Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

8/31/2018

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

RE: **Notice of Exempt Modification for T-Mobile Crown Site BU: 876347**
T-Mobile Site ID: CT11377C
53 Slater Street, Manchester, CT 06040
Latitude: 41° 48' 18.0"/ Longitude: -72° 32' 1.0"

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 133-foot level of the existing 155-foot monopole tower at 53 Slater Street in Manchester, CT. The tower is owned by Crown Castle. The property is owned by 121 Connecticut Avenue Associates. T-Mobile intends to replace (6) panel antennas for (6) proposed panel antennas, swap out (3) RRUs and add (1) hybrid fiber cable. T-Mobile will also swap out the antenna mount for a new mount.

This facility was approved by the by the Town of Manchester Planning and Zoning Commission on August 17, 1998. This approval was given without conditions.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b) (2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Jay Moran, Mayor, Town of Manchester, Matthew R. Bordeaux, Senior Planner, as well as the property owner, and Crown Castle is the tower owner.

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

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

3. The proposed modification 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 Communication 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-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: William Stone.

Sincerely,

William Stone
Real Estate Specialist
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
518-373-3543
William.stone@crowncastle.com

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc:

The Honorable Jay Moran, Mayor,
Town of Manchester
41 Center Street
Manchester, CT 06040

Matthew R. Bordeaux, Senior Planner
Town of Manchester
41 Center Street
Manchester, CT 06040

121 Connecticut Avenue Associates
Attn: Jean Burns
9 Lake Lane
Ellington, CT 06029

ORIGIN ID:GFLA (518) 373-3547
WILL STONE
CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065
UNITED STATES US

SHIP DATE: 05SEP18
ACTWGT: 2.00 LB
CAD: 104924194/INET4040

BILL SENDER

TO JEAN BURNS
121 CONNECTICUT AVENUE ASSOC
9 LAKE LANE
ELLINGTON CT 06029
(555) 555-5555 REF: 1734.7680
INV:
PO: DEPT:

552J1/F78C/DCA5

FedEx Express

J182118081501uv

THU - 06 SEP 3:00P
STANDARD OVERNIGHT

TRK# 0201 7731 4152 4970

06029

EB QCWA CT-US BDL

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
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Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

ORIGIN ID:GFLA (518) 373-3547
WILL STONE
CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065
UNITED STATES US

SHIP DATE: 05SEP18
ACTWGT: 2.00 LB
CAD: 104924194/INET4040

BILL SENDER

TO MATTHEW R. BORDEAUX, SR. PLANNER
TOWN OF MANCHESTER
41 CENTER STREET

MANCHESTER CT 06040
(860) 647-5235 REF: 1734.7680
INV:
PO: DEPT:

552J1/F78C/DCA5

J182118081501uv

TRK# 0201 7731 4146 4503

THU - 06 SEP 3:00P
STANDARD OVERNIGHT

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06040
CT-US BDL

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ORIGIN ID:GFLA (518) 373-3547
WILL STONE
CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065
UNITED STATES US

SHIP DATE: 05SEP18
ACTWGT: 2.00 LB
CAD: 104924194/INET4040

BILL SENDER

TO HON. JAY MORAN, MAYOR
TOWN OF MANCHESTER
41 CENTER STREET

MANCHESTER CT 06040
(860) 647-5235 REF: 1734.7680
INV:
PO: DEPT:

552J1/F78C/DCA5

FedEx Express

J182118081501uv

THU - 06 SEP 3:00P
STANDARD OVERNIGHT

TRK# 0201 7731 4143 6867

EB QCWA

06040
CT-US BDL

After printing this label:

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VOL 2013 PG 259

TOWN OF MANCHESTER

PLANNING AND ZONING COMMISSION

CERTIFICATE OF APPROVAL OF SPECIAL EXCEPTION

Owner of record: Raglin Associates, c/o Sullivan Tile Dist.

Property Address: 53 Slater Street

Applicant: Sprint Spectrum LP

Regulation(s) cited: Article IV, Section 19.05

SPECIAL EXCEPTION GRANTED:

with modifications and the condition that a caveat addressing co-location requirements be submitted for staff review and filed on the land records by the applicant prior to any construction.

* ALL SITE WORK APPROVED BY THIS SPECIAL EXCEPTION MUST BE COMPLETED BY AUGUST 17, 2003 (5 yrs. From approval date). FAILURE TO COMPLETE ALL WORK WITHIN THE SPECIFIED TIME PERIOD WILL RESULT IN AUTOMATIC EXPIRATION OF THE APPROVAL.

* THIS CERTIFICATE MUST BE RECORDED IN THE LAND RECORDS IN THE OFFICE OF THE TOWN CLERK BEFORE THE SPECIAL EXCEPTION IS LAWFULLY EFFECTIVE.

CERTIFIED:

Frank Daversa

Secretary
Planning and Zoning Commission

*DATE ADOPTED: August 17, 1998

FILE NO. S-147

Received for Record on
SEP 11 1998 at 2:43 P.M.
Joseph V. Camposeo

Joseph V. Camposeo, Town Clerk

TOWN OF MANCHESTER
41 CENTER STREET - P.O. BOX 191
MANCHESTER, CT 06045-0191
(860) 647-3052 FAX: (860) 647-3144

ZONING PERMIT

CERTIFICATION OF ZONING COMPLIANCE REQUEST

PERMIT/APPLICATION NBR: 99 00000638 DATE APPLIED: 10/08/98
PERMIT TYPE: ZONE APP TYPE: DISH PREPARED BY: PAT21
DATE ISSUED: 11/03/98

PROPERTY ADDRESS:
3 SLATER STREET
TENANT:

LEGAL DESCRIPTION:

OWNER NAME/ADDRESS:
AGLIN ASSOCIATES
C/O SULLIVAN TILE DIST
5 RAILROAD AVE
EST HAVEN CT 06516

CONTRACTOR NAME/ADDRESS:

OTHER:
PRINT PCS

VALUATION:
OCCUPANCY TYPE: COMMERCIAL BUIL Certificate of O-C-U-P-T: C
Dimensions of structure: 150' Plans for building: YES

DESCRIPTION OF OTHER BUILDINGS NOT SHOWN:
CONDITIONS: REMARKS:
ADDTNL APPROVAL: ADDTNL PERMITS:

MISCELLANEOUS INFO: SITE DEVELOPMENT AND COLORS OF TOWER AND EQUIPMENT CABINETS TO BE AS APPRVD BY PZC ON 8/17/98

THIS IS TO CERTIFY THAT THE ABOVE STATED INFORMATION IS A PERMITTED AND LAWFUL USE AS CONTROLLED BY THE ZONING REGULATIONS OF THE TOWN OF MANCHESTER, CONNECTICUT, UPON AUTHORIZED SIGNATURE OF THE ZONING ENFORCEMENT OFFICER.

Thomas R. O'Meara
APPROVAL SIGNATURE

11/3/98
DATE

ORIGINAL

53 SLATER STREET

Location	53 SLATER STREET	**Mblu**	56/ 5140/ 53/ /
Acct#	514000053	**Owner**	ONE HUNDRED TWENTY ONE CONN-
Assessment	$1,690,200	**Appraisal**	$2,414,500
PID	14616	**Building Count**	4

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2011	$1,689,400	$725,100	$2,414,500
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2011	$1,182,600	$507,600	$1,690,200

Owner of Record

Owner	ONE HUNDRED TWENTY ONE CONN-ECTICUT AVENUE ASSOCIATES LLC	**Sale Price**	$1,180,000
		Certificate	C
Address	9 LAKE LANE ELLINGTON, CT 06029	**Book & Page**	2683/ 224
		Sale Date	07/17/2003
		Instrument	33

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
ONE HUNDRED TWENTY ONE CONN-	$1,180,000	C	2683/ 224	33	07/17/2003
RAGLIN ASSOCIATES LLC	$0		2132/ 338		12/02/1999

Building Information

Building 1 : Section 1

Year Built: 1987
Living Area: 6333
Replacement Cost: $474,167
Replacement Cost Less Depreciation: $265,500

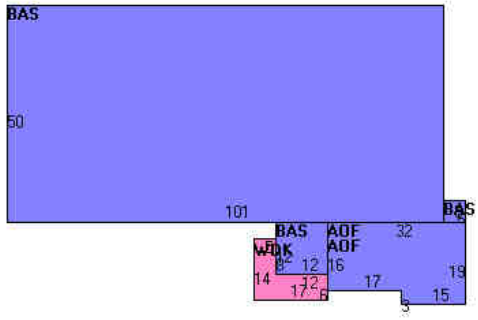
Building Attributes	
Field	**Description**
STYLE	Service Shop
MODEL	Ind/Comm

Building Photo

Grade	Average
Stories:	1
Occupancy	4
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	Brick Veneer
Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Wall Brd/Wood
Interior Wall 2	Minim/Masonry
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	Partial
Bldg Use	Industrial 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	300
Heat/AC	Heat/AC Packag
Frame Type	Steel
Baths/Plumbing	Average
Ceiling/Wall	Ceil & Min Wl
Rooms/Prtns	Average
Wall Height	14
% Comn Wall	0

(http://images.vgsi.com/photos/ManchesterCTPhotos//\00\03\43/03.jpg)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	5219	5219
AOF	Office, (Average)	1114	1114
WDK	Wood Deck	142	0
		6475	6333

Building 2 : Section 1

Year Built: 1987
Living Area: 24306
Replacement Cost: $1,082,175
Replacement Cost Less Depreciation: $606,000

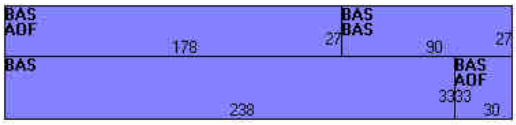
Building Photo

Building Attributes : Bldg 2 of 4	
Field	**Description**
STYLE	Pre-Eng Garage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	4
Exterior Wall 1	Pre-finsh Metl

Exterior Wall 2	Brick Veneer
Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	Partial
Bldg Use	Industrial 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	300
Heat/AC	Heat AC Split
Frame Type	Steel
Baths/Plumbing	Average
Ceiling/Wall	Susp Ceil & Wl
Rooms/Prtns	Average
Wall Height	22
% Comn Wall	0

(http://images.vgsi.com/photos/ManchesterCTPhotos//\00\03\43/04.jpg)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	18510	18510
AOF	Office, (Average)	5796	5796
		24306	24306

Building 3 : Section 1

Year Built: 1987
Living Area: 10320
Replacement Cost: $433,337
Replacement Cost Less Depreciation: $242,700

Building Attributes : Bldg 3 of 4	
Field	**Description**
STYLE	Pre-Eng Garage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	12
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	Brick Veneer

Building Photo

(http://images.vgsi.com/photos/ManchesterCTPhotos//\00\03\43/05.jpg)

Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Electric
Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	Industrial 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	300
Heat/AC	None
Frame Type	Steel
Baths/Plumbing	Average
Ceiling/Wall	Ceil & Min Wl
Rooms/Prtns	Average
Wall Height	18
% Comn Wall	0

Building Layout

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	10320	10320
		10320	10320

Building 4 : Section 1

Year Built: 2008
Living Area: 12000
Replacement Cost: $479,640
Replacement Cost Less Depreciation: $465,300

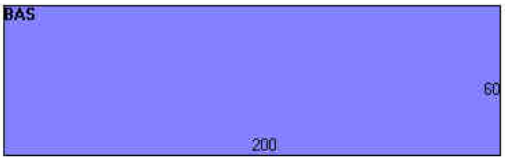
Building Attributes : Bldg 4 of 4	
Field	**Description**
STYLE	Pre-Eng Garage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	8
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	Concr/Cinder
Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas

Building Photo

(http://images.vgsi.com/photos/ManchesterCTPhotos//\00\03\43/06.jpg)

Building Layout

Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	Industrial 96
Total Rooms	00
Total Bedrms	00
Total Baths	0
1st Floor Use:	
Heat/AC	None
Frame Type	Steel
Baths/Plumbing	Average
Ceiling/Wall	Ceil & Min Wl
Rooms/Prtns	Average
Wall Height	18
% Comn Wall	0



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	12000	12000
		12000	12000

Extra Features

Extra Features				Legend
Code	**Description**	**Size**	**Value**	**Bldg #**
A/C	Partial AC	5796 S.F.	$6,500	2

Land

Land Use

Use Code	300
Description	Industrial 96
Zone	IND
Neighborhood	5000
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	4.96
Frontage	0
Depth	0
Assessed Value	$507,600
Appraised Value	$725,100

Outbuildings

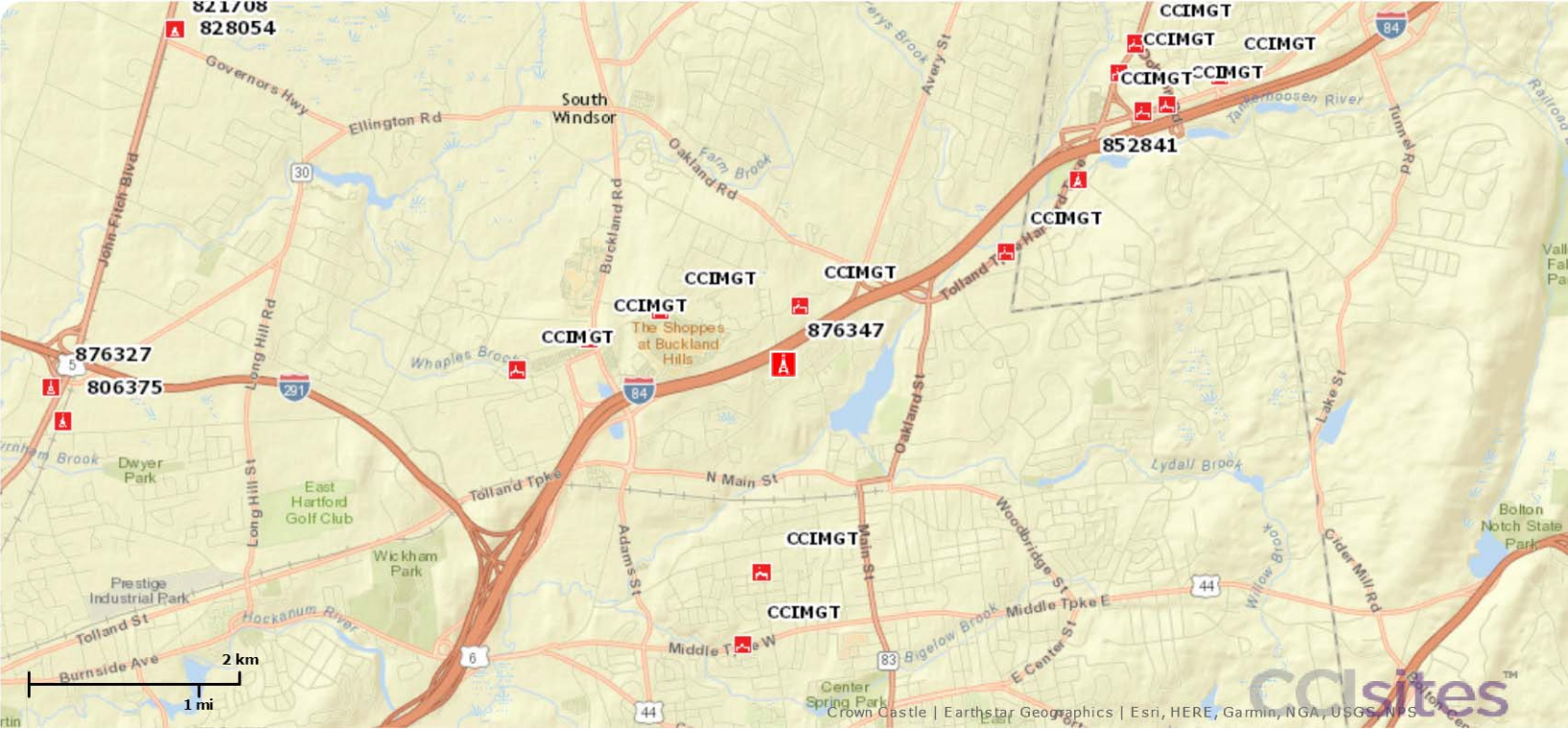
Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
PAV1	Paving Asphalt			13350 S.F.	$19,200	4
PAV1	Paving Asphalt			37000 S.F.	$17,800	1
FN3	Fence 6' Chain			300 L.F.	$2,000	1
PAV2	Paving Concrete			96 S.F.	$300	4
SHDT	Telephone Shed			319 S.F.	$31,600	1
FN4	Fence 8' Chain			54 L.F.	$900	1
SHDT	Telephone Shed			319 S.F.	$31,600	1

