10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

October 1, 2019

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification
27 Wintonbury Rd. Simsbury, CT 06070
Latitude: 41.89245
Longitude: -72.769542
Sprint Site#: CT03XC071 – DO Macro

Dear Ms. Bachman:

Sprint currently maintains three (3) antennas at the 75-foot level of the existing 100-foot lattice tower at 27 Wintonbury Rd. Simsbury, CT. The 100-foot lattice tower and property are owned by The Connecticut Light & Power Company, d/b/a Eversource Energy. Sprint now intends to replace three (3) of its existing antennas with three (3) new 800/1900/2500 MHz antennas, add (3) additional 2500 MHz antennas, and add (3) RRHs. The new antennas will be installed at the same 75-foot level of the tower.

Planned Modifications:
Tower:

Remove
N/A

Remove and Replace:
(2) RFS APXVSPP18-C antennas (Remove) - CommScope NNVV-65B-R4 antennas (Replace) 800/1900/2500 MHz
(1) RFS APXV9ERR18-C antenna (Remove) - CommScope NNVV-65B-R4 antennas (Replace) 800/1900/2500 MHz

Install New:
(3) Nokia AAHC panel antennas
(3) FD-RRH2X50- 800 RRHs
(1) 1-1/4" hybrid cable

Existing to Remain:
(3) FD-RRH2X50- 800 RRHs
(3) FD-RRH4x45 1900 RRHs

(3) 1-1/4" hybrid cable

Ground:
Install New: (1) Eltek Model ESOA220-SCA02

This facility was approved by the CSC for Sprint use per the attached approval letter dated April 3, 1997. This modification complies with this approval. Please see the enclosed.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to First Selectman - Eric Wellman, Elected Official, and Janell Mullen, Zoning Enforcement Officer for the Town of Simsbury, as well as the owner.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S;A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing structure.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, Sprint respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Jake Shappy
Transcend Wireless
Cell: 845-553-3330
Email: jshappy@transcendwireless.com

Attachments
cc: Eric Wellman – Town of Simsbury First Selectman
Janell Mullen – Town of Simsbury Zoning Enforcement Officer
The Connecticut Light & Power Company, d/b/a Eversource Energy – property and tower owner

EVERSOURCE ENERGY

107 Selden Street
Berlin, CT 06037

August 21, 2019

Mr. Jake Shappy
Transcend Wireless, LLC.
10 Industrial Ave. Suite 3
Mahwah, New Jersey. 07430

RE: Letter of Authorization

Project: Sprint Site # CT03XC071
27 Wintonbury Road
Simsbury, CT. 06070

Owner: Eversource Energy

Dear Mr. Shappy,

Eversource Energy, owner of the tower facility located at the address identified above, do hereby authorize Sprint PCS, and/ or it's agent, to use this authorization letter for the sole purpose of filing and consummating any land-use or building permit application(s) as may be required by the applicable permitting authorities for the Licensee's telecommunication's installation.

Sincerely,

Steven J. Florio
Eversource Energy

REF: CENTEK Engineering, LLC
Project # 17159.09
Structural Analysis Rev. Date 09/17/2018
CD's Rev. Date 02/15/2019

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

10 Franklin Square
New Britain, Connecticut 06051
Phone: (860) 827-2935
Fax: (860) 827-2950

071

April 3, 1997

Larry Woods
Site Development Manager
Sprint PCS
9 Barnes Industrial Road
Wallingford, CT 06492

Re: Sprint PCS notice of intent to modify an existing telecommunications facility located off Wintonbury Road in the Town of Simsbury, Connecticut.

Dear Mr. Woods:

At a public meeting held on April 2, 1997, the Connecticut Siting Council (Council) acknowledged your notice to modify an existing telecommunications facility in Simsbury, Connecticut, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modification is to be implemented as specified in your notice dated January 9, 1997, and amendment dated March 5, 1997. The modification is in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequency electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This change has been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequency now used and proposed for use on this tower. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Science and Technology, Bulletin No. 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

This decision is conditioned on a field investigation by the Council after the submittal of a final plan to the Council one week prior to the commencement of construction to include the following provisions:

- installation of silt fence for erosion and sediment control at the site of the proposed telecommunications equipment compound;
- surveying and marking of the property surrounding the proposed equipment compound to ensure that site work and equipment installation do not encroach onto adjacent property owned by the Simsbury Land Conservation Trust, Inc.;
- consolidation of the telecommunications equipment configuration to ensure maximum compaction of the equipment while allowing sufficient space to install a future emergency generator;
- cooperation with CL&P to install the new poles for the overhead utility line in a manner and configuration consistent with the transmission line pole gaps to minimize impacts to wetlands along the existing transmission line; and

- relocation of the proposed transition/riser pole leading into the equipment compound to the southeast of the tower structure to minimize tree clearing.

No clearing, grading, or placement of pole structures may commence until authorized by the Chairman of the Council after the receipt of final plan(s) and a field investigation to make necessary alterations in the final configuration consistent with this decision.

Enclosed is a staff report on this project dated April 2, 1997.

Thank you for your attention and cooperation.

Very truly yours,

Mortimer A. Gelston

Mortimer A. Gelston
Chairman

MAG/RKE/ss

c: Honorable Mary A. Glassman, First Selectman
Dorian Hill, CL&P

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Bechtel

Interoffice Memorandum

To	Scott M. Chasse, P.E.	*File No.*	23224-390-BLSS-573		
Subject	Transmittal	*Date*	06/23/97		
		From	J. M. McSpadden		
	G. Rivenburgh, File	*At*	Wallingford, CT	*Ext*	203-294-5633

Scott:

The following items are being transmitted to Sprint for the sites listed below:

Site CT03XC011 - Montowese
Tower Erection Drawings (2 copies)

Site CT03XC023 - Madison
Siting Council Drawings (3 copies)

Site CT03XC039 - North Haven, BANM
Revised Siting Council Drawings (2 "D" size)
NOTE: The requested 8 ½ x 11 will be delivered Tuesday, June 24th

Site CT03XC071 - Bloomfield/Tarriffville, NU Tower
Revised Zoning Drawings (4 copies)

Site CT03XC102 - Old Saybrook, 430 Middlesex Turnpike
Revised Lease Exhibit (5 copies)

Site CT03XC153 - Roscommon Building
Copy of letter from Allied Roofing and "okay'd" by Flatley

Site CT03XC207E - Tolland, 23 Rhodes Rd.
RF Sketch

Site CT03XC211 - Manchester, Buckland Hills Mall
RF Sketch

Site CT03XC212 - No. Vernon, 31 Stacy Lane

Site CT03XC368 - Newtown, CT Engineering Associated Corp.
RF Sketch (1 copy)

Site CT03XC375 - Noroton
Revised Structural Analysis Letter & Compuations (2 copies)

Wade Sofinski FOR JMM

J. M. McSpadden
Field Construction Manager

CRCOG : Capitol Region Council of Governments

Simsbury

Simsbury Quick Se

MOUNTAIN ROAD

Google Directions (https://maps.google.com/?daddr=M

View Details (/datasets/simsbury-properties/090

Property Record Card (http://www.propertyrecordcards.com/PropertyRe towncode=128&uniqueid=)

Property

Address	MOUNTAIN ROAD, SIMSBURY
ID	30372307

Ownership

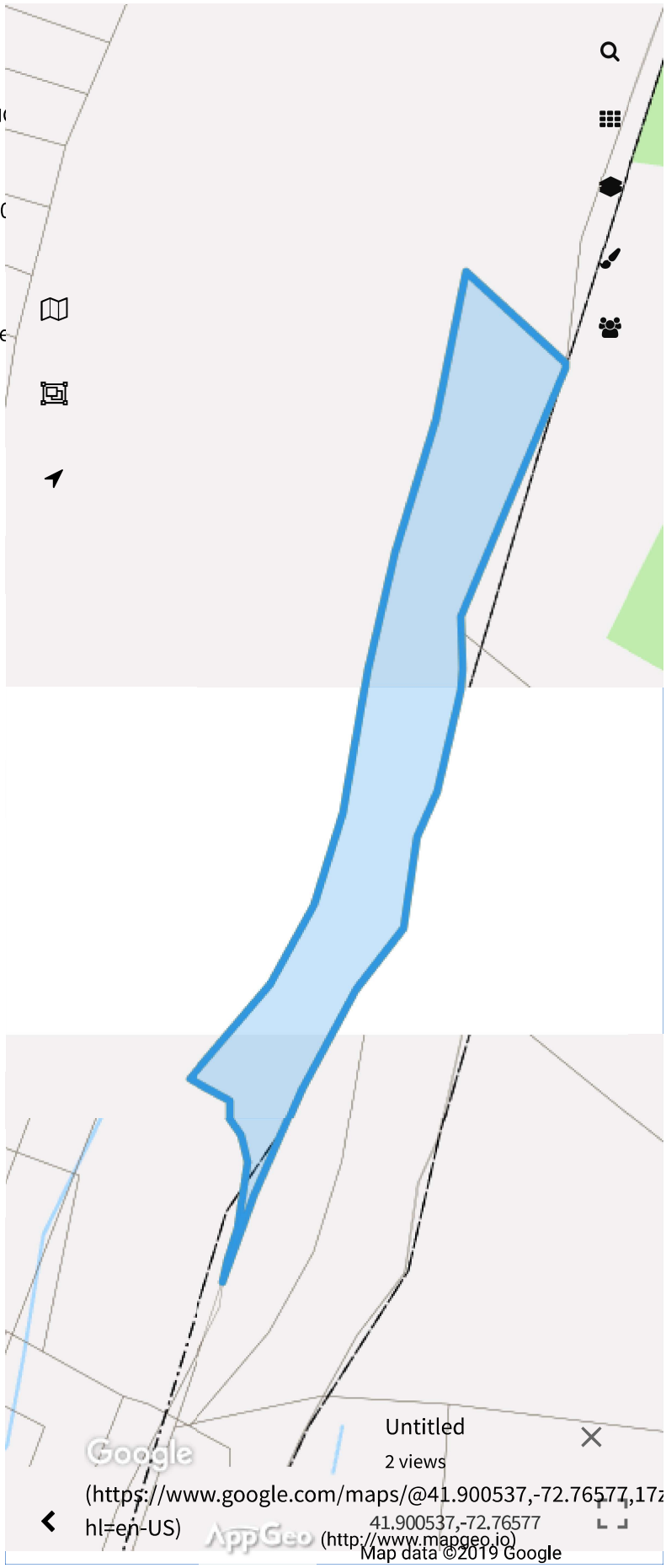
Owner	CONNECTICUT LIGHT AND POWER
Address	P O BOX 270 HARTFORD CT 61410270

Valuation

Total Assessment	$494
Land Value	$0
Building Value	$0
Last Sale	$0 on 1982-07-01
Book/Page	/

Land

Area	3.80 Acres
Zone	R-25



Town of Simsbury
Property Listing Report

Parcel ID K05 127 015 **Account** 30372307

Property Information

Owner	CONNECTICUT LIGHT AND POWER
Address	MOUNTAIN ROAD
Mailing Address	P O BOX 270 HARTFORD , CT 061410270
Land Use	- Commercial Vacant Land
Land Class	Vacant Land

Census Tract	4664000
Neighborhood	12
Zoning	R-25
Acreage	3.8
Utilities	
Lot Setting/ Desc	/

Photo

PARCEL VALUATIONS (Assessed value = 70% of Appraised Value)

	Appraised	Assessed
Buildings		
Outbuildings		
Improvements		
Extras		
Land		
Total	912	640
Previous		

Construction Details

Year Built	
Stories	
Building Style	
Building Use	
Building Condition	
Total Rooms	
Bedrooms	
Full Bathrooms	
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	
Roof Cover	

EXTERIOR WALLS:	
Primary	
Secondary	
INTERIOR WALLS:	
Primary	
Secondary	
FLOORS:	
Primary	
Secondary	
HEATING/AC:	
Heating Type	
Heating Fuel	
AC Type	

BUILDING AREA:

Effective Building Area	
Gross Building Area	
Total Living Area	

SALES HISTORY:

Sale Date	07/01/1982
Sale Price	0
Book/ Page	0260/0201

Report Created On **6/26/2019**

WIRELESS COMMUNICATIONS FACILITY

SITE ID: CT03XC071

27 WINTONBURY ROAD

SIMSBURY, CT 06070

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2016 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE SPRINT CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

FROM: 5 WAYSIDE ROAD
BURLINGTON, MA 01803

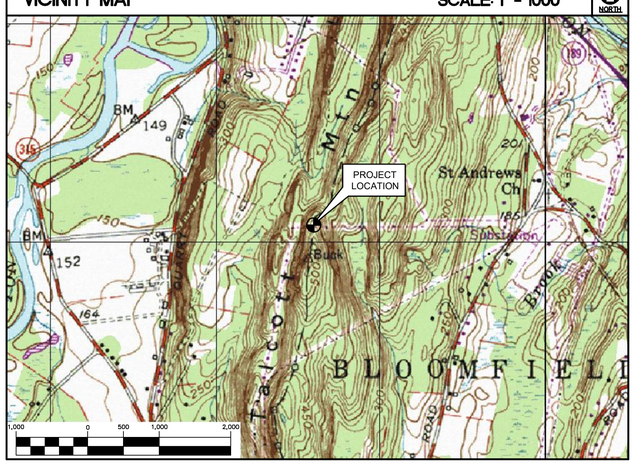
TO: 27 WINTONBURY ROAD
SIMSBURY, CT 06070

1.	START OUT BY GOING TO WAYSIDE ROAD.	0.12 MI.
2.	TURN LEFT ONTO CAMBRIDGE ST/US-3 N/MA	0.12 MI.
3.	MERGE ONTO I-95 S/MA-128 S/YANKEE DIVISION HWY S TOWARD WALTHAM/LOWELL	0.27 MI.
4.	TAKE THE I-90/MASS PIKE EXIT, EXIT 25, TOWARD BOSTON/ALBANY NY.	12.32 MI.
5.	MERGE ONTO I-90 W/MASSACHUSETTS TPKE W TOWARD WORCESTER (PORTIONS TOLL).	44.30 MI.
6.	MERGE ONTO I-84 W/WILBUR CROSS HWY S VIA EXIT 9 TOWARD US-20(PORTIONS TOLL).	0.90 MI.
7.	CONTINUE ON I-84.	36.50 MI.
8.	TAKE EXIT 61 FOR I-291 W TOWARD WINDSOR.	0.60 MI.
9.	CONTINUE ONTO I-291 W.	5.10 MI.
10.	TAKE EXIT 2B TO MERGE ONTO I-91 N TOWARD SPRINGFIELD.	2.20 MI.
11.	TAKE EXIT 37 FOR CT-305/BLOOMFIELD AVE TOWARD WINDSOR CENTER.	0.20 MI.
12.	TURN LEFT ONTO CT-305/BLOOMFIELD AVE.	2.50 MI.
13.	TURN RIGHT ONO CT-187 N.	3.30 MI.
14.	TAKE THE CT-189 N RAMP TO TARIFFVILLE/GRANBY	1.60 MI.
15.	TURN LEFT ONTO ELM STREET.	1.10 MI.
16.	TURN LEFT INTO QUARRY ROAD.	1.00 MI.
17.	MERGE ONTO TERRY'S PLAIN ROAD.	0.20 MI.
18.	TURN LEFT ONTO WINTONBURY ROAD.	0.40 MI.

VICINITY MAP

SCALE: 1" = 1000'

NORTH



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   A. REMOVE (3) EXISTING PANEL ANTENNAS FROM EXISTING TOWER MOUNT.
   B. INSTALL (6) PROPOSED PANEL ANTENNAS, (2) PER SECTOR.
   C. INSTALL (3) PROPOSED REMOTE RADIO UNITS ON TOWER.
   D. INSTALL (1) HYBRID CABLE FROM EQUIPMENT AT GRADE TO RRHs ON TOWER.
   D. INSTALL (1) EQUIPMENT CABINET AT GRADE ON EXISTING CONCRETE PAD.

