



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

Web Site: portal.ct.gov/csc

VIA ELECTRONIC MAIL

February 16, 2022

Denise Sabo
Northeast Site Solutions
420 Main Street, Suite 1
Sturbridge, MA 01566-1359
denise@northeastsitesolutions.com

RE: **PETITION NO. 1477** – Dish Wireless LLC petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for proposed modifications to an existing telecommunications facility located at 441 Homestead Avenue, Hartford, Connecticut.

Dear Ms. Sabo:

The Connecticut Siting Council (Council) requests your responses to the enclosed questions no later than March 2, 2022.

Please submit an original and 15 copies to the Council's office and an electronic copy to siting.council@ct.gov. In accordance with the State Solid Waste Management Plan and in accordance with Section 16-50j-12 of the Regulations of Connecticut State Agencies, the Council requests all filings be submitted on recyclable paper, primarily regular weight white office paper. Please avoid using heavy stock paper, colored paper, and metal or plastic binders and separators. Fewer copies of bulk material may be provided as appropriate.

Please be advised that the original and 15 copies are required to be submitted to the Council's office on or before the March 2, 2022 deadline.

Copies of your responses are required to be provided to all parties and intervenors listed in the service list, which can be found on the Council's website under the "Pending Matters" link.

Any request for an extension of time to submit responses to interrogatories shall be submitted to the Council in writing pursuant to §16-50j-22a of the Regulations of Connecticut State Agencies.

Sincerely,

A handwritten signature in black ink, appearing to read "Melanie Bachman".

Melanie Bachman
Executive Director

MB/MP

Petition No. 1477
DISH Wireless, LLC
441 Homestead Avenue, Hartford
Interrogatories

1. What is the total cost of the proposed project?
\$48,000.00
2. Provide construction work days/hours and duration of construction.
Monday through Friday between 8am-5pm. No more than 5 people will be on site
3. Under Attachment 1 of the Petition, Property Card, the property owner is identified as Talar Properties LLC. Under Attachment 3 of the Petition, Sheet T-1, Title Sheet, the property owner is identified as Global Signal Acquisitions. Submit a revised Sheet T-1.
Construction drawings have been revised
4. Under Attachment 3 of the Petition, Sheet M-1, Abutters' Exhibit, the site is identified on Parcel No. 152181003. However, the site is located on Parcel No. 152181002. Submit a revised Sheet M-1.
Construction drawings have been revised
5. Provide an updated structural analysis that takes into account the approved antenna and other tower mounted loading for Cellco (EM-VER-064-211022) and T-Mobile (EM-T-MOBILE-064-200824), available at:

https://portal.ct.gov/-/media/CSC/2_EMS-medialibrary/Hartford/HomesteadAve/Verizon/em-ver-064-211022_filing_HomesteadAve_Hartford.pdf

and

**Structural analysis
has been revised**

https://portal.ct.gov/-/media/CSC/2_EMS-medialibrary/Hartford/HomesteadAve/T_MOBILE/EM-T-MOBILE-064-200824_filing_HOMESTEAD-AVENUE-HARTFORD-806369-CT11161D.pdf

6. Sheet C-11 has a profile for a fence six feet tall with 1-foot barbed wire on top. Would the proposed fence match the existing compound fence?

Yes - the proposed fence would match the existing compound fence



DISH Wireless L.L.C. SITE ID:

BOBDL00044A

DISH Wireless L.L.C. SITE ADDRESS:

**439-455 HOMESTEAD AVE
HARTFORD, CT 06105**

SCOPE OF WORK	
THIS IS NOT AN ALL INCLUSIVE LIST. CONTRACTOR SHALL UTILIZE SPECIFIED EQUIPMENT PART OR ENGINEER APPROVED EQUIVALENT. CONTRACTOR SHALL VERIFY ALL NEEDED EQUIPMENT TO PROVIDE A FUNCTIONAL SITE. THE PROJECT GENERALLY CONSISTS OF THE FOLLOWING:	
TOWER SCOPE OF WORK:	
<ul style="list-style-type: none"> REMOVE ALL EXISTING ABANDONED EQUIPMENT AT 93'-0" MCL REMOVE EXISTING ANTENNA @ 91'-6" LEVEL INSTALL (3) PROPOSED PANEL ANTENNAS (1 PER SECTOR) INSTALL (1) PROPOSED TOWER PLATFORM MOUNT INSTALL PROPOSED JUMPERS INSTALL (6) PROPOSED RRUs (2 PER SECTOR) INSTALL (1) PROPOSED OVER VOLTAGE PROTECTION DEVICE (OVP) INSTALL (1) PROPOSED HYBRID CABLE 	
GROUND SCOPE OF WORK:	
<ul style="list-style-type: none"> REMOVE EXISTING 4'-11"x3'-3" STEEL PLATFORM INSTALL (1) PROPOSED METAL PLATFORM INSTALL (1) PROPOSED ICE BRIDGE INSTALL (1) PROPOSED PPC CABINET INSTALL (1) PROPOSED EQUIPMENT CABINET INSTALL (1) PROPOSED POWER CONDUIT INSTALL (1) PROPOSED TELCO CONDUIT INSTALL (1) PROPOSED TELCO-FIBER BOX INSTALL (1) PROPOSED GPS UNIT INSTALL (1) PROPOSED FIBER NID (IF REQUIRED) INSTALL FENCE EXPANSION 6'-3" X 9'-4" X 6'-2" 	

SITE INFORMATION	PROJECT DIRECTORY
PROPERTY OWNER: TALAR PROPERTIES LLC ADDRESS: P.O.705 N MOUNTAIN RD NEWINGTON, CT 06111	APPLICANT: DISH Wireless L.L.C. 5701 SOUTH SANTA FE DRIVE LITTLETON, CO 80120
TOWER TYPE: MONOPOLE	TOWER OWNER: CROWN CASTLE 2000 CORPORATE DRIVE CANONSBURG, PA 15317 (877) 486-9377
TOWER CO SITE ID: 806369	SITE DESIGNER: B+T GROUP 1717 S. BOULDER AVE, SUITE 300 TULSA, OK 74119 (918) 587-4630
TOWER APP NUMBER: 556641	SITE ACQUISITION: SARAH PARSONS
COUNTY: HARTFORD	CONSTRUCTION MANAGER: JAVIER SOTO JAVIER.SOTO@DISH.COM
LATITUDE (NAD 83): 41° 47' 01.6" N 41.78378056 N	RF ENGINEER: BOSSENER CHARLES BOSSENER.CHARLES@DISH.COM
LONGITUDE (NAD 83): 72° 42' 13.7" W 72.70379444 W	
ZONING JURISDICTION: CT - CITY OF HARTFORD	
ZONING DISTRICT: CX-1	
PARCEL NUMBER: HTFD-000152-000181-000002	
OCCUPANCY GROUP: U	
CONSTRUCTION TYPE: II-B	
POWER COMPANY: CONNECTICUT LIGHT & POWER	
TELEPHONE COMPANY: LIGHTOWER	



5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120



2000 CORPORATE DRIVE
CANONSBURG, PA 15317



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



B&T ENGINEERING, INC.
PEC.0001564
Expires 2/1/23

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: JJR	CHECKED BY: MTJ	APPROVED BY: MDW
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RFDS REV #: ---

CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
A	6/2/21	ISSUED FOR REVIEW
B	7/2/21	ISSUED FOR REVIEW
D	7/26/21	ISSUED FOR CONSTRUCTION
1	3/4/22	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
89233.006.01

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDL00044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

CONNECTICUT CODE COMPLIANCE

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

CODE TYPE	CODE
BUILDING	2018 CT STATE BUILDING CODE/2015 IBC W/ CT AMENDMENTS
MECHANICAL	2018 CT STATE BUILDING CODE/2015 IMC W/ CT AMENDMENTS
ELECTRICAL	2018 CT STATE BUILDING CODE/2017 NEC W/ CT AMENDMENTS

SHEET INDEX

SHEET NO.	SHEET TITLE
T-1	TITLE SHEET
M-1	ABUTTERS MAP
M-2	ABUTTERS MAP
A-1	OVERALL AND ENLARGED SITE PLAN
A-2	ELEVATION, ANTENNA LAYOUT AND SCHEDULE
A-3	EQUIPMENT PLATFORM AND H-FRAME DETAILS
A-4	EQUIPMENT DETAILS
A-5	EQUIPMENT DETAILS
A-6	EQUIPMENT DETAILS
A-7	FENCE DETAILS
E-1	ELECTRICAL/FIBER ROUTE PLAN AND NOTES
E-2	ELECTRICAL DETAILS
E-3	ELECTRICAL ONE-LINE, FAULT CALCS & PANEL SCHEDULE
G-1	GROUNDING PLANS AND NOTES
G-2	GROUNDING DETAILS
G-3	GROUNDING DETAILS
RF-1	RF CABLE COLOR CODE
GN-1	LEGEND AND ABBREVIATIONS
GN-2	GENERAL NOTES
GN-3	GENERAL NOTES
GN-4	GENERAL NOTES

SITE PHOTO



UNDERGROUND SERVICE ALERT CBYD 811
UTILITY NOTIFICATION CENTER OF CONNECTICUT
(800) 922-4455
WWW.CBYD.COM



CALL 2 WORKING DAYS UTILITY NOTIFICATION PRIOR TO CONSTRUCTION

GENERAL NOTES

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

11"x17" PLOT WILL BE HALF SCALE UNLESS OTHERWISE NOTED

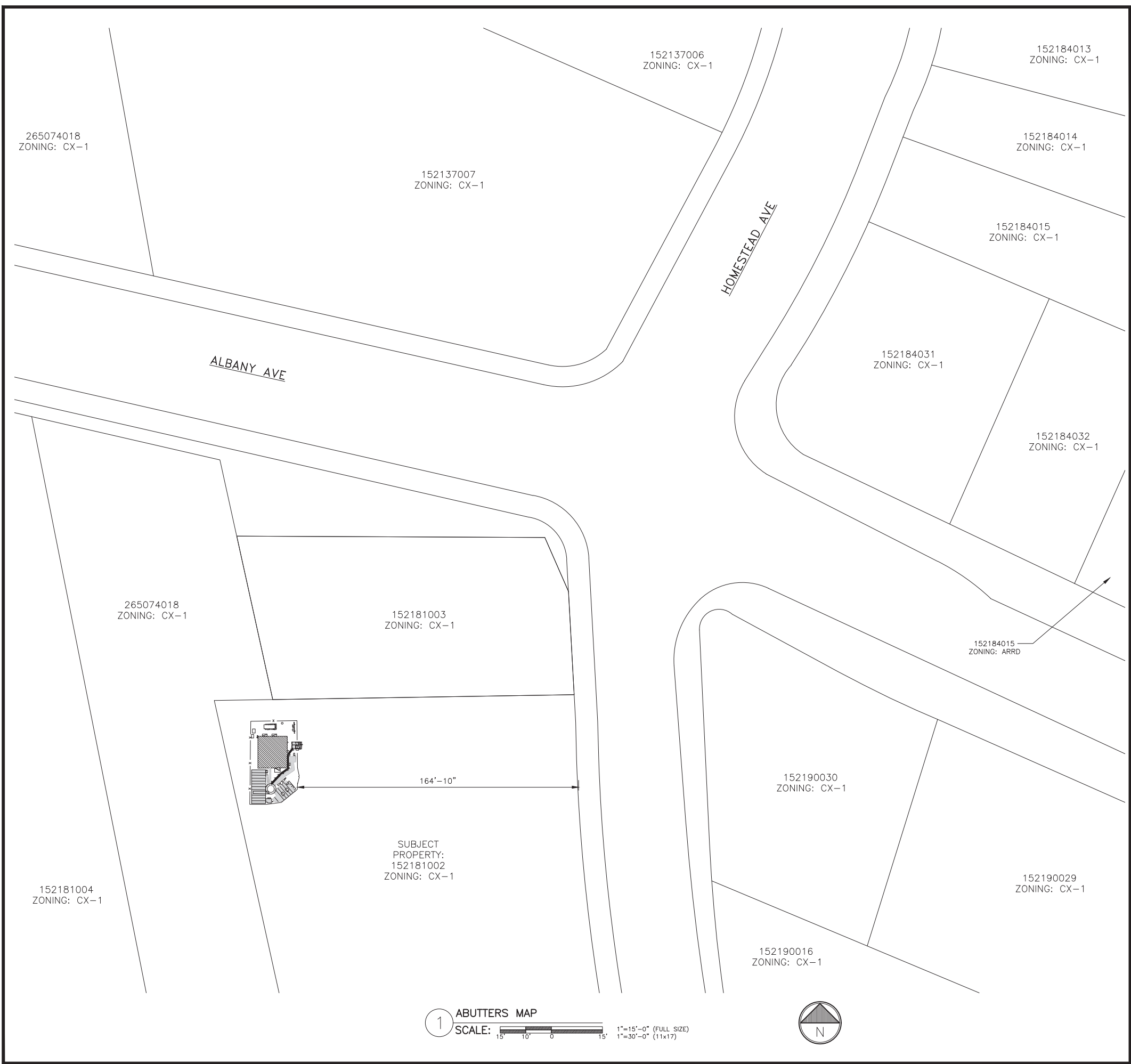
CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE, AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK.

DIRECTIONS

DIRECTIONS FROM BRADLEY INTERNATIONAL AIRPORT:
GET ON I-91 N IN WINDSOR FROM CT-187 N/BLUE HILLS AVE AND CT-218 E 12 MIN (4.5 MI) HEAD NORTH TOWARD WESTBOURNE PKWY 266 FT TURN LEFT ONTO WESTBOURNE PKWY 0.4 MI TURN LEFT ONTO CT-187 N/BLUE HILLS AVE 2.0 MI TURN RIGHT ONTO CT-218 E/COTTAGE GROVE RD CONTINUE TO FOLLOW CT-218 E 1.6 MI TURN LEFT TO MERGE WITH I-91 N TOWARD SPRINGFIELD 0.3 MI CONTINUE ON I-91 N. TAKE CT-20 W TO SCHOEPHOESTER RD IN WINDSOR LOCKS 10 MIN (10.0 MI) MERGE WITH I-91 N 5.3 MI USE THE RIGHT 2 LANES TO TAKE EXIT 40 FOR CT-20 TOWARD BRADLEY INTERNATIONAL AIRPORT 0.6 MI CONTINUE ONTO CT-20 W 2.8 MI CONTINUE ONTO BRADLEY INTERNATIONAL AIRPORT CON 1.3 MI DRIVE TO YOUR DESTINATION 1 MIN (0.4 MI) USE ANY LANE TO TURN SLIGHTLY RIGHT ONTO SCHOEPHOESTER RD 0.2 MI USE THE RIGHT 2 LANES TO TURN SLIGHTLY RIGHT.

VICINITY MAP





SUBJECT PROPERTY
 152181003
 1535 ALBANY AVE
 HARTFORD, CT 06105
 SOCCI JOSEPHINE C TRUSTEE
 1208 MARINE WAY APT A203

152181002
 1441 HOMESTEAD AVE
 HARTFORD, CT 06105
 TALAR PROPERTIES LLC
 705 N MOUNTAIN RD
 HARTFORD, CT 06111

265074018
 450 WINDSOR ST
 HARTFORD, CT 06105
 NATIONAL RAILROAD
 PASSENGER CO
 400 N CAPITOL ST NW
 HARTFORD, CT 06111

152184031
 1510 ALBANY AVE
 HARTFORD, CT 06105
 FAHIM LLC
 1510 ALBANY AVE
 HARTFORD, CT 06105

152184032
 1500 ALBANY AVE
 HARTFORD, CT 06105
 GATEWAY PROFESSIONALS LLC
 40 PRATTLING POND ROAD
 HARTFORD, CT 06032

152184033
 1496 ALBANY AVE
 HARTFORD, CT 06105
 PALMER CECIL
 1496 ALBANY AVE
 HARTFORD, CT 06112

152184015
 14 WESTBOURNE PKWY
 HARTFORD, CT 06105
 RODNEY ANDREW
 206 CORNWALL ST 208
 HARTFORD, CT 06112

152184014
 18 WESTBOURNE PKWY
 HARTFORD, CT 06105
 GRAY FLOYD
 22 WESTBOURNE PKWY
 HARTFORD, CT 06105

152184013
 22 WESTBOURNE PKWY
 HARTFORD, CT 06105
 GRAY FLOYD
 22 WESTBOURNE PKWY
 HARTFORD, CT 06105

152137006
 13 WESTBOURNE PKWY
 HARTFORD, CT 06105
 UNIVERSITY OF HARTFORD
 200 BLOOMFIELD AV
 HARTFORD, CT 06117

152137007
 1530 ALBANY AVE
 HARTFORD, CT 06105
 UNIVERSITY OF HARTFORD
 200 BLOOMFIELD AV
 HARTFORD, CT 06117

265074018
 450 WINDSOR ST
 HARTFORD, CT 06105
 NATIONAL RAILROAD
 PASSENGER CO
 400 N CAPITOL ST NW
 DC 20001-1511

152181004
 1575 ALBANY AVE
 HARTFORD, CT 06105
 CONN LIGHT & POWER CO
 PO BOX 270
 CT, 06141-0270

152190030
 1511 ALBANY AVE
 HARTFORD, CT 06105
 DIMAURO JOSEPH D TRUSTEE
 72 CRYSTAL DR
 HARTFORD, CT 06067

152190016
 450 HOMESTEAD AVE
 HARTFORD, CT 06105
 HARTFORD UNLIMITED
 ENTERPRISES
 85 PATRIOT RD
 CT, 06095-3841

152190029
 1510 ALBANY AVE
 HARTFORD, CT 06105
 HARTFORD UNLIMITED
 ENTERPRISES INC
 85 PATRIOT RD
 CT, 06095-3841

1 ABUTTERS MAP
 SCALE: 1"=15'-0" (FULL SIZE)
 1"=30'-0" (11x17)



5701 SOUTH SANTA FE DRIVE
 LITTLETON, CO 80120



2000 CORPORATE DRIVE
 CANONSBURG, PA 15317



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



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DRAWN BY: JTS CHECKED BY: JTS APPROVED BY: MDW

RFDS REV #: ---

CONSTRUCTION DOCUMENTS

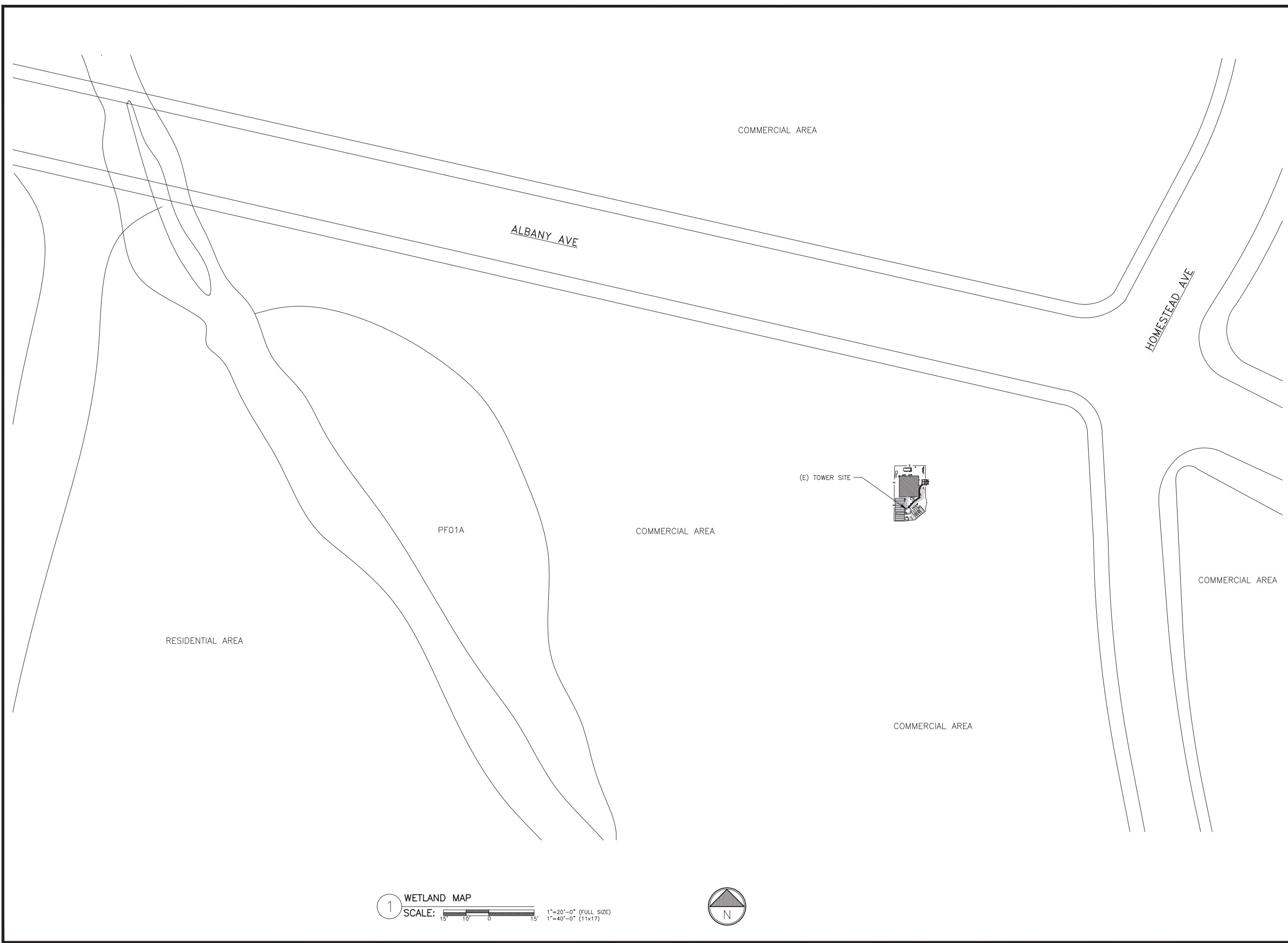
SUBMITTALS		
REV	DATE	DESCRIPTION
0	11/4/21	ISSUED FOR CONSTRUCTION
1	12/3/21	ISSUED FOR CONSTRUCTION
2	3/4/22	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
89233.006.01

DISH Wireless L.L.C.
 PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
ABUTTERS EXHIBIT

SHEET NUMBER
M-1



1 WETLAND MAP
 SCALE: 1"=20'-0" (FULL SIZE)
 1"=40'-0" (11x17)



dish
 wireless.

5701 SOUTH SANTA FE DRIVE
 LITTLETON, CO 80120

CROWN CASTLE

2000 CORPORATE DRIVE
 CANONSBURG, PA 15317

B+T GRP

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DRAWN BY:	CHECKED BY:	APPROVED BY:
JTS	JTS	MDW

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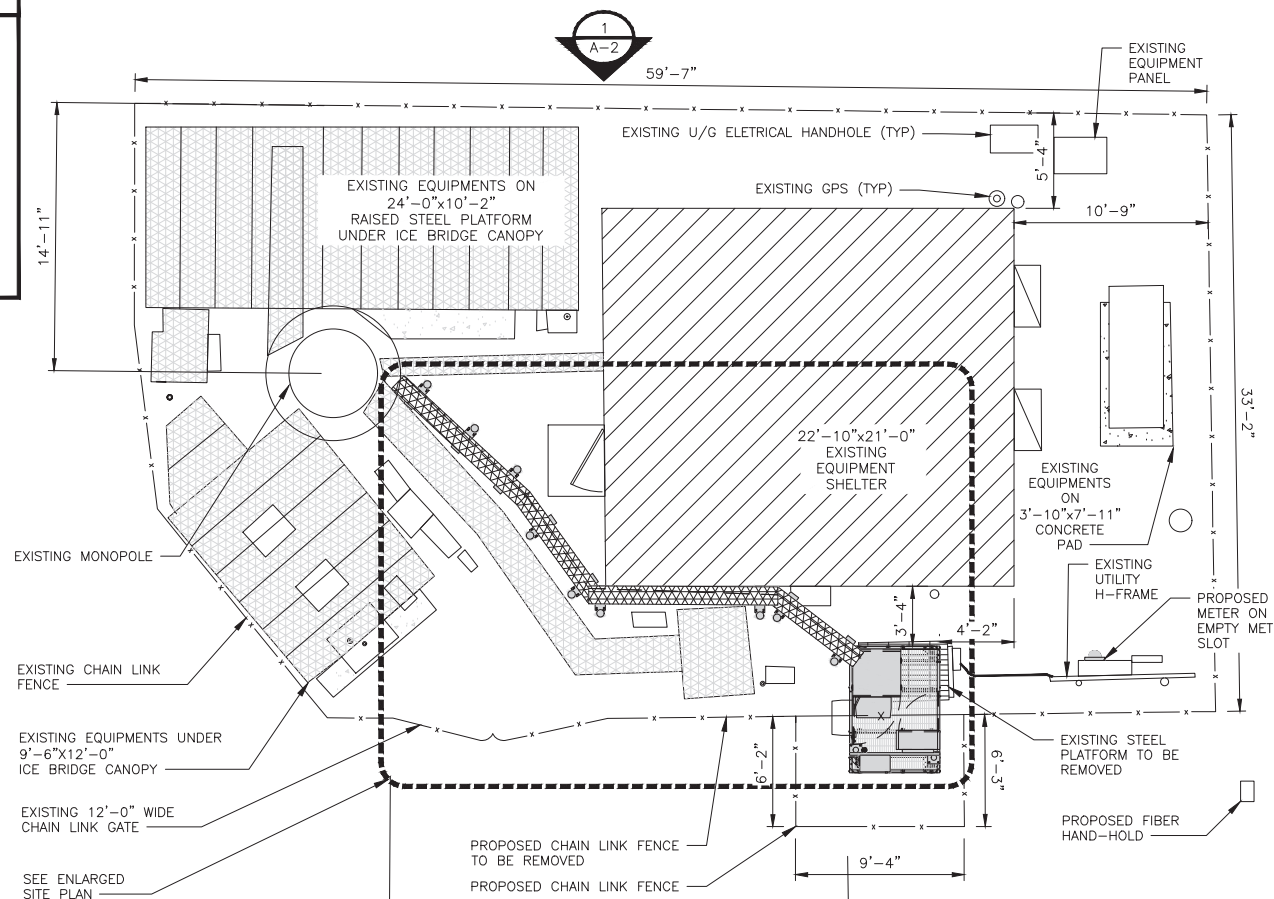
DISH Wireless L.L.C.
 PROJECT INFORMATION
BOBDLOO44A
 439-455 HOMESTEAD AVE
 HARTFORD, CT 06105

SHEET TITLE
WETLAND MAP

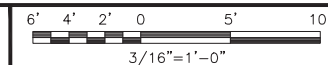
SHEET NUMBER
M-2

NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL PROPOSED UNDERGROUND UTILITY CONDUIT ROUTE.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.
3. THE GROUND LEASE PROVIDES BROAD/BLANKET UTILITY RIGHTS. "PWR" AND "FBR" PATH DEPICTED ON A-1 AND E-1 ARE BASED ON BEST AVAILABLE INFORMATION INCLUDING BUT NOT LIMITED TO FIELD VERIFICATION, PRIOR PROJECT DOCUMENTATION AND OTHER REAL PROPERTY RIGHTS DOCUMENTS. WHEN INSTALLING THE UTILITIES PLEASE LOCATE AND FOLLOW EXISTING PATH. IF EXISTING PATH IS NOT AN OPTION, PLEASE NOTIFY CROWN CASTLE REAL ESTATE AS FURTHER COORDINATION MAY BE NEEDED.



