



Northeast Site Solutions
Denise Sabo
4 Angela's Way, Burlington CT 06013
203-435-3640
denise@northeastsitesolutions.com

September 17, 2021

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

RE: Tower Share Application
56 Cosgrove Road Whifford Hill, West Willington, CT 06279
Latitude: 41.892478
Longitude: -72.260597
Site# 806383_Crown_Dish

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of Dish Wireless LLC. Dish Wireless LLC plans to install antennas and related equipment to the tower site located at Cosgrove Road Whifford Hill, West Willington, Connecticut.

Dish Wireless LLC proposes to install three (3) 600/1900 5G MHz antenna and six (6) RRUs, at the 114-foot level of the existing 140-foot self-support tower, one (1) Fiber cables will also be installed. Dish Wireless LLC equipment cabinets will be placed within 7x5 lease area. Included are plans by Infinigy, dated August 24, 2021 Exhibit C. Also included is a structural analysis prepared by Crown Castle, dated June 5, 2021, confirming that the existing tower is structurally capable of supporting the proposed equipment. Attached as Exhibit D. The facility was constructed on or about 1986. An email was sent to Ms. Margaret Dupilka of the Land Use Department in the Town of Willington inquiring on original zoning documents. On March 13, 1997 the Connecticut Siting Council in Docket No. 58 approved modifications to the tower.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50aa, of Dish Wireless LLC intent to share a telecommunications facility pursuant to R.C.S.A. 16-50j-88. In accordance with R.C.S.A., a copy of this letter is being sent to The Honorable Erika G. Wiczenski, First Selectwoman, for the Town of Willington, Michael D'Amato, Zoning Agent, as well as the tower owner (Crown Castle) and property owner (Ms. Isabella Drobney)

The planned modifications of the facility fall squarely within those activities explicitly provided for in R.C.S.A. 16-50j-89.

1. The proposed modification will not result in an increase in the height of the existing structure. The top of the tower is 140-feet; Dish Wireless LLC proposed antennas will be located at a center line height of 114-feet.
2. The proposed modifications will not result in the increase of the site boundary as depicted on the attached site plan.



3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed local and state criteria. The incremental effect of the proposed changes will be negligent.

4. The operation of the proposed antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard. As indicated in the attached power density calculations, the combined site operations will result in a total power density of 14.99% as evidenced by Exhibit F.

Connecticut General Statutes 16-50aa indicates that the Council must approve the shared use of a telecommunications facility provided it finds the shared use is technically, legally, environmentally, and economically feasible and meets public safety concerns. As demonstrated in this letter, Dish Wireless LLC respectfully indicates that the shared use of this facility satisfies these criteria.

A. Technical Feasibility. The existing monopole has been deemed structurally capable of supporting Dish Wireless LLC proposed loading. The structural analysis is included as Exhibit D.

B. Legal Feasibility. As referenced above, C.G.S. 16-50aa has been authorized to issue orders approving the shared use of an existing tower such as this support tower in Willington. Under the authority granted to the Council, an order of the Council approving the requested shared use would permit Dish Wireless LLC to obtain a building permit for the proposed installation. Further, a Letter of Authorization is included as Exhibit G, authorizing Dish Wireless LLC to file this application for shared use.

C. Environmental Feasibility. The proposed shared use of this facility would have a minimal environmental impact. The installation of Dish Wireless LLC equipment at the 114-foot level of the existing 140-foot tower would have an insignificant visual impact on the area around the tower. Dish Wireless LLC ground equipment would be installed within the existing facility compound. Dish Wireless LLC shared use would therefore not cause any significant alteration in the physical or environmental characteristics of the existing site. Additionally, as evidenced by Exhibit F, the proposed antennas would not increase radio frequency emissions to a level at or above the Federal Communications Commission safety standard.

D. Economic Feasibility. Dish Wireless LLC will be entering into an agreement with the owner of this facility to mutually agreeable terms. As previously mentioned, the Letter of Authorization has been provided by the owner to assist Dish Wireless LLC with this tower sharing application.

E. Public Safety Concerns. As discussed above, the tower is structurally capable of supporting Dish Wireless LLC proposed loading. Dish Wireless LLC is not aware of any public safety concerns relative to the proposed sharing of the existing tower. Dish Wireless LLC intentions of providing new and improved wireless service through the shared use of this facility is expected to enhance the safety and welfare of local residents and individuals traveling through Willington.

Sincerely,

Denise Sabo

Denise Sabo
Mobile: 203-435-3640
Fax: 413-521-0558
Office: 4 Angela's Way, Burlington CT 06013
Email: denise@northeastsitesolutions.com



Attachments

cc: The Honorable Erika G. Wieceński, First Selectwoman
Town Office Building
40 Old Farms Road Willington, CT 06279

Michael D'Amato, Zoning Agent
Town Office Building
40 Old Farms Road Willington, CT 06279

Ms. Isabella Drobney, Property Owner
56 Cosgrove Road Willington, CT 06279

Crown Castle, Tower Owner

Exhibit A

Original Facility Approval

TOWN OF WILLINGTON APPLICATION FOR ZONING AND BUILDING PERMIT

NOTICE: This application must be typed or printed in ink and filed

The undersigned hereby applies for a permit to: ERECT (X), ALTER (), ENLARGE (), REPAIR (), REMOVE (), DEMOLISH (), a building or structure herein described and in accordance with plans and specifications submitted in duplicate, herewith, as shown on accompanying survey maps.

LOCATION: Whiffard Hill, Willington, CT E (), W (), S (), N () side
(Street & Number or nearest public highway) (If no number is assigned indicate above on which side of street)

LOT # 1 ZONE INTENDED USE OF BUILDING mobile telephone system
To house electrical equipment for

SIZE OF LOT: #FT. FRONT #FT. DEEP AREA OF LOT

SIZE OF BUILDING: 154 FT. X 21 FT. NO. OF STORIES 1 TOTAL FLOOR AREA 323.5 SQ. FT.

DISTANCE OF BUILDING FROM LOT LINES: FRONT SIDE SIDE REAR
SEE ATTACHED PLAN

WORK WILL START ON OR ABOUT November 1, 1986

OWNER OF LAND Martin W. & Barbara N. Donnelly ADDRESS CORSTOVE Rd., N. Willington, CT

OWNER OF BUILDING MIRO MOBILE CTS of Hartford ADDRESS 670 MIRO MOBILE CTS OF NEW H

ARCHITECT CON-SERV, INC. 667-667-1824 ADDRESS 7 Karen Ctr., S-3, Billerica, MA

BUILDER NORFEST ENGINEERING & CONSTRUCTION CORP. ADDRESS 740 A Main Street, Woburn, MA 01801

MOBILE IMPROVEMENT CONT. REG. # N/A

This space to be used for Buildings to be Altered, Enlarged, Repaired, Removed or Demolished, Change in use and Special Permit Application.

STATE PROPOSED WORK TO BE DONE OR CHANGE IN USE IN DETAIL:

(Attach separate sheet if necessary)

Terry D. H.
Agar 1-800-712-2833

HOW IS THIS PERMIT BEING APPLIED FOR?
IF BUILDING IS TO BE DEMOLISHED OR REPAIRED, HAVE YOU NOTIFIED THE PROPER AUTHORITIES AS UTILITIES, SO HAVE YOUR CONNECTIONS REMOVED OR SANDED AND PLUGGED, WATER (), SEWER (), BLOCK (), GAS ().

I hereby agree to comply with the requirements of the Zoning Regulations of the Town of Willington and the provisions of the State Building Code and all other State and Health Codes. The plans and specifications submitted herewith have been prepared in accordance with and are intended to meet these requirements. I hereby certify that I am familiar with the regulations or that I have employed competent persons to assist me in the preparation of the plans and specifications. I further agree that as owner or agent for the owner that the work will be done in accordance with these regulations and that I will employ whatever competent assistance or workmen as may be needed to carry on the work in accordance with the regulations and to remove, replace, or repair any work not found to be in accordance with the regulations by any authority.

Id. of Person responsible 617-33-4875 Date of Submission 10/30/86
IMPORTANT: I hereby certify that I have read and understand the foregoing information. SIGNED Terry Donnelly
Owner of Property Authorized Agent (Affidavit)

ADDRESS

DO NOT WRITE BELOW THIS LINE

PERMIT NO. / DATE	Map/Parcel	Building <u>455</u>
COMMENTS/CONDITIONS:		Zoning <u>15</u>
<u>CERTIFICATE OF SITING</u>	Est. Cost Const. <u>\$90,000</u>	Driveway <u> </u>
<u>COUNCIL OF AGENTS</u>		Heating <u> </u>
<u>(FOUND)</u>		Electrical <u> </u>
	<u>TOTAL 28,000</u>	Plumbing <u> </u>
	<u>Foundation 12,000</u>	Septic <u> </u>
	<u>Build 85,000</u>	Other <u> </u>
	<u>Site 15,000</u>	TOTAL PD. <u>440 PD</u>
	<u>90,000</u>	(chk #/cash)

* 12/11/86
ZONING AGENT/DATE BUILDING OFFICIAL/DATE

PLANNING & ZONING COMMISSION

Willington, Connecticut 06279

ZONING PERMIT

Date of Application 19

This permit is hereby applied for in accordance with the requirements of the Willington Zoning Regulations for:

- ☒ new construction ☐ swimming pool ☐ change of use ☒ other
☐ addition ☐ sign ☐ excavating/filling

Zoning District Lot Area Lot Frontage Required Approvals (all date)

Record Map # Subdivision Lot No. Special Permit, yes ☐, no ☐

Location Site Plan Approval, yes ☐, no ☐
(House Number) (Street)

Property Owner Address Phone

PROPERTY USE:

- ☐ Single Family Residence ☐ Commercial ☐ Other
☐ Multi-Family Residence ☐ Industrial

PROPOSED STRUCTURES

Existing Structures: No. Use

1. Description
2. Dimensions
3. Livable Floor Area
4. Estimated Cost of Construction \$
1. Health Dept. Approval: # Date:
1. Driveway permit: # Date:

Conditions of Approval:

Reasons for Denial:

- ☐ Plot Plan Attached
☐ Conforming All Aspects
☐ Non Conforming

☐ Variance granted to

SIGN PERMIT ONLY		Permanent ()
() Signed Legend		Temporary ()
	Blackboard	Lettering
Color	_____	_____
Dimensions	_____	_____
Area	_____	_____
Building Frontage	_____	_____
Permitted Area	_____	_____
Letter Style _____		
Material _____		
Finish _____		
Lighting _____		
Front Set-Back _____		
Sketch to Scale Attached ☐		
Approved by _____		
Date _____		

For Date 19

Permit void if:

- a. Work or activity not commenced within 3 months of the date of issuance
- b. Construction authorized not completed within 1 year of the date of issuance.

This permit, if issued, is based upon the plot plan submitted. Falsification, by misrepresentation or omission; or failure to comply with the conditions of approval of this permit shall constitute a violation of the Willington Zoning Regulations.

Signature of owner or authorized agent Permit hereby - ☐ Issued ☐ Denied
(Agent's phone)

Fee of PAID

Date 19

Permit #

by *J. Jorgensen*
LAND USE AGENT
WILLINGTON LAND USE AGENCY

Zip #

ZONING CERTIFICATE OF COMPLIANCE

Willington, Connecticut 06279

Issued to Address Zone

For (Premises covered by certificate)
(House No.) (Street)

Lot # Record # Subdivision #

To verify that a plot plan (attached) certified by on 19 of the above-referenced lot and the structures thereon has been presented to the Zoning Enforcement Officer, and such plan indicates that the construction or use is in conformance with all the applicable Zoning Regulations. Such lot, structures, and/or use are hereby authorized for occupancy. This certificate is based on the certified plot plan submitted. Falsification, by misrepresentation or omission shall constitute a violation of the Willington Zoning Regulations and shall invalidate this Certificate.

Date 19 ...

by
LAND USE AGENT
PLANNING ZONING COMMISSION

Exhibit B

Property Card

56 COSGROVE RD

Location 56 COSGROVE RD

Mblu 33/ / 024-00/ /

Acct# 00058300

Owner DROBNEY ISABEL N

Assessment \$172,310

Appraisal \$246,150

PID 3010

Building Count 1

Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2017	\$180,500	\$65,650	\$246,150
Assessment			
Valuation Year	Improvements	Land	Total
2017	\$126,360	\$45,950	\$172,310

Owner of Record

Owner DROBNEY ISABEL N

Co-Owner AKA ISABELLA

Address 56 COSGROVE RD

WILLINGTON, CT 06279

Sale Price \$0

Certificate

Book & Page 204/369

Sale Date 05/29/2013

Building Information

Building 1 : Section 1

Year Built: 1958

Living Area: 1,963

Replacement Cost: \$237,151

Building Percent 71

Good:

Replacement Cost

Less Depreciation: \$168,380

Building Attributes	
Field	Description
Style	Ranch
Model	Residential
Grade:	Good
Stories:	1
Occupancy	1

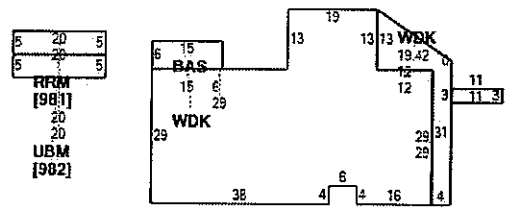
Building Photo



(<http://images.vgsi.com/photos/WilmingtonCTPhotos/\00\00\04\1>)

Building Layout

Exterior Wall 1	Stucco/Masonry
Exterior Wall 2	Brick Veneer
Roof Structure:	Gable or Hip
Roof Cover	Asbestos Shing
Interior Wall 1	Drywall/Sheet
Interior Wall 2	Wood Panel
Interior Flr 1	Hardwood
Interior Flr 2	Linoleum
Heat Fuel	Oil
Heat Type:	Hot Water
AC Type:	None
Total Bedrooms:	4 Bedrooms
Total Bthrms:	2
Total Half Baths:	0
Total Xtra Fixtrs:	1
Total Rooms:	6
Bath Style:	Average
Kitchen Style:	Average
Fireplaces	2
Basement Garage	2



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	1,963	1,963
RRM	Rec Room	0	0
UBM	Unfinished Basement	0	0
WDK	Wood Deck	326	0
		2,289	1,963

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 1010
Description Single Fam MDL-01
Zone R80
Neighborhood 110
Alt Land Appr No
Category

Land Line Valuation

Size (Acres) 4.2
Frontage
Depth
Assessed Value \$45,950
Appraised Value \$65,650

Outbuildings

Outbuildings						Legend
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
SHD1	SHED FRAME			312.00 S.F.	\$1,870	1
FGR3	GARAGE-POOR			1424.00 S.F.	\$10,250	1

Valuation History

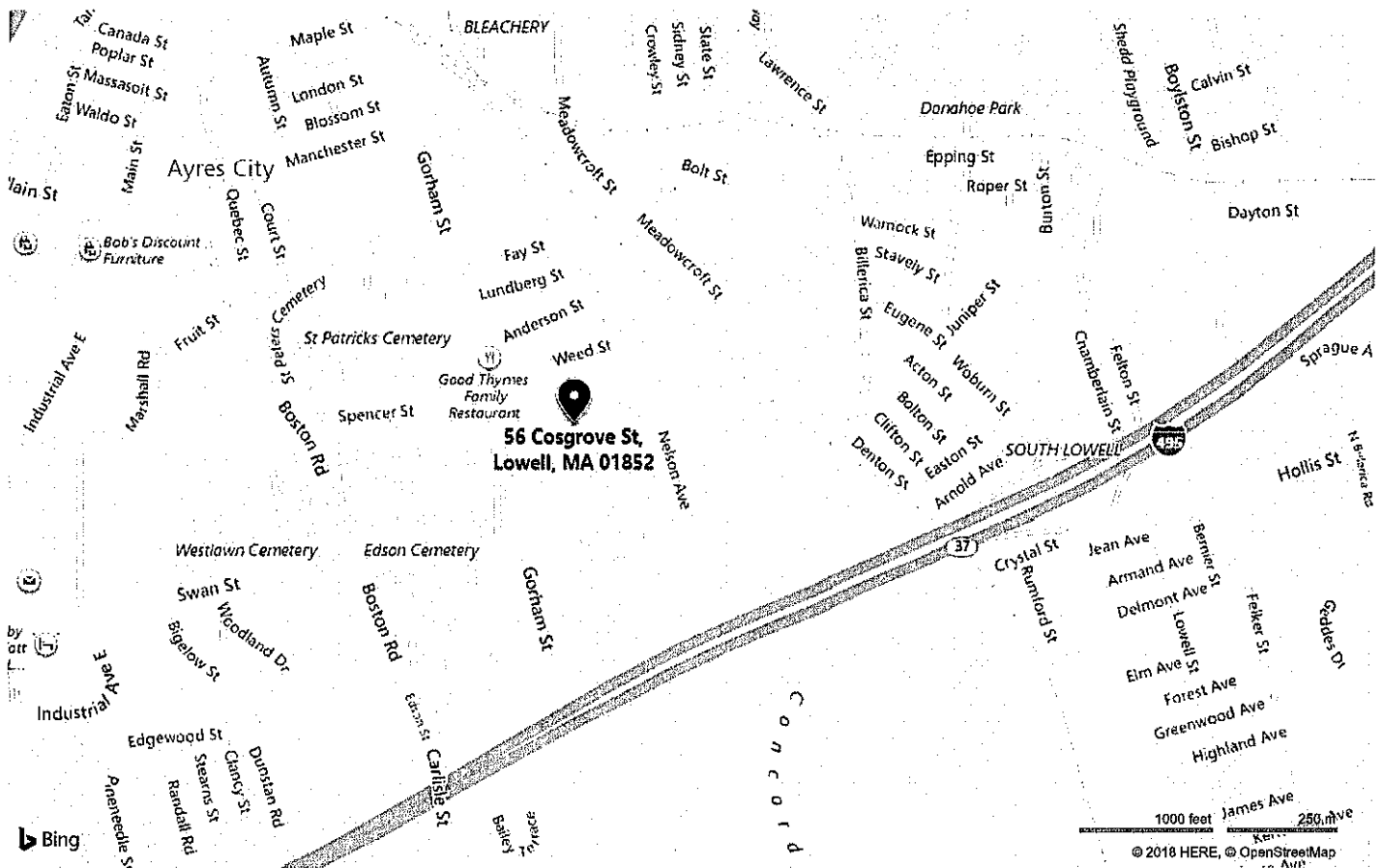
Appraisal			
Valuation Year	Improvements	Land	Total
2016	\$180,500	\$65,650	\$246,150

Assessment			
Valuation Year	Improvements	Land	Total
2016	\$126,360	\$45,950	\$172,310

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**56 Cosgrove St, Lowell, MA 01852**

Location: 42.619881485361084, -71.30272803319164



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Location: 42.619881485361084, -71.30272803319164

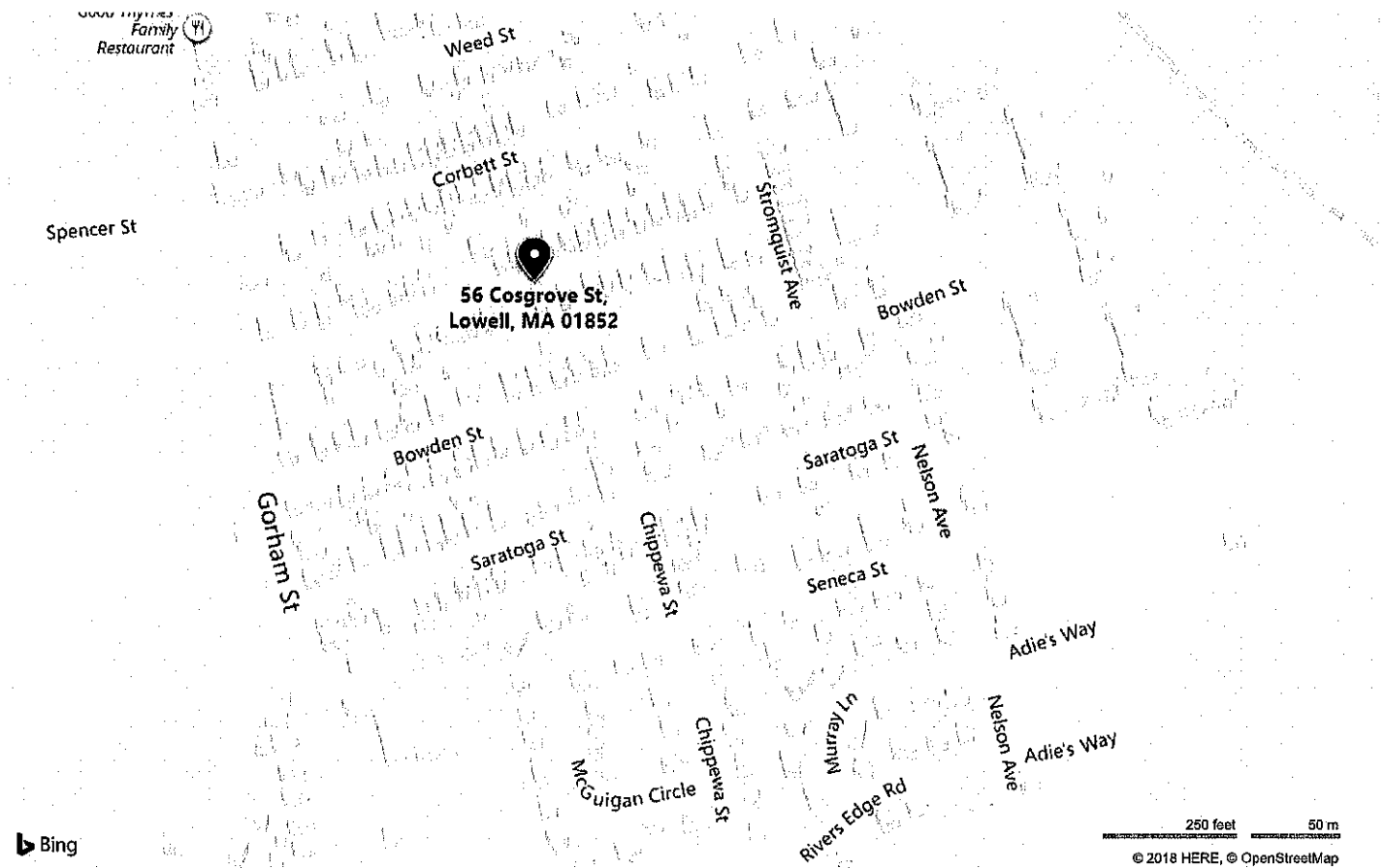
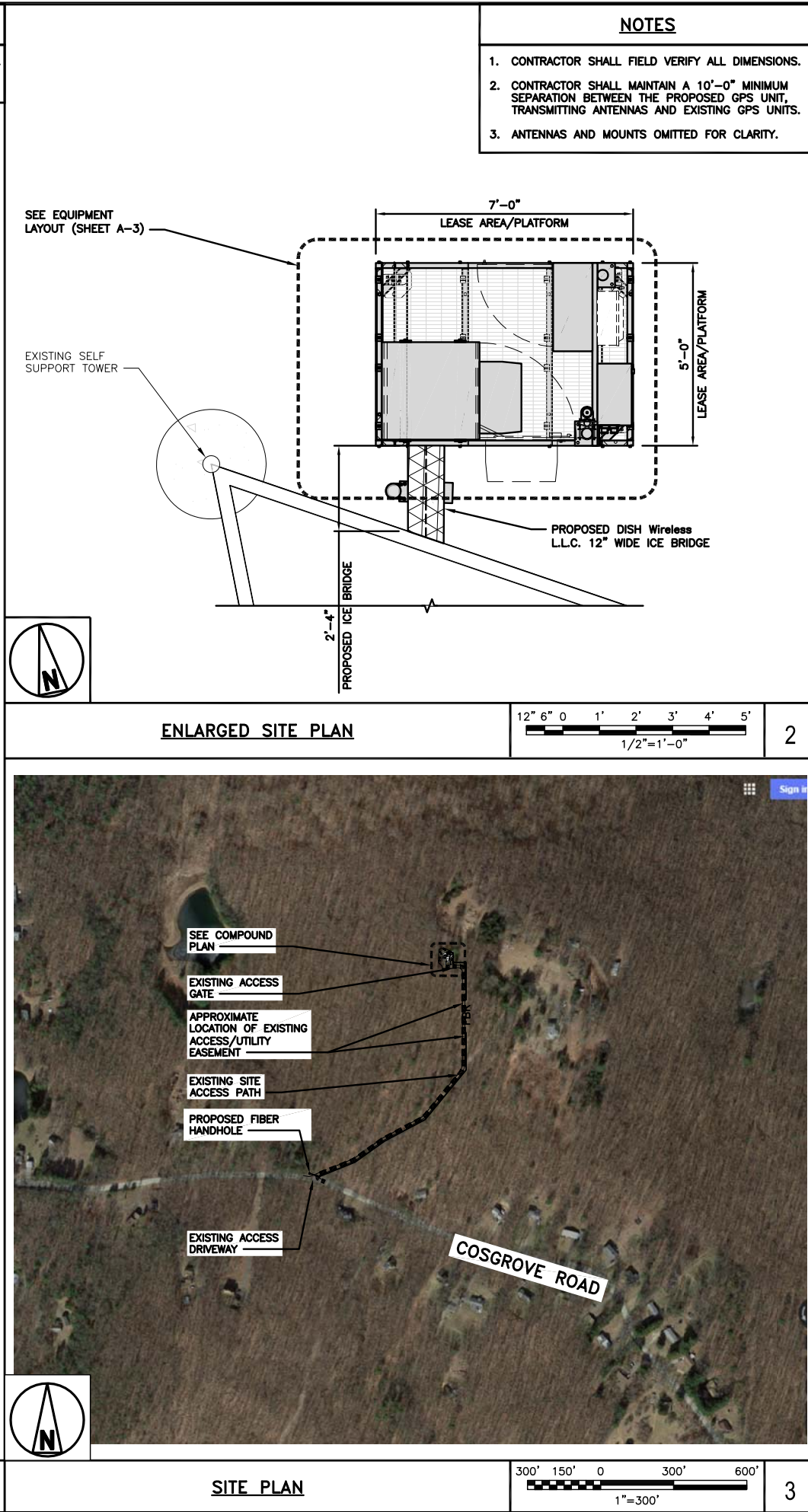
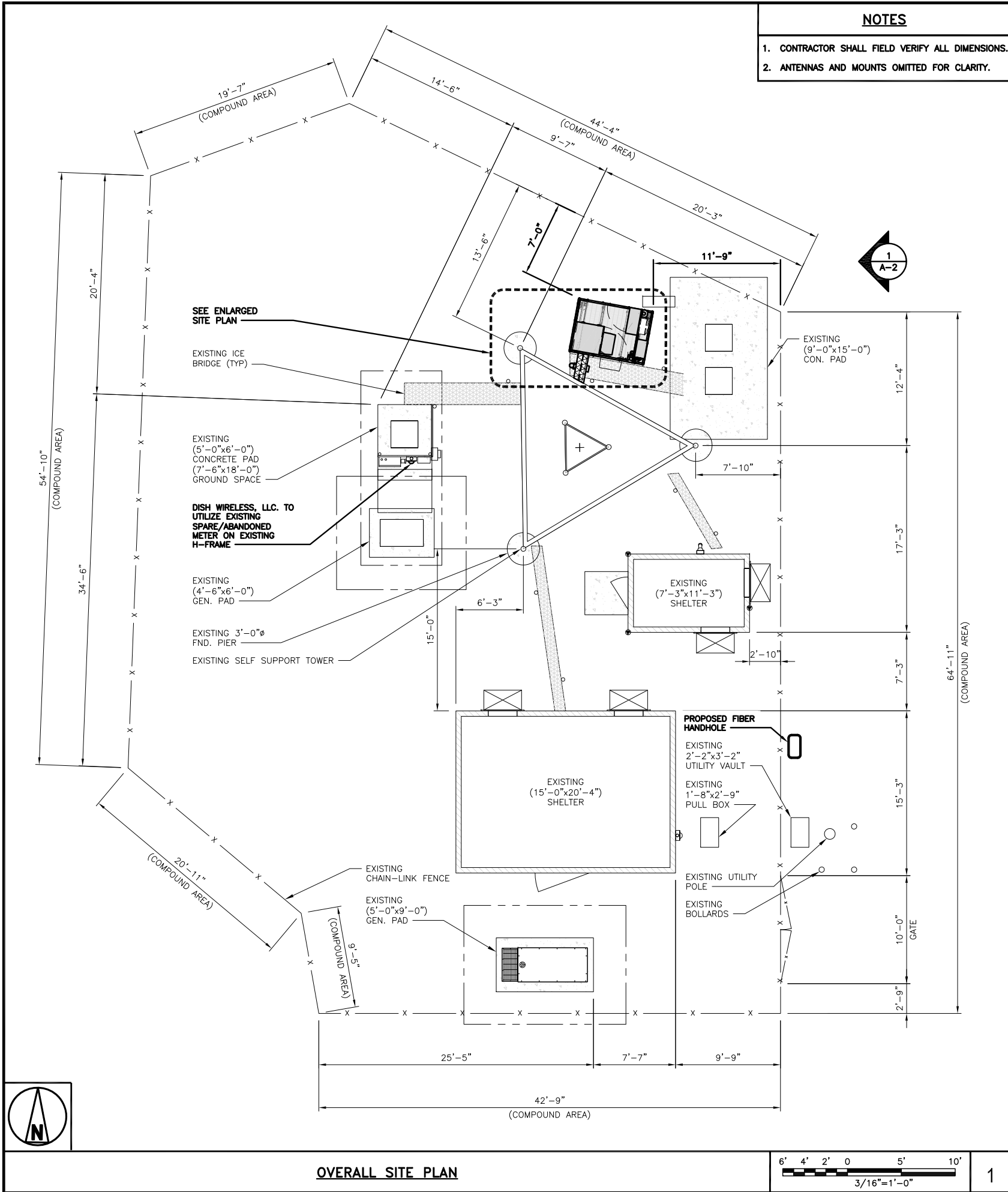


Exhibit C

Construction Drawings



dish wireless.

5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120

CROWN CASTLE

2000 CORPORATE DRIVE
CANONSBURG, PA 15317

INFINIGY

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the solutions are endless

2500 W. HIGGINS RD. SUITE 500 |
HOFFMAN ESTATES, IL 60169
PHONE: 847-648-4068 | FAX: 518-690-0793
WWW.INFINIGY.COM

STATE OF CONNECTICUT
SHUHEI SAKANAKU
34916
LICENSED PROFESSIONAL ENGINEER

8/24/2021

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

DRAWN BY: CHECKED BY: APPROVED BY:

RCD SS CJW

RFDS REV #: N/A

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	06/03/2021	ISSUED FOR REVIEW
0	08/24/2021	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
2039-Z5555C

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDL00051A
HRT 087 943325
COSGROVE ROAD WHIFFORD HILL
WEST WILLINGTON, CT 06279

SHEET TITLE
OVERALL AND ENLARGED
SITE PLAN

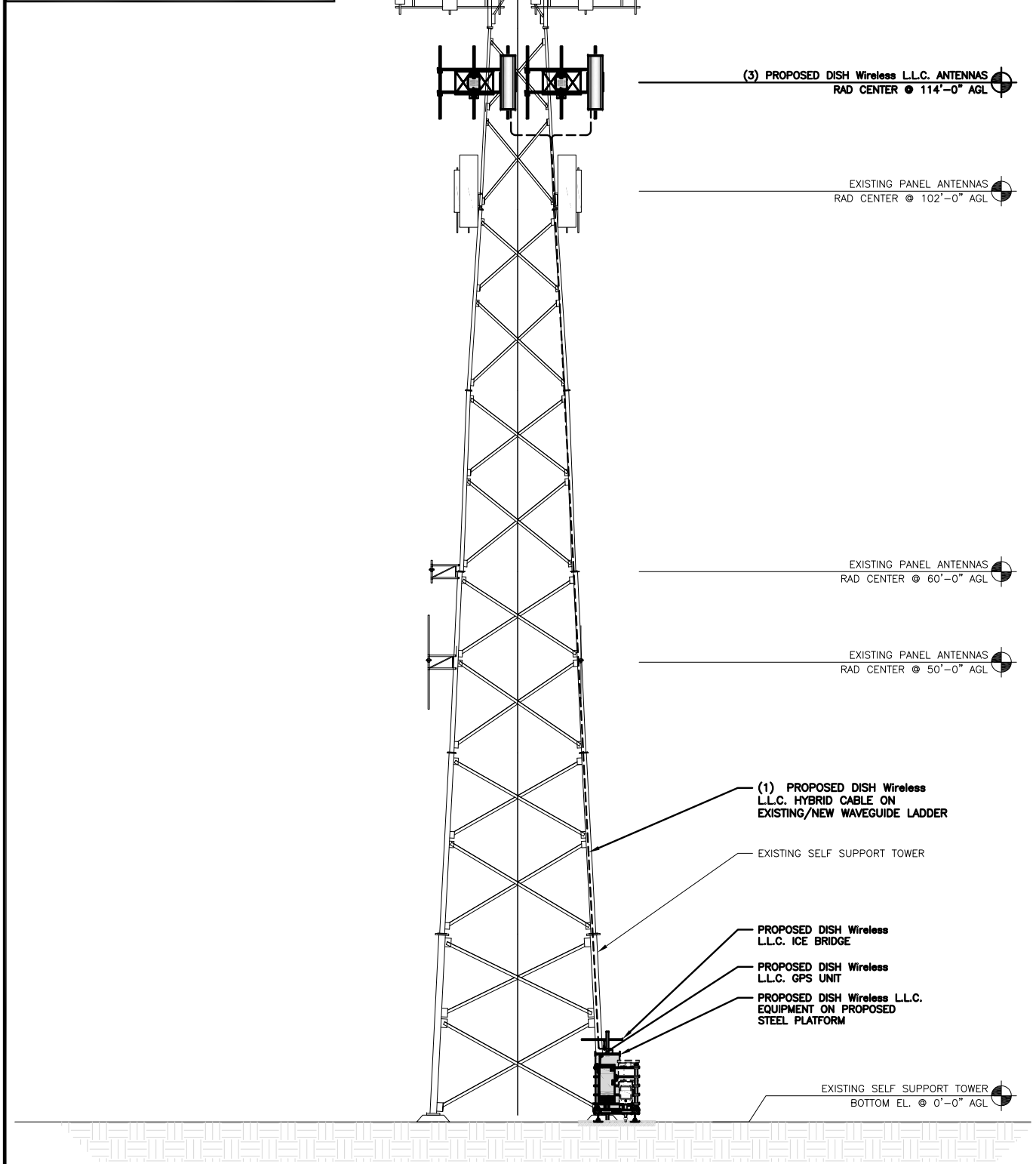
SHEET NUMBER
A-1

- NOTES
1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.

2. ANTENNA SPECIFICATIONS REFER TO ANTENNA SCHEDULE AND TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS

3. EXISTING EQUIPMENT AND FENCE OMITTED FOR CLARITY.

4. INFINIGY HAS NOT EVALUATED THE TOWER OR MOUNT STRUCTURE AND ASSUMES NO RESPONSIBILITY FOR THEIR STRUCTURAL INTEGRITY REGARDING PROPOSED LOADINGS. FINAL INSTALLATION SHALL COMPLY WITH RESULTS OF PASSING STRUCTURAL ANALYSES PERFORMED BY OTHERS.

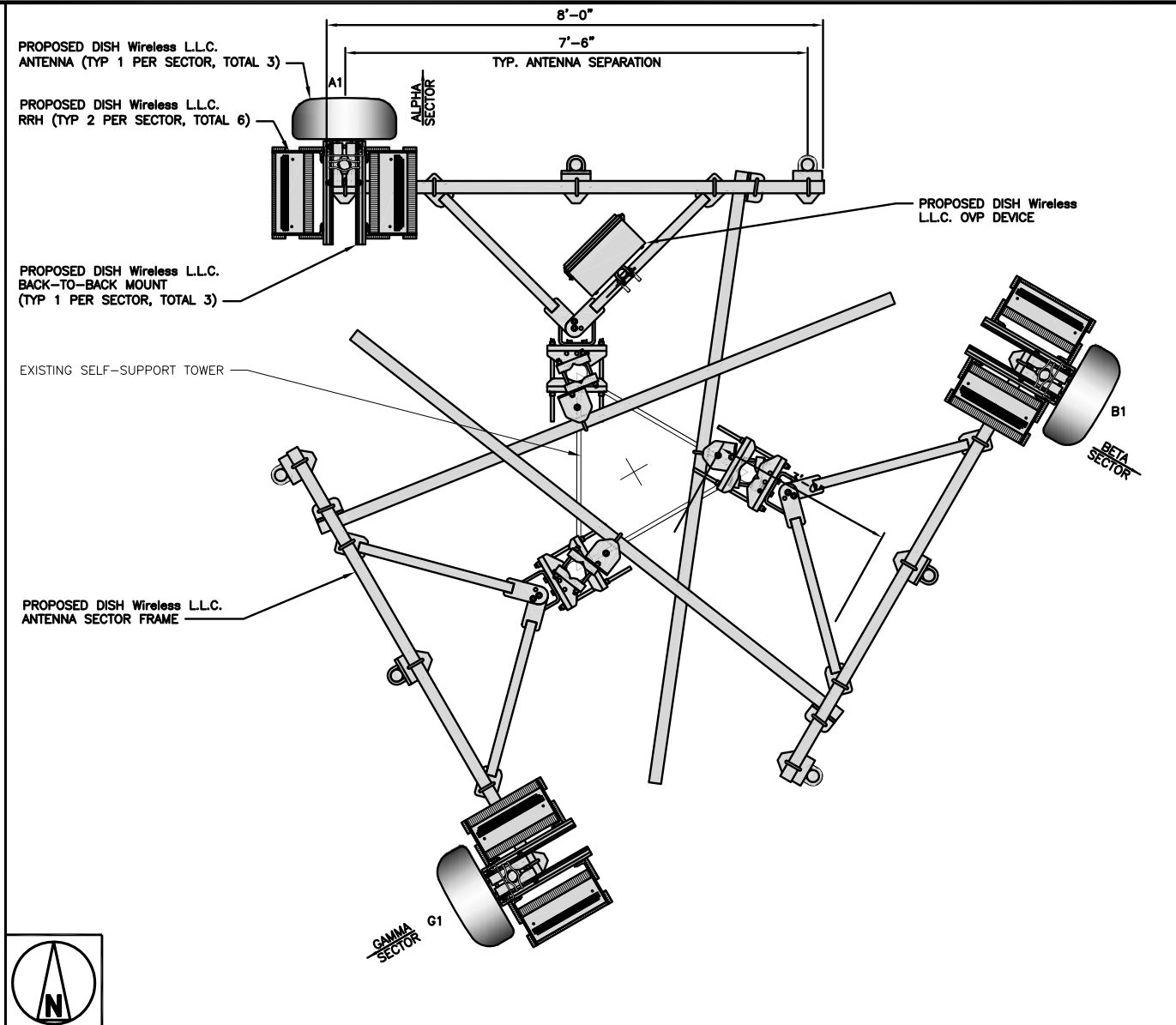


PROPOSED EAST ELEVATION

8' 4' 0 8' 16'

1/8"=1'-0"

1



ANTENNA LAYOUT

2

SECTOR	POSITION	ANTENNA						TRANSMISSION CABLE	
		EXISTING OR PROPOSED	MANUFACTURER - MODEL NUMBER	TECHNOLOGY	SIZE (HxW)	AZMUTH	RAD CENTER	FEED LINE TYPE AND LENGTH	
ALPHA	A1	PROPOSED	JMA WIRELESS - MX08FRO665-21	5G	72.0" x 20.0"	0°	114'-0"	(1) HIGH-CAPACITY HYBRID CABLE (137' LONG)	
BETA	B1	PROPOSED	JMA WIRELESS - MX08FRO665-21	5G	72.0" x 20.0"	120°	114'-0"		
GAMMA	C1	PROPOSED	JMA WIRELESS - MX08FRO665-21	5G	72.0" x 20.0"	240°	114'-0"		

SECTOR	POSITION	RRH		NOTES
		MANUFACTURER - MODEL NUMBER	TECHNOLOGY	
ALPHA	A1	FUJITSU - TA08025-B604	5G	1. CONTRACTOR TO REFER TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS. 2. ANTENNA AND RRH MODELS MAY CHANGE DUE TO EQUIPMENT AVAILABILITY. ALL EQUIPMENT CHANGES MUST BE APPROVED AND REMAIN IN COMPLIANCE WITH THE PROPOSED DESIGN AND STRUCTURAL ANALYSES.
	A1	FUJITSU - TA08025-B605	5G	
BETA	B1	FUJITSU - TA08025-B604	5G	
	B1	FUJITSU - TA08025-B605	5G	
GAMMA	G1	FUJITSU - TA08025-B604	5G	
	G1	FUJITSU - TA08025-B605	5G	

ANTENNA SCHEDULE

NO SCALE

3

dish
wireless.

