Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Wednesday, June 12, 2019 2:55 PM
To: krichers@transcendwireless.com

Subject: UPS Ship Notification, Reference Number 1: CTHA539A CSC EO



You have a package coming.

Scheduled Delivery Date: Thursday, 06/13/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From: TRANSCEND WIRELESS

Tracking Number: <u>1ZV257424298007131</u>

Theodore Shafer

Town of Burlington 200 Spielman Highway

BURLINGTON, CT 060131735

US

UPS Service: UPS GROUND

Number of Packages: 1

Scheduled Delivery: 06/13/2019

Signature Required: A signature is required for package delivery

Weight: 1.0 LBS

Reference Number 1: CTHA539A CSC EO



Download the UPS mobile app

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Wednesday, June 12, 2019 2:57 PM
To: krichers@transcendwireless.com

Subject: UPS Ship Notification, Reference Number 1: CTHA539A CSC ZO



You have a package coming.

Scheduled Delivery Date: Thursday, 06/13/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From: TRANSCEND WIRELESS

Tracking Number: <u>1ZV257424297297142</u>

Gerald Burns

Town of Burlington

Ship To: 200 Spielman Highway

BURLINGTON, CT 060131735

US

UPS Service: UPS GROUND

Number of Packages: 1

Scheduled Delivery: 06/13/2019

Signature Required: A signature is required for package delivery

Weight: 1.0 LBS

Reference Number 1: CTHA539A CSC ZO



Download the UPS mobile app



10 INDUSTRIAL AVE, SUITE 3 MAHWAH NJ 07430

PHONE: 201.684.0055 FAX: 201.684.0066

June 7, 2019

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

RE: Notice of Exempt Modification

719 George Washington Turnpike, Burlington, CT 06013

Latitude: 41.766400000 Longitude: -72.9617000000

T-Mobile Site#: CTHA539A - L600

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 179-foot level of the existing 180-foot monopole tower at 719 George Washington Turnpike, Burlington, CT. The 180-foot monopole tower and property are owned by the Town of Burlington. T-Mobile now intends to replace six (6) of its existing antennas with six (6) new 600/700/1900/2100 MHz antennas. The new antennas will be installed at the same 179-foot level of the tower.

Planned Modifications:

Tower:

Remove

N/A

Remove and Replace:

- (3) LNX-6515DS (Remove) APXVAARR24 43-U-NA20 Antenna (Replace) 600/700 MHz
- (3) AIR 21 KRC118023 B2P B4A (Remove) AIR 32 KRD901146-1 B66A_B2A Antenna (Replace) 1900/2100 Mhz

Install New:

- (3) Radio 4449 B71+B12 RRUs
- (3) 1-3/8" Hybrid Cables
- (1) SitePro handrail

Existing to Remain:

- (3) AIR 21 KRC118012 B2P B4A Antenna 1900 MHz
- (6) 1-5/8" coax
- (1) 1-3/8" Hybrid Cable

Ground:

<u>Remove</u>: Existing 6201 Cabinet <u>Install New:</u> 6102 Cabinet

This facility was originally approved by the CSC for tower-sharing on January 22, 1997. This modification complies with this approval. Please see the enclosed.

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

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,

Kyle Richers

Transcend Wireless Cell: 908-447-4716

Email: krichers@transcendwireless.com

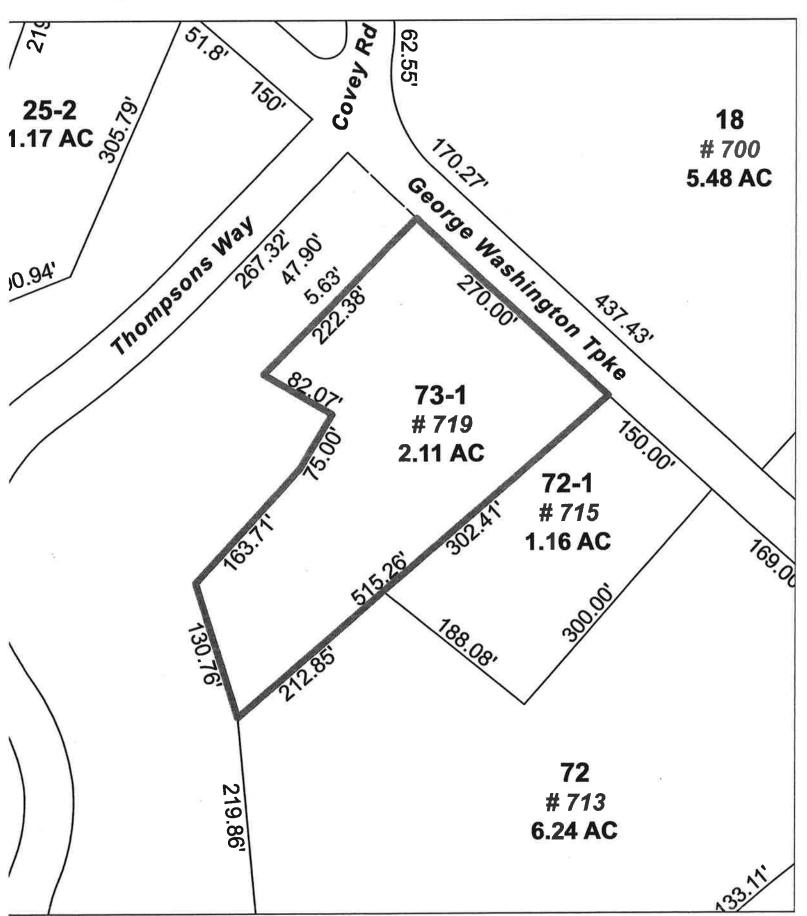
Attachments

cc: Theodore Shafer – Town of Burlington First Selectman Gerald Burns– Town of Burlington Zoning Enforcement Officer



Map-Block-Lot 4-08-73-1

Address: 719 GEO WASHINGTON TPKE



Town of Burlington, CT

Property Listing Report

Map Block Lot

4-08-73-1

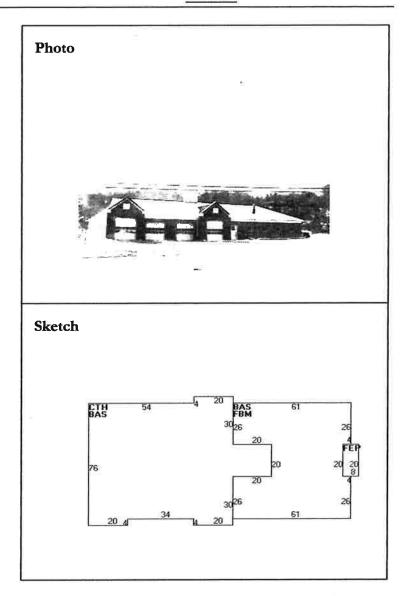
Account

00037000

Property Information

Property Location	719 GEO WASHINGTON TPKE
Owner	BURLINGTON TOWN OF
Co-Owner	
Mailing Address	200 SPIELMAN HWY
Mailing Address	BURLINGTON CT 06013
Land Use	9032 Mun Fire
Land Class	E
Zoning Code	СВ
Census Tract	4101

Neighborhood	4500	
Acreage	2.11	
Utilities	Well,Septic	
Lot Setting/Desc	Rural	Level
Additional Info		



Primary Construction Details

Year Built	1987
Stories	1
Building Style	Fire Station
Building Use	Ind/Com
Building Condition	Average +20
Floors	Concrete
Total Rooms	

Bedrooms		
Full Bathrooms	0	
Half Bathrooms		
Bath Style		
Kitchen Style		
Roof Style	Gable	
Roof Cover	Asphalt	

Exterior Walls	Vinyl Siding
Interior Walls	Drywall
Heating Type	Hot Water
Heating Fuel	Oil
АС Туре	None
Gross Bldg Area	19920
Total Living Area	9880

Town of Burlington, CT

Property Listing Report

Map Block Lot

4-08-73-1

Account

00037000

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	977900	684530
Extras	27100	18970
Improvements	1044600	731220
Outbuildings	39600	27720
Land	159200	111440
Total	1203800	842660

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Basement, Finished	3912	0
First Floor	9880	9880
Cathedral	5968	0
Porch, Enclosed	160	0
Total Area	19920	9860

Outbuilding and Extra Items

Туре	Description		
Fram Shedw/Ele	400.00 S.F.		
Open Porch	1040.00 S.F.		
Air Condition	8500.00 UNITS		
Paving-Asphalt	10000.00 S.F.		
Light w/Pole	5.00 UNITS		

Sales History

Owner of Record

Book/ Page

Sale Date

Sale Price

BURLINGTON TOWN OF

00091/0528

0



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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



January 23, 1997

David S. Malko, P.E. Manager Engineering & Regulatory Services Bell Atlantic NYNEX Mobile 20 Alexander Drive, P.O. Box 5029 Wallingford, CT 06492

Re: Bell Atlantic NYNEX Mobile request for an order of tower sharing at an existing telecommunications tower located at 716 George Washington Turnpike in the Town of Burlington, Connecticut.

Dear Mr. Malko:

At a meeting held January 22, 1997, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction.

The proposed shared use is to be implemented as specified in your letter dated December 19, 1996. Please notify the Council when all work is complete. A copy of the staff report on this request, dated January 22, 1997, is enclosed for your information.

Very truly yours,

Mortimer A. Gelston

Chairman

MAG:TEF:mmb Enclosure

1. Staff Report dated January 22, 1997.

c: Theodore Schiedel, First Selectman, Burlington Sandy Carter, Bell Atlantic NYNEX Mobile

- T- - Mobile -

WIRELESS COMMUNICATIONS FACILITY

BURLINGTON FIRE DEPARTMENT FLAGPOLE

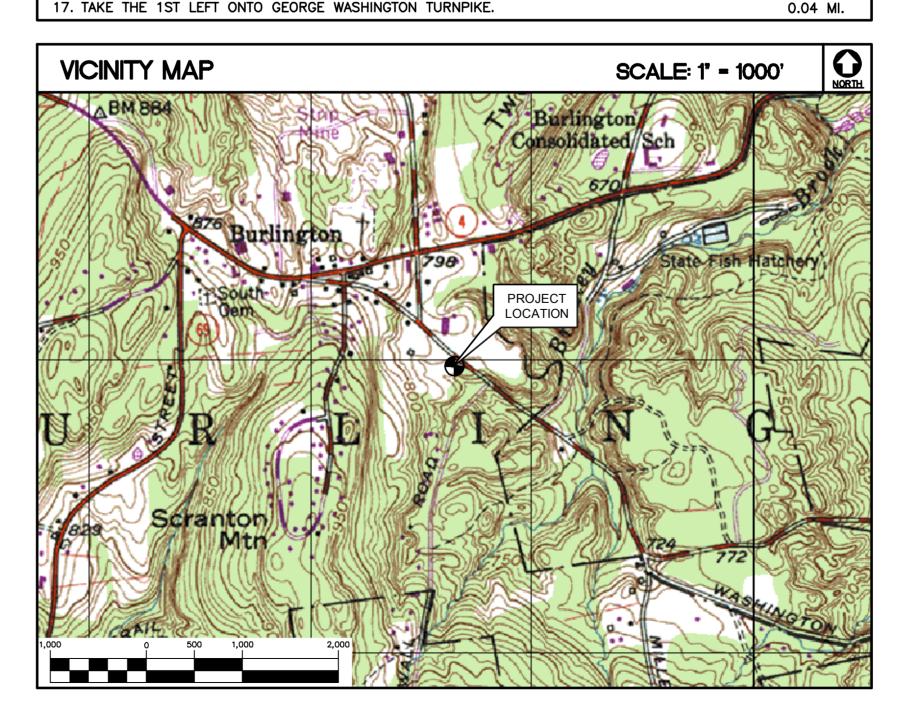
SITE ID: CTHA539A
719 GEORGE WASHINGTON TPKE
BURLINGTON, CT 06013

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." 2018 CONNECTICUT FIRE SAFETY CODE, 2017 NATIONAL ELECTRICAL CODE AND LOCAL CODES.
- 2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
- 3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD—OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
- 4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
- 5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
- 6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
- 7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
- 8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
- 9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
- 10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.

- 11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
- 12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE 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 CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- 17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
- 18. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
- 19. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS TO: 719 GEORGE WASHINGTON TPKE FROM: 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 BURLINGTON, CT 06013 HEAD NORTH ON GRIFFIN RD S TOWARD HARTMAN RD. TAKE THE 1ST LEFT ONTO DAY HILL RD. 0.61 MI. 3. TURN LEFT ONTO TUNXIS AVE/CT-189. 2.45 MI. 0.93 MI. 4. TURN SLIGHT RIGHT ONTO BROWN ST. 1.12 MI. 5. TURN RIGHT ONTO MOUNTAIN AVE/CT-178. CONTINUE TO FOLLOW CT-178 2.76 MI. 6. TURN RIGHT ONTO SIMSBURY RD/CT-185. CONTINUE TO FOLLOW CT-185 TURN RIGHT ONTO HOPMEADOW ST/US-202 E/CT-10. 0.19 MI. 0.17 MI. 8. TURN LEFT ONTO CANAL ST. 9. CANAL ST BECOMES DEER PARK RD. 1.25 MI. 10. TURN SLIGHT LEFT ONTO BUSHY HILL RD/CT-167. 2.72 MI. 1.58 MI. 11. TURN RIGHT ONTO ALBANY TURNPIKE/US-44 W/US-202 W. 12. TURN LEFT DOWD AVE. 0.86 MI. 13. DOWD AVE BECOMES MAPLE AVE. 0.89 MI. 14. TURN SLIGHT RIGHT ONTO BRIDGE ST/CT-179. CONTINUE TO FOLLOW CT-179. 2.43 MI. 2.30 MI. 15. TURN RIGHT ONTO SPIELMAN HWY/CT-4. 16. TURN LEFT ONTO COVEY RD. 0.14 MI.



T-MOBILE RF CONFIGURATION

67D95ADB_2xAIR+10P

PROJECT SUMMARY

- 1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
- A. REMOVE SIX (6) EXISTING ANTENNAS, TWO (2) PER SECTOR
- B. INSTALL THREE (3) NEW AIR 32 ANTENNAS, ONE (1) PER SECTOR
- C. INSTALL THREE (3) NEW OCT—PORT ANTENNAS, ONE (1) PEI SECTOR
- D. INSTALL THREE (3) NEW RADIO REMOTE UNITS, ONE (1) PE
- E. INSTALL NEW SITEPRO HANDRAIL K
- F. DECOMMISSION AND REMOVE ONE (1) EXISTING EQUIPMENT CABINET
- G. INSTALL ONE (1) NEW RBS 6102 MU AC EQUIPMENT CABINET
- H. INSTALL THREE (3) 6x12 NEW HYBRID CABLES
- I. UPGRADE TO 125 BREAKER

PROJECT INFORMATION

PROJECT INFO	ORMATION
SITE NAME:	BURLINGTON FIRE DEPARTMENT FLAGPOLE
SITE ID:	CTHA539A
SITE ADDRESS:	719 GEORGE WASHINGTON TPKE BURLINGTON, CT 06013
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:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-46'-00.65" N LONGITUDE: 72°-57'-41.02" W GROUND ELEVATION: 775'± AMSL
	COORDINATES AND GROUND ELEVATION

SHEET	INDEX	
SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	1
N-1	DESIGN BASIS AND SITE NOTES	1
C-1	SITE LOCATION PLAN	1
C-2	PARTIAL SITE PLAN & TOWER ELEVATION	1
C-3	ANTENNA MOUNTING CONFIG. AND ELEVATION	1
E-1	DETAILS	1
E-2	DETAILS	1

REFERENCED FROM GOOGLE EARTH.

TEST TO STATE TO STATE THE TO STATE TO

-- T---Mobile-

(203) 488-0580 (203) 488-8587 Fax 63-2 North Branford Road Branford, CT 06405

WIRELESS COMMUNICATIONS FACILITY

INGTON F.D. FLAGPOL

SITE ID: CTHA539A

719 GEORGE WASHINGTON TPKE
BURLINGTON, CT 06013

DATE: 05/01/19
SCALE: AS NOTED

JOB NO. 19027.15

TITLE
SHEET

T-1

DESIGN BASIS:

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

- 1. DESIGN CRITERIA:
- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 90-105 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 93 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2015 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2018 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

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

STRUCTURAL STEEL

- 1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
 - STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
 - 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)PIPE---ASTM A53 (FY = 35 KSI)
 - CONNECTION BOLTS---ASTM A325-N U-BOLTS---ASTM A36
- 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
- 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
- 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.

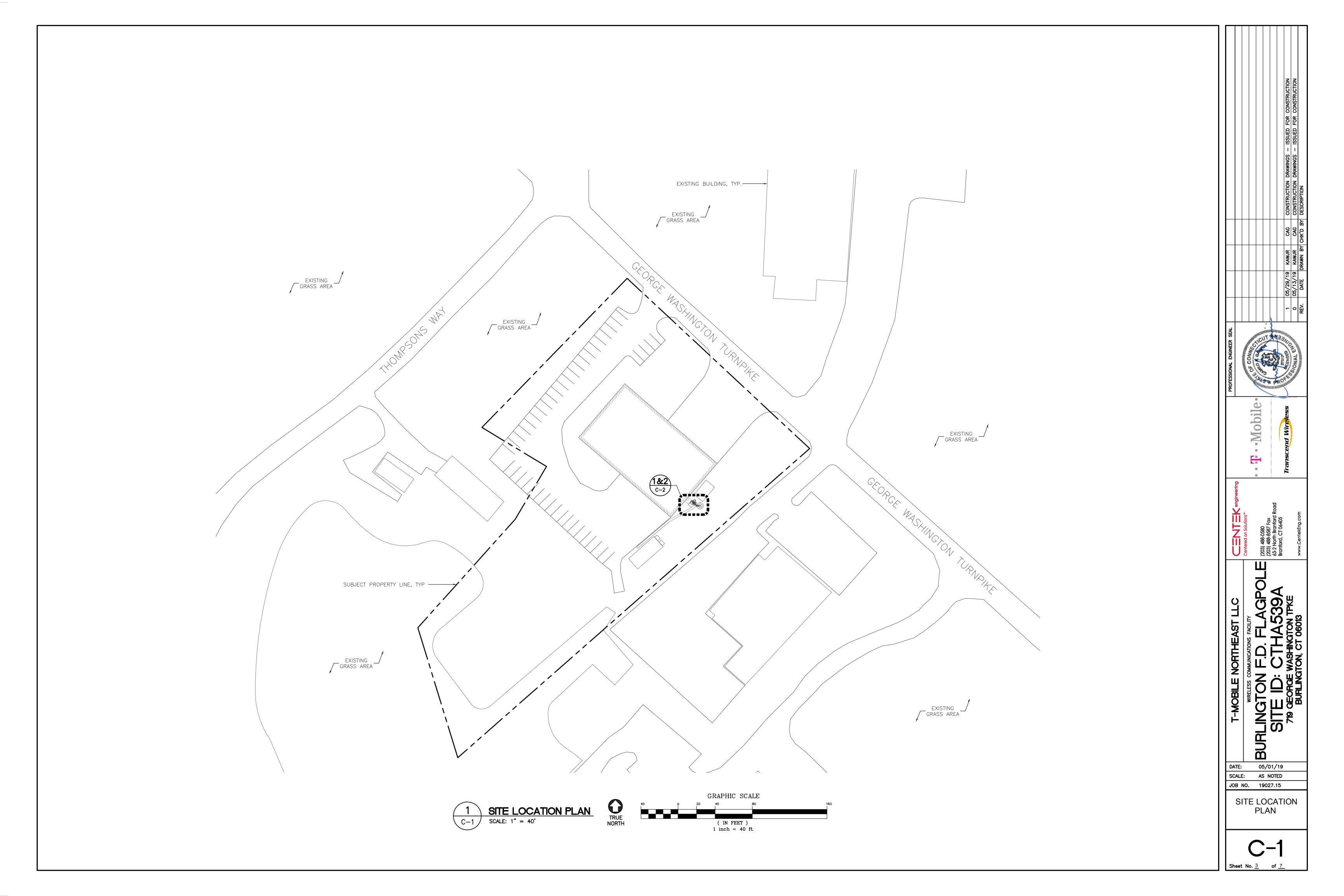
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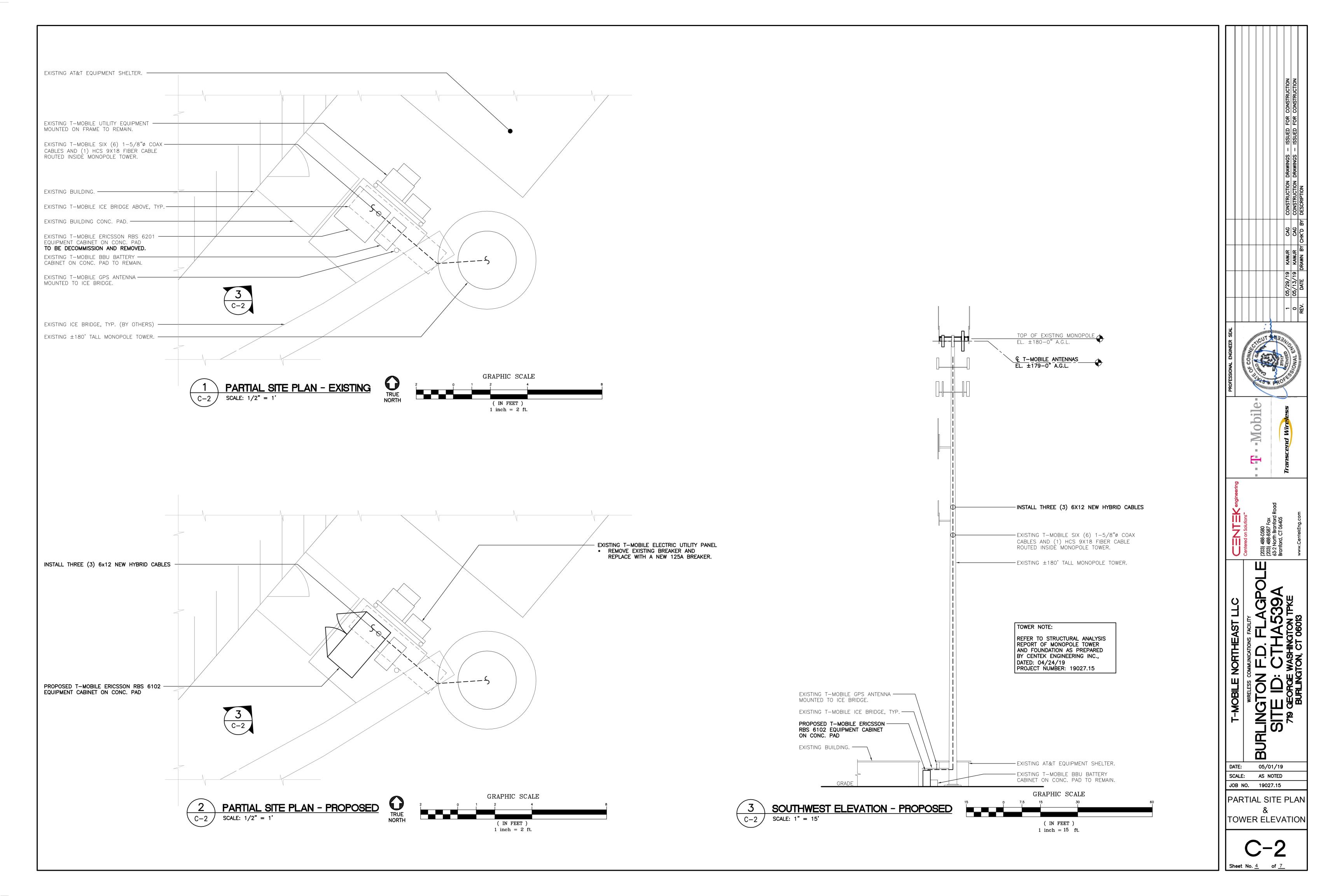
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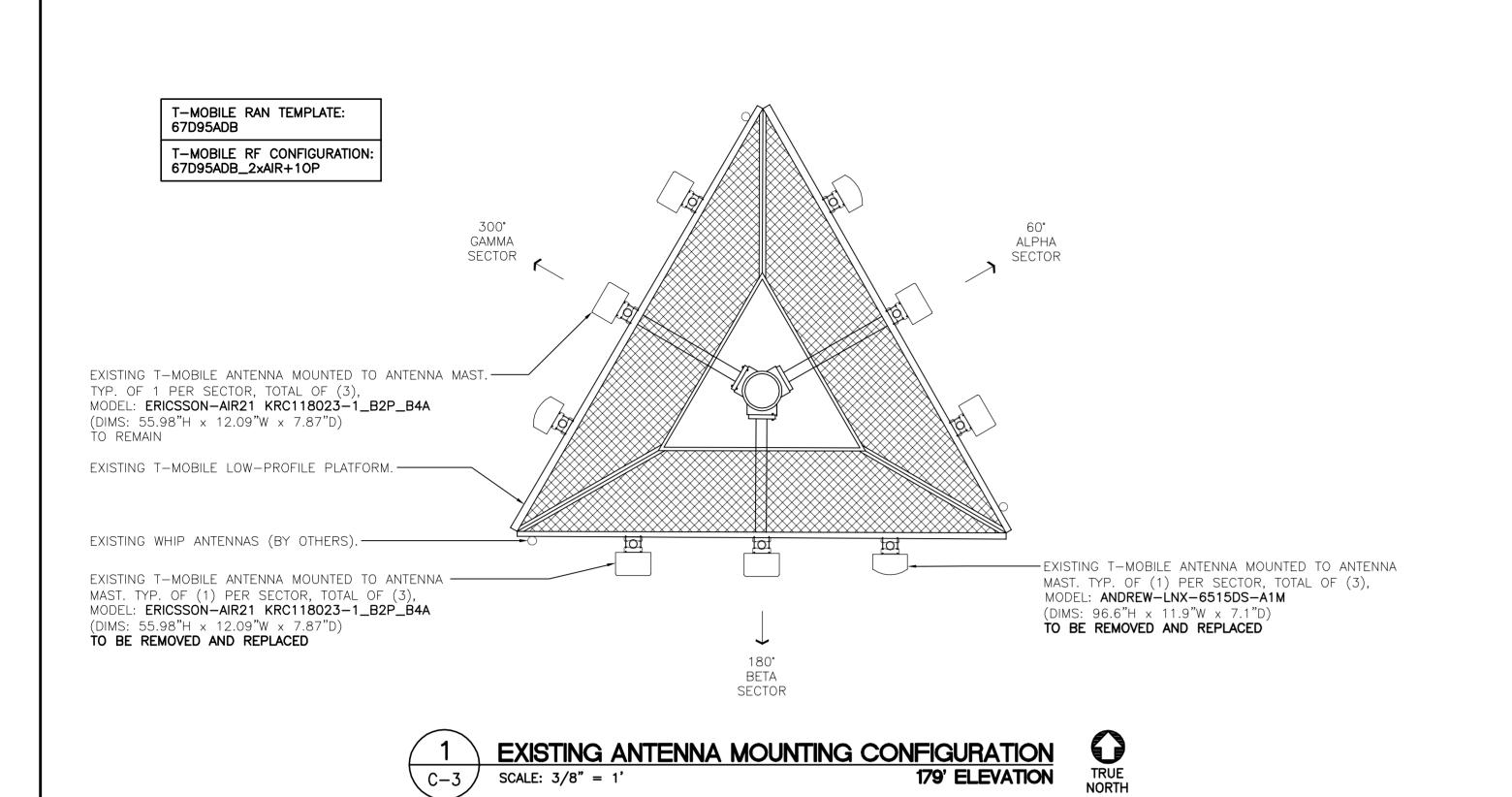
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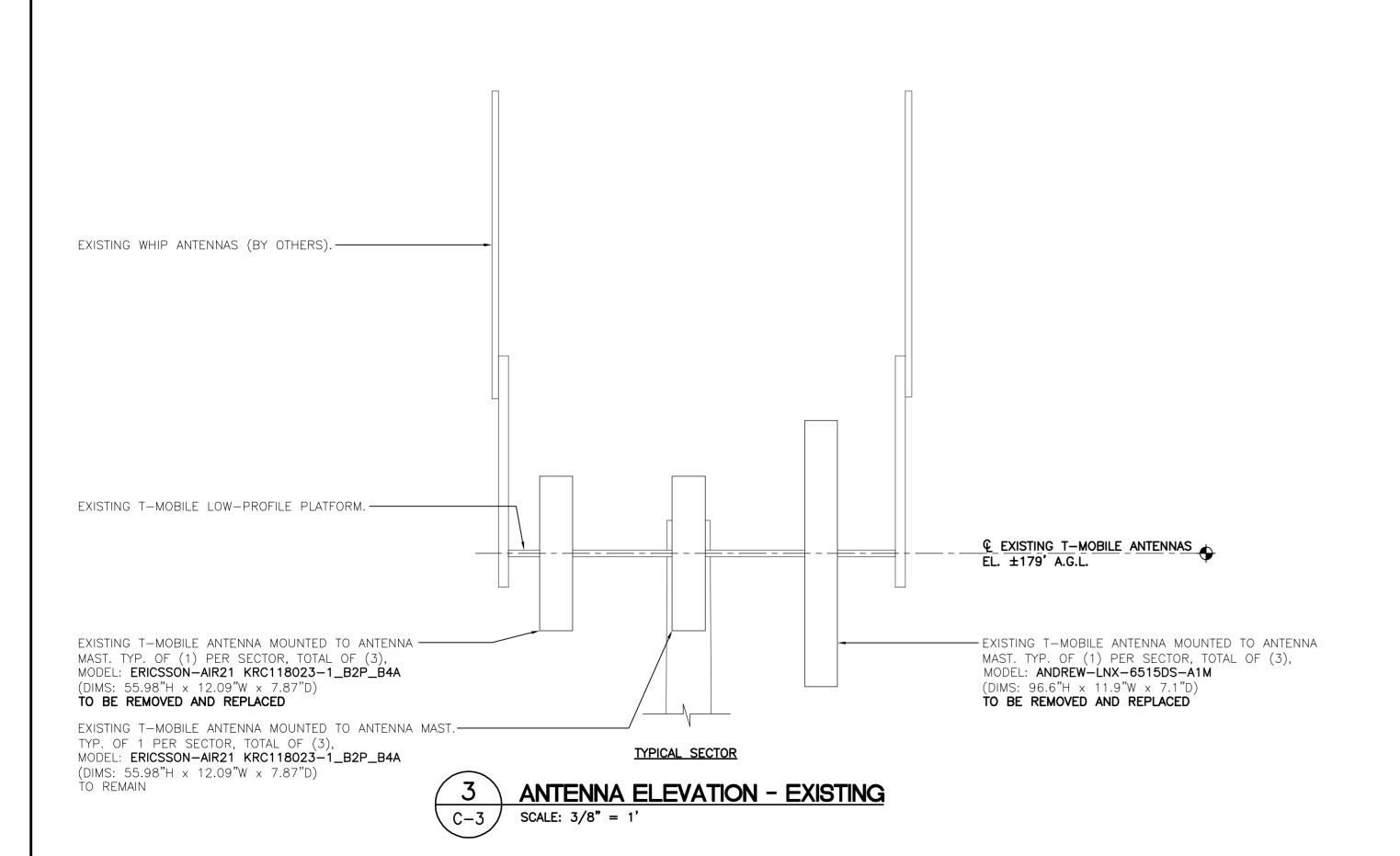
DESIGN BASIS AND SITE NOTES

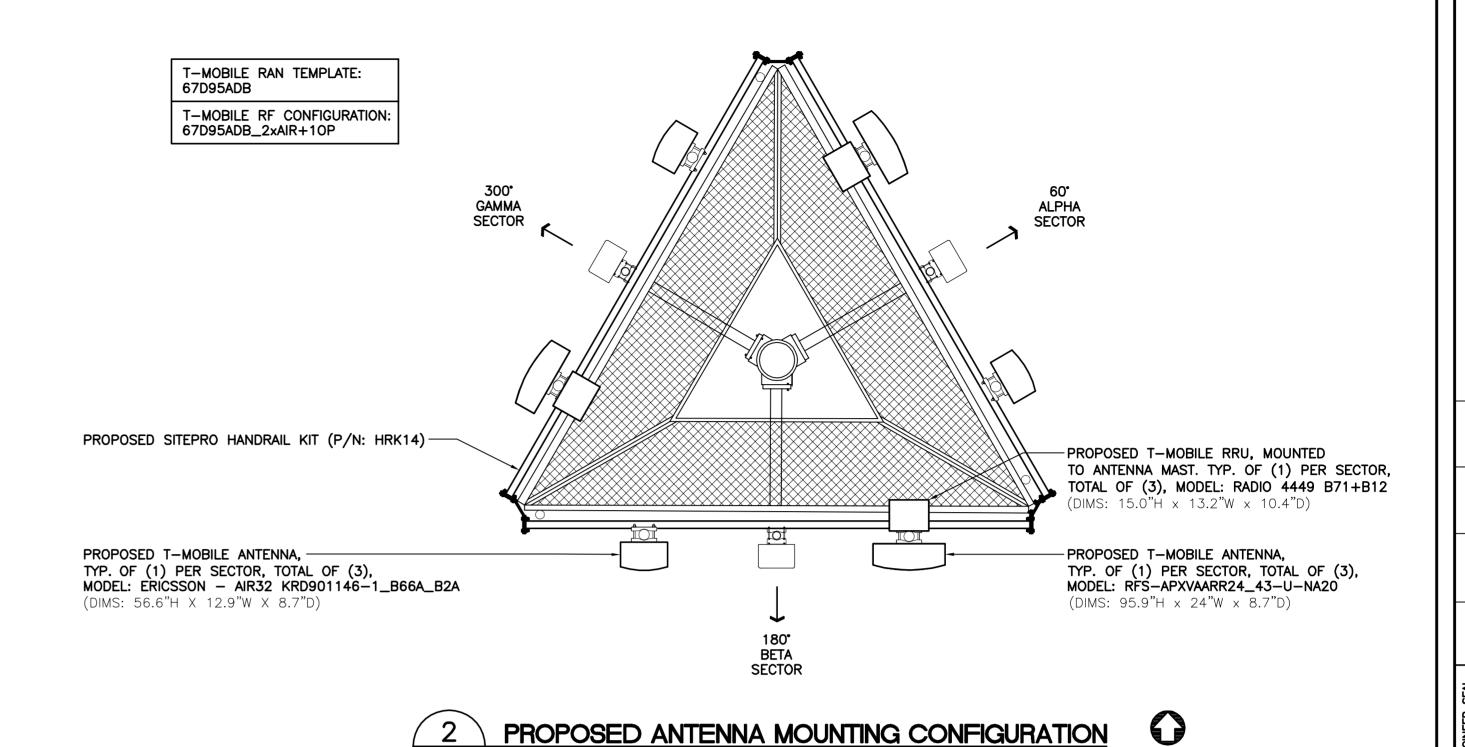
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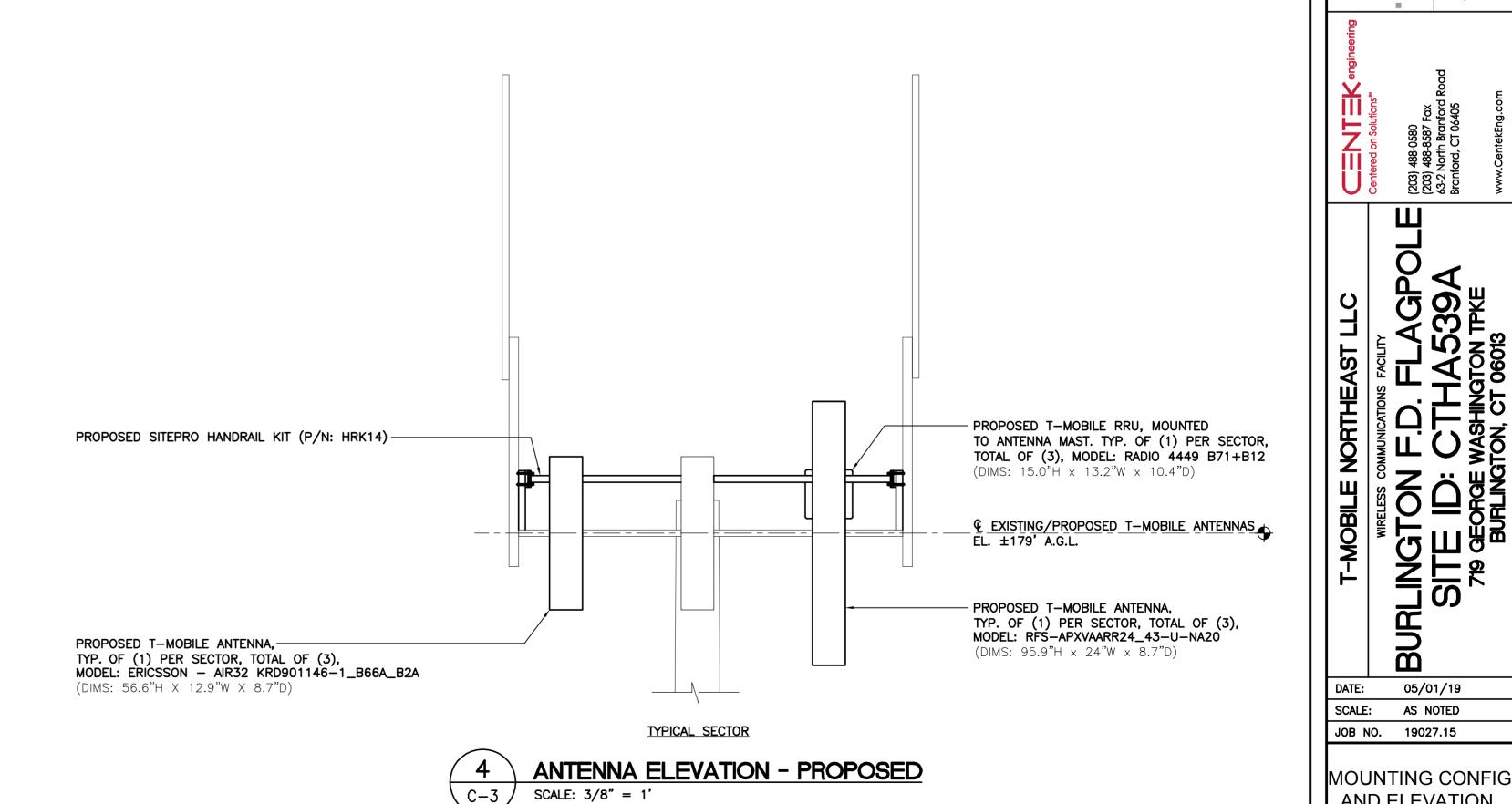


