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

1/8/15

Hand Delivered

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

CC to Property Owner
STATE OF CONNECTICUT DEPARTMENT OF EMERGENCY SERVICES AND PUBLIC PROTECTION, DIVISION OF STATE POLICE
1111 Country Club Road
Middletown, CT 06457

RE: Sprint Spectrum L.P. notice of intent to modify an existing telecommunications facility located at I 84 W & SOUTH ST. Middlebury, CT 06762. Known to Sprint Spectrum L.P. as site CT03XC028.

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: CT03XC028

South Street / I-84 (Police Tower)

South Street / I-84
Middlebury, CT 06762

July 10, 2014

EBI Project Number: 62143779

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

EBI Consulting
environmental | engineering | due diligence

July 10, 2014

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

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:
CT03XC028 - South Street / I-84 (Police Tower)

Site Total: 86.11% - MPE% in full compliance

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at South Street / I-84, Middlebury, 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 South Street / I-84, Middlebury, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. All calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 2 channels in the 1900 MHz Band were considered for each sector of the proposed installation.
2) 1 channel in the 800 MHz Band was considered for each sector of the proposed installation
3) 2 channels in the 2500 MHz Band were considered for each sector of the proposed installation.
4) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

6) The antennas used in this modeling are the RFS APXVSPP18-C-A20 and the RFS APXVTM14-C-I20. This is based on feedback from the carrier with regards to anticipated antenna selection. The RFS APXVSPP18-C-A20 has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. The RFS APXVTM14-C-I20 has a 15.9 dBd gain value at its main lobe at 2500 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
7) The antenna mounting height centerline for the proposed antennas is **97 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	CT03XC028 - South Street / I-84 (Police Tower)
Site Addresss	South Street / I-84, Middlebury, CT, 06762
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	2	40	5.9	97	91	1/2 "	0.5	0	138.69	0.60%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	97	91	1/2 "	0.5	0	39.00	0.30%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	97	91	1/2 "	0.5	0	138.69	1.06%
														Sector total Power Density Value:		1.96%

Sector 2

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	5.9	97	91	1/2 "	0.5	0	138.69	0.60%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	97	91	1/2 "	0.5	0	39.00	0.30%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	97	91	1/2 "	0.5	0	138.69	1.06%
														Sector total Power Density Value:		1.96%

Sector 3

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	5.9	97	91	1/2 "	0.5	0	138.69	0.60%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	97	91	1/2 "	0.5	0	39.00	0.30%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	97	91	1/2 "	0.5	0	138.69	1.06%
														Sector total Power Density Value:		1.96%

Site Composite MPE %	
Carrier	MPE %
Sprint	5.89%
AT&T	2.10%
MetroPCS	8.40%
Unidentified from DPS	62.34%
DOT	1.21%
T-Mobile	6.17%
Total Site MPE %	**86.11%**

EBI Consulting
environmental | engineering | due diligence

Summary

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

The anticipated Maximum Composite contributions from the Sprint facility are **5.89% (1.96% from sector 1, 1.96% from sector 2 and 1.96% 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 **86.11%** 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: SOUTH ST./I-84 (POLICE TOWER)

SITE CASCADE: CT03XC028-B

SITE ADDRESS: SOUTH STREET/I-84 MIDDLEBURY, CT 06762

SITE TYPE: 160'-0" SELF SUPPORT

Sprint
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

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

Transcend Wireless
48 SPRUCE STREET
OAKLAND, NJ 07346

SITE INFORMATION

PROPERTY OWNER:
TOWN OF MIDDLEBURY
POLICE DEPARTMENT
200 SOUTHFORD ROAD
MIDDLEBURY, CT 06762
PH.:(203)577-4028

SITE ADDRESS:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

GEOGRAPHIC COORDINATES:
LATITUDE: 41.513416, 41° 30' 48.297"
LONGITUDE: -73.124695, -73° 7' 28.902"

ZONING JURISDICTION:
TOWN OF MIDDLEBURY

ZONING DISTRICT:
XXXXXXXX

POWER COMPANY:
CONN. LIGHT & POWER
PH.: (888) 783-6617

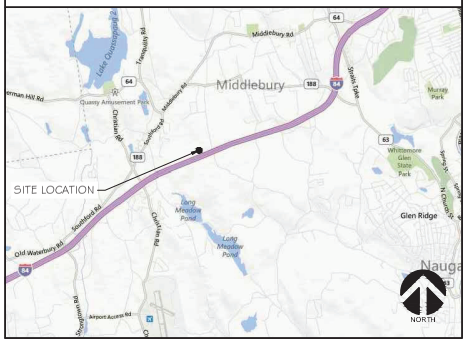
AAV PROVIDER:
AT&T
PH.: (210) 821-4105

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

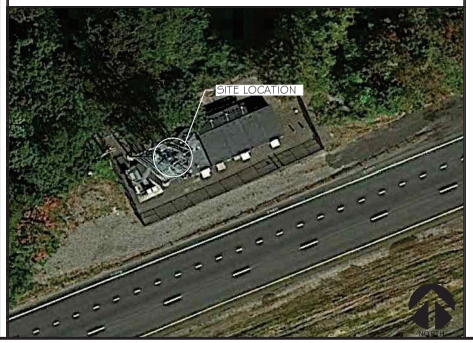
EQUIPMENT SUPPLIER:
ALCATEL-LUCENT
600-700 MOUNTAIN AVENUE
MURRAY HILL, NJ 07974
PH.: (908) 508-8080

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

APPLICABLE CODES

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

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

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SHEET INDEX

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

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: 12/31/2014

MARK	DATE	DESCRIPTION
A	12.31.14	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 12.31.2014

PROJECT TITLE:
SOUTH ST./I-84
(POLICE TOWER)
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

SHEET TITLE:
TITLE SHEET

SCALE: NONE

PROJECT NUMBER: 28715
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: 12/31/2014 Date:

MARK	DATE	DESCRIPTION
A	12.31.14	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 12.31.2014

PROJECT TITLE:
SOUTH ST./I-84
(POLICE TOWER)
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

SHEET TITLE:
SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 28715
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 PENETRATOR TO DETERMINE ANY DAMAGE OR CHANGES IN 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. MAINLINEHYBRID 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: 12/31/2014 Date:

MARK	DATE	DESCRIPTION
A	12.31.14	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 12.31.2014

PROJECT TITLE:
SOUTH ST./I-84
(POLICE TOWER)
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

SHEET TITLE:
SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 28715
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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STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

Signature: James R Skowronski Date: 12/31/2014

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ISSUE PHASE: FINAL
DATE ISSUED: 12.31.2014

PROJECT TITLE:
SOUTH ST./I-84
(POLICE TOWER)
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

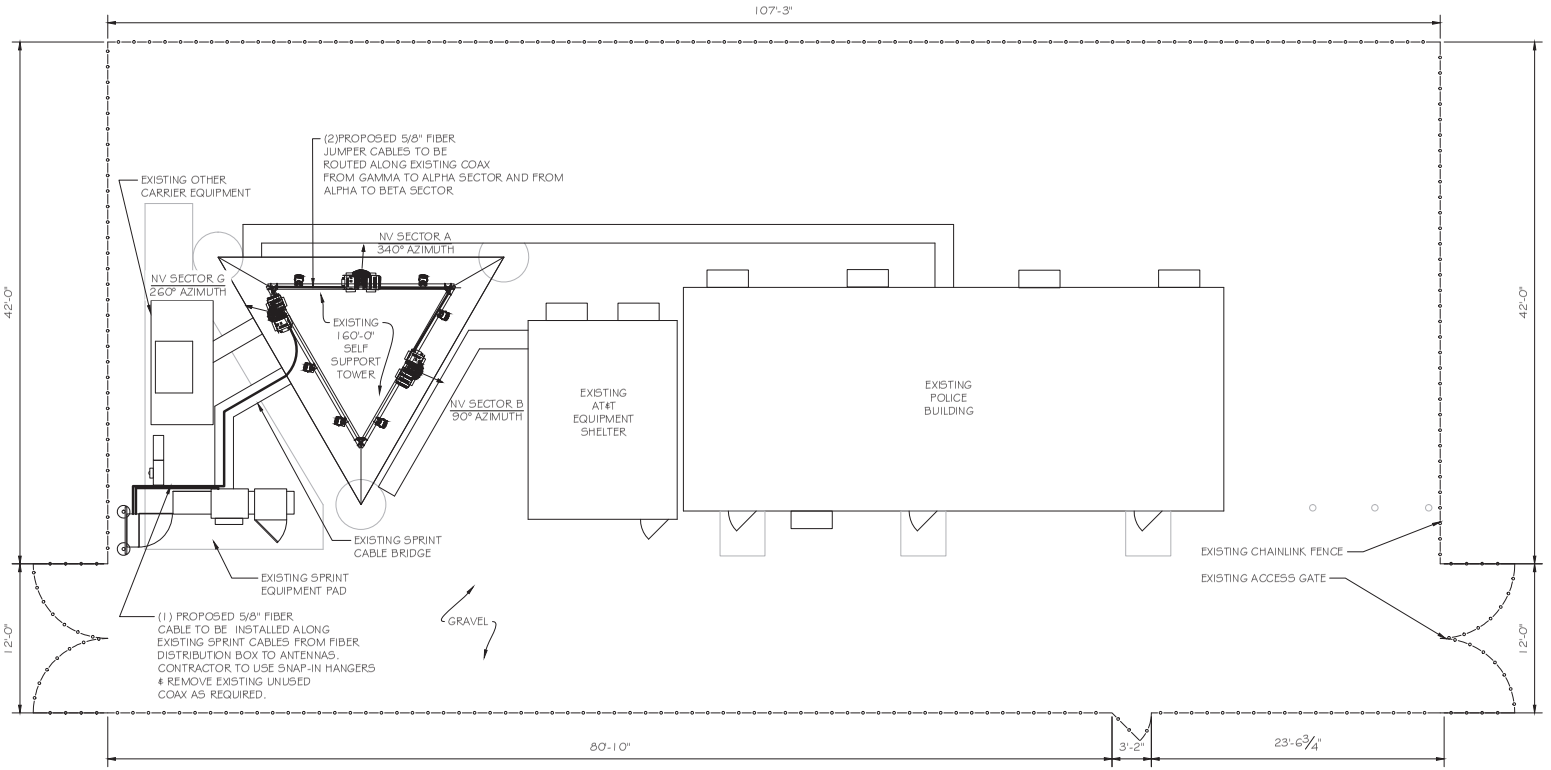
SHEET TITLE:
SPRINT SPECIFICATIONS

SCALE: NONE

PROJECT NUMBER: 28715
SHEET NUMBER: SP-3

NOTE: EXISTING SELF-SUPPORT TOWER TO BE STRUCTURALLY MODIFIED IN ACCORDANCE WITH THE STRUCTURAL ANALYSIS AND MODIFICATION DESIGN PRODUCED BY URS CORPORATION, DATED 9.30.2014.

NORTH



SITE PLAN
SCALE: 1" = 10'

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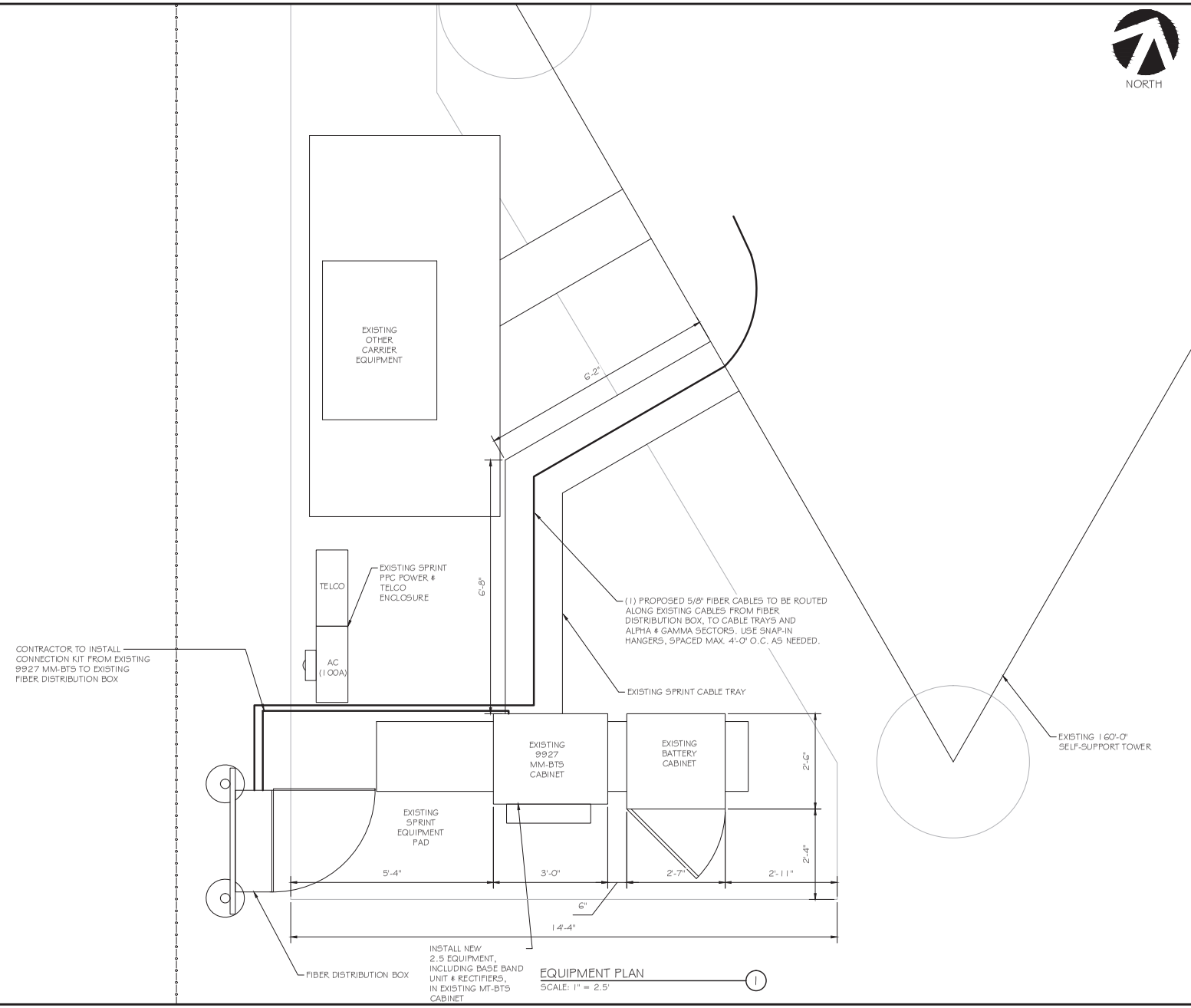
PROJECT TITLE:
SOUTH ST./I-84
(POLICE TOWER)
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

SHEET TITLE:
SITE PLAN

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

PROJECT NUMBER: 28715
SHEET NUMBER: A-1



EQUIPMENT PLAN
SCALE: 1" = 2.5'

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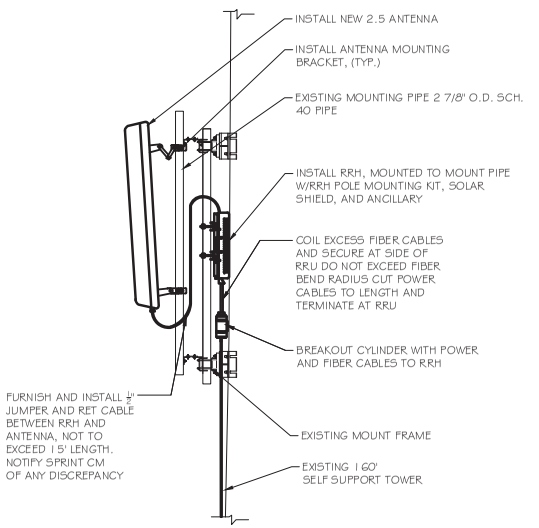
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

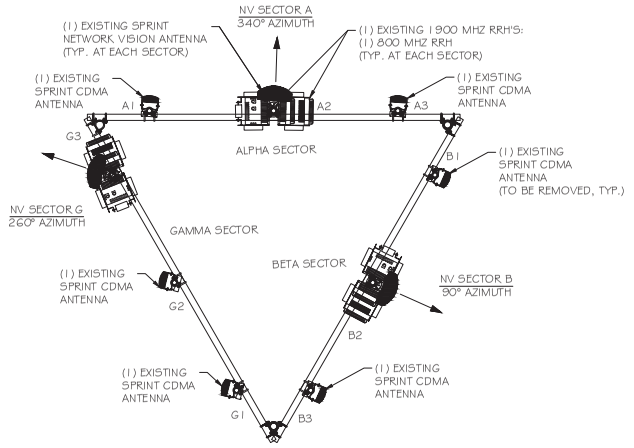
SHEET TITLE:
EQUIPMENT PLAN

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

PROJECT NUMBER: 28715
SHEET NUMBER: A-2

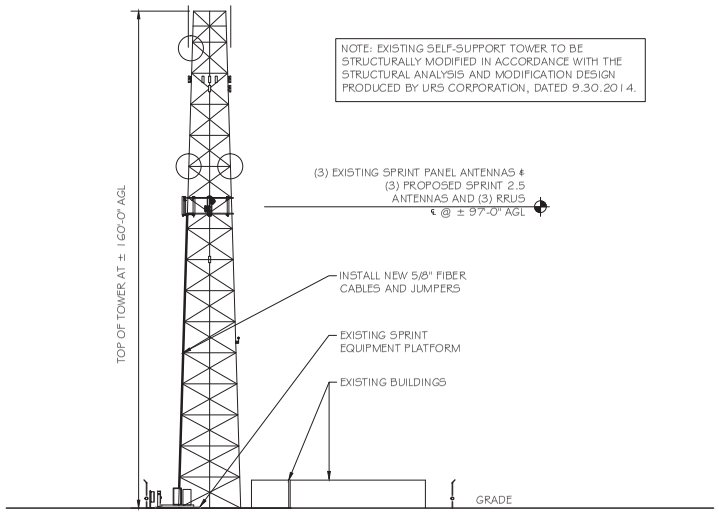


ANTENNA & RRH MOUNTING DETAILS (1)
SCALE: NTS



NORTH

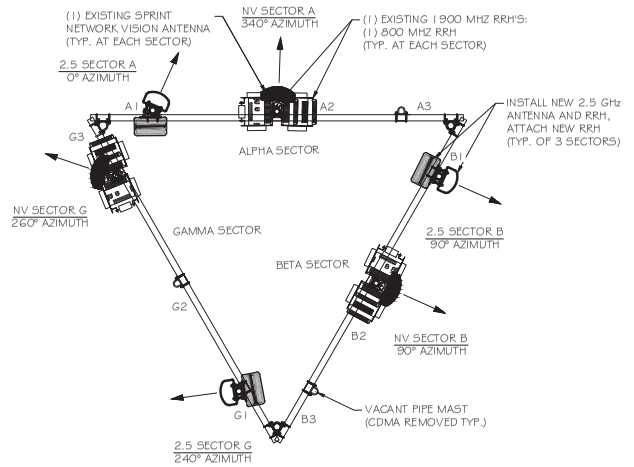
EXISTING ANTENNA ARRAY (3)
SCALE: NTS



BUILDING ELEVATION (2)
SCALE: 1" = 40'

0 20' 40' 80'

11" x 17" - 1" = 40'
22" x 34" - 1" = 20'



NORTH

PROPOSED ANTENNA ARRAY (4)
SCALE: NTS

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DATE ISSUED: 12.31.2014

PROJECT TITLE:
SOUTH ST./I-84
(POLICE TOWER)
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

SHEET TITLE:
BUILDING ELEVATIONS & ANTENNA DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 28715
SHEET NUMBER: A-3

Sprint

RFDS Sheet

General Site Information

Site ID	CT03XC028	Equipment Vendor	Alcatel-Lucent
Market	Southern Connecticut	Lattitude	41.513416
Region	Northeast	Longitude	-73.124695
MLA	N/A	LL SITE ID	N/A
Structure Type	Self Support		
BTS Type			
Solution ID		Sierra SR Equipment type	
		Equipment Vendor	Alcatel-Lucent

Incremental Power Draw needed by added Equipment: TBD

Base Equipment

BBU Kit	ALU BBU Kit	Top Hat	None
BBU Kit Qty	1	Top Hat Qty	N/A
		Top Hat Dimensions	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 Fiber Only	
Cable Qty	1	
Weight per foot. Lbs.	0.242	
Diameter. Inches.	0.73	
Length Ft.	117	(calculated as antenna height plus 20%)
Coax Jumper	TBD	
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.	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	97	97	97
Antenna Azimuth	0	90	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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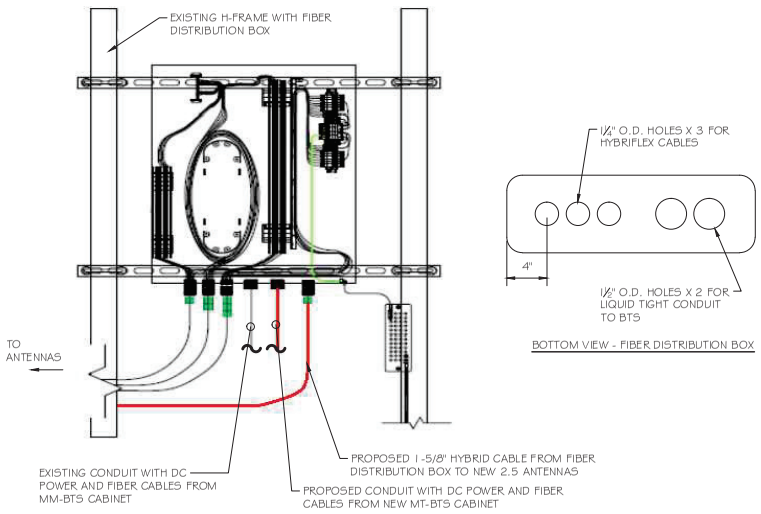
PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

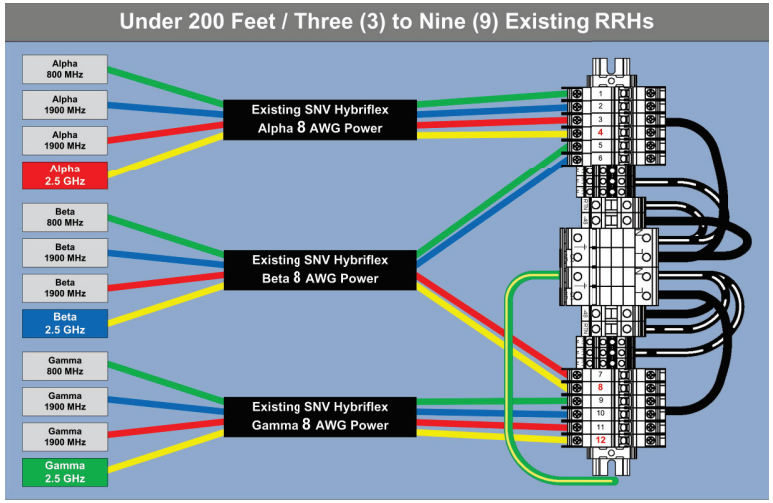
SHEET TITLE:
RF DATA SHEET

SCALE:
AS NOTED

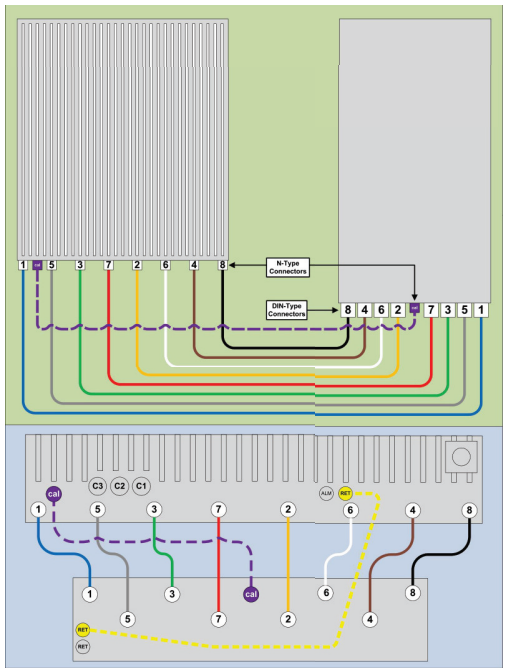
PROJECT NUMBER: 28715
SHEET NUMBER: A-4



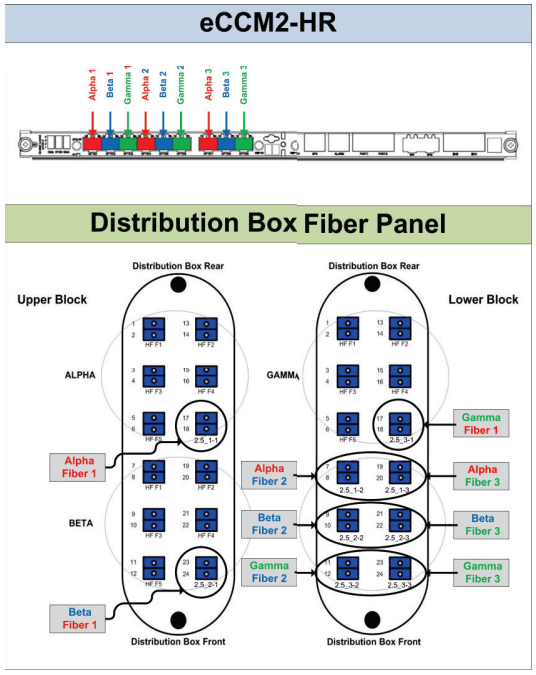
TYPICAL FIBER DISTRIBUTION BOX DETAIL (1)
SCALE: NTS



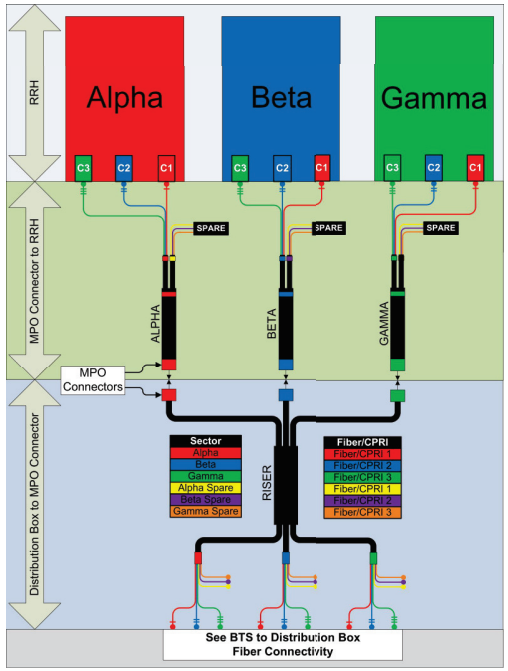
RRH TO DISTRIBUTION BOX POWER CONNECTIVITY DETAIL (2)
SCALE: NTS



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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MARK	DATE	DESCRIPTION
A	12.31.14	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 12.31.2014

PROJECT TITLE:
SOUTH ST./I-84
(POLICE TOWER)
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

SHEET TITLE:
FIBER PLUMBING DIAGRAM

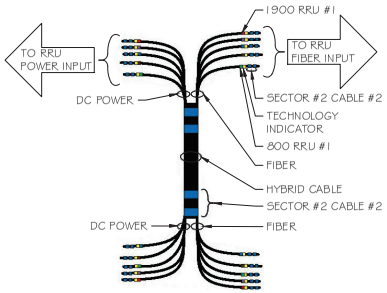
SCALE:
AS NOTED

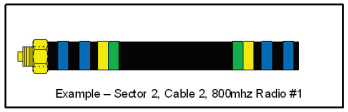
PROJECT NUMBER: 28715
SHEET NUMBER: A-5

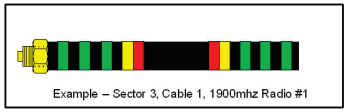
2.5 FREQUENCY	INDICATOR		ID
2500 -1	YEL	WHT	GRN
2500 -2	YEL	WHT	RED
2500 -3	YEL	WHT	BRN
2500 -4	YEL	WHT	BLU
2500 -5	YEL	WHT	SLT
2500 -6	YEL	WHT	ORG
2500 -7	YEL	WHT	WHT
2500 -8	YEL	WHT	PPL

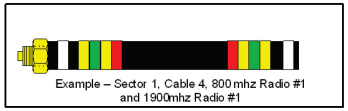
NV FREQUENCY	INDICATOR	ID
800-1	YEL	GRN
1900-1	YEL	RED
1900-2	YEL	BRN
1900-3	YEL	BLU
1900-4	YEL	SLT
800-1	YEL	ORG
RESERVED	YEL	WHT
RESERVED	YEL	PPL

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 (1)
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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SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

SHEET TITLE:
CABLE COLOR CODING

SCALE:
AS NOTED

PROJECT NUMBER: 28715
SHEET NUMBER: A-6

Product Data Sheet **HB058-M12-xxxF**

HYBRIFLEX™ RRH Fiber Only Cabling Solution, 0x18, Riser, 5/8", Multi-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative soluton for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable.

Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – **minimizes installation time and enables mechanical protection and shielding**
- Outer conductor grounding – **Eliminates typical grounding requirements and saves on installation costs**
- Lightweight solution and compact design – **Decreases tower loading**
- Robust cabling – **Eliminates need for expensive cable trays and ducts**
- Installation of tight bundled fiber optic cable pairs directly to the RRH – **Reduces CAPEX and wind load by eliminating need for interconnection**
- Optical fiber housed in single corrugated cable – **Saves CAPEX by standardizing RRH cable installation and reducing installation requirements**
- UL-Listed, flame-retardant jacket, UV protected assembly – **Allows both indoor and outdoor applications**

Technical Specifications

Structure			
Outer Conductor Armor:	Corrugated Aluminum	[mm (in)]	18.5 (0.73)
Jacket:	Flame Retardant, UV-Resistant	[mm (in)]	21.4 (0.84)
Standards (meets or exceeds)			UL1569 Type MC UL Listed
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	0.36 (0.242)
Minimum Bending Radius, Single Bending		[mm (in)]	90 (4)
Minimum Bending Radius, Repeated Bending		[mm (in)]	254 (10)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	1.97 (0.60)
Fiber Optic Properties			
Version			Multi-mode bend tolerant fiber-12 channel cable
Quantity, Fiber Count			18 pairs (9 main, 9 spares)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	250
Minimum Bending Radius (installation)		[mm (in)]	114.3 (4.5)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL Listed Type OFNR (UL1666) RoHS Compliant
Environment			
Installation Temperature		[°C (°F)]	-20 to +65 (-4 to +149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to +149)
Storage Temperature		[°C (°F)]	-40 to +70 (-40 to +158)

* This data is provisional and subject to change.

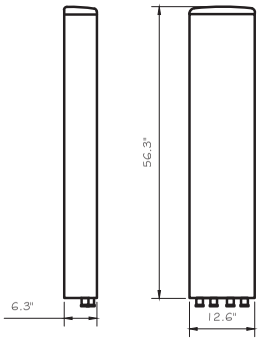
All information contained in the present datasheet is subject to confirmation at time of ordering.

RFS The Clear Choice®	HB058-M12-xxxF	Rev: P1	Print Date: 1.11.2013

Please visit us on the internet at http://www.rfsworld.com — Radio Frequency Systems

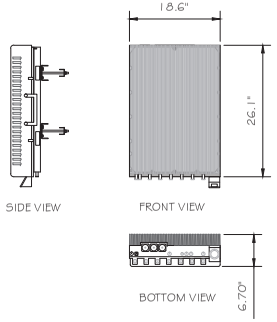
FIBER CABLE CROSS SECTION & DATA (1)
SCALE: NTS

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-RRH8x20-25

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

WEIGHT = 70 lbs.