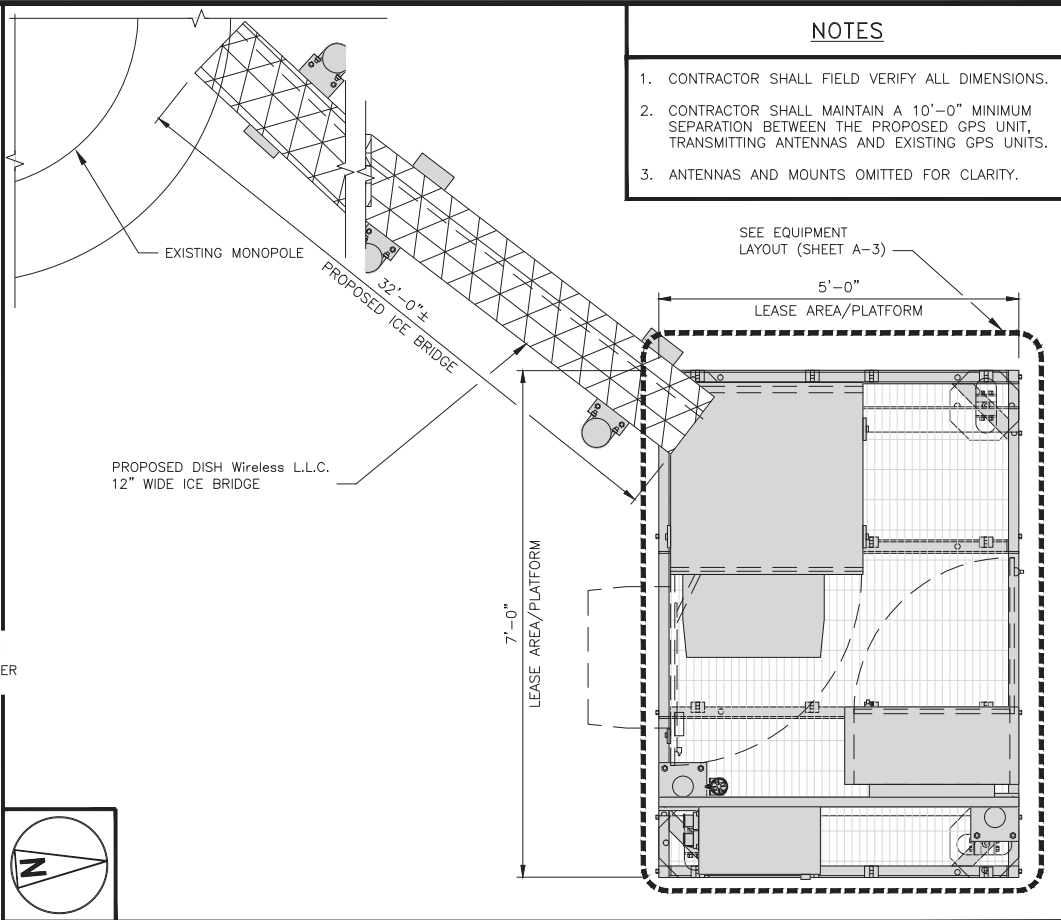
OVERALL SITE PLAN



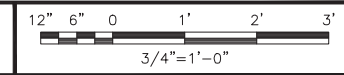
1

NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. CONTRACTOR SHALL MAINTAIN A 10'-0" MINIMUM SEPARATION BETWEEN THE PROPOSED GPS UNIT, TRANSMITTING ANTENNAS AND EXISTING GPS UNITS.
3. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



ENLARGED SITE PLAN



2



UTILITY PLAN

3



5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120



2000 CORPORATE DRIVE
CANONSBURG, PA 15317



1717 S. BOULDER
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PEC.0001564
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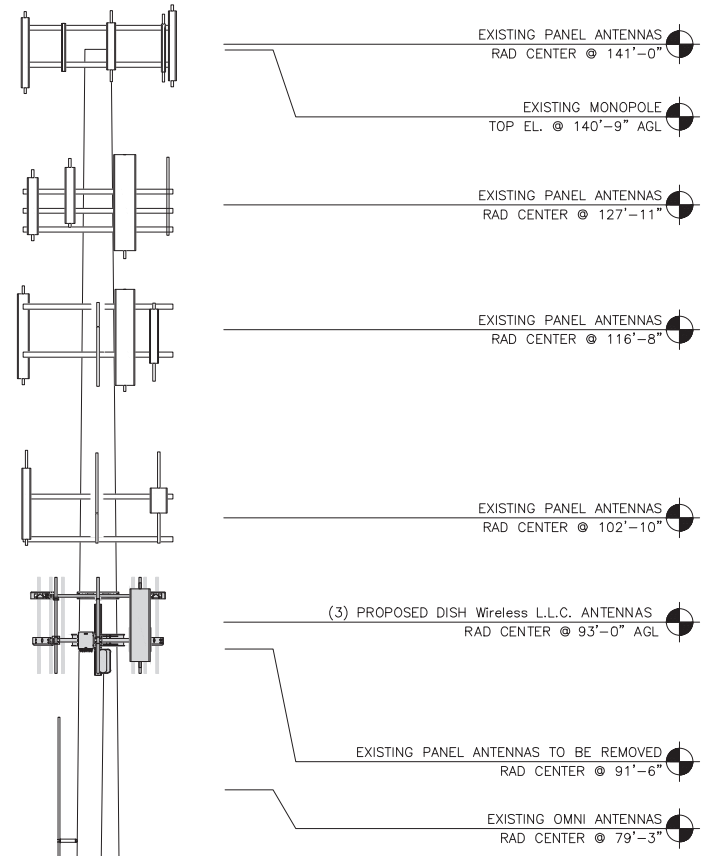
DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
OVERALL AND ENLARGED
SITE PLAN

SHEET NUMBER
A-1

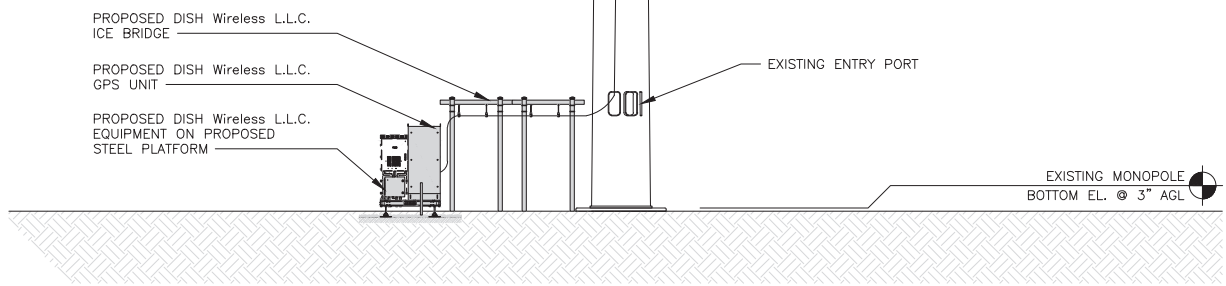
NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNA AND MW DISH SPECIFICATIONS REFER TO ANTENNA SCHEDULE AND TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS
3. EXISTING EQUIPMENT AND FENCE OMITTED FOR CLARITY.

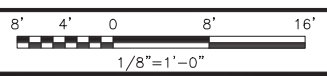


(1) PROPOSED DISH Wireless L.L.C. HYBRID CABLE ROUTED EXTERIOR POLE

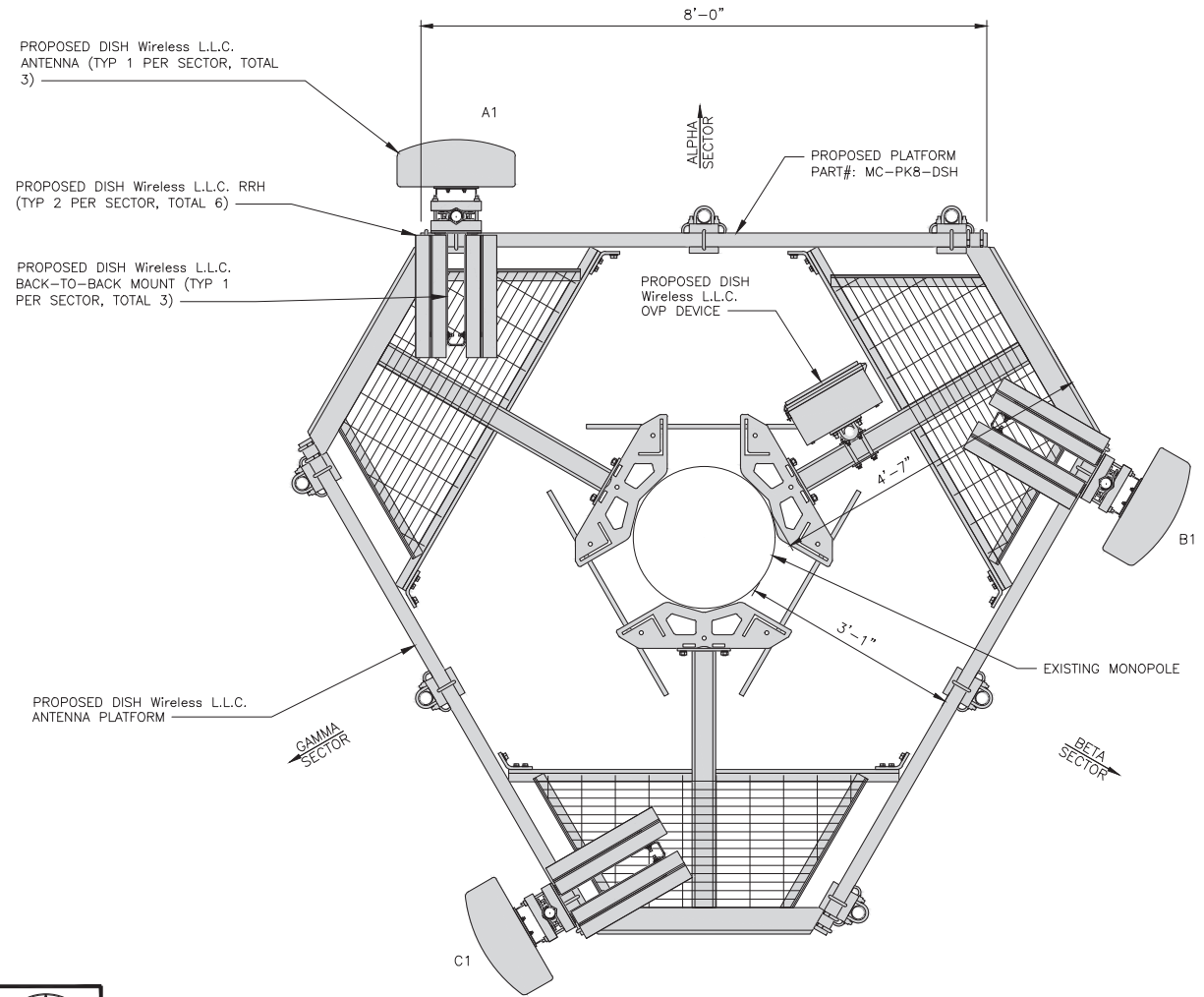
EXISTING MONOPOLE



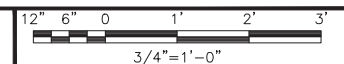
PROPOSED WEST ELEVATION



1



ANTENNA LAYOUT



2

SECTOR	POSITION	ANTENNA						TRANSMISSION CABLE
		EXISTING OR PROPOSED	MANUFACTURER - MODEL NUMBER	TECHNOLOGY	SIZE (HxW)	AZIMUTH	RAD CENTER	FEED LINE TYPE AND LENGTH
ALPHA	A1	PROPOSED	JMA WIRELESS-MX08FR0665-21	5G	72.0" x 20.0"	0°	93'-0"	(1) HIGH-CAPACITY HYBRID CABLE (150' LONG)
BETA	B1	PROPOSED	JMA WIRELESS-MX08FR0665-21	5G	72.0" x 20.0"	120°	93'-0"	
GAMMA	C1	PROPOSED	JMA WIRELESS-MX08FR0665-21	5G	72.0" x 20.0"	240°	93'-0"	

SECTOR	POSITION	RRH		NOTES
		MANUFACTURER - MODEL NUMBER	TECHNOLOGY	
ALPHA	A1	FUJITSU-TA08025-B605	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-B604	5G	
BETA	B1	FUJITSU-TA08025-B605	5G	
	B1	FUJITSU-TA08025-B604	5G	
GAMMA	C1	FUJITSU-TA08025-B605	5G	
	C1	FUJITSU-TA08025-B604	5G	

ANTENNA SCHEDULE

NO SCALE

3



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JJR MTJ MDW

RFDS REV #: ---

CONSTRUCTION DOCUMENTS

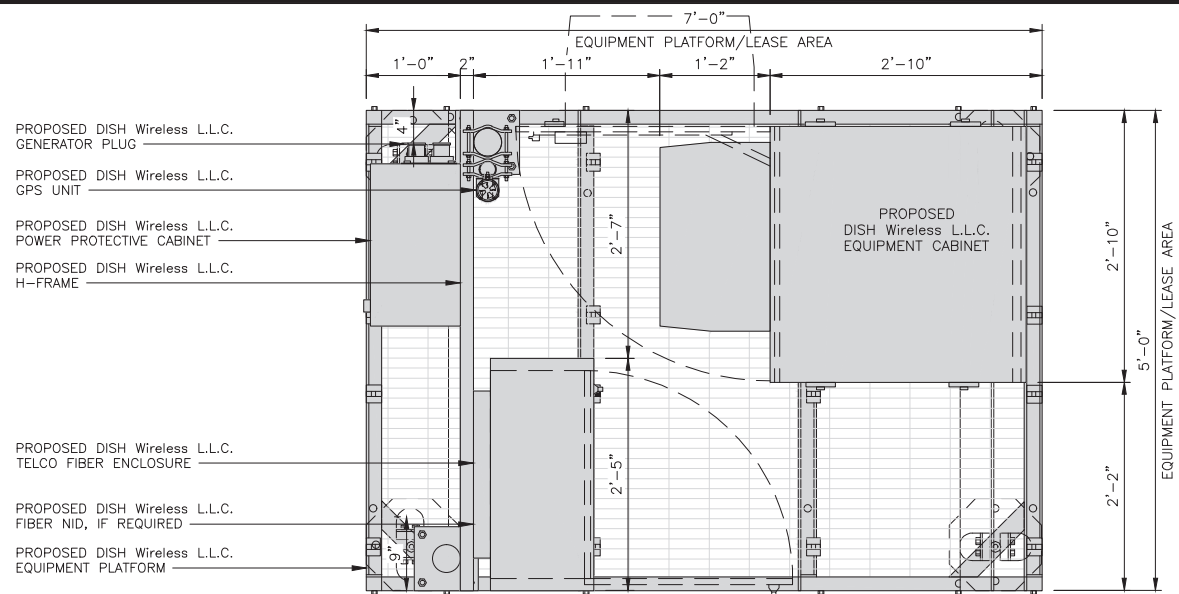
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439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
ELEVATION, ANTENNA
LAYOUT AND SCHEDULE

SHEET NUMBER
A-2



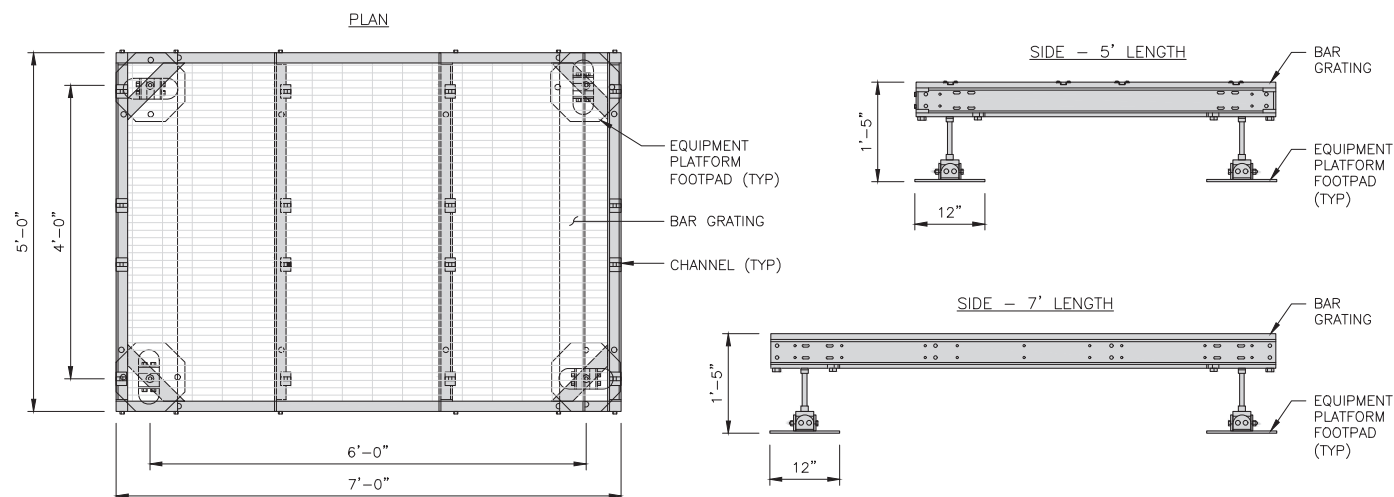
PLATFORM EQUIPMENT PLAN

1

COMMSCOPE MTC4045LP
5X7 PLATFORM

DIMENSIONS (HxWxD)	16"x84"x60"
TOTAL WEIGHT	423 LBS

NOTE:
GC TO PROVIDE EXTENDED
THREAD FOR PLATFORM IF
REQUIRED HEIGHT EXCEEDS 17"



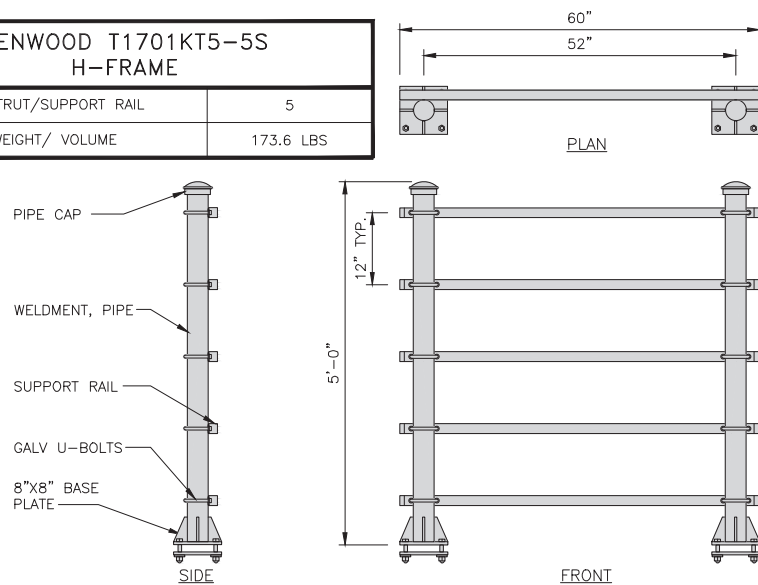
PLATFORM DETAIL

NO SCALE

2

KENWOOD T1701KT5-5S
H-FRAME

UNISTRUT/SUPPORT RAIL	5
WEIGHT/ VOLUME	173.6 LBS



H-FRAME DETAIL

NO SCALE

3

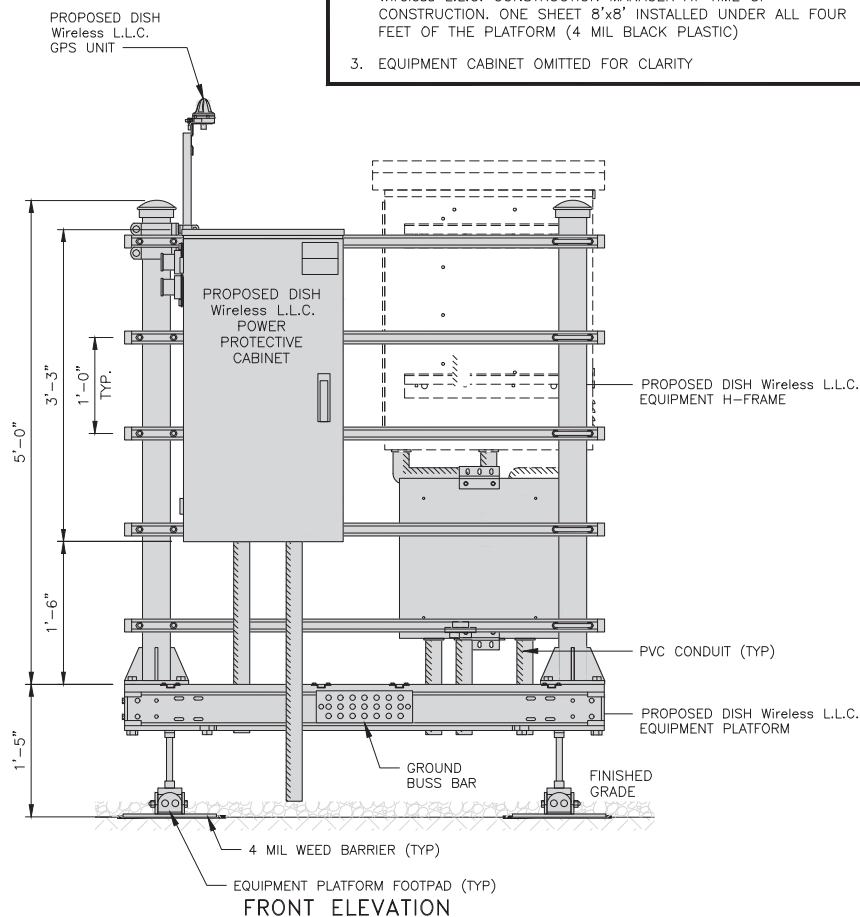
NOT USED

NO SCALE

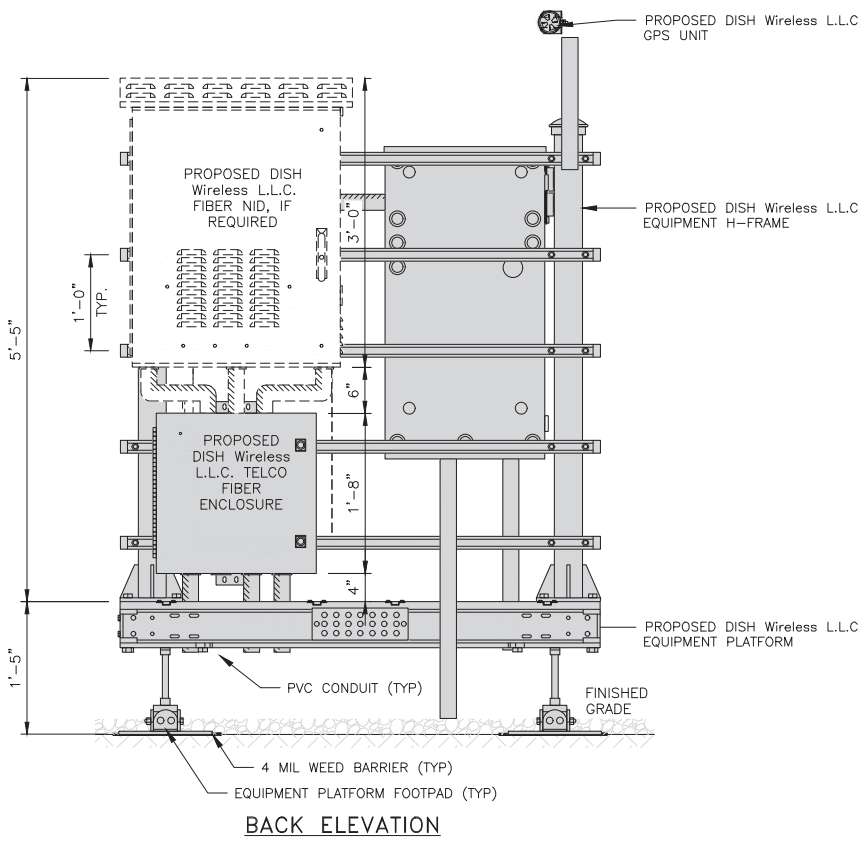
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NOTES

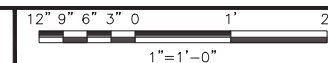
- CONTRACTOR TO BURY PLATFORM FEET WITH A MINIMUM OF 2" OF FILL PER EXISTING SITE SURFACE
- WEED BARRIER FABRIC TO BE ADDED AT DISCRETION OF DISH Wireless L.L.C. CONSTRUCTION MANAGER AT TIME OF CONSTRUCTION. ONE SHEET 8'x8' INSTALLED UNDER ALL FOUR FEET OF THE PLATFORM (4 MIL BLACK PLASTIC)
- EQUIPMENT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



FRONT ELEVATION



BACK ELEVATION



H-FRAME EQUIPMENT ELEVATION

NO SCALE

5



5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120



2000 CORPORATE DRIVE
CANONSBURG, PA 15317



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



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DRAWN BY:	CHECKED BY:	APPROVED BY:
JJR	MTJ	MDW

RFDS REV #:

CONSTRUCTION
DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
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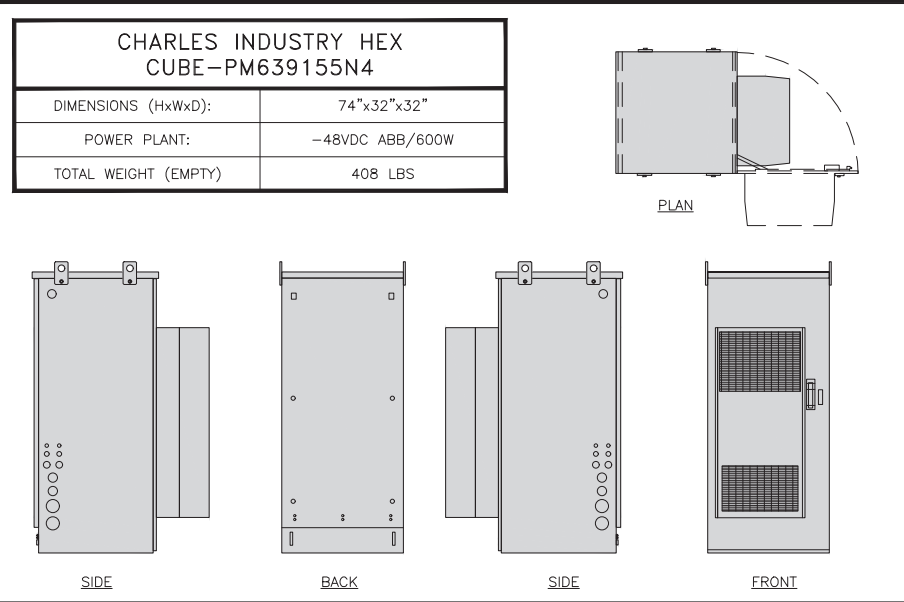
A&E PROJECT NUMBER
89233.006.01

