



April 5, 2023

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

RE: **TS-DISH-135-230215** - Dish Wireless, LLC request for an order to approve tower sharing at an existing telecommunications facility located at 168 Catoona Lane, Stamford, Connecticut.  
Dish Site 13710333

Dear Ms. Bachman,

Thank you for your "incomplete Letter" dated March 14, 2023, receipt of which is hereby acknowledged. In accordance with the items discussed in your letter, enclosed please find three (3) sets of Revised Drawings incorporating the correct code year, and three (3) copies of the Radio-Frequency Analysis with far-field included in the tables on pages 15 and 16.

The explanation of the far-field analysis begins on page 11 of the report, with an illustration of the analysis on page 12. I was advised that PTG uses a standing height of 6.5 feet above the ground instead of 6 feet in order to produce an overly conservative result.

Thank you for your patience in this matter. Dish respectfully requests that the Council approve this request for the use of the tower located at 168 Catoona Lane, Stamford, CT 06902.

If you have any questions, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Jack Andrews', is written over a faint, circular blue stamp or watermark.

Jack Andrews  
Zoning Manager, Centerline Communications  
10130 Donleigh Drive  
Columbia, MD 21046  
443-677-0144

Enclosures:



DISH WIRELESS, L.L.C. SITE ID:

NJJER01123B

DISH WIRELESS, L.L.C. SITE ADDRESS:

168 CATOONA LANE  
STAMFORD, CT 06902

BIRD WATCH SITE:  
PLEASE CONTACT BIRD.WATCH@AMERICANTOWER.COM OR  
AMERICAN TOWER NOC AT 877-518-6937 FOR ASSISTANCE

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:
- INSTALL (3) PROPOSED PANEL ANTENNAS (1 PER SECTOR)
  - INSTALL (3) PROPOSED ANTENNA SECTOR FRAME MOUNTS (1 PER SECTOR)
  - 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:
- 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 SAFETY SWITCH (IF REQUIRED)
  - INSTALL (1) PROPOSED CIENA BOX (IF REQUIRED)
  - INSTALL (1) PROPOSED METER SOCKET

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.

THE PROJECT DEPICTED IN THESE PLANS QUALIFIES AS AN ELIGIBLE FACILITIES REQUEST ENTITLED TO EXPEDITED REVIEW UNDER 47 U.S.C. § 1455(A) AS A MODIFICATION OF AN EXISTING WIRELESS TOWER THAT INVOLVES THE COLLOCATION, REMOVAL, AND/OR REPLACEMENT OF TRANSMISSION EQUIPMENT THAT IS NOT A SUBSTANTIAL CHANGE UNDER CFR § 1.61000 (B)(7).

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.

SITE INFORMATION

PROPERTY OWNER: AMERICAN TOWER  
ADDRESS: 168 CATOONA LANE  
STAMFORD, CT 06902

TOWER TYPE: SELF SUPPORT TOWER

TOWER CO SITE ID: 88018

TOWER APP NUMBER: 13710333\_D2

COUNTY: FAIRFIELD

LATITUDE (NAD 83): 41° 3' 10.170" N  
41.052825

LONGITUDE (NAD 83): 73° 33' 46.970" W  
-73.56304722

ZONING JURISDICTION: STAMFORD, CT

ZONING DISTRICT: COMMERCIAL

PARCEL NUMBER: 116

OCCUPANCY GROUP: U

CONSTRUCTION TYPE: II-B

POWER COMPANY: EVERSOURCE

TELEPHONE COMPANY: FRONTIER COMMUNICATIONS

PROJECT DIRECTORY

APPLICANT: DISH WIRELESS, L.L.C.  
5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120

TOWER OWNER: AMERICAN TOWER  
10 PRESIDENTIAL WAY  
WOBBURN, MA 01801

ENGINEER: ATC TOWER SERVICES, LLC  
3500 REGENCY PARKWAY SUITE 100  
CARY, NC 27518

SITE ACQUISITION: WILLIAM SNIDER  
WILLIAM.SNIDER@DISH.COM

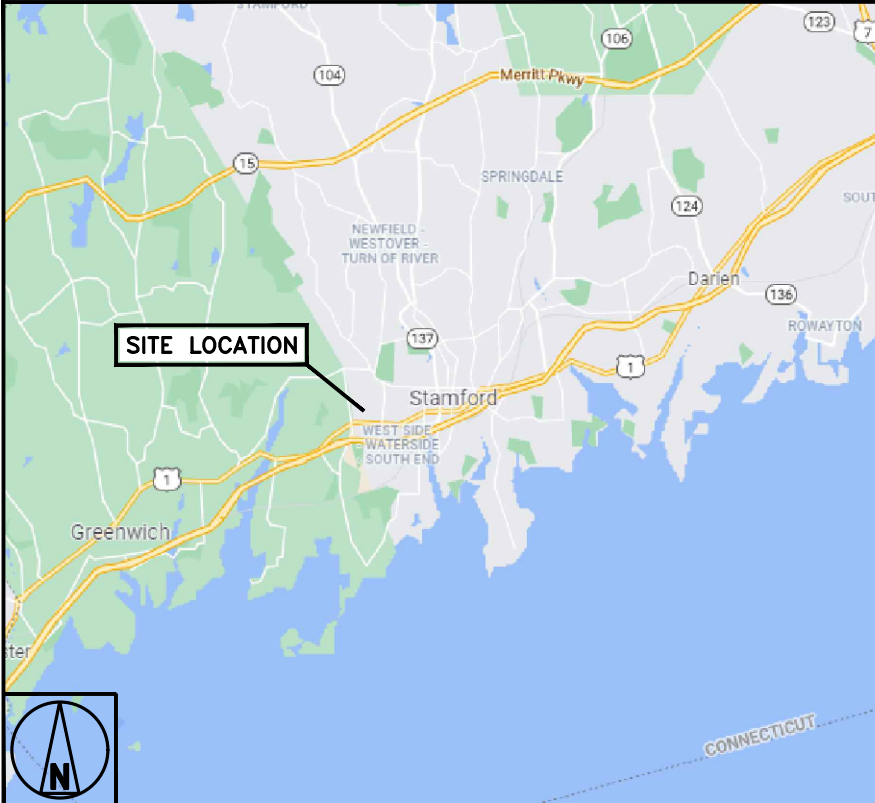
CONSTRUCTION MANAGER: VICTOR CORREA  
VICTOR.CORREA@DISH.COM

RF ENGINEER: MURUGABIRAN JAYAPAL  
MURUGABIRAN.JAYAPAL@DISH.COM

DIRECTIONS

COMING FROM NORTH I-95 TAKE EXIT 6. TURN RIGHT ONTO WEST AVE. TURN LEFT AT FIRST LIGHT ONTO W. MAIN ST. TURN RIGHT AT FIRST LIGHT AND FOLLOW ROAD TO END.

VICINITY MAP



NO SCALE



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



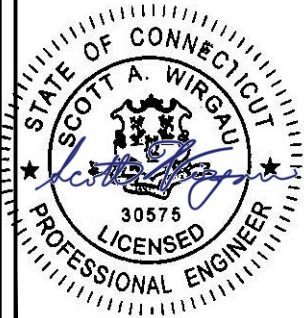
DRAWN BY: CHECKED BY: APPROVED BY:

TJC SRF SRF

RFDS REV #: ----

CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
0	08/27/2021	ISSUED FOR CONSTRUCTION
1	11/01/2021	PPC UPDATE
2	11/04/2022	RAD CENTER UPDT
3	03/21/2023	CODE COMPLIANCE



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.

A&E PROJECT NUMBER  
88018-13710333\_D2

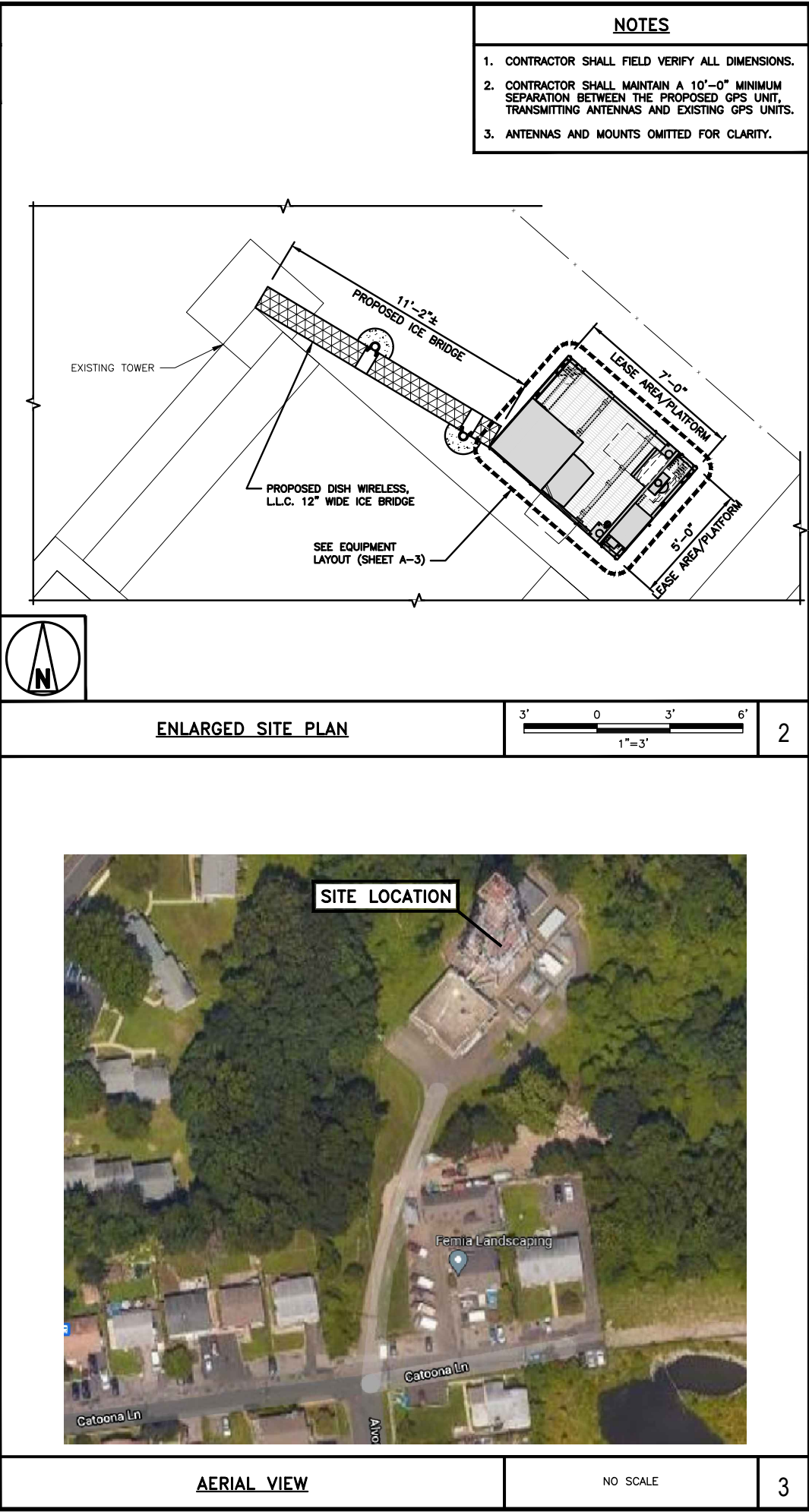
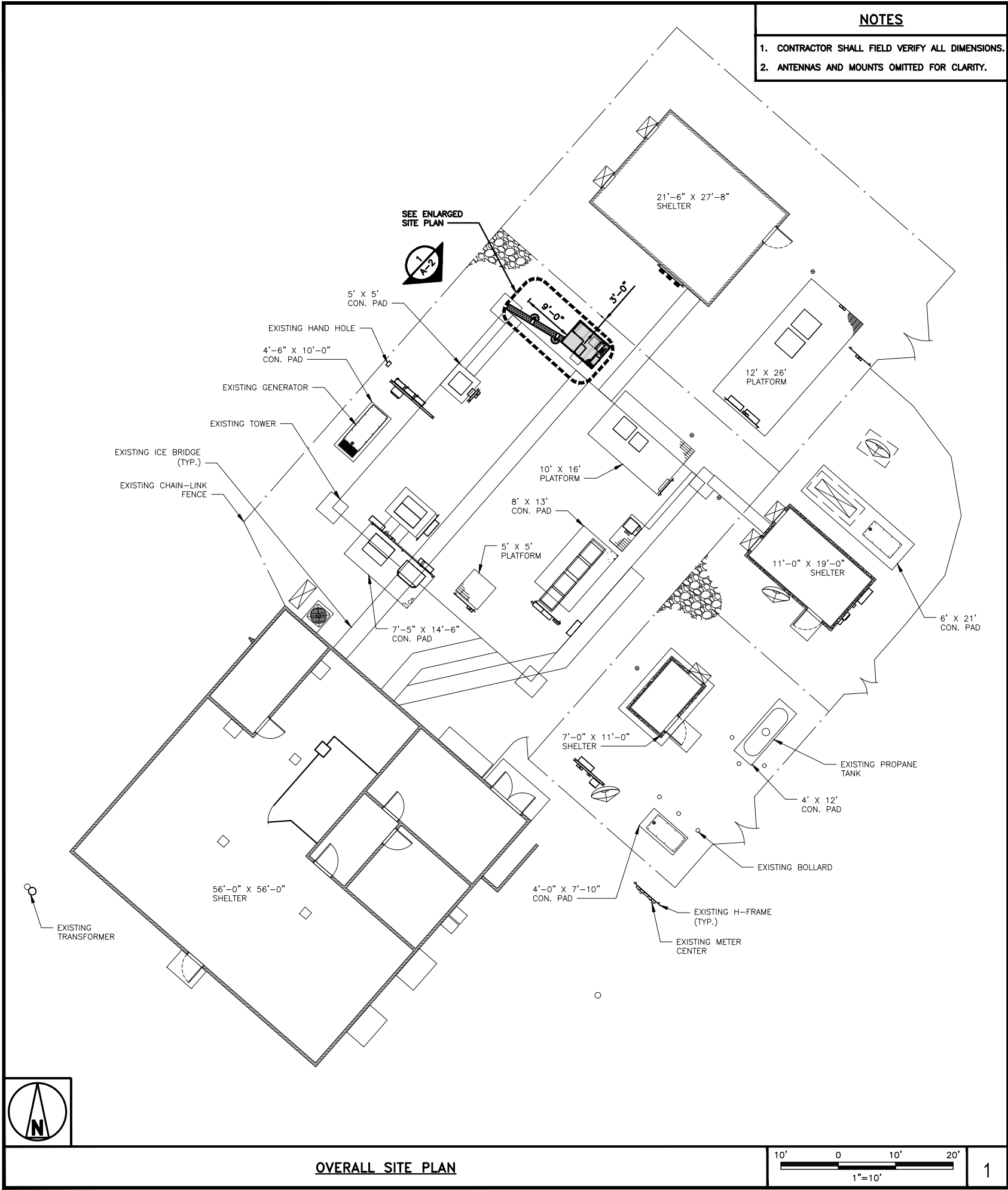
DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

SHEET TITLE  
TITLE SHEET

SHEET NUMBER

T-1





**dish**  
wireless.

5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120

**AMERICAN TOWER®**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: TJC  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: ----

CONSTRUCTION DOCUMENTS		
SUBMITTALS		
REV	DATE	DESCRIPTION
0	06/27/2021	ISSUED FOR CONSTRUCTION
1	11/01/2021	PPC UPDATE
2	11/04/2022	RAD CENTER UPDT



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88018-13710333\_D2

DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

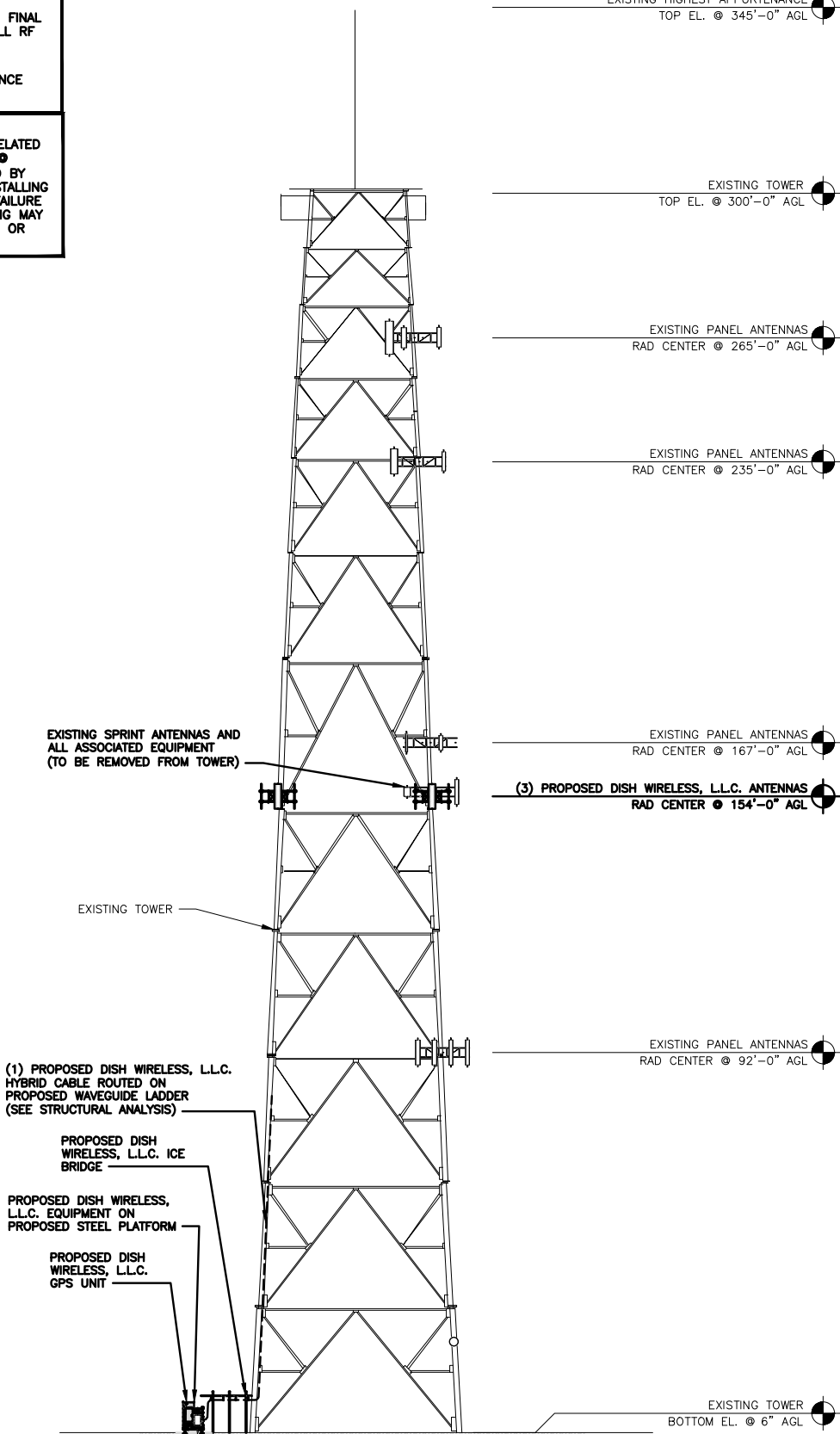
SHEET TITLE  
OVERALL AND ENLARGED  
SITE PLAN

SHEET NUMBER  
**A-1**

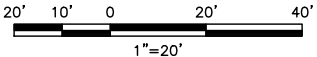
NOTES

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.

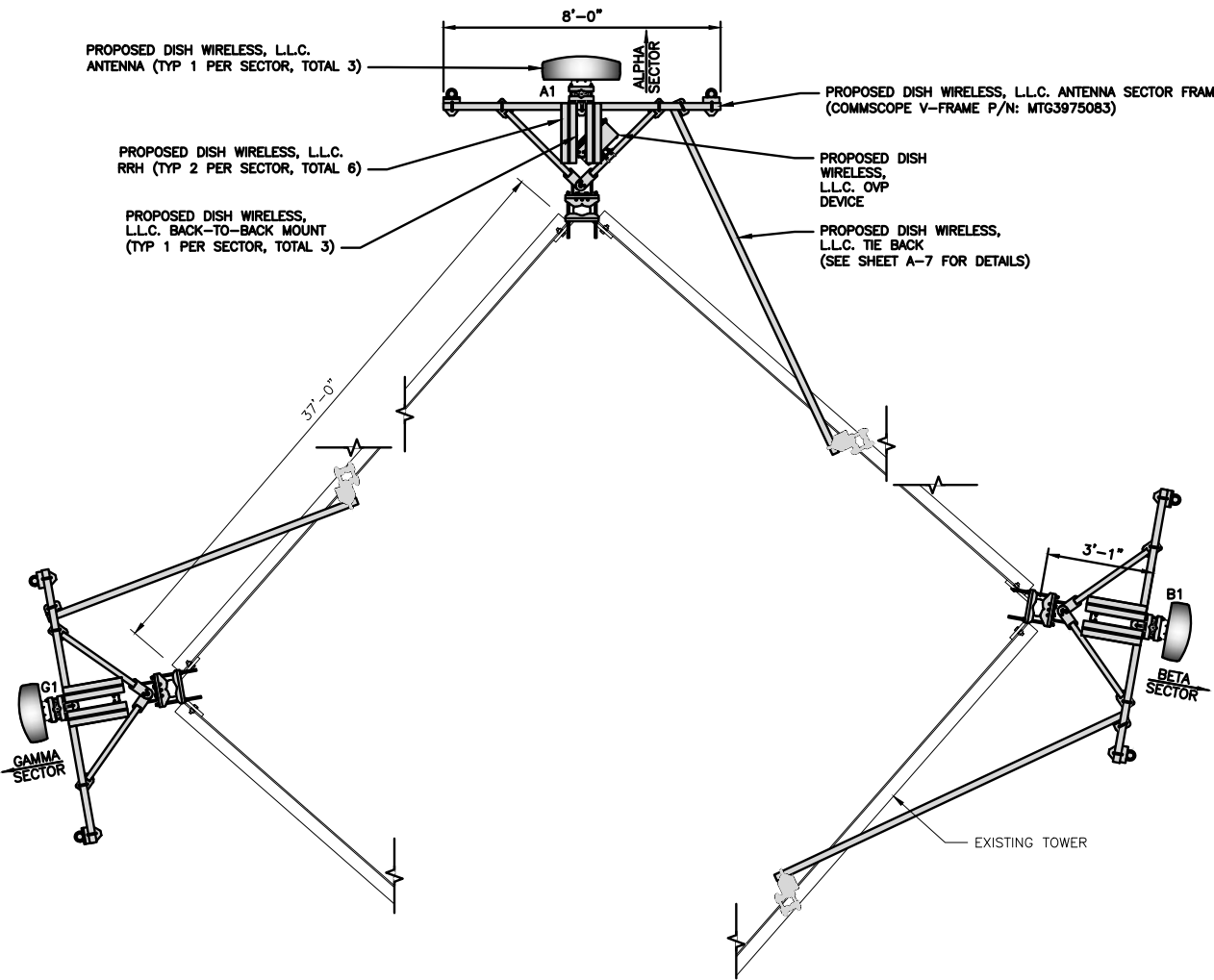
THE EXISTING LINES, ANTENNA, APPURTENANCES AND MOUNT RELATED TO THE EXISTING RAD CENTER @ 150'-155.6' SHALL BE REMOVED BY THE CONTRACTOR PRIOR TO INSTALLING THE PROPOSED INSTALLATION. FAILURE TO COMPLY WITH THE FOREGOING MAY RESULT IN ADDITIONAL CHARGES OR FEES.



