



1 Cityplace Dr, Suite 490  
Creve Coeur, MO 63141

Phone: (314) 513-0147  
www.crowncastle.com

February 9, 2022

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

RE: **Notice of Exempt Modification for AT&T  
Crown Site ID#876347; AT&T Site ID#CTL05307  
53 Slater Street, MANCHESTER, CT 06040  
Latitude: 41.8049919 / Longitude: -72.5335989**

Dear Ms. Bachman:

AT&T currently maintains (9) antennas at the 145-foot mounts on the existing 155-foot Monopole Tower located at **53 Slater Street, MANCHESTER**. The property is owned by One Hundred Twenty One Connecticut Avenue Associates LLC and the Tower by Crown Castle. AT&T now intends to replace nine (9) antennas. This modification/proposal includes hardware that is both 4G(LTE) and 5G capable through remote software configuration and either or both services may be turned on or off at various times.

**Planned Modifications:**

**Tower:**

**REMOVE AND REPLACE**

- (3) CCI – OPA-65R-LCUU-H6 Antennas (**REMOVE**), (3) Quintel – QD6616-7 Antennas (**REPLACE**)
- (3) Quintel – QS66512-2 Antennas (**REMOVE**), (3) Ericsson – AIR6449 N77D + (3) Ericsson AIR6419 N77G Antennas (**REPLACE**) (Antennas Stacked)
- (3) KATHRIEN – 800 – 10965 antennas (**REMOVE**), (3) CCI- DMP65R-BU6DA (**REPLACE**)
- (3) T-Arm mount (**REMOVE**), (3) Sabre #: C10857802 Mounts (**REPLACE**)
- (6) Coax Cables (**REMOVE**), (1) Fiber Cable (**REPLACE**)
- (6) DC Cable (**REMOVE**), (6) DC Cables (**REPLACE**)

**INSTALL:**

- (6) Y Cables
- (3) Ericsson – 4478 B14 Remote Radio Heads

**REMOVE**

- (6) CCI-TPX-070821 Triplexer (**REMOVE**)

**RELOCATE**

- (1) RAYCAP – DC6-48-60-08F Squid
- (2) RAYCAP – DC6-48-60-18-8F Squid
- (3) Ericsson 8843 B2/B66A Remote Radio head
- (3) Ericsson RRUS 4449 B5/B12
- (3) Ericsson RRUS 32 B30

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The Foundation for a Wireless World.

CrownCastle.com



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Creve Coeur, MO 63141

Phone: (314) 513-0147  
[www.crowncastle.com](http://www.crowncastle.com)

Ground:

**REMOVE:**

- (1) 5216 module
- (1) XMU Multiplexer

**INSTALL:**

- (1) 6675 Fronthaul Gateway (FHG)
- (1) 6673 Fronthaul Gateway (FHG)
- (1) Idle Cable
- (3) Rectifiers in existing power plant

This facility was approved 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.C.S.A. §16-50j-73, a copy of this letter is being sent to Jay Moran, Town of Manchester Mayor, James Davis, Town of Manchester Zoning Enforcement Officer, property owner, One Hundred Twenty One Connecticut Avenue Associates LLC, and Crown Castle, 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, AT&T 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).

Sincerely,

Ersilia Davis  
Crown Castle  
Agent for AT&T  
[edavis@nbcllc.com](mailto:edavis@nbcllc.com)/ 551-804-0667



1 Cityplace Dr, Suite 490  
Creve Coeur, MO 63141

Phone: (314) 513-0147  
[www.crowncastle.com](http://www.crowncastle.com)

cc:

Jay Moran, Mayor  
149 Strawberry Lane  
Manchester, CT 06040  
(860) 647- 3130  
*(Via Fedex)*

James Davis, Zoning Enforcement Officer  
41 Center Street  
Manchester, CT 06040  
(860) 647-3057  
*(Via Fedex)*

One Hundred Twenty One Connecticut Avenue Associates LLC, Property Owner  
9 Lake Lane  
Ellington, CT 06029  
*(Via Fedex)*

Crown Castle, Tower Owner



FedEx Tracking



776000516706



[ADD NICKNAME](#)

**ON TIME**

**Delivered**  
Thursday, February 10, 2022 at 11:59 am



**DELIVERED**

Signature not required

[GET STATUS UPDATES](#)

[OBTAIN PROOF OF DELIVERY](#)

**FROM**

Ersilia Davis

1777 Sentry Parkway  
VEVA 17, Suite 210  
Blue Bell, PA US 19422  
551-804-0667

**TO**

Jay Moran, Mayor  
Town of Manchester

149 Strawberry Lane  
MANCHESTER, CT US 06040  
860-647-3130

[MANAGE DELIVERY](#)

Travel History

**TIME ZONE**

Local Scan Time



Thursday, February 10, 2022

11:59 AM	MANCHESTER, CT	Delivered Package delivered to recipient address - release authorized
9:10 AM	WINDSOR LOCKS, CT	On FedEx vehicle for delivery
7:41 AM	WINDSOR LOCKS, CT	At local FedEx facility
5:27 AM	EAST GRANBY, CT	At destination sort facility
4:40 AM	NEWARK, NJ	Departed FedEx hub



FedEx Tracking



776000603135



[ADD NICKNAME](#)

**ON TIME**

Scheduled delivery:  
Thursday, February 10, 2022 by end of day



**IN TRANSIT**

On FedEx vehicle for delivery  
WINDSOR LOCKS, CT

[GET STATUS UPDATES](#)



Want to know when your package will arrive?

Take more control of your delivery with FedEx Delivery Manager®. [Sign up](#) or [Log in](#)

**FROM**

Ersilia Davis

1777 Sentry Parkway  
VEVA 17, Suite 210  
Blue Bell, PA US 19422  
551-804-0667

**TO**

James Davis, Zoning Enforcement  
Town of Manchester

41 Center Street  
MANCHESTER, CT US 06040  
860-647-3057

[MANAGE DELIVERY](#)

Travel History

**TIME ZONE**

Local Scan Time



Thursday, February 10,  
2022

9:10 AM	WINDSOR LOCKS, CT	On FedEx vehicle for delivery
7:32 AM	WINDSOR LOCKS, CT	At local FedEx facility
5:27 AM	EAST GRANBY, CT	At destination sort facility



FedEx Tracking



776000663748



[ADD NICKNAME](#)

**ON TIME**

Scheduled delivery:  
Thursday, February 10, 2022 by end of day



**IN TRANSIT**

On FedEx vehicle for delivery  
WINDSOR LOCKS, CT

[GET STATUS UPDATES](#)



Want to know when your package will arrive?

Take more control of your delivery with FedEx Delivery Manager®. [Sign up](#) or [Log in](#)

**FROM**

Ersilia Davis

1777 Sentry Parkway  
VEVA 17, Suite 210  
Blue Bell, PA US 19422  
551-804-0667

**TO**

One Hundred Twenty One Connecticut  
One Hundred Twenty One Connecticut

9 Lake Lane  
ELLINGTON, CT US 06029  
551-804-0667

[MANAGE DELIVERY](#)

### Travel History

**TIME ZONE**

Local Scan Time



Thursday, February 10,  
2022

8:46 AM	WINDSOR LOCKS, CT	On FedEx vehicle for delivery
7:32 AM	WINDSOR LOCKS, CT	At local FedEx facility
5:27 AM	EAST GRANBY, CT	At destination sort facility

# Exhibit A

## **Original Facility Approval**

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 Davera*

Secretary  
Planning and Zoning Commission

Received for Record on  
SEP 11 1998 at 2:43 PM.

*Joseph V. Camposo*  
Joseph V. Camposo, Town Clerk

\*DATE ADOPTED: August 17, 1998

FILE NO. S-147



6. 1998 3:17PM

SPRINT PCS

NO. 9098 P. 3

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:

CONTRACTOR NAME/ADDRESS:

AGLIN ASSOCIATES  
10 SULLIVAN TILE DIST  
5 RAILROAD AVE  
WEST HAVEN CT 06516

NUMBER:  
SPRINT PCS

LOCATION:

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:

ADDITIONAL APPROVAL:

ADDITIONAL PERMITS:

SCENARIOS INFO:

SITE DEVELOPMENT AND COLORS OF TOWER  
AND EQUIPMENT CABINETS TO BE AS APPROVD  
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

# Exhibit B

## Property Card

# 53 SLATER STREET

**Location** 53 SLATER STREET

**Mblu** 56/ 5140/ 53/ /

**Acct#** 514000053

**Owner** ONE HUNDRED TWENTY ONE  
CONN-

**Assessment** \$1,896,300

**Appraisal** \$2,708,900

**PID** 14616

**Building Count** 4

**DISTRICT** E

**CONCRETE**

## Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2021	\$1,950,800	\$758,100	\$2,708,900

Assessment			
Valuation Year	Improvements	Land	Total
2021	\$1,365,600	\$530,700	\$1,896,300

## Owner of Record

**Owner** ONE HUNDRED TWENTY ONE CONN-  
ECTICUT AVENUE ASSOCIATES LLC  
**Address** 9 LAKE LANE  
ELLINGTON, CT 06029

**Sale Price** \$1,180,000  
**Certificate** C  
**Book & Page** 2683/0224  
**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- RAGLIN ASSOCIATES LLC	\$1,180,000 \$0	C	2683/0224 2132/0338	33	07/17/2003 12/02/1999

## Building Information

### Building 1 : Section 1

**Year Built:** 1987  
**Living Area:** 6,333

**Replacement Cost:** \$386,370

**Replacement Cost**

**Less Depreciation:** \$231,800

**Building Attributes**

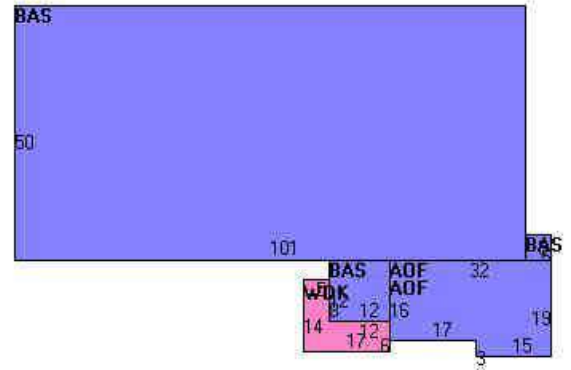
Field	Description
Style:	Pre-Eng Garage
Model	Ind/Comm
Grade	Average
Stories:	1
Occupancy	4.00
Exterior Wall 1	Pre-finish Metl
Exterior Wall 2	Brick Veneer
Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Wall Brd/Wood
Interior Wall 2	Minim/Masonry
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	Partial
Struct Class	
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 WI
Rooms/Prtns	Average
Wall Height	14.00
% Comn Wall	0.00

**Building Photo**



(http://images.vgsi.com/photos2/ManchesterCTPhotos/\00\03\43\03.jpg)

**Building Layout**



(http://images.vgsi.com/photos2/ManchesterCTPhotos/Sketches/14616\_1-

Building Sub-Areas (sq ft)			<u>Legend</u>
Code	Description	Gross Area	Living Area
BAS	First Floor	5,219	5,219
AOF	Office, (Average)	1,114	1,114
WDK	Wood Deck	72	0
		6,405	6,333

**Building 2 : Section 1**

**Year Built:** 1987

**Living Area:** 24,306

**Replacement Cost:** \$1,314,398

**Replacement Cost**

**Less Depreciation:** \$788,600

**Building Attributes : Bldg 2 of 4**

Field	Description
-------	-------------

Style:	Pre-Eng Garage
Model	Ind/Comm
Grade	Average
Stories:	1
Occupancy	6.00
Exterior Wall 1	Pre-finish 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
Struct Class	
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 & WI
Rooms/Prtns	Average
Wall Height	18.00
% Comn Wall	0.00

### Building Photo



(<http://images.vgsi.com/photos2/ManchesterCTPhotos//00\03\43\04.jpg>)

### Building Layout



([http://images.vgsi.com/photos2/ManchesterCTPhotos//Sketches/14616\\_1](http://images.vgsi.com/photos2/ManchesterCTPhotos//Sketches/14616_1);

Building Sub-Areas (sq ft)			<u>Legend</u>
Code	Description	Gross Area	Living Area
BAS	First Floor	18,510	18,510
AOF	Office, (Average)	5,796	5,796
FOP	Porch, Open	365	0
UEP	Porch, Enclosed, Unfinished	40	0
		24,711	24,306

### Building 3 : Section 1

**Year Built:** 1987  
**Living Area:** 10,320  
**Replacement Cost:** \$528,900  
**Replacement Cost Less Depreciation:** \$317,300

#### Building Attributes : Bldg 3 of 4

Field	Description
Style:	Pre-Eng Garage

Model	Ind/Comm
Grade	Average
Stories:	1
Occupancy	12.00
Exterior Wall 1	Pre-finish 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	Electric
Heating Type	Hot Air-no Duc
AC Type	None
Struct Class	
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 WI
Rooms/Prtns	Average
Wall Height	18.00
% Comn Wall	0.00

## Building Photo



(<http://images.vgsi.com/photos2/ManchesterCTPhotos/\00\03\43\05.jpg>)

## Building Layout



([http://images.vgsi.com/photos2/ManchesterCTPhotos/Sketches/14616\\_1](http://images.vgsi.com/photos2/ManchesterCTPhotos/Sketches/14616_1);

Building Sub-Areas (sq ft)			<u>Legend</u>
Code	Description	Gross Area	Living Area
BAS	First Floor	10,320	10,320
		10,320	10,320

## Building 4 : Section 1

<b>Year Built:</b>	2008
<b>Living Area:</b>	12,000
<b>Replacement Cost:</b>	\$586,200
<b>Replacement Cost</b>	
<b>Less Depreciation:</b>	\$451,400

Building Attributes : Bldg 4 of 4	
Field	Description
Style:	Pre-Eng Garage
Model	Ind/Comm
Grade	Average
Stories:	1

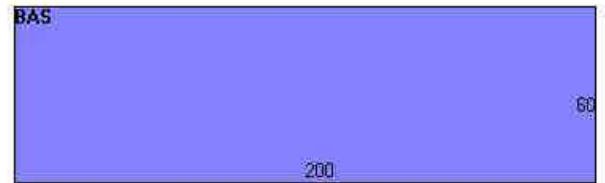
Occupancy	8.00
Exterior Wall 1	Pre-finish Metl
Exterior Wall 2	Concr/Cinder
Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Hot Air-no Duc
AC Type	None
Struct Class	
Bldg 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	18.00
% Corn Wall	0.00

### Building Photo



(<http://images.vgsi.com/photos2/ManchesterCTPhotos/\00\03\43\06.jpg>)

### Building Layout



([http://images.vgsi.com/photos2/ManchesterCTPhotos//Sketches/14616\\_1](http://images.vgsi.com/photos2/ManchesterCTPhotos//Sketches/14616_1))

Building Sub-Areas (sq ft)			<u>Legend</u>
Code	Description	Gross Area	Living Area
BAS	First Floor	12,000	12,000
		12,000	12,000

### Extra Features

Extra Features				<u>Legend</u>
Code	Description	Size	Value	Bldg #
A/C	Partial AC	5796.00 S.F.	\$7,000	2

### Land

#### Land Use

Use Code	300
Description	Industrial 96
Zone	IND

#### Land Line Valuation

Size (Acres)	4.96
Frontage	0
Depth	0

Neighborhood 5000  
 Alt Land Appr No  
 Category

Assessed Value \$530,700  
 Appraised Value \$758,100

**Outbuildings**

Outbuildings						Legend
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
PAV1	Paving Asphalt			13350.00 S.F.	\$30,000	4
PAV1	Paving Asphalt			74622.00 S.F.	\$56,000	1
FN3	Fence 6' Chain			300.00 L.F.	\$3,500	1
PAV2	Paving Concrete			96.00 S.F.	\$400	4
SHDT	Telephone Shed			319.00 S.F.	\$31,600	1
FN4	Fence 8' Chain			54.00 L.F.	\$1,600	1
SHDT	Telephone Shed			319.00 S.F.	\$31,600	1

**Valuation History**

Appraisal			
Valuation Year	Improvements	Land	Total
2020	\$1,951,900	\$758,100	\$2,710,000
2015	\$1,689,400	\$725,100	\$2,414,500
2010	\$1,766,600	\$760,300	\$2,526,900

Assessment			
Valuation Year	Improvements	Land	Total
2020	\$1,366,400	\$530,700	\$1,897,100
2015	\$1,182,600	\$507,600	\$1,690,200
2010	\$1,236,700	\$532,300	\$1,769,000



# Exhibit C

## **Construction Drawings**

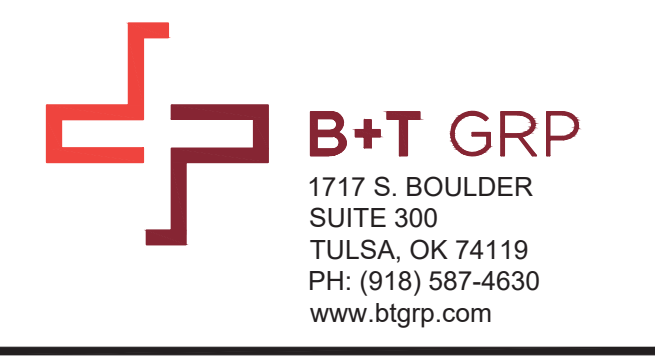


THIS SUBMISSION CONTAINS CONFIDENTIAL, PROPRIETARY OR TRADE SECRET INFORMATION THAT IS EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAWS. PLEASE MAKE SURE THESE PAGES ARE NOT DISCLOSED. IF ANY REQUEST IS MADE FOR THIS INFORMATION, PLEASE CONTACT THE SENDER IN ADDITION TO ANY LEGAL NOTICE REQUIREMENTS UNDER APPLICABLE LAW.  
DISCLAIMER PROVIDED BY AT&T. THIS STATEMENT DOES NOT CONSTITUTE ENGINEERING ANALYSIS OR DESIGN.



**AT&T SITE NUMBER:** CTL05307  
**AT&T SITE NAME:** BUCKLAND MALL  
**AT&T FA CODE:** 10071100  
**AT&T PACE NUMBER:** MRCTB052247, MRCTB050797, MRCTB051091,  
**AT&T PROJECT:** MRCTB051410  
**5G NR 1SR CBAND, BBU RECONFIGURATION WITH NEW IDS, LTE 7C, 5G NR 1SR CBAND**

**BUSINESS UNIT #:** 876347  
**SITE ADDRESS:** 53 SLATER STREET MANCHESTER, CT 06040  
**COUNTY:** HARTFORD  
**SITE TYPE:** MONOPOLE  
**TOWER HEIGHT:** 155'-0"



**AT&T SITE NUMBER:** CTL05307  
**BU #:** 876347  
**BUCKLAND MALL**  
 53 SLATER STREET MANCHESTER, CT 06040  
 EXISTING 155'-0" MONOPOLE

**ISSUED FOR:**

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	10/8/21	AJA	PRELIMINARY REVIEW	MTJ
B	10/28/21	AJA	PRELIMINARY REVIEW	MTJ
0	12/20/21	GAC	CONSTRUCTION	JHW

**SITE INFORMATION**

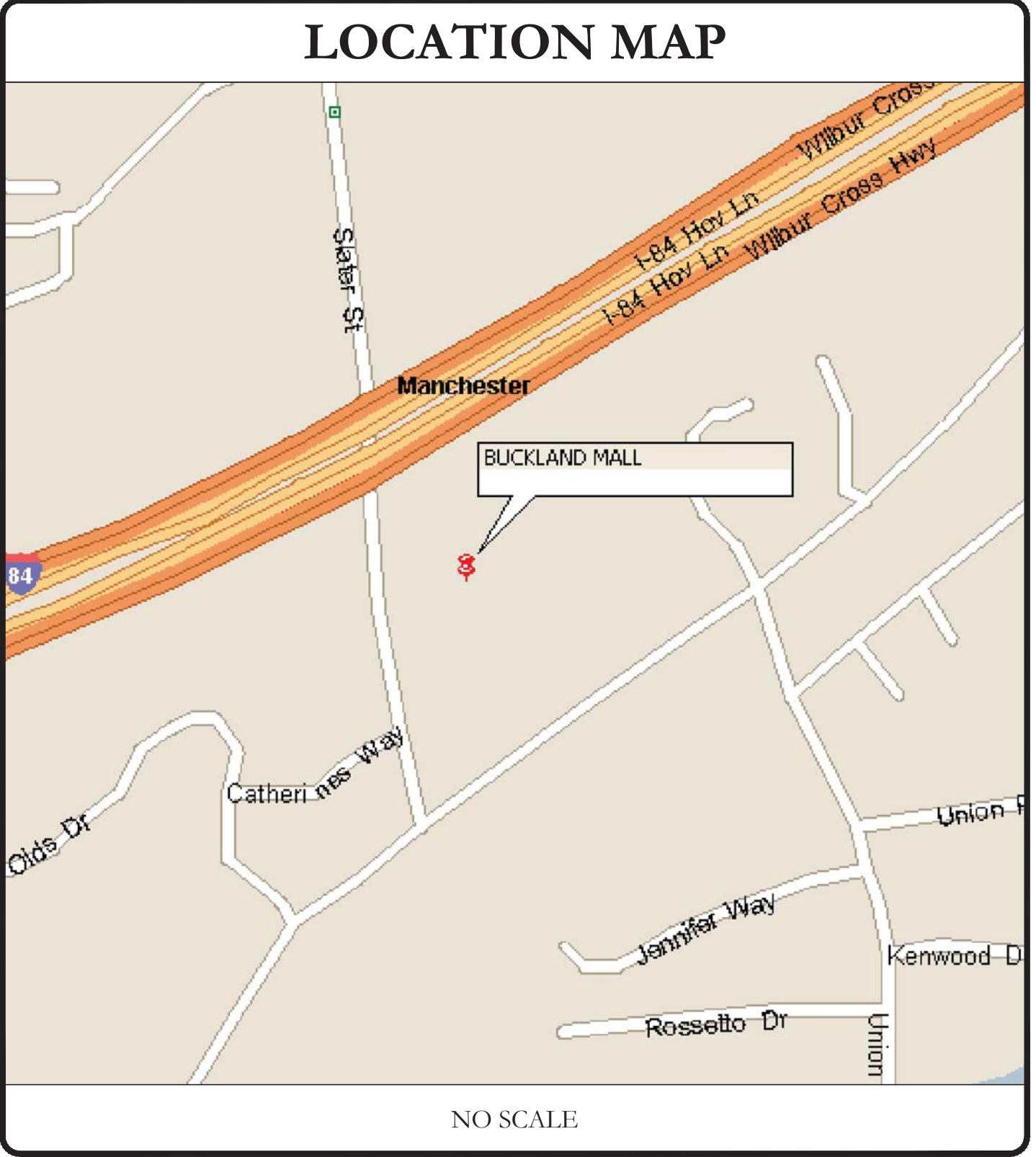
CROWN CASTLE USA INC. SITE NAME:	BUCKLAND MALL
SITE ADDRESS:	53 SLATER STREET MANCHESTER, CT 06040
COUNTY:	HARTFORD
MAP/PARCEL #:	514000053
AREA OF CONSTRUCTION:	EXISTING
LATITUDE:	41.8049919
LONGITUDE:	72.5335989
LAT/LONG TYPE:	NAD83
GROUND ELEVATION:	206'
CURRENT ZONING:	IND - INDUSTRIAL
JURISDICTION:	TOWN OF MANCHESTER
OCCUPANCY CLASSIFICATION:	U
TYPE OF CONSTRUCTION:	IIB
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
PROPERTY OWNER:	ONE HUNDRED TWENTY ONE CONNECTICUT AVENUE ASSOCIATES LLC 9 LAKE LANE ELLINGTON, CT 06029
TOWER OWNER:	CROWN CASTLE USA INC 2000 CORPORATE DRIVE CANONSBURG, PA 15317
CARRIER/APPLICANT:	AT&T TOWER ASSET GROUP 575 MOROSGO DRIVE ATLANTA, GA 30324-3300
ELECTRIC PROVIDER:	T.B.D
TELCO PROVIDER:	T.B.D

**DRAWING INDEX**

SHEET #	SHEET DESCRIPTION
T-1	TITLE SHEET
T-2	GENERAL NOTES
C-1.1	SITE PLAN
C-1.2	EXISTING & FINAL EQUIPMENT PLANS
C-2	FINAL ELEVATION & ANTENNA PLANS
C-3	FINAL EQUIPMENT SCHEDULE
C-4	EQUIPMENT MOUNTING DETAILS
C-5	EQUIPMENT SPECS
G-1	GROUNDING SCHEMATIC
G-2	GROUNDING DETAILS
ATTACHED	PLUMBING DIAGRAM
ATTACHED	MOUNT SPEC

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR FULL SIZE. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

CALL CONNECTICUT ONE CALL (800) 922-4455 CBYD.COM CALL 2 WORKING DAYS BEFORE YOU DIG!



**PROJECT TEAM**

A&E FIRM:	B+T GROUP 1717 S BOULDER AVE, SUITE 300 TULSA, OK 74119 MARVIN PHILLIPS marvin.phillips@btgrp.com
CROWN CASTLE USA INC. DISTRICT CONTACTS:	3530 TORINGDON WAY, SUITE 300 CHARLOTTE, NC 28277  PAUL PEDICONE - PROJECT MANAGER PAUL.PEDICONE@CROWNCastle.COM  JASON D'AMICO - CONSTRUCTION MANAGER JASON.DAMICO@CROWNCastle.COM

**NOTE:**  
PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN NOC AT (800) 788-7011 & CROWN CONSTRUCTION MANAGER.

**PROJECT DESCRIPTION**

THE PURPOSE OF THIS PROJECT IS TO ENHANCE BROADBAND CONNECTIVITY AND CAPACITY TO THE EXISTING ELIGIBLE WIRELESS FACILITY.

TOWER SCOPE OF WORK:	GROUND SCOPE OF WORK:
<ul style="list-style-type: none"> <li>REMOVE (3) CCI ANTENNAS - OPA-65R-LCUU-H6 ANTENNAS</li> <li>REMOVE (3) QUINTEL - QS66512-2 ANTENNAS</li> <li>REMOVE (3) KATHRIEN - 800-10965 ANTENNAS</li> <li>REMOVE (1) RAYCAP - DC6-48-60-08F SQUID</li> <li>REMOVE (6) COAX CABLE</li> <li>REMOVE (6) DC CABLE</li> <li>REMOVE (3) T-ARM MOUNT</li> <li>RELOCATE (3) ERICSSON - RRUS-32 B30</li> <li>INSTALL (3) SABRE #: C10857802 MOUNT</li> <li>INSTALL (3) QUINTEL - QD6616-7 ANTENNAS</li> <li>INSTALL (3) ERICSSON - AIR6449 N77D + AIR6419 N77G STACKED</li> <li>INSTALL (3) CCI - DMP65R-BU6DA ANTENNAS</li> <li>INSTALL (3) ERICSSON - 4478 B14 RADIOS</li> <li>INSTALL (1) RAYCAP - DC6-48-60-18-F SQUID</li> <li>INSTALL (6) Y CABLES (TO CONNECT FROM SQUID TO RRU)</li> <li>INSTALL (6) DC CABLES</li> <li>INSTALL (1) FIBER CABLE</li> </ul>	<ul style="list-style-type: none"> <li>REMOVE (1) XMU MULTIPLEXER</li> <li>REMOVE (1) 5216 MODULE</li> <li>INSTALL (1) 6675 FRONTHAUL GATEWAY (FHG)</li> <li>INSTALL (1) 6673 FRONTHAUL GATEWAY (FHG)</li> <li>INSTALL (1) IDLE CABLE</li> <li>INSTALL (3) RECTIFIERS IN EXISTING POWER PLANT</li> </ul>

**APPLICABLE CODES/REFERENCE DOCUMENTS**

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

CODE TYPE	CODE
BUILDING	2015 IBC
MECHANICAL	2015 IMC
ELECTRICAL	2017 NEC

**REFERENCE DOCUMENTS:**

STRUCTURAL ANALYSIS: N/A  
DATED:

MOUNT ANALYSIS: GPD GROUP  
DATED: 9/10/21

RFDS REVISION: PRELIMINARY  
DATED: 8/2/21

ORDER ID: 556512  
REVISION: 0

**B&T ENGINEERING, INC.**  
 PEC.0001564  
 Expires 2/10/22

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

<b>SHEET NUMBER:</b> <b>T-1</b>	<b>REVISION:</b> <b>0</b>
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**CROWN CASTLE USA INC. SITE ACTIVITY REQUIREMENTS:**

- NOTICE TO PROCEED- NO WORK SHALL COMMENCE PRIOR TO CROWN CASTLE USA INC. WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN CASTLE USA INC. NOC AT 800-788-7011 & THE CROWN CASTLE USA INC. CONSTRUCTION MANAGER.
- "LOOK UP" - CROWN CASTLE USA INC. SAFETY CLIMB REQUIREMENT: THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR CROWN CASTLE USA INC. POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.
- PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.
- ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND CROWN CASTLE USA INC. STANDARD CED-STD-10253, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA-322 (LATEST EDITION).
- ALL SITE WORK TO COMPLY WITH QAS-STD-10068 "INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON CROWN CASTLE USA INC. TOWER SITE," CED-STD-10294 "STANDARD FOR INSTALLATION OF MOUNTS AND APPURTENANCES," AND LATEST VERSION OF ANSI/TIA-1019-A-2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS." IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY CROWN CASTLE USA INC. PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
- ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
- THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
- THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
- ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.
- ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.
- CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
- ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, TOWER OWNER, CROWN CASTLE USA INC., AND/OR LOCAL UTILITIES.
- THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.
- THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
- THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
- THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.
- CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
- THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
- CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
- CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
- NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

**GREENFIELD GROUNDING NOTES:**

- ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
- THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
- THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.
- METAL CONDUIT AND TRAY SHALL BE GROUNDING AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
- METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
- EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.
- CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.
- ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
- ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
- USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
- EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
- ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
- COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
- ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.
- APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
- ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
- MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
- BOND ALL METALLIC OBJECTS WITHIN 6 FT OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.
- GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
- ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON-METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD-WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).
- BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY).

**GENERAL NOTES:**

- FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:  
CONTRACTOR: GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION  
CARRIER: AT&T  
TOWER OWNER: CROWN CASTLE USA INC.
- THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.
- THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.
- NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.
- SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.
- PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CROWN CASTLE.
- ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
- UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
- THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
- IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND CROWN CASTLE PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
- CONTRACTOR IS TO PERFORM A SITE INVESTIGATION AND IS TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.
- THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF CROWN CASTLE USA INC.
- CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
- CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

**CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:**

- ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.
- UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.
- ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f<sub>c</sub>) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°f AT TIME OF PLACEMENT.
- CONCRETE EXPOSED TO FREEZE-THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER-TO-CEMENT RATIO (W/C) OF 0.45.
- ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WVF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (F<sub>y</sub>) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:  
#4 BARS AND SMALLER.....40 ksi  
#5 BARS AND LARGER.....60 ksi
- THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:  
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH.....3"  
CONCRETE EXPOSED TO EARTH OR WEATHER:  
#6 BARS AND LARGER.....2"  
#5 BARS AND SMALLER.....1-1/2"  
CONCRETE NOT EXPOSED TO EARTH OR WEATHER:  
SLAB AND WALLS.....3/4"  
BEAMS AND COLUMNS.....1-1/2"
- A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

**ELECTRICAL INSTALLATION NOTES:**

- ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
- CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
- WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
- ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.
- ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.
- ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 22,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.
- EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
- ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).
- PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
- ALL THE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
- ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
- SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
- POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI-CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
- POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
- ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).
- RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEC AND NEC.
- ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
- ELECTRICAL METALLIC TUBING (EMT) OR METAL-CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
- SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
- LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
- CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SET SLOTTED FITTINGS ARE NOT ACCEPTABLE.
- CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEC AND THE NEC.
- WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREFOLD SPECMATE WIREWAY).
- SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
- CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER-ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER, PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKOUT ON OUTSIDE AND INSIDE.
- EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3R (OR BETTER) FOR EXTERIOR LOCATIONS.
- METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
- NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
- THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR CROWN CASTLE USA INC. BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
- THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
- INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "AT&T".
- ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

CONDUCTOR COLOR CODE		
SYSTEM	CONDUCTOR	COLOR
120/240V, 1Ø	A PHASE	BLACK
	B PHASE	RED
	NEUTRAL	WHITE
	GROUND	GREEN
120/208V, 3Ø	A PHASE	BLACK
	B PHASE	RED
	C PHASE	BLUE
	NEUTRAL	WHITE
	GROUND	GREEN
277/480V, 3Ø	A PHASE	BROWN
	B PHASE	ORANGE OR PURPLE
	C PHASE	YELLOW
	NEUTRAL	GREY
	GROUND	GREEN
DC VOLTAGE	POS (+)	RED**
	NEG (-)	BLACK**

\* SEE NEC 210.5(C)(1) AND (2)  
\*\* POLARITY MARKED AT TERMINATION

**ABBREVIATIONS:**

- ANT ANTENNA
- (E) EXISTING
- FIF FACILITY INTERFACE FRAME
- GEN GENERATOR
- GPS GLOBAL POSITIONING SYSTEM
- GSM GLOBAL SYSTEM FOR MOBILE
- LTE LONG TERM EVOLUTION
- MGB MASTER GROUND BAR
- MW MICROWAVE
- (N) NEW
- NEC NATIONAL ELECTRIC CODE
- (P) PROPOSED
- PP POWER PLANT
- QTY QUANTITY
- RECT RECTIFIER
- RBS RADIO BASE STATION
- RET REMOTE ELECTRIC TILT
- RFDS RADIO FREQUENCY DATA SHEET
- RFH REMOTE RADIO HEAD
- RRU REMOTE RADIO UNIT
- SIAD SMART INTEGRATED DEVICE
- TMA TOWER MOUNTED AMPLIFIER
- TYP TYPICAL
- UMTS UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM
- W.P. WORK POINT

**APWA UNIFORM COLOR CODE:**

- WHITE PROPOSED EXCAVATION
- PINK TEMPORARY SURVEY MARKINGS
- RED ELECTRIC POWER LINES, CABLES, CONDUIT, AND LIGHTING CABLES
- YELLOW GAS, OIL, STEAM, PETROLEUM, OR GASEOUS MATERIALS
- ORANGE COMMUNICATION, ALARM OR SIGNAL LINES, CABLES, OR CONDUIT AND TRAFFIC LOOPS
- BLUE POTABLE WATER
- PURPLE RECLAIMED WATER, IRRIGATION, AND SLURRY LINES
- GREEN SEWERS AND DRAIN LINES



575 MOROSGO DRIVE  
ATLANTA, GA 30324-3300



3530 TORINGDON WAY, SUITE 300  
CHARLOTTE, NC 28277



1717 S. BOULDER  
SUITE 300  
TULSA, OK 74119  
PH: (918) 587-4630  
www.btgrp.com

**AT&T SITE NUMBER:  
CTL05307**

**BU #: 876347  
BUCKLAND MALL**

**53 SLATER STREET  
MANCHESTER, CT 06040**

**EXISTING  
155'-0" MONOPOLE**

**ISSUED FOR:**

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	10/8/21	AJA	PRELIMINARY REVIEW	MTJ
B	10/28/21	AJA	PRELIMINARY REVIEW	MTJ
0	12/20/21	GAC	CONSTRUCTION	JHW



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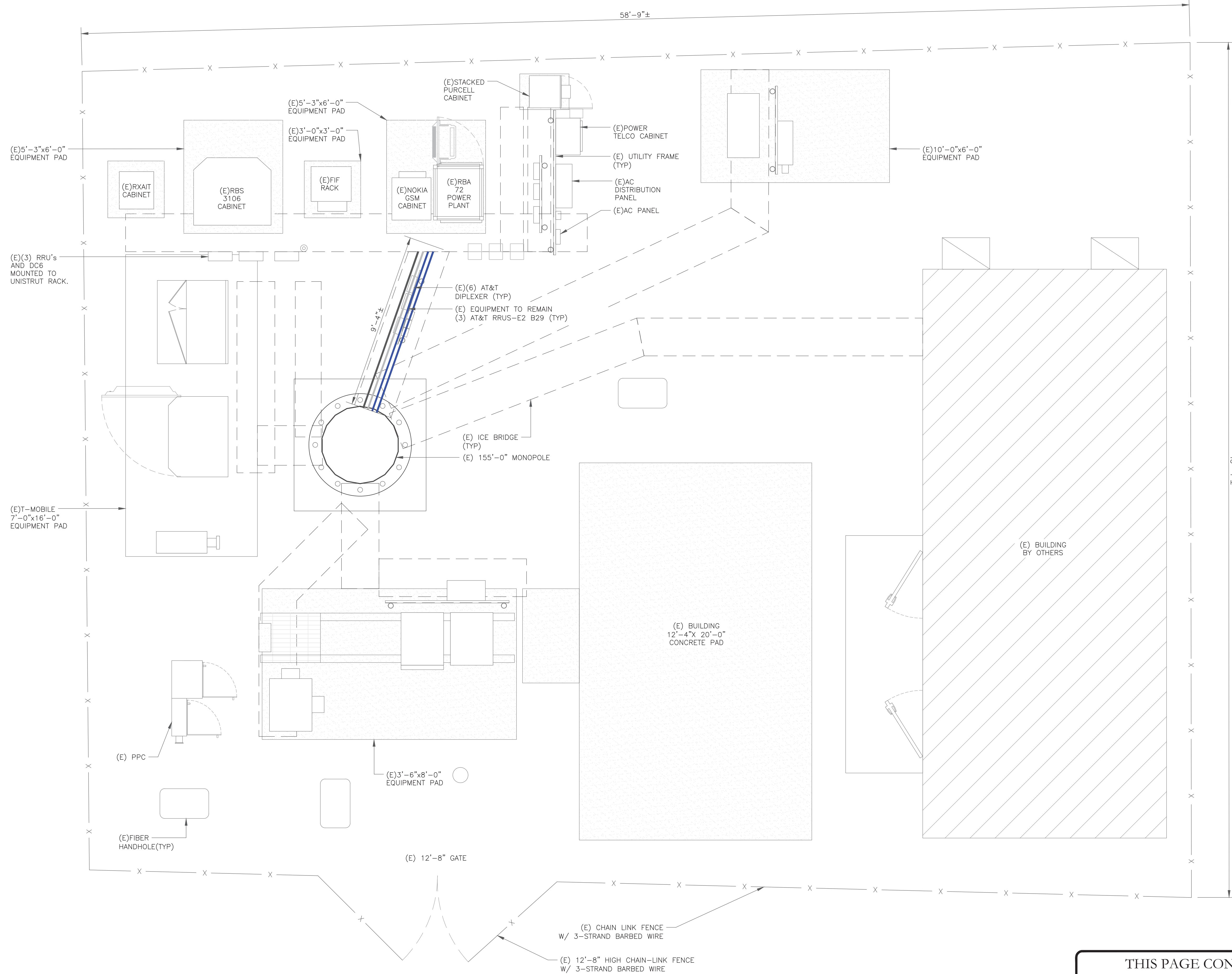
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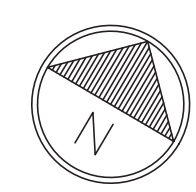
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1 SITE PLAN  
SCALE: 3/8"=1'-0" (FULL SIZE)  
3/16"=1'-0" (11x17)



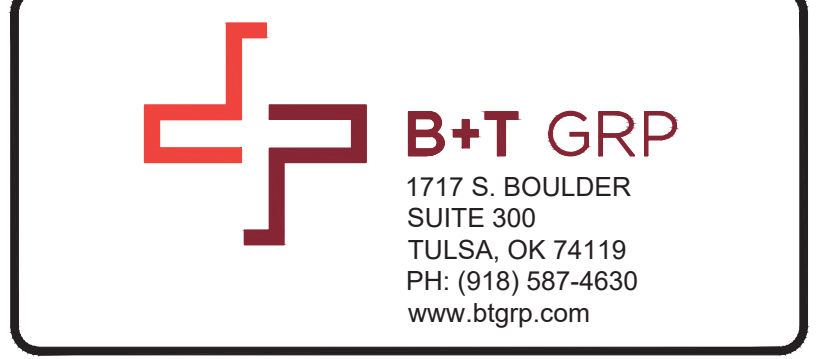
149606.005.01 BUCKLAND MALL\_CCI\_ATT\_CD.dwg - Sheet: C-1.1 - User: jackie.weeter - Dec. 20, 2021 - 2:33pm

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- GROUND SCOPE OF WORK:**
- REMOVE (1) 5216 MODULE
  - REMOVE (1) XMU MULTIPLEXER
  - REMOVE (6) TRIPLEXER
  - REMOVE (6) KATHREIN BIAS-T
  - REMOVE (6) COAX CABLES
  - INSTALL (6) DC CABLES
  - INSTALL (1) FIBER CABLE

**NOTE:**  
 THE POWER DESIGN FOR ANY AC ELECTRICAL POWER CHANGES IS TO BE PERFORMED BY OTHERS AND IS SHOWN HERE FOR REFERENCE PURPOSES ONLY. AT&T IS SOLELY RESPONSIBLE FOR THE ELECTRICAL POWER DESIGN.

