Transcend Wireless

10 Industrial Avenue,
Suite 3
Mahwah, NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

August 14, 2020

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

Notice of Exempt Modification
525 Orange Center Rd, Orange, CT
Latitude: 41.273611111
Longitude: -73.0188361111
T-Mobile Site#: CT11412A – Anchor

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 123-foot level of the existing 160-foot monopole tower at 525 Orange Center Road in Orange, CT. The 160 Monopole tower and underlying property is owned by the Town of Orange. T-Mobile now intends to replace three (3) of its existing antennas with three (3) new 2500 MHz antennas. The new antennas would be installed at the 123-foot level of the tower.

Planned Modifications:

Remove:
(1) 9x18 fiber cable

Remove and Replace:
Antennas:(3) Ericsson AIR21 B2A/B4P (Remove) – (3) Ericsson Air 6449 / 2500 MHz

Install New:
(3) Ericsson 4415 RRUs
(3) Commscope SDX1926Q-43 diplexers
(1) 6x12 fiber cable

Existing to Remain:
(3) Ericsson AIR32 - 1900 MHz / 2100 MHz
(3) RFS APXVAARR24_43 - 600 MHz / 700MHz / 1900 MHz / 2100 MHz
(3) Ericsson 4449 B71 B12 RRUs
(3) TMAs
(6) 1-5/8" coax (inside of the existing tower)

Ground:
Install (1) Battery cabinet B160 and (1) enclosure 6160 with BB6630, BB6648 and router and (1) PPC cabinet on proposed concrete pad

This facility was approved by Docket 0177A by the Siting Council August 6, 1997, with no record of conditions that would restrict exempt modifications. Therefore, this modification complies with the aforementioned approval.

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 Zeoli as the town official, and the tower and property 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.

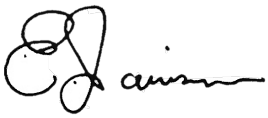
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

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, T-Mobile 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,



Elizabeth Jamieson
Transcend Wireless
10 Industrial Ave., Suite 3
Mahwah, New Jersey 07430
860-605-7808
EJamieson@TranscendWireless.com

cc:
James Zeoli, Orange - First Selectman, Property and Tower Owner
Jack Demirjian, Zoning Administrator & Enforcement Officer

Exhibit A

Original Facility Approval

Filing Guides
Meetings & Minutes
Public Participation
Audio Link to New Britain Hearing Rooms
Programs & Services
Telecommunications Database
Publications
Other Resources
Statutes & Regulations
Electric Transmission Upgrade Projects
Frequently Asked Questions

Melanie Bachman,
Executive Director

NOTICE TO USERS

DOCKET NO. 177A - An amended application of Cellco Partnership d/b/a Bell Atlantic NYNEX Mobile for a Certificate of Environmental Compatibility and Public Need for a two cell-site configuration in the Town of Orange. The proposed Prime A site would be located approximately 875 feet east of Orange Center Road at the rear of the High Plains Community Center, 525 Orange Center Road, with the Prime B site located approximately 400 feet northwest from the end of Ogg Meadow Road. These sites would replace the previously proposed Camp Cedarcrest site. A proposed alternate site is located within a 5.5 acre parcel of property approximately 250 feet south and west of Robert Treat Drive Extension, Orange, Connecticut.

ConnecticutSitingCouncil

August 6, 1997

Decision and Order

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a two-cell site configuration consisting of a prime A site at the High Plains Community Center property on Orange Center Road and a prime B site on South Central Regional Water Authority (SCRWA) property located off the end of Ogg Meadow Road in Orange, Connecticut, including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes § 16-50k, be issued to Cellco Partnership d/b/a Bell Atlantic NYNEX Mobile (BANM) for the construction, operation, and maintenance of two cellular telecommunications towers and associated equipment. We deny the alternate site on Robert Treat Drive Extension.

The facilities shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The towers shall be constructed as proposed, no taller than necessary to provide the proposed communications service, sufficient to accommodate the antennas of BANM, Springwich Cellular Limited Partnership (Springwich), Smart SMR of New York, Inc. d/b/a Nextel Communications (Nextel), and Sprint Spectrum L.P. d/b/a Sprint PCS (Sprint). Neither tower, excluding antennas, shall exceed 160 feet above ground level.

2. The Certificate Holder shall prepare Development and Management (D&M) Plans for the prime A amd prime B sites in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plans shall be submitted to and approved by the Council prior to the commencement of facility construction. The prime A D&M plan shall include a tower and foundation plan, signed by a professionally licensed engineer, designed to be safe and adequate to protect the electric supply system, and provisions for landscaping, architectural treatment, and traffic management consistent with terms established with the Town. The prime B D&M plan shall include relocation of the prime B tower within the leased parcel to prevent the fall zone of the tower from crossing paved sections of the Route 15 right-of-way; a tower and foundation plan, signed by a professionally licensed engineer; plans for dewatering the site if necessary; installation of a propane tank to fuel the emergency generator; placement of a counter-sunk and sealed concrete floor for the equipment building; traffic management with schedule to construct during daytime hours; and best management practices for on-site use of construction equipment. In addition, we will require landscaping and the establishment of vegetation to stabilize the site consistent with watershed management plans. Both site plans shall provide specifications for the placement of all antennas to be attached to the towers, and plans for the equipment buildings, foundation pads for Sprint's equipment, security fencing and gate, access roads, utility lines, site clearing, tree trimming, and erosion and sedimentation control consistent with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended.

3. Consistent with Section 16-50j-77 of the Regulations of Connecticut State Agencies, the Certificate Holder shall provide the Council notification of:

a. commencement of construction;
b. completion of construction;
c. completion of site rehabilitation;
d. commencement of operation;
e. transfer of ownership of the prime A tower to the Town of Orange; and
f. final construction cost.

4. Upon the establishment of any new State or federal radio frequency power density standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.

5. The Certificate Holder shall provide the Council a recalculated report of electromagnetic radio frequency power density if and when circumstances in operation cause a change in power density above the levels originally calculated and provided in the application.

6. The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

7. If the facility does not initially provide, or permanently ceases to provide telecommunications services following completion of construction, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapplication for any continued or new use shall be made to the Council before any such use is made.

8. Unless otherwise approved by the Council, this Decision and Order shall be void if all construction authorized herein is not completed within three years of the effective date of this Decision and Order or within three years after all appeals to this Decision and Order have been resolved.

Pursuant to General Statutes § 16-50p, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in the New Haven Register.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors to this proceeding are:

APPLICANT Cellco Partnership d/b/a	**ITS REPRESENTATIVE** Kenneth C. Baldwin, Esq. Brian C. S. Freeman, Esq. Bell Atlantic NYNEX Mobile Robinson & Cole One Commercial Plaza Hartford, CT 06103-3597 Mr. David S. Malko, P.E. Jennifer Young Gaudet, Mgr. - Regulatory Bell Atlantic NYNEX Mobile 20 Alexander Drive Wallingford, CT 06492
PARTY Residents of Robert Treat Extension, Elvera Spinaci Ross Court, and Mapledale Road 829 Robert Treat Extension Orange, CT 06477	-
INTERVENOR Eugene Burshuliak 864 Mapledale Road Orange, CT 06477	-
INTERVENOR Springwich Cellular Limited Partnership	**ITS REPRESENTATIVE** Peter J. Tyrrell, Esq. Springwich Cellular Limited Partnership 500 Enterprise Drive Rocky Hill, CT 06067-3900
PARTY Town of Orange	**ITS REPRESENTATIVE** Francis A. Teodosio, Esq. Orange Town Hall 617 Orange Center Road Orange, CT 06477
INTERVENOR Smart SMR of New York, Inc.	**ITS REPRESENTATIVE** Christopher B. Fisher, Esq. d/b/a Nextel Communications Cuddy, Feder & Worby 90 Maple Avenue White Plains, NY 10601-5196
PARTY John Rechi 805 Grassy Hill Road Orange, CT 06477	-
PARTY Erwin H. Levine 875 Robert Treat Extension	-

Orange, CT 06477

PARTY
Jeffery Friedrichs
248 Ross Court
Orange, CT 06477

PARTY
Orange Land Trust, Inc.

ITS REPRESENTATIVE
Edmund B. Tucker, President
Orange Land Trust, Inc.
433 Pudden Lane
Orange, CT 06477

INTERVENOR
Sprint Spectrum L.P.

ITS REPRESENTATIVE
Elias A. Alexiades, Esq.
d/b/a Sprint PCS Andrew C. Kruger, Esq.
Harris, Beach & Wilcox, LLP
147 North Broad Street
Milford, CT 06460

PARTY
Jay Nastri
820 Ogg Meadow Road
Orange, CT 06477

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Exhibit B

Property card

525 ORANGE CENTER RD

Location	525 ORANGE CENTER RD	**Mblu**	41/ 5/ 16/ /
Acct#	360800	**Owner**	ORANGE TOWN OF
Assessment	$6,500,400	**Appraisal**	$9,286,100
PID	2185	**Building Count**	2

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$4,606,100	$4,680,000	$9,286,100
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$3,224,400	$3,276,000	$6,500,400

Owner of Record

Owner	ORANGE TOWN OF	**Sale Price**	$0
Co-Owner	HIGH PLAINS CENTER	**Certificate**	
Address	617 ORANGE CENTER RD ORANGE, CT 06477	**Book & Page**	284/1100
		Sale Date	06/29/1983
		Instrument	00

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
ORANGE TOWN OF	$0		284/1100	00	06/29/1983

Building Information

Building 1 : Section 1

Year Built: 1955
Living Area: 40,546
Replacement Cost Less Depreciation: $3,530,000

Building Attributes	
Field	**Description**
STYLE	School
MODEL	Comm/Ind
Stories	1
Occupancy	1
Exterior Wall 1	Brick/Masonry
Exterior Wall 2	
Roof Structure	Flat Stl Truss
Roof Cover	BU Comp
Interior Wall 1	Paint
Interior Wall 2	
Interior Floor 1	Vinyl

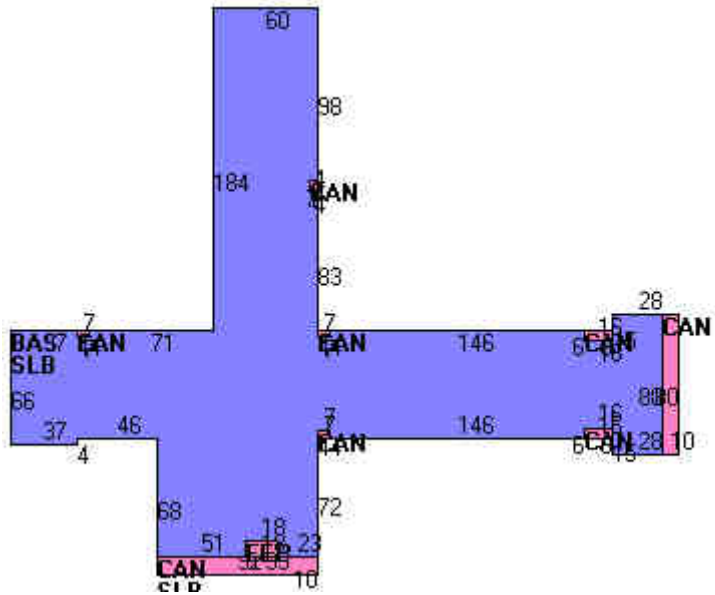
Building Photo

41-5-16 03/06/2017

(http://images.vgsi.com/photos/OrangeCTPhotos//\00\01\37/87.

Interior Floor 2	Ceramic Tile
Heating Fuel	Gas
HVAC	Hot Water
Ceilings	Susp Accous
Partitions	Typical
Bldg Use	Exempt Comm
Full Baths	0
Half Baths	0
Total Fixtures	70
% Sprinkler	0
Elevator	0
1st Floor Use	
Basement	Slab
Foundation	Concrete
Park Spaces	150
Frame Type	Fire Resistant
Footprint	
Wall Height	10
Bldg Adj	2.5

Building Layout



(http://images.vgsi.com/photos/OrangeCTPhotos//Sketches/218

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	40,546	40,546
CAN	Canopy	2,024	0
FEP	Finished Enclosed Porch	162	0
SLB	Slab	41,466	0
		84,198	40,546

Building 2 : Section 1

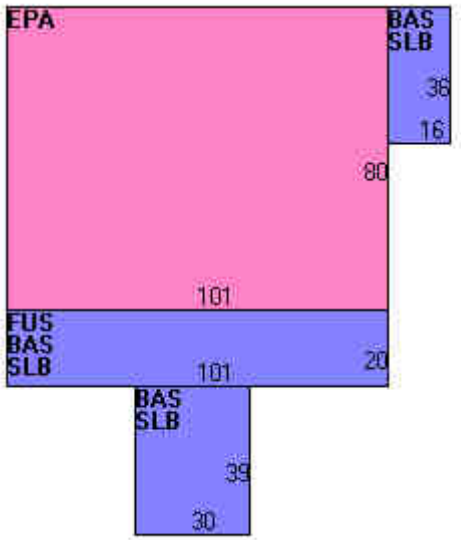
Year Built:	1975
Living Area:	5,786
Replacement Cost Less Depreciation:	$576,800

Building Attributes : Bldg 2 of 2	
Field	**Description**
STYLE	Gym/Auditorium
MODEL	Comm/Ind
Stories	1
Occupancy	2
Exterior Wall 1	Wood Frame
Exterior Wall 2	
Roof Structure	Arch -Wd Fr
Roof Cover	BU Comp
Interior Wall 1	Paint
Interior Wall 2	Glass
Interior Floor 1	Concrete
Interior Floor 2	Ceramic Tile
Heating Fuel	Gas
HVAC	Force Air Unit
Ceilings	Drywall
Partitions	Typical
Bldg Use	Exempt Comm
Full Baths	0
Half Baths	0
Total Fixtures	20
% Sprinkler	0
Elevator	0
1st Floor Use	

Building Photo

(http://images.vgsi.com/photos/OrangeCTPhotos//\00\00\83/07.

Building Layout



(http://images.vgsi.com/photos/OrangeCTPhotos//Sketches/218

Building Sub-Areas (sq ft)	Legend

Basement	N/A
Foundation	Concrete
Park Spaces	0
Frame Type	Wood Frame
Footprint	
Wall Height	25
Bldg Adj	1

Code	Description	Gross Area	Living Area
BAS	First Floor	3,766	3,766
FUS	Finished Upper Story	2,020	2,020
EPA	Encl Pool Area	8,080	0
SLB	Slab	3,766	0
		17,632	5,786

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	201E
Description	Exempt Comm
Zone	RES
Neighborhood	C20
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	28
Frontage	
Depth	
Assessed Value	$3,276,000
Appraised Value	$4,680,000

Outbuildings

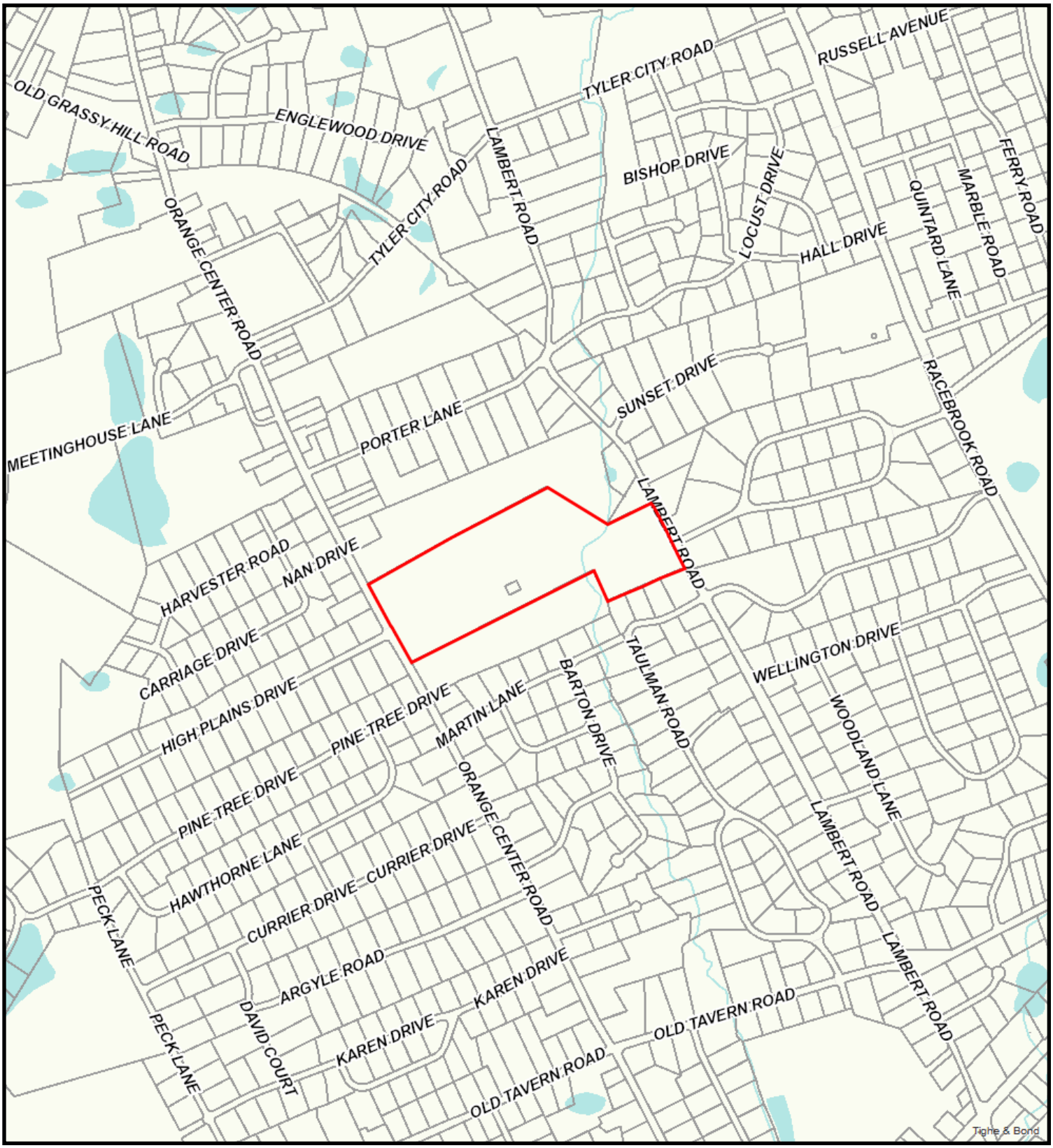
Outbuildings	Legend

Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
FGR1	Garage			4410 UNITS	$55,100	1
FN4	8' Chain Link			400 L.F.	$1,600	2
FOP	Open sided Porch			140 UNITS	$1,300	1
PAV1	Concrete Paving			85000 UNITS	$63,800	2
FGR1	Garage			5670 UNITS	$70,900	1
PAVC	Paving - Concrete			4000 UNITS	$6,000	2
LT1	Lights			4 UNITS	$2,500	2
GAZ	Gazebo			1500 UNITS	$32,400	1
FGR1	Garage			480 UNITS	$1,900	1
SHD7	Cell Shed			240 UNITS	$13,500	1
CNP	Canopy			1236 UNITS	$13,000	1
TEN	Tennis Court			2 UNITS	$15,000	1
FGR1	Garage			4410 UNITS	$82,700	1
BTH1	Pool House with Plumbing			1040 UNITS	$62,400	1
FOP	Open sided Porch			4392 UNITS	$71,200	1
SHD0	Shed - Metal Utility			480 UNITS	$2,200	1
FN1	4' Chain Link			1500 L.F.	$3,800	1

Valuation History

Appraisal			
Valuation Year	Improvements	Land	Total
2017	$4,606,100	$4,680,000	$9,286,100
2016	$4,606,100	$5,506,500	$10,112,600
2015	$4,606,100	$5,506,500	$10,112,600

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$3,224,400	$3,276,000	$6,500,400
2016	$3,224,400	$3,854,600	$7,079,000
2015	$3,224,400	$3,854,600	$7,079,000



525 Orange Center Road

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Scale: 1"=1000'

Scale is approximate

The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analyses.

Exhibit C

Construction Drawings

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

ORANGE/TOWN HIGH PLAINS
SITE ID: CT11412A
525 ORANGE CENTER RD
ORANGE, CT 06477

T-MOBILE RF CONFIGURATION

67D5997DB_2xAIR+1OP

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." 2017 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 CONSTRUCTON, 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 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 MANUFACTURER'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 T-MOBILE 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 CONDUITS 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 THE OWNER'S 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

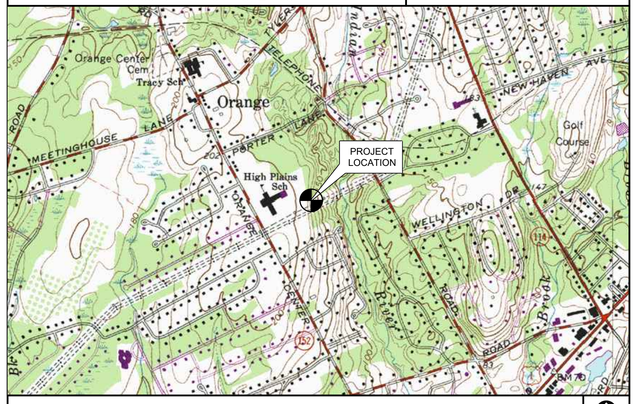
FROM: 35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

TO: 525 ORANGE CENTER RD
ORANGE, CT 06477

1.	.GET ON I-91 S IN WINDSOR	4.3 MI
2.	HEAD NORTH ON GRIFFIN RD S TOWARD DAY HILL RD	0.3 MI
3.	TURN RIGHT ONTO DAY HILL RD	3.6 MI
4.	USE THE RIGHT LANE TO MERGE ONTO I-91 S VIA THE RAMP TO HARTFORD	0.4 MI
5.	MERGE ONTO I-91 S	7.3 MI
6.	CONTINUE STRAIGHT TO STAY ON I-91 S	18.7 MI
7.	TAKE EXIT 17 TO MERGE ONTO CT-15 S/WILBUR CROSS PKWY	22.0 MI
8.	TAKE EXIT 57 TO MERGE ONTO CT-34 E/DERBY AVE/DERBY TURNPIKE TOWARD ORANGE	0.2 MI
9.	TAKE MAPLEDALE RD TO ORANGE CENTER RD	2.5 MI
10.	525 ORANGE CENTER RD ORANGE, CT 06477	

SITE COORDINATES: LATITUDE: 41°-16'-25.19" N
LONGITUDE: 73°-01'-7.71" W
GROUND ELEVATION: 181'± AMSL

COORDINATES AND GROUND ELEVATION ARE REFERENCED FROM GOOGLE EARTH



VICINITY MAP — NORTH

PROJECT SUMMARY

THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:

1. INSTALL (1) POWER ENCLOSURE 6160 AND (1) BATTERY CABINET B160 ON TOP OF PROPOSED 7'-0" x 4'-0" CONCRETE PAD
2. INSTALL (1) iXRe ROUTER
3. INSTALL (1) BB6630
4. INSTALL (1) BB6648
5. INSTALL (1) DIPLEXER PER SECTOR. TOTAL OF (3)
6. INSTALL (1) RADIO 4415 B25 PER SECTOR. TOTAL OF (3)
7. INSTALL (2) RRH DUAL SWIVEL MOUNTS PER SECTOR. TOTAL OF (6)
8. INSTALL (1) AIR6449 B41 ANTENNA PER SECTOR. TOTAL OF (3)
9. INSTALL (1) 200A PPC CABINET
10. REMOVE (1) AIR 21 ANTENNA PER SECTOR. TOTAL OF (3)
11. INSTALL (1) 6x12 HYBRID CABLE
12. REMOVE (1) 9x18 HYBRID CABLE

PROJECT INFORMATION

SITE NAME:	ORANGE/TOWN HIGH PLAINS
SITE ID:	CT11412A
SITE ADDRESS:	525 ORANGE CENTER RD, ORANGE CT 06477
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	DAN REID (PROJECT MANAGER) TRANSCEND WIRELESS, LLC (203) 592-8291
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405 CARLO F. CENTORE, PE (203) 488-0580 EXT. 122
PROJECT COORDINATES:	LATITUDE: 41°-16'-25.19" N LONGITUDE: 73°-01'-7.71" W GROUND ELEVATION: 181'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

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REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	08/07/20	ANC	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

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T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
ORANGE/TOWN HIGH PLAINS
SITE ID: CT11412A
525 ORANGE CENTER RD
ORANGE CT 06477

DATE: 07/06/20
SCALE: AS NOTED
JOB NO. 20074.54

TITLE SHEET

T-1

Sheet No. 1 of 9

NOTES AND SPECIFICATIONS

DESIGN BASIS:

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

1. DESIGN CRITERIA:

- RISK CATEGORY III (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 97 MPH (Vasd) (EXPOSURE C/ IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10).

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
4. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
5. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

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." 2017 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 IT'S 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 SITE OWNER'S 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 "DIG SAFE" (DIAL 811) AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNER'S ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.
20. THE COUNTY/CITY/TOWN WILL MAKE PERIODIC FIELD OBSERVATION AND INSPECTIONS TO MONITOR THE INSTALLATION, MATERIALS, WORKMANSHIP AND EQUIPMENT INCORPORATED INTO THE PROJECT TO ENSURE COMPLIANCE WITH THE DESIGN PLANS, SPECIFICATIONS, CONTRACT DOCUMENTS AND APPROVED SHOP DRAWINGS.
21. THE COUNTY/CITY/TOWN MUST BE NOTIFIED (2) WORKING DAYS PRIOR TO CONCEALMENT/BURIAL OF ANY SYSTEM OR MATERIAL THAT WILL PREVENT THE DIRECT INSPECTION OF MATERIALS, METHODS OR WORKMANSHIP. EXAMPLES OF THESE PROCESSES ARE BACKFILLING A GROUND RING OR TOWER FOUNDATION, POURING TOWER FOUNDATIONS, BURYING GROUND RODS, PLATES OR GRIDS, ETC. THE CONTRACTOR MAY PROCEED WITH THE SCHEDULED PROCESS (2) WORKING DAYS AFTER PROVIDING NOTICE UNLESS NOTIFIED OTHERWISE BY THE COUNTY/CITY/TOWN.

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.

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WIRELESS COMMUNICATIONS FACILITY

ORANGE/TOWN HIGH PLAINS
SITE ID: CT11412A
525 ORANGE CENTER RD
ORANGE CT 06477

DATE: 07/06/20
SCALE: AS NOTED
JOB NO. 20074.54

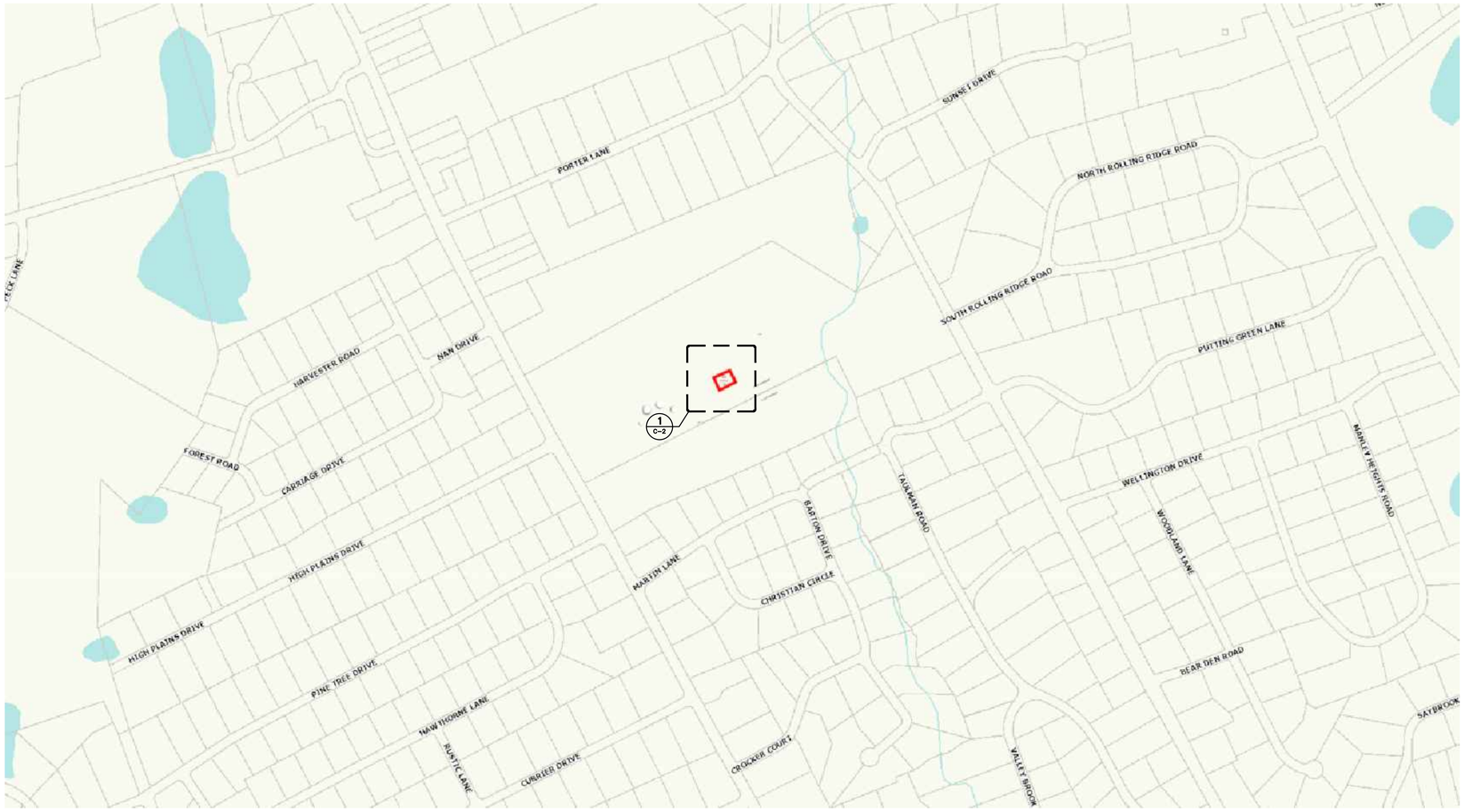
GENERAL NOTES AND SPECIFICATIONS

N-1

NOTE:
ALL COAX LENGTHS TO BE MEASURED
AND VERIFIED IN FIELD BEFORE ORDERING

ANTENNA SCHEDULE

SECTOR	EXISTING/PROPOSED	ANTENNA	SIZE (INCHES) (L x W x D)	ANTENNA ℄ HEIGHT	AZIMUTH	(E/P) RRU (QTY)	(E/P) TMA/DIPLEXER (QTY)	(QTY) PROPOSED COAX (LENGTH)
A1	EXISTING	ERICCSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.9 x 8.7	123'	80°			(1) 6x12 HYBRID CABLE (±175')
A2	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	123'	80°			
A3	EXISTING	RFS (APXVAARR24_43-U_NA20)	95.9 x 24 x 8.7	123'	80°	(E) RADIO 4449 B71 (1), (P) RADIO 4415 B25 (1)	(E) GENERIC TWIN STYLE 1B (1), (P) COMMSCOPE SDX1926Q-43 (1)	
B1	EXISTING	ERICCSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.9 x 8.7	123'	200°			
B2	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	123'	200°			
B3	EXISTING	RFS (APXVAARR24_43-U_NA20)	95.9 x 24 x 8.7	123'	200°	(E) RADIO 4449 B71 (1), (P) RADIO 4415 B25 (1)	(E) GENERIC TWIN STYLE 1B (1), (P) COMMSCOPE SDX1926Q-43 (1)	
C1	EXISTING	ERICCSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.9 x 8.7	123'	320°			
C2	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	123'	320°			
C3	EXISTING	RFS (APXVAARR24_43-U_NA20)	95.9 x 24 x 8.7	123'	320°	(E) RADIO 4449 B71 (1), (P) RADIO 4415 B25 (1)	(E) GENERIC TWIN STYLE 1B (1), (P) COMMSCOPE SDX1926Q-43 (1)	



1 C-1 SITE LOCATION PLAN
SCALE: NOT TO SCALE

TRUE NORTH

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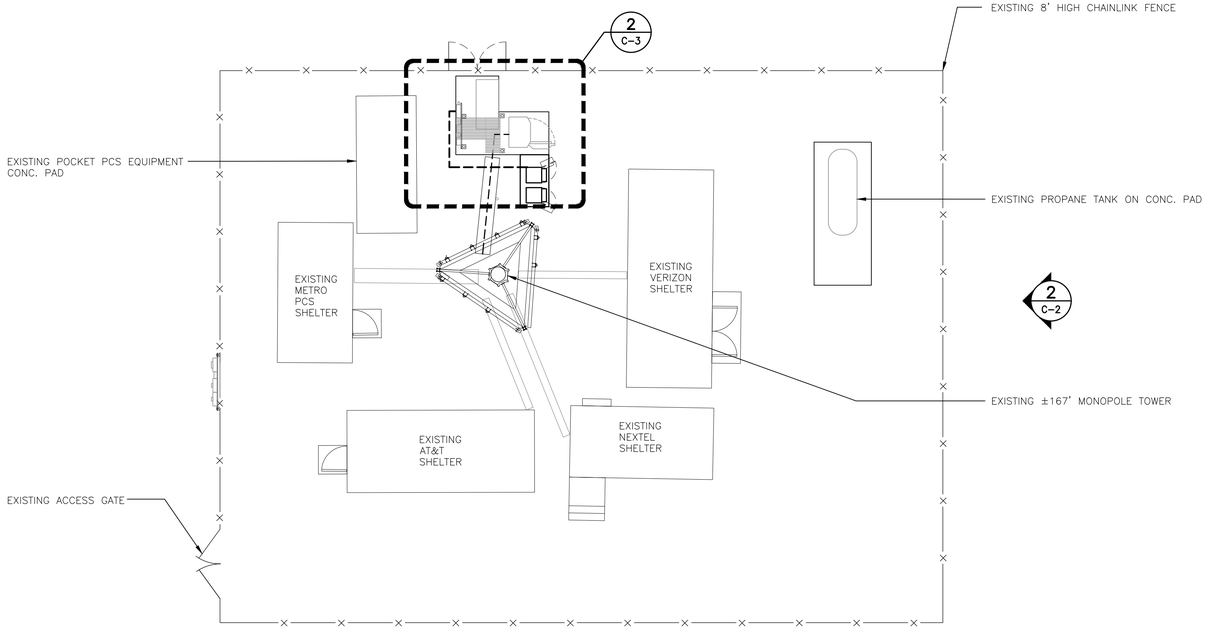
SITE LOCATION PLAN

C-1

Sheet No. 3 of 9



1 C-2 **COMPOUND PLAN**
SCALE: 1" = 10'

TRUE NORTH

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.

