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

April 18, 2019

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

RE: **Request of Dish Network Northeast LLC for an Order to Approve the Shared Use of an Existing Tower at 800 Booth Hill Road, Trumbull, CT 06611**

Dear Ms. Bachman:

Pursuant to Connecticut General Statutes ("C.G.S.") §16-50aa, as amended, Dish Network ("Dish Network") hereby requests an order from the Connecticut Siting Council ("Council") to approve the shared use by Dish Network of an existing telecommunication tower at 800 Booth Hill Road, Trumbull, CT 06611 (the "Property") The existing 460-foot tower and ground is owned by Crown Castle International Corp. ("Crown Castle") Dish Network requests that the Council find that the proposed shared us of the Crown Castle tower satisfies the criteria of C.G.S. §16-50aa and issue an order approving the proposed shared us. A copy of this filing is being sent to The Honorable Vicki Tesoro, First Selectman for the Town of Trumbull, Rina Bakalar, Economic and Community Development Director, as well as the property owner (Crown Castle).

Background

The existing Crown Castle facility consists of a 460-tower on 23.33-acre parcel along the west side of Booth Hill Road. T-Mobile has antennas at the 247' level, Verizon has antennas at the 230' level, T-Mobile and Verizon's ground equipment is northwest of the tower, Crown Castle has a radio building southeast of the tower inside the fenced in compound.

Dish Network is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. Dish Network and Crown Castle have agreed to the proposed shared use of the 136 Wright Road tower pursuant to mutually acceptable terms and conditions. Likewise, Dish Network and Crown Castle have agreed to the proposed installation of equipment cabinets on the ground on the south side of the tower. Crown Castle has authorized Dish Network to apply for all necessary permits and approvals that may be required to share the existing tower.

Dish Network proposes to install three (3) panel antennas, one (1) satellite dish antenna, five (5) RRUs, one (1) hybrid fiber lines. Dish will install a radio cabinet inside Crown Castle's radio building.

The Construction Drawings are Dish Network's project specifications for locations of all proposed site improvements. The Construction Drawings also contain specifications for Dish Network's proposed antennas.

C.G.S. § 16-50aa(c)(1) provides that, upon written request for approval of a proposed shared use, "if the Council finds that het proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the council shall issue an order approving such a shared use." Dish Network respectfully submits that the shared use of the tower satisfies these criteria.

A. Technical Feasibility. The existing Crown Castle tower is structurally capable of supporting Dish Network's proposed improvements. The prosed shared use of this tower is, therefore, technically feasible. A Feasibility Structural Analysis Report ("Structural Report") prepared for this project confirms that this tower can support Dish Network's proposed loading. A copy of the Structural Report has been included in this application.

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue order approving the shared use of an existing tower such as the Crown Castle tower. This authority complements the Council's prior-existing authority under C.G.S. § 16-50p to issue orders approving the construction of new towers that are subject to the Council's jurisdiction. In addition, § 16-50x(a) directs the Council to "give such consideration to the other state laws and municipal regulations as it shall deem appropriate" in ruling on requests for the shared use of existing tower facilities. Under the statutory authority vested in the Council, an order by the Council approving the requested shared use would permit the Applicant to obtain a building permit for the proposed installations. *Original zoning approval was unable to be located. Email correspondence with the jurisdiction is included with this application.

C. Environmental Feasibility. The proposed shared use of the Crown Castle tower would have a minimal environmental effect for the following reasons:

1. The proposed installation of three (3) panel antennas, one (1) satellite dish antenna, five (5) RRUs, one (1) hybrid fiber lines will have no visual impact on the area of the tower. Dish Network's cabinet would be installed within an existing radio building inside the compound. Dish Network's shared use of this tower therefore will not cause any significant change or alteration in the physical or environmental characteristics of the existing site.

2. Operation of Dish Network's antennas at this site would not exceed the RF emissions standard adopted by the Federal Communications Commission ("FCC"). Included in the EME report of this filing are the approximation tables that demonstrate that Dish Network's proposed facility will operate well within the FCC RF emissions safety standards.

3. Under ordinary operating conditions, the proposed installation would not require the use of any water or sanitary facilities and would not generate air emissions or discharges to water bodies or sanitary facilities. After construction is complete the proposed installations would not generate any increased traffic to the Crown Castle facility other than periodic maintenance. The proposed shared use of the Crown Castle tower, would, therefore, have a minimal environmental effect, and is environmentally feasible.

D. **Economic Feasibility.** As previously mentioned, Dish Network has entered into an agreement with Crown Castle for the shared use of the existing facility subject to mutually agreeable terms. The proposed tower sharing is, therefore, economically feasible. (Please see included authorization.)

E. **Public Safety Concerns.** As discussed above, the tower is structurally capable of supporting Dish Network's full array three (3) panel antennas, one (1) satellite dish antenna, five (5) RRUs, one (1) hybrid fiber lines and all related equipment. Dish Network is not aware of any public safety concerns relative to the proposed sharing of the existing Crown Castle tower.

Conclusion

For the reasons discussed above, the proposed shared use of the existing Crown Castle tower at 300 Governors Highway satisfies the criteria state in C.G.S. §16-50aa and advances the General Assembly's and the Council's goal of preventing the unnecessary proliferation of towers in Connecticut. The Applicant, therefore, respectfully requests that the Council issue an order approving the prosed shared use.

Sincerely,

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

Attachments:

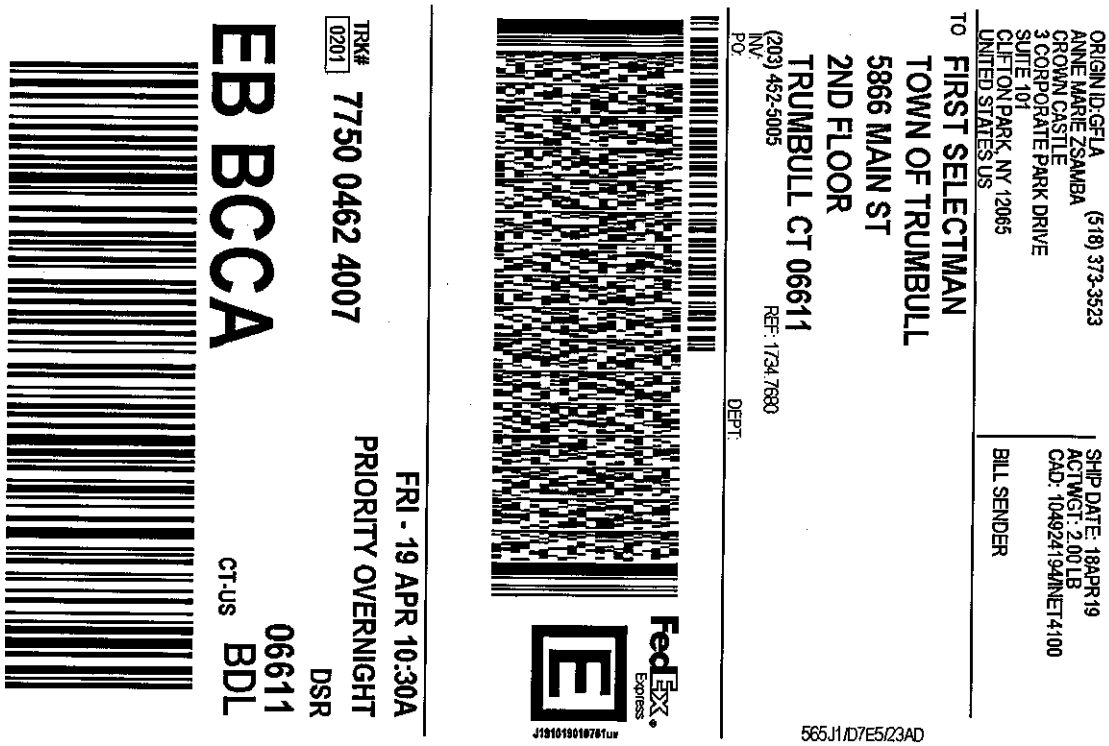
Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table report (RF Emissions Analysis Report)

Copies to:

The Honorable Vicki Tesoro, First Selectman for the Town of Trumbull
Town Hall – 2nd Floor
5866 Main Street
Trumbull, CT 06611
(203) 452-5005

Rina Bakalar, Economic and Community Development Director
Town Hall – 2nd Floor
5866 Main Street
Trumbull, CT 06611
(203) 452-5005

Crown Castle as Tower and Ground Owner



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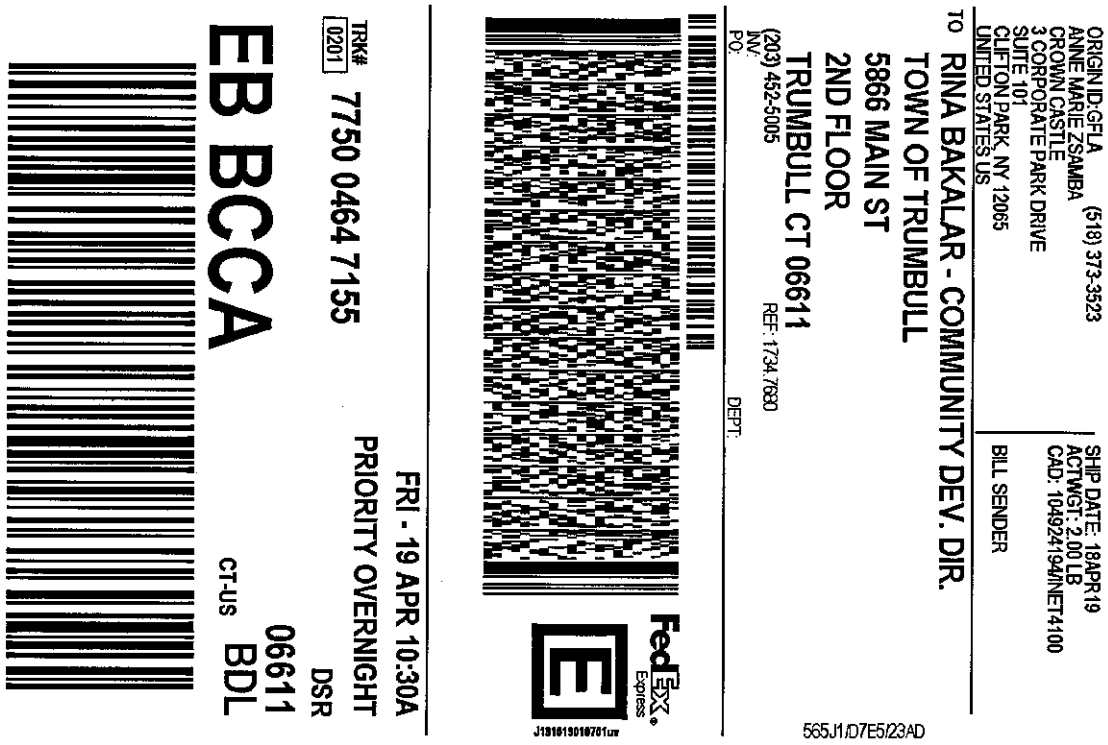
Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions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



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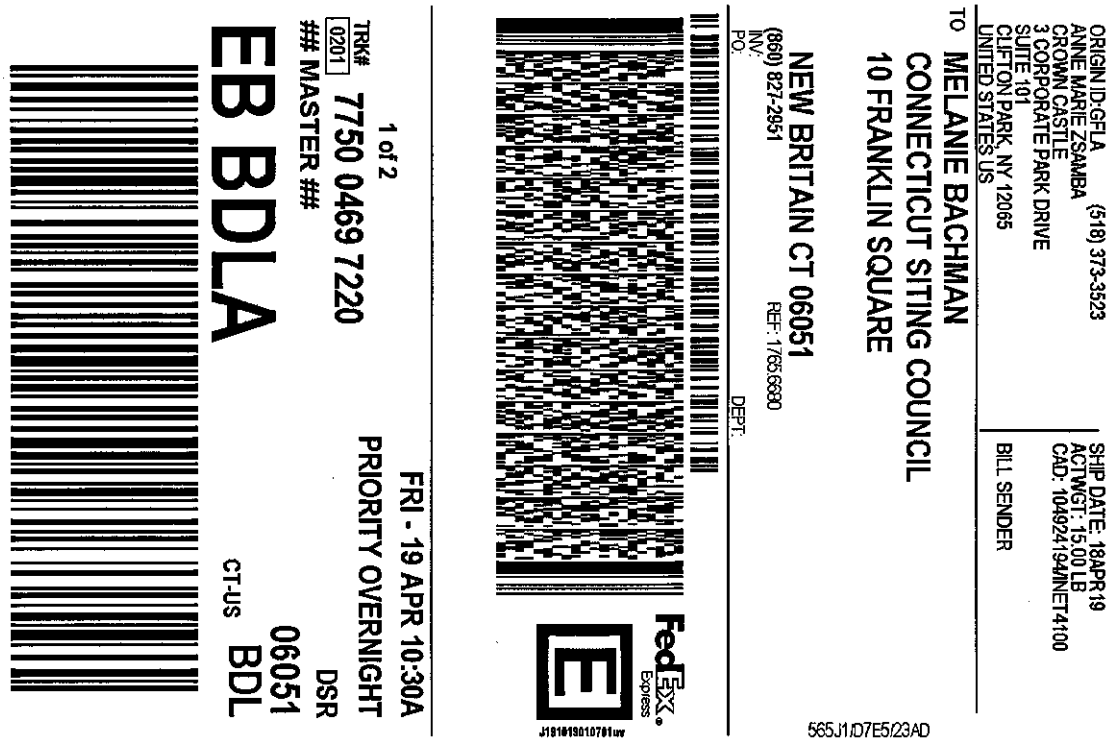

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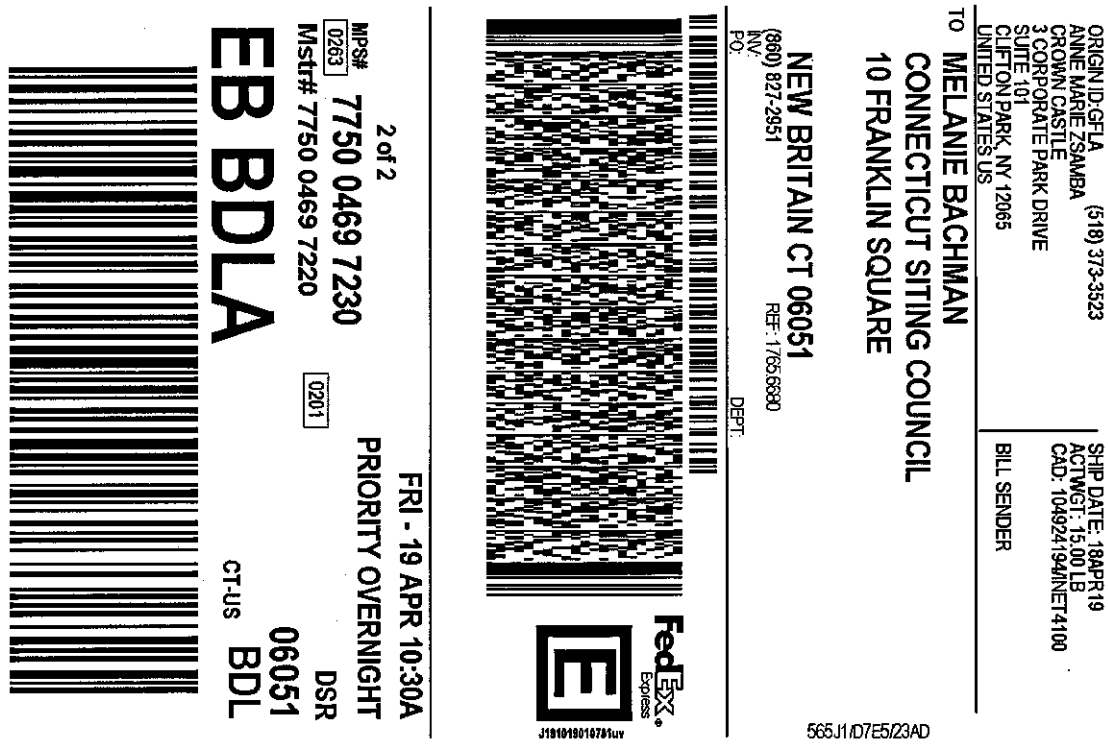

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From:	Holzschuh, Cymon
To:	Myl, Kimberly; CSC-DL Siting Council
Cc:	Helton, Heather (Contractor)
Subject:	RE: Existing Telecommunication Facility 800 Booth Hill Road, Trumbull (Crown: 873128 | T-Mobile: CT11203B)
Date:	Tuesday, January 19, 2016 2:40:02 PM

Thank you for your submission.

Although Docket 77 is the first filing the Council has on record for this facility, it appears that this facility was not certificated by the Council.

Docket 77 was filed by Metro Mobile CTS (now Verizon) to install antennas on the existing tower. T-Mobile is not bound to the conditions of approval for Docket 77.

I will note for our records that according to the Trumbull Zoning Officer, records of this facility's approval have not been retained.

Thanks,

Cymon Holzschuh
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051
P: 860.827.2941 | F: 860.827.2950

http://www.ct.gov/csc/

From: Myl, Kimberly [mailto:Kimberly.Myl@crowncastle.com]
Sent: Tuesday, January 19, 2016 11:43 AM
To: CSC-DL Siting Council
Cc: Helton, Heather (Contractor)
Subject: Existing Telecommunication Facility 800 Booth Hill Road, Trumbull (Crown: 873128 | T-Mobile: CT11203B)

To Whom It May Concern:

Please be advised both the township (email below) and Crown Castle as the tower owner, do not have the original zoning resolution on file. Please use this email as notification to waive this requirement as we will include this and the email from the township within our submission.

Please let me know if you have any questions or need additional information. Thank you in advance.

KIMBERLY MYL
Real Estate Specialist
T: (201) 236-9069 | M: (201) 993-3697

CROWN CASTLE
1200 MacArthur Blvd, Suite 200
Mahwah, NJ 07430

From: Gail Andreyka [mailto:gandreyka@trumbull-ct.gov]
Sent: Tuesday, January 19, 2016 9:59 AM
To: Myl, Kimberly
Subject: RE: INFO NEEDED

Hi Kimberly,

Doug Wenz, our Zoning Officer said that this application predates our records. Only copies of building permits would be available. The Building Department phone number is 203-452-5020.

Gail

800 BOOTH HILL ROAD

Location	800 BOOTH HILL ROAD	**Mblu**	H/04 / 00072/ 000/
Acct#		**Owner**	GLOBAL SIGNAL ACQUISITIONS IV LLC
Assessment	$4,200,000	**Appraisal**	$6,000,000
PID	2543	**Building Count**	1
Fire District	N		

Current Value

Appraisal	
Valuation Year	**Total**
2015	$6,000,000

Assessment	
Valuation Year	**Total**
2015	$4,200,000

Owner of Record

Owner	GLOBAL SIGNAL ACQUISITIONS IV LLC	**Sale Price**	$575,000
Co-Owner	C/O CROWN CASTLE USA INC	**Book & Page**	1714/ 158
Address	2000 CORPORATE DRIVE CANONSBURG, PA 15317	**Sale Date**	05/17/2016
		Instrument	25

Ownership History

Ownership History				
Owner	**Sale Price**	**Book & Page**	**Instrument**	**Sale Date**
GLOBAL SIGNAL ACQUISITIONS IV LLC	$575,000	1714/ 158	25	05/17/2016
DADDARIO F FRANCIS	$0	434/ 371		12/31/1979

Building Information

Building 1 : Section 1

Year Built: 1952
Living Area: 4,470

Building Attributes	
Field	**Description**
STYLE	Telephone Bldg
Stories:	1 Story

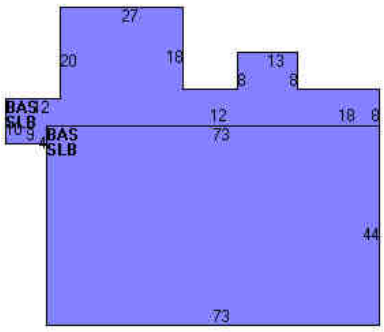
Building Photo

Occupancy	1
Exterior Wall 1	Concrete
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Tar & Gravel
Interior Wall 1	Minimum
Interior Wall 2	
Interior Floor 1	Minimum/Plywd
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air
AC Type	Central
Bldg Use	Rad/TV Tw
1st Floor Use:	
Heat/AC	Heat/AC Pkgs
Frame Type	Masonry
Baths/Plumbing	Average
Ceiling/Walls	Ceil & Walls
Rooms/Prtns	Average
Wall Height	10
% Comn Wall	

H04-72 05/04/2015

(http://images.vgsi.com/photos2/TrumbullCTPhotos//\00\02\46/15.JPG)

Building Layout



(http://images.vgsi.com/photos2/TrumbullCTPhotos//Sketches/2

Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	4,470	4,470
SLB	Slab	4,470	0
		8,940	4,470

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	433
Description	Rad/TV Tw
Zone	AA
Neighborhood	350
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	15.9
Frontage	
Depth	

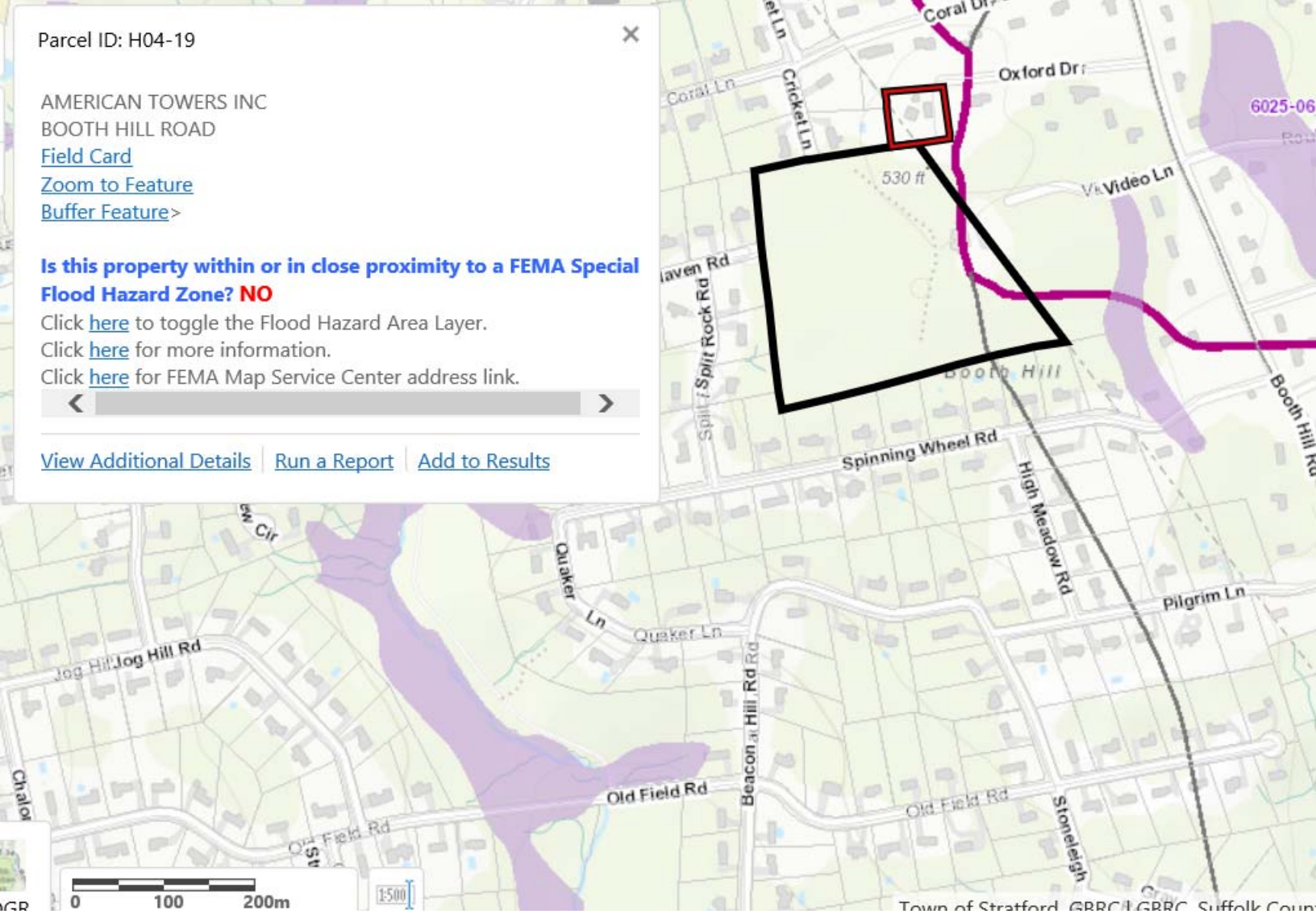
Outbuildings

Outbuildings					Legend
Code	Description	Sub Code	Sub Description	Size	Bldg #
PAV1	Paving Asph.			22800 S.F.	1
FN5	Fence 10'			250 L.F.	1
ANTG	Guyed Tower			436 L.F.	1

Valuation History

Appraisal	
Valuation Year	Total
2016	$9,710,400
2015	$9,710,400
2014	$3,013,400

Assessment	
Valuation Year	Total
2016	$6,797,280
2015	$6,797,280
2014	$2,109,300


Parcel ID: H04-19
AMERICAN TOWERS INC
BOOTH HILL ROAD
Field Card
Zoom to Feature
Buffer Feature>
Is this property within or in close proximity to a FEMA Special Flood Hazard Zone? NO
Click here to toggle the Flood Hazard Area Layer.
Click here for more information.
Click here for FEMA Map Service Center address link.
View Additional Details
Run a Report
Add to Results
530 ft
Oxford Dr
Coral Ln
Cricket Ln
Video Ln
Split Rock Rd
Booth Hill
Booth Hill Rd
Spinning Wheel Rd
High Meadow Rd
Pilgrim Ln
Quaker Ln
Beacon Hill Rd
Old Field Rd
Stoneleigh
Jog Hill Rd
0
100
200m
1:500

CROWN CASTLE

3530 Toringdon Way
Charlotte, NC 28277

Phone: (980) 209-8221
Fax: (724) 416-4688
www.crowncastle.com

April 9, 2019

GLOBAL SIGNAL ACQUISITIONS IV LLC
PO BOX 277455
ATLANTA, GA 30384-7455

RE: Letter of Authorization
Site ID: 873128
Site Name: TRUMBULL
Site Address: 800 Booth Hill Rd., Trumbull, CT 06611

Dear Landlord:

DISH NETWORK has proposed to install (3) antennas, (5) radios, and (1) hybrid cable.

Please allow this letter to serve as notification that DISH NETWORK has contracted with PINNACLE TOWERS LLC (a subsidiary of Crown Castle) to provide services related to local government zoning and permitting. PINNACLE TOWERS LLC is working with DISH NETWORK to manage this process.

This letter of authorization is required by CT - TOWN OF TRUMBULL for DISH NETWORK to apply for its building permit/zoning approvals which are required for the modification of their existing telecommunications equipment.

This letter neither overrides nor changes your current lease with PINNACLE TOWERS LLC.

Please execute this letter of authorization where indicated below, thus granting your authorization for this application and send the original to Bianca Reyes using the self-addressed, stamped, envelope included in this mailing, or the email listed below.

Thank you for your continued cooperation with PINNACLE TOWERS LLC.

Sincerely,

Bianca Reyes

Bianca Reyes
Real Estate Project Coordinator
Phone: (980) 209-8221 / E-mail: Bianca.Reyes@crowncastle.com

Approved By:

Name: SEAN DEMPSEY

Date: 4/9/2019

Signature: Sean Dempsey

DISH WIRELESS FIRST TIME INSTALL
CONSTRUCTION DRAWINGS

DISH WIRELESS SITE ID:

CT0100010A

TOWER OWNER SITE ID:

873128

SITE ADDRESS:

800 BOOTH HILL ROAD
TRUMBULL, CT 06611
(FAIRFIELD COUNTY)

SITE SUMMARY

PROJECT SCOPE:	PROJECT CONSISTS OF INSTALLING PROPOSED DISH WIRELESS TELECOMMUNICATION EQUIPMENT, CABLING, AND ANTENNAS AT AN EXISTING TELECOMMUNICATION SITE
SITE TYPE:	CO-LOCATION
TYPE OF OCCUPANCY:	TELECOMMUNICATIONS
TOWER TYPE:	GUYED TOWER
TOWER HEIGHT:	457.0'
RAD CENTER:	290.0'
TOWER LATITUDE:	41° 16' 44.26" N (41.2790°)
TOWER LONGITUDE:	-73° 11' 06.40" W (-73.1851°)
ZONING JURISDICTION:	TOWN OF TRUMBULL
COUNTY:	FAIRFIELD
PARCEL NUMBER:	H04-72
ZONING DISTRICT:	AA
POWER COMPANY:	UI CO 800-722-5584
TELEPHONE COMPANY:	VERIZON 800-922-0204

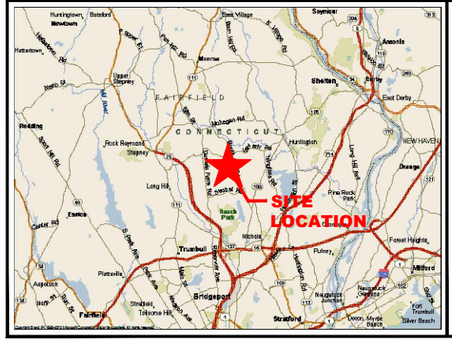
PROJECT DIRECTORY

TOWER OWNER:	CROWN CASTLE 2000 CORPORATE DRIVE CANONSBURG, PA 15317 724-416-2000
APPLICANT:	DISH WIRELESS 9601 S MERIDIAN BLVD ENGLEWOOD, CO 80112 PHONE: (866) 624-6874
SITE DESIGNER:	PM&A 1000 HOLCOMB WOODS PKWY, SUITE 210 ROSWELL, GA 30076 CONTACT: MENDY BENSON PHONE: 678-280-2325

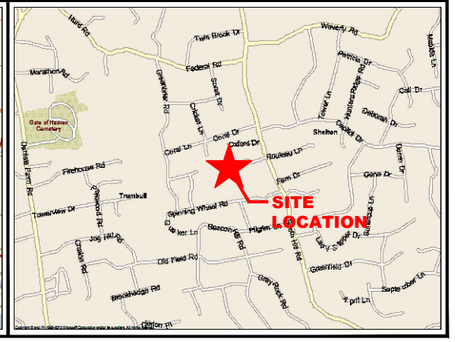
GENERAL NOTES

THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION, THEREFORE HANDICAP ACCESS IS NOT REQUIRED. A TECHNICIAN WILL VISIT THE SITE AS REQUIRED FOR ROUTINE MAINTENANCE. THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON DRAINAGE; NO SANITARY SEWER SERVICE, POTABLE WATER, OR TRASH DISPOSAL IS REQUIRED AND NO COMMERCIAL SIGNAGE IS PROPOSED.

VICINITY MAP



LOCAL MAP



CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND 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 THE LATEST EDITIONS OF THE FOLLOWING:

- 2012 INTERNATIONAL BUILDING CODE
- 2012 INTERNATIONAL RESIDENTIAL CODE
- 2012 INTERNATIONAL ENERGY CONSERVATION CODE
- 2012 INTERNATIONAL PLUMBING CODE
- 2012 INTERNATIONAL MECHANICAL CODE
- 2017 NATIONAL ELECTRIC CODE
- 2012 INTERNATIONAL FIRE CODE
- ANSI/TIA/EIA-222-G
- FAA COMPLIANCE
- FCC COMPLIANCE

DISH WIRELESS PROJECT MANAGER APPROVAL:

SIGNATURE DATE

CONSTRUCTION MANAGER APPROVAL:

SIGNATURE DATE

LEASING/SITE ACQUISITION:

SIGNATURE DATE

RF ENGINEER:

SIGNATURE DATE

LANDLORD/TOWER OWNER APPROVAL:

SIGNATURE DATE

SHEET INDEX

SHEET NO.	DESCRIPTION	REV	DATE
T-1	TITLE SHEET	0	04/04/19
GN-1	GENERAL NOTES	0	04/04/19
GN-2	GENERAL NOTES	0	04/04/19
EN-1	ELECTRICAL NOTES	0	04/04/19
EN-2	ELECTRICAL NOTES	0	04/04/19
C-1	COMPOUND PLAN	0	04/04/19
C-2	EQUIPMENT PLAN	0	04/04/19
C-3	TOWER ELEVATION AND ANTENNA LAYOUT	0	04/04/19
C-3.1	ANTENNA MOUNT (SUPPLEMENTAL)	0	04/04/19
1 OF 2	ANTENNA SCHEDULE & DIAGRAM (SUPPLEMENTAL)	0	04/04/19
2 OF 2	CABLE COLOR CODE (SUPPLEMENTAL)	0	04/04/19
C-4	EQUIPMENT DETAILS	0	04/04/19
C-5	EQUIPMENT DETAILS (SUPPLEMENTAL)	0	04/04/19
E-1	UTILITY PLAN	0	04/04/19
G-1	GROUNDING NOTES AND DETAILS	0	04/04/19
G-2	GROUNDING NOTES AND DETAILS	0	04/04/19
G-3	GROUNDING NOTES AND DETAILS	0	04/04/19
RF-1	RF DATA SHEET (SUPPLEMENTAL)	0	04/04/19
RF-2	PLUMBING DIAGRAM (SUPPLEMENTAL)	0	04/04/19

811 Know what's below. Call before you dig. www.call811.com

STATE OF CONNECTICUT
SHAYNA A.M. SMILEY
PEN.0032757
LICENSED PROFESSIONAL ENGINEER
4/10/2019

PLANS PREPARED FOR: DISH WIRELESS

PROJECT MANAGER: CROWN CASTLE

PLANS PREPARED BY: PM&A P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER: CCD19-085

DISH WIRELESS SITE ID: CT0100010A

TOWER OWNER SITE ID: 873128

SITE ADDRESS: 800 BOOTH HILL ROAD TRUMBULL, CT 06611

SHEET DESCRIPTION: TITLE SHEET

SHEET NUMBER: T-1.0

GENERAL NOTES:

1. EVERY EFFORT HAS BEEN MADE IN THE CONSTRUCTION DOCUMENTS TO PROVIDE A COMPLETE SCOPE OF WORK. MINOR DISCREPANCIES IN THE DRAWINGS AND/OR SPECIFICATIONS SHALL NOT EXCUSE CONTRACTORS FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
2. ALL REFERENCES TO OWNER HEREIN SHALL BE CONSTRUED TO MEAN THE CARRIER OR ITS DESIGNATED REPRESENTATIVE.
3. BIDDING REQUIREMENTS
   a. PRIOR TO THE SUBMISSION OF BIDS, VISIT THE JOB SITE TO BECOME FAMILIAR WITH ALL CONDITIONS AFFECTING THE PROPOSED PROJECT. VISIT THE SITE WITH THE CONSTRUCTION DOCUMENTS TO VERIFY FIELD DIMENSIONS AND CONDITIONS TO CONFIRM THAT THE PROJECT WILL BE ACCOMPLISHED AS SHOWN.
   b. PROVIDE NOTIFICATION TO OWNER IN WRITING OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO SUBMISSION OF PRICE PROPOSAL. IN THE EVENT OF DISCREPANCIES, PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED OTHERWISE.
   c. WHEN TOWER IS OWNED BY A THIRD PARTY, CONTACT TOWER OWNER REPRESENTATIVE FOR PARTICIPATION IN BID WALK.
   d. WHERE ANCHORING TO A CONCRETE ROOF SLAB, CONFIRM (PRIOR TO SUBMITTING BID) THE PRESENCE OF POST TENSION TENDONS. INCLUDE PROVISIONS FOR X-RAY PROCEDURES TO LOCATE THE TENDONS PRIOR TO CONSTRUCTION.
4. DRAWINGS ARE NOT TO BE SCALED. WRITTEN DIMENSIONS TAKE PRECEDENCE. CONSTRUCTION DOCUMENTS ARE INTENDED FOR DIAGRAMMATIC PURPOSES ONLY, UNO.
5. FIELD VERIFY ALL DIMENSIONS, ELEVATIONS AND EXISTING CONDITIONS PRIOR TO BEGINNING ANY MATERIALS ORDERING, FABRICATION OR CONSTRUCTION WORK ON THIS PROJECT. BRING ANY DISCREPANCIES IMMEDIATELY TO THE ATTENTION OF THE OWNER AND RESOLVE BEFORE PROCEEDING WITH THE WORK.
6. FURNISH ALL MATERIALS, EQUIPMENT, LABOR, AND ANY REQUIREMENTS NECESSARY TO COMPLETE PROJECT AS DESCRIBED IN THE CONSTRUCTION DOCUMENTS AND CONSTRUCTION SOW.
7. SUPERVISE AND DIRECT THE PROJECT DESCRIBED IN THE CONSTRUCTION DOCUMENTS. PROVIDE ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
8. ALL WORK PERFORMED ON THE PROJECT AND MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES APPLICABLE TO THE WORK.
9. CONSTRUCTION COORDINATION REQUIREMENTS
   a. NOTIFY OWNER OF ANY DISCREPANCIES PRIOR TO START OF WORK.
   b. OBTAIN ALL PERMITS. SCHEDULE AND COORDINATE ALL INSPECTIONS.
   c. PROVIDE, AT THE PROJECT SITE, A FULL, CURRENT SET OF CONSTRUCTION DOCUMENTS FOR USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
   d. RECEIVE WRITTEN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DOCUMENTS.
   e. PERFORM WORK DURING OWNER'S PREFERRED HOURS TO AVOID DISTURBING NORMAL BUSINESS.
   f. PROVIDE FALL PROTECTION IN ACCORDANCE WITH FEDERAL, STATE, LOCAL, AND OWNER REQUIREMENTS.
   g. IF FAA LIGHTING AND MARKING IS PRESENT ON SITE AND IS POWERED BY ELECTRICAL SERVICE THAT IS TO BE INTERRUPTED, MAINTAIN THE NECESSARY LIGHTS DURING CONSTRUCTION AND NOTIFY THE PROPER AUTHORITIES IN THE EVENT OF A DISRUPTION.
   h. PROVIDE A PORTABLE FIRE EXTINGUISHER WITH A RATING OF NOT LESS THAN 2-A OR 2-A10BC WITHIN 75 FEET TRAVEL DISTANCE TO ALL PORTIONS OF PROJECT AREA DURING CONSTRUCTION.
   i. STRUCTURAL COMPONENTS OF ADJACENT FACILITIES SHALL NOT BE ALTERED BY THIS CONSTRUCTION PROJECT, UNO. ENSURE THAT EXCAVATION DOES NOT AFFECT ADJACENT STRUCTURES.
   j. SEAL ALL PENETRATIONS THROUGH FIRE-RATED AREAS WITH U.L. LISTED OR FIRE MARSHALL-APPROVED MATERIALS, IF APPLICABLE.
   k. BURIED UTILITIES MAY EXIST IN THE AREA AND UTILITY INFORMATION SHOWN MAY NOT BE COMPLETE. CONTACT THE UTILITY LOCATE SERVICE A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION.
   l. COORDINATE ALL POWER INSTALLATION WITH POWER COMPANY AS REQUIRED. REPORT POWER INSTALLATION COORDINATION SOLUTION(S) TO OWNER.
   m. PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
   n. KEEP GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, AND RUBBISH. REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY OR PREMISES. SITE SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
   o. MAINTAIN THE INTEGRITY OF THE BUILDING ENVELOPE AND CONSTRUCT BARRIERS IN THE AREA OF WORK TO PREVENT DAMAGE FROM WEATHER AS WELL AS FROM CONSTRUCTION DUST AND DEBRIS.
10. INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO MANUFACTURER'S SPECIFICATIONS, UNO, OR WHERE LOCAL CODES OR ORDINANCES DIRECT OTHERWISE.
11. PROPOSED CELLULAR EQUIPMENT AND FIXTURES WILL BE FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR, UNLESS NOTED OTHERWISE.
12. ANY SUBSTITUTIONS OF MATERIALS AND/OR EQUIPMENT, MUST BE APPROVED BY OWNER.
13. DOCUMENT ALL CHANGES MADE IN THE FIELD BY MARKING UP THE APPROVED CONSTRUCTION DRAWINGS AND SUBMITTING THE REDLINED SET TO OWNER UPON COMPLETION. DOCUMENT ALL WORK PERFORMED WITH PHOTOGRAPHS TO BE SUBMITTED WITH REDLINED CONSTRUCTION DRAWINGS.
14. PROVIDE SUPPORTS FOR CABLES TO THE ELEVATION OF ALL INITIAL AND FUTURE ANTENNAS IN ACCORDANCE WITH ALL MANUFACTURER'S REQUIREMENTS.
15. CONFIRM THAT THE REQUIREMENTS OF THE STRUCTURAL ANALYSIS, MOUNT ANALYSIS AND ANY ASSOCIATED MODIFICATIONS HAVE BEEN FOLLOWED AND COMPLETED AS REQUIRED TO SUPPORT THE EQUIPMENT ASSOCIATED WITH THIS PROJECT.
16. KNOW AND OBSERVE MANUFACTURER'S MINIMUM BEND RADIUS SPECIFICATIONS BEFORE HANDLING HYBRID CABLES, RF CABLES, AND FIBER OPTIC LINES.
17. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS STIPULATED IN THE CONSTRUCTION SCOPE OF WORK CONTRACT, REGARDLESS OF INCLUSION OR OMISSION FROM THE CONSTRUCTION DRAWING(s).
18. ADHERENCE TO CONSTRUCTION DOCUMENTS AND CONSTRUCTION SOW ARE TO BE FOLLOWED.

ABBREVIATIONS

A/C	AIR CONDITIONING
AFF	ABOVE FINISHED FLOOR
AGL	ABOVE GROUND LEVEL, ABOVE GRADE LEVEL
AWS	ADVANCED WIRELESS SERVICE
BBU	BATTERY BACKUP UNIT
BLDG	BUILDING
BLK	BLOCKING
CLG	CEILING
CLR	CLEAR
CONC	CONCRETE
CONT	CONTINUOUS
D	DEPTH
DBL	DOUBLE
DEG	DEGREE
ø, DIA	DIAMETER
DIAG	DIAGONAL
DN	DOWN
DET	DETAIL
DWG	DRAWING
E	EXISTING
EA	EACH
ELEV, EL	ELEVATION
ELEC	ELECTRICAL
EQ	EQUAL
EQUIP	EQUIPMENT
EXT	EXTERIOR
FIF	FIBER INTERFACE FRAME, FACILITY INTERFACE FRAME
FIN	FINISH
FLUOR	FLUORESCENT
FLR	FLOOR
FT	FOOT, FEET
GA	GAUGE
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GRND	GROUND
GSM	GLOBAL SYSTEM MOBILE
GYP	GYPSUM BOARD
HORZ	HORIZONTAL
HR	HOUR
HT	HEIGHT
ID	INSIDE DIAMETER
IN	INCH, INCHES
INSUL	INSULATION
INT	INTERIOR
L	LENGTH
LBS	POUNDS
LTE	LONG TERM EVOLUTION
MAX	MAXIMUM
MECH	MECHANICAL
MTL	METAL
MFR	MANUFACTURER
MGR	MANAGER
MIMO	MULTIPLE IN MULTIPLE OUT
mMIMO	MASSIVE MULTIPLE IN MULTIPLE OUT
MIN	MINIMUM
MISC	MISCELLANEOUS
NA	NOT APPLICABLE
NIC	NOT IN CONTRACT
NO	NUMBER
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
PCS	PERSONAL COMMUNICATION SERVICE
PDU	POWER DISTRIBUTION UNIT
PROJ	PROJECT
PROP	PROPERTY
PT	PRESSURE TREATED
PVC	POLYVINYL CHLORIDE
REQ	REQUIRED
RF	RADIO FREQUENCY
RM	ROOM
RO	ROUGH OPENING
RRH	REMOTE RADIO HEAD
SHT	SHEET
SIM	SIMILAR
SPEC	SPECIFICATION
SF	SQUARE FOOT
SS	STAINLESS STEEL
STL	STEEL
SUSP	SUSPENDED
TMA	TOWER MOUNTED AMPLIFIER
TND	TINNED
TYP	TYPICAL
UMTS	UNIVERSAL MOBILE TELECOMMUNICATION SERVICE
UNO	UNLESS NOTED OTHERWISE
VERT	VERTICAL
W/	WITH
W/O	WITHOUT
WCS	WIRELESS COMMUNICATION SERVICE
WP	WATER PROOF

SCOPE OF WORK

SCOPE/STATE OF WORK SUMMARY SHOULD INCLUDE THE FOLLOWING:
ALL PURPOSED EQUIPMENT INDICATED IN DRAWINGS IS FOR AN UNMANNED TRANSMISSION FACILITY FOR TELECOMMUNICATIONS WIRELESS SERVICE. THIS IS NOT AN ALL-INCLUSIVE LIST. CONTRACTOR SHALL UTILIZE SPECIFIED EQUIPMENT PART OR ENGINEER APPROVE EQUIVALENT. CONTRACTOR SHALL VERIFY ALL NEEDED EQUIPMENT TO PROVIDE A FUNCTIONAL SITE. THE PROJECT GENERALLY CONSISTS OF THE FOLLOWING:

- INSTALL (3) PROPOSED PANEL ANTENNAS (1 PER SECTOR) (ERICSSON BUILD)
- INSTALL (3) NEW RET's (NOKIA BUILD ONLY)
- INSTALL (3) PROPOSED ANTENNA MOUNTS & ASSOCIATED JUMPERS (1 PER SECTOR)
- INSTALL (8) PROPOSED RRUs AND ASSOCIATED JUMPERS
- INSTALL (1) PROPOSED HYBRID CABLE. UP TO (3) HYBRID CABLES (ROOFTOP)
- INSTALL (1) PROPOSED CABLE LADDER FOR HYBRID SUPPORT (IF APPLICABLE)
- INSTALL (1) PROPOSED METAL PLATFORM w/ CANOPY (IF APPLICABLE) FOR GROUND EQUIPMENT OR CONCRETE PAD (PER DESIGN)
- INSTALL (1) PROPOSED ICE BRIDGE OR 4" RMC ON 4" CONCRETE SLEEPERS (PER DESIGN)
- INSTALL (1) PROPOSED BATTERY BACKUP SYSTEM IN CABINET
- INSTALL (1) PROPOSED PPC CABINET MOUNTED TO NEW H-FRAME
- INSTALL (1) PROPOSED SURGE SUPPRESSION DEVICE
- INSTALL (1) PROPOSED EQUIPMENT CABINET
- INSTALL (1) PROPOSED RBS CHASSIS IN PROPOSED EQUIPMENT CABINET
- INSTALL (1) PROPOSED BASEBAND UNIT IN PROPOSED RBS CHASSIS
- INSTALL (1) PROPOSED POWER CONDUIT FROM PLATFORM TO MEET-ME-POINT DESIGNATED BY POWER COMPANY
- INSTALL (1) PROPOSED METER BASE FOR POWER METER ON NEW H-FRAME
- INSTALL (1) PROPOSED TELCO CONDUIT FROM PLATFORM TO MEET-ME-POINT DESIGNATED BY TELCO PROVIDER
- INSTALL (1) PROPOSED NEMA4 TELCO-FIBER BOX MOUNTED TO NEW H-FRAME
- INSTALL (1) PROPOSED GPS ANTENNA WITH CABLE IN CONDUIT
- INSTALL (1) PROPOSED DISH WIRELESS (3'-0"ø) DISH ANTENNA FACING SOUTH ON PROPOSED PIPE MAST
- INSTALL (1) PROPOSED PIPE MAST FOR DISH ANTENNA

THE SIZE, HEIGHT AND DIRECTIO NOF ALL ANTENNAS SHALL BE ADJUSTED TO MEET SYSTEM REQUIREMENT DEPICTED BY THE LATEST APPROVED RFDS.

PROJECT NOTES

1. THE FOLLOWING INFORMATION HAS BEEN PROVIDED BY DISH WIRELESS FOR THIS PROJECT AND HAS NOT BEEN FIELD VERIFIED AS PART OF THIS PROJECT.
   a. EXISTING TOWER, MOUNT AND EQUIPMENT ELEVATIONS
   b. DESIGN PACKAGE BASED ON THE APPLICATION #: 484257
2. A STRUCTURAL ANALYSIS TO DETERMINE THE TOWER CAPACITY TO SUPPORT THE PROPOSED EQUIPMENT WAS PERFORMED FOR DISH WIRELESS OUTSIDE THE SCOPE OF THIS PROJECT.
   a. STRUCTURAL ANALYSIS BY: TOWER ENGINEERING PROFESSIONALS
   b. DATED: 03/26/2019
   c. RESULTS SUFFICIENT CAPACITY
3. CONFIRM THAT THE REQUIREMENTS OF THE STRUCTURAL ANALYSIS AND ANY ASSOCIATED MODIFICATIONS HAVE BEEN FOLLOWED AND COMPLETED AS REQUIRED TO SUPPORT THE EQUIPMENT ASSOCIATED WITH THIS PROJECT.

STATE OF CONNECTICUT
SHAYAN A.M. SMILEY
PEN.0032757
LICENSED
PROFESSIONAL ENGINEER
4/10/2019

PLANS PREPARED FOR:
dish WIRELESS

PROJECT MANAGER:
CROWN CASTLE

PLANS PREPARED BY:
PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
CT0100010A

TOWER OWNER SITE ID:
873128

SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
GENERAL NOTES

SHEET NUMBER:
GN-1

SITE NOTES:

1. WHEN SITE WORK IS INCLUDED IN SCOPE:
   a. CLEAR AND GRUB SITE OF ALL VEGETATION, PAVING, GRAVEL BASE AND OTHER DEBRIS NOT TO REMAIN. SUBGRADES ARE TO BE SET PRIOR TO LANDSCAPE INSTALLATION.
   b. PROVIDE ELEVATION OF SUBGRADE WITHIN 0.10 FOOT OF ELEVATIONS SHOWN ON PLAN MINUS DEPTH OF TOPSOIL, FILL, AND MULCH.
   c. ROUGH GRADE ALL AREAS WITHIN 1 FOOT OF ELEVATIONS INDICATED BEFORE PLANTING. PROVIDE POSITIVE DRAINAGE AWAY FROM EQUIPMENT SLABS, BUILDINGS AND THROUGH ALL PLANTER AREAS TO AVOID LOW SPOTS AND STANDING WATER.
   d. BLEND NEW GRADES NATURALLY INTO EXISTING GRADES.
   e. MAINTAIN POSITIVE DRAINAGE ON THE SITE AT ALL TIMES.
   f. IF REQUIRED, MAINTAIN CONTINUOUS EROSION CONTROL ON THE DOWNSTREAM SIDE OF THE SITE.
   g. IN LANDSCAPE AREAS, FINISH GRADES ARE TO FOLLOW THE GRADES AND EDGE DETAILS INDICATED AND BE MOUNDED 6 INCHES IN THE CENTER OF THE BED ABOVE THE EDGE OF THE LANDSCAPE AREA.
   h. DO NOT PLACE FILL OR EMBANKMENT MATERIAL ON FROZEN GROUND. DO NOT PLACE FROZEN MATERIALS, SNOW OR ICE IN ANY FILL OR EMBANKMENT.
   i. NOTIFY OWNER IF MODIFICATIONS TO THE PROPOSED GRADING SEEM NECESSARY AND OBTAIN APPROVAL PRIOR TO START OF WORK.
2. FOOTINGS SHALL BEAR ON FIRM, NATURAL, UNDISTURBED SOIL, OR ON ENGINEERED FILL (COMPACTED TO 95% ASTM D1557). ENSURE THAT EXCAVATIONS ARE FREE OF ORGANIC MATERIAL, DEBRIS, OR OTHER FOREIGN MATERIAL. NOTIFY OWNER IF ANY UNUSUAL CONDITIONS ARE ENCOUNTERED.

3. FILL AND SLAB BASE MATERIAL SHALL BE 3/4" MINUS CRUSHED ROCK PLACED IN 8" (MAXIMUM) LOOSE LIFTS AND COMPACTED TO 98% ASTM D1557.

CONCRETE NOTES:

1. CONCRETE AND REINFORCING SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:

CONCRETE CONSTRUCTION	ACI 318, f'c=4 KSI, UNO
CEMENT	ASTM C150, PORTLAND CEMENT TYPE II, UNO
REINFORCING STEEL	ASTM A615 (INCLUDING SUPPLEMENT S1), GRADE 60, fy=60 KSI, UNO
WELDED WIRE FABRIC	ASTM A185
SPIRAL REINFORCEMENT	ASTM A615, GRADE 60, fy=60 KSI
ANCHOR BOLTS	ASTM A307
GRADE 60 REBAR WELDING	ASTM A706

   NOTES: ANY BARS SO NOTED ON THE DRAWINGS SHALL BE GRADE 60, fy=60 KSI. REINFORCING COMPLYING WITH ASTM A615(S1) MAY BE WELDED ONLY IF MATERIAL PROPERTY REPORTS INDICATING CONFORMANCE WITH WELDING PROCEDURES SPECIFIED IN A.W.S. D14 ARE SUBMITTED.

2. CONCRETE PROTECTION (COVER) FOR REINFORCING STEEL SHALL BE AS FOLLOWS:

FOOTINGS AND OTHER UNFORMED SURFACES, EARTH FACE		3"
FORMED SURFACES EXPOSED TO EARTH OR WEATHER	(≥ #6 BARS)	2"
FORMED SURFACES EXPOSED TO EARTH OR WEATHER	(≤ #5 BARS)	1 1/2"
SLABS AND WALLS	(INTERIOR FACE)	3/4"

3. AIR ENTRAIN ALL CONCRETE WITH SURFACES EXPOSED TO WEATHER WITH AN AIR-ENTRAINING AGENT CONFORMING TO ASTM C260, C494, C618, C989 AND C1017. AIR ENTRAIN CONCRETE EXPOSED TO FREEZING AND THAWING WHILE MOIST IN ACCORDANCE WITH ACI 318, SECTION 4.4.1.

4. DETAIL REINFORCING STEEL (INCLUDING HOOKS AND BENDS) IN ACCORDANCE WITH ACI 315 AND 318. LAP ALL CONTINUOUS REINFORCEMENT AT LEAST 30 BAR DIAMETERS OR A MINIMUM OF 2'-0". PROVIDE CORNER BARS AT ALL WALL AND FOOTING INTERSECTIONS. LAP CORNER BARS AT LEAST 30 BAR DIAMETERS OR A MINIMUM OF 2'-0". LAP ADJACENT MATS OF WELDED WIRE FABRIC A MINIMUM OF 8" AT SIDES AND ENDS.

5. PERFORM WELDING OF GRADE 60 REINFORCING BARS (IF REQUIRED) USING LOW HYDROGEN ELECTRODES. PERFORM WELDING OF GRADE 40 REINFORCING BARS (IF REQUIRED) USING E70 XX ELECTRODES. DO NOT WELD WITHIN 4" OF COLD BENDS IN REINFORCING STEEL.

6. DO NOT FIELD BEND REINFORCING PARTIALLY EMBEDDED IN CONCRETE UNLESS SPECIFICALLY SO DETAILED OR APPROVED BY THE ENGINEER.

7. SUPPORT BARS ON CHAIRS OR DOBIE BRICKS.

8. FURNISH NON-SHRINK GROUT BY AN APPROVED MANUFACTURER. MIX AND PLACE IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED RECOMMENDATIONS. GROUT STRENGTH SHALL BE AT LEAST EQUAL TO THE MATERIAL ON WHICH IT IS PLACED (4 KSI, MINIMUM).

9. ALL EXPANSION ANCHORS TO BE HILTI BRAND, UNO. TEST ADHESIVE ANCHORS TO CONFIRM CAPACITY UNLESS WAIVED BY ENGINEER AND LOCAL JURISDICTION.

STRUCTURAL STEEL NOTES:

1. STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:

WIDE FLANGE SHAPES	ASTM A992, GRADE 50
SHAPES, PLATES, ANGLES, & RODS	ASTM A36, Fy 36 KSI
SPECIAL SHAPES AND PLATES	ASTM A572, Fy 50 KSI
PIPE COLUMNS	ASTM A53, GR B, Fy 35 KSI
STRUCTURAL TUBING	ASTM A500, GR B, Fy 46KSI
ANCHOR BOLTS	ASTM A307
CONNECTION BOLTS	ASTM A325 TWIST-OFF

2. BASE STRUCTURAL STEEL DESIGN, FABRICATION AND ERECTION (INCLUDING FIELD WELDING, HIGH STRENGTH FIELD BOLTING, EXPANSION BOLTS, AND THREADED EXPANSION ANCHORS) ON THE AISC "SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" LATEST EDITION.

3. HOT DIP GALVANIZE AFTER FABRICATION PER A123/A123M-00 ALL STEEL EXPOSED TO WEATHER AND WHERE NOTED.

4. CONFORM TO ALL AISC AND AWS STANDARDS FOR WELDING. PERFORM WELDING BY ANSI/AWS D1.1 CERTIFIED WELDERS USING E70 XX ELECTRODES. USE ONLY PRE-QUALIFIED WELDS AS DEFINED BY AWS.

5. PROVIDE COLD-FORMED STEEL FRAMING MEMBERS OF THE SHAPE, SIZE, AND GAUGE SHOWN ON THE PLANS. PROVIDE MINIMUM SECTION PROPERTIES INDICATED. ALL COLD-FORMED STEEL FRAMING SHALL CONFORM TO THE AISI "SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS."

6. FOR BOLTED CONNECTIONS, USE 3/4" DIA., BEARING-TYPE, A325 BOLTS WITH A MINIMUM OF TWO BOLTS, UNO.

7. FOR NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING, USE 5/8" DIA. A307 BOLTS, UNO.

8. PREPARE AND PAINT IN ACCORDANCE WITH THE PAINT MANUFACTURERS WRITTEN INSTRUCTIONS, UNO.

9. TOUCH UP ALL FIELD DRILLING, WELDING AND CUT SURFACES WITH 2 COATS OF GALVACON (ZINC RICH PAINT) OR APPROVED EQUAL.

10. THE STRUCTURAL INTEGRITY OF THE EQUIPMENT PLATFORM HAS NOT BEEN REVIEWED BY FDH INFRASTRUCTURE SERVICES, LLC.

SPECIAL INSPECTIONS:

1. WHEN REQUIRED, PROVIDE SPECIAL INSPECTIONS PERFORMED BY AN INDEPENDENT INSPECTOR, APPROVED BY OWNER'S REPRESENTATIVE AND THE LOCAL JURISDICTION.

2. THE SPECIAL INSPECTOR SHALL PROVIDE A COPY OF THE REPORT TO THE OWNER'S REPRESENTATIVE, STRUCTURAL ENGINEER, CONTRACTOR, AND BUILDING OFFICIAL.

STATE OF CONNECTICUT
SHAYNE A.M. SMILEY
PEN.0032757
LICENSED
PROFESSIONAL ENGINEER
4/10/2019

PLANS PREPARED FOR:

dish WIRELESS

PROJECT MANAGER:

CROWN CASTLE

PLANS PREPARED BY:

PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
CT0100010A

TOWER OWNER SITE ID:
873128

SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
GENERAL NOTES

SHEET NUMBER:
GN-2

ELECTRICAL NOTES:

GENERAL

GENERAL CONDITIONS:

A. CONTRACTOR SHALL INSPECT THE EXISTING SITE CONDITIONS PRIOR TO SUBMITTING BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARD TO THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE ISSUED TO CONSTRUCTION MANAGER IN WRITING FOR CLARIFICATION PRIOR TO SUBMITTAL OF BID AND CONTRACT AWARD.

B. THE CONTRACTOR SHALL OBTAIN PERMITS, LICENSES, MAKE ALL DEPOSITS, AND PAY ALL FEES REQUIRED FOR THE CONSTRUCTION OF WORK UNDER THIS SECTION.

C. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF ALL SYSTEMS AND COMPONENTS COVERED UNDER THIS SECTION. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. DRAWINGS SHALL NOT BE SCALED TO DETERMINE DIMENSIONS.

LAWS, REGULATIONS, ORDINANCES, STATUTES AND CODES:

A. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), AND ALL APPLICABLE LOCAL LAWS, REGULATIONS, ORDINANCES, STATUTES AND CODES. CONDUIT BENDS SHALL BE THE RADIUS BEND FOR THE TRADE SIZE OF CONDUIT IN COMPLIANCE WITH THE LATEST EDITIONS OF NEC.

REFERENCES:

A. THE PUBLICATIONS LISTED BELOW ARE PART OF THIS SPECIFICATION. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE. THIS SPECIFICATION IS ISSUED FOR CONSTRUCTION UNLESS OTHERWISE NOTED. EXCEPT AS MODIFIED BY THE REQUIREMENT SPECIFIED HEREIN OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THIS SPECIFICATION SHALL CONFORM TO THE APPLICABLE PROVISION OF THESE PUBLICATIONS.

1. ANSI/IEEE (AMERICAN NATIONAL STANDARDS INSTITUTE)
2. ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)
3. ICEA (INSULATED CABLE ENGINEERS ASSOCIATION)
4. NEMA (NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION)
5. NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)
6. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
7. UL (UNDERWRITERS LABORATORIES. INC.)
8. DISH WIRELESS GROUNDING AND BONDING STANDARDS, LATEST EDITION, AND COMPLY WITH DISH WIRELESS GROUNDING CHECKLIST, LATEST VERSION
9. R56 MOTOROLA STANDARDS

SCOPE OF WORK:

A. WORK UNDER THIS SECTION SHALL CONSIST OF FURNISHING ALL LABOR, MATERIAL, AND ASSOCIATED SERVICES REQUIRED TO COMPLETE REQUIRED CONSTRUCTION AND BE OPERATIONAL.

B. ALL ELECTRICAL EQUIPMENT UNDER THIS CONTRACT SHALL BE PROPERLY TESTED, ADJUSTED, AND ALIGNED BY THE CONTRACTOR.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATING, DRAINING OF TRENCHES, BACKFILLING, AND REMOVAL OF EXCESS DIRT.

D. THE CONTRACTOR SHALL PREPARE A COMPLETE SET OF AS-BUILT DRAWINGS, DOCUMENT ALL WIRING EQUIPMENT CONDITIONS, AND CHANGES WHILE COMPLETING THIS CONTRACT, THE AS-BUILT DRAWINGS SHALL BE SUBMITTED AT COMPLETION OF THE PROJECT.

PRODUCTS

GENERAL:

A. ALL MATERIALS AND EQUIPMENT SHALL BE UL LISTED, NEW, AND FREE FROM DEFECTS.

B. ALL ITEMS OF MATERIALS AND EQUIPMENT SHALL BE ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION AS SUITABLE FOR THE USE INTENDED.

C. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.

D. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING EQUAL TO OR GREATER THAN THE SHORT CIRCUIT CURRENT AVAILABLE, 10,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT.

MATERIALS AND EQUIPMENT:

A. CONDUIT:

1. RIGID METAL CONDUIT (RMC) SHALL BE HOT-DIPPED GALVANIZED INSIDE AND OUTSIDE INCLUDING ENDS AND THREADS AND ENAMELED OR LACQUERED INSIDE IN ADDITION TO GALVANIZING.
2. LIQUID TIGHT FLEXIBLE METAL CONDUIT SHALL BE UL LISTED.
3. CONDUIT CLAMPS, STRAPS AND SUPPORTS SHALL BE STEEL OR MALLEABLE IRON. ALL FITTINGS SHALL BE COMPRESSION AND CONCRETE TIGHT TYPE.
4. NONMETALLIC CONDUIT AND FITTINGS SHALL BE SCHEDULE 40 PVC UNLESS SCHEDULE 80 PVC IS SPECIFIED. INSTALL USING SOLVENT-CEMENT-TYPE JOINTS AS RECOMMENDED BY THE MANUFACTURER.

B. CONDUCTORS AND CABLE:

1. CONDUCTORS AND CABLE SHALL BE FLAME-RETARDANT, MOISTURE AND HEAT RESISTANT THERMOPLASTIC, SINGLE CONDUCTOR, COPPER, TYPE THHN/THWN-2, 600 VOLT, SIZE AS INDICATED, #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR USED.
2. #10 AWG AND SMALLER CONDUCTOR SHALL BE SOLID OR STRANDED AND #8 AWG AND LARGER CONDUCTORS SHALL BE STRANDED.
3. SOLDERLESS, COMPRESSION-TYPE CONNECTORS SHALL BE USED FOR TERMINATION OF ALL STRANDED CONDUCTORS.
4. STRAIN-RELIEF SUPPORTS GRIPS SHALL BE HUBBELL KELLEMS OR APPROVED EQUAL. CABLES SHALL BE SUPPORTED IN ACCORDANCE WITH THE NEC AND CABLE MANUFACTURER'S RECOMMENDATIONS.
5. ALL CONDUCTORS SHALL BE TAGGED AT BOTH ENDS OF THE CONDUCTOR, AT ALL PULL BOXES, J-BOXES, EQUIPMENT AND CABINETS AND SHALL BE IDENTIFIED WITH APPROVED PLASTIC TAGS (ACTION CRAFT, BRADY, OR APPROVED EQUAL).

C. DISCONNECT SWITCHES:

1. DISCONNECT SWITCHES SHALL BE HEAVY DUTY, DEAD-FRONT, QUICK-MAKE, QUICK-BREAK, EXTERNALLY OPERABLE, HANDLE LOCKABLE AND INTERLOCK WITH COVER IN CLOSED POSITION, RATING AS INDICATED, UL LABELED FURNISHED IN NEMA 3R ENCLOSURE, SQUARE-D OR ENGINEER APPROVED EQUAL.