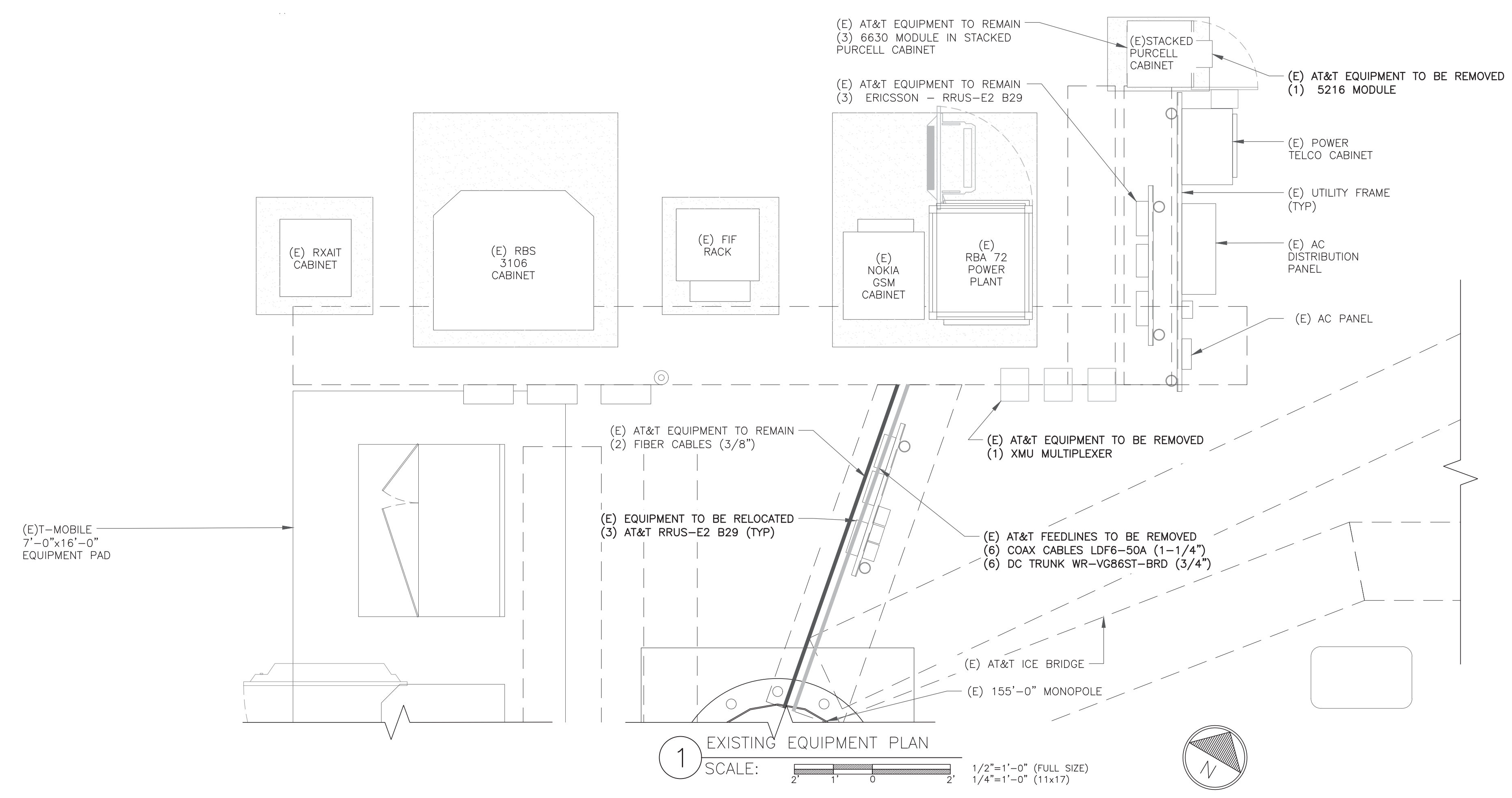


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 155'-0" MONOPOLE

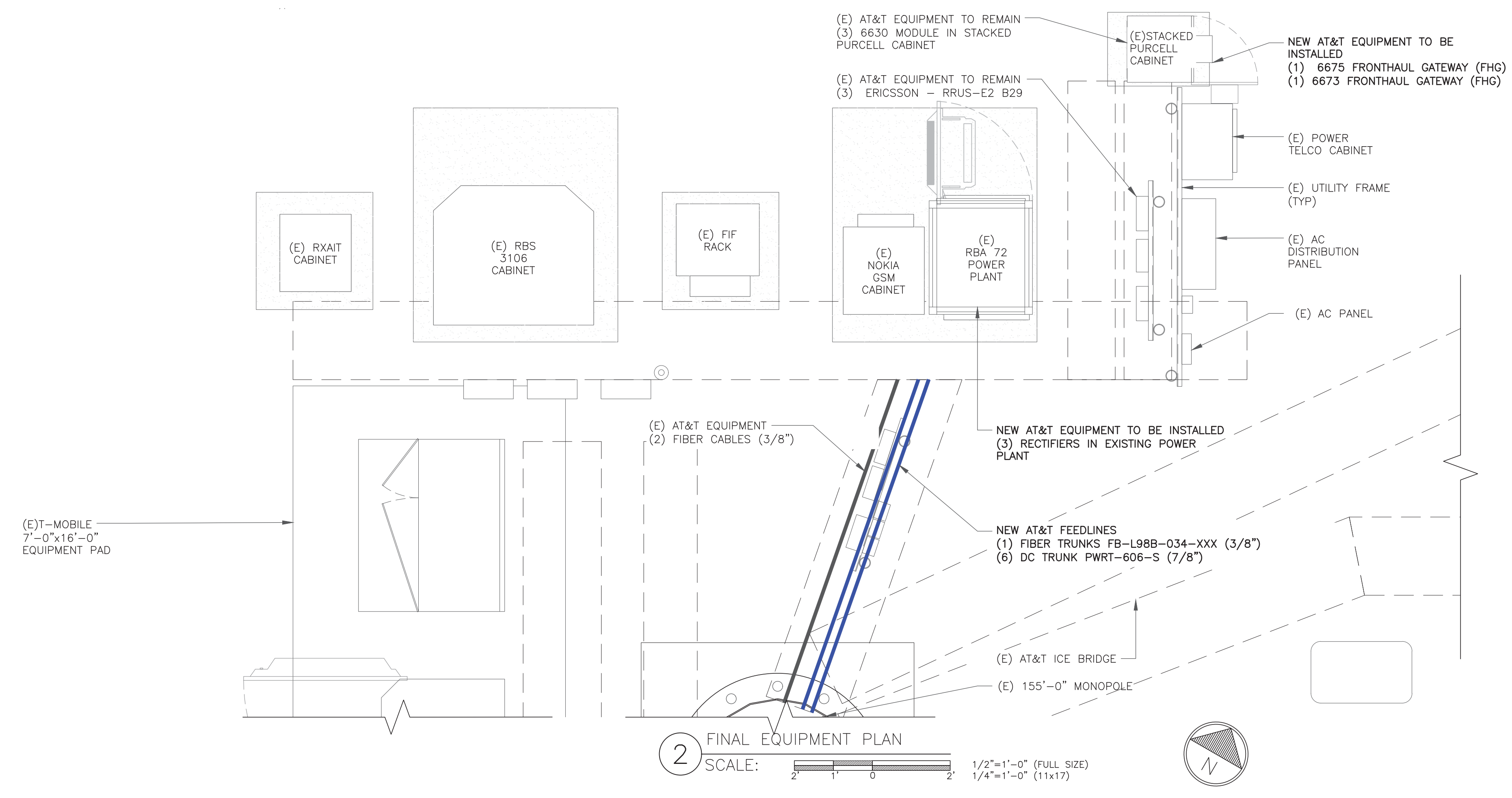


- GROUND SCOPE OF WORK:**
- INSTALL (1) 6675 FRONTHAUL GATEWAY (FHG)
  - INSTALL (1) 6673 FRONTHAUL GATEWAY (FHG)
  - INSTALL (1) 6630 MODULE IN STACKED PURCELL CABINET
  - INSTALL (1) IDLE CABLE
  - INSTALL (3) RECTIFIERS IN EXISTING POWER PLANT
  - INSTALL (6) COAX CABLES
  - INSTALL (1) FIBER TRUNKS
  - INSTALL (6) DC TRUNKS

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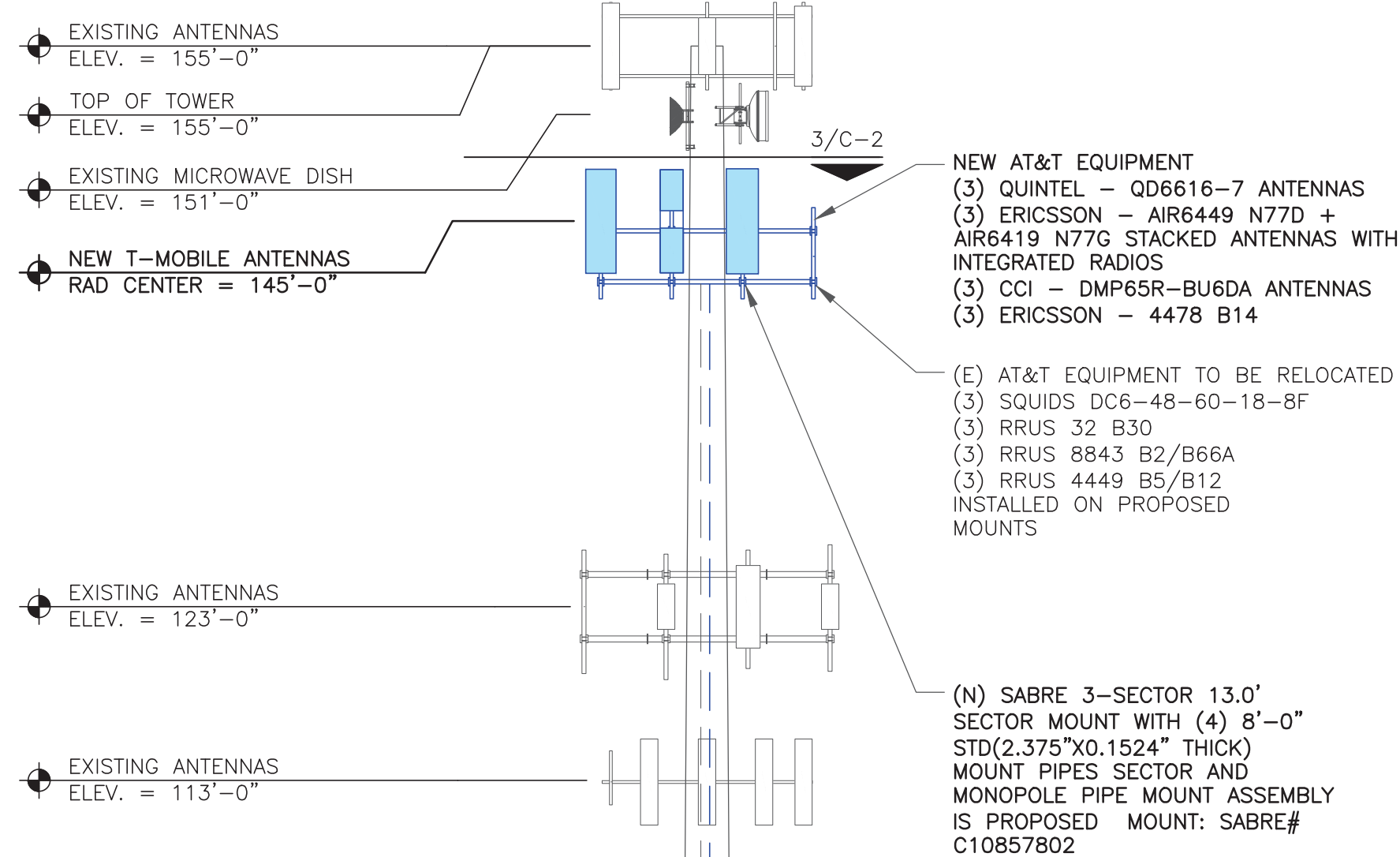


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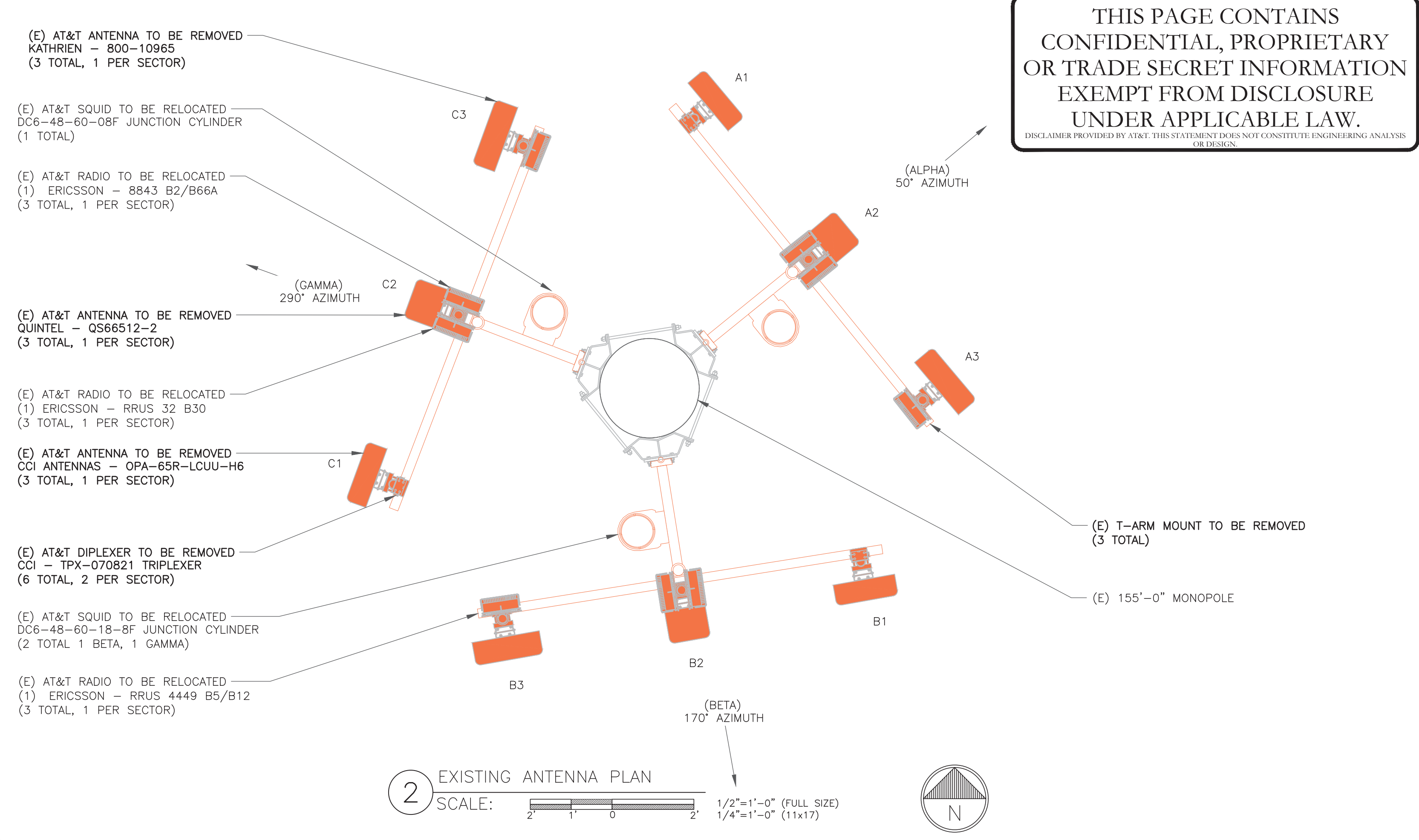
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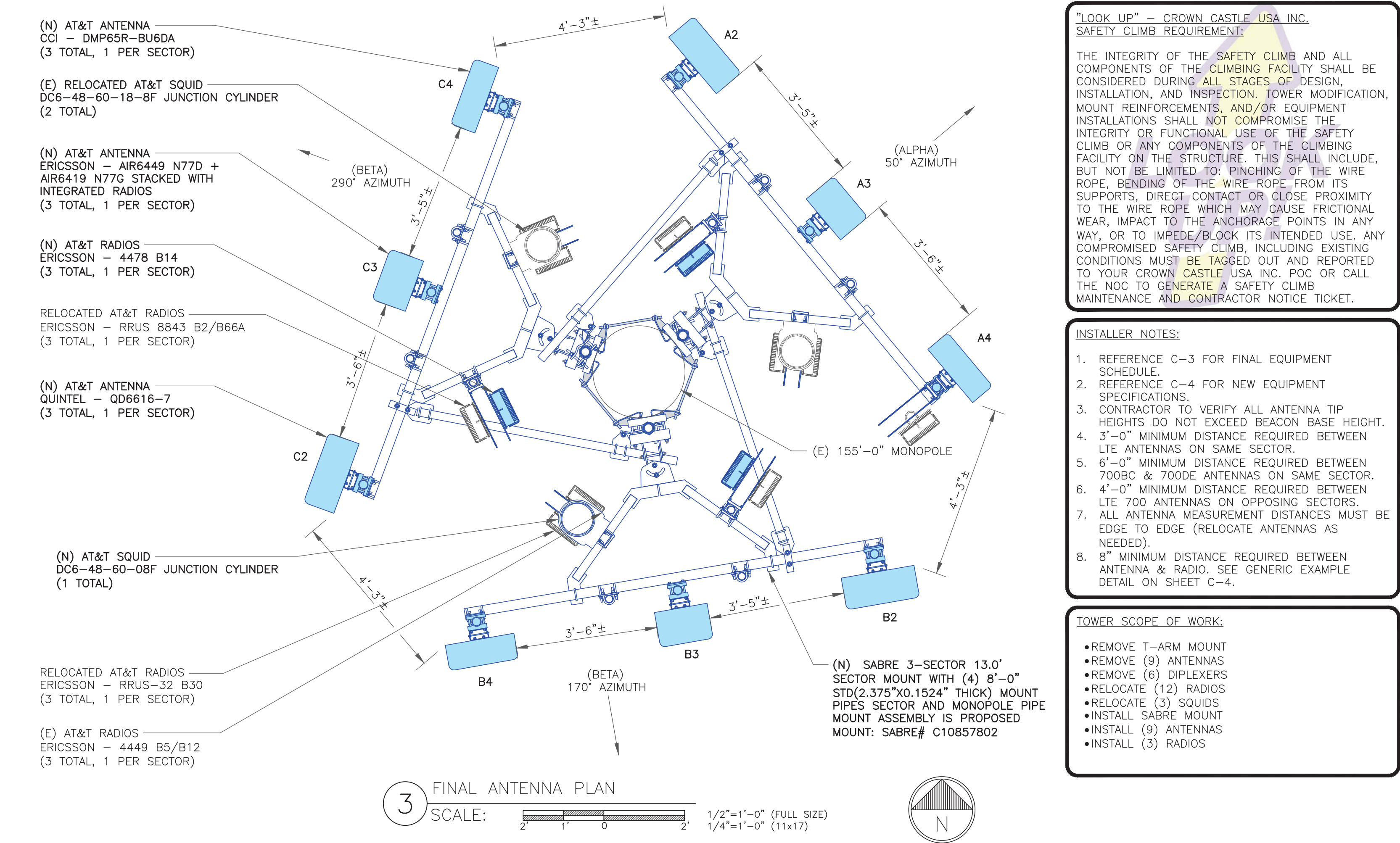
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1 FINAL ELEVATION  
SCALE: NOT TO SCALE



2 EXISTING ANTENNA PLAN  
SCALE: 1/2"=1'-0" (FULL SIZE)  
1/4"=1'-0" (11x17)



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"LOOK UP" - CROWN CASTLE USA INC.  
SAFETY CLIMB REQUIREMENT:

THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR CROWN CASTLE USA INC. POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.

- INSTALLER NOTES:
- REFERENCE C-3 FOR FINAL EQUIPMENT SCHEDULE.
  - REFERENCE C-4 FOR NEW EQUIPMENT SPECIFICATIONS.
  - CONTRACTOR TO VERIFY ALL ANTENNA TIP HEIGHTS DO NOT EXCEED BEACON BASE HEIGHT.
  - 3'-0" MINIMUM DISTANCE REQUIRED BETWEEN LTE ANTENNAS ON SAME SECTOR.
  - 6'-0" MINIMUM DISTANCE REQUIRED BETWEEN 700BC & 700DE ANTENNAS ON SAME SECTOR.
  - 4'-0" MINIMUM DISTANCE REQUIRED BETWEEN LTE 700 ANTENNAS ON OPPOSING SECTORS.
  - ALL ANTENNA MEASUREMENT DISTANCES MUST BE EDGE TO EDGE (RELOCATE ANTENNAS AS NEEDED).
  - 8" MINIMUM DISTANCE REQUIRED BETWEEN ANTENNA & RADIO. SEE GENERIC EXAMPLE DETAIL ON SHEET C-4.

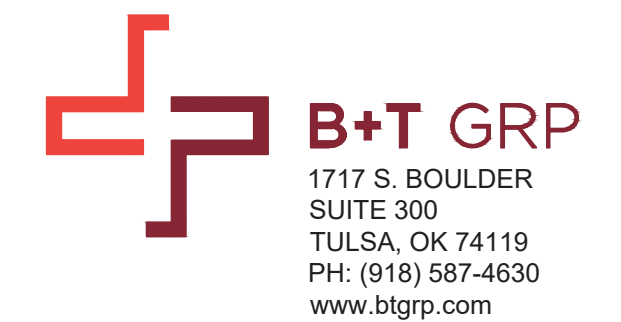
- TOWER SCOPE OF WORK:
- REMOVE T-ARM MOUNT
  - REMOVE (9) ANTENNAS
  - REMOVE (6) DIPLEXERS
  - RELOCATE (12) RADIOS
  - RELOCATE (3) SQUIDS
  - INSTALL SABRE MOUNT
  - INSTALL (9) ANTENNAS
  - INSTALL (3) RADIOS

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**FINAL ANTENNA AND FEEDLINE SCHEDULE**

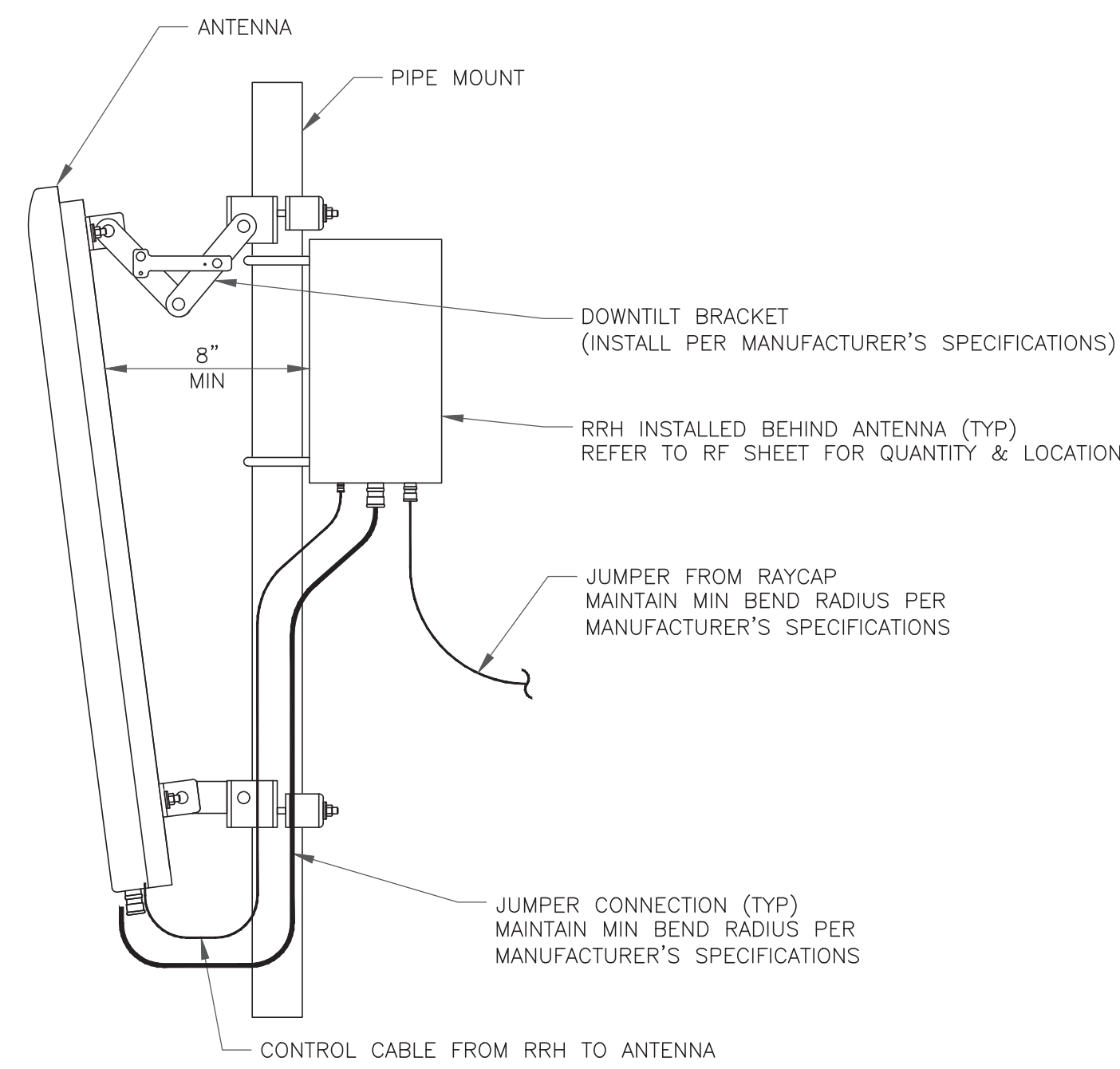
POS.	TECH	STATUS	AZIMUTH	ANTENNA TYPE	ANTENNA RAD CENTER	MECHANICAL DOWNTILT	ELECTRICAL DOWNTILT	MAIN COAX SIZE	MAIN COAX LENGTH	COAX QTY	TMA QTY AND MODEL	SURGE PROTECTION	DC/FIBER CABLES	RRHs QTY & MODEL ON TOWER	LOCATION	DIPLEXER ON TOWER	DIPLEXER ON GROUND	RET CABLE
ALPHA SECTOR																		
A2	LTE 700/LTE 1900/LTE AWS/5G 1900/5G AWS	NEW	50°	QUINTEL – QD6616-7	145'-0"	0°	3°/3°/7°/7°/7°/7°/7°	1-5/8"	195'-0"	2	-	(E) DC6-48-60-18-8F	(1) 3/8" FIBER (2) 7/8" DC LINES	(1) ERICSSON-8843 B2/B66A (1) ERICSSON-RRUS-E2 B29 (1) ERICSSON-4478 B14	TOWER	N	N	N
A3	5G CBAND	NEW	50°	ERICSSON-AIR6449 N77D+ AIR6419 N77G STACKED	145'-0"	-	-	-	-	-	-			INTEGRATED WITHIN	-	-	-	-
A4	LTE 700/LTE WCS/5G 850	NEW	50°	CCI – DMP65R-BU6DA	145'-0"	0°	8°/3°/8°	-	-	-	-			(1) ERICSSON-4449 B5/B12 (1) ERICSSON-RRUS-32 B30	TOWER	N	N	N
BETA SECTOR																		
B2	LTE 700/LTE 1900/LTE AWS/5G1900/5G AWS	NEW	170°	QUINTEL – QD6616-7	145'-0"	0°	3°/3°/6°/6°/6°/6°/6°	1-5/8"	195'-0"	2	-	(E) DC6-48-60-18-8F	(1) 3/8" FIBER (2) 7/8" DC LINES	(1) ERICSSON-8843 B2/B66A (1) ERICSSON-RRUS-E2 B29 (1) ERICSSON-4478 B14	TOWER	N	N	N
B3	5G CBAND	NEW	170°	ERICSSON-AIR6449 N77D+ AIR6419 N77G STACKED	145'-0"	-	-	-	-	-	-			INTEGRATED WITHIN	-	-	-	-
B4	LTE 700/LTE WCS/5G 850	NEW	170°	CCI – DMP65R-BU6DA	145'-0"	0°	8°/3°/8°	-	-	-	-			(1) ERICSSON-4449 B5/B12 (1) ERICSSON-RRUS-32 B30	TOWER	N	N	N
GAMMA SECTOR																		
C2	LTE 700/LTE 1900/LTE AWS/5G1900/5G AWS	NEW	290°	QUINTEL – QD6616-7	145'-0"	0°	3°/3°/7°/7°/7°/7°/7°	1-5/8"	195'-0"	2	-	(E) DC6-48-60-18-8F	(1) 3/8" FIBER (2) 7/8" DC LINES	(1) ERICSSON-8843 B2/B66A (1) ERICSSON-RRUS-E2 B29 (1) ERICSSON-4478 B14	TOWER	N	N	N
C3	5G CBAND	NEW	290°	ERICSSON-AIR6449 N77D+ AIR6419 N77G STACKED	145'-0"	-	-	-	-	-	-			INTEGRATED WITHIN	-	-	-	-
C4	LTE 700/LTE WCS/5G 850	NEW	290°	CCI – DMP65R-BU6DA	145'-0"	0°	8°/2°/8°	-	-	-	-			(1) ERICSSON-4449 B5/B12 (1) ERICSSON-RRUS-32 B30	TOWER	N	N	N

FEEDLINE TOTALS

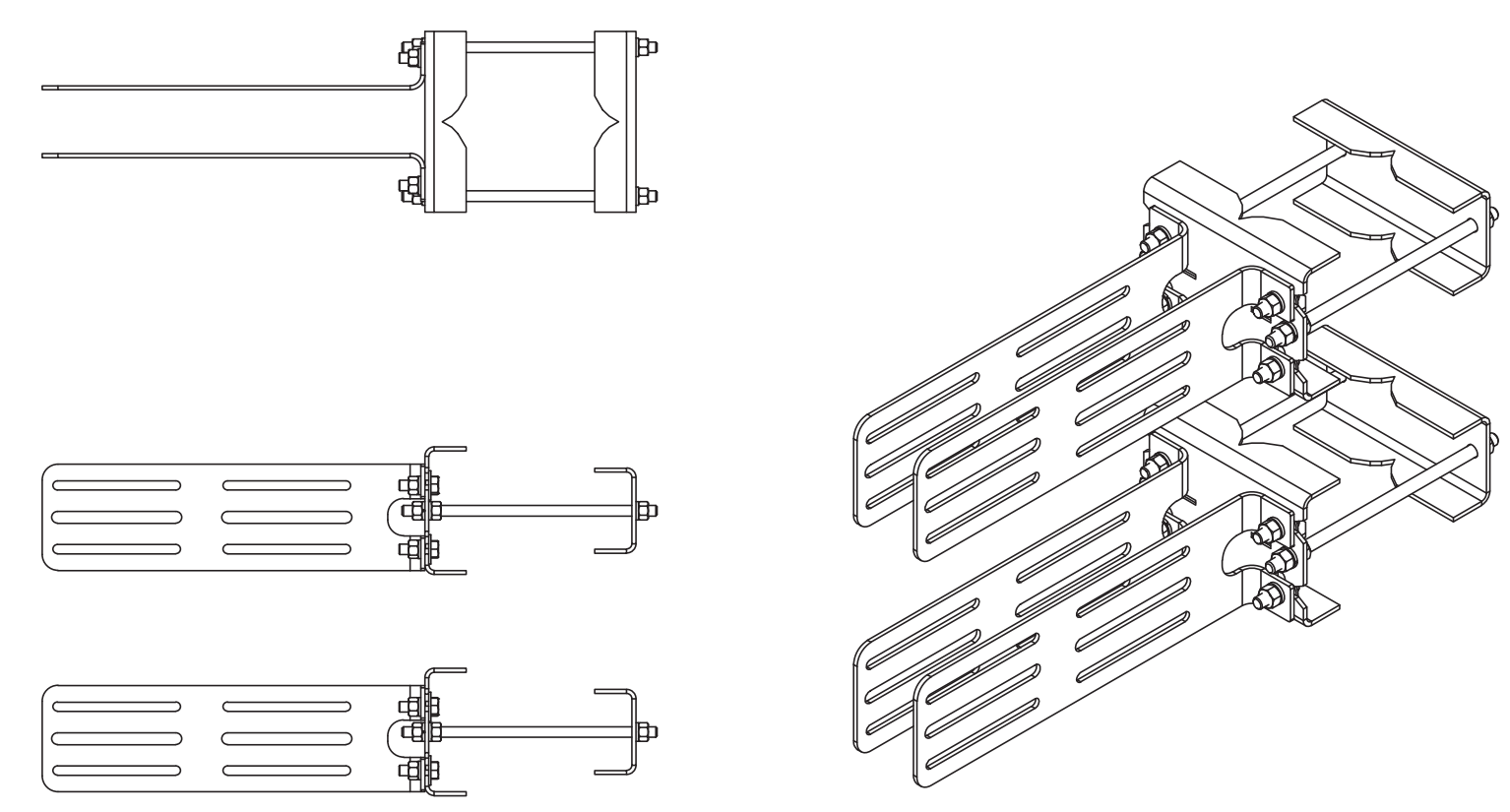
6	(N) COAX	1-5/8"	195' +/-
6	(N) DC	7/8"	195' +/-
3	(N) FIBER	3/8"	195' +/-

NOTE: BOLD DENOTES NEW EQUIPMENT

1 FINAL ANTENNA AND FEEDLINE SCHEDULE  
 SCALE: NOT TO SCALE

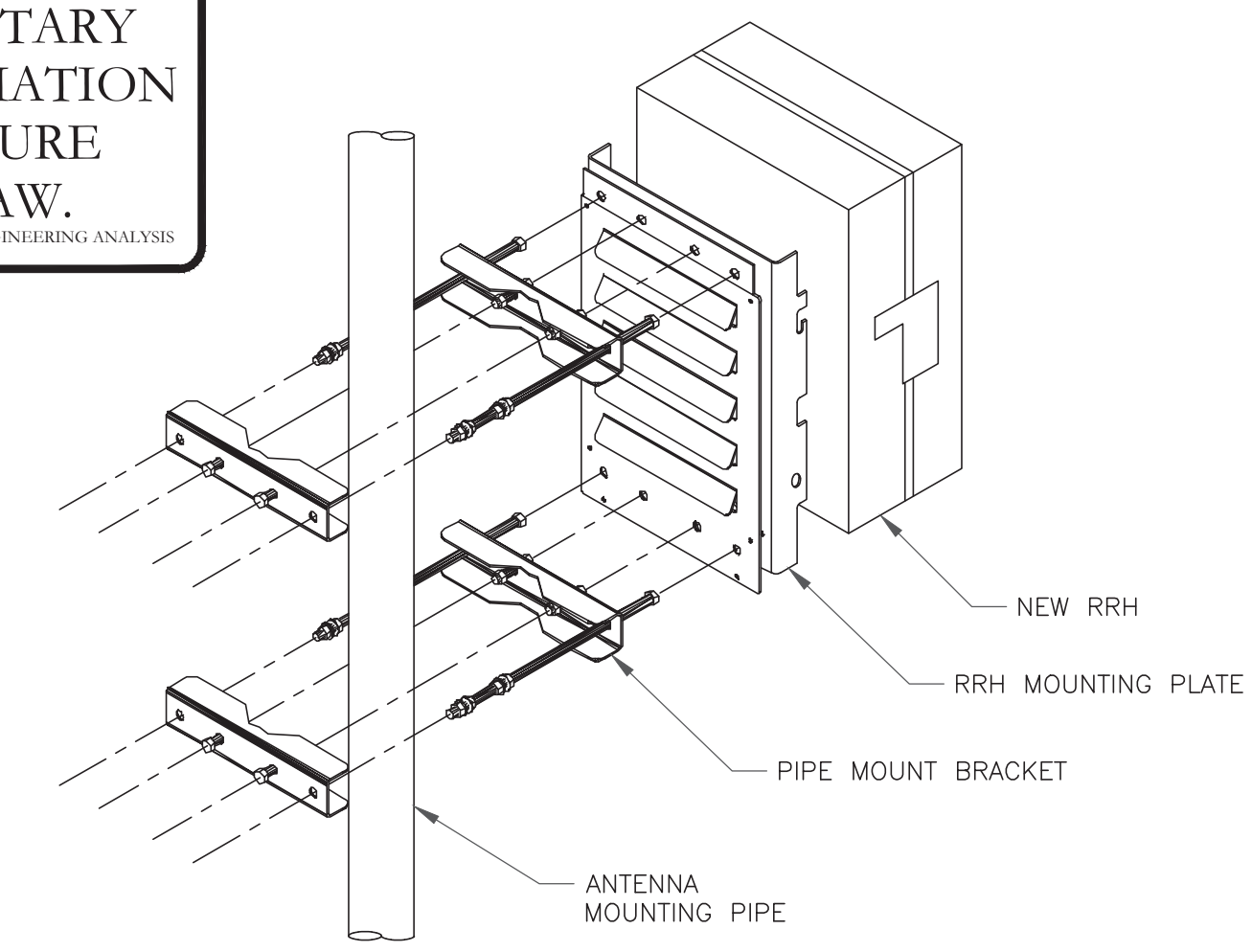


1 GENERIC ANTENNA MOUNTING ELEVATION  
SCALE: NOT TO SCALE



2 COMMSCOPE - RR-FA2  
SCALE: NOT TO SCALE

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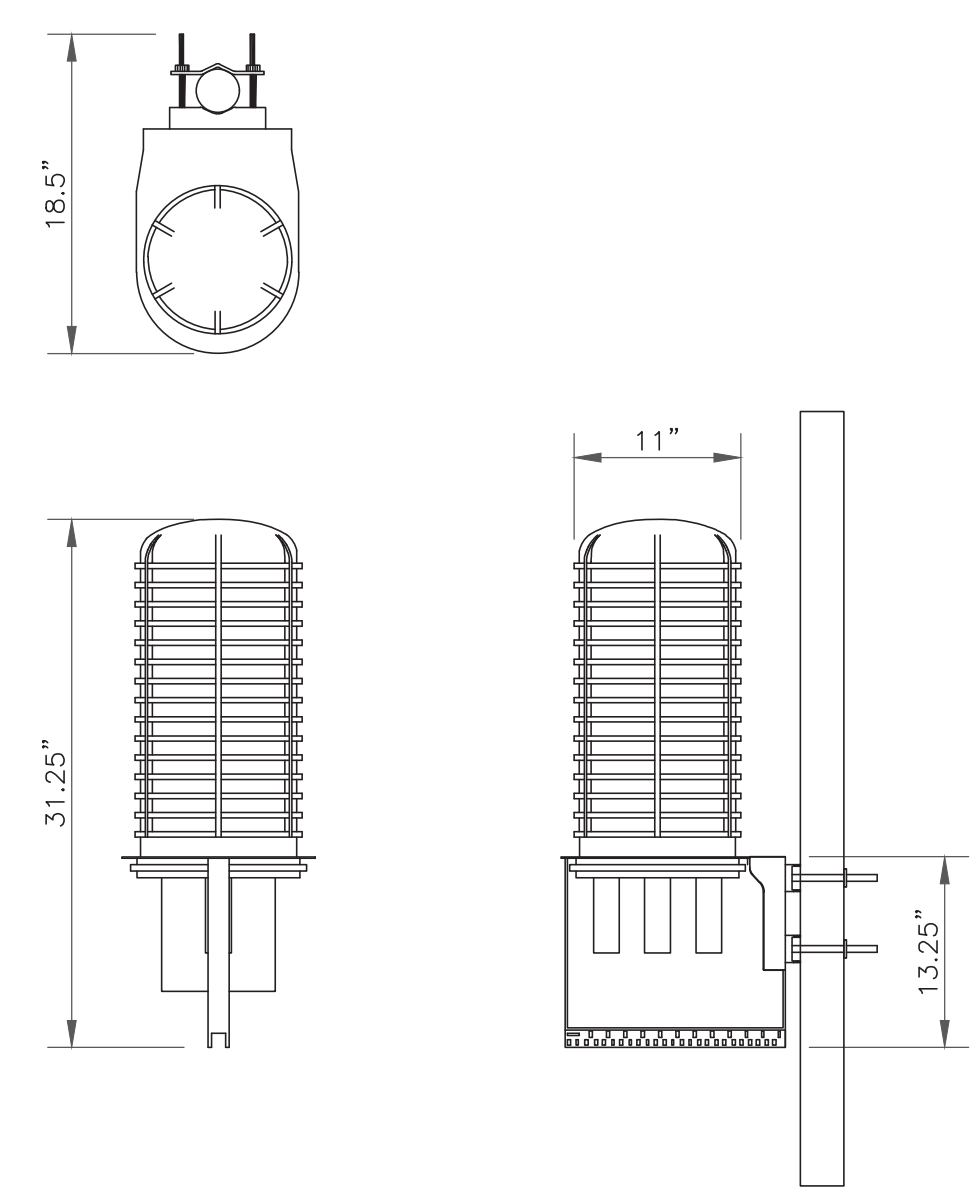
3 SINGLE RRH MOUNTING DETAIL  
SCALE: NOT TO SCALE

NOTE:  
ANTENNA NOT SHOWN FOR CLARITY

**RAYCAP**  
DC6-48-60-18-8F

RAYCAP - DC6-48-60-18-8F  
SIZE: 11x31.25 IN.  
WEIGHT: 32.8 LBS  
NOMINAL OPERATING VOLTAGE: 48 VDC  
VOLTAGE PROTECTION RATING: 400 V  
WIND LOADING: 150 MPH SUSTAINED (105.7 LBS)  
WIND LOADING: 195 MPH GUST (213.6 LBS)

CONTRACTOR TO USE "THREAD LUBRICANT" ON MOUNTING BOLTS DURING INSTALLATION



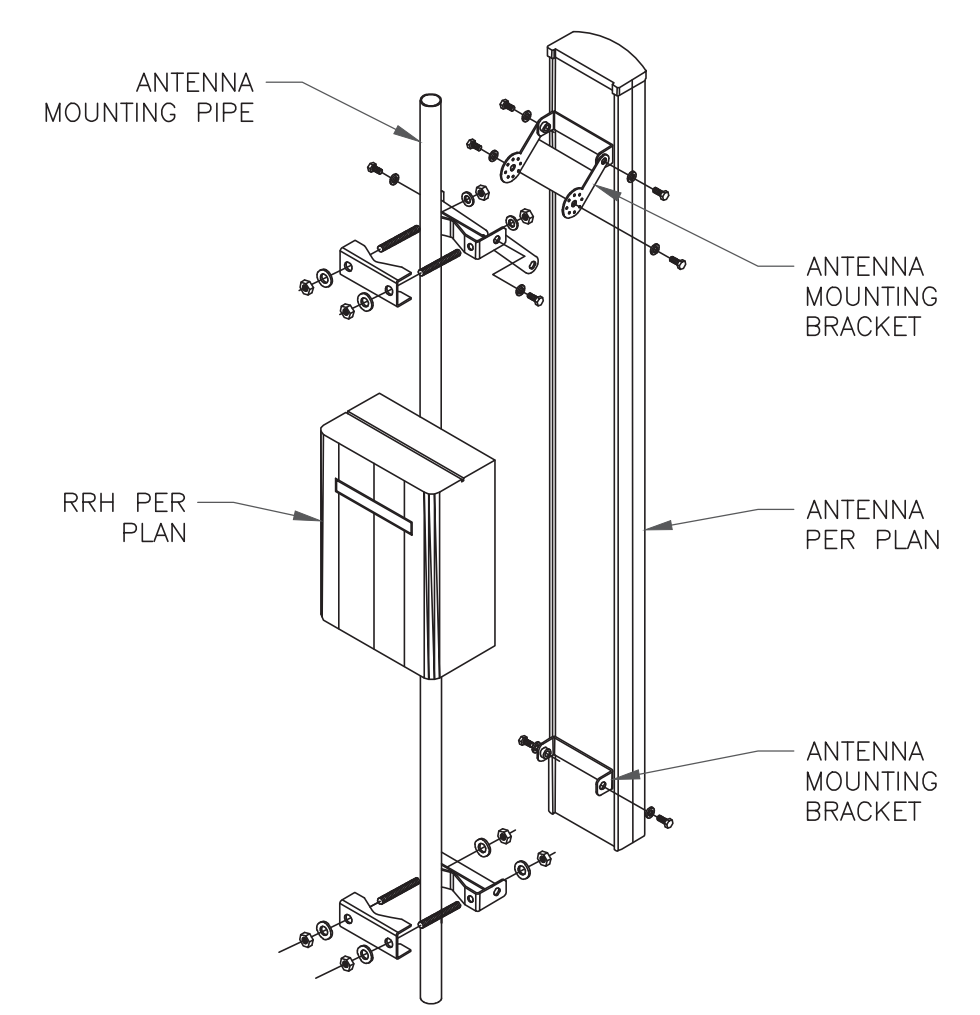
4 ANTENNA WITH RRH MOUNTING DETAIL  
SCALE: NOT TO SCALE

**INSTALLER NOTES:**

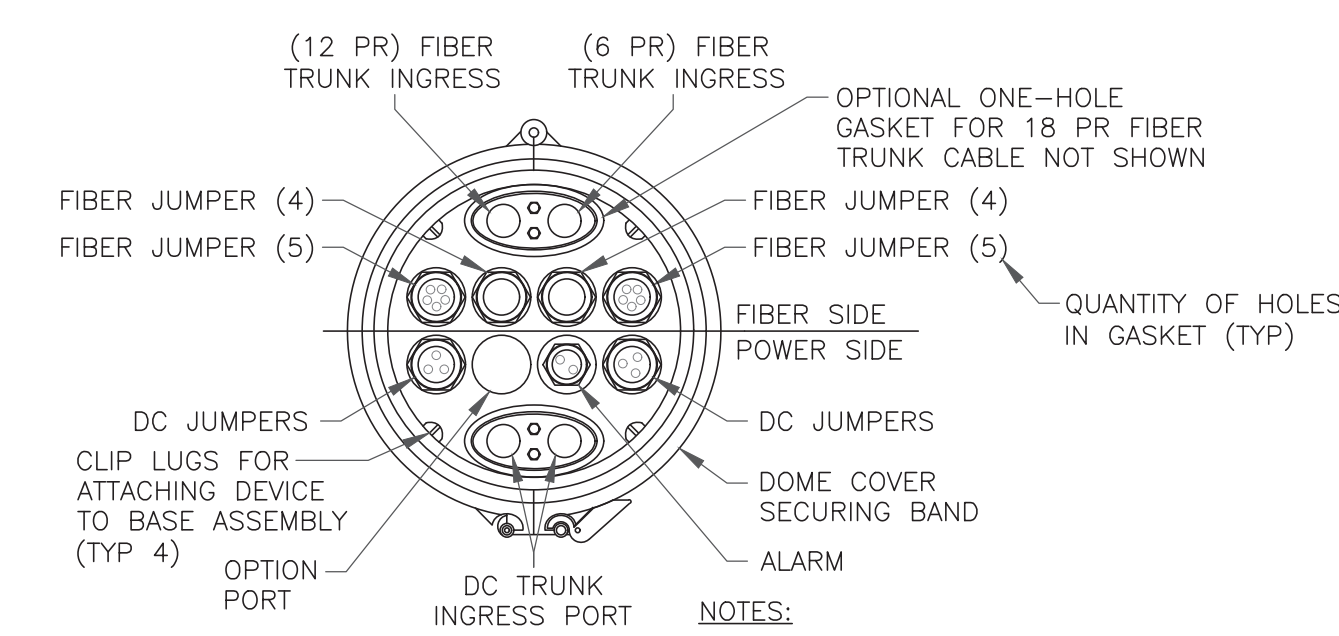
1. COMPLY WITH MANUFACTURERS INSTRUCTIONS TO ENSURE THAT ALL RRHS RECEIVE ELECTRICAL POWER WITHIN 24 HOURS OF BEING REMOVED FROM THE MANUFACTURER'S PACKAGING.
2. DO NOT OPEN RRH PACKAGES IN THE RAIN.
3. ALL PIPES, BRACKETS, AND MISCELLANEOUS HARDWARE TO BE GALVANIZED UNLESS NOTED OTHERWISE.

**INSTALLER NOTES:**

1. COMPLY WITH MANUFACTURERS INSTRUCTIONS TO ENSURE THAT ALL RRHS RECEIVE ELECTRICAL POWER WITHIN 24 HOURS OF BEING REMOVED FROM THE MANUFACTURER'S PACKAGING.
2. DO NOT OPEN RRH PACKAGES IN THE RAIN.
3. ALL PIPES, BRACKETS, AND MISCELLANEOUS HARDWARE TO BE GALVANIZED UNLESS NOTED OTHERWISE.