STRUCTURAL COMPLIANCE

ANTENNA MOUNTS

A STRUCTURAL ANALYSIS OF THE ANTENNA MOUNTS WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

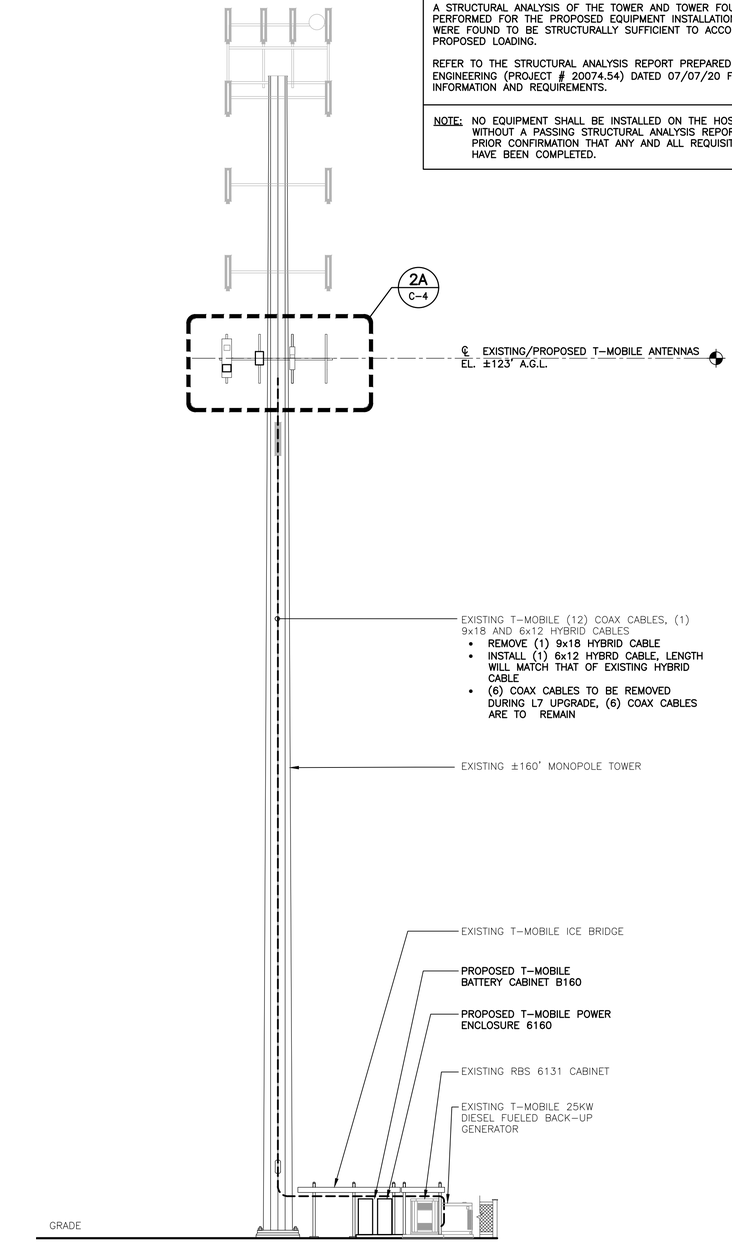
REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 20074.54) DATED 07/07/20 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

TOWER AND TOWER FOUNDATION

A STRUCTURAL ANALYSIS OF THE TOWER AND TOWER FOUNDATION WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 20074.54) DATED 07/07/20 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

NOTE: NO EQUIPMENT SHALL BE INSTALLED ON THE HOSTING STRUCTURE WITHOUT A PASSING STRUCTURAL ANALYSIS REPORT AND CONTRACTOR PRIOR CONFIRMATION THAT ANY AND ALL REQUISITE MODIFICATIONS HAVE BEEN COMPLETED.



2 C-2 **EAST TOWER ELEVATION**
SCALE: 1" = 8'

GRAPHIC SCALE
8 0 4 8 16 32
(IN FEET)
1 inch = 8 ft.

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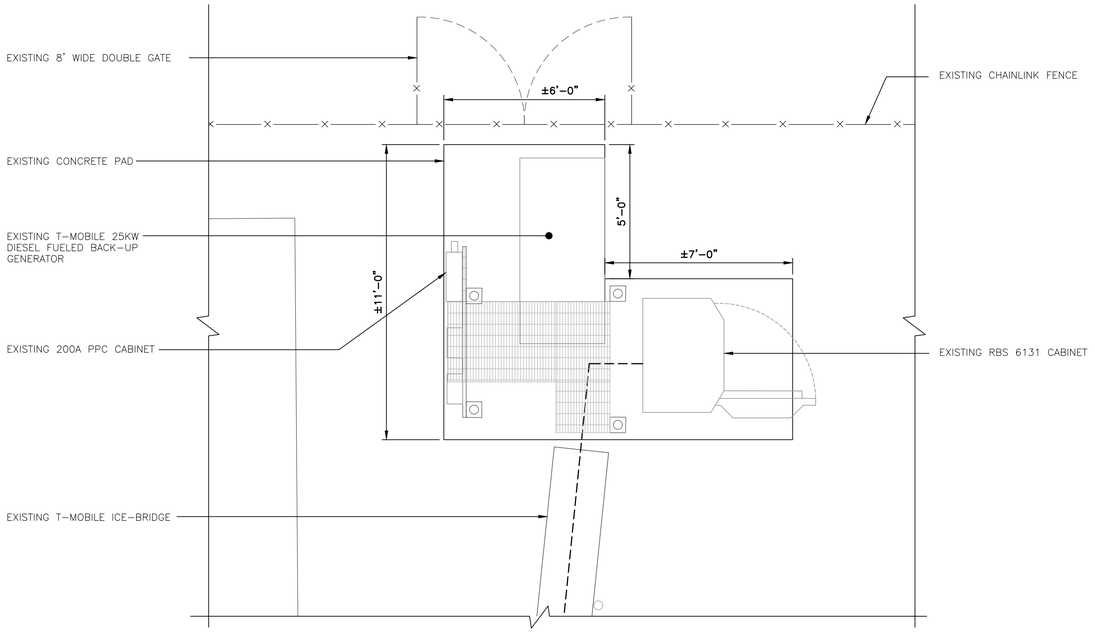
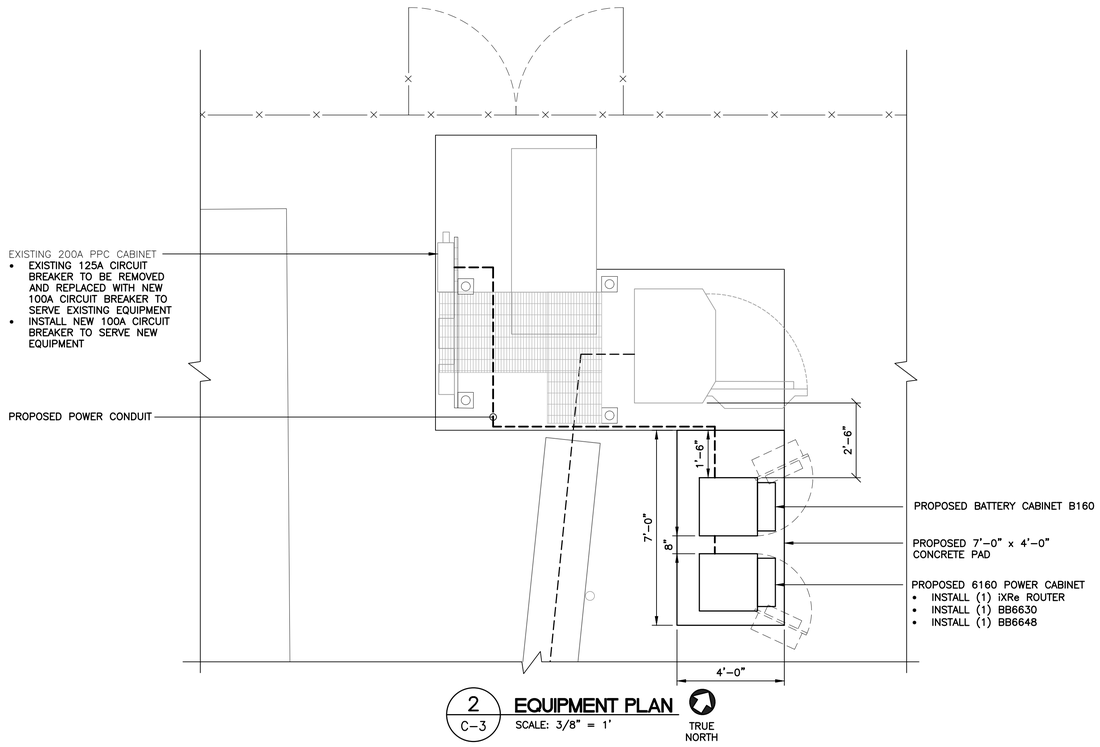
COMPOUND PLAN AND ELEVATION

C-2

Sheet No. 4 of 9



1 / C-3 **EQUIPMENT PLAN**
SCALE: 3/8" = 1'
TRUE NORTH



2 / C-3 **EQUIPMENT PLAN**
SCALE: 3/8" = 1'
TRUE NORTH

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EQUIPMENT PLAN

C-3

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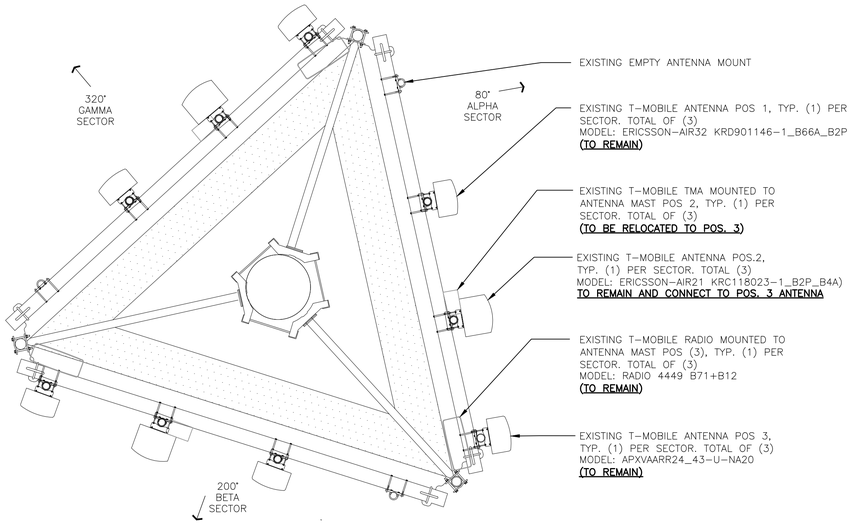
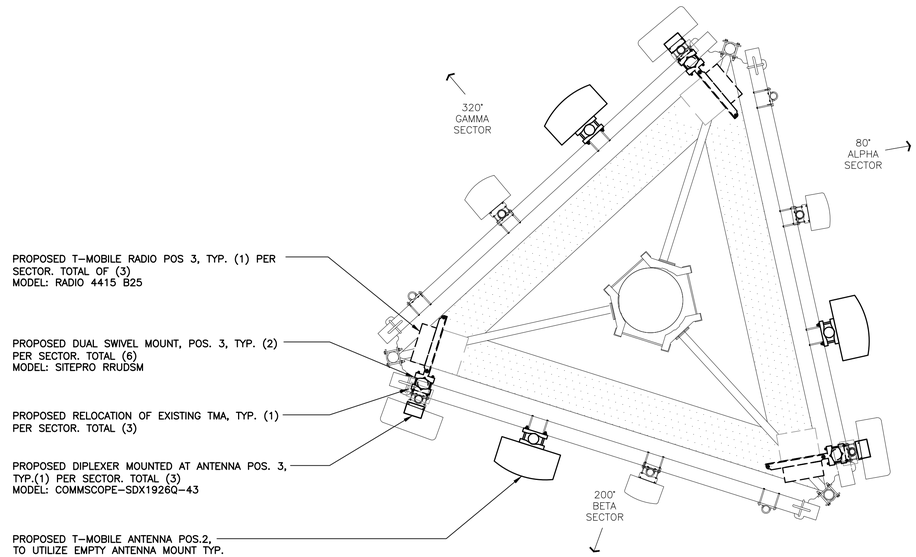


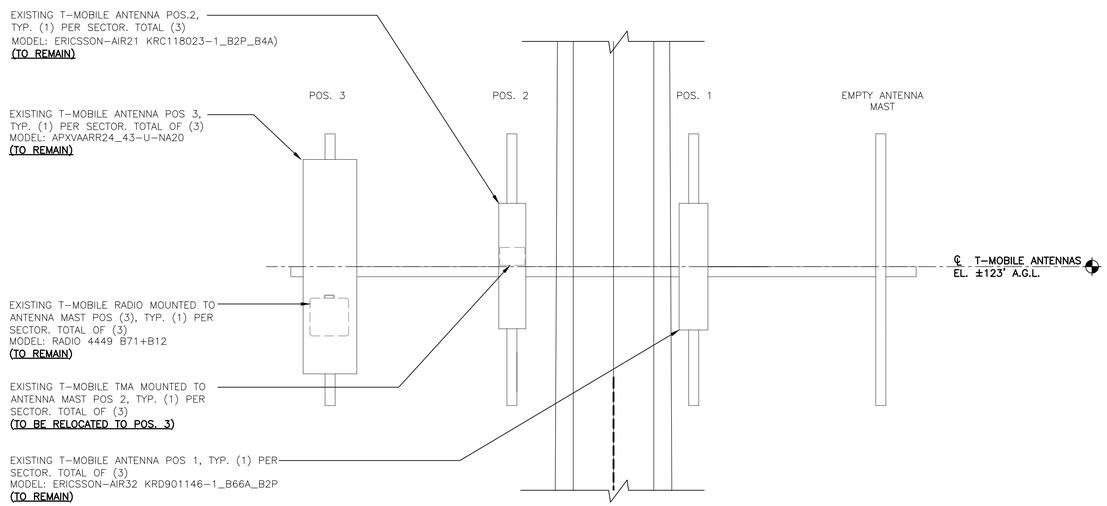
1 / C-4 **EXISTING ANTENNA CONFIGURATION**
SCALE: 1/2" = 1'

TRUE NORTH

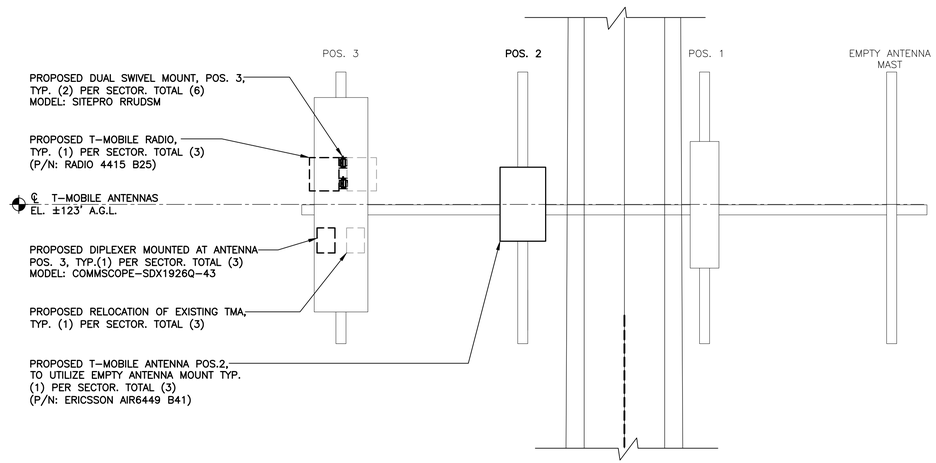


1A / C-4 **PROPOSED ANTENNA CONFIGURATION**
SCALE: 1/2" = 1'

TRUE NORTH



2 / C-4 **EXISTING ANTENNA ELEVATION**
SCALE: 3/8" = 1'



2A / C-4 **PROPOSED ANTENNA ELEVATION**
SCALE: 3/8" = 1'

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ANTENNA PLANS

C-4

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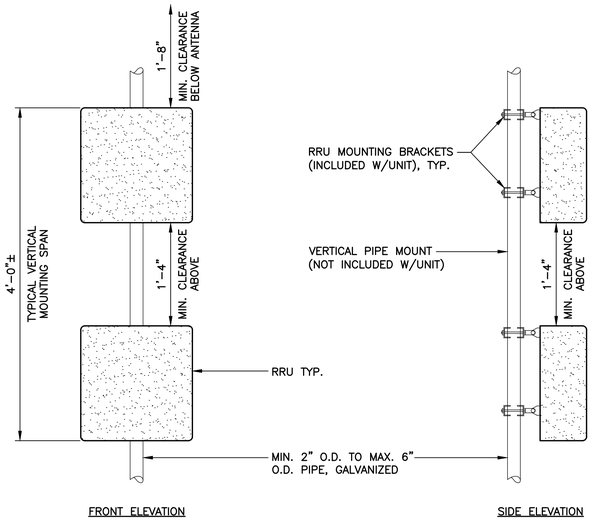
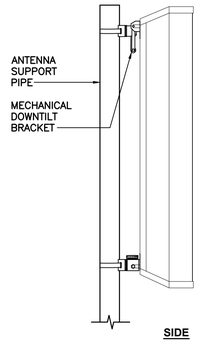


FRONT ELEVATION SIDE ELEVATION

NOTES:

1. T-MOBILE SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

1 / C-5 **TYPICAL RRUS MOUNTING DETAILS**
SCALE: NOT TO SCALE



SIDE

FRONT

ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: AIR6449 B41	33.1"L x 20.6"W x 8.6"D	±104 LBS.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.		

2 / C-5 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE

FRONT VIEW

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4415 B25	14.9"L x 13.2"W x 5.4"D	±46 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.			

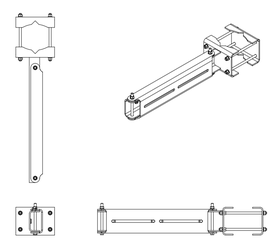
3 / C-5 **PROPOSED RRU DETAIL**
SCALE: NOT TO SCALE

EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: ENCLOSURE 6160	62.0"H x 26.0"W x 26.0"D	±1200 LBS

4 / C-5 **ENCLOSURE 6160 (OUTDOOR)**
SCALE: NOT TO SCALE

EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: BATTERY CABINET B160	62.0"H x 26.0"W x 26.0"D	±1883 LBS

5 / C-5 **BATTERY CABINET DETAIL**
NOT TO SCALE



RRU DUAL SWIVEL MOUNT		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: PART NO.: SITE PRO 1 RRUDSM	27.75"L x 6.5"W x 4.7"D	39.4 LBS.

6 / C-5 **RRH DUAL SWIVEL MOUNT DETAIL**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	08/07/20	ANC	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

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T-Mobile

Transcend Wireless

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www.CentekEng.com

T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
ORANGE/TOWN HIGH PLAINS
SITE ID: CT11412A
525 ORANGE CENTER RD
ORANGE CT 06477

DATE: 07/06/20
SCALE: AS NOTED
JOB NO. 20074.54

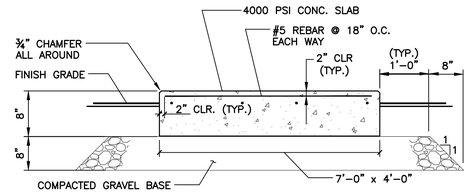
TYPICAL EQUIPMENT DETAILS

C-5

Sheet No. 7 of 9

DIPLEXER		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: SDX1926Q-43(E14F05P86)	4.2"L x 7.0"W x 3.0"D	–
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.		

1 / C-6 **PROPOSED DIPLEXER DETAIL**
SCALE: NOT TO SCALE



2 / C-6 **TYPICAL CONCRETE PAD DETAIL**
NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	08/07/20	ANC	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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525 ORANGE CENTER RD
ORANGE CT 06477

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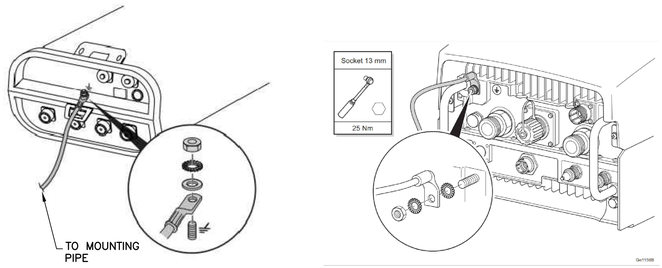
JOB NO. 20074.54

TYPICAL EQUIPMENT DETAILS

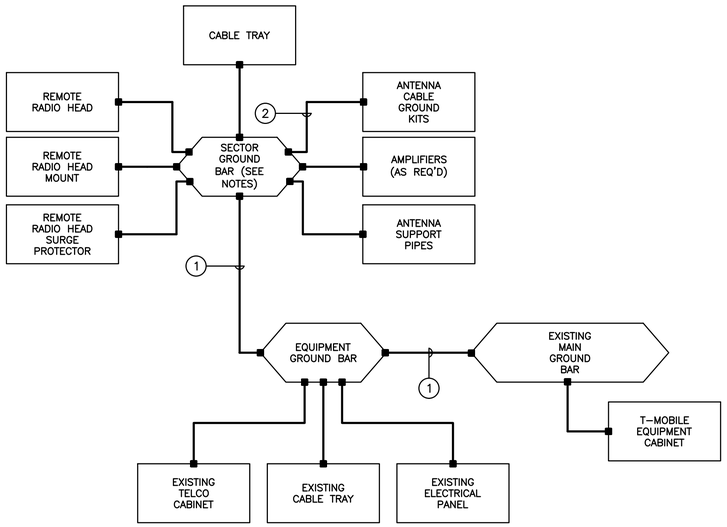
C-6

Sheet No. 8 of 9



1 E-1 TYPICAL ANTENNA/RRU GROUNDING DETAILS

SCALE: NOT TO SCALE



GROUNDING SCHEMATIC NOTES

(1) #2 AWG

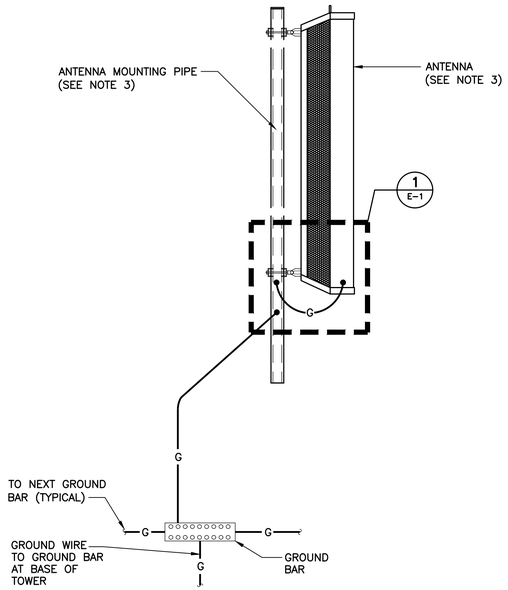
(2) #6 AWG

GENERAL NOTES:

1. ALL SURGE SUPPRESSION EQUIPMENT SHALL BE BONDED TO GROUND PER MANUFACTURER'S SPECIFICATIONS
2. UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, GROUND CONDUCTORS SHOWN SHALL BE #2 AWG (SOLID TINNED BCW – EXTERIOR; STRANDED GREEN INSULATED – INTERIOR).
3. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
4. BOND ALL EQUIPMENT CABINETS AND BATTERY CABINETS TO GROUND PER MANUFACTURER'S SPECIFICATIONS.
5. COORDINATE ALL ROOF MOUNTED EQUIPMENT WITH OWNER.
6. ALL ROOF MOUNTED AMPLIFIERS AND ASSOCIATED EQUIPMENT SHALL BE BONDED TO THE SECTOR GROUND BAR PER MANUFACTURER'S SPECIFICATIONS.
7. ALL GROUNDING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NEC AND OWNER'S REQUIREMENTS.

4 E-1 TYPICAL GROUNDING SCHEMATIC DETAIL

SCALE: NOT TO SCALE

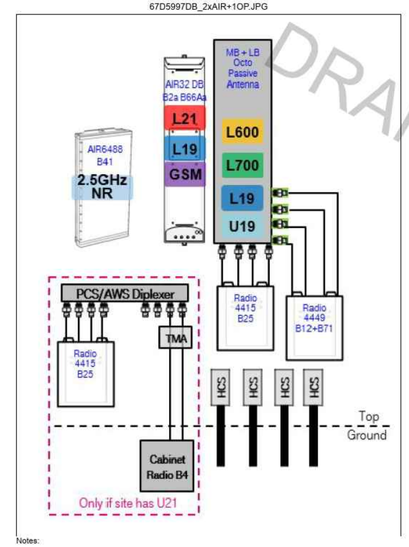


NOTES:

1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

2 E-1 TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NOT TO SCALE



Notes:

3 E-1 PROPOSED PLUMBING DIAGRAM

SCALE: NOT TO SCALE

RISER DIAGRAM NOTES

(1) EXISTING 200A PPC CABINET TO REMAIN.

(2) EXISTING CONDUITS AND CONDUCTORS TO REMAIN.

(3) EXISTING EQUIPMENT CABINET TO REMAIN.

(4) EXISTING 125A/2P CIRCUIT BREAKER SERVING EXISTING EQUIPMENT CABINET TO BE REMOVED AND REPLACED WITH NEW 100A/2P CIRCUIT BREAKER. COORDINATE CABINET DOWNGRADE WITH CONSTRUCTION MANAGER.

(5) NEW 100A/2P CIRCUIT BREAKER TO SERVE NEW EQUIPMENT CABINET.

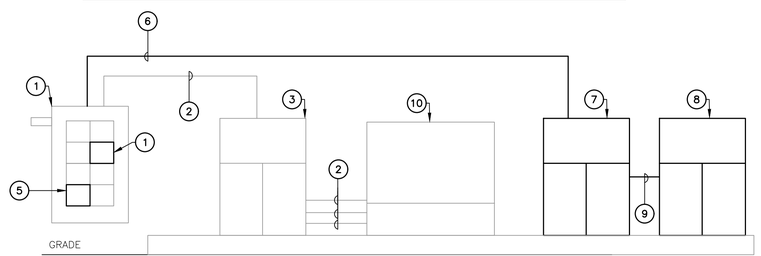
(6) (3) #1 AWG, (1) #8 AWG GROUND, 1–1/4" CONDUIT.

(7) NEW RADIO EQUIPMENT CABINET.

(8) NEW BATTERY CABINET.

(9) DC CONDUIT AND CONDUCTORS FOR BATTERY CABINET CONNECTION PER MANUFACTURERS SPECIFICATIONS.

(10) EXISTING 15KW DIESEL FUELED GENERATOR



5 E-1 ELECTRICAL POWER RISER DIAGRAM

SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	08/07/20	ANC	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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DATE:	07/06/20
SCALE:	AS NOTED
JOB NO.	20074.54

TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 9 of 9

Exhibit D

Structural Analysis Report

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

160-ft Existing Valmont Monopole

Proposed T-Mobile
Antenna Upgrade (L600)

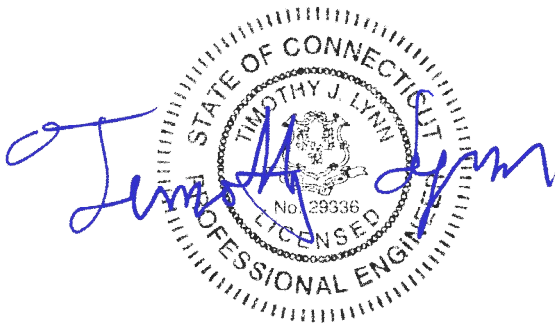
T-Mobile Site Ref: CT11412A

525 Orange Center Road
Orange, CT

Centek Project No. 19027.69

Date: July 7, 2020

Max Stress Ratio = 71.1%



Prepared for:

T-Mobile USA
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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 T-Mobile on the existing monopole (tower) located in Orange, CT.

The host tower is a 160-ft tall, four-section, twelve sided, tapered monopole, originally designed and manufactured by Valmont Structures job no; 16632-97, dated February 25, 1998. The manufacturer's drawings and calculations were unavailable for use in this report. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural analysis report prepared by Centek; job no; 19027.69 dated May 13, 2019.

Antenna and appurtenance information were obtained from the aforementioned structural report prepared by Centek and an RF data sheet.

The tower is made up of four (4) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 21.2-in at the top and 64.0-in at the base.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- NEXTEL (Existing):
  Antennas: Nine (9) Decibel DB844H90E-M panel antennas pipe mounted to Verizon's platform w/ handrails with a RAD center elevation of 167-ft above the existing tower base plate.
  Coax Cables: Nine (9) 1-1/4" ∅ coax cables running on the inside of the existing tower.
- CLEARWIRE (Existing):
  Antennas: Three (3) Argus LLPX310R panel antennas w/ Samsung WiMax remote radio heads, two (2) Andrew VHLP2-11-DW1 dish antennas and one (1) GPS antenna pipe mounted to Verizon's platform with rails with a RAD center elevation of 167-ft above the existing tower base plate.
  Coax Cables: Two (2) 2" ∅ flex conduits and three (3) 1/2" ∅ coax cables running on the inside of the existing tower.
- VERIZON (Existing):
  Antennas: Three (3) Antel BXA-70063-6CF panel antennas, six (6) Antel LPA-80060-6CF panel antennas, six (6) BXA-171063-12BF panel antennas, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Head, one (1) RFS DB-T1-6Z-8AB-0Z main distribution box and six (6) RFS FD9R6004/2C-3L diplexers mounted on a 13-ft platform with rails with a RAD center elevation of 158-ft above the existing tower base plate.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ fiber cable running on the inside of the existing tower.