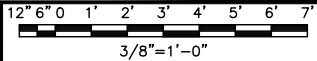
PROPOSED NORTH ELEVATION



1



ANTENNA LAYOUT



2

SECTOR	POSITION	ANTENNA						TRANSMISSION CABLE
		EXISTING OR PROPOSED	MANUFACTURER - MODEL NUMBER	TECHNOLOGY	SIZE (HxW)	AZIMUTH	RAD CENTER	
ALPHA	A1	PROPOSED	MX08FRO665-21	5G	72.0" x 20.0"	0°	154'-0"	(1) HIGH-CAPACITY HYBRID CABLE (185' LONG)
BETA	B1	PROPOSED	MX08FRO665-21	5G	72.0" x 20.0"	100°	154'-0"	
GAMMA	G1	PROPOSED	MX08FRO665-21	5G	72.0" x 20.0"	260°	154'-0"	

SECTOR	POSITION	RRH		NOTES
		MANUFACTURER - MODEL NUMBER	TECHNOLOGY	
ALPHA	A1	TA08025-B604	N66 / N70	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. 3. AZIMUTHS ARE TENTATIVE, NEEDS TO BE CONFIRMED BEFORE CONSTRUCTION STARTS.
	A1	TA08025-B605	N29 / N71	
BETA	B1	TA08025-B604	N66 / N70	
	B1	TA08025-B605	N29 / N71	
GAMMA	G1	TA08025-B604	N66 / N70	
	G1	TA08025-B605	N29 / N71	
-	-	RDIDC-9181-PF-48	-	

ANTENNA SCHEDULE

NO SCALE

3

dish  
wireless.

5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120

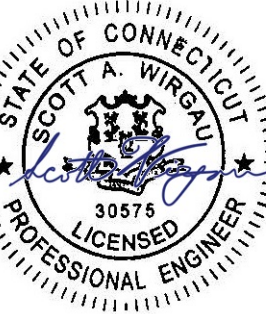
AMERICAN TOWER®  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: TJC  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: ----

CONSTRUCTION  
DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
0	09/27/2021	ISSUED FOR CONSTRUCTION
1	11/01/2021	PPC UPDATE
2	11/04/2022	RAD CENTER UPDT



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A&E PROJECT NUMBER  
88018-13710333\_D2

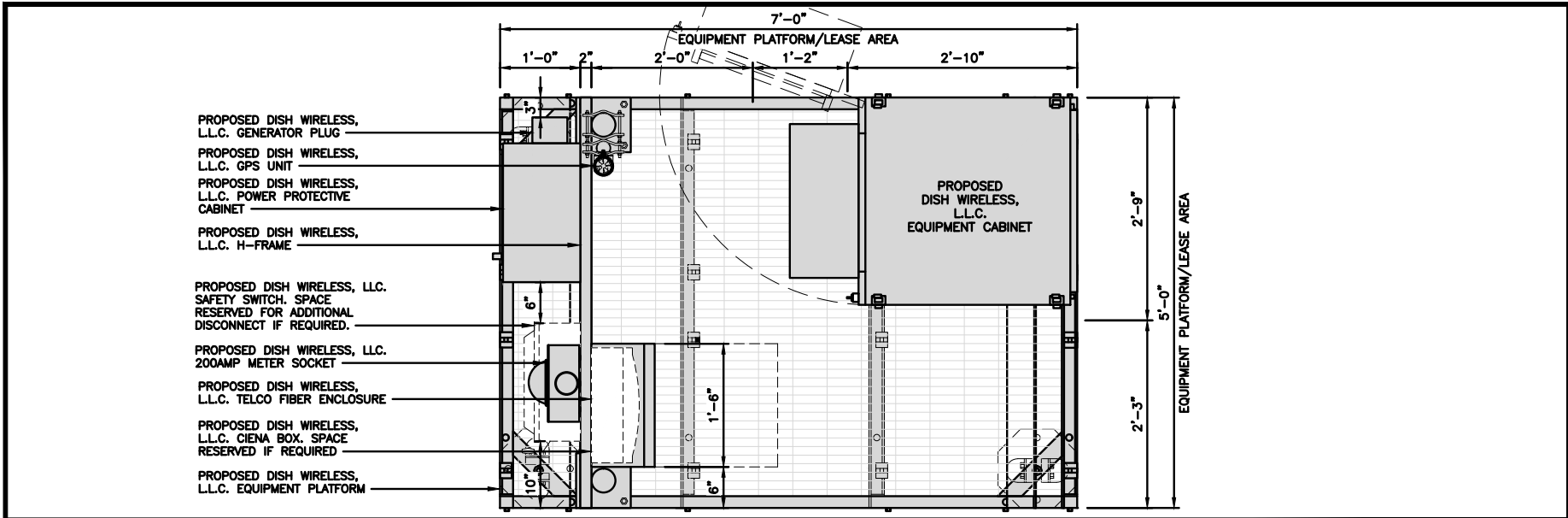
DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

SHEET TITLE  
ELEVATION, ANTENNA  
LAYOUT AND SCHEDULE

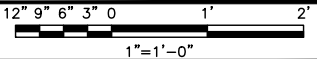
SHEET NUMBER

A-2

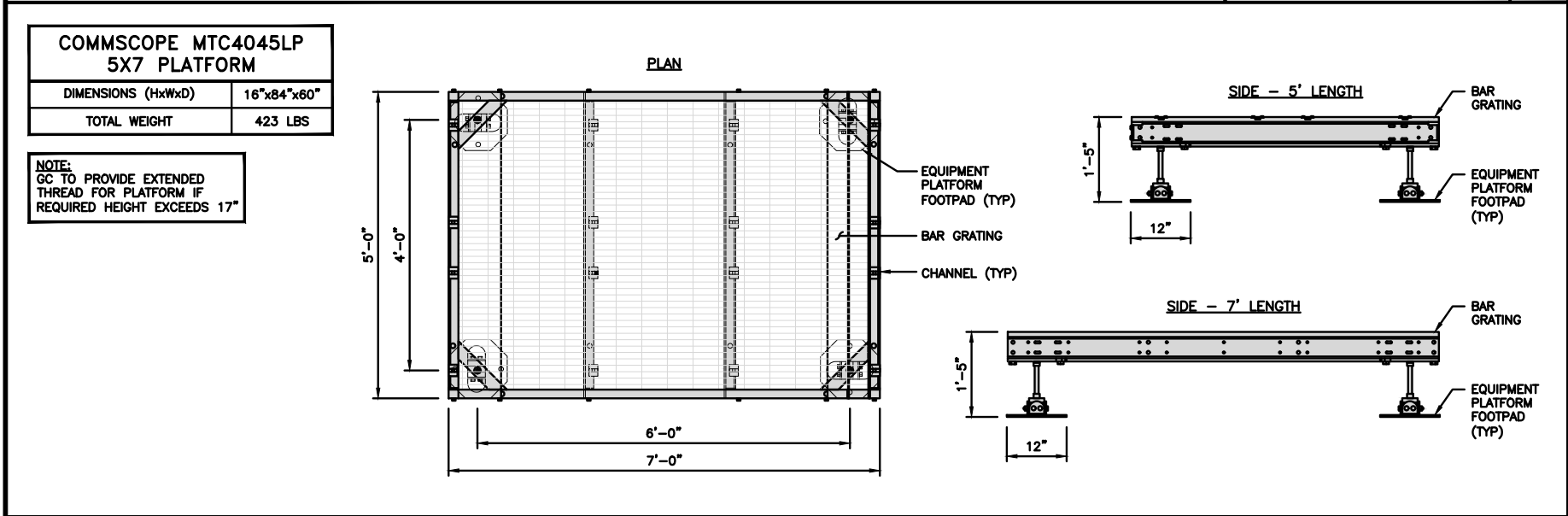




PLATFORM EQUIPMENT PLAN



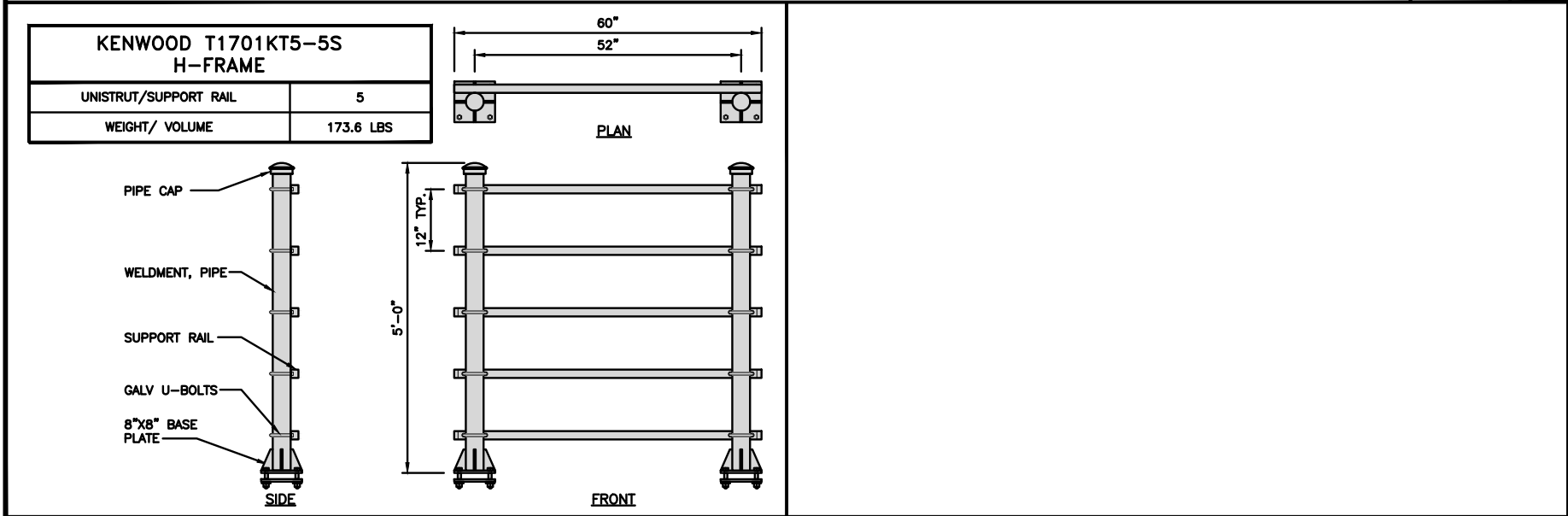
1



PLATFORM DETAIL

NO SCALE

2



H-FRAME DETAIL

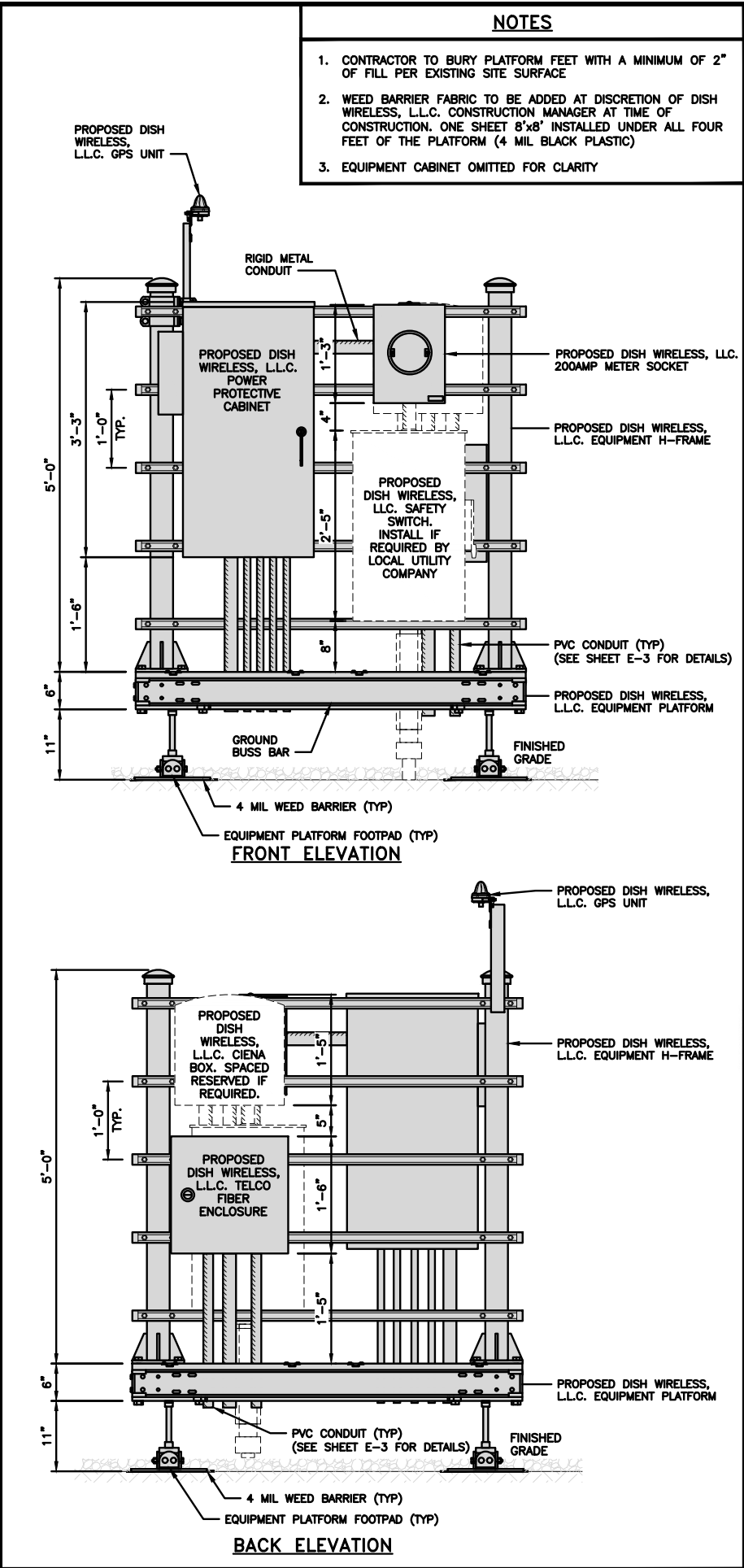
NO SCALE

3

NOT USED

NO SCALE

4



H-FRAME EQUIPMENT ELEVATION

**dish**  
wireless.

5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120

**AMERICAN TOWER**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: TJC  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: - - - -

### CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
0	09/27/2021	ISSUED FOR CONSTRUCTION
1	11/01/2021	PPC UPDATE



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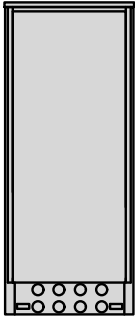
A&E PROJECT NUMBER  
88018-13710333\_D2

DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

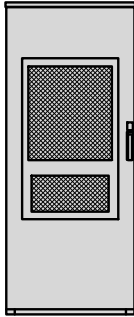
SHEET TITLE  
EQUIPMENT PLATFORM AND  
H-FRAME DETAILS

SHEET NUMBER  
**A-3**

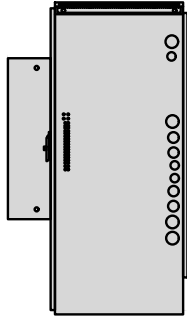
ENERSYS HEX CABINET 2000005996	
DIMENSIONS (HxWxD):	73"x30"x32"
WEIGHT EMPTY:	376 lbs
HEATER	800W
POWER SYSTEM	-48V ALPHA/600A



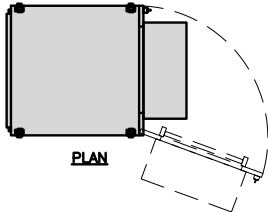
BACK



FRONT



SIDE



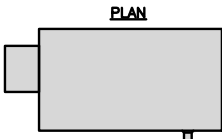
PLAN

CABINET DETAIL

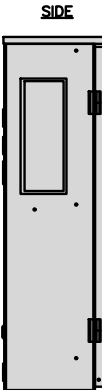
NO SCALE

1

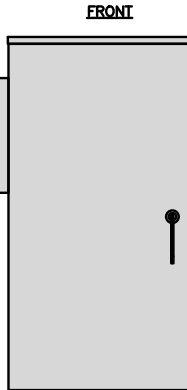
RAYCAP RDIAC-6512-P-240-MTS POWER & TELCO PROTECTION CABINET	
DIMENSIONS (HxWxD)	40"x20"x10"
WEIGHT/ VOLUME	124 LBS
MANUAL TRANSFER SWITCH	200A
LOAD CENTER	30 POSITION
MAIN BREAKER	200A, 65kA AIC
GENERATOR RECEPTACLE	CAMLOCK
NEMA RATING	3R POWDER COATED ALUMINUM
SURGE PROTECTION DEVICE	UL 1449 4TH EDITION LISTED



PLAN



SIDE



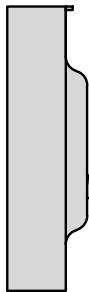
FRONT

POWER PROTECTION CABINET (PPC) DETAIL

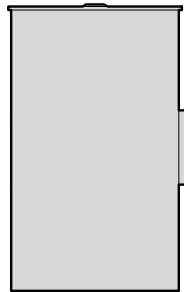
NO SCALE

2

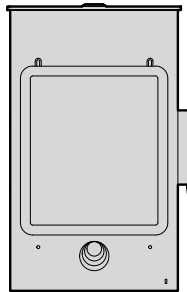
SQUARE D SAFETY SWITCH D324NRB	
ENCLOSURE DIM (HxWxD)	29.25"x17.25"x8.25"
TOTAL WEIGHT (EMPTY)	45.33 LBS
MAX VOLTAGE/AMPS/WATT	240V/200A/48000W
ENCLOSURE RATING	OUTDOOR NEMA 3R



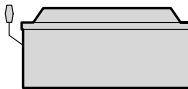
SIDE



BACK



FRONT



PLAN

SAFETY SWITCH

NO SCALE

3

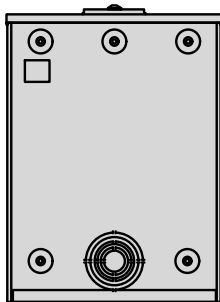
EATON METER SOCKET UNRRS213BEUSE	
METER SOCKET TYPE	RING
ENCLOSURE DIM (HxWxD)	16"x12"x6"
MAIN AMPERE RATING	200A
WEIGHT	18 LBS



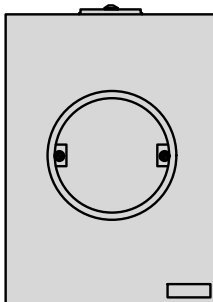
PLAN



SIDE



BACK



FRONT

METER SOCKET DETAIL

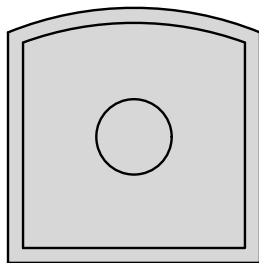
NO SCALE

4

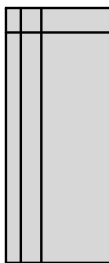
CIENA 3931 SERVICE DELIVERY SWITCH	
DIMENSIONS (HxWxD)	17.0"x16.8"x7.0" 431x427x178mm
WEIGHT	28.6 LBS/13.0 KG
POWER INPUT	60W MAX



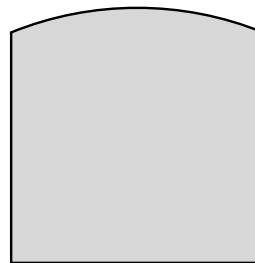
PLAN



FRONT



SIDE



BACK

CIENA DETAIL

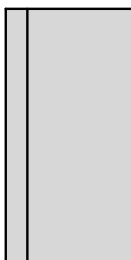
NO SCALE

5

CHARLES FIBER TELCO ENCLOSURE CUBE-MP1818WB-A	
ENCLOSURE DIM (HxWxD)	18.0"x18.0"x9.25"
NEMA RATING	4X
THERMAL	SEALED
MOUNTING BACKBOARD	WOOD



