

Approved

By: Craig Dossey, Executive Director

Date: 07/23/2019

El Paso County Planning & Community Development



SITE SUMMARY

PROJECT SCOPE: PROJECT CONSISTS OF INSTALLING PROPOSED DISH WIRELESS TELECOMMUNICATION EQUIPMENT, CABLING, AND ANTENNAS AT AN EXISTING TELECOMMUNICATION SITE

SITE TYPE: CO-LOCATION

TYPE OF OCCUPANCY: TELECOMMUNICATIONS

TOWER TYPE: MONOPOLE

RAD CENTER: 72'-0"

TOWER LATITUDE: 38° 52' 29.07" N (38.87496)

TOWER LONGITUDE: 104° 41' 10.30" W (-104.68623)

ZONING JURISDICTION: JURISDICTION

COUNTY: EL PASO

PARCEL NUMBER: 5332001008

POWER COMPANY: MOUNTAIN VIEW ELECTRIC
(719) 495-2283

TELEPHONE COMPANY: CENTURYLINK
(719) 445-1855

PROJECT DIRECTORY

TOWER OWNER: AMERICAN TOWER CORPORATION
10 PRESIDENTIAL WAY
WOBBURN, MA 01801
PHONE: (781) 926-6966

APPLICANT: DISH WIRELESS
9601 S MERIDIAN BLVD
ENGLEWOOD, CO 80112
PHONE: (866) 624-6874

SITE DESIGNER: SELECTIVE SITE CONSULTANTS, INC.
7171 W 95TH ST, SUITE 600
OVERLAND PARK, KS 66212
PHONE: (913) 438-7700

GENERAL NOTES

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



UNDERGROUND
SERVICE ALERT

CALL 811

48 HOURS BEFORE YOU DIG



DISH WIRELESS FIRST TIME INSTALL CONSTRUCTION DRAWINGS



DISH WIRELESS SITE ID:

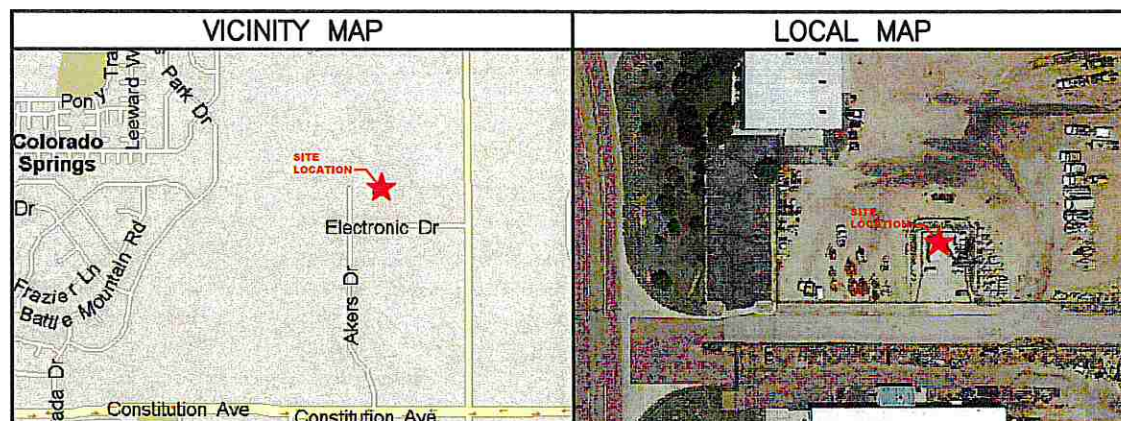
CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922
(EL PASO COUNTY)



CODE COMPLIANCE

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

- 2015 INTERNATIONAL BUILDING CODE
- 2015 INTERNATIONAL FIRE CODE
- 2015 INTERNATIONAL FUEL GAS CODE
- 2015 INTERNATIONAL MECHANICAL CODE
- 2015 INTERNATIONAL EXISTING BUILDING CODE
- 2015 INTERNATIONAL PROPERTY MAINTENANCE CODE
- 2017 NATIONAL ELECTRICAL CODE
- ANSI/TIA/EIA-222-G
- LOCAL BUILDING CODE
- CITY/COUNTY ORDINANCES
- FAA COMPLIANCE
- FCC COMPLIANCE



DISH WIRELESS PROJECT MANAGER APPROVAL:

SIGNATURE

DATE

CONSTRUCTION MANAGER APPROVAL:

SIGNATURE

DATE

LEASING/SITE ACQUISITION:

SIGNATURE

DATE

RF ENGINEER:

SIGNATURE

DATE

LANDLORD/TOWER OWNER APPROVAL:

SIGNATURE

DATE

SHEET INDEX

SHEET NO.	DESCRIPTION	REV. NO.	REVISION DATE
T-1	TITLE SHEET	5	07/10/19
GN-1	GENERAL NOTES	5	07/10/19
GN-2	GENERAL NOTES	5	07/10/19
EN-1	ELECTRICAL NOTES	5	07/10/19
EN-2	ELECTRICAL NOTES	5	07/10/19
C-1	OVERALL SITE PLAN	5	07/10/19
C-1.1	COMPOUND PLAN	5	07/10/19
C-2	EQUIPMENT PLAN	5	07/10/19
C-3	TOWER ELEVATION & ANTENNA LAYOUT	5	07/10/19
1 OF 2	ANTENNA SCHEDULE & DIAGRAM (SUPP.)	5	07/10/19
2 OF 2	CABLE COLOR CODE (SUPPLEMENTAL)	5	07/10/19
C-4	EQUIPMENT DETAILS	5	07/10/19
C-4.1	EQUIPMENT DETAILS	5	07/10/19
C-4.2	EQUIPMENT DETAILS	5	07/10/19
C-4.3	EQUIPMENT DETAILS	5	07/10/19
C-5	CABINET DETAILS	5	07/10/19
E-1	UTILITY PLANS	5	07/10/19
E-1.1	FAULT CURRENT CALCULATIONS	5	07/10/19
E-2	ELECTRICAL DETAILS	5	07/10/19
E-2.1	PANEL SCHEDULE	5	07/10/19
G-1	GROUNDING NOTES & DETAILS	5	07/10/19
G-2	GROUNDING NOTES & DETAILS	5	07/10/19
G-3	GROUNDING NOTES & DETAILS	5	07/10/19
RF-1	RF DATA SHEET (SUPPLEMENTAL)	5	07/10/19
RF-2	PLUMBING DIAGRAM (SUPPLEMENTAL)	5	07/10/19
RF-2.1	PLUMBING DIAGRAM (SUPPLEMENTAL)	5	07/10/19

PREPARED FOR:

dish
WIRELESS



7171 West 95th Street, Suite 600
Overland Park, Kansas 66212
Phone: 913-438-7700
Fax: 913-438-7777

ENGINEERING LICENSE:

STATE OF COLORADO

STATE CERTIFICATE OF AUTHORIZATION # 20041302439

ENGINEER: KEVIN M. VANMAALE PE# 0053946 DISCIPLINE: CIVIL
REJ. ROBERT E. JENSEN 54720 CIVIL
TMS TERRANCE M. SUPER 36490 ELECTRICAL
SDK SHELTON D. KEISLING 49843 ELECTRICAL



DRAWN BY: MGH
CHECKED BY: TW
APPVD:

SUBMITTALS

DATE	DESCRIPTION	REV	ISSUED BY
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07/08/19	REVISED PER COMMENTS	4	MGH
07/10/19	REVISED PER COMMENTS	5	MGH

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DISH WIRELESS SITE ID:

CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

TITLE
SHEET

SHEET NUMBER:

T-1

(TWR19-001)

GENERAL NOTES:

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

12. ANY SUBSTITUTIONS OF MATERIALS AND/OR EQUIPMENT, MUST BE APPROVED BY OWNER.
13. DOCUMENT ALL CHANGES MADE IN THE FIELD BY MARKING UP THE APPROVED CONSTRUCTION DRAWINGS AND SUBMITTING THE REDLINED SET TO OWNER UPON COMPLETION. DOCUMENT ALL WORK PERFORMED WITH PHOTOGRAPHS TO BE SUBMITTED WITH REDLINED CONSTRUCTION DRAWINGS.
14. PROVIDE SUPPORTS FOR CABLES TO THE ELEVATION OF ALL INITIAL AND FUTURE ANTENNAS IN ACCORDANCE WITH ALL MANUFACTURER'S REQUIREMENTS.
15. CONFIRM THAT THE REQUIREMENTS OF THE STRUCTURAL ANALYSIS, MOUNT ANALYSIS AND ANY ASSOCIATED MODIFICATIONS HAVE BEEN FOLLOWED AND COMPLETED AS REQUIRED TO SUPPORT THE EQUIPMENT ASSOCIATED WITH THIS PROJECT.
16. KNOW AND OBSERVE MANUFACTURER'S MINIMUM BEND RADIUS SPECIFICATIONS BEFORE HANDLING HYBRID CABLES, RF CABLES, AND FIBER OPTIC LINES.
17. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS STIPULATED IN THE CONSTRUCTION SCOPE OF WORK CONTRACT, REGARDLESS OF INCLUSION OR OMISSION FROM THE CONSTRUCTION DRAWING(S).

ABBREVIATIONS

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



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:

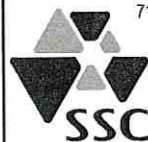
- INSTALL (3) PROPOSED PANEL ANTENNAS (1 PER SECTOR)
- INSTALL (3) PROPOSED ANTENNA MOUNTS (1 PER SECTOR)
- INSTALL PROPOSED JUMPERS
- INSTALL (8) PROPOSED RRU's
- INSTALL (1) PROPOSED HYBRID CABLE
- INSTALL (1) PROPOSED CABLE LADDER (IF APPLICABLE)
- INSTALL (1) PROPOSED METAL PLATFORM WITH CANOPY FOR GROUND EQUIPMENT
- INSTALL (1) PROPOSED ICE BRIDGE
- INSTALL (1) PROPOSED BBU IN CABINET
- INSTALL (1) PROPOSED PPC CABINET MOUNTED TO PROPOSED H-FRAME
- INSTALL (1) PROPOSED SURGE SUPPRESSION DEVICE
- INSTALL (1) PROPOSED EQUIPMENT CABINET
- INSTALL (1) PROPOSED RBS CHASSIS IN PROPOSED EQUIPMENT CABINET
- INSTALL (1) PROPOSED BASEBAND UNIT IN PROPOSED RBS CHASSIS
- INSTALL (1) PROPOSED POWER CONDUIT FROM PLATFORM TO MEET-ME-POINT DESIGNATED BY POWER COMPANY
- INSTALL (1) PROPOSED GPS ANTENNA WITH CABLE IN CONDUIT
- INSTALL (1) PROPOSED PIPE MAST
- INSTALL (1) PROPOSED LTE BACKHAUL ANTENNA ON PROPOSED PIPE MAST WITH CABLE IN CONDUIT

PROJECT NOTES

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

PREPARED FOR:

dish
WIRELESS



7171 West 95th Street, Suite 600
Overland Park, Kansas 66212
Phone: 913-438-7700
Fax: 913-438-7777

ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
KMY KEVIN M. VANMAELE 53946 CIVIL C
REJ ROBERT E. JENSEN 54720 CIVIL C
TMS TERRANCE M. SUPER 35690 ELECTRICAL E
SDK SHELTON D. KEISLING 49843 ELECTRICAL E



DRAWN BY: MGH

CHECKED BY: TW

APP'VD:

SUBMITTALS

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SHEET TITLE:

GENERAL NOTES

SHEET NUMBER:

GN-1

(TWR19-001)

SITE NOTES:

- WHEN SITE WORK IS INCLUDED IN SCOPE:
 - CLEAR AND GRUB SITE OF ALL VEGETATION, PAVING, GRAVEL BASE AND OTHER DEBRIS NOT TO REMAIN. SUBGRADES ARE TO BE SET PRIOR TO LANDSCAPE INSTALLATION.
 - PROVIDE ELEVATION OF SUBGRADE WITHIN 0.10 FOOT OF ELEVATIONS SHOWN ON PLAN MINUS DEPTH OF TOPSOIL, FILL, AND MULCH.
 - ROUGH GRADE ALL AREAS WITHIN 1 FOOT OF ELEVATIONS INDICATED BEFORE PLANTING. PROVIDE POSITIVE DRAINAGE AWAY FROM EQUIPMENT SLABS, BUILDINGS AND THROUGH ALL PLANTER AREAS TO AVOID LOW SPOTS AND STANDING WATER.
 - BLEND NEW GRADES NATURALLY INTO EXISTING GRADES.
 - MAINTAIN POSITIVE DRAINAGE ON THE SITE AT ALL TIMES.
 - IF REQUIRED, MAINTAIN CONTINUOUS EROSION CONTROL ON THE DOWNSTREAM SIDE OF THE SITE.
 - IN LANDSCAPE AREAS, FINISH GRADES ARE TO FOLLOW THE GRADES AND EDGE DETAILS INDICATED AND BE MOUNDED 6 INCHES IN THE CENTER OF THE BED ABOVE THE EDGE OF THE LANDSCAPE AREA.
 - DO NOT PLACE FILL OR EMBANKMENT MATERIAL ON FROZEN GROUND. DO NOT PLACE FROZEN MATERIALS, SNOW OR ICE IN ANY FILL OR EMBANKMENT.
 - NOTIFY OWNER IF MODIFICATIONS TO THE PROPOSED GRADING SEEM NECESSARY AND OBTAIN APPROVAL PRIOR TO START OF WORK.
- FOOTINGS SHALL BEAR ON FIRM, NATURAL, UNDISTURBED SOIL, OR ON ENGINEERED FILL (COMPACTED TO 95% ASTM D1557). ENSURE THAT EXCAVATIONS ARE FREE OF ORGANIC MATERIAL, DEBRIS, OR OTHER FOREIGN MATERIAL. NOTIFY OWNER IF ANY UNUSUAL CONDITIONS ARE ENCOUNTERED.
- FILL AND SLAB BASE MATERIAL SHALL BE 3/4" MINUS CRUSHED ROCK PLACED IN 8" (MAXIMUM) LOOSE LIFTS AND COMPACTED TO 98% ASTM D1557.

CONCRETE NOTES:

- CONCRETE AND REINFORCING SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:

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

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

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

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

- AIR ENTRAIN ALL CONCRETE WITH SURFACES EXPOSED TO WEATHER WITH AN AIR-ENTRAINING AGENT CONFORMING TO ASTM C260, C494, C618, C989 AND C1017. AIR ENTRAIN CONCRETE EXPOSED TO FREEZING AND THAWING WHILE MOIST IN ACCORDANCE WITH ACI 318, SECTION 4.4.1.
- DETAIL REINFORCING STEEL (INCLUDING HOOKS AND BENDS) IN ACCORDANCE WITH ACI 315 AND 318. LAP ALL CONTINUOUS REINFORCEMENT AT LEAST 30 BAR DIAMETERS OR A MINIMUM OF 2'-0". PROVIDE CORNER BARS AT ALL WALL AND FOOTING INTERSECTIONS. LAP CORNER BARS AT LEAST 30 BAR DIAMETERS OR A MINIMUM OF 2'-0". LAP ADJACENT MATS OF WELDED WIRE FABRIC A MINIMUM OF 8" AT SIDES AND ENDS.
- PERFORM WELDING OF GRADE 60 REINFORCING BARS (IF REQUIRED) USING LOW HYDROGEN ELECTRODES. PERFORM WELDING OF GRADE 40 REINFORCING BARS (IF REQUIRED) USING E70 XX ELECTRODES. DO NOT WELD WITHIN 4" OF COLD BENDS IN REINFORCING STEEL.
- DO NOT FIELD BEND REINFORCING PARTIALLY EMBEDDED IN CONCRETE UNLESS SPECIFICALLY SO DETAILED OR APPROVED BY THE ENGINEER.
- SUPPORT BARS ON CHAIRS OR DOBIE BRICKS.
- FURNISH NON-SHRINK GROUT BY AN APPROVED MANUFACTURER. MIX AND PLACE IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED RECOMMENDATIONS. GROUT STRENGTH SHALL BE AT LEAST EQUAL TO THE MATERIAL ON WHICH IT IS PLACED (4 KSI, MINIMUM).
- ALL EXPANSION ANCHORS TO BE HILTI BRAND, UNO. TEST ADHESIVE ANCHORS TO CONFIRM CAPACITY UNLESS WAIVED BY ENGINEER AND LOCAL JURISDICTION.

STRUCTURAL STEEL NOTES:

- STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:

WIDE FLANGE SHAPES	ASTM A992, GRADE 50
SHAPES, PLATES, ANGLES, & RODS	ASTM A36, Fy 36 KSI
SPECIAL SHAPES AND PLATES	ASTM A572, Fy 50 KSI
PIPE COLUMNS	ASTM A53, GR B, Fy 35 KSI
STRUCTURAL TUBING	ASTM A500, GR B, Fy 46KSI
ANCHOR BOLTS	ASTM A307
CONNECTION BOLTS	ASTM A325 TWIST-OFF
- BASE STRUCTURAL STEEL DESIGN, FABRICATION AND ERECTION (INCLUDING FIELD WELDING, HIGH STRENGTH FIELD BOLTING, EXPANSION BOLTS, AND THREADED EXPANSION ANCHORS) ON THE AISC "SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" LATEST EDITION.
- HOT DIP GALVANIZE AFTER FABRICATION PER A123/A123M-00 ALL STEEL EXPOSED TO WEATHER AND WHERE NOTED.
- CONFORM TO ALL AISC AND AWS STANDARDS FOR WELDING. PERFORM WELDING BY ANSI/AWS D1.1 CERTIFIED WELDERS USING E70 XX ELECTRODES. USE ONLY PRE-QUALIFIED WELDS AS DEFINED BY AWS.
- PROVIDE COLD-FORMED STEEL FRAMING MEMBERS OF THE SHAPE, SIZE, AND GAUGE SHOWN ON THE PLANS. PROVIDE MINIMUM SECTION PROPERTIES INDICATED. ALL COLD-FORMED STEEL FRAMING SHALL CONFORM TO THE AISI "SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS."
- FOR BOLTED CONNECTIONS, USE 3/4" DIA., BEARING-TYPE, A325 BOLTS WITH A MINIMUM OF TWO BOLTS, UNO.
- FOR NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING, USE 5/8" DIA. A307 BOLTS, UNO.
- PREPARE AND PAINT IN ACCORDANCE WITH THE PAINT MANUFACTURERS WRITTEN INSTRUCTIONS, UNO.
- TOUCH UP ALL FIELD DRILLING, WELDING AND CUT SURFACES WITH 2 COATS OF GALVACON (ZINC RICH PAINT) OR APPROVED EQUAL.
- THE STRUCTURAL INTEGRITY OF THE EQUIPMENT PLATFORM HAS NOT BEEN REVIEWED BY FDH INFRASTRUCTURE SERVICES, LLC.

SPECIAL INSPECTIONS:

- WHEN REQUIRED, PROVIDE SPECIAL INSPECTIONS PERFORMED BY AN INDEPENDENT INSPECTOR, APPROVED BY OWNER'S REPRESENTATIVE AND THE LOCAL JURISDICTION.
- THE SPECIAL INSPECTOR SHALL PROVIDE A COPY OF THE REPORT TO THE OWNER'S REPRESENTATIVE, STRUCTURAL ENGINEER, CONTRACTOR, AND BUILDING OFFICIAL.



PREPARED FOR:

dish
WIRELESS



ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
KMY KEVIN M. VANMAALE 53946 CIVIL
REJ ROBERT E. JENSEN 54720 CIVIL
TMS TERRANCE M. JENSEN 38999 ELECTRICAL
SDK SHELTON KEISLING 00643 ELECTRICAL



DRAWN BY: MGH
CHECKED BY: TW
APP'VD:

SUBMITTALS				
DATE	DESCRIPTION	REV	ISSUED BY	
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DISH WIRELESS SITE ID:

CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

GENERAL NOTES

SHEET NUMBER:

GN-2

(TWR19-001)

ELECTRICAL NOTES:

GENERAL

GENERAL CONDITIONS:

- A. CONTRACTOR SHALL INSPECT THE EXISTING SITE CONDITIONS PRIOR TO SUBMITTING BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARD TO THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE ISSUED TO CONSTRUCTION MANAGER IN WRITING FOR CLARIFICATION PRIOR TO SUBMITTAL OF BID AND CONTRACT AWARD.
- B. THE CONTRACTOR SHALL OBTAIN PERMITS, LICENSES, MAKE ALL DEPOSITS, AND PAY ALL FEES REQUIRED FOR THE CONSTRUCTION OF WORK UNDER THIS SECTION.
- C. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF ALL SYSTEMS AND COMPONENTS COVERED UNDER THIS SECTION. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. DRAWINGS SHALL NOT BE SCALED TO DETERMINE DIMENSIONS.

LAWS, REGULATIONS, ORDINANCES, STATUTES AND CODES:

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

REFERENCES:

- A. THE PUBLICATIONS LISTED BELOW ARE PART OF THIS SPECIFICATION. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE. THIS SPECIFICATION IS ISSUED FOR CONSTRUCTION UNLESS OTHERWISE NOTED. EXCEPT AS MODIFIED BY THE REQUIREMENT SPECIFIED HEREIN OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THIS SPECIFICATION SHALL CONFORM TO THE APPLICABLE PROVISION OF THESE PUBLICATIONS.
1. ANSI/IEEE (AMERICAN NATIONAL STANDARDS INSTITUTE)
 2. ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)
 3. ICEA (INSULATED CABLE ENGINEERS ASSOCIATION)
 4. NEMA (NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION)
 5. NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)
 6. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
 7. UL (UNDERWRITERS LABORATORIES, INC.)
 8. DISH WIRELESS GROUNDING AND BONDING STANDARDS, LATEST EDITION, AND COMPLY WITH DISH WIRELESS GROUNDING CHECKLIST, LATEST VERSION
 9. R56 MOTOROLA STANDARDS

SCOPE OF WORK:

- A. WORK UNDER THIS SECTION SHALL CONSIST OF FURNISHING ALL LABOR, MATERIAL, AND ASSOCIATED SERVICES REQUIRED TO COMPLETE REQUIRED CONSTRUCTION AND BE OPERATIONAL.
- B. ALL ELECTRICAL EQUIPMENT UNDER THIS CONTRACT SHALL BE PROPERLY TESTED, ADJUSTED, AND ALIGNED BY THE CONTRACTOR.
- C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATING, DRAINING OF TRENCHES, BACKFILLING, AND REMOVAL OF EXCESS DIRT.
- D. THE CONTRACTOR SHALL PREPARE A COMPLETE SET OF AS-BUILT DRAWINGS, DOCUMENT ALL WIRING EQUIPMENT CONDITIONS, AND CHANGES WHILE COMPLETING THIS CONTRACT, THE AS-BUILT DRAWINGS SHALL BE SUBMITTED AT COMPLETION OF THE PROJECT.