- AT&T (Existing to Remain):
  Antennas: Three (3) CCI HPA-65R-BUU-H6 panel antennas, six (6) Powerwave 7770 panel antennas and twelve (12) Powerwave LGP21401 TMAs mounted on a 13-ft platform with rails with a RAD center elevation of 148-ft above grade.
  Appurtenances: Three (3) Ericsson RRUS-11, three (3) Ericsson RRUS-12, three (3) Ericsson A2s and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted to one (1) universal ring mount with a RAD center elevation of 150-ft above grade level.
  Coax Cables: Twelve (12) 1-1/4" ∅ coax cables, one (1) fiber trunk and two (2) DC trunks running on the inside of the existing tower.
- SPRINT (Existing):
  Antennas: Three (3) RFS APXVSPP18 panel antennas, three (3) RFS APXVTM14 panel antennas, three (3) 800MHz RRH, three (3) 1900MHz RRH and three (3) TD-RRH-8x20 remote radio heads mounted on a 13-ft platform with rails with a RAD center elevation of 138-ft above the existing tower base plate.
  Coax Cables: Three (3) 1-1/4" ∅ fiber cables running on the inside of the existing tower.
- SPRINT (Existing):
  Antennas: One (1) GPS antenna on a GPS Stand-off mount with a RAD center elevation of 76-ft above grade.
  Coax Cables: One (1) 1/2"∅ coax cable running on the inside of the existing tower.
- T-MOBILE (Existing to Remain):
  Antennas: Three (3) Ericsson AIR32 panel antenna, three (3) RFS APXVAARR24_43 panel antennas, three (3) Ericsson 4449 B71 B12 remote radio units and three (3) TMAs mounted on a 13-ft platform with rails with a RAD center elevation of 123-ft above the existing tower base plate.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables and two (2) 6x12 fiber cables running on the inside of the existing tower.
- T-MOBILE (Existing to Remove):
  Antennas: Three (3) Ericsson AIR21 panel antennas mounted on a 13-ft platform with rails with a RAD center elevation of 123-ft above the existing tower base plate.
  Coax Cables: One (1) 9x18 fiber cable running on the inside of the existing tower.
- **T-MOBILE (Proposed):**
  Antennas: Three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson 4415 remote radio units and three (3) Commscope SDX1926Q-43 diplexers mounted on a 13-ft platform with rails with a RAD center elevation of 123-ft above the existing tower base plate.
  Coax Cables: One (1) 6x12 fiber cable running on the inside of the existing tower.

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 or reinforcement drawings.
- 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.
- All existing coax cables to be installed as indicated in this report.

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 0.75" radial ice on the tower structure and its components.

Basic Wind Speed:	Orange; v = 97 mph (3 second gust)	*[Appendix N of the 2018 CT Building Code]*
Load Cases:	Load Case 1; 97 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/ 0.75" 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 **71.1%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L4)	0'-37.17'	71.1%	**PASS**

Foundation and Anchors

The existing foundation consists of an 8.0-ft square x 10.0-ft long reinforced concrete pier on a 22.0-ft x4.0-ft thick reinforce concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural report prepared by Centek. The base of the tower is connected to the foundation by means of (24) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 10-ft into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	48 kips
	Compression	65 kips
	Moment	5298 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
Reinforced Concrete Pad and Pier	OTM[(2)]	1.0	2.31	**PASS**

Note 1: FS denotes Factor of Safety.
Note 2: OTM denotes Overturning Moment.

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Shear	46.6%	**PASS**
Base Plate	Bending	60.0%	**PASS**

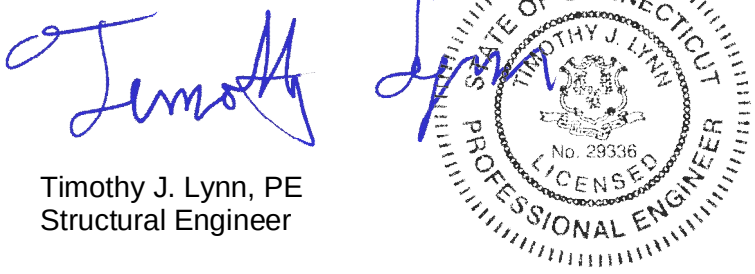
Conclusion

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 T-Mobile. 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.

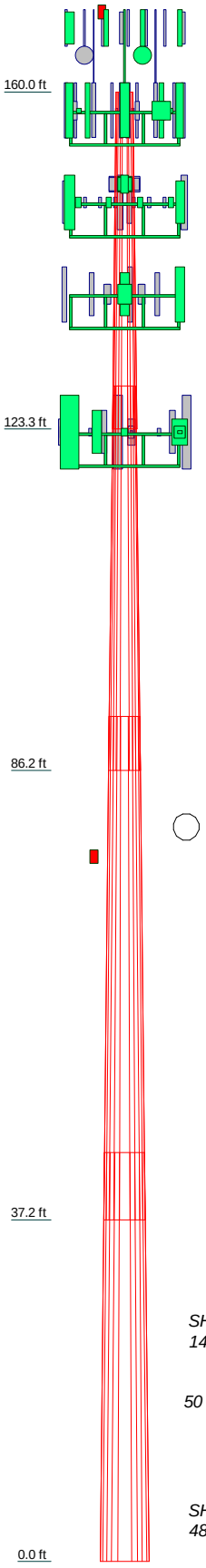
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	36.670	12	0.219	4.670	21.200	31.460		2.3
2	41.830	12	0.344	5.830	29.715	41.440		5.6
3	54.830	12	0.438	7.330	39.118	54.460		12.2
4	44.500	12	0.469		51.533	64.000		13.1
							A572-65	33.2



ALL REACTIONS ARE FACTORED

AXIAL 108 K

SHEAR 14 K *MOM 1693*

TORQUE 0 kip-ft
50 mph WIND - 0.750 in ICE

AXIAL 65 K

SHEAR 48 K *MOM 5298*

TORQUE 1 kip-ft
REACTIONS - 97 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
GPS (Clearwire - Existing)	168	Valmont Uni-Tri Bracket (ATI - Existing)	150
DB844H90E-M (Nextel - Existing)	167	7770.00 (ATI - Existing)	148
DB844H90E-M (Nextel - Existing)	167	7770.00 (ATI - Existing)	148
DB844H90E-M (Nextel - Existing)	167	(4) LGP21401 TMA (ATI - Existing)	148
DB844H90E-M (Nextel - Existing)	167	HPA-65R-BUU-H6 (ATI - Existing)	148
DB844H90E-M (Nextel - Existing)	167	HPA-65R-BUU-H6 (ATI - Existing)	148
DB844H90E-M (Nextel - Existing)	167	HPA-65R-BUU-H6 (ATI - Existing)	148
DB844H90E-M (Nextel - Existing)	167	(4) LGP21401 TMA (ATI - Existing)	148
DB844H90E-M (Nextel - Existing)	167	(4) LGP21401 TMA (ATI - Existing)	148
DB844H90E-M (Nextel - Existing)	167	7770.00 (ATI - Existing)	148
LLPX310R (Clearwire - Existing)	167	7770.00 (ATI - Existing)	148
LLPX310R (Clearwire - Existing)	167	7770.00 (ATI - Existing)	148
LLPX310R (Clearwire - Existing)	167	7770.00 (ATI - Existing)	148
RRU (Clearwire - Existing)	167	13' Platform w/Rails (ATI - Existing)	146
RRU (Clearwire - Existing)	167	APXVSPP18-C-A20 (Sprint - Existing)	138
RRU (Clearwire - Existing)	167	APXVTM14 (Sprint - Existing)	138
(4) 8'x2 1/2" Pipe Mount (Nextel - Existing)	165	APXVSPP18-C-A20 (Sprint - Existing)	138
		APXVTM14 (Sprint - Existing)	138
(4) 8'x2 1/2" Pipe Mount (Nextel - Existing)	165	APXVSPP18-C-A20 (Sprint - Existing)	138
(4) 8'x2 1/2" Pipe Mount (Nextel - Existing)	165	FD-RRH 2x50 800 (Sprint - Existing)	138
		FD-RRH 2x50 800 (Sprint - Existing)	138
VHLP2-11-DW1 (Clearwire - Existing)	164	FD-RRH 2x50 800 (Sprint - Existing)	138
VHLP2-11-DW1 (Clearwire - Existing)	164	FD-RRH 4x45 1900 (Sprint - Existing)	138
BXA-171063-12BF (Verizon - Existing)	158	FD-RRH 4x45 1900 (Sprint - Existing)	138
BXA-70063/6CF (Verizon - Existing)	158	FD-RRH 4x45 1900 (Sprint - Existing)	138
LPA-80060-6CF (Verizon - Existing)	158	TD-RRH8x20-25 (Sprint - Existing)	138
LPA-80060-6CF (Verizon - Existing)	158	TD-RRH8x20-25 (Sprint - Existing)	138
BXA-171063-12BF (Verizon - Existing)	158	TD-RRH8x20-25 (Sprint - Existing)	138
BXA-70063/6CF (Verizon - Existing)	158	APXVTM14 (Sprint - Existing)	138
LPA-80060-6CF (Verizon - Existing)	158	13' Platform w/Rails (Sprint - Existing)	136
LPA-80060-6CF (Verizon - Existing)	158	APXVAARR24-43 (T-Mobile - Existing)	123
BXA-171063-12BF (Verizon - Existing)	158	AIR6449 (T-Mobile - Proposed)	123
BXA-70063/6CF (Verizon - Existing)	158	AIR32 (T-Mobile - Existing)	123
LPA-80060-6CF (Verizon - Existing)	158	APXVAARR24-43 (T-Mobile - Existing)	123
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	158	AIR6449 (T-Mobile - Proposed)	123
		AIR32 (T-Mobile - Existing)	123
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	158	APXVAARR24-43 (T-Mobile - Existing)	123
		TMA 10"x8"x3" (T-Mobile - Existing)	123
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	158	TMA 10"x8"x3" (T-Mobile - Existing)	123
		TMA 10"x8"x3" (T-Mobile - Existing)	123
BXA-171063-12BF (Verizon - Existing)	158	Radio 4449 B71 B12 (T-Mobile - Existing)	123
BXA-171063-12BF (Verizon - Existing)	158		
BXA-171063-12BF (Verizon - Existing)	158	Radio 4449 B71 B12 (T-Mobile - Existing)	123
RRH2x40-AWS (Verizon - Existing)	158		
RRH2x40-AWS (Verizon - Existing)	158	Radio 4449 B71 B12 (T-Mobile - Existing)	123
RRH2x40-AWS (Verizon - Existing)	158		
DB-T1-6Z-8AB-0Z (Verizon - Existing)	158	4415 B25 (T-Mobile - Proposed)	123
LPA-80060-6CF (Verizon - Existing)	158	4415 B25 (T-Mobile - Proposed)	123
13' Platform w/Rails (Verizon - Existing)	156	4415 B25 (T-Mobile - Proposed)	123
RRUS-12 (ATI - Existing)	150	SDX1926Q-43 (T-Mobile - Proposed)	123
RRUS-12 (ATI - Existing)	150	SDX1926Q-43 (T-Mobile - Proposed)	123
RRUS-12 (ATI - Existing)	150	SDX1926Q-43 (T-Mobile - Proposed)	123
A2 (ATI - Existing)	150	AIR32 (T-Mobile - Existing)	123
A2 (ATI - Existing)	150	AIR6449 (T-Mobile - Proposed)	123
A2 (ATI - Existing)	150	13' Platform w/Rails (T-Mobile - Existing)	121
RRUS-11 (ATI - Existing)	150		
RRUS-11 (ATI - Existing)	150	GPS (Sprint - Existing)	76
RRUS-11 (ATI - Existing)	150	Stand-off	75
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	150	Stand-off	75

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.000 ft
7. TOWER RATING: 71.1%

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

Job: **20074.54 - CT11412A**
Project: **160-ft Valmont Monopole - 525 Orange Center Rd., Orange, CT**
Client: T-Mobile | Drawn by: TJL | App'd:
Code: TIA-222-G | Date: 07/07/20 | Scale: NTS
Path: J:\Jobs\2007400.WI\54_CT11412A\05_Structural\Tower Analysis\Backup Documentation\Calcs\ERI Files\160' Monopole_Orange_CT.eri | Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.000 ft.
Nominal ice thickness of 0.750 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 pole 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		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	160.000-123.330	36.670	4.670	12	21.200	31.460	0.219	0.876	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L2	123.330-86.170	41.830	5.830	12	29.715	41.440	0.344	1.376	A572-65 (65 ksi)
L3	86.170-37.170	54.830	7.330	12	39.118	54.460	0.438	1.752	A572-65 (65 ksi)
L4	37.170-0.000	44.500		12	51.533	64.000	0.469	1.876	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	21.871	14.795	831.313	7.511	10.982	75.701	1684.465	7.282	5.095	23.263
	32.493	22.031	2744.484	11.184	16.296	168.412	5561.069	10.843	7.844	35.819
L2	31.997	32.534	3582.389	10.515	15.393	232.735	7258.892	16.012	7.042	20.47
	42.780	45.521	9812.935	14.712	21.466	457.140	19883.667	22.404	10.184	29.605
L3	42.032	54.553	10417.699	13.847	20.263	514.122	21109.082	26.849	9.310	21.255
	56.227	76.190	28381.014	19.340	28.210	1006.052	57507.629	37.499	13.421	30.643
L4	55.311	77.116	25666.021	18.281	26.694	961.487	52006.317	37.954	12.554	26.767
	66.092	95.943	49427.852	22.744	33.152	1490.946	100154.229	47.220	15.895	33.891

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
L1 160.000-123.330				1	1	1			
L2 123.330-86.170				1	1	1			
L3 86.170-37.170				1	1	1			
L4 37.170-0.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
1 1/4 (Nextel - Existing)	A	No	Yes	Inside Pole	160.000 - 3.000	9	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
2" dia Flex Conuit (Clearwire - Existing)	A	No	Yes	Inside Pole	160.000 - 3.000	2	No Ice	0.000	0.005
							1/2" Ice	0.000	0.005
							1" Ice	0.000	0.005
1/2 (Clearwire - Existing)	A	No	Yes	Inside Pole	160.000 - 3.000	3	No Ice	0.000	0.000
							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000
1 5/8	B	No	Yes	Inside Pole	156.000 - 3.000	12	No Ice	0.000	0.001

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
(Verizon - Existing)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
HYBRIFLEX 1-5/8"	B	No	Yes	Inside Pole	156.000 - 3.000	1	No Ice	0.000	0.002
(Verizon - Existing)							1/2" Ice	0.000	0.002
							1" Ice	0.000	0.002
1 1/4	C	No	Yes	Inside Pole	146.000 - 3.000	12	No Ice	0.000	0.001
(AT&T - Existing)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
RG6-Fiber	C	No	Yes	Inside Pole	150.000 - 3.000	1	No Ice	0.000	0.001
(AT&T - Existing)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
#8 AWG Copper	C	No	Yes	Inside Pole	150.000 - 3.000	2	No Ice	0.000	0.000
WIre							1/2" Ice	0.000	0.000
(AT&T - Existing)							1" Ice	0.000	0.000
HYBRIFLEX 1-1/4"	A	No	Yes	Inside Pole	136.000 - 3.000	3	No Ice	0.000	0.001
(Sprint - Existing)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
1 5/8	B	No	Yes	Inside Pole	123.000 - 3.000	6	No Ice	0.000	0.001
(T-Mobile - Existing)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
HYBRIFLEX 1-1/4"	A	No	Yes	Inside Pole	123.000 - 3.000	3	No Ice	0.000	0.001
(T-Mobile - Existing)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
1/2	A	No	Yes	Inside Pole	75.000 - 3.000	1	No Ice	0.000	0.000
(Sprint - Existing)							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	160.000-123.330	A	0.000	0.000	0.000	0.000	0.661
		B	0.000	0.000	0.000	0.000	0.470
		C	0.000	0.000	0.000	0.000	0.209
L2	123.330-86.170	A	0.000	0.000	0.000	0.000	0.909
		B	0.000	0.000	0.000	0.000	0.764
		C	0.000	0.000	0.000	0.000	0.335
L3	86.170-37.170	A	0.000	0.000	0.000	0.000	1.209
		B	0.000	0.000	0.000	0.000	1.010
		C	0.000	0.000	0.000	0.000	0.442
L4	37.170-0.000	A	0.000	0.000	0.000	0.000	0.845
		B	0.000	0.000	0.000	0.000	0.705
		C	0.000	0.000	0.000	0.000	0.308

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	160.000-123.330	A	1.734	0.000	0.000	0.000	0.000	0.661

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
		B		0.000	0.000	0.000	0.000	0.470
		C		0.000	0.000	0.000	0.000	0.209
L2	123.330-86.170	A	1.683	0.000	0.000	0.000	0.000	0.909
		B		0.000	0.000	0.000	0.000	0.764
		C		0.000	0.000	0.000	0.000	0.335
L3	86.170-37.170	A	1.595	0.000	0.000	0.000	0.000	1.209
		B		0.000	0.000	0.000	0.000	1.010
		C		0.000	0.000	0.000	0.000	0.442
L4	37.170-0.000	A	1.417	0.000	0.000	0.000	0.000	0.845
		B		0.000	0.000	0.000	0.000	0.705
		C		0.000	0.000	0.000	0.000	0.308

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) 8'x2 1/2" Pipe Mount (Nextel - Existing)	A	From Face	3.000 0.000 0.000	0.000	165.000	No Ice 1/2" Ice 1" Ice	2.300 3.132 3.620	2.300 3.132 3.620	0.041 0.057 0.080
(4) 8'x2 1/2" Pipe Mount (Nextel - Existing)	B	From Face	3.000 0.000 0.000	0.000	165.000	No Ice 1/2" Ice 1" Ice	2.300 3.132 3.620	2.300 3.132 3.620	0.041 0.057 0.080
(4) 8'x2 1/2" Pipe Mount (Nextel - Existing)	C	From Face	3.000 0.000 0.000	0.000	165.000	No Ice 1/2" Ice 1" Ice	2.300 3.132 3.620	2.300 3.132 3.620	0.041 0.057 0.080
DB844H90E-M (Nextel - Existing)	A	From Face	3.000 2.000 0.000	0.000	167.000	No Ice 1/2" Ice 1" Ice	2.867 3.177 3.487	3.796 4.104 4.419	0.010 0.036 0.067
DB844H90E-M (Nextel - Existing)	A	From Face	3.000 -2.000 0.000	0.000	167.000	No Ice 1/2" Ice 1" Ice	2.867 3.177 3.487	3.796 4.104 4.419	0.010 0.036 0.067
DB844H90E-M (Nextel - Existing)	A	From Face	3.000 -6.000 0.000	0.000	167.000	No Ice 1/2" Ice 1" Ice	2.867 3.177 3.487	3.796 4.104 4.419	0.010 0.036 0.067
DB844H90E-M (Nextel - Existing)	B	From Face	3.000 2.000 0.000	0.000	167.000	No Ice 1/2" Ice 1" Ice	2.867 3.177 3.487	3.796 4.104 4.419	0.010 0.036 0.067
DB844H90E-M (Nextel - Existing)	B	From Face	3.000 -2.000 0.000	0.000	167.000	No Ice 1/2" Ice 1" Ice	2.867 3.177 3.487	3.796 4.104 4.419	0.010 0.036 0.067
DB844H90E-M (Nextel - Existing)	B	From Face	3.000 -6.000 0.000	0.000	167.000	No Ice 1/2" Ice 1" Ice	2.867 3.177 3.487	3.796 4.104 4.419	0.010 0.036 0.067
DB844H90E-M	C	From Face	3.000	0.000	167.000	No Ice	2.867	3.796	0.010

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert*	*Azimuth Adjustment*	*Placement*		C_AA_A *Front*	C_AA_A *Side*	*Weight*
			ft *ft* *ft*	°	*ft*		ft^2	ft^2	*K*
(Nextel - Existing)			2.000			1/2" Ice	3.177	4.104	0.036
			0.000			1" Ice	3.487	4.419	0.067
DB844H90E-M	C	From Face	3.000	0.000	167.000	No Ice	2.867	3.796	0.010
(Nextel - Existing)			-2.000			1/2" Ice	3.177	4.104	0.036
			0.000			1" Ice	3.487	4.419	0.067
DB844H90E-M	C	From Face	3.000	0.000	167.000	No Ice	2.867	3.796	0.010
(Nextel - Existing)			-6.000			1/2" Ice	3.177	4.104	0.036
			0.000			1" Ice	3.487	4.419	0.067
LLPX310R	A	From Face	3.000	0.000	167.000	No Ice	4.304	1.945	0.029
(Clearwire - Existing)			6.000			1/2" Ice	4.596	2.214	0.055
			0.000			1" Ice	4.896	2.489	0.084
LLPX310R	B	From Face	3.000	0.000	167.000	No Ice	4.304	1.945	0.029
(Clearwire - Existing)			6.000			1/2" Ice	4.596	2.214	0.055
			0.000			1" Ice	4.896	2.489	0.084
LLPX310R	C	From Face	3.000	0.000	167.000	No Ice	4.304	1.945	0.029
(Clearwire - Existing)			6.000			1/2" Ice	4.596	2.214	0.055
			0.000			1" Ice	4.896	2.489	0.084
RRU	A	From Face	3.000	0.000	167.000	No Ice	1.804	0.778	0.033
(Clearwire - Existing)			0.000			1/2" Ice	2.000	0.920	0.045
			0.000			1" Ice	2.196	1.062	0.057
RRU	A	From Face	3.000	0.000	167.000	No Ice	1.804	0.778	0.033
(Clearwire - Existing)			0.000			1/2" Ice	2.000	0.920	0.045
			0.000			1" Ice	2.196	1.062	0.057
RRU	A	From Face	3.000	0.000	167.000	No Ice	1.804	0.778	0.033
(Clearwire - Existing)			0.000			1/2" Ice	2.000	0.920	0.045
			0.000			1" Ice	2.196	1.062	0.057
GPS	A	From Face	2.000	0.000	168.000	No Ice	1.000	1.000	0.010
(Clearwire - Existing)			0.000			1/2" Ice	1.500	1.500	0.015
			0.000			1" Ice	2.000	2.000	0.020
13' Platform w/Rails	C	None		0.000	156.000	No Ice	17.200	17.200	2.000
(Verizon - Existing)						1/2" Ice	22.300	22.300	3.000
						1" Ice	83.000	83.000	4.000
LPA-80060-6CF	A	From Face	3.000	0.000	158.000	No Ice	6.527	6.758	0.022
(Verizon - Existing)			6.000			1/2" Ice	6.987	7.215	0.072
			0.000			1" Ice	7.443	7.663	0.127
BXA-171063-12BF	A	From Face	3.000	0.000	158.000	No Ice	4.734	3.572	0.015
(Verizon - Existing)			4.000			1/2" Ice	5.180	4.007	0.042
			0.000			1" Ice	5.633	4.450	0.075
BXA-70063/6CF	A	From Face	3.000	0.000	158.000	No Ice	7.569	4.158	0.012
(Verizon - Existing)			0.000			1/2" Ice	8.016	4.595	0.054
			0.000			1" Ice	8.470	5.040	0.103
LPA-80060-6CF	A	From Face	3.000	0.000	158.000	No Ice	6.527	6.758	0.022
(Verizon - Existing)			-6.000			1/2" Ice	6.987	7.215	0.072
			0.000			1" Ice	7.443	7.663	0.127
LPA-80060-6CF	B	From Face	3.000	0.000	158.000	No Ice	6.527	6.758	0.022
(Verizon - Existing)			6.000			1/2" Ice	6.987	7.215	0.072
			0.000			1" Ice	7.443	7.663	0.127
BXA-171063-12BF	B	From Face	3.000	0.000	158.000	No Ice	4.734	3.572	0.015
(Verizon - Existing)			4.000			1/2" Ice	5.180	4.007	0.042
			0.000			1" Ice	5.633	4.450	0.075
BXA-70063/6CF	B	From Face	3.000	0.000	158.000	No Ice	7.569	4.158	0.012
(Verizon - Existing)			0.000			1/2" Ice	8.016	4.595	0.054
			0.000			1" Ice	8.470	5.040	0.103
LPA-80060-6CF	B	From Face	3.000	0.000	158.000	No Ice	6.527	6.758	0.022
(Verizon - Existing)			-6.000			1/2" Ice	6.987	7.215	0.072
			0.000			1" Ice	7.443	7.663	0.127
LPA-80060-6CF	C	From Face	3.000	0.000	158.000	No Ice	6.527	6.758	0.022

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
(Verizon - Existing)			6.000			1/2" Ice	6.987	7.215	0.072
			0.000			1" Ice	7.443	7.663	0.127
BXA-171063-12BF	C	From Face	3.000	0.000	158.000	No Ice	4.734	3.572	0.015
(Verizon - Existing)			4.000			1/2" Ice	5.180	4.007	0.042
			0.000			1" Ice	5.633	4.450	0.075
BXA-70063/6CF	C	From Face	3.000	0.000	158.000	No Ice	7.569	4.158	0.012
(Verizon - Existing)			0.000			1/2" Ice	8.016	4.595	0.054
			0.000			1" Ice	8.470	5.040	0.103
LPA-80060-6CF	C	From Face	3.000	0.000	158.000	No Ice	6.527	6.758	0.022
(Verizon - Existing)			-6.000			1/2" Ice	6.987	7.215	0.072
			0.000			1" Ice	7.443	7.663	0.127
(2) FD9R6004/2C-3L	A	From Face	3.000	0.000	158.000	No Ice	0.314	0.076	0.003
Diplexer			0.000			1/2" Ice	0.386	0.119	0.005
(Verizon - Existing)			0.000			1" Ice	0.466	0.169	0.009
(2) FD9R6004/2C-3L	B	From Face	3.000	0.000	158.000	No Ice	0.314	0.076	0.003
Diplexer			0.000			1/2" Ice	0.386	0.119	0.005
(Verizon - Existing)			0.000			1" Ice	0.466	0.169	0.009
(2) FD9R6004/2C-3L	C	From Face	3.000	0.000	158.000	No Ice	0.314	0.076	0.003
Diplexer			0.000			1/2" Ice	0.386	0.119	0.005
(Verizon - Existing)			0.000			1" Ice	0.466	0.169	0.009
BXA-171063-12BF	A	From Face	3.000	0.000	158.000	No Ice	4.734	3.572	0.015
(Verizon - Existing)			-4.000			1/2" Ice	5.180	4.007	0.042
			0.000			1" Ice	5.633	4.450	0.075
BXA-171063-12BF	B	From Face	3.000	0.000	158.000	No Ice	4.734	3.572	0.015
(Verizon - Existing)			-4.000			1/2" Ice	5.180	4.007	0.042
			0.000			1" Ice	5.633	4.450	0.075
BXA-171063-12BF	C	From Face	3.000	0.000	158.000	No Ice	4.734	3.572	0.015
(Verizon - Existing)			-4.000			1/2" Ice	5.180	4.007	0.042
			0.000			1" Ice	5.633	4.450	0.075
RRH2x40-AWS	A	From Face	3.000	0.000	158.000	No Ice	2.161	1.420	0.044
(Verizon - Existing)			-4.000			1/2" Ice	2.360	1.590	0.061
			0.000			1" Ice	2.565	1.768	0.082
RRH2x40-AWS	B	From Face	3.000	0.000	158.000	No Ice	2.161	1.420	0.044
(Verizon - Existing)			-4.000			1/2" Ice	2.360	1.590	0.061
			0.000			1" Ice	2.565	1.768	0.082
RRH2x40-AWS	C	From Face	3.000	0.000	158.000	No Ice	2.161	1.420	0.044
(Verizon - Existing)			-4.000			1/2" Ice	2.360	1.590	0.061
			0.000			1" Ice	2.565	1.768	0.082
DB-T1-6Z-8AB-0Z	C	From Face	3.000	0.000	158.000	No Ice	4.800	2.000	0.044
(Verizon - Existing)			-4.000			1/2" Ice	5.070	2.193	0.080
			0.000			1" Ice	5.348	2.393	0.120
13' Platform w/Rails	C	None		0.000	146.000	No Ice	17.200	17.200	2.000
(AT&T - Existing)						1/2" Ice	22.300	22.300	3.000
						1" Ice	83.000	83.000	4.000
7770.00	A	From Face	3.000	0.000	148.000	No Ice	5.508	2.928	0.035
(AT&T - Existing)			6.000			1/2" Ice	5.867	3.273	0.068
			0.000			1" Ice	6.233	3.625	0.105
7770.00	A	From Face	3.000	0.000	148.000	No Ice	5.508	2.928	0.035
(AT&T - Existing)			-6.000			1/2" Ice	5.867	3.273	0.068
			0.000			1" Ice	6.233	3.625	0.105
7770.00	B	From Face	3.000	0.000	148.000	No Ice	5.508	2.928	0.035
(AT&T - Existing)			6.000			1/2" Ice	5.867	3.273	0.068
			0.000			1" Ice	6.233	3.625	0.105
7770.00	B	From Face	3.000	0.000	148.000	No Ice	5.508	2.928	0.035
(AT&T - Existing)			-6.000			1/2" Ice	5.867	3.273	0.068
			0.000			1" Ice	6.233	3.625	0.105
7770.00	C	From Face	3.000	0.000	148.000	No Ice	5.508	2.928	0.035

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T - Existing)			6.000				1/2" Ice	5.867	3.273	0.068
			0.000				1" Ice	6.233	3.625	0.105
7770.00	C	From Face	3.000	0.000	0.000	148.000	No Ice	5.508	2.928	0.035
(AT&T - Existing)			-6.000				1/2" Ice	5.867	3.273	0.068
			0.000				1" Ice	6.233	3.625	0.105
(4) LGP21401 TMA	A	From Face	3.000	0.000	0.000	148.000	No Ice	0.817	0.346	0.018
(AT&T - Existing)			0.000				1/2" Ice	0.937	0.440	0.023
			0.000				1" Ice	1.065	0.540	0.031
(4) LGP21401 TMA	B	From Face	3.000	0.000	0.000	148.000	No Ice	0.817	0.346	0.018
(AT&T - Existing)			0.000				1/2" Ice	0.937	0.440	0.023
			0.000				1" Ice	1.065	0.540	0.031
(4) LGP21401 TMA	C	From Face	3.000	0.000	0.000	148.000	No Ice	0.817	0.346	0.018
(AT&T - Existing)			0.000				1/2" Ice	0.937	0.440	0.023
			0.000				1" Ice	1.065	0.540	0.031
RRUS-12	A	From Face	0.500	0.000	0.000	150.000	No Ice	3.145	1.285	0.058
(AT&T - Existing)			0.000				1/2" Ice	3.365	1.438	0.081
			0.000				1" Ice	3.592	1.600	0.108
RRUS-12	B	From Face	0.500	0.000	0.000	150.000	No Ice	3.145	1.285	0.058
(AT&T - Existing)			0.000				1/2" Ice	3.365	1.438	0.081
			0.000				1" Ice	3.592	1.600	0.108
RRUS-12	C	From Face	0.500	0.000	0.000	150.000	No Ice	3.145	1.285	0.058
(AT&T - Existing)			0.000				1/2" Ice	3.365	1.438	0.081
			0.000				1" Ice	3.592	1.600	0.108
A2	A	From Face	0.500	0.000	0.000	150.000	No Ice	2.077	0.505	0.022
(AT&T - Existing)			0.000				1/2" Ice	2.257	0.615	0.035
			0.000				1" Ice	2.443	0.732	0.050
A2	B	From Face	0.500	0.000	0.000	150.000	No Ice	2.077	0.505	0.022
(AT&T - Existing)			0.000				1/2" Ice	2.257	0.615	0.035
			0.000				1" Ice	2.443	0.732	0.050
A2	C	From Face	0.500	0.000	0.000	150.000	No Ice	2.077	0.505	0.022
(AT&T - Existing)			0.000				1/2" Ice	2.257	0.615	0.035
			0.000				1" Ice	2.443	0.732	0.050
HPA-65R-BUU-H6	A	From Face	3.000	0.000	0.000	148.000	No Ice	9.658	6.450	0.051
(AT&T - Existing)			6.000				1/2" Ice	10.128	6.913	0.114
			0.000				1" Ice	10.606	7.384	0.183
HPA-65R-BUU-H6	B	From Face	3.000	0.000	0.000	148.000	No Ice	9.658	6.450	0.051
(AT&T - Existing)			6.000				1/2" Ice	10.128	6.913	0.114
			0.000				1" Ice	10.606	7.384	0.183
HPA-65R-BUU-H6	C	From Face	3.000	0.000	0.000	148.000	No Ice	9.658	6.450	0.051
(AT&T - Existing)			6.000				1/2" Ice	10.128	6.913	0.114
			0.000				1" Ice	10.606	7.384	0.183
RRUS-11	A	From Face	0.500	0.000	0.000	150.000	No Ice	2.566	1.068	0.050
(AT&T - Existing)			0.000				1/2" Ice	2.765	1.211	0.070
			0.000				1" Ice	2.971	1.361	0.092
RRUS-11	B	From Face	0.500	0.000	0.000	150.000	No Ice	2.566	1.068	0.050
(AT&T - Existing)			0.000				1/2" Ice	2.765	1.211	0.070
			0.000				1" Ice	2.971	1.361	0.092
RRUS-11	C	From Face	0.500	0.000	0.000	150.000	No Ice	2.566	1.068	0.050
(AT&T - Existing)			0.000				1/2" Ice	2.765	1.211	0.070
			0.000				1" Ice	2.971	1.361	0.092
DC6-48-60-18-8F Surge Arrestor	C	From Face	0.500	0.000	0.000	150.000	No Ice	1.909	1.909	0.020
			0.000				1/2" Ice	2.098	2.098	0.039
(AT&T - Existing)			0.000				1" Ice	2.294	2.294	0.062
Valmont Uni-Tri Bracket	C	None			0.000	150.000	No Ice	1.750	1.750	0.290
(AT&T - Existing)							1/2" Ice	1.940	1.940	0.306
							1" Ice	2.130	2.130	0.323
13' Platform w/Rails	C	None			0.000	136.000	No Ice	17.200	17.200	2.000