5701 SOUTH SANTA FE DRIVE
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CROWN
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DRAWN BY: RCD

CHECKED BY: SS

APPROVED BY: CJW

RFDS REV #: N/A

CONSTRUCTION DOCUMENTS

SUBMITTALS

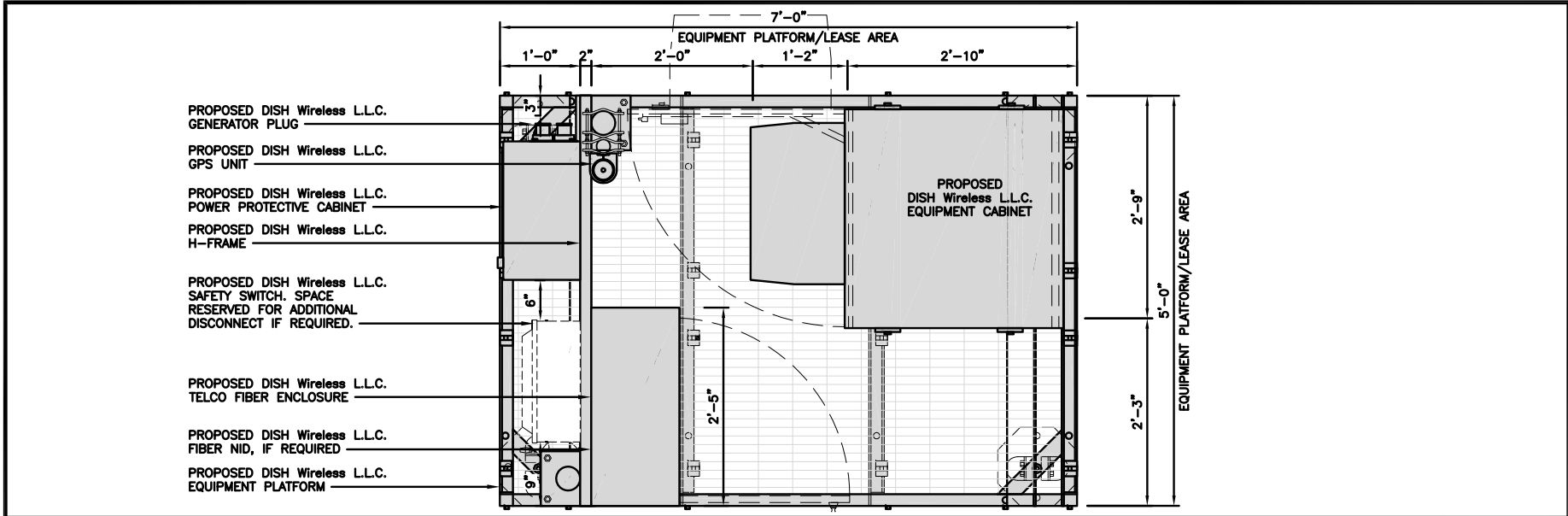
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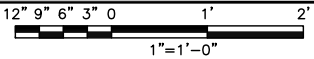
DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDL00051A
HRT 087 943325
COSGROVE ROAD WHIFFORD HILL
WEST WILLINGTON, CT 06279

SHEET TITLE
ELEVATION, ANTENNA
LAYOUT AND SCHEDULE

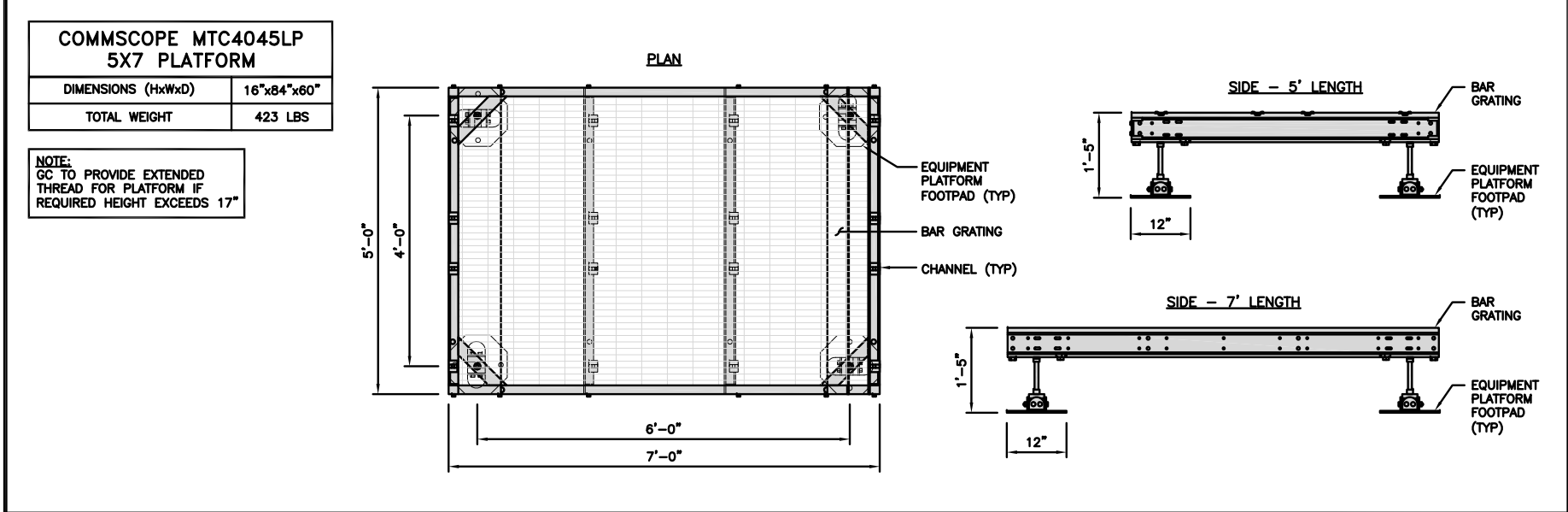
SHEET NUMBER
A-2



PLATFORM EQUIPMENT PLAN



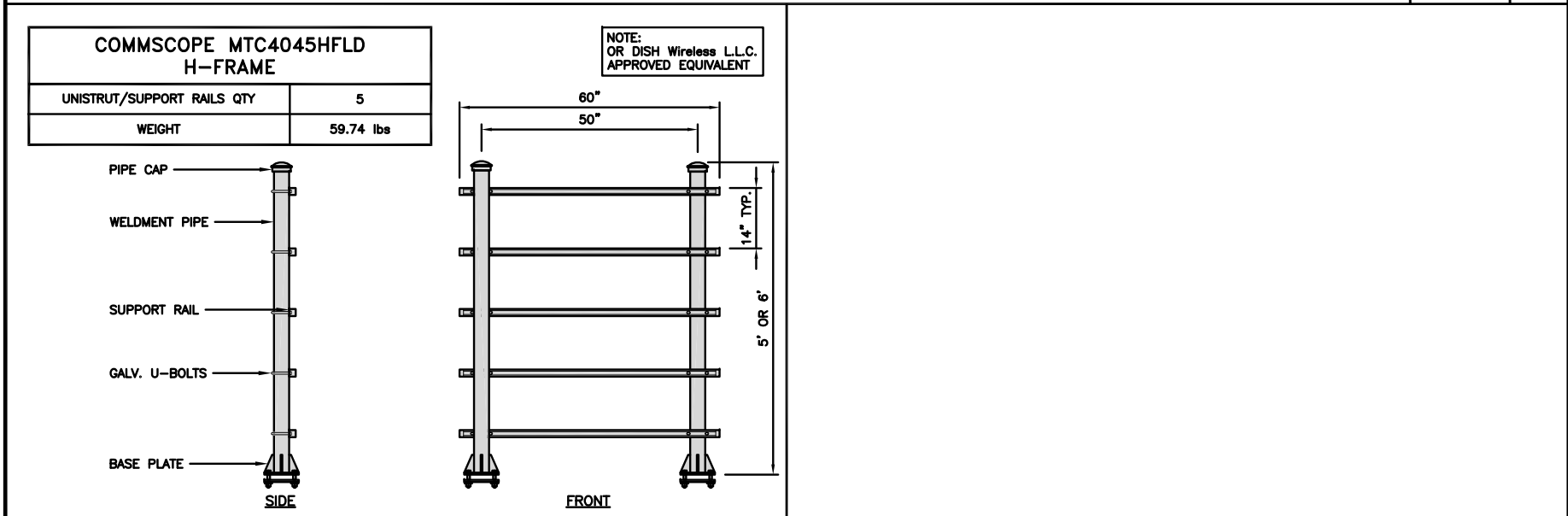
1



PLATFORM DETAIL

NO SCALE

2



H-FRAME DETAIL

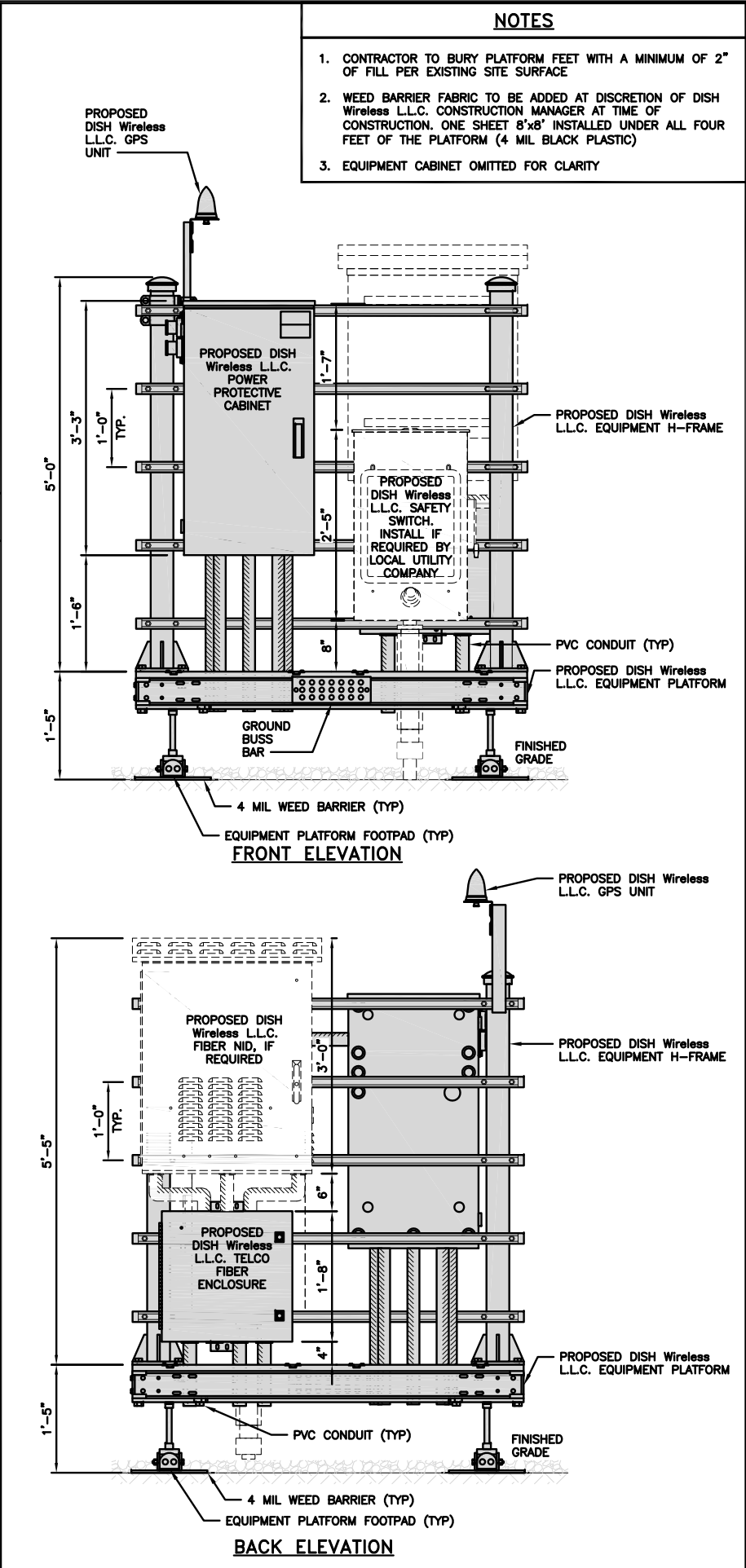
NO SCALE

3

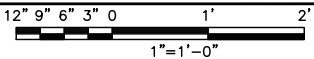
NOT USED

NO SCALE

4



H-FRAME EQUIPMENT ELEVATION



5

NOTES

1. CONTRACTOR TO BURY PLATFORM FEET WITH A MINIMUM OF 2" OF FILL PER EXISTING SITE SURFACE
2. WEED BARRIER FABRIC TO BE ADDED AT DISCRETION OF DISH Wireless L.L.C. CONSTRUCTION MANAGER AT TIME OF CONSTRUCTION. ONE SHEET 8'x8' INSTALLED UNDER ALL FOUR FEET OF THE PLATFORM (4 MIL BLACK PLASTIC)
3. EQUIPMENT CABINET OMITTED FOR CLARITY



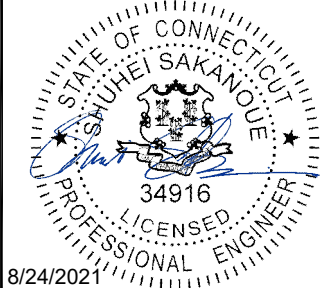
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RFDS REV #: N/A

CONSTRUCTION DOCUMENTS

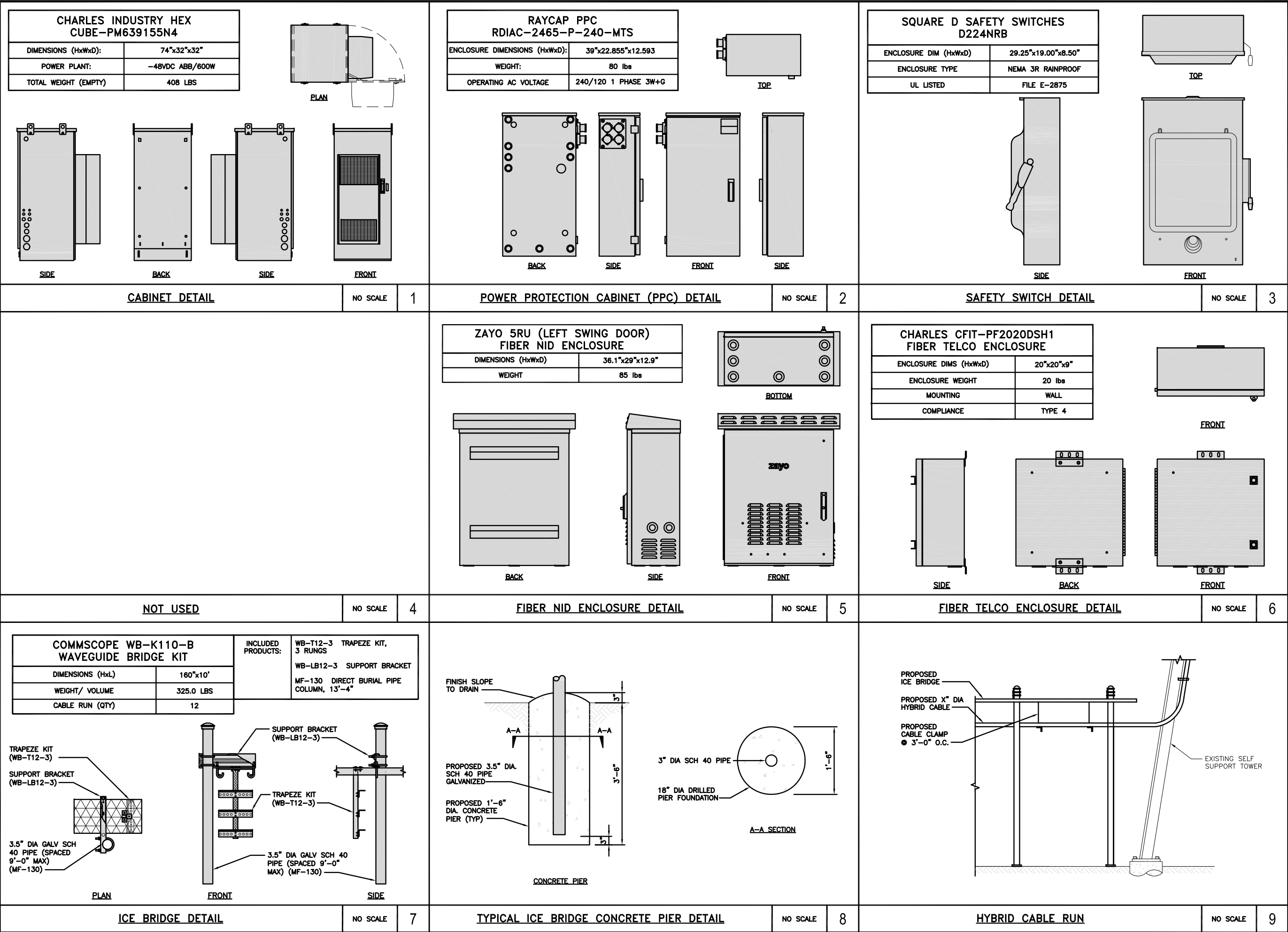
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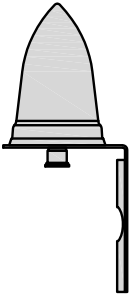
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SHEET TITLE
EQUIPMENT PLATFORM AND
H-FRAME DETAILS

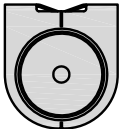
SHEET NUMBER
A-3



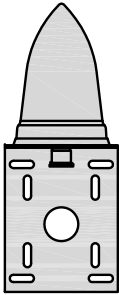
PCTEL GPSGL-TMG-SPI-40NCB	
DIMENSIONS (DIAxH) MM/INCH	81x184mm 3.2"x7.25"
WEIGHT W/ACCESSORIES	075 lbs
CONNECTOR	N-FEMALE
FREQUENCY RANGE	1590 ± 30MHz



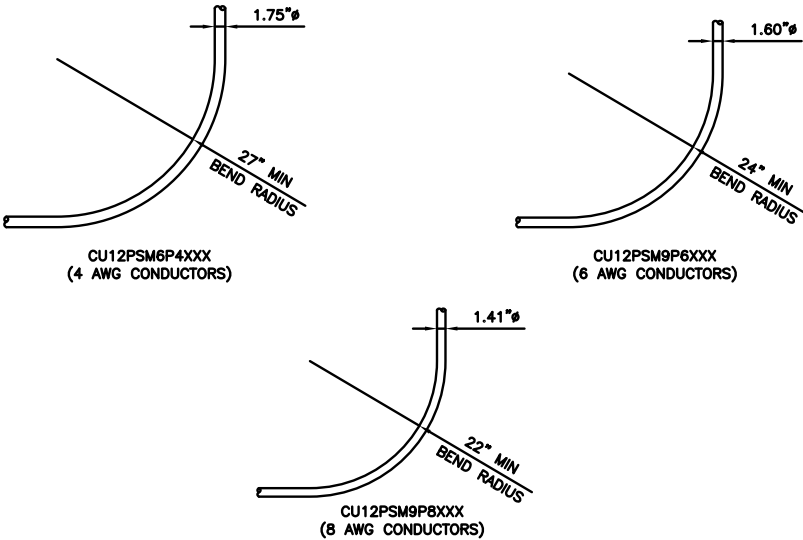
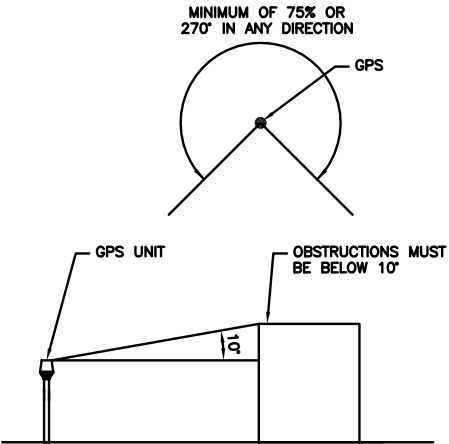
BACK



TOP



SIDE



GPS DETAIL

NO SCALE

1

GPS MINIMUM SKY VIEW REQUIREMENTS

NO SCALE

2

CABLES UNLIMITED HYBRID CABLE
MINIMUM BEND RADIUSES

NO SCALE

3

NOT USED

NO SCALE

4

NOT USED

NO SCALE

5

NOT USED

NO SCALE

6

NOT USED

NO SCALE

7

NOT USED

NO SCALE

8

NOT USED

NO SCALE

9

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DRAWN BY:	CHECKED BY:	APPROVED BY:
RCD	SS	CJW

RFDS REV #: N/A

CONSTRUCTION DOCUMENTS

REV	DATE	DESCRIPTION
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0	06/24/2021	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
2039-Z5555C

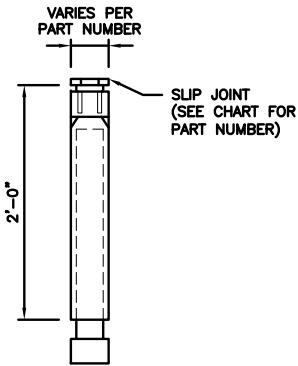
DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDL00051A
HRT 087 943325
COSGROVE ROAD WHIFFORD HILL
WEST WILLINGTON, CT 06279

SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-5

FUJITSU TRIPLE BAND TA08025-B605 <table><tr><td>DIMENSIONS (HxWxD)</td><td>14.9"x15.7"x9"</td></tr><tr><td>WEIGHT</td><td>74.95 lbs</td></tr><tr><td>CONNECTOR TYPE</td><td>4.3-10 RF CONNECTOR</td></tr><tr><td>POWER SUPPLY</td><td>DC -58~-36V</td></tr></table> PLAN BACK SIDE FRONT <td colspan="3"> FUJITSU DUAL BAND TA08025-B604 <table><tr><td>DIMENSIONS (HxWxD)</td><td>14.9"x15.7"x7.8"</td></tr><tr><td>WEIGHT</td><td>63.9 lbs</td></tr><tr><td>CONNECTOR TYPE</td><td>4.3-10 RF CONNECTOR</td></tr><tr><td>POWER SUPPLY</td><td>DC -58~-36V</td></tr></table> PLAN BACK SIDE FRONT <td colspan="3"> SABRE DOUBLE Z-BRACKET C10123155 <table><tr><td>DIMENSIONS (HxWxD) (1 BRACKET)</td><td>5"x20"x1-13/16"</td></tr><tr><td>WEIGHT (FULL ASSEMBLY)</td><td>35.79 lbs</td></tr><tr><td>PACKAGE QUANTITY</td><td>4</td></tr></table><table><tr><th>#</th><th>DESCRIPTION</th></tr><tr><td>1</td><td>PLATE, CHANNEL BRACKET</td></tr><tr><td>2</td><td>RRH Z BRACKET, 3/16"</td></tr><tr><td>3</td><td>THREADED ROD ASSEMBLY 1/2"x12"</td></tr></table> NOTE: OR DISH Wireless L.L.C. APPROVED EQUIVALENT RRH MOUNT DETAIL NO SCALE 3 </td></td>			DIMENSIONS (HxWxD)	14.9"x15.7"x9"	WEIGHT	74.95 lbs	CONNECTOR TYPE	4.3-10 RF CONNECTOR	POWER SUPPLY	DC -58~-36V	FUJITSU DUAL BAND TA08025-B604 <table><tr><td>DIMENSIONS (HxWxD)</td><td>14.9"x15.7"x7.8"</td></tr><tr><td>WEIGHT</td><td>63.9 lbs</td></tr><tr><td>CONNECTOR TYPE</td><td>4.3-10 RF CONNECTOR</td></tr><tr><td>POWER SUPPLY</td><td>DC -58~-36V</td></tr></table> PLAN BACK SIDE FRONT <td colspan="3"> SABRE DOUBLE Z-BRACKET C10123155 <table><tr><td>DIMENSIONS (HxWxD) (1 BRACKET)</td><td>5"x20"x1-13/16"</td></tr><tr><td>WEIGHT (FULL ASSEMBLY)</td><td>35.79 lbs</td></tr><tr><td>PACKAGE QUANTITY</td><td>4</td></tr></table><table><tr><th>#</th><th>DESCRIPTION</th></tr><tr><td>1</td><td>PLATE, CHANNEL BRACKET</td></tr><tr><td>2</td><td>RRH Z BRACKET, 3/16"</td></tr><tr><td>3</td><td>THREADED ROD ASSEMBLY 1/2"x12"</td></tr></table> NOTE: OR DISH Wireless L.L.C. APPROVED EQUIVALENT RRH MOUNT DETAIL NO SCALE 3 </td>			DIMENSIONS (HxWxD)	14.9"x15.7"x7.8"	WEIGHT	63.9 lbs	CONNECTOR TYPE	4.3-10 RF CONNECTOR	POWER SUPPLY	DC -58~-36V	SABRE DOUBLE Z-BRACKET C10123155 <table><tr><td>DIMENSIONS (HxWxD) (1 BRACKET)</td><td>5"x20"x1-13/16"</td></tr><tr><td>WEIGHT (FULL ASSEMBLY)</td><td>35.79 lbs</td></tr><tr><td>PACKAGE QUANTITY</td><td>4</td></tr></table><table><tr><th>#</th><th>DESCRIPTION</th></tr><tr><td>1</td><td>PLATE, CHANNEL BRACKET</td></tr><tr><td>2</td><td>RRH Z BRACKET, 3/16"</td></tr><tr><td>3</td><td>THREADED ROD ASSEMBLY 1/2"x12"</td></tr></table> NOTE: OR DISH Wireless L.L.C. APPROVED EQUIVALENT RRH MOUNT DETAIL NO SCALE 3			DIMENSIONS (HxWxD) (1 BRACKET)	5"x20"x1-13/16"	WEIGHT (FULL ASSEMBLY)	35.79 lbs	PACKAGE QUANTITY	4	#	DESCRIPTION	1	PLATE, CHANNEL BRACKET	2	RRH Z BRACKET, 3/16"	3	THREADED ROD ASSEMBLY 1/2"x12"
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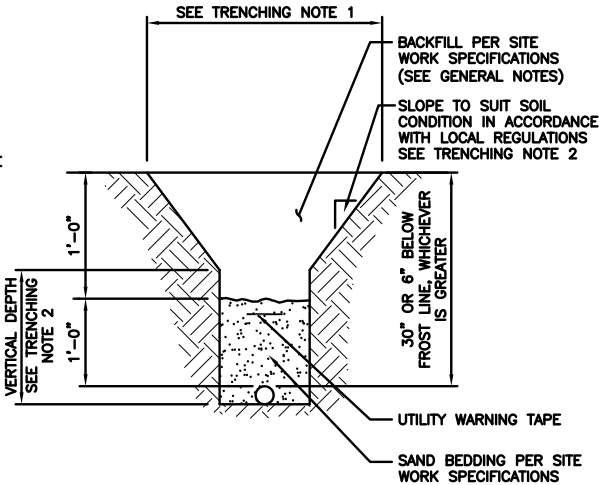
CARLON EXPANSION FITTINGS				
COUPLING END PART#	MALE TERMINAL ADAPTER END PART#	SIZE	STD CTN QTY.	TRAVEL LENGTH
E945D	E945DX	1/2"	20	4"
E945E	E945EX	3/4"	15	4"
E945F	E945FX	1"	10	4"
E945G	E945GX	1 1/4"	5	4"
E945H	E945HX	1 1/2"	5	4"
E945J	E945JX	2"	15	8"
E945K	E945KX	2 1/2"	10	8"
E945L	E945LX	3"	10	8"
E945M	E945MX	3 1/2"	5	8"
E945N	E945NX	4"	5	8"
E945P	E945PX	5"	1	8"
E945R	E945RX	6"	1	8"



NOTE:
CONTRACTOR TO INSTALL EXPANSION FITTING SLIP JOINT AT METER CENTER CONDUIT TERMINATION, AS PER LOCAL UTILITY POLICY, ORDINANCE AND/OR SPECIFIED REQUIREMENT.

TRENCHING NOTES

1. CONTRACTOR SHALL RESTORE THE TRENCH TO ITS ORIGINAL CONDITIONS BY EITHER SEEDING OR SODDING GRASS AREAS, OR REPLACING ASPHALT OR CONCRETE AREAS TO ITS ORIGINAL CROSS SECTION.
2. TRENCHING SAFETY; INCLUDING, BUT NOT LIMITED TO SOIL CLASSIFICATION, SLOPING, AND SHORING, SHALL BE GOVERNED BY THE CURRENT OSHA TRENCHING AND EXCAVATION SAFETY STANDARDS.
3. ALL CONDUITS SHALL BE INSTALLED IN COMPLIANCE WITH THE CURRENT NATIONAL ELECTRIC CODE (NEC) OR AS REQUIRED BY THE LOCAL JURISDICTION, WHICHEVER IS THE MOST STRINGENT.



EXPANSION JOINT DETAIL

NO SCALE

1

TYPICAL UNDERGROUND TRENCH DETAIL

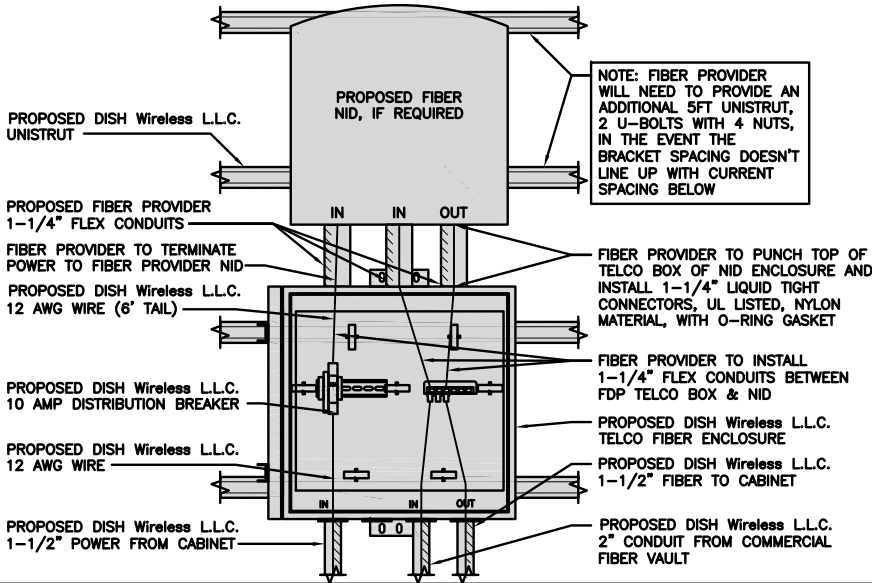
NO SCALE

2

NOT USED

NO SCALE

3



LIT TELCO BOX – INTERIOR WIRING LAYOUT (OPTIONAL)

NO SCALE

4

NOT USED

NO SCALE

5

NOT USED

NO SCALE

6

NOT USED

NO SCALE

7

NOT USED

NO SCALE

8

NOT USED

NO SCALE

9



5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120



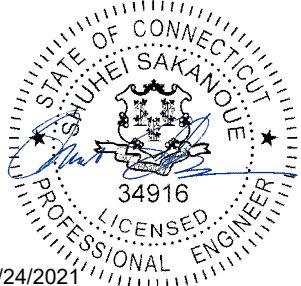
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RCD SS CJW

RFDS REV #: N/A

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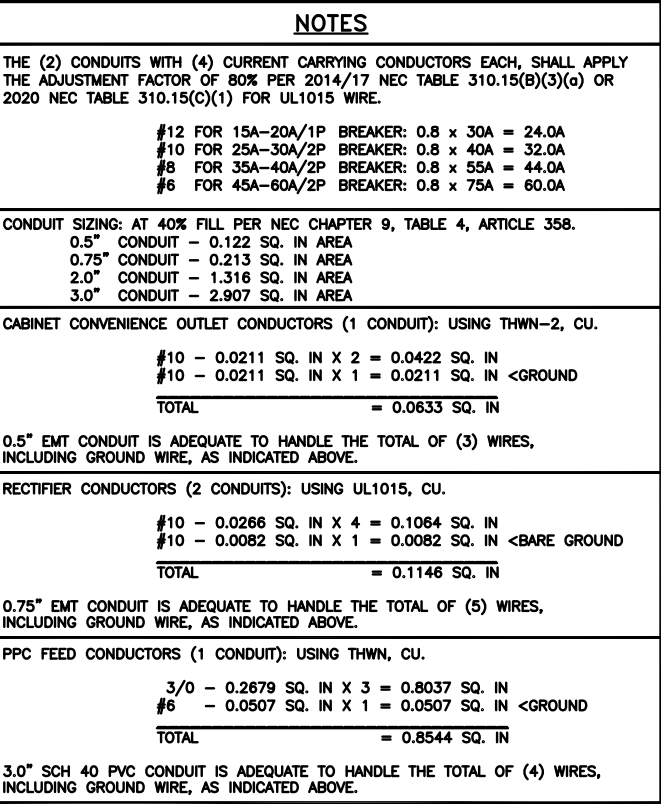
A&E PROJECT NUMBER
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DISH Wireless L.L.C.
PROJECT INFORMATION
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HRT 087 943325
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SHEET TITLE
ELECTRICAL
DETAILS

SHEET NUMBER

E-2



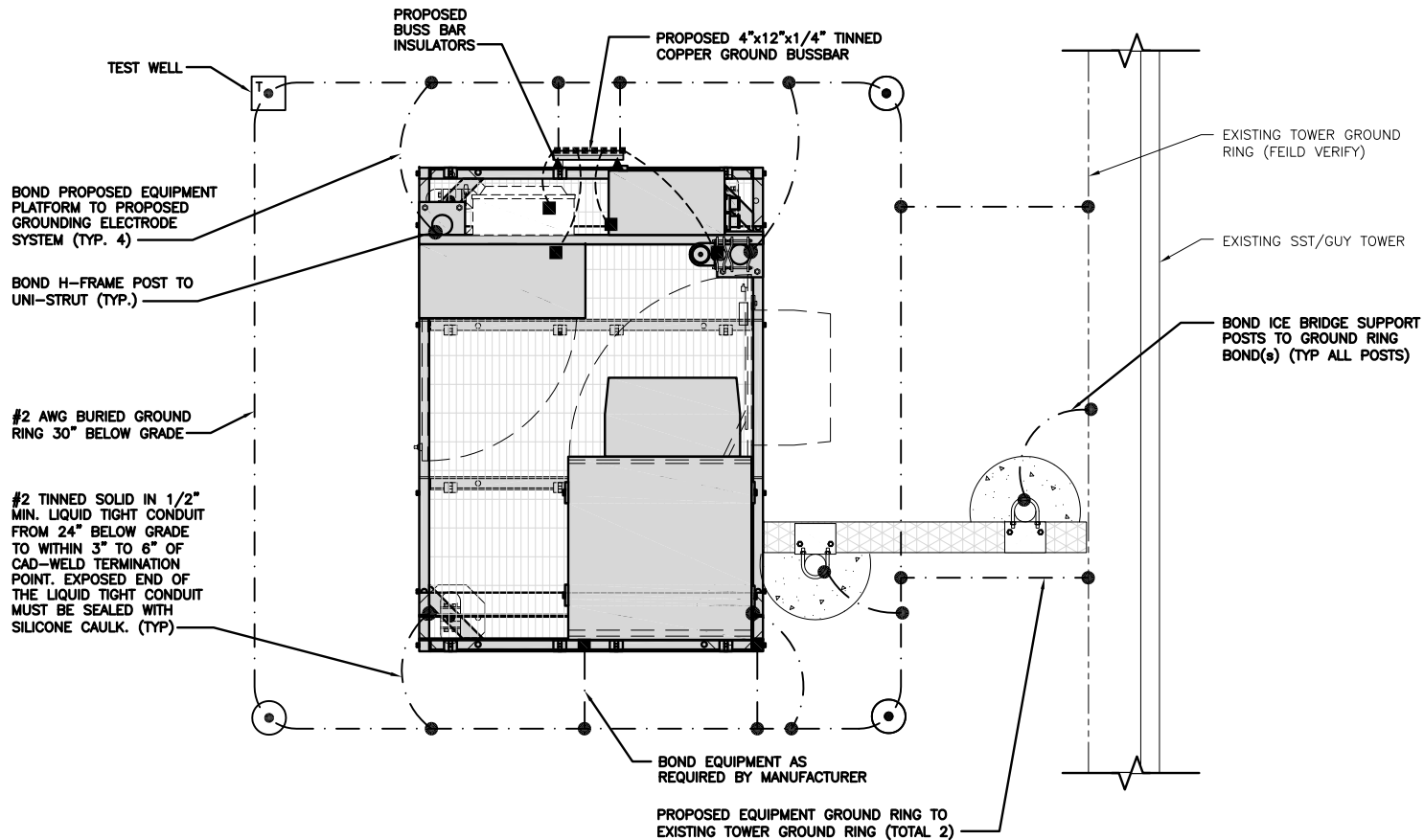
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1

2

3



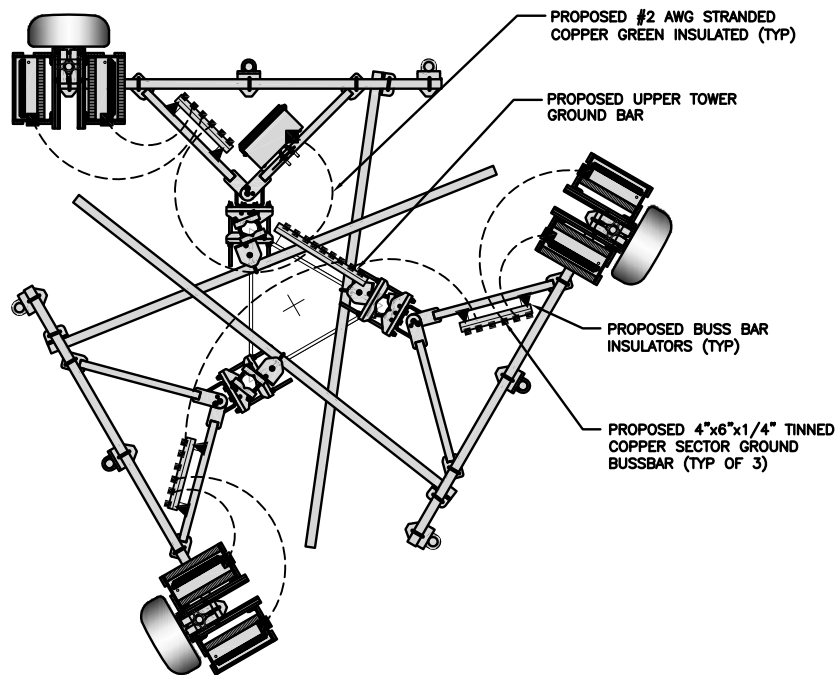
TYPICAL EQUIPMENT GROUNDING PLAN

NO SCALE

1

NOTES

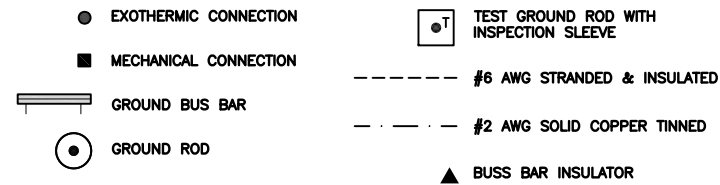
1. ANTENNAS AND OVP SHOWN ARE GENERIC AND NOT REFERENCING TO A SPECIFIC MANUFACTURER. THIS LAYOUT IS FOR REFERENCE ONLY



TYPICAL ANTENNA GROUNDING PLAN

NO SCALE

2



GROUNDING LEGEND

1. GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
2. CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND DISH Wireless L.L.C. GROUNDING AND BONDING REQUIREMENTS AND MANUFACTURER'S SPECIFICATIONS.
3. ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.

GROUNDING KEY NOTES

- (A) **EXTERIOR GROUND RING:** #2 AWG SOLID COPPER, BURIED AT A DEPTH OF AT LEAST 30 INCHES BELOW GRADE, OR 6 INCHES BELOW THE FROST LINE AND APPROXIMATELY 24 INCHES FROM THE EXTERIOR WALL OR FOOTING.
- (B) **TOWER GROUND RING:** THE GROUND RING SYSTEM SHALL BE INSTALLED AROUND AN ANTENNA TOWER'S LEGS, AND/OR GUY ANCHORS. WHERE SEPARATE SYSTEMS HAVE BEEN PROVIDED FOR THE TOWER AND THE BUILDING, AT LEAST TWO BONDS SHALL BE MADE BETWEEN THE TOWER RING GROUND SYSTEM AND THE BUILDING RING GROUND SYSTEM USING MINIMUM #2 AWG SOLID COPPER CONDUCTORS.
- (C) **INTERIOR GROUND RING:** #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTOR EXTENDED AROUND THE PERIMETER OF THE EQUIPMENT AREA. ALL NON-TELECOMMUNICATIONS RELATED METALLIC OBJECTS FOUND WITHIN A SITE SHALL BE GROUNDED TO THE INTERIOR GROUND RING WITH #6 AWG STRANDED GREEN INSULATED CONDUCTOR.
- (D) **BOND TO INTERIOR GROUND RING:** #2 AWG SOLID TINNED COPPER WIRE PRIMARY BONDS SHALL BE PROVIDED AT LEAST AT FOUR POINTS ON THE INTERIOR GROUND RING, LOCATED AT THE CORNERS OF THE BUILDING.
- (E) **GROUND ROD:** UL LISTED COPPER CLAD STEEL. MINIMUM 1/2" DIAMETER BY EIGHT FEET LONG. GROUND RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES. GROUND RODS SHALL BE DRIVEN TO THE DEPTH OF GROUND RING CONDUCTOR.
- (F) **CELL REFERENCE GROUND BAR:** POINT OF GROUND REFERENCE FOR ALL COMMUNICATIONS EQUIPMENT FRAMES. ALL BONDS ARE MADE WITH #2 AWG UNLESS NOTED OTHERWISE STRANDED GREEN INSULATED COPPER CONDUCTORS. BOND TO GROUND RING WITH (2) #2 SOLID TINNED COPPER CONDUCTORS.
- (G) **HATCH PLATE GROUND BAR:** BOND TO THE INTERIOR GROUND RING WITH TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS. WHEN A HATCH-PLATE AND A CELL REFERENCE GROUND BAR ARE BOTH PRESENT, THE CRGB MUST BE CONNECTED TO THE HATCH-PLATE AND TO THE INTERIOR GROUND RING USING (2) TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS EACH.
- (H) **EXTERIOR CABLE ENTRY PORT GROUND BARS:** LOCATED AT THE ENTRANCE TO THE CELL SITE BUILDING. BOND TO GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTORS WITH AN EXOTHERMIC WELD AND INSPECTION SLEEVE.
- (I) **TELCO GROUND BAR:** BOND TO BOTH CELL REFERENCE GROUND BAR OR EXTERIOR GROUND RING.
- (J) **FRAME BONDING:** THE BONDING POINT FOR TELECOM EQUIPMENT FRAMES SHALL BE THE GROUND BUS THAT IS NOT ISOLATED FROM THE EQUIPMENTS METAL FRAMEWORK.
- (K) **INTERIOR UNIT BONDS:** METAL FRAMES, CABINETS AND INDIVIDUAL METALLIC UNITS LOCATED WITH THE AREA OF THE INTERIOR GROUND RING REQUIRE A #6 AWG STRANDED GREEN INSULATED COPPER BOND TO THE INTERIOR GROUND RING.
- (L) **FENCE AND GATE GROUNDING:** METAL FENCES WITHIN 7 FEET OF THE EXTERIOR GROUND RING OR OBJECTS BONDED TO THE EXTERIOR GROUND RING SHALL BE BONDED TO THE GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTOR AT AN INTERVAL NOT EXCEEDING 25 FEET. BONDS SHALL BE MADE AT EACH GATE POST AND ACROSS GATE OPENINGS.
- (M) **EXTERIOR UNIT BONDS:** METALLIC OBJECTS, EXTERNAL TO OR MOUNTED TO THE BUILDING, SHALL BE BONDED TO THE EXTERIOR GROUND RING. USING #2 TINNED SOLID COPPER WIRE
- (N) **ICE BRIDGE SUPPORTS:** EACH ICE BRIDGE LEG SHALL BE BONDED TO THE GROUND RING WITH #2 AWG BARE TINNED COPPER CONDUCTOR. PROVIDE EXOTHERMIC WELDS AT BOTH THE ICE BRIDGE LEG AND BURIED GROUND RING.
- (O) **DURING ALL DC POWER SYSTEM CHANGES** INCLUDING DC SYSTEM CHANGE OUTS, RECTIFIER REPLACEMENTS OR ADDITIONS, BREAKER DISTRIBUTION CHANGES, BATTERY ADDITIONS, BATTERY REPLACEMENTS AND INSTALLATIONS OR CHANGES TO DC CONVERTER SYSTEMS IT SHALL BE REQUIRED THAT SERVICE CONTRACTORS VERIFY ALL DC POWER SYSTEMS ARE EQUIPPED WITH A MASTER DC SYSTEM RETURN GROUND CONDUCTOR FROM THE DC POWER SYSTEM COMMON RETURN BUS DIRECTLY CONNECTED TO THE CELL SITE REFERENCE GROUND BAR
- (P) **TOWER TOP COLLECTOR BUSS BAR** IS TO BE MECHANICALLY BONDED TO TOWER STEEL.