PRODUCTS

GENERAL:

- A. ALL MATERIALS AND EQUIPMENT SHALL BE UL LISTED, NEW, AND FREE FROM DEFECTS.
- B. ALL ITEMS OF MATERIALS AND EQUIPMENT SHALL BE ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION AS SUITABLE FOR THE USE INTENDED.
- C. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.
- D. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING EQUAL TO OR GREATER THAN THE SHORT CIRCUIT CURRENT AVAILABLE, 10,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT.

MATERIALS AND EQUIPMENT:

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

B. CONDUCTORS AND CABLE:

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

C. DISCONNECT SWITCHES:

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

D. CHEMICAL ELECTROLYTIC GROUNDING SYSTEM:

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

E. SYSTEM GROUNDING

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

F. OTHER MATERIALS:

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

G. PANELS AND LOAD CENTERS:

1. ALL PANEL LABELS SHALL BE TYPEWRITTEN.

EXECUTION:

GENERAL:

- A. ALL MATERIAL AND EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- B. EQUIPMENT SHALL BE TIGHTLY COVERED AND PROTECTED AGAINST DIRT OR WATER, AND AGAINST CHEMICAL OR MECHANICAL INJURY DURING INSTALLATION AND CONSTRUCTION PERIODS.

LABOR AND WORKMANSHIP:

- A. ALL LABOR FOR THE INSTALLATION OF MATERIALS AND EQUIPMENT FURNISHED FOR THE ELECTRICAL SYSTEM SHALL BE INSTALLED BY EXPERIENCED WIREMEN, IN A NEAT AND WORKMAN-LIKE MANNER.
- B. ALL ELECTRICAL EQUIPMENT SHALL BE ADJUSTED, ALIGNED AND TESTED BY THE CONTRACTOR AS REQUIRED TO PRODUCE THE INTENDED PERFORMANCE.
- C. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL THOROUGHLY CLEAN ALL EXPOSED EQUIPMENT, REMOVE ALL LABELS AND ANY DEBRIS, CRATING OR CARTONS AND LEAVE THE INSTALLATION FINISHED AND READY FOR OPERATION.

PREPARED FOR:

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WIRELESS



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ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
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REJ ROBERT E. JENSEN 54720 CIVIL C
TMS TERRANCE M. SUPER 36490 ELECTRICAL E
SDK SHELTON D. KEISLING 49643 ELECTRICAL E



DRAWN BY: MGH

CHECKED BY: TW

APP'D:

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DISH WIRELESS SITE ID:

CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

ELECTRICAL NOTES

SHEET NUMBER:

EN-1

(TWR19-001)

ELECTRICAL NOTES (CONTINUED)

COORDINATION:

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

INSTALLATION:

A. CONDUIT:

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

B. CONDUCTORS AND CABLE:

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

C. DISCONNECT SWITCHES:

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

D. GROUNDING:

1. ALL METALLIC PARTS OF ELECTRICAL EQUIPMENT WHICH DO NOT CARRY CURRENT SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING MANUFACTURER, DISH WIRELESS GROUNDING AND BONDING STANDARDS, LATEST EDITION, AND COMPLY WITH DISH WIRELESS GROUNDING CHECKLIST, LATEST VERSION, AND THE NATIONAL ELECTRICAL CODE.
2. PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEM INDICATED WITH ASSEMBLY OF MATERIALS, INCLUDING GROUNDING ELECTRODES, BONDING JUMPERS AND ADDITIONAL ACCESSORIES AS REQUIRED FOR A COMPLETE INSTALLATION.

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

ACCEPTANCE TESTING:

- A. CERTIFIED PERSONNEL USING CERTIFIED EQUIPMENT SHALL PERFORM REQUIRED TESTS AND SUBMIT WRITTEN TEST REPORTS UPON COMPLETION.
- B. WHEN MATERIAL AND/OR WORKMANSHIP IS FOUND NOT TO COMPLY WITH THE SPECIFIED REQUIREMENTS, THE NON-COMPLYING ITEMS SHALL BE REMOVED FROM THE PROJECT SITE AND REPLACED WITH ITEMS COMPLYING WITH THE SPECIFIED REQUIREMENTS PROMPTLY AFTER RECEIPT OF NOTICE FOR NON-COMPLIANCE.
- C. TEST PROCEDURES:
 1. ALL FEEDERS SHALL HAVE INSULATION TESTED AFTER INSTALLATION, BEFORE CONNECTION TO DEVICES. THE CONDUCTORS SHALL TEST FREE FROM SHORT CIRCUITS AND GROUNDS. TESTING SHALL BE FOR ONE MINUTE USING 1000V DC. PROVIDE WRITTEN DOCUMENTATION FOR ALL TEST RESULTS.
 2. PRIOR TO ENERGIZING CIRCUITRY, TEST WIRING DEVICES FOR ELECTRICAL CONTINUITY AND PROPER POLARITY CONNECTIONS.
 3. MEASURE AND RECORD VOLTAGES BETWEEN PHASES AND BETWEEN PHASE CONDUCTORS AND NEUTRALS, SUBMIT A REPORT OF MAXIMUM AND MINIMUM VOLTAGES.
 4. PERFORM GROUNDING TEST TO MEASURE GROUNDING RESISTANCE OF GROUNDING SYSTEM USING THE IEEE STANDARD 3-POINT "FALL-OF-POTENTIAL" METHOD. PROVIDE PLOTTED TEST VALUES AND LOCATION SKETCH. NOTIFY THE ENGINEER IMMEDIATELY IF MEASURED VALUE IS OVER 5 OHMS.

PREPARED FOR:

dish
WIRELESS



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Fax: 913-438-7777

ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
KMY KEVIN M. VANMAELE 53946 CIVIL C
REJ ROBERT E. JENSEN 54720 CIVIL C
TMS TERRANCE M. SUPER 36490 ELECTRICAL E
SDK SHELTON D. KEISLING 49543 ELECTRICAL E



DRAWN BY: MGH
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APPV'D:

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2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

ELECTRICAL NOTES

SHEET NUMBER:

EN-2

(TWR19-001)

DISH WIRELESS IS COLLOCATING (3) PANEL ANTENNAS ONTO THE EXISTING CELL TOWER AND PLACING (1) EQUIPMENT CABINET IN THE EXISTING EQUIPMENT SHELTER (SEE SHEET C-1.1 FOR ENLARGED SITE PLAN)

EXISTING ACCESS DRIVE

Electronic Dr

Akers Dr

500 ft

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PREPARED FOR:

dish
WIRELESS

SSC

7171 West 95th Street, Suite 600
Overland Park, Kansas 66212
Phone: 913-438-7700
Fax: 913-438-7777

ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439

ENGINEER:	PE#	DISCIPLINE:	
KMV KEVIN M. VANMAELE	53946	CIVIL	C
REJ ROBERT E. JENSEN	54720	CIVIL	C
TMS TERRANCE M. SUPER	36490	ELECTRICAL	E
SDK SHELTON D. KEISLING	49643	ELECTRICAL	E

COLORADO LICENSED
Kevin M. VanMaale
PE.0053946
7/10/19
PROFESSIONAL ENGINEER

DRAWN BY: MGH
CHECKED BY: TW
APPVD:

SUBMITTALS				
DATE	DESCRIPTION	REV	ISSUED BY	
04/11/19	ISSUED FOR REVIEW	A	MGH	
04/14/19	REVISED PER COMMENTS	1	MGH	
04/22/19	ISSUED FOR CONST.	2	MGH	
06/24/19	REVISED PER COMMENTS	3	MGH	
07/08/19	REVISED PER COMMENTS	4	MGH	
07/10/19	REVISED PER COMMENTS	5	MGH	

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DISH WIRELESS SITE ID:
CO1410011A

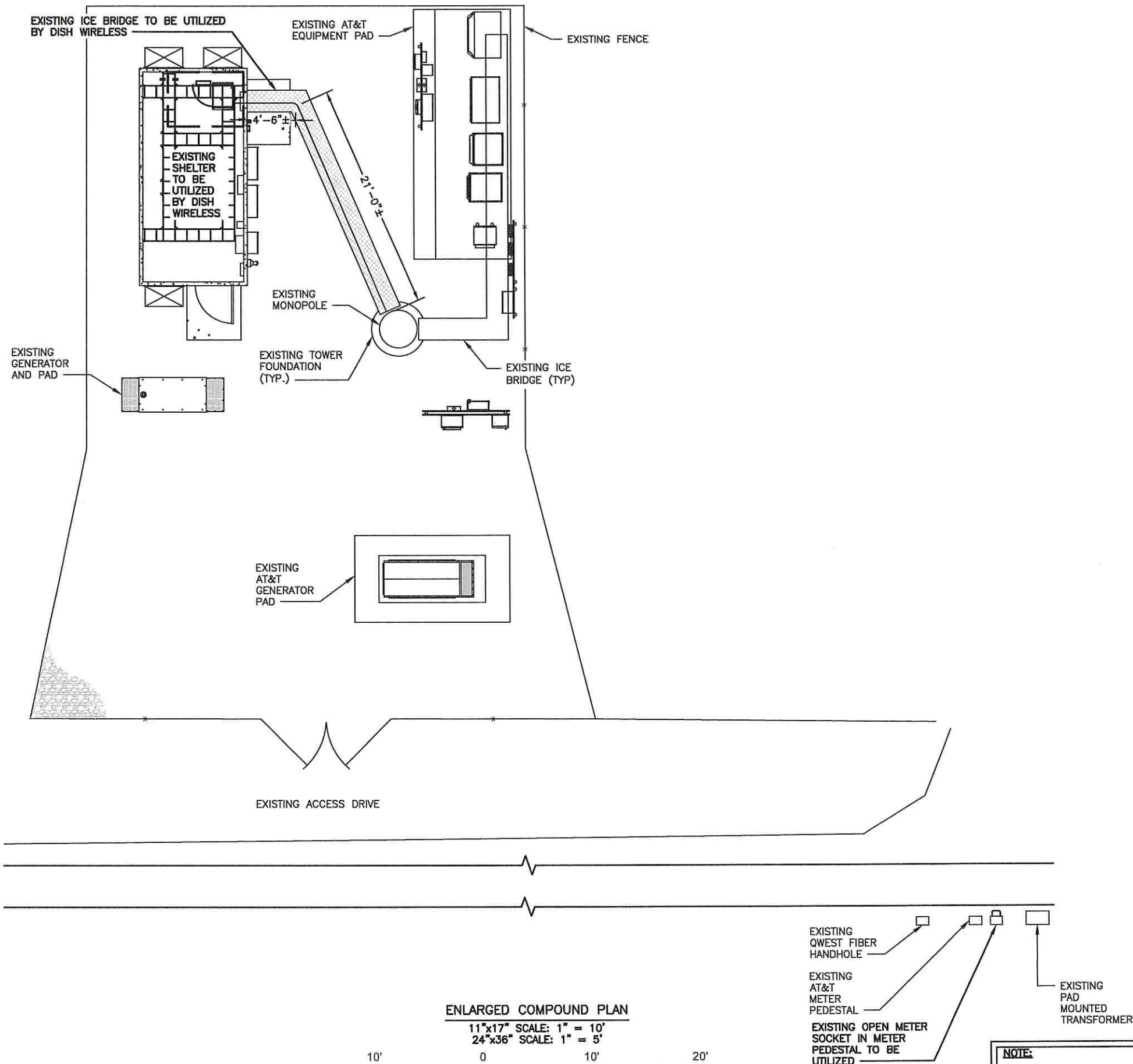
TOWER OWNER SITE ID:
302459

SITE ADDRESS:
2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:
OVERALL SITE PLAN

SHEET NUMBER:
C-1
(TWR19-001)

HYBRID CABLE LENGTH:
EQUIPMENT TO TOWER = 25'-0" ±
TOWER TO RAD CENTER = 75'-0" ±



NOTE:
1. WHEN APPLICABLE, LTE BACKHAUL ANTENNA LOCATION TO BE VERIFIED IN THE FIELD AT TIME OF CONSTRUCTION.