D. CHEMICAL ELECTROLYTIC GROUNDING SYSTEM:

1. INSTALL CHEMICAL GROUNDING AS REQUIRED. THE SYSTEM SHALL BE ELECTROLYTIC MAINTENANCE FREE ELECTRODE CONSISTING OF RODS WITH A MINIMUM #2 AWG CU EXOTHERMICALLY WELDED PIGTAIL, PROTECTIVE BOXES, AND BACKFILL MATERIAL. MANUFACTURER SHALL BE LYNCOLE XIT GROUNDING ROD TYPES K2-(*)CS OR K2L-(*)CS (*) LENGTH AS REQUIRED.
2. GROUND ACCESS BOX SHALL BE A POLYPLASTIC BOX FOR NON-TRAFFIC APPLICATIONS, INCLUDING BOLT DOWN FLUSH COVER WITH "BREATHER" HOLES, XIT MODEL #XB-22. ALL DISCONNECT SWITCHES AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED LAMICOID NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS ID NUMBERING, AND THE ELECTRICAL POWER SOURCE.
3. BACKFILL MATERIAL SHALL BE LYNCONITE AND LYNCOLE GROUNDING GRAVEL.

E. SYSTEM GROUNDING

1. ALL GROUNDING COMPONENTS SHALL BE TINNED AND GROUNDING CONDUCTOR SHALL BE #2 AWG BARE, SOLID, TINNED, COPPER. ABOVE GRADE GROUNDING CONDUCTORS SHALL BE INSULATED WHERE NOTED.
2. GROUNDING BUSES SHALL BE BARE, TINNED ANNEALED COPPER BARS OF RECTANGULAR CROSS SECTION. STANDARD BUS BARS MGB, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. THEY SHALL NOT BE FABRICATED OR MODIFIED IN THE FIELD. ALL GROUNDING BUSES SHALL BE IDENTIFIED WITH MINIMUM 3/4" LETTERS BY WAY OF STENCILING OR DESIGNATION PLATE.
3. CONNECTORS SHALL BE HIGH-CONDUCTIVITY, HEAVY DUTY, LISTED AND LABELED AS GROUNDING CONNECTORS FOR THE MATERIALS USED. USE TWO-HOLE COMPRESSION LUGS WITH HEAT SHRINK FOR MECHANICAL CONNECTIONS. INTERIOR CONNECTIONS USE TWO-HOLE COMPRESSION LUGS WITH INSPECTION WINDOW AND CLEAR HEAT SHRINK.
4. EXOTHERMIC WELDED CONNECTIONS SHALL BE PROVIDED IN KIT FORM AND SELECTED FOR THE SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND OTHER ITEMS TO BE CONNECTED.
5. GROUND RODS SHALL BE COPPER-CLAD STEEL WITH HIGH-STRENGTH STEEL CORE AND ELECTROLYTIC-GRADE COPPER OUTER SHEATH, MOLTEN WELDED TO CORE, 5/8"x10'-0". ALL GROUNDING RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES.
6. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS IN COMPLIANCE WITH THE DISH WIRELESS SPECIFICATIONS AND NEC. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED TO ALL METALLIC JUNCTION BOXES, PULLBOXES, DISCONNECT SWITCHES, STARTERS, AND EQUIPMENT.

F. OTHER MATERIALS:

1. THE CONTRACTOR SHALL PROVIDE OTHER MATERIALS, THOUGH NOT SPECIFICALLY DESCRIBED, WHICH ARE REQUIRED FOR A COMPLETELY OPERATIONAL SYSTEM AND PROPER INSTALLATION OF THE WORK.
2. PROVIDE PULL BOXES AND JUNCTION BOXES WHERE SHOWN OR REQUIRED BY NEC.

G. PANELS AND LOAD CENTERS:

1. ALL PANEL LABELS SHALL BE TYPEWRITTEN.

EXECUTION:

GENERAL:

A. ALL MATERIAL AND EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

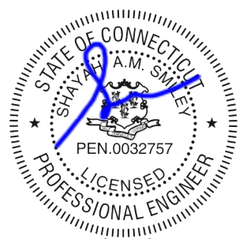
B. EQUIPMENT SHALL BE TIGHTLY COVERED AND PROTECTED AGAINST DIRT OR WATER, AND AGAINST CHEMICAL OR MECHANICAL INJURY DURING INSTALLATION AND CONSTRUCTION PERIODS.

LABOR AND WORKMANSHIP:

A. ALL LABOR FOR THE INSTALLATION OF MATERIALS AND EQUIPMENT FURNISHED FOR THE ELECTRICAL SYSTEM SHALL BE INSTALLED BY EXPERIENCED WIREMEN, IN A NEAT AND WORKMAN-LIKE MANNER.

B. ALL ELECTRICAL EQUIPMENT SHALL BE ADJUSTED, ALIGNED AND TESTED BY THE CONTRACTOR AS REQUIRED TO PRODUCE THE INTENDED PERFORMANCE.

C. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL THOROUGHLY CLEAN ALL EXPOSED EQUIPMENT, REMOVE ALL LABELS AND ANY DEBRIS, CRATING OR CARTONS AND LEAVE THE INSTALLATION FINISHED AND READY FOR OPERATION.



4/10/2019

PLANS PREPARED FOR:

dish WIRELESS

PROJECT MANAGER:

CROWN CASTLE

PLANS PREPARED BY:

PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
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TOWER OWNER SITE ID:
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SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
ELECTRICAL NOTES

SHEET NUMBER:
EN-1

ELECTRICAL NOTES (CONTINUED)

COORDINATION:

A. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ELECTRICAL ITEMS WITH THE OWNER–FURNISHED EQUIPMENT DELIVERY SCHEDULE TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

INSTALLATION:

A. CONDUIT:

1. ALL ELECTRICAL WIRING SHALL BE INSTALLED IN CONDUIT AS SPECIFIED. NO CONDUIT OR TUBING OF LESS THAN 3/4 INCH TRADE SIZE.
2. PROVIDE RIGID PVC SCHEDULE 80 CONDUITS FOR ALL RISERS, OR WHERE RMC OTHERWISE NOTED.
3. INSTALL SCHEDULE 40 PVC CONDUIT WITH A MINIMUM COVER OF 24" UNDER ROADWAYS, PARKING LOTS, STREETS, AND ALLEYS. CONDUIT SHALL HAVE A MINIMUM COVER OF 18" IN ALL OTHER NON–TRAFFIC APPLICATIONS (REFER TO 2017 NEC, TABLE 300.5).
4. USE GALVANIZED FLEXIBLE STEEL CONDUIT WHERE DIRECT CONNECTION TO EQUIPMENT WITH MOVEMENT, VIBRATION, OR FOR EASE OF MAINTENANCE. USE LIQUID TIGHT, FLEXIBLE METAL CONDUIT FOR OUTDOOR APPLICATIONS. INSTALL GALVANIZED FLEXIBLE STEEL CONDUIT AT ALL POINTS OF CONNECTION TO EQUIPMENT MOUNTED ON SUPPORT TO ALLOW FOR EXPANSION AND CONTRACTION.
5. A RUN OF CONDUIT BETWEEN BOXES OR EQUIPMENT SHALL NOT CONTAIN MORE THAN THE EQUIVALENT OF THREE 90 DEGREE BENDS MAX. CONDUIT BEND SHALL BE MADE WITH THE UL LISTED BENDER OR FACTORY 90 DEGREE ELBOWS MAY BE USED.
6. FIELD FABRICATED CONDUITS SHALL BE CUT SQUARE WITH A CONDUIT CUTTING TOOL AND REAMED TO PROVIDE A SMOOTH INSIDE SURFACE.
7. PROVIDE INSULATED GROUNDING BUSHING FOR ALL CONDUITS.
8. CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL CONDUITS DURING CONSTRUCTION. TEMPORARY OPENINGS IN THE CONDUIT SYSTEM SHALL BE PLUGGED OR CAPPED TO PREVENT ENTRANCE OF MOISTURE OR FOREIGN MATTER. CONTRACTOR SHALL REPLACE ANY CONDUITS CONTAINING FOREIGN MATERIALS THAT CANNOT BE REMOVED.
9. ALL CONDUITS SHALL BE SWABBED CLEAN BY PULLING AN APPROPRIATE SIZE MANDREL THROUGH THE CONDUIT BEFORE INSTALLATION OF CONDUCTORS OR CABLES. CONDUIT SHALL BE FREE OF DIRT AND DEBRIS.
10. INSTALL PULL STRINGS IN ALL CLEAN EMPTY CONDUITS. IDENTIFY PULL STRINGS AT EACH END.
11. INSTALL 2" HIGHLY VISIBLE AND DETECTABLE TAPE 12" ABOVE ALL UNDERGROUND CONDUITS AND CONDUCTORS.
12. CONDUITS SHALL BE INSTALLED IN SUCH A MANNER AS TO INSURE AGAINST COLLECTION OF TRAPPED CONDENSATION.
13. PROVIDE CORE DRILLING AS NECESSARY FOR PENETRATIONS TO ALLOW FOR RACEWAYS AND CABLES TO BE ROUTED THROUGH THE BUILDING. DO NOT PENETRATE STRUCTURAL MEMBERS AND/OR SLEEVES. PENETRATIONS IN FIRE RATED CONSTRUCTION SHALL BE EFFECTIVELY SEALED WITH FIRE RATED MATERIAL WHICH SHALL MAINTAIN THE FIRE RATING OF THE WALL OR STRUCTURE. FIRE STOPS AT FLOOR PENETRATIONS SHALL PREVENT PASSAGE OF WATER, SMOKE, FIRE, AND FUMES. ALL MATERIAL SHALL BE UL APPROVED FOR THE PURPOSE.

B. CONDUCTORS AND CABLE:

1. SPLICES SHALL BE MADE ONLY AT OUTLETS, JUNCTION BOXES, OR ACCESSIBLE RACEWAY CONDUITS APPROVED FOR THIS PURPOSE.
2. PULLING LUBRICANTS SHALL BE UL APPROVED. CONTRACTOR SHALL USE NYLON OR HEMP ROPE FOR PULLING CONDUCTOR OR CABLES INTO THE CONDUIT.
3. CABLES SHALL BE NEATLY TRAINED, WITHOUT INTERLACING, AND BE OF SUFFICIENT LENGTH IN ALL BOXES AND EQUIPMENT TO PERMIT MAKING A NEAT ARRANGEMENT. CABLES SHALL BE SECURED IN A MANNER TO AVOID TENSION ON CONDUCTORS OR TERMINALS. CONDUCTORS SHALL BE PROTECTED FROM MECHANICAL INJURY AND MOISTURE. SHARP BENDS OVER CONDUIT BUSHINGS IS PROHIBITED. DAMAGED CABLES SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.

C. DISCONNECT SWITCHES:

1. INSTALL DISCONNECT SWITCHES LEVEL AND PLUMB. CONNECT TO WIRING SYSTEM AND GROUNDING SYSTEM AS INDICATED.

D. GROUNDING:

1. ALL METALLIC PARTS OF ELECTRICAL EQUIPMENT WHICH DO NOT CARRY CURRENT SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING MANUFACTURER, DISH WIRELESS GROUNDING AND BONDING STANDARDS, LATEST EDITION, AND COMPLY WITH DISH WIRELESS GROUNDING CHECKLIST, LATEST VERSION, AND THE NATIONAL ELECTRICAL CODE.
2. PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEM INDICATED WITH ASSEMBLY OF MATERIALS, INCLUDING GROUNDING ELECTRODES, BONDING JUMPERS AND ADDITIONAL ACCESSORIES AS REQUIRED FOR A COMPLETE INSTALLATION.
3. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUNDING CONDUCTORS SHALL NOT BE LOOPED OR SHARPLY BENT. ROUTE GROUNDING CONNECTIONS AND CONDUCTORS TO GROUND IN THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE TO MINIMIZE TRANSIENT VOLTAGE RISES.
4. BUILDINGS AND/OR NEW TOWERS GREATER THAN 75 FEET IN HEIGHT AND WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWER, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 AWG 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). SEE STANDARD 6.3.2.2.
5. TIGHTEN GROUNDING AND BONDING CONNECTORS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES FOR CONNECTORS AND BOLTS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT AVAILABLE, TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUE VALUES SPECIFIED IN UL TO ASSURE PERMANENT AND EFFECTIVE GROUNDING.
6. CONTRACTOR SHALL VERIFY THE LOCATIONS OF GROUNDING TIE–IN–POINTS TO THE EXISTING GROUNDING SYSTEM. ALL UNDERGROUND GROUNDING CONNECTIONS SHALL BE MADE BY THE EXOTHERMIC WELD PROCESS AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. ALL GROUNDING CONNECTIONS SHALL BE INSPECTED FOR TIGHTNESS. EXOTHERMIC WELDED CONNECTIONS SHALL BE APPROVED BY THE INSPECTOR HAVING JURISDICTION BEFORE BEING PERMANENTLY CONCEALED.
8. APPLY CORROSION–RESISTANT FINISH TO FIELD CONNECTIONS AND PLACES WHERE FACTORY APPLIED PROTECTIVE COATINGS HAVE BEEN DESTROYED. USE KOPR–SHIELD ANTI–OXIDATION COMPOUND ON ALL COMPRESSION GROUNDING CONNECTIONS.
9. A SEPARATE, CONTINUOUS, INSULATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED IN ALL FEEDER AND BRANCH CIRCUITS.
10. BOND ALL INSULATED GROUNDING BUSHINGS WITH A BARE #6 AWG GROUNDING CONDUCTOR TO A GROUND BUS.
11. DIRECT BURIED GROUNDING CONDUCTORS SHALL BE INSTALLED AT A NOMINAL DEPTH OF 30" MINIMUM BELOW GRADE, OR 6" BELOW THE FROST LINE, USE THE GREATER OF THE TWO DISTANCES.
12. ALL GROUNDING CONDUCTORS EMBEDDED IN OR PENETRATING CONCRETE SHALL BE INSTALLED IN SCHEDULE 40 PVC CONDUIT.
13. THE INSTALLATION OF CHEMICAL ELECTROLYTIC GROUNDING SYSTEM SHALL BE IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. REMOVE SEALING TAPE FROM LEACHING AND BREATHER HOLES. INSTALL PROTECTIVE BOX FLUSH WITH GRADE.
14. DRIVE GROUND RODS UNTIL TOPS ARE A MINIMUM DISTANCE OF 30" DEPTH OR 6" BELOW FROST LINE, USING THE GREATER OF THE TWO DISTANCES.
15. CONTRACTOR SHALL REPAIR, AND/OR REPLACE, EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.

ACCEPTANCE TESTING:

A. CERTIFIED PERSONNEL USING CERTIFIED EQUIPMENT SHALL PERFORM REQUIRED TESTS AND SUBMIT WRITTEN TEST REPORTS UPON COMPLETION.

B. WHEN MATERIAL AND/OR WORKMANSHIP IS FOUND NOT TO COMPLY WITH THE SPECIFIED REQUIREMENTS, THE NON–COMPLYING ITEMS SHALL BE REMOVED FROM THE PROJECT SITE AND REPLACED WITH ITEMS COMPLYING WITH THE SPECIFIED REQUIREMENTS PROMPTLY AFTER RECEIPT OF NOTICE FOR NON–COMPLIANCE.

C. TEST PROCEDURES:

1. ALL FEEDERS SHALL HAVE INSULATION TESTED AFTER INSTALLATION, BEFORE CONNECTION TO DEVICES. THE CONDUCTORS SHALL TEST FREE FROM SHORT CIRCUITS AND GROUNDS. TESTING SHALL BE FOR ONE MINUTE USING 1000V DC. PROVIDE WRITTEN DOCUMENTATION FOR ALL TEST RESULTS.
2. PRIOR TO ENERGIZING CIRCUITRY, TEST WIRING DEVICES FOR ELECTRICAL CONTINUITY AND PROPER POLARITY CONNECTIONS.
3. MEASURE AND RECORD VOLTAGES BETWEEN PHASES AND BETWEEN PHASE CONDUCTORS AND NEUTRALS, SUBMIT A REPORT OF MAXIMUM AND MINIMUM VOLTAGES.
4. PERFORM GROUNDING TEST TO MEASURE GROUNDING RESISTANCE OF GROUNDING SYSTEM USING THE IEEE STANDARD 3–POINT "FALL–OF–POTENTIAL" METHOD. PROVIDE PLOTTED TEST VALUES AND LOCATION SKETCH. NOTIFY THE ENGINEER IMMEDIATELY IF MEASURED VALUE IS OVER 5 OHMS.

STATE OF CONNECTICUT
SHAYNE A.M. SMILEY
PEN.0032757
LICENSED
PROFESSIONAL ENGINEER
4/10/2019

PLANS PREPARED FOR:

dish WIRELESS

PROJECT MANAGER:

CROWN CASTLE

PLANS PREPARED BY:

PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
CT0100010A

TOWER OWNER SITE ID:
873128

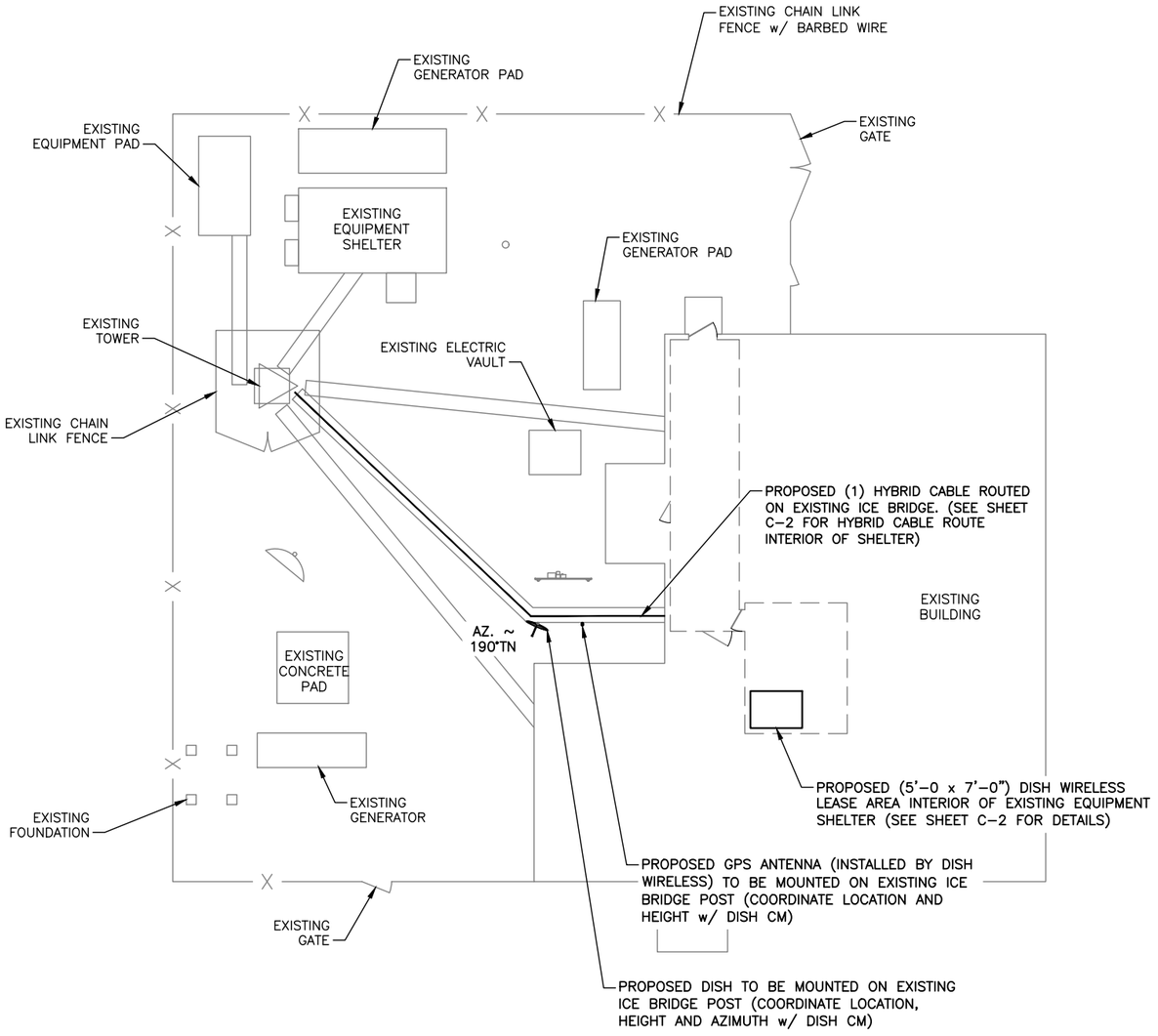
SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
ELECTRICAL NOTES

SHEET NUMBER:
EN-2

PROPOSED SATELLITE DISH LOCATION TO BE VERIFIED IN THE FIELD AT TIME OF CONSTRUCTION

HYBRID CABLE LENGTHS:
TOWER TO ENTRY PORT = ±65'–0"
ENTRY PORT TO EQUIPMENT = ±30'–0"
TOTAL HYBRID CABLE LENGTH = ±95'–0"
TOWER TO RAD CENTER = ±290'–0"



COMPOUND PLAN
SCALE: 1" = 20'

20 0 20
SCALE: 1" = 20'

STATE OF CONNECTICUT
SHAYNE A.M. SMILEY
PEN.0032757
LICENSED PROFESSIONAL ENGINEER
4/10/2019

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dish WIRELESS

PROJECT MANAGER:
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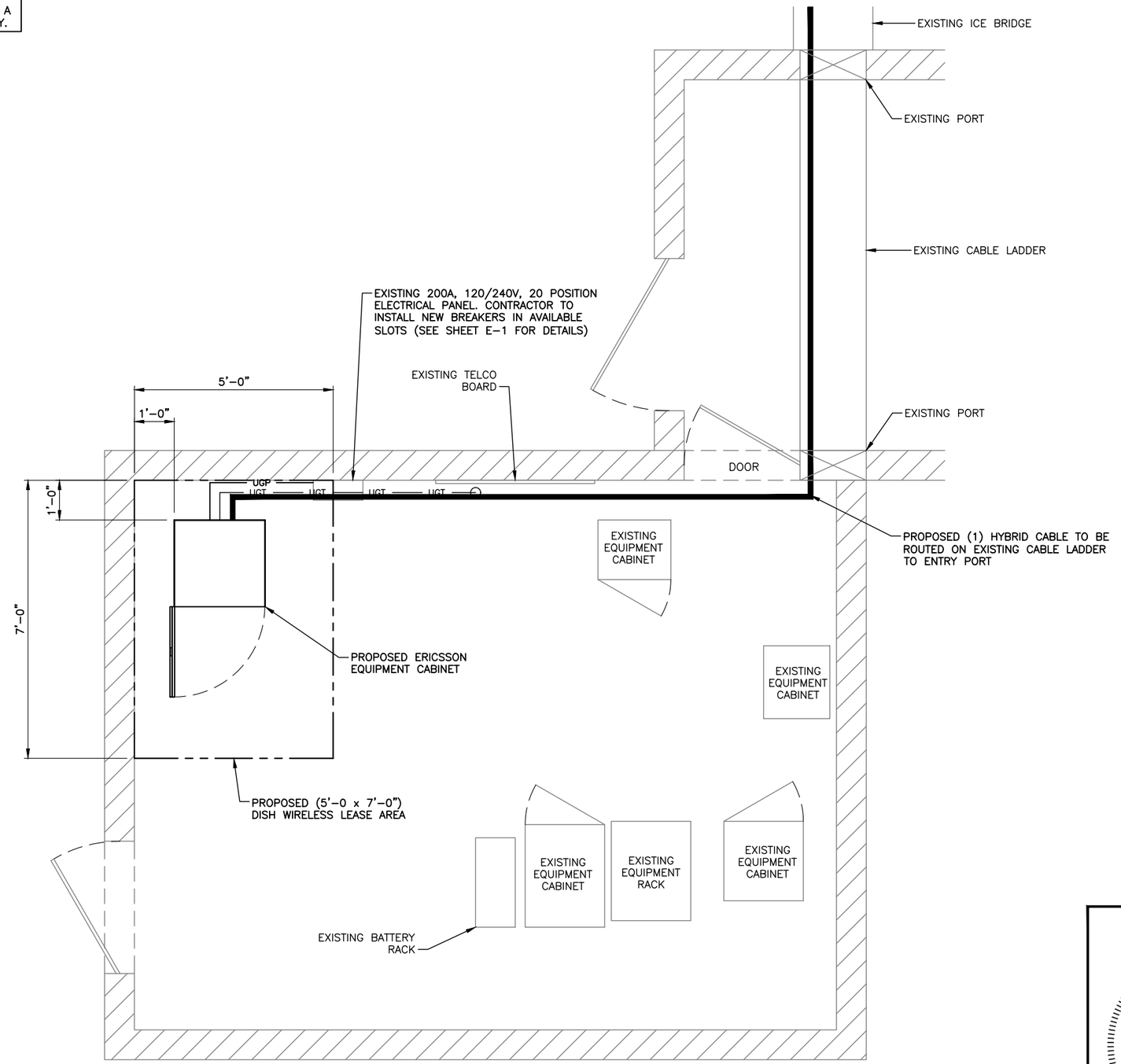
TRUMBULL, CT 06611

SHEET DESCRIPTION:
COMPOUND PLAN

SHEET NUMBER:
C-1

NOTES:

1. WHEN APPLICABLE, DISH WIRELESS SUPPORT PIPE SHALL BE POSITIONED AS TO AFFORD FUTURE DISH A CLEAR, UNOBSTRUCTED VIEW OF THE SOUTHERN SKY.



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

STATE OF CONNECTICUT
SHAYAN A.M. SMILEY
PEN.0032757
LICENSED
PROFESSIONAL ENGINEER
4/10/2019

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dish WIRELESS

PROJECT MANAGER:
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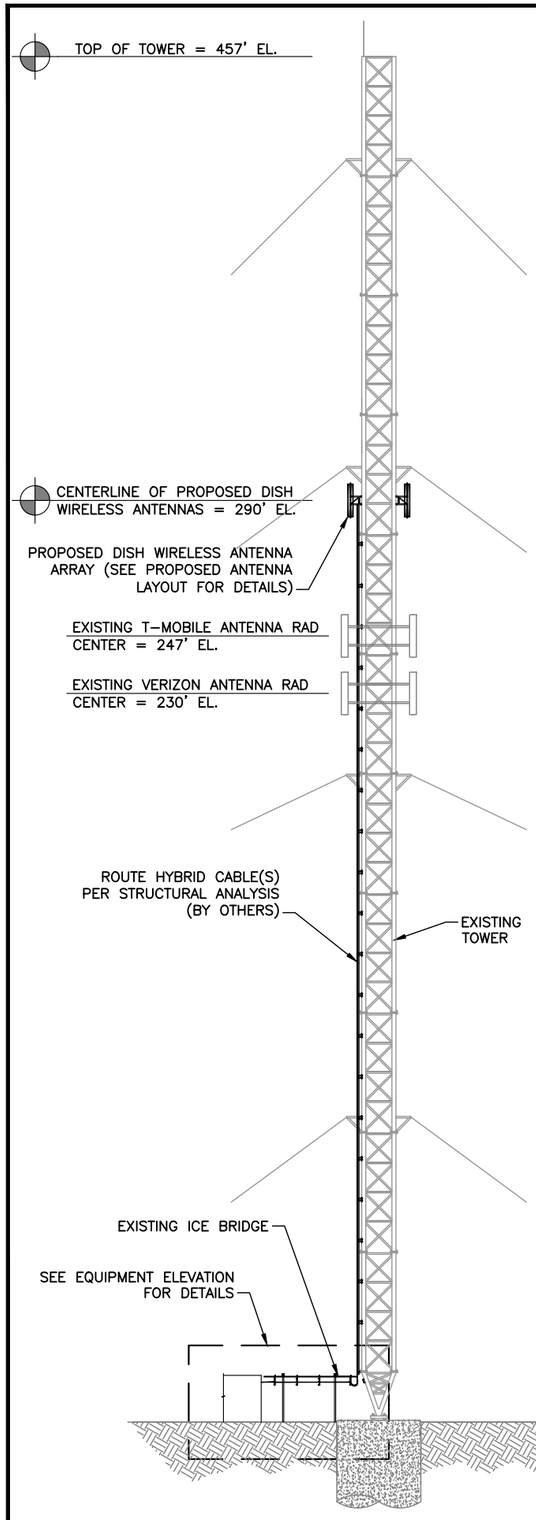
TRUMBULL, CT 06611

SHEET DESCRIPTION:
EQUIPMENT PLAN

SHEET NUMBER:
C-2



TOWER ELEVATION
NOT TO SCALE

ANTENNA LAYOUT NOTES:

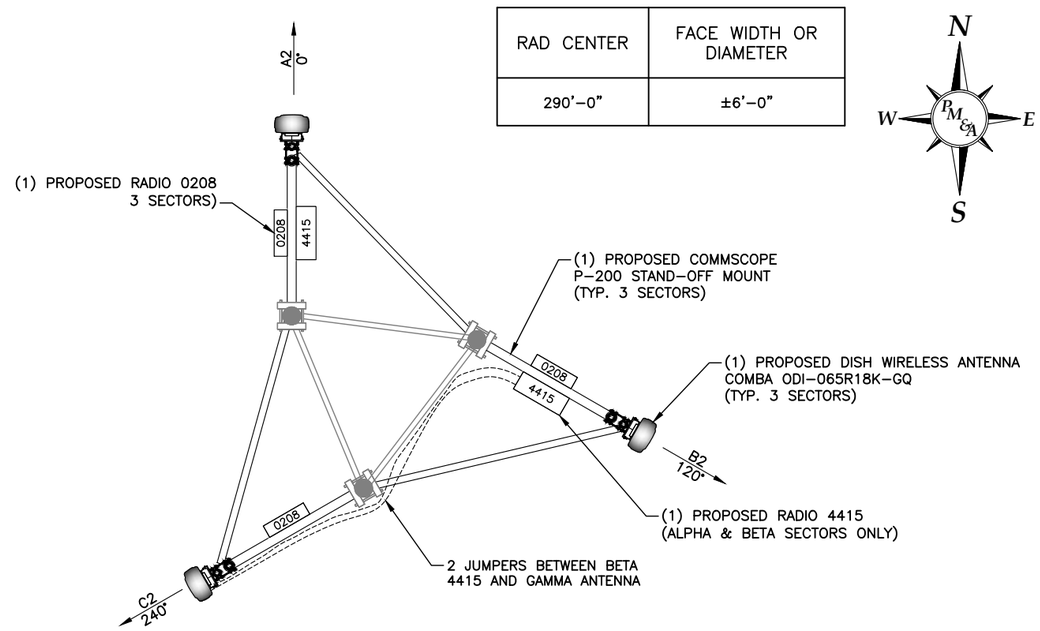
1. THIS ANTENNA ORIENTATION PLAN IS A SCHEMATIC. THE CONTRACTOR SHALL VERIFY TOWER ORIENTATION AND FIELD COORDINATE REQUIRED ADJUSTMENTS TO ACHIEVE THE DESIRED ANTENNA AZIMUTHS.
2. ANTENNA CENTERLINE HEIGHT REFERENCED FROM GROUND AT BASE OF TOWER, ASSUMING HEIGHT OF 0'-0" AT SAID REFERENCE POINT.
3. ALL ANTENNAS, CABLES AND MOUNTS SHALL BE INSTALLED IN ACCORDANCE WITH THE TOWER ENGINEER'S RECOMMENDATIONS IN A MANNER CONSISTENT WITH THE STRUCTURAL ANALYSIS REPORT.
4. ALL ANTENNA BRACKETS PER ANTENNA MANUFACTURER, OR EQUAL. CONTRACTOR TO COORDINATE REQUIRED MECHANICAL DOWN TILT WITH DISH WIRELESS.
5. ALL ANTENNA INFORMATION TO BE CONFIRMED WITH DISH WIRELESS RF DESIGN PRIOR TO INSTALLATION.
6. VERIFY POSITIONS AND AZIMUTH OF ANTENNAS WITH DISH WIRELESS PRIOR TO INSTALLATION.
7. SECTOR FRAMES AND ANTENNAS SHOULD HAVE IDENTIFYING TORQUE MARKS SHOWN AFTER INSTALLATION.
8. ALL CLOSE-OUT PHOTOS ADHERE TO CLOSE-OUT DOCUMENTATION.

EQUIPMENT TESTING:

CONTRACTOR SHALL COMPLETE THE FOLLOWING REQUIREMENTS:

1. ANTENNAS & RF JUMPERS:
   - ALL RF JUMPERS & ANTENNA PORTS MUST HAVE DOCUMENTED PASSING SYSTEM SWEEP TEST.
   - PIM TESTING IS REQUIRED FOR ALL INSTALLED ANTENNAS & FEEDLINES.
   - SYSTEM SWEEPS SHALL BE AT A RETURN LOSS OF ≤ -16db.
   - ALL SWEEPS MUST BE PROVIDED IN A PDF AS WELL AS ANRITSU (OR EQUAL) DATA FILE FORMAT.
   - FINAL ACCEPTANCE: PERFORM ALL TECHNICAL TESTS SPECIFIED IN THE CONSTRUCTION SOW, SECTION XIV.
2. HYBRID CABLES:
   - ALL FIBER PAIRS MUST HAVE A DOCUMENTED PASSING POWER & A FIBER INSPECTION SCOPE TEST.
   - PASSING POWER TEST SHALL BE ≤ 3db.
   - REQUIRED FIBER TEST GEAR SHALL BE VIAVI JDSU FIT-SD103; P5000i FIBER SCOPE DIGITAL INSPECTION KIT; VIAVI 2303/11, OLS-35 OPTICAL LASER LIGHT SOURCE 1310/1550 NM, SM, INTERCHANGEABLE ADAPTER OR EQUAL.
   - ALL FIBER TEST RESULTS MUST BE PROVIDED IN PDF FORMAT.
   - FINAL ACCEPTANCE: PERFORM ALL TECHNICAL TESTS SPECIFIED IN THE CONSTRUCTION SOW, SECTION XIV.

ADD MID TOWER GROUND BUS BAR WHERE APPLICABLE PER LIGHTNING ZONE REQUIREMENTS.



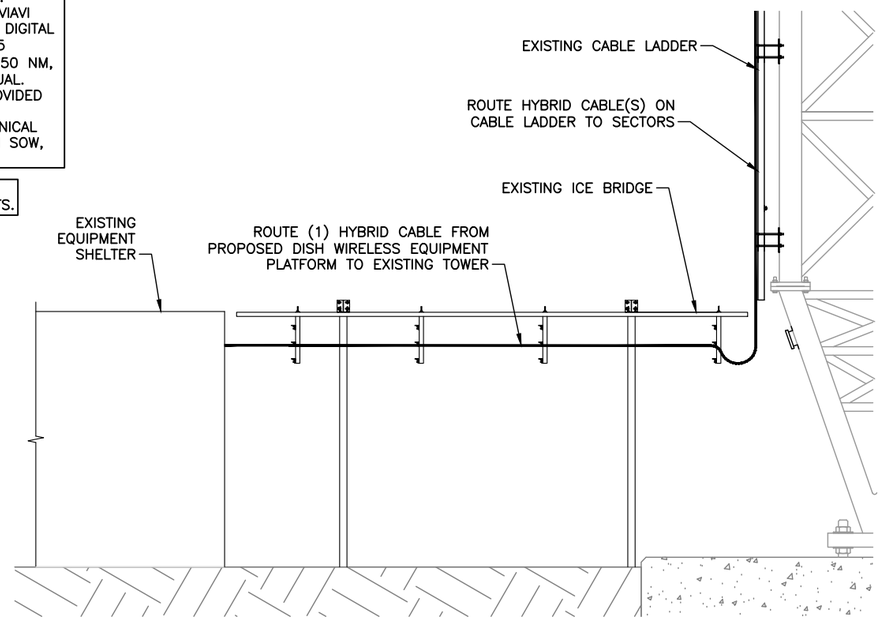
RAD CENTER	FACE WIDTH OR DIAMETER
290'-0"	±6'-0"

PROPOSED ANTENNA LAYOUT
NOT TO SCALE

PROPOSED RET RUN FROM 4415 RRU TO ANTENNA (FOR ALPHA SECTOR AND DAISY CHAINED TO BETA AND GAMMA SECTORS) ALONG TOWER STRUCTURE, NOT IN OPEN AIR.

NOTES:

1. DISH WIRELESS TO CONFIRM WITH TOWER OWNER THE VERTICAL LEASE AREA RIGHTS AVAILABLE PRIOR TO CONSTRUCTION. EXISTING EQUIPMENT MAY OBSTRUCT DESIRED DISH WIRELESS RAD-CENTER.
2. TOWER FACE WIDTH/DIAMETER IS AN ESTIMATE FROM STRUCTURAL ANALYSIS.



EQUIPMENT ELEVATION
NOT TO SCALE

INSTALLER NOTE:

1. SCHEMATIC LAYOUT ONLY. REFER TO SHEETS C-1 AND C-2 FOR EXACT EQUIPMENT LAYOUT, SIZES AND LOCATIONS OF ICE BRIDGE.
2. ALL CABLE SUPPORTS SHOULD BE BLOCKS AND GROMMETS. NO SNAP-INS ARE ALLOWED.

4/10/2019

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dish WIRELESS

PROJECT MANAGER:
CROWN CASTLE

PLANS PREPARED BY:
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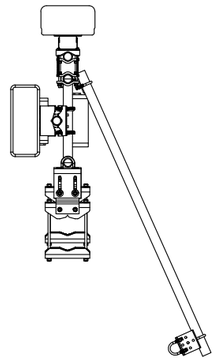
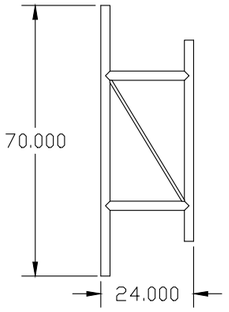
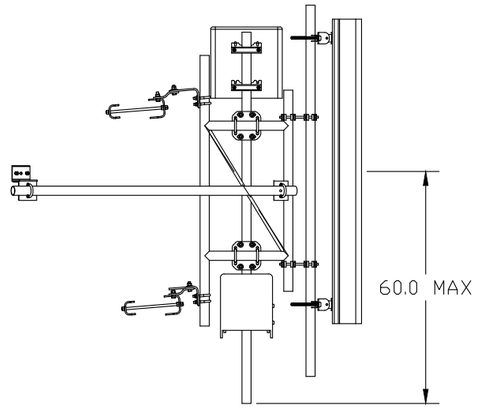
TRUMBULL, CT 06611

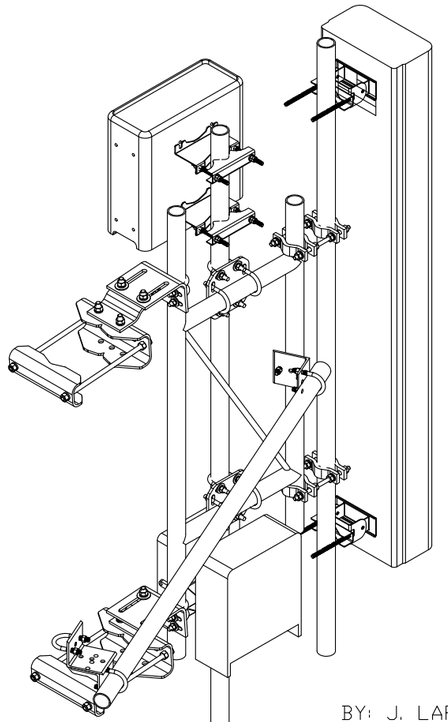
SHEET DESCRIPTION:
TOWER ELEVATION & ANTENNA LAYOUT

SHEET NUMBER:
C-3

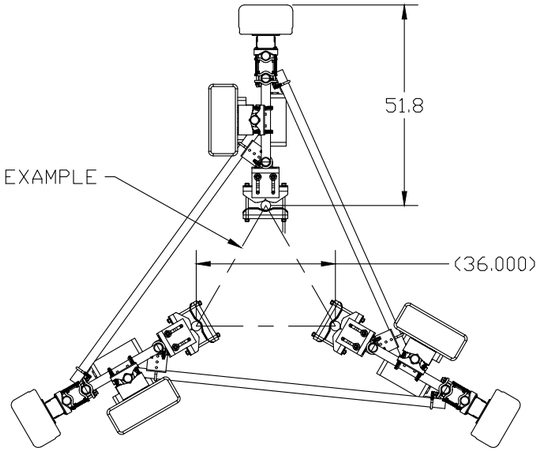








BY: J. LAPALME
10/30/2018



COMMSCOPE P-200 STAND-OFF FRAME,
PM-SU2-B UNIVERSAL TOWER MOUNT KIT,
BC-30-10 PIPE-TO-PIPE CLAMP SET,
XP-2020 CROSSOVER BRKTS. (2),
SA-B12 STIFF ARM KIT AND
PLUS 2X MT-651-96 PLAIN END PIPES

SCALE 1:28

dish TECHNOLOGIES

TITLE: TOP VIEW, GUYED TOWER
P-200 CONFIG.

SIZE	DWG. NO.	REV.
B	XXXXX	WC01
SCALE: NONE	SHEET 1 OF 1	

SUPPLEMENTAL INFORMATION

PLANS PREPARED FOR:
dish WIRELESS

PROJECT MANAGER:
CROWN CASTLE

PLANS PREPARED BY:
PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
CT0100010A

TOWER OWNER SITE ID:
873128

SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

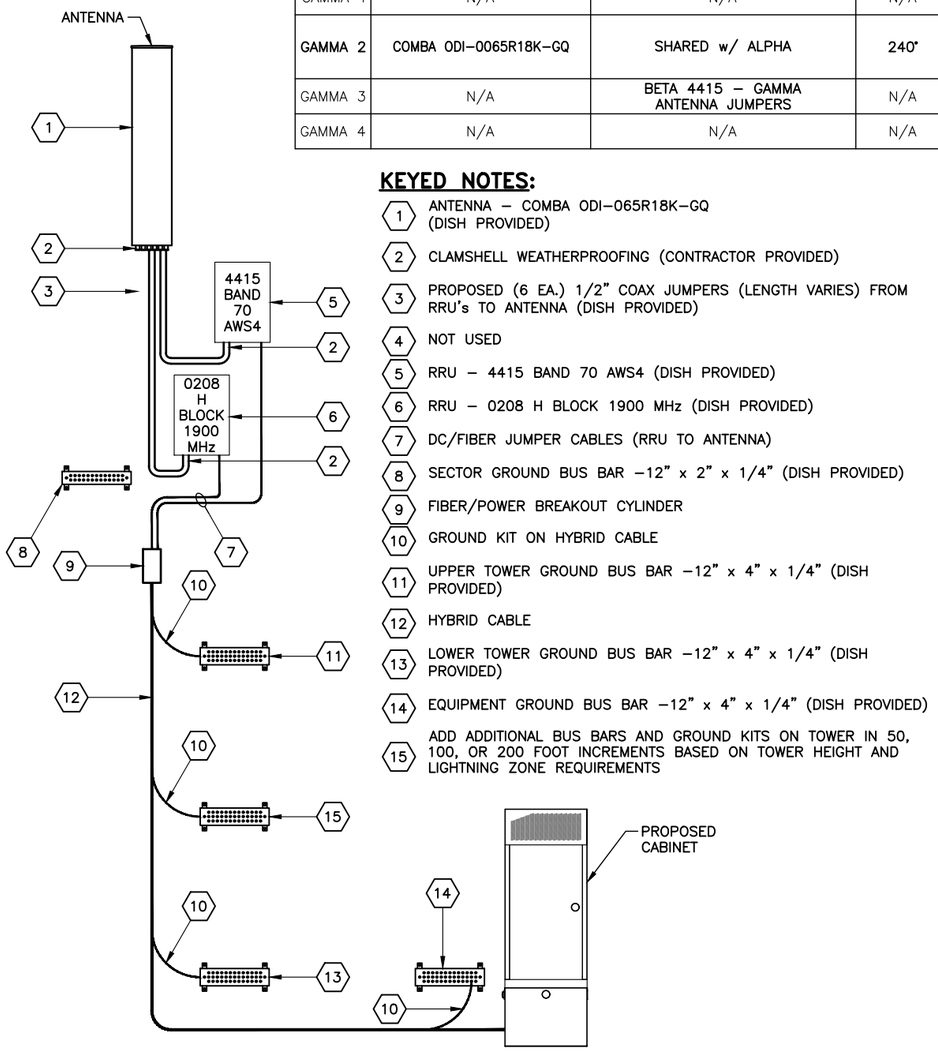
SHEET DESCRIPTION:
ANTENNA MOUNT

SHEET NUMBER:
C3.1

ANTENNA SCHEDULE

SECTOR	ANTENNA MANUFACTURER/MODEL NUMBER	PRIMARY FEEDER (COAX/HYBRID CABLES)	AZIMUTH	RAD CENTER	MECH D-TILT	ELECT D-TILT	RRU MANUFACTURER/MODEL NUMBER	RRU TECHNOLOGY	RRU LOCATION	PRIMARY FEEDER SIZE	JUMPER SIZE	JUMPER QTY	JUMPER LENGTH
ALPHA 1	N/A	N/A	N/A	N/A	N/A	N/A	ERICSSON 0208	H-BLOCK	SECTOR	N/A	1/2"	2	10'-0"
ALPHA 2	COMBA ODI-0065R18K-GQ	(1) 7/8"ø HYBRID CABLE	0°	290'	0°	2100MHz - 2° 700MHz - 4°	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALPHA 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A ERICSSON 4415	N/A BAND 70	N/A SECTOR	N/A N/A	N/A 1/2"	N/A 2	N/A 10'-0"
ALPHA 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BETA 1	N/A	N/A	N/A	N/A	N/A	N/A	ERICSSON 0208	H-BLOCK	SECTOR	N/A	1/2"	2	10'-0"
BETA 2	COMBA ODI-0065R18K-GQ	SHARED w/ ALPHA	120°	290'	0°	2100MHz - 2° 700MHz - 4°	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BETA3	N/A	N/A	N/A	N/A	N/A	N/A	N/A ERICSSON 4415 (SHARED)	N/A BAND 70	N/A SECTOR	N/A N/A	N/A 1/2"	N/A 2	N/A 10'-0"
BETA 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GAMMA 1	N/A	N/A	N/A	N/A	N/A	N/A	ERICSSON 0208	H-BLOCK	SECTOR	N/A	1/2"	2	10'-0"
GAMMA 2	COMBA ODI-0065R18K-GQ	SHARED w/ ALPHA	240°	290'	0°	2100MHz - 2° 700MHz - 4°	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GAMMA 3	N/A	BETA 4415 - GAMMA ANTENNA JUMPERS	N/A	N/A	N/A	N/A	N/A RRU 4415 SHARED FROM BETA	N/A BAND 70	N/A SECTOR	N/A N/A	N/A 1/2"	N/A 2	N/A 30'-0"
GAMMA 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TYPICAL SECTOR



KEYED NOTES:

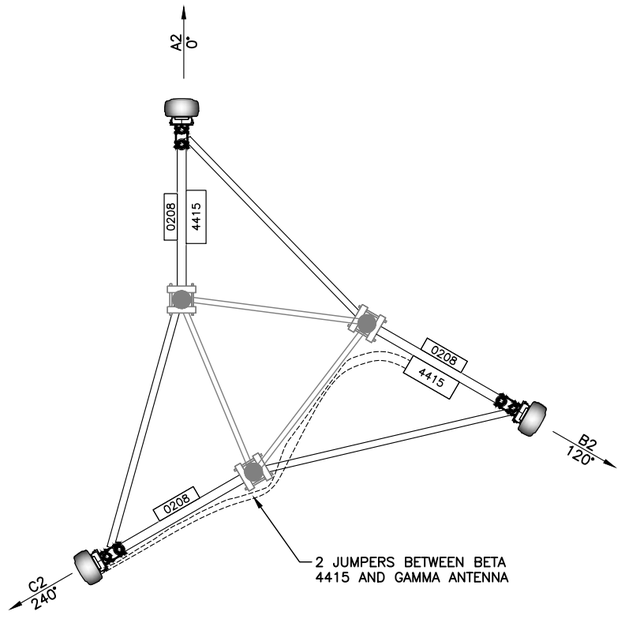
1. ANTENNA - COMBA ODI-065R18K-GQ (DISH PROVIDED)
2. CLAMSHELL WEATHERPROOFING (CONTRACTOR PROVIDED)
3. PROPOSED (6 EA.) 1/2" COAX JUMPERS (LENGTH VARIES) FROM RRU's TO ANTENNA (DISH PROVIDED)
4. NOT USED
5. RRU - 4415 BAND 70 AWS4 (DISH PROVIDED)
6. RRU - 0208 H BLOCK 1900 MHz (DISH PROVIDED)
7. DC/FIBER JUMPER CABLES (RRU TO ANTENNA)
8. SECTOR GROUND BUS BAR -12" x 2" x 1/4" (DISH PROVIDED)
9. FIBER/POWER BREAKOUT CYLINDER
10. GROUND KIT ON HYBRID CABLE
11. UPPER TOWER GROUND BUS BAR -12" x 4" x 1/4" (DISH PROVIDED)
12. HYBRID CABLE
13. LOWER TOWER GROUND BUS BAR -12" x 4" x 1/4" (DISH PROVIDED)
14. EQUIPMENT GROUND BUS BAR -12" x 4" x 1/4" (DISH PROVIDED)
15. ADD ADDITIONAL BUS BARS AND GROUND KITS ON TOWER IN 50, 100, OR 200 FOOT INCREMENTS BASED ON TOWER HEIGHT AND LIGHTNING ZONE REQUIREMENTS

NOTE:

PROPOSED RET CABLE 4415 RRU TO ANTENNA (1) PER SECTOR. BETA SECTOR TO BE DAISY CHAINED TO GAMMA ALONG TOWER STRUCTURE, NOT IN OPEN AIR.

NOTE:

CONTRACTOR TO REFER TO, CONFIRM DOWNTILT CHANGES AND VALIDATE, THE LATEST RFDS PRIOR TO CONSTRUCTION.



WEIGHT (EXCLUDING MOUNTING HARDWARE)

19.84 lbs (9kg) — 0208 H BLOCK 1900 MHz

46.0 lbs (21kg) — 4415 BAND 70 AWS4

SUPPLEMENTAL INFORMATION

PLANS PREPARED FOR:

dish WIRELESS

PROJECT MANAGER:

CROWN CASTLE

PLANS PREPARED BY:

PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

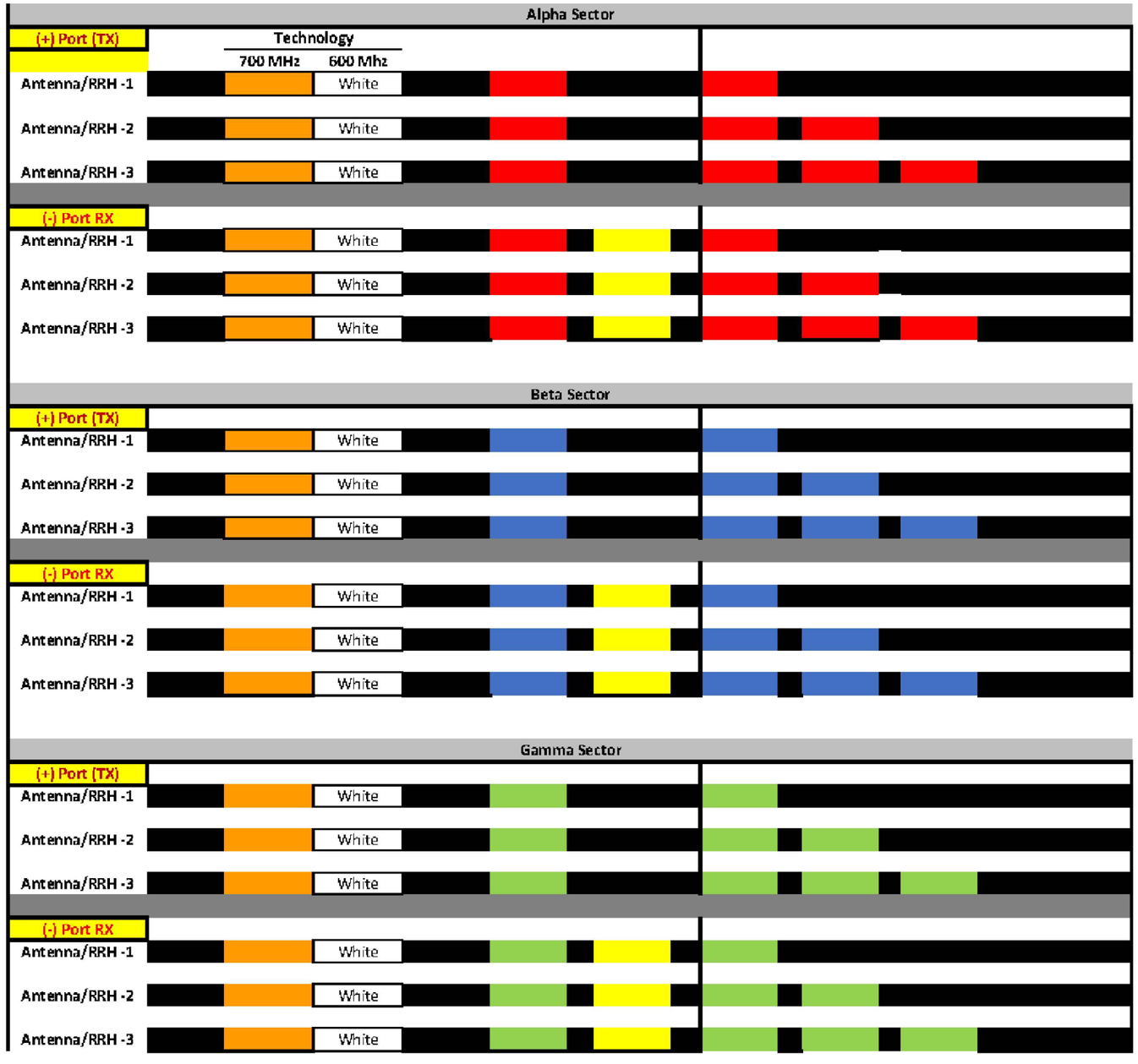
DISH WIRELESS SITE ID:
CT0100010A

TOWER OWNER SITE ID:
873128

SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
ANTENNA SCHEDULE AND DIAGRAM

SHEET NUMBER:
1 OF 2



NOTE:

CONTRACTOR TO REFER TO, AND VALIDATE, THE LATEST RFDS PRIOR TO CONSTRUCTION.

CABLE COLOR CODE

SUPPLEMENTAL INFORMATION

PLANS PREPARED FOR:

dish WIRELESS

PROJECT MANAGER:

CROWN CASTLE

PLANS PREPARED BY:

PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:

CCD19-085

DISH WIRELESS SITE ID:

CT0100010A

TOWER OWNER SITE ID:

873128

SITE ADDRESS:

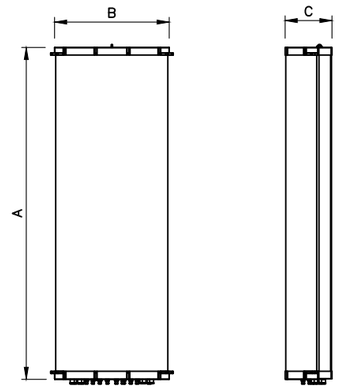
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:

CABLE COLOR CODE

SHEET NUMBER:

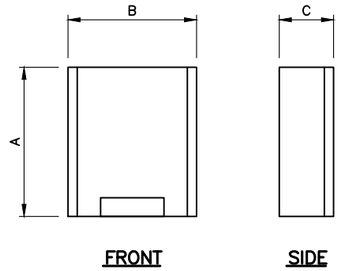
2 OF 2



FRONT SIDE

ANTENNA SPECIFICATIONS				
MODEL	LENGTH (A)	WIDTH (B)	DEPTH (C)	WEIGHT (lb)
COMBA – ODI-065R18K-GQ	53.5"	9.8"	2.4"	25.1
PANORAMA – WMMG-7-27	6.10"	6.10"	2.95"	2.43

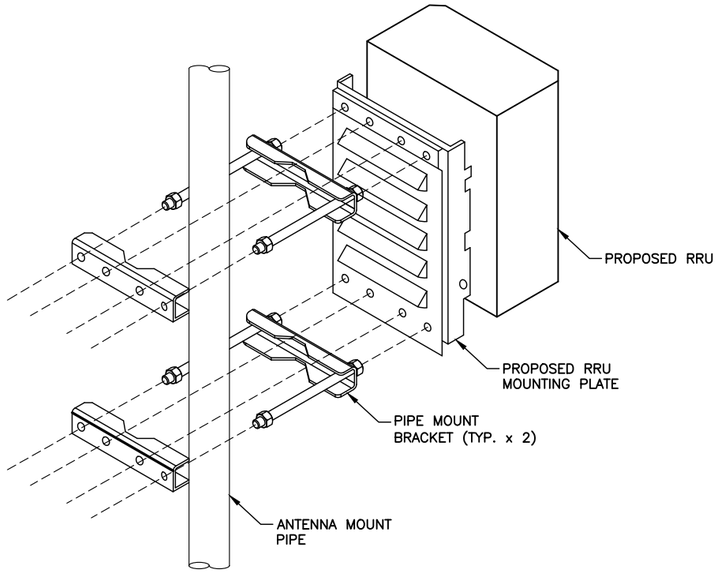
ANTENNA SPECIFICATIONS
NOT TO SCALE



FRONT SIDE

RADIO SPECIFICATIONS				
MODEL	LENGTH (A)	WIDTH (B)	DEPTH (C)	WEIGHT (lb)
ERICSSON – RADIO 4415	16.54"	13.64"	4.84"	44.09
ERICSSON – RADIO 0208	13.82"	11.73"	3.31"	18.52

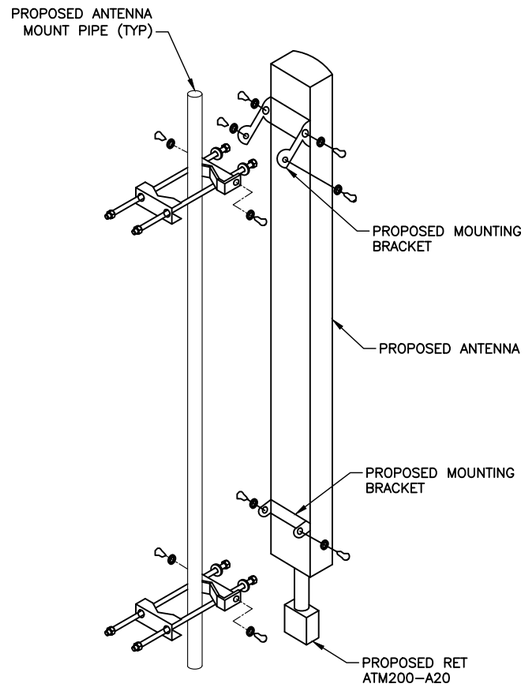
RADIO SPECIFICATIONS
NOT TO SCALE



NOTES:

1. ERICSSON VIA DISH WIRELESS SUPPLIES RRU, RRU PIPE-MOUNTING BRACKET. SUBCONTRACTOR SHALL INSTALL ALL MOUNTING HARDWARE INCLUDING RRU PIPE-MOUNTING BRACKET.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED

REMOTE RADIO UNIT (RRU) PIPE MOUNT
NOT TO SCALE



ANTENNA MOUNTING
NOT TO SCALE

STATE OF CONNECTICUT
SHAYNE A.M. SMILEY
PEN.0032757
LICENSED PROFESSIONAL ENGINEER
4/10/2019

PLANS PREPARED FOR:
dish WIRELESS

PROJECT MANAGER:
CROWN CASTLE

PLANS PREPARED BY:
PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY: JDJ
CHECKED BY: MSB
APPROVED:

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
CT0100010A

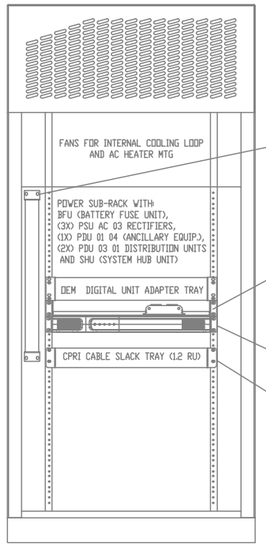
TOWER OWNER SITE ID:
873128

SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
EQUIPMENT DETAILS

SHEET NUMBER:
C-4

REVISIONS					
ECO NO.	ITEM MASTER	REV	DESCRIPTION	DATE	BY
C45181	219097	01	INITIAL RELEASE, CREATED FROM 217555. UPDATED WITH RBS6101 CABINET WITH BATTERY ENCLOSURE/PLINTH BBU6101.	12-19-18	JL



NOTES: UNLESS OTHERWISE SPECIFIED

1. POWER CABINET WEIGHT 1380kg (397 LBS) MAX. INCLUDES STANDARD EQUIPMENT. DISH HAS ALSO ADDED A MFG ROUTER @ 7.2 kg(8.2 LBS) AND/OR LTE ROUTER @ 58kg (1.3 LBS) AND 1 ACCESSORY TRAY@ 65kg (3.7 3lbs).
2. BATTERY ENCLOSURE WEIGHT IS 93kg(205 LBS) EXCLUDING THE STORAGE BATTERIES. THE NSB 40FT HT RELBATTERY WEIGHT 134kg (30.86 LBS) EACH X 96kg/ 123.5 LBS TOTAL), EXCLUDING CABLES.
3. POWER EQUIPMENT IN THE CABINET CONVERTS AC POWER INTO-48V DEPOWER FOR THE BASE STATION.
4. THE POWER SYSTEM CAPACITY RATING IS 10kW MAXIMUM. THE SYSTEM IS OUTFITTED WITH 3X 2500W RECTIFIERS (7.5kW), WHICH 1 RECTIFIER (2.5kW) IS FOR SYSTEM REDUNDANCY.
5. AC INPUT POWER OPTION- PLEASE SEE SEPARATE RBS6101 CABINET DOCUMENT WITH OTHER AC POWER OPTIONS.