PROJECT INFORMATION

SITE ID:	CT03XC071
SITE ADDRESS:	27 WINTONBURY ROAD SIMSBURY, CT 06070
APPLICANT:	SPRINT 5 WAYSIDE ROAD BURLINGTON, MA 01803
CONTACT PERSON:	DOUG TALMADGE (PROJECT MANAGER) (475)434-4292
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41° 53' 32.82"N LONGITUDE: 72° 46' 10.35"W GROUND ELEVATION: ±470' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS AND SITE NOTES	0
C-1	COMPOUND PLANS AND ELEVATION	0
C-2	TYPICAL DETAILS	0
C-3	COLOR CODE AND CPRI DETAILS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	02/15/19	TJL	CAG	ISSUED FOR CONSTRUCTION
0	02/11/19	TJL	CAG	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT · TIMOTHY J. LYNCH · 24211 · REGISTERED PROFESSIONAL ENGINEER

Sprint

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

SPRINT
WIRELESS COMMUNICATIONS FACILITY

SITE ID: CT03CX071
27 WINTONBURY ROAD
SIMSBURY, CT 06070

DATE: 09/28/18
SCALE: AS NOTED
JOB NO. 17159.04

TITLE SHEET

T-1

Sheet No. 1 of 5

DESIGN BASIS:

GOVERNING CODE: 2015 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2018 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:

   - RISK CATEGORY: III (BASED ON IBC TABLE 1604.5)
   - NOMINAL DESIGN SPEED (OTHER STRUCTURE): 93 MPH (Vasd) (EXPOSURE C/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2015 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2018 CONNECTICUT STATE BUILDING CODE.
   - SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS---ASTM A325-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS---ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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1	02/15/19	TJL	CAG	ISSUED FOR CONSTRUCTION

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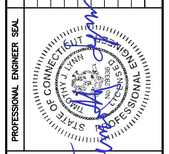

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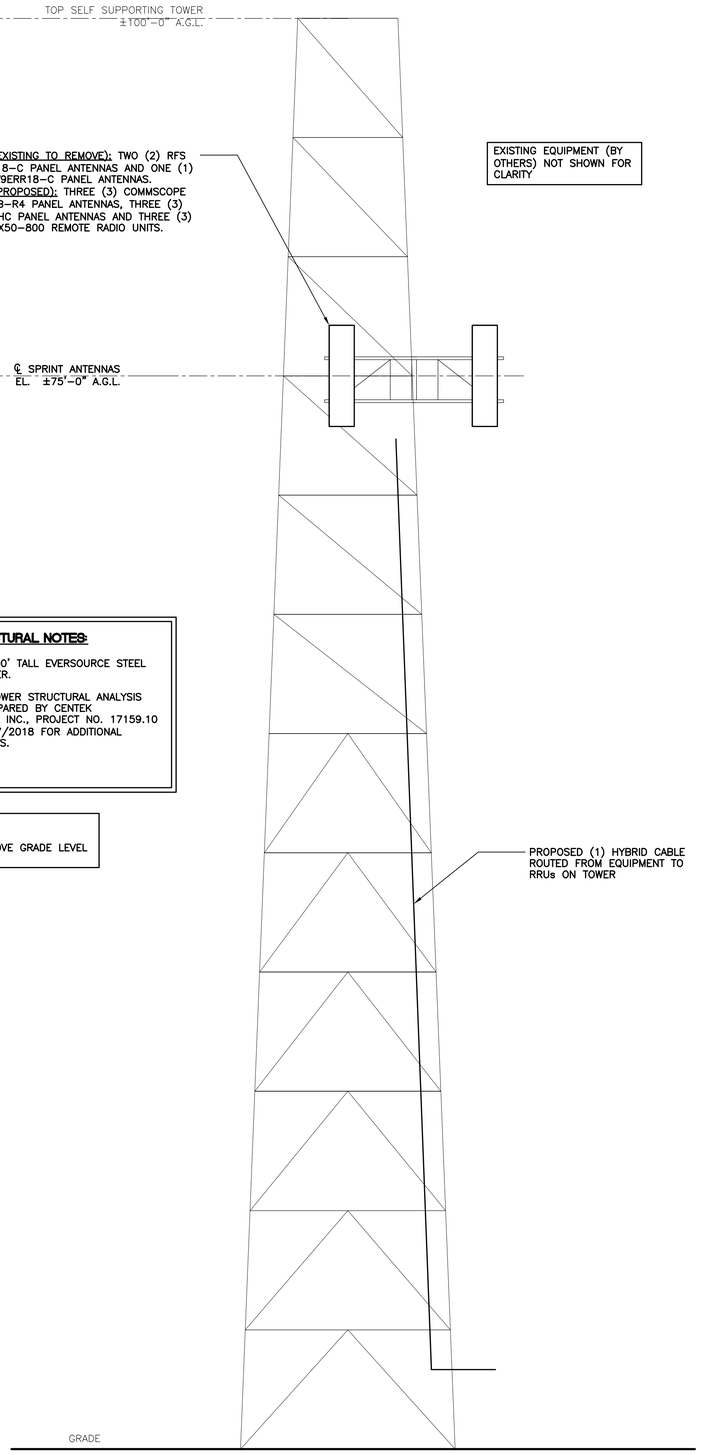
DESIGN BASIS AND SITE NOTES

N-1

Sheet No. 2 of 5



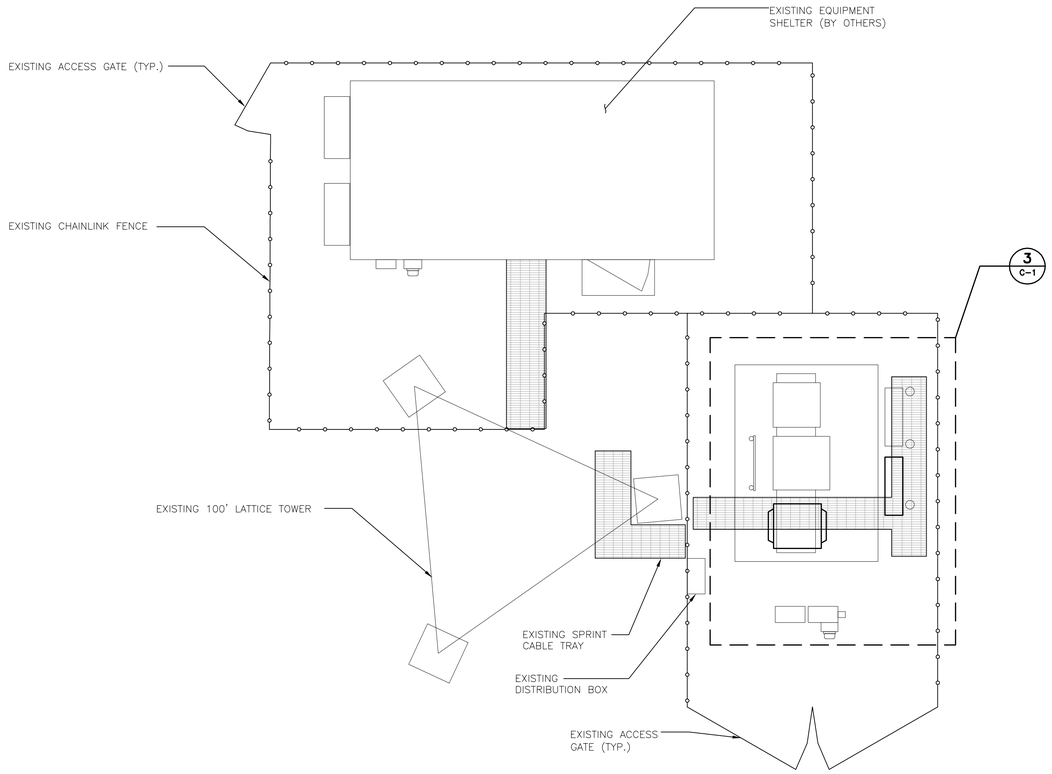
TOWER STRUCTURAL NOTES:

1. EXISTING 1000' TALL EVERSOURCE STEEL LATTICE TOWER.
2. REFER TO TOWER STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING, INC., PROJECT NO. 17159.10 DATED 09/17/2018 FOR ADDITIONAL REQUIREMENTS.

NOTES:

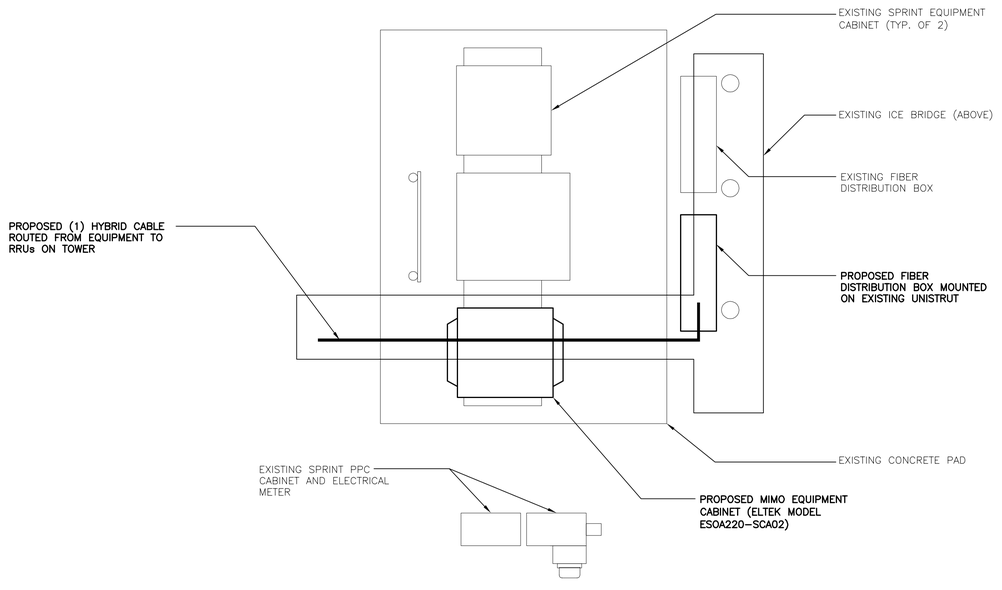
1. A.G.L. = ABOVE GRADE LEVEL

1 / C-1 **TOWER ELEVATION**
SCALE: 1" = 5'-0"



2 / C-1 **COMPOUND PLAN**
SCALE: 1" = 4'-0"

APPROX. NORTH



3 / C-1 **EQUIPMENT PLAN**
SCALE: 1" = 2'-0"

APPROX. NORTH

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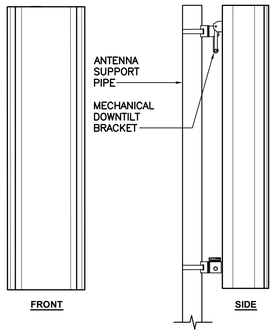
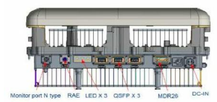
COMPOUND PLANS AND ELEVATION

C-1

Sheet No. 3 of 5





BOTTOM - AAHC

BOTTOM - NNVV-65B-R4 ANTENNA

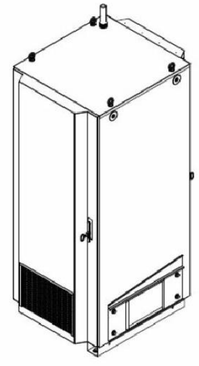
ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: NNVV-65B-R4	72.0"L x 19.6"W x 7.8"D	78 LBS.
MAKE: NOKIA MODEL: AAHC	25.6"L x 19.7"W x 9.6"D	104 LBS.

1 / C-2 **PROPOSED ANTENNA DETAIL**
SCALE: 1/2" = 1'-0"

RRH-2x50-800

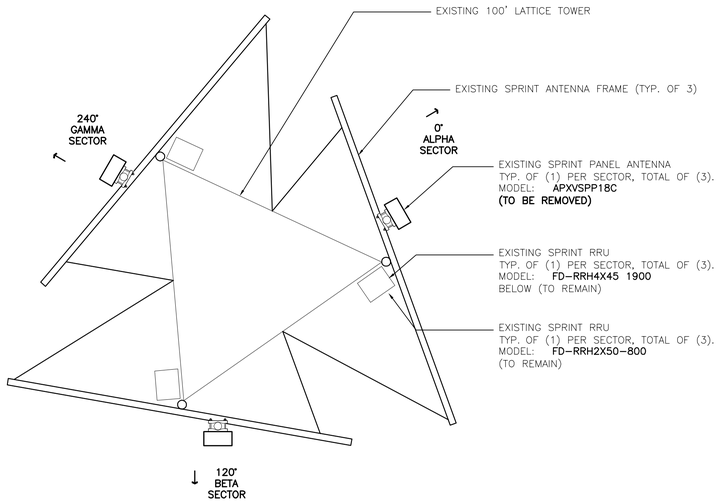
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ALCATEL-LUCENT MODEL: RRH-2x50-800	15.7"L x 13.0"W x 9.8"D	53 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH SPRINT CONSTRUCTION MANAGER PRIOR TO ORDERING.			

2 / C-2 **REMOTE RADIO HEAD DETAIL**
SCALE: NOT TO SCALE

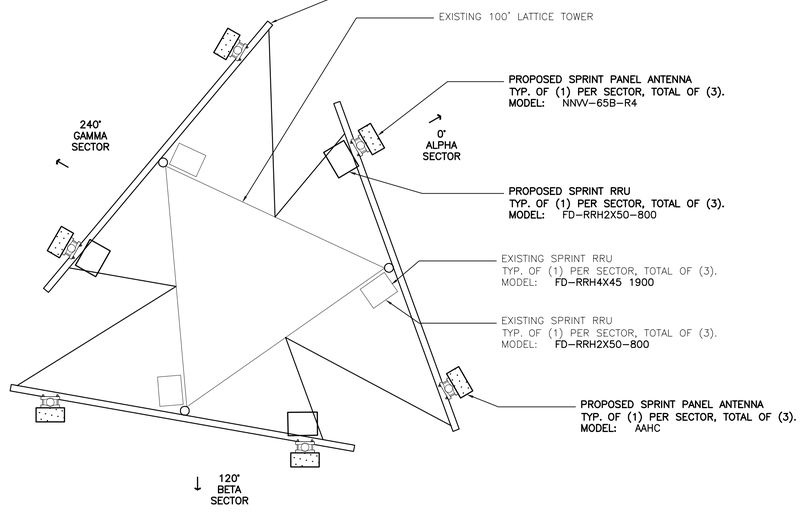


EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ELTEK MODEL: ESOA220-SCA02	30.0"W x 38.0"D x 73.5"H	505 LBS.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH SPRINT CONSTRUCTION MANAGER PRIOR TO ORDERING.		

3 / C-2 **EQUIPMENT CABINET DETAIL**
SCALE: NOT TO SCALE



4 / C-2 **EXISTING ANTENNA MOUNTING CONFIGURATION**
SCALE: 3/8" = 1' — **155' ELEVATION** — TRUE NORTH



5 / C-2 **PROPOSED ANTENNA MOUNTING CONFIGURATION**
SCALE: 3/8" = 1' — **155' ELEVATION** — TRUE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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0	02/11/19	TJL	CAG	ISSUED FOR CONSTRUCTION

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TYPICAL DETAILS

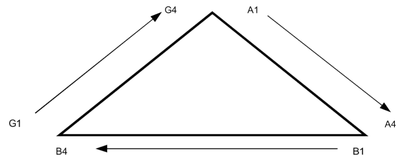
C-2
Sheet No. 4 of 5

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 1: Antenna Orientation



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
   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 remova
7. Examples of the cable and frequency color codes are shown in Figure 19-1 and Figure 19-2.

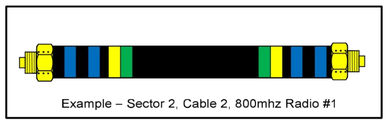
FIGURE 19.1 CABLE COLOR CODE

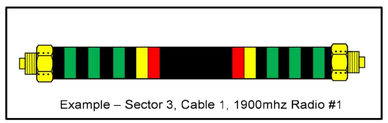
Sector	Cable	First Ring	Second Ring	Third Ring
1 Alpha	1	Green	No Tape	No Tape
1	2	Blue	No Tape	No Tape
1	3	Brown	No Tape	No Tape
1	4	White	No Tape	No Tape
1	5	Red	No Tape	No Tape
1	6	Grey	No Tape	No Tape
1	7	Purple	No Tape	No Tape
1	8	Orange	No Tape	No Tape
2 Beta	1	Green	Green	No Tape
2	2	Blue	Blue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

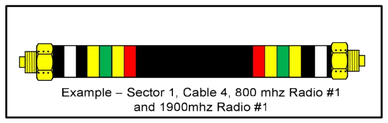
FIGURE 19.2 COLOR CODE

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

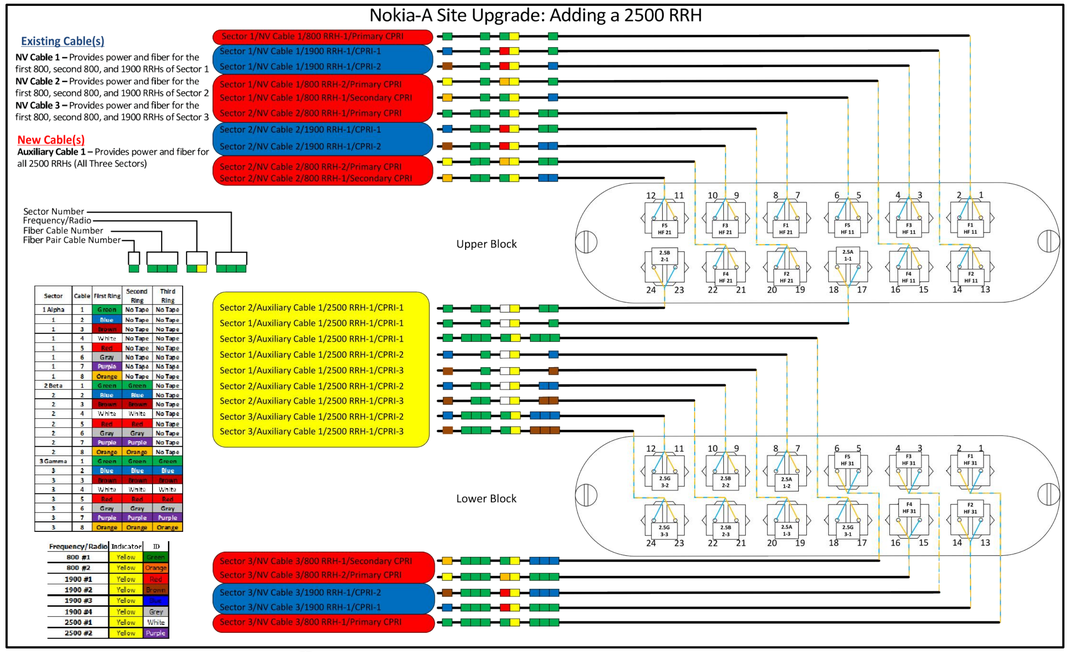
FREQUE	INDICATOR	ID
2500 -1	YEL WHT	GRN
2500 -2	YEL WHT	RED
2500 -3	YEL WHT	BRN
2500 -4	YEL WHT	BLU
2500 -5	YEL WHT	SLT
2500 -6	YEL WHT	ORG
2500 -7	YEL WHT	WHT
2500 -8	YEL WHT	PPL