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

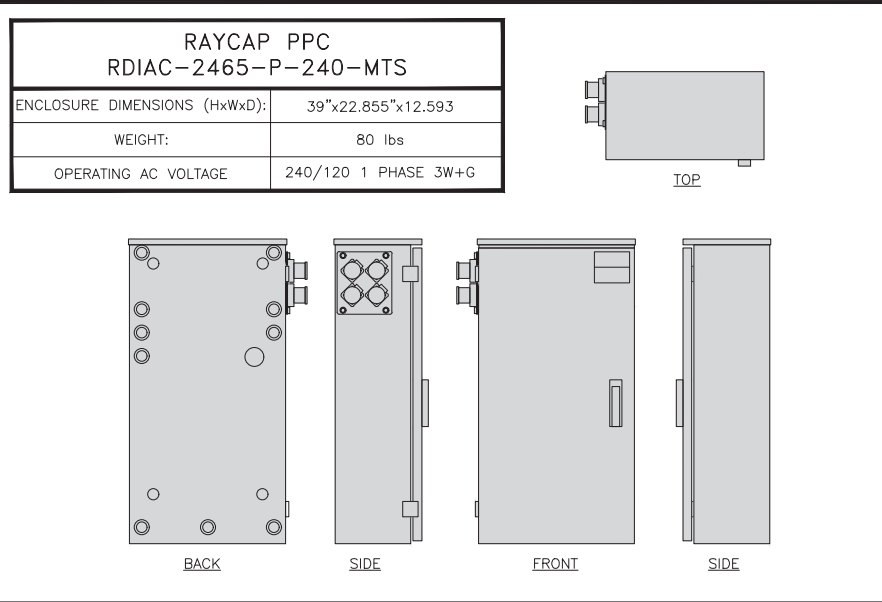
SHEET TITLE
EQUIPMENT PLATFORM AND
H-FRAME DETAILS

SHEET NUMBER

A-3



CABINET DETAIL NO SCALE 1



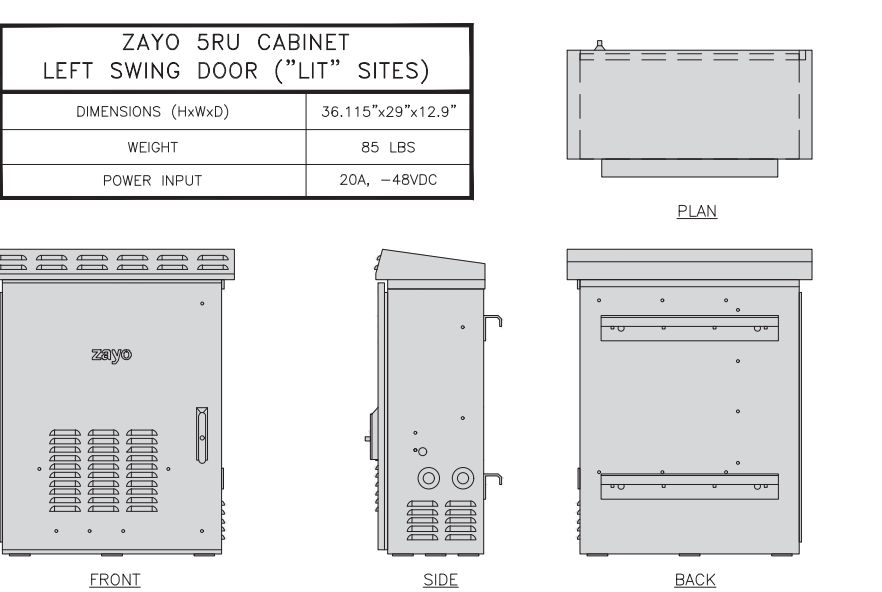
POWER PROTECTION CABINET (PPC) DETAIL NO SCALE 2

NOT USED

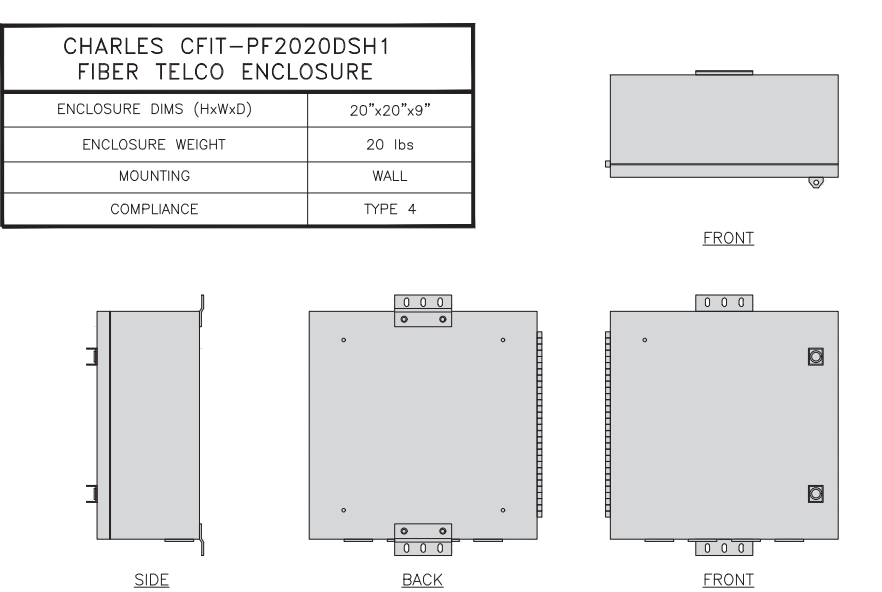
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NOT USED

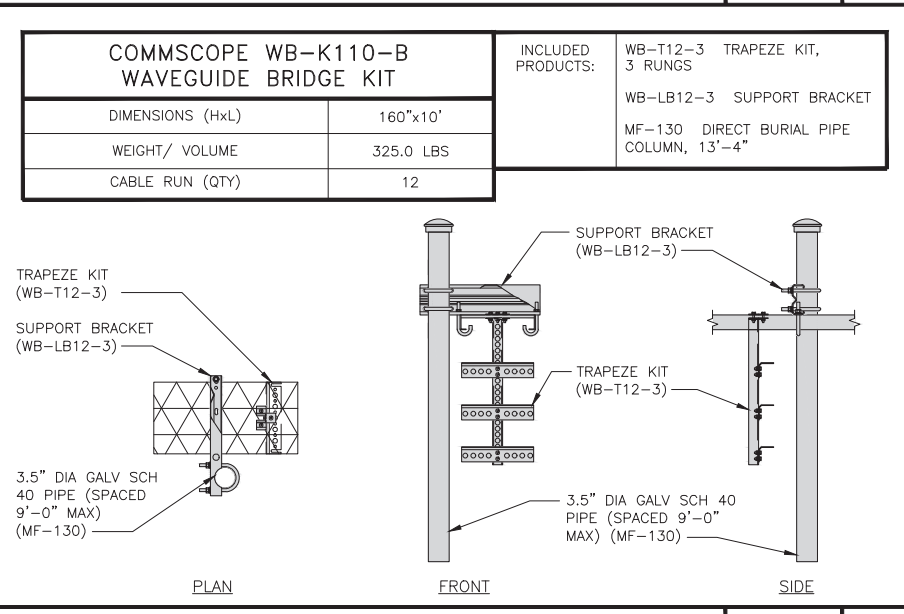
NO SCALE 4



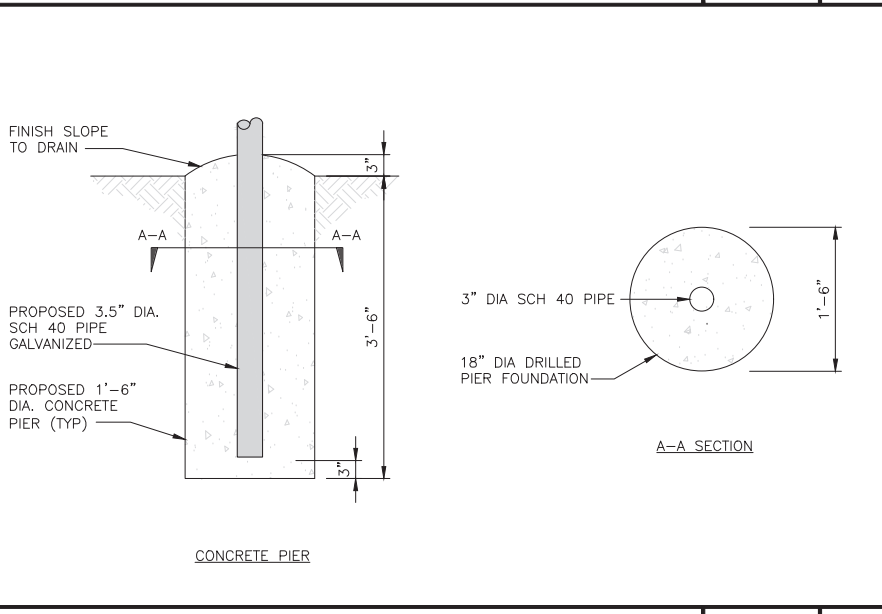
NETWORK INTERFACE UNIT DETAIL NO SCALE 5



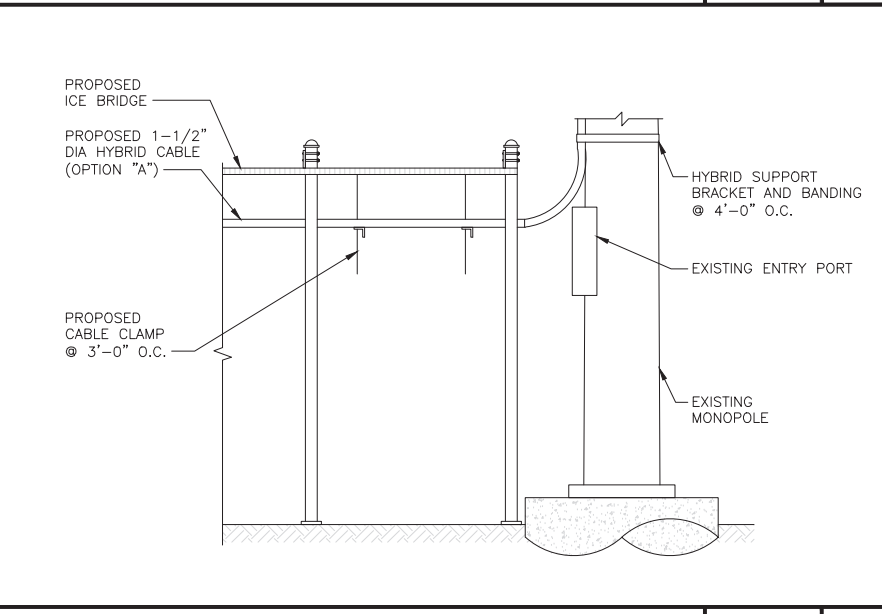
FIBER TELCO ENCLOSURE DETAIL NO SCALE 6



ICE BRIDGE DETAIL NO SCALE 7



TYPICAL ICE BRIDGE CONCRETE PIER DETAIL NO SCALE 8



HYBRID CABLE RUN NO SCALE 9

dish wireless.

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CROWN CASTLE

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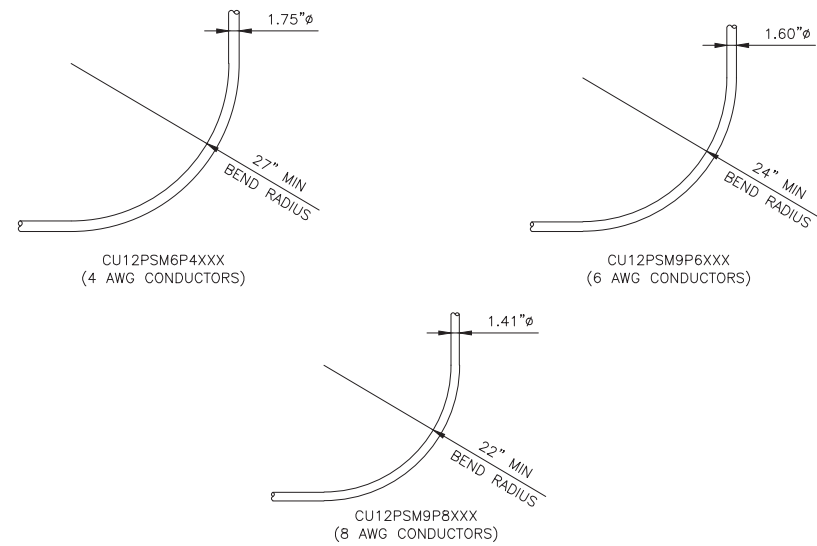
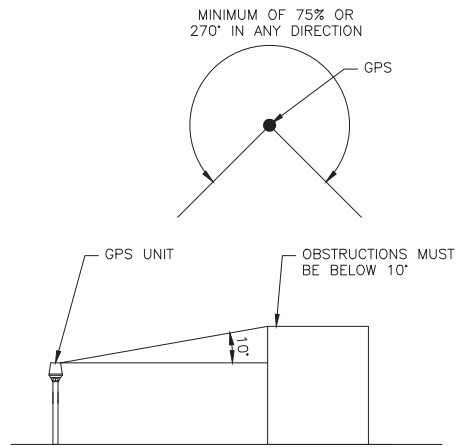
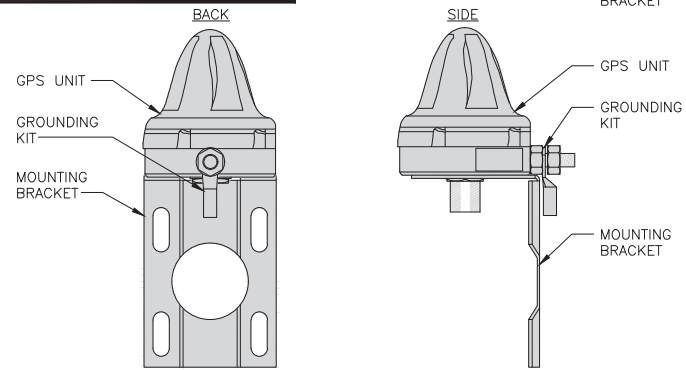
A&E PROJECT NUMBER
89233.006.01

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDL00044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-4

ROSENBERGER GPSGLONASS-36-N-S	
DIMENSION (DIA x H)	69mm x 98.5mm
WEIGHT (WITH ACCESSORIES)	515.74g
CONNECTOR	N-FEMALE
FREQUENCY RANGE	1559 MHz ~ 1610.5MHz



GPS ANTENNA 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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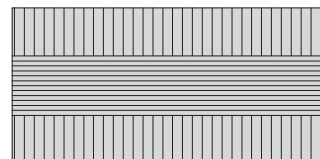
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PROJECT INFORMATION
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439-455 HOMESTEAD AVE
HARTFORD, CT 06105

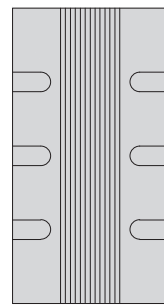
SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-5

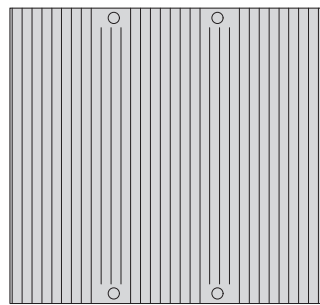
FUJITSU TA08025-B604 RRH	
DIMENSIONS (HxWxD) (KG/IN)	380x400x200/14.9"x15.7"x9.8"
WEIGHT(KG,LB)/ VOLUME	29kg,63.9lb/ 30L
POWER SUPPLY	DC-58~-36V



PLAN

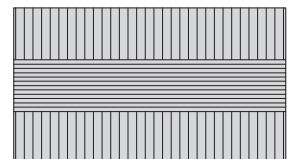


SIDE

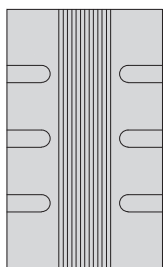


FRONT

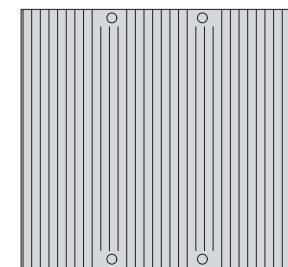
FUJITSU TA08025-B605 RRH	
DIMENSIONS (HxWxD) (KG/IN)	380x400x230/14.9"x15.7"x9.0"
WEIGHT(KG,LB)/ VOLUME	34kg,74.9lb/ 35L
POWER SUPPLY	DC-58~-36V



PLAN



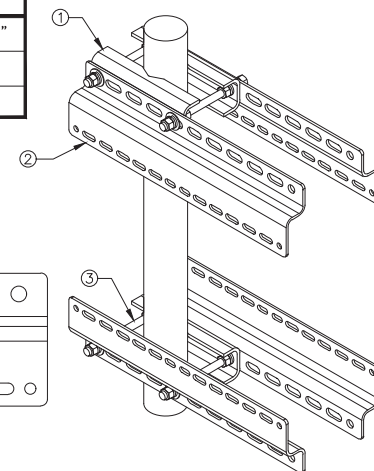
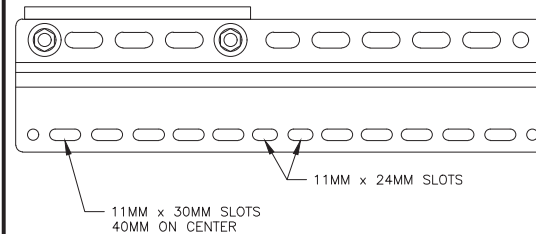
SIDE



FRONT

SABRE INDUSTRIES RRU BRACKET MOUNT C10123155	
DIMENSIONS (HxWxD) (1 BRACKET)	5"x20"x1-13/16"
WEIGHT (FULL ASSEMBLY)	35.79 lbs
PACKAGE QUANTITY	4

ITEM#	DESCRIPTION
1	PLATE, CHANNEL BRACKET
2	RRH Z BRACKET, 3/16"
3	THREADED ROD ASSEMBLY 1/2"x12"



REMOTE RADIO HEAD DETAIL

NO SCALE

1

REMOTE RADIO HEAD DETAIL

NO SCALE

2

REMOTE RADIO MOUNT DETAIL

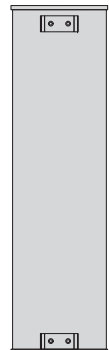
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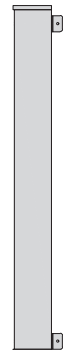
JMA WIRELESS MX08FRO665-21 ANTENNA	
DIMENSIONS (HxWxD)	72.0"x20.0"x8.0"
TOTAL WEIGHT	64.5 LB
RF PORTS, CONNECTOR TYPE	8 x 4.3-10 FEMALE



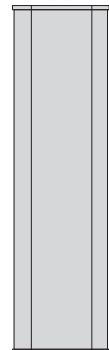
PLAN



BACK



SIDE



FRONT

NO SCALE

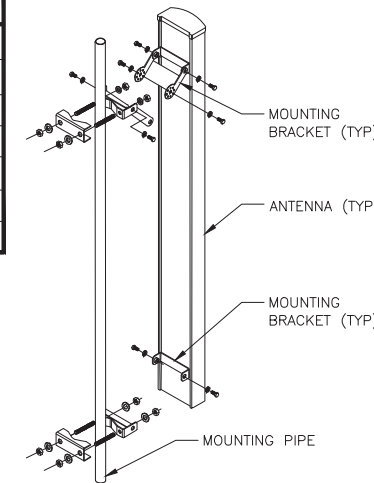
4

NOT USED

NO SCALE

5

M04 MOUNTING BRACKET HPA-33R-BUU-H4-K	
WIDTH	5" (135mm)
DEPTH	2" (51mm)
HEIGHT	8" (213mm)
TOTAL WEIGHT (WITH BRACKETS)	1.5 LBS (15.50 Kg)
HOUSING MATERIAL	ASA/ABS/ALUMINUM
RADOME COLOR	LIGHT GRAY
CONNECTOR	1X8-PIN DAISY CHAIN



ANTENNA MOUNTING DETAIL

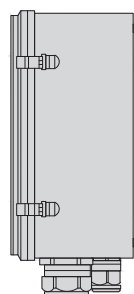
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6

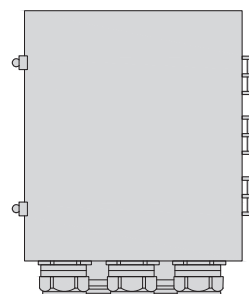
RAYCAP RDIC-9181-PF-48 DC SURGE PROTECTION (OVP)	
DIMENSIONS (HxWxD)	18.98"x14.39"x8.15"
WEIGHT	21.82 LBS



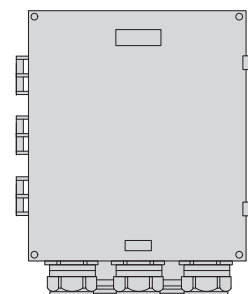
PLAN



SIDE



BACK

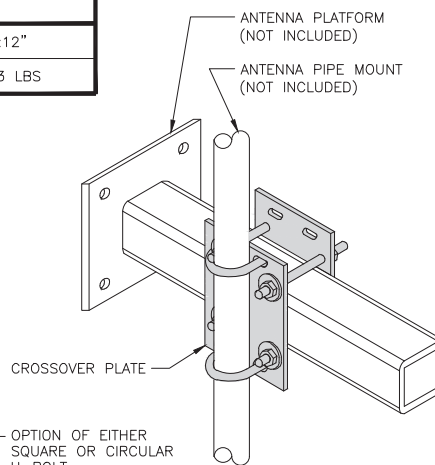
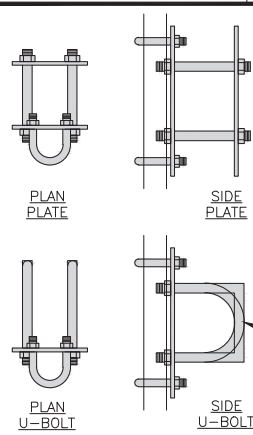


FRONT

NO SCALE

7

COMMSCOPE XP-2040 CROSSOVER PLATE	
DIMENSIONS (HxW)	10"x12"
WEIGHT	11.023 LBS

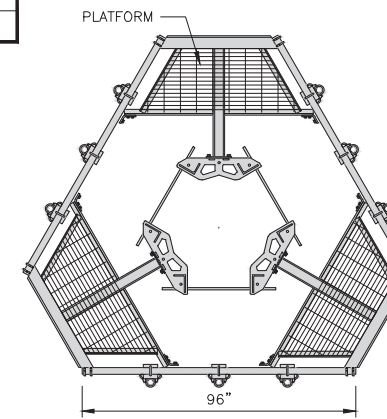
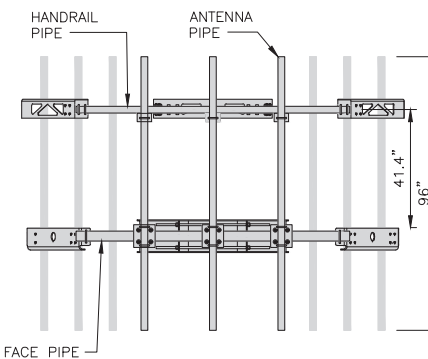


RRH/OVP MOUNT DETAIL

NO SCALE

8

COMMSCOPE MC-PK8-DSH	
FACE WIDTH	96"
WEIGHT	1373.08 lbs
NOTE: 15" TO 38" O.D.	



ANTENNA PLATFORM DETAIL

NO SCALE

9

dish
wireless.