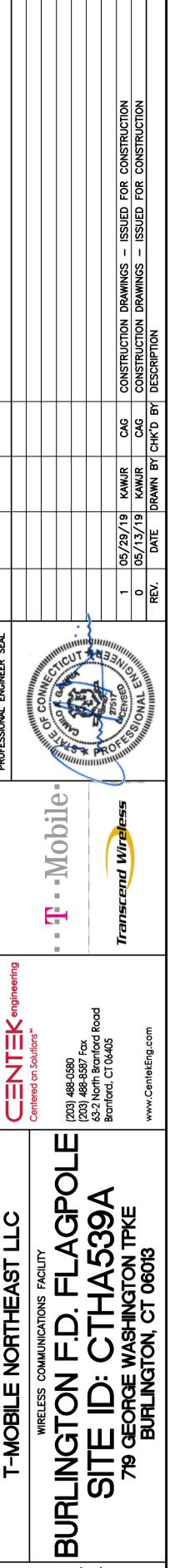






SCALE: 3/8" = 1'



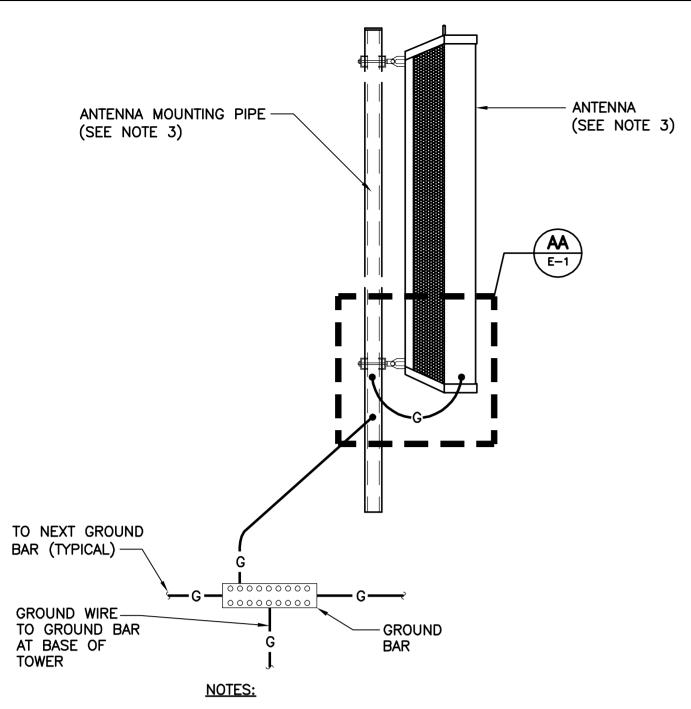


05/01/19

AND ELEVATION

TRUE NORTH

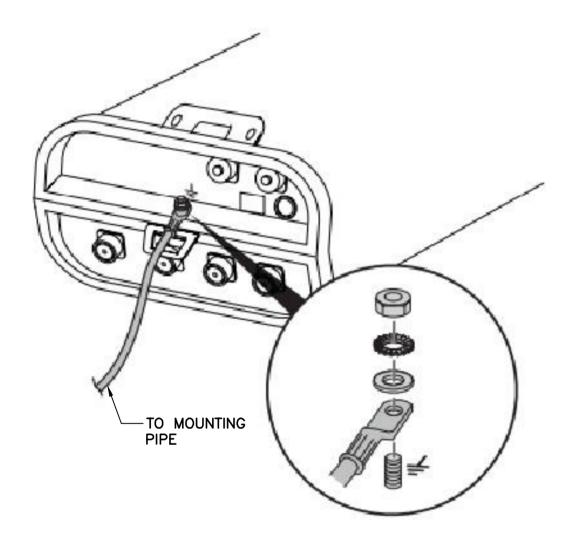
179' ELEVATION



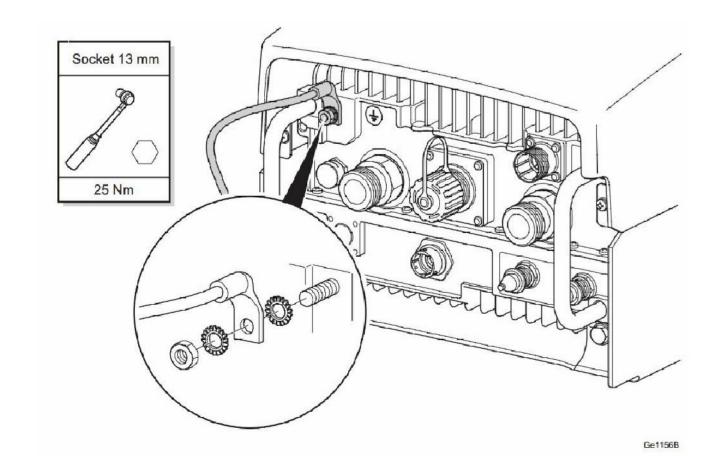
- BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
- 2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
- 3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.
- $\left(\begin{array}{c} \mathbf{1} \\ \mathbf{E}-1 \end{array}\right)$

TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NONE

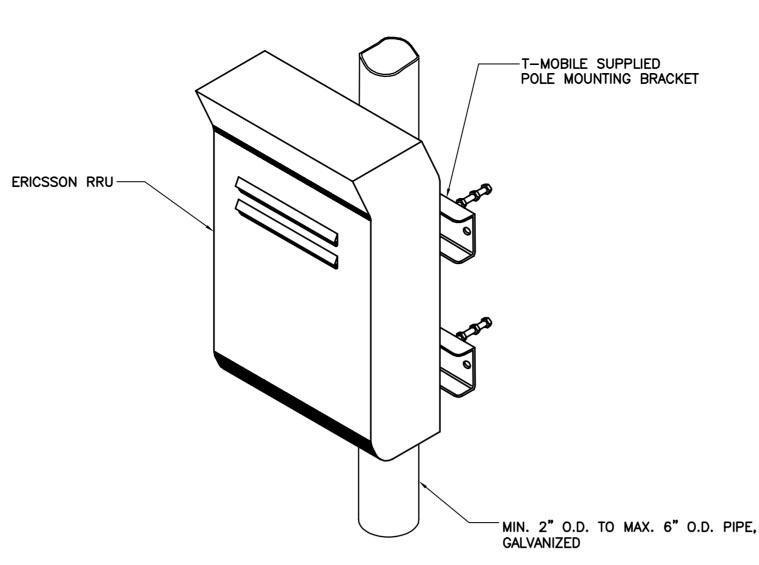


AA TYPICAL ANTENNA GROUNDING DETAIL
SCALE: NONE



2 TYPICAL RRU GROUNDING DETAIL

NOT TO SCALE

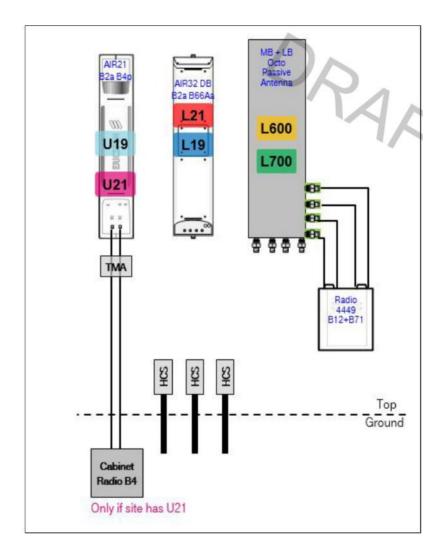


ISOMETRIC VIEW

NOTES:

- 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.

TYPICAL RRUS MOUNTING DETAILS SCALE: NOT TO SCALE



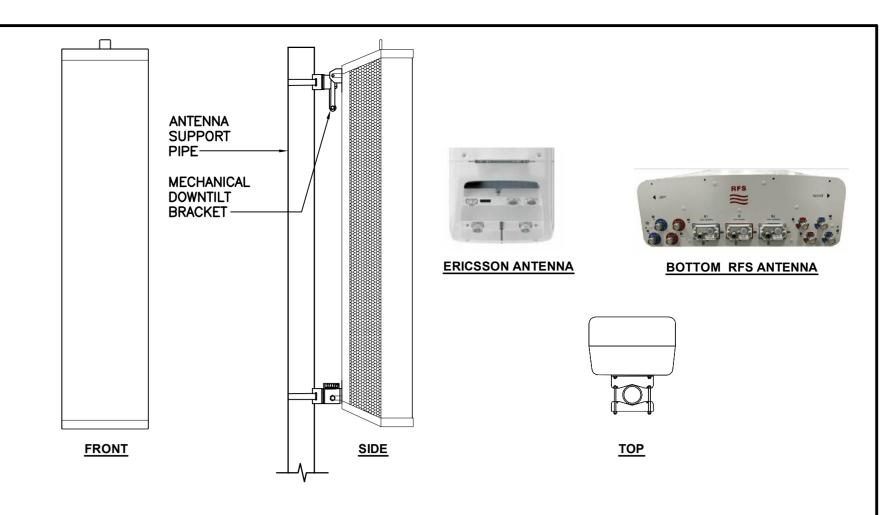




ISOMETRIC VIEW

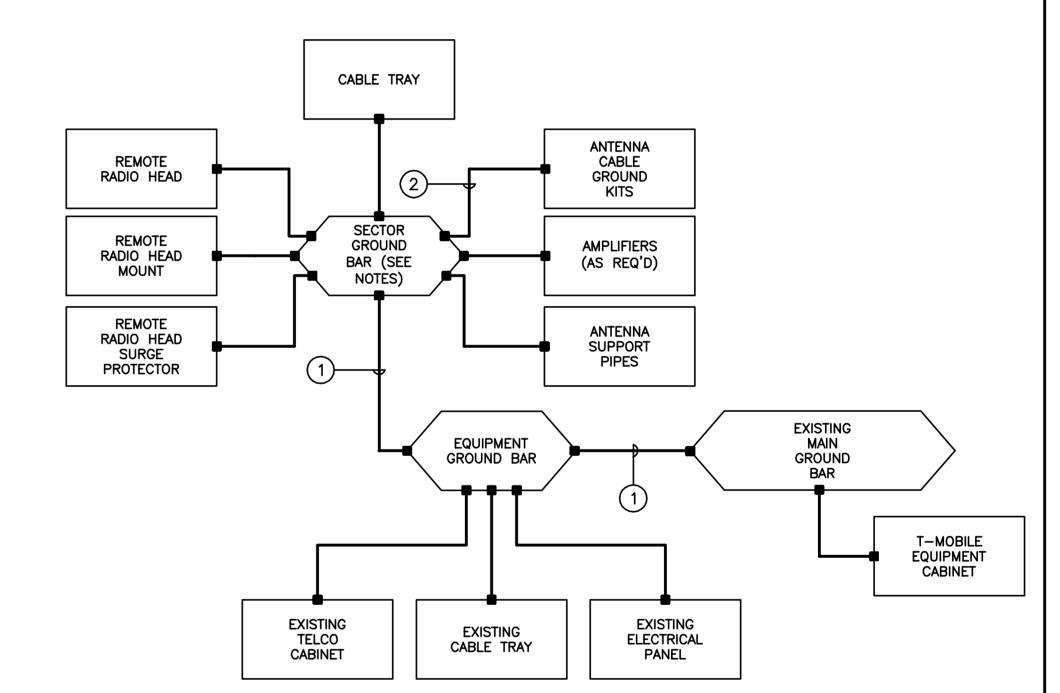
		RRU (REMOTE RA	ADIO UNIT)	
EQUIPMEN	NT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: MODEL:	ERICSSON RADIO 4449 B71B12	14.9"L x 13.2"W x 10.4"D	74 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.
		COORDINATE FINAL EQUIPMENT	MODEL SELECTION WI	TH T-MOBILE





ALPHA/BETA/GAMMA ANTENNA			
EQUIPMENT		DIMENSIONS	WEIGHT
MAKE: MODEL:	ERICSSON AIR32 KRD901146-1_B66A_B2A	56.6"L x 12.9"W x 8.7"D	132.2 LBS.
MAKE: MODEL:	RFS APXVAARR24_43-U-NA20	95.9"L × 24"W × 8.7"D	153 LBS.

6 PROPOSED ANTENNA DETAIL
SCALE: NONE



GROUNDING SCHEMATIC NOTES

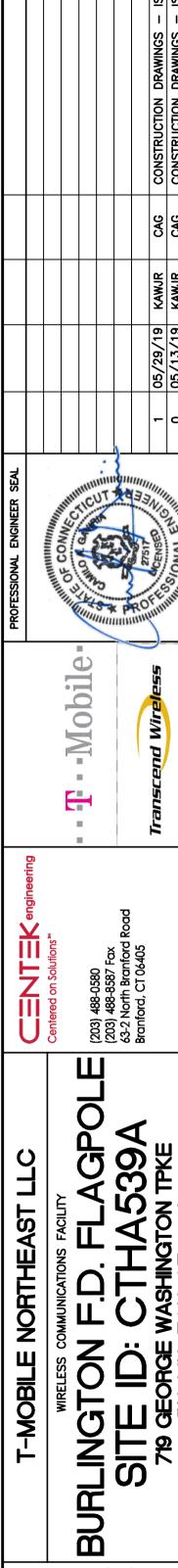
1 #2 AWG

(2) #6

GENERAL NOTES:

- 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.
- ALL GROUNDING SHALL BE IN ACCORDANCE WITH NEC AND OWNER'S REQUIREMENTS.





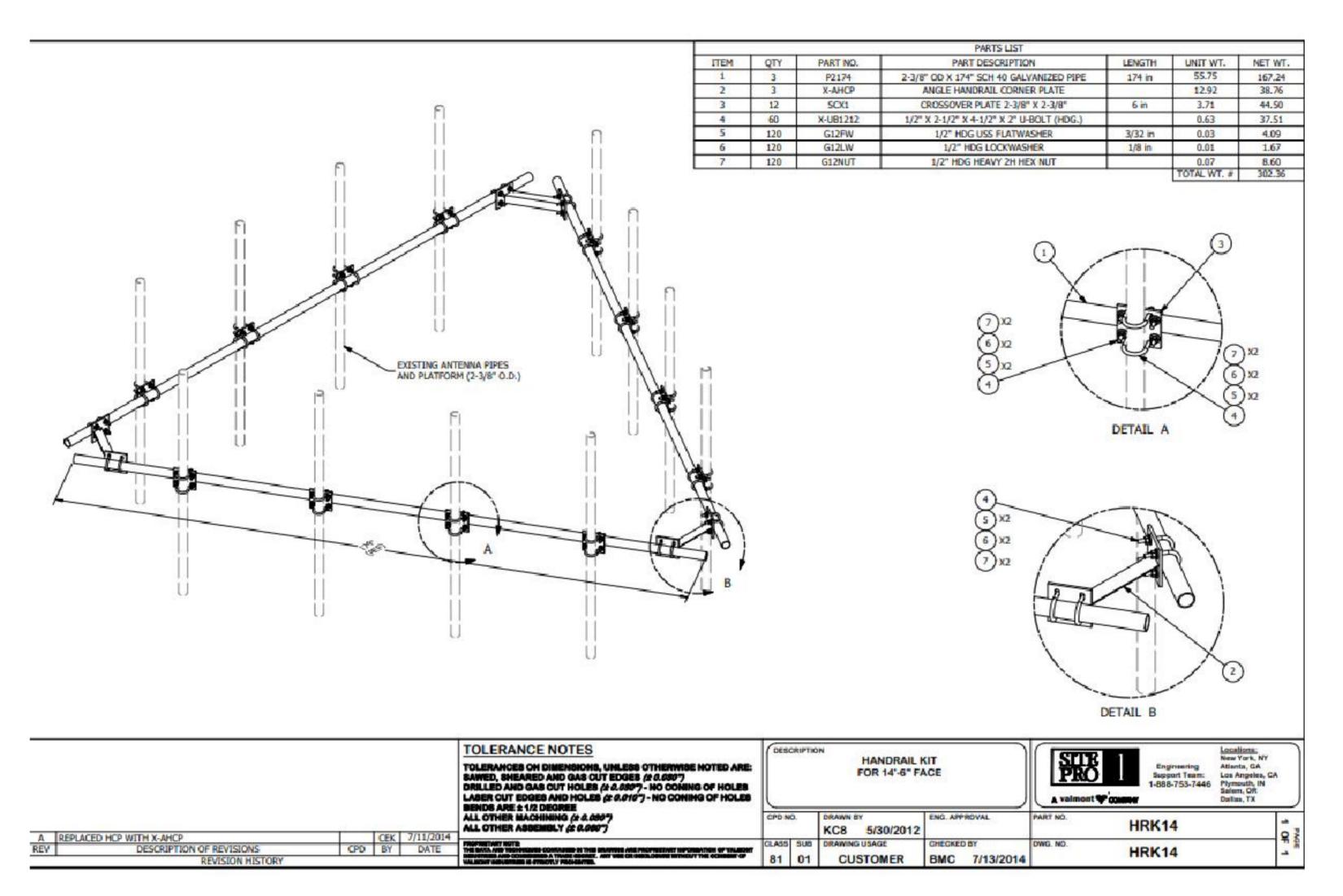
E-1

DETAILS

05/01/19

SCALE: AS NOTED

JOB NO. 19027.15



1 HANDRAIL DETAIL (SITE PRO P/N: HRK14)

SCALE: NOT TO SCALE



E	EQUIPMENT CABINET			
E	EQUIPMENT		DIMENSIONS	WEIGHT
	AKE: ODEL:	ERICSSON 6102 MU AC CABINET	57.09"H x 51.18"W x 27.56"D	727.53 LBS

2 ERICSSON RADIO CABINET DETAIL

SCALE: NOT TO SCALE

T-MOBILE NORTHEAST LLC wireless communications Facility wireless communications Facility LINGTON F.D. FLAGPOLE (203) 488-0380 SITE ID: CTHA539A SITE ID: CTHA545A SITE ID: CTHA54
RILLING
(203) 488-8587 Fax 63-2 North Branford Road
-

SCALE: AS NOTED

JOB NO. 19027.15

DETAILS



Centered on Solutions[™]

Structural Analysis Report

180-ft Existing EEI Monopole

Proposed T-Mobile Antenna Upgrade

T-Mobile Site Ref: CTHA539A

719 George Washington Turnpike Burlington, CT

CENTEK Project No. 19027.15

Date: April 24, 2019

OF CONVECTION OF

Prepared for:

T-Mobile USA 35 Griffin Road Bloomfield, CT 06002

Structural Analysis – 180-ft EEI Monopole T-Mobile Antenna Upgrade – CTHA539A Burlington, CT April 24, 2019

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Structural Analysis – 180-ft EEI Monopole T-Mobile Antenna Upgrade – CTHA539A Burlington, CT April 24, 2019

Introduction

The purpose of this report is to summarize the results of the non-linear, P-∆ structural analysis of the antenna upgrade proposed by T-Mobile on the existing monopole (tower) located in Burlington, CT.

The host tower is a 180-ft tall, four-section, eighteen sided, tapered monopole, originally designed and manufactured by Engineered Endeavors Incorporated (EEI); project no. 13628 dated September 15, 2005. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural analysis report prepared by Centek job no; 17051.00, dated April 17, 2017. The tower was previously reinforced per the structural analysis and reinforcement deign prepared by Atlantis Group dated October 8, 2014.

Antenna and appurtenance information were obtained from the previously issued structural reports, visual verification from grade conducted by Centek personnel on April 15, 2019 and a T-Mobile RF data sheet.

The tower is made up of four (4) tapered vertical sections consisting of A572-65 pole sections. The tower sections are slip joint connected. The diameter of the pole (flat-flat) is 19.50-in at the top and 56.25-in at the base.

Antenna and Appurtenance Summary

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

- TOWN (EXISTING):
 - <u>Antennas</u>: Three (3) 20-ft Omni-directional whip antennas mounted to the T-Mobile low profile platform with an elevation of 191-ft above grade level.
 - <u>Coax Cables</u>: Three (3) 1-5/8" \varnothing coax cables running on the inside of the existing monopole.
- AT&T (EXISTING):
 - <u>Antennas</u>: Six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted to one (1) universal ring mount with a RAD center elevation of 170-ft above grade level.
 - <u>Coax Cables:</u> One (1) fiber cable and two (2) dc control cables running on the inside of the existing monopole.
- AT&T (EXISTING):
 - Antennas: Six (6) Powerwave 7770.00 panel antennas, three (3) Powerwave P65-17-XLH-RR panel antennas, six (6) LGP21401 TMA's and six (6) LGP13519 diplexers mounted on a low profile platform with a RAD center elevation of 170-ft above grade level.
 - <u>Coax Cables</u>: Twelve (12) 1-5/8" \varnothing coax cables running on the inside of the existing monopole

Structural Analysis – 180-ft EEI Monopole T-Mobile Antenna Upgrade – CTHA539A Burlington, CT April 24, 2019

VERIZON (EXISTING):

Antennas: Six (6) RFS APL866513 panel antennas, six (6) Commscope JAHH-65B-R3B panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Nokia B66A RRH4x45 remote radio heads, three (3) Nokia RRH 4T4R B5 remote radio heads and two (2) Raycap RC2DC-3315-PF-48 main distribution boxes mounted on a low profile platform with a RAD center elevation of 160-ft above grade level

<u>Coax Cables</u>: Twelve (12) 1-5/8" \varnothing coax cables and two (2) 1-5/8" \varnothing fiber cables running inside the monopole.

TOWN (EXISTING):

<u>Antennas</u>: One (1) 20-ft dipole antenna mounted on a 3-ft standoff with an elevation of 138.5-ft above grade level.

<u>Coax Cables</u>: One (1) 1-5/8" \varnothing coax cable running on the inside of the existing monopole.

TOWN (EXISTING):

Antennas: One (1) 8-ft Omni-directional whip antenna and one (1) 3-ft yagi mounted on a 3-ft standoff with an elevation of 132.5-ft above grade level.

<u>Coax Cables</u>: One (1) 1-5/8" \varnothing and one (1) 1/2" \varnothing coax cables running on the inside of the existing monopole.

■ TOWN (EXISTING):

<u>Antennas</u>: One (1) 10-ft dipole antenna mounted on a 3-ft standoff with an elevation of 112.5-ft above grade level.

<u>Coax Cables</u>: One (1) 1-5/8" \varnothing coax cable running on the inside of the existing monopole.

■ T-MOBILE (EXISTING TO REMAIN):

Antennas: Three (3) Ericsson AIR21 panel antennas mounted on a low profile platform with a RAD center elevation of 179-ft above grade level.

<u>Coax Cables</u>: Six (6) 1-5/8" \varnothing coax cables and one (1) 9x18 Hybrid cable running inside the monopole.

T-MOBILE (EXISTING TO REMOVE):

Antennas: Three (3) Ericsson AIR21 panel antennas and three (3) Andrew LNX-6515DS mounted on a low profile platform with a RAD center elevation of 179-ft above grade level.

T-MOBILE (PROPOSED):

Antennas: Three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAARR24_43 panel antennas and three (3) Ericsson 4449 B71 B12 remote radio heads mounted on a low profile platform with a RAD center elevation of 179-ft above grade level. (SitePro handrail kit (p/n HRK14) to be installed on platform)

<u>Coax Cables:</u> Three (3) 6x12 fiber lines running on the exterior of the monopole.

CENTEK Engineering, Inc. Structural Analysis – 180-ft EEI Monopole T-Mobile Antenna Upgrade – CTHA539A Burlington, CT April 24, 2019

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 coax cables to be installed as indicated in this report.

CENTEK Engineering, Inc. Structural Analysis – 180-ft EEI Monopole T-Mobile Antenna Upgrade – CTHA539A Burlington, CT April 24, 2019

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 CSBC¹ and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

D = = := \\\/:= = |

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

[Annow D of TIA 222 C 200E]

Basic Wind Speed:	Hartford; $v = 90-105 \text{ mph}$	[Annex B of TIA-222-G-2005]
	Burlington; v = 93 mph	[Appendix N of the 2018 CT Building Code]
Load Cases:	Load Case 1; 93 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	[Appendix N of the 2018 CT Building Code]
	Load Case 2; 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	[Annex B of TIA-222-G-2005]

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

Structural Analysis – 180-ft EEI Monopole T-Mobile Antenna Upgrade – CTHA539A Burlington, CT April 24, 2019

Tower Capacity

 Calculated stresses were found to be within allowable limits. Per tnxTower "Section Capacity Table", this tower was found to be at 98.0% of its total capacity.

Tower Section Elevation		Stress Ratio (percentage of capacity)	Result	
Pole Shaft (L1)	139.50'-179.00'	98.0%	PASS	

⁽¹⁾ Wall thickness increased in tower section 2 to account for reinforcement design prepared by Atlantis Group for T-Mobile dated 10.8.14.

Foundation and Anchors

The existing foundation consists of a 7.5 \varnothing x 28.0-ft long reinforced concrete caisson. The subgrade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural report. The base of the tower is connected to the foundation by means of (18) 2.25 $^{\circ}$ \varnothing , ASTM A615-75 anchor bolts embedded 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
	Shear	34 kips
Base	Compression	53 kips
	Moment	4399 kip-ft

The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete	Moment Capacity	66.7%	PASS
Caisson	Lateral Deflection	0.24 in. ⁽¹⁾	PASS

⁽²⁾ Lateral deflection limited to 0.75" under service load condition per section 9.5 of TIA-222-G.

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	57.1%	PASS
Base Plate	Bending	90.8%	PASS

Conclusion

This analysis shows that the subject tower <u>is adequate</u> 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

CENTEK Engineering, Inc. Structural Analysis – 180-ft EEI Monopole T-Mobile Antenna Upgrade – CTHA539A Burlington, CT April 24, 2019

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 uncorroded 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.

CENTEK Engineering, Inc. Structural Analysis – 180-ft EEI Monopole T-Mobile Antenna Upgrade – CTHA539A Burlington, CT April 24, 2019

<u>GENERAL DESCRIPTION OF STRUCTURAL</u> 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 selfsupporting 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.

179.0 ft 0.1875 39.50 4.00 18 139.5 ft 50.10 5.20 37.5377 48 93.4 ft A572-65 52.29 47.1230 8 8.7 46.3 ft 52.70 56.2500 10.7 18 0.0 ft 27.7 Number of Sides REACTIONS - 93 mph WIND Thickness (in) Socket Length Top Dia (in) Bot Dia (in) Weight (K) Length (ft) Grade

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
20' x 2" Dia Omni (Town Existing)	191	(2) LPG13519 Diplexer (ATT Existing)	170
20' x 2" Dia Omni (Town Existing)	191	(2) LPG13519 Diplexer (ATI Existing)	170
20' x 2" Dia Omni (Town Existing)	191	EEI 14-ft Low Profile Platform (ATT	168
AIR21 B2A/B4P (T-Mobile Existing)	179	Existing)	
AIR32 (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
AIR21 B2A/B4P (T-Mobile Existing)	179	JAHH-65B-R3B (Verizon Existing)	160
AIR32 (T-Mobile Existing)	179	JAHH-65B-R3B (Verizon Existing)	160
AIR21 B2A/B4P (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
AIR32 (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
APXVAARR24-43 (T-Mobile Proposed)	179	JAHH-65B-R3B (Verizon Existing)	160
APXVAARR24-43 (T-Mobile Proposed)	179	JAHH-65B-R3B (Verizon Existing)	160
APXVAARR24-43 (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
4449 B12,B71 (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
4449 B12,B71 (T-Mobile Proposed)	179	JAHH-65B-R3B (Verizon Existing)	160
4449 B12,B71 (T-Mobile Proposed)	179	JAHH-65B-R3B (Verizon Existing)	160
EEI 14-ft Platform w/ Rails (T-Mobile	177	APL866513-42T0 (Verizon Existing)	160
Existing)		B66A RRH4x45 (Verizon Existing)	160
(2) RRUS-11 (ATI Existing)	170	B66A RRH4x45 (Verizon Existing)	160
(2) RRUS-11 (AT Existing)	170	B66A RRH4x45 (Verizon Existing)	160
(2) RRUS-11 (AT Existing)	170	RRH4x30-B13 (Verizon Existing)	160
DC6-48-60-18-8F Surge Arrestor (ATI	170	RRH4x30-B13 (Verizon Existing)	160
Existing)		RRH4x30-B13 (Verizon Existing)	160
Valmont Uni-Tri Bracket (ATT Existing)	170	RRH 4T4R B5 160W (Verizon Existing)	160
7770.00 (ATT Existing)	170	RRH 4T4R B5 160W (Verizon Existing)	160
P65-17-XLH-RR (ATI Existing)	170	RRH 4T4R B5 160W (Verizon Existing)	160
7770.00 (ATI Existing)	170	RC2DC-3315-PF-48 (Verizon Existing)	160
7770.00 (AT <u>I</u> Existing)	170	RC2DC-3315-PF-48 (Verizon Existing)	160
P65-17-XLH-RR (ATT Existing)	170	EEI 14-ft Low Profile Platform (Verizon	158
7770.00 (ATI Existing)	170	Existing)	
7770.00 (ATI Existing)	170	20' 4-Bay Dipole (Town Existing)	138.5
P65-17-XLH-RR (AT Existing)	170	3' Pipe Mount Side Arm (Town Existing)	138.5
7770.00 (AT_ Existing)	170	3' Pipe Mount Side Arm (Town Existing)	132.5
(2) LGP21401 TMA (ATT Existing)	170	8' x 2" Omni (Town Existing)	132.5
(2) LGP21401 TMA (ATI Existing)	170	3' Yagi (Town Existing)	132.5
(2) LGP21401 TMA (ATT Existing)	170	10' Dipole (Town Existing)	112.5
(2) LPG13519 Diplexer (ATI Existing)	170	3' Pipe Mount Side Arm (Town Existing)	112.5

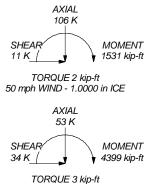
MATERIAL STRENGTH

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

TOWER DESIGN NOTES

- Tower designed for Exposure C to the TIA-222-G Standard.
 Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
- Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
 4. Deflections are based upon a 60 mph wind.
- 5. Tower Structure Class III.
- 6. Topographic Category 1 with Crest Height of 0.00 ft
- Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- Welds are fabricated with ER-70S-6 electrodes.
- 9. Wall thickness increased in tower section 2 to account for reinforcement design per Atlantis Group drawings dated 10.8.14

 10. TOWER RATING: 98%



ALL REACTIONS ARE FACTORED

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

^{lob:} 19027.15 - CTHA539A				
Project: 180' EEI Moi	opole - 719 Georg	e Washington Tpk., Burlington, (
Client: T-Mobile	Drawn by: TJL	App'd:		
Code: TIA-222-G	Date: 04/24/19	Scale: NTS		
Path:		Dwg No. F-1		

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> Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

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 93 mph.

Structure Class III.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 1.0000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards...

Welds are fabricated with ER-70S-6 electrodes..

Wall thickness increased in tower section 2 to account for reinforcement design per Atlantis Group drawings dated 10.8.14.