Valuation History

Appraisal

Valuation Year	Improvements	Land	Total
2010	$1,766,600	$760,300	$2,526,900
2005	$871,200	$540,700	$1,411,900
2000	$1,082,500	$540,700	$1,623,200

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2010	$1,236,700	$532,300	$1,769,000
2005	$609,900	$378,500	$988,400
2000	$757,800	$378,500	$1,136,300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CCIMGT
876347
876327
806375
CCIMGT
CCIMGT
South Windsor
Ellington Rd
Governors Hwy
John Fitch Blvd
Buckland Rd
Oakland Rd
Farm Brook
Avery St
Tankerhoosen River
Tunnel Rd
Tolland Tpke
Long Hill Rd
Whaples Brook
The Shoppes at Buckland Hills
Oakland St
Lake St
Lydall Brook
Dwyer Park
East Hartford Golf Club
Tolland Tpke
N Main St
Long Hill St
Adams St
Main St
Woodbridge St
Bolton Notch State Park
Prestige Industrial Park
Wickham Park
Tolland St
Hockanum River
Burnside Ave
Middle Tpke W
Middle Tpke E
Bigelow Brook
Willow Brook
Cider Mill Rd
E Center St
Center Spring Park
2 km
1 mi
Crown Castle | Earthstar Geographics | Esri, HERE, Garmin, NGA, USGS, NPS

T-Mobile

CROWN CASTLE

CBU
876347

SITE ID
CT11377C

SITE NAME
SPRINT MANCHESTER/SLATER

SITE ADDRESS
53 SLATER STREET
MANCHESTER, CT 06040

CONFIGURATION
67D92DB_1XAIR+1OP (U21 MARKET)

SHEET INDEX

NO.	DESCRIPTION
T1	TITLE PAGE
N1	NOTES
C1	PLAN & ELEVATION
C2	RF CHART AND ORIENTATION
D1	EQUIPMENT DETAILS
E1	GROUNDING & ELECTRICAL DETAILS
E2	RF PLUMBING DIAGRAM

TOWER OWNER NOTIFICATION

ONCE THE CONTRACTOR HAS RECEIVED AND ACCEPTED THE NOTICE TO PROCEED, CONTRACTOR WILL CONTACT THE CROWN CASTLE CONSTRUCTION MANAGER OF RECORD (NOTED ON THE FIRST PAGE ON THIS CONSTRUCTION DRAWING) A MINIMUM OF 48 HOURS PRIOR TO WORK START. UPON ARRIVAL TO THE JOB SITE, CONTRACTOR CREW IS REQUIRED CALL 1-800-788-7011 TO NOTIFY THE CROWN CASTLE NOC WORK HAS BEGUN.

LOCATION MAP

GENERAL NOTES

- HANDICAP ACCESS REQUIREMENTS ARE NOT REQUIRED.
- FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.
- FACILITY HAS NO PLUMBING OR REFRIGERANTS.
- THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATORY REQUIREMENTS.
- ALL NEW MATERIAL SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR UNLESS NOTED OTHERWISE. EQUIPMENT, ANTENNAS/RRH AND CABLES FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR.
- THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON STORMWATER DRAINAGE.
- NO SANITARY SEWER, POTABLE WATER, OR TRASH DISPOSAL SERVICE IS REQUIRED
- NO COMMERCIAL SIGNAGE IS PROPOSED

CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED WITH ANY LOCAL AMENDMENTS BY THE LOCAL GOVERNING AUTHORITIES:

- INTERNATIONAL BUILDING CODE
- NATIONAL ELECTRICAL CODE
- NATIONAL FIRE PROTECTION ASSOCIATION 101
- NATIONAL FIRE PROTECTION ASSOCIATION 1
- LOCAL BUILDING CODES
- CITY/COUNTY ORDINANCES
- AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATIONS (AISC)
- UNDERWRITERS LABORATORIES APPROVED ELECTRICAL PRODUCTS.
- ANSI EIA/TIA 222 REV. G
- TIA 607
- INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS 81
- IEEE C2 (LATEST EDITION)
- TELCORDIA GR-1275
- ANSI T1.311

PROJECT SITE INFORMATION

SITE ID:	CT11377C
SITE NAME:	SPRINT MANCHESTER/SLATER
SITE ADDRESS:	53 SLATER STREET MANCHESTER, CT 06040
PERMITTING JURISDICTION:	TOWN OF MANCHESTER
COUNTY:	HARTFORD
ZONING:	INDUSTRIAL
SITE COORDINATES:	
LATITUDE:	41.804971° (41°48'17.9") N (NAD 83)
LONGITUDE:	-72.533585° (72°32'00.9") W (NAD 83)
APPLICANT:	T-MOBILE NORTHEAST LLC 103 MONARCH DRIVE LIVERPOOL, NY 13088

STRUCTURAL ANALYSIS INFORMATION

TOWER ANALYSIS

INFINIGY ENGINEERING HAS NOT EVALUATED THE EXISTING TOWER FOR THIS SITE AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. REFER TO STRUCTURAL ANALYSIS FROM TOWER OWNER PRIOR TO ANY CONSTRUCTION.

ANTENNA MOUNTS

INFINIGY ENGINEERING HAS NOT EVALUATED THE EXISTING MOUNTS FOR THIS SITE, AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. REFER TO PASSING MOUNT ANALYSIS PRIOR TO ANY CONSTRUCTION.

PROJECT TEAM INFORMATION

CLIENT REPRESENTATIVE:	CROWN CASTLE 3 CORPORATE PARK DRIVE SUITE 101 CLIFTON PARK, NY 12065
CLIENT REP. CONTACT:	WILL STONE (518) 373-3543
ENGINEER:	INFINIGY 6865 DEERPATH ROAD SUITE 152 ELKRIDGE, MD 21075
ENGINEER CONTACT:	MATTHEW LIVERETTE (518) 690-0790

SCOPE OF WORK

SCOPE OF WORK:
TMO 67D92DB_1xAIR+1OP (U21 Market) (UPSTATE NY MARKET)
REPLACING (3) EXISTING RRU WITH NEW MODELS. ADDING (1) HYBRID FIBER CABLE AND (3) RRUS. REMOVE EXISTING (6) ANTENNAS AND PLACE WITH (6) NEW ANTENNAS. SWAP EXISTING MOUNT FOR NEW MOUNT.

811
Know what's below. Call before you dig.

TO OBTAIN LOCATION OF PARTICIPANTS UNDERGROUND FACILITIES BEFORE YOU DIG IN CONNECTICUT, CONTACT CALL BEFORE YOU DIG
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CONNECTICUT STATUTE REQUIRES MIN OF 2 WORKING DAYS NOTICE BEFORE YOU EXCAVATE

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T-MOBILE NORTHEAST LLC
103 MONARCH DRIVE
LIVERPOOL, NY 13088

INFINIGY
6865 DEERPATH ROAD SUITE 152
ELKRIDGE, MD 21075
TEL (443) 592-3143

STATE OF CONNECTICUT
JOHN S. STEVENS
LICENSED PROFESSIONAL ENGINEER
AUG 20 2018

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No	Submittal / Revision	App'd	Date
0	ISSUED FOR CONSTRUCTION	RCD	08/20/18
A	ISSUED FOR REVIEW	RCD	08/07/18

Drawn: SL
Designed: MRL
Checked: AJD

Project Number: 600-007

Project Title:
CT11377C
SPRINT MANCHESTER/SLATER
53 SLATER STREET
MANCHESTER, CT 06040

Prepared For:
CROWN CASTLE

Drawing Title
TITLE PAGE

Drawing Number
T1

GENERAL NOTES

PART 1 – GENERAL REQUIREMENTS

1.1 THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
- A. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
- B. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
- C. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE – "NEC").
- D. AND NFPA 101 (LIFE SAFETY CODE).
- E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM).
- F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE).

1.2 DEFINITIONS:
A: WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
B: COMPANY: T-MOBILE CORPORATION
C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
D: CONTRACTOR: CONSTRUCTION CONTRACTOR; CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.
E: THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.

1.3 POINT OF CONTACT: COMMUNICATION BETWEEN THE COMPANY AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE COMPANY SITE DEVELOPMENT SPECIALIST OR OTHER PROJECT COORDINATOR APPOINTED TO MANAGE THE PROJECT FOR THE COMPANY.

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

1.5 DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE: THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS, STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES, AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.
A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS-BUILT" DRAWINGS.

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

1.7 NOTICE TO PROCEED:
A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED.
B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE T-MOBILE WITH AN OPERATIONAL WIRELESS FACILITY.

PART 2 – EXECUTION

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

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

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

2.4 COMPANY FURNISHED MATERIAL AND EQUIPMENT: ALL HANDLING, STORAGE AND INSTALLATION OF COMPANY FURNISHED MATERIAL AND EQUIPMENT SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
A. CONTRACTOR SHALL PROCURE ALL OTHER REQUIRED WORK RELATED MATERIALS NOT PROVIDED BY T-MOBILE TO SUCCESSFULLY CONSTRUCT A WIRELESS FACILITY.

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

2.6 EXISTING CONDITIONS: NOTIFY THE COMPANY REPRESENTATIVE OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

PART 3 – RECEIPT OF MATERIAL & EQUIPMENT

3.1 RECEIPT OF MATERIAL AND EQUIPMENT: CONTRACTOR IS RESPONSIBLE FOR T-MOBILE PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:
- A. ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.
- B. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES.
- C. TAKE RESPONSIBILITY FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT.
- D. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY-FOUR HOURS AFTER RECEIPT, REPORT TO T-MOBILE OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
- E. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
- F. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF-LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

PART 4 – GENERAL REQUIREMENTS FOR CONSTRUCTION

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

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

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

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

4.5 CONDUCT TESTING AS REQUIRED HEREIN.

PART 5 – TESTS AND INSPECTIONS

5.1 TESTS AND INSPECTIONS:
- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
- B. CONTRACTOR SHALL COORDINATE TEST AND INSPECTION SCHEDULES WITH COMPANY'S REPRESENTATIVE WHO MUST BE ON SITE TO WITNESS SUCH TESTS AND INSPECTIONS.
- C. WHEN THE USE OF A THIRD PARTY INDEPENDENT TESTING AGENCY IS REQUIRED, THE AGENCY THAT IS SELECTED MUST PERFORM SUCH WORK ON A REGULAR BASIS IN THE STATE WHERE THE PROJECT IS LOCATED AND HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
- D. THE THIRD PARTY TESTING AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
- E. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
- F. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS.
- G. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

PART 6 – TRENCHING AND BACKFILLING

6.1 TRENCHING AND BACKFILLING: THE CONTRACTOR SHALL PERFORM ALL EXCAVATION OF EVERY DESCRIPTION AND OF WHATEVER SUBSTANCES ENCOUNTERED, TO THE DEPTHS INDICATED ON THE CONSTRUCTION DRAWINGS OR AS OTHERWISE SPECIFIED.

A. PROTECTION OF EXISTING UTILITIES: THE CONTRACTOR SHALL CHECK WITH THE LOCAL UTILITIES AND THE RESPECTIVE UTILITY LOCATOR COMPANIES PRIOR TO STARTING EXCAVATION OPERATIONS IN EACH RESPECTIVE AREA TO ASCERTAIN THE LOCATIONS OF KNOWN UTILITY LINES. THE LOCATIONS, NUMBER AND TYPES OF EXISTING UTILITY LINES DETAILED ON THE CONSTRUCTION DRAWINGS ARE APPROXIMATE AND DO NOT REPRESENT EXACT INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL LINES DAMAGED DURING EXCAVATION AND ALL ASSOCIATED OPERATIONS. ALL UTILITY LINES UNCOVERED DURING THE EXCAVATION OPERATIONS, SHALL BE PROTECTED FROM DAMAGE DURING EXCAVATION AND ASSOCIATED OPERATIONS. ALL REPAIRS SHALL BE APPROVED BY THE UTILITY COMPANY.

B. HAND DIGGING: UNLESS APPROVED IN WRITING OTHERWISE, ALL DIGGING WITHIN AN EXISTING CELL SITE COMPOUND IS TO BE DONE BY HAND.

C. DURING EXCAVATION, MATERIAL SUITABLE FOR BACKFILLING SHALL BE STOCKPILED IN AN ORDERLY MANNER A SUFFICIENT DISTANCE FROM THE BANKS OF THE TRENCH TO AVOID OVERLOADING AND TO PREVENT SLIDES OR CAVE-INS. ALL EXCAVATED MATERIALS NOT REQUIRED OR SUITABLE FOR BACKFILL SHALL BE REMOVED AND DISPOSED OF AT THE CONTRACTOR'S EXPENSE.

D. GRADING SHALL BE DONE AS MAY BE NECESSARY TO PREVENT SURFACE WATER FROM FLOWING INTO TRENCHES OR OTHER EXCAVATIONS, AND ANY WATER ACCUMULATING THEREIN SHALL BE REMOVED BY PUMPING OR BY OTHER APPROVED METHOD.

E. SHEETING AND SHORING SHALL BE DONE AS NECESSARY FOR THE PROTECTION OF THE WORK AND FOR THE SAFETY OF PERSONNEL. UNLESS OTHERWISE INDICATED, EXCAVATION SHALL BE BY OPEN CUT, EXCEPT THAT SHORT SECTIONS OF A TRENCH MAY BE TUNNELED IF, THE CONDUIT CAN BE SAFELY AND PROPERLY INSTALLED AND BACKFILL CAN BE PROPERLY TAMPED IN SUCH TUNNEL SECTIONS. EARTH EXCAVATION SHALL COMPRISE ALL MATERIALS AND SHALL INCLUDE CLAY, SILT, SAND, MUCK, GRAVEL, HARDPAN, LOOSE SHALE, AND LOOSE STONE.

F. TRENCHES SHALL BE OF NECESSARY WIDTH FOR THE PROPER LAYING OF THE CONDUIT OR CABLE, AND THE BANKS SHALL BE AS NEARLY VERTICAL AS PRACTICABLE. THE BOTTOM OF THE TRENCHES SHALL BE ACCURATELY GRADED TO PROVIDE UNIFORM BEARING AND SUPPORT FOR EACH SECTION OF THE CONDUIT OR CABLE ON UNDISTURBED SOIL AT EVERY POINT ALONG ITS ENTIRE LENGTH. EXCEPT WHERE ROCK IS ENCOUNTERED, CARE SHALL BE TAKEN NOT TO EXCAVATE BELOW THE DEPTHS INDICATED. WHERE ROCK EXCAVATIONS ARE NECESSARY, THE ROCK SHALL BE EXCAVATED TO A MINIMUM OVER DEPTH OF 6 INCHES BELOW THE TRENCH DEPTHS INDICATED ON THE CONSTRUCTION DRAWINGS OR SPECIFIED. OVER DEPTHS IN THE ROCK EXCAVATION AND UNAUTHORIZED OVER DEPTHS SHALL BE THOROUGHLY BACK FILLED AND TAMPED TO THE APPROPRIATE GRADE. WHENEVER WET OR OTHERWISE UNSTABLE SOIL THAT IS INCAPABLE OF PROPERLY SUPPORTING THE CONDUIT OR CABLE IS ENCOUNTERED IN THE BOTTOM OF THE TRENCH, SUCH SOLID SHALL BE REMOVED TO A MINIMUM OVER DEPTH OF 6 INCHES AND THE TRENCH BACKFILLED TO THE PROPER GRADE WITH EARTH OF OTHER SUITABLE MATERIAL, AS HEREINAFTER SPECIFIED.