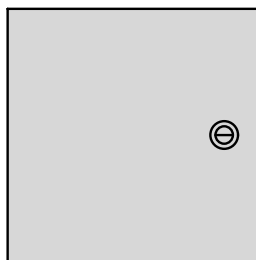
PLAN



SIDE



BACK



FRONT

FIBER TELCO ENCLOSURE DETAIL

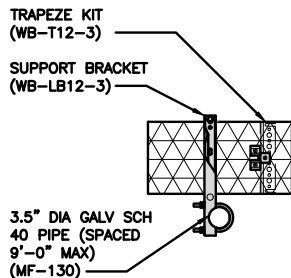
NO SCALE

6

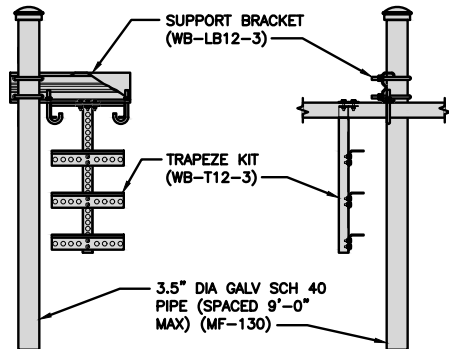
COMMSCOPE WB-K110-B WAVEGUIDE BRIDGE KIT	
DIMENSIONS (HxL)	160"x10"
WEIGHT/ VOLUME	325.0 LBS
CABLE RUN (QTY)	12

INCLUDED PRODUCTS:

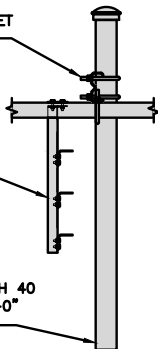
WB-T12-3 TRAPEZE KIT,  
3 RUNGS  
WB-LB12-3 SUPPORT BRACKET  
MF-130 DIRECT BURIAL PIPE  
COLUMN, 13'-4"



PLAN



FRONT

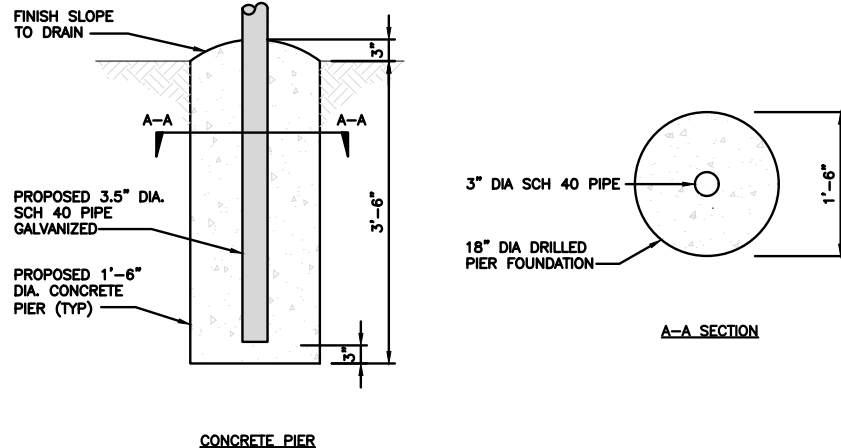


SIDE

ICE BRIDGE DETAIL

NO SCALE

7

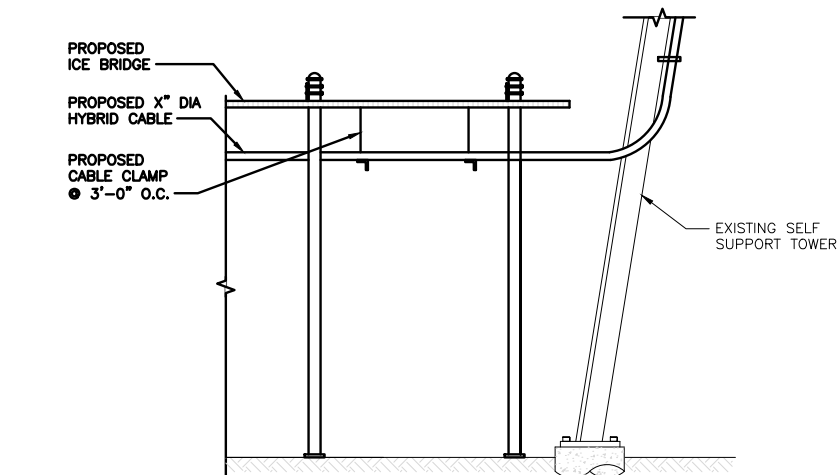


CONCRETE PIER

TYPICAL ICE BRIDGE CONCRETE PIER DETAIL

NO SCALE

8



HYBRID CABLE RUN

NO SCALE

9

**dish**  
wireless.

5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120

**AMERICAN TOWER**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: CHECKED BY: APPROVED BY:

TJC SRF SRF

RFDS REV #: ----

## CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
0	09/27/2021	ISSUED FOR CONSTRUCTION
1	11/01/2021	PPC UPDATE



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A&E PROJECT NUMBER  
88018-13710333\_D2

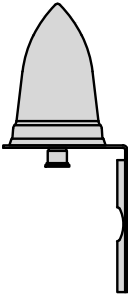
DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

SHEET TITLE  
EQUIPMENT DETAILS

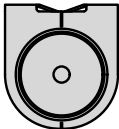
SHEET NUMBER

**A-4**

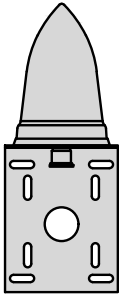
PCTEL GPSGL-TMG-SPI-40NCB	
DIMENSIONS (DIAxH) MM/INCH	81x184mm 3.2"x7.25"
WEIGHT W/ACCESSORIES	075 lbs
CONNECTOR	N-FEMALE
FREQUENCY RANGE	1590 ± 30MHz



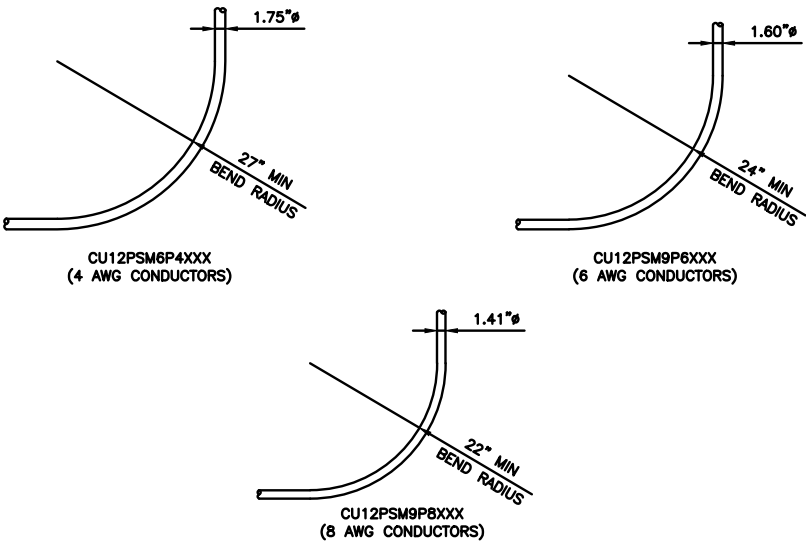
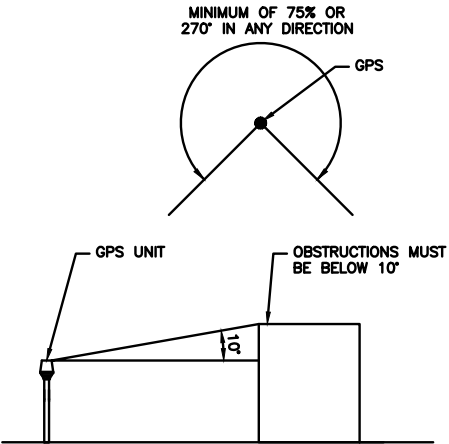
BACK



TOP



SIDE



GPS DETAIL

NO SCALE

1

GPS MINIMUM SKY VIEW REQUIREMENTS

NO SCALE

2

CABLES UNLIMITED HYBRID CABLE  
MINIMUM BEND RADIUSES

NO SCALE

3

NOT USED

NO SCALE

4

NOT USED

NO SCALE

5

NOT USED

NO SCALE

6

NOT USED

NO SCALE

7

NOT USED

NO SCALE

8

NOT USED

NO SCALE

9

**dish**  
wireless.

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LITTLETON, CO 80120

**AMERICAN TOWER**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

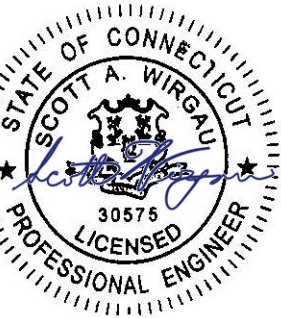
DRAWN BY: CHECKED BY: APPROVED BY:

TJC SRF SRF

RFDS REV #: ----

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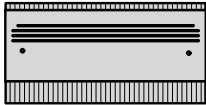
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EQUIPMENT DETAILS

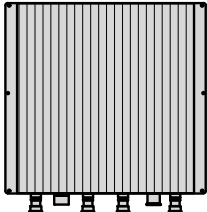
SHEET NUMBER

**A-5**

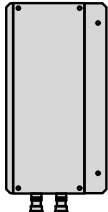
FUJITSU DUAL BAND TA08025-B604	
DIMENSIONS (HxWxD)	14.9"x15.7"x7.8"
WEIGHT	63.9 lbs
CONNECTOR TYPE	4.3-10 RF CONNECTOR
POWER SUPPLY	DC -58~-36V



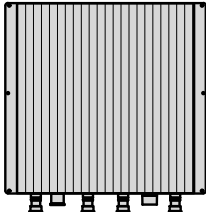
PLAN



BACK

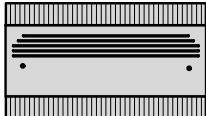


SIDE

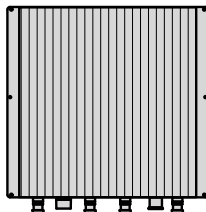


FRONT

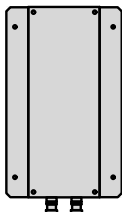
FUJITSU TRIPLE BAND TA08025-B605	
DIMENSIONS (HxWxD)	14.9"x15.7"x9"
WEIGHT	74.95 lbs
CONNECTOR TYPE	4.3-10 RF CONNECTOR
POWER SUPPLY	DC -58~-36V



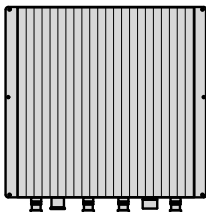
PLAN



BACK



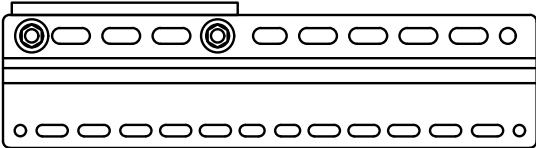
SIDE



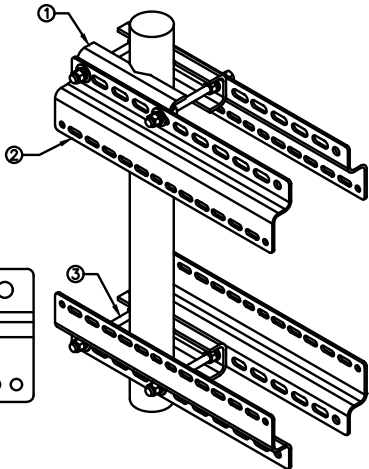
FRONT

SABRE DOUBLE Z-BRACKET G10123155	
DIMENSIONS (HxWxD) (1 BRACKET)	5"x20"x1-13/16"
WEIGHT (FULL ASSEMBLY)	35.79 lbs
PACKAGE QUANTITY	4

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



NOTE:  
OR DISH Wireless L.L.C.  
APPROVED EQUIVALENT



RRH DETAIL

NO SCALE

1

RRH DETAIL

NO SCALE

2

RRH MOUNT DETAIL

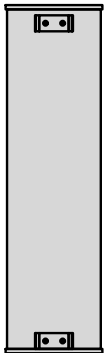
NO SCALE

3

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



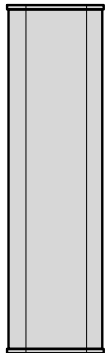
PLAN



BACK



SIDE



FRONT

ANTENNA DETAIL

NO SCALE

4

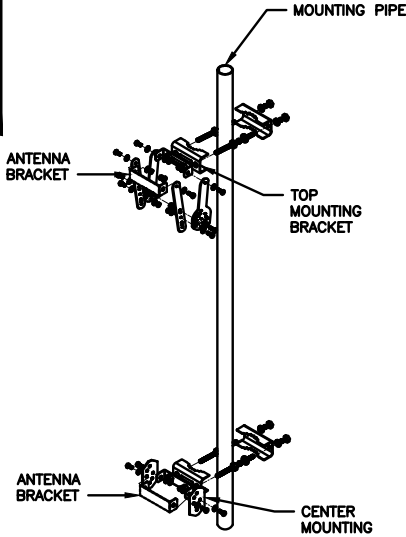
NOT USED

NO SCALE

5

JMA ANTENNA MOUNT BRACKET #91900318	
TOTAL WEIGHT (WITH BRACKETS)	18 lbs (8.18 Kg)
POLE DIAMETER RANGE	2.5" TO 4.5"

NOTE:  
KIT #91900318: TOP AND BOTTOM BRACKETS  
FOR 4-, 6-, AND 8-FOOT ANTENNAS  
ANTENNA BRACKET NOT PART OF KIT



NOTE:  
OR DISH Wireless L.L.C.  
APPROVED EQUIVALENT

ANTENNA BRACKET DETAIL

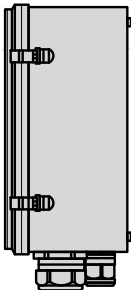
NO SCALE

6

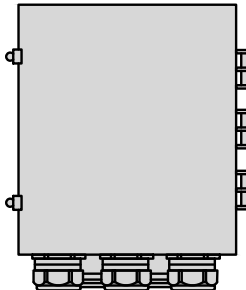
RAYCAP RDIDC-9181-PF-48 DC SURGE PROTECTION (OVP)	
DIMENSIONS (HxWxD)	18.98"x14.39"x8.15"
WEIGHT	21.82 LBS



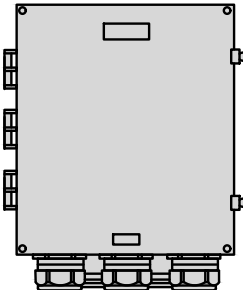
PLAN



SIDE



BACK



FRONT

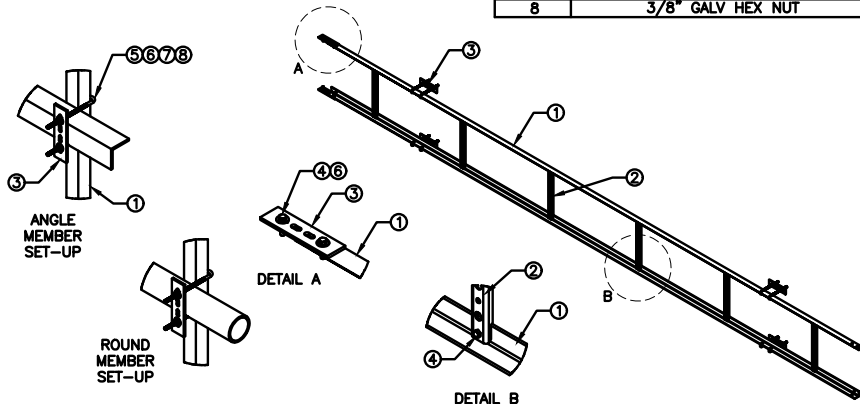
SURGE SUPPRESSION DETAIL (OVP)

NO SCALE

7

COMMSCOPE 20' CABLE LADDER 6 HOLE RUNGS	
DIMENSIONS (WxL)	20.5"x240"
WEIGHT	84.94 lbs

ITEM#	DESCRIPTION
1	20" ANGLE SIDE RAIL
2	20" LADDER RUNG
3	BACKING PLATE
4	3/8"x1-1/2" GALV BOLT KIT
5	8" GALV J-BOLT KIT
6	3/8" GALV FLAT WASHER
7	3/8" GALV LOCK WASHER
8	3/8" GALV HEX NUT

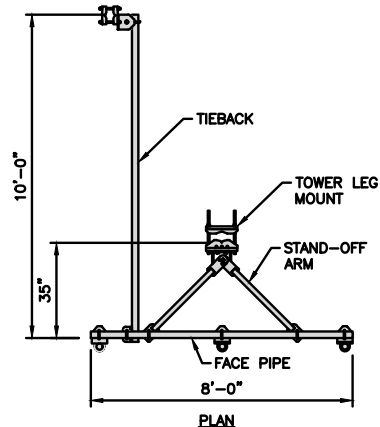


CABLE LADDER DETAIL

NO SCALE

8

COMMSCOPE V-FRAME MTG3975083	
FACE SIZE	8'-0"
WEIGHT	352.136 lbs



ANTENNA FRAME DETAIL

NO SCALE

9

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TJC SRF SRF

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STAMFORD, CT 06902

SHEET TITLE  
EQUIPMENT DETAILS

SHEET NUMBER

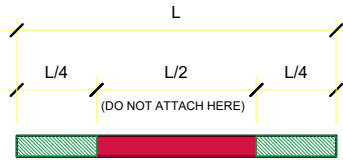
**A-6**



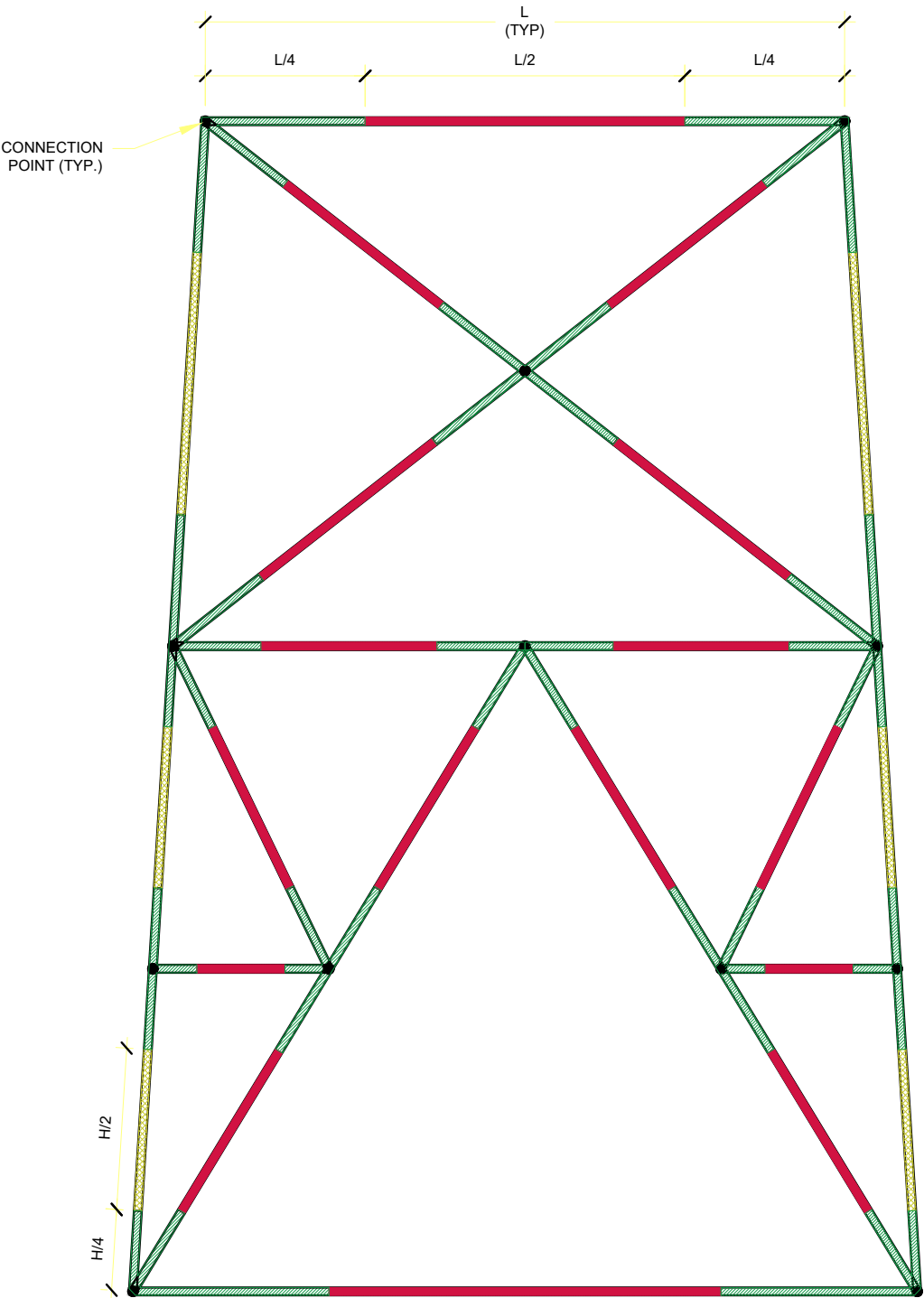
STIFF ARM LOCATION NOTES:

- TIE BACK SHALL BE CONNECTED PER MANUFACTURER SPECIFICATIONS. IF THE ANGLE OF ATTACHMENT DEVIATES FROM THE MANUFACTURER RANGES, A SITE SPECIFIC ANALYSIS THAT CONSIDERS THESE EFFECTS ON BOTH THE TOWER AND THE MOUNT WILL BE NEEDED.
- ACCEPTABLE STIFF ARM TO TOWER MEMBER ATTACHMENT LOCATIONS:
  - A) INTERIOR BRACING MEMBERS:
    - WITHIN 25% OF EITHER END OF THE MEMBER'S LENGTH.
  - B) TOWER LEGS:
    - WITHIN 25% OF EITHER END OF THE MEMBER'S LENGTH. IF ATTACHMENT IS NOT WITHIN 25% OF EITHER END OF THE MEMBERS LENGTH THEN ADJUST ATTACHMENT POINT TO MINIMIZE DISTANCE TO END OF MEMBER WHILE FOLLOWING MANUFACTURERS SPECIFICATIONS.