5 ANTENNA WITH DUAL RRH MOUNTING DETAIL  
SCALE: NOT TO SCALE



6 SQUID MOUNTING DETAIL  
SCALE: NOT TO SCALE

**NOTES:**

1. REMOVE CABLE SEALING GLAND AND INSTALL M32x1.5 METRIC-T0-1\"/>

575 MOROSGO DRIVE  
ATLANTA, GA 30324-3300

3530 TORINGDON WAY, SUITE 300  
CHARLOTTE, NC 28277

1717 S. BOULDER  
SUITE 300  
TULSA, OK 74119  
PH: (918) 587-4630  
www.blgrp.com

AT&T SITE NUMBER:  
**CTL05307**

BU #: **876347**  
**BUCKLAND MALL**

53 SLATER STREET  
MANCHESTER, CT 06040

EXISTING  
155'-0" MONOPOLE

**ISSUED FOR:**

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	10/8/21	AJA	PRELIMINARY REVIEW	MTJ
B	10/28/21	AJA	PRELIMINARY REVIEW	MTJ
0	12/20/21	GAC	CONSTRUCTION	JHW

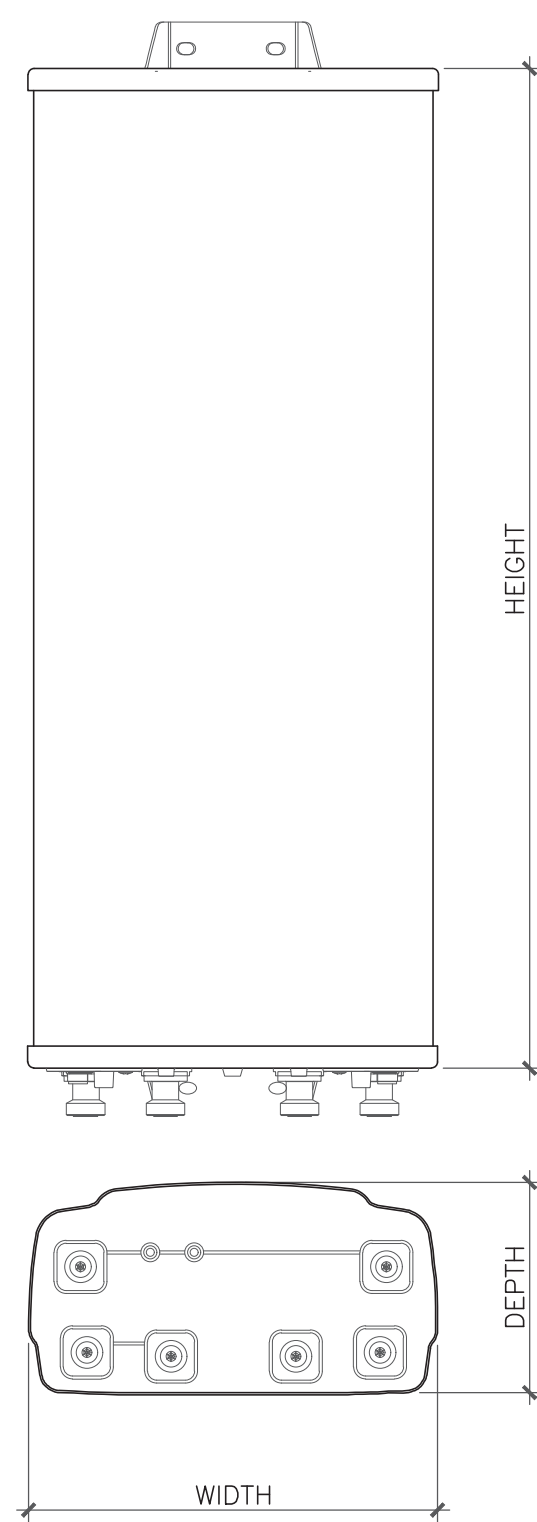
B&T ENGINEERING, INC.  
PEC.0001564  
Expires 2/10/22

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SHEET NUMBER: **C-4** REVISION: **0**

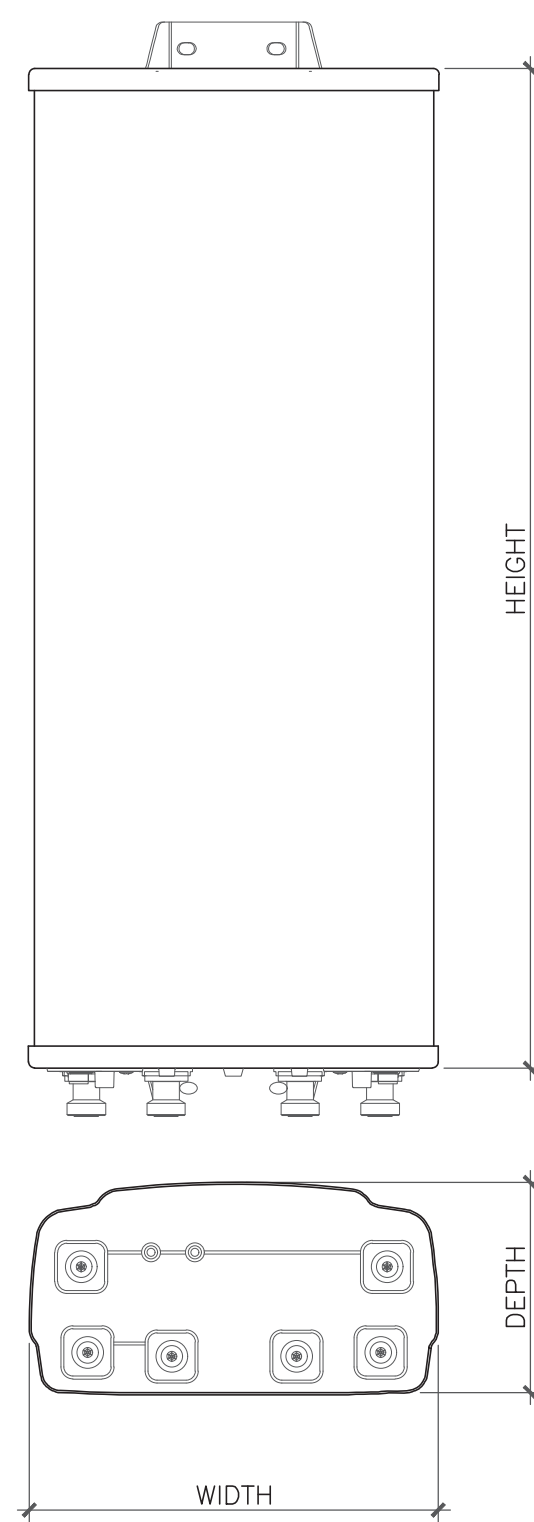
149606.005.01 BUCKLAND MALL\_CCI\_ATT\_CD.dwg - Sheet C-4 - User: jockie.waeter - Dec. 20, 2021 - 2:33pm





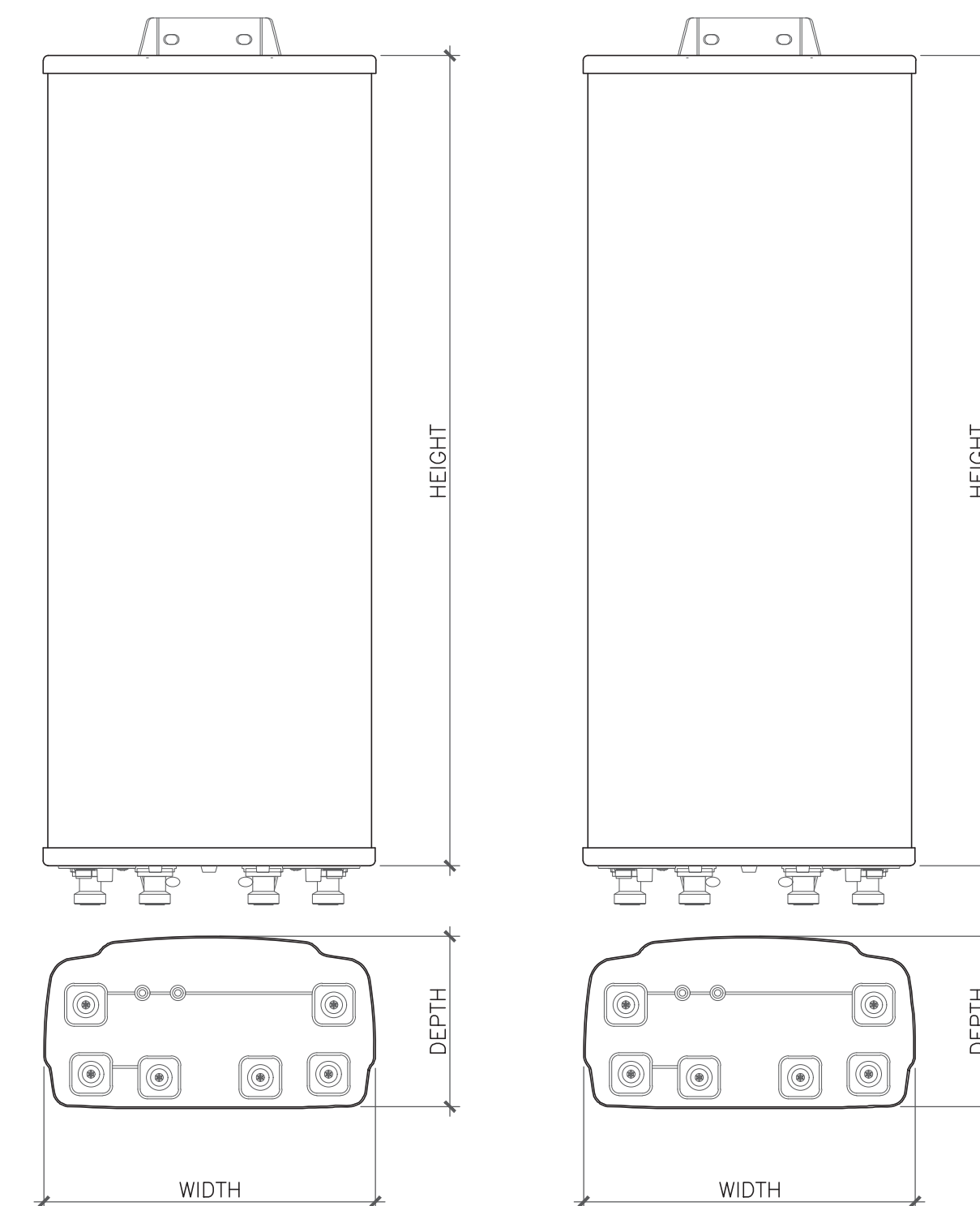
ANTENNA DIMENSIONS (INCHES)				
MODEL	HEIGHT	WIDTH	DEPTH	WEIGHT
CCI - DMP65R-BU6DA	71.20"	20.70"	7.70"	89.30 lbs

1 ANTENNA DETAIL  
SCALE: NOT TO SCALE



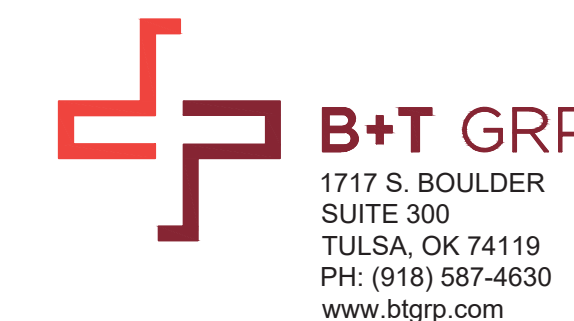
ANTENNA DIMENSIONS (INCHES)				
MODEL	HEIGHT	WIDTH	DEPTH	WEIGHT
QUINTEL - QD6616-7	72.00"	22.00"	9.60"	130.00 lbs

2 ANTENNA DETAIL  
SCALE: NOT TO SCALE



ANTENNA DIMENSIONS (INCHES)				
MODEL	HEIGHT	WIDTH	DEPTH	WEIGHT
ERICSSON - AIR6449 N77D	30.63"	15.87"	10.55"	83.78lbs
ERICSSON/AIR6419 N77G	27.95"	15.75"	6.68"	66.20lbs

3 ANTENNA DETAIL  
SCALE: NOT TO SCALE



AT&T SITE NUMBER:  
**CTL05307**

BU #: **876347**  
**BUCKLAND MALL**

53 SLATER STREET  
MANCHESTER, CT 06040

EXISTING  
155'-0" MONOPOLE

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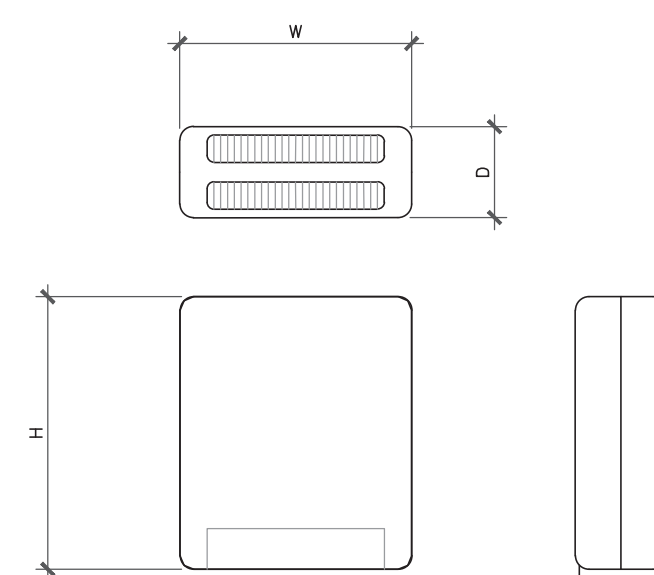


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SHEET NUMBER: REVISION:

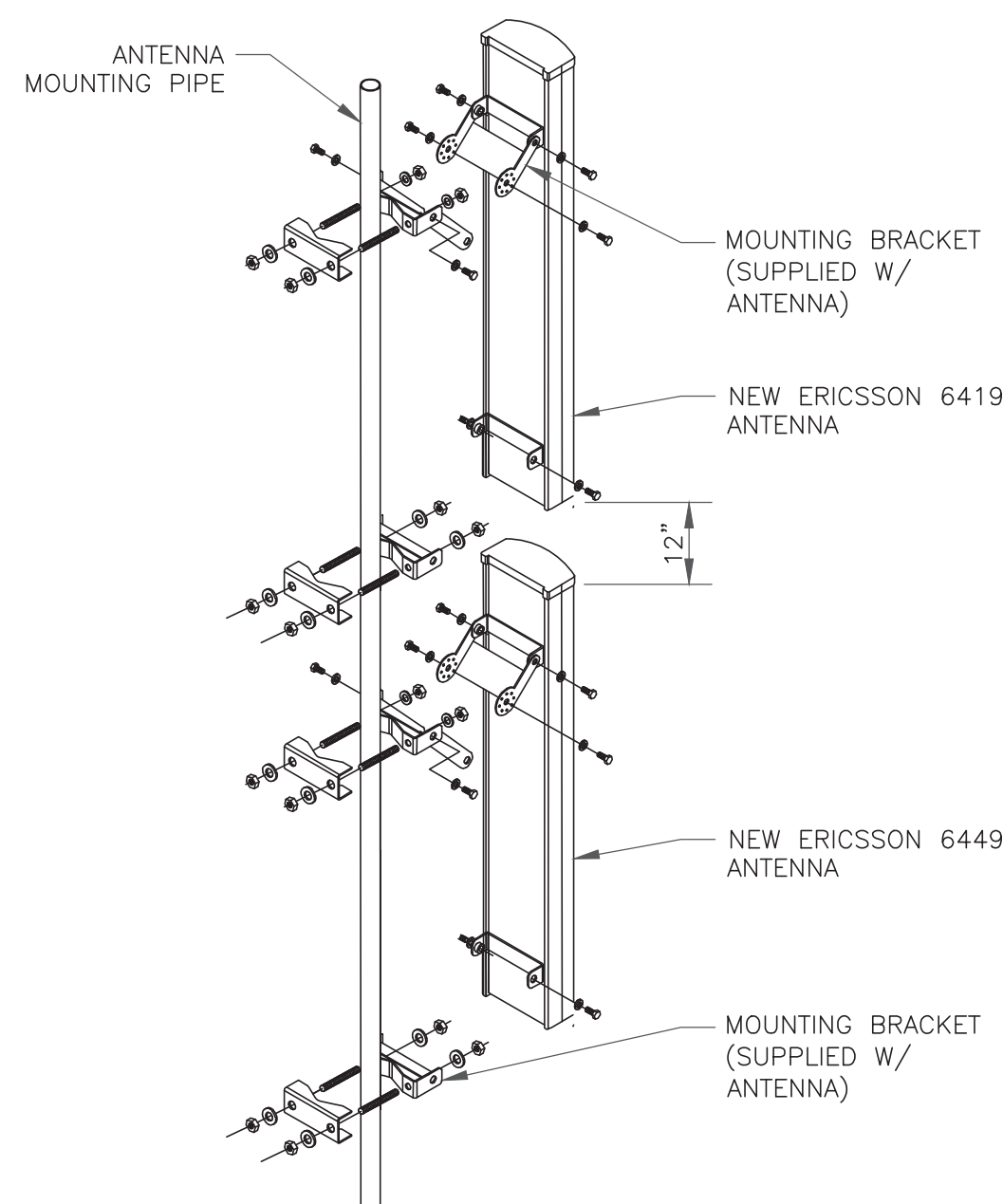
**C-5** **0**



RRU SPECIFICATIONS

MANUFACTURER	ERICSSON
MODEL #	4478 B14
WIDTH	13.4"
DEPTH	8.26
HEIGHT	18.1"
WEIGHT	59.4 LBS

4 RRU SPECIFICATIONS  
SCALE: NOT TO SCALE



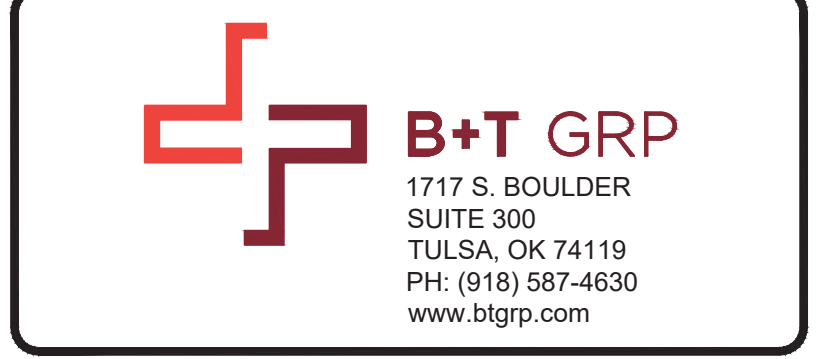
5 ANTENNA MOUNTING DETAIL  
SCALE: NOT TO SCALE

6 NOT USED  
SCALE: NOT TO SCALE

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AT&T SITE NUMBER:  
**CTL05307**

BU #: **876347**  
**BUCKLAND MALL**

53 SLATER STREET  
 MANCHESTER, CT 06040

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 155'-0" MONOPOLE

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0	12/20/21	GAC	CONSTRUCTION	JHW

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SHEET NUMBER: **G-1** REVISION: **0**

GROUNDING PLAN LEGEND:

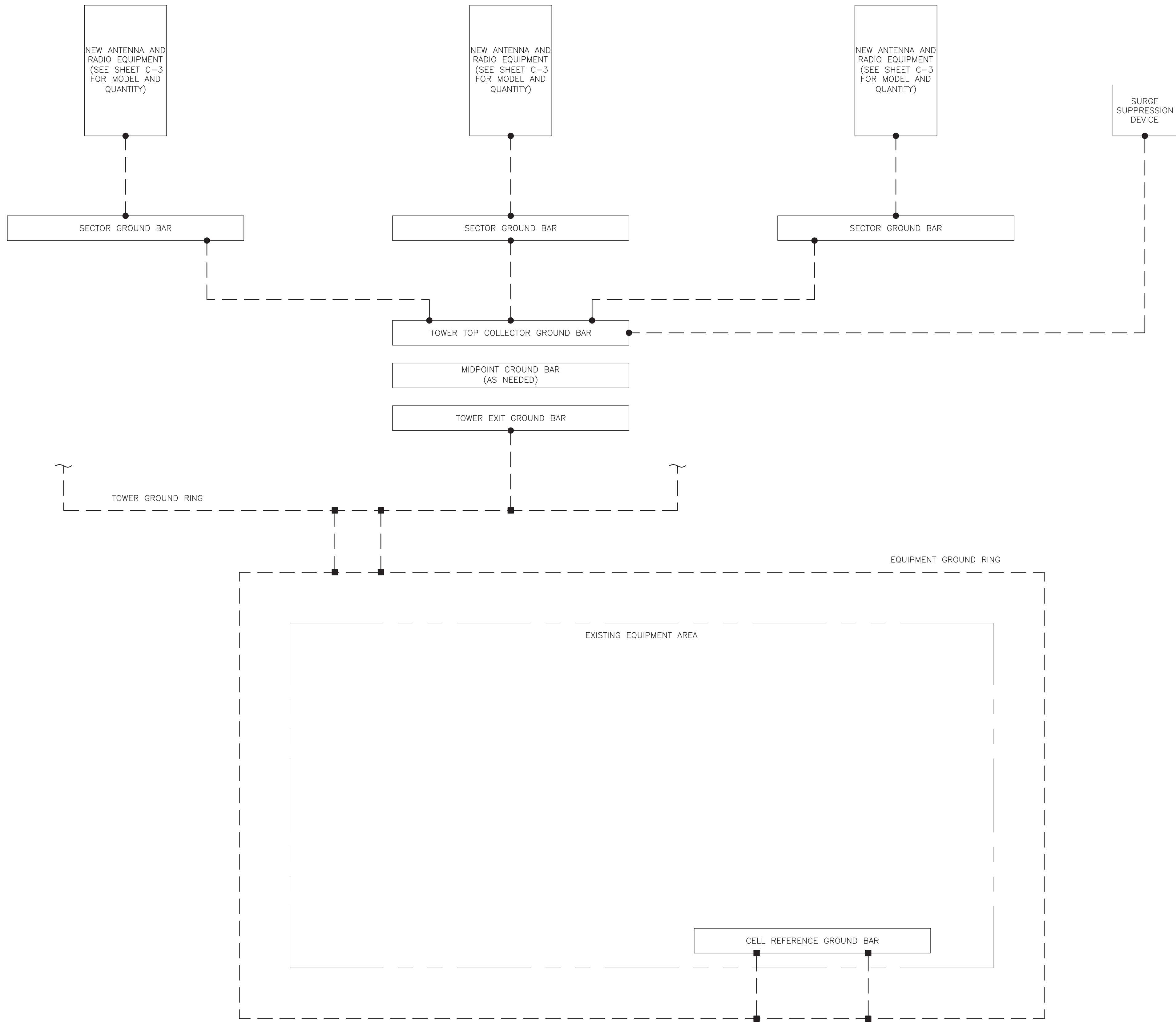
- GROUND WIRE
- EXOTHERMIC WELD
- MECHANICAL CONNECTION
- ⊙ COPPER GROUND ROD
- ⊗ GROUND ROD W/ TEST WELL

CELL REFERENCE GROUND BAR: POINT OF GROUND REFERENCE FOR ALL COMMUNICATIONS EQUIPMENT FRAMES. ALL BONDS ARE MADE WITH #2 STRANDED GREEN INSULATED COPPER CONDUCTORS. BOND TO GROUND RING WITH (2) #2 SOLID TINNED COPPER CONDUITS (ATT-TP-76416 7.6.7).

HATCH PLATE GROUND BAR: BOND TO THE INTERIOR GROUND RING WITH (2) #2 STRANDED GREEN INSULATED COPPER CONDUCTORS. WHEN A HATCH-PLATE AND A CELL REFERENCE GROUND BAR ARE BOTH PRESENT, THE CELL SITE REFERENCE GROUND BAR MUST BE CONNECTED TO THE HATCH-PLATE AND TO THE INTERIOR GROUND RING USING (2) #2 STRANDED GREEN INSULATED COPPER CONDUCTORS.

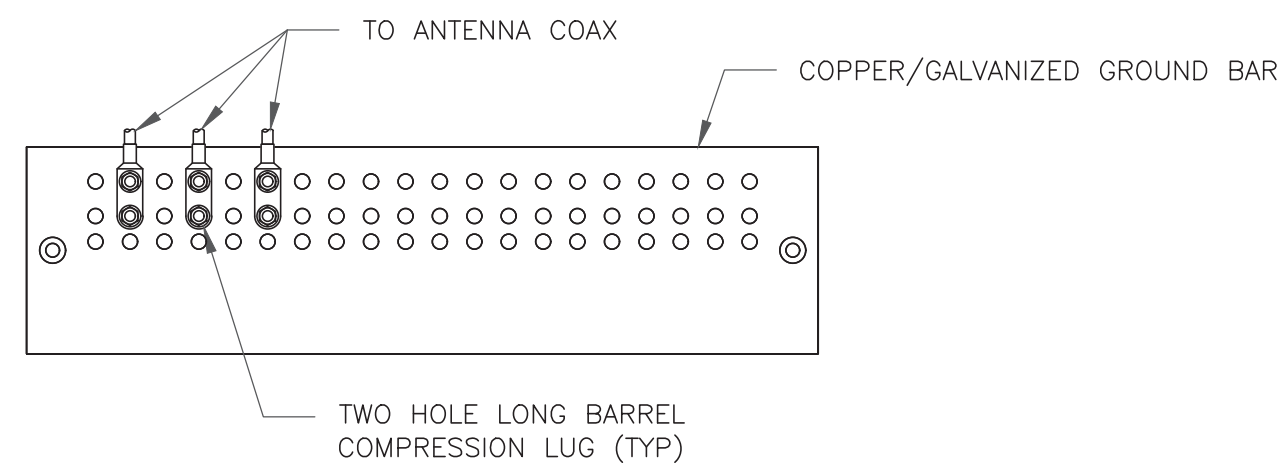
EXTERIOR CABLE ENTRY PORT GROUND BARS: LOCATED AT THE ENTRANCE TO THE CELL SITE BUILDING. BOND TO GROUND RING WITH A #2 SOLID TINNED COPPER CONDUCTORS WITH AN EXOTHERMIC WELD AND INSPECTION SLEEVE (ATT-TP-76416 7.6.7.2).

DURING ALL DC POWER SYSTEM CHANGES INCLUDING DC SYSTEM CHANGE OUTS, RECTIFIER REPLACEMENTS OR ADDITIONS, BREAKER DISTRIBUTION CHANGES, BATTERY ADDITIONS, BATTERY REPLACEMENTS AND INSTALLATIONS OR CHANGES TO DC CONVERTER SYSTEMS IT SHALL BE REQUIRED THAT SERVICES CONTRACTORS VERIFY ALL DC POWER SYSTEMS ARE EQUIPPED WITH MASTER DC SYSTEM RETURN GROUND CONDUCTOR FROM THE DC POWER SYSTEM COMMON RETURN BUS DIRECTLY CONNECTED TO THE CELL SITE REFERENCE GROUND BAR PER TP76300 SECTION H 6 AND TP76416 FIGURE 7-11 REQUIREMENTS.



1 GROUNDING SCHEMATIC  
 SCALE: NOT TO SCALE

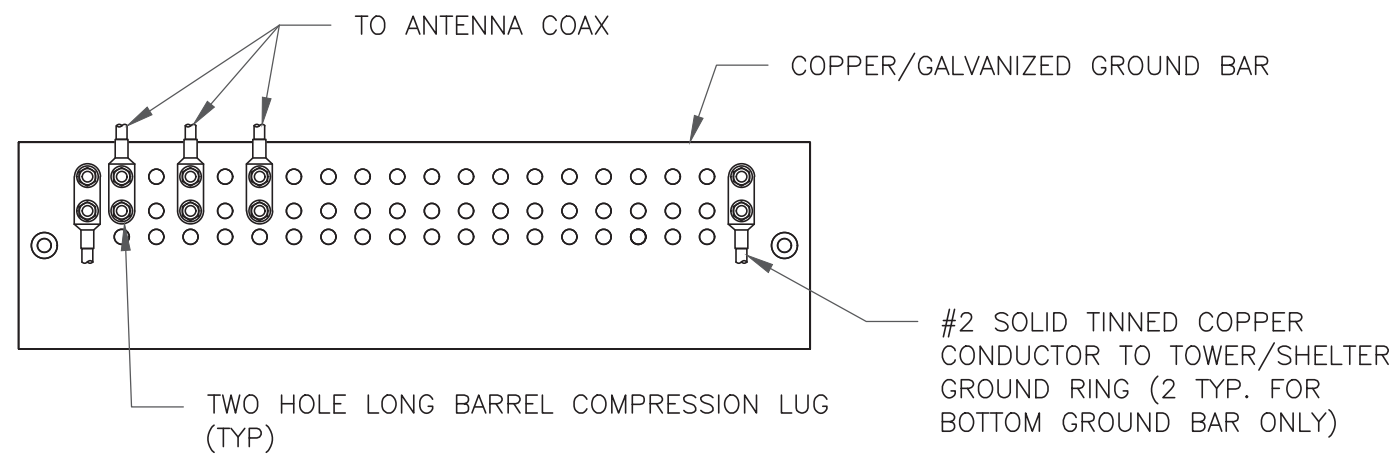
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NOTES:

1. DOUBLING UP "OR STACKING" OF CONNECTIONS IS NOT PERMITTED.
2. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
3. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO ANTENNA MOUNT STEEL.

1 ANTENNA SECTOR GROUND BAR DETAIL  
SCALE: NOT TO SCALE

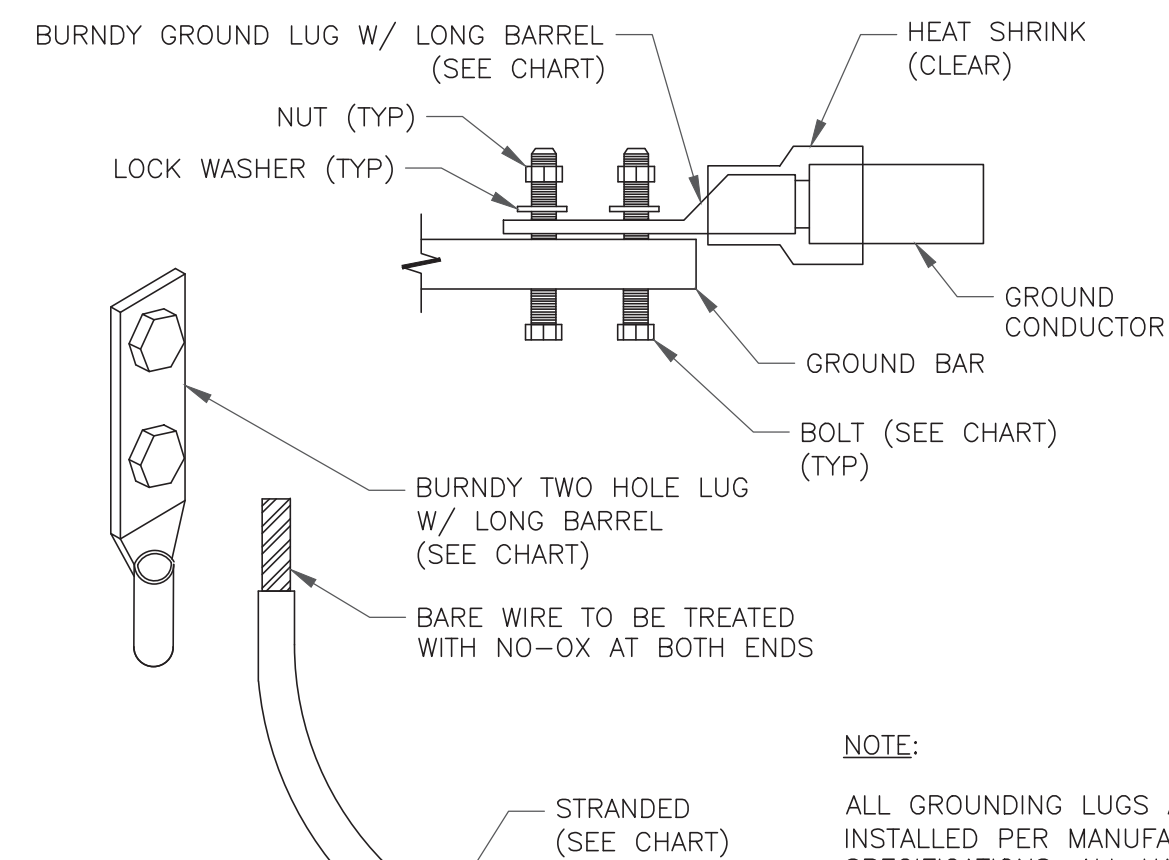


NOTES:

1. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
2. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO TOWER STEEL (TOWER ONLY).
3. GROUND BAR SHALL BE ISOLATED FROM BUILDING OR SHELTER.

2 TOWER/SHELTER GROUND BAR DETAIL  
SCALE: NOT TO SCALE

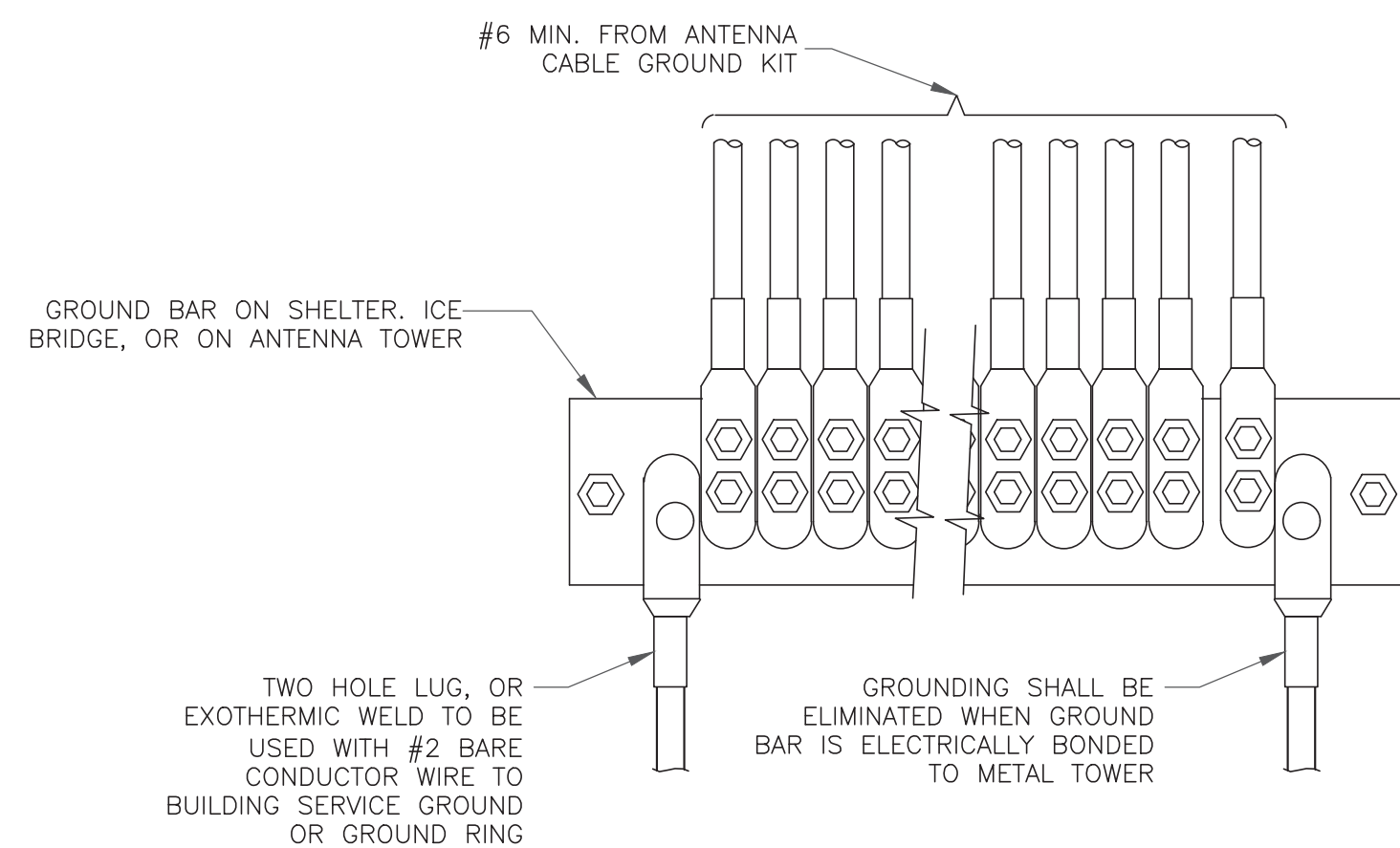
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 GREEN INSULATED	YA6C-2TC38	3/8" - 16 NC SS 2 BOLT
#2 SOLID TINNED	YA3C-2TC38	3/8" - 16 NC SS 2 BOLT
#2 STRANDED	YA2C-2TC38	3/8" - 16 NC SS 2 BOLT
#2/0 STRANDED	YA26-2TC38	3/8" - 16 NC SS 2 BOLT
#4/0 STRANDED	YA28-2N	1/2" - 16 NC SS 2 BOLT



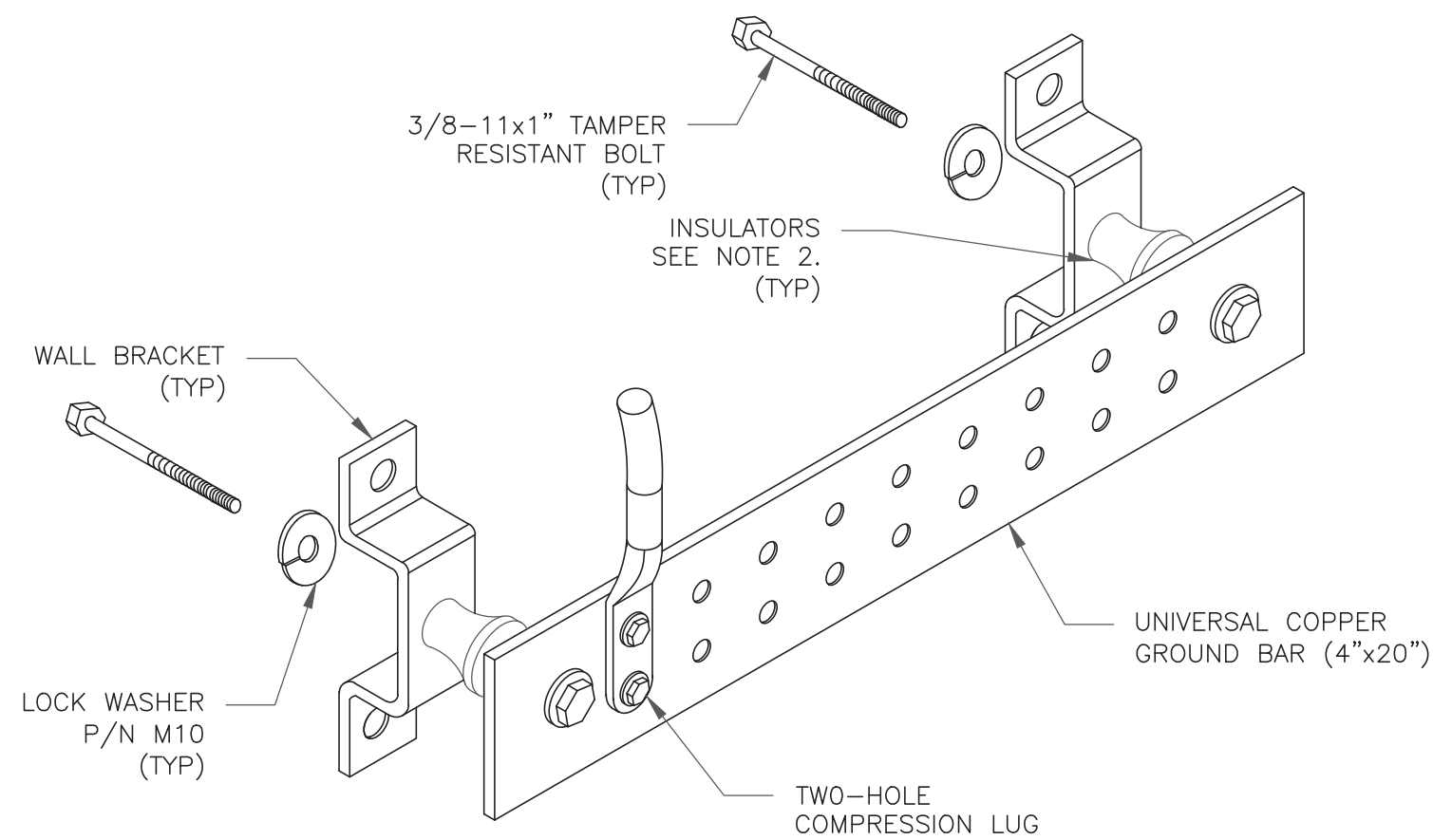
NOTE:

ALL GROUNDING LUGS ARE TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. ALL HARDWARE BOLTS, NUTS, LOCK WASHERS SHALL BE STAINLESS STEEL. ALL HARDWARE ARE TO BE AS FOLLOWS: BOLT, FLAT WASHER, GROUND BAR, GROUND LUG, FLAT WASHER AND NUT.

3 MECHANICAL LUG CONNECTION  
SCALE: NOT TO SCALE



4 GROUNDWIRE INSTALLATION  
SCALE: NOT TO SCALE



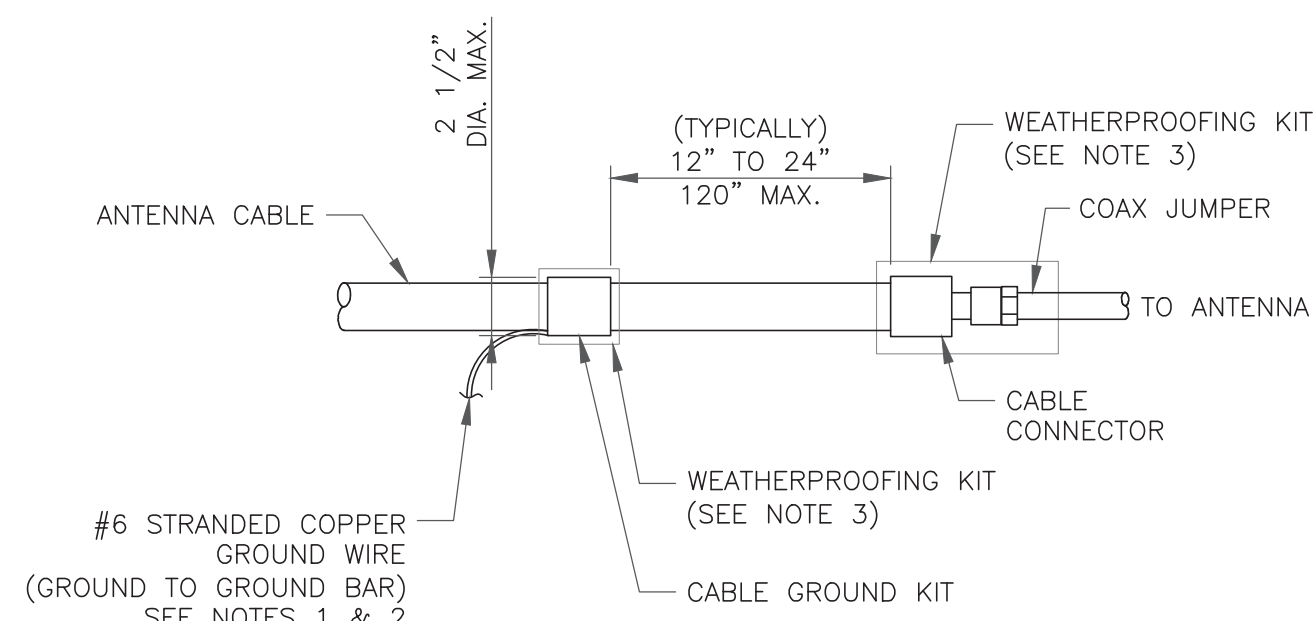
NOTES:

1. DOWN LEAD (HOME RUN) CONDUCTORS ARE NOT TO BE INSTALLED ON CROWN CASTLE USA INC. TOWER, PER THE GROUNDING DOWN CONDUCTOR POLICY QAS-STD-10091. NO MODIFICATION OR DRILLING TO TOWER STEEL IS ALLOWED IN ANY FORM OR FASHION, CAD-WELDING ON THE TOWER AND/OR IN THE AIR ARE NOT PERMITTED.
2. OMIT INSULATOR WHEN MOUNTING TO TOWER STEEL OR PLATFORM STEEL. USE INSULATORS WHEN ATTACHING TO BUILDING OR SHELTERS.

