.00	No Ice 1/2" Ice	2.71 2.95	2.61 2.84	0.06 0.08
Andrew 800MHz RRH (Sprint)	A	From Face	4.00 2.00 0.00	0.0000	247.00	No Ice 1/2" Ice	2.49 2.57	1.97 2.17	0.06 0.08
Andrew 800MHz RRH (Sprint)	B	From Face	4.00 2.00 0.00	0.0000	247.00	No Ice 1/2" Ice	2.49 2.57	1.97 2.17	0.06 0.08
Andrew 800MHz RRH (Sprint)	C	From Face	4.00 2.00 0.00	0.0000	247.00	No Ice 1/2" Ice	2.49 2.57	1.97 2.17	0.06 0.08
IBC1900BB-1 Combiner (Sprint)	A	From Face	4.00 0.00	0.0000	247.00	No Ice 1/2" Ice	1.13 1.27	0.54 0.65	0.02 0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	K
			0.00						
IBC1900BB-1 Combiner (Sprint)	B	From Face	4.00 0.00 0.00	0.0000	247.00	No Ice 1/2" Ice	1.13 1.27	0.54 0.65	0.02 0.03
IBC1900BB-1 Combiner (Sprint)	C	From Face	4.00 0.00 0.00	0.0000	247.00	No Ice 1/2" Ice	1.13 1.27	0.54 0.65	0.02 0.03
IBC1900HG-2A Combiner (Sprint)	A	From Face	4.00 0.00 0.00	0.0000	247.00	No Ice 1/2" Ice	1.13 1.27	0.54 0.65	0.02 0.03
IBC1900HG-2A Combiner (Sprint)	B	From Face	4.00 0.00 0.00	0.0000	247.00	No Ice 1/2" Ice	1.13 1.27	0.54 0.65	0.02 0.03
IBC1900HG-2A Combiner (Sprint)	C	From Face	4.00 0.00 0.00	0.0000	247.00	No Ice 1/2" Ice	1.13 1.27	0.54 0.65	0.02 0.03
PiROD Rotatable Platform #122379 (Sprint)	C	None		0.0000	247.00	No Ice 1/2" Ice	24.90 30.70	24.90 30.70	1.81 2.44
2.5" Dia. 12' OMNI	A	From Leg	4.00 0.00 5.00	0.0000	135.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	0.03 0.05
4' Standoff Mount	A	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	0.05 0.09
2.5" Dia. 12' OMNI	C	From Leg	4.00 0.00 5.00	0.0000	135.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	0.03 0.05
4' Standoff Mount	C	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	0.05 0.09
20' Omni	A	From Leg	6.00 0.00 10.00	0.0000	125.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	0.06 0.10
6' Standoff Mount	A	From Leg	3.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	4.97 6.12	6.12 7.27	0.07 0.13
(3) L-810 Obstruction Lights w/ Mount Kit (Tower)	C	None		0.0000	125.00	No Ice 1/2" Ice	0.85 0.97	0.43 0.53	0.05 0.05
2.5" Dia. 12' OMNI	C	From Leg	4.00 0.00 5.00	0.0000	110.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	0.03 0.05
4' Standoff Mount	C	From Leg	2.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	0.05 0.09
Camera with Mount	A	From Leg	0.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	5.60 5.92	5.60 5.92	0.15 0.21
1.5" Dia 4' Omni w/Pipe Mount	A	From Leg	4.00 0.00 5.00	0.0000	50.00	No Ice 1/2" Ice	0.94 1.39	0.94 1.39	0.02 0.03
4' Standoff Mount	A	From Leg	2.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	0.05 0.09
APXV9TM14-120 (Sprint)	A	From Face	4.00 6.00	0.0000	247.00	No Ice 1/2" Ice	7.27 7.80	5.33 6.05	0.10 0.16

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 K
			0.00						
APXV9TM14-120	B	From Face	4.00	0.0000	247.00	No Ice	7.27	5.33	0.10
(Sprint)			6.00			1/2" Ice	7.80	6.05	0.16
			0.00						
APXV9TM14-120	C	From Face	4.00	0.0000	247.00	No Ice	7.27	5.33	0.10
(Sprint)			6.00			1/2" Ice	7.80	6.05	0.16
			0.00						
TD-RRH 8x20	A	From Face	4.00	0.0000	247.00	No Ice	4.72	1.70	0.07
(Sprint)			6.00			1/2" Ice	5.01	1.92	0.10
			0.00						
TD-RRH 8x20	B	From Face	4.00	0.0000	247.00	No Ice	4.72	1.70	0.07
(Sprint)			6.00			1/2" Ice	5.01	1.92	0.10
			0.00						
TD-RRH 8x20	C	From Face	4.00	0.0000	247.00	No Ice	4.72	1.70	0.07
(Sprint)			6.00			1/2" Ice	5.01	1.92	0.10
			0.00						
TMA	A	From Face	4.00	0.0000	232.00	No Ice	1.40	0.70	0.01
(T-Mobile)			0.00			1/2" Ice	1.56	0.82	0.02
			0.00						
TMA	B	From Face	4.00	0.0000	232.00	No Ice	1.40	0.70	0.01
(T-Mobile)			0.00			1/2" Ice	1.56	0.82	0.02
			0.00						
TMA	C	From Face	4.00	0.0000	232.00	No Ice	1.40	0.70	0.01
(T-Mobile)			0.00			1/2" Ice	1.56	0.82	0.02
			0.00						
PiROD 12' Universal	C	None		0.0000	232.00	No Ice	21.88	21.88	1.07
T-Frame (3)						1/2" Ice	30.68	30.68	1.49
(T-Mobile)									
AIR B2A/B4P w/ 6' Sch 40	A	From Face	4.00	0.0000	232.00	No Ice	6.75	5.65	0.10
Pipe Mount			-2.00			1/2" Ice	7.31	6.56	0.16
(T-Mobile)			0.00						
AIR B2A/B4P w/ 6' Sch 40	A	From Face	4.00	0.0000	232.00	No Ice	6.75	5.65	0.10
Pipe Mount			2.00			1/2" Ice	7.31	6.56	0.16
(T-Mobile)			0.00						
AIR B2A/B4P w/ 6' Sch 40	B	From Face	4.00	0.0000	232.00	No Ice	6.75	5.65	0.10
Pipe Mount			-2.00			1/2" Ice	7.31	6.56	0.16
(T-Mobile)			0.00						
AIR B2A/B4P w/ 6' Sch 40	B	From Face	4.00	0.0000	232.00	No Ice	6.75	5.65	0.10
Pipe Mount			2.00			1/2" Ice	7.31	6.56	0.16
(T-Mobile)			0.00						
AIR B2A/B4P w/ 6' Sch 40	C	From Face	4.00	0.0000	232.00	No Ice	6.75	5.65	0.10
Pipe Mount			-2.00			1/2" Ice	7.31	6.56	0.16
(T-Mobile)			0.00						
AIR B2A/B4P w/ 6' Sch 40	C	From Face	4.00	0.0000	232.00	No Ice	6.75	5.65	0.10
Pipe Mount			2.00			1/2" Ice	7.31	6.56	0.16
(T-Mobile)			0.00						

Dishes

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 K
KP4F-23	B	Grid	From Face	1.00 -6.00 0.00	0.0000		110.00	4.00	No Ice 1/2" Ice	10.05 13.09	0.05 0.12
Andrew 6' w/Radome	B	Paraboloid w/Radome	From Face	1.00 -6.00 0.00	0.0000		105.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.38 0.45

Truss-Leg Properties

Section Designation	Area in^2	Area Ice in^2	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in^2
Pirod 105245	1090.3344	1814.3549	0.68	0.22	7.5718	12.5997	5.3014
Pirod 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirod 105218	2263.4687	3690.8612	0.75	0.46	7.8593	12.8155	7.2158
Pirod 105218	2263.4687	3690.8612	0.75	0.46	7.8593	12.8155	7.2158
Pirod 105219	2441.8688	3942.2854	0.94	0.49	8.4787	13.6885	9.4248
Pirod 105219	2441.8688	3942.2854	0.94	0.49	8.4787	13.6885	9.4248
Pirod 105219	2441.8688	3942.2854	0.94	0.49	8.4787	13.6885	9.4248
Pirod 105220	2578.8005	4132.5504	1.12	0.50	8.9542	14.3491	11.9282
Pirod 105220	2578.8005	4132.5504	1.12	0.50	8.9542	14.3491	11.9282
Pirod 105220	2578.8005	4132.5504	1.12	0.50	8.9542	14.3491	11.9282
Pirod 112738	3466.5160	5074.9521	1.69	0.68	12.0365	17.6214	14.7262

Tower Pressures - No Ice

$G_H = 1.101$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1	237.50	1.758	33	61.875	A	0.938	14.632	3.750	24.09	16.252	0.000
245.00-230.00					B	0.125	11.056		33.54	0.000	0.000
					C	0.000	7.680		48.83	0.000	0.000
T2	220.00	1.72	32	88.334	A	1.250	21.909	6.667	28.79	21.670	0.000
230.00-210.00					B	1.250	46.283		14.03	0.000	0.000
					C	0.000	12.806		52.07	0.000	0.000
T3	200.00	1.673	31	99.167	A	1.250	24.779	8.334	32.02	21.670	0.000
210.00-190.00					B	1.250	49.036		16.57	0.000	0.000
					C	0.000	15.838		52.62	0.000	0.000
T4	185.00	1.636	30	66.264	A	3.914	18.016	12.641	57.64	10.835	0.000
190.00-180.00					B	3.238	30.791		37.15	0.000	0.000
					C	4.235	12.641		74.90	0.000	0.000
T5	170.00	1.597	30	162.528	A	8.376	35.453	24.703	56.36	21.670	0.000
180.00-160.00					B	7.235	61.003		36.20	0.000	0.000
					C	8.723	24.703		73.90	0.000	0.000
T6	150.00	1.541	29	202.945	A	9.854	36.991	26.241	56.02	21.670	0.000
160.00-140.00					B	8.877	62.541		36.74	0.000	0.000
					C	14.658	26.241		64.16	0.000	0.000
T7	130.00	1.48	27	242.945	A	13.053	40.470	26.241	49.03	21.670	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
140.00-120.00					B	12.230	62.541		35.10	0.000	0.000
					C	18.182	26.241		59.07	0.000	0.000
T8	115.00	1.429	26	136.681	A	7.080	22.788	14.155	47.39	10.835	0.000
120.00-110.00					B	6.788	32.305		36.21	0.000	0.000
					C	9.705	14.155		59.32	0.000	0.000
T9	105.00	1.392	26	146.681	A	10.723	24.638	14.155	40.03	10.835	0.000
110.00-100.00					B	9.887	32.305		33.55	0.000	0.000
					C	13.182	14.155		51.78	0.000	0.000
T10	90.00	1.332	25	323.362	A	18.615	49.276	28.309	41.70	21.670	0.000
100.00-80.00					B	15.822	64.609		35.20	0.000	0.000
					C	21.529	28.309		56.80	0.000	0.000
T11	70.00	1.24	23	363.780	A	20.424	50.864	29.897	41.94	21.670	0.000
80.00-60.00					B	17.638	66.197		35.66	0.000	0.000
					C	23.276	29.897		56.23	0.000	0.000
T12	50.00	1.126	21	403.780	A	25.135	53.639	29.897	37.95	21.670	0.000
60.00-40.00					B	22.509	66.197		33.70	0.000	0.000
					C	28.405	29.897		51.28	0.000	0.000
T13	30.00	1	18	443.780	A	30.574	54.564	29.897	35.12	21.670	0.000
40.00-20.00					B	28.016	66.197		31.73	0.000	0.000
					C	34.170	29.897		46.67	0.000	0.000
T14 20.00-0.00	10.00	1	18	494.209	A	19.205	64.855	40.189	47.81	21.670	0.000
					B	16.616	76.489		43.17	0.000	0.000
					C	21.624	40.189		65.02	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.101$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	237.50	1.758	24	0.5000	63.125	A	1.771	25.310	6.250	23.08	17.752	0.000
245.00-230.00						B	0.236	19.878		31.07	0.000	0.000
						C	0.000	15.312		40.82	0.000	0.000
T2	220.00	1.72	24	0.5000	90.000	A	2.361	36.240	10.001	25.91	23.670	0.000
230.00-210.00						B	2.361	68.488		14.12	0.000	0.000
						C	0.000	23.057		43.37	0.000	0.000
T3	200.00	1.673	23	0.5000	100.834	A	2.361	39.661	11.668	27.77	23.670	0.000
210.00-190.00						B	2.361	71.799		15.73	0.000	0.000
						C	0.000	26.676		43.74	0.000	0.000
T4	185.00	1.636	23	0.5000	67.098	A	3.822	31.633	21.034	59.33	11.835	0.000
190.00-180.00						B	2.930	49.051		40.47	0.000	0.000
						C	4.235	22.728		78.01	0.000	0.000
T5	170.00	1.597	22	0.5000	164.197	A	8.393	62.310	40.814	57.73	23.670	0.000
180.00-160.00						B	6.888	97.258		39.19	0.000	0.000
						C	8.723	44.303		76.97	0.000	0.000
T6	150.00	1.541	21	0.5000	204.614	A	10.029	64.940	42.789	57.08	23.670	0.000
160.00-140.00						B	8.740	99.974		39.36	0.000	0.000
						C	15.665	46.611		68.71	0.000	0.000
T7	130.00	1.48	21	0.5000	244.614	A	12.924	72.206	42.789	50.26	23.670	0.000
140.00-120.00						B	11.988	100.632		37.99	0.000	0.000
						C	19.180	47.146		64.51	0.000	0.000
T8	115.00	1.429	20	0.5000	137.516	A	6.942	40.906	22.852	47.76	11.835	0.000
120.00-110.00						B	6.703	52.010		38.92	0.000	0.000
						C	10.207	25.236		64.48	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T9	105.00	1.392	19	0.5000	147.516	A	10.429	45.274	22.852	41.02	11.835	0.000
110.00-100.00						B	9.570	52.965		36.54	0.000	0.000
						C	13.664	26.388		57.06	0.000	0.000
T10	90.00	1.332	18	0.5000	325.031	A	19.234	89.384	45.704	42.08	23.670	0.000
100.00-80.00						B	15.731	104.794		37.92	0.000	0.000
						C	22.540	51.181		62.00	0.000	0.000
T11 80.00-60.00	70.00	1.24	17	0.5000	365.448	A	21.099	92.211	47.910	42.28	23.670	0.000
						B	17.588	107.619		38.26	0.000	0.000
						C	24.291	53.970		61.22	0.000	0.000
T12 60.00-40.00	50.00	1.126	16	0.5000	405.448	A	25.434	98.010	47.910	38.81	23.670	0.000
						B	22.301	108.241		36.70	0.000	0.000
						C	29.406	54.566		57.05	0.000	0.000
T13 40.00-20.00	30.00	1	14	0.5000	445.448	A	30.581	100.365	47.910	36.59	23.670	0.000
						B	27.650	108.866		35.09	0.000	0.000
						C	35.158	55.172		53.04	0.000	0.000
T14 20.00-0.00	10.00	1	14	0.5000	495.878	A	20.268	109.218	58.836	45.44	23.670	0.000
						B	16.954	117.638		43.71	0.000	0.000
						C	22.670	63.567		68.23	0.000	0.000