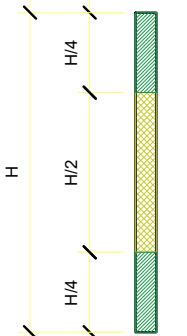
- ACCEPTABLE ATTACHMENT REGION & FORCE
- ACCEPTABLE ATTACHMENT REGION & FORCE
- DO NOT ATTACH HERE



INTERIOR BRACING



TOWER SECTION



TOWER LEG



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LITTLETON, CO 80120

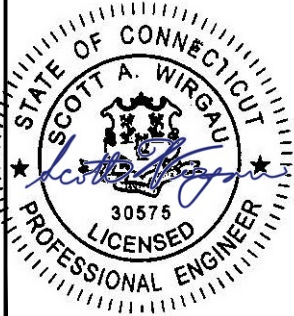


DRAWN BY:	CHECKED BY:	APPROVED BY:
TJC	SRF	SRF

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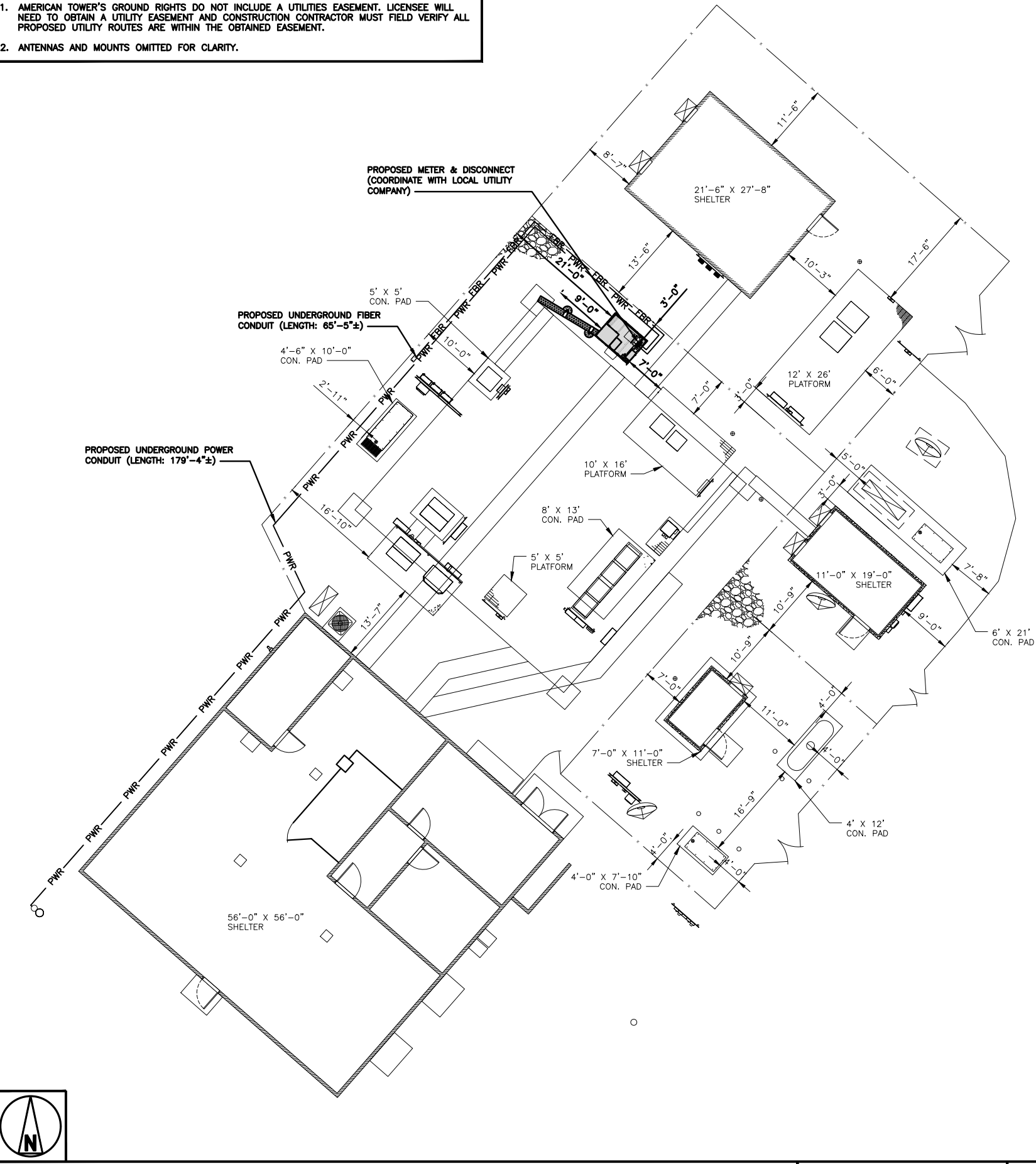
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PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

SHEET TITLE  
EQUIPMENT DETAILS

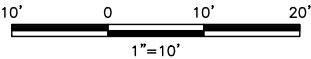
SHEET NUMBER  
A-7

NOTES

1. AMERICAN TOWER'S GROUND RIGHTS DO NOT INCLUDE A UTILITIES EASEMENT. LICENSEE WILL NEED TO OBTAIN A UTILITY EASEMENT AND CONSTRUCTION CONTRACTOR MUST FIELD VERIFY ALL PROPOSED UTILITY ROUTES ARE WITHIN THE OBTAINED EASEMENT.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



UTILITY ROUTE PLAN



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.

- 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.
- 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.
- LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO CONSTRUCTION.
- CONDUIT ROUGH-IN SHALL BE COORDINATED WITH THE MECHANICAL EQUIPMENT TO AVOID LOCATION CONFLICTS. VERIFY WITH THE MECHANICAL EQUIPMENT CONTRACTOR AND COMPLY AS REQUIRED.
- CONTRACTOR SHALL PROVIDE ALL BREAKERS, CONDUITS AND CIRCUITS AS REQUIRED FOR A COMPLETE SYSTEM.
- CONTRACTOR SHALL PROVIDE PULL BOXES AND JUNCTION BOXES AS REQUIRED BY THE NEC ARTICLE 314.
- CONTRACTOR SHALL PROVIDE ALL STRAIN RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
- 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.
- 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.
- ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
- PANEL SCHEDULE LOADING AND CIRCUIT ARRANGEMENTS REFLECT POST-CONSTRUCTION EQUIPMENT.
- CONTRACTOR SHALL BE RESPONSIBLE FOR AS-BUILT PANEL SCHEDULE AND SITE DRAWINGS.
- ALL TRENCHES IN COMPOUND TO BE HAND DUG

ELECTRICAL NOTES

NO SCALE



AERIAL VIEW

NO SCALE

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wireless.

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LITTLETON, CO 80120



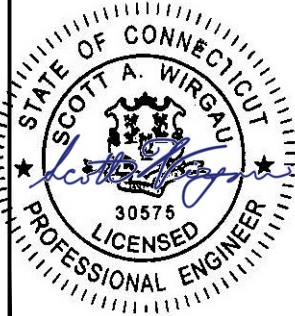
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STAMFORD, CT 06902

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"

VARIES PER PART NUMBER

2'-0"

SLIP JOINT (SEE CHART FOR PART NUMBER)

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

TRENCHING NOTES

1. CONTRACTOR SHALL RESTORE THE TRENCH TO ITS ORIGINAL CONDITIONS BY EITHER SEEDING OR SODDING GRASS AREAS, OR REPLACING ASPHALT OR CONCRETE AREAS TO ITS ORIGINAL CROSS SECTION.

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

3. ALL CONDUITS SHALL BE INSTALLED IN COMPLIANCE WITH THE CURRENT NATIONAL ELECTRIC CODE (NEC) OR AS REQUIRED BY THE LOCAL JURISDICTION, WHICHEVER IS THE MOST STRINGENT.

SEE TRENCHING NOTE 1

BACKFILL PER SITE WORK SPECIFICATIONS (SEE GENERAL NOTES)

SLOPE TO SUIT SOIL CONDITION IN ACCORDANCE WITH LOCAL REGULATIONS SEE TRENCHING NOTE 2

30" OR 6" BELOW FROST LINE, WHICHEVER IS GREATER

UTILITY WARNING TAPE

SAND BEDDING PER SITE WORK SPECIFICATIONS

VERTICAL DEPTH SEE TRENCHING NOTE 2

1'-0"

1'-0"

DISH Wireless L.L.C. PROVIDES 12AWG WIRE (6' TAIL)

PROPOSED DISH Wireless L.L.C. UNISTRUT

PROPOSED DISH Wireless L.L.C. 10 AMP DISTRIBUTION BREAKER

PROPOSED DISH Wireless L.L.C. 12 AWG WIRE

PROPOSED DISH Wireless L.L.C. 1-1/2" POWER FROM CABINET

DISH Wireless L.L.C. INSTALLS 1-1/2" CONDUITS FOR POWER AND FIBER TO CABINET

DISH Wireless L.L.C. FIBER DISTRIBUTION PANEL

PROPOSED DISH Wireless L.L.C. TELCO FIBER ENCLOSURE

DISH Wireless L.L.C. FIBER JUMPER TO CABINET WILL NEED TO BE TERMINATED BY FIBER PROVIDER ON OTHER SIDE OF BULKHEAD/LC TO LC CONNECTOR WHERE CIRCUIT IS TERMINATED.

PROPOSED FIBER PROVIDER FIBER LATERAL FROM RIGHT OF WAY TO STREET, TERMINATED TO FDP

PROPOSED DISH Wireless L.L.C. 1-1/2" FIBER TO CABINET

PROPOSED DISH Wireless L.L.C. 2" CONDUIT FROM COMMERCIAL FIBER VAULT

EXPANSION JOINT DETAIL

NO SCALE

1

PROPOSED DISH Wireless L.L.C. UNISTRUT

PROPOSED FIBER PROVIDER 1-1/4" FLEX CONDUITS

FIBER PROVIDER TO TERMINATE POWER TO FIBER PROVIDER NID

PROPOSED DISH Wireless L.L.C. 12 AWG WIRE (6' TAIL)

PROPOSED DISH Wireless L.L.C. 10 AMP DISTRIBUTION BREAKER

PROPOSED DISH Wireless L.L.C. 12 AWG WIRE

PROPOSED DISH Wireless L.L.C. 1-1/2" POWER FROM CABINET

PROPOSED FIBER PROVIDER 1-1/4" FLEX CONDUITS

FIBER PROVIDER TO PUNCH TOP OF TELCO BOX OF NID ENCLOSURE AND INSTALL 1-1/4" LIQUID TIGHT CONNECTORS, UL LISTED, NYLON MATERIAL, WITH O-RING GASKET

FIBER PROVIDER TO INSTALL 1-1/4" FLEX CONDUITS BETWEEN FDP TELCO BOX & NID

PROPOSED DISH Wireless L.L.C. TELCO FIBER ENCLOSURE

PROPOSED DISH Wireless L.L.C. 1-1/2" FIBER TO CABINET

PROPOSED DISH Wireless L.L.C. 2" CONDUIT FROM COMMERCIAL FIBER VAULT

NOTE: FIBER PROVIDER WILL NEED TO PROVIDE AN ADDITIONAL 5FT UNISTRUT, 2 U-BOLTS WITH 4 NUTS, IN THE EVENT THE BRACKET SPACING DOESN'T LINE UP WITH CURRENT SPACING BELOW

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

dish  
wireless.

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CHECKED BY: SRF

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CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
0	09/27/2021	ISSUED FOR CONSTRUCTION
1	11/01/2021	PPC UPDATE

STATE OF CONNECTICUT

SCOTT A. WIRGAU

30575

PROFESSIONAL ENGINEER

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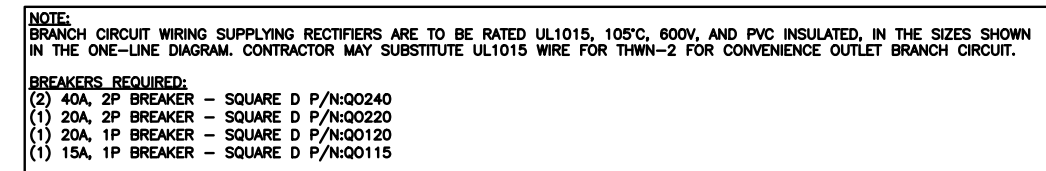
A&E PROJECT NUMBER  
88018-13710333\_D2

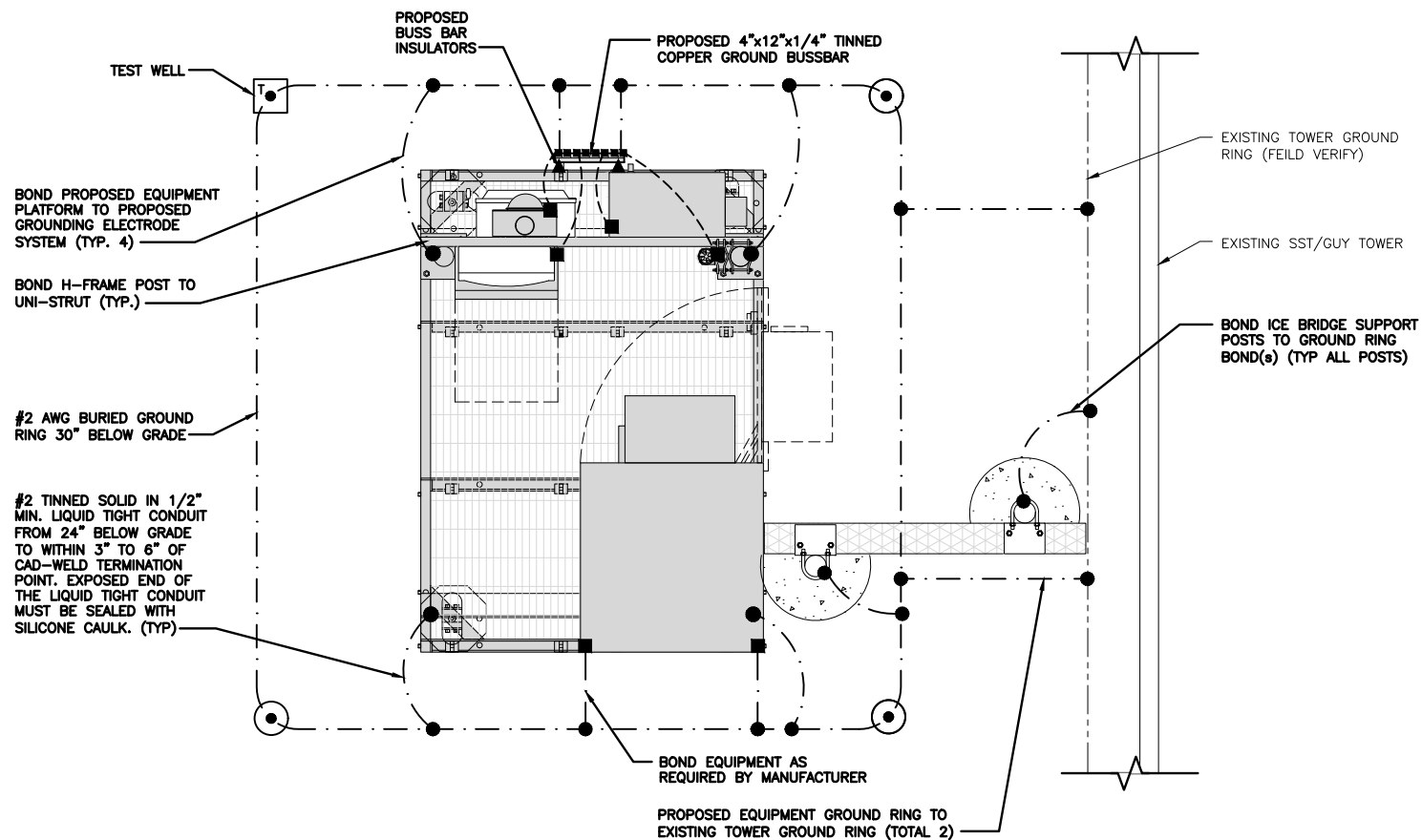
DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

SHEET TITLE  
ELECTRICAL DETAILS

SHEET NUMBER  
E-2

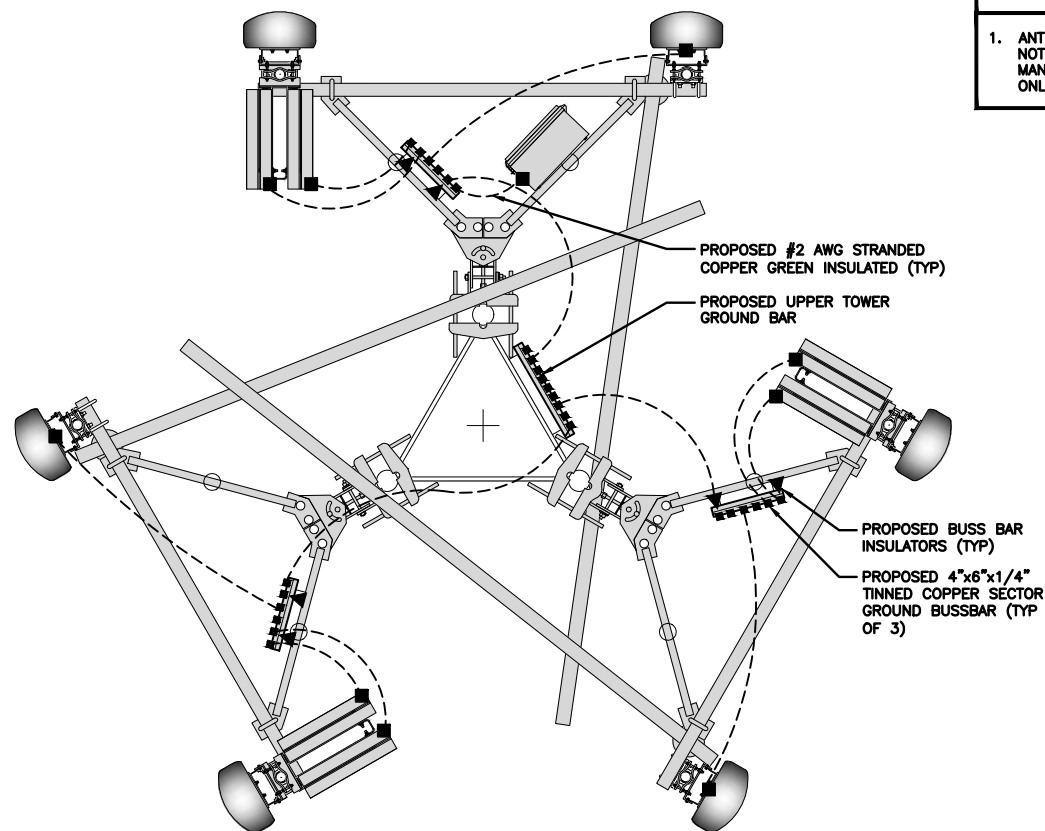






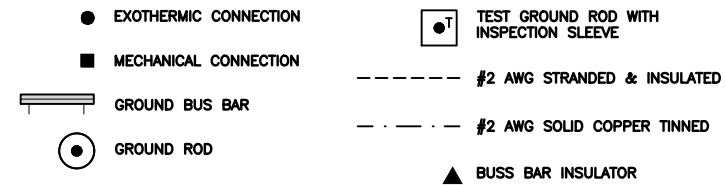
TYPICAL EQUIPMENT GROUNDING PLAN

NO SCALE 1



TYPICAL ANTENNA GROUNDING PLAN

NO SCALE 2



GROUNDING LEGEND

- GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
- 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.
- 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 5/8" 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.
- (J) **TELCO GROUND BAR:** BOND TO BOTH CELL REFERENCE GROUND BAR OR EXTERIOR GROUND RING.
- (K) **FRAME BONDING:** THE BONDING POINT FOR TELECOM EQUIPMENT FRAMES SHALL BE THE GROUND BUS THAT IS NOT ISOLATED FROM THE EQUIPMENTS METAL FRAMEWORK.
- (L) **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.
- (M) **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.
- (N) **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
- (P) **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.
- (Q) **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
- (R) **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

**dish**  
wireless.

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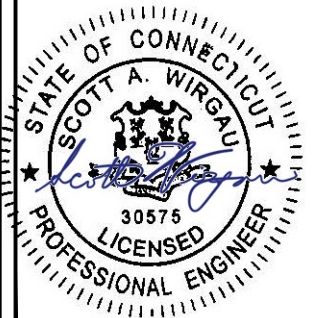
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3500 REGENCY PARKWAY  
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CARY, NC 27518  
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DOCUMENTS

