HPC Wireless Services
46 Mill Plain Rd.
Floor 2
Danbury, CT, 06811
P.: 203.797.1112

May 7, 2014

VIA OVERNIGHT DELIVERY

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

RE: Sprint Spectrum, L.P. – Notice of Exempt Modification
10 Tanner Marsh Road, Guilford, CT

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of Sprint Spectrum, L.P. ("Sprint"). Sprint is undertaking modifications to certain existing sites in its Connecticut network in order to implement updated technology. In order to do so, Sprint will modify antenna and equipment configurations at a number of existing 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 attachments is being sent to the First Selectman of the Town of Guilford.

Sprint plans to modify the existing facility at 10 Tanner Marsh Road, owned by CTI Towers (coordinates 41°17'19.59"N, -72°39'29.87"W). Attached are drawings depicting the planned changes, and documentation of the structural sufficiency of the tower to accommodate the revised antenna configuration. Also included is a power density calculation reflecting the modification to Sprint's operations at the site.

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

1. The height of the overall structure will be unaffected. Sprint proposes to add three (3) antennas and three (3) remote radio heads, all at a centerline height of approximately 140' above the tower base. Additionally, Sprint will install one (1) new hybrid cable inside the monopole.

2. The proposed changes will not extend the site boundaries. Sprint will install additional batteries and new rectifiers in existing cabinets. Thus, there will be no effect on the site compound.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the proposed changes will be negligible.

4. The changes to the facility 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. As indicated in the attached power density calculations, Sprint's operations at the site will result in a power density of 20.724%; the combined site operations will result in a total power density of 40.348%.

Please feel free to call me with any questions or concerns regarding this matter. Thank you for your consideration.

Respectfully submitted,
Sprint Spectrum, L.P.

By: _____
Eric Dahl, Consultant
edahl@comcast.net
860-227-1975

Attachments

cc: Mr. Joseph Mazza, First Selectman, Town of Guilford

Sprint

PROJECT:	2.5 EQUIPMENT DEPLOYMENT
SITE NAME:	SOUTH GUILFORD
SITE CASCADE:	CT03XC022
SITE ADDRESS:	10 TANNER MARSH ROAD SOUTH GUILDFORD, CT 06437
SITE TYPE:	MONOPOLE
MARKET:	SOUTHERN CONNECTICUT

SITE INFORMATION

PROPERTY OWNER:
CTI TOWERS ASSETS 1, LLC
38 POND STREET, SUITE 305
FRANKLIN, MA 02038

LATITUDE:
41.288773°

LONGITUDE:
-72.658287°

COUNTY:
NEW HAVEN

JURISDICTION:
TOWN OF GUILFORD
CONNECTICUT SITING COUNCIL

AAV PROVIDER:
AT&T

POWER COMPANY:
CONNECTICUT LIGHT AND POWER
PHONE# 800-922-4455

SPRINT CONSTRUCTION MANAGER:
GARY WOOD
860-940-9168
GARY.WOOD@SPRINT.COM

AREA MAP

LOCATION MAP

PROJECT DISCRIPTION

SPRINT PROPOSED TO MODIFY AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY.

- INSTALL (1) NEW BBU
- INSTALL (8) NEW BATTERIES IN EXISTING BBU CABINET
- INSTALL (3) PANEL ANTENNAS
- INSTALL (3) RRU'S NEAR ANTENNA
- INSTALL (27) JUMPER CABLES
- INSTALL (1) FIBER CABLE

APPLICABLE CODES

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

1. INTERNATIONAL BUILDING CODE (2012 IBC)
2. TIA-EIA-222-G OR LATEST EDITION
3. NFPA 780 - LIGHTNING PROTECTION CODE
4. 2011 NATIONAL ELECTRIC CODE OR LATEST EDITION
5. ANY OTHER NATIONAL OR LOCAL APPLICABLE CODES MOST RECENT EDITIONS.
6. CT BUILDING CODE
7. LOCAL BUILDING CODE
8. CITY/COUNTY ORDINANCES

SHEET INDEX

DWG.	DESCRIPTION	REV.
T-1	COVER SHEET	00
SP-1	SPRINT SPECIFICATIONS (SHEET 1 OF 3)	00
SP-2	SPRINT SPECIFICATIONS (SHEET 2 OF 3)	00
SP-3	SPRINT SPECIFICATIONS (SHEET 3 OF 3)	00
A-1	SITE PLAN	00
A-2	BUILDING ELEVATION AND CABLE PLAN	00
A-3	ANTENNA PLAN AND MOUNTING DETAILS	00
A-4	RF DATA SHEET AND EQUIPMENT INFORMATION	00
A-5	WIRING DIAGRAMS	00
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A-7	EQUIPMENT SPECIFICATIONS	00
E-1	ONE-LINE DIAGRAM	00
G-1	GROUNDING DETAILS	00

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

Sprint
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251
(517) 436-7466

A SAXON DESIGN GROUP
244 RIVERS EDGE LANE
TOMS RIVER, NJ 08755
(732) 678-0155

ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE: 3/24/14

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No: ASDGSP26

CLIENT ID No: CT03XC022

DESIGN TYPE: 2.5 GHz

SITE INFORMATION:
SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE
COVER SHEET

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

DATE: 3-3-14
PROJECT No: ASDGSP26
DRAWING BY: CD
CHK BY:
DWG No: T-1

24"x36" SHEETS - SIGN & SEAL AREA

THESE OUTLINE SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS, INCLUDING CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

SECTION 01 100 – SCOPE OF WORK

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT CONSTRUCTION STANDARDS FOR WIRELESS SITES, CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

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

1.4 NATIONALLY RECOGNIZED CODES AND STANDARDS:

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

1. GR–78–CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
2. GR–1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY –GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
3. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE – "NEC") AND NFPA 101 (LIFE SAFETY CODE).
4. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
5. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
6. AMERICAN CONCRETE INSTITUTE (ACI)
7. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
8. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
9. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
10. PORTLAND CEMENT ASSOCIATION (PCA)
11. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
12. BRICK INDUSTRY ASSOCIATION (BIA)
13. AMERICAN WELDING SOCIETY (AWS)
14. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
15. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
16. DOOR AND HARDWARE INSTITUTE (DHI)
17. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
18. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

1.5 DEFINITIONS:

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

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

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

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

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

A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS–BUILT" DRAWINGS.
B. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK. CONTRACTOR SHALL NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY VARIATIONS PRIOR TO PROCEEDING WITH THE WORK.
C. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.

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

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

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

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

1.14 METHODS OF PROCEDURE (MOPS) FOR CONSTRUCTION: CONTRACTOR SHALL PERFORM WORK AS DESCRIBED IN THE FOLLOWING INSTALLATION AND COMMISSIONING MOPS.

A. TOP HAT
B. HOW TO INSTALL A NEW CABINET
C. BASE BAND UNIT IN EXISTING UNIT
D. INSTALLATION OF BATTERIES
E. INSTALLATION OF HYBRID CABLE
F. INSTALLATION OF RRH'S
G. CABLING
H. TS–0200 REV 4 – ANTENNA LINE ACCEPTANCE STANDARDS
I. SPRINT CELL SITE ENGINEERING NOTICE – EN 2012–001, REV 1.
J. COMMISSIONING MOPS
K. SPRINT CELL SITE ENGINEERING NOTICE – EN–2013–002
L. SPRINT ENGINEERING LETTER – EL–0504
M. SPRINT ENGINEERING LETTER – EL–0568
N. SPRINT TECHNICAL SPECIFICATION – TS–0193

1.15 USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:

A. 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

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

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

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

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

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

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

SECTION 01 200 – COMPANY FURNISHED MATERIAL AND EQUIPMENT

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 RECEIPT OF MATERIAL AND EQUIPMENT:

A. COMPANY FURNISHED MATERIAL AND EQUIPMENT IS IDENTIFIED ON THE RF DATA SHEET IN THE CONSTRUCTION DOCUMENTS.

B. THE CONTRACTOR IS RESPONSIBLE FOR SPRINT PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:

1. ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.
2. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES.
3. TAKE RESPONSIBILITY FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT.
4. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY–FOUR HOURS AFTER RECEIPT, REPORT TO SPRINT OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
5. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
6. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF–LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

3.2 DELIVERABLES:

A. COMPLETE SHIPPING AND RECEIPT DOCUMENTATION IN ACCORDANCE WITH COMPANY PRACTICE.

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

C. UPLOAD DOCUMENTATION INTO SPRINT SITE MANAGEMENT SYSTEM (SMS) AND/OR PROVIDE HARD COPY DOCUMENTATION AS REQUESTED.

SECTION 01 300 – CELL SITE CONSTRUCTION

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 NOTICE TO PROCEED:

A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED AND THE ISSUANCE OF THE WORK ORDER.

B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE SPRINT WITH AN OPERATIONAL WIRELESS FACILITY.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 FUNCTIONAL REQUIREMENTS:

A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. THE ACTIVITIES DESCRIBED ARE NOT EXHAUSTIVE, AND CONTRACTOR SHALL TAKE ANY AND ALL ACTIONS AS NECESSARY TO SUCCESSFULLY COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.

B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.

C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES

D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. PERFORM ANY REQUIRED SITE ENVIRONMENTAL MITIGATION.
2. PREPARE GROUND SITES; PROVIDE DE–GRUBBING; AND ROUGH AND FINAL GRADING, AND COMPOUND SURFACE TREATMENTS.
3. MANAGE AND CONDUCT ALL ACTIVITIES FOR INSTALLATION OF UTILITIES INCLUDING ELECTRICAL AND TELCO BACKHAUL.
4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
5. INSTALL ABOVE GROUND GROUNDING SYSTEMS.
6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
7. INSTALL "H–FRAMES", CABINETS AND SHELTERS AS INDICATED.
8. INSTALL ROADS, ACCESS WAYS, CURBS AND DRAINS AS INDICATED.
9. ACCOMPLISH REQUIRED MODIFICATION OF EXISTING FACILITIES.
10. PROVIDE ANTENNA SUPPORT STRUCTURE FOUNDATIONS.
11. PROVIDE SLABS AND EQUIPMENT PLATFORMS.
12. INSTALL COMPOUND FENCING, SIGHT SHIELDING, LANDSCAPING AND ACCESS BARRIERS.
13. PERFORM INSPECTION AND MATERIAL TESTING AS REQUIRED HEREINAFTER.
14. CONDUCT SITE RESISTANCE TO EARTH TESTING AS REQUIRED HEREINAFTER
15. INSTALL FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS.
16. INSTALL TOWERS, ANTENNA SUPPORT STRUCTURES AND PLATFORMS ON EXISTING TOWERS AS REQUIRED.
17. INSTALL CELL SITE RADIOS, MICROWAVE, GPS, COAXIAL MAINLINE, ANTENNAS, CROSS BAND COUPLERS, TOWER TOP AMPLIFIERS, LOW NOISE AMPLIFIERS AND RELATED EQUIPMENT.
18. PERFORM, DOCUMENT, AND CLOSE OUT ANY CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
19. PERFORM ANTENNAL AND COAX SWEEP TESTING AND MAKE ANY AND ALL NECESSARY CORRECTIONS.
20. REMAIN ON SITE MOBILIZED THROUGHOUT HAND–OFF AND INTEGRATION TO ASSIST AS NEEDED UNTIL SITE IS DEEMED SUBSTANTIALLY COMPLETE AND PLACED "ON AIR."

3.2 GENERAL REQUIREMENTS FOR CIVIL CONSTRUCTION:

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

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

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

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

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

E. CONDUCT TESTING AS REQUIRED HEREIN.

3.3 DELIVERABLES:

A. CONTRACTOR SHALL REVIEW, APPROVE, AND SUBMIT TO SPRINT SHOP DRAWINGS, PRODUCT DATA, SAMPLES, AND SIMILAR SUBMITTALS AS REQUIRED HEREINAFTER

B. PROVIDE DOCUMENTATION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING. DOCUMENTATION SHALL BE FORWARDED IN ORIGINAL FORMAT AND/OR UPLOADED INTO SMS.

1. ALL CORRESPONDENCE AND PRELIMINARY CONSTRUCTION REPORTS.
2. PROJECT PROGRESS REPORTS.
3. CIVIL CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
4. ELECTRICAL SERVICE COMPLETION DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
5. LINES AND ANTENNA INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
6. POWER INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
7. TELCO READY DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
8. PPC (OR SHELTER) INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
9. TOWER CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
10. TOWER CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
11. BTS AND RADIO EQUIPMENT DELIVERED AT SITE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
12. NETWORK OPERATIONS HANDOFF CHECKLIST (HOC WALK) COMPLETE (UPLOAD FORM IN SMS)
13. CIVIL CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
14. SITE CONSTRUCTION PROGRESS PHOTOS UNLOADED INTO SMS.

CONTINUE SHEET SP–2

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

Sprint

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(732) 678-0155

ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE:

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No:
ASDGSP26

CLIENT ID No:
CT03XC022

DESIGN TYPE:
2.5 GHz

SITE INFORMATION:

SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE

SPRINT SPECIFICATIONS
(SHEET 1 OF 3)

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

24"x36" SHEETS - SIGN & SEAL AREA

DATE:	3-3-14
PROJECT No:	ASDGSP26
DRAWING BY:	CD
CHK BY:	
DWG No:	SP-1

CONTINUED FROM SP-1:

SECTION 01 400 – SUBMITTALS, TESTS, AND INSPECTIONS

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 SUBMITTALS:

A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.

B. SUBMIT THE FOLLOWING TO COMPANY REPRESENTATIVE FOR APPROVAL.
1. CONCRETE MIX–DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
3. SPECIAL FINISHES FOR INTERIOR SPACES, IF ANY.
4. ALL EQUIPMENT AND MATERIALS SO IDENTIFIED ON THE CONSTRUCTION DRAWINGS.
5. CHEMICAL GROUNDING DESIGN.

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.

1.4 TESTS AND INSPECTIONS:

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.

B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. COAX SWEEPS AND FIBER TESTS PER TS–0200 REV 4 ANTENNA LINE ACCEPTANCE STANDARDS.
2. AGL, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE–FOR–THE–PURPOSE ANTENNA ALIGNMENT TOOL.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.

C. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING;
1. AZIMUTH, DOWNTILT, AGL – UPLOAD REPORT FROM ANTENNA ALIGNMENT TOOL TO SITERRA TASK 465. INSTALLED AZIMUTH, DOWNTILT, AND AGL MUST CONFORM TO THE RF DATA SHEETS. SWEEP AND FIBER TESTS
2. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
3. ALL AVAILABLE JURISDICTIONAL INFORMATION
4. PDF SCAN OF REDLINES PRODUCED IN FIELD
5. ELECTRONIC AS–BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS. ANY FIELD CHANGE MUST BE REFLECTED BY MODIFYING THE PLANS, ELEVATIONS, AND DETAILS IN THE DRAWING SETS. GENERAL NOTES INDICATING MODIFICATIONS WILL NOT BE ACCEPTED. CHANGES SHALL BE HIGHLIGHTED AS "CLOUDS" IDENTIFIED AS THE "AS–BUILT" CONDITION.
6. LIEN WAIVERS
7. FINAL PAYMENT APPLICATION
8. REQUIRED FINAL CONSTRUCTION PHOTOS
9. CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
10. ALL POST NTP TASKS INCLUDING DOCUMENT UPLOADS COMPLETED IN SITERRA (SPRINTS DOCUMENT REPOSITORY OF RECORD).

1.5 COMMISSIONING: PERFORM ALL COMMISSIONING AS REQUIRED BY APPLICABLE MOPS

1.6 INTEGRATION: PERFORM ALL INTEGRATION ACTIVITIES AS REQUIRED BY APPLICABLE MOPS

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 REQUIREMENTS FOR TESTING:

A. THIRD PARTY TESTING AGENCY: WHEN THE USE OF A THIRD PARTY INDEPENDENT TESTING AGENCY IS REQUIRED, THE AGENCY THAT IS SELECTED MUST PERFORM SUCH WORK ON A REGULAR BASIS IN THE STATE WHERE THE PROJECT IS LOCATED AND HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
1. THE THIRD PARTY TESTING AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
2. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.

3.2 REQUIRED TESTS:

A. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. CONCRETE CYLINDER BREAK TESTS FOR THE TOWER AND ANCHOR FOUNDATIONS AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
2. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED IN SECTION: HOT MIX ASPHALT PAVING.
3. FIELD QUALITY CONTROL TESTING AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
4. TESTING REQUIRED UNDER SECTION: AGGREGATE BASE FOR ACCESS ROADS, PADS AND ANCHOR LOCATIONS
5. STRUCTURAL BACKFILL COMPACTION TESTS FOR THE TOWER FOUNDATION.
6. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
7. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS.
8. GROUNDING AT ANTENNA MASTS FOR GPS AND ANTENNAS
9. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

3.3 REQUIRED INSPECTIONS:

A. SCHEDULE INSPECTIONS WITH COMPANY REPRESENTATIVE.

B. CONDUCT INSPECTIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. GROUNDING SYSTEM INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
3. COMPACTION OF BACKFILL MATERIALS; AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS; ASPHALT PAVING; AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
4. PRE– AND POST–CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES.
5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
6. ANTENNA AZIMUTH , DOWN TILT AND PER SUNLIGHT TOOL SUNSIGHT INSTRUMENTS – ANTENNALIGN ALIGNMENT TOOL (AAT)
7. VERIFICATION DOCUMENTED WITH THE ANTENNA CHECKLIST REPORT, BY A&E, SITE DEVELOPMENT REP, OR RF REP.
8. FINAL INSPECTION CHECKLIST AND HANDOFF WALK (HOC.). SIGNED FORM SHOWING ACCEPTANCE BY FIELD OPS IS TO BE UPLOADED INTO SMS.
9. COAX SWEEP AND FIBER TESTING DOCUMENTS SUBMITTED VIA SMS FOR RF APPROVAL.
10. SCAN–ABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
11. ALL AVAILABLE JURISDICTIONAL INFORMATION
12. PDF SCAN OF REDLINES PRODUCED IN FIELD

E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.

F. CONSTRUCTION INSPECTIONS AND CORRECTIVE MEASURES SHALL BE DOCUMENTED BY THE CONTRACTOR WITH WRITTEN REPORTS AND PHOTOGRAPHS. PHOTOGRAPHS MUST BE DIGITAL AND OF SUFFICIENT QUALITY TO CLEARLY SHOW THE SITE CONSTRUCTION. PHOTOGRAPHS MUST CLEARLY IDENTIFY THE PHOTOGRAPHED ITEM AND BE LABELED WITH THE SITE CASCADE NUMBER, SITE NAME, DESCRIPTION, AND DATE.

3.4 DELIVERABLES: TEST AND INSPECTION REPORTS AND CLOSEOUT DOCUMENTATION SHALL BE UPLOADED TO THE SMS AND/OR FORWARDED TO SPRINT FOR INCLUSION INTO THE PERMANENT SITE FILES.

A. THE FOLLOWING TEST AND INSPECTION REPORTS SHALL BE PROVIDED AS APPLICABLE.
1. CONCRETE MIX AND CYLINDER BREAK REPORTS.
2. STRUCTURAL BACKFILL COMPACTION REPORTS.
3. SITE RESISTANCE TO EARTH TEST.
4. ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
5. TOWER ERECTION INSPECTIONS AND MEASUREMENTS DOCUMENTING TOWER INSTALLED PER SUPPLIER'S REQUIREMENTS AND THE APPLICABLE SECTIONS HEREIN.
6. COAX CABLE SWEEP TESTS PER COMPANY'S "ANTENNA LINE ACCEPTANCE STANDARDS".

B. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES THE FOLLOWING;
1. TEST WELLS AND TRENCHES: PHOTOGRAPHS OF ALL TEST WELLS; PHOTOGRAPHS SHOWING ALL OPEN EXCAVATIONS AND TRENCHING PRIOR TO BACKFILLING SHOWING A TAPE MEASURE VISIBLE IN THE EXCAVATIONS INDICATING DEPTH.
2. CONDUITS, CONDUCTORS AND GROUNDING: PHOTOGRAPHS SHOWING TYPICAL INSTALLATION OF CONDUCTORS AND CONNECTORS; PHOTOGRAPHS SHOWING TYPICAL BEND RADIUS OF INSTALLED GROUND WIRES AND GROUND ROD SPACING;
3. CONCRETE FORMS AND REINFORCING: CONCRETE FORMING AT TOWER AND EQUIPMENT/SHELTER PAD/FOUNDATIONS – PHOTOGRAPHS SHOWING ALL REINFORCING STEEL, UTILITY AND CONDUIT STUB OUTS; PHOTOGRAPHS SHOWING CONCRETE POUR OF SHELTER SLAB/FOUNDATION, TOWER FOUNDATION AND GUY ANCHORS WITH VIBRATOR IN USE; PHOTOGRAPHS SHOWING EACH ANCHOR ON GUYED TOWERS, BEFORE CONCRETE POUR.
4. TOWER, ANTENNAS AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING – TOP AND BOTTOM; PHOTOS OF COAX GROUNDING––TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
5. ROOF TOPS: PRE–CONSTRUCTION AND POST–CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;
6. SITE LAYOUT – PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
7. FINISHED UTILITIES: CLOSE–UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE–UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE–UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.
8. REQUIRED MATERIALS CERTIFICATIONS: CONCRETE MIX DESIGNS; MILL CERTIFICATION FOR ALL REINFORCING AND STRUCTURAL STEEL; AND ASPHALT PAVING MIX DESIGN.
9. ANY AND ALL SUBMITTALS BY THE JURISDICTION OR COMPANY.

SECTION 01 500 – PROJECT REPORTING

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 WEEKLY REPORTS:

A. CONTRACTOR SHALL PROVIDE SPRINT WITH WEEKLY REPORTS SHOWING PROJECT STATUS. THIS STATUS REPORT FORMAT WILL BE PROVIDED TO THE CONTRACTOR BY SPRINT. THE REPORT WILL CONTAIN SITE ID NUMBER, THE MILESTONES FOR EACH SITE, INCLUDING THE BASELINE DATE, ESTIMATED COMPLETION DATE AND ACTUAL COMPLETION DATE.

B. REPORT INFORMATION WILL BE TRANSMITTED TO SPRINT VIA ELECTRONIC MEANS AS REQUIRED. THIS INFORMATION WILL PROVIDE A BASIS FOR PROGRESS MONITORING AND PAYMENT.

3.2 PROJECT CONFERENCE CALLS:

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

3.3 PROJECT TRACKING IN SMS:

A. CONTRACTOR SHALL PROVIDE SCHEDULE UPDATES AND PROJECTIONS IN THE SMS SYSTEM ON A WEEKLY BASIS.

3.4 ADDITIONAL REPORTING:

A. ADDITIONAL OR ALTERNATE REPORTING REQUIREMENTS MAY BE ADDED TO THE REPORT AS DETERMINED TO BE REASONABLY NECESSARY BY COMPANY.

3.5 PROJECT PHOTOGRAPHS:

A. FILE DIGITAL PHOTOGRAPHS OF COMPLETED SITE IN JPEG FORMAT IN THE SMS PHOTO LIBRARY FOR THE RESPECTIVE SITE. PHOTOGRAPHS SHALL BE CLEARLY LABELED WITH SITE NUMBER, NAME AND DESCRIPTION, AND SHALL INCLUDE AT A MINIMUM THE FOLLOWING AS APPLICABLE:
1. SHELTER AND TOWER OVERVIEW.
2. TOWER FOUNDATION(S) – FORMS AND STEEL BEFORE POUR (EACH ANCHOR ON GUYED TOWERS).
3. TOWER FOUNDATION(S) POUR WITH VIBRATOR IN USE (EACH ANCHOR ON GUYED TOWERS).
4. TOWER STEEL AS BEING INSTALLED INTO HOLE (SHOW ANCHOR STEEL ON GUYED TOWERS).
5. PHOTOS OF TOWER SECTION STACKING.
6. CONCRETE TESTING / SAMPLES.
7. PLACING OF ANCHOR BOLTS IN TOWER FOUNDATION.
8. BUILDING/WATER TANK FROM ROAD FOR TENANT IMPROVEMENTS OR COMMENTS.
9. SHELTER FOUNDATION––FORMS AND STEEL BEFORE POURING.
10. SHELTER FOUNDATION POUR WITH VIBRATOR IN USE.
11. COAX CABLE ENTRY INTO SHELTER.
12. PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
13. ROOFTOP PRE AND POST CONSTRUCTION PHOTOS TO INCLUDE PENETRATIONS AND INTERIOR CEILING.
14. PHOTOS OF TOWER TOP COAX LINE COLOR CODING AND COLOR CODING AT GROUND LEVEL.
15. PHOTOS OF ALL APPROPRIATE COMPANY OR REGULATORY SIGNAGE.
16. PHOTOS OF EQUIPMENT BOLT DOWN INSIDE SHELTER.
17. POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE AND POWER AND TELCO SUPPLY LOCATIONS INCLUDING METER/DISCONNECT.
18. ELECTRICAL TRENCH(S) WITH ELECTRICAL / CONDUIT BEFORE BACKFILL.
19. ELECTRICAL TRENCH(S) WITH FOIL–BACKED TAPE BEFORE FURTHER BACKFILL.
20. TELCO TRENCH WITH TELEPHONE / CONDUIT BEFORE BACKFILL.
21. TELCO TRENCH WITH FOIL–BACKED TAPE BEFORE FURTHER BACKFILL.
22. SHELTER GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
23. TOWER GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
24. FENCE GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
25. ALL BTS GROUND CONNECTIONS.
26. ALL GROUND TEST WELLS.
27. ANTENNA GROUND BAR AND EQUIPMENT GROUND BAR.
28. ADDITIONAL GROUNDING POINTS ON TOWERS ABOVE 200'.
29. HVAC UNITS INCLUDING CONDENSERS ON SPLIT SYSTEMS.
30. GPS ANTENNAS.
31. CABLE TRAY AND/OR WAVEGUIDE BRIDGE.
32. DOGHOUSE/CABLE EXIT FROM ROOF.
33. EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA.
34. MASTER BUS BAR.
35. TELCO BOARD AND NIU.
36. ELECTRICAL DISTRIBUTION WALL.
37. CABLE ENTRY WITH SURGE SUPPRESSION.
38. ENTRANCE TO EQUIPMENT ROOM.
39. COAX WEATHERPROOFING–TOP AND BOTTOM OF TOWER.
40. COAX GROUNDING –TOP AND BOTTOM OF TOWER.
41. ANTENNA AND MAST GROUNDING.
42. LANDSCAPING – WHERE APPLICABLE.

3.6 FINAL PROJECT ACCEPTANCE: COMPLETE ALL REQUIRED REPORTING TASKS PER CONTRACT, CONTRACT DOCUMENTS OR THE SPRINT INTEGRATED CONSTRUCTION STANDARDS FOR WIRELESS SITES AND UPLOAD INTO SITERRA.

SECTION 07 500 – ROOF CUTTING, PATCHING AND REPAIR

SUMMARY:
THIS SECTION SPECIFIES CUTTING AND PATCHING EXISTING ROOFING SYSTEMS WHERE CONDUIT OR CABLES EXIT THE BUILDING ONTO THE ROOF OR BUILDING–MOUNTED ANTENNAS, AND AS REQUIRED FOR WATERTIGHT PERFORMANCE. ROOFTOP ENTRY OPENINGS IN MEMBRANE ROOFTOPS SHALL BE CONSTRUCTED TO COMPLY WITH LANDLORD, ANY EXISTING WARRANTY, AND LOCAL JURISDICTIONAL STANDARDS.

1.4 SUBMITTALS:

A. PRE–CONSTRUCTION ROOF PHOTOS: COMPLETE A ROOF INSPECTION PRIOR TO THE INSTALLATION OF SPRINT EQUIPMENT ON ANY ROOFTOP BUILD. AT A MINIMUM INSPECT AND PHOTOGRAPH (MINIMUM 3 EA.) ALL AREAS IMPACTED BY THE ADDITION OF THE SPRINT EQUIPMENT.

B. PROVIDE SIMILAR PHOTOGRAPHS SHOWING ROOF CONDITIONS AFTER CONSTRUCTION (MINIMUM 3 EA.)

C. ROOF INSPECTION PHOTOGRAPHS SHOULD BE UPLOADED WITH CLOSEOUT PHOTOGRAPHS.

SECTION 09 900 – PAINTING

QUALITY ASSURANCE:

A. COMPLY WITH GOVERNING CODES AND REGULATIONS. PROVIDE PRODUCTS OF ACCEPTABLE MANUFACTURERS WHICH HAVE BEEN IN SATISFACTORY USE IN SIMILAR SERVICE FOR THREE YEARS. USE EXPERIENCED INSTALLERS. DELIVER, HANDLE, AND STORE MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. COMPLY WITH ALL ENVIRONMENTAL REGULATIONS FOR VOLATILE ORGANIC COMPOUNDS.

CONTINUE SHEET SP–3

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-26-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

Sprint

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ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE:

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No:
ASDGSP26

CLIENT ID No:
CT03XC022

DESIGN TYPE:
2.5 GHz

SITE INFORMATION:

SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE

SPRINT SPECIFICATIONS
(SHEET 2 OF 3)

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

DATE:	3-3-14
PROJECT No:	ASDGSP26
DRAWING BY:	CD
CHK BY:	
DWG No:	SP-2

24"x36" SHEETS - SIGN & SEAL AREA

CONTINUED FROM SP-2:

MATERIALS:

A. MANUFACTURERS: BENJAMIN MOORE, ICI DEVOE COATINGS, PPG, SHERWIN WILLIAMS OR APPROVED EQUAL. PROVIDE PREMIUM GRADE, PROFESSIONAL-QUALITY PRODUCTS FOR COATING SYSTEMS.

PAINT SCHEDULE:

A. EXTERIOR ANTENNAE AND ANTENNA MOUNTING HARDWARE: ONE COAT OF PRIMER AND TWO FINISH COATS. PAINT FOR ANTENNAE SHALL BE NON-METALLIC BASED AND CONTAIN NO METALLIC PARTICLES. PROVIDE COLORS AND PATTERNS AS REQUIRED TO MASK APPEARANCE OF ANTENNAE ON ADJACENT BUILDING SURFACES AND AS ACCEPTABLE TO THE OWNER. REFER TO ANTENNA MANUFACTURER'S INSTRUCTIONS WHENEVER POSSIBLE.

B. ROOF TOP CONSTRUCTION: TOUCH UP - PREPARE SURFACES TO BE REPAIRED. FOLLOW INDUSTRY STANDARDS AND REQUIREMENTS OF OWNER TO MATCH EXISTING COATING AND FINISH.

PAINTING APPLICATION:

1. INSPECT SURFACES, REPORT UNSATISFACTORY CONDITIONS IN WRITING; BEGINNING WORK MEANS ACCEPTANCE OF SUBSTRATE.
2. COMPLY WITH MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS FOR PREPARATION, PRIMING AND COATING WORK. COORDINATE WITH WORK OF OTHER SECTIONS.
3. MATCH APPROVED MOCK-UPS FOR COLOR, TEXTURE, AND PATTERN. RE-COAT OR REMOVE AND REPLACE WORK WHICH DOES NOT MATCH OR SHOWS LOSS OF ADHESION.
4. CLEAN UP, TOUCH UP AND PROTECT WORK.

TOUCHUP PAINTING:

1. GALVANIZING DAMAGE AND ALL BOLTS AND NUTS SHALL BE TOUCHED UP AFTER TOWER ERECTION WITH "GALVANOX," "DRY GALV," OR "ZINC-IT."
2. FIELD TOUCHUP PAINT SHALL BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
3. ALL METAL COMPONENTS SHALL BE HANDLED WITH CARE TO PREVENT DAMAGE TO THE COMPONENTS, THEIR PRESERVATIVE TREATMENT, OR THEIR PROTECTIVE COATINGS.

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

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

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

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

JUMPERS AND CONNECTORS:
FURNISH AND INSTALL 1/2" COAX JUMPER CABLES BETWEEN THE RRH'S AND ANTENNAS. JUMPERS SHALL BE TYPE LDF 4, FLC 12-50, CR 540, OR FXL 540. SUPER-FLEX CABLES ARE NOT ACCEPTABLE. JUMPERS BETWEEN THE RRH'S AND ANTENNAS OR TOWER TOP AMPLIFIERS SHALL CONSIST OF 1/2 INCH FOAM DIELECTRIC, OUTDOOR RATED COAXIAL CABLE. DO NOT USE SUPERFLEX OUTDOORS. JUMPERS SHALL BE FACTORY FABRICATED IN APPROPRIATE LENGTHS WITH A MAXIMUM OF 4 FEET EXCESS PER JUMPER AND HAVE CONNECTORS AT EACH END, MANUFACTURED BY SUPPLIER. IF JUMPERS ARE FIELD FABRICATED, FOLLOW MANUFACTURER'S REQUIREMENTS FOR INSTALLATION OF CONNECTORS

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 CABLES INSTALLATION:

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

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

C. EXTREME CARE SHALL BE TAKEN TO AVOID DAMAGE TO THE CABLES DURING HANDLING AND INSTALLATION.
   1. FASTENING MAIN HYBRID CABLES: ALL CABLES SHALL BE PERMANENTLY FASTENED TO THE COAX LADDER AT 4'-0" OC USING NON-MAGNETIC STAINLESS STEEL CLIPS.
   2. FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA), WITHIN THE MMBTS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES:
      a. FIBER: SUPPORT FIBER BUNDLES USING ½" VELCRO STRAPS OF THE REQUIRED LENGTH @ 18" OC. 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 MANUFACTURES 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 REV 4.
   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 REQUIRE BY THE APPLICABLE INSTALLATION MOPS.

C. COMPLY WITH MANUFACTURERS INSTALLATION AND START-UP REQUIREMENTS

DC CIRCUIT BREAKER LABELING

A. LABEL CIRCUIT BREAKERS ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE - EN 2012-001, REV 1.

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

SUMMARY:

A. THIS SECTION SPECIFIES MMBTS 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 REQUIRE BY THE APPLICABLE INSTALLATION MOPS.

C. COMPLY WITH MANUFACTURERS INSTALLATION AND START-UP REQUIREMENTS

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.

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:

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

E. 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

CONDUIT:

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

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

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

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

E. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FINAL CONNECTION TO EQUIPMENT. FITTINGS SHALL BE METALLIC GLAND TYPE COMPRESSION FITTINGS, MAINTAINING THE INTEGRITY OF CONDUIT SYSTEM. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE. MAXIMUM LENGTH OF FLEXIBLE CONDUIT SHALL NOT EXCEED 6-FEET. LFMC SHALL BE PROTECTED AND SUPPORTED AS REQUIRE 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.
   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 GASKETED 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 AS 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 AS INDICATED.

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.

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-18-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

Sprint

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TOMS RIVER, NJ 08755
(732) 678-0155

ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE:

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No:
ASDGSP26

CLIENT ID No:
CT03XC022

DESIGN TYPE:
2.5 GHz

SITE INFORMATION:

SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE

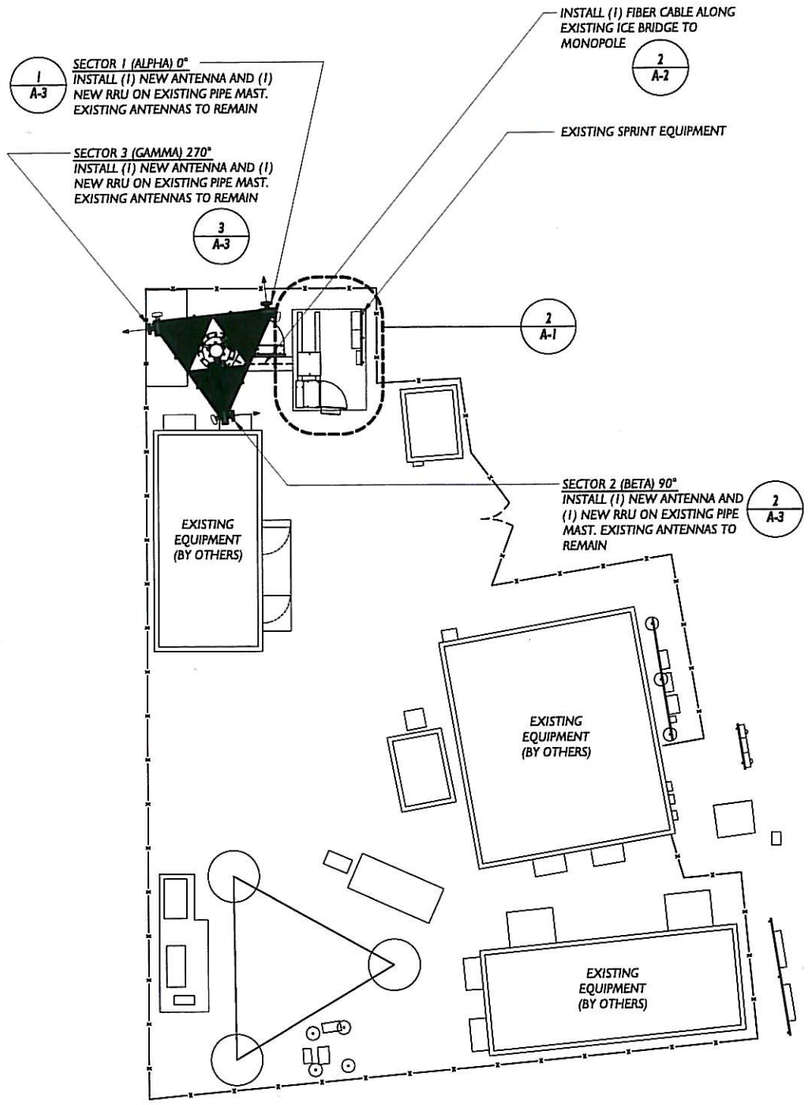
SPRINT SPECIFICATIONS
(SHEET 3 OF 3)

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

DATE:	3-3-14
PROJECT No:	ASDGSP26
DRAWING BY:	CD
CHK BY:	
DWG No:	SP-3

24"x36" SHEETS - SIGN & SEAL AREA

NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.



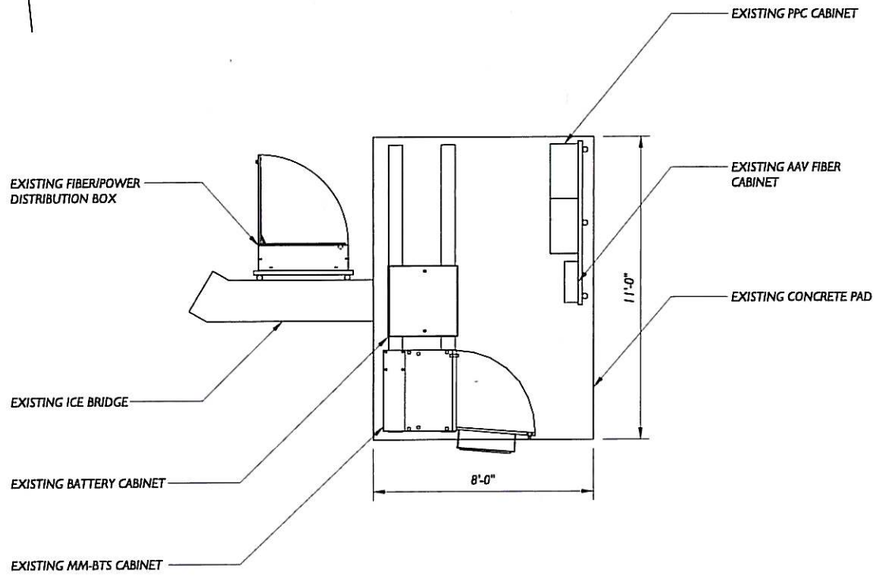
TANNER MARSH ROAD

OVERALL SITE PLAN

SCALE	11"x17" : 1/16"= 1'-0"
	24"x36" : 1/8"= 1'-0"

1

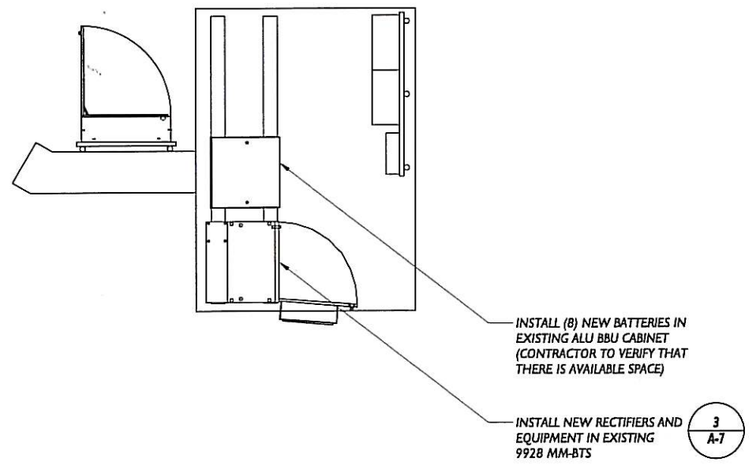
NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.