5 GROUND BAR DETAIL  
SCALE: NOT TO SCALE

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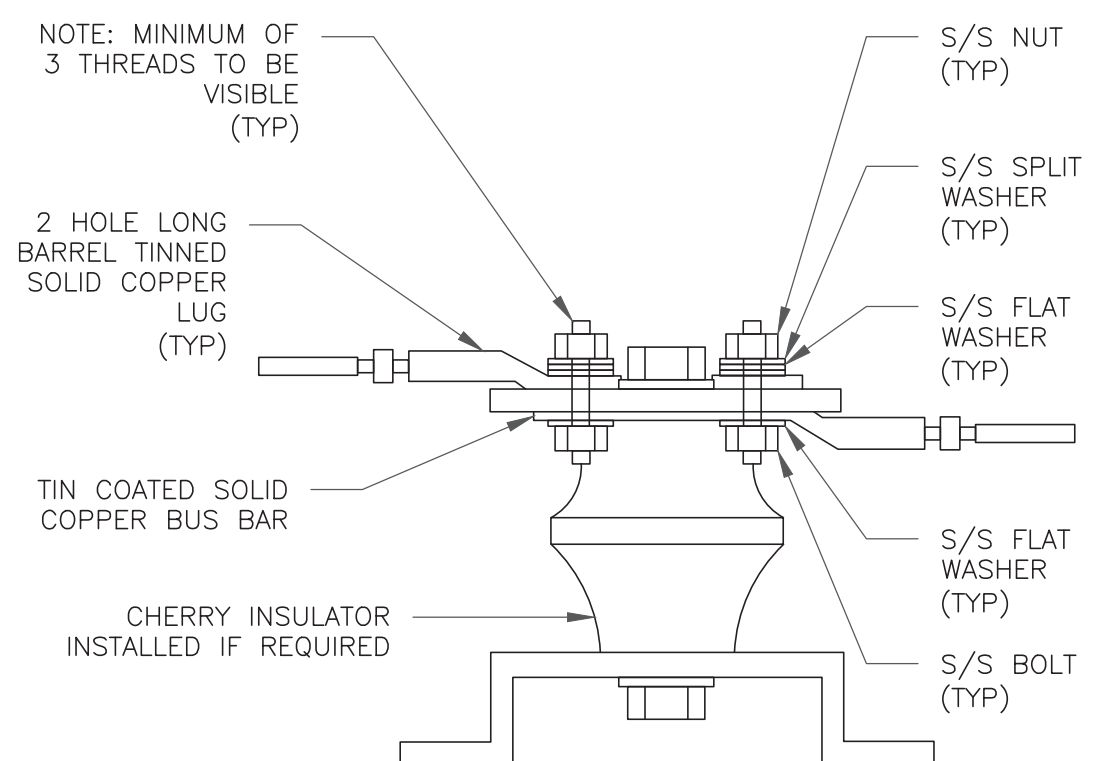
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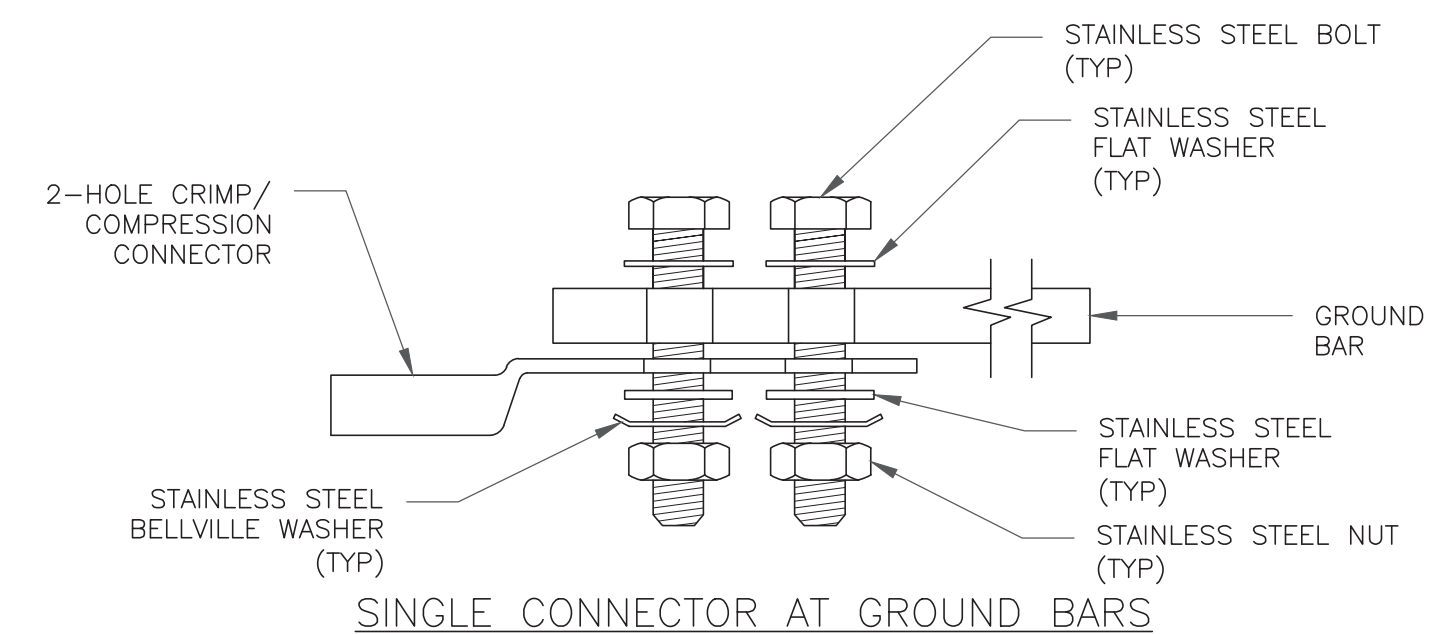
NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT, COLD SHRINK SHALL NOT BE USED.

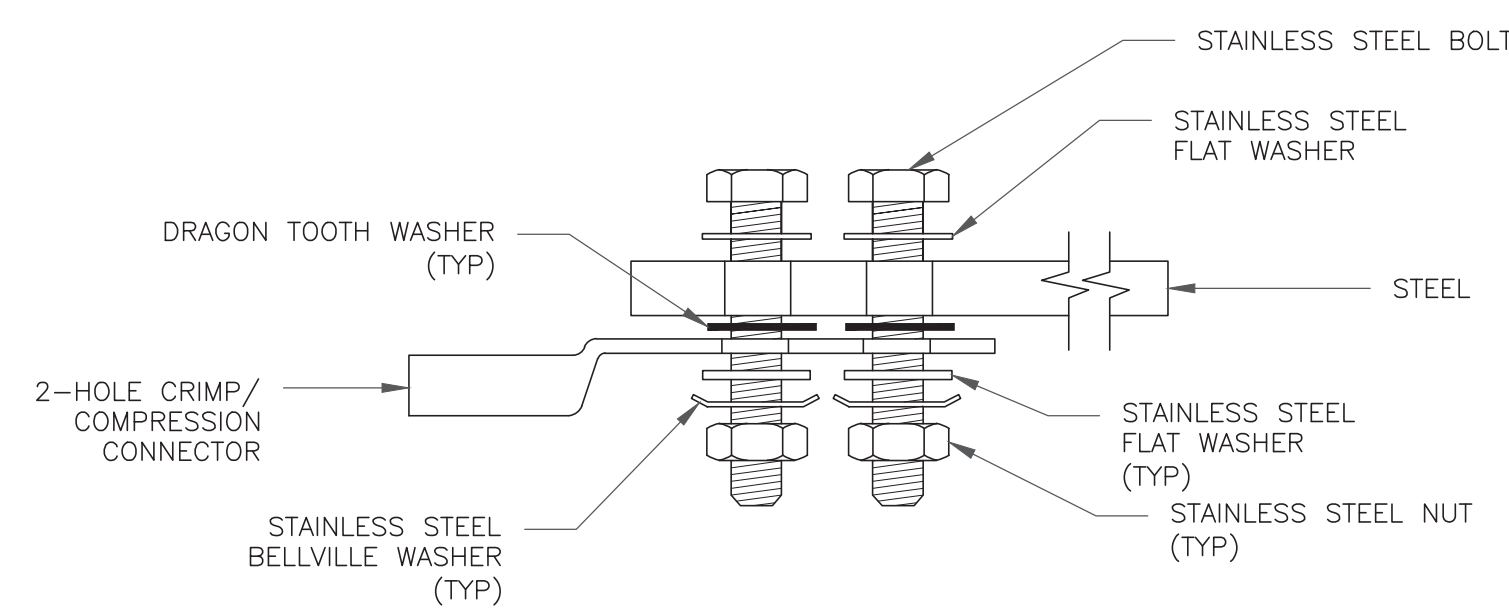
6 CABLE GROUND KIT CONNECTION  
SCALE: NOT TO SCALE



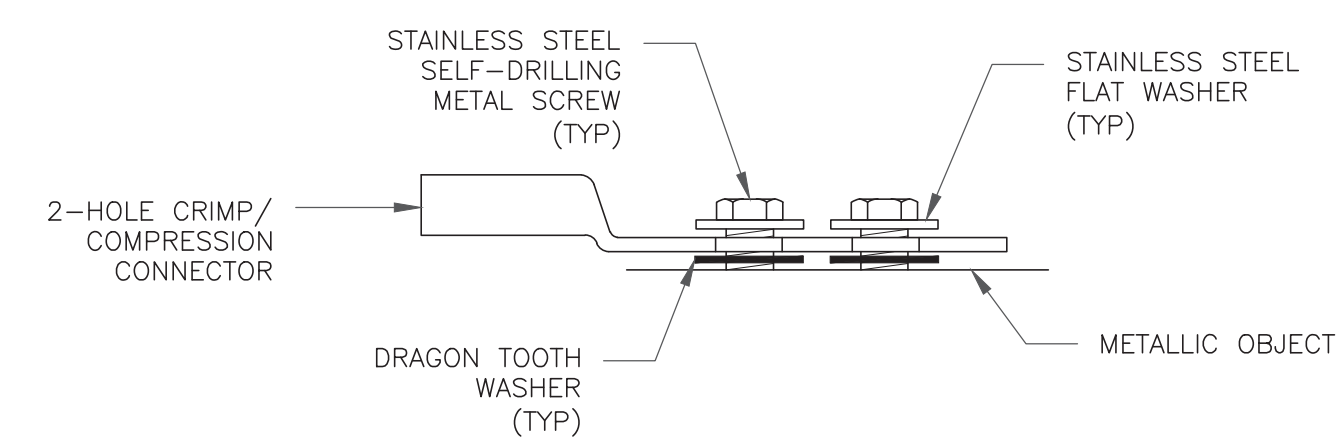
7 LUG DETAIL  
SCALE: NOT TO SCALE



SINGLE CONNECTOR AT GROUND BARS



SINGLE CONNECTOR AT STEEL OBJECTS



SINGLE CONNECTOR AT METALLIC/STEEL OBJECTS

8 HARDWARE DETAIL FOR EXTERIOR CONNECTIONS  
SCALE: NOT TO SCALE

575 MOROSGO DRIVE  
ATLANTA, GA 30324-3300

3530 TORINGDON WAY, SUITE 300  
CHARLOTTE, NC 28277

1717 S. BOULDER  
SUITE 300  
TULSA, OK 74119  
PH: (918) 587-4630  
www.blgrp.com

AT&T SITE NUMBER:  
**CTL05307**

BU #: **876347**  
**BUCKLAND MALL**

53 SLATER STREET  
MANCHESTER, CT 06040

EXISTING  
155'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
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B	10/28/21	AJA	PRELIMINARY REVIEW	MTJ
0	12/20/21	GAC	CONSTRUCTION	JHW



B&T ENGINEERING, INC.  
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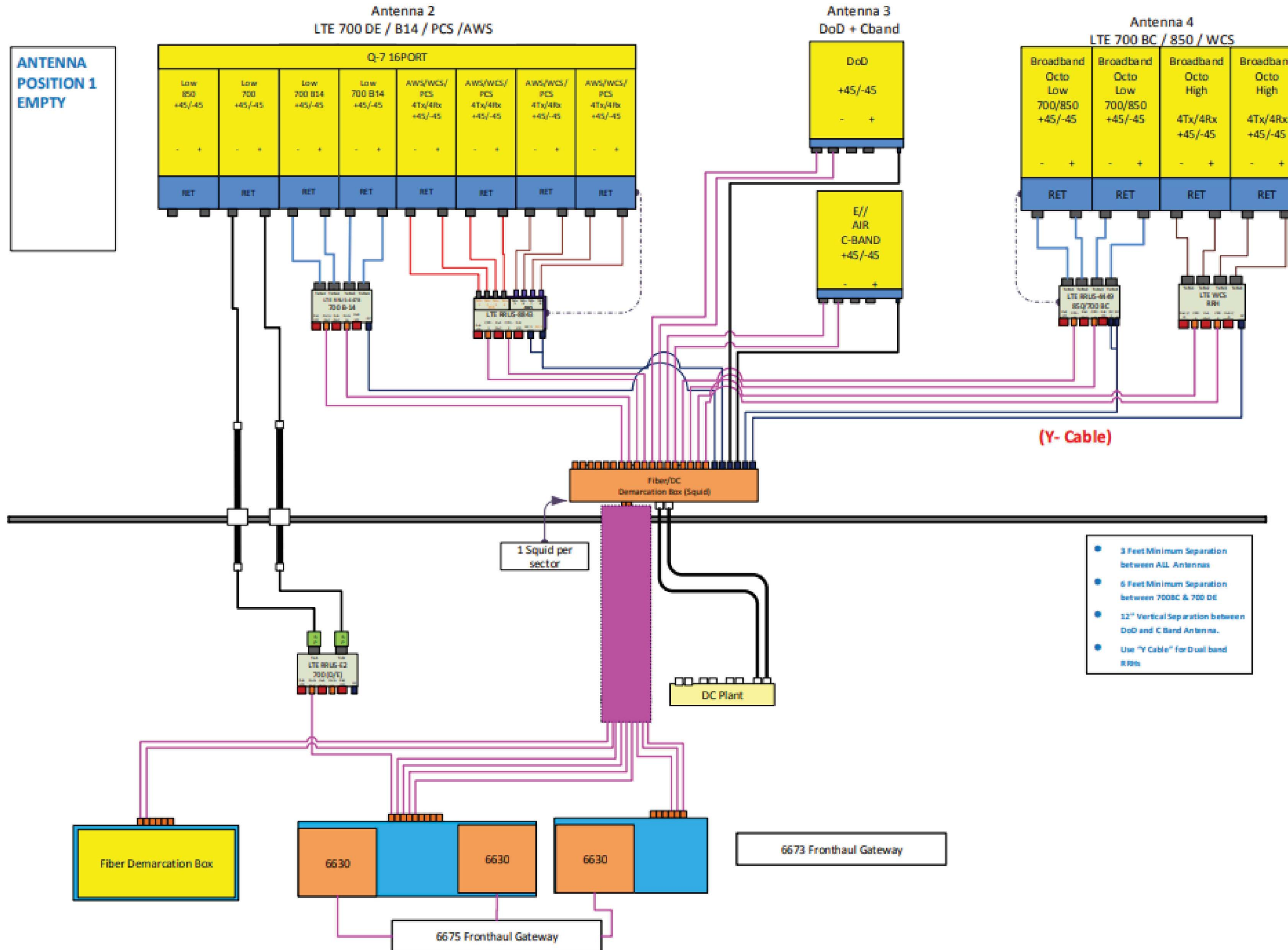
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SHEET NUMBER: **G-2** REVISION: **0**

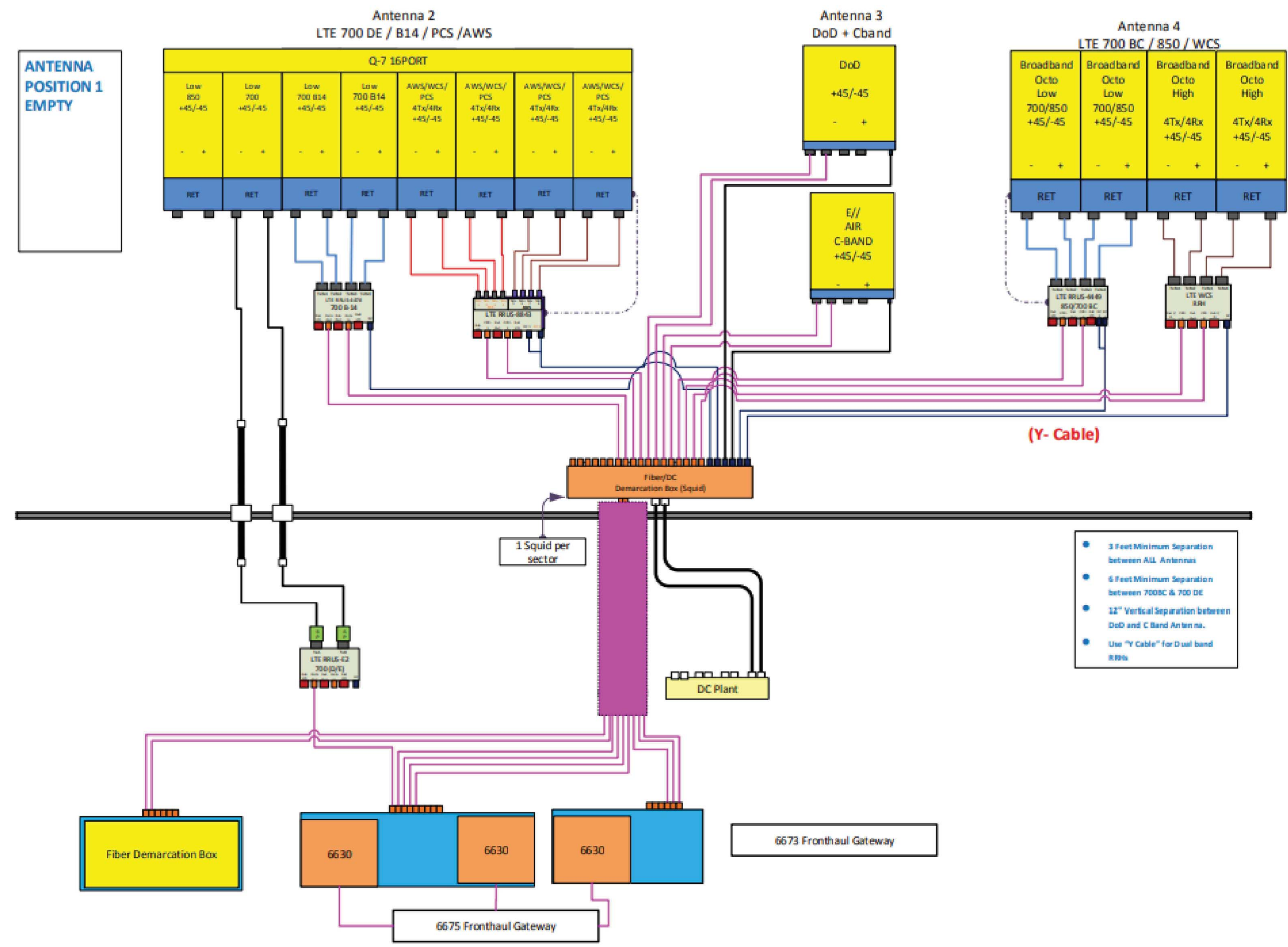
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Diagram - Sector A Diagram File Name - CT5307\_Cband\_3Ant\_Q7\_DoD\_CB\_DMP\_DEBot\_8843\_AWS\_PCS\_1DCFIB\_2COX\_3x6630\_6675.vsd  
 Atoil Site Name - CTL05307 Location Name - MANCHESTER NORTH Market - CONNECTICUT Market Cluster - NEW ENGLA  
 Comments: Important Note: For detailed radio to antenna wiring refer to the latest field notice - Antenna\_Radio Connection Drawings Playbook v6.0\_Ericsson \*



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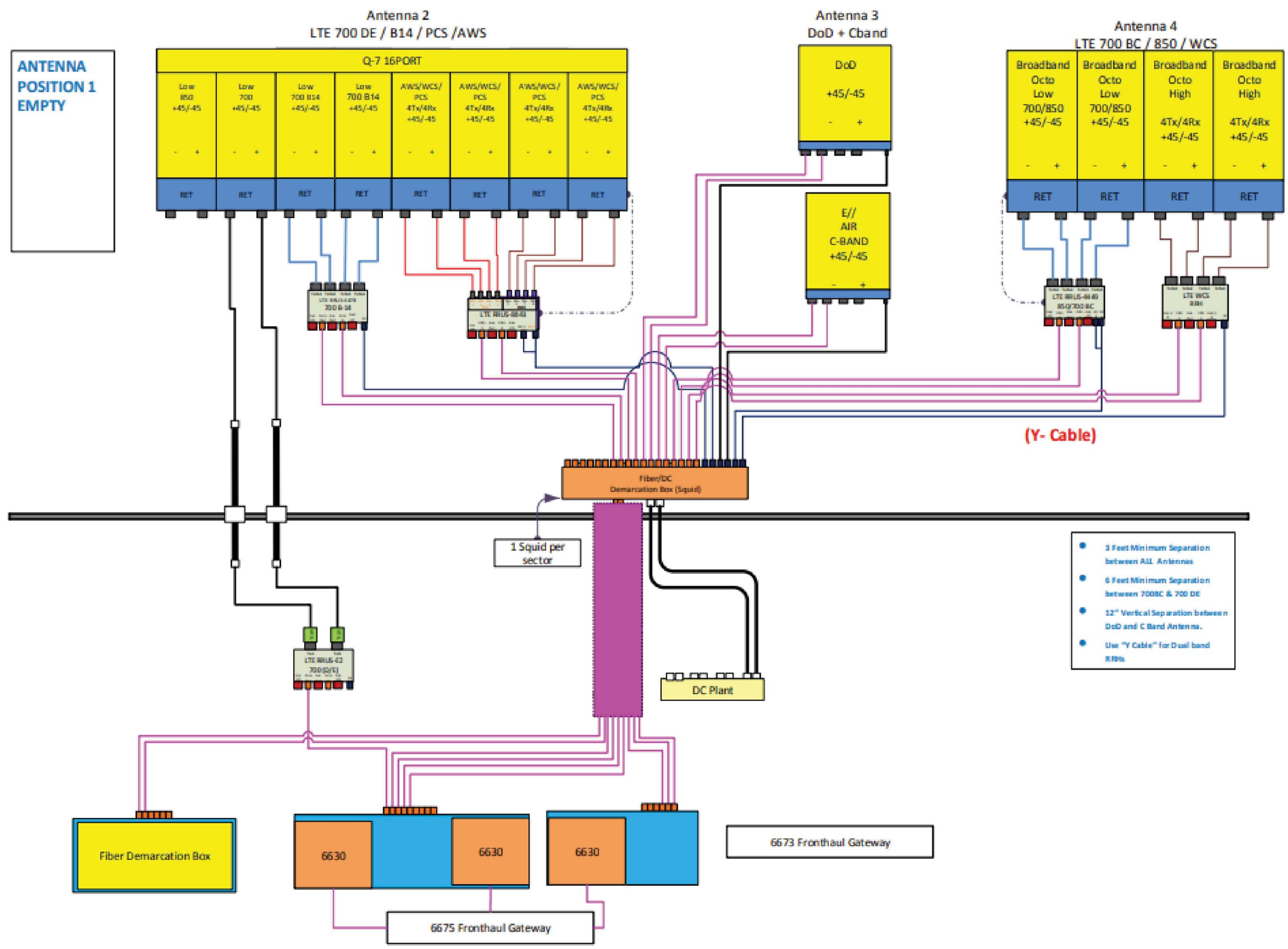


ANTENNA POSITION 1 EMPTY

(Y- Cable)

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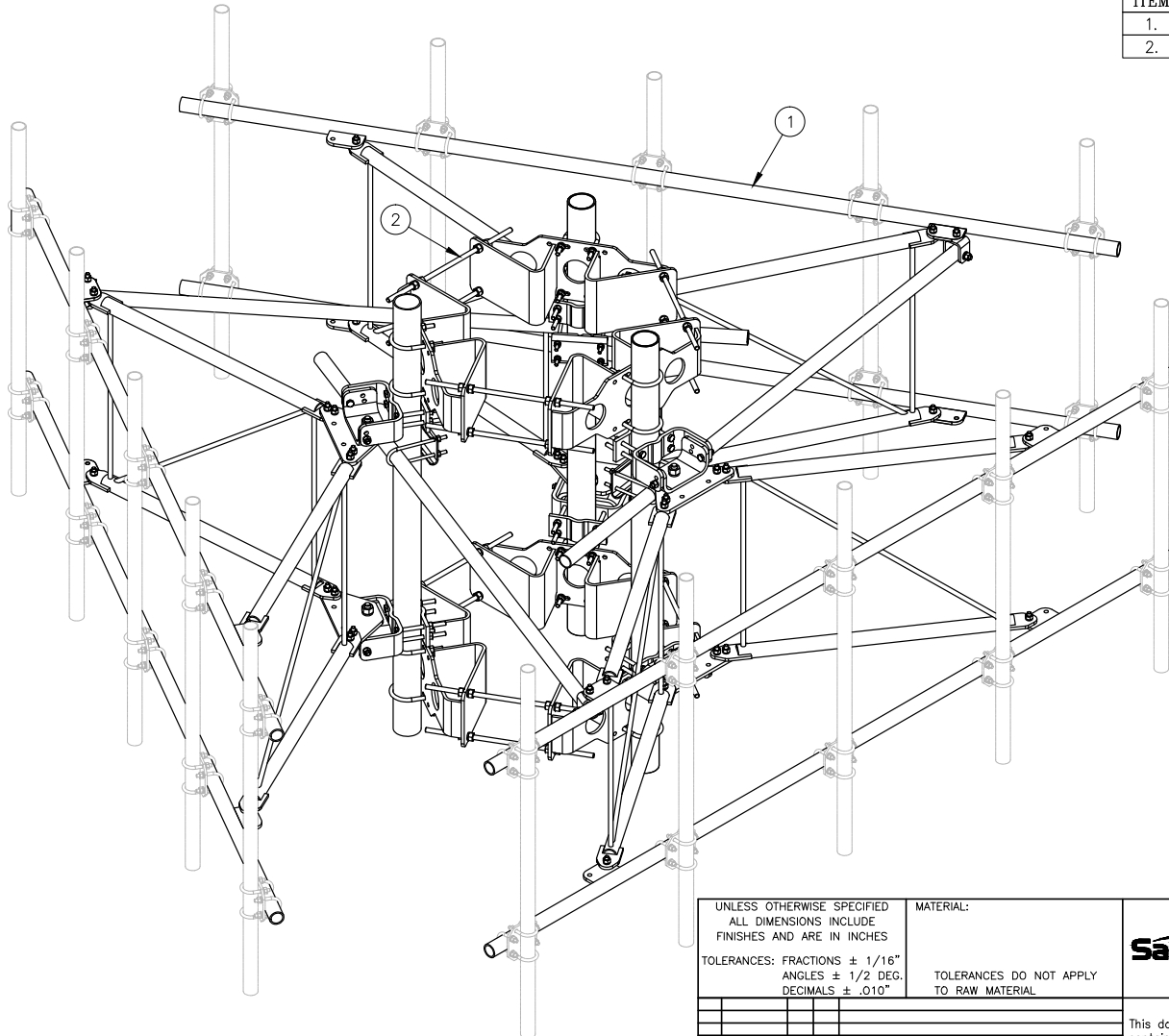
Diagram - Sector C Diagram File Name - CT5307\_Cband\_3Ant\_Q7\_DoD\_CB\_DMP\_DEbot\_8843\_AWS\_PCS\_1DCFIB\_2COX\_3x6630\_6675.vsd  
 Atoll Site Name - CTL05307 Location Name - MANCHESTER NORTH Market - CONNECTICUT Market Cluster - NEW ENGLAND  
 Comments: Important Note: For detailed radio to antenna wiring refer to the latest field notice - Antenna\_Radio Connection Drawings Playbook v6.0\_Ericsson "





C10857802 12' HD V-BOOM ASSEMBLIES W/TIEBACK

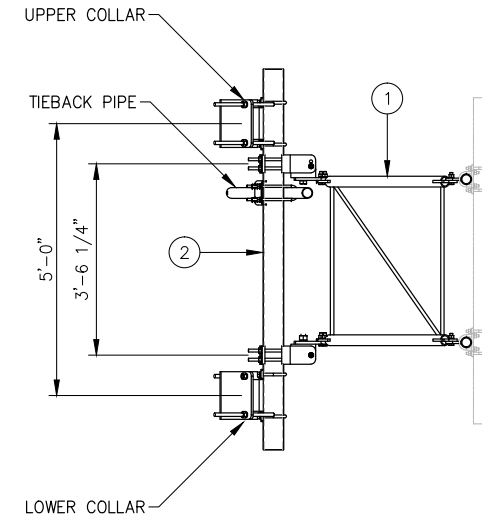
ITEM	QTY.	PART NO.	DESCRIPTION	WEIGHT
1.	3	C10857001C	12' HD V-BOOM ASSEMBLY W/TIE BACK	1386
2.	1	C10899055	4 1/2" O.D. MONOPOLE PIPE MOUNT ASSEMBLY	994
TOTAL WEIGHT				2380



ISOMETRIC VIEW

NOTES:

1. MOUNTING PIPES & CROSSOVER PLATE KITS MUST BE PURCHASED SEPARATELY.
2. SEE DRAWING C10857001C FOR 12' V-BOOM ASSEMBLY.
3. SEE DRAWING C10899055 FOR 4 1/2" O.D. MONOPOLE PIPE MOUNT ASSEMBLY.



VIEW A-A  
FROM PAGE 2

UNLESS OTHERWISE SPECIFIED  
ALL DIMENSIONS INCLUDE  
FINISHES AND ARE IN INCHES

MATERIAL:

TOLERANCES: FRACTIONS  $\pm 1/16"$   
ANGLES  $\pm 1/2$  DEG.  
DECIMALS  $\pm .010"$

TOLERANCES DO NOT APPLY  
TO RAW MATERIAL



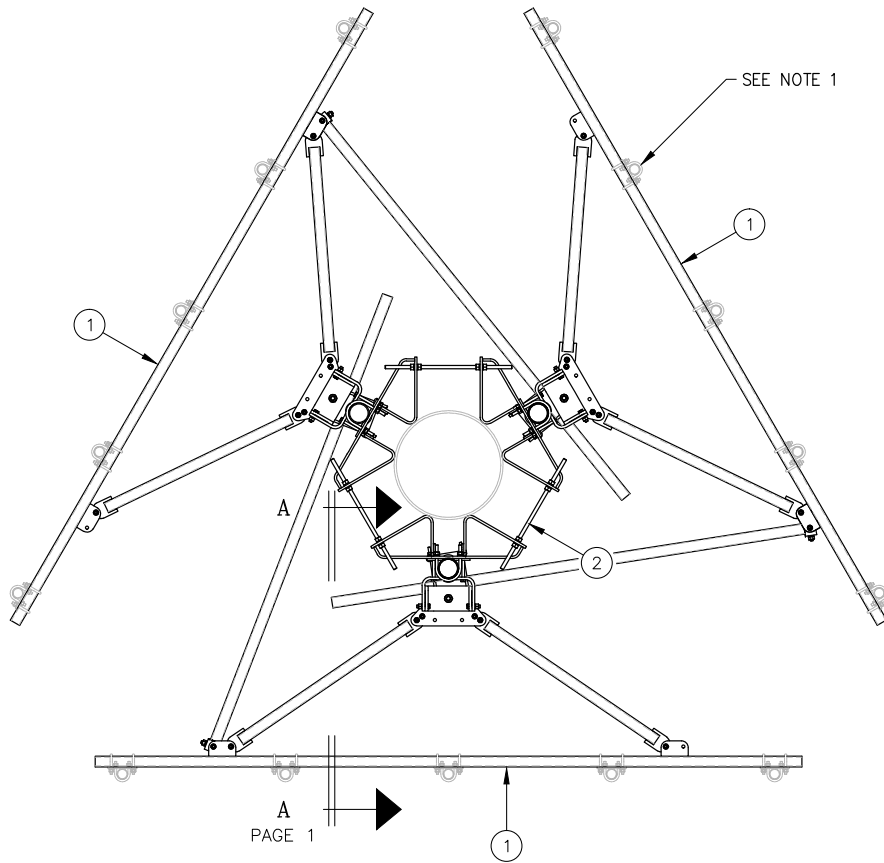
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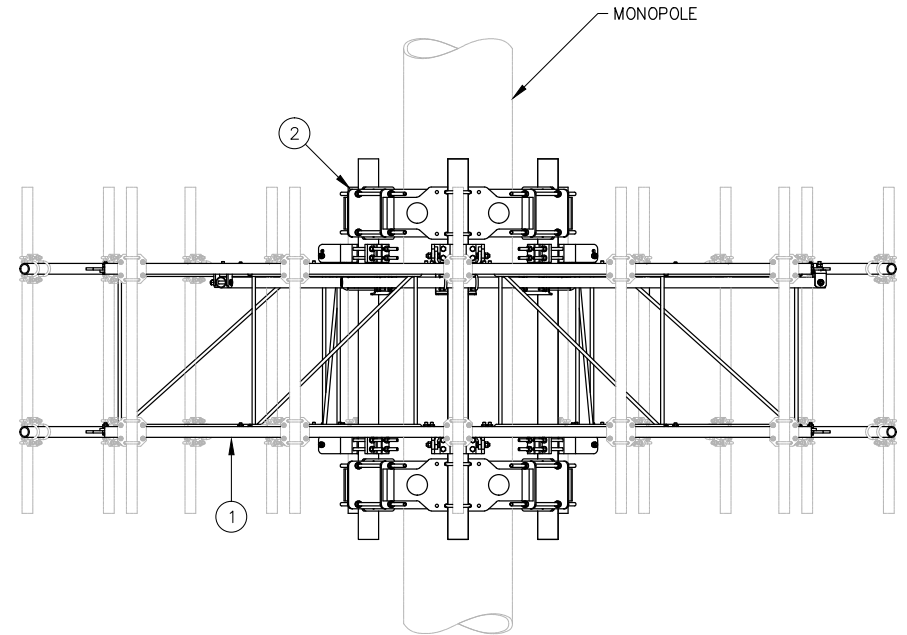
12' HD V-BOOM ASSEMBLIES W/TIEBACK  
(3' STANDOFF)  
ON MONOPOLE PIPE MOUNT ASSEMBLY  
W/NO ANTENNA MOUNTING PIPES

REV	DATE	DRW/CHK	DESCRIPTION

DATE	9/24/18	SIZE	B	DRAWING NO.	C10857802	REV	0
DRAWN BY	WRF	SCALE	None	PAGE	1	OF	2
CHECKED BY	WMN						



PLAN VIEW



ELEVATION VIEW

A  
PAGE 1

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES			MATERIAL:
TOLERANCES: FRACTIONS $\pm 1/16"$ ANGLES $\pm 1/2$ DEG. DECIMALS $\pm .010"$			TOLERANCES DO NOT APPLY TO RAW MATERIAL
REV	DATE	DRW/CHK	DESCRIPTION



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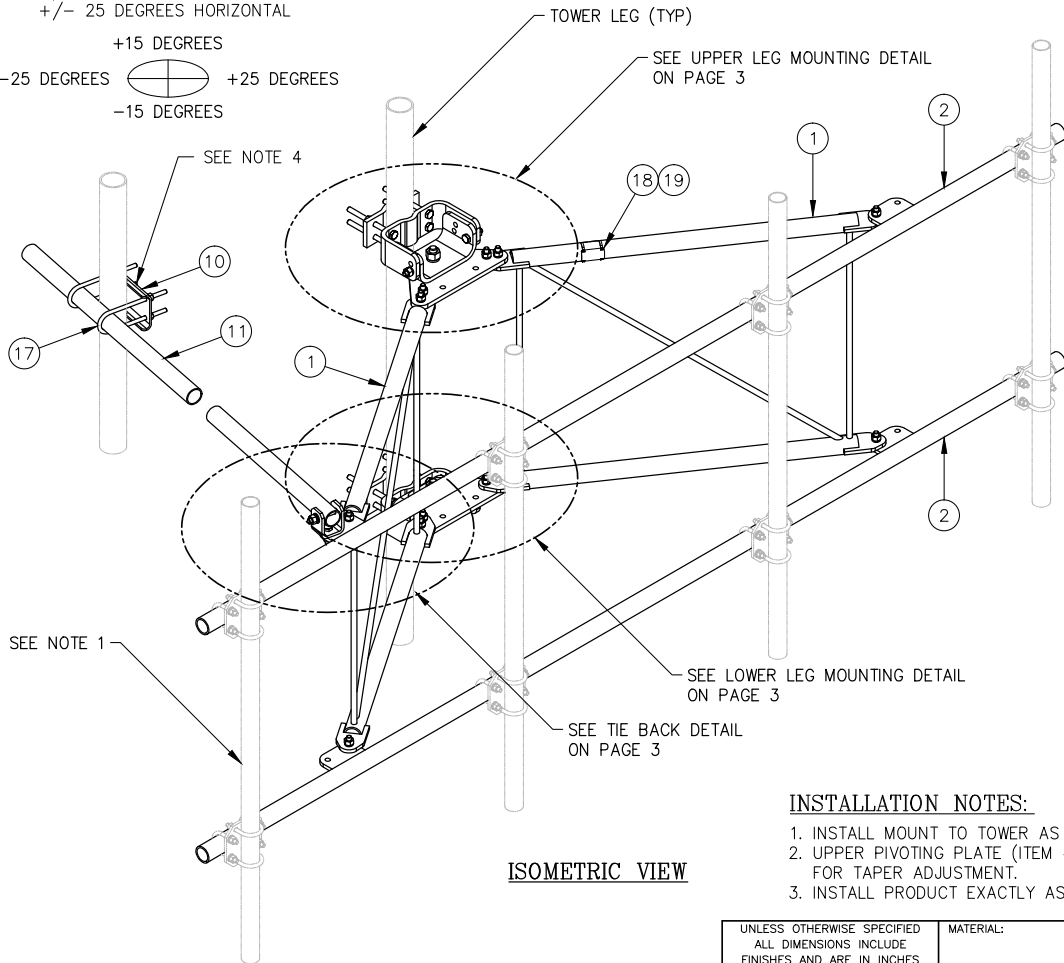
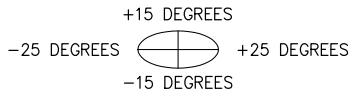
12' HD V-BOOM ASSEMBLIES W/TIEBACK  
(3' STANDOFF)  
ON MONOPOLE PIPE MOUNT ASSEMBLY  
W/NO ANTENNA MOUNTING PIPES

DATE	09/24/18	SIZE	B	DRAWING NO.	C10857802	REV	0
DRAWN BY	WRF	SCALE	None	PAGE	2	OF	2
CHECKED BY	WMN						



**TIEBACK ANGLE RANGE DETAIL**

+/- 15 DEGREES VERTICAL  
 +/- 25 DEGREES HORIZONTAL



**ISOMETRIC VIEW**

**NOTES:**

1. MOUNTING PIPES & CROSSOVER PLATE KITS MUST BE PURCHASED SEPARATELY.
2. QUANTITIES SHOWN IN LISTS OF MATERIAL ARE FOR ONE (1) V-BOOM ONLY.
3. THIS V-BOOM WILL MOUNT TO THE FOLLOWING: 1 1/2"Ø TO 5 9/16"Ø ROUND LEG.
4. TIEBACK MUST BE CONNECTED TO A RIGID MEMBER THAT PROVIDES ADEQUATE SUPPORT WITHIN THE LIMITS NOTED ABOVE IN THE TIEBACK ANGLE RANGE DETAIL UNLESS APPROVED BY THE ENGINEER OF RECORD.

**INSTALLATION NOTES:**

1. INSTALL MOUNT TO TOWER AS SHOWN, SO THAT WELDED STANDOFF DIAGONAL IS SLOPING DOWNWARD FROM TOWER END TO FACE PIPE END.
2. UPPER PIVOTING PLATE (ITEM 4) HAS THREE HOLES ON EACH SIDE AND UPPER LEG CLAMP PLATE (ITEM 5) HAS TWO HOLES ON EACH SIDE FOR TAPER ADJUSTMENT.
3. INSTALL PRODUCT EXACTLY AS SHOWN IN DRAWING, WITH ALL BOLTS FACING UPWARDS.

**C10857001C 12' HD V-BOOM ASSEMBLY W/TIEBACK**

ITEM	QTY.	PART NO.	DESCRIPTION	WEIGHT
1.	2	CW01222	WELDMENT, STANDOFF ARM	126
2.	2	CW01223	WELDMENT, FACE PIPE	147
3.	2	CS03109	PLATE, ROTATING	34
4.	1	CS03110	PLATE, PIVOTING (UPPER)	16
5.	1	CS03111	PLATE, LEG CLAMP (UPPER)	17
6.	1	CS03112	PLATE, PIVOTING (LOWER)	14
7.	1	CS03113	PLATE, LEG CLAMP (LOWER)	17
8.	2	CS03114	PLATE, LEG CLAMP (BACK)	14
9.	1	CS00098	PLATE, TIE BACK SWIVEL	3
10.	1	CS03285	PLATE, TIE BACK CLAMP	4
11.	1	CS03333	PIPE, TIE BACK	38
12.	2	C40026073	BOLT ASSEMBLY, 1 Ø X 3 A325	4
13.	8	C40140004	BOLT ASSEMBLY, 5/8 Ø X 8 A307	13
14.	1	C40026033	BOLT ASSEMBLY, 5/8 Ø X 4 1/2 A325	1
15.	12	C40026025	BOLT ASSEMBLY, 5/8 Ø X 2 1/2 A325	6
16.	5	C40026024	BOLT ASSEMBLY, 5/8 Ø X 2 1/4 A325	3
17.	2	C40034183	U-BOLT ASSEMBLY, 1/2 Ø X 2 15/16 C-C	3
18.	1	Z30992001	MOUNT CLASSIFICATION TAG C10857001C	1
19.	2	C40062103	STAINLESS STEEL SELF-LOCKING CABLE TIE	1
<b>TOTAL WEIGHT</b>				<b>462</b>

**PACKAGING NOTE**

CK00386 INCLUDES ITEMS 1, 3, 4, 5, 6, 7, 12 & 15 (8 QTY)  
 CK00387-HDW INCLUDES ITEMS 8, 9, 10, 13, 14, 15 (4 QTY), 16, 17, 18 & 19  
 CK00387-STL INCLUDES ITEMS 2 & 11

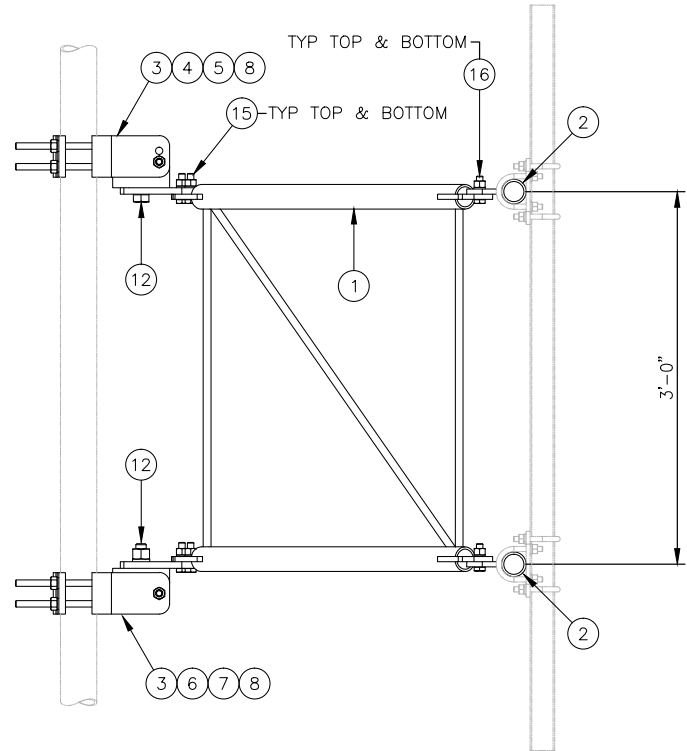
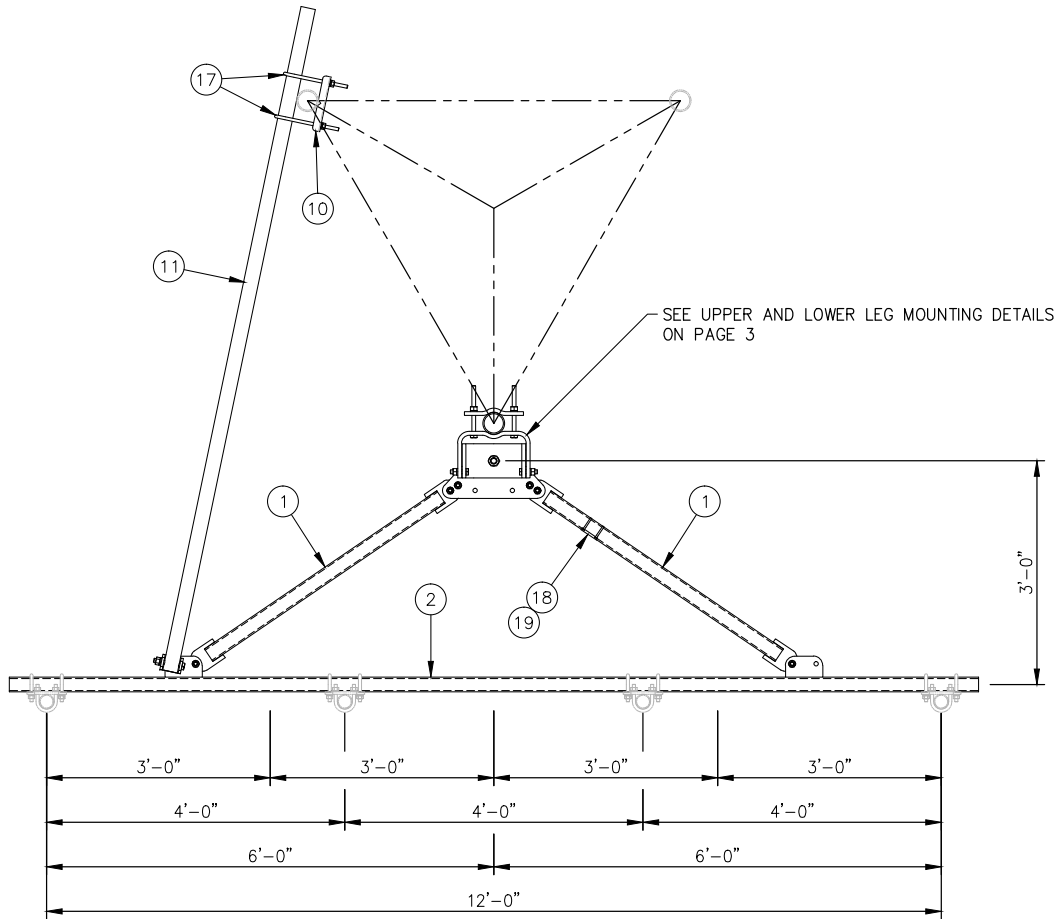
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES		MATERIAL:	
TOLERANCES: FRACTIONS ± 1/16"		TOLERANCES DO NOT APPLY TO RAW MATERIAL	
ANGLES ± 1/2 DEG.			
DECIMALS ± .010"			
REV	DATE	DRW/CHK	DESCRIPTION
4	04/11/17	KLE/EK	REVISED PACKAGING NOTE
3	10/19/16	KLE/DEL	ADDED INSTALLATION NOTES
2	02/05/16	DL/WDEL	ADDED PACKAGING NOTE
1	01/21/16	KLE/EK	REVISED NOTES & ADDED TIEBACK ANGLE RANGE DETAIL



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**12' HD V-BOOM ASSEMBLY W/TIEBACK  
 (3' STANDOFF)  
 W/NO ANTENNA MOUNTING PIPES**