2.5 RRH DETAIL (3)
SCALE: NTS

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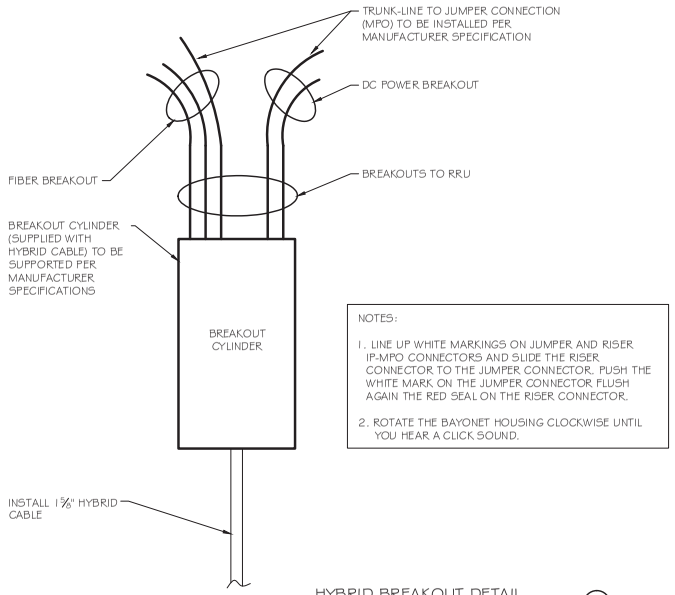
(POLICE TOWER)
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

SHEET TITLE:
ANTENNA & HYBRID CABLE DETAILS

SCALE:
AS NOTED

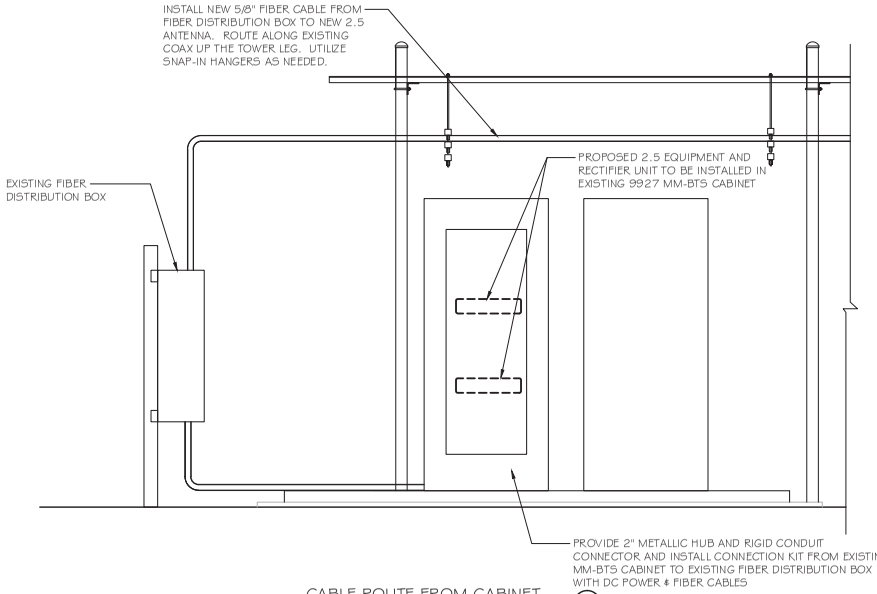
PROJECT NUMBER: 28715
SHEET NUMBER: A-7



NOTES:

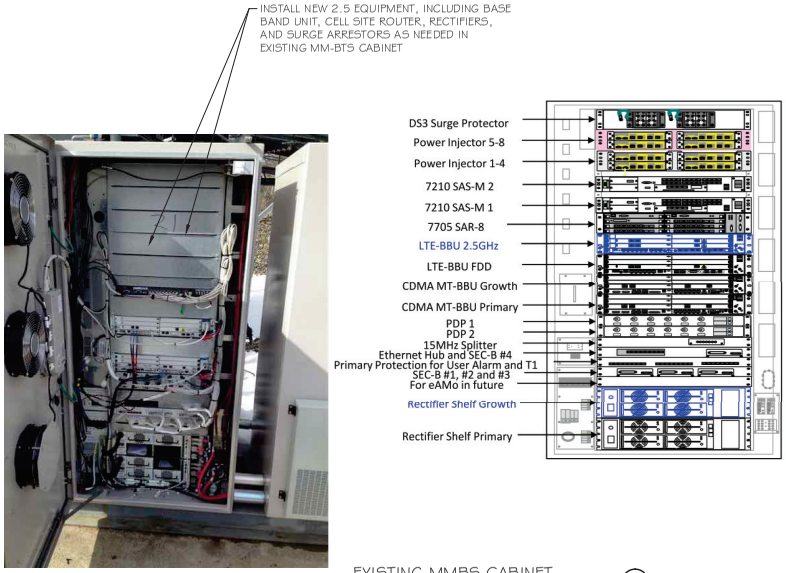
1. LINE UP WHITE MARKINGS ON JUMPER AND RISER IP-MPO CONNECTORS AND SLIDE THE RISER CONNECTOR TO THE JUMPER CONNECTOR. PUSH THE WHITE MARK ON THE JUMPER CONNECTOR FLUSH AGAINST THE RED SEAL ON THE RISER CONNECTOR.
2. ROTATE THE BAYONET HOUSING CLOCKWISE UNTIL YOU HEAR A CLICK SOUND.

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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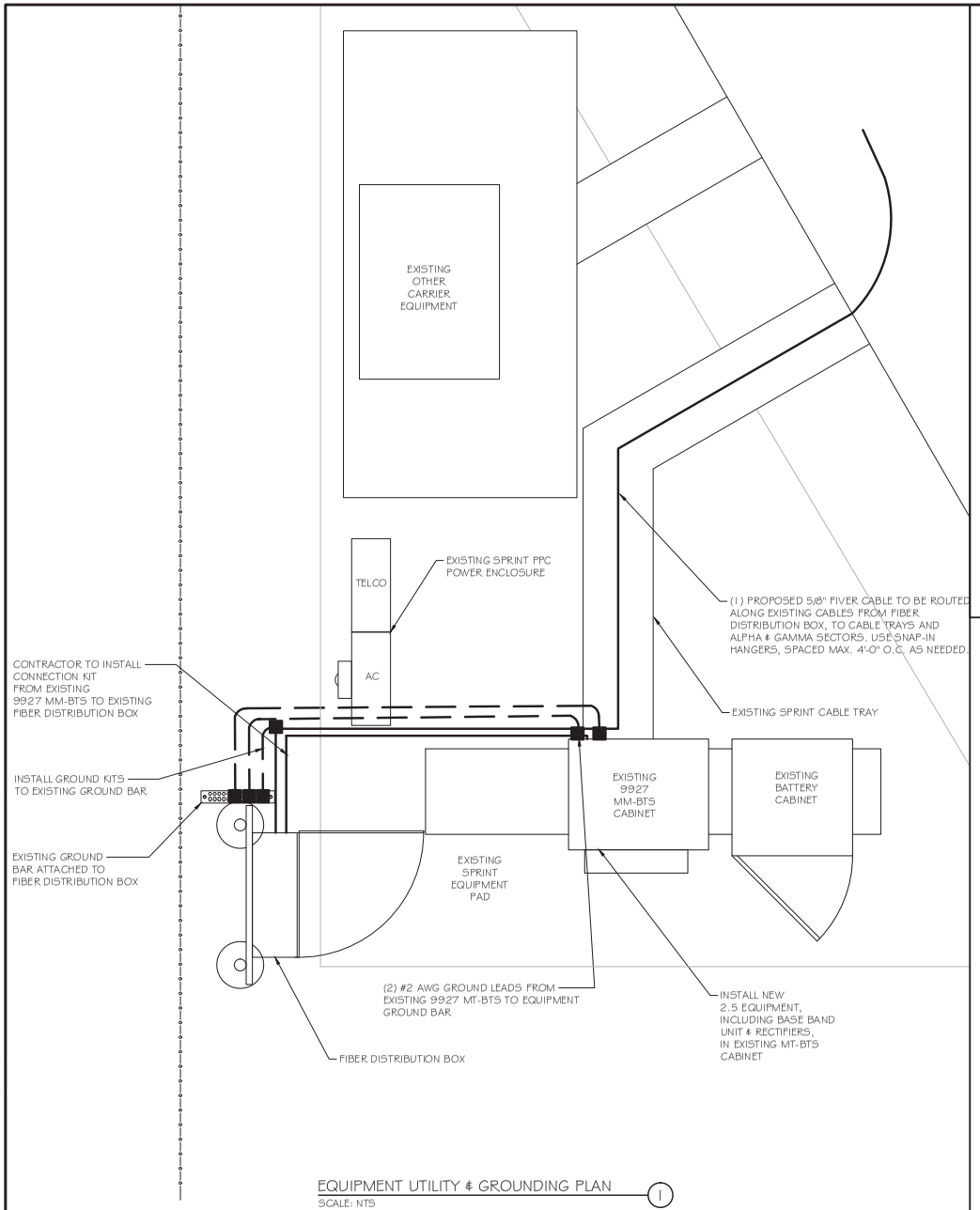
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

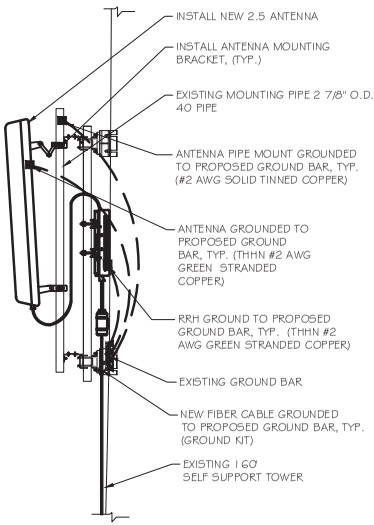
SHEET TITLE:
EQUIPMENT DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 28715
SHEET NUMBER: A-8



EQUIPMENT UTILITY & GROUNDING PLAN (1)
SCALE: NTS



ANTENNA GROUNDING DETAIL (2)
SCALE: NTS

GROUNDING NOTES:

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

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

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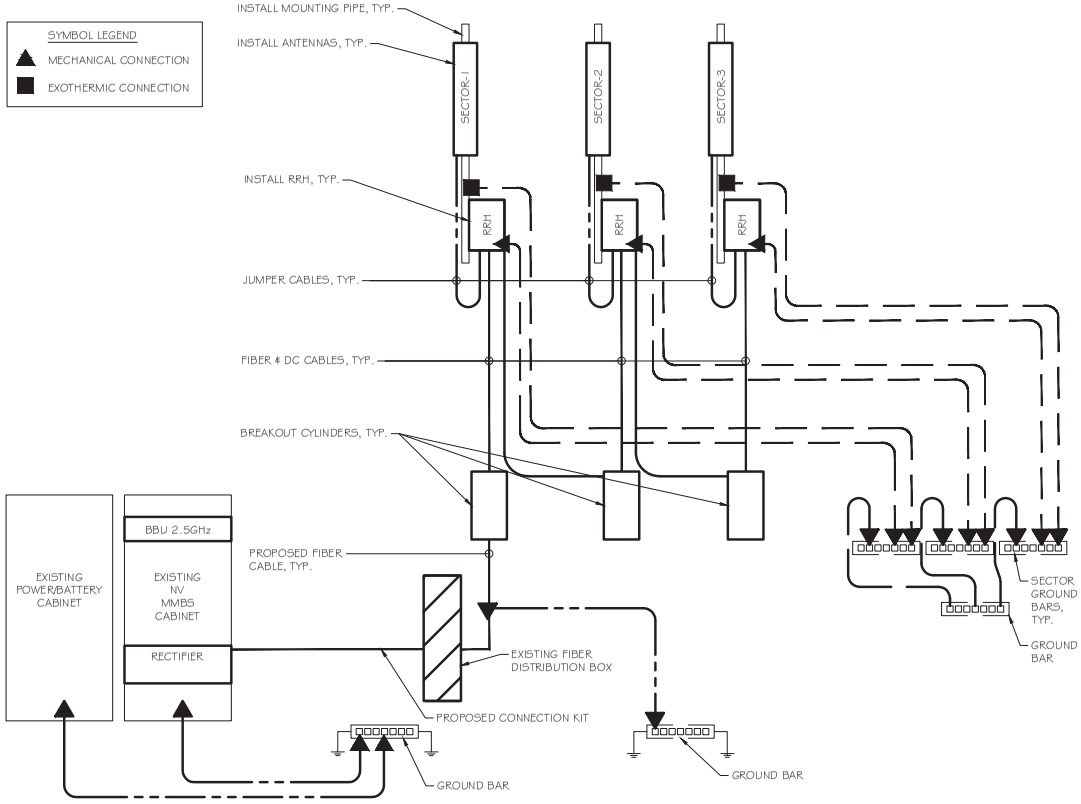
NEW HAVEN COUNTY

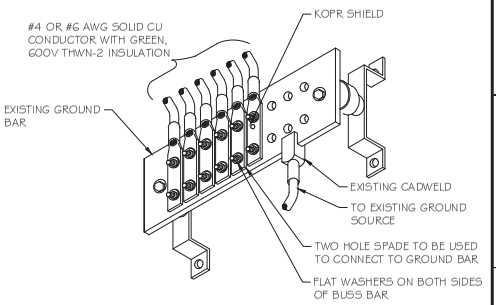
SHEET TITLE:
EQUIPMENT UTILITY & GROUNDING PLAN

SCALE:
AS NOTED

PROJECT NUMBER: 28715
SHEET NUMBER: E-1



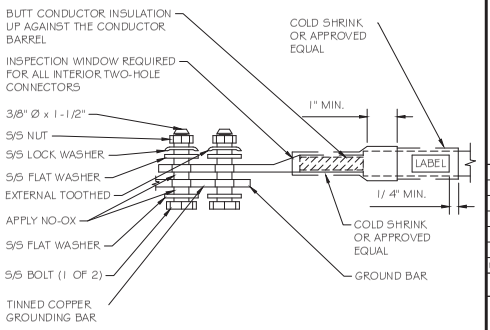
GROUNDING RISER DIAGRAM (1)
SCALE: NTS



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)
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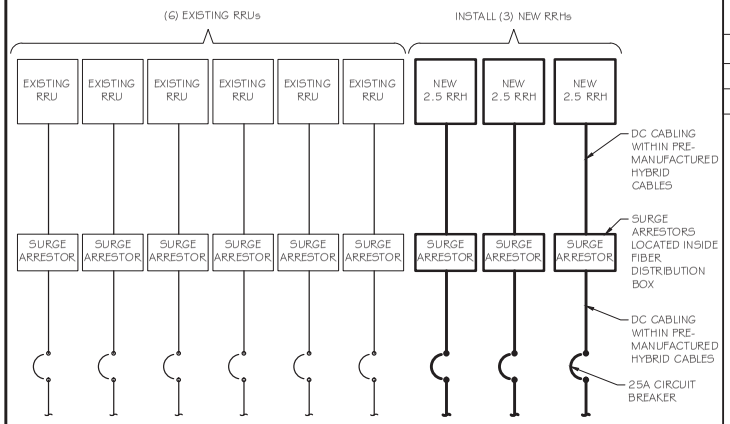
NEW HAVEN COUNTY

SHEET TITLE:
GROUNDING DETAILS

SCALE:
AS NOTED

PROJECT NUMBER: 28715
SHEET NUMBER: E-2



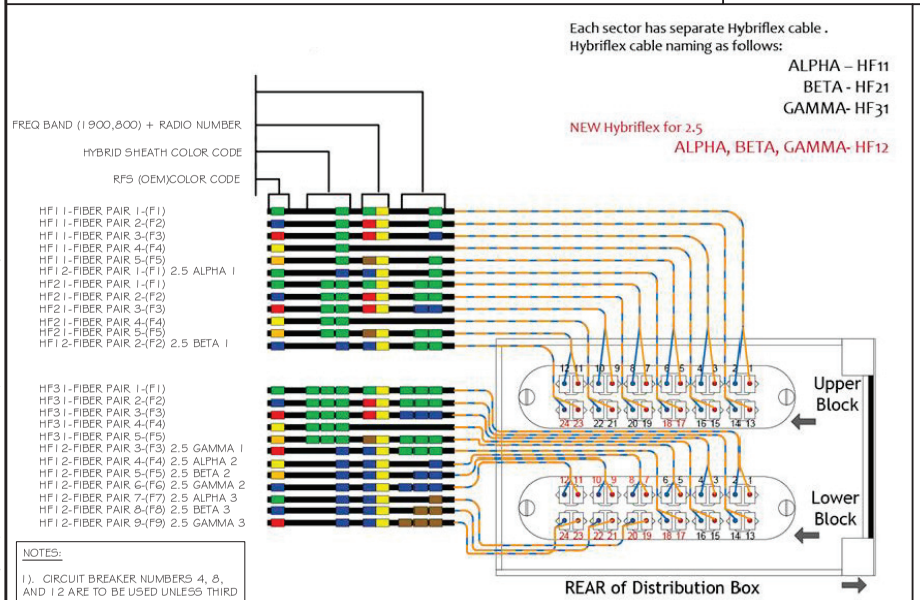
DC ONE-LINE DIAGRAM
SCALE: NTS
1

A/C PANEL SCHEDULE

VOLTAGE:	240V/120		PANEL STATUS:	EXISTING		N TO GROUND BOND:	YES
MAIN BREAKER:	100 AMP		MODEL NUMBER:	TBD		INTERNAL TVSS:	YES
MOUNT:	GROUND		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	MBTS 100	100	2	ON			ON	2	60	AC SURGE PROTECTION	7
2											8
3	BLANK (UNUSED)	-	-	-			OFF	2	60	SPARE	9
4	BLANK (UNUSED)	-	-	-							10
5	SPARE	20	1	OFF			ON	1	20	TELCO GFI	11
6	FAN	10	1	ON			-	-	-	BLANK (UNUSED)	12

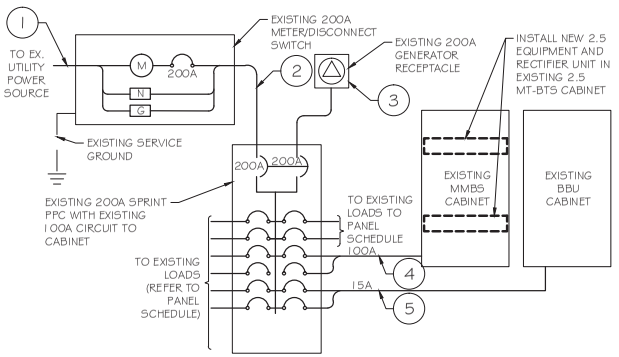
AC PANEL SCHEDULE
SCALE: NTS
2



NOTES:

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

TYPICAL FIBER DISTRIBUTION
SCALE: NTS
3



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
SCALE: NTS
4

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.

12/31/2014
Signature: Date:

MARK	DATE	DESCRIPTION
A	12.31.14	FINAL CONSTRUCTION DRAWINGS ISSUED

ISSUE PHASE: FINAL
DATE ISSUED: 12.31.2014

PROJECT TITLE:
SOUTH ST./I-84
(POLICE TOWER)
SITE#:CT03XC028-B

PROJECT INFORMATION:
SOUTH STREET/I-84
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

SHEET TITLE:
DC POWER DETAILS & PANEL SCHEDULES

SCALE:
AS NOTED

PROJECT NUMBER: 28715
SHEET NUMBER: E-3

DETAILED STRUCTURAL ANALYSIS AND REINFORCEMENT OF AN EXISTING 160' SELF SUPPORT LATTICE TOWER AND ITS FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENT

Site ID:	**(T-Mobile)**	**CT11052E**
	(Sprint)	**CT03XC028**
Site Name:	**(T-Mobile)**	**Middlebury / I-84 / X16&17_1**
	(Sprint)	**Connecticut State Police Site #20**
Address:	**I-84 and South Street**	
	Middlebury, CT	

prepared for

T-Mobile

Northeast Site Solutions
54 Main Street
Sturbridge, MA 01566

Sprint

Transcend Wireless
10 International Avenue
Suite 3
Mahwah, NJ 07430

prepared by

URS

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

36928699.00000
TWS-017 (Rev. 2)

September 30, 2014

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis and reinforcement of the existing 160' self-supporting lattice tower located west of the intersection of I-84 and South Street in Middlebury, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code, the TIA/EIA-222-F standard, and the Connecticut State Police Requirements for a wind velocity of 90 mph (fastest mile) and 90 mph (fastest mile) concurrent with ½" ice. Twist (rotation) and sway (deflection) were determined in accordance with Connecticut State Police Requirements for a wind velocity of 90 mph (fastest mile) concurrent with ½" ice. The antenna loading considered in the analysis consists of all existing, future, and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction of this report.

The proposed T-Mobile and Sprint antenna modifications are listed below:

PROPOSED ANTENNA	CARRIER	ANTENNA CENTER ELEVATION
Remove:		
(3) Existing Antenna Mounts	**T-Mobile (existing)**	**@ 125'**
(6) CDMA Units	**Sprint (existing)**	**@ 97'**
Install:		
(3) LNX-6515DS-VTM Panel Antennas **(3) Smart Bias-T Units** **(6) 1 5/8" Coaxial Cables** **(3) 2-Panel Antenna Mounts**	**T-Mobile (proposed)**	**@ 125'**
(3) RFS APXV9TM14-ALU-I20 Panel Antennas **(3) TD-RRH-8x20-25 RRH Units** **(1) Junction Box** **(27) 8' Jumper Cables** **(3) 8' Commscope AISG Cables** **(1) ALU Fiber Optic Cable**	**Sprint (proposed)**	**@ 97'**

The results of an initial analysis indicated that the tower structure and foundation requires modification in order to support the proposed loading conditions. The required modifications are shown in SK-1 thru SK-3 in Section 6 of this report. **Once these modifications are performed the tower and its foundation are considered structurally adequate with the wind load classification specified above and all the existing and proposed antenna loading.**

The tower deflection (sway) is 0.5468 degrees, and the tower rotation (twist) is 0.1233 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. **The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees for combined deflection (sway) and rotation (twist).**

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 geometry, member sizes and foundation taken from Tower and Foundation reports prepared by Stainless, Inc. project number 358807 dated December 14, 1993.

3) Soil information taken from geotechnical report prepared by Dr. Clarence Welti, P.E., P.C., dated December 17, 2012.

4) Previous structural analysis and reinforcement performed by URS Corporation for AT&T, project number CTK-013 / 36917383, signed and sealed December 18, 2012.

5) Antenna inventory as specified in section 2 and 6 of this report taken from inventory provided by CSP, dated February 8, 2014.

6) Sprint antennas taken from "Flat Files" received April 22, 2014 and preliminary construction drawings dated May 8, 2014.

7) Previous structural analysis performed by URS Corporation, on behalf of Sprint, project number TWS-014 / 36928699, signed and sealed May 16, 2014.

8) T-Mobile antennas taken from RFDS, dated July 16, 2014.

9) Coax cable orientation as specified in section 6 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 Connecticut State Police provided the tower inventory for this site. The user of this report shall field verify the antenna and mount configuration used, as well as the physical condition of the tower members 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 AES

STATE OF CONNECTICUT
RICHARD A. SAMBOR
No. 9857
LICENSED
PROFESSIONAL ENGINEER

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

RAS/mcd
cc: IA, CF/Book – URS

2. INTRODUCTION

The subject tower is located west of the intersection of I-84 and South Street in Middlebury, Connecticut. The structure is a self-supporting three-legged 160' steel tapered lattice tower manufactured by Stainless Incorporated.

The inventory is summarized in the table below::

Antenna Type	*Carrier*	*Mount*	*Centerline Elevation*	*Cable*
4' Lightning Rod	(existing)	Pipe mount above	177'	---
16' Lightning Rod Mounting Pipe	(existing)	None	168'	---
Tower Light	(existing)	None	160'-6"	---
(3) 6' Microwave Dishes w/radomes	CSP 52 to 54 (future)	Leg Mounts	160'	---
(1) Celwave PD-83 antenna	CSP – 1 (existing)	(3) 4' Stand-off	160'	(1) 7/8" coax cable
(1) DB-228	FBI – 3 (existing)			(1) 7/8" coax cable
(2) OGT9-806 antennas (1) Decibel DB810K-Y	CSP 8 to 10 (existing)			(3) 1-5/8" coax cable
(6) SC479-HF1LDF (2) Tower Top Amplifier	CSP 40 to 47 (existing)			(6) 1-5/8" coax cable (2) 1/2" coax cables
(5) Filter/Diplexers	(existing)	(3) 4' Stand-offs (listed above)	155'	---
(1) Decibel DB304-A	ATF – 2 (existing)	*Shared with Above*	153'	(1) 7/8" coax cable
(2) OGT9-806 antennas (1) DB810K	CSP 11 to 13 (existing)	4' Stand-off	143'	(3) 1-5/8" coax cable
(3) Powerwave 7770 (3) Powerwave 7020 RET (6) TMAs (6) Diplexers	AT&T (existing)	(3) T-Frames	138'	(12) 1 1/4" coax cable (relocated, see SK-2)
(4) SBNH-1D6565C (2 A, 1 B & 1 C) (2) KMW AM-X-CD-16-65-00T (1 B & 1 C) (9) TMAs (6) Diplexers (1) Surge Suppressor	AT&T (existing)	*Shared with Above*	138'	(1) 3" Flex Conduit with 3 Fiber & 6 DC Cables
(1) SC479-HF1LDF (inverted)	CSP – 39 (existing)	Leg Mount	130'	(1) 1-5/8" coax cable
(3) LNX-6515DS-VTM Panel Antennas (3) Smart Bias-T Units	**T-Mobile (Proposed)**	**(3) 2-Panel Antenna Mounts**	**125'**	**(6) 1 5/8" Coaxial Cables**

Antenna Type	*Carrier*	*Mount*	*Centerline Elevation*	*Cable*
(3) EMS RR90-17-02-DP antennas (3) TMA Units	T-Mobile (existing)	**Relocated to (3) 2-Panel Antenna Mounts**	125'	(6) 1 5/8" coax cable
(1) Celwave PD1142	DOT – 4 (existing)	3' Stand-off	122'	(1) 7/8" coax cable
(1) 20' Omni	EMS – 14 (reserved)	Leg Mount	115'	---
(2) 6' Dishes w/ Ice Canopy	CSP – 6 & 7 (existing)	(2) Dish Mounts	110'	(2) WEP65 coax cable
(3) RFS APXV9TM14-ALU-I20 Panel Antennas (3) TD-RRH-8x20-25 RRH Units (1) Junction Box	**Sprint (Proposed)**	*See Below Mounts*	**97'**	**(27) 8' Jumper Cables (3) 8' Commscope AISG Cables (1) ALU Fiber Optic Cable**
(3) RFS APXVSPP-C-20 Antennas (3) Andrew RRH 800 MHz 2x40W (3) Panasonic RRH 1900 MHz 2x40W	Sprint (existing)	Existing Pipe Mounts	97'	(6) 1 1/4" coax cable (3) Hybriflex cable
(1) PD10054	CSP – 5 (existing)	Leg Mount	85'	(1) 7/8" coax cable
GPS-TMG-HR-26NCM	Sprint (existing)	2' Stand-off	55'	(1) 1/2" coax cable

This structural analysis of the communications tower was performed by URS Corporation, AES for T-Mobile and Sprint. The purpose of this analysis was to investigate the structural integrity of the reinforced tower with its existing and proposed antenna loads. The analysis was conducted to evaluate twist (rotation), sway (deflection), and stress on the tower.

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, the Connecticut State Police Requirements, 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.

Load Condition 1 = 90 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 90 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

The TIA/EIA standard permits one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For 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

The stresses on the modified tower structure were evaluated to compare with the allowable stress in accordance with AISC. The results of an initial analysis indicated the tower structure and foundation needed reinforcement. Once the modifications had been made to the tower, the modified tower structure is BELOW allowable stresses under the proposed loading.

The tower deflection (sway) is 0.5468 degrees, and the tower rotation (twist) is 0.1233 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. **The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees for combined deflection (sway) and rotation (twist).**

Tower Base Reactions:

Description	Current
Axial Load (Kips)	70
Pier Compression (kips)	373
Pier Uplift (kips)	315
Overall Overturning (kip-ft)	6961
Overall Shear (kips)	73
Shear per Leg (kips)	41

Controlling Tower Component Stress vs. Capacity Summary:

Component / (Section No.)	Critical Component Size	Controlling Elevation	Stress (% capacity)	Pass/Fail
Tower Leg (T8)	HSS 6.875x0.4	37.5' – 50.0	90.1	Pass
Diagonal (T3)	2L2 1/2x2x1/4	100' – 125'	98.1	Pass
Horizontal (T3)	L3x2 1/2x1/4	100' – 125'	94.7	Pass
Top Girt (T4)	L3x3x1/4	75' – 100'	76.3	Pass
Redundant Horizontal Bracing (T9)	L2x2x5/16	25' – 37.5'	43.6	Pass
Redundant Diagonal Bracing (T9)	L2x2x5/16	25' – 37.5'	83.9	Pass
Inner Bracing (T7)	L2 1/2x2 1/2x3/16	0'-25'	10.7	Pass
Tower Anchor Bolts	(1) A325N 3/4" Bolts	58.333'	90.1	Pass
Foundation Anchor Bolts	Tension & Shear	-----	98.0	Pass

Foundation Summary:

Component	Required / Allowable	Computed	% Capacity	Pass/Fail
Overturning Moment Factor of Safety	2.0 min	2.05	97.6	Pass
Foundation Bearing Pressure	4.5 ksf max	2.1083	44.9	Pass

Tower Twist & Sway at Top:

Description	Current	Total Allowable
Tower Sway (degrees)	0.5468	---
Tower Twist (degrees)	0.1233	
Total Deflection (degrees)	0.6701	0.75

5. CONCLUSIONS

The results of an initial analysis indicated that the tower structure and foundation requires modification in order to support the proposed loading conditions. The required modifications are shown in SK-1 thru SK-3 in Section 6 of this report. **Once these modifications are performed the tower and its foundation are considered structurally adequate with the wind load classification specified above and all the existing and proposed antenna loading.**

The tower deflection (sway) is 0.5468 degrees, and the tower rotation (twist) is 0.1233 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. **The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees for combined deflection (sway) and rotation (twist).**

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.

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.

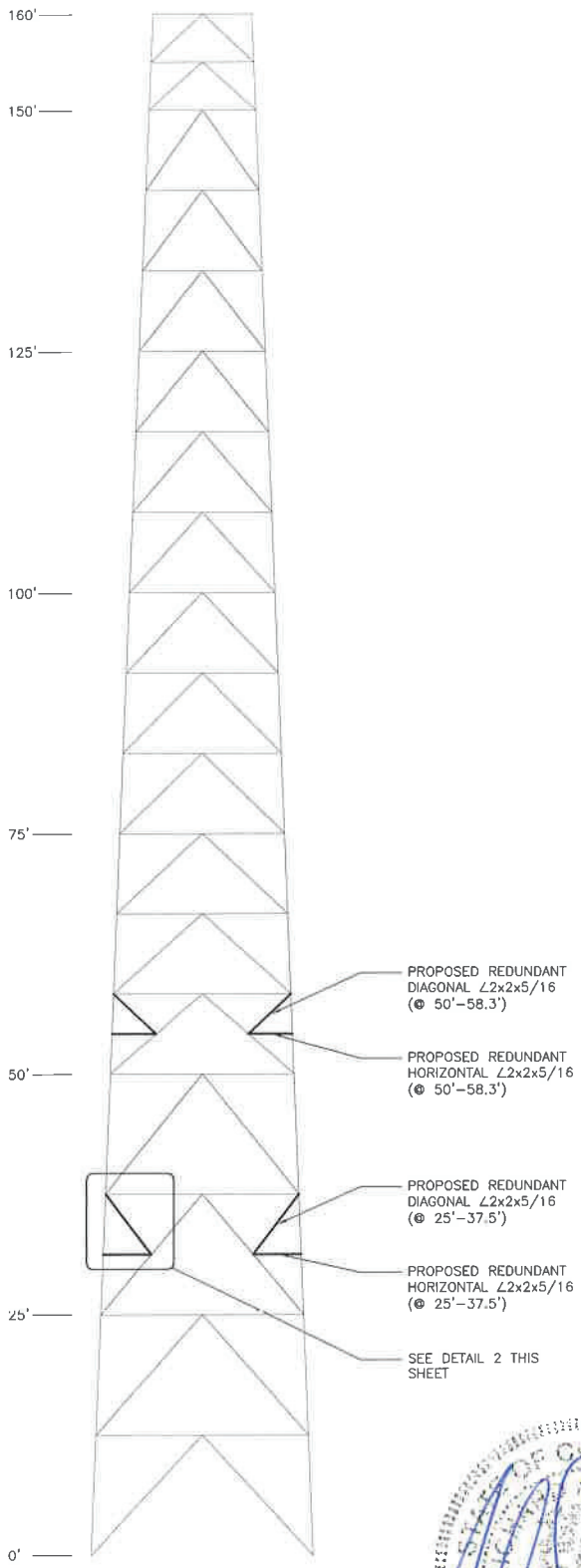
Ongoing and Periodic Inspection and Maintenance:

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.