Tower Pressure - Service

$G_H = 1.101$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	237.50	1.758	11	61.875	A	0.938	14.632	3.750	24.09	16.252	0.000
245.00-230.00					B	0.125	11.056		33.54	0.000	0.000
					C	0.000	7.680		48.83	0.000	0.000
T2	220.00	1.72	11	88.334	A	1.250	21.909	6.667	28.79	21.670	0.000
230.00-210.00					B	1.250	46.283		14.03	0.000	0.000
					C	0.000	12.806		52.07	0.000	0.000
T3	200.00	1.673	11	99.167	A	1.250	24.779	8.334	32.02	21.670	0.000
210.00-190.00					B	1.250	49.036		16.57	0.000	0.000
					C	0.000	15.838		52.62	0.000	0.000
T4	185.00	1.636	10	66.264	A	3.914	18.016	12.641	57.64	10.835	0.000
190.00-180.00					B	3.238	30.791		37.15	0.000	0.000
					C	4.235	12.641		74.90	0.000	0.000
T5	170.00	1.597	10	162.528	A	8.376	35.453	24.703	56.36	21.670	0.000
180.00-160.00					B	7.235	61.003		36.20	0.000	0.000
					C	8.723	24.703		73.90	0.000	0.000
T6	150.00	1.541	10	202.945	A	9.854	36.991	26.241	56.02	21.670	0.000
160.00-140.00					B	8.877	62.541		36.74	0.000	0.000
					C	14.658	26.241		64.16	0.000	0.000
T7	130.00	1.48	9	242.945	A	13.053	40.470	26.241	49.03	21.670	0.000
140.00-120.00					B	12.230	62.541		35.10	0.000	0.000
					C	18.182	26.241		59.07	0.000	0.000
T8	115.00	1.429	9	136.681	A	7.080	22.788	14.155	47.39	10.835	0.000
120.00-110.00					B	6.788	32.305		36.21	0.000	0.000
					C	9.705	14.155		59.32	0.000	0.000
T9	105.00	1.392	9	146.681	A	10.723	24.638	14.155	40.03	10.835	0.000
110.00-100.00					B	9.887	32.305		33.55	0.000	0.000
					C	13.182	14.155		51.78	0.000	0.000
T10	90.00	1.332	9	323.362	A	18.615	49.276	28.309	41.70	21.670	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
100.00-80.00					B	15.822	64.609		35.20	0.000	0.000
					C	21.529	28.309		56.80	0.000	0.000
T11	70.00	1.24	8	363.780	A	20.424	50.864	29.897	41.94	21.670	0.000
80.00-60.00					B	17.638	66.197		35.66	0.000	0.000
					C	23.276	29.897		56.23	0.000	0.000
T12	50.00	1.126	7	403.780	A	25.135	53.639	29.897	37.95	21.670	0.000
60.00-40.00					B	22.509	66.197		33.70	0.000	0.000
					C	28.405	29.897		51.28	0.000	0.000
T13	30.00	1	6	443.780	A	30.574	54.564	29.897	35.12	21.670	0.000
40.00-20.00					B	28.016	66.197		31.73	0.000	0.000
					C	34.170	29.897		46.67	0.000	0.000
T14 20.00-0.00	10.00	1	6	494.209	A	19.205	64.855	40.189	47.81	21.670	0.000
					B	16.616	76.489		43.17	0.000	0.000
					C	21.624	40.189		65.02	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.23	0.60	A	0.252	2.433	0.602	1	1	9.750	1.43	95.33	A
245.00-230.00			B	0.181	2.662	0.587	1	1	6.611			
			C	0.124	2.869	0.578	1	1	4.438			
T2	0.71	1.25	A	0.262	2.401	0.605	1	1	14.506	3.00	149.84	B
230.00-210.00			B	0.538	1.855	0.718	1	1	34.466			
			C	0.145	2.79	0.581	1	1	7.436			
T3	0.71	1.85	A	0.262	2.401	0.605	1	1	16.244	3.03	151.66	B
210.00-190.00			B	0.507	1.891	0.701	1	1	35.631			
			C	0.16	2.736	0.583	1	1	9.234			
T4	0.36	1.24	A	0.331	2.217	0.626	1	1	15.189	1.92	192.47	B
190.00-180.00			B	0.514	1.883	0.704	1	1	24.930			
			C	0.255	2.424	0.603	1	1	11.858			
T5	0.71	2.33	A	0.27	2.38	0.607	1	1	29.899	3.83	191.67	B
180.00-160.00			B	0.42	2.026	0.66	1	1	47.490			
			C	0.206	2.577	0.592	1	1	23.336			
T6	0.88	2.79	A	0.231	2.496	0.597	1	1	31.944	3.98	198.79	B
160.00-140.00			B	0.352	2.167	0.633	1	1	48.476			
			C	0.202	2.591	0.591	1	1	30.159			
T7	0.90	2.96	A	0.22	2.53	0.595	1	1	37.123	4.14	207.05	B
140.00-120.00			B	0.308	2.276	0.618	1	1	50.900			
			C	0.183	2.654	0.587	1	1	33.587			
T8	0.46	1.79	A	0.219	2.535	0.594	1	1	20.624	2.12	211.70	B
120.00-110.00			B	0.286	2.334	0.612	1	1	26.549			
			C	0.175	2.683	0.586	1	1	17.993			
T9	0.47	2.07	A	0.241	2.465	0.6	1	1	25.497	2.26	226.49	B
110.00-100.00			B	0.288	2.329	0.612	1	1	29.664			
			C	0.186	2.642	0.588	1	1	21.500			
T10	0.95	4.21	A	0.21	2.563	0.592	1	1	47.810	4.21	210.38	B
100.00-80.00			B	0.249	2.441	0.602	1	1	54.689			
			C	0.154	2.756	0.582	1	1	38.009			
T11	0.95	4.87	A	0.196	2.61	0.59	1	1	50.413	4.15	207.47	B
80.00-60.00			B	0.23	2.497	0.597	1	1	57.163			
			C	0.146	2.786	0.581	1	1	40.643			
T12	0.96	5.29	A	0.195	2.612	0.589	1	1	56.750	4.09	204.35	B
60.00-40.00			B	0.22	2.532	0.595	1	1	61.870			
			C	0.144	2.792	0.581	1	1	45.764			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T13	0.97	5.30	A	0.192	2.623	0.589	1	1	62.700	3.94	197.02	B
40.00-20.00			B	0.212	2.555	0.593	1	1	67.270			
			C	0.144	2.792	0.581	1	1	51.529			
T14	0.97	7.81	A	0.17	2.699	0.585	1	1	57.129	3.75	187.27	B
20.00-0.00			B	0.188	2.635	0.588	1	1	61.598			
			C	0.125	2.865	0.578	1	1	44.852			
Sum Weight:	10.23	44.37						OTM	5258.44 kip-ft	45.85		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.23	0.60	A	0.252	2.433	0.602	0.825	1	9.586	1.42	94.38	A
245.00-230.00			B	0.181	2.662	0.587	0.825	1	6.589			
			C	0.124	2.869	0.578	0.825	1	4.438			
T2	0.71	1.25	A	0.262	2.401	0.605	0.825	1	14.288	2.98	149.13	B
230.00-210.00			B	0.538	1.855	0.718	0.825	1	34.247			
			C	0.145	2.79	0.581	0.825	1	7.436			
T3	0.71	1.85	A	0.262	2.401	0.605	0.825	1	16.026	3.02	150.95	B
210.00-190.00			B	0.507	1.891	0.701	0.825	1	35.412			
			C	0.16	2.736	0.583	0.825	1	9.234			
T4	0.36	1.24	A	0.331	2.217	0.626	0.825	1	14.505	1.89	188.92	B
190.00-180.00			B	0.514	1.883	0.704	0.825	1	24.364			
			C	0.255	2.424	0.603	0.825	1	11.117			
T5	0.71	2.33	A	0.27	2.38	0.607	0.825	1	28.433	3.75	187.50	B
180.00-160.00			B	0.42	2.026	0.66	0.825	1	46.224			
			C	0.206	2.577	0.592	0.825	1	21.809			
T6	0.88	2.79	A	0.231	2.496	0.597	0.825	1	30.219	3.87	193.51	B
160.00-140.00			B	0.352	2.167	0.633	0.825	1	46.922			
			C	0.202	2.591	0.591	0.825	1	27.594			
T7	0.90	2.96	A	0.22	2.53	0.595	0.825	1	34.839	3.99	199.72	B
140.00-120.00			B	0.308	2.276	0.618	0.825	1	48.759			
			C	0.183	2.654	0.587	0.825	1	30.405			
T8	0.46	1.79	A	0.219	2.535	0.594	0.825	1	19.385	2.04	203.64	B
120.00-110.00			B	0.286	2.334	0.612	0.825	1	25.361			
			C	0.175	2.683	0.586	0.825	1	16.295			
T9	0.47	2.07	A	0.241	2.465	0.6	0.825	1	23.620	2.15	215.07	B
110.00-100.00			B	0.288	2.329	0.612	0.825	1	27.934			
			C	0.186	2.642	0.588	0.825	1	19.194			
T10	0.95	4.21	A	0.21	2.563	0.592	0.825	1	44.553	4.02	201.21	B
100.00-80.00			B	0.249	2.441	0.602	0.825	1	51.920			
			C	0.154	2.756	0.582	0.825	1	34.241			
T11	0.95	4.87	A	0.196	2.61	0.59	0.825	1	46.838	3.95	197.75	B
80.00-60.00			B	0.23	2.497	0.597	0.825	1	54.076			
			C	0.146	2.786	0.581	0.825	1	36.570			
T12	0.96	5.29	A	0.195	2.612	0.589	0.825	1	52.351	3.86	192.92	B
60.00-40.00			B	0.22	2.532	0.595	0.825	1	57.931			
			C	0.144	2.792	0.581	0.825	1	40.793			
T13	0.97	5.30	A	0.192	2.623	0.589	0.825	1	57.349	3.69	184.27	B
40.00-20.00			B	0.212	2.555	0.593	0.825	1	62.367			
			C	0.144	2.792	0.581	0.825	1	45.549			
T14	0.97	7.81	A	0.17	2.699	0.585	0.825	1	53.768	3.59	179.48	B
20.00-0.00			B	0.188	2.635	0.588	0.825	1	58.691			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	10.23	44.37	C	0.125	2.865	0.578	0.825	1 OTM	41.067 5121.42 kip-ft	44.22		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.23	0.60	A	0.252	2.433	0.602	0.8	1	9.563	1.41	94.25	A
245.00-230.00			B	0.181	2.662	0.587	0.8	1	6.586			
			C	0.124	2.869	0.578	0.8	1	4.438			
T2	0.71	1.25	A	0.262	2.401	0.605	0.8	1	14.256	2.98	149.03	B
230.00-210.00			B	0.538	1.855	0.718	0.8	1	34.216			
			C	0.145	2.79	0.581	0.8	1	7.436			
T3	0.71	1.85	A	0.262	2.401	0.605	0.8	1	15.994	3.02	150.85	B
210.00-190.00			B	0.507	1.891	0.701	0.8	1	35.381			
			C	0.16	2.736	0.583	0.8	1	9.234			
T4	0.36	1.24	A	0.331	2.217	0.626	0.8	1	14.407	1.88	188.41	B
190.00-180.00			B	0.514	1.883	0.704	0.8	1	24.283			
			C	0.255	2.424	0.603	0.8	1	11.011			
T5	0.71	2.33	A	0.27	2.38	0.607	0.8	1	28.224	3.74	186.90	B
180.00-160.00			B	0.42	2.026	0.66	0.8	1	46.043			
			C	0.206	2.577	0.592	0.8	1	21.591			
T6	0.88	2.79	A	0.231	2.496	0.597	0.8	1	29.973	3.86	192.75	B
160.00-140.00			B	0.352	2.167	0.633	0.8	1	46.700			
			C	0.202	2.591	0.591	0.8	1	27.228			
T7	0.90	2.96	A	0.22	2.53	0.595	0.8	1	34.512	3.97	198.67	B
140.00-120.00			B	0.308	2.276	0.618	0.8	1	48.454			
			C	0.183	2.654	0.587	0.8	1	29.950			
T8	0.46	1.79	A	0.219	2.535	0.594	0.8	1	19.208	2.02	202.49	B
120.00-110.00			B	0.286	2.334	0.612	0.8	1	25.192			
			C	0.175	2.683	0.586	0.8	1	16.052			
T9	0.47	2.07	A	0.241	2.465	0.6	0.8	1	23.352	2.13	213.44	B
110.00-100.00			B	0.288	2.329	0.612	0.8	1	27.686			
			C	0.186	2.642	0.588	0.8	1	18.864			
T10	0.95	4.21	A	0.21	2.563	0.592	0.8	1	44.087	4.00	199.90	B
100.00-80.00			B	0.249	2.441	0.602	0.8	1	51.524			
			C	0.154	2.756	0.582	0.8	1	33.703			
T11	0.95	4.87	A	0.196	2.61	0.59	0.8	1	46.328	3.93	196.36	B
80.00-60.00			B	0.23	2.497	0.597	0.8	1	53.635			
			C	0.146	2.786	0.581	0.8	1	35.988			
T12	0.96	5.29	A	0.195	2.612	0.589	0.8	1	51.723	3.83	191.29	B
60.00-40.00			B	0.22	2.532	0.595	0.8	1	57.369			
			C	0.144	2.792	0.581	0.8	1	40.083			
T13	0.97	5.30	A	0.192	2.623	0.589	0.8	1	56.585	3.65	182.45	B
40.00-20.00			B	0.212	2.555	0.593	0.8	1	61.667			
			C	0.144	2.792	0.581	0.8	1	44.695			
T14	0.97	7.81	A	0.17	2.699	0.585	0.8	1	53.288	3.57	178.36	B
20.00-0.00			B	0.188	2.635	0.588	0.8	1	58.275			
			C	0.125	2.865	0.578	0.8	1	40.527			
Sum Weight:	10.23	44.37						OTM	5101.85 kip-ft	43.99		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.23	0.60	A	0.252	2.433	0.602	0.85	1	9.609	1.42	94.52	A
245.00-230.00			B	0.181	2.662	0.587	0.85	1	6.592			
			C	0.124	2.869	0.578	0.85	1	4.438			
T2	0.71	1.25	A	0.262	2.401	0.605	0.85	1	14.319	2.98	149.23	B
230.00-210.00			B	0.538	1.855	0.718	0.85	1	34.278			
			C	0.145	2.79	0.581	0.85	1	7.436			
T3	0.71	1.85	A	0.262	2.401	0.605	0.85	1	16.057	3.02	151.05	B
210.00-190.00			B	0.507	1.891	0.701	0.85	1	35.443			
			C	0.16	2.736	0.583	0.85	1	9.234			
T4	0.36	1.24	A	0.331	2.217	0.626	0.85	1	14.602	1.89	189.43	B
190.00-180.00			B	0.514	1.883	0.704	0.85	1	24.445			
			C	0.255	2.424	0.603	0.85	1	11.223			
T5	0.71	2.33	A	0.27	2.38	0.607	0.85	1	28.642	3.76	188.09	B
180.00-160.00			B	0.42	2.026	0.66	0.85	1	46.405			
			C	0.206	2.577	0.592	0.85	1	22.027			
T6	0.88	2.79	A	0.231	2.496	0.597	0.85	1	30.466	3.89	194.26	B
160.00-140.00			B	0.352	2.167	0.633	0.85	1	47.144			
			C	0.202	2.591	0.591	0.85	1	27.961			
T7	0.90	2.96	A	0.22	2.53	0.595	0.85	1	35.165	4.02	200.76	B
140.00-120.00			B	0.308	2.276	0.618	0.85	1	49.065			
			C	0.183	2.654	0.587	0.85	1	30.859			
T8	0.46	1.79	A	0.219	2.535	0.594	0.85	1	19.562	2.05	204.79	B
120.00-110.00			B	0.286	2.334	0.612	0.85	1	25.531			
			C	0.175	2.683	0.586	0.85	1	16.537			
T9	0.47	2.07	A	0.241	2.465	0.6	0.85	1	23.888	2.17	216.70	B
110.00-100.00			B	0.288	2.329	0.612	0.85	1	28.181			
			C	0.186	2.642	0.588	0.85	1	19.523			
T10	0.95	4.21	A	0.21	2.563	0.592	0.85	1	45.018	4.05	202.52	B
100.00-80.00			B	0.249	2.441	0.602	0.85	1	52.315			
			C	0.154	2.756	0.582	0.85	1	34.779			
T11	0.95	4.87	A	0.196	2.61	0.59	0.85	1	47.349	3.98	199.14	B
80.00-60.00			B	0.23	2.497	0.597	0.85	1	54.517			
			C	0.146	2.786	0.581	0.85	1	37.152			
T12	0.96	5.29	A	0.195	2.612	0.589	0.85	1	52.980	3.89	194.55	B
60.00-40.00			B	0.22	2.532	0.595	0.85	1	58.494			
			C	0.144	2.792	0.581	0.85	1	41.503			
T13	0.97	5.30	A	0.192	2.623	0.589	0.85	1	58.114	3.72	186.09	B
40.00-20.00			B	0.212	2.555	0.593	0.85	1	63.068			
			C	0.144	2.792	0.581	0.85	1	46.404			
T14	0.97	7.81	A	0.17	2.699	0.585	0.85	1	54.248	3.61	180.59	B
20.00-0.00			B	0.188	2.635	0.588	0.85	1	59.106			
			C	0.125	2.865	0.578	0.85	1	41.608			
Sum Weight:	10.23	44.37						OTM	5141.00 kip-ft	44.45		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.53	0.80	A	0.429	2.009	0.664	1	1	18.573	1.48	98.52	A
245.00-230.00			B	0.319	2.248	0.622	1	1	12.596			
			C	0.243	2.46	0.6	1	1	9.187			
T2	1.68	1.56	A	0.429	2.01	0.664	1	1	26.418	3.61	180.61	B
230.00-210.00			B	0.787	1.807	0.886	1	1	63.045			
			C	0.256	2.419	0.603	1	1	13.914			
T3	1.68	2.21	A	0.417	2.032	0.659	1	1	28.481	3.48	173.88	B
210.00-190.00			B	0.735	1.782	0.846	1	1	63.094			
			C	0.265	2.395	0.606	1	1	16.157			
T4	0.84	1.73	A	0.528	1.866	0.712	1	1	26.357	2.36	235.94	B
190.00-180.00			B	0.775	1.799	0.876	1	1	45.903			
			C	0.402	2.06	0.652	1	1	19.062			
T5	1.68	4.01	A	0.431	2.007	0.665	1	1	49.803	4.16	208.13	B
180.00-160.00			B	0.634	1.787	0.775	1	1	82.280			
			C	0.323	2.237	0.623	1	1	36.332			
T6	1.90	4.54	A	0.366	2.134	0.638	1	1	51.491	4.07	203.43	B
160.00-140.00			B	0.531	1.863	0.714	1	1	80.119			
			C	0.304	2.284	0.617	1	1	44.436			
T7	1.96	4.82	A	0.348	2.176	0.632	1	1	58.542	4.08	204.04	B
140.00-120.00			B	0.46	1.957	0.678	1	1	80.227			
			C	0.271	2.376	0.607	1	1	47.821			
T8	1.00	2.78	A	0.348	2.176	0.632	1	1	32.784	2.07	206.64	B
120.00-110.00			B	0.427	2.013	0.663	1	1	41.184			
			C	0.258	2.414	0.604	1	1	25.447			
T9	1.04	3.18	A	0.378	2.11	0.643	1	1	39.528	2.17	216.54	B
110.00-100.00			B	0.424	2.019	0.662	1	1	44.615			
			C	0.272	2.375	0.608	1	1	29.698			
T10	2.11	6.26	A	0.334	2.209	0.627	1	1	75.274	4.06	202.97	B
100.00-80.00			B	0.371	2.125	0.64	1	1	82.813			
			C	0.227	2.509	0.596	1	1	53.056			
T11	2.11	7.02	A	0.31	2.27	0.619	1	1	78.181	3.98	199.24	B
80.00-60.00			B	0.343	2.189	0.63	1	1	85.374			
			C	0.214	2.549	0.593	1	1	56.316			
T12	2.15	7.60	A	0.304	2.284	0.617	1	1	85.933	3.86	193.04	B
60.00-40.00			B	0.322	2.239	0.623	1	1	89.721			
			C	0.207	2.572	0.592	1	1	61.702			
T13	2.17	7.78	A	0.294	2.312	0.614	1	1	92.212	3.66	183.19	B
40.00-20.00			B	0.306	2.279	0.618	1	1	94.919			
			C	0.203	2.587	0.591	1	1	67.763			
T14	2.17	10.87	A	0.261	2.405	0.605	1	1	86.320	3.57	178.37	B
20.00-0.00			B	0.271	2.375	0.608	1	1	88.427			
			C	0.174	2.685	0.585	1	1	59.884			
Sum Weight:	23.00	65.18						OTM	5574.00 kip-ft	46.61		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.53	0.80	A	0.429	2.009	0.664	0.825	1	18.263	1.46	97.40	A
245.00-230.00			B	0.319	2.248	0.622	0.825	1	12.554			
			C	0.243	2.46	0.6	0.825	1	9.187			
T2	1.68	1.56	A	0.429	2.01	0.664	0.825	1	26.005	3.59	179.63	B
230.00-210.00			B	0.787	1.807	0.886	0.825	1	62.631			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.256	2.419	0.603	0.825	1	13.914			
T3	1.68	2.21	A	0.417	2.032	0.659	0.825	1	28.068	3.46	172.94	B
210.00-190.00			B	0.735	1.782	0.846	0.825	1	62.680			
			C	0.265	2.395	0.606	0.825	1	16.157			
T4	0.84	1.73	A	0.528	1.866	0.712	0.825	1	25.688	2.34	233.63	B
190.00-180.00			B	0.775	1.799	0.876	0.825	1	45.390			
			C	0.402	2.06	0.652	0.825	1	18.321			
T5	1.68	4.01	A	0.431	2.007	0.665	0.825	1	48.334	4.11	205.50	B
180.00-160.00			B	0.634	1.787	0.775	0.825	1	81.074			
			C	0.323	2.237	0.623	0.825	1	34.805			
T6	1.90	4.54	A	0.366	2.134	0.638	0.825	1	49.736	4.00	200.08	B
160.00-140.00			B	0.531	1.863	0.714	0.825	1	78.590			
			C	0.304	2.284	0.617	0.825	1	41.694			
T7	1.96	4.82	A	0.348	2.176	0.632	0.825	1	56.280	3.99	199.40	B
140.00-120.00			B	0.46	1.957	0.678	0.825	1	78.129			
			C	0.271	2.376	0.607	0.825	1	44.464			
T8	1.00	2.78	A	0.348	2.176	0.632	0.825	1	31.570	2.01	201.49	B
120.00-110.00			B	0.427	2.013	0.663	0.825	1	40.011			
			C	0.258	2.414	0.604	0.825	1	23.660			
T9	1.04	3.18	A	0.378	2.11	0.643	0.825	1	37.703	2.09	209.35	B
110.00-100.00			B	0.424	2.019	0.662	0.825	1	42.940			
			C	0.272	2.375	0.608	0.825	1	27.307			
T10	2.11	6.26	A	0.334	2.209	0.627	0.825	1	71.908	3.94	197.02	B
100.00-80.00			B	0.371	2.125	0.64	0.825	1	80.060			
			C	0.227	2.509	0.596	0.825	1	49.111			
T11	2.11	7.02	A	0.31	2.27	0.619	0.825	1	74.488	3.86	192.86	B
80.00-60.00			B	0.343	2.189	0.63	0.825	1	82.296			
			C	0.214	2.549	0.593	0.825	1	52.065			
T12	2.15	7.60	A	0.304	2.284	0.617	0.825	1	81.482	3.71	185.53	B
60.00-40.00			B	0.322	2.239	0.623	0.825	1	85.818			
			C	0.207	2.572	0.592	0.825	1	56.556			
T13	2.17	7.78	A	0.294	2.312	0.614	0.825	1	86.860	3.50	174.78	B
40.00-20.00			B	0.306	2.279	0.618	0.825	1	90.080			
			C	0.203	2.587	0.591	0.825	1	61.610			
T14	2.17	10.87	A	0.261	2.405	0.605	0.825	1	82.773	3.46	172.99	B
20.00-0.00			B	0.271	2.375	0.608	0.825	1	85.461			
			C	0.174	2.685	0.585	0.825	1	55.917			
Sum Weight:	23.00	65.18						OTM	5479.91 kip-ft	45.52		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.53	0.80	A	0.429	2.009	0.664	0.8	1	18.219	1.46	97.24	A
245.00-230.00			B	0.319	2.248	0.622	0.8	1	12.548			
			C	0.243	2.46	0.6	0.8	1	9.187			
T2	1.68	1.56	A	0.429	2.01	0.664	0.8	1	25.946	3.59	179.49	B
230.00-210.00			B	0.787	1.807	0.886	0.8	1	62.572			
			C	0.256	2.419	0.603	0.8	1	13.914			
T3	1.68	2.21	A	0.417	2.032	0.659	0.8	1	28.009	3.46	172.81	B
210.00-190.00			B	0.735	1.782	0.846	0.8	1	62.621			
			C	0.265	2.395	0.606	0.8	1	16.157			
T4	0.84	1.73	A	0.528	1.866	0.712	0.8	1	25.593	2.33	233.30	B