EXISTING SPRINT EQUIPMENT PLAN

SCALE	11"x17" : 3/16" = 1'-0"
	24"x36" : 3/8" = 1'-0"

2



PROPOSED SPRINT EQUIPMENT PLAN

SCALE	11"x17" : 3/16" = 1'-0"
	24"x36" : 3/8" = 1'-0"

3

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

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(732) 678-0155

ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE: 3/24/14

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No:
ASDGSP26

CLIENT ID No:
CT03XC022

DESIGN TYPE:
2.5 GHz

SITE INFORMATION:

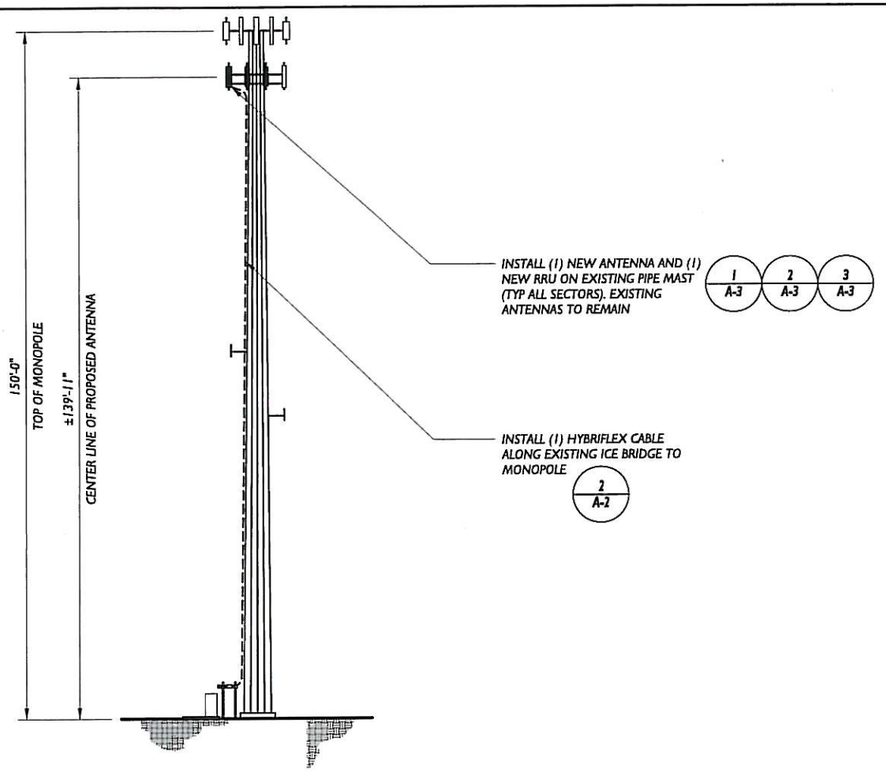
SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE
SITE PLAN

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

DATE:	3-3-14
PROJECT No:	ASDGSP26
DRAWING BY:	CD
CHK BY:	
DWG No:	A-1

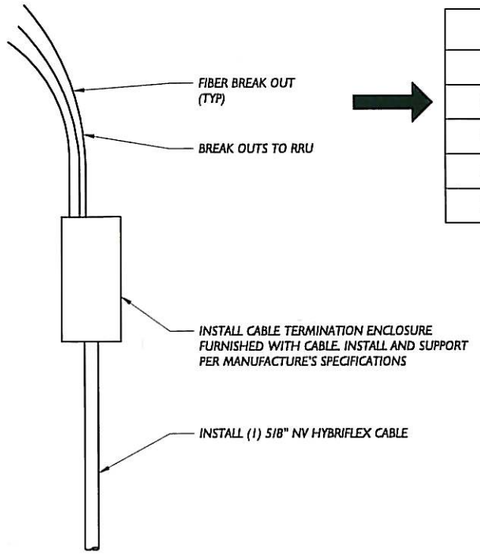
24"x36" SHEETS - SIGN & SEAL AREA



NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.

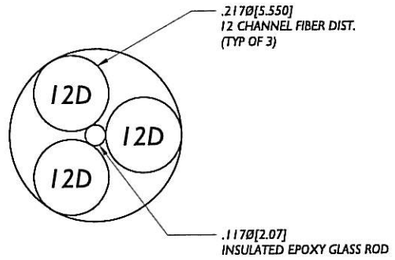
ELEVATION

SCALE: 11"x17" : 1/32" = 1'-0" | 24"x36" : 1/16" = 1'-0" | 1



HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE

CABLE	LENGTH	DC CONDUCTOR	CABLE DIAMETER
FIBER ONLY	VARIES	USE NV HYBRIFLEX	5/8"
HYBRIFLEX	OVER 200'	8 AWG	1 1/4"
HYBRIFLEX	225'-300'	6 AWG	1 1/4"
HYBRIFLEX	325'-375'	4 AWG	1 1/4"



HYBRID BREAK OUT DETAIL

SCALE: 11"x17" : NTS | 24"x36" : NTS | 2

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-26-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

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ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE: 3/24/14

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No: ASDGSP26

CLIENT ID No: CT03XC022

DESIGN TYPE: 2.5 GHz

SITE INFORMATION:

SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE

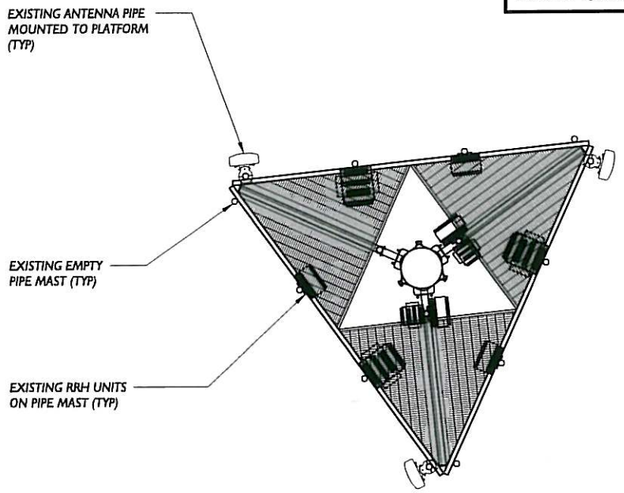
BUILDING ELEVATION
AND CABLE PLAN

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

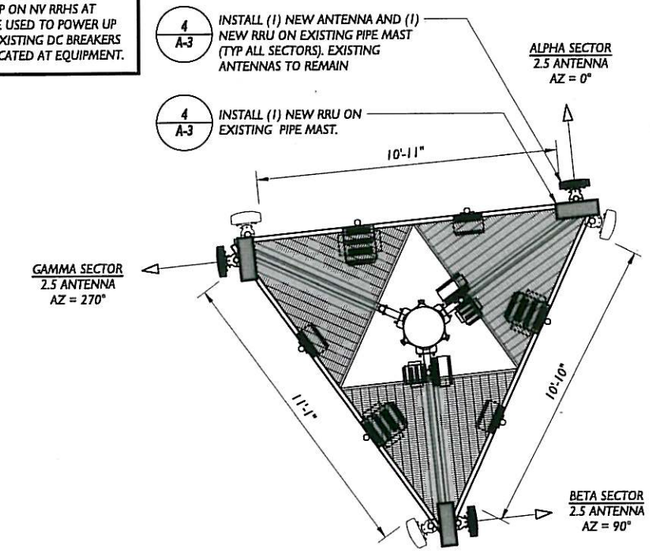
DATE: 3-3-14
PROJECT No: ASDGSP26
DRAWING BY: CD
CHK BY:
DWG No: A-2

24"x36" SHEETS - SIGN & SEAL AREA

NOTE:
SPARE DC CABLES ARE COILED UP ON NV RRHS AT SPRINT ARRAY. THESE ARE TO BE USED TO POWER UP THE 2.5 RRHS AND TIED INTO EXISTING DC BREAKERS INSIDE FIBER JUNCTION BOX LOCATED AT EQUIPMENT.



EXISTING LAYOUT

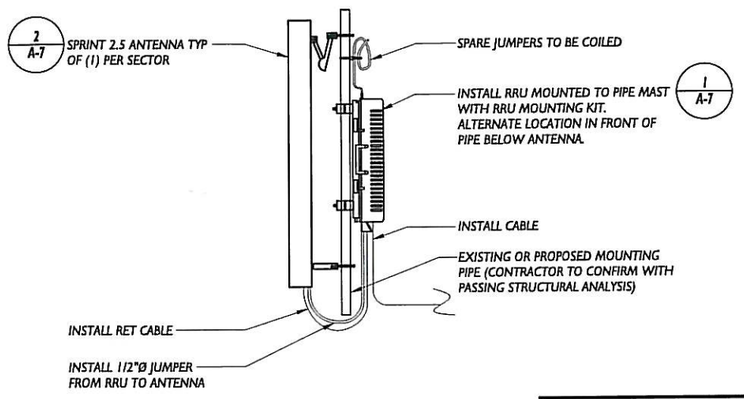


PROPOSED LAYOUT

EXISTING AND PROPOSED LAYOUTS

SCALE	11"x17" : 3/16" = 1'-0"	1
	24"x36" : 3/8" = 1'-0"	

NOTE:
1. CUT DC CONDUCTORS TO LENGTH.
2. COIL FIBER CABLE AND SECURE TO SIDE OF RRU.
3. DO NOT EXCEED BEND RADIUS.
4. JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA CAN NOT EXCEED 15'. NOTIFY SPRINT CM OF ANY DISCREPANCY.



NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.

ANTENNA AND RRU MOUNTING DETAIL

SCALE	11"x17" : NTS	4
	24"x36" : NTS	

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

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ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE:

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No:
ASDGSP26

CLIENT ID No:
CT03XC022

DESIGN TYPE:
2.5 GHz

SITE INFORMATION:

SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE

ANTENNA PLAN
AND MOUNTING DETAILS

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

DATE: 3-3-14
PROJECT No: ASDGSP26
DRAWING BY: CD
CHK BY:
DWG No: A-3

24"x36" SHEETS - SIGN & SEAL AREA

NOTE:
GENERAL CONTRACTOR TO VERIFY CURRENT RFDS PRIOR TO CONSTRUCTION START.

NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.

Sprint

RFDS Sheet

General Site Information

Site ID	CT03XC022
Market	Southern Connecticut
Region	EAST
MLA	N/A
Structure Type	MONOPOLE
BTS Type	N/A
Solution ID	

Equipment Vendor	ALU
Latitude	41.288773
Longitude	-72.858287
LL SITE ID	N/A
Sitera SR Equipment type	N/A
Equipment Vendor	ALU

Incremental Power Draw needed by added Equipment: 0

Base Equipment

BBU Kit	ALU BBU KIT
BBU Kit Qty	1
Growth Cabinet	NONE
Growth Cabinet Qty	N/A
Growth Cabinet Dimensions	N/A
Growth Cabinet Weight	N/A

Top Hat	NONE
Top Hat Qty	N/A
Top Hat Dimensions	N/A
Top Hat Weight (lbs)	N/A

RF Path Information

RRH	TD-RRHBx20-25
RRH Qty	3
RRH Dimensions	25.1in x 18.6 x 6.7 in
RRH Weight, lbs.	70
RRH Mount Weight. Lbs.	TBD
Power and Fiber Cable	ALU Fiber only
Cable Qty	1
Weight per foot. Lbs.	0.12
Diameter. Inches.	0.7
Length Ft.	108 (calculated as antenna height plus 20%)
Coax Jumper	Coax Jumper. Mfg TBD.
Coax Jumper Qty	27
Coax Jumper Length. Feet.	8
Coax Jumper Weight	TBD
Coax Jumper Diameter. Inches	0.5
AISG Cable	Commscope ATC8-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 APXVTM14-C-I20	RFS APXVTM14-C-I20	RFS APXVTM14-C-I20
Antenna qty	1	1	1
Antenna Dimensions, Inches	55.3 x 12.6 x 5.3	55.3 x 12.6 x 5.3	55.3 x 12.6 x 5.3
Antenna Weight. Lbs	56	56	56
Antenna Mounting Kit Weight. Lbs.	11 (estimate)	11 (estimate)	11 (estimate)
CL Height	139'-11"	139'-11"	139'-11"
Antenna Azimuth	0	90	270
Antenna Mechanical Downtilt	0	0	0
Antenna etilt	-2	-2	-2

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

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TOMS RIVER, NJ 08755
(732) 678-0155

ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE:

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No: ASDGSP26

CLIENT ID No: CT03XC022

DESIGN TYPE: 2.5 GHz

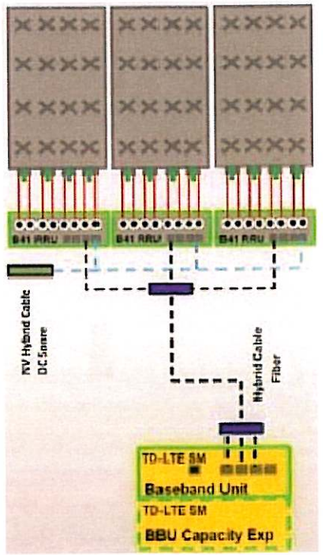
SITE INFORMATION:
SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE
RF DATA SHEET AND EQUIPMENT INFORMATION

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

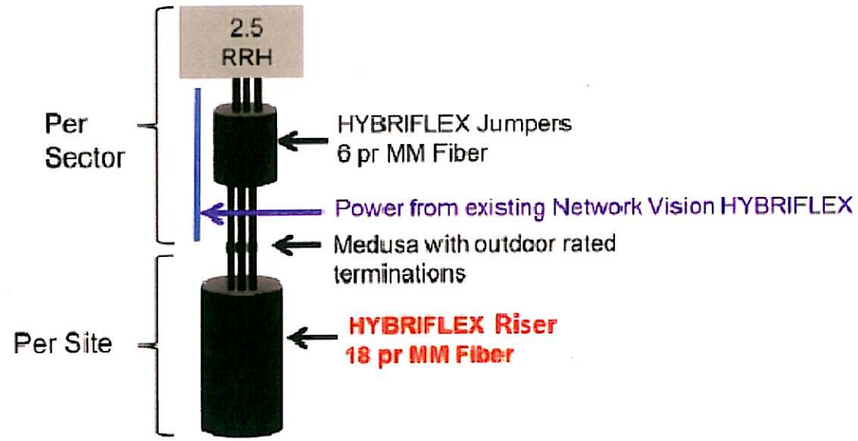
DATE: 3-3-14
PROJECT No: ASDGSP26
DRAWING BY: CD
CHK BY:
DWG No: A-4

24"x36" SHEETS - SIGN & SEAL AREA

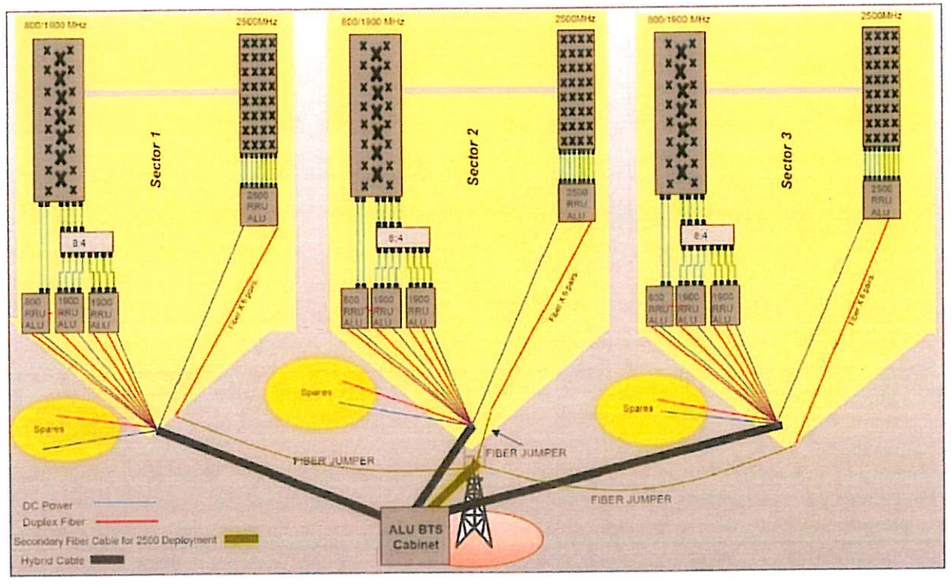


ALU 2500MHz ALU SCENARIO 1 | SCALE | 11"x17" : NTS / 24"x36" : NTS | 1

NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.



RFS 2500MHz ALU SCENARIO 1 | SCALE | 11"x17" : NTS / 24"x36" : NTS | 2



RAN WIRING DIAGRAM: ALU EQUIPMENT | SCALE | 11"x17" : NTS / 24"x36" : NTS | 3

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

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(732) 678-0155

ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE:

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No: ASDGSP26

CLIENT ID No: CT03XC022

DESIGN TYPE: 2.5 GHz

SITE INFORMATION:

SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE: WIRING DIAGRAMS

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

DATE: 3-3-14
PROJECT No: ASDGSP26
DRAWING BY: CD
CHK BY:
DWG No: A-5

24"x36" SHEETS - SIGN & SEAL AREA

NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.

NV CABLES			
BAND	INDICATOR	PORT	COLOR
800-1	YEL GRN	NV-1	GRN
1900-1	YEL RED	NV-2	BLU
1900-2	YEL BRN	NV-3	BRN
1900-3	YEL BLU	NV-4	WHT
1900-4	YEL SLT	NV-5	RED
800-2	YEL ORG	NV-6	SLT
SPARE	YEL WHT	NV-7	PPL
2500	YEL PPL	NV-8	ORG

HYBRID	
HYBRID	COLOR
1	GRN
2	BLU
3	BRN
4	WHT
5	RED
6	SLT
7	PPL
8	ORG

2.5 Band	
2500 Radio 1	COLOR
YEL WHT	GRN
YEL WHT	BLU
YEL WHT	BRN
YEL WHT	WHT
YEL WHT	RED
YEL WHT	SLT
YEL WHT	PPL
YEL WHT	ORG

FIGURE 19.1 CABLE COLOR CODE

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

NOTES

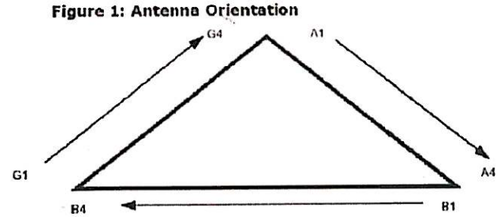
1. All cables shall be marked at the top and bottom with 2" colored tape, stencil tag colored tape, or colored heat shrink tubing
2. Colored tape may be obtained from Graybar Electronic. UV stabilized tape or heat shrink are preferred.
3. The first ring shall be closest to the end of the cable, and there shall be a 1" space between each ring.
4. The cable color code shall be applied in accordance to Table 19-1.
   A. Table 19-1 only shows 3 sectors, but additional sectors are easily supported by adding the appropriate number of colored rings to the cable color code.
5. After the cable color code is applied, the frequency color code, Table 19-2, must be applied for the specific frequency band in use on a given line.
   A.2" gap shall separate the cable color code from the frequency color code.
   B. The 2" color rings for the frequency code shall be placed next to each other with no spaces.
6. Wrap 2" colored tape a minimum of 3 times around the coax, and keep the tape in the same area as much as possible. This will allow removal of tape that fades or discolors due to weather.
7. Examples of the cable and frequency color codes are shown in Figure 19-1 and Figure 19-2.