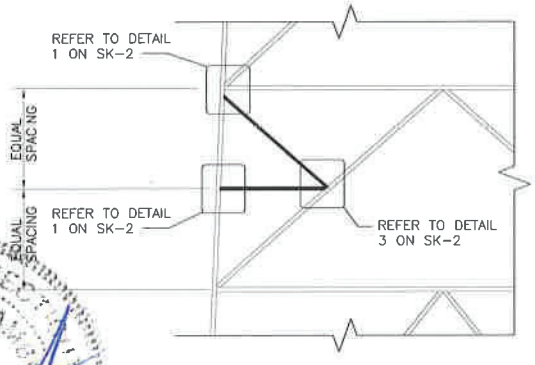
The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire 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

REINFORCEMENT DRAWINGS SK-1 THRU SK-3



1 SK-1 TOWER ELEVATION
SCALE: 1" = 20'-0"



2 SK-1 PARTIAL TOWER ELEVATION
SCALE: 1/8" = 1'-0"

STRUCTURAL NOTES

THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION. NO MEMBER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY. THE CONTRACTOR SHALL BE AWARE OF WEATHER AND WIND CONDITIONS AND NOT PERFORM MEMBER MODIFICATION IN A WIND.

STRUCTURAL STEEL MATERIAL:

STRUCTURAL PLATES	ASTM A372
STEEL BEAMS, CHANNELS & ANGLES	ASTM A36
BOLTS	ASTM A325

MODIFICATIONS SHOWN ARE FOR EACH FACE OR LEG UNLESS NOTED OTHERWISE

UNLESS OTHERWISE NOTED, ALL STEEL WILL BE GALVANIZED IN ACCORDANCE WITH ASTM 123 AFTER FABRICATION. TOUCH UP ALL DAMAGED GALVANIZED STEEL WITH APPROVED COLD ZINC, "GALVANOX", "DRY GALV", "ZINC-IT", OR APPROVED EQUIVALENT, IN ACCORDANCE WITH MANUFACTURERS GUIDELINES. TOUCH-UP DAMAGED NON GALVANIZED STEEL WITH SAME PAINT APPLIED IN SHOP OR FIELD.

EXISTING DIMENSIONS OF STRUCTURE SHOWN ON THESE DOCUMENTS ARE NOT GUARANTEED. CONTRACTOR SHALL TAKE FIELD DIMENSIONS AS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK AND SHALL ASSUME FULL RESPONSIBILITY FOR THEIR ACCURACY. WHEN SHOP DRAWINGS BASED ON FIELD MEASUREMENT ARE SUBMITTED FOR REVIEW, DIMENSIONS ARE PROVIDED FOR THE ENGINEER'S REFERENCE ONLY.

ALL WELDING SHALL BE DONE BY A CERTIFIED WELDER IN ACCORDANCE WITH AWS STANDARDS, USING E70XX ELECTRODES UNLESS OTHERWISE NOTED. WHERE WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZES PER "PREQUALIFIED WELDED JOINTS" TABLES IN AISC "MANUAL OF STEEL CONSTRUCTION", NINTH EDITION.

IF WELDING GALVANIZED MATERIALS, USE PRECAUTIONS & PROCEDURES PER AWS D1.1.

MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

CONNECTIONS / FIELD ASSEMBLY:
BOLTED CONNECTIONS SHALL BE TIGHTENED TO SNUG TIGHT AS DEFINED BY AISC. SPECIFICALLY THE "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS".

COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

INSPECTIONS:
SPECIAL INSPECTIONS ARE REQUIRED PER CODE.

BUILDING PERMIT APPLICANT SHALL SUPPLY THE SERVICES OF A SPECIAL INSPECTOR AND TESTING AGENTS AS REQUIRED. CONTRACTOR SHALL COORDINATE INSPECTIONS OF FABRICATOR'S AND ERECTOR'S WORK AND MATERIALS TO MEET THE REQUIREMENTS OF THE STATEMENT OF SPECIAL INSPECTIONS FOR THIS PROJECT.

COPIES OF TESTING AND INSPECTION REPORTS WILL BE PROVIDED TO THE OWNER, BUILDING OFFICIAL, ENGINEER OF RECORD AND CONTRACTOR.

OW NO:	36928699
Designed by:	–
Drawn by:	PD
Checked by:	MCD
Approved by:	RAS

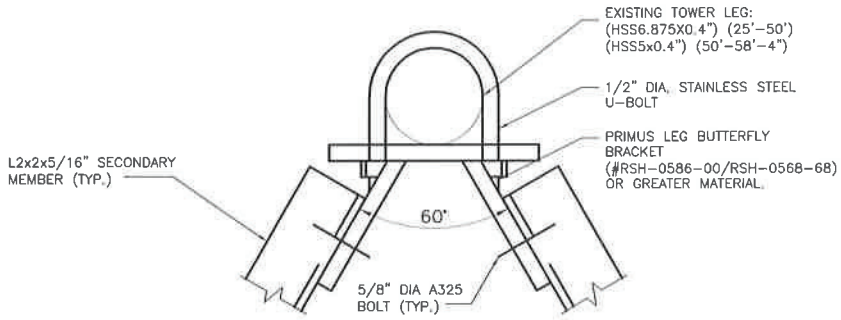
URS CORPORATION AES
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

T-Mobile
Sprint

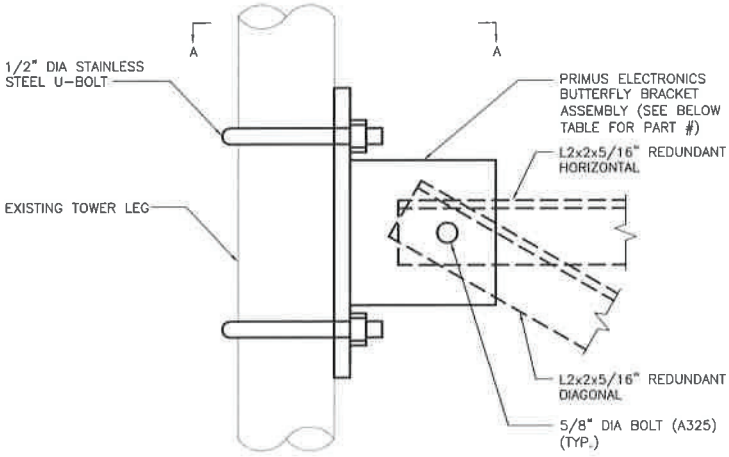
SITE ADDRESS:
CT1078
CONNECTICUT
STATE POLICE SITE #20
Intersection of I-84W & South St
MIDDLEBURY, CT

REV.	DATE:	DESCRIPTION

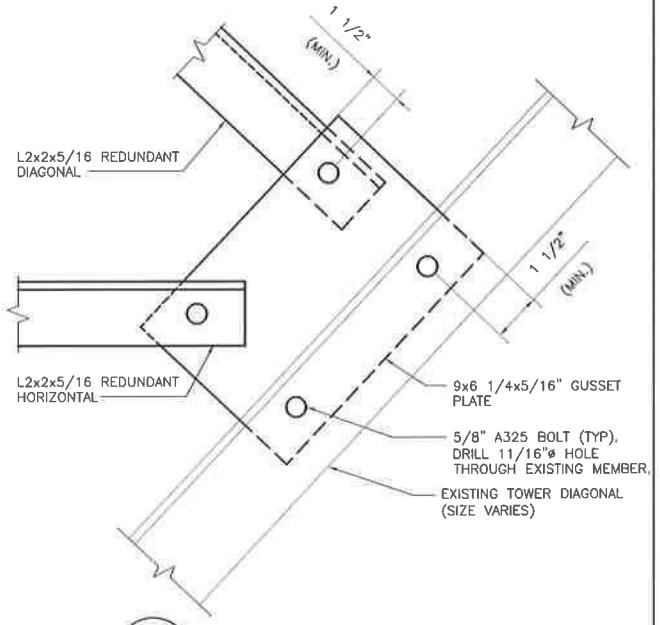
Scale: AS NOTED | Date: 09/30/14
Job No. TWS014R2 | File No.
Dwg. No. SK-1
Dwg. 1 of 3



2 SK-2 SECTION A
SCALE: N.T.S.



1 SK-2 LEG CONNECTION
SCALE: N.T.S.



3 SK-2 DIAGONAL CONNECTION
SCALE: N.T.S.

NOTES:
1. ABOVE DETAIL 1 IS INDICATING PROPOSED CONNECTION FOR HORIZONTAL OR DIAGONAL MEMBER AS SHOWN ON SK-1.
2. BUTTERFLY BRACKET INSTALLATION FOR DIAGONAL MEMBER CONNECTION SHALL BE AS CLOSE TO ADJOINING EXISTING HORIZONTAL MEMBER AS POSSIBLE.

ELEVATION	LEG BUTTERFLY BRACKET #
25'-37.5'	RSH-0586-00
50'-58.3'	RSH-0568-68

NOTE: LEG BUTTERFLY BRACKET ASSEMBLY INFORMATION FROM PRIMUS ELECTRONICS CORPORATION. CONTRACTOR SHALL USE PRODUCTS SIMILAR TO OR EXCEEDING IN QUALITY FOR CONSTRUCTION.

DW NO:	36928699
Designed by:	
Drawn by:	PD
Checked by:	MCD
Approved by:	RAS

URS CORPORATION AES
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

T-Mobile
Sprint

SITE ADDRESS:
CT1078
CONNECTICUT
STATE POLICE SITE #20
Intersection of I-84W & South St
MIDDLEBURY, CT

REV.	DATE:	DESCRIPTION

Scale: AS NOTED | Date: 09/30/14
Job No. TWS014R2 | File No.

Dwg. No. SK-2

SOIL

1. SOIL BEARING CAPACITY OF 4,500 PSF USED FOR FOUNDATION DESIGN. GENERAL CONTRACTOR RESPONSIBLE FOR VERIFYING BEARING CAPACITIES.
2. ALL SURFACES MUST BE FREE OF STANDING WATER PRIOR TO PLACING.
3. COMPACTED GRAVEL FILL PER CONNECTICUT DOT STANDARD SPEC. SECTION M.02.01 AND ASTM D1557.
4. CONTACT THE ENGINEER IF GROUND WATER IS IN ENCOUNTERED AND DEWATERING IS REQUIRED.

CONCRETE

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318 AND THE SPECIFICATION CAST-IN-PLACE CONCRETE.
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. CONCRETE SHALL BE AIR ENTRAINED TO (4% TO 6%) AND SLUMP OF 3" TO 5".
3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.
4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

   CONCRETE CAST AGAINST EARTH.....3 IN.

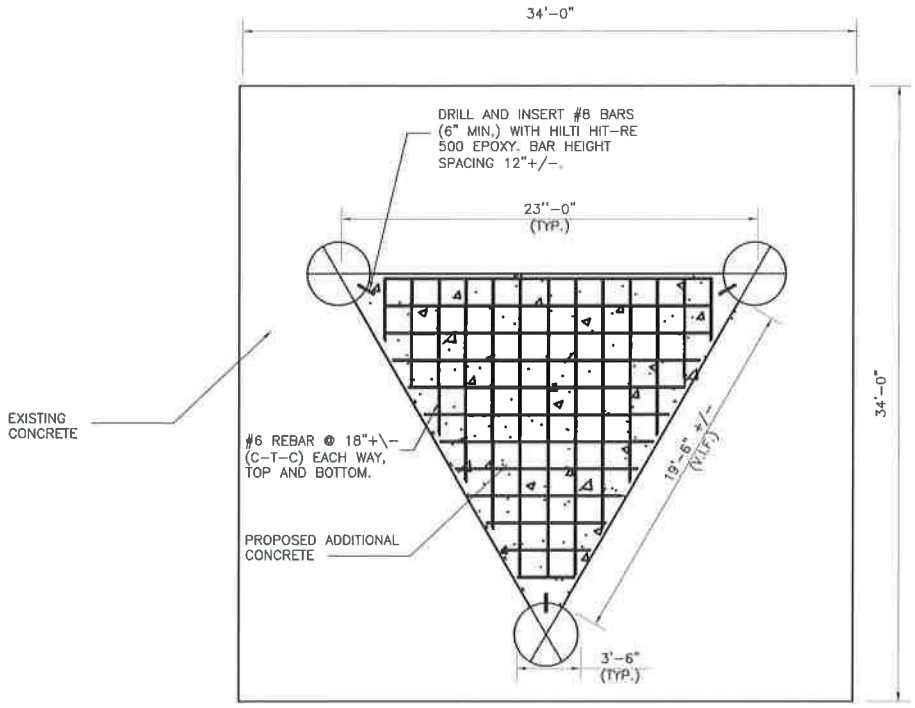
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER.....2 IN.
   #5 AND SMALLER & WWF .....1 1/2 IN.

   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL.....3/4 IN.
   BEAMS AND COLUMNS.....1 1/2 IN.

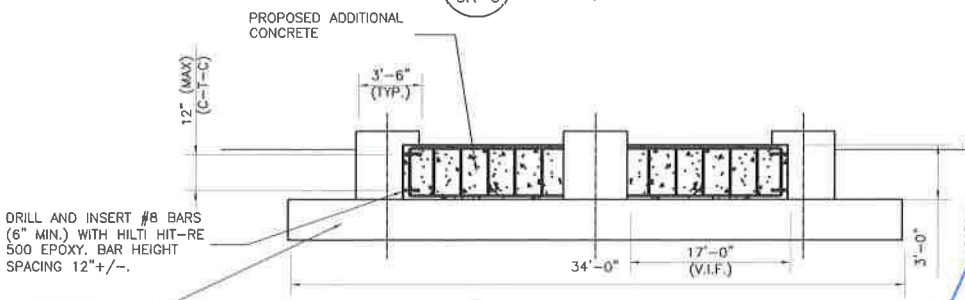
5. A CHAMFER 3/4" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.
6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR ENGINEERING APPROVAL WHEN DRILLING.
7. COLD WEATHER CONCRETE PLACING SHALL BE IN ACCORDANCE WITH ACI-306.
8. NO FOOTING SHALL BE PLACED ON FROZEN GROUND. UNCURED CONCRETE SHALL BE PROTECTED AGAINST FROST.
9. APPLY NON-SLIP BROOM FINISH IMMEDIATELY AFTER TROWEL FINISHING.

FOUNDATION NOTES

1. A PRESUMPTIVE SOIL BEARING CAPACITY OF 4500 PSF WAS USED FOR THE FOUNDATION DESIGN. THE GENERAL CONTRACTOR IS TO CONFIRM THE EXISTING SOIL BEARING PRESSURE.
2. ALL FOOTINGS SHALL BEAR ON EXISTING UNDISTURBED ORGANIC FREE SOIL. ALL UNSUITABLE SOIL SHALL BE REMOVED AS DIRECTED BY THE ENGINEER AND REPLACED WITH COMPACTED GRAVEL PLACED IN 8" LAYERS AND COMPACTED TO 95% OF MODIFIED OPTIMUM DENSITY.
3. NO REBAR SHALL BE CUT DURING INSTALLATION OF CONCRETE WITHOUT PRIOR ENGINEERING APPROVAL WHEN DRILLING HOLES IN CONCRETE.



1 SK-3 PLAN
SCALE: 3/32 = 1'-0"



2 SK-3 ELEVATION
SCALE: 3/32" = 1'-0"

STATE OF CONNECTICUT
RICHARD A. SAMPSON
No. 20057
LICENSED PROFESSIONAL ENGINEER

OW NO:	36928699
Designed by:	—
Drawn by:	PD
Checked by:	MCD
Approved by:	RAS

URS CORPORATION AES
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

T-Mobile
Sprint

SITE ADDRESS:
CT1078
CONNECTICUT
STATE POLICE SITE #20
Intersection of I-84W & South St
MIDDLEBURY, CT

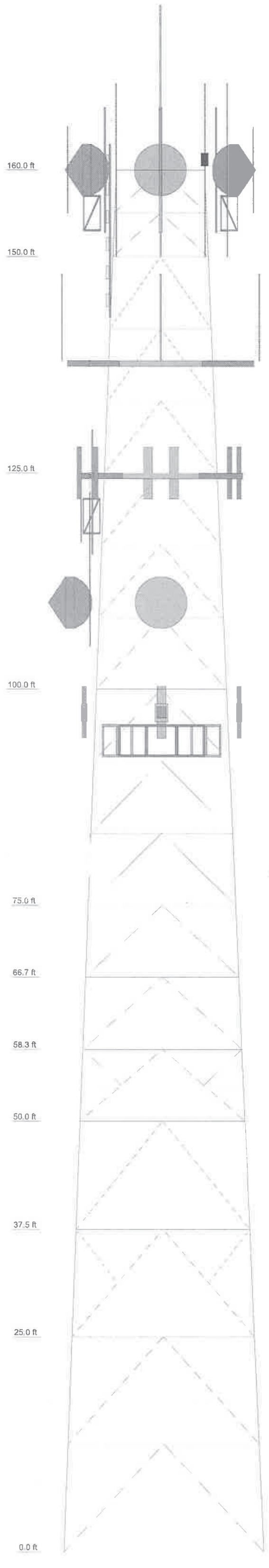
REV.	DATE:	DESCRIPTION

Scale: AS NOTED | Date: 09/30/14
Job No. TWS014R2 | File No.

Dwg. No. SK-3
Dwg. 3 of 3

TNX TOWER INPUT / OUTPUT SUMMARY

Section	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	HSS6.875x0.5 w/ (3) 2x5/8 Bars	HSS6.875x.4		HSS5x.4	P5x0.4 w/ (3) 1.5x5/8 Plates		P5x0.3 w/ (3) 1.5x5/8 Plates	P.5x.250		
Leg Grade	A500-50	A514-60		A572-50				A500-50		
Diagonals	2L3 1/2x3x3/8	2L3 1/2x3x5/16			2L3x2 1/2x1/4			2L2 1/2x2x1/4	2L2 1/2x2x3/16	
Diagonal Grade	A36									
Top Girts	N.A.	L4x4x1/4		L3x3x1/2		N.A.	L3x3x1/4	N.A.		L3x3x1/4
Horizontals	L4x4x1/2		N.A.	L3x3x1/2				L3x2 1/2x1/4	L2 1/2x2 1/2x3/16	L3x3x1/4
Red. Horizontals	N.A.	L2x2x5/16	N.A.	L2x2x5/16				N.A.		
Red. Diagonals	N.A.	L2x2x5/16	N.A.	L2x2x5/16				N.A.		
Inner Bracing	L2 1/2x2 1/2x3/16						L2 1/2x2x3/16		N.A.	
Face Width (ft)	23	21	20	19	18.3333	17.6667	17	15	13	11 / 10.2
# Panels @ (ft)	4 @ 12.5						12 @ 8.33333			2 @ 5
Weight (K) 32.1	8.4	3.2	2.8	2.1	2.0	2.0	5.1	3.1	2.3	1.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 5/8x4'	177	T-Frame (ATT)	138
16'x2.5" Pipe Mount	168	T-Frame (ATT)	138
Tower Light	160.5	7770.00 (ATT)	138
6'8"x4" Pipe Mount (CSP - Future)	160	7770.00 (ATT)	138
6'8"x4" Pipe Mount (CSP - Future)	160	SC479-HF1LDF (CSP - 39 (inverted))	130 - 115.625
6'8"x4" Pipe Mount (CSP - Future)	160	RR90-17-02DP (T-Mobile)	125
PD83 (CSP - 1)	160	RR90-17-02DP (T-Mobile)	125
DB810K-Y (CSP - 9)	160	RR90-17-02DP (T-Mobile)	125
OGT9-806 (CSP - 10)	160	DSM2 (T-Mobile)	125
OGT9-806 (CSP - 8)	160	DSM2 (T-Mobile)	125
(2) SC479-HF1LDF (CSP - 40 ,41)	160	DSM2 (T-Mobile)	125
(2) SC479-HF1LDF (CSP - 42 ,44)	160	LNX-6515DS-VTM w/ 6' 2" sch 40 Piipe Mount (T-Mobile)	125
TMA (CSP - 43)	160	LNX-6515DS-VTM w/ 6' 2" sch 40 Piipe Mount (T-Mobile)	125
(2) SC479-HF1LDF (CSP - 45 ,46)	160	LNX-6515DS-VTM w/ 6' 2" sch 40 Piipe Mount (T-Mobile)	125
TMA (CSP - 47)	160	PD1142 (DOT - 4)	122
DB228-A (FBI - 3)	160	3' Sidearm	120
6' w/ Radome (CSP - Future)	160	4"x96"x72" Ice Canopy	115
6' w/ Radome (CSP - Future)	160	4"x96"x72" Ice Canopy	115
6' w/ Radome (CSP - Future)	160	3" Dia 20' Omni (EMS - 14)	115
Filter/Diplexer	155	6'x4" Pipe Mount	110
Filter/Diplexer	155	6'x4" Pipe Mount	110
6' Side-Arm	155	6' w/ Radome (CSP - 6)	110
6' Side-Arm	155	6' w/ Radome (CSP - 7)	110
6' Side-Arm	155	RRH 800MHz 2x50W (Sprint)	97.3
Filter/Diplexer	155	RRH 800MHz 2x50W (Sprint)	97.3
Filter/Diplexer	155	APXVTM14-C-1 20 (Sprint)	97.3
Filter/Diplexer	155	APXVTM14-C-1 20 (Sprint)	97.3
DB304 (ATF - 2)	153	APXVTM14-C-1 20 (Sprint)	97.3
OGT9-806 (CSP - 13)	143	TD-RRH8x20-25 (Sprint)	97.3
DB810K-Y (CSP - 12)	143	TD-RRH8x20-25 (Sprint)	97.3
OGT9-806 (CSP - 11)	143	TD-RRH8x20-25 (Sprint)	97.3
7770.00 (ATT)	138	junction box (Sprint)	97.3
T-Frame (ATT)	138	RRH 1900 MHz 2x40W (Sprint)	97.3
SBNH-1D6565C (ATT)	138	RRH 1900 MHz 2x40W (Sprint)	97.3
SBNH-1D6565C (ATT)	138	APXVSPP18-C-A20 (Sprint)	97.3
SBNH-1D6565C (ATT)	138	RRH 1900 MHz 2x40W (Sprint)	97.3
AM-X-CD-16-65-00T-RET (6') (ATT)	138	RRH 800MHz 2x50W (Sprint)	97.3
AM-X-CD-16-65-00T-RET (6') (ATT)	138	APXVSPP18-C-A20 (Sprint)	97.3
SBNH-1D6565C (ATT)	138	APXVSPP18-C-A20 (Sprint)	97.3
7020 RET (ATT)	138	PM-SU35-48 (Sprint)	97.3
7020 RET (ATT)	138	Sector Frame (Sprint)	94
7020 RET (ATT)	138	Sector Frame (Sprint)	94
(5) TMA (ATT)	138	Sector Frame (Sprint)	94
(5) TMA (ATT)	138	PD10054 (CSP - 5)	85
(5) TMA (ATT)	138	Stand off arm (Sprint)	55
(4) Diplexer (ATT)	138	GPS (Sprint)	55
(4) Diplexer (ATT)	138		
(4) Diplexer (ATT)	138		
Surge Suppressor (ATT)	138		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A572-50	50 ksi	65 ksi
A36	36 ksi	58 ksi	A514-60	60 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower designed for a 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 90 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 90 mph wind.
4. TOWER RATING: 98.1%

MAX. CORNER REACTIONS AT BASE:
DOWN: 373 K
SHEAR: 41 K

UPLIFT: -315 K
SHEAR: 37 K

AXIAL
70 K
SHEAR 73 K
MOMENT 6961 kip-ft
TORQUE 58 kip-ft
90 mph WIND - 0.5000 in ICE

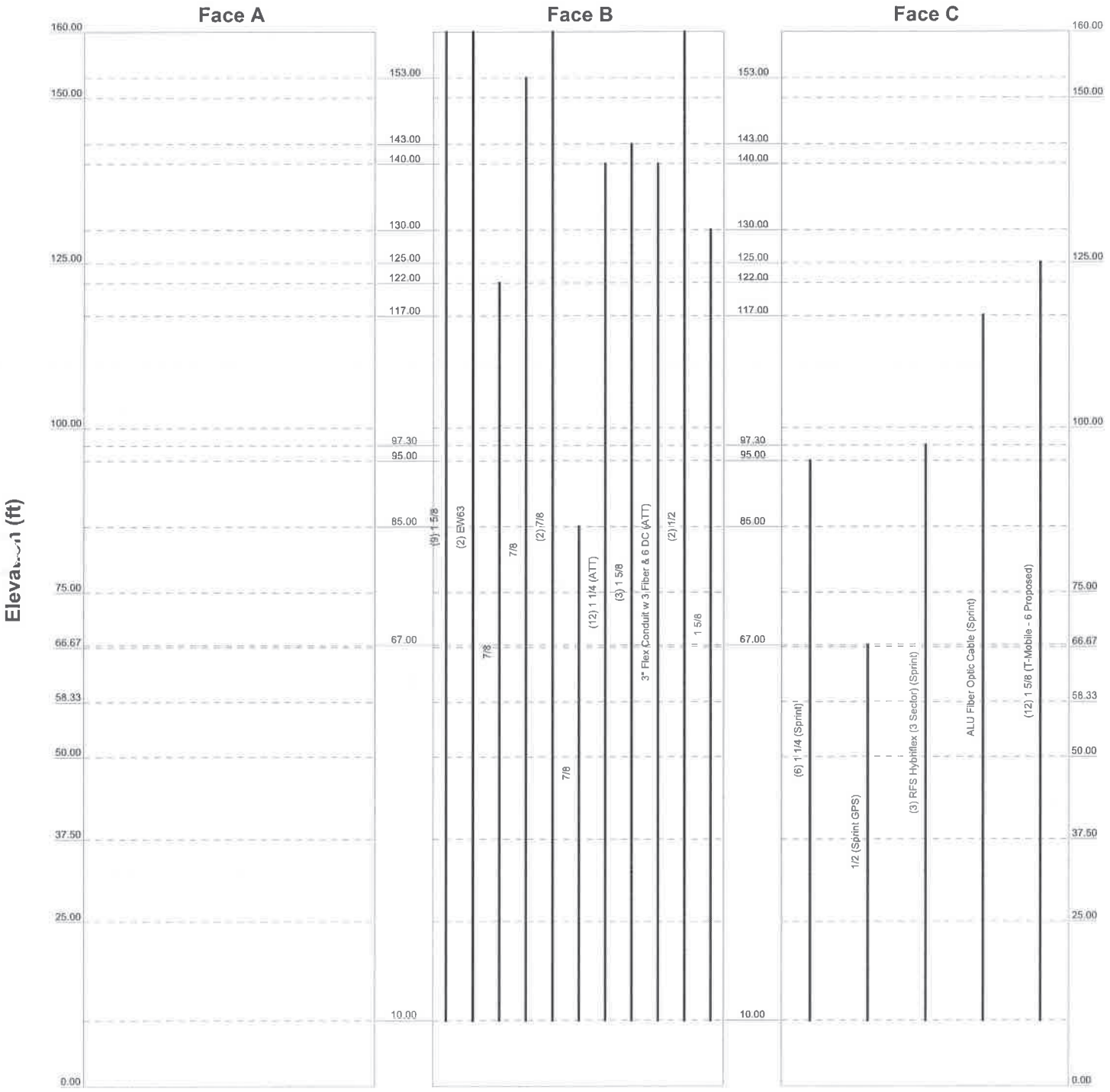
AXIAL
46 K
SHEAR 58 K
MOMENT 5486 kip-ft
TORQUE 41 kip-ft
REACTIONS - 90 mph WIND

URS Corporation	Job: 160' Self Support Lattice - CSP #20		
500 Enterprise Drive, Suite 3B	Project: TWS-014 (Rev. 2) / NSS-013		
Rocky Hill, CT 06067	Client: T-Mobile / Sprint	Drawn by: MCD	App'd:
Phone: 860-529-8882	Code: TIA/EIA-222-F	Date: 09/30/14	Scale: NTS
FAX: 860-529-3991	Path: [illegible]		Dwg No. E-1

TNX TOWER FEEDLINE DISTRIBUTION CHART

Feed Line Distribution Chart
0' - 160'

Round Flat App In Face App Out Face Truss Leg

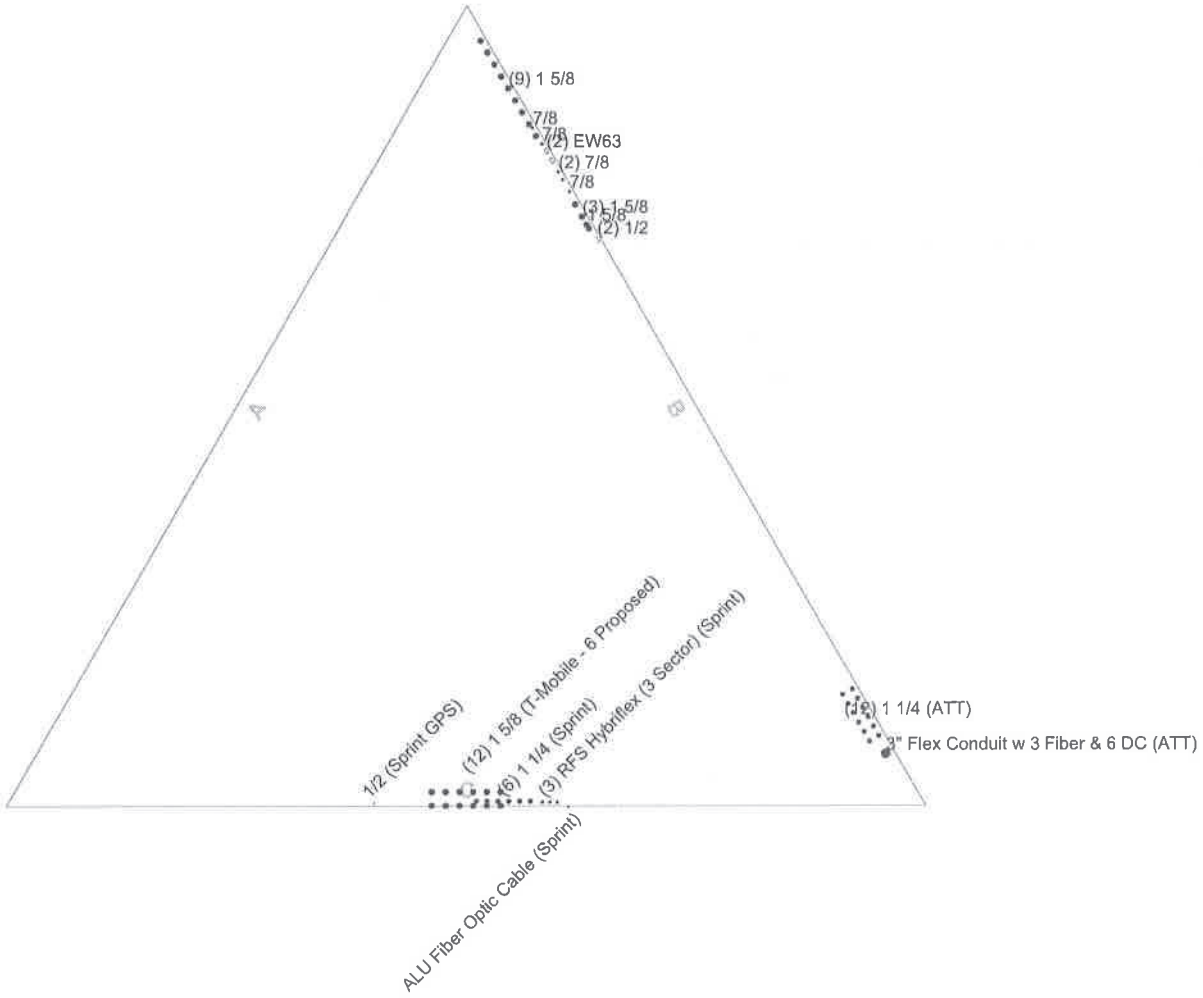


URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	Job: ***160' Self Support Lattice - CSP #20*** Project: ***TWS-014 (Rev. 2) / NSS-013*** Client: T-Mobile / Sprint — Drawn by: MCD — App'd: Code: TIA/EIA-222-F — Date: 09/30/14 — Scale: NTS Path: C:\Users\Michael.Dalida\Desktop\16931310-NSS013ERI Files\Mobilatory CSP.ett — Dwg No: E-7