DATE	12/22/15	SIZE	B	DRAWING NO.	C10857001C	REV	4
DRAWN BY	WRF	SCALE	None	PAGE	1	OF 3	
CHECKED BY	EK						



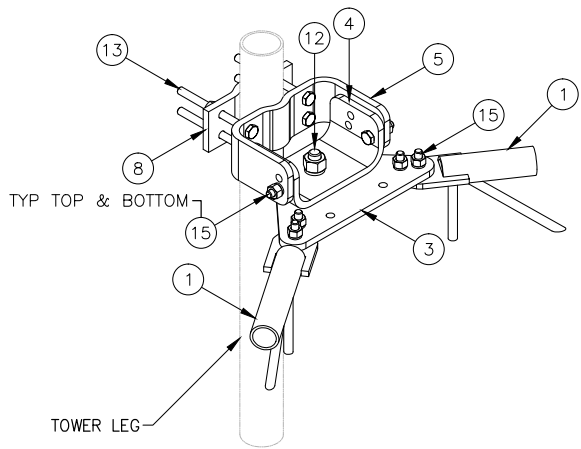
**MOUNTING OPTIONS**  
SHOWING MOUNTING PIPE PLACEMENTS

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES			MATERIAL:		
TOLERANCES: FRACTIONS $\pm 1/16"$ ANGLES $\pm 1/2$ DEG. DECIMALS $\pm .010"$			TOLERANCES DO NOT APPLY TO RAW MATERIAL		
REV	DATE	DRW/CHK	DESCRIPTION		
4	04/11/17	KLE/EK	REVISED PACKAGING NOTE		
3	10/19/16	KLE/DEL	ADDED INSTALLATION NOTES		
2	02/05/16	DL/WDEL	ADDED PACKAGING NOTE		
1	01/21/16	KLE/EK	REVISED NOTES & ADDED TIEBACK ANGLE RANGE DETAIL		

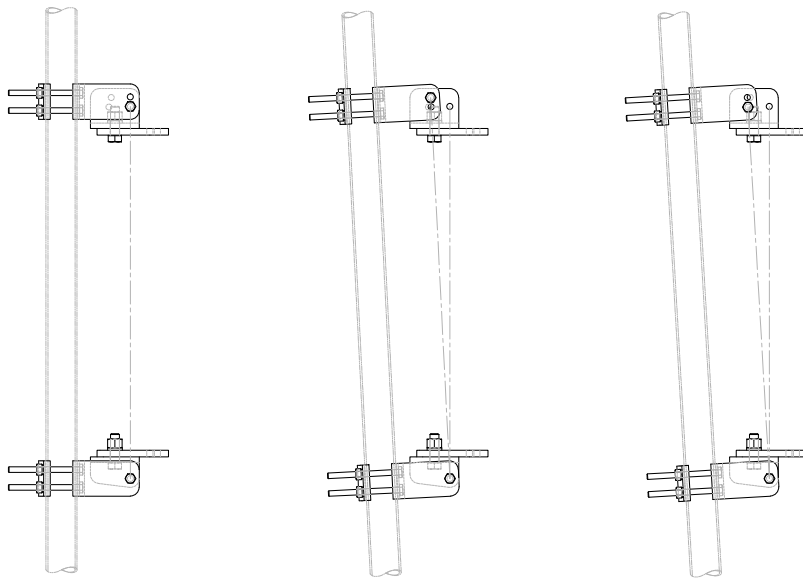
**Sabre Industries**  
Towers and Poles

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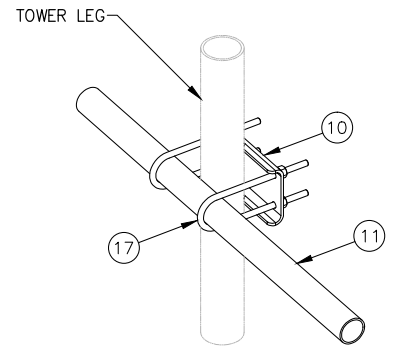
12' HD V-BOOM ASSEMBLY W/TIEBACK (3' STANDOFF) W/NO ANTENNA MOUNTING PIPES					
DATE		12/22/15	SIZE	DRAWING NO.	REV
DRAWN BY		WRF	B	C10857001C	4
CHECKED BY		EK	SCALE	None	PAGE 2 OF 3



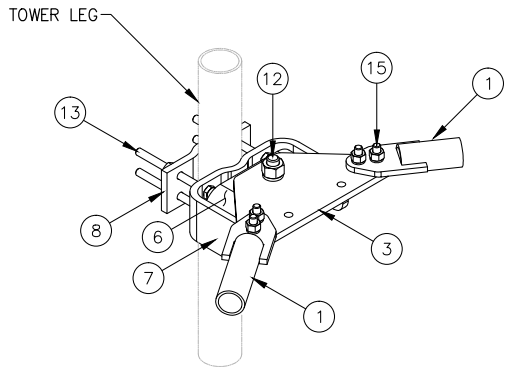
**UPPER LEG MOUNTING DETAIL**



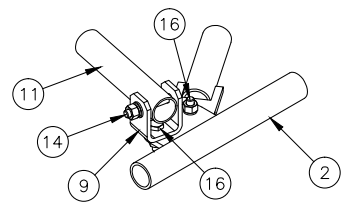
-----PIVOTING OPTIONS-----



**TIE BACK DETAIL AT TOWER LEG**



**LOWER LEG MOUNTING DETAIL**



**TIE BACK DETAIL AT ANTENNA MOUNTING FRAME**

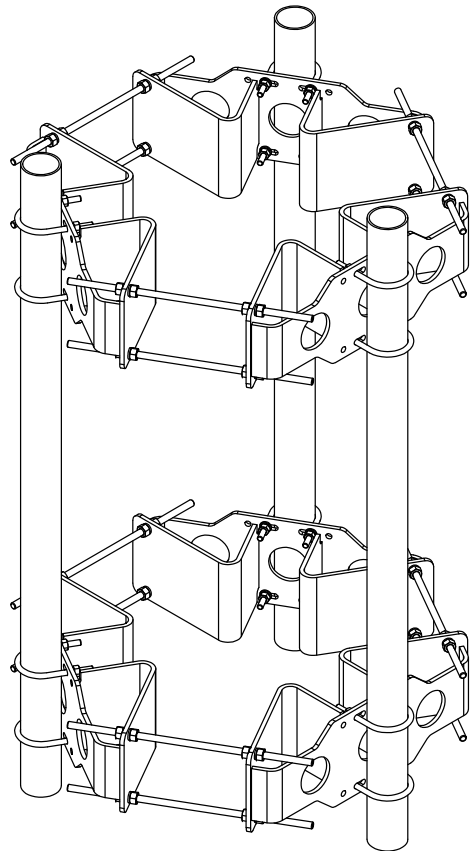
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES		MATERIAL:		<b>Sabre Industries</b> Towers and Poles	<b>12' HD V-BOOM ASSEMBLY W/TIEBACK (3' STANDOFF) W/NO ANTENNA MOUNTING PIPES</b>						
TOLERANCES: FRACTIONS ± 1/16" ANGLES ± 1/2 DEG. DECIMALS ± .010"		TOLERANCES DO NOT APPLY TO RAW MATERIAL									
<b>CONFIDENTIAL</b>					This document and the information contained herein is the confidential trade secret property of Sabre Communications Corporation ("Sabre") and must not be reproduced, copied or used, in whole or in part, for any purpose without the prior written consent of Sabre. © 2015 Sabre Communications Corporation. All rights reserved.						
REV	DATE	DRW/CHK	DESCRIPTION	DATE					12/22/15	SIZE	B
4	04/11/17	KLE/EK	REVISED PACKAGING NOTE	DRAWN BY	WRF	CHECKED BY	EK	SCALE	None	PAGE	3 OF 3
3	10/19/16	KLE/DEL	ADDED INSTALLATION NOTES								
2	02/05/16	DL/WDEL	ADDED PACKAGING NOTE								
1	01/21/16	KLE/EK	REVISED NOTES & ADDED TIEBACK ANGLE RANGE DETAIL								



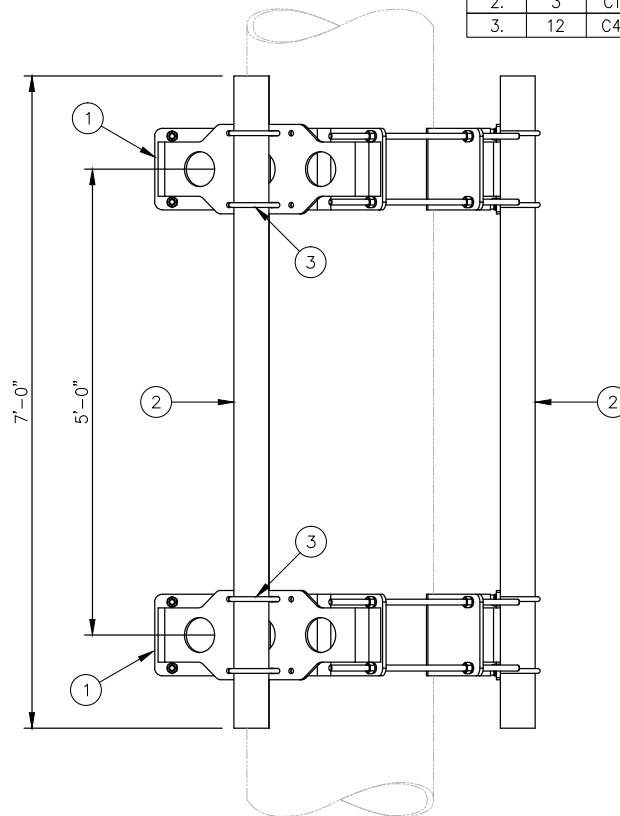
**NOTE:**

SEE DRAWING C10112378 FOR INSTALLATION OF TRI-COLLAR BRACKET ASSEMBLY

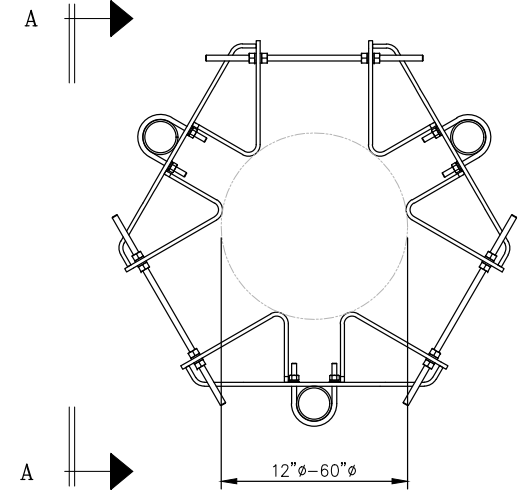
C10899055 4 1/2" O.D. PIPE MOUNT ASSEMBLY				
ITEM	QTY.	PART NO.	DESCRIPTION	WEIGHT
1.	2	C10112378	TRI-COLLAR BRACKET ASSEMBLY	732
2.	3	C10901407	PIPE, 4 1/2 O.D. X .237 X 7'-0	236
3.	12	C40034032	U-BOLT ASSEMBLY, 5/8 $\phi$ X 5 3/16 C-C	26
TOTAL WEIGHT				994



ISOMETRIC VIEW



VIEW A-A



PLAN VIEW

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES		MATERIAL:	
TOLERANCES: FRACTIONS $\pm 1/16"$ ANGLES $\pm 1/2$ DEG. DECIMALS $\pm .010"$		TOLERANCES DO NOT APPLY TO RAW MATERIAL	
REV	DATE	DRW/CHK	DESCRIPTION
1	02/03/17	WRF/KLE	COLLAR WAS C10112301

**Sabre Industries**  
Towers and Poles

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4 1/2" O.D. PIPE MOUNT ASSEMBLY FOR MONOPOLES (FITS 12" TO 60" DIAMETER)			
DATE	01/26/16	SIZE	B
DRAWN BY	WRF	DRAWING NO.	C10899055
CHECKED BY	DLW	SCALE	None
		REV	1
		PAGE	1 OF 1

# Exhibit D

## **Structural Analysis Report**

Date: **October 12, 2021**



Tower Engineering Professionals  
326 Tryon Road  
Raleigh, NC 27603  
(919) 661-6351

**Subject: Structural Analysis Report**

**Carrier Designation:** **AT&T Mobility Co-Locate**  
**Site Number:** CTL05307  
**Site Name:** N/A  
**FA Number:** 10071100

**Crown Castle Designation:** **BU Number:** 876347  
**Site Name:** Buckland Mall  
**JDE Job Number:** 649413  
**Work Order Number:** 2017828  
**Order Number:** 556512 Rev. 0

**Engineering Firm Designation:** **TEP Project Number:** 25697.610341

**Site Data:** **53 Slater Street, Manchester, Hartford County, CT 06040**  
**Latitude 41° 48' 18.00", Longitude -72° 32' 1.00"**  
**155 Foot - Monopole Tower**

Tower Engineering Professionals is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the above-mentioned tower.

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: Proposed Equipment Configuration

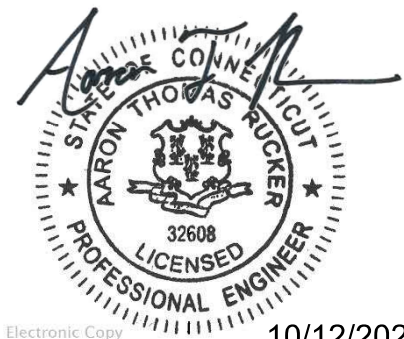
**Sufficient Capacity - 85.4%**

This analysis utilizes an ultimate 3-second gust wind speed of 118 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Mohd Abu Ghazal / PHX

Respectfully submitted by:

Aaron T. Rucker, P.E.



Electronic Copy

10/12/2021

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Table 5 - Tower Component Stresses vs. Capacity

4.1) Recommendations

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tnxTower Output

### 6) APPENDIX B

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### 7) APPENDIX C

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## 1) INTRODUCTION

This tower is a 155-ft monopole tower designed by Paul J. Ford and Company.

## 2) ANALYSIS CRITERIA

<b>TIA-222 Revision:</b>	TIA-222-H
<b>Risk Category:</b>	II
<b>Wind Speed:</b>	118 mph
<b>Exposure Category:</b>	C
<b>Topographic Factor:</b>	1.0
<b>Ice Thickness:</b>	1.50 in
<b>Wind Speed with Ice:</b>	50 mph
<b>Service Wind Speed:</b>	60 mph

**Table 1 - Proposed Equipment Configuration**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
143.0	145.0	3	CCI Antennas	DMP65R-BU6D w/ Mount Pipe	3 6 6	3/8 7/8 1-5/8
		3	Ericsson	AIR 6419 B77G w/ Mount Pipe		
		3	Ericsson	AIR 6449 N77 w/ Mount Pipe		
		3	Quintel Tech.	QD6616-7 w/ Mount Pipe		
		3	Ericsson	RADIO 4478 B14		
		3	Ericsson	RRUS 32 B30		
		3	Ericsson	RRUS 4449 B5/B12		
		3	Ericsson	RRUS 8843 B2/B66A		
	3	Raycap	DC6-48-60-18-8F			
	143.0	1	Tower Mounts	Sabre C10857802		

**Table 2 - Other Considered Equipment**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
155.0	155.0	3	RFS Celwave	APXVTM14-C-120 w/ Mount Pipe	2 3 3 5	5/8 5/16 1-1/4 1/2
		3	RFS Celwave	APXVSPP18-C-A20 w/ Mount Pipe		
		3	Argus Tech.	LPX310R w/ Mount Pipe		
		3	Alcatel Lucent	TD-RRH8X20-25		
		3	Samsung Telecom.	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	VHLP2.5-18		
		1	Andrew	VHLP2-11		
		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)
153.0	153.0	3	Alcatel Lucent	800MHz 2X50W RRH w/Filter	-	-
		3	Alcatel Lucent	PCS 1900MHz 4x45W-65MHz		
		1	Tower Mounts	Pipe Mount [PM 601-3]		
		1	Tower Mounts	Side Arm Mount [SO 104-3]		
133.0	133.0	3	Ericsson	AIR -32 B2A/B66AA w/ Mount Pipe	2 3	1-3/8 1-5/8
		3	RFS Celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
		3	Ericsson	AIR6449 B41_T-MOBILE w/ Mount Pipe		
		3	Ericsson	RADIO 4449 B71 B85A_T-MOBILE		
		3	Ericsson	RADIO 4460 B2/B25 B66_TMO		
		1	Tower Mounts	Platform Mount [LP 304-1_HR-1]		
123.0	123.0	3	JMA Wireless	MX08FRO665-21 w/ Mount Pipe	1	1-1/2
		1	Raycap	RDIDC-9181-PF-48		
		3	Fujitsu	TA08025-B605		
		3	Fujitsu	TA08025-B604		
		1	Tower Mounts	Commscope MC-PK8-DSH		
113.0	113.0	3	Andrew	LNx-6512DS-T0M w/ Mount Pipe	8	1-5/8
		3	VZW	Sub6 Antenna - VZS01 w/ Mount Pipe		
		6	Commscope	SBNHH-1D65B w/ Mount Pipe		
		3	Samsung Telecom.	RFV01U-D2A		
		3	Samsung Telecom.	RFV01U-D1A		
		1	RFS Celwave	DB-T1-6Z-8AB-0Z		
		1	Raycap	RVZDC-6627-PF-48		
		3	Tower Mounts	P2.5 STD Support Rail		
		3	Tower Mounts	VZWSMART-PLK3 w/ 24" L3x3x1/4 angles		
		3	Tower Mounts	PRK-SFS Handrail Reinforcement Kit		
60.0	60.0	1	Tower Mounts	Platform Mount [LP 1201-1]	-	-
		1	Tower Mounts	Side Arm Mount [SO 701-1]		

### 3) ANALYSIS PROCEDURE

**Table 3 - Documents Provided**

Document	Reference	Source
Geotechnical Report	1533476	CCISites
Tower Foundation Drawings	1615406	CCISites
Tower Manufacturer Drawings	2068033	CCISites

#### 3.1) Analysis Method

tnxTower (version 8.1.1.0), 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. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 Standard.

#### 3.2) Assumptions

- 1) The tower and structures were maintained in accordance with the TIA-222 Standard.
- 2) 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. Tower Engineering Professionals 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)	$\phi P_{allow}$ (k)	% Capacity	Pass / Fail
L1	155 - 115.5	Pole	TP29.308x22x0.25	1	-18.64	1276.15	52.1	Pass
L2	115.5 - 79.25	Pole	TP35.514x28.114x0.313	2	-30.44	2093.96	80.7	Pass
L3	79.25 - 43.75	Pole	TP41.456x34.057x0.375	3	-40.42	2932.47	85.4	Pass
L4	43.75 - 0	Pole	TP48.8x39.735x0.438	4	-58.06	4125.15	83.9	Pass
							<b>Summary</b>	
						Pole (L3)	85.4	Pass
						<b>RATING =</b>	<b>85.4</b>	<b>Pass</b>

**Table 5 - Tower Component Stresses vs. Capacity - LC7**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	-	84.8	Pass
1,2	Base Plate	-	64.7	Pass
1,2	Base Foundation Structural	-	55.0	Pass
1,2	Base Foundation Soil Interaction	-	52.6	Pass

<b>Structure Rating (max from all components) =</b>	<b>85.4%</b>
---	--------------

Notes:

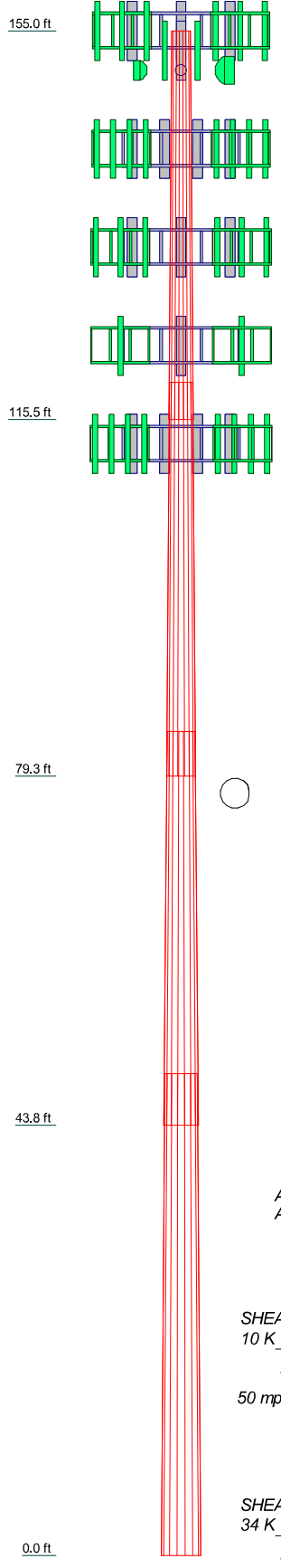
- 1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.
- 2) Rating per TIA-222-H Section 15.5

**4.1) Recommendations**

- 1) The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

**APPENDIX A**  
**TNXTOWER OUTPUT**

Section	1	2	3	4	
Length (ft)	39.50	40.00	40.00	49.00	
Number of Sides	18	18	18	18	
Thickness (in)	0.250	0.313	0.375	0.438	
Socket Length (ft)	3.75	4.50	5.25		
Top Dia (in)	22.000	28.114	34.057	38.735	
Bot Dia (in)	28.308	35.514	41.456	48.800	
Grade		A607-60	A607-65		
Weight (K)	2.7	4.3	6.1	10.1	23.2



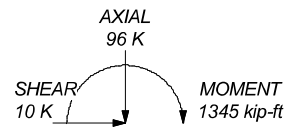
**MATERIAL STRENGTH**

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

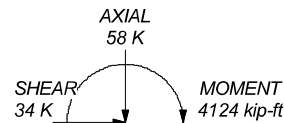
**TOWER DESIGN NOTES**

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 118 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 85.4%

ALL REACTIONS ARE FACTORED



TORQUE 0 kip-ft  
50 mph WIND - 1.500 in ICE



TORQUE 1 kip-ft  
REACTIONS - 118 mph WIND

 Tower Engineering Professionals	<b>Tower Engineering Professionals</b>		<b>Job: Buckland Mall (BU 876347)</b>		
	326 Tryon Road		Project: <b>TEP No. 25697.610341</b>		
	Raleigh, NC 27603		Client: Crown Castle	Drawn by: AW	App'd:
	Phone: (919) 661-6351		Code: TIA-222-H	Date: 10/11/21	Scale: NTS
	FAX: (919) 661-6350		Path:		Dwg No. E-1

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Buckland Mall (BU 876347)	<b>Page</b> 1 of 22
	<b>Project</b> TEP No. 25697.610341	<b>Date</b> 17:20:58 10/11/21
	<b>Client</b> Crown Castle	<b>Designed by</b> AW

## Tower Input Data

The tower is a monopole.

This tower is designed using the TIA-222-H standard.

The following design criteria apply:

Tower is located in Hartford County, Connecticut.

Tower base elevation above sea level: 196.00 ft.

Basic wind speed of 118 mph.

Risk Category II.

Exposure Category C.

Simplified Topographic Factor Procedure for wind speed-up calculations is used.

Topographic Category: 1.

Crest Height: 0.00 ft.

Nominal ice thickness of 1.500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

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

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

Tower analysis based on target reliabilities in accordance with Annex S.

Load Modification Factors used:  $K_{es}(F_w) = 0.95$ ,  $K_{es}(t_i) = 0.85$ .

Maximum demand-capacity ratio is: 1.05.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

<ul style="list-style-type: none"> <li>Consider Moments - Legs</li> <li>Consider Moments - Horizontals</li> <li>Consider Moments - Diagonals</li> <li>Use Moment Magnification</li> <li>√ Use Code Stress Ratios</li> <li>√ Use Code Safety Factors - Guys</li> <li>Escalate Ice</li> <li>Always Use Max Kz</li> <li>Use Special Wind Profile</li> <li>Include Bolts In Member Capacity</li> <li>Leg Bolts Are At Top Of Section</li> <li>Secondary Horizontal Braces Leg</li> <li>Use Diamond Inner Bracing (4 Sided)</li> <li>SR Members Have Cut Ends</li> <li>SR Members Are Concentric</li> </ul>	<ul style="list-style-type: none"> <li>Distribute Leg Loads As Uniform</li> <li>Assume Legs Pinned</li> <li>√ Assume Rigid Index Plate</li> <li>√ Use Clear Spans For Wind Area</li> <li>Use Clear Spans For KL/r</li> <li>Retension Guys To Initial Tension</li> <li>√ Bypass Mast Stability Checks</li> <li>√ Use Azimuth Dish Coefficients</li> <li>√ Project Wind Area of Appurt.</li> <li>Autocalc Torque Arm Areas</li> <li>Add IBC .6D+W Combination</li> <li>√ Sort Capacity Reports By Component</li> <li>Triangulate Diamond Inner Bracing</li> <li>Treat Feed Line Bundles As Cylinder</li> <li>Ignore KL/ry For 60 Deg. Angle Legs</li> </ul>	<ul style="list-style-type: none"> <li>Use ASCE 10 X-Brace Ly Rules</li> <li>Calculate Redundant Bracing Forces</li> <li>Ignore Redundant Members in FEA</li> <li>SR Leg Bolts Resist Compression</li> <li>All Leg Panels Have Same Allowable</li> <li>Offset Girt At Foundation</li> <li>√ Consider Feed Line Torque</li> <li>Include Angle Block Shear Check</li> <li>Use TIA-222-H Bracing Resist. Exemption</li> <li>Use TIA-222-H Tension Splice Exemption</li> <li style="background-color: #e0e0e0;">Poles</li> <li>√ Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> <li>Pole Without Linear Attachments</li> <li>Pole With Shroud Or No Appurtenances</li> <li>Outside and Inside Corner Radii Are Known</li> </ul>
--	---	--



<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Buckland Mall (BU 876347)	<b>Page</b> 3 of 22
	<b>Project</b> TEP No. 25697.610341	<b>Date</b> 17:20:58 10/11/21
	<b>Client</b> Crown Castle	<b>Designed by</b> AW

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
CU12PSM9P6XXX(1-1/2) *** ***	A	No	Surface Ar (CaAa)	123.00 - 0.00	1	1	0.000 0.000	1.600		2.350

### Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C <sub>AA</sub> ft <sup>2</sup> /ft	Weight plf
ATCB-B01-005(5/16)	C	No	No	Inside Pole	155.00 - 0.00	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.075 0.075 0.075 0.075
9776(5/8)	C	No	No	Inside Pole	155.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.275 0.275 0.275 0.275
HB058-M12-XXXF(5/8)	C	No	No	Inside Pole	155.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.242 0.242 0.242 0.242
HB114-1-08U4-M5J(1-1/4)	C	No	No	Inside Pole	155.00 - 0.00	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.080 1.080 1.080 1.080
**143** PWRT-606-S(7/8")	A	No	No	Inside Pole	143.00 - 0.00	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.890 0.890 0.890 0.890
LDF7-50A(1-5/8")	A	No	No	Inside Pole	143.00 - 0.00	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.820 0.820 0.820 0.820
FB-L98B-034-XXX(3/8")	A	No	No	Inside Pole	143.00 - 0.00	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.057 0.057 0.057 0.057
**133** HCS 6X12 6AWG(1-3/8)	A	No	No	Inside Pole	133.00 - 0.00	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.700 1.700 1.700 1.700
HCS 6X12 4AWG(1-5/8)	A	No	No	Inside Pole	133.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	2.400 2.400 2.400 2.400
HB158-21U6S24-xx M_TMO(1-5/8)	A	No	No	Inside Pole	133.00 - 0.00	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	2.500 2.500 2.500 2.500
**113** 561(1-5/8)	B	No	No	Inside Pole	113.00 - 0.00	6	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.350 1.350 1.350



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	<b>Client</b> Crown Castle	<b>Designed by</b> AW

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C <sub>AA</sub> ft <sup>2</sup> /ft	Weight plf
HB158-U12S24-XX X-LI(1-5/8)	B	No	No	Inside Pole	113.00 - 0.00	2	2" Ice	1.350
							No Ice	3.200
							1/2" Ice	3.200
							1" Ice	3.200
							2" Ice	3.200
***								***

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
L1	155.00-115.50	A	0.000	0.000	2.681	0.000	0.50
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	19.987	0.000	0.41
L2	115.50-79.25	A	0.000	0.000	7.159	0.000	0.86
		B	0.000	0.000	0.000	0.000	0.49
		C	0.000	0.000	18.343	0.000	0.37
L3	79.25-43.75	A	0.000	0.000	7.011	0.000	0.84
		B	0.000	0.000	0.000	0.000	0.51
		C	0.000	0.000	17.963	0.000	0.37
L4	43.75-0.00	A	0.000	0.000	8.641	0.000	1.04
		B	0.000	0.000	0.000	0.000	0.63
		C	0.000	0.000	22.137	0.000	0.45

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
L1	155.00-115.50	A	1.467	0.000	0.000	16.474	0.000	0.67
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	53.963	0.000	0.96
L2	115.50-79.25	A	1.420	0.000	0.000	28.435	0.000	1.18
		B		0.000	0.000	0.000	0.000	0.49
		C		0.000	0.000	49.523	0.000	0.89
L3	79.25-43.75	A	1.356	0.000	0.000	27.176	0.000	1.14
		B		0.000	0.000	0.000	0.000	0.51
		C		0.000	0.000	47.659	0.000	0.85
L4	43.75-0.00	A	1.225	0.000	0.000	32.377	0.000	1.38
		B		0.000	0.000	0.000	0.000	0.63
		C		0.000	0.000	57.342	0.000	1.01

### Feed Line Center of Pressure

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Section	Elevation	CP <sub>X</sub>	CP <sub>Z</sub>	CP <sub>X</sub> Ice	CP <sub>Z</sub> Ice
	ft	in	in	in	in
L1	155.00-115.50	-1.589	2.273	-1.425	2.038
L2	115.50-79.25	-2.263	1.856	-2.277	1.687
L3	79.25-43.75	-2.341	1.917	-2.444	1.813
L4	43.75-0.00	-2.407	1.969	-2.584	1.923

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 <sub>a</sub> No Ice	K <sub>a</sub> Ice
L1	2	Safety Line 3/8	115.50 - 155.00	1.0000	1.0000
L1	4	2" Rigid Conduit	115.50 - 155.00	1.0000	1.0000
L1	6	FSJ4-50B(1/2)	115.50 - 155.00	1.0000	1.0000
L1	20	CU12PSM9P6XXX(1-1/2)	115.50 - 123.00	1.0000	1.0000
L2	2	Safety Line 3/8	79.25 - 115.50	1.0000	1.0000
L2	4	2" Rigid Conduit	79.25 - 115.50	1.0000	1.0000
L2	6	FSJ4-50B(1/2)	79.25 - 115.50	1.0000	1.0000
L2	20	CU12PSM9P6XXX(1-1/2)	79.25 - 115.50	1.0000	1.0000
L3	2	Safety Line 3/8	43.75 - 79.25	1.0000	1.0000
L3	4	2" Rigid Conduit	43.75 - 79.25	1.0000	1.0000
L3	6	FSJ4-50B(1/2)	43.75 - 79.25	1.0000	1.0000
L3	20	CU12PSM9P6XXX(1-1/2)	43.75 - 79.25	1.0000	1.0000
L4	2	Safety Line 3/8	0.00 - 43.75	1.0000	1.0000
L4	4	2" Rigid Conduit	0.00 - 43.75	1.0000	1.0000
L4	6	FSJ4-50B(1/2)	0.00 - 43.75	1.0000	1.0000
L4	20	CU12PSM9P6XXX(1-1/2)	0.00 - 43.75	1.0000	1.0000

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral	Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
<b>**155**</b>									
APXVTM14-C-120 w/ Mount Pipe	A	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.09 4.48 4.88 5.71	2.86 3.23 3.61 4.40	0.08 0.13 0.19 0.33
APXVTM14-C-120 w/	B	From	4.00	0.000	155.00	No Ice	4.09	2.86	0.08

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<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert</i> <i>ft ft ft</i>	<i>Azimuth Adjustment</i> <i>°</i>	<i>Placement</i> <i>ft</i>	<i>C<sub>AA</sub> Front</i> <i>ft<sup>2</sup></i>	<i>C<sub>AA</sub> Side</i> <i>ft<sup>2</sup></i>	<i>Weight</i> <i>K</i>
Mount Pipe		Centroid-Le g	0.000 0.000			1/2" Ice 4.48 1" Ice 4.88 2" Ice 5.71	3.23 3.61 4.40	0.13 0.19 0.33
APXVTM14-C-120 w/ Mount Pipe	C	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 4.09 1/2" Ice 4.48 1" Ice 4.88 2" Ice 5.71	2.86 3.23 3.61 4.40	0.08 0.13 0.19 0.33
APXVSPP18-C-A20 w/ Mount Pipe	A	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 4.60 1/2" Ice 5.05 1" Ice 5.50 2" Ice 6.44	4.01 4.45 4.89 5.82	0.10 0.16 0.23 0.42
APXVSPP18-C-A20 w/ Mount Pipe	B	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 4.60 1/2" Ice 5.05 1" Ice 5.50 2" Ice 6.44	4.01 4.45 4.89 5.82	0.10 0.16 0.23 0.42
APXVSPP18-C-A20 w/ Mount Pipe	C	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 4.60 1/2" Ice 5.05 1" Ice 5.50 2" Ice 6.44	4.01 4.45 4.89 5.82	0.10 0.16 0.23 0.42
LPX310R w/ Mount Pipe	A	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 2.31 1/2" Ice 2.64 1" Ice 2.97 2" Ice 3.65	2.34 2.87 3.41 4.56	0.03 0.05 0.08 0.16
LPX310R w/ Mount Pipe	B	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 2.31 1/2" Ice 2.64 1" Ice 2.97 2" Ice 3.65	2.34 2.87 3.41 4.56	0.03 0.05 0.08 0.16
LPX310R w/ Mount Pipe	C	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 2.31 1/2" Ice 2.64 1" Ice 2.97 2" Ice 3.65	2.34 2.87 3.41 4.56	0.03 0.05 0.08 0.16
TD-RRH8X20-25	A	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 3.70 1/2" Ice 3.95 1" Ice 4.20 2" Ice 4.72	1.29 1.46 1.64 2.02	0.07 0.09 0.12 0.18
TD-RRH8X20-25	B	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 3.70 1/2" Ice 3.95 1" Ice 4.20 2" Ice 4.72	1.29 1.46 1.64 2.02	0.07 0.09 0.12 0.18
TD-RRH8X20-25	C	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 3.70 1/2" Ice 3.95 1" Ice 4.20 2" Ice 4.72	1.29 1.46 1.64 2.02	0.07 0.09 0.12 0.18
WIMAX DAP HEAD	A	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 1.55 1/2" Ice 1.70 1" Ice 1.87 2" Ice 2.22	0.68 0.80 0.92 1.19	0.03 0.04 0.06 0.09
WIMAX DAP HEAD	B	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 1.55 1/2" Ice 1.70 1" Ice 1.87 2" Ice 2.22	0.68 0.80 0.92 1.19	0.03 0.04 0.06 0.09
WIMAX DAP HEAD	C	From Centroid-Le g	4.00 0.000 0.000	0.000	155.00	No Ice 1.55 1/2" Ice 1.70 1" Ice 1.87 2" Ice 2.22	0.68 0.80 0.92 1.19	0.03 0.04 0.06 0.09
HORIZON COMPACT	A	From Centroid-Le	4.00 0.000	0.000	155.00	No Ice 0.72 1/2" Ice 0.83	0.37 0.45	0.01 0.02

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	<b>Client</b>	Crown Castle	<b>Designed by</b>	AW

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Vert					
			Lateral		°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
			ft	ft					
			ft						
		g	-4.000			1" Ice	0.94	0.54	0.03
						2" Ice	1.19	0.74	0.05
HORIZON COMPACT	B	From Centroid-Le	4.00	0.000	155.00	No Ice	0.72	0.37	0.01
		g	0.000			1/2" Ice	0.83	0.45	0.02
			-4.000			1" Ice	0.94	0.54	0.03
						2" Ice	1.19	0.74	0.05
HORIZON COMPACT	C	From Centroid-Le	4.00	0.000	155.00	No Ice	0.72	0.37	0.01
		g	0.000			1/2" Ice	0.83	0.45	0.02
			-4.000			1" Ice	0.94	0.54	0.03
						2" Ice	1.19	0.74	0.05
2.4" Dia x 4-ft Mount Pipe	A	From Centroid-Le	4.00	0.000	155.00	No Ice	0.87	0.87	0.01
		g	0.000			1/2" Ice	1.12	1.12	0.02
			0.000			1" Ice	1.37	1.37	0.03
						2" Ice	1.91	1.91	0.06
2.4" Dia x 4-ft Mount Pipe	B	From Centroid-Le	4.00	0.000	155.00	No Ice	0.87	0.87	0.01
		g	0.000			1/2" Ice	1.12	1.12	0.02
			0.000			1" Ice	1.37	1.37	0.03
						2" Ice	1.91	1.91	0.06
2.4" Dia x 4-ft Mount Pipe	C	From Centroid-Le	4.00	0.000	155.00	No Ice	0.87	0.87	0.01
		g	0.000			1/2" Ice	1.12	1.12	0.02
			0.000			1" Ice	1.37	1.37	0.03
						2" Ice	1.91	1.91	0.06
Miscellaneous [NA 510-1]	C	None		0.000	155.00	No Ice	6.36	6.36	0.26
						1/2" Ice	8.52	8.52	0.34
						1" Ice	10.62	10.62	0.46
						2" Ice	14.64	14.64	0.77
Platform Mount [LP 1201-1]	C	None		0.000	155.00	No Ice	18.38	18.38	2.10
						1/2" Ice	22.11	22.11	2.65
						1" Ice	25.87	25.87	3.26
						2" Ice	33.47	33.47	4.66
**153**									
800MHz 2X50W RRH W/FILTER	A	From Leg	1.00	0.000	153.00	No Ice	2.06	1.93	0.06
			0.000			1/2" Ice	2.24	2.11	0.09
			0.000			1" Ice	2.43	2.29	0.11
						2" Ice	2.83	2.68	0.17
800MHz 2X50W RRH W/FILTER	B	From Leg	1.00	0.000	153.00	No Ice	2.06	1.93	0.06
			0.000			1/2" Ice	2.24	2.11	0.09
			0.000			1" Ice	2.43	2.29	0.11
						2" Ice	2.83	2.68	0.17
800MHz 2X50W RRH W/FILTER	C	From Leg	1.00	0.000	153.00	No Ice	2.06	1.93	0.06
			0.000			1/2" Ice	2.24	2.11	0.09
			0.000			1" Ice	2.43	2.29	0.11
						2" Ice	2.83	2.68	0.17
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00	0.000	153.00	No Ice	2.32	2.24	0.06
			0.000			1/2" Ice	2.53	2.44	0.08
			0.000			1" Ice	2.74	2.65	0.11
						2" Ice	3.19	3.09	0.17
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00	0.000	153.00	No Ice	2.32	2.24	0.06
			0.000			1/2" Ice	2.53	2.44	0.08
			0.000			1" Ice	2.74	2.65	0.11
						2" Ice	3.19	3.09	0.17
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00	0.000	153.00	No Ice	2.32	2.24	0.06
			0.000			1/2" Ice	2.53	2.44	0.08
			0.000			1" Ice	2.74	2.65	0.11
						2" Ice	3.19	3.09	0.17
Pipe Mount [PM 601-3]	C	None		0.000	153.00	No Ice	3.17	3.17	0.20
						1/2" Ice	3.79	3.79	0.23

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
							1" Ice	4.42	4.42	0.28
							2" Ice	5.76	5.76	0.40
Side Arm Mount [SO 104-3]	C	None			0.000	153.00	No Ice	2.62	2.62	0.29
							1/2" Ice	3.30	3.30	0.41
							1" Ice	3.98	3.98	0.53
							2" Ice	5.35	5.35	0.77
<b>**143**</b>										
AIR 6419 B77G w/ Mount Pipe	A	From Face	4.00		0.000	143.00	No Ice	4.32	2.49	0.08
			0.000				1/2" Ice	4.74	2.84	0.11
			2.000				1" Ice	5.17	3.21	0.15
							2" Ice	6.09	4.00	0.24
AIR 6419 B77G w/ Mount Pipe	B	From Face	4.00		0.000	143.00	No Ice	4.32	2.49	0.08
			0.000				1/2" Ice	4.74	2.84	0.11
			2.000				1" Ice	5.17	3.21	0.15
							2" Ice	6.09	4.00	0.24
AIR 6419 B77G w/ Mount Pipe	C	From Face	4.00		0.000	143.00	No Ice	4.32	2.49	0.08
			0.000				1/2" Ice	4.74	2.84	0.11
			2.000				1" Ice	5.17	3.21	0.15
							2" Ice	6.09	4.00	0.24
DMP65R-BU6D w/ Mount Pipe	A	From Face	4.00		0.000	143.00	No Ice	11.96	5.97	0.11
			0.000				1/2" Ice	12.70	6.63	0.20
			2.000				1" Ice	13.46	7.30	0.30
							2" Ice	15.02	8.69	0.53
DMP65R-BU6D w/ Mount Pipe	B	From Face	4.00		0.000	143.00	No Ice	11.96	5.97	0.11
			0.000				1/2" Ice	12.70	6.63	0.20
			2.000				1" Ice	13.46	7.30	0.30
							2" Ice	15.02	8.69	0.53
DMP65R-BU6D w/ Mount Pipe	C	From Face	4.00		0.000	143.00	No Ice	11.96	5.97	0.11
			0.000				1/2" Ice	12.70	6.63	0.20
			2.000				1" Ice	13.46	7.30	0.30
							2" Ice	15.02	8.69	0.53
QD6616-7 w/ Mount Pipe	A	From Face	4.00		0.000	143.00	No Ice	12.56	6.93	0.16
			0.000				1/2" Ice	13.30	7.60	0.25
			2.000				1" Ice	14.06	8.28	0.36
							2" Ice	15.63	9.68	0.61
QD6616-7 w/ Mount Pipe	B	From Face	4.00		0.000	143.00	No Ice	12.56	6.93	0.16
			0.000				1/2" Ice	13.30	7.60	0.25
			2.000				1" Ice	14.06	8.28	0.36
							2" Ice	15.63	9.68	0.61
QD6616-7 w/ Mount Pipe	C	From Face	4.00		0.000	143.00	No Ice	12.56	6.93	0.16
			0.000				1/2" Ice	13.30	7.60	0.25
			2.000				1" Ice	14.06	8.28	0.36
							2" Ice	15.63	9.68	0.61
AIR 6449 N77 w/ Mount Pipe	A	From Face	4.00		0.000	143.00	No Ice	3.65	2.72	0.11
			0.000				1/2" Ice	3.99	3.03	0.15
			2.000				1" Ice	4.35	3.36	0.20
							2" Ice	5.11	4.05	0.31
AIR 6449 N77 w/ Mount Pipe	B	From Face	4.00		0.000	143.00	No Ice	3.65	2.72	0.11
			0.000				1/2" Ice	3.99	3.03	0.15
			2.000				1" Ice	4.35	3.36	0.20
							2" Ice	5.11	4.05	0.31
AIR 6449 N77 w/ Mount Pipe	C	From Face	4.00		0.000	143.00	No Ice	3.65	2.72	0.11
			0.000				1/2" Ice	3.99	3.03	0.15
			2.000				1" Ice	4.35	3.36	0.20
							2" Ice	5.11	4.05	0.31
RADIO 4478 B14	A	From Face	4.00		0.000	143.00	No Ice	2.02	1.25	0.06
			0.000				1/2" Ice	2.20	1.40	0.08

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b>	Buckland Mall (BU 876347)	<b>Page</b>	9 of 22
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	<b>Client</b>	Crown Castle	<b>Designed by</b>	AW

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
			2.000				1" Ice 2.39	1.55	0.10
							2" Ice 2.78	1.89	0.15
RADIO 4478 B14	B	From Face	4.00	0.000	143.00	No Ice 2.02	1.25	0.06	
			0.000			1/2" Ice 2.20	1.40	0.08	
			2.000			1" Ice 2.39	1.55	0.10	
						2" Ice 2.78	1.89	0.15	
RADIO 4478 B14	C	From Face	4.00	0.000	143.00	No Ice 2.02	1.25	0.06	
			0.000			1/2" Ice 2.20	1.40	0.08	
			2.000			1" Ice 2.39	1.55	0.10	
						2" Ice 2.78	1.89	0.15	
RRUS 8843 B2/B66A	A	From Face	4.00	0.000	143.00	No Ice 1.64	1.35	0.07	
			0.000			1/2" Ice 1.80	1.50	0.09	
			2.000			1" Ice 1.97	1.65	0.11	
						2" Ice 2.32	1.99	0.16	
RRUS 8843 B2/B66A	B	From Face	4.00	0.000	143.00	No Ice 1.64	1.35	0.07	
			0.000			1/2" Ice 1.80	1.50	0.09	
			2.000			1" Ice 1.97	1.65	0.11	
						2" Ice 2.32	1.99	0.16	
RRUS 8843 B2/B66A	C	From Face	4.00	0.000	143.00	No Ice 1.64	1.35	0.07	
			0.000			1/2" Ice 1.80	1.50	0.09	
			2.000			1" Ice 1.97	1.65	0.11	
						2" Ice 2.32	1.99	0.16	
RRUS 32 B30	A	From Face	4.00	0.000	143.00	No Ice 2.73	1.67	0.05	
			0.000			1/2" Ice 2.95	1.86	0.07	
			2.000			1" Ice 3.18	2.05	0.10	
						2" Ice 3.66	2.46	0.16	
RRUS 32 B30	B	From Face	4.00	0.000	143.00	No Ice 2.73	1.67	0.05	
			0.000			1/2" Ice 2.95	1.86	0.07	
			2.000			1" Ice 3.18	2.05	0.10	
						2" Ice 3.66	2.46	0.16	
RRUS 32 B30	C	From Face	4.00	0.000	143.00	No Ice 2.73	1.67	0.05	
			0.000			1/2" Ice 2.95	1.86	0.07	
			2.000			1" Ice 3.18	2.05	0.10	
						2" Ice 3.66	2.46	0.16	
RRUS 4449 B5/B12	A	From Face	4.00	0.000	143.00	No Ice 1.97	1.41	0.07	
			0.000			1/2" Ice 2.14	1.56	0.09	
			2.000			1" Ice 2.33	1.73	0.11	
						2" Ice 2.72	2.07	0.16	
RRUS 4449 B5/B12	B	From Face	4.00	0.000	143.00	No Ice 1.97	1.41	0.07	
			0.000			1/2" Ice 2.14	1.56	0.09	
			2.000			1" Ice 2.33	1.73	0.11	
						2" Ice 2.72	2.07	0.16	
RRUS 4449 B5/B12	C	From Face	4.00	0.000	143.00	No Ice 1.97	1.41	0.07	
			0.000			1/2" Ice 2.14	1.56	0.09	
			2.000			1" Ice 2.33	1.73	0.11	
						2" Ice 2.72	2.07	0.16	
DC6-48-60-18-8F	A	From Face	4.00	0.000	143.00	No Ice 1.21	1.21	0.03	
			0.000			1/2" Ice 1.89	1.89	0.05	
			2.000			1" Ice 2.11	2.11	0.08	
						2" Ice 2.57	2.57	0.14	
DC6-48-60-18-8F	B	From Face	4.00	0.000	143.00	No Ice 1.21	1.21	0.03	
			0.000			1/2" Ice 1.89	1.89	0.05	
			2.000			1" Ice 2.11	2.11	0.08	
						2" Ice 2.57	2.57	0.14	
DC6-48-60-18-8F	C	From Face	4.00	0.000	143.00	No Ice 1.21	1.21	0.03	
			0.000			1/2" Ice 1.89	1.89	0.05	
			2.000			1" Ice 2.11	2.11	0.08	