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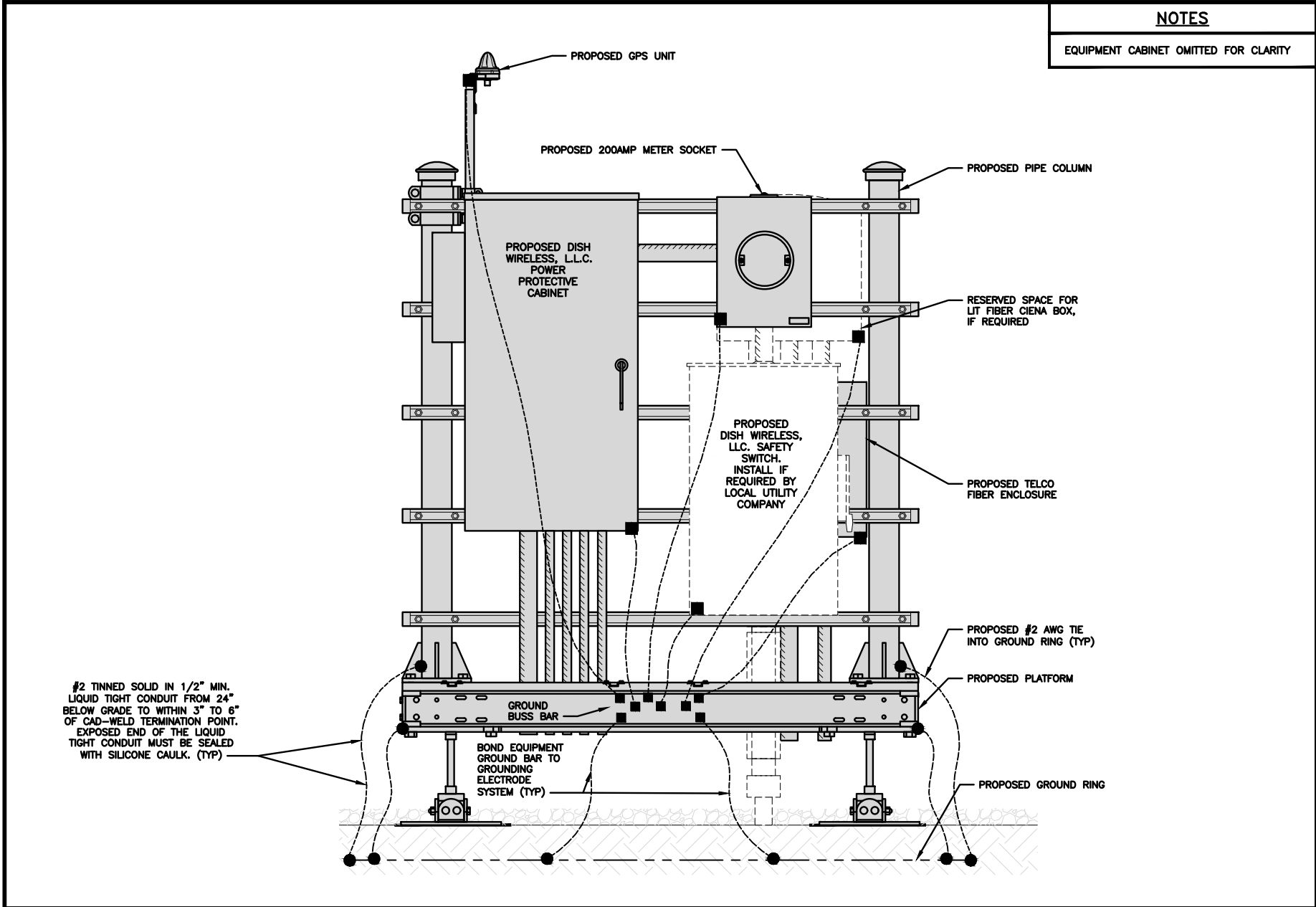
A&E PROJECT NUMBER  
88018-13710333\_D2

DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

SHEET TITLE  
GROUNDING PLANS  
AND NOTES

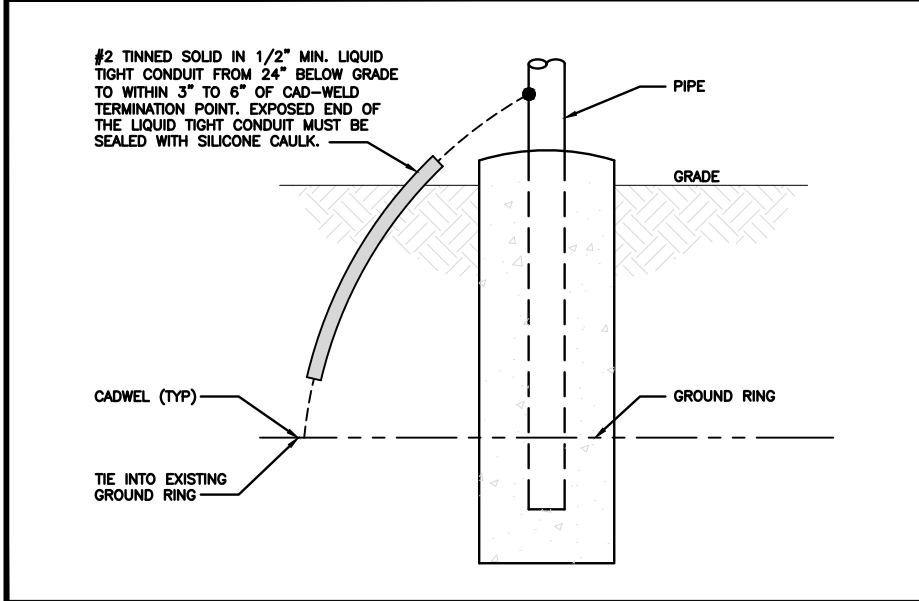
SHEET NUMBER

G-1



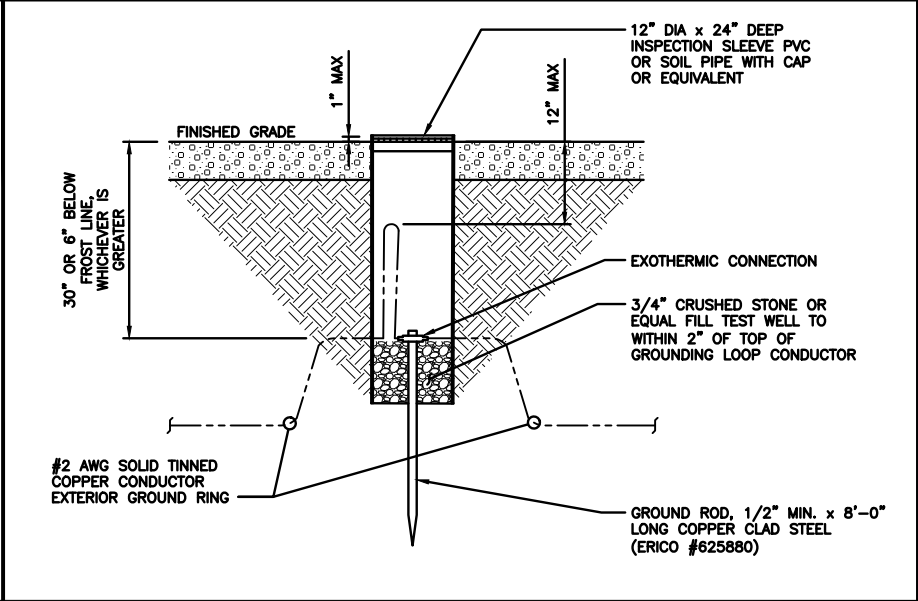
H-FRAME GROUNDING DETAIL

NO SCALE 1



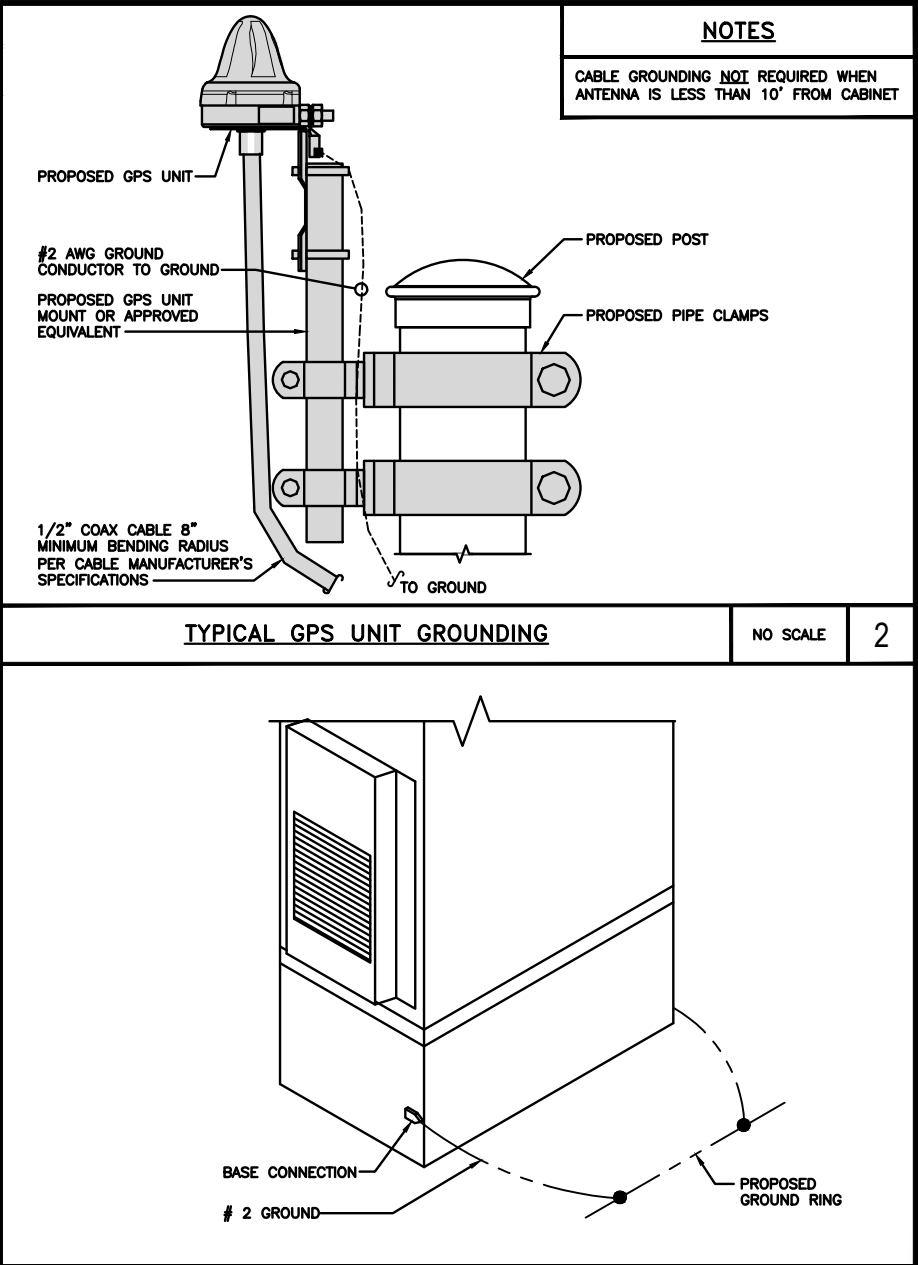
TRANSITIONING GROUND DETAIL

NO SCALE 4



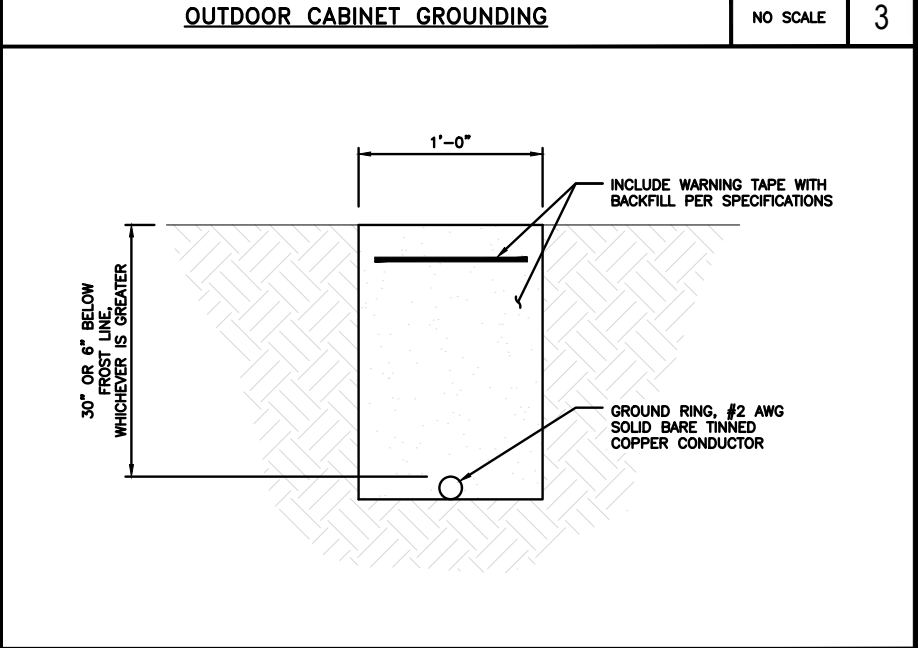
TYPICAL TEST GROUND ROD WITH INSPECTION SLEEVE

NO SCALE 5



TYPICAL GPS UNIT GROUNDING

NO SCALE 2



OUTDOOR CABINET GROUNDING

NO SCALE 3



TYPICAL GROUND RING TRENCH

NO SCALE 6

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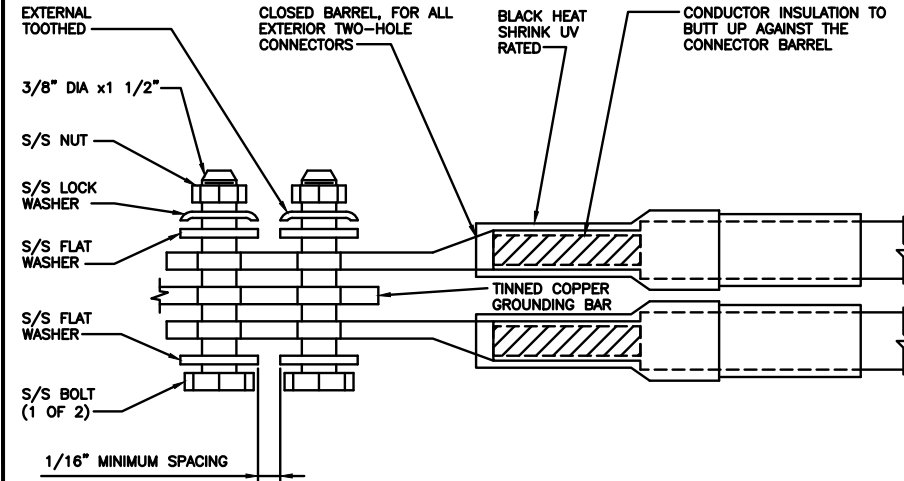
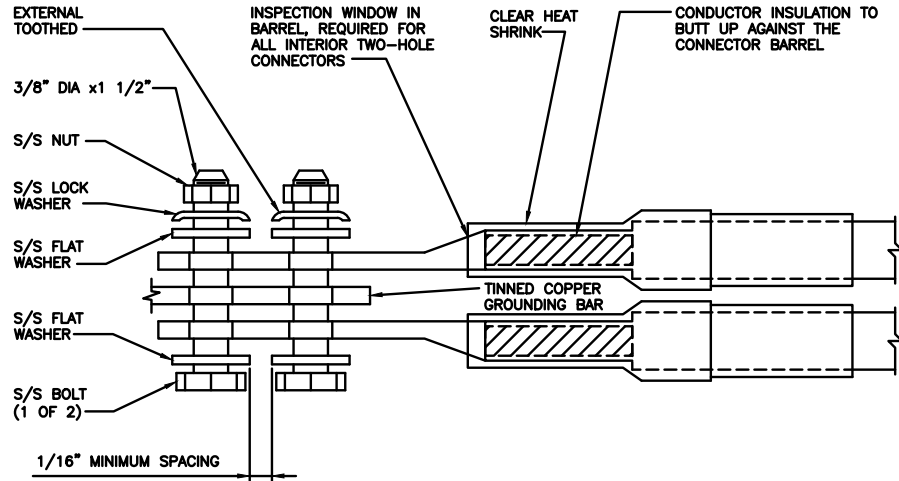
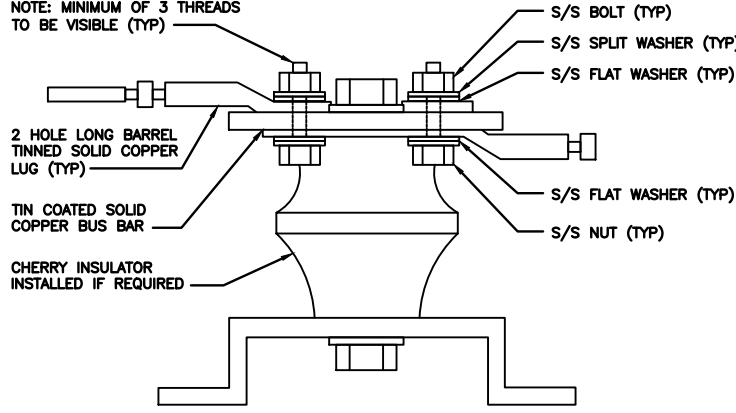
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STAMFORD, CT 06902

SHEET TITLE  
GROUNDING DETAILS

SHEET NUMBER  
**G-2**



<div>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.</div> <div>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.</div> <div>3. FOR GROUND BOND TO STEEL ONLY: COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.</div> <div>4. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUND CONDUCTOR DOWN TO GROUNDING BUS.</div> <div>5. NUT &amp; WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUND BAR AND BOLTED ON THE BACK SIDE.</div> <div>6. ALL GROUNDING PARTS AND EQUIPMENT TO BE SUPPLIED AND INSTALLED BY CONTRACTOR.</div> <div>7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUND BAR AS REQUIRED.</div> <div>8. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).</div>														
TYPICAL GROUNDING NOTES			NO SCALE	1	TYPICAL EXTERIOR TWO HOLE LUG			NO SCALE	2	TYPICAL INTERIOR TWO HOLE LUG			NO SCALE	3
														
LUG DETAIL			NO SCALE	4	NOT USED			NO SCALE	5	NOT USED			NO SCALE	6
NOT USED			NO SCALE	7	NOT USED			NO SCALE	8	NOT USED			NO SCALE	9

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STAMFORD, CT 06902

SHEET TITLE  
GROUNDING DETAILS

SHEET NUMBER  
G-3

RF JUMPER COLOR CODING				3/4" TAPE WIDTHS WITH 3/4" SPACING								
LOW-BAND RRH – (600MHz N71 BASEBAND) + (850MHz N26 BAND) + (700MHz N29 BAND) – OPTIONAL PER MARKET	ALPHA RRH				BETA RRH				GAMMA RRH			
	PORT 1 + SLANT	PORT 2 – SLANT	PORT 3 + SLANT	PORT 4 – SLANT	PORT 1 + SLANT	PORT 2 – SLANT	PORT 3 + SLANT	PORT 4 – SLANT	PORT 1 + SLANT	PORT 2 – SLANT	PORT 3 + SLANT	PORT 4 – SLANT
	RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
	ORANGE	ORANGE	RED	RED	ORANGE	ORANGE	BLUE	BLUE	ORANGE	ORANGE	GREEN	GREEN
		WHITE (-) PORT	ORANGE	ORANGE		WHITE (-) PORT	ORANGE	ORANGE		WHITE (-) PORT	ORANGE	ORANGE
ADD FREQUENCY COLOR TO SECTOR BAND (CBRS WILL USE YELLOW BANDS)												
MID-BAND RRH – (AWS BANDS N66+N70)												
	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	EXAMPLE 1				EXAMPLE 2				EXAMPLE 3			
	RED		RED		RED		RED					
	BLUE		BLUE		BLUE		ORANGE					
	GREEN		GREEN		GREEN		PURPLE					
INCLUDE SECTOR BANDS BEING SUPPORTED ALONG WITH FREQUENCY BANDS												
	ORANGE											
	PURPLE											
EXAMPLE 1 – HYBRID, OR DISCREET, SUPPORTS ALL SECTORS, BOTH LOW-BANDS AND MID-BANDS												
EXAMPLE 2 – HYBRID, OR DISCREET, SUPPORTS CBRS ONLY, ALL SECTORS												
FIBER JUMPERS TO RRHs	LOW BAND RRH		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		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	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	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
	RED	RED	WHITE	RED	BLUE	BLUE	WHITE	BLUE	GREEN	GREEN	GREEN	GREEN
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												

RF CABLE COLOR CODES

NO SCALE

1

NOT USED

NO SCALE

4

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

ORANGE

AWS  
(N66+N70+H–BLOCK)

PURPLE

CBRS TECH  
(3 GHz)

YELLOW

NEGATIVE SLANT PORT  
ON ANT/RRH

WHITE

ALPHA SECTOR

RED

BETA SECTOR

BLUE

GAMMA SECTOR

GREEN

COLOR IDENTIFIER

NO SCALE

2

NOT USED

NO SCALE

3

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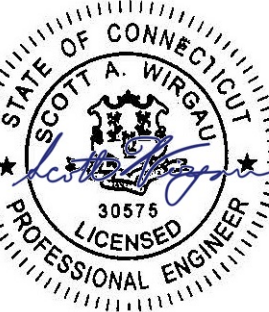
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SHEET TITLE  
RF  
CABLE COLOR CODES

SHEET NUMBER

RF-1

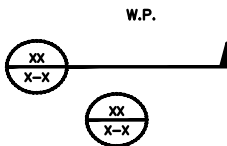
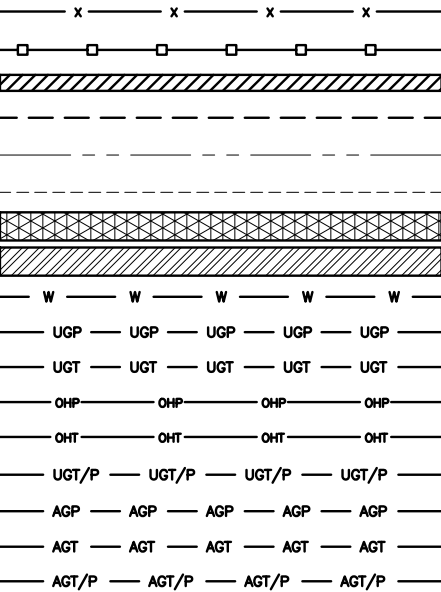
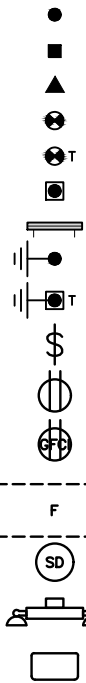
EXOTHERMIC CONNECTION  
MECHANICAL CONNECTION  
BUSS BAR INSULATOR  
CHEMICAL ELECTROLYTIC GROUNDING SYSTEM  
TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM  
EXOTHERMIC WITH INSPECTION SLEEVE  
GROUNDING BAR  
GROUND ROD  
TEST GROUND ROD WITH INSPECTION SLEEVE  
  