PREPARED FOR:

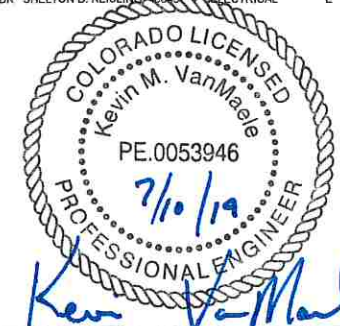
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ENGINEER: PE# DISCIPLINE:
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REJ ROBERT E. JENSEN 54720 CIVIL C
TMS TERRANCE M. SUPER 36490 ELECTRICAL E
SDR SHELTON D. KEISLING 48600 ELECTRICAL E



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CO1410011A

TOWER OWNER SITE ID:
302459

SITE ADDRESS:
2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:
ENLARGED
COMPOUND PLAN

SHEET NUMBER:

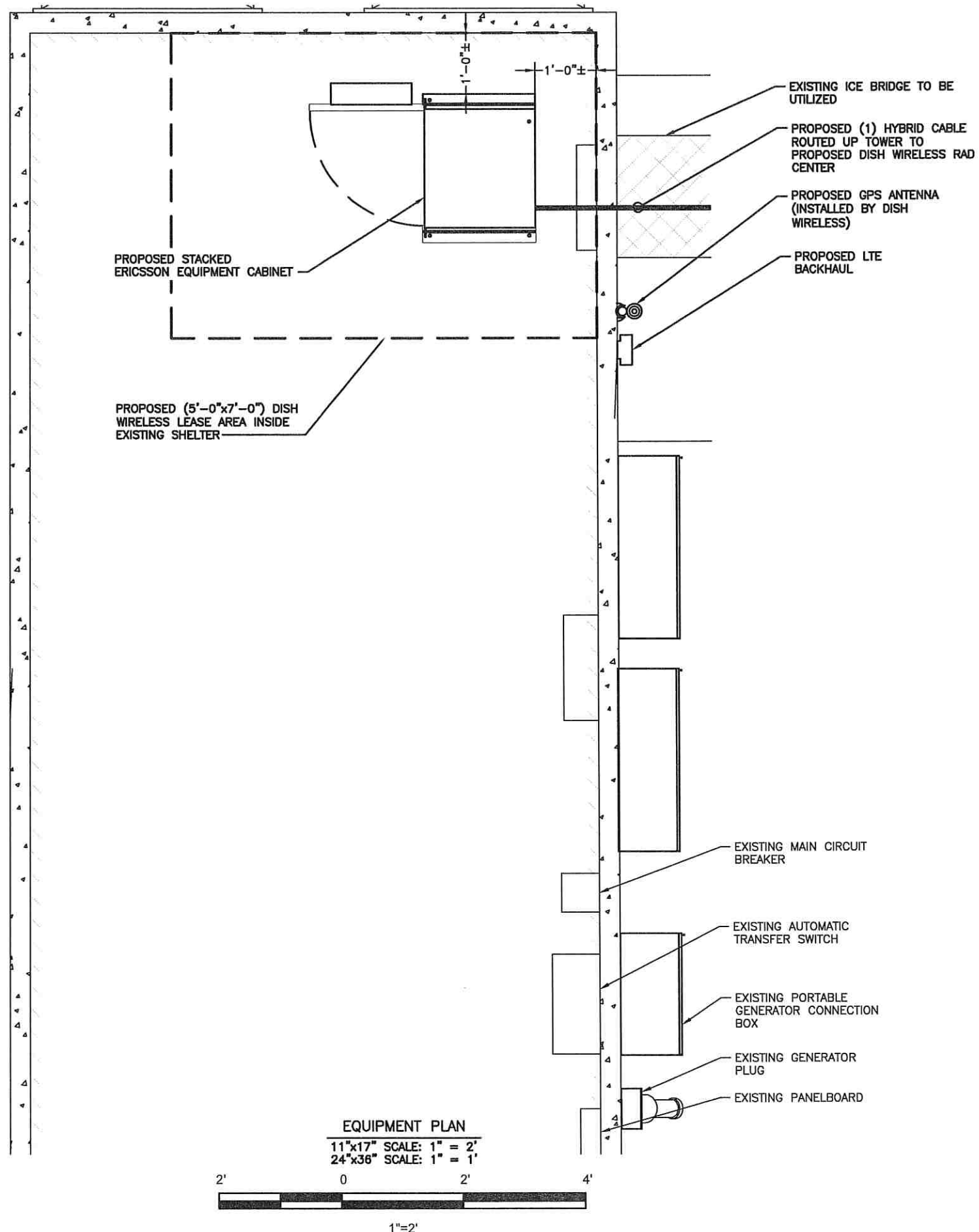
C-1.1
(TWR19-001)

SAFETY NOTE:

WHEN APPLICABLE, CONTRACTOR SHALL COVER PROPOSED (8"x8") HOLE IN PLATFORM GRATE TO PREVENT TRIPPING HAZARD. SEE OSHA STANDARDS, SECTION 29 CFR 1926.501(b)(4)(ii).

NOTES:

1. WHEN APPLICABLE, LTE BACKHAUL ANTENNA LOCATION TO BE VERIFIED IN THE FIELD AT TIME OF CONSTRUCTION.
2. WHEN APPLICABLE, DISH WIRELESS SUPPORT PIPE SHALL BE POSITIONED AS TO AFFORD FUTURE DISH A CLEAR, UNOBSTRUCTED VIEW OF THE SOUTHERN SKY.
3. CONTRACTOR TO PROVIDE 4MIL FABRIC BENEATH PROPOSED DISH WIRELESS EQUIPMENT PLATFORM AND LEGS IF NONE PRESENT.



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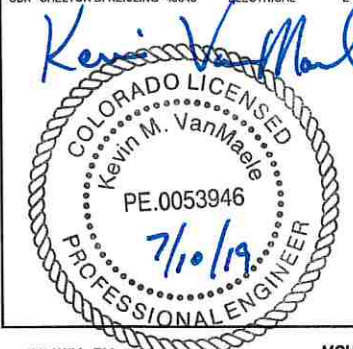
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REJ ROBERT E. JENSEN 54720 CIVIL C
TMS TERRANCE M. SUPER 38490 ELECTRICAL E
SDK SHELTON D. KEISLING 49643 ELECTRICAL E



DRAWN BY: MGH

CHECKED BY: TW

APP'D:

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DISH WIRELESS SITE ID:

CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

EQUIPMENT PLAN

SHEET NUMBER:

C-2

(TWR19-001)

NOTES:

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

RAD CENTER

FACE WIDTH OR
DIAMETER

72'-0"±

2'-0"±

(1) PROPOSED DISH WIRELESS
ANTENNA
COMBA ODI-065R16M18JJ-GQ V2
(TYP. 3 SECTORS)

ALPHA SECTOR
1B
(AZ = 30°)

(1) PROPOSED
RRUS-E2 B29
(TYP. 3 SECTORS)

(1) PROPOSED
RADIO 4415
(ALPHA & BETA
SECTORS ONLY)

(1) PROPOSED
COMMSCOPE
STAND-OFF MOUNT
(TYP. 3 SECTORS)

GAMMA SECTOR
3B
(AZ = 310°)

(1) PROPOSED RADIO 0208
(TYP. 3 SECTORS)

2B
(AZ = 205°)
BETA SECTOR

PROPOSED ANTENNA LAYOUT
N.T.S.

PROPOSED DISH WIRELESS
ANTENNA ARRAY
(SEE PROPOSED ANTENNA
LAYOUT FOR DETAILS)

DISH WILL NEED TO
REMOVE ABANDONED ATC
COAX/ANTENNAS &
PLATFORM @ ELEV.=72'-0"
PRIOR TO INSTALLATION

STRUCTURE INFORMATION IS SHOWN FOR ILLUSTRATIVE
PURPOSES ONLY. STRUCTURAL INTEGRITY OF SUPPORTING
STRUCTURE, ANTENNA MOUNTS, AND FOUNDATION SHALL BE
VERIFIED AS ACCEPTABLE BY ENGINEER CERTIFIED
STRUCTURAL ANALYSIS, UTILIZING THE LOADING
REPRESENTED WITHIN THESE DRAWINGS PRIOR TO THE
EXECUTION OF EQUIPMENT CHANGES CONTAINED IN THESE
DRAWINGS. CONTRACTOR SHALL OBTAIN ALL STRUCTURAL
REPORTS AND FOLLOW ALL RECOMMENDATIONS.

REFER TO STRUCTURAL EVALUATION
BY ATC DATED 03/07/19

ROUTE (1) HYBRID
CABLE TO
PROPOSED DISH
WIRELESS RAD
CENTER

SEE EQUIPMENT
ELEVATION FOR
DETAILS

PROPOSED (0'-5")
WIDE DISH
WIRELESS ICE
BRIDGE

PROPOSED DISH
WIRELESS CABINET

PROPOSED (0'-5")
DISH WIRELESS ICE
BRIDGE
(SEE SHEET C-7
FOR DETAILS)

ROUTE (1) HYBRID
CABLE FROM
PROPOSED DISH
WIRELESS
EQUIPMENT
PLATFORM TO
TOWER

FINAL TOWER ELEVATION
N.T.S.

EQUIPMENT ELEVATION
N.T.S.