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 Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification

Use Code Stress Ratios

Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric

Distribute Leg Loads As Uniform Assume Legs Pinned

Assume Rigid Index Plate Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension Bypass Mast Stability Checks Use Azimuth Dish Coefficients

Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination

Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation

Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption

Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by

Section	Elevation	Section Length	Splice Length	Number of	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft	Sides	in	in	in	in	
L1	179.00-139.50	39.50	4.00	18	19.5000	28.0455	0.1875	0.7500	A572-65
									(65 ksi)
L2	139.50-93.40	50.10	5.20	18	26.8051	37.5377	0.3750	1.5000	A572-65
									(65 ksi)
L3	93.40-46.31	52.29	6.39	18	35.6737	47.1230	0.3750	1.5000	A572-65
									(65 ksi)
L4	46.31-0.00	52.70		18	44.9739	56.2500	0.3750	1.5000	A572-65
									(65 ksi)

Tapered Pole Properties

Section	Tip Dia.	Area	I	r	С	I/C	$J_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{$	It/Q	w	w/t
	in	in ²	in ⁴	in	in	in³	in ⁴	in ²	in	
L1	19.7719	11.4934	541.5782	6.8559	9.9060	54.6717	1083.8689	5.7478	3.1020	16.544
	28.4492	16.5790	1625.5317	9.8896	14.2471	114.0955	3253.2023	8.2911	4.6060	24.565
L2	28.0309	31.4585	2776.3466	9.3827	13.6170	203.8882	5556.3464	15.7322	4.0577	10.821
	38.0589	44.2329	7717.8693	13.1928	19.0692	404.7306	15445.8939	22.1207	5.9466	15.858
L3	37.3224	42.0143	6613.8340	12.5311	18.1223	364.9563	13236.3706	21.0112	5.6186	14.983
	47.7921	55.6418	15362.6008	16.5955	23.9385	641.7533	30745.4162	27.8262	7.6336	20.356
L4	46.9982	53.0838	13339.7306	15.8326	22.8467	583.8794	26697.0140	26.5469	7.2554	19.348
	57.0599	66.5052	26231.8094	19.8356	28.5750	917.9986	52498.1354	33.2589	9.2400	24.64

Tower	Gusset	Gusset	Gusset Grade Adjust. Factor	Adjust.	Weight Mult.	Double Angle	0	U
Elevation	Area	Thickness	A_f	Factor		Stitch Bolt	Stitch Bolt	Stitch Bolt
	(per face)			A_r		Spacing	Spacing	Spacing
	_					Diagonals	Horizontals	Redundants
ft	ft ²	in				in	in	in
L1			1	1	1			
179.00-139.50								
L2			1	1	1			
139.50-93.40								
L3 93.40-46.31			1	1	1			
L4 46.31-0.00			1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude	Component	Placement	Total	Number	Start/End	Width or	Perimeter	Weight
		From	Type		Number	Per Row	Position	Diameter		
		Torque		ft				in	in	plf
		Calculation								
HYBRIFLEX 1-1/4"	В	No	Surface Ar	179.00 -	3	3	0.000	1.5400		1.30
(T-Mobile Proposed)			(CaAa)	3.00			0.000			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face	Allow	Exclude	Component	Placement	Total	$C_A A_A$	Weight
	or	Shield	From	Type		Number	_	
	Leg		Torque		ft		ft²/ft	plf
			Calculation					

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Description	Face or	Allow Shield	Exclude From	Component Type	Placement	Total Number		$C_A A_A$	Weight
	Leg		Torque Calculation	21	ft			ft²/ft	plf
1 5/8	A	No	No	Inside Pole	179.00 - 3.00	3	No Ice	0.00	1.04
(Town Existing)							1/2" Ice	0.00	1.04
_							1" Ice	0.00	1.04
1 5/8	Α	No	No	Inside Pole	138.50 - 3.00	1	No Ice	0.00	1.04
(Town Existing)							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1 5/8	A	No	No	Inside Pole	132.50 - 3.00	1	No Ice	0.00	1.04
(Town Existing)							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1/2	A	No	No	Inside Pole	128.50 - 3.00	1	No Ice	0.00	0.25
(Town Existing)							1/2" Ice	0.00	0.25
							1" Ice	0.00	0.25
1 5/8	Α	No	No	Inside Pole	113.00 - 3.00	1	No Ice	0.00	1.04
(Town Existing)							1/2" Ice	0.00	1.04
· · · · · · · · · · · · · · · · · · ·							1" Ice	0.00	1.04
1 5/8	В	No	No	Inside Pole	179.00 - 3.00	6	No Ice	0.00	1.04
(T-Mobile Existing)							1/2" Ice	0.00	1.04
,							1" Ice	0.00	1.04
HYBRIFLEX 1-1/4"	В	No	No	Inside Pole	179.00 - 3.00	1	No Ice	0.00	1.30
(T-Mobile Existing)							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
1 5/8	Α	No	No	Inside Pole	170.00 - 3.00	12	No Ice	0.00	1.04
(AT&T Existing)							1/2" Ice	0.00	1.04
,							1" Ice	0.00	1.04
RG6-Fiber	Α	No	No	Inside Pole	170.00 - 3.00	1	No Ice	0.00	0.00
(AT&T Existing)							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
#8 AWG Copper	Α	No	No	Inside Pole	170.00 - 3.00	2	No Ice	0.00	0.00
WIre							1/2" Ice	0.00	0.00
(AT&T Existing)							1" Ice	0.00	0.00
1 5/8	C	No	No	Inside Pole	160.00 - 3.00	12	No Ice	0.00	1.04
(Verizon Existing)							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
HYBRIFLEX 1-5/8"	C	No	No	Inside Pole	160.00 - 3.00	2	No Ice	0.00	1.90
(Verizon Existing)	-						1/2" Ice	0.00	1.90
							1" Ice	0.00	1.90

Feed Line/Linear Appurtenances Section Areas

Tower	Tower	Face	A_R	A_F	C_AA_A	$C_A A_A$	Weight
Section	Elevation				In Face	Out Face	
	ft		ft^2	ft^2	ft^2	ft^2	K
L1	179.00-139.50	A	0.000	0.000	0.000	0.000	0.50
		В	0.000	0.000	18.249	0.000	0.45
		C	0.000	0.000	0.000	0.000	0.33
L2	139.50-93.40	A	0.000	0.000	0.000	0.000	0.84
		В	0.000	0.000	21.298	0.000	0.53
		C	0.000	0.000	0.000	0.000	0.75
L3	93.40-46.31	A	0.000	0.000	0.000	0.000	0.89
		В	0.000	0.000	21.756	0.000	0.54
		C	0.000	0.000	0.000	0.000	0.77
L4	46.31-0.00	A	0.000	0.000	0.000	0.000	0.82
		В	0.000	0.000	20.009	0.000	0.50
		C	0.000	0.000	0.000	0.000	0.71

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180' EEI Monopole - 719 George Washington Tpk., Burlingt CT	on, 09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower	Tower	Face	Ice	A_R	A_F	$C_A A_A$	$C_A A_A$	Weight
Section	Elevation	or	Thickness			In Face	Out Face	
	ft	Leg	in	ft^2	ft^2	ft^2	ft^2	K
L1	179.00-139.50	A	2.924	0.000	0.000	0.000	0.000	0.50
		В		0.000	0.000	51.688	0.000	1.37
		C		0.000	0.000	0.000	0.000	0.33
L2	139.50-93.40	A	2.834	0.000	0.000	0.000	0.000	0.84
		В		0.000	0.000	60.324	0.000	1.60
		C		0.000	0.000	0.000	0.000	0.75
L3	93.40-46.31	A	2.693	0.000	0.000	0.000	0.000	0.89
		В		0.000	0.000	60.554	0.000	1.59
		C		0.000	0.000	0.000	0.000	0.77
L4	46.31-0.00	A	2.416	0.000	0.000	0.000	0.000	0.82
		В		0.000	0.000	54.165	0.000	1.39
		C		0.000	0.000	0.000	0.000	0.71

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X	CP_Z
				Ice	Ice
	ft	in	in	in	in
L1	179.00-139.50	2.8642	-1.6536	2.7434	-1.5839
L2	139.50-93.40	3.0328	-1.7510	3.1601	-1.8245
L3	93.40-46.31	3.1454	-1.8160	3.4563	-1.9955
L4	46.31-0.00	3.0228	-1.7452	3.4449	-1.9889

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

ſ	Tower	Feed Line	Description	Feed Line	K_a	K_a
ı	Section	Record No.		Segment Elev.	No Ice	Ice
ſ	L1	13	HYBRIFLEX 1-1/4"	139.50 -	1.0000	1.0000
ı				179.00		
ı	L2	13	HYBRIFLEX 1-1/4"	93.40 - 139.50	1.0000	1.0000
ı	L3	13	HYBRIFLEX 1-1/4"	46.31 - 93.40	1.0000	1.0000

Discrete Tower Loads

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client	Designed by
T-Mobile	TJL

Description	Face or	Offset Type	Offsets: Horz	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weig
	Leg		Lateral						
			Vert ft	0	ft		ft ²	ft ²	K
			ft ft		Ji		Ji	Ji	A
20' x 2" Dia Omni	A	From Face	4.00	0.0000	191.00	No Ice	4.00	4.00	0.02
(Town Existing)			-6.00			1/2" Ice	6.03	6.03	0.05
			0.00			1" Ice	8.07	8.07	0.09
20' x 2" Dia Omni	В	From Face	4.00	0.0000	191.00	No Ice	4.00	4.00	0.02
(Town Existing)			-6.00			1/2" Ice	6.03	6.03	0.05
20' x 2" Dia Omni	С	From Face	0.00 4.00	0.0000	191.00	1" Ice No Ice	8.07 4.00	8.07 4.00	0.09
(Town Existing)	C	rioiii race	-6.00	0.0000	191.00	1/2" Ice	6.03	6.03	0.03
(Town Existing)			0.00			1" Ice	8.07	8.07	0.09
20' 4-Bay Dipole	C	From Face	4.00	0.0000	138.50	No Ice	4.00	4.00	0.0
(Town Existing)	-		-6.00			1/2" Ice	6.00	6.00	0.10
ζ,			0.00			1" Ice	8.00	8.00	0.14
3' Pipe Mount Side Arm	C	From Face	4.00	0.0000	138.50	No Ice	0.30	0.30	0.01
(Town Existing)			-6.00			1/2" Ice	0.61	0.61	0.03
			0.00			1" Ice	0.81	0.81	0.09
8' x 2" Omni	Α	From Face	4.00	0.0000	132.50	No Ice	1.60	1.60	0.02
(Town Existing)			-6.00			1/2" Ice	2.42	2.42	0.03
21 Vo ~		From Face	0.00 4.00	0.0000	132.50	1" Ice No Ice	3.24 2.08	3.24 2.08	0.03
3' Yagi (Town Existing)	A	rioiii race	-6.00	0.0000	132.30	1/2" Ice	3.79	3.79	0.0.
(Town Existing)			0.00			1" Ice	5.52	5.52	0.0
3' Pipe Mount Side Arm	A	From Face	4.00	0.0000	132.50	No Ice	0.30	0.30	0.0
(Town Existing)	••	11011111110	-6.00	0.0000	102.00	1/2" Ice	0.61	0.61	0.0
ζ,			0.00			1" Ice	0.81	0.81	0.0
10' Dipole	C	From Face	4.00	0.0000	112.50	No Ice	4.00	4.00	0.0
(Town Existing)			-6.00			1/2" Ice	6.00	6.00	0.0
			0.00			1" Ice	8.00	8.00	0.10
3' Pipe Mount Side Arm	C	From Face	4.00	0.0000	112.50	No Ice	0.30	0.30	0.0
(Town Existing)			-6.00			1/2" Ice	0.61	0.61	0.0
A ID 21 D 2 A /D 4 D		E E	0.00	0.0000	170.00	1" Ice	0.81	0.81	0.0
AIR21 B2A/B4P (T-Mobile Existing)	A	From Face	3.00 -5.00	0.0000	179.00	No Ice 1/2" Ice	6.05 6.42	4.36 4.70	0.03
(1-Mobile Existing)			0.00			1" Ice	6.80	5.06	0.1
AIR32	A	From Face	3.00	0.0000	179.00	No Ice	6.51	4.71	0.13
(T-Mobile Proposed)		Troin Tucc	0.00	0.0000	177.00	1/2" Ice	6.89	5.07	0.1
(I I I I I I I I I I I I I I I I I I I			0.00			1" Ice	7.27	5.43	0.2
AIR21 B2A/B4P	В	From Face	3.00	0.0000	179.00	No Ice	6.05	4.36	0.0
(T-Mobile Existing)			-5.00			1/2" Ice	6.42	4.70	0.13
			0.00			1" Ice	6.80	5.06	0.1
AIR32	В	From Face	3.00	0.0000	179.00	No Ice	6.51	4.71	0.13
(T-Mobile Existing)			0.00			1/2" Ice	6.89	5.07	0.1
A ID 21 D 2 A /D 4 D	C	From Face	0.00	0.0000	170.00	1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P	С	From Face	3.00 -5.00	0.0000	179.00	No Ice 1/2" Ice	6.05	4.36	0.03
(T-Mobile Proposed)			0.00			1" Ice	6.42 6.80	4.70 5.06	0.17
AIR32	С	From Face	3.00	0.0000	179.00	No Ice	6.51	4.71	0.13
(T-Mobile Proposed)	C	r rom r ucc	0.00	0.0000	177.00	1/2" Ice	6.89	5.07	0.13
,			0.00			1" Ice	7.27	5.43	0.23
APXVAARR24-43	A	From Face	3.00	0.0000	179.00	No Ice	20.24	8.89	0.10
(T-Mobile Proposed)			5.00			1/2" Ice	20.89	9.49	0.2
			0.00			1" Ice	21.54	10.09	0.39
APXVAARR24-43	В	From Face	3.00	0.0000	179.00	No Ice	20.24	8.89	0.1
(T-Mobile Proposed)			5.00			1/2" Ice	20.89	9.49	0.2
A DWILL A D D O 4 40	-	Б Б	0.00	0.0000	170.00	1" Ice	21.54	10.09	0.39
APXVAARR24-43	C	From Face	3.00	0.0000	179.00	No Ice	20.24	8.89	0.10
(T-Mobile Proposed)			5.00 0.00			1/2" Ice 1" Ice	20.89 21.54	9.49 10.09	0.2

Centek Engineering Inc. 63-2 North Branford Rd.

Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Description	Face or	Offset Type	Offsets: Horz	Azimuth Adjustment	Placement		C_AA_A Front	$C_A A_A$ Side	Weig
	Leg	- 1	Lateral Vert	•					
			ft	0	ft		ft^2	ft^2	K
			ft ft		j.		Ji	J.	
4449 B12,B71	A	From Face	3.00	0.0000	179.00	No Ice	1.65	1.16	0.08
(T-Mobile Proposed)			5.00			1/2" Ice	1.81	1.29	0.10
4440 D12 D71	D	E E	0.00	0.0000	170.00	1" Ice	1.98	1.44	0.11
4449 B12,B71 (T-Mobile Proposed)	В	From Face	3.00 5.00	0.0000	179.00	No Ice 1/2" Ice	1.65 1.81	1.16 1.29	0.03
(1-Mobile 11oposed)			0.00			1" Ice	1.98	1.44	0.1
4449 B12,B71	C	From Face	3.00	0.0000	179.00	No Ice	1.65	1.16	0.0
(T-Mobile Proposed)			5.00			1/2" Ice	1.81	1.29	0.10
			0.00			1" Ice	1.98	1.44	0.1
EEI 14-ft Platform w/ Rails	C	None		0.0000	177.00	No Ice	19.00	19.00	1.7
(T-Mobile Existing)						1/2" Ice	24.00	24.00	2.0
(A) DDII(C 11		г г	0.50	0.0000	170.00	1" Ice	29.00	29.00	2.2
(2) RRUS-11 (AT&T Existing)	A	From Face	0.50 0.00	0.0000	170.00	No Ice 1/2" Ice	2.57 2.76	1.07 1.21	0.03
(AI&I Existing)			0.00			1" Ice	2.76	1.21	0.0
(2) RRUS-11	В	From Face	0.50	0.0000	170.00	No Ice	2.57	1.07	0.0
(AT&T Existing)	Ъ	Trom ruce	0.00	0.0000	170.00	1/2" Ice	2.76	1.21	0.0
(22 2)			0.00			1" Ice	2.97	1.36	0.0
(2) RRUS-11	C	From Face	0.50	0.0000	170.00	No Ice	2.57	1.07	0.0
(AT&T Existing)			0.00			1/2" Ice	2.76	1.21	0.0
			0.00			1" Ice	2.97	1.36	0.0
DC6-48-60-18-8F Surge	C	From Face	0.50	0.0000	170.00	No Ice	1.91	1.91	0.0
Arrestor			0.00			1/2" Ice	2.10	2.10	0.0
(AT&T Existing)	C	Mana	0.00	0.0000	170.00	1" Ice	2.29	2.29	0.00
Valmont Uni-Tri Bracket (AT&T Existing)	C	None		0.0000	170.00	No Ice 1/2" Ice	1.75 1.94	1.75 1.94	0.2
(AT&T Existing)						1" Ice	2.13	2.13	0.3
7770.00	Α	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.0
(AT&T Existing)			6.00			1/2" Ice	5.87	3.27	0.0
`			0.00			1" Ice	6.23	3.63	0.1
P65-17-XLH-RR	A	From Face	3.00	0.0000	170.00	No Ice	11.47	6.80	0.0
(AT&T Existing)			4.00			1/2" Ice	12.08	7.38	0.13
			0.00			1" Ice	12.71	7.98	0.19
7770.00	A	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.0
(AT&T Existing)			-6.00 0.00			1/2" Ice 1" Ice	5.87 6.23	3.27 3.63	0.0
7770.00	В	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.0
(AT&T Existing)	ь	1 Tom 1 acc	6.00	0.0000	170.00	1/2" Ice	5.87	3.27	0.0
(III Zingung)			0.00			1" Ice	6.23	3.63	0.1
P65-17-XLH-RR	В	From Face	3.00	0.0000	170.00	No Ice	11.47	6.80	0.0
(AT&T Existing)			4.00			1/2" Ice	12.08	7.38	0.13
			0.00			1" Ice	12.71	7.98	0.19
7770.00	В	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.0
(AT&T Existing)			-6.00			1/2" Ice	5.87	3.27	0.0
7770.00	C	г г	0.00	0.0000	170.00	1" Ice	6.23	3.63	0.1
7770.00	C	From Face	3.00	0.0000	170.00	No Ice 1/2" Ice	5.51	2.93	0.0
(AT&T Existing)			6.00 0.00			1/2 Ice 1" Ice	5.87 6.23	3.27 3.63	0.0
P65-17-XLH-RR	C	From Face	3.00	0.0000	170.00	No Ice	11.47	6.80	0.0
(AT&T Existing)	_	2 10111 1 400	4.00	0.0000	1,0.00	1/2" Ice	12.08	7.38	0.1
			0.00			1" Ice	12.71	7.98	0.1
7770.00	C	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.0
(AT&T Existing)			-6.00			1/2" Ice	5.87	3.27	0.0
			0.00			1" Ice	6.23	3.63	0.1
(2) LGP21401 TMA	Α	From Face	3.00	0.0000	170.00	No Ice	0.82	0.35	0.0
(AT&T Existing)	А		0.00		1,0.00	1/2" Ice	0.94	0.44	0.0

Centek Engineering Inc. 63-2 North Branford Rd.

Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

Job	Page
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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client	Designed by
T-Mobile	TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral	Azimuth Adjustment	Placement		C _A A _A Front	C _A A _A Side	Weigh
			Vert ft ft	0	ft		ft ²	ft²	K
			ft						
(2) LGP21401 TMA	В	From Face	3.00	0.0000	170.00	No Ice	0.82	0.35	0.02
(AT&T Existing)			0.00			1/2" Ice	0.94	0.44	0.02
(2) I CD21 (01 TMA		г г	0.00	0.0000	170.00	1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	C	From Face	3.00	0.0000	170.00	No Ice 1/2" Ice	0.82	0.35	0.02
(AT&T Existing)			0.00 0.00			1/2 Ice 1" Ice	0.94	0.44 0.54	0.02 0.03
(2) LPG13519 Diplexer	Α	From Face	3.00	0.0000	170.00	No Ice	1.06 0.23	0.34	0.03
(AT&T Existing)	A	rioiii race	0.00	0.0000	170.00	1/2" Ice	0.23	0.10	0.01
(AT&T Existing)			0.00			1" Ice	0.29	0.21	0.01
(2) LPG13519 Diplexer	В	From Face	3.00	0.0000	170.00	No Ice	0.30	0.26	0.01
(AT&T Existing)	ь	rioni race	0.00	0.0000	170.00	1/2" Ice	0.23	0.10	0.01
(AT&T Existing)			0.00			1" Ice	0.25	0.21	0.01
(2) LPG13519 Diplexer	C	From Face	3.00	0.0000	170.00	No Ice	0.23	0.16	0.01
(AT&T Existing)	C	r rom r acc	0.00	0.0000	170.00	1/2" Ice	0.29	0.21	0.01
(Mixi Existing)			0.00			1" Ice	0.36	0.28	0.01
EEI 14-ft Low Profile	C	None	0.00	0.0000	168.00	No Ice	16.50	16.50	1.55
Platform	Ü	110110		0.0000	100.00	1/2" Ice	20.00	20.00	1.80
(AT&T Existing)						1" Ice	23.50	23.50	2.05
APL866513-42T0	Α	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
(Verizon Existing)			-6.00			1/2" Ice	4.36	3.92	0.05
()			0.00			1" Ice	4.68	4.23	0.08
JAHH-65B-R3B	Α	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
(Verizon Existing)			0.00			1/2" Ice	9.58	6.44	0.12
,			0.00			1" Ice	10.05	6.91	0.19
JAHH-65B-R3B	A	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
(Verizon Existing)			4.00			1/2" Ice	9.58	6.44	0.12
_			0.00			1" Ice	10.05	6.91	0.19
APL866513-42T0	Α	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
(Verizon Existing)			-6.00			1/2" Ice	4.36	3.92	0.05
			0.00			1" Ice	4.68	4.23	0.08
APL866513-42T0	В	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
(Verizon Existing)			-6.00			1/2" Ice	4.36	3.92	0.05
			0.00			1" Ice	4.68	4.23	0.08
JAHH-65B-R3B	В	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
(Verizon Existing)			0.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
JAHH-65B-R3B	В	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
(Verizon Existing)			4.00			1/2" Ice	9.58	6.44	0.12
	_		0.00			1" Ice	10.05	6.91	0.19
APL866513-42T0	В	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
(Verizon Existing)			-6.00			1/2" Ice	4.36	3.92	0.05
A DI 0.66512 4250		г г	0.00	0.0000	160.00	1" Ice	4.68	4.23	0.08
APL866513-42T0	C	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
(Verizon Existing)			-6.00			1/2" Ice	4.36	3.92	0.05
IAIIII CED DOD	C	E E	0.00	0.0000	160.00	1" Ice	4.68	4.23	0.08
JAHH-65B-R3B (Verizon Existing)	C	From Face	3.00 0.00	0.0000	160.00	No Ice 1/2" Ice	9.11 9.58	5.98 6.44	0.06 0.12
(Vertzon Existing)						1" Ice		6.91	0.12
JAHH-65B-R3B	С	From Face	0.00 3.00	0.0000	160.00	No Ice	10.05 9.11	5.98	0.19
(Verizon Existing)	C	riom race	4.00	0.0000	100.00	1/2" Ice	9.11	5.98 6.44	0.06
(v GITZOH EXISHIIG)			0.00			1" Ice	9.38 10.05	6.44	0.12
APL866513-42T0	C	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.19
(Verizon Existing)	C	11011111 acc	-6.00	0.0000	100.00	1/2" Ice	4.36	3.92	0.02
(, or izon Existing)			0.00			1" Ice	4.68	4.23	0.03
B66A RRH4x45	Α	From Face	3.00	0.0000	160.00	No Ice	2.53	1.60	0.03
(Verizon Existing)	А	11011111 acc	4.00	0.0000	100.00	1/2" Ice	2.74	1.78	0.07
(Sillon Labourg)			0.00			1" Ice	2.96	1.97	0.03

Centek Engineering Inc. 63-2 North Branford Rd.

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral	Azimuth Adjustment	Placement		C _A A _A Front	C _A A _A Side	Weigh
			Vert ft ft	0	ft		ft ²	ft²	K
B66A RRH4x45	В	From Face	3.00	0.0000	160.00	No Ice	2.53	1.60	0.07
(Verizon Existing)	ь	1 Iom 1 acc	4.00	0.0000	100.00	1/2" Ice	2.74	1.78	0.07
(Verizon Existing)			0.00			1" Ice	2.96	1.97	0.03
B66A RRH4x45	C	From Face	3.00	0.0000	160.00	No Ice	2.53	1.60	0.07
(Verizon Existing)	C	1 Iom 1 acc	4.00	0.0000	100.00	1/2" Ice	2.74	1.78	0.09
(Verizon Existing)			0.00			1" Ice	2.96	1.97	0.11
RRH4x30-B13	Α	From Face	3.00	0.0000	160.00	No Ice	2.16	1.62	0.06
(Verizon Existing)		r roin r acc	0.00	0.0000	100.00	1/2" Ice	2.35	1.79	0.08
(verizon zimoning)			0.00			1" Ice	2.55	1.97	0.10
RRH4x30-B13	В	From Face	3.00	0.0000	160.00	No Ice	2.16	1.62	0.06
(Verizon Existing)	ь	r roin r acc	0.00	0.0000	100.00	1/2" Ice	2.35	1.79	0.08
(Verizon Existing)			0.00			1" Ice	2.55	1.97	0.10
RRH4x30-B13	C	From Face	3.00	0.0000	160.00	No Ice	2.16	1.62	0.06
(Verizon Existing)			0.00			1/2" Ice	2.35	1.79	0.08
(0.00			1" Ice	2.55	1.97	0.10
RRH 4T4R B5 160W	A	From Face	3.00	0.0000	160.00	No Ice	1.28	0.72	0.04
(Verizon Existing)			-4.00			1/2" Ice	1.43	0.83	0.05
			0.00			1" Ice	1.58	0.95	0.06
RRH 4T4R B5 160W	В	From Face	3.00	0.0000	160.00	No Ice	1.28	0.72	0.04
(Verizon Existing)			-4.00			1/2" Ice	1.43	0.83	0.05
· · · · · · · · · · · · · · · · · · ·			0.00			1" Ice	1.58	0.95	0.06
RRH 4T4R B5 160W	C	From Face	3.00	0.0000	160.00	No Ice	1.28	0.72	0.04
(Verizon Existing)			-4.00			1/2" Ice	1.43	0.83	0.05
			0.00			1" Ice	1.58	0.95	0.06
RC2DC-3315-PF-48	A	From Face	1.00	0.0000	160.00	No Ice	3.01	1.96	0.03
(Verizon Existing)			1.00			1/2" Ice	3.23	2.15	0.05
			0.00			1" Ice	3.46	2.35	0.08
RC2DC-3315-PF-48	В	From Face	1.00	0.0000	160.00	No Ice	3.01	1.96	0.03
(Verizon Existing)			1.00			1/2" Ice	3.23	2.15	0.05
3 ,			0.00			1" Ice	3.46	2.35	0.08
EEI 14-ft Low Profile	C	None		0.0000	158.00	No Ice	16.50	16.50	1.55
Platform						1/2" Ice	20.00	20.00	1.80
(Verizon Existing)						1" Ice	23.50	23.50	2.05

Tower Pressures - No Ice

 $G_H=1.100$

Section	z	K_Z	q_z	A_G	F	A_F	A_R	A_{leg}	Leg	$C_A A_A$	$C_A A_A$
Elevation					а				%	In	Out
				_	С	_	_	_		Face	Face
ft	ft		psf	ft^2	e	ft^2	ft^2	ft^2		ft^2	ft^2
L1	158.19	1.394	34	79.364	Α	0.000	79.364	79.364	100.00	0.000	0.000
179.00-139.50					В	0.000	79.364		100.00	18.249	0.000
					C	0.000	79.364		100.00	0.000	0.000
L2	115.52	1.305	32	126.948	Α	0.000	126.948	126.948	100.00	0.000	0.000
139.50-93.40					В	0.000	126.948		100.00	21.298	0.000
					C	0.000	126.948		100.00	0.000	0.000
L3 93.40-46.31	69.31	1.172	28	167.002	Α	0.000	167.002	167.002	100.00	0.000	0.000
					В	0.000	167.002		100.00	21.756	0.000

Centek Engineering Inc. 63-2 North Branford Rd.

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Ī	Project	Date
	180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Ī	Client	Designed by
	T-Mobile	TJL

Section	Z	K_Z	q_z	A_G	F	A_F	A_R	A_{leg}	Leg	C_AA_A	$C_A A_A$
Elevation					а				%	In	Out
					С					Face	Face
ft	ft		psf	ft^2	e	ft ²	ft ²	ft^2		ft ²	ft^2
					C	0.000	167.002		100.00	0.000	0.000
L4 46.31-0.00	23.42	0.932	22	200.789	Α	0.000	200.789	200.789	100.00	0.000	0.000
					В	0.000	200.789		100.00	20.009	0.000
					C	0.000	200.789		100.00	0.000	0.000

Tower Pressure - With Ice

 $G_H = 1.100$

Section	z	K_Z	q_z	t_Z	A_G	F	A_F	A_R	A_{leg}	Leg	C_AA_A	$C_A A_A$
Elevation						a				%	In	Out
						c					Face	Face
ft	ft		psf	in	ft^2	e	ft^2	ft^2	ft^2		ft^2	ft^2
L1	158.19	1.394	8	2.9242	98.615	Α	0.000	98.615	98.615	100.00	0.000	0.000
179.00-139.50						В	0.000	98.615		100.00	51.688	0.000
						C	0.000	98.615		100.00	0.000	0.000
L2 139.50-93.40	115.52	1.305	8	2.8337	149.415	Α	0.000	149.415	149.415	100.00	0.000	0.000
						В	0.000	149.415		100.00	60.324	0.000
						C	0.000	149.415		100.00	0.000	0.000
L3 93.40-46.31	69.31	1.172	7	2.6926	189.242	Α	0.000	189.242	189.242	100.00	0.000	0.000
						В	0.000	189.242		100.00	60.554	0.000
						C	0.000	189.242		100.00	0.000	0.000
L4 46.31-0.00	23.42	0.932	6	2.4157	221.571	Α	0.000	221.571	221.571	100.00	0.000	0.000
						В	0.000	221.571		100.00	54.165	0.000
						C	0.000	221.571		100.00	0.000	0.000

Tower Pressure - Service

 $G_H=1.100$

Section	z	K_Z	q_z	A_G	F	A_F	A_R	A_{leg}	Leg	$C_A A_A$	$C_A A_A$
Elevation					а				%	In	Out
				_	c	_	_	_		Face	Face
ft	ft		psf	ft^2	e	ft ²	ft ²	ft^2		ft^2	ft^2
L1	158.19	1.394	11	79.364	Α	0.000	79.364	79.364	100.00	0.000	0.000
179.00-139.50					В	0.000	79.364		100.00	18.249	0.000
					C	0.000	79.364		100.00	0.000	0.000
L2	115.52	1.305	10	126.948	Α	0.000	126.948	126.948	100.00	0.000	0.000
139.50-93.40					В	0.000	126.948		100.00	21.298	0.000
					C	0.000	126.948		100.00	0.000	0.000
L3 93.40-46.31	69.31	1.172	9	167.002	Α	0.000	167.002	167.002	100.00	0.000	0.000
					В	0.000	167.002		100.00	21.756	0.000
					C	0.000	167.002		100.00	0.000	0.000
L4 46.31-0.00	23.42	0.932	7	200.789	Α	0.000	200.789	200.789	100.00	0.000	0.000
					В	0.000	200.789		100.00	20.009	0.000
					C	0.000	200.789		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Centek Engineering Inc. 63-2 North Branford Rd.

> Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
L1	1.29	1.89	Α	1	0.65	34	1	1	79.364	1.91	48.42	C
179.00-139.50			В	1	0.65		1	1	79.364			
			C	1	0.65		1	1	79.364			
L2	2.11	6.45	Α	1	0.65	32	1	1	126.948	2.86	62.06	C
139.50-93.40			В	1	0.65		1	1	126.948			
			C	1	0.65		1	1	126.948			
L3	2.20	8.69	Α	1	0.65	28	1	1	167.002	3.37	71.60	C
93.40-46.31			В	1	0.65		1	1	167.002			
			C	1	0.65		1	1	167.002			
L4 46.31-0.00	2.02	10.72	Α	1	0.65	22	1	1	200.789	3.22	69.51	C
			В	1	0.65		1	1	200.789			
			C	1	0.65		1	1	200.789			
Sum Weight:	7.62	27.75						OTM	942.11	11.36		
									kip-ft			

Tower Forces - No Ice - Wind 60 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			c			psf						
ft	K	K	e						ft^2	K	plf	
L1	1.29	1.89	Α	1	0.65	34	1	1	79.364	1.91	48.42	C
179.00-139.50			В	1	0.65		1	1	79.364			
			C	1	0.65		1	1	79.364			
L2	2.11	6.45	Α	1	0.65	32	1	1	126.948	2.86	62.06	C
139.50-93.40			В	1	0.65		1	1	126.948			
			C	1	0.65		1	1	126.948			
L3	2.20	8.69	Α	1	0.65	28	1	1	167.002	3.37	71.60	C
93.40-46.31			В	1	0.65		1	1	167.002			
			C	1	0.65		1	1	167.002			
L4 46.31-0.00	2.02	10.72	Α	1	0.65	22	1	1	200.789	3.22	69.51	C
			В	1	0.65		1	1	200.789			
			C	1	0.65		1	1	200.789			
Sum Weight:	7.62	27.75						OTM	942.11	11.36		
									kip-ft			

Tower Forces - No Ice - Wind 90 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			c			psf						
ft	K	K	e						ft^2	K	plf	
L1	1.29	1.89	Α	1	0.65	34	1	1	79.364	1.91	48.42	C
179.00-139.50			В	1	0.65		1	1	79.364			
			C	1	0.65		1	1	79.364			
L2	2.11	6.45	Α	1	0.65	32	1	1	126.948	2.86	62.06	C
139.50-93.40			В	1	0.65		1	1	126.948			
			C	1	0.65		1	1	126.948			
L3	2.20	8.69	Α	1	0.65	28	1	1	167.002	3.37	71.60	C

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf			_			
ft	K	K	e						ft^2	K	plf	
93.40-46.31			В	1	0.65		1	1	167.002			
			C	1	0.65		1	1	167.002			
L4 46.31-0.00	2.02	10.72	Α	1	0.65	22	1	1	200.789	3.22	69.51	C
			В	1	0.65		1	1	200.789			
			C	1	0.65		1	1	200.789			
Sum Weight:	7.62	27.75						OTM	942.11	11.36		
									kip-ft			

Tower Forces - With Ice - Wind Normal To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	a									Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
L1	2.21	5.69	Α	1	1.2	8	1	1	98.615	1.10	27.92	C
179.00-139.50			В	1	1.2		1	1	98.615			
			C	1	1.2		1	1	98.615			
L2	3.19	12.17	Α	1	1.2	8	1	1	149.415	1.56	33.89	C
139.50-93.40			В	1	1.2		1	1	149.415			
			C	1	1.2		1	1	149.415			
L3	3.25	15.68	Α	1	1.2	7	1	1	189.242	1.77	37.65	C
93.40-46.31			В	1	1.2		1	1	189.242			
			C	1	1.2		1	1	189.242			
L4 46.31-0.00	2.92	18.14	Α	1	1.2	6	1	1	221.571	1.65	35.60	C
			В	1	1.2		1	1	221.571			
			C	1	1.2		1	1	221.571			
Sum Weight:	11.57	51.68						OTM	516.42	6.09		
									kip-ft			

Tower Forces - With Ice - Wind 60 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	a									Face
			c			psf						
ft	K	K	e						ft^2	K	plf	
L1	2.21	5.69	Α	1	1.2	8	1	1	98.615	1.10	27.92	C
179.00-139.50			В	1	1.2		1	1	98.615			
			C	1	1.2		1	1	98.615			
L2	3.19	12.17	Α	1	1.2	8	1	1	149.415	1.56	33.89	C
139.50-93.40			В	1	1.2		1	1	149.415			
			C	1	1.2		1	1	149.415			
L3	3.25	15.68	Α	1	1.2	7	1	1	189.242	1.77	37.65	C
93.40-46.31			В	1	1.2		1	1	189.242			
			C	1	1.2		1	1	189.242			
L4 46.31-0.00	2.92	18.14	Α	1	1.2	6	1	1	221.571	1.65	35.60	C
			В	1	1.2		1	1	221.571			
			C	1	1.2		1	1	221.571			
Sum Weight:	11.57	51.68						OTM	516.42	6.09		
									kip-ft			

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Client T-Mobile	Designed by

Tower Forces - With Ice - Wind 90 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf			_			
ft	K	K	e						ft^2	K	plf	
L1	2.21	5.69	Α	1	1.2	8	1	1	98.615	1.10	27.92	C
179.00-139.50			В	1	1.2		1	1	98.615			
			C	1	1.2		1	1	98.615			
L2	3.19	12.17	Α	1	1.2	8	1	1	149.415	1.56	33.89	C
139.50-93.40			В	1	1.2		1	1	149.415			
			C	1	1.2		1	1	149.415			
L3	3.25	15.68	Α	1	1.2	7	1	1	189.242	1.77	37.65	C
93.40-46.31			В	1	1.2		1	1	189.242			
			C	1	1.2		1	1	189.242			
L4 46.31-0.00	2.92	18.14	Α	1	1.2	6	1	1	221.571	1.65	35.60	C
			В	1	1.2		1	1	221.571			
			C	1	1.2		1	1	221.571			
Sum Weight:	11.57	51.68						OTM	516.42	6.09		
									kip-ft			

Tower Forces - Service - Wind Normal To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а			_						Face
			c			psf						
ft	K	K	e						ft^2	K	plf	
L1	1.29	1.89	Α	1	0.65	11	1	1	79.364	0.62	15.68	C
179.00-139.50			В	1	0.65		1	1	79.364			
			C	1	0.65		1	1	79.364			
L2	2.11	6.45	Α	1	0.65	10	1	1	126.948	0.93	20.10	C
139.50-93.40			В	1	0.65		1	1	126.948			
			C	1	0.65		1	1	126.948			
L3	2.20	8.69	Α	1	0.65	9	1	1	167.002	1.09	23.19	C
93.40-46.31			В	1	0.65		1	1	167.002			
			C	1	0.65		1	1	167.002			
L4 46.31-0.00	2.02	10.72	Α	1	0.65	7	1	1	200.789	1.04	22.51	C
			В	1	0.65		1	1	200.789			
			C	1	0.65		1	1	200.789			
Sum Weight:	7.62	27.75						OTM	305.09	3.68		
									kip-ft			

Tower Forces - Service - Wind 60 To Face

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Project 180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	Date 09:39:39 04/24/19
Client T-Mobile	Designed by

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			c			psf			_			
ft	K	K	e						ft^2	K	plf	
L1	1.29	1.89	Α	1	0.65	11	1	1	79.364	0.62	15.68	C
179.00-139.50			В	1	0.65		1	1	79.364			
			C	1	0.65		1	1	79.364			
L2	2.11	6.45	Α	1	0.65	10	1	1	126.948	0.93	20.10	C
139.50-93.40			В	1	0.65		1	1	126.948			
			C	1	0.65		1	1	126.948			
L3	2.20	8.69	Α	1	0.65	9	1	1	167.002	1.09	23.19	C
93.40-46.31			В	1	0.65		1	1	167.002			
			C	1	0.65		1	1	167.002			
L4 46.31-0.00	2.02	10.72	Α	1	0.65	7	1	1	200.789	1.04	22.51	C
			В	1	0.65		1	1	200.789			
			C	1	0.65		1	1	200.789			
Sum Weight:	7.62	27.75						OTM	305.09	3.68		
									kip-ft			