FIGURE 19.2 COLOR CODE

FREQUENC	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

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

Figure 1: Antenna Orientation



REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

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ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE:

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No:
ASDGSP26

CLIENT ID No:
CT03XC022

DESIGN TYPE:
2.5 GHz

SITE INFORMATION:
SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE
RF DATA SHEET

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

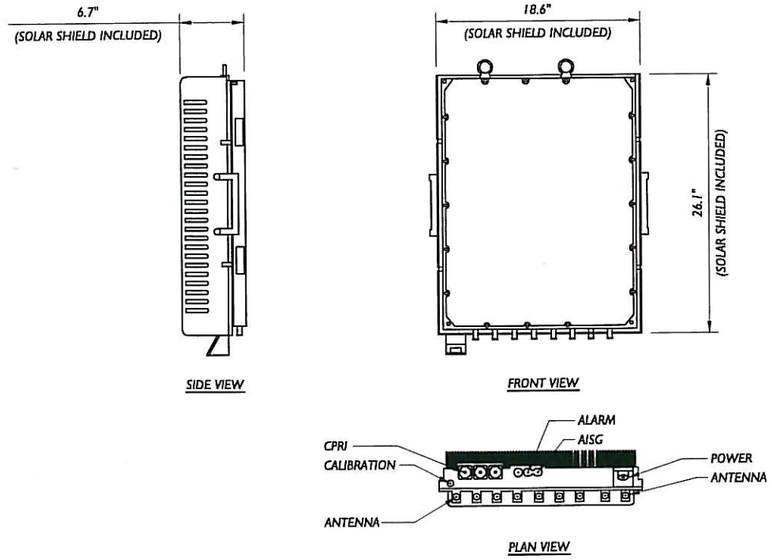
DATE: 3-3-14
PROJECT No: ASDGSP26
DRAWING BY: CD
CHK BY:
DWG No: A-6

24"x36" SHEETS - SIGN & SEAL AREA

CABLE MARKING DIAGRAM

SCALE 11"x17" : NTS
24"x36" : NTS

1



TD-RRH8x20-25 REMOTE RADIO HEAD

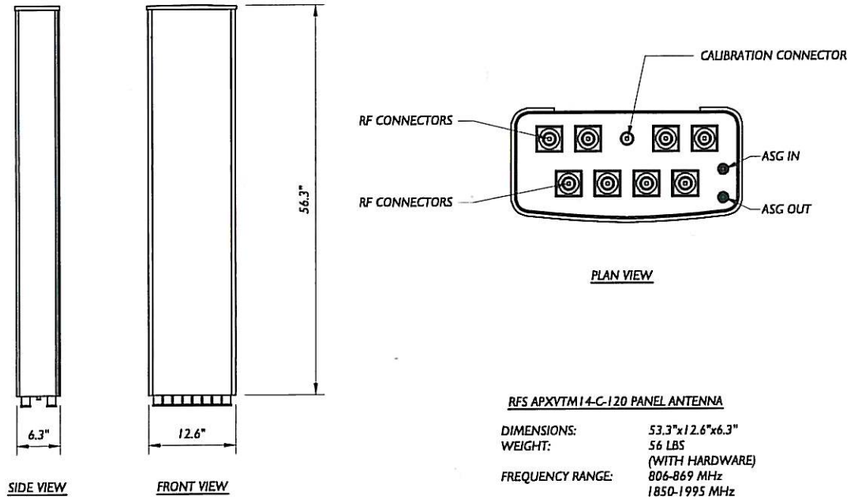
DIMENSIONS:	26.1"x18.6"x6.7"
WEIGHT:	60 LBS (WITH HARDWARE)

2.5 RRUS DETAIL

SCALE	11"x17" : NTS
	24"x36" : NTS

1

NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.



RFS APXVTM14-C-120 PANEL ANTENNA

DIMENSIONS:	53.3"x12.6"x6.3"
WEIGHT:	56 LBS (WITH HARDWARE)
FREQUENCY RANGE:	806-869 MHz 1850-1995 MHz

2.5 ANTENNA DETAIL

SCALE	11"x17" : NTS
	24"x36" : NTS

2

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
D2	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
D1	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
D0	3-3-14	INITIAL SUBMISSION	CM	KLR

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(732) 678-0155

ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE:

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No:	ASDGSP26
CLIENT ID No:	CT03XC022
DESIGN TYPE:	2.5 GHz

SITE INFORMATION:

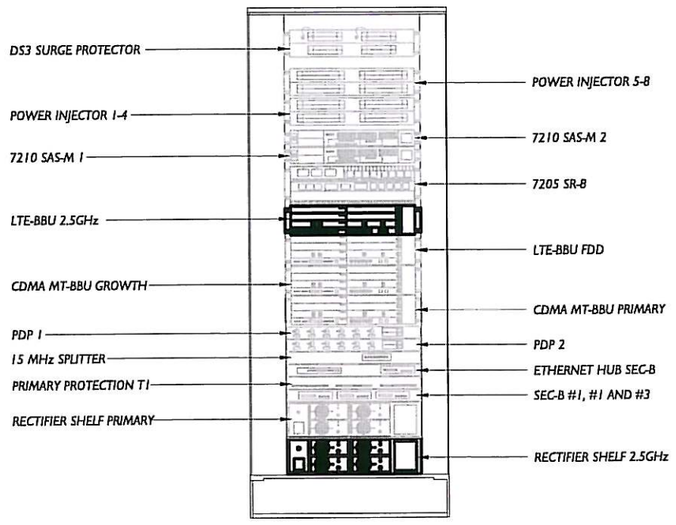
SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE

EQUIPMENT SPECIFICATIONS

MICHAEL L. BOHLINGER CT LICENSE No. 20405	DATE: 3-3-14
	PROJECT No: ASDGSP26
	DRAWING BY: CD
	CHK BY:
	DWG No: A-7

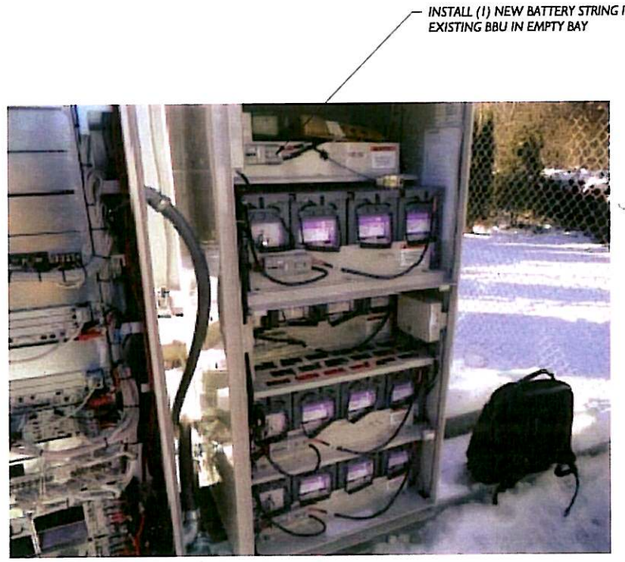
24"x36" SHEETS - SIGN & SEAL AREA



2.5 EQUIP. IN EXISTING CABINET

SCALE	11"x17" : NTS
	24"x36" : NTS

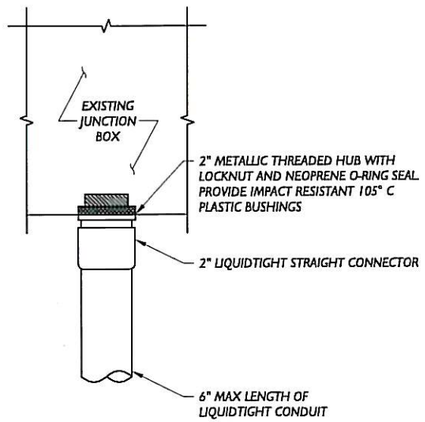
3



EXISTING BBU CABINET

SCALE	11"x17" : NTS
	24"x36" : NTS

4



JUNCTION BOX PENETRATION

SCALE	11"x17" : NTS
	24"x36" : NTS

5

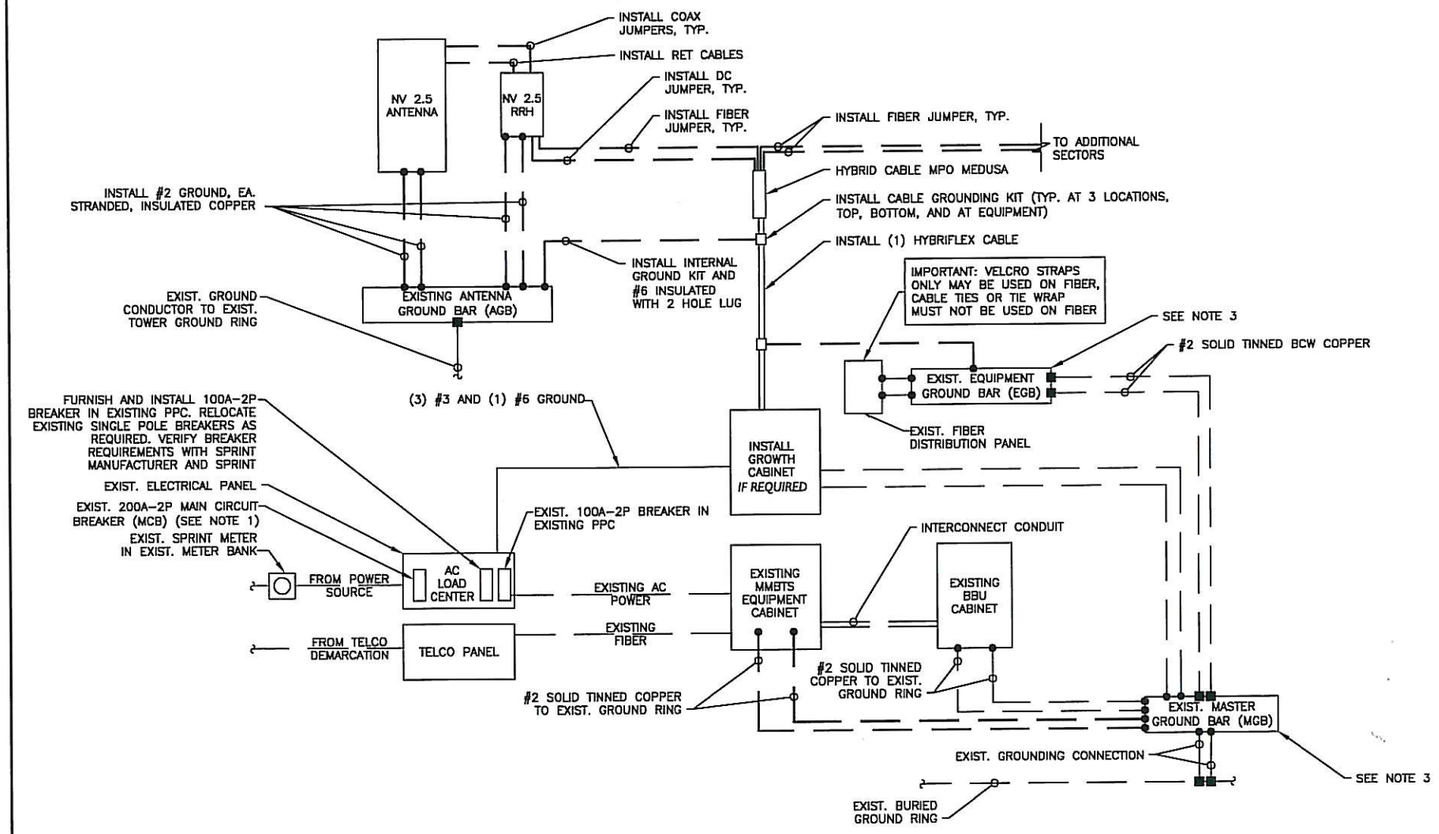
SPECIAL WORK NOTE:

1. G.C. TO FURNISH AND INSTALL ALL COMPONENTS TO UPGRADE EXISTING ELECTRICAL SERVICE, CONDUIT, CONDUCTOR, PPC AND MCB IN ACCORDANCE WITH SPRINT CONSTRUCTION STANDARDS NV 2.5 ADDENDUM "ENGINEERING NOTICE 2013-002 (POWER UPGRADES) REV.0"
2. G.C. TO FURNISH AND INSTALL UPGRADE THE EXISTING MMBTS BREAKER, CONDUCTOR, AND CONDUIT TO A MINIMUM NEC RATING FOR A 100-AMP, 240V CIRCUIT.
3. FOR NEW OR REPAIRED GROUNDING EQUIPMENT, REFER TO SPRINT GROUNDING STANDARDS AND FOLLOWING (SUPPLEMENTS):
   -ANTI-THEFT UPDATE TO SPRINT GROUNDING DATED 08-24-12
   -SPRINT ENGINEERING LETTER EL-0504 DATED 04-20-12

NOTE:
MAXIMUM LENGTH OF LIQUID TIGHT CONDUIT IS TO BE 6 FEET

SYMBOL LEGEND

- (X) SPECIAL WORK NOTE
- ■ EXOTHERMIC CONNECTION
- ● MECHANICAL CONNECTION
- □ CABLE GROUNDING KIT



ELECTRICAL ONE-LINE DIAGRAM

SCALE: 11"x17" : NTS; 24"x36" : NTS

1

ELECTRICAL NOTES

1) ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.

2) THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONDUIT ROUTING WITH LOCAL UTILITY COMPANIES AND SPRINT CONSTRUCTION MANAGER.

3) ALL CONDUITS ROUTED BELOW GRADE SHALL TRANSITION TO RIGID GALVANIZED ELBOWS WITH RIGID GALVANIZED STEEL CONDUIT ABOVE GRADE.

4) ALL METAL CONDUITS SHALL BE PROVIDED WITH GROUNDING BUSHINGS.

5) GENERAL CONTRACTOR SHALL PROVIDE ALL DIRECT BURIED CONDUITS WITH PLASTIC WARNING TAPE IDENTIFYING CONTENTS. TAPE COLORS SHALL BE ORANGE FOR TELEPHONE AND RED FOR ELECTRIC.

6) ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.

7) THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIALS DESCRIBED BY DRAWINGS AND SPECIFICATIONS INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.

8) GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.

9) ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.

10) BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.

11) ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.

12) RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.

13) RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.

14) FIBER OPTIC CIRCUITS SHALL BE IN ACCORDANCE WITH NEC ARTICLE 770-OPTICAL FIBER CABLES AND RACEWAYS.

15) COMMUNICATIONS CIRCUITS SHALL BE IN ACCORDANCE WITH NEC ARTICLE 800-COMMUNICATIONS SYSTEMS.

NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.

ELECTRICAL NOTES

SCALE: 11"x17" : NTS; 24"x36" : NTS

2

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
02	3-24-14	REVISED PER CLIENT COMMENTS	KLR	MLB
01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

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(732) 678-0155

ENGINEER'S LICENSE

MICHAEL L. BOHLINGER

SIGNATURE:

PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 20405

ASDG PROJECT No:
ASDGSP26

CLIENT ID No:
CT03XC022

DESIGN TYPE:
2.5 GHz

SITE INFORMATION:

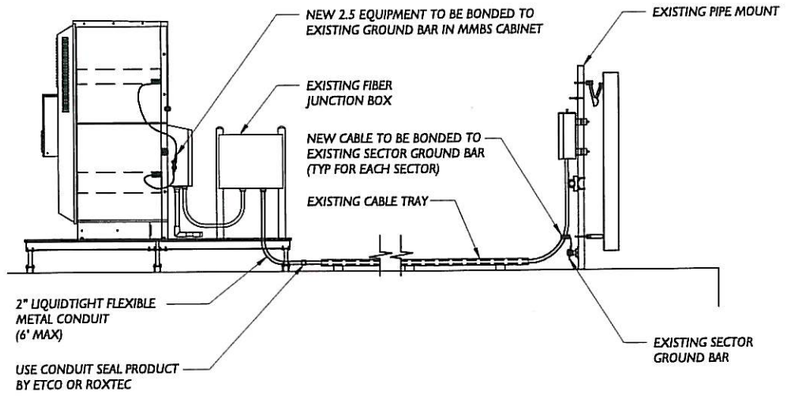
SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE
ONE-LINE DIAGRAM

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

DATE: 3-3-14
PROJECT No: ASDGSP26
DRAWING BY: CD
CHK BY:
DWG No: E-1

24"x36" SHEETS - SIGN & SEAL AREA

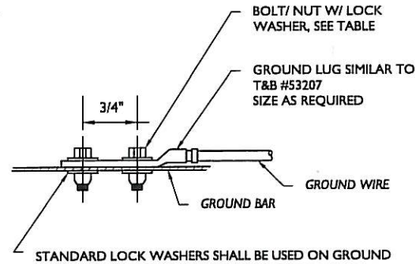


TYPICAL EQUIPMENT GROUNDING SCHEMATIC

SCALE: 11"x17" : NTS; 24"x36" : NTS

1

NOTE:
SITE INFORMATION AND PLANS ARE BASED UPON 2.5 AUDIT DOCUMENTATION PROVIDED BY THE SPRINT.



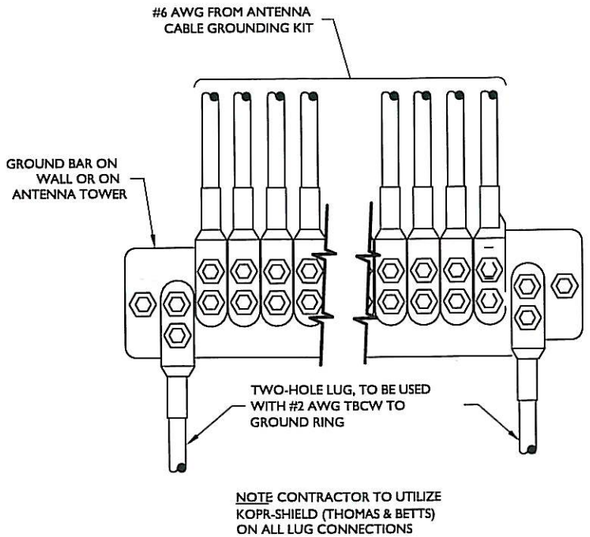
STANDARD LOCK WASHERS SHALL BE USED ON GROUND BARS, SSERRATED "DRAGON TOOTH" LOCK WASHERS SHALL BE USED ON CONNECTIONS TO BUILDING STEEL AND MISCELLANEOUS METALS.