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b>	Buckland Mall (BU 876347)	<b>Page</b>	10 of 22
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	<b>Client</b>	Crown Castle	<b>Designed by</b>	AW

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz Lateral	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
Sector Mount [SM 502-3]	C	None			0.000	143.00	2" Ice	2.57	2.57	0.14
							No Ice	29.82	29.82	1.67
							1/2" Ice	42.21	42.21	2.27
							1" Ice	54.43	54.43	3.05
							2" Ice	78.49	78.49	5.18
**133**										
AIR -32 B2A/B66AA w/ Mount Pipe	A	From Centroid-Le g	4.00	0.000	0.000	133.00	No Ice	3.76	3.15	0.19
							1/2" Ice	4.12	3.49	0.25
							1" Ice	4.48	3.84	0.32
							2" Ice	5.24	4.58	0.48
							No Ice	3.76	3.15	0.19
AIR -32 B2A/B66AA w/ Mount Pipe	B	From Centroid-Le g	4.00	0.000	0.000	133.00	1/2" Ice	4.12	3.49	0.25
							1" Ice	4.48	3.84	0.32
							2" Ice	5.24	4.58	0.48
							No Ice	3.76	3.15	0.19
							1/2" Ice	4.12	3.49	0.25
AIR -32 B2A/B66AA w/ Mount Pipe	C	From Centroid-Le g	4.00	0.000	0.000	133.00	1" Ice	4.48	3.84	0.32
							2" Ice	5.24	4.58	0.48
							No Ice	3.76	3.15	0.19
							1/2" Ice	4.12	3.49	0.25
							1" Ice	4.48	3.84	0.32
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Centroid-Le g	4.00	0.000	0.000	133.00	2" Ice	5.24	4.58	0.48
							No Ice	14.69	6.87	0.19
							1/2" Ice	15.46	7.55	0.31
							1" Ice	16.23	8.25	0.46
							2" Ice	17.82	9.67	0.79
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Centroid-Le g	4.00	0.000	0.000	133.00	No Ice	14.69	6.87	0.19
							1/2" Ice	15.46	7.55	0.31
							1" Ice	16.23	8.25	0.46
							2" Ice	17.82	9.67	0.79
							No Ice	14.69	6.87	0.19
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Centroid-Le g	4.00	0.000	0.000	133.00	1/2" Ice	15.46	7.55	0.31
							1" Ice	16.23	8.25	0.46
							2" Ice	17.82	9.67	0.79
							No Ice	14.69	6.87	0.19
							1/2" Ice	15.46	7.55	0.31
AIR6449 B41_T-MOBILE w/ Mount Pipe	A	From Centroid-Le g	4.00	0.000	0.000	133.00	2" Ice	17.82	9.67	0.79
							No Ice	5.19	2.71	0.13
							1/2" Ice	5.59	3.04	0.17
							1" Ice	6.02	3.38	0.23
							2" Ice	6.90	4.12	0.35
AIR6449 B41_T-MOBILE w/ Mount Pipe	B	From Centroid-Le g	4.00	0.000	0.000	133.00	No Ice	5.19	2.71	0.13
							1/2" Ice	5.59	3.04	0.17
							1" Ice	6.02	3.38	0.23
							2" Ice	6.90	4.12	0.35
							No Ice	5.19	2.71	0.13
AIR6449 B41_T-MOBILE w/ Mount Pipe	C	From Centroid-Le g	4.00	0.000	0.000	133.00	1/2" Ice	5.59	3.04	0.17
							1" Ice	6.02	3.38	0.23
							2" Ice	6.90	4.12	0.35
							No Ice	5.19	2.71	0.13
							1/2" Ice	5.59	3.04	0.17
RADIO 4449 B71 B85A_T-MOBILE	A	From Centroid-Le g	4.00	0.000	0.000	133.00	2" Ice	6.90	4.12	0.35
							No Ice	1.97	1.59	0.07
							1/2" Ice	2.15	1.75	0.09
							1" Ice	2.33	1.92	0.12
							2" Ice	2.72	2.28	0.17
RADIO 4449 B71 B85A_T-MOBILE	B	From Centroid-Le g	4.00	0.000	0.000	133.00	No Ice	1.97	1.59	0.07
							1/2" Ice	2.15	1.75	0.09
							1" Ice	2.33	1.92	0.12
							2" Ice	2.72	2.28	0.17
							No Ice	1.97	1.59	0.07
RADIO 4449 B71 B85A_T-MOBILE	C	From Centroid-Le g	4.00	0.000	0.000	133.00	1/2" Ice	2.15	1.75	0.09
							1" Ice	2.33	1.92	0.12
							2" Ice	2.72	2.28	0.17
							No Ice	1.97	1.59	0.07
							1/2" Ice	2.15	1.75	0.09
RADIO 4460 B2/B25 B66_TMO	A	From Centroid-Le g	4.00	0.000	0.000	133.00	No Ice	2.14	1.69	0.11
							1/2" Ice	2.32	1.85	0.13
							2" Ice	2.72	2.28	0.17
							1" Ice	2.51	2.02	0.16

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	<b>Client</b>	Crown Castle	<b>Designed by</b>	AW

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
RADIO 4460 B2/B25 B66_TMO	B	From Centroid-Le g	4.00	0.000	0.000	133.00	2" Ice	2.91	2.39	0.22
			0.000	0.000			No Ice	2.14	1.69	0.11
			0.000	0.000			1/2" Ice	2.32	1.85	0.13
			0.000	0.000			1" Ice	2.51	2.02	0.16
RADIO 4460 B2/B25 B66_TMO	C	From Centroid-Le g	4.00	0.000	0.000	133.00	2" Ice	2.91	2.39	0.22
			0.000	0.000			No Ice	2.14	1.69	0.11
			0.000	0.000			1/2" Ice	2.32	1.85	0.13
			0.000	0.000			1" Ice	2.51	2.02	0.16
2.4" Dia x 8-ft Mount Pipe	A	From Centroid-Le g	4.00	0.000	0.000	133.00	2" Ice	2.91	2.39	0.22
			0.000	0.000			No Ice	1.90	1.90	0.03
			0.000	0.000			1/2" Ice	2.73	2.73	0.04
			0.000	0.000			1" Ice	3.40	3.40	0.06
2.4" Dia x 8-ft Mount Pipe	B	From Centroid-Le g	4.00	0.000	0.000	133.00	2" Ice	4.40	4.40	0.12
			0.000	0.000			No Ice	1.90	1.90	0.03
			0.000	0.000			1/2" Ice	2.73	2.73	0.04
			0.000	0.000			1" Ice	3.40	3.40	0.06
2.4" Dia x 8-ft Mount Pipe	C	From Centroid-Le g	4.00	0.000	0.000	133.00	2" Ice	4.40	4.40	0.12
			0.000	0.000			No Ice	1.90	1.90	0.03
			0.000	0.000			1/2" Ice	2.73	2.73	0.04
			0.000	0.000			1" Ice	3.40	3.40	0.06
Platform Mount [LP 304-1_HR-1]	C	None		0.000	0.000	133.00	2" Ice	4.40	4.40	0.12
				0.000			No Ice	21.41	21.41	1.60
				0.000			1/2" Ice	26.62	26.62	2.06
				0.000			1" Ice	31.66	31.66	2.60
**123**						2" Ice	41.38	41.38	3.96	
MX08FRO665-21 w/ Mount Pipe	A	From Centroid-Le g	4.00	0.000	0.000	123.00	No Ice	8.01	4.23	0.11
			0.000	0.000			1/2" Ice	8.52	4.69	0.19
			0.000	0.000			1" Ice	9.04	5.16	0.29
			0.000	0.000			2" Ice	10.11	6.12	0.52
MX08FRO665-21 w/ Mount Pipe	B	From Centroid-Le g	4.00	0.000	0.000	123.00	No Ice	8.01	4.23	0.11
			0.000	0.000			1/2" Ice	8.52	4.69	0.19
			0.000	0.000			1" Ice	9.04	5.16	0.29
			0.000	0.000			2" Ice	10.11	6.12	0.52
MX08FRO665-21 w/ Mount Pipe	C	From Centroid-Le g	4.00	0.000	0.000	123.00	No Ice	8.01	4.23	0.11
			0.000	0.000			1/2" Ice	8.52	4.69	0.19
			0.000	0.000			1" Ice	9.04	5.16	0.29
			0.000	0.000			2" Ice	10.11	6.12	0.52
TA08025-B605	A	From Centroid-Le g	4.00	0.000	0.000	123.00	No Ice	1.96	1.13	0.08
			0.000	0.000			1/2" Ice	2.14	1.27	0.09
			0.000	0.000			1" Ice	2.32	1.41	0.11
			0.000	0.000			2" Ice	2.71	1.72	0.16
TA08025-B605	B	From Centroid-Le g	4.00	0.000	0.000	123.00	No Ice	1.96	1.13	0.08
			0.000	0.000			1/2" Ice	2.14	1.27	0.09
			0.000	0.000			1" Ice	2.32	1.41	0.11
			0.000	0.000			2" Ice	2.71	1.72	0.16
TA08025-B605	C	From Centroid-Le g	4.00	0.000	0.000	123.00	No Ice	1.96	1.13	0.08
			0.000	0.000			1/2" Ice	2.14	1.27	0.09
			0.000	0.000			1" Ice	2.32	1.41	0.11
			0.000	0.000			2" Ice	2.71	1.72	0.16
TA08025-B604	A	From Centroid-Le g	4.00	0.000	0.000	123.00	No Ice	1.96	0.98	0.06
			0.000	0.000			1/2" Ice	2.14	1.11	0.08
			0.000	0.000			1" Ice	2.32	1.25	0.10
			0.000	0.000			2" Ice	2.71	1.55	0.15
TA08025-B604	B	From Centroid-Le g	4.00	0.000	0.000	123.00	No Ice	1.96	0.98	0.06
			0.000	0.000			1/2" Ice	2.14	1.11	0.08
			0.000	0.000			1" Ice	2.32	1.25	0.10



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	<b>Client</b>	Crown Castle	<b>Designed by</b>	AW

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
TA08025-B604	C	From Centroid-Le g	4.00	0.000	0.000	123.00	2" Ice	2.71	1.55	0.15
			0.000	0.000			No Ice	1.96	0.98	0.06
			0.000	0.000			1/2" Ice	2.14	1.11	0.08
			0.000	0.000			1" Ice	2.32	1.25	0.10
RDIDC-9181-PF-48	A	From Centroid-Le g	4.00	0.000	0.000	123.00	2" Ice	2.71	1.55	0.15
			0.000	0.000			No Ice	2.01	1.17	0.02
			0.000	0.000			1/2" Ice	2.19	1.31	0.04
			0.000	0.000			1" Ice	2.37	1.46	0.06
(2) 2.4" Dia x 8-ft Mount Pipe	A	From Centroid-Le g	4.00	0.000	0.000	123.00	2" Ice	2.76	1.78	0.11
			0.000	0.000			No Ice	1.90	1.90	0.03
			0.000	0.000			1/2" Ice	2.73	2.73	0.04
			0.000	0.000			1" Ice	3.40	3.40	0.06
(2) 2.4" Dia x 8-ft Mount Pipe	B	From Centroid-Le g	4.00	0.000	0.000	123.00	2" Ice	4.40	4.40	0.12
			0.000	0.000			No Ice	1.90	1.90	0.03
			0.000	0.000			1/2" Ice	2.73	2.73	0.04
			0.000	0.000			1" Ice	3.40	3.40	0.06
(2) 2.4" Dia x 8-ft Mount Pipe	C	From Centroid-Le g	4.00	0.000	0.000	123.00	2" Ice	4.40	4.40	0.12
			0.000	0.000			No Ice	1.90	1.90	0.03
			0.000	0.000			1/2" Ice	2.73	2.73	0.04
			0.000	0.000			1" Ice	3.40	3.40	0.06
Commscope MC-PK8-DSH	C	None		0.000	0.000	123.00	2" Ice	4.40	4.40	0.12
							No Ice	34.24	34.24	1.75
							1/2" Ice	62.95	62.95	2.10
							1" Ice	91.66	91.66	2.45
**113**						2" Ice	149.08	149.08	3.15	
LNX-6512DS-T0M w/ Mount Pipe	A	From Centroid-Le g	4.00	0.000	0.000	113.00	No Ice	2.67	2.15	0.05
			0.000	0.000			1/2" Ice	2.94	2.42	0.09
			0.000	0.000			1" Ice	3.22	2.69	0.14
			0.000	0.000			2" Ice	3.81	3.25	0.27
LNX-6512DS-T0M w/ Mount Pipe	B	From Centroid-Le g	4.00	0.000	0.000	113.00	No Ice	2.67	2.15	0.05
			0.000	0.000			1/2" Ice	2.94	2.42	0.09
			0.000	0.000			1" Ice	3.22	2.69	0.14
			0.000	0.000			2" Ice	3.81	3.25	0.27
LNX-6512DS-T0M w/ Mount Pipe	C	From Centroid-Le g	4.00	0.000	0.000	113.00	No Ice	2.67	2.15	0.05
			0.000	0.000			1/2" Ice	2.94	2.42	0.09
			0.000	0.000			1" Ice	3.22	2.69	0.14
			0.000	0.000			2" Ice	3.81	3.25	0.27
Sub6 Antenna - VZS01 w/ Mount Pipe	A	From Centroid-Le g	4.00	0.000	0.000	113.00	No Ice	4.92	2.69	0.10
			0.000	0.000			1/2" Ice	5.26	3.15	0.14
			0.000	0.000			1" Ice	5.62	3.63	0.19
			0.000	0.000			2" Ice	6.37	4.64	0.29
Sub6 Antenna - VZS01 w/ Mount Pipe	B	From Centroid-Le g	4.00	0.000	0.000	113.00	No Ice	4.92	2.69	0.10
			0.000	0.000			1/2" Ice	5.26	3.15	0.14
			0.000	0.000			1" Ice	5.62	3.63	0.19
			0.000	0.000			2" Ice	6.37	4.64	0.29
Sub6 Antenna - VZS01 w/ Mount Pipe	C	From Centroid-Le g	4.00	0.000	0.000	113.00	No Ice	4.92	2.69	0.10
			0.000	0.000			1/2" Ice	5.26	3.15	0.14
			0.000	0.000			1" Ice	5.62	3.63	0.19
			0.000	0.000			2" Ice	6.37	4.64	0.29
(2) SBNHH-1D65B w/ Mount Pipe	A	From Centroid-Le g	4.00	0.000	0.000	113.00	No Ice	4.09	3.30	0.07
			0.000	0.000			1/2" Ice	4.49	3.68	0.13
			0.000	0.000			1" Ice	4.89	4.07	0.20
			0.000	0.000			2" Ice	5.72	4.87	0.39
(2) SBNHH-1D65B w/ Mount Pipe	B	From Centroid-Le g	4.00	0.000	0.000	113.00	No Ice	4.09	3.30	0.07
			0.000	0.000			1/2" Ice	4.49	3.68	0.13
			0.000	0.000			1" Ice	4.89	4.07	0.20
			0.000	0.000			2" Ice	5.72	4.87	0.39

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
(2) SBNHH-1D65B w/ Mount Pipe	C	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	5.72	4.87	0.39
			0.000	0.000			No Ice	4.09	3.30	0.07
			0.000	0.000			1/2" Ice	4.49	3.68	0.13
			0.000	0.000			1" Ice	4.89	4.07	0.20
(3) RFV01U-D2A	A	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	5.72	4.87	0.39
			0.000	0.000			No Ice	1.88	1.01	0.07
			0.000	0.000			1/2" Ice	2.05	1.14	0.09
			0.000	0.000			1" Ice	2.22	1.28	0.11
RFV01U-D1A	A	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	2.60	1.59	0.15
			0.000	0.000			No Ice	1.88	1.25	0.08
			0.000	0.000			1/2" Ice	2.05	1.39	0.10
			0.000	0.000			1" Ice	2.22	1.54	0.12
(2) RFV01U-D1A	B	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	2.60	1.86	0.18
			0.000	0.000			No Ice	1.88	1.25	0.08
			0.000	0.000			1/2" Ice	2.05	1.39	0.10
			0.000	0.000			1" Ice	2.22	1.54	0.12
DB-T1-6Z-8AB-0Z	A	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	2.60	1.86	0.18
			0.000	0.000			No Ice	4.80	2.00	0.04
			0.000	0.000			1/2" Ice	5.07	2.19	0.08
			0.000	0.000			1" Ice	5.35	2.39	0.12
RVZDC-6627-PF-48	B	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	5.93	2.81	0.21
			0.000	0.000			No Ice	3.79	2.51	0.03
			0.000	0.000			1/2" Ice	4.04	2.73	0.06
			0.000	0.000			1" Ice	4.30	2.95	0.10
2.4" Dia x 8-ft Mount Pipe	A	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	4.84	3.42	0.18
			0.000	0.000			No Ice	1.90	1.90	0.03
			0.000	0.000			1/2" Ice	2.73	2.73	0.04
			0.000	0.000			1" Ice	3.40	3.40	0.06
2.4" Dia x 8-ft Mount Pipe	B	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	4.40	4.40	0.12
			0.000	0.000			No Ice	1.90	1.90	0.03
			0.000	0.000			1/2" Ice	2.73	2.73	0.04
			0.000	0.000			1" Ice	3.40	3.40	0.06
2.4" Dia x 8-ft Mount Pipe	C	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	4.40	4.40	0.12
			0.000	0.000			No Ice	1.90	1.90	0.03
			0.000	0.000			1/2" Ice	2.73	2.73	0.04
			0.000	0.000			1" Ice	3.40	3.40	0.06
L3x3x1/4 2-ft	A	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	4.40	4.40	0.12
			0.000	0.000			No Ice	0.60	0.07	0.01
			0.000	0.000			1/2" Ice	0.75	0.11	0.02
			0.000	0.000			1" Ice	0.91	0.16	0.02
L3x3x1/4 2-ft	B	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	1.26	0.27	0.05
			0.000	0.000			No Ice	0.60	0.07	0.01
			0.000	0.000			1/2" Ice	0.75	0.11	0.02
			0.000	0.000			1" Ice	0.91	0.16	0.02
L3x3x1/4 2-ft	C	From Centroid-Leg	4.00	0.000	0.000	113.00	2" Ice	1.26	0.27	0.05
			0.000	0.000			No Ice	0.60	0.07	0.01
			0.000	0.000			1/2" Ice	0.75	0.11	0.02
			0.000	0.000			1" Ice	0.91	0.16	0.02
Platform Mount [LP 1201-1_KCKR-HR-1]	C	None		0.000	0.000	113.00	2" Ice	1.26	0.27	0.05
				0.000			No Ice	37.61	37.61	2.63
				0.000			1/2" Ice	45.62	45.62	3.48
				0.000			1" Ice	53.59	53.59	4.46
**60** Side Arm Mount [SO 701-1]	A	From Leg	1.50	0.000	0.000	60.00	2" Ice	69.65	69.65	6.85
			0.000	0.000			No Ice	0.85	1.67	0.07
			0.000	0.000			1/2" Ice	1.14	2.34	0.08
						1" Ice	1.43	3.01	0.09	

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			ft ft ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
***					2" Ice	2.01	4.35	0.12

### Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				ft	°	°	ft	ft	ft <sup>2</sup>	K	
VHLP1-23	A	Paraboloid w/Shroud (HP)	From Centroid -Leg	4.00 0.000 -4.000	-64.000		155.00	1.27	No Ice 1/2" Ice 1" Ice 2" Ice	1.28 1.45 1.62 1.96	0.01 0.02 0.02 0.04
VHLP2.5-18	B	Paraboloid w/Shroud (HP)	From Centroid -Leg	4.00 0.000 -4.000	21.000		155.00	2.92	No Ice 1/2" Ice 1" Ice 2" Ice	6.68 7.07 7.45 8.23	0.05 0.08 0.12 0.19
VHLP2-11	C	Paraboloid w/Shroud (HP)	From Centroid -Leg	4.00 0.000 -4.000	13.000		155.00	2.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.72 4.01 4.30 4.88	0.03 0.05 0.07 0.11

### Load Combinations

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

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

### Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	155 - 115.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-42.55	-0.07	-0.84
			Max. Mx	8	-18.66	-456.32	-4.82
			Max. My	2	-18.65	4.24	454.82
			Max. Vy	8	21.92	-456.32	-4.82
			Max. Vx	2	-21.92	4.24	454.82
			Max. Torque	4			-0.82
L2	115.5 - 79.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-63.18	-1.21	0.45
			Max. Mx	8	-30.48	-1418.82	-10.52
			Max. My	2	-30.45	9.80	1422.43
			Max. Vy	8	29.22	-1418.82	-10.52
			Max. Vx	2	-29.39	9.80	1422.43
			Max. Torque	3			-1.22
L3	79.25 - 43.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-75.51	-0.65	-0.08
			Max. Mx	8	-40.44	-2479.10	-17.08
			Max. My	2	-40.43	16.13	2488.35
			Max. Vy	8	31.71	-2479.10	-17.08
			Max. Vx	2	-31.85	16.13	2488.35
			Max. Torque	13			1.30
L4	43.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-96.35	0.22	-1.48
			Max. Mx	8	-58.07	-4098.21	-26.29

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	2	-58.06	24.67	4113.69
			Max. Vy	8	34.05	-4098.21	-26.29
			Max. Vx	2	-34.18	24.67	4113.69
			Max. Torque	13			1.30

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	33	96.35	-0.03	-10.31
	Max. H <sub>x</sub>	20	58.11	33.96	0.23
	Max. H <sub>z</sub>	2	58.11	0.16	34.11
	Max. M <sub>x</sub>	2	4113.69	0.16	34.11
	Max. M <sub>z</sub>	8	4098.21	-33.99	-0.17
	Max. Torsion	13	1.30	-17.09	-29.51
	Min. Vert	23	43.58	29.50	17.15
	Min. H <sub>x</sub>	8	58.11	-33.99	-0.17
	Min. H <sub>z</sub>	14	58.11	-0.16	-34.05
	Min. M <sub>x</sub>	14	-4103.84	-0.16	-34.05
	Min. M <sub>z</sub>	20	-4093.90	33.96	0.23
	Min. Torsion	23	-1.28	29.50	17.15

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	48.42	0.00	0.00	0.15	-0.27	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	58.11	-0.16	-34.11	-4113.69	24.67	1.19
0.9 Dead+1.0 Wind 0 deg - No Ice	43.58	-0.16	-34.11	-4024.12	24.17	1.20
1.2 Dead+1.0 Wind 30 deg - No Ice	58.11	16.86	-29.50	-3555.63	-2028.21	0.87
0.9 Dead+1.0 Wind 30 deg - No Ice	43.58	16.86	-29.50	-3478.19	-1983.94	0.88
1.2 Dead+1.0 Wind 60 deg - No Ice	58.11	29.43	-16.89	-2030.56	-3549.32	0.10
0.9 Dead+1.0 Wind 60 deg - No Ice	43.58	29.43	-16.89	-1986.41	-3471.83	0.09
1.2 Dead+1.0 Wind 90 deg - No Ice	58.11	33.99	0.17	26.29	-4098.21	-0.75
0.9 Dead+1.0 Wind 90 deg - No Ice	43.58	33.99	0.17	25.62	-4008.79	-0.77
1.2 Dead+1.0 Wind 120 deg - No Ice	58.11	29.49	17.08	2059.39	-3557.16	-1.15
0.9 Dead+1.0 Wind 120 deg - No Ice	43.58	29.49	17.08	2014.51	-3479.50	-1.17
1.2 Dead+1.0 Wind 150 deg - No Ice	58.11	17.09	29.51	3556.80	-2063.66	-1.28
0.9 Dead+1.0 Wind 150 deg - No Ice	43.58	17.09	29.51	3479.31	-2018.54	-1.30

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Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
1.2 Dead+1.0 Wind 180 deg - No Ice	58.11	0.16	34.05	4103.84	-24.46	-1.13
0.9 Dead+1.0 Wind 180 deg - No Ice	43.58	0.16	34.05	4014.45	-23.76	-1.15
1.2 Dead+1.0 Wind 210 deg - No Ice	58.11	-16.87	29.45	3548.33	2030.06	-0.87
0.9 Dead+1.0 Wind 210 deg - No Ice	43.58	-16.87	29.45	3471.03	1985.95	-0.87
1.2 Dead+1.0 Wind 240 deg - No Ice	58.11	-29.35	16.90	2032.74	3535.43	-0.06
0.9 Dead+1.0 Wind 240 deg - No Ice	43.58	-29.35	16.90	1988.48	3458.49	-0.05
1.2 Dead+1.0 Wind 270 deg - No Ice	58.11	-33.96	-0.23	-37.00	4093.90	0.97
0.9 Dead+1.0 Wind 270 deg - No Ice	43.58	-33.96	-0.23	-36.12	4004.80	0.99
1.2 Dead+1.0 Wind 300 deg - No Ice	58.11	-29.50	-17.15	-2070.00	3558.02	1.26
0.9 Dead+1.0 Wind 300 deg - No Ice	43.58	-29.50	-17.15	-2024.92	3480.55	1.28
1.2 Dead+1.0 Wind 330 deg - No Ice	58.11	-17.13	-29.57	-3566.55	2070.31	1.25
0.9 Dead+1.0 Wind 330 deg - No Ice	43.58	-17.13	-29.57	-3488.88	2025.24	1.27
1.2 Dead+1.0 Ice+1.0 Temp	96.35	0.00	0.00	1.48	0.22	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	96.35	-0.03	-10.32	-1341.90	5.78	0.25
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	96.35	5.12	-8.93	-1160.34	-665.67	0.16
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	96.35	8.92	-5.12	-663.96	-1161.48	-0.02
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	96.35	10.30	0.04	7.66	-1340.98	-0.21
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	96.35	8.93	5.16	673.74	-1163.27	-0.29
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	96.35	5.17	8.93	1163.60	-673.97	-0.29
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	96.35	0.03	10.31	1342.61	-5.74	-0.24
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	96.35	-5.13	8.92	1161.58	666.21	-0.16
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	96.35	-8.90	5.13	667.52	1158.15	0.03
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	96.35	-10.30	-0.05	-7.14	1339.87	0.25
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	96.35	-8.94	-5.18	-673.18	1163.42	0.31
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	96.35	-5.18	-8.94	-1162.82	675.57	0.29
Dead+Wind 0 deg - Service	48.42	-0.04	-8.31	-990.73	5.69	0.30
Dead+Wind 30 deg - Service	48.42	4.11	-7.19	-856.32	-488.76	0.22
Dead+Wind 60 deg - Service	48.42	7.17	-4.11	-489.00	-855.12	0.02
Dead+Wind 90 deg - Service	48.42	8.28	0.04	6.41	-987.31	-0.19
Dead+Wind 120 deg - Service	48.42	7.18	4.16	496.13	-857.04	-0.29
Dead+Wind 150 deg - Service	48.42	4.16	7.19	856.81	-497.30	-0.32
Dead+Wind 180 deg - Service	48.42	0.04	8.30	988.52	-6.12	-0.28
Dead+Wind 210 deg - Service	48.42	-4.11	7.17	854.74	488.72	-0.22
Dead+Wind 240 deg - Service	48.42	-7.15	4.12	489.69	851.29	-0.01
Dead+Wind 270 deg - Service	48.42	-8.27	-0.06	-8.81	985.79	0.24
Dead+Wind 300 deg - Service	48.42	-7.19	-4.18	-498.52	856.78	0.32
Dead+Wind 330 deg - Service	48.42	-4.17	-7.20	-859.00	498.43	0.32

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## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-48.42	0.00	0.00	48.42	0.00	0.000%
2	-0.16	-58.11	-34.11	0.16	58.11	34.11	0.000%
3	-0.16	-43.58	-34.11	0.16	43.58	34.11	0.000%
4	16.86	-58.11	-29.50	-16.86	58.11	29.50	0.000%
5	16.86	-43.58	-29.50	-16.86	43.58	29.50	0.000%
6	29.43	-58.11	-16.89	-29.43	58.11	16.89	0.000%
7	29.43	-43.58	-16.89	-29.43	43.58	16.89	0.000%
8	33.99	-58.11	0.17	-33.99	58.11	-0.17	0.000%
9	33.99	-43.58	0.17	-33.99	43.58	-0.17	0.000%
10	29.49	-58.11	17.08	-29.49	58.11	-17.08	0.000%
11	29.49	-43.58	17.08	-29.49	43.58	-17.08	0.000%
12	17.09	-58.11	29.51	-17.09	58.11	-29.51	0.000%
13	17.09	-43.58	29.51	-17.09	43.58	-29.51	0.000%
14	0.16	-58.11	34.05	-0.16	58.11	-34.05	0.000%
15	0.16	-43.58	34.05	-0.16	43.58	-34.05	0.000%
16	-16.87	-58.11	29.45	16.87	58.11	-29.45	0.000%
17	-16.87	-43.58	29.45	16.87	43.58	-29.45	0.000%
18	-29.35	-58.11	16.90	29.35	58.11	-16.90	0.000%
19	-29.35	-43.58	16.90	29.35	43.58	-16.90	0.000%
20	-33.96	-58.11	-0.23	33.96	58.11	0.23	0.000%
21	-33.96	-43.58	-0.23	33.96	43.58	0.23	0.000%
22	-29.50	-58.11	-17.15	29.50	58.11	17.15	0.000%
23	-29.50	-43.58	-17.15	29.50	43.58	17.15	0.000%
24	-17.13	-58.11	-29.57	17.13	58.11	29.57	0.000%
25	-17.13	-43.58	-29.57	17.13	43.58	29.57	0.000%
26	0.00	-96.35	0.00	0.00	96.35	0.00	0.000%
27	-0.03	-96.35	-10.32	0.03	96.35	10.32	0.000%
28	5.12	-96.35	-8.93	-5.12	96.35	8.93	0.000%
29	8.92	-96.35	-5.12	-8.92	96.35	5.12	0.000%
30	10.30	-96.35	0.04	-10.30	96.35	-0.04	0.000%
31	8.93	-96.35	5.16	-8.93	96.35	-5.16	0.000%
32	5.17	-96.35	8.93	-5.17	96.35	-8.93	0.000%
33	0.03	-96.35	10.31	-0.03	96.35	-10.31	0.000%
34	-5.13	-96.35	8.92	5.13	96.35	-8.92	0.000%
35	-8.90	-96.35	5.13	8.90	96.35	-5.13	0.000%
36	-10.30	-96.35	-0.05	10.30	96.35	0.05	0.000%
37	-8.94	-96.35	-5.18	8.94	96.35	5.18	0.000%
38	-5.18	-96.35	-8.94	5.18	96.35	8.94	0.000%
39	-0.04	-48.42	-8.31	0.04	48.42	8.31	0.000%
40	4.11	-48.42	-7.19	-4.11	48.42	7.19	0.000%
41	7.17	-48.42	-4.11	-7.17	48.42	4.11	0.000%
42	8.28	-48.42	0.04	-8.28	48.42	-0.04	0.000%
43	7.18	-48.42	4.16	-7.18	48.42	-4.16	0.000%
44	4.16	-48.42	7.19	-4.16	48.42	-7.19	0.000%
45	0.04	-48.42	8.30	-0.04	48.42	-8.30	0.000%
46	-4.11	-48.42	7.17	4.11	48.42	-7.17	0.000%
47	-7.15	-48.42	4.12	7.15	48.42	-4.12	0.000%
48	-8.27	-48.42	-0.06	8.27	48.42	0.06	0.000%
49	-7.19	-48.42	-4.18	7.19	48.42	4.18	0.000%
50	-4.17	-48.42	-7.20	4.17	48.42	7.20	0.000%

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	<b>Client</b> Crown Castle	<b>Designed by</b> AW

## Non-Linear Convergence Results

<i>Load Combination</i>	<i>Converged?</i>	<i>Number of Cycles</i>	<i>Displacement Tolerance</i>	<i>Force Tolerance</i>
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00013576
3	Yes	5	0.00000001	0.00005348
4	Yes	7	0.00000001	0.00019170
5	Yes	6	0.00000001	0.00064661
6	Yes	7	0.00000001	0.00018929
7	Yes	6	0.00000001	0.00063799
8	Yes	5	0.00000001	0.00022970
9	Yes	5	0.00000001	0.00009056
10	Yes	7	0.00000001	0.00019000
11	Yes	6	0.00000001	0.00063927
12	Yes	7	0.00000001	0.00019417
13	Yes	6	0.00000001	0.00065457
14	Yes	5	0.00000001	0.00074970
15	Yes	5	0.00000001	0.00034876
16	Yes	7	0.00000001	0.00018752
17	Yes	6	0.00000001	0.00063167
18	Yes	7	0.00000001	0.00018959
19	Yes	6	0.00000001	0.00063946
20	Yes	5	0.00000001	0.00083157
21	Yes	5	0.00000001	0.00038493
22	Yes	7	0.00000001	0.00019472
23	Yes	6	0.00000001	0.00065640
24	Yes	7	0.00000001	0.00019061
25	Yes	6	0.00000001	0.00064089
26	Yes	4	0.00000001	0.00000001
27	Yes	6	0.00006794	0.00066037
28	Yes	7	0.00000001	0.00031091
29	Yes	7	0.00000001	0.00030889
30	Yes	6	0.00006795	0.00066030
31	Yes	7	0.00000001	0.00031146
32	Yes	7	0.00000001	0.00031553
33	Yes	6	0.00006793	0.00066030
34	Yes	7	0.00000001	0.00030610
35	Yes	7	0.00000001	0.00030712
36	Yes	6	0.00006794	0.00065885
37	Yes	7	0.00000001	0.00031478
38	Yes	7	0.00000001	0.00031159
39	Yes	4	0.00000001	0.00059421
40	Yes	5	0.00000001	0.00037302
41	Yes	5	0.00000001	0.00035971
42	Yes	4	0.00000001	0.00055220
43	Yes	5	0.00000001	0.00035997
44	Yes	5	0.00000001	0.00038232
45	Yes	4	0.00000001	0.00063633
46	Yes	5	0.00000001	0.00034949
47	Yes	5	0.00000001	0.00035978
48	Yes	4	0.00000001	0.00061185
49	Yes	5	0.00000001	0.00038338
50	Yes	5	0.00000001	0.00036203

## Maximum Tower Deflections - Service Wind



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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	37.723	50	2.056	0.003
L2	119.25 - 79.25	22.861	50	1.830	0.002
L3	83.75 - 43.75	11.072	50	1.278	0.001
L4	49 - 0	3.729	50	0.706	0.000

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	APXVTM14-C-120 w/ Mount Pipe	50	37.723	2.056	0.003	32232
153.00	800MHz 2X50W RRH W/FILTER	50	36.860	2.048	0.003	32232
151.00	VHLP1-23	50	35.997	2.040	0.003	32232
143.00	AIR 6419 B77G w/ Mount Pipe	50	32.565	2.005	0.002	13430
133.00	AIR -32 B2A/B66AA w/ Mount Pipe	50	28.361	1.949	0.002	7324
123.00	MX08FRO665-21 w/ Mount Pipe	50	24.319	1.869	0.002	5036
113.00	LNx-6512DS-T0M w/ Mount Pipe	50	20.514	1.753	0.002	4283
60.00	Side Arm Mount [SO 701-1]	50	5.552	0.879	0.000	3065

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	156.467	24	8.566	0.012
L2	119.25 - 79.25	94.913	24	7.620	0.007
L3	83.75 - 43.75	46.009	24	5.320	0.003
L4	49 - 0	15.496	24	2.935	0.001

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	APXVTM14-C-120 w/ Mount Pipe	24	156.467	8.566	0.012	8072
153.00	800MHz 2X50W RRH W/FILTER	24	152.893	8.533	0.012	8072
151.00	VHLP1-23	24	149.322	8.499	0.012	8072
143.00	AIR 6419 B77G w/ Mount Pipe	24	135.112	8.354	0.011	3361
133.00	AIR -32 B2A/B66AA w/ Mount Pipe	24	117.698	8.119	0.009	1830
123.00	MX08FRO665-21 w/ Mount Pipe	24	100.956	7.783	0.008	1255
113.00	LNx-6512DS-T0M w/ Mount Pipe	24	85.183	7.301	0.007	1062
60.00	Side Arm Mount [SO 701-1]	24	23.076	3.659	0.002	743

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## Compression Checks

## Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
L1	155 - 115.5 (1)	TP29.308x22x0.25	39.50	0.00	0.0	22.507	-18.64	1215.38	0.015
L2	115.5 - 79.25 (2)	TP35.514x28.114x0.313	40.00	0.00	0.0	34.090	-30.44	1994.25	0.015
L3	79.25 - 43.75 (3)	TP41.456x34.057x0.375	40.00	0.00	0.0	47.741	-40.42	2792.83	0.014
L4	43.75 - 0 (4)	TP48.8x39.735x0.438	49.00	0.00	0.0	67.157	-58.06	3928.71	0.015

## Pole Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>rx</sub> kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	M <sub>uy</sub> kip-ft	φM <sub>ny</sub> kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	155 - 115.5 (1)	TP29.308x22x0.25	458.02	867.63	0.528	0.00	867.63	0.000
L2	115.5 - 79.25 (2)	TP35.514x28.114x0.313	1426.77	1720.89	0.829	0.00	1720.89	0.000
L3	79.25 - 43.75 (3)	TP41.456x34.057x0.375	2495.04	2833.97	0.880	0.00	2833.97	0.000
L4	43.75 - 0 (4)	TP48.8x39.735x0.438	4123.88	4763.74	0.866	0.00	4763.74	0.000

## Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V <sub>u</sub> K	φV <sub>n</sub> K	Ratio $\frac{V_u}{\phi V_n}$	Actual T <sub>u</sub> kip-ft	φT <sub>n</sub> kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	155 - 115.5 (1)	TP29.308x22x0.25	22.00	364.61	0.060	0.40	905.70	0.000
L2	115.5 - 79.25 (2)	TP35.514x28.114x0.313	29.45	598.28	0.049	1.16	1800.73	0.001
L3	79.25 - 43.75 (3)	TP41.456x34.057x0.375	31.91	837.85	0.038	1.25	2943.04	0.000
L4	43.75 - 0 (4)	TP48.8x39.735x0.438	34.25	1178.61	0.029	1.25	4991.82	0.000

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### Pole Interaction Design Data

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_u$	$M_{ux}$	$M_{uy}$	$V_u$	$T_u$			
L1	155 - 115.5 (1)	0.015	0.528	0.000	0.060	0.000	0.547	1.050	4.8.2
L2	115.5 - 79.25 (2)	0.015	0.829	0.000	0.049	0.001	0.847	1.050	4.8.2
L3	79.25 - 43.75 (3)	0.014	0.880	0.000	0.038	0.000	0.896	1.050	4.8.2
L4	43.75 - 0 (4)	0.015	0.866	0.000	0.029	0.000	0.881	1.050	4.8.2

### Section Capacity Table

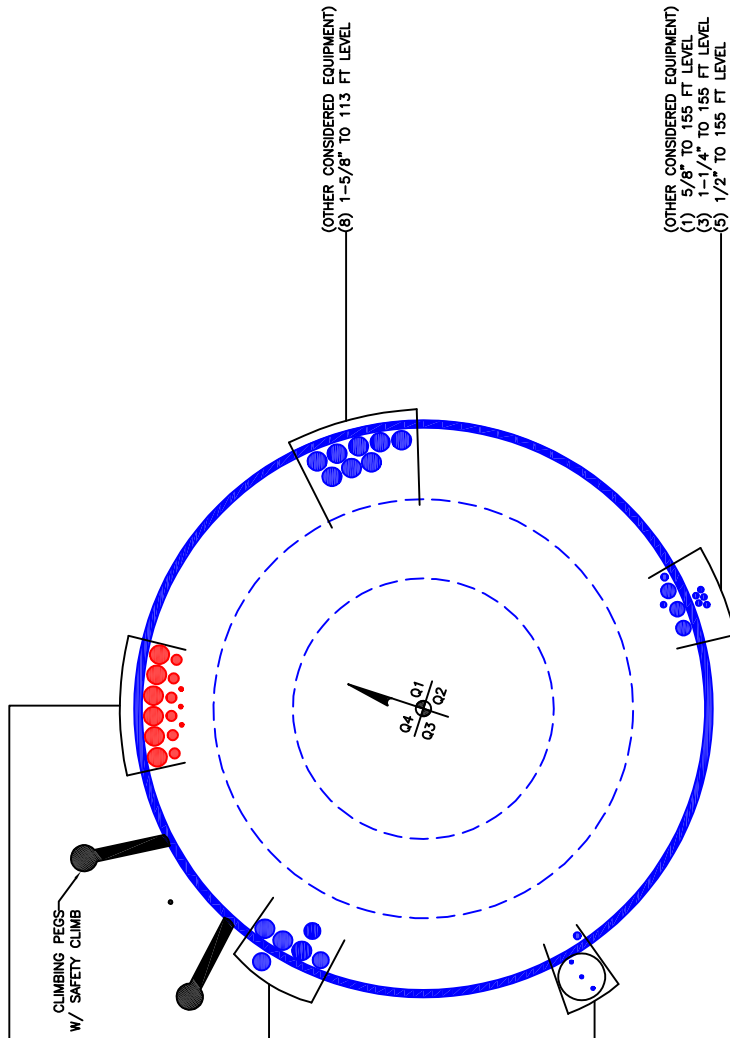
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail
L1	155 - 115.5	Pole	TP29.308x22x0.25	1	-18.64	1276.15	52.1	Pass
L2	115.5 - 79.25	Pole	TP35.514x28.114x0.313	2	-30.44	2093.96	80.7	Pass
L3	79.25 - 43.75	Pole	TP41.456x34.057x0.375	3	-40.42	2932.47	85.4	Pass
L4	43.75 - 0	Pole	TP48.8x39.735x0.438	4	-58.06	4125.15	83.9	Pass
<b>Summary</b>								
Pole (L3)							85.4	Pass
<b>RATING =</b>							<b>85.4</b>	<b>Pass</b>

**APPENDIX B**  
**BASE LEVEL DRAWING**



**(PROPOSED EQUIPMENT CONFIGURATION)**

- (3) 3/8" TO 143 FT LEVEL
- (6) 7/8" TO 143 FT LEVEL
- (6) 1-5/8" TO 143 FT LEVEL



CLIMBING RECS-  
W/ SAFETY CLIMB

**(OTHER CONSIDERED EQUIPMENT)**

- (1) 1-1/2" TO 123 FT LEVEL
- (2) 1-3/8" TO 133 FT LEVEL
- (3) 1-5/8" TO 133 FT LEVEL

**(OTHER CONSIDERED EQUIPMENT)**  
(6) 1-5/8" TO 113 FT LEVEL

**(OTHER CONSIDERED EQUIPMENT-IN CONDUIT)**

- (3) 5/16" TO 155 FT LEVEL
- (OTHER CONSIDERED EQUIPMENT)
- (1) 5/8" TO 155 FT LEVEL

**(OTHER CONSIDERED EQUIPMENT)**  
(1) 5/8" TO 155 FT LEVEL  
(3) 1-1/4" TO 155 FT LEVEL  
(5) 1/2" TO 155 FT LEVEL

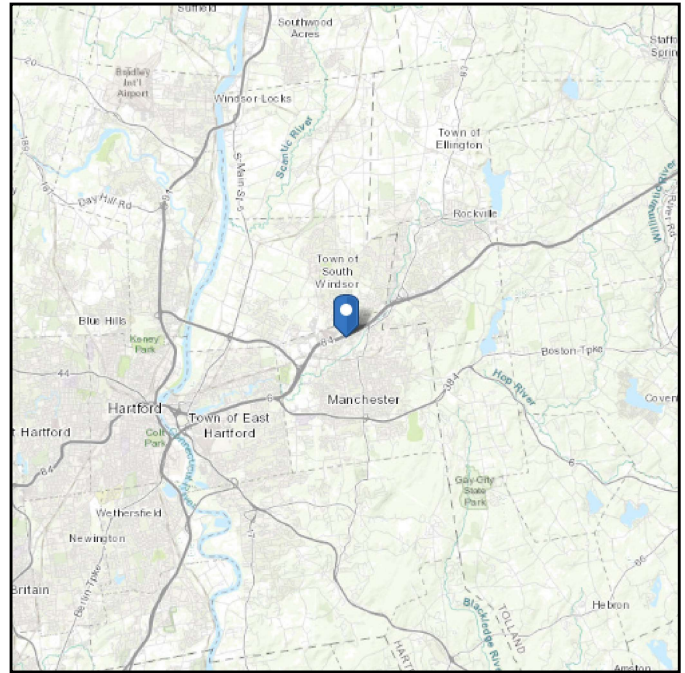
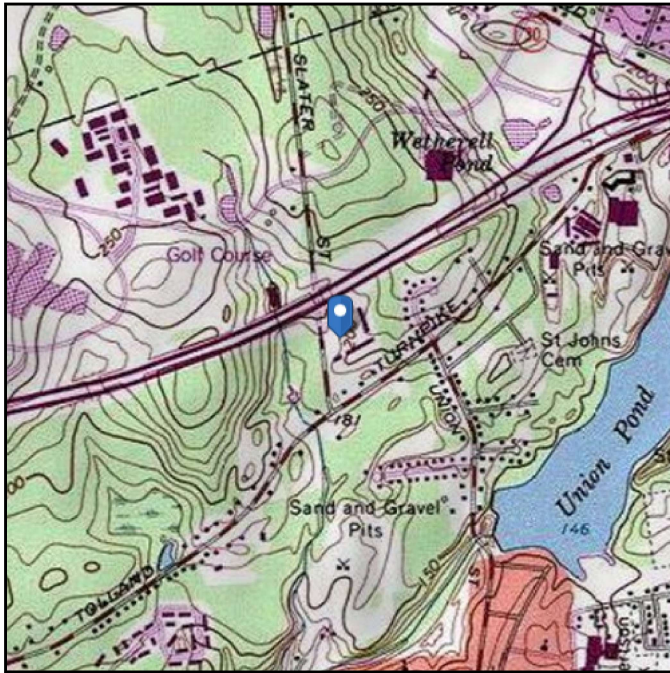
**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

# ASCE 7 Hazards Report

**Address:**  
No Address at This  
Location

**Standard:** ASCE/SEI 7-16  
**Risk Category:** II  
**Soil Class:** D - Default (see  
Section 11.4.3)

**Elevation:** 195.5 ft (NAVD 88)  
**Latitude:** 41.805  
**Longitude:** -72.533611



## Wind

### Results:

Wind Speed:	118 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	98 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2  
Date Accessed: Thu Oct 07 2021

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

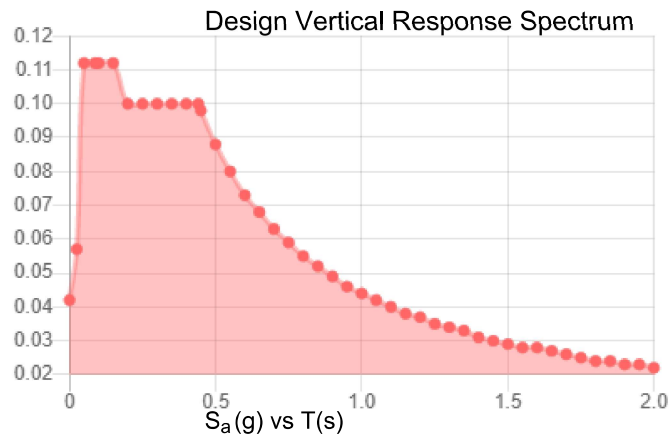
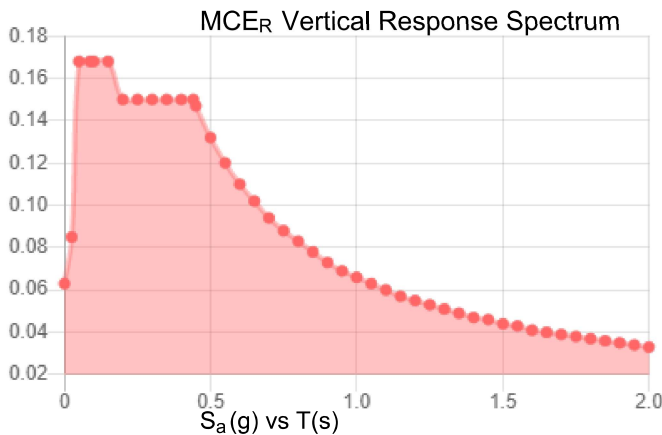
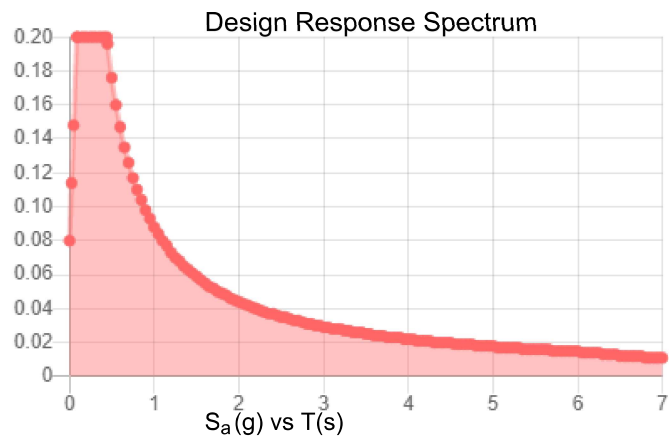
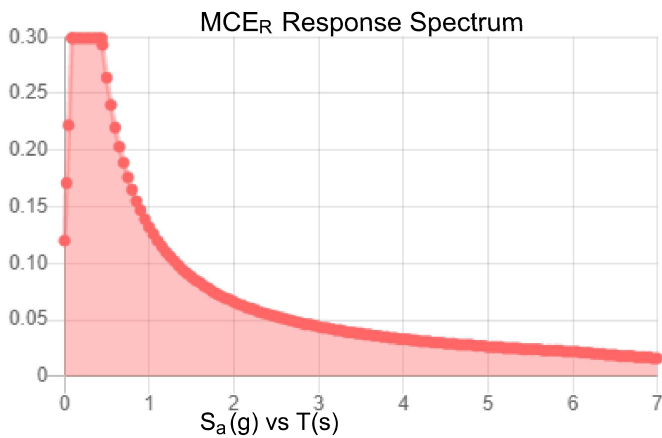
Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

**Site Soil Class:** D - Default (see Section 11.4.3)

**Results:**

$S_s$ :	0.187	$S_{D1}$ :	0.088
$S_1$ :	0.055	$T_L$ :	6
$F_a$ :	1.6	PGA :	0.1
$F_v$ :	2.4	PGA <sub>M</sub> :	0.161
$S_{MS}$ :	0.299	$F_{PGA}$ :	1.599
$S_{M1}$ :	0.132	$I_e$ :	1
$S_{DS}$ :	0.2	$C_v$ :	0.7

**Seismic Design Category** B



**Data Accessed:**

Thu Oct 07 2021

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-18 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.