SINGLE POLE SWITCH  
  
DUPLEX RECEPTACLE  
  
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-DBTDX

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  
ABV ABOVE  
AC ALTERNATING CURRENT  
ADDL ADDITIONAL  
AFF ABOVE FINISHED FLOOR  
AFG ABOVE FINISHED GRADE  
AGL ABOVE GROUND LEVEL  
AIC AMPERAGE INTERRUPTION CAPACITY  
ALUM ALUMINUM  
ALT ALTERNATE  
ANT ANTENNA  
APPROX APPROXIMATE  
ARCH ARCHITECTURAL  
ATS AUTOMATIC TRANSFER SWITCH  
AWG AMERICAN WIRE GAUGE  
BATT BATTERY  
BLDG BUILDING  
BLK BLOCK  
BLKG BLOCKING  
BM BEAM  
BTC BARE TINNED COPPER CONDUCTOR  
BOF BOTTOM OF FOOTING  
CAB CABINET  
CANT CANTILEVERED  
CHG CHARGING  
CLG CEILING  
CLR CLEAR  
COL COLUMN  
COMM COMMON  
CONC CONCRETE  
CONSTR CONSTRUCTION  
DBL DOUBLE  
DC DIRECT CURRENT  
DEPT DEPARTMENT  
DF DOUGLAS FIR  
DIA DIAMETER  
DIAG DIAGONAL  
DIM DIMENSION  
DWG DRAWING  
DWL DOWEL  
EA EACH  
EC ELECTRICAL CONDUCTOR  
EL ELEVATION  
ELEC ELECTRICAL  
EMT ELECTRICAL METALLIC TUBING  
ENG ENGINEER  
EQ EQUAL  
EXP EXPANSION  
EXT EXTERIOR  
EW EACH WAY  
FAB FABRICATION  
FF FINISH FLOOR  
FG FINISH GRADE  
FIF FACILITY INTERFACE FRAME  
FIN FINISH(ED)  
FLR FLOOR  
FDN FOUNDATION  
FOC FACE OF CONCRETE  
FOM FACE OF MASONRY  
FOS FACE OF STUD  
FOW FACE OF WALL  
FS FINISH SURFACE  
FT FOOT  
FTG FOOTING  
GA GAUGE  
GEN GENERATOR  
GFCI GROUND FAULT CIRCUIT INTERRUPTER  
GLB GLUE LAMINATED BEAM  
GLV GALVANIZED  
GPS GLOBAL POSITIONING SYSTEM  
GND GROUND  
GSM GLOBAL SYSTEM FOR MOBILE  
HDG HOT DIPPED GALVANIZED  
HDR HEADER  
HGR HANGER  
HVAC HEAT/VENTILATION/AIR CONDITIONING  
HT HEIGHT  
IGR INTERIOR GROUND RING

IN INCH  
INT INTERIOR  
LB(S) POUND(S)  
LF LINEAR FEET  
LTE LONG TERM EVOLUTION  
MAS MASONRY  
MAX MAXIMUM  
MB MACHINE BOLT  
MECH MECHANICAL  
MFR MANUFACTURER  
MGB MASTER GROUND BAR  
MIN MINIMUM  
MISC MISCELLANEOUS  
MTL METAL  
MTS MANUAL TRANSFER SWITCH  
MW MICROWAVE  
NEC NATIONAL ELECTRIC CODE  
NM NEWTON METERS  
NO. NUMBER  
# NUMBER  
NTS NOT TO SCALE  
OC ON-CENTER  
OSHA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION  
OPNG OPENING  
P/C PRECAST CONCRETE  
PCS PERSONAL COMMUNICATION SERVICES  
PCU PRIMARY CONTROL UNIT  
PRC PRIMARY RADIO CABINET  
PP POLARIZING PRESERVING  
PSF POUNDS PER SQUARE FOOT  
PSI POUNDS PER SQUARE INCH  
PT PRESSURE TREATED  
PWR POWER CABINET  
QTY QUANTITY  
RAD RADIUS  
RECT RECTIFIER  
REF REFERENCE  
REINF REINFORCEMENT  
REQ'D REQUIRED  
RET REMOTE ELECTRIC TILT  
RF RADIO FREQUENCY  
RMC RIGID METALLIC CONDUIT  
RRH REMOTE RADIO HEAD  
RRU REMOTE RADIO UNIT  
RWY RACEWAY  
SCH SCHEDULE  
SHT SHEET  
SIAD SMART INTEGRATED ACCESS DEVICE  
SIM SIMILAR  
SPEC SPECIFICATION  
SQ SQUARE  
SS STAINLESS STEEL  
STD STANDARD  
STL STEEL  
TEMP TEMPORARY  
THK THICKNESS  
TMA TOWER MOUNTED AMPLIFIER  
TN TOE NAIL  
TOA TOP OF ANTENNA  
TOC TOP OF CURB  
TOF TOP OF FOUNDATION  
TOP TOP OF PLATE (PARAPET)  
TOS TOP OF STEEL  
TOW TOP OF WALL  
TVSS TRANSIENT VOLTAGE SURGE SUPPRESSION  
TYP TYPICAL  
UG UNDERGROUND  
UL UNDERWRITERS LABORATORY  
UNO UNLESS NOTED OTHERWISE  
UMTS UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM  
UPS UNINTERRUPTIBLE POWER SYSTEM (DC POWER PLANT)  
VIF VERIFIED IN FIELD  
W WIDE  
W/ WITH  
WD WOOD  
WP WEATHERPROOF  
WT WEIGHT

ABBREVIATIONS

dish  
wireless.

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AMERICAN TOWER®  
A.T. ENGINEERING SERVICE, PLLC  
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CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: TJC  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: ----

CONSTRUCTION  
DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
0	09/27/2021	ISSUED FOR CONSTRUCTION
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A&E PROJECT NUMBER

88018-13710333\_D2

DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

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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DRAWN BY:	CHECKED BY:	APPROVED BY:
TJC	SRF	SRF

RFDS REV #: ----

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SUBMITTALS		
REV	DATE	DESCRIPTION
0	09/27/2021	ISSUED FOR CONSTRUCTION
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A&E PROJECT NUMBER  
88018–13710333\_D2

DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

SHEET TITLE  
GENERAL NOTES

SHEET NUMBER  
GN-2





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.

STRUCTURAL STEEL NOTES:

1. STRUCTURAL STEEL SHALL CONFORM TO THE LATEST EDITION OF THE AISC “SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS.”
2. STRUCTURAL STEEL ROLLED SHAPES, PLATES AND BARS SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:

A. ASTM A–572, GRADE 50 – ALL W SHAPES, UNLESS NOTED OR A992 OTHERWISE

B. ASTM A–36 – ALL OTHER ROLLED SHAPES, PLATES AND BARS UNLESS NOTED OTHERWISE.

C. ASTM A–500, GRADE B – HSS SECTION (SQUARE, RECTANGULAR, AND ROUND)

D. ASTM A–325, TYPE SC OR N – ALL BOLTS FOR CONNECTING STRUCTURAL MEMBERS

E. ASTM F–1554 07 – ALL ANCHOR BOLTS, UNLESS NOTED OTHERWISE
3. ALL EXPOSED STRUCTURAL STEEL MEMBERS SHALL BE HOT–DIPPED GALVANIZED AFTER FABRICATION PER ASTM A123. EXPOSED STEEL HARDWARE AND ANCHOR BOLTS SHALL BE GALVANIZED PER ASTM A153 OR B695.
4. ALL FIELD CUT SURFACES, FIELD DRILLED HOLES AND GROUND SURFACES WHERE EXISTING PAINT OR GALVANIZATION REMOVAL WAS REQUIRED SHALL BE REPAIRED WITH (2) BRUSHED COATS OF ZRC GALVILITE COLD GALVANIZING COMPOUND PER ASTM A780 AND MANUFACTURER'S RECOMMENDATIONS.
5. DO NOT DRILL HOLES THROUGH STRUCTURAL STEEL MEMBERS EXCEPT AS SHOWN AND DETAILED ON STRUCTURAL DRAWINGS.
6. CONNECTIONS:

A. ALL WELDING TO BE PERFORMED BY AWS CERTIFIED WELDERS AND CONDUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AWS WELDING CODE D1.1.

B. ALL WELDS SHALL BE INSPECTED VISUALLY. 25% OF WELDS SHALL BE INSPECTED WITH DYE PENETRANT OR MAGNETIC PARTICLE TO MEET THE ACCEPTANCE CRITERIA OF AWS D1.1. REPAIR ALL WELDS AS NECESSARY.

C. INSPECTION SHALL BE PERFORMED BY AN AWS CERTIFIED WELD INSPECTOR.

D. IT IS THE CONTRACTORS RESPONSIBILITY TO PROVIDE BURNING/WELDING PERMITS AS REQUIRED BY LOCAL GOVERNING AUTHORITY AND IF REQUIRED SHALL HAVE FIRE DEPARTMENT DETAIL FOR ANY WELDING ACTIVITY.

E. ALL ELECTRODES TO BE LOW HYDROGEN, MATCHING FILLER METAL, PER AWS D1.1, UNLESS NOTED OTHERWISE.

F. MINIMUM WELD SIZE TO BE 0.1875 INCH FILLET WELDS, UNLESS NOTED OTHERWISE.

G. PRIOR TO FIELD WELDING GALVANIZING MATERIAL, CONTRACTOR SHALL GRIND OFF GALVANIZING ¼” BEYOND ALL FIELD WELD SURFACES. AFTER WELD AND WELD INSPECTION IS COMPLETE, REPAIR ALL GROUND AND WELDED SURFACES WITH ZRC GALVILITE COLD GALVANIZING COMPOUND PER ASTM A780 AND MANUFACTURERS RECOMMENDATIONS.

H. THE CONTRACTOR SHALL PROVIDE ADEQUATE SHORING AND/OR BRACING WHERE REQUIRED DURING CONSTRUCTION UNTIL ALL CONNECTIONS ARE COMPLETE.

I. ANY FIELD CHANGES OR SUBSTITUTIONS SHALL HAVE PRIOR APPROVAL FROM THE ENGINEER, AND DISH WIRELESS L.L.C. PROJECT MANAGER IN WRITING



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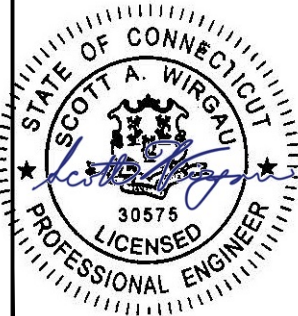
DRAWN BY: CHECKED BY: APPROVED BY:

TJC SRF SRF

RFDS REV #: ----

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A&E PROJECT NUMBER

88018–13710333\_D2

DISH WIRELESS, L.L.C.  
PROJECT INFORMATION  
NJJER01123B  
168 CATOONA LANE  
STAMFORD, CT 06902

SHEET TITLE  
GENERAL NOTES

SHEET NUMBER

GN-4

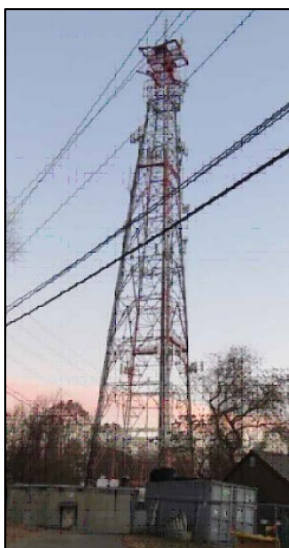




# PINNACLE TELECOM GROUP

Professional and Technical Services

## ANTENNA SITE FCC RF COMPLIANCE ASSESSMENT AND REPORT FOR MUNICIPAL SUBMISSION



***PREPARED FOR:***

Dish Wireless, LLC

***SITE ID:***

NJER01123B

***SITE ADDRESS:***

168 CATOONA LANE  
STAMFORD, CT

***LATITUDE:***

N 41.052825

***LONGITUDE:***

W 73.56304722

***STRUCTURE TYPE:***

LATTICE TOWER

***REPORT DATE:***

MARCH 11, 2022

***COMPLIANCE CONCLUSION:***

Dish Wireless, LLC will be in compliance with the rules and regulations as described in OET Bulletin 65, following the implementation of the proposed mitigation as detailed in the report.

14 RIDGEDALE AVENUE • SUITE 260 • CEDAR KNOLLS, NJ 07927 • 973-451-1630

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## **INTRODUCTION AND SUMMARY**

At the request of Dish Wireless, LLC (“Dish”), Pinnacle Telecom Group has performed an independent expert assessment of radiofrequency (RF) levels and related FCC compliance for proposed wireless base station antenna operations on an existing lattice tower located at 168 Catoona Lane in Stamford, CT. Dish refers to the antenna site by the code “NJJER01123B”, and its proposed operation involves directional panel antennas and transmission in the 600 MHz, 2000 MHz and 2100 MHz frequency bands licensed to it by the FCC.

The FCC requires all wireless antenna operators to perform an assessment of potential human exposure to radiofrequency (RF) fields emanating from all the transmitting antennas at a site whenever antenna operations are added or modified, and to ensure compliance with the Maximum Permissible Exposure (MPE) limit in the FCC’s regulations. In this case, the compliance assessment needs to take into account the RF effects of other existing antenna operations at the site by AT&T, Clearwire, MetroPCS, Sprint, T-Mobile, Verizon Wireless, Marcus Spectrum Holding, LLC, Spectrum Holding Company, LLC, and the State of Connecticut. Note that while the site drawings indicate there may be other antennas at the site, a search of FCC records indicates there are no other licensed transmitting antenna operations to include in the compliance assessment for the site. FCC regulations require any future antenna collocators to assess and assure continuing compliance based on the cumulative effects of all then-proposed and then-existing antennas at the site.

This report describes a mathematical analysis of RF levels resulting around the site in areas of unrestricted public access, that is, at street level around the site. The compliance analysis employs a standard FCC formula for calculating the effects of the antennas in a very conservative manner, in order to overstate the RF levels and to ensure “safe-side” conclusions regarding compliance with the FCC limit for safe continuous exposure of the general public.

The results of a compliance assessment can be described in layman’s terms by expressing the calculated RF levels as simple percentages of the FCC MPE limit. If the normalized reference for that limit is 100 percent, then calculated RF levels



higher than 100 percent indicate the MPE limit is exceeded and there is a need to mitigate the potential exposure. On the other hand, calculated RF levels consistently below 100 percent serve as a clear and sufficient demonstration of compliance with the MPE limit. We can (and will) also describe the overall worst-case result via the “plain-English” equivalent “times-below-the-limit” factor.

The result of the RF compliance assessment in this case is as follows:

- ❑ At street level, the conservatively calculated maximum RF level from the combination of proposed and existing antenna operations at the site is 2.8380 percent of the FCC general population MPE limit – well below the 100-percent reference for compliance. In other words, the worst-case calculated RF level – intentionally and significantly overstated by the calculations – is still more than 35 times below the FCC limit for safe, continuous exposure of the general public.
- ❑ A supplemental analysis of the RF levels at the same height as the Dish antennas indicate that the FCC MPE limit is potentially exceeded. Therefore, it is recommended that four Caution signs be installed six feet below the antennas. In addition, NOC Information signs are to be installed at the base of the tower.
- ❑ The results of the calculations, along with the proposed mitigation, combine to satisfy the FCC requirements and associated guidelines on RF compliance at street level around the site and on the subject roof. Moreover, because of the significant conservatism incorporated in the analysis, RF levels actually caused by the antennas will be lower than these calculations indicate.

The remainder of this report provides the following:

- ❑ relevant technical data on the proposed Dish antenna operations at the site, as well as on the other existing antenna operations;
- ❑ a description of the applicable FCC mathematical model for calculating RF levels, and application of the relevant technical data to that model;

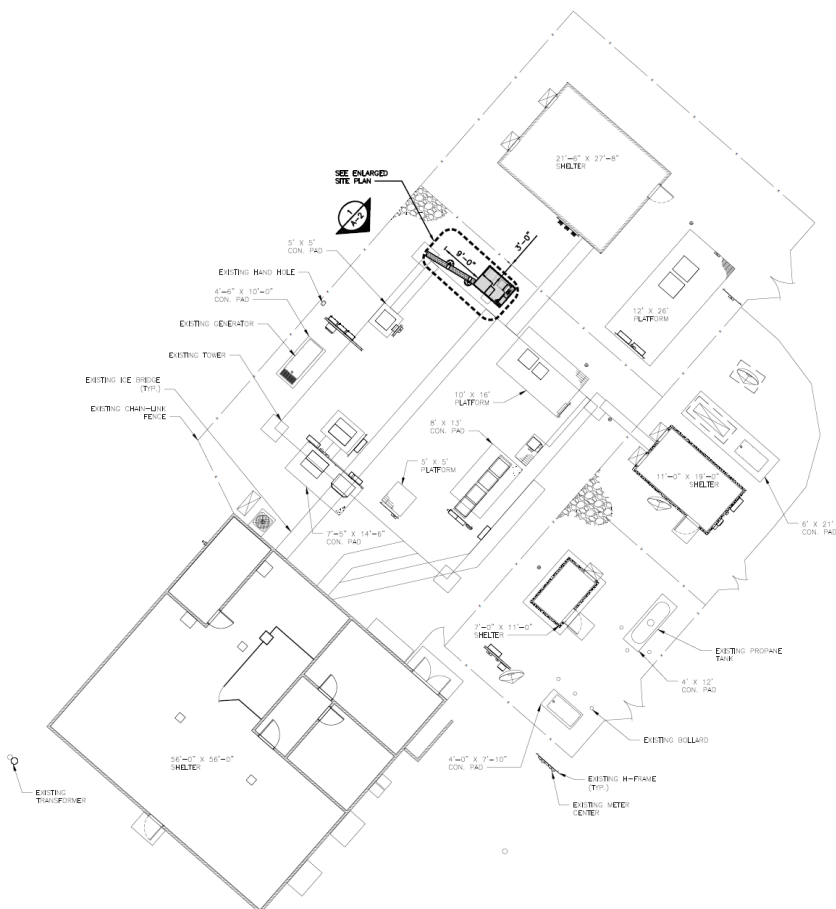
- analysis of the results of the calculations against the FCC MPE limit, and the compliance conclusion for the site.

In addition, four Appendices are included. Appendix A provides information on the documents used to prepare the analysis. Appendix B provides background on the FCC MPE limit. Appendix C details the proposed mitigation to satisfy the FCC requirements and associated guidelines on RF compliance. Appendix D provides a summary of the qualifications of the expert certifying FCC compliance for this site.

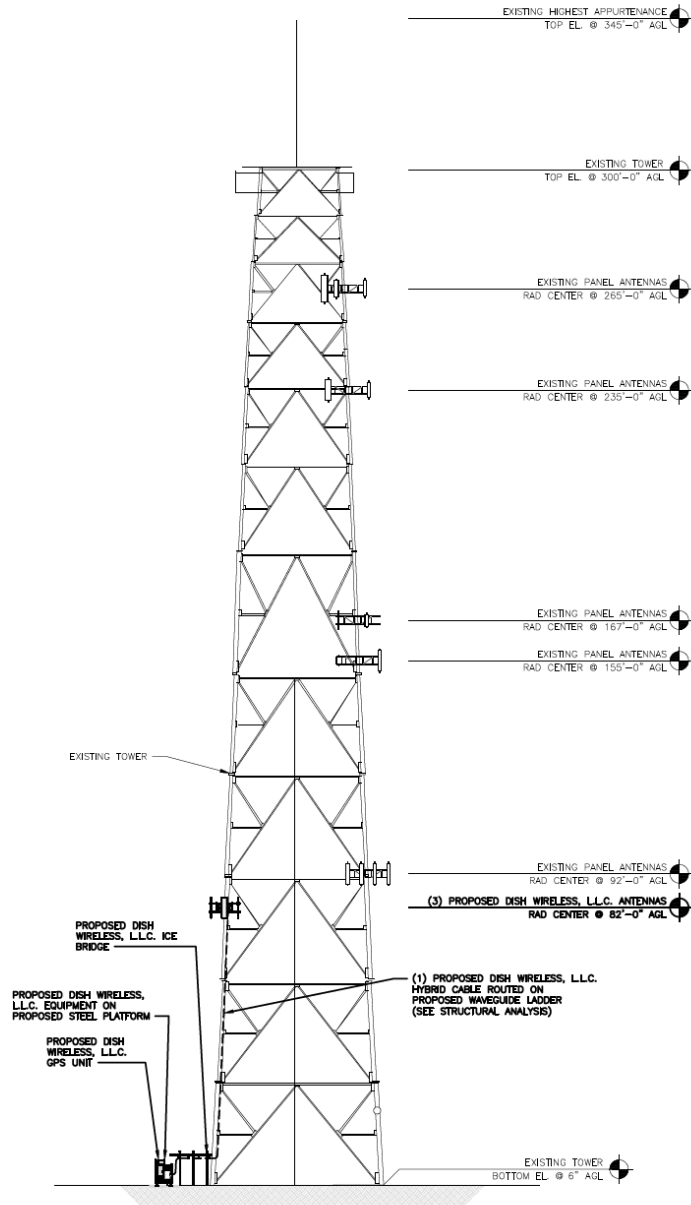
## ANTENNA AND TRANSMISSION DATA

The plan and elevation views that follow, extracted from the site drawings, illustrate the mounting positions of the Dish antennas at the site.

### Plan View:



Elevation View:



The table that follows summarizes the relevant data for the proposed Dish antenna operations. Note that the "Z" height references the centerline of the antenna.