TABLE		
WIRE SIZE	LUG #	BOLT SIZE
#4/0	53212	1/2" – 20 NC x 1/2" S.S. BOLT & NUT W/ LOCK WASHERS
#2	53207	1/4" – 20 NC x 1/2" S.S. BOLT & NUT W/ LOCK WASHERS
#6	53205	

GROUND LUG CONNECTION

SCALE: 11"x17" : NTS; 24"x36" : NTS

2



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

GROUND LUG CONNECTION TO GROUND BAR

SCALE: 11"x17" : NTS; 24"x36" : NTS

3

REV.	DATE	REVISION DESCRIPTION	DRAWN BY	CHKD. BY
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01	3-19-14	REVISED PER CLIENT COMMENTS	CM	KLR
00	3-3-14	INITIAL SUBMISSION	CM	KLR

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CONNECTICUT LICENSE No. 20405

ASDG PROJECT No: ASDGSP26

CLIENT ID No: CT03XC022

DESIGN TYPE: 2.5 GHz

SITE INFORMATION:

SOUTH GUILFORD
10 TANNER MARSH ROAD
SOUTH GUILFORD, CT 06437

DRAWING TITLE

GROUNDING DETAILS

MICHAEL L. BOHLINGER
CT LICENSE No. 20405

DATE: 3-3-14
PROJECT No: ASDGSP26
DRAWING BY: CD
CHK BY:
DWG No.: G-1

24"x36" SHEETS - SIGN & SEAL AREA

EBI Consulting
environmental | engineering | due diligence

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

Sprint Existing Facility

Site ID: CT03XC022

Rte 1 TCI Tower
10 Tanner Marsh Road
South Guilford, CT 06437

May 7, 2014

EBI Project Number: 62142630

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

EBI Consulting
environmental | engineering | due diligence

May 7, 2014

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

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:
CT03XC022 - Rte 1 TCI Tower

Site Total: 40.348% - MPE% in full compliance

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 10 Tanner Marsh Road, South Guilford, 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 (µW/cm^2). The general population exposure limit for the cellular band is approximately 567 µW/cm^2, and the general population exposure limit for the 1900 MHz and 2500 MHz bands band is 1000 µW/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 10 Tanner Marsh Road, South Guilford, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario. Actual values seen from this site will be dramatically less than those shown in this report. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 2 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 was used in this direction.

6) The antennas used in this modeling are the RFS APXVSPP18-C-A20 and the RFS APXVTMM-C-120. 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 APXVTMM-C-120 has a 15.9 dBd gain value at its main lobe at 2500 MHz. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario.
7) The antenna mounting height centerlines for the proposed antennas are **140 feet** above ground level (AGL).
8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

Site ID	CT03XC022 - Rte 1 TCI Tower
Site Addresss	10 Tanner Marsh Road, South Guilford, CT 06437
Site Type	Monopole

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	15.9	140	134	1/2 "	0.5	0	1386.9474	27.76875	2.77688%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	140	134	1/2 "	0.5	0	389.96892	7.807759	1.37703%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	40	1	40	13.4	140	134	1/2 "	0.5	0	779.93784	15.61552	2.75406%
														Sector total Power Density Value:		6.908%	

Sector 2

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	15.9	140	134	1/2 "	0.5	0	1386.9474	27.76875	2.77688%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	140	134	1/2 "	0.5	0	389.96892	7.807759	1.37703%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	40	1	40	13.4	140	134	1/2 "	0.5	0	779.93784	15.61552	2.75406%
														Sector total Power Density Value:		6.908%	

Sector 3

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	15.9	140	134	1/2 "	0.5	0	1386.9474	27.76875	2.77688%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	140	134	1/2 "	0.5	0	389.96892	7.807759	1.37703%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	40	1	40	13.4	140	134	1/2 "	0.5	0	779.93784	15.61552	2.75406%
														Sector total Power Density Value:		6.908%	

Site Composite MPE %	
Carrier	MPE %
Sprint	20.724%
Verizon Wireless PCS	4.920%
Verizon Wireless Cellular	7.210%
Verizon Wireless AWS	3.214%
Verizon Wireless 700 MH	3.280%
TCI	0.01
Total Site MPE %	**40.348%**

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 **20.724% (6.908% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **40.348%** 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

Structural Analysis for CTI Towers

150' Monopole Tower

CTI Towers Site Name: Guilford
CTI Towers Site ID: 10110
Sprint Site ID: CT03XC022
Sprint Site Name: Rte. 1 TCI Tower

FDH Project Number 1426101400

Analysis Results

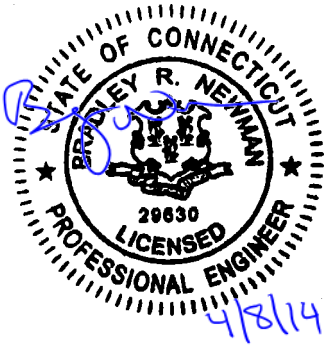
Tower Components	69.0%	Sufficient
Foundation	37.7%	Sufficient

Prepared By:

Cary J Webb, PE
Project Engineer

Reviewed By:

Bradley Newman, PE
Senior Project Engineer
CT PE License No. 29630



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April 8, 2014

Prepared pursuant to TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the 2005 Connecticut State Building Code

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of CTI Towers, FDH Engineering, Inc. performed a structural analysis of the monopole located in Guilford, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads pursuant to the *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA/EIA-222-F* and the *2005 Connecticut State Building Code*. Information pertaining to the existing/proposed antenna loading, current tower geometry, geotechnical data, foundation dimensions, and member sizes was obtained from:

- Daley Tower Service, Inc. (Job No. 23513-0317) original design drawings dated July 29, 2013
- Terracon (Project No. J2135125) Geotechnical Engineering Report dated April 9, 2013
- Vertical Solutions, Inc. (Project No 130479, Rev. 0) Structural Review Letter dated May 22, 2013
- CTI Towers

The *basic design wind speed* per the *TIA/EIA-222-F* standards and the *2005 Connecticut State Building Code* is 85 mph without ice and 38 mph with 3/4" radial ice. Ice is considered to increase in thickness with height.

Conclusions

With the existing and proposed antennas from Sprint in place at 140 ft, the tower meets the requirements of the *TIA/EIA-222-F* standards and the *2005 Connecticut State Building Code* provided the **Recommendations** listed below are satisfied. Furthermore, provided the foundations were designed and constructed per the original design drawings (see Daley Tower Service, Inc. Job No. 23513-0317), and provided the soil parameters (see Terracon Project No. J2135125), the foundations should have the necessary capacity to support the existing and proposed loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Engineering, Inc. is accurate (i.e., the steel data, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the *TIA/EIA-222-F* standards and the *2005 Connecticut State Building Code* are met with the existing and proposed loading in place, we have the following recommendations:

1. The proposed feedlines should be installed inside the pole shaft.
2. RRU/RRH Stipulation: The proposed and existing equipment may be installed in any arrangement as determined by the client.

APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Engineering, Inc. should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft)	Description	Feedlines[1]	Carrier	Mount Elevation (ft)	Mount Type
150	(6) Antel BXA-70063/6CF (6) Antel BXA-171063/12CF (6) Alcatel Lucent RRH2X40-AWS (6) Alcatel Lucent RRH2x40 LTE (1) RFS 24"x24"x10"	(18) 1-5/8"	Verizon	150	(1) Platform w/ Handrails (Assumed CaAa = 33.02 ft^2)
140	(3) RFS APXVSPP18-C-A20 (3) Alcatel Lucent 800 MHz RRH (3) Alcatel Lucent 1900MHz RRH Notch Filters	(3) 1-1/4"	Sprint	140	(1) Platform w/ Handrails

1. Feedlines installed inside the pole shaft unless otherwise noted

Proposed Loading:

Antenna Elevation (ft)	Description	Feedlines	Carrier	Mount Elevation (ft)	Mount Type
140	(3) RFS APXVTM14-C-120 (3) RFS APXVSPP18-C-A20 (3) Alcatel Lucent 800 MHz RRH (3) Alcatel Lucent 1900MHz RRH (3) Alcatel Lucent TD-RRH8x20-25 (3) Andrew 800 MHz 2x50W External Notch Filter	(3) 1-1/4" (1) .7"	Sprint	140	(1) Platform w/ Handrails

RESULTS

The following yield strength of steel for individual members was used for analysis:

Table 2 - Material Strength

Member Type	Yield Strength
Tower Shaft Sections	65 ksi
Base Plate	60 ksi
Anchor Bolts	75 ksi

Table 3 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. *Note: Capacities up to 105% are considered acceptable.* **Table 4** displays the maximum foundation reactions.

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information

Table 3 - Summary of Working Percentage of Structural Components

Section No.	Elevation ft	Component Type	Size	% Capacity	Pass Fail
L1	150 - 113	Pole	TP30.48x20x0.1875	69.0	Pass
L2	113 - 91.25	Pole	TP36.27x28.9012x0.25	66.1	Pass
L3	91.25 - 46.25	Pole	TP48.52x34.3529x0.3125	62.3	Pass
L4	46.25 - 0	Pole	TP61x45.9824x0.375	56.5	Pass
		Anchor Bolts	(16) 2.25" Ø w/ BC = 68"	42.5	Pass
		Base Plate	74" Ø x 2" thk.	38.9	Pass

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis* *(TIA/EIA-222-F)*	Original Design *(ANSI/TIA-222-G)*
Axial	37 k	44 k
Shear	23 k	49 k
Moment	2,520 k-ft	5,150 k-ft

*Foundation determined adequate per independent analysis.

GENERAL COMMENTS

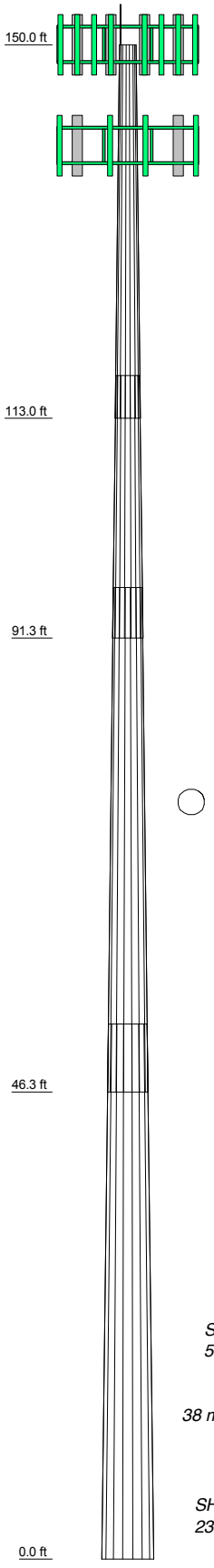
This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of CTI Towers to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Engineering, Inc. should be notified immediately to perform a revised analysis.

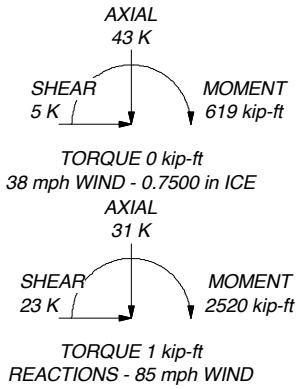
LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.

APPENDIX

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	37.00	18	0.1875	4.25	20.0000	30.4800	A572-65	1.9
2	26.00	18	0.2500	5.00	28.9012	36.2700		2.3
3	50.00	18	0.3125	6.75	34.3529	48.5200		6.9
4	53.00	18	0.3750		45.9824	61.0000		11.4
								22.5





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	150	APXVSPP18-C-A20 w/Mount Pipe	140
(2) BXA-70063/6CF w/ Mount Pipe	150	APXVTM14-C-120 w/Mount Pipe	140
(2) BXA-70063/6CF w/ Mount Pipe	150	APXVTM14-C-120 w/Mount Pipe	140
(2) BXA-70063/6CF w/ Mount Pipe	150	APXVTM14-C-120 w/Mount Pipe	140
(2) BXA-171063/12CF w/ Mount Pipe	150	800 MHz RRH	140
(2) BXA-171063/12CF w/ Mount Pipe	150	800 MHz RRH	140
(2) BXA-171063/12CF w/ Mount Pipe	150	800 MHz RRH	140
(2) RRH2X40-AWS	150	1900MHz RRH	140
(2) RRH2X40-AWS	150	1900MHz RRH	140
(2) RRH2X40-AWS	150	1900MHz RRH	140
(2) RRH2x40 LTE	150	TD-RRH8x20-25	140
(2) RRH2x40 LTE	150	TD-RRH8x20-25	140
(2) RRH2x40 LTE	150	TD-RRH8x20-25	140
24"x24"x10"	150	800 MHz 2x50W External Notch Filter	140
Platform With Handrails MNT	150	800 MHz 2x50W External Notch Filter	140
APXVSPP18-C-A20 w/Mount Pipe	140	800 MHz 2x50W External Notch Filter	140
APXVSPP18-C-A20 w/Mount Pipe	140	Platform With Handrails MNT	140

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 69%

FDH Engineering, Inc.
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Raleigh, NC 27616
Phone: 9197551012
FAX: 9197551031
Tower Analysis

Job: **Guilford, 10110**			
Project: **1426101400**			
Client: CTI Towers	Drawn by: Cary Webb	App'd:	
Code: TIA/EIA-222-F	Date: 04/08/14	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole 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		

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	150.00-113.00	37.00	4.25	18	20.0000	30.4800	0.1875	0.7500	A572-65 (65 ksi)
L2	113.00-91.25	26.00	5.00	18	28.9012	36.2700	0.2500	1.0000	A572-65 (65 ksi)
L3	91.25-46.25	50.00	6.75	18	34.3529	48.5200	0.3125	1.2500	A572-65 (65 ksi)
L4	46.25-0.00	53.00		18	45.9824	61.0000	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	20.3085	11.7909	584.7409	7.0334	10.1600	57.5532	1170.2512	5.8966	3.1900	17.013
	30.9502	18.0278	2090.0227	10.7538	15.4838	134.9809	4182.7954	9.0156	5.0345	26.851
L2	30.5702	22.7347	2357.8359	10.1712	14.6818	160.5956	4718.7742	11.3695	4.6466	18.586
	36.8295	28.5819	4685.0638	12.7871	18.4252	254.2753	9376.2923	14.2937	5.9435	23.774
L3	36.3214	33.7638	4942.8720	12.0844	17.4513	283.2383	9892.2479	16.8851	5.4961	17.588
	49.2685	47.8158	14039.0663	17.1137	24.6482	569.5787	28096.6055	23.9125	7.9895	25.566
L4	48.6339	54.2843	14265.3644	16.1906	23.3591	610.6988	28549.4996	27.1473	7.4329	19.821
	61.9410	72.1589	33506.6412	21.5219	30.9880	1081.2780	67057.3713	36.0863	10.0760	26.869

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.00-113.00				1	1	1		
L2 113.00-91.25				1	1	1		
L3 91.25-46.25				1	1	1		
L4 46.25-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1-1/4"	C	No	Inside Pole	140.00 - 0.00	3	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
.7"	C	No	Inside Pole	140.00 - 0.00	1	No Ice	0.00	0.47
						1/2" Ice	0.00	0.47
						1" Ice	0.00	0.47
						2" Ice	0.00	0.47
						4" Ice	0.00	0.47
**								
1-5/8"	C	No	Inside Pole	150.00 - 0.00	18	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	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
L1	150.00-113.00	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	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.76
L2	113.00-91.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.46
L3	91.25-46.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.95
L4	46.25-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.98

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	150.00-113.00	A	0.884	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.76
L2	113.00-91.25	A	0.859	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.46
L3	91.25-46.25	A	0.818	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.95
L4	46.25-0.00	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.98

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.00-113.00	0.0000	0.0000	0.0000	0.0000
L2	113.00-91.25	0.0000	0.0000	0.0000	0.0000
L3	91.25-46.25	0.0000	0.0000	0.0000	0.0000
L4	46.25-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft	C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K

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	C	From Leg	0.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.25 0.66 0.97 1.49 2.68	0.25 0.66 0.97 1.49 2.68	0.03 0.03 0.04 0.06 0.14
**									
(2) BXA-70063/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.98 8.62 9.23 10.47 13.08	5.41 6.56 7.42 9.20 12.95	0.04 0.10 0.17 0.33 0.79
(2) BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.98 8.62 9.23 10.47 13.08	5.41 6.56 7.42 9.20 12.95	0.04 0.10 0.17 0.33 0.79
(2) BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.98 8.62 9.23 10.47 13.08	5.41 6.56 7.42 9.20 12.95	0.04 0.10 0.17 0.33 0.79
(2) BXA-171063/12CF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.03 5.58 6.10 7.17 9.44	5.29 6.46 7.35 9.15 12.95	0.04 0.09 0.14 0.27 0.68
(2) BXA-171063/12CF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.03 5.58 6.10 7.17 9.44	5.29 6.46 7.35 9.15 12.95	0.04 0.09 0.14 0.27 0.68
(2) BXA-171063/12CF w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.03 5.58 6.10 7.17 9.44	5.29 6.46 7.35 9.15 12.95	0.04 0.09 0.14 0.27 0.68
(2) RRH2X40-AWS	A	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
(2) RRH2X40-AWS	B	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
(2) RRH2X40-AWS	C	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
(2) RRH2x40 LTE	A	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.25 2.45 2.66 3.10 4.10	1.23 1.39 1.55 1.91 2.73	0.05 0.07 0.09 0.13 0.27
(2) RRH2x40 LTE	B	From Leg	4.00	0.0000	150.00	No Ice	2.25	1.23	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	2.45	1.39	0.07
			0.00			1" Ice	2.66	1.55	0.09
						2" Ice	3.10	1.91	0.13
						4" Ice	4.10	2.73	0.27
(2) RRH2x40 LTE	C	From Leg	4.00	0.0000	150.00	No Ice	2.25	1.23	0.05
			0.00			1/2" Ice	2.45	1.39	0.07
			0.00			1" Ice	2.66	1.55	0.09
						2" Ice	3.10	1.91	0.13
						4" Ice	4.10	2.73	0.27
24"x24"x10"	A	From Leg	4.00	0.0000	150.00	No Ice	5.60	2.33	0.04
			0.00			1/2" Ice	5.92	2.56	0.08
			0.00			1" Ice	6.24	2.79	0.12
						2" Ice	6.91	3.28	0.21
						4" Ice	8.37	4.37	0.45
Platform With Handrails MNT	C	None		0.0000	150.00	No Ice	33.03	33.03	1.71
						1/2" Ice	44.60	44.60	2.19
						1" Ice	56.17	56.17	2.68
						2" Ice	79.31	79.31	3.65
						4" Ice	125.59	125.59	5.58
**									
APXVSPP18-C-A20 w/Mount Pipe	A	From Leg	4.00	0.0000	140.00	No Ice	8.50	6.95	0.08
			0.00			1/2" Ice	9.15	8.13	0.15
			0.00			1" Ice	9.77	9.02	0.23
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
APXVSPP18-C-A20 w/Mount Pipe	B	From Leg	4.00	0.0000	140.00	No Ice	8.50	6.95	0.08
			0.00			1/2" Ice	9.15	8.13	0.15
			0.00			1" Ice	9.77	9.02	0.23
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
APXVSPP18-C-A20 w/Mount Pipe	C	From Leg	4.00	0.0000	140.00	No Ice	8.50	6.95	0.08
			0.00			1/2" Ice	9.15	8.13	0.15
			0.00			1" Ice	9.77	9.02	0.23
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
APXVTM14-C-120 w/Mount Pipe	A	From Leg	4.00	0.0000	140.00	No Ice	7.13	4.96	0.08
			0.00			1/2" Ice	7.66	5.75	0.13
			0.00			1" Ice	8.18	6.47	0.19
						2" Ice	9.26	8.01	0.34
						4" Ice	11.53	11.41	0.75
APXVTM14-C-120 w/Mount Pipe	B	From Leg	4.00	0.0000	140.00	No Ice	7.13	4.96	0.08
			0.00			1/2" Ice	7.66	5.75	0.13
			0.00			1" Ice	8.18	6.47	0.19
						2" Ice	9.26	8.01	0.34
						4" Ice	11.53	11.41	0.75
APXVTM14-C-120 w/Mount Pipe	C	From Leg	4.00	0.0000	140.00	No Ice	7.13	4.96	0.08
			0.00			1/2" Ice	7.66	5.75	0.13
			0.00			1" Ice	8.18	6.47	0.19
						2" Ice	9.26	8.01	0.34
						4" Ice	11.53	11.41	0.75
800 MHz RRH	A	From Leg	4.00	0.0000	140.00	No Ice	2.49	2.07	0.05
			0.00			1/2" Ice	2.71	2.27	0.07
			0.00			1" Ice	2.93	2.48	0.10
						2" Ice	3.41	2.93	0.16
						4" Ice	4.46	3.93	0.32
800 MHz RRH	B	From Leg	4.00	0.0000	140.00	No Ice	2.49	2.07	0.05
			0.00			1/2" Ice	2.71	2.27	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	2.93	2.48	0.10
						2" Ice	3.41	2.93	0.16
						4" Ice	4.46	3.93	0.32
800 MHz RRH	C	From Leg	4.00	0.0000	140.00	No Ice	2.49	2.07	0.05
			0.00			1/2" Ice	2.71	2.27	0.07
			0.00			1" Ice	2.93	2.48	0.10
						2" Ice	3.41	2.93	0.16
						4" Ice	4.46	3.93	0.32
1900MHz RRH	A	From Leg	4.00	0.0000	140.00	No Ice	2.70	2.77	0.06
			0.00			1/2" Ice	2.94	3.01	0.08
			0.00			1" Ice	3.18	3.26	0.11
						2" Ice	3.70	3.78	0.18
						4" Ice	4.85	4.93	0.35
1900MHz RRH	B	From Leg	4.00	0.0000	140.00	No Ice	2.70	2.77	0.06
			0.00			1/2" Ice	2.94	3.01	0.08
			0.00			1" Ice	3.18	3.26	0.11
						2" Ice	3.70	3.78	0.18
						4" Ice	4.85	4.93	0.35
1900MHz RRH	C	From Leg	4.00	0.0000	140.00	No Ice	2.70	2.77	0.06
			0.00			1/2" Ice	2.94	3.01	0.08
			0.00			1" Ice	3.18	3.26	0.11
						2" Ice	3.70	3.78	0.18
						4" Ice	4.85	4.93	0.35
TD-RRH8x20-25	A	From Leg	4.00	0.0000	140.00	No Ice	4.72	1.70	0.07
			0.00			1/2" Ice	5.01	1.92	0.10
			0.00			1" Ice	5.32	2.14	0.13
						2" Ice	5.95	2.62	0.20
						4" Ice	7.31	3.68	0.40
TD-RRH8x20-25	B	From Leg	4.00	0.0000	140.00	No Ice	4.72	1.70	0.07
			0.00			1/2" Ice	5.01	1.92	0.10
			0.00			1" Ice	5.32	2.14	0.13
						2" Ice	5.95	2.62	0.20
						4" Ice	7.31	3.68	0.40
TD-RRH8x20-25	C	From Leg	4.00	0.0000	140.00	No Ice	4.72	1.70	0.07
			0.00			1/2" Ice	5.01	1.92	0.10
			0.00			1" Ice	5.32	2.14	0.13
						2" Ice	5.95	2.62	0.20
						4" Ice	7.31	3.68	0.40
800 MHz 2x50W External Notch Filter	A	From Leg	4.00	0.0000	140.00	No Ice	0.78	0.29	0.01
			0.00			1/2" Ice	0.90	0.38	0.01
			0.00			1" Ice	1.03	0.48	0.02
						2" Ice	1.31	0.70	0.04
						4" Ice	1.99	1.24	0.10
800 MHz 2x50W External Notch Filter	B	From Leg	4.00	0.0000	140.00	No Ice	0.78	0.29	0.01
			0.00			1/2" Ice	0.90	0.38	0.01
			0.00			1" Ice	1.03	0.48	0.02
						2" Ice	1.31	0.70	0.04
						4" Ice	1.99	1.24	0.10
800 MHz 2x50W External Notch Filter	C	From Leg	4.00	0.0000	140.00	No Ice	0.78	0.29	0.01
			0.00			1/2" Ice	0.90	0.38	0.01
			0.00			1" Ice	1.03	0.48	0.02
						2" Ice	1.31	0.70	0.04
						4" Ice	1.99	1.24	0.10
Platform With Handrails MNT	C	None		0.0000	140.00	No Ice	33.03	33.03	1.71
						1/2" Ice	44.60	44.60	2.19
						1" Ice	56.17	56.17	2.68
						2" Ice	79.31	79.31	3.65