5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120

CROWN
CASTLE

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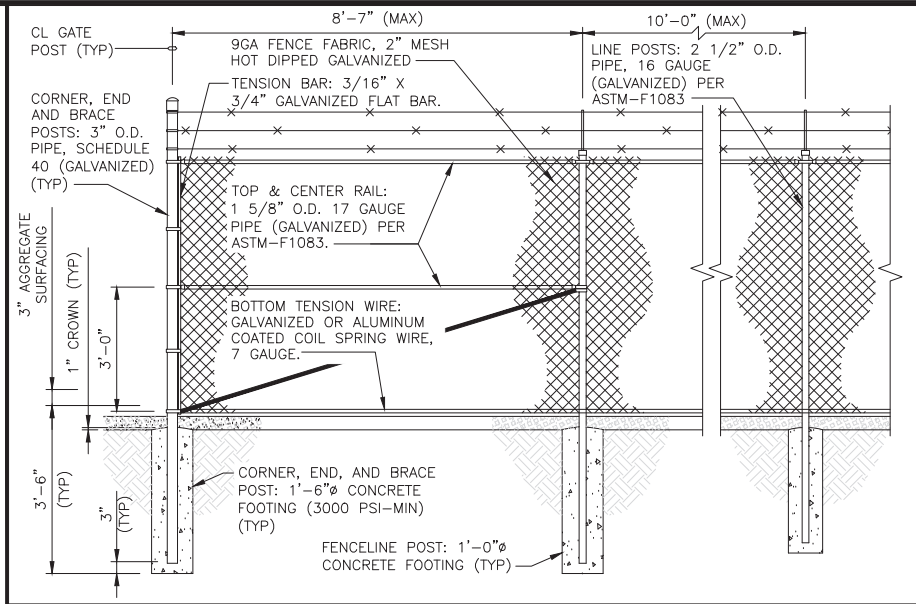
DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER

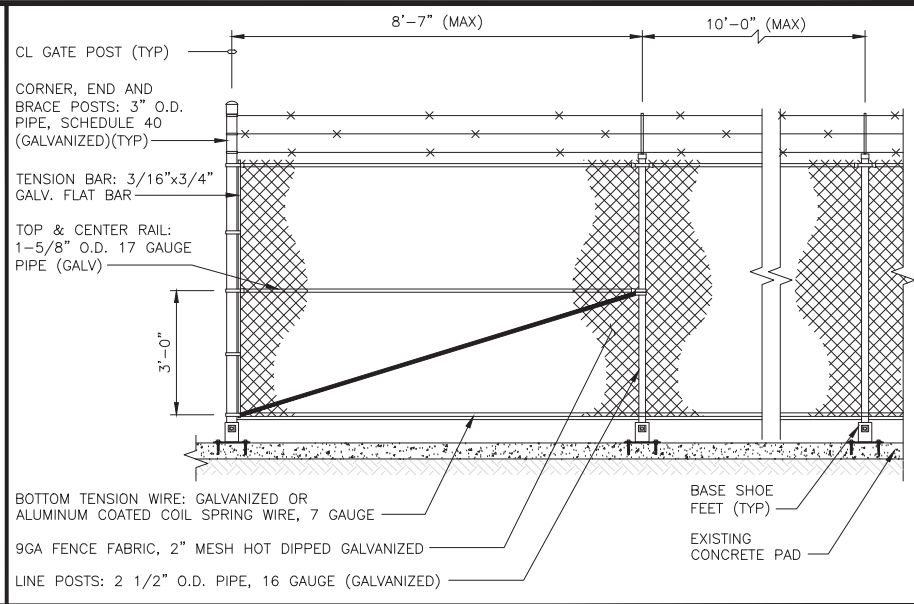
A-6

- 1 LINE POSTS: 2 1/2" O.D. PIPE, 16 GAUGE (GALVANIZED) PER ASTM-F1083.
- 2 CORNER, END AND BRACE POSTS: 3" O.D. PIPE, SCHEDULE 40 (GALVANIZED).
- 3 TOP RAIL: 1 5/8" O.D. 17 GAUGE PIPE (GALVANIZED) PER ASTM-F1083.
- 4 BRACE RAIL: 1 5/8" O.D. 17 GAUGE PIPE (GALVANIZED).
- 5 DIAGONAL TRUSS ROD: 3/8" GALVANIZED ROD WITH TURNBUCKLE.
- 6 TENSION BAR: 3/16" X 3/4" GALVANIZED FLAT BAR.
- 7 BOTTOM TENSION WIRE: GALVANIZED OR ALUMINUM COATED COIL SPRING WIRE, 7 GAUGE.
- 8 GATE POSTS: 2 7/8" O.D. SCHEDULE 40 PIPE (GALVANIZED).
- 9 COMBINATION PADLOCK ACCORDING TO DISH WIRELESS REQUIREMENTS.
- 10 GATE FRAMES: 1 7/8" O.D. SCHEDULE 40 PIPE (GALVANIZED).
- 11 BARBED WIRE SUPPORT ARM: SINGLE ARM TYPE (GALVANIZED). ARM SHALL BE INCLINED OUTWARD AT AN ANGLE OF 45 DEGREES.
- 12 BARBED WIRE: GALVANIZED, ASTM A121 CLASS 3; THREE 14 GAUGE MINIMUM STEEL WIRES WITH 4 POINT ROUND 14 GAUGE BARBS SPACED 4" APART.
- 13 9GA FENCE FABRIC, 2" MESH HOT DIPPED GALVANIZED
- 14 MISCELLANEOUS:
 - A. RAIL COUPLINGS: SLEEVE TYPE, 6" LONG EXPANSION SPRING EVERY FIFTH COUPLING.
 - B. POST TOPS: PRESSED STEEL, MALLEABLE IRON WITH PRESSED STEEL EXTENSION ARM, OR ONE-PIECE ALUMINUM CASTING; WITH HOLE FOR TOP, ALL DESIGNED TO FIT OVER THE OUTSIDE OF THE POSTS AND TO PREVENT ENTRY OF MOISTURE INTO TUBULAR POSTS.
 - C. LATCHES SHALL BE FORKED TYPE AND SHALL BE ARRANGED FOR PADLOCKING WITH THE PADLOCK ACCESSIBLE FROM BOTH SIDES OF THE GATE.
 - D. KEEPERS SHALL CONSIST OF MECHANICAL DEVICES FOR SECURING AND SUPPORTING THE FREE END OF THE GATES WHEN IN THE FULL OPEN POSITION. KEEPERS SHALL BE MOUNTED ON 2 7/8" O.D. PIPE POSTS FILLED WITH CONCRETE AND SET IN CONCRETE FOUNDATIONS.
 - E. INSTALL FENCING PER ASTM-F567.
 - F. INSTALL SWING GATES PER ASTM-F900.
 - G. LOCAL ORDINANCE OF BARBED WIRE PERMIT REQUIREMENT SHALL BE COMPLETED IF REQUIRED.
 - H. USE GALVANIZED HOG RING WIRE TO MOUNT ALL SIGNS.
 - I. ALL SIGNS MUST BE MOUNTED ON INSIDE OF FENCE.



TYPICAL FENCE DETAIL

NO SCALE 2



TYPICAL FENCE ELEVATION DETAIL

NO SCALE 3

MATERIAL DESCRIPTION

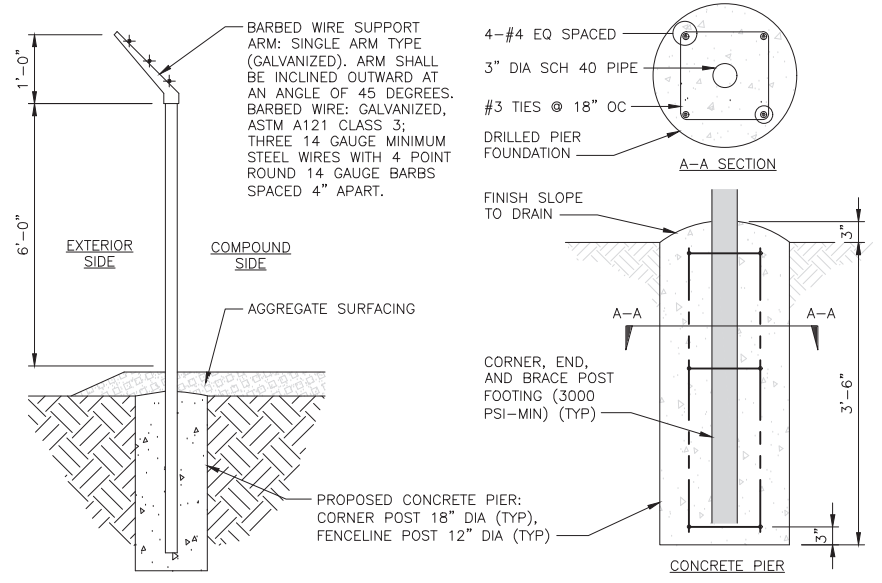
NO SCALE 1

NOT USED

NO SCALE 4

NOT USED

NO SCALE 5



TYPICAL FENCE & CONCRETE PIER SECTION

NO SCALE 6

NOT USED

NO SCALE 7

NOT USED

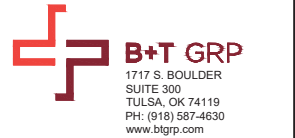
NO SCALE 8



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CANONSBURG, PA 15317



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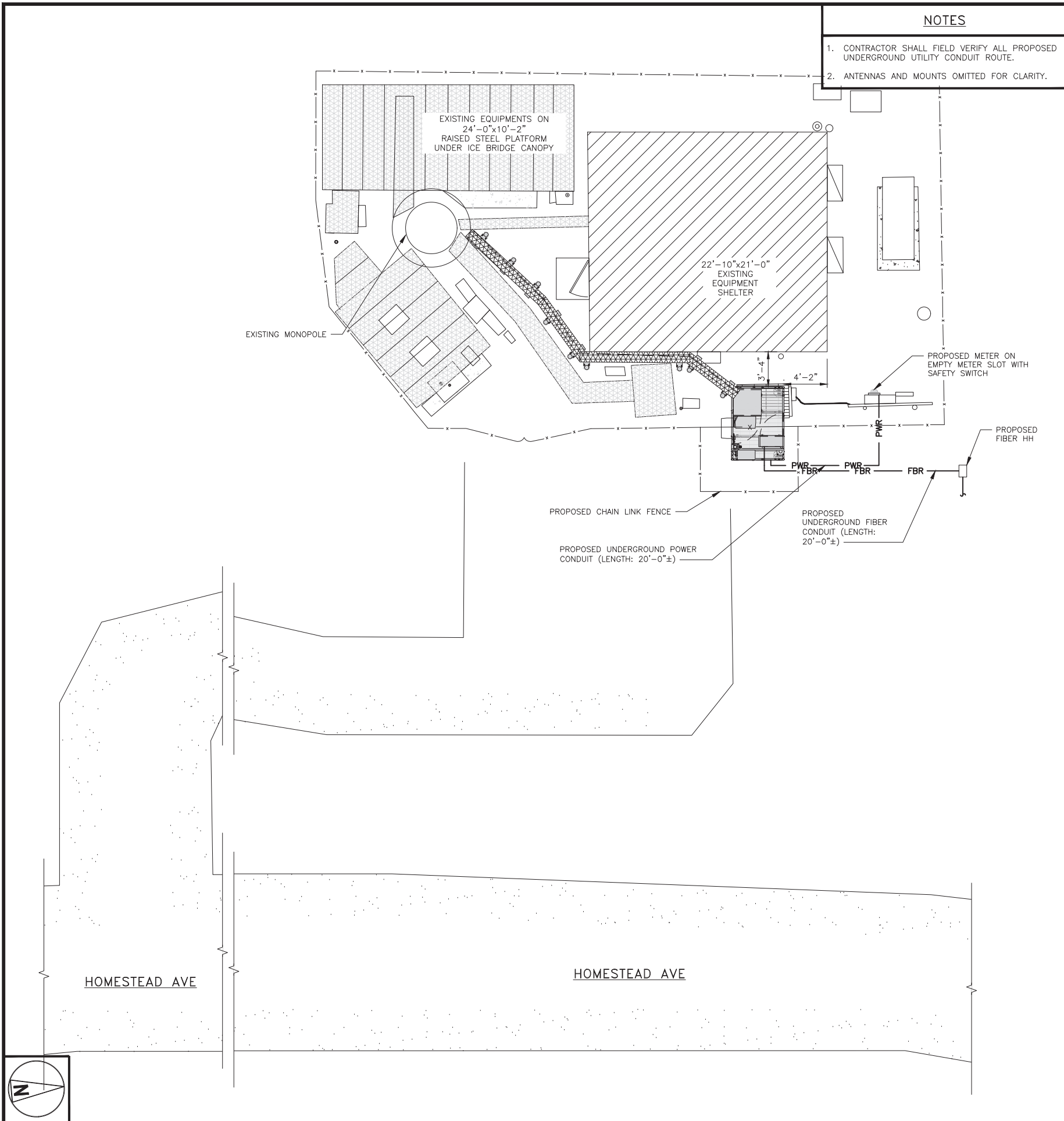
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DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
ELECTRICAL/FIBER ROUTE
PLAN AND NOTES

SHEET NUMBER
E-1



NOTES

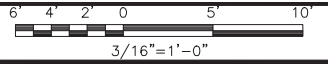
1. CONTRACTOR SHALL FIELD VERIFY ALL PROPOSED UNDERGROUND UTILITY CONDUIT ROUTE.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.

DC POWER WIRING SHALL BE COLOR CODED AT EACH END FOR IDENTIFYING +24V AND -48V CONDUCTORS. RED MARKINGS SHALL IDENTIFY +24V AND BLUE MARKINGS SHALL IDENTIFY -48V.

1. CONTRACTOR SHALL INSPECT THE EXISTING CONDITIONS PRIOR TO SUBMITTING A BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTOR'S FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE PROJECT MANAGER FOR CLARIFICATION, NOT AFTER THE CONTRACT HAS BEEN AWARDED.
2. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH CURRENT NATIONAL ELECTRICAL CODES AND ALL STATE AND LOCAL CODES, LAWS, AND ORDINANCES. PROVIDE ALL COMPONENTS AND WIRING SIZES AS REQUIRED TO MEET NEC STANDARDS.
3. LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO CONSTRUCTION.
4. CONDUIT ROUGH-IN SHALL BE COORDINATED WITH THE MECHANICAL EQUIPMENT TO AVOID LOCATION CONFLICTS. VERIFY WITH THE MECHANICAL EQUIPMENT CONTRACTOR AND COMPLY AS REQUIRED.
5. CONTRACTOR SHALL PROVIDE ALL BREAKERS, CONDUITS AND CIRCUITS AS REQUIRED FOR A COMPLETE SYSTEM.
6. CONTRACTOR SHALL PROVIDE PULL BOXES AND JUNCTION BOXES AS REQUIRED BY THE NEC ARTICLE 314.
7. CONTRACTOR SHALL PROVIDE ALL STRAIN RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
8. ALL DISCONNECTS AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED PHENOLIC NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS INSTALLED ON, AND PANEL FIELD LOCATIONS FED FROM.
9. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS PER THE SPECIFICATIONS AND NEC 250. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULL BOXES, AND ALL DISCONNECT SWITCHES, AND EQUIPMENT CABINETS.
10. ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
11. PANEL SCHEDULE LOADING AND CIRCUIT ARRANGEMENTS REFLECT POST-CONSTRUCTION EQUIPMENT.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR AS-BUILT PANEL SCHEDULE AND SITE DRAWINGS.
13. ALL TRENCHES IN COMPOUND TO BE HAND DUG



UTILITY ROUTE PLAN



ELECTRICAL NOTES



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LITTLETON, CO 80120



2000 CORPORATE DRIVE
CANONSBURG, PA 15317



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JJR	MTJ	MDW

RFDS REV #: ---

CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
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D	7/26/21	ISSUED FOR CONSTRUCTION
1	3/4/22	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
89233.006.01

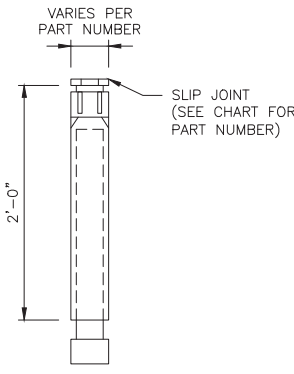
DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
ELECTRICAL/FIBER ROUTE
PLAN AND NOTES

SHEET NUMBER
E-1

CARLON EXPANSION FITTINGS

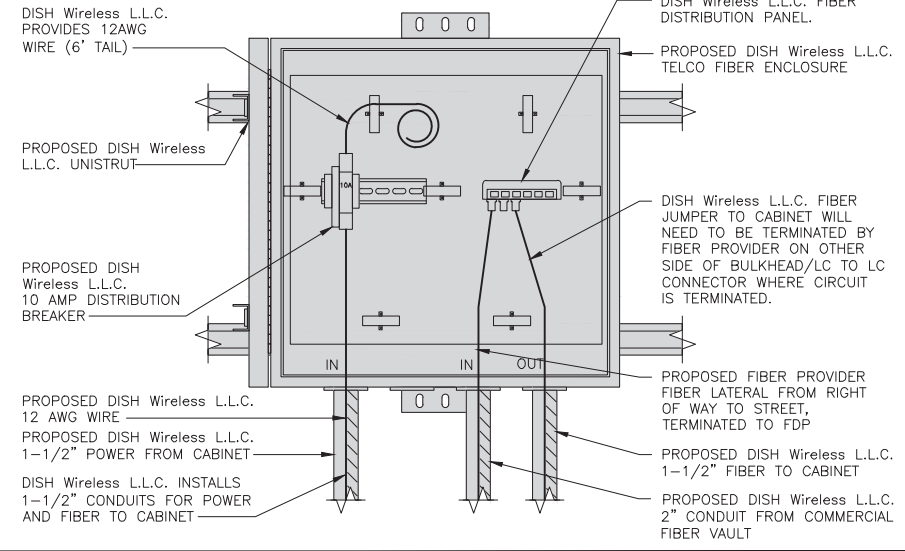
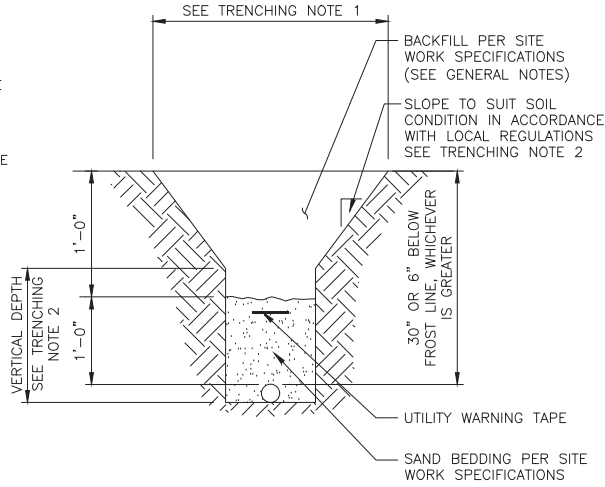
COUPLING END PART#	MALE TERMINAL ADAPTER END PART#	SIZE	STD CTN QTY.	TRAVEL LENGTH
E945D	E945DX	1/2"	20	4"
E945E	E945EX	3/4"	15	4"
E945F	E945FX	1"	10	4"
E945G	E945GX	1 1/4"	5	4"
E945H	E945HX	1 1/2"	5	4"
E945J	E945JX	2"	15	8"
E945K	E945KX	2 1/2"	10	8"
E945L	E945LX	3"	10	8"
E945M	E945MX	3 1/2"	5	8"
E945N	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

- 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.
- TRENCHING SAFETY; INCLUDING, BUT NOT LIMITED TO SOIL CLASSIFICATION, SLOPING, AND SHORING, SHALL BE GOVERNED BY THE CURRENT OSHA TRENCHING AND EXCAVATION SAFETY STANDARDS.
- 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.



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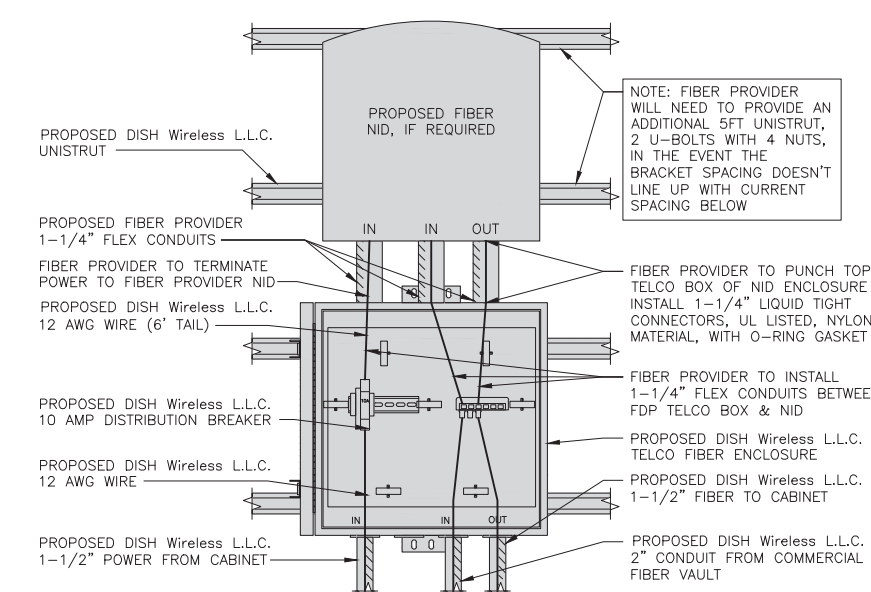
SHEET TITLE
ELECTRICAL DETAILS

SHEET NUMBER
E-2

EXPANSION JOINT DETAIL NO SCALE **1**

TYPICAL UNDERGROUND TRENCH DETAIL NO SCALE **2**

DARK TELCO BOX - INTERIOR WIRING LAYOUT NO SCALE **3**



LIT TELCO BOX - INTERIOR WIRING LAYOUT (OPTIONAL) NO SCALE **4**

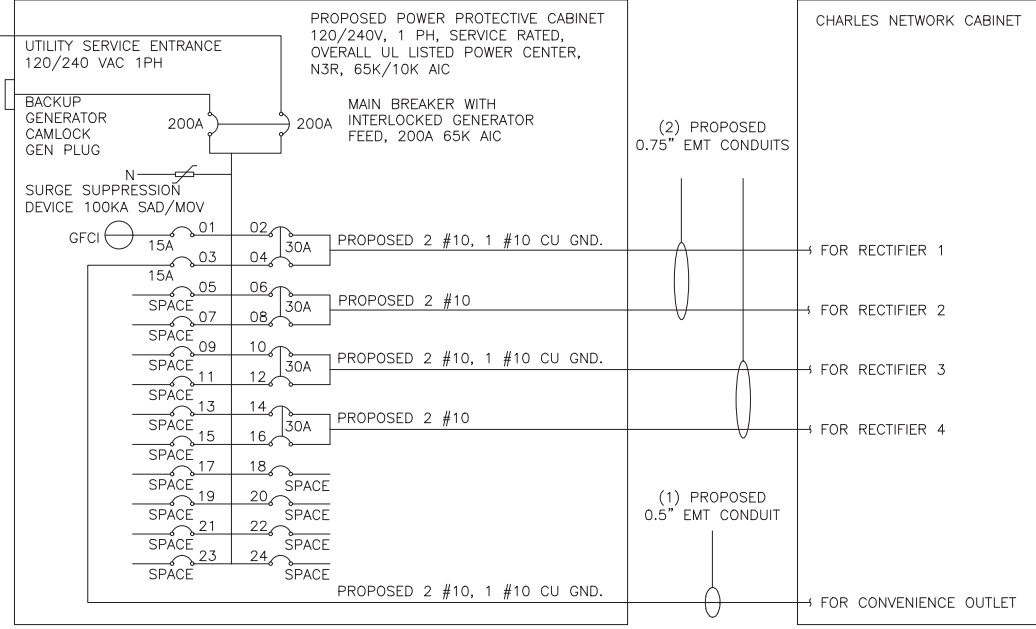
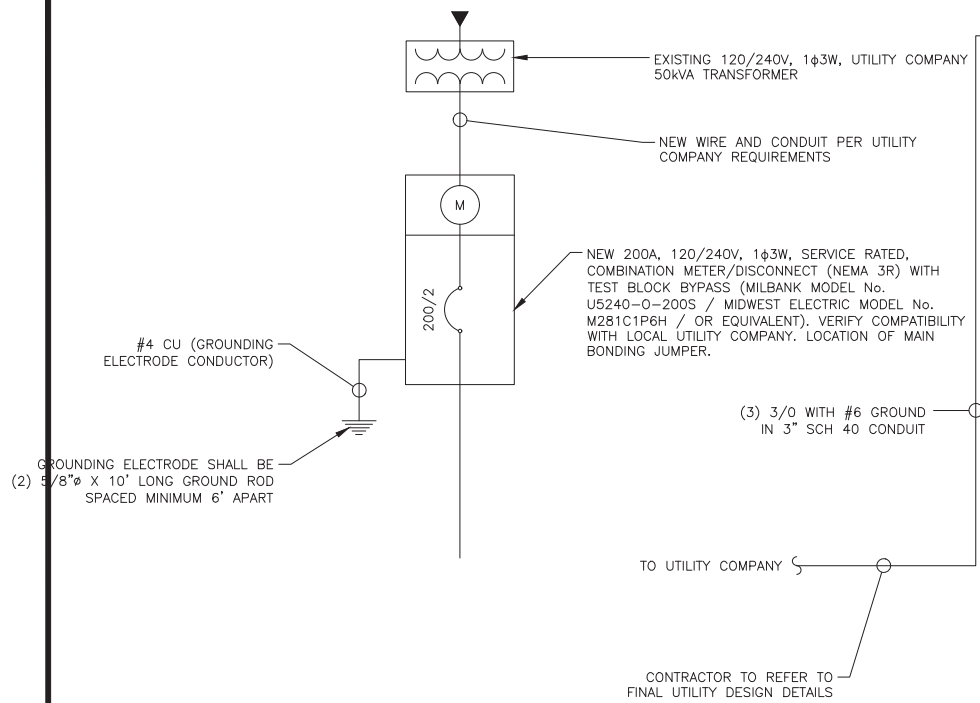
NOT USED NO SCALE **5**

NOT USED NO SCALE **6**

NOT USED NO SCALE **7**

NOT USED NO SCALE **8**

NOT USED NO SCALE **9**



NOTE: BRANCH CIRCUIT WIRING SUPPLYING RECTIFIERS ARE TO BE RATED UL1015, 105°C, 600V, AND PVC INSULATED, IN THE SIZES SHOWN IN THE ONE-LINE DIAGRAM. CONTRACTOR MAY SUBSTITUTE UL1015 WIRE FOR THWN-2 FOR CONVENIENCE OUTLET BRANCH CIRCUIT.

BREAKERS REQUIRED:
 (4) 30A, 2P BREAKER - SQUARE D P/N:Q0230
 (1) 15A, 1P BREAKER - SQUARE D P/N:Q0115

PPC ONE-LINE DIAGRAM

NO SCALE 1

PROPOSED CHARLES PANEL SCHEDULE										
LOAD SERVED	VOLT AMPS (WATTS)		TRIP	CKT #	PHASE	CKT #	TRIP	VOLT AMPS (WATTS)		LOAD SERVED
	L1	L2						L1	L2	
PPC GFCI OUTLET	180	180	15A	1	A	2	30A	2880	2880	ABB/GE INFINITY RECTIFIER 1
CHARLES GFCI OUTLET		180	15A	3	B	4	30A	2880	2880	ABB/GE INFINITY RECTIFIER 1
-SPACE-				5	A	6	30A	2880	2880	ABB/GE INFINITY RECTIFIER 2
-SPACE-				7	B	8	30A	2880	2880	ABB/GE INFINITY RECTIFIER 2
-SPACE-				9	A	10	30A	2880	2880	ABB/GE INFINITY RECTIFIER 3
-SPACE-				11	B	12	30A	2880	2880	ABB/GE INFINITY RECTIFIER 3
-SPACE-				13	A	14	30A	2880	2880	ABB/GE INFINITY RECTIFIER 4
-SPACE-				15	B	16	30A	2880	2880	ABB/GE INFINITY RECTIFIER 4
-SPACE-				17	A	18				-SPACE-
-SPACE-				19	B	20				-SPACE-
-SPACE-				21	A	22				-SPACE-
-SPACE-				23	B	24				-SPACE-
VOLTAGE AMPS	180	180						11520	11520	
200A MCB, 1 ϕ , 24 SPACE, 120/240V				L1	L2					
MB RATING: 65,000 AIC				11700	11700					
				98	98					VOLTAGE AMPS
										AMPS
										MAX AMPS
										MAX 125%

PANEL SCHEDULE

NO SCALE 2

NOT USED

NO SCALE 3

NOTES

THE (2) CONDUITS WITH (4) CURRENT CARRYING CONDUCTORS EACH, SHALL APPLY THE ADJUSTMENT FACTOR OF 80% PER 2014/17 NEC TABLE 310.15(B)(3)(g) OR 2020 NEC TABLE 310.15(C)(1) FOR UL1015 WIRE.