Tower Forces - Service - Wind 90 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
L1	1.29	1.89	Α	1	0.65	11	1	1	79.364	0.62	15.68	C
179.00-139.50			В	1	0.65		1	1	79.364			
			C	1	0.65		1	1	79.364			
L2	2.11	6.45	Α	1	0.65	10	1	1	126.948	0.93	20.10	C
139.50-93.40			В	1	0.65		1	1	126.948			
			C	1	0.65		1	1	126.948			
L3	2.20	8.69	Α	1	0.65	9	1	1	167.002	1.09	23.19	C
93.40-46.31			В	1	0.65		1	1	167.002			
			C	1	0.65		1	1	167.002			
L4 46.31-0.00	2.02	10.72	Α	1	0.65	7	1	1	200.789	1.04	22.51	C
			В	1	0.65		1	1	200.789			
			C	1	0.65		1	1	200.789			
Sum Weight:	7.62	27.75						OTM	305.09	3.68		
									kip-ft			

Force Totals

Load	Vertical	Sum of	Sum of	Sum of	Sum of	Sum of Torques
Case	Forces	Forces	Forces	Overturning	Overturning	
		X	Z	Moments, M_x	Moments, M_z	
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	27.75					
Bracing Weight	0.00					
Total Member Self-Weight	27.75			0.22	-1.30	
Total Weight	44.05			0.22	-1.30	
Wind 0 deg - No Ice		0.00	-21.07	-2575.67	-1.30	0.84
Wind 30 deg - No Ice		10.55	-18.24	-2230.56	-1291.74	1.70
Wind 60 deg - No Ice		18.27	-10.53	-1287.72	-2236.41	2.11

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Load	Vertical	Sum of	Sum of	Sum of	Sum of	Sum of Torques
Case	Forces	Forces	Forces	Overturning	Overturning	3 1
		X	Z	Moments, M_x	Moments, M _z	
	K	K	K	kip-ft	kip-ft	kip-ft
Wind 90 deg - No Ice		21.10	0.00	0.22	-2582.19	1.95
Wind 120 deg - No Ice		18.27	10.53	1288.17	-2236.41	1.27
Wind 150 deg - No Ice		10.55	18.24	2231.01	-1291.74	0.25
Wind 180 deg - No Ice		0.00	21.07	2576.11	-1.30	-0.84
Wind 210 deg - No Ice		-10.55	18.24	2231.01	1289.14	-1.70
Wind 240 deg - No Ice		-18.27	10.53	1288.17	2233.82	-2.11
Wind 270 deg - No Ice		-21.10	0.00	0.22	2579.59	-1.95
Wind 300 deg - No Ice		-18.27	-10.53	-1287.72	2233.82	-1.27
Wind 330 deg - No Ice		-10.55	-18.24	-2230.56	1289.14	-0.25
Member Ice	23.93					
Total Weight Ice	95.38			4.44	-7.75	
Wind 0 deg - Ice		0.00	-10.55	-1259.51	-7.75	0.36
Wind 30 deg - Ice		5.28	-9.13	-1090.17	-640.46	1.22
Wind 60 deg - Ice		9.14	-5.27	-627.53	-1103.64	1.75
Wind 90 deg - Ice		10.56	0.00	4.44	-1273.17	1.82
Wind 120 deg - Ice		9.14	5.27	636.42	-1103.64	1.39
Wind 150 deg - Ice		5.28	9.13	1099.06	-640.46	0.59
Wind 180 deg - Ice		0.00	10.55	1268.40	-7.75	-0.36
Wind 210 deg - Ice		-5.28	9.13	1099.06	624.96	-1.22
Wind 240 deg - Ice		-9.14	5.27	636.42	1088.14	-1.75
Wind 270 deg - Ice		-10.56	0.00	4.44	1257.67	-1.82
Wind 300 deg - Ice		-9.14	-5.27	-627.53	1088.14	-1.39
Wind 330 deg - Ice		-5.28	-9.13	-1090.17	624.96	-0.59
Total Weight	44.05			0.22	-1.30	
Wind 0 deg - Service		0.00	-6.82	-833.40	-0.33	0.27
Wind 30 deg - Service		3.42	-5.91	-721.64	-418.23	0.55
Wind 60 deg - Service		5.92	-3.41	-416.31	-724.15	0.68
Wind 90 deg - Service		6.83	0.00	0.78	-836.13	0.63
Wind 120 deg - Service		5.92	3.41	417.87	-724.15	0.41
Wind 150 deg - Service		3.42	5.91	723.21	-418.23	0.08
Wind 180 deg - Service		0.00	6.82	834.97	-0.33	-0.27
Wind 210 deg - Service		-3.42	5.91	723.21	417.57	-0.55
Wind 240 deg - Service		-5.92	3.41	417.87	723.50	-0.68
Wind 270 deg - Service		-6.83	0.00	0.78	835.47	-0.63
Wind 300 deg - Service		-5.92	-3.41	-416.31	723.50	-0.41
Wind 330 deg - Service		-3.42	-5.91	-721.64	417.57	-0.08

Load Combinations

Comb.	Description
No.	
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Comb.	Description	
No.		
16	1.2 Dead+1.6 Wind 210 deg - No Ice	
17	0.9 Dead+1.6 Wind 210 deg - No Ice	
18	1.2 Dead+1.6 Wind 240 deg - No Ice	
19	0.9 Dead+1.6 Wind 240 deg - No Ice	
20	1.2 Dead+1.6 Wind 270 deg - No Ice	
21	0.9 Dead+1.6 Wind 270 deg - No Ice	
22	1.2 Dead+1.6 Wind 300 deg - No Ice	
23	0.9 Dead+1.6 Wind 300 deg - No Ice	
24	1.2 Dead+1.6 Wind 330 deg - No Ice	
25	0.9 Dead+1.6 Wind 330 deg - No Ice	
26	1.2 Dead+1.0 Ice+1.0 Temp	
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	
39	Dead+Wind 0 deg - Service	
40	Dead+Wind 30 deg - Service	
41	Dead+Wind 60 deg - Service	
42	Dead+Wind 90 deg - Service	
43	Dead+Wind 120 deg - Service	
44	Dead+Wind 150 deg - Service	
45	Dead+Wind 180 deg - Service	
46	Dead+Wind 210 deg - Service	
47	Dead+Wind 240 deg - Service	
48	Dead+Wind 270 deg - Service	
49	Dead+Wind 300 deg - Service	
50	Dead+Wind 330 deg - Service	

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
	179 - 139.5	Pole	Max Tension	1	0.00	0.00	0.00
LI	179 - 139.3	role	Max. Compression	26	-39.45	-1.54	0.28
			-	8		-1.54 -487.18	
			Max. Mx		-11.08		0.01
			Max. My	2	-11.09	-0.23	486.20
			Max. Vy	8	19.24	-487.18	0.01
			Max. Vx	14	19.19	-0.23	-485.97
			Max. Torque	21			0.16
L2	139.5 - 93.4	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-57.99	-4.77	-8.29
			Max. Mx	8	-21.13	-1477.52	-0.62
			Max. My	14	-21.14	-0.81	-1474.12
			Max. Vy	8	24.67	-1477.52	-0.62
			Max. Vx	14	24.62	-0.81	-1474.12
			Max. Torque	19			3.33
L3	93.4 - 46.31	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-78.97	-7.21	-7.72
			Max. Mx	8	-34.45	-2722.41	-0.51
			Max. My	14	-34.46	-1.20	-2716.00

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burling CT	gton, 09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load	Axial	Major Axis Moment	Minor Axis Moment
	· ·	7.1		Comb.	K	kip-ft	kip-ft
			Max. Vy	8	29.46	-2722.41	-0.51
			Max. Vx	14	29.41	-1.20	-2716.00
			Max. Torque	19			3.32
L4	46.31 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-106.48	-9.69	-6.46
			Max. Mx	8	-52.83	-4399.49	-0.26
			Max. My	14	-52.83	-1.65	-4389.65
			Max. Vy	8	33.81	-4399.49	-0.26
			Max. Vx	14	33.76	-1.65	-4389.65
			Max. Torque	19			3.30

Maximum Reactions

Location	Condition	Gov.	Vertical	Horizontal, X	Horizontal, 2
		Load	K	K	K
		Comb.			
Pole	Max. Vert	30	106.48	-10.56	-0.00
	Max. H _x	20	52.86	33.76	-0.00
	Max. H _z	2	52.86	-0.00	33.71
	Max. M _x	2	4389.02	-0.00	33.71
	Max. Mz	8	4399.49	-33.76	-0.00
	Max. Torsion	19	3.29	29.23	-16.85
	Min. Vert	13	39.65	-16.88	-29.19
	Min. H _x	8	52.86	-33.76	-0.00
	Min. Hz	14	52.86	-0.00	-33.71
	Min. M _x	14	-4389.65	-0.00	-33.71
	Min. Mz	20	-4396.17	33.76	-0.00
	Min. Torsion	7	-3.29	-29.23	16.85

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	44.05	0.00	0.00	0.22	-1.30	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	52.86	0.00	-33.71	-4389.02	-1.65	1.27
0.9 Dead+1.6 Wind 0 deg - No Ice	39.65	0.00	-33.71	-4314.72	-1.21	1.28
1.2 Dead+1.6 Wind 30 deg - No Ice	52.86	16.88	-29.19	-3800.97	-2200.57	2.63
0.9 Dead+1.6 Wind 30 deg - No Ice	39.65	16.88	-29.19	-3736.63	-2162.87	2.64
1.2 Dead+1.6 Wind 60 deg - No Ice	52.86	29.23	-16.85	-2194.38	-3810.29	3.28
0.9 Dead+1.6 Wind 60 deg - No Ice	39.65	29.23	-16.85	-2157.26	-3745.29	3.29
1.2 Dead+1.6 Wind 90 deg - No Ice	52.86	33.76	0.00	0.26	-4399.49	3.06
0.9 Dead+1.6 Wind 90 deg - No Ice	39.65	33.76	0.00	0.19	-4324.51	3.06
1.2 Dead+1.6 Wind 120 deg - No Ice	52.86	29.23	16.85	2194.92	-3810.33	2.01

Centek Engineering Inc. 63-2 North Branford Rd.

Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

-	Job	Page
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	Project 180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	Date 09:39:39 04/24/19
	Client T-Mobile	Designed by TJL

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 120 deg -	39.65	29.23	16.85	2157.65	-3745.33	2.01
No Ice						
1.2 Dead+1.6 Wind 150 deg -	52.86	16.88	29.19	3801.57	-2200.62	0.43
No Ice	20.65	16.00	20.10	2727.06	2162.00	0.42
0.9 Dead+1.6 Wind 150 deg - No Ice	39.65	16.88	29.19	3737.06	-2162.90	0.42
1.2 Dead+1.6 Wind 180 deg -	52.86	0.00	33.71	4389.65	-1.65	-1.27
No Ice	32.00	0.00	33.71	4367.03	-1.03	-1.27
0.9 Dead+1.6 Wind 180 deg -	39.65	0.00	33.71	4315.17	-1.21	-1.28
No Ice						
1.2 Dead+1.6 Wind 210 deg -	52.86	-16.88	29.19	3801.56	2197.31	-2.63
No Ice						
0.9 Dead+1.6 Wind 210 deg -	39.65	-16.88	29.19	3737.05	2160.47	-2.64
No Ice	72 0 c	20.22	4 - 0 -	240402	200= 02	
1.2 Dead+1.6 Wind 240 deg -	52.86	-29.23	16.85	2194.92	3807.02	-3.28
No Ice 0.9 Dead+1.6 Wind 240 deg -	39.65	-29.23	16.85	2157.64	3742.89	-3.29
No Ice	39.03	-29.23	10.63	2137.04	3742.09	-3.29
1.2 Dead+1.6 Wind 270 deg -	52.86	-33.76	0.00	0.26	4396.17	-3.06
No Ice	32.00	33.70	0.00	0.20	1370.17	5.00
0.9 Dead+1.6 Wind 270 deg -	39.65	-33.76	0.00	0.19	4322.07	-3.06
No Ice						
1.2 Dead+1.6 Wind 300 deg -	52.86	-29.23	-16.85	-2194.37	3806.97	-2.01
No Ice						
0.9 Dead+1.6 Wind 300 deg -	39.65	-29.23	-16.85	-2157.25	3742.85	-2.01
No Ice	50.06	16.00	20.10	2000.06	2107.27	0.42
1.2 Dead+1.6 Wind 330 deg -	52.86	-16.88	-29.19	-3800.96	2197.27	-0.43
No Ice 0.9 Dead+1.6 Wind 330 deg -	39.65	-16.88	-29.19	-3736.62	2160.43	-0.42
No Ice	39.03	-10.00	-29.19	-3730.02	2100.43	-0.42
1.2 Dead+1.0 Ice+1.0 Temp	106.48	0.00	0.00	6.46	-9.69	0.00
1.2 Dead+1.0 Wind 0 deg+1.0	106.48	0.00	-10.55	-1511.42	-9.84	0.17
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 30 deg+1.0	106.48	5.28	-9.13	-1308.15	-769.77	1.06
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 60 deg+1.0	106.48	9.14	-5.27	-752.50	-1326.08	1.67
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 90 deg+1.0	106.48	10.56	0.00	6.53	-1529.60	1.83
Ice+1.0 Temp 1.2 Dead+1.0 Wind 120	106.48	9.14	5.27	765.58	-1326.10	1.50
deg+1.0 Ice+1.0 Temp	100.46	9.14	3.21	703.36	-1320.10	1.50
1.2 Dead+1.0 Wind 150	106.48	5.28	9.13	1321.26	-769.79	0.77
deg+1.0 Ice+1.0 Temp	100110	3.20	7.15	1021.20	707.77	0
1.2 Dead+1.0 Wind 180	106.48	0.00	10.55	1524.54	-9.84	-0.17
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	106.48	-5.28	9.13	1321.27	750.12	-1.06
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	106.48	-9.14	5.27	765.59	1306.45	-1.67
deg+1.0 Ice+1.0 Temp	106.40	10.56	0.00	6.52	1500.05	1.02
1.2 Dead+1.0 Wind 270	106.48	-10.56	0.00	6.53	1509.95	-1.83
deg+1.0 Ice+1.0 Temp 1.2 Dead+1.0 Wind 300	106.48	-9.14	-5.27	-752.51	1306.42	-1.50
deg+1.0 Ice+1.0 Temp	100.40	-7.14	-3.21	-132.31	1300.42	-1.50
1.2 Dead+1.0 Wind 330	106.48	-5.28	-9.13	-1308.16	750.10	-0.77
deg+1.0 Ice+1.0 Temp			,			
Dead+Wind 0 deg - Service	44.05	0.00	-6.82	-880.98	-1.39	0.26
Dead+Wind 30 deg - Service	44.05	3.42	-5.91	-762.93	-442.87	0.54
Dead+Wind 60 deg - Service	44.05	5.92	-3.41	-440.37	-766.06	0.68
Dead+Wind 90 deg - Service	44.05	6.83	0.00	0.26	-884.34	0.63
Dead+Wind 120 deg - Service	44.05	5.92	3.41	440.89	-766.06	0.42
Dead+Wind 150 deg - Service	44.05	3.42	5.91	763.45	-442.87	0.09

Centek Engineering Inc. 63-2 North Branford Rd.

Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

Job	Page
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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Load	Vertical	$Shear_x$	$Shear_z$	Overturning	Overturning	Torque
Combination				Moment, M_x	Moment, M_z	
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 180 deg - Service	44.05	0.00	6.82	881.50	-1.39	-0.26
Dead+Wind 210 deg - Service	44.05	-3.42	5.91	763.45	440.10	-0.54
Dead+Wind 240 deg - Service	44.05	-5.92	3.41	440.89	763.29	-0.68
Dead+Wind 270 deg - Service	44.05	-6.83	0.00	0.26	881.57	-0.63
Dead+Wind 300 deg - Service	44.05	-5.92	-3.41	-440.37	763.29	-0.42
Dead+Wind 330 deg - Service	44.05	-3.42	-5.91	-762.93	440.10	-0.09

Solution Summary

5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	PX K 0.00 0.00 0.00 16.88 16.88 29.23 29.23 33.76 33.76 29.23 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	PY K -44.05 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65	PZ K 0.00 -33.71 -33.71 -29.19 -29.19 -16.85 -16.85 0.00 0.00 16.85 16.85 29.19	PX K 0.00 -0.00 -0.00 -16.88 -16.88 -29.23 -29.23 -33.76 -33.76 -29.23	PY K 44.05 52.86 39.65 52.86 39.65 52.86 39.65 52.86 39.65 52.86	PZ K 0.00 33.71 33.71 29.19 29.19 16.85 16.85 -0.00 -0.00	% Error 0.000% 0.000% 0.000% 0.000% 0.000% 0.000% 0.000% 0.000%
1 2 3 4 4 5 6 6 7 8 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	0.00 0.00 0.00 16.88 16.88 29.23 29.23 33.76 33.76 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-44.05 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65	0.00 -33.71 -33.71 -29.19 -29.19 -16.85 -16.85 0.00 0.00 16.85 16.85	0.00 -0.00 -0.00 -16.88 -16.88 -29.23 -29.23 -33.76 -33.76 -29.23	44.05 52.86 39.65 52.86 39.65 52.86 39.65 52.86 39.65	0.00 33.71 33.71 29.19 29.19 16.85 16.85 -0.00	0.000% 0.000% 0.000% 0.000% 0.000% 0.000%
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	0.00 0.00 16.88 16.88 29.23 29.23 33.76 33.76 29.23 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65	-33.71 -33.71 -29.19 -29.19 -16.85 -16.85 0.00 0.00 16.85 16.85	-0.00 -0.00 -16.88 -16.88 -29.23 -29.23 -33.76 -33.76 -29.23	52.86 39.65 52.86 39.65 52.86 39.65 52.86 39.65	33.71 33.71 29.19 29.19 16.85 16.85 -0.00	0.000% 0.000% 0.000% 0.000% 0.000% 0.000%
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	0.00 16.88 16.88 29.23 29.23 33.76 33.76 29.23 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65	-33.71 -29.19 -29.19 -16.85 -16.85 0.00 0.00 16.85 16.85	-0.00 -16.88 -16.88 -29.23 -29.23 -33.76 -33.76 -29.23	39.65 52.86 39.65 52.86 39.65 52.86 39.65	33.71 29.19 29.19 16.85 16.85 -0.00	0.000% 0.000% 0.000% 0.000% 0.000%
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	16.88 16.88 29.23 29.23 33.76 33.76 29.23 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65	-29.19 -29.19 -16.85 -16.85 0.00 0.00 16.85 16.85	-16.88 -16.88 -29.23 -29.23 -33.76 -33.76 -29.23	52.86 39.65 52.86 39.65 52.86 39.65	29.19 29.19 16.85 16.85 -0.00	0.000% 0.000% 0.000% 0.000%
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	16.88 29.23 29.23 33.76 33.76 29.23 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65	-29.19 -16.85 -16.85 0.00 0.00 16.85 16.85	-16.88 -29.23 -29.23 -33.76 -33.76 -29.23	39.65 52.86 39.65 52.86 39.65	29.19 16.85 16.85 -0.00	0.000% 0.000% 0.000% 0.000%
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	29.23 29.23 33.76 33.76 29.23 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-52.86 -39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65	-16.85 -16.85 0.00 0.00 16.85 16.85	-29.23 -29.23 -33.76 -33.76 -29.23	52.86 39.65 52.86 39.65	16.85 16.85 -0.00	0.000% 0.000% 0.000%
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	29.23 33.76 33.76 29.23 29.23 16.88 0.00 0.00 -16.88 -16.88	-39.65 -52.86 -39.65 -52.86 -39.65 -52.86 -39.65	-16.85 0.00 0.00 16.85 16.85	-29.23 -33.76 -33.76 -29.23	39.65 52.86 39.65	16.85 -0.00	0.000% 0.000%
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	33.76 33.76 29.23 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-52.86 -39.65 -52.86 -39.65 -52.86 -39.65	0.00 0.00 16.85 16.85	-33.76 -33.76 -29.23	52.86 39.65	-0.00	0.000%
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	33.76 29.23 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-39.65 -52.86 -39.65 -52.86 -39.65	0.00 16.85 16.85	-33.76 -29.23	39.65		
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	29.23 29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-52.86 -39.65 -52.86 -39.65	16.85 16.85	-29.23		-0.00	0.000%
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	29.23 16.88 16.88 0.00 0.00 -16.88 -16.88	-39.65 -52.86 -39.65	16.85				0.000/0
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	16.88 16.88 0.00 0.00 -16.88 -16.88	-52.86 -39.65			32.80	-16.85	0.000%
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	16.88 0.00 0.00 -16.88 -16.88	-39.65	20.10	-29.23	39.65	-16.85	0.000%
14 15 16 17 18 19 20 21 22 23 24 25 26 27	0.00 0.00 -16.88 -16.88		∠7.19	-16.88	52.86	-29.19	0.000%
14 15 16 17 18 19 20 21 22 23 24 25 26 27	0.00 -16.88 -16.88		29.19	-16.88	39.65	-29.19	0.000%
16 17 18 19 20 21 22 23 24 25 26 27	-16.88 -16.88	-52.86	33.71	-0.00	52.86	-33.71	0.000%
17 18 19 20 21 22 23 24 25 26 27	-16.88	-39.65	33.71	-0.00	39.65	-33.71	0.000%
17 18 19 20 21 22 23 24 25 26 27	-16.88	-52.86	29.19	16.88	52.86	-29.19	0.000%
18 19 20 21 22 23 24 25 26 27		-39.65	29.19	16.88	39.65	-29.19	0.000%
19 20 21 22 23 24 25 26 27	-29.23	-52.86	16.85	29.23	52.86	-16.85	0.000%
20 21 22 23 24 25 26 27	-29.23	-39.65	16.85	29.23	39.65	-16.85	0.000%
21 22 23 24 25 26 27	-33.76	-52.86	0.00	33.76	52.86	-0.00	0.000%
22 23 24 25 26 27	-33.76	-39.65	0.00	33.76	39.65	-0.00	0.000%
23 24 25 26 27	-29.23	-52.86	-16.85	29.23	52.86	16.85	0.000%
24 25 26 27	-29.23	-39.65	-16.85	29.23	39.65	16.85	0.000%
25 26 27	-16.88	-52.86	-29.19	16.88	52.86	29.19	0.000%
26 27	-16.88	-39.65	-29.19	16.88	39.65	29.19	0.000%
27	0.00	-106.48	0.00	-0.00	106.48	-0.00	0.000%
	0.00	-106.48	-10.55	-0.00	106.48	10.55	0.000%
2.8	5.28	-106.48	-9.13	-5.28	106.48	9.13	0.000%
29	9.14	-106.48	-5.27	-9.14	106.48	5.27	0.000%
30	10.56	-106.48	0.00	-10.56	106.48	-0.00	0.000%
31	9.14	-106.48	5.27	-9.14	106.48	-5.27	0.000%
32	5.28	-106.48	9.13	-5.28	106.48	-9.13	0.000%
33	0.00	-106.48	10.55	-0.00	106.48	-10.55	0.000%
34	-5.28	-106.48	9.13	5.28	106.48	-9.13	0.000%
35	-9.14	-106.48	5.27	9.14	106.48	-5.27	0.000%
	-10.56	-106.48	0.00	10.56	106.48	-0.00	0.000%
37	-9.14	-106.48	-5.27	9.14	106.48	5.27	0.000%
38	-5.28	-106.48	-9.13	5.28	106.48	9.13	0.000%
39	0.00	-44.05	-6.82	-0.00	44.05	6.82	0.000%
40	3.42	-44.05 -44.05	-0.82 -5.91	-3.42	44.05	5.91	0.000%
40	5.42	-44.05 -44.05	-3.41	-5.42 -5.92	44.05	3.41	0.000%
41 42	6.83	-44.05 -44.05	0.00	-5.92 -6.83	44.05 44.05	-0.00	0.000%
42	5.92	-44.05 -44.05	3.41	-6.83 -5.92	44.05	-0.00 -3.41	0.000%
43 44		-44.05	5.41 5.91	-3.42	44.05	-5.41 -5.91	0.000%
44	3.42	-44.05	6.82	-0.00	44.05	-5.91 -6.82	0.000%
45 46	3.42 0.00	-44.05 -44.05	6.82 5.91	-0.00 3.42	44.05 44.05	-6.82 -5.91	0.000%

Centek Engineering Inc. 63-2 North Branford Rd.

Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

Job	Page
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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Sum of Applied Forces							
Load	PX	PY	PZ	PX	PY	PZ	% Error
Comb.	K	K	K	K	K	K	
47	-5.92	-44.05	3.41	5.92	44.05	-3.41	0.000%
48	-6.83	-44.05	0.00	6.83	44.05	-0.00	0.000%
49	-5.92	-44.05	-3.41	5.92	44.05	3.41	0.000%
50	-3.42	-44.05	-5.91	3.42	44.05	5.91	0.000%

Non-Linear Convergence Results

Load	Converged?	Number	Displacement	Force
Combination		of Cycles	Tolerance	Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00012724
3	Yes	5	0.00000001	0.00005724
4	Yes	6	0.00000001	0.00054578
5	Yes	6	0.00000001	0.00016018
6	Yes	6	0.00000001	0.00052024
7	Yes	6	0.00000001	0.00015099
8	Yes	5	0.00000001	0.00030513
9	Yes	5	0.00000001	0.00013841
10	Yes	6	0.00000001	0.00054397
11	Yes	6	0.00000001	0.00015941
12	Yes	6	0.00000001	0.00053214
13	Yes	6	0.00000001	0.00015523
14	Yes	5	0.00000001	0.00012725
15	Yes	5	0.00000001	0.00005724
16	Yes	6	0.00000001	0.00052287
17	Yes	6	0.00000001	0.00015200
18	Yes	6	0.00000001	0.00054911
19	Yes	6	0.00000001	0.00016137
20	Yes	5	0.00000001	0.00030512
21	Yes	5	0.00000001	0.00013844
22	Yes	6	0.00000001	0.00052482
23	Yes	6	0.00000001	0.00015274
24	Yes	6	0.00000001	0.00053594
25	Yes	6	0.00000001	0.00015674
26	Yes	4	0.00000001	0.00013583
27	Yes	6	0.00010394	0.00060215
28	Yes	7	0.00000001	0.00034648
29	Yes	7	0.00000001	0.00032798
30	Yes	6	0.00010386	0.00063709
31	Yes	7	0.00000001	0.00036057
32	Yes	7	0.00000001	0.00034399
33	Yes	6	0.00010393	0.00061263
34	Yes	7	0.00000001	0.00033339
35	Yes	7	0.00000001	0.00035350
36	Yes	6	0.00010400	0.00062817
37	Yes	7	0.00000001	0.00032186
38	Yes	7	0.00000001	0.00033619
39	Yes	4	0.00000001	0.00018766
40	Yes	5	0.0000001	0.00009567
41	Yes	5	0.00000001	0.00008276
42	Yes	4	0.00000001	0.00027295
43	Yes	5	0.00000001	0.00009480
44	Yes	5	0.00000001	0.00008839
45	Yes	4	0.00000001	0.00018823
46	Yes	5	0.00000001	0.00008351
47	Yes	5	0.00000001	0.00009741

Centek Engineering Inc. 63-2 North Branford Rd.

Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

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Project	Date
180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

48	Yes	4	0.00000001	0.00027165
49	Yes	5	0.00000001	0.00008418
50	Yes	5	0.00000001	0.00008956

Maximum Tower Deflections - Service Wind

Section	Elevation	Horz.	Gov.	Tilt	Twist
No.		Deflection	Load		
	ft	in	Comb.	٥	۰
L1	179 - 139.5	36.024	42	1.9083	0.0033
L2	143.5 - 93.4	22.776	42	1.5431	0.0031
L3	98.6 - 46.31	10.526	42	1.0366	0.0017
L4	52.7 - 0	2.958	42	0.5207	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov.	Deflection	Tilt	Twist	Radius of
		Load				Curvature
ft		Comb.	in	0	0	ft
191.00	20' x 2" Dia Omni	42	36.024	1.9083	0.0033	26953
179.00	AIR21 B2A/B4P	42	36.024	1.9083	0.0033	26953
177.00	EEI 14-ft Platform w/ Rails	42	35.241	1.8882	0.0033	26953
170.00	(2) RRUS-11	42	32.508	1.8176	0.0033	14974
168.00	EEI 14-ft Low Profile Platform	42	31.733	1.7973	0.0033	12251
160.00	APL866513-42T0	42	28.680	1.7158	0.0032	7092
158.00	EEI 14-ft Low Profile Platform	42	27.932	1.6953	0.0032	6416
138.50	20' 4-Bay Dipole	42	21.137	1.4890	0.0030	3946
132.50	8' x 2" Omni	42	19.270	1.4230	0.0028	4145
112.50	10' Dipole	42	13.769	1.1969	0.0022	4984

Maximum Tower Deflections - Design Wind

Section	Elevation	Horz.	Gov.	Tilt	Twist
No.		Deflection	Load		
	ft	in	Comb.	0	0
L1	179 - 139.5	178.943	8	9.4949	0.0158
L2	143.5 - 93.4	113.265	8	7.6827	0.0149
L3	98.6 - 46.31	52.387	8	5.1632	0.0085
L4	52.7 - 0	14.724	8	2.5933	0.0031

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov.	Deflection	Tilt	Twist	Radius of
		Load				Curvature
ft		Comb.	in	٥	0	ft
191.00	20' x 2" Dia Omni	8	178.943	9.4949	0.0158	5686
179.00	AIR21 B2A/B4P	8	178.943	9.4949	0.0158	5686

Centek Engineering Inc. 63-2 North Branford Rd.

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Client T-Mobile	Designed by TJL

Elevation	Appurtenance	Gov. Load	Deflection	Tilt	Twist	Radius of Curvature
ft		Comb.	in	0	0	ft
177.00	EEI 14-ft Platform w/ Rails	8	175.059	9.3950	0.0158	5686
170.00	(2) RRUS-11	8	161.516	9.0449	0.0158	3158
168.00	EEI 14-ft Low Profile Platform	8	157.676	8.9445	0.0158	2583
160.00	APL866513-42T0	8	142.542	8.5401	0.0157	1492
158.00	EEI 14-ft Low Profile Platform	8	138.833	8.4381	0.0156	1349
138.50	20' 4-Bay Dipole	8	105.128	7.4140	0.0145	822
132.50	8' x 2" Omni	8	95.857	7.0861	0.0138	861
112.50	10' Dipole	8	68.521	5.9611	0.0107	1023

Compression Checks

		Pole Design Data							
Section	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio
No.	ft		ft	ft		in^2	K	K	P_u
L1	179 - 139.5 (1)	TP28.0455x19.5x0.1875	39.50	179.00	224.2	16.0640	-11.08	72.22	$\phi P_n = 0.153$
L2	139.5 - 93.4 (2)	TP37.5377x26.8051x0.375	50.10	179.00	167.8	42.9070	-21.13	344.06	0.155
L3	93.4 - 46.31 (3)	TP47.123x35.6737x0.375	52.29	179.00	133.4	53.9765	-34.45	684.96	0.050
L4	46.31 - 0 (4)	TP56.25x44.9739x0.375	52.70	179.00	108.3	66.5052	-52.83	1281.21	0.041

Pole Bending Design Data								
Section No.	Elevation	Size	M_{ux}	ϕM_{nx}	Ratio M _{ux}	M_{uy}	ϕM_{ny}	Ratio M _{uv}
	ft		kip-ft	kip-ft	$\frac{M_{ux}}{\phi M_{nx}}$	kip-ft	kip-ft	$\frac{M_{uy}}{\phi M_{ny}}$
L1	179 - 139.5 (1)	TP28.0455x19.5x0.1875	487.18	590.06	0.826	0.00	590.06	0.000
L2	139.5 - 93.4 (2)	TP37.5377x26.8051x0.375	1477.53	2357.09	0.627	0.00	2357.09	0.000
L3	93.4 - 46.31 (3)	TP47.123x35.6737x0.375	2722.41	3542.45	0.769	0.00	3542.45	0.000
L4	46.31 - 0 (4)	TP56.25x44.9739x0.375	4399.48	4986.09	0.882	0.00	4986.09	0.000
L4	40.51 - 0 (4)	11 30.23844.973980.373	4377.40	4700.09	0.002	0.00	4700.09	0.000

Pole Shear Design Data								
Section No.	Elevation	Size	$Actual \ V_u$	ϕV_n	$Ratio$ V_u	Actual T_u	ϕT_n	Ratio T _u
	ft		K	K	ϕV_n	kip-ft	kip-ft	ϕT_n
L1	179 - 139.5 (1)	TP28.0455x19.5x0.1875	19.24	531.05	0.036	0.03	1182.80	0.000
L2	139.5 - 93.4 (2)	TP37.5377x26.8051x0.375	24.67	1593.89	0.015	3.08	4727.34	0.001
L3	93.4 - 46.31 (3)	TP47.123x35.6737x0.375	29.46	1900.17	0.016	3.06	7102.42	0.000
L4	46.31 - 0 (4)	TP56.25x44.9739x0.375	33.81	2167.33	0.016	3.06	9994.50	0.000

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180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	09:39:39 04/24/19
Client T-Mobile	Designed by TJL

Pole Interaction Design Data

Section No.	Elevation	Ratio P_u	Ratio M_{ux}	Ratio M_{uy}	$Ratio$ V_u	Ratio T_u	Comb. Stress	Allow. Stress	Criteria
	ft	ϕP_n	ϕM_{nx}	ϕM_{ny}	ϕV_n	ϕT_n	Ratio	Ratio	
L1	179 - 139.5 (1)	0.153	0.826	0.000	0.036	0.000	0.980	1.000	4.8.2
L2	139.5 - 93.4 (2)	0.061	0.627	0.000	0.015	0.001	0.689	1.000	4.8.2
L3	93.4 - 46.31 (3)	0.050	0.769	0.000	0.016	0.000	0.819	1.000	4.8.2
L4	46.31 - 0 (4)	0.041	0.882	0.000	0.016	0.000	0.924	1.000	4.8.2

Section Capacity Table

Section	Elevation	Component	Size	Critical	P	ϕP_{allow}	%	Pass
No.	ft	Type		Element	K	K	Capacity	Fail
L1	179 - 139.5	Pole	TP28.0455x19.5x0.1875	1	-11.08	72.22	98.0	Pass
L2	139.5 - 93.4	Pole	TP37.5377x26.8051x0.375	2	-21.13	344.06	68.9	Pass
L3	93.4 - 46.31	Pole	TP47.123x35.6737x0.375	3	-34.45	684.96	81.9	Pass
L4	46.31 - 0	Pole	TP56.25x44.9739x0.375	4	-52.83	1281.21	92.4	Pass
							Summary	
						Pole (L1)	98.0	Pass
						RATING =	98.0	Pass

 $Program\ Version\ 8.0.5.0-11/28/2018\ File: J:/Jobs/1902700. WI/15_CTHA539A/05_Structural/Tower\ Analysis/Backup\ Documentation/Calcs/ERI\ Files/180'\ EEI\ Monopole\ Burlington,\ CT.eri$



Subject:

Location:

Rev. 0: 4/24/19

Anchor Bolt and Baseplate Analysis

180-FT Monopole Burlington, CT

Prepared by: T.J.L. Checked by: C.A.G.

Job No. 19027.15

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment = M_{LL} := 4399·ft·kips (Input From tnxTower)

Shear Force = Shear := 34-kips (Input From tnxTower)

Axial Force = $R_{II} := 53 \cdot \text{kips}$ (Input From tnxTower)

Anchor Bolt Data:

ASTMA615 Grade 75

Number of Anchor Bolts = N := 18 (User Input)

Bolt Ultimate Strength = F_{u} := 100·ksi (User Input)

Bolt Yield Strength = $F_V := 75 \cdot ksi$ (User Input)

Bolt Modulus = E := 29000·ksi (User Input)

Diameter of Anchor Bol $ts = D := 2.25 \cdot in$ (User Input)

Threads per Inch = n := 4.5

Top of Concrete to Bot Leveling Nut = $I_{ar} := 2 \cdot in$ (User Input)

Anchor Rod Force Correction Factor = $n_c = 1$ Table 2-1 Adderdum 3

Base Plate Data:

ASTMA572 Grade 60

 $Plate Yield Strength = F_{Vf} := 60 \cdot ksi$ (User Input)

Base Plate Thickness = $t_{TP} := 2 \cdot in$ (User Input)

Base Plate Diameter = $D_{OD} := 71 \cdot in$ (User Input)

Outer Pole Diameter = $D_T := 56.25 \cdot in$ (User Input)

Pole Wall Thickness = $t_T := 0.375 \cdot in$ (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

(User Input)



Branford, CT 06405

F: (203) 488-8587

Subject:

Location:

Rev. 0: 4/24/19

Anchor Bolt and Baseplate Analysis

180-FT Monopole Burlington, CT

Prepared by: T.J.L. Checked by: C.A.G.