1 / C–3 **COLOR CODE DIAGRAM**
NOT TO SCALE



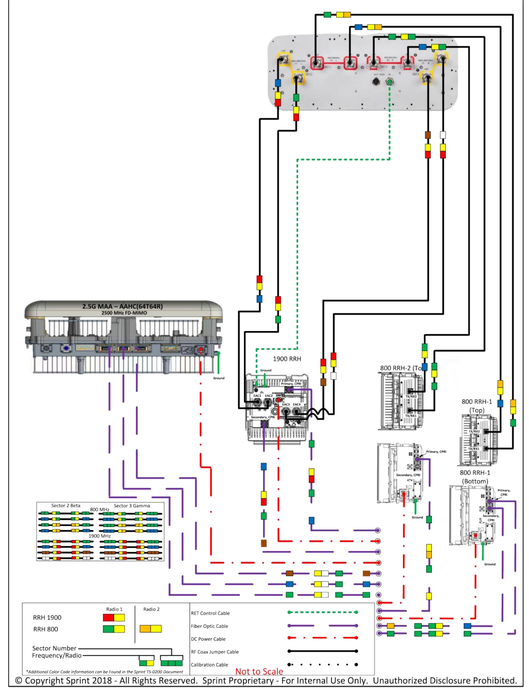
Sector	Cable	First Ring	Second Ring	Third Ring
1 Alpha	1	Green	No Tape	No Tape
1	2	Blue	No Tape	No Tape
1	3	Brown	No Tape	No Tape
1	4	White	No Tape	No Tape
1	5	Red	No Tape	No Tape
1	6	Gray	No Tape	No Tape
1	7	Purple	No Tape	No Tape
1	8	Orange	No Tape	No Tape
2 Beta	1	Green	Green	No Tape
2	2	Blue	Blue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

Frequency/Radio	Indicator	ID
800 #1	Yellow	Green
800 #2	Yellow	Orange
1900 #1	Yellow	Red
1900 #2	Yellow	Brown
1900 #3	Yellow	Blue
1900 #4	Yellow	Gray
2500 #1	Yellow	White
2500 #2	Yellow	Purple

2 / C–3 **CPRI DIAGRAM**
NOT TO SCALE

Prepared By: Mark Elliott	Revision Date: March 24, 2018	Revision Number: R1	Sprint
Approved By: RAN Hardware & Antenna Teams	Approval Date: Final-Macro Generated		

ALU 21-MIMO NNVV-65B-R4 wo Filters



3 / C–3 **PLUMBING DIAGRAM**
NOT TO SCALE

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COLOR CODE AND CPRI DETAILS

C-3

Sheet No. 5 of 5

CENTEK engineering

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Structural Analysis Report

100-ft Existing Self-Supporting Lattice Tower

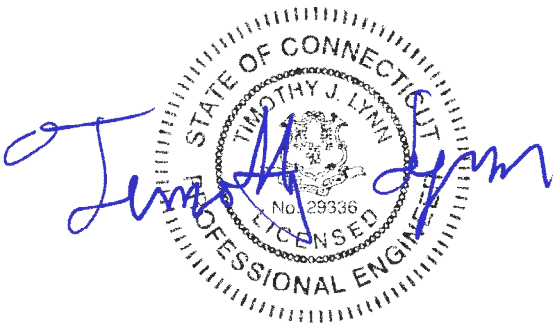
Proposed Sprint Antenna Upgrade

Sprint Site Ref: CT03XC071

Wintonbury Avenue
Simsbury, CT

CENTEK Project No. 17159.04

~~Date: June 13, 2018~~
Rev 1: September 17, 2018



Prepared for:
Transcend Wireless
10 Industrial Ave, Suite 3
Mahwah, NJ 07430

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by Sprint on the existing self-supporting lattice tower located in Simsbury, Connecticut.

The host tower is a 100-ft, four-section, three legged, self-supporting tapered lattice tower originally designed and manufactured by Stainless Inc., report no. 1935-S, dated November 3, 1967. The tower geometry, structure member sizes and the foundation system information were obtained from the aforementioned design documents.

Antenna and appurtenance information were obtained from a previous structural report prepared by Centek project no. 13003.06 dated August 1, 2013, a Sprint RF sheet and visual verification from grade conducted by Centek personnel on January 25, 2018.

The existing tower consists of four (4) tapered steel pipe leg sections conforming to ASTM A53 Grade B. Diagonal lateral support bracing consists of steel pipe sections conforming to ASTM A53 Grade B. Horizontal support bracing consists of A36 steel angle construction. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by bolted and welded gusset connections. The width of the tower face is 7-ft at the top and 15-ft at the base.

Antenna and Appurtenance Summary

The existing tower was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- Eversource (Existing):
  Appurtenance: One (1) 20-ft dipole leg mounted to the top of the tower.
  Conduit: One (1) 1-1/4" ∅ coax cable.
- Eversource (Existing):
  Appurtenance: Two (2) 3-ft ∅ microwave dishes on a pipe mast with a RAD center elevations of 89-ft and 85-ft above existing grade.
  Conduit: Two (2) 1-1/4" ∅ coax cable.
- UNKNOWN (Existing):
  Antennas: One (1) GPS antenna leg mounted with an elevation of 56-ft above existing grade.
  Coax Cable: One (1) 1/2" ∅ coax cable.
- UNKNOWN (Existing):
  Antennas: One (1) GPS antenna leg mounted with an elevation of 12-ft above existing grade.
  Coax Cable: One (1) 1/2" ∅ coax cable.

- SPRINT (Existing to Remain):
  Antennas: Three (3) 1900MHz 4X45W RRHs and three (3) 800MHz 2X50W RRHs mounted on three (3) existing 12-ft T-Arms with a RAD center elevation of 75-ft above existing grade.
  Coax Cables: Three (3) 1-1/4"∅ Hybriflex cables running on a face of the existing tower as specified in Section 3 of this report.
- **SPRINT (Existing to Remove):**
  Antennas: Two (2) RFS APXVSPP18-C-A20 and one (1) RFS APXV9ERR18-C-A20 panel antennas mounted on three (3) existing 12-ft T-Arms with a RAD center elevation of 75-ft above existing grade.
- **SPRINT (Proposed):**
  Antennas: Three (3) Commscope NNVV-65B-R4 panel antennas, three (3) Nokia AAHC panel antennas and three (3) 800MHz 2X50W RRHs mounted on three (3) existing 12-ft T-Arms with a RAD center elevation of 75-ft above existing grade.
  Coax Cables: One (1) 1-1/4"∅ Hybriflex cable running on a face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-G-2005 entitled "Structural Standard for Antenna Support Structures and Antennas", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 1.00" radial ice on the tower structure and its components.

Basic Wind Speed:	Hartford County; v = 90-105 mph (3-second gust)	*[Annex B of TIA-222-G-2005]*
	Simsbury; v = 93 mph (Nominal)	*[Appendix N of the 2018 CT Building Code]*
Load Cases:	Load Case 1; 93 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2018 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

[1] The 2015 International Building Code as amended by the 2018 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits. This tower was found to be at **88.4%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T4)	0'-0"-25'-0"	77.3%	**PASS**
Diagonal (T3)	25'-0"-50'-0"	88.4%	**PASS**

- The tower combined deflection is **0.2782 degrees**.

Deflection (degrees)	Proposed	Allowable	Result
Sway (Tilt)	0.2645	0.5	**PASS**
Twist	0.0863	0.5	**PASS**
Combined	0.2782	0.5	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) individual 2'-6" square tapering to 4'-0" square by 4'-0" long piers with eight (8) rock anchors per pier. The foundation properties and sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned original Stainless design documents. Tower legs are connected to the foundation by means of (6) 1-1/2"∅, ASTM A36 anchor bolts per leg, embedded into the concrete foundation structure.

- The tower base maximum corner reactions developed from the governing Load Case 2 were used in the verification of the foundation and its anchors:

Vector	Proposed Reactions
Compression	**115 kips**
Uplift	**101 kips**
Shear	**15 kips**
Total Shear	**27 kips**
Overturning Moment	**1438 kip-ft**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 FS(1)	Proposed Loading (FS)(1)	Result
Reinf. Conc. Pier w/ Rock Anchors	Uplift	1.0	1.16	**PASS**

Note 1: FS denotes Factor of Safety

- The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	25.8%	**PASS**

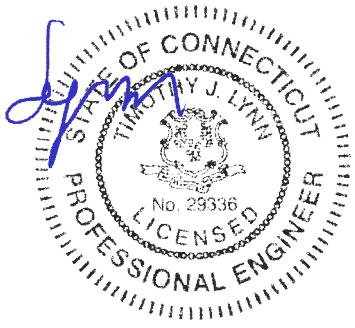
C o n c l u s i o n

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by Sprint. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

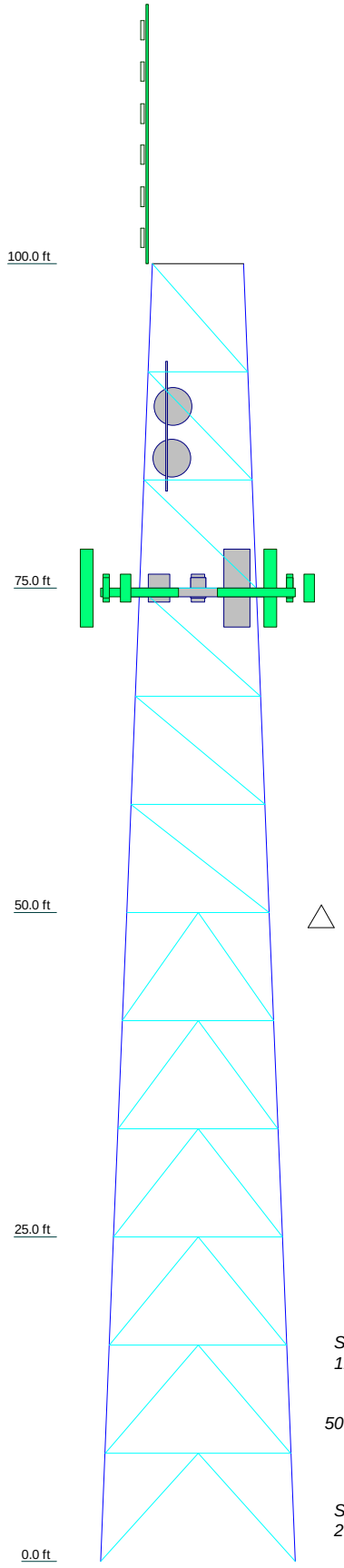
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	T1	T2	T3	T4
Legs	HSS5x.188	HSS5x.188	HSS5x.312	HSS5x.375
Leg Grade	A53-B-35			
Diagonals	HSS3x.188		HSS2.5x.125	HSS2.875x.188
Diagonal Grade	A53-B-35			
Top Girts	L3x3x1/4	N.A.		
Horizontals	L3x3x1/4	L4x4x1/4	L3x3x1/4	
Face Width (ft)	7	9	11	13
# Panels @ (ft)	12 @ 8.33333			
Weight (K)	1.6	1.9	2.2	2.9



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
20' 8 Bay Di-Pole	100	FD-RRH 2x50 800 (Sprint - Existing)	75
3-ft Dish	89	FD-RRH 4x45 1900 (Sprint - Existing)	75
10'x2.5" Pipe Mount	87.5	FD-RRH 4x45 1900 (Sprint - Existing)	75
3-ft Dish	85	FD-RRH 4x45 1900 (Sprint - Existing)	75
NNVV-65B-R4 (Sprint - Proposed)	75	FD-RRH 2x50 800 (Sprint - Proposed)	75
AAHC (Sprint - Proposed)	75	FD-RRH 2x50 800 (Sprint - Proposed)	75
NNVV-65B-R4 (Sprint - Proposed)	75	FD-RRH 2x50 800 (Sprint - Proposed)	75
AAHC (Sprint - Proposed)	75	Rohn T-Arm (1) (Sprint - Existing)	75
NNVV-65B-R4 (Sprint - Proposed)	75	Rohn T-Arm (1) (Sprint - Existing)	75
AAHC (Sprint - Proposed)	75	Rohn T-Arm (1) (Sprint - Existing)	75
FD-RRH 2x50 800 (Sprint - Existing)	75	GPS	56
FD-RRH 2x50 800 (Sprint - Existing)	75	GPS	12

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 4 with Crest Height of 150.00 ft
7. TOWER RATING: 88.4%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 115 K
SHEAR: 15 K

UPLIFT: -101 K
SHEAR: 14 K

AXIAL
66 K
SHEAR *11 K*
MOMENT *544 kip-ft*

TORQUE 1 kip-ft
50 mph WIND - 1.0000 in ICE

AXIAL
14 K
SHEAR *27 K*
MOMENT *1438 kip-ft*

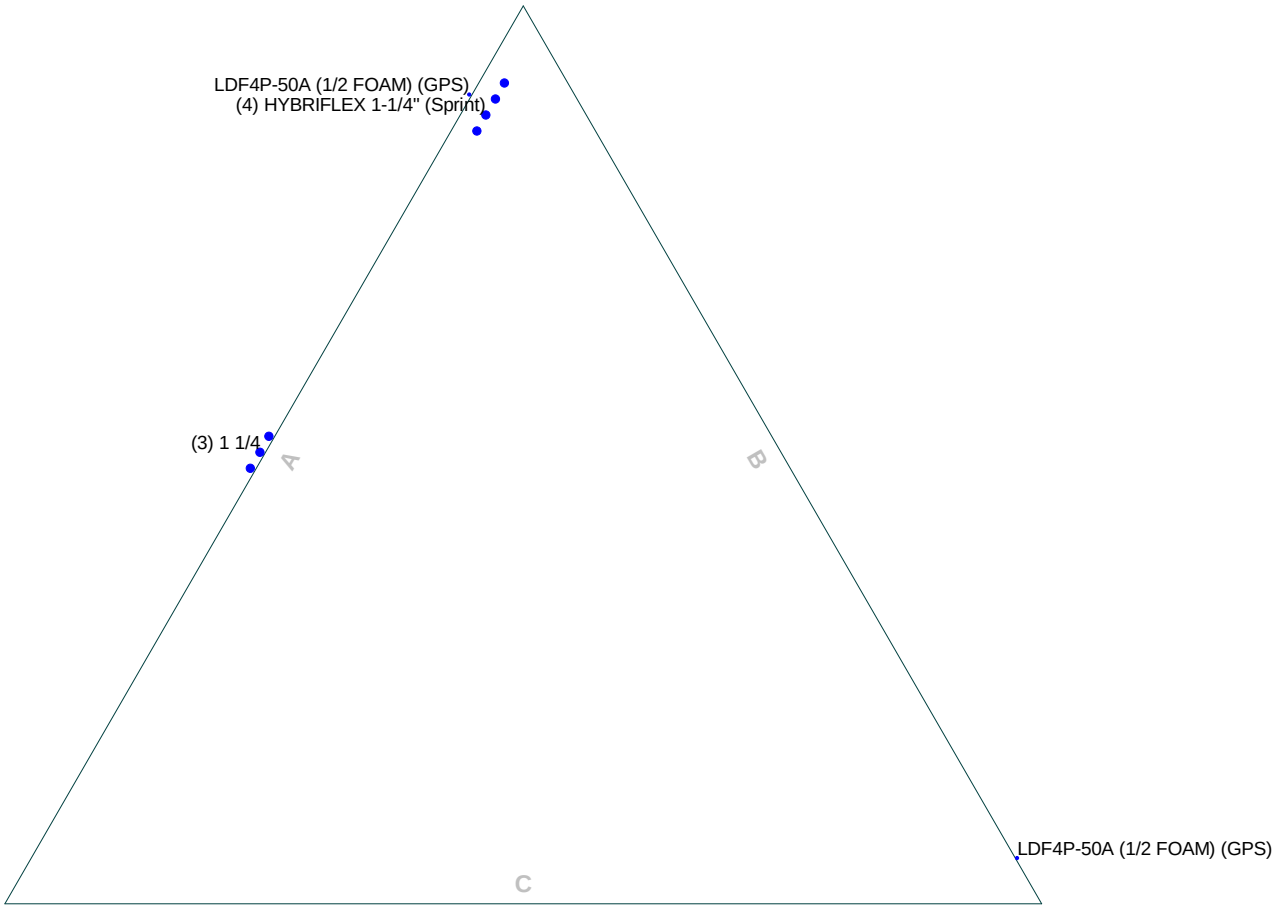
TORQUE 7 kip-ft
REACTIONS - 93 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: ***17159.04 - CT03XC071***		
Project: ***100-ft Stainless Lattice Tower - Wintonbury Rd, Simsbury, CT***		
Client: Sprint	Drawn by: TJL	App'd:
Code: TIA-222-G	Date: 06/13/18	Scale: NTS
Path: J:\Jobs\1715900.W\04_CT03XC071_Simsbury\04_Structural\Backup Documentation\ERI Files\100' Self-supporting Lattice Simsbury.eri		Dwg No. E-1