ANTENNA LAYOUT NOTES:

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

EQUIPMENT TESTING:

CONTRACTOR SHALL COMPLETE THE FOLLOWING REQUIREMENTS:

1. ANTENNAS & RF JUMPERS:
 - ALL RF JUMPERS & ANTENNA PORTS MUST HAVE DOCUMENTED PASSING SYSTEM SWEEP TEST.
 - PIM TESTING IS REQUIRED FOR ALL INSTALLED ANTENNAS & FEEDLINES.
 - SYSTEM SWEEPS SHALL BE AT A RETURN LOSS OF ≤ -16 db.
 - ALL SWEEPS MUST BE PROVIDED IN A PDF AS WELL AS ANRITSU (OR EQUAL) DATA FILE FORMAT.
 - FINAL ACCEPTANCE: PERFORM ALL TECHNICAL TESTS SPECIFIED IN THE CONSTRUCTION SOW, SECTION XIV
2. HYBRID CABLES:
 - ALL FIBER PAIRS MUST HAVE A DOCUMENTED PASSING POWER & A FIBER INSPECTION SCOPE TEST.
 - PASSING POWER TEST SHALL BE ≤ 3 db.
 - REQUIRED FIBER TEST GEAR SHALL BE VIAVI JDSU FIT-SD103; P5000I FIBER SCOPE DIGITAL INSPECTION KIT; VIAVI 2303/11, OLS-35 OPTICAL LASER LIGHT SOURCE 1310/1550 NM, SM, INTERCHANGEABLE ADAPTER OR EQUAL.
 - ALL FIBER TEST RESULTS MUST BE PROVIDED IN PDF FORMAT.
 - FINAL ACCEPTANCE: PERFORM ALL TECHNICAL TESTS SPECIFIED IN THE CONSTRUCTION SOW, SECTION XIV

INSTALLER NOTES:

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

PREPARED FOR:

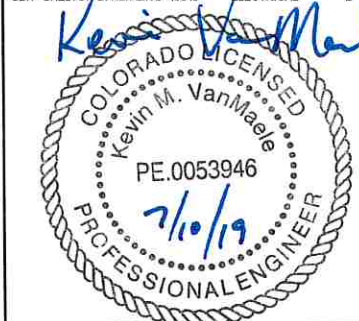
dish
WIRELESS



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ENGINEERING LICENSE:

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ENGINEER: PE# DISCIPLINE:
KIM KEVIN M. VANMAELE 53945 CIVIL
REJ ROBERT E. JENSEN 54720 CIVIL
TMS TERRANCE M. SUPER 36450 ELECTRICAL
SDK SHELTON D. KEISLING 49643 ELECTRICAL



DRAWN BY: MGH
CHECKED BY: TW
APP'D:

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DISH WIRELESS SITE ID:

CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

TOWER ELEVATION &
ANTENNA LAYOUT

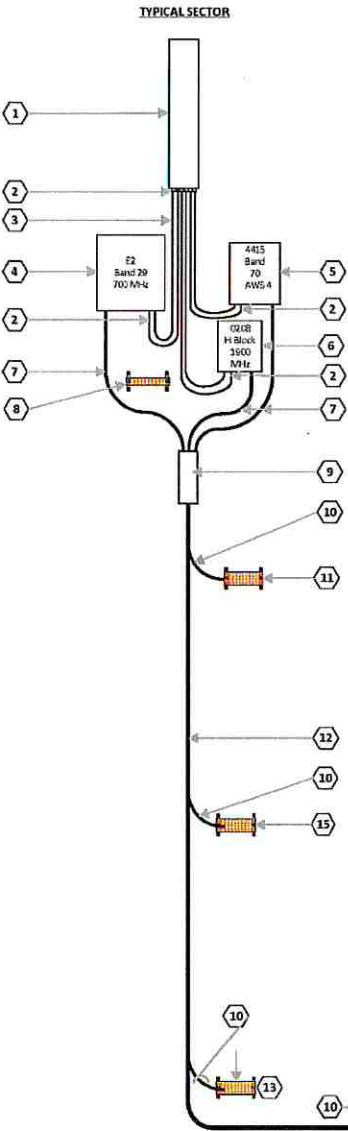
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C-3

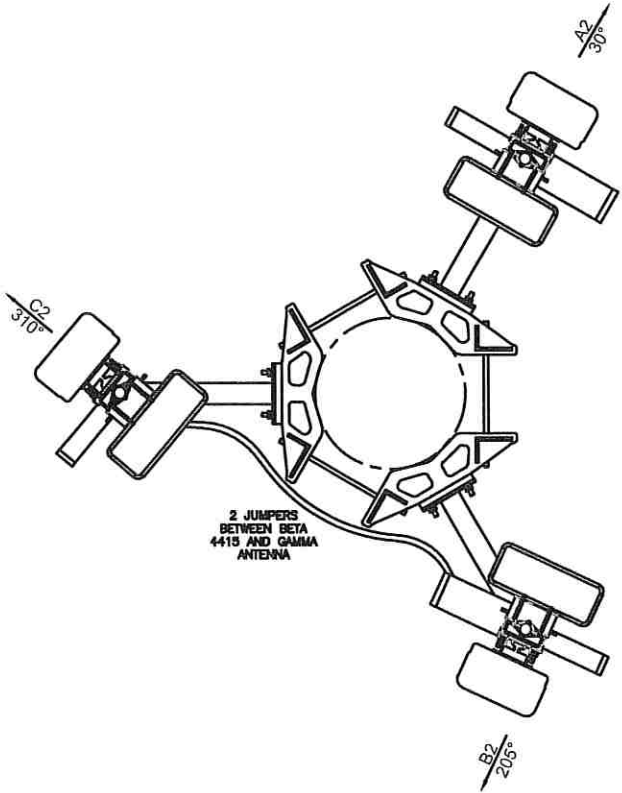
(TWR19-001)

ERICSSON ANTENNA AND RRU CONFIGURATION

ANTENNA SCHEDULE													
SECTOR	ANTENNA MANUFACTURER/MODEL	PRIMARY FEEDER (COAX/HYBRID CABLE)	AZIMUTH	RAD CENTER	MECH D-TILT	ELECT D-TILT (2100/700)	RRU MANUFACTURER	RRU TECHNOLOGY	RRU LOCATION	PRIMARY FEEDER SIZE	JUMPER SIZE	JUMPER QTY	JUMPER LENGTH
ALPHA 1	N/A	N/A	N/A	N/A	N/A	N/A	ERICSSON 32	BAND 29	SECTOR	N/A	1/2"	2	10'-0"
ALPHA 2	COMBA ODI-065R16M18JJ-GQ V2 DS 0-0-0	HYBRID-DSHYBKIT-18612-50M - 7/8"	30°	72'-0"	0°	2°/4'	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALPHA 3	N/A	N/A	N/A	N/A	N/A	N/A	ERICSSON 0208	H-BLOCK	SECTOR	N/A	1/2"	2	10'-0"
							ERICSSON 4415	BAND 70	SECTOR	N/A	1/2"	2	10'-0"
ALPHA 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BETA 1	N/A	N/A	N/A	N/A	N/A	N/A	ERICSSON 32	BAND 29	SECTOR	N/A	1/2"	2	10'-0"
BETA 2	COMBA ODI-065R16M18JJ-GQ V2 DS 0-0-0	SHARED WITH ALPHA	205°	72'-0"	0°	2°/4'	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BETA 3	N/A	N/A	N/A	N/A	N/A	N/A	ERICSSON 0208	H-BLOCK	SECTOR	N/A	1/2"	2	10'-0"
							ERICSSON 4415(SHARED)	BAND 70	SECTOR	N/A	1/2"	2	10'-0"
BETA 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GAMMA 1	N/A	N/A	N/A	N/A	N/A	N/A	ERICSSON 32	BAND 29	SECTOR	N/A	1/2"	2	10'-0"
GAMMA 2	COMBA ODI-065R16M18JJ-GQ V2 DS 0-0-0	SHARED WITH ALPHA	310°	72'-0"	0°	2°/4'	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GAMMA 3	N/A	N/A	N/A	N/A	N/A	N/A	ERICSSON 0208	H-BLOCK	SECTOR	N/A	1/2"	4	10'-0"
							ERICSSON 4415(SHARED)	BAND 70	SECTOR	N/A	1/2"	2	30'-0"
GAMMA 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



- KEY NOTES
- 1 ANTENNA - Comba ODI-065R16M18JJ-GQ V2 DS 0-0-0 - (Dish Provided)
 - 2 Clamshell Weather Proofing (Contractor Provided)
 - 3 Proposed (6 ea.) 1/2" Coax Jumpers from RRUs to Antenna - (Dish Provided) - Variable Lengths
 - 4 RRU - E2 (x3) Band 29 700 MHz - (Dish Provided)
 - 5 RRU - 4415 (x2) Band 70 AWS 4 - (Dish Provided)
 - 6 RRU - 0208 (x3) H Block 1900 MHz - (Dish Provided)
 - 7 DC/Fiber Jumper Cables (Breakout Cylinder to RRU)
 - 8 Sector Ground Bus Bar - 12"x2"x1/4" (Dish Provided)
 - 9 Fiber/Power Breakout Cylinder
 - 10 Ground Kit on Hybrid Cable
 - 11 Upper Tower Ground Bus Bar - 12"x4"x1/4" (Dish Provided)
 - 12 Hybrid Cable
 - 13 Lower Tower Ground Bus Bar - 12"x4"x1/4" (Dish Provided)
 - 14 Equipment Ground Bus Bar - 12"x4"x1/4" (Dish Provided)
 - 15 Add Additional Bus Bars and Ground Kits On Tower in 50, 100, or 200-foot Increments Based on Tower Height and Lightning Zone Requirements



NOTE: PROPOSED RET CABLE 4415 RRU TO ANTENNA (1) PER SECTOR. BETA SECTOR TO BE DAISY CHAINED TO GAMMA.

- INSTALLER NOTE:
- SCHEMATIC LAYOUT ONLY. REFER TO EXACT EQUIPMENT LAYOUT, SIZES AND LOCATIONS OF ICE BRIDGE OR RMC.
 - ALL CABLE SUPPORTS SHOULD BE BLOCKS AND GROMMETS. BUTTERFLIES AND SNAP-INS ARE NOT ALLOWED.
 - STRAIN-RELIEVE SUPPORT FOR ALL TOWER CABLES AND/OR FIBERS, SHALL OCCUR EVERY 48" VERTICALLY, AND 24" HORIZONTALLY.
 - CONTRACTOR TO REFERENCE DISH NETWORK LATEST ISSUE RFDS AND GIVE PRECEDENCE TO INFORMATION PROVIDED IN LATEST RFDS OVER INFORMATION PROVIDED IN ANTENNA SCHEDULE TABLE.
 - CONTRACTOR TO VERIFY PROPOSED LOADING, TOWER/FOUNDATION MODIFICATIONS AND REMOVED EQUIPMENT AS STATED IN PASSING STRUCTURAL ANALYSIS AND MOD DESIGNS AND CONTACT DISH NETWORK IMMEDIATELY IN THE EVENT OF ANY DISCREPANCIES.
 - CONTRACTOR IS TO NOTE ANY APPURTENANCES ON TOWER THAT EXTENDS WITHIN 2 OF THE TOP OF AND 5' BELOW THE DISH ANTENNAS. IF ANY APPURTENANCE IS ENCRDACHING THIS THRESHOLD, THE CONTRACTOR IS TO COMMUNICATE THE FINDING WITH DISH NETWORK IMMEDIATELY AND BEFORE CONSTRUCTION STARTS.