G. BACKFILLING OF TRENCHES. TRENCHES SHALL NOT BE BACKFILLED UNTIL ALL SPECIFIED TESTS HAVE BEEN PERFORMED AND ACCEPTED. WHERE COMPACTED BACKFILL IS NOT INDICATED THE TRENCHES SHALL BE CAREFULLY BACKFILLED WITH SELECT MATERIAL SUCH AS EXCAVATED SOILS THAT ARE FREE OF ROOTS, SOD, RUBBISH OR STONES, DEPOSITED IN 6 INCH LAYERS AND THOROUGHLY AND CAREFULLY RAMMED UNTIL THE CONDUIT OR CABLE HAS A COVER OF NOT LESS THAN 1 FOOT. THE REMAINDER OF THE BACKFILL MATERIAL SHALL BE GRANULAR IN NATURE AND SHALL NOT CONTAIN ROOTS, SOD, RUBBING, OR STONES OF 2-1/2 INCH MAXIMUM DIMENSION. BACKFILL SHALL BE CAREFULLY PLACED IN THE TRENCH AND IN 1 FOOT LAYERS AND EACH LAYER TAMPED. SETTLING THE BACKFILL WITH WATER WILL BE PERMITTED. THE SURFACE SHALL BE GRADED TO A REASONABLE UNIFORMITY AND THE MOUNDING OVER THE TRENCHES LEFT IN A UNIFORM AND NEAT CONDITION.

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
	NON-FUSIBLE DISCONNECT SWITCH
F	FUSIBLE DISCONNECT SWITCH
	SURFACE MOUNTED PANEL BOARD
T	TRANSFORMER
M	KILOWATT HOUR METER
JB	JUNCTION BOX
PB	PULL BOX TO NEC/TELCO STANDARDS
	UNDERGROUND UTILITIES
	EXOTHERMIC WELD CONNECTION
	MECHANICAL CONNECTION
OR	GROUND ROD
OR	GROUND ROD WITH INSPECTION SLEEVE
	GROUND BAR
	120AC DUPLEX RECEPTACLE
G	GROUND CONDUCTOR
	DC POWER AND FIBER OPTIC TRUNK CABLES
E	DC POWER CABLES
# / #	REPRESENTS DETAIL NUMBER / REF. DRAWING NUMBER

ABBREVIATIONS

CIGBE	COAX ISOLATED GROUND BAR EXTERNAL
MIGB	MASTER ISOLATED GROUND BAR
SST	SELF SUPPORTING TOWER
GPS	GLOBAL POSITIONING SYSTEM
TYP.	TYPICAL
DWG	DRAWING
BCW	BARE COPPER WIRE
BFG	BELOW FINISH GRADE
PVC	POLYVINYL CHLORIDE
CAB	CABINET
C	CONDUIT
SS	STAINLESS STEEL
G	GROUND
AWG	AMERICAN WIRE GAUGE
RGS	RIGID GALVANIZED STEEL
AHJ	AUTHORITY HAVING JURISDICTION
TTLNA	TOWER TOP LOW NOISE AMPLIFIER
UNO	UNLESS NOTED OTHERWISE
EMT	ELECTRICAL METALLIC TUBING
AGL	ABOVE GROUND LEVEL

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JOHN S. STEVENS
No. 24705
AUG 20 2018
PROFESSIONAL ENGINEER

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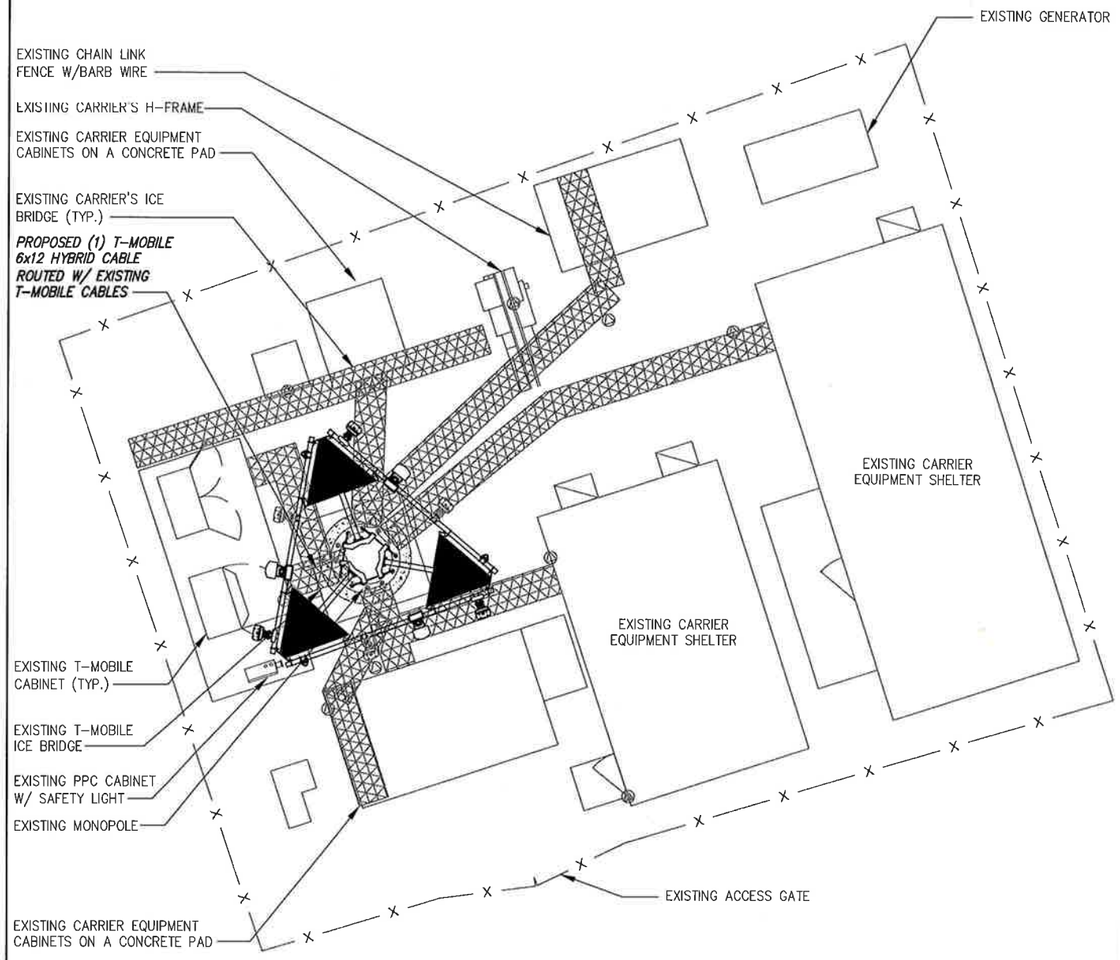
Prepared For:
CROWN CASTLE

Drawing Title
NOTES

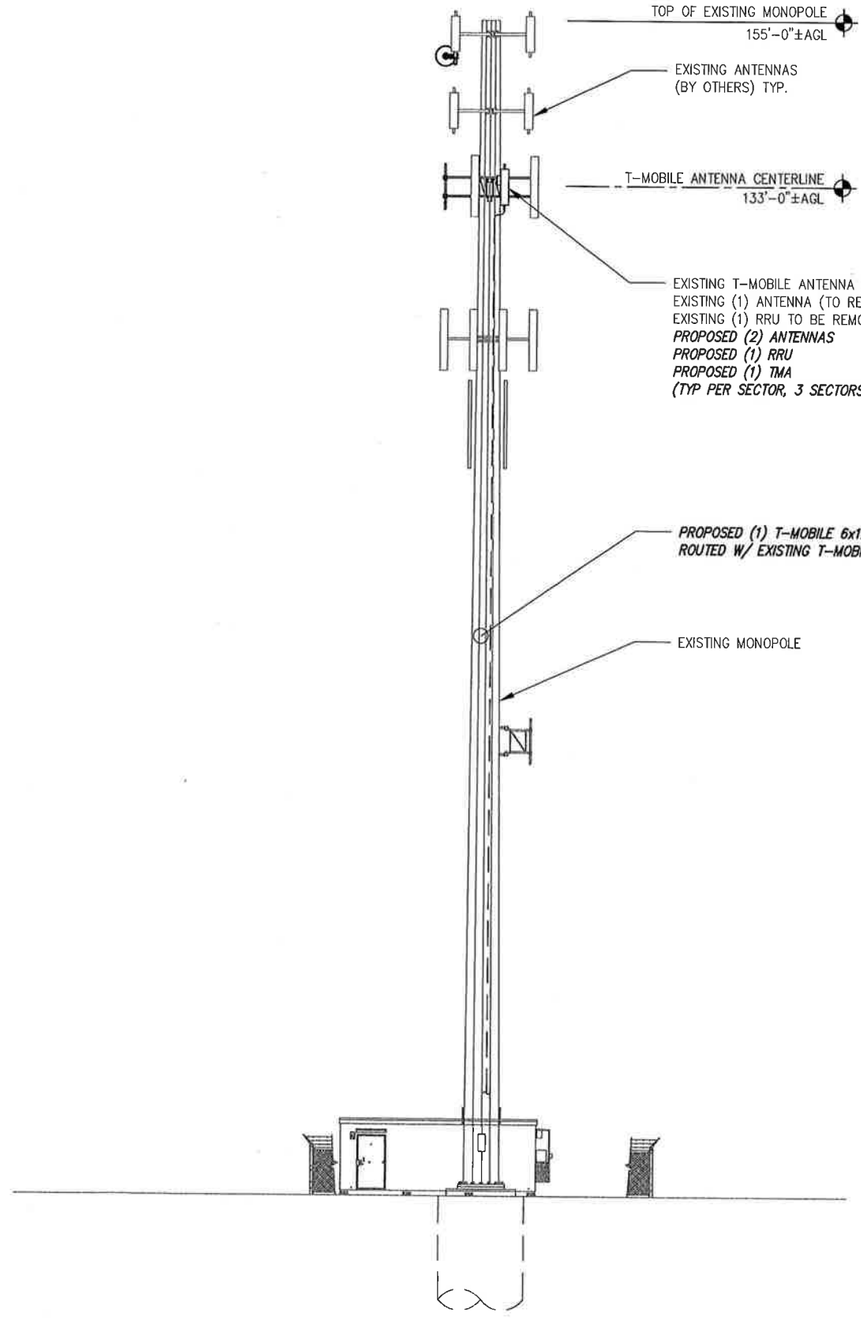
Drawing Number
N1



NORTH

1 / C1 PLAN VIEW
SCALE: AS NOTED

GRAPHIC SCALE:
40' 20' 0 20' 40'
SCALE (11x17): 1" = 40'-0"
SCALE (22x34): 1" = 20'-0"



2 / C1 ELEVATION
SCALE: NOT TO SCALE

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PLAN AND ELEVATION

Drawing Number
C1

SECTOR	ANTENNA POSITION	ANTENNA MODEL #	VENDOR	AZIMUTH	M-TILT	E-TILT	ANTENNA CENTERLINE	TMA/RRU MODEL #	CABLE LENGTH	CABLE TYPE AND QUANTITY
ALPHA	A-1	**AIR21 B2A B4P**	ERICSSON	40°	0	TBD	133'-0"	**(1) TWIN STYLE 1B-AWS**	**183'±**	(2) 1-5/8" COAX
	A-2	**APXVAARR24_43-U-NA20**	**RFS**	**40°**	0	TBD	133'-0"	**(1) RRU 4449 B71=B12**	183'±	**(1) 6X12 HYBRID TRUNK CABLE (SHARED)**
	A-3	AIR 32 B2A/B66AA	ERICSSON	40°	0	TBD	133'-0"	--	183'±	(1) 6X12 HYBRID TRUNK CABLE (SHARED)
BETA	B-1	**AIR21 B2A B4P**	ERICSSON	170°	0	TBD	133'-0"	**(1) TWIN STYLE 1B-AWS**	**183'±**	(2) 1-5/8" COAX
	B-2	**APXVAARR24_43-U-NA20**	**RFS**	**170°**	0	TBD	133'-0"	**(1) RRU 4449 B71=B12**	183'±	**(1) 6X12 HYBRID TRUNK CABLE (SHARED)**
	B-3	AIR 32 B2A/B66AA	ERICSSON	170°	0	TBD	133'-0"	--	183'±	(1) 6X12 HYBRID TRUNK CABLE (SHARED)
GAMMA	C-1	**AIR21 B2A B4P**	ERICSSON	270°	0	TBD	133'-0"	**(1) TWIN STYLE 1B-AWS**	**183'±**	(2) 1-5/8" COAX
	C-2	**APXVAARR24_43-U-NA20**	**RFS**	**270°**	0	TBD	133'-0"	**(1) RRU 4449 B71=B12**	183'±	**(1) 6X12 HYBRID TRUNK CABLE (SHARED)**
	C-3	AIR 32 B2A/B66AA	ERICSSON	270°	0	TBD	133'-0"	--	183'±	(1) 6X12 HYBRID TRUNK CABLE (SHARED)

1 C2 RF SYSTEM CHART
SCALE: NOT TO SCALE

KEY

EXISTING
PROPOSED

ANTENNA LOCATION KEY

VIEWED FROM BEHIND

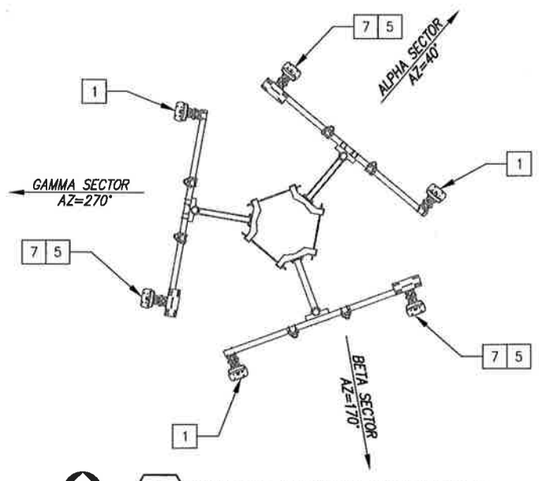
#1 #2 #3

GENERAL NOTES:

1. CONTRACTOR TO VERIFY PROPOSED ANTENNA INFORMATION IS THE MOST CURRENT AT TIME OF CONSTRUCTION.
2. CONTRACTOR TO CONFIRM CABLE LENGTHS FOR ANY PROPOSED CABLES/JUMPERS PRIOR TO CONSTRUCTION.