TNX TOWER FEEDLINE PLAN

Feed Line Plan

_____ Round _____ Flat _____ App In Face _____ App Out Face



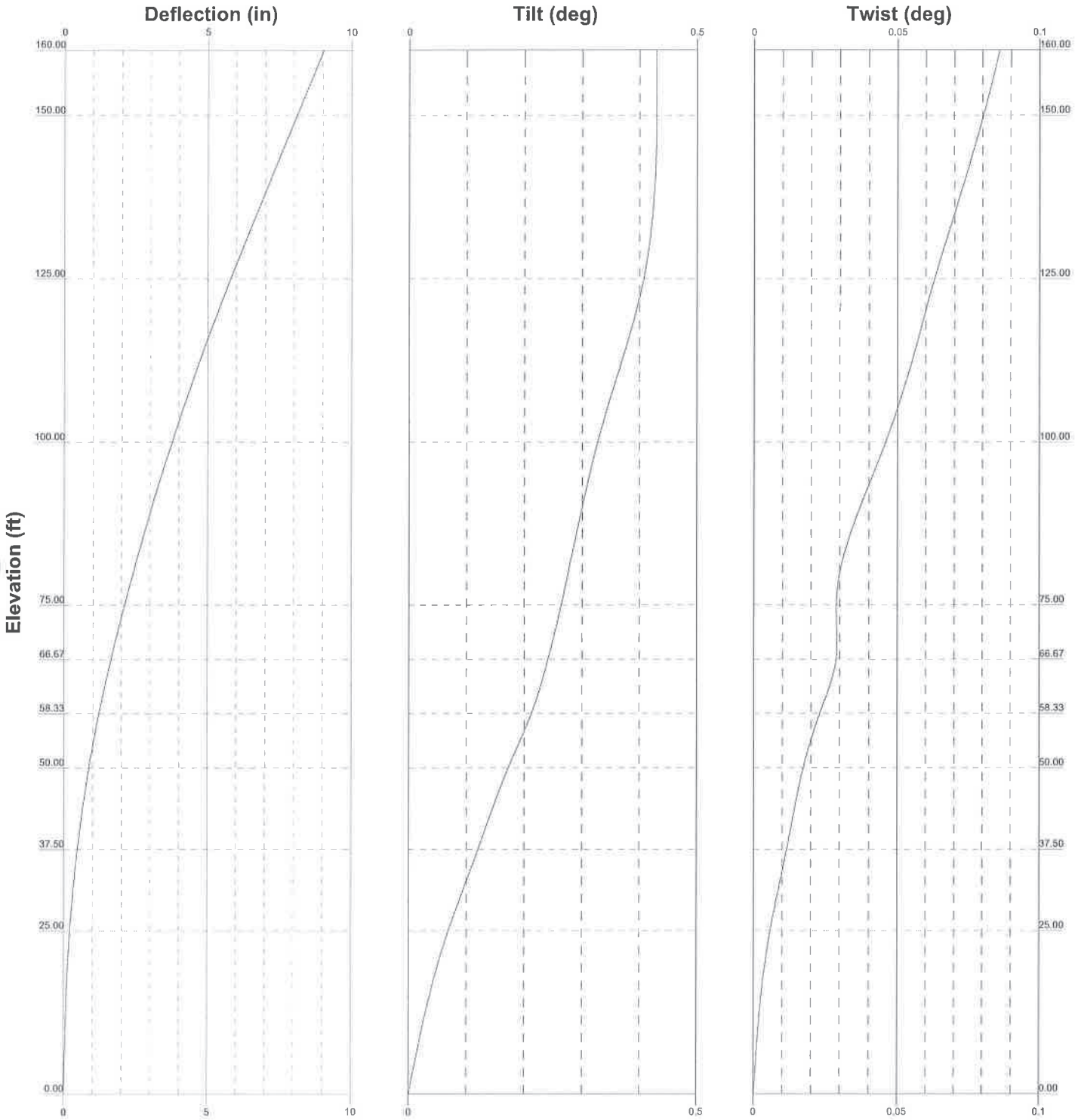
URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: 860-529-8882
FAX: 860-529-3991

Job: ***160' Self Support Lattice - CSP #20***			
Project: ***TWS-014 (Rev. 2) / NSS-013***			
Client: T-Mobile / Sprint	Drawn by: MCD	App'd:	
Code: TIA/EIA-222-F	Date: 09/30/14	Scale: NTS	
Path: C:\Users\Michael Dalduo\Desktop\38131\16-NSS013\ERI Files\Middlebury CSP.dt		Dwg No. E-7	

TNX TOWER DEFLECTION, TILT, AND TWIST

TIA/EIA-222-F - Service - 90 mph

Maximum Values



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

Job: *160' Self Support Lattice - CSP #20*			
Project: *TWS-014 (Rev. 2) / NSS-013*			
Client: T-Mobile / Sprint	Drawn by: MCD	App'd:	
Code: TIA/EIA-222-F	Date: 09/30/14	Scale: NTS	
Path: C:\Users\Michael.Dalkos\Desktop\36931310\NSS013ERI Files\MidNippon CSP.eri		Dwg No. E-5	

TNX TOWER DETAILED OUTPUT

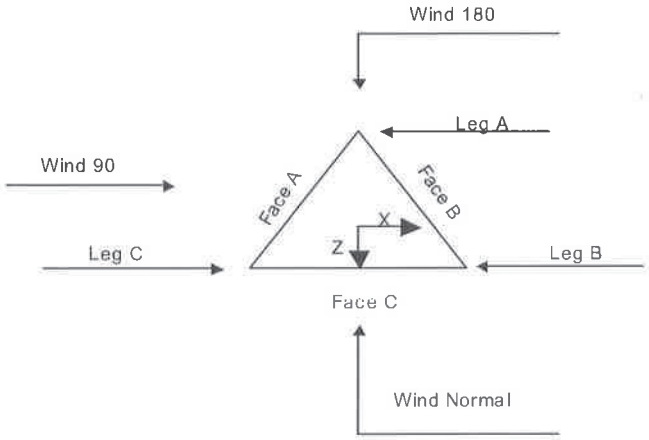
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 160.00 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 10.20 ft at the top and 23.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 90 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 90 mph is used in combination with ice.
Deflections calculated using a wind speed of 90 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	160.00-150.00			10.20	1	10.00
T2	150.00-125.00			11.00	1	25.00
T3	125.00-100.00			13.00	1	25.00
T4	100.00-75.00			15.00	1	25.00
T5	75.00-66.67			17.00	1	8.33
T6	66.67-58.33			17.67	1	8.33
T7	58.33-50.00			18.33	1	8.33
T8	50.00-37.50			19.00	1	12.50
T9	37.50-25.00			20.00	1	12.50
T10	25.00-0.00			21.00	1	25.00

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	160.00-150.00	5.00	K Brace Down	No	Yes	0.0000	0.0000
T2	150.00-125.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T3	125.00-100.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T4	100.00-75.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T5	75.00-66.67	8.33	K Brace Down	No	Yes	0.0000	0.0000

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
T6	66.67-58.33	8.33	K Brace Down	No	Yes	0.0000	0.0000
T7	58.33-50.00	8.33	K1 Down	No	Yes	0.0000	0.0000
T8	50.00-37.50	12.50	K Brace Down	No	Yes	0.0000	0.0000
T9	37.50-25.00	12.50	K1 Down	No	Yes	0.0000	0.0000
T10	25.00-0.00	12.50	K Brace Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 160.00-150.00	Pipe	P.5x.250	A500-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T2 150.00-125.00	Pipe	P.5x.250	A500-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T3 125.00-100.00	Pipe	P.5x.250	A500-50 (50 ksi)	Double Angle	2L2 1/2x2x1/4	A36 (36 ksi)
T4 100.00-75.00	Arbitrary Shape	P5x0.3 w/ (3) 1.5x5/8 Plates	A500-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T5 75.00-66.67	Arbitrary Shape	P5x0.4 w/ (3) 1.5x5/8 Plates	A572-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T6 66.67-58.33	Arbitrary Shape	P5x0.4 w/ (3) 1.5x5/8 Plates	A572-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T7 58.33-50.00	Pipe	HSS5x.4	A514-60 (60 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T8 50.00-37.50	Pipe	HSS6.875x.4	A514-60 (60 ksi)	Double Angle	2L3 1/2x3x5/16	A36 (36 ksi)
T9 37.50-25.00	Pipe	HSS6.875x.4	A514-60 (60 ksi)	Double Angle	2L3 1/2x3x5/16	A36 (36 ksi)
T10 25.00-0.00	Arbitrary Shape	HSS6.875x0.5 w/ (3) 2x5/8 Bars	A500-50 (50 ksi)	Double Angle	2L3 1/2x3x3/8	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 160.00-150.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Solid Round		A36M-50 (50 ksi)
T4 100.00-75.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T6 66.67-58.33	Single Angle	L3x3x1/2	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T7 58.33-50.00	Single Angle	L3x3x1/2	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T8 50.00-37.50	Single Angle	L4x4x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T9 37.50-25.00	Single Angle	L4x4x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 160.00-150.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T2 150.00-125.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 125.00-100.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x2 1/2x1/4	A36 (36 ksi)
T4 100.00-75.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T5 75.00-66.67	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T6 66.67-58.33	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T7 58.33-50.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T8 50.00-37.50	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T9 37.50-25.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T10 25.00-0.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x4x1/2	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T3 125.00-100.00	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T4 100.00-75.00	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T5 75.00-66.67	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T6 66.67-58.33	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T7 58.33-50.00	Equal Angle		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T8 50.00-37.50	Equal Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T9 37.50-25.00	Equal Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T10 25.00-0.00	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T7	A36	Horizontal (1)	Equal Angle	L2x2x5/16	1
58.33-50.00	(36 ksi)	Diagonal (1)	Equal Angle	L2x2x5/16	1
T9	A36	Horizontal (1)	Equal Angle	L2x2x5/16	1
37.50-25.00	(36 ksi)	Diagonal (1)	Single Angle	L2x2x5/16	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 160.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	0.0000
T2 150.00-125.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T3 125.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T4 100.00-75.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T5 75.00-66.67	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T6 66.67-58.33	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T7 58.33-50.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	Mid-Pt	36.0000
T8 50.00-37.50	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T9 37.50-25.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	Mid-Pt	36.0000
T10 25.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	0.65	0.65	1
160.00-150.00				1	1	1	1	0.65	0.65	1
T2	Yes	Yes	1	1	1	1	1	0.65	0.65	1
150.00-125.00				1	1	1	1	0.65	0.65	1
T3	Yes	Yes	1	1	1	1	1	0.65	0.65	1
125.00-100.00				1	1	1	1	0.65	0.65	1
T4	Yes	Yes	1	1	1	1	1	0.65	0.65	1
100.00-75.00				1	1	1	1	0.65	0.65	1
T5	Yes	Yes	1	1	1	1	1	0.65	0.65	1
75.00-66.67				1	1	1	1	0.65	0.65	1
T6	Yes	Yes	1	1	1	1	1	0.65	0.65	1
66.67-58.33				1	1	1	1	0.65	0.65	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T7	Yes	Yes	1	1	1	1	1	1	1	0.65	0.65	0.65	0.65	1	1
58.33-50.00				1	1	1	1	1	1	0.65	0.65	0.65	0.65	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	0.65	0.65	0.65	0.65	1	1
50.00-37.50				1	1	1	1	1	1	0.65	0.65	0.65	0.65	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	0.65	0.65	0.65	0.65	1	1
37.50-25.00				1	1	1	1	1	1	0.65	0.65	0.65	0.65	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	0.65	0.65	0.65	0.65	1	1
25.00-0.00				1	1	1	1	1	1	0.65	0.65	0.65	0.65	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
160.00-150.00														
T2	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
150.00-125.00														
T3	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
125.00-100.00														
T4	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
100.00-75.00														
T5 75.00-66.67	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 66.67-58.33	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 58.33-50.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 50.00-37.50	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 37.50-25.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 25.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Connection Offsets Diagonal Vert. Top in	Diagonal Horiz. Top in	Diagonal Vert. Bot. in	Diagonal Horiz. Bot. in	K-Bracing Vert. Top in	K-Bracing Horiz. Top in	K-Bracing Vert. Bot. in	K-Bracing Horiz. Bot. in
T1	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
160.00-150.00								
T2	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
150.00-125.00								
T3	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
125.00-100.00								

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T4 100.00-75.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T5 75.00-66.67	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T6 66.67-58.33	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T7 58.33-50.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T8 50.00-37.50	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T9 37.50-25.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T10 25.00-0.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 160.00-150.00	Flange	0.7500 A325X	6	0.7500 A325N	1	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T2 150.00-125.00	Flange	0.7500 A325X	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T3 125.00-100.00	Flange	0.7500 A325X	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T4 100.00-75.00	Flange	0.7500 A325X	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T5 75.00-66.67	Flange	0.8750 A325X	6	0.7500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T6 66.67-58.33	Flange	0.8750 A325X	6	0.7500 A325N	1	0.6250 A325X	2	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T7 58.33-50.00	Flange	0.8750 A325X	6	0.7500 A325N	1	0.6250 A325X	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T8 50.00-37.50	Flange	1.0000 A325X	8	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T9 37.50-25.00	Flange	1.0000 A325X	8	1.0000 A325N	1	0.6250 A325X	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T10 25.00-0.00	Flange	1.0000 A325X	8	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	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 1/4 (Sprint)	C	Yes	Ar (CfAe)	95.00 - 10.00	-0.5000	-0.04	6	6	1.5500	1.5500		0.66
1/2 (Sprint GPS)	C	Yes	Ar (CfAe)	67.00 - 10.00	-0.5000	0.1	1	1	1.5000	0.5800		0.25
1 5/8	B	Yes	Ar (CfAe)	160.00 - 10.00	-0.5000	-0.4	9	9	1.9800	1.9800		1.04
EW63	B	Yes	Af (CfAe)	160.00 - 10.00	-0.5000	-0.315	2	2	1.5742	1.5742	5.0668	0.51

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8	B	Yes	Ar (CfAe)	122.00 - 10.00	-0.5000	-0.35	1	1	1.5000	1.1100		0.54
7/8	B	Yes	Ar (CfAe)	153.00 - 10.00	-0.5000	-0.33	1	1	1.5000	1.1100		0.54
7/8	B	Yes	Ar (CfAe)	160.00 - 10.00	-0.5000	-0.29	2	2	1.5000	1.1100		0.54
7/8	B	Yes	Ar (CfAe)	85.00 - 10.00	-0.5000	-0.27	1	1	1.1100	1.1100		0.54
1 1/4 (ATT)	B	Yes	Ar (CfAe)	140.00 - 10.00	-4.0000	0.38	12	6	1.5500	1.5500		0.66
1 5/8	B	Yes	Ar (CfAe)	143.00 - 10.00	-0.5000	-0.24	3	3	1.9800	1.9800		1.04
3" Flex Conduit w 3 Fiber & 6 DC (ATT)	B	Yes	Ar (CfAe)	140.00 - 10.00	-1.0000	0.43	1	1	3.0000	3.0000		3.00
1/2	B	Yes	Ar (CfAe)	160.00 - 10.00	-0.5000	-0.21	2	2	0.5800	0.5800		0.25
1 5/8	B	Yes	Ar (CfAe)	130.00 - 10.00	-0.5000	-0.23	1	1	1.9800	1.9800		1.04
RFS Hybriflex (3 Sector) (Sprint)	C	Yes	Ar (CfAe)	97.30 - 10.00	-0.5000	-0.09	3	3	1.0900	1.0900		0.00
ALU Fiber Optic Cable (Sprint)	C	Yes	Ar (CfAe)	117.00 - 10.00	0.0000	-0.11	1	1	0.7000	0.7000		0.12
1 5/8 (T-Mobile - 6 Proposed)	C	Yes	Ar (CfAe)	125.00 - 10.00	-3.0000	0	12	6	1.9800	1.9800		1.04

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	160.00-150.00	A	0.000	0.000	0.000	0.000	0.00
		B	17.944	2.624	0.000	0.000	0.12
		C	0.000	0.000	0.000	0.000	0.00
T2	150.00-125.00	A	0.000	0.000	0.000	0.000	0.00
		B	71.589	6.559	0.000	0.000	0.54
		C	0.000	0.000	0.000	0.000	0.00
T3	125.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	90.639	6.559	0.000	0.000	0.70
		C	25.742	0.000	0.000	0.000	0.31
T4	100.00-75.00	A	0.000	0.000	0.000	0.000	0.00
		B	91.842	6.559	0.000	0.000	0.71
		C	47.785	0.000	0.000	0.000	0.39
T5	75.00-66.67	A	0.000	0.000	0.000	0.000	0.00
		B	31.076	2.186	0.000	0.000	0.24
		C	17.481	0.000	0.000	0.000	0.14
T6	66.67-58.33	A	0.000	0.000	0.000	0.000	0.00
		B	31.076	2.186	0.000	0.000	0.24
		C	17.868	0.000	0.000	0.000	0.14
T7	58.33-50.00	A	0.000	0.000	0.000	0.000	0.00
		B	31.076	2.186	0.000	0.000	0.24
		C	17.868	0.000	0.000	0.000	0.14
T8	50.00-37.50	A	0.000	0.000	0.000	0.000	0.00
		B	46.615	3.280	0.000	0.000	0.36
		C	26.802	0.000	0.000	0.000	0.21
T9	37.50-25.00	A	0.000	0.000	0.000	0.000	0.00
		B	46.615	3.280	0.000	0.000	0.36
		C	26.802	0.000	0.000	0.000	0.21
T10	25.00-0.00	A	0.000	0.000	0.000	0.000	0.00

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	55.938	3.936	0.000	0.000	0.43
		C	32.163	0.000	0.000	0.000	0.25

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	160.00-150.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		27.711	4.701	0.000	0.000	0.32
		C		0.000	0.000	0.000	0.000	0.00
T2	150.00-125.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		111.131	11.754	0.000	0.000	1.40
		C		0.000	0.000	0.000	0.000	0.00
T3	125.00-100.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		141.264	11.754	0.000	0.000	1.82
		C		39.658	0.000	0.000	0.000	0.78
T4	100.00-75.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		143.550	11.754	0.000	0.000	1.84
		C		77.943	0.000	0.000	0.000	1.08
T5	75.00-66.67	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		48.729	3.918	0.000	0.000	0.62
		C		28.620	0.000	0.000	0.000	0.38
T6	66.67-58.33	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		48.729	3.918	0.000	0.000	0.62
		C		29.674	0.000	0.000	0.000	0.39
T7	58.33-50.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		48.729	3.918	0.000	0.000	0.62
		C		29.674	0.000	0.000	0.000	0.39
T8	50.00-37.50	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		73.094	5.877	0.000	0.000	0.93
		C		44.510	0.000	0.000	0.000	0.59
T9	37.50-25.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		73.094	5.877	0.000	0.000	0.93
		C		44.510	0.000	0.000	0.000	0.59
T10	25.00-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		87.713	7.052	0.000	0.000	1.12
		C		53.413	0.000	0.000	0.000	0.70

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	160.00-150.00	A	0.000	0.000	0.000	0.000
		B	0.000	1.298	2.196	3.521
		C	0.000	0.000	0.000	0.000
T2	150.00-125.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.334	5.242	8.336
		C	0.000	0.000	0.000	0.000
T3	125.00-100.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.914	6.646	10.557
		C	0.000	1.005	1.760	2.712
T4	100.00-75.00	A	0.000	0.000	0.000	0.000

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
		B	0.000	3.807	7.172	11.421
		C	0.000	1.894	3.483	5.681
T5	75.00-66.67	A	0.000	0.000	0.000	0.000
		B	0.000	1.261	2.370	3.783
		C	0.000	0.680	1.245	2.039
T6	66.67-58.33	A	0.000	0.000	0.000	0.000
		B	0.000	1.249	2.346	3.746
		C	0.000	0.698	1.260	2.093
T7	58.33-50.00	A	0.000	0.000	0.000	0.000
		B	0.000	2.499	3.905	6.235
		C	0.000	1.396	2.098	3.484
T8	50.00-37.50	A	0.000	0.000	0.000	0.000
		B	0.000	1.381	3.194	5.099
		C	0.000	0.772	1.716	2.849
T9	37.50-25.00	A	0.000	0.000	0.000	0.000
		B	0.000	2.765	4.905	7.831
		C	0.000	1.545	2.635	4.375
T10	25.00-0.00	A	0.000	0.000	0.000	0.000
		B	0.000	1.590	3.685	5.884
		C	0.000	0.888	1.980	3.288

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	160.00-150.00	1.7255	-14.1043	1.7962	-15.0538
T2	150.00-125.00	7.6747	-16.9658	8.3006	-18.0094
T3	125.00-100.00	10.4271	-11.7819	11.2683	-12.3943
T4	100.00-75.00	10.2630	-7.3348	11.4549	-7.3740
T5	75.00-66.67	11.0094	-7.2475	12.2774	-7.2167
T6	66.67-58.33	11.2528	-7.2407	12.4570	-7.0020
T7	58.33-50.00	11.1627	-7.1734	11.8059	-6.5770
T8	50.00-37.50	12.4776	-8.0064	13.9801	-7.8460
T9	37.50-25.00	11.8558	-7.5950	13.0758	-7.2877
T10	25.00-0.00	8.7440	-5.5925	10.4430	-5.8436

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod 5/8x4'	A	From Leg	0.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	0.25 0.66	0.25 0.66	0.03 0.03
16'x2.5" Pipe Mount	A	From Leg	0.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	4.00 4.80	4.00 4.80	0.09 0.09

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
6'8"x4" Pipe Mount (CSP - Future)	A	From Leg	0.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
6'8"x4" Pipe Mount (CSP - Future)	B	From Leg	0.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
6'8"x4" Pipe Mount (CSP - Future)	C	From Leg	0.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
Tower Light	B	From Leg	0.00 0.00 0.00	0.0000	160.50	No Ice 1/2" Ice	0.50 0.60	0.50 0.60	0.00 0.00
PD83 (CSP - 1)	B	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	2.43 4.30	2.43 4.30	0.02 0.04
DB810K-Y (CSP - 9)	A	From Leg	6.50 0.00 2.00	0.0000	160.00	No Ice 1/2" Ice	4.08 5.73	4.08 5.73	0.04 0.07
OGT9-806 (CSP - 13)	B	From Leg	6.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	2.15 3.25	2.15 3.25	0.02 0.03
DB810K-Y (CSP - 12)	A	From Leg	6.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	4.08 5.73	4.08 5.73	0.04 0.07
OGT9-806 (CSP - 10)	B	From Leg	6.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	2.15 3.25	2.15 3.25	0.02 0.03
OGT9-806 (CSP - 8)	C	From Leg	6.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	2.15 3.25	2.15 3.25	0.02 0.03
OGT9-806 (CSP - 11)	C	From Leg	6.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	2.15 3.25	2.15 3.25	0.02 0.03
6' Side-Arm	A	From Leg	3.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	13.04 18.07	14.60 19.40	0.14 0.15
6' Side-Arm	B	From Leg	3.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	13.04 18.07	14.60 19.40	0.14 0.15
6' Side-Arm	C	From Leg	3.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	13.04 18.07	14.60 19.40	0.14 0.15
Filter/Diplexer	A	From Leg	3.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	3.15 3.39	1.05 1.21	0.02 0.04
Filter/Diplexer	A	From Leg	3.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	3.15 3.39	1.05 1.21	0.02 0.04
Filter/Diplexer	A	From Leg	3.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	3.15 3.39	1.05 1.21	0.02 0.04
Filter/Diplexer	B	From Leg	3.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	3.15 3.39	1.05 1.21	0.02 0.04
Filter/Diplexer	C	From Leg	3.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	3.15 3.39	1.05 1.21	0.02 0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
DB304	C	From Leg	0.50	0.0000	153.00	No Ice	6.07	6.07	0.05
(ATF - 2)			0.00			1/2" Ice	8.27	8.27	0.09
			0.00						
T-Frame	A	From Leg	2.00	0.0000	138.00	No Ice	8.90	8.90	0.22
(ATT)			0.00			1/2" Ice	13.80	13.80	0.32
			0.00						
T-Frame	B	From Leg	2.00	0.0000	138.00	No Ice	8.90	8.90	0.22
(ATT)			0.00			1/2" Ice	13.80	13.80	0.32
			0.00						
T-Frame	C	From Leg	2.00	0.0000	138.00	No Ice	8.90	8.90	0.22
(ATT)			0.00			1/2" Ice	13.80	13.80	0.32
			0.00						
7770.00	A	From Leg	1.50	0.0000	138.00	No Ice	10.03	5.60	0.02
(ATT)			0.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770.00	B	From Leg	1.50	0.0000	138.00	No Ice	10.03	5.60	0.02
(ATT)			0.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770.00	C	From Leg	1.50	0.0000	138.00	No Ice	10.03	5.60	0.02
(ATT)			0.00			1/2" Ice	10.61	6.15	0.07
			0.00						
PD1142	C	From Leg	3.00	0.0000	122.00	No Ice	1.20	1.20	0.01
(DOT - 4)			0.00			1/2" Ice	2.81	2.81	0.02
			0.00						
3' Sidearm	C	From Leg	1.50	0.0000	120.00	No Ice	5.90	5.90	0.13
			0.00			1/2" Ice	6.60	6.60	0.15
			0.00						
6'x4" Pipe Mount	A	From Leg	0.50	0.0000	110.00	No Ice	2.09	2.09	0.05
			0.00			1/2" Ice	2.46	2.46	0.07
			0.00						
6'x4" Pipe Mount	C	From Leg	0.50	0.0000	110.00	No Ice	2.09	2.09	0.05
			0.00			1/2" Ice	2.46	2.46	0.07
			0.00						
GPS	B	From Face	3.00	0.0000	55.00	No Ice	0.44	0.44	0.00
(Sprint)			0.00			1/2" Ice	0.56	0.56	0.00
			0.00						
Stand off arm	B	From Face	1.00	0.0000	55.00	No Ice	0.96	0.96	0.03
(Sprint)			0.00			1/2" Ice	1.29	1.29	0.04
			0.00						
Sector Frame	A	From Face	0.50	0.0000	94.00	No Ice	9.00	3.00	0.25
(Sprint)			0.00			1/2" Ice	12.00	3.50	0.32
			0.00						
Sector Frame	B	From Face	0.50	0.0000	94.00	No Ice	9.00	3.00	0.25
(Sprint)			0.00			1/2" Ice	12.00	3.50	0.32
			0.00						
Sector Frame	C	From Face	0.50	0.0000	94.00	No Ice	9.00	3.00	0.25
(Sprint)			0.00			1/2" Ice	12.00	3.50	0.32
			0.00						
4"x96"x72" Ice Canopy	A	From Leg	3.00	0.0000	115.00	No Ice	3.73	2.80	0.30
			0.00			1/2" Ice	4.39	3.30	0.55
			0.00						
4"x96"x72" Ice Canopy	C	From Leg	3.00	0.0000	115.00	No Ice	3.73	2.80	0.30
			0.00			1/2" Ice	4.39	3.30	0.55
			0.00						
SC479-HF1LDF	C	From Leg	1.50	0.0000	115.63 - 130.00	No Ice	5.06	5.06	0.03
(CSP - 39 (inverted))			0.00			1/2" Ice	6.54	6.54	0.07
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) SC479-HF1LDF (CSP - 40 & 41)	A	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	5.06 6.54	5.06 6.54	0.03 0.07
(2) SC479-HF1LDF (CSP - 42 & 44)	B	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	5.06 6.54	5.06 6.54	0.03 0.07
TMA (CSP - 43)	B	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03
(2) SC479-HF1LDF (CSP - 45 & 46)	C	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	5.06 6.54	5.06 6.54	0.03 0.07
TMA (CSP - 47)	C	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03
SBNH-1D6565C (ATT)	A	From Leg	1.50 5.00 0.00	0.0000	138.00	No Ice 1/2" Ice	11.41 12.03	7.70 8.29	0.06 0.13
SBNH-1D6565C (ATT)	A	From Leg	1.50 -5.00 0.00	0.0000	138.00	No Ice 1/2" Ice	11.41 12.03	7.70 8.29	0.06 0.13
SBNH-1D6565C (ATT)	B	From Leg	1.50 5.00 0.00	0.0000	138.00	No Ice 1/2" Ice	11.41 12.03	7.70 8.29	0.06 0.13
AM-X-CD-16-65-00T-RET (6') (ATT)	B	From Leg	1.50 -5.00 0.00	0.0000	138.00	No Ice 1/2" Ice	8.26 8.81	4.64 5.09	0.05 0.10
AM-X-CD-16-65-00T-RET (6') (ATT)	C	From Leg	1.50 5.00 0.00	0.0000	138.00	No Ice 1/2" Ice	8.26 8.81	4.64 5.09	0.05 0.10
SBNH-1D6565C (ATT)	C	From Leg	1.50 -5.00 0.00	0.0000	138.00	No Ice 1/2" Ice	11.41 12.03	7.70 8.29	0.06 0.13
7020 RET (ATT)	A	From Leg	1.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	0.40 0.49	0.20 0.28	0.00 0.01
7020 RET (ATT)	B	From Leg	1.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	0.40 0.49	0.20 0.28	0.00 0.01
7020 RET (ATT)	C	From Leg	1.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	0.40 0.49	0.20 0.28	0.00 0.01
(5) TMA (ATT)	A	From Leg	1.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03
(5) TMA (ATT)	B	From Leg	1.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03
(5) TMA (ATT)	C	From Leg	1.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03
(4) Diplexer (ATT)	A	From Leg	1.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	0.23 0.30	0.17 0.24	0.01 0.01
(4) Diplexer (ATT)	B	From Leg	1.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	0.23 0.30	0.17 0.24	0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) Diplexer	C	From Leg	1.50	0.0000	138.00	No Ice	0.23	0.17	0.01
(ATT)			0.00			1/2" Ice	0.30	0.24	0.01
			0.00						
Surge Suppressor	B	From Face	0.50	0.0000	138.00	No Ice	0.80	0.80	0.03
(ATT)			5.00			1/2" Ice	0.94	0.94	0.04
			0.00						
DB228-A	A	From Leg	1.50	0.0000	160.00	No Ice	7.30	7.30	0.07
(FBI - 3)			0.00			1/2" Ice	13.14	13.14	0.09
			0.00						
PD10054	B	From Leg	1.50	0.0000	85.00	No Ice	5.62	5.62	0.02
(CSP - 5)			0.00			1/2" Ice	5.90	5.90	0.02
			0.00						
3" Dia 20' Omni	C	From Leg	1.50	0.0000	115.00	No Ice	6.00	6.00	0.06
(EMS - 14)			0.00			1/2" Ice	8.03	8.03	0.10
			0.00						
APXVSPP18-C-A20	A	From Face	1.50	0.0000	97.30	No Ice	8.26	6.71	0.09
(Sprint)			0.00			1/2" Ice	8.81	7.66	0.15
			0.00						
APXVSPP18-C-A20	B	From Face	1.50	0.0000	97.30	No Ice	8.26	6.71	0.09
(Sprint)			0.00			1/2" Ice	8.81	7.66	0.15
			0.00						
APXVSPP18-C-A20	C	From Leg	1.50	0.0000	97.30	No Ice	8.26	6.71	0.09
(Sprint)			0.00			1/2" Ice	8.81	7.66	0.15
			0.00						
PM-SU35-48	C	From Leg	0.50	0.0000	97.30	No Ice	2.32	2.32	0.15
(Sprint)			0.00			1/2" Ice	2.82	2.82	0.18
			0.00						
RRH 1900 MHz 2x40W	A	From Face	0.50	0.0000	97.30	No Ice	2.49	3.34	0.10
(Sprint)			0.00			1/2" Ice	2.71	3.69	0.13
			0.00						
RRH 1900 MHz 2x40W	B	From Face	0.50	0.0000	97.30	No Ice	2.49	3.34	0.10
(Sprint)			0.00			1/2" Ice	2.71	3.69	0.13
			0.00						
RRH 1900 MHz 2x40W	C	From Face	0.50	0.0000	97.30	No Ice	2.49	3.34	0.10
(Sprint)			-5.00			1/2" Ice	2.71	3.69	0.13
			0.00						
RRH 800MHz 2x50W	A	From Face	1.00	0.0000	97.30	No Ice	2.49	2.34	0.07
(Sprint)			1.00			1/2" Ice	2.71	2.66	0.10
			0.00						
RRH 800MHz 2x50W	B	From Face	1.00	0.0000	97.30	No Ice	2.49	2.34	0.07
(Sprint)			1.00			1/2" Ice	2.71	2.66	0.10
			0.00						
RRH 800MHz 2x50W	A	From Face	1.00	0.0000	97.30	No Ice	2.49	2.34	0.07
(Sprint)			-5.00			1/2" Ice	2.71	2.66	0.10
			0.00						
APXVTM14-C-I 20	A	From Leg	1.50	0.0000	97.30	No Ice	6.90	4.34	0.07
(Sprint)			0.00			1/2" Ice	7.35	4.74	0.11
			0.00						
APXVTM14-C-I 20	B	From Leg	1.50	0.0000	97.30	No Ice	6.90	4.34	0.07
(Sprint)			0.00			1/2" Ice	7.35	4.74	0.11
			0.00						
APXVTM14-C-I 20	C	From Leg	1.50	0.0000	97.30	No Ice	6.90	4.34	0.07
(Sprint)			0.00			1/2" Ice	7.35	4.74	0.11
			0.00						
TD-RRH8x20-25	A	From Leg	1.50	0.0000	97.30	No Ice	4.32	1.41	0.07
(Sprint)			0.00			1/2" Ice	4.60	1.61	0.09
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
TD-RRH8x20-25 (Sprint)	B	From Leg	1.50 0.00 0.00	0.0000	97.30	No Ice 1/2" Ice	4.32 4.60	1.41 1.61	0.07 0.09
TD-RRH8x20-25 (Sprint)	C	From Leg	1.50 0.00 0.00	0.0000	97.30	No Ice 1/2" Ice	4.32 4.60	1.41 1.61	0.07 0.09
junction box (Sprint)	C	None		0.0000	97.30	No Ice 1/2" Ice	1.87 2.05	1.40 1.57	0.05 0.06
RR90-17-02DP (T-Mobile)	A	From Leg	2.50 1.50 0.00	0.0000	125.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
RR90-17-02DP (T-Mobile)	B	From Leg	2.50 1.50 0.00	0.0000	125.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
RR90-17-02DP (T-Mobile)	C	From Leg	2.50 1.50 0.00	0.0000	125.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
DSM2 (T-Mobile)	A	From Leg	0.50 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	2.03 2.30	1.56 1.78	0.09 0.13
DSM2 (T-Mobile)	B	From Leg	0.50 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	2.03 2.30	1.56 1.78	0.09 0.13
DSM2 (T-Mobile)	C	From Leg	0.50 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	2.03 2.30	1.56 1.78	0.09 0.13
LNX-6515DS-VTM w/ 6' 2" sch 40 Piipe Mount (T-Mobile)	A	From Leg	2.00 -1.50 0.00	0.0000	125.00	No Ice 1/2" Ice	11.45 12.06	9.12 10.21	0.07 0.15
LNX-6515DS-VTM w/ 6' 2" sch 40 Piipe Mount (T-Mobile)	B	From Leg	2.00 -1.50 0.00	0.0000	125.00	No Ice 1/2" Ice	11.45 12.06	9.12 10.21	0.07 0.15
LNX-6515DS-VTM w/ 6' 2" sch 40 Piipe Mount (T-Mobile)	C	From Leg	2.00 -1.50 0.00	0.0000	125.00	No Ice 1/2" Ice	11.45 12.06	9.12 10.21	0.07 0.15