Comba ODI-065R16M18JJ-GQ V2 DS 0-0-0 Antenna - 57.3 lbs. (26 kg) Mount - 2.8 lbs. (6.2 kg)	E2 Band 29 700 MHz 52.9 lbs. (24 kg)	0208 H Block 1900 MHz 19.84 lbs. (9 kg)	4415 Band 70 AWS 4 46 lbs. (21 kg)
Weight, excl. mounting hardware			

NOTES:

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COLORADO LICENSED
Kevin M. VanMaale
PE.0053946
7/10/19
PROFESSIONAL ENGINEER

DISH WIRELESS SITE ID:
CO1410011A

TOWER OWNER SITE ID:
302459

SITE ADDRESS:
2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:
ANTENNA SCHEDULE & DIAGRAM

SHEET NUMBER:
1 OF 2
(TWR19-001)

SUPPLEMENTAL INFORMATION

Alpha Sector			
Antenna/RRH	Technology		
	700 MHz	600 Mhz	
(+) Port (TX)			
Antenna/RRH -1		White	
Antenna/RRH -2		White	
Antenna/RRH -3		White	
(-) Port RX			
Antenna/RRH -1		White	
Antenna/RRH -2		White	
Antenna/RRH -3		White	
Beta Sector			
(+) Port (TX)			
Antenna/RRH -1		White	
Antenna/RRH -2		White	
Antenna/RRH -3		White	
(-) Port RX			
Antenna/RRH -1		White	
Antenna/RRH -2		White	
Antenna/RRH -3		White	
Gamma Sector			
(+) Port (TX)			
Antenna/RRH -1		White	
Antenna/RRH -2		White	
Antenna/RRH -3		White	
(-) Port RX			
Antenna/RRH -1		White	
Antenna/RRH -2		White	
Antenna/RRH -3		White	

CABLE COLOR CODE

NOTE:

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

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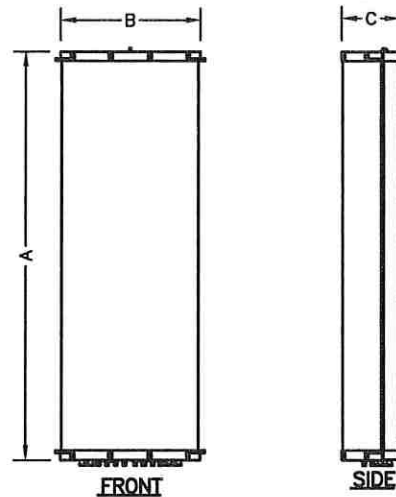
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CABLE COLOR CODE

SHEET NUMBER:

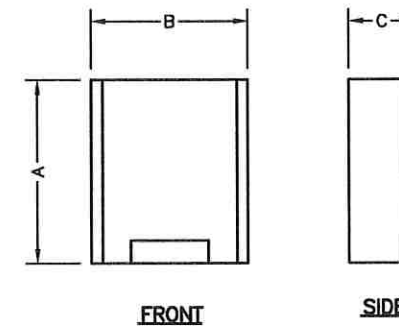
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(TWR19-001)



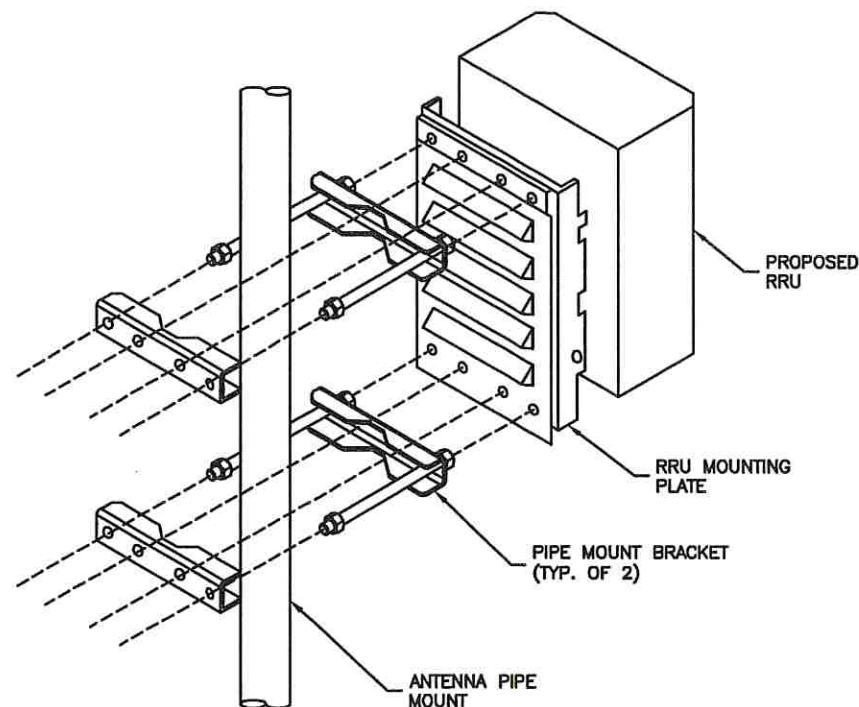
ANTENNA SPECIFICATIONS				
MODEL	LENGTH (A)	WIDTH (B)	DEPTH (C)	WEIGHT (lb)
COMBA - ODI-065R16M18J-GQ V2	78.7"	14.0"	7.6"	57.3
PANORAMA - WMMG-7-27	6.10"	6.10"	2.95"	2.43

ANTENNA SPECIFICATIONS
N.T.S.



RADIO SPECIFICATIONS				
MODEL	LENGTH (A)	WIDTH (B)	DEPTH (C)	WEIGHT (lb)
ERICSSON - RADIO 4415	16.54"	13.64"	4.84"	44.09
ERICSSON - RADIO 0208	13.82"	11.73"	3.31"	18.52
RRUS-E2 B29	20.39"	18.50"	7.48"	52.90

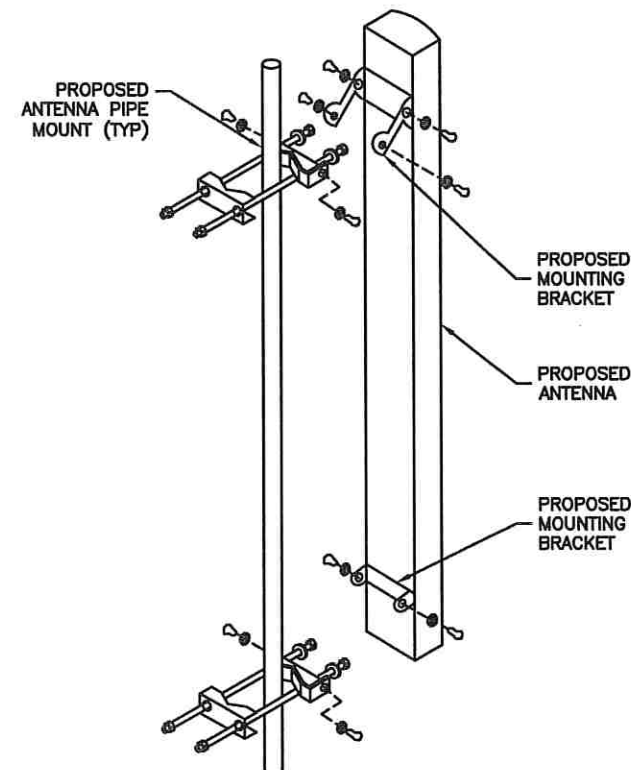
RADIO SPECIFICATIONS
N.T.S.



NOTES:

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

REMOTE RADIO UNIT (RRU) PIPE MOUNT
N.T.S.



ANTENNA MOUNTING
N.T.S.

PREPARED FOR:

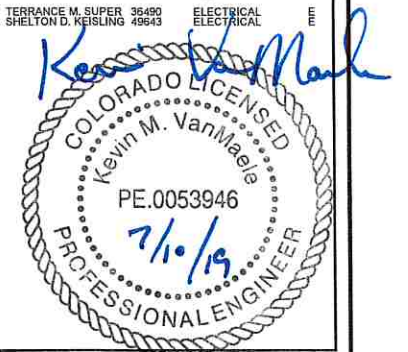
dish
WIRELESS

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ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
KMY KEVIN M. VANMAELE 53846 CIVIL C
REJ ROBERT E. JENSEN 54720 CIVIL E
TMS TERRANCE M. SUPER 36490 ELECTRICAL
SDK SHELTON D. KEISLING 49643 ELECTRICAL



DRAWN BY: MGH
CHECKED BY: TW
APP'D:

SUBMITTALS

DATE	DESCRIPTION	REV	ISSUED BY
04/11/19	ISSUED FOR REVIEW	A	MGH
04/14/19	REVISED PER COMMENTS	1	MGH
04/22/19	ISSUED FOR CONST.	2	MGH
06/24/19	REVISED PER COMMENTS	3	MGH
07/08/19	REVISED PER COMMENTS	4	MGH
07/10/19	REVISED PER COMMENTS	5	MGH

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DISH WIRELESS SITE ID:

CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

EQUIPMENT DETAILS

SHEET NUMBER:

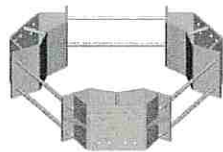
C-4

(TWR19-001)

Product Specifications

COMMSCOPE®

POWERED BY **ANDREW**



MC-RM1030-3
Universal Ring Mount, 10 in to 30 in OD

Dimensions

Mounting Diameter, maximum	762.0 mm	30 in
Mounting Diameter, minimum	254.0 mm	10 in
Height	254.0 mm	10.0 in
Length	152.4 mm	6.0 in
Mounting Circumference, maximum	2392.7 mm	94.2 in
Mounting Circumference, minimum	797.6 mm	31.4 in
Weight	86.3 kg	190.3 lb
Width	558.8 mm	22.0 in

Environmental Specifications

Wind Rating	140 mph (BWS) at 150 ft AGL 160 mph (3-second gust) at 150 ft AGL using Exposure D per FBC
Wind Rating Criteria	Four 72 in x 8 in panel antennas per sector
Wind Rating Test Method	TIA/EIA-222

General Specifications

Product Type	Universal ring mount
Includes	Mount Threaded rod
Material Type	Hot dip galvanized steel
Mounting	Monopole, 254-762 mm (10-30 in) OD
Package Quantity	1
Sectors, quantity	3

MC-RM1030-3 MOUNT SPECS

NO SCALE

1

Product Specifications

COMMSCOPE®

POWERED BY **ANDREW**



MC-SA24-B
Stand-off Arm with U-bolts, 24 in

Dimensions

Pipe Outer Diameter	60.3 mm	2 3/8 in
Height	254.0 mm	10.0 in
Length	609.6 mm	24.0 in
Weight	27.2 kg	60.0 lb
Width	254.0 mm	10.0 in

Environmental Specifications

Man Rating	250 lb vertical man load at 15 mph (BWS)
Wind Rating	120 mph (BWS) at 150 ft AGL 140 mph (3-second gust) at 150 ft AGL using Exposure D per FBC
Wind Rating Criteria	Four 72 in x 8 in panel antennas per sector
Wind Rating Test Method	TIA/EIA-222-G

General Specifications

Product Type	Support arms for ring mount
Pipe, quantity	0
Includes	Hardware Stand-off arms
Material Type	Hot dip galvanized steel
Mounting	Ring mount
Package Quantity	1
Stand-off Distance	609.6 mm 24.0 in

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

* Footnotes

Man Rating	BWS—Base Wind Speed
Wind Rating	BWS—Base Wind Speed; FBC—Florida Building Code

MC-SA24-B STANDOFF ARM SPECS

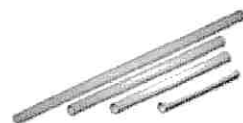
NO SCALE

2

Product Specifications

COMMSCOPE®

POWERED BY **ANDREW**



MT-651-96
Plain End Pipe, 2-3/8 in OD x 96 in

Dimensions

Pipe Outer Diameter	60.3 mm	2 3/8 in
Height	60.3 mm	2.4 in
Length	2438.4 mm	96.0 in
Weight	15.2 kg	33.5 lb
Width	60.3 mm	2.4 in

General Specifications

Material Type	Hot dip galvanized steel
Pipe Length	2438.4 mm 96.0 in
Product Type	Bulk pipe
Includes	Pipe
Package Quantity	1
Pipe, quantity	1

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

MT-651-96 PIPE SPECS

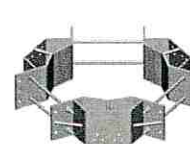
NO SCALE

4

Product Specifications

COMMSCOPE®

on the go



Andrew Solutions
MC-RM1550-3
Universal Ring Mount, 15 in to 50 in OD

Dimensions

Mounting Diameter, maximum	1270.0 mm	50 in
Mounting Diameter, minimum	381.0 mm	15 in
Height	254.0 mm	10.0 in
Length	152.4 mm	6.0 in
Mounting Circumference, maximum	3990.3 mm	157.1 in
Mounting Circumference, minimum	1196.3 mm	47.1 in
Weight	117.9 kg	260.0 lb
Width	736.6 mm	29.0 in