REFER TO DISH Wireless L.L.C. GROUNDING NOTES.

GROUNDING KEY NOTES

NO SCALE

3

dish
wireless.

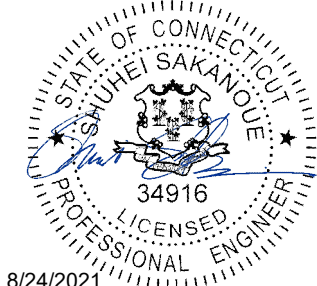
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DOCUMENTS

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O	08/24/2021	ISSUED FOR CONSTRUCTION

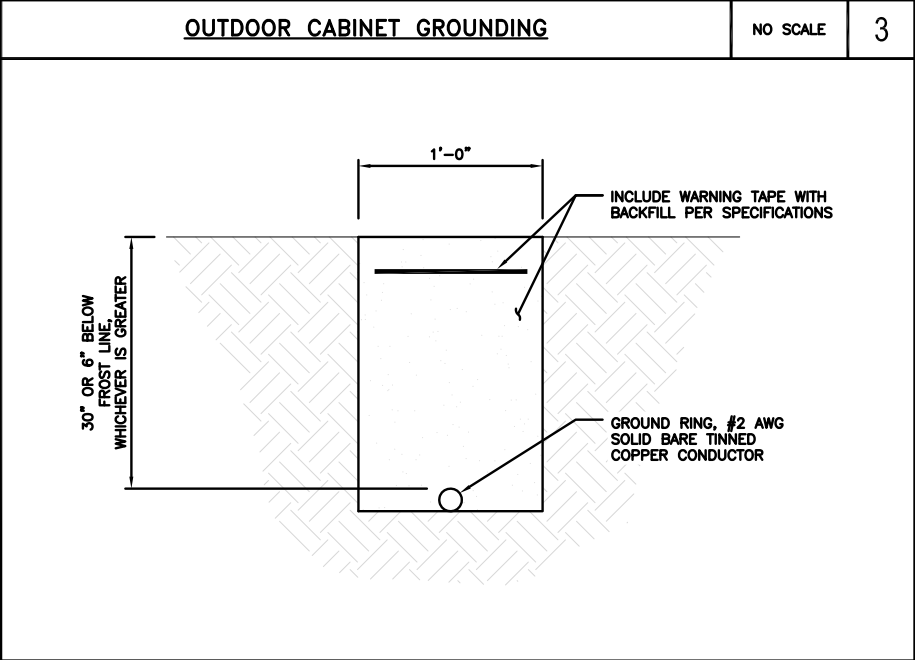
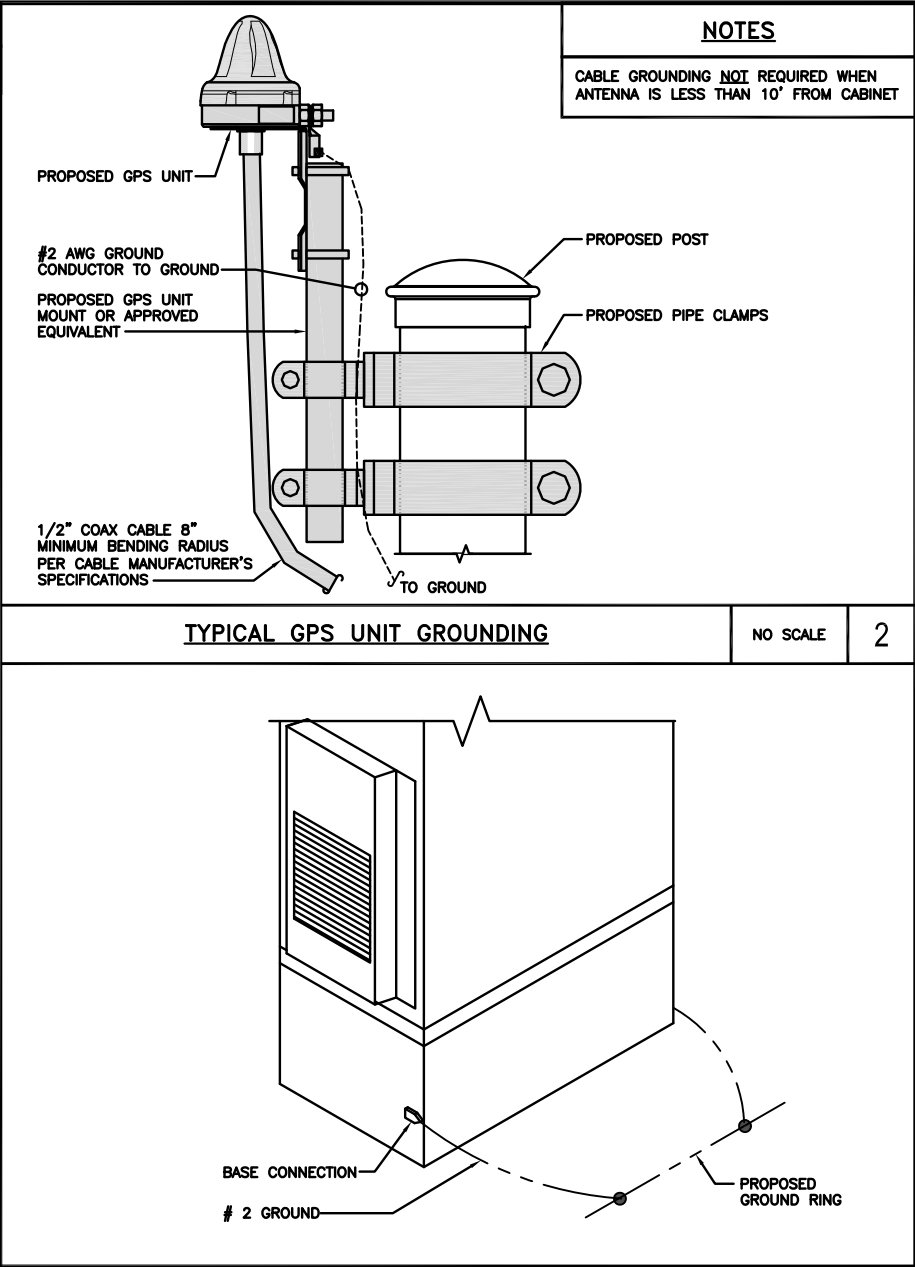
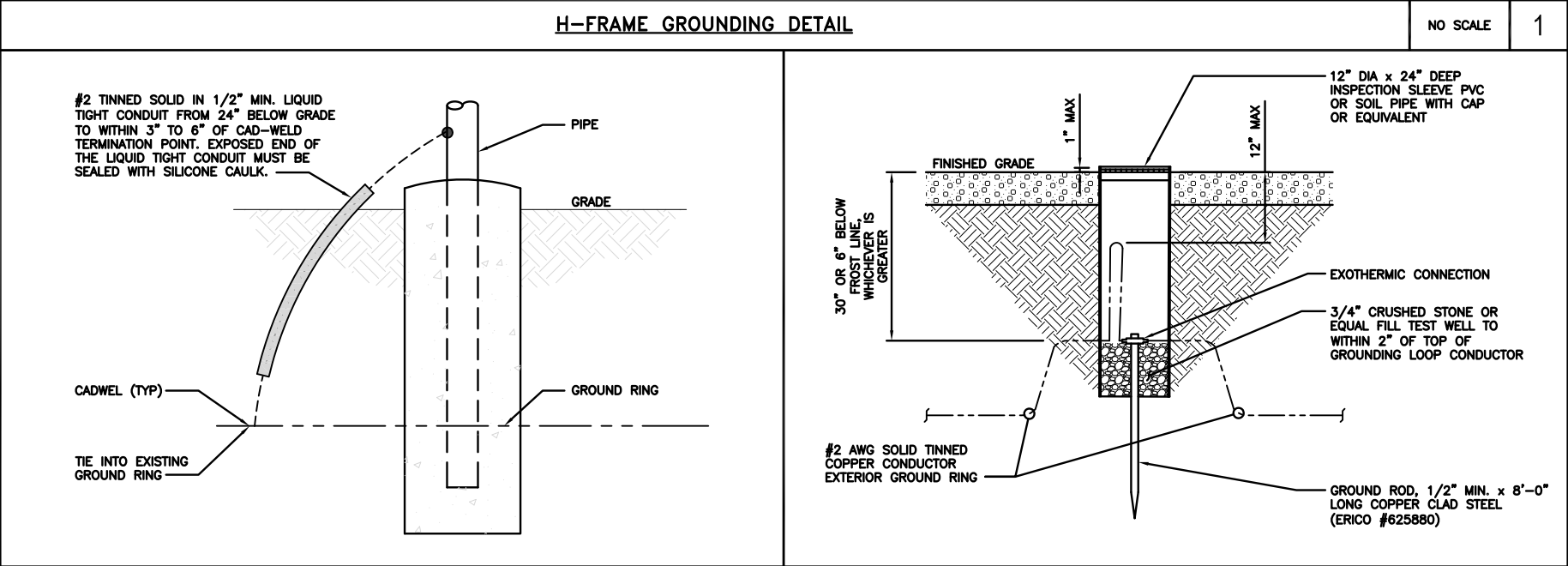
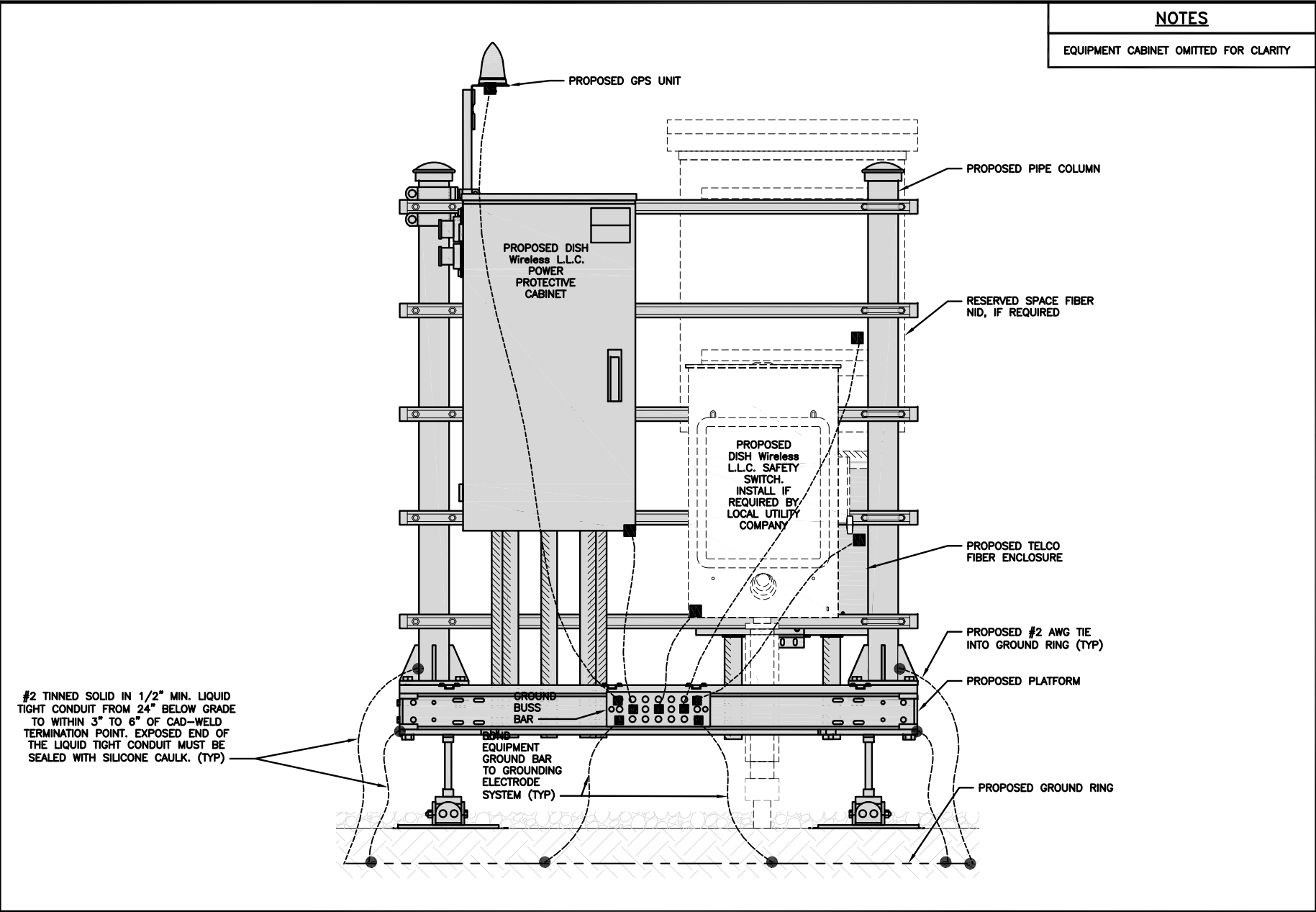
A&E PROJECT NUMBER
2039-Z5555C

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDL00051A
HRT 087 943325
COSGROVE ROAD WHIFFORD HILL
WEST WILLINGTON, CT 06279

SHEET TITLE
GROUNDING PLANS
AND NOTES

SHEET NUMBER

G-1



dish
wireless.

5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120

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2000 CORPORATE DRIVE
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STATE OF CONNECTICUT
SHUHEI SAKANOU
34916
LICENSED PROFESSIONAL ENGINEER

8/24/2021

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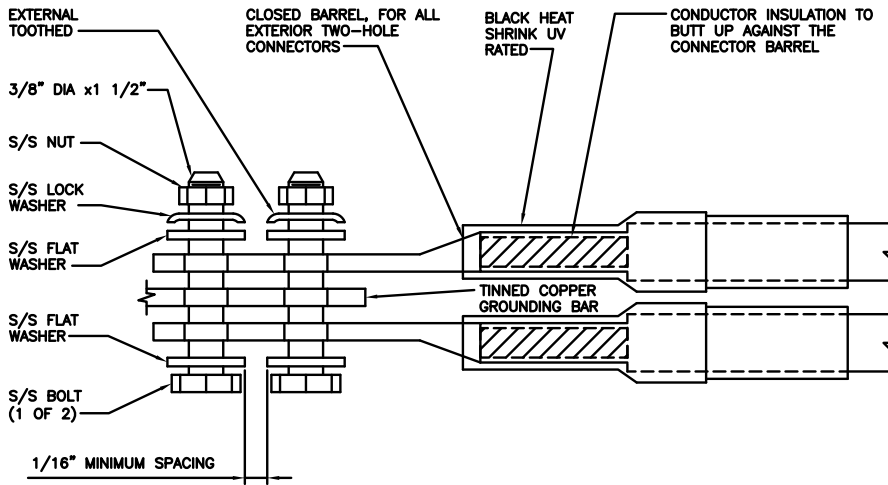
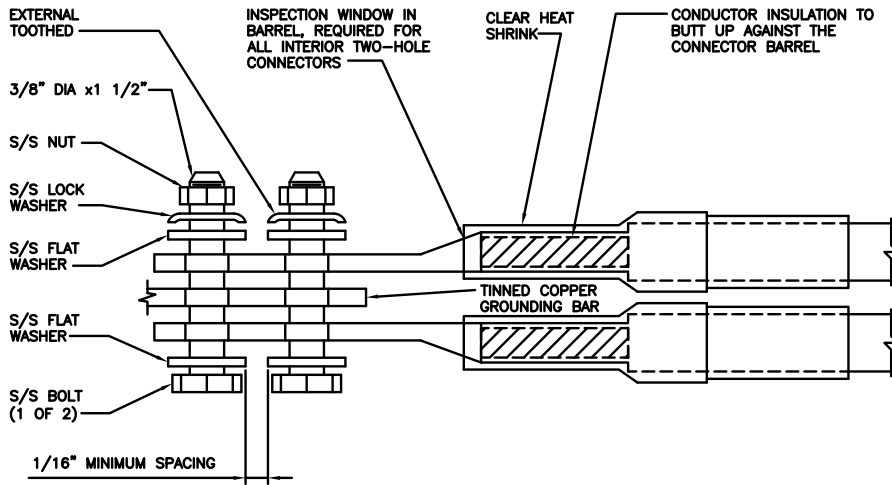
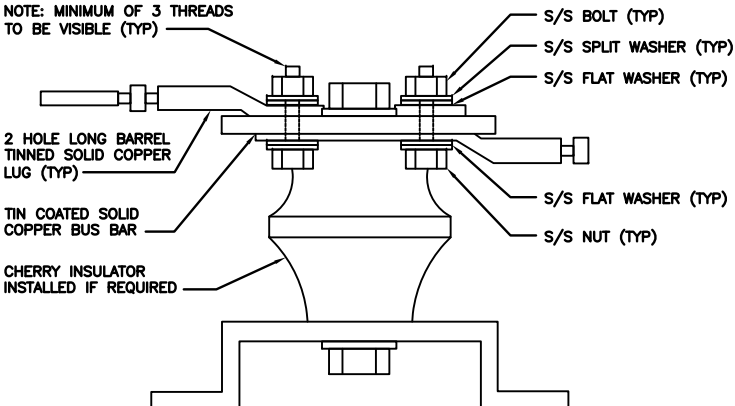
SHEET TITLE

GROUNDING DETAILS

SHEET NUMBER

G-2

DISH Wireless L.L.C. TEMPLATE VERSION 39 – 08/06/2021

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUND BAR. ROUTE CONDUCTORS TO BURIED GROUND RING AND PROVIDE PARALLEL EXOTHERMIC WELD. 2. ALL EXTERIOR GROUNDING HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING. 3. FOR GROUND BOND TO STEEL ONLY: COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING. 4. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUND CONDUCTOR DOWN TO GROUNDING BUS. 5. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUND BAR AND BOLTED ON THE BACK SIDE. 6. ALL GROUNDING PARTS AND EQUIPMENT TO BE SUPPLIED AND INSTALLED BY CONTRACTOR. 7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUND BAR AS REQUIRED. 8. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).														
TYPICAL GROUNDING NOTES			NO SCALE	1	TYPICAL EXTERIOR TWO HOLE LUG			NO SCALE	2	TYPICAL INTERIOR TWO HOLE LUG			NO SCALE	3
														
LUG DETAIL			NO SCALE	4	NOT USED			NO SCALE	5	NOT USED			NO SCALE	6
NOT USED			NO SCALE	7	NOT USED			NO SCALE	8	NOT USED			NO SCALE	9



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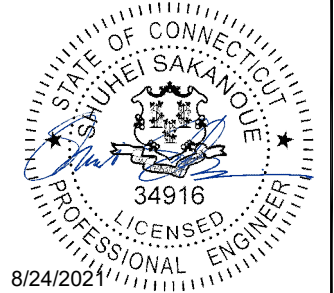
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SHEET TITLE GROUNDING DETAILS		
SHEET NUMBER G-3		

RF JUMPER COLOR CODING				3/4" TAPE WIDTHS WITH 3/4" SPACING								
LOW-BAND RRH – (600MHz N71 BASEBAND) + (850MHz N26 BAND) + (700MHz N29 BAND) – OPTIONAL PER MARKET	ALPHA RRH				BETA RRH				GAMMA RRH			
	PORT 1 + SLANT	PORT 2 – SLANT	PORT 3 + SLANT	PORT 4 – SLANT	PORT 1 + SLANT	PORT 2 – SLANT	PORT 3 + SLANT	PORT 4 – SLANT	PORT 1 + SLANT	PORT 2 – SLANT	PORT 3 + SLANT	PORT 4 – SLANT
	RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
	ORANGE	ORANGE	RED	RED	ORANGE	ORANGE	BLUE	BLUE	ORANGE	ORANGE	GREEN	GREEN
ADD FREQUENCY COLOR TO SECTOR BAND (CBRS WILL USE YELLOW BANDS)												
MID-BAND RRH – (AWS BANDS N66+N70)												
ADD FREQUENCY COLOR TO SECTOR BAND (CBRS WILL USE YELLOW BANDS)												
HYBRID/DISCREET CABLES												
INCLUDE SECTOR BANDS BEING SUPPORTED ALONG WITH FREQUENCY BANDS	EXAMPLE 1			EXAMPLE 2			EXAMPLE 3					
EXAMPLE 1 – HYBRID, OR DISCREET, SUPPORTS ALL SECTORS, BOTH LOW-BANDS AND MID-BANDS												
EXAMPLE 2 – HYBRID, OR DISCREET, SUPPORTS CBRS ONLY, ALL SECTORS												
FIBER JUMPERS TO RRHs												
LOW-BAND RRH FIBER CABLES HAVE SECTOR STRIPE ONLY	LOW BAND RRH		HIGH BAND RRH		LOW BAND RRH		HIGH BAND RRH		LOW BAND RRH		HIGH BAND RRH	
POWER CABLES TO RRHs												
LOW-BAND RRH POWER CABLES HAVE SECTOR STRIPE ONLY	LOW BAND RRH		HIGH BAND RRH		LOW BAND RRH		HIGH BAND RRH		LOW BAND RRH		HIGH BAND RRH	
RET MOTORS AT ANTENNAS												
	ANTENNA 1 LOW BAND/ "IN"		ANTENNA 1 HIGH BAND/ "IN"		ANTENNA 1 LOW BAND/ "IN"		ANTENNA 1 HIGH BAND/ "IN"		ANTENNA 1 LOW BAND/ "IN"		ANTENNA 1 HIGH BAND/ "IN"	
MICROWAVE RADIO LINKS												
LINKS WILL HAVE A 1.5–2 INCH WHITE WRAP WITH THE AZIMUTH COLOR OVERLAPPING IN THE MIDDLE. ADD ADDITIONAL SECTOR COLOR BANDS FOR EACH ADDITIONAL MW RADIO.	FORWARD AZIMUTH OF 0–120 DEGREES				FORWARD AZIMUTH OF 120–240 DEGREES				FORWARD AZIMUTH OF 240–360 DEGREES			
	PRIMARY		SECONDARY		PRIMARY		SECONDARY		PRIMARY		SECONDARY	
MICROWAVE CABLES WILL REQUIRE P-TOUCH LABELS INSIDE THE CABINET TO IDENTIFY THE LOCAL AND REMOTE SITE ID'S												

RF CABLE COLOR CODES

NO SCALE

1

NOT USED

NO SCALE

4

LOW BANDS (N71+N26)
OPTIONAL – (N29)

ORANGE

AWS
(N66+N70+H-BLOCK)

PURPLE

CBRS TECH
(3 GHz)

YELLOW

NEGATIVE SLANT PORT
ON ANT/RRH

WHITE

ALPHA SECTOR

RED

BETA SECTOR

BLUE

GAMMA SECTOR

GREEN

COLOR IDENTIFIER

NO SCALE

2

NOT USED

NO SCALE

3

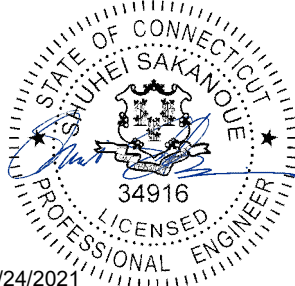
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COSGROVE ROAD WHIFFORD HILL
WEST WILLINGTON, CT 06279

SHEET TITLE

RF
CABLE COLOR CODE

SHEET NUMBER

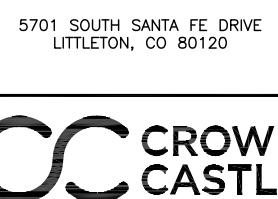
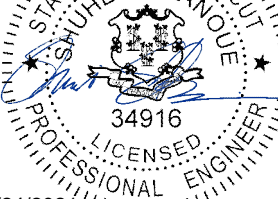
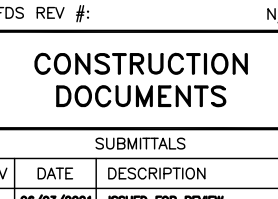
RF-1

EXOTHERMIC CONNECTION	
MECHANICAL CONNECTION	
BUSS BAR INSULATOR	
CHEMICAL ELECTROLYTIC GROUNDING SYSTEM	
TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM	
EXOTHERMIC WITH INSPECTION SLEEVE	
GROUNDING BAR	
GROUND ROD	
TEST GROUND ROD WITH INSPECTION SLEEVE	
SINGLE POLE SWITCH	
DUPLEX RECEPTACLE	
DUPLEX GFCI RECEPTACLE	
FLUORESCENT LIGHTING FIXTURE (2) TWO LAMPS 48-T8	
SMOKE DETECTION (DC)	
EMERGENCY LIGHTING (DC)	
SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW LED-1-25A400/51K-SR4-120-PE-DDBTXD	
CHAIN LINK FENCE	
WOOD/WROUGHT IRON FENCE	
WALL STRUCTURE	
LEASE AREA	
PROPERTY LINE (PL)	
SETBACKS	
ICE BRIDGE	
CABLE TRAY	
WATER LINE	
UNDERGROUND POWER	
UNDERGROUND TELCO	
OVERHEAD POWER	
OVERHEAD TELCO	
UNDERGROUND TELCO/POWER	
ABOVE GROUND POWER	
ABOVE GROUND TELCO	
ABOVE GROUND TELCO/POWER	
WORKPOINT	
SECTION REFERENCE	
DETAIL REFERENCE	

LEGEND

AB	ANCHOR BOLT	IN	INCH
ABV	ABOVE	INT	INTERIOR
AC	ALTERNATING CURRENT	LB(S)	POUND(S)
ADDL	ADDITIONAL	LF	LINEAR FEET
AFF	ABOVE FINISHED FLOOR	LTE	LONG TERM EVOLUTION
AFG	ABOVE FINISHED GRADE	MAS	MASONRY
AGL	ABOVE GROUND LEVEL	MAX	MAXIMUM
AIC	AMPERAGE INTERRUPTION CAPACITY	MB	MACHINE BOLT
ALUM	ALUMINUM	MECH	MECHANICAL
ALT	ALTERNATE	MFR	MANUFACTURER
ANT	ANTENNA	MGB	MASTER GROUND BAR
APPROX	APPROXIMATE	MIN	MINIMUM
ARCH	ARCHITECTURAL	MISC	MISCELLANEOUS
ATS	AUTOMATIC TRANSFER SWITCH	MTL	METAL
AWG	AMERICAN WIRE GAUGE	MTS	MANUAL TRANSFER SWITCH
BATT	BATTERY	MW	MICROWAVE
BLDG	BUILDING	NEC	NATIONAL ELECTRIC CODE
BLK	BLOCK	NM	NEWTON METERS
BLKG	BLOCKING	NO.	NUMBER
BM	BEAM	#	NUMBER
BTC	BARE TINNED COPPER CONDUCTOR	NTS	NOT TO SCALE
BOF	BOTTOM OF FOOTING	OC	ON-CENTER
CAB	CABINET	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
CANT	CANTILEVERED	OPNG	OPENING
CHG	CHARGING	P/C	PRECAST CONCRETE
CLG	CEILING	PCS	PERSONAL COMMUNICATION SERVICES
CLR	CLEAR	PCU	PRIMARY CONTROL UNIT
COL	COLUMN	PRC	PRIMARY RADIO CABINET
COMM	COMMON	PP	POLARIZING PRESERVING
CONC	CONCRETE	PSF	POUNDS PER SQUARE FOOT
CONSTR	CONSTRUCTION	PSI	POUNDS PER SQUARE INCH
DBL	DOUBLE	PT	PRESSURE TREATED
DC	DIRECT CURRENT	PWR	POWER CABINET
DEPT	DEPARTMENT	QTY	QUANTITY
DF	DOUGLAS FIR	RAD	RADIUS
DIA	DIAMETER	RECT	RECTIFIER
DIAG	DIAGONAL	REF	REFERENCE
DIM	DIMENSION	REINF	REINFORCEMENT
DWG	DRAWING	REQ'D	REQUIRED
DWL	DOWEL	RET	REMOTE ELECTRIC TILT
EA	EACH	RF	RADIO FREQUENCY
EC	ELECTRICAL CONDUCTOR	RMC	RIGID METALLIC CONDUIT
EL.	ELEVATION	RRH	REMOTE RADIO HEAD
ELEC	ELECTRICAL	RRU	REMOTE RADIO UNIT
EMT	ELECTRICAL METALLIC TUBING	RWY	RACEWAY
ENG	ENGINEER	SCH	SCHEDULE
EQ	EQUAL	SHT	SHEET
EXP	EXPANSION	SIAD	SMART INTEGRATED ACCESS DEVICE
EXT	EXTERIOR	SIM	SIMILAR
EW	EACH WAY	SPEC	SPECIFICATION
FAB	FABRICATION	SQ	SQUARE
FF	FINISH FLOOR	SS	STAINLESS STEEL
FG	FINISH GRADE	STD	STANDARD
FIF	FACILITY INTERFACE FRAME	STL	STEEL
FIN	FINISH(ED)	TEMP	TEMPORARY
FLR	FLOOR	THK	THICKNESS
FDN	FOUNDATION	TMA	TOWER MOUNTED AMPLIFIER
FOC	FACE OF CONCRETE	TN	TOE NAIL
FOM	FACE OF MASONRY	TOA	TOP OF ANTENNA
FOS	FACE OF STUD	TOC	TOP OF CURB
FOW	FACE OF WALL	TOF	TOP OF FOUNDATION
FS	FINISH SURFACE	TOP	TOP OF PLATE (PARAPET)
FT	FOOT	TOS	TOP OF STEEL
FTG	FOOTING	TOW	TOP OF WALL
GA	GAUGE	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
GEN	GENERATOR	TYP	TYPICAL
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	UG	UNDERGROUND
GLB	GLUE LAMINATED BEAM	UL	UNDERWRITERS LABORATORY
GLV	GALVANIZED	UNO	UNLESS NOTED OTHERWISE
GPS	GLOBAL POSITIONING SYSTEM	UMTS	UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM
GND	GROUND	UPS	UNINTERRUPTIBLE POWER SYSTEM (DC POWER PLANT)
GSM	GLOBAL SYSTEM FOR MOBILE	VIF	VERIFIED IN FIELD
HDG	HOT DIPPED GALVANIZED	W	WIDE
HDR	HEADER	W/	WITH
HGR	HANGER	WD	WOOD
HVAC	HEAT/VENTILATION/AIR CONDITIONING	WP	WEATHERPROOF
HT	HEIGHT	WT	WEIGHT
IGR	INTERIOR GROUND RING		

ABBREVIATIONS

		
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SHEET TITLE LEGEND AND ABBREVIATIONS		
SHEET NUMBER GN-1		

SITE ACTIVITY REQUIREMENTS:

1. NOTICE TO PROCEED – NO WORK SHALL COMMENCE PRIOR TO CONTRACTOR RECEIVING A WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE DISH Wireless L.L.C. AND TOWER OWNER NOC & THE DISH Wireless L.L.C. AND TOWER OWNER CONSTRUCTION MANAGER.
2. "LOOK UP" – DISH Wireless L.L.C. AND TOWER OWNER SAFETY CLIMB REQUIREMENT:

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

GENERAL NOTES:

- 1.FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

CONTRACTOR:GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION

CARRIER:DISH Wireless L.L.C.

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



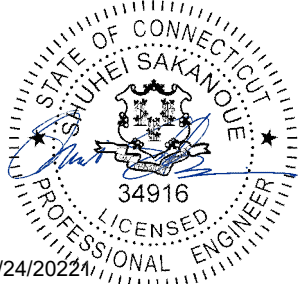
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RCD SS CJW

RFDS REV #: N/A

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A&E PROJECT NUMBER

2039–Z5555C

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDL00051A
HRT 087 943325
COSGROVE ROAD WHIFFORD HILL
WEST WILLINGTON, CT 06279

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-2

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

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

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.
- 4.1. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.
- 4.2. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 22,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.
5. EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
6. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).
7. PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
8. TIE WRAPS ARE NOT ALLOWED.
9. ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
10. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
11. POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI-CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
12. POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
13. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).
14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.
15. ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

16. ELECTRICAL METALLIC TUBING (EMT) OR METAL-CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
18. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.
20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND THE NEC.
21. WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).
22. SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
23. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER-ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.
24. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3 (OR BETTER) FOR EXTERIOR LOCATIONS.
25. METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
26. NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
27. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR DISH Wireless L.L.C. AND TOWER OWNER BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
28. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
29. INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "DISH Wireless L.L.C.".
30. ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.



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RCD	SS	CJW

RFDS REV #: N/A

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REV	DATE	DESCRIPTION
A	06/03/2021	ISSUED FOR REVIEW
0	06/24/2021	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
2039-Z5555C

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDL00051A
HRT 087 943325
COSGROVE ROAD WHIFFORD HILL
WEST WILLINGTON, CT 06279

SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-3

GROUNDING NOTES:

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



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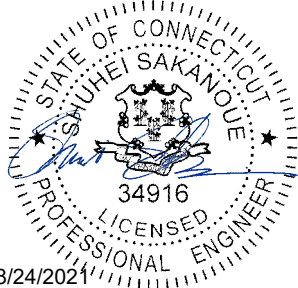


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SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-4

Exhibit D

Structural Analysis Report

Date: **June 05, 2021**



Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Subject: **Structural Analysis Report**

Carrier Designation: **DISH Network Co-Locate**
Site Number: BOBDL00051A
Site Name: CT-CCI-T-806383

Crown Castle Designation: **BU Number:** 806383
Site Name: HRT 087 943325
JDE Job Number: 650045
Work Order Number: 1966275
Order Number: 556635 Rev. 1

Engineering Firm Designation: **Crown Castle Project Number:** 1966275

Site Data: **COSGROVE ROAD, WEST WILLINGTON, TOLLAND County, CT**
Latitude 41° 53' 32.92", Longitude -72° 15' 38.15"
140 Foot - Self Support Tower

Crown Castle 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:

LC5: 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: Sudarshan Kasera

Respectfully submitted by:

Maham Barimani, P.E.
Senior Project Engineer

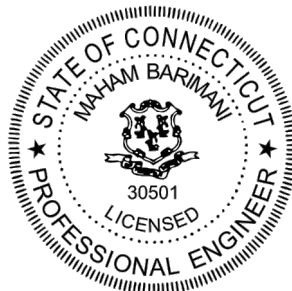


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Additional Calculations

1) INTRODUCTION

This tower is a 140 ft Self Support tower designed by ROHN.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	2 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)
114.0	114.0	3	fujitsu	TA08025-B604	1	1-1/2
		3	fujitsu	TA08025-B605		
		3	jma wireless	MX08FRO665-21 w/ Mount Pipe		
		1	raycap	RDIDC-9181-PF-48		
		1	tower mounts	Commscope MTC3975083		

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)
137.0	139.0	3	alcatel lucent	RRH2X60-AWS	14	3/8 1-5/8
		3	alcatel lucent	RRH2X60-PCS		
		6	andrew	HBXX-6517DS-VTM w/ Mount Pipe		
		3	andrew	LNx-6514DS-VTM w/ Mount Pipe		
		3	andrew	LNx-8513DS-A1M w/ Mount Pipe		
		2	rfs celwave	DB-T1-6Z-8AB-0Z		
		6	rfs celwave	FD9R6004/2C-3L		
	137.0	1	crown mounts	Sector Mount [SM 510-3]		
124.0	125.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz	3	7/8 1-1/4
		6	alcatel lucent	RRH2x50-800		
		3	commscope	NNVV-65B-R4 w/ Mount Pipe		
		3	nokia	FZHN		
		3	rfs celwave	APXVTM14-ALU-I20 w/ Mount Pipe		
	124.0	1	crown mounts	Sector Mount [SM 502-3]		
101.0	102.0	3	ems wireless	RR90-17-00DP w/ Mount Pipe	15	1/4 1-1/4
		3	ericsson	KRY 112 144/1		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		3	ericsson	KRY 112 489/2		
		3	ericsson	RADIO 4415 B66A		
		3	ericsson	RADIO 4449 B12/B71		
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
	101.0	1	mount	(3) 4' Sector Frames		
60.0	60.0	1	crown mounts	Side Arm Mount [SO 203-1]	1	1/2
		1	gps	GPS_A		
50.0	50.0	1	gps	GPS_A	1	1/2
		1	gps	GPS_RESERVED		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
4-GEOTECHNICAL REPORTS	1069386	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	1069383	CCISITES
4-TOWER MANUFACTURER DRAWINGS	1069394	CCISITES
4-POST-MODIFICATION INSPECTION	5786395	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	5670805	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.9.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

3.2) Assumptions

- 1) Tower and structures were maintained in accordance with the TIA-222 Standard.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	140 - 120	Leg	ROHN 2 STD	3	-16.53	38.68	42.7	Pass
T2	120 - 100	Leg	ROHN 2.5 EH	39	-40.90	78.15	52.3	Pass
T3	100 - 80	Leg	ROHN 3 EH	69	-64.36	99.06	65.0	Pass
T4	80 - 60	Leg	ROHN 3.5 EH	90	-87.16	132.01	66.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T5	60 - 40	Leg	ROHN 4 X-STR	111	-108.81	167.90	64.8	Pass
T6	40 - 20	Leg	ROHN 5 EH	132	-128.21	211.31	60.7	Pass
T7	20 - 0	Leg	ROHN 5 X-STR	147	-148.38	211.86	70.0	Pass
T1	140 - 120	Diagonal	L1 3/4x1 3/4x3/16	12	-2.89	11.65	24.8 46.3 (b)	Pass
T2	120 - 100	Diagonal	L1 3/4x1 3/4x3/16	47	-3.09	6.72	46.1 51.9 (b)	Pass
T3	100 - 80	Diagonal	L2x2x3/16	75	-3.97	6.31	63.0	Pass
T4	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	96	-4.23	9.65	43.8 64.5 (b)	Pass
T5	60 - 40	Diagonal	L3x3x3/16	117	-4.56	13.19	34.6 69.8 (b)	Pass
T6	40 - 20	Diagonal	L3x3x3/16	137	-5.54	9.05	61.3 65.1 (b)	Pass
T7	20 - 0	Diagonal	L3x3x1/4	152	-5.92	9.92	59.7	Pass
T1	140 - 120	Top Girt	L2x2x1/8	4	-0.33	4.27	7.7 8.3 (b)	Pass
T2	120 - 100	Top Girt	L2x2x1/8	41	-0.71	4.27	16.6	Pass
							Summary	
						Leg (T7)	70.0	Pass
						Diagonal (T5)	69.8	Pass
						Top Girt (T2)	16.6	Pass
						Bolt Checks	69.8	Pass
						Rating =	70.0	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	58.1	Pass
1	Base Foundation (Structure)	0	26.1	Pass
1	Base Foundation (Soil Interaction)	0	51.8	Pass

Structure Rating (max from all components) =	70%
---	------------

Notes:

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

4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

Section	T1	T2	T3	T4	T5	T6	T7	
Legs	ROHN 2 STD	ROHN 2.5 EH	ROHN 3 EH	ROHN 3.5 EH	ROHN 4 X-STR	ROHN 5 EH	ROHN 5 X-STR	
Leg Grade				A618-50				
Diagonals				L2 1/2x2 1/2x3/16	L3x3x3/16		L3x3x1/4	
Diagonal Grade				A36			A572-50	
Top Girts					N.A.			
Face Width (ft)	6.52083	6.5625	8.60417	10.6354	12.6771	14.7708	16.7708	18.7708
# Panels @ (ft)	5 @ 4	4 @ 5		9 @ 6.66667		2 @ 10	2 @ 9.95833	
Weight (K)	0.7	1.0	1.1	1.5	1.9	2.1	2.4	10.8