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" Ice	125.59	125.59	5.58

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 113	Pole	Max Tension	14	0.00	-0.00	-0.00
			Max. Compression	14	-13.38	0.03	0.53
			Max. Mx	11	-7.03	356.59	0.17
			Max. My	2	-7.01	0.02	362.04
			Max. Vy	11	-13.48	356.59	0.17
			Max. Vx	2	-13.64	0.02	362.04
			Max. Torque	11			-0.55
L2	113 - 91.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.75	0.03	0.53
			Max. Mx	11	-9.65	656.11	0.18
			Max. My	2	-9.64	0.02	664.97
			Max. Vy	11	-15.06	656.11	0.18
			Max. Vx	2	-15.22	0.02	664.97
			Max. Torque	5			0.55
L3	91.25 - 46.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.06	0.03	0.53
			Max. Mx	11	-17.20	1385.47	0.19
			Max. My	2	-17.19	0.02	1401.34
			Max. Vy	11	-18.69	1385.47	0.19
			Max. Vx	2	-18.85	0.02	1401.34
			Max. Torque	5			0.55
L4	46.25 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-42.66	0.03	0.53
			Max. Mx	11	-31.18	2495.44	0.19
			Max. My	2	-31.18	0.02	2519.79
			Max. Vy	11	-23.25	2495.44	0.19
			Max. Vx	2	-23.41	0.02	2519.79
			Max. Torque	5			0.55

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	42.66	-0.00	-0.00
	Max. H_x	11	31.19	23.23	0.00
	Max. H_z	2	31.19	0.00	23.39
	Max. M_x	2	2519.79	0.00	23.39
	Max. M_z	5	2495.40	-23.23	0.00
	Max. Torsion	5	0.55	-23.23	0.00
	Min. Vert	2	31.19	0.00	23.39
	Min. H_x	5	31.19	-23.23	0.00
	Min. H_z	8	31.19	0.00	-23.39
	Min. M_x	8	-2519.41	0.00	-23.39
	Min. M_z	11	-2495.44	23.23	0.00
	Min. Torsion	11	-0.55	23.23	0.00

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	31.19	0.00	-0.00	-0.18	0.02	0.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 0 deg - No Ice	31.19	0.00	-23.39	-2519.79	0.02	-0.01
Dead+Wind 30 deg - No Ice	31.19	11.62	-20.26	-2182.36	-1247.75	-0.28
Dead+Wind 60 deg - No Ice	31.19	20.12	-11.70	-1260.08	-2161.20	-0.48
Dead+Wind 90 deg - No Ice	31.19	23.23	-0.00	-0.19	-2495.40	-0.55
Dead+Wind 120 deg - No Ice	31.19	20.12	11.70	1259.70	-2161.19	-0.47
Dead+Wind 150 deg - No Ice	31.19	11.62	20.26	2181.99	-1247.74	-0.27
Dead+Wind 180 deg - No Ice	31.19	0.00	23.39	2519.41	0.02	0.01
Dead+Wind 210 deg - No Ice	31.19	-11.62	20.26	2181.99	1247.79	0.28
Dead+Wind 240 deg - No Ice	31.19	-20.12	11.70	1259.70	2161.24	0.48
Dead+Wind 270 deg - No Ice	31.19	-23.23	-0.00	-0.19	2495.44	0.55
Dead+Wind 300 deg - No Ice	31.19	-20.12	-11.70	-1260.08	2161.24	0.47
Dead+Wind 330 deg - No Ice	31.19	-11.62	-20.26	-2182.36	1247.79	0.26
Dead+Ice+Temp	42.66	0.00	0.00	-0.53	0.03	0.00
Dead+Wind 0 deg+Ice+Temp	42.66	0.00	-5.40	-619.21	0.03	-0.01
Dead+Wind 30 deg+Ice+Temp	42.66	2.68	-4.68	-536.33	-306.75	-0.07
Dead+Wind 60 deg+Ice+Temp	42.66	4.65	-2.70	-309.89	-531.34	-0.12
Dead+Wind 90 deg+Ice+Temp	42.66	5.37	0.00	-0.57	-613.54	-0.13
Dead+Wind 120 deg+Ice+Temp	42.66	4.65	2.70	308.74	-531.34	-0.11
Dead+Wind 150 deg+Ice+Temp	42.66	2.68	4.68	535.18	-306.75	-0.06
Dead+Wind 180 deg+Ice+Temp	42.66	0.00	5.40	618.06	0.03	0.01
Dead+Wind 210 deg+Ice+Temp	42.66	-2.68	4.68	535.18	306.81	0.07
Dead+Wind 240 deg+Ice+Temp	42.66	-4.65	2.70	308.74	531.40	0.12
Dead+Wind 270 deg+Ice+Temp	42.66	-5.37	0.00	-0.57	613.60	0.13
Dead+Wind 300 deg+Ice+Temp	42.66	-4.65	-2.70	-309.89	531.40	0.11
Dead+Wind 330 deg+Ice+Temp	42.66	-2.68	-4.68	-536.33	306.81	0.06
Dead+Wind 0 deg - Service	31.19	0.00	-8.09	-872.52	0.02	-0.00
Dead+Wind 30 deg - Service	31.19	4.02	-7.01	-755.74	-432.00	-0.10
Dead+Wind 60 deg - Service	31.19	6.96	-4.05	-436.41	-748.26	-0.17
Dead+Wind 90 deg - Service	31.19	8.04	0.00	-0.19	-863.92	-0.19
Dead+Wind 120 deg - Service	31.19	6.96	4.05	436.03	-748.26	-0.16
Dead+Wind 150 deg - Service	31.19	4.02	7.01	755.36	-432.00	-0.09
Dead+Wind 180 deg - Service	31.19	0.00	8.09	872.14	0.02	0.00
Dead+Wind 210 deg - Service	31.19	-4.02	7.01	755.36	432.04	0.10
Dead+Wind 240 deg - Service	31.19	-6.96	4.05	436.03	748.31	0.17
Dead+Wind 270 deg - Service	31.19	-8.04	0.00	-0.19	863.97	0.19
Dead+Wind 300 deg - Service	31.19	-6.96	-4.05	-436.41	748.31	0.16
Dead+Wind 330 deg - Service	31.19	-4.02	-7.01	-755.74	432.04	0.09

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	-31.19	0.00	0.00	31.19	0.00	0.000%
2	0.00	-31.19	-23.39	0.00	31.19	23.39	0.003%
3	11.62	-31.19	-20.26	-11.62	31.19	20.26	0.000%
4	20.12	-31.19	-11.70	-20.12	31.19	11.70	0.000%
5	23.23	-31.19	0.00	-23.23	31.19	0.00	0.003%
6	20.12	-31.19	11.70	-20.12	31.19	-11.70	0.000%
7	11.62	-31.19	20.26	-11.62	31.19	-20.26	0.000%
8	0.00	-31.19	23.39	0.00	31.19	-23.39	0.003%
9	-11.62	-31.19	20.26	11.62	31.19	-20.26	0.000%
10	-20.12	-31.19	11.70	20.12	31.19	-11.70	0.000%
11	-23.23	-31.19	0.00	23.23	31.19	0.00	0.003%
12	-20.12	-31.19	-11.70	20.12	31.19	11.70	0.000%
13	-11.62	-31.19	-20.26	11.62	31.19	20.26	0.000%
14	0.00	-42.66	0.00	-0.00	42.66	-0.00	0.000%
15	0.00	-42.66	-5.40	-0.00	42.66	5.40	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
16	2.69	-42.66	-4.68	-2.68	42.66	4.68	0.000%
17	4.65	-42.66	-2.70	-4.65	42.66	2.70	0.000%
18	5.37	-42.66	0.00	-5.37	42.66	-0.00	0.000%
19	4.65	-42.66	2.70	-4.65	42.66	-2.70	0.000%
20	2.69	-42.66	4.68	-2.68	42.66	-4.68	0.000%
21	0.00	-42.66	5.40	-0.00	42.66	-5.40	0.000%
22	-2.69	-42.66	4.68	2.68	42.66	-4.68	0.000%
23	-4.65	-42.66	2.70	4.65	42.66	-2.70	0.000%
24	-5.37	-42.66	0.00	5.37	42.66	-0.00	0.000%
25	-4.65	-42.66	-2.70	4.65	42.66	2.70	0.000%
26	-2.69	-42.66	-4.68	2.68	42.66	4.68	0.000%
27	0.00	-31.19	-8.09	-0.00	31.19	8.09	0.004%
28	4.02	-31.19	-7.01	-4.02	31.19	7.01	0.001%
29	6.96	-31.19	-4.05	-6.96	31.19	4.05	0.001%
30	8.04	-31.19	0.00	-8.04	31.19	-0.00	0.004%
31	6.96	-31.19	4.05	-6.96	31.19	-4.05	0.001%
32	4.02	-31.19	7.01	-4.02	31.19	-7.01	0.001%
33	0.00	-31.19	8.09	-0.00	31.19	-8.09	0.004%
34	-4.02	-31.19	7.01	4.02	31.19	-7.01	0.001%
35	-6.96	-31.19	4.05	6.96	31.19	-4.05	0.001%
36	-8.04	-31.19	0.00	8.04	31.19	-0.00	0.004%
37	-6.96	-31.19	-4.05	6.96	31.19	4.05	0.001%
38	-4.02	-31.19	-7.01	4.02	31.19	7.01	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	13	0.00003886	0.00006834
3	Yes	16	0.00000001	0.00008889
4	Yes	16	0.00000001	0.00009048
5	Yes	13	0.00003889	0.00008245
6	Yes	16	0.00000001	0.00008806
7	Yes	16	0.00000001	0.00009023
8	Yes	13	0.00003886	0.00006832
9	Yes	16	0.00000001	0.00009029
10	Yes	16	0.00000001	0.00008804
11	Yes	13	0.00003889	0.00008245
12	Yes	16	0.00000001	0.00009046
13	Yes	16	0.00000001	0.00008895
14	Yes	6	0.00000001	0.00000001
15	Yes	14	0.00000001	0.00008209
16	Yes	14	0.00000001	0.00009849
17	Yes	14	0.00000001	0.00009846
18	Yes	14	0.00000001	0.00008113
19	Yes	14	0.00000001	0.00009765
20	Yes	14	0.00000001	0.00009824
21	Yes	14	0.00000001	0.00008168
22	Yes	14	0.00000001	0.00009828
23	Yes	14	0.00000001	0.00009767
24	Yes	14	0.00000001	0.00008115
25	Yes	14	0.00000001	0.00009847
26	Yes	14	0.00000001	0.00009853
27	Yes	12	0.00010731	0.00008397
28	Yes	13	0.00000001	0.00008322

29	Yes	13	0.00000001	0.00008844
30	Yes	12	0.00010727	0.00008487
31	Yes	13	0.00000001	0.00008116
32	Yes	13	0.00000001	0.00008726
33	Yes	12	0.00010729	0.00008387
34	Yes	13	0.00000001	0.00008743
35	Yes	13	0.00000001	0.00008112
36	Yes	12	0.00010728	0.00008488
37	Yes	13	0.00000001	0.00008838
38	Yes	13	0.00000001	0.00008337

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 113	23.336	27	1.6135	0.0032
L2	117.25 - 91.25	13.243	27	1.2218	0.0009
L3	96.25 - 46.25	8.478	27	0.9201	0.0005
L4	53 - 0	2.362	27	0.4194	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Lightning Rod	27	23.336	1.6135	0.0032	19449
140.00	APXVSPP18-C-A20 w/Mount Pipe	27	20.054	1.5018	0.0023	9724

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 113	67.290	2	4.6507	0.0091
L2	117.25 - 91.25	38.211	2	3.5246	0.0027
L3	96.25 - 46.25	24.468	2	2.6553	0.0015
L4	53 - 0	6.820	2	1.2108	0.0005

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Lightning Rod	2	67.290	4.6507	0.0091	6826
140.00	APXVSPP18-C-A20 w/Mount Pipe	2	57.836	4.3298	0.0068	3412

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	150 - 148.276	TP30.48x20x0.1875	37.00	0.00	0.0	39.000	12.0815	-2.37	471.18	0.005
	148.276 - 146.553					39.000	12.3720	-2.47	482.51	0.005
	146.553 - 144.829					39.000	12.6626	-2.57	493.84	0.005
	144.829 - 143.105					39.000	12.9531	-2.68	505.17	0.005
	143.105 - 141.382					39.000	13.2437	-2.79	516.50	0.005
	141.382 - 139.658					39.000	13.5342	-5.27	527.84	0.010
	139.658 - 137.934					39.000	13.8248	-5.38	539.17	0.010
	137.934 - 136.211					39.000	14.1153	-5.50	550.50	0.010
	136.211 - 134.487					39.000	14.4059	-5.62	561.83	0.010
	134.487 - 132.763					39.000	14.6964	-5.75	573.16	0.010
	132.763 - 131.039					39.000	14.9870	-5.88	584.49	0.010
	131.039 - 129.316					39.000	15.2776	-6.01	595.83	0.010
	129.316 - 127.592					39.000	15.5681	-6.15	607.16	0.010
	127.592 - 125.868					39.000	15.8587	-6.28	618.49	0.010
	125.868 - 124.145					39.000	16.1492	-6.42	629.82	0.010
	124.145 - 122.421					39.000	16.4398	-6.57	641.15	0.010
	122.421 - 120.697					39.000	16.7303	-6.71	652.48	0.010
	120.697 - 118.974					38.724	17.0209	-6.86	659.12	0.010
	118.974 - 117.25					38.433	17.3114	-7.01	665.33	0.011
	117.25 - 113					37.714	18.0278	-3.34	679.90	0.005
L2	117.25 - 113	TP36.27x28.9012x0.25	26.00	0.00	0.0	39.000	23.6905	-4.35	923.93	0.005
	113 - 111.953					39.000	23.9260	-7.81	933.11	0.008
	111.953 - 110.906					39.000	24.1614	-7.93	942.29	0.008
	110.906 - 109.859					39.000	24.3968	-8.05	951.48	0.008
	109.859 - 108.813					39.000	24.6322	-8.16	960.66	0.008
	108.813 - 107.766					39.000	24.8677	-8.28	969.84	0.009
	107.766 - 106.719					39.000	25.1031	-8.40	979.02	0.009
	106.719 -					39.000	25.3385	-8.52	988.20	0.009

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 $\frac{P}{P_a}$
	105.672									
	105.672 - 104.625					39.000	25.5740	-8.64	997.38	0.009
	104.625 - 103.578					39.000	25.8094	-8.76	1006.57	0.009
	103.578 - 102.531					39.000	26.0448	-8.88	1015.75	0.009
	102.531 - 101.484					39.000	26.2803	-9.01	1024.93	0.009
	101.484 - 100.438					39.000	26.5157	-9.13	1034.11	0.009
	100.438 - 99.3906					39.000	26.7511	-9.26	1043.29	0.009
	99.3906 - 98.3438					39.000	26.9866	-9.38	1052.48	0.009
	98.3438 - 97.2969					39.000	27.2220	-9.51	1061.66	0.009
	97.2969 - 96.25					39.000	27.4574	-9.64	1070.84	0.009
	96.25 - 91.25					39.000	28.5819	-4.87	1114.69	0.004
L3	96.25 - 91.25	TP48.52x34.3529x0.3125	50.00	0.00	0.0	39.000	35.1690	-5.94	1371.59	0.004
	91.25 - 89.125					39.000	35.7663	-11.13	1394.88	0.008
	89.125 - 87					39.000	36.3635	-11.45	1418.18	0.008
	87 - 84.875					39.000	36.9607	-11.77	1441.47	0.008
	84.875 - 82.75					39.000	37.5579	-12.10	1464.76	0.008
	82.75 - 80.625					39.000	38.1551	-12.43	1488.05	0.008
	80.625 - 78.5					39.000	38.7523	-12.77	1511.34	0.008
	78.5 - 76.375					39.000	39.3495	-13.12	1534.63	0.009
	76.375 - 74.25					39.000	39.9467	-13.46	1557.92	0.009
	74.25 - 72.125					39.000	40.5439	-13.81	1581.21	0.009
	72.125 - 70					39.000	41.1411	-14.17	1604.50	0.009
	70 - 67.875					39.000	41.7383	-14.53	1627.80	0.009
	67.875 - 65.75					39.000	42.3355	-14.90	1651.09	0.009
	65.75 - 63.625					39.000	42.9328	-15.27	1674.38	0.009
	63.625 - 61.5					39.000	43.5300	-15.64	1697.67	0.009
	61.5 - 59.375					39.000	44.1272	-16.02	1720.96	0.009
	59.375 - 57.25					39.000	44.7244	-16.41	1744.25	0.009
	57.25 - 55.125					39.000	45.3216	-16.80	1767.54	0.010
	55.125 - 53					39.000	45.9188	-17.19	1790.83	0.010
	53 - 46.25					38.531	47.8158	-9.06	1842.39	0.005
L4	53 - 46.25	TP61x45.9824x0.375	53.00	0.00	0.0	39.000	56.5607	-10.64	2205.87	0.005
	46.25 - 43.8158					39.000	57.3817	-20.24	2237.89	0.009
	43.8158 - 41.3816					39.000	58.2027	-20.79	2269.90	0.009
	41.3816 - 38.9474					39.000	59.0236	-21.35	2301.92	0.009
	38.9474 - 36.5132					39.000	59.8446	-21.91	2333.94	0.009
	36.5132 - 34.0789					39.000	60.6655	-22.48	2365.96	0.010
	34.0789 - 31.6447					39.000	61.4865	-23.06	2397.97	0.010
	31.6447 - 29.2105					39.000	62.3074	-23.64	2429.99	0.010
	29.2105 - 26.7763					39.000	63.1284	-24.23	2462.01	0.010
	26.7763 - 24.3421					39.000	63.9493	-24.83	2494.02	0.010
	24.3421 - 21.9079					39.000	64.7703	-25.43	2526.04	0.010
	21.9079 -					39.000	65.5913	-26.04	2558.06	0.010