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
190.00-180.00			B	0.775	1.799	0.876	0.8	1	45.317			
			C	0.402	2.06	0.652	0.8	1	18.215			
T5	1.68	4.01	A	0.431	2.007	0.665	0.8	1	48.124	4.10	205.13	B
180.00-160.00			B	0.634	1.787	0.775	0.8	1	80.902			
			C	0.323	2.237	0.623	0.8	1	34.587			
T6	1.90	4.54	A	0.366	2.134	0.638	0.8	1	49.485	3.99	199.60	B
160.00-140.00			B	0.531	1.863	0.714	0.8	1	78.371			
			C	0.304	2.284	0.617	0.8	1	41.303			
T7	1.96	4.82	A	0.348	2.176	0.632	0.8	1	55.957	3.97	198.74	B
140.00-120.00			B	0.46	1.957	0.678	0.8	1	77.829			
			C	0.271	2.376	0.607	0.8	1	43.985			
T8	1.00	2.78	A	0.348	2.176	0.632	0.8	1	31.396	2.01	200.75	B
120.00-110.00			B	0.427	2.013	0.663	0.8	1	39.843			
			C	0.258	2.414	0.604	0.8	1	23.405			
T9	1.04	3.18	A	0.378	2.11	0.643	0.8	1	37.442	2.08	208.33	B
110.00-100.00			B	0.424	2.019	0.662	0.8	1	42.701			
			C	0.272	2.375	0.608	0.8	1	26.965			
T10	2.11	6.26	A	0.334	2.209	0.627	0.8	1	71.427	3.92	196.17	B
100.00-80.00			B	0.371	2.125	0.64	0.8	1	79.667			
			C	0.227	2.509	0.596	0.8	1	48.548			
T11	2.11	7.02	A	0.31	2.27	0.619	0.8	1	73.961	3.84	191.95	B
80.00-60.00			B	0.343	2.189	0.63	0.8	1	81.856			
			C	0.214	2.549	0.593	0.8	1	51.458			
T12	2.15	7.60	A	0.304	2.284	0.617	0.8	1	80.847	3.69	184.46	B
60.00-40.00			B	0.322	2.239	0.623	0.8	1	85.261			
			C	0.207	2.572	0.592	0.8	1	55.821			
T13	2.17	7.78	A	0.294	2.312	0.614	0.8	1	86.096	3.47	173.57	B
40.00-20.00			B	0.306	2.279	0.618	0.8	1	89.389			
			C	0.203	2.587	0.591	0.8	1	60.731			
T14	2.17	10.87	A	0.261	2.405	0.605	0.8	1	82.266	3.44	172.23	B
20.00-0.00			B	0.271	2.375	0.608	0.8	1	85.037			
			C	0.174	2.685	0.585	0.8	1	55.350			
Sum Weight:	23.00	65.18						OTM	5466.47 kip-ft	45.37		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.53	0.80	A	0.429	2.009	0.664	0.85	1	18.307	1.46	97.56	A
245.00-230.00			B	0.319	2.248	0.622	0.85	1	12.560			
			C	0.243	2.46	0.6	0.85	1	9.187			
T2	1.68	1.56	A	0.429	2.01	0.664	0.85	1	26.064	3.60	179.77	B
230.00-210.00			B	0.787	1.807	0.886	0.85	1	62.690			
			C	0.256	2.419	0.603	0.85	1	13.914			
T3	1.68	2.21	A	0.417	2.032	0.659	0.85	1	28.127	3.46	173.08	B
210.00-190.00			B	0.735	1.782	0.846	0.85	1	62.739			
			C	0.265	2.395	0.606	0.85	1	16.157			
T4	0.84	1.73	A	0.528	1.866	0.712	0.85	1	25.784	2.34	233.96	B
190.00-180.00			B	0.775	1.799	0.876	0.85	1	45.464			
			C	0.402	2.06	0.652	0.85	1	18.427			
T5	1.68	4.01	A	0.431	2.007	0.665	0.85	1	48.543	4.12	205.88	B
180.00-160.00			B	0.634	1.787	0.775	0.85	1	81.247			
			C	0.323	2.237	0.623	0.85	1	35.023			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T6	1.90	4.54	A	0.366	2.134	0.638	0.85	1	49.986	4.01	200.55	B
160.00-140.00			B	0.531	1.863	0.714	0.85	1	78.808			
			C	0.304	2.284	0.617	0.85	1	42.086			
T7	1.96	4.82	A	0.348	2.176	0.632	0.85	1	56.603	4.00	200.06	B
140.00-120.00			B	0.46	1.957	0.678	0.85	1	78.429			
			C	0.271	2.376	0.607	0.85	1	44.944			
T8	1.00	2.78	A	0.348	2.176	0.632	0.85	1	31.743	2.02	202.23	B
120.00-110.00			B	0.427	2.013	0.663	0.85	1	40.178			
			C	0.258	2.414	0.604	0.85	1	23.916			
T9	1.04	3.18	A	0.378	2.11	0.643	0.85	1	37.964	2.10	210.38	B
110.00-100.00			B	0.424	2.019	0.662	0.85	1	43.180			
			C	0.272	2.375	0.608	0.85	1	27.648			
T10	2.11	6.26	A	0.334	2.209	0.627	0.85	1	72.389	3.96	197.87	B
100.00-80.00			B	0.371	2.125	0.64	0.85	1	80.453			
			C	0.227	2.509	0.596	0.85	1	49.675			
T11	2.11	7.02	A	0.31	2.27	0.619	0.85	1	75.016	3.88	193.77	B
80.00-60.00			B	0.343	2.189	0.63	0.85	1	82.735			
			C	0.214	2.549	0.593	0.85	1	52.672			
T12	2.15	7.60	A	0.304	2.284	0.617	0.85	1	82.118	3.73	186.60	B
60.00-40.00			B	0.322	2.239	0.623	0.85	1	86.376			
			C	0.207	2.572	0.592	0.85	1	57.291			
T13	2.17	7.78	A	0.294	2.312	0.614	0.85	1	87.625	3.52	175.98	B
40.00-20.00			B	0.306	2.279	0.618	0.85	1	90.771			
			C	0.203	2.587	0.591	0.85	1	62.489			
T14	2.17	10.87	A	0.261	2.405	0.605	0.85	1	83.280	3.48	173.76	B
20.00-0.00			B	0.271	2.375	0.608	0.85	1	85.884			
			C	0.174	2.685	0.585	0.85	1	56.483			
Sum Weight:	23.00	65.18						OTM	5493.35 kip-ft	45.68		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.23	0.60	A	0.252	2.433	0.602	1	1	9.750	0.49	32.99	A
245.00-230.00			B	0.181	2.662	0.587	1	1	6.611			
			C	0.124	2.869	0.578	1	1	4.438			
T2	0.71	1.25	A	0.262	2.401	0.605	1	1	14.506	1.04	51.85	B
230.00-210.00			B	0.538	1.855	0.718	1	1	34.466			
			C	0.145	2.79	0.581	1	1	7.436			
T3	0.71	1.85	A	0.262	2.401	0.605	1	1	16.244	1.05	52.48	B
210.00-190.00			B	0.507	1.891	0.701	1	1	35.631			
			C	0.16	2.736	0.583	1	1	9.234			
T4	0.36	1.24	A	0.331	2.217	0.626	1	1	15.189	0.67	66.60	B
190.00-180.00			B	0.514	1.883	0.704	1	1	24.930			
			C	0.255	2.424	0.603	1	1	11.858			
T5	0.71	2.33	A	0.27	2.38	0.607	1	1	29.899	1.33	66.32	B
180.00-160.00			B	0.42	2.026	0.66	1	1	47.490			
			C	0.206	2.577	0.592	1	1	23.336			
T6	0.88	2.79	A	0.231	2.496	0.597	1	1	31.944	1.38	68.79	B
160.00-140.00			B	0.352	2.167	0.633	1	1	48.476			
			C	0.202	2.591	0.591	1	1	30.159			
T7	0.90	2.96	A	0.22	2.53	0.595	1	1	37.123	1.43	71.64	B
140.00-120.00			B	0.308	2.276	0.618	1	1	50.900			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.183	2.654	0.587	1	1	33.587			
T8	0.46	1.79	A	0.219	2.535	0.594	1	1	20.624	0.73	73.25	B
120.00-110.00			B	0.286	2.334	0.612	1	1	26.549			
			C	0.175	2.683	0.586	1	1	17.993			
T9	0.47	2.07	A	0.241	2.465	0.6	1	1	25.497	0.78	78.37	B
110.00-100.00			B	0.288	2.329	0.612	1	1	29.664			
			C	0.186	2.642	0.588	1	1	21.500			
T10	0.95	4.21	A	0.21	2.563	0.592	1	1	47.810	1.46	72.80	B
100.00-80.00			B	0.249	2.441	0.602	1	1	54.689			
			C	0.154	2.756	0.582	1	1	38.009			
T11	0.95	4.87	A	0.196	2.61	0.59	1	1	50.413	1.44	71.79	B
80.00-60.00			B	0.23	2.497	0.597	1	1	57.163			
			C	0.146	2.786	0.581	1	1	40.643			
T12	0.96	5.29	A	0.195	2.612	0.589	1	1	56.750	1.41	70.71	B
60.00-40.00			B	0.22	2.532	0.595	1	1	61.870			
			C	0.144	2.792	0.581	1	1	45.764			
T13	0.97	5.30	A	0.192	2.623	0.589	1	1	62.700	1.36	68.17	B
40.00-20.00			B	0.212	2.555	0.593	1	1	67.270			
			C	0.144	2.792	0.581	1	1	51.529			
T14	0.97	7.81	A	0.17	2.699	0.585	1	1	57.129	1.30	64.80	B
20.00-0.00			B	0.188	2.635	0.588	1	1	61.598			
			C	0.125	2.865	0.578	1	1	44.852			
Sum Weight:	10.23	44.37						OTM	1819.53 kip-ft	15.86		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.23	0.60	A	0.252	2.433	0.602	0.825	1	9.586	0.49	32.66	A
245.00-230.00			B	0.181	2.662	0.587	0.825	1	6.589			
			C	0.124	2.869	0.578	0.825	1	4.438			
T2	0.71	1.25	A	0.262	2.401	0.605	0.825	1	14.288	1.03	51.60	B
230.00-210.00			B	0.538	1.855	0.718	0.825	1	34.247			
			C	0.145	2.79	0.581	0.825	1	7.436			
T3	0.71	1.85	A	0.262	2.401	0.605	0.825	1	16.026	1.04	52.23	B
210.00-190.00			B	0.507	1.891	0.701	0.825	1	35.412			
			C	0.16	2.736	0.583	0.825	1	9.234			
T4	0.36	1.24	A	0.331	2.217	0.626	0.825	1	14.505	0.65	65.37	B
190.00-180.00			B	0.514	1.883	0.704	0.825	1	24.364			
			C	0.255	2.424	0.603	0.825	1	11.117			
T5	0.71	2.33	A	0.27	2.38	0.607	0.825	1	28.433	1.30	64.88	B
180.00-160.00			B	0.42	2.026	0.66	0.825	1	46.224			
			C	0.206	2.577	0.592	0.825	1	21.809			
T6	0.88	2.79	A	0.231	2.496	0.597	0.825	1	30.219	1.34	66.96	B
160.00-140.00			B	0.352	2.167	0.633	0.825	1	46.922			
			C	0.202	2.591	0.591	0.825	1	27.594			
T7	0.90	2.96	A	0.22	2.53	0.595	0.825	1	34.839	1.38	69.11	B
140.00-120.00			B	0.308	2.276	0.618	0.825	1	48.759			
			C	0.183	2.654	0.587	0.825	1	30.405			
T8	0.46	1.79	A	0.219	2.535	0.594	0.825	1	19.385	0.70	70.46	B
120.00-110.00			B	0.286	2.334	0.612	0.825	1	25.361			
			C	0.175	2.683	0.586	0.825	1	16.295			
T9	0.47	2.07	A	0.241	2.465	0.6	0.825	1	23.620	0.74	74.42	B