140.0 ft

120.0 ft

100.0 ft

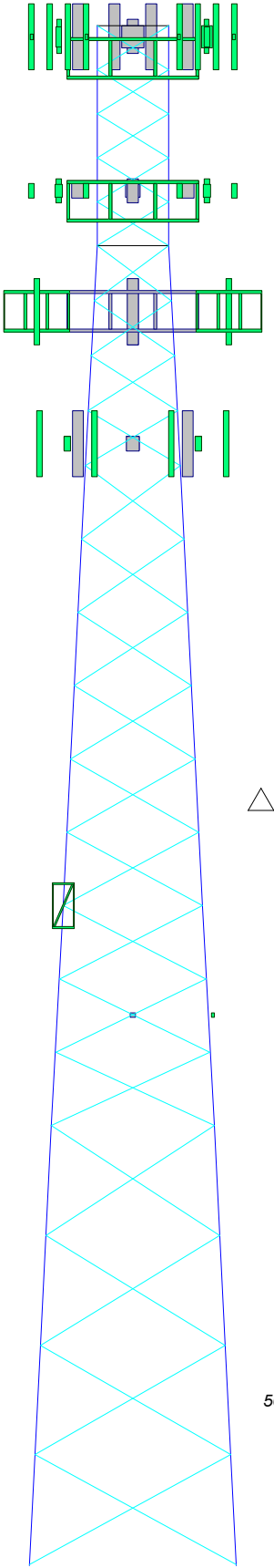
80.0 ft

60.0 ft

40.0 ft

20.0 ft

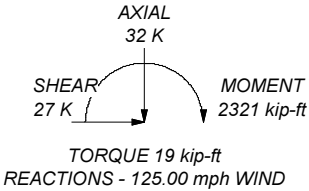
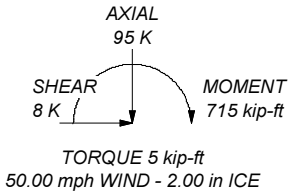
0.0 ft



ALL REACTIONS
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 153 K
SHEAR: 17 K

UPLIFT: -127 K
SHEAR: 15 K



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A618-50	50 ksi	70 ksi	A572-50	50 ksi	65 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-H Standard.
2. Tower designed for a 125.00 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50.00 mph basic wind with 2.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60.00 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TIA-222-H Annex S
8. TOWER RATING: 70%



Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: (724) 416-2000
FAX:

Job: **806383**

Project: **1966275**

Client: Crown Castle	Drawn by: SKasera	App'd:
Code: TIA-222-H	Date: 06/05/21	Scale: NTS
Path: C:\Users\skasera\Desktop\Work Area\SAI\806383\WO 1966275 - SAI\Prod\806383 RPA.er		Dwg No. E-1

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 140.00 ft above the ground line.
 The base of the tower is set at an elevation of 0.00 ft above the ground line.
 The face width of the tower is 6.52 ft at the top and 18.77 ft at the base.
 This tower is designed using the TIA-222-H standard.
 The following design criteria apply:

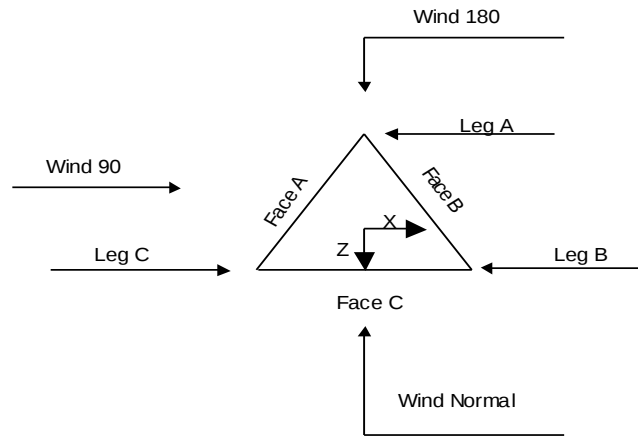
- Tower base elevation above sea level: 933.00 ft.
- Basic wind speed of 125.00 mph.
- Risk Category II.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 2.00 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50.00 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60.00 mph.
- TIA-222-H Annex S.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.05.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Maximum demand-capacity ratio is: 1.
- 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.
✓ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Use TIA-222-H Tension Splice
✓ Secondary Horizontal Braces Leg	✓ Sort Capacity Reports By Component	Exemption
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	
✓ SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	
SR Members Are Concentric	Ignore KL/ry For 60 Deg. Angle Legs	

Poles

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	140.00-120.00			6.52	1	20.00
T2	120.00-100.00		08N087	6.56	1	20.00
T3	100.00-80.00		09N006	8.60	1	20.00
T4	80.00-60.00		10N007	10.64	1	20.00
T5	60.00-40.00		11N007	12.68	1	20.00
T6	40.00-20.00		12N004	14.77	1	20.00
T7	20.00-0.00		13N003	16.77	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	140.00-120.00	4.00	X Brace	No	No	0.00	0.00
T2	120.00-100.00	5.00	X Brace	No	No	0.00	0.00
T3	100.00-80.00	6.67	X Brace	No	No	0.00	0.00
T4	80.00-60.00	6.67	X Brace	No	No	0.00	0.00
T5	60.00-40.00	6.67	X Brace	No	No	0.00	0.00
T6	40.00-20.00	10.00	X Brace	No	No	0.00	0.00
T7	20.00-0.00	9.96	X Brace	No	No	0.00	1.00

Tower Section Geometry (cont'd)

Tower Elevation	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
ft						

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 140.00-120.00	Pipe	ROHN 2 STD	A618-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 120.00-100.00	Pipe	ROHN 2.5 EH	A618-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 100.00-80.00	Pipe	ROHN 3 EH	A618-50 (50 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T4 80.00-60.00	Pipe	ROHN 3.5 EH	A618-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 60.00-40.00	Pipe	ROHN 4 X-STR	A618-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T6 40.00-20.00	Pipe	ROHN 5 EH	A618-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T7 20.00-0.00	Pipe	ROHN 5 X-STR	A618-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 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 140.00-120.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T2 120.00-100.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		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 _r	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 140.00-120.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T2 120.00-100.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T3 100.00-80.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T4 80.00-60.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T5 60.00-40.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T6 40.00-20.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T7 20.00-0.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors ¹							
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1 140.00-	Yes	Yes	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	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
120.00				1	1	1	1	1	1	1
T2 120.00- 100.00	Yes	Yes	1	1	1	1	1	1	1	1
T3 100.00- 80.00	Yes	Yes	1	1	1	1	1	1	1	1
T4 80.00- 60.00	Yes	Yes	1	1	1	1	1	1	1	1
T5 60.00- 40.00	Yes	Yes	1	1	1	1	1	1	1	1
T6 40.00- 20.00	Yes	Yes	1	1	1	1	1	1	1	1
T7 20.00- 0.00	Yes	Yes	1	1	1	1	1	1	1	1

¹Note: 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		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
T1 140.00- 120.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 120.00- 100.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 100.00- 80.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T4 80.00- 60.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 60.00- 40.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 40.00- 20.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 20.00-0.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub- Diagonal		Redundant Sub- Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	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
T1 140.00- 120.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 120.00- 100.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 100.00- 80.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T4 80.00- 60.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 60.00- 40.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 40.00- 20.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 20.00-0.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

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 140.00-120.00	Flange	0.63	4	0.50	1	0.50	1	0.50	0	0.50	0	0.50	0	0.50	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 120.00-100.00	Flange	0.75	4	0.50	1	0.50	1	0.63	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 100.00-80.00	Flange	0.88	4	0.50	1	0.50	0	0.00	0	0.50	0	0.50	0	0.50	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 80.00-60.00	Flange	0.88	4	0.50	1	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 60.00-40.00	Flange	1.00	4	0.50	1	0.63	0	0.63	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 40.00-20.00	Flange	1.00	4	0.63	1	0.63	0	0.00	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7 20.00-0.00	Flange	1.00	0	0.63	1	0.63	0	0.00	0	0.63	0	0.63	0	0.63	0
		A449		A325N		A325N		A325N		A325N		A325N		A325N	

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

LDF7-50A(1-5/8)	C	No	No	Ar (CaAa)	137.00 - 8.00	0.00	0.3	14	8	0.50	1.98		0.82
LDF2-50(3/8)	C	No	No	Ar (CaAa)	137.00 - 8.00	0.00	0.25	1	1	0.50	0.44		0.08

HB114-08U3M12-XXXF(7/8)	B	No	No	Ar (CaAa)	124.00 - 8.00	0.00	-0.33	1	1	0.50	1.11		0.68
HB114-1-08U4-M5F(1-1/4)	B	No	No	Ar (CaAa)	124.00 - 8.00	0.00	-0.35	3	3	0.50	1.54		1.30

LDF1-50A(1/4)	A	No	No	Ar (CaAa)	101.00 - 8.00	0.00	0.365	1	1	0.50	0.34		0.06
FLC 114-50J(1-1/4)	A	No	No	Ar (CaAa)	101.00 - 8.00	0.00	0.4	15	8	0.50	1.58		0.70

LDF4-50A(1/2)	C	No	No	Ar (CaAa)	60.00 - 8.00	4.00	0.26	1	1	0.50	0.63		0.15

LDF4-50A(1/2)	B	No	No	Ar (CaAa)	50.00 - 8.00	0.00	-0.355	1	1	0.50	0.63		0.15

Feedline Ladder (Af)	A	No	No	Af (CaAa)	101.00 - 8.00	0.00	0.4	1	1	3.00	3.00		8.40
Feedline Ladder (Af)	B	No	No	Af (CaAa)	124.00 - 8.00	0.00	-0.35	1	1	3.00	3.00		8.40
Feedline Ladder (Af)	C	No	No	Af (CaAa)	137.00 - 8.00	0.00	0.3	1	1	3.00	3.00		8.40

Safety Line 3/8	C	No	No	Ar (CaAa)	140.00 - 8.00	0.00	0.5	1	1	0.50	0.38		0.22

CU12PSM9P 6XXX(1-1/2)	B	No	No	Ar (CaAa)	114.00 - 0.00	0.00	-0.25	1	1	1.60	1.60		2.35

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
**													

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C _A A _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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	140.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	4.292	0.000	0.05
		C	0.000	0.000	57.122	0.000	0.34
T2	120.00-100.00	A	0.000	0.000	2.905	0.000	0.02
		B	0.000	0.000	23.700	0.000	0.29
		C	0.000	0.000	67.070	0.000	0.40
T3	100.00-80.00	A	0.000	0.000	58.090	0.000	0.38
		B	0.000	0.000	24.660	0.000	0.31
		C	0.000	0.000	67.070	0.000	0.40
T4	80.00-60.00	A	0.000	0.000	58.090	0.000	0.38
		B	0.000	0.000	24.660	0.000	0.31
		C	0.000	0.000	67.070	0.000	0.40
T5	60.00-40.00	A	0.000	0.000	58.090	0.000	0.38
		B	0.000	0.000	25.290	0.000	0.31
		C	0.000	0.000	68.330	0.000	0.41
T6	40.00-20.00	A	0.000	0.000	58.090	0.000	0.38
		B	0.000	0.000	25.920	0.000	0.31
		C	0.000	0.000	68.330	0.000	0.41
T7	20.00-0.00	A	0.000	0.000	34.854	0.000	0.23
		B	0.000	0.000	16.832	0.000	0.20
		C	0.000	0.000	40.998	0.000	0.24

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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	140.00-120.00	A	1.950	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	11.046	0.000	0.20
		C		0.000	0.000	83.538	0.000	1.66
T2	120.00-100.00	A	1.918	0.000	0.000	3.968	0.000	0.08
		B		0.000	0.000	62.359	0.000	1.14
		C		0.000	0.000	96.177	0.000	1.90
T3	100.00-80.00	A	1.879	0.000	0.000	78.817	0.000	1.59
		B		0.000	0.000	64.903	0.000	1.18
		C		0.000	0.000	95.477	0.000	1.87
T4	80.00-60.00	A	1.833	0.000	0.000	78.144	0.000	1.56
		B		0.000	0.000	64.026	0.000	1.15
		C		0.000	0.000	94.619	0.000	1.83

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
T5	60.00-40.00	A	1.772	0.000	0.000	77.270	0.000	1.51
		B		0.000	0.000	67.060	0.000	1.16
		C		0.000	0.000	101.853	0.000	1.89
T6	40.00-20.00	A	1.684	0.000	0.000	75.999	0.000	1.46
		B		0.000	0.000	69.223	0.000	1.15
		C		0.000	0.000	99.880	0.000	1.81
T7	20.00-0.00	A	1.509	0.000	0.000	44.087	0.000	0.81
		B		0.000	0.000	42.834	0.000	0.69
		C		0.000	0.000	57.579	0.000	0.99

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
T1	140.00-120.00	-8.89	3.26	-8.17	4.10
T2	120.00-100.00	-9.17	-3.41	-7.61	-3.50
T3	100.00-80.00	-10.49	-16.99	-8.96	-15.01
T4	80.00-60.00	-11.09	-17.93	-9.95	-16.71
T5	60.00-40.00	-11.51	-18.21	-11.10	-17.16
T6	40.00-20.00	-13.66	-21.78	-12.80	-20.84
T7	20.00-0.00	-10.17	-16.88	-9.66	-17.18

Shielding Factor K_a

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	LDF7-50A(1-5/8)	120.00 - 137.00	0.6000	0.5822
T1	3	LDF2-50(3/8)	120.00 - 137.00	0.6000	0.5822
T1	5	HB114-08U3M12- XXXXF(7/8)	120.00 - 124.00	0.6000	0.5822
T1	6	HB114-1-08U4-M5F(1-1/4)	120.00 - 124.00	0.6000	0.5822
T1	18	Feedline Ladder (Af)	120.00 - 124.00	0.6000	0.5822
T1	19	Feedline Ladder (Af)	120.00 - 137.00	0.6000	0.5822
T1	21	Safety Line 3/8	120.00 - 140.00	0.6000	0.5822
T2	2	LDF7-50A(1-5/8)	100.00 - 120.00	0.6000	0.6000
T2	3	LDF2-50(3/8)	100.00 - 120.00	0.6000	0.6000
T2	5	HB114-08U3M12- XXXXF(7/8)	100.00 - 120.00	0.6000	0.6000
T2	6	HB114-1-08U4-M5F(1-1/4)	100.00 - 120.00	0.6000	0.6000
T2	10	LDF1-50A(1/4)	100.00 - 101.00	0.6000	0.6000
T2	11	FLC 114-50J(1-1/4)	100.00 - 101.00	0.6000	0.6000
T2	17	Feedline Ladder (Af)	100.00 - 101.00	0.6000	0.6000
T2	18	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T2	19	Feedline Ladder (Af)	100.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
			120.00		
T2	21	Safety Line 3/8	100.00 -	0.6000	0.6000
			120.00		
T2	23	CU12PSM9P6XXX(1-1/2)	100.00 -	0.6000	0.6000
			114.00		
T3	2	LDF7-50A(1-5/8)	80.00 -	0.6000	0.6000
			100.00		
T3	3	LDF2-50(3/8)	80.00 -	0.6000	0.6000
			100.00		
T3	5	HB114-08U3M12- XXXF(7/8)	80.00 -	0.6000	0.6000
			100.00		
T3	6	HB114-1-08U4-M5F(1-1/4)	80.00 -	0.6000	0.6000
			100.00		
T3	10	LDF1-50A(1/4)	80.00 -	0.6000	0.6000
			100.00		
T3	11	FLC 114-50J(1-1/4)	80.00 -	0.6000	0.6000
			100.00		
T3	17	Feedline Ladder (Af)	80.00 -	0.6000	0.6000
			100.00		
T3	18	Feedline Ladder (Af)	80.00 -	0.6000	0.6000
			100.00		
T3	19	Feedline Ladder (Af)	80.00 -	0.6000	0.6000
			100.00		
T3	21	Safety Line 3/8	80.00 -	0.6000	0.6000
			100.00		
T3	23	CU12PSM9P6XXX(1-1/2)	80.00 -	0.6000	0.6000
			100.00		
T4	2	LDF7-50A(1-5/8)	60.00 -	0.6000	0.6000
			80.00		
T4	3	LDF2-50(3/8)	60.00 -	0.6000	0.6000
			80.00		
T4	5	HB114-08U3M12- XXXF(7/8)	60.00 -	0.6000	0.6000
			80.00		
T4	6	HB114-1-08U4-M5F(1-1/4)	60.00 -	0.6000	0.6000
			80.00		
T4	10	LDF1-50A(1/4)	60.00 -	0.6000	0.6000
			80.00		
T4	11	FLC 114-50J(1-1/4)	60.00 -	0.6000	0.6000
			80.00		
T4	17	Feedline Ladder (Af)	60.00 -	0.6000	0.6000
			80.00		
T4	18	Feedline Ladder (Af)	60.00 -	0.6000	0.6000
			80.00		
T4	19	Feedline Ladder (Af)	60.00 -	0.6000	0.6000
			80.00		
T4	21	Safety Line 3/8	60.00 -	0.6000	0.6000
			80.00		
T4	23	CU12PSM9P6XXX(1-1/2)	60.00 -	0.6000	0.6000
			80.00		
T5	2	LDF7-50A(1-5/8)	40.00 -	0.6000	0.6000
			60.00		
T5	3	LDF2-50(3/8)	40.00 -	0.6000	0.6000
			60.00		
T5	5	HB114-08U3M12- XXXF(7/8)	40.00 -	0.6000	0.6000
			60.00		
T5	6	HB114-1-08U4-M5F(1-1/4)	40.00 -	0.6000	0.6000
			60.00		
T5	10	LDF1-50A(1/4)	40.00 -	0.6000	0.6000
			60.00		
T5	11	FLC 114-50J(1-1/4)	40.00 -	0.6000	0.6000
			60.00		
T5	13	LDF4-50A(1/2)	40.00 -	0.6000	0.6000
			60.00		
T5	15	LDF4-50A(1/2)	40.00 -	0.6000	0.6000
			50.00		
T5	17	Feedline Ladder (Af)	40.00 -	0.6000	0.6000
			60.00		
T5	18	Feedline Ladder (Af)	40.00 -	0.6000	0.6000
			60.00		

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T5	19	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	21	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T5	23	CU12PSM9P6XXX(1-1/2)	40.00 - 60.00	0.6000	0.6000
T6	2	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T6	3	LDF2-50(3/8)	20.00 - 40.00	0.6000	0.6000
T6	5	HB114-08U3M12-XXXX(7/8)	20.00 - 40.00	0.6000	0.6000
T6	6	HB114-1-08U4-M5F(1-1/4)	20.00 - 40.00	0.6000	0.6000
T6	10	LDF1-50A(1/4)	20.00 - 40.00	0.6000	0.6000
T6	11	FLC 114-50J(1-1/4)	20.00 - 40.00	0.6000	0.6000
T6	13	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T6	15	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T6	17	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	18	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	19	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	21	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T6	23	CU12PSM9P6XXX(1-1/2)	20.00 - 40.00	0.6000	0.6000
T7	2	LDF7-50A(1-5/8)	8.00 - 20.00	0.6000	0.6000
T7	3	LDF2-50(3/8)	8.00 - 20.00	0.6000	0.6000
T7	5	HB114-08U3M12-XXXX(7/8)	8.00 - 20.00	0.6000	0.6000
T7	6	HB114-1-08U4-M5F(1-1/4)	8.00 - 20.00	0.6000	0.6000
T7	10	LDF1-50A(1/4)	8.00 - 20.00	0.6000	0.6000
T7	11	FLC 114-50J(1-1/4)	8.00 - 20.00	0.6000	0.6000
T7	13	LDF4-50A(1/2)	8.00 - 20.00	0.6000	0.6000
T7	15	LDF4-50A(1/2)	8.00 - 20.00	0.6000	0.6000
T7	17	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T7	18	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T7	19	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T7	21	Safety Line 3/8	8.00 - 20.00	0.6000	0.6000
T7	23	CU12PSM9P6XXX(1-1/2)	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft

LNx-8513DS-A1M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	137.00
LNx-8513DS-A1M w/ Mount Pipe	B	From Leg	4.00 0.00	0.000	137.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
LNx-8513DS-A1M w/ Mount Pipe	C	From Leg	2.00 4.00 0.00	0.000	137.00
(2) HBXX-6517DS-VTM w/ Mount Pipe	A	From Leg	2.00 4.00 0.00	0.000	137.00
(2) HBXX-6517DS-VTM w/ Mount Pipe	B	From Leg	2.00 4.00 0.00	0.000	137.00
(2) HBXX-6517DS-VTM w/ Mount Pipe	C	From Leg	2.00 4.00 0.00	0.000	137.00
LNx-6514DS-VTM w/ Mount Pipe	A	From Leg	2.00 4.00 0.00	0.000	137.00
LNx-6514DS-VTM w/ Mount Pipe	B	From Leg	2.00 4.00 0.00	0.000	137.00
LNx-6514DS-VTM w/ Mount Pipe	C	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-PCS	A	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-PCS	B	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-PCS	C	From Leg	2.00 4.00 0.00	0.000	137.00
(2) FD9R6004/2C-3L	A	From Leg	2.00 4.00 0.00	0.000	137.00
(2) FD9R6004/2C-3L	B	From Leg	2.00 4.00 0.00	0.000	137.00
(2) FD9R6004/2C-3L	C	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-AWS	C	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-AWS	B	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-AWS	A	From Leg	2.00 4.00 0.00	0.000	137.00
DB-T1-6Z-8AB-0Z	A	From Leg	2.00 4.00 0.00	0.000	137.00
DB-T1-6Z-8AB-0Z	B	From Leg	2.00 4.00 0.00	0.000	137.00
Sector Mount [SM 510-3] ***	C	None	2.00	0.000	137.00
NNVV-65B-R4 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.000	124.00
NNVV-65B-R4 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.000	124.00
NNVV-65B-R4 w/ Mount Pipe	C	From Leg	4.00 0.00	0.000	124.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
APXVTM14-ALU-I20 w/ Mount Pipe	A	From Leg	1.00 4.00 0.00	0.000	124.00
APXVTM14-ALU-I20 w/ Mount Pipe	B	From Leg	1.00 4.00 0.00	0.000	124.00
APXVTM14-ALU-I20 w/ Mount Pipe	C	From Leg	1.00 4.00 0.00	0.000	124.00
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00 4.00 0.00	0.000	124.00
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00 4.00 0.00	0.000	124.00
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00 4.00 0.00	0.000	124.00
(2) RRH2x50-800	A	From Leg	1.00 4.00 0.00	0.000	124.00
(2) RRH2x50-800	B	From Leg	1.00 4.00 0.00	0.000	124.00
(2) RRH2x50-800	C	From Leg	1.00 4.00 0.00	0.000	124.00
FZHN	A	From Leg	1.00 4.00 0.00	0.000	124.00
FZHN	B	From Leg	1.00 4.00 0.00	0.000	124.00
FZHN	C	From Leg	1.00 4.00 0.00	0.000	124.00
Empty Mount Pipe	A	From Leg	1.00 4.00 0.00	0.000	124.00
Empty Mount Pipe	B	From Leg	1.00 4.00 0.00	0.000	124.00
Empty Mount Pipe	C	From Leg	1.00 4.00 0.00	0.000	124.00
Sector Mount [SM 502-3] ***	C	None	0.00	0.000	124.00
MX08FRO665-21 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	114.00
MX08FRO665-21 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	114.00
MX08FRO665-21 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	114.00
TA08025-B604	A	From Leg	4.00 0.00 0.00	0.000	114.00
TA08025-B604	B	From Leg	4.00 0.00 0.00	0.000	114.00
TA08025-B604	C	From Leg	4.00 0.00 0.00	0.000	114.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
TA08025-B605	A	From Leg	0.00 4.00 0.00 0.00	0.000	114.00
TA08025-B605	B	From Leg	4.00 0.00 0.00	0.000	114.00
TA08025-B605	C	From Leg	4.00 0.00 0.00	0.000	114.00
RDIDC-9181-PF-48	A	From Leg	4.00 0.00 0.00	0.000	114.00
(2) 8' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	114.00
(2) 8' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	114.00
(2) 8' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	114.00
Commscope MTC3975083 ***	C	None		0.000	114.00
RR90-17-00DP w/ Mount Pipe	A	From Leg	2.00 0.00 1.00	0.000	101.00
RR90-17-00DP w/ Mount Pipe	B	From Leg	2.00 0.00 1.00	0.000	101.00
RR90-17-00DP w/ Mount Pipe	C	From Leg	2.00 0.00 1.00	0.000	101.00
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	2.00 0.00 1.00	0.000	101.00
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	2.00 0.00 1.00	0.000	101.00
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 489/2	A	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 489/2	B	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 489/2	C	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 144/1	A	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 144/1	B	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 144/1	C	From Leg	2.00 0.00 1.00	0.000	101.00
RADIO 4449 B12/B71	A	From Leg	2.00 0.00 1.00	0.000	101.00
RADIO 4449 B12/B71	B	From Leg	2.00 0.00 1.00	0.000	101.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
RADIO 4449 B12/B71	C	From Leg	1.00 2.00 0.00	0.000	101.00
RADIO 4415 B66A	A	From Leg	1.00 2.00 0.00	0.000	101.00
RADIO 4415 B66A	B	From Leg	1.00 2.00 0.00	0.000	101.00
RADIO 4415 B66A	C	From Leg	1.00 2.00 0.00	0.000	101.00
(3) 4' Sector Frames 1.9" x10' Horizontal Pipe	C A	None From Leg	1.00 0.50 0.00	0.000 0.000	101.00 101.00
1.9" x10' Horizontal Pipe	B	From Leg	0.50 0.00 0.00	0.000	101.00
1.9" x10' Horizontal Pipe	C	From Leg	0.50 0.00 0.00	0.000	101.00
Pipe Mount	A	From Leg	2.00 0.00 0.00	0.000	101.00
Pipe Mount	B	From Leg	2.00 0.00 0.00	0.000	101.00
Pipe Mount	C	From Leg	2.00 0.00 0.00	0.000	101.00
*** GPS_A	C	From Leg	2.00 0.00 0.00	0.000	60.00
Side Arm Mount [SO 203-1]	C	From Leg	0.00 0.00 0.00	0.000	60.00
*** GPS_A	A	From Leg	0.50 0.00 0.00	0.000	50.00
*** GPS_RESERVED	B	From Leg	0.50 0.00 0.00	0.000	50.00
*** **					

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice

Comb. No.	Description
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	140 - 120	Leg	Max Tension	15	11.85	-0.01	-0.01
			Max. Compression	2	-16.52	0.05	0.02
			Max. Mx	22	-0.78	0.55	-0.01
			Max. My	16	-1.54	0.01	-0.59
			Max. Vy	3	-0.97	0.42	-0.00
			Max. Vx	8	-0.96	-0.00	0.37
		Diagonal	Max Tension	5	2.77	0.00	0.00
			Max. Compression	16	-2.89	0.00	0.00
			Max. Mx	35	0.54	0.03	-0.00
			Max. My	12	-1.65	0.00	0.00
			Max. Vy	35	-0.03	0.03	-0.00
			Max. Vx	12	-0.00	0.00	0.00
		Top Girt	Max Tension	14	0.36	0.00	0.00
			Max. Compression	3	-0.33	0.00	0.00
			Max. Mx	26	0.03	-0.07	0.00
			Max. My	26	0.03	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T2	120 - 100	Leg	Max. Vy	26	0.04	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
			Max Tension	15	31.89	-0.10	-0.01
			Max. Compression	2	-40.90	0.28	0.02
			Max. Mx	14	30.42	-0.29	-0.02
			Max. My	20	-4.95	-0.01	-0.24
		Diagonal	Max. Vy	14	0.44	-0.29	-0.02
			Max. Vx	24	-0.42	-0.01	0.24
			Max Tension	4	3.11	0.00	0.00
			Max. Compression	4	-3.09	0.00	0.00
			Max. Mx	35	0.78	0.04	-0.00
			Max. My	32	0.81	0.03	-0.00
		Top Girt	Max. Vy	37	0.03	0.03	-0.00
			Max. Vx	32	0.00	0.00	0.00
			Max Tension	14	0.24	0.00	0.00
			Max. Compression	19	-0.23	0.00	0.00
			Max. Mx	26	0.01	-0.07	0.00
			Max. My	26	0.01	0.00	0.00
T3	100 - 80	Leg	Max. Vy	26	-0.04	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
			Max Tension	15	52.61	-0.13	-0.03
			Max. Compression	2	-64.36	0.13	0.03
			Max. Mx	14	36.85	-0.29	-0.02
			Max. My	20	-5.08	-0.01	-0.24
		Diagonal	Max. Vy	14	-0.07	-0.29	-0.02
			Max. Vx	20	0.09	-0.01	-0.22
			Max Tension	4	3.93	0.00	0.00
			Max. Compression	16	-3.97	0.00	0.00
			Max. Mx	37	0.82	0.06	-0.01
			Max. My	27	-1.25	0.05	0.01
T4	80 - 60	Leg	Max. Vy	37	0.05	0.06	-0.01
			Max. Vx	33	0.00	0.00	0.00
			Max Tension	15	72.36	-0.14	-0.02
			Max. Compression	2	-87.16	0.24	0.03
			Max. Mx	2	-87.16	0.24	0.03
			Max. My	20	-6.92	-0.02	-0.24
		Diagonal	Max. Vy	33	-0.06	-0.17	-0.01
			Max. Vx	20	0.09	-0.02	-0.24
			Max Tension	16	4.20	0.00	0.00
			Max. Compression	16	-4.23	0.00	0.00
			Max. Mx	27	1.11	0.10	-0.01
			Max. My	36	0.74	0.09	-0.01
T5	60 - 40	Leg	Max. Vy	37	0.06	0.09	-0.01
			Max. Vx	36	0.00	0.00	0.00
			Max Tension	15	90.59	-0.20	-0.02
			Max. Compression	2	-108.81	0.32	0.03
			Max. Mx	33	2.17	-0.55	-0.01
			Max. My	20	-8.07	-0.02	-0.27
		Diagonal	Max. Vy	33	0.15	-0.55	-0.01
			Max. Vx	3	0.09	-0.11	0.16
			Max Tension	16	4.54	0.00	0.00
			Max. Compression	16	-4.56	0.00	0.00
			Max. Mx	27	1.08	0.13	-0.01
			Max. My	28	-0.87	0.10	0.02
T6	40 - 20	Leg	Max. Vy	37	0.08	0.12	-0.02
			Max. Vx	28	-0.00	0.00	0.00
			Max Tension	15	106.72	-0.33	-0.04
			Max. Compression	2	-128.21	0.54	0.04
			Max. Mx	33	2.92	-0.91	-0.01
			Max. My	20	-9.76	-0.05	-0.64
		Diagonal	Max. Vy	33	0.17	-0.91	-0.01
			Max. Vx	20	-0.15	-0.05	-0.64
			Max Tension	16	5.35	0.00	0.00
			Max. Compression	2	-5.54	0.00	0.00
			Max. Mx	37	0.53	0.17	-0.02
			Max. My	36	1.81	0.15	-0.02
T7	20 - 0	Leg	Max. Vy	37	0.09	0.16	0.02
			Max. Vx	36	0.00	0.00	0.00
			Max Tension	15	128.06	0.60	0.04
			Max. Compression	2	-128.21	0.54	0.04

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	2	-154.03	0.00	-0.00
			Max. Mx	33	5.73	-0.91	-0.01
			Max. My	24	-10.16	-0.06	0.91
			Max. Vy	2	-7.88	0.00	-0.00
			Max. Vx	8	-2.39	0.00	0.00
		Diagonal	Max Tension	16	5.60	0.00	0.00
			Max. Compression	2	-5.92	0.00	0.00
			Max. Mx	37	0.17	0.22	-0.02
			Max. My	36	2.13	0.17	-0.03
			Max. Vy	37	0.09	0.22	-0.02
			Max. Vx	36	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	140.83	13.07	-8.03
	Max. H _x	18	140.83	13.07	-8.03
	Max. H _z	5	-106.44	-9.81	7.17
	Min. Vert	7	-116.23	-11.17	6.89
	Min. H _x	7	-116.23	-11.17	6.89
Leg B	Min. H _z	18	140.83	13.07	-8.03
	Max. Vert	10	144.23	-13.71	-8.30
	Max. H _x	23	-121.65	11.83	7.20
	Max. H _z	23	-121.65	11.83	7.20
	Min. Vert	23	-121.65	11.83	7.20
Leg A	Min. H _x	10	144.23	-13.71	-8.30
	Min. H _z	10	144.23	-13.71	-8.30
	Max. Vert	2	153.32	-0.54	16.74
	Max. H _x	21	8.86	2.37	0.63
	Max. H _z	2	153.32	-0.54	16.74
	Min. Vert	15	-127.44	0.52	-14.50
	Min. H _x	8	11.15	-2.39	0.79
	Min. H _z	15	-127.44	0.52	-14.50

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	26.39	-0.00	-0.00	-11.87	9.03	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	31.66	-0.04	-26.99	-2320.87	15.45	-17.15
0.9 Dead+1.0 Wind 0 deg - No Ice	23.75	-0.04	-26.99	-2317.31	12.74	-17.15
1.2 Dead+1.0 Wind 30 deg - No Ice	31.66	12.35	-21.47	-1880.66	-1060.15	-12.59
0.9 Dead+1.0 Wind 30 deg - No Ice	23.75	12.35	-21.47	-1877.10	-1062.86	-12.59
1.2 Dead+1.0 Wind 60 deg - No Ice	31.66	20.06	-11.59	-1025.12	-1737.87	-12.98
0.9 Dead+1.0 Wind 60 deg - No Ice	23.75	20.06	-11.59	-1021.56	-1740.58	-12.98
1.2 Dead+1.0 Wind 90 deg - No Ice	31.66	23.65	0.04	-9.63	-2023.90	-18.99
0.9 Dead+1.0 Wind 90 deg - No Ice	23.75	23.65	0.04	-6.07	-2026.61	-18.99
1.2 Dead+1.0 Wind 120 deg - No Ice	31.66	22.38	12.97	1085.45	-1882.47	-10.66
0.9 Dead+1.0 Wind 120 deg	23.75	22.38	12.97	1089.01	-1885.18	-10.66

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
- No Ice						
1.2 Dead+1.0 Wind 150 deg	31.66	12.91	22.37	1901.52	-1093.96	9.13
- No Ice						
0.9 Dead+1.0 Wind 150 deg	23.75	12.91	22.37	1905.08	-1096.67	9.13
- No Ice						
1.2 Dead+1.0 Wind 180 deg	31.66	0.04	25.55	2196.76	6.23	17.15
- No Ice						
0.9 Dead+1.0 Wind 180 deg	23.75	0.04	25.55	2200.32	3.52	17.15
- No Ice						
1.2 Dead+1.0 Wind 210 deg	31.66	-12.35	21.47	1852.18	1081.83	12.59
- No Ice						
0.9 Dead+1.0 Wind 210 deg	23.75	-12.35	21.47	1855.74	1079.12	12.59
- No Ice						
1.2 Dead+1.0 Wind 240 deg	31.66	-21.30	12.31	1044.45	1842.37	12.98
- No Ice						
0.9 Dead+1.0 Wind 240 deg	23.75	-21.30	12.31	1048.01	1839.66	12.98
- No Ice						
1.2 Dead+1.0 Wind 270 deg	31.66	-23.65	-0.04	-18.85	2045.58	18.99
- No Ice						
0.9 Dead+1.0 Wind 270 deg	23.75	-23.65	-0.04	-15.29	2042.87	18.99
- No Ice						
1.2 Dead+1.0 Wind 300 deg	31.66	-21.13	-12.25	-1066.12	1821.34	10.66
- No Ice						
0.9 Dead+1.0 Wind 300 deg	23.75	-21.13	-12.25	-1062.56	1818.63	10.66
- No Ice						
1.2 Dead+1.0 Wind 330 deg	31.66	-12.91	-22.37	-1930.00	1115.64	-9.13
- No Ice						
0.9 Dead+1.0 Wind 330 deg	23.75	-12.91	-22.37	-1926.44	1112.93	-9.13
- No Ice						
1.2 Dead+1.0 Ice+1.0 Temp	95.20	-0.00	-0.00	-42.61	41.85	0.00
1.2 Dead+1.0 Wind 0	95.20	-0.01	-7.65	-712.22	42.73	-4.39
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 30	95.20	3.67	-6.38	-605.31	-281.78	-4.49
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 60	95.20	6.18	-3.57	-358.35	-504.64	-4.88
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 90	95.20	7.18	0.01	-41.73	-588.75	-5.18
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 120	95.20	6.47	3.75	283.86	-521.46	-2.61
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 150	95.20	3.75	6.50	526.38	-286.42	1.89
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 180	95.20	0.01	7.46	614.84	40.98	4.39
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	95.20	-3.67	6.38	520.10	365.49	4.49
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	95.20	-6.35	3.67	279.23	598.89	4.88
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 270	95.20	-7.18	-0.01	-43.48	672.46	5.18
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	95.20	-6.31	-3.65	-362.99	594.63	2.61
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	95.20	-3.75	-6.50	-611.59	370.13	-1.89
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	26.39	-0.01	-6.57	-571.76	10.15	-4.16
Dead+Wind 30 deg - Service	26.39	3.00	-5.23	-464.93	-250.94	-3.05
Dead+Wind 60 deg - Service	26.39	4.88	-2.82	-257.27	-415.48	-3.15
Dead+Wind 90 deg - Service	26.39	5.76	0.01	-10.75	-484.91	-4.61
Dead+Wind 120 deg - Service	26.39	5.44	3.16	255.07	-450.55	-2.59
Dead+Wind 150 deg - Service	26.39	3.14	5.44	453.16	-259.14	2.21
Dead+Wind 180 deg - Service	26.39	0.01	6.22	524.83	7.92	4.16
Dead+Wind 210 deg - Service	26.39	-3.00	5.23	441.20	269.01	3.05
Dead+Wind 240 deg - Service	26.39	-5.18	3.00	245.13	453.63	3.15
Dead+Wind 270 deg -	26.39	-5.76	-0.01	-12.99	502.98	4.61

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Service						
Dead+Wind 300 deg -	26.39	-5.14	-2.98	-267.21	448.53	2.59
Service						
Dead+Wind 330 deg -	26.39	-3.14	-5.44	-476.90	277.21	-2.21
Service						

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-26.39	0.00	0.00	26.39	0.00	0.000%
2	-0.04	-31.66	-26.99	0.04	31.66	26.99	0.000%
3	-0.04	-23.75	-26.99	0.04	23.75	26.99	0.000%
4	12.35	-31.66	-21.47	-12.35	31.66	21.47	0.000%
5	12.35	-23.75	-21.47	-12.35	23.75	21.47	0.000%
6	20.06	-31.66	-11.59	-20.06	31.66	11.59	0.000%
7	20.06	-23.75	-11.59	-20.06	23.75	11.59	0.000%
8	23.65	-31.66	0.04	-23.65	31.66	-0.04	0.000%
9	23.65	-23.75	0.04	-23.65	23.75	-0.04	0.000%
10	22.38	-31.66	12.97	-22.38	31.66	-12.97	0.000%
11	22.38	-23.75	12.97	-22.38	23.75	-12.97	0.000%
12	12.91	-31.66	22.37	-12.91	31.66	-22.37	0.000%
13	12.91	-23.75	22.37	-12.91	23.75	-22.37	0.000%
14	0.04	-31.66	25.55	-0.04	31.66	-25.55	0.000%
15	0.04	-23.75	25.55	-0.04	23.75	-25.55	0.000%
16	-12.35	-31.66	21.47	12.35	31.66	-21.47	0.000%
17	-12.35	-23.75	21.47	12.35	23.75	-21.47	0.000%
18	-21.30	-31.66	12.31	21.30	31.66	-12.31	0.000%
19	-21.30	-23.75	12.31	21.30	23.75	-12.31	0.000%
20	-23.65	-31.66	-0.04	23.65	31.66	0.04	0.000%
21	-23.65	-23.75	-0.04	23.65	23.75	0.04	0.000%
22	-21.13	-31.66	-12.25	21.13	31.66	12.25	0.000%
23	-21.13	-23.75	-12.25	21.13	23.75	12.25	0.000%
24	-12.91	-31.66	-22.37	12.91	31.66	22.37	0.000%
25	-12.91	-23.75	-22.37	12.91	23.75	22.37	0.000%
26	0.00	-95.20	0.00	0.00	95.20	0.00	0.000%
27	-0.01	-95.20	-7.65	0.01	95.20	7.65	0.000%
28	3.67	-95.20	-6.38	-3.67	95.20	6.38	0.000%
29	6.18	-95.20	-3.57	-6.18	95.20	3.57	0.000%
30	7.18	-95.20	0.01	-7.18	95.20	-0.01	0.000%
31	6.47	-95.20	3.75	-6.47	95.20	-3.75	0.000%
32	3.75	-95.20	6.50	-3.75	95.20	-6.50	0.000%
33	0.01	-95.20	7.46	-0.01	95.20	-7.46	0.000%
34	-3.67	-95.20	6.38	3.67	95.20	-6.38	0.000%
35	-6.35	-95.20	3.67	6.35	95.20	-3.67	0.000%
36	-7.18	-95.20	-0.01	7.18	95.20	0.01	0.000%
37	-6.31	-95.20	-3.65	6.31	95.20	3.65	0.000%
38	-3.75	-95.20	-6.50	3.75	95.20	6.50	0.000%
39	-0.01	-26.39	-6.57	0.01	26.39	6.57	0.000%
40	3.00	-26.39	-5.23	-3.00	26.39	5.23	0.000%
41	4.88	-26.39	-2.82	-4.88	26.39	2.82	0.000%
42	5.76	-26.39	0.01	-5.76	26.39	-0.01	0.000%
43	5.44	-26.39	3.16	-5.44	26.39	-3.16	0.000%
44	3.14	-26.39	5.44	-3.14	26.39	-5.44	0.000%
45	0.01	-26.39	6.22	-0.01	26.39	-6.22	0.000%
46	-3.00	-26.39	5.23	3.00	26.39	-5.23	0.000%
47	-5.18	-26.39	3.00	5.18	26.39	-3.00	0.000%
48	-5.76	-26.39	-0.01	5.76	26.39	0.01	0.000%
49	-5.14	-26.39	-2.98	5.14	26.39	2.98	0.000%
50	-3.14	-26.39	-5.44	3.14	26.39	5.44	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	2.53	39	0.161	0.017
T2	120 - 100	1.86	39	0.146	0.016
T3	100 - 80	1.27	39	0.121	0.013
T4	80 - 60	0.80	39	0.093	0.010
T5	60 - 40	0.45	39	0.065	0.007
T6	40 - 20	0.21	39	0.040	0.005
T7	20 - 0	0.06	39	0.020	0.002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
137.00	LNx-8513DS-A1M w/ Mount Pipe	39	2.43	0.159	0.017	194507
124.00	NNVV-65B-R4 w/ Mount Pipe	39	1.99	0.150	0.017	60807
114.00	MX08FRO665-21 w/ Mount Pipe	39	1.67	0.140	0.016	47478
101.00	RR90-17-00DP w/ Mount Pipe	39	1.30	0.123	0.014	43795
60.00	GPS_A	39	0.45	0.065	0.007	41840
50.00	GPS_A	39	0.31	0.052	0.006	47918