Environmental Specifications

Wind Rating	140 mph (BWS) at 150 ft AGL 160 mph (3-second gust) at 150 ft AGL using Exposure D per FBC
Wind Rating Criteria	Four 72 in x 8 in panel antennas per sector
Wind Rating Test Method	TIA/EIA-222

General Specifications

Product Type	Universal ring mount
Includes	Mount Threaded rod
Material Type	Hot dip galvanized steel
Mounting	Monopole, 381-1270 mm (15-50 in) OD
Package Quantity	1
Sectors, quantity	3

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

* Footnotes

Wind Rating	BWS—Base Wind Speed; FBC—Florida Building Code
-------------	------------------------------------------------

MC-RM1550-3 MOUNT SPECS

NO SCALE

3

PREPARED FOR:

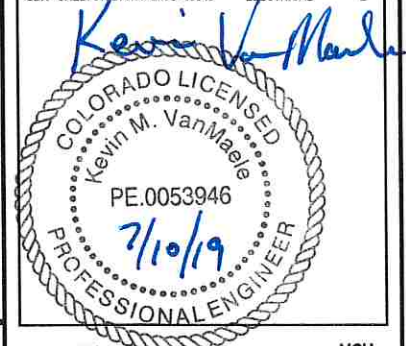
dish
WIRELESS



1717 West 95th Street, Suite 600
Overland Park, Kansas 66212
Phone: 913-438-7700
Fax: 913-438-7777

ENGINEERING LICENSE:

STATE OF <u>COLORADO</u>		
STATE CERTIFICATE OF AUTHORIZATION # 20041302439		
ENGINEER:	PE#:	DISCIPLINE:
KMV KEVIN M. VANMAELE	53946	CIVIL
REJ ROBERT E. JENSEN	54720	CIVIL
TMS TERRANCE M. SUPER	36450	ELECTRICAL
SDK SHELTON D. KEISLING	49643	ELECTRICAL



DRAWN BY: MGH

CHECKED BY: TW

APP'D:

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DISH WIRELESS SITE ID:

CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

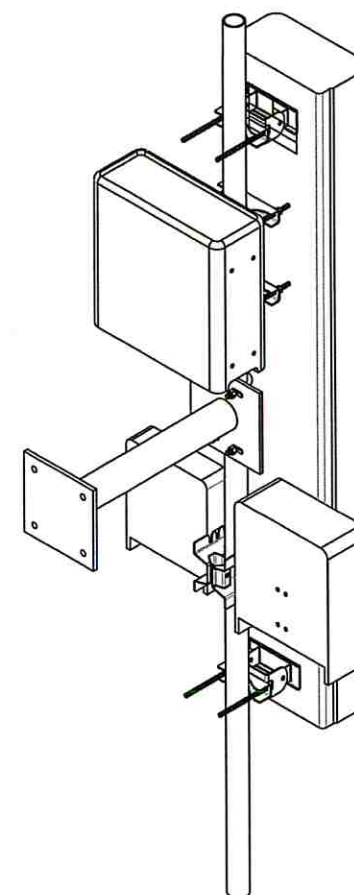
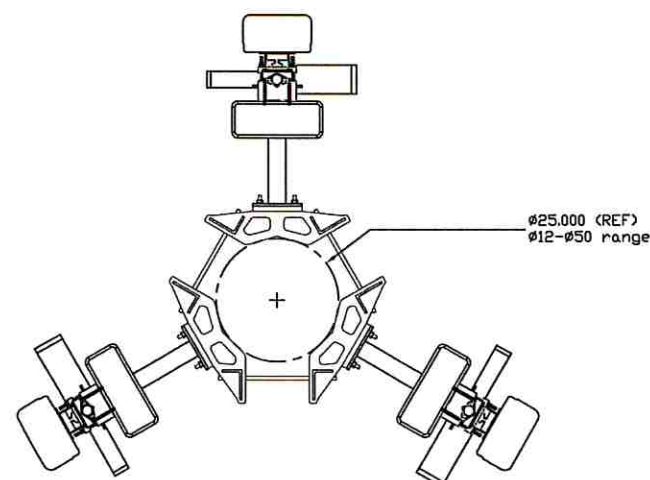
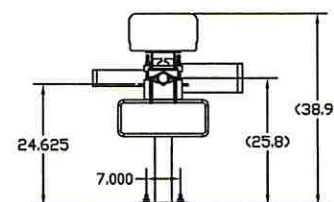
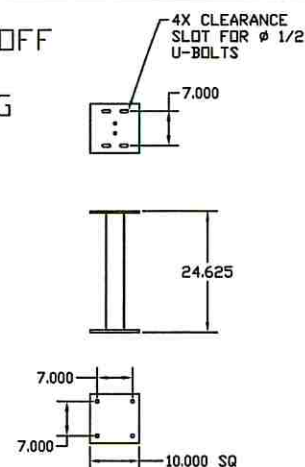
SHEET TITLE:

EQUIPMENT DETAILS
(MONOPOLE)

SHEET NUMBER:

C-4.1
(TWR19-001)

MC-SA24-B STAND-OFF
SUPPORT
10" X 24-5/8" LONG
ONE 2-3/8" X 108"
PIPE CONFIG.



BY: J. LAPALME
10/30/2018

MC-RM1550-3 "OR" MC-RM1030-3 COMMScope RING MOUNTS
AND MC-SA24-B COMMScope STAND-OFF
W ERICSSON GEAR

SCALE 1:16

dish TECHNOLOGIES

TOP VIEW, MONOPOLE
MC-SA24-B CONFIG.

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07/10/19	REVISED PER COMMENTS	5	MGH

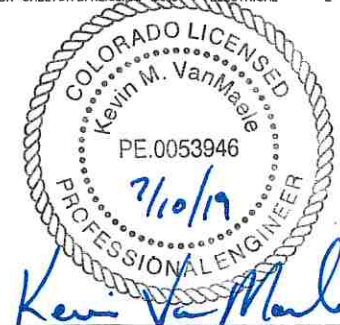
PREPARED FOR:

dish
WIRELESS

7171 West 95th Street, Suite 600
Overland Park, Kansas 66212
Phone: 913-438-7700
Fax: 913-438-7777

ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
KMY KEVIN M. VANMAELE 53846 CIVIL C
REJ ROBERT E. JENSEN 54720 CIVIL E
TMS TERRANCE M. SUPER 36450 ELECTRICAL
SDK SHELTON D. KEISLING 6080 ELECTRICAL



DRAWN BY: MGH
CHECKED BY: TW
APP'D:

SUBMITTALS

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DISH WIRELESS SITE ID:

CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

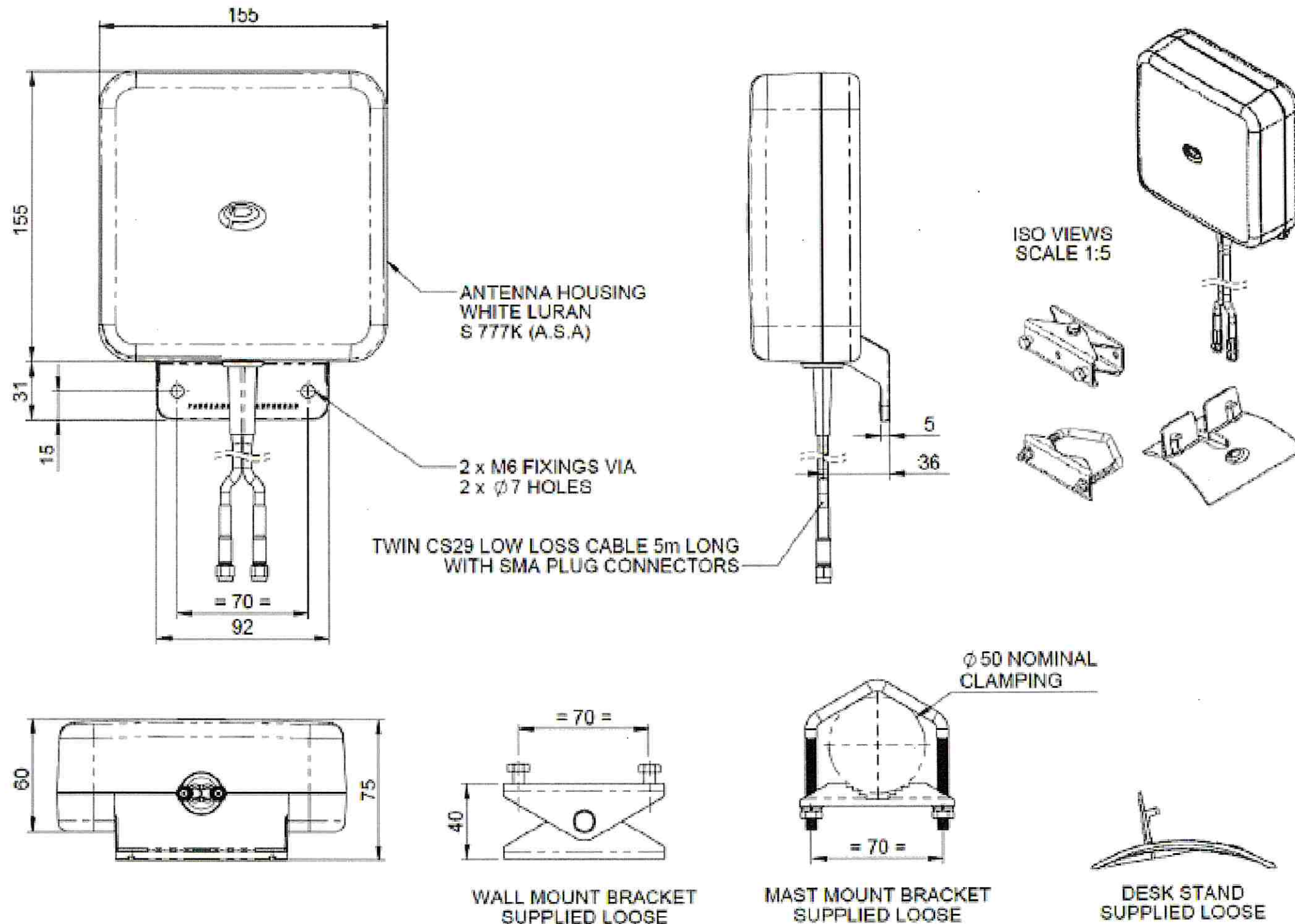
EQUIPMENT DETAILS

SHEET NUMBER:

C-4.2

(TWR19-001)

ANTENNA MOUNTING DETAILS
N.T.S.



LTE BACKHAUL ANTENNA
N.T.S.