## Ice

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### Results:

Ice Thickness: 1.50 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

**Data Source:** Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8

**Date Accessed:** Thu Oct 07 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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# Monopole Base Plate Connection

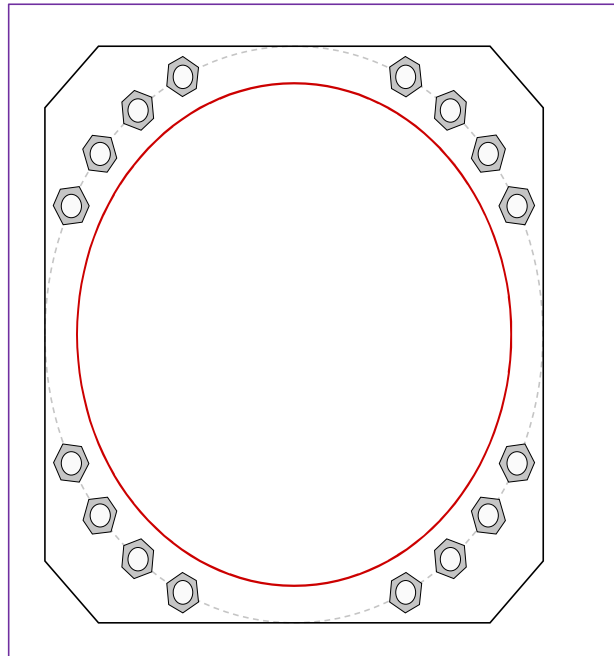


Site Info	
BU #	876347
Site Name	Buckland Mall
Order #	556512 Rev. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
$l_{ar}$ (in)	0.75

Applied Loads	
Moment (kip-ft)	4123.89
Axial Force (kips)	58.06
Shear Force (kips)	34.25

\*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
-----------------------	------------------

Anchor Rod Data
(16) 2-1/4" $\phi$ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 56" BC <i>Anchor Spacing: 6 in</i>
Base Plate Data
56" W x 3.25" Plate (A572-50; $F_y=50$ ksi, $F_u=65$ ksi); Clip: 6 in
Stiffener Data
N/A
Pole Data
48.8" x 0.4375" 18-sided pole (A607-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary	<i>(units of kips, kip-in)</i>	
$P_{u,t} = 217.15$	$\phi P_{n,t} = 243.75$	<b>Stress Rating</b>
$V_u = 2.14$	$\phi V_n = 149.1$	<b>84.8%</b>
$M_u = n/a$	$\phi M_n = n/a$	<b>Pass</b>
Base Plate Summary		
Max Stress (ksi):	30.59	(Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	<b>64.7%</b>	<b>Pass</b>

# Pier and Pad Foundation



BU #: 876347  
 Site Name: Buckland Mall  
 App. Number: 556512 Rev. 0

TIA-222 Revision: H  
 Tower Type: Monopole

Top & Bot. Pad Rein. Different?:   
 Block Foundation?:   
 Rectangular Pad?:

Superstructure Analysis Reactions		
Compression, $P_{comp}$ :	58.11	kips
Base Shear, $V_{u\_comp}$ :	34.17	kips
Moment, $M_u$ :	4123.89	ft-kips
Tower Height, $H$ :	155	ft
BP Dist. Above Fdn, $bp_{dist}$ :	3	in

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	406.17	34.17	8.0%	Pass
Bearing Pressure (ksf)	23.36	3.19	13.7%	Pass
Overturning (kip*ft)	8535.41	4491.22	52.6%	Pass
Pier Flexure (Comp.) (kip*ft)	7589.39	4380.17	55.0%	Pass
Pier Compression (kip)	23390.64	124.26	0.5%	Pass
Pad Flexure (kip*ft)	4568.38	1601.90	33.4%	Pass
Pad Shear - 1-way (kips)	709.93	268.82	36.1%	Pass
Pad Shear - 2-way (Comp) (ksi)	0.164	0.045	25.8%	Pass
Flexural 2-way (Comp) (kip*ft)	6333.75	2628.10	39.5%	Pass

Pier Properties		
Pier Shape:	Square	
Pier Diameter, $dpier$ :	7	ft
Ext. Above Grade, $E$ :	0.5	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

\*Rating per TIA-222-H Section 15.5

Structural Rating*:	55.0%
Soil Rating*:	52.6%

Pad Properties		
Depth, $D$ :	10	ft
Pad Width, $W_1$ :	23	ft
Pad Thickness, $T$ :	3	ft
Pad Rebar Size (Bottom dir. 2), $Sp_2$ :	9	
Pad Rebar Quantity (Bottom dir. 2), $mp_2$ :	34	
Pad Clear Cover, $cc_{pad}$ :	3	in

Material Properties		
Rebar Grade, $F_y$ :	60	ksi
Concrete Compressive Strength, $F'_c$ :	3	ksi
Dry Concrete Density, $\delta_c$ :	150	pcf

Soil Properties		
Total Soil Unit Weight, $\gamma$ :	115	pcf
Ultimate Net Bearing, $Q_{net}$ :	30,000	ksf
Cohesion, $C_u$ :	0.000	ksf
Friction Angle, $\phi$ :	30	degrees
SPT Blow Count, $N_{blows}$ :	15	
Base Friction, $\mu$ :	0.45	
Neglected Depth, $N$ :	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, $gw$ :	N/A	ft

<--Toggle between Gross and Net

# Exhibit E

## **Mount Analysis**

Date: **May 4, 2020**

Kevin Morrow  
Crown Castle  
3530 Toringdon Way, Suite 300  
Charlotte, NC 28277  
(704) 405-6607

 **MASER CONSULTING**  
— CONNECTICUT —  
Maser Consulting Connecticut  
2000 Midlantic Drive, Ste 100  
Mt. Laurel, NJ 08054  
(732) 383-1950  
CrownStructural@maserconsulting.com

**Subject:** **Mount Analysis Report**

**Carrier Designation:** **AT&T Mobility Equipment Change Out**  
**Carrier FA Number:** 10071100  
**Carrier Site Number:** CTV5207  
**Carrier Site Name:** Manchester North

**Crown Castle Designation:** **Crown Castle BU Number:** 876347  
**Crown Castle Site Name:** Buckland Mall  
**Crown Castle JDE Job Number:** 546297  
**Crown Castle PO Number:** 1523774  
**Crown Castle Order Number:** 469372 Rev. 1

**Engineering Firm Designation:** **Maser Consulting Connecticut Project Number:** 19922054A

**Site Data:** **53 Slater Street, Manchester, CT 06040, Hartford County**  
**Latitude 41° 48' 18.00", Longitude -72° 32' 1.00"**

**Structure Information:** **Tower Height & Type:** **155 ft Monopole**  
**Mount Elevation:** **143 ft**  
**Mount Type:** **(3) 8' Modified T-Arm**

Dear Mr. Morrow,

Maser Consulting Connecticut is pleased to submit this "**Mount Analysis Report**" to determine the structural integrity of AT&T Mobility's antenna mounting system with the proposed appurtenance and equipment addition on the above mentioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

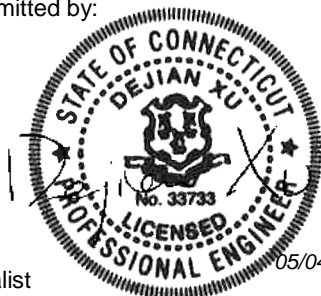
8' Modified T-Arm Mount (typical)

**Sufficient**

This analysis has been performed in accordance with the TIA-222-H Standard based upon an ultimate 3-second gust wind speed of 118 mph. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Grant Walters

Respectfully submitted by:



Dejian Xu, PE  
Technical Specialist

05/04/2020

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### 1) INTRODUCTION

This is a modified 3 - sector 8' Modified T-Arm Mount mapped by Tower Engineering Professionals.

The mount has been modified per reinforcement drawings prepared by Maser Consulting Connecticut, in March of 2019. Reinforcement consists of installation of new tieback members.

This mount is installed at the 143 ft elevation, on the 155 ft Monopole.

### 2) ANALYSIS CRITERIA

<b>TIA-222 Revision:</b>	TIA-222-H
<b>Risk Category:</b>	II
<b>Wind Speed:</b>	118 mph (Ultimate 3-sec Gust)
<b>Exposure Category:</b>	C
<b>Mean Base Elevation (AMSL):</b>	195.35 ft
<b>Topographic Factor (K<sub>zt</sub>):</b>	1.0
<b>Ice Thickness:</b>	1.5 in
<b>Wind Speed with Ice:</b>	50 mph
<b>Live Loading Wind Speed:</b>	30 mph
<b>Man Live Load at Mid/End-Points:</b>	250 lb
<b>Man Live Load at Mount Pipes:</b>	500 lb

**Table 1 - Proposed Equipment Configuration**

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
143.0	145.0	3	CCI	OPA-65R-LCUU-H6	Modified T-Arm
		3	Kathrein	80010965	
		3	Quintel	QS66512-2	
		6	CCI	TPX-070821	
		3	Ericsson	RRUS 32	
		3	Ericsson	RRUS 4449 B5/B12	
		3	Ericsson	RRUS 8843 B2/B66A	
		3	Ericsson	RRUS E2 B29	
		3	Kathrein	782 10253	
		3	Raycap	DC6-48-60-18-8F	

### 3) ANALYSIS PROCEDURE

**Table 2 - Documents Provided**

Document	Remarks	Reference	Source
Mount Mapping	Tower Engineering Professionals Job Number: 70024-50822, dated 06/21/16	-	Maser Consulting Connecticut
Radio Frequency Data Sheet	RFDS ID: 2589693, Version 3.00, dated 02/04/19	-	Crown Castle
Mount Modification	Maser Consulting Connecticut Project Number: 19922054A dated: 03/22/19	-	Maser Consulting Connecticut

### 3.1) Analysis Method

RISA-3D (version 17), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

Proprietary Excel sheets were used to calculate member loading for various load cases. Selected output from the analysis is included in Appendix B.

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Tower Mount Analysis* (Revision C). In addition, this analysis is in accordance with AT&T's Mount Technical Directive.

### 3.2) Assumptions

- 1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
- 2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
- 3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
- 4) The connection from the tower to the mount is in good condition and has been analyzed and found sufficient assuming it will achieve its theoretical strength.
- 5) The connection from the mast pipe to the mount standoff is assumed adequately tightened and in good condition.
- 6) Due to site specific analysis parameters, it is assumed that wind forces will control over seismic forces and as such, seismic forces have not been considered in this analysis.
- 7) Equipment installations are only conducted when the wind speed is less than 30 mph.
- 8) Proposed antennas are assumed to have associated equipment installed on the same mount pipe unless explicitly stated otherwise in the 'Recommendations' section of this report.
- 9) Proposed loading is assumed to be installed in the location shown in Appendix A of this report. Any changes made to the proposed loading location will render this report invalid.
- 10) If applicable, steel grades have been assumed as follows:

HSS (Rectangular)	ASTM 500 (GR B-46)
Pipe	ASTM A53 (GR 35)
Bolts	ASTM A325
U-Bolts	SAE J429 GR 2

- 11) Standoff arm connection weld size assumed to be 7/16" thick (1/16" less than the thickness of the standoff arm member).
- 12) This analysis considered an 8' long face horizontal member per vendor direction.

Discrepancies between in-field conditions and the assumptions listed above may render this analysis invalid unless explicitly approved by Maser Consulting Connecticut Crown Castle should be notified to determine the effect on the structural integrity of the antenna mounting system.



**4) ANALYSIS RESULTS**

**Table 3 - Mount Component Stresses vs. Capacity (Modified T-Arm)**

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1,2,4	Mast Pipe	M23A	143.0	0.1	Pass
1,2,4	Face Horizontal	M43		43.8	Pass
1,2,4	Standoff Horizontal	M1		38.1	Pass
1,2,4	Mount Pipe	M35		58.4	Pass
1,2,4	Tie Back	M60		3.6	Pass
1,2,4	Empty Mount Pipe	M45		20.8	Pass
1,3,4	Mount Connection	-		83.0	Pass

<b>Structure Rating (max from all components) =</b>	<b>83.0%</b>
---	--------------

Notes:

- 1) See additional documentation in "Appendix B – Software Input Calculations" for calculations supporting the % capacity consumed
- 2) See additional documentation in "Appendix C – Analysis Output" for calculations supporting the % capacity consumed
- 3) See additional documentation in "Appendix D – Additional Calculations" for calculations supporting the % capacity consumed
- 4) All sectors are typical

**4.1) Recommendations**

The mounts are **sufficient** for the proposed loads and do not require modifications.

## 5) DISCLAIMER OF WARRANTIES

The engineering services rendered by Maser Consulting Connecticut in connection with this structural analysis are limited to a computer analysis of the mounting frame structure and theoretical capacity of its main structural members. No allowance has been made for any damaged, bent, missing, loose, or rusted members or connections.

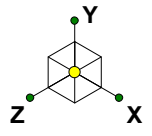
Maser Consulting Connecticut will accept no liability which may arise due to any existing deficiency in design, material, fabrication, erection, construction, or lack of maintenance. Maser Consulting Connecticut has not performed a site visit at the aforementioned facility to verify member sizes or equipment loading. Contractor should inspect the condition of the existing structure, mounting frames and connections and notify Maser Consulting Connecticut of any discrepancies or deficiencies before proceeding with installation.

The attached sketch is a schematic representation of the analyzed mounting frames. The contractor shall be responsible for field verifying the existing conditions, proper fit, and clearances in the field. Any mention of structural modifications are reasonable estimates and should not be used as a construction document. Construction documents depicting the required modification are obtainable from Maser Consulting Connecticut, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as part of our work. We recommend that material of suitable size and strength be purchased from a reputable manufacturer.

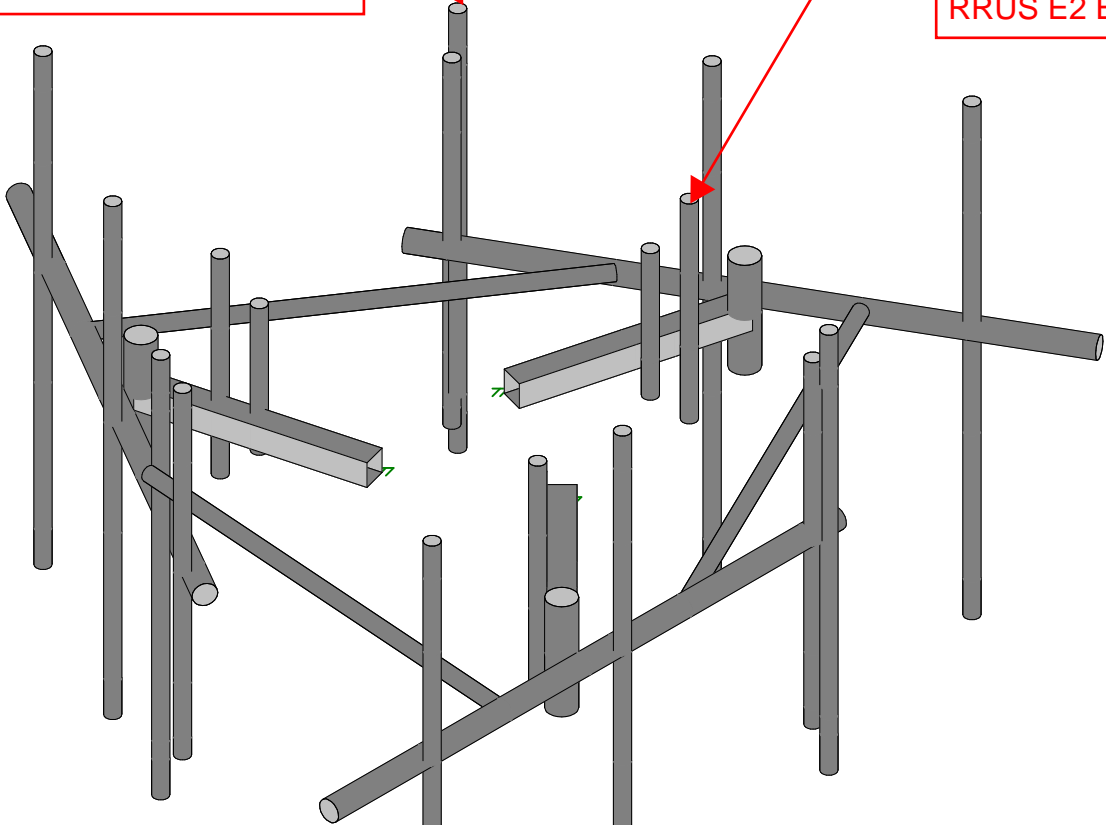
Maser Consulting Connecticut makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of the mounting frames. Maser Consulting Connecticut will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report.

**APPENDIX A**  
**WIRE FRAME AND RENDERED MODELS**



**PROPOSED**  
OPA-65R-LCUU-H6 ANTENNA  
TPX-070821  
782 10253

**PROPOSED**  
RRUS E2 B29

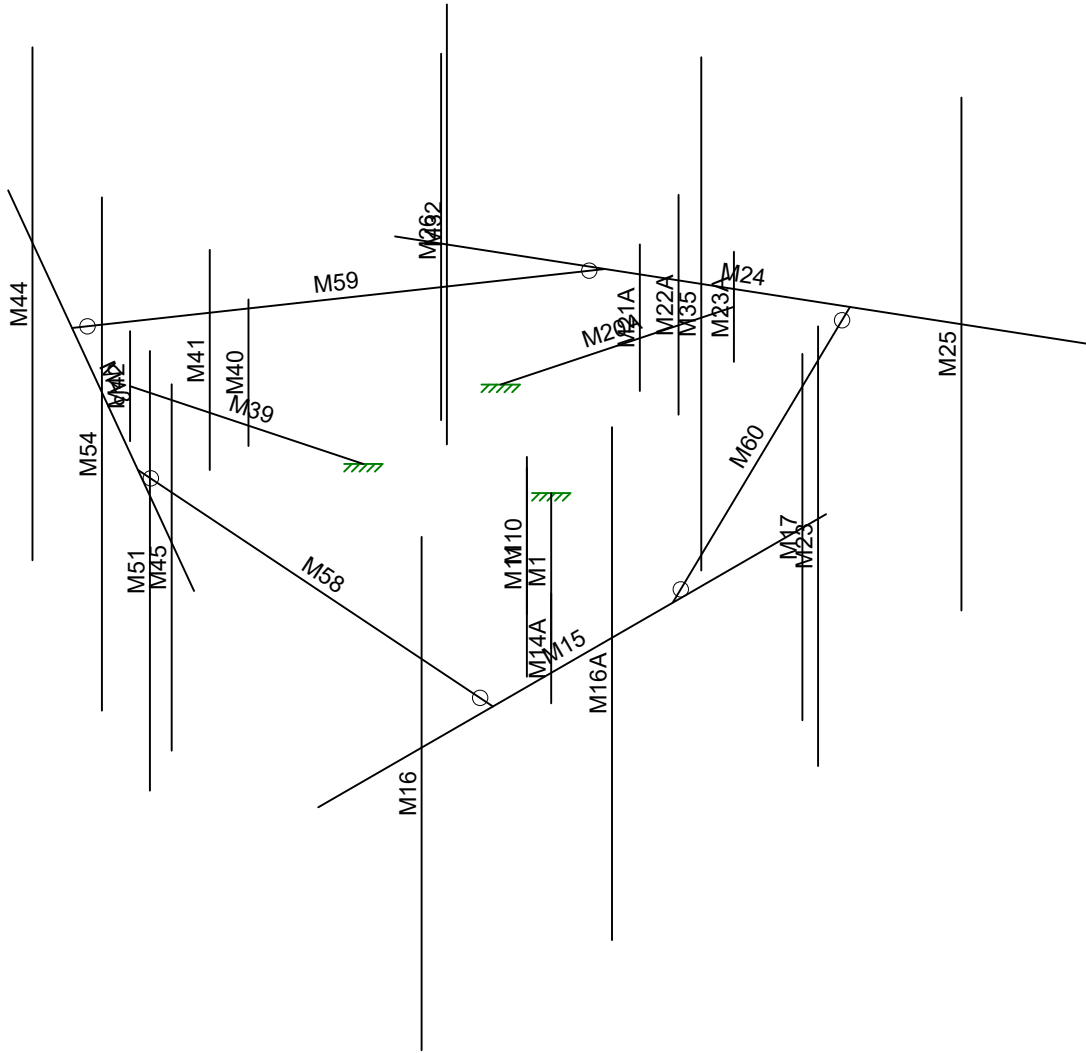
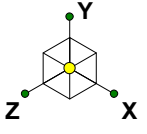


**PROPOSED**  
80010965 ANTENNA  
RRUS B5/12  
RRUS B25/66

**PROPOSED**  
QS66512-12 ANTENNA  
RRUS 32  
DC6

Envelope Only Solution

Maser Consulting Connect...	Mount Analysis	May 4, 2020 at 9:19 AM
GHW		Antenna Mount - LOADED.r3d
19922054A		



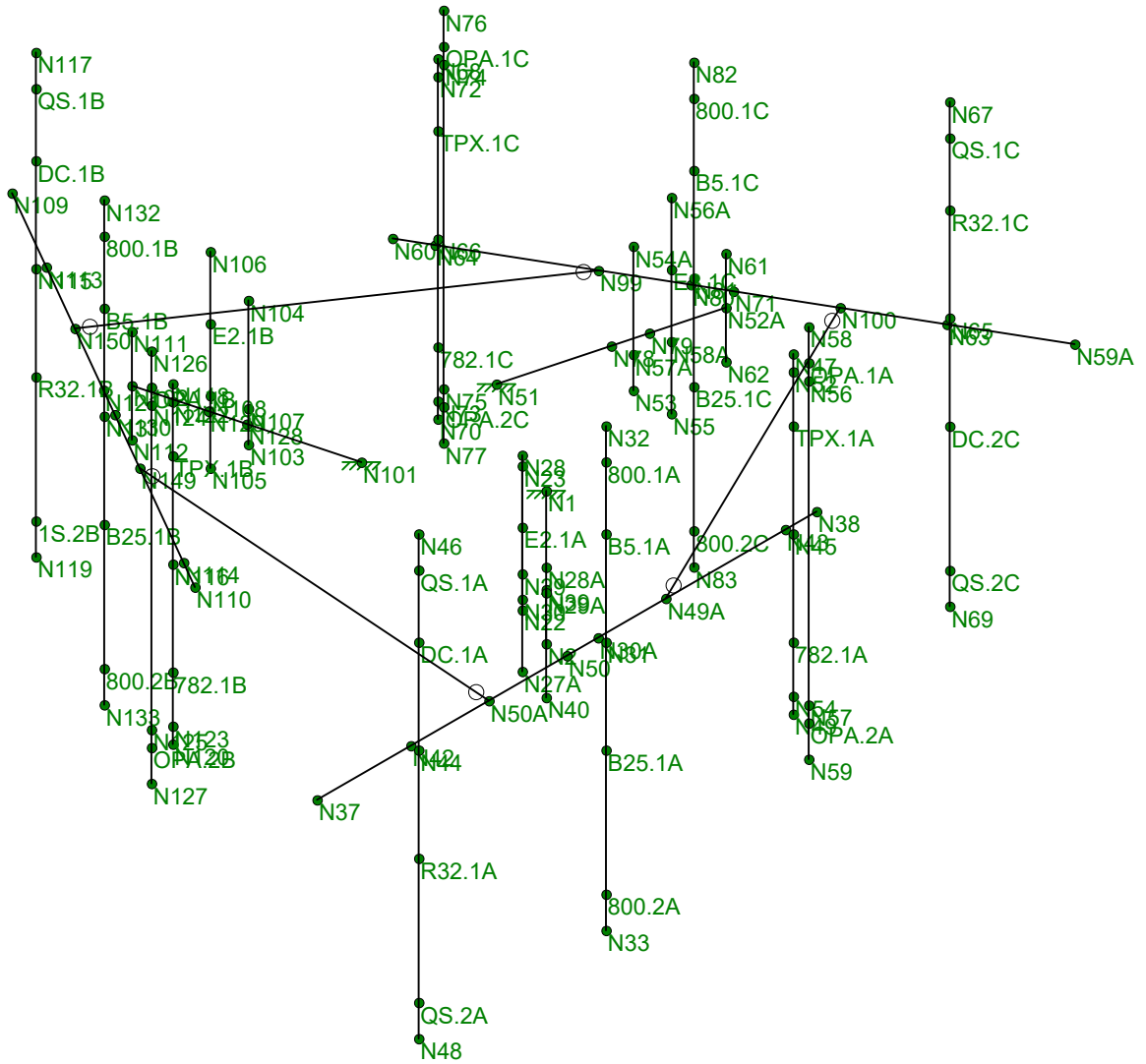
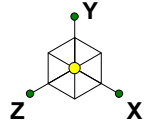
Envelope Only Solution

Maser Consulting Connect...
GHW
19922054A

Mount Analysis

May 4, 2020 at 9:20 AM
Antenna Mount - LOADED.r3d



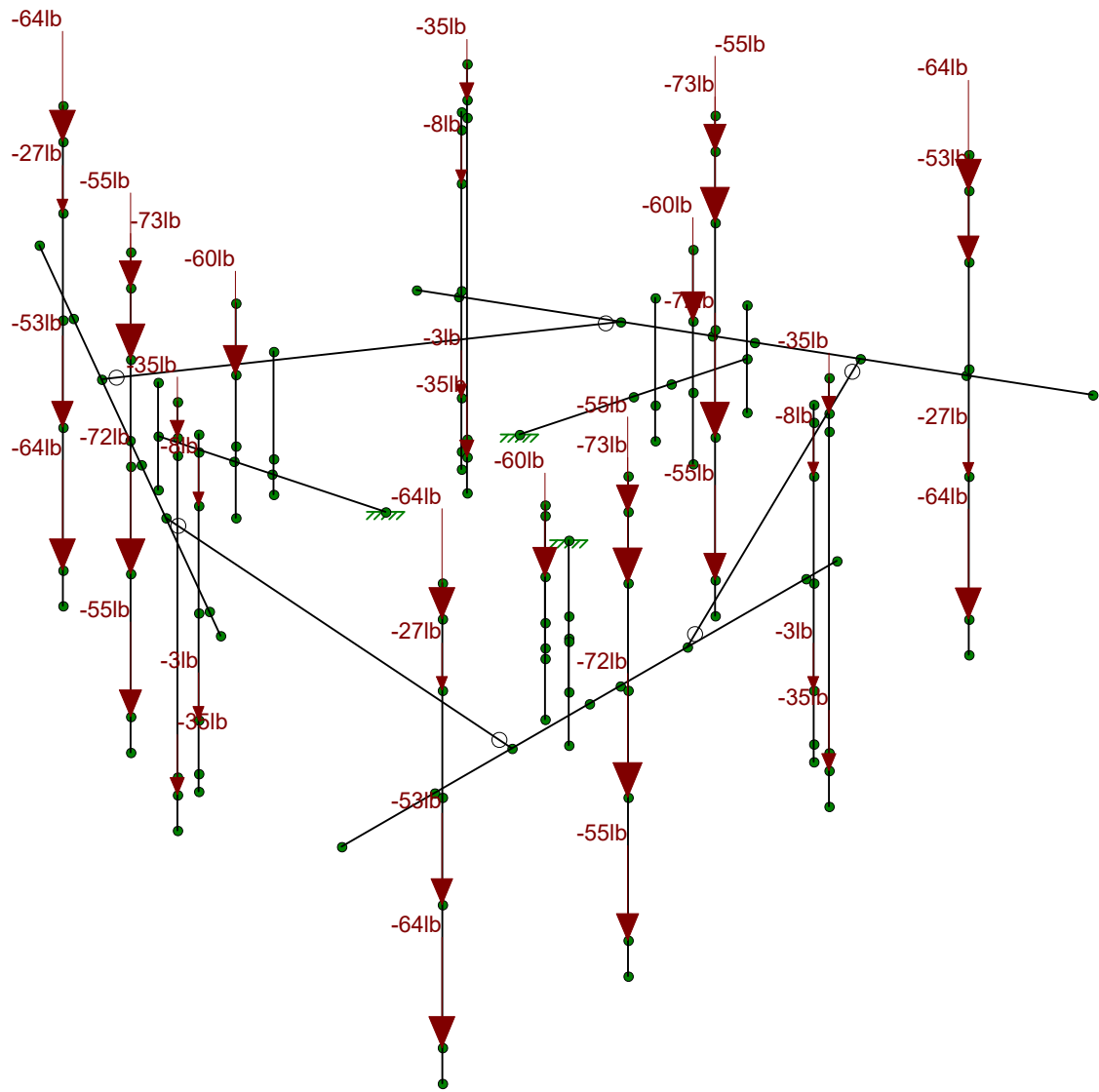
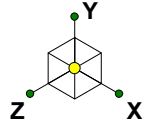


Envelope Only Solution

Maser Consulting Connect...
GHW
19922054A

Mount Analysis

May 4, 2020 at 9:21 AM  
Antenna Mount - LOADED.r3d



Loads: BLC 1, Dead  
Envelope Only Solution

Maser Consulting Connect...	Mount Analysis	May 4, 2020 at 9:21 AM
GHW		Antenna Mount - LOADED.r3d
19922054A		





**APPENDIX B**  
**SOFTWARE INPUT CALCULATIONS**



Client: Crown Caslte Date: 5/1/2020  
 Site Name: Buckland Mall  
 Project No. 19922054A  
 Title: Antenna Mount Analysis Page: 1

Version 1.0

## I. LOADING SUMMARY

Quantity	Manufacturer	Antenna/ Appurtenance	Status	Sector
3	CCI	OPA-65R-LCUU-H6	Proposed	Alpha, Beta, & Gamma
3	KATHREIN	80010965	Proposed	Alpha, Beta, & Gamma
3	QUINTEL	QS66512-2	Proposed	Alpha, Beta, & Gamma
6	CCI	TPX-070821	Proposed	Alpha, Beta, & Gamma
3	ERICSSON	RRUS 32	Proposed	Alpha, Beta, & Gamma
3	ERICSSON	RRU 4449 B5 + B12	Proposed	Alpha, Beta, & Gamma
3	ERICSSON	RRUS 8843 B2/B66A	Proposed	Alpha, Beta, & Gamma
3	ERICSSON	RRUS E2 B29	Proposed	Alpha, Beta, & Gamma
3	KATHREIN	782 10253	Proposed	Alpha, Beta, & Gamma
3	RAYCAP	DC6-48-60-18-8F	Existing/Proposed	Alpha, Beta, & Gamma



## II. DESIGN CRITERIA

### Basic Site Criteria:

TIA Standard:	<b>TIA-222-H</b>	
Antenna Centerline:	<b>z</b>	<b>145</b> ft
Supporting Structure Type:	<b>Monopole Tower</b>	
Risk Category:	<b>II</b>	
Basic Wind Speed (3 sec. Gust, 700-Year MRI):	<b>V</b>	<b>118</b> mph
Basic Wind Speed with ice (3 sec. Gust):	<b>V<sub>i</sub></b>	<b>50</b> mph
Maintenance Wind Speed:	<b>V<sub>m</sub></b>	<b>30</b> mph
Design Ice Thickness (500-Year MRI):	<b>t<sub>i</sub></b>	<b>1.5</b> in
Exposure Category:	<b>C</b>	
Topographic Category:	<b>1</b>	
Topographic Factor:	<b>K<sub>zt</sub></b>	<b>1.00</b>
Ground Elevation (AMSL):		<b>195.35</b> ft
Ground Elevation Factor:	<b>K<sub>e</sub></b>	<b>0.99</b>
Shielding Factor:	<b>K<sub>s</sub></b>	<b>0.90</b>
Gust Effect Factor:	<b>G<sub>r</sub></b>	<b>1.00</b>
Wind Directionality Factor:	<b>K<sub>d</sub></b>	<b>0.95</b>
Velocity Pressure Coefficient:	<b>K<sub>z</sub></b>	<b>1.37</b>
Importance Factor <sub>Wind, no ice</sub> :	<b>I<sub>wind</sub></b>	<b>1.00</b>
Importance Factor <sub>Wind, with ice</sub> :	<b>I<sub>wind w/ice</sub></b>	<b>1.00</b>
Importance Factor <sub>Ice</sub> :	<b>I<sub>ice</sub></b>	<b>1.00</b>
Ice Velocity Pressure Exposure Coefficient:	<b>K<sub>iz</sub></b>	<b>1.16</b>

### Wind and Ice Design Criteria:

Velocity Pressure:	<b>q<sub>z</sub></b>	<b>41.42</b> psf
Velocity Pressure (With Ice):	<b>q<sub>zi</sub></b>	<b>7.44</b> psf
Velocity Pressure (Maintenance):	<b>q<sub>zm</sub></b>	<b>2.68</b> psf
Factored Ice Thickness:	<b>t<sub>iz</sub></b>	<b>1.74</b> in



III. CALCULATIONS

• Load on Appurtenances

Antenna/ Appurtenance	Non-Iced Condition								Iced Condition							
	Mounting Pipe		Equipment						Mounting Pipe		Equipment					
	Length (in)	Diameter (in)	Shape Type	Height (in)	Width (in)	Depth (in)	Weight (lbs)	Force Coefficient		Length (in)	Diameter (in)	Height (in)	Width (in)	Depth (in)	Force Coefficient	
								C <sub>a</sub> Front	C <sub>a</sub> Side						C <sub>a</sub> Front	C <sub>a</sub> Side
OPA-65R-LCUU-H6	72.0	2.375	Rect	72.30	14.40	7.30	69.50	1.31	1.50	75.5	5.9	75.78	17.88	10.78	1.28	1.40
80010965	84.0	2.375	Rect	78.70	20.00	6.90	108.60	1.26	1.55	87.5	5.9	82.18	23.48	10.38	1.24	1.43
QS66512-2	84.0	2.375	Rect	72.00	12.00	9.60	126.60	1.36	1.42	87.5	5.9	75.48	15.48	13.08	1.31	1.35
TPX-070821	0.0	0.000	Rect	5.83	9.65	2.05	7.50	1.20	1.22	0.0	0.0	9.31	13.13	5.53	1.20	1.20
RRUS 32	0.0	0.000	Rect	27.20	12.00	7.00	52.90	1.20	1.26	0.0	0.0	30.68	15.48	10.48	1.20	1.22
RRU 4449 B5 + B12	0.0	0.000	Rect	14.96	13.19	10.43	73.00	1.20	1.20	0.0	0.0	18.44	16.67	13.91	1.20	1.20
RRUS 8843 B2/B66A	0.0	0.000	Rect	14.90	13.20	10.90	72.00	1.20	1.20	0.0	0.0	18.38	16.68	14.38	1.20	1.20
RRUS E2 B29	0.0	0.000	Rect	20.40	18.50	7.50	60.00	1.20	1.21	0.0	0.0	23.88	21.98	10.98	1.20	1.20
782 10253	0.0	0.000	Rect	4.30	3.00	1.70	2.90	1.20	1.20	0.0	0.0	7.78	6.48	5.18	1.20	1.20
DC6-48-60-18-8F	0.0	0.000	Round	31.40	10.20	10.20	26.20	0.71	0.71	0.0	0.0	34.88	13.68	13.68	0.70	0.70

Antenna/ Appurtenance	# of Brackets	Turned 90°?	% Shield Front	% Shield Side	Non-Iced Condition			Iced Condition			Maintenance Condition		Seismic Condition	
					Wind Force (lbs.)		Gravity (lbs.)	Wind Force (lbs.)		Gravity (lbs.)	Wind Force (lbs.)		Vertical (lbs.)	Horizontal (lbs.)
					F <sub>N</sub>	F <sub>T</sub>		F <sub>N</sub>	F <sub>T</sub>		F <sub>N</sub>	F <sub>T</sub>	E <sub>V</sub>	E <sub>H</sub>
OPA-65R-LCUU-H6	2	No	0%	0%	196.4	143.1	34.8	44.7	43.2	120.0	12.7	9.3	0.0	0.0
80010965	2	No	0%	0%	288.2	155.2	54.3	63.0	47.4	166.6	18.6	10.0	0.0	0.0
QS66512-2	2	No	0%	0%	173.3	175.2	63.3	41.6	50.2	114.3	11.2	11.3	0.0	0.0
TPX-070821	1	No	0%	0%	19.4	4.2	7.5	7.6	3.9	19.1	1.3	0.3	0.0	0.0
RRUS 32	1	No	0%	0%	112.7	69.1	52.9	29.4	21.0	84.9	7.3	4.5	0.0	0.0
RRU 4449 B5 + B12	1	No	0%	0%	68.1	53.9	73.0	19.0	16.6	60.6	4.4	3.5	0.0	0.0
RRUS 8843 B2/B66A	1	No	0%	0%	67.9	56.1	72.0	19.0	17.1	61.4	4.4	3.6	0.0	0.0
RRUS E2 B29	1	No	0%	0%	130.3	53.2	60.0	32.5	17.0	91.8	8.4	3.4	0.0	0.0
782 10253	1	No	0%	0%	4.5	2.5	2.9	3.1	3.2	7.1	0.3	0.2	0.0	0.0
DC6-48-60-18-8F	1	No	0%	0%	65.7	65.7	26.2	17.3	18.0	73.7	4.2	4.2	0.0	0.0

\* ALL CALCULATED LOADS ARE PER MOUNTING BRACKET. TO GET THE TOTAL EQUIPMENT LOAD, MULTIPLY THE INDIVIDUAL LOADS BY THE NUMBER OF BRACKETS