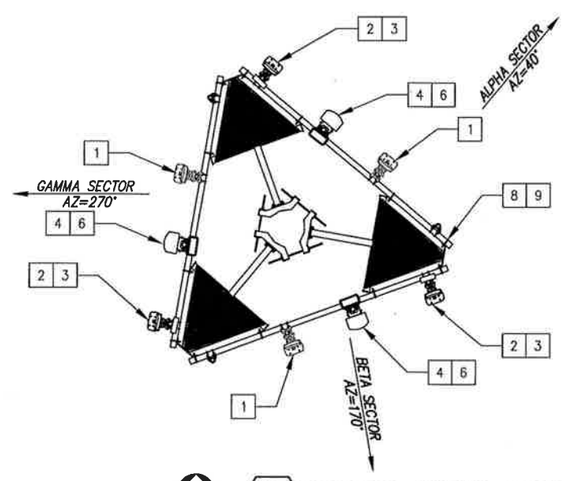
ORIENTATION PLAN KEY

KEY	DESCRIPTION	TYPE	QTY	STATUS
1	AIR -32 B2A/B66AA	ANTENNA	3	REMAIN
2	**AIR21 B2A/B4P**	**ANTENNA**	**3**	**PROPOSED**
3	**TWIN STYLE 1B-AWS**	**TMA**	**3**	**PROPOSED**
4	**APXVAARR24_43-U-NA20**	**ANTENNA**	**3**	**PROPOSED**
5	RRUS11 B12	RRU	3	REMOVED
6	**RRUS 4449**	**RRU**	**3**	**PROPOSED**
7	AIR21 B4A/B12P	ANTENNA	3	REMOVED
8	**MTS-196-14**	**PLATFORM**	**1**	**PROPOSED**
9	**MT-195-12**	**HANDRAIL KIT**	**1**	**PROPOSED**



NORTH

2 C2 EXISTING ANTENNA ORIENTATION
SCALE: NOT TO SCALE



NORTH

3 C2 PROPOSED ANTENNA ORIENTATION
SCALE: NOT TO SCALE

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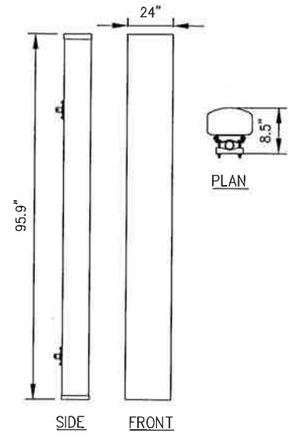
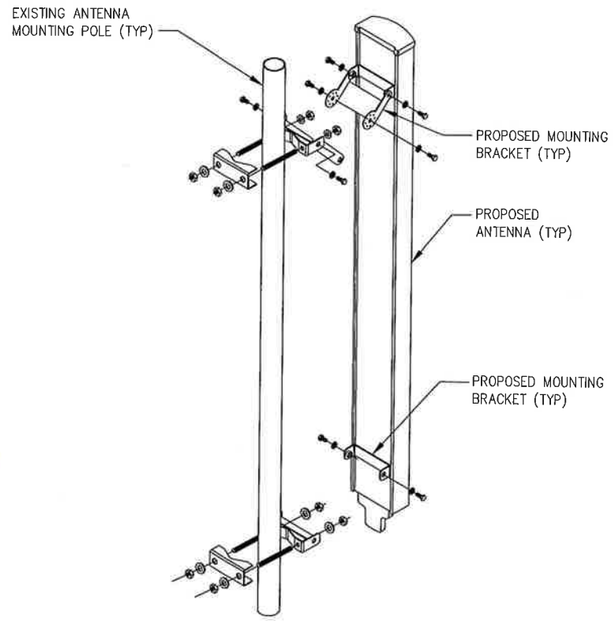
RF CHART

Drawing Number
C2

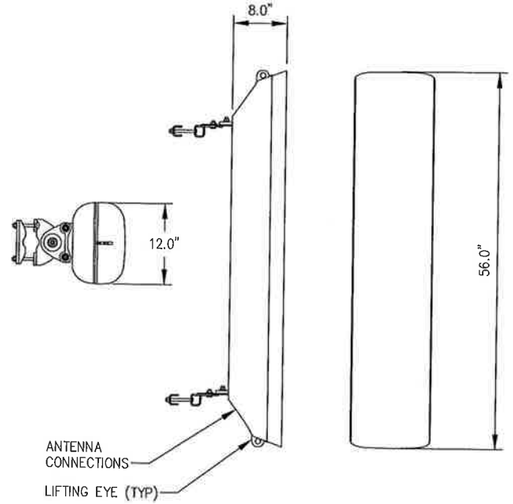


RFS MODEL NO.:	APXVAARR24_43-U-NA20
RADOME MATERIAL:	FIBERGLASS
RADOME COLOR:	LIGHT GREY
DIMENSIONS, HxWxD:	95.9"x24"x8.5"
WEIGHT, W/O MOUNTING KIT:	128 LBS

1 / D1 APX ANTENNA DETAIL
SCALE: NOT TO SCALE

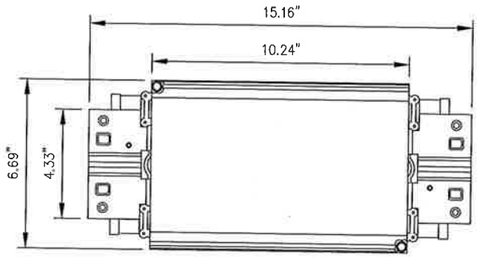


2 / D1 ANTENNA/RRU MOUNTING DETAIL
SCALE: NOT TO SCALE

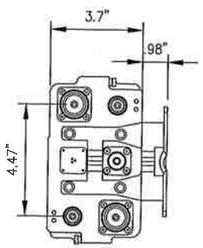


ERICSSON MODEL NO.:	AIR21-B2A/B4P
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
RADOME COLOR:	LIGHT GRAY
DIMENSIONS, HxWxD:	56.0"x12.0"x8.0"
WEIGHT, W/ PRE-MOUNTED BRACKETS:	83.0 LBS
CONNECTOR:	(2) 7-16 DIN FEMALE

3 / D1 AIR ANTENNA DETAIL
SCALE: NOT TO SCALE

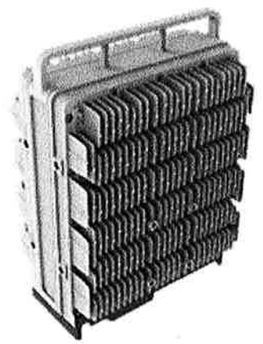


FRONT VIEW



BOTTOM VIEW

4 / D1 TMA DETAIL
SCALE: NOT TO SCALE



ERICSSON 4449 B71+B12 SPECIFICATIONS

- HxWxD, (INCHES) : 17.91"x13.19"x10.63"
- WEIGHT (LBS) : 74.96
- COLOR : GRAY

5 / D1 4449 B71+B12 RRU DETAIL
SCALE: NOT TO SCALE

T-MOBILE NORTHEAST LLC
103 MONARCH DRIVE
LIVERPOOL, NY 13088

INFINIGY
6865 DEERPATH ROAD SUITE 152
ELKRIDGE, MD 21075
TEL (443) 592-3143

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
LICENSED PROFESSIONAL ENGINEER
AUG 30 2018

No	Submittal / Revision	App'd	Date
0	ISSUED FOR CONSTRUCTION	RCD	08/30/18
A	ISSUED FOR REVIEW	RCD	08/07/18

Drawn: SL
Designed: MRL
Checked: AJD

Project Number: 600-007

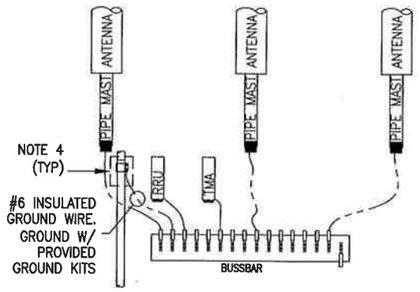
Project Title:
CT11377C
SPRINT
MANCHESTER/SLATER
53 SLATER STREET
MANCHESTER, CT 06040

Prepared For: CROWN CASTLE

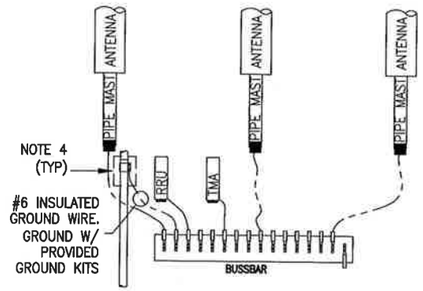
Drawing Title
EQUIPMENT DETAILS

Drawing Number
D1

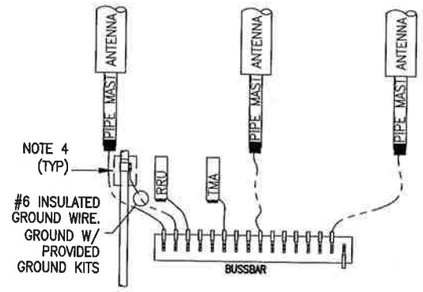
ALPHA SECTOR
(LAYOUT SHOWN GENERICALLY, SEE ANTENNA ORIENTATION)



BETA SECTOR
(LAYOUT SHOWN GENERICALLY, SEE ANTENNA ORIENTATION)

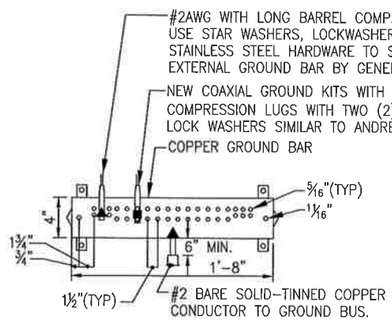


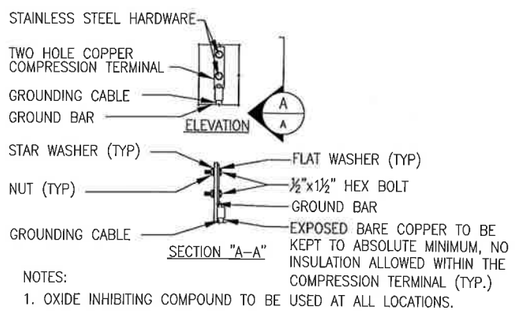
GAMMA SECTOR
(LAYOUT SHOWN GENERICALLY, SEE ANTENNA ORIENTATION)



NOTES:
1. PROVIDE #2AWG GROUNDING CONDUCTOR, U.O.N.
2. PROVIDE BONDING AND GROUNDING CONDUCTORS WITH GREEN TYPE THWN INSULATION, U.O.N.
3. PROVIDE SOLID TINNED BARE COPPER WIRE (BCW) GROUNDING CONDUCTOR.
4. PROVIDE STANDARD COAX OR HYBRID CABLE GROUNDING KIT OR FIELD FABRICATE TO SUIT CONDITIONS. TOTAL LENGTH OF GROUNDING CONDUCTOR SHALL NOT EXCEED 10'-0".
5. PROVIDE GROUNDING ELECTRODES QUANTITY, TYPE AND SIZE AS INDICATED ON SITE GROUNDING PLAN.
6. LEAVE GROUND WIRE COILED UP ABOVE GRADE. CAP END OF CONDUIT.
7. ADD COAX OR HYBRID CABLE GROUND KIT CONNECTION TO BUSSBAR WHEN LENGTH OF CABLE TRAY (FROM TOWER OR MONOPOLE TO EQUIPMENT) IS GREATER THAN 20'-0".
8. ADD #2/0 GREEN INSULATED CONDUCTOR BETWEEN CABLE TRAY AND GRIPSTRUT/COVER.
9. BUSSBARS ARE TO BE TINNED COPPER BARS (¼"X2"X12") MOUNTED ON INSULATORS, U.O.N.
10. GROUND ALL PROPOSED ANTENNAS, DIPLEXERS, TMAS, AND RRUS PER MANU. SPECS.

1 / E1 GROUNDING DIAGRAM
SCALE: NOT TO SCALE

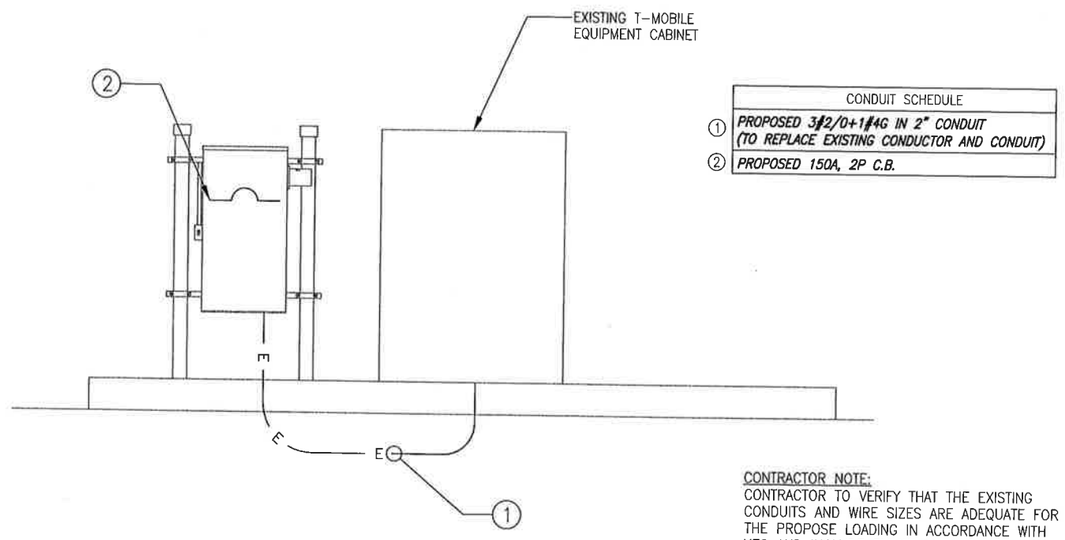




NOTES:
1. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

NOTES:
1. ALL HARDWARE STAINLESS STEEL COAT ALL SURFACES WITH KOPR-SHIELD BEFORE MATING.
2. FOR GROUND BOND TO STEEL ONLY: INSERT A TOOTH WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH KOPR-SHIELD.
3. ALL HOLES ARE COUNTERSUNK 1/16".

2 / E1 GROUND BAR CONNECTION DETAIL
SCALE: NOT TO SCALE



CONDUIT SCHEDULE
① PROPOSED 3#2/0+1#4G IN 2" CONDUIT (TO REPLACE EXISTING CONDUCTOR AND CONDUIT)
② PROPOSED 150A, 2P C.B.

CONTRACTOR NOTE:
CONTRACTOR TO VERIFY THAT THE EXISTING CONDUITS AND WIRE SIZES ARE ADEQUATE FOR THE PROPOSE LOADING IN ACCORDANCE WITH NEC AND INCLUDE ELECTRICAL UPGRADES IN THE SCOPE OF WORK AS REQUIRED.

3 / E1 ONE LINE DIAGRAM
SCALE: NOT TO SCALE

T-MOBILE NORTHEAST LLC
103 MONARCH DRIVE
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TEL (443) 592-3143

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 34201
LICENSED PROFESSIONAL ENGINEER
AUG 28 2018

No.	Submittal / Revision	Appd	Date
0	ISSUED FOR CONSTRUCTION	RCD	08/20/18
A	ISSUED FOR REVIEW	RCD	08/07/18

Drawn: SL
Designed: MBL
Checked: AJD

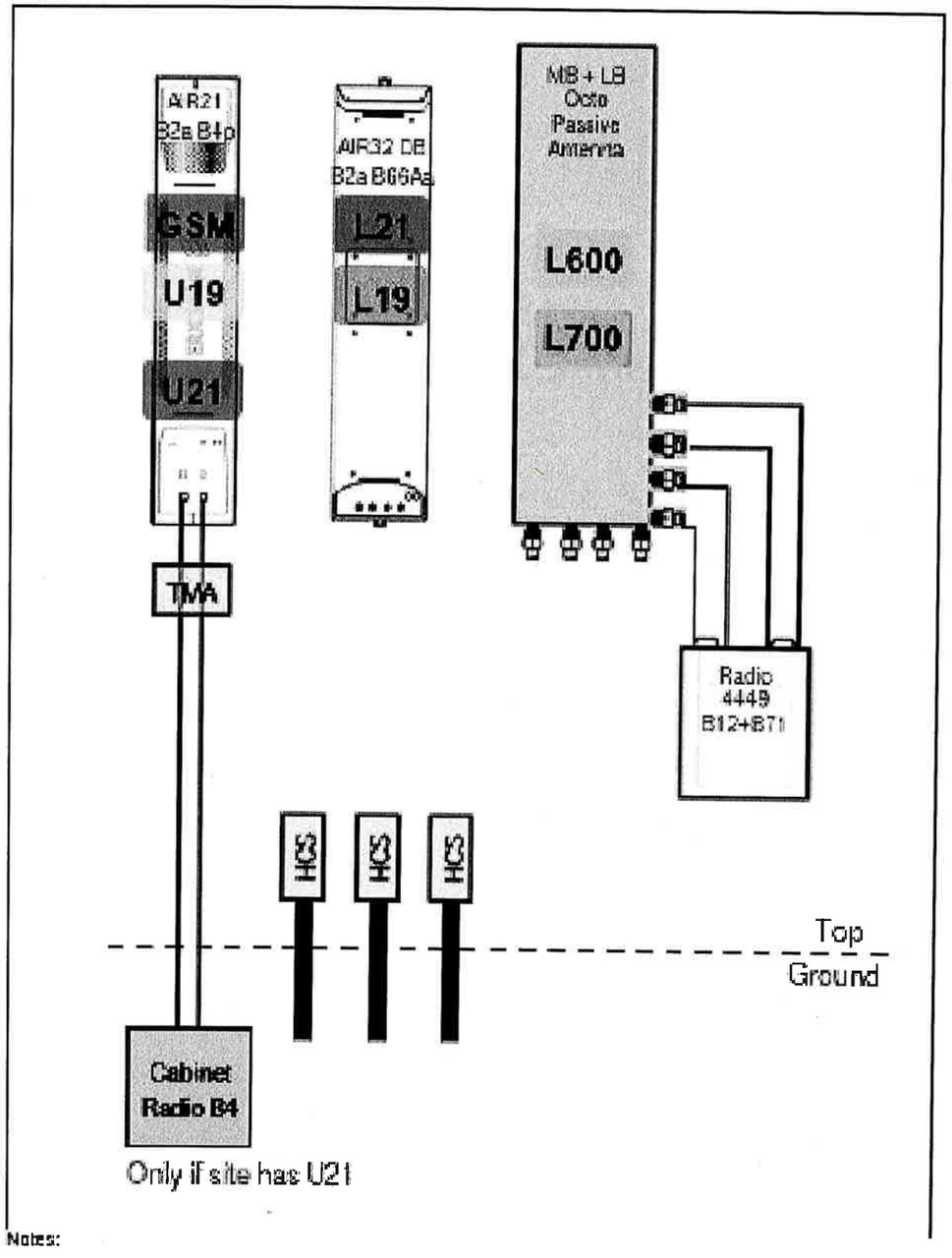
Project Number: 600-007

Project Title:
CT11377C
SPRINT
MANCHESTER/SLATER
53 SLATER STREET
MANCHESTER, CT 06040

Prepared For:
CROWN CASTLE

Drawing Title
GROUNDING & ELECTRICAL DETAILS

Drawing Number
E1



Notes:

1 / E2 RF PLUMBING DIAGRAM
SCALE: AS NOTED

T-Mobile

T-MOBILE NORTHEAST LLC
103 MONARCH DRIVE
LIVERPOOL, NY 13088

INFINIGY

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STATE OF CONNECTICUT
JOHN S. STEVENS
No. 21705
PROFESSIONAL ENGINEER
AUG 20 2018

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53 SLATER STREET
MANCHESTER, CT 06040

Prepared For: CROWN CASTLE

Drawing Title
RF PLUMBING DIAGRAM

Drawing Number
E2

PAUL J. FORD & COMPANY

Date: **August 06, 2018**

Charles Trask
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Paul J. Ford and Company
250 East Broad st., Suite 600
Columbus, OH 43215
(614) 221-6679

Subject: **Structural Analysis Report**

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11377C
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	876347
	Crown Castle Site Name:	BUCKLAND MALL
	Crown Castle JDE Job Number:	512593
	Crown Castle Work Order Number:	1601377
	Crown Castle Order Number:	446062 Rev. 0
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37518-2720.001.7805
Site Data:	**53 Slater Street, MANCHESTER, Hartford County, CT**	
	Latitude *41° 48' 18"*, Longitude *-72° 32' 1"*	
	155 Foot - Monopole Tower	

Dear Charles Trask,

Paul J. Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1231155, in accordance with order 446062, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II, Exposure Category C and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1 were used in this analysis.

We at *Paul J. Ford and Company* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Gowtham

Gowtham Penumatsa
Structural Designer MCS

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER

8-7-18

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 155 ft Monopole tower designed by SUMMIT in February of 2002. The tower was originally designed for a wind speed of 80 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, “Structural Standard for Antenna Supporting Structures and Antennas”, with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II, Exposure Category C and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1 were used in this analysis.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
133.0	133.0	3	ericsson	ERICSSON AIR 21 B2A B4P	1	1-3/8	-
		3	ericsson	KRY 112 144/1			
		3	ericsson	RADIO 4449 B12/B71			
		3	rfs celwave	APXVAARR24_43-U-NA20			
		1	Commscope	MT-195-12 Handrail Kit			
		1	Commscope	MT-196-14 Low profile Platform			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
155.0	155.0	3	alcatel lucent	TD-RRH8x20-25	5 2 3 3 2	1/2 5/8 1-1/4 5/16 2” Cond	1
		3	argus technologies	LPX310R w/ Mount Pipe			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		3	samsung telecommunications	WIMAX DAP HEAD			
		1	tower mounts	Miscellaneous [NA 510-1]			
		1	tower mounts	Platform Mount [LP 1201-1]			
	151.0	1	andrew	VHLP1-23			
		1	andrew	VHLP2-11			
		1	andrew	VHLP2.5-18			
		3	dragonwave	HORIZON COMPACT			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
153.0	153.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	-	-	1
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Pipe Mount [PM 601-3]			
		1	tower mounts	Side Arm Mount [SO 104-3]			
145.0	147.0	3	ericsson	RRUS 11	-	-	1
	145.0	1	tower mounts	Pipe Mount [PM 601-3]			
143.0	145.0	3	cci antennas	OPA-65R-LCUU-H6 w/ Mount Pipe	2 1	3/4 3/8	2
		1	raycap	DC6-48-60-18-8F			
		6	cci antennas	TPX-070821			
		3	ericsson	RRUS 11			
		3	ericsson	RRUS 32			
		3	ericsson	RRUS 32 B2			
		3	kathrein	782 10253			
		3	quintel technology	QS66512-2 w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F	6 2 1	1-1/4 3/4 3/8	1
	143.0	1	tower mounts	T-Arm Mount [TA 702-3]			
133.0	133.0	3	ericsson	AIR -32 B2A/B66AA	1 7	1-1/4 1-5/8	1
		3	ericsson	KRC 118 057/1 w/ Mount Pipe	-	-	3
		3	ericsson	RRUS 11 B12			
		1	tower mounts	Platform Mount [LP 403-1]			
		1	tower mounts	Side Arm Mount [SO 201-3]			
113.0	113.0	3	alcatel lucent	RRH2X60-AWS	12 2	1-5/8 1-1/4	1
		3	alcatel lucent	RRH2x60-700			
		3	andrew	LNX-6512DS-T0M w/ Mount Pipe			
		3	antel	BXA-70063/6CFx2 w/ Mount Pipe			
		6	commscope	SBNHH-1D65B w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		1	tower mounts	Platform Mount [LP 1201-1]			
60.0	60.0	1	tower mounts	Side Arm Mount [SO 701-1]	-	-	1

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 1204605EG1, 06/12/2012	1533476	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 329298-597, 09/11/1998	1615406	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, A02-T0021, 02/18/2002	2068033	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.2.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J. Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	155 - 115.5	Pole	TP29.31x22x0.25	1	-11.94	1507.55	59.4	Pass
L2	115.5 - 79.25	Pole	TP35.51x28.11x0.31	2	-22.07	2469.71	87.0	Pass
L3	79.25 - 43.75	Pole	TP41.46x34.06x0.38	3	-31.85	3485.55	92.4	Pass
L4	43.75 - 0	Pole	TP48.8x39.73x0.44	4	-49.30	4858.33	91.8	Pass
							Summary	
						Pole (L3)	92.4	Pass
						RATING =	**92.4**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	93.2	Pass
1	Base Plate	0	75.5	Pass
1	Base Foundation Structural Steel	0	61.5	Pass
1	Base Foundation Soil Interaction	0	54.4	Pass

Structure Rating (max from all components) =	**93.2%**

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.

4.1) Recommendations

The monopole and its foundation have sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 97.0 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.00 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50.0 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60.0 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	155.00-115.50	39.50	3.75	18	22.00	29.31	0.25	1.00	A607-60 (60 ksi)
L2	115.50-79.25	40.00	4.50	18	28.11	35.51	0.31	1.25	A607-65 (65 ksi)
L3	79.25-43.75	40.00	5.25	18	34.06	41.46	0.38	1.50	A607-65

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L4	43.75-0.00	49.00		18	39.73	48.80	0.44	1.75	(65 ksi) A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.30	17.26	1031.48	7.72	11.18	92.29	2064.32	8.63	3.43	13.728
	29.72	23.06	2459.70	10.32	14.89	165.21	4922.63	11.53	4.72	18.873
L2	29.20	27.58	2692.83	9.87	14.28	188.55	5389.20	13.79	4.40	14.074
	36.01	34.92	5466.10	12.50	18.04	302.98	10939.40	17.46	5.70	18.241
L3	35.37	40.09	5745.80	11.96	17.30	332.11	11499.17	20.05	5.33	14.224
	42.04	48.90	10425.54	14.58	21.06	495.05	20864.80	24.45	6.64	17.697
L4	41.27	54.57	10646.61	13.95	20.19	527.44	21307.22	27.29	6.22	14.225
	49.49	67.16	19844.89	17.17	24.79	800.51	39715.89	33.59	7.82	17.872

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 155.00-115.50				1	1	1			
L2 115.50-79.25				1	1	1			
L3 79.25-43.75				1	1	1			
L4 43.75-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***										
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
**								
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	155.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	2.48
						1" Ice	0.00	4.84
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	155.00 - 0.00	1	No Ice	0.24	0.72
						1/2" Ice	0.34	2.48
						1" Ice	0.44	4.84
ATCB-B01-005(5/16)	C	No	CaAa (Out Of Face)	155.00 - 0.00	3	No Ice	0.00	0.07
						1/2" Ice	0.00	0.57
						1" Ice	0.00	1.68
FSJ4-50B(1/2)	C	No	CaAa (Out Of Face)	155.00 - 0.00	5	No Ice	0.00	0.14
						1/2" Ice	0.00	0.77
						1" Ice	0.00	2.01

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
9776(5/8)	C	No	Inside Pole	155.00 - 0.00	1	No Ice	0.00	0.28
						1/2" Ice	0.00	0.28
						1" Ice	0.00	0.28
HB058-M12-XXXF(5/8)	C	No	Inside Pole	155.00 - 0.00	1	No Ice	0.00	0.24
						1/2" Ice	0.00	0.24
						1" Ice	0.00	0.24
HB114-1-08U4-M5J(1-1/4)	C	No	Inside Pole	155.00 - 0.00	3	No Ice	0.00	1.08
						1/2" Ice	0.00	1.08
						1" Ice	0.00	1.08
**								
LDF6-50A(1-1/4)	C	No	Inside Pole	143.00 - 0.00	6	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
FB-L98B-002-75000(3/8)	C	No	Inside Pole	143.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	143.00 - 0.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
FB-L98B-002-75000(3/8)	C	No	CaAa (Out Of Face)	143.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.60
						1" Ice	0.00	1.76
WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	143.00 - 0.00	1	No Ice	0.00	0.58
						1/2" Ice	0.00	1.38
						1" Ice	0.00	2.78
WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	143.00 - 0.00	1	No Ice	0.08	0.58
						1/2" Ice	0.18	1.38
						1" Ice	0.28	2.78
2" (Nominal) Conduit	C	No	Inside Pole	143.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
**								
HB114-21U3M12-XXXF(1-1/4)	C	No	Inside Pole	133.00 - 0.00	1	No Ice	0.00	1.22
						1/2" Ice	0.00	1.22
						1" Ice	0.00	1.22
LCF158-50JA-A0(1-5/8)	C	No	Inside Pole	133.00 - 0.00	6	No Ice	0.00	0.80
						1/2" Ice	0.00	0.80
						1" Ice	0.00	0.80
HCS 6X12 6AWG(1-3/8)	C	No	Inside Pole	133.00 - 0.00	1	No Ice	0.00	1.70
						1/2" Ice	0.00	1.70
						1" Ice	0.00	1.70
HCS 6X12 4AWG(1-5/8)	C	No	Inside Pole	133.00 - 0.00	1	No Ice	0.00	2.40
						1/2" Ice	0.00	2.40
						1" Ice	0.00	2.40
**								
561(1-5/8)	C	No	Inside Pole	113.00 - 0.00	12	No Ice	0.00	1.35
						1/2" Ice	0.00	1.35
						1" Ice	0.00	1.35
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	113.00 - 0.00	2	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
**								
***								
***								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	155.00-115.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.568	0.61
L2	115.50-79.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.491	1.47

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L3	79.25-43.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.254	1.48
L4	43.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	13.869	1.83

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	155.00-115.50	A	2.302	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	42.409	5.07
L2	115.50-79.25	A	2.228	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	44.865	5.87
L3	79.25-43.75	A	2.128	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	42.884	5.51
L4	43.75-0.00	A	1.921	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	51.102	6.32

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	155.00-115.50	-1.87	1.08	-2.93	1.69
L2	115.50-79.25	-2.12	1.22	-3.48	2.01
L3	79.25-43.75	-2.17	1.25	-3.61	2.09
L4	43.75-0.00	-2.21	1.28	-3.69	2.13