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	10.31	2	0.659	0.072
T2	120 - 100	7.58	2	0.597	0.068
T3	100 - 80	5.19	2	0.494	0.055
T4	80 - 60	3.25	2	0.378	0.042
T5	60 - 40	1.82	2	0.265	0.029
T6	40 - 20	0.84	2	0.161	0.019
T7	20 - 0	0.24	2	0.082	0.008

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
137.00	LNx-8513DS-A1M w/ Mount Pipe	2	9.89	0.651	0.071	47544
124.00	NNVV-65B-R4 w/ Mount Pipe	2	8.11	0.613	0.069	14863
114.00	MX08FRO665-21 w/ Mount Pipe	2	6.82	0.570	0.065	11466
101.00	RR90-17-00DP w/ Mount Pipe	2	5.30	0.500	0.056	10642
60.00	GPS_A	2	1.82	0.265	0.029	10289
50.00	GPS_A	2	1.28	0.210	0.024	11793

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria
T1	140	Leg	A325N	0.63	4	2.79	20.34	0.137	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	2.77	5.71	0.486	1.05	Member Block Shear
		Top Girt	A325N	0.50	1	0.36	4.13	0.087	1.05	Member Bearing
T2	120	Leg	A325N	0.75	4	7.97	30.10	0.265	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	3.11	5.71	0.545	1.05	Member Block Shear
		Top Girt	A325N	0.50	1	0.71	4.13	0.172	1.05	Member Bearing
T3	100	Leg	A325N	0.88	4	13.15	41.56	0.317	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	3.93	6.20	0.633	1.05	Member Bearing
T4	80	Leg	A325N	0.88	4	18.09	41.56	0.435	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	4.20	6.20	0.677	1.05	Member Bearing
T5	60	Leg	A325N	1.00	4	22.65	54.52	0.415	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	4.54	6.20	0.732	1.05	Member Bearing
T6	40	Leg	A325N	1.00	4	26.68	54.52	0.489	1.05	Bolt Tension
		Diagonal	A325N	0.63	1	5.35	7.83	0.684	1.05	Member Bearing
T7	20	Diagonal	A325N	0.63	1	5.60	11.70	0.479	1.05	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	ROHN 2 STD	20.00	4.00	61.0 K=1.00	1.07	-16.53	36.84	0.449 ¹
T2	120 - 100	ROHN 2.5 EH	20.03	5.01	65.0 K=1.00	2.25	-40.90	74.43	0.550 ¹
T3	100 - 80	ROHN 3 EH	20.03	6.68	70.5 K=1.00	3.02	-64.36	94.34	0.682 ¹
T4	80 - 60	ROHN 3.5 EH	20.03	6.68	61.3 K=1.00	3.68	-87.16	125.73	0.693 ¹
T5	60 - 40	ROHN 4 X-STR	20.04	6.68	54.3 K=1.00	4.41	-108.81	159.90	0.680 ¹
T6	40 - 20	ROHN 5 EH	20.03	10.02	65.4 K=1.00	6.11	-128.21	201.25	0.637 ¹
T7	20 - 0	ROHN 5 X-STR	20.03	9.97	65.1 K=1.00	6.11	-148.38	201.77	0.735 ¹

¹ P_u / φP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L1 3/4x1 3/4x3/16	7.68	3.62	126.6 K=1.00	0.62	-2.89	11.09	0.261 ¹

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T2	120 - 100	L1 3/4x1 3/4x3/16	9.73	4.77	166.7 K=1.00	0.62	-3.09	6.40	0.484 ¹
T3	100 - 80	L2x2x3/16	12.27	6.06	184.5 K=1.00	0.71	-3.97	6.01	0.661 ¹
T4	80 - 60	L2 1/2x2 1/2x3/16	14.02	6.91	167.6 K=1.00	0.90	-4.23	9.20	0.460 ¹
T5	60 - 40	L3x3x3/16	15.89	7.83	157.6 K=1.00	1.09	-4.56	12.56	0.363 ¹
T6	40 - 20	L3x3x3/16	19.10	9.45	190.3 K=1.00	1.09	-5.54	8.61	0.643 ¹
T7	20 - 0	L3x3x1/4	20.80	10.30	208.8 K=1.00	1.44	-5.92	9.45	0.627 ¹

KL/R > 200 (C) - 152

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 K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L2x2x1/8	6.52	6.11	184.6 K=1.00	0.48	-0.33	4.07	0.081 ¹
T2	120 - 100	L2x2x1/8	6.56	6.11	184.6 K=1.00	0.48	-0.71	4.07	0.174 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 K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	ROHN 2 STD	20.00	4.00	61.0	1.07	11.17	48.35	0.231 ¹
T2	120 - 100	ROHN 2.5 EH	20.03	5.01	65.0	2.25	31.89	101.41	0.314 ¹
T3	100 - 80	ROHN 3 EH	20.03	6.68	70.5	3.02	52.61	135.72	0.388 ¹
T4	80 - 60	ROHN 3.5 EH	20.03	6.68	61.3	3.68	72.36	165.53	0.437 ¹
T5	60 - 40	ROHN 4 X-STR	20.04	6.68	54.3	4.41	90.59	198.34	0.457 ¹
T6	40 - 20	ROHN 5 EH	20.03	10.02	65.4	6.11	106.72	275.04	0.388 ¹
T7	20 - 0	ROHN 5 X-STR	20.03	0.08	0.5	6.11	128.06	275.04	0.466 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 K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L1 3/4x1 3/4x3/16	7.68	3.62	83.3	0.38	2.77	16.44	0.169 ¹
T2	120 - 100	L1 3/4x1 3/4x3/16	9.73	4.77	109.0	0.38	3.11	16.44	0.189 ¹
T3	100 - 80	L2x2x3/16	11.71	5.78	114.5	0.45	3.93	19.50	0.201 ¹

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T4	80 - 60	L2 1/2x2 1/2x3/16	14.02	6.91	108.2	0.59	4.20	25.60	0.164 ¹
T5	60 - 40	L3x3x3/16	15.89	7.83	101.3	0.73	4.54	31.74	0.143 ¹
T6	40 - 20	L3x3x3/16	19.10	9.45	122.3	0.71	5.35	30.97	0.173 ¹
T7	20 - 0	L3x3x1/4	20.80	10.30	134.5	0.94	5.60	45.79	0.122 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Tension)

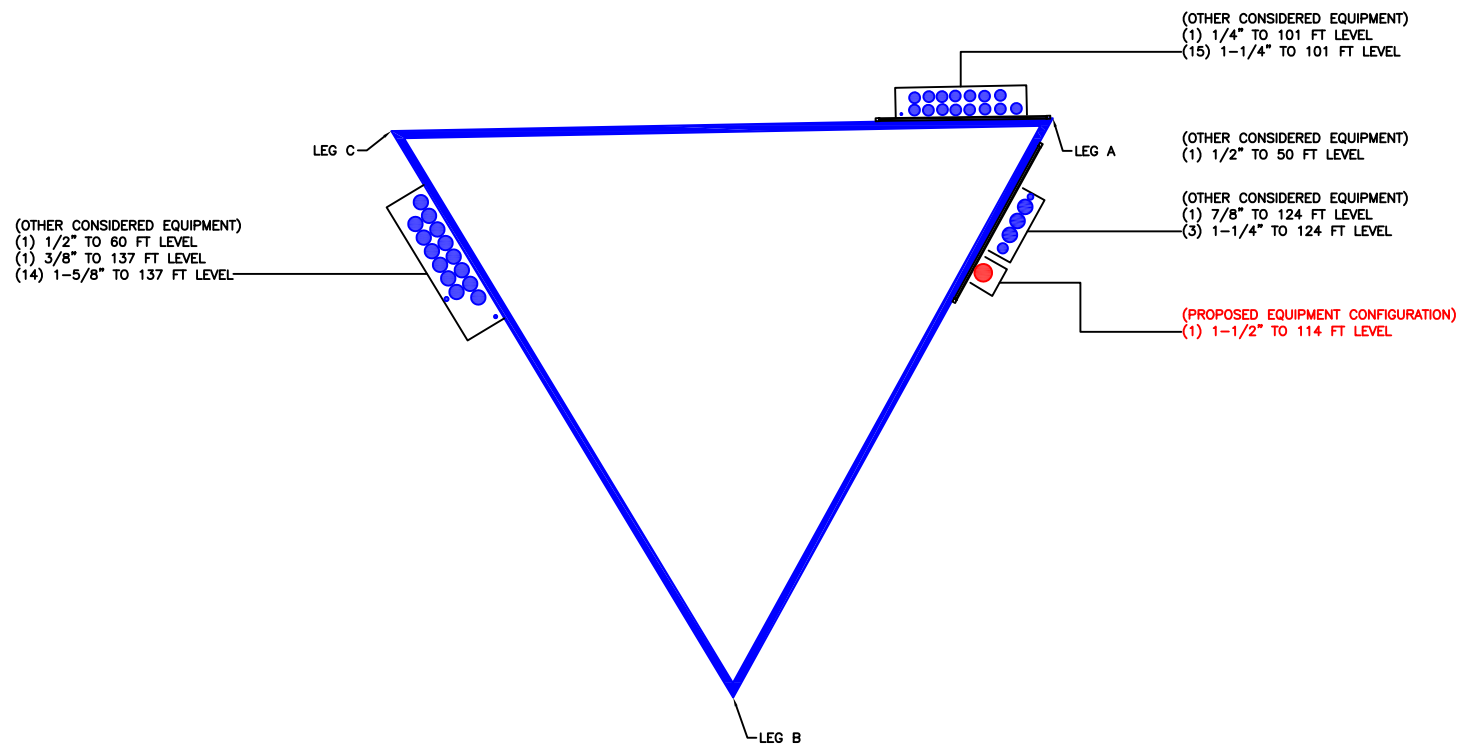
Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L2x2x1/8	6.52	6.11	121.2	0.30	0.36	13.25	0.027 ¹
T2	120 - 100	L2x2x1/8	6.56	6.11	121.2	0.30	0.71	13.25	0.054 ¹

¹ P_u / φP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP _{allow} K	% Capacity	Pass Fail
T1	140 - 120	Leg	ROHN 2 STD	3	-16.53	38.68	42.7	Pass
T2	120 - 100	Leg	ROHN 2.5 EH	39	-40.90	78.15	52.3	Pass
T3	100 - 80	Leg	ROHN 3 EH	69	-64.36	99.06	65.0	Pass
T4	80 - 60	Leg	ROHN 3.5 EH	90	-87.16	132.01	66.0	Pass
T5	60 - 40	Leg	ROHN 4 X-STR	111	-108.81	167.90	64.8	Pass
T6	40 - 20	Leg	ROHN 5 EH	132	-128.21	211.31	60.7	Pass
T7	20 - 0	Leg	ROHN 5 X-STR	147	-148.38	211.86	70.0	Pass
T1	140 - 120	Diagonal	L1 3/4x1 3/4x3/16	12	-2.89	11.65	24.8	Pass
T2	120 - 100	Diagonal	L1 3/4x1 3/4x3/16	47	-3.09	6.72	46.3 (b) 46.1	Pass
T3	100 - 80	Diagonal	L2x2x3/16	75	-3.97	6.31	51.9 (b) 63.0	Pass
T4	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	96	-4.23	9.65	43.8	Pass
T5	60 - 40	Diagonal	L3x3x3/16	117	-4.56	13.19	64.5 (b) 34.6	Pass
T6	40 - 20	Diagonal	L3x3x3/16	137	-5.54	9.05	69.8 (b) 61.3	Pass
T7	20 - 0	Diagonal	L3x3x1/4	152	-5.92	9.92	65.1 (b) 59.7	Pass
T1	140 - 120	Top Girt	L2x2x1/8	4	-0.33	4.27	7.7	Pass
T2	120 - 100	Top Girt	L2x2x1/8	41	-0.71	4.27	8.3 (b) 16.6	Pass
							Summary	
							Leg (T7)	Pass
							Diagonal (T5)	Pass
							Top Girt (T2)	Pass
							Bolt Checks	Pass
							RATING =	Pass
							70.0	

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Self Support Anchor Rod Capacity

Site Info		
BU #	806383	
Site Name	HRT 087 943325	
Order #	556635 Rev 1	

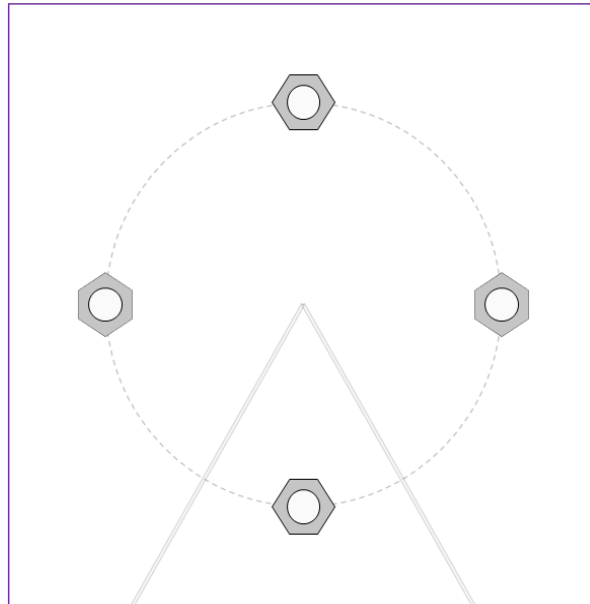
Analysis Considerations		
TIA-222 Revision	H	
Grout Considered:	No	
l_{ar} (in)	0.5	

Applied Loads		
	Comp.	Uplift
Axial Force (kips)	153.32	127.44
Shear Force (kips)	16.75	14.51

*TIA-222-H Section 15.5 Applied

Considered Eccentricity		
Leg Mod Eccentricity (in)	0.000	
Anchor Rod N.A Shift (in)	0.000	
Total Eccentricity (in)	0.000	

*Anchor Rod Eccentricity Applied



Connection Properties		Analysis Results	
Anchor Rod Data		Anchor Rod Summary	
(4) 1" ϕ bolts (A449 N; $F_y=92$ ksi, $F_u=120$ ksi)		(units of kips, kip-in)	
l_{ar} (in): 0.5		$Pu_c = 38.33$	$\phi Pn_c = 65.03$
		$Vu = 4.19$	$\phi Vn = 29.26$
		$Mu = n/a$	$\phi Mn = n/a$
			Stress Rating
			58.1%
			Pass

Pier and Pad Foundation



BU # : 806383
 Site Name: HRT 087 943325
 App. Number: 556635 Rev 1

TIA-222 Revision: H
 Tower Type: Self Support

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

Superstructure Analysis Reactions		
Compression, P_{comp} :	153.32	kips
Compression Shear, V_{u_comp} :	16.75	kips
Uplift, P_{uplift} :	127.44	kips
Uplift Shear, V_{u_uplift} :	14.51	kips
Tower Height, H :	140	ft
Base Face Width, BW :	18.77	ft
BP Dist. Above Fdn, bp_{dist} :	1.75	in

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, $dpier$:	3	ft
Ext. Above Grade, E :	0.5	ft
Pier Rebar Size, Sc :	8	
Pier Rebar Quantity, mc :	16	
Pier Tie/Spiral Size, St :	3	
Pier Tie/Spiral Quantity, mt :	11	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

Pad Properties		
Depth, D :	12.5	ft
Pad Width, W_1 :	7	ft
Pad Thickness, T :	2	ft
Pad Rebar Size (Bottom dir. 2), Sp_2 :	6	
Pad Rebar Quantity (Bottom dir. 2), mp_2 :	8	
Pad Clear Cover, cc_{pad} :	3	in

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

Soil Properties		
Total Soil Unit Weight, γ :	115	pcf
Ultimate Net Bearing, Q_{net} :	16.000	ksf
Cohesion, C_u :		ksf
Friction Angle, ϕ :	35	degrees
SPT Blow Count, N_{blows} :	100	
Base Friction, μ :		
Neglected Depth, N :	3.34	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	N/A	ft

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
Uplift (kips)	234.38	127.44	51.8%	Pass
Lateral (Sliding) (kips)	98.55	14.51	14.0%	Pass
Bearing Pressure (ksf)	13.08	5.01	36.5%	Pass
Pier Flexure (Comp.) (kip*ft)	827.46	184.25	21.2%	Pass
Pier Flexure (Tension) (kip*ft)	623.43	159.61	24.4%	Pass
Pier Compression (kip)	1727.31	167.32	9.2%	Pass
Pad Flexure (kip*ft)	307.01	44.88	13.9%	Pass
Pad Shear - 1-way (kips)	137.16	7.71	5.4%	Pass
Pad Shear - 2-way (Comp) (ksi)	0.164	0.027	15.9%	Pass
Flexural 2-way (Comp) (kip*ft)	614.02	110.55	17.1%	Pass
Pad Shear - 2-way (Uplift) (ksi)	0.164	0.045	26.1%	Pass
Flexural 2-way (Tension) (kip*ft)	614.02	95.77	14.9%	Pass

*Rating per TIA-222-H Section 15.5

Structural Rating*:	26.1%
Soil Rating*:	51.8%

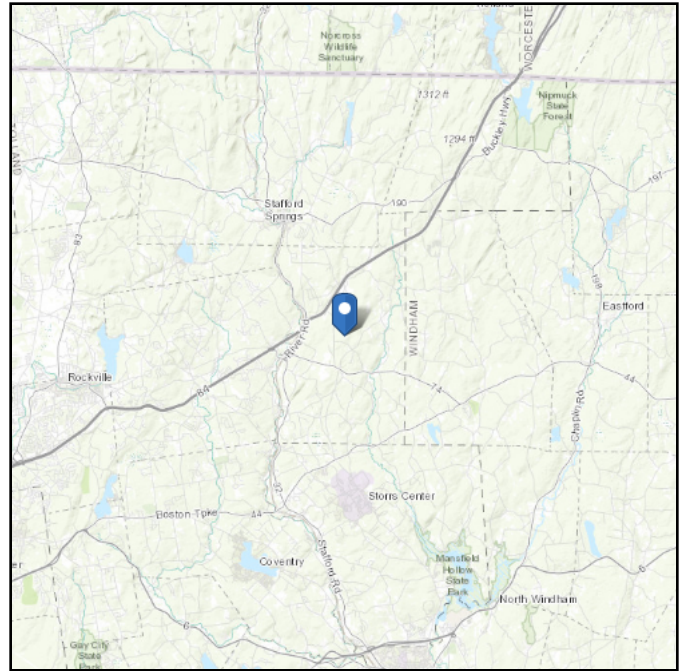
<-- Toggle between Gross and Net

ASCE 7 Hazards Report

Address:
No Address at This
Location

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

Elevation: 933.47 ft (NAVD 88)
Latitude: 41.892478
Longitude: -72.260597



Wind

Results:

Wind Speed:	125 Vmph
10-year MRI	77 Vmph
25-year MRI	87 Vmph
50-year MRI	95 Vmph
100-year MRI	102 Vmph

Data Sources: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, and Section 26.5.2, incorporating errata of March 12, 2014

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).

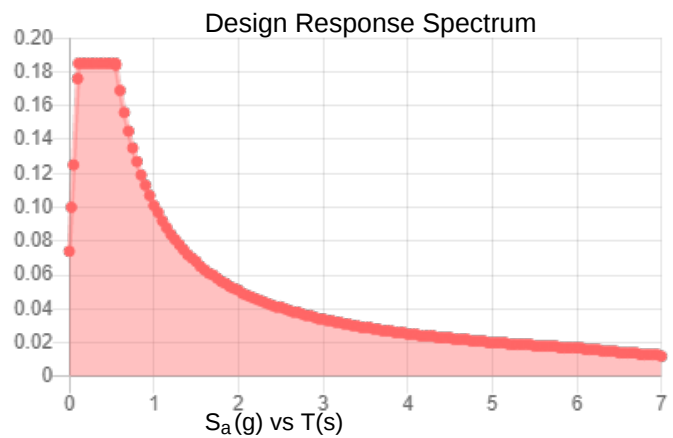
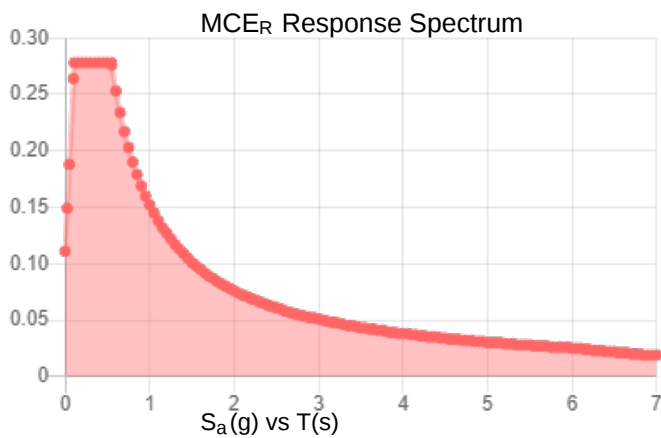
Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Site Soil Class: D - Stiff Soil

Results:

S_S :	0.174	S_{DS} :	0.185
S_1 :	0.063	S_{D1} :	0.101
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.086
S_{MS} :	0.278	PGA_M :	0.138
S_{M1} :	0.152	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B



Data Accessed:

Mon May 24 2021

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: 1.00 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

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

Date Accessed: Mon May 24 2021

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

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 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.

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Exhibit E

Mount Analysis

Date: **August 2, 2021**

Darcy Tarr
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
704-405-6589



Trylon
1825 W. Walnut Hill Lane,
Suite 302
Irving, TX 75038
214-930-1730

Subject:	Mount Replacement Analysis Report	
Carrier Designation:	Dish Network Equipment Change Out	
	Carrier Site Number:	BOBDL00051A
	Carrier Site Name:	CT-CCI-T-806383
Crown Castle Designation:	Crown Castle BU Number:	806383
	Crown Castle Site Name:	HRT 087 943325
	Crown Castle JDE Job Number:	650045
	Crown Castle Order Number:	556635 Rev. 1
Engineering Firm Designation:	Trylon Report Designation:	189333
Site Data:	Cosgrove Road Whifford Hill, West Willington, Tolland County, CT, 06279 Latitude 41°53'32.92" Longitude -72°15'38.15"	
Structure Information:	Tower Height & Type:	140.0 ft Self Support Tower
	Mount Elevation:	114.0 ft
	Mount Type:	8.0 ft Sector Frame

Dear Darcy Tarr,

Trylon is pleased to submit this **"Mount Replacement Analysis Report"** to determine the structural integrity of Dish Network's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

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

Sector Frame

Sufficient*

***Sufficient upon completion of the changes listed in the 'Recommendations' section of this report.**

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.

Mount analysis prepared by: Steve Mustaro, P.E.

Respectfully Submitted by:
Cliff Abernathy, P.E.



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1) INTRODUCTION

This is a proposed three sector 8.0 ft Sector Frame, designed by Commscope.

2) ANALYSIS CRITERIA

Building Code:	2015 IBC / 2018 CTSBC
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	125 mph
Exposure Category:	B
Topographic Factor at Base:	1.0
Topographic Factor at Mount:	1.0
Ice Thickness:	2.0 in
Wind Speed with Ice:	50 mph
Seismic S_s:	0.174
Seismic S_1:	0.063
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
114.0	114.0	3	JMA WIRELESS	MX08FRO665-21	8.0 ft Sector Frame [Commscope MTC3975083]
		3	FUJITSU	TA08025-B604	
		3	FUJITSU	TA08025-B605	
		1	RAYCAP	RDIDC-9181-PF-48	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Crown Application	Dish Network Application	556635 Rev. 1	CCI Sites
Mount Manufacturer Drawings	Commscope	MTC3975083	Trylon

3.1) Analysis Method

RISA-3D (Version 17.0.4), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

A tool internally developed, using Microsoft Excel, by Trylon was used to calculate wind loading on all appurtenances, dishes, and mount members for various load cases. Selected output from the analysis is included in Appendix B.

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Tower Mount Analysis* (Revision B).

3.2) Assumptions

- 1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
- 2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
- 3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
- 4) The analysis will be required to be revised if the existing conditions in the field differ from those shown in the above-referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.
- 5) Prior structural modifications to the tower mounting system are assumed to be installed as shown per available data.
- 6) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM A500 (GR B-46)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Tylon should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (Sector Frame, Worst Case Sector)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1, 2	Mount Pipe(s)	MP3	114.0	20.0	Pass
	Horizontal(s)	H1		17.8	Pass
	Standoff(s)	M4		21.7	Pass
	Bracing(s)	M24		46.3	Pass
	Tieback(s)	M31A		9.9	Pass
	Mount Connection(s)	-		20.1	Pass

Structure Rating (max from all components) =	46.3%
---	--------------

Notes:

- 1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
- 2) Rating per TIA-222-H, Section 15.5

Table 4 - Tieback Connection Data Table

Tower Connection Node No.	Existing / Proposed	Resultant End Reaction (lb)	Connected Member Type	Connected Member Size	Member Compressive Capacity (lb) ³	Notes
N52A	Proposed	854.4	Leg	ROHN 2.5 EH	3,721.5	1

Notes:

- 1) Tieback connection point is within 25% of either end of the connected tower member
- 2) Tieback connection point is NOT within 25% of either end of the connected tower member
- 3) Reduced member compressive capacity according to CED-STD-10294 *Standard for Installation of Mounts and Appurtenances*

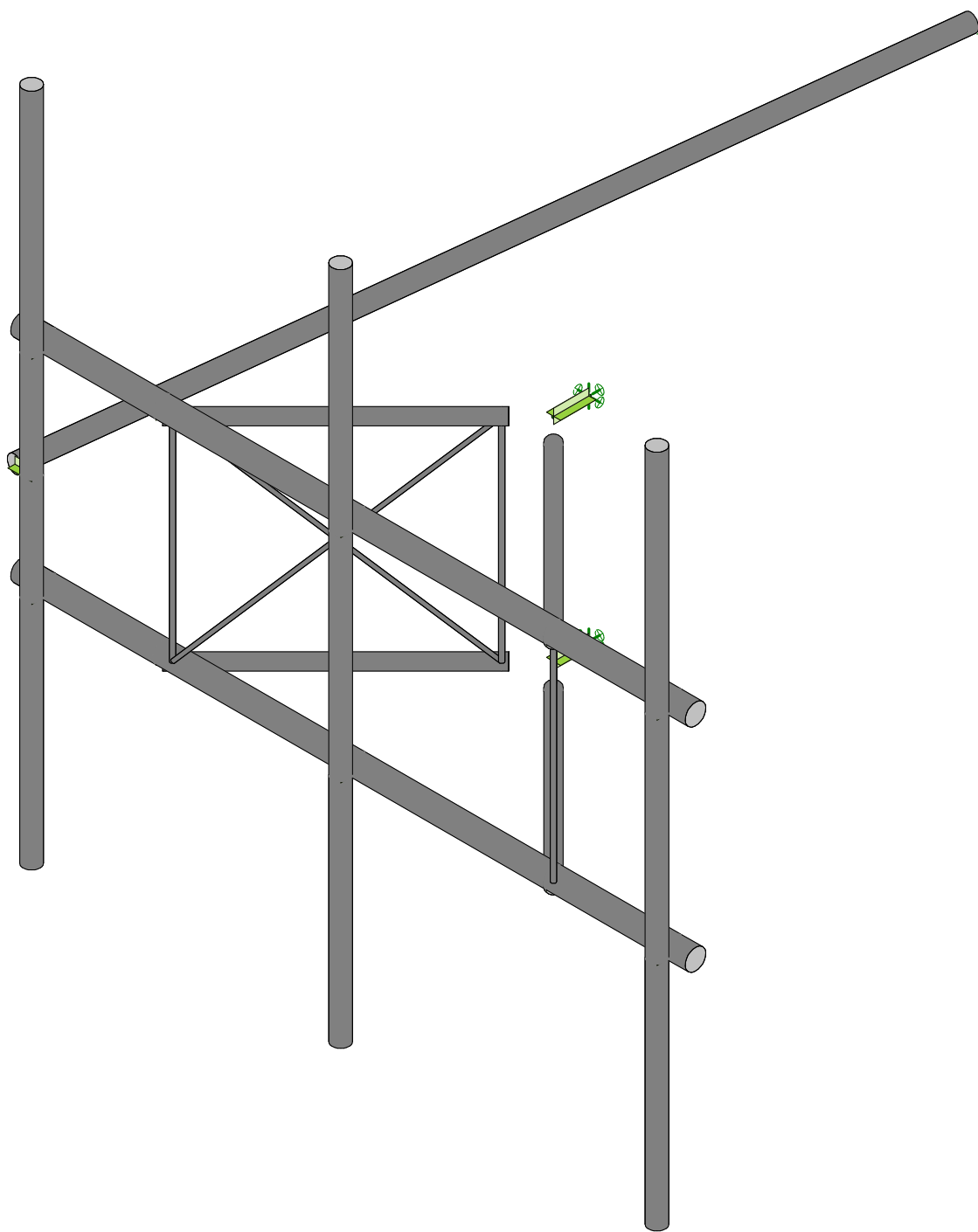
4.1) Recommendations

The mount has sufficient capacity to carry the proposed loading configuration. In order for the results of the analysis to be considered valid, the proposed mount listed below must be installed.

1. Commscope MTC3975083. Tiebacks to be installed within 25% of either end of tower leg.

No structural modifications are required at this time, provided that the above-listed changes are implemented.

APPENDIX A
WIRE FRAME AND RENDERED MODELS



Trylon	806383	Render
SMM		Aug 2, 2021 at 8:41 AM
189333		806383_loaded.r3d

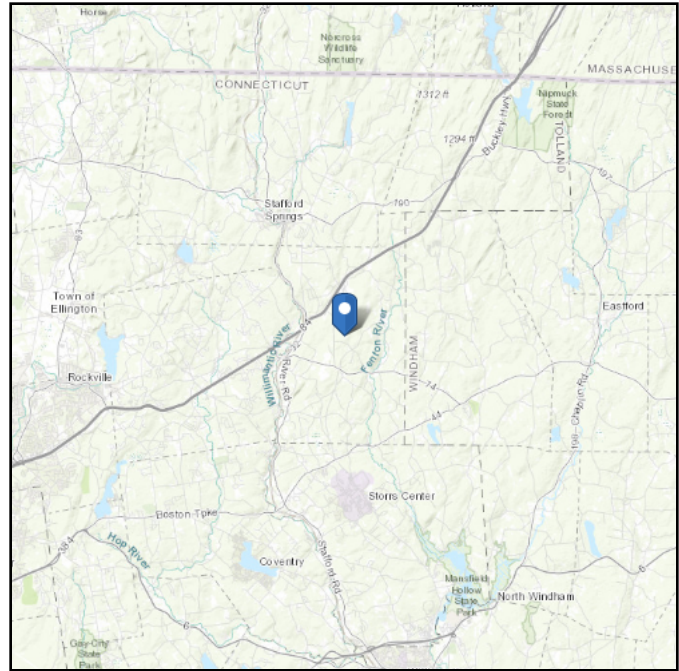
APPENDIX B
SOFTWARE INPUT CALCULATIONS

ASCE 7 Hazards Report

Address:
No Address at This
Location

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

Elevation: 933.47 ft (NAVD 88)
Latitude: 41.892478
Longitude: -72.260597



Ice

Results:

Ice Thickness: 1.00 in.
Concurrent Temperature: 5 F
Gust Speed: 50 mph

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

Date Accessed: Mon Aug 02 2021

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

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 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.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

CONNECTICUT DESIGN CRITERIA - STATE

Revision: R-400 7/30/2021

CT is NOT a Home Rule State; Tab added only for Design Criteria

(APPENDIX N) MUNICIPALITY - SPECIFIC STRUCTURAL DESIGN PARAMETERS												
Municipality	Ground Snow Load	Wind Design Parameters										
		MCE Spectral Accelerations (%g)		Ultimate Design Wind Speeds, V_{ult} (mph)			Nominal Design Wind Speeds, V_{asd} (mph)			Wind-Borne Debris Regions ¹		Hurricane-Prone Regions
		S_s	S_1	Risk Cat. I	Risk Cat. II	Risk Cat III-IV	Risk Cat. I	Risk Cat. II	Risk Cat. III-IV	Risk Cat. II & III except Occup I-2	Risk Cat III Occup I-2 & Risk Cat. IV	
Willington	35	0.174	0.063	115	125	135	89	97	105			Yes

1. Wind-Borne Debris Regions: Type A: Full Municipality.

Type B: Areas south of Interstate 95.

Exception: Areas that are more than one mile from the coastal mean high-water line as certified by a registered design professional may be classified as being outside a wind-borne debris region.

Type C: Areas south of Metro North/Amtrak Railroad to the west of the Quinnipiac River and areas south of Interstate 95 to the east of the Quinnipiac River.

Exception: Areas that are more than one mile from the coastal mean high-water line as certified by a registered design professional may be classified as being outside a wind-borne debris region.

TIA LOAD CALCULATOR 2.0

PROJECT DATA		
Job Code:	189333	
Carrier Site ID:	BU# 806383	
Carrier Site Name:	HRT 087 943325	

CODES AND STANDARDS		
Building Code:	2015 IBC	
Local Building Code:	2018 CSBC	
Design Standard:	TIA-222-H	

STRUCTURE DETAILS		
Mount Type:	Sector Frame	--
Mount Elevation:	114.0	ft.
Number of Sectors:	3	--
Structure Type:	Self Support Tower	--
Structure Height:	140.0	ft.

ANALYSIS CRITERIA		
Structure Risk Category:	II	--
Exposure Category:	B	--
Site Class:	D - Default	--
Ground Elevation:	933.47	ft.

TOPOGRAPHIC DATA		
Topographic Category:	1.00	--
Topographic Feature:	N/A	--
Crest Point Elevation:	0.00	ft.
Base Point Elevation:	0.00	ft.
Crest to Mid-Height (L/2):	0.00	ft.
Distance from Crest (x):	0.00	ft.
Base Topo Factor (K_{zt}):	1.00	--
Mount Topo Factor (K_{zt}):	1.00	--

WIND PARAMETERS		
Design Wind Speed:	125	mph
Wind Escalation Factor (K_s):	1.00	--
Velocity Coefficient (K_z):	1.03	--
Directionality Factor (K_d):	0.95	--
Gust Effect Factor (G_h):	1.00	--
Shielding Factor (K_a):	0.90	--
Velocity Pressure (q_z):	37.69	psf

ICE PARAMETERS		
Design Ice Wind Speed:	50	mph
Design Ice Thickness (t_i):	2.00	in
Importance Factor (I_i):	1.00	--
Ice Velocity Pressure (q_{zi}):	37.69	psf
Mount Ice Thickness (t_{iz}):	2.26	in

WIND STRUCTURE CALCULATIONS		
Flat Member Pressure:	67.84	psf
Round Member Pressure:	40.71	psf
Ice Wind Pressure:	7.19	psf

SEISMIC PARAMETERS		
Importance Factor (I_e):	1.00	--
Short Period Accel. (S_s):	0.17	g
1 Second Accel (S_1):	0.06	g
Short Period Des. (S_{DS}):	0.19	g
1 Second Des. (S_{D1}):	0.10	g
Short Period Coeff. (F_a):	1.60	--
1 Second Coeff. (F_v):	2.40	--
Response Coefficient (C_s):	0.09	--
Amplification Factor (A_s):	1.20	--

LOAD COMBINATIONS [LRFD]

#	Description
1	1.4DL
2	1.2DL + 1WL 0 AZI
3	1.2DL + 1WL 30 AZI
4	1.2DL + 1WL 45 AZI
5	1.2DL + 1WL 60 AZI
6	1.2DL + 1WL 90 AZI
7	1.2DL + 1WL 120 AZI
8	1.2DL + 1WL 135 AZI
9	1.2DL + 1WL 150 AZI
10	1.2DL + 1WL 180 AZI
11	1.2DL + 1WL 210 AZI
12	1.2DL + 1WL 225 AZI
13	1.2DL + 1WL 240 AZI
14	1.2DL + 1WL 270 AZI
15	1.2DL + 1WL 300 AZI
16	1.2DL + 1WL 315 AZI
17	1.2DL + 1WL 330 AZI
18	0.9DL + 1WL 0 AZI
19	0.9DL + 1WL 30 AZI
20	0.9DL + 1WL 45 AZI
21	0.9DL + 1WL 60 AZI
22	0.9DL + 1WL 90 AZI
23	0.9DL + 1WL 120 AZI
24	0.9DL + 1WL 135 AZI
25	0.9DL + 1WL 150 AZI
26	0.9DL + 1WL 180 AZI
27	0.9DL + 1WL 210 AZI
28	0.9DL + 1WL 225 AZI
29	0.9DL + 1WL 240 AZI
30	0.9DL + 1WL 270 AZI
31	0.9DL + 1WL 300 AZI
32	0.9DL + 1WL 315 AZI
33	0.9DL + 1WL 330 AZI
34	1.2DL + 1DLi + 1WLi 0 AZI
35	1.2DL + 1DLi + 1WLi 30 AZI
36	1.2DL + 1DLi + 1WLi 45 AZI
37	1.2DL + 1DLi + 1WLi 60 AZI
38	1.2DL + 1DLi + 1WLi 90 AZI
39	1.2DL + 1DLi + 1WLi 120 AZI
40	1.2DL + 1DLi + 1WLi 135 AZI
41	1.2DL + 1DLi + 1WLi 150 AZI

#	Description
42	1.2DL + 1DLi + 1WLi 180 AZI
43	1.2DL + 1DLi + 1WLi 210 AZI
44	1.2DL + 1DLi + 1WLi 225 AZI
45	1.2DL + 1DLi + 1WLi 240 AZI
46	1.2DL + 1DLi + 1WLi 270 AZI
47	1.2DL + 1DLi + 1WLi 300 AZI
48	1.2DL + 1DLi + 1WLi 315 AZI
49	1.2DL + 1DLi + 1WLi 330 AZI
50	(1.2+0.2Sds) + 1.0E 0 AZI
51	(1.2+0.2Sds) + 1.0E 30 AZI
52	(1.2+0.2Sds) + 1.0E 45 AZI
53	(1.2+0.2Sds) + 1.0E 60 AZI
54	(1.2+0.2Sds) + 1.0E 90 AZI
55	(1.2+0.2Sds) + 1.0E 120 AZI
56	(1.2+0.2Sds) + 1.0E 135 AZI
57	(1.2+0.2Sds) + 1.0E 150 AZI
58	(1.2+0.2Sds) + 1.0E 180 AZI
59	(1.2+0.2Sds) + 1.0E 210 AZI
60	(1.2+0.2Sds) + 1.0E 225 AZI
61	(1.2+0.2Sds) + 1.0E 240 AZI
62	(1.2+0.2Sds) + 1.0E 270 AZI
63	(1.2+0.2Sds) + 1.0E 300 AZI
64	(1.2+0.2Sds) + 1.0E 315 AZI
65	(1.2+0.2Sds) + 1.0E 330 AZI
66	(0.9-0.2Sds) + 1.0E 0 AZI
67	(0.9-0.2Sds) + 1.0E 30 AZI
68	(0.9-0.2Sds) + 1.0E 45 AZI
69	(0.9-0.2Sds) + 1.0E 60 AZI
70	(0.9-0.2Sds) + 1.0E 90 AZI
71	(0.9-0.2Sds) + 1.0E 120 AZI
72	(0.9-0.2Sds) + 1.0E 135 AZI
73	(0.9-0.2Sds) + 1.0E 150 AZI
74	(0.9-0.2Sds) + 1.0E 180 AZI
75	(0.9-0.2Sds) + 1.0E 210 AZI
76	(0.9-0.2Sds) + 1.0E 225 AZI
77	(0.9-0.2Sds) + 1.0E 240 AZI
78	(0.9-0.2Sds) + 1.0E 270 AZI
79	(0.9-0.2Sds) + 1.0E 300 AZI
80	(0.9-0.2Sds) + 1.0E 315 AZI
81	(0.9-0.2Sds) + 1.0E 330 AZI
82-88	1.2D + 1.5 Lv1

#	Description
89	1.2D + 1.5Lm + 1.0Wm 0 AZI - MP1
90	1.2D + 1.5Lm + 1.0Wm 30 AZI - MP1
91	1.2D + 1.5Lm + 1.0Wm 45 AZI - MP1
92	1.2D + 1.5Lm + 1.0Wm 60 AZI - MP1
93	1.2D + 1.5Lm + 1.0Wm 90 AZI - MP1
94	1.2D + 1.5Lm + 1.0Wm 120 AZI - MP1
95	1.2D + 1.5Lm + 1.0Wm 135 AZI - MP1
96	1.2D + 1.5Lm + 1.0Wm 150 AZI - MP1
97	1.2D + 1.5Lm + 1.0Wm 180 AZI - MP1
98	1.2D + 1.5Lm + 1.0Wm 210 AZI - MP1
99	1.2D + 1.5Lm + 1.0Wm 225 AZI - MP1
100	1.2D + 1.5Lm + 1.0Wm 240 AZI - MP1
101	1.2D + 1.5Lm + 1.0Wm 270 AZI - MP1
102	1.2D + 1.5Lm + 1.0Wm 300 AZI - MP1
103	1.2D + 1.5Lm + 1.0Wm 315 AZI - MP1
104	1.2D + 1.5Lm + 1.0Wm 330 AZI - MP1
105	1.2D + 1.5Lm + 1.0Wm 0 AZI - MP2
106	1.2D + 1.5Lm + 1.0Wm 30 AZI - MP2
107	1.2D + 1.5Lm + 1.0Wm 45 AZI - MP2
108	1.2D + 1.5Lm + 1.0Wm 60 AZI - MP2
109	1.2D + 1.5Lm + 1.0Wm 90 AZI - MP2
110	1.2D + 1.5Lm + 1.0Wm 120 AZI - MP2
111	1.2D + 1.5Lm + 1.0Wm 135 AZI - MP2
112	1.2D + 1.5Lm + 1.0Wm 150 AZI - MP2
113	1.2D + 1.5Lm + 1.0Wm 180 AZI - MP2
114	1.2D + 1.5Lm + 1.0Wm 210 AZI - MP2
115	1.2D + 1.5Lm + 1.0Wm 225 AZI - MP2
116	1.2D + 1.5Lm + 1.0Wm 240 AZI - MP2
117	1.2D + 1.5Lm + 1.0Wm 270 AZI - MP2
118	1.2D + 1.5Lm + 1.0Wm 300 AZI - MP2
119	1.2D + 1.5Lm + 1.0Wm 315 AZI - MP2
120	1.2D + 1.5Lm + 1.0Wm 330 AZI - MP2