#12 FOR 15A-20A/1P BREAKER: 0.8 x 30A = 24.0A
 #10 FOR 25A-30A/2P BREAKER: 0.8 x 40A = 32.0A
 #8 FOR 35A-40A/2P BREAKER: 0.8 x 55A = 44.0A
 #6 FOR 45A-60A/2P BREAKER: 0.8 x 75A = 60.0A

CONDUIT SIZING: AT 40% FILL PER NEC CHAPTER 9, TABLE 4, ARTICLE 358.
 0.5" CONDUIT - 0.122 SQ. IN AREA
 0.75" CONDUIT - 0.213 SQ. IN AREA
 2.0" CONDUIT - 1.316 SQ. IN AREA
 3.0" CONDUIT - 2.907 SQ. IN AREA

CABINET CONVENIENCE OUTLET CONDUCTORS (1 CONDUIT): USING THWN-2, CU.
 #10 - 0.0211 SQ. IN X 2 = 0.0422 SQ. IN
 #10 - 0.0211 SQ. IN X 1 = 0.0211 SQ. IN <GROUND
 TOTAL = 0.0633 SQ. IN

0.5" EMT CONDUIT IS ADEQUATE TO HANDLE THE TOTAL OF (3) WIRES, INCLUDING GROUND WIRE, AS INDICATED ABOVE.

RECTIFIER CONDUCTORS (2 CONDUITS): USING UL1015, CU.
 #10 - 0.0266 SQ. IN X 4 = 0.1064 SQ. IN
 #10 - 0.0082 SQ. IN X 1 = 0.0082 SQ. IN <BARE GROUND
 TOTAL = 0.1146 SQ. IN

0.75" EMT CONDUIT IS ADEQUATE TO HANDLE THE TOTAL OF (5) WIRES, INCLUDING GROUND WIRE, AS INDICATED ABOVE.

PPC FEED CONDUCTORS (1 CONDUIT): USING THWN, CU.
 3/0 - 0.2679 SQ. IN X 3 = 0.8037 SQ. IN
 #6 - 0.0507 SQ. IN X 1 = 0.0507 SQ. IN <GROUND
 TOTAL = 0.8544 SQ. IN

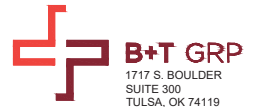
3.0" SCH 40 PVC CONDUIT IS ADEQUATE TO HANDLE THE TOTAL OF (4) WIRES, INCLUDING GROUND WIRE, AS INDICATED ABOVE.



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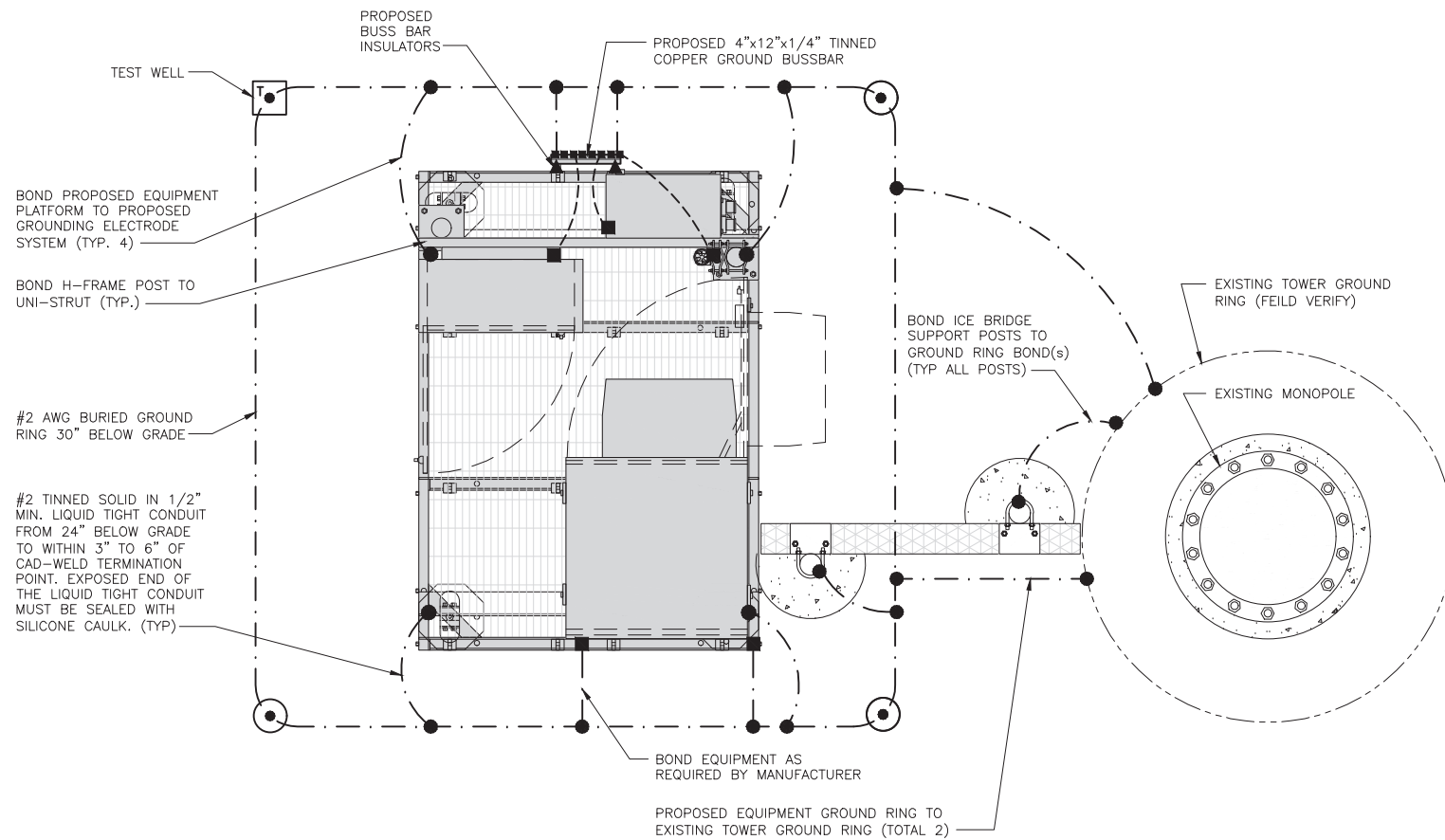
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DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
ELECTRICAL ONE-LINE, FAULT
CALCS & PANEL SCHEDULE

SHEET NUMBER
E-3

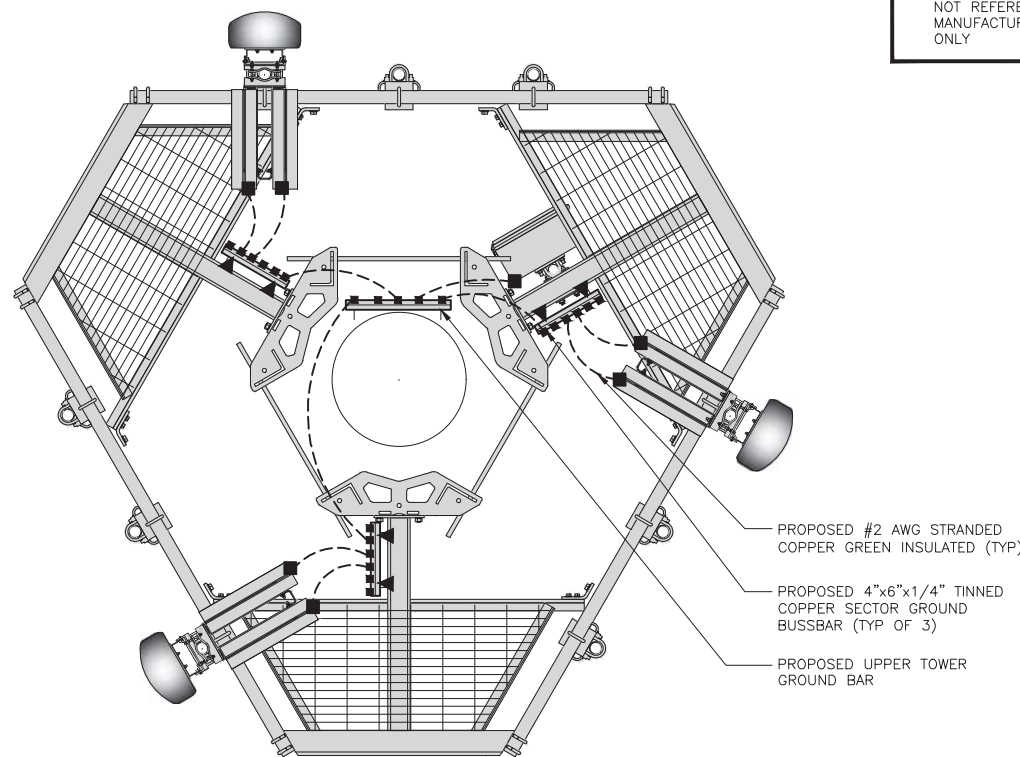


TYPICAL EQUIPMENT GROUNDING PLAN

NO SCALE 1

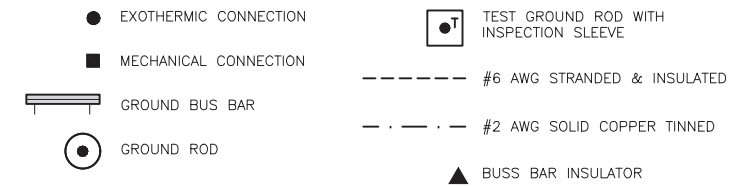
NOTES

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 PROPOSED ANTENNA MOUNT COLLAR. REFER TO DISH Wireless L.L.C. GROUNDING NOTES.

GROUNDING KEY NOTES

NO SCALE 3



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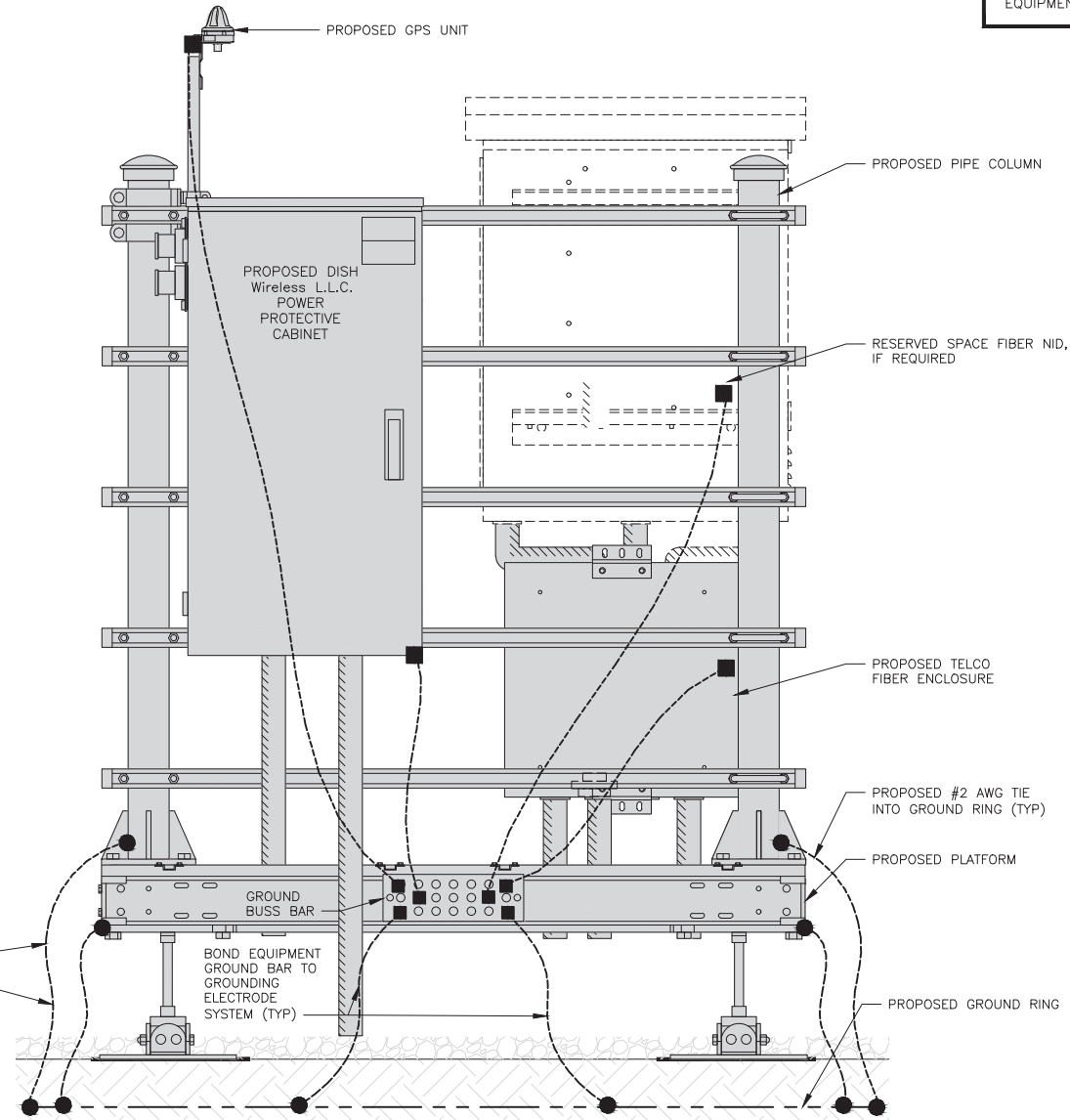
SHEET TITLE
GROUNDING PLANS
AND NOTES

SHEET NUMBER

G-1

NOTES

EQUIPMENT CABINET OMITTED FOR CLARITY

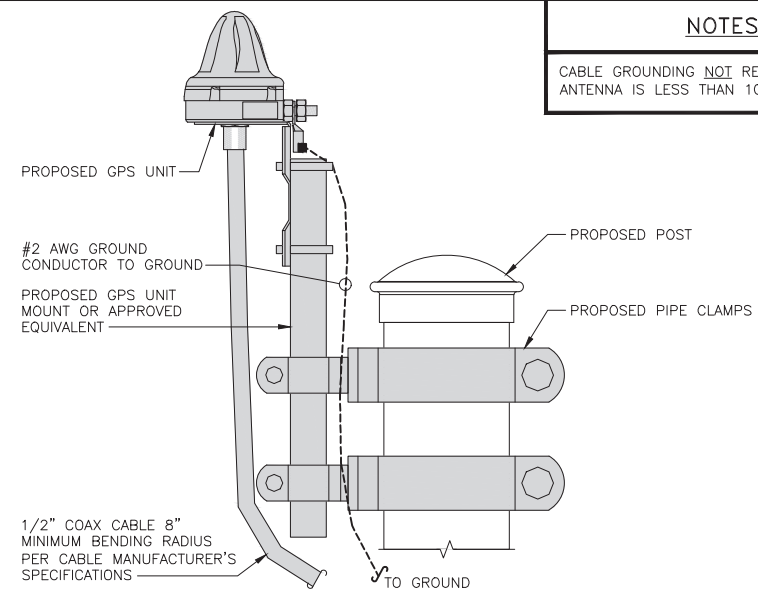


H-FRAME GROUNDING DETAIL

NO SCALE 1

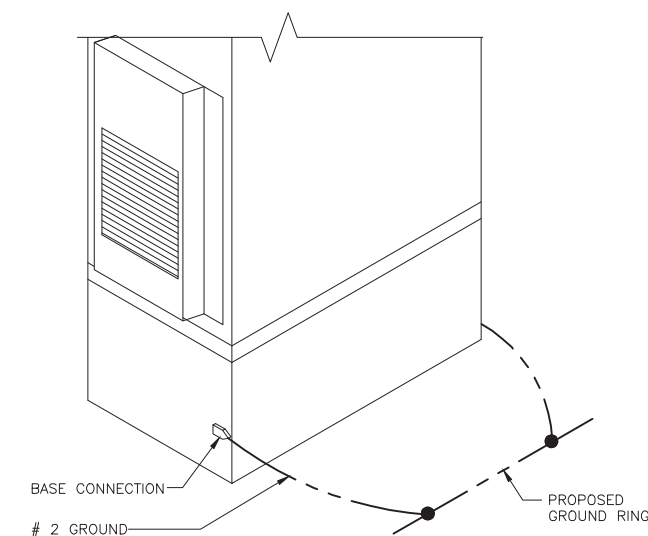
NOTES

CABLE GROUNDING NOT REQUIRED WHEN ANTENNA IS LESS THAN 10' FROM CABINET



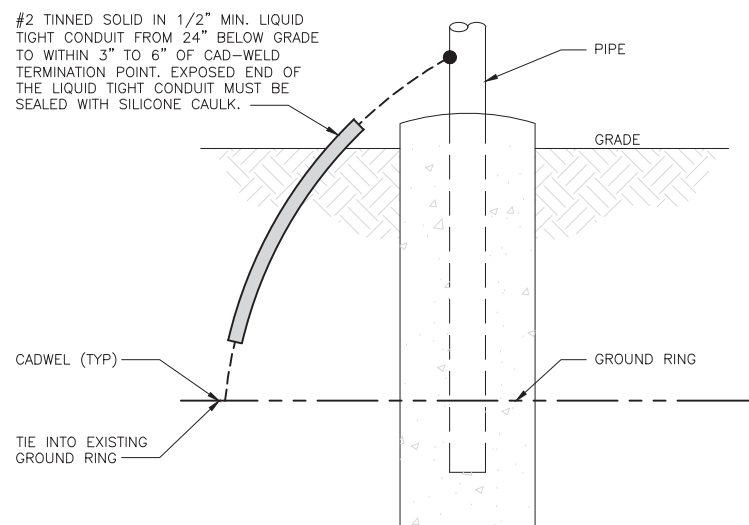
TYPICAL GPS UNIT GROUNDING

NO SCALE 2



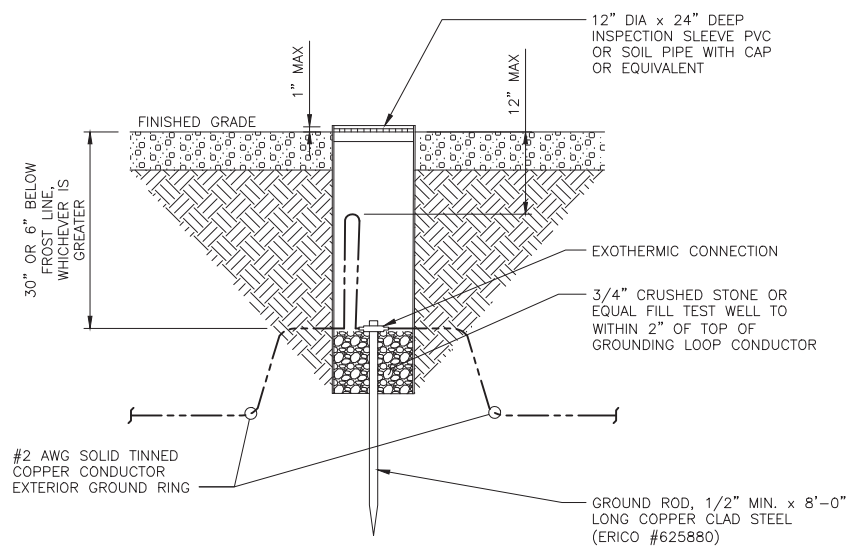
OUTDOOR CABINET GROUNDING

NO SCALE 3



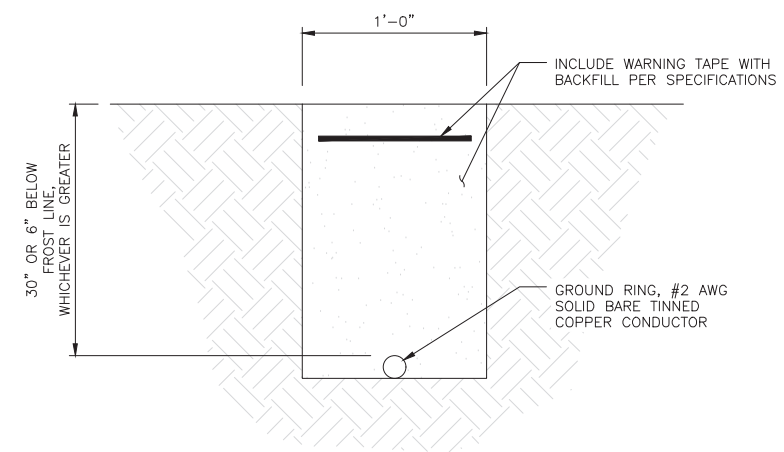
TRANSITIONING GROUND DETAIL

NO SCALE 4



TYPICAL TEST GROUND ROD WITH INSPECTION SLEEVE

NO SCALE 5



TYPICAL GROUND RING TRENCH

NO SCALE 6



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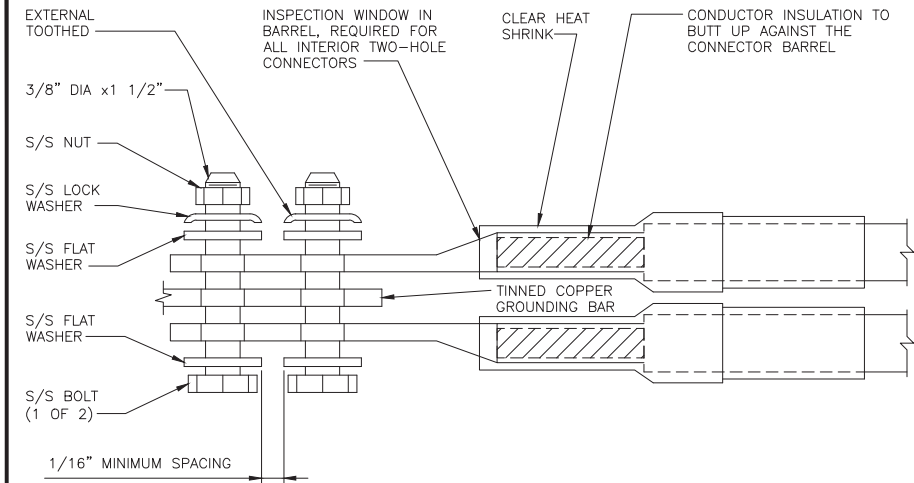
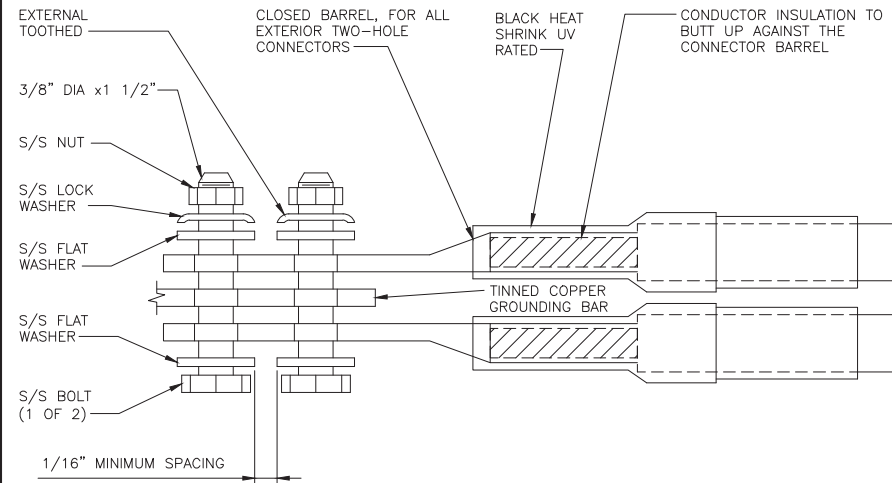
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SHEET TITLE
GROUNDING DETAILS

SHEET NUMBER

G-2

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

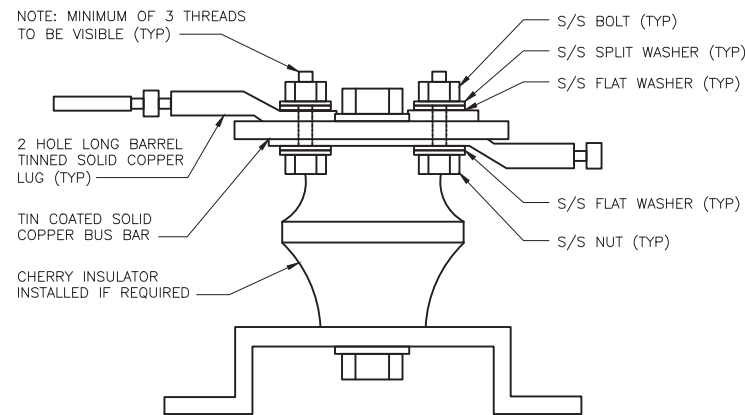
NO SCALE

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

dish
wireless.

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LITTLETON, CO 80120

CROWN CASTLE

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CANONSBURG, PA 15317

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A&E PROJECT NUMBER
89233.006.01

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

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

ADD FREQUENCY COLOR TO SECTOR BAND (CBRS WILL USE YELLOW BANDS)

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
	WHITE (-) PORT	ORANGE	ORANGE		WHITE (-) PORT	ORANGE	ORANGE		WHITE (-) PORT	ORANGE	ORANGE
			WHITE (-) PORT				WHITE (-) PORT				WHITE (-) PORT

MID-BAND RRH - (AWS BANDS N66+N70)

ADD FREQUENCY COLOR TO SECTOR BAND (CBRS WILL USE YELLOW BANDS)

RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
PURPLE	PURPLE	RED	RED	PURPLE	PURPLE	BLUE	BLUE	PURPLE	PURPLE	GREEN	GREEN
	WHITE (-) PORT	PURPLE	PURPLE		WHITE (-) PORT	PURPLE	PURPLE		WHITE (-) PORT	PURPLE	PURPLE
			WHITE (-) PORT				WHITE (-) PORT				WHITE (-) PORT

HYBRID/DISCREET CABLES

INCLUDE SECTOR BANDS BEING SUPPORTED ALONG WITH FREQUENCY BANDS

EXAMPLE 1 - HYBRID, OR DISCREET, SUPPORTS ALL SECTORS, BOTH LOW-BANDS AND MID-BANDS

EXAMPLE 2 - HYBRID, OR DISCREET, SUPPORTS CBRS ONLY, ALL SECTORS

EXAMPLE 1	EXAMPLE 2	EXAMPLE 3
RED	RED	RED
BLUE	BLUE	
GREEN	GREEN	ORANGE
ORANGE	YELLOW	PURPLE
PURPLE		

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
RED	RED	BLUE	BLUE	GREEN	GREEN
	PURPLE		PURPLE		PURPLE

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
RED	RED	BLUE	BLUE	GREEN	GREEN
	PURPLE		PURPLE		PURPLE

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"
RED	RED	BLUE	BLUE	GREEN	GREEN
	PURPLE		PURPLE		PURPLE

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.