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 $\frac{P}{P_a}$
	19.4737									
	19.4737 - 17.0395					39.000	66.4122	-26.66	2590.08	0.010
	17.0395 - 14.6053					38.938	67.2332	-27.29	2617.90	0.010
	14.6053 - 12.1711					38.732	68.0541	-27.92	2635.85	0.011
	12.1711 - 9.73684					38.526	68.8751	-28.56	2653.47	0.011
	9.73684 - 7.30263					38.320	69.6960	-29.20	2670.74	0.011
	7.30263 - 4.86842					38.114	70.5170	-29.86	2687.68	0.011
	4.86842 - 2.43421					37.908	71.3380	-30.52	2704.28	0.011
	2.43421 - 0					37.702	72.1589	-31.18	2720.54	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	150 - 148.276	TP30.48x20x0.1875	11.67	2.317	39.000	0.059	0.00	0.000	39.000	0.000
	148.276 - 146.553		23.30	4.411	39.000	0.113	0.00	0.000	39.000	0.000
	146.553 - 144.829		35.11	6.343	39.000	0.163	0.00	0.000	39.000	0.000
	144.829 - 143.105		47.10	8.130	39.000	0.208	0.00	0.000	39.000	0.000
	143.105 - 141.382		59.26	9.784	39.000	0.251	0.00	0.000	39.000	0.000
	141.382 - 139.658		73.30	11.586	39.000	0.297	0.00	0.000	39.000	0.000
	139.658 - 137.934		94.37	14.293	39.000	0.366	0.00	0.000	39.000	0.000
	137.934 - 136.211		115.63	16.796	39.000	0.431	0.00	0.000	39.000	0.000
	136.211 - 134.487		137.06	19.112	39.000	0.490	0.00	0.000	39.000	0.000
	134.487 - 132.763		158.69	21.258	39.000	0.545	0.00	0.000	39.000	0.000
	132.763 - 131.039		180.50	23.248	39.000	0.596	0.00	0.000	39.000	0.000
	131.039 - 129.316		202.50	25.096	39.000	0.643	0.00	0.000	39.000	0.000
	129.316 - 127.592		224.70	26.813	39.000	0.688	0.00	0.000	39.000	0.000
	127.592 - 125.868		247.09	28.411	39.000	0.728	0.00	0.000	39.000	0.000
	125.868 - 124.145		269.68	29.899	39.000	0.767	0.00	0.000	39.000	0.000
	124.145 - 122.421		292.47	31.285	39.000	0.802	0.00	0.000	39.000	0.000
	122.421 - 120.697		315.45	32.578	39.000	0.835	0.00	0.000	39.000	0.000
	120.697 -		338.64	33.786	38.724	0.872	0.00	0.000	38.724	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	118.974									
	118.974 - 117.25		362.04	34.914	38.433	0.908	0.00	0.000	38.433	0.000
	117.25 - 113		184.96	16.443	37.714	0.436	0.00	0.000	37.714	0.000
L2	117.25 - 113	TP36.27x28.9012x0.25	235.74	16.217	39.000	0.416	0.00	0.000	39.000	0.000
	113 - 111.953		435.36	29.360	39.000	0.753	0.00	0.000	39.000	0.000
	111.953 - 110.906		450.10	29.763	39.000	0.763	0.00	0.000	39.000	0.000
	110.906 - 109.859		464.92	30.150	39.000	0.773	0.00	0.000	39.000	0.000
	109.859 - 108.813		479.82	30.522	39.000	0.783	0.00	0.000	39.000	0.000
	108.813 - 107.766		494.80	30.879	39.000	0.792	0.00	0.000	39.000	0.000
	107.766 - 106.719		509.86	31.223	39.000	0.801	0.00	0.000	39.000	0.000
	106.719 - 105.672		525.00	31.553	39.000	0.809	0.00	0.000	39.000	0.000
	105.672 - 104.625		540.22	31.870	39.000	0.817	0.00	0.000	39.000	0.000
	104.625 - 103.578		555.52	32.175	39.000	0.825	0.00	0.000	39.000	0.000
	103.578 - 102.531		570.90	32.469	39.000	0.833	0.00	0.000	39.000	0.000
	102.531 - 101.484		586.37	32.752	39.000	0.840	0.00	0.000	39.000	0.000
	101.484 - 100.438		601.92	33.024	39.000	0.847	0.00	0.000	39.000	0.000
	100.438 - 99.3906		617.56	33.285	39.000	0.853	0.00	0.000	39.000	0.000
	99.3906 - 98.3438		633.27	33.538	39.000	0.860	0.00	0.000	39.000	0.000
	98.3438 - 97.2969		649.08	33.781	39.000	0.866	0.00	0.000	39.000	0.000
	97.2969 - 96.25		664.97	34.014	39.000	0.872	0.00	0.000	39.000	0.000
	96.25 - 91.25		338.80	15.989	39.000	0.410	0.00	0.000	39.000	0.000
L3	96.25 - 91.25	TP48.52x34.3529x0.3125	403.39	15.746	39.000	0.404	0.00	0.000	39.000	0.000
	91.25 - 89.125		775.67	29.271	39.000	0.751	0.00	0.000	39.000	0.000
	89.125 - 87		809.51	29.549	39.000	0.758	0.00	0.000	39.000	0.000
	87 - 84.875		843.71	29.806	39.000	0.764	0.00	0.000	39.000	0.000
	84.875 - 82.75		878.27	30.044	39.000	0.770	0.00	0.000	39.000	0.000
	82.75 - 80.625		913.20	30.265	39.000	0.776	0.00	0.000	39.000	0.000
	80.625 - 78.5		948.49	30.469	39.000	0.781	0.00	0.000	39.000	0.000
	78.5 - 76.375		984.16	30.659	39.000	0.786	0.00	0.000	39.000	0.000
	76.375 - 74.25		1020.19	30.835	39.000	0.791	0.00	0.000	39.000	0.000
	74.25 - 72.125		1056.60	30.998	39.000	0.795	0.00	0.000	39.000	0.000
	72.125 - 70		1093.38	31.149	39.000	0.799	0.00	0.000	39.000	0.000
	70 - 67.875		1130.55	31.289	39.000	0.802	0.00	0.000	39.000	0.000
	67.875 - 65.75		1168.08	31.419	39.000	0.806	0.00	0.000	39.000	0.000
	65.75 - 63.625		1206.00	31.540	39.000	0.809	0.00	0.000	39.000	0.000
	63.625 - 61.5		1244.30	31.651	39.000	0.812	0.00	0.000	39.000	0.000
	61.5 - 59.375		1282.98	31.755	39.000	0.814	0.00	0.000	39.000	0.000
	59.375 - 57.25		1322.05	31.851	39.000	0.817	0.00	0.000	39.000	0.000
	57.25 - 55.125		1361.50	31.940	39.000	0.819	0.00	0.000	39.000	0.000
	55.125 - 53		1401.34	32.022	39.000	0.821	0.00	0.000	39.000	0.000
	53 - 46.25		712.67	15.015	38.531	0.390	0.00	0.000	38.531	0.000
L4	53 - 46.25	TP61x45.9824x0.375	818.03	14.801	39.000	0.380	0.00	0.000	39.000	0.000
	46.25 - 43.8158		1578.38	27.744	39.000	0.711	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	43.8158 - 41.3816		1626.50	27.786	39.000	0.712	0.00	0.000	39.000	0.000
	41.3816 - 38.9474		1675.10	27.823	39.000	0.713	0.00	0.000	39.000	0.000
	38.9474 - 36.5132		1724.18	27.855	39.000	0.714	0.00	0.000	39.000	0.000
	36.5132 - 34.0789		1773.72	27.882	39.000	0.715	0.00	0.000	39.000	0.000
	34.0789 - 31.6447		1823.74	27.906	39.000	0.716	0.00	0.000	39.000	0.000
	31.6447 - 29.2105		1874.26	27.925	39.000	0.716	0.00	0.000	39.000	0.000
	29.2105 - 26.7763		1925.26	27.941	39.000	0.716	0.00	0.000	39.000	0.000
	26.7763 - 24.3421		1976.75	27.954	39.000	0.717	0.00	0.000	39.000	0.000
	24.3421 - 21.9079		2028.74	27.964	39.000	0.717	0.00	0.000	39.000	0.000
	21.9079 - 19.4737		2081.23	27.972	39.000	0.717	0.00	0.000	39.000	0.000
	19.4737 - 17.0395		2134.23	27.977	39.000	0.717	0.00	0.000	39.000	0.000
	17.0395 - 14.6053		2187.74	27.980	38.938	0.719	0.00	0.000	38.938	0.000
	14.6053 - 12.1711		2241.77	27.981	38.732	0.722	0.00	0.000	38.732	0.000
	12.1711 - 9.73684		2296.32	27.981	38.526	0.726	0.00	0.000	38.526	0.000
	9.73684 - 7.30263		2351.38	27.979	38.320	0.730	0.00	0.000	38.320	0.000
	7.30263 - 4.86842		2406.98	27.975	38.114	0.734	0.00	0.000	38.114	0.000
	4.86842 - 2.43421		2463.12	27.970	37.908	0.738	0.00	0.000	37.908	0.000
	2.43421 - 0		2519.78	27.965	37.702	0.742	0.00	0.000	37.702	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	150 - 148.276	TP30.48x20x0.1875	6.70	0.555	26.000	0.043	0.01	0.001	26.000	0.000
	148.276 - 146.553		6.80	0.550	26.000	0.042	0.01	0.001	26.000	0.000
	146.553 - 144.829		6.90	0.545	26.000	0.042	0.01	0.001	26.000	0.000
	144.829 - 143.105		7.01	0.541	26.000	0.042	0.01	0.001	26.000	0.000
	143.105 - 141.382		7.11	0.537	26.000	0.041	0.01	0.001	26.000	0.000
	141.382 - 139.658		12.17	0.899	26.000	0.069	0.01	0.001	26.000	0.000
	139.658 - 137.934		12.28	0.888	26.000	0.068	0.01	0.001	26.000	0.000
	137.934 - 136.211		12.39	0.877	26.000	0.067	0.01	0.001	26.000	0.000

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	136.211 - 134.487		12.49	0.867	26.000	0.067	0.01	0.001	26.000	0.000
	134.487 - 132.763		12.60	0.858	26.000	0.066	0.01	0.001	26.000	0.000
	132.763 - 131.039		12.71	0.848	26.000	0.065	0.01	0.001	26.000	0.000
	131.039 - 129.316		12.83	0.839	26.000	0.065	0.01	0.001	26.000	0.000
	129.316 - 127.592		12.94	0.831	26.000	0.064	0.01	0.001	26.000	0.000
	127.592 - 125.868		13.05	0.823	26.000	0.063	0.01	0.001	26.000	0.000
	125.868 - 124.145		13.17	0.815	26.000	0.063	0.01	0.001	26.000	0.000
	124.145 - 122.421		13.28	0.808	26.000	0.062	0.01	0.001	26.000	0.000
	122.421 - 120.697		13.40	0.801	26.000	0.062	0.01	0.001	26.000	0.000
	120.697 - 118.974		13.52	0.794	26.000	0.061	0.01	0.001	26.000	0.000
	118.974 - 117.25		13.64	0.788	26.000	0.061	0.01	0.000	26.000	0.000
	117.25 - 113		6.23	0.346	26.000	0.027	0.00	0.000	26.000	0.000
L2	117.25 - 113	TP36.27x28.9012x0.25	7.75	0.327	26.000	0.025	0.01	0.000	26.000	0.000
	113 - 111.953		14.05	0.587	26.000	0.045	0.01	0.000	26.000	0.000
	111.953 - 110.906		14.12	0.585	26.000	0.045	0.01	0.000	26.000	0.000
	110.906 - 109.859		14.20	0.582	26.000	0.045	0.01	0.000	26.000	0.000
	109.859 - 108.813		14.27	0.579	26.000	0.045	0.01	0.000	26.000	0.000
	108.813 - 107.766		14.35	0.577	26.000	0.044	0.01	0.000	26.000	0.000
	107.766 - 106.719		14.43	0.575	26.000	0.044	0.01	0.000	26.000	0.000
	106.719 - 105.672		14.50	0.572	26.000	0.044	0.01	0.000	26.000	0.000
	105.672 - 104.625		14.58	0.570	26.000	0.044	0.01	0.000	26.000	0.000
	104.625 - 103.578		14.66	0.568	26.000	0.044	0.01	0.000	26.000	0.000
	103.578 - 102.531		14.74	0.566	26.000	0.044	0.01	0.000	26.000	0.000
	102.531 - 101.484		14.82	0.564	26.000	0.043	0.01	0.000	26.000	0.000
	101.484 - 100.438		14.90	0.562	26.000	0.043	0.01	0.000	26.000	0.000
	100.438 - 99.3906		14.98	0.560	26.000	0.043	0.01	0.000	26.000	0.000
	99.3906 - 98.3438		15.06	0.558	26.000	0.043	0.01	0.000	26.000	0.000
	98.3438 - 97.2969		15.14	0.556	26.000	0.043	0.01	0.000	26.000	0.000
	97.2969 - 96.25		15.22	0.554	26.000	0.043	0.01	0.000	26.000	0.000
	96.25 - 91.25		7.27	0.254	26.000	0.020	0.00	0.000	26.000	0.000
L3	96.25 - 91.25	TP48.52x34.3529x0.3125	8.41	0.239	26.000	0.018	0.01	0.000	26.000	0.000
	91.25 - 89.125		15.85	0.443	26.000	0.034	0.01	0.000	26.000	0.000
	89.125 - 87		16.02	0.440	26.000	0.034	0.01	0.000	26.000	0.000
	87 - 84.875		16.19	0.438	26.000	0.034	0.01	0.000	26.000	0.000