Job No. 19027.15

Anchor Bolt Analysis:

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

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

$$d_{rt} \coloneqq D - \frac{0.9743 \cdot in}{n} = 2.033 \cdot in$$

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

$$P_{u} := \frac{n_{C} \cdot \pi \cdot M_{u}}{N \cdot D_{RC}} + \frac{R_{u}}{N} = 144.7 \cdot \text{kips}$$

$$V_{u} := \frac{Shear}{N} = 1.9 \cdot kips$$

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

$$\frac{\left(P_{u} + \frac{V_{u}}{\eta}\right)}{\Phi R_{nt}} \cdot 100 = 57.1$$

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

Condition1 = "OK"

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

$$\Phi R_{nm} := 0.9 \cdot F_{V} \cdot Z = 94.597 \cdot in \cdot k$$

$$\label{eq:Mu} \mathsf{M}_u \! := \left[\begin{array}{ll} 0 \quad \text{if} \quad \mathsf{I}_{ar} < \mathsf{D} & = 0 \cdot \text{in} \cdot \mathsf{k} \\ \\ 0.65 \cdot \mathsf{I}_{ar'} \cdot \mathsf{V}_u \quad \text{otherwise} \end{array} \right.$$

$$\left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \right] \cdot 100 = 31$$

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

Condition2 = "OK"



Branford, CT 06405

Subject:

Location:

Anchor Bolt and Baseplate Analysis

180-FT Monopole

Burlington, CT

Prepared by: T.J.L. Checked by: C.A.G. Job No. 19027.15

Rev. 0: 4/24/19

Base Plate Analysis:

Strength Resistance Factor for Yieldingdue to Bending =

Strength Resistance Factor for Yieldingdue to Shear =

Outside Fillet Horizontal Leg Dimension =

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Effective Pole Outside Diameter =

Effective Base Plate Outside Diameter =

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Anch or

Rods =

Angle Defining Limiting Effective Base Plate Width Based on Plate Thickness =

Angle Defining Limiting Effective Base Plate Width Based on Distance Between Anchor Rod Bolt Circle and Effective Pole Outside Diameter =

Governing Angle Defining Effective Base Plate Width Resisting Bending =

Effective Moment Arm of Anchor Rod Force =

Effective Base Plate Width Resisting Bending from Transverse Bend Line =

Effective Base Plate Width Resisting Bending from Radial Bend Lines =

Total Effective Base Plate Width Resisting Bending =

Required Base Plate Thickness =

Plate Bending Stress % of Capacity =

Condition2 =

Required Base Plate Thickness =

Plate Bending Stress % of Capacity =

Condition2 =

 $\phi_b = 0.9$

 $\phi_{V} := 1.0$

 $w_1 := 0.25 \cdot in$

 $D_{\Delta} := D_T + w_1 = 56.5 \cdot in$

$$\begin{split} D_{oe} \coloneqq & \begin{bmatrix} D_{OD} & \text{if} & D_{OD} \leq \left(D_{BC} + 6 \cdot t_{TP}\right) & = 71 \cdot \text{in} \\ \\ \left(D_{BC} + 6 \cdot t_{TP}\right) & \text{otherwise} \end{bmatrix} \end{split}$$

 $\theta_1 := \frac{\pi}{N} = 0.175$

 $\theta_2 := asin \left(\frac{12 \cdot t_{TP}}{D_{BC}} \right) = 0.378$

 $\theta_3 := a\cos\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.364$

 $\theta := min(\theta_1, \theta_2, \theta_3) = 0.175$

 $x := 0.5 \cdot (D_{BC} - D_{e}) = 4.25 \cdot in$

 $B_{et} := D_{BC} \cdot sin(\theta) = 11.287 \cdot in$

 $B_{er} := (D_{oe} - D_{e}) \cdot sin(\theta) = 2.518 \cdot in$

 $B_{eff} := B_{et} + B_{er} = 13.805 \cdot in$

 $t_{TP.Req} := \sqrt{\frac{4 \cdot P_u \cdot x}{\phi_h \cdot F_{vf} B_{eff}}} = 1.816 \cdot in$

 $\frac{^{t}TP.Req}{^{t}TP} = 90.8 \cdot \%$

 $Condition 3 := if \left(\frac{{}^tTP.Req}{{}^tTP} < 1.00, "Ok" \; , "Overstressed" \right)$

Condition3 = "Ok"

 $t_{TP.Req} \coloneqq \frac{\varphi_b \cdot t_T \cdot F_{yp}}{\varphi_v \cdot 0.6 \cdot F_{vf}} = 0.609 \cdot in$

 $\frac{^{t}TP.Req}{^{t}TP} = 30.5 \cdot \%$

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

Condition4 = "Ok"



Centered on Solutions www.centekeng.com Branford, CT 06405

F: (203) 488-8587

Subject:

Location:

Rev. 0: 4/24/19

CAISSON FOUNDATION

180-ft EEI Monopole Burlington, CT

Prepared by: TJL Checked by: C.A.G.

Job No. 19027.15

Caisson Foundation:

Input Data:

Shear Force = $S := \, 34k$ USER INPUT-FROM tnxTower

Overturning Moment = USER INPUT-FROM tnxTower $M:=\,4399ft\cdot k$

AppliedAxial Load= USER INPUT-FROM tnxTower A1 := 53k

Bending Moment = Mu := 4510ft·k USER INPUT--FROM LPILE

Moment Capacity = USER INPUT-FROM LPILE $Mn := 7497 ft \cdot k$

Foundation Diameter = $d \coloneqq 7.5 ft$ **USER INPUT**

Overall Length of Caisson = **USER INPUT** $L_{c} := 28.0 \text{ft}$

Depth From Top of Caisson to Grade = **USER INPUT** $L_{pag} := 1.0ft$

> n:= 24 Number of Rebar = **USER INPUT**

 $\mathsf{Ar} \coloneqq \mathsf{1.560in}^2$ Area of Rebar = **USER INPUT**

Rebar Yield Strength = fy := 60ksi **USER INPUT**

USER INPUT Concrete Comp Strength = f'c := 4ksi

Check Moment Capacity:

 $FS:=\frac{0.9{\cdot}Mn}{Mu}=1.5$ Factor of Safety =

Factor of Safety Required = $FS_{reqd} := 1.0$

FOSCheck := $if(FS \ge FS_{read}, "OK", "NO GOOD")$

FOSCheck = "OK"

LPILE Plus for Windows, Version 5.0 (5.0.47)

Analysis of Individual Piles and Drilled Shafts Subjected to Lateral Loading Using the p-y Method

> (c) 1985-2010 by Ensoft, Inc. AII Rights Reserved

This program is licensed to:
TJL Centek Engineering
Files Used for Analysis
Path to file locations: J:\Jobs\1902700.WI\15_CTHA539A\05_Structural\Tower Analysis\Backup Documentation\Calcs\Foundation\ Name of input data file: Caisson Analysis.lpd Name of output file: Caisson Analysis.lpo Name of plot output file: Caisson Analysis.lpp Name of runtime file: Caisson Analysis.lpr
Time and Date of Analysis
Date: April 24, 2019 Time: 9:53:02
Problem Title
19027.15 - Burlington
Program Options
Units Used in Computations - US Customary Units: Inches, Pounds
Basic Program Options:

Analysis Type 3:

- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear El

Computation Options:

- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:

- Number of pile increments = 100 - Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-04 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:

- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.

- Printing Increment (spacing of output points) = 8

Pile Structural	Properties and	Geometry	

Pile Length = 336.00 in

Depth of ground surface below top of pile = 12.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Poi nt	Pile	Moment of	Pile	Modulus of
Depth	Di ameter	Inertia	Area	Elasticity
in	in	i n**4	Sq. i n	lbs/Sq.in
0.0000	90.00000000	3220623.	6361.7000	3600000.
336.0000	90.00000000	3220623.	6361.7000	3600000.
	Depth in 0.0000	Depth Diameter in in 0.0000 90.00000000	Depth Diameter Inertia in in in**4 0.0000 90.00000000 3220623.	Depth Diameter Inertia Area in in**4 Sq.in 0.0000 90.00000000 3220623. 6361.7000

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 12.000 in

Distance from top of pile to bottom of layer = 336.000 in

p-y subgrade modulus k for top of soil layer = 90.000 lbs/in**3

p-y subgrade modulus k for bottom of layer = 90.000 lbs/in**3

(Depth of lowest layer extends 0.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth ______

Effective unit weight of soil with depth defined using 2 points

Point	Depth X	Eff. Unit Weight
No.	in	bs/in**3
1	12. 00	0. 07500
2	336. 00	0. 07500

Shear Strength of Soils

Shear strength parameters with depth defined using 2 points

Poi nt No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	12.000	0.00000	34.00		
2	336.000	0.00000	34.00		

Notes:

- Cohesion = uniaxial compressive strength for rock materials. (1)
- (2) Values of E50 are reported for clay strata.
- Default values will be generated for E50 when input values are 0. (3)
- RQD and k_rm are reported only for weak rock strata.

Loadi ng Type
Static loading criteria was used for computation of p-y curves.
Pile-head Loading and Pile-head Fixity Conditions
Number of Loads specified = 2
Load Case Number 1
Pile-head boundary conditions are Shear and Moment (BC Type 1) Shear force at pile head = 34000.000 lbs Bending moment at pile head = 52788000.000 in-lbs Axial load at pile head = 53000.000 lbs
Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.
Load Case Number 2
Pile-head boundary conditions are Shear and Moment (BC Type 1) Shear force at pile head = 14000.000 lbs Bending moment at pile head = 22056000.000 in-lbs Axial load at pile head = 53000.000 lbs
Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.
Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
Number of sections = 1
Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 90.0000 in

Material Properties:

4.000 kip/in**2 Compressive Strength of Concrete 60. ki p/i n**2 Yield Stress of Reinforcement Modulus of Elasticity of Reinforcement = 29000. kip/in**2 Number of Reinforcing Bars 24 Area of Single Bar 1.56000 in**2 Number of Rows of Reinforcing Bars 13 Area of Steel 37.440 in**2 Area of Shaft 6361.725 in**2 Percentage of Steel Reinforcement 0.589 percent Cover Thickness (edge to bar center) 4.000 in

Unfactored Axial Squash Load Capacity = 23748.97 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.560	41.000
2	3. 120	39. 603
3	3. 120	35. 507
4	3. 120	28. 991
5	3. 120	20. 500
6	3. 120	10. 612
7	3. 120	0.000
8	3. 120	-10. 612
9	3. 120	-20. 500
10	3. 120	-28. 991
11	3. 120	-35.507
12	3. 120	-39. 603
13	1. 560	-41.000

Axial Thrust Force = 53000.00 lbs

Bending Max. Steel	Bendi ng	Bendi ng	Maxi mum	Neutral Axis Max	c. Concrete
Moment Stress	Stiffness	Curvature	Strain	Posi ti on	Stress
in-lbs psi	l b-i n2	rad/i n	in/in 	inches	psi
7871395. 810. 10726	1. 259423E+13	6. 250000E-07	0.00003043	48. 69557306	108. 10167

15667996.	1. 253440E+13	0. 00000125	0. 00005867	46. 93414494	206. 70181
1556. 36275	1. 200 1102 110	0.00000120	0.0000007	10. 70 11 117 1	200. 70101
23390755.	1. 247507E+13	0.00000188	0.00008694	46. 36802718	303. 93957
2303. 76148					
31037487.	1. 241499E+13	0.00000250	0. 00011517	46.06913790	399. 53867
3050. 01250					
31037487.	9. 931996E+12	0.00000313	0.00007136	22. 83490196	246. 35066
5724. 33701					
31037487.	8. 276663E+12	0. 00000375	0. 00008393	22. 38083616	288. 58837
6918. 58407	7 0040005 40	0.00000100	0.00000400	04 00404004	000 (0054
31037487.	7. 094283E+12	0. 00000438	0. 00009623	21. 99486896	329. 60951
8120. 65100	/ 2074075 12	0 00000500	0.00010054	21 70000402	270 40225
31037487.	6. 207497E+12	0.00000500	0. 00010854	21. 70800403	370. 40325
9322. 33942 31037487.	5. 517775E+12	0. 00000563	0. 00012087	21. 48722336	410. 96899
10523. 64669	3. 31///3E+12	0.00000303	0.00012067	21.40/22330	410. 90099
31037487.	4. 965998E+12	0.00000625	0.00013320	21. 31271347	451. 30607
11724. 57068	4. 703770L+12	0.00000023	0.00013320	21. 312/134/	431.30007
31037487.	4. 514544E+12	0.00000688	0. 00014556	21. 17186531	491. 41382
12925. 10935	1.0110112112	0.0000000	0. 0001 1000	21. 17 100001	171. 11002
31037487.	4. 138332E+12	0.00000750	0.00015792	21. 05627283	531. 29154
14125. 26066					
31037487.	3.819998E+12	0.00000813	0.00017063	21.00000009	572.01342
15315. 62498					
31037487.	3.547141E+12	0.00000875	0.00018319	20. 93596771	611. 98899
16509. 99819					
31037487.	3. 310665E+12	0. 00000938	0. 00019557	20. 86125210	651. 09081
17709. 59709					
31037487.	3. 103749E+12	0.00001000	0. 00020797	20. 79736188	689. 96473
18908. 76505	0 0011755 10	0.00001070	0.0000000	20 7422001	700 (0004
31037487.	2. 921175E+12	0. 00001063	0. 00022039	20. 74239001	728. 60984
20107. 50108 31037487.	2. 758888E+12	0.00001125	0. 00023282	20. 69486126	767. 02549
21305. 80151	2. /30000E+12	0.00001123	0.00023262	20. 09400120	707.02349
31037487.	2. 613683E+12	0. 00001188	0.00024526	20. 65360889	805. 21096
22503. 66344	2.013003L+12	0.00001100	0.00024320	20.03300007	003. 21070
31037487.	2. 482999E+12	0.00001250	0.00025772	20. 61769679	843. 16540
23701. 08491					
31037487.	2. 364761E+12	0.00001313	0.00027020	20. 58637396	880. 88825
24898. 06141					
31037487.	2. 257272E+12	0.00001375	0.00028269	20. 55902079	918. 37868
26094. 59046					
31037487.	2. 159130E+12	0. 00001438	0. 00029519	20. 53512499	955. 63586
27290. 66977					
31037487.	2. 069166E+12	0. 00001500	0. 00030771	20. 51426008	992. 65897
28486. 29686	0.0/40775.40	0.00004570	0.0000005	00 10/07171	1000 11710
32207454.	2. 061277E+12	0. 00001563	0. 00032025	20. 49607471	1029. 44748
29681. 46615	2 05/0/15:12	0 00001/25	0 00022200	20 4002/040	1044 00022
33425299. 30876. 17729	2. 056941E+12	0. 00001625	0.00033280	20. 48026040	1066. 00033
34641972.	2. 052858E+12	0. 00001688	0. 00034537	20. 46656236	1102. 31684
J 10+1772.	2. 002000L112	5. 55551555	0.00004007	20. 10000200	1102.01004

32070. 42604					
35857469.	2. 048998E+12	0. 00001750	0. 00035796	20. 45476064	1138. 39624
33264. 20897	2. 040770L+12	0.00001730	0.00033770	20. 43470004	1130. 37024
37071781.	2. 045340E+12	0.00001813	0.00037056	20. 44466481	1174. 23769
34457. 52306	2.0.00.02.12	0.0000.010	0.0000,000	20. 11100101	1171120707
38284905.	2. 041862E+12	0. 00001875	0. 00038318	20. 43611124	1209. 84043
35650. 36451		0.0000.070	0.00000.0	201 10011121	0,, 0,10,10
39496826.	2.038546E+12	0.00001938	0.00039581	20. 42895243	1245. 20340
36842. 73236					
40707551.	2.035378E+12	0.00002000	0.00040846	20. 42307034	1280. 32618
38034. 61920					
41917058.	2. 032342E+12	0.00002063	0.00042113	20. 41834697	1315. 20748
39226. 02622					
43125352.	2. 029428E+12	0. 00002125	0.00043381	20. 41469112	1349. 84677
40416. 94660					
44332421.	2. 026625E+12	0. 00002188	0. 00044651	20. 41201428	1384. 24305
41607. 37844					
45538260.	2. 023923E+12	0.00002250	0. 00045923	20. 41024134	1418. 39552
42797. 31753	0.0010105.10	0.0000010	0.00047407	00 40000057	4.50 00040
46742858.	2. 021313E+12	0. 00002313	0. 00047197	20. 40930256	1452. 30319
43986. 76147	0.010700F.10	0 00000075	0.00040470	20 40012005	1405 0/507
47946213. 45175. 70555	2. 018788E+12	0.00002375	0. 00048472	20. 40913895	1485. 96527
49148319.	2. 016341E+12	0. 00002438	0. 00049749	20. 40969685	1519. 38094
46364. 14554	2.010341E+12	0.00002436	0.00049749	20. 40909000	1319. 30094
51548742.	2. 011658E+12	0. 00002563	0.00052308	20. 41278139	1585. 46908
48739. 50183	2. 011030L+12	0.00002303	0.00032300	20. 41270137	1303. 40700
53944067.	2. 007221E+12	0.00002688	0.00054874	20. 41821823	1650. 56016
51112. 80117	2.00,22.12.12	0.0002000	0.00001071	20. 11021020	1000.00010
56334231.	2.002995E+12	0.00002813	0.00057447	20. 42573109	1714. 64664
53484. 01308					
58719189.	1. 998951E+12	0.00002938	0.00060028	20. 43509737	1777. 72124
55853. 10143					
61098850.	1. 995064E+12	0.00003063	0. 00062616	20. 44611856	1839. 77548
58220. 04095					
63412459.	1. 989410E+12	0. 00003188	0. 00065190	20. 45169219	1900. 26682
60000.00000	1 0/01075 10	0.0000010	0.000/7575	00 10011010	4055 44007
65196189.	1. 968187E+12	0. 00003313	0. 00067575	20. 40014818	1955. 11326
60000.00000	1 0441705.10	0 00002420	0.000/0012	20 22012010	2007 00121
66830852.	1. 944170E+12	0. 00003438	0. 00069912	20. 33813819	2007. 80121
60000.00000 68019891.	1. 909330E+12	0. 00003563	0. 00072076	20. 23198977	2055 54215
60000.00000	1. 909330E+12	0.00003363	0.00072076	20. 23190911	2055. 56315
69202490.	1. 876678E+12	0. 00003688	0.00074243	20. 13377801	2102. 55276
60000. 00000	1.070070L+12	0.00003000	0.00074243	20. 13377001	2102. 33270
70382441.	1. 846097E+12	0. 00003813	0.00076414	20. 04313543	2148. 80150
60000.00000		3. 00000010	3. 33373111	_0.0.010010	21.10.00100
71249530.	1. 809512E+12	0.00003938	0.00078449	19. 92355987	2191. 25112
60000.00000					
72050029.	1. 773539E+12	0.00004063	0.00080458	19.80498210	2232. 41755
60000.00000					

72848542.	1. 739667E+12	0. 00004188	0. 00082470	19. 69430342	2272. 94266
60000. 00000 73645063.	1. 707712E+12	0. 00004313	0.00084486	19. 59084526	2312. 82334
60000. 00000 74123403.	1. 670387E+12	0.00004438	0. 00086531	19. 49999884	2352. 59332
60000. 00000 75130149.	1. 646688E+12	0. 00004563	0.00088797	19. 46239963	2395. 97913
60000. 00000 75626406.	1. 613363E+12	0. 00004688	0. 00090612	19. 33052883	2429. 69959
60000. 00000 76121310. 60000. 00000	1. 581742E+12	0. 00004813	0.00092429	19. 20609042	2462. 89755
76614838. 60000.00000	1. 551693E+12	0. 00004938	0.00094250	19. 08852115	2495. 57031
77106998. 60000.00000	1. 523101E+12	0.00005063	0.00096073	18. 97731945	2527. 71572
77597782. 60000.00000	1. 495861E+12	0. 00005188	0.00097899	18. 87202933	2559. 33131
78087181. 60000.00000	1. 469876E+12	0.00005313	0.00099728	18. 77223775	2590. 41458
78575171. 60000.00000	1. 445061E+12	0.00005438	0. 00101559	18. 67756650	2620. 96272
79061745. 60000.00000	1. 421335E+12	0.00005563	0. 00103394	18. 58767495	2650. 97321
79386055. 60000.00000	1. 395799E+12	0.00005688	0. 00105108	18. 48060116	2678. 38190
79672577. 60000.00000	1. 370711E+12	0. 00005813	0. 00106797	18. 37371513	2704. 85757
79958046. 60000.00000	1. 346662E+12	0.00005938	0. 00108488	18. 27172950	2730. 87675
80242459. 60000. 00000	1. 323587E+12	0.00006063	0. 00110182	18. 17434385	2756. 43747
80525845. 60000. 00000	1. 301428E+12	0.00006188	0. 00111878	18. 08128729	2781. 53827
80855231. 60000. 00000	1. 280875E+12	0. 00006313	0. 00113625	18. 00000027	2806. 91513
81665540. 60000. 00000	1. 268591E+12	0.00006438	0. 00115875	18. 00000027	2839. 21336
81665540. 60000. 00000	1. 244427E+12	0.00006563	0. 00117529	17. 90912971	2862. 01540
81708503. 60000. 00000	1. 221809E+12	0.00006688	0. 00119171	17. 81993821	2884. 18148
81978191. 60000. 00000	1. 203350E+12	0. 00006813	0. 00120815	17. 73437306	2905. 91461
82246907. 60000. 00000	1. 185541E+12	0.00006938	0. 00122462	17. 65223578	2927. 21240
82514660. 60000. 00000	1. 168349E+12	0.00007063	0. 00124112	17. 57334933	2948. 07315
82781434. 60000. 00000	1. 151742E+12	0.00007188	0. 00125764	17. 49754474	2968. 49470
83047224.	1. 135689E+12	0.00007313	0. 00127418	17. 42466643	2988. 47509

60000.00000					
83312044.	1. 120162E+12	0. 00007438	0. 00129075	17. 35457227	3008. 01259
60000.00000	1. 120102L+12	0.00007430	0.00127073	17. 33437227	3000.01237
83638070.	1. 087975E+12	0.00007688	0. 00132154	17. 19077781	3042. 90921
60000.00000	11.0077702.12	0.00007000	0.00102101	17.17077701	0012.70721
83922393.	1. 057290E+12	0.00007938	0. 00135195	17. 03246579	3075. 74836
60000.00000		0.0000.700	0.00.00.70	.,, 002,007,	00.0
84203799.	1. 028443E+12	0.00008188	0.00138244	16. 88481823	3107. 09092
60000.00000					
84482249.	1. 001271E+12	0.00008438	0.00141302	16. 74689636	3136. 92404
60000.00000					
84757700.	9. 756282E+11	0.00008688	0.00144368	16. 61786869	3165. 23461
60000.00000					
84757700.	9. 483379E+11	0.00008938	0.00147469	16. 49999902	3192. 25060
60000.00000					
85394048.	9. 294590E+11	0. 00009188	0. 00151556	16. 49588183	3225. 82732
60000.00000					
85645661.	9. 075037E+11	0. 00009438	0. 00154503	16. 37122348	3247. 80396
60000.00000					
85894570.	8. 866536E+11	0. 00009688	0. 00157459	16. 25384733	3268. 35790
60000.00000					
86140761.	8. 668253E+11	0. 00009938	0. 00160423	16. 14321694	3287. 47671
60000.00000	0 4704045 44	0.00040400	0.004/000/	4/ 00004/00	0005 44757
86384207.	8. 479431E+11	0. 00010188	0. 00163396	16. 03884682	3305. 14757
60000.00000	0.0000000.11	0 00010420	0 001//277	15 04020172	3321. 35700
86624831. 60000. 00000	8. 299385E+11	0. 00010438	0. 00166377	15. 94029173	3321.35700
86862662.	8. 127501E+11	0. 00010688	0. 00169367	15. 84716275	3336. 09213
60000.00000	0. 12/301E+11	0.00010000	0.00109307	13. 047 10273	3330. 09213
87097620.	7. 963211E+11	0. 00010938	0. 00172365	15. 75909242	3349. 33896
60000.00000	7. 703211L+11	0.00010730	0.00172303	13. 73707242	3347. 33070
87277284.	7. 801321E+11	0. 00011188	0. 00175256	15. 66534653	3360. 62932
60000.00000	7.0013212111	0.00011100	0.00173230	10. 0000 1000	3300. 02732
87387579.	7. 640444E+11	0.00011438	0.00178006	15. 56335822	3370. 01814
60000.00000					
87495723.	7. 486265E+11	0.00011688	0.00180763	15. 46636418	3378. 15155
60000.00000					
87601687.	7. 338361E+11	0.00011938	0.00183528	15. 37405595	3385. 01865
60000.00000					
87705451.	7. 196345E+11	0.00012188	0.00186300	15. 28615192	3390. 60841
60000.00000					
87806984.	7. 059858E+11	0. 00012438	0. 00189080	15. 20239189	3394. 90958
60000.00000					
87906284.	6. 928574E+11	0. 00012688	0. 00191867	15. 12253985	3397. 91078
60000.00000					
88003305.	6. 802188E+11	0. 00012938	0. 00194662	15. 04637316	3399. 60034
60000.00000	/ /0//705 11	0.00046400	0.00407040	45 00000045	2207 5225
88312438.	6. 696678E+11	0. 00013188	0. 00197813	15. 00000045	3397. 52958
60000.00000	/ /315005 11	0.00010400	0.000015/0	15 00000045	2200 44/2/
88976509.	6. 621508E+11	0. 00013438	0. 00201563	15. 00000045	3388. 11636
60000.00000					

88976509. 60000.00000	6. 500567E+11	0. 00013688	0.00204993	14. 97668937	3384. 09200
88976509. 60000.00000	6. 383965E+11	0. 00013938	0.00207659	14. 89932910	3388. 89417
88976509. 60000.00000	6. 271472E+11	0. 00014188	0. 00210333	14. 82524917	3392. 84893
88976509. 60000.00000	6. 162875E+11	0.00014438	0.00213015	14. 75428864	3395. 94679
88976509. 60000. 00000	6. 057975E+11	0. 00014688	0. 00215705	14. 68629465	3398. 17793
88976509. 60000. 00000	5. 956586E+11	0. 00014938	0. 00218403	14. 62112501	3399. 53236
88976509. 60000. 00000	5. 858536E+11	0. 00015188	0. 00221110	14. 55865100	3399. 99986
88976509. 60000. 00000	5. 763661E+11	0. 00015438	0. 00223840	14. 49973360	3394. 40272
88976509. 60000. 00000	5. 671809E+11	0. 00015688	0. 00226576	14. 44310412	3388. 65819
89002853. 60000.00000	5. 584493E+11	0. 00015938	0. 00229319	14. 38863382	3382. 89755
89069458. 60000. 00000 89135528.	5. 502360E+11	0.00016188	0. 00232068	14. 33623418	3377. 12031
60000. 00000 89201124.	5. 422694E+11 5. 345386E+11	0. 00016438 0. 00016688	0. 00234823 0. 00237585	14. 28580597 14. 23727408	3381. 46900 3386. 04269
60000. 00000 89266187.	5. 270328E+11	0. 00016938	0. 00237363	14. 19055268	3389. 98192
60000. 00000 89330745.	5. 197425E+11	0. 00017188	0. 00243127	14. 14557204	3393. 28011
60000.00000 89394769.	5. 126582E+11	0. 00017438	0. 00245908	14. 10225973	3395. 93027
60000.00000 89521201.	4. 990729E+11	0. 00017938	0. 00251491	14. 02038261	3399. 25834
60000. 00000 89644397.	4. 862069E+11	0. 00018438	0. 00257111	13. 94498572	3397. 40230
60000. 00000 89763040.	4. 739963E+11	0. 00018938	0. 00262781	13. 87622997	3387. 37361
60000.00000 89869805.	4. 623527E+11	0. 00019438	0. 00268407	13. 80872145	3377. 46253
60000.00000 89904318. 60000.00000	4. 509307E+11	0.00019938	0.00273628	13. 72428820	3368. 62144
89938175. 60000.00000	4. 400645E+11	0. 00020438	0. 00278864	13. 64469901	3376. 87750
89971381. 60000.00000	4. 297141E+11	0.00020938	0. 00284114	13. 56961861	3384. 08069
89971381. 60000. 00000	4. 196916E+11	0. 00021438	0.00289406	13. 49999920	3390. 02628
89971381. 60000. 00000	4. 101260E+11	0. 00021938	0. 00296156	13. 49999920	3396. 49644
89971381.	4. 009867E+11	0. 00022438	0. 00302906	13. 49999920	3399. 65731

60000.00000					
89971381.	3. 922458E+11	0.00022938	0.00309656	13. 49999920	3394. 06162
60000.00000					
90175643.	3.847494E+11	0. 00023438	0. 00316188	13. 49069729	3383. 73816
60000.00000	3. 767506E+11	0. 00023938	0. 00321381	10 40500410	2274 05241
90184676. 60000. 00000	3. /0/3U0E+11	0.00023938	0.00321381	13. 42583612	3376. 95341
90193483.	3. 690782E+11	0. 00024438	0. 00326583	13. 36399779	3370. 14487
60000, 00000	3. 070702E111	0.00021100	0.00020000	13. 30377777	3370. 11107
90202055.	3. 617125E+11	0.00024938	0.00331794	13. 30500528	3363. 31219
60000.00000					
90210395.	3. 546355E+11	0.00025438	0.00337014	13. 24869767	3356. 45494
60000.00000					
90218492.	3. 478303E+11	0. 00025938	0. 00342243	13. 19492474	3361. 79378
60000.00000	0 /1001/F.11	0.00027420	0 00247402	10 14054700	22/0 /4222
90226332. 60000.00000	3. 412816E+11	0. 00026438	0. 00347483	13. 14354703	3368. 64223
90231359.	3. 349656E+11	0. 00026938	0. 00352795	13. 09680149	3375. 04404
60000.00000	3. 347030E111	0.00020730	0.00332773	13.07000147	3373. 04404
90231359.	3. 288614E+11	0.00027438	0. 00358418	13.06306466	3381. 55589
60000.00000					
90231359.	3. 229758E+11	0.00027938	0.00364059	13. 03117856	3387. 12537
60000.00000					
90231359.	3. 172971E+11	0. 00028438	0. 00369718	13. 00106540	3391. 72973
60000.00000	0 11014/F.11	0 0000000	0 00275207	10 070/5545	2205 2451/
90231359. 60000. 00000	3. 118146E+11	0. 00028938	0. 00375396	12. 97265545	3395. 34516
90231359.	3. 065184E+11	0. 00029438	0. 00381094	12. 94588163	3397. 94638
60000.00000	J. 003104L+11	0.00027430	0.00301074	12. /4300103	3377. 74030

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 89971.38135 in-kip

Axial Thrust Force = 53000.00 lbs

Bending Max. Steel	Bendi ng	Bendi ng	Maxi mum	Neutral Axis Ma	ax. Concrete
Moment Stress	Stiffness	Curvature	Strain	Position	Stress
in-Ibs psi	l b-i n2	rad/i n	in/in	inches	psi
7871395. 810. 10726	1. 259423E+13	6. 250000E-07	0.00003043	48. 69557306	108. 10167
15667996. 1556. 36275	1. 253440E+13	0. 00000125	0.00005867	46. 93414494	206. 70181
23390755.	1. 247507E+13	0.00000188	0.00008694	46. 36802718	303. 93957

2303. 76148					
31037487.	1. 241499E+13	0.00000250	0.00011517	46.06913790	399. 53867
3050. 01250					
31037487.	9. 931996E+12	0.00000313	0.00007136	22.83490196	246. 35066
5724. 33701					
31037487.	8. 276663E+12	0.00000375	0.00008393	22. 38083616	288. 58837
6918. 58407					
31037487.	7. 094283E+12	0.00000438	0.00009623	21. 99486896	329. 60951
8120. 65100					
31037487.	6. 207497E+12	0.00000500	0.00010854	21. 70800403	370. 40325
9322. 33942					
31037487.	5. 517775E+12	0.00000563	0.00012087	21. 48722336	410. 96899
10523. 64669					
31037487.	4. 965998E+12	0.00000625	0.00013320	21. 31271347	451. 30607
11724. 57068					
31037487.	4. 514544E+12	0.00000688	0. 00014556	21. 17186531	491. 41382
12925. 10935					
31037487.	4. 138332E+12	0. 00000750	0. 00015792	21. 05627283	531. 29154
14125. 26066					
31037487.	3. 819998E+12	0. 00000813	0. 00017063	21. 00000009	572. 01342
15315. 62498	0 5474445 40	0.0000075	0.00040040	00 0050/774	(44 00000
31037487.	3. 547141E+12	0. 00000875	0. 00018319	20. 93596771	611. 98899
16509. 99819	0.040//55.40	0.0000000	0 00040557	00 0/405040	/54 00004
31037487.	3. 310665E+12	0. 00000938	0. 00019557	20. 86125210	651. 09081
17709. 59709	0 100740F.10	0. 00001000	0. 00020797	20 7072/100	/00 0/472
31037487. 18908. 76505	3. 103749E+12	0.00001000	0.00020797	20. 79736188	689. 96473
31037487.	2. 921175E+12	0. 00001063	0. 00022039	20. 74239001	728. 60984
20107. 50108	2. 9211/3E+12	0.00001003	0.00022039	20. /4239001	720.00904
31037487.	2. 758888E+12	0. 00001125	0. 00023282	20. 69486126	767. 02549
21305. 80151	2. 750000L+12	0.00001123	0.00023202	20. 07400120	707.02347
31037487.	2. 613683E+12	0. 00001188	0. 00024526	20. 65360889	805. 21096
22503. 66344	2.0100032112	0.00001100	0.00021020	20.0000007	003. 21070
31037487.	2. 482999E+12	0.00001250	0.00025772	20. 61769679	843. 16540
23701. 08491	_, , , , , , , , , , , , , , , , , , ,	0.0000.200	0.00020772	20.0	0.00.100.10
31037487.	2. 364761E+12	0.00001313	0.00027020	20. 58637396	880. 88825
24898. 06141					
31037487.	2. 257272E+12	0.00001375	0.00028269	20. 55902079	918. 37868
26094. 59046					
31037487.	2. 159130E+12	0.00001438	0.00029519	20. 53512499	955. 63586
27290. 66977					
31037487.	2. 069166E+12	0.00001500	0.00030771	20. 51426008	992. 65897
28486. 29686					
32207454.	2. 061277E+12	0.00001563	0.00032025	20. 49607471	1029. 44748
29681. 46615					
33425299.	2. 056941E+12	0. 00001625	0.00033280	20. 48026040	1066. 00033
30876. 17729					
34641972.	2. 052858E+12	0. 00001688	0. 00034537	20. 46656236	1102. 31684
32070. 42604	0.040000= 10	0.00001==0	0.0000==0:	00 4543:0::	4400 0010:
35857469.	2. 048998E+12	0. 00001750	0. 00035796	20. 45476064	1138. 39624
33264. 20897					