MICROWAVE CABLES WILL REQUIRE P-TOUCH LABELS INSIDE THE CABINET TO IDENTIFY THE LOCAL AND REMOTE SITE ID'S

FORWARD AZIMUTH OF 0-120 DEGREES		FORWARD AZIMUTH OF 120-240 DEGREES		FORWARD AZIMUTH OF 240-360 DEGREES	
PRIMARY	SECONDARY	PRIMARY	SECONDARY	PRIMARY	SECONDARY
WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
RED	RED	BLUE	BLUE	GREEN	GREEN
WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
	RED		BLUE		GREEN
	WHITE		WHITE		WHITE

RF CABLE COLOR CODES

NO SCALE

1

LOW BANDS (N71+N26) OPTIONAL - (N29)

ORANGE

CBRS TECH (3 GHz)

YELLOW

AWS (N66+N70+H-BLOCK)

PURPLE

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

NOT USED

NO SCALE

4

dish wireless.

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CROWN CASTLE

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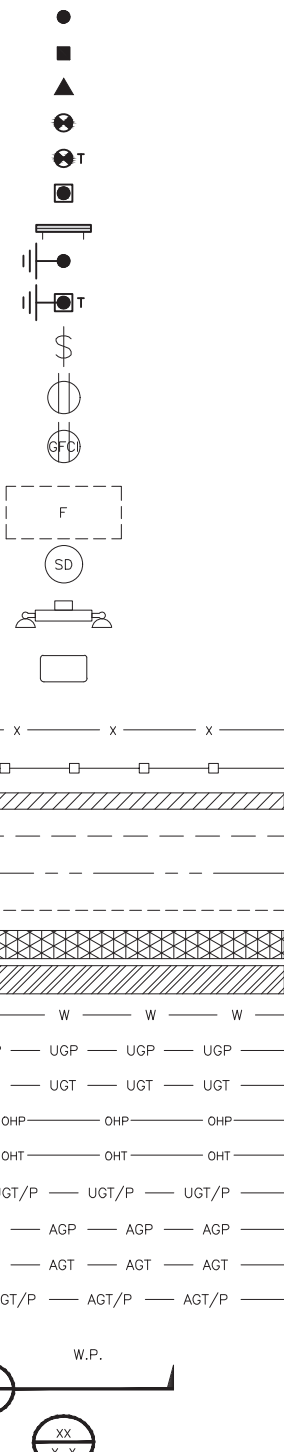
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DISH Wireless L.L.C.
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HARTFORD, CT 06105

SHEET TITLE
RF
CABLE COLOR CODES

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-DEBTDX
 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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DISH Wireless L.L.C.
 PROJECT INFORMATION
 BOBDL00044A
 439-455 HOMESTEAD AVE
 HARTFORD, CT 06105

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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1	3/4/22	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
89233.006.01

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

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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PEC.0001564
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DRAWN BY:	CHECKED BY:	APPROVED BY:
JJR	MTJ	MDW

RFDS REV #: ---

CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
A	6/2/21	ISSUED FOR REVIEW
B	7/2/21	ISSUED FOR REVIEW
O	7/26/21	ISSUED FOR CONSTRUCTION
1	3/4/22	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
89233.006.01

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

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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DRAWN BY:	CHECKED BY:	APPROVED BY:
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CONSTRUCTION DOCUMENTS

SUBMITTALS		
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A	6/2/21	ISSUED FOR REVIEW
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A&E PROJECT NUMBER
89233.006.01

DISH Wireless L.L.C.
PROJECT INFORMATION
BOBDLOO044A
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-4

Date: **March 07, 2022**



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

Subject: **Structural Analysis Report**

Carrier Designation: **DISH Network Co-Locate**
Site Number: BOBDL00044A
Site Name: CT-CCI-T-806369

Crown Castle Designation: **BU Number:** 806369
Site Name: HRT 094 943225
JDE Job Number: 650039
Work Order Number: 2086975
Order Number: 556641 Rev. 0

Engineering Firm Designation: **Crown Castle Project Number:** 2086975

Site Data: **439-455 HOMESTEAD AVE, HARTFORD, HARTFORD County, CT**
Latitude 41° 47' 1.61", Longitude -72° 42' 13.66"
140 Foot - Monopole 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:

LC7: Proposed Equipment Configuration

***Sufficient Capacity**

***The structure has sufficient capacity once the loading changes, described in the Recommendations section of this report, are completed.**

This analysis utilizes an ultimate 3-second gust wind speed of 117 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: Patrick Himes

Respectfully submitted by:

Digitally signed by Maham Barimani
Date: 2022.03.08 15:20:05

Maham Barimani, P.E.
Senior Project Engineer



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1) INTRODUCTION

This tower is a 140 ft Monopole tower designed by VALMONT and mapped by Tower Engineering Professionals, Inc., in July of 2008.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	117 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1.5 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)
93.0	93.0	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 MC-PK8-DSH		

Table 2 - Non-Carrier Equipment To-Be-Removed

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
93.0	93.0	3	kathrein	742 213 w/ Mount Pipe	-	-
		1	tower mounts	Pipe Mount [PM 602-3]		
		2	tower mounts	Side Arm Mount [SO 104-3]		

Table 3 - 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)
140.0	140.0	2	raycap	RRFDC-3315-PF-48	8	1-5/8
		3	amphenol	BXA-80063-4BF-EDIN-X w/ Mount Pipe		
		3	commscope	NHH-65B-R2B		
		3	commscope	NHHSS-65B-R2B		
		3	samsung telecommunications	CBRS RT4401-48A		
		3	samsung telecommunications	MT6407-77A w/ Mount Pipe		
		3	samsung telecommunications	RF4439D-25A		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		6	samsung telecommunications	RF4440D-13A		
		1	tower mounts	Platform Mount [LP 713-1]		
		3	tower mounts	Side-By-Side Mounting Kit [#BSAMNT-SBS-1-2]		
126.0	128.0	3	ericsson	AIR -32 B2A/B66AA w/ Mount Pipe	9 3	1-5/8 1-3/8
		3	ericsson	AIR6449 B41 w/ Mount Pipe		
		3	ericsson	ERICSSON AIR 21 B2A B4P_T-MOBILE w/ Mount Pipe		
		3	ericsson	RADIO 4449 B71 B85A_T-MOBILE		
		3	ericsson	RRUS 4415 B25_CCIV2		
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
	126.0	1	tower mounts	Platform Reinforcement Kit [#PRK-1245]		
		3	rfs celwave	ATMAA1412D-1A20		
1		tower mounts	Platform Mount [LP 713-1]			
117.0	120.0	3	ericsson	RRUS 8843 B2/B66A_CCIV2	6 6 2 4	1-5/8 7/8 3/8 Conduit
		3	raycap	DC6-48-60-18-8F		
	117.0	2	cci antennas	DMP65R-BU6D w/ Mount Pipe		
		1	cci antennas	DMP65R-BU8D w/ Mount Pipe		
		2	cci antennas	TPA65R-BU6D w/ Mount Pipe		
		1	cci antennas	TPA65R-BU8D w/ Mount Pipe		
		3	ericsson	AIR 6419 B77G w/ Mount Pipe		
		3	ericsson	AIR 6449 N77 w/ Mount Pipe		
		3	ericsson	RADIO 4478 B14		
		3	ericsson	RRUS 32 B30		
		3	ericsson	RRUS 4449 B5/B12		
		1	tower mounts	Platform Mount [LP 303-1_HR-1]		
104.0	104.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	-	-
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz		
		1	tower mounts	Pipe Mount [PM 601-3]		
103.0	105.0	3	ericsson	AIR6449 B41_T-MOBILE w/ Mount Pipe	3	1-5/8
		3	ericsson	RADIO 4460 B2/B25 B66_TMO		
		3	ericsson	Radio 4480_TMOV2		
		3	rfs celwave	APXVAALL24_43-U-NA20_TMO w/ Mount Pipe		
	103.0	1	tower mounts	Platform Mount [LP 713-1]		
93.0	93.0	-	-	-	6	1-5/8

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
74.0	80.0	1	antel	BCD-87010	1	7/8
	74.0	1	tower mounts	Side Arm Mount [SO 701-1]		
50.0	52.0	1	lucent	KS24019-L112A	1	7/8
	50.0	1	tower mounts	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Reference	Source
4-GEOTECHNICAL REPORTS	2294838	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	2294380	CCISITES
4-TOWER MANUFACTURER DRAWINGS	2294379	CCISITES

3.1) Analysis Method

tnxTower (version 8.1.1.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

3.2) Assumptions

- 1) 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 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	140 - 86.83	Pole	TP39.223x26.216x0.3125	1	-29.09	2319.28	34.7	Pass
L2	86.83 - 38	Pole	TP50.56x37.2109x0.4063	2	-45.02	3892.16	46.5	Pass
L3	38 - 0	Pole	TP59.05x48.0329x0.5	3	-66.68	5790.26	44.5	Pass
							Summary	
						Pole (L2)	46.5	Pass
						Rating =	46.5	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	47.3	Pass
1	Base Plate	0	15.5	Pass
1	Base Foundation (Structure)	0	32.8	Pass
1	Base Foundation (Soil Interaction)	0	43.0	Pass

Structure Rating (max from all components) =	47.3%
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Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed. 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. In order for the results of this analysis to be considered valid, the loading modification, as follows, must be completed.

Loading Changes:

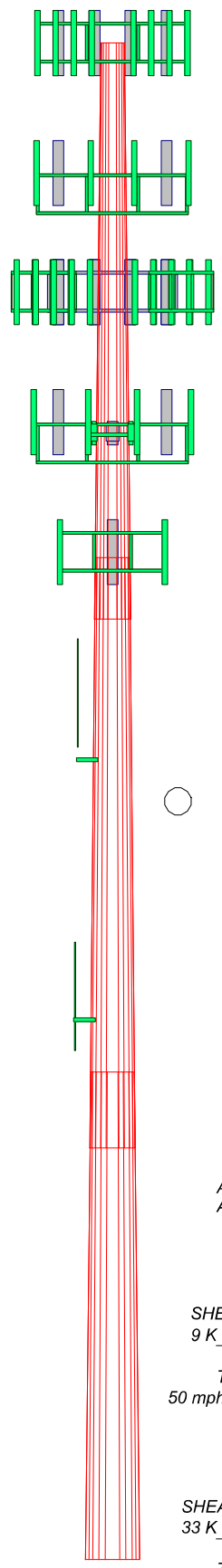
- a) Removal of the abandoned antennas and mounts at the 93 ft level.

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

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3
Length (ft)	53.17	54.50	45.00
Number of Sides	12	12	12
Thickness (in)	0.3125	0.4063	0.5000
Socket Length (ft)	5.67	7.00	
Top Dia (in)	26.2160	37.2109	48.0329
Bot Dia (in)	39.2230	50.5600	59.0500
Grade		A572-65	
Weight (K)	5.9	10.5	13.1

140.0 ft
86.8 ft
38.0 ft
0.0 ft

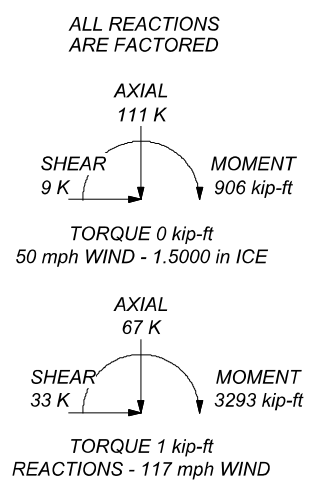


MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 117 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 46.5%



<p>Crown Castle 2000 Corporate Drive Canonsburg, PA 15317 The Pathway to Possible Phone: (724) 416-2000 FAX:</p>		Job: 806369
		Project:
Client: Crown Castle	Drawn by: phimes	App'd:
Code: TIA-222-H	Date: 03/07/22	Scale: NTS
Path:		Dwg No. E-1

C:\Users\phimes\Desktop\Work Area\806369\WO 2066975 - SA\Prod\806369.dwg

Tower Input Data

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

- Tower is located in Hartford County, Connecticut.
- Tower base elevation above sea level: 60.00 ft.
- Basic wind speed of 117 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 1.5000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Maximum demand-capacity ratio is: 1.05.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination ✓ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-H Bracing Resist. Exemption Use TIA-222-H Tension Splice Exemption <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ 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
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Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	140.00-86.83	53.17	5.67	12	26.2160	39.2230	0.3125	1.2500	A572-65 (65 ksi)
L2	86.83-38.00	54.50	7.00	12	37.2109	50.5600	0.4063	1.6250	A572-65 (65 ksi)
L3	38.00-0.00	45.00		12	48.0329	59.0500	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	27.0306	26.0654	2232.3752	9.2735	13.5799	164.3883	4523.3974	12.8286	6.1884	19.803
	40.4964	39.1537	7566.4519	13.9300	20.3175	372.4103	15331.683	19.2703	9.6743	30.958
L2	39.8181	48.1451	8324.2452	13.1761	19.2753	431.8614	16867.177	23.6956	8.8838	21.868
	52.2003	65.6074	21064.222	17.9550	26.1901	804.2825	42681.825	32.2900	12.4613	30.674
L3	51.3252	76.5280	22069.675	17.0168	24.8811	887.0069	44719.145	37.6648	11.5328	23.066
	60.9567	94.2655	41247.015	20.9609	30.5879	1348.4749	83577.635	46.3946	14.4854	28.971

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
L1 140.00-86.83				1	1	1			
L2 86.83-38.00				1	1	1			
L3 38.00-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
***** Climbing Pegs	A	No	Surface Ar (CaAa)	140.00 - 0.00	1	1	-0.050 0.050	0.7050		1.80
Safety Line 3/8"	A	No	Surface Ar (CaAa)	140.00 - 0.00	1	1	0.000 0.000	0.3750		0.22
LCF158-50JA(1-5/8)	A	No	Surface Ar (CaAa)	126.00 - 0.00	1	1	0.380 0.380	2.0100		0.92
HCS 6X12 6AWG(1-3/8) ***	C	No	Surface Ar (CaAa)	126.00 - 0.00	1	1	0.320 0.320	1.3800		1.70
HCS 6X12 4AWG(1-5/8) ***** ***	C	No	Surface Ar (CaAa)	126.00 - 0.00	5	5	0.380 0.500	1.6600		2.40
HB158-21U6S24-xxM_TMO(1-5/8) *****	A	No	Surface Ar (CaAa)	103.00 - 0.00	3	2	-0.130 -0.100	1.9960		2.50
AVA7-50(1-5/8) ***	B	No	Surface Ar (CaAa)	93.00 - 0.00	6	6	-0.500 -0.200	2.0100		0.70

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
CU12PSM9P6XXX(1-1/2) *****	B	No	Surface Ar (CaAa)	93.00 - 0.00	1	1	0.000 0.000	1.6000		2.35
LDF5-50A(7/8)	B	No	Surface Ar (CaAa)	74.00 - 50.00	1	1	-0.100 -0.100	1.0900		0.33
LDF5-50A(7/8) *****	B	No	Surface Ar (CaAa)	50.00 - 0.00	2	2	-0.150 -0.100	1.0900		0.33

Feed Line/Linear Appurtenances - Entered As Area

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

LDF7-50A(1-5/8)	B	No	No	Inside Pole	140.00 - 0.00	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.82 0.82 0.82 0.82
HB158-1-08U8-S8J18(1-5/8)	B	No	No	Inside Pole	140.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.30 1.30 1.30 1.30

HB158-21U6S12-XXXM-01(1-5/8)	B	No	No	Inside Pole	140.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.90 1.90 1.90 1.90

HCS 6X12 6AWG(1-3/8)	A	No	No	Inside Pole	126.00 - 0.00	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.70 1.70 1.70 1.70
LCF158-50JA(1-5/8)	A	No	No	Inside Pole	126.00 - 0.00	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.92 0.92 0.92 0.92

LDF7-50A(1-5/8)	C	No	No	Inside Pole	117.00 - 0.00	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.82 0.82 0.82 0.82
FB-L98B-034-XXX(3/8)	C	No	No	Inside Pole	117.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.06 0.06 0.06 0.06
FB-L98B-034-XXXXXX(3/8)	C	No	No	Inside Pole	117.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.05 0.05 0.05 0.05
2" Conduit	C	No	No	Inside Pole	117.00 - 0.00	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	2.80 2.80 2.80 2.80

PWRT-606-S(7/8)	C	No	No	Inside Pole	117.00 - 0.00	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.89 0.89 0.89 0.89
2" Conduit	C	No	No	Inside Pole	117.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	2.80 2.80 2.80 2.80

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	140.00-86.83	A	0.000	0.000	20.071	0.000	0.51
		B	0.000	0.000	8.428	0.000	0.47
		C	0.000	0.000	37.917	0.000	1.19
L2	86.83-38.00	A	0.000	0.000	34.581	0.000	0.81
		B	0.000	0.000	71.934	0.000	0.73
		C	0.000	0.000	47.267	0.000	1.72
L3	38.00-0.00	A	0.000	0.000	26.912	0.000	0.63
		B	0.000	0.000	60.192	0.000	0.58
		C	0.000	0.000	36.784	0.000	1.34

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	140.00-86.83	A	1.441	0.000	0.000	69.440	0.000	1.29
		B		0.000	0.000	14.289	0.000	0.62
		C		0.000	0.000	71.441	0.000	1.92
L2	86.83-38.00	A	1.358	0.000	0.000	99.257	0.000	1.97
		B		0.000	0.000	130.209	0.000	2.10
		C		0.000	0.000	89.060	0.000	2.64
L3	38.00-0.00	A	1.203	0.000	0.000	74.568	0.000	1.46
		B		0.000	0.000	109.843	0.000	1.65
		C		0.000	0.000	67.891	0.000	2.00

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	140.00-86.83	-3.4051	0.2568	-4.5056	-0.3593
L2	86.83-38.00	-2.3704	-3.6381	-2.9746	-3.7326
L3	38.00-0.00	-2.2619	-4.1548	-2.8296	-4.3540

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

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	2	Climbing Pegs	86.83 - 140.00	1.0000	1.0000
L1	3	Safety Line 3/8"	86.83 - 140.00	1.0000	1.0000
L1	13	LCF158-50JA(1-5/8)	86.83 - 126.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L1	15	HCS 6X12 6AWG(1-3/8)	86.83 - 126.00	1.0000	1.0000
L1	19	HCS 6X12 4AWG(1-5/8)	86.83 - 126.00	1.0000	1.0000
L1	35	HB158-21U6S24-xxM_TMO(1-5/8)	86.83 - 103.00	1.0000	1.0000
L1	37	AVA7-50(1-5/8)	86.83 - 93.00	1.0000	1.0000
L1	39	CU12PSM9P6XXX(1-1/2)	86.83 - 93.00	1.0000	1.0000
L2	2	Climbing Pegs	38.00 - 86.83	1.0000	1.0000
L2	3	Safety Line 3/8"	38.00 - 86.83	1.0000	1.0000
L2	13	LCF158-50JA(1-5/8)	38.00 - 86.83	1.0000	1.0000
L2	15	HCS 6X12 6AWG(1-3/8)	38.00 - 86.83	1.0000	1.0000
L2	19	HCS 6X12 4AWG(1-5/8)	38.00 - 86.83	1.0000	1.0000
L2	35	HB158-21U6S24-xxM_TMO(1-5/8)	38.00 - 86.83	1.0000	1.0000
L2	37	AVA7-50(1-5/8)	38.00 - 86.83	1.0000	1.0000
L2	39	CU12PSM9P6XXX(1-1/2)	38.00 - 86.83	1.0000	1.0000
L2	41	LDF5-50A(7/8)	50.00 - 74.00	1.0000	1.0000
L2	42	LDF5-50A(7/8)	38.00 - 50.00	1.0000	1.0000
L3	2	Climbing Pegs	0.00 - 38.00	1.0000	1.0000
L3	3	Safety Line 3/8"	0.00 - 38.00	1.0000	1.0000
L3	13	LCF158-50JA(1-5/8)	0.00 - 38.00	1.0000	1.0000
L3	15	HCS 6X12 6AWG(1-3/8)	0.00 - 38.00	1.0000	1.0000
L3	19	HCS 6X12 4AWG(1-5/8)	0.00 - 38.00	1.0000	1.0000
L3	35	HB158-21U6S24-xxM_TMO(1-5/8)	0.00 - 38.00	1.0000	1.0000
L3	37	AVA7-50(1-5/8)	0.00 - 38.00	1.0000	1.0000
L3	39	CU12PSM9P6XXX(1-1/2)	0.00 - 38.00	1.0000	1.0000
L3	42	LDF5-50A(7/8)	0.00 - 38.00	1.0000	1.0000

Discrete Tower Loads

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

BXA-80063-4BF-EDIN-X w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.62 4.99 5.36 6.13	3.47 4.04 4.63 5.83	0.03 0.07 0.12 0.23
BXA-80063-4BF-EDIN-X w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.62 4.99 5.36 6.13	3.47 4.04 4.63 5.83	0.03 0.07 0.12 0.23
BXA-80063-4BF-EDIN-X	C	From Leg	4.00	0.0000	140.00	No Ice	4.62	3.47	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAAA Front ft ²	CAAA Side ft ²	Weight K
w/ Mount Pipe			0.00 0.00			1/2" Ice 5.36	4.04 4.63	0.07 0.12
						1" Ice 6.13	5.83	0.23
RRFDC-3315-PF-48	A	From Leg	4.00 0.00 2.00	0.0000	140.00	No Ice 1/2" Ice 3.60 3.84 4.34	2.19 2.39 2.61 3.05	0.03 0.06 0.09 0.17
Side Arm Mount [SO 203-3]	A	None		0.0000	140.00	No Ice 1/2" Ice 8.05 9.55 12.80	6.68 8.05 9.55 12.80	0.38 0.46 0.57 0.87
Platform Mount [LP 713-1]	C	None		0.0000	140.00	No Ice 1/2" Ice 35.76 38.76 45.26	32.89 35.76 38.76 45.26	1.51 2.23 3.03 4.86

NHH-65B-R2B	A	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 4.56 4.98 5.84	2.49 2.88 3.27 4.08	0.04 0.09 0.15 0.28
NHH-65B-R2B	B	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 4.56 4.98 5.84	2.49 2.88 3.27 4.08	0.04 0.09 0.15 0.28
NHH-65B-R2B	C	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 4.56 4.98 5.84	2.49 2.88 3.27 4.08	0.04 0.09 0.15 0.28
NHHSS-65B-R2B	A	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 4.36 4.76 5.58	2.38 2.75 3.12 3.90	0.07 0.12 0.17 0.30
NHHSS-65B-R2B	B	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 4.36 4.76 5.58	2.38 2.75 3.12 3.90	0.07 0.12 0.17 0.30
NHHSS-65B-R2B	C	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 4.36 4.76 5.58	2.38 2.75 3.12 3.90	0.07 0.12 0.17 0.30
MT6407-77A w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 5.26 5.61 6.36	2.68 3.14 3.62 4.63	0.10 0.14 0.18 0.29
MT6407-77A w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 5.26 5.61 6.36	2.68 3.14 3.62 4.63	0.10 0.14 0.18 0.29
MT6407-77A w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 5.26 5.61 6.36	2.68 3.14 3.62 4.63	0.10 0.14 0.18 0.29

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	CA _{AA} Front	CA _{AA} Side	Weight
			Horz	Lateral	Vert			ft ²	ft ²	
			ft	ft	ft	°	ft	ft ²	ft ²	K
CBRS RT4401-48A	A	From Leg	4.00	0.0000	140.00		No Ice	0.99	0.50	0.02
			0.00				1/2"	1.12	0.60	0.03
			0.00				Ice	1.26	0.70	0.04
							1" Ice	1.55	0.94	0.06
							2" Ice			
CBRS RT4401-48A	B	From Leg	4.00	0.0000	140.00		No Ice	0.99	0.50	0.02
			0.00				1/2"	1.12	0.60	0.03
			0.00				Ice	1.26	0.70	0.04
							1" Ice	1.55	0.94	0.06
							2" Ice			
CBRS RT4401-48A	C	From Leg	4.00	0.0000	140.00		No Ice	0.99	0.50	0.02
			0.00				1/2"	1.12	0.60	0.03
			0.00				Ice	1.26	0.70	0.04
							1" Ice	1.55	0.94	0.06
							2" Ice			
RF4439D-25A	A	From Leg	4.00	0.0000	140.00		No Ice	1.87	1.25	0.07
			0.00				1/2"	2.03	1.39	0.09
			0.00				Ice	2.21	1.54	0.11
							1" Ice	2.59	1.87	0.17
							2" Ice			
RF4439D-25A	B	From Leg	4.00	0.0000	140.00		No Ice	1.87	1.25	0.07
			0.00				1/2"	2.03	1.39	0.09
			0.00				Ice	2.21	1.54	0.11
							1" Ice	2.59	1.87	0.17
							2" Ice			
RF4439D-25A	C	From Leg	4.00	0.0000	140.00		No Ice	1.87	1.25	0.07
			0.00				1/2"	2.03	1.39	0.09
			0.00				Ice	2.21	1.54	0.11
							1" Ice	2.59	1.87	0.17
							2" Ice			
(2) RF4440D-13A	A	From Leg	4.00	0.0000	140.00		No Ice	1.87	1.13	0.07
			0.00				1/2"	2.03	1.27	0.09
			0.00				Ice	2.21	1.41	0.11
							1" Ice	2.59	1.72	0.16
							2" Ice			
(2) RF4440D-13A	B	From Leg	4.00	0.0000	140.00		No Ice	1.87	1.13	0.07
			0.00				1/2"	2.03	1.27	0.09
			0.00				Ice	2.21	1.41	0.11
							1" Ice	2.59	1.72	0.16
							2" Ice			
(2) RF4440D-13A	C	From Leg	4.00	0.0000	140.00		No Ice	1.87	1.13	0.07
			0.00				1/2"	2.03	1.27	0.09
			0.00				Ice	2.21	1.41	0.11
							1" Ice	2.59	1.72	0.16
							2" Ice			
RRFDC-3315-PF-48	B	From Leg	4.00	0.0000	140.00		No Ice	3.36	2.19	0.03
			0.00				1/2"	3.60	2.39	0.06
			2.00				Ice	3.84	2.61	0.09
							1" Ice	4.34	3.05	0.17
							2" Ice			
Side-By-Side Mounting Kit [#BSAMNT-SBS-1-2]	A	From Leg	4.00	0.0000	140.00		No Ice	2.38	2.38	0.04
			0.00				1/2"	3.40	3.40	0.05
			0.00				Ice	4.45	4.45	0.08
							1" Ice	5.91	5.91	0.15
							2" Ice			
Side-By-Side Mounting Kit [#BSAMNT-SBS-1-2]	B	From Leg	4.00	0.0000	140.00		No Ice	2.38	2.38	0.04
			0.00				1/2"	3.40	3.40	0.05
			0.00				Ice	4.45	4.45	0.08
							1" Ice	5.91	5.91	0.15
							2" Ice			
Side-By-Side Mounting Kit [#BSAMNT-SBS-1-2]	C	From Leg	4.00	0.0000	140.00		No Ice	2.38	2.38	0.04
			0.00				1/2"	3.40	3.40	0.05
			0.00				Ice	4.45	4.45	0.08
							1" Ice	5.91	5.91	0.15
							2" Ice			