AC INPUT	VOLTAGE RANGE V AC	NOMINAL VOLTAGE	RECOMMENDED EQUIP. AC BREAKER	RATED PWR	TYP PWR
2W + PE + N 120/240V AC, 60 Hz	200/100 240/120	115V	60A	10kW	2.5kW

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS TOLERANCES ARE:

XXXX ± .100 HOLE DIA. ± .075
XXX ± .25
XX ± .10 ANGLE ± 1.5°
X ± .75

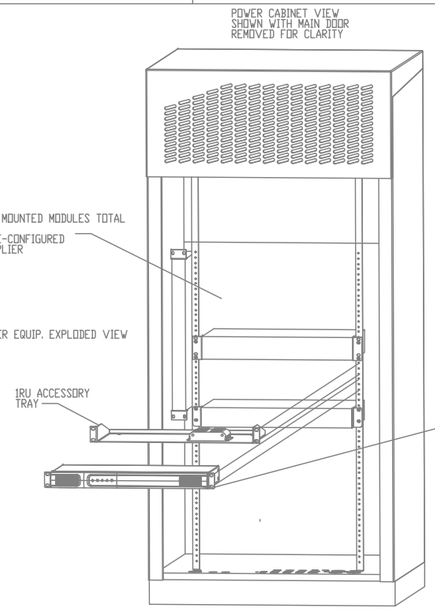
APPROVALS	DATE
DESIGNED	
DRAWN J. LAPALME	05-04-18
CHECKED	

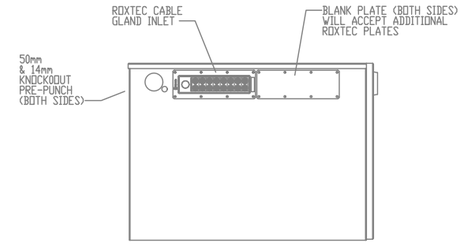
dish TECHNOLOGIES

TITLE: ASSY DWG, ERICSSON RBS6101 CABINET AND BATTERY PLINTH WITH SELECTED DISH MODULES

SIZE	DWG NO.	REV.
B	219097	01

SCALE: NONE SHEET 1 OF 3





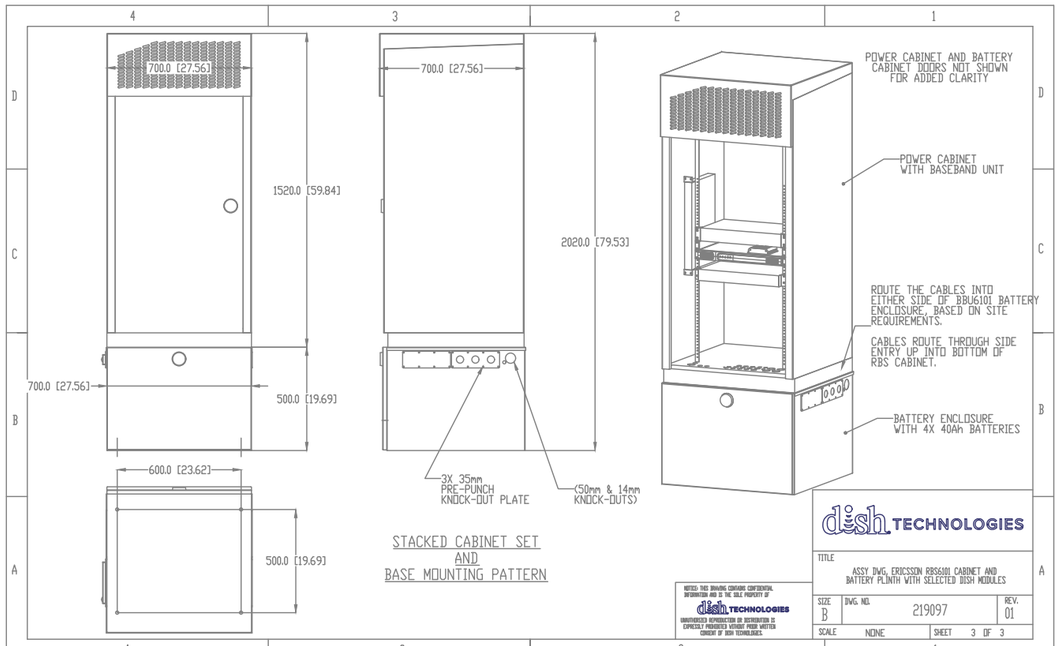
LEFT SIDE OF BBU6101 BATTERY CABINET: WITH ROXTEC CABLE INLET AND BLANK COVER PLATE

dish TECHNOLOGIES

TITLE: ASSY DWG, ERICSSON RBS6101 CABINET AND BATTERY PLINTH WITH SELECTED DISH MODULES

SIZE	DWG NO.	REV.
B	219097	01

SCALE: NONE SHEET 2 OF 3



STACKED CABINET SET AND BASE MOUNTING PATTERN

dish TECHNOLOGIES

TITLE: ASSY DWG, ERICSSON RBS6101 CABINET AND BATTERY PLINTH WITH SELECTED DISH MODULES

SIZE	DWG NO.	REV.
B	219097	01

SCALE: NONE SHEET 3 OF 3

SUPPLEMENTAL INFORMATION

PLANS PREPARED FOR:

dish WIRELESS

PROJECT MANAGER:

CROWN CASTLE

PLANS PREPARED BY:

PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

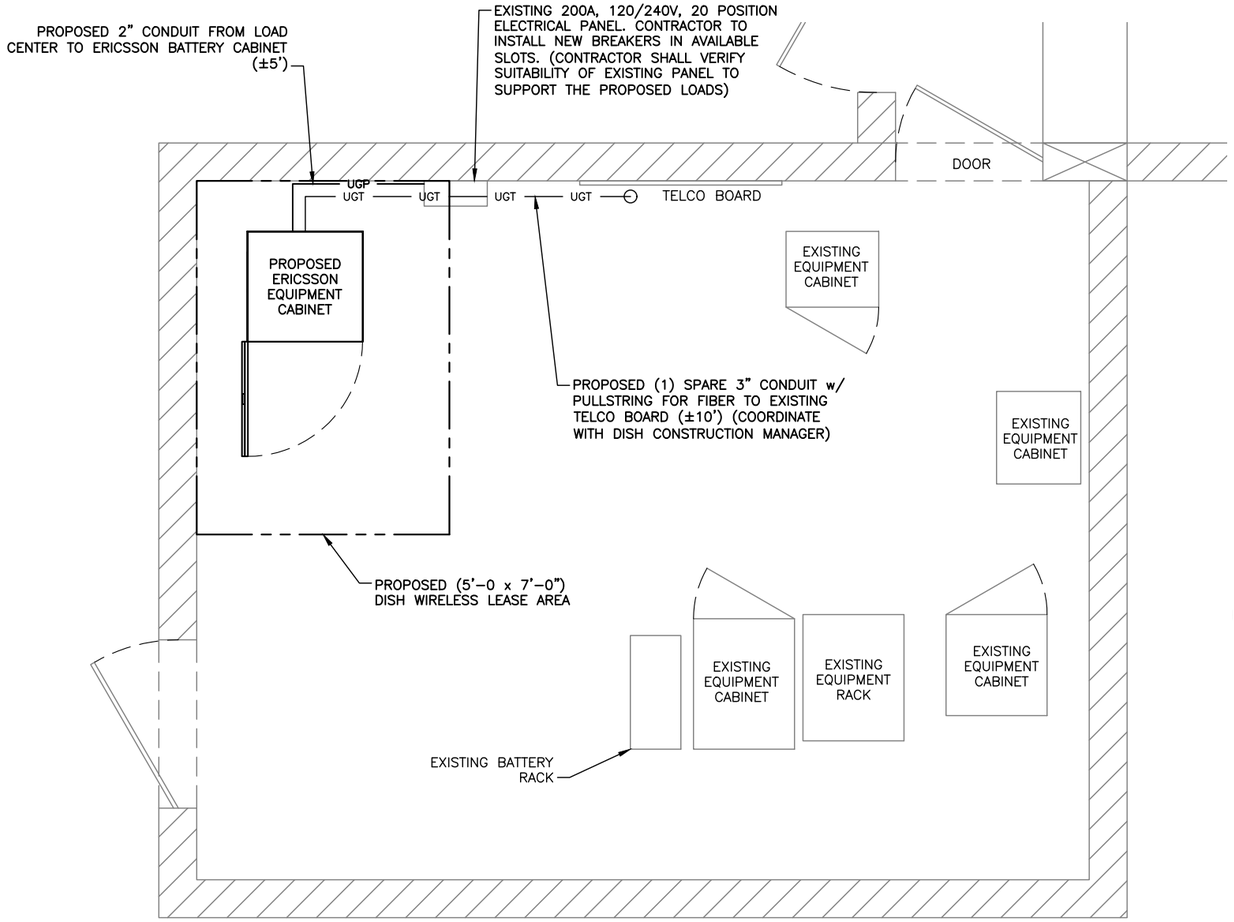
DISH WIRELESS SITE ID:
CT0100010A

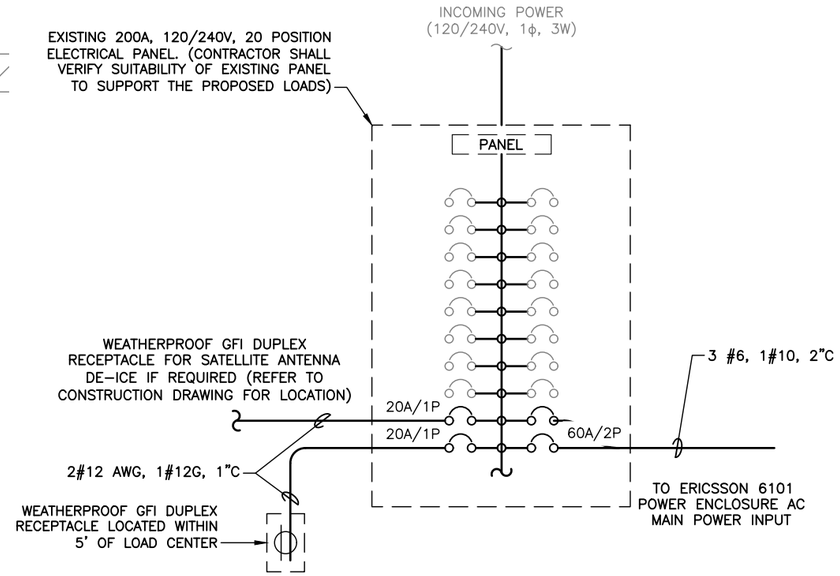
TOWER OWNER SITE ID:
873128

SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
EQUIPMENT DETAILS

SHEET NUMBER:
C-5





ELECTRICAL ONE-LINE DIAGRAM
NOT TO SCALE

NOTES:

1. ALL CONDUITS INTERIOR OF SHELTER SHALL BE EMT.
2. ROUTE CONDUITS ALONG WALL/CEILING AND ATTACH USING 2 HOLE CONDUIT STRAPS @ 3' O.C. MAX
3. CONTRACTOR TO INSTALL RECEPTACLE(S) AS REQUIRED. COORDINATE WITH DISH WIRELESS CONSTRUCTION MANAGER

NOTES:

1. CONTRACTOR SHALL ARRANGE CONDUITS, WIRING, EQUIPMENT AND OTHER WORK AS SHOWN ON THIS PLAN AND SHEET E-2, PROVIDING REQUIRED CLEARANCES AND ACCESS PER NEC. WHERE FIELD ADJUSTMENTS ARE NECESSARY, COORDINATE WITH SITE CM AND DISH WIRELESS.
2. PULL BOX(ES) ARE REQUIRED WHEN THE EQUIVALENT OF THREE 90 DEGREE BENDS MAX, INCLUDING THE BENDS LOCATED AT AN OUTLET OR FITTING, ARE USED BETWEEN PULL POINTS; 150 FEET OF CONDUIT LENGTH IS EQUIVALENT TO AN ADDITIONAL 90 DEGREES.

UTILITY NOTES:

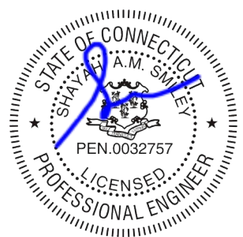
1. CONTRACTOR TO COORDINATE SERVICE ROUTING & CONNECTION WITH LOCAL TELEPHONE AND POWER COMPANIES.
2. CONTRACTOR SHALL FOLLOW LOCAL UTILITY COMPANY STANDARDS WHEN CONNECTING TO UTILITIES, PROVIDING REQUIRED CLEARANCES AND ACCESS PER NEC. LOCAL AND STATE BUILDING CODES SHALL GOVERN IN CASES WHERE UTILITY CO. STANDARDS DIFFER.
3. CONTRACTOR TO PROVIDE SPARE 3" TELCO CONDUIT W/ PULLSTRING FOR POTENTIAL FUTURE FIBER APPLICATIONS.

NOTES:

1. ELECTRICAL ROUTING IS A SCHEMATIC. THE CONTRACTOR SHALL VERIFY EQUIPMENT LOCATION AND ELECTRICAL ROUTING PRIOR TO INSTALLATION.

INSTALLER NOTE:

SCHEMATIC LAYOUT ONLY. REFER TO COMPOUND PLAN DRAWING FOR EXACT EQUIPMENT LAYOUT.



4/10/2019

PLANS PREPARED FOR:
dish WIRELESS

PROJECT MANAGER:
CROWN CASTLE

PLANS PREPARED BY:
PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
CT0100010A

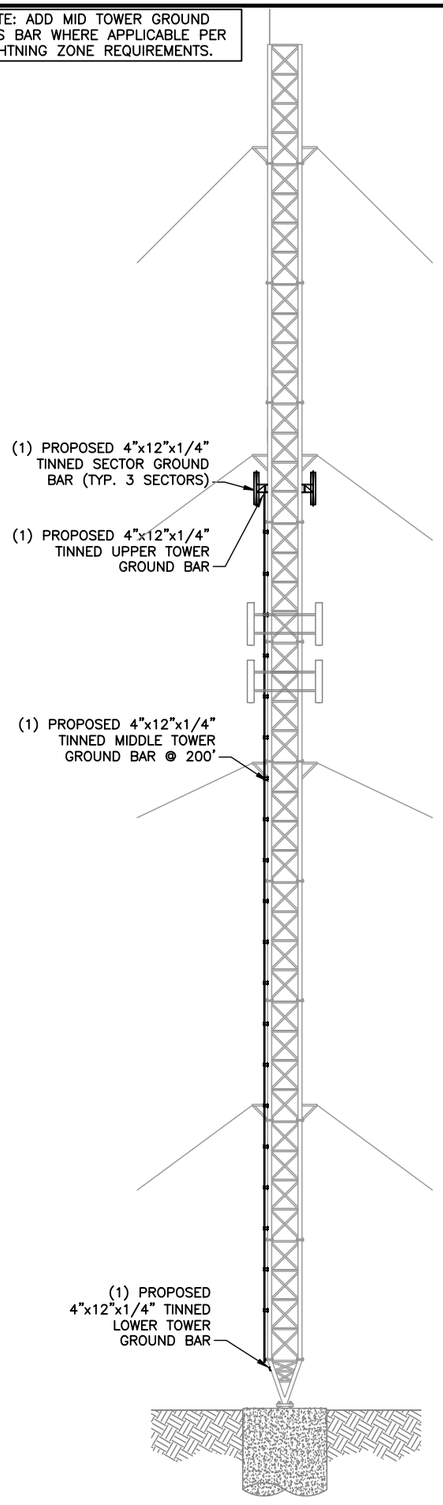
TOWER OWNER SITE ID:
873128

SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
UTILITY PLANS

SHEET NUMBER:
E-1

NOTE: ADD MID TOWER GROUND BUS BAR WHERE APPLICABLE PER LIGHTNING ZONE REQUIREMENTS.



TOWER ELEVATION GROUNDING
NOT TO SCALE

LEGEND

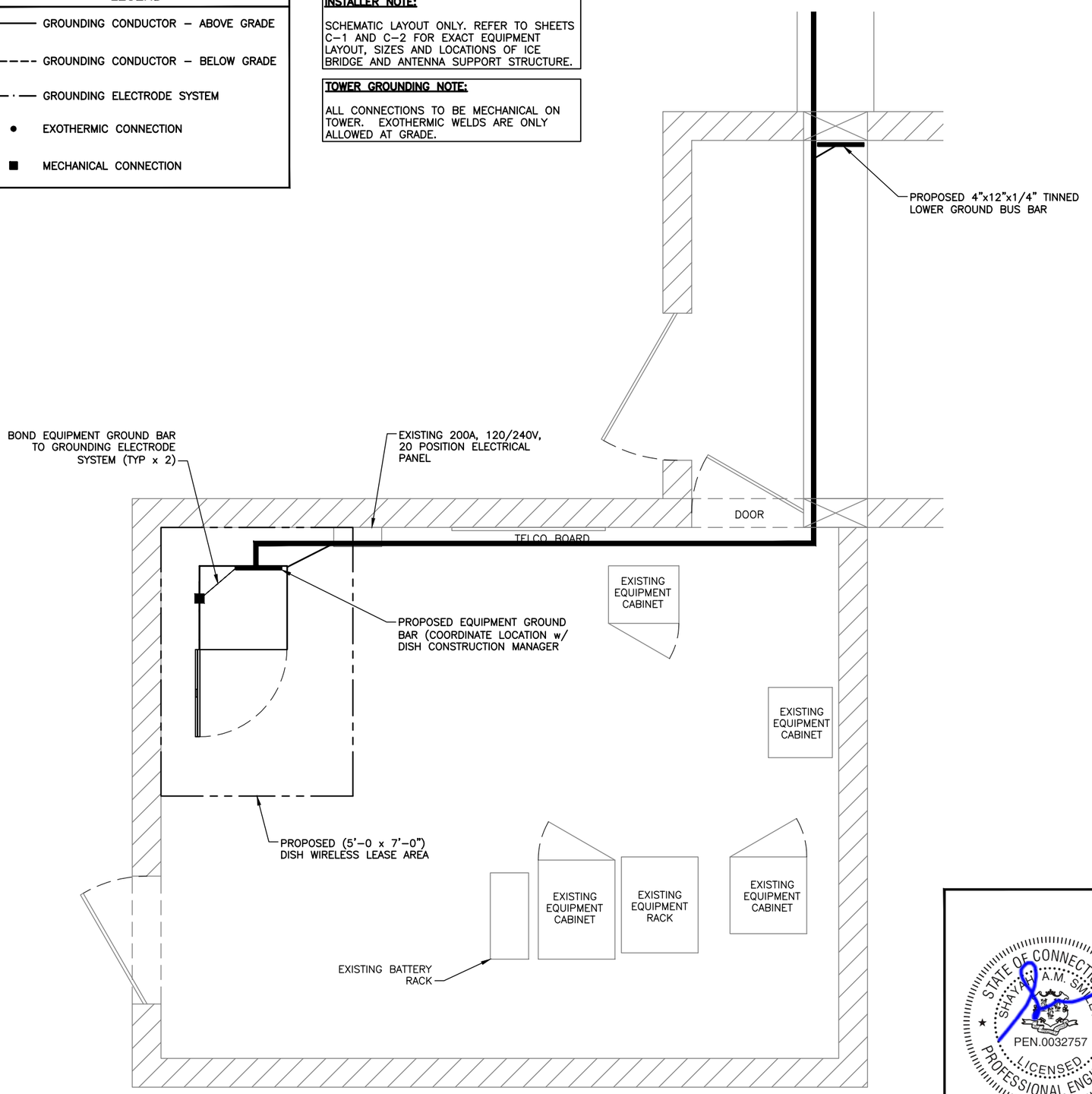
- GROUNDING CONDUCTOR – ABOVE GRADE
- GROUNDING CONDUCTOR – BELOW GRADE
- GROUNDING ELECTRODE SYSTEM
- EXOTHERMIC CONNECTION
- MECHANICAL CONNECTION

INSTALLER NOTE:

SCHEMATIC LAYOUT ONLY. REFER TO SHEETS C–1 AND C–2 FOR EXACT EQUIPMENT LAYOUT, SIZES AND LOCATIONS OF ICE BRIDGE AND ANTENNA SUPPORT STRUCTURE.

TOWER GROUNDING NOTE:

ALL CONNECTIONS TO BE MECHANICAL ON TOWER. EXOTHERMIC WELDS ARE ONLY ALLOWED AT GRADE.



GROUNDING PLAN SCHEMATIC
NOT TO SCALE

STATE OF CONNECTICUT
SHAYNE A.M. SMILEY
PEN.0032757
LICENSED
PROFESSIONAL ENGINEER
4/10/2019

PLANS PREPARED FOR:
dish WIRELESS

PROJECT MANAGER:
CROWN CASTLE

PLANS PREPARED BY:
PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
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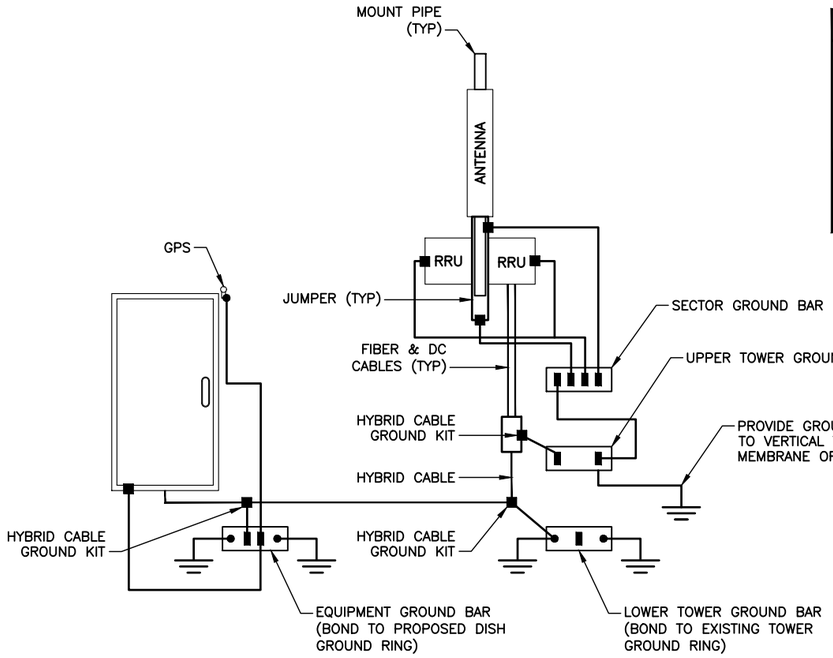
873128

SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
GROUNDING NOTES AND DETAILS

SHEET NUMBER:
G-1



GROUNDING RISER DIAGRAM (TYP. PER SECTOR)
NOT TO SCALE

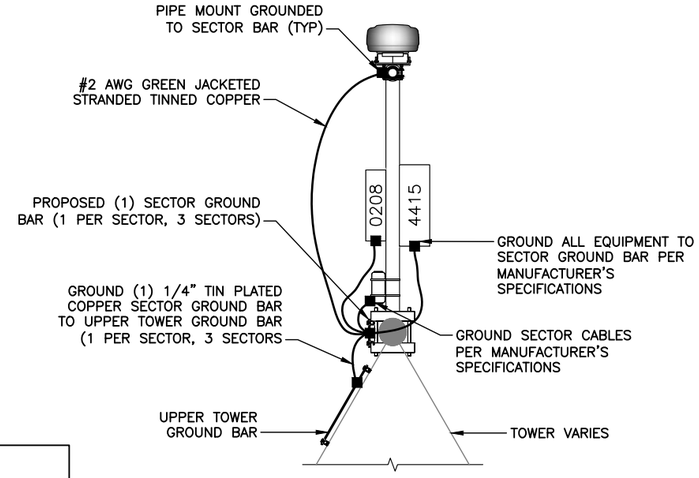
LEGEND	
———	GROUNDING CONDUCTOR – ABOVE GRADE
●	EXOTHERMIC CONNECTION
■	MECHANICAL CONNECTION
⏚	GROUND ROD

NOTE:

1. SEE SHEET G-3 FOR GROUND BAR DETAILS.
2. #2 STRANDED GREEN INSULATED COPPER WIRE FROM RADIOS AND ANTENNAS TO ANTENNA BUSBAR.
3. #2 STRANDED GREEN INSULATED COPPER WIRE FROM ANTENNA BUS BAR TO TOP TOWER BUSBAR.
4. ADD MID GROUND BUS BAR WHERE APPLICABLE PER LIGHTNING ZONE REQUIREMENTS.

TOWER GROUNDING NOTE:

ALL CONNECTIONS TO BE MECHANICAL ON TOWER. ALL GROUNDS TO BE MECHANICAL CONNECTION ABOVE GRADE. EXOTHERMIC WELDS ARE ONLY ALLOWED AT GRADE.



NOTE:

GROUNDING SHOWN FOR (1) SECTOR ONLY. GROUNDING REQUIRED FOR ALL (3) SECTORS.

GROUND BAR AT MOUNT
NOT TO SCALE

4/10/2019

PLANS PREPARED FOR:

dish WIRELESS

PROJECT MANAGER:

CROWN CASTLE

PLANS PREPARED BY:

PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
CT0100010A

TOWER OWNER SITE ID:
873128

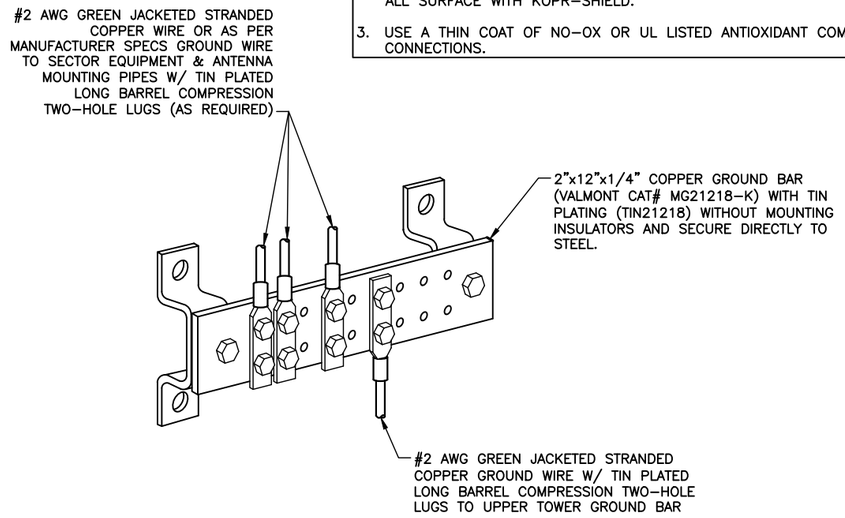
SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
GROUNDING NOTES AND DETAILS

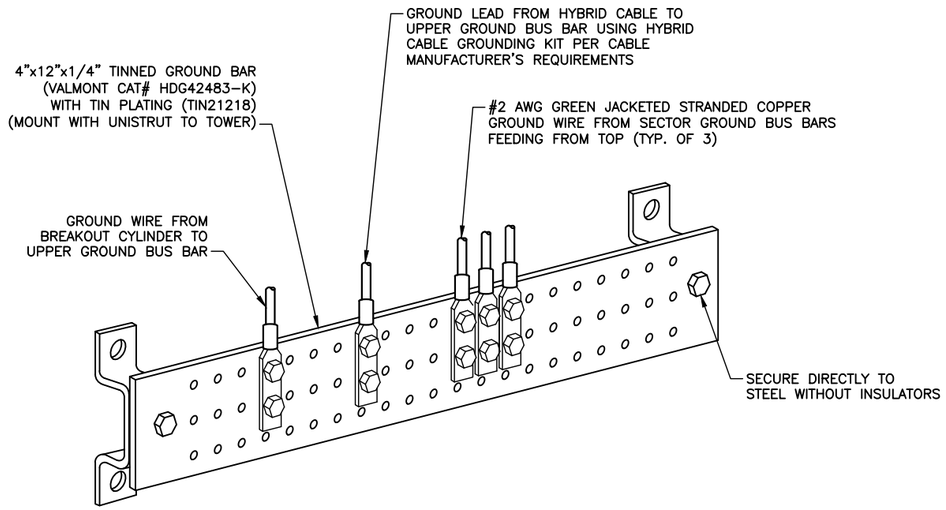
SHEET NUMBER:
G-2

NOTES:

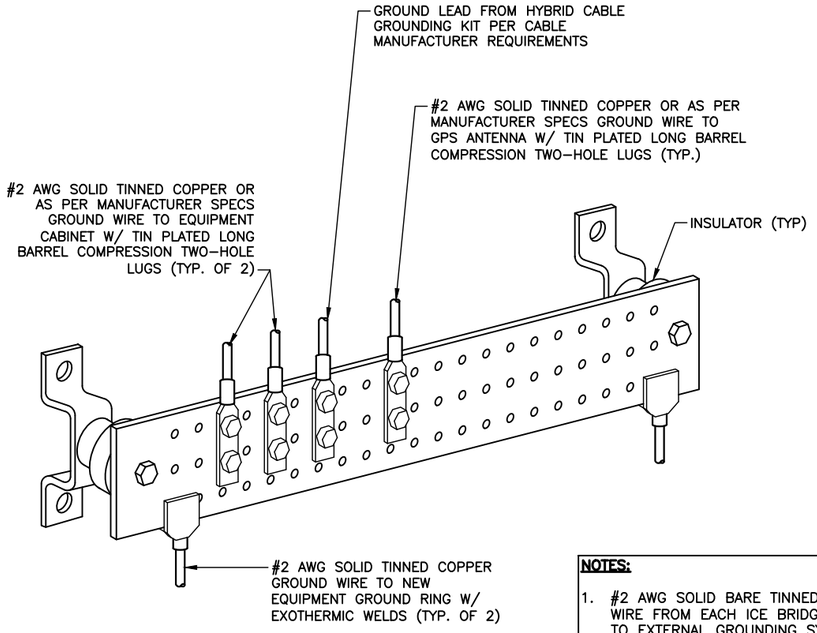
1. ALL HARDWARE SHALL BE 18-8 STAINLESS STEEL INCLUDING BELLEVILLE WASHERS. COAT ALL SURFACES WITH KOPR-SHIELD BEFORE MATING.
2. IF BONDING TO STEEL, INSERT A TOOTH WASHER BETWEEN LUG AND STEEL AND COAT ALL SURFACE WITH KOPR-SHIELD.
3. USE A THIN COAT OF NO-OX OR UL LISTED ANTIOXIDANT COMPOUND BETWEEN CONNECTIONS.



SECTOR GROUND BAR DETAIL
NOT TO SCALE



UPPER TOWER GROUND BAR DETAIL
NOT TO SCALE



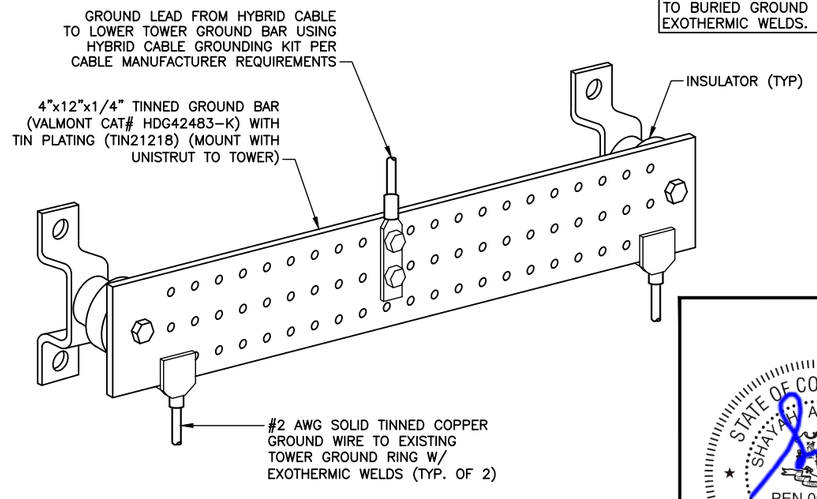
EQUIPMENT GROUND BAR DETAIL
NOT TO SCALE

NOTES:

1. #2 AWG SOLID BARE TINNED COPPER WIRE FROM EACH ICE BRIDGE POST TO EXTERNAL GROUNDING SYSTEM USING EXOTHERMIC WELDS.
2. IN CASES OF SHEATHED STRANDED WIRES, CONNECTOR SHALL HAVE INSPECTION WINDOW AND NO MORE THAN 1/8" GAP BETWEEN CONNECTOR BODY AND SHEATH.

NOTE:

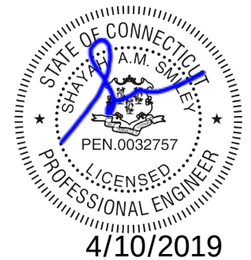
GROUND FROM SATELLITE DISH TO EQUIPMENT GROUND RING WHEN APPLICABLE



LOWER TOWER GROUND BAR DETAIL
NOT TO SCALE

NOTE:

#2 AWG SOLID TINNED COPPER GROUND CONDUCTOR FROM ICE BRIDGE POSTS TO BURIED GROUND RING USING EXOTHERMIC WELDS.



4/10/2019

PLANS PREPARED FOR:
dish WIRELESS

PROJECT MANAGER:
CROWN CASTLE

PLANS PREPARED BY:
PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
CT0100010A

TOWER OWNER SITE ID:
873128

SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
GROUNDING NOTES AND DETAILS

SHEET NUMBER:
G-3

RF Design Data Sheet

Site Information			
State	CT	Site ID	CT0100010A
Site Name	873128	Tower Type	Guyed
Address	800 Booth Hill Rd	City	Trumbull
Latitude (degrees)	41.278961	Zip	6611
Longitude (degrees)	-73.185111	Tower Owner	Crown
RFDS Revision	1.0	Issue Date	3/22/2019
RF Engineer	Danh Mai	832-531-0378	Danh.Mai@Ericsson.com

Design Information			
Technology	NB-IoT		
Vendor	Ericsson		
Site Configuration	4415-2 No Band 29		
Site Type - Equipment - Band	AWS-4		
Sector Information (Expected Configuration)	**Sector-1 (Alpha)**	**Sector-2 (Beta)**	**Sector-3 (Gamma)**
LTE Sector Number	CT0100010A_1	CT0100010A_2	CT0100010A_3
Antenna Center Line (ft)	290	290	290
Antenna Model Number	ODI2-065R18K-GQ	ODI2-065R18K-GQ	ODI2-065R18K-GQ
Number of Antennas / Sector	1	1	1
Antenna Dimensions (LxWxD) (In)	53.5 x 9.8 x 2.4	53.5 x 9.8 x 2.4	53.5 x 9.8 x 2.4
Antenna Weight (lbs.)	25	25	25
Antenna Manufacturer	Comba	Comba	Comba
Horizontal Beamwidth	64	64	64
Gain (dBd)	17.8	17.8	17.8
Azimuth (deg) (Relative to True North)	0	120	240
Antenna Downtilt (Mechanical)	0	0	0
Antenna Downtilt 2100 (Electrical)	2	2	2
Antenna Downtilt 700 (Electrical)	4	4	4
Radio Model (Band 70)	Radio 4415	Radio 4415	-
Radio Quantity (Band 70)	1	1	-
Radio Model (H-Block)	Radio 0208	Radio 0208	Radio 0208
Radio Quantity (H-Block)	1	1	1
Radio Model (700 band)	-	-	-
Radio Quantity (700 band)	-	-	-
Number of Feeders / Sector	4	4	4
Feeder Diameter (Nominal) (in)	1/2	1/2	1/2
Feeder Length (m)	3	3	3
700 MHz Radio location	-	-	-
700 MHz Coax Cable Type (in)	-	-	-
TX/RX Diplexer Model			
TX/RX Diplexer Qty			
TX/RX Diplexer Dim (inch) / Wt (lbs)			

Description of Cabling Configuration Changes / Additions	
Mandatory : Append Sketches indicating Locations of all new Antennas, Cabling, Duplexor, Diplexors (if applicable), TMA's etc....	
Sector Alpha	
Sector Beta	
Sector Gamma	
General Comments	03/22/2019 RAD changed from 350' to 290'

NOTE:

CONTRACTOR TO REFER TO, AND VALIDATE, THE LATEST RFDS PRIOR TO CONSTRUCTION.

SUPPLEMENTAL INFORMATION

PLANS PREPARED FOR:

dish WIRELESS

PROJECT MANAGER:

CROWN CASTLE

PLANS PREPARED BY:

PM&A
P. MARSHALL & ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:
CCD19-085

DISH WIRELESS SITE ID:
CT0100010A

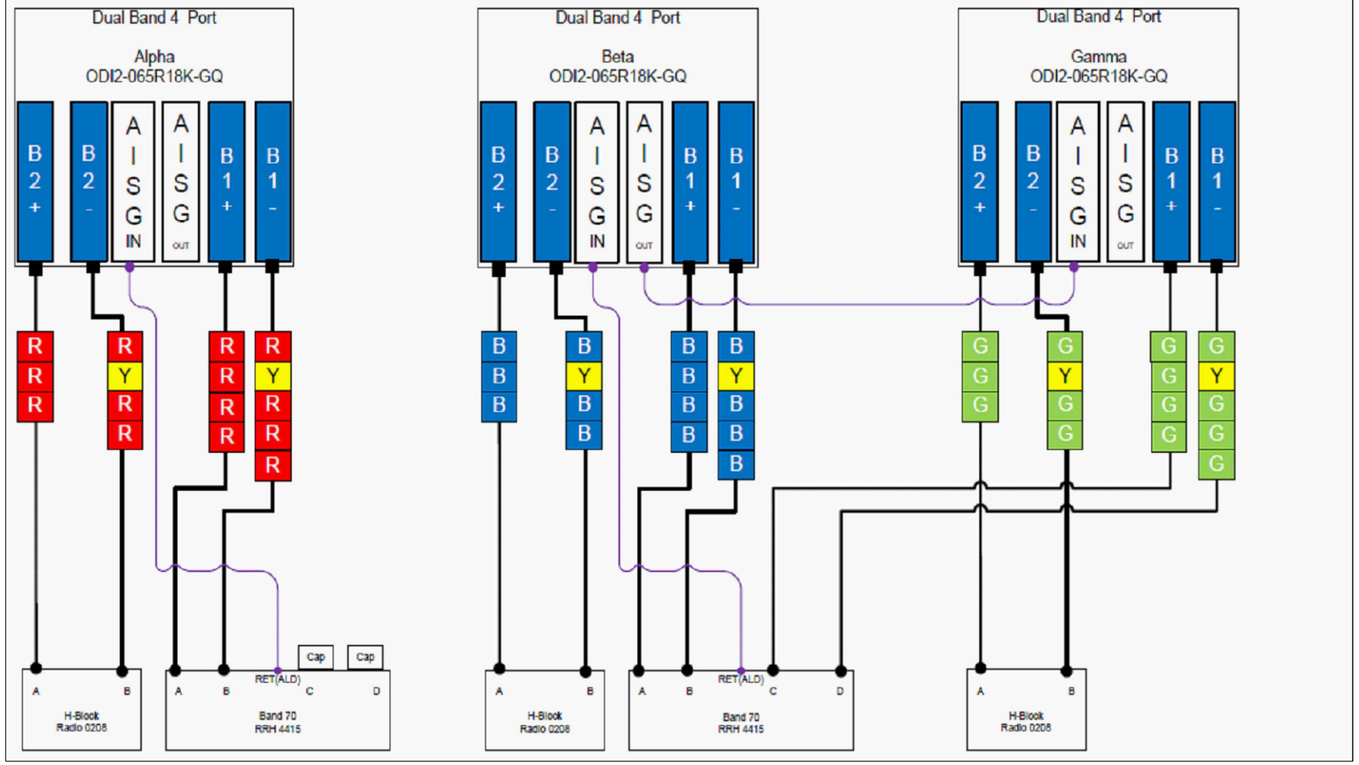
TOWER OWNER SITE ID:
873128

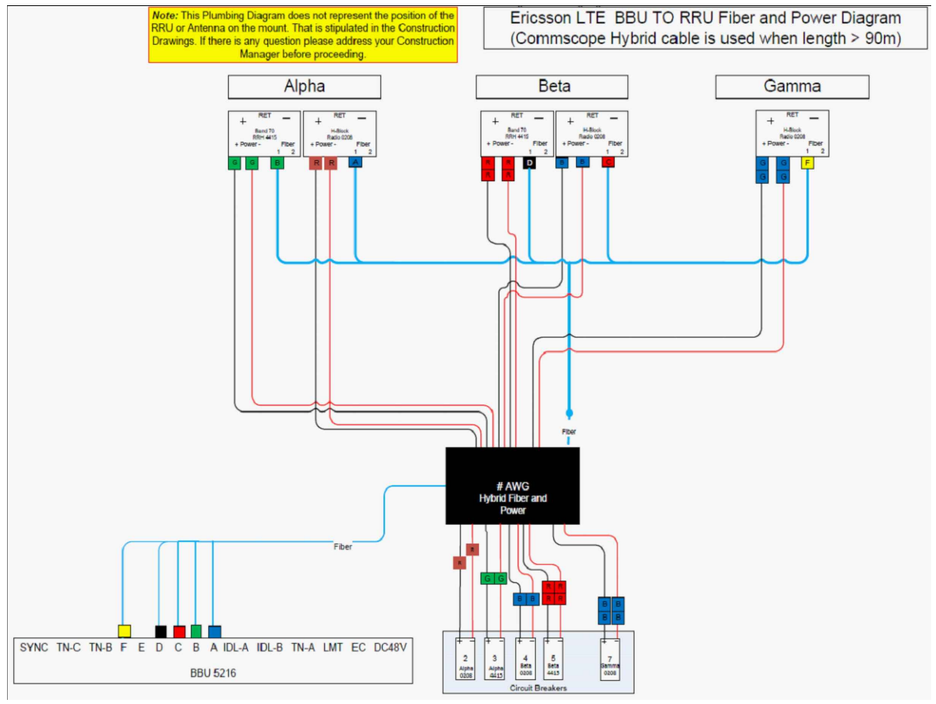
SITE ADDRESS:
800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:
RF DATA SHEET

SHEET NUMBER:
RF-1

Ericsson Antenna to RRU Diagram





NOTE:

CONTRACTOR TO REFER TO, AND VALIDATE, THE LATEST RFDS PRIOR TO CONSTRUCTION.

SUPPLEMENTAL INFORMATION

PLANS PREPARED FOR:

dish WIRELESS

PROJECT MANAGER:

CROWN CASTLE

PLANS PREPARED BY:

PM&A
P. MARSHALL
& ASSOCIATES

DRAWN BY:	JDJ
CHECKED BY:	MSB
APPROVED:	

SUBMITTALS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/04/19	JDJ	0

PM&A PROJECT NUMBER:

CCD19-085

DISH WIRELESS SITE ID:

CT0100010A

TOWER OWNER SITE ID:

873128

SITE ADDRESS:

800 BOOTH HILL ROAD
TRUMBULL, CT 06611

SHEET DESCRIPTION:

PLUMBING DIAGRAM

SHEET NUMBER:

RF-2

Date	Rev	Revision Record
09/30/2016	1	Initial Release
03/16/2017	2	Update
04/10/2017	A	Production Release

HUGHES PROPRIETARY

Job	Approvals	Date	
Originator:	Bingqian Lu	09/30/2016	***Hughes Network Systems, LLC***
Approved:	Peter Hou	04/10/2017	
Checked:	Larry Cronise Michael Middeke	04/10/2017 04/10/2017	**Title:** Antenna System, Ka-band, 90cm
Type: 201	**Sheet** 1 **of** 28		**CAGE CODE** **3L0W2** **No.** **1506345**

TABLE OF CONTENTS

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LIST OF FIGURES

Figure **Sheet**

LIST OF TABLES

Table **Sheet**

1. INTRODUCTION

1.1 PURPOSE/SCOPE

1.1.1 Purpose

The purpose of this specification control document shall be to define the requirements for a 90 cm Ka-band Antenna System (referred to hereafter as the Antenna).

1.1.2 Scope

This document defines the part numbering, electrical requirements, mechanical requirements, and environmental requirements for the Antenna. It is intended to be used as the guiding document for development of the Antenna between Hughes and the Antenna supplier.

1.2 REVISION HISTORY

Table 1-1. Revision History

Revision	Description
1	Initial Release
2	Update per mechanical feedback. Inactivate 1506345-0009 and replace with 1504881-0001. Inactivate 1506345-0010 and replace with 1506501-0001. Inactivate 1506345-0011 and replace with 1506502-0001. Inactivate 1506345-0012 and replace with 1506503-0001.
A	Update Table 2-1 to add material 1506345-0013, Section 5.6.1 to change to 99 RMS points, Sections 5.6.5, 5.7.2 and 5.8.4 to correct marking requirements, Section 5.9 to correct hardware kits, Section 5.10 to change anti-icing requirements, and Table 6-1 to add more details.

1.3 APPLICABLE DOCUMENTS

1.3.1 Applicable External Documents

Note: Please apply latest revision of document listed in **Table 1-2**.

Table 1-2. Applicable External Documents

Item #	Document #	Rev.	Description
1	DIRECTIVE 2005/20/EC	Latest	DIRECTIVE 2005/20/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2005 amending Directive 94/62/EC on packaging and packaging waste
2	DIRECTIVE 2011/65/EU	Latest	DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment
3	DIRECTIVE 2012/19/EC	Latest	DIRECTIVE 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on waste electrical and electronic equipment E (WEEE).
4	47 CFR 25	Latest	Part 25—Satellite Communications (Antenna Performance Standard)
5	EN 301 459	Latest	Satellite Earth Stations and Systems (SES) - Harmonized EN for Satellite Interactive Terminals (SIT) and Satellite User Terminals (SUT) transmitting towards satellites in geostationary orbit in the 29.5 to 30.0 GHz frequency bands covering essential requirements under article 3.2 of - the R&TTE Directive (Antenna Performance Standard)
6	Resolution No. 527 of 2011	Sept 2011	STANDARDS FOR CERTIFICATION AND APPROVAL OF SATELLITE EARTH STATION OPERATING WITH Geostationary Satellites

Item #	Document #	Rev.	Description
7	EN 301 360	Latest	Satellite Earth Stations and Systems (SES); Harmonized EN for Satellite Interactive Terminals (SIT) and Satellite User Terminals (SUT) transmitting towards geostationary satellites in the 27.5 GHz to 29.5 GHz frequency bands covering essential requirements under article 3.2 of the R&TTE Directive
8	MH10.8.3M	1993	Bar Code Symbols on Transport Packages and Unit Loads
9	C95.2-1999	1999	IEEE Standard for Radio-Frequency Energy and Current-Flow Symbols –Description
10	EN 10152	2003	Electrolytically zinc coated cold rolled steel flat products for cold forming — Technical delivery conditions
11	ASTM B 117-09	Latest	Standard Practice for Operating Salt Spray (Fog) Apparatus

1.3.2 Applicable Internal Documents

Note: Please apply latest revision of document listed in **Table 1-3**.

Table 1-3. Applicable Internal Documents (HCM)

Item #	Document #	Description	Entity Controlling Document
1	1020429	Product Acceptance Plan (MES 9000)	Copies available from Configuration Management, Hughes Network Systems, LLC, 11717 Exploration Lane, Germantown MD 20876
2	1020425	First Article Inspection (MES 2000)	
3	1503643	JUPITER-1 Radio Outline Drawing, 1W	
4	1504413	JUPITER-1 Radio Outline Drawing, 2W	
5	1505689	JUPITER-2 Radio Outline Drawing	
6	1031542	Environmental Spec-UNSHLTD O/S TELECOM EQPT	
7	1027650	Supplier Barcode Labels Spec	

Note: Copies of documents in this section can be requested from Hughes Network Systems, LLC, Purchasing Department.

1.4 TERMS, ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

Reference: 1038660 for approved entries to this section and additional terms, acronyms, and definitions.

Table 1-4. Terms, Acronyms, and Definitions

Terms/Acronym	Definition/Descriptions
AD	Acronym Definitions—Capitalize Each Word
AFR	Annual Failure Rate
ALT	Accelerated Life Test
Az	Azimuth
CP	Circular Polarization
DC	Direct Current
DOA	Dead On Arrival
DPMO	Defects Per Million Opportunities
ECN	Engineering Change Notice, a formal document used to control changes to a document, drawing, or material after it has been released to production
El	Elevation
ETSI	European Telecommunications Standards Institute, http://webstore.ansi.org/
FCC	Federal Communications Commission
FIT	Failure In Time

Terms/Acronym	Definition/Descriptions
FSS	Fixed Satellite Service
GHz	Gigahertz
HNS	Hughes Network Systems, LLC
IDU	Indoor Unit
IFL	Interfacility Link
LHCP	Left-Hand Circular Polarized
LNB	Low Noise Blockconverter, typically consisting of a low-noise amplifier followed by a frequency downconverter
LP	Linearly Polarized
LP-H	Linearly Polarized Horizontal
LP-V	Linearly Polarized Vertical
MES	Materials Engineering Standards
MPN	Manufacturer's Part Number
MTBF	Mean Time Between Failures
N/A	Not Applicable
ODU	Outdoor Unit
OMT	Orthomode Transducer
Pol	Polarization
Polarizer	A Hardware device used to convert Linear to Circular Polarization
RHCP	Right-Hand Circular Polarized
RF	Radio Frequency
RX	Receive
ST	Satellite Terminal
TBD	To Be Determined
TX	Transmit
TRIA	Transmit Receive Isolation Assembly, typically consisting of an OMT, filters, and diplexer
VSAT	Very Small Aperture Terminal
VSWR	Voltage Standing Wave Ratio
XPD	Cross Polarization Discrimination
W	West
RoHS	Restriction of Hazardous Substances
WEEE	Waste Electrical and Electronic Equipment

2. MATERIAL

The HNS material for each item defined in the document consists of the seven-digit drawing number, a hyphen, and a four digit extension (dash number); for example, 1506345-0001. The following materials are defined in this document.

Note: Do not purchase any material per the MPN only; use the Material Dash # (MCN).

Example: 1506345-xxxx

Table 2-1. Material

Material Dash #	SAP Description (40 charsacters maximum)	MPN	MFR
-0001	Reflector, 90 cm, Gray, No Logo	7581361-02	Skyware Global 815612
-0002	Reflector, 90 cm, Gray, HughesNet Logo	7581361-03	Skyware Global 815612
-0003	Reflector, 90 cm, Gray, Xplornet Logo	7581361-04	Skyware Global 815612
-0004	Reflector, 90 cm, Gray, Galaxy Logo	7581361-05	Skyware Global 815612
-0005	Back Structure, 90 cm	7581364-02	Skyware Global 815612
-0006	Az/El Assy, 2 3/8in pole, no skew	7581430	Skyware Global 815612
-0007	Feed Boomarm, 90cm	7581362-02	Skyware Global 815612
-0008	JUPITER Radio Adapter	7581363-02	Skyware Global 815612
-0009	Label, Boomarm, Caution RF	(OBSOLETE)	Skyware Global 815612
-0010	Hardware Kit, 90 cm Ant.	7581436 (OBSOLETE)	Skyware Global 815612
-0011	Hardware Kit, 90 cm REF and MEG	7581435 (OBSOLETE)	Skyware Global 815612
-0012	Hardware Kit, 90 cm Feed SPRT	7581434 (OBSOLETE)	Skyware Global 815612
-0013	Boomarm Plate, 90cm	7581475-02	Skyware Global 815612

2.1 CHANGES PRIOR TO PRODUCTION RELEASE

All changes prior to revision "A" need to be communicated between Hughes and the supplier though a numerical revision of this document.

2.2 CHANGES TO MATERIAL AFTER PRODUCTION RELEASE

The below applies when the document is released to revision A or higher.

2.2.1 Supplier Changes to Material

The supplier cannot make any changes to this specification without the express approval by Hughes Network Systems, LLC Purchasing Department through a formal Deviation or Engineering Change Notice (ECN).

Deviations will be controlled by serial numbers, lot, or effective dates. If deviations are not renewed or an ECN is not delivered prior to the expiration of a deviation, products delivered must conform to this specification.

No other form of communication is acceptable, such as verbally or by e-mail.

2.2.2 Hughes Network Systems, LLC Changes to Material

All changes initiated by Hughes Network Systems, LLC must be documented though a formal Deviation or ECN. All changes will be communicated to suppliers by Hughes Network Systems, LLC though Purchasing Department.

Deviations will be controlled by serial numbers, lot, or effective dates. If deviations are not renewed or an ECN is not delivered prior to the expiration of a deviation, products delivered must conform to this specification. Reference Hughes Networks Systems, LLC document 1018115 **(for internal use only)** for details of the deviation and ECN process.

No other form of communication is acceptable, such as verbally or by e-mail.

3. FUNCTIONAL REQUIREMENTS

3.1 FUNCTION PERFORMED

The following functions illustrate the Antenna operation, which simultaneously:

1. Transmit a circularly polarized Ka-band signal to one of the FSS satellites listed in **Table 3-1**. The circular polarization is either LHCP or RHCP, manually set at installation.
2. Receive a circularly polarized Ka-band signal to one of the FSS satellites listed in **Table 3-1**. The circular polarization is either LHCP or RHCP, electronically selectable.

3.2 SATELLITE CHARACTERISTICS

The Antenna shall be capable of simultaneously transmitting/receiving signals to/from the Ka-band FSS satellites listed in **Table 3-1**.

Table 3-1. Satellite Characteristics

Uplink Frequency (GHz)	Downlink Frequency (GHz)	Uplink Polarization	Downlink Polarization
28.0 – 30.0	17.7 – 20.2	LHCP or RHCP	LHCP or RHCP

3.3 OPERATIONAL DESCRIPTION

The 90 cm Ka-band Antenna System is comprised of Antenna Assembly and Radio Assembly components. On transmit, the reflector shall collimate the Tx signal from the feed horn to form an electromagnetic beam aimed at the chosen satellite. On receive, the Antenna shall intercept the incoming signals from the same satellite to focus onto the same feed horn to let the signals flow to the LNB's, which in turn down-convert the signal to L-band and send these signals to the IFL cable connecting to the indoor equipment for further processing.

Overall, the Antenna shall function as a spatial filter that amplifies signals to/from the chosen directions while attenuating signals to/from all other directions. The combination of the Antenna and spectrum filters ensures the proper transmission and reception of signals to and from the satellites, while keeping interference to an acceptable level.

Figure 3-1. Concept view of Ka-band 90cm Jupiter Antenna Assembly

4. PERFORMANCE REQUIREMENTS

4.1 ELECTRICAL PERFORMANCE

Table 4-1 lists the electrical performance specifications. Antenna performance shall meet or exceed the performance indicated in this section. Specifications in this section shall be met over the full environmental operating conditions specified in Section 5.10 of this specification.

Table 4-1. Antenna Electrical Performance Summary

Item	Parameter	Requirements	
1.	RX Frequency	17.7 – 20.2 GHz	
2.	TX Frequency	28.0 – 30.0 GHz	
3.	Polarization – RX and TX	Circular (LHCP and RHCP)	
4.	RX Gain (min)	17.7 GHz 18.3 GHz 18.8 GHz 19.3 GHz 19.7 GHz 20.2 GHz	42.4 dBi 42.7 dBi 42.9 dBi 43.1 dBi 43.3 dBi 43.5 dBi
5.	TX Gain (min)	28.0 GHz 29.25 GHz 29.5 GHz 30.0 GHz	46.2 dBi 46.5 dBi 46.6 dBi 46.8 dBi
6.	Return Loss (Reference only)	17.7 to 20.2 GHz 28.0 to 30 GHz	≥ 20 dB ≥ 25 dB
7.	Adjacent Satellite Interference Rejection (ACI)[1]	17.7 to 18.8 GHz 18.8 to 19.3 GHz 19.7 to 20.2 GHz	≥ 23 dB ≥ 24 dB ≥ 25 dB
8.	TX Antenna Pattern Compliance	Per FCC Part 25-209, ETSI EN 301 459, ENTSI EN 301 360, Anatel Resolution No. 527	
9.	Cross-Polarization Isolation	> 37 dB linear equivalent, on axis and within a -1 dB co-pol beam contour in linear polarization, including the feedhorn but excluding the polarizer	
10.	Noise Temperature	44 K max at 30° elevation	
11.	Beam Squint (peak-to-peak)	Between opposite sense RX/RX Between opposite sense TX/TX Between same sense RX/TX Between opposite sense RX/TX	< 0.10° max < 0.07° max < 0.03° max < 0.12° max
12.	Antenna System Wet Loss	17.7 to 20.2 GHz 28.0 to 30 GHz	≤ 0.50 dB ≤ 1.00 dB
		Due to 10 mm/hour vertical rainfall, with no wind at 30° antenna elevation	
13.	Additional Pointing Loss	17.7 to 20.2 GHz 28.0 to 30 GHz	≤ 0.1 dB ≤ 0.2 dB
		Due to mechanical creep and degradation during life of product, including thermal drift over 55° C ΔT (at 4° C/minute)	
14.	Max TX Power Handling	6 W	

[1] The ASI is defined as the **power sum** over the range of angles ±2, ±4, and ±6, including the topocentric effects and antenna pointing error (0.2°). Hence, the ASI is calculated as a power sum over the following angles: ±(1.9°to 2.5°), ±(4.0° to 4.8°), and ±(6.1° to 7.1°)

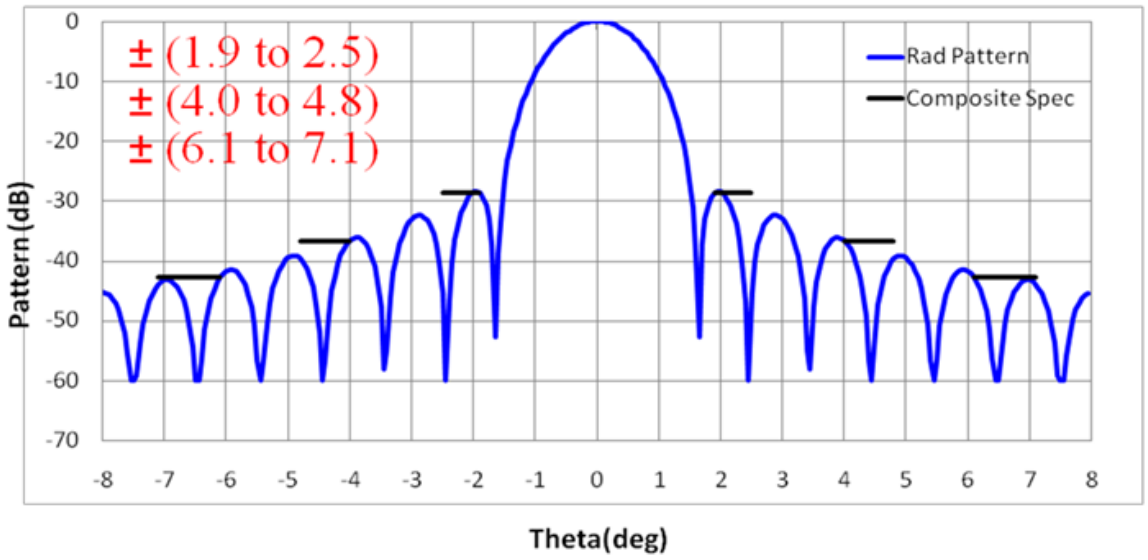


Figure 4-1. Calculation of ASI

4.2 ANTENNA SYSTEM PERFORMANCE (REFERENCE ONLY)

The 90 cm Ka-band Antenna System in this section is defined as the antenna mated with a TRIA (HNS 1501960) and LNB having a typical noise figure of 1.4 dB. The following table defines de typical performance of the system.

Table 4-2. Antenna System Performance

Item	Parameter	Requirements		
1.	ODU G/T with Giotto radio at 30° elevation, +22°C ambient temperature at 19.7GHz	20.31dB		
2.	Antenna Axial Radio (Both Rx and Tx)	Band	Worst Case (dB)	Average (dB)
		Band A_Rx	2.0	1.3
		Band B/NGSO_Rx	2.23	1.42
		Band A/B_Tx	1.42	0.86
3.	Cross Polarization Isolation (Both Rx and Tx)	Band A_Rx	18.9	22.6
		Band B/NGSO_Rx	18.0	21.8
		Band A/B_Tx	21.8	26.1

4.3 MECHANICAL PERFORMANCE

Table 4-3 provides a short summary of most mechanical and some environmental requirements. For detailed mechanical requirements refer to Section 5 and for detailed environmental requirements refer to Section 5.10 of this specification.

Table 4-3. Antenna Mechanical Performance Summary

Item	Parameters	Requirements
1.	Aperture Size/Shape	See Table 5-2
2.	Reflector Focal Length	See Table 5-2

3.	Reflector f/D (defined as focal length/electrical height)	See Table 5-2
4.	Reflector Profile (rim thickness)	Maximized for aesthetics
5.	Elevation Angle Range	5° to 90°, coarse, continuous
6.	Maximum Elevation Error	Max. error between antenna elevation reading and reflector true position is < +/- 1.5°
7.	Azimuth Range	0º to 360°, coarse, continuous
8.	Fine Az and El	<0.1° adjustment/setability in both Az & El, <0.02° backlash in both Az & El, +/-5.0° minimum range in El, +/-5.0° minimum range in Az
9.	Polarization Rotation Adjustment	<1.0° resolution/adjustment/setability, +/- 90° range
10.	Scales, Elevation	1.0° min. reading ability for Elevation Scale, 5° to 90° markings
11.	Scales, Orbital Arc	1.0° min. reading ability for Orbital Arc, -90° to +90° markings
12.	Antenna Assembly Weight	See Section 5.2 for requirements
13.	Color	See Section 5.1 for requirements
14.	Mast Pipe Requirement	For Pole Mount, 60" above ground, 18" below ground. Minimum.
15.	Safety Requirements	Requires Professional Engineering Certification/Analysis for the full antenna, tri-mast-mount, and mounting hardware under common installations & wind conditions throughout the United States.
16.	Survival Wind – No re-pointing required	See Section 6.2 for requirements.
17.	Survival Wind – No permanent damage, re-pointing allowed	See Section 6.3 for requirements.
18.	Survival Wind – Permanent damage allowed, cannot become windblown hazard	See Section 6.4 for requirements.
19.	Survival Wind - Permanent damage allowed, cannot become windblown hazard, tethering acceptable	See Section 6.5 for requirements.
20.	Anti-icing	See Section 5.10 for requirements.

4.4 ANTENNA INSTALLATION

Table 4-4 provides a short summary of most installation requirements. The time values for installations assume a skilled professional installer for each installation.

Table 4-4. Antenna Installation Requirements

Item	Parameter	Requirements
1.	Time to assemble and install antenna and tri-mount (pre-installed IFL cable, pre-installed radio assembly on feed boomarm), base antenna only.	≤ 25 minutes
2.	Time to coarse point the antenna (finding the right satellite with sufficient signal strength to lock).	≤ 10 minutes
3.	Time to fine point the antenna (meeting the specs of initial pointing losses and XPD). Ka only.	≤ 10 minutes

5. MECHANICAL REQUIREMENTS

5.1 MATERIAL AND FINISH

The material selection and finish of components defined in this specification shall be consistent with the mechanical requirements from this section and the environmental requirements from Section 5.10.

The reflector material shall be galvanized steel A40 DDS, 24 GA (0.028") Hot Dipped DDS, 24GA (0.028") or Electro Galvanized DDS (12G/12G, 22 GA (0.030") or equivalent.

The Antenna components, unless otherwise specified, shall be colored as per the Cool Gray No. 10C per Pantone color specification, solid matte edition (RAL7019), or a similar gray color approved by Hughes. All antenna parts in front of the Reflector should be color-matched to this color specification unless otherwise specified.

The Az/El assembly does not need to be painted as long as it meets the requirements from Section 5.10.

5.2 WEIGHT

The Antenna shall weigh 30 lbs maximum. The Antenna includes reflector, feed boomarm assembly, Az/El mechanism, hardware kit and the reflector back structure. Packaging material shall be excluded from the weight requirement.

5.3 GALVANIC COMPATIBILITY

The Antenna assembly should be considered in harsh environment from galvanic corrosion perspective. Materials and fasteners used on the Antenna and at the interfaces must be galvanically compatible. When dissimilar metals are used in intimate contact, suitable protection against galvanic corrosion shall be applied. Dissimilar metals should not exhibit greater than 0.15V potential difference in the anodic index.

5.4 MECHANICAL SAFETY

The Antenna assembly shall have no sharp edges or burrs. A professional engineering certification/analysis shall be performed for:

1. The fully configured Antenna assembly
2. The fully configured Antenna assembly attached to the trimast mount (including Radio)
3. The fully configured Antenna assembly, attached to a pole mount (5 ft. above ground, 30" minimum below ground)
4. All wind loading conditions described in Section 5.10.

5.5 RADIO ASSEMBLY INTERFACE

The Antenna shall be designed to interface with the following Radio Assemblies, defined by the Interface Outline Drawings from **Table 5-1**. Refer to these documents for radio assembly mounting locations and overall dimensions.

Table 5-1. Radio Assembly Interface

Item	Radio Assembly Interface Outline Drawing	Radio Description
1.	1503643	JUPITER-1, Radio Assembly, 1W
2.	1504413	JUPITER-1, Radio Assembly, 2W
3.	1505689	JUPITER-2, Radio Assembly

These outline drawings should be used to complete the Antenna Optics design and locate the Phase Center of the radio assembly with the focal point of the Reflector.

5.6 REFLECTOR REQUIREMENTS

5.6.1 Surface RMS

The reflector surface accuracy, at vendor packout should be calculated by measuring a minimum of 99 points over a minimum of 95% of the effective aperture, surface RMS to be 0.010" maximum RMS and surface peak to peak to be 0.050" max.

5.6.2 Reflector Size/Form Factor

The reflector dimensions as listed in **Table 5-2** are for reference only.

Table 5-2. Reflector Physical Dimensions (Reference Only)

Parameter	Dimensions (mm)
Aperture Size/Shape	Effective: 892.68 mm circular equivalent nominal Electrical: 878.28 mm (height) x 907.33 mm (width) Physical: 908 mm (height) x 937.44 mm (width)
Focal Length (f)	700 mm
Reflector f/D (defined as focal length/electrical height)	0.8

5.6.3 Reflector Branding and Artwork

The branding logos shall be permanently marked on the front side of the reflector. The logos shall be per Pantone Black C and meet the HNS marking requirements. Refer to the figures below for dimensions.

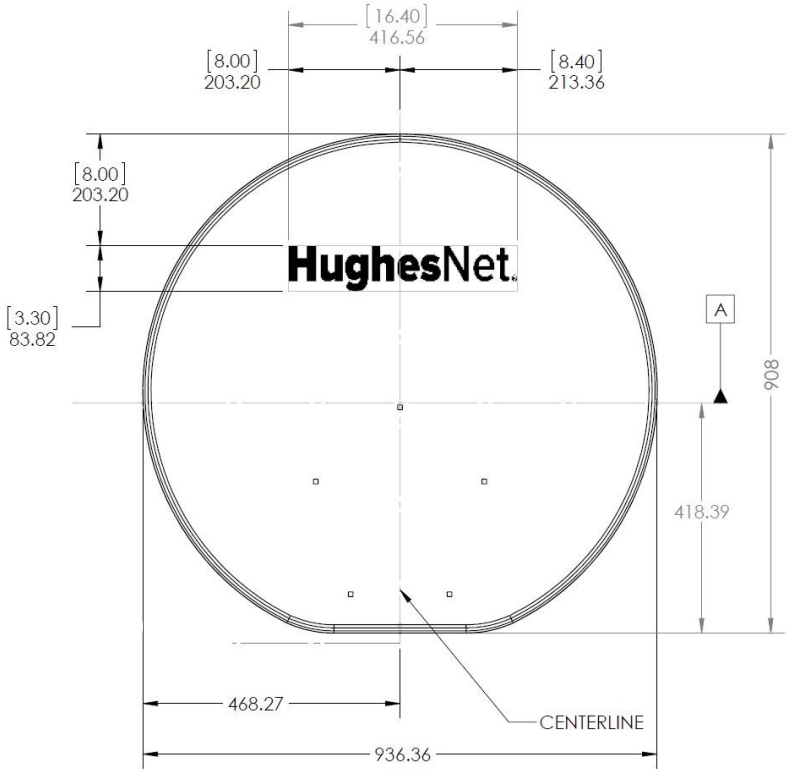


Figure 5-1. HughesNet Logo

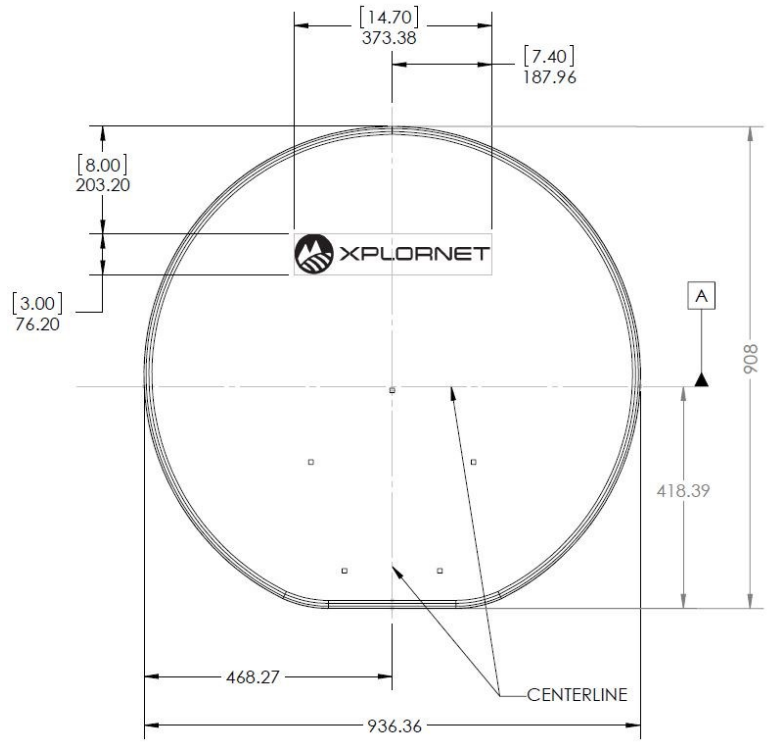


Figure 5-2. Xplornet Logo

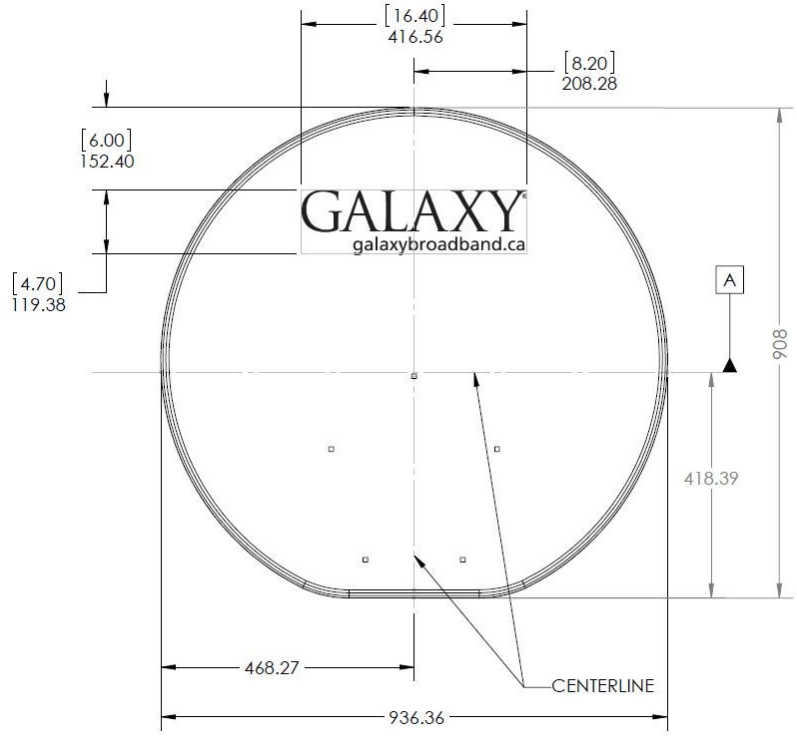


Figure 5-3. Galaxy Logo

5.6.4 Reflector Installation

When removed from the packaging box, the reflector shall be a single-piece assembly and require at most 5 fastener connections to properly secure it to the overall Antenna structure.