2. 045340E+12	0. 00001813	0.00037056	20. 44466481	1174. 23769
2. 041862E+12	0. 00001875	0.00038318	20. 43611124	1209. 84043
2. 038546E+12	0.00001938	0. 00039581	20. 42895243	1245. 20340
2. 035378E+12	0.00002000	0.00040846	20. 42307034	1280. 32618
2. 032342E+12	0.00002063	0.00042113	20. 41834697	1315. 20748
2. 029428E+12	0.00002125	0.00043381	20. 41469112	1349. 84677
2. 026625E+12	0. 00002188	0. 00044651	20. 41201428	1384. 24305
2. 023923E+12	0.00002250	0. 00045923	20. 41024134	1418. 39552
2. 021313E+12	0.00002313	0. 00047197	20. 40930256	1452. 30319
2. 018788E+12	0. 00002375	0.00048472	20. 40913895	1485. 96527
2. 016341E+12	0.00002438	0.00049749	20. 40969685	1519. 38094
2. 011658E+12	0. 00002563	0.00052308	20. 41278139	1585. 46908
2. 007221E+12	0. 00002688	0.00054874	20. 41821823	1650. 56016
2. 002995E+12	0. 00002813	0.00057447	20. 42573109	1714. 64664
1. 998951E+12	0. 00002938	0. 00060028	20. 43509737	1777. 72124
1. 995064E+12	0.00003063	0. 00062616	20. 44611856	1839. 77548
1. 989410E+12	0. 00003188	0.00065190	20. 45169219	1900. 26682
1. 968187E+12	0. 00003313	0.00067575	20. 40014818	1955. 11326
1. 944170E+12	0. 00003438	0.00069912	20. 33813819	2007. 80121
1. 909330E+12	0. 00003563	0.00072076	20. 23198977	2055. 56315
1. 876678E+12			20. 13377801	2102. 55276
1. 846097E+12	0. 00003813	0. 00076414	20. 04313543	2148. 80150
1. 809512E+12	0. 00003938	0.00078449	19. 92355987	2191. 25112
1. 773539E+12	0. 00004063	0.00080458	19. 80498210	2232. 41755
1. 739667E+12	0. 00004188	0.00082470	19. 69430342	2272. 94266
1. 707712E+12	0. 00004313	0. 00084486	19. 59084526	2312. 82334
	2. 041862E+12 2. 038546E+12 2. 035378E+12 2. 032342E+12 2. 029428E+12 2. 026625E+12 2. 023923E+12 2. 021313E+12 2. 018788E+12 2. 016341E+12 2. 01658E+12 2. 007221E+12 2. 002995E+12 1. 998951E+12 1. 998951E+12 1. 9989410E+12 1. 9989410E+12 1. 968187E+12 1. 944170E+12 1. 944170E+12 1. 909330E+12 1. 876678E+12 1. 846097E+12 1. 809512E+12 1. 773539E+12 1. 773539E+12 1. 739667E+12	2. 041862E+12	2. 041862E+12 0. 00001875 0. 00038318 2. 038546E+12 0. 00001938 0. 00039581 2. 035378E+12 0. 00002000 0. 00040846 2. 032342E+12 0. 00002063 0. 00042113 2. 029428E+12 0. 00002125 0. 00043381 2. 023923E+12 0. 00002250 0. 00045923 2. 021313E+12 0. 00002313 0. 00047197 2. 018788E+12 0. 00002375 0. 00048472 2. 016341E+12 0. 00002438 0. 00049749 2. 007221E+12 0. 00002688 0. 00052308 2. 007221E+12 0. 00002688 0. 00054874 1. 998951E+12 0. 00002813 0. 00057447 1. 998951E+12 0. 00002938 0. 0006028 1. 9989410E+12 0. 00003188 0. 00065190 1. 968187E+12 0. 00003438 0. 00067575 1. 909330E+12 0. 00003438 0. 00072076 1. 876678E+12 0. 00003813 0. 00074243 1. 809512E+12 0. 00003813 0. 00078449 1. 773539E+12 0. 00004188 0. 00078449 1. 739667E+12 0. 000004188 0. 000082470	2. 041862E+12

40000 00000					
60000. 00000 74123403.	1. 670387E+12	0. 00004438	0. 00086531	19. 49999884	2352. 59332
60000. 00000	1.070307L+12	0.00004430	0.00000331	17. 47777004	2332. 37332
75130149.	1. 646688E+12	0.00004563	0.00088797	19. 46239963	2395. 97913
60000.00000	110100002.12	0.00001000	0.00000777	17. 10207700	2070177710
75626406.	1. 613363E+12	0.00004688	0.00090612	19. 33052883	2429, 69959
60000.00000		0.0000.000	0.000700.2	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	/ / . /
76121310.	1.581742E+12	0.00004813	0.00092429	19. 20609042	2462. 89755
60000.00000					
76614838.	1.551693E+12	0.00004938	0.00094250	19. 08852115	2495. 57031
60000.00000					
77106998.	1.523101E+12	0.00005063	0.00096073	18. 97731945	2527. 71572
60000.00000					
77597782.	1. 495861E+12	0. 00005188	0. 00097899	18. 87202933	2559. 33131
60000.00000					
78087181.	1. 469876E+12	0. 00005313	0. 00099728	18. 77223775	2590. 41458
60000.00000					
78575171.	1. 445061E+12	0. 00005438	0. 00101559	18. 67756650	2620. 96272
60000.00000	4 4040055 40	0.00005570	0.00400004	40 507/7405	0/50 07004
79061745.	1. 421335E+12	0. 00005563	0. 00103394	18. 58767495	2650. 97321
60000.00000	1 2057005.12	0.00005700	0. 00105108	10 400/011/	2/70 20100
79386055. 60000. 00000	1. 395799E+12	0. 00005688	0.00105108	18. 48060116	2678. 38190
79672577.	1. 370711E+12	0. 00005813	0. 00106797	18. 37371513	2704. 85757
60000.00000	1. 3/0/11L+12	0.00003613	0.00100797	10. 3/3/1313	2704.03737
79958046.	1. 346662E+12	0.00005938	0. 00108488	18. 27172950	2730. 87675
60000.00000	110100022112	0.00000700	0.00100100	10.27172700	2700.07070
80242459.	1. 323587E+12	0.00006063	0. 00110182	18. 17434385	2756. 43747
60000.00000					
80525845.	1. 301428E+12	0.00006188	0. 00111878	18. 08128729	2781. 53827
60000.00000					
80855231.	1. 280875E+12	0.00006313	0. 00113625	18. 00000027	2806. 91513
60000.00000					
81665540.	1. 268591E+12	0. 00006438	0. 00115875	18. 00000027	2839. 21336
60000.00000					
81665540.	1. 244427E+12	0. 00006563	0. 00117529	17. 90912971	2862. 01540
60000.00000	1 2210005 12	0.0000//00	0 00110171	17 01002021	2004 10140
81708503.	1. 221809E+12	0. 00006688	0. 00119171	17. 81993821	2884. 18148
60000. 00000 81978191.	1. 203350E+12	0. 00006813	0. 00120815	17. 73437306	2905. 91461
60000.00000	1. 203330E+12	0.00000613	0.00120613	17.73437300	2905. 91401
82246907.	1. 185541E+12	0. 00006938	0. 00122462	17. 65223578	2927. 21240
60000.00000	1. 1000+1E+12	0.00000730	0.00122402	17.03223370	2727.21240
82514660.	1. 168349E+12	0.00007063	0. 00124112	17. 57334933	2948. 07315
60000.00000					
82781434.	1. 151742E+12	0.00007188	0.00125764	17. 49754474	2968. 49470
60000.00000					
83047224.	1. 135689E+12	0.00007313	0. 00127418	17. 42466643	2988. 47509
60000.00000					
83312044.	1. 120162E+12	0. 00007438	0. 00129075	17. 35457227	3008. 01259
60000.00000					

83638070. 60000.00000	1. 087975E+12	0. 00007688	0. 00132154	17. 19077781	3042. 90921
83922393.	1. 057290E+12	0. 00007938	0. 00135195	17. 03246579	3075. 74836
60000.00000 84203799.	1. 028443E+12	0. 00008188	0. 00138244	16. 88481823	3107. 09092
60000.00000 84482249.	1. 001271E+12	0. 00008438	0. 00141302	16. 74689636	3136. 92404
60000. 00000 84757700.	9. 756282E+11	0. 00008688	0. 00144368	16. 61786869	3165. 23461
60000. 00000 84757700.	9. 483379E+11	0. 00008938	0. 00147469	16. 49999902	3192. 25060
60000.00000 85394048.	9. 294590E+11	0. 00009188	0. 00151556	16. 49588183	3225. 82732
60000. 00000 85645661.	9. 075037E+11	0. 00009438	0. 00154503	16. 37122348	3247. 80396
60000.00000 85894570.	8. 866536E+11	0.00009688	0. 00157459	16. 25384733	3268. 35790
60000. 00000 86140761.	8. 668253E+11	0.00009938	0. 00160423	16. 14321694	3287. 47671
60000. 00000 86384207.	8. 479431E+11	0. 00007738	0. 00163396	16. 03884682	3305. 14757
60000.00000					
86624831. 60000. 00000	8. 299385E+11	0.00010438	0. 00166377	15. 94029173	3321. 35700
86862662. 60000. 00000	8. 127501E+11	0. 00010688	0. 00169367	15. 84716275	3336. 09213
87097620. 60000. 00000	7. 963211E+11	0. 00010938	0. 00172365	15. 75909242	3349. 33896
87277284. 60000. 00000	7. 801321E+11	0. 00011188	0. 00175256	15. 66534653	3360. 62932
87387579. 60000. 00000	7. 640444E+11	0. 00011438	0. 00178006	15. 56335822	3370. 01814
87495723. 60000. 00000	7. 486265E+11	0. 00011688	0. 00180763	15. 46636418	3378. 15155
87601687. 60000. 00000	7. 338361E+11	0. 00011938	0. 00183528	15. 37405595	3385. 01865
87705451. 60000.00000	7. 196345E+11	0. 00012188	0.00186300	15. 28615192	3390. 60841
87806984. 60000.00000	7. 059858E+11	0. 00012438	0. 00189080	15. 20239189	3394. 90958
87906284. 60000.00000	6. 928574E+11	0. 00012688	0. 00191867	15. 12253985	3397. 91078
88003305. 60000.00000	6. 802188E+11	0.00012938	0. 00194662	15. 04637316	3399. 60034
88312438.	6. 696678E+11	0. 00013188	0. 00197813	15. 00000045	3397. 52958
60000.00000 88976509.	6. 621508E+11	0. 00013438	0. 00201563	15. 00000045	3388. 11636
60000. 00000 88976509.	6. 500567E+11	0.00013688	0.00204993	14. 97668937	3384. 09200
60000. 00000 88976509.	6. 383965E+11	0.00013938	0.00207659	14. 89932910	3388. 89417

60000.00000					
88976509.	6. 271472E+11	0. 00014188	0. 00210333	14. 82524917	3392. 84893
60000.00000	0. 271472L+11	0.00014100	0.00210333	14. 02324717	3372.04073
88976509.	6. 162875E+11	0.00014438	0. 00213015	14. 75428864	3395. 94679
60000.00000	0.1020702.11	0.000.1100	0.002.00.0	11.70120001	0070.71077
88976509.	6. 057975E+11	0. 00014688	0. 00215705	14. 68629465	3398. 17793
60000.00000					
88976509.	5. 956586E+11	0.00014938	0.00218403	14. 62112501	3399. 53236
60000.00000					
88976509.	5.858536E+11	0.00015188	0.00221110	14. 55865100	3399. 99986
60000.00000					
88976509.	5. 763661E+11	0. 00015438	0. 00223840	14. 49973360	3394. 40272
60000.00000					
88976509.	5. 671809E+11	0. 00015688	0. 00226576	14. 44310412	3388. 65819
60000.00000	E E04402E 11	0.00015030	0.00000010	14 200/2202	2202 00755
89002853.	5. 584493E+11	0. 00015938	0. 00229319	14. 38863382	3382. 89755
60000.00000 89069458.	E E00040E.11	0. 00016188	0 00222040	14 22422410	3377. 12031
60000.00000	5. 502360E+11	0.00016188	0. 00232068	14. 33623418	3377. 12031
89135528.	5. 422694E+11	0. 00016438	0. 00234823	14. 28580597	3381. 46900
60000.00000	J. 422074L+11	0.00010430	0.00234023	14. 20300377	3301. 40700
89201124.	5. 345386E+11	0. 00016688	0. 00237585	14. 23727408	3386. 04269
60000.00000					
89266187.	5. 270328E+11	0.00016938	0.00240352	14. 19055268	3389. 98192
60000.00000					
89330745.	5. 197425E+11	0. 00017188	0. 00243127	14. 14557204	3393. 28011
60000.00000					
89394769.	5. 126582E+11	0. 00017438	0. 00245908	14. 10225973	3395. 93027
60000.00000	4 0007005 44	0.00017000	0 00051401	14 000000/4	2200 25024
89521201.	4. 990729E+11	0. 00017938	0. 00251491	14. 02038261	3399. 25834
60000.00000 89644397.	4. 862069E+11	0. 00018438	0. 00257111	13. 94498572	3397. 40230
60000.00000	4.002009E+11	0.00016436	0.00237111	13. 94490372	3397. 40230
89763040.	4. 739963E+11	0. 00018938	0. 00262781	13. 87622997	3387. 37361
60000, 00000	4. 737703L111	0.00010730	0.00202701	13.07022777	3307.37301
89869805.	4. 623527E+11	0.00019438	0. 00268407	13. 80872145	3377. 46253
60000.00000					
89904318.	4.509307E+11	0.00019938	0.00273628	13.72428820	3368. 62144
60000.00000					
89938175.	4. 400645E+11	0.00020438	0. 00278864	13. 64469901	3376. 87750
60000.00000				10 = 10 / 10 / 1	
89971381.	4. 297141E+11	0. 00020938	0. 00284114	13. 56961861	3384. 08069
60000.00000	/ 10/01/F.11	0 00021420	0.0000404	12 4000000	2200 02420
89971381. 60000. 00000	4. 196916E+11	0. 00021438	0. 00289406	13. 49999920	3390. 02628
89971381.	4. 101260E+11	0. 00021938	0. 00296156	13. 49999920	3396. 49644
60000.00000	T. 101200LT11	0.00021730	0.00270130	13. 7//77720	3370.47044
89971381.	4. 009867E+11	0.00022438	0.00302906	13. 49999920	3399. 65731
60000.00000			2. 2.302.00		
89971381.	3. 922458E+11	0.00022938	0.00309656	13. 49999920	3394. 06162
60000.00000					

90175643.	3.847494E+11	0.00023438	0.00316188	13. 49069729	3383. 73816
60000.00000					
90184676.	3. 767506E+11	0. 00023938	0. 00321381	13. 42583612	3376. 95341
60000.00000					
90193483.	3. 690782E+11	0. 00024438	0. 00326583	13. 36399779	3370. 14487
60000.00000					
90202055.	3. 617125E+11	0. 00024938	0. 00331794	13. 30500528	3363. 31219
60000.00000					
90210395.	3. 546355E+11	0. 00025438	0. 00337014	13. 24869767	3356. 45494
60000.00000					
90218492.	3. 478303E+11	0. 00025938	0. 00342243	13. 19492474	3361. 79378
60000.00000					
90226332.	3. 412816E+11	0. 00026438	0. 00347483	13. 14354703	3368. 64223
60000.00000	0.0101515.11				
90231359.	3. 349656E+11	0. 00026938	0. 00352795	13. 09680149	3375. 04404
60000.00000					
90231359.	3. 288614E+11	0. 00027438	0. 00358418	13. 06306466	3381. 55589
60000.00000	0 0007505 44	0.0007000	0.000/4050	40 00447057	0007 40507
90231359.	3. 229758E+11	0. 00027938	0. 00364059	13. 03117856	3387. 12537
60000.00000	0 4700745 44	0.00000400	0.000/0710	10 0010/540	2204 72072
90231359.	3. 172971E+11	0. 00028438	0. 00369718	13. 00106540	3391. 72973
60000.00000	0 11014/F 11	0.0000000	0.00075307	10 070/5545	2205 24547
90231359.	3. 118146E+11	0. 00028938	0. 00375396	12. 97265545	3395. 34516
60000.00000	2 0/51045 44	0.00000400	0.00001004	10 045001/0	2207 04/20
90231359.	3. 065184E+11	0. 00029438	0. 00381094	12. 94588163	3397. 94638
60000.00000					

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 89971.38135 in-kip

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)

Specified shear force at pile head = 34000.000 lbs

Specified moment at pile head = 52788000.000 in-lbs

Specified axial load at pile head = 53000.000 lbs

Depth Es*h	Deflect.	Moment	Shear	SI ope	Total	Flx. Rig.	Soil Res.
X	у	M	V	S	Stress	EI	p
F/L in	in	lbs-in	lbs	Rad.	lbs/in**2	lbs-in**2	lbs/in
0.000	0. 841405	5. 28E+07	34000.	-0. 006566	745. 909	2. 01E+12	0. 000

0.000							
26.880	0. 674447	5. 37E+07	29436.	-0. 005854	758. 496	2. 01E+12	-613. 016
3053. 957							
53. 760	0. 526798	5. 41E+07	-2474. 259	-0. 005131	764. 663	2. 01E+12	-1755. 814
11199.							
80.640	0. 398598	5. 33E+07	-61796.	-0.004410	753. 305	2. 01E+12	-2462. 378
20757.							
107. 520	0. 289525	5.08E+07	-1. 29E+05	-0.003712	717. 540	2. 01E+12	-2488. 988
28885.							
134. 400	0. 198614	4.64F+07	-1. 93E+05	-0.003063	656. 904	2. 02F+12	-2187, 934
37014.			,02,00	0.00000			,
161. 280	0. 124242	4 05F+07	-2. 45E+05	-0 002485	574. 347	2 04F+12	-1669, 222
45142.	0. 12 12 12	1.002107	2. 102100	0.002100	071.017	2.012112	1007. 222
188. 160	0. 064212	3 34F±07	-2. 81E+05	_0_001008	475. 036	2 06F ₊ 12	-1018.039
53271.	0.004212	J. J4L+07	-2.01L+03	-0.001770	475.050	2. 00L+12	-1010.037
215. 040	0. 013242	2 565,07	-2. 99F+05	0 001050	365. 526	1. 25E+13	-241. 985
	0.013242	2.30E+07	-2. 99E+U3	-0.001636	303. 320	1. Z3E+13	-241.900
61399.	0.00/000	1 7/5 07	2 225 25	0 001011	252 750	1 055 10	745 557
	-0. 036030	I. /6E+U/	-2. 92E+05	-0.001811	253. 750	1. 25E+13	745. 557
69528.							
268. 800	-0. 084285	1. 01E+07	-2. 57E+05	-0. 001782	149. 678	1. 26E+13	1947. 993
77656.							
295. 680	-0. 131952	4. 09E+06	-1.86E+05	-0. 001767	65. 452	1. 26E+13	3368. 882
85785.							
322. 560	-0. 179372	5. 08E+05	-73421.	-0. 001763	15. 422	1. 26E+13	5013.524
93913.							