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 - Existing)						1/2" Ice	22.300	22.300	3.000
						1" Ice	83.000	83.000	4.000
APXVTM14	A	From Face	3.000	0.000	138.000	No Ice	6.342	3.607	0.056
(Sprint - Existing)			0.000			1/2" Ice	6.716	3.967	0.096
			0.000			1" Ice	7.097	4.333	0.140
APXVSPP18-C-A20	A	From Face	3.000	0.000	138.000	No Ice	8.024	5.283	0.057
(Sprint - Existing)			-6.000			1/2" Ice	8.480	5.736	0.107
			0.000			1" Ice	8.943	6.196	0.162
APXVTM14	B	From Face	3.000	0.000	138.000	No Ice	6.342	3.607	0.056
(Sprint - Existing)			0.000			1/2" Ice	6.716	3.967	0.096
			0.000			1" Ice	7.097	4.333	0.140
APXVSPP18-C-A20	B	From Face	3.000	0.000	138.000	No Ice	8.024	5.283	0.057
(Sprint - Existing)			-6.000			1/2" Ice	8.480	5.736	0.107
			0.000			1" Ice	8.943	6.196	0.162
APXVTM14	C	From Face	3.000	0.000	138.000	No Ice	6.342	3.607	0.056
(Sprint - Existing)			0.000			1/2" Ice	6.716	3.967	0.096
			0.000			1" Ice	7.097	4.333	0.140
APXVSPP18-C-A20	C	From Face	3.000	0.000	138.000	No Ice	8.024	5.283	0.057
(Sprint - Existing)			-6.000			1/2" Ice	8.480	5.736	0.107
			0.000			1" Ice	8.943	6.196	0.162
FD-RRH 2x50 800	A	From Face	1.000	0.000	138.000	No Ice	2.058	1.932	0.064
(Sprint - Existing)			0.000			1/2" Ice	2.240	2.109	0.086
			0.000			1" Ice	2.429	2.293	0.111
FD-RRH 2x50 800	B	From Face	1.000	0.000	138.000	No Ice	2.058	1.932	0.064
(Sprint - Existing)			0.000			1/2" Ice	2.240	2.109	0.086
			0.000			1" Ice	2.429	2.293	0.111
FD-RRH 2x50 800	C	From Face	1.000	0.000	138.000	No Ice	2.058	1.932	0.064
(Sprint - Existing)			0.000			1/2" Ice	2.240	2.109	0.086
			0.000			1" Ice	2.429	2.293	0.111
FD-RRH 4x45 1900	A	From Face	1.000	0.000	138.000	No Ice	2.319	2.384	0.060
(Sprint - Existing)			0.000			1/2" Ice	2.524	2.590	0.084
			0.000			1" Ice	2.736	2.804	0.111
FD-RRH 4x45 1900	B	From Face	1.000	0.000	138.000	No Ice	2.319	2.384	0.060
(Sprint - Existing)			0.000			1/2" Ice	2.524	2.590	0.084
			0.000			1" Ice	2.736	2.804	0.111
FD-RRH 4x45 1900	C	From Face	1.000	0.000	138.000	No Ice	2.319	2.384	0.060
(Sprint - Existing)			0.000			1/2" Ice	2.524	2.590	0.084
			0.000			1" Ice	2.736	2.804	0.111
TD-RRH8x20-25	A	From Face	1.000	0.000	138.000	No Ice	4.045	1.533	0.070
(Sprint - Existing)			0.000			1/2" Ice	4.298	1.712	0.097
			0.000			1" Ice	4.557	1.899	0.128
TD-RRH8x20-25	B	From Face	1.000	0.000	138.000	No Ice	4.045	1.533	0.070
(Sprint - Existing)			0.000			1/2" Ice	4.298	1.712	0.097
			0.000			1" Ice	4.557	1.899	0.128
TD-RRH8x20-25	C	From Face	1.000	0.000	138.000	No Ice	4.045	1.533	0.070
(Sprint - Existing)			0.000			1/2" Ice	4.298	1.712	0.097
			0.000			1" Ice	4.557	1.899	0.128
AIR6449	A	From Face	3.000	0.000	123.000	No Ice	5.655	2.416	0.103
(T-Mobile - Proposed)			-6.000			1/2" Ice	5.956	2.641	0.141
			0.000			1" Ice	6.265	2.874	0.184
AIR32	A	From Face	3.000	0.000	123.000	No Ice	6.510	4.712	0.133
(T-Mobile - Existing)			3.000			1/2" Ice	6.887	5.068	0.179
			0.000			1" Ice	7.271	5.431	0.230
APXVAARR24-43	A	From Face	3.000	0.000	123.000	No Ice	20.243	8.889	0.153
(T-Mobile - Existing)			6.000			1/2" Ice	20.890	9.487	0.266
			0.000			1" Ice	21.544	10.092	0.387
AIR6449	B	From Face	3.000	0.000	123.000	No Ice	5.655	2.416	0.103

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(T-Mobile - Proposed)			-6.000				1/2" Ice	5.956	2.641	0.141
			0.000				1" Ice	6.265	2.874	0.184
AIR32	B	From Face	3.000	0.000	0.000	123.000	No Ice	6.510	4.712	0.133
(T-Mobile - Existing)			3.000				1/2" Ice	6.887	5.068	0.179
			0.000				1" Ice	7.271	5.431	0.230
APXVAARR24-43	B	From Face	3.000	0.000	0.000	123.000	No Ice	20.243	8.889	0.153
(T-Mobile - Existing)			6.000				1/2" Ice	20.890	9.487	0.266
			0.000				1" Ice	21.544	10.092	0.387
AIR6449	C	From Face	3.000	0.000	0.000	123.000	No Ice	5.655	2.416	0.103
(T-Mobile - Proposed)			-6.000				1/2" Ice	5.956	2.641	0.141
			0.000				1" Ice	6.265	2.874	0.184
AIR32	C	From Face	3.000	0.000	0.000	123.000	No Ice	6.510	4.712	0.133
(T-Mobile - Existing)			3.000				1/2" Ice	6.887	5.068	0.179
			0.000				1" Ice	7.271	5.431	0.230
APXVAARR24-43	C	From Face	3.000	0.000	0.000	123.000	No Ice	20.243	8.889	0.153
(T-Mobile - Existing)			6.000				1/2" Ice	20.890	9.487	0.266
			0.000				1" Ice	21.544	10.092	0.387
TMA 10"x8"x3"	A	From Face	3.000	0.000	0.000	123.000	No Ice	0.667	0.258	0.015
(T-Mobile - Existing)			0.000				1/2" Ice	0.770	0.331	0.020
			0.000				1" Ice	0.881	0.411	0.027
TMA 10"x8"x3"	B	From Face	3.000	0.000	0.000	123.000	No Ice	0.667	0.258	0.015
(T-Mobile - Existing)			0.000				1/2" Ice	0.770	0.331	0.020
			0.000				1" Ice	0.881	0.411	0.027
TMA 10"x8"x3"	C	From Face	3.000	0.000	0.000	123.000	No Ice	0.667	0.258	0.015
(T-Mobile - Existing)			0.000				1/2" Ice	0.770	0.331	0.020
			0.000				1" Ice	0.881	0.411	0.027
Radio 4449 B71 B12	A	From Face	3.000	0.000	0.000	123.000	No Ice	1.639	1.291	0.074
(T-Mobile - Existing)			-6.000				1/2" Ice	1.799	1.436	0.091
			0.000				1" Ice	1.966	1.587	0.111
Radio 4449 B71 B12	B	From Face	3.000	0.000	0.000	123.000	No Ice	1.639	1.291	0.074
(T-Mobile - Existing)			-6.000				1/2" Ice	1.799	1.436	0.091
			0.000				1" Ice	1.966	1.587	0.111
Radio 4449 B71 B12	C	From Face	3.000	0.000	0.000	123.000	No Ice	1.639	1.291	0.074
(T-Mobile - Existing)			-6.000				1/2" Ice	1.799	1.436	0.091
			0.000				1" Ice	1.966	1.587	0.111
4415 B25	A	From Face	3.000	0.000	0.000	123.000	No Ice	1.843	0.820	0.046
(T-Mobile - Proposed)			-6.000				1/2" Ice	2.012	0.943	0.060
			0.000				1" Ice	2.190	1.075	0.077
4415 B25	B	From Face	3.000	0.000	0.000	123.000	No Ice	1.843	0.820	0.046
(T-Mobile - Proposed)			-6.000				1/2" Ice	2.012	0.943	0.060
			0.000				1" Ice	2.190	1.075	0.077
4415 B25	C	From Face	3.000	0.000	0.000	123.000	No Ice	1.843	0.820	0.046
(T-Mobile - Proposed)			-6.000				1/2" Ice	2.012	0.943	0.060
			0.000				1" Ice	2.190	1.075	0.077
SDX1926Q-43	A	From Face	3.000	0.000	0.000	123.000	No Ice	0.241	0.101	0.030
(T-Mobile - Proposed)			-6.000				1/2" Ice	0.306	0.144	0.032
			0.000				1" Ice	0.379	0.195	0.036
SDX1926Q-43	B	From Face	3.000	0.000	0.000	123.000	No Ice	0.241	0.101	0.030
(T-Mobile - Proposed)			-6.000				1/2" Ice	0.306	0.144	0.032
			0.000				1" Ice	0.379	0.195	0.036
SDX1926Q-43	C	From Face	3.000	0.000	0.000	123.000	No Ice	0.241	0.101	0.030
(T-Mobile - Proposed)			-6.000				1/2" Ice	0.306	0.144	0.032
			0.000				1" Ice	0.379	0.195	0.036
13' Platform w/Rails	C	None			0.000	121.000	No Ice	17.200	17.200	2.000
(T-Mobile - Existing)							1/2" Ice	22.300	22.300	3.000
							1" Ice	83.000	83.000	4.000
Stand-off	C	From Face	1.000		0.000	75.000	No Ice	0.750	0.750	0.027

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			1/2" Ice	0.950	0.950	0.036
			0.000			1" Ice	5.060	5.060	0.138
Stand-off	A	From Face	1.000	0.000	75.000	No Ice	0.750	0.750	0.027
			0.000			1/2" Ice	0.950	0.950	0.036
			0.000			1" Ice	5.060	5.060	0.138
GPS	A	From Face	2.000	0.000	76.000	No Ice	1.000	1.000	0.010
(Sprint - Existing)			0.000			1/2" Ice	1.500	1.500	0.015
			0.000			1" Ice	2.000	2.000	0.020

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2-11-DW1	A	Paraboloid	From	3.000	Worst		164.000	2.000	No Ice	3.142	0.035
(Clearwire - Existing)		w/Radome	Face	-2.000					1/2" Ice	3.409	0.017
				0.000					1" Ice	3.676	0.000
VHLP2-11-DW1	C	Paraboloid	From	3.000	Worst		164.000	2.000	No Ice	3.142	0.035
(Clearwire - Existing)		w/Radome	Face	-2.000					1/2" Ice	3.409	0.017
				0.000					1" Ice	3.676	0.000

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	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
L1	140.594	1.36	0.031	83.062	A	0.000	83.062	83.062	100.00	0.000	0.000
160.000-123.3					B	0.000	83.062		100.00	0.000	0.000
30					C	0.000	83.062		100.00	0.000	0.000
L2	104.030	1.276	0.029	115.781	A	0.000	115.781	115.781	100.00	0.000	0.000
123.330-86.17					B	0.000	115.781		100.00	0.000	0.000
0					C	0.000	115.781		100.00	0.000	0.000
L3	61.009	1.141	0.026	200.612	A	0.000	200.612	200.612	100.00	0.000	0.000
86.170-37.170					B	0.000	200.612		100.00	0.000	0.000
					C	0.000	200.612		100.00	0.000	0.000
L4	18.629	0.889	0.021	188.024	A	0.000	188.024	188.024	100.00	0.000	0.000
37.170-0.000					B	0.000	188.024		100.00	0.000	0.000
					C	0.000	188.024		100.00	0.000	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	140.594	1.36	0.008	1.734	93.660	A	0.000	93.660	93.660	100.00	0.000	0.000
160.000-123.330						B	0.000	93.660		100.00	0.000	0.000
						C	0.000	93.660		100.00	0.000	0.000
L2	104.030	1.276	0.008	1.683	126.520	A	0.000	126.520	126.520	100.00	0.000	0.000
123.330-86.170						B	0.000	126.520		100.00	0.000	0.000
						C	0.000	126.520		100.00	0.000	0.000
L3	61.009	1.141	0.007	1.595	214.352	A	0.000	214.352	214.352	100.00	0.000	0.000
86.170-37.170						B	0.000	214.352		100.00	0.000	0.000
						C	0.000	214.352		100.00	0.000	0.000
L4 37.170-0.000	18.629	0.889	0.006	1.417	197.905	A	0.000	197.905	197.905	100.00	0.000	0.000
						B	0.000	197.905		100.00	0.000	0.000
						C	0.000	197.905		100.00	0.000	0.000

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	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
L1	140.594	1.36	0.011	83.062	A	0.000	83.062	83.062	100.00	0.000	0.000
160.000-123.3					B	0.000	83.062		100.00	0.000	0.000
30					C	0.000	83.062		100.00	0.000	0.000
L2	104.030	1.276	0.010	115.781	A	0.000	115.781	115.781	100.00	0.000	0.000
123.330-86.17					B	0.000	115.781		100.00	0.000	0.000
0					C	0.000	115.781		100.00	0.000	0.000
L3	61.009	1.141	0.009	200.612	A	0.000	200.612	200.612	100.00	0.000	0.000
86.170-37.170					B	0.000	200.612		100.00	0.000	0.000
					C	0.000	200.612		100.00	0.000	0.000
L4	18.629	0.889	0.007	188.024	A	0.000	188.024	188.024	100.00	0.000	0.000
37.170-0.000					B	0.000	188.024		100.00	0.000	0.000
					C	0.000	188.024		100.00	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 ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	1.340	2.298	A	1	1	0.031	1	1	83.062	2.841	0.077	C
160.000-123.3			B	1	1		1	1	83.062			
30			C	1	1		1	1	83.062			
L2	2.008	5.555	A	1	1	0.029	1	1	115.781	3.715	0.100	C
123.330-86.17			B	1	1		1	1	115.781			
0			C	1	1		1	1	115.781			
L3	2.662	12.197	A	1	1	0.026	1	1	200.612	5.730	0.117	C
86.170-37.170			B	1	1		1	1	200.612			
			C	1	1		1	1	200.612			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L4	1.858	13.103	A	1	1	0.021	1	1	188.024	4.285	0.115	C
37.170-0.000			B	1	1		1	1	188.024			
			C	1	1		1	1	188.024			
Sum Weight:	7.868	33.152						OTM	1215.396 kip-ft	16.572		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	2.298	A	1	1	0.031	1	1	83.062	2.841	0.077	C
160.000-123.3			B	1	1		1	1	83.062			
30			C	1	1		1	1	83.062			
L2	2.008	5.555	A	1	1	0.029	1	1	115.781	3.715	0.100	C
123.330-86.17			B	1	1		1	1	115.781			
0			C	1	1		1	1	115.781			
L3	2.662	12.197	A	1	1	0.026	1	1	200.612	5.730	0.117	C
86.170-37.170			B	1	1		1	1	200.612			
			C	1	1		1	1	200.612			
L4	1.858	13.103	A	1	1	0.021	1	1	188.024	4.285	0.115	C
37.170-0.000			B	1	1		1	1	188.024			
			C	1	1		1	1	188.024			
Sum Weight:	7.868	33.152						OTM	1215.396 kip-ft	16.572		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	2.298	A	1	1	0.031	1	1	83.062	2.841	0.077	C
160.000-123.3			B	1	1		1	1	83.062			
30			C	1	1		1	1	83.062			
L2	2.008	5.555	A	1	1	0.029	1	1	115.781	3.715	0.100	C
123.330-86.17			B	1	1		1	1	115.781			
0			C	1	1		1	1	115.781			
L3	2.662	12.197	A	1	1	0.026	1	1	200.612	5.730	0.117	C
86.170-37.170			B	1	1		1	1	200.612			
			C	1	1		1	1	200.612			
L4	1.858	13.103	A	1	1	0.021	1	1	188.024	4.285	0.115	C
37.170-0.000			B	1	1		1	1	188.024			
			C	1	1		1	1	188.024			
Sum Weight:	7.868	33.152						OTM	1215.396 kip-ft	16.572		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	2.298	A	1	1	0.031	1	1	83.062	2.841	0.077	C
160.000-123.3			B	1	1		1	1	83.062			
30			C	1	1		1	1	83.062			
L2	2.008	5.555	A	1	1	0.029	1	1	115.781	3.715	0.100	C
123.330-86.17			B	1	1		1	1	115.781			
0			C	1	1		1	1	115.781			
L3	2.662	12.197	A	1	1	0.026	1	1	200.612	5.730	0.117	C
86.170-37.170			B	1	1		1	1	200.612			
			C	1	1		1	1	200.612			
L4	1.858	13.103	A	1	1	0.021	1	1	188.024	4.285	0.115	C
37.170-0.000			B	1	1		1	1	188.024			
			C	1	1		1	1	188.024			
Sum Weight:	7.868	33.152						OTM	1215.396 kip-ft	16.572		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	4.532	A	1	1.2	0.008	1	1	93.660	1.022	0.028	C
160.000-123.3			B	1	1.2		1	1	93.660			
30			C	1	1.2		1	1	93.660			
L2	2.008	8.524	A	1	1.2	0.008	1	1	126.520	1.295	0.035	C
123.330-86.17			B	1	1.2		1	1	126.520			
0			C	1	1.2		1	1	126.520			
L3	2.662	17.012	A	1	1.2	0.007	1	1	214.352	1.952	0.040	C
86.170-37.170			B	1	1.2		1	1	214.352			
			C	1	1.2		1	1	214.352			
L4	1.858	17.073	A	1	1.2	0.006	1	1	197.905	1.438	0.039	C
37.170-0.000			B	1	1.2		1	1	197.905			
			C	1	1.2		1	1	197.905			
Sum Weight:	7.868	47.140						OTM	424.174 kip-ft	5.706		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	4.532	A	1	1.2	0.008	1	1	93.660	1.022	0.028	C
160.000-123.3			B	1	1.2		1	1	93.660			
30			C	1	1.2		1	1	93.660			
L2	2.008	8.524	A	1	1.2	0.008	1	1	126.520	1.295	0.035	C
123.330-86.17			B	1	1.2		1	1	126.520			
0			C	1	1.2		1	1	126.520			
L3	2.662	17.012	A	1	1.2	0.007	1	1	214.352	1.952	0.040	C
86.170-37.170			B	1	1.2		1	1	214.352			
			C	1	1.2		1	1	214.352			
L4	1.858	17.073	A	1	1.2	0.006	1	1	197.905	1.438	0.039	C
37.170-0.000			B	1	1.2		1	1	197.905			
			C	1	1.2		1	1	197.905			
Sum Weight:	7.868	47.140						OTM	424.174 kip-ft	5.706		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	4.532	A	1	1.2	0.008	1	1	93.660	1.022	0.028	C
160.000-123.3			B	1	1.2		1	1	93.660			
30			C	1	1.2		1	1	93.660			
L2	2.008	8.524	A	1	1.2	0.008	1	1	126.520	1.295	0.035	C
123.330-86.17			B	1	1.2		1	1	126.520			
0			C	1	1.2		1	1	126.520			
L3	2.662	17.012	A	1	1.2	0.007	1	1	214.352	1.952	0.040	C
86.170-37.170			B	1	1.2		1	1	214.352			
			C	1	1.2		1	1	214.352			
L4	1.858	17.073	A	1	1.2	0.006	1	1	197.905	1.438	0.039	C
37.170-0.000			B	1	1.2		1	1	197.905			
			C	1	1.2		1	1	197.905			
Sum Weight:	7.868	47.140						OTM	424.174 kip-ft	5.706		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	4.532	A	1	1.2	0.008	1	1	93.660	1.022	0.028	C
160.000-123.3			B	1	1.2		1	1	93.660			
30			C	1	1.2		1	1	93.660			
L2	2.008	8.524	A	1	1.2	0.008	1	1	126.520	1.295	0.035	C
123.330-86.17			B	1	1.2		1	1	126.520			
0			C	1	1.2		1	1	126.520			
L3	2.662	17.012	A	1	1.2	0.007	1	1	214.352	1.952	0.040	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
86.170-37.170			B	1	1.2		1	1	214.352			
			C	1	1.2		1	1	214.352			
L4	1.858	17.073	A	1	1.2	0.006	1	1	197.905	1.438	0.039	C
37.170-0.000			B	1	1.2		1	1	197.905			
			C	1	1.2		1	1	197.905			
Sum Weight:	7.868	47.140						OTM	424.174 kip-ft	5.706		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	2.298	A	1	1	0.011	1	1	83.062	0.973	0.027	C
160.000-123.3			B	1	1		1	1	83.062			
30			C	1	1		1	1	83.062			
L2	2.008	5.555	A	1	1	0.010	1	1	115.781	1.272	0.034	C
123.330-86.17			B	1	1		1	1	115.781			
0			C	1	1		1	1	115.781			
L3	2.662	12.197	A	1	1	0.009	1	1	200.612	1.961	0.040	C
86.170-37.170			B	1	1		1	1	200.612			
			C	1	1		1	1	200.612			
L4	1.858	13.103	A	1	1	0.007	1	1	188.024	1.467	0.039	C
37.170-0.000			B	1	1		1	1	188.024			
			C	1	1		1	1	188.024			
Sum Weight:	7.868	33.152						OTM	416.075 kip-ft	5.673		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	2.298	A	1	1	0.011	1	1	83.062	0.973	0.027	C
160.000-123.3			B	1	1		1	1	83.062			
30			C	1	1		1	1	83.062			
L2	2.008	5.555	A	1	1	0.010	1	1	115.781	1.272	0.034	C
123.330-86.17			B	1	1		1	1	115.781			
0			C	1	1		1	1	115.781			
L3	2.662	12.197	A	1	1	0.009	1	1	200.612	1.961	0.040	C
86.170-37.170			B	1	1		1	1	200.612			
			C	1	1		1	1	200.612			
L4	1.858	13.103	A	1	1	0.007	1	1	188.024	1.467	0.039	C
37.170-0.000			B	1	1		1	1	188.024			
			C	1	1		1	1	188.024			
Sum Weight:	7.868	33.152						OTM	416.075 kip-ft	5.673		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	2.298	A	1	1	0.011	1	1	83.062	0.973	0.027	C
160.000-123.3			B	1	1		1	1	83.062			
30			C	1	1		1	1	83.062			
L2	2.008	5.555	A	1	1	0.010	1	1	115.781	1.272	0.034	C
123.330-86.17			B	1	1		1	1	115.781			
0			C	1	1		1	1	115.781			
L3	2.662	12.197	A	1	1	0.009	1	1	200.612	1.961	0.040	C
86.170-37.170			B	1	1		1	1	200.612			
			C	1	1		1	1	200.612			
L4	1.858	13.103	A	1	1	0.007	1	1	188.024	1.467	0.039	C
37.170-0.000			B	1	1		1	1	188.024			
			C	1	1		1	1	188.024			
Sum Weight:	7.868	33.152						OTM	416.075 kip-ft	5.673		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.340	2.298	A	1	1	0.011	1	1	83.062	0.973	0.027	C
160.000-123.3			B	1	1		1	1	83.062			
30			C	1	1		1	1	83.062			
L2	2.008	5.555	A	1	1	0.010	1	1	115.781	1.272	0.034	C
123.330-86.17			B	1	1		1	1	115.781			
0			C	1	1		1	1	115.781			
L3	2.662	12.197	A	1	1	0.009	1	1	200.612	1.961	0.040	C
86.170-37.170			B	1	1		1	1	200.612			
			C	1	1		1	1	200.612			
L4	1.858	13.103	A	1	1	0.007	1	1	188.024	1.467	0.039	C
37.170-0.000			B	1	1		1	1	188.024			
			C	1	1		1	1	188.024			
Sum Weight:	7.868	33.152						OTM	416.075 kip-ft	5.673		

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	33.152					
Bracing Weight	0.000					
Total Member Self-Weight	33.152			0.143	0.364	
Total Weight	54.246			0.143	0.364	
Wind 0 deg - No Ice		-0.047	-30.111	-3196.917	8.263	-0.210
Wind 30 deg - No Ice		15.003	-26.053	-2764.643	-1589.679	0.035
Wind 45 deg - No Ice		21.241	-21.258	-2254.934	-2252.385	0.158
Wind 60 deg - No Ice		26.033	-15.015	-1591.546	-2761.570	0.270
Wind 90 deg - No Ice		30.087	0.047	8.042	-3193.403	0.433
Wind 120 deg - No Ice		26.080	15.097	1605.514	-2769.469	0.480
Wind 135 deg - No Ice		21.308	21.325	2266.391	-2263.556	0.455
Wind 150 deg - No Ice		15.085	26.101	2772.828	-1603.360	0.398
Wind 180 deg - No Ice		0.047	30.111	3197.203	-7.535	0.210
Wind 210 deg - No Ice		-15.003	26.053	2764.929	1590.406	-0.035
Wind 225 deg - No Ice		-21.241	21.258	2255.220	2253.112	-0.158
Wind 240 deg - No Ice		-26.033	15.015	1591.832	2762.297	-0.270
Wind 270 deg - No Ice		-30.087	-0.047	-7.756	3194.130	-0.433
Wind 300 deg - No Ice		-26.080	-15.097	-1605.228	2770.196	-0.480
Wind 315 deg - No Ice		-21.308	-21.325	-2266.105	2264.283	-0.455
Wind 330 deg - No Ice		-15.085	-26.101	-2772.542	1604.088	-0.398
Member Ice	13.988					
Total Weight Ice	95.326			0.605	0.567	
Wind 0 deg - Ice		-0.015	-13.624	-1561.337	3.056	-0.290
Wind 30 deg - Ice		6.796	-11.791	-1350.832	-777.876	-0.170
Wind 45 deg - Ice		9.619	-9.623	-1102.095	-1101.606	-0.090
Wind 60 deg - Ice		11.786	-6.799	-778.211	-1350.224	-0.004
Wind 90 deg - Ice		13.618	0.015	3.094	-1560.629	0.162
Wind 120 deg - Ice		11.801	6.825	783.732	-1352.713	0.286
Wind 135 deg - Ice		9.640	9.644	1106.825	-1105.125	0.320
Wind 150 deg - Ice		6.822	11.806	1354.532	-782.186	0.332
Wind 180 deg - Ice		0.015	13.624	1562.548	-1.922	0.290
Wind 210 deg - Ice		-6.796	11.791	1352.043	779.010	0.170
Wind 225 deg - Ice		-9.619	9.623	1103.306	1102.740	0.090
Wind 240 deg - Ice		-11.786	6.799	779.422	1351.358	0.004
Wind 270 deg - Ice		-13.618	-0.015	-1.883	1561.763	-0.162
Wind 300 deg - Ice		-11.801	-6.825	-782.521	1353.847	-0.286
Wind 315 deg - Ice		-9.640	-9.644	-1105.615	1106.259	-0.320
Wind 330 deg - Ice		-6.822	-11.806	-1353.321	783.320	-0.332
Total Weight	54.246			0.143	0.364	
Wind 0 deg - Service		-0.016	-10.308	-1094.330	3.068	-0.072
Wind 30 deg - Service		5.136	-8.919	-946.347	-543.967	0.012
Wind 45 deg - Service		7.272	-7.278	-771.854	-770.836	0.054
Wind 60 deg - Service		8.912	-5.140	-544.752	-945.149	0.093
Wind 90 deg - Service		10.300	0.016	2.847	-1092.982	0.148
Wind 120 deg - Service		8.928	5.168	549.721	-947.853	0.164
Wind 135 deg - Service		7.295	7.300	775.964	-774.661	0.156
Wind 150 deg - Service		5.164	8.935	949.337	-548.651	0.136
Wind 180 deg - Service		0.016	10.308	1094.616	-2.340	0.072
Wind 210 deg - Service		-5.136	8.919	946.632	544.695	-0.012
Wind 225 deg - Service		-7.272	7.278	772.140	771.564	-0.054
Wind 240 deg - Service		-8.912	5.140	545.038	945.877	-0.093
Wind 270 deg - Service		-10.300	-0.016	-2.561	1093.710	-0.148
Wind 300 deg - Service		-8.928	-5.168	-549.436	948.581	-0.164
Wind 315 deg - Service		-7.295	-7.300	-775.679	775.388	-0.156
Wind 330 deg - Service		-5.164	-8.935	-949.051	549.379	-0.136

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 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service

Comb. No.	Description
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	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
L1	160 - 123.33	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-37.693	0.121	-0.443
			Max. Mx	26	-13.328	510.955	2.932
			Max. My	18	-13.323	-2.722	-511.161
			Max. Vy	26	-22.142	510.955	2.932
			Max. Vx	18	22.182	-2.722	-511.161
			Max. Torque	2			1.042
L2	123.33 - 86.17	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-59.699	0.121	-0.443
			Max. Mx	26	-26.028	1552.277	5.812
			Max. My	18	-26.024	-5.609	-1553.913
			Max. Vy	26	-32.472	1552.277	5.812
			Max. Vx	18	32.511	-5.609	-1553.913
			Max. Torque	11			-0.769
L3	86.17 - 37.17	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-81.763	0.640	-0.634
			Max. Mx	26	-43.443	3294.736	9.557
			Max. My	18	-43.441	-9.270	-3298.160
			Max. Vy	26	-40.889	3294.736	9.557
			Max. Vx	18	40.929	-9.270	-3298.160
			Max. Torque	28			0.789
L4	37.17 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-107.905	0.640	-0.634
			Max. Mx	26	-65.070	5282.740	12.999
			Max. My	18	-65.070	-12.710	-5287.898
			Max. Vy	26	-48.174	5282.740	12.999
			Max. Vx	18	48.212	-12.710	-5287.898
			Max. Torque	28			0.787

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	43	107.905	-0.015	-13.624
	Max. H_x	26	65.096	48.140	0.076
	Max. H_z	2	65.096	0.076	48.178
	Max. M_x	2	5287.535	0.076	48.178
	Max. M_z	10	5281.811	-48.140	-0.076
	Max. Torsion	28	0.787	41.728	24.155
	Min. Vert	7	48.822	-33.986	34.013
	Min. H_x	10	65.096	-48.140	-0.076