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _A A _A		Weight
			Horz	Lateral	Vert			Front	Side	
			ft	ft	ft	°	ft	ft ²	ft ²	K
Mount Reinforcement Specifications	A	None			0.0000	140.00	No Ice	28.63	28.63	0.28
							1/2" Ice	37.31	37.31	0.67
							1" Ice	45.80	45.80	0.94
							2" Ice	62.38	62.38	1.63

APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	126.00	No Ice	14.69	6.87	0.19
							1/2" Ice	15.46	7.55	0.31
							1" Ice	16.23	8.25	0.46
							2" Ice	17.82	9.67	0.79
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	126.00	No Ice	14.69	6.87	0.19
							1/2" Ice	15.46	7.55	0.31
							1" Ice	16.23	8.25	0.46
							2" Ice	17.82	9.67	0.79
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	126.00	No Ice	14.69	6.87	0.19
							1/2" Ice	15.46	7.55	0.31
							1" Ice	16.23	8.25	0.46
							2" Ice	17.82	9.67	0.79
AIR -32 B2A/B66AA w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	126.00	No Ice	3.76	3.15	0.19
							1/2" Ice	4.12	3.49	0.25
							1" Ice	4.48	3.84	0.32
							2" Ice	5.24	4.58	0.48
AIR -32 B2A/B66AA w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	126.00	No Ice	3.76	3.15	0.19
							1/2" Ice	4.12	3.49	0.25
							1" Ice	4.48	3.84	0.32
							2" Ice	5.24	4.58	0.48
AIR -32 B2A/B66AA w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	126.00	No Ice	3.76	3.15	0.19
							1/2" Ice	4.12	3.49	0.25
							1" Ice	4.48	3.84	0.32
							2" Ice	5.24	4.58	0.48
RADIO 4449 B71 B85A_T-MOBILE	A	From Leg	4.00	0.00	0.0000	126.00	No Ice	1.97	1.59	0.07
							1/2" Ice	2.15	1.75	0.09
							1" Ice	2.33	1.92	0.12
							2" Ice	2.72	2.28	0.17
RADIO 4449 B71 B85A_T-MOBILE	B	From Leg	4.00	0.00	0.0000	126.00	No Ice	1.97	1.59	0.07
							1/2" Ice	2.15	1.75	0.09
							1" Ice	2.33	1.92	0.12
							2" Ice	2.72	2.28	0.17
RADIO 4449 B71 B85A_T-MOBILE	C	From Leg	4.00	0.00	0.0000	126.00	No Ice	1.97	1.59	0.07
							1/2" Ice	2.15	1.75	0.09
							1" Ice	2.33	1.92	0.12
							2" Ice	2.72	2.28	0.17
ATMAA1412D-1A20	A	From Leg	4.00	0.00	0.0000	126.00	No Ice	0.41	1.00	0.01
							1/2" Ice	0.50	1.13	0.02
							1" Ice	0.59	1.26	0.03
							2" Ice	0.81	1.55	0.06
ATMAA1412D-1A20	B	From Leg	4.00	0.00	0.0000	126.00	No Ice	0.41	1.00	0.01
							1/2" Ice	0.50	1.13	0.02
							1" Ice	0.59	1.26	0.03
							2" Ice	0.81	1.55	0.06
ATMAA1412D-1A20	C	From Leg	4.00	0.00	0.0000	126.00	No Ice	0.41	1.00	0.01
							1/2" Ice	0.50	1.13	0.02
							1" Ice	0.59	1.26	0.03
							2" Ice	0.81	1.55	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
12' Hor x 2.5" x 2.5" Angle Mount	A	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	5.00	0.02	0.07
						1/2"	6.23	0.07	0.10
						Ice	7.48	0.14	0.14
						1" Ice	9.62	0.32	0.24
12' Hor x 2.5" x 2.5" Angle Mount	B	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	5.00	0.02	0.07
						1/2"	6.23	0.07	0.10
						Ice	7.48	0.14	0.14
						1" Ice	9.62	0.32	0.24
12' Hor x 2.5" x 2.5" Angle Mount	C	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	5.00	0.02	0.07
						1/2"	6.23	0.07	0.10
						Ice	7.48	0.14	0.14
						1" Ice	9.62	0.32	0.24
Platform Mount [LP 713-1]	C	None		0.0000	126.00	2" Ice			
						No Ice	32.89	32.89	1.51
						1/2"	35.76	35.76	2.23
						Ice	38.76	38.76	3.03
						1" Ice	45.26	45.26	4.86

ERICSSON AIR 21 B2A B4P_T-MOBILE w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	3.14	2.59	0.11
						1/2"	3.45	2.88	0.16
						Ice	3.77	3.19	0.23
						1" Ice	4.43	3.84	0.38
ERICSSON AIR 21 B2A B4P_T-MOBILE w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	3.14	2.59	0.11
						1/2"	3.45	2.88	0.16
						Ice	3.77	3.19	0.23
						1" Ice	4.43	3.84	0.38
ERICSSON AIR 21 B2A B4P_T-MOBILE w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	3.14	2.59	0.11
						1/2"	3.45	2.88	0.16
						Ice	3.77	3.19	0.23
						1" Ice	4.43	3.84	0.38
AIR6449 B41 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	5.18	2.72	0.12
						1/2"	5.59	3.05	0.16
						Ice	6.01	3.39	0.22
						1" Ice	6.90	4.13	0.34
AIR6449 B41 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	5.18	2.72	0.12
						1/2"	5.59	3.05	0.16
						Ice	6.01	3.39	0.22
						1" Ice	6.90	4.13	0.34
AIR6449 B41 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	5.18	2.72	0.12
						1/2"	5.59	3.05	0.16
						Ice	6.01	3.39	0.22
						1" Ice	6.90	4.13	0.34
RRUS 4415 B25_CCIV2	A	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	1.84	0.82	0.05
						1/2"	2.01	0.94	0.06
						Ice	2.19	1.07	0.08
						1" Ice	2.57	1.37	0.12
RRUS 4415 B25_CCIV2	B	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	1.84	0.82	0.05
						1/2"	2.01	0.94	0.06
						Ice	2.19	1.07	0.08
						1" Ice	2.57	1.37	0.12
RRUS 4415 B25_CCIV2	C	From Leg	4.00 0.00 2.00	0.0000	126.00	2" Ice			
						No Ice	1.84	0.82	0.05
						1/2"	2.01	0.94	0.06
						Ice	2.19	1.07	0.08
						1" Ice	2.57	1.37	0.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
						1" Ice 2" Ice	2.57 1.37	0.12	
Platform Reinforcement Kit [#PRK-1245]	C	None		0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.84 16.96 22.08 32.32	0.28 0.30 0.32 0.36	

DMP65R-BU8D w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	15.89 16.81 17.76 19.70	7.89 8.74 9.60 11.37	0.14 0.25 0.38 0.68
DMP65R-BU6D w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.96 12.70 13.46 15.02	5.97 6.63 7.30 8.69	0.11 0.20 0.30 0.53
DMP65R-BU6D w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.96 12.70 13.46 15.02	5.97 6.63 7.30 8.69	0.11 0.20 0.30 0.53
DC6-48-60-18-8F	A	From Leg	1.00 0.00 3.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.21 1.89 2.11 2.57	1.21 1.89 2.11 2.57	0.02 0.04 0.07 0.13
DC6-48-60-18-8F	B	From Leg	1.00 0.00 3.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.21 1.89 2.11 2.57	1.21 1.89 2.11 2.57	0.02 0.04 0.07 0.13
DC6-48-60-18-8F	C	From Leg	1.00 0.00 3.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.21 1.89 2.11 2.57	1.21 1.89 2.11 2.57	0.02 0.04 0.07 0.13
RRUS 32 B30	A	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.69 2.91 3.14 3.61	1.57 1.76 1.95 2.35	0.06 0.08 0.10 0.16
RRUS 32 B30	B	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.69 2.91 3.14 3.61	1.57 1.76 1.95 2.35	0.06 0.08 0.10 0.16
RRUS 32 B30	C	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.69 2.91 3.14 3.61	1.57 1.76 1.95 2.35	0.06 0.08 0.10 0.16
RRUS 4449 B5/B12	A	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	B	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	C	From Leg	4.00 0.00	0.0000	117.00	No Ice 1/2"	1.97 2.14	1.41 1.56	0.07 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CA _{AA} Front ft ²	CA _{AA} Side ft ²	Weight K
			0.00			Ice 2.33	1.73	0.11
						1" Ice 2.72	2.07	0.16
						2" Ice		
RRUS 8843 B2/B66A_CCIV2	A	From Leg	4.00	0.0000	117.00	No Ice 1.98	1.70	0.08
			0.00			1/2" 2.16	1.86	0.10
			3.00			Ice 2.34	2.04	0.12
						1" Ice 2.73	2.41	0.18
						2" Ice		
RRUS 8843 B2/B66A_CCIV2	B	From Leg	4.00	0.0000	117.00	No Ice 1.98	1.70	0.08
			0.00			1/2" 2.16	1.86	0.10
			3.00			Ice 2.34	2.04	0.12
						1" Ice 2.73	2.41	0.18
						2" Ice		
RRUS 8843 B2/B66A_CCIV2	C	From Leg	4.00	0.0000	117.00	No Ice 1.98	1.70	0.08
			0.00			1/2" 2.16	1.86	0.10
			3.00			Ice 2.34	2.04	0.12
						1" Ice 2.73	2.41	0.18
						2" Ice		
Platform Mount [LP 303-1_HR-1]	C	None		0.0000	117.00	No Ice 17.09	17.09	1.50
						1/2" 21.47	21.47	1.88
						Ice 25.72	25.72	2.35
						1" Ice 33.96	33.96	3.52
						2" Ice		

AIR 6419 B77G w/ Mount Pipe	A	From Leg	4.00	0.0000	117.00	No Ice 4.32	2.49	0.08
			0.00			1/2" 4.74	2.84	0.11
			0.00			Ice 5.17	3.21	0.15
						1" Ice 6.09	4.00	0.24
						2" Ice		
AIR 6419 B77G w/ Mount Pipe	B	From Leg	4.00	0.0000	117.00	No Ice 4.32	2.49	0.08
			0.00			1/2" 4.74	2.84	0.11
			0.00			Ice 5.17	3.21	0.15
						1" Ice 6.09	4.00	0.24
						2" Ice		
AIR 6419 B77G w/ Mount Pipe	C	From Leg	4.00	0.0000	117.00	No Ice 4.32	2.49	0.08
			0.00			1/2" 4.74	2.84	0.11
			0.00			Ice 5.17	3.21	0.15
						1" Ice 6.09	4.00	0.24
						2" Ice		
AIR 6449 N77 w/ Mount Pipe	A	From Leg	4.00	0.0000	117.00	No Ice 3.65	2.72	0.11
			0.00			1/2" 3.99	3.03	0.15
			0.00			Ice 4.35	3.36	0.20
						1" Ice 5.11	4.05	0.31
						2" Ice		
AIR 6449 N77 w/ Mount Pipe	B	From Leg	4.00	0.0000	117.00	No Ice 3.65	2.72	0.11
			0.00			1/2" 3.99	3.03	0.15
			0.00			Ice 4.35	3.36	0.20
						1" Ice 5.11	4.05	0.31
						2" Ice		
AIR 6449 N77 w/ Mount Pipe	C	From Leg	4.00	0.0000	117.00	No Ice 3.65	2.72	0.11
			0.00			1/2" 3.99	3.03	0.15
			0.00			Ice 4.35	3.36	0.20
						1" Ice 5.11	4.05	0.31
						2" Ice		
TPA65R-BU8D w/ Mount Pipe	A	From Leg	4.00	0.0000	117.00	No Ice 15.94	7.91	0.12
			0.00			1/2" 16.87	8.76	0.24
			0.00			Ice 17.82	9.63	0.36
						1" Ice 19.76	11.40	0.67
						2" Ice		
TPA65R-BU6D w/ Mount Pipe	B	From Leg	4.00	0.0000	117.00	No Ice 12.25	6.05	0.10
			0.00			1/2" 13.00	6.71	0.19
			0.00			Ice 13.76	7.39	0.28
						1" Ice 15.34	8.79	0.52
						2" Ice		
TPA65R-BU6D w/ Mount	C	From Leg	4.00	0.0000	117.00	No Ice 12.25	6.05	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
Pipe			0.00 0.00			1/2" Ice 13.00 7.39 15.34 8.79	6.71 7.39 8.79	0.19 0.28 0.52
RADIO 4478 B14	A	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 2.02 2.20 2.39 1.55 2.78 1.89	1.25 1.40 1.55 1.89	0.06 0.08 0.10 0.15
RADIO 4478 B14	B	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 2.02 2.20 2.39 1.55 2.78 1.89	1.25 1.40 1.55 1.89	0.06 0.08 0.10 0.15
RADIO 4478 B14	C	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 2.02 2.20 2.39 1.55 2.78 1.89	1.25 1.40 1.55 1.89	0.06 0.08 0.10 0.15

PCS 1900MHz 4x45W-65MHz	A	From Leg	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
PCS 1900MHz 4x45W-65MHz	B	From Leg	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
PCS 1900MHz 4x45W-65MHz	C	From Leg	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
800MHz 2X50W RRH W/FILTER	A	From Leg	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 2.06 2.24 2.43 2.83	1.93 2.11 2.29 2.68	0.06 0.09 0.11 0.17
800MHz 2X50W RRH W/FILTER	B	From Leg	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 2.06 2.24 2.43 2.83	1.93 2.11 2.29 2.68	0.06 0.09 0.11 0.17
800MHz 2X50W RRH W/FILTER	C	From Leg	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 2.06 2.24 2.43 2.83	1.93 2.11 2.29 2.68	0.06 0.09 0.11 0.17
Pipe Mount [PM 601-3]	C	None		0.0000	104.00	No Ice 1/2" Ice 3.17 3.79 4.42 5.76	3.17 3.79 4.42 5.76	0.20 0.23 0.28 0.40

6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice 1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice 1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	103.00	2" Ice			
						No Ice	1.43	1.43	0.02
						1/2"	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
Platform Mount [LP 713-1]	C	None		0.0000	103.00	2" Ice			
						No Ice	32.89	32.89	1.51
						1/2"	35.76	35.76	2.23
						Ice	38.76	38.76	3.03
						1" Ice	45.26	45.26	4.86

AIR6449 B41_T-MOBILE w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	5.19	2.71	0.13
						1/2"	5.59	3.04	0.17
						Ice	6.02	3.38	0.23
						1" Ice	6.90	4.12	0.35
						2" Ice			
AIR6449 B41_T-MOBILE w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	5.19	2.71	0.13
						1/2"	5.59	3.04	0.17
						Ice	6.02	3.38	0.23
						1" Ice	6.90	4.12	0.35
						2" Ice			
AIR6449 B41_T-MOBILE w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	5.19	2.71	0.13
						1/2"	5.59	3.04	0.17
						Ice	6.02	3.38	0.23
						1" Ice	6.90	4.12	0.35
						2" Ice			
APXVAALL24_43-U- NA20_TMO w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	14.69	6.87	0.18
						1/2"	15.46	7.55	0.31
						Ice	16.23	8.25	0.45
						1" Ice	17.82	9.67	0.78
						2" Ice			
APXVAALL24_43-U- NA20_TMO w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	14.69	6.87	0.18
						1/2"	15.46	7.55	0.31
						Ice	16.23	8.25	0.45
						1" Ice	17.82	9.67	0.78
						2" Ice			
APXVAALL24_43-U- NA20_TMO w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	14.69	6.87	0.18
						1/2"	15.46	7.55	0.31
						Ice	16.23	8.25	0.45
						1" Ice	17.82	9.67	0.78
						2" Ice			
Radio 4480_TMOV2	A	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	2.88	1.40	0.08
						1/2"	3.09	1.56	0.10
						Ice	3.31	1.73	0.13
						1" Ice	3.78	2.09	0.19
						2" Ice			
Radio 4480_TMOV2	B	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	2.88	1.40	0.08
						1/2"	3.09	1.56	0.10
						Ice	3.31	1.73	0.13
						1" Ice	3.78	2.09	0.19
						2" Ice			
Radio 4480_TMOV2	C	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	2.88	1.40	0.08
						1/2"	3.09	1.56	0.10
						Ice	3.31	1.73	0.13
						1" Ice	3.78	2.09	0.19
						2" Ice			
RADIO 4460 B2/B25 B66_TMO	A	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	2.14	1.69	0.11
						1/2"	2.32	1.85	0.13
						Ice	2.51	2.02	0.16
						1" Ice	2.91	2.39	0.22
						2" Ice			
RADIO 4460 B2/B25 B66_TMO	B	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice	2.14	1.69	0.11
						1/2"	2.32	1.85	0.13
						Ice	2.51	2.02	0.16
						2" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
						1" Ice 2" Ice	2.91 2.39	0.22
RADIO 4460 B2/B25 B66_TMO	C	From Leg	4.00 0.00 2.00	0.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.14 2.32 2.51 2.91 2.39	0.11 0.13 0.16 0.22
***** *****								
MX08FRO665-21 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.01 8.52 9.04 10.11 6.12	0.11 0.19 0.29 0.52
MX08FRO665-21 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.01 8.52 9.04 10.11 6.12	0.11 0.19 0.29 0.52
MX08FRO665-21 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.01 8.52 9.04 10.11 6.12	0.11 0.19 0.29 0.52
RDIDC-9181-PF-48	A	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.31 2.50 2.70 3.12 1.96	0.02 0.04 0.06 0.12
TA08025-B604	A	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.96 2.14 2.32 2.71 1.55	0.06 0.08 0.10 0.15
TA08025-B604	B	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.96 2.14 2.32 2.71 1.55	0.06 0.08 0.10 0.15
TA08025-B604	C	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.96 2.14 2.32 2.71 1.55	0.06 0.08 0.10 0.15
TA08025-B605	A	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.96 2.14 2.32 2.71 1.72	0.08 0.09 0.11 0.16
TA08025-B605	B	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.96 2.14 2.32 2.71 1.72	0.08 0.09 0.11 0.16
TA08025-B605	C	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.96 2.14 2.32 2.71 1.72	0.08 0.09 0.11 0.16
(2) 8' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40 1.90	0.03 0.04 0.06 0.12
(2) 8' x 2" Mount Pipe	B	From Leg	4.00	0.0000	93.00	No Ice	1.90	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} _{Front} ft ²	C _{AA} _{Side} ft ²	Weight K	
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
(2) 8' x 2" Mount Pipe	C	From Leg	4.00	0.0000	93.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
Commscope MC-PK8-DSH	C	None		0.0000	93.00	No Ice	34.24	34.24	1.75
						1/2"	62.95	62.95	2.10
						Ice	91.66	91.66	2.45
						1" Ice	149.08	149.08	3.15
						2" Ice			

BCD-87010	C	From Leg	2.00	0.0000	74.00	No Ice	2.90	2.90	0.03
			0.00			1/2"	4.05	4.05	0.05
			6.00			Ice	5.21	5.21	0.08
						1" Ice	7.01	7.01	0.16
						2" Ice			
Side Arm Mount [SO 701-1]	C	From Leg	1.00	0.0000	74.00	No Ice	0.85	1.67	0.07
			0.00			1/2"	1.14	2.34	0.08
			0.00			Ice	1.43	3.01	0.09
						1" Ice	2.01	4.35	0.12
						2" Ice			

KS24019-L112A	C	From Leg	2.00	0.0000	50.00	No Ice	0.10	0.10	0.01
			0.00			1/2"	0.18	0.18	0.01
			2.00			Ice	0.26	0.26	0.01
						1" Ice	0.42	0.42	0.01
						2" Ice			
Side Arm Mount [SO 701-1]	C	From Leg	1.00	0.0000	50.00	No Ice	0.85	1.67	0.07
			0.00			1/2"	1.14	2.34	0.08
			0.00			Ice	1.43	3.01	0.09
						1" Ice	2.01	4.35	0.12
						2" Ice			

Load Combinations

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

Comb. No.	Description
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
L1	140 - 86.83	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-59.89	0.44	1.13
			Max. Mx	20	-29.10	639.65	0.81
			Max. My	14	-29.09	-0.75	-643.51
			Max. Vy	20	-23.75	639.65	0.81
			Max. Vx	14	23.92	-0.75	-643.51
			Max. Torque	22			-1.00
L2	86.83 - 38	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-82.77	1.58	0.58
			Max. Mx	20	-45.03	1888.12	1.20
			Max. My	14	-45.02	-1.08	-1900.13
			Max. Vy	20	-28.68	1888.12	1.20
			Max. Vx	14	28.86	-1.08	-1900.13
			Max. Torque	22			-1.00
L3	38 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-111.31	1.45	0.78
			Max. Mx	20	-66.68	3272.86	2.34
			Max. My	14	-66.68	-2.43	-3293.38
			Max. Vy	20	-32.79	3272.86	2.34
			Max. Vx	14	32.97	-2.43	-3293.38
			Max. Torque	18			-0.67

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	111.31	0.01	8.70
	Max. H _x	20	66.69	32.76	0.04
	Max. H _z	2	66.69	0.04	32.95
	Max. M _x	2	3290.28	0.04	32.95
	Max. M _z	8	3269.92	-32.76	-0.04
	Max. Torsion	6	0.67	-28.36	16.44
	Min. Vert	7	50.02	-28.36	16.44
	Min. H _x	8	66.69	-32.76	-0.04
	Min. H _z	14	66.69	-0.04	-32.95
	Min. M _x	14	-3293.38	-0.04	-32.95
	Min. M _z	20	-3272.86	32.76	0.04
	Min. Torsion	18	-0.67	28.36	-16.44

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	55.58	0.00	0.00	1.26	1.19	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	66.69	-0.04	-32.95	-3290.28	5.37	-0.22
0.9 Dead+1.0 Wind 0 deg - No Ice	50.02	-0.04	-32.95	-3263.73	4.96	-0.23
1.2 Dead+1.0 Wind 30 deg - No Ice	66.69	16.35	-28.51	-2847.32	-1630.84	-0.51
0.9 Dead+1.0 Wind 30 deg - No Ice	50.02	16.35	-28.51	-2824.39	-1617.86	-0.52
1.2 Dead+1.0 Wind 60 deg - No Ice	66.69	28.36	-16.44	-1640.99	-2829.69	-0.67
0.9 Dead+1.0 Wind 60 deg - No Ice	50.02	28.36	-16.44	-1627.95	-2806.90	-0.67
1.2 Dead+1.0 Wind 90 deg - No Ice	66.69	32.76	0.04	5.46	-3269.92	-0.64
0.9 Dead+1.0 Wind 90 deg - No Ice	50.02	32.76	0.04	5.03	-3243.53	-0.64
1.2 Dead+1.0 Wind 120 deg - No Ice	66.69	28.39	16.51	1650.86	-2833.58	-0.44
0.9 Dead+1.0 Wind 120 deg - No Ice	50.02	28.39	16.51	1636.96	-2810.76	-0.44
1.2 Dead+1.0 Wind 150 deg - No Ice	66.69	16.42	28.55	2854.32	-1637.59	-0.13
0.9 Dead+1.0 Wind 150 deg - No Ice	50.02	16.42	28.55	2830.57	-1624.56	-0.13
1.2 Dead+1.0 Wind 180 deg - No Ice	66.69	0.04	32.95	3293.38	-2.43	0.22
0.9 Dead+1.0 Wind 180 deg - No Ice	50.02	0.04	32.95	3266.05	-2.77	0.22
1.2 Dead+1.0 Wind 210 deg - No Ice	66.69	-16.35	28.51	2850.42	1633.79	0.51
0.9 Dead+1.0 Wind 210 deg - No Ice	50.02	-16.35	28.51	2826.71	1620.05	0.51
1.2 Dead+1.0 Wind 240 deg - No Ice	66.69	-28.36	16.44	1644.10	2832.63	0.67
0.9 Dead+1.0 Wind 240 deg - No Ice	50.02	-28.36	16.44	1630.26	2809.08	0.67
1.2 Dead+1.0 Wind 270 deg - No Ice	66.69	-32.76	-0.04	-2.34	3272.86	0.64
0.9 Dead+1.0 Wind 270 deg - No Ice	50.02	-32.76	-0.04	-2.71	3245.71	0.64
1.2 Dead+1.0 Wind 300 deg - No Ice	66.69	-28.39	-16.51	-1647.74	2836.53	0.45
0.9 Dead+1.0 Wind 300 deg - No Ice	50.02	-28.39	-16.51	-1634.64	2812.95	0.44
1.2 Dead+1.0 Wind 330 deg - No Ice	66.69	-16.42	-28.55	-2851.21	1640.54	0.13

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
0.9 Dead+1.0 Wind 330 deg - No Ice	50.02	-16.42	-28.55	-2828.26	1626.75	0.13
1.2 Dead+1.0 Ice+1.0 Temp	111.31	0.00	0.00	-0.78	1.45	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	111.31	-0.01	-8.70	-905.12	2.74	-0.12
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	111.31	4.32	-7.53	-783.43	-447.36	-0.16
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	111.31	7.49	-4.34	-452.02	-777.16	-0.16
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	111.31	8.66	0.01	0.27	-898.27	-0.12
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	111.31	7.50	4.36	452.23	-778.29	-0.04
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	111.31	4.34	7.54	782.81	-449.35	0.04
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	111.31	0.01	8.70	903.35	0.44	0.12
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	111.31	-4.32	7.53	781.66	450.54	0.16
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	111.31	-7.49	4.34	450.25	780.35	0.16
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	111.31	-8.66	-0.01	-2.03	901.46	0.12
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	111.31	-7.50	-4.36	-454.01	781.50	0.04
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	111.31	-4.34	-7.54	-784.58	452.54	-0.04
Dead+Wind 0 deg - Service	55.58	-0.01	-8.16	-810.43	2.18	-0.06
Dead+Wind 30 deg - Service	55.58	4.05	-7.07	-701.20	-401.28	-0.13
Dead+Wind 60 deg - Service	55.58	7.03	-4.07	-403.74	-696.90	-0.17
Dead+Wind 90 deg - Service	55.58	8.12	0.01	2.25	-805.46	-0.16
Dead+Wind 120 deg - Service	55.58	7.04	4.09	407.98	-697.86	-0.11
Dead+Wind 150 deg - Service	55.58	4.07	7.08	704.74	-402.95	-0.03
Dead+Wind 180 deg - Service	55.58	0.01	8.16	813.01	0.26	0.06
Dead+Wind 210 deg - Service	55.58	-4.05	7.07	703.78	403.73	0.13
Dead+Wind 240 deg - Service	55.58	-7.03	4.07	406.32	699.34	0.17
Dead+Wind 270 deg - Service	55.58	-8.12	-0.01	0.33	807.90	0.16
Dead+Wind 300 deg - Service	55.58	-7.04	-4.09	-405.40	700.30	0.11
Dead+Wind 330 deg - Service	55.58	-4.07	-7.08	-702.16	405.39	0.03