5.6.5 Reflector Marking

5.6.5.1 Date Stamp

Permanent text indicating the manufacturing date shall be applied in a visible location on the back of the reflector. The date text shall include at minimum the month and year of manufacture.

5.6.5.2 Manufacturer ID

Mark with the Manufacturer ID. An additional character shall follow the Date stamp to denote the manufacturer. Please contact Hughes Product Line Manager or Hughes Purchasing for the Manufacturer ID.

5.7 FEED BOOMARM REQUIREMENTS

5.7.1 Feed Boomarm with Radio Mount Installation

The feed boomarm shall be capable of supporting the radio assembly and should be size such that an installer can pass up to two RG-6 Quad Shield cable assembly complete with F-connector terminations thru the feedarm interior with ease.

5.7.2 Feed Boomarm Marking

5.7.2.1 Part Number and Revision

Permanent text indicating the Manufacturer Part Number and Revision level shall be applied in a visible location on the boomarm and radio adapter.

5.7.3 Feed Boomarm Caution RF Frequency Label

A caution label manufacturing part number: 1504881-0001 must be applied on the feed boomarm in a location visible from both sides. For reference, the text shall be as shown in **Figure 5-4** in both English and Spanish. The text shall be in black print on a yellow label per IEEE STD C95.2-1999 for RF energy and current flow symbols.

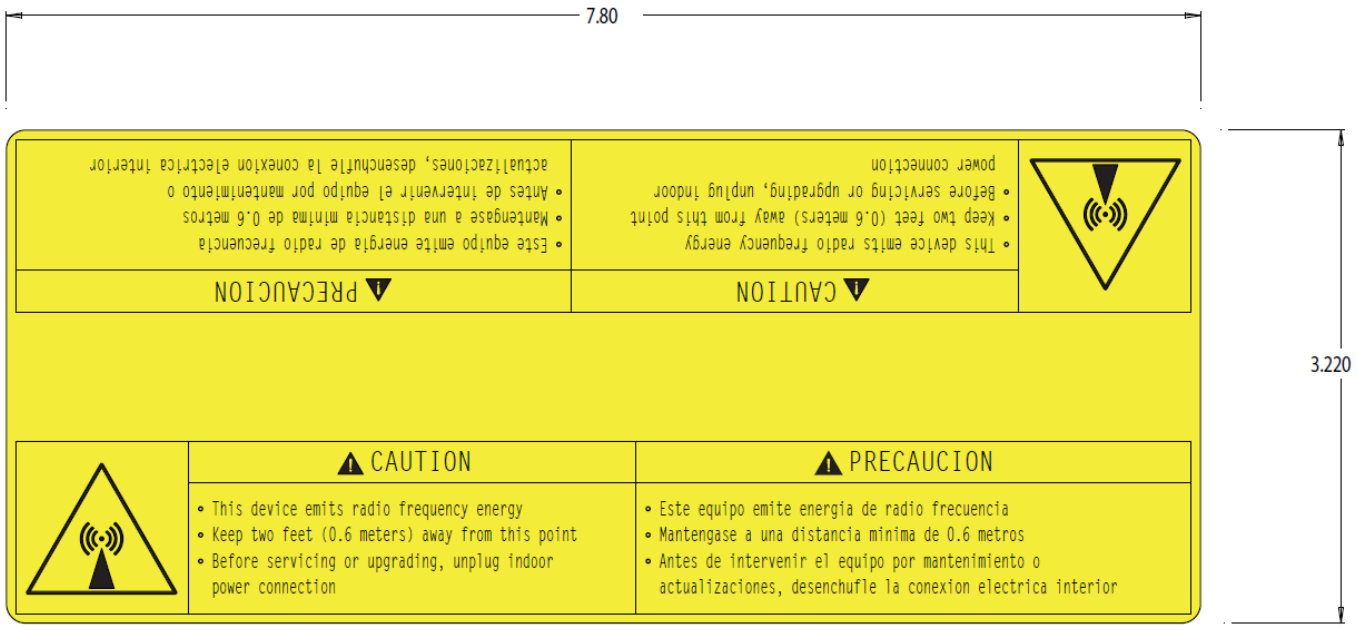


Figure 5-4. Boomarm Caution RF Frequency Label

5.8 AZ/EL MECHANISM REQUIREMENTS

5.8.1 Reflector Back Structure with Az/El Mechanism Installation

The reflector back structure with Az/El mechanism shall support the reflector and the entire feed boomarm assembly. The reflector back structure with Az/El mechanism shall be installed using a minimum number of fasteners.

5.8.2 Az/El Mechanism to Mast Pipe Interface

The Az/El mechanism shall be designed to attach onto a 2-3/8 inch outer diameter Mast Pipe. The pipe shall be of sufficient thickness and rigidity to prevent being crushed or visibly deformed by attachment of the Az/El mechanism.

5.8.3 Az/El Adjustments

The system shall have provisions for coarse and fine Az/El adjustments. The system shall also have provisions for an easy-to-read dial/scale to peak the signal. Table 5-3 lists the Az/El mechanism requirements.

Table 5-3. Az/El Adjustment Mechanism Requirements

Parameter	Elevation		Azimuth	
	Coarse	Fine	Coarse	Fine
Range	5° to 90º	±5°	0º to 360º	± 5º
Resolution	1º	0.1º	1º	0.1º
Backlash	-	< 0.02º	-	< 0.02º
Lockdown Movement	-	< 0.05°	-	< 0.05°

5.8.3.1 Elevation

Coarse Adjustment: The elevation range shall be from 5º to 90º. The coarse adjustment scale shall be marked from 5º to 90º in one degree increments. The elevation adjustment shall be continuous and smooth.
Fine Adjustment: The fine adjustment scale range shall be a minimum of±5°, anywhere within the 0º to 90º coarse adjustment zone. The fine adjustment scale shall be marked with 0.1º increments. The fine adjustment shall have a precision of 0.05º with maximum backlash/error of 0.02º.
Locking Mechanism: The elevation setting shall be maintained by an appropriate locking mechanism that does not alter the elevation and azimuth position of the reflector when locked in elevation.

5.8.3.2 Azimuth

Coarse Adjustment: The azimuth range when mounted to a pole or non-penetrating mount shall be 360º. The minimum range shall be ±45° when mounted to a wall at elevation angle greater than 80º and polarization of 0. The azimuth adjustment shall be continuous and smooth.
Fine Adjustment: The fine adjustment scale range shall be a minimum of±5°, anywhere within the 0º to 360º coarse adjustment zone. The fine adjustment scale shall be marked with a 0.1° increments. The fine adjustment shall have a precision of 0.05° with a maximum backlash/error of 0.02º.
Locking Mechanism: The azimuth setting shall be maintained by an appropriate locking mechanism that does not alter the elevation and azimuth position of the reflector when locked in azimuth.

5.8.4 Az/El Mechanism Marking

5.8.4.1 Date Stamp

Permanent text indicating the manufacturing date shall be applied in a visible location on the Az/El Mechanism. The date text shall include at minimum the month and year of manufacture.

5.8.4.2 Part Number and Revision

Permanent text indicating the Manufacturer Part Number and Revision level shall be applied in a visible location on the Az/El Mechanism and the reflector back structure.

5.8.5 Mount Diameter

The Az/El mechanism shall be designed to attach onto a 2-3/8 inch outer diameter Mast Pipe. The pipe shall be of sufficient thickness and rigidity to prevent being crushed or visibly deformed by attachment of the Az/El mechanism.

5.9 HARDWARE KIT REQUIREMENTS

When removed from the packaging carton(s), the hardware kit(s) 1506501-0001, 1506502-0001 and 1506503-0001 shall include the necessary hardware to assemble the Antenna and attach the Radio. Three kits have been established. Kit 1 labeled with P/N 1506501-0001 contains the other two kits, kit 2 labeled with P/N 1506502-0001 and kit 3 labeled with P/N 1506503-0001. The number of required tools and hardware fastening styles shall be minimized. A design goal of a single fastener size for all installation hardware shall be considered. The hardware kit shall meet all environmental and galvanic compatibility requirements within this specification. All hardware requiring manipulation during installation or maintenance shall conform to the ANSI Unified Standard.

5.10 ANTI-ICING KIT REQUIREMENTS

The Anti-icing kit shall be designed for field installation with proper packaging and reference materials. It shall be powered by 120Vac, 60Hz, voltage and use a maximum of 20Amps of current. The Anti-icing kit shall be automatically controlled by temperature and moisture sensors. It shall also have the ability to over-ride the automatic setting by use of a manual switch. The temperature turn-on point shall be 38 degrees Fahrenheit. The Anti-icing kit shall function for both the reflector and feedhorn surfaces. The Anti-icing kit shall meet all required safety certifications.

6. ENVIRONMENTAL REQUIREMENTS

The Antenna shall comply with the Class II environmental requirements specified in **Table 6-1** in accordance with HNS Document 1031542, Environmental Specification: Unsheltered Outdoor Telecommunications Equipment. The following subsections describe additional environmental requirements for the Antenna and supersede HNS Document 1031542.

Table 6-1 shall provide the testing plan method of compliance to the environmental requirements of this specification for the development and production of the Antenna. A legend is provided at the bottom of the table.

Table 6-1. Antenna Test Plan Summary

Applicable Requirements	Test Description	EVT	DVT	MVT	Production
1031542 Section 3.1.2	Temperature, Survival	A	D	D	-
1031542 Section 3.3.2	Humidity, Survival	A	D	D	-
1031542 Section 5.1	Corrosion Resistance, Temperature Cycling/High Humidity	A	D	D	-
1031542 Section 5.2	Salt Fog	A	T	D	ST, as needed
1506345 **Section 6.1**	Operational Wind	A	T	T	ST, as needed-
1506345 **Section 6.2**	Survival Wind, No Repointing Required	A	T	T	ST, as needed
1506345 **Section 6.3**	Survival Wind, No Permanent Damage	A	T	T	ST, as needed
1506345 **Section 6.4**	Survival Wind, No Windblown Hazard	A	T	T	ST, as needed
1506345 **Section 6.5**	Survival Wind, Tethering Acceptable	A	-	-	-
1031542 Section 7.1.1	Mechanical, Shock Resistance, Operational	-	T	T	-
1031542 Section 7.1.2	Mechanical, Shock Resistance, Survival	-	T	T	-
1031542 Section 7.2.1.1	Random Vibration Resistance, Subsystem Level Requirements, Operational	A	T	T	-
1031542 Section 7.2.1.2	Random Vibration Resistance, Subsystem Level Requirements, Survival	A	T	T	-
1031542 Section 7.4.1.1	Handling and Transportation, Packaged Shock, Weight Categories 1 and 2	-	T	T	-
1031542 Section 7.4.2.1	Handling and Transportation , Packaged Vibration, Weight Categories 1 and 2	-	T	T	-

Legend:

A: Analysis

D: Demonstrate (by design or derived from testing of another parameter)

I: Sample Inspection

PAT: Product Audit Test

ST: Sample Test

T: Test (default test condition is at room temperature of 22°C, unless otherwise indicated)

6.1 OPERATIONAL WIND

The antenna and mount combined shall not drift more than ±0.16°(0.5 dB Tx and 0.25 dB Rx) when subject to winds up to 35 mph from any incident angle.

6.2 SURVIVAL WIND – NO REPOINTING REQUIRED

The Antenna and mount shall not require repointing when subject to winds up to 100 mph from any incident angle; however the system does not have to remain operational for winds exceeding 35 mph.

6.3 SURVIVAL WIND – NO PERMANENT DAMAGE

The Antenna and mount shall not exhibit permanent damage when subject to winds up to 125 mph from any incident angle; however, the system may require repointing for winds exceeding 100 mph.

6.4 SURVIVAL WIND – NO WINDBLOWN HAZARD

The Antenna and mount shall not become a windblown hazard when subject to winds up to 150 mph from any incident angle; however, the system may exhibit damage when subject to winds exceeding 125 mph.

6.5 SURVIVAL WIND –TETHERING ACCEPTABLE

The Antenna and mount shall not become a windblown hazard when subject to winds between 150 and 180 mph from any incident angle; however, the use of tethering is acceptable for windspeed in this range.

7. MATERIALS ENGINEERING REQUIREMENTS

7.1 GENERAL

The supplier shall comply with MES requirements detailed 1020429 (Product Acceptance Plan (MES 9000)).

7.2 CRITICAL PARAMETERS

The critical parameters and dimensions shall be determined after successful completion of Manufacturing Verification Test (MVT) and as identified in the Product Characteristic and Compliance Plan (PCCP), both of which are part of the MES requirements within the 1020429 (Product Acceptance Plan (MES 9000)).

8. QUALITY ASSURANCE

8.1 GENERAL

The supplier must comply with MES requirements and other milestones mentioned in the 1020429 (MES 9000) documents, culminating in a mutually agreed upon PCCP.

8.2 DEAD ON ARRIVAL (DOA)

All manufacturing processes, tests, inspections, and environmental tests shall be designed to ensure a DOA rate of 1207 Defects per Million Opportunities (DPMO) or less. DOA shall be defined as defects in "out-of-box" products characterized by the following opportunities for error:

- Nonconformance to electrical requirements of this specification
- Missing part of a product affecting form, fit, or functionality
- Defect in install ability (fails to install into the system)
- System failure caused by the unit in a certified hardware configuration
- DOA shall be calculated as a rolling average of x-month intervals:
  - DOA = (number of defects detected in x months) x (number of opportunities for error)

8.3 COMPONENT CHANGES

Supplier shall notify the procuring activity prior to the delivery of any parts that have any Class I changes. A Class I change is defined as any change or modification in design, material, or process that may affect form, fit, interchangeability, function, or reliability of the device as defined in this specification. Proprietary information need not be disclosed.

8.4 RESPONSIBILITY FOR INSPECTION

Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. The supplier may use any facility suitable for the performance of these inspections set forth in the specification, where such inspections are deemed necessary to ensure that parts conform to the prescribed requirements. In addition, any inspection or workmanship used by the supplier for inspection, supplier plan, or otherwise shall be preapproved by HNS.

8.5 QUALIFICATION INSPECTION

Qualification inspection is a series of tests and examinations intended to determine if there are any design flaws in the product. Failure of qualification inspection indicates that the product in its current form is unproven and should not go into final production. All qualification results shall be available for the buyer to review. Product Qualification Inspection testing shall be done according to the Product Characteristic Compliance Plan (PCCP) and reported via a Statistical Quality Control (SQC) report.

8.6 QUALITY CONFORMANCE INSPECTION

Quality conformance inspection is a series of tests and examinations intended to determine if a particular production lot meets the standards previously determined to be acceptable. Production equipment shall conform in all respects to the functional specification and shall successfully complete acceptance testing to the current production test procedures. The item shall be inspected prior to delivery for compliance to the requirements set forth herein. The supplier shall perform inspections on the complete lot. The buyer will expect that all products delivered will be fully compliant to this specification, except as amended by the purchase order. Any lack of compliance may be cause for rejection of the entire lot. Quality Conformance Inspection shall be done according to the Product Characteristic Compliance Plan (PCCP) and reported via a Statistical Quality Control (SQC) report.

8.7 VISUAL AND MECHANICAL INSPECTION

All equipment shall be inspected to verify that the material, design, construction, physical dimensions, and workmanship are in accordance with the applicable requirements and PCCP.

9. RELIABILITY REQUIREMENTS

9.1 DESIGN LIFE

The design life of the Antenna shall be 10 years minimum when the system environment does not exceed the operational conditions specified in Section 5.10. The design life is defined as all hardware remaining serviceable and operable at the specified performance level.

9.2 PRODUCTION LIFE

Does not apply.

9.3 ANNUALIZED FAILURE RATE (AFR)

The unit shall have an AFR of no greater than 0.0876% at an ambient temperature of operation of 22° C. Expected MTBF of 10,000,000 hours shall conform to design requirements.

AFR shall be calculated as follows:

- MTBF = 0.0876%.
- MTBF is the minimum time between product failures when the system environment does not exceed the operational conditions specified in Section 5.
- AFR = 8760 hours/MTBF (1 year = 8760 hours)
- Failure Rate (FR) = number of failures/CUM operating hours
- Then MTBF can be calculated: MTBF = 1/FR(λ)
- Reliability (R) = e-λt when $1/\lambda = t$; R = 0.63

  Note: Cumulative (CUM) operating hours are defined as $\sum_{i=1}^{n} Unit_{(i)}$ powered-on time (hours)

9.4 PATTERN DEFECTS

The following provisions shall apply with respect to multiple failures of units resulting from the same defect in design materials and/or manufacturing processes. In the event that a pattern defect is demonstrated within one year of the date of shipment, Supplier agrees to promptly (a) modify the units' design and materials and/or manufacturing process so that the pattern defect will no longer occur and (b) repair, replace, or credit Buyer's account for any such goods that are returned by Buyer during the applicable warranty period set forth above, provided that Supplier is promptly notified in writing upon discovery by Buyer that such goods failed to conform to this specification with a detailed explanation of any alleged deficiencies. Buyer receives a Return Material Authorization (RMA) number from Supplier, and Supplier's examination of such goods shall disclose that such alleged deficiencies actually exist and were not caused by accident, misuse, abuse, mishandling, neglect, alteration, negligence, improper installation, unauthorized repair or alteration by anyone other than Supplier, or improper testing. If Supplier elects to repair such goods, Supplier shall have a reasonable time to make such repair or replacement. Such repair, replacement, or credit shall constitute fulfillment.

10. PACKAGING

10.1 PACKAGING, SHIPPING, AND LABELING

Packaging shall come in two configurations: A standard single-pack and a standard three-pack. The Antenna Assembly shall be packaged to most effectively utilize the cubic space available to obtain the lowest shipping rates via UPS and Fed Ex. As a general guideline, the single antenna package or packages should be designed to fall within the STD or OS1 shipping categories. The current UPS shipping guidelines are printed below for reference. Please refer to the respective carriers for any interpretation or questions regarding these guidelines.

- **Maximum Length:** The maximum length per domestic, export or import package is 108 inches.
- **Maximum Size:** The maximum size per domestic, export or import package is 165 inches in length and girth [(2 x width) + (2 x height)] combined.
- **Maximum Weight:** For domestic package shipments, the maximum actual weight per package is 150 pounds.

The devices shall be packed in containers suitable for protection of the components from damage during shipment in a railroad boxcar, ship, an enclosed truck, or by airfreight for either domestic or international shipment. All packages will be labeled for identification of contents with the HNS material number. A certificate of origin shall be included in each shipment. HNS and vendor shall mutually agree upon other box labeling.

Each shipment must be accompanied by a letter from the manufacturer or supplier certifying compliance with the RoHS directive. Unless otherwise noted, for all packaged cartons containing parts defined in this specification the Labeling Requirements in the Product Marking Specification shall apply along with the environmental requirements for packaging. The shipping cartons will be plain brown craft corrugated with single color printing.

In addition,

- Antenna packages shall meet the following sequence of the ISTA-3A standard packaged-product test:

Sequence	3
Test Category	Shock
Test Type	Drop
Test Level	9 drops – height varies with packaged-product weight

- Antenna packages leaving the manufacturer shall be palletized using standard materials necessary to protect the shipment from damage.
- Antenna packages shall withstand an LTL shipment load caused by units stacked up to 100" high in a warehouse.
- Antenna packages shall withstand static load caused by units stacked up to 150" high in a warehouse

10.2 PACKAGING AND PACKAGING WASTE

Directive 94/62/EC – DIRECTIVE 2005/20/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL – of 9 March 2005, amending Directive 94/62/EC on packaging and packaging waste.

10.3 CARTON LABELING

Each carton shall be labeled with HNS Label 1041333-0001 or an approved equivalent, containing the following information:

- Model number
- Description
- Part number and revision (human and barcode readable)
- Packing date
- Country of origin

The vendor shall contact HNS for the specific model number, description, etc. which is defined in the Product Marking Specification.

10.4 ANTENNA ASSEMBLY PACKAGING

Components defined in this specification may be purchased by HNS under higher level assembly kit numbers. The contents and quantity of kit-level orders are defined in SAP using a Bill of Materials (BOM) format. The vendor should contact HNS purchasing for detailed BOM information.

11. REGULATORY REQUIREMENTS

11.1 WEEE REQUIREMENT

Directive 2012/19/EC of the European Parliament and of the Council of 4 July 2012 on Waste Electrical and Electronic Equipment (WEEE). This Directive was transposed into national law 14 February 2014. At that time, the old Directive (2002/96/EC) was repealed. The period between 13 August 2012 and 14 August 2018 is a transitional period, the scope of the new WEEE Directive remains the same as the scope of the old WEEE Directive (10 categories). From 15 August 2018 onwards the scope of the Directive is widened to include all electrical and electronic equipment (EEE), the scope of the old WEEE Directive will no longer be valid. Directive Requirements

11.2 RESTRICTION OF HAZARDOUS SUBSTANCES IN MANUFACTURE

All material supplied to this specification shall meet the Directive 2011/65/EU of the European Parliament and of the Council, on the restriction of the use of certain hazardous substances in electrical and electronic equipment, requires the reduction of the substances Lead, Mercury, Cadmium, Hexavalent Chromium, Polybrominated Biphenyls (PBB), and Polybrominated Diphenyl Ethers (PBDE) in electronic products as January 03, 2013. Unless otherwise noted, all materials used must be compliant with this directive and any subsequent revisions or amendments. A Material Declaration, from the manufacturer, shall be supplied to HNS, LLC Component Engineering for this material.

Mail Address:	**Email:**
Hughes Network Systems, LLC c/o Component Engineering Dept. 0908 11717 Exploration Lane Germantown, MD 20876-2700	ComponentEngineering@hughes.com

Date: **April 1, 2019**

Darcy Tarr
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

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

Subject: **Structural Analysis Report – Revision 1**

Carrier Designation:	***Dish Network* Co-Locate**	
	Carrier Site Number:	CT100010A
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	873128
	Crown Castle Site Name:	Trumbull
	Crown Castle JDE Job Number:	563455
	Crown Castle Work Order Number:	1714849
	Crown Castle Application Number:	484257 Rev. 2
Engineering Firm Designation:	**TEP Project Number:**	25575.244275
Site Data:	**800 Booth Hill Rd., Trumbull, Fairfield County, CT 06611** **Latitude *41° 16' 44.26"*, Longitude *-73° 11' 6.40"*** **457 Foot - Guyed Tower**	

Dear Darcy Tarr,

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**

This analysis utilizes an ultimate 3-second gust wind speed of 125 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: Jessica R. Moebs, P.E. / AJO

Respectfully submitted by:

Aaron Rucker, P.E.

Electronic Copy

04/01/2019

Revision #	Date Issued	Description
0	March 26, 2019	Original structural analysis report
1	April 1, 2019	Revised building code

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 457-ft guyed tower designed by Blaw Knox, and mapped by Pinnacle Towers in July of 2003. The original design standard and wind speed are unknown. The tower has been modified multiple times in the past to accommodate additional loading. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	B
Topographic Factor:	1.0
Ice Thickness:	1.50 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	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)
290.0	290.0	3	Comba Telecom	ODI2-065R18K-GQ w/ Mount Pipe	1	7/8
		3	Ericsson	Radio 0208		
		2	Ericsson	Radio 4415		
		1	Tower Mounts	Side Arm Mount [SO 312-3]		

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)
458.0	477.0	1	Dielectric	TFU-18JTH/VP-R P230	1	4-1/16
444.0	454.0	1	Sinclair	SRL-235-2	1	7/8
	444.0	1	Tower Mounts	Side Arm Mount [SO 308-1]		
419.0	419.0	1	ERI	1183-3CP	1	3
393.0	393.0	1	Shively Labs	6014-2	1	1-5/8
382.0	382.0	1	Shively Labs	6014-2	1	1-5/8
367.0	367.0	1	ERI	SHP-2AE	1	3
342.0	352.0	1	RFS Celwave	455-6	1	1/2
	350.0	1	Antel	BCD-87077		
	342.0	1	Tower Mounts	Side Arm Mount [SO 601-1]		
		1	Tower Mounts	Side Arm Mount [SO 303-1]		
330.0	335.0	1	Andrew	PG1N0F-0090-310	1	1-1/4
	330.0	1	Tower Mounts	Side Arm Mount [SO 602-1]		
		-	-	-	1	1-5/8
326.0	329.0	1	Decibel	DB201-A	-	-
	326.0	1	Tower Mounts	Side Arm Mount [SO 602-1]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
325.0	325.0	1	Decibel	DB408	1	1-1/4
		1	Tower Mounts	Side Arm Mount [SO 303-1]		
322.0	327.0	1	Sinclair	SRL-310C-4HD	1 1	1-1/4 1/2
	322.0	1	Radiowaves	SPD3-5.8		
		1	Tower Mounts	Side Arm Mount [SO 308-1]		
		1	Tower Mounts	Pipe Mount [PM 601-1]		
310.0	316.0	1	Shively Labs	6014-2	1	1-5/8
	306.0	1	Shively Labs	6014-2		
277.0	283.0	1	RFS Celwave	BMR10-A-B1	1	1-5/8
264.0	273.0	1	Telewave	ANT150F6	1	1-5/8
	264.0	1	Tower Mounts	Side Arm Mount [SO 303-1]		
255.0	261.0	1	Decibel	DB809KT3E-Y	1	1-1/4
	255.0	1	Tower Mounts	Side Arm Mount [SO 203-1]		
247.0	247.0	3	RFS Celwave	APX16DWV-16DWVS-C w/ Mount Pipe	16 2	7/8 1-5/8
		3	RFS Celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
		3	Ericsson	KRY 112 489/2		
		3	Ericsson	Radio 4449 B12/B71		
		6	RFS Celwave	FDBL5003D-S		
		3	RFS Celwave	ATMAA1412D-1A20		
		1	Tower Mounts	Sector Mount [SM 301-3]		
230.0	232.0	3	Alcatel Lucent	RRH2x60-700	2 19	1-5/8 7/8
		3	Commscope	HBXX-6516DS-VTM w/ Mount Pipe		
		3	Andrew	SBNHH-1D65B w/ Mount Pipe		
		2	Andrew	LNX-8513DS-VTM w/ Mount Pipe		
		1	Andrew	LNX-6514DS-VTM w/ Mount Pipe		
		3	Alcatel Lucent	RRH2X60-PCS		
		3	Alcatel Lucent	RRH2X60-AWS		
		2	RFS Celwave	DB-T1-6Z-8AB-0Z		
	230.0	1	Tower Mounts	Sector Mount [SM 407-3]		
206.0	206.0	1	Mark	P-9A72GN-U	1	7/8
200.0	200.0	1	Gabriel Elec.	DFPD1-52 w/ Mount Pipe	1	1/4
178.0	178.0	1	Radiowaves	SPD4-5.2	1	1/2
150.0	150.0	1	Andrew	HPX6-65-P3A	2	EW63
146.0	146.0	1	Andrew	PL6-65-PXA	1	EW63
		1	Tower Mounts	Pipe Mount [PM 601-1]		
140.0	140.0	1	Channel Master	CM 4228HD	1	3/8

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
136.0	138.0	1	RFS Celwave	MGA2-16N	3	3/8
	136.0	1	CSI-Cellular Specialties	CSI-AY/809-960/11		
		1	Tower Mounts	2.4"Ø x 8' Mount Pipe		
	135.0	1	Channel Master	CM 4228HD		
	134.0	1	RFS Celwave	MGAR3-23N		
133.0	143.0	1	RFS Celwave	220-5	2 1	7/8 1/2
	142.0	1	Decibel	DB264-A		
	133.0	1	Tower Mounts	Side Arm Mount [SO 601-1]		
		1	Tower Mounts	Side Arm Mount [SO 202-1]		
117.0	117.0	1	Mark	P-9A48GN-U	1	7/8
109.0	113.0	1	RFS Celwave	PD1132-D	1	7/8
	109.0	1	Tower Mounts	Side Arm Mount [SO 202-1]		
108.0	108.0	1	Mark	SSH-9A72GN	1	7/8
99.0	99.0	1	Ligowave	PTP 900-13	1 1	7/8 1/4
		1	Radiowaves	SPD2-5.8		
62.0	68.0	1	Mark	P-9A48GN-U	3	7/8
	62.0	2	Tower Mounts	Side Arm Mount [SO 601-1]		
	61.0	1	Mark	SSH-9A72GN		
	54.0	1	CSI-Cellular Specialties	CSI-AY/809-960/11		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Reports	FDH Engineering	1418454	CCISites
Tower Foundation Mapping	Tower Engineering Professionals	1520339	CCISites
Tower Mapping	Pinnacle Towers Inc.	1327906	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	2407618	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	2633757	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	2755396	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	3006419	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	5592838	CCISites
Post-Modification Inspection	Pinnacle Towers Inc.	1956007	CCISites
Post-Modification Inspection	Tower Engineering Professionals	2438393	CCISites
Post-Modification Inspection	Tower Engineering Professionals	3417531	CCISites
Post-Modification Inspection	Tower Engineering Professionals	3442609	CCISites
Post-Modification Inspection	Sinnott Gering and Schmitt Towers, Inc.	5760315	CCISites
Appurtenance Mapping	Tower Engineering Professionals	1327906	CCISites

3.1) Analysis Method

tnxTower (version 8.0.5.0), 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.

tnxTower was used to determine the loads on the modified structure. Additional calculations were performed to determine the stresses in the reinforced leg sections. These calculations are presented in Appendix C.

3.2) Assumptions

1) The tower and foundation were built and maintained in accordance with the manufacturer's specification.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2, and the referenced drawings.
3) All tower components are in sufficient condition to carry their full design capacity.
4) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
5) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not perform a site visit to verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.
6) Per photos from CCI Sites, the termination and stitch welds of the reinforcing sleeves to the tower legs at 361-ft to 401-ft were assumed to be 3/16" fillet welds by 3" long. The end gaps between the sleeves and the flange were assumed to be 12".
7) The following material grades were assumed:
   a) Leg Grade: A7-33
   b) Original Bracing Grade: A7-33
   c) Original Connection Bolts: A307
   d) 2L3-1/2x3-1/2x3/8 Pull-off: A36
   e) 2L3x3x3/16 Bottom Torque Arm Members: A36
   f) Top Torque Arm Members: A36
8) TEP could not analyze the base casting. The base casting thickness was not provided. TEP recommends a base casting thickness be obtained prior to modification. TEP assumes the base casting is sufficient for the purposes of this analysis.

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 (lb)	ΦP_{allow} (lb)	% Capacity	Pass / Fail
T1	457 - 436	Leg	3	4	-24073	156820	15.4	Pass
T2	436 - 421	Leg	2 3/4	46	-33559	128255	26.2	Pass
T3	421 - 401	Leg	2 3/4	76	-70416	128255	54.9	Pass
T4-T7	401 - 381	Leg	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	Note 1	Note 1	Note 1	58.8	Pass
T8-T11	381 - 361	Leg	3.5" S.R. w/ 3.5 SCH40 Half Pipe	Note 1	Note 1	Note 1	48.1	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	ϕP_{allow} (lb)	% Capacity	Pass / Fail
T12	361 - 341	Leg	3	191	-98223	204054	48.1	Pass
T13	341 - 321	Leg	3	236	-76943	161863	47.5	Pass
T14	321 - 301	Leg	3	269	-81573	161863	50.4	Pass
T15	301 - 281	Leg	3	302	-80376	161863	49.7	Pass
T16	281 - 276	Leg	3	336	-84853	161863	52.4	Pass
T17	276 - 271	Leg	3	345	-91349	161863	56.4	Pass
T18	271 - 266	Leg	3	354	-99374	161863	61.4	Pass
T19	266 - 261	Leg	3	366	-106507	161863	65.8	Pass
T20	261 - 256	Leg	3	378	-119617	161863	73.9	Pass
T21	256 - 251	Leg	3	387	-125575	204054	61.5	Pass
T22	251 - 246	Leg	3	398	-109530	161863	67.7	Pass
T23	246 - 241	Leg	3	410	-105951	204054	51.9	Pass
T24	241 - 221	Leg	3	427	-110921	161863	68.5	Pass
T25	221 - 201	Leg	3 1/4	458	-135318	198845	68.1	Pass
T26	201 - 181	Leg	3 1/4	491	-144173	198845	72.5	Pass
T27	181 - 161	Leg	3 1/4	524	-144482	198845	72.7	Pass
T28	161 - 141	Leg	3 1/2	559	-134214	239126	56.1	Pass
T29	141 - 121	Leg	3 1/2	592	-129372	239126	54.1	Pass
T30	121 - 101	Leg	3 1/2	625	-165514	239126	69.2	Pass
T31	101 - 81	Leg	3 1/2	657	-178020	239126	74.4	Pass
T32	81 - 61	Leg	3 1/2	690	-182675	239126	76.4	Pass
T33	61 - 41	Leg	3 1/2	724	-180836	239126	75.6	Pass
T34	41 - 20	Leg	3 1/2	757	-178226	233628	76.3	Pass
T35	20 - 6.70833	Leg	3 1/4	787	-178365	209100	85.3	Pass
T36	6.70833 - 0	Leg	3 1/4	811	-182423	245056	74.4	Pass
T1	457 - 436	Diagonal	L2 1/2x2x1/4	18	-1741	24604	7.1 19.4 (b)	Pass
T2	436 - 421	Diagonal	L2 1/2x2x3/16	55	-2242	19146	11.7 12.9 (b)	Pass
T3	421 - 401	Diagonal	L2 1/2x2x3/16	86	-5336	19146	27.9 35.4 (b)	Pass
T4	401 - 396	Diagonal	L2 1/2x2x3/16	113	-5721	19146	29.9 37.6 (b)	Pass
T5	396 - 391	Diagonal	L2 1/2x2x3/16	122	-6468	19146	33.8 43.5 (b)	Pass
T6	391 - 386	Diagonal	L2 1/2x2x3/16	134	-8159	19146	42.6 47.4 (b)	Pass
T7	386 - 381	Diagonal	L2 1/2x2x3/16	146	-7034	19146	36.7 55.2 (b)	Pass
T8	381 - 376	Diagonal	L2 1/2x2x3/16	152	-7052	19146	36.8 55.5 (b)	Pass
T9	376 - 371	Diagonal	L2 1/2x2x3/16	162	-8501	19146	44.4 50.2 (b)	Pass
T10	371 - 366	Diagonal	L2 1/2x2x3/16	176	-7093	19146	37.0 47.6 (b)	Pass
T11	366 - 361	Diagonal	L2 1/2x2x3/16	188	-7396	19146	38.6 48.6 (b)	Pass
T12	361 - 341	Diagonal	L2 1/2x2x3/16	230	-6888	19146	36.0 44.5 (b)	Pass
T13	341 - 321	Diagonal	L2 1/2x2x3/16	266	-5235	19146	27.3 34.9 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	ϕP_{allow} (lb)	% Capacity	Pass / Fail
T14	321 - 301	Diagonal	L2 1/2x2x3/16	279	-4047	19146	21.1 35.2 (b)	Pass
T15	301 - 281	Diagonal	L2 1/2x2x3/16	312	-5720	19146	29.9 49.3 (b)	Pass
T16	281 - 276	Diagonal	L2 1/2x2x3/16	338	-5913	19146	30.9 40.2 (b)	Pass
T17	276 - 271	Diagonal	L2 1/2x2x3/16	347	-6609	19146	34.5 43.5 (b)	Pass
T18	271 - 266	Diagonal	L2 1/2x2x3/16	359	-6423	19146	33.5 50.1 (b)	Pass
T19	266 - 261	Diagonal	L2 1/2x2x3/16	371	-7392	19146	38.6 44.8 (b)	Pass
T20	261 - 256	Diagonal	L3x3x1/4	381	11787	43976	26.8 63.5 (b)	Pass
T21	256 - 251	Diagonal	L3x3x1/4	392	16317	43976	37.1 87.9 (b)	Pass
T22	251 - 246	Diagonal	L3x3x1/4	406	-11546	42355	27.3 62.2 (b)	Pass
T23	246 - 241	Diagonal	L3x3x1/4	418	10351	43976	23.5 55.8 (b)	Pass
T24	241 - 221	Diagonal	L3x3x1/4	455	-9052	42355	21.4 48.8 (b)	Pass
T25	221 - 201	Diagonal	L2 1/2x2x3/16	488	-5074	19146	26.5 43.8 (b)	Pass
T26	201 - 181	Diagonal	L2 1/2x2x3/16	521	-2561	19146	13.4 22.1 (b)	Pass
T27	181 - 161	Diagonal	L2 1/2x2x3/16	537	-2923	19146	15.3 25.2 (b)	Pass
T28	161 - 141	Diagonal	L3x3x1/4	566	-5893	42423	13.9 24.8 (b)	Pass
T29	141 - 121	Diagonal	L3x3x1/4	612	7693	42906	17.9 33.8 (b)	Pass
T30	121 - 101	Diagonal	L2 1/2x2x3/16	652	-5555	19146	29.0 35.8 (b)	Pass
T31	101 - 81	Diagonal	L2 1/2x2x3/16	687	-3396	19146	17.7 29.3 (b)	Pass
T32	81 - 61	Diagonal	L2 1/2x2x3/16	701	-1684	19146	8.8 14.5 (b)	Pass
T33	61 - 41	Diagonal	L2 1/2x2x3/16	732	-3513	19146	18.4 30.3 (b)	Pass
T34	41 - 20	Diagonal	L2 1/2x2x3/16	768	-5396	18871	28.6 46.5 (b)	Pass
T35	20 - 6.70833	Diagonal	L2x2x3/16	794	-2021	18534	10.9 17.4 (b)	Pass
T36	6.70833 - 0	Diagonal	L2x2x3/16	817	-3864	22580	17.1 33.3 (b)	Pass
T1	457 - 436	Horizontal	L2 1/2x2x1/4	36	-1276	16395	7.8 11.0 (b)	Pass
T2	436 - 421	Horizontal	L2 1/2x2x1/4	58	1244	32027	3.9 10.7 (b)	Pass
T12	361 - 341	Secondary Horizontal	L2x2x1/4	215	-1701	23775	7.2 16.8 (b)	Pass
T21	256 - 251	Secondary Horizontal	2L3 1/2x3 1/2x3/8x3/8	396	23542	154196	15.3 63.4 (b)	Pass
T23	246 - 241	Secondary Horizontal	2L3 1/2x3 1/2x3/8x3/8	422	1835	154196	1.2 4.9 (b)	Pass
T1	457 - 436	Top Girt	C8x13.75	7	-1	68630	0.3	Pass
T2	436 - 421	Top Girt	L2 1/2x2x1/4	10	1137	32027	3.5 9.8 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	ϕP_{allow} (lb)	% Capacity	Pass / Fail
T3	421 - 401	Top Girt	L2 1/2x2x1/4	49	624	32027	1.9 5.4 (b)	Pass
T4	401 - 396	Top Girt	L2 1/2x2x1/4	77	-347	16310	2.1 4.3 (b)	Pass
T6	391 - 386	Top Girt	L2 1/2x2x1/4	130	671	33056	2.0	Pass
T10	371 - 366	Top Girt	L2 1/2x2x1/4	171	668	33056	2.0	Pass
T12	361 - 341	Top Girt	L2 1/2x2x1/4	184	576	32027	1.8 5.0 (b)	Pass
T13	341 - 321	Top Girt	L2 1/2x2x1/4	194	384	32027	1.2 3.3 (b)	Pass
T14	321 - 301	Top Girt	L2 1/2x2x1/4	241	319	32027	1.0 2.8 (b)	Pass
T15	301 - 281	Top Girt	L2 1/2x2x3/16	274	352	24516	1.4 3.0 (b)	Pass
T16	281 - 276	Top Girt	L2 1/2x2x1/4	307	297	32027	0.9 2.6 (b)	Pass
T18	271 - 266	Top Girt	L2 1/2x2x1/4	358	-699	16395	4.3 6.0 (b)	Pass
T20	261 - 256	Top Girt	L2 1/2x2x3/16	370	-5451	12631	43.2 47.0 (b)	Pass
T22	251 - 246	Top Girt	L2 1/2x2x3/16	403	-5874	12631	46.5 50.6 (b)	Pass
T24	241 - 221	Top Girt	L2 1/2x2x3/16	415	-632	12631	5.0 5.5 (b)	Pass
T25	221 - 201	Top Girt	L2 1/2x2x3/16	430	649	24516	2.6 5.6 (b)	Pass
T26	201 - 181	Top Girt	L2 1/2x2x3/16	463	676	24516	2.8 5.8 (b)	Pass
T27	181 - 161	Top Girt	2L3x2x1/4x3/8	496	872	73267	1.2 3.8 (b)	Pass
T28	161 - 141	Top Girt	L2 1/2x2x3/16	529	785	24516	3.2 6.8 (b)	Pass
T29	141 - 121	Top Girt	L2 1/2x2x3/16	562	1700	24516	6.9 14.7 (b)	Pass
T30	121 - 101	Top Girt	L2 1/2x2x3/16	595	-6840	12763	53.6 59.0 (b)	Pass
T31	101 - 81	Top Girt	L2 1/2x2x3/16	628	820	24516	3.3 7.1 (b)	Pass
T32	81 - 61	Top Girt	L2 1/2x2x3/16	661	920	24516	3.8 7.9 (b)	Pass
T33	61 - 41	Top Girt	L2 1/2x2x3/16	694	949	24516	3.9 8.2 (b)	Pass
T34	41 - 20	Top Girt	L2 1/2x2x3/16	727	832	24516	3.4 7.2 (b)	Pass
T35	20 - 6.70833	Top Girt	2L2 1/2x2x3/16x1/4	789	16552	49003	33.8 55.6 (b)	Pass
T1	457 - 436	Mid Girt	L2 1/2x2x1/4	13	4186	32027	13.1 36.1 (b)	Pass
T3	421 - 401	Mid Girt	L2 1/2x2x1/4	80	-315	16310	1.9 4.0 (b)	Pass
T12	361 - 341	Mid Girt	L2 1/2x2x1/4	199	282	32027	0.9 2.4 (b)	Pass
T13	341 - 321	Mid Girt	L2 1/2x2x1/4	242	323	32027	1.0 2.8 (b)	Pass
T14	321 - 301	Mid Girt	L2 1/2x2x1/4	277	434	32027	1.4 3.7 (b)	Pass
T15	301 - 281	Mid Girt	L2 1/2x2x3/16	308	383	24516	1.6 3.3 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	ϕP_{allow} (lb)	% Capacity	Pass / Fail
T24	241 - 221	Mid Girt	L2 1/2x2x3/16	433	751	24516	3.1 6.5 (b)	Pass
T25	221 - 201	Mid Girt	L2 1/2x2x3/16	466	635	24516	2.6 5.5 (b)	Pass
T26	201 - 181	Mid Girt	L2 1/2x2x3/16	499	687	24516	2.8 5.9 (b)	Pass
T27	181 - 161	Mid Girt	L2 1/2x2x3/16	532	671	24516	2.7 5.8 (b)	Pass
T28	161 - 141	Mid Girt	L2 1/2x2x3/16	565	749	24516	3.1 6.5 (b)	Pass
T29	141 - 121	Mid Girt	L2 1/2x2x3/16	598	-9032	12763	70.8 84.5 (b)	Pass
T30	121 - 101	Mid Girt	L2 1/2x2x3/16	630	580	23349	2.5 5.0 (b)	Pass
T31	101 - 81	Mid Girt	L2 1/2x2x3/16	664	894	24516	3.6 7.7 (b)	Pass
T32	81 - 61	Mid Girt	L2 1/2x2x3/16	697	920	24516	3.8 7.9 (b)	Pass
T33	61 - 41	Mid Girt	L2 1/2x2x3/16	730	868	24516	3.5 7.5 (b)	Pass
T34	41 - 20	Mid Girt	L2 1/2x2x3/16	759	1347	24516	5.5 11.6 (b)	Pass
T1	457 - 436	Guy A@446.5	9/16	826	13614	22050	61.7	Pass
T8	381 - 376	Guy A@381	1 3/8	829	64080	146157	43.8	Pass
T21	256 - 251	Guy A@254.5	1 1/4	832	62232	120958	51.4	Pass
T29	141 - 121	Guy A@131	11/16	846	22206	31499	70.5	Pass
T1	457 - 436	Guy B@446.5	9/16	825	13618	22050	61.8	Pass
T8	381 - 376	Guy B@381	1 3/8	828	65678	146157	44.9	Pass
T21	256 - 251	Guy B@254.5	1 1/4	831	62478	120958	51.7	Pass
T29	141 - 121	Guy B@131	11/16	839	22057	31499	70.0	Pass
T1	457 - 436	Guy C@446.5	9/16	824	13560	22050	61.5	Pass
T8	381 - 376	Guy C@381	1 3/8	827	62640	146157	42.9	Pass
T21	256 - 251	Guy C@254.5	1 1/4	830	61294	120958	50.7	Pass
T29	141 - 121	Guy C@131	11/16	833	21634	31499	68.7	Pass
T8	381 - 376	Top Guy Pull-Off@381	2L3x2x1/4x3/8	142	20713	73267	28.3 89.3 (b)	Pass
T29	141 - 121	Torque Arm Top@131	L3x3x3/8 (TA - BU#873128)	848	20392	61040	33.4 57.4 (b)	Pass
T29	141 - 121	Torque Arm Bottom@131	2L3x3x3/16x3/4	850	-23074	33027	69.9	Pass
							Summary	
						Leg (T35)	85.3	Pass
						Diagonal (T21)	87.9	Pass
						Horizontal (T1)	11.0	Pass
						Secondary Horizontal (T21)	63.4	Pass
						Top Girt (T30)	59.0	Pass
						Mid Girt (T29)	84.5	Pass
						Guy A (T29)	70.5	Pass
						Guy B (T29)	70.0	Pass
						Guy C (T29)	68.7	Pass
						Top Guy Pull-Off	89.3	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	ΦP_{allow} (lb)	% Capacity	Pass / Fail
						(T8)		
						Torque Arm Top (T29)	57.4	Pass
						Torque Arm Bottom (T29)	69.9	Pass
						Bolt Checks	89.3	Pass
						RATING =	**89.3**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity - LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Mast Foundation	-	48.8	Pass
1,2	Guy Anchor Foundation A	-	57.5	Pass
1,2	Guy Anchor Foundation B	-	79.8	Pass
1,2	Guy Anchor Foundation C	-	77.9	Pass

Structure Rating (max from all components) =	89.3%

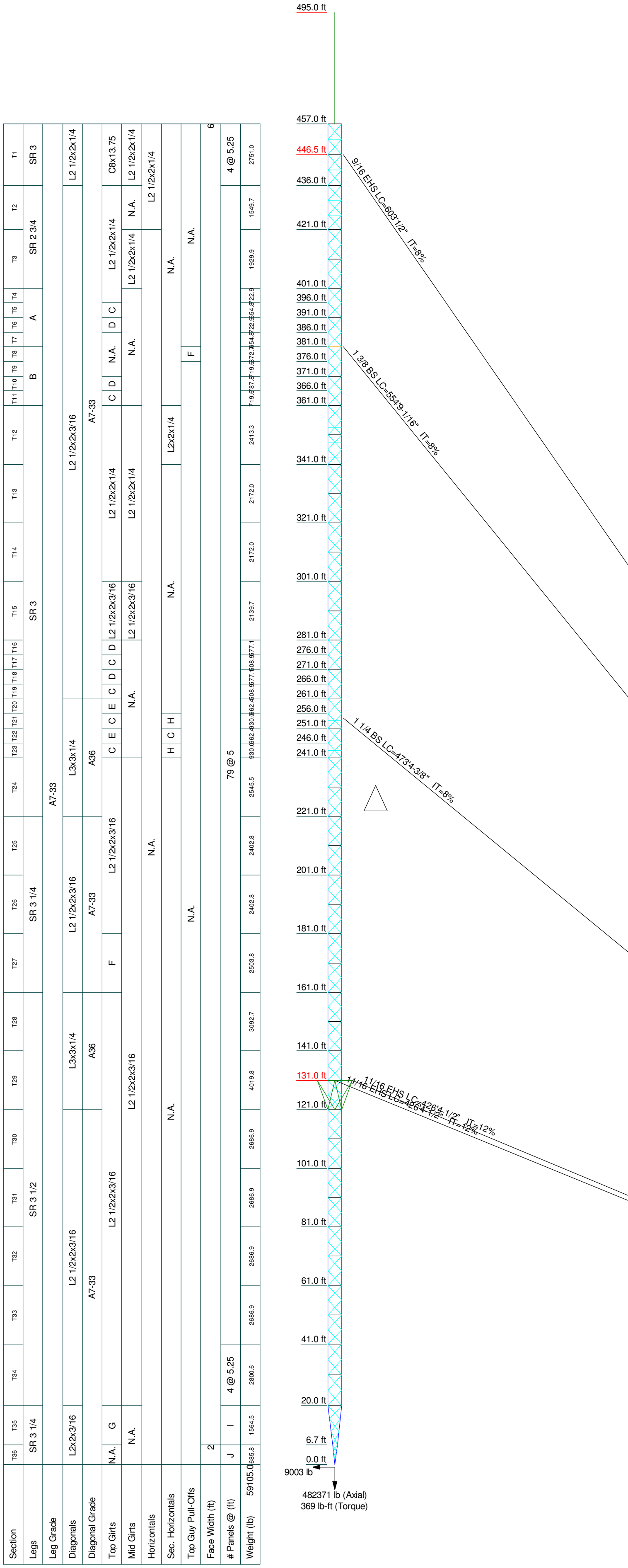
Notes:
1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.
2) Rating per TIA-222-H Section 15.5

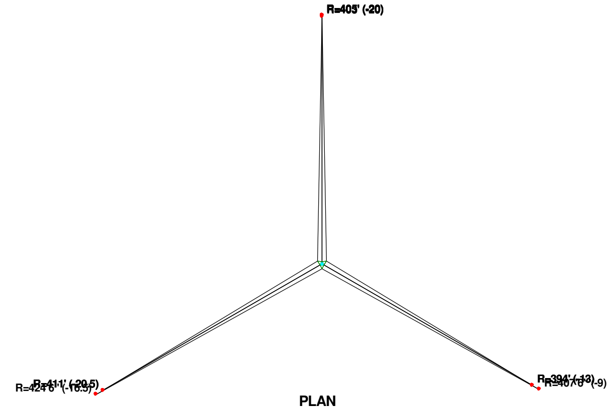
4.1) Recommendations

1) If the load differs from that described in Tables 1 and 2 of this report, the referenced drawings, or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
2) The tower and its base and anchor foundations have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT





DESIGNED APPURTENANCE LOADING

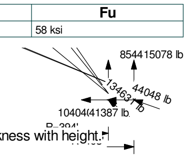
TYPE	ELEVATION	TYPE	ELEVATION
12" x 3' Beacon	457	ATMAA1412D-1A20	247
SRL-235-2	444	ATMAA1412D-1A20	247
Side Arm Mount [SO 308-1]	444	2.4" Dia x 6-ft Pipe	247
ERI 1183-3CP	419	2.4" Dia x 6-ft Pipe	247
6014-2	393	2.4" Dia x 6-ft Pipe	247
6014-2	382	Sector Mount [SM 301-3]	247
SHP-2AE	367	HBXX-6516DS-VTM w/ Mount Pipe	230
BCD-87077	342	HBXX-6516DS-VTM w/ Mount Pipe	230
Side Arm Mount [SO 303-1]	342	HBXX-6516DS-VTM w/ Mount Pipe	230
455-6	342	SBNHH-1D65B w/ Mount Pipe	230
Side Arm Mount [SO 601-1]	342	SBNHH-1D65B w/ Mount Pipe	230
3" x 6" SideLight	333	SBNHH-1D65B w/ Mount Pipe	230
3" x 6" SideLight	333	LNX-8513DS-VTM w/ Mount Pipe	230
3" x 6" SideLight	333	LNX-6514DS-VTM w/ Mount Pipe	230
PG1N0F-0090-310	330	LNX-8513DS-VTM w/ Mount Pipe	230
Side Arm Mount [SO 601-1]	330	RRH2X60-PCS	230
DB201-A	326	RRH2X60-PCS	230
Side Arm Mount [SO 602-1]	326	RRH2X60-PCS	230
DB408	325	RRH2X60-AWS	230
Side Arm Mount [SO 303-1]	325	RRH2X60-AWS	230
SRL310C-4HD	322	RRH2X60-AWS	230
Side Arm Mount [SO 308-1]	322	RRH2x60-700	230
Pipe Mount [PM 601-1]	322	RRH2x60-700	230
SPD3-5.8	322	RRH2x60-700	230
6014-2	316	(2) DB-T1-6Z-8AB-0Z	230
6014-2	306	Sector Mount [SM 407-3]	230
ODI2-065R18K-GQ w/ Mount Pipe	290	3" x 6" SideLight	215
ODI2-065R18K-GQ w/ Mount Pipe	290	3" x 6" SideLight	215
ODI2-065R18K-GQ w/ Mount Pipe	290	3" x 6" SideLight	215
RADIO 4415	290	P-9A72GN-U	206
RADIO 4415	290	DFPD1-52 w/ Mount Pipe	200
RADIO 0208	290	SPD4-5.2	178
RADIO 0208	290	12"x12"x3" TMA	178
RADIO 0208	290	1.9" x 5.5' Pipe (Horizontal)	150
2.4" Dia x 12-ft Pipe	290	HPX6-65-P3A	150
2.4" Dia x 12-ft Pipe	290	Pipe Mount [PM 601-1]	146
2.4" Dia x 12-ft Pipe	290	PL6-65-PXA	146
Side Arm Mount [SO 312-3]	290	CM 4228HD	140
BMR10-A-B1	277	2.4" Dia x 8-ft Mount Pipe	136
ANT150F6	264	CSI-AY/809-960/11	136
Side Arm Mount [SO 303-1]	264	CM 4228HD	136
(2) PL6" x 0.5"	258.5	MGA2-16N	136
(2) PL6" x 0.5"	258.5	MGAR3-23N	136
(2) PL6" x 0.5"	258.5	Side Arm Mount [SO 601-1]	133
DB809KT3E-Y	255	220-5	133
Side Arm Mount [SO 203-1]	255	DB264-A	133
APXVAARR24_43-U-NA20 w/ Mount Pipe	247	Side Arm Mount [SO 202-1]	133
APXVAARR24_43-U-NA20 w/ Mount Pipe	247	P-9A48GN-U	117
APXVAARR24_43-U-NA20 w/ Mount Pipe	247	3" x 6" SideLight	112
(2) RADIO 4449 B12/B71	247	3" x 6" SideLight	112
RADIO 4449 B12/B71	247	3" x 6" SideLight	112
APX16DWV-16DWVS-C w/ Mount Pipe	247	PD1132-D	109
APX16DWV-16DWVS-C w/ Mount Pipe	247	Side Arm Mount [SO 202-1]	109
APX16DWV-16DWVS-C w/ Mount Pipe	247	2.4" Dia x 4-ft Mount Pipe	108
KRY 112 489/2	247	SSH-9A72GN	108
KRY 112 489/2	247	PTP 900-13 w/ Mount Pipe	99
KRY 112 489/2	247	SPD2-5.8	99
(2) FDBL5003D-S	247	CSI-AY/809-960/11	62
(2) FDBL5003D-S	247	(2) Side Arm Mount [SO 601-1]	62
(2) FDBL5003D-S	247	P-9A48GN-U	62
ATMAA1412D-1A20	247	SSH-9A72GN	62

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	F	2L3x2x1/4x3/8
B	3.5" S.R. w/ 3.5 SCH40 Half Pipe	G	2L2 1/2x2x3/16x1/4
C	N.A.	H	2L3 1/2x3 1/2x3/8x3/8
D	L2 1/2x2x1/4	I	3 @ 4.43056
E	L2 1/2x2x3/16	J	3 @ 2.23611

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A7-33	33 ksi	60 ksi	A36	36 ksi	58 ksi



TOWER DESIGN NOTES

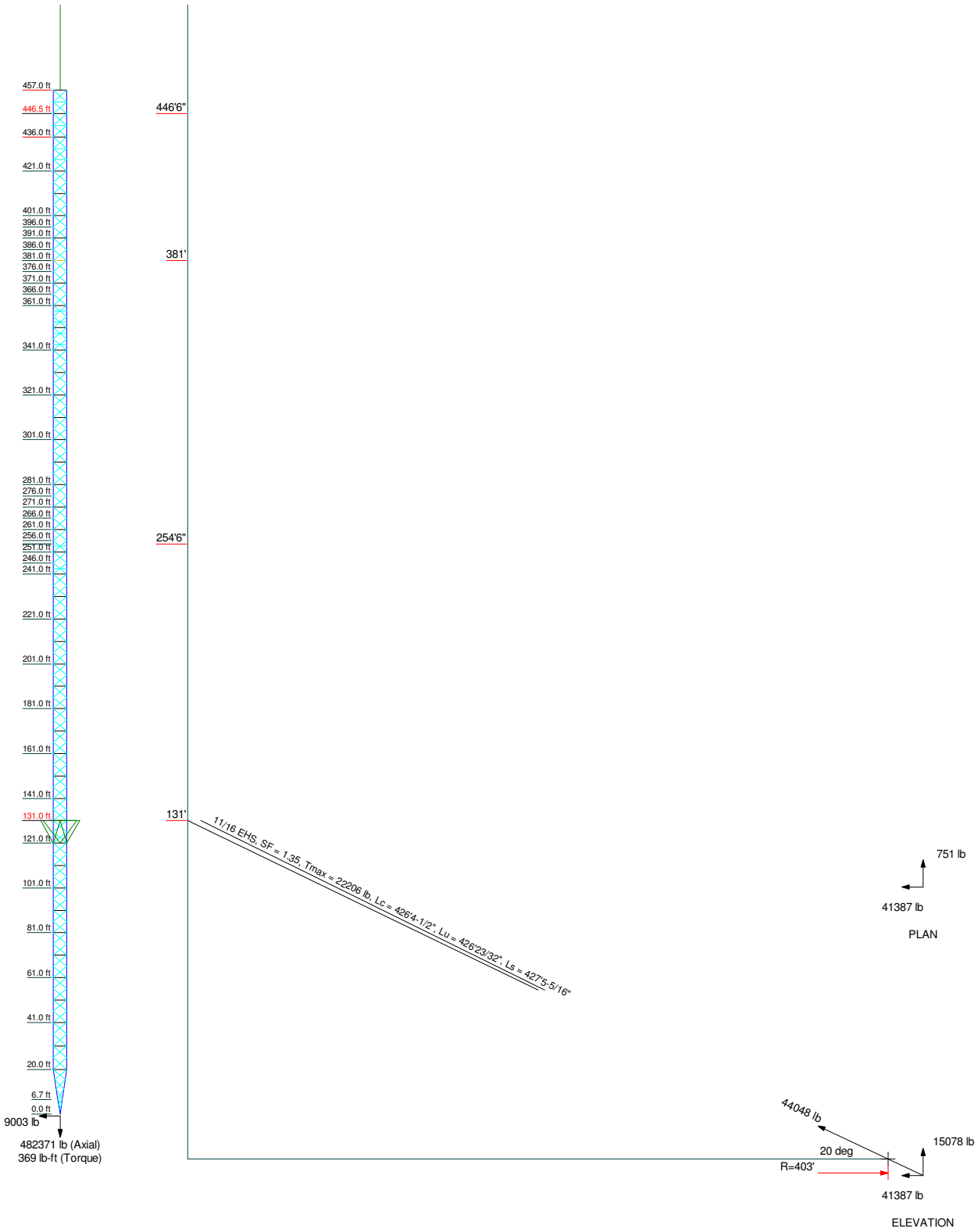
1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in 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'
8. 38' Dielectric TFU-18JTH/VP-R P230 is included for load transfer only.