Feed Line Plan

Round Flat App In Face App Out Face



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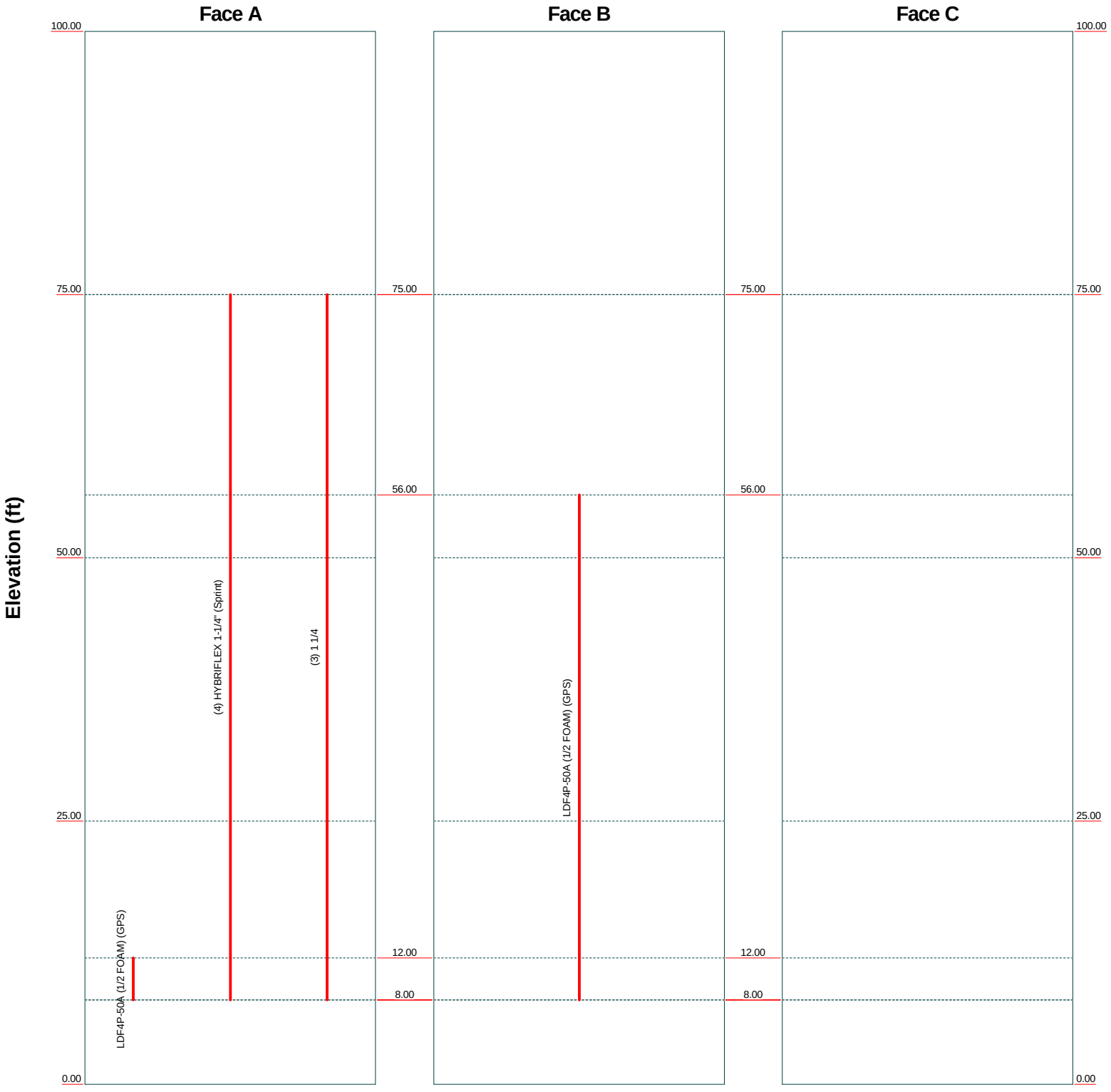
Path: J:\Jobs\1715900.W\04_CT03XC071 Simsbury\04_Structural\Backup Documentation\ER Files\100' Self-supporting Lattice Simsbury.eri			Dwg No. E-7

Feed Line Distribution Chart
0' - 100'

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



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***17159.04 - CT03XC071***		
	Project: ***100-ft Stainless Lattice Tower - Wintonbury Rd, Simsbury, CT***		
	Client: Sprint	Drawn by: TJL	App'd:
	Code: TIA-222-G	Date: 06/13/18	Scale: NTS
	Path: J:\Jobs\1715900.W\04_CT03XC071 Simsbury\04_Structural\Backup Documentation\ER Files\100' Self-supporting Lattice Simsbury.eri		Dwg No. E-7

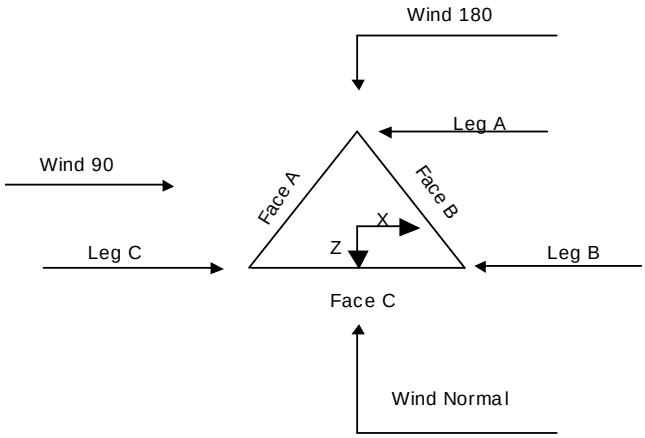
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 7.00 ft at the top and 15.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 93 mph.
Structure Class III.
Exposure Category C.
Topographic Category 4.
Crest Height 150.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
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		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r	√	All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice		Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	100.00-75.00			7.00	1	25.00
T2	75.00-50.00			9.00	1	25.00
T3	50.00-25.00			11.00	1	25.00
T4	25.00-0.00			13.00	1	25.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	100.00-75.00	8.33	Diag Down	No	Yes	0.0000	0.0000
T2	75.00-50.00	8.33	Diag Down	No	Yes	0.0000	0.0000
T3	50.00-25.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T4	25.00-0.00	8.33	K Brace Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 100.00-75.00	Pipe	HSS5x.188	A53-B-35 (35 ksi)	Pipe	HSS3x.188	A53-B-35 (35 ksi)
T2 75.00-50.00	Pipe	HSS5x.188	A53-B-35 (35 ksi)	Pipe	HSS3x.188	A53-B-35 (35 ksi)
T3 50.00-25.00	Pipe	HSS5x.312	A53-B-35 (35 ksi)	Pipe	HSS2.5x.125	A53-B-35 (35 ksi)
T4 25.00-0.00	Pipe	HSS5x.375	A53-B-35 (35 ksi)	Pipe	HSS2.875x.188	A53-B-35 (35 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 100.00-75.00	None	Flat Bar		A36 (36 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)
T2 75.00-50.00	None	Flat Bar		A36 (36 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T3 50.00-25.00	None	Flat Bar		A36 (36 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)
T4 25.00-0.00	None	Flat Bar		A36 (36 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 100.00-75.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 75.00-50.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 50.00-25.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 25.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
100.00-75.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
75.00-50.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
50.00-25.00				1	1	1	1	1	1	1
T4 25.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
100.00-75.00														
T2 75.00-50.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 50.00-25.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 25.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1	Flange	0.7500	4	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
100.00-75.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 75.00-50.00	Flange	0.7500	4	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 50.00-25.00	Flange	0.7500	8	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 25.00-0.00	Flange	1.5000	6	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A36		A325N		A325N		A325N		A325N		A325N		A325N	

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF4P-50A (1/2 FOAM) (GPS)	A	No	Ar (CaAa)	12.00 - 8.00	0.0000	0.4	1	1	0.6300	0.6300		0.15
LDF4P-50A (1/2 FOAM) (GPS)	B	No	Ar (CaAa)	56.00 - 8.00	0.0000	0.45	1	1	0.6300	0.6300		0.15
HYBRIFLEX 1-1/4" (Sprint)	A	No	Ar (CaAa)	75.00 - 8.00	-3.0000	0.4	4	4	1.5400	1.5400		1.30
1 1/4	A	No	Ar (CaAa)	75.00 - 8.00	0.0000	0	3	3	1.5500	1.5500		0.66

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	100.00-75.00	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	0.00
T2	75.00-50.00	A	0.000	0.000	27.025	0.000	0.18
		B	0.000	0.000	0.378	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	50.00-25.00	A	0.000	0.000	27.025	0.000	0.18
		B	0.000	0.000	1.575	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T4	25.00-0.00	A	0.000	0.000	18.629	0.000	0.12
		B	0.000	0.000	1.071	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	100.00-75.00	A	3.312	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	0.00
T2	75.00-50.00	A	3.348	0.000	0.000	112.353	0.000	2.33
		B		0.000	0.000	4.396	0.000	0.10
		C		0.000	0.000	0.000	0.000	0.00
T3	50.00-25.00	A	3.355	0.000	0.000	112.474	0.000	2.33
		B		0.000	0.000	18.351	0.000	0.41
		C		0.000	0.000	0.000	0.000	0.00
T4	25.00-0.00	A	3.201	0.000	0.000	76.635	0.000	1.56
		B		0.000	0.000	11.955	0.000	0.26
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	100.00-75.00	0.0000	0.0000	0.0000	0.0000
T2	75.00-50.00	-1.2230	-3.4919	-0.4302	-1.9782
T3	50.00-25.00	-1.1708	-3.8640	0.4022	-1.6147
T4	25.00-0.00	-0.9690	-3.2066	0.2825	-1.6021

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	2	LDF4P-50A (1/2 FOAM)	50.00 - 56.00	0.6000	0.6000
T2	3	HYBRIFLEX 1-1/4"	50.00 - 75.00	0.6000	0.6000
T2	4	1 1/4	50.00 - 75.00	0.6000	0.6000
T3	2	LDF4P-50A (1/2 FOAM)	25.00 - 50.00	0.6000	0.6000
T3	3	HYBRIFLEX 1-1/4"	25.00 - 50.00	0.6000	0.6000
T3	4	1 1/4	25.00 - 50.00	0.6000	0.6000
T4	1	LDF4P-50A (1/2 FOAM)	8.00 - 12.00	0.6000	0.6000
T4	2	LDF4P-50A (1/2 FOAM)	8.00 - 25.00	0.6000	0.6000
T4	3	HYBRIFLEX 1-1/4"	8.00 - 25.00	0.6000	0.6000
T4	4	1 1/4	8.00 - 25.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Rohn T-Arm (1)	A	From Leg	0.00	0.0000	75.00	No Ice	7.33	7.33	0.38
(Sprint - Existing)			0.00			1/2" Ice	10.00	10.00	0.49
			0.00			1" Ice	12.67	12.67	0.60
Rohn T-Arm (1)	B	From Leg	0.00	0.0000	75.00	No Ice	7.33	7.33	0.38
(Sprint - Existing)			0.00			1/2" Ice	10.00	10.00	0.49
			0.00			1" Ice	12.67	12.67	0.60
Rohn T-Arm (1)	C	From Leg	0.00	0.0000	75.00	No Ice	7.33	7.33	0.38
(Sprint - Existing)			0.00			1/2" Ice	10.00	10.00	0.49
			0.00			1" Ice	12.67	12.67	0.60
GPS	B	From Leg	0.00	0.0000	12.00	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.02
GPS	A	From Leg	0.00	0.0000	56.00	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.02
NNVV-65B-R4	A	From Leg	3.00	0.0000	75.00	No Ice	14.61	9.17	0.11
(Sprint - Proposed)			3.00			1/2" Ice	15.13	9.63	0.21
			0.00			1" Ice	15.65	10.11	0.32
AAHC	A	From Leg	3.00	0.0000	75.00	No Ice	4.20	2.06	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(Sprint - Proposed)			-3.00			1/2" Ice	4.46	2.25	0.14
			0.00			1" Ice	4.72	2.45	0.17
NNVV-65B-R4	B	From Leg	3.00	0.0000	75.00	No Ice	14.61	9.17	0.11
(Sprint - Proposed)			3.00			1/2" Ice	15.13	9.63	0.21
			0.00			1" Ice	15.65	10.11	0.32
AAHC	B	From Leg	3.00	0.0000	75.00	No Ice	4.20	2.06	0.10
(Sprint - Proposed)			-3.00			1/2" Ice	4.46	2.25	0.14
			0.00			1" Ice	4.72	2.45	0.17
NNVV-65B-R4	C	From Leg	3.00	0.0000	75.00	No Ice	14.61	9.17	0.11
(Sprint - Proposed)			3.00			1/2" Ice	15.13	9.63	0.21
			0.00			1" Ice	15.65	10.11	0.32
AAHC	C	From Leg	3.00	0.0000	75.00	No Ice	4.20	2.06	0.10
(Sprint - Proposed)			-3.00			1/2" Ice	4.46	2.25	0.14
			0.00			1" Ice	4.72	2.45	0.17
FD-RRH 2x50 800	A	From Leg	3.00	0.0000	75.00	No Ice	2.06	1.93	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	B	From Leg	3.00	0.0000	75.00	No Ice	2.06	1.93	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	C	From Leg	3.00	0.0000	75.00	No Ice	2.06	1.93	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 4x45 1900	A	From Leg	3.00	0.0000	75.00	No Ice	2.32	2.38	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 4x45 1900	B	From Leg	3.00	0.0000	75.00	No Ice	2.32	2.38	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 4x45 1900	C	From Leg	3.00	0.0000	75.00	No Ice	2.32	2.38	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 2x50 800	A	From Leg	3.00	0.0000	75.00	No Ice	2.06	1.93	0.06
(Sprint - Proposed)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	B	From Leg	3.00	0.0000	75.00	No Ice	2.06	1.93	0.06
(Sprint - Proposed)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	C	From Leg	3.00	0.0000	75.00	No Ice	2.06	1.93	0.06
(Sprint - Proposed)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
20' 8 Bay Di-Pole	C	From Leg	0.50	0.0000	100.00	No Ice	4.00	4.00	0.06
			0.00			1/2" Ice	6.00	6.00	0.10
			10.00			1" Ice	8.00	8.00	0.14
10'x2.5" Pipe Mount	A	From Face	0.50	0.0000	87.50	No Ice	2.67	2.67	0.06
			0.00			1/2" Ice	3.91	3.91	0.08
			0.00			1" Ice	4.96	4.96	0.11

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
3-ft Dish	A	Paraboloid w/o Radome	From Face	0.00 0.00 0.00	0.0000		85.00	3.00	No Ice 1/2" Ice 1" Ice	7.07 7.47 7.86	0.06 0.10 0.14
3-ft Dish	A	Paraboloid w/o Radome	From Face	0.00 0.00 0.00	0.0000		89.00	3.00	No Ice 1/2" Ice 1" Ice	7.07 7.47 7.86	0.06 0.10 0.14

Tower Pressures - No Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 100.00-75.00	87.50	1.231	45	210.425	A	5.438	29.073	20.856	60.43	0.000	0.000
					B	5.438	29.073		60.43	0.000	0.000
					C	5.438	29.073		60.43	0.000	0.000
T2 75.00-50.00	62.50	1.146	48	260.425	A	9.250	30.216	20.856	52.84	27.025	0.000
					B	9.250	30.216		52.84	0.378	0.000
					C	9.250	30.216		52.84	0.000	0.000
T3 50.00-25.00	37.50	1.029	50	310.425	A	8.438	33.381	20.856	49.87	27.025	0.000
					B	8.438	33.381		49.87	1.575	0.000
					C	8.438	33.381		49.87	0.000	0.000
T4 25.00-0.00	12.50	0.85	49	360.425	A	9.938	36.201	20.856	45.20	18.629	0.000
					B	9.938	36.201		45.20	1.071	0.000
					C	9.938	36.201		45.20	0.000	0.000

Tower Pressure - With Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 100.00-75.00	87.50	1.231	11	3.3119	224.236	A	5.438	86.852	48.484	52.54	0.000	0.000
						B	5.438	86.852		52.54	0.000	0.000
						C	5.438	86.852		52.54	0.000	0.000
T2 75.00-50.00	62.50	1.146	12	3.3479	274.386	A	9.250	94.520	48.785	47.01	112.353	0.000
						B	9.250	94.520		47.01	4.396	0.000
						C	9.250	94.520		47.01	0.000	0.000
T3 50.00-25.00	37.50	1.029	13	3.3551	324.416	A	8.438	113.862	48.845	39.94	112.474	0.000
						B	8.438	113.862		39.94	18.351	0.000
						C	8.438	113.862		39.94	0.000	0.000
T4 25.00-0.00	12.50	0.85	12	3.2012	373.774	A	9.938	118.287	47.561	37.09	76.635	0.000
						B	9.938	118.287		37.09	11.955	0.000
						C	9.938	118.287		37.09	0.000	0.000