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection = 0.84140455 in

Computed slope at pile head = -0.00656642

Maximum bending moment = 54130224. Ibs-in

Maximum shear force = -299443.50162 Ibs

Depth of maximum bending moment = 53.76000000 in

Depth of maximum shear force = 221.76000 in

Number of iterations = 38

Number of zero deflection points = 1
```

Computed Values of Load Distribution and Deflection

for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)

Specified shear force at pile head = 14000.000 lbs

Specified moment at pile head = 22056000.000 in-lbs

Specified axial load at pile head = 53000.000 lbs

Depth Es*h	Deflect.	Moment	Shear	SI ope	Total	Flx. Rig.	Soil Res.
X F/L	У	М	V	S	Stress	EI	р
in	in	lbs-in		Rad.	lbs/in**2	lbs-in**2	lbs/in
0.000 0.000	0. 236301	2. 21E+07	14000.	-0. 001228	316. 507	1. 25E+13	0.000
26. 880 4499. 712	0. 203923	2. 24E+07	11885.	-0. 001181	321. 644	1. 25E+13	-273. 093
53. 760 12628.	0. 172841	2. 26E+07	-840. 432	-0. 001132	324.068	1. 25E+13	-649. 606
80. 640 20757.	0. 143066	2. 23E+07	-21753.	-0.001084	320. 050	1. 25E+13	-883. 803
107. 520	0. 114579	2. 14E+07	-47153.	-0. 001036	307. 219	1. 25E+13	-985. 012
28885. 134. 400	0. 087327	1. 98E+07	-73586.	-0.000992	284. 546	1. 25E+13	-961. 989
37014. 161. 280	0. 061214	1. 75E+07	-97818.	-0. 000952	252. 256	1. 25E+13	-822. 419
45142. 188. 160	0. 036106	1. 46E+07	-1. 17E+05	-0. 000917	211. 755	1. 25E+13	-572. 438
53271. 215. 040	0. 011835	1. 13E+07	-1. 28E+05	-0. 000890	165. 561	1. 26E+13	-216. 272
	-0. 011789	7. 80E+06	-1. 27E+05	-0. 000869	117. 270	1. 26E+13	243. 944
	-0. 034964	4. 52E+06	-1. 14E+05	-0. 000856	71. 527	1. 26E+13	808. 099
77656. 295. 680 85785.	-0. 057878	1. 84E+06	-83095.	-0. 000850	34. 029	1. 26E+13	1477. 691
	-0. 080681	2. 30E+05	-33167.	-0. 000848	11. 539	1. 26E+13	2255. 057

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection = 0.23630119 in
Computed slope at pile head = -0.00122845

Maximum bending moment = 22597097. Ibs-in
Maximum shear force = -129108.20257 lbs
Depth of maximum bending moment = 53.76000000 in
Depth of maximum shear force = 228.48000 in
Number of iterations = 5
Number of zero deflection points = 1

Summary of Dila Documents

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in Type 2 = Shear and Slope, M = Pile-head Moment lbs-in Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs Type 4 - Deflection and Moment S - Pile-head Slope radians

Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

	Pile- Condi			l e-Head ndi ti on	Axi al Load		Pile-Head Deflection	Maximum Moment	Maximum Shear
<i>31</i> °°	1	1		2	Ibs		in	in-lbs	Ibs
1	V=	34000.	M=	5. 28E+07	53000.000	0	0. 8414046	5. 4130E+07	-299444.
1	V=	14000.	M=	2. 21E+07	53000, 000	0	0. 2363012	2.2597E+07	-129108.

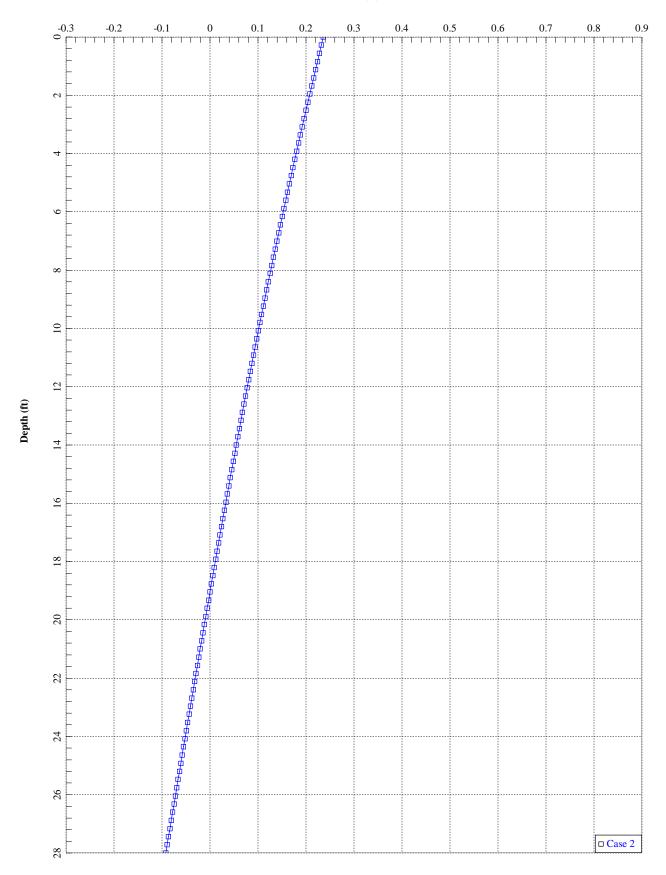
Computed Pile-head Stiffness Matrix Members K22, K23, K32, K33 for Superstructure

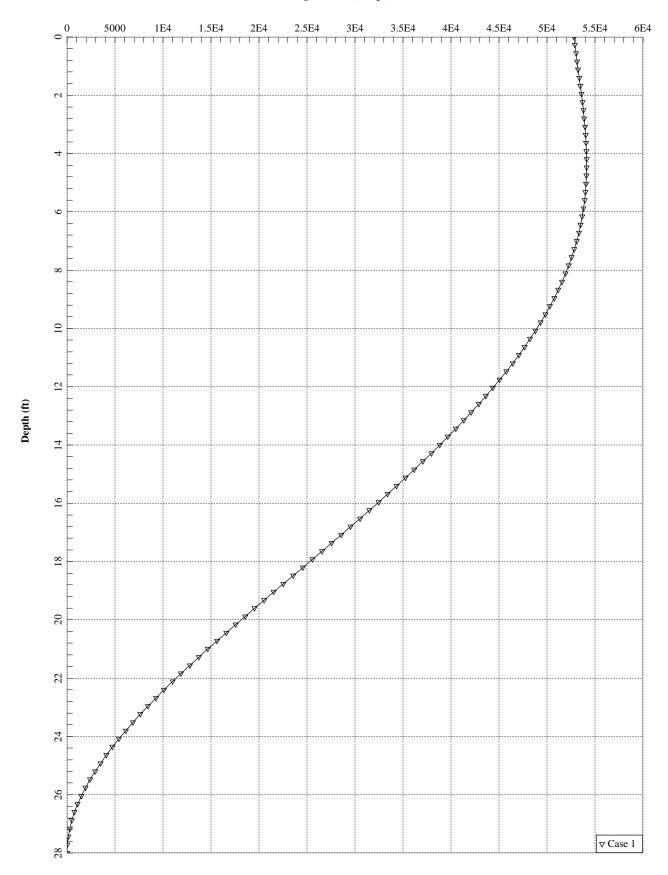
Top y in	Shear React. Ibs	Mom. React. in-1bs	K22 Ibs/in	K32 in-Ibs/in
0.00155937	3400.00005	637038. 93934	2180373.	4. 085243E+08
0.00469416	10235. 01985	1917678.	2180373.	4. 085243E+08
0.00744007	16222. 12266	3039448.	2180373.	4. 085243E+08
0.00938832	20470. 03970	3835357.	2180373.	4. 085243E+08

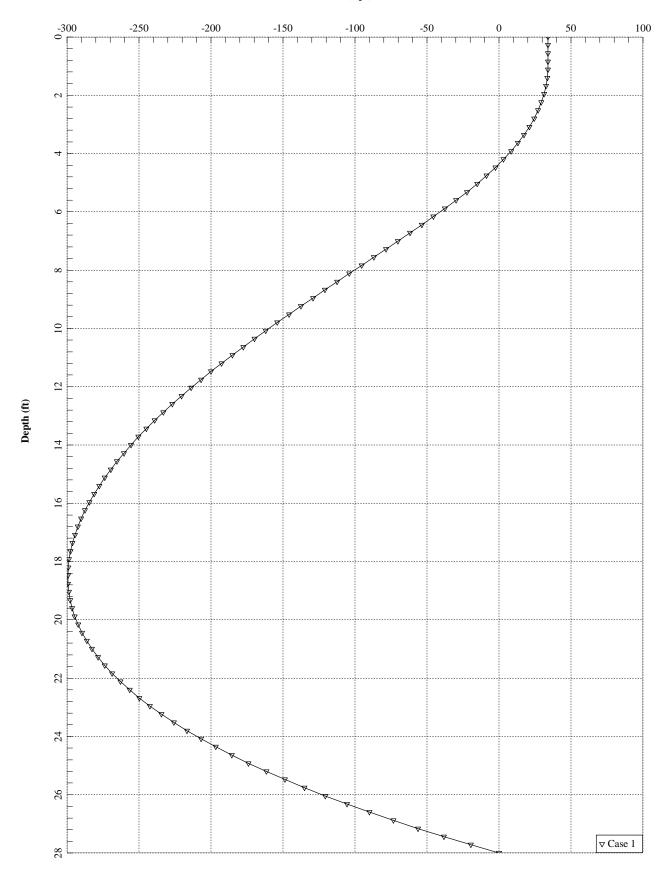
0. 01089950	23764. 98015	4452711.	2180373.	4. 085243E+08
0. 01213423	26457. 14251	4957126.	2180373.	4. 085243E+08
0. 01317817	28733. 33336	5383604.	2180373.	4. 085243E+08
0. 01408248	30705. 05956	5753035.	2180373.	4. 085243E+08
0. 01488014	32444. 24532	6078896.	2180373.	4. 085243E+08
0. 01559366	34000. 00000	6370389.	2180373.	4. 085243E+08
Top Rota. rad	Shear React.	Mom. React.	K23 Ibs/rad	K33 in-lbs/rad
0.00005461	22307. 48338	5278800.	4. 085243E+08	9. 667240E+10
0.00016468	67158. 47564	15890771.	4. 078046E+08	9. 649309E+10
0.00026167	106461. 92159	25186277.	4. 068557E+08	9. 625208E+10
0.00033139	134358. 84033	31781543.	4. 054370E+08	9. 590299E+10
0.00076390	158589. 06185	36897229.	2. 076038E+08	4. 830096E+10
0.00108501	181333. 35338	41077048.	1. 671258E+08	3. 785864E+10
0.00131812	201260. 75844	44611035.	1. 526879E+08	3. 384448E+10
0. 00150412	218772. 53750	47672314.	1. 454493E+08	3. 169458E+10
0. 00166867	234759. 72748	50372554.	1. 406864E+08	3. 018717E+10
0. 00178835	247988. 77006	52788000.	1. 386687E+08	2. 951765E+10

K22 = abs(Shear Reaction/Top y)
K23 = abs(Shear Reaction/Top Rotation)
K32 = abs(Moment Reaction/Top y)
K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.







RAN Template: A&L Template: 67D95ADB_2xAIR+1OP Power System Template: 67D95ADB Custom

CTHA539A_L600_3.1_draft

Section 1 - Site Information

Site ID: CTHA539A Status: Draft

Version: 3.1
Project Type: L600
Approved: Not Approved
Approved By: Not Approved
Last Modified: 4/17/2019 11:7:50 AM Last Modified By: GSM1900\AMurill9

Burlington Fire Department Flagpole Site Class: Monopole

Site Type: Structure Non Building
Plan Year: 2019
Market: CONNECTICUT Vendor: Ericsson Landlord: <undefined>

Latitude: 41.7664000000

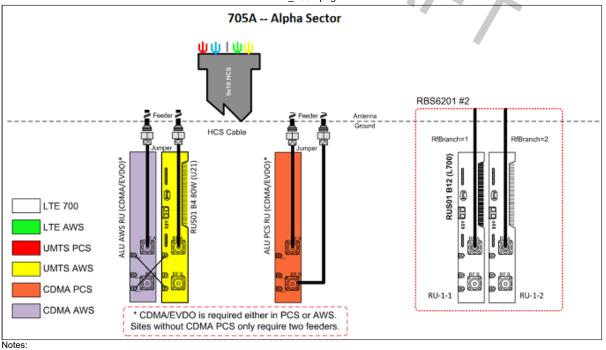
Longitude: -72.9617000000
Address: 719 George Washington Tpke
City, State: Burlington, CT
Region: NORTHEAST

RAN Template: 67D95ADB AL Template: 67D95ADB_2xAIR+1OP

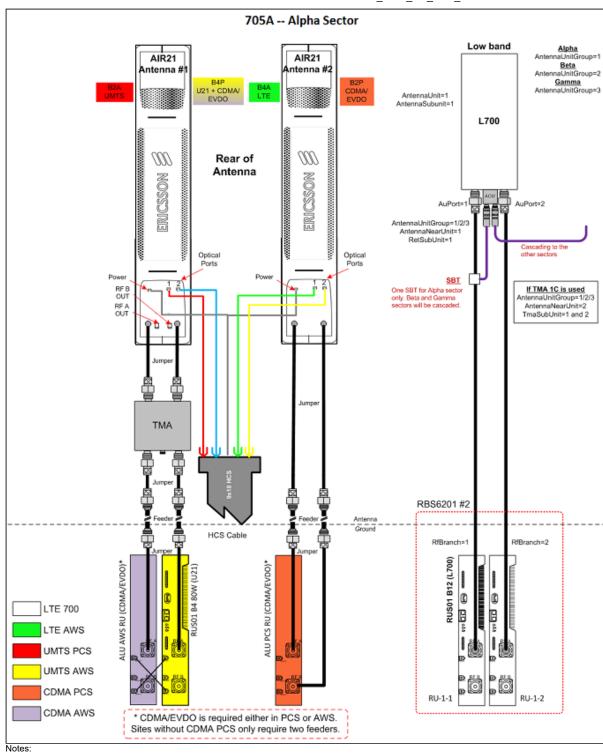
Sector Count: 3 Antenna Count: 9 Coax Line Count: 6 TMA Count: 0 RRU Count: 3

Section 2 - Existing Template Images

RAN_705A.png



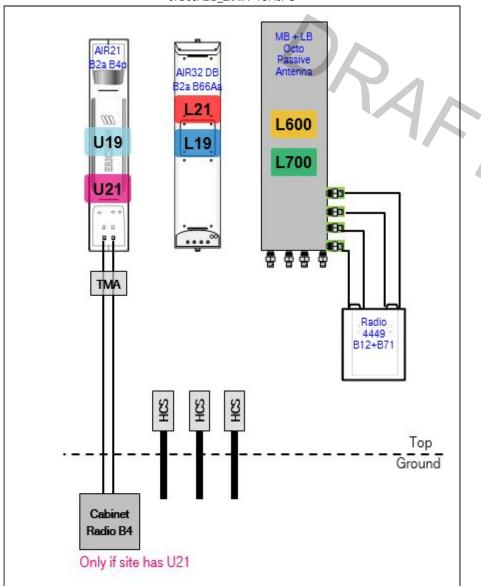
AL_705A.png



Notes:

Section 3 - Proposed Template Images

67D95ADB_2xAIR+1OP.JPG



rfds.eng.t-mobile.com/DataSheet/Printout/11878626

Section 4 - Siteplan Images

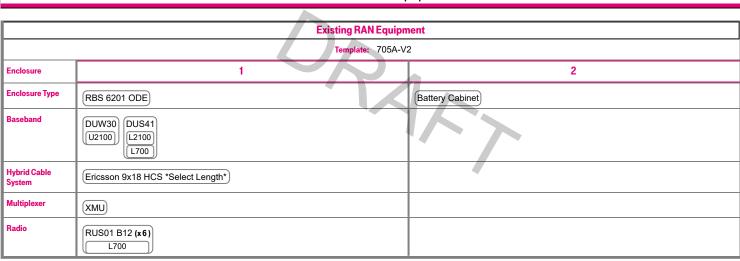
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rfds.eng.t-mobile.com/DataSheet/Printout/11878626

CTHA539A_L600_3.1_draft

Section 5 - RAN Equipment



	Proposed RAN Equipment						
	Template: 67D95ADB						
Enclosure	1						
Enclosure Type	RBS 6102 MU AC						
Baseband	DUW30 BB 6630 BB 6630 L2100 L1900 L700 L600						
Hybrid Cable System	Ericsson 9x18 HCS *Select Length*) Ericsson 6x12 HCS *Select Length & AWG* (x2)) Ericsson 6x12 HCS *Select AWG & Length*)						
RAN Scope of Work:							

Swap RBS 6201 ODE with (1) RBS 6102 MU AC. Carry over the DUW30 to the new cabinet. Remove (6) RUS01 B12 radios. Replace (1) DUS41 with (1) BB6630 for LTE, Add (1) BB6630 for future 5G (N600). Remove (1) XMU.

Add (3) 6x12 HCS. Total will be (4) HCS.

CTHA539A_L600_3.1_draft

Section 6 - A&L Equipment

Existing Template: 1DP_2xAIR_705A
Proposed Template: 67D95ADB_2xAIR+1OP

		S	ector 1 (Existing) view fro	om behind				
Coverage Type	A - Outdoor Macro							
Antenna	1			2	3			
Antenna Model	Ericsson - AIR21 KRC118	023-1_B2P_B4A (Quad)	Ericsson - AIR21 KRC118	3023-1_B2P_B4A (Quad)	(Andrew - LNX-6515DS-A1M (Dual)			
Azimuth	60		60		60			
M. Tilt								
Height	179		179		179			
Ports	P1	P2	Р3	P4	P5			
Active Tech.	U2100		L2100		L700			
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2		2		2			
Cables					1-5/8" Coax (x2)			
TMAs								
Diplexers / Combiners								
Radio								
Sector Equipment								

Unconnected Equipment:

Scope of Work:

Add L7 antenna on new mount. Re-use existing coax if swept clean and not aluminum otherwise replace 2 per sector.

RAN Template: A&L Template: 67D95ADB 67D95ADB_2xAIR+1OP Custom

CTHA539A_L600_3.1_draft

Coverage Type	(A - Outdoo	r Macro)								
Antenna		1				2			3	
Antenna Model	RFS - APX	VAARR24_43-l	J-NA20 (Octo	D)	Ericsson - AIR21 KRC	:118023-1_B2P_B4A (Quad)	Ericsson -	AIR32 KRD90)1146-1_B66A	_B2A (Octo
Azimuth	60				60		60			
M. Tilt										
Height	179				179		179			
Ports	P1	P2	Р3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L700 L600	L700 L600				(U2100)	L2100	L2100	L1900	L1900
Dark Tech.										1
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2				2	2	2	2	2
Cables										
ГМАѕ										
Diplexers / Combiners										
Radio	Radio 4449 B71+B1 2 (At Antenna 1)	SHARED Radio 4449 B71+B1 2 (At Antenna								
Sector Equipment										
Jnconnected Equip	ment:				-				-	
Cable: 1-5/8" C	coax	: 1-5/8" Coax								
Scope of Work:										

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

RAN Template: A&L Template: Power System Template: 67D95ADB 67D95ADB_2xAIR+1OP Custom

CTHA539A_L600_3.1_draft

67D95ÅDB (67D95ADB_2xAIR+1OP	Custom			0111/1000/1_2000_0.1_di
		S	sector 2 (Existing) view fro	om behind	
Coverage Type	A - Outdoor Macro				
Antenna	1	I	-	2	3
Antenna Model	Ericsson - AIR21 KRC118	8023-1_B2P_B4A (Quad)	Ericsson - AIR21 KRC118	3023-1_B2P_B4A (Quad)	(Andrew - LNX-6515DS-A1M (Dual)
Azimuth	180		180		180
M. Tilt					
Height	179		179		179
Ports	P1	P2	Р3	P4	P5
Active Tech.	U2100		L2100		L700
Dark Tech.					
Restricted Tech.					
Decomm. Tech.					
E. Tilt	2		2		2
Cables					1-5/8" Coax (x2)
TMAs					
Diplexers / Combiners					
Radio					
Sector Equipment					
Unconnected Equip	oment:				
Scope of Work:					
Add L7 antenna	a on new mount. Re-use exis	ting coax if swept clean and	not aluminum otherwise rep	place 2 per sector.	

 RAN Template:
 A&L Template:
 Power System Template:

 67D95ADB
 67D95ADB_2xAIR+10P
 Custom

CTHA539A_L600_3.1_draft

Coverage Type										
Ooverage Type	A - Outdoor	r Macro								
Antenna		1				2			3	
Antenna Model	RFS - APX	VAARR24_43-I	U-NA20 (Octo		Ericsson - AIR21 KRC1	18023-1_B2P_B4A (Quad)	Ericsson - A	AIR32 KRD90)1146-1_B66A	_B2A (Octo)
Azimuth	180				180		180			
M. Tilt										
Height	179				179		179			
Ports	P1	P2	Р3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L700 L600	L700 L600				(U2100)	L2100	L2100	(L1900)	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2			0	2	2	2	2	2
Cables										
TMAs										
Diplexers / Combiners										
Radio	Radio 4449 B71+B1 2 (At Antenna	SHARED Radio 4449 B71+B1 2 (At Antenna								
Sector Equipment		ĺ								İ
Unconnected Equip	oment:									
Cable: 1-5/8" C	Cable	: 1-5/8" Coax								
Scope of Work:										

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

RAN Template: A&L Template: 67D95ADB 67D95ADB_2xAIR+1OP Custom

CTHA539A_L600_3.1_draft

		<u> </u>	ector 3 (Existing) view fr	om behind				
Coverage Type	A - Outdoor Macro							
Antenna	1			2	3			
Antenna Model	Ericsson - AIR21 KRC118	023-1_B2P_B4A (Quad)	Ericsson - AIR21 KRC11	8023-1_B2P_B4A (Quad)	(Andrew - LNX-6515DS-A1M (Dual)			
Azimuth	300		300		300			
M. Tilt								
Height	179		179		179			
Ports	P1	P2	P3	P4	P5			
Active Tech.	U2100		L2100		L700			
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2		2		2			
Cables					1-5/8" Coax (x2)			
TMAs								
Diplexers / Combiners								
Radio								

Scope of Work:

Add L7 antenna on new mount. Re-use existing coax if swept clean and not aluminum otherwise replace 2 per sector.

 RAN Template:
 A&L Template:
 Power System Template:

 67D95ADB
 67D95ADB_2xAIR+10P
 Custom

CTHA539A_L600_3.1_draft

Coverage Type	A - Outdoor Macro									
Antenna		1				2			3	
Antenna Model	RFS - APX	VAARR24_43-I	U-NA20 (Octo	<u>)</u>	Ericsson - AIR21 KR	C118023-1_B2P_B4A (Quad)	Ericsson -	AIR32 KRD90)1146-1_B66A	_B2A (Oc
Azimuth	300				300		300			
M. Tilt										
Height	179				179		179			
Ports	P1	P2	Р3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L700 L600	L700 L600				(U2100)	L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2			0	2	2	2	2	2
Cables										
TMAs										
Diplexers / Combiners										
Radio	Radio 4449 B71+B1 2 (At Antenna)	SHARED Radio 4449 B71+B1 2 (At Antenna I)								
Sector Equipment										
Unconnected Equip	ment:									
Cable: 1-5/8" C	Cable	: 1-5/8" Coax								
Scope of Work:										

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

RAN Template: 67D95ADB 2xAIR+10P Power System Template: Custom

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

----- This section is intentionally blank. ----
Proposed Power Systems Equipment



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600MHz, 700MHz, AWS & PCS applications.

- 24 Inch Width For Easier Zoning
- Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality
- Superior elevation pattern performance across the entire electrical down tilt range
- Includes three AISG RET motors Includes 0.5m AISG jumper for optional diasy chain of two high band RET motors for one single AISG point of high band tilt control.
- Low band arrays driven by a single RET motor



Technical Features

LOW BAND LEFT ARRAY (617-746 MHZ) [R1]

		7 11	
Frequency Band	MHz	617-698	698-746
Gain	dBi	15.1	15.5
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.4
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	24
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

LOW BAND RIGHT ARRAY (617-746 MHZ) [R2]

MHz	617-698	698-746
dBi	14.8	15.1
Deg	65	62
Deg	11.4	10.3
Deg	0-12	0-12
dB	19	20
dB	25	23
dB	19	19
dB	5	3
dBc		-153
-	1.5:1	1.5:1
dB	25	25
Watt	250	250
	dBi Deg Deg Deg dB dB dB dB dB dBc - dB	dBi 14.8 Deg 65 Deg 11.4 Deg 0-12 dB 19 dB 25 dB 19 dB 5 dBc - - 1.5:1 dB 25

APXVAARR24_43-U-NA20

REV: C

REV DATE: Dec 1, 2017

www.rfsworld.com



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°

ELECTRICAL SPECIFICATIONS

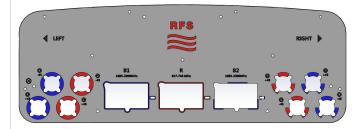
Impedance	Ohm	50.0
Polarization	Deg	±45°

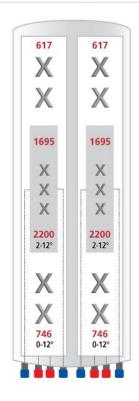
MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	2436 x 609 x 222 (95.9 x 24 x 8.7)
Weight (Antenna Only)	kg (lb)	58 (128)
Weight (Mounting Hardware only)	kg (lb)	11.5 (25.3)
Shipping Weight	kg (lb)	80 (176)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Mounting Hardware Material		Galvanized steel
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	241 (150)
Environmental		ETSI 300-019-2-4 Class 4.1E





ORDERING INFORMATION

Order No.	Configuration	Mounting Hardware	Mounting pipe Diameter	Shipping Weight
APXVAARR24_43-U-NA20	Field Replace RET included (3)	APM40-5E Beam tilt kit (included)	60-120mm	80 Kg

APXVAARR24_43-U-NA20 REV: C REV DATE: Dec 1, 2017 www.rfsworld.com



Centered on Solutions[™]

Structural Analysis Report

Antenna Mount Analysis

T-Mobile Site #: CTHA539A

719 George Washington Tpke Burlington, CT 06013

Centek Project No. 19027.15

Date: April 22, 2019

Max Stress Ratio = 78.2%

Prepared for:

T-Mobile USA 35 Griffin Road Bloomfield, CT 06002



CENTEK Engineering, Inc.

Structural Analysis – Mount Analysis T-Mobile Site Ref. ~ CTHA539A Burlington, CT April 24, 2019

Table of Contents

SECTION 1 - REPORT

- ANTENNA AND APPURTENANCE SUMMARY
- STRUCTURE LOADING
- CONCLUSION

SECTION 2 - CALCULATIONS

- WIND LOAD ON APPURTENANCES
- RISA3D OUTPUT REPORT

<u>SECTION 3 - REFERENCE MATERIALS (NOT INCLUDED WITHIN REPORT)</u>

RF DATA SHEET, DATED 04/23/2019

TABLE OF CONTENTS TOC-1



Centered on Solutions[™]

April 24, 2019

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

Re: Structural Letter ~ Antenna Mount T-Mobile – Site Ref: CTHA539A 719 George Washington Tpke Burlington, CT 06013

Centek Project No. 19027.15

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) low profile platform 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:

<u>Low Profile Platform:</u> Three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAARR24-43-NA20 panel antennas, three (3) Ericsson AIR21 panel antennas, three (3) Ericsson 4449 B71_B12 remote radio units mounted on a platform with a RAD center elevation of 179-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 93 mph for Burlington 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 equipment upgrade, it is our opinion that the existing antenna platform with the installation of one (1) SitePro handrail (p/n HRK14) 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 Prepared by:

Thanin Chanmalai Engineer CENTEK Engineering, Inc. Structural Analysis – Mount Analysis T-Mobile Site Ref. ~ CTHA539A Burlington, CT April 24, 2019

Section 2 - Calculations

Subject:

Location:

Rev. 0: 04/22/19

Loads on Equipment

Burlington, CT

Prepared by: F.J.P Checked by: C.A.G. Job No. 19027.15

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

Wind Speeds

Basic Wind Speed V := 93mph (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 = (User Input) $Structure_Type := Pole$ SC := IIStructure Category = (User Input) Exposure Category = Exp := C(User Input)

Structure Height = h := 180ft (User Input) Height to Center of Antennas = z := 179 ft (User Input)

Radial Ice Thickness = in $t_i := 1.00$ (User Input per Annex B of TIA-222-G)

Radial Ice Density = Id := 56.00pcf (User Input) Topograpic Factor = $K_{71} := 1.0$ (User Input) $K_a := 1.0$ (User Input)

 $G_{H} = 1.1$

Output

Gust Response Factor =

Wind Direction Probability Factor =

$$K_d := \left| \begin{array}{c} \text{if Structure_Type = Pole} \\ 0.95 \\ \text{if Structure_Type = Lattice} \\ 0.85 \end{array} \right| = 0.95 \qquad \begin{array}{c} \text{(Per Table 2-2 of TIA-222-G)} \\ \text{(Per Table 2-3 of TIA-222-G)} \\ \end{array}$$

(User Input)

Importance Factors =

$$I_{Wind} := \left\| \begin{array}{c} \text{if } SC = 1 \\ \left\| 0.87 \\ \end{array} \right\| = 1$$

$$\left\| 1.00 \\ \text{if } SC = 2 \\ \left\| 1.00 \\ \end{array} \right\|$$

$$\left\| 1.15 \right\|$$

$$I_{Wind_w_lce} := \left\| \begin{array}{c} \text{if SC = 1} \\ 0 \\ \text{if SC = 2} \\ 1.00 \\ \text{if SC = 3} \\ 1.00 \end{array} \right\| = 1$$

 $K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.184$

Velocity Pressure Coefficient Antennas =

$$t_{iz} := 2.0 \cdot t_i \cdot l_{ice} \cdot K_{\underline{i}\underline{z}} \cdot K_{zt}^{0.35} = 2.368$$

$$Kz := 2.01 \cdot \left(\left(\frac{z}{zg} \right) \right)^{\frac{\alpha}{\alpha}} = 1.431$$

Velocity Pressure w/o Ice Antennas =

 $qz := 0.00256 \cdot K_d \cdot Kz \cdot V^2 \cdot I_{Wind} = 30.09 \text{ psf}$

Velocity Pressure with Ice Antennas =

 $qz_{ice} := 0.00256 \cdot K_d \cdot Kz \cdot V_i^2 \cdot I_{Wind} = 8.7 \text{ psf}$



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Job No. 19027.15

Development of Wind & Ice Load on Antennas

Antenna Data:

Rev. 0: 04/22/19

Antenna Model = RFS APXVAARR24_43-U-NA20 Antenna Shape = Flat (User Input) Antenna Height = $L_{ant} := 95.9$ in (User Input) Antenna Width = $W_{ant} := 19.7$ in (User Input) Antenna Thickness = $T_{ant} := 8.7$ (User Input)

Antenna Weight = $WT_{ant} := 114.7$ (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input)

 $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.9$ Antenna Aspect Ratio =

Antenna Force Coefficient = $Ca_{ant} = 1.31$

Wind Load (without ice)

Surface Area for One Antenna =
$$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 13.1$$
 sf

Total Antenna Wind Force Front =
$$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 567$$

Surface Area for One Antenna =
$$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$$
 sf

Total Antenna Wind Force Side =
$$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 250$$
 lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =
$$SA_{ICEantF} := \frac{\left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(W_{ant} + 2 \cdot t_{iz}\right)}{144} = 17.1$$
 sf

Total Antenna Wind Force w/ Ice Front =
$$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 213$$
 lbs

Surface Area for One Antenna w/ Ice =
$$SA_{ICEantS} := \frac{\left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(T_{ant} + 2 \cdot t_{iz}\right)}{144} = 9.4$$
 sf

Total Antenna Wind Force w/ Ice Side =
$$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 117$$
 lbs

Gravity Load (without ice)

Gravity Loads (ice only)

Volume of Each Antenna =
$$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \cdot 10^4$$
 cu in

$$\text{Volume of Ice on Each Antenna} = \qquad \quad V_{\text{ice}} \coloneqq \left(L_{\text{ant}} + 2 \cdot t_{\text{iz}} \right) \cdot \left(W_{\text{ant}} + 2 \cdot t_{\text{iz}} \right) \cdot \left(T_{\text{ant}} + 2 \cdot t_{\text{iz}} \right) - V_{\text{ant}} = 2 \cdot 10^{4}$$

$$\text{Cu in}$$
 Weight of Ice on Each Antenna = $W_{\text{ICEant}} := \frac{V_{\text{ice}}}{1728} \cdot \text{Id} = 538$ lbs



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Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = Ericsson KRC118023-1_B2A_B4P

Antenna Shape = Flat (User Input)

 $L_{ant} := 56.26$ Antenna Height = (User Input) in

Antenna Width = (User Input) $W_{ant} \coloneqq 12.08$ in

 $T_{ant} := 7.87$ Antenna Thickness = (User Input)

Antenna Weight = $WT_{ant} := 150$ (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input)

 $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.7$ Antenna Aspect Ratio =

Antenna Force Coefficient = $Ca_{ant} = 1.3$

Wind Load (without ice)

 $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$ Surface Area for One Antenna = sf

 $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 202$ Total Antenna Wind Force Front = lbs

 $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.1$ Surface Area for One Antenna = sf

Total Antenna Wind Force Side = $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 132$ lbs

Wind Load (with ice)

 $SA_{ICEantF} := \frac{\left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(W_{ant} + 2 \cdot t_{iz}\right)}{144} = 7.1$ Surface Area for One Antenna w/ Ice = sf

Total Antenna Wind Force w/ Ice Front = $Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 88$ lbs

 $SA_{ICEantS} \coloneqq \frac{\left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(T_{ant} + 2 \cdot t_{iz}\right)}{144} = 5.3$ Surface Area for One Antenna w/ Ice = sf

Total Antenna Wind Force w/ Ice Side = $Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 66$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 150$ lbs

Gravity Loads (ice only)

Weight of Ice on Each Antenna =

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5349$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 7583$

cu in

lbs

 $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 246$

Weight of Ice on All Antennas = lbs $W_{ICEant} \cdot N_{ant} = 246$



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Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = Ericsson KRD901146-1_B66A_B2A

Antenna Shape = Flat

(User Input)

Antenna Height = L

 $L_{ant} := 56.65$

(User Input)

Antenna Width =

 $W_{ant} \coloneqq 12.87$

in (User Input)

in

Antenna Thickness =

 $T_{ant} := 8.66$

n (User Input)

Antenna Weight =

 $WT_{ant} := 132.2$

s (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)

$$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.1$$

sf

Total Antenna Wind Force Front =

 $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 215$

<mark>lbs</mark>

Surface Area for One Antenna =

$$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.4$$

sf

Total Antenna Wind Force Side =

$$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 145$$

lbs

Wind Load (with ice)

$$SA_{ICEantF} := \frac{\left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(W_{ant} + 2 \cdot t_{iz}\right)}{144} = 7.5$$

Total Antenna Wind Force w/ Ice Front =

$$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 92$$

$$SA_{ICEantS} := \frac{\left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(T_{ant} + 2 \cdot t_{iz}\right)}{144} = 5.7$$

$$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 70$$

lbs

sf

lbs

Gravity Load (without ice)

$$WT_{ant} \cdot N_{ant} = 132$$

lbs

Gravity Loads (ice only)