Tower Engineering Professionals 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	Job: **Trumbull (BU 873128)**	
TEP	Project: **TEP No. 25575.244275**	
	Client: Crown Castle	Drawn by: JRM / App'd:
	Code: TIA-222-H	Date: 03/26/19 / Scale: NTS
	Path:	Dwg No. E-1

Guy Tensions and Tower Reactions

TIA-222-H - 125 mph/50 mph 1.5000 in Ice Exposure B

Maximum Values
Anchor 'A'@403 ft Azimuth 0 deg Elev -20 ft
Plane through centroid of tower



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Raleigh, NC 27603
TEP
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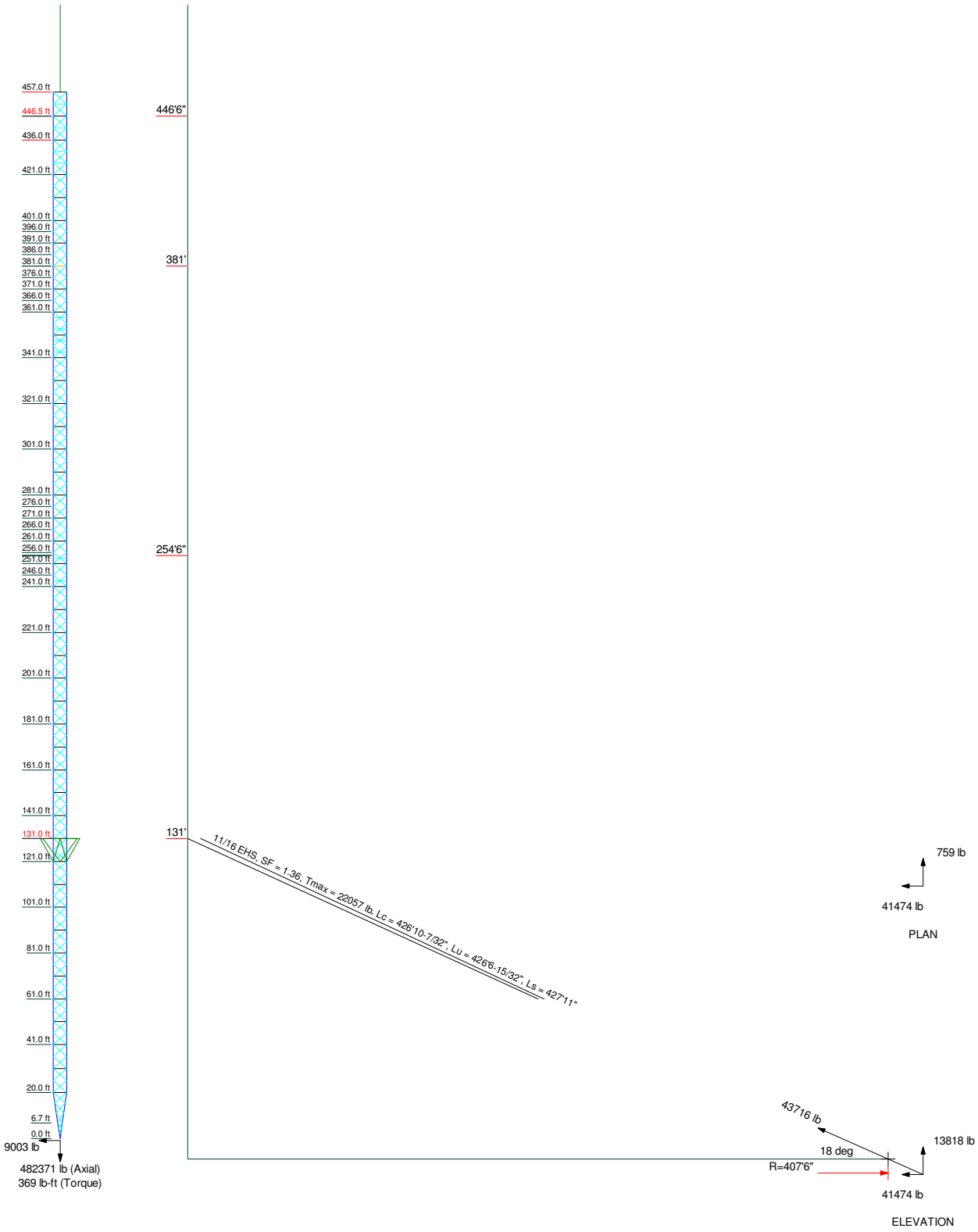
Project: ***TEP No. 25575.244275***		
Client: Crown Castle	Drawn by: JRM	App'd:
Code: TIA-222-H	Date: 03/26/19	Scale: NTS
Path:		Dwg No. E-6

Guy Tensions and Tower Reactions

TIA-222-H - 125 mph/50 mph 1.5000 in Ice Exposure B

Maximum Values
Anchor 'B'@407.5 ft Azimuth 120 deg Elev -9 ft
Plane through centroid of tower



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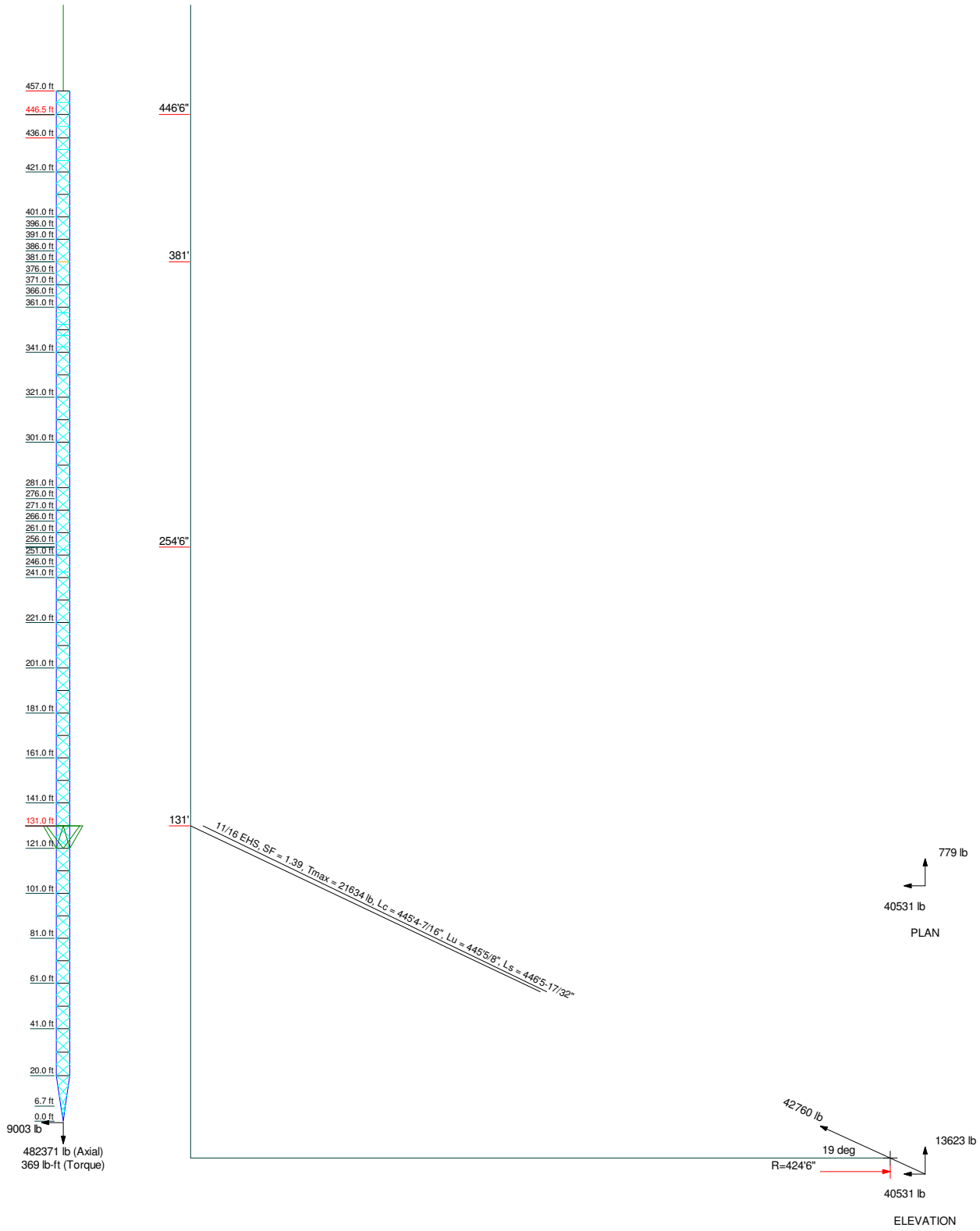
Project: *TEP No. 25575.244275*		
Client: Crown Castle	Drawn by: JRM	App'd:
Code: TIA-222-H	Date: 03/26/19	Scale: NTS
Path:		Dwg No. E-6

Guy Tensions and Tower Reactions

TIA-222-H - 125 mph/50 mph 1.5000 in Ice Exposure B

Maximum Values
Anchor 'C'@424.5 ft Azimuth 240 deg Elev -16.5 ft
Plane through centroid of tower



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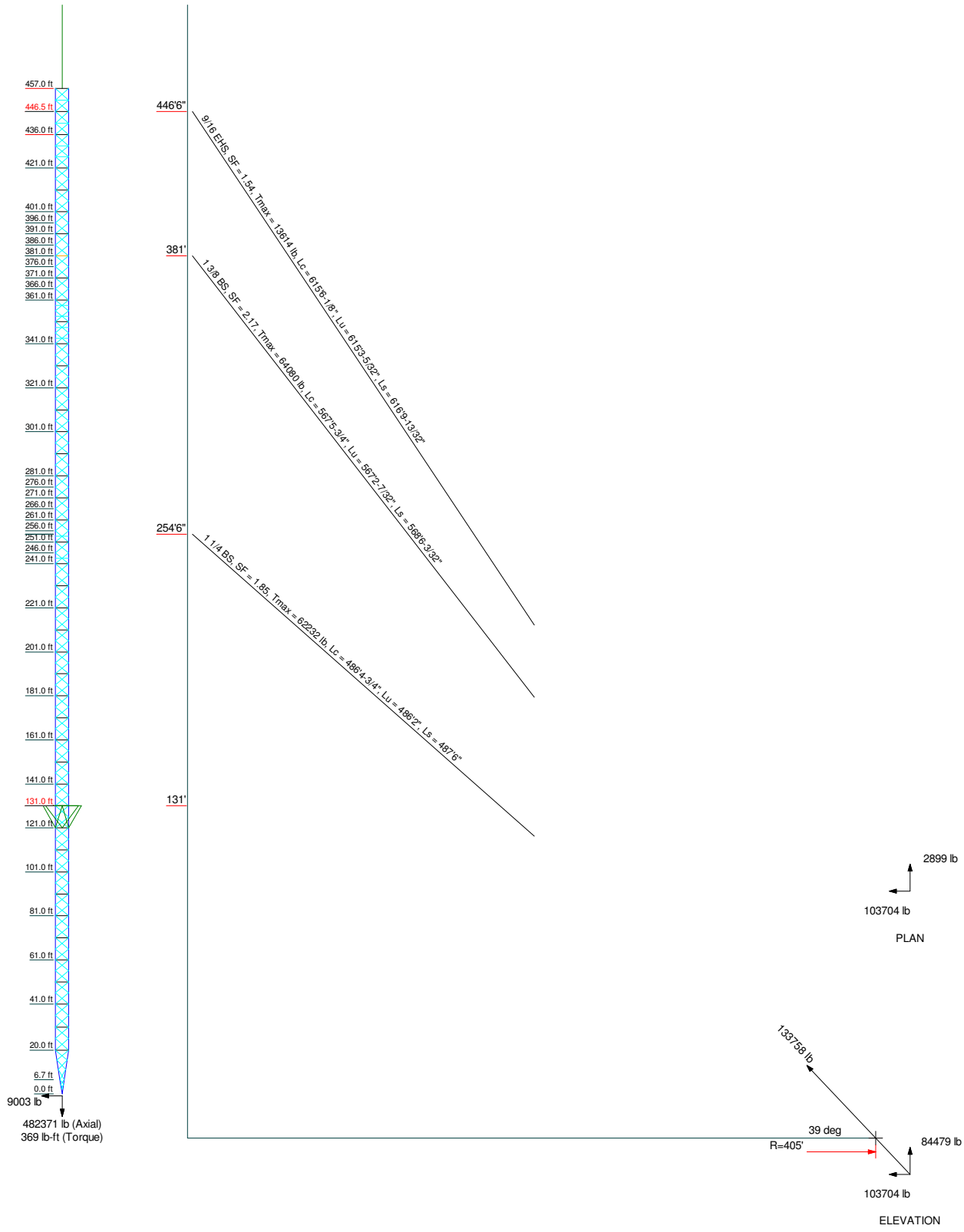
Client: Crown Castle	Drawn by: JRM	App'd:
Code: TIA-222-H	Date: 03/26/19	Scale: NTS
Path:		Dwg No. E-6

Guy Tensions and Tower Reactions

TIA-222-H - 125 mph/50 mph 1.5000 in Ice Exposure B

Maximum Values
Anchor 'A'@405 ft Azimuth 0 deg Elev -20 ft
Plane through centroid of tower



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Raleigh, NC 27603
TEP
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FAX: (919) 661-6350

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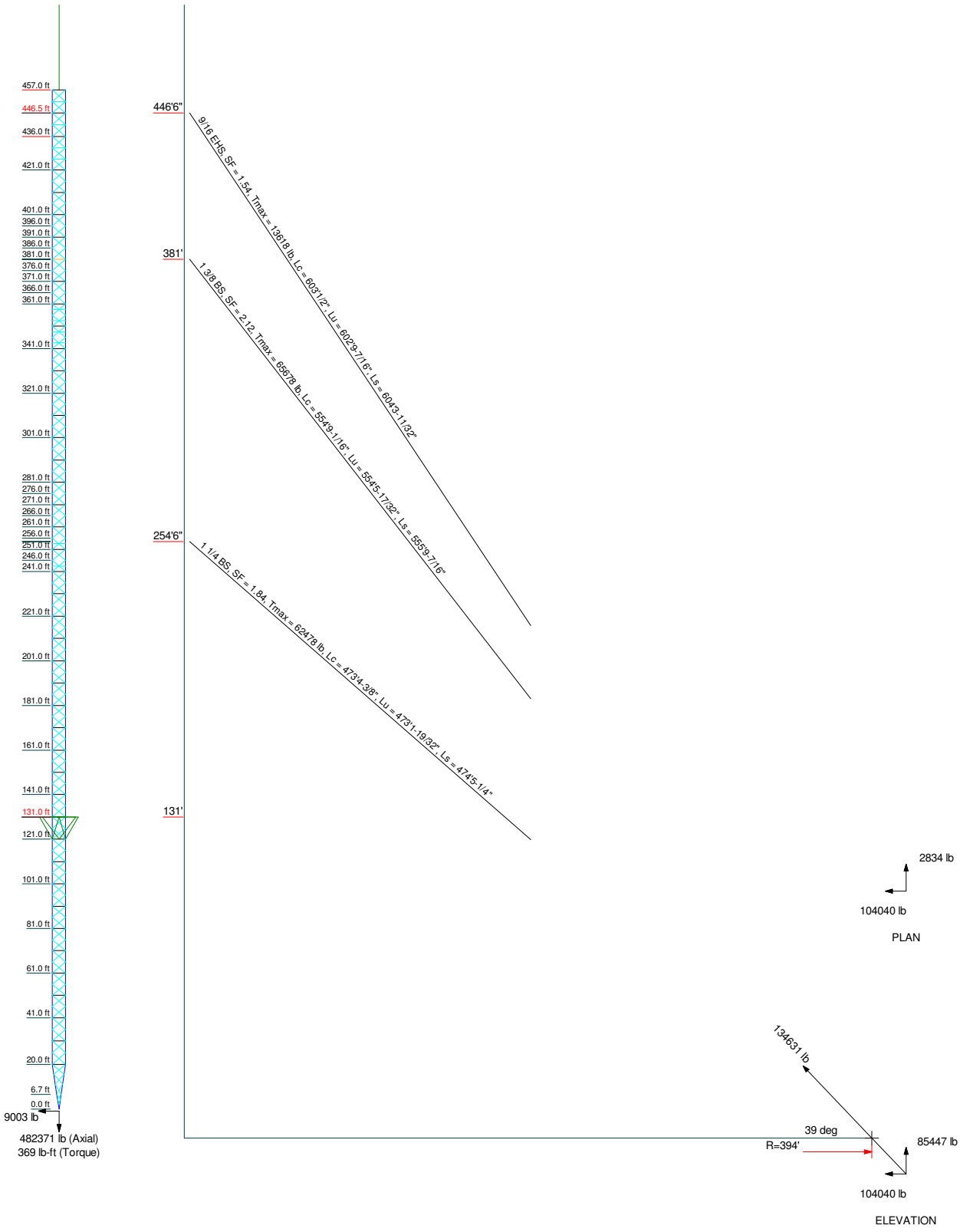
Project: *TEP No. 25575.244275*			
Client: Crown Castle	Drawn by: JRM	App'd:	
Code: TIA-222-H	Date: 03/26/19	Scale: NTS	
Path:		Dwg No. E-6	

Guy Tensions and Tower Reactions

TIA-222-H - 125 mph/50 mph 1.5000 in Ice Exposure B

Maximum Values
Anchor 'B'@394 ft Azimuth 120 deg Elev -13 ft
Plane through centroid of tower



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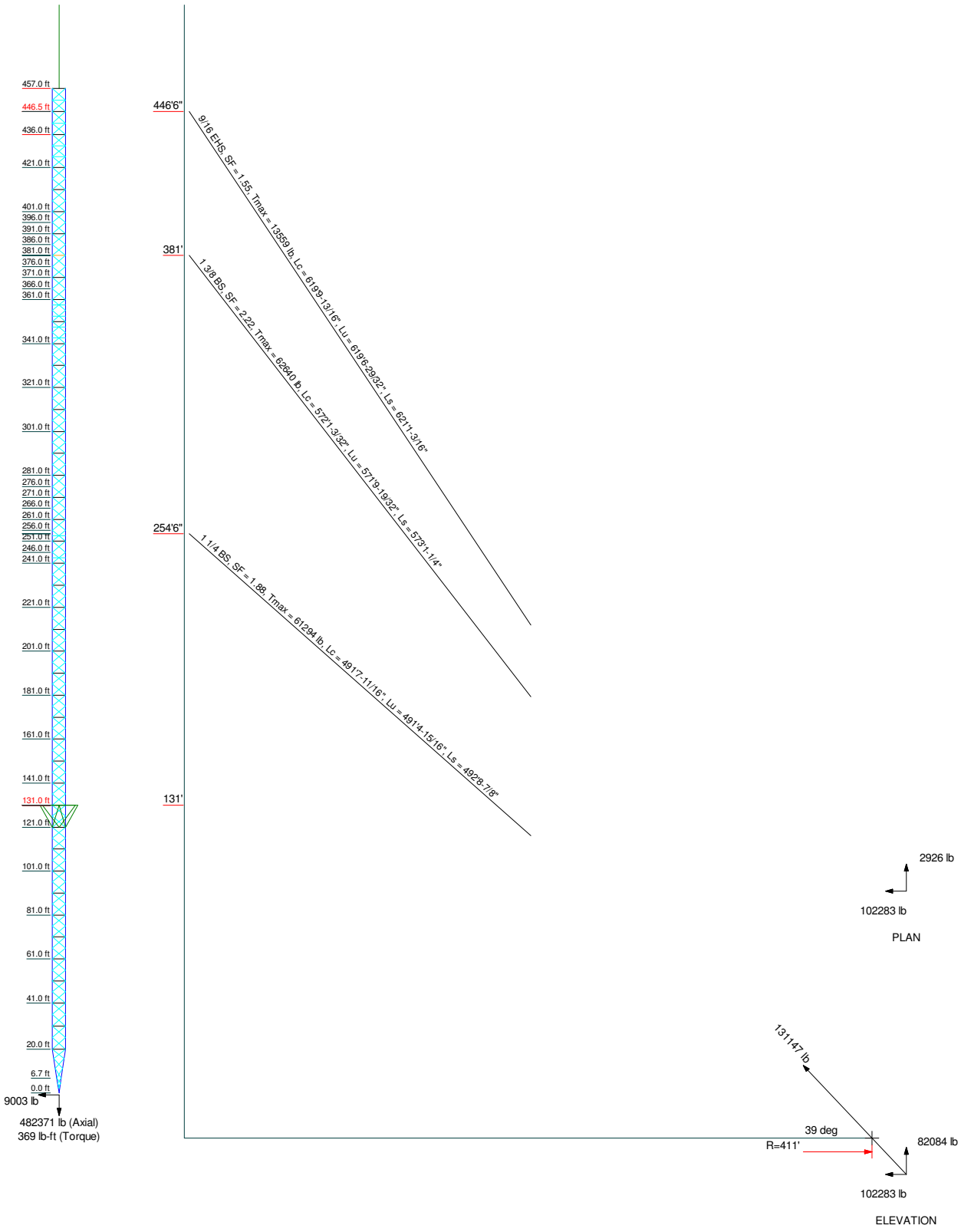
Job: *Trumbull (BU 873128)*		
Project: *TEP No. 25575.244275*		
Client: Crown Castle	Drawn by: JRM	App'd:
Code: TIA-222-H	Date: 03/26/19	Scale: NTS
Path:		Dwg No. E-6

Guy Tensions and Tower Reactions

TIA-222-H - 125 mph/50 mph 1.5000 in Ice Exposure B

Maximum Values
Anchor 'C'@411 ft Azimuth 240 deg Elev -20.5 ft
Plane through centroid of tower



Tower Engineering Professionals	Job: ***Trumbull (BU 873128)***	
326 Tryon Road	Project: ***TEP No. 25575.244275***	
Raleigh, NC 27603	Client: Crown Castle	Drawn by: JRM / App'd:
TEP	Phone: (919) 661-6351	Code: TIA-222-H / Date: 03/26/19 / Scale: NTS
	FAX: (919) 661-6350	Path: / Dwg No. E-6

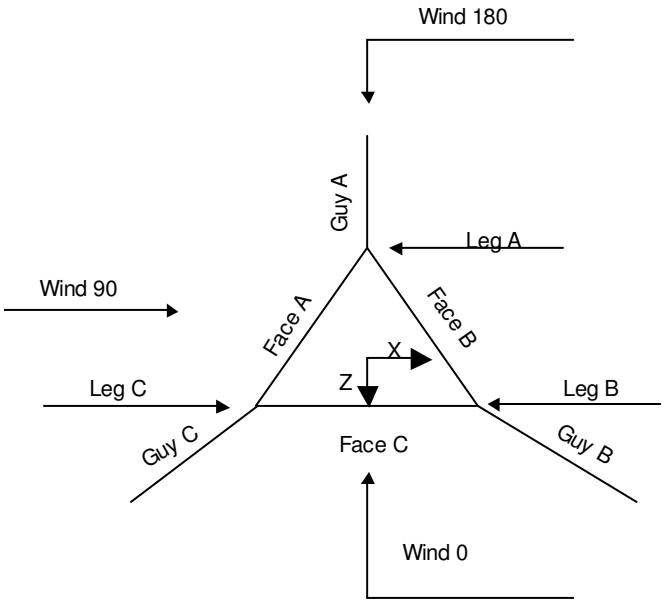
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 457' above the ground line.
The base of the tower is set at an elevation of 0' above the ground line.
The face width of the tower is 6' at the top and tapered at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

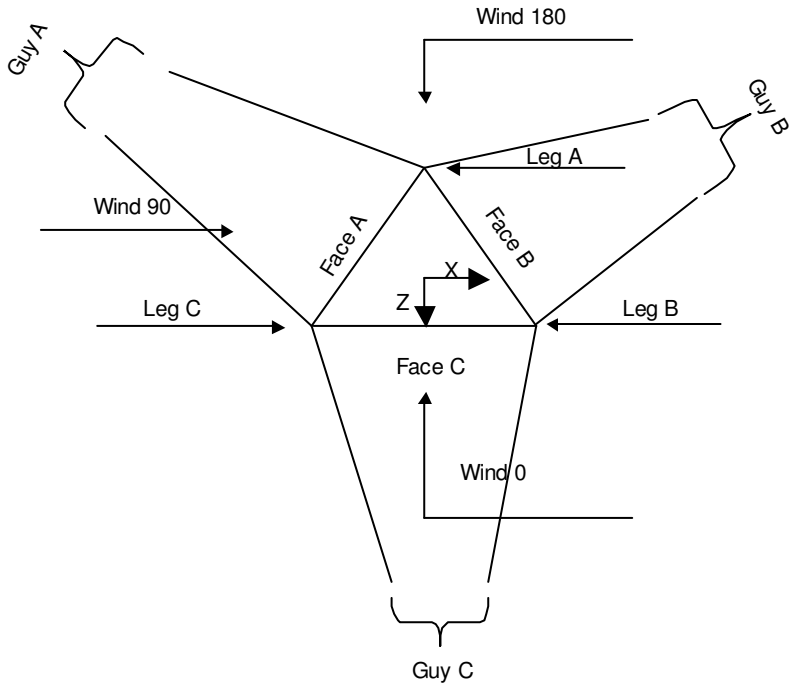
Tower is located in Fairfield County, Connecticut.
Tower base elevation above sea level: 520'.
Basic wind speed of 125 mph.
Risk Category II.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0'.
Nominal ice thickness of 1.5000 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.
Pressures are calculated at each section.
Safety factor used in guy design is 0.9524.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Stress ratio used in tower member design is 1.05.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area	√	SR Leg Bolts Resist Compression
	Use Code Stress Ratios	√	Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
	Use Code Safety Factors - Guys	√	Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
√	Include Bolts In Member Capacity	√	Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Corner & Starmount Guyed Tower



Face Guyed

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	457'-436'			6'	1	21'
T2	436'-421'			6'	1	15'
T3	421'-401'			6'	1	20'
T4	401'-396'			6'	1	5'
T5	396'-391'			6'	1	5'
T6	391'-386'			6'	1	5'
T7	386'-381'			6'	1	5'
T8	381'-376'			6'	1	5'
T9	376'-371'			6'	1	5'
T10	371'-366'			6'	1	5'
T11	366'-361'			6'	1	5'
T12	361'-341'			6'	1	20'
T13	341'-321'			6'	1	20'
T14	321'-301'			6'	1	20'
T15	301'-281'			6'	1	20'
T16	281'-276'			6'	1	5'

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T17	276'-271'			6'	1	5'
T18	271'-266'			6'	1	5'
T19	266'-261'			6'	1	5'
T20	261'-256'			6'	1	5'
T21	256'-251'			6'	1	5'
T22	251'-246'			6'	1	5'
T23	246'-241'			6'	1	5'
T24	241'-221'			6'	1	20'
T25	221'-201'			6'	1	20'
T26	201'-181'			6'	1	20'
T27	181'-161'			6'	1	20'
T28	161'-141'			6'	1	20'
T29	141'-121'			6'	1	20'
T30	121'-101'			6'	1	20'
T31	101'-81'			6'	1	20'
T32	81'-61'			6'	1	20'
T33	61'-41'			6'	1	20'
T34	41'-20'			6'	1	21'
T35	20'-6'8-17/32"			6'	1	13'3-15/32"
T36	6'8-17/32"-0'			2'	1	6'8-17/32"

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	457'-436'	5'3"	X Brace	No	Yes	0.0000	0.0000
T2	436'-421'	5'	X Brace	No	Yes	0.0000	0.0000
T3	421'-401'	5'	X Brace	No	Yes	0.0000	0.0000
T4	401'-396'	5'	X Brace	No	Yes	0.0000	0.0000
T5	396'-391'	5'	X Brace	No	Yes	0.0000	0.0000
T6	391'-386'	5'	X Brace	No	Yes	0.0000	0.0000
T7	386'-381'	5'	X Brace	No	Yes	0.0000	0.0000
T8	381'-376'	5'	X Brace	No	Yes	0.0000	0.0000
T9	376'-371'	5'	X Brace	No	Yes	0.0000	0.0000
T10	371'-366'	5'	X Brace	No	Yes	0.0000	0.0000
T11	366'-361'	5'	X Brace	No	Yes	0.0000	0.0000
T12	361'-341'	5'	X Brace	No	Yes	0.0000	0.0000
T13	341'-321'	5'	X Brace	No	Yes	0.0000	0.0000
T14	321'-301'	5'	X Brace	No	Yes	0.0000	0.0000
T15	301'-281'	5'	X Brace	No	Yes	0.0000	0.0000
T16	281'-276'	5'	X Brace	No	Yes	0.0000	0.0000
T17	276'-271'	5'	X Brace	No	Yes	0.0000	0.0000
T18	271'-266'	5'	X Brace	No	Yes	0.0000	0.0000
T19	266'-261'	5'	X Brace	No	Yes	0.0000	0.0000
T20	261'-256'	5'	X Brace	No	Yes	0.0000	0.0000
T21	256'-251'	5'	X Brace	No	Yes	0.0000	0.0000
T22	251'-246'	5'	X Brace	No	Yes	0.0000	0.0000
T23	246'-241'	5'	X Brace	No	Yes	0.0000	0.0000
T24	241'-221'	5'	X Brace	No	Yes	0.0000	0.0000
T25	221'-201'	5'	X Brace	No	Yes	0.0000	0.0000
T26	201'-181'	5'	X Brace	No	Yes	0.0000	0.0000
T27	181'-161'	5'	X Brace	No	Yes	0.0000	0.0000
T28	161'-141'	5'	X Brace	No	Yes	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T29	141'-121'	5'	X Brace	No	Yes	0.0000	0.0000
T30	121'-101'	5'	X Brace	No	Yes	0.0000	0.0000
T31	101'-81'	5'	X Brace	No	Yes	0.0000	0.0000
T32	81'-61'	5'	X Brace	No	Yes	0.0000	0.0000
T33	61'-41'	5'	X Brace	No	Yes	0.0000	0.0000
T34	41'-20'	5'3"	X Brace	No	Yes	0.0000	0.0000
T35	20'-6'8-17/32"	4'5-5/32"	X Brace	No	Yes	0.0000	0.0000
T36	6'8-17/32"-0'	2'2-7/8"	X Brace	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 457'-436'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T2 436'-421'	Solid Round	2 3/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T3 421'-401'	Solid Round	2 3/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T4 401'-396'	Arbitrary Shape	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T5 396'-391'	Arbitrary Shape	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T6 391'-386'	Arbitrary Shape	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T7 386'-381'	Arbitrary Shape	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T8 381'-376'	Arbitrary Shape	3.5" S.R. w/ 3.5 SCH40 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T9 376'-371'	Arbitrary Shape	3.5" S.R. w/ 3.5 SCH40 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T10 371'-366'	Arbitrary Shape	3.5" S.R. w/ 3.5 SCH40 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T11 366'-361'	Arbitrary Shape	3.5" S.R. w/ 3.5 SCH40 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T12 361'-341'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T13 341'-321'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T14 321'-301'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T15 301'-281'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T16 281'-276'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T17 276'-271'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T18 271'-266'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T19 266'-261'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T20 261'-256'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T21 256'-251'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T22 251'-246'	Solid Round	3	A7-33	Single Angle	L3x3x1/4	A36

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
			(33 ksi)			(36 ksi)
T23 246'-241'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T24 241'-221'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T25 221'-201'	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T26 201'-181'	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T27 181'-161'	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T28 161'-141'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T29 141'-121'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T30 121'-101'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T31 101'-81'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T32 81'-61'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T33 61'-41'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T34 41'-20'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T35 20'-6'8-17/32"	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2x2x3/16	A7-33 (33 ksi)
T36 6'8-17/32"-0'	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2x2x3/16	A7-33 (33 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 457'-436'	Channel	C8x13.75	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T2 436'-421'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T3 421'-401'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T4 401'-396'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T6 391'-386'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T7 386'-381'	Single Angle		A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T8 381'-376'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T10 371'-366'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T11 366'-361'	Single Angle		A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T12 361'-341'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T13 341'-321'	Single Angle	L2 1/2x2x1/4	A7-33	Single Angle	L2 1/2x2x1/4	A7-33

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
			(33 ksi)			(33 ksi)
T14 321'-301'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T15 301'-281'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T16 281'-276'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T18 271'-266'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T19 266'-261'	Single Angle		A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T20 261'-256'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T22 251'-246'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T23 246'-241'	Single Angle		A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T24 241'-221'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T25 221'-201'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T26 201'-181'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T27 181'-161'	Double Angle	2L3x2x1/4x3/8	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T28 161'-141'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T29 141'-121'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T30 121'-101'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T31 101'-81'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T32 81'-61'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T33 61'-41'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T34 41'-20'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T35 20'-6'8-17/32"	Double Angle	2L2 1/2x2x3/16x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 457'-436'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T2 436'-421'	None	Single Angle		A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T3 421'-401'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Solid Round		A36 (36 ksi)
T12 361'-341'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T13 341'-321'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Solid Round		A36 (36 ksi)
T14 321'-301'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Solid Round		A36 (36 ksi)
T15 301'-281'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Solid Round		A36 (36 ksi)
T24 241'-221'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T25 221'-201'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T26 201'-181'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T27 181'-161'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T28 161'-141'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T29 141'-121'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T30 121'-101'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T31 101'-81'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T32 81'-61'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T33 61'-41'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T34 41'-20'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T12 361'-341'	Equal Angle	L2x2x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T21 256'-251'	Double Equal Angle	2L3 1/2x3 1/2x3/8x3/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T23 246'-241'	Double Equal Angle	2L3 1/2x3 1/2x3/8x3/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 457'-436'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T2 436'-421'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T3 421'-401'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T4 401'-396'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T5 396'-391'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T6 391'-386'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T7 386'-381'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T8 381'-376'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T9 376'-371'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T10 371'-366'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T11 366'-361'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T12 361'-341'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T13 341'-321'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T14 321'-301'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T15 301'-281'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T16 281'-276'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T17 276'-271'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T18 271'-266'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T19 266'-261'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T20 261'-256'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T21 256'-251'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T22 251'-246'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T23 246'-241'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T24 241'-221'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T25 221'-201'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T26 201'-181'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T27 181'-161'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T28 161'-141'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T29 141'-121'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	38.0000	38.0000	36.0000
T30 121'-101'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T31 101'-81'	0.00	0.3750	A7-33	1.03	1	1.05	Third-Pt	Third-Pt	36.0000

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T32 81'-61'	0.00	0.3750	(33 ksi) A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T33 61'-41'	0.00	0.3750	(33 ksi) A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T34 41'-20'	0.00	0.3750	(33 ksi) A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T35 20'-6'8-17/32"	0.00	0.2500	(33 ksi) A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000
T36 6'8-17/32"-0'	0.00	0.2500	(33 ksi) A7-33 (33 ksi)	1.03	1	1.05	Third-Pt	Third-Pt	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 457'-436'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T2 436'-421'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T3 421'-401'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T4 401'-396'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T5 396'-391'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T6 391'-386'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T7 386'-381'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T8 381'-376'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T9 376'-371'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T10 371'-366'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T11 366'-361'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T12 361'-341'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1
T13 341'-321'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T14 321'-301'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T15 301'-281'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T16 281'-276'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T17 276'-271'	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T18 271'-266'	Yes	No	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
				1		1		1		1		1		1		1	
T19 266'-261'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T20 261'-256'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T21 256'-251'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		0.5		1	
T22 251'-246'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T23 246'-241'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		0.5		1	
T24 241'-221'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T25 221'-201'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T26 201'-181'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T27 181'-161'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T28 161'-141'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T29 141'-121'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T30 121'-101'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T31 101'-81'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T32 81'-61'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T33 61'-41'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T34 41'-20'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T35 20'-6'8-17/32"	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	
T36 6'8-17/32"-0'	Yes	No	1	1		1		1		1		1		1		1	
				1		1		1		1		1		1		1	

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 457'-436'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1
T2 436'-421'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	1
T3 421'-401'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T4 401'-396'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T5 396'-391'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T6 391'-386'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75
T7 386'-381'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75
T8 381'-376'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T9 376'-371'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T10 371'-366'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T11 366'-361'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T12 361'-341'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T13 341'-321'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T14 321'-301'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T15 301'-281'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T16 281'-276'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T17 276'-271'	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T18 271'-266'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T19 266'-261'	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T20 261'-256'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T21 256'-251'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T22 251'-246'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T23 246'-241'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T24 241'-221'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T25 221'-201'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T26 201'-181'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T27 181'-161'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T28 161'-141'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T29 141'-121'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T30 121'-101'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T31 101'-81'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T32 81'-61'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T33 61'-41'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T34 41'-20'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T35 20'-6'8-17/32"	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T36 6'8-17/32"-0'	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 457'-436'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T2 436'-421'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T3 421'-401'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T4 401'-396'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T5 396'-391'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T6 391'-386'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T7 386'-381'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T8 381'-376'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T9 376'-371'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T10 371'-366'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T11 366'-361'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T12 361'-341'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T13 341'-321'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T14 321'-301'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T15 301'-281'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T16 281'-276'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T17 276'-271'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T18 271'-266'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T19 266'-261'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T20 261'-256'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T21 256'-251'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T22 251'-246'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T23 246'-241'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T24 241'-221'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T25 221'-201'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T26 201'-181'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T27 181'-161'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T28 161'-141'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T29 141'-121'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T30 121'-101'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T31 101'-81'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T32 81'-61'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T33 61'-41'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T34 41'-20'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T35 20'-6'8-17/32"	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T36 6'8-17/32"-0'	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 457'-436'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A325X	0
T2 436'-421'	Flange	0.8750 A307	8	0.5000 A325X	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	0	0.5000 A307	2	0.0000 A325X	0
T3 421'-401'	Flange	0.8750 A307	8	0.5000 A325N	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T4 401'-396'	Flange	0.8750 A307	0	0.5000 A325N	2	0.5000 A307	2	0.0000 A307	0	0.5000 A307	0	0.0000 A307	0	0.0000 A325X	0
T5 396'-391'	Flange	0.8750 A307	0	0.5000 A325N	2	0.0000 A307	0	0.0000 A307	0	0.5000 A307	0	0.0000 A307	0	0.0000 A325X	0
T6 391'-386'	Flange	0.8750 A307	0	0.5000 A325X	2	0.0000 A307	2	0.0000 A307	0	0.5000 A307	0	0.0000 A307	0	0.5000 A325X	0
T7 386'-381'	Flange	0.8750 A307	8	0.5000 A325X	2	0.0000 A307	0	0.5000 A307	2	0.5000 A307	0	0.0000 A307	0	0.5000 A325X	0

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T8 381'-376'	Flange	0.8750 A307	0	0.5000 A325N	2	0.5000 A307	2	0.0000 A307	0	0.5000 A307	0	0.0000 A307	0	0.0000 A325X	0
T9 376'-371'	Flange	0.8750 A307	0	0.5000 A325N	2	0.0000 A307	0	0.0000 A307	0	0.5000 A307	0	0.0000 A307	0	0.0000 A325X	0
T10 371'-366'	Flange	0.8750 A307	0	0.5000 A325N	2	0.0000 A307	2	0.0000 A307	0	0.5000 A307	0	0.0000 A307	0	0.0000 A325X	0
T11 366'-361'	Flange	0.8750 A307	8	0.5000 A325N	2	0.0000 A307	0	0.5000 A307	2	0.5000 A307	0	0.0000 A307	0	0.0000 A325X	0
T12 361'-341'	Flange	0.8750 A307	8	0.5000 A325N	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.5000 A325X	1
T13 341'-321'	Flange	0.8750 A307	8	0.5000 A325N	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T14 321'-301'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T15 301'-281'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T16 281'-276'	Flange	0.8750 A307	0	0.5000 A325N	2	0.5000 A307	2	0.0000 A307	0	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T17 276'-271'	Flange	0.8750 A307	0	0.5000 A325N	2	0.0000 A307	0	0.0000 A307	0	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T18 271'-266'	Flange	0.8750 A307	0	0.5000 A325N	2	0.5000 A307	2	0.0000 A307	0	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T19 266'-261'	Flange	0.8750 A307	8	0.5000 A325N	2	0.0000 A307	0	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T20 261'-256'	Flange	0.6250 A307	0	0.5000 A325N	2	0.5000 A307	2	0.0000 A307	0	0.5000 A307	0	0.0000 A307	0	0.5000 A325N	0
T21 256'-251'	Flange	0.6250 A307	0	0.5000 A325N	2	0.0000 A307	0	0.0000 A307	0	0.5000 A307	0	0.0000 A307	0	0.5000 A325N	2
T22 251'-246'	Flange	0.6250 A307	0	0.5000 A325N	2	0.5000 A307	2	0.0000 A307	0	0.5000 A307	0	0.0000 A307	0	0.5000 A325N	0
T23 246'-241'	Flange	0.6250 A307	8	0.5000 A325N	2	0.0000 A307	0	0.5000 A307	2	0.5000 A307	0	0.0000 A307	0	0.5000 A325N	2
T24 241'-221'	Flange	0.6250 A307	8	0.5000 A325N	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T25 221'-201'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T26 201'-181'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T27 181'-161'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T28 161'-141'	Flange	0.6250 A307	8	0.6250 A325N	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T29 141'-121'	Flange	0.6250 A307	8	0.6250 A325N	2	0.5000 A307	2	0.5000 A307	2	0.5000 A325N	2	0.0000 A307	0	0.0000 A325X	0
T30 121'-101'	Flange	0.8750 A307	8	0.5000 A325N	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T31 101'-81'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T32 81'-61'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T33 61'-41'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.0000 A325X	0
T34 41'-20'	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.5000 A307	2	0.0000 A307	0	0.6250 A325X	0
T35 20'-6'8-17/32"	Flange	0.8750 A307	8	0.5000 A307	2	0.5000 A325N	2	0.5000 A307	0	0.5000 A307	0	0.0000 A307	0	0.6250 A325X	0
T36 6'8-17/32"-0'	Flange	0.8750 A307	0	0.5000 A307	2	0.5000 A307	0	0.5000 A307	0	0.5000 A307	0	0.0000 A307	0	0.0000 A325X	0

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
446.5	EHS	A	9/16	2800	8%	23000	0.671	615'3-27/32"	405'	0.0000	-20'	100%
		B	9/16	2800	8%	23000	0.671	602'10-3/32"	394'	0.0000	-13'	100%
		C	9/16	2800	8%	23000	0.671	619'7-9/16"	411'	0.0000	-20'6"	100%
381	BS	A	1 3/8	18560	8%	24000	3.970	567'2-3/4"	405'	0.0000	-20'	100%
		B	1 3/8	18560	8%	24000	3.970	554'6-1/8"	394'	0.0000	-13'	100%
		C	1 3/8	18560	8%	24000	3.970	571'10-3/16"	411'	0.0000	-20'6"	100%
254.5	BS	A	1 1/4	15360	8%	24000	3.280	486'2-13/32"	405'	0.0000	-20'	100%
		B	1 1/4	15360	8%	24000	3.280	473'1-29/32"	394'	0.0000	-13'	100%
		C	1 1/4	15360	8%	24000	3.280	491'5-9/32"	411'	0.0000	-20'6"	100%
131	EHS	A	11/16	6000	12%	24000	0.994	426'27/32"	403'	0.0000	-20'	100%
		B	11/16	6000	12%	24000	0.994	426'6-19/32"	407'6"	0.0000	-9'	100%
		C	11/16	6000	12%	24000	0.994	445'23/32"	424'6"	0.0000	-16'6"	100%

Guy Data *(cont'd)*

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
446.5	Corner						
381	Corner						
254.5	Corner						
131	Torque Arm	15'	53.0000	Bat Ear	A36 (36 ksi)	Double Equal Angle	L3x3x3/8 (TA - BU#873128) 2L3x3x3/16x3/4

Guy Data *(cont'd)*

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
446'6"	A572-50 (50 ksi)	Solid Round				A7-33 (33 ksi)	Double Angle	
381'	A572-50 (50 ksi)	Solid Round			No	A7-33 (33 ksi)	Double Angle	2L3x2x1/4x3/8
254'6"	A572-50 (50 ksi)	Solid Round				A36 (36 ksi)	Double Angle	
131'	A572-50 (50 ksi)	Solid Round				A7-33 (33 ksi)	Double Angle	

Guy Data *(cont'd)*

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
446.5	413	405	416		43'3/8"	41'3-31/32"	43'7-9/16"	
					11.3 sec/pulse	11.1 sec/pulse	11.4 sec/pulse	
381	2252	2201	2270		33'15/32"	31'7-3/16"	33'6-31/32"	
					9.9 sec/pulse	9.7 sec/pulse	10.0 sec/pulse	
254.5	1595	1552	1612		24'6-19/32"	23'3-1/4"	25'31/32"	
					8.6 sec/pulse	8.3 sec/pulse	8.6 sec/pulse	
131	424	424	442		14'10-7/16"	14'11-1/32"	16'2-3/4"	
					6.7 sec/pulse	6.7 sec/pulse	7.0 sec/pulse	

Guy Data *(cont'd)*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
446.5	No	No			1	1	1	1
381	No	No			1	1	1	1
254.5	No	No			1	1	1	1
131	Yes	Yes	0.98	0.98	1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
446.5	0.0000 A325N	0	0.0000	1	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75
381	0.6250 A325N	0	0.0000	0.75	0.5000 A307	2	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
254.5	0.6250 A325N	0	0.0000	0.75	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75
131	0.7500 A325N	2	0.0000	0.75	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
446.5	A	213'3"	39	6	1.5366
	B	216'9"	39	6	1.5391
	C	213'	39	6	1.5364
381	A	180'6"	37	6	1.5111
	B	184'	37	6	1.5141

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
	C	180'3"	37	6	1.5109
254.5	A	117'3"	33	5	1.4473
	B	120'9"	33	5	1.4516
	C	117'	33	5	1.4470
131	A	55'6"	26	4	1.3430
	B	61'	27	4	1.3558
	C	57'3"	27	4	1.3472

Guy-Tensioning Information

				Temperature At Time Of Tensioning													
				0 F		20 F		40 F		60 F		80 F		100 F		120 F	
Guy Elevation ft		H ft	V ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft
446.5	A	401.54	466.50	3196	37.91	3057	39.57	2924	41.28	2800	43.03	2676	44.93	2568	46.71	2467	48.52
	B	390.54	459.50	3201	36.37	3059	37.98	2926	39.63	2800	41.33	2682	43.06	2564	44.94	2462	46.70
	C	407.54	467.00	3197	38.44	3057	40.12	2924	41.86	2800	43.63	2676	45.55	2568	47.37	2467	49.20
381	A	401.54	401.00	21808	28.28	20660	29.79	19577	31.38	18560	33.04	17610	34.75	16726	36.52	15906	38.32
	B	390.54	394.00	21845	26.99	20686	28.46	19590	29.99	18560	31.60	17597	33.26	16700	34.97	15868	36.73
	C	407.54	401.50	21815	28.73	20663	30.28	19578	31.89	18560	33.58	17610	35.32	16727	37.11	15909	38.93
254.5	A	401.54	274.50	19088	19.85	17746	21.32	16502	22.89	15360	24.55	14320	26.29	13381	28.08	12536	29.92
	B	390.54	267.50	19167	18.74	17798	20.15	16528	21.66	15360	23.27	14296	24.96	13335	26.70	12472	28.50
	C	407.54	275.00	19076	20.30	17737	21.80	16497	23.40	15360	25.08	14326	26.85	13393	28.66	12554	30.52
131	A	398.74	151.00	7859	11.38	7214	12.39	6600	13.53	6000	14.87	5469	16.30	4987	17.85	4557	19.52
	B	403.24	140.00	7890	11.37	7233	12.39	6609	13.55	6000	14.92	5463	16.37	4977	17.95	4544	19.64
	C	420.24	147.50	7845	12.44	7201	13.54	6569	14.84	6000	16.23	5478	17.76	5006	19.42	4585	21.18

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
HB158-1-08U8-S8J18(1-5/8)	C	No	No	Ar (CaAa)	230' - 10'	-5.0000	0.35	2	2	0.5000	1.9800		1.30
LCF78-50A(7/8")	A	No	No	Ar (CaAa)	230' - 10'	-4.0000	0.35	7	3	0.5000	1.0900		0.34
LDF5-50A(7/8")	A	No	No	Ar (CaAa)	247' - 10'	0.0000	0.4	12	6	1.0000 0.5000	1.0900		0.33
LDF5-50A(7/8")	A	No	No	Ar (CaAa)	247' - 10'	0.0000	0.2	4	4	0.5000	1.0900		0.33
HB158-1-08U8-S8J18(1-5/8)	A	No	No	Ar (CaAa)	247' - 10'	0.0000	0.35	2	2	0.5000	1.9800		1.30
EW63(ELLIPTICAL)	A	No	No	Ar (CaAa)	150' - 10'	0.0000	-0.28	2	1	0.5000	2.0100		0.51
LCF78-50A(7/8")	A	No	No	Ar (CaAa)	206' - 10'	-3.0000	-0.38	7	3	0.5000	1.0900		0.34
LCF78-50A(7/8")	A	No	No	Ar (CaAa)	230' - 206'	-3.0000	-0.38	6	3	0.5000	1.0900		0.34
1" Rigid Conduit	A	No	No	Ar (CaAa)	457' - 10'	0.0000	-0.33	1	1	1.0000	1.0000		1.13
3/8" Cable (Lights)	C	No	No	Ar (CaAa)	457' - 10'	0.0000	0.4	1	1	0.3750	0.3750		0.22
1/4 Coax	B	No	No	Ar (CaAa)	99' - 10'	0.0000	-0.18	1	1	0.2500	0.2500		0.10

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1/4 Coax	C	No	No	Ar (CaAa)	200' - 10'	0.0000	0.4	1	1	0.2500	0.2500		0.10
3/8" Coax	A	No	No	Ar (CaAa)	136' - 10'	0.0000	-0.15	3	3	0.3750	0.3750		0.07
3/8" Coax	A	No	No	Ar (CaAa)	140' - 10'	3.0000	-0.15	1	1	0.3750	0.3750		0.07
Banjo (6" dia, 36" step)	A	No	No	Af (CaAa)	230' - 10'	-2.0000	0.35	1	1	0.3330	0.3330		0.45
Banjo (6" dia, 36" step)	A	No	No	Af (CaAa)	230' - 10'	-2.0000	-0.38	1	1	0.3330	0.3330		0.45
LDF5-50A(7/8")	B	No	No	Ar (CaAa)	133' - 10'	0.0000	-0.4	2	2	0.7500	1.0900		0.33
LDF5-50A(7/8")	B	No	No	Ar (CaAa)	444' - 133'	0.0000	-0.4	1	1	1.0900	1.0900		0.33
HJ8-50B(3")	B	No	No	Ar (CaAa)	419' - 10'	0.0000	0	1	1	3.0100	3.0100		1.78
LDF6-50A(1 1/4")	B	No	No	Ar (CaAa)	330' - 10'	0.0000	-0.03	1	1	1.5500	1.5500		0.66
LDF7-50A(1-5/8")	B	No	No	Ar (CaAa)	264' - 10'	-2.0000	0.1	1	1	1.9800	1.9800		0.82
LDF7-50A(1-5/8")	B	No	No	Ar (CaAa)	310' - 10'	0.0000	-0.05	1	1	1.9800	1.9800		0.82
LDF7-50A(1-5/8")	B	No	No	Ar (CaAa)	277' - 10'	0.0000	0.26	1	1	1.9800	1.9800		0.82
LDF6-50A(1-1/4")	B	No	No	Ar (CaAa)	322' - 10'	0.0000	-0.3	2	1	0.5000	1.5500		0.66
LDF6-50A(1-1/4")	B	No	No	Ar (CaAa)	325' - 322'	0.0000	-0.3	1	1	0.5000	1.5500		0.66
LDF7-50A(1-5/8")	B	No	No	Ar (CaAa)	330' - 10'	0.0000	-0.35	1	1	1.9800	1.9800		0.82
LDF4P-50A(1/2")	B	No	No	Ar (CaAa)	133' - 10'	0.0000	-0.14	3	2	0.3000	0.6300		0.15
LDF4P-50A(1/2")	B	No	No	Ar (CaAa)	178' - 133'	0.0000	-0.14	2	2	0.3000	0.6300		0.15
LDF4P-50A(1/2")	B	No	No	Ar (CaAa)	322' - 178'	0.0000	-0.14	1	1	0.3000 0.6300	0.6300		0.15
LDF4-50A(1/2")	B	No	No	Ar (CaAa)	342' - 10'	1.0000	0.4	1	1	0.5000	0.6300		0.15
EW63(ELLIPTICAL) **	B	No	No	Ar (CaAa)	146' - 10'	0.0000	-0.23	1	1	2.0100	2.0100		0.51
AVA5-50(7/8")	C	No	No	Ar (CaAa)	230' - 10'	-4.0000	-0.4	6	3	0.5000	1.1020		0.30
Banjo 12" Dia. (40" Step)	C	No	No	Af (CaAa)	230' - 10'	-3.0000	-0.4	1	1	0.2500	0.0001		1.91
475-000(4 1/16")	C	No	No	Ar (CaAa)	457' - 10'	-6.0000	0	1	1	4.0620	4.0620		5.50
LDF7-50A(1-5/8")	C	No	No	Ar (CaAa)	388' - 10'	0.0000	-0.35	1	1	1.9800	1.9800		0.82
DSHYBKIT-18612-XXM(7/8)	C	No	No	Ar (CaAa)	290' - 10'	0.0000	-0.39	1	1	0.8750	0.8750		1.24
LDF5-50A(7/8")	C	No	No	Ar (CaAa)	109' - 10'	0.0000	-0.4	1	1	1.0900	1.0900		0.33
HJ8-50B(3")	C	No	No	Ar (CaAa)	367' - 10'	0.0000	-0.1	1	1	3.0100	3.0100		1.78
LDF6-50A(1-1/4")	C	No	No	Ar (CaAa)	255' - 10'	0.0000	0.1	1	1	0.5000	1.5500		0.66
LDF5-50A(7/8")	C	No	No	Ar (CaAa)	133' - 117'	0.0000	0.475	1	1	1.0900	1.0900		0.33
LDF5-50A(7/8")	C	No	No	Ar (CaAa)	117' - 99'	0.0000	0.475	2	2	0.5000	1.0900		0.33
LDF5-50A(7/8")	C	No	No	Ar (CaAa)	99' - 62'	0.0000	0.475	3	2	0.5000	1.0900		0.33
LDF5-50A(7/	C	No	No	Ar (CaAa)	62' - 10'	0.0000	0.475	6	2	0.5000	1.0900		0.33

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
8")													
LDF5-50A(7/8")	C	No	No	Ar (CaAa)	108' - 10'	0.0000	0.4	1	1	1.0900	1.0900		0.33
LDF7-50A(1-5/8")	C	No	No	Ar (CaAa)	393' - 10'	0.0000	0.2	1	1	1.9800	1.9800		0.82
**													
Thin Flat Climbing Ladder	C	No	No	Af (CaAa)	457' - 10'	-9.0000	0	1	1	2.0000	2.0000		4.00
Safety Line 3/8	C	No	No	Ar (CaAa)	457' - 10'	-9.0000	0	1	1	0.3750	0.3750		0.22

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf
**								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	457'-436'	A	0.000	0.000	2.100	0.000	24
		B	0.000	0.000	0.872	0.000	3
		C	0.000	0.000	15.022	0.000	209
T2	436'-421'	A	0.000	0.000	1.500	0.000	17
		B	0.000	0.000	1.635	0.000	5
		C	0.000	0.000	10.757	0.000	149
T3	421'-401'	A	0.000	0.000	2.000	0.000	23
		B	0.000	0.000	7.598	0.000	39
		C	0.000	0.000	14.380	0.000	199
T4	401'-396'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	2.050	0.000	11
		C	0.000	0.000	3.602	0.000	50
T5	396'-391'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	2.050	0.000	11
		C	0.000	0.000	4.001	0.000	51
T6	391'-386'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	2.050	0.000	11
		C	0.000	0.000	4.994	0.000	55
T7	386'-381'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	2.050	0.000	11
		C	0.000	0.000	5.590	0.000	58
T8	381'-376'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	2.050	0.000	11
		C	0.000	0.000	5.593	0.000	58
T9	376'-371'	A	0.000	0.000	0.500	0.000	6

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		B	0.000	0.000	2.050	0.000	11
		C	0.000	0.000	5.596	0.000	58
T10	371'-366'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	2.050	0.000	11
		C	0.000	0.000	5.900	0.000	60
T11	366'-361'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	2.050	0.000	11
		C	0.000	0.000	7.108	0.000	67
T12	361'-341'	A	0.000	0.000	2.000	0.000	23
		B	0.000	0.000	8.263	0.000	42
		C	0.000	0.000	28.462	0.000	267
T13	341'-321'	A	0.000	0.000	2.000	0.000	23
		B	0.000	0.000	13.460	0.000	62
		C	0.000	0.000	28.515	0.000	267
T14	321'-301'	A	0.000	0.000	2.000	0.000	23
		B	0.000	0.000	25.762	0.000	112
		C	0.000	0.000	28.573	0.000	267
T15	301'-281'	A	0.000	0.000	2.000	0.000	23
		B	0.000	0.000	27.940	0.000	121
		C	0.000	0.000	29.422	0.000	278
T16	281'-276'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	7.183	0.000	31
		C	0.000	0.000	7.606	0.000	73
T17	276'-271'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	7.975	0.000	34
		C	0.000	0.000	7.611	0.000	73
T18	271'-266'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	7.975	0.000	34
		C	0.000	0.000	7.615	0.000	73
T19	266'-261'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	8.569	0.000	37
		C	0.000	0.000	7.619	0.000	73
T20	261'-256'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	8.965	0.000	38
		C	0.000	0.000	7.624	0.000	73
T21	256'-251'	A	0.000	0.000	0.500	0.000	6
		B	0.000	0.000	8.965	0.000	38
		C	0.000	0.000	8.249	0.000	76
T22	251'-246'	A	0.000	0.000	2.640	0.000	14
		B	0.000	0.000	8.965	0.000	38
		C	0.000	0.000	8.408	0.000	76
T23	246'-241'	A	0.000	0.000	11.200	0.000	45
		B	0.000	0.000	8.965	0.000	38
		C	0.000	0.000	8.413	0.000	76
T24	241'-221'	A	0.000	0.000	58.552	0.000	228
		B	0.000	0.000	35.860	0.000	153
		C	0.000	0.000	43.218	0.000	362
T25	221'-201'	A	0.000	0.000	75.905	0.000	288
		B	0.000	0.000	35.860	0.000	153
		C	0.000	0.000	54.935	0.000	431
T26	201'-181'	A	0.000	0.000	77.540	0.000	293
		B	0.000	0.000	35.860	0.000	153
		C	0.000	0.000	55.508	0.000	433
T27	181'-161'	A	0.000	0.000	77.540	0.000	293
		B	0.000	0.000	36.931	0.000	156
		C	0.000	0.000	55.644	0.000	433
T28	161'-141'	A	0.000	0.000	81.158	0.000	302
		B	0.000	0.000	38.125	0.000	159
		C	0.000	0.000	55.770	0.000	433
T29	141'-121'	A	0.000	0.000	87.980	0.000	318
		B	0.000	0.000	43.204	0.000	172

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		C	0.000	0.000	57.225	0.000	437
T30	121'-101'	A	0.000	0.000	88.580	0.000	320
		B	0.000	0.000	44.580	0.000	176
		C	0.000	0.000	61.651	0.000	450
T31	101'-81'	A	0.000	0.000	88.580	0.000	320
		B	0.000	0.000	45.030	0.000	178
		C	0.000	0.000	66.990	0.000	466
T32	81'-61'	A	0.000	0.000	88.580	0.000	320
		B	0.000	0.000	45.080	0.000	178
		C	0.000	0.000	67.813	0.000	467
T33	61'-41'	A	0.000	0.000	88.580	0.000	320
		B	0.000	0.000	45.080	0.000	178
		C	0.000	0.000	74.165	0.000	486
T34	41'-20'	A	0.000	0.000	93.009	0.000	336
		B	0.000	0.000	47.334	0.000	187
		C	0.000	0.000	77.873	0.000	511
T35	20'-6'8-17/32"	A	0.000	0.000	44.290	0.000	160
		B	0.000	0.000	22.540	0.000	89
		C	0.000	0.000	37.083	0.000	243
T36	6'8-17/32"-0'	A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	0.000	0
		C	0.000	0.000	0.000	0.000	0

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	457'-436'	A	1.654	0.000	0.000	9.048	0.000	136
		B		0.000	0.000	3.519	0.000	47
		C		0.000	0.000	44.899	0.000	816
T2	436'-421'	A	1.648	0.000	0.000	6.443	0.000	97
		B		0.000	0.000	6.578	0.000	88
		C		0.000	0.000	31.989	0.000	580
T3	421'-401'	A	1.641	0.000	0.000	8.563	0.000	128
		B		0.000	0.000	20.068	0.000	316
		C		0.000	0.000	42.543	0.000	770
T4	401'-396'	A	1.636	0.000	0.000	2.136	0.000	32
		B		0.000	0.000	5.321	0.000	84
		C		0.000	0.000	10.615	0.000	192
T5	396'-391'	A	1.634	0.000	0.000	2.134	0.000	32
		B		0.000	0.000	5.317	0.000	84
		C		0.000	0.000	11.657	0.000	208
T6	391'-386'	A	1.632	0.000	0.000	2.132	0.000	32
		B		0.000	0.000	5.313	0.000	84
		C		0.000	0.000	14.269	0.000	248
T7	386'-381'	A	1.629	0.000	0.000	2.129	0.000	32
		B		0.000	0.000	5.309	0.000	84
		C		0.000	0.000	15.829	0.000	271
T8	381'-376'	A	1.627	0.000	0.000	2.127	0.000	32
		B		0.000	0.000	5.305	0.000	84
		C		0.000	0.000	15.816	0.000	271
T9	376'-371'	A	1.625	0.000	0.000	2.125	0.000	32
		B		0.000	0.000	5.300	0.000	84
		C		0.000	0.000	15.803	0.000	270
T10	371'-366'	A	1.623	0.000	0.000	2.123	0.000	32
		B		0.000	0.000	5.296	0.000	83
		C		0.000	0.000	16.416	0.000	281

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T11	366'-361'	A	1.621	0.000	0.000	2.121	0.000	32
		B		0.000	0.000	5.291	0.000	83
		C		0.000	0.000	18.903	0.000	324
T12	361'-341'	A	1.615	0.000	0.000	8.460	0.000	126
		B		0.000	0.000	21.507	0.000	336
		C		0.000	0.000	75.452	0.000	1292
T13	341'-321'	A	1.606	0.000	0.000	8.422	0.000	125
		B		0.000	0.000	40.092	0.000	591
		C		0.000	0.000	75.188	0.000	1283
T14	321'-301'	A	1.596	0.000	0.000	8.383	0.000	124
		B		0.000	0.000	81.436	0.000	1139
		C		0.000	0.000	74.909	0.000	1274
T15	301'-281'	A	1.585	0.000	0.000	8.340	0.000	123
		B		0.000	0.000	86.755	0.000	1214
		C		0.000	0.000	78.253	0.000	1319
T16	281'-276'	A	1.578	0.000	0.000	2.078	0.000	31
		B		0.000	0.000	22.142	0.000	309
		C		0.000	0.000	20.620	0.000	344
T17	276'-271'	A	1.575	0.000	0.000	2.075	0.000	30
		B		0.000	0.000	24.168	0.000	339
		C		0.000	0.000	20.597	0.000	344
T18	271'-266'	A	1.572	0.000	0.000	2.072	0.000	30
		B		0.000	0.000	24.140	0.000	338
		C		0.000	0.000	20.574	0.000	343
T19	266'-261'	A	1.569	0.000	0.000	2.069	0.000	30
		B		0.000	0.000	25.647	0.000	360
		C		0.000	0.000	20.550	0.000	342
T20	261'-256'	A	1.566	0.000	0.000	2.066	0.000	30
		B		0.000	0.000	26.638	0.000	375
		C		0.000	0.000	20.526	0.000	341
T21	256'-251'	A	1.563	0.000	0.000	2.063	0.000	30
		B		0.000	0.000	26.606	0.000	374
		C		0.000	0.000	22.373	0.000	367
T22	251'-246'	A	1.560	0.000	0.000	6.413	0.000	87
		B		0.000	0.000	26.572	0.000	373
		C		0.000	0.000	22.812	0.000	373
T23	246'-241'	A	1.557	0.000	0.000	23.805	0.000	316
		B		0.000	0.000	26.538	0.000	372
		C		0.000	0.000	22.784	0.000	372
T24	241'-221'	A	1.549	0.000	0.000	123.852	0.000	1634
		B		0.000	0.000	105.801	0.000	1477
		C		0.000	0.000	114.454	0.000	1781
T25	221'-201'	A	1.535	0.000	0.000	159.105	0.000	2085
		B		0.000	0.000	105.201	0.000	1459
		C		0.000	0.000	142.561	0.000	2128
T26	201'-181'	A	1.520	0.000	0.000	160.382	0.000	2098
		B		0.000	0.000	104.548	0.000	1440
		C		0.000	0.000	147.991	0.000	2169
T27	181'-161'	A	1.503	0.000	0.000	159.610	0.000	2076
		B		0.000	0.000	110.052	0.000	1442
		C		0.000	0.000	147.351	0.000	2146
T28	161'-141'	A	1.484	0.000	0.000	168.869	0.000	2176
		B		0.000	0.000	112.785	0.000	1457
		C		0.000	0.000	146.274	0.000	2116
T29	141'-121'	A	1.463	0.000	0.000	197.323	0.000	2438
		B		0.000	0.000	125.969	0.000	1578
		C		0.000	0.000	149.881	0.000	2142
T30	121'-101'	A	1.439	0.000	0.000	199.755	0.000	2427
		B		0.000	0.000	129.204	0.000	1576
		C		0.000	0.000	164.869	0.000	2252
T31	101'-81'	A	1.411	0.000	0.000	197.942	0.000	2379

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		B		0.000	0.000	133.234	0.000	1590
		C		0.000	0.000	176.871	0.000	2366
T32	81'-61'	A	1.377	0.000	0.000	195.729	0.000	2322
		B		0.000	0.000	131.878	0.000	1547
		C		0.000	0.000	174.753	0.000	2310
T33	61'-41'	A	1.332	0.000	0.000	192.863	0.000	2248
		B		0.000	0.000	129.327	0.000	1484
		C		0.000	0.000	174.325	0.000	2314
T34	41'-20'	A	1.265	0.000	0.000	198.028	0.000	2247
		B		0.000	0.000	131.803	0.000	1462
		C		0.000	0.000	177.930	0.000	2303
T35	20'-6'8-17/32"	A	1.165	0.000	0.000	91.098	0.000	992
		B		0.000	0.000	59.909	0.000	630
		C		0.000	0.000	81.073	0.000	1010
T36	6'8-17/32"-0'	A	1.014	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	0.000	0
		C		0.000	0.000	0.000	0.000	0

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	457'-436'	-0.6300	1.7639	-1.9430	2.3821
T2	436'-421'	-0.6170	1.4120	-1.8968	1.5560
T3	421'-401'	0.8440	0.4747	-1.0059	1.0426
T4	401'-396'	0.9038	0.3392	-0.7478	0.8190
T5	396'-391'	0.8267	0.6948	-1.2091	1.4533
T6	391'-386'	0.7452	1.2750	-0.8772	2.0108
T7	386'-381'	1.3114	1.8498	-0.3432	3.0196
T8	381'-376'	1.1262	1.6100	-0.2696	2.3965
T9	376'-371'	1.3023	1.8393	-0.3378	2.9830
T10	371'-366'	1.2354	1.9578	-0.2080	2.6324
T11	366'-361'	1.7388	3.4570	0.0586	4.0243
T12	361'-341'	1.5494	3.1204	0.0912	3.2459
T13	341'-321'	2.2012	2.6587	1.4852	2.9761
T14	321'-301'	2.9015	0.5928	2.7121	-0.1175
T15	301'-281'	3.2143	0.4975	3.2728	-0.1203
T16	281'-276'	3.3132	0.6307	3.5082	0.2099
T17	276'-271'	4.1717	0.7947	4.6423	0.3779
T18	271'-266'	3.7646	0.7267	4.0910	0.3346
T19	266'-261'	4.3909	0.7446	4.9228	0.3162
T20	261'-256'	3.9213	0.6242	4.3395	0.2370
T21	256'-251'	3.6582	0.8963	3.9859	0.6540
T22	251'-246'	3.4766	-0.4584	3.7864	-0.3725
T23	246'-241'	2.4793	-5.0815	2.7425	-4.1614
T24	241'-221'	2.0914	-5.0192	2.2012	-4.0329
T25	221'-201'	1.4628	-4.7498	1.3759	-3.6001
T26	201'-181'	1.0950	-4.6400	0.8257	-3.2818
T27	181'-161'	1.1253	-4.6755	0.8543	-3.3743
T28	161'-141'	0.6903	-4.4838	0.4151	-3.3138
T29	141'-121'	-0.0064	-4.6051	-0.8563	-3.4501
T30	121'-101'	-0.7468	-4.8622	-1.4138	-3.1773
T31	101'-81'	-1.0302	-4.2258	-1.3516	-2.7628
T32	81'-61'	-1.0541	-4.1383	-1.3422	-2.7870
T33	61'-41'	-1.0720	-3.7096	-1.3472	-2.6282
T34	41'-20'	-1.0786	-3.7286	-1.3579	-2.6908

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T35	20'-6'8-17/32"	-0.7748	-2.9678	-0.9434	-2.1486
T36	6'8-17/32"-0'	0.0000	0.0000	0.0000	0.0000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	9	1" Rigid Conduit	436.00 - 457.00	0.6000	0.5177
T1	10	3/8" Cable (Lights)	436.00 - 457.00	0.6000	0.5177
T1	20	LDF5-50A(7/8")	436.00 - 444.00	0.6000	0.5177
T1	42	475-000(4 1/16")	436.00 - 457.00	1.0000	0.5177
T1	66	Thin Flat Climbing Ladder	436.00 - 457.00	0.6000	0.5177
T1	67	Safety Line 3/8	436.00 - 457.00	0.6000	0.5177
T2	9	1" Rigid Conduit	421.00 - 436.00	0.6000	0.5327
T2	10	3/8" Cable (Lights)	421.00 - 436.00	0.6000	0.5327
T2	20	LDF5-50A(7/8")	421.00 - 436.00	0.6000	0.5327
T2	42	475-000(4 1/16")	421.00 - 436.00	1.0000	0.5327
T2	66	Thin Flat Climbing Ladder	421.00 - 436.00	0.6000	0.5327
T2	67	Safety Line 3/8	421.00 - 436.00	0.6000	0.5327
T3	9	1" Rigid Conduit	401.00 - 421.00	0.6000	0.5769
T3	10	3/8" Cable (Lights)	401.00 - 421.00	0.6000	0.5769
T3	20	LDF5-50A(7/8")	401.00 - 421.00	0.6000	0.5769
T3	21	HJ8-50B(3")	401.00 - 419.00	1.0000	0.5769
T3	42	475-000(4 1/16")	401.00 - 421.00	1.0000	0.5769
T3	66	Thin Flat Climbing Ladder	401.00 - 421.00	0.6000	0.5769
T3	67	Safety Line 3/8	401.00 - 421.00	0.6000	0.5769
T4	9	1" Rigid Conduit	396.00 - 401.00	0.6000	0.5138
T4	10	3/8" Cable (Lights)	396.00 - 401.00	0.6000	0.5138
T4	20	LDF5-50A(7/8")	396.00 - 401.00	0.6000	0.5138
T4	21	HJ8-50B(3")	396.00 - 401.00	1.0000	0.5138
T4	42	475-000(4 1/16")	396.00 - 401.00	1.0000	0.5138