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	84.875 - 82.75		16.36	0.436	26.000	0.033	0.01	0.000	26.000	0.000
	82.75 - 80.625		16.53	0.433	26.000	0.033	0.01	0.000	26.000	0.000
	80.625 - 78.5		16.71	0.431	26.000	0.033	0.01	0.000	26.000	0.000
	78.5 - 76.375		16.88	0.429	26.000	0.033	0.01	0.000	26.000	0.000
	76.375 - 74.25		17.05	0.427	26.000	0.033	0.01	0.000	26.000	0.000
	74.25 - 72.125		17.23	0.425	26.000	0.033	0.01	0.000	26.000	0.000
	72.125 - 70		17.41	0.423	26.000	0.033	0.01	0.000	26.000	0.000
	70 - 67.875		17.59	0.421	26.000	0.032	0.01	0.000	26.000	0.000
	67.875 - 65.75		17.76	0.420	26.000	0.032	0.01	0.000	26.000	0.000
	65.75 - 63.625		17.94	0.418	26.000	0.032	0.01	0.000	26.000	0.000
	63.625 - 61.5		18.12	0.416	26.000	0.032	0.01	0.000	26.000	0.000
	61.5 - 59.375		18.30	0.415	26.000	0.032	0.01	0.000	26.000	0.000
	59.375 - 57.25		18.49	0.413	26.000	0.032	0.01	0.000	26.000	0.000
	57.25 - 55.125		18.67	0.412	26.000	0.032	0.01	0.000	26.000	0.000
	55.125 - 53		18.85	0.411	26.000	0.032	0.01	0.000	26.000	0.000
	53 - 46.25		9.25	0.193	26.000	0.015	0.00	0.000	26.000	0.000
L4	53 - 46.25	TP61x45.9824x0.375	10.26	0.181	26.000	0.014	0.01	0.000	26.000	0.000
	46.25 - 43.8158		19.69	0.343	26.000	0.026	0.01	0.000	26.000	0.000
	43.8158 - 41.3816		19.88	0.342	26.000	0.026	0.01	0.000	26.000	0.000
	41.3816 - 38.9474		20.07	0.340	26.000	0.026	0.01	0.000	26.000	0.000
	38.9474 - 36.5132		20.27	0.339	26.000	0.026	0.01	0.000	26.000	0.000
	36.5132 - 34.0789		20.46	0.337	26.000	0.026	0.01	0.000	26.000	0.000
	34.0789 - 31.6447		20.66	0.336	26.000	0.026	0.01	0.000	26.000	0.000
	31.6447 - 29.2105		20.86	0.335	26.000	0.026	0.01	0.000	26.000	0.000
	29.2105 - 26.7763		21.07	0.334	26.000	0.026	0.01	0.000	26.000	0.000
	26.7763 - 24.3421		21.27	0.333	26.000	0.026	0.01	0.000	26.000	0.000
	24.3421 - 21.9079		21.47	0.332	26.000	0.025	0.01	0.000	26.000	0.000
	21.9079 - 19.4737		21.68	0.331	26.000	0.025	0.01	0.000	26.000	0.000
	19.4737 - 17.0395		21.89	0.330	26.000	0.025	0.01	0.000	26.000	0.000
	17.0395 - 14.6053		22.10	0.329	26.000	0.025	0.01	0.000	26.000	0.000
	14.6053 - 12.1711		22.31	0.328	26.000	0.025	0.01	0.000	26.000	0.000
	12.1711 - 9.73684		22.53	0.327	26.000	0.025	0.01	0.000	26.000	0.000
	9.73684 - 7.30263		22.75	0.326	26.000	0.025	0.01	0.000	26.000	0.000
	7.30263 - 4.86842		22.96	0.326	26.000	0.025	0.01	0.000	26.000	0.000
	4.86842 - 2.43421		23.18	0.325	26.000	0.025	0.01	0.000	26.000	0.000
	2.43421 - 0		23.41	0.324	26.000	0.025	0.01	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P / P_a	Ratio f_{bx} / F_{bx}	Ratio f_{by} / F_{by}	Ratio f_v / F_v	Ratio f_{vt} / F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 148.276	0.005	0.059	0.000	0.043	0.000	0.065 ✔	1.333	H1-3+VT ✔
	148.276 - 146.553	0.005	0.113	0.000	0.042	0.000	0.119 ✔	1.333	H1-3+VT ✔
	146.553 - 144.829	0.005	0.163	0.000	0.042	0.000	0.168 ✔	1.333	H1-3+VT ✔
	144.829 - 143.105	0.005	0.208	0.000	0.042	0.000	0.214 ✔	1.333	H1-3+VT ✔
	143.105 - 141.382	0.005	0.251	0.000	0.041	0.000	0.257 ✔	1.333	H1-3+VT ✔
	141.382 - 139.658	0.010	0.297	0.000	0.069	0.000	0.308 ✔	1.333	H1-3+VT ✔
	139.658 - 137.934	0.010	0.366	0.000	0.068	0.000	0.378 ✔	1.333	H1-3+VT ✔
	137.934 - 136.211	0.010	0.431	0.000	0.067	0.000	0.442 ✔	1.333	H1-3+VT ✔
	136.211 - 134.487	0.010	0.490	0.000	0.067	0.000	0.501 ✔	1.333	H1-3+VT ✔
	134.487 - 132.763	0.010	0.545	0.000	0.066	0.000	0.556 ✔	1.333	H1-3+VT ✔
	132.763 - 131.039	0.010	0.596	0.000	0.065	0.000	0.607 ✔	1.333	H1-3+VT ✔
	131.039 - 129.316	0.010	0.643	0.000	0.065	0.000	0.655 ✔	1.333	H1-3+VT ✔
	129.316 - 127.592	0.010	0.688	0.000	0.064	0.000	0.699 ✔	1.333	H1-3+VT ✔
	127.592 - 125.868	0.010	0.728	0.000	0.063	0.000	0.740 ✔	1.333	H1-3+VT ✔
	125.868 - 124.145	0.010	0.767	0.000	0.063	0.000	0.778 ✔	1.333	H1-3+VT ✔
	124.145 - 122.421	0.010	0.802	0.000	0.062	0.000	0.813 ✔	1.333	H1-3+VT ✔
	122.421 - 120.697	0.010	0.835	0.000	0.062	0.000	0.847 ✔	1.333	H1-3+VT ✔
	120.697 - 118.974	0.010	0.872	0.000	0.061	0.000	0.884 ✔	1.333	H1-3+VT ✔
	118.974 - 117.25	0.011	0.908	0.000	0.061	0.000	0.920 ✔	1.333	H1-3+VT ✔
	117.25 - 113	0.005	0.436	0.000	0.027	0.000	0.441 ✔	1.333	H1-3+VT ✔
L2	117.25 - 113	0.005	0.416	0.000	0.025	0.000	0.421 ✔	1.333	H1-3+VT ✔
	113 - 111.953	0.008	0.753	0.000	0.045	0.000	0.762 ✔	1.333	H1-3+VT ✔
	111.953 - 110.906	0.008	0.763	0.000	0.045	0.000	0.772 ✔	1.333	H1-3+VT ✔
	110.906 - 109.859	0.008	0.773	0.000	0.045	0.000	0.782 ✔	1.333	H1-3+VT ✔
	109.859 - 108.813	0.008	0.783	0.000	0.045	0.000	0.792 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	108.813 - 107.766	0.009	0.792	0.000	0.044	0.000	0.801 ✔	1.333	H1-3+VT ✔
	107.766 - 106.719	0.009	0.801	0.000	0.044	0.000	0.810 ✔	1.333	H1-3+VT ✔
	106.719 - 105.672	0.009	0.809	0.000	0.044	0.000	0.818 ✔	1.333	H1-3+VT ✔
	105.672 - 104.625	0.009	0.817	0.000	0.044	0.000	0.826 ✔	1.333	H1-3+VT ✔
	104.625 - 103.578	0.009	0.825	0.000	0.044	0.000	0.834 ✔	1.333	H1-3+VT ✔
	103.578 - 102.531	0.009	0.833	0.000	0.044	0.000	0.842 ✔	1.333	H1-3+VT ✔
	102.531 - 101.484	0.009	0.840	0.000	0.043	0.000	0.849 ✔	1.333	H1-3+VT ✔
	101.484 - 100.438	0.009	0.847	0.000	0.043	0.000	0.856 ✔	1.333	H1-3+VT ✔
	100.438 - 99.3906	0.009	0.853	0.000	0.043	0.000	0.863 ✔	1.333	H1-3+VT ✔
	99.3906 - 98.3438	0.009	0.860	0.000	0.043	0.000	0.869 ✔	1.333	H1-3+VT ✔
	98.3438 - 97.2969	0.009	0.866	0.000	0.043	0.000	0.876 ✔	1.333	H1-3+VT ✔
	97.2969 - 96.25	0.009	0.872	0.000	0.043	0.000	0.882 ✔	1.333	H1-3+VT ✔
	96.25 - 91.25	0.004	0.410	0.000	0.020	0.000	0.414 ✔	1.333	H1-3+VT ✔
L3	96.25 - 91.25	0.004	0.404	0.000	0.018	0.000	0.408 ✔	1.333	H1-3+VT ✔
	91.25 - 89.125	0.008	0.751	0.000	0.034	0.000	0.759 ✔	1.333	H1-3+VT ✔
	89.125 - 87	0.008	0.758	0.000	0.034	0.000	0.766 ✔	1.333	H1-3+VT ✔
	87 - 84.875	0.008	0.764	0.000	0.034	0.000	0.773 ✔	1.333	H1-3+VT ✔
	84.875 - 82.75	0.008	0.770	0.000	0.033	0.000	0.779 ✔	1.333	H1-3+VT ✔
	82.75 - 80.625	0.008	0.776	0.000	0.033	0.000	0.785 ✔	1.333	H1-3+VT ✔
	80.625 - 78.5	0.008	0.781	0.000	0.033	0.000	0.790 ✔	1.333	H1-3+VT ✔
	78.5 - 76.375	0.009	0.786	0.000	0.033	0.000	0.795 ✔	1.333	H1-3+VT ✔
	76.375 - 74.25	0.009	0.791	0.000	0.033	0.000	0.800 ✔	1.333	H1-3+VT ✔
	74.25 - 72.125	0.009	0.795	0.000	0.033	0.000	0.804 ✔	1.333	H1-3+VT ✔
	72.125 - 70	0.009	0.799	0.000	0.033	0.000	0.808 ✔	1.333	H1-3+VT ✔
	70 - 67.875	0.009	0.802	0.000	0.032	0.000	0.811 ✔	1.333	H1-3+VT ✔
	67.875 - 65.75	0.009	0.806	0.000	0.032	0.000	0.815 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	65.75 - 63.625	0.009	0.809	0.000	0.032	0.000	0.818 ✔	1.333	H1-3+VT ✔
	63.625 - 61.5	0.009	0.812	0.000	0.032	0.000	0.821 ✔	1.333	H1-3+VT ✔
	61.5 - 59.375	0.009	0.814	0.000	0.032	0.000	0.824 ✔	1.333	H1-3+VT ✔
	59.375 - 57.25	0.009	0.817	0.000	0.032	0.000	0.826 ✔	1.333	H1-3+VT ✔
	57.25 - 55.125	0.010	0.819	0.000	0.032	0.000	0.829 ✔	1.333	H1-3+VT ✔
	55.125 - 53	0.010	0.821	0.000	0.032	0.000	0.831 ✔	1.333	H1-3+VT ✔
	53 - 46.25	0.005	0.390	0.000	0.015	0.000	0.395 ✔	1.333	H1-3+VT ✔
L4	53 - 46.25	0.005	0.380	0.000	0.014	0.000	0.384 ✔	1.333	H1-3+VT ✔
	46.25 - 43.8158	0.009	0.711	0.000	0.026	0.000	0.721 ✔	1.333	H1-3+VT ✔
	43.8158 - 41.3816	0.009	0.712	0.000	0.026	0.000	0.722 ✔	1.333	H1-3+VT ✔
	41.3816 - 38.9474	0.009	0.713	0.000	0.026	0.000	0.723 ✔	1.333	H1-3+VT ✔
	38.9474 - 36.5132	0.009	0.714	0.000	0.026	0.000	0.724 ✔	1.333	H1-3+VT ✔
	36.5132 - 34.0789	0.010	0.715	0.000	0.026	0.000	0.725 ✔	1.333	H1-3+VT ✔
	34.0789 - 31.6447	0.010	0.716	0.000	0.026	0.000	0.725 ✔	1.333	H1-3+VT ✔
	31.6447 - 29.2105	0.010	0.716	0.000	0.026	0.000	0.726 ✔	1.333	H1-3+VT ✔
	29.2105 - 26.7763	0.010	0.716	0.000	0.026	0.000	0.726 ✔	1.333	H1-3+VT ✔
	26.7763 - 24.3421	0.010	0.717	0.000	0.026	0.000	0.727 ✔	1.333	H1-3+VT ✔
	24.3421 - 21.9079	0.010	0.717	0.000	0.025	0.000	0.727 ✔	1.333	H1-3+VT ✔
	21.9079 - 19.4737	0.010	0.717	0.000	0.025	0.000	0.728 ✔	1.333	H1-3+VT ✔
	19.4737 - 17.0395	0.010	0.717	0.000	0.025	0.000	0.728 ✔	1.333	H1-3+VT ✔
	17.0395 - 14.6053	0.010	0.719	0.000	0.025	0.000	0.729 ✔	1.333	H1-3+VT ✔
	14.6053 - 12.1711	0.011	0.722	0.000	0.025	0.000	0.733 ✔	1.333	H1-3+VT ✔
	12.1711 - 9.73684	0.011	0.726	0.000	0.025	0.000	0.737 ✔	1.333	H1-3+VT ✔
	9.73684 - 7.30263	0.011	0.730	0.000	0.025	0.000	0.741 ✔	1.333	H1-3+VT ✔
	7.30263 - 4.86842	0.011	0.734	0.000	0.025	0.000	0.745 ✔	1.333	H1-3+VT ✔
	4.86842 - 2.43421	0.011	0.738	0.000	0.025	0.000	0.749 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	2.43421 - 0	0.011	0.742	0.000	0.025	0.000	0.753 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	150 - 113	Pole	TP30.48x20x0.1875	1	-7.01	886.88	69.0	Pass
L2	113 - 91.25	Pole	TP36.27x28.9012x0.25	2	-9.64	1427.43	66.1	Pass
L3	91.25 - 46.25	Pole	TP48.52x34.3529x0.3125	3	-17.19	2387.18	62.3	Pass
L4	46.25 - 0	Pole	TP61x45.9824x0.375	4	-31.18	3626.48	56.5	Pass
							Summary	
						Pole (L1)	69.0	Pass
						RATING =	**69.0**	**Pass**

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

TIA Rev G

Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#:	
Site Name:	*Guilford*
App #:	
Pole Manufacturer:	*Other*

Reactions		
Mu:	2520	ft-kips
Axial, Pu:	31	kips
Shear, Vu:	23	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	105	ksi
Yield (Fy):	75	ksi
Bolt Circle:	68	in

Anchor Rod Results

Max Rod (Cu+ Vu/ή):	116.0	Kips
Allowable Axial, Φ*Fu*Anet:	273.0	Kips
Anchor Rod Stress Ratio:	42.5%	**Pass**

Rigid
AISC LRFD
φ*Tn

Plate Data		
Diam:	74	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	12.10	in

Base Plate Results Flexural Check

Base Plate Stress:	21.0	ksi
Allowable Plate Stress:	54.0	ksi
Base Plate Stress Ratio:	38.9%	**Pass**

Rigid
AISC LRFD
φ*Fy
Y.L. Length: 30.05

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:	Both	
Groove Depth:	0.3125	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	10	in
Height:	12	in
Thick:	1	in
Notch:	0.5	in
Grade:	50	ksi
Weld str.:	70	ksi

n/a

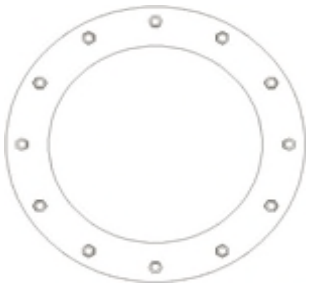
Stiffener Results

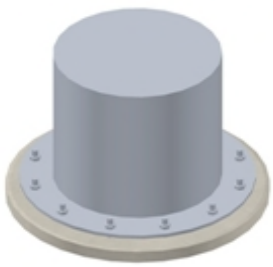
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	61	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None





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

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

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FDH Engineering
****
*
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*
****

Project Title: Guilford - 1426101400
Project Notes:

Calculation Method: Full 8CD

******* I N P U T D A T A

Pier Properties

Diameter (ft)	Distance of Top of Pier above Ground (ft)	Concrete Strength (ksi)	Steel Yield Strength (ksi)
8.00	0.50	4.00	60.00

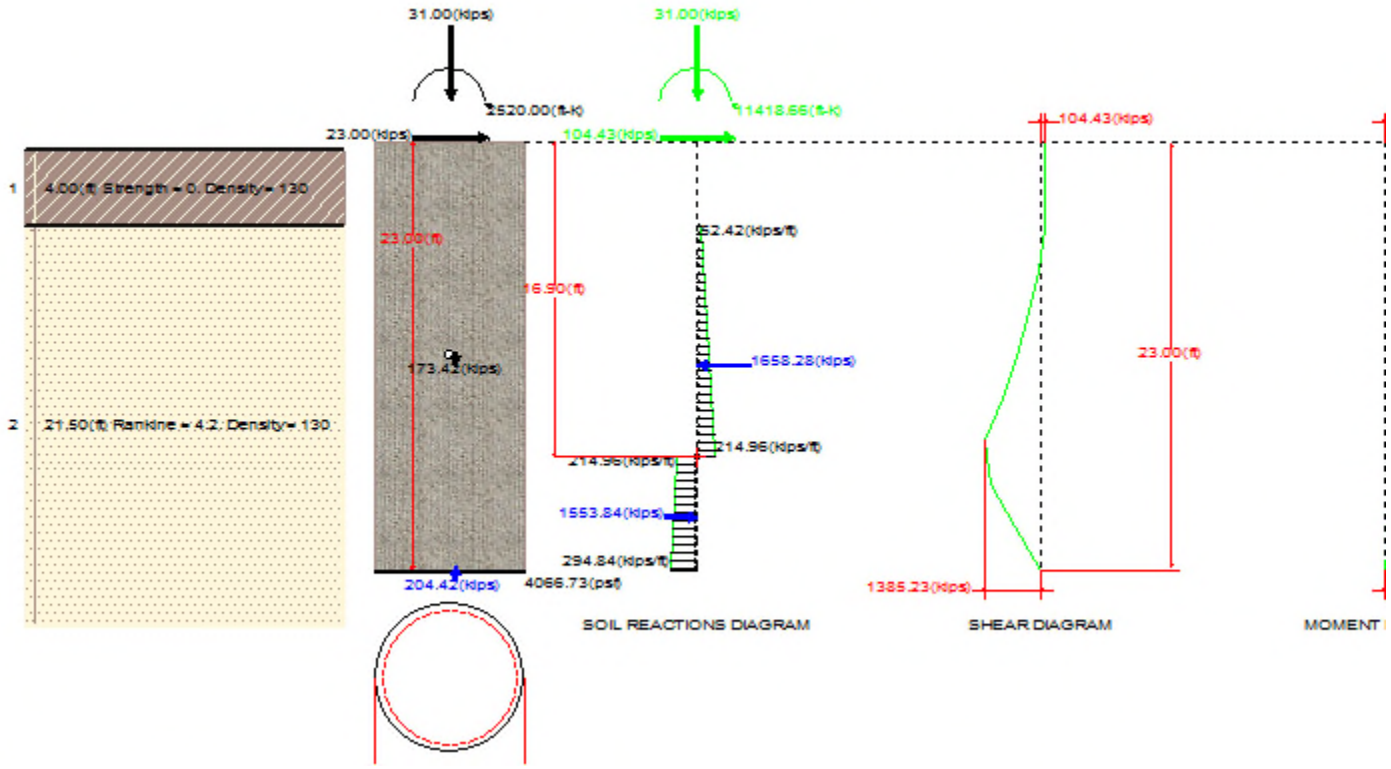
Soil Properties

Layer	Type	Thickness (ft)	Depth at Top of Layer (ft)	Density (lbs/ft^3)	CU (psf)	KP	PHI (deg)
1	Clay	4.00	0.00	130.0			
2	Sand	21.50	4.00	130.0		4.200	37.98

Design (Factored) Loads at Top of Pier

Moment (ft-k)	Axial Load (kips)	Shear Load (kips)	Additional Safety Factor Against Soil Failure
2520.0	31.0	23.00	4.50

******* R E S U L T S



Calculated Pier Properties

Length (ft)	Weight (kips)	Pressure Due To Axial Load (psf)	Pressure Due To Weight (psf)	Total End-Bearing Pressure (psf)
23.000	173.416	616.7	3450.0	4066.7

Ultimate Resisting Forces Along Pier

Type	Distance of Top of Layer to Top of Pier (ft)	Thickness (ft)	Density (lbs/ft^3)	CU (psf)	KP	Force (kips)	Arm (ft)
Clay	0.50	4.00	130.0			0.00	2.50
Sand	4.50	12.40	130.0		4.200	1658.28	11.96
Sand	16.90	6.10	130.0		4.200	-1553.84	20.11

Shear and Moments Along Pier

Distance below Top of Pier (ft)	Shear (with Safety Factor) (kips)	Moment (with Safety Factor) (ft-k)	Shear (without Safety Factor) (kips)	Moment (without Safety Factor) (ft-k)
0.00	104.4	11418.7	23.2	2537.5
2.30	104.4	11658.9	23.2	2590.9
4.60	99.1	11898.8	22.0	2644.2
6.90	-59.1	11958.1	-13.1	2657.4
9.20	-286.7	11573.8	-63.7	2571.9
11.50	-583.5	10586.3	-129.7	2352.5
13.80	-949.7	8836.4	-211.0	1963.6
16.10	-1385.2	6164.5	-307.8	1369.9
18.40	-1217.6	2906.8	-270.6	646.0
20.70	-643.5	753.3	-143.0	167.4
23.00	0.0	0.0	0.0	0.0

Reinforcement and Capacity

Total Reinforcement Percent	Reinforcement Area (in^2)	Usable Axial Capacity (kips)	Usable Moment Capacity (ft-k)
0.44	31.85	31.0	5715.3

US Standard Re-Bars (Select one of the following)

Quantity	Name	Area (in^2)	Diameter (in)	Spacing (in)
160	#4	0.20	0.500	1.69
103	#5	0.31	0.625	2.62
73	#6	0.44	0.750	3.70
54	#7	0.60	0.875	5.00
41	#8	0.79	1.000	6.59
32	#9	1.00	1.128	8.44
26	#10	1.27	1.270	10.39
21	#11	1.56	1.410	12.87
15	#14	2.25	1.693	18.01

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

Site Name: *Guilford*

Loads Already Factored		
For M (WL)	1.3	<----Disregard
For P (DL)	1.3	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	8.0	ft
Concrete Area =	7238.2	in^2

Reinforcement:

Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	7.28	ft
Vert. Cage Diameter =	87.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	24	
As Total=	37.44	in^2
A s/ Aconc, Rho:	0.0052	0.52%

ACI 10.5 , ACI 21.10.4, and IBC 1810.

Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0032
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.52%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	13899.12	kips
at Mu=(ϕ=0.65)Mn=	9742.13	ft-kips
Max Tu, (φ=0.9) Tn =	2021.76	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	2657.4	ft-kips **(* Note)**
Max. Factored Shaft Pu:	31	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	Shaft Factored Loads		
1.00	Mu:	2657.4	ft-kips
1.00	Pu:	31	kips

Material Properties

Concrete Comp. strength, f'c =	4000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2005

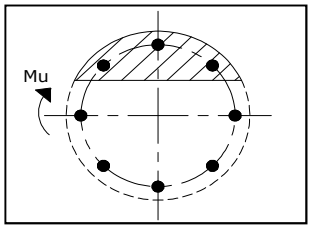
Seismic Properties

Seismic Design Category =	C
Seismic Risk =	**Moderate**

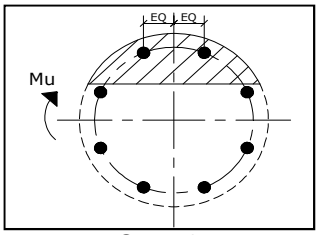
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**12.42**	in
Extreme Steel Strain, εt:	**0.0191**	

εt > 0.0050, Tension Controlled

Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	31.00	kips
Drilled Shaft Moment Capacity, φMn:	**7037.43**	ft-kips
Drilled Shaft Superimposed Mu:	**2657.40**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**37.8%**