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

Shielding Factor Ka

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

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
LPX310R w/ Mount Pipe	A	From Leg	4.00	0.000	155.00	No Ice	2.31	2.34	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	2.64	2.87	0.05
			0.00			Ice	2.97	3.41	0.08
						1" Ice			
LPX310R w/ Mount Pipe	B	From Leg	4.00	0.000	155.00	No Ice	2.31	2.34	0.03
			0.00			1/2"	2.64	2.87	0.05
			0.00			Ice	2.97	3.41	0.08
						1" Ice			
LPX310R w/ Mount Pipe	C	From Leg	4.00	0.000	155.00	No Ice	2.31	2.34	0.03
			0.00			1/2"	2.64	2.87	0.05
			0.00			Ice	2.97	3.41	0.08
						1" Ice			
HORIZON COMPACT	A	From Leg	4.00	0.000	155.00	No Ice	0.72	0.37	0.01
			0.00			1/2"	0.83	0.45	0.02
			-4.00			Ice	0.94	0.54	0.03
						1" Ice			
HORIZON COMPACT	B	From Leg	4.00	0.000	155.00	No Ice	0.72	0.37	0.01
			0.00			1/2"	0.83	0.45	0.02
			-4.00			Ice	0.94	0.54	0.03
						1" Ice			
HORIZON COMPACT	C	From Leg	4.00	0.000	155.00	No Ice	0.72	0.37	0.01
			0.00			1/2"	0.83	0.45	0.02
			-4.00			Ice	0.94	0.54	0.03
						1" Ice			
WIMAX DAP HEAD	A	From Leg	4.00	0.000	155.00	No Ice	1.55	0.68	0.03
			0.00			1/2"	1.70	0.80	0.04
			0.00			Ice	1.87	0.92	0.06
						1" Ice			
WIMAX DAP HEAD	B	From Leg	4.00	0.000	155.00	No Ice	1.55	0.68	0.03
			0.00			1/2"	1.70	0.80	0.04
			0.00			Ice	1.87	0.92	0.06
						1" Ice			
WIMAX DAP HEAD	C	From Leg	4.00	0.000	155.00	No Ice	1.55	0.68	0.03
			0.00			1/2"	1.70	0.80	0.04
			0.00			Ice	1.87	0.92	0.06
						1" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	0.000	155.00	No Ice	8.26	6.95	0.08
			0.00			1/2"	8.82	8.13	0.15
			0.00			Ice	9.35	9.02	0.23
						1" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.000	155.00	No Ice	8.26	6.95	0.08
			0.00			1/2"	8.82	8.13	0.15
			0.00			Ice	9.35	9.02	0.23
						1" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	0.000	155.00	No Ice	8.26	6.95	0.08
			0.00			1/2"	8.82	8.13	0.15
			0.00			Ice	9.35	9.02	0.23
						1" Ice			
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00	0.000	155.00	No Ice	6.58	4.96	0.08
			0.00			1/2"	7.03	5.75	0.13
			0.00			Ice	7.47	6.47	0.19
						1" Ice			
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00	0.000	155.00	No Ice	6.58	4.96	0.08
			0.00			1/2"	7.03	5.75	0.13
			0.00			Ice	7.47	6.47	0.19
						1" Ice			
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00	0.000	155.00	No Ice	6.58	4.96	0.08
			0.00			1/2"	7.03	5.75	0.13
			0.00			Ice	7.47	6.47	0.19
						1" Ice			
TD-RRH8x20-25	A	From Leg	4.00	0.000	155.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			0.00			Ice	4.56	1.90	0.13
						1" Ice			
TD-RRH8x20-25	A	From Leg	4.00	0.000	155.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	4.56	1.90	0.13
						1" Ice			
TD-RRH8x20-25	B	From Leg	4.00	0.000	155.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			0.00			Ice	4.56	1.90	0.13
						1" Ice			
8'x2 1/2" Pipe Mount	A	From Leg	4.00	0.000	155.00	No Ice	2.30	2.30	0.04
			0.00			1/2"	3.13	3.13	0.06
			0.00			Ice	3.62	3.62	0.08
						1" Ice			
8'x2 1/2" Pipe Mount	B	From Leg	4.00	0.000	155.00	No Ice	2.30	2.30	0.04
			0.00			1/2"	3.13	3.13	0.06
			0.00			Ice	3.62	3.62	0.08
						1" Ice			
8'x2 1/2" Pipe Mount	C	From Leg	4.00	0.000	155.00	No Ice	2.30	2.30	0.04
			0.00			1/2"	3.13	3.13	0.06
			0.00			Ice	3.62	3.62	0.08
						1" Ice			
Miscellaneous [NA 510-1]	C	None		0.000	155.00	No Ice	6.00	6.00	0.26
						1/2"	8.50	8.50	0.34
						Ice	11.00	11.00	0.42
						1" Ice			
Platform Mount [LP 1201-1]	C	None		0.000	155.00	No Ice	23.10	23.10	2.10
						1/2"	26.80	26.80	2.50
						Ice	30.50	30.50	2.90
						1" Ice			
***									
800MHz 2X50W RRH W/FILTER	A	From Leg	1.00	0.000	153.00	No Ice	2.06	1.93	0.06
			0.00			1/2"	2.24	2.11	0.09
			0.00			Ice	2.43	2.29	0.11
						1" Ice			
800MHz 2X50W RRH W/FILTER	B	From Leg	1.00	0.000	153.00	No Ice	2.06	1.93	0.06
			0.00			1/2"	2.24	2.11	0.09
			0.00			Ice	2.43	2.29	0.11
						1" Ice			
800MHz 2X50W RRH W/FILTER	C	From Leg	1.00	0.000	153.00	No Ice	2.06	1.93	0.06
			0.00			1/2"	2.24	2.11	0.09
			0.00			Ice	2.43	2.29	0.11
						1" Ice			
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00	0.000	153.00	No Ice	2.32	2.24	0.06
			0.00			1/2"	2.53	2.44	0.08
			0.00			Ice	2.74	2.65	0.11
						1" Ice			
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00	0.000	153.00	No Ice	2.32	2.24	0.06
			0.00			1/2"	2.53	2.44	0.08
			0.00			Ice	2.74	2.65	0.11
						1" Ice			
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00	0.000	153.00	No Ice	2.32	2.24	0.06
			0.00			1/2"	2.53	2.44	0.08
			0.00			Ice	2.74	2.65	0.11
						1" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	153.00	No Ice	4.39	4.39	0.20
						1/2"	5.48	5.48	0.24
						Ice	6.57	6.57	0.28
						1" Ice			
Side Arm Mount [SO 104-3]	C	None		0.000	153.00	No Ice	3.30	3.30	0.29
						1/2"	4.13	4.13	0.32
						Ice	4.96	4.96	0.35
						1" Ice			
***									
RRUS 11	A	From Leg	1.00	0.000	145.00	No Ice	2.79	1.19	0.05
			0.00			1/2"	3.00	1.34	0.07
			2.00			Ice	3.21	1.50	0.10
						1" Ice			
RRUS 11	B	From Leg	1.00	0.000	145.00	No Ice	2.79	1.19	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	3.00	1.34	0.07
			2.00			1" Ice	3.21	1.50	0.10
RRUS 11	C	From Leg	1.00 0.00 2.00	0.000	145.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
Pipe Mount [PM 601-3]	C	None		0.000	145.00	No Ice 1/2" Ice 1" Ice	4.39 5.48 6.57	4.39 5.48 6.57	0.20 0.24 0.28
***									
DC6-48-60-18-8F	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	0.02 0.04 0.06
QS66512-2 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	3.83 9.29 9.91	6.22 9.66 10.62	0.14 0.21 0.30
QS66512-2 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	3.83 9.29 9.91	6.22 9.66 10.62	0.14 0.21 0.30
QS66512-2 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	3.83 9.29 9.91	6.22 9.66 10.62	0.14 0.21 0.30
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	7.18 8.36 9.26	0.10 0.18 0.26
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	7.18 8.36 9.26	0.10 0.18 0.26
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	7.18 8.36 9.26	0.10 0.18 0.26
(2) TPX-070821	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.47 0.56 0.66	0.10 0.15 0.20	0.01 0.01 0.02
(2) TPX-070821	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.47 0.56 0.66	0.10 0.15 0.20	0.01 0.01 0.02
(2) TPX-070821	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.47 0.56 0.66	0.10 0.15 0.20	0.01 0.01 0.02
782 10253	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.11 0.15 0.20	0.06 0.10 0.14	0.00 0.00 0.01
782 10253	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.11 0.15 0.20	0.06 0.10 0.14	0.00 0.00 0.01
782 10253	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.11 0.15 0.20	0.06 0.10 0.14	0.00 0.00 0.01
RRUS 11	A	From Leg	4.00	0.000	143.00	No Ice	2.79	1.19	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1/2" Ice	3.00	1.34	0.07
			2.00				1" Ice	3.21	1.50	0.10
RRUS 11	B	From Leg	4.00		0.000	143.00	No Ice	2.79	1.19	0.05
			0.00				1/2" Ice	3.00	1.34	0.07
			2.00				1" Ice	3.21	1.50	0.10
RRUS 11	C	From Leg	4.00		0.000	143.00	No Ice	2.79	1.19	0.05
			0.00				1/2" Ice	3.00	1.34	0.07
			2.00				1" Ice	3.21	1.50	0.10
RRUS 32	A	From Leg	4.00		0.000	143.00	No Ice	2.86	1.78	0.06
			0.00				1/2" Ice	3.08	1.97	0.08
			2.00				1" Ice	3.32	2.17	0.10
RRUS 32	B	From Leg	4.00		0.000	143.00	No Ice	2.86	1.78	0.06
			0.00				1/2" Ice	3.08	1.97	0.08
			2.00				1" Ice	3.32	2.17	0.10
RRUS 32	C	From Leg	4.00		0.000	143.00	No Ice	2.86	1.78	0.06
			0.00				1/2" Ice	3.08	1.97	0.08
			2.00				1" Ice	3.32	2.17	0.10
RRUS 32 B2	A	From Leg	4.00		0.000	143.00	No Ice	2.73	1.67	0.05
			0.00				1/2" Ice	2.95	1.86	0.07
			2.00				1" Ice	3.18	2.05	0.10
RRUS 32 B2	B	From Leg	4.00		0.000	143.00	No Ice	2.73	1.67	0.05
			0.00				1/2" Ice	2.95	1.86	0.07
			2.00				1" Ice	3.18	2.05	0.10
RRUS 32 B2	C	From Leg	4.00		0.000	143.00	No Ice	2.73	1.67	0.05
			0.00				1/2" Ice	2.95	1.86	0.07
			2.00				1" Ice	3.18	2.05	0.10
DC6-48-60-18-8F	B	From Leg	4.00		0.000	143.00	No Ice	0.92	0.92	0.02
			0.00				1/2" Ice	1.46	1.46	0.04
			2.00				1" Ice	1.64	1.64	0.06
T-Arm Mount [TA 702-3]	C	None			0.000	143.00	No Ice	5.64	5.64	0.34
							1/2" Ice	6.55	6.55	0.43
							1" Ice	7.46	7.46	0.52
2.375" OD x 6' Mount Pipe	A	From Leg	4.00		0.000	143.00	No Ice	1.43	1.43	0.03
			0.00				1/2" Ice	1.92	1.92	0.04
			0.00				1" Ice	2.29	2.29	0.05
2.375" OD x 6' Mount Pipe	B	From Leg	4.00		0.000	143.00	No Ice	1.43	1.43	0.03
			0.00				1/2" Ice	1.92	1.92	0.04
			0.00				1" Ice	2.29	2.29	0.05
2.375" OD x 6' Mount Pipe	C	From Leg	4.00		0.000	143.00	No Ice	1.43	1.43	0.03
			0.00				1/2" Ice	1.92	1.92	0.04
			0.00				1" Ice	2.29	2.29	0.05
*****										
*****										
ERICSSON AIR 21 B2A B4P	A	From Leg	4.00		0.000	133.00	No Ice	6.09	4.30	0.09
			0.00				1/2" Ice	6.46	4.65	0.13
			0.00				1" Ice	6.84	5.00	0.18
ERICSSON AIR 21 B2A B4P	B	From Leg	4.00		0.000	133.00	No Ice	6.09	4.30	0.09
			0.00				1/2" Ice	6.46	4.65	0.13
			0.00				1" Ice	6.84	5.00	0.18

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ERICSSON AIR 21 B2A B4P	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	6.09 6.46 6.84	4.30 4.65 5.00	0.09 0.13 0.18
APXVAARR24_43-U-NA20	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	20.24 20.89 21.54	8.89 9.49 10.09	0.13 0.24 0.36
APXVAARR24_43-U-NA20	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	20.24 20.89 21.54	8.89 9.49 10.09	0.13 0.24 0.36
APXVAARR24_43-U-NA20	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	20.24 20.89 21.54	8.89 9.49 10.09	0.13 0.24 0.36
AIR -32 B2A/B66AA	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	6.51 6.89 7.27	4.71 5.07 5.43	0.13 0.18 0.23
AIR -32 B2A/B66AA	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	6.51 6.89 7.27	4.71 5.07 5.43	0.13 0.18 0.23
AIR -32 B2A/B66AA	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	6.51 6.89 7.27	4.71 5.07 5.43	0.13 0.18 0.23
KRY 112 144/1	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	0.35 0.43 0.51	0.17 0.23 0.30	0.01 0.01 0.02
KRY 112 144/1	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	0.35 0.43 0.51	0.17 0.23 0.30	0.01 0.01 0.02
KRY 112 144/1	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	0.35 0.43 0.51	0.17 0.23 0.30	0.01 0.01 0.02
RADIO 4449 B12/B71	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	1.65 1.81 1.98	1.16 1.30 1.45	0.07 0.09 0.11
RADIO 4449 B12/B71	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	1.65 1.81 1.98	1.16 1.30 1.45	0.07 0.09 0.11
RADIO 4449 B12/B71	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	1.65 1.81 1.98	1.16 1.30 1.45	0.07 0.09 0.11
Platform Mount [LP 302-1]	C	From Leg	0.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	33.03 44.60 56.17	33.03 44.60 56.17	1.71 2.19 2.68
***									
BXA-70063/6CFx2 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	7.81 8.36 8.87	5.40 6.55 7.41	0.04 0.10 0.17
BXA-70063/6CFx2 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	7.81 8.36 8.87	5.40 6.55 7.41	0.04 0.10 0.17

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-70063/6CFx2 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	7.81 8.36 8.87	5.40 6.55 7.41	0.04 0.10 0.17
LNX-6512DS-T0M w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	5.33 5.72 6.12	4.53 5.15 5.77	0.05 0.09 0.15
LNX-6512DS-T0M w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	5.33 5.72 6.12	4.53 5.15 5.77	0.05 0.09 0.15
LNX-6512DS-T0M w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	5.33 5.72 6.12	4.53 5.15 5.77	0.05 0.09 0.15
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	8.40 8.96 9.49	7.07 8.26 9.18	0.07 0.14 0.21
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	8.40 8.96 9.49	7.07 8.26 9.18	0.07 0.14 0.21
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	8.40 8.96 9.49	7.07 8.26 9.18	0.07 0.14 0.21
RRH2X60-AWS	A	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	1.88 2.06 2.24	1.24 1.39 1.54	0.04 0.06 0.08
RRH2X60-AWS	B	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	1.88 2.06 2.24	1.24 1.39 1.54	0.04 0.06 0.08
RRH2X60-AWS	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	1.88 2.06 2.24	1.24 1.39 1.54	0.04 0.06 0.08
RRH2x60-700	A	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH2x60-700	B	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH2x60-700	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
DB-T1-6Z-8AB-0Z	A	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	0.04 0.08 0.12
Platform Mount [LP 1201-1]	C	None		0.000	113.00	No Ice 1/2" Ice 1" Ice	23.10 26.80 30.50	23.10 26.80 30.50	2.10 2.50 2.90
***									
Side Arm Mount [SO 701-1]	C	None		0.000	60.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09

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

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP1-23	A	Paraboloid w/o Radome	From Leg	4.00 0.00 -4.00	-64.000		155.00	1.27	No Ice 1/2" Ice 1" Ice	1.28 1.45 1.62	0.01 0.02 0.03
VHLP2.5-18	B	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 -4.00	21.000		155.00	2.92	No Ice 1/2" Ice 1" Ice	6.68 7.07 7.46	0.05 0.08 0.12
VHLP2-11	C	Paraboloid w/o Radome	From Leg	4.00 0.00 -4.00	13.000		155.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 155.00-115.50	134.46	1.347	31	85.620	A	0.000	85.620	85.620	100.00	0.000	0.000
					B	0.000	85.620		100.00	0.000	0.000
					C	0.000	85.620		100.00	0.000	11.568
L2 115.50-79.25	96.92	1.257	29	98.506	A	0.000	98.506	98.506	100.00	0.000	0.000
					B	0.000	98.506		100.00	0.000	0.000
					C	0.000	98.506		100.00	0.000	11.491
L3 79.25-43.75	61.26	1.142	26	114.498	A	0.000	114.498	114.498	100.00	0.000	0.000
					B	0.000	114.498		100.00	0.000	0.000
					C	0.000	114.498		100.00	0.000	11.254
L4 43.75-0.00	22.10	0.921	21	165.433	A	0.000	165.433	165.433	100.00	0.000	0.000
					B	0.000	165.433		100.00	0.000	0.000
					C	0.000	165.433		100.00	0.000	13.869

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 155.00-115.50	134.46	1.347	8	2.30	100.773	A	0.000	100.773	100.773	100.00	0.000	0.000
						B	0.000	100.773		100.00	0.000	0.000
						C	0.000	100.773		100.00	0.000	42.409
L2 115.50-	96.92	1.257	8	2.23	112.412	A	0.000	112.412	112.412	100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
79.25						B	0.000	112.412		100.00	0.000	0.000
						C	0.000	112.412		100.00	0.000	44.865
L3 79.25-43.75	61.26	1.142	7	2.13	127.677	A	0.000	127.677	127.677	100.00	0.000	0.000
						B	0.000	127.677		100.00	0.000	0.000
						C	0.000	127.677		100.00	0.000	42.884
L4 43.75-0.00	22.10	0.921	6	1.92	180.947	A	0.000	180.947	180.947	100.00	0.000	0.000
						B	0.000	180.947		100.00	0.000	0.000
						C	0.000	180.947		100.00	0.000	51.102

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 155.00-115.50	134.46	1.347	11	85.620	A	0.000	85.620	85.620	100.00	0.000	0.000
					B	0.000	85.620		100.00	0.000	0.000
					C	0.000	85.620		100.00	0.000	11.568
L2 115.50-79.25	96.92	1.257	10	98.506	A	0.000	98.506	98.506	100.00	0.000	0.000
					B	0.000	98.506		100.00	0.000	0.000
					C	0.000	98.506		100.00	0.000	11.491
L3 79.25-43.75	61.26	1.142	9	114.498	A	0.000	114.498	114.498	100.00	0.000	0.000
					B	0.000	114.498		100.00	0.000	0.000
					C	0.000	114.498		100.00	0.000	11.254
L4 43.75-0.00	22.10	0.921	7	165.433	A	0.000	165.433	165.433	100.00	0.000	0.000
					B	0.000	165.433		100.00	0.000	0.000
					C	0.000	165.433		100.00	0.000	13.869

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
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
L1	155 - 115.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-40.91	7	-4
			Max. Mx	8	-11.99	-507	-7
			Max. My	2	-11.95	4	512
			Max. Vy	8	21.02	-507	-7
			Max. Vx	2	-21.13	4	512
			Max. Torque	14			2
L2	115.5 - 79.25	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-65.98	14	-6
			Max. Mx	8	-22.12	-1486	-13
			Max. My	2	-22.08	6	1499
			Max. Vy	8	30.38	-1486	-13
			Max. Vx	2	-30.61	6	1499
			Max. Torque	25			2
L3	79.25 - 43.75	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-82.80	21	-10
			Max. Mx	8	-31.87	-2602	-20
			Max. My	2	-31.85	8	2623
			Max. Vy	8	33.76	-2602	-20
			Max. Vx	2	-33.99	8	2623
			Max. Torque	25			2
L4	43.75 - 0	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-109.53	31	-15
			Max. Mx	8	-49.30	-4348	-29
			Max. My	2	-49.30	11	4380
			Max. Vy	8	37.13	-4348	-29
			Max. Vx	2	-37.35	11	4380
			Max. Torque	25			3