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
6' w/ Radome (CSP - 6)	A	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		110.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.23 0.34
6' w/ Radome (CSP - 7)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		110.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.23 0.34
6' w/ Radome (CSP - Future)	A	Paraboloid w/Radome	From Leg	1.00 0.00	0.0000		160.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.23 0.34

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 ft²	Weight K
				0.00							
6' w/ Radome (CSP - Future)	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		160.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.23 0.34
6' w/ Radome (CSP - Future)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		160.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.23 0.34

Tower Pressures - No Ice

$G_H = 1.129$

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 160.00-150.00	155.00	1.556	32	110.170	A	10.889	8.342	8.342	43.38	0.000	0.000
					B	11.316	26.286		22.19	0.000	0.000
					C	10.889	8.342		43.38	0.000	0.000
T2 150.00-125.00	137.50	1.503	31	310.425	A	19.557	20.856	20.856	51.61	0.000	0.000
					B	20.874	92.445		18.40	0.000	0.000
					C	19.557	20.856		51.61	0.000	0.000
T3 125.00-100.00	112.50	1.42	29	360.425	A	23.281	20.856	20.856	47.25	0.000	0.000
					B	23.195	111.495		15.48	0.000	0.000
					C	21.521	46.597		30.62	0.000	0.000
T4 100.00-75.00	87.50	1.321	27	416.680	A	28.204	30.202	30.202	51.71	0.000	0.000
					B	27.591	122.043		20.18	0.000	0.000
					C	24.721	77.987		29.41	0.000	0.000
T5 75.00-66.67	70.83	1.244	26	150.004	A	9.964	10.067	10.067	50.26	0.000	0.000
					B	9.781	41.144		19.77	0.000	0.000
					C	8.719	27.549		27.76	0.000	0.000
T6 66.67-58.33	62.50	1.2	25	155.560	A	10.257	10.067	10.067	49.53	0.000	0.000
					B	10.097	41.144		19.65	0.000	0.000
					C	8.997	27.935		27.26	0.000	0.000
T7 58.33-50.00	54.17	1.152	24	159.031	A	13.957	6.952	6.952	33.25	0.000	0.000
					B	12.239	38.028		13.83	0.000	0.000
					C	11.860	24.820		18.95	0.000	0.000
T8 50.00-37.50	43.75	1.084	22	250.917	A	15.266	14.338	14.338	48.43	0.000	0.000
					B	15.352	60.953		18.79	0.000	0.000
					C	13.551	41.140		26.22	0.000	0.000
T9 37.50-25.00	31.25	1	21	263.417	A	19.771	14.338	14.338	42.04	0.000	0.000
					B	18.146	60.953		18.13	0.000	0.000
					C	17.136	41.140		24.60	0.000	0.000
T10 25.00-0.00	12.50	1	21	572.674	A	32.789	40.587	40.587	55.31	0.000	0.000
					B	33.039	96.524		31.33	0.000	0.000
					C	30.809	72.749		39.19	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.129$

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	155.00	1.556	32	0.5000	111.004	A	10.889	14.033	10.011	40.17	0.000	0.000
160.00-150.00						B	12.070	40.446		19.06	0.000	0.000
						C	10.889	14.033		40.17	0.000	0.000
T2	137.50	1.503	31	0.5000	312.510	A	19.557	32.849	25.027	47.76	0.000	0.000
150.00-125.00						B	22.974	140.646		15.30	0.000	0.000
						C	19.557	32.849		47.76	0.000	0.000
T3	112.50	1.42	29	0.5000	362.510	A	23.281	33.677	25.027	43.94	0.000	0.000
125.00-100.00						B	24.478	171.027		12.80	0.000	0.000
						C	20.570	72.330		26.94	0.000	0.000
T4 100.00-75.00	87.50	1.321	27	0.5000	418.765	A	28.204	43.774	34.373	47.75	0.000	0.000
						B	28.537	183.517		16.21	0.000	0.000
						C	22.523	119.824		24.15	0.000	0.000
T5 75.00-66.67	70.83	1.244	26	0.5000	150.699	A	9.964	14.779	11.458	46.31	0.000	0.000
						B	10.099	62.247		15.84	0.000	0.000
						C	7.926	42.720		22.62	0.000	0.000
T6 66.67-58.33	62.50	1.2	25	0.5000	156.255	A	10.257	14.877	11.458	45.59	0.000	0.000
						B	10.428	62.357		15.74	0.000	0.000
						C	8.164	43.852		22.03	0.000	0.000
T7 58.33-50.00	54.17	1.152	24	0.5000	159.726	A	13.957	13.552	8.342	30.32	0.000	0.000
						B	11.641	59.783		11.68	0.000	0.000
						C	10.474	41.830		15.95	0.000	0.000
T8 50.00-37.50	43.75	1.084	22	0.5000	251.960	A	15.266	20.564	16.424	45.84	0.000	0.000
						B	16.044	92.277		15.16	0.000	0.000
						C	12.417	64.303		21.41	0.000	0.000
T9 37.50-25.00	31.25	1	21	0.5000	264.460	A	19.771	22.705	16.424	38.67	0.000	0.000
						B	17.817	93.034		14.82	0.000	0.000
						C	15.396	65.670		20.26	0.000	0.000
T10 25.00-0.00	12.50	1	21	0.5000	574.759	A	32.789	53.631	44.758	51.79	0.000	0.000
						B	33.957	139.753		25.77	0.000	0.000
						C	29.501	106.155		32.99	0.000	0.000

Tower Pressure - Service

$G_H = 1.129$

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	155.00	1.556	32	110.170	A	10.889	8.342	8.342	43.38	0.000	0.000
160.00-150.00					B	11.316	26.286		22.19	0.000	0.000
					C	10.889	8.342		43.38	0.000	0.000
T2	137.50	1.503	31	310.425	A	19.557	20.856	20.856	51.61	0.000	0.000
150.00-125.00					B	20.874	92.445		18.40	0.000	0.000
					C	19.557	20.856		51.61	0.000	0.000
T3	112.50	1.42	29	360.425	A	23.281	20.856	20.856	47.25	0.000	0.000
125.00-100.00					B	23.195	111.495		15.48	0.000	0.000
					C	21.521	46.597		30.62	0.000	0.000
T4	87.50	1.321	27	416.680	A	28.204	30.202	30.202	51.71	0.000	0.000
100.00-75.00					B	27.591	122.043		20.18	0.000	0.000
					C	24.721	77.987		29.41	0.000	0.000
T5 75.00-66.67	70.83	1.244	26	150.004	A	9.964	10.067	10.067	50.26	0.000	0.000
					B	9.781	41.144		19.77	0.000	0.000
					C	8.719	27.549		27.76	0.000	0.000
T6 66.67-58.33	62.50	1.2	25	155.560	A	10.257	10.067	10.067	49.53	0.000	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
					B	10.097	41.144		19.65	0.000	0.000
					C	8.997	27.935		27.26	0.000	0.000
T7 58.33-50.00	54.17	1.152	24	159.031	A	13.957	6.952	6.952	33.25	0.000	0.000
					B	12.239	38.028		13.83	0.000	0.000
					C	11.860	24.820		18.95	0.000	0.000
T8 50.00-37.50	43.75	1.084	22	250.917	A	15.266	14.338	14.338	48.43	0.000	0.000
					B	15.352	60.953		18.79	0.000	0.000
					C	13.551	41.140		26.22	0.000	0.000
T9 37.50-25.00	31.25	1	21	263.417	A	19.771	14.338	14.338	42.04	0.000	0.000
					B	18.146	60.953		18.13	0.000	0.000
					C	17.136	41.140		24.60	0.000	0.000
T10 25.00-0.00	12.50	1	21	572.674	A	32.789	40.587	40.587	55.31	0.000	0.000
					B	33.039	96.524		31.33	0.000	0.000
					C	30.809	72.749		39.19	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	0.12	1.18	A	0.175	2.683	0.586	1	1	15.774	2.22	222.40	B
160.00-150.00			B	0.341	2.192	0.629	1	1	27.861			
			C	0.175	2.683	0.586	1	1	15.774			
T2	0.54	2.32	A	0.13	2.846	0.579	1	1	31.625	6.01	240.25	B
150.00-125.00			B	0.365	2.137	0.638	1	1	79.850			
			C	0.13	2.846	0.579	1	1	31.625			
T3	1.02	3.12	A	0.122	2.875	0.578	1	1	35.328	6.67	266.63	B
125.00-100.00			B	0.374	2.118	0.641	1	1	94.688			
			C	0.189	2.633	0.588	1	1	48.931			
T4	1.10	5.08	A	0.14	2.808	0.58	1	1	45.721	7.00	279.86	B
100.00-75.00			B	0.359	2.151	0.636	1	1	105.183			
			C	0.246	2.448	0.601	1	1	71.590			
T5	0.38	1.95	A	0.134	2.833	0.579	1	1	15.794	2.28	273.58	B
75.00-66.67			B	0.339	2.196	0.629	1	1	35.652			
			C	0.242	2.462	0.6	1	1	25.243			
T6	0.38	1.99	A	0.131	2.844	0.579	1	1	16.083	2.24	268.22	B
66.67-58.33			B	0.329	2.221	0.625	1	1	35.826			
			C	0.237	2.476	0.599	1	1	25.723			
T7	0.38	2.07	A	0.131	2.841	0.579	1	1	17.981	2.18	261.54	B
58.33-50.00			B	0.316	2.254	0.621	1	1	35.853			
			C	0.231	2.497	0.597	1	1	26.681			
T8	0.57	2.77	A	0.118	2.893	0.577	1	1	23.541	3.07	245.69	B
50.00-37.50			B	0.304	2.285	0.617	1	1	52.970			
			C	0.218	2.537	0.594	1	1	37.998			
T9	0.57	3.21	A	0.129	2.848	0.579	1	1	28.066	2.99	239.37	B
37.50-25.00			B	0.3	2.295	0.616	1	1	55.692			
			C	0.221	2.527	0.595	1	1	41.613			
T10	0.68	8.42	A	0.128	2.854	0.578	1	1	56.263	5.32	212.93	B
25.00-0.00			B	0.226	2.511	0.596	1	1	90.578			
			C	0.181	2.661	0.587	1	1	73.490			
Sum Weight:	5.73	32.12						OTM	3246.32 kip-ft	39.97		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	1.18	A	0.175	2.683	0.586	0.825	1	13.868	2.07	206.59	B
160.00-150.00			B	0.341	2.192	0.629	0.825	1	25.881			
			C	0.175	2.683	0.586	0.825	1	13.868			
T2	0.54	2.32	A	0.13	2.846	0.579	0.825	1	28.202	5.73	229.26	B
150.00-125.00			B	0.365	2.137	0.638	0.825	1	76.197			
			C	0.13	2.846	0.579	0.825	1	28.202			
T3	1.02	3.12	A	0.122	2.875	0.578	0.825	1	31.254	6.38	255.20	B
125.00-100.00			B	0.374	2.118	0.641	0.825	1	90.629			
			C	0.189	2.633	0.588	0.825	1	45.164			
T4	1.10	5.08	A	0.14	2.808	0.58	0.825	1	40.786	6.68	267.01	B
100.00-75.00			B	0.359	2.151	0.636	0.825	1	100.354			
			C	0.246	2.448	0.601	0.825	1	67.264			
T5	0.38	1.95	A	0.134	2.833	0.579	0.825	1	14.051	2.17	260.45	B
75.00-66.67			B	0.339	2.196	0.629	0.825	1	33.940			
			C	0.242	2.462	0.6	0.825	1	23.717			
T6	0.38	1.99	A	0.131	2.844	0.579	0.825	1	14.288	2.12	254.99	B
66.67-58.33			B	0.329	2.221	0.625	0.825	1	34.059			
			C	0.237	2.476	0.599	0.825	1	24.148			
T7	0.38	2.07	A	0.131	2.841	0.579	0.825	1	15.539	2.05	245.91	B
58.33-50.00			B	0.316	2.254	0.621	0.825	1	33.711			
			C	0.231	2.497	0.597	0.825	1	24.605			
T8	0.57	2.77	A	0.118	2.893	0.577	0.825	1	20.869	2.92	233.23	B
50.00-37.50			B	0.304	2.285	0.617	0.825	1	50.284			
			C	0.218	2.537	0.594	0.825	1	35.626			
T9	0.57	3.21	A	0.129	2.848	0.579	0.825	1	24.606	2.82	225.73	B
37.50-25.00			B	0.3	2.295	0.616	0.825	1	52.516			
			C	0.221	2.527	0.595	0.825	1	38.614			
T10	0.68	8.42	A	0.128	2.854	0.578	0.825	1	50.525	4.98	199.34	B
25.00-0.00			B	0.226	2.511	0.596	0.825	1	84.796			
			C	0.181	2.661	0.587	0.825	1	68.098			
Sum Weight:	5.73	32.12						OTM	3085.69 kip-ft	37.92		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	1.18	A	0.175	2.683	0.586	0.8	1	13.596	2.04	204.33	B
160.00-150.00			B	0.341	2.192	0.629	0.8	1	25.598			
			C	0.175	2.683	0.586	0.8	1	13.596			
T2	0.54	2.32	A	0.13	2.846	0.579	0.8	1	27.713	5.69	227.69	B
150.00-125.00			B	0.365	2.137	0.638	0.8	1	75.675			
			C	0.13	2.846	0.579	0.8	1	27.713			
T3	1.02	3.12	A	0.122	2.875	0.578	0.8	1	30.672	6.34	253.57	B
125.00-100.00			B	0.374	2.118	0.641	0.8	1	90.049			
			C	0.189	2.633	0.588	0.8	1	44.626			
T4	1.10	5.08	A	0.14	2.808	0.58	0.8	1	40.081	6.63	265.17	B
100.00-75.00			B	0.359	2.151	0.636	0.8	1	99.664			
			C	0.246	2.448	0.601	0.8	1	66.646			
T5	0.38	1.95	A	0.134	2.833	0.579	0.8	1	13.801	2.15	258.57	B
75.00-66.67			B	0.339	2.196	0.629	0.8	1	33.695			

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	0.242	2.462	0.6	0.8	1	23.499			
T6	0.38	1.99	A	0.131	2.844	0.579	0.8	1	14.032	2.11	253.10	B
66.67-58.33			B	0.329	2.221	0.625	0.8	1	33.806			
			C	0.237	2.476	0.599	0.8	1	23.923			
T7	0.38	2.07	A	0.131	2.841	0.579	0.8	1	15.190	2.03	243.68	B
58.33-50.00			B	0.316	2.254	0.621	0.8	1	33.405			
			C	0.231	2.497	0.597	0.8	1	24.309			
T8	0.57	2.77	A	0.118	2.893	0.577	0.8	1	20.488	2.89	231.45	B
50.00-37.50			B	0.304	2.285	0.617	0.8	1	49.900			
			C	0.218	2.537	0.594	0.8	1	35.287			
T9	0.57	3.21	A	0.129	2.848	0.579	0.8	1	24.112	2.80	223.78	B
37.50-25.00			B	0.3	2.295	0.616	0.8	1	52.063			
			C	0.221	2.527	0.595	0.8	1	38.186			
T10	0.68	8.42	A	0.128	2.854	0.578	0.8	1	49.705	4.93	197.40	B
25.00-0.00			B	0.226	2.511	0.596	0.8	1	83.970			
			C	0.181	2.661	0.587	0.8	1	67.328			
Sum Weight:	5.73	32.12						OTM	3062.75 kip-ft	37.62		

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	0.12	1.18	A	0.175	2.683	0.586	0.85	1	14.140	2.09	208.85	B
160.00-150.00			B	0.341	2.192	0.629	0.85	1	26.164			
			C	0.175	2.683	0.586	0.85	1	14.140			
T2	0.54	2.32	A	0.13	2.846	0.579	0.85	1	28.691	5.77	230.83	B
150.00-125.00			B	0.365	2.137	0.638	0.85	1	76.719			
			C	0.13	2.846	0.579	0.85	1	28.691			
T3	1.02	3.12	A	0.122	2.875	0.578	0.85	1	31.836	6.42	256.84	B
125.00-100.00			B	0.374	2.118	0.641	0.85	1	91.208			
			C	0.189	2.633	0.588	0.85	1	45.702			
T4	1.10	5.08	A	0.14	2.808	0.58	0.85	1	41.491	6.72	268.84	B
100.00-75.00			B	0.359	2.151	0.636	0.85	1	101.044			
			C	0.246	2.448	0.601	0.85	1	67.882			
T5	0.38	1.95	A	0.134	2.833	0.579	0.85	1	14.300	2.19	262.32	B
75.00-66.67			B	0.339	2.196	0.629	0.85	1	34.184			
			C	0.242	2.462	0.6	0.85	1	23.935			
T6	0.38	1.99	A	0.131	2.844	0.579	0.85	1	14.544	2.14	256.88	B
66.67-58.33			B	0.329	2.221	0.625	0.85	1	34.311			
			C	0.237	2.476	0.599	0.85	1	24.373			
T7	0.38	2.07	A	0.131	2.841	0.579	0.85	1	15.888	2.07	248.14	B
58.33-50.00			B	0.316	2.254	0.621	0.85	1	34.017			
			C	0.231	2.497	0.597	0.85	1	24.902			
T8	0.57	2.77	A	0.118	2.893	0.577	0.85	1	21.251	2.94	235.01	B
50.00-37.50			B	0.304	2.285	0.617	0.85	1	50.667			
			C	0.218	2.537	0.594	0.85	1	35.965			
T9	0.57	3.21	A	0.129	2.848	0.579	0.85	1	25.101	2.85	227.68	B
37.50-25.00			B	0.3	2.295	0.616	0.85	1	52.970			
			C	0.221	2.527	0.595	0.85	1	39.043			
T10	0.68	8.42	A	0.128	2.854	0.578	0.85	1	51.345	5.03	201.28	B
25.00-0.00			B	0.226	2.511	0.596	0.85	1	85.622			
			C	0.181	2.661	0.587	0.85	1	68.868			

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:	5.73	32.12						OTM	3108.64 kip-ft	38.21		

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	0.32	1.72	A	0.225	2.516	0.596	1	1	19.249	2.80	280.40	B
160.00-150.00			B	0.473	1.937	0.684	1	1	39.741			
			C	0.225	2.516	0.596	1	1	19.249			
T2	1.40	3.38	A	0.168	2.707	0.584	1	1	38.752	8.09	323.49	B
150.00-125.00			B	0.524	1.871	0.71	1	1	122.805			
			C	0.168	2.707	0.584	1	1	38.752			
T3	2.60	4.41	A	0.157	2.745	0.583	1	1	42.901	9.08	363.12	B
125.00-100.00			B	0.539	1.854	0.718	1	1	147.332			
			C	0.256	2.419	0.603	1	1	64.220			
T4	2.92	6.93	A	0.172	2.693	0.585	1	1	53.815	9.19	367.79	B
100.00-75.00			B	0.506	1.892	0.701	1	1	157.141			
			C	0.34	2.195	0.629	1	1	97.883			
T5	1.00	2.59	A	0.164	2.72	0.584	1	1	18.592	2.97	356.20	B
75.00-66.67			B	0.48	1.927	0.688	1	1	52.896			
			C	0.336	2.204	0.628	1	1	34.737			
T6	1.01	2.64	A	0.161	2.732	0.583	1	1	18.933	2.89	347.30	B
66.67-58.33			B	0.466	1.948	0.681	1	1	52.872			
			C	0.333	2.212	0.627	1	1	35.638			
T7	1.01	2.76	A	0.172	2.691	0.585	1	1	21.887	2.76	331.70	B
58.33-50.00			B	0.447	1.978	0.672	1	1	51.813			
			C	0.327	2.226	0.625	1	1	36.604			
T8	1.52	3.60	A	0.142	2.8	0.58	1	1	27.200	3.94	315.19	B
50.00-37.50			B	0.43	2.008	0.664	1	1	77.340			
			C	0.304	2.284	0.617	1	1	52.111			
T9	1.52	4.22	A	0.161	2.733	0.583	1	1	33.011	3.76	300.61	B
37.50-25.00			B	0.419	2.027	0.66	1	1	79.182			
			C	0.307	2.279	0.618	1	1	55.975			
T10	1.82	10.62	A	0.15	2.77	0.582	1	1	63.977	6.44	257.58	B
25.00-0.00			B	0.302	2.29	0.617	1	1	120.127			
			C	0.236	2.48	0.598	1	1	93.025			
Sum Weight:	15.11	42.86						OTM	4283.57 kip-ft	51.93		

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	0.32	1.72	A	0.225	2.516	0.596	0.825	1	17.343	2.65	265.49	B
160.00-150.00			B	0.473	1.937	0.684	0.825	1	37.628			
			C	0.225	2.516	0.596	0.825	1	17.343			

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
T2	1.40	3.38	A	0.168	2.707	0.584	0.825	1	35.329	7.82	312.90	B
150.00-125.00			B	0.524	1.871	0.71	0.825	1	118.785			
			C	0.168	2.707	0.584	0.825	1	35.329			
T3	2.60	4.41	A	0.157	2.745	0.583	0.825	1	38.827	8.81	352.56	B
125.00-100.00			B	0.539	1.854	0.718	0.825	1	143.049			
			C	0.256	2.419	0.603	0.825	1	60.621			
T4	2.92	6.93	A	0.172	2.693	0.585	0.825	1	48.879	8.90	356.10	B
100.00-75.00			B	0.506	1.892	0.701	0.825	1	152.147			
			C	0.34	2.195	0.629	0.825	1	93.942			
T5	1.00	2.59	A	0.164	2.72	0.584	0.825	1	16.848	2.87	344.29	B
75.00-66.67			B	0.48	1.927	0.688	0.825	1	51.129			
			C	0.336	2.204	0.628	0.825	1	33.350			
T6	1.01	2.64	A	0.161	2.732	0.583	0.825	1	17.138	2.79	335.31	B
66.67-58.33			B	0.466	1.948	0.681	0.825	1	51.047			
			C	0.333	2.212	0.627	0.825	1	34.209			
T7	1.01	2.76	A	0.172	2.691	0.585	0.825	1	19.445	2.66	318.66	B
58.33-50.00			B	0.447	1.978	0.672	0.825	1	49.776			
			C	0.327	2.226	0.625	0.825	1	34.771			
T8	1.52	3.60	A	0.142	2.8	0.58	0.825	1	24.529	3.80	303.75	B
50.00-37.50			B	0.43	2.008	0.664	0.825	1	74.532			
			C	0.304	2.284	0.617	0.825	1	49.938			
T9	1.52	4.22	A	0.161	2.733	0.583	0.825	1	29.551	3.61	288.77	B
37.50-25.00			B	0.419	2.027	0.66	0.825	1	76.064			
			C	0.307	2.279	0.618	0.825	1	53.280			
T10	1.82	10.62	A	0.15	2.77	0.582	0.825	1	58.239	6.12	244.84	B
25.00-0.00			B	0.302	2.29	0.617	0.825	1	114.184			
			C	0.236	2.48	0.598	0.825	1	87.863			
Sum Weight:	15.11	42.86						OTM	4134.78 kip-ft	50.04		

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	0.32	1.72	A	0.225	2.516	0.596	0.8	1	17.071	2.63	263.37	B
160.00-150.00			B	0.473	1.937	0.684	0.8	1	37.327			
			C	0.225	2.516	0.596	0.8	1	17.071			
T2	1.40	3.38	A	0.168	2.707	0.584	0.8	1	34.841	7.78	311.38	B
150.00-125.00			B	0.524	1.871	0.71	0.8	1	118.210			
			C	0.168	2.707	0.584	0.8	1	34.841			
T3	2.60	4.41	A	0.157	2.745	0.583	0.8	1	38.245	8.78	351.05	B
125.00-100.00			B	0.539	1.854	0.718	0.8	1	142.437			
			C	0.256	2.419	0.603	0.8	1	60.106			
T4	2.92	6.93	A	0.172	2.693	0.585	0.8	1	48.174	8.86	354.43	B
100.00-75.00			B	0.506	1.892	0.701	0.8	1	151.434			
			C	0.34	2.195	0.629	0.8	1	93.379			
T5	1.00	2.59	A	0.164	2.72	0.584	0.8	1	16.599	2.85	342.59	B
75.00-66.67			B	0.48	1.927	0.688	0.8	1	50.876			
			C	0.336	2.204	0.628	0.8	1	33.151			
T6	1.01	2.64	A	0.161	2.732	0.583	0.8	1	16.881	2.78	333.60	B
66.67-58.33			B	0.466	1.948	0.681	0.8	1	50.787			
			C	0.333	2.212	0.627	0.8	1	34.005			
T7	1.01	2.76	A	0.172	2.691	0.585	0.8	1	19.096	2.64	316.79	B
58.33-50.00			B	0.447	1.978	0.672	0.8	1	49.485			

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	0.327	2.226	0.625	0.8	1	34.510			
T8	1.52	3.60	A	0.142	2.8	0.58	0.8	1	24.147	3.78	302.11	B
50.00-37.50			B	0.43	2.008	0.664	0.8	1	74.131			
			C	0.304	2.284	0.617	0.8	1	49.627			
T9	1.52	4.22	A	0.161	2.733	0.583	0.8	1	29.057	3.59	287.08	B
37.50-25.00			B	0.419	2.027	0.66	0.8	1	75.619			
			C	0.307	2.279	0.618	0.8	1	52.896			
T10	1.82	10.62	A	0.15	2.77	0.582	0.8	1	57.419	6.08	243.02	B
25.00-0.00			B	0.302	2.29	0.617	0.8	1	113.335			
			C	0.236	2.48	0.598	0.8	1	87.125			
Sum Weight:	15.11	42.86						OTM	4113.53 kip-ft	49.77		