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
110.00-100.00			B	0.288	2.329	0.612	0.825	1	27.934			
			C	0.186	2.642	0.588	0.825	1	19.194			
T10	0.95	4.21	A	0.21	2.563	0.592	0.825	1	44.553	1.39	69.62	B
100.00-80.00			B	0.249	2.441	0.602	0.825	1	51.920			
			C	0.154	2.756	0.582	0.825	1	34.241			
T11	0.95	4.87	A	0.196	2.61	0.59	0.825	1	46.838	1.37	68.42	B
80.00-60.00			B	0.23	2.497	0.597	0.825	1	54.076			
			C	0.146	2.786	0.581	0.825	1	36.570			
T12	0.96	5.29	A	0.195	2.612	0.589	0.825	1	52.351	1.34	66.75	B
60.00-40.00			B	0.22	2.532	0.595	0.825	1	57.931			
			C	0.144	2.792	0.581	0.825	1	40.793			
T13	0.97	5.30	A	0.192	2.623	0.589	0.825	1	57.349	1.28	63.76	B
40.00-20.00			B	0.212	2.555	0.593	0.825	1	62.367			
			C	0.144	2.792	0.581	0.825	1	45.549			
T14	0.97	7.81	A	0.17	2.699	0.585	0.825	1	53.768	1.24	62.10	B
20.00-0.00			B	0.188	2.635	0.588	0.825	1	58.691			
			C	0.125	2.865	0.578	0.825	1	41.067			
Sum Weight:	10.23	44.37						OTM	1772.12 kip-ft	15.30		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.23	0.60	A	0.252	2.433	0.602	0.8	1	9.563	0.49	32.61	A
245.00-230.00			B	0.181	2.662	0.587	0.8	1	6.586			
			C	0.124	2.869	0.578	0.8	1	4.438			
T2	0.71	1.25	A	0.262	2.401	0.605	0.8	1	14.256	1.03	51.57	B
230.00-210.00			B	0.538	1.855	0.718	0.8	1	34.216			
			C	0.145	2.79	0.581	0.8	1	7.436			
T3	0.71	1.85	A	0.262	2.401	0.605	0.8	1	15.994	1.04	52.20	B
210.00-190.00			B	0.507	1.891	0.701	0.8	1	35.381			
			C	0.16	2.736	0.583	0.8	1	9.234			
T4	0.36	1.24	A	0.331	2.217	0.626	0.8	1	14.407	0.65	65.19	B
190.00-180.00			B	0.514	1.883	0.704	0.8	1	24.283			
			C	0.255	2.424	0.603	0.8	1	11.011			
T5	0.71	2.33	A	0.27	2.38	0.607	0.8	1	28.224	1.29	64.67	B
180.00-160.00			B	0.42	2.026	0.66	0.8	1	46.043			
			C	0.206	2.577	0.592	0.8	1	21.591			
T6	0.88	2.79	A	0.231	2.496	0.597	0.8	1	29.973	1.33	66.70	B
160.00-140.00			B	0.352	2.167	0.633	0.8	1	46.700			
			C	0.202	2.591	0.591	0.8	1	27.228			
T7	0.90	2.96	A	0.22	2.53	0.595	0.8	1	34.512	1.37	68.74	B
140.00-120.00			B	0.308	2.276	0.618	0.8	1	48.454			
			C	0.183	2.654	0.587	0.8	1	29.950			
T8	0.46	1.79	A	0.219	2.535	0.594	0.8	1	19.208	0.70	70.07	B
120.00-110.00			B	0.286	2.334	0.612	0.8	1	25.192			
			C	0.175	2.683	0.586	0.8	1	16.052			
T9	0.47	2.07	A	0.241	2.465	0.6	0.8	1	23.352	0.74	73.85	B
110.00-100.00			B	0.288	2.329	0.612	0.8	1	27.686			
			C	0.186	2.642	0.588	0.8	1	18.864			
T10	0.95	4.21	A	0.21	2.563	0.592	0.8	1	44.087	1.38	69.17	B
100.00-80.00			B	0.249	2.441	0.602	0.8	1	51.524			
			C	0.154	2.756	0.582	0.8	1	33.703			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T11	0.95	4.87	A	0.196	2.61	0.59	0.8	1	46.328	1.36	67.94	B
80.00-60.00			B	0.23	2.497	0.597	0.8	1	53.635			
			C	0.146	2.786	0.581	0.8	1	35.988			
T12	0.96	5.29	A	0.195	2.612	0.589	0.8	1	51.723	1.32	66.19	B
60.00-40.00			B	0.22	2.532	0.595	0.8	1	57.369			
			C	0.144	2.792	0.581	0.8	1	40.083			
T13	0.97	5.30	A	0.192	2.623	0.589	0.8	1	56.585	1.26	63.13	B
40.00-20.00			B	0.212	2.555	0.593	0.8	1	61.667			
			C	0.144	2.792	0.581	0.8	1	44.695			
T14	0.97	7.81	A	0.17	2.699	0.585	0.8	1	53.288	1.23	61.72	B
20.00-0.00			B	0.188	2.635	0.588	0.8	1	58.275			
			C	0.125	2.865	0.578	0.8	1	40.527			
Sum Weight:	10.23	44.37						OTM	1765.35 kip-ft	15.22		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.23	0.60	A	0.252	2.433	0.602	0.85	1	9.609	0.49	32.71	A
245.00-230.00			B	0.181	2.662	0.587	0.85	1	6.592			
			C	0.124	2.869	0.578	0.85	1	4.438			
T2	0.71	1.25	A	0.262	2.401	0.605	0.85	1	14.319	1.03	51.64	B
230.00-210.00			B	0.538	1.855	0.718	0.85	1	34.278			
			C	0.145	2.79	0.581	0.85	1	7.436			
T3	0.71	1.85	A	0.262	2.401	0.605	0.85	1	16.057	1.05	52.27	B
210.00-190.00			B	0.507	1.891	0.701	0.85	1	35.443			
			C	0.16	2.736	0.583	0.85	1	9.234			
T4	0.36	1.24	A	0.331	2.217	0.626	0.85	1	14.602	0.66	65.55	B
190.00-180.00			B	0.514	1.883	0.704	0.85	1	24.445			
			C	0.255	2.424	0.603	0.85	1	11.223			
T5	0.71	2.33	A	0.27	2.38	0.607	0.85	1	28.642	1.30	65.08	B
180.00-160.00			B	0.42	2.026	0.66	0.85	1	46.405			
			C	0.206	2.577	0.592	0.85	1	22.027			
T6	0.88	2.79	A	0.231	2.496	0.597	0.85	1	30.466	1.34	67.22	B
160.00-140.00			B	0.352	2.167	0.633	0.85	1	47.144			
			C	0.202	2.591	0.591	0.85	1	27.961			
T7	0.90	2.96	A	0.22	2.53	0.595	0.85	1	35.165	1.39	69.47	B
140.00-120.00			B	0.308	2.276	0.618	0.85	1	49.065			
			C	0.183	2.654	0.587	0.85	1	30.859			
T8	0.46	1.79	A	0.219	2.535	0.594	0.85	1	19.562	0.71	70.86	B
120.00-110.00			B	0.286	2.334	0.612	0.85	1	25.531			
			C	0.175	2.683	0.586	0.85	1	16.537			
T9	0.47	2.07	A	0.241	2.465	0.6	0.85	1	23.888	0.75	74.98	B
110.00-100.00			B	0.288	2.329	0.612	0.85	1	28.181			
			C	0.186	2.642	0.588	0.85	1	19.523			
T10	0.95	4.21	A	0.21	2.563	0.592	0.85	1	45.018	1.40	70.08	B
100.00-80.00			B	0.249	2.441	0.602	0.85	1	52.315			
			C	0.154	2.756	0.582	0.85	1	34.779			
T11	0.95	4.87	A	0.196	2.61	0.59	0.85	1	47.349	1.38	68.91	B
80.00-60.00			B	0.23	2.497	0.597	0.85	1	54.517			
			C	0.146	2.786	0.581	0.85	1	37.152			
T12	0.96	5.29	A	0.195	2.612	0.589	0.85	1	52.980	1.35	67.32	B
60.00-40.00			B	0.22	2.532	0.595	0.85	1	58.494			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.144	2.792	0.581	0.85	1	41.503			
T13	0.97	5.30	A	0.192	2.623	0.589	0.85	1	58.114	1.29	64.39	B
40.00-20.00			B	0.212	2.555	0.593	0.85	1	63.068			
			C	0.144	2.792	0.581	0.85	1	46.404			
T14	0.97	7.81	A	0.17	2.699	0.585	0.85	1	54.248	1.25	62.49	B
20.00-0.00			B	0.188	2.635	0.588	0.85	1	59.106			
			C	0.125	2.865	0.578	0.85	1	41.608			
Sum Weight:	10.23	44.37						OTM	1778.89 kip-ft	15.38		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	30.28					
Bracing Weight	14.09					
Total Member Self-Weight	44.37			-5.14	-17.30	
Total Weight	60.61			-5.14	-17.30	
Wind 0 deg - No Ice		0.04	-53.46	-6913.78	-26.69	23.88
Wind 30 deg - No Ice		26.24	-45.27	-5907.82	-3442.45	3.70
Wind 45 deg - No Ice		36.92	-36.88	-4821.14	-4842.96	-6.62
Wind 60 deg - No Ice		45.04	-25.99	-3405.56	-5910.72	-16.61
Wind 90 deg - No Ice		52.35	-0.07	-18.20	-6844.96	-31.74
Wind 120 deg - No Ice		46.35	26.70	3441.06	-6008.77	-39.01
Wind 135 deg - No Ice		36.63	36.64	4777.76	-4804.36	-37.13
Wind 150 deg - No Ice		25.95	45.10	5874.51	-3403.02	-34.31
Wind 180 deg - No Ice		-0.14	51.80	6768.31	3.25	-21.36
Wind 210 deg - No Ice		-26.34	45.46	5918.20	3418.87	-2.37
Wind 225 deg - No Ice		-37.04	36.98	4822.03	4820.53	7.91
Wind 240 deg - No Ice		-46.76	26.98	3479.88	6022.63	17.70
Wind 270 deg - No Ice		-52.57	0.07	7.16	6833.75	32.68
Wind 300 deg - No Ice		-44.97	-25.78	-3374.06	5862.65	38.45
Wind 315 deg - No Ice		-36.81	-36.59	-4783.02	4788.82	38.04
Wind 330 deg - No Ice		-26.11	-45.01	-5875.22	3384.97	35.41
Member Ice	20.81					
Total Weight Ice	96.92			-13.26	-51.26	
Wind 0 deg - Ice		0.06	-53.53	-7061.01	-61.69	25.24
Wind 30 deg - Ice		26.48	-45.72	-6067.01	-3559.89	5.68
Wind 45 deg - Ice		37.32	-37.29	-4955.00	-5000.58	-4.81
Wind 60 deg - Ice		45.62	-26.33	-3506.37	-6104.29	-15.28
Wind 90 deg - Ice		52.85	-0.06	-23.55	-7050.68	-31.19
Wind 120 deg - Ice		46.41	26.72	3501.58	-6162.79	-39.17
Wind 135 deg - Ice		37.10	37.00	4892.13	-4971.16	-38.34
Wind 150 deg - Ice		26.20	45.52	6014.67	-3523.57	-35.47
Wind 180 deg - Ice		-0.47	52.56	6956.46	3.81	-20.73
Wind 210 deg - Ice		-26.81	45.87	6056.81	3494.05	-2.55
Wind 225 deg - Ice		-37.62	37.40	4939.98	4930.00	7.45
Wind 240 deg - Ice		-46.91	27.07	3546.88	6117.85	16.99
Wind 270 deg - Ice		-53.15	0.27	20.65	6980.63	32.49
Wind 300 deg - Ice		-45.78	-25.88	-3450.42	6015.01	40.34
Wind 315 deg - Ice		-37.41	-36.88	-4905.03	4902.30	40.15
Wind 330 deg - Ice		-26.34	-45.44	-6032.94	3435.33	36.41
Total Weight	60.61			-5.14	-17.30	
Wind 0 deg - Service		0.01	-18.50	-2397.46	-2.12	8.26