#	Description
121	1.2D + 1.5Lm + 1.0Wm 0 AZI - MP3
122	1.2D + 1.5Lm + 1.0Wm 30 AZI - MP3
123	1.2D + 1.5Lm + 1.0Wm 45 AZI - MP3
124	1.2D + 1.5Lm + 1.0Wm 60 AZI - MP3
125	1.2D + 1.5Lm + 1.0Wm 90 AZI - MP3
126	1.2D + 1.5Lm + 1.0Wm 120 AZI - MP3
127	1.2D + 1.5Lm + 1.0Wm 135 AZI - MP3
128	1.2D + 1.5Lm + 1.0Wm 150 AZI - MP3
129	1.2D + 1.5Lm + 1.0Wm 180 AZI - MP3
130	1.2D + 1.5Lm + 1.0Wm 210 AZI - MP3
131	1.2D + 1.5Lm + 1.0Wm 225 AZI - MP3
132	1.2D + 1.5Lm + 1.0Wm 240 AZI - MP3
133	1.2D + 1.5Lm + 1.0Wm 270 AZI - MP3
134	1.2D + 1.5Lm + 1.0Wm 300 AZI - MP3
135	1.2D + 1.5Lm + 1.0Wm 315 AZI - MP3
136	1.2D + 1.5Lm + 1.0Wm 330 AZI - MP3
137	1.2D + 1.5Lm + 1.0Wm 0 AZI - MP4
138	1.2D + 1.5Lm + 1.0Wm 30 AZI - MP4
139	1.2D + 1.5Lm + 1.0Wm 45 AZI - MP4
140	1.2D + 1.5Lm + 1.0Wm 60 AZI - MP4
141	1.2D + 1.5Lm + 1.0Wm 90 AZI - MP4
142	1.2D + 1.5Lm + 1.0Wm 120 AZI - MP4
143	1.2D + 1.5Lm + 1.0Wm 135 AZI - MP4
144	1.2D + 1.5Lm + 1.0Wm 150 AZI - MP4
145	1.2D + 1.5Lm + 1.0Wm 180 AZI - MP4
146	1.2D + 1.5Lm + 1.0Wm 210 AZI - MP4
147	1.2D + 1.5Lm + 1.0Wm 225 AZI - MP4
148	1.2D + 1.5Lm + 1.0Wm 240 AZI - MP4
149	1.2D + 1.5Lm + 1.0Wm 270 AZI - MP4
150	1.2D + 1.5Lm + 1.0Wm 300 AZI - MP4
151	1.2D + 1.5Lm + 1.0Wm 315 AZI - MP4
152	1.2D + 1.5Lm + 1.0Wm 330 AZI - MP4

*This page shows an example of maintenance loads for (4) pipes, the number of mount pipe LCs may vary per site

EQUIPMENT LOADING

[illegible]

EQUIPMENT WIND CALCULATIONS

[illegible]

EQUIPMENT LATERAL WIND FORCE CALCULATIONS

[illegible]

EQUIPMENT SEISMIC FORCE CALCULATIONS

[illegible]

APPENDIX C
SOFTWARE ANALYSIS OUTPUT

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISACONNECTION CODE	AISC 15th(360-16): LRFD
Cold Formed Steel Code	AISI S100-16: LRFD
Wood Code	AWC NDS-15: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	ACI 530-13: Strength
Aluminum Code	AA ADM1-10: LRFD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

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

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Density[k...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3
8	A500 Gr. C - 46	29000	11154	.3	.65	.49	46	1.3	62	1.4
9	A529 Gr. 50	29000	11154	.3	.65	.49	50	1.3	65	1.4

Cold Formed Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Density[k/ft^3]	Yield[ksi]	Fu[ksi]
1	A653 SS Gr33	29500	11346	.3	.65	.49	33	45
2	A653 SS Gr50/1	29500	11346	.3	.65	.49	50	65

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in ²]	Iyy [in ⁴]	Izz [in ⁴]	J [in ⁴]
1	Horizontals	PIPE 2.5	Beam	None	A500 Gr. C - 46	Typical	1.61	1.45	1.45	2.89
2	Standoffs	PIPE 1.5	Beam	None	A500 Gr. C - 46	Typical	.749	.293	.293	.586
3	Tie Backs	PIPE 2.0	Beam	None	A500 Gr. C - 46	Typical	1.02	.627	.627	1.25
4	Mount Pipes	PIPE 2.0	Beam	None	A500 Gr. C - 46	Typical	1.02	.627	.627	1.25
5	Standoff Bracin...	SR 5/8_HRA	Beam	None	A529 Gr. 50	Typical	.307	.007	.007	.015

Hot Rolled Steel Section Sets (Continued)

	Label	Shape	Type	Design List	Material	Design R...	A [in ²]	I _{yy} [in ⁴]	I _{zz} [in ⁴]	J [in ⁴]
6	Vertical pipes	PIPE 3.0	Beam	None	A500 Gr. C - 46	Typical	2.07	2.85	2.85	5.69
7	Standoff Bracin...	SR 1/2"	Beam	None	A529 Gr. 50	Typical	.196	.003	.003	.006

Cold Formed Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in ²]	I _{yy} [in ⁴]	I _{zz} [in ⁴]	J [in ⁴]
1	CF1A	8CU1.25X0..	Beam	None	A653 SS Gr33	Typical	.581	.057	4.41	.00063

Joint Boundary Conditions

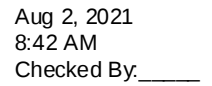
	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N13						
2	N14						
3	N48	Reaction	Reaction	Reaction	Reaction		Reaction
4	N49	Reaction	Reaction	Reaction	Reaction		Reaction
5	N52A	Reaction	Reaction	Reaction			

Basic Load Cases

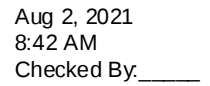
	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(P...
1	Self Weight	DL		-1			5		
2	Structure Wind Z	WLZ						18	
3	Structure Wind X	WLX						18	
4	Wind Load 0 AZI	WLZ					5		
5	Wind Load 30 AZI	None					10		
6	Wind Load 45 AZI	None					10		
7	Wind Load 60 AZI	None					10		
8	Wind Load 90 AZI	WLX					5		
9	Wind Load 120 AZI	None					10		
10	Wind Load 135 AZI	None					10		
11	Wind Load 150 AZI	None					10		
12	Ice Weight	OL1					5	18	
13	Ice Structure Wind Z	OL2						18	
14	Ice Structure Wind X	OL3						18	
15	Ice Wind Load 0 AZI	OL2					5		
16	Ice Wind Load 30 AZI	None					10		
17	Ice Wind Load 45 AZI	None					10		
18	Ice Wind Load 60 AZI	None					10		
19	Ice Wind Load 90 AZI	OL3					5		
20	Ice Wind Load 120 AZI	None					10		
21	Ice Wind Load 135 AZI	None					10		
22	Ice Wind Load 150 AZI	None					10		
23	Seismic Load Z	ELZ			-.111		5		
24	Seismic Load X	ELX	-.111				5		
25	Live Load 1 (Lv)	None					1		
26	Live Load 2 (Lv)	None					1		
27	Live Load 3 (Lv)	None					1		
28	Maintenance Load 1 (...)	None					1		
29	Maintenance Load 2 (...)	None					1		
30	Maintenance Load 3 (...)	None					1		

Load Combinations

	Description	So..P...	S...	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..
1	1.4DL	Yes	Y	DL	1.4															
2	1.2DL + 1WL 0 AZI	Yes	Y	DL	1.2	2	1	3		4	1									
3	1.2DL + 1WL 30 AZI	Yes	Y	DL	1.2	2	.866	3	.5	5	1									
4	1.2DL + 1WL 45 AZI	Yes	Y	DL	1.2	2	.707	3	.707	6	1									
5	1.2DL + 1WL 60 AZI	Yes	Y	DL	1.2	2	.5	3	.866	7	1									
6	1.2DL + 1WL 90 AZI	Yes	Y	DL	1.2	2		3	1	8	1									
7	1.2DL + 1WL 120 AZI	Yes	Y	DL	1.2	2	-.5	3	.866	9	1									
8	1.2DL + 1WL 135 AZI	Yes	Y	DL	1.2	2	-.707	3	.707	10	1									
9	1.2DL + 1WL 150 AZI	Yes	Y	DL	1.2	2	-.866	3	.5	11	1									
10	1.2DL + 1WL 180 AZI	Yes	Y	DL	1.2	2	-1	3		4	-1									
11	1.2DL + 1WL 210 AZI	Yes	Y	DL	1.2	2	-.866	3	-.5	5	-1									
12	1.2DL + 1WL 225 AZI	Yes	Y	DL	1.2	2	-.707	3	-.707	6	-1									
13	1.2DL + 1WL 240 AZI	Yes	Y	DL	1.2	2	-.5	3	-.866	7	-1									
14	1.2DL + 1WL 270 AZI	Yes	Y	DL	1.2	2		3	-1	8	-1									
15	1.2DL + 1WL 300 AZI	Yes	Y	DL	1.2	2	.5	3	-.866	9	-1									
16	1.2DL + 1WL 315 AZI	Yes	Y	DL	1.2	2	.707	3	-.707	10	-1									
17	1.2DL + 1WL 330 AZI	Yes	Y	DL	1.2	2	.866	3	-.5	11	-1									
18	0.9DL + 1WL 0 AZI	Yes	Y	DL	.9	2	1	3		4	1									
19	0.9DL + 1WL 30 AZI	Yes	Y	DL	.9	2	.866	3	.5	5	1									
20	0.9DL + 1WL 45 AZI	Yes	Y	DL	.9	2	.707	3	.707	6	1									
21	0.9DL + 1WL 60 AZI	Yes	Y	DL	.9	2	.5	3	.866	7	1									
22	0.9DL + 1WL 90 AZI	Yes	Y	DL	.9	2		3	1	8	1									
23	0.9DL + 1WL 120 AZI	Yes	Y	DL	.9	2	-.5	3	.866	9	1									
24	0.9DL + 1WL 135 AZI	Yes	Y	DL	.9	2	-.707	3	.707	10	1									
25	0.9DL + 1WL 150 AZI	Yes	Y	DL	.9	2	-.866	3	.5	11	1									
26	0.9DL + 1WL 180 AZI	Yes	Y	DL	.9	2	-1	3		4	-1									
27	0.9DL + 1WL 210 AZI	Yes	Y	DL	.9	2	-.866	3	-.5	5	-1									
28	0.9DL + 1WL 225 AZI	Yes	Y	DL	.9	2	-.707	3	-.707	6	-1									
29	0.9DL + 1WL 240 AZI	Yes	Y	DL	.9	2	-.5	3	-.866	7	-1									
30	0.9DL + 1WL 270 AZI	Yes	Y	DL	.9	2		3	-1	8	-1									
31	0.9DL + 1WL 300 AZI	Yes	Y	DL	.9	2	.5	3	-.866	9	-1									
32	0.9DL + 1WL 315 AZI	Yes	Y	DL	.9	2	.707	3	-.707	10	-1									
33	0.9DL + 1WL 330 AZI	Yes	Y	DL	.9	2	.866	3	-.5	11	-1									
34	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	1	14	15	1								
35	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	.866	14	.5	16	1							
36	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	.707	14	.707	17	1							
37	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	.5	14	.866	18	1							
38	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13		14	1	19	1							
39	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	-.5	14	.866	20	1							
40	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	-.707	14	.707	21	1							
41	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	-.866	14	.5	22	1							
42	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	-1	14		15	-1							
43	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	-.866	14	-.5	16	-1							
44	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	-.707	14	-.707	17	-1							
45	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	-.5	14	-.866	18	-1							
46	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13		14	-1	19	-1							
47	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	.5	14	-.866	20	-1							
48	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	.707	14	-.707	21	-1							
49	1.2DL + 1DLi + 1WL...	Yes	Y	DL	1.2	OL1	1	13	.866	14	-.5	22	-1							
50	(1.2+0.2Sds)DL + 1...	Yes	Y	DL	1.2...	23	1	24												
51	(1.2+0.2Sds)DL + 1...	Yes	Y	DL	1.2...	23	.866	24	.5											



	Description	So..P...	S...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...
52	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 .707	24 .707										
53	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 .5	24 .866										
54	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23	24 1										
55	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 -.5	24 .866										
56	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 -.707	24 .707										
57	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 -.866	24 .5										
58	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 -1	24										
59	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 -.866	24 -.5										
60	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 -.707	24 -.707										
61	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 -.5	24 -.866										
62	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23	24 -1										
63	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 .5	24 -.866										
64	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 .707	24 -.707										
65	(1.2+0.2Sds)DL + 1...	Yes	Y		DL 1.2...	23 .866	24 -.5										
66	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 1	24										
67	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 .866	24 .5										
68	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 .707	24 .707										
69	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 .5	24 .866										
70	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23	24 1										
71	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 -.5	24 .866										
72	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 -.707	24 .707										
73	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 -.866	24 .5										
74	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 -1	24										
75	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 -.866	24 -.5										
76	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 -.707	24 -.707										
77	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 -.5	24 -.866										
78	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23	24 -1										
79	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 .5	24 -.866										
80	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 .707	24 -.707										
81	(0.9-0.2Sds)DL + 1E...	Yes	Y		DL .863	23 .866	24 -.5										
82	1.2DL + 1Lv1	Yes	Y		DL 1.2	25 1.5											
83	1.2DL + 1Lv2	Yes	Y		DL 1.2	26 1.5											
84	1.2DL + 1Lv3	Yes	Y		DL 1.2	27 1.5											
85	1.2DL + 1.5Lm + 1...	Yes	Y		DL 1.2	28 1.5	2 .058	3	4 .058								
86	1.2DL + 1.5Lm + 1...	Yes	Y														



Page 6

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

	Member	Shape	Code Check	Loc[in]	LC	Shea...	Loc.....	L...	phi*Pn...	phi*Pn...	phi*Mn...	phi*Mn.....	Eqn
7	M2	PIPE_1.5	.197	34.81	37	.130	.725	49	23485...	31008.6	1452.45	1452.45	1..H1-1b
8	H1	PIPE_2.5	.187	76	34	.060	76	42	45255...	66654	4726.5	4726.5	1..H1-1b
9	M3	PIPE_1.5	.184	34.81	123	.084	34.81	1..	23485...	31008.6	1452.45	1452.45	1..H1-1b
10	M5	PIPE_2.5	.175	76	42	.056	76	34	45255...	66654	4726.5	4726.5	1..H1-1b
11	M1	PIPE_1.5	.171	34.81	130	.083	34.81	90	23485...	31008.6	1452.45	1452.45	1..H1-1b
12	M31A	PIPE_2.0	.104	61.625	39	.007	123...	46	9324.69	42228	2459.85	2459.85	1..H1-1b
13	M26	SR 5/8_H...	.045	30.25	42	.056	0	1..	1849.1...	13805...	143.808	143.808	1..H1-1b*
14	M23	SR 5/8_H...	.030	30.25	9	.016	0	17	1849.1...	13805...	143.808	143.808	1..H1-1b*
15	MP2	PIPE_2.0	.025	63	109	.100	33	1..	15369...	42228	2459.85	2459.85	1..H1-1b*
16	M25	SR 5/8_H...	.018	16.385	42	.056	0	1..	1849.1...	13805...	143.808	143.808	1..H1-1b
17	M27	SR 1/2"	.000	44.854	25	.013	44....	37	1432.0...	8835.75	73.632	73.632	1..H1-1b*
18	M30	SR 1/2"	.000	0	132	.007	44....	1..	1432.0...	8835.75	73.632	73.632	1..H1-1a

Envelope AISI S100-16: LRFD Cold Formed Steel Code Checks

Mem...	Shape	Code Check	Loc[in]	LC	Shea...Lo...	phi*...	phi*T...	phi*...	phi*...	phi...phi...	Cb	Eqn
No Data to Print ...												

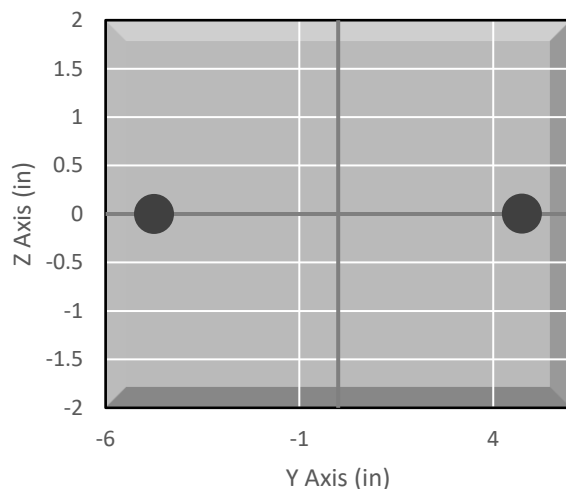
APPENDIX D
ADDITIONAL CALCUATIONS

BOLT TOOL 1.5.2

Project Data	
Job Code:	189333
Carrier Site ID:	BU# 806383
Carrier Site Name:	HRT 087 943325

Code	
Design Standard:	TIA-222-H
Slip Check:	Yes
Pretension Standard:	TIA-222-H

Bolt Properties		
Connection Type:	Threaded Rod	
Diameter:	0.75	in
Grade:	A36	--
Yield Strength (Fy):	36	ksi
Ultimate Strength (Fu):	58	ksi
Number of Bolts:	2	--
Threads Included:	Yes	--
Double Shear:	No	--
Connection Pipe Size:	9.5	in

Bolt Layout


Connection Description
Standoff to Leg Connection

Bolt Check*		
Tensile Capacity (ϕT_n):	14549.0	lbs
Shear Capacity (ϕV_n):	9608.9	lbs
Tension Force (T_u):	832.8	lbs
Shear Force (V_u):	1887.2	lbs
Tension Usage:	5.5%	--
Shear Usage:	18.7%	--
Interaction:	18.7%	Pass
Controlling Member:	M31	--
Controlling LC:	46	--

*Rating per TIA-222-H Section 15.5

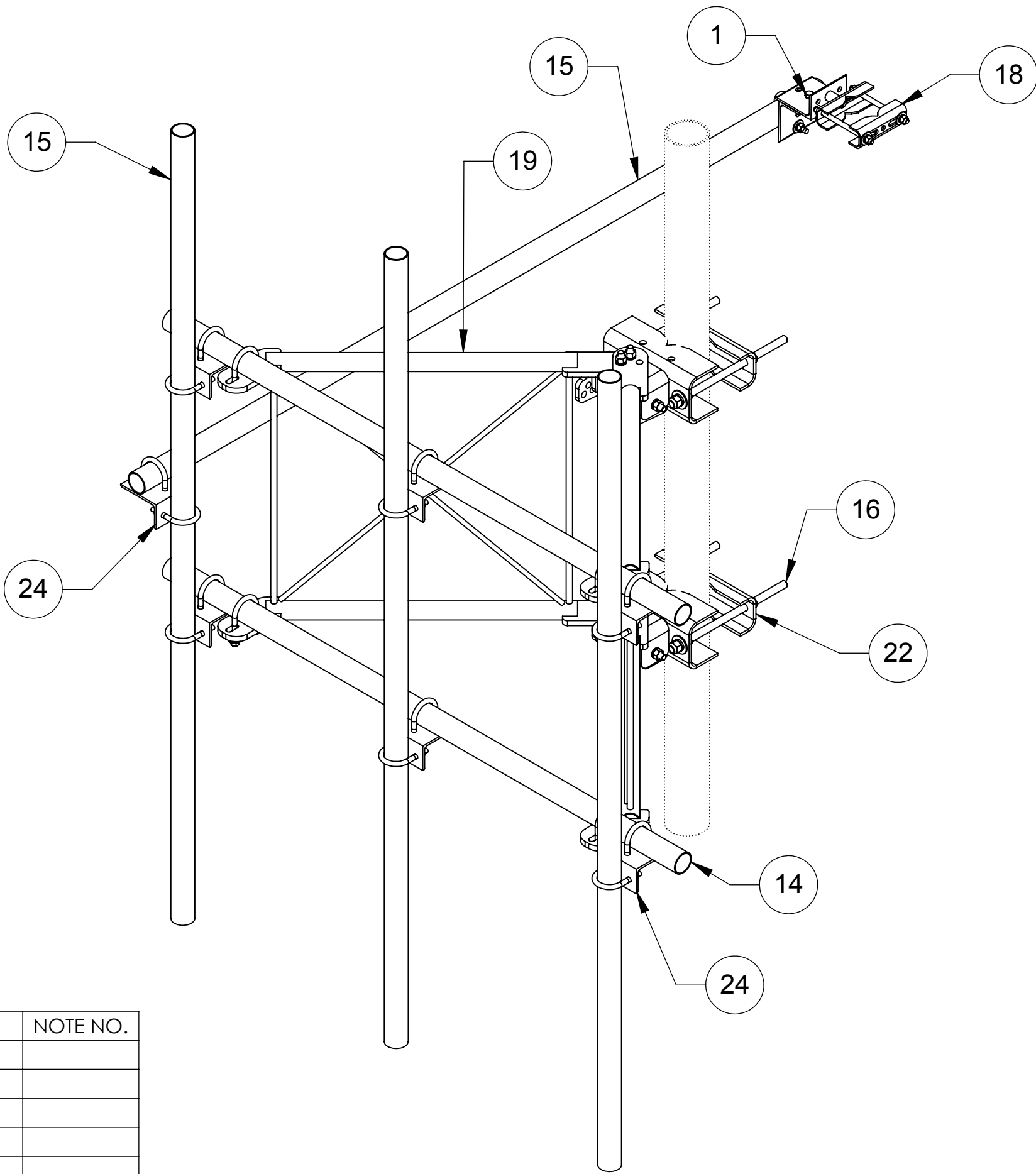
Slip Check*		
Sliding Capacity (ϕR_{ns}):	9363.3	lbs
Torsion Capacity (ϕR_{nr}):	3706.3	lb-ft
Sliding Force (V_{us}):	1971.7	lbs
Torsional Force (T_{ur}):	0.0	lb-ft
Sliding Usage:	20.1%	--
Torsion Usage:	0.0%	--
Interaction:	20.1%	Pass
Controlling Member:	M31	--
Controlling LC:	41	--

*Rating per TIA-222-H Section 15.5

APPENDIX E
SUPPLEMENTAL DRAWINGS

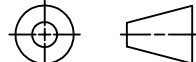
NOTES:
1.0 ALL METRIC DIMENSIONS ARE IN BRACKETS.

www.Talleycom.com | Sales@Talleycom.com | 800.949.7079



ITEM	PART NO.	DESCRIPTION	QTY.	WEIGHT	NOTE NO.
1	GB-04125	1/2" X 1-1/4" GALV BOLT KIT	1	0.12 LBS	
2	GB-04265	1/2" X 2-3/4" GALV BOLT KIT	1	0.20 LBS	
3	GB-05225	5/8" X 2-1/4" GALV BOLT KIT	8	0.28 LBS	
4	GB-05305	5/8" X 3" GALV BOLT KIT	4	0.35 LBS	
5	GN-04	1/2" GALV HEX NUT	4	0.04 LBS	
6	GN-06	3/4" GALV HEX NUT	12	0.15 LBS	
7	GUB-4240	1/2" X 2-1/2" X 4" GALV U-BOLT	19	0.56 LBS	
8	GWF-04	1/2" GALV FLAT WASHER	4	0.03 LBS	
9	GWF-05	5/8" GALV FLAT WASHER	4	0.06 LBS	
10	GWF-06	3/4" GALV FLAT WASHER	8	0.10 LBS	
11	GWL-04	1/2" GALV LOCK WASHER	4	0.01 LBS	
12	GWL-06	3/4" GALV LOCK WASHER	8	0.04 LBS	
13	MT-379-8	1/2" X 8" GALV THREADED ROD	2	0.44 LBS	
14	MT-651-96	2.375" OD x 96" PIPE	2	17.29 LBS	
15	MT-651-96	Ø 2.375" OD X 96" PIPE	4	23.05 LBS	
16	MT38416	Threaded Rod Galv 3/4" x 16"	4	1.99 LBS	
17	OS15034	3/4" X 1-1/2" OFFSET COLLAR	1	0.14 LBS	
18	SAB01	FORMED CLAMP	2	1.35 LBS	
19	SFV01	WELDMENT, SF-V STANDOFF ARM	2	36.81 LBS	
20	SFV02	SFV AZIMUTH BRACKET	3	6.70 LBS	
21	SFV03	SFV TAPER BRACKET	1	7.49 LBS	
22	SMU2080.06	CLAMP PLATE	2	6.96 LBS	
23	SMU208004	MOUNT	2	12.15 LBS	
24	XA2020.01	ANTENNA MOUNT ANGLE	9	2.65 LBS	

DENSITY	0.28	lbs/in³
MASS	400.61	lbs
VOLUME	1421.66	in³
SURFACE AREA		in²
HEIGHT		
LENGTH		
WIDTH		

COMMSCOPE, INC. OF NORTH CAROLINA									
TOLERANCES						SAP MATERIAL MASTER			
0 PLACE X ± .25			2 PLACE .XX ± .06			MTC3975083			
1 PLACE X ± .12			ANGLES ± 2°						
FINISH					MATERIAL				
GALV A123					A1011/A1018, A500, A529				
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS PER INTERPRETATION OF HANSBROOK TECHNICAL DRAWINGS VOLUMES 1 & 2, THIRD EDITION (2002)		NAME	DATE	TITLE					
	CE	RDLS	7/14/17						
	RW			SECTOR FRAME, 8' FACE, (3) 96" PIPES					
	RV								
	AD								
	RE	TP	7/14/17						
	ECN			SCALE	DOCUMENT NO. MTC3975083				
	1:12								
SIZE	WORK AREA	MODEL			DRAWING			SHEET 1 OF 2	
C		VERSION	STATUS	REVISION	VERSION	STATUS	REVISION		
							PRE		

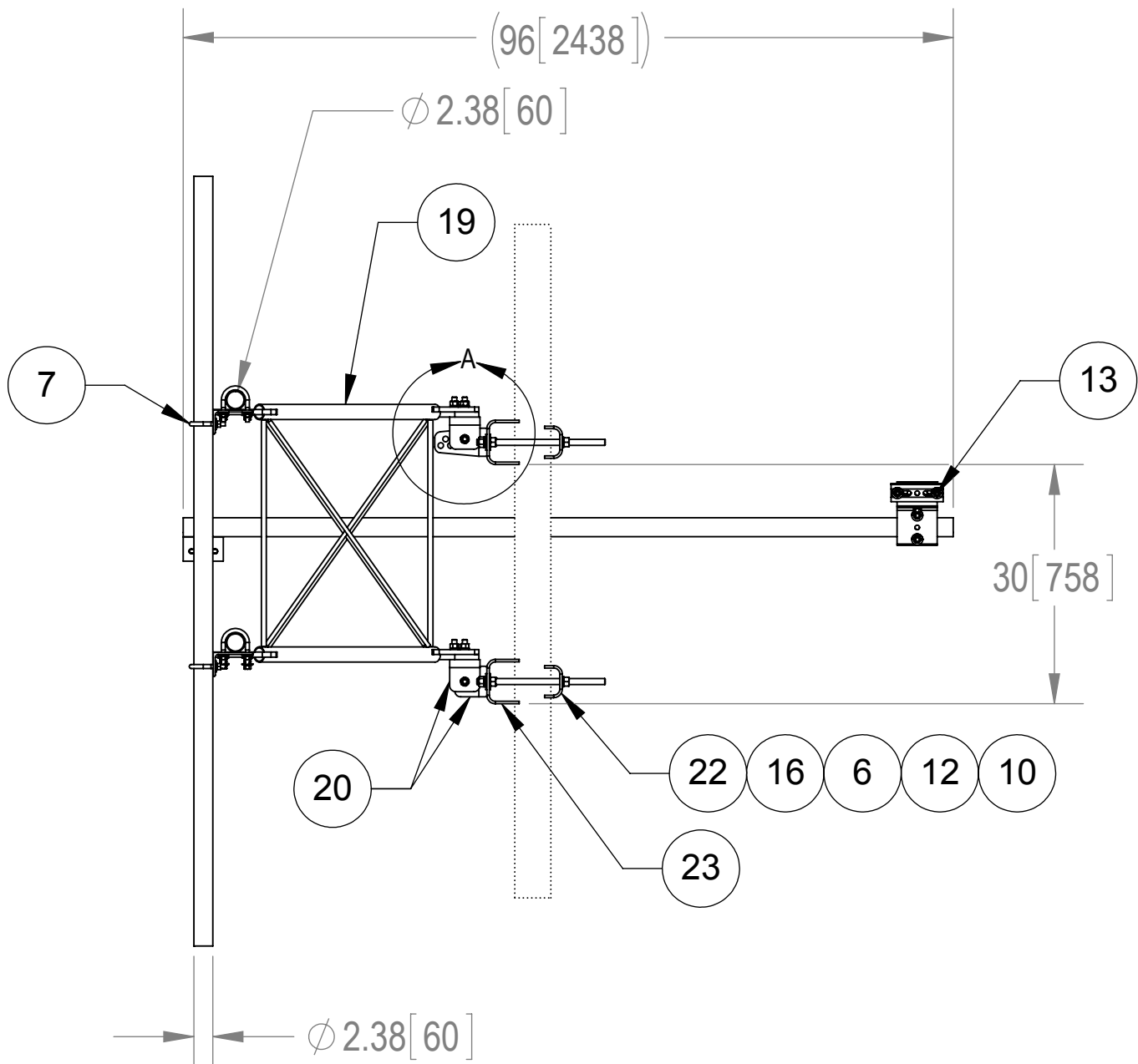
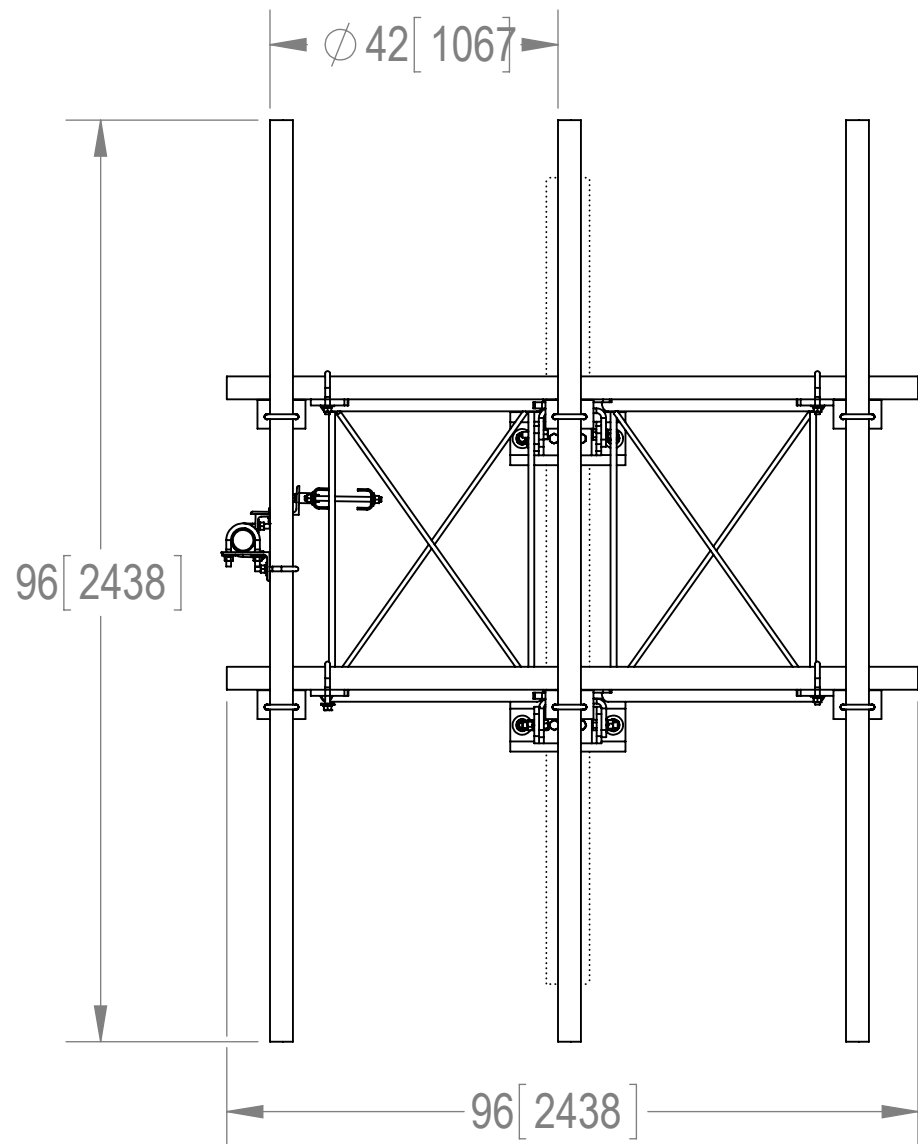
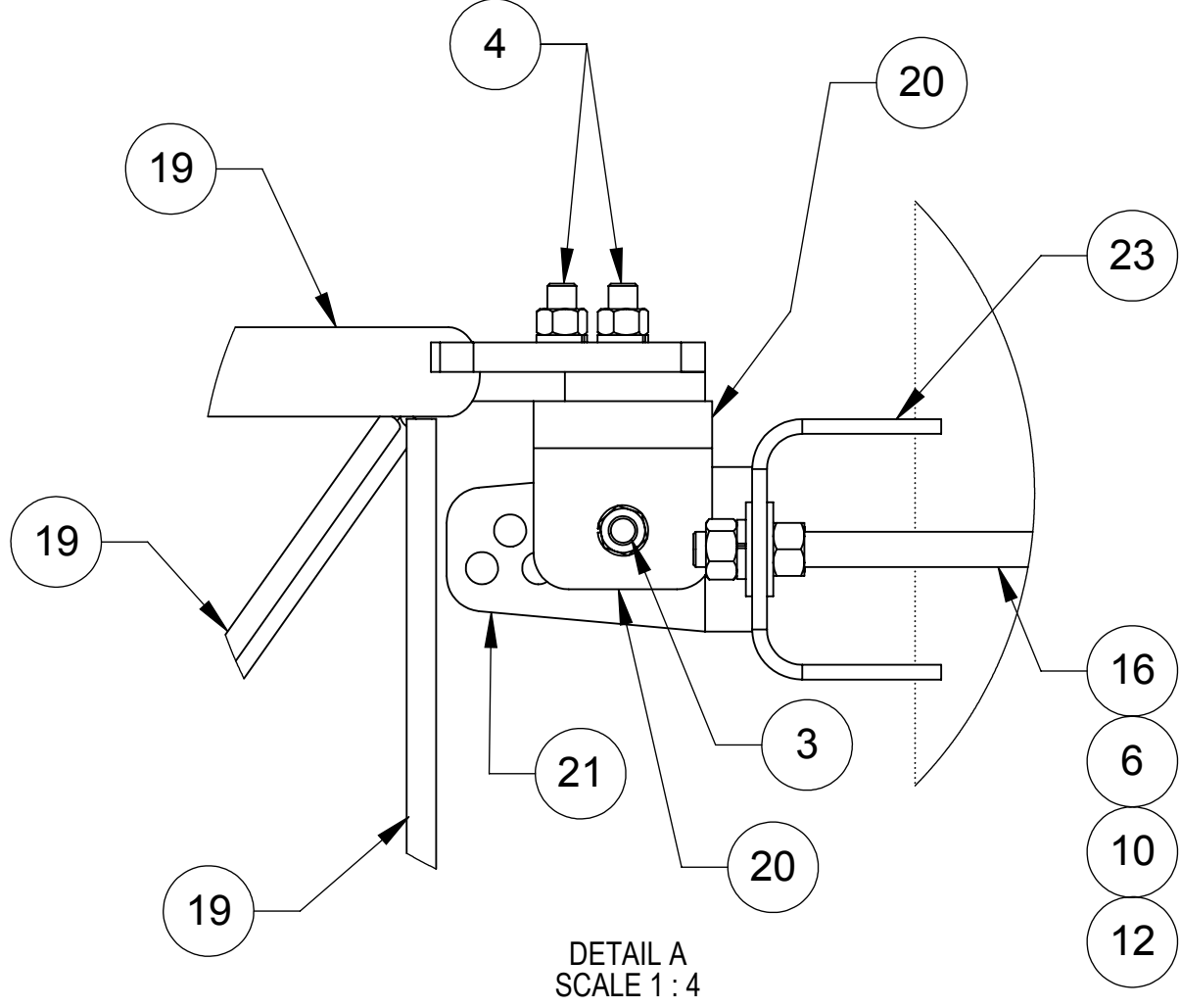
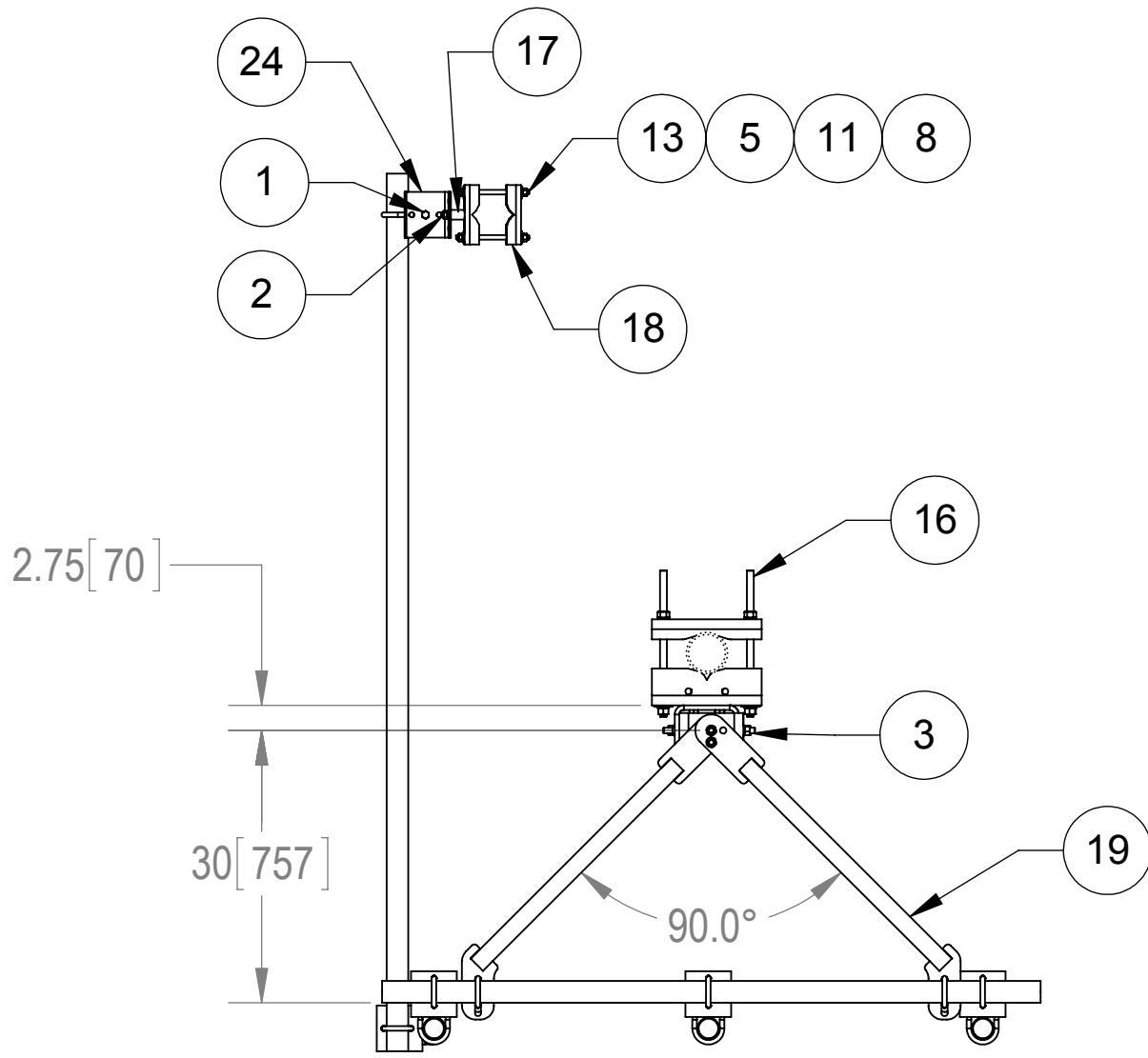
4

3

2

1

NOTES:
1.0 ALL METRIC DIMENSIONS ARE IN BRACKETS.