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	-55.58	0.00	0.00	55.58	0.00	0.000%
2	-0.04	-66.69	-32.95	0.04	66.69	32.95	0.000%
3	-0.04	-50.02	-32.95	0.04	50.02	32.95	0.000%
4	16.35	-66.69	-28.51	-16.35	66.69	28.51	0.000%
5	16.35	-50.02	-28.51	-16.35	50.02	28.51	0.000%
6	28.36	-66.69	-16.44	-28.36	66.69	16.44	0.000%
7	28.36	-50.02	-16.44	-28.36	50.02	16.44	0.000%
8	32.76	-66.69	0.04	-32.76	66.69	-0.04	0.000%
9	32.76	-50.02	0.04	-32.76	50.02	-0.04	0.000%
10	28.39	-66.69	16.51	-28.39	66.69	-16.51	0.000%
11	28.39	-50.02	16.51	-28.39	50.02	-16.51	0.000%
12	16.42	-66.69	28.55	-16.42	66.69	-28.55	0.000%
13	16.42	-50.02	28.55	-16.42	50.02	-28.55	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
14	0.04	-66.69	32.95	-0.04	66.69	-32.95	0.000%
15	0.04	-50.02	32.95	-0.04	50.02	-32.95	0.000%
16	-16.35	-66.69	28.51	16.35	66.69	-28.51	0.000%
17	-16.35	-50.02	28.51	16.35	50.02	-28.51	0.000%
18	-28.36	-66.69	16.44	28.36	66.69	-16.44	0.000%
19	-28.36	-50.02	16.44	28.36	50.02	-16.44	0.000%
20	-32.76	-66.69	-0.04	32.76	66.69	0.04	0.000%
21	-32.76	-50.02	-0.04	32.76	50.02	0.04	0.000%
22	-28.39	-66.69	-16.51	28.39	66.69	16.51	0.000%
23	-28.39	-50.02	-16.51	28.39	50.02	16.51	0.000%
24	-16.42	-66.69	-28.55	16.42	66.69	28.55	0.000%
25	-16.42	-50.02	-28.55	16.42	50.02	28.55	0.000%
26	0.00	-111.31	0.00	0.00	111.31	0.00	0.000%
27	-0.01	-111.31	-8.70	0.01	111.31	8.70	0.000%
28	4.32	-111.31	-7.53	-4.32	111.31	7.53	0.000%
29	7.49	-111.31	-4.34	-7.49	111.31	4.34	0.000%
30	8.66	-111.31	0.01	-8.66	111.31	-0.01	0.000%
31	7.50	-111.31	4.36	-7.50	111.31	-4.36	0.000%
32	4.34	-111.31	7.54	-4.34	111.31	-7.54	0.000%
33	0.01	-111.31	8.70	-0.01	111.31	-8.70	0.000%
34	-4.32	-111.31	7.53	4.32	111.31	-7.53	0.000%
35	-7.49	-111.31	4.34	7.49	111.31	-4.34	0.000%
36	-8.66	-111.31	-0.01	8.66	111.31	0.01	0.000%
37	-7.50	-111.31	-4.36	7.50	111.31	4.36	0.000%
38	-4.34	-111.31	-7.54	4.34	111.31	7.54	0.000%
39	-0.01	-55.58	-8.16	0.01	55.58	8.16	0.000%
40	4.05	-55.58	-7.07	-4.05	55.58	7.07	0.000%
41	7.03	-55.58	-4.07	-7.03	55.58	4.07	0.000%
42	8.12	-55.58	0.01	-8.12	55.58	-0.01	0.000%
43	7.04	-55.58	4.09	-7.04	55.58	-4.09	0.000%
44	4.07	-55.58	7.08	-4.07	55.58	-7.08	0.000%
45	0.01	-55.58	8.16	-0.01	55.58	-8.16	0.000%
46	-4.05	-55.58	7.07	4.05	55.58	-7.07	0.000%
47	-7.03	-55.58	4.07	7.03	55.58	-4.07	0.000%
48	-8.12	-55.58	-0.01	8.12	55.58	0.01	0.000%
49	-7.04	-55.58	-4.09	7.04	55.58	4.09	0.000%
50	-4.07	-55.58	-7.08	4.07	55.58	7.08	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00007412
3	Yes	4	0.00000001	0.00003707
4	Yes	5	0.00000001	0.00006888
5	Yes	5	0.00000001	0.00003377
6	Yes	5	0.00000001	0.00007061
7	Yes	5	0.00000001	0.00003468
8	Yes	4	0.00000001	0.00009690
9	Yes	4	0.00000001	0.00005697
10	Yes	5	0.00000001	0.00006871
11	Yes	5	0.00000001	0.00003365
12	Yes	5	0.00000001	0.00007096
13	Yes	5	0.00000001	0.00003479
14	Yes	4	0.00000001	0.00007475
15	Yes	4	0.00000001	0.00003764
16	Yes	5	0.00000001	0.00007041
17	Yes	5	0.00000001	0.00003452
18	Yes	5	0.00000001	0.00006847
19	Yes	5	0.00000001	0.00003353
20	Yes	4	0.00000001	0.00010365
21	Yes	4	0.00000001	0.00006219
22	Yes	5	0.00000001	0.00007133
23	Yes	5	0.00000001	0.00003500

24	Yes	5	0.00000001	0.00006930
25	Yes	5	0.00000001	0.00003394
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00094811
28	Yes	5	0.00000001	0.00008475
29	Yes	5	0.00000001	0.00008454
30	Yes	4	0.00000001	0.00093930
31	Yes	4	0.00000001	0.00099918
32	Yes	5	0.00000001	0.00008467
33	Yes	4	0.00000001	0.00094412
34	Yes	5	0.00000001	0.00008477
35	Yes	5	0.00000001	0.00008463
36	Yes	4	0.00000001	0.00094420
37	Yes	5	0.00000001	0.00008514
38	Yes	5	0.00000001	0.00008525
39	Yes	4	0.00000001	0.00001397
40	Yes	4	0.00000001	0.00003363
41	Yes	4	0.00000001	0.00003564
42	Yes	4	0.00000001	0.00001446
43	Yes	4	0.00000001	0.00003342
44	Yes	4	0.00000001	0.00003565
45	Yes	4	0.00000001	0.00001401
46	Yes	4	0.00000001	0.00003537
47	Yes	4	0.00000001	0.00003344
48	Yes	4	0.00000001	0.00001455
49	Yes	4	0.00000001	0.00003620
50	Yes	4	0.00000001	0.00003389

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 86.83	11.723	45	0.7051	0.0009
L2	92.5 - 38	5.249	45	0.5420	0.0003
L3	45 - 0	1.215	45	0.2445	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	BXA-80063-4BF-EDIN-X w/ Mount Pipe	45	11.723	0.7051	0.0009	92637
126.00	APXVAARR24_43-U-NA20 w/ Mount Pipe	45	9.690	0.6674	0.0007	33084
117.00	DMP65R-BU8D w/ Mount Pipe	45	8.417	0.6404	0.0006	20138
104.00	PCS 1900MHz 4x45W-65MHz	45	6.667	0.5939	0.0004	12866
103.00	6' x 2" Mount Pipe	45	6.539	0.5899	0.0004	12518
93.00	MX08FRO665-21 w/ Mount Pipe	45	5.308	0.5445	0.0003	9948
74.00	BCD-87010	45	3.306	0.4343	0.0002	8822
50.00	KS24019-L112A	45	1.486	0.2763	0.0001	7853

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 86.83	47.555	14	2.8621	0.0037
L2	92.5 - 38	21.288	14	2.1994	0.0014

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L3	45 - 0	4.924	14	0.9915	0.0003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	BXA-80063-4BF-EDIN-X w/ Mount Pipe	14	47.555	2.8621	0.0037	22889
126.00	APXVAARR24_43-U-NA20 w/ Mount Pipe	14	39.307	2.7090	0.0028	8174
117.00	DMP65R-BU8D w/ Mount Pipe	14	34.139	2.5993	0.0023	4974
104.00	PCS 1900MHz 4x45W-65MHz	14	27.041	2.4104	0.0018	3177
103.00	6' x 2" Mount Pipe	14	26.518	2.3939	0.0017	3091
93.00	MX08FRO665-21 w/ Mount Pipe	14	21.525	2.2096	0.0014	2455
74.00	BCD-87010	14	13.407	1.7620	0.0008	2177
50.00	KS24019-L112A	14	6.025	1.1204	0.0004	1937

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	140 - 86.83 (1)	TP39.223x26.216x0.3125	53.17	0.00	0.0	37.758 0	-29.09	2208.84	0.013
L2	86.83 - 38 (2)	TP50.56x37.2109x0.4063	54.50	0.00	0.0	63.364 5	-45.02	3706.82	0.012
L3	38 - 0 (3)	TP59.05x48.0329x0.5	45.00	0.00	0.0	94.265 5	-66.68	5514.53	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	140 - 86.83 (1)	TP39.223x26.216x0.3125	643.51	1838.14	0.350	0.00	1838.14	0.000
L2	86.83 - 38 (2)	TP50.56x37.2109x0.4063	1900.13	3995.66	0.476	0.00	3995.66	0.000
L3	38 - 0 (3)	TP59.05x48.0329x0.5	3293.38	7247.00	0.454	0.00	7247.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V _u K	φV _n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T _u kip-ft	φT _n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	140 - 86.83 (1)	TP39.223x26.216x0.3125	23.92	662.65	0.036	0.33	2187.20	0.000
L2	86.83 - 38 (2)	TP50.56x37.2109x0.4063	28.86	1112.05	0.026	0.22	4738.27	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L3	38 - 0 (3)	TP59.05x48.0329x0.5	32.97	1654.36	0.020	0.22	8520.33	0.000

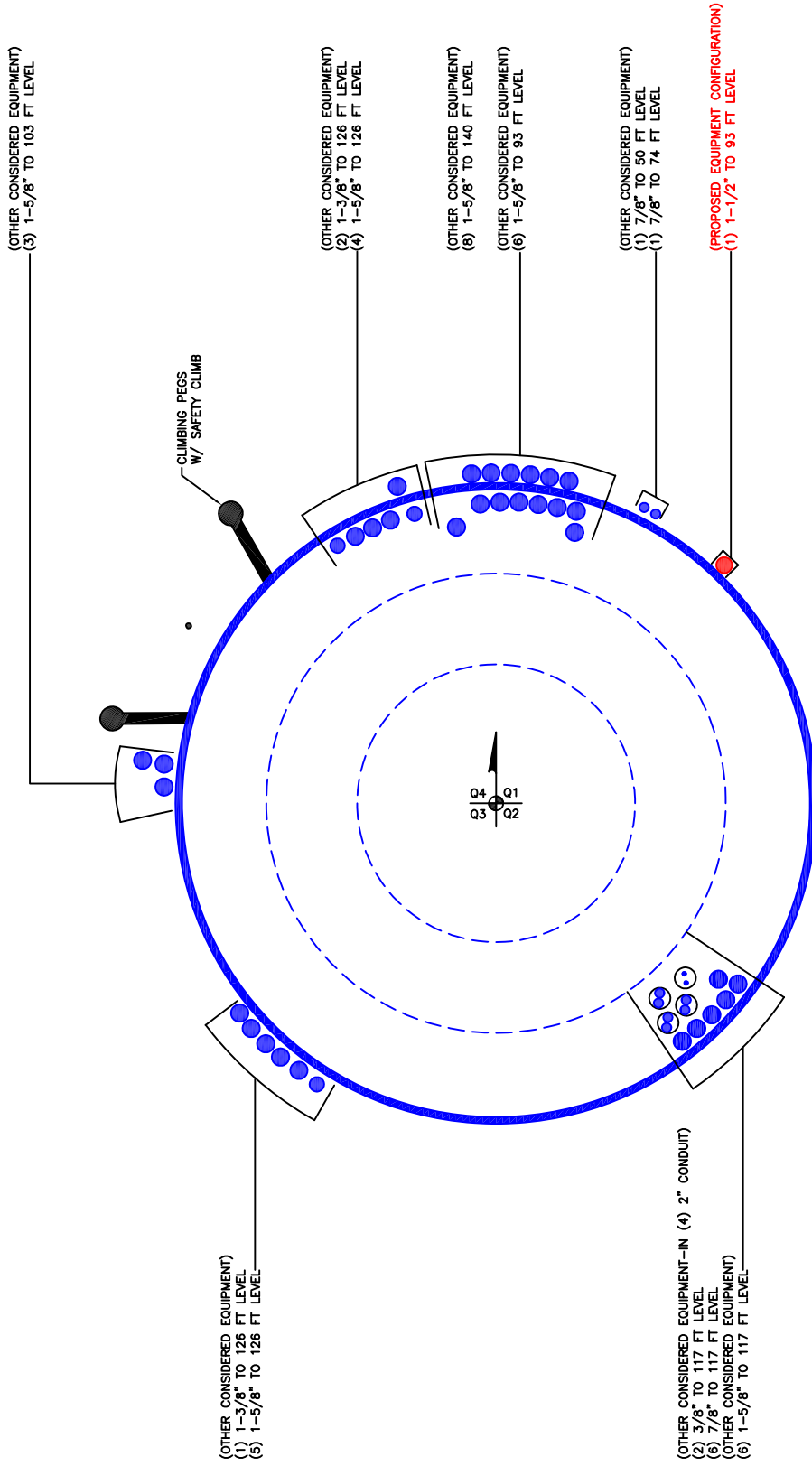
Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	140 - 86.83 (1)	0.013	0.350	0.000	0.036	0.000	0.365	1.050	4.8.2
L2	86.83 - 38 (2)	0.012	0.476	0.000	0.026	0.000	0.488	1.050	4.8.2
L3	38 - 0 (3)	0.012	0.454	0.000	0.020	0.000	0.467	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L1	140 - 86.83	Pole	TP39.223x26.216x0.3125	1	-29.09	2319.28	34.7	Pass	
L2	86.83 - 38	Pole	TP50.56x37.2109x0.4063	2	-45.02	3892.16	46.5	Pass	
L3	38 - 0	Pole	TP59.05x48.0329x0.5	3	-66.68	5790.26	44.5	Pass	
							Summary		
							Pole (L2)	46.5	Pass
							RATING =	46.5	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Monopole Base Plate Connection

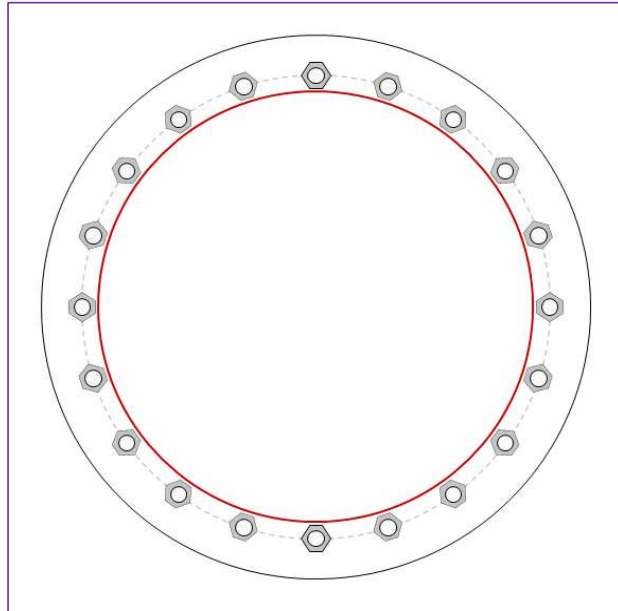


Site Info	
BU #	806369
Site Name	HRT 094 943225
Order #	556641, Rev. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	0.25

Applied Loads	
Moment (kip-ft)	3293.38
Axial Force (kips)	66.68
Shear Force (kips)	32.97

*TIA-222-H Section 15.5 Applied



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

Anchor Rod Data
(20) 2-1/4" \varnothing bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 63.5" BC
Base Plate Data
74.641" OD x 3" Plate (A572-60; $F_y=60$ ksi, $F_u=75$ ksi)
Stiffener Data
N/A
Pole Data
59.05" x 0.5" 12-sided pole (A572-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary	<i>(units of kips, kip-in)</i>	
$P_{u,t} = 121.08$	$\phi P_{n,t} = 243.75$	Stress Rating
$V_u = 1.65$	$\phi V_n = 149.1$	47.3%
$M_u = n/a$	$\phi M_n = n/a$	Pass
Base Plate Summary		
Max Stress (ksi):	8.81	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	15.5%	Pass

Drilled Pier Foundation

BU # :	806369
Site Name:	HRT 094 943225
Order Number:	556641, Rev. 0
TIA-222 Revision:	H
Tower Type:	Monopole



Check Limitation	
Apply TIA-222-H Section 15.5:	<input checked="" type="checkbox"/>
	N/A
Additional Longitudinal Rebar	
Input Effective Depths (else Actual):	<input type="checkbox"/>
Shear Design Options	
Check Shear along Depth of Pier:	<input checked="" type="checkbox"/>
Utilize Shear-Friction Methodology:	<input type="checkbox"/>
Override Critical Depth:	<input type="checkbox"/>

[Go to Soil Calculations](#)

Analysis Results		
Soil Lateral Check		
D_{red} (ft from TOC)	Compression	Uplift
Soil Safety Factor	7.47	-
Max Moment (kip-ft)	7.77	-
Rating*	3489.06	-
	16.3%	-
Soil Vertical Check		
	Compression	Uplift
Skin Friction (kips)	406.44	-
End Bearing (kips)	298.21	-
Weight of Concrete (kips)	251.31	-
Total Capacity (kips)	704.65	-
Axial (kips)	318.00	-
Rating*	43.0%	-

Reinforced Concrete Flexure		
Critical Depth (ft from TOC)	7.40	-
Critical Moment (kip-ft)	3489.03	-
Critical Moment Capacity	10737.31	-
Rating*	30.9%	-
Reinforced Concrete Shear		
Critical Depth (ft from TOC)	25.50	-
Critical Shear (kip)	194.97	-
Critical Shear Capacity	565.90	-
Rating*	32.8%	-

Structural Foundation Rating*		
Soil Interaction Rating*	32.8%	
	43.0%	

*Rating per TIA-222-H Section 15.5

Rebar & Pier Options

Embedded Pole Inputs

Belled Pier Inputs

Pier Design Data	
Depth	47 ft
Ext. Above Grade	0 ft
Pier Section 1	
<i>From 0' below grade to 47' below grade</i>	
Pier Diameter	7.5 ft
Rebar Quantity	52
Rebar Size	10
Rebar Cage Diameter	82 in
Tie Size	4
Tie Spacing	in

Soil Profile

# of Layers	8
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Groundwater Depth	10
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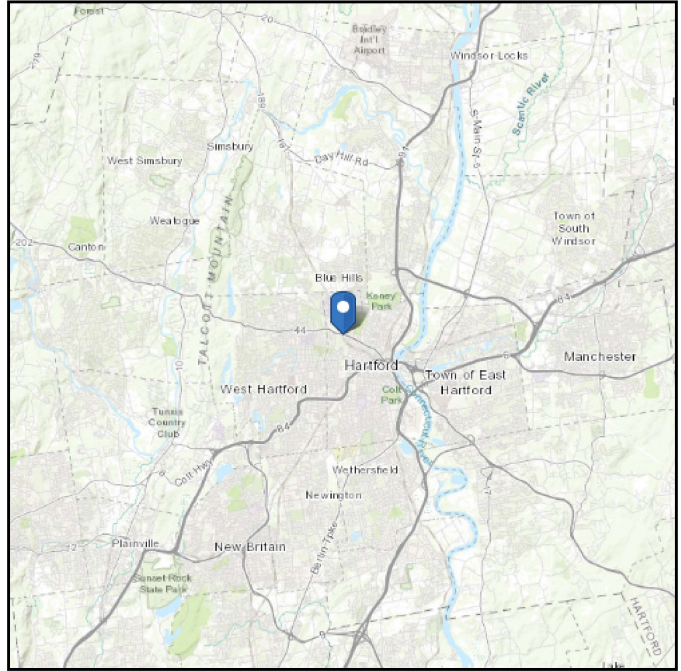
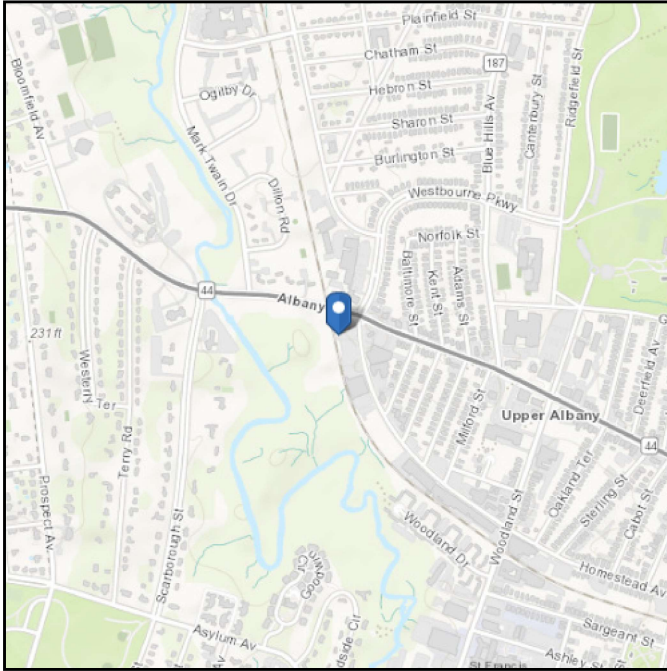
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	2	2	105	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	2	3.75	1.75	100	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
3	3.75	5	1.25	100	150	0.5	30	0.000	0.000	0.00	0.00			Cohesionless
4	5	10	5	100	150	0.5	30	0.000	0.000	0.60	0.60			Cohesionless
5	10	25	15	36	87.6	0.1	27	0.000	0.000	0.40	0.40			Cohesionless
6	25	35	10	36	87.6	0.1	27	0.000	0.000	0.60	0.60			Cohesionless
7	35	45	10	41	87.6	0.2	0	0.11	0.11	0.60	0.60			Cohesive
8	45	47	2	41	87.6	0	32	0.00	0.00	1.00	1.00	9		Cohesionless

ASCE 7 Hazards Report

Address:
No Address at This
Location

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

Elevation: 60.06 ft (NAVD 88)
Latitude: 41.783781
Longitude: -72.703794



Wind

Results:

Wind Speed	117 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	97 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Mon Mar 07 2022

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

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

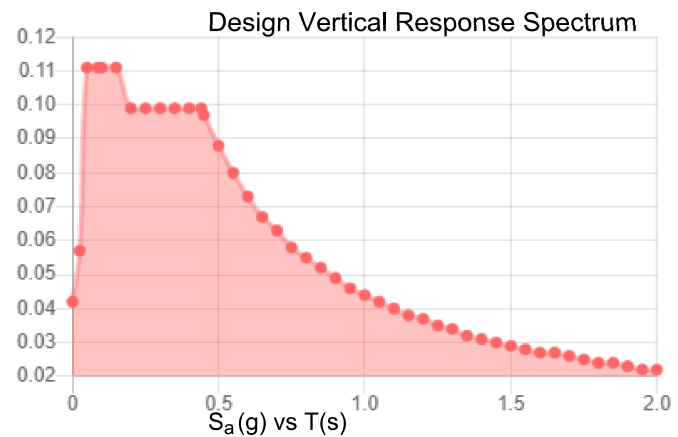
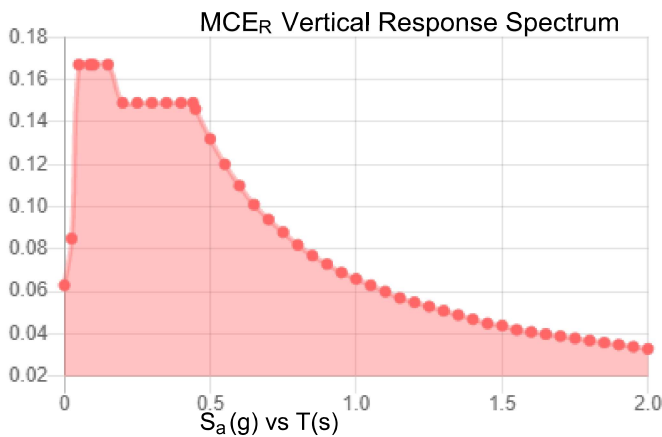
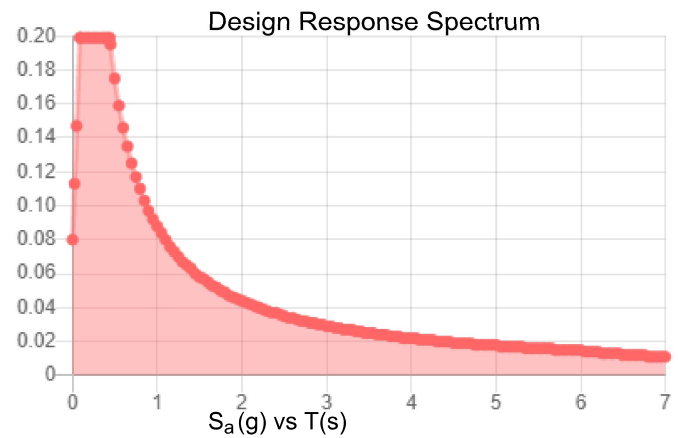
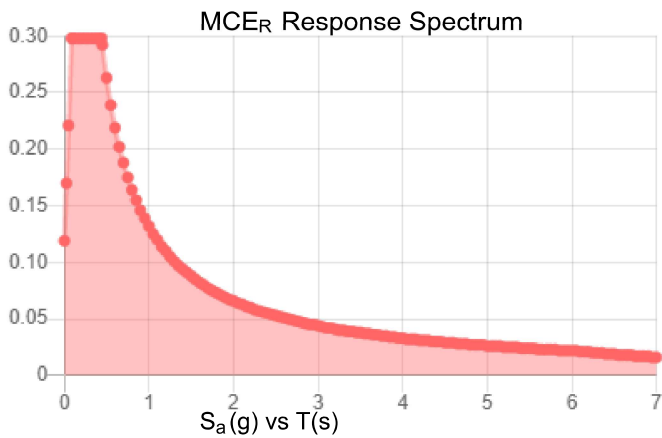
Seismic

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

Results:

S_s :	0.186	S_{D1} :	0.088
S_1 :	0.055	T_L :	6
F_a :	1.6	PGA :	0.1
F_v :	2.4	PGA _M :	0.16
S_{MS} :	0.298	F_{PGA} :	1.6
S_{M1} :	0.132	I_e :	1
S_{DS} :	0.199	C_v :	0.7

Seismic Design Category B



Data Accessed: Mon Mar 07 2022

Date Source:

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

Ice

Results:

Ice Thickness: 1.50 in.
Concurrent Temperature: 5 F
Gust Speed 50 mph

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

Date Accessed: Mon Mar 07 2022

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

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

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