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 30 deg - Service		9.08	-15.66	-2049.38	-1184.05	1.28
Wind 45 deg - Service		12.78	-12.76	-1673.36	-1668.65	-2.29
Wind 60 deg - Service		15.59	-8.99	-1183.54	-2038.12	-5.75
Wind 90 deg - Service		18.11	-0.03	-11.44	-2361.39	-10.98
Wind 120 deg - Service		16.04	9.24	1185.53	-2072.05	-13.50
Wind 135 deg - Service		12.67	12.68	1648.06	-1655.30	-12.85
Wind 150 deg - Service		8.98	15.61	2027.56	-1170.40	-11.87
Wind 180 deg - Service		-0.05	17.93	2336.83	8.24	-7.39
Wind 210 deg - Service		-9.11	15.73	2042.67	1190.11	-0.82
Wind 225 deg - Service		-12.82	12.80	1663.38	1675.12	2.74
Wind 240 deg - Service		-16.18	9.33	1198.97	2091.07	6.13
Wind 270 deg - Service		-18.19	0.02	-2.67	2371.73	11.31
Wind 300 deg - Service		-15.56	-8.92	-1172.64	2035.71	13.30
Wind 315 deg - Service		-12.74	-12.66	-1660.17	1664.14	13.16
Wind 330 deg - Service		-9.03	-15.57	-2038.10	1178.38	12.25

Load Combinations

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

Comb. No.	Description
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	245 - 230	Leg	Max Tension	5	22.22	0.60	-0.37
			Max. Compression	13	-25.94	0.65	-0.40
			Max. Mx	14	-3.23	0.74	-0.01
			Max. My	2	-25.60	-0.01	0.75
			Max. Vy	14	-2.78	0.70	-0.09
			Max. Vx	2	-2.95	-0.01	0.75
		Diagonal	Max Tension	4	3.30	0.00	0.00
			Max. Compression	12	-3.29	0.00	0.00
			Max. Mx	29	1.06	-0.00	0.00
			Max. My	12	-3.29	0.00	0.00
			Max. Vy	29	-0.00	-0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
		Top Girt	Max Tension	13	1.02	0.00	0.00
			Max. Compression	5	-1.10	0.00	0.00
			Max. Mx	18	-0.00	0.01	0.00
			Max. My	25	-0.16	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	25	0.00	0.00	0.00
		Bottom Girt	Max Tension	5	1.60	0.00	0.00
			Max. Compression	13	-1.71	0.00	0.00
			Max. Mx	18	0.01	0.01	0.00
			Max. My	34	0.18	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	34	0.00	0.00	0.00
T2	230 - 210	Leg	Max Tension	5	67.05	1.26	-0.01
			Max. Compression	13	-71.96	0.48	-0.00
			Max. Mx	13	-25.99	2.02	-0.07
			Max. My	6	-2.14	0.00	1.79
			Max. Vy	30	-3.62	0.48	0.00
			Max. Vx	20	2.85	0.00	-0.32
		Diagonal	Max Tension	34	4.35	0.00	0.00
			Max. Compression	34	-4.33	0.00	0.00
			Max. Mx	29	0.69	-0.01	0.00
			Max. My	11	-4.14	-0.00	0.00
			Max. Vy	23	-0.01	-0.01	0.00
			Max. Vx	11	-0.00	0.00	0.00
		Top Girt	Max Tension	13	1.96	0.00	0.00
			Max. Compression	5	-1.86	0.00	0.00
			Max. Mx	18	-0.00	0.01	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	34	-0.17	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	34	-0.00	0.00	0.00
		Bottom Girt	Max Tension	22	1.94	0.00	0.00
			Max. Compression	13	-2.05	0.00	0.00
			Max. Mx	18	0.03	0.01	0.00
			Max. My	34	0.30	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	34	-0.00	0.00	0.00
T3	210 - 190	Leg	Max Tension	5	115.07	0.33	0.01
			Max. Compression	13	-121.67	2.97	0.00
			Max. Mx	30	-120.43	3.11	0.03
			Max. My	20	-4.55	-0.01	-2.22
			Max. Vy	30	-5.28	3.11	0.03
			Max. Vx	20	2.94	0.04	-1.64
		Diagonal	Max Tension	34	5.04	0.00	0.00
			Max. Compression	34	-5.26	0.00	0.00
			Max. Mx	29	1.50	-0.01	0.00
			Max. My	26	-5.23	-0.00	-0.00
			Max. Vy	29	-0.01	-0.01	0.00
			Max. Vx	26	0.00	-0.00	-0.00
		Top Girt	Max Tension	30	1.81	0.00	0.00
			Max. Compression	22	-1.69	0.00	0.00
			Max. Mx	18	0.01	0.01	0.00
			Max. My	34	-0.24	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	34	-0.00	0.00	0.00
		Bottom Girt	Max Tension	5	1.31	0.00	0.00
			Max. Compression	13	-1.25	0.00	0.00
			Max. Mx	18	0.04	0.01	0.00
			Max. My	34	-0.04	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	34	0.00	0.00	0.00
T4	190 - 180	Leg	Max Tension	5	115.04	-2.80	-0.01
			Max. Compression	24	-121.67	5.34	-0.03
			Max. Mx	22	111.50	-5.86	-0.06
			Max. My	6	-4.04	-0.14	9.46
			Max. Vy	32	0.47	-5.78	-0.01
			Max. Vx	20	0.97	-0.20	-9.35
		Diagonal	Max Tension	28	4.69	0.00	0.00
			Max. Compression	20	-5.26	0.00	0.00
			Max. Mx	22	3.56	0.09	0.01
			Max. My	26	-3.42	-0.06	0.03
			Max. Vy	22	0.02	0.09	0.01
			Max. Vx	26	-0.01	0.00	0.00
T5	180 - 160	Leg	Max Tension	5	135.55	-5.72	-0.02
			Max. Compression	24	-149.18	5.41	-0.00
			Max. Mx	22	124.35	-5.86	-0.06
			Max. My	6	-4.72	-0.14	9.46
			Max. Vy	32	-0.19	-5.70	-0.02
			Max. Vx	20	-0.55	-0.20	-9.35
		Diagonal	Max Tension	34	4.63	0.00	0.00
			Max. Compression	34	-5.09	0.00	0.00
			Max. Mx	24	3.51	0.09	0.00
			Max. My	26	2.06	0.07	0.01
			Max. Vy	24	-0.03	0.09	0.00
			Max. Vx	19	-0.00	0.00	0.00
T6	160 - 140	Leg	Max Tension	22	156.15	-5.24	-0.03
			Max. Compression	24	-175.33	5.38	0.03
			Max. Mx	22	145.86	-5.51	-0.03
			Max. My	23	-9.95	-0.03	5.40

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	32	-0.19	-5.44	-0.02
			Max. Vx	20	0.21	-0.00	-5.39
		Diagonal	Max Tension	34	4.95	0.00	0.00
			Max. Compression	34	-5.33	0.00	0.00
			Max. Mx	24	3.34	0.06	0.00
			Max. My	27	-4.37	0.00	0.01
			Max. Vy	22	0.02	0.06	-0.01
			Max. Vx	19	-0.00	0.00	0.00
T7	140 - 120	Leg	Max Tension	22	177.67	-5.00	0.07
			Max. Compression	24	-202.10	4.68	0.05
			Max. Mx	22	166.86	-5.45	-0.03
			Max. My	23	-12.70	-0.08	5.61
			Max. Vy	32	-0.26	-5.39	-0.05
			Max. Vx	31	0.35	-0.09	-5.56
		Diagonal	Max Tension	34	5.75	0.00	0.00
			Max. Compression	34	-6.09	0.00	0.00
			Max. Mx	24	3.89	0.10	0.01
			Max. My	27	-4.79	-0.00	0.01
			Max. Vy	22	0.03	0.09	0.01
			Max. Vx	27	-0.00	0.00	0.00
T8	120 - 110	Leg	Max Tension	22	188.90	-4.76	0.05
			Max. Compression	24	-215.88	2.97	-0.01
			Max. Mx	22	188.90	-4.76	0.05
			Max. My	23	-13.23	-0.08	5.61
			Max. Vy	19	0.29	4.64	0.04
			Max. Vx	31	-0.24	-0.09	-5.56
		Diagonal	Max Tension	34	6.33	0.00	0.00
			Max. Compression	34	-6.58	0.00	0.00
			Max. Mx	24	4.15	0.09	0.01
			Max. My	25	1.19	0.07	0.01
			Max. Vy	21	0.03	0.08	-0.01
			Max. Vx	25	-0.00	0.00	0.00
T9	110 - 100	Leg	Max Tension	22	199.51	-3.52	-0.08
			Max. Compression	24	-229.03	4.16	0.25
			Max. Mx	24	-228.52	9.41	-0.20
			Max. My	31	-14.83	-0.29	-6.88
			Max. Vy	19	-1.39	9.39	0.07
			Max. Vx	31	1.53	-0.29	-6.88
		Diagonal	Max Tension	33	6.64	0.00	0.00
			Max. Compression	25	-7.01	0.00	0.00
			Max. Mx	22	5.38	0.09	0.01
			Max. My	33	-6.24	0.02	-0.01
			Max. Vy	22	0.03	0.09	0.01
			Max. Vx	33	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	24	3.97	0.00	0.00
			Max. Compression	24	-3.97	0.00	0.00
			Max. Mx	32	2.60	-0.21	0.00
			Max. My	32	2.07	0.00	0.01
			Max. Vy	32	0.06	0.00	0.00
			Max. Vx	32	-0.00	0.00	0.00
T10	100 - 80	Leg	Max Tension	22	222.77	-4.22	-0.03
			Max. Compression	24	-258.51	4.81	0.00
			Max. Mx	30	-257.21	4.82	-0.02
			Max. My	31	-15.44	-0.29	-6.88
			Max. Vy	32	-0.21	-4.73	-0.26
			Max. Vx	23	0.35	-0.12	5.71
		Diagonal	Max Tension	34	7.36	0.00	0.00
			Max. Compression	34	-7.63	0.00	0.00
			Max. Mx	24	5.01	0.14	0.01
			Max. My	33	-7.16	0.03	-0.02