COMMScope, INC. OF NORTH CAROLINA				
TITLE				
SECTOR FRAME, 8' FACE, (3) 96" PIPES				
SIZE	SCALE	DOCUMENT NO.		
C	1:20	MTC3975083		
 		DRAWING		SHEET 2 OF 2
		VERSION	STATUS	
		PRE		

Exhibit F

Power Density/RF Emissions Report

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

Dish Wireless Existing Facility

Site ID: BOBDL00051A

806383

Cosgrove Road

West Willington, Connecticut 06279

August 31, 2021

EBI Project Number: 6221004796

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	14.99%

August 31, 2021

Dish Wireless

Emissions Analysis for Site: BOBDL00051A - 806383

EBI Consulting was directed to analyze the proposed Dish Wireless facility located at **Cosgrove Road** in **West Willington, Connecticut** for the purpose of determining whether the emissions from the Proposed Dish Wireless Antenna Installation located on this property are within specified federal limits.

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

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

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

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

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure.



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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed Dish Wireless Wireless antenna facility located at Cosgrove Road in West Willington, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since Dish Wireless is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 20 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

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

- 1) 4 n71 channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 2) 4 n70 channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 3) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
- 4) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 20 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.



- 5) The antennas used in this modeling are the JMA MX08FRO665-2I for the 600 MHz / 1900 MHz channel(s) in Sector A, the JMA MX08FRO665-2I for the 600 MHz / 1900 MHz channel(s) in Sector B, the JMA MX08FRO665-2I for the 600 MHz / 1900 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 20 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 6) The antenna mounting height centerline of the proposed antennas is 114 feet above ground level (AGL).
- 7) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.
- 8) All calculations were done with respect to uncontrolled / general population threshold limits.



Dish Wireless Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	I	Antenna #:	I	Antenna #:	I
Make / Model:	JMA MX08FRO665-2I	Make / Model:	JMA MX08FRO665-2I	Make / Model:	JMA MX08FRO665-2I
Frequency Bands:	600 MHz / 1900 MHz	Frequency Bands:	600 MHz / 1900 MHz	Frequency Bands:	600 MHz / 1900 MHz
Gain:	17.45 dBd / 22.65 dBd	Gain:	17.45 dBd / 22.65 dBd	Gain:	17.45 dBd / 22.65 dBd
Height (AGL):	114 feet	Height (AGL):	114 feet	Height (AGL):	114 feet
Channel Count:	8	Channel Count:	8	Channel Count:	8
Total TX Power (W):	280 Watts	Total TX Power (W):	280 Watts	Total TX Power (W):	280 Watts
ERP (W):	3,065.51	ERP (W):	3,065.51	ERP (W):	3,065.51
Antenna AI MPE %:	1.36%	Antenna BI MPE %:	1.36%	Antenna CI MPE %:	1.36%



EBI Consulting

environmental | engineering | due diligence

Site Composite MPE %	
Carrier	MPE %
Dish Wireless (Max at Sector A):	1.36%
Verizon	2.97%
T-Mobile	5.47%
Willington FD	0.1%
Metro PCS	0.96%
Nextel	0.24%
Sprint	3.89%
Site Total MPE % :	14.99%

Dish Wireless MPE % Per Sector	
Dish Wireless Sector A Total:	1.36%
Dish Wireless Sector B Total:	1.36%
Dish Wireless Sector C Total:	1.36%
Site Total MPE % :	14.99%

Dish Wireless Maximum MPE Power Values (Sector A)							
Dish Wireless Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu\text{W}/\text{cm}^2$)	Frequency (MHz)	Allowable MPE ($\mu\text{W}/\text{cm}^2$)	Calculated % MPE
Dish Wireless 600 MHz n71	4	223.68	114.0	2.76	600 MHz n71	400	0.69%
Dish Wireless 1900 MHz n70	4	542.70	114.0	6.69	1900 MHz n70	1000	0.67%
						Total:	1.36%

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



Summary

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

The anticipated maximum composite contributions from the Dish Wireless facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

Dish Wireless Sector	Power Density Value (%)
Sector A:	1.36%
Sector B:	1.36%
Sector C:	1.36%
Dish Wireless Maximum MPE % (Sector A):	1.36%
Site Total:	14.99%
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **14.99%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Exhibit G

Letter of Authorization



4545 E River Rd, Suite 320
West Henrietta, NY 14586

Phone: (585) 445-5896
Fax: (724) 416-4461
www.crowncastle.com

Crown Castle Letter of Authorization

CT - CONNECTICUT SITING COUNCIL

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

Re: Tower Share Application
Crown Castle telecommunications site at:
COSGROVE ROAD WHIFFORD HILL, WEST WILLINGTON, CT 06279

CROWN ATLANTIC COMPANY LLC ("Crown Castle") hereby authorizes DISH Wireless LLC, including their Agent, to act as our Agent in the processing of all zoning applications, building permits and approvals through the CT - CONNECTICUT SITING COUNCIL for the existing wireless communications site described below:

Crown Site ID/Name: 806383/HRT 087 943325
Customer Site ID: BOBDL00051A/CT-CCI-T-806383
Site Address: COSGROVE ROAD WHIFFORD HILL, WEST WILLINGTON,
CT 06279

Crown Castle

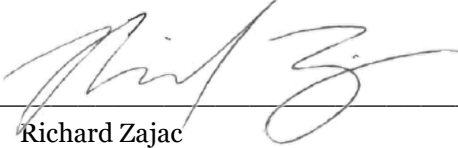
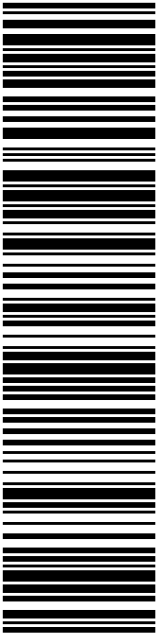
By:  Date: 9/7/2021
Richard Zajac
Site Acquisition Specialist

Exhibit H

Recipient Mailings

 Click-N-Ship®	
P	usps.com US POSTAGE Flat Rate Env \$7.95 9405 5036 9930 0009 9439 32 0079 5000 0010 6279 09/21/2021 Mailed from 01566
PRIORITY MAIL 2-DAY™	
Expected Delivery Date: 09/24/21 Re#: CR-806383 0006	
DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	
R021	
SHIP TO: ERIKA G WIECENSKI FIRST SELECTMAN 40 OLD FARMS RD WILLINGTON CT 06279-1720	
USPS TRACKING #  9405 5036 9930 0009 9439 32	
Electronic Rate Approved #038555749	



Cut on dotted line.

Instructions

- Each Click-N-Ship® label is unique. Labels are to be used as printed and used only once. DO NOT PHOTO COPY OR ALTER LABEL.
- Place your label so it does not wrap around the edge of the package.
- Adhere your label to the package. A self-adhesive label is recommended. If tape or glue is used, DO NOT TAPE OVER BARCODE. Be sure all edges are secure.
- To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.
- Mail your package on the "Ship Date" you selected when creating this label.

Click-N-Ship® Label Record

USPS TRACKING # :
9405 5036 9930 0009 9439 32

Trans. #: 544097697
 Print Date: 09/21/2021
 Ship Date: 09/21/2021
 Expected Delivery Date: 09/24/2021

Priority Mail® Postage: **\$7.95**
 Total: **\$7.95**

From: DEBORAH CHASE
 NORTHEAST SITE SOLUTIONS
 420 MAIN ST
 STE 1
 STURBRIDGE MA 01566-1359

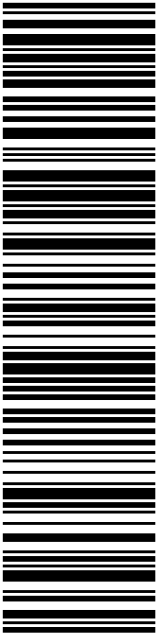
Re#: CR-806383

To: ERIKA G WIECENSKI
 FIRST SELECTMAN
 40 OLD FARMS RD
 WILLINGTON CT 06279-1720

* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.



Thank you for shipping with the United States Postal Service!
 Check the status of your shipment on the USPS Tracking® page at usps.com

 Click-N-Ship®	
P	usps.com US POSTAGE Flat Rate Env \$7.95 9405 5036 9930 0009 9439 56 0079 5000 0010 6279 09/21/2021 Mailed from 01566
PRIORITY MAIL 2-DAY™	
Expected Delivery Date: 09/24/21 Re#: CR-806383 0006	
DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	
R021	
SHIP TO: MICHAEL D'AMATO ZONING AGENT 40 OLD FARMS RD WILLINGTON CT 06279-1720	
USPS TRACKING #	
	
9405 5036 9930 0009 9439 56	
Electronic Rate Approved #038555749	

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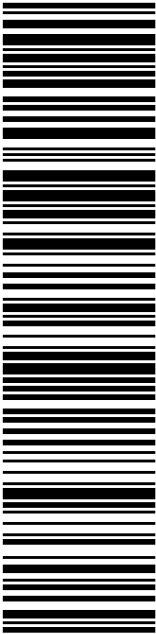
- Each Click-N-Ship® label is unique. Labels are to be used as printed and used only once. DO NOT PHOTO COPY OR ALTER LABEL.
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- Mail your package on the "Ship Date" you selected when creating this label.

Click-N-Ship® Label Record

USPS TRACKING # : 9405 5036 9930 0009 9439 56	
Trans. #: 544097697 Print Date: 09/21/2021 Ship Date: 09/21/2021 Expected Delivery Date: 09/24/2021	Priority Mail® Postage: \$7.95 Total: \$7.95
From: DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	
To: MICHAEL D'AMATO ZONING AGENT 40 OLD FARMS RD WILLINGTON CT 06279-1720	
Re#: CR-806383	
* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.	



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 Click-N-Ship®	
P	usps.com US POSTAGE Flat Rate Env U.S. POSTAGE PAID Click-N-Ship®
9405 5036 9930 0009 9439 70 0010 6279	09/21/2021 Mailed from 01566
PRIORITY MAIL 2-DAY™	
DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	Expected Delivery Date: 09/24/21 Re#: CR-806383 0006
SHIP TO: ISABELLA DROBNEY 56 COSGROVE RD WILLINGTON CT 06279-1408	
USPS TRACKING #  9405 5036 9930 0009 9439 70	
Electronic Rate Approved #038555749	

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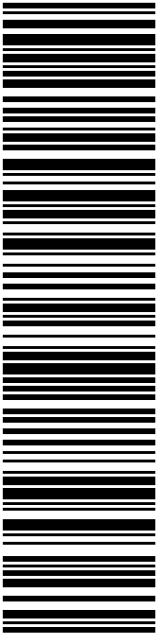
- Each Click-N-Ship® label is unique. Labels are to be used as printed and used only once. DO NOT PHOTO COPY OR ALTER LABEL.
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Click-N-Ship® Label Record

USPS TRACKING # : 9405 5036 9930 0009 9439 70	
Trans. #: 544097697 Print Date: 09/21/2021 Ship Date: 09/21/2021 Expected Delivery Date: 09/24/2021	Priority Mail® Postage: \$7.95 Total: \$7.95
From: DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	
To: ISABELLA DROBNEY 56 COSGROVE RD WILLINGTON CT 06279-1408	
Re#: CR-806383	
* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.	



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 Click-N-Ship®	
P	usps.com US POSTAGE Flat Rate Env \$7.95 9405 5036 9930 0009 9993 66 0079 5000 0031 4586 U.S. POSTAGE PAID Click-N-Ship®
09/21/2021	Mailed from 01566
PRIORITY MAIL 2-DAY™	
DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	Expected Delivery Date: 09/24/21 Re#: DS-806383 0006
R013	
SHIP TO: RICH ZAJAC CROWN CASTLE 4545 E RIVER RD STE 320 W HENRIETTA NY 14586-9024	
USPS TRACKING #	
	
9405 5036 9930 0009 9993 66	
Electronic Rate Approved #038555749	



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- Place your label so it does not wrap around the edge of the package.
- Adhere your label to the package. A self-adhesive label is recommended. If tape or glue is used, DO NOT TAPE OVER BARCODE. Be sure all edges are secure.
- To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.
- Mail your package on the "Ship Date" you selected when creating this label.

Click-N-Ship® Label Record

USPS TRACKING # : 9405 5036 9930 0009 9993 66	
Trans. #: 544101713 Print Date: 09/21/2021 Ship Date: 09/21/2021 Expected Delivery Date: 09/24/2021	Priority Mail® Postage: \$7.95 Total: \$7.95
From: DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	
To: RICH ZAJAC CROWN CASTLE 4545 E RIVER RD STE 320 W HENRIETTA NY 14586-9024	
Re#: DS-806383	
* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.	



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806 383-Willington



FISKDALE
458 MAIN ST
FISKDALE, MA 01518-9998
(800) 275-8777

12:24 PM

09/21/2021

Product	Qty	Unit Price	Price
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Prepaid Mail	1		\$0.00
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West Henrietta, NY 14586

Weight: 0 lb 2.00 oz

Acceptance Date:

Tue 09/21/2021

Tracking #:

9405 5036 9930 0009 9993 66

Prepaid Mail	1		\$0.00
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Willington, CT 06279

Weight: 1 lb 4.40 oz

Acceptance Date:

Tue 09/21/2021

Tracking #:

9405 5036 9930 0009 9439 32

Prepaid Mail	1		\$0.00
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Willington, CT 06279

Weight: 1 lb 3.50 oz

Acceptance Date:

Tue 09/21/2021

Tracking #:

9405 5036 9930 0009 9439 70

Prepaid Mail	1		\$0.00
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Willington, CT 06279

Weight: 1 lb 3.70 oz

Acceptance Date:

Tue 09/21/2021

Tracking #:

9405 5036 9930 0009 9439 56

Grand Total:

\$0.00

Date: **June 05, 2021**



Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Subject: **Structural Analysis Report**

Carrier Designation: **DISH Network Co-Locate**
Site Number: BOBDL00051A
Site Name: CT-CCI-T-806383

Crown Castle Designation: **BU Number:** 806383
Site Name: HRT 087 943325
JDE Job Number: 650045
Work Order Number: 1966275
Order Number: 556635 Rev. 1

Engineering Firm Designation: **Crown Castle Project Number:** 1966275

Site Data: **COSGROVE ROAD, WEST WILLINGTON, TOLLAND County, CT**
Latitude 41° 53' 32.92", Longitude -72° 15' 38.15"
140 Foot - Self Support Tower

Crown Castle 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:

LC5: 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: Sudarshan Kasera

Respectfully submitted by:

Maham Barimani, P.E.
Senior Project Engineer

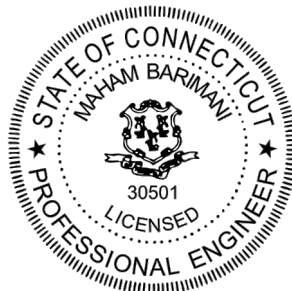


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7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 140 ft Self Support tower designed by ROHN.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	2 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)
114.0	114.0	3	fujitsu	TA08025-B604	1	1-1/2
		3	fujitsu	TA08025-B605		
		3	jma wireless	MX08FRO665-21 w/ Mount Pipe		
		1	raycap	RDIDC-9181-PF-48		
		1	tower mounts	Commscope MTC3975083		

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)
137.0	139.0	3	alcatel lucent	RRH2X60-AWS	14	3/8 1-5/8
		3	alcatel lucent	RRH2X60-PCS		
		6	andrew	HBXX-6517DS-VTM w/ Mount Pipe		
		3	andrew	LNx-6514DS-VTM w/ Mount Pipe		
		3	andrew	LNx-8513DS-A1M w/ Mount Pipe		
		2	rfs celwave	DB-T1-6Z-8AB-0Z		
		6	rfs celwave	FD9R6004/2C-3L		
	137.0	1	crown mounts	Sector Mount [SM 510-3]		
124.0	125.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz	3	7/8 1-1/4
		6	alcatel lucent	RRH2x50-800		
		3	commscope	NNVV-65B-R4 w/ Mount Pipe		
		3	nokia	FZHN		
		3	rfs celwave	APXVTM14-ALU-I20 w/ Mount Pipe		
	124.0	1	crown mounts	Sector Mount [SM 502-3]		
101.0	102.0	3	ems wireless	RR90-17-00DP w/ Mount Pipe	15	1/4 1-1/4
		3	ericsson	KRY 112 144/1		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		3	ericsson	KRY 112 489/2		
		3	ericsson	RADIO 4415 B66A		
		3	ericsson	RADIO 4449 B12/B71		
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
	101.0	1	mount	(3) 4' Sector Frames	1	1/2
60.0	60.0	1	crown mounts	Side Arm Mount [SO 203-1]		
50.0	50.0	1	gps	GPS_A	1	1/2
		1	gps	GPS_A		
		1	gps	GPS_RESERVED		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
4-GEOTECHNICAL REPORTS	1069386	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	1069383	CCISITES
4-TOWER MANUFACTURER DRAWINGS	1069394	CCISITES
4-POST-MODIFICATION INSPECTION	5786395	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	5670805	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.9.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

3.2) Assumptions

- 1) Tower and structures were maintained in accordance with the TIA-222 Standard.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	140 - 120	Leg	ROHN 2 STD	3	-16.53	38.68	42.7	Pass
T2	120 - 100	Leg	ROHN 2.5 EH	39	-40.90	78.15	52.3	Pass
T3	100 - 80	Leg	ROHN 3 EH	69	-64.36	99.06	65.0	Pass
T4	80 - 60	Leg	ROHN 3.5 EH	90	-87.16	132.01	66.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T5	60 - 40	Leg	ROHN 4 X-STR	111	-108.81	167.90	64.8	Pass
T6	40 - 20	Leg	ROHN 5 EH	132	-128.21	211.31	60.7	Pass
T7	20 - 0	Leg	ROHN 5 X-STR	147	-148.38	211.86	70.0	Pass
T1	140 - 120	Diagonal	L1 3/4x1 3/4x3/16	12	-2.89	11.65	24.8 46.3 (b)	Pass
T2	120 - 100	Diagonal	L1 3/4x1 3/4x3/16	47	-3.09	6.72	46.1 51.9 (b)	Pass
T3	100 - 80	Diagonal	L2x2x3/16	75	-3.97	6.31	63.0	Pass
T4	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	96	-4.23	9.65	43.8 64.5 (b)	Pass
T5	60 - 40	Diagonal	L3x3x3/16	117	-4.56	13.19	34.6 69.8 (b)	Pass
T6	40 - 20	Diagonal	L3x3x3/16	137	-5.54	9.05	61.3 65.1 (b)	Pass
T7	20 - 0	Diagonal	L3x3x1/4	152	-5.92	9.92	59.7	Pass
T1	140 - 120	Top Girt	L2x2x1/8	4	-0.33	4.27	7.7 8.3 (b)	Pass
T2	120 - 100	Top Girt	L2x2x1/8	41	-0.71	4.27	16.6	Pass
							Summary	
						Leg (T7)	70.0	Pass
						Diagonal (T5)	69.8	Pass
						Top Girt (T2)	16.6	Pass
						Bolt Checks	69.8	Pass
						Rating =	70.0	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	58.1	Pass
1	Base Foundation (Structure)	0	26.1	Pass
1	Base Foundation (Soil Interaction)	0	51.8	Pass

Structure Rating (max from all components) =	70%
---	------------

Notes:

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

4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

Section	T1	T2	T3	T4	T5	T6	T7	
Legs	ROHN 2 STD	ROHN 2.5 EH	ROHN 3 EH	ROHN 3.5 EH	ROHN 4 X-STR	ROHN 5 EH	ROHN 5 X-STR	
Leg Grade				A618-50				
Diagonals				L2 1/2x2 1/2x3/16	L3x3x3/16		L3x3x1/4	
Diagonal Grade				A36			A572-50	
Top Girts					N.A.			
Face Width (ft)	6.52083	6.5625	8.60417	10.6354	12.6771	14.7708	16.7708	18.7708
# Panels @ (ft)	5 @ 4	4 @ 5		9 @ 6.66667		2 @ 10	2 @ 9.95833	
Weight (K)	0.7	1.0	1.1	1.5	1.9	2.1	2.4	10.8

140.0 ft

120.0 ft

100.0 ft

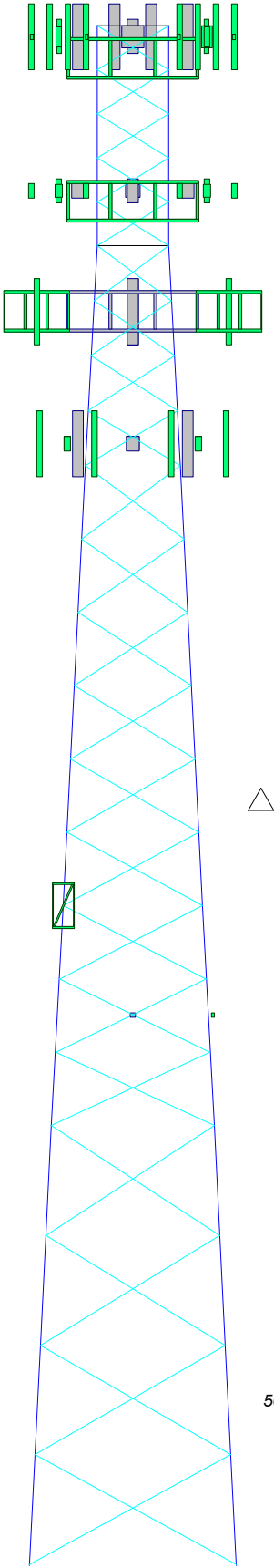
80.0 ft

60.0 ft

40.0 ft

20.0 ft

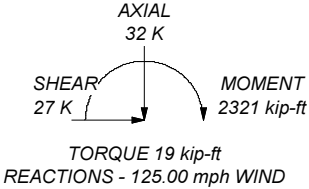
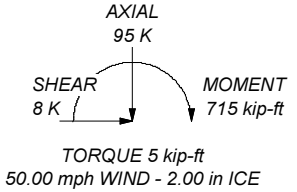
0.0 ft



ALL REACTIONS
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 153 K
SHEAR: 17 K

UPLIFT: -127 K
SHEAR: 15 K



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A618-50	50 ksi	70 ksi	A572-50	50 ksi	65 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-H Standard.
2. Tower designed for a 125.00 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50.00 mph basic wind with 2.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60.00 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TIA-222-H Annex S
8. TOWER RATING: 70%



Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: (724) 416-2000
FAX:

Job: **806383**

Project: **1966275**

Client: Crown Castle	Drawn by: SKasera	App'd:
Code: TIA-222-H	Date: 06/05/21	Scale: NTS
Path: C:\Users\skasera\Desktop\Work Area\SAI\806383\WO 1966275 - SAI\Prod\806383 RPA.er		Dwg No. E-1

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 140.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 6.52 ft at the top and 18.77 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

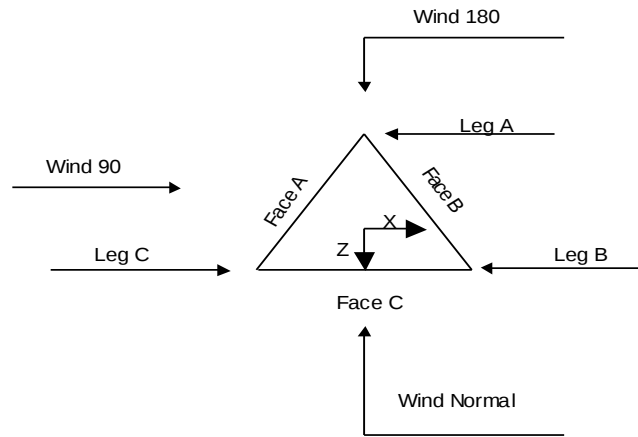
- Tower base elevation above sea level: 933.00 ft.
- Basic wind speed of 125.00 mph.
- Risk Category II.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 2.00 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50.00 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60.00 mph.
- TIA-222-H Annex S.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.05.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Maximum demand-capacity ratio is: 1.
- 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.
✓ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Use TIA-222-H Tension Splice
✓ Secondary Horizontal Braces Leg	✓ Sort Capacity Reports By Component	Exemption
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	
✓ SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	
SR Members Are Concentric	Ignore KL/ry For 60 Deg. Angle Legs	

Poles

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	140.00-120.00			6.52	1	20.00
T2	120.00-100.00		08N087	6.56	1	20.00
T3	100.00-80.00		09N006	8.60	1	20.00
T4	80.00-60.00		10N007	10.64	1	20.00
T5	60.00-40.00		11N007	12.68	1	20.00
T6	40.00-20.00		12N004	14.77	1	20.00
T7	20.00-0.00		13N003	16.77	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	140.00-120.00	4.00	X Brace	No	No	0.00	0.00
T2	120.00-100.00	5.00	X Brace	No	No	0.00	0.00
T3	100.00-80.00	6.67	X Brace	No	No	0.00	0.00
T4	80.00-60.00	6.67	X Brace	No	No	0.00	0.00
T5	60.00-40.00	6.67	X Brace	No	No	0.00	0.00
T6	40.00-20.00	10.00	X Brace	No	No	0.00	0.00
T7	20.00-0.00	9.96	X Brace	No	No	0.00	1.00

Tower Section Geometry (cont'd)

Tower Elevation	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
ft						

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 140.00-120.00	Pipe	ROHN 2 STD	A618-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 120.00-100.00	Pipe	ROHN 2.5 EH	A618-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 100.00-80.00	Pipe	ROHN 3 EH	A618-50 (50 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T4 80.00-60.00	Pipe	ROHN 3.5 EH	A618-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 60.00-40.00	Pipe	ROHN 4 X-STR	A618-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T6 40.00-20.00	Pipe	ROHN 5 EH	A618-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T7 20.00-0.00	Pipe	ROHN 5 X-STR	A618-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 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 140.00-120.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T2 120.00-100.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		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 _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
T1 140.00-120.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T2 120.00-100.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T3 100.00-80.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T4 80.00-60.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T5 60.00-40.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T6 40.00-20.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00
T7 20.00-0.00	0.00	0.00	A36 (36 ksi)	1	1	1	36.00	36.00	36.00

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors ¹							
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1 140.00-	Yes	Yes	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	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
120.00				1	1	1	1	1	1	1
T2 120.00- 100.00	Yes	Yes	1	1	1	1	1	1	1	1
T3 100.00- 80.00	Yes	Yes	1	1	1	1	1	1	1	1
T4 80.00- 60.00	Yes	Yes	1	1	1	1	1	1	1	1
T5 60.00- 40.00	Yes	Yes	1	1	1	1	1	1	1	1
T6 40.00- 20.00	Yes	Yes	1	1	1	1	1	1	1	1
T7 20.00- 0.00	Yes	Yes	1	1	1	1	1	1	1	1

¹Note: 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		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
T1 140.00- 120.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 120.00- 100.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 100.00- 80.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T4 80.00- 60.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 60.00- 40.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 40.00- 20.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 20.00-0.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub- Diagonal		Redundant Sub- Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	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
T1 140.00- 120.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 120.00- 100.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 100.00- 80.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T4 80.00- 60.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 60.00- 40.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 40.00- 20.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 20.00-0.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

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 140.00-120.00	Flange	0.63	4	0.50	1	0.50	1	0.50	0	0.50	0	0.50	0	0.50	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 120.00-100.00	Flange	0.75	4	0.50	1	0.50	1	0.63	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 100.00-80.00	Flange	0.88	4	0.50	1	0.50	0	0.00	0	0.50	0	0.50	0	0.50	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 80.00-60.00	Flange	0.88	4	0.50	1	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 60.00-40.00	Flange	1.00	4	0.50	1	0.63	0	0.63	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 40.00-20.00	Flange	1.00	4	0.63	1	0.63	0	0.00	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7 20.00-0.00	Flange	1.00	0	0.63	1	0.63	0	0.00	0	0.63	0	0.63	0	0.63	0
		A449		A325N		A325N		A325N		A325N		A325N		A325N	

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 Spacin g in	Width or Diameter in	Perimeter in	Weight plf

LDF7-50A(1-5/8)	C	No	No	Ar (CaAa)	137.00 - 8.00	0.00	0.3	14	8	0.50	1.98		0.82
LDF2-50(3/8)	C	No	No	Ar (CaAa)	137.00 - 8.00	0.00	0.25	1	1	0.50	0.44		0.08

HB114-08U3M12-XXXF(7/8)	B	No	No	Ar (CaAa)	124.00 - 8.00	0.00	-0.33	1	1	0.50	1.11		0.68
HB114-1-08U4-M5F(1-1/4)	B	No	No	Ar (CaAa)	124.00 - 8.00	0.00	-0.35	3	3	0.50	1.54		1.30

LDF1-50A(1/4)	A	No	No	Ar (CaAa)	101.00 - 8.00	0.00	0.365	1	1	0.50	0.34		0.06
FLC 114-50J(1-1/4)	A	No	No	Ar (CaAa)	101.00 - 8.00	0.00	0.4	15	8	0.50	1.58		0.70

LDF4-50A(1/2)	C	No	No	Ar (CaAa)	60.00 - 8.00	4.00	0.26	1	1	0.50	0.63		0.15

LDF4-50A(1/2)	B	No	No	Ar (CaAa)	50.00 - 8.00	0.00	-0.355	1	1	0.50	0.63		0.15

Feedline Ladder (Af)	A	No	No	Af (CaAa)	101.00 - 8.00	0.00	0.4	1	1	3.00	3.00		8.40
Feedline Ladder (Af)	B	No	No	Af (CaAa)	124.00 - 8.00	0.00	-0.35	1	1	3.00	3.00		8.40
Feedline Ladder (Af)	C	No	No	Af (CaAa)	137.00 - 8.00	0.00	0.3	1	1	3.00	3.00		8.40

Safety Line 3/8	C	No	No	Ar (CaAa)	140.00 - 8.00	0.00	0.5	1	1	0.50	0.38		0.22

CU12PSM9P 6XXX(1-1/2)	B	No	No	Ar (CaAa)	114.00 - 0.00	0.00	-0.25	1	1	1.60	1.60		2.35

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
**													

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf

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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	140.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	4.292	0.000	0.05
		C	0.000	0.000	57.122	0.000	0.34
T2	120.00-100.00	A	0.000	0.000	2.905	0.000	0.02
		B	0.000	0.000	23.700	0.000	0.29
		C	0.000	0.000	67.070	0.000	0.40
T3	100.00-80.00	A	0.000	0.000	58.090	0.000	0.38
		B	0.000	0.000	24.660	0.000	0.31
		C	0.000	0.000	67.070	0.000	0.40
T4	80.00-60.00	A	0.000	0.000	58.090	0.000	0.38
		B	0.000	0.000	24.660	0.000	0.31
		C	0.000	0.000	67.070	0.000	0.40
T5	60.00-40.00	A	0.000	0.000	58.090	0.000	0.38
		B	0.000	0.000	25.290	0.000	0.31
		C	0.000	0.000	68.330	0.000	0.41
T6	40.00-20.00	A	0.000	0.000	58.090	0.000	0.38
		B	0.000	0.000	25.920	0.000	0.31
		C	0.000	0.000	68.330	0.000	0.41
T7	20.00-0.00	A	0.000	0.000	34.854	0.000	0.23
		B	0.000	0.000	16.832	0.000	0.20
		C	0.000	0.000	40.998	0.000	0.24

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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	140.00-120.00	A	1.950	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	11.046	0.000	0.20
		C		0.000	0.000	83.538	0.000	1.66
T2	120.00-100.00	A	1.918	0.000	0.000	3.968	0.000	0.08
		B		0.000	0.000	62.359	0.000	1.14
		C		0.000	0.000	96.177	0.000	1.90
T3	100.00-80.00	A	1.879	0.000	0.000	78.817	0.000	1.59
		B		0.000	0.000	64.903	0.000	1.18
		C		0.000	0.000	95.477	0.000	1.87
T4	80.00-60.00	A	1.833	0.000	0.000	78.144	0.000	1.56
		B		0.000	0.000	64.026	0.000	1.15
		C		0.000	0.000	94.619	0.000	1.83

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
T5	60.00-40.00	A	1.772	0.000	0.000	77.270	0.000	1.51
		B		0.000	0.000	67.060	0.000	1.16
		C		0.000	0.000	101.853	0.000	1.89
T6	40.00-20.00	A	1.684	0.000	0.000	75.999	0.000	1.46
		B		0.000	0.000	69.223	0.000	1.15
		C		0.000	0.000	99.880	0.000	1.81
T7	20.00-0.00	A	1.509	0.000	0.000	44.087	0.000	0.81
		B		0.000	0.000	42.834	0.000	0.69
		C		0.000	0.000	57.579	0.000	0.99

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
T1	140.00-120.00	-8.89	3.26	-8.17	4.10
T2	120.00-100.00	-9.17	-3.41	-7.61	-3.50
T3	100.00-80.00	-10.49	-16.99	-8.96	-15.01
T4	80.00-60.00	-11.09	-17.93	-9.95	-16.71
T5	60.00-40.00	-11.51	-18.21	-11.10	-17.16
T6	40.00-20.00	-13.66	-21.78	-12.80	-20.84
T7	20.00-0.00	-10.17	-16.88	-9.66	-17.18

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	LDF7-50A(1-5/8)	120.00 - 137.00	0.6000	0.5822
T1	3	LDF2-50(3/8)	120.00 - 137.00	0.6000	0.5822
T1	5	HB114-08U3M12- XXXXF(7/8)	120.00 - 124.00	0.6000	0.5822
T1	6	HB114-1-08U4-M5F(1-1/4)	120.00 - 124.00	0.6000	0.5822
T1	18	Feedline Ladder (Af)	120.00 - 124.00	0.6000	0.5822
T1	19	Feedline Ladder (Af)	120.00 - 137.00	0.6000	0.5822
T1	21	Safety Line 3/8	120.00 - 140.00	0.6000	0.5822
T2	2	LDF7-50A(1-5/8)	100.00 - 120.00	0.6000	0.6000
T2	3	LDF2-50(3/8)	100.00 - 120.00	0.6000	0.6000
T2	5	HB114-08U3M12- XXXXF(7/8)	100.00 - 120.00	0.6000	0.6000
T2	6	HB114-1-08U4-M5F(1-1/4)	100.00 - 120.00	0.6000	0.6000
T2	10	LDF1-50A(1/4)	100.00 - 101.00	0.6000	0.6000
T2	11	FLC 114-50J(1-1/4)	100.00 - 101.00	0.6000	0.6000
T2	17	Feedline Ladder (Af)	100.00 - 101.00	0.6000	0.6000
T2	18	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T2	19	Feedline Ladder (Af)	100.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
			120.00		
T2	21	Safety Line 3/8	100.00 -	0.6000	0.6000
			120.00		
T2	23	CU12PSM9P6XXX(1-1/2)	100.00 -	0.6000	0.6000
			114.00		
T3	2	LDF7-50A(1-5/8)	80.00 -	0.6000	0.6000
			100.00		
T3	3	LDF2-50(3/8)	80.00 -	0.6000	0.6000
			100.00		
T3	5	HB114-08U3M12- XXXX(7/8)	80.00 -	0.6000	0.6000
			100.00		
T3	6	HB114-1-08U4-M5F(1-1/4)	80.00 -	0.6000	0.6000
			100.00		
T3	10	LDF1-50A(1/4)	80.00 -	0.6000	0.6000
			100.00		
T3	11	FLC 114-50J(1-1/4)	80.00 -	0.6000	0.6000
			100.00		
T3	17	Feedline Ladder (Af)	80.00 -	0.6000	0.6000
			100.00		
T3	18	Feedline Ladder (Af)	80.00 -	0.6000	0.6000
			100.00		
T3	19	Feedline Ladder (Af)	80.00 -	0.6000	0.6000
			100.00		
T3	21	Safety Line 3/8	80.00 -	0.6000	0.6000
			100.00		
T3	23	CU12PSM9P6XXX(1-1/2)	80.00 -	0.6000	0.6000
			100.00		
T4	2	LDF7-50A(1-5/8)	60.00 -	0.6000	0.6000
			80.00		
T4	3	LDF2-50(3/8)	60.00 -	0.6000	0.6000
			80.00		
T4	5	HB114-08U3M12- XXXX(7/8)	60.00 -	0.6000	0.6000
			80.00		
T4	6	HB114-1-08U4-M5F(1-1/4)	60.00 -	0.6000	0.6000
			80.00		
T4	10	LDF1-50A(1/4)	60.00 -	0.6000	0.6000
			80.00		
T4	11	FLC 114-50J(1-1/4)	60.00 -	0.6000	0.6000
			80.00		
T4	17	Feedline Ladder (Af)	60.00 -	0.6000	0.6000
			80.00		
T4	18	Feedline Ladder (Af)	60.00 -	0.6000	0.6000
			80.00		
T4	19	Feedline Ladder (Af)	60.00 -	0.6000	0.6000
			80.00		
T4	21	Safety Line 3/8	60.00 -	0.6000	0.6000
			80.00		
T4	23	CU12PSM9P6XXX(1-1/2)	60.00 -	0.6000	0.6000
			80.00		
T5	2	LDF7-50A(1-5/8)	40.00 -	0.6000	0.6000
			60.00		
T5	3	LDF2-50(3/8)	40.00 -	0.6000	0.6000
			60.00		
T5	5	HB114-08U3M12- XXXX(7/8)	40.00 -	0.6000	0.6000
			60.00		
T5	6	HB114-1-08U4-M5F(1-1/4)	40.00 -	0.6000	0.6000
			60.00		
T5	10	LDF1-50A(1/4)	40.00 -	0.6000	0.6000
			60.00		
T5	11	FLC 114-50J(1-1/4)	40.00 -	0.6000	0.6000
			60.00		
T5	13	LDF4-50A(1/2)	40.00 -	0.6000	0.6000
			60.00		
T5	15	LDF4-50A(1/2)	40.00 -	0.6000	0.6000
			50.00		
T5	17	Feedline Ladder (Af)	40.00 -	0.6000	0.6000
			60.00		
T5	18	Feedline Ladder (Af)	40.00 -	0.6000	0.6000
			60.00		

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T5	19	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	21	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T5	23	CU12PSM9P6XXX(1-1/2)	40.00 - 60.00	0.6000	0.6000
T6	2	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T6	3	LDF2-50(3/8)	20.00 - 40.00	0.6000	0.6000
T6	5	HB114-08U3M12-XXXX(7/8)	20.00 - 40.00	0.6000	0.6000
T6	6	HB114-1-08U4-M5F(1-1/4)	20.00 - 40.00	0.6000	0.6000
T6	10	LDF1-50A(1/4)	20.00 - 40.00	0.6000	0.6000
T6	11	FLC 114-50J(1-1/4)	20.00 - 40.00	0.6000	0.6000
T6	13	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T6	15	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T6	17	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	18	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	19	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	21	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T6	23	CU12PSM9P6XXX(1-1/2)	20.00 - 40.00	0.6000	0.6000
T7	2	LDF7-50A(1-5/8)	8.00 - 20.00	0.6000	0.6000
T7	3	LDF2-50(3/8)	8.00 - 20.00	0.6000	0.6000
T7	5	HB114-08U3M12-XXXX(7/8)	8.00 - 20.00	0.6000	0.6000
T7	6	HB114-1-08U4-M5F(1-1/4)	8.00 - 20.00	0.6000	0.6000
T7	10	LDF1-50A(1/4)	8.00 - 20.00	0.6000	0.6000
T7	11	FLC 114-50J(1-1/4)	8.00 - 20.00	0.6000	0.6000
T7	13	LDF4-50A(1/2)	8.00 - 20.00	0.6000	0.6000
T7	15	LDF4-50A(1/2)	8.00 - 20.00	0.6000	0.6000
T7	17	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T7	18	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T7	19	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T7	21	Safety Line 3/8	8.00 - 20.00	0.6000	0.6000
T7	23	CU12PSM9P6XXX(1-1/2)	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft