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H_z	18	65.096	-0.076	-48.178
	Min. M_x	18	-5287.898	-0.076	-48.178
	Min. M_z	26	-5282.740	48.140	0.076
	Min. Torsion	12	-0.774	-41.728	-24.155

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	54.246	0.000	0.000	0.143	0.364	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	65.096	-0.076	-48.178	-5287.535	13.640	-0.429
0.9 Dead+1.6 Wind 0 deg - No Ice	48.822	-0.076	-48.178	-5241.582	13.374	-0.415
1.2 Dead+1.6 Wind 30 deg - No Ice	65.096	24.004	-41.685	-4572.576	-2629.281	0.013
0.9 Dead+1.6 Wind 30 deg - No Ice	48.822	24.004	-41.685	-4532.849	-2606.547	0.025
1.2 Dead+1.6 Wind 45 deg - No Ice	65.096	33.986	-34.013	-3729.530	-3725.384	0.242
0.9 Dead+1.6 Wind 45 deg - No Ice	48.822	33.986	-34.013	-3697.144	-3693.109	0.252
1.2 Dead+1.6 Wind 60 deg - No Ice	65.096	41.652	-24.023	-2632.301	-4567.571	0.447
0.9 Dead+1.6 Wind 60 deg - No Ice	48.822	41.652	-24.023	-2609.467	-4527.962	0.454
1.2 Dead+1.6 Wind 90 deg - No Ice	65.096	48.140	0.076	13.352	-5281.811	0.724
0.9 Dead+1.6 Wind 90 deg - No Ice	48.822	48.140	0.076	13.161	-5235.982	0.724
1.2 Dead+1.6 Wind 120 deg - No Ice	65.096	41.728	24.155	2655.438	-4580.684	0.774
0.9 Dead+1.6 Wind 120 deg - No Ice	48.822	41.728	24.155	2632.263	-4540.932	0.768
1.2 Dead+1.6 Wind 135 deg - No Ice	65.096	34.093	34.120	3748.458	-3743.959	0.719
0.9 Dead+1.6 Wind 135 deg - No Ice	48.822	34.093	34.120	3715.776	-3711.481	0.711
1.2 Dead+1.6 Wind 150 deg - No Ice	65.096	24.135	41.761	4586.045	-2652.066	0.621
0.9 Dead+1.6 Wind 150 deg - No Ice	48.822	24.135	41.761	4546.081	-2629.084	0.611
1.2 Dead+1.6 Wind 180 deg - No Ice	65.096	0.076	48.178	5287.898	-12.710	0.340
0.9 Dead+1.6 Wind 180 deg - No Ice	48.822	0.076	48.178	5241.850	-12.688	0.327
1.2 Dead+1.6 Wind 210 deg - No Ice	65.096	-24.004	41.685	4572.936	2630.215	-0.001
0.9 Dead+1.6 Wind 210 deg - No Ice	48.822	-24.004	41.685	4533.114	2607.237	-0.013
1.2 Dead+1.6 Wind 225 deg - No Ice	65.096	-33.986	34.013	3729.888	3726.319	-0.176
0.9 Dead+1.6 Wind 225 deg - No Ice	48.822	-33.986	34.013	3697.408	3693.799	-0.187
1.2 Dead+1.6 Wind 240 deg - No Ice	65.096	-41.652	24.023	2632.656	4568.505	-0.346

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
0.9 Dead+1.6 Wind 240 deg - No Ice	48.822	-41.652	24.023	2609.729	4528.651	-0.354
1.2 Dead+1.6 Wind 270 deg - No Ice	65.096	-48.140	-0.076	-12.999	5282.740	-0.635
0.9 Dead+1.6 Wind 270 deg - No Ice	48.822	-48.140	-0.076	-12.901	5236.667	-0.637
1.2 Dead+1.6 Wind 300 deg - No Ice	65.096	-41.728	-24.155	-2655.082	4581.609	-0.787
0.9 Dead+1.6 Wind 300 deg - No Ice	48.822	-41.728	-24.155	-2632.000	4541.615	-0.782
1.2 Dead+1.6 Wind 315 deg - No Ice	65.096	-34.093	-34.120	-3748.099	3744.883	-0.785
0.9 Dead+1.6 Wind 315 deg - No Ice	48.822	-34.093	-34.120	-3715.512	3712.163	-0.776
1.2 Dead+1.6 Wind 330 deg - No Ice	65.096	-24.135	-41.761	-4585.684	2652.992	-0.723
0.9 Dead+1.6 Wind 330 deg - No Ice	48.822	-24.135	-41.761	-4545.815	2629.767	-0.712
1.2 Dead+1.0 Ice+1.0 Temp	107.905	0.000	0.000	0.634	0.640	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	107.905	-0.015	-13.624	-1689.494	3.455	-0.323
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	107.905	6.796	-11.791	-1461.674	-841.625	-0.201
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	107.905	9.619	-9.623	-1192.496	-1191.952	-0.117
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	107.905	11.786	-6.799	-842.002	-1461.002	-0.025
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	107.905	13.618	0.015	3.481	-1688.714	0.154
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	107.905	11.801	6.825	848.226	-1463.746	0.291
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	107.905	9.640	9.644	1197.848	-1195.834	0.331
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	107.905	6.822	11.806	1465.888	-846.380	0.349
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	107.905	0.015	13.624	1690.964	-2.036	0.316
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	107.905	-6.796	11.791	1463.145	843.044	0.201
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	107.905	-9.619	9.623	1193.968	1193.373	0.121
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	107.905	-11.786	6.799	843.473	1462.423	0.032
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	107.905	-13.618	-0.015	-2.011	1690.135	-0.148
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	107.905	-11.801	-6.825	-846.758	1465.166	-0.291
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	107.905	-9.640	-9.644	-1196.379	1197.254	-0.335
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	107.905	-6.822	-11.806	-1464.419	847.799	-0.356
Dead+Wind 0 deg - Service	54.246	-0.016	-10.308	-1125.923	3.187	-0.083
Dead+Wind 30 deg - Service	54.246	5.136	-8.919	-973.657	-559.645	0.004
Dead+Wind 45 deg - Service	54.246	7.272	-7.278	-794.122	-793.068	0.049
Dead+Wind 60 deg - Service	54.246	8.912	-5.140	-560.459	-972.418	0.090
Dead+Wind 90 deg - Service	54.246	10.300	0.016	2.954	-1124.529	0.149
Dead+Wind 120 deg - Service	54.246	8.928	5.168	565.616	-975.220	0.168
Dead+Wind 135 deg - Service	54.246	7.295	7.300	798.388	-797.031	0.160
Dead+Wind 150 deg - Service	54.246	5.164	8.935	976.762	-564.500	0.141
Dead+Wind 180 deg - Service	54.246	0.016	10.308	1126.226	-2.419	0.079
Dead+Wind 210 deg - Service	54.246	-5.136	8.919	973.960	560.413	-0.003

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 225 deg - Service	54.246	-7.272	7.278	794.425	793.836	-0.046
Dead+Wind 240 deg - Service	54.246	-8.912	5.140	560.761	973.186	-0.085
Dead+Wind 270 deg - Service	54.246	-10.300	-0.016	-2.652	1125.297	-0.145
Dead+Wind 300 deg - Service	54.246	-8.928	-5.168	-565.313	975.988	-0.168
Dead+Wind 315 deg - Service	54.246	-7.295	-7.300	-798.085	797.799	-0.163
Dead+Wind 330 deg - Service	54.246	-5.164	-8.935	-976.459	565.268	-0.146

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	0.000	-54.246	0.000	0.000	54.246	0.000	0.000%
2	-0.076	-65.096	-48.178	0.076	65.096	48.178	0.000%
3	-0.076	-48.822	-48.178	0.076	48.822	48.178	0.000%
4	24.004	-65.096	-41.685	-24.004	65.096	41.685	0.000%
5	24.004	-48.822	-41.685	-24.004	48.822	41.685	0.000%
6	33.986	-65.096	-34.013	-33.986	65.096	34.013	0.000%
7	33.986	-48.822	-34.013	-33.986	48.822	34.013	0.000%
8	41.652	-65.096	-24.023	-41.652	65.096	24.023	0.000%
9	41.652	-48.822	-24.023	-41.652	48.822	24.023	0.000%
10	48.140	-65.096	0.076	-48.140	65.096	-0.076	0.000%
11	48.140	-48.822	0.076	-48.140	48.822	-0.076	0.000%
12	41.728	-65.096	24.155	-41.728	65.096	-24.155	0.000%
13	41.728	-48.822	24.155	-41.728	48.822	-24.155	0.000%
14	34.093	-65.096	34.120	-34.093	65.096	-34.120	0.000%
15	34.093	-48.822	34.120	-34.093	48.822	-34.120	0.000%
16	24.135	-65.096	41.761	-24.135	65.096	-41.761	0.000%
17	24.135	-48.822	41.761	-24.135	48.822	-41.761	0.000%
18	0.076	-65.096	48.178	-0.076	65.096	-48.178	0.000%
19	0.076	-48.822	48.178	-0.076	48.822	-48.178	0.000%
20	-24.004	-65.096	41.685	24.004	65.096	-41.685	0.000%
21	-24.004	-48.822	41.685	24.004	48.822	-41.685	0.000%
22	-33.986	-65.096	34.013	33.986	65.096	-34.013	0.000%
23	-33.986	-48.822	34.013	33.986	48.822	-34.013	0.000%
24	-41.652	-65.096	24.023	41.652	65.096	-24.023	0.000%
25	-41.652	-48.822	24.023	41.652	48.822	-24.023	0.000%
26	-48.140	-65.096	-0.076	48.140	65.096	0.076	0.000%
27	-48.140	-48.822	-0.076	48.140	48.822	0.076	0.000%
28	-41.728	-65.096	-24.155	41.728	65.096	24.155	0.000%
29	-41.728	-48.822	-24.155	41.728	48.822	24.155	0.000%
30	-34.093	-65.096	-34.120	34.093	65.096	34.120	0.000%
31	-34.093	-48.822	-34.120	34.093	48.822	34.120	0.000%
32	-24.135	-65.096	-41.761	24.135	65.096	41.761	0.000%
33	-24.135	-48.822	-41.761	24.135	48.822	41.761	0.000%
34	0.000	-107.905	0.000	0.000	107.905	0.000	0.000%
35	-0.015	-107.905	-13.624	0.015	107.905	13.624	0.000%
36	6.796	-107.905	-11.791	-6.796	107.905	11.791	0.000%
37	9.619	-107.905	-9.623	-9.619	107.905	9.623	0.000%
38	11.786	-107.905	-6.799	-11.786	107.905	6.799	0.000%
39	13.618	-107.905	0.015	-13.618	107.905	-0.015	0.000%
40	11.801	-107.905	6.825	-11.801	107.905	-6.825	0.000%
41	9.640	-107.905	9.644	-9.640	107.905	-9.644	0.000%
42	6.822	-107.905	11.806	-6.822	107.905	-11.806	0.000%
43	0.015	-107.905	13.624	-0.015	107.905	-13.624	0.000%
44	-6.796	-107.905	11.791	6.796	107.905	-11.791	0.000%
45	-9.619	-107.905	9.623	9.619	107.905	-9.623	0.000%
46	-11.786	-107.905	6.799	11.786	107.905	-6.799	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
47	-13.618	-107.905	-0.015	13.618	107.905	0.015	0.000%
48	-11.801	-107.905	-6.825	11.801	107.905	6.825	0.000%
49	-9.640	-107.905	-9.644	9.640	107.905	9.644	0.000%
50	-6.822	-107.905	-11.806	6.822	107.905	11.806	0.000%
51	-0.016	-54.246	-10.308	0.016	54.246	10.308	0.000%
52	5.136	-54.246	-8.919	-5.136	54.246	8.919	0.000%
53	7.272	-54.246	-7.278	-7.272	54.246	7.278	0.000%
54	8.912	-54.246	-5.140	-8.912	54.246	5.140	0.000%
55	10.300	-54.246	0.016	-10.300	54.246	-0.016	0.000%
56	8.928	-54.246	5.168	-8.928	54.246	-5.168	0.000%
57	7.295	-54.246	7.300	-7.295	54.246	-7.300	0.000%
58	5.164	-54.246	8.935	-5.164	54.246	-8.935	0.000%
59	0.016	-54.246	10.308	-0.016	54.246	-10.308	0.000%
60	-5.136	-54.246	8.919	5.136	54.246	-8.919	0.000%
61	-7.272	-54.246	7.278	7.272	54.246	-7.278	0.000%
62	-8.912	-54.246	5.140	8.912	54.246	-5.140	0.000%
63	-10.300	-54.246	-0.016	10.300	54.246	0.016	0.000%
64	-8.928	-54.246	-5.168	8.928	54.246	5.168	0.000%
65	-7.295	-54.246	-7.300	7.295	54.246	7.300	0.000%
66	-5.164	-54.246	-8.935	5.164	54.246	8.935	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	0.00026152
3	Yes	4	0.00000001	0.00013988
4	Yes	5	0.00000001	0.00057875
5	Yes	5	0.00000001	0.00024834
6	Yes	5	0.00000001	0.00064091
7	Yes	5	0.00000001	0.00027020
8	Yes	5	0.00000001	0.00057303
9	Yes	5	0.00000001	0.00024557
10	Yes	4	0.00000001	0.00040520
11	Yes	4	0.00000001	0.00024068
12	Yes	5	0.00000001	0.00059145
13	Yes	5	0.00000001	0.00025331
14	Yes	5	0.00000001	0.00064931
15	Yes	5	0.00000001	0.00027294
16	Yes	5	0.00000001	0.00058192
17	Yes	5	0.00000001	0.00024878
18	Yes	4	0.00000001	0.00016726
19	Yes	4	0.00000001	0.00007159
20	Yes	5	0.00000001	0.00057679
21	Yes	5	0.00000001	0.00024720
22	Yes	5	0.00000001	0.00064154
23	Yes	5	0.00000001	0.00027037
24	Yes	5	0.00000001	0.00058163
25	Yes	5	0.00000001	0.00024963
26	Yes	4	0.00000001	0.00020680
27	Yes	4	0.00000001	0.00010536
28	Yes	5	0.00000001	0.00058046
29	Yes	5	0.00000001	0.00024805
30	Yes	5	0.00000001	0.00064973
31	Yes	5	0.00000001	0.00027309

32	Yes	5	0.00000001	0.00059089
33	Yes	5	0.00000001	0.00025293
34	Yes	4	0.00000001	0.00000001
35	Yes	5	0.00000001	0.00040220
36	Yes	5	0.00000001	0.00059218
37	Yes	5	0.00000001	0.00064447
38	Yes	5	0.00000001	0.00059280
39	Yes	5	0.00000001	0.00040210
40	Yes	5	0.00000001	0.00060096
41	Yes	5	0.00000001	0.00065094
42	Yes	5	0.00000001	0.00059682
43	Yes	5	0.00000001	0.00040286
44	Yes	5	0.00000001	0.00059627
45	Yes	5	0.00000001	0.00064690
46	Yes	5	0.00000001	0.00059540
47	Yes	5	0.00000001	0.00040251
48	Yes	5	0.00000001	0.00059639
49	Yes	5	0.00000001	0.00065037
50	Yes	5	0.00000001	0.00060077
51	Yes	4	0.00000001	0.00003101
52	Yes	4	0.00000001	0.00020110
53	Yes	4	0.00000001	0.00022983
54	Yes	4	0.00000001	0.00019527
55	Yes	4	0.00000001	0.00003416
56	Yes	4	0.00000001	0.00021042
57	Yes	4	0.00000001	0.00023475
58	Yes	4	0.00000001	0.00019951
59	Yes	4	0.00000001	0.00003060
60	Yes	4	0.00000001	0.00019915
61	Yes	4	0.00000001	0.00023089
62	Yes	4	0.00000001	0.00020500
63	Yes	4	0.00000001	0.00003299
64	Yes	4	0.00000001	0.00019837
65	Yes	4	0.00000001	0.00023522
66	Yes	4	0.00000001	0.00020930

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 123.33	20.649	65	1.274	0.002
L2	128 - 86.17	12.746	65	1.023	0.001
L3	92 - 37.17	6.252	65	0.672	0.000
L4	44.5 - 0	1.412	65	0.289	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
168.000	GPS	65	20.649	1.274	0.002	31139
167.000	DB844H90E-M	65	20.649	1.274	0.002	31139
165.000	(4) 8'x2 1/2" Pipe Mount	65	20.649	1.274	0.002	31139
164.000	VHLP2-11-DW1	65	20.649	1.274	0.002	31139
158.000	LPA-80060-6CF	65	20.129	1.259	0.002	31139

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
156.000	13' Platform w/Rails	65	19.609	1.245	0.002	31139
150.000	RRUS-12	65	18.061	1.201	0.001	15569
148.000	7770.00	65	17.550	1.186	0.001	12974
146.000	13' Platform w/Rails	65	17.043	1.170	0.001	11121
138.000	APXVTM14	65	15.063	1.108	0.001	7076
136.000	13' Platform w/Rails	65	14.584	1.092	0.001	6487
123.000	AIR6449	65	11.674	0.977	0.000	5064
121.000	13' Platform w/Rails	65	11.261	0.958	0.000	5148
76.000	GPS	65	4.169	0.529	0.000	6707
75.000	Stand-off	65	4.054	0.521	0.000	6702

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 123.33	96.864	30	5.982	0.008
L2	128 - 86.17	59.846	30	4.809	0.003
L3	92 - 37.17	29.366	30	3.159	0.001
L4	44.5 - 0	6.633	30	1.359	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
168.000	GPS	30	96.864	5.982	0.008	6787
167.000	DB844H90E-M	30	96.864	5.982	0.008	6787
165.000	(4) 8'x2 1/2" Pipe Mount	30	96.864	5.982	0.008	6787
164.000	VHLP2-11-DW1	30	96.864	5.982	0.008	6787
158.000	LPA-80060-6CF	30	94.429	5.914	0.008	6787
156.000	13' Platform w/Rails	30	91.996	5.846	0.007	6787
150.000	RRUS-12	30	84.744	5.639	0.006	3392
148.000	7770.00	30	82.351	5.569	0.006	2826
146.000	13' Platform w/Rails	30	79.976	5.499	0.005	2422
138.000	APXVTM14	30	70.704	5.206	0.004	1539
136.000	13' Platform w/Rails	30	68.458	5.130	0.004	1411
123.000	AIR6449	30	54.817	4.593	0.002	1097
121.000	13' Platform w/Rails	30	52.883	4.504	0.002	1115
76.000	GPS	30	19.583	2.487	0.001	1432
75.000	Stand-off	30	19.043	2.447	0.001	1431

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	160 - 123.33 (1)	TP31.46x21.2x0.219	36.670	0.000	0.0	21.109	-13.313	1280.340	0.010
L2	123.33 - 86.17 (2)	TP41.44x29.715x0.344	41.830	0.000	0.0	43.711	-26.016	2903.880	0.009
L3	86.17 - 37.17 (3)	TP54.46x39.118x0.438	54.830	0.000	0.0	73.298	-43.438	4793.440	0.009
L4	37.17 - 0 (4)	TP64x51.533x0.469	44.500	0.000	0.0	95.943	-65.070	5850.220	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	160 - 123.33 (1)	TP31.46x21.2x0.219	513.972	781.276	0.658	0.000	781.276	0.000
L2	123.33 - 86.17 (2)	TP41.44x29.715x0.344	1558.900	2332.717	0.668	0.000	2332.717	0.000
L3	86.17 - 37.17 (3)	TP54.46x39.118x0.438	3306.025	5072.692	0.652	0.000	5072.692	0.000
L4	37.17 - 0 (4)	TP64x51.533x0.469	5298.342	7575.983	0.699	0.000	7575.983	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	160 - 123.33 (1)	TP31.46x21.2x0.219	22.243	640.169	0.035	0.644	1588.117	0.000
L2	123.33 - 86.17 (2)	TP41.44x29.715x0.344	32.572	1451.940	0.022	0.642	4743.992	0.000
L3	86.17 - 37.17 (3)	TP54.46x39.118x0.438	40.987	2396.720	0.017	0.786	10315.250	0.000
L4	37.17 - 0 (4)	TP64x51.533x0.469	48.269	2925.110	0.017	0.785	15400.167	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	160 - 123.33 (1)	0.010	0.658	0.000	0.035	0.000	0.669 ✔	1.000	4.8.2 ✔
L2	123.33 - 86.17 (2)	0.009	0.668	0.000	0.022	0.000	0.678 ✔	1.000	4.8.2 ✔
L3	86.17 - 37.17 (3)	0.009	0.652	0.000	0.017	0.000	0.661 ✔	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L4	37.17 - 0 (4)	0.011	0.699	0.000	0.017	0.000	0.711 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	160 - 123.33	Pole	TP31.46x21.2x0.219	1	-13.313	1280.340	66.9	Pass
L2	123.33 - 86.17	Pole	TP41.44x29.715x0.344	2	-26.016	2903.880	67.8	Pass
L3	86.17 - 37.17	Pole	TP54.46x39.118x0.438	3	-43.438	4793.440	66.1	Pass
L4	37.17 - 0	Pole	TP64x51.533x0.469	4	-65.070	5850.220	71.1	Pass
							Summary	
						Pole (L4)	71.1	Pass
						RATING =	**71.1**	**Pass**

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Subject:	Anchor Bolt and Baseplate Analysis
Location:	160-FT Valmont Monopole Orange, CT
Rev. 0: 7/7/20	Prepared by: T.J.L. Checked by: C.A.G. Job No. 20074.54

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$M_u := 5298 \cdot ft \cdot kips$	(Input From RisaTower)
Shear Force =	$Shear := 48 \cdot kips$	(Input From RisaTower)
Axial Force =	$R_u := 65 \cdot kips$	(Input From RisaTower)

Anchor Bolt Data:

ASTMA615 Grade 75

Number of Anchor Bolts =	$N := 24$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 72.76 \cdot in$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)
Top of Concrete to Bot Leveling Nut =	$l_{ar} := 2 \cdot in$	(User Input)
Anchor Rod Force Correction Factor =	$n_c = 1$	Table 2-1 Addendum 3

Base Plate Data:

Use AST MA572 Grade 60

Plate Yield Strength =	$F_{yf} := 60 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{TP} := 3 \cdot in$	(User Input)
Base Plate Diameter =	$D_{OD} := 78.76 \cdot in$	(User Input)
Outer Pole Diameter =	$D_T := 64 \cdot in$	(User Input)
Pole Wall Thickness =	$t_T := 0.469 \cdot in$	(User Input)
Pole Design Yield Strength =	$F_{yp} := 65 \cdot ksi$	(User Input)
	$\eta := 0.5$	For Ungrouted Base Plate per TIA-222-G Section 4.9.9

Anchor Bolt Analysis:

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 = 3.248 \cdot in^2$

Tensile Root Diameter = $d_{rt} := D - \frac{0.9743 \cdot in}{n} = 2.033 \cdot in$

Plastic Section Modulus = $Z := \frac{d_{rt}^3}{6} = 1.401 \cdot in^3$

Maximum Anchor Rod Force = $P_u := \frac{n_c \cdot \pi \cdot M_u}{N \cdot D_{BC}} + \frac{R_u}{N} = 117.1 \cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 2 \cdot kips$

Design Tensile Strength = $\Phi R_{nt} := 0.8 \cdot F_u \cdot A_n = 259.815 \cdot k$

Bolt % of Capacity = $\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \cdot 100 = 46.6$

Condition1 = $Condition1 := if\left[\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \le 1.00, "OK", "Overstressed" \right]$

Condition1 = "OK"

Design Shear Strength = $\Phi R_{nv} := 0.75 \cdot 0.45 \cdot F_u \cdot A_g = 134.193 \cdot k$

Design Flexural Strength = $\Phi R_{nm} := 0.9 \cdot F_y \cdot Z = 94.597 \cdot in \cdot k$

$$M_u := \begin{cases} 0 & \text{if } l_{ar} < D \\ 0.65 \cdot l_{ar} \cdot V_u & \text{otherwise} \end{cases} = 0 \cdot in \cdot k$$

Bolt % of Capacity = $\left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \right] \cdot 100 = 20.3$

Condition2 = $Condition2 := if\left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \le 1.00, "OK", "Overstressed" \right]$

Condition2 = "OK"

Base Plate Analysis:

Strength Resistance Factor for Yielding due to Bending = $\phi_b := 0.9$

Strength Resistance Factor for Yielding due to Shear = $\phi_v := 1.0$

Outside Fillet Horizontal Leg Dimension = $w_1 := 0.25 \cdot in$

Effective Pole Outside Diameter = $D_e := D_T + w_1 = 64.25 \cdot in$

Effective Base Plate Outside Diameter = $D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \le \left(D_{BC} + 6 \cdot t_{TP}\right) \\ \left(D_{BC} + 6 \cdot t_{TP}\right) & \text{otherwise} \end{cases} = 78.76 \cdot in$

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Anchor Rods = $\theta_1 := \frac{\pi}{N} = 0.131$

Angle Defining Limiting Effective Base Plate Width Based on Plate Thickness = $\theta_2 := \operatorname{asin}\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.518$

Angle Defining Limiting Effective Base Plate Width Based on Distance Between Anchor Rod Bolt Circle and Effective Pole Outside Diameter = $\theta_3 := \operatorname{acos}\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.344$

Governing Angle Defining Effective Base Plate Width Resisting Bending = $\theta := \min\left(\theta_1, \theta_2, \theta_3\right) = 0.131$

Effective Moment Arm of Anchor Rod Force = $x := 0.5 \cdot \left(D_{BC} - D_e\right) = 4.255 \cdot in$

Effective Base Plate Width Resisting Bending from Transverse Bend Line = $B_{et} := D_{BC} \cdot \sin(\theta) = 9.497 \cdot in$

Effective Base Plate Width Resisting Bending from Radial Bend Lines = $B_{er} := \left(D_{oe} - D_e\right) \cdot \sin(\theta) = 1.894 \cdot in$

Total Effective Base Plate Width Resisting Bending = $B_{eff} := B_{et} + B_{er} = 11.391 \cdot in$

Required Base Plate Thickness = $t_{TP.Req} := \sqrt{\frac{4 \cdot P_u \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.8 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 60.0 \cdot \%$

Condition2 = $Condition3 := \text{if}\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition3 = "Ok"

Required Base Plate Thickness = $t_{TP.Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.762 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 25.4 \cdot \%$

Condition2 = $Condition4 := \text{if}\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition4 = "Ok"

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Subject: FOUNDATION ANALYSIS

Location: 160-ft Valmont Monopole
Orange, CT

Rev. 0: 7/7/20

Prepared by: T.J.L Checked by: C.A.G.
Job no. 20074.54

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 5298 \cdot ft \cdot kips$	(User Input)	
Shear Force =	$Shear := 48 \cdot kip$	(User Input)	
Axial Force =	$Axial := 65 \cdot kip$	(User Input)	
Tower Height =	$H_t := 160 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 14 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 10 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 8 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 4 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 22 \cdot ft$	(User Input)	

Anchor Bolt Data:

Length of Anchor Bolts=	$L_{st} := 132 \cdot in$	(User Input)	
Projection of Anchor Bolts Above Pier =	$A_{BP} := 10 \cdot in$	(User Input)	
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)	
Base Plate Bolt Circle =	$MP := 72.76 \cdot in$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_u := 20000 \cdot psf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_a := \frac{q_u}{2} = 10000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 11$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.41 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 31$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 9$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.128 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 35$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 10$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.27 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 35$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 1.561 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.999 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 1.267 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 120 \cdot pcf$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 3.6 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 3.6 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 5.04 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 4.32 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 4$

$A_p := W_f \cdot T_p = 88$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 380.16 \cdot kip$

Weight of Concrete Pad = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 L_p\right] \cdot \gamma_c = 386.4 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left(W_f^2 - d_p^2\right) \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 478.8 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left(\frac{D_f^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right) \cdot \gamma_s = 149.372 \cdot kip$

Weight of Soil Wedge at back face Corners = $WT_{s3} := 2 \cdot \left[(D_f)^3 \cdot \frac{\tan(\Phi_s)}{3}\right] \cdot \gamma_s = 126.74 \cdot kips$

Total Weight = $WT_{tot} := WT_c + WT_{s1} + Axial = 930.2 \cdot kip$

Resisting Weight = $WT_R := 0.9 \cdot WT_c + 0.75 \cdot WT_{s1} + 0.75 \cdot Axial = 755.61 \cdot kip$

Resisting Moment = $M_r := (WT_R) \cdot \frac{W_f}{2} + 0.75 \cdot S_u \cdot \frac{T_f}{3} + 0.75 \cdot \left[\left(WT_{s2} + WT_{s3}\right) \cdot \left(W_f + \frac{D_f \cdot \tan(\Phi_s)}{3}\right)\right] = 13806 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + Shear \cdot (L_p + T_f) = 5970 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.31$

Factor of Safety Required = $FS_{req} := 1$

$OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 798.75 \cdot kips$

$Shear\_Check := if(S_p > Shear, "Okay", "No Good")$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^2 = 484$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 1774.67 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 5.286 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < .75 \cdot q_u, "Okay", "No Good")$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -1.442 \cdot ksf$

$Min\_Pressure\_Check := if\left[(P_{min} \geq 0) \cdot (P_{min} < .75 \cdot q_u), "Okay", "No Good"\right]$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 5.761$

Distance to Kern = $X_k := \frac{W_f}{6} = 3.667$ Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{\frac{M_{ot}}{1.6}}{WT_{tot}} = 4.011$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 4.033 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 4.033 \cdot ksf$

$Pressure\_Check := if(q_{adj} < q_a, "Okay", "No Good")$

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.6 \times 10^4 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if\left(P_b > Axial, "Okay", "No Good"\right)$

Bearing_Check = "Okay"

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 3.644$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$

$V_{req} := \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d$ (ACI-2008 11.2.1.1)

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

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 36.6$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot \left(d_p + d\right)^2}{4} = 106.5$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 377.5$

Guess Value = $v_u := 1ksf$

(From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := Find(v_u) = 7 \cdot ksf$

$V_u := v_u \cdot d \cdot W_f = 559.4 \cdot kips$

Required Shear Strength = $V_{req} := V_u = 559.4 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 4127.9 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$q_b := q_{adj} - d_1 \cdot Slope = 2.687 \cdot ksf$

Maximum Bending at Face of Pier = $M_n := \frac{1}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 2146.7 \cdot kip \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000 \right)}{1000} \right] \cdot 0.5 \right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$R_n := \frac{M_n}{W_f \cdot d^2} = 51 \cdot psi$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.0009$

$\rho_{min} := \rho = 0.00086$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases}$$ (ACI-2008 7.12.2.1)

Check Bottom Bars:

$$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 10.39 \cdot in^2$$

$As_{prov.bot} := A_{bbot} \cdot NB_{bot} = 44.3 \cdot in^2$

$Pad\_Reinforcement\_Bot := if(As_{prov.bot} > As, "Okay", "No Good")$

Pad_Reinforcement_Bot = "Okay"

Check Temp Shrinkage Reinforcement:

$As := \rho_{sh} \cdot (W_f \cdot T_f) = 22.8 \cdot in^2$

$As_{prov.top} := A_{btop} \cdot NB_{top} = 35 \cdot in^2$

$As_{prov.tot} := As_{prov.bot} + As_{prov.top} = 79.3 \cdot in^2$

$Pad\_Reinforcement\_Temp := if(As_{prov.tot} > As, "Okay", "No Good")$

Pad_Reinforcement_Temp = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 6.28 \cdot in$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 38.3 \cdot in$$

Minimum Development Length =

$L_{dbmin} := 12 \cdot in$ (ACI-2008 12.2.1)

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 81 \cdot in$$

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

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := d_p^2 = 9216 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 46.08 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 48.4 \cdot in^2$

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

Steel_Area_Check = "Okay"

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

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 8.319 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 90 \cdot in$

Maximum Moment in Pier = $M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] = 69576 \cdot in \cdot kips$

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

$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) := \left(d_p \cdot 12 \;\; NB_{pier} \;\; BS_{pier} \;\; \frac{Axial \cdot 1.333}{kips} \;\; \frac{M_p}{in \cdot kips}\right)$

$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) = (96 \;\; 31 \;\; 11 \;\; 86.6 \;\; 69576)$