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	22	0.05	0.14	0.01
			Max. Vx	33	0.00	0.00	0.00
T11	80 - 60	Leg	Max Tension	22	244.50	-4.36	-0.01
			Max. Compression	24	-286.50	5.01	0.06
			Max. Mx	30	-285.44	5.03	-0.03
			Max. My	23	-21.70	0.08	4.58
			Max. Vy	32	0.20	-4.81	-0.07
			Max. Vx	23	-0.21	-0.02	4.39
		Diagonal	Max Tension	34	7.77	0.00	0.00
			Max. Compression	34	-8.02	0.00	0.00
			Max. Mx	22	5.73	0.14	0.01
			Max. My	32	-6.91	0.08	-0.02
			Max. Vy	22	0.05	0.14	0.01
			Max. Vx	32	0.00	0.00	0.00
T12	60 - 40	Leg	Max Tension	22	265.91	-4.89	-0.03
			Max. Compression	24	-314.30	5.56	-0.07
			Max. Mx	30	-313.36	5.56	0.00
			Max. My	20	-26.08	1.99	-5.85
			Max. Vy	27	-0.52	-4.85	0.01
			Max. Vx	23	-0.27	1.98	5.85
		Diagonal	Max Tension	17	8.40	0.00	0.00
			Max. Compression	34	-8.95	0.00	0.00
			Max. Mx	22	5.74	0.20	0.02
			Max. My	32	-7.46	0.10	-0.03
			Max. Vy	22	0.07	0.20	0.02
			Max. Vx	32	0.00	0.00	0.00
T13	40 - 20	Leg	Max Tension	22	289.30	-10.77	-0.02
			Max. Compression	24	-341.99	13.65	0.49
			Max. Mx	30	-341.07	13.76	-0.29
			Max. My	23	-27.16	6.48	21.12
			Max. Vy	30	-1.34	13.76	-0.29
			Max. Vx	23	-2.65	6.48	21.12
		Diagonal	Max Tension	33	10.10	0.00	0.00
			Max. Compression	32	-10.98	0.00	0.00
			Max. Mx	23	-1.67	0.29	-0.04
			Max. My	32	-10.92	0.19	-0.07
			Max. Vy	23	0.08	0.29	-0.04
			Max. Vx	32	0.01	0.00	0.00
T14	20 - 0	Leg	Max Tension	5	295.74	-7.97	0.23
			Max. Compression	24	-361.37	0.00	-0.00
			Max. Mx	30	-358.26	13.76	-0.29
			Max. My	23	-34.12	6.48	21.12
			Max. Vy	30	0.89	13.76	-0.29
			Max. Vx	23	1.36	6.48	21.12
		Diagonal	Max Tension	32	18.39	0.00	0.00
			Max. Compression	7	-16.82	0.00	0.00
			Max. Mx	21	15.67	-0.53	0.09
			Max. My	25	2.92	-0.49	-0.12
			Max. Vy	23	-0.16	-0.53	-0.11
			Max. Vx	25	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	375.77	31.05	-18.36

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. H_x	13	356.89	34.54	-20.42
	Max. H_z	22	-309.61	-33.94	20.04
	Min. Vert	5	-310.01	-29.44	17.47
	Min. H_x	22	-309.61	-33.94	20.04
	Min. H_z	13	356.89	34.54	-20.42
Leg B	Max. Vert	24	376.57	-30.49	-18.76
	Max. H_x	32	-304.50	33.49	20.41
	Max. H_z	32	-304.50	33.49	20.41
	Min. Vert	15	-307.23	29.03	17.82
	Min. H_x	7	355.37	-34.01	-20.75
	Min. H_z	7	355.37	-34.01	-20.75
Leg A	Max. Vert	19	375.26	0.70	35.74
	Max. H_x	22	202.61	1.57	16.55
	Max. H_z	2	354.86	0.61	39.80
	Min. Vert	10	-307.43	-0.50	-34.04
	Min. H_x	30	-139.96	-1.36	-21.18
	Min. H_z	27	-305.58	-0.44	-39.24

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	60.61	0.00	0.00	-5.13	-17.30	-0.00
Dead+Wind 0 deg - No Ice	60.61	0.04	-53.45	-6955.81	-26.94	24.00
Dead+Wind 30 deg - No Ice	60.61	26.23	-45.26	-5943.93	-3463.51	3.83
Dead+Wind 45 deg - No Ice	60.61	36.92	-36.88	-4850.63	-4872.58	-6.51
Dead+Wind 60 deg - No Ice	60.61	45.04	-25.99	-3426.43	-5946.89	-16.57
Dead+Wind 90 deg - No Ice	60.61	52.34	-0.07	-18.36	-6886.80	-31.78
Dead+Wind 120 deg - No Ice	60.61	46.34	26.69	3461.90	-6045.36	-39.08
Dead+Wind 135 deg - No Ice	60.61	36.63	36.63	4806.96	-4833.89	-37.20
Dead+Wind 150 deg - No Ice	60.61	25.95	45.10	5910.42	-3423.96	-34.38
Dead+Wind 180 deg - No Ice	60.61	-0.14	51.80	6809.77	3.21	-21.47
Dead+Wind 210 deg - No Ice	60.61	-26.34	45.46	5954.35	3439.78	-2.50
Dead+Wind 225 deg - No Ice	60.61	-37.04	36.98	4851.50	4850.05	7.81
Dead+Wind 240 deg - No Ice	60.61	-46.75	26.98	3500.98	6059.21	17.66
Dead+Wind 270 deg - No Ice	60.61	-52.56	0.07	7.17	6875.48	32.72
Dead+Wind 300 deg - No Ice	60.61	-44.96	-25.77	-3394.80	5898.50	38.52
Dead+Wind 315 deg - No Ice	60.61	-36.81	-36.59	-4812.39	4818.05	38.11
Dead+Wind 330 deg - No Ice	60.61	-26.11	-45.01	-5911.24	3405.57	35.48
Dead+Ice+Temp	96.92	-0.00	-0.00	-13.27	-51.14	0.00
Dead+Wind 0 deg+Ice+Temp	96.92	0.06	-53.53	-7128.02	-62.32	25.59
Dead+Wind 30 deg+Ice+Temp	96.92	26.47	-45.72	-6124.72	-3593.82	6.01
Dead+Wind 45 deg+Ice+Temp	96.92	37.32	-37.29	-5002.15	-5048.23	-4.56
Dead+Wind 60 deg+Ice+Temp	96.92	45.62	-26.32	-3539.76	-6162.45	-15.13
Dead+Wind 90 deg+Ice+Temp	96.92	52.85	-0.06	-23.79	-7117.82	-31.25
Dead+Wind 120 deg+Ice+Temp	96.92	46.41	26.71	3534.85	-6221.33	-39.36
Dead+Wind 135 deg+Ice+Temp	96.92	37.10	37.00	4938.88	-5018.62	-38.57
Dead+Wind 150 deg+Ice+Temp	96.92	26.20	45.52	6072.12	-3557.23	-35.73
Dead+Wind 180 deg+Ice+Temp	96.92	-0.47	52.56	7022.91	3.67	-21.07
Dead+Wind 210 deg+Ice+Temp	96.92	-26.81	45.87	6114.57	3527.24	-2.87
Dead+Wind 225 deg+Ice+Temp	96.92	-37.62	37.39	4987.10	4976.94	7.19
Dead+Wind 240 deg+Ice+Temp	96.92	-46.90	27.07	3580.51	6175.86	16.83
Dead+Wind 270 deg+Ice+Temp	96.92	-53.15	0.27	20.72	7047.09	32.55
Dead+Wind 300 deg+Ice+Temp	96.92	-45.77	-25.88	-3483.53	6072.30	40.52
Dead+Wind 315 deg+Ice+Temp	96.92	-37.41	-36.88	-4951.96	4948.97	40.38
Dead+Wind 330 deg+Ice+Temp	96.92	-26.34	-45.44	-6090.51	3468.07	36.68

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 0 deg - Service	60.61	0.01	-18.50	-2410.35	-20.68	8.31
Dead+Wind 30 deg - Service	60.61	9.08	-15.66	-2060.20	-1209.88	1.32
Dead+Wind 45 deg - Service	60.61	12.78	-12.76	-1681.87	-1697.48	-2.26
Dead+Wind 60 deg - Service	60.61	15.58	-8.99	-1189.04	-2069.24	-5.73
Dead+Wind 90 deg - Service	60.61	18.11	-0.03	-9.71	-2394.48	-10.99
Dead+Wind 120 deg - Service	60.61	16.04	9.24	1194.61	-2103.30	-13.52
Dead+Wind 135 deg - Service	60.61	12.67	12.68	1660.04	-1684.07	-12.89
Dead+Wind 150 deg - Service	60.61	8.98	15.60	2041.87	-1196.18	-11.91
Dead+Wind 180 deg - Service	60.61	-0.05	17.92	2353.07	-10.25	-7.43
Dead+Wind 210 deg - Service	60.61	-9.11	15.73	2057.06	1178.91	-0.85
Dead+Wind 225 deg - Service	60.61	-12.82	12.80	1675.44	1666.92	2.72
Dead+Wind 240 deg - Service	60.61	-16.18	9.33	1208.12	2085.34	6.11
Dead+Wind 270 deg - Service	60.61	-18.19	0.02	-0.87	2367.80	11.32
Dead+Wind 300 deg - Service	60.61	-15.56	-8.92	-1178.08	2029.74	13.33
Dead+Wind 315 deg - Service	60.61	-12.74	-12.66	-1668.62	1655.87	13.20
Dead+Wind 330 deg - Service	60.61	-9.03	-15.57	-2048.87	1167.10	12.29

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-60.61	0.00	-0.00	60.61	-0.00	0.000%
2	0.04	-60.61	-53.46	-0.04	60.61	53.45	0.004%
3	26.24	-60.61	-45.27	-26.23	60.61	45.26	0.005%
4	36.92	-60.61	-36.88	-36.92	60.61	36.88	0.005%
5	45.04	-60.61	-25.99	-45.04	60.61	25.99	0.005%
6	52.35	-60.61	-0.07	-52.34	60.61	0.07	0.005%
7	46.35	-60.61	26.70	-46.34	60.61	-26.69	0.004%
8	36.63	-60.61	36.64	-36.63	60.61	-36.63	0.004%
9	25.95	-60.61	45.10	-25.95	60.61	-45.10	0.005%
10	-0.14	-60.61	51.80	0.14	60.61	-51.80	0.005%
11	-26.34	-60.61	45.46	26.34	60.61	-45.46	0.005%
12	-37.04	-60.61	36.98	37.04	60.61	-36.98	0.004%
13	-46.76	-60.61	26.98	46.75	60.61	-26.98	0.004%
14	-52.57	-60.61	0.07	52.56	60.61	-0.07	0.005%
15	-44.97	-60.61	-25.78	44.96	60.61	25.77	0.005%
16	-36.81	-60.61	-36.59	36.81	60.61	36.59	0.005%
17	-26.11	-60.61	-45.01	26.11	60.61	45.01	0.005%
18	0.00	-96.92	0.00	0.00	96.92	0.00	0.001%
19	0.06	-96.92	-53.53	-0.06	96.92	53.53	0.003%
20	26.48	-96.92	-45.72	-26.47	96.92	45.72	0.003%
21	37.32	-96.92	-37.29	-37.32	96.92	37.29	0.003%
22	45.62	-96.92	-26.33	-45.62	96.92	26.32	0.003%
23	52.85	-96.92	-0.06	-52.85	96.92	0.06	0.003%
24	46.41	-96.92	26.72	-46.41	96.92	-26.71	0.003%
25	37.10	-96.92	37.00	-37.10	96.92	-37.00	0.003%
26	26.20	-96.92	45.52	-26.20	96.92	-45.52	0.003%
27	-0.47	-96.92	52.56	0.47	96.92	-52.56	0.003%
28	-26.81	-96.92	45.87	26.81	96.92	-45.87	0.003%
29	-37.62	-96.92	37.40	37.62	96.92	-37.39	0.003%
30	-46.91	-96.92	27.07	46.90	96.92	-27.07	0.003%
31	-53.15	-96.92	0.27	53.15	96.92	-0.27	0.003%
32	-45.78	-96.92	-25.88	45.77	96.92	25.88	0.003%
33	-37.41	-96.92	-36.88	37.41	96.92	36.88	0.003%
34	-26.34	-96.92	-45.44	26.34	96.92	45.44	0.003%
35	0.01	-60.61	-18.50	-0.01	60.61	18.50	0.002%
36	9.08	-60.61	-15.66	-9.08	60.61	15.66	0.002%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
37	12.78	-60.61	-12.76	-12.78	60.61	12.76	0.002%
38	15.59	-60.61	-8.99	-15.58	60.61	8.99	0.002%
39	18.11	-60.61	-0.03	-18.11	60.61	0.03	0.002%
40	16.04	-60.61	9.24	-16.04	60.61	-9.24	0.002%
41	12.67	-60.61	12.68	-12.67	60.61	-12.68	0.002%
42	8.98	-60.61	15.61	-8.98	60.61	-15.60	0.002%
43	-0.05	-60.61	17.93	0.05	60.61	-17.92	0.002%
44	-9.11	-60.61	15.73	9.11	60.61	-15.73	0.002%
45	-12.82	-60.61	12.80	12.82	60.61	-12.80	0.002%
46	-16.18	-60.61	9.33	16.18	60.61	-9.33	0.002%
47	-18.19	-60.61	0.02	18.19	60.61	-0.02	0.002%
48	-15.56	-60.61	-8.92	15.56	60.61	8.92	0.002%
49	-12.74	-60.61	-12.66	12.74	60.61	12.66	0.002%
50	-9.03	-60.61	-15.57	9.03	60.61	15.57	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00006904	0.00011706
3	Yes	15	0.00007497	0.00012692
4	Yes	15	0.00007875	0.00013319
5	Yes	15	0.00008026	0.00013571
6	Yes	15	0.00007494	0.00012689
7	Yes	15	0.00006903	0.00011706
8	Yes	15	0.00007087	0.00012021
9	Yes	15	0.00007487	0.00012681
10	Yes	15	0.00008025	0.00013572
11	Yes	15	0.00007486	0.00012674
12	Yes	15	0.00007086	0.00012015
13	Yes	15	0.00006898	0.00011693
14	Yes	15	0.00007483	0.00012666
15	Yes	15	0.00008021	0.00013562
16	Yes	15	0.00007869	0.00013309
17	Yes	15	0.00007486	0.00012675
18	Yes	6	0.00000001	0.00010438
19	Yes	16	0.00006296	0.00010801
20	Yes	16	0.00006666	0.00011415
21	Yes	16	0.00006905	0.00011811
22	Yes	16	0.00006999	0.00011969
23	Yes	16	0.00006661	0.00011409
24	Yes	16	0.00006295	0.00010804
25	Yes	16	0.00006407	0.00010994
26	Yes	16	0.00006657	0.00011409
27	Yes	16	0.00007001	0.00011976
28	Yes	16	0.00006660	0.00011407
29	Yes	16	0.00006407	0.00010991
30	Yes	16	0.00006290	0.00010791
31	Yes	16	0.00006653	0.00011393
32	Yes	16	0.00006997	0.00011963
33	Yes	16	0.00006899	0.00011801
34	Yes	16	0.00006655	0.00011398
35	Yes	15	0.00000001	0.00012167
36	Yes	15	0.00000001	0.00012513
37	Yes	15	0.00000001	0.00012732