LNx-8513DS-A1M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	137.00
LNx-8513DS-A1M w/ Mount Pipe	B	From Leg	4.00 0.00	0.000	137.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
LNx-8513DS-A1M w/ Mount Pipe	C	From Leg	2.00 4.00 0.00	0.000	137.00
(2) HBXX-6517DS-VTM w/ Mount Pipe	A	From Leg	2.00 4.00 0.00	0.000	137.00
(2) HBXX-6517DS-VTM w/ Mount Pipe	B	From Leg	2.00 4.00 0.00	0.000	137.00
(2) HBXX-6517DS-VTM w/ Mount Pipe	C	From Leg	2.00 4.00 0.00	0.000	137.00
LNx-6514DS-VTM w/ Mount Pipe	A	From Leg	2.00 4.00 0.00	0.000	137.00
LNx-6514DS-VTM w/ Mount Pipe	B	From Leg	2.00 4.00 0.00	0.000	137.00
LNx-6514DS-VTM w/ Mount Pipe	C	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-PCS	A	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-PCS	B	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-PCS	C	From Leg	2.00 4.00 0.00	0.000	137.00
(2) FD9R6004/2C-3L	A	From Leg	2.00 4.00 0.00	0.000	137.00
(2) FD9R6004/2C-3L	B	From Leg	2.00 4.00 0.00	0.000	137.00
(2) FD9R6004/2C-3L	C	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-AWS	C	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-AWS	B	From Leg	2.00 4.00 0.00	0.000	137.00
RRH2X60-AWS	A	From Leg	2.00 4.00 0.00	0.000	137.00
DB-T1-6Z-8AB-0Z	A	From Leg	2.00 4.00 0.00	0.000	137.00
DB-T1-6Z-8AB-0Z	B	From Leg	2.00 4.00 0.00	0.000	137.00
Sector Mount [SM 510-3] ***	C	None	2.00	0.000	137.00
NNVV-65B-R4 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.000	124.00
NNVV-65B-R4 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.000	124.00
NNVV-65B-R4 w/ Mount Pipe	C	From Leg	4.00 0.00	0.000	124.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
APXVTM14-ALU-I20 w/ Mount Pipe	A	From Leg	1.00 4.00 0.00	0.000	124.00
APXVTM14-ALU-I20 w/ Mount Pipe	B	From Leg	1.00 4.00 0.00	0.000	124.00
APXVTM14-ALU-I20 w/ Mount Pipe	C	From Leg	1.00 4.00 0.00	0.000	124.00
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00 4.00 0.00	0.000	124.00
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00 4.00 0.00	0.000	124.00
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00 4.00 0.00	0.000	124.00
(2) RRH2x50-800	A	From Leg	1.00 4.00 0.00	0.000	124.00
(2) RRH2x50-800	B	From Leg	1.00 4.00 0.00	0.000	124.00
(2) RRH2x50-800	C	From Leg	1.00 4.00 0.00	0.000	124.00
FZHN	A	From Leg	1.00 4.00 0.00	0.000	124.00
FZHN	B	From Leg	1.00 4.00 0.00	0.000	124.00
FZHN	C	From Leg	1.00 4.00 0.00	0.000	124.00
Empty Mount Pipe	A	From Leg	1.00 4.00 0.00	0.000	124.00
Empty Mount Pipe	B	From Leg	1.00 4.00 0.00	0.000	124.00
Empty Mount Pipe	C	From Leg	1.00 4.00 0.00	0.000	124.00
Sector Mount [SM 502-3] ***	C	None	0.00	0.000	124.00
MX08FRO665-21 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	114.00
MX08FRO665-21 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	114.00
MX08FRO665-21 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	114.00
TA08025-B604	A	From Leg	4.00 0.00 0.00	0.000	114.00
TA08025-B604	B	From Leg	4.00 0.00 0.00	0.000	114.00
TA08025-B604	C	From Leg	4.00 0.00 0.00	0.000	114.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
TA08025-B605	A	From Leg	0.00 4.00 0.00 0.00	0.000	114.00
TA08025-B605	B	From Leg	4.00 0.00 0.00	0.000	114.00
TA08025-B605	C	From Leg	4.00 0.00 0.00	0.000	114.00
RDIDC-9181-PF-48	A	From Leg	4.00 0.00 0.00	0.000	114.00
(2) 8' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	114.00
(2) 8' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	114.00
(2) 8' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	114.00
Commscope MTC3975083 ***	C	None		0.000	114.00
RR90-17-00DP w/ Mount Pipe	A	From Leg	2.00 0.00 1.00	0.000	101.00
RR90-17-00DP w/ Mount Pipe	B	From Leg	2.00 0.00 1.00	0.000	101.00
RR90-17-00DP w/ Mount Pipe	C	From Leg	2.00 0.00 1.00	0.000	101.00
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	2.00 0.00 1.00	0.000	101.00
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	2.00 0.00 1.00	0.000	101.00
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 489/2	A	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 489/2	B	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 489/2	C	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 144/1	A	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 144/1	B	From Leg	2.00 0.00 1.00	0.000	101.00
KRY 112 144/1	C	From Leg	2.00 0.00 1.00	0.000	101.00
RADIO 4449 B12/B71	A	From Leg	2.00 0.00 1.00	0.000	101.00
RADIO 4449 B12/B71	B	From Leg	2.00 0.00 1.00	0.000	101.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
RADIO 4449 B12/B71	C	From Leg	1.00 2.00 0.00	0.000	101.00
RADIO 4415 B66A	A	From Leg	1.00 2.00 0.00	0.000	101.00
RADIO 4415 B66A	B	From Leg	1.00 2.00 0.00	0.000	101.00
RADIO 4415 B66A	C	From Leg	1.00 2.00 0.00	0.000	101.00
(3) 4' Sector Frames 1.9" x10' Horizontal Pipe	C A	None From Leg	1.00 0.50 0.00	0.000 0.000	101.00 101.00
1.9" x10' Horizontal Pipe	B	From Leg	0.50 0.00 0.00	0.000	101.00
1.9" x10' Horizontal Pipe	C	From Leg	0.50 0.00 0.00	0.000	101.00
Pipe Mount	A	From Leg	2.00 0.00 0.00	0.000	101.00
Pipe Mount	B	From Leg	2.00 0.00 0.00	0.000	101.00
Pipe Mount	C	From Leg	2.00 0.00 0.00	0.000	101.00
*** GPS_A	C	From Leg	2.00 0.00 0.00	0.000	60.00
Side Arm Mount [SO 203-1]	C	From Leg	0.00 0.00 0.00	0.000	60.00
*** GPS_A	A	From Leg	0.50 0.00 0.00	0.000	50.00
*** GPS_RESERVED	B	From Leg	0.50 0.00 0.00	0.000	50.00
*** **					

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice

Comb. No.	Description
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	140 - 120	Leg	Max Tension	15	11.85	-0.01	-0.01
			Max. Compression	2	-16.52	0.05	0.02
			Max. Mx	22	-0.78	0.55	-0.01
			Max. My	16	-1.54	0.01	-0.59
			Max. Vy	3	-0.97	0.42	-0.00
			Max. Vx	8	-0.96	-0.00	0.37
		Diagonal	Max Tension	5	2.77	0.00	0.00
			Max. Compression	16	-2.89	0.00	0.00
			Max. Mx	35	0.54	0.03	-0.00
			Max. My	12	-1.65	0.00	0.00
			Max. Vy	35	-0.03	0.03	-0.00
			Max. Vx	12	-0.00	0.00	0.00
		Top Girt	Max Tension	14	0.36	0.00	0.00
			Max. Compression	3	-0.33	0.00	0.00
			Max. Mx	26	0.03	-0.07	0.00
			Max. My	26	0.03	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T2	120 - 100	Leg	Max. Vy	26	0.04	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
			Max Tension	15	31.89	-0.10	-0.01
			Max. Compression	2	-40.90	0.28	0.02
			Max. Mx	14	30.42	-0.29	-0.02
			Max. My	20	-4.95	-0.01	-0.24
		Diagonal	Max. Vy	14	0.44	-0.29	-0.02
			Max. Vx	24	-0.42	-0.01	0.24
			Max Tension	4	3.11	0.00	0.00
			Max. Compression	4	-3.09	0.00	0.00
			Max. Mx	35	0.78	0.04	-0.00
			Max. My	32	0.81	0.03	-0.00
		Top Girt	Max. Vy	37	0.03	0.03	-0.00
			Max. Vx	32	0.00	0.00	0.00
			Max Tension	14	0.24	0.00	0.00
			Max. Compression	19	-0.23	0.00	0.00
			Max. Mx	26	0.01	-0.07	0.00
			Max. My	26	0.01	0.00	0.00
T3	100 - 80	Leg	Max. Vy	26	-0.04	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
			Max Tension	15	52.61	-0.13	-0.03
			Max. Compression	2	-64.36	0.13	0.03
			Max. Mx	14	36.85	-0.29	-0.02
			Max. My	20	-5.08	-0.01	-0.24
		Diagonal	Max. Vy	14	-0.07	-0.29	-0.02
			Max. Vx	20	0.09	-0.01	-0.22
			Max Tension	4	3.93	0.00	0.00
			Max. Compression	16	-3.97	0.00	0.00
			Max. Mx	37	0.82	0.06	-0.01
			Max. My	27	-1.25	0.05	0.01
T4	80 - 60	Leg	Max. Vy	37	0.05	0.06	-0.01
			Max. Vx	33	0.00	0.00	0.00
			Max Tension	15	72.36	-0.14	-0.02
			Max. Compression	2	-87.16	0.24	0.03
			Max. Mx	2	-87.16	0.24	0.03
			Max. My	20	-6.92	-0.02	-0.24
		Diagonal	Max. Vy	33	-0.06	-0.17	-0.01
			Max. Vx	20	0.09	-0.02	-0.24
			Max Tension	16	4.20	0.00	0.00
			Max. Compression	16	-4.23	0.00	0.00
			Max. Mx	27	1.11	0.10	-0.01
			Max. My	36	0.74	0.09	-0.01
T5	60 - 40	Leg	Max. Vy	37	0.06	0.09	-0.01
			Max. Vx	36	0.00	0.00	0.00
			Max Tension	15	90.59	-0.20	-0.02
			Max. Compression	2	-108.81	0.32	0.03
			Max. Mx	33	2.17	-0.55	-0.01
			Max. My	20	-8.07	-0.02	-0.27
		Diagonal	Max. Vy	33	0.15	-0.55	-0.01
			Max. Vx	3	0.09	-0.11	0.16
			Max Tension	16	4.54	0.00	0.00
			Max. Compression	16	-4.56	0.00	0.00
			Max. Mx	27	1.08	0.13	-0.01
			Max. My	28	-0.87	0.10	0.02
T6	40 - 20	Leg	Max. Vy	37	0.08	0.12	-0.02
			Max. Vx	28	-0.00	0.00	0.00
			Max Tension	15	106.72	-0.33	-0.04
			Max. Compression	2	-128.21	0.54	0.04
			Max. Mx	33	2.92	-0.91	-0.01
			Max. My	20	-9.76	-0.05	-0.64
		Diagonal	Max. Vy	33	0.17	-0.91	-0.01
			Max. Vx	20	-0.15	-0.05	-0.64
			Max Tension	16	5.35	0.00	0.00
			Max. Compression	2	-5.54	0.00	0.00
			Max. Mx	37	0.53	0.17	-0.02
			Max. My	36	1.81	0.15	-0.02
T7	20 - 0	Leg	Max. Vy	37	0.09	0.16	0.02
			Max. Vx	36	0.00	0.00	0.00
			Max Tension	15	128.06	0.60	0.04
			Max. Compression	2	-128.21	0.54	0.04

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	2	-154.03	0.00	-0.00
			Max. Mx	33	5.73	-0.91	-0.01
			Max. My	24	-10.16	-0.06	0.91
			Max. Vy	2	-7.88	0.00	-0.00
			Max. Vx	8	-2.39	0.00	0.00
		Diagonal	Max Tension	16	5.60	0.00	0.00
			Max. Compression	2	-5.92	0.00	0.00
			Max. Mx	37	0.17	0.22	-0.02
			Max. My	36	2.13	0.17	-0.03
			Max. Vy	37	0.09	0.22	-0.02
			Max. Vx	36	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	140.83	13.07	-8.03
	Max. H _x	18	140.83	13.07	-8.03
	Max. H _z	5	-106.44	-9.81	7.17
	Min. Vert	7	-116.23	-11.17	6.89
	Min. H _x	7	-116.23	-11.17	6.89
	Min. H _z	18	140.83	13.07	-8.03
Leg B	Max. Vert	10	144.23	-13.71	-8.30
	Max. H _x	23	-121.65	11.83	7.20
	Max. H _z	23	-121.65	11.83	7.20
	Min. Vert	23	-121.65	11.83	7.20
	Min. H _x	10	144.23	-13.71	-8.30
	Min. H _z	10	144.23	-13.71	-8.30
Leg A	Max. Vert	2	153.32	-0.54	16.74
	Max. H _x	21	8.86	2.37	0.63
	Max. H _z	2	153.32	-0.54	16.74
	Min. Vert	15	-127.44	0.52	-14.50
	Min. H _x	8	11.15	-2.39	0.79
	Min. H _z	15	-127.44	0.52	-14.50

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	26.39	-0.00	-0.00	-11.87	9.03	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	31.66	-0.04	-26.99	-2320.87	15.45	-17.15
0.9 Dead+1.0 Wind 0 deg - No Ice	23.75	-0.04	-26.99	-2317.31	12.74	-17.15
1.2 Dead+1.0 Wind 30 deg - No Ice	31.66	12.35	-21.47	-1880.66	-1060.15	-12.59
0.9 Dead+1.0 Wind 30 deg - No Ice	23.75	12.35	-21.47	-1877.10	-1062.86	-12.59
1.2 Dead+1.0 Wind 60 deg - No Ice	31.66	20.06	-11.59	-1025.12	-1737.87	-12.98
0.9 Dead+1.0 Wind 60 deg - No Ice	23.75	20.06	-11.59	-1021.56	-1740.58	-12.98
1.2 Dead+1.0 Wind 90 deg - No Ice	31.66	23.65	0.04	-9.63	-2023.90	-18.99
0.9 Dead+1.0 Wind 90 deg - No Ice	23.75	23.65	0.04	-6.07	-2026.61	-18.99
1.2 Dead+1.0 Wind 120 deg - No Ice	31.66	22.38	12.97	1085.45	-1882.47	-10.66
0.9 Dead+1.0 Wind 120 deg	23.75	22.38	12.97	1089.01	-1885.18	-10.66

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
- No Ice						
1.2 Dead+1.0 Wind 150 deg	31.66	12.91	22.37	1901.52	-1093.96	9.13
- No Ice						
0.9 Dead+1.0 Wind 150 deg	23.75	12.91	22.37	1905.08	-1096.67	9.13
- No Ice						
1.2 Dead+1.0 Wind 180 deg	31.66	0.04	25.55	2196.76	6.23	17.15
- No Ice						
0.9 Dead+1.0 Wind 180 deg	23.75	0.04	25.55	2200.32	3.52	17.15
- No Ice						
1.2 Dead+1.0 Wind 210 deg	31.66	-12.35	21.47	1852.18	1081.83	12.59
- No Ice						
0.9 Dead+1.0 Wind 210 deg	23.75	-12.35	21.47	1855.74	1079.12	12.59
- No Ice						
1.2 Dead+1.0 Wind 240 deg	31.66	-21.30	12.31	1044.45	1842.37	12.98
- No Ice						
0.9 Dead+1.0 Wind 240 deg	23.75	-21.30	12.31	1048.01	1839.66	12.98
- No Ice						
1.2 Dead+1.0 Wind 270 deg	31.66	-23.65	-0.04	-18.85	2045.58	18.99
- No Ice						
0.9 Dead+1.0 Wind 270 deg	23.75	-23.65	-0.04	-15.29	2042.87	18.99
- No Ice						
1.2 Dead+1.0 Wind 300 deg	31.66	-21.13	-12.25	-1066.12	1821.34	10.66
- No Ice						
0.9 Dead+1.0 Wind 300 deg	23.75	-21.13	-12.25	-1062.56	1818.63	10.66
- No Ice						
1.2 Dead+1.0 Wind 330 deg	31.66	-12.91	-22.37	-1930.00	1115.64	-9.13
- No Ice						
0.9 Dead+1.0 Wind 330 deg	23.75	-12.91	-22.37	-1926.44	1112.93	-9.13
- No Ice						
1.2 Dead+1.0 Ice+1.0 Temp	95.20	-0.00	-0.00	-42.61	41.85	0.00
1.2 Dead+1.0 Wind 0	95.20	-0.01	-7.65	-712.22	42.73	-4.39
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 30	95.20	3.67	-6.38	-605.31	-281.78	-4.49
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 60	95.20	6.18	-3.57	-358.35	-504.64	-4.88
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 90	95.20	7.18	0.01	-41.73	-588.75	-5.18
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 120	95.20	6.47	3.75	283.86	-521.46	-2.61
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 150	95.20	3.75	6.50	526.38	-286.42	1.89
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 180	95.20	0.01	7.46	614.84	40.98	4.39
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	95.20	-3.67	6.38	520.10	365.49	4.49
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	95.20	-6.35	3.67	279.23	598.89	4.88
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 270	95.20	-7.18	-0.01	-43.48	672.46	5.18
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	95.20	-6.31	-3.65	-362.99	594.63	2.61
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	95.20	-3.75	-6.50	-611.59	370.13	-1.89
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	26.39	-0.01	-6.57	-571.76	10.15	-4.16
Dead+Wind 30 deg - Service	26.39	3.00	-5.23	-464.93	-250.94	-3.05
Dead+Wind 60 deg - Service	26.39	4.88	-2.82	-257.27	-415.48	-3.15
Dead+Wind 90 deg - Service	26.39	5.76	0.01	-10.75	-484.91	-4.61
Dead+Wind 120 deg - Service	26.39	5.44	3.16	255.07	-450.55	-2.59
Dead+Wind 150 deg - Service	26.39	3.14	5.44	453.16	-259.14	2.21
Dead+Wind 180 deg - Service	26.39	0.01	6.22	524.83	7.92	4.16
Dead+Wind 210 deg - Service	26.39	-3.00	5.23	441.20	269.01	3.05
Dead+Wind 240 deg - Service	26.39	-5.18	3.00	245.13	453.63	3.15
Dead+Wind 270 deg -	26.39	-5.76	-0.01	-12.99	502.98	4.61

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Service						
Dead+Wind 300 deg -	26.39	-5.14	-2.98	-267.21	448.53	2.59
Service						
Dead+Wind 330 deg -	26.39	-3.14	-5.44	-476.90	277.21	-2.21
Service						

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-26.39	0.00	0.00	26.39	0.00	0.000%
2	-0.04	-31.66	-26.99	0.04	31.66	26.99	0.000%
3	-0.04	-23.75	-26.99	0.04	23.75	26.99	0.000%
4	12.35	-31.66	-21.47	-12.35	31.66	21.47	0.000%
5	12.35	-23.75	-21.47	-12.35	23.75	21.47	0.000%
6	20.06	-31.66	-11.59	-20.06	31.66	11.59	0.000%
7	20.06	-23.75	-11.59	-20.06	23.75	11.59	0.000%
8	23.65	-31.66	0.04	-23.65	31.66	-0.04	0.000%
9	23.65	-23.75	0.04	-23.65	23.75	-0.04	0.000%
10	22.38	-31.66	12.97	-22.38	31.66	-12.97	0.000%
11	22.38	-23.75	12.97	-22.38	23.75	-12.97	0.000%
12	12.91	-31.66	22.37	-12.91	31.66	-22.37	0.000%
13	12.91	-23.75	22.37	-12.91	23.75	-22.37	0.000%
14	0.04	-31.66	25.55	-0.04	31.66	-25.55	0.000%
15	0.04	-23.75	25.55	-0.04	23.75	-25.55	0.000%
16	-12.35	-31.66	21.47	12.35	31.66	-21.47	0.000%
17	-12.35	-23.75	21.47	12.35	23.75	-21.47	0.000%
18	-21.30	-31.66	12.31	21.30	31.66	-12.31	0.000%
19	-21.30	-23.75	12.31	21.30	23.75	-12.31	0.000%
20	-23.65	-31.66	-0.04	23.65	31.66	0.04	0.000%
21	-23.65	-23.75	-0.04	23.65	23.75	0.04	0.000%
22	-21.13	-31.66	-12.25	21.13	31.66	12.25	0.000%
23	-21.13	-23.75	-12.25	21.13	23.75	12.25	0.000%
24	-12.91	-31.66	-22.37	12.91	31.66	22.37	0.000%
25	-12.91	-23.75	-22.37	12.91	23.75	22.37	0.000%
26	0.00	-95.20	0.00	0.00	95.20	0.00	0.000%
27	-0.01	-95.20	-7.65	0.01	95.20	7.65	0.000%
28	3.67	-95.20	-6.38	-3.67	95.20	6.38	0.000%
29	6.18	-95.20	-3.57	-6.18	95.20	3.57	0.000%
30	7.18	-95.20	0.01	-7.18	95.20	-0.01	0.000%
31	6.47	-95.20	3.75	-6.47	95.20	-3.75	0.000%
32	3.75	-95.20	6.50	-3.75	95.20	-6.50	0.000%
33	0.01	-95.20	7.46	-0.01	95.20	-7.46	0.000%
34	-3.67	-95.20	6.38	3.67	95.20	-6.38	0.000%
35	-6.35	-95.20	3.67	6.35	95.20	-3.67	0.000%
36	-7.18	-95.20	-0.01	7.18	95.20	0.01	0.000%
37	-6.31	-95.20	-3.65	6.31	95.20	3.65	0.000%
38	-3.75	-95.20	-6.50	3.75	95.20	6.50	0.000%
39	-0.01	-26.39	-6.57	0.01	26.39	6.57	0.000%
40	3.00	-26.39	-5.23	-3.00	26.39	5.23	0.000%
41	4.88	-26.39	-2.82	-4.88	26.39	2.82	0.000%
42	5.76	-26.39	0.01	-5.76	26.39	-0.01	0.000%
43	5.44	-26.39	3.16	-5.44	26.39	-3.16	0.000%
44	3.14	-26.39	5.44	-3.14	26.39	-5.44	0.000%
45	0.01	-26.39	6.22	-0.01	26.39	-6.22	0.000%
46	-3.00	-26.39	5.23	3.00	26.39	-5.23	0.000%
47	-5.18	-26.39	3.00	5.18	26.39	-3.00	0.000%
48	-5.76	-26.39	-0.01	5.76	26.39	0.01	0.000%
49	-5.14	-26.39	-2.98	5.14	26.39	2.98	0.000%
50	-3.14	-26.39	-5.44	3.14	26.39	5.44	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	2.53	39	0.161	0.017
T2	120 - 100	1.86	39	0.146	0.016
T3	100 - 80	1.27	39	0.121	0.013
T4	80 - 60	0.80	39	0.093	0.010
T5	60 - 40	0.45	39	0.065	0.007
T6	40 - 20	0.21	39	0.040	0.005
T7	20 - 0	0.06	39	0.020	0.002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
137.00	LNx-8513DS-A1M w/ Mount Pipe	39	2.43	0.159	0.017	194507
124.00	NNVV-65B-R4 w/ Mount Pipe	39	1.99	0.150	0.017	60807
114.00	MX08FRO665-21 w/ Mount Pipe	39	1.67	0.140	0.016	47478
101.00	RR90-17-00DP w/ Mount Pipe	39	1.30	0.123	0.014	43795
60.00	GPS_A	39	0.45	0.065	0.007	41840
50.00	GPS_A	39	0.31	0.052	0.006	47918

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	10.31	2	0.659	0.072
T2	120 - 100	7.58	2	0.597	0.068
T3	100 - 80	5.19	2	0.494	0.055
T4	80 - 60	3.25	2	0.378	0.042
T5	60 - 40	1.82	2	0.265	0.029
T6	40 - 20	0.84	2	0.161	0.019
T7	20 - 0	0.24	2	0.082	0.008

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
137.00	LNx-8513DS-A1M w/ Mount Pipe	2	9.89	0.651	0.071	47544
124.00	NNVV-65B-R4 w/ Mount Pipe	2	8.11	0.613	0.069	14863
114.00	MX08FRO665-21 w/ Mount Pipe	2	6.82	0.570	0.065	11466
101.00	RR90-17-00DP w/ Mount Pipe	2	5.30	0.500	0.056	10642
60.00	GPS_A	2	1.82	0.265	0.029	10289
50.00	GPS_A	2	1.28	0.210	0.024	11793

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria
T1	140	Leg	A325N	0.63	4	2.79	20.34	0.137	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	2.77	5.71	0.486	1.05	Member Block Shear
		Top Girt	A325N	0.50	1	0.36	4.13	0.087	1.05	Member Bearing
T2	120	Leg	A325N	0.75	4	7.97	30.10	0.265	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	3.11	5.71	0.545	1.05	Member Block Shear
		Top Girt	A325N	0.50	1	0.71	4.13	0.172	1.05	Member Bearing
T3	100	Leg	A325N	0.88	4	13.15	41.56	0.317	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	3.93	6.20	0.633	1.05	Member Bearing
T4	80	Leg	A325N	0.88	4	18.09	41.56	0.435	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	4.20	6.20	0.677	1.05	Member Bearing
T5	60	Leg	A325N	1.00	4	22.65	54.52	0.415	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	4.54	6.20	0.732	1.05	Member Bearing
T6	40	Leg	A325N	1.00	4	26.68	54.52	0.489	1.05	Bolt Tension
		Diagonal	A325N	0.63	1	5.35	7.83	0.684	1.05	Member Bearing
T7	20	Diagonal	A325N	0.63	1	5.60	11.70	0.479	1.05	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	ROHN 2 STD	20.00	4.00	61.0 K=1.00	1.07	-16.53	36.84	0.449 ¹
T2	120 - 100	ROHN 2.5 EH	20.03	5.01	65.0 K=1.00	2.25	-40.90	74.43	0.550 ¹
T3	100 - 80	ROHN 3 EH	20.03	6.68	70.5 K=1.00	3.02	-64.36	94.34	0.682 ¹
T4	80 - 60	ROHN 3.5 EH	20.03	6.68	61.3 K=1.00	3.68	-87.16	125.73	0.693 ¹
T5	60 - 40	ROHN 4 X-STR	20.04	6.68	54.3 K=1.00	4.41	-108.81	159.90	0.680 ¹
T6	40 - 20	ROHN 5 EH	20.03	10.02	65.4 K=1.00	6.11	-128.21	201.25	0.637 ¹
T7	20 - 0	ROHN 5 X-STR	20.03	9.97	65.1 K=1.00	6.11	-148.38	201.77	0.735 ¹

¹ P_u / φP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L1 3/4x1 3/4x3/16	7.68	3.62	126.6 K=1.00	0.62	-2.89	11.09	0.261 ¹

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T2	120 - 100	L1 3/4x1 3/4x3/16	9.73	4.77	166.7 K=1.00	0.62	-3.09	6.40	0.484 ¹
T3	100 - 80	L2x2x3/16	12.27	6.06	184.5 K=1.00	0.71	-3.97	6.01	0.661 ¹
T4	80 - 60	L2 1/2x2 1/2x3/16	14.02	6.91	167.6 K=1.00	0.90	-4.23	9.20	0.460 ¹
T5	60 - 40	L3x3x3/16	15.89	7.83	157.6 K=1.00	1.09	-4.56	12.56	0.363 ¹
T6	40 - 20	L3x3x3/16	19.10	9.45	190.3 K=1.00	1.09	-5.54	8.61	0.643 ¹
T7	20 - 0	L3x3x1/4	20.80	10.30	208.8 K=1.00	1.44	-5.92	9.45	0.627 ¹
KL/R > 200 (C) - 152									

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 K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L2x2x1/8	6.52	6.11	184.6 K=1.00	0.48	-0.33	4.07	0.081 ¹
T2	120 - 100	L2x2x1/8	6.56	6.11	184.6 K=1.00	0.48	-0.71	4.07	0.174 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 K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	ROHN 2 STD	20.00	4.00	61.0	1.07	11.17	48.35	0.231 ¹
T2	120 - 100	ROHN 2.5 EH	20.03	5.01	65.0	2.25	31.89	101.41	0.314 ¹
T3	100 - 80	ROHN 3 EH	20.03	6.68	70.5	3.02	52.61	135.72	0.388 ¹
T4	80 - 60	ROHN 3.5 EH	20.03	6.68	61.3	3.68	72.36	165.53	0.437 ¹
T5	60 - 40	ROHN 4 X-STR	20.04	6.68	54.3	4.41	90.59	198.34	0.457 ¹
T6	40 - 20	ROHN 5 EH	20.03	10.02	65.4	6.11	106.72	275.04	0.388 ¹
T7	20 - 0	ROHN 5 X-STR	20.03	0.08	0.5	6.11	128.06	275.04	0.466 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 K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L1 3/4x1 3/4x3/16	7.68	3.62	83.3	0.38	2.77	16.44	0.169 ¹
T2	120 - 100	L1 3/4x1 3/4x3/16	9.73	4.77	109.0	0.38	3.11	16.44	0.189 ¹
T3	100 - 80	L2x2x3/16	11.71	5.78	114.5	0.45	3.93	19.50	0.201 ¹

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T4	80 - 60	L2 1/2x2 1/2x3/16	14.02	6.91	108.2	0.59	4.20	25.60	0.164 ¹
T5	60 - 40	L3x3x3/16	15.89	7.83	101.3	0.73	4.54	31.74	0.143 ¹
T6	40 - 20	L3x3x3/16	19.10	9.45	122.3	0.71	5.35	30.97	0.173 ¹
T7	20 - 0	L3x3x1/4	20.80	10.30	134.5	0.94	5.60	45.79	0.122 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Tension)

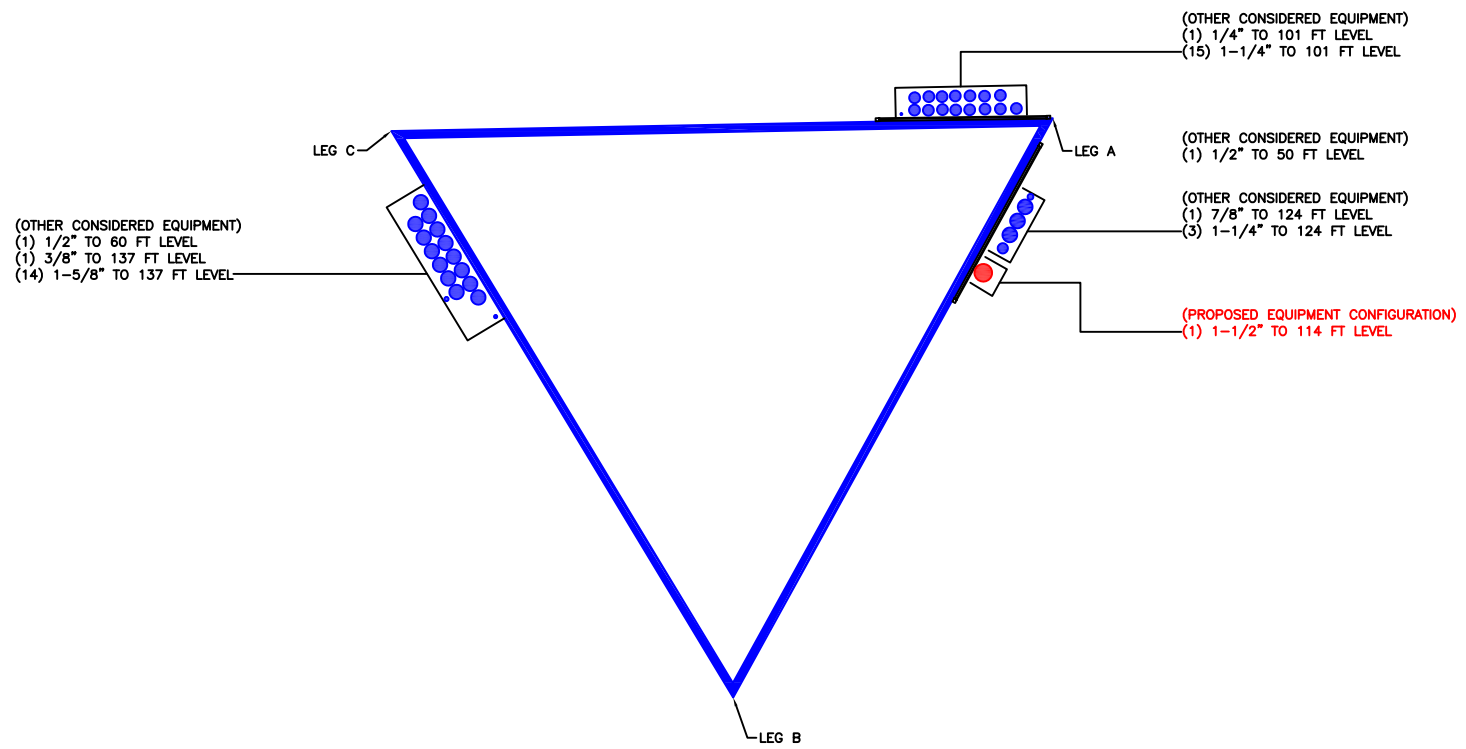
Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L2x2x1/8	6.52	6.11	121.2	0.30	0.36	13.25	0.027 ¹
T2	120 - 100	L2x2x1/8	6.56	6.11	121.2	0.30	0.71	13.25	0.054 ¹

¹ P_u / φP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP _{allow} K	% Capacity	Pass Fail
T1	140 - 120	Leg	ROHN 2 STD	3	-16.53	38.68	42.7	Pass
T2	120 - 100	Leg	ROHN 2.5 EH	39	-40.90	78.15	52.3	Pass
T3	100 - 80	Leg	ROHN 3 EH	69	-64.36	99.06	65.0	Pass
T4	80 - 60	Leg	ROHN 3.5 EH	90	-87.16	132.01	66.0	Pass
T5	60 - 40	Leg	ROHN 4 X-STR	111	-108.81	167.90	64.8	Pass
T6	40 - 20	Leg	ROHN 5 EH	132	-128.21	211.31	60.7	Pass
T7	20 - 0	Leg	ROHN 5 X-STR	147	-148.38	211.86	70.0	Pass
T1	140 - 120	Diagonal	L1 3/4x1 3/4x3/16	12	-2.89	11.65	24.8	Pass
T2	120 - 100	Diagonal	L1 3/4x1 3/4x3/16	47	-3.09	6.72	46.3 (b) 46.1	Pass
T3	100 - 80	Diagonal	L2x2x3/16	75	-3.97	6.31	51.9 (b) 63.0	Pass
T4	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	96	-4.23	9.65	43.8 64.5 (b)	Pass
T5	60 - 40	Diagonal	L3x3x3/16	117	-4.56	13.19	34.6 69.8 (b)	Pass
T6	40 - 20	Diagonal	L3x3x3/16	137	-5.54	9.05	61.3 65.1 (b)	Pass
T7	20 - 0	Diagonal	L3x3x1/4	152	-5.92	9.92	59.7	Pass
T1	140 - 120	Top Girt	L2x2x1/8	4	-0.33	4.27	7.7 8.3 (b)	Pass
T2	120 - 100	Top Girt	L2x2x1/8	41	-0.71	4.27	16.6	Pass
							Summary	
							Leg (T7)	Pass
							Diagonal (T5)	Pass
							Top Girt (T2)	Pass
							Bolt Checks	Pass
							RATING =	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Self Support Anchor Rod Capacity

Site Info		
BU #	806383	
Site Name	HRT 087 943325	
Order #	556635 Rev 1	

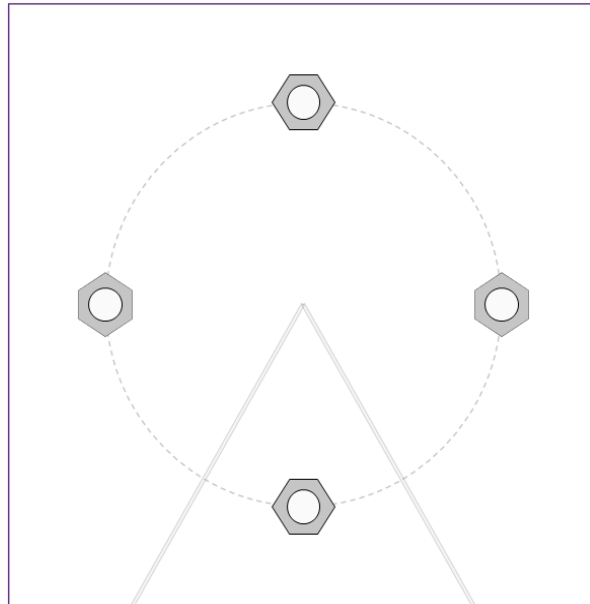
Analysis Considerations		
TIA-222 Revision	H	
Grout Considered:	No	
l_{ar} (in)	0.5	

Applied Loads		
	Comp.	Uplift
Axial Force (kips)	153.32	127.44
Shear Force (kips)	16.75	14.51

*TIA-222-H Section 15.5 Applied

Considered Eccentricity		
Leg Mod Eccentricity (in)	0.000	
Anchor Rod N.A Shift (in)	0.000	
Total Eccentricity (in)	0.000	

*Anchor Rod Eccentricity Applied



Connection Properties		Analysis Results	
Anchor Rod Data		Anchor Rod Summary	
(4) 1" ϕ bolts (A449 N; $F_y=92$ ksi, $F_u=120$ ksi)		(units of kips, kip-in)	
l_{ar} (in): 0.5		$Pu_c = 38.33$	$\phi Pn_c = 65.03$
		$Vu = 4.19$	$\phi Vn = 29.26$
		$Mu = n/a$	$\phi Mn = n/a$
		Stress Rating	
		58.1%	
		Pass	

Pier and Pad Foundation



BU # : 806383
 Site Name: HRT 087 943325
 App. Number: 556635 Rev 1

TIA-222 Revision: H
 Tower Type: Self Support

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

Superstructure Analysis Reactions		
Compression, P_{comp} :	153.32	kips
Compression Shear, V_{u_comp} :	16.75	kips
Uplift, P_{uplift} :	127.44	kips
Uplift Shear, V_{u_uplift} :	14.51	kips
Tower Height, H :	140	ft
Base Face Width, BW :	18.77	ft
BP Dist. Above Fdn, bp_{dist} :	1.75	in

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, $dpier$:	3	ft
Ext. Above Grade, E :	0.5	ft
Pier Rebar Size, Sc :	8	
Pier Rebar Quantity, mc :	16	
Pier Tie/Spiral Size, St :	3	
Pier Tie/Spiral Quantity, mt :	11	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

Pad Properties		
Depth, D :	12.5	ft
Pad Width, W_1 :	7	ft
Pad Thickness, T :	2	ft
Pad Rebar Size (Bottom dir. 2), Sp_2 :	6	
Pad Rebar Quantity (Bottom dir. 2), mp_2 :	8	
Pad Clear Cover, cc_{pad} :	3	in

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

Soil Properties		
Total Soil Unit Weight, γ :	115	pcf
Ultimate Net Bearing, Q_{net} :	16.000	ksf
Cohesion, C_u :		ksf
Friction Angle, ϕ :	35	degrees
SPT Blow Count, N_{blows} :	100	
Base Friction, μ :		
Neglected Depth, N :	3.34	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	N/A	ft

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
Uplift (kips)	234.38	127.44	51.8%	Pass
Lateral (Sliding) (kips)	98.55	14.51	14.0%	Pass
Bearing Pressure (ksf)	13.08	5.01	36.5%	Pass
Pier Flexure (Comp.) (kip*ft)	827.46	184.25	21.2%	Pass
Pier Flexure (Tension) (kip*ft)	623.43	159.61	24.4%	Pass
Pier Compression (kip)	1727.31	167.32	9.2%	Pass
Pad Flexure (kip*ft)	307.01	44.88	13.9%	Pass
Pad Shear - 1-way (kips)	137.16	7.71	5.4%	Pass
Pad Shear - 2-way (Comp) (ksi)	0.164	0.027	15.9%	Pass
Flexural 2-way (Comp) (kip*ft)	614.02	110.55	17.1%	Pass
Pad Shear - 2-way (Uplift) (ksi)	0.164	0.045	26.1%	Pass
Flexural 2-way (Tension) (kip*ft)	614.02	95.77	14.9%	Pass

*Rating per TIA-222-H Section 15.5

Structural Rating*:	26.1%
Soil Rating*:	51.8%

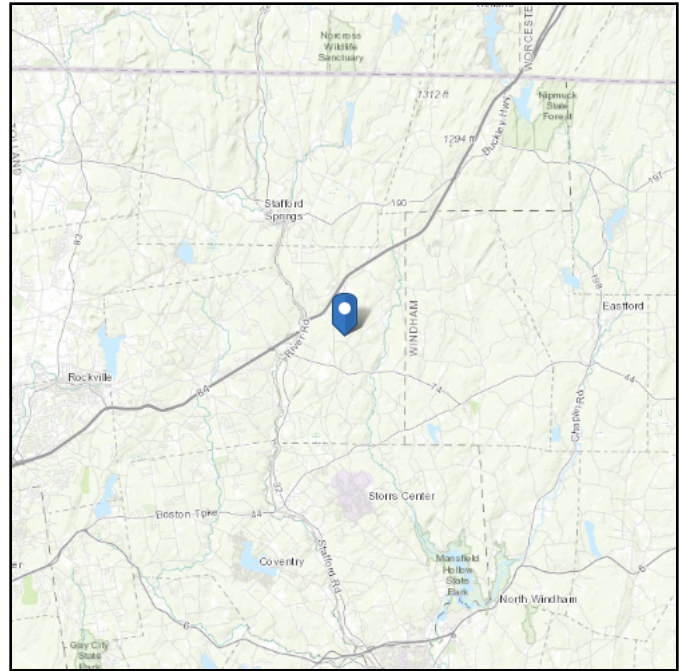
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ASCE 7 Hazards Report

Address:
No Address at This
Location

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

Elevation: 933.47 ft (NAVD 88)
Latitude: 41.892478
Longitude: -72.260597



Wind

Results:

Wind Speed:	125 Vmph
10-year MRI	77 Vmph
25-year MRI	87 Vmph
50-year MRI	95 Vmph
100-year MRI	102 Vmph

Data Sources: ASCE MSF-24-2021 Fig. 26.5-1A and Figs. CC-1–CC-4, and Section 26.5.2, incorporating errata of March 12, 2014

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).

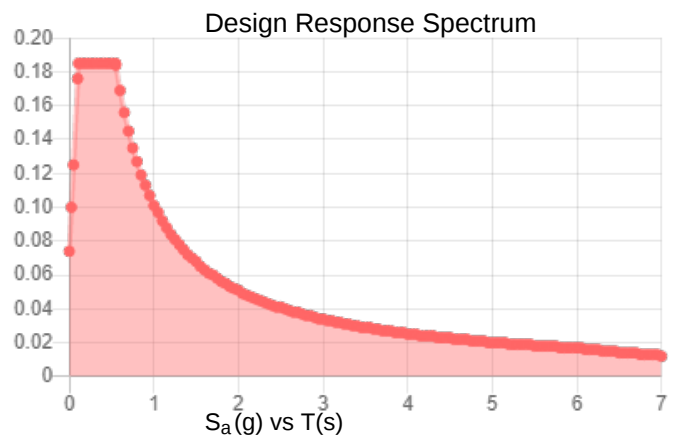
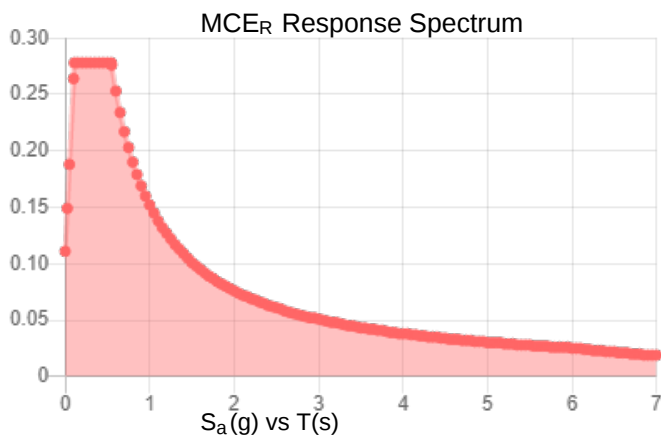
Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Site Soil Class: D - Stiff Soil

Results:

S_S :	0.174	S_{DS} :	0.185
S_1 :	0.063	S_{D1} :	0.101
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.086
S_{MS} :	0.278	PGA_M :	0.138
S_{M1} :	0.152	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B



Data Accessed:

Mon May 24 2021

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: 1.00 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

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

Date Accessed: Mon May 24 2021

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

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 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.

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