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	0.32	1.72	A	0.225	2.516	0.596	0.85	1	17.615	2.68	267.62	B
160.00-150.00			B	0.473	1.937	0.684	0.85	1	37.930			
			C	0.225	2.516	0.596	0.85	1	17.615			
T2	1.40	3.38	A	0.168	2.707	0.584	0.85	1	35.818	7.86	314.41	B
150.00-125.00			B	0.524	1.871	0.71	0.85	1	119.359			
			C	0.168	2.707	0.584	0.85	1	35.818			
T3	2.60	4.41	A	0.157	2.745	0.583	0.85	1	39.409	8.85	354.07	B
125.00-100.00			B	0.539	1.854	0.718	0.85	1	143.661			
			C	0.256	2.419	0.603	0.85	1	61.135			
T4	2.92	6.93	A	0.172	2.693	0.585	0.85	1	49.584	8.94	357.77	B
100.00-75.00			B	0.506	1.892	0.701	0.85	1	152.860			
			C	0.34	2.195	0.629	0.85	1	94.505			
T5	1.00	2.59	A	0.164	2.72	0.584	0.85	1	17.097	2.88	345.99	B
75.00-66.67			B	0.48	1.927	0.688	0.85	1	51.381			
			C	0.336	2.204	0.628	0.85	1	33.548			
T6	1.01	2.64	A	0.161	2.732	0.583	0.85	1	17.394	2.81	337.02	B
66.67-58.33			B	0.466	1.948	0.681	0.85	1	51.308			
			C	0.333	2.212	0.627	0.85	1	34.414			
T7	1.01	2.76	A	0.172	2.691	0.585	0.85	1	19.794	2.67	320.52	B
58.33-50.00			B	0.447	1.978	0.672	0.85	1	50.067			
			C	0.327	2.226	0.625	0.85	1	35.033			
T8	1.52	3.60	A	0.142	2.8	0.58	0.85	1	24.910	3.82	305.38	B
50.00-37.50			B	0.43	2.008	0.664	0.85	1	74.933			
			C	0.304	2.284	0.617	0.85	1	50.248			
T9	1.52	4.22	A	0.161	2.733	0.583	0.85	1	30.046	3.63	290.46	B
37.50-25.00			B	0.419	2.027	0.66	0.85	1	76.509			
			C	0.307	2.279	0.618	0.85	1	53.665			
T10	1.82	10.62	A	0.15	2.77	0.582	0.85	1	59.058	6.17	246.66	B
25.00-0.00			B	0.302	2.29	0.617	0.85	1	115.033			
			C	0.236	2.48	0.598	0.85	1	88.600			
Sum Weight:	15.11	42.86						OTM	4156.04 kip-ft	50.31		

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	0.12	1.18	A	0.175	2.683	0.586	1	1	15.774	2.22	222.40	B
160.00-150.00			B	0.341	2.192	0.629	1	1	27.861			
			C	0.175	2.683	0.586	1	1	15.774			
T2	0.54	2.32	A	0.13	2.846	0.579	1	1	31.625	6.01	240.25	B
150.00-125.00			B	0.365	2.137	0.638	1	1	79.850			
			C	0.13	2.846	0.579	1	1	31.625			
T3	1.02	3.12	A	0.122	2.875	0.578	1	1	35.328	6.67	266.63	B
125.00-100.00			B	0.374	2.118	0.641	1	1	94.688			
			C	0.189	2.633	0.588	1	1	48.931			
T4	1.10	5.08	A	0.14	2.808	0.58	1	1	45.721	7.00	279.86	B
100.00-75.00			B	0.359	2.151	0.636	1	1	105.183			
			C	0.246	2.448	0.601	1	1	71.590			
T5	0.38	1.95	A	0.134	2.833	0.579	1	1	15.794	2.28	273.58	B
75.00-66.67			B	0.339	2.196	0.629	1	1	35.652			
			C	0.242	2.462	0.6	1	1	25.243			
T6	0.38	1.99	A	0.131	2.844	0.579	1	1	16.083	2.24	268.22	B
66.67-58.33			B	0.329	2.221	0.625	1	1	35.826			
			C	0.237	2.476	0.599	1	1	25.723			
T7	0.38	2.07	A	0.131	2.841	0.579	1	1	17.981	2.18	261.54	B
58.33-50.00			B	0.316	2.254	0.621	1	1	35.853			
			C	0.231	2.497	0.597	1	1	26.681			
T8	0.57	2.77	A	0.118	2.893	0.577	1	1	23.541	3.07	245.69	B
50.00-37.50			B	0.304	2.285	0.617	1	1	52.970			
			C	0.218	2.537	0.594	1	1	37.998			
T9	0.57	3.21	A	0.129	2.848	0.579	1	1	28.066	2.99	239.37	B
37.50-25.00			B	0.3	2.295	0.616	1	1	55.692			
			C	0.221	2.527	0.595	1	1	41.613			
T10	0.68	8.42	A	0.128	2.854	0.578	1	1	56.263	5.32	212.93	B
25.00-0.00			B	0.226	2.511	0.596	1	1	90.578			
			C	0.181	2.661	0.587	1	1	73.490			
Sum Weight:	5.73	32.12						OTM	3246.32 kip-ft	39.97		

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	0.12	1.18	A	0.175	2.683	0.586	0.825	1	13.868	2.07	206.59	B
160.00-150.00			B	0.341	2.192	0.629	0.825	1	25.881			
			C	0.175	2.683	0.586	0.825	1	13.868			
T2	0.54	2.32	A	0.13	2.846	0.579	0.825	1	28.202	5.73	229.26	B
150.00-125.00			B	0.365	2.137	0.638	0.825	1	76.197			
			C	0.13	2.846	0.579	0.825	1	28.202			
T3	1.02	3.12	A	0.122	2.875	0.578	0.825	1	31.254	6.38	255.20	B
125.00-100.00			B	0.374	2.118	0.641	0.825	1	90.629			
			C	0.189	2.633	0.588	0.825	1	45.164			
T4	1.10	5.08	A	0.14	2.808	0.58	0.825	1	40.786	6.68	267.01	B
100.00-75.00			B	0.359	2.151	0.636	0.825	1	100.354			
			C	0.246	2.448	0.601	0.825	1	67.264			
T5	0.38	1.95	A	0.134	2.833	0.579	0.825	1	14.051	2.17	260.45	B
75.00-66.67			B	0.339	2.196	0.629	0.825	1	33.940			

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	0.242	2.462	0.6	0.825	1	23.717			
T6	0.38	1.99	A	0.131	2.844	0.579	0.825	1	14.288	2.12	254.99	B
66.67-58.33			B	0.329	2.221	0.625	0.825	1	34.059			
			C	0.237	2.476	0.599	0.825	1	24.148			
T7	0.38	2.07	A	0.131	2.841	0.579	0.825	1	15.539	2.05	245.91	B
58.33-50.00			B	0.316	2.254	0.621	0.825	1	33.711			
			C	0.231	2.497	0.597	0.825	1	24.605			
T8	0.57	2.77	A	0.118	2.893	0.577	0.825	1	20.869	2.92	233.23	B
50.00-37.50			B	0.304	2.285	0.617	0.825	1	50.284			
			C	0.218	2.537	0.594	0.825	1	35.626			
T9	0.57	3.21	A	0.129	2.848	0.579	0.825	1	24.606	2.82	225.73	B
37.50-25.00			B	0.3	2.295	0.616	0.825	1	52.516			
			C	0.221	2.527	0.595	0.825	1	38.614			
T10	0.68	8.42	A	0.128	2.854	0.578	0.825	1	50.525	4.98	199.34	B
25.00-0.00			B	0.226	2.511	0.596	0.825	1	84.796			
			C	0.181	2.661	0.587	0.825	1	68.098			
Sum Weight:	5.73	32.12						OTM	3085.69 kip-ft	37.92		

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	0.12	1.18	A	0.175	2.683	0.586	0.8	1	13.596	2.04	204.33	B
160.00-150.00			B	0.341	2.192	0.629	0.8	1	25.598			
			C	0.175	2.683	0.586	0.8	1	13.596			
T2	0.54	2.32	A	0.13	2.846	0.579	0.8	1	27.713	5.69	227.69	B
150.00-125.00			B	0.365	2.137	0.638	0.8	1	75.675			
			C	0.13	2.846	0.579	0.8	1	27.713			
T3	1.02	3.12	A	0.122	2.875	0.578	0.8	1	30.672	6.34	253.57	B
125.00-100.00			B	0.374	2.118	0.641	0.8	1	90.049			
			C	0.189	2.633	0.588	0.8	1	44.626			
T4	1.10	5.08	A	0.14	2.808	0.58	0.8	1	40.081	6.63	265.17	B
100.00-75.00			B	0.359	2.151	0.636	0.8	1	99.664			
			C	0.246	2.448	0.601	0.8	1	66.646			
T5	0.38	1.95	A	0.134	2.833	0.579	0.8	1	13.801	2.15	258.57	B
75.00-66.67			B	0.339	2.196	0.629	0.8	1	33.695			
			C	0.242	2.462	0.6	0.8	1	23.499			
T6	0.38	1.99	A	0.131	2.844	0.579	0.8	1	14.032	2.11	253.10	B
66.67-58.33			B	0.329	2.221	0.625	0.8	1	33.806			
			C	0.237	2.476	0.599	0.8	1	23.923			
T7	0.38	2.07	A	0.131	2.841	0.579	0.8	1	15.190	2.03	243.68	B
58.33-50.00			B	0.316	2.254	0.621	0.8	1	33.405			
			C	0.231	2.497	0.597	0.8	1	24.309			
T8	0.57	2.77	A	0.118	2.893	0.577	0.8	1	20.488	2.89	231.45	B
50.00-37.50			B	0.304	2.285	0.617	0.8	1	49.900			
			C	0.218	2.537	0.594	0.8	1	35.287			
T9	0.57	3.21	A	0.129	2.848	0.579	0.8	1	24.112	2.80	223.78	B
37.50-25.00			B	0.3	2.295	0.616	0.8	1	52.063			
			C	0.221	2.527	0.595	0.8	1	38.186			
T10	0.68	8.42	A	0.128	2.854	0.578	0.8	1	49.705	4.93	197.40	B
25.00-0.00			B	0.226	2.511	0.596	0.8	1	83.970			
			C	0.181	2.661	0.587	0.8	1	67.328			

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:	5.73	32.12						OTM	3062.75 kip-ft	37.62		

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	0.12	1.18	A	0.175	2.683	0.586	0.85	1	14.140	2.09	208.85	B
160.00-150.00			B	0.341	2.192	0.629	0.85	1	26.164			
			C	0.175	2.683	0.586	0.85	1	14.140			
T2	0.54	2.32	A	0.13	2.846	0.579	0.85	1	28.691	5.77	230.83	B
150.00-125.00			B	0.365	2.137	0.638	0.85	1	76.719			
			C	0.13	2.846	0.579	0.85	1	28.691			
T3	1.02	3.12	A	0.122	2.875	0.578	0.85	1	31.836	6.42	256.84	B
125.00-100.00			B	0.374	2.118	0.641	0.85	1	91.208			
			C	0.189	2.633	0.588	0.85	1	45.702			
T4	1.10	5.08	A	0.14	2.808	0.58	0.85	1	41.491	6.72	268.84	B
100.00-75.00			B	0.359	2.151	0.636	0.85	1	101.044			
			C	0.246	2.448	0.601	0.85	1	67.882			
T5	0.38	1.95	A	0.134	2.833	0.579	0.85	1	14.300	2.19	262.32	B
75.00-66.67			B	0.339	2.196	0.629	0.85	1	34.184			
			C	0.242	2.462	0.6	0.85	1	23.935			
T6	0.38	1.99	A	0.131	2.844	0.579	0.85	1	14.544	2.14	256.88	B
66.67-58.33			B	0.329	2.221	0.625	0.85	1	34.311			
			C	0.237	2.476	0.599	0.85	1	24.373			
T7	0.38	2.07	A	0.131	2.841	0.579	0.85	1	15.888	2.07	248.14	B
58.33-50.00			B	0.316	2.254	0.621	0.85	1	34.017			
			C	0.231	2.497	0.597	0.85	1	24.902			
T8	0.57	2.77	A	0.118	2.893	0.577	0.85	1	21.251	2.94	235.01	B
50.00-37.50			B	0.304	2.285	0.617	0.85	1	50.667			
			C	0.218	2.537	0.594	0.85	1	35.965			
T9	0.57	3.21	A	0.129	2.848	0.579	0.85	1	25.101	2.85	227.68	B
37.50-25.00			B	0.3	2.295	0.616	0.85	1	52.970			
			C	0.221	2.527	0.595	0.85	1	39.043			
T10	0.68	8.42	A	0.128	2.854	0.578	0.85	1	51.345	5.03	201.28	B
25.00-0.00			B	0.226	2.511	0.596	0.85	1	85.622			
			C	0.181	2.661	0.587	0.85	1	68.868			
Sum Weight:	5.73	32.12						OTM	3108.64 kip-ft	38.21		

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	11.77					
Bracing Weight	20.36					
Total Member Self-Weight	32.12			-7.25	-5.33	

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
Total Weight	45.58			-7.25	-5.33	
Wind 0 deg - No Ice		0.14	-57.61	-5623.29	-20.26	20.45
Wind 30 deg - No Ice		27.80	-48.44	-4757.59	-2718.06	-2.09
Wind 45 deg - No Ice		38.97	-39.21	-3850.92	-3809.99	-11.12
Wind 60 deg - No Ice		47.45	-27.41	-2690.42	-4643.32	-19.87
Wind 90 deg - No Ice		55.60	0.20	21.94	-5443.30	-32.90
Wind 120 deg - No Ice		49.78	28.75	2795.26	-4850.37	-41.43
Wind 135 deg - No Ice		39.26	39.12	3829.33	-3856.47	-39.66
Wind 150 deg - No Ice		27.98	48.08	4696.61	-2749.60	-35.56
Wind 180 deg - No Ice		-0.00	54.82	5358.79	-5.15	-19.02
Wind 210 deg - No Ice		-28.03	48.31	4721.73	2744.38	2.09
Wind 225 deg - No Ice		-39.30	39.37	3857.04	3849.93	12.97
Wind 240 deg - No Ice		-49.80	28.92	2813.70	4841.79	20.98
Wind 270 deg - No Ice		-55.34	0.31	33.81	5404.08	33.18
Wind 300 deg - No Ice		-47.01	-27.16	-2662.65	4584.90	38.89
Wind 315 deg - No Ice		-38.54	-38.89	-3816.11	3752.34	38.23
Wind 330 deg - No Ice		-27.40	-48.11	-4721.52	2663.82	35.28
Member Ice	10.74					
Total Weight Ice	69.67			-14.93	-22.67	
Wind 0 deg - Ice		0.14	-72.94	-7140.58	-37.78	32.46
Wind 30 deg - Ice		35.52	-61.84	-6081.46	-3493.01	2.01
Wind 45 deg - Ice		49.90	-50.17	-4933.86	-4899.64	-11.48
Wind 60 deg - Ice		60.86	-35.17	-3458.53	-5975.46	-24.70
Wind 90 deg - Ice		71.04	0.21	15.33	-6976.63	-45.34
Wind 120 deg - Ice		63.03	36.42	3542.43	-6172.40	-58.19
Wind 135 deg - Ice		50.20	50.08	4897.05	-4947.77	-57.03
Wind 150 deg - Ice		35.70	61.47	6004.05	-3525.86	-52.23
Wind 180 deg - Ice		-0.00	70.33	6872.36	-22.73	-31.00
Wind 210 deg - Ice		-35.75	61.71	6029.64	3485.70	-2.01
Wind 225 deg - Ice		-50.24	50.33	4925.20	4906.33	13.38
Wind 240 deg - Ice		-63.05	36.59	3560.98	6128.95	25.73
Wind 270 deg - Ice		-70.78	0.32	27.04	6901.92	45.62
Wind 300 deg - Ice		-60.41	-34.91	-3430.39	5881.25	55.71
Wind 315 deg - Ice		-49.46	-49.84	-4898.41	4806.32	55.55
Wind 330 deg - Ice		-35.11	-61.51	-6044.62	3403.27	51.94
Total Weight	45.58			-7.25	-5.33	
Wind 0 deg - Service		0.14	-57.61	-5619.19	-6.49	20.45
Wind 30 deg - Service		27.80	-48.44	-4753.48	-2704.28	-2.09
Wind 45 deg - Service		38.97	-39.21	-3846.81	-3796.22	-11.12
Wind 60 deg - Service		47.45	-27.41	-2686.32	-4629.55	-19.87
Wind 90 deg - Service		55.60	0.20	26.05	-5429.52	-32.90
Wind 120 deg - Service		49.78	28.75	2799.36	-4836.60	-41.43
Wind 135 deg - Service		39.26	39.12	3833.44	-3842.69	-39.66
Wind 150 deg - Service		27.98	48.08	4700.72	-2735.82	-35.56
Wind 180 deg - Service		-0.00	54.82	5362.89	8.62	-19.02
Wind 210 deg - Service		-28.03	48.31	4725.84	2758.16	2.09
Wind 225 deg - Service		-39.30	39.37	3861.15	3863.71	12.97
Wind 240 deg - Service		-49.80	28.92	2817.80	4855.56	20.98
Wind 270 deg - Service		-55.34	0.31	37.91	5417.86	33.18
Wind 300 deg - Service		-47.01	-27.16	-2658.54	4598.67	38.89
Wind 315 deg - Service		-38.54	-38.89	-3812.00	3766.12	38.23
Wind 330 deg - Service		-27.40	-48.11	-4717.41	2677.59	35.28

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
19	Dead+Wind 0 deg+Ice
20	Dead+Wind 30 deg+Ice
21	Dead+Wind 45 deg+Ice
22	Dead+Wind 60 deg+Ice
23	Dead+Wind 90 deg+Ice
24	Dead+Wind 120 deg+Ice
25	Dead+Wind 135 deg+Ice
26	Dead+Wind 150 deg+Ice
27	Dead+Wind 180 deg+Ice
28	Dead+Wind 210 deg+Ice
29	Dead+Wind 225 deg+Ice
30	Dead+Wind 240 deg+Ice
31	Dead+Wind 270 deg+Ice
32	Dead+Wind 300 deg+Ice
33	Dead+Wind 315 deg+Ice
34	Dead+Wind 330 deg+Ice
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment lb-in	Minor Axis Moment lb-in
T1	160 - 150	Leg	Max Tension	22	2.02	-1305.35	205.81
			Max. Compression	19	-4.93	-2925.36	-148.98
			Max. Mx	22	1.77	3074.32	775.25

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment lb-in	Minor Axis Moment lb-in
			Max. My	26	-1.12	53.42	3616.39
			Max. Vy	27	-1.04	-1264.31	-411.33
			Max. Vx	26	-1.02	-74.56	-1224.51
		Diagonal	Max Tension	25	4.49	0.00	0.00
			Max. Compression	25	-4.66	0.00	0.00
			Max. Mx	20	4.41	525.51	0.00
			Max. My	24	0.41	0.00	20.09
			Max. Vy	20	-0.02	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Horizontal	Max Tension	33	3.49	0.00	0.00
			Max. Compression	25	-3.53	341.49	82.59
			Max. Mx	22	0.05	368.05	44.09
			Max. My	23	2.58	298.37	108.54
			Max. Vy	22	0.03	368.05	44.09
			Max. Vx	24	-0.00	0.00	0.00
		Top Girt	Max Tension	32	2.23	283.89	87.91
			Max. Compression	24	-2.42	321.57	64.97
			Max. Mx	22	-0.75	341.40	41.63
			Max. My	24	1.35	262.05	100.51
			Max. Vy	22	0.02	341.40	41.63
			Max. Vx	24	-0.00	0.00	0.00
T2	150 - 125	Leg	Max Tension	22	24.45	-13301.75	873.90
			Max. Compression	19	-33.43	499.32	-108.07
			Max. Mx	32	13.47	28424.73	-2050.71
			Max. My	31	-2.48	-415.55	28646.31
			Max. Vy	27	-1.04	-16146.66	872.77
			Max. Vx	31	-1.11	-415.55	-17079.97
		Diagonal	Max Tension	26	11.87	0.00	0.00
			Max. Compression	26	-12.04	0.00	0.00
			Max. Mx	20	11.22	885.82	0.00
			Max. My	24	1.38	0.00	42.56
			Max. Vy	20	-0.03	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Horizontal	Max Tension	33	7.43	0.00	0.00
			Max. Compression	25	-7.50	368.28	221.06
			Max. Mx	22	0.30	457.54	75.45
			Max. My	25	-7.50	368.28	221.06
			Max. Vy	22	0.02	457.54	75.45
			Max. Vx	32	-0.00	0.00	0.00
T3	125 - 100	Leg	Max Tension	32	69.28	-4294.08	-1379.87
			Max. Compression	19	-86.33	5431.73	-996.63
			Max. Mx	22	38.01	-7460.05	1211.92
			Max. My	26	-3.71	-496.33	-8034.05
			Max. Vy	21	0.47	-5501.65	3160.41
			Max. Vx	30	0.60	-3264.50	-6573.14
		Diagonal	Max Tension	28	15.42	0.00	0.00
			Max. Compression	28	-15.72	0.00	0.00
			Max. Mx	20	15.37	1301.23	0.00
			Max. My	24	1.39	0.00	53.79
			Max. Vy	20	0.04	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Horizontal	Max Tension	28	10.41	0.00	0.00
			Max. Compression	29	-10.47	754.90	38.30
			Max. Mx	32	0.79	1122.09	177.99
			Max. My	30	1.84	93.85	-219.04
			Max. Vy	32	0.04	1122.09	177.99
			Max. Vx	30	0.00	93.85	-219.04
		Inner Bracing	Max Tension	23	0.00	0.00	0.00
			Max. Compression	21	-0.01	0.00	0.00
			Max. Mx	18	-0.00	-376.32	0.00
			Max. My	19	0.00	0.00	-3.09

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment lb-in	Minor Axis Moment lb-in
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T4	100 - 75	Leg	Max Tension	22	123.78	-3906.69	-411.49
			Max. Compression	19	-151.03	4503.28	-625.16
			Max. Mx	22	85.15	-14604.55	501.88
			Max. My	23	-9.08	-431.14	14974.82
			Max. Vy	22	-0.64	-5813.87	219.67
			Max. Vx	31	-0.65	-78.44	-6586.45
		Diagonal	Max Tension	26	18.37	0.00	0.00
			Max. Compression	26	-18.83	0.00	0.00
			Max. Mx	20	17.77	1910.71	0.00
			Max. My	24	1.48	0.00	70.57
			Max. Vy	20	0.05	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Horizontal	Max Tension	26	13.31	1302.18	-26.32
			Max. Compression	26	-13.17	1302.37	-26.16
			Max. Mx	22	1.34	1954.28	271.70
			Max. My	30	2.00	570.63	-357.50
			Max. Vy	22	0.07	1954.28	271.70
			Max. Vx	30	0.01	570.63	-357.50
		Top Girt	Max Tension	26	11.47	690.50	-12.95
			Max. Compression	29	-11.53	772.19	70.22
			Max. Mx	32	-1.84	998.84	305.67
			Max. My	30	1.92	363.19	-353.88
			Max. Vy	32	0.04	998.84	305.67
			Max. Vx	30	0.00	363.19	-353.88
		Inner Bracing	Max Tension	29	0.20	0.00	0.00
			Max. Compression	29	-0.20	0.00	0.00
			Max. Mx	18	-0.00	-488.67	0.00
			Max. My	19	0.01	0.00	-3.17
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
T5	75 - 66.6667	Leg	Max Tension	22	143.56	-4846.19	215.43
			Max. Compression	19	-173.63	10628.17	-714.25
			Max. Mx	19	-173.63	10628.17	-714.25
			Max. My	23	-11.79	-258.07	6697.96
			Max. Vy	30	-0.14	10563.06	182.07
			Max. Vx	24	0.15	-2620.48	6243.72
		Diagonal	Max Tension	26	18.83	0.00	0.00
			Max. Compression	26	-19.31	0.00	0.00
			Max. Mx	20	18.04	2024.29	0.00
			Max. My	24	1.51	0.00	72.32
			Max. Vy	20	0.06	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Horizontal	Max Tension	26	13.90	1386.95	-28.52
			Max. Compression	26	-13.76	1387.23	-28.40
			Max. Mx	22	1.54	1964.16	273.87
			Max. My	30	1.61	776.90	-350.39
			Max. Vy	22	0.07	1964.16	273.87
			Max. Vx	30	0.00	776.90	-350.39
		Inner Bracing	Max Tension	23	0.00	0.00	0.00
			Max. Compression	33	-0.01	0.00	0.00
			Max. Mx	18	-0.00	-529.37	0.00
			Max. My	24	0.00	0.00	-3.12
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
T6	66.6667 - 58.3333	Leg	Max Tension	22	163.30	-9333.16	-143.33
			Max. Compression	19	-196.30	-11215.65	-788.55
			Max. Mx	19	-196.30	-11215.65	-788.55
			Max. My	23	-13.22	-1988.99	17435.10

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment lb-in	Minor Axis Moment lb-in
			Max. Vy	30	0.29	10563.02	182.09
			Max. Vx	23	-0.24	-1988.99	17435.10
		Diagonal	Max Tension	26	19.28	0.00	0.00
			Max. Compression	26	-19.79	0.00	0.00
			Max. Mx	20	18.31	2141.48	0.00
			Max. My	24	1.52	0.00	74.07
			Max. Vy	20	-0.06	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Top Girt	Max Tension	26	14.50	1497.89	-30.67
			Max. Compression	26	-14.32	1498.19	-30.36
			Max. Mx	22	0.67	2110.07	262.99
			Max. My	30	1.33	847.09	-344.47
			Max. Vy	22	0.07	2110.07	262.99
			Max. Vx	30	0.00	847.09	-344.47
		Inner Bracing	Max Tension	26	0.25	0.00	0.00
			Max. Compression	26	-0.25	0.00	0.00
			Max. Mx	18	-0.00	-571.71	0.00
			Max. My	24	0.23	0.00	-3.08
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
T7	58.3333 - 50	Leg	Max Tension	22	182.10	6281.37	568.31
			Max. Compression	19	-218.52	-1521.07	-1241.31
			Max. Mx	19	-218.44	32098.67	663.73
			Max. My	23	-14.09	-1988.99	17435.10
			Max. Vy	19	-0.90	32098.67	663.73
			Max. Vx	23	0.63	-1988.99	17435.10
		Diagonal	Max Tension	26	19.59	0.00	0.00
			Max. Compression	26	-20.13	0.00	0.00
			Max. Mx	33	11.64	-2345.40	96.30
			Max. My	34	-19.95	894.46	203.75
			Max. Vy	33	0.06	-2345.22	100.53
			Max. Vx	34	0.00	0.00	0.00
		Top Girt	Max Tension	26	14.77	1692.33	-36.16
			Max. Compression	26	-14.96	1692.50	-36.49
			Max. Mx	22	0.23	2604.87	255.27
			Max. My	30	1.59	715.02	-348.98
			Max. Vy	22	0.08	2604.87	255.27
			Max. Vx	30	0.00	715.02	-348.98
		Redund Horz 1 Bracing	Max Tension	19	3.79	0.00	0.00
			Max. Compression	19	-3.79	0.00	0.00
			Max. Mx	18	0.25	-188.00	0.00
			Max. My	25	3.58	0.00	4.34
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	25	-0.00	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	19	2.51	0.00	0.00
			Max. Compression	19	-2.51	0.00	0.00
			Max. Mx	20	2.17	-241.20	0.00
			Max. My	24	1.01	0.00	-8.44
			Max. Vy	20	0.01	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Inner Bracing	Max Tension	26	0.26	0.00	0.00
			Max. Compression	26	-0.26	0.00	0.00
			Max. Mx	18	-0.01	-626.08	0.00
			Max. My	24	0.24	0.00	-3.00
			Max. Vy	18	-0.02	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
T8	50 - 37.5	Leg	Max Tension	22	202.61	-1706.11	508.74
			Max. Compression	19	-241.79	-14583.14	-1710.10
			Max. Mx	24	-240.33	-14599.70	2074.55

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment lb-in	Minor Axis Moment lb-in
			Max. My	23	-15.63	-2523.49	21354.88
			Max. Vy	30	0.18	-1343.14	-553.81
			Max. Vx	19	0.19	2908.96	-19572.42
		Diagonal	Max Tension	26	24.53	0.00	0.00
			Max. Compression	26	-25.14	0.00	0.00
			Max. Mx	20	22.91	4173.89	0.00
			Max. My	24	2.04	0.00	167.43
			Max. Vy	20	-0.09	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Top Girt	Max Tension	26	15.44	1574.80	-26.61
			Max. Compression	26	-15.43	1574.90	-25.74
			Max. Mx	22	0.60	2987.15	530.04
			Max. My	30	1.46	78.91	-625.84
			Max. Vy	22	0.07	2987.15	530.04
			Max. Vx	30	0.01	78.91	-625.84
		Inner Bracing	Max Tension	26	0.27	0.00	0.00
			Max. Compression	26	-0.27	0.00	0.00
			Max. Mx	18	-0.01	-730.42	0.00
			Max. My	24	0.25	0.00	-2.78
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
T9	37.5 - 25	Leg	Max Tension	22	229.28	8277.79	317.15
			Max. Compression	19	-273.71	-37530.78	-1709.84
			Max. Mx	19	-273.49	81881.02	1273.73
			Max. My	23	-17.33	-4565.17	30236.66
			Max. Vy	19	1.63	81881.02	1273.73
			Max. Vx	23	-0.71	-4565.17	30236.66
		Diagonal	Max Tension	26	25.36	-3415.88	134.22
			Max. Compression	26	-25.92	0.00	0.00
			Max. Mx	33	15.23	-4652.70	209.89
			Max. My	25	-24.68	2581.61	-470.72
			Max. Vy	33	0.09	-4652.56	212.84
			Max. Vx	25	-0.01	0.00	0.00
		Top Girt	Max Tension	26	15.92	1756.76	-34.62
			Max. Compression	26	-16.29	1756.76	-35.25
			Max. Mx	22	0.22	3166.93	523.46
			Max. My	30	1.49	262.57	-637.73
			Max. Vy	22	0.08	3166.93	523.46
			Max. Vx	30	0.01	262.57	-637.73
		Redund Horz 1 Bracing	Max Tension	19	4.74	0.00	0.00
			Max. Compression	19	-4.74	0.00	0.00
			Max. Mx	22	2.46	-223.74	0.00
			Max. My	25	-1.14	0.00	5.17
			Max. Vy	22	-0.01	0.00	0.00
			Max. Vx	25	0.00	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	19	3.73	0.00	0.00
			Max. Compression	19	-3.73	0.00	0.00
			Max. Mx	25	3.53	-335.20	0.00
			Max. My	24	1.49	0.00	-13.68
			Max. Vy	25	-0.01	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Inner Bracing	Max Tension	26	0.28	0.00	0.00
			Max. Compression	26	-0.28	0.00	0.00
			Max. Mx	18	-0.01	-823.14	0.00
			Max. My	24	0.26	0.00	-2.29
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
T10	25 - 0	Leg	Max Tension	22	287.53	-30783.90	-235.39
			Max. Compression	19	-341.27	0.00	-0.08