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	109.53	-0.00	0.00
	Max. H_x	21	37.01	36.98	0.29
	Max. H_z	3	37.01	0.05	37.29
	Max. M_x	2	4380	0.05	37.29
	Max. M_z	8	4348	-37.07	-0.17
	Max. Torsion	25	3	18.65	32.29
	Min. Vert	15	37.01	-0.23	-37.18
	Min. H_x	9	37.01	-37.07	-0.17
	Min. H_z	14	49.35	-0.23	-37.18
	Min. M_x	14	-4365	-0.23	-37.18
	Min. M_z	20	-4337	36.97	0.29
	Min. Torsion	13	-3	-18.76	-32.18

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	41.12	0.00	-0.00	1	2	0
1.2 Dead+1.6 Wind 0 deg - No Ice	49.35	-0.05	-37.29	-4380	11	-3
0.9 Dead+1.6 Wind 0 deg - No Ice	37.01	-0.05	-37.29	-4308	11	-3
1.2 Dead+1.6 Wind 30 deg - No Ice	49.35	18.46	-32.17	-3774	-2161	-1
0.9 Dead+1.6 Wind 30 deg - No Ice	37.01	18.46	-32.17	-3712	-2126	-1
1.2 Dead+1.6 Wind 60 deg - No Ice	49.35	32.15	-18.39	-2148	-3772	0
0.9 Dead+1.6 Wind 60 deg - No Ice	37.01	32.15	-18.39	-2113	-3710	0
1.2 Dead+1.6 Wind 90 deg - No Ice	49.35	37.07	0.17	29	-4348	1
0.9 Dead+1.6 Wind 90 deg - No Ice	37.01	37.07	0.17	28	-4277	1
1.2 Dead+1.6 Wind 120 deg - No Ice	49.35	32.23	18.60	2184	-3786	3
0.9 Dead+1.6 Wind 120 deg - No Ice	37.01	32.23	18.60	2148	-3724	3
1.2 Dead+1.6 Wind 150 deg - No Ice	49.35	18.76	32.18	3777	-2209	3
0.9 Dead+1.6 Wind 150 deg - No Ice	37.01	18.76	32.18	3714	-2173	3
1.2 Dead+1.6 Wind 180 deg - No Ice	49.35	0.23	37.18	4365	-36	3
0.9 Dead+1.6 Wind 180 deg - No Ice	37.01	0.23	37.18	4293	-36	3
1.2 Dead+1.6 Wind 210 deg - No Ice	49.35	-18.27	32.17	3775	2134	2
0.9 Dead+1.6 Wind 210 deg - No Ice	37.01	-18.27	32.17	3713	2098	2
1.2 Dead+1.6 Wind 240 deg - No Ice	49.35	-31.92	18.47	2164	3740	0
0.9 Dead+1.6 Wind 240 deg - No Ice	37.01	-31.92	18.47	2128	3678	0
1.2 Dead+1.6 Wind 270 deg - No Ice	49.35	-36.97	-0.29	-46	4337	-1
0.9 Dead+1.6 Wind 270 deg - No Ice	37.01	-36.98	-0.29	-46	4265	-1
1.2 Dead+1.6 Wind 300 deg - No Ice	49.35	-32.07	-18.81	-2216	3764	-3
0.9 Dead+1.6 Wind 300 deg - No Ice	37.01	-32.07	-18.81	-2180	3701	-3
1.2 Dead+1.6 Wind 330 deg - No Ice	49.35	-18.65	-32.29	-3792	2195	-3

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 330 deg - No Ice	37.01	-18.65	-32.29	-3730	2159	-3
1.2 Dead+1.0 Ice+1.0 Temp	109.53	0.00	-0.00	15	31	0
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	109.53	-0.01	-12.84	-1654	33	-2
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	109.53	6.39	-11.10	-1426	-798	-1
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	109.53	11.10	-6.36	-809	-1412	0
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	109.53	12.80	0.04	23	-1633	1
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	109.53	11.11	6.41	849	-1415	2
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	109.53	6.45	11.10	1457	-811	2
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	109.53	0.05	12.82	1682	21	2
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	109.53	-6.34	11.09	1457	851	1
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	109.53	-11.04	6.39	844	1463	0
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	109.53	-12.77	-0.06	4	1689	-1
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	109.53	-11.07	-6.46	-826	1469	-2
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	109.53	-6.42	-11.12	-1431	867	-2
Dead+Wind 0 deg - Service	41.12	-0.01	-7.98	-930	4	-1
Dead+Wind 30 deg - Service	41.12	3.95	-6.88	-801	-457	0
Dead+Wind 60 deg - Service	41.12	6.88	-3.93	-456	-800	0
Dead+Wind 90 deg - Service	41.12	7.93	0.04	7	-922	0
Dead+Wind 120 deg - Service	41.12	6.90	3.98	464	-802	1
Dead+Wind 150 deg - Service	41.12	4.01	6.88	803	-468	1
Dead+Wind 180 deg - Service	41.12	0.05	7.96	928	-6	1
Dead+Wind 210 deg - Service	41.12	-3.91	6.88	802	455	0
Dead+Wind 240 deg - Service	41.12	-6.83	3.95	460	796	0
Dead+Wind 270 deg - Service	41.12	-7.91	-0.06	-9	923	0
Dead+Wind 300 deg - Service	41.12	-6.86	-4.02	-470	801	-1
Dead+Wind 330 deg - Service	41.12	-3.99	-6.91	-805	468	-1

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-41.12	0.00	-0.00	41.12	0.00	0.002%
2	-0.05	-49.35	-37.29	0.05	49.35	37.29	0.005%
3	-0.05	-37.01	-37.29	0.05	37.01	37.29	0.004%
4	18.46	-49.35	-32.17	-18.46	49.35	32.17	0.000%
5	18.46	-37.01	-32.17	-18.46	37.01	32.17	0.000%
6	32.15	-49.35	-18.39	-32.15	49.35	18.39	0.000%
7	32.15	-37.01	-18.39	-32.15	37.01	18.39	0.000%
8	37.07	-49.35	0.17	-37.07	49.35	-0.17	0.005%
9	37.07	-37.01	0.17	-37.07	37.01	-0.17	0.004%
10	32.23	-49.35	18.60	-32.23	49.35	-18.60	0.000%
11	32.23	-37.01	18.60	-32.23	37.01	-18.60	0.000%
12	18.76	-49.35	32.18	-18.76	49.35	-32.18	0.000%
13	18.76	-37.01	32.18	-18.76	37.01	-32.18	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
14	0.23	-49.35	37.19	-0.23	49.35	-37.18	0.005%
15	0.23	-37.01	37.19	-0.23	37.01	-37.18	0.008%
16	-18.27	-49.35	32.17	18.27	49.35	-32.17	0.000%
17	-18.27	-37.01	32.17	18.27	37.01	-32.17	0.000%
18	-31.92	-49.35	18.47	31.92	49.35	-18.47	0.000%
19	-31.92	-37.01	18.47	31.92	37.01	-18.47	0.000%
20	-36.98	-49.35	-0.29	36.97	49.35	0.29	0.005%
21	-36.98	-37.01	-0.29	36.98	37.01	0.29	0.004%
22	-32.07	-49.35	-18.81	32.07	49.35	18.81	0.000%
23	-32.07	-37.01	-18.81	32.07	37.01	18.81	0.000%
24	-18.65	-49.35	-32.29	18.65	49.35	32.29	0.000%
25	-18.65	-37.01	-32.29	18.65	37.01	32.29	0.000%
26	0.00	-109.53	0.00	-0.00	109.53	0.00	0.000%
27	-0.01	-109.53	-12.84	0.01	109.53	12.84	0.002%
28	6.39	-109.53	-11.10	-6.39	109.53	11.10	0.001%
29	11.10	-109.53	-6.36	-11.10	109.53	6.36	0.001%
30	12.80	-109.53	0.04	-12.80	109.53	-0.04	0.002%
31	11.11	-109.53	6.41	-11.11	109.53	-6.41	0.001%
32	6.45	-109.53	11.10	-6.45	109.53	-11.10	0.001%
33	0.05	-109.53	12.82	-0.05	109.53	-12.82	0.002%
34	-6.34	-109.53	11.10	6.34	109.53	-11.09	0.001%
35	-11.04	-109.53	6.39	11.04	109.53	-6.39	0.001%
36	-12.78	-109.53	-0.06	12.77	109.53	0.06	0.002%
37	-11.07	-109.53	-6.46	11.07	109.53	6.46	0.001%
38	-6.42	-109.53	-11.12	6.42	109.53	11.12	0.001%
39	-0.01	-41.12	-7.98	0.01	41.12	7.98	0.003%
40	3.95	-41.12	-6.88	-3.95	41.12	6.88	0.003%
41	6.88	-41.12	-3.93	-6.88	41.12	3.93	0.003%
42	7.93	-41.12	0.04	-7.93	41.12	-0.04	0.003%
43	6.90	-41.12	3.98	-6.90	41.12	-3.98	0.003%
44	4.01	-41.12	6.89	-4.01	41.12	-6.88	0.003%
45	0.05	-41.12	7.96	-0.05	41.12	-7.96	0.003%
46	-3.91	-41.12	6.88	3.91	41.12	-6.88	0.003%
47	-6.83	-41.12	3.95	6.83	41.12	-3.95	0.003%
48	-7.91	-41.12	-0.06	7.91	41.12	0.06	0.003%
49	-6.86	-41.12	-4.02	6.86	41.12	4.02	0.003%
50	-3.99	-41.12	-6.91	3.99	41.12	6.91	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000544
2	Yes	16	0.00005259	0.00013604
3	Yes	16	0.00003256	0.00010108
4	Yes	21	0.00000001	0.00009003
5	Yes	20	0.00000001	0.00012905
6	Yes	21	0.00000001	0.00008958
7	Yes	20	0.00000001	0.00012845
8	Yes	16	0.00005272	0.00013137
9	Yes	16	0.00003264	0.00009697
10	Yes	21	0.00000001	0.00009270
11	Yes	20	0.00000001	0.00013292
12	Yes	21	0.00000001	0.00009143
13	Yes	20	0.00000001	0.00013085
14	Yes	16	0.00005264	0.00007514
15	Yes	15	0.00007285	0.00012222
16	Yes	21	0.00000001	0.00008979
17	Yes	20	0.00000001	0.00012873
18	Yes	21	0.00000001	0.00008941
19	Yes	20	0.00000001	0.00012819
20	Yes	16	0.00005274	0.00011770
21	Yes	16	0.00003266	0.00008394
22	Yes	21	0.00000001	0.00009160
23	Yes	20	0.00000001	0.00013107

24	Yes	21	0.00000001	0.00009379
25	Yes	20	0.00000001	0.00013441
26	Yes	15	0.00000001	0.00001519
27	Yes	18	0.00013966	0.00012297
28	Yes	20	0.00003881	0.00010454
29	Yes	20	0.00003881	0.00010625
30	Yes	18	0.00013970	0.00011582
31	Yes	20	0.00003877	0.00011511
32	Yes	20	0.00003876	0.00010848
33	Yes	18	0.00013956	0.00012285
34	Yes	20	0.00003872	0.00012038
35	Yes	20	0.00003872	0.00011776
36	Yes	18	0.00013956	0.00011907
37	Yes	20	0.00003874	0.00011350
38	Yes	20	0.00003873	0.00012128
39	Yes	15	0.00009808	0.00004404
40	Yes	15	0.00009784	0.00010749
41	Yes	15	0.00009784	0.00010729
42	Yes	15	0.00009807	0.00004223
43	Yes	15	0.00009785	0.00011870
44	Yes	15	0.00009785	0.00010581
45	Yes	15	0.00009808	0.00004294
46	Yes	15	0.00009786	0.00011370
47	Yes	15	0.00009786	0.00010904
48	Yes	15	0.00009810	0.00004183
49	Yes	15	0.00009787	0.00010751
50	Yes	15	0.00009786	0.00012363

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	35.35	50	1.953	0.001
L2	119.25 - 79.25	21.32	50	1.711	0.002
L3	83.75 - 43.75	10.33	50	1.190	0.001
L4	49 - 0	3.48	50	0.659	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	LPX310R w/ Mount Pipe	50	35.35	1.953	0.001	32003
153.00	800MHz 2X50W RRH W/FILTER	50	34.53	1.943	0.002	32003
151.00	VHLP1-23	50	33.71	1.934	0.002	32003
145.00	RRUS 11	50	31.28	1.904	0.002	16001
143.00	DC6-48-60-18-8F	50	30.47	1.893	0.002	13334
133.00	ERICSSON AIR 21 B2A B4P	50	26.50	1.832	0.002	7272
113.00	BXA-70063/6CFx2 w/ Mount Pipe	50	19.12	1.637	0.002	4332
60.00	Side Arm Mount [SO 701-1]	50	5.19	0.820	0.001	3300

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	165.98	2	9.197	0.007
L2	119.25 - 79.25	100.24	2	8.060	0.011

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L3	83.75 - 43.75	48.60	2	5.608	0.006
L4	49 - 0	16.41	24	3.103	0.003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	LPX310R w/ Mount Pipe	2	165.98	9.197	0.007	7143
153.00	800MHz 2X50W RRH W/FILTER	2	162.15	9.152	0.008	7143
151.00	VHLP1-23	2	158.33	9.108	0.008	7143
145.00	RRUS 11	2	146.90	8.968	0.009	3570
143.00	DC6-48-60-18-8F	2	143.12	8.918	0.009	2974
133.00	ERICSSON AIR 21 B2A B4P	2	124.50	8.629	0.010	1618
113.00	BXA-70063/6CFx2 w/ Mount Pipe	2	89.92	7.711	0.010	955
60.00	Side Arm Mount [SO 701-1]	24	24.42	3.864	0.004	707

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	155 - 115.5 (1)	TP29.31x22x0.25	39.50	0.00	0.0	22.51	-11.94	1507.55	0.008
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	40.00	0.00	0.0	34.09	-22.07	2469.71	0.009
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	40.00	0.00	0.0	47.74	-31.85	3485.55	0.009
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	49.00	0.00	0.0	67.16	-49.30	4858.33	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	155 - 115.5 (1)	TP29.31x22x0.25	514	878	0.585	0	878	0.000
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	1501	1743	0.861	0	1743	0.000
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	2625	2871	0.914	0	2871	0.000
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	4382	4826	0.908	0	4826	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	155 - 115.5 (1)	TP29.31x22x0.25	21.16	753.77	0.028	1	1761	0.001
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	30.61	1234.85	0.025	2	3496	0.000
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	33.99	1742.77	0.020	2	5756	0.000
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	37.35	2429.16	0.015	3	9677	0.000

Pole Interaction Design Data

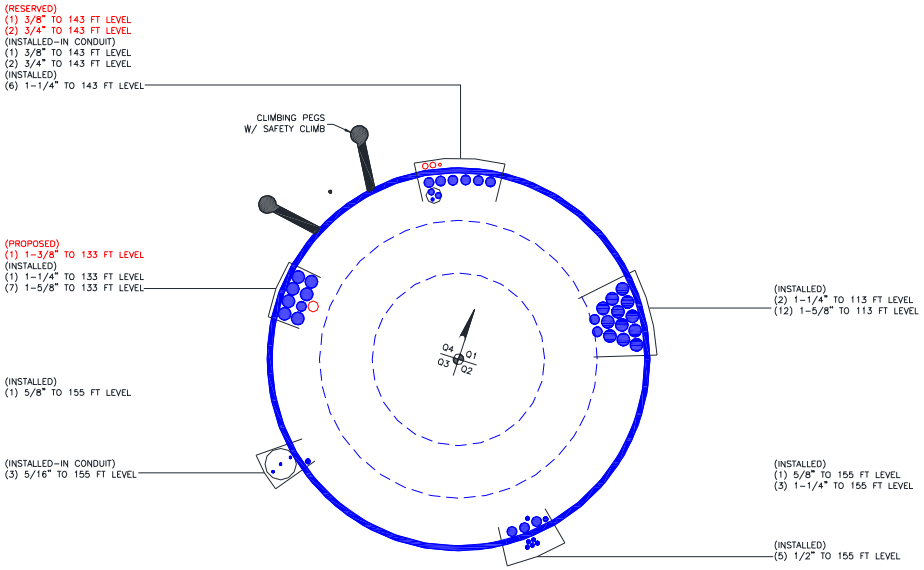
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	155 - 115.5 (1)	0.008	0.585	0.000	0.028	0.001	0.594 ✔	1.000	4.8.2 ✔
L2	115.5 - 79.25 (2)	0.009	0.861	0.000	0.025	0.000	0.870 ✔	1.000	4.8.2 ✔
L3	79.25 - 43.75 (3)	0.009	0.914	0.000	0.020	0.000	0.924 ✔	1.000	4.8.2 ✔
L4	43.75 - 0 (4)	0.010	0.908	0.000	0.015	0.000	0.918 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	155 - 115.5	Pole	TP29.31x22x0.25	1	-11.94	1507.55	59.4	Pass
L2	115.5 - 79.25	Pole	TP35.51x28.11x0.31	2	-22.07	2469.71	87.0	Pass
L3	79.25 - 43.75	Pole	TP41.46x34.06x0.38	3	-31.85	3485.55	92.4	Pass
L4	43.75 - 0	Pole	TP48.8x39.73x0.44	4	-49.30	4858.33	91.8	Pass
							Summary	
						Pole (L3)	92.4	Pass
						RATING =	**92.4**	**Pass**