<b>Ant. ID</b>	<b>Carrier</b>	<b>Antenna Manufacturer</b>	<b>Antenna Model</b>	<b>Type</b>	<b>Freq (MHz)</b>	<b>Ant. Dim. (ft.)</b>	<b>Total Input Power (watts)</b>	<b>Total ERP (watts)</b>	<b>Z AGL (ft)</b>	<b>Ant. Gain (dBd)</b>	<b>B/W</b>	<b>Azimuth</b>	<b>EDT</b>	<b>MDT</b>
❶	Dish	JMA Wireless	MX08FRO665-21	Panel	600	6	120	1637	82	11.46	68	0	2	0
❶	Dish	JMA Wireless	MX08FRO665-21	Panel	2000	6	160	6011	82	16.16	62	0	2	0
❶	Dish	JMA Wireless	MX08FRO665-21	Panel	2100	6	160	7567	82	16.66	64	0	2	0
❷	Dish	JMA Wireless	MX08FRO665-21	Panel	600	6	120	1637	82	11.46	68	100	2	0
❷	Dish	JMA Wireless	MX08FRO665-21	Panel	2000	6	160	6011	82	16.16	62	100	2	0
❷	Dish	JMA Wireless	MX08FRO665-21	Panel	2100	6	160	7567	82	16.66	64	100	2	0
❸	Dish	JMA Wireless	MX08FRO665-21	Panel	600	6	120	1637	82	11.46	68	260	2	0
❸	Dish	JMA Wireless	MX08FRO665-21	Panel	2000	6	160	6011	82	16.16	62	260	2	0
❸	Dish	JMA Wireless	MX08FRO665-21	Panel	2100	6	160	7567	82	16.66	64	260	2	0

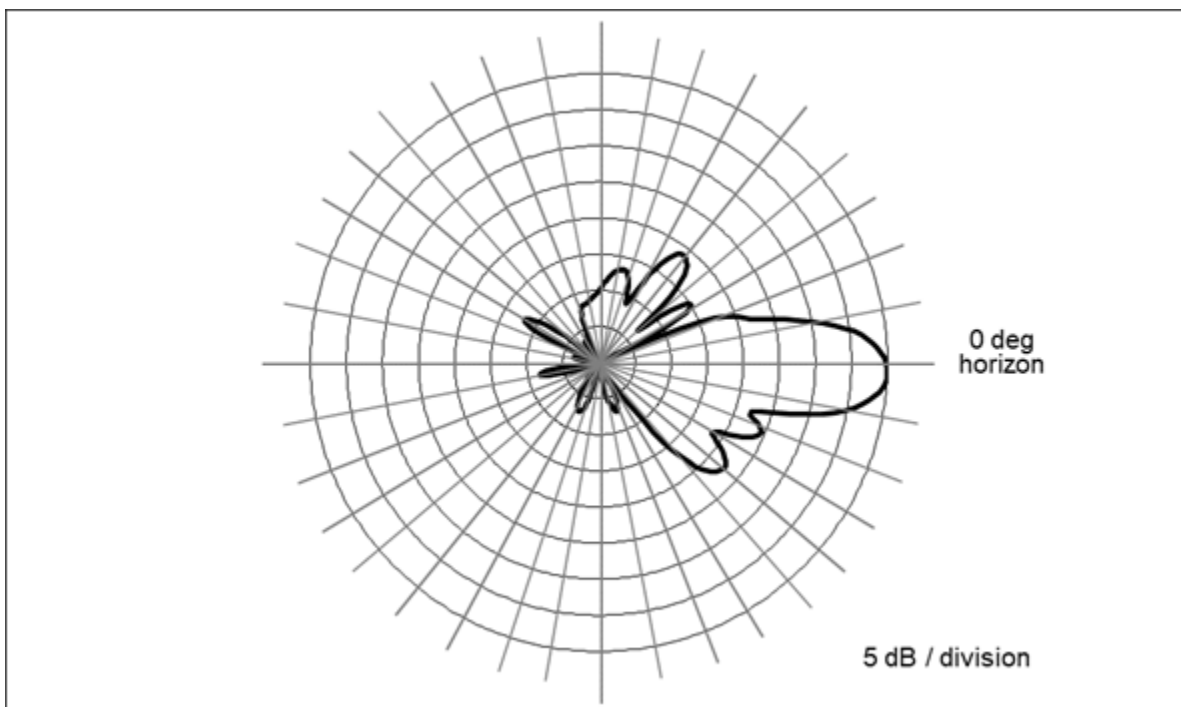
The area below the antennas, at street level, is of interest in terms of potential “uncontrolled” exposure of the general public, so the antenna’s vertical-plane emission characteristic is used in the calculations, as it is a key determinant of the relative amount of RF emissions in the “downward” direction.

By way of illustration, Figure 1 that follows shows the vertical-plane radiation pattern of the proposed antenna model in the 600 MHz frequency band. In this type of antenna radiation pattern diagram, the antenna is effectively pointed at the three o’clock position (the horizon) and the relative strength of the pattern at different angles is described using decibel units.

Note that the use of a decibel scale to describe the relative pattern at different angles actually serves to significantly understate the actual focusing effects of the antenna. Where the antenna pattern reads 20 dB the relative RF energy emitted at the corresponding downward angle is  $1/100^{\text{th}}$  of the maximum that occurs in the main beam (at 0 degrees); at 30 dB, the energy is only  $1/1000^{\text{th}}$  of the maximum.

Finally, note that the automatic pattern-scaling feature of our internal software may skew side-by-side visual comparisons of different antenna models, or even different parties’ depictions of the same antenna model.

**Figure 1. Commscope FFVV-65B-R2 – 600 MHz Vertical-plane Pattern**



As noted at the outset, there are existing antenna operations to include in the compliance assessment. For each of the wireless operators, we will conservatively assume operation with maximum channel capacity and at maximum transmitter power per channel to be used by each wireless operator in each of their respective FCC-licensed frequency bands. For each of the other operators, we will rely on the transmission parameters in their respective FCC licenses.

The table that follows summarizes the relevant data for the collocated antenna operations.



<i>Carrier</i>	<i>Antenna Manufacturer</i>	<i>Antenna Model</i>	<i>Type</i>	<i>Freq (MHz)</i>	<i>Total ERP (watts)</i>	<i>Ant. Gain (dBd)</i>	<i>Azimuth</i>
AT&T	Generic	Generic	Panel	700	4945	11.26	N/A
AT&T	Generic	Generic	Panel	850	2400	11.76	N/A
AT&T	Generic	Generic	Panel	1900	5756	15.56	N/A
AT&T	Generic	Generic	Panel	2100	5890	15.66	N/A
AT&T	Generic	Generic	Panel	2300	4131	16.16	N/A
Clearwire	Generic	Generic	Panel	2500	2972	15.70	N/A
Clearwire	Generic	Generic	Dish	11000	70	32.40	N/A
Sprint	Generic	Generic	Panel	800	2168	13.36	N/A
Sprint	Generic	Generic	Panel	1900	6168	15.86	N/A
Sprint	Generic	Generic	Panel	2500	4669	15.90	N/A
T-Mobile	Generic	Generic	Panel	600	3163	12.96	N/A
T-Mobile	Generic	Generic	Panel	700	867	13.36	N/A
T-Mobile	Generic	Generic	Panel	1900	4123	15.36	N/A
T-Mobile	Generic	Generic	Panel	1900	1452	15.60	N/A
T-Mobile	Generic	Generic	Panel	2100	4626	15.86	N/A
T-Mobile	Generic	Generic	Panel	1900	1419	15.50	N/A
T-Mobile	Generic	Generic	Panel	2500	12804	22.35	N/A
Verizon Wireless	Generic	Generic	Panel	746	2400	11.76	N/A
Verizon Wireless	Generic	Generic	Panel	869	5166	12.36	N/A
Verizon Wireless	Generic	Generic	Panel	1900	5372	15.26	N/A
Verizon Wireless	Generic	Generic	Panel	2100	5625	15.46	N/A
Marcus Spectrum Holdings, Inc.	Generic	Generic	Omni	451	400	3.86	N/A
Marcus Spectrum Holdings, Inc.	Generic	Generic	Omni	464	225	3.86	N/A
Marcus Spectrum Holdings, Inc.	Generic	Generic	Omni	462	400	3.86	N/A
Spectrum Holding Company, LLC	Generic	Generic	Dish	6000	14288	39.56	N/A
State of Connecticut	Generic	Generic	Omni	173	500	3.66	N/A

## Compliance Analysis

FCC Office of Engineering and Technology Bulletin 65 (“OET Bulletin 65”) provides guidelines for mathematical models to calculate the RF levels at various points around transmitting antennas. Different models apply in different areas around antennas, with one model applying to street level around a site, and another applying to the rooftop near the antennas. We will address each area of interest in turn in the subsections that follow.

### ***Street Level Analysis***

At street-level around an antenna site (in what is called the “far field” of the antennas), the RF levels are directly proportional to the total antenna input power and the relative antenna gain in the downward direction of interest – and the levels are otherwise inversely proportional to the square of the straight-line distance to the antenna.

Conservative calculations also assume the potential RF exposure is enhanced by reflection of the RF energy from the intervening ground. Our calculations will assume a 100% “perfect”, mirror-like reflection, which is the absolute worst-case scenario.

The formula for street-level compliance assessment for any given wireless antenna operation is as follows:

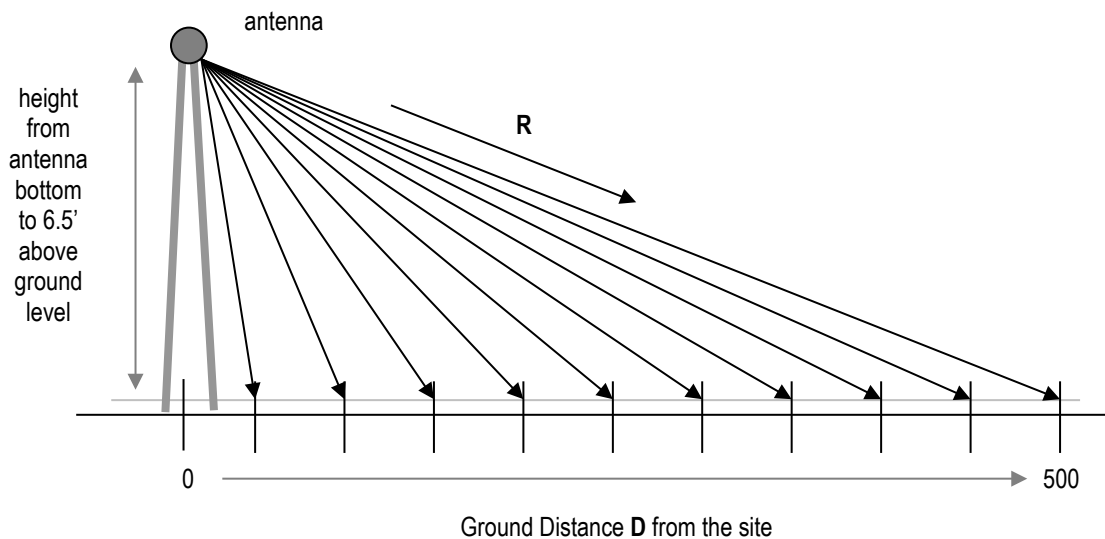
$$\text{MPE\%} = (100 * \text{Chans} * \text{TxPower} * 10^{(\text{Gmax} - \text{Vdisc}/10)} * 4) / (\text{MPE} * 4\pi * R^2)$$

where

MPE%	=	RF level, expressed as a percentage of the MPE limit applicable to continuous exposure of the general public
100	=	factor to convert the raw result to a percentage
Chans	=	maximum number of RF channels per sector
TxPower	=	maximum transmitter power per channel, in milliwatts

$10^{(G_{\max}-V_{\text{disc}}/10)}$	=	numeric equivalent of the relative antenna gain in the downward direction of interest; data on the antenna vertical-plane pattern is taken from manufacturer specifications
4	=	factor to account for a 100-percent-efficient energy reflection from the ground, and the squared relationship between RF field strength and power density ( $2^2 = 4$ )
MPE	=	FCC general population MPE limit
R	=	straight-line distance from the RF source to the point of interest, centimeters

The MPE% calculations are performed out to a distance of 500 feet from the facility to points 6.5 feet (approximately two meters, the FCC-recommended standing height) off the ground, as illustrated in Figure 2, below.



**Figure 2. Street-level MPE% Calculation Geometry**

It is popularly understood that the farther away one is from an antenna, the lower the RF level – which is generally but not universally correct. The results of MPE% calculations fairly close to the site will reflect the variations in the vertical-plane antenna pattern as well as the variation in straight-line distance to the antenna.



Therefore, RF levels may actually increase slightly with increasing distance within the range of zero to 500 feet from the site. As the distance approaches 500 feet and beyond, though, the antenna pattern factor becomes less significant, the RF levels become primarily distance-controlled and, as a result, the RF levels generally decrease with increasing distance. In any case, the RF levels more than 500 feet from a wireless antenna site are well understood to be sufficiently low to be comfortably in compliance.

According to the FCC, when directional antennas (such as panels) are used, compliance assessments are based on the RF effect of a single (facing) antenna sector, as the effects of directional antennas pointed away from the point(s) of interest are considered insignificant. If the different parameters apply in the different sectors, compliance is based on the worst-case parameters.

Street level FCC compliance for a collocated antenna site is assessed in the following manner. At each distance point along the ground, an MPE% calculation is made for each antenna operation (including each frequency band), and the sum of the individual MPE% contributions at each point is compared to 100 percent, the normalized reference for compliance with the MPE limit. We refer to the sum of the individual MPE% contributions as “total MPE%”, and any calculated total MPE% result exceeding 100 percent is, by definition, higher than the FCC limit and represents non-compliance and a need to mitigate the potential exposure. If all results are consistently below 100 percent, on the other hand, that set of results serves as a clear and sufficient demonstration of compliance with the MPE limit.

Note that the following conservative methodology and assumptions are incorporated into the MPE% calculations on a general basis:

1. The antennas are assumed to be operating continuously at maximum power and maximum channel capacity.
2. The power-attenuation effects of shadowing or other obstructions to the line-of-sight path from the antenna to the point of interest are ignored.
3. The calculations intentionally minimize the distance factor (R) by assuming a 6'6" human and performing the calculations from the bottom (rather than

the centerline) of each operator’s lowest-mounted antenna, as applicable.

4. The calculations also conservatively take into account, when applicable, the different technical characteristics and related RF effects of the use of multiple antennas for transmission in the same frequency band.
5. The RF exposure at ground level is assumed to be 100-percent enhanced (increased) via a “perfect” field reflection from the intervening ground.

The net result of these assumptions is to intentionally and significantly overstate the calculated RF levels relative to the levels that will actually result from the antenna operations – and the purpose of this conservatism is to allow very “safe-side” conclusions about compliance.

The tables that follow provide the results of the MPE% calculations for each antenna operation, with the overall worst-case calculated result highlighted in bold in the last column of the last table. Note that the transmission parameters for each Dish antenna sector are identical, and the calculations reflect the worst-case result for any/all sectors.

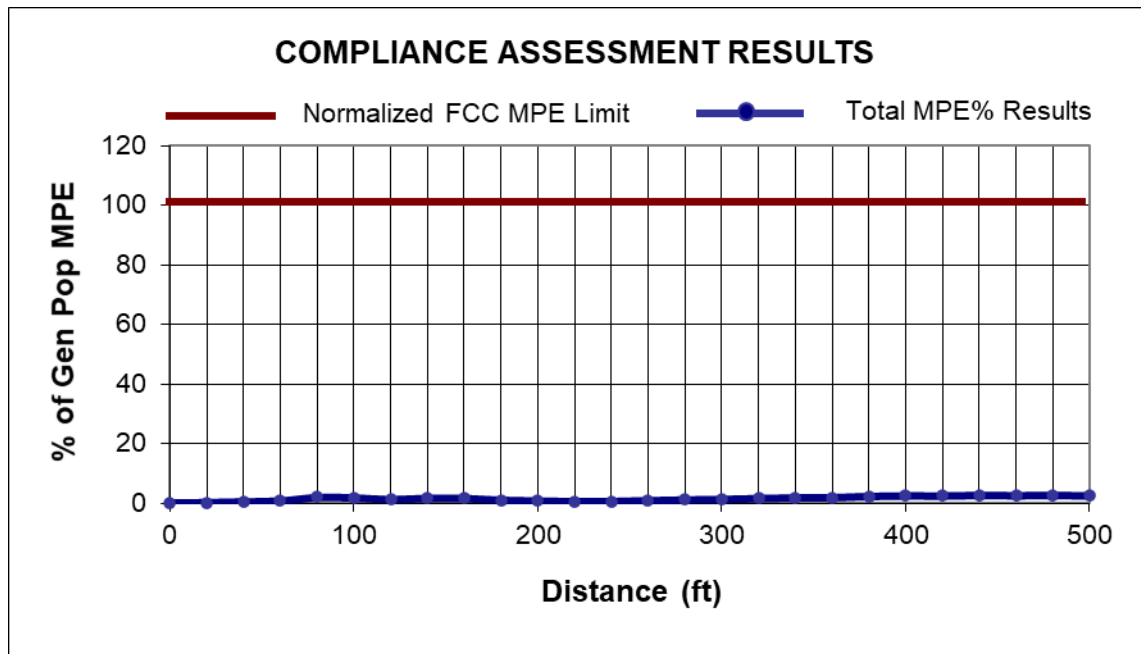
<b>Ground Distance (ft)</b>	<b>Dish 600 MHz MPE%</b>	<b>Dish 2000 MHz MPE%</b>	<b>Dish 2100 MHz MPE%</b>	<b>AT&amp;T MPE%</b>	<b>Clearwire MPE%</b>	<b>Sprint MPE%</b>	<b>T-Mobile MPE%</b>	<b>Subtotal MPE%</b>
0	0.0027	0.0035	0.0001	0.0231	0.0002	0.0186	0.0639	0.1121
20	0.0170	0.0424	0.0267	0.0193	0.0016	0.0114	0.0834	0.2018
40	0.0056	0.0383	0.0494	0.0306	0.0004	0.0085	0.0924	0.2252
60	0.0947	0.0210	0.1594	0.0452	0.0007	0.0098	0.0966	0.4274
80	0.3287	0.1833	0.8979	0.0566	0.0010	0.0294	0.1536	1.6505
100	0.1622	0.4638	0.2795	0.0713	0.0002	0.0256	0.2113	1.2139
120	0.0832	0.0279	0.0571	0.0867	0.0045	0.0499	0.2179	0.5272
140	0.1614	0.1187	0.0188	0.1052	0.0001	0.0407	0.1963	0.6412
160	0.1923	0.1515	0.1048	0.1305	0.0024	0.0426	0.1685	0.7926
180	0.1341	0.0327	0.0451	0.1245	0.0055	0.0774	0.1361	0.5554
200	0.0809	0.1033	0.0987	0.1105	0.0004	0.1123	0.0992	0.6053
220	0.0682	0.0725	0.0563	0.1402	0.0015	0.0923	0.0913	0.5223
240	0.1216	0.0633	0.0564	0.1868	0.0080	0.0555	0.0863	0.5779
260	0.1782	0.0846	0.1017	0.2239	0.0057	0.0294	0.0983	0.7218
280	0.2517	0.0737	0.1041	0.2381	0.0010	0.0239	0.1151	0.8076
300	0.3424	0.0310	0.0551	0.2231	0.0011	0.0401	0.1371	0.8299
320	0.4379	0.0017	0.0079	0.2220	0.0065	0.0447	0.1662	0.8869
340	0.3901	0.0015	0.0070	0.2454	0.0084	0.0476	0.2050	0.9050
360	0.4938	0.0071	0.0036	0.2573	0.0083	0.0509	0.2238	1.0448
380	0.5866	0.0202	0.0216	0.2992	0.0036	0.0538	0.2945	1.2795
400	0.5312	0.0183	0.0196	0.2942	0.0011	0.0460	0.3299	1.2403
420	0.6083	0.0098	0.0152	0.2746	0.0002	0.0488	0.3701	1.3270
440	0.5557	0.0089	0.0138	0.2402	0.0002	0.0325	0.4784	1.3297
460	0.6127	0.0026	0.0001	0.2049	0.0010	0.0157	0.5175	1.3545
480	0.5638	0.0024	0.0001	0.1667	0.0023	0.0108	0.5534	1.2995
500	0.5205	0.0022	0.0001	0.1296	0.0033	0.0101	0.5846	1.2504

Ground Distance (ft)	Subtotal MPE%	Verizon Wireless MPE%	Marcus Spectrum Holdings MPE%	Spectrum Holdings Company MPE%	State of Connecticut MPE%	Total MPE%
0	0.1121	0.0486	0.0002	0.0058	0.0005	0.1672
20	0.2018	0.0921	0.0049	0.0055	0.0050	0.3093
40	0.2252	0.3040	0.0173	0.0049	0.0157	0.5671
60	0.4274	0.3466	0.0304	0.0041	0.0313	0.8398
80	1.6505	0.3215	0.0483	0.0033	0.0459	2.0695
100	1.2139	0.6404	0.0577	0.0027	0.0569	1.9716
120	0.5272	0.7128	0.0581	0.0022	0.0639	1.3642
140	0.6412	1.0638	0.0483	0.0018	0.0651	1.8202
160	0.7926	0.9001	0.0264	0.0015	0.0616	1.7822
180	0.5554	0.5229	0.0109	0.0049	0.0530	1.1471
200	0.6053	0.2303	0.0017	0.0041	0.0414	0.8828
220	0.5223	0.0613	0.0043	0.0035	0.0301	0.6215
240	0.5779	0.0596	0.0133	0.0030	0.0162	0.6700
260	0.7218	0.2236	0.0267	0.0053	0.0096	0.9870
280	0.8076	0.3650	0.0527	0.0046	0.0047	1.2346
300	0.8299	0.5447	0.0670	0.0041	0.0017	1.4474
320	0.8869	0.7484	0.0711	0.0036	0.0012	1.7112
340	0.9050	0.9821	0.0790	0.0032	0.0033	1.9726
360	1.0448	0.8814	0.0783	0.0073	0.0047	2.0165
380	1.2795	1.0991	0.0726	0.0066	0.0101	2.4679
400	1.2403	1.3319	0.0659	0.0060	0.0128	2.6569
420	1.3270	1.2128	0.0572	0.0055	0.0194	2.6219
440	1.3297	1.4206	0.0424	0.0050	0.0224	2.8201
460	1.3545	1.3036	0.0329	0.0046	0.0253	2.7209
<b>480</b>	<b>1.2995</b>	<b>1.4797</b>	<b>0.0239</b>	<b>0.0042</b>	<b>0.0307</b>	<b>2.8380</b>
500	1.2504	1.3669	0.0166	0.0039	0.0340	2.6718

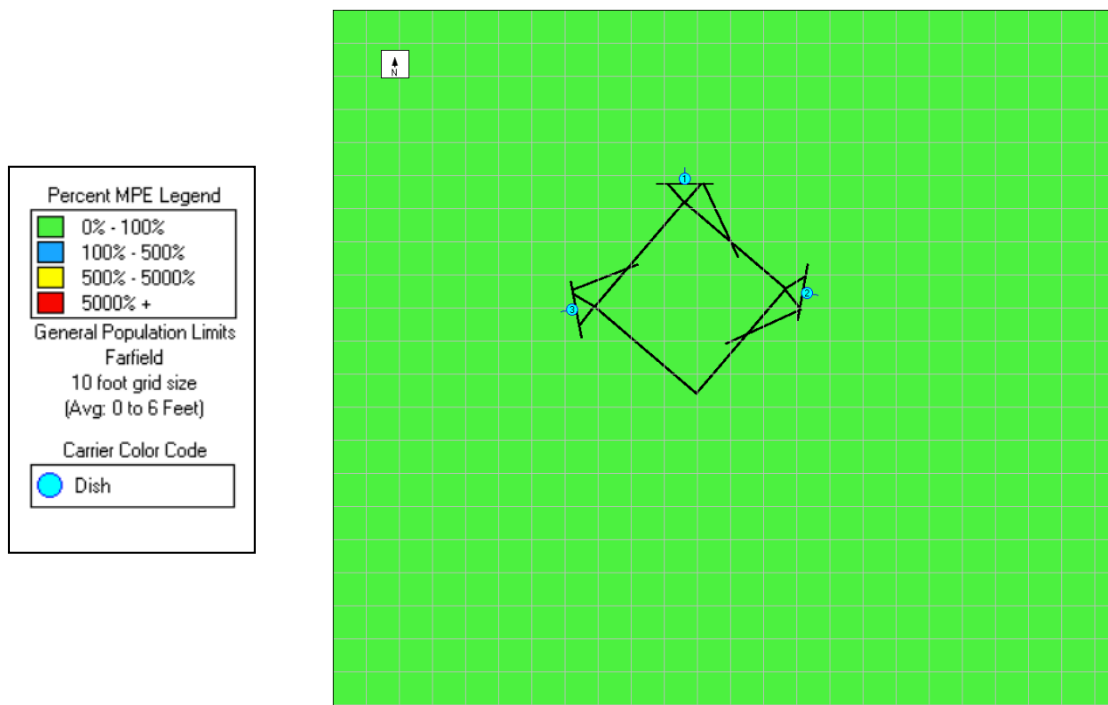


As indicated, the maximum calculated overall RF level is 2.8380 percent of the FCC MPE limit – well below the 100-percent reference for compliance.