38	Yes	15	0.00000001	0.00012824
39	Yes	15	0.00000001	0.00012516
40	Yes	15	0.00000001	0.00012180
41	Yes	15	0.00000001	0.00012298
42	Yes	15	0.00000001	0.00012516
43	Yes	15	0.00000001	0.00012830
44	Yes	15	0.00000001	0.00012513
45	Yes	15	0.00000001	0.00012293
46	Yes	15	0.00000001	0.00012168
47	Yes	15	0.00000001	0.00012496
48	Yes	15	0.00000001	0.00012809
49	Yes	15	0.00000001	0.00012717
50	Yes	15	0.00000001	0.00012497

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	245 - 230	12.952	40	0.6275	0.0444
T2	230 - 210	10.940	40	0.5971	0.0478
T3	210 - 190	8.506	40	0.5177	0.0440
T4	190 - 180	6.464	40	0.4238	0.0372
T5	180 - 160	5.615	40	0.3752	0.0322
T6	160 - 140	4.208	40	0.2900	0.0256
T7	140 - 120	3.089	40	0.2341	0.0208
T8	120 - 110	2.196	40	0.1818	0.0174
T9	110 - 100	1.823	40	0.1627	0.0152
T10	100 - 80	1.486	40	0.1440	0.0129
T11	80 - 60	0.940	40	0.1067	0.0097
T12	60 - 40	0.528	40	0.0780	0.0067
T13	40 - 20	0.237	46	0.0498	0.0041
T14	20 - 0	0.052	46	0.0218	0.0013

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
247.00	Lightning Rod 2"x10'	40	12.952	0.6275	0.0444	44214
232.00	TMA	40	11.202	0.6024	0.0476	17212
135.00	2.5" Dia. 12' OMNI	40	2.846	0.2205	0.0200	22434
125.00	20' Omni	40	2.400	0.1936	0.0183	23240
110.00	KP4F-23	40	1.823	0.1627	0.0152	36092
105.00	Andrew 6' w/Radome	40	1.650	0.1535	0.0140	30857
60.00	Camera with Mount	40	0.528	0.0780	0.0067	38394
50.00	1.5" Dia 4' Omni w/Pipe Mount	46	0.370	0.0642	0.0054	45414

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	245 - 230	38.023	24	1.8133	0.1285
T2	230 - 210	32.268	24	1.7227	0.1416
T3	210 - 190	25.229	24	1.5095	0.1347
T4	190 - 180	19.248	24	1.2480	0.1140
T5	180 - 160	16.740	24	1.1104	0.0974
T6	160 - 140	12.551	24	0.8640	0.0777
T7	140 - 120	9.208	24	0.6991	0.0631
T8	120 - 110	6.536	24	0.5433	0.0526
T9	110 - 100	5.422	24	0.4862	0.0463
T10	100 - 80	4.417	24	0.4300	0.0392
T11	80 - 60	2.787	30	0.3182	0.0295
T12	60 - 40	1.564	30	0.2324	0.0204
T13	40 - 20	0.698	30	0.1481	0.0122
T14	20 - 0	0.152	30	0.0648	0.0038

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
247.00	Lightning Rod 2"x10'	24	38.023	1.8133	0.1285	15393
232.00	TMA	24	33.019	1.7385	0.1400	5991
135.00	2.5" Dia. 12' OMNI	24	8.481	0.6586	0.0602	7511
125.00	20' Omni	24	7.146	0.5784	0.0552	7739
110.00	KP4F-23	24	5.422	0.4862	0.0463	11977
105.00	Andrew 6' w/Radome	24	4.904	0.4585	0.0427	10243
60.00	Camera with Mount	30	1.564	0.2324	0.0204	12829
50.00	1.5" Dia 4' Omni w/Pipe Mount	30	1.092	0.1910	0.0163	15108

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	245	Leg	A325N	0.6250	5	0.28	12.89	0.022 ✓	1.333	Bolt DS
T2	230	Leg	A325N	0.7500	5	4.45	18.56	0.240 ✓	1.333	Bolt DS
T3	210	Leg	A325N	1.0000	6	11.17	34.54	0.324 ✓	1.333	Bolt Tension
T4	190	Leg	A325N	1.0000	6	19.17	34.56	0.555 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.69	8.16	0.575 ✓	1.333	Member Bearing
T5	180	Leg	A325N	1.0000	6	21.07	34.56	0.610 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.63	8.16	0.567 ✓	1.333	Member Bearing
T6	160	Leg	A325N	1.0000	6	24.31	34.56	0.703 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.95	8.16	0.607 ✓	1.333	Member Bearing
T7	140	Leg	A325N	1.0000	6	27.81	34.56	0.805 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	5.75	8.16	0.705 ✓	1.333	Member Bearing
T8	120	Diagonal	A325N	1.2500	1	6.33	10.20	0.621 ✓	1.333	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T9	110	Leg	A325N	1.2500	6	33.25	54.00	0.616 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	6.64	10.20	0.651 ✓	1.333	Member Bearing
T10	100	Leg	A325N	1.2500	6	35.17	54.00	0.651 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	7.36	16.99	0.433 ✓	1.333	Member Bearing
T11	80	Leg	A325N	1.2500	6	38.98	54.00	0.722 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	7.77	16.99	0.457 ✓	1.333	Member Bearing
T12	60	Leg	A325N	1.2500	6	42.55	54.00	0.788 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	8.40	16.99	0.494 ✓	1.333	Member Bearing
T13	40	Leg	A325N	1.2500	6	45.87	53.99	0.850 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	10.10	13.59	0.743 ✓	1.333	Member Bearing
T14	20	Leg	A325N	1.2500	6	49.29	54.00	0.913 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	18.39	27.19	0.676 ✓	1.333	Member Bearing

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	245 - 230	1 1/2	15.00	2.33	74.7 K=1.00	20.058	1.7672	-25.94	35.44	0.732 ✓
T2	230 - 210	2	20.00	2.38	57.0 K=1.00	23.222	3.1416	-71.96	72.95	0.986 ✓
T3	210 - 190	2 1/2	20.00	2.33	44.8 K=1.00	25.141	4.9087	-118.16	123.41	0.957 ✓
T4	190 - 180	Pirod 105245	10.02	10.02	37.8 K=1.00	26.132	5.3014	-121.67	138.54	0.878 ✓
T5	180 - 160	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-149.18	138.54	1.077 ✓
T6	160 - 140	Pirod 105218	20.03	10.02	32.4 K=1.00	26.848	7.2158	-175.33	193.73	0.905 ✓
T7	140 - 120	Pirod 105218	20.03	10.02	32.4 K=1.00	26.848	7.2158	-202.10	193.73	1.043 ✓
T8	120 - 110	Pirod 105219	10.02	10.02	28.4 K=1.00	27.351	9.4248	-215.88	257.78	0.837 ✓
T9	110 - 100	Pirod 105219	10.02	5.19	28.4 K=1.00	27.351	9.4248	-229.03	257.78	0.888 ✓
T10	100 - 80	Pirod 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-258.51	257.78	1.003 ✓
T11	80 - 60	Pirod 105220	20.03	10.02	25.2 K=1.00	27.723	11.9282	-286.50	330.69	0.866 ✓
T12	60 - 40	Pirod 105220	20.03	10.02	25.2	27.723	11.9282	-314.30	330.69	0.950

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
					K=1.00					✓
T13	40 - 20	Pirod 105220	20.03	10.02	25.2 K=1.00	27.723	11.9282	-341.99	330.69	1.034 ✓
T14	20 - 0	Pirod 112738	20.03	20.03	32.6 K=1.00	26.826	14.7262	-361.37	395.05	0.915 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T4	190 - 180	0.5	1.47	120.0	10.366	0.1963	0.97	2.28	0.424 ✓
T5	180 - 160	0.5	1.47	120.0	10.279	0.1963	0.55	2.26	0.243 ✓
T6	160 - 140	0.5	1.46	119.0	10.423	0.1963	0.22	2.29	0.097 ✓
T7	140 - 120	0.5	1.46	119.0	10.423	0.1963	0.35	2.29	0.155 ✓
T8	120 - 110	0.625	1.45	94.4	13.671	0.3068	0.29	4.69	0.061 ✓
T9	110 - 100	0.625	1.45	94.4	13.671	0.3068	1.54	4.69	0.329 ✓
T10	100 - 80	0.625	1.45	94.4	13.671	0.3068	0.35	4.69	0.074 ✓
T11	80 - 60	0.625	1.43	93.6	13.766	0.3068	0.22	4.73	0.047 ✓
T12	60 - 40	0.625	1.43	93.6	13.766	0.3068	0.48	4.73	0.101 ✓
T13	40 - 20	0.625	1.43	93.6	13.766	0.3068	2.89	4.73	0.611 ✓
T14	20 - 0	0.75	1.73	93.9	16.080	0.4418	1.41	9.78	0.145 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	245 - 230	3/4	4.63	2.24	143.6 K=1.00	7.246	0.4418	-3.29	3.20	1.027 ✓
T2	230 - 210	7/8	5.05	2.45	134.3 K=1.00	8.281	0.6013	-4.33	4.98	0.870 ✓
T3	210 - 190	1	5.48	2.64	126.7 K=1.00	9.307	0.7854	-4.87	7.31	0.666 ✓
T4	190 - 180	L2 1/2x2 1/2x3/16	11.42	5.19	125.8 K=1.00	9.431	0.9020	-5.26	8.51	0.618 ✓

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T5	180 - 160	L2 1/2x2 1/2x3/16	12.50	5.84	141.5 K=1.00	7.462	0.9020	-5.09	6.73	0.756 ✔
T6	160 - 140	L2 1/2x2 1/2x3/16	13.80	6.54	158.4 K=1.00	5.949	0.9020	-5.33	5.37	0.992 ✔
T7	140 - 120	L3x3x3/16	15.24	7.29	146.8 K=1.00	6.931	1.0900	-6.09	7.56	0.806 ✔
T8	120 - 110	L3x3x3/16	16.01	7.69	154.7 K=1.00	6.237	1.0900	-6.58	6.80	0.968 ✔
T9	110 - 100	L3x3x3/16	16.80	8.09	162.9 K=1.00	5.628	1.0900	-7.01	6.13	1.142 ✔
T10	100 - 80	L3x3x5/16	18.45	8.93	181.9 K=1.00	4.515	1.7800	-7.63	8.04	0.949 ✔
T11	80 - 60	L3x3x5/16	20.16	9.79	199.5 K=1.00	3.753	1.7800	-8.02	6.68	1.201 ✔
T12	60 - 40	L3 1/2x3 1/2x5/16	21.92	10.68	185.7 K=1.00	4.331	2.0900	-8.95	9.05	0.989 ✔
T13	40 - 20	L4x4x1/4	23.71	11.58	174.8 K=1.00	4.887	1.9400	-10.98	9.48	1.158 ✔
T14	20 - 0	2L3 1/2x3 1/2x5/16x3/4	30.49	14.91	165.7 K=1.00	5.440	4.1800	-16.82	22.74	0.740 ✔

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T9	110 - 100	L3x3x5/16	13.48	12.48	254.3 K=1.00	2.309	1.7800	-3.97	4.11	0.966 ✔
		KL/R > 250 (C) - 232								

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	245 - 230	7/8	4.00	3.88	212.6 K=1.00	3.305	0.6013	-1.10	1.99	0.555 ✔
		KL/R > 200 (C) - 5								
T2	230 - 210	1	4.01	3.85	184.6 K=1.00	4.382	0.7854	-1.86	3.44	0.542 ✔
T3	210 - 190	1	4.52	4.31	206.8 K=1.00	3.492	0.7854	-1.69	2.74	0.615 ✔
		KL/R > 200 (C) - 107								

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	245 - 230	7/8	4.00	3.88	212.6 K=1.00	3.305	0.6013	-1.71	1.99	0.859 ✔
T2	230 - 210	KL/R > 200 (C) - 8 1	4.49	4.32	207.4 K=1.00	3.472	0.7854	-2.05	2.73	0.751 ✔
T3	210 - 190	KL/R > 200 (C) - 53 1 KL/R > 200 (C) - 110	4.98	4.77	229.2 K=1.00	2.843	0.7854	-1.25	2.23	0.561 ✔