Tower Pressure - Service

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	87.50	1.231	16	210.425	A	5.438	29.073	20.856	60.43	0.000	0.000
100.00-75.00					B	5.438	29.073		60.43	0.000	0.000
					C	5.438	29.073		60.43	0.000	0.000
T2 75.00-50.00	62.50	1.146	17	260.425	A	9.250	30.216	20.856	52.84	27.025	0.000
					B	9.250	30.216		52.84	0.378	0.000
					C	9.250	30.216		52.84	0.000	0.000
T3 50.00-25.00	37.50	1.029	18	310.425	A	8.438	33.381	20.856	49.87	27.025	0.000
					B	8.438	33.381		49.87	1.575	0.000
					C	8.438	33.381		49.87	0.000	0.000
T4 25.00-0.00	12.50	0.85	18	360.425	A	9.938	36.201	20.856	45.20	18.629	0.000
					B	9.938	36.201		45.20	1.071	0.000
					C	9.938	36.201		45.20	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.00	1.56	A	0.164	2.721	45	1	1	19.232	2.00	80.09	C
100.00-75.00			B	0.164	2.721		1	1	19.232			
			C	0.164	2.721		1	1	19.232			
T2	0.18	1.86	A	0.152	2.766	48	1	1	23.324	3.28	131.07	C
75.00-50.00			B	0.152	2.766		1	1	23.324			
			C	0.152	2.766		1	1	23.324			
T3	0.18	2.17	A	0.135	2.829	50	1	1	24.201	3.62	144.93	C
50.00-25.00			B	0.135	2.829		1	1	24.201			
			C	0.135	2.829		1	1	24.201			
T4 25.00-0.00	0.13	2.90	A	0.128	2.854	49	1	1	26.958	3.71	148.48	C
			B	0.128	2.854		1	1	26.958			
			C	0.128	2.854		1	1	26.958			
Sum Weight:	0.49	8.49						OTM	562.26 kip-ft	12.61		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.00	1.56	A	0.164	2.721	45	0.8	1	18.144	1.89	75.56	C
100.00-75.00			B	0.164	2.721		0.8	1	18.144			
			C	0.164	2.721		0.8	1	18.144			
T2	0.18	1.86	A	0.152	2.766	48	0.8	1	21.474	3.07	122.79	C
75.00-50.00			B	0.152	2.766		0.8	1	21.474			
			C	0.152	2.766		0.8	1	21.474			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T3	0.18	2.17	A	0.135	2.829	50	0.8	1	22.513	3.42	136.85	C
50.00-25.00			B	0.135	2.829		0.8	1	22.513			
			C	0.135	2.829		0.8	1	22.513			
T4 25.00-0.00	0.13	2.90	A	0.128	2.854	49	0.8	1	24.970	3.47	138.99	C
			B	0.128	2.854		0.8	1	24.970			
			C	0.128	2.854		0.8	1	24.970			
Sum Weight:	0.49	8.49						OTM	528.87 kip-ft	11.85		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.00	1.56	A	0.164	2.721	45	0.85	1	18.416	1.92	76.69	C
100.00-75.00			B	0.164	2.721		0.85	1	18.416			
			C	0.164	2.721		0.85	1	18.416			
T2	0.18	1.86	A	0.152	2.766	48	0.85	1	21.937	3.12	124.86	C
75.00-50.00			B	0.152	2.766		0.85	1	21.937			
			C	0.152	2.766		0.85	1	21.937			
T3	0.18	2.17	A	0.135	2.829	50	0.85	1	22.935	3.47	138.87	C
50.00-25.00			B	0.135	2.829		0.85	1	22.935			
			C	0.135	2.829		0.85	1	22.935			
T4 25.00-0.00	0.13	2.90	A	0.128	2.854	49	0.85	1	25.467	3.53	141.37	C
			B	0.128	2.854		0.85	1	25.467			
			C	0.128	2.854		0.85	1	25.467			
Sum Weight:	0.49	8.49						OTM	537.22 kip-ft	12.04		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.00	8.85	A	0.412	2.042	11	1	1	61.138	1.20	48.02	C
100.00-75.00			B	0.412	2.042		1	1	61.138			
			C	0.412	2.042		1	1	61.138			
T2	2.42	10.68	A	0.378	2.109	12	1	1	68.521	2.18	87.31	C
75.00-50.00			B	0.378	2.109		1	1	68.521			
			C	0.378	2.109		1	1	68.521			
T3	2.74	12.49	A	0.377	2.111	13	1	1	79.782	2.63	105.07	C
50.00-25.00			B	0.377	2.111		1	1	79.782			
			C	0.377	2.111		1	1	79.782			
T4 25.00-0.00	1.82	13.59	A	0.343	2.188	12	1	1	82.506	2.46	98.25	C
			B	0.343	2.188		1	1	82.506			
			C	0.343	2.188		1	1	82.506			
Sum Weight:	6.99	45.61						OTM	370.68	8.47		

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
									kip-ft			

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.00	8.85	A	0.412	2.042	11	0.8	1	60.050	1.18	47.17	C
100.00-75.00			B	0.412	2.042		0.8	1	60.050			
			C	0.412	2.042		0.8	1	60.050			
T2	2.42	10.68	A	0.378	2.109	12	0.8	1	66.671	2.14	85.72	C
75.00-50.00			B	0.378	2.109		0.8	1	66.671			
			C	0.378	2.109		0.8	1	66.671			
T3	2.74	12.49	A	0.377	2.111	13	0.8	1	78.094	2.59	103.56	C
50.00-25.00			B	0.377	2.111		0.8	1	78.094			
			C	0.377	2.111		0.8	1	78.094			
T4 25.00-0.00	1.82	13.59	A	0.343	2.188	12	0.8	1	80.519	2.41	96.42	C
			B	0.343	2.188		0.8	1	80.519			
			C	0.343	2.188		0.8	1	80.519			
Sum Weight:	6.99	45.61						OTM	364.34 kip-ft	8.32		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.00	8.85	A	0.412	2.042	11	0.85	1	60.322	1.18	47.38	C
100.00-75.00			B	0.412	2.042		0.85	1	60.322			
			C	0.412	2.042		0.85	1	60.322			
T2	2.42	10.68	A	0.378	2.109	12	0.85	1	67.134	2.15	86.12	C
75.00-50.00			B	0.378	2.109		0.85	1	67.134			
			C	0.378	2.109		0.85	1	67.134			
T3	2.74	12.49	A	0.377	2.111	13	0.85	1	78.516	2.60	103.94	C
50.00-25.00			B	0.377	2.111		0.85	1	78.516			
			C	0.377	2.111		0.85	1	78.516			
T4 25.00-0.00	1.82	13.59	A	0.343	2.188	12	0.85	1	81.015	2.42	96.88	C
			B	0.343	2.188		0.85	1	81.015			
			C	0.343	2.188		0.85	1	81.015			
Sum Weight:	6.99	45.61						OTM	365.92 kip-ft	8.36		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.00	1.56	A	0.164	2.721	16	1	1	19.232	0.72	28.99	C
100.00-75.00			B	0.164	2.721		1	1	19.232			
			C	0.164	2.721		1	1	19.232			
T2	0.18	1.86	A	0.152	2.766	17	1	1	23.324	1.19	47.44	C
75.00-50.00			B	0.152	2.766		1	1	23.324			
			C	0.152	2.766		1	1	23.324			
T3	0.18	2.17	A	0.135	2.829	18	1	1	24.201	1.31	52.46	C
50.00-25.00			B	0.135	2.829		1	1	24.201			
			C	0.135	2.829		1	1	24.201			
T4 25.00-0.00	0.13	2.90	A	0.128	2.854	18	1	1	26.958	1.34	53.74	C
			B	0.128	2.854		1	1	26.958			
			C	0.128	2.854		1	1	26.958			
Sum Weight:	0.49	8.49						OTM	203.51 kip-ft	4.57		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.00	1.56	A	0.164	2.721	16	0.8	1	18.144	0.68	27.35	C
100.00-75.00			B	0.164	2.721		0.8	1	18.144			
			C	0.164	2.721		0.8	1	18.144			
T2	0.18	1.86	A	0.152	2.766	17	0.8	1	21.474	1.11	44.44	C
75.00-50.00			B	0.152	2.766		0.8	1	21.474			
			C	0.152	2.766		0.8	1	21.474			
T3	0.18	2.17	A	0.135	2.829	18	0.8	1	22.513	1.24	49.53	C
50.00-25.00			B	0.135	2.829		0.8	1	22.513			
			C	0.135	2.829		0.8	1	22.513			
T4 25.00-0.00	0.13	2.90	A	0.128	2.854	18	0.8	1	24.970	1.26	50.31	C
			B	0.128	2.854		0.8	1	24.970			
			C	0.128	2.854		0.8	1	24.970			
Sum Weight:	0.49	8.49						OTM	191.42 kip-ft	4.29		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.00	1.56	A	0.164	2.721	16	0.85	1	18.416	0.69	27.76	C
100.00-75.00			B	0.164	2.721		0.85	1	18.416			
			C	0.164	2.721		0.85	1	18.416			
T2	0.18	1.86	A	0.152	2.766	17	0.85	1	21.937	1.13	45.19	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
75.00-50.00			B	0.152	2.766		0.85	1	21.937			
			C	0.152	2.766		0.85	1	21.937			
T3	0.18	2.17	A	0.135	2.829	18	0.85	1	22.935	1.26	50.26	C
50.00-25.00			B	0.135	2.829		0.85	1	22.935			
			C	0.135	2.829		0.85	1	22.935			
T4 25.00-0.00	0.13	2.90	A	0.128	2.854	18	0.85	1	25.467	1.28	51.17	C
			B	0.128	2.854		0.85	1	25.467			
			C	0.128	2.854		0.85	1	25.467			
Sum Weight:	0.49	8.49						OTM	194.44 kip-ft	4.36		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	3.75					
Bracing Weight	4.74					
Total Member Self-Weight	8.49			-2.27	0.99	
Total Weight	11.53			-2.27	0.99	
Wind 0 deg - No Ice		-0.09	-16.67	-875.84	8.88	-2.32
Wind 30 deg - No Ice		7.97	-13.82	-725.94	-416.18	-3.35
Wind 60 deg - No Ice		14.33	-7.45	-378.69	-774.12	-3.33
Wind 90 deg - No Ice		16.48	0.44	35.63	-880.82	-2.75
Wind 120 deg - No Ice		14.87	8.59	456.34	-793.35	-1.84
Wind 150 deg - No Ice		8.62	14.06	742.45	-472.74	-0.27
Wind 180 deg - No Ice		0.71	16.13	857.21	-60.57	1.62
Wind 210 deg - No Ice		-7.98	13.81	720.85	419.13	3.35
Wind 240 deg - No Ice		-14.48	8.26	427.69	761.47	4.17
Wind 270 deg - No Ice		-16.23	-0.03	-4.55	860.87	3.53
Wind 300 deg - No Ice		-13.98	-8.07	-432.50	746.17	1.71
Wind 330 deg - No Ice		-8.14	-14.04	-745.80	432.91	-0.51
Member Ice	37.12					
Total Weight Ice	64.17			-22.43	7.51	
Wind 0 deg - Ice		-0.03	-10.58	-555.54	10.08	-0.70
Wind 30 deg - Ice		5.21	-9.02	-476.35	-254.35	-1.02
Wind 60 deg - Ice		9.21	-5.05	-271.57	-464.18	-1.01
Wind 90 deg - Ice		10.59	0.14	-10.07	-531.70	-0.83
Wind 120 deg - Ice		9.30	5.37	251.24	-466.51	-0.54
Wind 150 deg - Ice		5.42	9.10	438.35	-272.80	-0.09
Wind 180 deg - Ice		0.23	10.50	510.63	-12.57	0.49
Wind 210 deg - Ice		-5.21	9.02	431.31	269.68	1.02
Wind 240 deg - Ice		-9.17	5.26	241.89	470.48	1.24
Wind 270 deg - Ice		-10.51	-0.01	-23.18	539.56	1.08
Wind 300 deg - Ice		-9.10	-5.25	-289.12	469.43	0.52
Wind 330 deg - Ice		-5.26	-9.10	-482.83	274.18	-0.16
Total Weight	11.53			-2.27	0.99	
Wind 0 deg - Service		-0.03	-6.03	-316.30	3.39	-0.84
Wind 30 deg - Service		2.88	-5.00	-262.05	-150.46	-1.21
Wind 60 deg - Service		5.19	-2.70	-136.36	-280.01	-1.20
Wind 90 deg - Service		5.97	0.16	13.60	-318.63	-1.00
Wind 120 deg - Service		5.38	3.11	165.87	-286.97	-0.67
Wind 150 deg - Service		3.12	5.09	269.43	-170.93	-0.10

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 180 deg - Service		0.26	5.84	310.96	-21.75	0.59
Wind 210 deg - Service		-2.89	5.00	261.61	151.87	1.21
Wind 240 deg - Service		-5.24	2.99	155.50	275.78	1.51
Wind 270 deg - Service		-5.88	-0.01	-0.94	311.76	1.28
Wind 300 deg - Service		-5.06	-2.92	-155.84	270.24	0.62
Wind 330 deg - Service		-2.95	-5.08	-269.23	156.86	-0.18

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service

Comb. No.	Description
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	100 - 75	Leg	Max Tension	7	5.35	-0.34	-0.15
			Max. Compression	10	-6.70	0.04	-0.03
			Max. Mx	11	-6.48	0.41	-0.01
			Max. My	6	-2.23	0.00	-0.45
			Max. Vy	11	-0.39	0.41	-0.01
			Max. Vx	14	0.39	-0.01	-0.42
		Diagonal	Max Tension	12	3.37	0.00	0.00
			Max. Compression	8	-3.66	0.00	0.00
			Max. Mx	36	1.28	0.42	0.00
			Max. My	27	0.29	0.00	0.00
			Max. Vy	36	-0.14	0.00	0.00
			Max. Vx	27	0.00	0.00	0.00
		Horizontal	Max Tension	8	2.00	0.00	0.00
			Max. Compression	2	-1.99	0.00	0.00
			Max. Mx	26	0.06	-0.32	0.00
			Max. My	38	0.51	0.00	0.01
			Max. Vy	26	0.15	0.00	0.00
			Max. Vx	38	-0.00	0.00	0.00
		Top Girt	Max Tension	15	0.30	0.00	0.00
			Max. Compression	2	-0.32	0.00	0.00
			Max. Mx	26	-0.03	-0.22	0.00
			Max. My	38	0.03	0.00	0.01
			Max. Vy	26	-0.13	0.00	0.00
			Max. Vx	38	-0.00	0.00	0.00
T2	75 - 50	Leg	Max Tension	23	31.40	-0.24	0.01
			Max. Compression	10	-37.81	0.33	0.14
			Max. Mx	11	-37.22	0.33	0.13
			Max. My	6	-18.44	0.08	0.37
			Max. Vy	11	-0.15	0.25	0.00
			Max. Vx	8	-0.16	-0.00	0.27
		Diagonal	Max Tension	12	9.98	0.00	0.00
			Max. Compression	16	-9.97	0.00	0.00
			Max. Mx	36	3.63	0.58	0.00
			Max. My	27	0.30	0.00	0.00
			Max. Vy	36	0.17	0.00	0.00
			Max. Vx	27	0.00	0.00	0.00
		Horizontal	Max Tension	8	7.54	0.00	0.00
			Max. Compression	12	-7.55	0.00	0.00
			Max. Mx	37	0.32	-0.60	0.00
			Max. My	38	2.52	0.00	0.01
			Max. Vy	37	-0.23	0.00	0.00
			Max. Vx	38	0.01	0.00	0.00
T3	50 - 25	Leg	Max Tension	23	56.97	-0.28	-0.03
			Max. Compression	10	-66.37	0.48	0.01
			Max. Mx	11	-65.57	0.48	0.01
			Max. My	8	0.07	-0.02	0.48
			Max. Vy	11	-0.15	0.48	0.01
			Max. Vx	20	0.16	-0.00	-0.48

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	17	8.09	0.00	0.00
			Max. Compression	16	-8.20	0.00	0.00
			Max. Mx	38	2.79	0.24	0.00
			Max. My	27	-0.10	0.00	0.00
			Max. Vy	38	-0.09	0.00	0.00
			Max. Vx	27	-0.00	0.00	0.00
		Horizontal	Max Tension	16	7.99	0.00	0.00
			Max. Compression	12	-8.03	0.03	0.00
			Max. Mx	37	0.49	0.21	0.04
			Max. My	27	0.37	0.18	0.04
			Max. Vy	37	0.15	0.21	0.04
			Max. Vx	27	-0.01	0.00	0.00
T4	25 - 0	Leg	Max Tension	23	89.34	-0.49	-0.01
			Max. Compression	10	-102.80	0.00	-0.00
			Max. Mx	11	-89.43	0.51	0.01
			Max. My	8	-0.06	-0.02	0.49
			Max. Vy	11	0.19	0.51	0.01
			Max. Vx	8	0.19	-0.02	0.49
		Diagonal	Max Tension	17	9.24	0.00	0.00
			Max. Compression	16	-9.39	0.00	0.00
			Max. Mx	32	3.49	0.31	0.00
			Max. My	27	-0.20	0.00	0.00
			Max. Vy	32	-0.11	0.00	0.00
			Max. Vx	27	-0.00	0.00	0.00
		Horizontal	Max Tension	16	6.21	0.00	0.00
			Max. Compression	17	-6.22	0.03	0.01
			Max. Mx	37	0.71	0.23	0.04
			Max. My	35	-0.98	0.22	0.05
			Max. Vy	37	0.16	0.22	0.05
			Max. Vx	34	-0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	110.04	12.49	-7.49
	Max. H_x	18	110.04	12.49	-7.49
	Max. H_z	5	-83.81	-9.17	7.47
	Min. Vert	7	-100.36	-11.83	6.95
	Min. H_x	7	-100.36	-11.83	6.95
	Min. H_z	16	91.93	9.59	-7.66
Leg B	Max. Vert	10	115.26	-12.96	-7.61
	Max. H_x	23	-100.60	11.84	6.96
	Max. H_z	25	-86.73	9.49	7.40
	Min. Vert	23	-100.60	11.84	6.96
	Min. H_x	10	115.26	-12.96	-7.61
	Min. H_z	12	99.05	-10.23	-7.79
Leg A	Max. Vert	2	110.27	-0.13	14.57
	Max. H_x	21	3.90	3.57	0.25
	Max. H_z	2	110.27	-0.13	14.57
	Min. Vert	15	-100.18	-0.00	-13.72
	Min. H_x	9	-1.06	-3.56	-0.18
	Min. H_z	15	-100.18	-0.00	-13.72