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	66	Thin Flat Climbing Ladder	396.00 - 401.00	0.6000	0.5138
T4	67	Safety Line 3/8	396.00 - 401.00	0.6000	0.5138
T5	9	1" Rigid Conduit	391.00 - 396.00	0.6000	0.5996
T5	10	3/8" Cable (Lights)	391.00 - 396.00	0.6000	0.5996
T5	20	LDF5-50A(7/8")	391.00 - 396.00	0.6000	0.5996
T5	21	HJ8-50B(3")	391.00 - 396.00	1.0000	0.5996
T5	42	475-000(4 1/16")	391.00 - 396.00	1.0000	0.5996
T5	64	LDF7-50A(1-5/8")	391.00 - 393.00	0.6000	0.5996
T5	66	Thin Flat Climbing Ladder	391.00 - 396.00	0.6000	0.5996
T5	67	Safety Line 3/8	391.00 - 396.00	0.6000	0.5996
T6	9	1" Rigid Conduit	386.00 - 391.00	0.6000	0.5156
T6	10	3/8" Cable (Lights)	386.00 - 391.00	0.6000	0.5156
T6	20	LDF5-50A(7/8")	386.00 - 391.00	0.6000	0.5156
T6	21	HJ8-50B(3")	386.00 - 391.00	1.0000	0.5156
T6	42	475-000(4 1/16")	386.00 - 391.00	1.0000	0.5156
T6	45	LDF7-50A(1-5/8")	386.00 - 388.00	0.6000	0.5156
T6	64	LDF7-50A(1-5/8")	386.00 - 391.00	0.6000	0.5156
T6	66	Thin Flat Climbing Ladder	386.00 - 391.00	0.6000	0.5156
T6	67	Safety Line 3/8	386.00 - 391.00	0.6000	0.5156
T7	9	1" Rigid Conduit	381.00 - 386.00	0.6000	0.6000
T7	10	3/8" Cable (Lights)	381.00 - 386.00	0.6000	0.6000
T7	20	LDF5-50A(7/8")	381.00 - 386.00	0.6000	0.6000
T7	21	HJ8-50B(3")	381.00 - 386.00	1.0000	0.6000
T7	42	475-000(4 1/16")	381.00 - 386.00	1.0000	0.6000
T7	45	LDF7-50A(1-5/8")	381.00 - 386.00	0.6000	0.6000
T7	64	LDF7-50A(1-5/8")	381.00 - 386.00	0.6000	0.6000
T7	66	Thin Flat Climbing Ladder	381.00 - 386.00	0.6000	0.6000
T7	67	Safety Line 3/8	381.00 - 386.00	0.6000	0.6000
T8	9	1" Rigid Conduit	376.00 - 381.00	0.6000	0.5031
T8	10	3/8" Cable (Lights)	376.00 - 381.00	0.6000	0.5031
T8	20	LDF5-50A(7/8")	376.00 - 381.00	0.6000	0.5031

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T8	21	HJ8-50B(3")	376.00 - 381.00	1.0000	0.5031
T8	42	475-000(4 1/16")	376.00 - 381.00	1.0000	0.5031
T8	45	LDF7-50A(1-5/8")	376.00 - 381.00	0.6000	0.5031
T8	64	LDF7-50A(1-5/8")	376.00 - 381.00	0.6000	0.5031
T8	66	Thin Flat Climbing Ladder	376.00 - 381.00	0.6000	0.5031
T8	67	Safety Line 3/8	376.00 - 381.00	0.6000	0.5031
T9	9	1" Rigid Conduit	371.00 - 376.00	0.6000	0.5948
T9	10	3/8" Cable (Lights)	371.00 - 376.00	0.6000	0.5948
T9	20	LDF5-50A(7/8")	371.00 - 376.00	0.6000	0.5948
T9	21	HJ8-50B(3")	371.00 - 376.00	1.0000	0.5948
T9	42	475-000(4 1/16")	371.00 - 376.00	1.0000	0.5948
T9	45	LDF7-50A(1-5/8")	371.00 - 376.00	0.6000	0.5948
T9	64	LDF7-50A(1-5/8")	371.00 - 376.00	0.6000	0.5948
T9	66	Thin Flat Climbing Ladder	371.00 - 376.00	0.6000	0.5948
T9	67	Safety Line 3/8	371.00 - 376.00	0.6000	0.5948
T10	9	1" Rigid Conduit	366.00 - 371.00	0.6000	0.5114
T10	10	3/8" Cable (Lights)	366.00 - 371.00	0.6000	0.5114
T10	20	LDF5-50A(7/8")	366.00 - 371.00	0.6000	0.5114
T10	21	HJ8-50B(3")	366.00 - 371.00	1.0000	0.5114
T10	42	475-000(4 1/16")	366.00 - 371.00	1.0000	0.5114
T10	45	LDF7-50A(1-5/8")	366.00 - 371.00	0.6000	0.5114
T10	48	HJ8-50B(3")	366.00 - 367.00	1.0000	0.5114
T10	64	LDF7-50A(1-5/8")	366.00 - 371.00	0.6000	0.5114
T10	66	Thin Flat Climbing Ladder	366.00 - 371.00	0.6000	0.5114
T10	67	Safety Line 3/8	366.00 - 371.00	0.6000	0.5114
T11	9	1" Rigid Conduit	361.00 - 366.00	0.6000	0.5953
T11	10	3/8" Cable (Lights)	361.00 - 366.00	0.6000	0.5953
T11	20	LDF5-50A(7/8")	361.00 - 366.00	0.6000	0.5953
T11	21	HJ8-50B(3")	361.00 - 366.00	1.0000	0.5953
T11	42	475-000(4 1/16")	361.00 - 366.00	1.0000	0.5953
T11	45	LDF7-50A(1-5/8")	361.00 - 366.00	0.6000	0.5953

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T11	48	HJ8-50B(3")	361.00 - 366.00	1.0000	0.5953
T11	64	LDF7-50A(1-5/8")	361.00 - 366.00	0.6000	0.5953
T11	66	Thin Flat Climbing Ladder	361.00 - 366.00	0.6000	0.5953
T11	67	Safety Line 3/8	361.00 - 366.00	0.6000	0.5953
T12	9	1" Rigid Conduit	341.00 - 361.00	0.6000	0.4980
T12	10	3/8" Cable (Lights)	341.00 - 361.00	0.6000	0.4980
T12	20	LDF5-50A(7/8")	341.00 - 361.00	0.6000	0.4980
T12	21	HJ8-50B(3")	341.00 - 361.00	1.0000	0.4980
T12	37	LDF4-50A(1/2")	341.00 - 342.00	0.6000	0.4980
T12	42	475-000(4 1/16")	341.00 - 361.00	1.0000	0.4980
T12	45	LDF7-50A(1-5/8")	341.00 - 361.00	0.6000	0.4980
T12	48	HJ8-50B(3")	341.00 - 361.00	1.0000	0.4980
T12	64	LDF7-50A(1-5/8")	341.00 - 361.00	0.6000	0.4980
T12	66	Thin Flat Climbing Ladder	341.00 - 361.00	0.6000	0.4980
T12	67	Safety Line 3/8	341.00 - 361.00	0.6000	0.4980
T13	9	1" Rigid Conduit	321.00 - 341.00	0.6000	0.5767
T13	10	3/8" Cable (Lights)	321.00 - 341.00	0.6000	0.5767
T13	20	LDF5-50A(7/8")	321.00 - 341.00	0.6000	0.5767
T13	21	HJ8-50B(3")	321.00 - 341.00	1.0000	0.5767
T13	23	LDF6-50A(1 1/4")	321.00 - 330.00	0.6000	0.5767
T13	31	LDF6-50A(1-1/4")	321.00 - 322.00	0.6000	0.5767
T13	32	LDF6-50A(1-1/4")	322.00 - 325.00	0.6000	0.5767
T13	33	LDF7-50A(1-5/8")	321.00 - 330.00	0.6000	0.5767
T13	36	LDF4P-50A(1/2")	321.00 - 322.00	0.6000	0.5767
T13	37	LDF4-50A(1/2")	321.00 - 341.00	0.6000	0.5767
T13	42	475-000(4 1/16")	321.00 - 341.00	1.0000	0.5767
T13	45	LDF7-50A(1-5/8")	321.00 - 341.00	0.6000	0.5767
T13	48	HJ8-50B(3")	321.00 - 341.00	1.0000	0.5767
T13	64	LDF7-50A(1-5/8")	321.00 - 341.00	0.6000	0.5767
T13	66	Thin Flat Climbing Ladder	321.00 - 341.00	0.6000	0.5767
T13	67	Safety Line 3/8	321.00 - 341.00	0.6000	0.5767

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T14	9	1" Rigid Conduit	301.00 - 321.00	0.6000	0.5780
T14	10	3/8" Cable (Lights)	301.00 - 321.00	0.6000	0.5780
T14	20	LDF5-50A(7/8")	301.00 - 321.00	0.6000	0.5780
T14	21	HJ8-50B(3")	301.00 - 321.00	1.0000	0.5780
T14	23	LDF6-50A(1 1/4")	301.00 - 321.00	0.6000	0.5780
T14	27	LDF7-50A(1-5/8")	301.00 - 310.00	0.6000	0.5780
T14	31	LDF6-50A(1-1/4")	301.00 - 321.00	0.6000	0.5780
T14	33	LDF7-50A(1-5/8")	301.00 - 321.00	0.6000	0.5780
T14	36	LDF4P-50A(1/2")	301.00 - 321.00	0.6000	0.5780
T14	37	LDF4-50A(1/2")	301.00 - 321.00	0.6000	0.5780
T14	42	475-000(4 1/16")	301.00 - 321.00	1.0000	0.5780
T14	45	LDF7-50A(1-5/8")	301.00 - 321.00	0.6000	0.5780
T14	48	HJ8-50B(3")	301.00 - 321.00	1.0000	0.5780
T14	64	LDF7-50A(1-5/8")	301.00 - 321.00	0.6000	0.5780
T14	66	Thin Flat Climbing Ladder	301.00 - 321.00	0.6000	0.5780
T14	67	Safety Line 3/8	301.00 - 321.00	0.6000	0.5780
T15	9	1" Rigid Conduit	281.00 - 301.00	0.6000	0.5794
T15	10	3/8" Cable (Lights)	281.00 - 301.00	0.6000	0.5794
T15	20	LDF5-50A(7/8")	281.00 - 301.00	0.6000	0.5794
T15	21	HJ8-50B(3")	281.00 - 301.00	1.0000	0.5794
T15	23	LDF6-50A(1 1/4")	281.00 - 301.00	0.6000	0.5794
T15	27	LDF7-50A(1-5/8")	281.00 - 301.00	0.6000	0.5794
T15	31	LDF6-50A(1-1/4")	281.00 - 301.00	0.6000	0.5794
T15	33	LDF7-50A(1-5/8")	281.00 - 301.00	0.6000	0.5794
T15	36	LDF4P-50A(1/2")	281.00 - 301.00	0.6000	0.5794
T15	37	LDF4-50A(1/2")	281.00 - 301.00	0.6000	0.5794
T15	42	475-000(4 1/16")	281.00 - 301.00	1.0000	0.5794
T15	45	LDF7-50A(1-5/8")	281.00 - 301.00	0.6000	0.5794
T15	46	DSHYBKIT-18612-XXM(7/8)	281.00 - 290.00	0.6000	0.5794
T15	48	HJ8-50B(3")	281.00 - 301.00	1.0000	0.5794
T15	64	LDF7-50A(1-5/8")	281.00 - 301.00	0.6000	0.5794

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T15	66	Thin Flat Climbing Ladder	281.00 - 301.00	0.6000	0.5794
T15	67	Safety Line 3/8	281.00 - 301.00	0.6000	0.5794
T16	9	1" Rigid Conduit	276.00 - 281.00	0.6000	0.5381
T16	10	3/8" Cable (Lights)	276.00 - 281.00	0.6000	0.5381
T16	20	LDF5-50A(7/8")	276.00 - 281.00	0.6000	0.5381
T16	21	HJ8-50B(3")	276.00 - 281.00	1.0000	0.5381
T16	23	LDF6-50A(1 1/4")	276.00 - 281.00	0.6000	0.5381
T16	27	LDF7-50A(1-5/8")	276.00 - 281.00	0.6000	0.5381
T16	28	LDF7-50A(1-5/8")	276.00 - 277.00	0.6000	0.5381
T16	31	LDF6-50A(1-1/4")	276.00 - 281.00	0.6000	0.5381
T16	33	LDF7-50A(1-5/8")	276.00 - 281.00	0.6000	0.5381
T16	36	LDF4P-50A(1/2")	276.00 - 281.00	0.6000	0.5381
T16	37	LDF4-50A(1/2")	276.00 - 281.00	0.6000	0.5381
T16	42	475-000(4 1/16")	276.00 - 281.00	1.0000	0.5381
T16	45	LDF7-50A(1-5/8")	276.00 - 281.00	0.6000	0.5381
T16	46	DSHYBKIT-18612-XXM(7/8)	276.00 - 281.00	0.6000	0.5381
T16	48	HJ8-50B(3")	276.00 - 281.00	1.0000	0.5381
T16	64	LDF7-50A(1-5/8")	276.00 - 281.00	0.6000	0.5381
T16	66	Thin Flat Climbing Ladder	276.00 - 281.00	0.6000	0.5381
T16	67	Safety Line 3/8	276.00 - 281.00	0.6000	0.5381
T17	9	1" Rigid Conduit	271.00 - 276.00	0.6000	0.6000
T17	10	3/8" Cable (Lights)	271.00 - 276.00	0.6000	0.6000
T17	20	LDF5-50A(7/8")	271.00 - 276.00	0.6000	0.6000
T17	21	HJ8-50B(3")	271.00 - 276.00	1.0000	0.6000
T17	23	LDF6-50A(1 1/4")	271.00 - 276.00	0.6000	0.6000
T17	27	LDF7-50A(1-5/8")	271.00 - 276.00	0.6000	0.6000
T17	28	LDF7-50A(1-5/8")	271.00 - 276.00	0.6000	0.6000
T17	31	LDF6-50A(1-1/4")	271.00 - 276.00	0.6000	0.6000
T17	33	LDF7-50A(1-5/8")	271.00 - 276.00	0.6000	0.6000
T17	36	LDF4P-50A(1/2")	271.00 - 276.00	0.6000	0.6000
T17	37	LDF4-50A(1/2")	271.00 - 276.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T17	42	475-000(4 1/16")	271.00 - 276.00	1.0000	0.6000
T17	45	LDF7-50A(1-5/8")	271.00 - 276.00	0.6000	0.6000
T17	46	DSHYBKIT-18612-XXM(7/8)	271.00 - 276.00	0.6000	0.6000
T17	48	HJ8-50B(3")	271.00 - 276.00	1.0000	0.6000
T17	64	LDF7-50A(1-5/8")	271.00 - 276.00	0.6000	0.6000
T17	66	Thin Flat Climbing Ladder	271.00 - 276.00	0.6000	0.6000
T17	67	Safety Line 3/8	271.00 - 276.00	0.6000	0.6000
T18	9	1" Rigid Conduit	266.00 - 271.00	0.6000	0.5390
T18	10	3/8" Cable (Lights)	266.00 - 271.00	0.6000	0.5390
T18	20	LDF5-50A(7/8")	266.00 - 271.00	0.6000	0.5390
T18	21	HJ8-50B(3")	266.00 - 271.00	1.0000	0.5390
T18	23	LDF6-50A(1 1/4")	266.00 - 271.00	0.6000	0.5390
T18	27	LDF7-50A(1-5/8")	266.00 - 271.00	0.6000	0.5390
T18	28	LDF7-50A(1-5/8")	266.00 - 271.00	0.6000	0.5390
T18	31	LDF6-50A(1-1/4")	266.00 - 271.00	0.6000	0.5390
T18	33	LDF7-50A(1-5/8")	266.00 - 271.00	0.6000	0.5390
T18	36	LDF4P-50A(1/2")	266.00 - 271.00	0.6000	0.5390
T18	37	LDF4-50A(1/2")	266.00 - 271.00	0.6000	0.5390
T18	42	475-000(4 1/16")	266.00 - 271.00	1.0000	0.5390
T18	45	LDF7-50A(1-5/8")	266.00 - 271.00	0.6000	0.5390
T18	46	DSHYBKIT-18612-XXM(7/8)	266.00 - 271.00	0.6000	0.5390
T18	48	HJ8-50B(3")	266.00 - 271.00	1.0000	0.5390
T18	64	LDF7-50A(1-5/8")	266.00 - 271.00	0.6000	0.5390
T18	66	Thin Flat Climbing Ladder	266.00 - 271.00	0.6000	0.5390
T18	67	Safety Line 3/8	266.00 - 271.00	0.6000	0.5390
T19	9	1" Rigid Conduit	261.00 - 266.00	0.6000	0.6000
T19	10	3/8" Cable (Lights)	261.00 - 266.00	0.6000	0.6000
T19	20	LDF5-50A(7/8")	261.00 - 266.00	0.6000	0.6000
T19	21	HJ8-50B(3")	261.00 - 266.00	1.0000	0.6000
T19	23	LDF6-50A(1 1/4")	261.00 - 266.00	0.6000	0.6000
T19	26	LDF7-50A(1-5/8")	261.00 - 264.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T19	27	LDF7-50A(1-5/8")	261.00 - 266.00	0.6000	0.6000
T19	28	LDF7-50A(1-5/8")	261.00 - 266.00	0.6000	0.6000
T19	31	LDF6-50A(1-1/4")	261.00 - 266.00	0.6000	0.6000
T19	33	LDF7-50A(1-5/8")	261.00 - 266.00	0.6000	0.6000
T19	36	LDF4P-50A(1/2")	261.00 - 266.00	0.6000	0.6000
T19	37	LDF4-50A(1/2")	261.00 - 266.00	0.6000	0.6000
T19	42	475-000(4 1/16")	261.00 - 266.00	1.0000	0.6000
T19	45	LDF7-50A(1-5/8")	261.00 - 266.00	0.6000	0.6000
T19	46	DSHYBKIT-18612-XXM(7/8)	261.00 - 266.00	0.6000	0.6000
T19	48	HJ8-50B(3")	261.00 - 266.00	1.0000	0.6000
T19	64	LDF7-50A(1-5/8")	261.00 - 266.00	0.6000	0.6000
T19	66	Thin Flat Climbing Ladder	261.00 - 266.00	0.6000	0.6000
T19	67	Safety Line 3/8	261.00 - 266.00	0.6000	0.6000
T20	9	1" Rigid Conduit	256.00 - 261.00	0.6000	0.5201
T20	10	3/8" Cable (Lights)	256.00 - 261.00	0.6000	0.5201
T20	20	LDF5-50A(7/8")	256.00 - 261.00	0.6000	0.5201
T20	21	HJ8-50B(3")	256.00 - 261.00	1.0000	0.5201
T20	23	LDF6-50A(1 1/4")	256.00 - 261.00	0.6000	0.5201
T20	26	LDF7-50A(1-5/8")	256.00 - 261.00	0.6000	0.5201
T20	27	LDF7-50A(1-5/8")	256.00 - 261.00	0.6000	0.5201
T20	28	LDF7-50A(1-5/8")	256.00 - 261.00	0.6000	0.5201
T20	31	LDF6-50A(1-1/4")	256.00 - 261.00	0.6000	0.5201
T20	33	LDF7-50A(1-5/8")	256.00 - 261.00	0.6000	0.5201
T20	36	LDF4P-50A(1/2")	256.00 - 261.00	0.6000	0.5201
T20	37	LDF4-50A(1/2")	256.00 - 261.00	0.6000	0.5201
T20	42	475-000(4 1/16")	256.00 - 261.00	1.0000	0.5201
T20	45	LDF7-50A(1-5/8")	256.00 - 261.00	0.6000	0.5201
T20	46	DSHYBKIT-18612-XXM(7/8)	256.00 - 261.00	0.6000	0.5201
T20	48	HJ8-50B(3")	256.00 - 261.00	1.0000	0.5201
T20	64	LDF7-50A(1-5/8")	256.00 - 261.00	0.6000	0.5201
T20	66	Thin Flat Climbing Ladder	256.00 - 261.00	0.6000	0.5201

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T20	67	Safety Line 3/8	256.00 - 261.00	0.6000	0.5201
T21	9	1" Rigid Conduit	251.00 - 256.00	0.6000	0.5054
T21	10	3/8" Cable (Lights)	251.00 - 256.00	0.6000	0.5054
T21	20	LDF5-50A(7/8")	251.00 - 256.00	0.6000	0.5054
T21	21	HJ8-50B(3")	251.00 - 256.00	1.0000	0.5054
T21	23	LDF6-50A(1 1/4")	251.00 - 256.00	0.6000	0.5054
T21	26	LDF7-50A(1-5/8")	251.00 - 256.00	0.6000	0.5054
T21	27	LDF7-50A(1-5/8")	251.00 - 256.00	0.6000	0.5054
T21	28	LDF7-50A(1-5/8")	251.00 - 256.00	0.6000	0.5054
T21	31	LDF6-50A(1-1/4")	251.00 - 256.00	0.6000	0.5054
T21	33	LDF7-50A(1-5/8")	251.00 - 256.00	0.6000	0.5054
T21	36	LDF4P-50A(1/2")	251.00 - 256.00	0.6000	0.5054
T21	37	LDF4-50A(1/2")	251.00 - 256.00	0.6000	0.5054
T21	42	475-000(4 1/16")	251.00 - 256.00	1.0000	0.5054
T21	45	LDF7-50A(1-5/8")	251.00 - 256.00	0.6000	0.5054
T21	46	DSHYBKIT-18612-XXM(7/8)	251.00 - 256.00	0.6000	0.5054
T21	48	HJ8-50B(3")	251.00 - 256.00	1.0000	0.5054
T21	54	LDF6-50A(1-1/4")	251.00 - 255.00	0.6000	0.5054
T21	64	LDF7-50A(1-5/8")	251.00 - 256.00	0.6000	0.5054
T21	66	Thin Flat Climbing Ladder	251.00 - 256.00	0.6000	0.5054
T21	67	Safety Line 3/8	251.00 - 256.00	0.6000	0.5054
T22	3	LDF5-50A(7/8")	246.00 - 247.00	0.6000	0.5210
T22	4	LDF5-50A(7/8")	246.00 - 247.00	0.6000	0.5210
T22	5	HB158-1-08U8-S8J18(1-5/8)	246.00 - 247.00	0.6000	0.5210
T22	9	1" Rigid Conduit	246.00 - 251.00	0.6000	0.5210
T22	10	3/8" Cable (Lights)	246.00 - 251.00	0.6000	0.5210
T22	20	LDF5-50A(7/8")	246.00 - 251.00	0.6000	0.5210
T22	21	HJ8-50B(3")	246.00 - 251.00	1.0000	0.5210
T22	23	LDF6-50A(1 1/4")	246.00 - 251.00	0.6000	0.5210
T22	26	LDF7-50A(1-5/8")	246.00 - 251.00	0.6000	0.5210
T22	27	LDF7-50A(1-5/8")	246.00 - 251.00	0.6000	0.5210

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T22	28	LDF7-50A(1-5/8")	246.00 - 251.00	0.6000	0.5210
T22	31	LDF6-50A(1-1/4")	246.00 - 251.00	0.6000	0.5210
T22	33	LDF7-50A(1-5/8")	246.00 - 251.00	0.6000	0.5210
T22	36	LDF4P-50A(1/2")	246.00 - 251.00	0.6000	0.5210
T22	37	LDF4-50A(1/2")	246.00 - 251.00	0.6000	0.5210
T22	42	475-000(4 1/16")	246.00 - 251.00	1.0000	0.5210
T22	45	LDF7-50A(1-5/8")	246.00 - 251.00	0.6000	0.5210
T22	46	DSHYBKIT-18612-XXM(7/8)	246.00 - 251.00	0.6000	0.5210
T22	48	HJ8-50B(3")	246.00 - 251.00	1.0000	0.5210
T22	54	LDF6-50A(1-1/4")	246.00 - 251.00	0.6000	0.5210
T22	64	LDF7-50A(1-5/8")	246.00 - 251.00	0.6000	0.5210
T22	66	Thin Flat Climbing Ladder	246.00 - 251.00	0.6000	0.5210
T22	67	Safety Line 3/8	246.00 - 251.00	0.6000	0.5210
T23	3	LDF5-50A(7/8")	241.00 - 246.00	0.6000	0.5063
T23	4	LDF5-50A(7/8")	241.00 - 246.00	0.6000	0.5063
T23	5	HB158-1-08U8-S8J18(1-5/8)	241.00 - 246.00	0.6000	0.5063
T23	9	1" Rigid Conduit	241.00 - 246.00	0.6000	0.5063
T23	10	3/8" Cable (Lights)	241.00 - 246.00	0.6000	0.5063
T23	20	LDF5-50A(7/8")	241.00 - 246.00	0.6000	0.5063
T23	21	HJ8-50B(3")	241.00 - 246.00	1.0000	0.5063
T23	23	LDF6-50A(1 1/4")	241.00 - 246.00	0.6000	0.5063
T23	26	LDF7-50A(1-5/8")	241.00 - 246.00	0.6000	0.5063
T23	27	LDF7-50A(1-5/8")	241.00 - 246.00	0.6000	0.5063
T23	28	LDF7-50A(1-5/8")	241.00 - 246.00	0.6000	0.5063
T23	31	LDF6-50A(1-1/4")	241.00 - 246.00	0.6000	0.5063
T23	33	LDF7-50A(1-5/8")	241.00 - 246.00	0.6000	0.5063
T23	36	LDF4P-50A(1/2")	241.00 - 246.00	0.6000	0.5063
T23	37	LDF4-50A(1/2")	241.00 - 246.00	0.6000	0.5063
T23	42	475-000(4 1/16")	241.00 - 246.00	1.0000	0.5063
T23	45	LDF7-50A(1-5/8")	241.00 - 246.00	0.6000	0.5063
T23	46	DSHYBKIT-18612-XXM(7/8)	241.00 - 246.00	0.6000	0.5063

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T23	48	HJ8-50B(3")	241.00 - 246.00	1.0000	0.5063
T23	54	LDF6-50A(1-1/4")	241.00 - 246.00	0.6000	0.5063
T23	64	LDF7-50A(1-5/8")	241.00 - 246.00	0.6000	0.5063
T23	66	Thin Flat Climbing Ladder	241.00 - 246.00	0.6000	0.5063
T23	67	Safety Line 3/8	241.00 - 246.00	0.6000	0.5063
T24	1	HB158-1-08U8-S8J18(1-5/8)	221.00 - 230.00	0.6000	0.5644
T24	2	LCF78-50A(7/8")	221.00 - 230.00	0.6000	0.5644
T24	3	LDF5-50A(7/8")	221.00 - 241.00	0.6000	0.5644
T24	4	LDF5-50A(7/8")	221.00 - 241.00	0.6000	0.5644
T24	5	HB158-1-08U8-S8J18(1-5/8)	221.00 - 241.00	0.6000	0.5644
T24	8	LCF78-50A(7/8")	221.00 - 230.00	0.6000	0.5644
T24	9	1" Rigid Conduit	221.00 - 241.00	0.6000	0.5644
T24	10	3/8" Cable (Lights)	221.00 - 241.00	0.6000	0.5644
T24	15	Banjo (6" dia, 36" step)	221.00 - 230.00	0.6000	0.5644
T24	16	Banjo (6" dia, 36" step)	221.00 - 230.00	0.6000	0.5644
T24	20	LDF5-50A(7/8")	221.00 - 241.00	0.6000	0.5644
T24	21	HJ8-50B(3")	221.00 - 241.00	1.0000	0.5644
T24	23	LDF6-50A(1 1/4")	221.00 - 241.00	0.6000	0.5644
T24	26	LDF7-50A(1-5/8")	221.00 - 241.00	0.6000	0.5644
T24	27	LDF7-50A(1-5/8")	221.00 - 241.00	0.6000	0.5644
T24	28	LDF7-50A(1-5/8")	221.00 - 241.00	0.6000	0.5644
T24	31	LDF6-50A(1-1/4")	221.00 - 241.00	0.6000	0.5644
T24	33	LDF7-50A(1-5/8")	221.00 - 241.00	0.6000	0.5644
T24	36	LDF4P-50A(1/2")	221.00 - 241.00	0.6000	0.5644
T24	37	LDF4-50A(1/2")	221.00 - 241.00	0.6000	0.5644
T24	40	AVA5-50(7/8")	221.00 - 230.00	0.6000	0.5644
T24	41	Banjo 12" Dia. (40" Step)	221.00 - 230.00	0.6000	0.5644
T24	42	475-000(4 1/16")	221.00 - 241.00	1.0000	0.5644
T24	45	LDF7-50A(1-5/8")	221.00 - 241.00	0.6000	0.5644
T24	46	DSHYBKIT-18612-XXM(7/8)	221.00 - 241.00	0.6000	0.5644
T24	48	HJ8-50B(3")	221.00 - 241.00	1.0000	0.5644

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T24	54	LDF6-50A(1-1/4")	221.00 - 241.00	0.6000	0.5644
T24	64	LDF7-50A(1-5/8")	221.00 - 241.00	0.6000	0.5644
T24	66	Thin Flat Climbing Ladder	221.00 - 241.00	0.6000	0.5644
T24	67	Safety Line 3/8	221.00 - 241.00	0.6000	0.5644
T25	1	HB158-1-08U8-S8J18(1-5/8)	201.00 - 221.00	0.6000	0.5810
T25	2	LCF78-50A(7/8")	201.00 - 221.00	0.6000	0.5810
T25	3	LDF5-50A(7/8")	201.00 - 221.00	0.6000	0.5810
T25	4	LDF5-50A(7/8")	201.00 - 221.00	0.6000	0.5810
T25	5	HB158-1-08U8-S8J18(1-5/8)	201.00 - 221.00	0.6000	0.5810
T25	7	LCF78-50A(7/8")	201.00 - 206.00	0.6000	0.5810
T25	8	LCF78-50A(7/8")	206.00 - 221.00	0.6000	0.5810
T25	9	1" Rigid Conduit	201.00 - 221.00	0.6000	0.5810
T25	10	3/8" Cable (Lights)	201.00 - 221.00	0.6000	0.5810
T25	15	Banjo (6" dia, 36" step)	201.00 - 221.00	0.6000	0.5810
T25	16	Banjo (6" dia, 36" step)	201.00 - 221.00	0.6000	0.5810
T25	20	LDF5-50A(7/8")	201.00 - 221.00	0.6000	0.5810
T25	21	HJ8-50B(3")	201.00 - 221.00	1.0000	0.5810
T25	23	LDF6-50A(1 1/4")	201.00 - 221.00	0.6000	0.5810
T25	26	LDF7-50A(1-5/8")	201.00 - 221.00	0.6000	0.5810
T25	27	LDF7-50A(1-5/8")	201.00 - 221.00	0.6000	0.5810
T25	28	LDF7-50A(1-5/8")	201.00 - 221.00	0.6000	0.5810
T25	31	LDF6-50A(1-1/4")	201.00 - 221.00	0.6000	0.5810
T25	33	LDF7-50A(1-5/8")	201.00 - 221.00	0.6000	0.5810
T25	36	LDF4P-50A(1/2")	201.00 - 221.00	0.6000	0.5810
T25	37	LDF4-50A(1/2")	201.00 - 221.00	0.6000	0.5810
T25	40	AVA5-50(7/8")	201.00 - 221.00	0.6000	0.5810
T25	41	Banjo 12" Dia. (40" Step)	201.00 - 221.00	0.6000	0.5810
T25	42	475-000(4 1/16")	201.00 - 221.00	1.0000	0.5810
T25	45	LDF7-50A(1-5/8")	201.00 - 221.00	0.6000	0.5810
T25	46	DSHYBKIT-18612-XXM(7/8)	201.00 - 221.00	0.6000	0.5810
T25	48	HJ8-50B(3")	201.00 - 221.00	1.0000	0.5810

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T25	54	LDF6-50A(1-1/4")	201.00 - 221.00	0.6000	0.5810
T25	64	LDF7-50A(1-5/8")	201.00 - 221.00	0.6000	0.5810
T25	66	Thin Flat Climbing Ladder	201.00 - 221.00	0.6000	0.5810
T25	67	Safety Line 3/8	201.00 - 221.00	0.6000	0.5810
T26	1	HB158-1-08U8-S8J18(1-5/8)	181.00 - 201.00	0.6000	0.5831
T26	2	LCF78-50A(7/8")	181.00 - 201.00	0.6000	0.5831
T26	3	LDF5-50A(7/8")	181.00 - 201.00	0.6000	0.5831
T26	4	LDF5-50A(7/8")	181.00 - 201.00	0.6000	0.5831
T26	5	HB158-1-08U8-S8J18(1-5/8)	181.00 - 201.00	0.6000	0.5831
T26	7	LCF78-50A(7/8")	181.00 - 201.00	0.6000	0.5831
T26	9	1" Rigid Conduit	181.00 - 201.00	0.6000	0.5831
T26	10	3/8" Cable (Lights)	181.00 - 201.00	0.6000	0.5831
T26	12	1/4 Coax	181.00 - 200.00	0.6000	0.5831
T26	15	Banjo (6" dia, 36" step)	181.00 - 201.00	0.6000	0.5831
T26	16	Banjo (6" dia, 36" step)	181.00 - 201.00	0.6000	0.5831
T26	20	LDF5-50A(7/8")	181.00 - 201.00	0.6000	0.5831
T26	21	HJ8-50B(3")	181.00 - 201.00	1.0000	0.5831
T26	23	LDF6-50A(1 1/4")	181.00 - 201.00	0.6000	0.5831
T26	26	LDF7-50A(1-5/8")	181.00 - 201.00	0.6000	0.5831
T26	27	LDF7-50A(1-5/8")	181.00 - 201.00	0.6000	0.5831
T26	28	LDF7-50A(1-5/8")	181.00 - 201.00	0.6000	0.5831
T26	31	LDF6-50A(1-1/4")	181.00 - 201.00	0.6000	0.5831
T26	33	LDF7-50A(1-5/8")	181.00 - 201.00	0.6000	0.5831
T26	36	LDF4P-50A(1/2")	181.00 - 201.00	0.6000	0.5831
T26	37	LDF4-50A(1/2")	181.00 - 201.00	0.6000	0.5831
T26	40	AVA5-50(7/8")	181.00 - 201.00	0.6000	0.5831
T26	41	Banjo 12" Dia. (40" Step)	181.00 - 201.00	0.6000	0.5831
T26	42	475-000(4 1/16")	181.00 - 201.00	1.0000	0.5831
T26	45	LDF7-50A(1-5/8")	181.00 - 201.00	0.6000	0.5831
T26	46	DSHYBKIT-18612-XXM(7/8)	181.00 - 201.00	0.6000	0.5831
T26	48	HJ8-50B(3")	181.00 - 201.00	1.0000	0.5831

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T26	54	LDF6-50A(1-1/4")	181.00 - 201.00	0.6000	0.5831
T26	64	LDF7-50A(1-5/8")	181.00 - 201.00	0.6000	0.5831
T26	66	Thin Flat Climbing Ladder	181.00 - 201.00	0.6000	0.5831
T26	67	Safety Line 3/8	181.00 - 201.00	0.6000	0.5831
T27	1	HB158-1-08U8-S8J18(1-5/8)	161.00 - 181.00	0.6000	0.5834
T27	2	LCF78-50A(7/8")	161.00 - 181.00	0.6000	0.5834
T27	3	LDF5-50A(7/8")	161.00 - 181.00	0.6000	0.5834
T27	4	LDF5-50A(7/8")	161.00 - 181.00	0.6000	0.5834
T27	5	HB158-1-08U8-S8J18(1-5/8)	161.00 - 181.00	0.6000	0.5834
T27	7	LCF78-50A(7/8")	161.00 - 181.00	0.6000	0.5834
T27	9	1" Rigid Conduit	161.00 - 181.00	0.6000	0.5834
T27	10	3/8" Cable (Lights)	161.00 - 181.00	0.6000	0.5834
T27	12	1/4 Coax	161.00 - 181.00	0.6000	0.5834
T27	15	Banjo (6" dia, 36" step)	161.00 - 181.00	0.6000	0.5834
T27	16	Banjo (6" dia, 36" step)	161.00 - 181.00	0.6000	0.5834
T27	20	LDF5-50A(7/8")	161.00 - 181.00	0.6000	0.5834
T27	21	HJ8-50B(3")	161.00 - 181.00	1.0000	0.5834
T27	23	LDF6-50A(1 1/4")	161.00 - 181.00	0.6000	0.5834
T27	26	LDF7-50A(1-5/8")	161.00 - 181.00	0.6000	0.5834
T27	27	LDF7-50A(1-5/8")	161.00 - 181.00	0.6000	0.5834
T27	28	LDF7-50A(1-5/8")	161.00 - 181.00	0.6000	0.5834
T27	31	LDF6-50A(1-1/4")	161.00 - 181.00	0.6000	0.5834
T27	33	LDF7-50A(1-5/8")	161.00 - 181.00	0.6000	0.5834
T27	35	LDF4P-50A(1/2")	161.00 - 178.00	0.6000	0.5834
T27	36	LDF4P-50A(1/2")	178.00 - 181.00	0.6000	0.5834
T27	37	LDF4-50A(1/2")	161.00 - 181.00	0.6000	0.5834
T27	40	AVA5-50(7/8")	161.00 - 181.00	0.6000	0.5834
T27	41	Banjo 12" Dia. (40" Step)	161.00 - 181.00	0.6000	0.5834
T27	42	475-000(4 1/16")	161.00 - 181.00	1.0000	0.5834
T27	45	LDF7-50A(1-5/8")	161.00 - 181.00	0.6000	0.5834
T27	46	DSHYBKIT-18612-XXM(7/8)	161.00 - 181.00	0.6000	0.5834

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T27	48	HJ8-50B(3")	161.00 - 181.00	1.0000	0.5834
T27	54	LDF6-50A(1-1/4")	161.00 - 181.00	0.6000	0.5834
T27	64	LDF7-50A(1-5/8")	161.00 - 181.00	0.6000	0.5834
T27	66	Thin Flat Climbing Ladder	161.00 - 181.00	0.6000	0.5834
T27	67	Safety Line 3/8	161.00 - 181.00	0.6000	0.5834
T28	1	HB158-1-08U8-S8J18(1-5/8)	141.00 - 161.00	0.6000	0.5631
T28	2	LCF78-50A(7/8")	141.00 - 161.00	0.6000	0.5631
T28	3	LDF5-50A(7/8")	141.00 - 161.00	0.6000	0.5631
T28	4	LDF5-50A(7/8")	141.00 - 161.00	0.6000	0.5631
T28	5	HB158-1-08U8-S8J18(1-5/8)	141.00 - 161.00	0.6000	0.5631
T28	6	EW63(ELLIPTICAL)	141.00 - 150.00	0.6000	0.5631
T28	7	LCF78-50A(7/8")	141.00 - 161.00	0.6000	0.5631
T28	9	1" Rigid Conduit	141.00 - 161.00	0.6000	0.5631
T28	10	3/8" Cable (Lights)	141.00 - 161.00	0.6000	0.5631
T28	12	1/4 Coax	141.00 - 161.00	0.6000	0.5631
T28	15	Banjo (6" dia, 36" step)	141.00 - 161.00	0.6000	0.5631
T28	16	Banjo (6" dia, 36" step)	141.00 - 161.00	0.6000	0.5631
T28	20	LDF5-50A(7/8")	141.00 - 161.00	0.6000	0.5631
T28	21	HJ8-50B(3")	141.00 - 161.00	1.0000	0.5631
T28	23	LDF6-50A(1 1/4")	141.00 - 161.00	0.6000	0.5631
T28	26	LDF7-50A(1-5/8")	141.00 - 161.00	0.6000	0.5631
T28	27	LDF7-50A(1-5/8")	141.00 - 161.00	0.6000	0.5631
T28	28	LDF7-50A(1-5/8")	141.00 - 161.00	0.6000	0.5631
T28	31	LDF6-50A(1-1/4")	141.00 - 161.00	0.6000	0.5631
T28	33	LDF7-50A(1-5/8")	141.00 - 161.00	0.6000	0.5631
T28	35	LDF4P-50A(1/2")	141.00 - 161.00	0.6000	0.5631
T28	37	LDF4-50A(1/2")	141.00 - 161.00	0.6000	0.5631
T28	38	EW63(ELLIPTICAL)	141.00 - 146.00	0.6000	0.5631
T28	40	AVA5-50(7/8")	141.00 - 161.00	0.6000	0.5631
T28	41	Banjo 12" Dia. (40" Step)	141.00 - 161.00	0.6000	0.5631
T28	42	475-000(4 1/16")	141.00 - 161.00	1.0000	0.5631

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T28	45	LDF7-50A(1-5/8")	141.00 - 161.00	0.6000	0.5631
T28	46	DSHYBKIT-18612-XXM(7/8)	141.00 - 161.00	0.6000	0.5631
T28	48	HJ8-50B(3")	141.00 - 161.00	1.0000	0.5631
T28	54	LDF6-50A(1-1/4")	141.00 - 161.00	0.6000	0.5631
T28	64	LDF7-50A(1-5/8")	141.00 - 161.00	0.6000	0.5631
T28	66	Thin Flat Climbing Ladder	141.00 - 161.00	0.6000	0.5631
T28	67	Safety Line 3/8	141.00 - 161.00	0.6000	0.5631
T29	1	HB158-1-08U8-S8J18(1-5/8)	121.00 - 141.00	0.6000	0.5659
T29	2	LCF78-50A(7/8")	121.00 - 141.00	0.6000	0.5659
T29	3	LDF5-50A(7/8")	121.00 - 141.00	0.6000	0.5659
T29	4	LDF5-50A(7/8")	121.00 - 141.00	0.6000	0.5659
T29	5	HB158-1-08U8-S8J18(1-5/8)	121.00 - 141.00	0.6000	0.5659
T29	6	EW63(ELLIPTICAL)	121.00 - 141.00	0.6000	0.5659
T29	7	LCF78-50A(7/8")	121.00 - 141.00	0.6000	0.5659
T29	9	1" Rigid Conduit	121.00 - 141.00	0.6000	0.5659
T29	10	3/8" Cable (Lights)	121.00 - 141.00	0.6000	0.5659
T29	12	1/4 Coax	121.00 - 141.00	0.6000	0.5659
T29	13	3/8" Coax	121.00 - 136.00	0.6000	0.5659
T29	14	3/8" Coax	121.00 - 140.00	0.6000	0.5659
T29	15	Banjo (6" dia, 36" step)	121.00 - 141.00	0.6000	0.5659
T29	16	Banjo (6" dia, 36" step)	121.00 - 141.00	0.6000	0.5659
T29	19	LDF5-50A(7/8")	121.00 - 133.00	0.6000	0.5659
T29	20	LDF5-50A(7/8")	133.00 - 141.00	0.6000	0.5659
T29	21	HJ8-50B(3")	121.00 - 141.00	1.0000	0.5659
T29	23	LDF6-50A(1 1/4")	121.00 - 141.00	0.6000	0.5659
T29	26	LDF7-50A(1-5/8")	121.00 - 141.00	0.6000	0.5659
T29	27	LDF7-50A(1-5/8")	121.00 - 141.00	0.6000	0.5659
T29	28	LDF7-50A(1-5/8")	121.00 - 141.00	0.6000	0.5659
T29	31	LDF6-50A(1-1/4")	121.00 - 141.00	0.6000	0.5659
T29	33	LDF7-50A(1-5/8")	121.00 - 141.00	0.6000	0.5659
T29	34	LDF4P-50A(1/2")	121.00 - 133.00	0.6000	0.5659

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T29	35	LDF4P-50A(1/2")	133.00 - 141.00	0.6000	0.5659
T29	37	LDF4-50A(1/2")	121.00 - 141.00	0.6000	0.5659
T29	38	EW63(ELLIPTICAL)	121.00 - 141.00	0.6000	0.5659
T29	40	AVA5-50(7/8")	121.00 - 141.00	0.6000	0.5659
T29	41	Banjo 12" Dia. (40" Step)	121.00 - 141.00	0.6000	0.5659
T29	42	475-000(4 1/16")	121.00 - 141.00	1.0000	0.5659
T29	45	LDF7-50A(1-5/8")	121.00 - 141.00	0.6000	0.5659
T29	46	DSHYBKIT-18612-XXM(7/8)	121.00 - 141.00	0.6000	0.5659
T29	48	HJ8-50B(3")	121.00 - 141.00	1.0000	0.5659
T29	54	LDF6-50A(1-1/4")	121.00 - 141.00	0.6000	0.5659
T29	59	LDF5-50A(7/8")	121.00 - 133.00	0.6000	0.5659
T29	64	LDF7-50A(1-5/8")	121.00 - 141.00	0.6000	0.5659
T29	66	Thin Flat Climbing Ladder	121.00 - 141.00	0.6000	0.5659
T29	67	Safety Line 3/8	121.00 - 141.00	0.6000	0.5659
T30	1	HB158-1-08U8-S8J18(1-5/8)	101.00 - 121.00	0.6000	0.5888
T30	2	LCF78-50A(7/8")	101.00 - 121.00	0.6000	0.5888
T30	3	LDF5-50A(7/8")	101.00 - 121.00	0.6000	0.5888
T30	4	LDF5-50A(7/8")	101.00 - 121.00	0.6000	0.5888
T30	5	HB158-1-08U8-S8J18(1-5/8)	101.00 - 121.00	0.6000	0.5888
T30	6	EW63(ELLIPTICAL)	101.00 - 121.00	0.6000	0.5888
T30	7	LCF78-50A(7/8")	101.00 - 121.00	0.6000	0.5888
T30	9	1" Rigid Conduit	101.00 - 121.00	0.6000	0.5888
T30	10	3/8" Cable (Lights)	101.00 - 121.00	0.6000	0.5888
T30	12	1/4 Coax	101.00 - 121.00	0.6000	0.5888
T30	13	3/8" Coax	101.00 - 121.00	0.6000	0.5888
T30	14	3/8" Coax	101.00 - 121.00	0.6000	0.5888
T30	15	Banjo (6" dia, 36" step)	101.00 - 121.00	0.6000	0.5888
T30	16	Banjo (6" dia, 36" step)	101.00 - 121.00	0.6000	0.5888
T30	19	LDF5-50A(7/8")	101.00 - 121.00	0.6000	0.5888
T30	21	HJ8-50B(3")	101.00 - 121.00	0.6000	0.5888
T30	23	LDF6-50A(1 1/4")	101.00 - 121.00	0.6000	0.5888

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T30	26	LDF7-50A(1-5/8")	101.00 - 121.00	0.6000	0.5888
T30	27	LDF7-50A(1-5/8")	101.00 - 121.00	0.6000	0.5888
T30	28	LDF7-50A(1-5/8")	101.00 - 121.00	0.6000	0.5888
T30	31	LDF6-50A(1-1/4")	101.00 - 121.00	0.6000	0.5888
T30	33	LDF7-50A(1-5/8")	101.00 - 121.00	0.6000	0.5888
T30	34	LDF4P-50A(1/2")	101.00 - 121.00	0.6000	0.5888
T30	37	LDF4-50A(1/2")	101.00 - 121.00	0.6000	0.5888
T30	38	EW63(ELLIPTICAL)	101.00 - 121.00	0.6000	0.5888
T30	40	AVA5-50(7/8")	101.00 - 121.00	0.6000	0.5888
T30	41	Banjo 12" Dia. (40" Step)	101.00 - 121.00	0.6000	0.5888
T30	42	475-000(4 1/16")	101.00 - 121.00	1.0000	0.5888
T30	45	LDF7-50A(1-5/8")	101.00 - 121.00	0.6000	0.5888
T30	46	DSHYBKIT-18612-XXM(7/8)	101.00 - 121.00	0.6000	0.5888
T30	47	LDF5-50A(7/8")	101.00 - 109.00	0.6000	0.5888
T30	48	HJ8-50B(3")	101.00 - 121.00	0.6000	0.5888
T30	54	LDF6-50A(1-1/4")	101.00 - 121.00	0.6000	0.5888
T30	59	LDF5-50A(7/8")	117.00 - 121.00	0.6000	0.5888
T30	60	LDF5-50A(7/8")	101.00 - 117.00	0.6000	0.5888
T30	63	LDF5-50A(7/8")	101.00 - 108.00	0.6000	0.5888
T30	64	LDF7-50A(1-5/8")	101.00 - 121.00	0.6000	0.5888
T30	66	Thin Flat Climbing Ladder	101.00 - 121.00	0.6000	0.5888
T30	67	Safety Line 3/8	101.00 - 121.00	0.6000	0.5888
T31	1	HB158-1-08U8-S8J18(1-5/8)	81.00 - 101.00	0.6000	0.5925
T31	2	LCF78-50A(7/8")	81.00 - 101.00	0.6000	0.5925
T31	3	LDF5-50A(7/8")	81.00 - 101.00	0.6000	0.5925
T31	4	LDF5-50A(7/8")	81.00 - 101.00	0.6000	0.5925
T31	5	HB158-1-08U8-S8J18(1-5/8)	81.00 - 101.00	0.6000	0.5925
T31	6	EW63(ELLIPTICAL)	81.00 - 101.00	0.6000	0.5925
T31	7	LCF78-50A(7/8")	81.00 - 101.00	0.6000	0.5925
T31	9	1" Rigid Conduit	81.00 - 101.00	0.6000	0.5925
T31	10	3/8" Cable (Lights)	81.00 - 101.00	0.6000	0.5925
T31	11	1/4 Coax	81.00 - 99.00	0.6000	0.5925
T31	12	1/4 Coax	81.00 - 101.00	0.6000	0.5925
T31	13	3/8" Coax	81.00 - 101.00	0.6000	0.5925
T31	14	3/8" Coax	81.00 - 101.00	0.6000	0.5925
T31	15	Banjo (6" dia, 36" step)	81.00 - 101.00	0.6000	0.5925
T31	16	Banjo (6" dia, 36" step)	81.00 - 101.00	0.6000	0.5925
T31	19	LDF5-50A(7/8")	81.00 - 101.00	0.6000	0.5925
T31	21	HJ8-50B(3")	81.00 - 101.00	0.6000	0.5925
T31	23	LDF6-50A(1 1/4")	81.00 - 101.00	0.6000	0.5925

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T31	26	LDF7-50A(1-5/8")	81.00 - 101.00	0.6000	0.5925
T31	27	LDF7-50A(1-5/8")	81.00 - 101.00	0.6000	0.5925
T31	28	LDF7-50A(1-5/8")	81.00 - 101.00	0.6000	0.5925
T31	31	LDF6-50A(1-1/4")	81.00 - 101.00	0.6000	0.5925
T31	33	LDF7-50A(1-5/8")	81.00 - 101.00	0.6000	0.5925
T31	34	LDF4P-50A(1/2")	81.00 - 101.00	0.6000	0.5925
T31	37	LDF4-50A(1/2")	81.00 - 101.00	0.6000	0.5925
T31	38	EW63(ELLIPTICAL)	81.00 - 101.00	0.6000	0.5925
T31	40	AVA5-50(7/8")	81.00 - 101.00	0.6000	0.5925
T31	41	Banjo 12" Dia. (40" Step)	81.00 - 101.00	0.6000	0.5925
T31	42	475-000(4 1/16")	81.00 - 101.00	1.0000	0.5925
T31	45	LDF7-50A(1-5/8")	81.00 - 101.00	0.6000	0.5925
T31	46	DSHYBKIT-18612-XXM(7/8)	81.00 - 101.00	0.6000	0.5925
T31	47	LDF5-50A(7/8")	81.00 - 101.00	0.6000	0.5925
T31	48	HJ8-50B(3")	81.00 - 101.00	0.6000	0.5925
T31	54	LDF6-50A(1-1/4")	81.00 - 101.00	0.6000	0.5925
T31	60	LDF5-50A(7/8")	99.00 - 101.00	0.6000	0.5925
T31	61	LDF5-50A(7/8")	81.00 - 99.00	0.6000	0.5925
T31	63	LDF5-50A(7/8")	81.00 - 101.00	0.6000	0.5925
T31	64	LDF7-50A(1-5/8")	81.00 - 101.00	0.6000	0.5925
T31	66	Thin Flat Climbing Ladder	81.00 - 101.00	0.6000	0.5925
T31	67	Safety Line 3/8	81.00 - 101.00	0.6000	0.5925
T32	1	HB158-1-08U8-S8J18(1-5/8)	61.00 - 81.00	0.6000	0.5971
T32	2	LCF78-50A(7/8")	61.00 - 81.00	0.6000	0.5971
T32	3	LDF5-50A(7/8")	61.00 - 81.00	0.6000	0.5971
T32	4	LDF5-50A(7/8")	61.00 - 81.00	0.6000	0.5971
T32	5	HB158-1-08U8-S8J18(1-5/8)	61.00 - 81.00	0.6000	0.5971
T32	6	EW63(ELLIPTICAL)	61.00 - 81.00	0.6000	0.5971
T32	7	LCF78-50A(7/8")	61.00 - 81.00	0.6000	0.5971
T32	9	1" Rigid Conduit	61.00 - 81.00	0.6000	0.5971
T32	10	3/8" Cable (Lights)	61.00 - 81.00	0.6000	0.5971
T32	11	1/4 Coax	61.00 - 81.00	0.6000	0.5971
T32	12	1/4 Coax	61.00 - 81.00	0.6000	0.5971
T32	13	3/8" Coax	61.00 - 81.00	0.6000	0.5971
T32	14	3/8" Coax	61.00 - 81.00	0.6000	0.5971
T32	15	Banjo (6" dia, 36" step)	61.00 - 81.00	0.6000	0.5971
T32	16	Banjo (6" dia, 36" step)	61.00 - 81.00	0.6000	0.5971
T32	19	LDF5-50A(7/8")	61.00 - 81.00	0.6000	0.5971
T32	21	HJ8-50B(3")	61.00 - 81.00	0.6000	0.5971
T32	23	LDF6-50A(1 1/4")	61.00 - 81.00	0.6000	0.5971
T32	26	LDF7-50A(1-5/8")	61.00 - 81.00	0.6000	0.5971
T32	27	LDF7-50A(1-5/8")	61.00 - 81.00	0.6000	0.5971
T32	28	LDF7-50A(1-5/8")	61.00 - 81.00	0.6000	0.5971
T32	31	LDF6-50A(1-1/4")	61.00 - 81.00	0.6000	0.5971
T32	33	LDF7-50A(1-5/8")	61.00 - 81.00	0.6000	0.5971
T32	34	LDF4P-50A(1/2")	61.00 - 81.00	0.6000	0.5971
T32	37	LDF4-50A(1/2")	61.00 - 81.00	0.6000	0.5971
T32	38	EW63(ELLIPTICAL)	61.00 - 81.00	0.6000	0.5971
T32	40	AVA5-50(7/8")	61.00 - 81.00	0.6000	0.5971
T32	41	Banjo 12" Dia. (40" Step)	61.00 - 81.00	0.6000	0.5971
T32	42	475-000(4 1/16")	61.00 - 81.00	1.0000	0.5971
T32	45	LDF7-50A(1-5/8")	61.00 - 81.00	0.6000	0.5971
T32	46	DSHYBKIT-18612-XXM(7/8)	61.00 - 81.00	0.6000	0.5971
T32	47	LDF5-50A(7/8")	61.00 - 81.00	0.6000	0.5971
T32	48	HJ8-50B(3")	61.00 - 81.00	0.6000	0.5971
T32	54	LDF6-50A(1-1/4")	61.00 - 81.00	0.6000	0.5971
T32	61	LDF5-50A(7/8")	62.00 - 81.00	0.6000	0.5971
T32	62	LDF5-50A(7/8")	61.00 - 62.00	0.6000	0.5971
T32	63	LDF5-50A(7/8")	61.00 - 81.00	0.6000	0.5971
T32	64	LDF7-50A(1-5/8")	61.00 - 81.00	0.6000	0.5971

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T32	66	Thin Flat Climbing Ladder	61.00 - 81.00	0.6000	0.5971
T32	67	Safety Line 3/8	61.00 - 81.00	0.6000	0.5971
T33	1	HB158-1-08U8-S8J18(1-5/8)	41.00 - 61.00	0.6000	0.6000
T33	2	LCF78-50A(7/8")	41.00 - 61.00	0.6000	0.6000
T33	3	LDF5-50A(7/8")	41.00 - 61.00	0.6000	0.6000
T33	4	LDF5-50A(7/8")	41.00 - 61.00	0.6000	0.6000
T33	5	HB158-1-08U8-S8J18(1-5/8)	41.00 - 61.00	0.6000	0.6000
T33	6	EW63(ELLIPTICAL)	41.00 - 61.00	0.6000	0.6000
T33	7	LCF78-50A(7/8")	41.00 - 61.00	0.6000	0.6000
T33	9	1" Rigid Conduit	41.00 - 61.00	0.6000	0.6000
T33	10	3/8" Cable (Lights)	41.00 - 61.00	0.6000	0.6000
T33	11	1/4 Coax	41.00 - 61.00	0.6000	0.6000
T33	12	1/4 Coax	41.00 - 61.00	0.6000	0.6000
T33	13	3/8" Coax	41.00 - 61.00	0.6000	0.6000
T33	14	3/8" Coax	41.00 - 61.00	0.6000	0.6000
T33	15	Banjo (6" dia, 36" step)	41.00 - 61.00	0.6000	0.6000
T33	16	Banjo (6" dia, 36" step)	41.00 - 61.00	0.6000	0.6000
T33	19	LDF5-50A(7/8")	41.00 - 61.00	0.6000	0.6000
T33	21	HJ8-50B(3")	41.00 - 61.00	0.6000	0.6000
T33	23	LDF6-50A(1 1/4")	41.00 - 61.00	0.6000	0.6000
T33	26	LDF7-50A(1-5/8")	41.00 - 61.00	0.6000	0.6000
T33	27	LDF7-50A(1-5/8")	41.00 - 61.00	0.6000	0.6000
T33	28	LDF7-50A(1-5/8")	41.00 - 61.00	0.6000	0.6000
T33	31	LDF6-50A(1-1/4")	41.00 - 61.00	0.6000	0.6000
T33	33	LDF7-50A(1-5/8")	41.00 - 61.00	0.6000	0.6000
T33	34	LDF4P-50A(1/2")	41.00 - 61.00	0.6000	0.6000
T33	37	LDF4-50A(1/2")	41.00 - 61.00	0.6000	0.6000
T33	38	EW63(ELLIPTICAL)	41.00 - 61.00	0.6000	0.6000
T33	40	AVA5-50(7/8")	41.00 - 61.00	0.6000	0.6000
T33	41	Banjo 12" Dia. (40" Step)	41.00 - 61.00	0.6000	0.6000
T33	42	475-000(4 1/16")	41.00 - 61.00	1.0000	0.6000
T33	45	LDF7-50A(1-5/8")	41.00 - 61.00	0.6000	0.6000
T33	46	DSHYBKIT-18612-XXM(7/8)	41.00 - 61.00	0.6000	0.6000
T33	47	LDF5-50A(7/8")	41.00 - 61.00	0.6000	0.6000
T33	48	HJ8-50B(3")	41.00 - 61.00	0.6000	0.6000
T33	54	LDF6-50A(1-1/4")	41.00 - 61.00	0.6000	0.6000
T33	62	LDF5-50A(7/8")	41.00 - 61.00	0.6000	0.6000
T33	63	LDF5-50A(7/8")	41.00 - 61.00	0.6000	0.6000
T33	64	LDF7-50A(1-5/8")	41.00 - 61.00	0.6000	0.6000
T33	66	Thin Flat Climbing Ladder	41.00 - 61.00	0.6000	0.6000
T33	67	Safety Line 3/8	41.00 - 61.00	0.6000	0.6000
T34	1	HB158-1-08U8-S8J18(1-5/8)	20.00 - 41.00	0.6000	0.6000
T34	2	LCF78-50A(7/8")	20.00 - 41.00	0.6000	0.6000
T34	3	LDF5-50A(7/8")	20.00 - 41.00	0.6000	0.6000
T34	4	LDF5-50A(7/8")	20.00 - 41.00	0.6000	0.6000
T34	5	HB158-1-08U8-S8J18(1-5/8)	20.00 - 41.00	0.6000	0.6000
T34	6	EW63(ELLIPTICAL)	20.00 - 41.00	0.6000	0.6000
T34	7	LCF78-50A(7/8")	20.00 - 41.00	0.6000	0.6000
T34	9	1" Rigid Conduit	20.00 - 41.00	0.6000	0.6000
T34	10	3/8" Cable (Lights)	20.00 - 41.00	0.6000	0.6000
T34	11	1/4 Coax	20.00 - 41.00	0.6000	0.6000
T34	12	1/4 Coax	20.00 - 41.00	0.6000	0.6000
T34	13	3/8" Coax	20.00 - 41.00	0.6000	0.6000
T34	14	3/8" Coax	20.00 - 41.00	0.6000	0.6000
T34	15	Banjo (6" dia, 36" step)	20.00 - 41.00	0.6000	0.6000
T34	16	Banjo (6" dia, 36" step)	20.00 - 41.00	0.6000	0.6000
T34	19	LDF5-50A(7/8")	20.00 - 41.00	0.6000	0.6000
T34	21	HJ8-50B(3")	20.00 - 41.00	0.6000	0.6000
T34	23	LDF6-50A(1 1/4")	20.00 - 41.00	0.6000	0.6000
T34	26	LDF7-50A(1-5/8")	20.00 - 41.00	0.6000	0.6000
T34	27	LDF7-50A(1-5/8")	20.00 - 41.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T34	28	LDF7-50A(1-5/8")	20.00 - 41.00	0.6000	0.6000
T34	31	LDF6-50A(1-1/4")	20.00 - 41.00	0.6000	0.6000
T34	33	LDF7-50A(1-5/8")	20.00 - 41.00	0.6000	0.6000
T34	34	LDF4P-50A(1/2")	20.00 - 41.00	0.6000	0.6000
T34	37	LDF4-50A(1/2")	20.00 - 41.00	0.6000	0.6000
T34	38	EW63(ELLIPTICAL)	20.00 - 41.00	0.6000	0.6000
T34	40	AVA5-50(7/8")	20.00 - 41.00	0.6000	0.6000
T34	41	Banjo 12" Dia. (40" Step)	20.00 - 41.00	0.6000	0.6000
T34	42	475-000(4 1/16")	20.00 - 41.00	1.0000	0.6000
T34	45	LDF7-50A(1-5/8")	20.00 - 41.00	0.6000	0.6000
T34	46	DSHYBKIT-18612-XXM(7/8)	20.00 - 41.00	0.6000	0.6000
T34	47	LDF5-50A(7/8")	20.00 - 41.00	0.6000	0.6000
T34	48	HJ8-50B(3")	20.00 - 41.00	0.6000	0.6000
T34	54	LDF6-50A(1-1/4")	20.00 - 41.00	0.6000	0.6000
T34	62	LDF5-50A(7/8")	20.00 - 41.00	0.6000	0.6000
T34	63	LDF5-50A(7/8")	20.00 - 41.00	0.6000	0.6000
T34	64	LDF7-50A(1-5/8")	20.00 - 41.00	0.6000	0.6000
T34	66	Thin Flat Climbing Ladder	20.00 - 41.00	0.6000	0.6000
T34	67	Safety Line 3/8	20.00 - 41.00	0.6000	0.6000
T35	1	HB158-1-08U8-S8J18(1-5/8)	10.00 - 20.00	0.6000	0.5401
T35	2	LCF78-50A(7/8")	10.00 - 20.00	0.6000	0.5401
T35	3	LDF5-50A(7/8")	10.00 - 20.00	0.6000	0.5401
T35	4	LDF5-50A(7/8")	10.00 - 20.00	0.6000	0.5401
T35	5	HB158-1-08U8-S8J18(1-5/8)	10.00 - 20.00	0.6000	0.5401
T35	6	EW63(ELLIPTICAL)	10.00 - 20.00	0.6000	0.5401
T35	7	LCF78-50A(7/8")	10.00 - 20.00	0.6000	0.5401
T35	9	1" Rigid Conduit	10.00 - 20.00	0.6000	0.5401
T35	10	3/8" Cable (Lights)	10.00 - 20.00	0.6000	0.5401
T35	11	1/4 Coax	10.00 - 20.00	0.6000	0.5401
T35	12	1/4 Coax	10.00 - 20.00	0.6000	0.5401
T35	13	3/8" Coax	10.00 - 20.00	0.6000	0.5401
T35	14	3/8" Coax	10.00 - 20.00	0.6000	0.5401
T35	15	Banjo (6" dia, 36" step)	10.00 - 20.00	0.6000	0.5401
T35	16	Banjo (6" dia, 36" step)	10.00 - 20.00	0.6000	0.5401
T35	19	LDF5-50A(7/8")	10.00 - 20.00	0.6000	0.5401
T35	21	HJ8-50B(3")	10.00 - 20.00	0.6000	0.5401
T35	23	LDF6-50A(1 1/4")	10.00 - 20.00	0.6000	0.5401
T35	26	LDF7-50A(1-5/8")	10.00 - 20.00	0.6000	0.5401
T35	27	LDF7-50A(1-5/8")	10.00 - 20.00	0.6000	0.5401
T35	28	LDF7-50A(1-5/8")	10.00 - 20.00	0.6000	0.5401
T35	31	LDF6-50A(1-1/4")	10.00 - 20.00	0.6000	0.5401
T35	33	LDF7-50A(1-5/8")	10.00 - 20.00	0.6000	0.5401
T35	34	LDF4P-50A(1/2")	10.00 - 20.00	0.6000	0.5401
T35	37	LDF4-50A(1/2")	10.00 - 20.00	0.6000	0.5401
T35	38	EW63(ELLIPTICAL)	10.00 - 20.00	0.6000	0.5401
T35	40	AVA5-50(7/8")	10.00 - 20.00	0.6000	0.5401
T35	41	Banjo 12" Dia. (40" Step)	10.00 - 20.00	0.6000	0.5401
T35	42	475-000(4 1/16")	10.00 - 20.00	1.0000	0.5401
T35	45	LDF7-50A(1-5/8")	10.00 - 20.00	0.6000	0.5401
T35	46	DSHYBKIT-18612-XXM(7/8)	10.00 - 20.00	0.6000	0.5401
T35	47	LDF5-50A(7/8")	10.00 - 20.00	0.6000	0.5401
T35	48	HJ8-50B(3")	10.00 - 20.00	0.6000	0.5401
T35	54	LDF6-50A(1-1/4")	10.00 - 20.00	0.6000	0.5401
T35	62	LDF5-50A(7/8")	10.00 - 20.00	0.6000	0.5401
T35	63	LDF5-50A(7/8")	10.00 - 20.00	0.6000	0.5401
T35	64	LDF7-50A(1-5/8")	10.00 - 20.00	0.6000	0.5401
T35	66	Thin Flat Climbing Ladder	10.00 - 20.00	0.6000	0.5401
T35	67	Safety Line 3/8	10.00 - 20.00	0.6000	0.5401