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment lb-in	Minor Axis Moment lb-in
			Max. Mx	19	-307.97	-37530.58	-1709.53
			Max. My	23	-18.66	-4565.30	30236.47
			Max. Vy	19	-0.60	33637.46	-727.79
			Max. Vx	20	-0.27	295.50	-17895.96
		Diagonal	Max Tension	26	24.99	0.00	0.00
			Max. Compression	26	-25.86	0.00	0.00
			Max. Mx	26	24.99	5793.54	0.00
			Max. My	30	-1.22	0.00	199.28
			Max. Vy	26	-0.11	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Horizontal	Max Tension	26	17.17	3174.88	-64.77
			Max. Compression	26	-17.08	3174.89	-64.88
			Max. Mx	22	3.05	4853.77	428.55
			Max. My	30	1.88	1151.46	-618.21
			Max. Vy	22	0.13	4853.77	428.55
			Max. Vx	30	0.01	1151.46	-618.21
		Inner Bracing	Max Tension	30	0.00	0.00	0.00
			Max. Compression	33	-0.02	0.00	0.00
			Max. Mx	18	-0.01	-979.29	0.00
			Max. My	24	0.00	0.00	-1.44
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	370.05	35.51	-21.26
	Max. H_x	30	370.05	35.51	-21.26
	Max. H_z	21	-305.26	-30.10	20.25
	Min. Vert	22	-314.75	-31.98	19.19
	Min. H_x	22	-314.75	-31.98	19.19
	Min. H_z	29	351.79	32.65	-21.68
Leg B	Max. Vert	24	371.48	-35.08	-21.94
	Max. H_x	32	-309.94	31.32	19.71
	Max. H_z	33	-300.30	29.27	21.04
	Min. Vert	32	-309.94	31.32	19.71
	Min. H_x	24	371.48	-35.08	-21.94
	Min. H_z	25	352.88	-32.05	-22.58
Leg A	Max. Vert	19	372.68	0.80	41.44
	Max. H_x	31	21.87	9.44	1.31
	Max. H_z	19	372.68	0.80	41.44
	Min. Vert	27	-313.15	-0.78	-37.30
	Min. H_x	23	22.46	-9.44	1.38
	Min. H_z	27	-313.15	-0.78	-37.30

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x lb-in	Overturning Moment, M_z lb-in	Torque lb-in
Dead Only	45.58	0.00	0.00	-87020.43	-63969.55	0.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	lb-in	lb-in	lb-in
Dead+Wind 0 deg - No Ice	45.58	0.14	-57.61	-65827692.12	-243829.71	245308.25
Dead+Wind 30 deg - No Ice	45.58	27.80	-48.44	-55726575.31	-31827500.71	-25425.83
Dead+Wind 45 deg - No Ice	45.58	38.97	-39.21	-45105695.03	-44612421.41	-133767.03
Dead+Wind 60 deg - No Ice	45.58	47.45	-27.41	-31509665.40	-54374529.94	-238833.63
Dead+Wind 90 deg - No Ice	45.58	55.60	0.20	262822.14	-63742326.83	-395328.48
Dead+Wind 120 deg - No Ice	45.58	49.78	28.75	32715592.65	-56773847.35	-497781.46
Dead+Wind 135 deg - No Ice	45.58	39.26	39.12	44844821.62	-45172673.21	-476433.33
Dead+Wind 150 deg - No Ice	45.58	27.98	48.08	54992546.23	-32208081.40	-427029.73
Dead+Wind 180 deg - No Ice	45.58	-0.00	54.82	62752439.97	-62188.59	-228090.50
Dead+Wind 210 deg - No Ice	45.58	-28.03	48.31	55294779.31	32145051.49	25423.09
Dead+Wind 225 deg - No Ice	45.58	-39.30	39.37	45178293.61	45094018.36	155881.07
Dead+Wind 240 deg - No Ice	45.58	-49.80	28.92	32937664.42	56670736.09	252108.34
Dead+Wind 270 deg - No Ice	45.58	-55.34	0.31	405481.99	63271088.21	398672.77
Dead+Wind 300 deg - No Ice	45.58	-47.01	-27.16	-31175931.70	53672212.47	467223.13
Dead+Wind 315 deg - No Ice	45.58	-38.54	-38.89	-44687478.68	43919229.54	459180.98
Dead+Wind 330 deg - No Ice	45.58	-27.40	-48.11	-55293195.84	31175185.92	423595.31
Dead+Ice	69.67	0.00	0.00	-179337.36	-272266.12	0.23
Dead+Wind 0 deg+Ice	69.67	0.14	-72.94	-83529391.23	-455246.57	390084.06
Dead+Wind 30 deg+Ice	69.67	35.52	-61.84	-71171366.43	-40871416.55	24021.87
Dead+Wind 45 deg+Ice	69.67	49.90	-50.17	-57739757.99	-57325793.67	-138108.39
Dead+Wind 60 deg+Ice	69.67	60.86	-35.17	-40471185.39	-69915652.27	-297015.58
Dead+Wind 90 deg+Ice	69.67	71.04	0.21	182601.18	-81631363.02	-545364.45
Dead+Wind 120 deg+Ice	69.67	63.03	36.42	41427005.43	-72200356.02	-700127.43
Dead+Wind 135 deg+Ice	69.67	50.20	50.08	57294178.29	-57907766.27	-686093.41
Dead+Wind 150 deg+Ice	69.67	35.70	61.47	70237731.59	-41269285.12	-628248.69
Dead+Wind 180 deg+Ice	69.67	-0.00	70.33	80401244.28	-274200.26	-372649.18
Dead+Wind 210 deg+Ice	69.67	-35.75	61.71	70546200.03	40785034.44	-24016.05
Dead+Wind 225 deg+Ice	69.67	-50.24	50.33	57633613.87	57408636.05	160918.66
Dead+Wind 240 deg+Ice	69.67	-63.05	36.59	41650790.01	71677489.14	309330.09
Dead+Wind 270 deg+Ice	69.67	-70.78	0.32	323469.95	80732723.07	548792.49
Dead+Wind 300 deg+Ice	69.67	-60.41	-34.91	-40133217.13	68781871.32	670287.57
Dead+Wind 315 deg+Ice	69.67	-49.46	-49.84	-57313963.41	56202407.86	668326.46
Dead+Wind 330 deg+Ice	69.67	-35.11	-61.51	-70728653.70	39790873.50	624678.92
Dead+Wind 0 deg - Service	45.58	0.14	-57.61	-65827692.12	-243829.71	245308.25
Dead+Wind 30 deg - Service	45.58	27.80	-48.44	-55726575.31	-31827500.71	-25425.83
Dead+Wind 45 deg - Service	45.58	38.97	-39.21	-45105695.03	-44612421.41	-133767.03
Dead+Wind 60 deg - Service	45.58	47.45	-27.41	-31509665.40	-54374529.94	-238833.63
Dead+Wind 90 deg - Service	45.58	55.60	0.20	262822.14	-63742326.83	-395328.48
Dead+Wind 120 deg - Service	45.58	49.78	28.75	32715592.65	-56773847.35	-497781.46
Dead+Wind 135 deg - Service	45.58	39.26	39.12	44844821.62	-45172673.21	-476433.33
Dead+Wind 150 deg - Service	45.58	27.98	48.08	54992546.23	-32208081.40	-427029.73
Dead+Wind 180 deg - Service	45.58	-0.00	54.82	62752439.97	-62188.59	-228090.50
Dead+Wind 210 deg - Service	45.58	-28.03	48.31	55294779.31	32145051.49	25423.09
Dead+Wind 225 deg - Service	45.58	-39.30	39.37	45178293.61	45094018.36	155881.07
Dead+Wind 240 deg - Service	45.58	-49.80	28.92	32937664.42	56670736.09	252108.34
Dead+Wind 270 deg - Service	45.58	-55.34	0.31	405481.99	63271088.21	398672.77
Dead+Wind 300 deg - Service	45.58	-47.01	-27.16	-31175931.70	53672212.47	467223.13
Dead+Wind 315 deg - Service	45.58	-38.54	-38.89	-44687478.68	43919229.54	459180.98
Dead+Wind 330 deg - Service	45.58	-27.40	-48.11	-55293195.84	31175185.92	423595.31

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-45.58	0.00	0.00	45.58	0.00	0.000%
2	0.14	-45.58	-57.61	-0.14	45.58	57.61	0.000%
3	27.80	-45.58	-48.44	-27.80	45.58	48.44	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
4	38.97	-45.58	-39.21	-38.97	45.58	39.21	0.000%
5	47.45	-45.58	-27.41	-47.45	45.58	27.41	0.000%
6	55.60	-45.58	0.20	-55.60	45.58	-0.20	0.000%
7	49.78	-45.58	28.75	-49.78	45.58	-28.75	0.000%
8	39.26	-45.58	39.12	-39.26	45.58	-39.12	0.000%
9	27.98	-45.58	48.08	-27.98	45.58	-48.08	0.000%
10	-0.00	-45.58	54.82	0.00	45.58	-54.82	0.000%
11	-28.03	-45.58	48.31	28.03	45.58	-48.31	0.000%
12	-39.30	-45.58	39.37	39.30	45.58	-39.37	0.000%
13	-49.80	-45.58	28.92	49.80	45.58	-28.92	0.000%
14	-55.34	-45.58	0.31	55.34	45.58	-0.31	0.000%
15	-47.01	-45.58	-27.16	47.01	45.58	27.16	0.000%
16	-38.54	-45.58	-38.89	38.54	45.58	38.89	0.000%
17	-27.40	-45.58	-48.11	27.40	45.58	48.11	0.000%
18	0.00	-69.67	0.00	0.00	69.67	0.00	0.000%
19	0.14	-69.67	-72.94	-0.14	69.67	72.94	0.000%
20	35.52	-69.67	-61.84	-35.52	69.67	61.84	0.000%
21	49.90	-69.67	-50.17	-49.90	69.67	50.17	0.000%
22	60.86	-69.67	-35.17	-60.86	69.67	35.17	0.000%
23	71.04	-69.67	0.21	-71.04	69.67	-0.21	0.000%
24	63.03	-69.67	36.42	-63.03	69.67	-36.42	0.000%
25	50.20	-69.67	50.08	-50.20	69.67	-50.08	0.000%
26	35.70	-69.67	61.47	-35.70	69.67	-61.47	0.000%
27	-0.00	-69.67	70.33	0.00	69.67	-70.33	0.000%
28	-35.75	-69.67	61.71	35.75	69.67	-61.71	0.000%
29	-50.24	-69.67	50.33	50.24	69.67	-50.33	0.000%
30	-63.05	-69.67	36.59	63.05	69.67	-36.59	0.000%
31	-70.78	-69.67	0.32	70.78	69.67	-0.32	0.000%
32	-60.41	-69.67	-34.91	60.41	69.67	34.91	0.000%
33	-49.46	-69.67	-49.84	49.46	69.67	49.84	0.000%
34	-35.11	-69.67	-61.51	35.11	69.67	61.51	0.000%
35	0.14	-45.58	-57.61	-0.14	45.58	57.61	0.000%
36	27.80	-45.58	-48.44	-27.80	45.58	48.44	0.000%
37	38.97	-45.58	-39.21	-38.97	45.58	39.21	0.000%
38	47.45	-45.58	-27.41	-47.45	45.58	27.41	0.000%
39	55.60	-45.58	0.20	-55.60	45.58	-0.20	0.000%
40	49.78	-45.58	28.75	-49.78	45.58	-28.75	0.000%
41	39.26	-45.58	39.12	-39.26	45.58	-39.12	0.000%
42	27.98	-45.58	48.08	-27.98	45.58	-48.08	0.000%
43	-0.00	-45.58	54.82	0.00	45.58	-54.82	0.000%
44	-28.03	-45.58	48.31	28.03	45.58	-48.31	0.000%
45	-39.30	-45.58	39.37	39.30	45.58	-39.37	0.000%
46	-49.80	-45.58	28.92	49.80	45.58	-28.92	0.000%
47	-55.34	-45.58	0.31	55.34	45.58	-0.31	0.000%
48	-47.01	-45.58	-27.16	47.01	45.58	27.16	0.000%
49	-38.54	-45.58	-38.89	38.54	45.58	38.89	0.000%
50	-27.40	-45.58	-48.11	27.40	45.58	48.11	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001

5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000110
20	Yes	4	0.00000001	0.00000081
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000120
25	Yes	4	0.00000001	0.00000114
26	Yes	4	0.00000001	0.00000094
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000081
29	Yes	4	0.00000001	0.00000102
30	Yes	4	0.00000001	0.00000113
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000093
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 150	9.025	35	0.4319	0.0850
T2	150 - 125	8.100	35	0.4312	0.0813
T3	125 - 100	5.787	35	0.4069	0.0604
T4	100 - 75	3.756	35	0.3293	0.0434
T5	75 - 66.6667	2.106	35	0.2622	0.0306
T6	66.6667 - 58.3333	1.639	35	0.2385	0.0266
T7	58.3333 - 50	1.216	35	0.2126	0.0225
T8	50 - 37.5	0.865	35	0.1703	0.0184

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T9	37.5 - 25	0.472	35	0.1224	0.0129
T10	25 - 0	0.210	35	0.0707	0.0075

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
177.00	Lightning Rod 5/8x4'	35	9.025	0.4319	0.0850	110091
168.00	16'x2.5" Pipe Mount	35	9.025	0.4319	0.0850	110091
160.50	Tower Light	35	9.025	0.4319	0.0850	110091
160.00	6' w/ Radome	35	9.025	0.4319	0.0850	110091
155.00	6' Side-Arm	35	8.564	0.4317	0.0834	110091
153.00	DB304	35	8.379	0.4316	0.0827	80116
143.00	OGT9-806	35	7.445	0.4292	0.0766	Inf
138.00	T-Frame	35	6.976	0.4260	0.0723	72621
130.00	SC479-HF1LDF	35	6.237	0.4165	0.0649	28870
125.00	RR90-17-02DP	35	5.787	0.4069	0.0604	21905
122.81	SC479-HF1LDF	35	5.595	0.4017	0.0585	20964
122.00	PD1142	35	5.524	0.3996	0.0579	20801
120.00	3' Sidearm	35	5.351	0.3941	0.0563	20596
115.63	SC479-HF1LDF	35	4.982	0.3809	0.0531	20277
115.00	4"x96"x72" Ice Canopy	35	4.930	0.3789	0.0526	20232
110.00	6' w/ Radome	35	4.523	0.3623	0.0493	19881
97.30	APXVSPP18-C-A20	35	3.559	0.3212	0.0419	19307
94.00	Sector Frame	35	3.325	0.3119	0.0402	19406
85.00	PD10054	35	2.720	0.2885	0.0356	19703
55.00	GPS	35	1.066	0.1965	0.0208	10692

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 150	11.434	19	0.5468	0.1233
T2	150 - 125	10.265	19	0.5459	0.1178
T3	125 - 100	7.337	19	0.5153	0.0876
T4	100 - 75	4.764	19	0.4173	0.0627
T5	75 - 66.6667	2.673	19	0.3324	0.0439
T6	66.6667 - 58.3333	2.081	19	0.3024	0.0379
T7	58.3333 - 50	1.544	19	0.2697	0.0320
T8	50 - 37.5	1.098	19	0.2161	0.0261
T9	37.5 - 25	0.599	19	0.1553	0.0182
T10	25 - 0	0.266	19	0.0898	0.0106

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
177.00	Lightning Rod 5/8x4'	19	11.434	0.5468	0.1233	83667
168.00	16'x2.5" Pipe Mount	19	11.434	0.5468	0.1233	83667
160.50	Tower Light	19	11.434	0.5468	0.1233	83667
160.00	6' w/ Radome	19	11.434	0.5468	0.1233	83667
155.00	6' Side-Arm	19	10.851	0.5466	0.1209	83667
153.00	DB304	19	10.617	0.5464	0.1198	60841
143.00	OGT9-806	19	9.435	0.5433	0.1110	583014
138.00	T-Frame	19	8.842	0.5394	0.1048	58520
130.00	SC479-HF1LDF	19	7.906	0.5274	0.0941	22995
125.00	RR90-17-02DP	19	7.337	0.5153	0.0876	17411
122.81	SC479-HF1LDF	19	7.093	0.5087	0.0849	16652
122.00	PD1142	19	7.004	0.5061	0.0840	16519
120.00	3' Sidearm	19	6.785	0.4992	0.0817	16347
115.63	SC479-HF1LDF	19	6.317	0.4825	0.0769	16074
115.00	4"x96"x72" Ice Canopy	19	6.251	0.4800	0.0763	16036
110.00	6' w/ Radome	19	5.736	0.4590	0.0714	15736
97.30	APXVSPP18-C-A20	19	4.514	0.4071	0.0605	15254
94.00	Sector Frame	19	4.218	0.3954	0.0579	15343
85.00	PD10054	19	3.452	0.3657	0.0511	15609
55.00	GPS	19	1.354	0.2492	0.0296	8440

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	160	Leg	A325X	0.7500	6	0.00	19.44	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	4.49	12.23	0.367 ✔	1.333	Member Bearing
		Horizontal	A325X	0.6250	2	1.76	9.20	0.192 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	2	1.21	6.44	0.188 ✔	1.333	Bolt Shear
T2	150	Leg	A325X	0.7500	6	1.04	19.44	0.054 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	11.87	12.23	0.971 ✔	1.333	Member Bearing
		Horizontal	A325X	0.6250	2	3.75	8.16	0.460 ✔	1.333	Member Bearing
T3	125	Leg	A325X	0.7500	6	6.37	19.44	0.328 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	15.42	16.31	0.945 ✔	1.333	Member Bearing
		Horizontal	A325X	0.6250	2	5.24	9.20	0.569 ✔	1.333	Bolt Shear
T4	100	Leg	A325X	0.7500	6	14.40	19.44	0.741 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	18.37	16.31	1.126 ✔	1.333	Member Bearing
		Horizontal	A325X	0.6250	2	6.66	9.20	0.723 ✔	1.333	Bolt Shear
T5	75	Leg	A325X	0.8750	6	23.93	26.46	0.904 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	18.83	16.31	1.154 ✔	1.333	Member Bearing
		Horizontal	A325X	0.6250	2	6.95	9.20	0.755 ✔	1.333	Bolt Shear
T6	66.6667	Leg	A325X	0.8750	6	27.22	26.46	1.029 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	19.28	16.31	1.182 ✔	1.333	Member Bearing
		Top Girt	A325X	0.6250	2	7.25	9.20	0.788 ✔	1.333	Bolt Shear

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
T7	58.3333	Leg	A325X	0.8750	6	30.35	26.46	1.147 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	19.59	16.31	1.201 ✓	1.333	Member Bearing
		Top Girt	A325X	0.6250	2	7.48	9.20	0.813 ✓	1.333	Bolt Shear
T8	50	Leg	A325X	1.0000	8	25.33	34.56	0.733 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	24.53	27.19	0.902 ✓	1.333	Member Bearing
T9	37.5	Leg	A325X	1.0000	8	28.66	34.56	0.829 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	25.36	27.19	0.933 ✓	1.333	Member Bearing
		Top Girt	A325X	0.6250	2	8.14	9.20	0.885 ✓	1.333	Bolt Shear
T10	25	Leg	A325X	1.0000	8	32.51	34.56	0.941 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	25.86	32.99	0.784 ✓	1.333	Bolt Shear
		Horizontal	A325X	0.6250	2	8.59	9.20	0.933 ✓	1.333	Bolt Shear

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	160 - 150	P.5x.250	10.01	5.01	35.7 K=1.00	26.418	3.7306	-4.93	98.56	0.050 ✓
T2	150 - 125	P.5x.250	25.03	8.34	59.5 K=1.00	22.798	3.7306	-33.43	85.05	0.393 ✓
T3	125 - 100	P.5x.250	25.03	8.34	59.5 K=1.00	22.798	3.7306	-86.33	85.05	1.015 ✓
T4	100 - 75	P5x0.3 w/ (3) 1.5x5/8 Plates	25.03	8.34	51.4 K=1.00	24.126	7.2544	-151.03	175.02	0.863 ✓
T5	75 - 66.6667	P5x0.4 w/ (3) 1.5x5/8 Plates	8.34	8.34	53.2 K=1.00	23.840	8.6530	-173.63	206.29	0.842 ✓
T6	66.6667 - 58.3333	P5x0.4 w/ (3) 1.5x5/8 Plates	8.34	8.34	53.2 K=1.00	23.840	8.6530	-196.29	206.29	0.952 ✓
T7	58.3333 - 50	HSS5x.4	8.34	4.17	30.7 K=1.00	32.038	5.7805	-218.52	185.20	1.180 ✓
T8	50 - 37.5	HSS6.875x.4	12.51	12.51	65.5 K=1.00	24.741	8.1367	-241.79	201.31	1.201 ✓
T9	37.5 - 25	HSS6.875x.4	12.51	6.26	32.7 K=1.00	31.679	8.1367	-273.71	257.76	1.062 ✓
T10	25 - 0	HSS6.875x0.5 w/ (3) 2x5/8 Bars	25.03	12.51	58.7 K=1.00	22.946	13.1229	-341.27	301.12	1.133 ✓

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	160 - 150	2L2 1/2x2x3/16	7.43	6.88	112.1 K=1.08	11.392	1.6200	-4.66	18.45	0.253 ✔
T2	150 - 125	2L2 1/2x2x3/16	10.57	9.96	151.3 K=1.00	6.523	1.6200	-12.04	10.57	1.139 ✔
T3	125 - 100	2L2 1/2x2x1/4	11.21	10.63	162.7 K=1.00	5.640	2.1300	-15.72	12.01	1.308 ✔
T4	100 - 75	2L3x2 1/2x1/4	11.91	11.21	142.4 K=1.00	7.367	2.6300	-18.83	19.38	0.972 ✔
T5	75 - 66.6667	2L3x2 1/2x1/4	12.15	11.46	145.5 K=1.00	7.052	2.6300	-19.31	18.55	1.041 ✔
T6	66.6667 - 58.3333	2L3x2 1/2x1/4	12.39	11.71	148.7 K=1.00	6.752	2.6300	-19.79	17.76	1.114 ✔
T7	58.3333 - 50	2L3x2 1/2x1/4	12.64	12.09	145.1 K=1.00	7.094	2.6300	-20.13	18.66	1.079 ✔
T8	50 - 37.5	2L3 1/2x3x5/16	16.01	15.22	166.0 K=1.00	5.418	3.8700	-25.14	20.97	1.199 ✔
T9	37.5 - 25	2L3 1/2x3x5/16	16.33	15.55	154.2 K=1.00	6.280	3.8700	-25.92	24.30	1.066 ✔
T10	25 - 0	2L3 1/2x3x3/8	16.99	16.06	176.8 K=1.00	4.780	4.5900	-25.86	21.94	1.179 ✔

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 $\frac{P}{P_a}$
T1	160 - 150	L3x3x1/4	10.60	10.18	102.7 K=0.78	12.633	1.4400	-3.53	18.19	0.194 ✔
T2	150 - 125	L2 1/2x2 1/2x3/16	12.33	5.96	139.3 K=0.96	7.694	0.9020	-7.50	6.94	1.081 ✔
T3	125 - 100	L3x2 1/2x1/4	14.33	6.96	153.6 K=0.97	6.332	1.3100	-10.47	8.30	1.262 ✔
T4	100 - 75	L3x3x1/2	16.33	7.86	155.1 K=0.96	6.210	2.7500	-13.17	17.08	0.771 ✔
T5	75 - 66.6667	L3x3x1/2	17.00	8.20	161.1 K=0.96	5.751	2.7500	-13.76	15.82	0.870 ✔
T10	25 - 0	L4x4x1/2	22.00	10.59	155.6 K=0.96	6.165	3.7500	-17.08	23.12	0.739 ✔

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	160 - 150	L3x3x1/4	10.20	9.39	120.7	10.183	1.4400	-2.42	14.66	0.165

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					✓
T4	100 - 75	L3x3x1/4	15.00	7.29	137.8 K=0.93	7.868	1.4400	-11.53	11.33	1.017 ✓
T6	66.6667 - 58.3333	L3x3x1/2	17.67	8.33	158.0 K=0.92	5.981	2.7500	-14.32	16.45	0.871 ✓
T7	58.3333 - 50	L3x3x1/2	18.33	8.67	163.8 K=0.92	5.566	2.7500	-14.96	15.31	0.977 ✓
T8	50 - 37.5	L4x4x1/4	19.00	9.29	131.3 K=0.94	8.667	1.9400	-15.43	16.81	0.918 ✓
T9	37.5 - 25	L4x4x1/4	20.00	9.52	134.2 K=0.93	8.295	1.9400	-16.29	16.09	1.012 ✓

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T7	58.3333 - 50	L2x2x5/16	4.58	4.38	134.6 K=1.00	8.241	1.1500	-3.79	9.48	0.400 ✓
T9	37.5 - 25	L2x2x5/16	5.00	4.71	145.0 K=1.00	7.099	1.1500	-4.74	8.16	0.581 ✓

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T7	58.3333 - 50	L2x2x5/16	6.07	5.66	174.1 K=1.00	4.927	1.1500	-2.51	5.67	0.443 ✓
T9	37.5 - 25	L2x2x5/16	7.85	7.38	227.0 K=1.00	2.897	1.1500	-3.73	3.33	1.118 ✓

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T3	125 - 100	L2 1/2x2x3/16	7.17	7.17	201.4 K=1.00	3.681	0.8090	-0.01	2.98	0.004 ✓
T4	100 - 75	L2 1/2x2x3/16	7.50	7.50	210.8 K=1.00	3.361	0.8090	-0.20	2.72	0.073 ✓
T5	75 - 66.6667	L2 1/2x2x3/16	8.50	8.50	238.9 K=1.00	2.617	0.8090	-0.01	2.12	0.007 ✓
T6	66.6667 -	L2 1/2x2x3/16	8.83	8.83	248.2	2.423	0.8090	-0.25	1.96	0.127

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 $\frac{P}{P_a}$
	58.3333				K=1.00					✔
T7	58.3333 - 50	L2 1/2x2x3/16	9.17	9.17	257.6 K=1.00	2.250	0.8090	-0.26	1.82	0.142 ✔
		KL/R > 250 (C) - 184								
T8	50 - 37.5	L2 1/2x2 1/2x3/16	9.50	9.50	230.3 K=1.00	2.815	0.9020	-0.27	2.54	0.105 ✔
T9	37.5 - 25	L2 1/2x2 1/2x3/16	10.00	10.00	242.4 K=1.00	2.541	0.9020	-0.28	2.29	0.123 ✔
T10	25 - 0	L2 1/2x2 1/2x3/16	11.00	11.00	266.7 K=1.00	2.100	0.9020	-0.02	1.89	0.010 ✔
		KL/R > 250 (C) - 241								

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	160 - 150	P.5x.250	10.01	5.01	35.7	30.000	3.7306	1.89	111.92	0.017 ✔
T2	150 - 125	P.5x.250	25.03	8.34	59.5	30.000	3.7306	24.45	111.92	0.218 ✔
T3	125 - 100	P.5x.250	25.03	8.34	59.5	30.000	3.7306	69.28	111.92	0.619 ✔
T4	100 - 75	P5x0.3 w/ (3) 1.5x5/8 Plates	25.03	8.34	51.4	30.000	7.2544	123.79	217.63	0.569 ✔
T5	75 - 66.6667	P5x0.4 w/ (3) 1.5x5/8 Plates	8.34	8.34	53.2	30.000	8.6530	143.56	259.59	0.553 ✔
T6	66.6667 - 58.3333	P5x0.4 w/ (3) 1.5x5/8 Plates	8.34	8.34	53.2	30.000	8.6530	163.30	259.59	0.629 ✔
T7	58.3333 - 50	HSS5x.4	8.34	4.17	30.7	36.000	5.7805	182.10	208.10	0.875 ✔
T8	50 - 37.5	HSS6.875x.4	12.51	12.51	65.5	36.000	8.1367	202.61	292.92	0.692 ✔
T9	37.5 - 25	HSS6.875x.4	12.51	6.26	32.7	36.000	8.1367	229.28	292.92	0.783 ✔
T10	25 - 0	HSS6.875x0.5 w/ (3) 2x5/8 Bars	25.03	12.51	58.7	30.000	13.1229	287.53	393.69	0.730 ✔

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	160 - 150	2L2 1/2x2x3/16	7.43	6.88	108.6	29.000	0.9689	4.49	28.10	0.160

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 $\frac{P}{P_a}$
T2	150 - 125	2L2 1/2x2x3/16	10.57	9.96	155.4	29.000	0.9689	11.87	28.10	0.423
T3	125 - 100	2L2 1/2x2x1/4	11.21	10.63	166.9	29.000	1.2694	15.42	36.81	0.419
T4	100 - 75	2L3x2 1/2x1/4	11.91	11.21	145.8	29.000	1.6444	18.37	47.69	0.385
T5	75 - 66.6667	2L3x2 1/2x1/4	12.15	11.46	149.0	29.000	1.6444	18.83	47.69	0.395
T6	66.6667 - 58.3333	2L3x2 1/2x1/4	12.39	11.71	152.2	29.000	1.6444	19.28	47.69	0.404
T7	58.3333 - 50	2L3x2 1/2x1/4	12.64	12.09	148.3	29.000	1.6444	19.59	47.69	0.411
T8	50 - 37.5	2L3 1/2x3x5/16	16.01	15.22	169.7	29.000	2.3752	24.53	68.88	0.356
T9	37.5 - 25	2L3 1/2x3x5/16	16.33	15.55	157.5	29.000	2.3752	25.36	68.88	0.368
T10	25 - 0	2L3 1/2x3x3/8	16.99	16.06	180.4	29.000	2.8097	24.99	81.48	0.307

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 $\frac{P}{P_a}$
T1	160 - 150	L3x3x1/4	10.60	10.18	131.4	29.000	0.9394	3.49	27.24	0.128
T2	150 - 125	L2 1/2x2 1/2x3/16	12.33	5.96	183.8	29.000	0.5710	7.43	16.56	0.449
T3	125 - 100	L3x2 1/2x1/4	14.33	6.96	111.1	29.000	0.8419	10.41	24.41	0.426
T4	100 - 75	L3x3x1/2	16.33	7.86	105.1	29.000	1.7813	13.31	51.66	0.258
T5	75 - 66.6667	L3x3x1/2	17.00	8.20	109.6	29.000	1.7813	13.90	51.66	0.269
T10	25 - 0	L4x4x1/2	22.00	10.59	104.2	29.000	2.5313	17.17	73.41	0.234

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	160 - 150	L3x3x1/4	10.20	9.39	126.2	29.000	0.9394	2.23	27.24	0.082
T4	100 - 75	L3x3x1/4	15.00	7.29	94.1	21.600	1.4400	11.47	31.10	0.369

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 $\frac{P}{P_a}$
T6	66.6667 - 58.3333	L3x3x1/2	17.67	8.33	114.0	29.000	1.7813	14.50	51.66	0.281 ✔
T7	58.3333 - 50	L3x3x1/2	18.33	8.67	118.5	29.000	1.7813	14.77	51.66	0.286 ✔
T8	50 - 37.5	L4x4x1/4	19.00	9.29	89.2	21.600	1.9400	15.44	41.90	0.368 ✔
T9	37.5 - 25	L4x4x1/4	20.00	9.52	93.3	29.000	1.3144	15.92	38.12	0.418 ✔

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T7	58.3333 - 50	L2x2x5/16	4.58	4.38	87.4	21.600	1.1500	3.79	24.84	0.152 ✔
T9	37.5 - 25	L2x2x5/16	5.00	4.71	94.1	21.600	1.1500	4.74	24.84	0.191 ✔

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T7	58.3333 - 50	L2x2x5/16	6.07	5.66	113.0	21.600	1.1500	2.51	24.84	0.101 ✔
T9	37.5 - 25	L2x2x5/16	7.85	7.38	147.3	21.600	1.1500	3.73	24.84	0.150 ✔

Inner Bracing 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 $\frac{P}{P_a}$
T3	125 - 100	L2 1/2x2x3/16	7.17	7.17	143.4	21.600	0.8090	0.00	17.47	0.000 ✔
T4	100 - 75	L2 1/2x2x3/16	7.50	7.50	150.1	21.600	0.8090	0.20	17.47	0.011 ✔
T5	75 - 66.6667	L2 1/2x2x3/16	8.50	8.50	170.1	21.600	0.8090	0.00	17.47	0.000 ✔
T6	66.6667 - 58.3333	L2 1/2x2x3/16	8.83	8.83	176.7	21.600	0.8090	0.25	17.47	0.014 ✔
T7	58.3333 - 50	L2 1/2x2x3/16	9.17	9.17	183.4	21.600	0.8090	0.26	17.47	0.015 ✔