Tower Mast Reaction Summary

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 Only	11.53	0.00	0.00	-2.27	0.99	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	13.83	-0.14	-26.67	-1372.57	13.83	-3.72
0.9 Dead+1.6 Wind 0 deg - No Ice	10.38	-0.14	-26.67	-1371.46	13.53	-3.72
1.2 Dead+1.6 Wind 30 deg - No Ice	13.83	12.75	-22.11	-1137.41	-652.88	-5.37
0.9 Dead+1.6 Wind 30 deg - No Ice	10.38	12.75	-22.11	-1136.37	-652.98	-5.36
1.2 Dead+1.6 Wind 60 deg - No Ice	13.83	22.92	-11.93	-591.71	-1216.25	-5.33
0.9 Dead+1.6 Wind 60 deg - No Ice	10.38	22.92	-11.93	-590.85	-1216.16	-5.33
1.2 Dead+1.6 Wind 90 deg - No Ice	13.83	26.38	0.70	58.01	-1383.03	-4.41
0.9 Dead+1.6 Wind 90 deg - No Ice	10.38	26.38	0.70	58.67	-1382.89	-4.41
1.2 Dead+1.6 Wind 120 deg - No Ice	13.83	23.80	13.74	717.17	-1245.71	-2.95
0.9 Dead+1.6 Wind 120 deg - No Ice	10.38	23.80	13.74	717.62	-1245.61	-2.95
1.2 Dead+1.6 Wind 150 deg - No Ice	13.83	13.79	22.49	1165.68	-743.52	-0.42
0.9 Dead+1.6 Wind 150 deg - No Ice	10.38	13.79	22.49	1165.99	-743.58	-0.43
1.2 Dead+1.6 Wind 180 deg - No Ice	13.83	1.13	25.81	1346.10	-97.45	2.59
0.9 Dead+1.6 Wind 180 deg - No Ice	10.38	1.13	25.81	1346.36	-97.72	2.59
1.2 Dead+1.6 Wind 210 deg - No Ice	13.83	-12.77	22.10	1131.06	656.82	5.37
0.9 Dead+1.6 Wind 210 deg - No Ice	10.38	-12.77	22.10	1131.39	656.31	5.37
1.2 Dead+1.6 Wind 240 deg - No Ice	13.83	-23.17	13.21	671.25	1193.83	6.67
0.9 Dead+1.6 Wind 240 deg - No Ice	10.38	-23.17	13.21	671.72	1193.16	6.67
1.2 Dead+1.6 Wind 270 deg - No Ice	13.83	-25.97	-0.04	-6.39	1350.26	5.65
0.9 Dead+1.6 Wind 270 deg - No Ice	10.38	-25.97	-0.04	-5.71	1349.54	5.65
1.2 Dead+1.6 Wind 300 deg - No Ice	13.83	-22.37	-12.92	-677.93	1170.67	2.74
0.9 Dead+1.6 Wind 300 deg - No Ice	10.38	-22.37	-12.92	-677.03	1170.00	2.74
1.2 Dead+1.6 Wind 330 deg - No Ice	13.83	-13.02	-22.47	-1169.22	678.90	-0.81
0.9 Dead+1.6 Wind 330 deg - No Ice	10.38	-13.02	-22.47	-1168.18	678.38	-0.81
1.2 Dead+1.0 Ice+1.0 Temp	66.47	0.00	0.00	-22.96	7.74	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	66.47	-0.03	-10.58	-543.72	10.35	-0.71
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	66.47	5.21	-9.02	-466.29	-247.95	-1.04
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	66.47	9.21	-5.05	-265.95	-453.44	-1.04

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
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	66.47	10.59	0.14	-10.57	-519.25	-0.85
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	66.47	9.30	5.37	244.50	-455.59	-0.55
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	66.47	5.42	9.10	427.16	-266.52	-0.09
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	66.47	0.23	10.50	497.86	-12.45	0.50
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	66.47	-5.21	9.02	420.07	263.79	1.04
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	66.47	-9.17	5.26	235.08	460.00	1.26
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	66.47	-10.51	-0.01	-23.77	527.57	1.10
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	66.47	-9.10	-5.25	-283.63	459.14	0.54
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	66.47	-5.26	-9.10	-472.82	268.31	-0.16
Dead+Wind 0 deg - Service	11.53	-0.03	-6.03	-312.09	3.85	-0.84
Dead+Wind 30 deg - Service	11.53	2.88	-5.00	-258.90	-146.94	-1.22
Dead+Wind 60 deg - Service	11.53	5.19	-2.70	-135.48	-274.35	-1.21
Dead+Wind 90 deg - Service	11.53	5.97	0.16	11.46	-312.07	-1.00
Dead+Wind 120 deg - Service	11.53	5.38	3.11	160.54	-281.01	-0.67
Dead+Wind 150 deg - Service	11.53	3.12	5.09	261.98	-167.43	-0.10
Dead+Wind 180 deg - Service	11.53	0.26	5.84	302.79	-21.32	0.59
Dead+Wind 210 deg - Service	11.53	-2.89	5.00	254.15	149.27	1.22
Dead+Wind 240 deg - Service	11.53	-5.24	2.99	150.16	270.73	1.51
Dead+Wind 270 deg - Service	11.53	-5.88	-0.01	-3.10	306.11	1.28
Dead+Wind 300 deg - Service	11.53	-5.06	-2.92	-154.98	265.49	0.62
Dead+Wind 330 deg - Service	11.53	-2.95	-5.08	-266.10	154.27	-0.18

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	-11.53	0.00	0.00	11.53	0.00	0.000%
2	-0.14	-13.83	-26.67	0.14	13.83	26.67	0.000%
3	-0.14	-10.38	-26.67	0.14	10.38	26.67	0.000%
4	12.75	-13.83	-22.11	-12.75	13.83	22.11	0.000%
5	12.75	-10.38	-22.11	-12.75	10.38	22.11	0.000%
6	22.92	-13.83	-11.93	-22.92	13.83	11.93	0.000%
7	22.92	-10.38	-11.93	-22.92	10.38	11.93	0.000%
8	26.38	-13.83	0.70	-26.38	13.83	-0.70	0.000%
9	26.38	-10.38	0.70	-26.38	10.38	-0.70	0.000%
10	23.80	-13.83	13.74	-23.80	13.83	-13.74	0.000%
11	23.80	-10.38	13.74	-23.80	10.38	-13.74	0.000%
12	13.79	-13.83	22.49	-13.79	13.83	-22.49	0.000%
13	13.79	-10.38	22.49	-13.79	10.38	-22.49	0.000%
14	1.13	-13.83	25.81	-1.13	13.83	-25.81	0.000%
15	1.13	-10.38	25.81	-1.13	10.38	-25.81	0.000%
16	-12.77	-13.83	22.10	12.77	13.83	-22.10	0.000%
17	-12.77	-10.38	22.10	12.77	10.38	-22.10	0.000%
18	-23.17	-13.83	13.21	23.17	13.83	-13.21	0.000%
19	-23.17	-10.38	13.21	23.17	10.38	-13.21	0.000%
20	-25.97	-13.83	-0.04	25.97	13.83	0.04	0.000%
21	-25.97	-10.38	-0.04	25.97	10.38	0.04	0.000%
22	-22.37	-13.83	-12.92	22.37	13.83	12.92	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
23	-22.37	-10.38	-12.92	22.37	10.38	12.92	0.000%
24	-13.02	-13.83	-22.47	13.02	13.83	22.47	0.000%
25	-13.02	-10.38	-22.47	13.02	10.38	22.47	0.000%
26	0.00	-66.47	0.00	0.00	66.47	0.00	0.000%
27	-0.03	-66.47	-10.58	0.03	66.47	10.58	0.000%
28	5.21	-66.47	-9.02	-5.21	66.47	9.02	0.000%
29	9.21	-66.47	-5.05	-9.21	66.47	5.05	0.000%
30	10.59	-66.47	0.14	-10.59	66.47	-0.14	0.000%
31	9.30	-66.47	5.37	-9.30	66.47	-5.37	0.000%
32	5.42	-66.47	9.10	-5.42	66.47	-9.10	0.000%
33	0.23	-66.47	10.50	-0.23	66.47	-10.50	0.000%
34	-5.21	-66.47	9.02	5.21	66.47	-9.02	0.000%
35	-9.17	-66.47	5.26	9.17	66.47	-5.26	0.000%
36	-10.51	-66.47	-0.01	10.51	66.47	0.01	0.000%
37	-9.10	-66.47	-5.25	9.10	66.47	5.25	0.000%
38	-5.26	-66.47	-9.10	5.26	66.47	9.10	0.000%
39	-0.03	-11.53	-6.03	0.03	11.53	6.03	0.000%
40	2.88	-11.53	-5.00	-2.88	11.53	5.00	0.000%
41	5.19	-11.53	-2.70	-5.19	11.53	2.70	0.000%
42	5.97	-11.53	0.16	-5.97	11.53	-0.16	0.000%
43	5.38	-11.53	3.11	-5.38	11.53	-3.11	0.000%
44	3.12	-11.53	5.09	-3.12	11.53	-5.09	0.000%
45	0.26	-11.53	5.84	-0.26	11.53	-5.84	0.000%
46	-2.89	-11.53	5.00	2.89	11.53	-5.00	0.000%
47	-5.24	-11.53	2.99	5.24	11.53	-2.99	0.000%
48	-5.88	-11.53	-0.01	5.88	11.53	0.01	0.000%
49	-5.06	-11.53	-2.92	5.06	11.53	2.92	0.000%
50	-2.95	-11.53	-5.08	2.95	11.53	5.08	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001

24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 75	0.906	43	0.0591	0.0226
T2	75 - 50	0.590	43	0.0569	0.0171
T3	50 - 25	0.286	43	0.0409	0.0053
T4	25 - 0	0.080	43	0.0228	0.0020

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	20' 8 Bay Di-Pole	43	0.906	0.0591	0.0226	Inf
89.00	3-ft Dish	43	0.768	0.0595	0.0209	Inf
87.50	10'x2.5" Pipe Mount	43	0.749	0.0594	0.0206	Inf
85.00	3-ft Dish	43	0.717	0.0592	0.0201	862756
75.00	Rohn T-Arm (1)	43	0.590	0.0569	0.0171	731765
56.00	GPS	43	0.353	0.0454	0.0073	91845
12.00	GPS	43	0.028	0.0114	0.0009	97094

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 75	4.033	11	0.2645	0.0863
T2	75 - 50	2.625	11	0.2542	0.0628
T3	50 - 25	1.268	11	0.1823	0.0237
T4	25 - 0	0.354	10	0.1015	0.0087

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	20' 8 Bay Di-Pole	11	4.033	0.2645	0.0863	601497
89.00	3-ft Dish	11	3.416	0.2657	0.0805	273410
87.50	10'x2.5" Pipe Mount	11	3.332	0.2654	0.0793	240600
85.00	3-ft Dish	11	3.191	0.2645	0.0771	200501
75.00	Rohn T-Arm (1)	11	2.625	0.2542	0.0628	171200
56.00	GPS	11	1.569	0.2022	0.0262	20428
12.00	GPS	10	0.126	0.0509	0.0033	21849

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	100	Leg	A325N	0.7500	4	1.34	29.82	0.045 ✓	1	Bolt Tension
		Diagonal	A325N	1.0000	1	3.37	25.65	0.131 ✓	1	Member Bearing
		Horizontal	A325N	0.6250	2	1.00	12.43	0.081 ✓	1	Bolt Shear
T2	75	Leg	A325N	0.7500	4	7.85	29.82	0.263 ✓	1	Bolt Tension
		Diagonal	A325N	1.0000	1	9.98	25.65	0.389 ✓	1	Member Bearing
		Horizontal	A325N	0.6250	2	3.77	12.43	0.304 ✓	1	Bolt Shear
T3	50	Leg	A325N	0.7500	8	7.12	29.82	0.239 ✓	1	Bolt Tension
		Diagonal	A325N	1.0000	1	8.09	17.10	0.473 ✓	1	Member Bearing
		Horizontal	A325N	0.6250	2	4.02	12.43	0.323 ✓	1	Bolt Shear
T4	25	Leg	A36	1.5000	6	14.89	57.65	0.258 ✓	1	Bolt Tension
		Diagonal	A325N	1.0000	1	9.24	25.65	0.360 ✓	1	Member Bearing
		Horizontal	A325N	0.6250	2	3.11	12.43	0.250 ✓	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 75	HSS5x.188	25.03	8.34	58.6 K=1.00	2.6381	-6.70	69.69	0.096 [1] ✔
T2	75 - 50	HSS5x.188	25.03	8.34	58.6 K=1.00	2.6381	-37.81	69.69	0.543 [1] ✔
T3	50 - 25	HSS5x.312	25.03	8.34	60.0 K=1.00	4.3050	-66.37	112.78	0.589 [1] ✔
T4	25 - 0	HSS5x.375	25.03	8.34	60.7 K=1.00	5.0994	-102.80	133.02	0.773 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 75	HSS3x.188	12.02	11.45	137.2 K=1.00	1.5448	-3.66	18.53	0.198 [1] ✔
T2	75 - 50	HSS3x.188	13.54	13.01	155.9 K=1.00	1.5448	-9.97	14.35	0.695 [1] ✔
T3	50 - 25	HSS2.5x.125	10.57	10.23	145.5 K=1.00	0.8688	-8.20	9.27	0.884 [1] ✔
T4	25 - 0	HSS2.875x.188	11.21	10.90	136.7 K=1.00	1.4765	-9.39	17.85	0.526 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 75	L3x3x1/4	8.33	7.52	140.0 K=0.92	1.4400	-1.99	16.61	0.120 [1] ✔
T2	75 - 50	L4x4x1/4	10.33	9.52	134.6 K=0.94	1.9400	-7.55	24.17	0.312 [1] ✔
T3	50 - 25	L3x3x1/4	11.00	5.09	111.6 K=1.08	1.4400	-8.03	24.21	0.332 [1] ✔
T4	25 - 0	L3x3x1/4	14.33	6.76	133.0 K=0.97	1.4400	-6.22	18.38	0.338 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 75	L3x3x1/4	7.00	6.58	128.3 K=0.96	1.4400	-0.32	19.62	0.017 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 75	HSS5x.188	25.03	8.34	58.6	2.6381	5.35	83.10	0.064 [1] ✔
T2	75 - 50	HSS5x.188	25.03	8.34	58.6	2.6381	31.40	83.10	0.378 [1] ✔
T3	50 - 25	HSS5x.312	25.03	8.34	60.0	4.3050	56.97	135.61	0.420 [1] ✔
T4	25 - 0	HSS5x.375	25.03	8.34	60.7	5.0994	89.34	160.63	0.556 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 75	HSS3x.188	12.02	11.45	137.2	1.5448	3.37	48.66	0.069 [1] ✔
T2	75 - 50	HSS3x.188	13.54	13.01	155.9	1.5448	9.98	48.66	0.205 [1] ✔
T3	50 - 25	HSS2.5x.125	10.57	10.23	145.5	0.8688	8.09	27.37	0.296 [1] ✔
T4	25 - 0	HSS2.875x.188	11.21	10.90	136.7	1.4765	9.24	46.51	0.199 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 75	L3x3x1/4	8.33	7.52	102.2	0.9394	2.00	40.86	0.049 [1] ✔
T2	75 - 50	L4x4x1/4	10.33	9.52	95.2	1.3144	7.54	57.18	0.132 [1] ✔
T3	50 - 25	L3x3x1/4	11.00	5.09	102.4	0.9394	7.99	40.86	0.196 [1] ✔
T4	25 - 0	L3x3x1/4	14.33	6.76	134.7	0.9394	6.21	40.86	0.152 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 75	L3x3x1/4	7.00	6.58	84.9	1.4400	0.30	46.66	0.007 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	100 - 75	Leg	HSS5x.188	2	-6.70	69.69	9.6	Pass
T2	75 - 50	Leg	HSS5x.188	23	-37.81	69.69	54.3	Pass
T3	50 - 25	Leg	HSS5x.312	44	-66.37	112.78	58.9	Pass
T4	25 - 0	Leg	HSS5x.375	74	-102.80	133.02	77.3	Pass
T1	100 - 75	Diagonal	HSS3x.188	7	-3.66	18.53	19.8	Pass
T2	75 - 50	Diagonal	HSS3x.188	30	-9.97	14.35	69.5	Pass
T3	50 - 25	Diagonal	HSS2.5x.125	54	-8.20	9.27	88.4	Pass
T4	25 - 0	Diagonal	HSS2.875x.188	84	-9.39	17.85	52.6	Pass
T1	100 - 75	Horizontal	L3x3x1/4	12	-1.99	16.61	12.0	Pass
T2	75 - 50	Horizontal	L4x4x1/4	32	-7.55	24.17	31.2	Pass
T3	50 - 25	Horizontal	L3x3x1/4	67	-8.03	24.21	33.2	Pass
T4	25 - 0	Horizontal	L3x3x1/4	82	-6.22	18.38	33.8	Pass
T1	100 - 75	Top Girt	L3x3x1/4	6	-0.32	19.62	1.7	Pass
						Summary		
						Leg (T4)	77.3	Pass
						Diagonal (T3)	88.4	Pass
						Horizontal (T4)	33.8	Pass
						Top Girt (T1)	1.7	Pass
						Bolt Checks	47.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						RATING =	**88.4**	**Pass**