Antenna Pole Forces *Dielectric TFU-18JTH/VP-R P230*

Length of Pole	Ix	Iy	Modulus E		Antenna Pole C_AA_A	Antenna Pole Weight	Length of Beacon	Beacon C_AA_A	Beacon Weight
ft	in^4	in^4	ksi		ft^2/ft	plf	ft	ft^2	lb
38'	1000.0000	1000.0000	29000	No Ice	1.04	127.60	0'	0.00	0
				With Ice	2.52	175.70		0.00	0

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft ft ft	°	ft		ft^2	ft^2	lb
12" x 3' Beacon	A	From Centroid-Leg	0.00 0' 34'	0.0000	457'	No Ice 1/2" Ice 1" Ice 2" Ice	1.53 2.36 2.60 3.11	1.53 2.36 2.60 3.11	21 49 79 150
3" x 6" SideLight	A	From Leg	1.00 0' 0'	0.0000	333'	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	1 2 5 12
3" x 6" SideLight	B	From Leg	1.00 0' 0'	0.0000	333'	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	1 2 5 12
3" x 6" SideLight	C	From Leg	1.00 0' 0'	0.0000	333'	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	1 2 5 12
3" x 6" SideLight	A	From Leg	1.00 0' 0'	0.0000	215'	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	1 2 5 12
3" x 6" SideLight	B	From Leg	1.00 0' 0'	0.0000	215'	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	1 2 5 12
3" x 6" SideLight	C	From Leg	1.00 0' 0'	0.0000	215'	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	1 2 5 12
3" x 6" SideLight	A	From Leg	1.00 0' 0'	0.0000	112'	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	1 2 5 12
3" x 6" SideLight	B	From Leg	1.00 0' 0'	0.0000	112'	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	1 2 5 12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
3" x 6" SideLight	C	From Leg	1.00 0' 0'	0.0000	112'	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	1 2 5 12
*** *** *** ***									
SRL-235-2	A	From Leg	6.00 0' 10'	80.0000	444'	No Ice 1/2" Ice 1" Ice 2" Ice	5.60 7.84 10.10 14.65	5.60 7.84 10.10 14.65	90 124 174 323
Side Arm Mount [SO 308-1]	A	From Leg	3.00 0' 0'	80.0000	444'	No Ice 1/2" Ice 1" Ice 2" Ice	0.98 1.70 2.42 3.86	3.03 5.22 7.41 11.79	53 79 105 156
*** ***									
ERI 1183-3CP	C	None		0.0000	419'	No Ice 1/2" Ice 1" Ice 2" Ice	119.38 167.05 169.13 173.32	119.38 167.05 169.13 173.32	4350 6270 8216 12193
***									
6014-2	A	None		0.0000	393'	No Ice 1/2" Ice 1" Ice 2" Ice	65.00 135.00 205.00 345.00	65.00 135.00 205.00 345.00	1086 2388 3690 6294
6014-2	C	None		0.0000	382'	No Ice 1/2" Ice 1" Ice 2" Ice	65.00 135.00 205.00 345.00	65.00 135.00 205.00 345.00	1086 2388 3690 6294
***									
SHP-2AE	C	From Leg	1.00 0' 0'	-20.0000	367'	No Ice 1/2" Ice 1" Ice 2" Ice	39.75 41.11 42.49 45.26	110.98 112.49 114.00 117.06	220 780 1359 2576
*** *** ***									
BCD-87077	C	From Leg	6.00 0' 8'	0.0000	342'	No Ice 1/2" Ice 1" Ice 2" Ice	3.06 4.27 5.49 7.55	3.06 4.27 5.49 7.55	27 49 79 163
Side Arm Mount [SO 303-1]	C	From Leg	3.00 0' 0'	0.0000	342'	No Ice 1/2" Ice 1" Ice 2" Ice	2.24 3.19 4.14 6.04	5.32 7.69 10.06 14.80	115 159 202 290
455-6	A	From Leg	4.00 0' 10'	-60.0000	342'	No Ice 1/2" Ice 1" Ice 2" Ice	5.50 7.53 9.58 13.73	5.50 7.53 9.58 13.73	25 65 118 262
Side Arm Mount [SO 601-1]	A	From Leg	2.00 0' 0'	-60.0000	342'	No Ice 1/2" Ice 1" Ice 2" Ice	1.22 1.85 2.48 3.74	6.30 8.61 10.92 15.54	159 197 234 310
*** ***									

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
PG1N0F-0090-310	B	From Leg	6.00 0' 5'	-60.0000	330'	No Ice 1/2" Ice 1" Ice 2" Ice	3.00 4.03 5.03 6.26	3.00 4.03 5.03 6.26	28 50 78 155
Side Arm Mount [SO 601-1]	B	From Leg	3.00 0' 0'	-60.0000	330'	No Ice 1/2" Ice 1" Ice 2" Ice	1.22 1.85 2.48 3.74	6.30 8.61 10.92 15.54	159 197 234 310
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DB201-A	A	From Leg	6.00 0' 3'	0.0000	326'	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.98 2.86 4.62	1.10 1.98 2.86 4.62	25 33 40 55
Side Arm Mount [SO 602-1]	A	From Leg	3.00 0' 0'	0.0000	326'	No Ice 1/2" Ice 1" Ice 2" Ice	2.72 4.11 5.50 8.28	12.93 17.82 22.71 32.49	146 223 301 456
***									
DB408	A	From Leg	6.00 0' 0'	0.0000	325'	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 3.42 4.94 7.98	1.90 3.42 4.94 7.98	17 22 27 37
Side Arm Mount [SO 303-1]	A	From Leg	3.00 0' 0'	0.0000	325'	No Ice 1/2" Ice 1" Ice 2" Ice	2.24 3.19 4.14 6.04	5.32 7.69 10.06 14.80	115 159 202 290
***									
SRL310C-4HD	B	From Leg	6.00 0' 5'	0.0000	322'	No Ice 1/2" Ice 1" Ice 2" Ice	1.14 2.09 3.04 4.94	1.14 2.09 3.04 4.94	15 25 35 55
Side Arm Mount [SO 308-1]	B	From Leg	3.00 0' 0'	0.0000	322'	No Ice 1/2" Ice 1" Ice 2" Ice	0.98 1.70 2.42 3.86	3.03 5.22 7.41 11.79	53 79 105 156
Pipe Mount [PM 601-1]	A	From Leg	0.50 0' 0'	0.0000	322'	No Ice 1/2" Ice 1" Ice 2" Ice	3.00 3.74 4.48 5.96	0.90 1.12 1.34 1.78	65 79 93 122
***									
6014-2	A	None		0.0000	316'	No Ice 1/2" Ice 1" Ice 2" Ice	65.00 135.00 205.00 345.00	65.00 135.00 205.00 345.00	1086 2388 3690 6294
6014-2	A	None		0.0000	306'	No Ice 1/2" Ice 1" Ice 2" Ice	65.00 135.00 205.00 345.00	65.00 135.00 205.00 345.00	1086 2388 3690 6294
***									
ODI2-065R18K-GQ w/ Mount Pipe	A	From Leg	4.00 0' 0'	60.0000	290'	No Ice 1/2" Ice 1" Ice 2" Ice	5.06 5.46 5.86 6.68	3.13 3.77 4.42 5.79	94 135 182 295
ODI2-065R18K-GQ w/ Mount Pipe	B	From Leg	4.00 0'	60.0000	290'	No Ice 1/2" Ice	5.06 5.46	3.13 3.77	94 135

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0'			1" Ice	5.86	4.42	182
						2" Ice	6.68	5.79	295
ODI2-065R18K-GQ w/ Mount Pipe	C	From Leg	4.00 0'	60.0000	290'	No Ice 1/2" Ice	5.06 5.46	3.13 3.77	94 135
			0'			1" Ice	5.86	4.42	182
						2" Ice	6.68	5.79	295
RADIO 4415	A	From Leg	4.00 0'	60.0000	290'	No Ice 1/2" Ice	1.86 2.03	0.87 1.00	50 64
			0'			1" Ice	2.20	1.14	81
						2" Ice	2.58	1.44	124
RADIO 4415	B	From Leg	4.00 0'	60.0000	290'	No Ice 1/2" Ice	1.86 2.03	0.87 1.00	50 64
			0'			1" Ice	2.20	1.14	81
						2" Ice	2.58	1.44	124
RADIO 0208	A	From Leg	4.00 0'	60.0000	290'	No Ice 1/2" Ice	1.40 1.55	0.38 0.47	20 29
			0'			1" Ice	1.70	0.57	40
						2" Ice	2.04	0.80	69
RADIO 0208	B	From Leg	4.00 0'	60.0000	290'	No Ice 1/2" Ice	1.40 1.55	0.38 0.47	20 29
			0'			1" Ice	1.70	0.57	40
						2" Ice	2.04	0.80	69
RADIO 0208	C	From Leg	4.00 0'	60.0000	290'	No Ice 1/2" Ice	1.40 1.55	0.38 0.47	20 29
			0'			1" Ice	1.70	0.57	40
						2" Ice	2.04	0.80	69
2.4" Dia x 12-ft Pipe	A	From Leg	2.00 0'	0.0000	290'	No Ice 1/2" Ice	0.05 0.10	2.86 4.08	40 62
			0'			1" Ice	0.15	5.33	91
						2" Ice	0.25	7.61	173
2.4" Dia x 12-ft Pipe	B	From Leg	2.00 0'	0.0000	290'	No Ice 1/2" Ice	0.05 0.10	2.86 4.08	40 62
			0'			1" Ice	0.15	5.33	91
						2" Ice	0.25	7.61	173
2.4" Dia x 12-ft Pipe	C	From Leg	2.00 0'	0.0000	290'	No Ice 1/2" Ice	0.05 0.10	2.86 4.08	40 62
			0'			1" Ice	0.15	5.33	91
						2" Ice	0.25	7.61	173
Side Arm Mount [SO 312-3]	A	None		0.0000	290'	No Ice	7.87	7.87	210
						1/2" Ice	11.82	11.82	319
						1" Ice	15.77	15.77	428
						2" Ice	23.67	23.67	647
***									
BMR10-A-B1	B	From Leg	1.00 0'	-30.0000	277'	No Ice 1/2" Ice	8.60 9.90	8.60 9.90	55 113
			6'			1" Ice	11.20	11.20	180
						2" Ice	13.80	13.80	340
***									
ANT150F6	A	From Leg	6.00 0'	0.0000	264'	No Ice 1/2" Ice	4.80 6.83	4.80 6.83	30 66
			9'			1" Ice	8.87	8.87	114
						2" Ice	13.01	13.01	249
Side Arm Mount [SO 303-1]	A	From Leg	3.00 0'	0.0000	264'	No Ice 1/2" Ice	2.24 3.19	5.32 7.69	115 159
			0'			1" Ice	4.14	10.06	202
						2" Ice	6.04	14.80	290
***									

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
DB809KT3E-Y	B	From Leg	3.00 0' 6'	-60.0000	255'	No Ice 1/2" Ice 1" Ice 2" Ice	3.39 4.55 5.73 7.38	3.39 4.55 5.73 7.38	30 55 86 173
Side Arm Mount [SO 203-1]	B	From Leg	1.50 0' 0'	-60.0000	255'	No Ice 1/2" Ice 1" Ice 2" Ice	2.96 4.10 5.24 7.52	3.36 4.68 6.00 8.64	125 154 182 239
***									
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.00 5' 0'	-10.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	11.02 12.55 14.10 16.45	161 297 444 775
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	4.00 5' 0'	-30.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	11.02 12.55 14.10 16.45	161 297 444 775
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	4.00 5' 0'	-50.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	11.02 12.55 14.10 16.45	161 297 444 775
(2) RADIO 4449 B12/B71	A	From Leg	4.00 -5' 0'	-10.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	74 90 109 155
RADIO 4449 B12/B71	B	From Leg	4.00 5' 0'	-30.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	74 90 109 155
APX16DWV-16DWVS-C w/ Mount Pipe	A	From Leg	4.00 -5' 0'	-10.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	6.82 7.28 7.72 8.63	3.49 4.26 4.96 6.40	61 110 165 298
APX16DWV-16DWVS-C w/ Mount Pipe	B	From Leg	4.00 -5' 0'	-30.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	6.82 7.28 7.72 8.63	3.49 4.26 4.96 6.40	61 110 165 298
APX16DWV-16DWVS-C w/ Mount Pipe	C	From Leg	4.00 -5' 0'	-50.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	6.82 7.28 7.72 8.63	3.49 4.26 4.96 6.40	61 110 165 298
KRY 112 489/2	A	From Leg	4.00 -5' 0'	-10.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	0.56 0.66 0.76 1.00	0.37 0.45 0.54 0.75	15 20 27 46
KRY 112 489/2	B	From Leg	4.00 -5' 0'	-30.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	0.56 0.66 0.76 1.00	0.37 0.45 0.54 0.75	15 20 27 46
KRY 112 489/2	C	From Leg	4.00 -5' 0'	-50.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	0.56 0.66 0.76 1.00	0.37 0.45 0.54 0.75	15 20 27 46
(2) FDBL5003D-S	A	From Leg	4.00 5' 0'	-10.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	0.52 0.62 0.71 0.94	0.13 0.18 0.24 0.39	8 11 16 31

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(2) FDBL5003D-S	B	From Leg	4.00 -5' 0'	-30.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	0.52 0.62 0.71 0.94	0.13 0.18 0.24 0.39	8 11 16 31
(2) FDBL5003D-S	C	From Leg	4.00 0' 0'	-50.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	0.52 0.62 0.71 0.94	0.13 0.18 0.24 0.39	8 11 16 31
ATMAA1412D-1A20	A	From Leg	4.00 -5' 0'	-10.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.26 1.55	0.41 0.50 0.59 0.81	13 21 30 56
ATMAA1412D-1A20	B	From Leg	4.00 -5' 0'	-30.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.26 1.55	0.41 0.50 0.59 0.81	13 21 30 56
ATMAA1412D-1A20	C	From Leg	4.00 -5' 0'	-50.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.26 1.55	0.41 0.50 0.59 0.81	13 21 30 56
2.4" Dia x 6-ft Pipe	A	From Leg	4.00 0' 0'	0.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.93 2.30 3.06	1.43 1.93 2.30 3.06	22 33 48 90
2.4" Dia x 6-ft Pipe	B	From Leg	4.00 0' 0'	0.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.93 2.30 3.06	1.43 1.93 2.30 3.06	22 33 48 90
2.4" Dia x 6-ft Pipe	C	From Leg	4.00 0' 0'	0.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.93 2.30 3.06	1.43 1.93 2.30 3.06	22 33 48 90
Sector Mount [SM 301-3]	C	None		0.0000	247'	No Ice 1/2" Ice 1" Ice 2" Ice	29.61 39.80 49.99 70.37	29.61 39.80 49.99 70.37	1302 1843 2383 3465
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HBXX-6516DS-VTM w/ Mount Pipe	A	From Leg	4.00 -6' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	5.66 6.07 6.48 7.33	4.53 5.21 5.86 7.20	50 99 155 287
HBXX-6516DS-VTM w/ Mount Pipe	B	From Leg	4.00 -6' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	5.66 6.07 6.48 7.33	4.53 5.21 5.86 7.20	50 99 155 287
HBXX-6516DS-VTM w/ Mount Pipe	C	From Leg	4.00 -6' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	5.66 6.07 6.48 7.33	4.53 5.21 5.86 7.20	50 99 155 287
SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 -2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	8.65 9.32 9.90 11.10	7.64 8.93 9.88 11.82	87 162 246 439
SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 -2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	8.65 9.32 9.90 11.10	7.64 8.93 9.88 11.82	87 162 246 439

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 -2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	8.65 9.32 9.90 11.10	7.64 8.93 9.88 11.82	87 162 246 439
LNX-8513DS-VTM w/ Mount Pipe	A	From Leg	4.00 2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	8.41 8.97 9.50 10.59	7.08 8.27 9.18 11.02	65 134 211 393
LNX-6514DS-VTM w/ Mount Pipe	C	From Leg	4.00 2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	8.44 8.98 9.51 10.58	7.42 8.45 9.34 11.18	79 152 233 420
LNX-8513DS-VTM w/ Mount Pipe	B	From Leg	4.00 2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	8.41 8.97 9.50 10.59	7.08 8.27 9.18 11.02	65 134 211 393
RRH2X60-PCS	A	From Leg	4.00 -6' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	2.20 2.39 2.59 3.01	1.72 1.90 2.09 2.48	55 75 99 155
RRH2X60-PCS	B	From Leg	4.00 -6' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	2.20 2.39 2.59 3.01	1.72 1.90 2.09 2.48	55 75 99 155
RRH2X60-PCS	C	From Leg	4.00 -6' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	2.20 2.39 2.59 3.01	1.72 1.90 2.09 2.48	55 75 99 155
RRH2X60-AWS	A	From Leg	4.00 2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	3.50 3.76 4.03 4.58	1.82 2.05 2.29 2.79	60 83 109 173
RRH2X60-AWS	B	From Leg	4.00 2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	3.50 3.76 4.03 4.58	1.82 2.05 2.29 2.79	60 83 109 173
RRH2X60-AWS	C	From Leg	4.00 2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	3.50 3.76 4.03 4.58	1.82 2.05 2.29 2.79	60 83 109 173
RRH2x60-700	A	From Leg	4.00 -2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	3.50 3.76 4.03 4.58	1.82 2.05 2.29 2.79	60 83 109 173
RRH2x60-700	B	From Leg	4.00 -2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	3.50 3.76 4.03 4.58	1.82 2.05 2.29 2.79	60 83 109 173
RRH2x60-700	C	From Leg	4.00 -2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	3.50 3.76 4.03 4.58	1.82 2.05 2.29 2.79	60 83 109 173
(2) DB-T1-6Z-8AB-0Z	B	From Leg	4.00 -2' 2'	-30.0000	230'	No Ice 1/2" Ice 1" Ice 2" Ice	4.80 5.07 5.35 5.93	2.00 2.19 2.39 2.81	44 80 120 213
Sector Mount [SM 407-3]	C	None		0.0000	230'	No Ice	20.49	20.49	956

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
						1/2" Ice	30.39	30.39	1376
						1" Ice	40.29	40.29	1797
						2" Ice	60.09	60.09	2638
***									
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DFPD1-52 w/ Mount Pipe	C	From Leg	1.00	60.0000	200'	No Ice	1.63	0.93	22
			0'			1/2" Ice	1.84	1.17	38
			0'			1" Ice	2.07	1.43	58
						2" Ice	2.56	1.99	109
***									
***									
***									
12"x12"x3" TMA	C	From Leg	0.50	0.0000	178'	No Ice	1.20	0.32	15
			0'			1/2" Ice	1.34	0.40	23
			0'			1" Ice	1.48	0.49	33
						2" Ice	1.79	0.69	59
1.9" x 5.5' Pipe (Horizontal)	B	From Leg	0.00	0.0000	150'	No Ice	1.04	0.03	14
			-2'			1/2" Ice	1.43	0.05	24
			0'			1" Ice	1.81	0.09	39
						2" Ice	2.61	0.17	85
***									
Pipe Mount [PM 601-1]	B	From Leg	0.50	-50.0000	146'	No Ice	3.00	0.90	65
			0'			1/2" Ice	3.74	1.12	79
			0'			1" Ice	4.48	1.34	93
						2" Ice	5.96	1.78	122
***									
CSI-AY/809-960/11	B	From Leg	1.50	20.0000	136'	No Ice	0.16	0.21	7
			0'			1/2" Ice	0.50	0.69	13
			0'			1" Ice	0.84	1.17	19
						2" Ice	1.52	2.13	32
2.4" Dia x 8-ft Mount Pipe	B	From Leg	0.67	0.0000	136'	No Ice	1.90	1.90	29
			0'			1/2" Ice	2.73	2.73	44
			0'			1" Ice	3.40	3.40	63
						2" Ice	4.40	4.40	119
***									
220-5	A	From Leg	6.00	-60.0000	133'	No Ice	3.40	3.40	22
			0'			1/2" Ice	5.42	5.42	49
			10'			1" Ice	7.46	7.46	89
						2" Ice	11.59	11.59	206
Side Arm Mount [SO 601-1]	A	From Leg	3.00	-60.0000	133'	No Ice	1.22	6.30	159
			0'			1/2" Ice	1.85	8.61	197
			0'			1" Ice	2.48	10.92	234
						2" Ice	3.74	15.54	310
DB264-A	C	From Leg	2.00	-20.0000	133'	No Ice	3.16	3.16	36
			0'			1/2" Ice	5.69	5.69	47
			9'			1" Ice	8.22	8.22	58
						2" Ice	13.27	13.27	79
Side Arm Mount [SO 202-1]	C	From Leg	1.00	-20.0000	133'	No Ice	2.96	2.53	110
			0'			1/2" Ice	4.10	3.51	134
			0'			1" Ice	5.24	4.49	157
						2" Ice	7.52	6.45	204
***									
***									
PD1132-D	B	From Leg	2.00	80.0000	109'	No Ice	24.89	24.89	105
			0'			1/2" Ice	25.85	25.85	276
			4'			1" Ice	26.81	26.81	459

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
						2" Ice	28.75	28.75	862
Side Arm Mount [SO 202-1]	B	From Leg	1.00 0' 0'	80.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice	2.96 4.10 5.24 7.52	2.53 3.51 4.49 6.45	110 134 157 204
***									
2.4" Dia x 4-ft Mount Pipe	C	From Leg	0.50 0' 0'	0.0000	108'	No Ice 1/2" Ice 1" Ice 2" Ice	0.87 1.12 1.37 1.91	0.87 1.12 1.37 1.91	15 22 32 62
***									
***									
PTP 900-13 w/ Mount Pipe	C	From Leg	2.00 0' 0'	50.0000	99'	No Ice 1/2" Ice 1" Ice 2" Ice	2.15 2.39 2.64 3.18	0.92 1.17 1.44 2.03	15 34 56 113
***									
CSI-AY/809-960/11	C	From Leg	2.00 0' -8'	-20.0000	62'	No Ice 1/2" Ice 1" Ice 2" Ice	0.16 0.50 0.84 1.52	0.21 0.69 1.17 2.13	7 13 19 32
(2) Side Arm Mount [SO 601-1]	C	From Leg	1.00 0' 0'	0.0000	62'	No Ice 1/2" Ice 1" Ice 2" Ice	1.22 1.85 2.48 3.74	6.30 8.61 10.92 15.54	159 197 234 310
***									
(2) PL6" x 0.5"	A	From Face	0.00 0' 0'	0.0000	258'6"	No Ice 1/2" Ice 1" Ice 2" Ice	9.40 10.75 12.10 14.80	0.01 0.02 0.03 0.05	123 153 184 246
(2) PL6" x 0.5"	B	From Face	0.00 0' 0'	0.0000	258'6"	No Ice 1/2" Ice 1" Ice 2" Ice	9.40 10.75 12.10 14.80	0.01 0.02 0.03 0.05	123 153 184 246
(2) PL6" x 0.5"	C	From Face	0.00 0' 0'	0.0000	258'6"	No Ice 1/2" Ice 1" Ice 2" Ice	9.40 10.75 12.10 14.80	0.01 0.02 0.03 0.05	123 153 184 246

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
SPD4-5.2	C	Paraboloid w/Radome	From Leg	1.00 0' 0'	50.0000		178'	4.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.57 13.10 13.62 14.68	0 0 0 0
SPD3-5.8	A	Paraboloid	From	1.00	0.0000		322'	3.00	No Ice	7.07	35

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight lb
		w/Radome	Leg	0' 0'					1/2" Ice 1" Ice 2" Ice	7.47 7.86 8.66	73 112 188
P-9A72GN-U	C	Grid	From Leg	0.50 0' 0'	60.0000		206'	6.00	No Ice 1/2" Ice 1" Ice 2" Ice	28.27 29.07 29.86 31.44	112 261 410 709
HPX6-65-P3A	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0' 0'	0.0000		150'	6.46	No Ice 1/2" Ice 1" Ice 2" Ice	32.76 33.61 34.46 36.16	359 532 704 1049
PL6-65-PXA	B	Paraboloid w/Radome	From Leg	1.00 0' 0'	-50.0000		146'	6.36	No Ice 1/2" Ice 1" Ice 2" Ice	31.75 32.59 33.43 35.10	161 167 174 186
CM 4228HD	B	Grid	From Leg	1.00 0' 0'	-20.0000		140'	3.55	No Ice 1/2" Ice 1" Ice 2" Ice	9.90 10.37 10.84 11.78	40 93 56 63
CM 4228HD	B	Grid	From Leg	1.00 0' -1'	10.0000		136'	3.55	No Ice 1/2" Ice 1" Ice 2" Ice	9.90 10.37 10.84 11.78	40 93 56 63
MGA2-16N	B	Grid	From Leg	0.67 0' 2'	0.0000		136'	2.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.14 3.41 3.68 4.21	20 38 55 90
MGAR3-23N	B	Grid	From Leg	0.67 0' -2'	20.0000		136'	3.38	No Ice 1/2" Ice 1" Ice 2" Ice	9.00 9.45 9.90 10.79	30 79 127 224
P-9A48GN-U	C	Grid	From Leg	1.00 0' 0'	-60.0000		117'	4.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.57 13.10 13.62 14.68	112 179 246 381
SSH-9A72GN	C	Grid	From Leg	1.00 0' 0'	0.0000		108'	2.84	No Ice 1/2" Ice 1" Ice 2" Ice	6.35 6.73 7.11 7.86	38 128 219 400
SPD2-5.8	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0' 0'	0.0000		99'	2.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.14 3.41 3.68 4.21	22 40 60 90
P-9A48GN-U	C	Grid	From Leg	2.00 0' 6'	-70.0000		62'	4.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.57 13.10 13.62 14.68	112 179 246 381
SSH-9A72GN	C	Grid	From Leg	2.00 0' -1'	-20.0000		62'	6.00	No Ice 1/2" Ice 1" Ice 2" Ice	28.27 29.07 29.86 31.44	112 261 410 709

Load Combinations

Comb. No.	Description

Comb. No.	Description
1	Dead Only
2	1.2D+1.0W (pattern 1) 0 deg - No Ice+1.0 Guy
3	1.2D+1.0W (pattern 2) 0 deg - No Ice+1.0 Guy
4	1.2D+1.0W (pattern 3) 0 deg - No Ice+1.0 Guy
5	1.2D+1.0W (pattern 1) 30 deg - No Ice+1.0 Guy
6	1.2D+1.0W (pattern 2) 30 deg - No Ice+1.0 Guy
7	1.2D+1.0W (pattern 3) 30 deg - No Ice+1.0 Guy
8	1.2D+1.0W (pattern 1) 60 deg - No Ice+1.0 Guy
9	1.2D+1.0W (pattern 2) 60 deg - No Ice+1.0 Guy
10	1.2D+1.0W (pattern 3) 60 deg - No Ice+1.0 Guy
11	1.2D+1.0W (pattern 1) 90 deg - No Ice+1.0 Guy
12	1.2D+1.0W (pattern 2) 90 deg - No Ice+1.0 Guy
13	1.2D+1.0W (pattern 3) 90 deg - No Ice+1.0 Guy
14	1.2D+1.0W (pattern 1) 120 deg - No Ice+1.0 Guy
15	1.2D+1.0W (pattern 2) 120 deg - No Ice+1.0 Guy
16	1.2D+1.0W (pattern 3) 120 deg - No Ice+1.0 Guy
17	1.2D+1.0W (pattern 1) 150 deg - No Ice+1.0 Guy
18	1.2D+1.0W (pattern 2) 150 deg - No Ice+1.0 Guy
19	1.2D+1.0W (pattern 3) 150 deg - No Ice+1.0 Guy
20	1.2D+1.0W (pattern 1) 180 deg - No Ice+1.0 Guy
21	1.2D+1.0W (pattern 2) 180 deg - No Ice+1.0 Guy
22	1.2D+1.0W (pattern 3) 180 deg - No Ice+1.0 Guy
23	1.2D+1.0W (pattern 1) 210 deg - No Ice+1.0 Guy
24	1.2D+1.0W (pattern 2) 210 deg - No Ice+1.0 Guy
25	1.2D+1.0W (pattern 3) 210 deg - No Ice+1.0 Guy
26	1.2D+1.0W (pattern 1) 240 deg - No Ice+1.0 Guy
27	1.2D+1.0W (pattern 2) 240 deg - No Ice+1.0 Guy
28	1.2D+1.0W (pattern 3) 240 deg - No Ice+1.0 Guy
29	1.2D+1.0W (pattern 1) 270 deg - No Ice+1.0 Guy
30	1.2D+1.0W (pattern 2) 270 deg - No Ice+1.0 Guy
31	1.2D+1.0W (pattern 3) 270 deg - No Ice+1.0 Guy
32	1.2D+1.0W (pattern 1) 300 deg - No Ice+1.0 Guy
33	1.2D+1.0W (pattern 2) 300 deg - No Ice+1.0 Guy
34	1.2D+1.0W (pattern 3) 300 deg - No Ice+1.0 Guy
35	1.2D+1.0W (pattern 1) 330 deg - No Ice+1.0 Guy
36	1.2D+1.0W (pattern 2) 330 deg - No Ice+1.0 Guy
37	1.2D+1.0W (pattern 3) 330 deg - No Ice+1.0 Guy
38	1.2 Dead+1.0 Ice+1.0 Temp+Guy
39	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
40	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
41	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
42	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
43	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
44	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
45	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
46	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
47	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
48	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
49	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
51	Dead+Wind 0 deg - Service+Guy
52	Dead+Wind 30 deg - Service+Guy
53	Dead+Wind 60 deg - Service+Guy
54	Dead+Wind 90 deg - Service+Guy
55	Dead+Wind 120 deg - Service+Guy
56	Dead+Wind 150 deg - Service+Guy
57	Dead+Wind 180 deg - Service+Guy
58	Dead+Wind 210 deg - Service+Guy
59	Dead+Wind 240 deg - Service+Guy
60	Dead+Wind 270 deg - Service+Guy
61	Dead+Wind 300 deg - Service+Guy
62	Dead+Wind 330 deg - Service+Guy

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
Pole	495 - 457	5.999	61	0.1220	0.1810
Antenna					
T1	457 - 436	5.116	61	0.0780	0.1845
T2	436 - 421	4.813	61	0.0727	0.1850
T3	421 - 401	4.612	61	0.0672	0.1860
T4	401 - 396	4.443	51	0.0512	0.1874
T5	396 - 391	4.451	55	0.0472	0.1877
T6	391 - 386	4.469	55	0.0424	0.1881
T7	386 - 381	4.488	55	0.0366	0.1885
T8	381 - 376	4.513	55	0.0360	0.1889
T9	376 - 371	4.556	55	0.0390	0.1896
T10	371 - 366	4.603	55	0.0410	0.1908
T11	366 - 361	4.650	55	0.0420	0.1901
T12	361 - 341	4.696	55	0.0423	0.1829
T13	341 - 321	4.863	55	0.0349	0.1559
T14	321 - 301	4.973	55	0.0231	0.1281
T15	301 - 281	4.995	55	0.0297	0.1075
T16	281 - 276	4.945	55	0.0296	0.0885
T17	276 - 271	4.927	55	0.0274	0.0840
T18	271 - 266	4.909	55	0.0242	0.0800
T19	266 - 261	4.891	55	0.0199	0.0759
T20	261 - 256	4.876	55	0.0150	0.0724
T21	256 - 251	4.869	55	0.0101	0.0707
T22	251 - 246	4.873	55	0.0073	0.0691
T23	246 - 241	4.885	55	0.0081	0.0675
T24	241 - 221	4.895	55	0.0083	0.0655
T25	221 - 201	4.913	55	0.0143	0.0588
T26	201 - 181	4.855	55	0.0350	0.0485
T27	181 - 161	4.687	55	0.0591	0.0370
T28	161 - 141	4.408	55	0.0829	0.0359
T29	141 - 121	4.055	55	0.0951	0.0333
T30	121 - 101	3.690	55	0.0950	0.0295
T31	101 - 81	3.332	55	0.1094	0.0270
T32	81 - 61	2.890	55	0.1321	0.0283
T33	61 - 41	2.345	55	0.1582	0.0313
T34	41 - 20	1.692	55	0.1825	0.0331
T35	20 - 6.70833	0.909	55	0.2009	0.0339
T36	6.70833 - 0	0.371	55	0.2473	0.0375

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
457'	12" x 3' Beacon	61	5.116	0.0780	0.1845	28052
446'6"	Guy	61	4.954	0.0744	0.1846	60215
444'	SRL-235-2	61	4.919	0.0740	0.1847	86984
419'	ERI 1183-3CP	61	4.585	0.0659	0.1862	172987
393'	6014-2	55	4.462	0.0444	0.1880	117965
382'	6014-2	55	4.507	0.0350	0.1888	16613
381'	Guy	55	4.513	0.0360	0.1889	16287

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
367'	SHP-2AE	55	4.641	0.0419	0.1907	154675
342'	BCD-87077	55	4.856	0.0355	0.1572	80888
333'	3" x 6" SideLight	55	4.916	0.0288	0.1447	63374
330'	PG1N0F-0090-310	55	4.933	0.0262	0.1403	59639
326'	DB201-A	55	4.953	0.0240	0.1347	55293
325'	DB408	55	4.957	0.0238	0.1333	54314
322'	SPD3-5.8	55	4.969	0.0232	0.1293	52086
316'	6014-2	55	4.986	0.0237	0.1223	52671
306'	6014-2	55	4.997	0.0280	0.1122	57167
290'	ODI2-065R18K-GQ w/ Mount Pipe	55	4.973	0.0312	0.0970	103574
277'	BMR10-A-B1	55	4.931	0.0280	0.0849	129830
264'	ANT150F6	55	4.885	0.0180	0.0744	48356
258'6"	(2) PL6" x 0.5"	55	4.871	0.0126	0.0714	25429
255'	DB809KT3E-Y	55	4.869	0.0091	0.0704	22724
254'6"	Guy	55	4.869	0.0086	0.0702	23149
247'	APXVAARR24_43-U-NA20 w/ Mount Pipe	55	4.882	0.0079	0.0678	134583
230'	HBXX-6516DS-VTM w/ Mount Pipe	55	4.911	0.0077	0.0619	91816
215'	3" x 6" SideLight	55	4.906	0.0199	0.0561	52898
206'	P-9A72GN-U	55	4.879	0.0293	0.0513	45124
200'	DFPD1-52 w/ Mount Pipe	55	4.849	0.0361	0.0480	41891
178'	SPD4-5.2	55	4.652	0.0626	0.0363	42673
150'	HPX6-65-P3A	55	4.219	0.0918	0.0348	117625
146'	PL6-65-PXA	55	4.147	0.0937	0.0342	175184
140'	CM 4228HD	55	4.037	0.0952	0.0332	492219
138'	MGA2-16N	55	4.000	0.0953	0.0328	Inf
136'	CSI-AY/809-960/11	55	3.963	0.0953	0.0323	527250
135'	CM 4228HD	55	3.945	0.0952	0.0321	422449
134'	MGAR3-23N	55	3.926	0.0951	0.0319	352404
133'	220-5	55	3.908	0.0950	0.0317	302283
131'	Guy	55	3.871	0.0948	0.0313	232662
117'	P-9A48GN-U	55	3.620	0.0965	0.0291	290639
112'	3" x 6" SideLight	55	3.533	0.0995	0.0285	178042
109'	PD1132-D	55	3.480	0.1018	0.0282	96152
108'	SSH-9A72GN	55	3.462	0.1027	0.0281	83370
99'	SPD2-5.8	55	3.293	0.1114	0.0265	44112
68'	P-9A48GN-U	55	2.547	0.1485	0.0302	47831
62'	CSI-AY/809-960/11	55	2.374	0.1567	0.0312	47812
61'	SSH-9A72GN	55	2.345	0.1582	0.0313	47451

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
Pole	495 - 457	36.601	2	0.8002	0.6824
Antenna					
T1	457 - 436	31.398	14	0.6156	0.7007
T2	436 - 421	29.513	14	0.5919	0.7024
T3	421 - 401	28.557	16	0.5611	0.7056
T4	401 - 396	28.513	16	0.4752	0.7093
T5	396 - 391	28.523	16	0.4543	0.7104
T6	391 - 386	28.542	16	0.4300	0.7114
T7	386 - 381	28.567	16	0.4012	0.7125
T8	381 - 376	28.620	16	0.3681	0.7137

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T9	376 - 371	28.745	16	0.3436	0.7178
T10	371 - 366	28.890	16	0.3215	0.7235
T11	366 - 361	29.034	16	0.3018	0.7219
T12	361 - 341	29.170	16	0.2843	0.6933
T13	341 - 321	29.666	16	0.2153	0.5859
T14	321 - 301	29.933	16	0.1522	0.4754
T15	301 - 281	29.856	16	0.1436	0.3950
T16	281 - 276	29.499	16	0.1426	0.3204
T17	276 - 271	29.391	16	0.1332	0.3032
T18	271 - 266	29.284	16	0.1193	0.2874
T19	266 - 261	29.182	16	0.1049	0.2718
T20	261 - 256	29.091	16	0.0888	0.2583
T21	256 - 251	29.034	16	0.1141	0.2573
T22	251 - 246	29.027	16	0.1374	0.2563
T23	246 - 241	29.053	16	0.1490	0.2550
T24	241 - 221	29.074	16	0.1519	0.2543
T25	221 - 201	29.048	16	0.1187	0.2479
T26	201 - 181	28.663	16	0.1818	0.2302
T27	181 - 161	27.736	16	0.3218	0.2133
T28	161 - 141	26.229	16	0.4579	0.1994
T29	141 - 121	24.343	15	0.5452	0.1821
T30	121 - 101	22.221	15	0.5848	0.1629
T31	101 - 81	19.960	15	0.6834	0.1517
T32	81 - 61	17.182	15	0.8159	0.1422
T33	61 - 41	13.830	15	0.9589	0.1506
T34	41 - 20	9.915	15	1.0865	0.1608
T35	20 - 6.70833	5.297	15	1.1808	0.1634
T36	6.70833 - 0	2.146	15	1.4413	0.1798

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
457'	12" x 3' Beacon	14	31.398	0.6156	0.7007	5814
446'6"	Guy	14	30.406	0.6007	0.7011	12551
444'	SRL-235-2	14	30.189	0.5987	0.7014	18244
419'	ERI 1183-3CP	16	28.551	0.5541	0.7060	19495
393'	6014-2	16	28.534	0.4402	0.7110	21047
382'	6014-2	16	28.603	0.3743	0.7133	4064
381'	Guy	16	28.620	0.3681	0.7137	3992
367'	SHP-2AE	16	29.006	0.3055	0.7242	17610
342'	BCD-87077	16	29.645	0.2174	0.5911	19794
333'	3" x 6" SideLight	16	29.810	0.1944	0.5413	16031
330'	PG1N0F-0090-310	16	29.852	0.1848	0.5240	15057
326'	DB201-A	16	29.897	0.1710	0.5016	13929
325'	DB408	16	29.906	0.1673	0.4961	13676
322'	SPD3-5.8	16	29.928	0.1561	0.4804	13105
316'	6014-2	16	29.947	0.1401	0.4525	13277
306'	6014-2	16	29.907	0.1372	0.4133	14007
290'	ODI2-065R18K-GQ w/ Mount Pipe	16	29.682	0.1493	0.3536	23846
277'	BMR10-A-B1	16	29.413	0.1354	0.3065	12889
264'	ANT150F6	16	29.143	0.0990	0.2658	9962
258'6"	(2) PL6" x 0.5"	16	29.056	0.1005	0.2575	5677
255'	DB809KT3E-Y	16	29.028	0.1194	0.2572	5083
254'6"	Guy	16	29.026	0.1219	0.2571	5186
247'	APXVAARR24_43-U-NA20 w/	16	29.047	0.1475	0.2553	23964

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
	Mount Pipe					
230'	HBXX-6516DS-VTM w/ Mount Pipe	16	29.089	0.1413	0.2520	15453
215'	3" x 6" SideLight	16	28.980	0.1080	0.2434	9743
206'	P-9A72GN-U	16	28.805	0.1533	0.2351	8392
200'	DFPD1-52 w/ Mount Pipe	16	28.631	0.1880	0.2293	7797
178'	SPD4-5.2	16	27.546	0.3435	0.2111	7532
150'	HPX6-65-P3A	15	25.234	0.5144	0.1906	12142
146'	PL6-65-PXA	15	24.846	0.5300	0.1870	13796
140'	CM 4228HD	15	24.241	0.5476	0.1811	17291
138'	MGA2-16N	15	24.034	0.5519	0.1790	18840
136'	CSI-AY/809-960/11	15	23.826	0.5556	0.1769	20679
135'	CM 4228HD	15	23.721	0.5574	0.1758	21738
134'	MGAR3-23N	15	23.615	0.5590	0.1747	22912
133'	220-5	15	23.509	0.5606	0.1737	24220
131'	Guy	15	23.297	0.5638	0.1716	27341
117'	P-9A48GN-U	15	21.789	0.5988	0.1606	26060
112'	3" x 6" SideLight	15	21.241	0.6212	0.1583	14297
109'	PD1132-D	15	20.904	0.6367	0.1569	11246
108'	SSH-9A72GN	15	20.790	0.6422	0.1564	10499
99'	SPD2-5.8	15	19.709	0.6959	0.1498	7293
68'	P-9A48GN-U	15	15.065	0.9068	0.1476	8489
62'	CSI-AY/809-960/11	15	14.010	0.9512	0.1501	8736
61'	SSH-9A72GN	15	13.830	0.9589	0.1506	8699

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	457	Leg	A307	0.8750	8	1300	20778	0.063	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	1126	5522	0.204	1.05	Bolt Shear
		Horizontal	A307	0.5000	2	638	5522	0.116	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	0	5522	0.000	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	2093	5522	0.379	1.05	Bolt Shear
T2	436	Leg	A307	0.8750	8	2548	20778	0.123	1.05	Bolt Tension
		Diagonal	A325X	0.5000	2	960	7082	0.136	1.05	Member Block Shear
		Horizontal	A307	0.5000	2	622	5522	0.113	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	568	5522	0.103	1.05	Bolt Shear
T3	421	Leg	A307	0.8750	8	6046	20778	0.291	1.05	Bolt Tension
		Diagonal	A325N	0.5000	2	2635	7082	0.372	1.05	Member Block Shear
		Top Girt	A307	0.5000	2	312	5522	0.056	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	229	5522	0.041	1.05	Bolt Shear
T4	401	Diagonal	A325N	0.5000	2	2794	7082	0.394	1.05	Member Block Shear
		Top Girt	A307	0.5000	2	248	5522	0.045	1.05	Bolt Shear
T5	396	Diagonal	A325N	0.5000	2	3237	7082	0.457	1.05	Member Block Shear
T6	391	Diagonal	A325X	0.5000	2	3526	7082	0.498	1.05	Member Block Shear
T7	386	Leg	A307	0.8750	8	12469	20778	0.600	1.05	Bolt Tension
		Diagonal	A325X	0.5000	2	4104	7082	0.579	1.05	Member Block Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T8	381	Diagonal	A325N	0.5000	2	4127	7082	0.583	1.05	Member Block Shear
		Top Guy Pull-Off@381	A307	0.5000	2	10357	11045	0.938	1.05	Bolt Shear
T9	376	Diagonal	A325N	0.5000	2	3733	7082	0.527	1.05	Member Block Shear
T10	371	Diagonal	A325N	0.5000	2	3540	7082	0.500	1.05	Member Block Shear
T11	366	Leg	A307	0.8750	8	4409	20778	0.212	1.05	Bolt Tension
		Diagonal	A325N	0.5000	2	3615	7082	0.511	1.05	Member Block Shear
T12	361	Leg	A307	0.8750	8	3318	20778	0.160	1.05	Bolt Tension
		Diagonal	A325N	0.5000	2	3311	7082	0.467	1.05	Member Block Shear
		Secondary Horizontal	A325X	0.5000	1	1701	9661	0.176	1.05	Member Block Shear
		Top Girt	A307	0.5000	2	288	5522	0.052	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	141	5522	0.026	1.05	Bolt Shear
T13	341	Leg	A307	0.8750	8	3206	20778	0.154	1.05	Bolt Tension
		Diagonal	A325N	0.5000	2	2594	7082	0.366	1.05	Member Block Shear
		Top Girt	A307	0.5000	2	192	5522	0.035	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	162	5522	0.029	1.05	Bolt Shear
T14	321	Leg	A307	0.8750	8	3399	20778	0.164	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	2043	5522	0.370	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	160	5522	0.029	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	217	5522	0.039	1.05	Bolt Shear
T15	301	Leg	A307	0.8750	8	3278	20778	0.158	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	2860	5522	0.518	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	176	5522	0.032	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	191	5522	0.035	1.05	Bolt Shear
T16	281	Diagonal	A325N	0.5000	2	2988	7082	0.422	1.05	Member Block Shear
		Top Girt	A307	0.5000	2	148	5522	0.027	1.05	Bolt Shear
T17	276	Diagonal	A325N	0.5000	2	3234	7082	0.457	1.05	Member Block Shear
T18	271	Diagonal	A325N	0.5000	2	3723	7082	0.526	1.05	Member Block Shear
		Top Girt	A307	0.5000	2	349	5522	0.063	1.05	Bolt Shear
T19	266	Leg	A307	0.8750	8	4438	20778	0.214	1.05	Bolt Tension
		Diagonal	A325N	0.5000	2	3333	7082	0.471	1.05	Member Block Shear
T20	261	Diagonal	A325N	0.5000	2	5894	8836	0.667	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	2725	5522	0.494	1.05	Bolt Shear
T21	256	Diagonal	A325N	0.5000	2	8159	8836	0.923	1.05	Bolt Shear
		Secondary Horizontal	A325N	0.5000	2	11771	17672	0.666	1.05	Bolt Shear
T22	251	Diagonal	A325N	0.5000	2	5773	8836	0.653	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	2937	5522	0.532	1.05	Bolt Shear
T23	246	Leg	A307	0.6250	8	4406	10170	0.433	1.05	Bolt Tension
		Diagonal	A325N	0.5000	2	5176	8836	0.586	1.05	Bolt Shear
		Secondary Horizontal	A325N	0.5000	2	918	17672	0.052	1.05	Bolt Shear
T24	241	Leg	A307	0.6250	8	4622	10170	0.454	1.05	Bolt Tension
		Diagonal	A325N	0.5000	2	4526	8836	0.512	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	316	5522	0.057	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	375	5522	0.068	1.05	Bolt Shear
T25	221	Leg	A307	0.8750	8	5638	20778	0.271	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	2537	5522	0.459	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	325	5522	0.059	1.05	Bolt Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Mid Girt	A307	0.5000	2	318	5522	0.058	1.05	Bolt Shear
T26	201	Leg	A307	0.8750	8	6007	20778	0.289	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	1281	5522	0.232	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	338	5522	0.061	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	343	5522	0.062	1.05	Bolt Shear
T27	181	Leg	A307	0.8750	8	5762	20778	0.277	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	1461	5522	0.265	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	436	11045	0.039	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	335	5522	0.061	1.05	Bolt Shear
T28	161	Leg	A307	0.6250	8	5458	10170	0.537	1.05	Bolt Tension
		Diagonal	A325N	0.6250	2	2822	10833	0.260	1.05	Member Block Shear
		Top Girt	A307	0.5000	2	392	5522	0.071	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	375	5522	0.068	1.05	Bolt Shear
T29	141	Leg	A307	0.6250	8	5350	10170	0.526	1.05	Bolt Tension
		Diagonal	A325N	0.6250	2	3847	10833	0.355	1.05	Member Block Shear
		Top Girt	A307	0.5000	2	850	5522	0.154	1.05	Bolt Shear
		Mid Girt	A325N	0.5000	2	6285	7082	0.887	1.05	Member Block Shear
		Torque Arm Top@131	A325N	0.7500	2	10196	16924	0.602	1.05	Member Block Shear
		Torque Arm Bottom@131	A325N	0.7500	2	6297	16924	0.372	1.05	Member Block Shear
T30	121	Leg	A307	0.8750	8	6896	20778	0.332	1.05	Bolt Tension
		Diagonal	A325N	0.5000	2	2660	7082	0.376	1.05	Member Block Shear
		Top Girt	A307	0.5000	2	3420	5522	0.619	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	293	5522	0.053	1.05	Bolt Shear
T31	101	Leg	A307	0.8750	8	7418	20778	0.357	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	1698	5522	0.308	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	410	5522	0.074	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	447	5522	0.081	1.05	Bolt Shear
T32	81	Leg	A307	0.8750	8	7582	20778	0.365	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	842	5522	0.152	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	460	5522	0.083	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	460	5522	0.083	1.05	Bolt Shear
T33	61	Leg	A307	0.8750	8	7475	20778	0.360	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	1757	5522	0.318	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	474	5522	0.086	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	434	5522	0.079	1.05	Bolt Shear
T34	41	Leg	A307	0.8750	8	7267	20778	0.350	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	2698	5522	0.489	1.05	Bolt Shear
		Top Girt	A307	0.5000	2	416	5522	0.075	1.05	Bolt Shear
		Mid Girt	A307	0.5000	2	673	5522	0.122	1.05	Bolt Shear
T35	20	Leg	A307	0.8750	8	7296	20778	0.351	1.05	Bolt Tension
		Diagonal	A307	0.5000	2	1010	5522	0.183	1.05	Bolt Shear
		Top Girt	A325N	0.5000	2	8276	14165	0.584	1.05	Member Block Shear
T36	6.70833	Diagonal	A307	0.5000	2	1932	5522	0.350	1.05	Bolt Shear

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T_u lb	Allowable ϕT_n lb	Required S.F.	Actual S.F.
T1	446'6" (A) (826)	9/16 EHS	2800	35000	13614	22050	0.952	1.543
	446'6" (B) (825)	9/16 EHS	2800	35000	13618	22050	0.952	1.542
	446'6" (C) (824)	9/16 EHS	2800	35000	13560	22050	0.952	1.549
T8	381' (A) (829)	1 3/8 BS	18560	232000	64080	146157	0.952	2.172
	381' (B) (828)	1 3/8 BS	18560	232000	65678	146157	0.952	2.119
	381' (C) (827)	1 3/8 BS	18560	232000	62640	146157	0.952	2.222
T21	254'6" (A) (832)	1 1/4 BS	15360	192000	62232	120958	0.952	1.851
	254'6" (B) (831)	1 1/4 BS	15360	192000	62478	120958	0.952	1.844
	254'6" (C) (830)	1 1/4 BS	15360	192000	61294	120958	0.952	1.879
T29	131' (A) (845)	11/16 EHS	6000	50000	22148	31499	0.952	1.355
	131' (A) (846)	11/16 EHS	6000	50000	22206	31499	0.952	1.351
	131' (B) (839)	11/16 EHS	6000	50000	22057	31499	0.952	1.360
	131' (B) (840)	11/16 EHS	6000	50000	21962	31499	0.952	1.366
	131' (C) (833)	11/16 EHS	6000	50000	21634	31499	0.952	1.387
	131' (C) (834)	11/16 EHS	6000	50000	21424	31499	0.952	1.400

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	457 - 436	3	21'	5'3"	84.0 K=1.00	7.0686	-24073	149352	0.161 [1]
T2	436 - 421	2 3/4	15'	5'	87.3 K=1.00	5.9396	-33559	122148	0.275 [1]
T3	421 - 401	2 3/4	20'	5'	87.3 K=1.00	5.9396	-70416	122148	0.576 [1]
T4	401 - 396	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2 K=1.00	9.7900	-82241	232333	0.354 [1]
T5	396 - 391	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2 K=1.00	9.7900	-95588	232333	0.411 [1]
T6	391 - 386	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2 K=1.00	9.7900	-110427	232333	0.475 [1]
T7	386 - 381	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2 K=1.00	9.7900	-128049	232333	0.551 [1]
T8	381 - 376	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5 K=1.00	11.0000	-133515	267249	0.500 [1]
T9	376 - 371	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5 K=1.00	11.0000	-122948	267249	0.460 [1]
T10	371 - 366	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5 K=1.00	11.0000	-114191	267249	0.427 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T11	366 - 361	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5 K=1.00	11.0000	-105819	267249	0.396 [1]
T12	361 - 341	3	20'	2'6"	40.0 K=1.00	7.0686	-98223	194337	0.505 [1]
T13	341 - 321	3	20'	5'	80.0 K=1.00	7.0686	-76943	154155	0.499 [1]
T14	321 - 301	3	20'	5'	80.0 K=1.00	7.0686	-81573	154155	0.529 [1]
T15	301 - 281	3	20'	5'	80.0 K=1.00	7.0686	-80376	154155	0.521 [1]
T16	281 - 276	3	5'	5'	80.0 K=1.00	7.0686	-84853	154155	0.550 [1]
T17	276 - 271	3	5'	5'	80.0 K=1.00	7.0686	-91349	154155	0.593 [1]
T18	271 - 266	3	5'	5'	80.0 K=1.00	7.0686	-99374	154155	0.645 [1]
T19	266 - 261	3	5'	5'	80.0 K=1.00	7.0686	-106507	154155	0.691 [1]
T20	261 - 256	3	5'	5'	80.0 K=1.00	7.0686	-119617	154155	0.776 [1]
T21	256 - 251	3	5'	2'6"	40.0 K=1.00	7.0686	-125575	194337	0.646 [1]
T22	251 - 246	3	5'	5'	80.0 K=1.00	7.0686	-109530	154155	0.711 [1]
T23	246 - 241	3	5'	2'6"	40.0 K=1.00	7.0686	-105951	194337	0.545 [1]
T24	241 - 221	3	20'	5'	80.0 K=1.00	7.0686	-110921	154155	0.720 [1]
T25	221 - 201	3 1/4	20'	5'	73.8 K=1.00	8.2958	-135318	189376	0.715 [1]
T26	201 - 181	3 1/4	20'	5'	73.8 K=1.00	8.2958	-144173	189376	0.761 [1]
T27	181 - 161	3 1/4	20'	5'	73.8 K=1.00	8.2958	-144482	189376	0.763 [1]
T28	161 - 141	3 1/2	20'	5'	68.6 K=1.00	9.6211	-134214	227739	0.589 [1]
T29	141 - 121	3 1/2	20'	5'	68.6 K=1.00	9.6211	-129372	227739	0.568 [1]
T30	121 - 101	3 1/2	20'	5'	68.6 K=1.00	9.6211	-165514	227739	0.727 [1]
T31	101 - 81	3 1/2	20'	5'	68.6 K=1.00	9.6211	-178020	227739	0.782 [1]
T32	81 - 61	3 1/2	20'	5'	68.6 K=1.00	9.6211	-182675	227739	0.802 [1]
T33	61 - 41	3 1/2	20'	5'	68.6 K=1.00	9.6211	-180836	227739	0.794 [1]
T34	41 - 20	3 1/2	21'	5'3"	72.0 K=1.00	9.6211	-178226	222503	0.801 [1]
T35	20 - 6.70833	3 1/4	13'5-7/8"	4'6"	66.4 K=1.00	8.2958	-178365	199143	0.896 [1]
T36	6.70833 - 0	3 1/4	6'9-23/32"	2'3-1/4"	33.5 K=1.00	8.2958	-182423	233387	0.782 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T1	457 - 436	L2 1/2x2x1/4	7'7-13/16"	3'7-9/16"	107.0 K=1.04	1.0600	-1741	23433	0.074 [1]
T2	436 - 421	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-2242	18234	0.123 [1]
T3	421 - 401	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-5336	18234	0.293 [1]
T4	401 - 396	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-5721	18234	0.314 [1]
T5	396 - 391	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-6468	18234	0.355 [1]
T6	391 - 386	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-8159	18234	0.447 [1]
T7	386 - 381	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-7034	18234	0.386 [1]
T8	381 - 376	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-7052	18234	0.387 [1]
T9	376 - 371	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-8501	18234	0.466 [1]
T10	371 - 366	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-7093	18234	0.389 [1]
T11	366 - 361	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-7396	18234	0.406 [1]
T12	361 - 341	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-6888	18234	0.378 [1]
T13	341 - 321	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-5235	18234	0.287 [1]
T14	321 - 301	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-4047	18234	0.222 [1]
T15	301 - 281	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-5720	18234	0.314 [1]
T16	281 - 276	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-5913	18234	0.324 [1]
T17	276 - 271	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-6609	18234	0.362 [1]
T18	271 - 266	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-6423	18234	0.352 [1]
T19	266 - 261	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-7392	18234	0.405 [1]
T20	261 - 256	L3x3x1/4	7'6"	3'6-19/32"	84.0 K=1.17	1.4400	-4371	40338	0.108 [1]
T21	256 - 251	L3x3x1/4	7'6"	3'6-19/32"	84.0 K=1.17	1.4400	-11472	40338	0.284 [1]
T22	251 - 246	L3x3x1/4	7'6"	3'6-19/32"	84.0 K=1.17	1.4400	-11546	40338	0.286 [1]
T23	246 - 241	L3x3x1/4	7'6"	3'6-19/32"	84.0 K=1.17	1.4400	-9015	40338	0.223 [1]
T24	241 - 221	L3x3x1/4	7'6"	3'6-19/32"	84.0 K=1.17	1.4400	-9052	40338	0.224 [1]
T25	221 - 201	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-5074	18234	0.278 [1]
T26	201 - 181	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-2561	18234	0.140 [1]
T27	181 - 161	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	0.8090	-2923	18234	0.160 [1]
T28	161 - 141	L3x3x1/4	7'6"	3'6-15/32"	83.8 K=1.17	1.4400	-5893	40403	0.146 [1]
T29	141 - 121	L3x3x1/4	7'6"	3'6-15/32"	83.8 K=1.17	1.4400	-7536	40403	0.187 [1]
T30	121 - 101	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9	0.8090	-5555	18234	0.305 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T31	101 - 81	L2 1/2x2x3/16	7'6"	2" 3'6-19/32" K=1.05	104.9	0.8090	-3396	18234	0.186 [1]
T32	81 - 61	L2 1/2x2x3/16	7'6"	2" 3'6-19/32" K=1.05	104.9	0.8090	-1684	18234	0.092 [1]
T33	61 - 41	L2 1/2x2x3/16	7'6"	2" 3'6-19/32" K=1.05	104.9	0.8090	-3513	18234	0.193 [1]
T34	41 - 20	L2 1/2x2x3/16	7'7-13/16"	3'7-9/16" K=1.04	106.5	0.8090	-5396	17973	0.300 [1]
T35	20 - 6.70833	L2x2x3/16	4'9-1/8"	2'9-3/8" K=1.10	93.5	0.7150	-2021	17651	0.114 [1]
T36	6.70833 - 0	L2x2x3/16	2'5-17/32"	1'1-5/16" K=1.63	55.4	0.7150	-3864	21505	0.180 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	457 - 436	L2 1/2x2x1/4	6'	5'4-3/16" K=0.92	139.4	1.0600	-1276	15614	0.082 [1]
T2	436 - 421	L2 1/2x2x1/4	6'	5'4-9/16" K=0.92	139.8	1.0600	-191	15533	0.012 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T12	361 - 341	L2x2x1/4	6'	2'9-1/8" K=1.21	102.4	0.9380	-1701	22643	0.075 [1]
T21	256 - 251	2L3 1/2x3 1/2x3/8x3/8	6'	2'8-17/32" K=1.00	30.4	4.9700	-2175	171077	0.013 [1]
T23	246 - 241	2L3 1/2x3 1/2x3/8x3/8	6'	2'8-17/32" K=1.00	30.4	4.9700	-1835	171077	0.011 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	457 - 436	C8x13.75	6'	5'9"	112.2 K=1.00	4.0400	-1	65362	0.000 [1]
T3	421 - 401	L2 1/2x2x1/4	6'	5'4-9/16"	139.8 K=0.92	1.0600	-72	15533	0.005 [1]
T4	401 - 396	L2 1/2x2x1/4	6'	5'4-9/16"	139.8 K=0.92	1.0600	-347	15533	0.022 [1]
T12	361 - 341	L2 1/2x2x1/4	6'	5'3-1/4"	137.9 K=0.92	1.0600	-200	15944	0.013 [1]
T16	281 - 276	L2 1/2x2x1/4	6'	5'4-3/16"	139.4 K=0.92	1.0600	-28	15614	0.002 [1]
T18	271 - 266	L2 1/2x2x1/4	6'	5'4-3/16"	139.4 K=0.92	1.0600	-699	15614	0.045 [1]
T20	261 - 256	L2 1/2x2x3/16	6'	5'4-3/16"	138.7 K=0.92	0.8090	-5451	12030	0.453 [1]
T22	251 - 246	L2 1/2x2x3/16	6'	5'4-3/16"	138.7 K=0.92	0.8090	-5874	12030	0.488 [1]
T24	241 - 221	L2 1/2x2x3/16	6'	5'4-3/16"	138.7 K=0.92	0.8090	-632	12030	0.053 [1]
T26	201 - 181	L2 1/2x2x3/16	6'	5'3-31/32"	138.4 K=0.92	0.8090	-39	12092	0.003 [1]
T27	181 - 161	2L3x2x1/4x3/8	6'	5'3-31/32"	87.0 K=1.00	2.3800	-131	60208	0.002 [1]
T28	161 - 141	L2 1/2x2x3/16	6'	5'3-31/32"	138.4 K=0.92	0.8090	-52	12092	0.004 [1]
T29	141 - 121	L2 1/2x2x3/16	6'	5'3-23/32"	138.0 K=0.92	0.8090	-487	12156	0.040 [1]
T30	121 - 101	L2 1/2x2x3/16	6'	5'3-23/32"	138.0 K=0.92	0.8090	-6840	12156	0.563 [1]
T31	101 - 81	L2 1/2x2x3/16	6'	5'3-23/32"	138.0 K=0.92	0.8090	-5	12156	0.000 [1]
T32	81 - 61	L2 1/2x2x3/16	6'	5'3-23/32"	138.0 K=0.92	0.8090	-119	12156	0.010 [1]
T33	61 - 41	L2 1/2x2x3/16	6'	5'3-23/32"	138.0 K=0.92	0.8090	-159	12156	0.013 [1]

[1] P_u / ϕP_n controls

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T3	421 - 401	L2 1/2x2x1/4	6'	5'4-9/16"	139.8 K=0.92	1.0600	-315	15533	0.020 [1]
T12	361 - 341	L2 1/2x2x1/4	6'	5'4-3/16"	139.4 K=0.92	1.0600	-5	15614	0.000 [1]
T14	321 - 301	L2 1/2x2x1/4	6'	5'4-3/16"	139.4 K=0.92	1.0600	-47	15614	0.003 [1]
T15	301 - 281	L2 1/2x2x3/16	6'	5'4-3/16"	138.7 K=0.92	0.8090	-5	12030	0.000 [1]
T24	241 - 221	L2 1/2x2x3/16	6'	5'4-3/16"	138.7 K=0.92	0.8090	-249	12030	0.021 [1]
T26	201 - 181	L2 1/2x2x3/16	6'	5'3-31/32"	138.4 K=0.92	0.8090	-88	12092	0.007 [1]
T27	181 - 161	L2 1/2x2x3/16	6'	5'3-31/32"	138.4 K=0.92	0.8090	-61	12092	0.005 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T29	141 - 121	L2 1/2x2x3/16	6'	5'3-23/32"	138.0 K=0.92	0.8090	-9032	12156	0.743 [1]
T31	101 - 81	L2 1/2x2x3/16	6'	5'3-23/32"	138.0 K=0.92	0.8090	-81	12156	0.007 [1]
T32	81 - 61	L2 1/2x2x3/16	6'	5'3-23/32"	138.0 K=0.92	0.8090	-130	12156	0.011 [1]
T33	61 - 41	L2 1/2x2x3/16	6'	5'3-23/32"	138.0 K=0.92	0.8090	-74	12156	0.006 [1]

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T29	141 - 121 (835)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	138.4 K=0.90	2.1100	-1297	31544	0.041 [1]
T29	141 - 121 (836)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	138.4 K=0.90	2.1100	-1064	31544	0.034 [1]
T29	141 - 121 (841)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	138.4 K=0.90	2.1100	-1554	31544	0.049 [1]
T29	141 - 121 (842)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	138.4 K=0.90	2.1100	-1807	31544	0.057 [1]
T29	141 - 121 (847)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	138.4 K=0.90	2.1100	-2020	31544	0.064 [1]
T29	141 - 121 (848)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	138.4 K=0.90	2.1100	-1597	31544	0.051 [1]