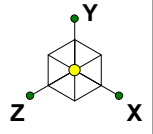
• Load on Framing Members

Optimize Co Factors by Member Length?  No

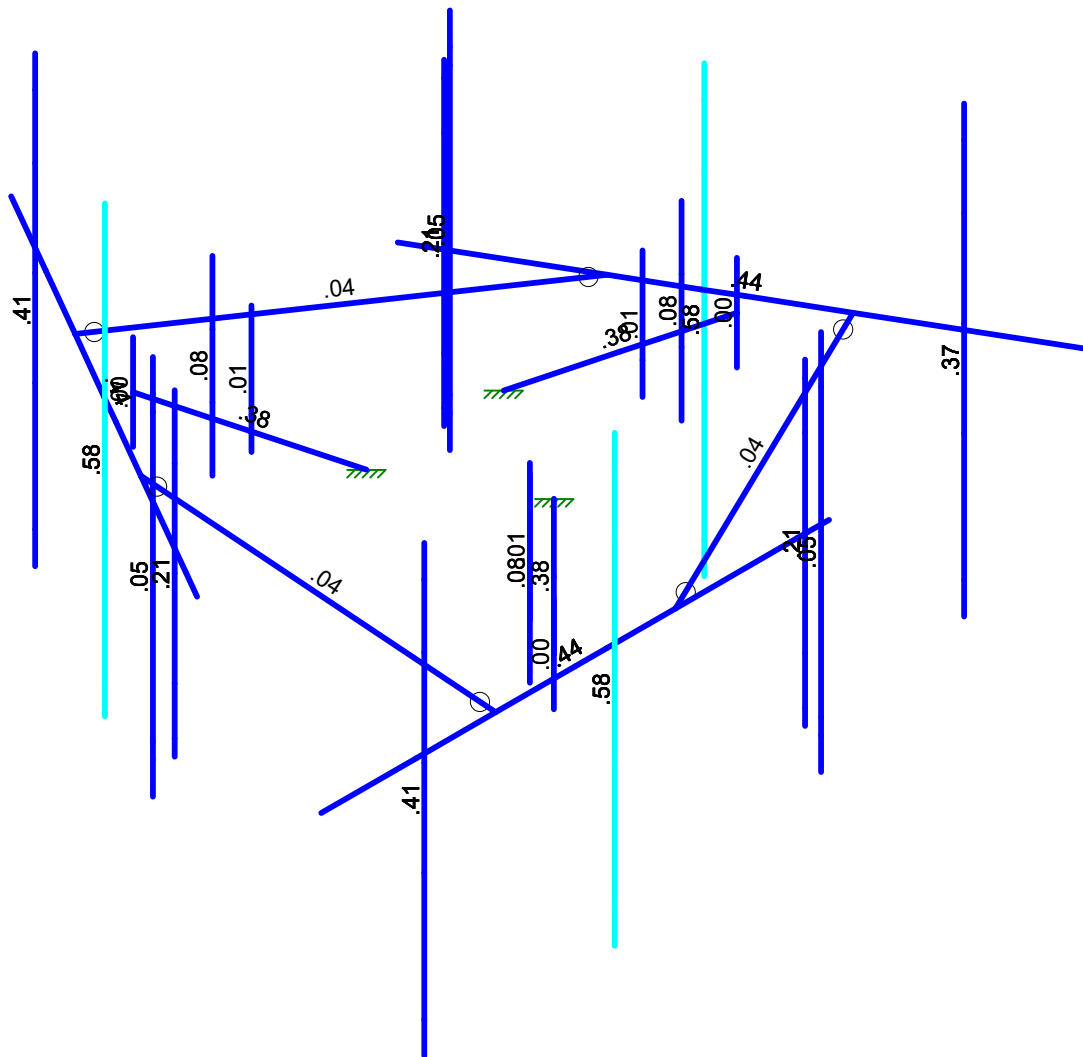
RISA Section Set Name	RISA Shape	Member Category	AISC Member Label	Member Surface	Non-Iced Condition			Iced Condition				Maintenance Condition	
					Exposed Wind Height (in)	Force Coefficient C <sub>s</sub>	Wind Load (plf)	Exposed Wind Height (in)	D <sub>c</sub> (in)	Force Coefficient C <sub>s</sub>	Wind Load (plf)	Ice Weight (plf)	Wind Load (plf)
Mast Pipe	PIPE_4.0	Pipe	Pipe 4.0	Round	4.50	1.20	18.64	7.98	4.50	1.20	5.93	13.26	1.20
Face Horizontal	PIPE_3.0	Pipe	Pipe 3.0	Round	3.50	1.20	14.50	6.98	3.50	1.20	5.19	11.13	0.94
Standoff Horizontal	HSS4X4X8	Rect. HSS	HSS4X4X1/2	HSS	4.00	1.25	17.26	7.48	5.66	1.25	5.79	15.72	1.12
Mount Pipe	PIPE_2.0	Pipe	Pipe 2.0	Round	0.00	1.20	0.00	3.48	2.38	1.20	0.00	8.74	0.00
Tie Back	PIPE_2.0	Pipe	Pipe 2.0	Round	2.38	1.20	9.84	5.85	2.38	1.20	4.35	8.74	0.64
Empty Mount Pipe	PIPE_2.0	Pipe	Pipe 2.0	Round	2.38	1.20	9.84	5.85	2.38	1.20	4.35	8.74	0.64



**APPENDIX C**  
**SOFTWARE ANALYSIS OUTPUT**



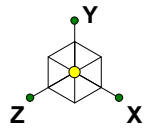
Code Check ( Env )	
Black	No Calc
Red	> 1.0
Magenta	.90-1.0
Green	.75-.90
Cyan	.50-.75
Blue	0-.50



Member Code Checks Displayed (Enveloped)  
Envelope Only Solution

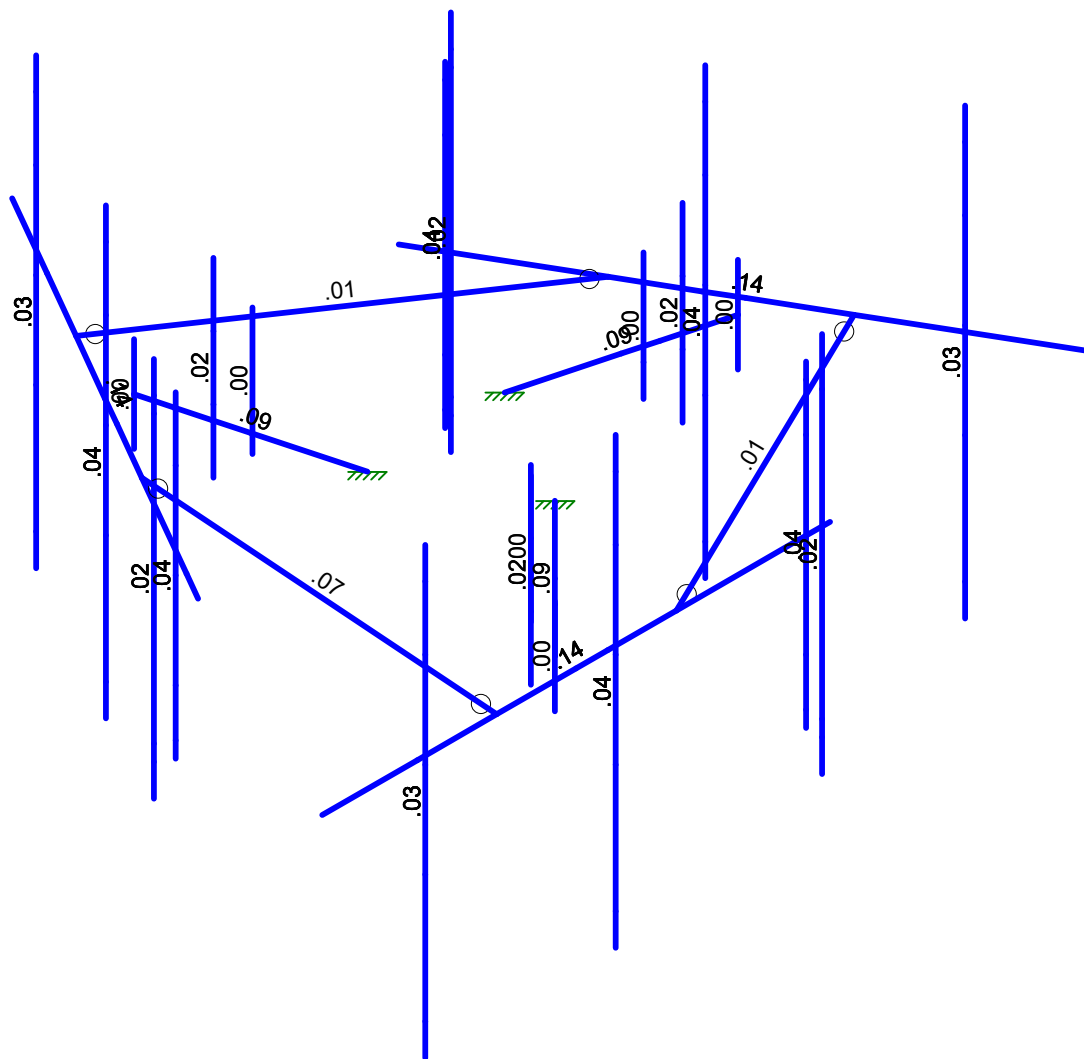
Maser Consulting Connect...	Mount Analysis	
GHW		May 4, 2020 at 9:19 AM
19922054A		Antenna Mount - LOADED.r3d





Shear Check  
( Env )

- No Calc
- > 1.0
- .90-1.0
- .75-.90
- .50-.75
- 0-.50



Member Shear Checks Displayed (Enveloped)  
Envelope Only Solution

Maser Consulting Connect...  
GHW  
19922054A

Mount Analysis

May 4, 2020 at 9:20 AM  
Antenna Mount - LOADED.r3d



**Member Primary Data**

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			Standoff Horizontal	Beam	SquareTube	A500 Gr.46	Typical
2	M10	N23	N22			Empty Mount Pipe	Column	Pipe	A53 Gr B	Typical
3	M11	N28	N27A			Empty Mount Pipe	Column	Pipe	A53 Gr B	Typical
4	M14A	N39	N40			Mast Pipe	Column	Pipe	A53 Gr B	Typical
5	M15	N37	N38			Face Horizontal	Beam	RECT	A53 Gr B	Typical
6	M16	N46	N48			Mount Pipe	Column	Pipe	A53 Gr B	Typical
7	M17	N47	N49			Empty Mount Pipe	Column	Pipe	A53 Gr B	Typical
8	M18	N44	N42			RIGID	None	None	RIGID	Typical
9	M19	N45	N43			RIGID	None	None	RIGID	Typical
10	M20	N50	N2			RIGID	None	None	RIGID	Typical
11	M21	N54	N57			RIGID	None	None	RIGID	Typical
12	M22	N52	N56			RIGID	None	None	RIGID	Typical
13	M23	N59	N58			Mount Pipe	Column	Pipe	A53 Gr B	Typical
14	M14	N29A	N30			RIGID	None	None	RIGID	Typical
15	M15A	N28A	N29			RIGID	None	None	RIGID	Typical
16	M16A	N32	N33			Mount Pipe	Column	Pipe	A53 Gr B	Typical
17	M17A	N31	N30A			RIGID	None	None	RIGID	Typical
18	M20A	N51	N52A			Standoff Horizontal	Beam	SquareTube	A500 Gr.46	Typical
19	M21A	N54A	N53			Empty Mount Pipe	Column	Pipe	A53 Gr B	Typical
20	M22A	N56A	N55			Empty Mount Pipe	Column	Pipe	A53 Gr B	Typical
21	M23A	N61	N62			Mast Pipe	Column	Pipe	A53 Gr B	Typical
22	M24	N59A	N60			Face Horizontal	Beam	RECT	A53 Gr B	Typical
23	M25	N67	N69			Mount Pipe	Column	Pipe	A53 Gr B	Typical
24	M26	N68	N70			Empty Mount Pipe	Column	Pipe	A53 Gr B	Typical
25	M27	N65	N63			RIGID	None	None	RIGID	Typical
26	M28	N66	N64			RIGID	None	None	RIGID	Typical
27	M29	N71	N52A			RIGID	None	None	RIGID	Typical
28	M30	N73	N75			RIGID	None	None	RIGID	Typical
29	M31	N72	N74			RIGID	None	None	RIGID	Typical
30	M32	N77	N76			Mount Pipe	Column	Pipe	A53 Gr B	Typical
31	M33	N79	N58A			RIGID	None	None	RIGID	Typical
32	M34	N78	N57A			RIGID	None	None	RIGID	Typical
33	M35	N82	N83			Mount Pipe	Column	Pipe	A53 Gr B	Typical
34	M36	N81	N80			RIGID	None	None	RIGID	Typical
35	M39	N101	N102			Standoff Horizontal	Beam	SquareTube	A500 Gr.46	Typical
36	M40	N104	N103			Empty Mount Pipe	Column	Pipe	A53 Gr B	Typical
37	M41	N106	N105			Empty Mount Pipe	Column	Pipe	A53 Gr B	Typical
38	M42	N111	N112			Mast Pipe	Column	Pipe	A53 Gr B	Typical
39	M43	N109	N110			Face Horizontal	Beam	RECT	A53 Gr B	Typical
40	M44	N117	N119			Mount Pipe	Column	Pipe	A53 Gr B	Typical
41	M45	N118	N120			Empty Mount Pipe	Column	Pipe	A53 Gr B	Typical
42	M46	N115	N113			RIGID	None	None	RIGID	Typical
43	M47	N116	N114			RIGID	None	None	RIGID	Typical
44	M48	N121	N102			RIGID	None	None	RIGID	Typical
45	M49	N123	N125			RIGID	None	None	RIGID	Typical
46	M50	N122	N124			RIGID	None	None	RIGID	Typical
47	M51	N127	N126			Mount Pipe	Column	Pipe	A53 Gr B	Typical
48	M52	N129	N108			RIGID	None	None	RIGID	Typical
49	M53	N128	N107			RIGID	None	None	RIGID	Typical
50	M54	N132	N133			Mount Pipe	Column	Pipe	A53 Gr B	Typical
51	M55	N131	N130			RIGID	None	None	RIGID	Typical
52	M58	N50A	N149			Tie Back	Column	Pipe	A53 Gr B	Typical
53	M59	N150	N99			Tie Back	Column	Pipe	A53 Gr B	Typical
54	M60	N100	N49A			Tie Back	Column	Pipe	A53 Gr B	Typical



**Basic Load Cases**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(P...
1	Dead	DL		-1.05		39			
2	0	WL				78		108	
3	30	WL				78		108	
4	60	WL				78		108	
5	90	WL				78		108	
6	120	WL				78		108	
7	150	WL				78		108	
8	180	WL				78		108	
9	210	WL				78		108	
10	240	WL				78		108	
11	270	WL				78		108	
12	300	WL				78		108	
13	330	WL				78		108	
14	Ice	None				39		54	
15	0Ice	None				78		108	
16	30Ice	None				78		108	
17	60Ice	None				78		108	
18	90Ice	None				78		108	
19	120Ice	None				78		108	
20	150Ice	None				78		108	
21	180Ice	None				78		108	
22	210Ice	None				78		108	
23	240Ice	None				78		108	
24	270Ice	None				78		108	
25	300Ice	None				78		108	
26	330Ice	None				78		108	
27	0M	None				78		108	
28	30M	None				78		108	
29	60M	None				78		108	
30	90M	None				78		108	
31	120M	None				78		108	
32	150M	None				78		108	
33	180M	None				78		108	
34	210M	None				78		108	
35	240M	None				78		108	
36	270M	None				78		108	
37	300M	None				78		108	
38	330M	None				78		108	
39	L_M	None				1			
40	L_V	None				1			
41	E_V	ELY				39			
42	E_Hx	ELX				39			
43	E_Hz	ELZ				39			

**Load Combinations**

	Description	SolveP...	S...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLC Fac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...
1	1.4D	Yes	Y	1	1.4								
2	1.2D+1.0W1	Yes	Y	1	1.2	2	1						
3	1.2D+1.0W2	Yes	Y	1	1.2	3	1						
4	1.2D+1.0W3	Yes	Y	1	1.2	4	1						
5	1.2D+1.0W4	Yes	Y	1	1.2	5	1						
6	1.2D+1.0W5	Yes	Y	1	1.2	6	1						
7	1.2D+1.0W6	Yes	Y	1	1.2	7	1						
8	1.2D+1.0W7	Yes	Y	1	1.2	8	1						



### Load Combinations (Continued)

	Description	Solve P...	S...	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLC Fac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..
9	1.2D+1.0W8	Yes	Y	1	1.2	9	1								
10	1.2D+1.0W9	Yes	Y	1	1.2	10	1								
11	1.2D+1.0W10	Yes	Y	1	1.2	11	1								
12	1.2D+1.0W11	Yes	Y	1	1.2	12	1								
13	1.2D+1.0W12	Yes	Y	1	1.2	13	1								
14	0.9D+1.0W1	Yes	Y	1	.9	2	1								
15	0.9D+1.0W2	Yes	Y	1	.9	3	1								
16	0.9D+1.0W3	Yes	Y	1	.9	4	1								
17	0.9D+1.0W4	Yes	Y	1	.9	5	1								
18	0.9D+1.0W5	Yes	Y	1	.9	6	1								
19	0.9D+1.0W6	Yes	Y	1	.9	7	1								
20	0.9D+1.0W7	Yes	Y	1	.9	8	1								
21	0.9D+1.0W8	Yes	Y	1	.9	9	1								
22	0.9D+1.0W9	Yes	Y	1	.9	10	1								
23	0.9D+1.0W10	Yes	Y	1	.9	11	1								
24	0.9D+1.0W11	Yes	Y	1	.9	12	1								
25	0.9D+1.0W12	Yes	Y	1	.9	13	1								
26	1.2D+1.0 Ice	Yes	Y	1	1.2	14	1								
27	1.2D+1.0ICE+1.0W1...	Yes	Y	1	1.2	14	1	15	1						
28	1.2D+1.0ICE+1.0W2...	Yes	Y	1	1.2	14	1	16	1						
29	1.2D+1.0ICE+1.0W3...	Yes	Y	1	1.2	14	1	17	1						
30	1.2D+1.0ICE+1.0W4...	Yes	Y	1	1.2	14	1	18	1						
31	1.2D+1.0ICE+1.0W5...	Yes	Y	1	1.2	14	1	19	1						
32	1.2D+1.0ICE+1.0W6...	Yes	Y	1	1.2	14	1	20	1						
33	1.2D+1.0ICE+1.0W7...	Yes	Y	1	1.2	14	1	21	1						
34	1.2D+1.0ICE+1.0W8...	Yes	Y	1	1.2	14	1	22	1						
35	1.2D+1.0ICE+1.0W9...	Yes	Y	1	1.2	14	1	23	1						
36	1.2D+1.0ICE+1.0W1...	Yes	Y	1	1.2	14	1	24	1						
37	1.2D+1.0ICE+1.0W1...	Yes	Y	1	1.2	14	1	25	1						
38	1.2D+1.0ICE+1.0W1...	Yes	Y	1	1.2	14	1	26	1						
39	1.2D+1.5LM1+1.0W1...	Yes	Y	1	1.2	39	1.5	27	1						
40	1.2D+1.5LM1+1.0W2...	Yes	Y	1	1.2	39	1.5	28	1						
41	1.2D+1.5LM1+1.0W3...	Yes	Y	1	1.2	39	1.5	29	1						
42	1.2D+1.5LM1+1.0W4...	Yes	Y	1	1.2	39	1.5	30	1						
43	1.2D+1.5LM1+1.0W5...	Yes	Y	1	1.2	39	1.5	31	1						
44	1.2D+1.5LM1+1.0W6...	Yes	Y	1	1.2	39	1.5	32	1						
45	1.2D+1.5LM1+1.0W7...	Yes	Y	1	1.2	39	1.5	33	1						
46	1.2D+1.5LM1+1.0W8...	Yes	Y	1	1.2	39	1.5	34	1						
47	1.2D+1.5LM1+1.0W9...	Yes	Y	1	1.2	39	1.5	35	1						
48	1.2D+1.5LM1+1.0W1...	Yes	Y	1	1.2	39	1.5	36	1						
49	1.2D+1.5LM1+1.0W1...	Yes	Y	1	1.2	39	1.5	37	1						
50	1.2D+1.5LM1+1.0W1...	Yes	Y	1	1.2	39	1.5	38	1						
51															
52	1.2D+1.5LV	Yes	Y	1	1.2	40	1.5								
53															
54	1.2D + Ev + Ehx	Yes	Y	1	1.2	41	1	42	1	43					
55	1.2D + Ev + Ehz	Yes	Y	1	1.2	41	1	42		43	1				
56	1.2D + Ev - Ehx	Yes	Y	1	1.2	41	1	42	-1	43					
57	1.2D + Ev - Ehz	Yes	Y	1	1.2	41	1	42		43	-1				
58	0.9D - Ev + Ehx	Yes	Y	1	.9	41	-1	42	1	43					
59	0.9D - Ev + Ehz	Yes	Y	1	.9	41	-1	42		43	1				
60	0.9D - Ev - Ehx	Yes	Y	1	.9	41	-1	42	-1	43					
61	0.9D - Ev - Ehz	Yes	Y	1	.9	41	-1	42		43	-1				



Company : Maser Consulting Connecticut  
 Designer : GHW  
 Job Number : 19922054A  
 Model Name : Mount Analysis

May 4, 2020  
 9:22 AM  
 Checked By: DX

### Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N1	max	2735.923	14	2730.175	34	1473.618	18	-1323.122	23	6367.842	13	6675.526	27
2		min	-2728.003	8	787.039	15	-1476.464	12	-5472.809	42	-6320.764	19	1513.602	20
3	N51	max	1829.246	3	2730.188	30	2416.062	4	8346.125	37	6369.843	21	1214.712	27
4		min	-1835.55	21	787.06	23	-2426.593	22	2181.027	17	-6322.686	3	197.077	20
5	N101	max	1536.296	13	2730.231	38	2312.585	18	-502.041	23	6356.163	17	-2014.748	25
6		min	-1553.286	19	787.051	19	-2309.304	12	-3213.837	30	-6309.219	11	-7836.751	33
7	Totals:	max	5294.293	2	8189.845	32	5293.789	17						
8		min	-5294.287	20	2362.206	25	-5293.794	11						

### Envelope AISC 15th(360-16): LRFD Steel Code Checks

Member	Shape	Code Che...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pnc [...]	phi*Pnt [...]	phi*Mn y...	phi*Mn z...	Cb	Eqn
1	M1	HSS4X4X8	.381	0	.38	.093	24	y	38	238475....	249228	26565	26565	1...H1-1b
2	M10	PIPE 2.0	.006	18	9	.002	18		9	30625.434	32130	1871.625	1871.625	1...H1-1b
3	M11	PIPE 2.0	.082	24	8	.016	24		8	28843.414	32130	1871.625	1871.625	2...H1-1b
4	M14A	PIPE 4.0	.001	9	9	.001	9		9	92571.332	93240	10631.25	10631.25	1...H1-1b
5	M15	PIPE 3.0	.444	48	43	.141	48		2	46290.523	65205	5748.75	5748.75	1...H1-1b
6	M16	PIPE 2.0	.407	36.75	8	.030	36.75		20	17855.085	32130	1871.625	1871.625	1...H1-1b
7	M17	PIPE 2.0	.205	30	4	.040	30		4	23808.54	32130	1871.625	1871.625	1...H1-1b
8	M23	PIPE 2.0	.047	9	8	.020	63		8	20866.733	32130	1871.625	1871.625	1 H1-1b
9	M16A	PIPE 2.0	.584	36.75	8	.037	18.375		8	17855.085	32130	1871.625	1871.625	1...H1-1b
10	M20A	HSS4X4X8	.381	0	.34	.092	24	y	33	238475....	249228	26565	26565	1...H1-1b
11	M21A	PIPE 2.0	.006	18	6	.002	18		6	30625.434	32130	1871.625	1871.625	1...H1-1b
12	M22A	PIPE 2.0	.082	24	4	.016	24		4	28843.414	32130	1871.625	1871.625	2...H1-1b
13	M23A	PIPE 4.0	.001	9	6	.001	9		6	92571.332	93240	10631.25	10631.25	1...H1-1b
14	M24	PIPE 3.0	.438	48	34	.142	48		10	46290.523	65205	5748.75	5748.75	1...H1-1b
15	M25	PIPE 2.0	.374	36.75	6	.030	18.375		4	17855.085	32130	1871.625	1871.625	1...H1-1b
16	M26	PIPE 2.0	.208	30	12	.040	30		12	23808.54	32130	1871.625	1871.625	1...H1-1b
17	M32	PIPE 2.0	.047	9	4	.021	63		4	20866.733	32130	1871.625	1871.625	1 H1-1b
18	M35	PIPE 2.0	.584	36.75	4	.037	18.375		4	17855.085	32130	1871.625	1871.625	1...H1-1b
19	M39	HSS4X4X8	.381	0	.30	.093	24	y	30	238475....	249228	26565	26565	1...H1-1b
20	M40	PIPE 2.0	.006	18	13	.002	18		13	30625.434	32130	1871.625	1871.625	1...H1-1b
21	M41	PIPE 2.0	.082	24	12	.016	24		12	28843.414	32130	1871.625	1871.625	2...H1-1b
22	M42	PIPE 4.0	.001	9	13	.001	9		13	92571.332	93240	10631.25	10631.25	1...H1-1b
23	M43	PIPE 3.0	.438	48	30	.142	48		6	46290.523	65205	5748.75	5748.75	1...H1-1b
24	M44	PIPE 2.0	.408	36.75	12	.030	36.75		24	17855.085	32130	1871.625	1871.625	1...H1-1b
25	M45	PIPE 2.0	.208	30	4	.040	30		4	23808.54	32130	1871.625	1871.625	1...H1-1b
26	M51	PIPE 2.0	.047	9	12	.021	63		12	20866.733	32130	1871.625	1871.625	1 H1-1b
27	M54	PIPE 2.0	.584	36.75	12	.037	18.375		12	17855.085	32130	1871.625	1871.625	1...H1-1b
28	M58	PIPE 2.0	.036	36.23	33	.075	0		41	20751.508	32130	1871.625	1871.625	1...H1-1b
29	M59	PIPE 2.0	.036	36.23	37	.012	72.46		9	20751.508	32130	1871.625	1871.625	1...H1-1b
30	M60	PIPE 2.0	.036	36.23	29	.013	0		52	20751.508	32130	1871.625	1871.625	1...H1-1b

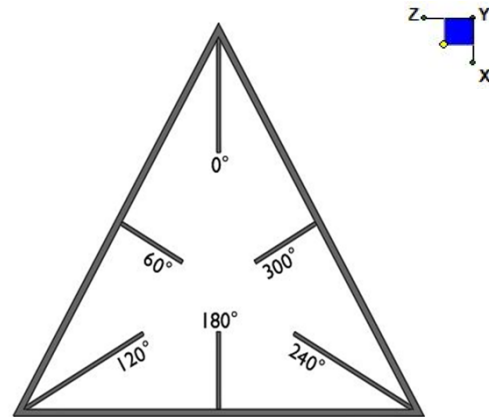
**APPENDIX D**  
**ADDITIONAL CALCULATIONS**



## I. Mount-to-Tower Connection Check

### RISA Model Data

Nodes (labeled per RISA)	Orientation (per graphic of typical platform)
N1	150
N101	30
N51	270



TYPICAL PLATFORM

### Tower Connection Bolt Checks

Any moment resistance?:

Bolt Quantity per Reaction:

$d_x$  (in) (Delta X of typ. bolt config. sketch) :

$d_y$  (in) (Delta Y of typ. bolt config. sketch) :

Bolt Type:

Bolt Diameter (in):

Required Tensile Strength (kips):

Required Shear Strength (kips):

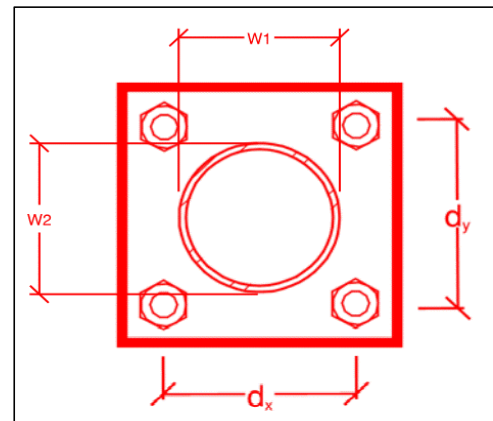
Tensile Strength / bolt (kips):

Shear Strength / bolt (kips):

Tensile Capacity Overall:

Shear Capacity Overall:

yes
4
7
7
A325N
0.625
29.7
7.0
20.7
12.4
<b>35.8%*</b>
<b>14.1%</b>



\*Note: Tension reduction not required if tension or shear capacity < 30%

### Tower Connection Plate and Weld Check

Connecting Standoff Member Shape:

Plate Width (in):

Plate Height (in):

W1 (in):

W2 (in):

Fy (ksi, plate):

$t_{plate}$  (in):

Weld Size (1/16 in):

$\Phi \cdot R_n$  (kip/in):

Required Weld Strength (kip/in):

Plate Bending Capacity:

Weld Capacity:

Rect
10
10
4
4
36
0.625
7
9.74
4.85
<b>83.0%</b>
<b>49.8%</b>

### Max Plate Bending Strengths

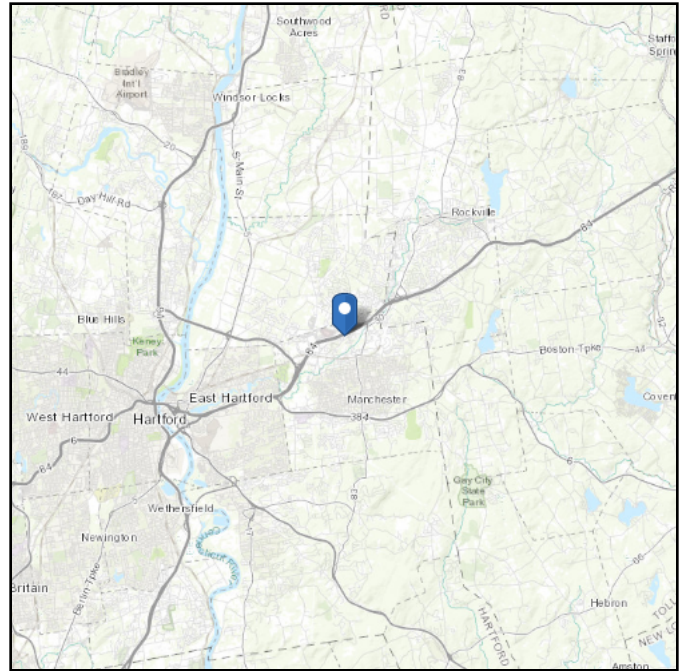
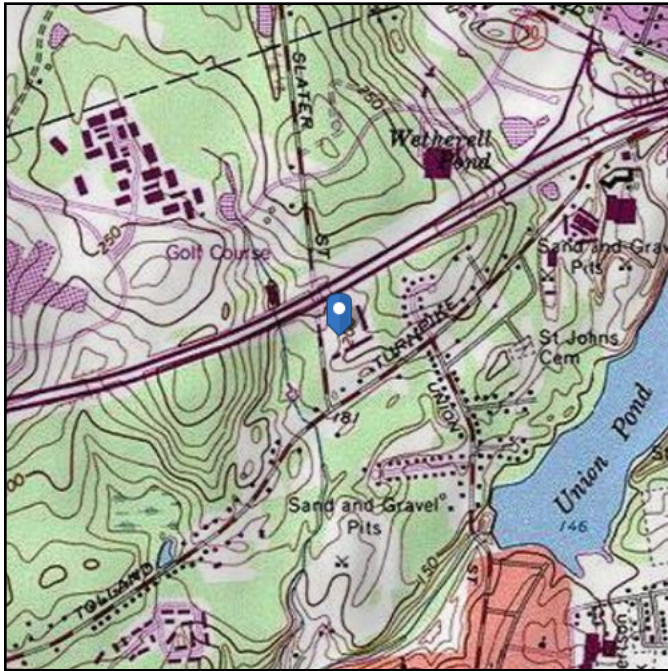
$M_{u_{xx}}$ (kip-in) :	21.7
$\Phi \cdot M_{n_{xx}}$ (kip-in) :	31.6
$M_{u_{yy}}$ (kip-in) :	4.6
$\Phi \cdot M_{n_{yy}}$ (kip-in) :	31.6

# ASCE 7 Hazards Report

**Address:**  
No Address at This Location

**Standard:** ASCE/SEI 7-16  
**Risk Category:** II  
**Soil Class:** D - Default (see Section 11.4.3)

**Elevation:** 195.35 ft (NAVD 88)  
**Latitude:** 41.804992  
**Longitude:** -72.533599



## Wind

### Results:

Wind Speed:	118 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	98 Vmph

**Data Source:** ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1-CC.2-4

**Date Accessed:** Fri May 01 2020

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

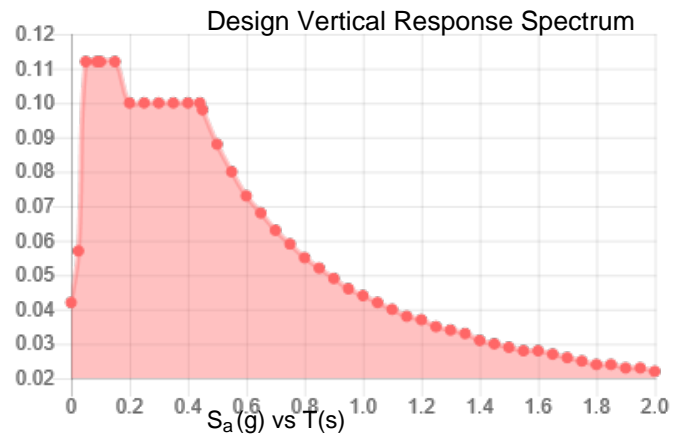
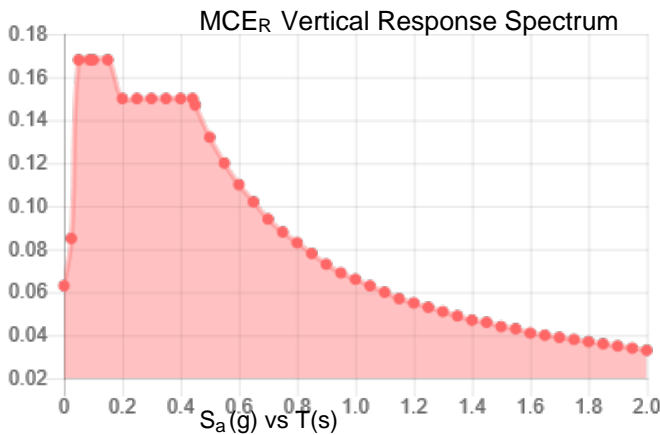
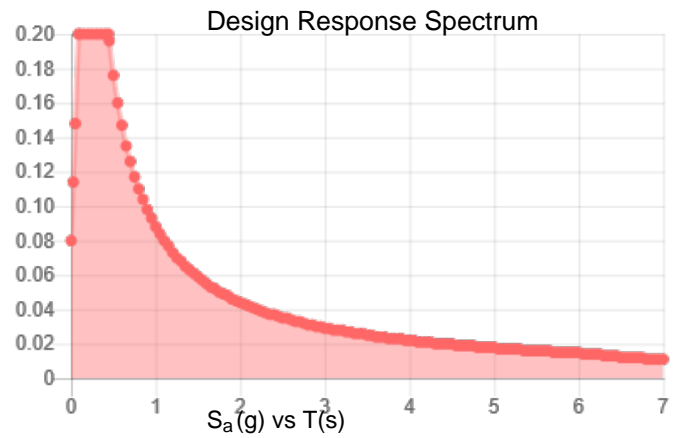
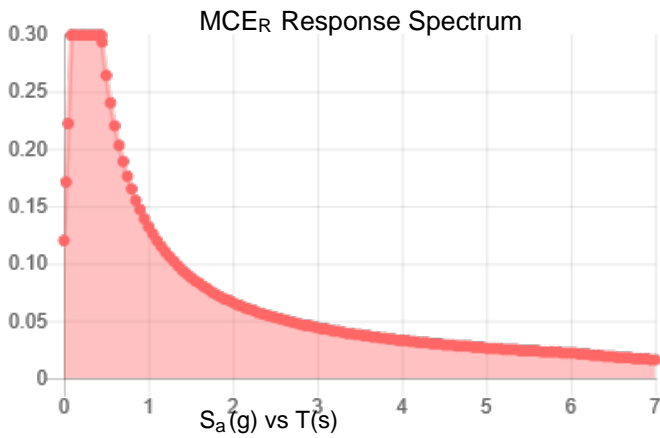


**Site Soil Class:** D - Default (see Section 11.4.3)

**Results:**

$S_S$ :	0.187	$S_{D1}$ :	0.088
$S_1$ :	0.055	$T_L$ :	6
$F_a$ :	1.6	PGA :	0.1
$F_v$ :	2.4	PGA <sub>M</sub> :	0.161
$S_{MS}$ :	0.299	$F_{PGA}$ :	1.599
$S_{M1}$ :	0.132	$I_e$ :	1
$S_{DS}$ :	0.2	$C_v$ :	0.7

**Seismic Design Category** B



**Data Accessed:**

Fri May 01 2020

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

## Ice

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**Results:**

Ice Thickness: 1.50 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

**Data Source:** Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8

**Date Accessed:** Fri May 01 2020

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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# Exhibit F

## **Power Density/RF Emissions Report**

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

AT&T Existing Facility

Site ID: CTL05307 - 876347

Buckland Mall  
53 Slater Street  
Manchester, Connecticut 06040

**January 27, 2022**

**EBI Project Number: 6222000336**

Site Compliance Summary	
Compliance Status:	<b>COMPLIANT</b>
Site total MPE% of FCC general population allowable limit:	<b>31.17%</b>

January 27, 2022

AT&T

Emissions Analysis for Site: CTL05307 - 876347 - Buckland Mall

EBI Consulting was directed to analyze the proposed AT&T facility located at **53 Slater Street** in **Manchester, Connecticut** for the purpose of determining whether the emissions from the Proposed AT&T 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The number of  $\mu\text{W}/\text{cm}^2$  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 ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately  $400 \mu\text{W}/\text{cm}^2$  and  $467 \mu\text{W}/\text{cm}^2$ , respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is  $1000 \mu\text{W}/\text{cm}^2$ . 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 AT&T Wireless antenna facility located at 53 Slater Street in Manchester, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower. For power density calculations, the broadcast footprint of the AIR6449 antenna has been considered. Due to the beamforming nature of this antenna, the actual beam locations vary depending on demand and are narrow in nature. Using the broadcast footprint accounts for the potential location of beams at any given time.

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

- 1) 4 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 2) 2 LTE DE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 3) 4 LTE FN channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 4) 4 5G channels (850 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 5) 4 LTE / 5G 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.

- 6) 4 LTE / 5G channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 7) 4 LTE channels (WCS Band – 2300 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 25 Watts per Channel.
- 8) 2 C-Band Channels (3700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 144.58 Watts per Channel.
- 9) 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.
- 10) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 11) The antennas used in this modeling are the Quintel QD6616-7 for the 700 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6419 for the 3700 MHz channel(s), the Ericsson AIR 6449 for the 3700 MHz channel(s), the CCI DMP65R-BU6DA for the 700 MHz / 850 MHz / 2300 MHz channel(s) in Sector A, the Quintel QD6616-7 for the 700 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6419 for the 3700 MHz channel(s), the Ericsson AIR 6449 for the 3700 MHz channel(s), the CCI DMP65R-BU6DA for the 700 MHz / 850 MHz / 2300 MHz channel(s) in Sector B, the Quintel QD6616-7 for the 700 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6419 for the 3700 MHz channel(s), the Ericsson AIR 6449 for the 3700 MHz channel(s), the CCI DMP65R-BU6DA for the 700 MHz / 850 MHz / 2300 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

- 12) The antenna mounting height centerline of the proposed antennas is 145 feet above ground level (AGL).
- 13) 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.
- 14) All calculations were done with respect to uncontrolled / general population threshold limits.



## AT&T Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Quintel QD6616-7	Make / Model:	Quintel QD6616-7	Make / Model:	Quintel QD6616-7
Frequency Bands:	700 MHz / 700 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	700 MHz / 700 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	700 MHz / 700 MHz / 1900 MHz / 2100 MHz
Gain:	11.97 dBd / 11.97 dBd / 15.11 dBd / 15.33 dBd	Gain:	11.97 dBd / 11.97 dBd / 15.11 dBd / 15.33 dBd	Gain:	11.97 dBd / 11.97 dBd / 15.11 dBd / 15.33 dBd
Height (AGL):	145 feet	Height (AGL):	145 feet	Height (AGL):	145 feet
Channel Count:	14	Channel Count:	14	Channel Count:	14
Total TX Power (W):	560 Watts	Total TX Power (W):	560 Watts	Total TX Power (W):	560 Watts
ERP (W):	14,426.08	ERP (W):	14,426.08	ERP (W):	14,426.08
Antenna A1 MPE %:	<b>3.49%</b>	Antenna B1 MPE %:	<b>3.49%</b>	Antenna C1 MPE %:	<b>3.49%</b>
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR 6419	Make / Model:	Ericsson AIR 6419	Make / Model:	Ericsson AIR 6419
Frequency Bands:	3700 MHz	Frequency Bands:	3700 MHz	Frequency Bands:	3700 MHz
Gain:	23.45 dBd	Gain:	23.45 dBd	Gain:	23.45 dBd
Height (AGL):	145 feet	Height (AGL):	145 feet	Height (AGL):	145 feet
Channel Count:	1	Channel Count:	1	Channel Count:	1
Total TX Power (W):	144.58 Watts	Total TX Power (W):	144.58 Watts	Total TX Power (W):	144.58 Watts
ERP (W):	31,996.92	ERP (W):	31,996.92	ERP (W):	31,996.92
Antenna A2 MPE %:	<b>5.95%</b>	Antenna B2 MPE %:	<b>5.95%</b>	Antenna C2 MPE %:	<b>5.95%</b>
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449
Frequency Bands:	3700 MHz	Frequency Bands:	3700 MHz	Frequency Bands:	3700 MHz
Gain:	23.45 dBd	Gain:	23.45 dBd	Gain:	23.45 dBd
Height (AGL):	145 feet	Height (AGL):	145 feet	Height (AGL):	145 feet
Channel Count:	1	Channel Count:	1	Channel Count:	1
Total TX Power (W):	144.58 Watts	Total TX Power (W):	144.58 Watts	Total TX Power (W):	144.58 Watts
ERP (W):	31,996.92	ERP (W):	31,996.92	ERP (W):	31,996.92
Antenna A3 MPE %:	<b>5.95%</b>	Antenna B3 MPE %:	<b>5.95%</b>	Antenna C3 MPE %:	<b>5.95%</b>
Antenna #:	4	Antenna #:	4	Antenna #:	4
Make / Model:	CCI DMP65R-BU6DA	Make / Model:	CCI DMP65R-BU6DA	Make / Model:	CCI DMP65R-BU6DA
Frequency Bands:	700 MHz / 850 MHz / 2300 MHz	Frequency Bands:	700 MHz / 850 MHz / 2300 MHz	Frequency Bands:	700 MHz / 850 MHz / 2300 MHz
Gain:	11.85 dBd / 12.45 dBd / 16.25 dBd	Gain:	11.85 dBd / 12.45 dBd / 16.25 dBd	Gain:	11.85 dBd / 12.45 dBd / 16.25 dBd
Height (AGL):	145 feet	Height (AGL):	145 feet	Height (AGL):	145 feet
Channel Count:	12	Channel Count:	12	Channel Count:	12
Total TX Power (W):	420 Watts	Total TX Power (W):	420 Watts	Total TX Power (W):	420 Watts
ERP (W):	9,479.38	ERP (W):	9,479.38	ERP (W):	9,479.38
Antenna A4 MPE %:	<b>2.68%</b>	Antenna B4 MPE %:	<b>2.68%</b>	Antenna C4 MPE %:	<b>2.68%</b>

- An adjusted power reduction factor of 0.32 was applied to the AIR 6449 antennas per guidance from AT&T.

- Specifications were not available for the Ericsson AIR 6419 antenna. Per AT&T, specifications for the AIR 6449 antenna were used to model the 6419 due to its similarity.

Site Composite MPE %	
Carrier	MPE %
AT&T (Max at Sector A):	18.08%
Sprint	0.34%
Clearwire	0.09%
T-Mobile	7.92%
Verizon	4.74%
<b>Site Total MPE % :</b>	<b>31.17%</b>

AT&T MPE % Per Sector	
AT&T Sector A Total:	18.08%
AT&T Sector B Total:	18.08%
AT&T Sector C Total:	18.08%
Site Total MPE % :	31.17%

### AT&T Maximum MPE Power Values (Sector A)

AT&T Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ( $\mu\text{W}/\text{cm}^2$ )	Frequency (MHz)	Allowable MPE ( $\mu\text{W}/\text{cm}^2$ )	Calculated % MPE
AT&T 700 MHz LTE FN	4	629.59	145.0	4.69	700 MHz LTE FN	467	1.00%
AT&T 700 MHz LTE DE	2	629.59	145.0	2.34	700 MHz LTE DE	467	0.50%
AT&T 1900 MHz LTE/5G	4	1297.36	145.0	9.66	1900 MHz LTE/5G	1000	0.97%
AT&T 2100 MHz LTE/5G	4	1364.77	145.0	10.16	2100 MHz LTE/5G	1000	1.02%
AT&T 3700 MHz C-Band	1	31996.92	145.0	59.54	3700 MHz C-Band	1000	5.95%
AT&T 3700 MHz C-Band	1	31996.92	145.0	59.54	3700 MHz C-Band	1000	5.95%
AT&T 700 MHz LTE	4	612.43	145.0	4.56	700 MHz LTE	467	0.98%
AT&T 850 MHz 5G	4	703.17	145.0	5.23	850 MHz 5G	567	0.92%
AT&T 2300 MHz LTE	4	1054.24	145.0	7.85	2300 MHz LTE	1000	0.78%
						<b>Total:</b>	<b>18.08%</b>

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

## Summary

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

The anticipated maximum composite contributions from the AT&T 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:

AT&T Sector	Power Density Value (%)
Sector A:	18.08%
Sector B:	18.08%
Sector C:	18.08%
AT&T Maximum MPE % (Sector A):	18.08%
Site Total:	31.17%
Site Compliance Status:	<b>COMPLIANT</b>

The anticipated composite MPE value for this site assuming all carriers present is **31.17%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

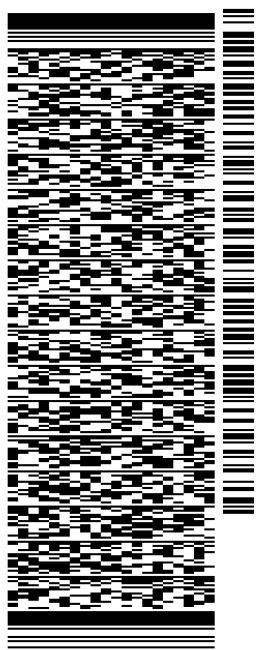
ORIGIN ID:QFMA (551) 804-0667  
 ERSILIA DAVIS  
 1777 SENTRY PARKWAY  
 VEVA 17, SUITE 210  
 BLUE BELL, PA 19422  
 UNITED STATES US

SHIP DATE: 10FEB22  
 ACTWGT: 1.00 LB  
 CAD: 108980334IN/NET4460

BILL SENDER

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**CONNECTICUT SITING COUNCIL**  
**10 FRANKLIN SQUARE**

**NEW BRITAIN CT 06051**  
 (860) 827-2935 REF: 100788NBC  
 INV: DEPT: 876347  
 PO:



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