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 $\frac{P}{P_a}$
T8	50 - 37.5	L2 1/2x2 1/2x3/16	9.50	9.50	146.5	21.600	0.9020	0.27	19.48	0.014 ✔
T9	37.5 - 25	L2 1/2x2 1/2x3/16	10.00	10.00	154.2	21.600	0.9020	0.28	19.48	0.014 ✔
T10	25 - 0	L2 1/2x2 1/2x3/16	10.50	10.50	162.0	21.600	0.9020	0.00	19.48	0.000 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	160 - 150	Leg	P.5x.250	3	-4.93	131.38	3.8	Pass
T2	150 - 125	Leg	P.5x.250	24	-33.43	113.37	29.5	Pass
T3	125 - 100	Leg	P.5x.250	54	-86.33	113.37	76.2	Pass
T4	100 - 75	Leg	P5x0.3 w/ (3) 1.5x5/8 Plates	93	-151.03	233.30	64.7	Pass
T5	75 - 66.6667	Leg	P5x0.4 w/ (3) 1.5x5/8 Plates	132	-173.63	274.98	63.1 67.8 (b)	Pass
T6	66.6667 - 58.3333	Leg	P5x0.4 w/ (3) 1.5x5/8 Plates	147	-196.29	274.98	71.4 77.2 (b)	Pass
T7	58.3333 - 50	Leg	HSS5x.4	162	-218.52	246.87	88.5	Pass
T8	50 - 37.5	Leg	HSS6.875x.4	189	-241.79	268.35	90.1	Pass
T9	37.5 - 25	Leg	HSS6.875x.4	204	-273.71	343.60	79.7	Pass
T10	25 - 0	Leg	HSS6.875x0.5 w/ (3) 2x5/8 Bars	231	-341.27	401.39	85.0	Pass
T1	160 - 150	Diagonal	2L2 1/2x2x3/16	11	-4.66	24.60	19.0 27.6 (b)	Pass
T2	150 - 125	Diagonal	2L2 1/2x2x3/16	29	-12.04	14.09	85.5	Pass
T3	125 - 100	Diagonal	2L2 1/2x2x1/4	63	-15.72	16.01	98.1	Pass
T4	100 - 75	Diagonal	2L3x2 1/2x1/4	101	-18.83	25.83	72.9 84.5 (b)	Pass
T5	75 - 66.6667	Diagonal	2L3x2 1/2x1/4	137	-19.31	24.72	78.1 86.6 (b)	Pass
T6	66.6667 - 58.3333	Diagonal	2L3x2 1/2x1/4	153	-19.79	23.67	83.6 88.7 (b)	Pass
T7	58.3333 - 50	Diagonal	2L3x2 1/2x1/4	172	-20.13	24.87	80.9 90.1 (b)	Pass
T8	50 - 37.5	Diagonal	2L3 1/2x3x5/16	195	-25.14	27.95	89.9	Pass
T9	37.5 - 25	Diagonal	2L3 1/2x3x5/16	214	-25.92	32.40	80.0	Pass
T10	25 - 0	Diagonal	2L3 1/2x3x3/8	236	-25.86	29.24	88.4	Pass
T1	160 - 150	Horizontal	L3x3x1/4	10	-3.53	24.25	14.5	Pass
T2	150 - 125	Horizontal	L2 1/2x2 1/2x3/16	28	-7.50	9.25	81.1	Pass
T3	125 - 100	Horizontal	L3x2 1/2x1/4	61	-10.47	11.06	94.7	Pass
T4	100 - 75	Horizontal	L3x3x1/2	100	-13.17	22.76	57.8	Pass
T5	75 - 66.6667	Horizontal	L3x3x1/2	136	-13.76	21.08	65.3	Pass
T10	25 - 0	Horizontal	L4x4x1/2	235	-17.08	30.82	55.4 70.0 (b)	Pass
T1	160 - 150	Top Girt	L3x3x1/4	5	-2.42	19.55	12.4 14.1 (b)	Pass
T4	100 - 75	Top Girt	L3x3x1/4	96	-11.53	15.10	76.3	Pass
T6	66.6667 - 58.3333	Top Girt	L3x3x1/2	149	-14.32	21.92	65.3	Pass
T7	58.3333 - 50	Top Girt	L3x3x1/2	164	-14.96	20.40	73.3	Pass
T8	50 - 37.5	Top Girt	L4x4x1/4	191	-15.43	22.41	68.9	Pass
T9	37.5 - 25	Top Girt	L4x4x1/4	206	-16.29	21.45	75.9	Pass
T7	58.3333 - 50	Redund Horz 1 Bracing	L2x2x5/16	176	-3.79	12.63	30.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T9	37.5 - 25	Redund Horz 1 Bracing	L2x2x5/16	218	-4.74	10.88	43.6	Pass
T7	58.3333 - 50	Redund Diag 1 Bracing	L2x2x5/16	180	-2.51	7.55	33.2	Pass
T9	37.5 - 25	Redund Diag 1 Bracing	L2x2x5/16	219	-3.73	4.44	83.9	Pass
T3	125 - 100	Inner Bracing	L2 1/2x2x3/16	66	-0.01	3.97	0.3	Pass
T4	100 - 75	Inner Bracing	L2 1/2x2x3/16	128	-0.20	3.62	5.5	Pass
T5	75 - 66.6667	Inner Bracing	L2 1/2x2x3/16	142	-0.01	2.82	0.5	Pass
T6	66.6667 - 58.3333	Inner Bracing	L2 1/2x2x3/16	157	-0.25	2.61	9.5	Pass
T7	58.3333 - 50	Inner Bracing	L2 1/2x2x3/16	184	-0.26	2.43	10.7	Pass
T8	50 - 37.5	Inner Bracing	L2 1/2x2 1/2x3/16	199	-0.27	3.39	7.9	Pass
T9	37.5 - 25	Inner Bracing	L2 1/2x2 1/2x3/16	227	-0.28	3.06	9.2	Pass
T10	25 - 0	Inner Bracing	L2 1/2x2 1/2x3/16	241	-0.02	2.52	0.7	Pass
							Summary	
						Leg (T8)	90.1	Pass
						Diagonal (T3)	98.1	Pass
						Horizontal (T3)	94.7	Pass
						Top Girt (T4)	76.3	Pass
						Redund Horz 1 Bracing (T9)	43.6	Pass
						Redund Diag 1 Bracing (T9)	83.9	Pass
						Inner Bracing (T7)	10.7	Pass
						Bolt Checks	90.1	Pass
						RATING =	**98.1**	**Pass**

ANCHOR BOLT EVALUATION

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	$Uplift := 315 \cdot kips$	*user input*
Shear:	$Shear := 41 \cdot kips$	*user input*
Compression:	$Compression := 373 \cdot kips$	*user input*

Anchor Bolt Data:

Use ASTM A36 per page 4.1 of structural analysis dated November 23, 1993

Number of Anchor Bolts = N	$N := 6$	*user input*	
Bolt Ultimate Strength:	$F_u := 58 \cdot ksi$	*user input*	
Bolt Yield Strength:	$Fy := 36 \cdot ksi$	*user input*	
Bolt Modulus:	$E := 29000 \cdot ksi$	*user input*	
Thickness of Anchor Bolts	$D := 1.75in$	*user input*	
Threads per Inch:	$n := 5$	*user input*	
Coefficient of Friction:	$\mu := 0.55$	*user input*	(for baseplate with grout ASCE 10-97)

Anchor Bolt Area:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 2.405 \cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 \qquad A_n = 1.899 \cdot in^2$$

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$AllowableTension := 1.33 \cdot (0.33 \cdot A_g \cdot F_u) \qquad AllowableTension = 61.2 \cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.33 \cdot (0.60 \cdot A_n \cdot Fy) \qquad F_{net.area} = 54.6 \cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 52.5 \cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.96$$

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

Condition1 = "OK"

Check Anchor Bolt Area:

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

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 11.2 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 4.2 \cdot in^2$$

Provided Area:

$$A_{sprovided} := A_n \cdot N \qquad A_{sprovided} = 11.4 \cdot in^2$$

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.98$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.37$$

Condition3 = "OK"

FOUNDATION EVALUATION

PIER AND MAT FOUNDATION ANALYSIS - 3 PIERS

TOWER FORCES:

Moment Caused by Tower	$M_t := 6961 \cdot kip \cdot ft$
Shear at Base of Tower	$S_t := 73 \cdot kip$
Max Compressive Force	$C_t := 373 \cdot kip$
Max Uplift	$U_t := 315 \cdot kip$
Height of Tower	$H_t := 160 \cdot ft$
Width of Tower at Base	$W_t := 23 \cdot ft$
Weight of Tower	$WT_t := 1 \cdot kip$

NOTE: Weight of Tower is incorporated into the other loads listed above and is therefore set equal to one for programming.

FOOTING DIMENSIONS:

Width of Footing	$W_f := 34 \cdot ft + 0ft$
Overall Depth of Footing	$D_f := 5ft$
Length of Pier	$L_p := 3.75 \cdot ft$
Extension of Pier Above Grade	$L_{pag} := 1 \cdot ft$
Diameter of Pier	$d_p := 3.5 \cdot ft$
Thickness of Footing	$T_f := 2.25 \cdot ft + 0ft$
Reinforement Cover:	$Cvr := 3in$

MATERIAL PROPERTIES:

Compressive Strength of Concrete	$f'c := 3000 \cdot psi$	Unit Weight of Soil	$\gamma_s := 125 \cdot pcf$
Yield Strength of Steel Reinforcement	$fy := 60000 \cdot psi$	Unit Weight of Concrete	$\gamma_c := 150 \cdot pcf$
Internal Friction Angle of Soil	$\phi_s := 34 \cdot deg$	Depth to Neglect	$n := 0 \cdot ft$
Allowable Bearing Capacity	$q_s := 4500 \cdot psf$	Cohesion of Clay Type Soil Note: Use 0 for Sandy Soil	$c := 0 \cdot ksf$
Coefficient of Lateral Soil Pressure	$K_p := \frac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)}$	$K_p = 3.5371$	

What is Position of Center of Tower with respect to Center of Pad? 1=Offset 2=Not Offset $Pos_{tower} := 2$

STEEL REINFORCING:

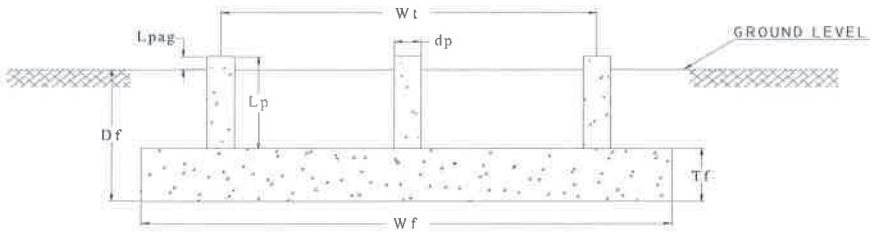
PIER REINFORCEMENT:

Bar Size	$BSpier := 9$	Bar Diameter	$d_{bpier} := 1.128 \cdot in$
Number of Bars	$NBpier := 9$	Bar Area	$A_{bpier} := 1 \cdot in^2$

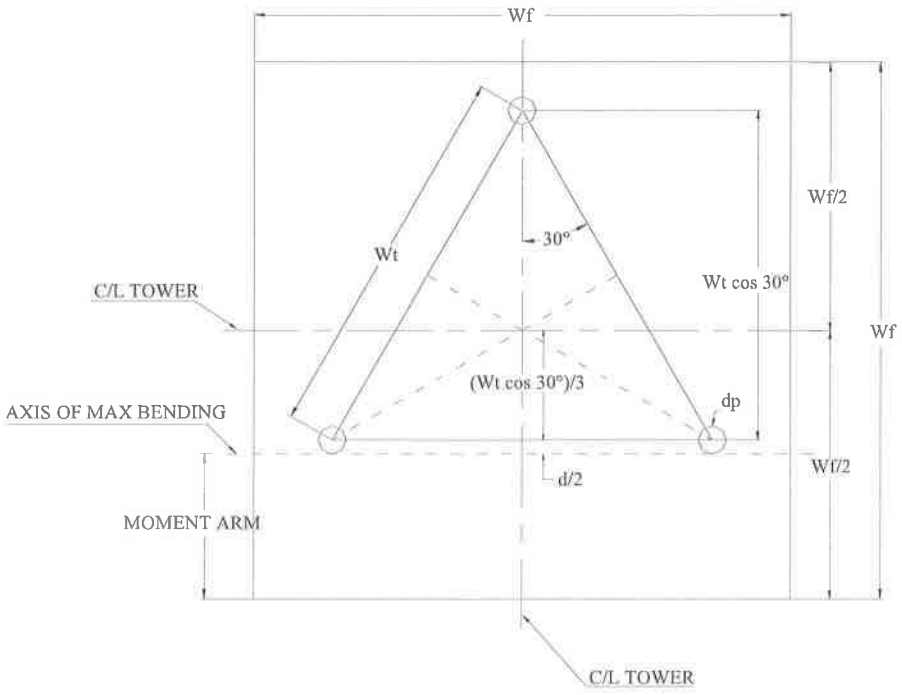
PAD REINFORCEMENT:

Bar Size	$BS_{pad} := 11$	Bar Diameter	$d_{bpad} := 1.410 \cdot in$
Number of Bars	$NB_{pad} := 32$	Bar Area	$A_{bpad} := 1.56 \cdot in^2$

FOUNDATION OVERVIEW



ELEVATION



PLAN

STABILITY OF FOOTING

Factor of Safety Req'd: $FS_{req} := 2$

Passive Pressure:

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p}$ $\quad P_{pt} = 1.2159 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}]$ $\quad P_{top} = 1.2159 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p}$ $\quad P_{bot} = 2.2107 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2}$ $\quad P_{ave} = 1.7133 \cdot ksf$

Shear:

$T_{pp} := if[n < (D_f - T_f), T_f, (D_f - n)]$ $\quad T_{pp} = 2.25 \cdot ft$

$A_{pp} := W_f \cdot T_{pp}$ $\quad A_{pp} = 76.5 \cdot ft^2$

Ultimate Shear: $S_u := P_{ave} \cdot A_{pp}$ $\quad S_u = 131.0673 \cdot kip$

Weight of Concrete Pad: $WT_c := \left(W_f^2 \cdot T_f\right) \cdot \gamma_c + \left[617.4619 ft^3 \cdot (\gamma_c - \gamma_s)\right] + 56.13290 \cdot \gamma_c$ $\quad WT_c = 414.0065 \cdot kip$

Weight of Soil: above Footing: $WT_{s1} := W_f^2 \left(\left|D_f - T_f\right|\right) \cdot \gamma_s$ $\quad WT_{s1} = 397.375 \cdot kip$

See Attached Hand calc for additional Concrete weight

Weight of Soil Wedge at back face: $WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\phi_s)}{2} \cdot W_f\right] \cdot \gamma_s$ $\quad WT_{s2} = 35.8333 \cdot kip$

Distance to center of Tower Leg from Edge of Footing:

$X_{t1} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot deg)}{2}$ $\qquad X_{t2} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot deg)}{3}$

$X_t := if(Pos_{tower} = 1, X_{t1}, X_{t2})$ $\quad X_t = 10.3605 \cdot ft$

Additional Offset of Footing: $X_{off1} := \frac{W_f}{2} - \left(\frac{W_t \cdot \cos(30 \cdot deg)}{3} + X_t\right)$ $\qquad X_{off2} := 0$

$X_{off} := if(Pos_{tower} = 1, X_{off1}, X_{off2})$ $\quad X_{off} = 0 \cdot ft$

Resisting Moment: $M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + S_u \cdot \frac{T_{pp}}{3} + WT_{s2} \cdot \left(W_f + \frac{T_{pp} \cdot \tan(\phi_s)}{3}\right)$

$M_r = 15145.2441 \cdot kip \cdot ft$

Overturning Moment: $M_{ot} := M_t + S_t \cdot (L_p + T_f) + WT_t \cdot X_{off}$ $\quad M_{ot} = 7399 \cdot kip \cdot ft$

Factor of Safety: $FS := \frac{M_r}{M_{ot}}$ $\quad FS = 2.05$

$SafetyCheck := if(FS > FS_{req}, "Okay", "No Good")$ $\quad SafetyCheck = "Okay"$

BEARING PRESSURE CHECK:

Pressure Applied:

$LOAD_{tot} := WT_c + WT_{s1} + WT_t$ $\quad LOAD_{tot} = 812.3815 \cdot kip$

$A_{mat} := W_f^2$ $\quad A_{mat} = 1156 \cdot ft^2$

$S := \frac{W_f^3}{6}$ $\quad S = 6550.6667 \cdot ft^3$

$P_{max} := \frac{LOAD_{tot}}{A_{mat}} + \frac{M_{ot}}{S}$ $\quad P_{max} = 1.8323 \cdot ksf$

$P_{min} := \frac{LOAD_{tot}}{A_{mat}} - \frac{M_{ot}}{S}$ $\quad P_{min} = -0.4268 \cdot ksf$

$MaxPressure := if\left(P_{max} < q_s, \text{"Okay"}, \text{"No Good"}\right)$ $\quad MaxPressure = \text{"Okay"}$

$MinPressure := if\left[\left(P_{min} \geq 0\right) \cdot \left(P_{min} < q_s\right), \text{"Okay"}, \text{"No Good"}\right]$ $\quad MinPressure = \text{"No Good"}$

Distance to Resultant of Pressure Distribution:

$$X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3}$$ $\quad X_p = 9.1923 \cdot ft$

Distance to Kern:

$X_k := \frac{W_f}{3}$ $\quad X_k = 11.3333 \cdot ft$

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

Eccentricity:

$e := \frac{M_{ot}}{LOAD_{tot}}$ $\quad e = 9.1078$

Adjusted Soil Pressure:

$$q_a := \frac{2 \cdot LOAD_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)}$$ $\quad q_a = 2.0183 \cdot ksf$

Revised Maximum:

$q_{max} := if\left(X_p < X_k, q_a, P_{max}\right)$ $\quad q_{max} = 2.0183 \cdot ksf$

$PressureCheck := if\left(q_{max} < q_s, \text{"Okay"}, \text{"No Good"}\right)$ $\quad PressureCheck = \text{"Okay"}$

CHECK PUNCHING AND BEAM SHEAR:

Load Factor: (EIA 3.1.1) $LF := if\left[H_t \le 700\cdot ft, 1.3, if\left[H_t \ge 1200, 1.7, 1.3 + \left(\frac{H_t - 700}{1200 - 700}\right)\cdot 0.4\right]\right]$ $LF = 1.3$

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

$\phi_c := .85$ (ACI 9.3.2.3)

$d := T_f - Cvr - .5\cdot in$ $d = 23.5\cdot in$

Factored load: $FL := LF\cdot \frac{C_t}{W_f^{\,2}}$ $FL = 0.4195\cdot ksf$

$V_{req} := \frac{FL\cdot\left(X_t - 0.5\cdot d_p - d\right)\cdot W_f}{\phi_c}$ $V_{req} = 111.6132\cdot kip$

ACI 11.3.1.1 $V_{Avail} := 2\cdot\sqrt{f'c\cdot psi}\cdot W_f\cdot d$ $V_{Avail} = 1050.3128\cdot kip$

$BeamShearCheck := if\left(V_{req} < V_{Avail}, "Okay", "No Good"\right)$ $BeamShearCheck = "Okay"$

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.12.2.1)

$b_o := \left(d_p + d\right)\cdot \pi$ $b_o = 17.1479\cdot ft$

$V_{req} := FL\cdot \frac{W_f^{\,2} - \left(d_p + d\right)^2\cdot \frac{\pi}{4}}{\phi_c}$ $V_{req} = 558.9232\cdot kip$

$V_{Avail} := 4\cdot\sqrt{f'c\cdot psi}\cdot b_o\cdot d$ $V_{Avail} = 1059.448\cdot kip$

$PunchingShearCheck := if\left(V_{req} < V_{Avail}, "Okay", "No Good"\right)$ $PunchingShearCheck = "Okay"$

TENSILE REINFORCEMENT IN PAD:

$\phi_m := .90$ per ACI 9.3.2.2

Applied Moments:

$$M_{nT} := LF\cdot\left[U_t\cdot\left(W_t\cdot\sin(60\cdot deg) - \frac{d_p}{2}\right) + S_t\cdot\left(D_f + L_{pag}\right)\right] - WT_t\cdot X_{off}$$

$$M_{nS} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left[\gamma_s\cdot\left(T_{pp} - T_f\right)\right] + WT_{s2}\cdot\left[\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2} + \left(D_f - n\right)\cdot\tan\left(\phi_s\right)\right]\right]$$

$$M_{nC} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left(\gamma_c\cdot T_f\right)\right]$$

Design Moment: $M_n := \dfrac{M_{nT} + M_{nS} + M_{nC}}{\phi_m}$ $M_n = 5827.2292\cdot kips\cdot ft$

Required Reinforcement:

ACI 10.2.7.3 $\beta := if\left[f'c \le 4000\cdot psi, .85, if\left[f'c \ge 8000\cdot psi, .65, .85 - \left(\dfrac{\frac{f'c}{psi} - 4000}{1000}\right)\cdot.05\right]\right]$ $\beta = 0.85$

Effective Width: $b_{eff} := W_t\cdot\cos(30\cdot deg) + d_p$ $b_{eff} = 281.023\cdot in$

$A_s := \dfrac{M_n}{\phi_m\cdot fy\cdot d}$ $A_s = 55.1038\cdot in^2$

$a := \dfrac{A_s\cdot fy}{\beta\cdot f'c\cdot b_{eff}}$ $a = 4.6137\cdot in$

$A_s := \dfrac{M_n}{fy\cdot\left(d - \frac{a}{2}\right)}$ $A_s = 54.9917\cdot in^2$

$\rho := \dfrac{A_s}{b_{eff}\cdot d}$ $\rho = 0.0083$

$d = 1.9583$

Temperature and Shrinkage: (ACI 7.12.2.1b)

$\rho_{sh} := if(fy \geq 60000 \cdot psi, 0.0018, 0.0020)$ $\rho_{sh} = 0.0018$

Area Required:

$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right)$ $As = 54.9917 \cdot in^2$

Area Provided:

$As_{prov} := A_{bpad} \cdot NB_{pad}$ $As_{prov} = 49.92 \cdot in^2$

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

DEVELOPMENT LENGTH OF PAD REINFORCEMENT:

TENSION (ACI 12.2.3)

Bar Spacing:

$B_{sPad} := \frac{W_f - 2 \cdot Cvr - NB_{pad} \cdot d_{bpad}}{NB_{pad} - 1}$ $B_{sPad} = 11.5123 \cdot in$

Development Length Factors:

Reinforcement Location Factor	$\alpha := 1.0$
Coating Factor	$\beta := 1.0$
Concrete strength Factor	$\lambda := 1.0$
Reinforcement Size Factor	$\gamma := 1.0$

Spacing or Cover Dimension:

$c := if\left(Cvr < \frac{B_{sPad}}{2}, Cvr, \frac{B_{sPad}}{2}\right)$ $c = 3 \cdot in$

Transverse Reinforcement Index As allowed by ACI 12.2.4 $k_{tr} := 0$

Development Length:

$L_{dbt} := \frac{3}{40} \cdot \frac{fy}{\sqrt{f'c \cdot psi}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{\frac{c + k_{tr}}{d_{bpad}}} \cdot d_{bpad}$ $L_{dbt} = 54.4464 \cdot in$

$L_{dbmin} := 12 \cdot in$

Minimum Development Length: (ACI 12.2.1)

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

Available Length in Pad:

$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr$ $L_{Pad} = 63 \cdot in$

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

REINFORCEMENT IN PIER:

Pier Area:

$$A_p := \frac{\pi \cdot d_p^{\,2}}{4} \qquad A_p = 1385.4424 \cdot in^2$$

(ACI 10.8.4 and 10.9.1)

$$A_{smin} := 0.01 \cdot 0.5 \cdot A_p \qquad A_{smin} = 6.9272 \cdot in^2$$

$$A_{sprov} := NBpier \cdot A_{bpier} \qquad A_{sprov} = 9 \cdot in^2$$

$$SteelAreaCheck := if\left(A_{sprov} > A_{smin}, "Okay", "No\ Good"\right) \qquad SteelAreaCheck = "Okay"$$

NOTE: Anchor Bolts are not accounted for in reinforcement calculation and will provide additional reinforcement to satisfy minimum requirement of steel.

Bar Spacing In Pier:

$$B_{sPier} := \frac{d_p \cdot \pi}{NBpier} - d_{bpier} \qquad B_{sPier} = 13.5328 \cdot in$$

Diamter of Reinforcement Cage:

$$Diam_{cage} := d_p - 2 \cdot Cvr \qquad Diam_{cage} = 36 \cdot in$$

Maximum Moment in Pier:

$$M_p := \left(S_t \cdot L_p\right) \cdot LF \qquad M_p = 4270.5 \cdot kips \cdot in$$

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

(defined variables)

$$\left(f'_c \;\; f_y \;\; cl \;\; Spiral\right) = (3 \;\; 60 \;\; 4 \;\; 0)$$

The required input is column diameter in inches, number of reinforcing bars, bar size number, factored axial load in kips and moment in kip inches:

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) := (42 \;\; 9 \;\; 9 \;\; 432 \;\; 3834)$$

Clears any previous output:

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := (0 \;\; 0 \;\; 0 \;\; 0)$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := \phi P'_n\left(D, N, n, P_u, M_{xu}\right)^T$$

The Output is given as useable axial load in kips, moment capacity in kip inches, splicing stress in ksi, and reinforcement ratio:

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = (1521.273 \;\; 13501.2978 \;\; -48.1686 \;\; 0.0065)$$

Column size and reinforcement may be changed to match capacity to the applied load.

$$AxialLoadCheck := if\left(\phi P_n \geq P_u, "Okay", "No\ Good"\right) \qquad AxialLoadCheck = "Okay"$$

$$BendingCheck := if\left(\phi M_{xn} \geq M_{xu}, "Okay", "No\ Good"\right) \qquad BendingCheck = "Okay"$$

DEVELOPMENT LENGTH OF PIER REINFORCEMENT:

TENSION (ACI 12.2.3)

Spacing and Cover: $Cvr = 3 \cdot in$ $B_{sPier} = 13.5328 \cdot in$

Factors for development:

Reinforcement Location Factor	$\alpha := 1.0$
Coating Factor	$\beta := 1.0$
Concrete strength Factor	$\lambda := 1.0$
Reinforcement Size Factor	$\gamma := 1.0$

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

Transverse Reinforcement: As allowed by ACI 12.2.4 $k_{tr} := 0$

$$L_{dbt} := \frac{3}{40} \cdot \frac{fy}{\sqrt{f'c \cdot psi}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{\frac{c + k_{tr}}{d_{bpier}}} \cdot d_{bpier} \qquad L_{dbt} = 34.8457 \cdot in$$

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

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

COMPRESSION: (ACI 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot fy}{\sqrt{f'c \cdot psi}} \qquad L_{dbc1} = 24.7132 \cdot in$$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot fy\right)$ $L_{dbmin} = 20.304 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right)$ $L_{dbc} = 24.7132 \cdot in$

Available Length in Pier:

$L_{pier} := L_p - 3 \cdot in$ $\quad L_{pier} = 42 \cdot in$

$L_{piertension} := if(L_{pier} > L_{dbt}, "Okay", "No Good")$ $\quad L_{piertension} = "Okay"$

$L_{piercompression} := if(L_{pier} > L_{dbc}, "Okay", "No Good")$ $\quad L_{piercompression} = "Okay"$

Available Length in Pad:

$L_{pad} := T_f - 3 \cdot in$ $\quad L_{pad} = 24 \cdot in$

$L_{padtension} := if[L_{pad} > (L_{dbt} - L_{pier}), "Okay", "No Good"]$ $\quad L_{padtension} = "Okay"$

$L_{padcompression} := if[L_{pad} > (L_{dbc} - L_{pier}), "Okay", "No Good"]$ $\quad L_{padcompression} = "Okay"$

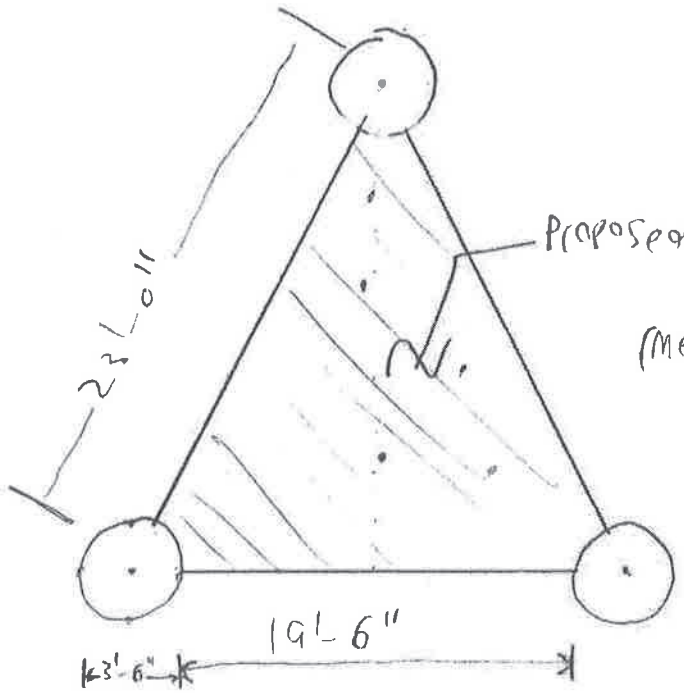
URS

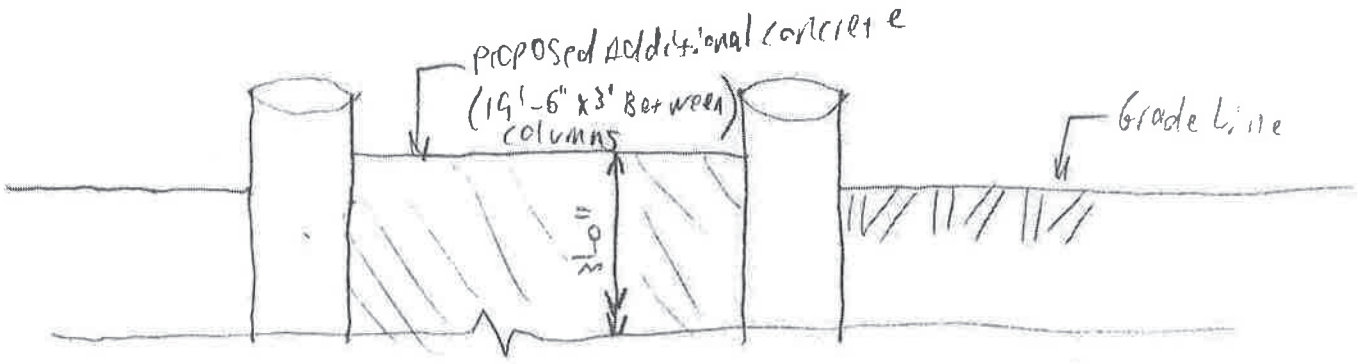
Job Middlebury, Ct Foundation modification | Project No. TWS-014R2 | Page ____ of ____

Description Additional Concrete for O.t. resistance | Computed by MCD | Date 9/2014 | Sheet ____ of ____

Checked by ____ | Date ____

Reference





$224\ SF \times 2'-9" \times (150PCF - 125PCF) = 15.4\ K.P$ (concrete − soil)

$224\ SF \times 0'-3" \times 150PCF = 8.4\ K.P$

Weight of Concrete pad before MODification = 390.15 K.P

S.F = 1.99 ≯ 2.0 ∴ N.G.

weight of concrete pad AFTER MODification = 413.95 K.P

S.F. = 2.05 > 2.0 ∴ (OK)