$$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6314$$

$$V_{ice} \coloneqq \left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(W_{ant} + 2 \cdot t_{iz}\right) \cdot \left(T_{ant} + 2 \cdot t_{iz}\right) - V_{ant} = 8166$$

cu in

Weight of Ice on Each Antenna =

$$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 265$$

Weight of Ice on All Antennas =

$$W_{ICEant} \cdot N_{ant} = 265$$

<mark>lbs</mark>



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Development of Wind & Ice Load on RRUS's

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 = $N_{RRUS} := 1$

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 =
$$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 54$$
 lbs

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

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

Wind Load (with ice)

Surface Area for One RRUS w/ Ice =
$$SA_{ICERRUSF} := \frac{\left(L_{RRUS} + 2 \cdot t_{iz}\right) \cdot \left(W_{RRUS} + 2 \cdot t_{iz}\right)}{144} = 2.4$$
 sf

Total RRUS Wind Force w/ Ice =
$$Fi_{RRUS} := qz_{Ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 28$$
 lbs

Surface Area for One RRUS w/ Ice =
$$SA_{ICERRUSS} := \frac{\left(L_{RRUS} + 2 \cdot t_{iz}\right) \cdot \left(T_{RRUS} + 2 \cdot t_{iz}\right)}{144} = 2.1 \quad \text{sf}$$

Total RRUS Wind Force w/ Ice =
$$Fi_{RRUS} := qz_{Ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 24$$
 lbs

Gravity Load (without ice)

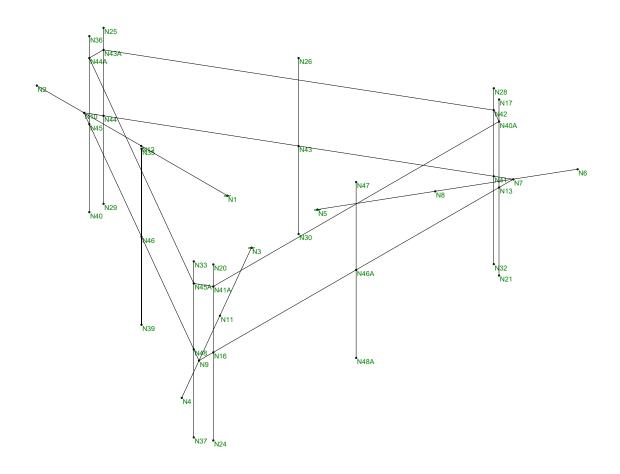
Gravity Loads (ice only)

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

$$\text{Volume of Ice on Each RRUS = } \\ V_{\text{ice}} \coloneqq \left(L_{\text{RRUS}} + 2 \cdot t_{\text{iz}} \right) \cdot \left(W_{\text{RRUS}} + 2 \cdot t_{\text{iz}} \right) \cdot \left(T_{\text{RRUS}} + 2 \cdot t_{\text{iz}} \right) - V_{\text{RRUS}} = 3286$$

Weight of Ice on Each RRUS =
$$W_{ICERRUS} := \frac{V_{Ice}}{1728} \cdot Id = 106$$
 lbs





Envelope Only Solution

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FG	T FÍ	OE; c^}}æÁTæ	¢Ì			Šà^^					Šæe^\a
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FI	T FÌ	OE; c^}}æÁTæ				Šà^^					Šæe^\læ
FÍ	TFJ	OE; c^}}æÁTæ	¢Ì			Šà^^					Šæe^¦æ¢
FÎ FÏ	TG€	OE, c^}}æ√Tæ				Šà^^					Šæe^\læ
FΪ	T GF	OE; c^}}æÁTæ				Šà^^					Šæe^\læ¢
FÌ	TŒ	OE; c^}}æÁTæ				Šà^^					Šæe^læ
FJ	T GH	OE; c^}}æÁTæ	¢Ì			Šà^^					Šæe^\læ¢
G€	TG	OE; c^}}æÁTæ				Šà^^					Šæe^\læ
GF	T GÎ	OE; c^}}æÁTæ				Šà^^					Šæe^¦æ¢
Œ	ΤĠ	OE; c^}}æÁTæ				Šà^^					Šæe^¦æ¢
GH	T GÎ	OE; c^}}æÁTæ				Šà^^					Šæe^\læ¢
G G G		OE, c^}}æÁTæ				Šà^^					Šæe^¦æ¢
GÍ	TGJ	OE; c^}}æÁTæ	¢Ì			Šà^^					Šæe^¦æ¢
Ĝ	TH€	OE, c^}}æÁTæ				Šà^^					Šæe^¦æ
GÏ	THF	OE, c^}}æÁTæ				Šà^^					Šæe^¦æ¢
	THG	OE, c^}}æÁTæ	¢Ì			Šà^^					Šæe^¦æ
GJ	THH	OE, c^}}æ√Tæ	¢Ì			Šàn n Šàn n					Šæe^¦æ
H€	T HHŒ	ΟΕ, α^}}æÁTæ				Šà^^					Šæe^¦æ
HF	T HFŒ	Pæ) 妿aj	Fĺ			Šà^^					Šæe^læ¢
HG	T HOOE	Pæ) ålæ ä	Fĺ			Šà^^					Šæe^¦æ
HH	THHÓ	Pæ) 妿ãi	FÍ			Šà^^					Šæe^¦æ¢

A Ya VYf 'Df]a Ufmi8 UHU

	Šæà^	OÁR[ãjc	RÁR[ã}c	SÁR[ā]c	Ü[cæa∰Ü^&cā[} E ∰Ü		•ā∦AŠEE	<u> </u>	Tæe^∖ãæ⊜	Ö^• ã	} Áܡ ^•
F	TF	ÞF	ÞG		U*d å * ^¦ (>[}^		ŒÁÕ¦ÈÓÁÜ^&c	V^]	ã&æ
G	TG	ÞH	ÞI		U*d å *^l (>[}^		ŒÁÕ¦ÈÓÁÜ^&c	V^]	ã8æ
Н	TH	ÞÍ	ÞÎ		U*d å * ^¦ (>[}^		<u>€ÁÕ¦ÈÓÁÜ^&c</u>	V^]	ã8æ
1	TI	ÞÏ	ÞJ				>[}^		ŒÁÕ¦ÈÓÁÜ^&c	V^]	ã8 <i>a</i> g
ĺ	Τĺ	ÞF€	ÞÏ				>[}^		€ÁÕ¦ÈÓÁÜ^&c	V^]	ã8 <i>æ</i>
Î	ΤÎ	ÞJ	ÞF€				>[}^		ŒÁÕ¦ÈÓÁÜ^&c	V^]	ã8 <i>a</i> g
Ϊ	ΤÏ	ÞG	ÞŒ		OE; c^} } æ				DÉ HÝÕ¦ ÈÓ	V^]	ã8 <i>æ</i>
Ì	TF€	ÞŒ	ÞFÏ		OE; c^} } æ				DÉ HÝÕ¦ ÈÓ	V^]	a8æ
J	T FF	ÞHG	ÞĠ		OE; c^} } æ				DÉ HÁÕ¦ ÈÓ	V^]	ã8 <i>æ</i>
F€	T FH	ÞH€	ÞĜ		OE; c^} } æ				DÉ HÁÕ¦ ÈÓ	V^]	ã8 <i>a</i> g
FF	T FI	ÞGJ	ÞĞ		OE; c^} } æ#				DÉ HÁÕ¦ ÈÓ	V^]	ã8 <i>æ</i>
FG	T FÍ	ÞI€	ÞĤ		OE; c^} } æ				DÉ HÁÕ¦ ÈÓ	V^]	ã8æ
FH	ΤFÎ	ÞHJ	ÞÁ		OE; c^} } æ				DÉ HÝÕ¦ ÈÓ	V^]	ã8 <i>æ</i>
FI	T FÌ	ÞĤ	ÞН		OE; c^} } æ				DÉ HÝÕ¦ ÈÓ	V^]	ã8æ
FÍ	T FJ	ÞHJ	ÞÁ		OE; c^} } æ				DÉ HÁÕ¦ ÈÓ	V^]	ã8 <i>æ</i>
FÎ	TŒ	ÞHJ	ÞÁ		OE; c^} } æ				DÉ HÝÕ¦ ÈÓ	V^]	a&æ
FΪ	TŒ	ÞHJ	ÞÁ		OE; c^} } æ				DÉ HÝÕ¦ ÈÓ	V^]	a&æ;
FÌ	TŒ	ÞHJ	ÞÁ		OE; c^} } æ				DÉ HÝÕ¦ ÈÓ	V^]	a&æ;
FJ	T GH	ÞЮ	ÞÁ		OB; c^} } æA	(Ó æ illi)	ãa^ÁØ æ <u>bil</u>	(DÉ HÁÕ¦ ÈÓ	V^]	ã8æ

A Ya VYf Df]a Ufmi8 UfU ff7 cbf]bi YXŁ

	Šæà^	OÁR[ãjc R∕	ÁR[ã]cSÁR[ã]c	Ü[cæa∰ Ù^&cā[}⊞ \	/^]^ Ö^•ã}Æ	EEE Tæe^∖ãa⇔	Ö^• â*} Áܡ ^•
G€	ΤG	ÞHJ Þ	ÞΗ		iÓladed ann Aiola		V^]
GF	ΤĞ		ÞΗ		Óda dhi ana ^Aoda		V^]
GG	ΤĠ	ÞHJ Þ	ÞΗ		Óda dhi ana ^Aoda		V^] a &æ
GH	ΤĠ		ÞΗ		Óda dhi ana ^Aoda		V^]
G	ΤĠ	Þ₩ Þ	ÞΗ		Ó and and an an an an an an an an an an an an an		V^] & æ
GÍ	ТGJ	ÞHJ Þ	ÞΗ	OB; e^} } æ###X	Ó and and an Aloqu		V^] a &æ
Ĝ	TH€	ÞHJ Þ	ÞΗ		Ó and an an Aloqu		V^] a &æ
ĞÏ	THF	ÞHJ Þ	ÞΗ		iÓladed ann Aiola		V^] a &æ
Ġ	THG	ÞHJ Þ	ÞΗ		iÓladed ann Aiola		V^] a &æ
GJ	H	ÞHJ Þ	ÞΗ		Óda dhi ana ^Aoda		V^] a &æ
H€	THHŒ	ÞÌŒ	ρĮΪ		iÓladed ann Aiola	0= : : 0 : = 0	V^] a &æ
HF	T HFŒ	ÞI HŒ Þ	ΡIG	Pæ) 妿ãj Ó			V^] a &æ
HG	THOSE	ÞI€ŒÞ	IFŒ	Pæ) 妿ãj Ó)^æ{ þ[}^	OÉ HÁÕ¦ ÈÓ	V^] a &æ
HH	THÓ	ÞIÍŒÞ	I I Œ	Pæ) 妿ãi Ó)^æ{ þ[}^		V^] a &æ
Н	ΤH	ÞIIŒÞ	IHŒ		P[}^ Þ[}^		V^] 88 24
HÍ	ΤΉ	ÞIGÞ	I€Œ		P[}^ Þ[}^		V^] 38 24
HÎ	ΤĤ	ÞIÍŒÞ	IFŒ	ÜÕÕÖ	P[}^ Þ [}^	ÜÕÖÖ	V^] a &æ

>c]bh7ccfX]bUhYg'UbX'HYa dYfUh fYg

	Šæè^	ÝÆká	ŸÆcá	ZÆGá	V^{] <i>Ã</i> ã⊘á	
F	ÞF	ËG	€	Ë€È	€	
G	ÞG	ËFG	€	ËÈ	€	
Н	ÞH	F	€	FĒHG€ÍF	€	
- 1	ÞI	ĵ	€	F€ÌÙGH€Í	€	
ĺ	ÞÍ	F	€	ËFË HG€Í F	€	
Î	ÞÎ	Î	€	ËF€ÈHUGH€Í	€	
Ϊ	ÞÏ	IËÎHFI	€	ËĖ	€	
Ì	ÞÌ	HÈGÎ HFI	€	ĔĒÍFJG	€	
J	ÞJ	IËÎHFI	€	ÌÈGÍ	€	
F€	ÞF€	ËJĚĠĠIJ	€	Ë€È	€	
FF	ÞFF	HÈGÎ HFI	€	ÍÈÍFJG	€	
FG	ÞFG	ĒĒĞGIJ	€	Ë€È	€	
FH	ÞFH	IËÎHFI	€	Ë Ě Ï Ě	€	
FI	ÞFÎ	IËÎHFI	€	ΪĚ	€	
FÍ	ÞFÏ	IËÎHFI		ËĚ	€	
FÎ	ÞŒ	l Ë Î HFI		ΪĚ	€	
FΪ	ÞŒ	IËÎHFI	Ë	ËĚ	€	
FÌ	ÞG	IËÎHFI	Ë	ΪĚ	€	
FJ	ÞĞ	ÊÈÏÎÏÎ		Ë€ÈHÏÍ	€	
G€	ÞĜ	ËŒHÌFÎH		ËĖG	€	
Œ	ÞĠ	l Èthî Ge		ËÈÏÍ	€	
GG	ÞGJ	ÊÈÏÎÏÎ	Ë	Ë€ÈHÏÍ	€	
GH	ÞH€	ËŒHÌFÎH	Ë	ËÈG	€	
G	ÞHG	l Èthî Ge	Ë	ËÈÏÍ	€	
GÍ	ÞН	l Èthî G		ÏÈÏÍ	€	
Ĝ	ÞH	ËŒHÌFÎH		ΙÈEĞ	€	
ĞÏ	ÞĤ	ĖÈÏÎÏÎ		€ÌHÏÍ	€	
GÌ	ÞHÏ	l Èthî G	Ë	ÏÈÏÍ	€	
GJ	ÞHJ	ËŒHÌFÎHH	Ë Ë	ΙÈEĠ	€	
H€	ÞI€	ĤÈÏÎÏÎ	Ë	€ÈHÏÍ	€	

K Ô^} ♂\ K VPÔ KFJ€GÏÈFÍ T[å^|Ápæ{^ KÔVPOÉHJOLÆÄT[ˇ}c

>c]bh7ccfX]bUhYg'UbX'HYa dYfUhi fYg'ff'cbh]bi YXŁ

	Šæà^	ÝÆká	ŸÆčá	ZÆcá	V^{] <i>Ä</i> ŽØá	Ö^cæ&@ÁØ1[{ÁÖãæjÈÈ
HF	ÞIF	l Èthî Gt	€	ËÈÏÍ	€	
HG	ÞΙΗ	ËGÈHÌFÎHH	€	ËĖĠ	€	
HH	ÞH	ÊÈÏÎÏÎ	€	Ë€ÈHÏÍ	€	
Н	ÞÍÍ	ÊÈÏÎÏÎ	€	€ÌHÏÍ	€	
HÍ	ÞIÎ	ËEHÌFÎH	€	ΙÈEĠ	€	
HÎ	ÞÌÌ	l Èthî G	€	ÏÈÏÍ	€	
ΗÏ	ÞIÎŒ	IËÎHFI	€	€	€	
HÌ	ÞΪ	IËÎHFI		€	€	
HJ	ÞIÌŒ	IËÎHFI	Ë	€	€	
I€	ÞI€Œ	IËÎHFI	Н	ËĚ	€	
1 F	ÞI FŒ	IËÎHFI	Н	ΪĚ	€	
IG	ÞГG	l Èthî G	Н	ËÈÏÍ	€	
ΙH	ÞI HŒ	ĤÈÏÎÏÎ	Н	Ë€ÈHÏÍ	€	
11	ÞII Œ	ĖÈÏÎÏÎ	Н	€ÌHÏÍ	€	
ΙÍ	ÞIÍŒ	l Èthî Gt	Н	ΪÈΪÍ	€	

>c]bhi6 ci bXUf mi7 cbX]hjcbg

		R[ã]oÁSæà^	ÝÁŽEDjá	ŸÄŽÐajá	ZÁŽEAjá	ÝÁÜ[dĚŽËdĐæåá	ŸÁÜ[dĚŽËdĐæåá	ZÁÜ[dĚŽË-6Dænaaá
	F	ÞF	Ü^æ & æ i }	Ü^æ&a i }	Ü^æ & æ i }	Ü^æ \$a {}}	Ü^æ &a i}	Ü^æ&aãi}
	G	ÞH	Ü^æ \$ æ []	Ü^æ&a i }	Ü^æ & æ i }	Ü^æ \$a {i}}	Ü^æ &a i}	Ü^æ & æ i }
Ī	Н	ÞÍ	Ü^æ&æi }	Ü^æ&æi }	Ü^æ&æi }	Ü^æ&æai }	Ü^æ &cā }	Ü^æ&æi }

A Ya VYf Dc]bh@cUXg f6 @ & 9ei Jda YbhK YJ \ HL

	T^{a^¦ÁŠæà^	Öā^&cā}	Tæ*}ããå^ŽÈËcá	Šį &andaj}žeĐÃá
F	T FÌ	Ÿ	Tæ*}ãã å^ŽÉĒcá ⊞EÉÍÌ	Н
G	T FÌ	Ÿ	l ⊞áì	Ϊ
Н	T FÎ	Ϋ	iiii í	Н
1	T FÎ	Ϋ	iiii í	Ϊ
ĺ	T FÍ	Ϋ		Н
Î	T FÍ	Ϋ	iii î	Ϊ
Ï	T FI	Ϋ	⊞ ì	Н
ì	T FI	Ϋ	iiii i	Ϊ
J	T FH	Ϋ	iiii í	Н
F€	T FH	Ϋ	É	Ϊ
FF	T FF	Ϋ	EEÎ Î	Н
FG	T FF	Ϋ		Ϊ
FH	T F€	Ϋ	i i	Н
FI	T F€	Ϋ	iii ì	Ϊ
FÍ	T HHŒ	Ϋ	iiii í	Н
FÎ	T HHŒ	Ϋ	É	Ϊ
FΪ	ΤÏ	Ÿ	iiii î	Н
FÌ	ΤÏ	Ϋ	iiii î	Ϊ
FJ	T FÌ	Ϋ	iiii I	ĺ
G€	T FI	Ϋ	EE I	ĺ
GF	T F€	Ϋ	EE I	ĺ

A Ya VYf Dc]bh'@cUXg f6 @7 '' .`≒WY K Y][\ lŁ

T^{ à^¦ÁŠæà^|

Öã^&cã[}

Tæ*}ãc°å^ŽÉEcá

Š[&andai]}ŽedŽiá

A Ya VYf Dc]bh@cUXg f6 @ ' . =\W K Y][\ HLf7 cbh]bi YXL

	T^{ à^¦ÁŠæà^	Öã^&cã[}	Tæ*}ãc°å^ŽÉËcá	Š[&æqā[}ŽebĒĀá
F	T FÌ	Ϋ	iii J	Ï
G	T FÌ	Ϋ	iii J	Н
Н	T FÎ	Ϋ	⊞EGH	Ϊ
	ΤFÎ	Ϋ	⊞GH	Н
ĺ	T FÍ	Ϋ	⊞ - HH	Ϊ
Î	T FÍ	Ϋ	⊞HH ⊞GÎ J	Н
Ϊ	T FI	Ϋ	ËÊĜJ	Ϊ
Ì	T FI	Ϋ	⊞GÎJ	Н
J	T FH	Ϋ	ËŒH	Ϊ
F€	T FH	Ϋ	⊞GH	Н
FF	T FF	Ϋ	⊞-HH	Ϊ
FG	T FF	Ϋ	⊞H ⊞G J	Н
FH	T F€	Ϋ	⊞GÎJ	Ϊ
FI	T F€	Ϋ	iii j	Н
FÍ	T HHŒ	Ÿ	⊞EGH	Ϊ
FÎ	T HHŒ	Ϋ	⊞EGH	Н
FΪ	ΤÏ	Ϋ	⊞HH	Ï
FÌ	ΤÏ	Ϋ	⊞HH	Н
FJ	T FÌ	Ϋ	i ll eî	ĺ
G€	T FI	Ϋ	⊞÷€Î	ĺ
GF	T F€	Ϋ	⊞÷€Î	ĺ

A Ya VYf 'Dc]bh'@cUXg'f6 @7 (: K]bX'k #=WYLLŁ

	T^{ à^¦AŠæà^	Öā^&cā[}	Tæ*}ãc°å^ŽiÊËcá	Šį &æqā[) ŽeĐÃ á
F	T FÌ	Ý	ÈÉÍ J ÈEÍ J	Н
G	T FÌ	Ý		Ϊ
Н	T FÎ	Ý	ÈHH	Ï
	T FÎ	Ý	ÈHH	Н
ĺ	T FÍ	Ý	Ì€HÍ	Ϊ
Î	T FÍ	Ý	ÈEHÍ	Н
Ϊ	TFI	Ý	ÈÉÍJ	Ϊ
Ì	T FI	Ý	EÉÍ J EEÍ J	Н
J	T FH	Ý	ÈHH	Ϊ
F€	T FH	Ý	ÈHH	Н
FF	T FF	Ý	ÈEHÍ	Ϊ
FG	T FF	Ý	ÈΕΗÍ	Н
FH	T F€	Ý	ÌÈ€Î	Н
FI	T F€	Ý	Ì E €Î	Ϊ
FÍ	T HHŒ	Ý	È	Н
FÎ	T HHŒ	Ý	Ì € II	Ϊ
FΪ	ΤÏ	Ý	ÈÎ	Н
FÌ	ΤÏ	Ý	ÈÎ	Ϊ
FJ	T FÌ	Ý	È€G	ĺ
G€	T FI	Ý	È€G	ĺ
GF	T F€	Ý	ÈEGÌ	ĺ

A Ya VYf 'Dc]bh@cUXg 'f6 @') . K]bX'LŁ

	T^{à^¦ÁŠæà^	Öã^&cã[}	Tæ*}ããå^ŽÉËæá	Š[&ænā[}ŽedĒĀá
F	T FÌ	Ý	ÈĠ	Ï
G	T FÌ	Ý	ÈĠ	Н
Н	T FÎ	Ý	È€ÎÎ	Ϊ

A Ya VYf 'Dc]bh'@cUXg 'f6 @7') . 'K]bX'LŁ'f7 cbhjbi YXŁ

	T^{ à^¦ÁŠæà^	Öã^&cã[}	Tæ*}ãc°å^ŽiÈËcá	Š[&aea][}ŽeĐÃá
- 1	T FÎ	Ý	ÈÎÎ	Н
ĺ	T FÍ	Ý	È G	Ï
Î	T FÍ	Ý	È G	Н
Ï	TFI	Ý	ÈĠ	Ï
Ì	TFI	Ý	ÈĠ	Н
J	T FH	Ý	ÈÎÎ	Ϊ
F€	T FH	Ý	ÈÎÎ	Н
FF	T FF	Ý	È EÏ G	Ϊ
FG	T FF	Ý	ÈEÏ G	Н
FH	T F€	Ý	EGÌ H	Н
FI	T F€	Ý	ÈĠH	Ϊ
FÍ	T HHŒ	Ý	ÈEF	Н
FÎ	T HHŒ	Ý	ÈEF	Ϊ
FΪ	ΤÏ	Ý	È€F È€Ï	Н
FÌ	ΤÏ	Ý	ÌĒ€Ï	Ϊ
FJ	T FÌ	Ý	ÈΗ	ĺ
G€	T FI	Ý	Ed H Ed I	ĺ
Œ	T F€	Ý	<u>Ì</u> €Í I	ĺ

A Ya VYf Dc Jbh @ UXg f6 @ * . K JbX k #=VV NL

	T^{à^¦ÁŠæà^	Öā^&cā[}	Tæ*}ããå^ŽĒËæá	Šį & acajį } ŽobŽi á
F	T FÌ	Z	È€Î	Ϊ
G	T FÌ	Z	È€Î	Н
Н	T FÎ	Z	È	Н
	T FÎ	Z	È I	Ϊ
ĺ	T FÍ	Z	ÈÎ	Н
Î	T FÍ	Z	ÈÎ	Ϊ
Ï	T FI	Z	Ì ÷ €Î	Н
Ì	T FI	Z	È€Î	Ϊ
J	T FH	Z	È	Н
F€	T FH	Z	È l	Ϊ
FF	T FF	Z	ÈÎ	Н
FG	T FF	Z	ÈÎ	Ϊ
FH	T F€	Z	ÈÉÍJ	Ϊ
FI	T F€	Z	Œ Í J	Н
FÍ	T HHOE	Z	ÈHH	Ϊ
FÎ	T HHŒ	Z	È HH	Н
FΪ	ΤÏ	Z	ÈEHÍ	Ϊ
FÌ	ΤÏ	Z	ÈEHÍ	Н
FJ	T FÌ	Z	È€GÌ	ĺ
G€	T FI	Z	È€GÌ	ĺ
GF	T F€	Z	È€G	ĺ

A Ya VYf Dc]bh@cUXg f6 @ + . K]bX NL

	T^{à^¦ÁŠæà^	Öã^&cã[}	Tæ*}ãçå^ŽÈËcá	Šį & accaiį) ŽebŽi á
F	T FÌ	Z	ΕĠΗ	Н
G	T FÌ	Z	ΕĠΗ	Ϊ
Н	T FÎ	Z	È€F	Н
1	T FÎ	Z	È€F	Ϊ
ĺ	T FÍ	Z	ÈEÏ	Н
Î	T FÍ	Z	È€Ï	Ϊ

A Ya VYf 'Dc]bh'@cUXg'f6 @ '+. 'K]bX'NL'f7 cbljbi YXL

	T^{a^¦ÁŠasà^	Öã^&cã[}	Tæ*}ããå^ŽÅËËcá	ŠĮ & ancajį) ŽedŽA á
Ϊ	T FI	Z	ΕĠH	Н
Ì	T FI	Z	EGÌ H	Ϊ
J	T FH	Z	Ì F €F	Н
F€	T FH	Z	ÈF€F	Ϊ
FF	T FF	Z	È€Ï	Н
FG	T FF	Z	È€F È€Ï È€Ï	Ϊ
FH	T F€	Z	l EFGi	Ϊ
FI	T F€	Z	ÈĠ	Н
FÍ	T HHŒ	Z	ÈÎÎ	Ϊ
FÎ	T HHŒ	Z	ÈÎ Î	Н
FΪ	ΤÏ	Z	ÈEÏG	Ϊ
FÌ	ΤÏ	Z	ÈEÏ G	Н
FJ	T FÌ	Z	ÈÉΙ	ĺ
G€	T FI	Z	ÈÉÍ∣	ĺ
GF	TF€	Z	È∃H	ĺ

A Ya VYf 8 JgHf JVi hYX @ UXg f6 @ ('. K JbX k #=\W LŁ

	T^{ à^¦ÁŠæà^	Öã^&cã}}	Ùca÷oÁTæt³}ããå^ŽiÐe£B21É•-á	Ò}åÁTæ≛}ãčå^ŽÈ	EÚcedoÁŠ[&acaja}ŽefHH	HÖ)åÁKj[&ænaaj]}ŽedÉÄá
F	TFI	Ý	È€G	È€G	€	€
G	T FÍ	Ý	È€G	È€G	€	€
Н	THHÓ	Ý	È€G	È€G	€	€
1	ΤÎ	Ý	È€G	È€G	€	€
ĺ	T HGOE	Ý	È€G	È€G	€	€
Î	ΤFÎ	Ý	È€G	È€G	€	€
Ï	T FÌ	Ý	È€G	È€G	€	€
Ì	ΤÏ	Ý	È€G	È€G	€	€
J	TI	Ý	È€G	È€G	€	€
F€	T HHŒ	Ý	È€G	È€G	€	€
FF	TF€	Ý	È€G	È€G	€	€
FG	TFF	Ý	È€G	È€G	€	€
FH	T FH	Ý	È€G	È€G	€	€

A Ya VYf 8]glf]Vi hYX @ UXg f6 @) . K]bX LŁ

	T^{à^¦ÁŠæà^∣	Öã^&cã}	ÙcæbcÁTæ*}ãã å^ŽiÐa£ÐÆ•~á	Ò}åÁTæ≛}ãčå^ŽÈ	ÈicæboÁŠ[&ææā[}Žef⊞	Ď}åÆŠ[&ænaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
F	T FÍ	Ý	Œ€Î	Œ€Î	€	€
G	T FI	Ý	È€Î	È€Î	€	€
Н	T FH	Ý	È€Î	È€Î	€	€
1	T FÎ	Ý	È€Î	È€Î	€	€
ĺ	T FF	Ý	Œ€Î	È€Î	€	€
Î	TF€	Ý	È€Î	È€Î	€	€
Ϊ	T HCCE	Ý	È€Î	È€Î	€	€
ì	TI	Ý	È€Î	È€Î	€	€
J	ΤÎ	Ý	È€Î	È€Î	€	€
F€	T HHÓ	Ý	È€Î	È€Î	€	€
FF	T HHŒ	Ý	È€Î	È€Î	€	€
FG	ΤÏ	Ý	È€Î	È€Î	€	€
FH	T FÌ	Ý	È€Î	È€Î	€	€

A Ya VYf'8]glf]Vi hYX'@:UXg'f6@''*'.'K]bX'k#\#\W'NL

A Ya VYf'8]g/fj JVi hYX' @ UXg'f6 @ '*'. K]bX'k #\\Y'NL'ff cbhjbi YXL

	T^{ à^¦ÁŠæà^	Öã^&cã[}	ÙcækoÁTæ*}ããå^ŽiÐe££21Ê•~á	Ò}åÁTæ*}ãčå^ŽÈ	ĒJœekoÁŠ[&æeā[}Že⊞H	Ò}åÆ (&æ 64) Žobà á
F	T HFCE	Z	ÈE€G	ÈE€G	€	€
G	Τĺ	Z	È€G	È€G	€	€
Н	T FI	Z	È€G	È€G	€	€
1	T FÍ	Z	ÈEG	ÈE€G	€	€
ĺ	T FH	Z	È€G	È€G	€	€
Î	T FF	Z	È€G	È€G	€	€
Ϊ	TF€	Z	È€G	È€G	€	€
Ì	T HHÓ	Z	È€G	È€G	€	€
J	ΤÎ	Z	È€G	È€G	€	€
F€	T FÎ	Z	È€G	È€G	€	€
FF	T HHOE	Z	È€G	È€G	€	€
FG	ΤÏ	Z	È€G	È€G	€	€
FH	T FÌ	Z	È€G	È€G	€	€

A Ya VYf 8]glf]Vi hYX @ UXg f6 @ + . K]bX NL

	T^{à^¦Æsæà^	Öã^&cã[}	Ùca÷oÁTae*}ããå^ŽiÐe£B2Ét•~á	Ò}åÁTæ≛}ãčå^ŽÈ	iii)cæboÁšį &ænajį}Žefiiii	Ď}åÆŠ[&ææã[}ŽæÉÃá
F	T HFCE	Z	E €Î	È€Î	€	€
G	Τĺ	Z	È€Î	È€Î	€	€
Н	ΤFI	Z	È€Î	È€Î	€	€
1	T FÍ	Z	È€Î	È€Î	€	€
ĺ	T FF	Z	È€Î	È€Î	€	€
Î	TF€	Z	È€Î	È€Î	€	€
Ϊ	THHÓ	Z	È €Î	È€Î	€	€
Ì	ΤÎ	Z	È€Î	È€Î	€	€
J	ΤFÎ	Z	E €Î	È€Î	€	€
F€	T FÌ	Z	È€Î	È€Î	€	€
FF	ΤÏ	Z	E €Î	È€Î	€	€
FG	T HHŒ	Z	ÈE€Î ÈE€Î	È€Î	€	€
FH	T FH	Z	È€Î	È€Î	€	€

A Ya VYf 8]glf]Vi hYX @ UXg f6 @ , . 6 @ & Hf Ubg]Ybh 5 f YU @ UXgŁ

	T^{à^¦AŠæà^	Öã^&cã}}	ÙcækoÁTæ*}ããå^ŽiÐe£ĐÊ•-á	Ò}åÁTæ*;}ãčå^ŽÈ	ËJœeloÁŠ[&æeā[}Že⊞	Ď}åΑŠ[&æaξī]ŽobÃá
F	TG	Ÿ	ËE€Î	iii€€J	G	HĚ
G	TG	Ÿ	⊞€J	⊞€€J	ΗĚ	ĺ
Н	TG	Ÿ	⊞€J	⊞€€I	ĺ	ÎĚ
	TG	Ÿ	i le el	ËËE€€HÎÎJ	ÎĚ	Ì
ĺ	ΤÎ	Ÿ	⊞€F	ËE€H	€	GÈÉÎG
Î	ΤÎ	Ÿ	⊞€€H	⊞€Ê	G È ÉÎ G	ΙÈĠ
Ϊ	ΤÎ	Ÿ	⊞€Î	⊞E€Ì	ΙÈĠ	ÎÈÌÏ
ì	ΤÎ	Ÿ	⊞€ì	ËŒFG	ÎÈÌÏ	ÌÈÉ
J	ΤÎ	Ÿ	ËEFG	⊞€FÍ	ÌÈ	F ∰ FG
F€	ΤÎ	Ÿ	lle rí	⊞€FÍ	F ∰ FG	FŒHÏÍ
FF	ΤÎ	Ÿ	lle rí	⊞€FÍ	FŒHÏÍ	FIÈHÏ
FG	ΤÎ	Ÿ	lle rí	⊞€FÍ	FIÈHÏ	FÎ Ĕ
FH	TH	Ÿ	⊞€Î	⊞E€J	G	HĚ
FI	TH	Ÿ	⊞€J	⊞€€J	HĚ	ĺ
FÍ	TH	Ÿ	⊞€J	⊞€€I	ĺ	ÎĚ
FÎ	TH	Ϋ́	⊞€	ËËE€€HÎÎJ	ÎĚ	Ì
FΪ	ΤI	Ÿ	⊞€F	ËE€H	€	GÈÉÎH
FÌ	ΤI	Ÿ	⊞€€H	⊞€ÊÎ	GÈÉÎH	ΙÈĖĞ
FJ	TI	Ÿ	⊞€î	⊞€È	ΙÈĠ	îÈìì

A Ya VYf 8]glf]Vi hYX @ UXg f6 @ , . 6 @ & Hf Ubg]Ybh 5 f YU @ UXg Lf7 cbh]bi YXL

	T^{à^¦ÁŠæà^	Öã^&cã[}	ÙcækoÁTæ*}ããå^ŽiÐe£ĐÊ•-á	Ò}åÁTæť}ãčå^ŽÈ	ÈicæboÁŠ[&ææā[}Že⊞H	Ď}åÆŠ[&æaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
G€	TI	Ÿ	<u> </u>	ËŒFG	ÎÈÌÌ	ÌÈGÍ
GF	ΤI	Ÿ	lle FG	⊞€FÍ	ÌĖ	F∰FH
GG	ΤI	Ÿ	lle rí	⊞€FÍ	F ∰F H	FŒHÏÍ
GH	ΤI	Ÿ	lle rí	⊞€FÍ	FŒHÏÍ	FIÈHÌ
G	ΤI	Ÿ	lie rí	lle fí	FIÈHÌ	FÎ Ě
GÍ	TF	Ÿ	⊞€î	⊞€€J	G	HĚ
Ĝ	TF	Ÿ	⊞€J	Œ€J	HĚ	ĺ
GÏ	TF	Ÿ	⊞€J	⊞€€I	ĺ	ÎĚ
GÌ	TF	Ÿ	⊞€I	ËËE€€HÎÎJ	ÎĚ	Ì
GJ	Τĺ	Ÿ	ËŒF	⊞€€H	€	GÈÉÎG
H€	Τĺ	Ÿ	ËE€H	⊞€Ê	G È ÉÎ G	ΙĖĖG
HF	Τĺ	Ÿ	⊞€Î	⊞€€Ì	ΙÈĠ	ÎÈÌÏ
HG	Τĺ	Ÿ	⊞€ì	ËŒFG	ÎÈÌÏ	ÌÈGÍ
HH	Τĺ	Ÿ	lle FG	⊞€FÍ	ÌÈÍ	F ∰ FG
Н	Τĺ	Ÿ	lle rí	⊞€FÍ	F ∰ FG	FŒÌÏÍ
HÍ	Τĺ	Ÿ	lie rí	⊞€FÍ	FŒHÏÍ	FIÈHÏ
HÎ	Τĺ	Ÿ	lle rí	⊞€FÍ	FIÈHÏ	FÎ <u>Ě</u>

6 Ug]W@UX'7 UgYg

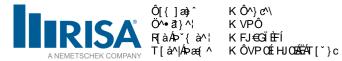
	ÓŠÔÁÖ^•&¦∄j;cã[}	Ôæ c ^*[¦^	ÝÁÕ¦æçãcî	ŸÁÕ¦æçãcî	ZÁÕ¦æçãcî	R[ã]c	Ú[ặc	Öãrdãa řÈ	ÈE^æÇTÈÈ	```¦æ&\```É
F	Ù^ -ÁY ^ ð t @c	Þ[}^		Ë						
G	Ò~~ã{ ^} œ⁄ ^ã @	Þ[}^					Ъ		Н	
Н	Q A^ÁY ^ã @c	Þ[}^					Ъ			
1	YajåÁjÐÁQ&∧ÁÝ	Þ[}^					Ð.	FH		
ĺ	Υą̃åÁÝ	Þ[}^					Ъ	FH		
Î	YajåÁ,ÐÁQ&∧ÁZ	Þ[}^					æ	FH		
Ϊ	Υą̃åÆ	Þ[}^					Œ	FH		
Ì	ÓŠÔÁGÁV¦æ;•ā\} oÁŒ^æ	Þ[}^						HÎ		

@UX'7ca V]bUh]cbg

	Ö^• & ā cā } Ù[## F#SÖÆÆ###**	ÚÖ^∣œ	Ù Ě ÓŠĈ	Øæ£HE	ŠÔØæ&l	H ĎŠĈ	Øæ£È	T ĎŠĈ	Øæ&H	ř Šôø	e&HĚ)ŠÔØæ	XHHÖŠĆ	Øæ£À	T ĎŠĈ	Øæ&À	T ŠĈ	Øæ&H	ĎŠÔ	Øæ&HH
F	FÈCÖÆÆFIII ^•	Ϋ	F	FÈG	G FÈ	í	F₿													
G	€ ÖÆÆÆË ^•	Ϋ	F	È	GÈ	ĺ	FÈ													
Н	FÈCÖÆÆFIIIŸ^•	Ϋ	F	FÈG	G FÈ	Н	F	1	F											
- 1	FÈSÖÆÆFIIIŸ^•	Ϋ	F	FÈG	G FÈ	iΪ	FÈ													
ĺ	€DÖÆÆFEEÖ*^•	Ϋ	F	È	GÈ	Ϊ	F₿													
Î	FÈGÖÆÆFIII ^•	Ÿ	F	FÈG	G FÈ	Н	F	Î	F											

9bj YcdY'>c]bhFYUMJcbg

	R[ã]c		ÝÆXá	ŠÔ		ŠÔ	ZÆŽá	ŠÔ	ΤΫ́ΑӁΕ̈́ά	ŠÔ	ΤΫÆΧËcá	ŠÔ		ıŠÔ
F	ÞF	{ æ¢	⊞ÉÍF	ĺ	GËJF	Î	ÈÈÌÌ	F	⊞H	G	ÈIF	F	ËHÈH	G
G		{ a	ËŒÌĺÌ	F	ΪΙĠ	G	∰JG	ĺ	ËÈJH	\blacksquare	ËĐÈÍ	ĺ	Ë ŒÎ Î	Î
Н	ÞΗ	{ æ¢	⊞HH	Н	GÈÌI	Î	∰GÎ	Н	ËÐFJ	G	ŒĴĴ	Н	ÎÈ	Н
1		{ a	ËÈÌG	ĺ	F È -Î Ì	G	ËGÈÌI	ĺ	ËŒJJJ	Î	⊞FJ	T	GÈÏÎ	ĺ
ĺ	ÞÍ	{ æ¢	FĚIH		GĚ Ġ	Н	FÈ€Î	G	JÈHÏÎ	Н	FÈĠ	F	ÍĒĪFÏ	Н
Î		{ a	ËÈEG	G	ËFJ	ĺ	ËŒHÏ	Τ	GÈ€Î	ĺ	⊞€	ĺ	FĚJI	ĺ
Ï	V[œ ; K	{ æ¢	€	Î	ÌÈÏÍ	H	€	F						



9bj YcdY'>c]bhFYUWIjcbg'fI7cbl'jbi YXŁ

R[ã]c	ÝÆXá	ŠÔ	ŸÆXá	ŠÔ	ZÁŽá	ŠÔ	TÝÁŽËcáŠĈ	ΤΫÆڏΕ̈́cáŠÔ	TZÁŽË-cáŠÔ
) {	ā ËÈIÎ	G	HÈÍÌ	ĺ	ĔĚJI	ĺ			

9bj YcdY'>c]bh8]gd`UMYa Ybhg

	R[ã]c		ÝÆŽjá	ŠÔ	ŸÆĞjá	ŠÔ	Z <i>Ã</i> Žajá	ŠÔ	ÝÁÜ[cæcā[}Á2ÊÉ	ÈŠÔ	ŸÁÜ[cæcā[}ÁÄÉ	ÈŠÔ	ZÁÜ[cæcā[}ÁŽÉÉ	ÈŠÔ
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G		{ a	Ę	F	€	F	€	F	€	F	€	F	€	F
Н	ÞG	{ æ¢	È€H	F	<u>∰</u> H	G	ÈÎJ		ÌĖĢIÍ^ËEH	1	ËÈÌ^Ë€	<u>H</u>	FEEJF^EEG	
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	ÞI	{ æ¢	<u> </u> ÈHÏ		∰ÌH	G	ÈÎÎ	G	FÈH ^Ë€G		HÈÏHYËEH		ÊÉGJ^Ë€Í	
ĺ		{ a	∰FFF	F	ËÈĠ	Ĩ	⊞HH	ļ	HEGJGY EEH	G	ËÐĒFÍ∧Ë€H	F	ÉÉÉGÎÌ^ËEH	F
J	ÞÍ	{ æ¢	€		€		€	Ш	€		€		€	
F€		{ a }	€	F	€	F	€	F	€	<u>F</u>	. €	F	€	F
FF	ÞÎ	{ æ¢	ŒĠ	G	<u></u> #G		<u>E</u> FH	Ę	FËÏÎ^ËH		HÈJHYËH		EGEG I ^ EEH	
FG	. "	{ a }	<u> </u>		ËĚÎF	H	ŒG		ËË!^Ë€H	<u>H</u>	HÈ G\Ë€I	<u>H</u>	ÉÉFÌ^ËEH	F
FH	ÞÏ	{ æ¢	<u>Ē</u>	G	<u> </u>		<u>È</u> HF	Ę	FËJÍ ^ËH		HEJHYEGH		EOEO GVEEH	
Fļ		{ a				H	<u>⊞</u> G		ĒĒTI^ĒH	<u>H</u>	HÈ C'È	<u>H</u>	ÉÈEHNEEH	F
FÍ	ÞÌ	{ æ¢	<u>EÉ</u> Í G	G			<u>È</u> GJ_	F	ËGÈEI F^ËEH	<u> </u>	GÈIFÎ ^ EEH	<u> </u>		
FÎ		{ a			<u>⊞</u> <u>€Î</u>	Н	<u> </u>		ËËË€H\ËŒG	H	ËËÎÎ^ËH	G	ËÈFÌ^ËG	H
FΪ	ÞJ	{ æ¢	<u><u><u> </u></u></u>		<u> </u>	G	<u>È</u> GÏ	G	FÈHF^ËG	<u> </u>	HÈÏHYËEH	<u> </u>	ĒÈFI^ĒÉ	
FÌ		{ a	<u>⊞</u> I	G	<u>ËÈÌG</u>		<u>⊞</u> G	l l	HEGI GV EEH	G	ËËFÍ^ËEH	F	ÉÈ HÈ HÈ	F
FJ	ÞF€	{ æ¢	Œ€H	F	<u> </u>	G	<u>È</u> H	Ц.		<u> </u>	ËÈÌ^Ë	<u>H</u>	FÈEÌÌ^ËEG	
G€		{ a	€		<u>ËÈ</u>		<u>⊞e</u> j J	F	FÈ I ^ ËH	Ġ	ÉÈG^E	G	JĚÍI^Ë	G
GF	ÞFF	{ æ¢	<u>È</u> Í		<u> </u>	G	<u>.</u> €	G	FÐÏ J^ËŒG	<u> </u>	GÉGÌ F^ÉGH		ËHÈ€Î^ËEH	
GG		{ a	€	G	∰ FH		<u>⊞</u> HF	ļ	ÌÈEHJ^Ë€H	G	ÉÈGÍ^Ë	G	ËE J^ËEG	H
GH	ÞFG	{ æ¢	ÈE€G	F	<u> </u>	G	<u>ÈG</u>	<u> </u>	I ÈÌ J∧Ë€H	<u> </u>	Œ)Œ\		GÊGF^Ë€G	
G		{ a	€				<u> </u>	F	ÎĚFÏ^Ë	G	ÊĚIJ^ËEI	F		G
Ğ	ÞFH	{ æ¢	ÈÏ H	G	⊞G-G		<u>É</u> HF	F	GÊUF^ÊH	<u> </u>	GË HF^ËEH	<u> </u>	ËÈJF^ËH ËËÎÎÍ^ËH	
Ĝ	L FÎ	{ a	∰GG		<u>ËFË</u> GFJ	Н	<u>⊞ei</u> G		ĔĖĨÌ^ËH	H		<u>H</u>		F
Ğ	ÞFÎ	{ æ¢	<u>Ē</u> FJ	1		G	<u>É</u> GÏ	G			HEEI GVEEH	<u> </u>	ÉÉFI^ÉEH	
GÌ	L F	{ ā	É FÌ	G	ËÈUG	1	<u>⊞G</u> G			G		G		F
GJ	ÞFÏ	{ æ¢	ĖFI	G	HEOTH	1	<u>È</u> l ÈìÎ		FEG GY EEG		HĒÌ^Ë€H		HÊJÌ^ËH ÉÈFF^ËH	
H€	ь <i>с</i> с	{ ā	<u>⊞G</u> €J ÈHF		<u>ËEEG</u> 譜ìì	H		G	FÈHÍÌ ^ ËEH	G	ÎÈFG^ËE ÍËFÌ^ËEH	<u>H</u>	GÊJÍ^EH	G
HF	ÞŒ	{ æ¢		G	ËËUG	G	È€F	-	JĖG ^ËH ËÈÌI^ËH	1		G		
HG HH	ÞŒ	{ a	<u>⊞</u> EJ	G	<u> EEUG</u> EEGHG	í	<u>Eelí</u> Eelî	H	HEHÍ ^ EE	<u>H</u>	GË HF^ËEH	í		G
H	PG	{ æ¢	EEGHÌ	ı	<u>шэго</u> ËFEGFJ	Н	<u>⊞</u> FI	í	É ÉHJ GY ÉEH	H		H	Ë Ë Ï^Ë€H	H
HÍ	ÞG		<u>E</u> FÍ		<u> </u>	G	<u>⊞F</u> F	G	ÌĚIÎ^ËH	î	HEEL GV EEH			í
HÎ	PG	{ æ¢	EG J	F	ËËUG	î	<u>шы г</u>	î	GEGI I ^ EEH	G		G	Ë ÈÌ^Ë€H	F
HÏ	ÞĞ	1	<u> </u>	G	<u>⊞</u> HÎ	G	ĔŒ	H	JÈÈÌI^Ë⊞	<u> </u>	ˌΠ^ˀI	G		í
HÌ	PG	{ æ¢	<u> </u>	ı	ËHF	î	<u> </u>		FET ^EEH			-	ËÈÍ HÈ	F
HJ	₽Ĝ		<u>EE</u> Î	G	<u> </u>	í	<u>mee</u> l ËÎH	í	FEH F^EEG	<u>G</u>	FÊIÏ^ËH	<u> </u>	GEÉÍÏ^EEH	
I€	PG	{ æ¢		î	— EEÉF	Н	EEF€G	Н		Н	ËËJI^Œ	F	E EHG EH	
1F	ÞĠ		È	G	<u> </u>	í	<u>шес</u> ÈîJ		FEG GY EEG	1	HĒÌ^Ē€H	T	HÊJÌ^ËH	
IG	PG	{ æ¢	EEGÎ	١	<u> </u>	Н	EFF	G		C	ÎÈFGYË	Н	E EFF EH	
IH	ÞGJ	{ æ¢	ÈFÎ	Î	<u> </u>	G	<u></u> ∐3 ∃HÏ	í		ı	ËÈÌÌ^Ë	H	ÌĚJÍ^ËH	
П	PGU	{ a	<u> </u>	G	ËHF	î		F		H		F	GEGIÌ ^EEH	
	ÞH€	{ æ¢	EHF	Н	EEGÎ	1	<u>щгі</u>	î	HEGI^E€H	í	FÊIÏ^ËH	í	GÈFI ^ËEH	_
l Î	PIR	{ a		Í	<u> </u>	Н	<u> </u>	G	EGE G EEH	H		F	ŒÉÉ NŒH	í
		19	ш		П (Д)		шее	J	24.0 11	-11	20 EU EU		220 001	

9bj YcdY'>c]bh8]gd`UWYa Ybhg`fl7cbh]bi YXŁ

	R[ã]c		ÝÆŽjá	ŠÔ	ŸÆÃjá	ŠÔ	ZÁŽAjá) ÝÁÜ[cæaji}ÁÄEEŠÔ ŸÁÜ[cæaji}ÁÄEEŠÔ ZÁÜ[cæaji	} ÁŽÉÉŠÔ
ΙΪ	ÞHG	{ æ¢	ËΉ	G	iiio۔	ĺĺ	ÈHÉH		
ΙÌ		{ a	⊞G+U	T I	ËÈ€Î	Н	⊞∓€G	ÉÈEJÌ^ËH H HÈÏF^ËB H ËÈSF^	ËH F
IJ	ÞН	{ æ¢	ÈGIF	G	<u> </u>	G	ÈlÍ	JÈSEI ^EEH Í ÍË FÌ ^EEH I GÈ JÍ ^	Ë€H Î
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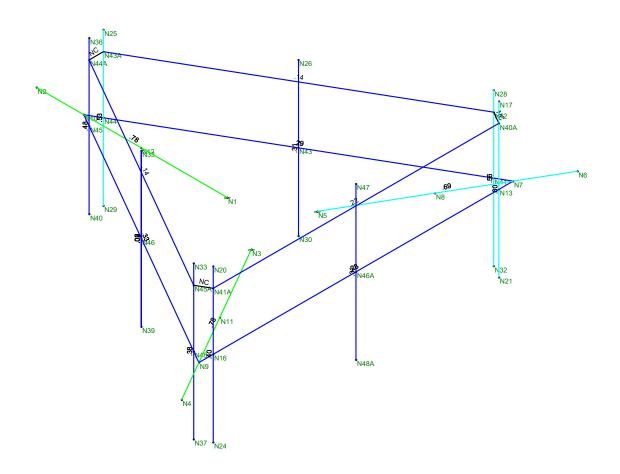
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RADIO FREQUENCY EMISSIONS ANALYSIS REPORT EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CTHA539A

Burlington Fire Department Flagpole 719 George Washington Turnpike Burlington, CT 06013

May 2, 2019

EBI Project Number: 6219001441

Site Compliance Summary				
Compliance Status:	COMPLIANT			
Site total MPE% of				
FCC general population	7.58 %			
allowable limit:				



May 2, 2019

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

Emissions Analysis for Site: CTHA539A - Burlington Fire Department Fla

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **719 George**Washington Turnpike, Burlington, CT, 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 (μ W/cm2). The number of μ W/cm² calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

General population/uncontrolled exposure limits apply to situations in which the general 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 (μ W/cm²). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 μ W/cm² and 467 μ W/cm² respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) frequency bands is 1000 μ W/cm². 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 **719 George Washington Turnpike, Burlington, CT**, 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 manufactures supplied specifications, minus 10 dB for directional panel antennas, 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) 1 UMTS channel (AWS Band 2100 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 2) 2 LTE channels (PCS Band 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 3) 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.
- 4) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 5) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.



- 6) 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.
- 7) 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 manufactures supplied specifications, minus 10 dB for directional panel antennas, 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.
- 8) The antennas used in this modeling are the Ericsson AIR32 B66A/B2A & Ericsson AIR21 B2P/B4A for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the RFS APXVAARR24_43-U-NA20 for 600 MHz and 700 MHz channels. 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 manufactures supplied specifications, minus 10 dB for directional panel antennas, 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.
- 9) The antenna mounting height centerline of the proposed antennas is **179 feet** above ground level (AGL).
- 10) 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.
- 11) All calculations were done with respect to uncontrolled / general population threshold limits.



T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	В	Sector:	С
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR32 B66A/B2A	Make / Model:	Ericsson AIR32 B66A/B2A	Make / Model:	Ericsson AIR32 B66A/B2A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	179 feet	Height (AGL):	179 feet	Height (AGL):	179 feet
Frequency	1900 MHz (PCS) /	Frequency	1900 MHz (PCS) /	Frequency	1900 MHz (PCS) /
Bands	2100 MHz (AWS)	Bands	2100 MHz (AWS)	Bands	2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	200	Total TX Power(W):	200	Total TX Power(W):	200
ERP (W):	7,780.90	ERP (W):	7,780.90	ERP (W):	7,780.90
Antenna A1 MPE%	0.93	Antenna B1 MPE%	0.93	Antenna C1 MPE%	0.93
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR21 B2P/B4A	Make / Model:	Ericsson AIR21 B2P/B4A	Make / Model:	Ericsson AIR21 B2P/B4A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	179 feet	Height (AGL):	179 feet	Height (AGL):	179 feet
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	40	Total TX Power(W):	40	Total TX Power(W):	40
ERP (W):	1,556.18	ERP (W):	1,556.18	ERP (W):	1,556.18
Antenna A2 MPE%	0.19	Antenna B2 MPE%	0.19	Antenna C2 MPE%	0.19
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
Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd
Height (AGL):	179 feet	Height (AGL):	179 feet	Height (AGL):	179 feet
Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,443.03	ERP (W):	2,443.03	ERP (W):	2,443.03
Antenna A3 MPE%	0.70	Antenna B3 MPE%	0.70	Antenna C3 MPE%	0.70

Site Composite MPE%			
Carrier	MPE%		
T-Mobile (Per Sector Max)	1.82 %		
Public Safety	0.85 %		
AT&T	1.28 %		
Verizon Wireless	3.63 %		
Site Total MPE %:	7.58 %		

T-Mobile Sector A Total:	1.82 %
T-Mobile Sector B Total:	1.82 %
T-Mobile Sector C Total:	1.82 %
Site Total:	7.58 %



T-Mobile Maximum MPE Power Values (Per Sector)

T-Mobile _Frequency Band / Technology (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (µW/cm²)	Frequency (MHz)	Allowable MPE (µW/cm²)	Calculated % MPE
T-Mobile PCS - 1900 MHz LTE	2	1,556.18	179	3.74	PCS - 1900 MHz	1000.00	0.37%
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	179	5.61	AWS - 2100 MHz	1000.00	0.56%
T-Mobile AWS - 2100 MHz UMTS	1	1,556.18	179	1.87	AWS - 2100 MHz	1000.00	0.19%
T-Mobile 600 MHz LTE	2	788.97	179	1.90	600 MHz	400.00	0.48%
T-Mobile 700 MHz LTE	2	432.54	179	1.04	700 MHz	467.00	0.22%
						Total:	1.82%

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



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:	1.82 %
Sector B:	1.82 %
Sector C:	1.82 %
T-Mobile Maximum	1.82 %
MPE % (Per Sector):	1.82 %
Site Total:	7.58 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **7.58%** 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.