APPENDIX B

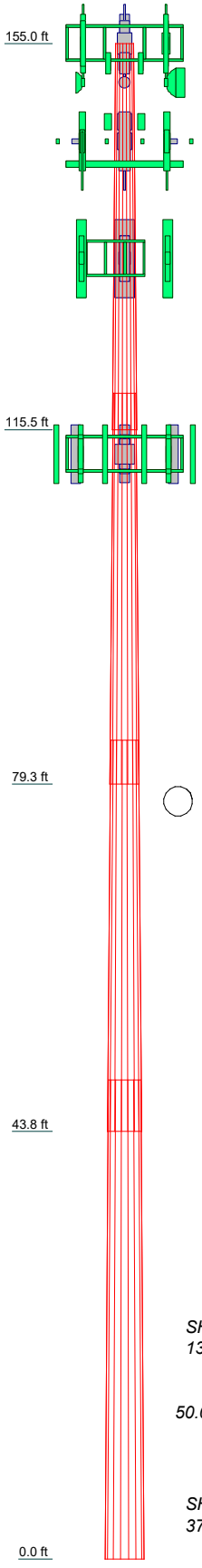
BASE LEVEL DRAWING


(RESERVED)
(1) 3/8" TO 143 FT LEVEL
(2) 3/4" TO 143 FT LEVEL
(INSTALLED-IN CONDUIT)
(1) 3/8" TO 143 FT LEVEL
(2) 3/4" TO 143 FT LEVEL
(INSTALLED)
(6) 1-1/4" TO 143 FT LEVEL
CLIMBING PEGS
W/ SAFETY CLIMB
(PROPOSED)
(1) 1-5/8" TO 133 FT LEVEL
(INSTALLED)
(1) 1-1/4" TO 133 FT LEVEL
(7) 1-5/8" TO 133 FT LEVEL
(INSTALLED)
(1) 5/8" TO 155 FT LEVEL
(INSTALLED-IN CONDUIT)
(3) 5/16" TO 155 FT LEVEL
(INSTALLED)
(2) 1-1/4" TO 113 FT LEVEL
(12) 1-5/8" TO 113 FT LEVEL
(INSTALLED)
(1) 5/8" TO 155 FT LEVEL
(3) 1-1/4" TO 155 FT LEVEL
(INSTALLED)
(5) 1/2" TO 155 FT LEVEL
Q4
Q1
Q3
Q2

APPENDIX C

ADDITIONAL CALCULATIONS

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	39.50	18	0.25	3.75	22.00	29.31	A607-60	2.7
2	40.00	18	0.31	4.50	28.11	35.51		4.3
3	40.00	18	0.38	5.25	34.06	41.46	A607-65	6.1
4	49.00	18	0.44		39.73	48.80		10.1



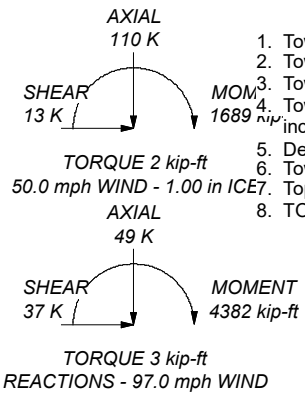
DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
LPX310R w/ Mount Pipe	155	RRUS 11	143
LPX310R w/ Mount Pipe	155	RRUS 32	143
LPX310R w/ Mount Pipe	155	RRUS 32	143
HORIZON COMPACT	155	RRUS 32	143
HORIZON COMPACT	155	RRUS 32 B2	143
HORIZON COMPACT	155	RRUS 32 B2	143
WIMAX DAP HEAD	155	RRUS 32 B2	143
WIMAX DAP HEAD	155	DC6-48-60-18-8F	143
WIMAX DAP HEAD	155	T-Arm Mount [TA 702-3]	143
APXVSPP18-C-A20 w/ Mount Pipe	155	2.375" OD x 6' Mount Pipe	143
APXVSPP18-C-A20 w/ Mount Pipe	155	2.375" OD x 6' Mount Pipe	143
APXVSPP18-C-A20 w/ Mount Pipe	155	2.375" OD x 6' Mount Pipe	143
APXVTM14-C-120 w/ Mount Pipe	155	DC6-48-60-18-8F	143
APXVTM14-C-120 w/ Mount Pipe	155	QS66512-2 w/ Mount Pipe	143
APXVTM14-C-120 w/ Mount Pipe	155	QS66512-2 w/ Mount Pipe	143
TD-RRH8x20-25	155	APXVAARR24_43-U-NA20	133
TD-RRH8x20-25	155	APXVAARR24_43-U-NA20	133
TD-RRH8x20-25	155	APXVAARR24_43-U-NA20	133
8'x2 1/2" Pipe Mount	155	AIR -32 B2A/B66AA	133
8'x2 1/2" Pipe Mount	155	AIR -32 B2A/B66AA	133
8'x2 1/2" Pipe Mount	155	AIR -32 B2A/B66AA	133
Miscellaneous [NA 510-1]	155	KRY 112 144/1	133
Platform Mount [LP 1201-1]	155	KRY 112 144/1	133
VHLP1-23	155	KRY 112 144/1	133
VHLP2.5-18	155	RADIO 4449 B12/B71	133
VHLP2-11	155	RADIO 4449 B12/B71	133
PCS 1900MHz 4x45W-65MHz	153	RADIO 4449 B12/B71	133
PCS 1900MHz 4x45W-65MHz	153	Platform Mount [LP 302-1]	133
PCS 1900MHz 4x45W-65MHz	153	ERICSSON AIR 21 B2A B4P	133
Pipe Mount [PM 601-3]	153	ERICSSON AIR 21 B2A B4P	133
Side Arm Mount [SO 104-3]	153	ERICSSON AIR 21 B2A B4P	133
800MHz 2X50W RRH W/FILTER	153	LNX-6512DS-T0M w/ Mount Pipe	113
800MHz 2X50W RRH W/FILTER	153	LNX-6512DS-T0M w/ Mount Pipe	113
800MHz 2X50W RRH W/FILTER	153	LNX-6512DS-T0M w/ Mount Pipe	113
Pipe Mount [PM 601-3]	145	(2) SBNHH-1D65B w/ Mount Pipe	113
RRUS 11	145	(2) SBNHH-1D65B w/ Mount Pipe	113
RRUS 11	145	(2) SBNHH-1D65B w/ Mount Pipe	113
RRUS 11	145	RRH2X60-AWS	113
QS66512-2 w/ Mount Pipe	143	RRH2X60-AWS	113
OPA-65R-LCUU-H6 w/ Mount Pipe	143	RRH2X60-AWS	113
OPA-65R-LCUU-H6 w/ Mount Pipe	143	RRH2x60-700	113
OPA-65R-LCUU-H6 w/ Mount Pipe	143	RRH2x60-700	113
(2) TPX-070821	143	RRH2x60-700	113
(2) TPX-070821	143	DB-T1-6Z-8AB-0Z	113
(2) TPX-070821	143	Platform Mount [LP 1201-1]	113
782 10253	143	BXA-70063/6CFx2 w/ Mount Pipe	113
782 10253	143	BXA-70063/6CFx2 w/ Mount Pipe	113
782 10253	143	BXA-70063/6CFx2 w/ Mount Pipe	113
RRUS 11	143	Side Arm Mount [SO 701-1]	60
RRUS 11	143		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	A607-65	65 ksi	80 ksi

ALL REACTIONS ARE FACTORED



TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97.0 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.0 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.0 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 92.4%

Paul J. Ford and Company
250 East Broad st., Suite 600
Columbus, OH 43215
Phone: (614) 221-6679
FAX:

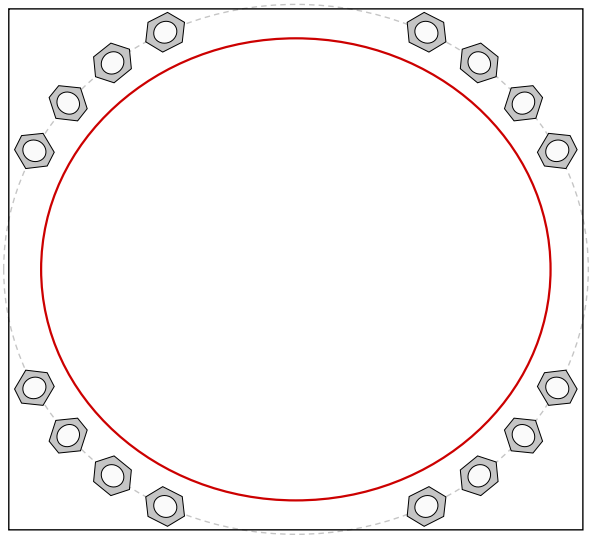
Job: 155 ft Monopole / Buckland Mall			
Project: PJF 37518-2720.001.7805 / BU 876347			
Client: Crown Castle	Drawn by: gpenumatsa		App'd:
Code: TIA-222-G	Date: 08/07/18		Scale: NTS
Path:			Dwg No. E-1

Monopole Base Plate Connection

Site Info	
BU #	876347
Site Name	Buckland Mall
Order #	

Analysis Considerations	
TIA-222 Revision	G
l_{ar} (in)	0
Eta Factor, η	0.5

Applied Loads	
Moment (kip-ft)	4382.00
Axial Force (kips)	49.00
Shear Force (kips)	37.00



Connection Properties

Anchor Rod Data

(16) 2-1/4" ø bolts (A615-75; Fy=75 ksi, Fu=100 ksi) on 56" BC

pos. (deg): 26.5, 38.8, 51.2, 63.5, 116.5, 128.8, 141.2, 153.5, 206.5, 2

Base Plate Data

55" OD x 3.25" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Stiffener Data

N/A

Pole Data

48.8" x 0.4375" 18-sided pole (A607-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-ft)*

Pu = 237.66	ϕPn = 260	**Stress Rating**
Vu = 2.31	ϕVn = n/a	**93.2%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	33.97	
Allowable Stress (ksi):	45	
Stress Ratio:	**75.5%**	**Pass**

Pier and Pad Foundation

BU # :	876347
Site Name:	
App. Number:	

TIA-222 Revision:	G
Tower Type:	Monopole

Block Foundation?: ☐

Superstructure Analysis Reactions

Compression, P_{comp}:	49	kips
Base Shear, Vu_comp:	37	kips
Moment, M_u:	4382	ft-kips
Tower Height, **H**:	155	ft
BP Dist. Above Fdn, bp_{dist}:	3	in

Pier Properties

Pier Shape:	Circular	
Pier Diameter, **dpier**:	7.0	ft
Ext. Above Grade, **E**:	0.50	ft
Pier Rebar Size, **Sc**:	11	
Pier Rebar Quantity, **mc**:	32	
Pier Tie/Spiral Size, **St**:	5	
Pier Tie/Spiral Quantity, **mt**:	12	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties

Depth, **D**:	10.0	ft
Pad Width, **W**:	23.0	ft
Pad Thickness, **T**:	3.0	ft
Pad Rebar Size, **Sp**:	9	
Pad Rebar Quantity, **mp**:	34	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties

Rebar Grade, **Fy**:	60000	psi
Concrete Compressive Strength, **F'c**:	3000	psi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties

Total Soil Unit Weight, γ:	115	pcf
Ultimate Gross Bearing, Qult:	30.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	30	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:		
Neglected Depth, **N**:	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	N/A	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating	Check
Lateral (Sliding) (kips)	361.20	37.00	**10.2%**	**Pass**
Bearing Pressure (ksf)	22.50	3.26	**14.5%**	**Pass**
*Overturning (kip*ft)*	8788.79	4779.75	**54.4%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	7571.00	4659.50	**61.5%**	**Pass**
Pier Compression (kip)	18370.97	100.95	**0.5%**	**Pass**
*Pad Flexure (kip*ft)*	4568.38	1801.61	**39.4%**	**Pass**
Pad Shear - 1-way (kips)	709.93	302.18	**42.6%**	**Pass**
Pad Shear - 2-way (ksi)	0.16	0.05	**28.7%**	**Pass**

Soil Rating:	**54.4%**
Structural Rating:	**61.5%**

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CT11377C

Sprint Manchester/Slater
53 Slater Street
Manchester, CT 06040

August 24, 2018

EBI Project Number: 6218005829

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	10.72 %

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

EBI Consulting
environmental | engineering | due diligence

August 24, 2018

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

Emissions Analysis for Site: **CT11377C – Sprint Manchester/Slater**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **53 Slater Street, Manchester, 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 (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **53 Slater Street, Manchester, 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 GSM channels (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 15 Watts per Channel.

2) 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.

3) 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.

4) 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.

5) 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.

6) 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.

7) 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.

8) 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.

9) The antennas used in this modeling are the **Ericsson AIR32 B2A/B66AA** & **Ericsson AIR21 B2A/B4P** 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.

10) The antenna mounting height centerline of the proposed antennas is **133 feet** above ground level (AGL).

11) 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.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR32 B2A/B66AA	Make / Model:	Ericsson AIR32 B2A/B66AA	Make / Model:	Ericsson AIR32 B2A/B66AA
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	133 feet	Height (AGL):	133 feet	Height (AGL):	133 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	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%	**1.73**	Antenna B1 MPE%	**1.73**	Antenna C1 MPE%	**1.73**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	133 feet	Height (AGL):	133 feet	Height (AGL):	133 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	2	Channel Count	2	Channel Count	2
Total TX Power(W):	55	Total TX Power(W):	55	Total TX Power(W):	55
ERP (W):	2,139.75	ERP (W):	2,139.75	ERP (W):	2,139.75
Antenna A2 MPE%	**0.48**	Antenna B2 MPE%	**0.48**	Antenna C2 MPE%	**0.48**
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):	133 feet	Height (AGL):	133 feet	Height (AGL):	133 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%	**1.29**	Antenna B3 MPE%	**1.29**	Antenna C3 MPE%	**1.29**

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**3.50 %**
Sprint	**0.34** %
Clearwire	**0.09** %
AT&T	**2.05** %
Verizon Wireless	**4.74** %
Site Total MPE %:	**10.72 %**

T-Mobile Sector A Total:	3.50 %
T-Mobile Sector B Total:	3.50 %
T-Mobile Sector C Total:	3.50 %
Site Total:	10.72 %

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 ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile PCS - 1900 MHz LTE	2	1,556.18	133	6.94	PCS - 1900 MHz	1000.00	0.69%
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	133	10.41	AWS - 2100 MHz	1000.00	1.04%
T-Mobile PCS - 1900 MHz GSM	1	583.57	133	1.30	PCS - 1900 MHz	1000.00	0.13%
T-Mobile AWS - 2100 MHz UMTS	1	1,556.18	133	3.47	AWS - 2100 MHz	1000.00	0.35%
T-Mobile 600 MHz LTE	2	788.97	133	3.52	600 MHz	400.00	0.88%
T-Mobile 700 MHz LTE	2	432.54	133	1.93	700 MHz	467.00	0.41%
						Total:	**3.50%**

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:	3.50 %
Sector B:	3.50 %
Sector C:	3.50 %
T-Mobile Maximum MPE % (Per Sector):	3.50 %
Site Total:	10.72 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **10.72%** 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.