Program Version 7.0.5.1 - 2/1/2016 File:J:/Jobs/1715900.WI/04_CT03XC071 Simsbury/04_Structural/Backup Documentation/ERI Files/100' Self-supporting Lattice Simsbury.eri

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Subject:	FOUNDATION WITH ROCK ANCHORS
Location:	Simsbury, CT
Rev. 0: 6/13/18	Prepared by: T.J.L. Checked by: C.F.C. Job No. 17159.04

Rock Anchor Design:

Input Data:

Max Pier Reactions:

Uplift =	Uplift := 101·kips	*user input*	
Shear =	Shear := 15·kips	*user input*	
Compression =	Axial := 115·kips	*user input*	

Structure:

Footing Width =	$B_{ftg} := 0ft$	*user input*	
Footing Length =	$L_{ftg} := 0ft$	*user input*	
Footing Thickness =	$T_{ftg} := 0ft$	*user input*	
Pier Length/Width Top =	$L_{pier1} := 2.5ft$	*user input*	
Pier Length/Width Bottom =	$L_{pier2} := 4.00ft$	*user input*	
Pier Height =	$T_{pier} := 4ft$	*user input*	
Pier Projection Above Grade =	$P_p := 3.00 \cdot ft$	*user input*	

Depths:

Depth to Bottom of Footing =	$D_{ftg} := 1.00ft$	*user input*	(from grade line)
Depth to Suitable Rock =	$D_{rock} := 1.00ft$	*user input*	(from grade line)
Depth to Suitable Earth =	$D_{earth} := 0ft$	*user input*	(from grade line)
Anchor Length =	$D_{anchor} := 11ft$	*user input*	(from grade line)

Subgrade Properties:

Internal Friction Angle =	$\phi := 35deg$	*user input*
Unit Weight of Earth =	$\gamma_{earth} := 110\frac{lb}{ft^3}$	*user input*
Unit Weight of Rock =	$\gamma_{rock} := 165\frac{lb}{ft^3}$	*user input*
Unit Weight of Conc =	$\gamma_{conc} := 150\frac{lb}{ft^3}$	*user input*
Ultimate Bearing =	Bearing := 24000·psf	*user input*

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Subject: FOUNDATION WITH ROCK ANCHORS

Location: Simsbury, CT

Rev. 0: 6/13/18

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 17159.04

Rock Anchor Properties:

Number of Anchors =	$N_{anchor} := 8$	*user input*	
Hole Diameter =	$hole_d := 2.00in$	*user input*	
Allowable Bond Stress Between Rock and Grout =	$\sigma_{bond} := 175 \cdot psi$	*user input*	Working bond Strength based on Granite Gneiss
Grout Allowable Compressive Stress =	$fc_g := 5000 \cdot psi$	*user input*	
Anchor Spacing* (along length) =	$S_{anchor} := 3ft$	*user input*	
Required Factor of Safety =	$F_S := 1$	*user input*	
Rock Anchor Ultimate Strength =	$Fu_{anchor} := 90ksi$	*user input*	#8 Grade 60 Rebar
Rock Anchor Yield Strength =	$Fy_{anchor} := 60ksi$	*user input*	
Rock Anchor Diameter =	$d_{ra} := 1.000in$	*user input*	
Rock Anchor Area per Group =	$A_g := 0.79in^2$	*user input*	
Rock Anchor Allowable Tension =	$T_{all} := 0.60 \cdot 71.1kips = 42.66 \cdot kips$		Per Recommendation of PTI For Prestressed Rock Anchors and Soil Anchors Section 6.6 Design Load Should not be more than 60% of Specified Minimum Tensile Strength.
Rock Anchor Maximum Working Load to Yield =	$T_y := 0.80 \cdot 71.1kips = 56.88 \cdot kips$		
Rock Anchor Shear Capacity =	$Sh := 0.4 \cdot T_y = 22.75 \cdot kips$		

Calculated Uplift Resistance:

Intermediate Dimension:

Suitable Earth Height = $H := D_{rock} - D_{earth} = 1\,ft$

Suitable Rock Height = $Z := \left(D_{anchor} - D_{rock}\right) = 10\,ft$

Total Anchor Width = $W := S_{anchor} = 3\,ft$

Base Area 1 of Resisting Pyramid = $B_1 := W^2 = 9\,ft^2$

Base Area 2 of Resisting Pyramid = $B_2 := [\tan(\phi)\cdot(Z)\cdot 2 + W]^2 = 289.1\,ft^2$

Base Area 3 of Resisting Pyramid = $B_3 := [\tan(\phi)\cdot(Z + H)\cdot 2 + W]^2 = 338.7\,ft^2$

Total Volume of Concrete = $V_{conc} := \frac{T_{pier}}{3}\cdot\left(L_{pier1}^2 + L_{pier2}^2 + \sqrt{L_{pier1}^2\cdot L_{pier2}^2}\right) = 43\cdot ft^3$

Total Volume of Resisting Material = $V_{tot} := \frac{\left[[H + (Z)]\cdot\left(B_1 + B_3 + \sqrt{B_1\cdot B_3}\right)\right]}{3} = 1477.5\cdot ft^3$

Volume of Rock = $V_{rock} := \frac{\left[(Z)\cdot\left(B_1 + B_2 + \sqrt{B_1\cdot B_2}\right)\right]}{3} = 1163.8\cdot ft^3$

Volume of Earth = $V_{earth} := V_{tot} - V_{rock} - V_{conc} = 270.6\cdot ft^3$

Total Weight of Concrete = $W_{conc} := V_{conc}\cdot\gamma_{conc} = 6.5\cdot kips$

Resisting Rock Force = $W_{rock} := V_{rock}\cdot\gamma_{rock} = 192\cdot kips$

Resisting Earth Force = $W_{earth} := V_{earth}\cdot\gamma_{earth} = 29.8\cdot kips$

Total Resisting Force = $W_{total} := 0.5\cdot W_{rock} + 0.5\cdot W_{earth} + 0.9\cdot W_{conc} = 116.7\cdot kips$

Foundation Uplift Check:

Factor of Safety = $\frac{W_{total}}{Uplift} = 1.16$

$Uplift\_Check := if\left(\frac{W_{total}}{Uplift} \geq F_S, \text{"OK"}, \text{"Overstressed"}\right)$

Uplift_Check = "OK"

Rock Bearing Capacity Check:

Bearing Force = $MaxBearing := \left[\frac{\left(Axial + W_{conc}\right)}{L_{pier2}^2}\right] = 7.591\cdot ksf$

$\frac{MaxBearing}{0.75Bearing} = 0.42$

$Rock\_Bearing\_Check := if\left(\frac{MaxBearing}{0.75Bearing} \leq 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Rock_Bearing_Check = "OK"

Rock Anchor Tension/Shear Check:

Tension Force per Anchor =

$$T_a := \frac{Uplift - W_{conc}}{N_{anchor}} = 11.8 \cdot kips$$

Design Shear Force per Anchor =

$$S_a := \frac{Shear}{N_{anchor}} = 1.9 \cdot kips$$

Reduced Tension For Tension/Shear Combination =

$$T_r := \left[1 - \left(\frac{S_a}{T_{all}}\right)^2\right] \cdot T_{all} = 42.58 \cdot kips$$

Tension Check =

$$TensionCheck := if\left(T_r \geq T_a, "OK", "IncreaseSize"\right) = "OK"$$

Shear Check =

$$ShearCheck := if\left(Sh \geq S_a, "OK", "IncreaseSize"\right) = "OK"$$

Provided Safety Factor =

$$\frac{T_r}{T_a} = 3.60$$

$$SafetyFactor := if\left(\frac{T_r}{T_a} \geq 1.0, "OK", "Overstressed"\right)$$

SafetyFactor = "OK"

Grout Bond Check:

Tension on Rock Anchor =

$$All_{bond} := \pi \cdot hole_d \cdot \sigma_{bond} \cdot \left(D_{anchor} - D_{rock}\right) = 132 \cdot kips$$

$$Bond\_Length\_Check := if\left(\frac{Uplift}{All_{bond} \cdot N_{anchor}} \leq F_S, "OK", "Increase Length"\right)$$

Bond_Length_Check = "OK"

Augment ID: CT03XC071Q17.1

RFDS ID: 111223

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RF Design Sheet

Site Identification	
Cascade	CT03XC071
SMS Schedule ID	12456299
SMS Schedule Name	DO Macro Upgrade
PID	
RRU OEM	ALU
Switch OEM	Alcatel Lucent
RFDS Issue Date	2017-08-15 00:00:00.0
RFDS Revision Date	2018-03-29 14:45:54.0
RFDS Revision	5

Filter Analysis Complete	YES
RFDS - Issue Date	08/15/2017
Design Status	Complete
Project Description	DO Macro Upgrade - Add 2500 MHz. Include MIMO.

Battery Backup Cabinet Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	

Junction Box Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
Junction Boxes needed at site	

BTS #2 Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
Needed at site	

Contact Information	
Engineer Email	Bill.M.Hastings@sprint.com
Sprint Badged RF Engineer	Bill Hastings
RF Engineer Email	Bill.M.Hastings@sprint.com
RF Engineer Phone	978-590-9700
RF Manager	Jonathan Hull
RF Manager Email	Jonathan.B.Hull@Sprint.com
RF Manager Phone	617-233-2920

Carrier Count	
2500 LTE	3
1900 LTE	1
1900 EVDO	
1900 Voice	1
800 LTE	1
800 Voice	1

UE Relay Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
UE Relay Azimuth	
Manufacturer	
UE Relay CL Height (meters)	

ALU Top Hat Model	
Model Number	SPR13MW0264A1
Weight (Lbs.)	110
Dimensions (In.)	10.6 x 29.5 x 20.1
Manufacturer	ALU
Top Hat Quantity	1

Power Protection Cabinet Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
Power Protection Cabinet	

Location Details	
Latitude	41.89244999
Longitude	-72.76953888
Market	Northern Connecticut
Region	Northeast
City	Simsbury
State	CT
Zip Code	CT/06070
County	Hartford

2500MHz	3
1900MHz	3
800MHz	3

GPS Antenna Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
GPS Antenna needed at site	

Repeater Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	

Growth Cabinet Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	

BTS #1 Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
Number of BTS #1	

A&E Drawing Requirements

03/14/2018 (SP): RFDS revised to include MIMO. 02/13/2018 (SP): RFDS revised to change to Dual Antennas due to KMW backorder. 12/13/2017 (WR): RFDS revised to replace NV dual band antenna with KMW 16 port tri-band antenna for 1900 2T4R, 800 2T4R and 2500 8T8R.
12/11/2017 (WR): RFDS revised to Keep Existing NV Antenna for 800/1900 and add 1 800/2500 antenna for LTE2.5 8T8R and enhance 2R for 800 MHz.
11/03/2017 (WR): RFDS revised to replace existing NV dual band antenna with Commscope 10 port tri-band antenna and add diplexers for ground mount 1900/800/2500 RRUs.

Additional RF Notes Special Construction Requirements

03/14/2018 (SP): RFDS revised to include MIMO. 02/13/2018 (SP): RFDS revised to change to Dual Antennas due to KMW backorder. 12/13/2017 (WR): RFDS revised to replace NV dual band antenna with KMW 16 port tri-band antenna for 1900 2T4R, 800 2T4R and 2500 8T8R.
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11/03/2017 (WR): RFDS revised to replace existing NV dual band antenna with Commscope 10 port tri-band antenna and add diplexers for ground mount 1900/800/2500 RRUs.

Band: 2500	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Radio Model						
Model Number	Nokia MIMO Integrated Radio/Antenna	Nokia MIMO Integrated Radio/Antenna	Nokia MIMO Integrated Radio/Antenna	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	Refer to Antenna model for details	Refer to Antenna model for details	Refer to Antenna model for details	N/A	N/A	N/A
Manufacturer	Nokia	Nokia	Nokia	N/A	N/A	N/A
Number of RRUs needed	1	1	1	0	0	0
Filter Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 2						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A		N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 3						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions		N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1						
Model Number	MIMO Upgrade Hybrid Nokia	MIMO Upgrade Hybrid Nokia	N/A	N/A	N/A	N/A
Weight (Lbs.)	2.307	2.307	N/A	N/A	N/A	N/A
Dimensions (In.)	1.689	1.689	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1 Qty						
Power Junction Cylinder Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Power Junction Cylinder Qty	0	0	0	0	0	0
Optical Junction Cylinder Qty needed						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Optical Junction Cylinder Qty needed	0	0	0	0	0	0

Band: 1900	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Radio Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Number of RRUs needed	0	0	0	0	0	0
Filter Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 2						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A		N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 3						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions		N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1 Qty						
Power Junction Cylinder Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Power Junction Cylinder Qty	0	0	0	0	0	0
Optical Junction Cylinder Qty needed						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Optical Junction Cylinder Qty needed	0	0	0	0	0	0

Band: 800	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Radio Model						
Model Number	RRH-2x50-800	RRH-2x50-800	RRH-2x50-800	N/A	N/A	N/A
Weight (lbs)	69.1	69.1	69.1	N/A	N/A	N/A
Dimensions	16 x 13 x 10	16 x 13 x 10	16 x 13 x 10	N/A	N/A	N/A
Manufacturer	ALU	ALU	ALU	N/A	N/A	N/A
Number of RRUs needed	1	1	1	0	0	0
Filter Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 2						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A		N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 3						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions		N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1 Qty						
Power Junction Cylinder Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Power Junction Cylinder Qty	0	0	0	0	0	0
Optical Junction Cylinder Qty needed						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Optical Junction Cylinder Qty needed	0	0	0	0	0	0

Band: 2500	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1						
Model Number	AAHC	AAHC	AAHC			
Weight (lbs)	103.7	103.7	103.7	N/A	N/A	N/A
Dimensions	25.6 x 19.7 x 9.64	25.6 x 19.7 x 9.64	25.6 x 19.7 x 9.64	N/A	N/A	N/A
Manufacturer	Nokia	Nokia	Nokia	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Qtyl	2.5 Jumper 8	2.5 Jumper 8	2.5 Jumper 8	N/A 0	N/A 0	N/A 0
Ant 1 RF requested Diameter	1/2"	1/2"	1/2"	N/A	N/A	N/A
Ant 1 RF requested Top Jumper Length(ft)	8	8	8	N/A	N/A	N/A
Antenna 1 Azimuth	0	120	240	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	75.0000024	75.0000024	75.0000024	N/A	N/A	N/A
Antenna 1 Electrical DT	2	2	2	N/A	N/A	N/A
Antenna 1 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Twist	N/A	N/A	N/A	N/A	N/A	N/A
Antenna2						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant2 Top Jumper Make/Mode/Qtyl	N/A 0	N/A 0	N/A 0	N/A 0	N/A 0	N/A 0
Ant 2 RF Top Jumper Diameter	N/A	N/A	N/A	N/A	N/A	N/A
Ant 2 RF Top Jumper Length(ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Azimuth	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Center Line (ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Twist	N/A	N/A	N/A	N/A	N/A	N/A

RF Design Sheet

Band: 1900	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1						
Model Number	NNVV-65B-R4	NNVV-65B-R4	NNVV-65B-R4			
Weight (lbs)	84.7	84.7	84.7	N/A	N/A	N/A
Dimensions	72 x 19.6 x 7.8	72 x 19.6 x 7.8	72 x 19.6 x 7.8	N/A	N/A	N/A
Manufacturer	CommScope	CommScope	CommScope	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Qtyl	800/1900 Jumper | 4	800/1900 Jumper | 4	800/1900 Jumper | 4	N/A | 0	N/A | 0	N/A | 0
Ant 1 RF requested Diameter	1/2"	1/2"	1/2"	N/A	N/A	N/A
Ant 1 RF requested Top Jumper Length(ft)	8	8	8	N/A	N/A	N/A
Antenna 1 Azimuth	0	120	240	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	75.0000024	75.0000024	75.0000024	N/A	N/A	N/A
Antenna 1 Electrical DT	3	3	3	N/A	N/A	N/A
Antenna 1 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Twist	N/A	N/A	N/A	N/A	N/A	N/A
Antenna2						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	
Ant2 Top Jumper Make/Mode/Qtyl	N/A | 0	N/A | 0	N/A | 0	N/A | 0	N/A | 0	N/A |
Ant 2 RF Top Jumper Diameter	N/A	N/A	N/A	N/A	N/A	N/A
Ant 2 RF Top Jumper Length(ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Azimuth	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Center Line (ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Twist	N/A	N/A	N/A	N/A	N/A	N/A

Band: 800	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1						
Model Number	Antenna assigned on a different band	Antenna assigned on a different band	Antenna assigned on a different band			
Weight (lbs)	0	0	0	N/A	N/A	N/A
Dimensions	0 x 0 x 0	0 x 0 x 0	0 x 0 x 0	N/A	N/A	N/A
Manufacturer	-	-	-	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Qtyl	800/1900 Jumper 2	800/1900 Jumper 2	800/1900 Jumper 2	N/A 0	N/A 0	N/A 0
Ant 1 RF requested Diameter	1/2"	1/2"	1/2"	N/A	N/A	N/A
Ant 1 RF requested Top Jumper Length(ft)	8	8	8	N/A	N/A	N/A
Antenna 1 Azimuth	0	120	240	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	75.0000024	75.0000024	75.0000024	N/A	N/A	N/A
Antenna 1 Electrical DT	5	5	5	N/A	N/A	N/A
Antenna 1 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Twist	N/A	N/A	N/A	N/A	N/A	N/A
Antenna2						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	
Ant2 Top Jumper Make/Mode/Qtyl	N/A 0	N/A 0	N/A 0	N/A 0	N/A 0	N/A
Ant 2 RF Top Jumper Diameter	N/A	N/A	N/A	N/A	N/A	N/A
Ant 2 RF Top Jumper Length(ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Azimuth	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Center Line (ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Twist	N/A	N/A	N/A	N/A	N/A	N/A