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

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

$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = \left(133.5 \;\; 1.1 \times 10^5 \;\; -60 \;\; 0\right)$

$Axial\_Load\_Check := if\left(\phi P_n \geq P_u, "Okay", "No Good"\right)$

Axial_Load_Check = "Okay"

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

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 117 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 45 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

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

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 47.15 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 18.727 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right)$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 26.753 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 25.38 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 26.753 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CT11412A_Anchor_5_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Section 1 - Site Information

Site ID: CT11412A
Status: Draft
Version: 5
Project Type: Anchor
Approved: Not Approved
Approved By: Not Approved
Last Modified: 6/30/2020 4:31:01 PM
Last Modified By: Dominic.Kallas2@T-Mobile.com

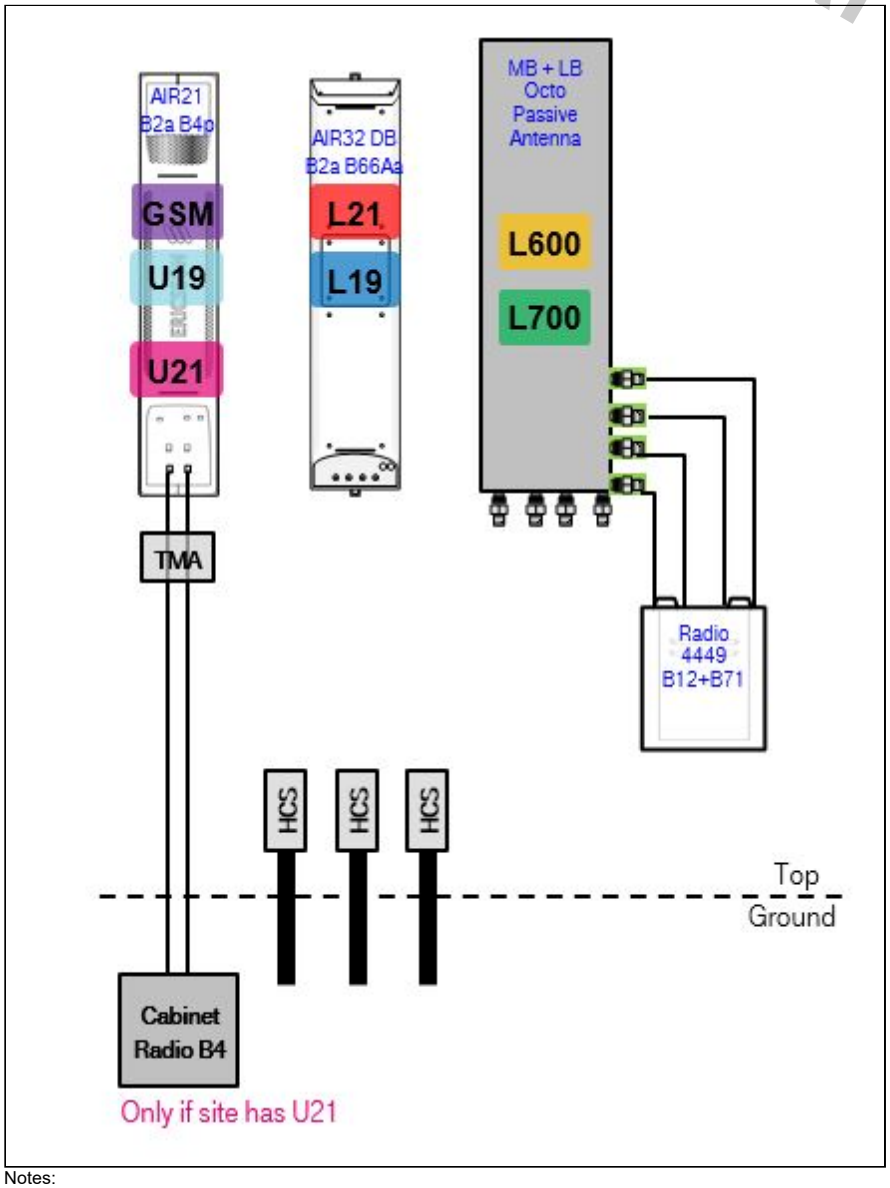
Site Name: Orange/Town High Plains
Site Class: Monopole
Site Type: Structure Non Building
Plan Year: 2020
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: <undefined>

Latitude: 41.27362722
Longitude: -73.01883670
Address: 525 Orange Center Rd.
City, State: Orange, CT
Region: NORTHEAST

RAN Template: 67D5A997DB Outdoor			AL Template: 67D5997DB_2xAIR+1OP (U21 Market)	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 6	**TMA Count:** 3	**RRU Count:** 6

Section 2 - Existing Template Images

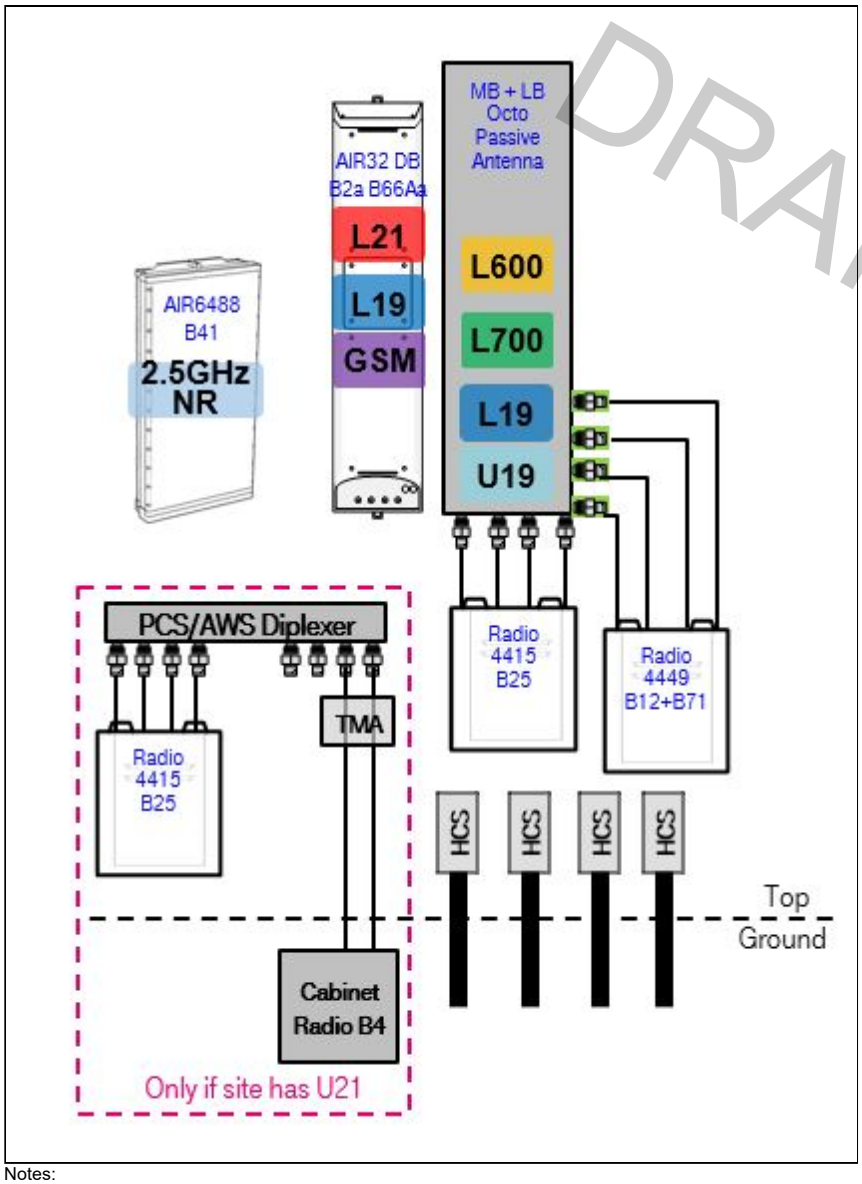
67D92DB_2xAIR+1OP.JPG



Notes:

Section 3 - Proposed Template Images

67D5997DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

----- This section is intentionally blank. -----

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CT11412A_Anchor_5_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 67D92DB Outdoor

Enclosure	1
Enclosure Type	RBS 6131
Baseband	DUW30 (U2100); DUW30 (U1900); DUG20 (G1900); BB 6630 (L2100, L1900, L700, L600); BB 6630 (N600)
Hybrid Cable System	Ericsson 9x18 HCS *Select Length*; Ericsson 6x12 HCS *Select Length & AWG* **(x 2)**
Radio	RU22 **(x 6)** (U2100)

Proposed RAN Equipment

Template: 67D5A997DB Outdoor

Enclosure	1	2	3
Enclosure Type	RBS 6131	Enclosure 6160	B160
Baseband	DUW30 (U2100); DUW30 (U1900); DUG20 (G1900); BB 6630 (L2100, L1900, L700, L600); BB 6630 (N600)	BB 6630 (L2500); BB 6648 (N2500)	
Hybrid Cable System	Ericsson 6x12 HCS *Select Length & AWG* **(x 2)**	Ericsson 6x12 HCS *Select AWG & Length*	
Radio	RU22 **(x 6)** (U2100)		

RAN Scope of Work:

Check AC service, and upgrade AC Service, Breakers, and PPC where necessary.

Add (1) Enclosure 6160.

Add (1) Battery Cabinet B160.

Add (1) iXRe Router to new Enclosure 6160.

Add (1) BB6630 for L2500 to new Enclosure 6160.

Add (1) BB6648 for N2500 to new Enclosure 6160.

Existing: (12) Coaxial Lines; 1-9x18 & 2-6x12 HCS

Remove (1) 9X18 HCS.

Add (1) 6X12 HCS for Anchor A&L Equipment. Length of new HCS will match that of existing HCS.

Keep (6) coax lines for U2100 and (6) will be removed during L7-4x2 upgrade.

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CT11412A_Anchor_5_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Section 6 - A&L Equipment

Existing Template: 67D92DB_2xAIR+1OP
Proposed Template: 67D5997DB_2xAIR+1OP (U21 Market)

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1				2		3			
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	80				80		80			
M. Tilt	0				0		0			
Height	123				123		123			
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**
Active Tech.	L2100	L2100	L1900	L1900	U1900 G1900	U2100		L700 L600 N600	L700 L600 N600	
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2	2	2		2		
Cables						1-5/8" Coax - 175 ft. **(x2)**		Coax Jumper **(x2)**	Coax Jumper **(x2)**	
TMAs						Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners										
Radio								Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Replace LB Dual in Position 3 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CT11412A_Anchor_5_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1				2		3			
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	80				80		80			
M. Tilt	0				0		0			
Height	123				123		123			
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**
Active Tech.	L2100	L2100	L1900 G1900	L1900	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	U1900 L1900	L1900 U2100
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2	2	2	2	2	2	2
Cables	Fiber Jumper		Fiber Jumper		Fiber Jumper	Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** 1-5/8" Coax - 175 ft. **(x2)**
TMAs										Generic Twin Style 1B - AWS (AtAntenna)
Diplexers / Combiners									Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)
Radio							Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4415 B25 (At Antenna)	SHARED Radio 4415 B25 (At Antenna)
Sector Equipment										

Unconnected Equipment:

Scope of Work:

*** L600 Scope of Work ***

Replace Low-Band Dual in Position 3 with (1) Low-Band/Mid-Band Octo.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in Position 3 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

***

*** Anchor Scope of Work ***

Move GSM to AIR32 DB in Position 1. GSM will share B2 Radios with L1900 1st Carrier.

Remove AIR21 B2A/B4P from Position 2.

Install AIR6449 B41 for L2500 and N2500 in Position 2.

Add (1) PCS/AWS 8:4 diplexer to Position 3 at antenna, and connect its four output ports to the Mid-Band ports of the Octo antenna.

Add (1) Radio 4415 B25 for L1900 2nd Carrier and U1900 to Position 3 near antenna, and connect its ports to the four PCS input ports of the diplexer.

Move coaxial lines and AWS TMA for U2100 to Position 3 near antenna, and connect its ports to two AWS input ports of the diplexer.

Make sure to install metal caps on all empty ports of AWS/PCS diplexer for load balancing.

Ensure RET control is enabled for all technology layers according to the Design Documents.

***

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CT11412A_Anchor_5_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Sector 2 (Existing) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1				2		3			
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	200				200		200			
M. Tilt	0				0		0			
Height	123				123		123			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2100	L2100	L1900	L1900	U1900 G1900	U2100		L700 L600 N600	L700 L600 N600	
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2	2	2		2		
Cables						1-5/8" Coax - 175 ft. **(x2)**		Coax Jumper **(x2)**	Coax Jumper **(x2)**	
TMAs						Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners										
Radio								Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Replace LB Dual in Position 3 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CT11412A_Anchor_5_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1				2		3			
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	200				200		200			
M. Tilt	0				0		0			
Height	123				123		123			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2100	L2100	L1900 G1900	L1900	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	U1900 L1900	L1900 U2100
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2	2	2	2	2	2	2
Cables	Fiber Jumper		Fiber Jumper		Fiber Jumper	Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** 1-5/8" Coax - 175 ft. **(x2)**
TMAs										Generic Twin Style 1B - AWS (AtAntenna)
Diplexers / Combiners									Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)
Radio							Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4415 B25 (At Antenna)	SHARED Radio 4415 B25 (At Antenna)
Sector Equipment										

Unconnected Equipment:

Scope of Work:

*** L600 Scope of Work ***

Replace Low-Band Dual in Position 3 with (1) Low-Band/Mid-Band Octo.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in Position 3 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

***

*** Anchor Scope of Work ***

Move GSM to AIR32 DB in Position 1. GSM will share B2 Radios with L1900 1st Carrier.

Remove AIR21 B2A/B4P from Position 2.

Install AIR6449 B41 for L2500 and N2500 in Position 2.

Add (1) PCS/AWS 8:4 diplexer to Position 3 at antenna, and connect its four output ports to the Mid-Band ports of the Octo antenna.

Add (1) Radio 4415 B25 for L1900 2nd Carrier and U1900 to Position 3 near antenna, and connect its ports to the four PCS input ports of the diplexer.

Move coaxial lines and AWS TMA for U2100 to Position 3 near antenna, and connect its ports to two AWS input ports of the diplexer.

Make sure to install metal caps on all empty ports of AWS/PCS diplexer for load balancing.

Ensure RET control is enabled for all technology layers according to the Design Documents.

***

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CT11412A_Anchor_5_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Sector 3 (Existing) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1				2		3			
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	320				320		320			
M. Tilt	0				0		0			
Height	123				123		123			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2100	L2100	L1900	L1900	U1900 G1900	U2100		L700 L600 N600	L700 L600 N600	
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2	2	2		2	2	
Cables						1-5/8" Coax - 175 ft. **(x2)**		Coax Jumper **(x2)**	Coax Jumper **(x2)**	
TMAs						Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners										
Radio								Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Replace LB Dual in Position 3 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CT11412A_Anchor_5_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1				2		3			
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	320				320		320			
M. Tilt	0				0		0			
Height	123				123		123			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2100	L2100	L1900 G1900	L1900	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	U1900 L1900	L1900 U2100
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2	2	2	2	2	2	2
Cables	Fiber Jumper		Fiber Jumper		Fiber Jumper	Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** 1-5/8" Coax - 175 ft. **(x2)**
TMAs										Generic Twin Style 1B - AWS (AtAntenna)
Diplexers / Combiners									Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)
Radio							Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4415 B25 (At Antenna)	SHARED Radio 4415 B25 (At Antenna)
Sector Equipment										

Unconnected Equipment:

Scope of Work:

*** L600 Scope of Work ***

Replace Low-Band Dual in Position 3 with (1) Low-Band/Mid-Band Octo.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in Position 3 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

***

*** Anchor Scope of Work ***

Move GSM to AIR32 DB in Position 1. GSM will share B2 Radios with L1900 1st Carrier.

Remove AIR21 B2A/B4P from Position 2.

Install AIR6449 B41 for L2500 and N2500 in Position 2.

Add (1) PCS/AWS 8:4 diplexer to Position 3 at antenna, and connect its four output ports to the Mid-Band ports of the Octo antenna.

Add (1) Radio 4415 B25 for L1900 2nd Carrier and U1900 to Position 3 near antenna, and connect its ports to the four PCS input ports of the diplexer.

Move coaxial lines and AWS TMA for U2100 to Position 3 near antenna, and connect its ports to two AWS input ports of the diplexer.

Make sure to install metal caps on all empty ports of AWS/PCS diplexer for load balancing.

Ensure RET control is enabled for all technology layers according to the Design Documents.

***

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CT11412A_Anchor_5_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

----- This section is intentionally blank. -----

Proposed Power Systems Equipment

Exhibit E

Mount Analysis

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

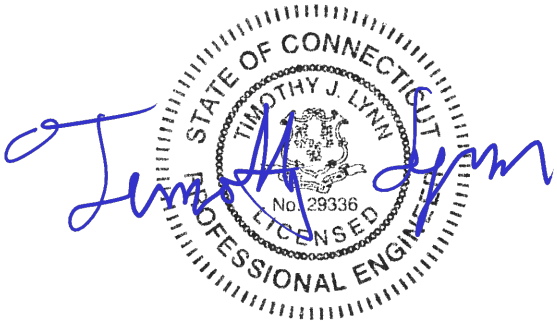
T-Mobile Site #: CT11412A

525 Orange Center Rd
Orange, CT

Centek Project No. 20074.54

Date: July 7, 2020

Max Stress Ratio = 73.8%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

CENTEK engineering

Centered on Solutions℠

July 7, 2020

Mr. Dan Reid
Transcend Wireless
10 Industrial Ave
Mahwah, NJ 07430

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CT11412A
525 Orange Center Road
Orange, CT 06477

Centek Project No. 20074.54

Dear Mr. Reid,

Centek Engineering, Inc. has reviewed the T-Mobile antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the existing mount, consisting of one (1) 13-ft platform with handrails to support the equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

- T-Mobile:
  Platform: Three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAARR243-NA20 panel antennas, three (3) KRY112 TMAs, three (3) Ericsson 4449 remote radio units, three (3) Ericsson 4415 remote radio units and three (3) Commscope SDX1926Q-43 diplexers mounted on one (1) low profile platform with a RAD center elevation of 123-ft +/- AGL.

The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 97 mph for Orange as required in Appendix N of the 2018 Connecticut State Building Code.

A structural analysis of tower and foundation needs to be completed prior to any work.

Based on our review of the installation, it is our opinion that the existing antenna platform is structurally adequate to support the proposed antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Section 2 - Calculations

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

Subject: TIA-222-G Loads

Location: Orange, CT

Rev. 0: 7/7/20

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 20074.54

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-G

Wind Speeds

Basic Wind Speed: $V := 97$ mph (User Input - 2018 CSBC Appendix N)

Basic Wind Speed with Ice: $V_i := 50$ mph (User Input per Annex B of TIA-222-G)

Input

Structure Type = $Structure\_Type := Pole$ (User Input)

Structure Category = $SC := II$ (User Input)

Exposure Category = $Exp := C$ (User Input)

Structure Height = $h := 160$ ft (User Input)

Height to Center of Antennas = $z_{Ant} := 123$ ft (User Input)

Radial Ice Thickness = $t_i := 0.75$ in (User Input per Annex B of TIA-222-G)

Radial Ice Density = $Id := 56.00$ pcf (User Input)

Topograpic Factor = $K_{zt} := 1.0$ (User Input)

$K_a := 1.0$ (User Input)

Gust Response Factor = $G_H = 1.1$ (User Input)

Output

Wind Direction Probability Factor = (Per Table 2-2 of TIA-222-G)

$$K_d := \begin{cases} 0.95 & \text{if } Structure\_Type = Pole \\ 0.85 & \text{if } Structure\_Type = Lattice \end{cases} = 0.95$$

Importance Factors = (Per Table 2-3 of TIA-222-G)

$$I_{Wind} := \begin{cases} 0.87 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.15 & \text{if } SC = 3 \end{cases} = 1$$

$$I_{Wind\_w\_Ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.00 & \text{if } SC = 3 \end{cases} = 1$$

$$I_{ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.25 & \text{if } SC = 3 \end{cases} = 1$$

$$K_{iz} := \left(\frac{z_{Ant}}{33}\right)^{0.1} = 1.141$$

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.711$$

Velocity Pressure Coefficient Antennas = $Kz_{Ant} := 2.01\left(\left(\frac{z_{Ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.322$

Velocity Pressure w/o Ice Antennas = $qz_{Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V^2 \cdot I_{Wind} = 30.251$

Velocity Pressure with Ice Antennas = $qz_{ice.Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V_i^2 \cdot I_{Wind} = 8.038$

CENTEK engineering
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63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject:	TIA-222-G Loads
Location:	Orange, CT
Rev. 0: 7/7/20	Prepared by: T.J.L. Checked by: C.F.C. Job No. 20074.54

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPXVAARR24-43		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 24$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 153$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.0$		
Antenna Force Coefficient =	$Ca_{ant} = 1.27$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 674$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 244$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 18.9$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 212$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.4$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 94$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 153$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \times 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 421$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 421$	lbs

CENTEK engineering
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63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject:	TIA-222-G Loads
Location:	Orange, CT
Rev. 0: 7/7/20	Prepared by: T.J.L. Checked by: C.F.C. Job No. 20074.54

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR32		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 56.6$	in	(User Input)
Antenna Width =	$W_{ant} := 12.9$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 132$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.4$		
Antenna Force Coefficient =	$Ca_{ant} = 1.28$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.1$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 217$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.4$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 146$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.8$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 77$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5.1$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 57$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 132$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6352$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5523$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 179$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 179$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR6449		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 33.1$	in	(User Input)
Antenna Width =	$W_{ant} := 20.5$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.3$	in	(User Input)
Antenna Weight =	$WT_{ant} := 103$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.6$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 188$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.9$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 76$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.1$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 64$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 3$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 32$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 103$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5632$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4609$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 149$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 149$	lbs

Development of Wind & Ice Load on RRUS

RRUS Data:

RRUS Model = Ericsson 4449 B71B12

RRUS Shape = Flat (User Input)

RRUS Height = $L_{RRUS} := 14.9$ in (User Input)

RRUS Width = $W_{RRUS} := 13.2$ in (User Input)

RRUS Thickness = $T_{RRUS} := 10.4$ in (User Input)

RRUS Weight = $WT_{RRUS} := 74$ lbs (User Input)

Number of RRUS's = $N_{RRUS} := 1$ (User Input)

RRUS Aspect Ratio = $Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.1$

RRUS Force Coefficient = $Ca_{RRUS} = 1.2$

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.4$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 55$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 43$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.1$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 22$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.8$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 19$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 74$ lbs

Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2045$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2164$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 70$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 70$ lbs

Development of Wind & Ice Load on RRUS

RRUS Data:

RRUS Model = Ericsson 4415 B25

RRUS Shape = Flat (User Input)

RRUS Height = $L_{RRUS} := 14.9$ in (User Input)

RRUS Width = $W_{RRUS} := 13.2$ in (User Input)

RRUS Thickness = $T_{RRUS} := 5.4$ in (User Input)

RRUS Weight = $WT_{RRUS} := 47$ lbs (User Input)

Number of RRUS's = $N_{RRUS} := 1$ (User Input)

RRUS Aspect Ratio = $Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.1$

RRUS Force Coefficient = $Ca_{RRUS} = 1.2$

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.4$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 55$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 0.6$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 22$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.1$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 22$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.1$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 12$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 47$ lbs

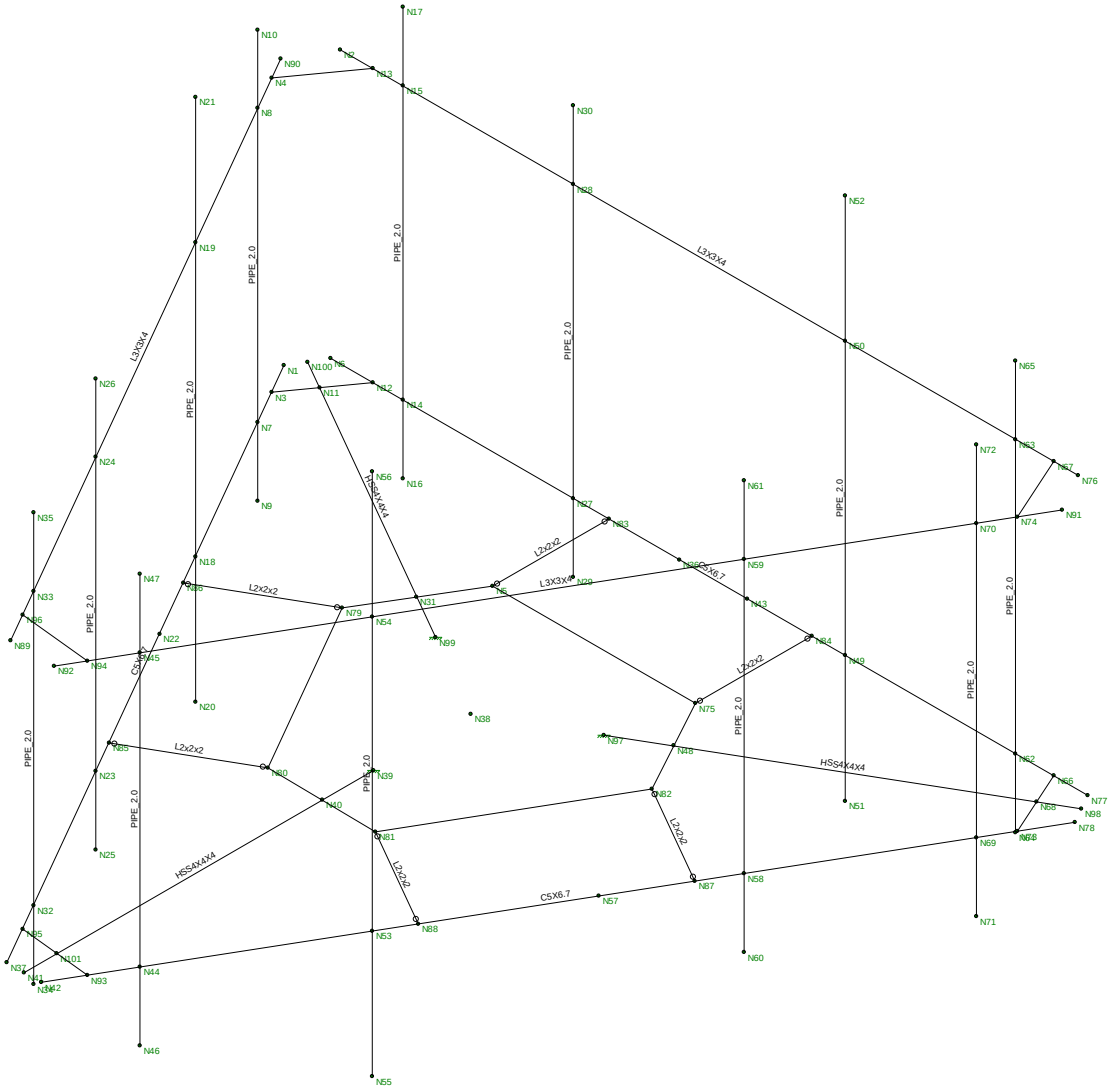
Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 1062$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 1625$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 53$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 53$ lbs