A graph of the overall calculation results, shown below, perhaps provides a clearer *visual* illustration of the relative compliance of the calculated RF levels. The line representing the overall calculation results shows an obviously clear, consistent margin to the FCC MPE limit.



The graphic output for the areas at street level surrounding the site is reproduced on the next page.

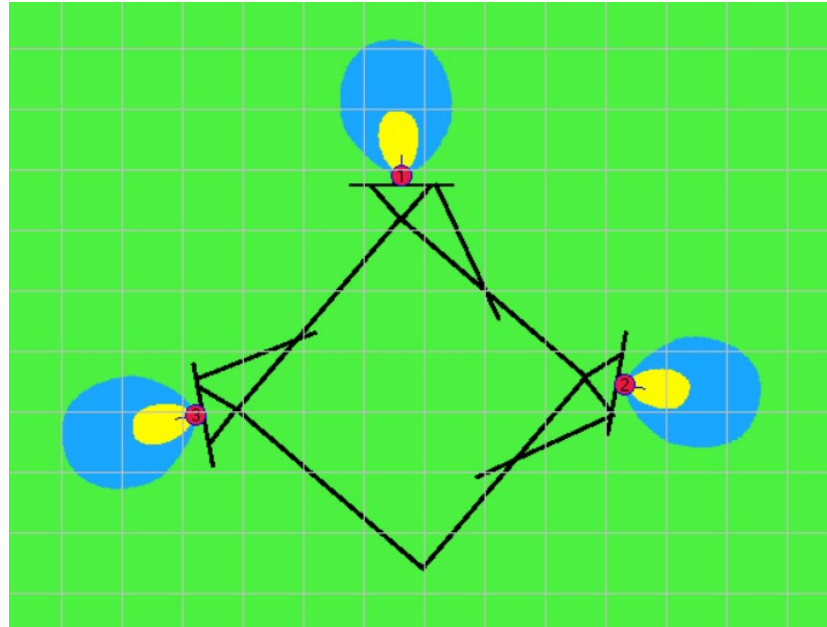
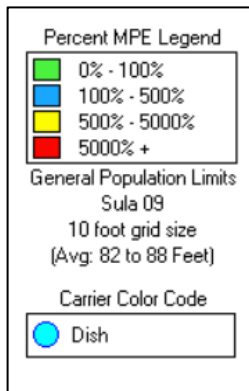


### ***Near-field Analysis***

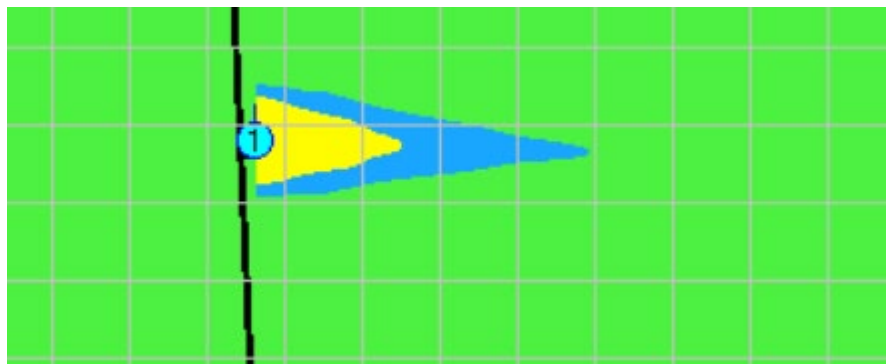
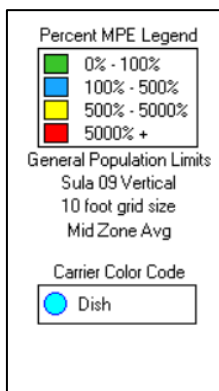
The compliance analysis for the same height as the antennas is performed using the RoofMaster program by Waterford Consultants.

RF levels in the near field of an antenna depend on the power input to the antenna, the antenna's length and horizontal beamwidth, the mounting height of the antenna above nearby roof, and one's position and distance from the antenna. RF levels in front of a directional antenna are higher than they are to the sides or rear, and in any given horizontal direction are inversely proportional to the straight-line distance to the antenna.

The RoofMaster graphic outputs for the same height as the Dish antennas are reproduced on the next page.



**RoofMaster – Same Height as the Antennas –  
Alpha / Beta / Gamma sectors**



**RoofMaster – Same Height as the Antennas –  
Alpha / Beta / Gamma sectors**

## COMPLIANCE CONCLUSION

According to the FCC, the MPE limit has been constructed in such a manner that continuous human exposure to RF fields up to and including 100 percent of the MPE limit is acceptable and safe.

The conservative analysis in this case shows that the maximum calculated RF level from the combination of proposed and existing antenna operations at street level around the site is 2.8380 percent of the FCC general population MPE limit. At the same height as the antennas, the analysis shows that the calculated RF levels potentially exceed the FCC MPE limit. Per Dish guidelines, and consistent with FCC guidance on compliance, it is recommended that four Caution signs be installed six feet below the antennas. In addition, NOC Information signs be installed at the base of the tower.

The results of the calculations, along with the described RF mitigation, combine to satisfy the FCC's RF compliance requirements and associated guidelines on compliance.

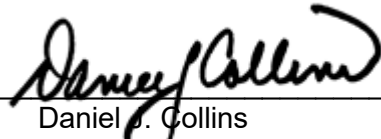
Moreover, because of the extremely conservative calculation methodology and operational assumptions we applied in the analysis, RF levels actually caused by the antennas will be significantly lower than the calculation results here indicate.



## CERTIFICATION

It is the policy of Pinnacle Telecom Group that all FCC RF compliance assessments are reviewed, approved, and signed by the firm's Chief Technical Officer who certifies as follows:

1. I have read and fully understand the FCC regulations concerning RF safety and the control of human exposure to RF fields (47 CFR 1.1301 *et seq*).
2. To the best of my knowledge, the statements and information disclosed in this report are true, complete and accurate.
3. The analysis of site RF compliance provided herein is consistent with the applicable FCC regulations, additional guidelines issued by the FCC, and industry practice.
4. The results of the analysis indicate that the subject antenna operations will be in compliance with the FCC regulations concerning the control of potential human exposure to the RF emissions from antennas.



Daniel J. Collins  
Chief Technical Officer  
Pinnacle Telecom Group, LLC

3/11/22

Date

## **Appendix A. DOCUMENTS USED TO PREPARE THE ANALYSIS**

**RFDS:** RFDS-NJJER01123B-Final-20211115-v.0\_20211116091330

**CD:** NJJER01123B\_FinalStampedCDs\_20211104113639

## Appendix B. Background on the FCC MPE Limit

As directed by the Telecommunications Act of 1996, the FCC has established limits for maximum continuous human exposure to RF fields.

The FCC maximum permissible exposure (MPE) limits represent the consensus of federal agencies and independent experts responsible for RF safety matters. Those agencies include the National Council on Radiation Protection and Measurements (NCRP), the Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), the American National Standards Institute (ANSI), the Environmental Protection Agency (EPA), and the Food and Drug Administration (FDA). In formulating its guidelines, the FCC also considered input from the public and technical community – notably the Institute of Electrical and Electronics Engineers (IEEE).

The FCC's RF exposure guidelines are incorporated in Section 1.301 *et seq* of its Rules and Regulations (47 CFR 1.1301-1.1310). Those guidelines specify MPE limits for both occupational and general population exposure.

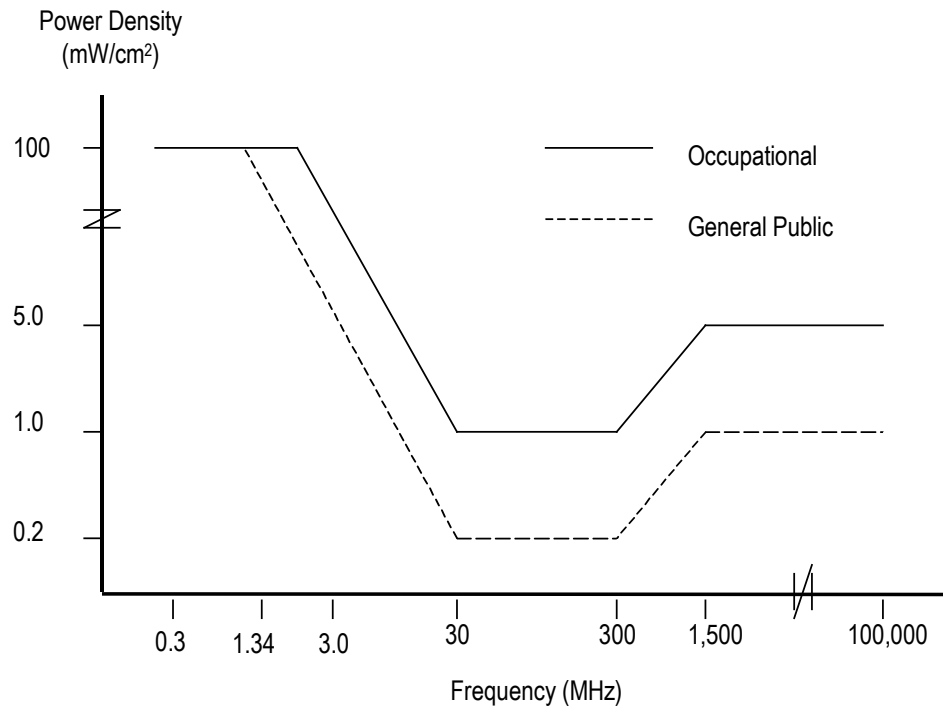
The specified continuous exposure MPE limits are based on known variation of human body susceptibility in different frequency ranges, and a Specific Absorption Rate (SAR) of 4 watts per kilogram, which is universally considered to accurately represent human capacity to dissipate incident RF energy (in the form of heat). The occupational MPE guidelines incorporate a safety factor of 10 or greater with respect to RF levels known to represent a health hazard, and an additional safety factor of five is applied to the MPE limits for general population exposure. Thus, the general population MPE limit has a built-in safety factor of more than 50. The limits were constructed to appropriately protect humans of both sexes and all ages and sizes and under all conditions – and continuous exposure at levels equal to or below the applicable MPE limits is considered to result in no adverse health effects or even health risk.

The reason for *two* tiers of MPE limits is based on an understanding and assumption that members of the general public are unlikely to have had appropriate RF safety training and may not be aware of the exposures they receive; occupational exposure in controlled environments, on the other hand, is assumed to involve individuals who have had such training, are aware of the exposures, and know how to maintain a safe personal work environment.

The FCC's RF exposure limits are expressed in two equivalent forms, using alternative units of field strength (expressed in volts per meter, or V/m), and power density (expressed in milliwatts per square centimeter, or mW/cm<sup>2</sup>). The table on the next page lists the FCC limits for both occupational and general population exposures, using the mW/cm<sup>2</sup> reference, for the different radio frequency ranges.

Frequency Range (F) (MHz)	Occupational Exposure (mW/cm <sup>2</sup> )	General Public Exposure (mW/cm <sup>2</sup> )
0.3 - 1.34	100	100
1.34 - 3.0	100	$180 / F^2$
3.0 - 30	$900 / F^2$	$180 / F^2$
30 - 300	1.0	0.2
300 - 1,500	$F / 300$	$F / 1500$
1,500 - 100,000	5.0	1.0

The diagram below provides a graphical illustration of both the FCC's occupational and general population MPE limits.



Because the FCC's RF exposure limits are frequency-shaped, the exact MPE limits applicable to the instant situation depend on the frequency range used by the systems of interest.



The most appropriate method of determining RF compliance is to calculate the RF power density attributable to a particular system and compare that to the MPE limit applicable to the operating frequency in question. The result is usually expressed as a percentage of the MPE limit.

For potential exposure from multiple systems, the respective percentages of the MPE limits are added, and the total percentage compared to 100 (percent of the limit). If the result is less than 100, the total exposure is in compliance; if it is more than 100, exposure mitigation measures are necessary to achieve compliance.

Note that the FCC “categorically excludes” all “non-building-mounted” wireless antenna operations whose mounting heights are more than 10 meters (32.8 feet) from the routine requirement to demonstrate compliance with the MPE limit, because such operations “are deemed, individually and cumulatively, to have no significant effect on the human environment”. The categorical exclusion also applies to *all* point-to-point antenna operations, regardless of the type of structure they’re mounted on. Note that the FCC considers any facility qualifying for the categorical exclusion to be automatically in compliance.

In addition, FCC Rules and Regulations Section 1.1307(b)(3) describes a provision known in the industry as “the 5% rule”. It describes that when a specific location – like a spot on a rooftop – is subject to an overall exposure level exceeding the applicable MPE limit, operators with antennas whose MPE% contributions at the point of interest are less than 5% are exempted from the obligation otherwise shared by all operators to bring the site into compliance, and those antennas are automatically deemed by the FCC to satisfy the rooftop compliance requirement.

### ***FCC References on RF Compliance***

47 CFR, FCC Rules and Regulations, Part 1 (Practice and Procedure), Section 1.1310 (Radiofrequency radiation exposure limits).

FCC Second Memorandum Opinion and Order and Notice of Proposed Rulemaking (FCC 97-303), *In the Matter of Procedures for Reviewing Requests for Relief From State and Local Regulations Pursuant to Section 332(c)(7)(B)(v) of the Communications Act of 1934 (WT Docket 97-192)*, *Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation (ET Docket 93-62)*, and *Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Amendment of the Commission's Rules to Preempt State and Local Regulation of Commercial Mobile Radio Service Transmitting Facilities*, released August 25, 1997.

FCC First Memorandum Opinion and Order, ET Docket 93-62, *In the Matter of Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, released December 24, 1996.

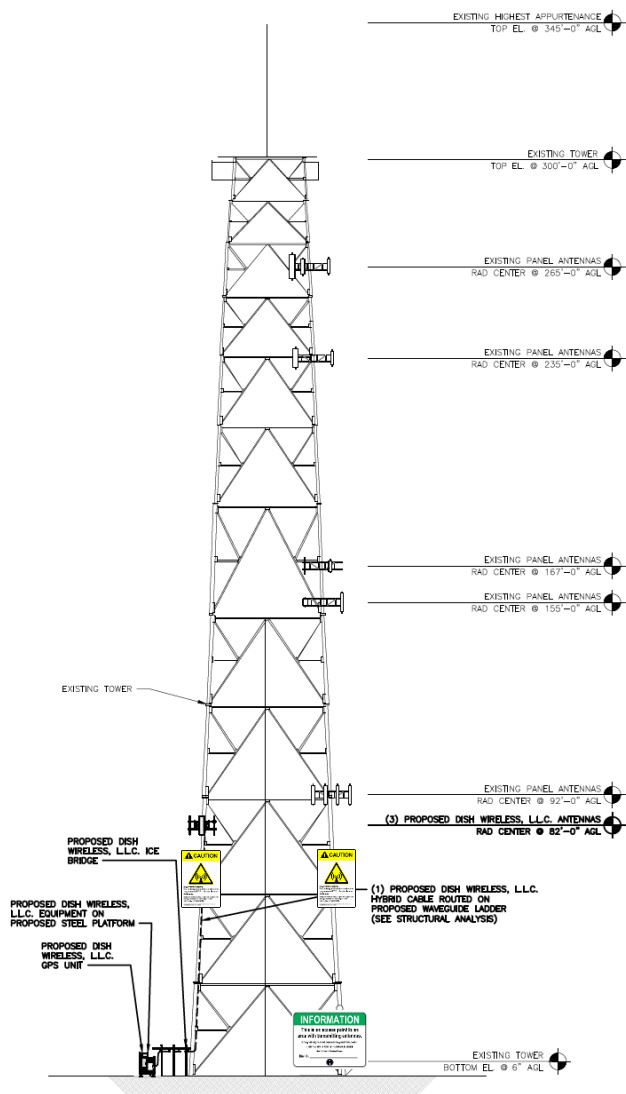
FCC Report and Order, ET Docket 93-62, *In the Matter of Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, released August 1, 1996.

FCC Report and Order, Notice of Proposed Rulemaking, Memorandum Opinion and Order (FCC 19-126), *Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields; Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies*, released December 4, 2019.

FCC Office of Engineering and Technology (OET) Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 97-01, August 1997.

FCC Office of Engineering and Technology (OET) Bulletin 56, "Questions and Answers About Biological Effects and Potential Hazards of RF Radiation", edition 4, August 1999.

Appendix C. Proposed Signage



NOC Information Sign		Caution Sign	
Guidelines Sign		Warning Sign	
Notice Sign			

## Appendix D. SUMMARY of EXPERT QUALIFICATIONS

***Daniel J. Collins, Chief Technical Officer, Pinnacle Telecom Group, LLC***

<b><i>Synopsis:</i></b>	<ul style="list-style-type: none"> <li>• 40+ years of experience in all aspects of wireless system engineering, related regulation, and RF exposure</li> <li>• Has performed or led RF exposure compliance assessments on more than 20,000 antenna sites since the latest FCC regulations went into effect in 1997</li> <li>• Has provided testimony as an RF compliance expert more than 1,500 times since 1997</li> <li>• Have been accepted as an FCC compliance expert in New York, New Jersey, Connecticut, Pennsylvania and more than 40 other states, as well as by the FCC</li> </ul>
<b><i>Education:</i></b>	<ul style="list-style-type: none"> <li>• B.E.E., City College of New York (Sch. Of Eng.), 1971</li> <li>• M.B.A., 1982, Fairleigh Dickinson University, 1982</li> <li>• Bronx High School of Science, 1966</li> </ul>
<b><i>Current Responsibilities:</i></b>	<ul style="list-style-type: none"> <li>• Leads all PTG staff work involving RF safety and FCC compliance, microwave and satellite system engineering, and consulting on wireless technology and regulation</li> </ul>
<b><i>Prior Experience:</i></b>	<ul style="list-style-type: none"> <li>• Edwards &amp; Kelcey, VP – RF Engineering and Chief Information Technology Officer, 1996-99</li> <li>• Bellcore (a Bell Labs offshoot after AT&amp;T's 1984 divestiture), Executive Director – Regulation and Public Policy, 1983-96</li> <li>• AT&amp;T (Corp. HQ), Division Manager – RF Engineering, and Director – Radio Spectrum Management, 1977-83</li> <li>• AT&amp;T Long Lines, Group Supervisor – Microwave Radio System Design, 1972-77</li> </ul>
<b><i>Specific RF Safety / Compliance Experience:</i></b>	<ul style="list-style-type: none"> <li>• Involved in RF exposure matters since 1972</li> <li>• Have had lead corporate responsibility for RF safety and compliance at AT&amp;T, Bellcore, Edwards &amp; Kelcey, and PTG</li> <li>• While at AT&amp;T, helped develop the mathematical models for calculating RF exposure levels</li> <li>• Have been relied on for compliance by all major wireless carriers, as well as by the federal government, several state and local governments, equipment manufacturers, system integrators, and other consulting / engineering firms</li> </ul>
<b><i>Other Background:</i></b>	<ul style="list-style-type: none"> <li>• Author, <i>Microwave System Engineering</i> (AT&amp;T, 1974)</li> <li>• Co-author and executive editor, <i>A Guide to New Technologies and Services</i> (Bellcore, 1993)</li> <li>• National Spectrum Management Association (NSMA) – former three-term President and Chairman of the Board of Directors; was founding member, twice-elected Vice President, long-time member of the Board, and was named an NSMA Fellow in 1991</li> <li>• Have published more than 35 articles in industry magazines</li> </ul>