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RF Design Sheet

Band: 2500	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant1 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 band combined with	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Upper Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Upper Pass Comp band combi with						
Antenna 1 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Low Pass Comp band comb with						
Position Ant 1						
Antenna2 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant2 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 band combined with						
Antenna 2 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant2 Upper Passive Comp Qty needed	0	0	0	0	0	0
Antenna 2 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Lower Passive Component band combined with						
Position Ant 2						

SprintVision

RF Design Sheet

Band: 1900	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant1 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 band combined with	800MHz	800MHz	800MHz	N/A	N/A	N/A
Antenna 1 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Upper Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Upper Pass Comp band combi with						
Antenna 1 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Low Pass Comp band comb with						
Position Ant 1						
Antenna2 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant2 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 band combined with						
Antenna 2 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant2 Upper Passive Comp Qty needed	0	0	0	0	0	0
Antenna 2 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Lower Passive Component band combined with						
Position Ant 2						

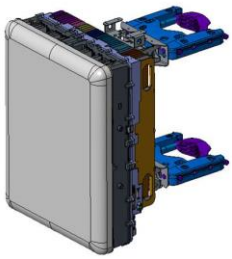
SprintVision

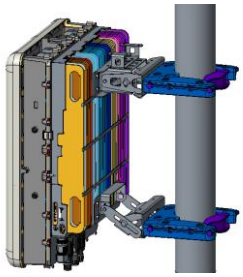
RF Design Sheet

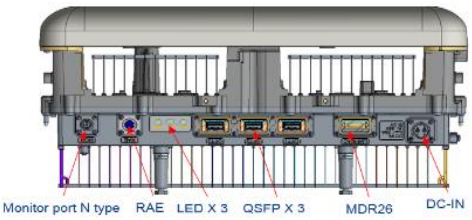
Band: 800	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant1 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 band combined with	1900MHz	1900MHz	1900MHz	N/A	N/A	N/A
Antenna 1 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Upper Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Upper Pass Comp band combi with						
Antenna 1 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Low Pass Comp band comb with						
Position Ant 1						
Antenna2 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant2 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 band combined with						
Antenna 2 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant2 Upper Passive Comp Qty needed	0	0	0	0	0	0
Antenna 2 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Lower Passive Component band combined with						
Position Ant 2						

Nokia Networks
6000 Connection Drive, Irvine, TX 75039, (972) 374 3000

TD LTE 2.5G Massive MIMO Adaptive Antenna (MAA) – AAHC







Category	Description	Unit	AAHC
Spectrum	3GPP Band		B41
	Operating frequency	MHz	2496-2690
RF characteristic	Number of TX/RX paths	#	64T64R
	Instantaneous Bandwidth IBW	MHz	194
	Occupied Bandwidth OBW	MHz	60
	Total Output power	W	120
	EIRP	dBm	74.8
	TX OBUE in B41 for sum of all 64 pipes at 1MHz offset	dBm/MHz	-13 sum of all ports
	Emission at IPWireless 2558-2568MHz	dBm/MHz	-57 sum of all ports
	Emission at NEXTRADAR at 2704-3000MHz	dBm/MHz	-27 sum of all ports
Power	Power inputs		2 pin, and with APPB/APPC
	Supply Voltage / Voltage Range	V	-48V DC voltage (-40.5V~-57V)
	Typical Power Consumption	W	75% duty cycle, 1400W for LTE
Interface	Optical Interface		3x QSFP (4 x 9.8G CPRI each)
	RAE Interface		Circle connector, AISG-ES-RAE v2.1.0
	LMI interface		MDR26
	Monitor interface		N_Female
Antenna Specifications	Antenna array		8x8x2
	Element Polarization	H/V or ± 45	± 45
	Gain [Broadcast 65 HBW]	dBi	15.2
	Horizontal BW [Broadcast] (@ -3dB)	Degrees	65
	Vertical BW [Broadcast] (@ -3dB)	Degrees	9
	Mechanical Downtilt Range	Degrees	± 5
	Electrical Downtilt Range	Degrees	± 10
	Cross Polar Isolation [Element]	dB	19
	Front-to-Back Ratio [Broadcast] (@ 180° ±15° cone)	dB	25
	Element Spacing	λ (mm)	horizontal 57.5, Vertical 80
	Upper Side Lobe Suppression (1st USLS) [Broadcast]	dB	16
	Cross Polar Discrimination [Broadcast] (@ -3dB)	dB	10
	Traffic (Service) Beam Azmithual Pan	Degrees	± 55
	Traffic (Service) Beam Elevational Tilt	Degrees	± 10
	Azimuth Beamwidth Squint (@ Boresight)	Degrees	configurable
	Broadcast Tracking @ ±60°	dBi	2
	Dimensions (LxWxD)	mm (in)	651x501x245 mm (25.6x19.7x9.6 in)
Mechanical Specifications	Weight	kg (lb)	47Kg (103.6lb)
	Max Wind Speed	kmh/mph	200kmh (125 mph)
	Wind Load Front/Side/Rear @ 150kmh	N(lbF)	349 /168/130 N (78.5 / 37.8 /29.2 lbF)
	Radom Material		PC
	Radom Color		Cold Gray
	Mounting Kit	mm (in)	FPKA/FPKB/FPKC
	Operational Temperature Range	C(F)	-40 ~ 55© -40 ~ 131(F)
	Ingress protection class		IP65
	Installation options		Pole, Wall
	Surge protection	kA	20

Product Specifications

NNVV-65B-R4

8-port sector antenna, 4x 698–896 and 4x 1695–2690 MHz, 65° HPBW, 4x RET

- Uses the 4.3-10 connector which is 40 percent smaller than the 7-16 DIN connector
- Supports re-configurable antenna sharing capability enabling control of the internal RET system using up to two separate RET compatible OEM radios
- All internal RET actuators are connected in "Cascaded MRET" configuration

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2500	2500–2690
Gain, dBi	14.5	14.9	16.8	17.2	17.5	18.1	17.8
Beamwidth, Horizontal, degrees	66	64	60	60	62	59	64
Beamwidth, Vertical, degrees	11.7	10.4	7.3	6.8	6.4	5.4	5.1
Beam Tilt, degrees	2–14	2–14	2–12	2–12	2–12	2–12	2–12
USLS (First Lobe), dB	16	18	14	16	15	16	18
Front-to-Back Ratio at 180°, dB	31	34	38	38	37	33	30
Isolation, dB	25	25	25	25	25	25	25
Isolation, Intersystem, dB	25	25	25	25	25	25	25
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150	-150	-150	-150	-150
Input Power per Port at 50°C, maximum, watts	300	300	250	250	250	200	200
Polarization	±45°	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2500	2500–2690
Gain by all Beam Tilts, average, dBi	14.1	14.6	16.5	16.9	17.0	17.6	17.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.5	±0.7	±0.4	±0.5	±0.6	±0.7
Gain by Beam Tilt, average, dBi	2 ° | 14.2	2 ° | 14.7	2 ° | 16.6	2 ° | 16.8	2 ° | 16.9	2 ° | 17.5	2 ° | 16.9
	8 ° | 14.2	8 ° | 14.7	7 ° | 16.7	7 ° | 17.1	7 ° | 17.2	7 ° | 17.9	7 ° | 17.5
	14 ° | 13.9	14 ° | 14.2	12 ° | 16.2	12 ° | 16.7	12 ° | 16.7	12 ° | 17.3	12 ° | 17.0
Beamwidth, Horizontal Tolerance, degrees	±3.9	±3.9	±5.7	±2.7	±3.1	±7.9	±8
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.8	±0.7	±0.5	±0.6	±0.4	±0.2
USLS, beampeak to 20° above beampeak, dB	16	18	14	15	14	14	14
Front-to-Back Total Power at 180° ± 30°, dB	20	20	31	31	28	28	26
CPR at Boresight, dB	21	20	18	18	19	19	20
CPR at Sector, dB	8	6	8	8	7	8	5

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

Product Specifications

NNVV-65B-R4

RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	685.0 N @ 150 km/h 154.0 lbf @ 150 km/h
Wind Loading, lateral	232.0 N @ 150 km/h 52.2 lbf @ 150 km/h
Wind Loading, maximum	889.0 N @ 150 km/h 199.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	498.0 mm | 19.6 in
Depth	197.0 mm | 7.8 in
Net Weight, without mounting kit	35.1 kg | 77.4 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (2) | Low band (2)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	8 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

Packed Dimensions

Length	2010.0 mm | 79.1 in
Width	608.0 mm | 23.9 in
Depth	352.0 mm | 13.9 in
Shipping Weight	49.0 kg | 108.0 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
   Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages. Hand the package to any UPS driver in your area.

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MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY ,NJ 07446

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH ,NJ 07430

UPS Access Point™
THE UPS STORE
120 E MAIN ST
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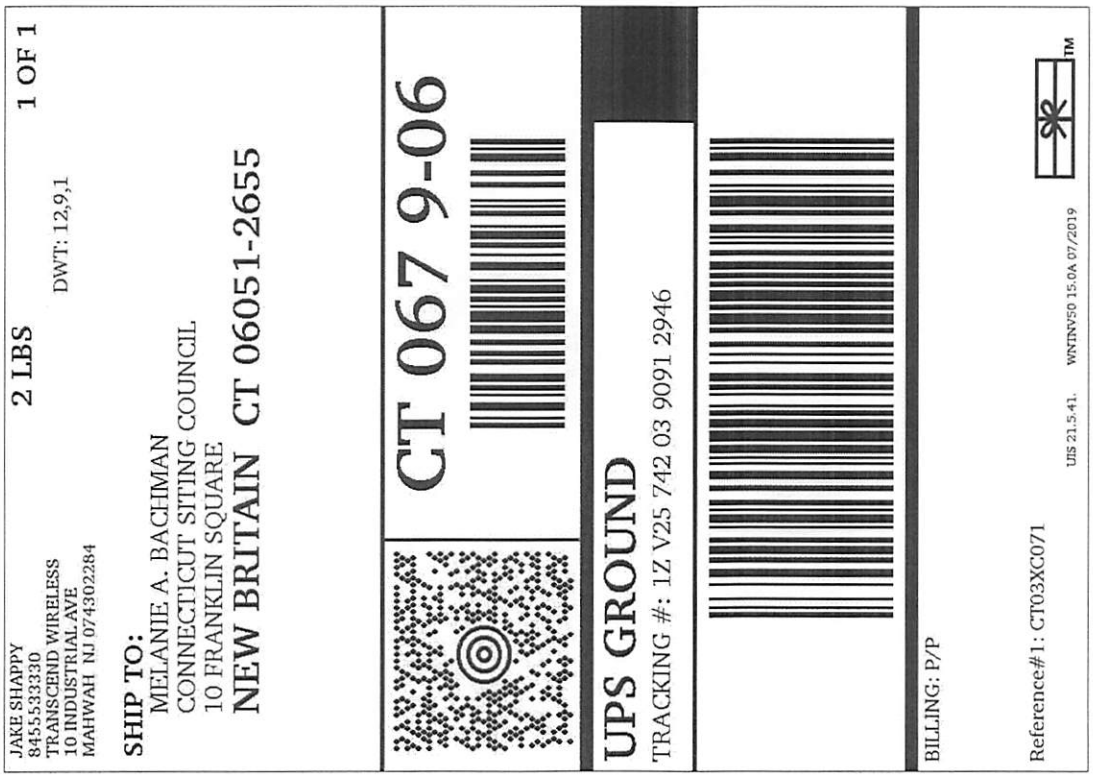

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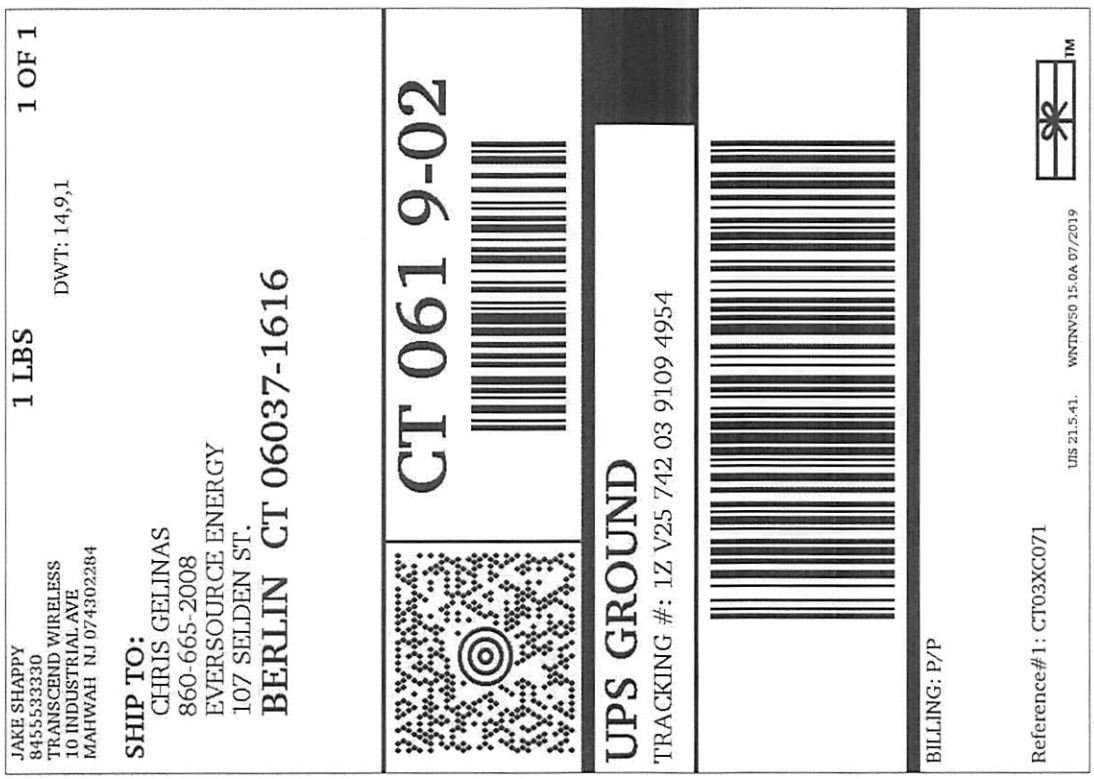

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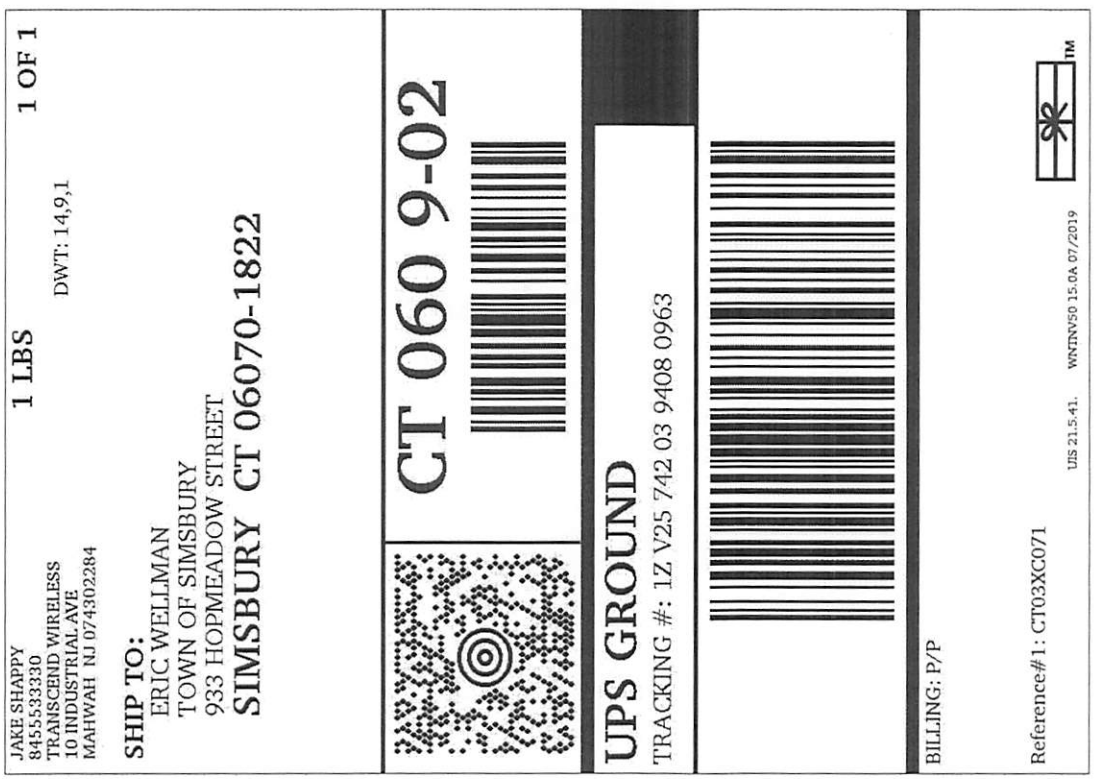

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