Envelope Only Solution

Centek		
FJP	CT11412A - Mount	July 7, 2020 at 3:00 PM
19027.69	Member Framing	CT11412A_AMA.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	(E)Outrigger	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
2	(E)Horz	C5X6.7	Beam	Pipe	A36 Gr.36	Typical	1.97	.47	7.48	.055
3	(E)Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	(E)Support	L3X3X4	Beam	Tube	A36 Gr.36	Typical	1.44	1.23	1.23	.031
5	(E)Handrail	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	.031
6	(E)Grating Support	L2x2x2	Beam	Single Angle	A36 Gr.36	Typical	.491	.189	.189	.003
7	(P) Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	(E)Outrigger	6			Lbyy						Lateral
2	M2	(E)Horz	13	Segment	Segment	Lbyy						Lateral
3	M3	(E)Horz	13	5	5	5	5	5				Lateral
4	M4	(E)Horz	13	Segment	Segment	Lbyy						Lateral
5	M8	(E)Handrail	12.667	4	4	4	4	4				Lateral
6	M13	(E)Antenna Mast	7.012			Lbyy						Lateral
7	M14	(E)Antenna Mast	7.012			Lbyy						Lateral
8	M15	(P) Antenna Mast	9			Lbyy						Lateral
9	M16	(E)Antenna Mast	7.012			Lbyy						Lateral
10	M17	(E)Antenna Mast	7.012			Lbyy						Lateral
11	M18	(E)Antenna Mast	7.012			Lbyy						Lateral
12	M19	(P) Antenna Mast	9			Lbyy						Lateral
13	M20	(E)Antenna Mast	7.012			Lbyy						Lateral
14	M21	(E)Antenna Mast	7.012			Lbyy						Lateral
15	M22	(E)Antenna Mast	7.012			Lbyy						Lateral
16	M23	(P) Antenna Mast	9			Lbyy						Lateral
17	M24	(E)Antenna Mast	7.012			Lbyy						Lateral
18	M28	(E)Grating Support	2			Lbyy						Lateral
19	M29	(E)Grating Support	2			Lbyy						Lateral
20	M30	(E)Grating Support	2			Lbyy						Lateral
21	M31	(E)Grating Support	2			Lbyy						Lateral
22	M32	(E)Grating Support	2			Lbyy						Lateral
23	M33	(E)Grating Support	2			Lbyy						Lateral
24	M34	(E)Handrail	12.667	4	4	4	4	4				Lateral
25	M35	(E)Handrail	12.667	4	4	4	4	4				Lateral
26	M38	(E)Outrigger	6			Lbyy						Lateral
27	M39	(E)Outrigger	6			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N39	N41			(E)Outrigger	Beam	Tube	A500 Gr....	Typical
2	M2	N78	N42			(E)Horz	Beam	Pipe	A36 Gr.36	Typical
3	M3	N6	N77			(E)Horz	Beam	Pipe	A36 Gr.36	Typical
4	M4	N37	N1			(E)Horz	Beam	Pipe	A36 Gr.36	Typical
5	M5	N81	N80		90	RIGID	None	None	RIGID	Typical
6	M6	N75	N82		90	RIGID	None	None	RIGID	Typical
7	M7	N79	N5		90	RIGID	None	None	RIGID	Typical
8	M8	N76	N2		180	(E)Handrail	Beam	Single Angle	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
9	M9	N4	N13			RIGID	None	None	RIGID	Typical
10	M10	N74	N67			RIGID	None	None	RIGID	Typical
11	M11	N3	N12			RIGID	None	None	RIGID	Typical
12	M12	N66	N73			RIGID	None	None	RIGID	Typical
13	M13	N16	N17			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
14	M14	N29	N30			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
15	M15	N51	N52			(P) Antenna Mast	Column	Pipe	A53 Gra...	Typical
16	M16	N64	N65			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
17	M17	N34	N35			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
18	M18	N25	N26			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
19	M19	N20	N21			(P) Antenna Mast	Column	Pipe	A53 Gra...	Typical
20	M20	N9	N10			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
21	M21	N71	N72			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
22	M22	N60	N61			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
23	M23	N55	N56			(P) Antenna Mast	Column	Pipe	A53 Gra...	Typical
24	M24	N46	N47			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
25	M25	N5	N75		180	RIGID	None	None	RIGID	Typical
26	M26	N80	N79		180	RIGID	None	None	RIGID	Typical
27	M27	N82	N81		180	RIGID	None	None	RIGID	Typical
28	M28	N75	N84		180	(E)Grating Support	Beam	Single Angle	A36 Gr.36	Typical
29	M29	N5	N83		90	(E)Grating Support	Beam	Single Angle	A36 Gr.36	Typical
30	M30	N79	N86		180	(E)Grating Support	Beam	Single Angle	A36 Gr.36	Typical
31	M31	N80	N85		90	(E)Grating Support	Beam	Single Angle	A36 Gr.36	Typical
32	M32	N81	N88		180	(E)Grating Support	Beam	Single Angle	A36 Gr.36	Typical
33	M33	N82	N87		90	(E)Grating Support	Beam	Single Angle	A36 Gr.36	Typical
34	M34	N90	N89		180	(E)Handrail	Beam	Single Angle	A36 Gr.36	Typical
35	M35	N92	N91		180	(E)Handrail	Beam	Single Angle	A36 Gr.36	Typical
36	M36	N94	N96			RIGID	None	None	RIGID	Typical
37	M37	N93	N95			RIGID	None	None	RIGID	Typical
38	M38	N97	N98			(E)Outrigger	Beam	Tube	A500 Gr....	Typical
39	M39	N99	N100			(E)Outrigger	Beam	Tube	A500 Gr....	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	-6.792369	0	-3.584217	0	
2	N2	-6.333333	4.674577	-4.090255	0	
3	N3	-6.500208	0	-3.07818	0	
4	N4	-6.500208	4.674577	-3.07818	0	
5	N5	-1.718575	0	-2.090255	0	
6	N6	-6.499792	0	-4.090255	0	
7	N7	-6.171715	0	-2.509213	0	
8	N8	-6.171715	4.674577	-2.509213	0	
9	N9	-6.171715	-1.168644	-2.509213	0	
10	N10	-6.171715	5.843222	-2.509213	0	
11	N11	-6.156739	0	-3.554595	0	
12	N12	-5.770558	0	-4.090255	0	
13	N13	-5.770558	4.674577	-4.090255	0	
14	N14	-5.2589	0	-4.090255	0	
15	N15	-5.2589	4.674577	-4.090255	0	
16	N16	-5.2589	-1.168644	-4.090255	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
17	N17	-5.2589	5.843222	-4.090255	0	
18	N18	-4.710909	0	0.020976	0	
19	N19	-4.710909	4.674577	0.020976	0	
20	N20	-4.710909	-2.162728	0.020976	0	
21	N21	-4.710909	6.837305	0.020976	0	
22	N22	-3.870758	0	1.476161	0	
23	N23	-2.373621	0	4.069279	0	
24	N24	-2.373621	4.674577	4.069279	0	
25	N25	-2.373621	-1.168644	4.069279	0	
26	N26	-2.373621	5.843222	4.069279	0	
27	N27	-2.337289	0	-4.090255	0	
28	N28	-2.337289	4.674577	-4.090255	0	
29	N29	-2.337289	-1.168644	-4.090255	0	
30	N30	-2.337289	5.843222	-4.090255	0	
31	N31	-2.209983	0	-1.275934	0	
32	N32	-0.912815	0	6.599468	0	
33	N33	-0.912815	4.674577	6.599468	0	
34	N34	-0.912815	-1.168644	6.599468	0	
35	N35	-0.912815	5.843222	6.599468	0	
36	N36	-0.511658	0	-4.090255	0	
37	N37	-0.292369	0	7.674113	0	
38	N38	0	0	0	0	
39	N39	0	0	1.674561	0	
40	N40	0	0	2.551869	0	
41	N41	0	0	7.674594	0	
42	N42	0.292161	0	7.674473	0	
43	N43	0.656986	0	-4.090255	0	
44	N44	0.912815	0	6.599468	0	
45	N45	0.912815	4.674577	6.599468	0	
46	N46	0.912815	-1.168644	6.599468	0	
47	N47	0.912815	5.843222	6.599468	0	
48	N48	2.209983	0	-1.275934	0	
49	N49	2.337289	0	-4.090255	0	
50	N50	2.337289	4.674577	-4.090255	0	
51	N51	2.337289	-2.162728	-4.090255	0	
52	N52	2.337289	6.837305	-4.090255	0	
53	N53	2.373621	0	4.069279	0	
54	N54	2.373621	4.674577	4.069279	0	
55	N55	2.373621	-2.162728	4.069279	0	
56	N56	2.373621	6.837305	4.069279	0	
57	N57	3.798094	0	1.602018	0	
58	N58	4.710909	0	0.020976	0	
59	N59	4.710909	4.674577	0.020976	0	
60	N60	4.710909	-1.168644	0.020976	0	
61	N61	4.710909	5.843222	0.020976	0	
62	N62	5.2589	0	-4.090255	0	
63	N63	5.2589	4.674577	-4.090255	0	
64	N64	5.2589	-1.168644	-4.090255	0	
65	N65	5.2589	5.843222	-4.090255	0	
66	N66	5.915886	0	-4.090255	0	
67	N67	5.915886	4.674577	-4.090255	0	
68	N68	6.156739	0	-3.554595	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
69	N69	6.171715	0	-2.509213	0	
70	N70	6.171715	4.674577	-2.509213	0	
71	N71	6.171715	-1.168644	-2.509213	0	
72	N72	6.171715	5.843222	-2.509213	0	
73	N73	6.427544	0	-2.952322	0	
74	N74	6.427544	4.674577	-2.952322	0	
75	N75	1.760625	0	-2.090255	0	
76	N76	6.333333	4.674577	-4.090255	0	
77	N77	6.500208	0	-4.090255	0	
78	N78	6.792161	0	-3.583857	0	
79	N79	-2.690527	0	-0.479618	0	
80	N80	-0.950927	0	2.533457	0	
81	N81	0.929902	0	2.569874	0	
82	N82	2.669502	0	-0.443202	0	
83	N83	-1.718575	0	-4.090255	0	
84	N84	1.760625	0	-4.090255	0	
85	N85	-2.682978	0	3.533457	0	
86	N86	-4.422578	0	0.520382	0	
87	N87	4.401552	0	0.556798	0	
88	N88	2.661952	0	3.569874	0	
89	N89	-0.375599	4.674577	7.529955	0	
90	N90	-6.708931	4.674577	-3.439699	0	
91	N91	6.708931	4.674577	-3.439699	0	
92	N92	0.375599	4.674577	7.529955	0	
93	N93	0.584322	0	7.168435	0	
94	N94	0.584322	4.674577	7.168435	0	
95	N95	-0.656986	0	7.042578	0	
96	N96	-0.656986	4.674577	7.042578	0	
97	N97	1.450212	0	-0.837281	0	
98	N98	6.646393	0	-3.837297	0	
99	N99	-1.450212	0	-0.837281	0	
100	N100	-6.646393	0	-3.837297	0	
101	N101	0	0	7.10919	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N39	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N97	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N99	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M13	Y	-.052	5.5
2	M13	Y	-.052	3
3	M21	Y	-.052	5.5
4	M21	Y	-.052	3
5	M17	Y	-.052	5.5
6	M17	Y	-.052	3
7	M13	Y	-.011	3.5

Member Point Loads (BLC 2 : Dead Load) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
8	M21	Y	-.011	3.5
9	M17	Y	-.011	3.5
10	M14	Y	-.067	.5
11	M14	Y	-.067	5.25
12	M22	Y	-.067	.5
13	M22	Y	-.067	5.25
14	M18	Y	-.067	.5
15	M18	Y	-.067	5.25
16	M15	Y	-.076	1
17	M15	Y	-.076	7.25
18	M23	Y	-.076	1
19	M23	Y	-.076	7.25
20	M19	Y	-.076	1
21	M19	Y	-.076	7.25
22	M15	Y	-.074	6
23	M23	Y	-.074	6
24	M19	Y	-.074	6
25	M15	Y	-.047	3
26	M19	Y	-.047	3
27	M23	Y	-.047	3

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M13	Y	-.075	5.5
2	M13	Y	-.075	3
3	M21	Y	-.075	5.5
4	M21	Y	-.075	3
5	M17	Y	-.075	5.5
6	M17	Y	-.075	3
7	M13	Y	-.02	3.5
8	M21	Y	-.02	3.5
9	M17	Y	-.02	3.5
10	M14	Y	-.089	.5
11	M14	Y	-.089	5.25
12	M22	Y	-.089	.5
13	M22	Y	-.089	5.25
14	M18	Y	-.089	.5
15	M18	Y	-.089	5.25
16	M15	Y	-.21	1
17	M15	Y	-.21	7.25
18	M23	Y	-.21	1
19	M23	Y	-.21	7.25
20	M19	Y	-.21	1
21	M19	Y	-.21	7.25
22	M15	Y	-.07	6
23	M23	Y	-.07	6
24	M19	Y	-.07	6
25	M15	Y	-.053	3
26	M19	Y	-.053	3
27	M23	Y	-.053	3

Member Point Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M13	X	.016	5.5
2	M13	X	.016	3
3	M21	X	.032	5.5
4	M21	X	.032	3
5	M17	X	.032	5.5
6	M17	X	.032	3
7	M13	X	.006	3.5
8	M21	X	.009	3.5
9	M17	X	.009	3.5
10	M14	X	.029	.5
11	M14	X	.029	5.25
12	M22	X	.038	.5
13	M22	X	.038	5.25
14	M18	X	.038	.5
15	M18	X	.038	5.25
16	M15	X	.046	1
17	M15	X	.046	7.25
18	M23	X	.105	1
19	M23	X	.105	7.25
20	M19	X	.105	1
21	M19	X	.105	7.25
22	M15	X	.019	6
23	M23	X	.022	6
24	M19	X	.022	6
25	M15	X	.012	3

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M13	X	.038	5.5
2	M13	X	.038	3
3	M21	X	.094	5.5
4	M21	X	.094	3
5	M17	X	.094	5.5
6	M17	X	.094	3
7	M13	X	.007	3.5
8	M21	X	.016	3.5
9	M17	X	.016	3.5
10	M14	X	.073	.5
11	M14	X	.073	5.25
12	M22	X	.108	.5
13	M22	X	.108	5.25
14	M18	X	.108	.5
15	M18	X	.108	5.25
16	M15	X	.121	1
17	M15	X	.121	7.25
18	M23	X	.336	1
19	M23	X	.336	7.25
20	M19	X	.336	1
21	M19	X	.336	7.25
22	M15	X	.043	6
23	M23	X	.054	6

Member Point Loads (BLC 5 : Wind X) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
24	M19	X	.054	6
25	M15	X	.022	3

Member Point Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M13	Z	.032	5.5
2	M13	Z	.032	3
3	M21	Z	.016	5.5
4	M21	Z	.016	3
5	M17	Z	.016	5.5
6	M17	Z	.016	3
7	M13	Z	.009	3.5
8	M21	Z	.006	3.5
9	M17	Z	.006	3.5
10	M14	Z	.038	.5
11	M14	Z	.038	5.25
12	M22	Z	.029	.5
13	M22	Z	.029	5.25
14	M18	Z	.029	.5
15	M18	Z	.029	5.25
16	M15	Z	.105	1
17	M15	Z	.105	7.25
18	M23	Z	.046	1
19	M23	Z	.046	7.25
20	M19	Z	.046	1
21	M19	Z	.046	7.25
22	M15	Z	.022	6
23	M23	Z	.019	6
24	M19	Z	.019	6
25	M19	Z	.012	3
26	M23	Z	.012	3

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M13	Z	.094	5.5
2	M13	Z	.094	3
3	M21	Z	.038	5.5
4	M21	Z	.038	3
5	M17	Z	.038	5.5
6	M17	Z	.038	3
7	M13	Z	.016	3.5
8	M21	Z	.007	3.5
9	M17	Z	.007	3.5
10	M14	Z	.108	.5
11	M14	Z	.108	5.25
12	M22	Z	.073	.5
13	M22	Z	.073	5.25
14	M18	Z	.073	.5
15	M18	Z	.073	5.25
16	M15	Z	.336	1
17	M15	Z	.336	7.25

Member Point Loads (BLC 7 : Wind Z) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
18	M23	Z	.121	1
19	M23	Z	.121	7.25
20	M19	Z	.121	1
21	M19	Z	.121	7.25
22	M15	Z	.054	6
23	M23	Z	.043	6
24	M19	Z	.043	6
25	M19	Z	.022	3
26	M23	Z	.022	3

Member Distributed Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M2	X	.003	.003	0	0
2	M4	X	.003	.003	0	0
3	M34	X	.002	.002	0	0
4	M35	X	.002	.002	0	0
5	M16	X	.002	.002	0	0
6	M20	X	.002	.002	0	0
7	M24	X	.002	.002	0	0
8	M17	X	.002	.002	0	.5
9	M17	X	.002	.002	5.25	0
10	M18	X	.002	.002	0	.5
11	M18	X	.002	.002	5.25	0
12	M19	X	.002	.002	0	1
13	M19	X	.002	.002	7.25	0
14	M21	X	.002	.002	0	.5
15	M21	X	.002	.002	5.25	0
16	M22	X	.002	.002	0	.5
17	M22	X	.002	.002	5.25	0
18	M23	X	.002	.002	0	1
19	M23	X	.002	.002	7.25	0
20	M13	X	.002	.002	0	0
21	M14	X	.002	.002	0	0
22	M15	X	.002	.002	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M2	X	.013	.013	0	0
2	M4	X	.013	.013	0	0
3	M34	X	.007	.007	0	0
4	M35	X	.007	.007	0	0
5	M16	X	.006	.006	0	0
6	M20	X	.006	.006	0	0
7	M24	X	.006	.006	0	0
8	M17	X	.006	.006	0	.5
9	M17	X	.006	.006	5.25	0
10	M18	X	.006	.006	0	.5
11	M18	X	.006	.006	5.25	0
12	M19	X	.006	.006	0	1
13	M19	X	.006	.006	7.25	0

Member Distributed Loads (BLC 5 : Wind X) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
14	M21	X	.006	.006	0	.5
15	M21	X	.006	.006	5.25	0
16	M22	X	.006	.006	0	.5
17	M22	X	.006	.006	5.25	0
18	M23	X	.006	.006	0	1
19	M23	X	.006	.006	7.25	0
20	M13	X	.006	.006	0	0
21	M14	X	.006	.006	0	0
22	M15	X	.006	.006	0	0

Member Distributed Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M2	Z	.003	.003	0	0
2	M3	Z	.003	.003	0	0
3	M4	Z	.003	.003	0	0
4	M34	Z	.002	.002	0	0
5	M35	Z	.002	.002	0	0
6	M8	Z	.002	.002	0	0
7	M16	Z	.002	.002	0	0
8	M20	Z	.002	.002	0	0
9	M24	Z	.002	.002	0	0
10	M13	Z	.002	.002	0	.5
11	M13	Z	.002	.002	5.25	0
12	M14	Z	.002	.002	0	.5
13	M14	Z	.002	.002	5.25	0
14	M15	Z	.002	.002	0	1
15	M15	Z	.002	.002	7.25	0
16	M17	Z	.002	.002	0	0
17	M18	Z	.002	.002	0	0
18	M19	Z	.002	.002	0	0
19	M21	Z	.002	.002	0	0
20	M22	Z	.002	.002	0	0
21	M23	Z	.002	.002	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M2	Z	.013	.013	0	0
2	M3	Z	.013	.013	0	0
3	M4	Z	.013	.013	0	0
4	M34	Z	.007	.007	0	0
5	M35	Z	.007	.007	0	0
6	M8	Z	.007	.007	0	0
7	M16	Z	.006	.006	0	0
8	M20	Z	.006	.006	0	0
9	M24	Z	.006	.006	0	0
10	M13	Z	.006	.006	0	.5
11	M13	Z	.006	.006	5.25	0
12	M14	Z	.006	.006	0	.5
13	M14	Z	.006	.006	5.25	0
14	M15	Z	.006	.006	0	1
15	M15	Z	.006	.006	7.25	0

Member Distributed Loads (BLC 7 : Wind Z) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
16	M17	Z	.006	.006	0	0
17	M18	Z	.006	.006	0	0
18	M19	Z	.006	.006	0	0
19	M21	Z	.006	.006	0	0
20	M22	Z	.006	.006	0	0
21	M23	Z	.006	.006	0	0

Member Distributed Loads (BLC 8 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.007	-.007	.6	2.4
2	M5	Y	-.003	-.003	0	1.881
3	M31	Y	-.006	-.006	0	.667
4	M31	Y	-.006	-.004	.667	1.333
5	M31	Y	-.004	-.0009859	1.333	2
6	M32	Y	-.006	-.006	0	.667
7	M32	Y	-.006	-.004	.667	1.333
8	M32	Y	-.004	-.0009513	1.333	2
9	M6	Y	-.003	-.003	0	1.881
10	M28	Y	-.006	-.006	0	.667
11	M28	Y	-.006	-.004	.667	1.333
12	M28	Y	-.004	-.0009513	1.333	2
13	M33	Y	-.006	-.006	0	.667
14	M33	Y	-.006	-.004	.667	1.333
15	M33	Y	-.004	-.0009859	1.333	2
16	M38	Y	-.009	-.006	.6	2.4
17	M2	Y	-.0005614	-.006	0	1.733
18	M2	Y	-.006	-.008	1.733	3.467
19	M2	Y	-.008	-.005	3.467	5.2
20	M3	Y	-.004	-.007	7.8	9.533
21	M3	Y	-.007	-.006	9.533	11.267
22	M3	Y	-.006	-.0006617	11.267	13
23	M12	Y	-.002	-.002	0	1.142
24	M38	Y	-.0001197	-.018	1.2	2.16
25	M38	Y	-.018	-.025	2.16	3.12
26	M38	Y	-.025	-.013	3.12	4.08
27	M38	Y	-.013	-.006	4.08	5.04
28	M38	Y	-.006	-.0001197	5.04	6
29	M7	Y	-.003	-.003	0	1.881
30	M29	Y	-.006	-.006	0	.667
31	M29	Y	-.006	-.004	.667	1.333
32	M29	Y	-.004	-.0009859	1.333	2
33	M30	Y	-.006	-.006	0	.667
34	M30	Y	-.006	-.004	.667	1.333
35	M30	Y	-.004	-.0009513	1.333	2
36	M39	Y	-.009	-.006	.6	2.4
37	M3	Y	-.0005614	-.006	0	1.733
38	M3	Y	-.006	-.008	1.733	3.467
39	M3	Y	-.008	-.005	3.467	5.2
40	M4	Y	-.004	-.007	7.8	9.533
41	M4	Y	-.007	-.006	9.533	11.267
42	M4	Y	-.006	-.0006617	11.267	13

Member Distributed Loads (BLC 8 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
43	M11	Y	-.002	-.002	0	1.142
44	M39	Y	-.0001197	-.018	1.2	2.16
45	M39	Y	-.018	-.025	2.16	3.12
46	M39	Y	-.025	-.013	3.12	4.08
47	M39	Y	-.013	-.006	4.08	5.04
48	M39	Y	-.006	-.0001197	5.04	6
49	M1	Y	-.0001197	-.018	1.2	2.16
50	M1	Y	-.018	-.025	2.16	3.12
51	M1	Y	-.025	-.013	3.12	4.08
52	M1	Y	-.013	-.006	4.08	5.04
53	M1	Y	-.006	-.0001197	5.04	6
54	M2	Y	-.004	-.007	7.8	9.533
55	M2	Y	-.007	-.006	9.533	11.267
56	M2	Y	-.006	-.0006616	11.267	13
57	M4	Y	-.0005569	-.006	0	1.733
58	M4	Y	-.006	-.008	1.733	3.467
59	M4	Y	-.008	-.005	3.467	5.2
60	M37	Y	-.002	-.002	0	1.142
61	M4	Y	-.01	-.01	4.781	8.26
62	M26	Y	-.01	-.01	1.11e-14	3.479
63	M3	Y	-.01	-.01	4.781	8.26
64	M25	Y	-.01	-.01	1.11e-16	3.479
65	M2	Y	-.01	-.01	4.781	8.26
66	M27	Y	-.01	-.01	1.604e-14	3.479

Member Distributed Loads (BLC 9 : BLC 3 Transient Area Loads)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.022	-.022	.6	2.4
2	M5	Y	-.008	-.008	0	1.881
3	M31	Y	-.019	-.018	0	.667
4	M31	Y	-.018	-.012	.667	1.333
5	M31	Y	-.012	-.003	1.333	2
6	M32	Y	-.019	-.017	0	.667
7	M32	Y	-.017	-.012	.667	1.333
8	M32	Y	-.012	-.003	1.333	2
9	M6	Y	-.008	-.008	0	1.881
10	M28	Y	-.019	-.017	0	.667
11	M28	Y	-.017	-.012	.667	1.333
12	M28	Y	-.012	-.003	1.333	2
13	M33	Y	-.019	-.018	0	.667
14	M33	Y	-.018	-.012	.667	1.333
15	M33	Y	-.012	-.003	1.333	2
16	M38	Y	-.027	-.018	.6	2.4
17	M2	Y	-.002	-.018	0	1.733
18	M2	Y	-.018	-.024	1.733	3.467
19	M2	Y	-.024	-.016	3.467	5.2
20	M3	Y	-.011	-.022	7.8	9.533
21	M3	Y	-.022	-.018	9.533	11.267
22	M3	Y	-.018	-.002	11.267	13
23	M12	Y	-.006	-.006	0	1.142
24	M38	Y	-.000359	-.053	1.2	2.16

Member Distributed Loads (BLC 9 : BLC 3 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
25	M38	Y	-.053	-.076	2.16	3.12
26	M38	Y	-.076	-.038	3.12	4.08
27	M38	Y	-.038	-.017	4.08	5.04
28	M38	Y	-.017	-.000359	5.04	6
29	M7	Y	-.008	-.008	0	1.881
30	M29	Y	-.019	-.018	0	.667
31	M29	Y	-.018	-.012	.667	1.333
32	M29	Y	-.012	-.003	1.333	2
33	M30	Y	-.019	-.017	0	.667
34	M30	Y	-.017	-.012	.667	1.333
35	M30	Y	-.012	-.003	1.333	2
36	M39	Y	-.028	-.017	.6	2.4
37	M3	Y	-.002	-.018	0	1.733
38	M3	Y	-.018	-.024	1.733	3.467
39	M3	Y	-.024	-.016	3.467	5.2
40	M4	Y	-.011	-.022	7.8	9.533
41	M4	Y	-.022	-.018	9.533	11.267
42	M4	Y	-.018	-.002	11.267	13
43	M11	Y	-.006	-.006	0	1.142
44	M39	Y	-.000359	-.053	1.2	2.16
45	M39	Y	-.053	-.076	2.16	3.12
46	M39	Y	-.076	-.038	3.12	4.08
47	M39	Y	-.038	-.017	4.08	5.04
48	M39	Y	-.017	-.000359	5.04	6
49	M1	Y	-.0003591	-.053	1.2	2.16
50	M1	Y	-.053	-.076	2.16	3.12
51	M1	Y	-.076	-.038	3.12	4.08
52	M1	Y	-.038	-.017	4.08	5.04
53	M1	Y	-.017	-.0003591	5.04	6
54	M2	Y	-.011	-.022	7.8	9.533
55	M2	Y	-.022	-.018	9.533	11.267
56	M2	Y	-.018	-.002	11.267	13
57	M4	Y	-.002	-.018	0	1.733
58	M4	Y	-.018	-.024	1.733	3.467
59	M4	Y	-.024	-.016	3.467	5.2
60	M37	Y	-.006	-.006	0	1.142
61	M4	Y	-.03	-.03	4.781	8.26
62	M26	Y	-.03	-.03	1.11e-14	3.479
63	M3	Y	-.03	-.03	4.781	8.26
64	M25	Y	-.03	-.03	1.11e-16	3.479
65	M2	Y	-.03	-.03	4.781	8.26
66	M27	Y	-.03	-.03	1.604e-14	3.479

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	DL		-1						
2	Dead Load	None					27		9	
3	Ice Load	None					27		9	
4	Wind with Ice X	None					25	22	1	
5	Wind X	None					25	22		

Basic Load Cases (Continued)

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib...	Area(...	Surfa...
6	Wind with Ice Z	None					26	21		
7	Wind Z	None					26	21		
8	BLC 2 Transient Area Loads	None						66		
9	BLC 3 Transient Area Loads	None						66		
10	BLC 4 Transient Area Loads	None								

Load Combinations

	Description	Solve	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	1.2D + 1.6W (X-direc...	Yes	Y		1	1.2	2	1.2	5	1.6																
2	0.9D + 1.6W (X-direc...	Yes	Y		1	.9	2	.9	5	1.6																
3	1.2D + 1.0Di + 1.0Wi...	Yes	Y		1	1.2	2	1.2	3	1	4	1														
4	1.2D + 1.6W (Z-direc...	Yes	Y		1	1.2	2	1.2	7	1.6																
5	0.9D + 1.6W (Z-direc...	Yes	Y		1	.9	2	.9	7	1.6																
6	1.2D + 1.0Di + 1.0Wi...	Yes	Y		1	1.2	2	1.2	3	1	6	1														

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N39	max	.075	5	4.803	4	0	3	-.422	2	.038	5	.195	1
2		min	-1.192	2	.965	2	-3.302	4	-2.328	4	-.572	2	0	4
3	N97	max	1.222	4	4.637	1	2.017	2	1.038	1	.187	5	1.993	1
4		min	-2.375	1	-.789	5	-1.186	5	-.362	5	-.294	2	-.322	5
5	N99	max	-.266	6	2.477	6	-.225	6	.502	6	-.026	6	1.138	2
6		min	-2.375	1	-2.377	2	-2.017	2	-.545	2	-.294	2	-.935	6
7	Totals:	max	0	6	8.546	6	0	3						
8		min	-5.942	1	2.899	2	-5.542	5						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
1	N1	max	0	6	.202	2	.083	1	2.128e-03	2	2.307e-03	2	1.711e-03	6
2		min	-.036	1	-.245	6	.002	6	-7.363e-04	6	-1.859e-04	5	-4.396e-03	2
3	N2	max	.651	1	.175	2	.806	4	1.086e-03	4	1.193e-02	1	-7.093e-04	6
4		min	-.004	6	-.213	6	.015	3	6.348e-04	3	-1.322e-02	4	-2.59e-03	1
5	N3	max	0	6	.174	2	.075	1	2.128e-03	2	2.315e-03	2	1.711e-03	6
6		min	-.022	1	-.235	6	.002	6	-7.36e-04	6	-1.903e-04	5	-4.396e-03	2
7	N4	max	.796	1	.168	2	.779	4	1.086e-03	4	1.193e-02	1	-7.11e-04	6
8		min	-.164	4	-.22	6	.02	3	6.348e-04	3	-1.322e-02	4	-2.591e-03	1
9	N5	max	0	5	.003	5	0	2	1.566e-04	4	3.432e-05	2	1.891e-08	6
10		min	0	1	-.002	3	0	6	0	1	-3.362e-06	4	-1.723e-04	1
11	N6	max	0	6	.199	2	.075	1	2.128e-03	2	2.315e-03	2	1.711e-03	6
12		min	-.05	1	-.244	6	.002	6	-7.36e-04	6	-1.731e-04	5	-4.396e-03	2
13	N7	max	0	3	.141	2	.064	1	7.338e-03	5	3.351e-03	1	7.467e-03	4
14		min	-.009	5	-.229	6	.002	6	-3.089e-03	1	-1.111e-03	4	-1.348e-02	2
15	N8	max	.89	1	.142	2	.823	4	8.967e-03	4	1.505e-02	1	7.153e-03	5
16		min	-.239	4	-.229	6	.009	3	-3.395e-03	2	-8.873e-03	4	-1.399e-02	1
17	N9	max	.096	4	.141	2	.107	1	7.311e-03	5	3.351e-03	1	7.467e-03	4
18		min	-.191	2	-.229	6	-.093	5	-3.088e-03	1	-1.111e-03	4	-1.345e-02	2
19	N10	max	1.086	1	.142	2	.949	4	8.993e-03	4	1.505e-02	1	7.153e-03	5

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
20		min	-.339	4	-.229	6	0	2	-3.395e-03	2	-8.873e-03	4	-1.402e-02	1
21	N11	max	0	6	.168	2	.065	1	2.128e-03	2	2.315e-03	2	1.711e-03	6
22		min	-.035	1	-.232	6	.002	6	-7.36e-04	6	-1.903e-04	5	-4.396e-03	2
23	N12	max	0	6	.161	2	.055	1	2.128e-03	2	2.315e-03	2	1.711e-03	6
24		min	-.05	1	-.229	6	.002	6	-7.36e-04	6	-1.903e-04	5	-4.396e-03	2
25	N13	max	.651	1	.158	2	.895	4	1.086e-03	4	1.193e-02	1	-7.11e-04	6
26		min	-.004	6	-.218	6	-.002	1	6.348e-04	3	-1.322e-02	4	-2.591e-03	1
27	N14	max	0	6	.134	2	.04	1	1.804e-02	4	2.488e-03	1	7.897e-04	6
28		min	-.05	1	-.222	6	.003	6	-1.421e-03	1	-1.34e-03	4	-4.591e-03	2
29	N15	max	.651	1	.134	2	.977	4	1.472e-02	4	7.399e-03	1	-6.798e-04	6
30		min	-.004	6	-.222	6	-.061	1	-1.837e-03	2	-1.327e-02	4	-5.276e-03	1
31	N16	max	.011	6	.134	2	.06	1	1.801e-02	4	2.488e-03	1	7.897e-04	6
32		min	-.114	2	-.222	6	-.239	4	-1.421e-03	1	-1.34e-03	4	-4.565e-03	2
33	N17	max	.725	1	.134	2	1.184	4	1.474e-02	4	7.399e-03	1	-6.799e-04	6
34		min	.006	6	-.222	6	-.087	1	-1.837e-03	2	-1.327e-02	4	-5.302e-03	1
35	N18	max	.034	2	.015	2	.044	1	8.358e-03	4	1.088e-03	5	9.178e-03	5
36		min	-.005	5	-.27	6	.002	6	-4.448e-03	2	-2.234e-04	2	-1.322e-02	1
37	N19	max	1.374	1	.014	2	.907	4	1.154e-02	4	1.324e-02	1	1.066e-02	4
38		min	-.387	4	-.271	6	-.231	1	-1.132e-02	1	2.571e-04	6	-2.774e-02	1
39	N20	max	.233	5	.015	2	.159	2	6.881e-03	4	1.088e-03	5	9.17e-03	5
40		min	-.228	1	-.271	6	-.178	4	-4.444e-03	2	-2.234e-04	2	-9.47e-03	1
41	N21	max	2.109	1	.014	2	1.214	4	1.188e-02	4	1.324e-02	1	1.067e-02	4
42		min	-.664	4	-.272	6	-.525	1	-1.134e-02	1	2.571e-04	6	-2.839e-02	1
43	N22	max	.019	1	-.024	2	.053	2	7.23e-03	4	5.593e-05	5	8.671e-03	4
44		min	.001	6	-.286	6	0	6	-7.768e-03	1	-4.471e-04	2	-1.619e-02	1
45	N23	max	.04	2	-.054	2	.041	1	7.23e-03	5	1.597e-03	2	6.691e-03	4
46		min	0	6	-.283	6	0	6	-1.217e-02	1	7.052e-05	6	-2.241e-02	1
47	N24	max	1.557	1	-.054	2	.783	4	8.823e-03	4	7.674e-03	4	5.713e-03	4
48		min	-.172	4	-.283	6	-.336	1	-1.099e-02	1	-3.483e-03	1	-2.438e-02	1
49	N25	max	.095	4	-.054	2	.212	1	6.943e-03	5	1.597e-03	2	6.689e-03	4
50		min	-.269	1	-.283	6	-.095	5	-1.217e-02	1	7.052e-05	6	-2.2e-02	2
51	N26	max	1.899	1	-.054	2	.907	4	8.85e-03	4	7.674e-03	4	5.713e-03	4
52		min	-.252	4	-.283	6	-.49	1	-1.099e-02	1	-3.483e-03	1	-2.441e-02	1
53	N27	max	0	6	-.011	2	.009	5	2.381e-02	4	6.034e-04	5	-1.096e-03	6
54		min	-.05	1	-.245	6	0	3	-2.374e-03	1	-1.085e-04	1	-3.947e-03	1
55	N28	max	.651	1	-.011	2	1.423	4	2.501e-02	4	-6.614e-04	3	-2.805e-04	6
56		min	-.004	6	-.245	6	-.137	1	-2.444e-03	1	-9.137e-03	4	-5.827e-03	1
57	N29	max	-.016	6	-.011	2	.033	1	2.34e-02	4	6.034e-04	5	-1.095e-03	6
58		min	-.102	1	-.245	6	-.32	4	-2.374e-03	1	-1.085e-04	1	-3.661e-03	1
59	N30	max	.733	1	-.011	2	1.774	4	2.504e-02	4	-6.614e-04	3	-2.805e-04	6
60		min	0	6	-.245	6	-.171	1	-2.445e-03	1	-9.137e-03	4	-5.854e-03	1
61	N31	max	0	5	.003	2	0	2	1.566e-04	4	3.432e-05	2	2.011e-08	6
62		min	0	1	-.003	6	0	6	0	1	-3.362e-06	4	-1.723e-04	1
63	N32	max	.08	1	-.078	2	.018	1	8.056e-03	4	3.07e-04	2	3.011e-03	5
64		min	0	4	-.353	4	0	6	-8.843e-03	2	-3.299e-06	3	-1.809e-02	1
65	N33	max	1.263	1	-.078	2	.686	4	6.732e-03	5	2.695e-03	4	2.32e-03	4
66		min	-.003	5	-.354	4	-.166	1	-7.438e-03	1	-1.306e-02	1	-1.625e-02	1
67	N34	max	.042	5	-.078	2	.142	2	8.03e-03	4	3.07e-04	2	3.011e-03	5
68		min	-.173	1	-.353	4	-.11	4	-8.843e-03	2	-3.299e-06	3	-1.807e-02	1
69	N35	max	1.491	1	-.078	2	.78	4	6.759e-03	5	2.695e-03	4	2.32e-03	4
70		min	-.035	5	-.354	4	-.27	1	-7.438e-03	1	-1.306e-02	1	-1.628e-02	1
71	N36	max	0	6	-.032	5	0	2	2.053e-02	4	5.265e-04	5	-4.226e-04	5