[1] P_u / ϕP_n controls

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T29	141 - 121 (837)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	140.8 K=0.90	2.1800	-20895	31454	0.664 [1]
T29	141 - 121 (838)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	140.8 K=0.90	2.1800	-21283	31454	0.677 [1]
T29	141 - 121 (843)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	140.8 K=0.90	2.1800	-22266	31454	0.708 [1]
T29	141 - 121 (844)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	140.8 K=0.90	2.1800	-22169	31454	0.705 [1]
T29	141 - 121 (849)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	140.8 K=0.90	2.1800	-22425	31454	0.713 [1]
T29	141 - 121 (850)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	140.8 K=0.90	2.1800	-23074	31454	0.734 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	457 - 436	3	21'	5'3"	84.0	7.0686	12019	209937	0.057 [1]
T2	436 - 421	2 3/4	15'	5'	87.3	5.9396	20383	176405	0.116 [1]
T3	421 - 401	2 3/4	20'	5'	87.3	5.9396	48371	176405	0.274 [1]
T4	401 - 396	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2	9.7900	59518	290763	0.205 [1]
T5	396 - 391	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2	9.7900	71461	290763	0.246 [1]
T6	391 - 386	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2	9.7900	86182	290763	0.296 [1]
T7	386 - 381	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2	9.7900	99749	290763	0.343 [1]
T8	381 - 376	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5	11.0000	58736	326700	0.180 [1]
T9	376 - 371	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5	11.0000	51037	326700	0.156 [1]
T10	371 - 366	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5	11.0000	40653	326700	0.124 [1]
T11	366 - 361	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5	11.0000	32142	326700	0.098 [1]
T12	361 - 341	3	20'	2'6"	40.0	7.0686	24673	209937	0.118 [1]
T13	341 - 321	3	20'	5'	80.0	7.0686	4403	209937	0.021 [1]
T14	321 - 301	3	20'	5'	80.0	7.0686	6807	209937	0.032 [1]
T15	301 - 281	3	20'	5'	80.0	7.0686	882	209937	0.004 [1]
T16	281 - 276	3	5'	5'	80.0	7.0686	6357	209937	0.030 [1]
T17	276 - 271	3	5'	5'	80.0	7.0686	12696	209937	0.060 [1]
T18	271 - 266	3	5'	5'	80.0	7.0686	18878	209937	0.090 [1]
T19	266 - 261	3	5'	5'	80.0	7.0686	27196	209937	0.130 [1]
T20	261 - 256	3	5'	5'	80.0	7.0686	30797	209937	0.147 [1]
T21	256 - 251	3	5'	2'6"	40.0	7.0686	41234	209937	0.196 [1]
T25	221 - 201	3 1/4	20'	5'	73.8	8.2958	30091	246384	0.122 [1]
T26	201 - 181	3 1/4	20'	5'	73.8	8.2958	38207	246384	0.155 [1]
T27	181 - 161	3 1/4	20'	5'	73.8	8.2958	37252	246384	0.151 [1]
T28	161 - 141	3 1/2	20'	5'	68.6	9.6211	23517	285748	0.082 [1]
T30	121 - 101	3 1/2	20'	5'	68.6	9.6211	21034	285748	0.074 [1]
T31	101 - 81	3 1/2	20'	5'	68.6	9.6211	36085	285748	0.126 [1]
T32	81 - 61	3 1/2	20'	5'	68.6	9.6211	36809	285748	0.129 [1]
T33	61 - 41	3 1/2	20'	5'	68.6	9.6211	27735	285748	0.097 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	457 - 436	L2 1/2x2x1/4	7'7-13/16"	3'7-9/16"	77.5	0.6778	2251	30502	0.074 [1]
T2	436 - 421	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	1921	23349	0.082 [1]
T3	421 - 401	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	5271	23349	0.226 [1]
T4	401 - 396	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	5588	23349	0.239 [1]
T5	396 - 391	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	6475	23349	0.277 [1]
T6	391 - 386	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	7051	23349	0.302 [1]
T7	386 - 381	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	8207	23349	0.352 [1]
T8	381 - 376	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	8253	23349	0.353 [1]
T9	376 - 371	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	7467	23349	0.320 [1]
T10	371 - 366	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	7079	23349	0.303 [1]
T11	366 - 361	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	7231	23349	0.310 [1]
T12	361 - 341	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	6622	23349	0.284 [1]
T13	341 - 321	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	5189	23349	0.222 [1]
T14	321 - 301	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	4087	23349	0.175 [1]
T15	301 - 281	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	5600	23349	0.240 [1]
T16	281 - 276	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	5975	23349	0.256 [1]
T17	276 - 271	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	6469	23349	0.277 [1]
T18	271 - 266	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	7447	23349	0.319 [1]
T19	266 - 261	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	6666	23349	0.285 [1]
T20	261 - 256	L3x3x1/4	7'6"	3'6-19/32"	48.4	0.9628	11787	41882	0.281 [1]
T21	256 - 251	L3x3x1/4	7'6"	3'6-19/32"	48.4	0.9628	16317	41882	0.390 [1]
T22	251 - 246	L3x3x1/4	7'6"	3'6-19/32"	48.4	0.9628	10319	41882	0.246 [1]
T23	246 - 241	L3x3x1/4	7'6"	3'6-19/32"	48.4	0.9628	10351	41882	0.247 [1]
T24	241 - 221	L3x3x1/4	7'6"	3'6-19/32"	48.4	0.9628	8741	41882	0.209 [1]
T25	221 - 201	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	4916	23349	0.211 [1]
T26	201 - 181	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	2370	23349	0.102 [1]
T27	181 - 161	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	2626	23349	0.112 [1]
T28	161 - 141	L3x3x1/4	7'6"	3'6-15/32"	48.4	0.9394	5644	40863	0.138 [1]
T29	141 - 121	L3x3x1/4	7'6"	3'6-15/32"	48.4	0.9394	7693	40863	0.188 [1]
T30	121 - 101	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	5319	23349	0.228 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T31	101 - 81	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	3149	23349	0.135 [1]
T32	81 - 61	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	1383	23349	0.059 [1]
T33	61 - 41	L2 1/2x2x3/16	7'6"	3'6-19/32"	75.0	0.5189	3221	23349	0.138 [1]
T34	41 - 20	L2 1/2x2x3/16	7'7-13/16"	3'7-9/16"	76.6	0.5189	5349	23349	0.229 [1]
T35	20 - 6.70833	L2x2x3/16	5'7-7/16"	3'31/32"	63.8	0.4484	1456	20176	0.072 [1]
T36	6.70833 - 0	L2x2x3/16	2'9-19/32"	1'1-13/16"	26.3	0.4484	2445	20176	0.121 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	457 - 436	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	767	30502	0.025 [1]
T2	436 - 421	L2 1/2x2x1/4	6'	5'4-9/16"	116.9	0.6778	1244	30502	0.041 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T12	361 - 341	L2x2x1/4	6'	2'9-1/8"	113.3	0.5863	1701	25505	0.067 [1]
T21	256 - 251	2L3 1/2x3 1/2x3/8x3/8	6'	2'8-17/32"	42.9	3.3759	23542	146853	0.160 [1]
T23	246 - 241	2L3 1/2x3 1/2x3/8x3/8	6'	2'8-17/32"	42.9	3.3759	1835	146853	0.012 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	457 - 436	C8x13.75	6'	5'9"	112.2	4.0400	1	119988	0.000 [1]
T2	436 - 421	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	1137	30502	0.037 [1]
T3	421 - 401	L2 1/2x2x1/4	6'	5'4-9/16"	116.9	0.6778	624	30502	0.020 [1]
T4	401 - 396	L2 1/2x2x1/4	6'	5'4-9/16"	116.9	0.6778	496	30502	0.016 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T6	391 - 386	L2 1/2x2x1/4	6'	5'8-9/32"	115.2	1.0600	671	31482	0.021 [1]
T10	371 - 366	L2 1/2x2x1/4	6'	5'8-1/32"	114.8	1.0600	668	31482	0.021 [1]
T12	361 - 341	L2 1/2x2x1/4	6'	5'3-1/4"	114.8	0.6778	576	30502	0.019 [1]
T13	341 - 321	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	384	30502	0.013 [1]
T14	321 - 301	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	319	30502	0.010 [1]
T15	301 - 281	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	0.5189	352	23349	0.015 [1]
T16	281 - 276	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	297	30502	0.010 [1]
T18	271 - 266	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	224	30502	0.007 [1]
T22	251 - 246	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	0.5189	76	23349	0.003 [1]
T24	241 - 221	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	0.5189	349	23349	0.015 [1]
T25	221 - 201	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	0.5189	649	23349	0.028 [1]
T26	201 - 181	L2 1/2x2x3/16	6'	5'3-31/32"	114.6	0.5189	676	23349	0.029 [1]
T27	181 - 161	2L3x2x1/4x3/8	6'	5'3-31/32"	77.2	1.5506	872	69778	0.012 [1]
T28	161 - 141	L2 1/2x2x3/16	6'	5'3-31/32"	114.6	0.5189	785	23349	0.034 [1]
T29	141 - 121	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	1700	23349	0.073 [1]
T30	121 - 101	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	5608	23349	0.240 [1]
T31	101 - 81	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	820	23349	0.035 [1]
T32	81 - 61	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	920	23349	0.039 [1]
T33	61 - 41	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	949	23349	0.041 [1]
T34	41 - 20	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	832	23349	0.036 [1]
T35	20 - 6.70833	2L2 1/2x2x3/16x1/4	6'	5'3-23/32"	86.4	1.0371	16552	46670	0.355 [1]

[1] P_u / ϕP_n controls

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	457 - 436	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	4186	30502	0.137 [1]
T3	421 - 401	L2 1/2x2x1/4	6'	5'4-9/16"	116.9	0.6778	458	30502	0.015 [1]
T12	361 - 341	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	282	30502	0.009 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T13	341 - 321	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	323	30502	0.011 [1]
T14	321 - 301	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	0.6778	434	30502	0.014 [1]
T15	301 - 281	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	0.5189	383	23349	0.016 [1]
T24	241 - 221	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	0.5189	751	23349	0.032 [1]
T25	221 - 201	L2 1/2x2x3/16	6'	5'3-31/32"	114.6	0.5189	635	23349	0.027 [1]
T26	201 - 181	L2 1/2x2x3/16	6'	5'3-31/32"	114.6	0.5189	687	23349	0.029 [1]
T27	181 - 161	L2 1/2x2x3/16	6'	5'3-31/32"	114.6	0.5189	671	23349	0.029 [1]
T28	161 - 141	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	749	23349	0.032 [1]
T29	141 - 121	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	12570	23349	0.538 [1]
T30	121 - 101	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	580	23349	0.025*[1]
T31	101 - 81	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	894	23349	0.038 [1]
T32	81 - 61	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	920	23349	0.039 [1]
T33	61 - 41	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	868	23349	0.037 [1]
T34	41 - 20	L2 1/2x2x3/16	6'	5'3-23/32"	114.2	0.5189	1347	23349	0.058 [1]

* DL controls
[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T8	381 - 376	2L3x2x1/4x3/8	6'	5'8-9/32"	76.6	1.5506	20713	69778	0.297 [1]

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T29	141 - 121 (835)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	152.9	1.3364	19328	58134	0.332 [1]
T29	141 - 121 (836)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	152.9	1.3364	18885	58134	0.325 [1]
T29	141 - 121 (841)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	152.9	1.3364	20072	58134	0.345 [1]
T29	141 - 121 (842)	L3x3x3/8 (TA - BU#873128)	7'6-19/32"	7'4-13/16"	152.9	1.3364	19053	58134	0.328 [1]
T29	141 - 121 (847)	L3x3x3/8 (TA -	7'6-19/3	7'4-13/1	152.9	1.3364	19806	58134	0.341 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T29	141 - 121 (848)	BU#873128) L3x3x3/8 (TA - BU#873128)	2" 7'6-19/32"	6" 7'4-13/16"	152.9	1.3364	20392	58134	0.351 [1]

[1] P_u / ϕP_n controls

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T29	141 - 121 (837)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	157.0	1.3889	11369	60417	0.188 [1]
T29	141 - 121 (838)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	157.0	1.3889	11893	60417	0.197 [1]
T29	141 - 121 (843)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	157.0	1.3889	11796	60417	0.195 [1]
T29	141 - 121 (844)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	157.0	1.3889	12593	60417	0.208 [1]
T29	141 - 121 (849)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	157.0	1.3889	12440	60417	0.206 [1]
T29	141 - 121 (850)	2L3x3x3/16x3/4	12'6-3/8"	12'3-15/32"	157.0	1.3889	12007	60417	0.199 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	457 - 436	Leg	3	4	-24073	156820	15.4	Pass
T2	436 - 421	Leg	2 3/4	46	-33559	128255	26.2	Pass
T3	421 - 401	Leg	2 3/4	76	-70416	128255	54.9	Pass
T4-T7	401 - 381	Leg	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	Note 1	Note 1	Note 1	58.8	Pass
T8-T11	381 - 361	Leg	3.5" S.R. w/ 3.5 SCH40 Half Pipe	Note 1	Note 1	Note 1	48.1	Pass
T12	361 - 341	Leg	3	191	-98223	204054	48.1	Pass
T13	341 - 321	Leg	3	236	-76943	161863	47.5	Pass
T14	321 - 301	Leg	3	269	-81573	161863	50.4	Pass
T15	301 - 281	Leg	3	302	-80376	161863	49.7	Pass
T16	281 - 276	Leg	3	336	-84853	161863	52.4	Pass
T17	276 - 271	Leg	3	345	-91349	161863	56.4	Pass
T18	271 - 266	Leg	3	354	-99374	161863	61.4	Pass
T19	266 - 261	Leg	3	366	-106507	161863	65.8	Pass
T20	261 - 256	Leg	3	378	-119617	161863	73.9	Pass
T21	256 - 251	Leg	3	387	-125575	204054	61.5	Pass
T22	251 - 246	Leg	3	398	-109530	161863	67.7	Pass
T23	246 - 241	Leg	3	410	-105951	204054	51.9	Pass
T24	241 - 221	Leg	3	427	-110921	161863	68.5	Pass
T25	221 - 201	Leg	3 1/4	458	-135318	198845	68.1	Pass
T26	201 - 181	Leg	3 1/4	491	-144173	198845	72.5	Pass
T27	181 - 161	Leg	3 1/4	524	-144482	198845	72.7	Pass
T28	161 - 141	Leg	3 1/2	559	-134214	239126	56.1	Pass
T29	141 - 121	Leg	3 1/2	592	-129372	239126	54.1	Pass
T30	121 - 101	Leg	3 1/2	625	-165514	239126	69.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T31	101 - 81	Leg	3 1/2	657	-178020	239126	74.4	Pass
T32	81 - 61	Leg	3 1/2	690	-182675	239126	76.4	Pass
T33	61 - 41	Leg	3 1/2	724	-180836	239126	75.6	Pass
T34	41 - 20	Leg	3 1/2	757	-178226	233628	76.3	Pass
T35	20 - 6.70833	Leg	3 1/4	787	-178365	209100	85.3	Pass
T36	6.70833 - 0	Leg	3 1/4	811	-182423	245056	74.4	Pass
T1	457 - 436	Diagonal	L2 1/2x2x1/4	18	-1741	24604	7.1	Pass
							19.4 (b)	
T2	436 - 421	Diagonal	L2 1/2x2x3/16	55	-2242	19146	11.7	Pass
							12.9 (b)	
T3	421 - 401	Diagonal	L2 1/2x2x3/16	86	-5336	19146	27.9	Pass
							35.4 (b)	
T4	401 - 396	Diagonal	L2 1/2x2x3/16	113	-5721	19146	29.9	Pass
							37.6 (b)	
T5	396 - 391	Diagonal	L2 1/2x2x3/16	122	-6468	19146	33.8	Pass
							43.5 (b)	
T6	391 - 386	Diagonal	L2 1/2x2x3/16	134	-8159	19146	42.6	Pass
							47.4 (b)	
T7	386 - 381	Diagonal	L2 1/2x2x3/16	146	-7034	19146	36.7	Pass
							55.2 (b)	
T8	381 - 376	Diagonal	L2 1/2x2x3/16	152	-7052	19146	36.8	Pass
							55.5 (b)	
T9	376 - 371	Diagonal	L2 1/2x2x3/16	162	-8501	19146	44.4	Pass
							50.2 (b)	
T10	371 - 366	Diagonal	L2 1/2x2x3/16	176	-7093	19146	37.0	Pass
							47.6 (b)	
T11	366 - 361	Diagonal	L2 1/2x2x3/16	188	-7396	19146	38.6	Pass
							48.6 (b)	
T12	361 - 341	Diagonal	L2 1/2x2x3/16	230	-6888	19146	36.0	Pass
							44.5 (b)	
T13	341 - 321	Diagonal	L2 1/2x2x3/16	266	-5235	19146	27.3	Pass
							34.9 (b)	
T14	321 - 301	Diagonal	L2 1/2x2x3/16	279	-4047	19146	21.1	Pass
							35.2 (b)	
T15	301 - 281	Diagonal	L2 1/2x2x3/16	312	-5720	19146	29.9	Pass
							49.3 (b)	
T16	281 - 276	Diagonal	L2 1/2x2x3/16	338	-5913	19146	30.9	Pass
							40.2 (b)	
T17	276 - 271	Diagonal	L2 1/2x2x3/16	347	-6609	19146	34.5	Pass
							43.5 (b)	
T18	271 - 266	Diagonal	L2 1/2x2x3/16	359	-6423	19146	33.5	Pass
							50.1 (b)	
T19	266 - 261	Diagonal	L2 1/2x2x3/16	371	-7392	19146	38.6	Pass
							44.8 (b)	
T20	261 - 256	Diagonal	L3x3x1/4	381	11787	43976	26.8	Pass
							63.5 (b)	
T21	256 - 251	Diagonal	L3x3x1/4	392	16317	43976	37.1	Pass
							87.9 (b)	
T22	251 - 246	Diagonal	L3x3x1/4	406	-11546	42355	27.3	Pass
							62.2 (b)	
T23	246 - 241	Diagonal	L3x3x1/4	418	10351	43976	23.5	Pass
							55.8 (b)	
T24	241 - 221	Diagonal	L3x3x1/4	455	-9052	42355	21.4	Pass
							48.8 (b)	
T25	221 - 201	Diagonal	L2 1/2x2x3/16	488	-5074	19146	26.5	Pass
							43.8 (b)	
T26	201 - 181	Diagonal	L2 1/2x2x3/16	521	-2561	19146	13.4	Pass
							22.1 (b)	
T27	181 - 161	Diagonal	L2 1/2x2x3/16	537	-2923	19146	15.3	Pass
							25.2 (b)	
T28	161 - 141	Diagonal	L3x3x1/4	566	-5893	42423	13.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
							24.8 (b)	
T29	141 - 121	Diagonal	L3x3x1/4	612	7693	42906	17.9	Pass
							33.8 (b)	
T30	121 - 101	Diagonal	L2 1/2x2x3/16	652	-5555	19146	29.0	Pass
							35.8 (b)	
T31	101 - 81	Diagonal	L2 1/2x2x3/16	687	-3396	19146	17.7	Pass
							29.3 (b)	
T32	81 - 61	Diagonal	L2 1/2x2x3/16	701	-1684	19146	8.8	Pass
							14.5 (b)	
T33	61 - 41	Diagonal	L2 1/2x2x3/16	732	-3513	19146	18.4	Pass
							30.3 (b)	
T34	41 - 20	Diagonal	L2 1/2x2x3/16	768	-5396	18871	28.6	Pass
							46.5 (b)	
T35	20 - 6.70833	Diagonal	L2x2x3/16	794	-2021	18534	10.9	Pass
							17.4 (b)	
T36	6.70833 - 0	Diagonal	L2x2x3/16	817	-3864	22580	17.1	Pass
							33.3 (b)	
T1	457 - 436	Horizontal	L2 1/2x2x1/4	36	-1276	16395	7.8	Pass
							11.0 (b)	
T2	436 - 421	Horizontal	L2 1/2x2x1/4	58	1244	32027	3.9	Pass
							10.7 (b)	
T12	361 - 341	Secondary Horizontal	L2x2x1/4	215	-1701	23775	7.2	Pass
							16.8 (b)	
T21	256 - 251	Secondary Horizontal	2L3 1/2x3 1/2x3/8x3/8	396	23542	154196	15.3	Pass
							63.4 (b)	
T23	246 - 241	Secondary Horizontal	2L3 1/2x3 1/2x3/8x3/8	422	1835	154196	1.2	Pass
							4.9 (b)	
T1	457 - 436	Top Girt	C8x13.75	7	-1	68630	0.3	Pass
T2	436 - 421	Top Girt	L2 1/2x2x1/4	10	1137	32027	3.5	Pass
							9.8 (b)	
T3	421 - 401	Top Girt	L2 1/2x2x1/4	49	624	32027	1.9	Pass
							5.4 (b)	
T4	401 - 396	Top Girt	L2 1/2x2x1/4	77	-347	16310	2.1	Pass
							4.3 (b)	
T6	391 - 386	Top Girt	L2 1/2x2x1/4	130	671	33056	2.0	Pass
T10	371 - 366	Top Girt	L2 1/2x2x1/4	171	668	33056	2.0	Pass
T12	361 - 341	Top Girt	L2 1/2x2x1/4	184	576	32027	1.8	Pass
							5.0 (b)	
T13	341 - 321	Top Girt	L2 1/2x2x1/4	194	384	32027	1.2	Pass
							3.3 (b)	
T14	321 - 301	Top Girt	L2 1/2x2x1/4	241	319	32027	1.0	Pass
							2.8 (b)	
T15	301 - 281	Top Girt	L2 1/2x2x3/16	274	352	24516	1.4	Pass
							3.0 (b)	
T16	281 - 276	Top Girt	L2 1/2x2x1/4	307	297	32027	0.9	Pass
							2.6 (b)	
T18	271 - 266	Top Girt	L2 1/2x2x1/4	358	-699	16395	4.3	Pass
							6.0 (b)	
T20	261 - 256	Top Girt	L2 1/2x2x3/16	370	-5451	12631	43.2	Pass
							47.0 (b)	
T22	251 - 246	Top Girt	L2 1/2x2x3/16	403	-5874	12631	46.5	Pass
							50.6 (b)	
T24	241 - 221	Top Girt	L2 1/2x2x3/16	415	-632	12631	5.0	Pass
							5.5 (b)	
T25	221 - 201	Top Girt	L2 1/2x2x3/16	430	649	24516	2.6	Pass
							5.6 (b)	
T26	201 - 181	Top Girt	L2 1/2x2x3/16	463	676	24516	2.8	Pass
							5.8 (b)	
T27	181 - 161	Top Girt	2L3x2x1/4x3/8	496	872	73267	1.2	Pass
							3.8 (b)	
T28	161 - 141	Top Girt	L2 1/2x2x3/16	529	785	24516	3.2	Pass

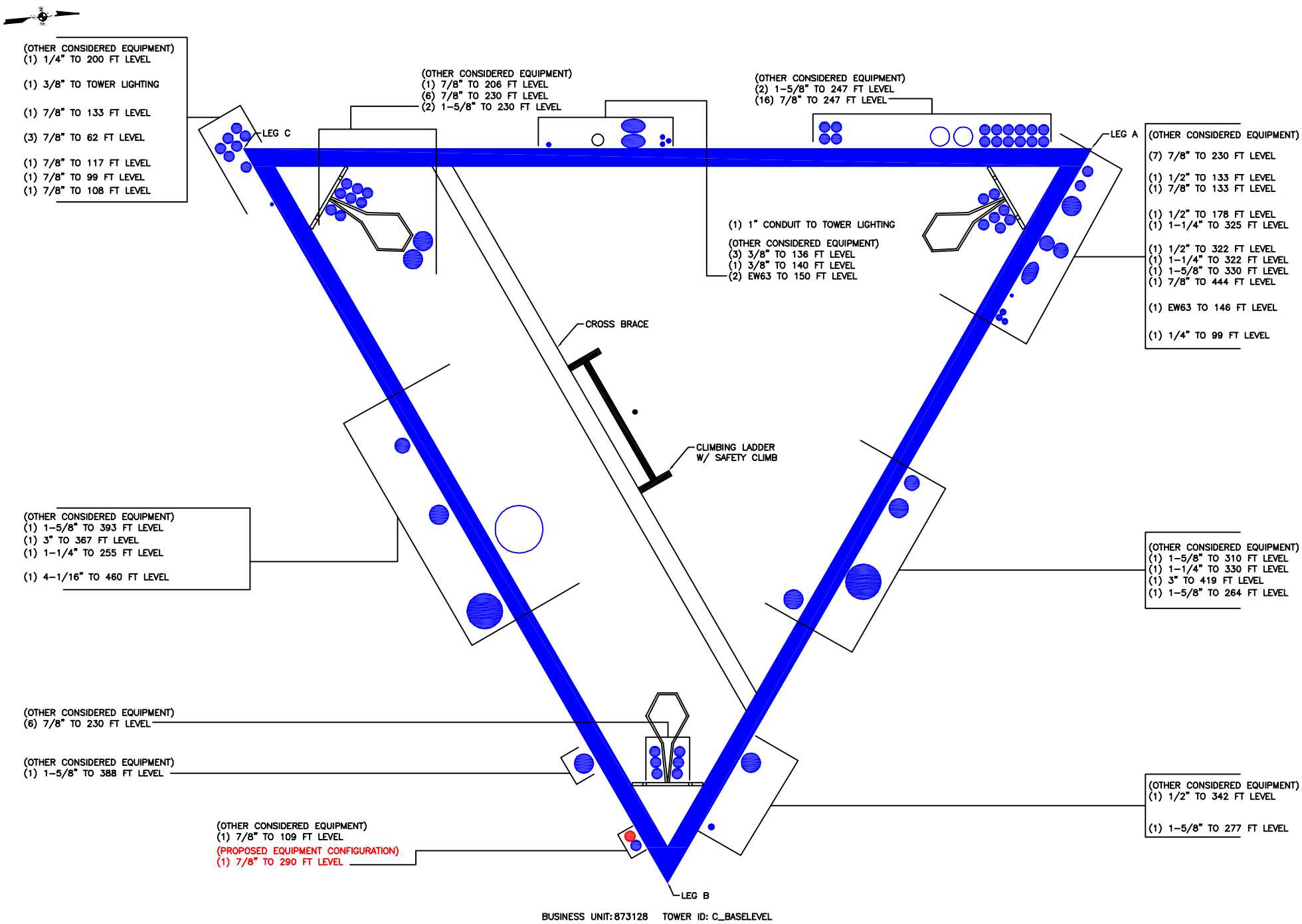
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
							6.8 (b)	
T29	141 - 121	Top Girt	L2 1/2x2x3/16	562	1700	24516	6.9	Pass
							14.7 (b)	
T30	121 - 101	Top Girt	L2 1/2x2x3/16	595	-6840	12763	53.6	Pass
							59.0 (b)	
T31	101 - 81	Top Girt	L2 1/2x2x3/16	628	820	24516	3.3	Pass
							7.1 (b)	
T32	81 - 61	Top Girt	L2 1/2x2x3/16	661	920	24516	3.8	Pass
							7.9 (b)	
T33	61 - 41	Top Girt	L2 1/2x2x3/16	694	949	24516	3.9	Pass
							8.2 (b)	
T34	41 - 20	Top Girt	L2 1/2x2x3/16	727	832	24516	3.4	Pass
							7.2 (b)	
T35	20 - 6.70833	Top Girt	2L2 1/2x2x3/16x1/4	789	16552	49003	33.8	Pass
							55.6 (b)	
T1	457 - 436	Mid Girt	L2 1/2x2x1/4	13	4186	32027	13.1	Pass
							36.1 (b)	
T3	421 - 401	Mid Girt	L2 1/2x2x1/4	80	-315	16310	1.9	Pass
							4.0 (b)	
T12	361 - 341	Mid Girt	L2 1/2x2x1/4	199	282	32027	0.9	Pass
							2.4 (b)	
T13	341 - 321	Mid Girt	L2 1/2x2x1/4	242	323	32027	1.0	Pass
							2.8 (b)	
T14	321 - 301	Mid Girt	L2 1/2x2x1/4	277	434	32027	1.4	Pass
							3.7 (b)	
T15	301 - 281	Mid Girt	L2 1/2x2x3/16	308	383	24516	1.6	Pass
							3.3 (b)	
T24	241 - 221	Mid Girt	L2 1/2x2x3/16	433	751	24516	3.1	Pass
							6.5 (b)	
T25	221 - 201	Mid Girt	L2 1/2x2x3/16	466	635	24516	2.6	Pass
							5.5 (b)	
T26	201 - 181	Mid Girt	L2 1/2x2x3/16	499	687	24516	2.8	Pass
							5.9 (b)	
T27	181 - 161	Mid Girt	L2 1/2x2x3/16	532	671	24516	2.7	Pass
							5.8 (b)	
T28	161 - 141	Mid Girt	L2 1/2x2x3/16	565	749	24516	3.1	Pass
							6.5 (b)	
T29	141 - 121	Mid Girt	L2 1/2x2x3/16	598	-9032	12763	70.8	Pass
							84.5 (b)	
T30	121 - 101	Mid Girt	L2 1/2x2x3/16	630	580	23349	2.5	Pass
							5.0 (b)	
T31	101 - 81	Mid Girt	L2 1/2x2x3/16	664	894	24516	3.6	Pass
							7.7 (b)	
T32	81 - 61	Mid Girt	L2 1/2x2x3/16	697	920	24516	3.8	Pass
							7.9 (b)	
T33	61 - 41	Mid Girt	L2 1/2x2x3/16	730	868	24516	3.5	Pass
							7.5 (b)	
T34	41 - 20	Mid Girt	L2 1/2x2x3/16	759	1347	24516	5.5	Pass
							11.6 (b)	
T1	457 - 436	Guy A@446.5	9/16	826	13614	22050	61.7	Pass
T8	381 - 376	Guy A@381	1 3/8	829	64080	146157	43.8	Pass
T21	256 - 251	Guy A@254.5	1 1/4	832	62232	120958	51.4	Pass
T29	141 - 121	Guy A@131	11/16	846	22206	31499	70.5	Pass
T1	457 - 436	Guy B@446.5	9/16	825	13618	22050	61.8	Pass
T8	381 - 376	Guy B@381	1 3/8	828	65678	146157	44.9	Pass
T21	256 - 251	Guy B@254.5	1 1/4	831	62478	120958	51.7	Pass
T29	141 - 121	Guy B@131	11/16	839	22057	31499	70.0	Pass
T1	457 - 436	Guy C@446.5	9/16	824	13560	22050	61.5	Pass
T8	381 - 376	Guy C@381	1 3/8	827	62640	146157	42.9	Pass
T21	256 - 251	Guy C@254.5	1 1/4	830	61294	120958	50.7	Pass
T29	141 - 121	Guy C@131	11/16	833	21634	31499	68.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T8	381 - 376	Top Guy Pull-Off@381	2L3x2x1/4x3/8	142	20713	73267	28.3 89.3 (b)	Pass
T29	141 - 121	Torque Arm Top@131	L3x3x3/8 (TA - BU#873128)	848	20392	61040	33.4 57.4 (b)	Pass
T29	141 - 121	Torque Arm Bottom@131	2L3x3x3/16x3/4	850	-23074	33027	69.9	Pass
							Summary	
							Leg (T35) 85.3	Pass
							Diagonal (T21) 87.9	Pass
							Horizontal (T1) 11.0	Pass
							Secondary Horizontal (T21) 63.4	Pass
							Top Girt (T30) 59.0	Pass
							Mid Girt (T29) 84.5	Pass
							Guy A (T29) 70.5	Pass
							Guy B (T29) 70.0	Pass
							Guy C (T29) 68.7	Pass
							Top Guy Pull-Off (T8) 89.3	Pass
							Torque Arm Top (T29) 57.4	Pass
							Torque Arm Bottom (T29) 69.9	Pass
							Bolt Checks 89.3	Pass
							RATING = **89.3**	**Pass**

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

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 873128 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 519.67 ft (NAVD 88)
Latitude: 41.27896
Longitude: -73.18511

Wind

Results:

Wind Speed:	122 Vmph	Connecticut State Building Code Wind speed: 125mph
10-year MRI	76 Vmph	
25-year MRI	86 Vmph	
50-year MRI	92 Vmph	
100-year MRI	99 Vmph	

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

Date Accessed: Mon Aug 27 2018

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 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

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

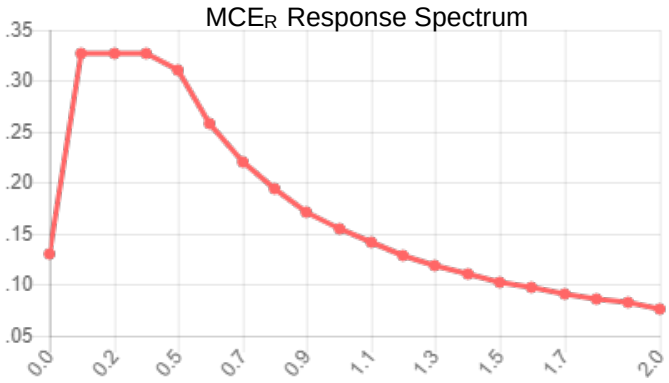
Seismic

Site Soil Class: D - Stiff Soil

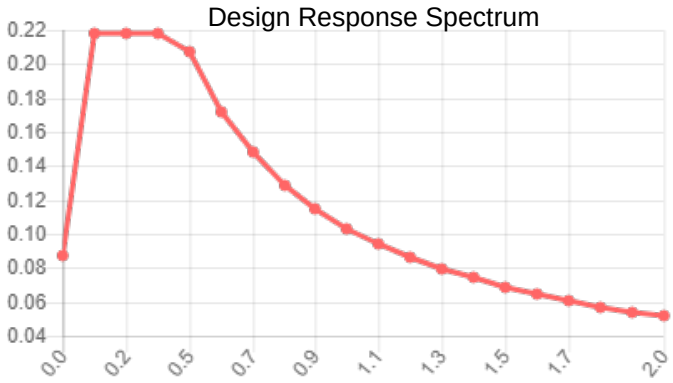
Results:

S_S :	0.204	S_{DS} :	0.218
S_1 :	0.065	S_{D1} :	0.103
F_a :	1.600	T_L :	6.000
F_v :	2.400	PGA :	0.110
S_{MS} :	0.327	PGA_M :	0.174
S_{M1} :	0.155	F_{PGA} :	1.580
		I_e :	1

Seismic Design Category B



S_a(g) vs T(s)



S_a(g) vs T(s)

Data Accessed: Mon Aug 27 2018

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Mon Aug 27 2018

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 50-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.

Project Name:	Trumbull	**Engineer:**	JRM
Project Number:	25575.244275	**Check:**	AJO
Client Site Number:	BU 873128	**Date:**	03/26/19

Solid rod Leg + Half Sleeve R/F - - - Elevations: 381' - 401'

ϕc =	0.90	- LRFD strength reduction factor (compression)
ϕT =	0.90	- LRFD strength reduction factor (tension)
ϕw =	0.75	- LRFD strength reduction factor (weld shear)
ϕv =	0.75	- LRFD strength reduction factor (shear)

Input - Loads

$P_{initial}$:	30.0	kips - force from initial load (no wind)
P_{wind}:	128.0	kips - force due to final loading including reinforcement
T_u:	99.7	kips - maximum load on leg

Quick Check

Weld Size:	OK
Weld Connection:	44.5%
Crushing Check:	58.8%
Leg Comp. Check:	47.6%
Sleeve Check:	32.1%
Built-up Check:	54.5%
Slenderness Check:	OK
Leg Tension Check:	45.2%

Input - Tower Leg 3" Dia. SR

K:	1.00	- effective length factor for leg
L_u:	5.00	ft - unbraced length of tower leg
F_{y_leg}:	33.00	ksi - minimum specified yield strength of tower leg
F_{u_leg}:	60.00	ksi - minimum specified ultimate strength of tower leg
r:	0.75	in - minimum radius of gyration of tower leg
A_{leg}:	7.07	in^2 - area of tower leg
Di:	0.00	in - inside diameter of tower leg
t_{leg}:	1.50	in - thickness of tower leg
f`c:	0.00	ksi - minimum specified compressive strength of grout (If ungrouted enter 0)

Input - Sleeve R/F 1 **Sleeve:** 3.75" OD Inner Sleeve & 3STD Outer Sleeve

F_{y_sleeve}:	35.00	ksi - minimum specified yield strength of sleeve r/f
F_{u_sleeve}:	60.00	ksi - minimum specified ultimate strength of sleeve r/f
r_{x_sleeve}:	0.51	in - minimum radius of gyration of sleeve r/f about the x-axis
r_{y_sleeve}:	1.16	in - minimum radius of gyration of sleeve r/f about the y-axis
A_{sleeve}:	1.11	in^2 - area of sleeve r/f
t_{sleeve}:	0.22	in - thickness of tower leg

Termination: Connected to Leg ONLY

Input - Sleeve Connection to Leg

a:	6.00	in - spacing of connectors connecting the sleeve to the leg
D:	3.00	- weld size for the weld connecting the sleeve to the leg (unit = # of 16ths)
Length //:	3.00	in - length of weld on each side of the leg at the termination
Length ⊥:	0.00	in - length of weld at the bottom/top of the leg sleeve at termination ($\pi D/2$)
No:	2.00	- number of longitudinal welds per end of the leg (typically near side & far side, so 2)
F_{EXX}:	70.00	ksi - weld electrode classification
Width:	3.50	in - maximum width of the built-up leg
Gap:	12.00	in - length of leg considered for crushing

Input - Built-up Leg Section

r_{x_bu}:	0.90	in - minimum radius of gyration of the built-up section about the x-axis
r_{y_bu}:	0.91	in - minimum radius of gyration of the built-up section about the y-axis

Input - Leg w/ Single Sleeve

A:	8.18	in^2 - area of (1) sleeve r/f + leg
r_{x_bu}:	0.80	in - minimum radius of gyration of the built-up section about the x-axis
r_{y_bu}:	0.82	in - minimum radius of gyration of the built-up section about the y-axis
Inner Sleeve Gap:	18.00	in - length of leg considered for crushing

Input - Grouted Leg

Ec:	0	ksi - Modulus of Elasticity of Grout
E_leg:	29,000	ksi - Modulus of Elasticity of Leg
E_sleeve:	29,000	ksi - Modulus of Elasticity of Sleeve

Project Name:	Trumbull	**Engineer:**	JRM
Project Number:	25575.244275	**Check:**	AJO
Client Site Number:	BU 873128	**Date:**	3/26/2019
Elevation:	361 - 381		

Solid Rod Leg + Half Sleeve R/F

Φc =	0.90	- LRFD strength reduction factor (compression)	Mast St.: 1.00 - from tnxTower
ΦT =	0.90	- LRFD strength reduction factor (tension)	
Φw =	0.75	- LRFD strength reduction factor (weld shear)	
Φv =	0.75	- LRFD strength reduction factor (shear)	

Input - Loads

$P_{initial}$:	30.0	kips - force from initial load (no wind)
P_{wind}:	133.5	kips - force due to final loading including reinforcement
T_u:	58.7	kips - maximum load on leg

Quick Check

Weld Size:	OK
Weld Connection:	48.1%
Crushing Check:	44.9%
Leg Comp. Check:	40.4%
Sleeve Check:	28.7%
Built-up Check:	47.7%
Slenderness Check:	OK
Leg Tension Check:	19.6%

Input - Tower Leg

3.5" SR

K:	1.00	- effective length factor for leg
L_u:	5.00	ft - unbraced length of tower leg
F_{y_leg}:	33.00	ksi - minimum specified yield strength of tower leg
F_{u_leg}:	60.00	ksi - minimum specified ultimate strength of tower leg
r:	0.88	in - minimum radius of gyration of tower leg
A_{leg}:	9.62	in^2 - area of tower leg
Di:	0.00	in - inside diameter of tower leg
t_{leg}:	1.75	in - thickness of tower leg
$f`_c$:	0.00	ksi - minimum specified compressive strength of grout (If ungrouted enter 0)

Input - Sleeve R/F

3.5 STD Gap Check: OK

F_{y_sleeve}:	35.00	ksi - minimum specified yield strength of sleeve r/f
F_{u_sleeve}:	60.00	ksi - minimum specified ultimate strength of sleeve r/f
r_{x_sleeve}:	0.58	in - minimum radius of gyration of sleeve r/f about the x-axis
r_{y_sleeve}:	1.34	in - minimum radius of gyration of sleeve r/f about the y-axis
A_{sleeve}:	1.34	in^2 - area of sleeve r/f
t_{sleeve}:	0.23	in - thickness of sleeve r/f

Termination: Connected to Leg ONLY

Input - Sleeve Connection to Leg

a:	6.00	in - spacing of connectors connecting the sleeve to the leg
D:	3.00	- weld size for the weld connecting the sleeve to the leg (unit = # of 16ths)
Length //:	3.00	in - length of weld on each side of the leg at the termination
Length ⊥:	0.00	in - length of weld at the bottom/top of the leg sleeve at termination ($\pi D/2$)
No:	2.00	- number of longitudinal welds per end of the leg (typically near side & far side, so 2)
F_{EXX}:	70.00	ksi - weld electrode classification
Width:	4.00	in - maximum width of the built-up leg
Gap:	12.00	in - length of leg considered for crushing

Input - Built-up Leg Section

3.5" SR w/3.5 STD Half Sleeve

r_{x_bu}:	0.93	in - minimum radius of gyration of the built-up section about the x-axis
r_{y_bu}:	0.94	in - minimum radius of gyration of the built-up section about the y-axis

Bearing: 48.8%

Pad		
Width at the top of the pad (ft)	**Width at the bottom of the pad (ft)**	**Thickness of the pad (ft)**
10.50	10.50	2.00

Pier			
Width at the top of the pier (ft)	**Width at the bottom of the pier (ft)**	**Length of the pier (ft)**	**Pier Extension above grade (ft)**
4.50	10.00	3.00	0.50

Soil Density (kcf)	**Depth to base of foundation (ft)**	**Factored Vertical Load (kip)**	**Factored Horizontal Load (kip)**
0.115	5.00	482.4	9.00

Weight of Concrete	57.86	**kip**
W_c (Replaced)	13.65	**kip**
Weight of Soil	18.54	**kip**
Total Vertical Load	574.05	**kip**
Moment	45.02	**kip-ft**
Section Modulus - S	136.43	**ft^3**
Area - A	110.25	**ft^2**
Min. Pressure - q_{min}	4.88	**ksf**
Max Pressure - q_{max}	5.54	**ksf**
All. Pressure - q_{all}	6.00	**ksf**
Factor of Safety	3	
ϕ	**0.6**	
ϕq_n	**10.8**	

Net Bearing Pressure? No

Lateral: 5.1%

Coefficient of Friction (μ)	**Friction Angle (ϕ) (Degrees)**	**Cohesion (ksf)**
0.4	34	0

K_P	3.54	
$Pressure_{Top}$	1.22	**ksf**
$Pressure_{Bottom}$	2.03	**ksf**
Force from pressure	34.17	**kip**
Force from friction	191.35	**kip**
ϕ	**0.75**	
ϕR_n	**169.14**	**kip**

Deadman Anchor Analysis: A - Anchor Path

Project Name: Trumbull
Job #: TEP No. 25575.244275
Client: BU 873128
Analysis by: JRM
Checked by: AJO

Anchor Block is Adequate for Uplift	**20.1%**
Anchor Block is Adequate for Lateral	**57.5%**

Loads

U_{max}: 99.56 kips - maximum uplift reaction
H_{max}: 145.09 kips - maximum horizontal reaction

Capacity

U_{all}: 471.05 kips - allowable uplift
H_{all}: 240.26 kips - allowable horizontal

Foundation Input

Guy Path: A
Anchor Ring: Anchor Path

W_b: 18.50 ft - width of anchor block
L_b: 23.00 ft - length of anchor block
T_b: 3.30 ft - thickness of anchor block
d: 2.00 ft - depth from t/ grade to t/ anchor block
b: 5.30 ft - depth from t/ grade to b/ anchor block

Ultimate Soil Properties

D_w: 8.50 ft - depth from t/ grade to water table

Geotechnical Firm: FDH Engineering
Report: 04-1229E
Date: 2/3/2005
Notes: Boring B-4
42" Frost Depth (per CT building code)

USE? Yes
Soil Berm:
depth: 4.00 ft
width: 18.50 ft
length: 23.50 ft
density: 110.00 pcf

Layer	Begin (ft)	End (ft)	ϕ Friction Angle (deg)	c Ult. Cohesion (psf)	γ Eff. Unit Weight (pcf)	f_s Ult. Skin Friction (ksf)	μ Friction Factor
1	0.00	2.00	33.00	0.00	115.00	0.00	0.00
2	2.00	3.50	0.00	0.00	115.00	0.00	0.40
3	3.50	4.00	33.00	0.00	115.00	0.36	0.40
4	4.00	5.30	41.00	0.00	125.00	0.65	0.40
5							
6							

Weight: 191.29 kips

Analysis Criteria

Uplift:	F_{s_sides}=	21.52	Yes	Horizontal:	F_{s_sides} =	31.37	Yes
	F_{s_front}=	23.65	Yes		F_{s_top} =	0.00	No
	F_{s_back}=	0.00	No		F_{s_bottom} =	0.00	No
					$F_{\perp} \cdot \mu$ =	183.32	Yes

Deadman Anchor Analysis: B - Anchor Path

Project Name: Trumbull
Job #: TEP No. 25575.244275
Client: BU 873128
Analysis by: JRM
Checked by: AJO

Anchor Block is Adequate for Uplift	**41.6%**
Anchor Block is Adequate for Lateral	**22.6%**
Concrete Block is Adequate for Lateral	**79.8%**
Concrete Block is Adequate for Overturning	**40.3%**

Loads

U_1: 85.45 kips - uplift reaction (block front)
H_1: 104.04 kips - maximum horizontal reaction (block
U_2: 13.82 kips - uplift reaction (block back)
H_2: 41.47 kips - maximum horizontal reaction (block back)

Capacity

U_{all}: 195.65 kips - allowable uplift
H_{all}: 439.24 kips - allowable horizontal

Foundation Input

Guy Path: B
Anchor Ring: Anchor Path

W_b: 7.00 ft - width of anchor block
L_b: 6.00 ft - length of anchor block
T_b: 5.50 ft - thickness of anchor block
d: 4.30 ft - depth from t/ grade to t/ anchor block
b: 9.80 ft - depth from t/ grade to b/ anchor block

Ultimate Soil Properties

D_w: 8.50 ft - depth from t/ grade to water table

Geotechnical Firm: FDH Engineering
Report: 04-1229E
Date: 2/3/2005
Notes: Boring B-2
42" Frost Depth (per CT building code)

USE? Yes
Concrete Berm:
depth (above gr): 3.00 ft
depth (below gr): 2.30 ft
width: 15.00 ft
length: 15.00 ft
density: 150.00 pcf

Layer	Begin (ft)	End (ft)	ϕ Friction Angle (deg)	c Ult. Cohesion (psf)	γ Eff. Unit Weight (pcf)	f_s Ult. Skin Friction (ksf)	μ Friction Factor
1	0.00	2.30	0.00	0.00	115.00	0.00	0.00
2	2.30	3.50	34.00	0.00	115.00	0.00	0.40
3	3.50	4.30	0.00	5000.00	135.00	2.32	0.40
4	4.30	8.50	0.00	5000.00	135.00	2.32	0.40
5	8.50	9.80	0.00	5000.00	72.60	2.32	0.40
6							

Analysis Criteria

Uplift:	F_{s_sides}=	113.38	Yes	Horizontal:	F_{s_sides} =	138.05	Yes
	F_{s_front}=	76.56	Yes		F_{s_top} =	0.00	No
	F_{s_back}=	0.00	No		F_{s_bottom} =	0.00	No
					$F_{\perp} \cdot \mu$ =	88.81	Yes

Deadman Anchor Analysis: C - Anchor Path

Project Name: Trumbull
Job #: TEP No. 25575.244275
Client: BU 873128
Analysis by: JRM
Checked by: AJO

Anchor Block is Adequate for Uplift	**67.9%**
Anchor Block is Adequate for Lateral	**49.0%**
Concrete Block is Adequate for Lateral	**77.9%**
Concrete Block is Adequate for Overturning	**39.6%**

Loads

U_1: 82.08 kips - uplift reaction (block front)
H_1: 102.28 kips - maximum horizontal reaction (block f
U_2: 13.62 kips - uplift reaction (block back)
H_2: 40.53 kips - maximum horizontal reaction (block back)

Capacity

U_{all}: 115.11 kips - allowable uplift
H_{all}: 198.72 kips - allowable horizontal

Foundation Input

Guy Path: C
Anchor Ring: Anchor Path

W_b: 7.00 ft - width of anchor block
L_b: 6.00 ft - length of anchor block
T_b: 5.50 ft - thickness of anchor block
d: 4.30 ft - depth from t/ grade to t/ anchor block
b: 9.80 ft - depth from t/ grade to b/ anchor block

Ultimate Soil Properties

D_w: 8.50 ft - depth from t/ grade to water table

Geotechnical Firm: FDH Engineering
Report: 04-1229E
Date: 2/3/2005
Notes: Boring B-3
42" Frost Depth (per CT building code)

USE? Yes
Concrete Berm:
depth (above gr): 3.00 ft
depth (below gr): 2.30 ft
width: 15.00 ft
length: 15.00 ft
density: 150.00 pcf

Layer	Begin (ft)	End (ft)	ϕ Friction Angle (deg)	c Ult. Cohesion (psf)	γ Eff. Unit Weight (pcf)	f_s Ult. Skin Friction (ksf)	μ Friction Factor
1	0.00	2.30	0.00	0.00	115.00	0.00	0.00
2	2.30	4.00	34.00	0.00	115.00	0.00	0.40
3	4.00	8.50	39.00	0.00	120.00	0.84	0.40
4	8.50	9.00	39.00	0.00	57.60	1.09	0.40
5	9.00	15.50	43.00	0.00	62.60	1.24	0.40
6							

Analysis Criteria

Uplift:	F_{s_sides}=	44.23	Yes	Horizontal:	F_{s_sides} =	55.12	Yes
	F_{s_front}=	30.29	Yes		F_{s_top} =	0.00	No
	F_{s_back}=	0.00	No		F_{s_bottom} =	0.00	No
					$F_{\perp} \cdot \mu$ =	86.86	Yes

RF EMISSIONS COMPLIANCE REPORT

Crown Castle on behalf of Dish Network, LLC

Crown Castle Site Name: Trumbull
Crown Castle Site ID: 873128
Dish Network, LLC Site ID: CT0100010A
800 Booth Hill Road
Shelton, CT
4/9/2019

Report Status:

Dish Network, LLC Is Compliant

sealed 11apr2019 mike@h2dc.com
H2DC PLLC CT CoA: 0001714

Prepared By:

Sitesafe, LLC

8618 Westwood Center Drive,
Suite 315

Vienna, VA 22182

Voice 703-276-1100
Fax 703-276-1169

Engineering Statement in Re:
Electromagnetic Energy Analysis
Crown Castle
Shelton, CT

My signature on the cover of this document indicates:

That I am registered as a Professional Engineer in the jurisdiction indicated; and

That I have extensive professional experience in the wireless communications engineering industry; and

That I am thoroughly familiar with the Rules and Regulations of the Federal Communications Commission ("the FCC" and "the FCC Rules") both in general and specifically as they apply to the FCC's Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; and

That the technical information serving as the basis for this report was supplied by Crown Castle (See attached Site Summary and Carrier documents), and that Dish Network, LLC's installations involve communications equipment, antennas and associated technical equipment at a location referred to as the "Trumbull" ("the site"); and

That Dish Network, LLC proposes to operate at the site with transmit antennas listed in the carrier summary and with a maximum effective radiated power as specified by Dish Network, LLC and shown on the worksheet, and that worst-case 100% duty cycle have been assumed; and

That in addition to the emitters specified in the worksheet, there are additional collocated point-to-point microwave facilities on this structure and, the antennas used are highly directional oriented at angles at or just below the horizontal and, that the energy present at ground level is typically so low as to be considered insignificant and have not been included in this analysis. A list of microwave antennas is included; and

That this analysis has been performed with the assumption that the ground immediately surrounding the tower is primarily flat or falling; and

That at this time, the FCC requires that certain licensees address specific levels of radio-frequency energy to which workers or members of the public might possibly be exposed (at §1.1307(b) of the FCC Rules); and

That such consideration of possible exposure of humans to radio-frequency radiation must utilize the standards set by the FCC, which is the Federal Agency having jurisdiction over communications facilities; and

That the FCC rules define two tiers of permissible exposure guidelines: 1) "uncontrolled environments," defined as situations in which persons may not be aware of (the "general public"), or may not be able to control their exposure to a transmission facility; and (2) "controlled environments," which defines situations in which persons are aware of their potential for exposure (industry personnel); and

That this statement specifically addresses the uncontrolled environment (which is more conservative than the controlled environment) and the limit set forth in the FCC rules for licensees of Dish Network, LLC's operating frequency as shown on the attached antenna worksheet; and

That when applying the uncontrolled environment standards, the predicted Maximum Power Density at two meters above ground level from the proposed Dish Network, LLC operation is no more than 0.021% of the maximum in any accessible area on the ground and

That it is understood per FCC Guidelines and OET65 Appendix A, that regardless of the existent radio-frequency environment, only those licenses whose contributions exceed five percent of the exposure limit pertinent to their operation(s) bear any responsibility for bringing any non-compliant area(s) into compliance; and

That when applying the uncontrolled environment standards, the cumulative predicted energy density from the proposed operation is no more than 21.878% of the maximum in any accessible area up to two meters above the ground per OET-65; and

That the calculations provided in this report are based on data provided by the client and antenna pattern data supplied by the antenna manufacturer, in accordance with FCC guidelines listed in OET-65. Horizontal and vertical antenna patterns are combined for modeling purposes to accurately reflect the energy two meters above ground level where on-axis energy refers to maximum energy two meters above the ground along the azimuth of the antenna and where area energy refers to the maximum energy anywhere two meters above the ground regardless of the antenna azimuth, accounting for cumulative energy from multiple antennas for the carrier and frequency range indicated; and

That the Occupational Safety and Health Administration has policies in place which address worker safety in and around communications sites, thus individual companies will be responsible for their employees' training regarding Radio Frequency Safety.

In summary, it is stated here that the proposed operation at the site would not result in exposure of the Public to excessive levels of radio-frequency energy as defined in the FCC Rules and Regulations, specifically 47 CFR 1.1307 and that Dish Network, LLC's proposed operation is completely compliant.

Finally, it is stated that access to the tower should be restricted to communication industry professionals, and approved contractor personnel trained in radio-frequency safety; and that the instant analysis addresses exposure levels at two meters above ground level and does not address exposure levels on the tower, or in the immediate proximity of the antennas.

Crown Castle
Trumbull
Site Summary

Carrier	Area Maximum Percentage MPE
American Medical Response Ambulance Services	0.059 %
American Messaging Company	0.004 %
CRN Wireless, LLC	0.778 %
Calamp Corporation	0.015 %
Connecticut Public Broadcasting, Inc.	0.014 %
Connecticut Public Broadcasting, Inc.	0.146 %
Connoisseur Media, LLC	4.8 %
Crown MAS	0.003 %
Dish Network, LLC (Proposed)	0.009 %
Dish Network, LLC (Proposed)	0.012 %
Marcus Communications, LLC	0.023 %
Shelton Police Department	0.007 %
Spok, Inc.	0.003 %
Spok, Inc.	0.002 %
T-Mobile	0.046 %
T-Mobile	0.052 %
T-Mobile	0.029 %
T-Mobile	0.029 %
The Kennedy Center, Inc.	0.043 %
U.S. Customs and Border Protection	0.053 %
Unknown Carrier	0.006 %
Unknown Carrier	0.051 %
Verizon Wireless	0.21 %
Verizon Wireless	0.127 %
Verizon Wireless	0.102 %
Verizon Wireless	0.081 %
WEZN	4.919 %
WPKN	5.747 %
WSHU	4.506 %

Composite Site MPE: 21.878 %

American Medical Response Ambulance Services
Trumbull
Carrier Summary

Frequency:	150	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	0.11725	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.05863	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	PD220-5	143	0	100	0.117252	0.058626	0.117252	0.058626

American Messaging Company
Trumbull
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	0.02293	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.00405	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	DB809KT3E-Y	261	0	100	0.022932	0.004047	0.022932	0.004047

CRN Wireless, LLC
Trumbull
Carrier Summary

Frequency:	959	MHz
Maximum Permissible Exposure (MPE):	639.33	µW/cm^2
Maximum power density at ground level:	4.9764	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.77837	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
CSI	AY/806-960/11	54	180	77	4.755192	0.743774	4.976402	0.778374

Calamp Corporation
Trumbull
Carrier Summary

Frequency:	150	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	0.03008	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.01504	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
TELEWAVE	ANT150F6	273	0	100	0.030082	0.015041	0.030082	0.015041

Connecticut Public Broadcasting, Inc.
Trumbull
Carrier Summary

Frequency:	150	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	0.02723	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.01361	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Dielectric	TFU-12DSB-R	328	0	100	0.017596	0.008798	0.018839	0.009419
Dielectric	TFU-18JTH/VP-R	477	0	100	0.008214	0.004107	0.008793	0.004396

Connecticut Public Broadcasting, Inc.
Trumbull
Carrier Summary

Frequency:	900	MHz
Maximum Permissible Exposure (MPE):	600	µW/cm^2
Maximum power density at ground level:	0.87856	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.14643	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
CSI	AY/806-960/11	136	0	100	0.825334	0.137556	0.878564	0.146427

Connoisseur Media, LLC
Trumbull
Carrier Summary

Frequency:	99.9	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	9.60022	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	4.80011	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ERI	SHP-2AE	367	0	20500	9.600222	4.800111	9.600224	4.800112

Crown MAS
Trumbull
Carrier Summary

Frequency:	450	MHz
Maximum Permissible Exposure (MPE):	300	µW/cm^2
Maximum power density at ground level:	0.01016	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.00339	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	PD455-6	352	0	100	0.01016	0.003387	0.01016	0.003387

Dish Network, LLC (Proposed)
Trumbull
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	0.0941	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.00941	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Comba	ODI2-065R18K-GQ	290	0	1081	0.0554	0.00554	0.087639	0.008764
Comba	ODI2-065R18K-GQ	290	120	1081	0.055224	0.005522	0.087639	0.008764
Comba	ODI2-065R18K-GQ	290	240	1081	0.0554	0.00554	0.087639	0.008764

Dish Network, LLC (Proposed)
Trumbull
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	0.11667	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.01167	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Comba	ODI2-065R18K-GQ	290	0	1081	0.056996	0.0057	0.104225	0.010423
Comba	ODI2-065R18K-GQ	290	120	1081	0.057053	0.005705	0.104225	0.010423
Comba	ODI2-065R18K-GQ	290	240	1081	0.056996	0.0057	0.104225	0.010423

Marcus Communications, LLC
Trumbull
Carrier Summary

Frequency:	450	MHz
Maximum Permissible Exposure (MPE):	300	µW/cm^2
Maximum power density at ground level:	0.06772	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.02257	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	DB408	325	0	100	0.067719	0.022573	0.067719	0.022573

Shelton Police Department
Trumbull
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	0.04133	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.00729	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	BMR10-O	283	0	100	0.020216	0.003568	0.041331	0.007294

Spok, Inc.
Trumbull
Carrier Summary

Frequency:	900	MHz
Maximum Permissible Exposure (MPE):	600	µW/cm^2
Maximum power density at ground level:	0.02046	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.00341	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Antel	BCD87077	350	0	100	0.020024	0.003337	0.020459	0.00341

Spok, Inc.
Trumbull
Carrier Summary

Frequency:	901	MHz
Maximum Permissible Exposure (MPE):	600.67	µW/cm^2
Maximum power density at ground level:	0.01281	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.00213	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	PG1N0F-0090-310	335	0	100	0.012806	0.002132	0.012806	0.002132

T-Mobile
Trumbull
Carrier Summary

Frequency:	700	MHz
Maximum Permissible Exposure (MPE):	466.67	µW/cm^2
Maximum power density at ground level:	0.21629	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.04635	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APXVAARR24_43-U-NA20	247	50	1307	0.131059	0.028084	0.138959	0.029777
RFS	APXVAARR24_43-U-NA20	247	150	1307	0.131059	0.028084	0.138959	0.029777
RFS	APXVAARR24_43-U-NA20	247	310	1307	0.131009	0.028073	0.138959	0.029777

T-Mobile
Trumbull
Carrier Summary

Frequency:	600	MHz
Maximum Permissible Exposure (MPE):	400	µW/cm^2
Maximum power density at ground level:	0.20793	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.05198	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APXVAARR24_43-U-NA20	247	50	1251	0.136922	0.03423	0.14004	0.03501
RFS	APXVAARR24_43-U-NA20	247	150	1251	0.136922	0.03423	0.14004	0.03501
RFS	APXVAARR24_43-U-NA20	247	310	1251	0.137206	0.034302	0.14004	0.03501

T-Mobile
Trumbull
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	0.29298	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.0293	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APX16DWV-16DWVS-C-A20	247	50	2536	0.184147	0.018415	0.217691	0.021769
RFS	APX16DWV-16DWVS-C-A20	247	150	2536	0.184147	0.018415	0.217691	0.021769
RFS	APX16DWV-16DWVS-C-A20	247	310	2536	0.184077	0.018408	0.217691	0.021769

T-Mobile
Trumbull
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	0.29298	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.0293	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APX16DWV-16DWVS-C-A20	247	50	2536	0.184147	0.018415	0.217691	0.021769
RFS	APX16DWV-16DWVS-C-A20	247	150	2536	0.184147	0.018415	0.217691	0.021769
RFS	APX16DWV-16DWVS-C-A20	247	310	2536	0.184077	0.018408	0.217691	0.021769

The Kennedy Center, Inc.
Trumbull
Carrier Summary

Frequency:	150	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	0.08623	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.04312	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	DB201-A	329	0	100	0.08623	0.043115	0.08623	0.043115

U.S. Customs and Border Protection
Trumbull
Carrier Summary

Frequency:	150	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	0.10665	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.05333	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	DB264	142	0	100	0.106652	0.053326	0.106652	0.053326

Unknown Carrier
Trumbull
Carrier Summary

Frequency:	150	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	0.01131	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.00565	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
SINCLAIR	SRL-235-2	451	0	100	0.00573	0.002865	0.011309	0.005654

Unknown Carrier
Trumbull
Carrier Summary

Frequency:	450	MHz
Maximum Permissible Exposure (MPE):	300	µW/cm^2
Maximum power density at ground level:	0.15366	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.05122	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	PD1132D	113	0	100	0.028862	0.009621	0.059083	0.019694
SINCLAIR	SRL310-C-4HD	327	0	100	0.096658	0.032219	0.101264	0.033755

Verizon Wireless
Trumbull
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	1.18741	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.20954	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	LNX-8513DS-VTM	232	50	4028	0.475683	0.083944	1.090593	0.192458
ANDREW	LNX-6514DS-VTM	232	170	3784	0.529428	0.093429	0.7947	0.140241
ANDREW	LNX-8513DS-VTM	232	290	4028	0.475683	0.083944	1.090593	0.192458

Verizon Wireless
Trumbull
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	1.27463	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.12746	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	SBNHH-1D65B	232	50	5154	0.777463	0.077746	1.224975	0.122497
ANDREW	SBNHH-1D65B	232	170	5154	0.777462	0.077746	1.224975	0.122497
ANDREW	SBNHH-1D65B	232	290	5154	0.778843	0.077884	1.224975	0.122497

Verizon Wireless
Trumbull
Carrier Summary

Frequency:	751	MHz
Maximum Permissible Exposure (MPE):	500.67	µW/cm^2
Maximum power density at ground level:	0.50853	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.10157	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	SBNHH-1D65B	232	50	2043	0.265958	0.053121	0.429546	0.085795
ANDREW	SBNHH-1D65B	232	170	2043	0.265958	0.053121	0.429546	0.085795
ANDREW	SBNHH-1D65B	232	290	2043	0.265958	0.053121	0.429546	0.085795

Verizon Wireless
Trumbull
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	0.81478	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.08148	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	HBXX-6516DS-VTM	232	50	3726	0.363472	0.036347	0.789964	0.078996
ANDREW	HBXX-6516DS-VTM	232	170	3726	0.363472	0.036347	0.789964	0.078996
ANDREW	HBXX-6516DS-VTM	232	290	3726	0.369558	0.036956	0.789964	0.078996

WEZN
Trumbull
Carrier Summary

Frequency:	99.9	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	9.83764	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	4.91882	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ERI	1183-3CP	419	0	27500	9.837633	4.918816	9.837636	4.918818

WPKN
Trumbull
Carrier Summary

Frequency:	89.5	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	11.49442	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	5.74721	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Shively	6014-2	310	35	10000	7.304504	3.652252	7.304505	3.652252
Shively	6014-2	394	35	10000	4.482141	2.241071	4.482142	2.241071

WSHU
Trumbull
Carrier Summary

Frequency:	91.1	MHz
Maximum Permissible Exposure (MPE):	200	µW/cm^2
Maximum power density at ground level:	9.01166	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	4.50583	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Shively	6014-2	393	320	20000	9.011657	4.505828	9.011659	4.505829

Trumbull
Composite Microwave Antenna Summary

Carrier	Antenna Make/Model	Height (feet)
WPKN, Inc.	Mark SSH-9A72GN	61
Connoisseur Media, LLC	Mark P-9A48GN-U	68
Sacred Heart University WSHU	Radiowaves SPD2-5.8	99
Sacred Heart University WSHU	Ligowave PTP-900-13	99
American Medical Response Ambulance Service	Mark SSH-9A72GN	108
Connoisseur Media, LLC	Mark P-9A48GN-U	117
Connecticut Public Broadcasting, Inc.	RFS MGAR3-23N	134
Connecticut Public Broadcasting, Inc.	Channel Master CM-4228HD	135
Connecticut Public Broadcasting, Inc.	RFS MGA2-16N	134
Connecticut Public Broadcasting, Inc.	Channel Master CM-4228HD	140
Connecticut Public Broadcasting, Inc.	Andrew PL6-65-PXA	146
Connecticut Public Broadcasting, Inc.	Andrew HPX6-65-P3A	150
Marcus Communications, LLC	Radiowaves SPD4-5.2	178
Sacred Heart University WSHU	Gabriel DFPD1-52	200
Unknown Carrier	Mark SSH-9A72GN	206
Unknown Carrier	Radiowaves SPD3-5.8	322