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	245 - 230	1 1/2	15.00	0.50	16.0	32.500	0.7732	22.22	25.13	0.884 ✔
T2	230 - 210	2	20.00	0.50	12.0	32.500	1.5625	67.05	50.78	1.320 ✔
T3	210 - 190	2 1/2	20.00	0.67	12.8	30.000	4.9087	115.07	147.26	0.781 ✔
T4	190 - 180	Pirod 105245	10.02	10.02	37.8	30.000	5.3014	115.04	159.04	0.723 ✔
T5	180 - 160	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	135.55	159.04	0.852 ✔
T6	160 - 140	Pirod 105218	20.03	10.02	32.4	30.000	7.2158	156.15	216.47	0.721 ✔
T7	140 - 120	Pirod 105218	20.03	10.02	32.4	30.000	7.2158	177.67	216.47	0.821 ✔
T8	120 - 110	Pirod 105219	10.02	10.02	28.4	30.000	9.4248	188.90	282.74	0.668 ✔
T9	110 - 100	Pirod 105219	10.02	4.82	28.4	30.000	9.4248	199.51	282.74	0.706 ✔
T10	100 - 80	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	222.77	282.74	0.788 ✔
T11	80 - 60	Pirod 105220	20.03	10.02	25.2	30.000	11.9282	244.50	357.85	0.683 ✔
T12	60 - 40	Pirod 105220	20.03	10.02	25.2	30.000	11.9282	265.93	357.85	0.743 ✔
T13	40 - 20	Pirod 105220	20.03	10.02	25.2	30.000	11.9282	289.30	357.85	0.808 ✔
T14	20 - 0	Pirod 112738	20.03	20.03	32.6	30.000	14.7262	295.74	441.79	0.669 ✔

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T4	190 - 180	0.5	1.47	120.0	10.366	0.1963	0.97	2.28	0.424 ✓
T5	180 - 160	0.5	1.47	120.0	10.279	0.1963	0.55	2.26	0.243 ✓
T6	160 - 140	0.5	1.46	119.0	10.423	0.1963	0.22	2.29	0.097 ✓
T7	140 - 120	0.5	1.46	119.0	10.423	0.1963	0.35	2.29	0.155 ✓
T8	120 - 110	0.625	1.45	94.4	13.671	0.3068	0.29	4.69	0.061 ✓
T9	110 - 100	0.625	1.45	94.4	13.671	0.3068	1.54	4.69	0.329 ✓
T10	100 - 80	0.625	1.45	94.4	13.671	0.3068	0.35	4.69	0.074 ✓
T11	80 - 60	0.625	1.43	93.6	13.766	0.3068	0.22	4.73	0.047 ✓
T12	60 - 40	0.625	1.43	93.6	13.766	0.3068	0.48	4.73	0.101 ✓
T13	40 - 20	0.625	1.43	93.6	13.766	0.3068	2.89	4.73	0.611 ✓
T14	20 - 0	0.75	1.73	93.9	16.080	0.4418	1.41	9.78	0.145 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	245 - 230	3/4	4.63	2.24	143.6	30.000	0.4418	3.30	13.25	0.249 ✓
T2	230 - 210	7/8	5.05	2.45	134.3	30.000	0.6013	4.35	18.04	0.241 ✓
T3	210 - 190	1	5.11	2.46	117.9	30.000	0.7854	5.04	23.56	0.214 ✓
T4	190 - 180	L2 1/2x2 1/2x3/16	11.42	5.19	80.1	21.600	0.9020	4.69	19.48	0.241 ✓
T5	180 - 160	L2 1/2x2 1/2x3/16	11.93	5.59	86.2	21.600	0.9020	4.63	19.48	0.237 ✓
T6	160 - 140	L2 1/2x2 1/2x3/16	13.80	6.54	100.8	21.600	0.9020	4.95	19.48	0.254 ✓
T7	140 - 120	L3x3x3/16	15.24	7.29	93.2	21.600	1.0900	5.75	23.54	0.244 ✓
T8	120 - 110	L3x3x3/16	16.01	7.69	98.2	21.600	1.0900	6.33	23.54	0.269 ✓
T9	110 - 100	L3x3x3/16	16.80	8.09	103.4	21.600	1.0900	6.64	23.54	0.282 ✓

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T10	100 - 80	L3x3x5/16	18.45	8.93	116.2	21.600	1.7800	7.36	38.45	0.191
T11	80 - 60	L3x3x5/16	20.16	9.79	127.4	21.600	1.7800	7.77	38.45	0.202
T12	60 - 40	L3 1/2x3 1/2x5/16	21.92	10.68	118.6	21.600	2.0900	8.40	45.14	0.186
T13	40 - 20	L4x4x1/4	22.81	11.13	106.9	21.600	1.9400	10.10	41.90	0.241
T14	20 - 0	2L3 1/2x3 1/2x5/16x3/4	30.49	14.91	165.7	21.600	4.1800	18.39	90.29	0.204

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T9	110 - 100	L3x3x5/16	13.48	12.48	162.4	21.600	1.7800	3.97	38.45	0.103

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	245 - 230	7/8	4.00	3.88	212.6	30.000	0.6013	1.02	18.04	0.057
T2	230 - 210	1	4.01	3.85	184.6	30.000	0.7854	1.96	23.56	0.083
T3	210 - 190	1	4.52	4.31	206.8	30.000	0.7854	1.81	23.56	0.077

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	245 - 230	7/8	4.00	3.88	212.6	30.000	0.6013	1.60	18.04	0.088
T2	230 - 210	1	4.49	4.32	207.4	30.000	0.7854	1.94	23.56	0.082
T3	210 - 190	1	4.98	4.77	229.2	30.000	0.7854	1.31	23.56	0.056

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	245 - 230	Leg	1 1/2	1	22.22	33.50	66.3	Pass
T2	230 - 210	Leg	2	46	67.05	67.69	99.1	Pass
T3	210 - 190	Leg	2 1/2	103	-118.16	164.50	71.8	Pass
T4	190 - 180	Leg	Pirod 105245	161	-121.67	184.67	65.9	Pass
T5	180 - 160	Leg	Pirod 105217	170	-149.18	184.67	80.8	Pass
T6	160 - 140	Leg	Pirod 105218	185	-175.33	258.24	67.9	Pass
T7	140 - 120	Leg	Pirod 105218	200	-202.10	258.24	78.3	Pass
T8	120 - 110	Leg	Pirod 105219	215	-215.88	343.62	62.8	Pass
T9	110 - 100	Leg	Pirod 105219	224	-229.03	343.62	66.7	Pass
T10	100 - 80	Leg	Pirod 105219	236	-258.51	343.62	75.2	Pass
T11	80 - 60	Leg	Pirod 105220	251	-286.50	440.81	65.0	Pass
T12	60 - 40	Leg	Pirod 105220	266	-314.30	440.81	71.3	Pass
T13	40 - 20	Leg	Pirod 105220	281	-341.99	440.81	77.6	Pass
T14	20 - 0	Leg	Pirod 112738	296	-361.37	526.59	68.6	Pass
T1	245 - 230	Diagonal	3/4	15	-3.29	4.27	77.1	Pass
T2	230 - 210	Diagonal	7/8	58	-4.33	6.64	65.2	Pass
T3	210 - 190	Diagonal	1	115	-4.87	9.74	49.9	Pass
T4	190 - 180	Diagonal	L2 1/2x2 1/2x3/16	166	-5.26	11.34	46.4	Pass
T5	180 - 160	Diagonal	L2 1/2x2 1/2x3/16	175	-5.09	8.97	56.7	Pass
T6	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	190	-5.33	7.15	74.4	Pass
T7	140 - 120	Diagonal	L3x3x3/16	205	-6.09	10.07	60.5	Pass
T8	120 - 110	Diagonal	L3x3x3/16	220	-6.58	9.06	72.6	Pass
T9	110 - 100	Diagonal	L3x3x3/16	228	-7.01	8.18	85.7	Pass
T10	100 - 80	Diagonal	L3x3x5/16	241	-7.63	10.71	71.2	Pass
T11	80 - 60	Diagonal	L3x3x5/16	256	-8.02	8.90	90.1	Pass
T12	60 - 40	Diagonal	L3 1/2x3 1/2x5/16	271	-8.95	12.07	74.2	Pass
T13	40 - 20	Diagonal	L4x4x1/4	286	-10.98	12.64	86.9	Pass
T14	20 - 0	Diagonal	2L3 1/2x3 1/2x5/16x3/4	300	-16.82	30.31	55.5	Pass
T9	110 - 100	Secondary Horizontal	L3x3x5/16	233	-3.97	5.48	72.5	Pass
T1	245 - 230	Top Girt	7/8	5	-1.10	2.65	41.7	Pass
T2	230 - 210	Top Girt	1	50	-1.86	4.59	40.6	Pass
T3	210 - 190	Top Girt	1	107	-1.69	3.66	46.1	Pass
T1	245 - 230	Bottom Girt	7/8	8	-1.71	2.65	64.4	Pass
T2	230 - 210	Bottom Girt	1	53	-2.05	3.63	56.3	Pass
T3	210 - 190	Bottom Girt	1	110	-1.25	2.98	42.1	Pass
							Summary	
						Leg (T2)	99.1	Pass
						Diagonal (T11)	90.1	Pass
						Secondary Horizontal (T9)	72.5	Pass
						Top Girt (T3)	46.1	Pass
						Bottom Girt (T1)	64.4	Pass
						Bolt Checks	68.5	Pass
						RATING =	**99.1**	**Pass**

ANCHOR BOLT ANALYSIS

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift:= 310 kips	*user input*	
Shear:	Shear := 54 kips	*user input*	
Compression:	Compression := 377 kips	*user input*	

Anchor Bolt Data:

Bolt Material --> A572 - Gr. 42 (for bolts up to 6" Dia.)

Number of Anchor Bolts = N	N := 6	*user input*	
Bolt Ultimate Strength:	F_u := 60 ksi	*user input*	
Bolt Yield Strength:	Fy := 42 ksi	*user input*	
Bolt Modulus:	E := 29000 ksi	*user input*	
Thickness of Anchor Bolts	D := 2.0in	*user input*	From PiROD DWG No. 202932-B
Threads per Inch:	n := 4.5	*user input*	
Coefficient of Friction:	μ := 0.55	*user input*	(for baseplate with grout ASCE 10-97)

Anchor Bolt Area:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 3.142 \cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 \qquad A_n = 2.498 \cdot in^2$$

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$AllowableTension := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u \right) \qquad AllowableTension = 82.9 \cdot kips$$

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.333 \cdot \left(0.60 \cdot A_n \cdot Fy \right) \qquad F_{net.area} = 83.9 \cdot kips$$

Note: 1.333 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 51.7 \cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.62$$

$$Condition1 := if\left(\frac{MaxTension}{F_{net.area}} \le 1.00, "OK", "Overstressed" \right)$$

Condition1 = "OK"

Check Anchor Bolt Area:

Based on the ASCE 10-97 Design of Latticed Steel Transmission Structures

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 10.1 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 3.0 \cdot in^2$$

Provided Area:

$$A_{sprovided} := A_n \cdot N \qquad A_{sprovided} = 15.0 \cdot in^2$$

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.68$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.20$$

Condition3 = "OK"

FOUNDATION ANALYSIS

URS

Job	250' (SST) Self-Supporting Tower - Mansfield, CT	Project No.	TWS-019	Page / Sheet	of 1 of 2
Description	Drilled Pier Caisson Evaluation	Computed by	MCD	Date	12/30/14
		Checked by		Date	

FOUNDATION ANALYSIS

Input Data

Maximum Pier Reactions:

Compression: $C_t := 377 \cdot kips$ *user input*

Uplift: $U_t := 310\,kips$ *user input*

Foundation Dimensions:

Drilled Caisson Length: $C_{Length} := 31 \cdot ft$ *user input*

Diameter of Pier: $d_p := 5.5ft$ *user input*

Extension of Pier Above Grade: $L_{pag} := 0.5ft$ *user input*

Material Properties:

Unit Weight of Concrete: $\gamma c := 150pcf$ *user input*

Unit Weight of Water: $\gamma w := 62.4pcf$ *user input*

Unit Weight of Soil: $\gamma s := 125pcf$ *user input*

Allowable Soil Bearing Capacity: $q_s := 5000psf$ *user input*

Water Table Below Grade: $Wd := 32 \cdot ft$ *user input*

Average Allowable Shear: $fl := 1020\,psf$ *user input*

Depth Neglected for Skin Friction at Top: $Depthunbond := 1.0\,ft$ *user input*

Loading:

$$TotalDownLoad := C_t + \pi \cdot \frac{d_p^{\,2}}{4} \cdot \left[L_{pag} \cdot \gamma c + \left[\gamma c \cdot \left(C_{Length} - L_{pag}\right)\right]\right]$$

$$TotalDownLoad = 487.5\,kips$$

$$PierWeight := \pi \cdot \frac{d_p^{\,2}}{4} \cdot \left[\left(Wd + L_{pag}\right) \cdot \gamma c + \left(C_{Length} - Wd - L_{pag}\right) \cdot (\gamma c - \gamma w)\right]$$

$$PierWeight = 112.7 \cdot kips$$

$$SoilShear := \pi\, d_p \cdot \left[fl \cdot (Wd - Depthunbond) + fl \cdot \left(C_{Length} - Wd - L_{pag}\right)\right]$$

$$SoilShear = 519.9 \cdot kips$$

Compression Capacity:

$$\text{TotalDownLoadCapacity} := \text{SoilShear} + q_s \cdot \left(\pi \cdot \frac{d_p^{\,2}}{4} \right)$$

$\text{TotalDownLoadCapacity} = 638.7 \cdot \text{kips}$

$\text{CheckDownLoadCapacity} := \text{if}(\text{TotalDownLoad} < \text{TotalDownLoadCapacity}, \text{"Okay"}, \text{"No Good"})$

$\text{CheckDownLoadCapacity} = \text{"Okay"}$

Tension Capacity:

$\text{TotalUpLiftCapacity} := \text{SoilShear} + \text{PierWeight}$

$\text{TotalUpLiftCapacity} = 632.6 \cdot \text{kips}$

$\text{CheckUpLiftCapacity} := \text{if}\left(U_t < \text{TotalUpLiftCapacity}, \text{"Okay"}, \text{"No Good"}\right)$

$\text{CheckUpLiftCapacity} = \text{"Okay"}$

$$\text{SafetyFactor}_{provided} := \frac{\text{TotalUpLiftCapacity}}{U_t}$$

$\text{SafetyFactor}_{provided} = 2.04$

Check Cone Failure:

$$\text{ConeFailureCapacity} := \frac{\left[\left(C_{Length} - L_{pag}\right) \cdot \tan(30\text{deg}) \cdot 2 + d_p\right]^2 \cdot \pi}{4} \cdot \frac{C_{Length} - L_{pag}}{3} \cdot \gamma_s$$

$\text{ConeFailureCapacity} = 1654.85 \cdot \text{kips}$

$\text{CheckConeFailureCapacity} := \text{if}\left(U_t < \text{ConeFailureCapacity}, \text{"Okay"}, \text{"No Good"}\right)$

$\text{CheckConeFailureCapacity} = \text{"Okay"}$

$$\text{ConeSafetyFactor}_{provided} := \frac{\text{ConeFailureCapacity}}{U_t}$$

$\text{ConeSafetyFactor}_{provided} = 5.34$