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
72		min	-.05	1	-.275	3	-.011	5	-9.845e-04	1	1.755e-05	3	-2.82e-03	1
73	N37	max	.1	1	-.099	2	.007	1	7.19e-03	4	1.921e-03	1	9.673e-05	4
74		min	0	6	-.442	4	0	6	1.067e-03	2	1.43e-05	6	-1.103e-03	2
75	N38	max	0	6	0	6	0	6	0	6	0	6	0	6
76		min	0	1	0	1	0	1	0	1	0	1	0	1
77	N39	max	0	6	0	6	0	6	0	6	0	6	0	6
78		min	0	1	0	1	0	1	0	1	0	1	0	1
79	N40	max	.002	2	-.001	2	0	5	1.566e-04	4	3.432e-05	2	1.796e-08	6
80		min	0	4	-.006	4	0	3	0	1	-3.362e-06	4	-1.723e-04	1
81	N41	max	.1	1	-.103	2	.002	4	7.19e-03	4	1.906e-03	1	9.698e-05	4
82		min	0	6	-.442	4	0	1	1.066e-03	2	1.571e-05	6	-1.102e-03	2
83	N42	max	.1	1	-.107	2	.002	4	7.19e-03	4	1.913e-03	1	9.71e-05	4
84		min	0	6	-.441	4	-.007	1	1.066e-03	2	1.643e-05	6	-1.102e-03	2
85	N43	max	0	6	-.034	5	0	3	1.844e-02	4	5.381e-05	2	1.801e-04	4
86		min	-.05	1	-.287	3	-.013	5	-9.731e-05	2	-3.98e-04	5	-2.64e-03	2
87	N44	max	.083	2	-.104	2	.003	5	9.154e-03	1	-4.28e-05	6	-3.973e-04	6
88		min	0	6	-.353	4	-.017	1	2.348e-03	6	-3.053e-04	5	-1.62e-02	2
89	N45	max	1.263	1	-.104	2	.694	4	7.776e-03	2	-6.703e-04	6	-9.569e-04	6
90		min	.008	6	-.354	4	.034	3	9.856e-04	6	-1.344e-02	1	-1.829e-02	1
91	N46	max	-.005	6	-.104	2	-.032	6	9.154e-03	1	-4.28e-05	6	-3.973e-04	6
92		min	-.144	2	-.353	4	-.145	1	2.343e-03	6	-3.053e-04	5	-1.617e-02	2
93	N47	max	1.52	1	-.104	2	.797	4	7.776e-03	2	-6.703e-04	6	-9.569e-04	6
94		min	.021	6	-.354	4	.048	3	9.901e-04	6	-1.344e-02	1	-1.832e-02	1
95	N48	max	0	5	.001	5	0	5	1.566e-04	4	3.432e-05	2	1.573e-08	6
96		min	0	1	-.006	1	0	1	0	1	-3.362e-06	4	-1.723e-04	1
97	N49	max	0	4	-.021	5	.017	5	1.542e-02	4	-5.929e-05	3	1.24e-03	4
98		min	-.049	1	-.292	3	0	2	3.826e-04	3	-1.545e-03	5	-3.252e-03	2
99	N50	max	.651	1	-.022	5	1.498	4	3.397e-02	4	8.543e-03	4	6.54e-04	4
100		min	-.004	6	-.293	3	.023	3	4.095e-04	3	-4.016e-03	1	-5.922e-03	2
101	N51	max	.032	4	-.021	5	-.01	3	1.167e-02	4	-5.929e-05	3	1.238e-03	4
102		min	-.102	2	-.292	3	-.303	4	3.812e-04	3	-1.545e-03	5	-1.782e-03	2
103	N52	max	.812	1	-.022	5	2.395	4	3.463e-02	4	8.543e-03	4	6.548e-04	4
104		min	-.02	4	-.293	3	.033	3	4.11e-04	3	-4.016e-03	1	-6.26e-03	2
105	N53	max	.046	2	-.127	2	.003	5	7.898e-03	2	2.492e-03	2	-1.578e-03	6
106		min	0	4	-.296	6	-.038	1	7.629e-04	6	-2.039e-04	4	-1.577e-02	1
107	N54	max	1.579	1	-.127	2	.808	4	1.428e-02	1	-5.791e-04	3	-1.597e-03	6
108		min	.042	6	-.297	6	.069	3	1.968e-03	6	-8.218e-03	4	-3.07e-02	1
109	N55	max	-.041	6	-.127	2	-.012	6	7.891e-03	2	2.492e-03	2	-1.572e-03	6
110		min	-.282	1	-.296	6	-.243	2	4.216e-04	6	-2.039e-04	4	-1.202e-02	1
111	N56	max	2.391	1	-.127	2	1.078	4	1.43e-02	1	-5.791e-04	3	-1.603e-03	6
112		min	.084	6	-.297	6	.139	3	2.043e-03	6	-8.218e-03	4	-3.135e-02	1
113	N57	max	.02	1	-.118	5	0	4	8.539e-03	1	-1.021e-05	6	-1.69e-03	6
114		min	-.005	5	-.292	3	-.052	2	2.037e-03	6	-6.292e-04	2	-1.738e-02	1
115	N58	max	.029	2	-.068	5	.006	5	9.54e-03	4	5.177e-04	1	-1.849e-03	6
116		min	.001	6	-.284	3	-.047	1	2.427e-03	3	-9.031e-04	5	-1.886e-02	2
117	N59	max	1.292	1	-.069	5	.927	4	1.11e-02	4	1.327e-02	1	-2.031e-03	6
118		min	.088	6	-.285	3	.04	3	1.725e-03	3	-6.527e-04	5	-2.034e-02	1
119	N60	max	-.025	6	-.068	5	-.036	6	9.252e-03	4	5.177e-04	1	-1.848e-03	6
120		min	-.231	2	-.284	3	-.162	1	2.426e-03	3	-9.031e-04	5	-1.846e-02	2
121	N61	max	1.578	1	-.069	5	1.083	4	1.113e-02	4	1.327e-02	1	-2.031e-03	6
122		min	.116	6	-.285	3	.064	3	1.725e-03	3	-6.527e-04	5	-2.037e-02	1
123	N62	max	0	4	.04	5	.016	4	1.641e-02	4	2.38e-03	1	1.705e-03	5

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
124		min	-.05	1	-.339	1	-.04	2	7.666e-05	3	4.051e-04	6	-5.451e-03	1
125	N63	max	.651	1	.04	5	.999	4	1.739e-02	4	1.506e-02	4	1.025e-03	4
126		min	-.004	6	-.34	1	.009	3	3.505e-04	3	1.23e-03	3	-5.304e-03	2
127	N64	max	.024	5	.04	5	-.007	3	1.639e-02	4	2.38e-03	1	1.705e-03	5
128		min	-.126	1	-.339	1	-.214	4	7.666e-05	3	4.051e-04	6	-5.425e-03	1
129	N65	max	.725	1	.04	5	1.243	4	1.742e-02	4	1.506e-02	4	1.025e-03	4
130		min	-.017	4	-.34	1	.014	3	3.505e-04	3	1.23e-03	3	-5.331e-03	2
131	N66	max	0	4	.053	5	.007	4	1.771e-03	5	2.326e-03	2	1.524e-03	5
132		min	-.05	1	-.384	1	-.058	1	-3.08e-03	1	5.197e-05	6	-6.276e-03	1
133	N67	max	.651	1	.048	5	.882	4	1.002e-03	4	1.418e-02	4	7.263e-04	6
134		min	-.004	6	-.37	1	-.031	1	-1.309e-03	2	2.225e-03	3	-2.356e-03	2
135	N68	max	.002	4	.046	5	.006	4	1.771e-03	5	2.326e-03	2	1.524e-03	5
136		min	-.035	1	-.382	1	-.065	1	-3.08e-03	1	5.197e-05	6	-6.276e-03	1
137	N69	max	.008	5	.023	5	.008	4	7.645e-03	5	2.879e-03	2	-2.328e-03	6
138		min	-.004	1	-.348	1	-.065	1	-2.193e-04	3	2.348e-04	6	-1.518e-02	1
139	N70	max	.861	1	.023	5	.832	4	8.467e-03	4	1.275e-02	1	-1.131e-03	6
140		min	.051	6	-.348	1	-.06	1	8.445e-04	3	2.166e-03	6	-1.144e-02	2
141	N71	max	-.031	6	.023	5	-.008	3	7.618e-03	5	2.879e-03	2	-2.328e-03	6
142		min	-.217	1	-.348	1	-.107	2	-2.193e-04	3	2.348e-04	6	-1.516e-02	1
143	N72	max	1.021	1	.023	5	.951	4	8.494e-03	4	1.275e-02	1	-1.131e-03	6
144		min	.067	6	-.348	1	-.026	2	8.446e-04	3	2.166e-03	6	-1.147e-02	2
145	N73	max	.004	5	.038	5	.005	4	1.771e-03	5	2.326e-03	2	1.524e-03	5
146		min	-.018	1	-.38	1	-.073	1	-3.08e-03	1	5.197e-05	6	-6.276e-03	1
147	N74	max	.798	1	.038	5	.794	4	1.002e-03	4	1.418e-02	4	7.263e-04	6
148		min	.038	6	-.367	1	-.097	1	-1.309e-03	2	2.225e-03	3	-2.356e-03	2
149	N75	max	0	5	.003	5	0	5	1.566e-04	4	3.432e-05	2	1.692e-08	6
150		min	0	1	-.005	1	0	1	0	1	-3.362e-06	4	-1.723e-04	1
151	N76	max	.651	1	.051	5	.81	4	1.002e-03	4	1.418e-02	4	7.256e-04	6
152		min	-.004	6	-.382	1	-.085	1	-1.309e-03	2	2.224e-03	3	-2.356e-03	2
153	N77	max	0	4	.064	5	.005	4	1.771e-03	5	2.326e-03	2	1.524e-03	5
154		min	-.05	1	-.428	1	-.075	1	-3.08e-03	1	5.052e-05	6	-6.277e-03	1
155	N78	max	.002	4	.058	5	.004	4	1.771e-03	5	2.311e-03	2	1.524e-03	5
156		min	-.036	1	-.431	1	-.083	1	-3.081e-03	1	5.056e-05	6	-6.277e-03	1
157	N79	max	0	2	.004	2	.001	2	1.566e-04	4	3.432e-05	2	1.92e-08	6
158		min	0	6	-.003	6	0	6	0	1	-3.362e-06	4	-1.723e-04	1
159	N80	max	.002	2	0	2	0	5	1.566e-04	4	3.432e-05	2	1.828e-08	6
160		min	0	4	-.006	4	0	3	0	1	-3.362e-06	4	-1.723e-04	1
161	N81	max	.002	2	-.003	2	0	5	1.566e-04	4	3.432e-05	2	1.76e-08	6
162		min	0	4	-.006	4	0	1	0	1	-3.362e-06	4	-1.723e-04	1
163	N82	max	0	2	0	5	0	5	1.566e-04	4	3.432e-05	2	1.666e-08	6
164		min	0	6	-.007	1	-.001	1	0	1	-3.362e-06	4	-1.723e-04	1
165	N83	max	0	6	-.022	5	.001	5	2.27e-02	4	1.118e-03	5	-9.435e-04	5
166		min	-.05	1	-.257	3	0	3	-1.903e-03	1	-4.014e-05	2	-3.456e-03	1
167	N84	max	0	4	-.028	5	.002	5	1.645e-02	4	-3.021e-05	3	8.635e-04	4
168		min	-.049	1	-.292	3	0	1	2.769e-04	3	-1.989e-03	5	-2.931e-03	2
169	N85	max	.029	1	-.049	2	.047	1	7.015e-03	5	1.499e-03	2	7.227e-03	4
170		min	0	6	-.285	6	0	6	-1.144e-02	1	-1.725e-04	5	-2.102e-02	1
171	N86	max	.028	1	-.002	2	.047	1	7.889e-03	4	8.948e-04	5	9.047e-03	5
172		min	0	6	-.278	6	0	6	-5.647e-03	2	-1.16e-03	2	-1.42e-02	1
173	N87	max	.028	1	-.087	5	.003	4	8.895e-03	4	-1.13e-04	3	-1.776e-03	6
174		min	0	4	-.287	3	-.047	1	2.411e-03	3	-7.314e-04	5	-1.832e-02	1
175	N88	max	.03	2	-.133	2	.002	4	8.12e-03	2	2.351e-03	2	-1.607e-03	6

Envelope Joint Displacements (Continued)

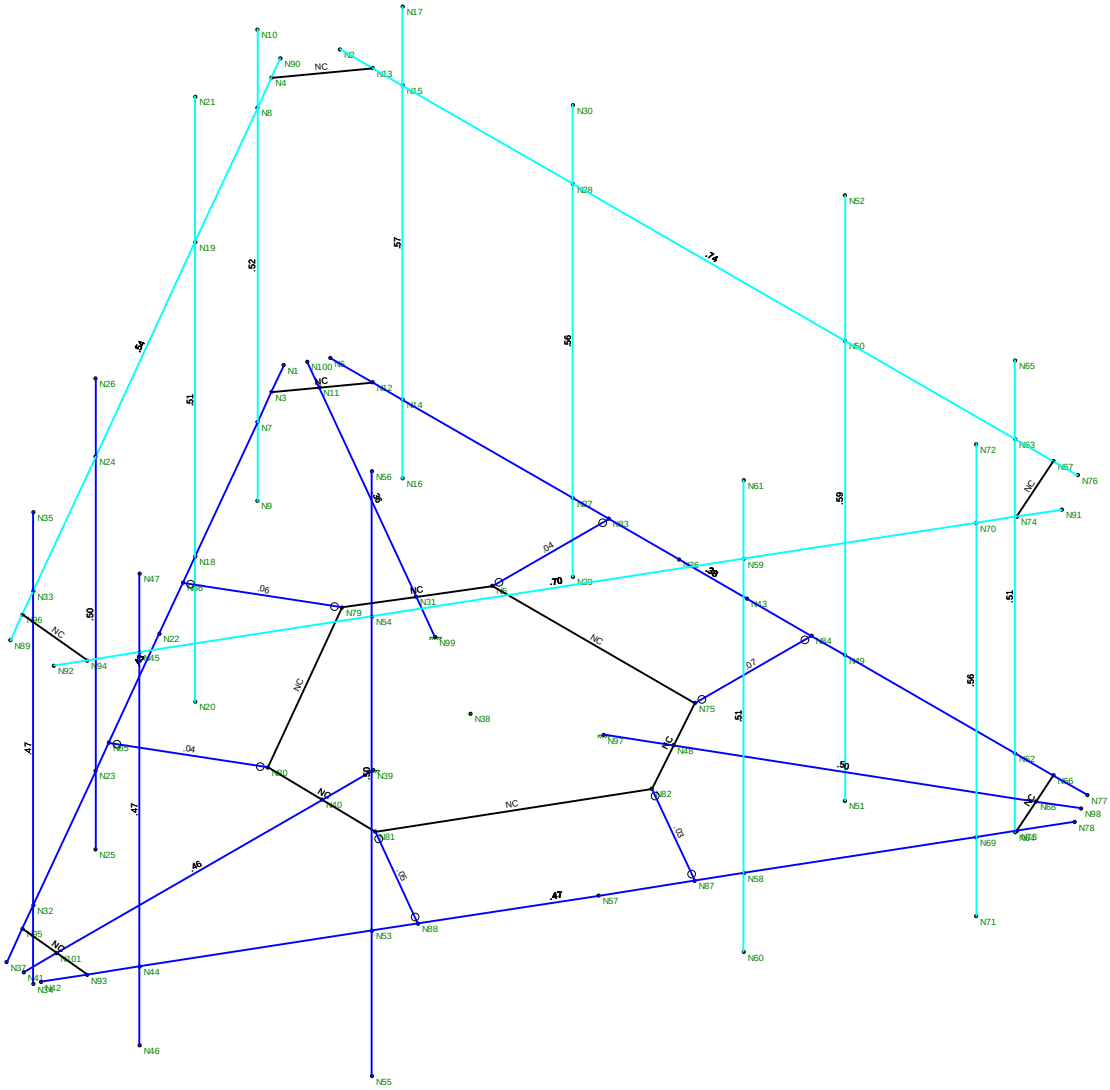
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
176		min	0	4	-.297	6	-.047	1	1.009e-03	6	5.73e-05	6	-1.603e-02	1
177	N89	max	1.094	1	-.082	2	.682	4	3.255e-03	5	5.579e-05	6	-1.366e-04	4
178		min	.002	5	-.396	4	-.069	1	-7.078e-04	3	-1.571e-02	1	-6.842e-04	2
179	N90	max	.744	1	.178	2	.746	4	1.086e-03	4	1.193e-02	1	-7.107e-04	6
180		min	-.106	4	-.215	6	.026	3	6.342e-04	3	-1.322e-02	4	-2.591e-03	1
181	N91	max	.735	1	.046	5	.747	4	1.001e-03	4	1.418e-02	4	7.257e-04	6
182		min	.02	6	-.382	1	-.133	1	-1.308e-03	2	2.225e-03	3	-2.356e-03	2
183	N92	max	1.094	1	-.088	2	.685	4	3.255e-03	5	5.496e-05	6	-1.362e-04	4
184		min	.002	5	-.397	4	.015	3	-7.088e-04	3	-1.572e-02	1	-6.831e-04	2
185	N93	max	.089	1	-.104	2	.002	4	7.19e-03	4	1.906e-03	1	9.698e-05	4
186		min	0	6	-.397	4	-.013	1	1.066e-03	2	1.571e-05	6	-1.102e-03	2
187	N94	max	1.162	1	-.092	2	.685	4	3.255e-03	5	5.52e-05	6	-1.363e-04	4
188		min	.003	5	-.384	4	.023	3	-7.092e-04	3	-1.572e-02	1	-6.83e-04	2
189	N95	max	.086	2	-.086	2	.015	1	7.19e-03	4	1.906e-03	1	9.698e-05	4
190		min	0	6	-.388	4	0	6	1.066e-03	2	1.571e-05	6	-1.102e-03	2
191	N96	max	1.186	1	-.083	2	.681	4	3.255e-03	5	5.52e-05	6	-1.363e-04	4
192		min	.004	5	-.377	4	-.122	1	-7.092e-04	3	-1.572e-02	1	-6.83e-04	2
193	N97	max	0	6	0	6	0	6	0	6	0	6	0	6
194		min	0	1	0	1	0	1	0	1	0	1	0	1
195	N98	max	.001	4	.061	5	.005	4	1.771e-03	5	2.326e-03	2	1.524e-03	5
196		min	-.043	1	-.429	1	-.079	1	-3.081e-03	1	5.197e-05	6	-6.277e-03	1
197	N99	max	0	6	0	6	0	6	0	6	0	6	0	6
198		min	0	1	0	1	0	1	0	1	0	1	0	1
199	N100	max	0	6	.201	2	.079	1	2.128e-03	2	2.315e-03	2	1.711e-03	6
200		min	-.043	1	-.244	6	.002	6	-7.362e-04	6	-1.903e-04	5	-4.396e-03	2
201	N101	max	.087	2	-.096	2	.002	4	7.19e-03	4	1.906e-03	1	9.698e-05	4
202		min	0	6	-.393	4	0	1	1.066e-03	2	1.571e-05	6	-1.102e-03	2

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	Cb	Eqn
1	M8	L3X3X4	.738	12...	1	.299	12...	z	4	32.733	46.656	1.688	3.454	1	H2-1
2	M35	L3X3X4	.699	3....	1	.318	.528	z	1	32.733	46.656	1.688	3.454	1	H2-1
3	M15	PIPE_2.0	.586	2.25	1	.137	2.25		4	12.144	32.13	1.872	1.872	1.55	H1-...
4	M13	PIPE_2.0	.572	1....	1	.168	5....		4	17.82	32.13	1.872	1.872	1.8...	H1-...
5	M14	PIPE_2.0	.564	1....	2	.140	1....		4	17.82	32.13	1.872	1.872	1.8...	H1-...
6	M21	PIPE_2.0	.556	1....	4	.162	1....		4	17.82	32.13	1.872	1.872	1.7...	H1-...
7	M34	L3X3X4	.544	1....	4	.350	12...	z	1	32.733	46.656	1.688	3.454	1	H2-1
8	M20	PIPE_2.0	.521	1....	4	.168	1....		1	17.82	32.13	1.872	1.872	1.7...	H1-...
9	M16	PIPE_2.0	.514	1....	2	.173	1....		4	17.82	32.13	1.872	1.872	1.7...	H1-...
10	M19	PIPE_2.0	.511	2.25	4	.194	2.25		1	12.144	32.13	1.872	1.872	1.4...	H1-...
11	M22	PIPE_2.0	.510	1....	5	.186	1....		1	17.82	32.13	1.872	1.872	1.7...	H1-...
12	M38	HSS4X4X4	.499	.938	1	.128	0	y	1	120....	139....	16.181	16.181	1.8...	H1-...
13	M23	PIPE_2.0	.498	2.25	1	.143	2.25		4	12.144	32.13	1.872	1.872	1.6...	H1-...
14	M18	PIPE_2.0	.496	1....	4	.133	1....		4	17.82	32.13	1.872	1.872	1.7...	H1-...
15	M17	PIPE_2.0	.473	1....	2	.210	1....		1	17.82	32.13	1.872	1.872	1.7...	H1-...
16	M24	PIPE_2.0	.471	1....	1	.203	1....		1	17.82	32.13	1.872	1.872	1.8...	H1-...
17	M2	C5X6.7	.469	12...	1	.362	11...	z	2	50.327	63.828	1.604	9.585	2.5...	H1-...
18	M1	HSS4X4X4	.457	.938	4	.126	0	y	4	120....	139....	16.181	16.181	1.8...	H1-...
19	M4	C5X6.7	.428	.812	1	.570	1....	y	1	50.331	63.828	1.604	9.265	2.0...	H1-...
20	M3	C5X6.7	.380	12...	6	.461	1....	y	4	28.842	63.828	1.604	8.187	1	H1-...

Envelope AISC 14th(360-10): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	Cb	Eqn
21	M39	HSS4X4X4	.359	.938	6	.070	.875	y	2	120....	139....	16.181	16.181	1.8...	H1-...
22	M28	L2x2x2	.073	.938	4	.008	0	y	1	12.103	15.908	.403	.812	1.1...	H2-1
23	M30	L2x2x2	.063	.938	1	.007	0	y	6	12.103	15.908	.403	.812	1.1...	H2-1
24	M32	L2x2x2	.054	.937	1	.008	0	y	4	12.103	15.908	.403	.812	1.1...	H2-1
25	M29	L2x2x2	.037	.938	4	.010	0	z	1	12.103	15.908	.403	.812	1.1...	H2-1
26	M31	L2x2x2	.036	.938	1	.007	0	z	4	12.103	15.908	.403	.812	1.1...	H2-1
27	M33	L2x2x2	.033	.917	3	.008	0	z	6	12.103	15.908	.403	.813	1.1...	H2-1



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
FJP	CT11412A - Mount	July 7, 2020 at 3:00 PM
19027.69	Unity Check	CT11412A_AMA.r3d

Exhibit F

Power Density/RF Emissions Report

EBI Consulting

environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11412A

Orange/Town High Plains
525 Orange Center Road
Orange, Connecticut 06477

July 25, 2020

EBI Project Number: 6220003391

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**18.17%**

July 25, 2020

T-Mobile
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, Connecticut 06002

Emissions Analysis for Site: CT11412A - Orange/Town High Plains

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **525 Orange Center Road** in **Orange, Connecticut** for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu W/cm^2$). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits; therefore, it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 525 Orange Center Road in Orange, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.

3) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

5) 2 UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

6) 4 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

7) 2 UMTS channels (AWS Band - 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

8) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

9) 2 LTE channels (BRS Band - 2500 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

10) 2 NR channels (BRS Band - 2500 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

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

12) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

13) The antennas used in this modeling are the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector A, the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector B, the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power

levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

14) The antenna mounting height centerline of the proposed antennas is 123 feet above ground level (AGL).

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

16) All calculations were done with respect to uncontrolled / general population threshold limits.

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32
Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz
Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd
Height (AGL):	123 feet	Height (AGL):	123 feet	Height (AGL):	123 feet
Channel Count:	8	Channel Count:	8	Channel Count:	8
Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts
ERP (W):	12,841.53	ERP (W):	12,841.53	ERP (W):	12,841.53
Antenna A1 MPE %:	**3.05%**	Antenna B1 MPE %:	**3.05%**	Antenna C1 MPE %:	**3.05%**
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449
Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz
Gain:	22.05 dBd / 22.05 dBd	Gain:	22.05 dBd / 22.05 dBd	Gain:	22.05 dBd / 22.05 dBd
Height (AGL):	123 feet	Height (AGL):	123 feet	Height (AGL):	123 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	160 Watts	Total TX Power (W):	160 Watts	Total TX Power (W):	160 Watts
ERP (W):	25,651.93	ERP (W):	25,651.93	ERP (W):	25,651.93
Antenna A2 MPE %:	**6.10%**	Antenna B2 MPE %:	**6.10%**	Antenna C2 MPE %:	**6.10%**
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz
Gain:	12.95 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd / 15.65 dBd / 16.35 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd / 15.65 dBd / 16.35 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd / 15.65 dBd / 16.35 dBd
Height (AGL):	123 feet	Height (AGL):	123 feet	Height (AGL):	123 feet
Channel Count:	11	Channel Count:	11	Channel Count:	11
Total TX Power (W):	440 Watts	Total TX Power (W):	440 Watts	Total TX Power (W):	440 Watts
ERP (W):	13,259.22	ERP (W):	13,259.22	ERP (W):	13,259.22
Antenna A3 MPE %:	**4.49%**	Antenna B3 MPE %:	**4.49%**	Antenna C3 MPE %:	**4.49%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	13.63%
AT&T	2.11%
Verizon	1.91%
Clearwire	0.07%
Sprint	0.45%
Site Total MPE % :	18.17%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	13.63%
T-Mobile Sector B Total:	13.63%
T-Mobile Sector C Total:	13.63%
Site Total MPE % :	18.17%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 1900 MHz GSM	4	1028.30	123.0	9.77	1900 MHz GSM	1000	0.98%
T-Mobile 1900 MHz LTE	2	2056.61	123.0	9.77	1900 MHz LTE	1000	0.98%
T-Mobile 2100 MHz LTE	2	2307.55	123.0	10.97	2100 MHz LTE	1000	1.10%
T-Mobile 2500 MHz LTE	2	6412.98	123.0	30.48	2500 MHz LTE	1000	3.05%
T-Mobile 2500 MHz NR	2	6412.98	123.0	30.48	2500 MHz NR	1000	3.05%
T-Mobile 600 MHz LTE	2	591.73	123.0	2.81	600 MHz LTE	400	0.70%
T-Mobile 600 MHz NR	1	1577.94	123.0	3.75	600 MHz NR	400	0.94%
T-Mobile 700 MHz LTE	2	648.82	123.0	3.08	700 MHz LTE	467	0.66%
T-Mobile 1900 MHz UMTS	2	1101.85	123.0	5.24	1900 MHz UMTS	1000	0.52%
T-Mobile 1900 MHz LTE	2	2203.69	123.0	10.47	1900 MHz LTE	1000	1.05%
T-Mobile 2100 MHz UMTS	2	1294.56	123.0	6.15	2100 MHz UMTS	1000	0.62%
						Total:	**13.63%**

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	13.63%
Sector B:	13.63%
Sector C:	13.63%
T-Mobile Maximum MPE % (Sector A):	13.63%
Site Total:	18.17%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **18.17%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Exhibit G

Mailing Receipts/Proof of Notice

View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialogue 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 scheduled Pickup
   - Your driver will pickup your shipment(s) as usual.

   Customers without a scheduled Pickup
   - Schedule a Pickup on ups.com to have a UPS driver pickup all of your packages.
   - 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. To find the location nearest you, please visit the 'Locations' Quick link at ups.com.

UPS Access Point™
MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY NJ

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

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY NJ

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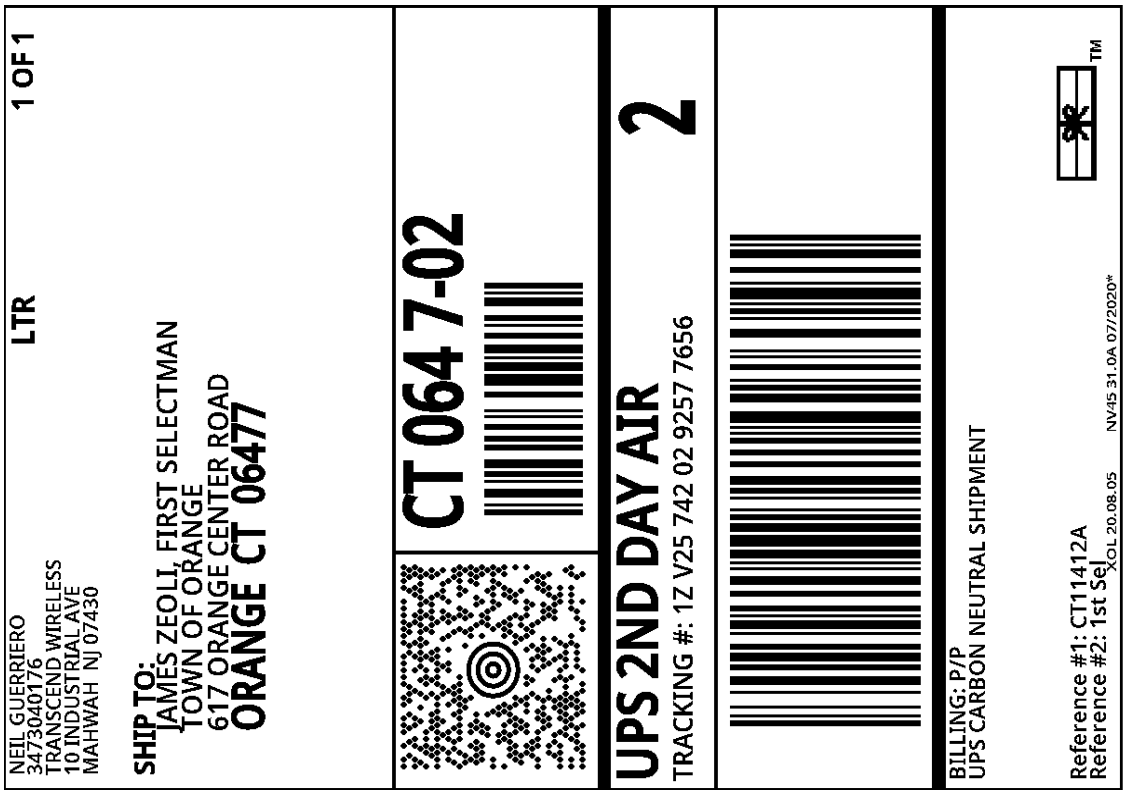

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