7171 West 95th Street, Suite 600
Overland Park, Kansas 66212
Phone: 913-438-7700
Fax: 913-438-7777

SSC

ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439

ENGINEER:	PE#:	DISCIPLINE:	
KMV KEVIN M. VANMAELE	53946	CIVIL	C
REJ ROBERT E. JENSEN	54720	CIVIL	C
TMS TERRANCE M. SUPER	36490	ELECTRICAL	E
SDK SHELTON D. KEISLING	49643	ELECTRICAL	E

COLORADO LICENSED
Kevin M. VanMaale
PE.0053946
7/10/19
PROFESSIONAL ENGINEER

DRAWN BY: MGH
CHECKED BY: TW
APP'D:

SUBMITTALS				
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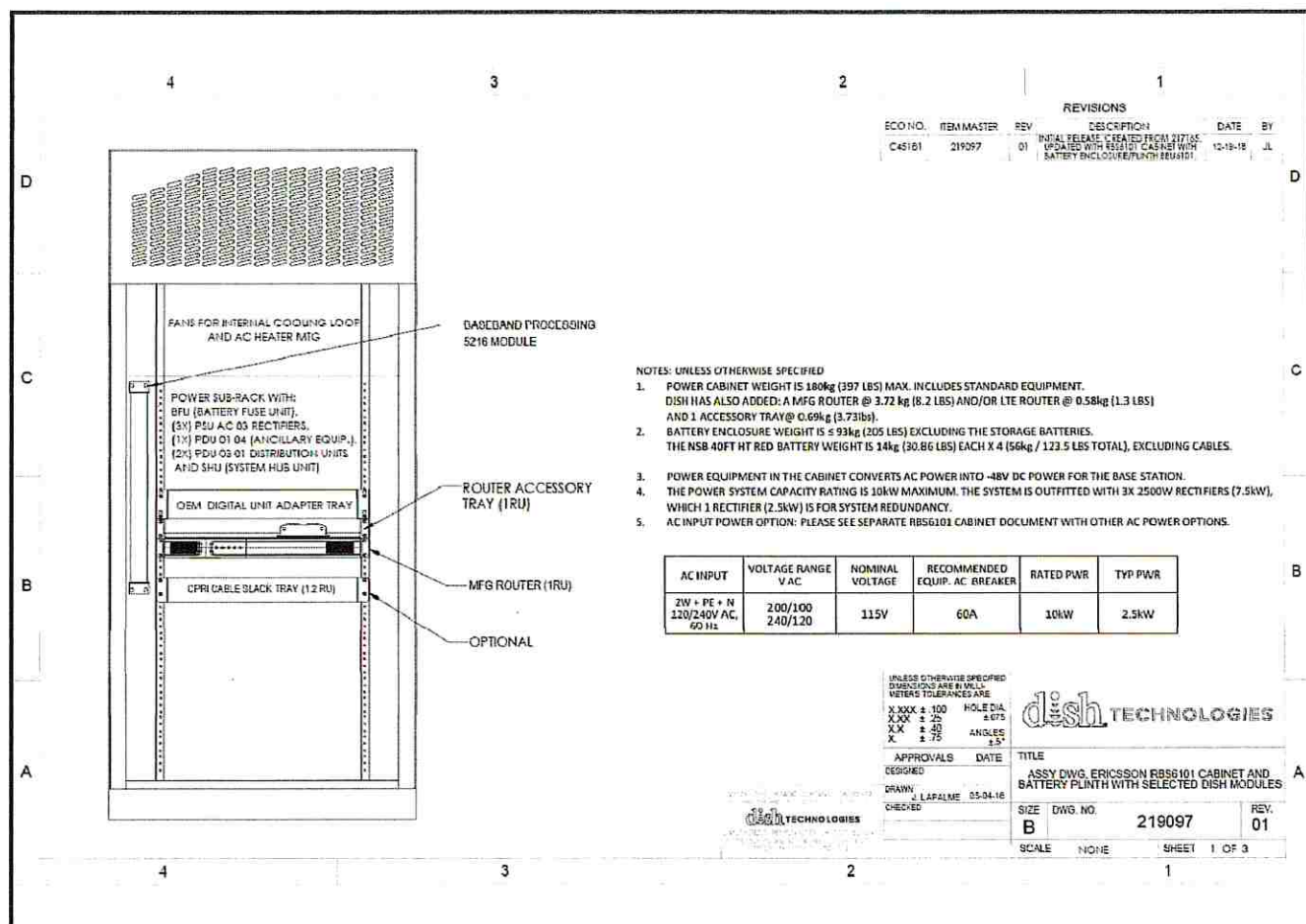
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CO1410011A

TOWER OWNER SITE ID:
302459

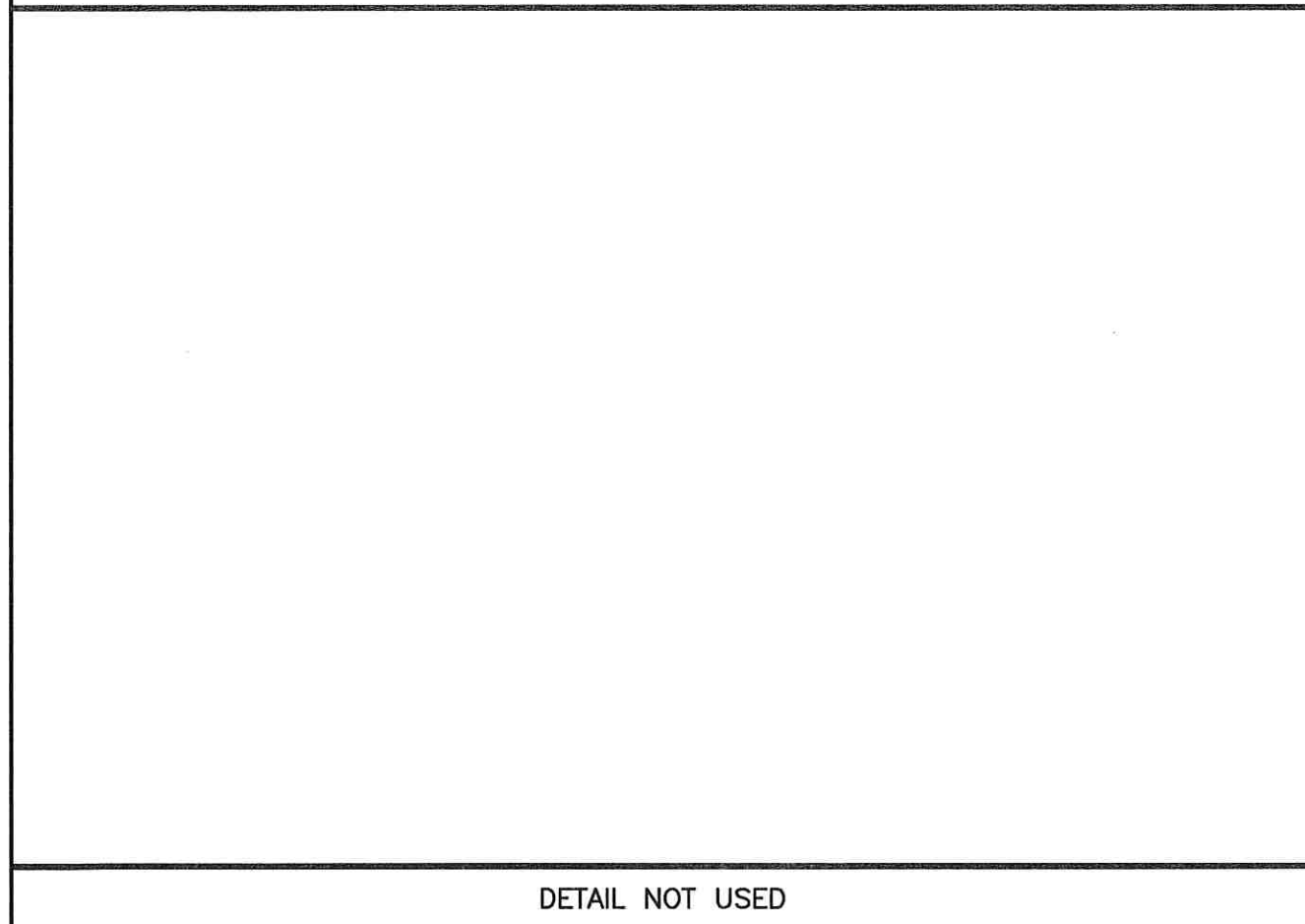
SITE ADDRESS:
2867 AKERS DR
COLORADO SPRINGS, CO 80922

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EQUIPMENT DETAILS

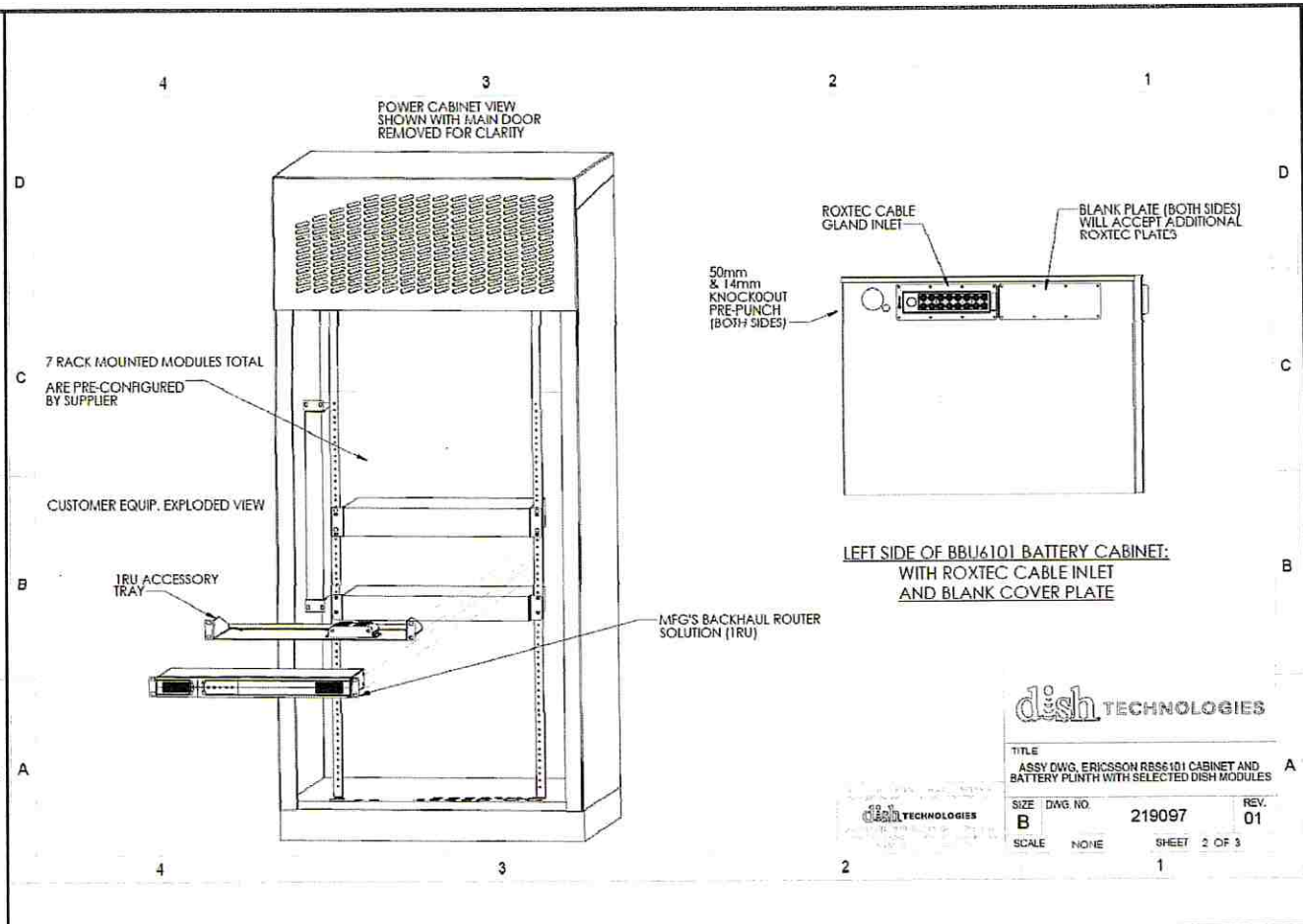
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C-4.3
(TWR19-001)



CABINET DETAILS

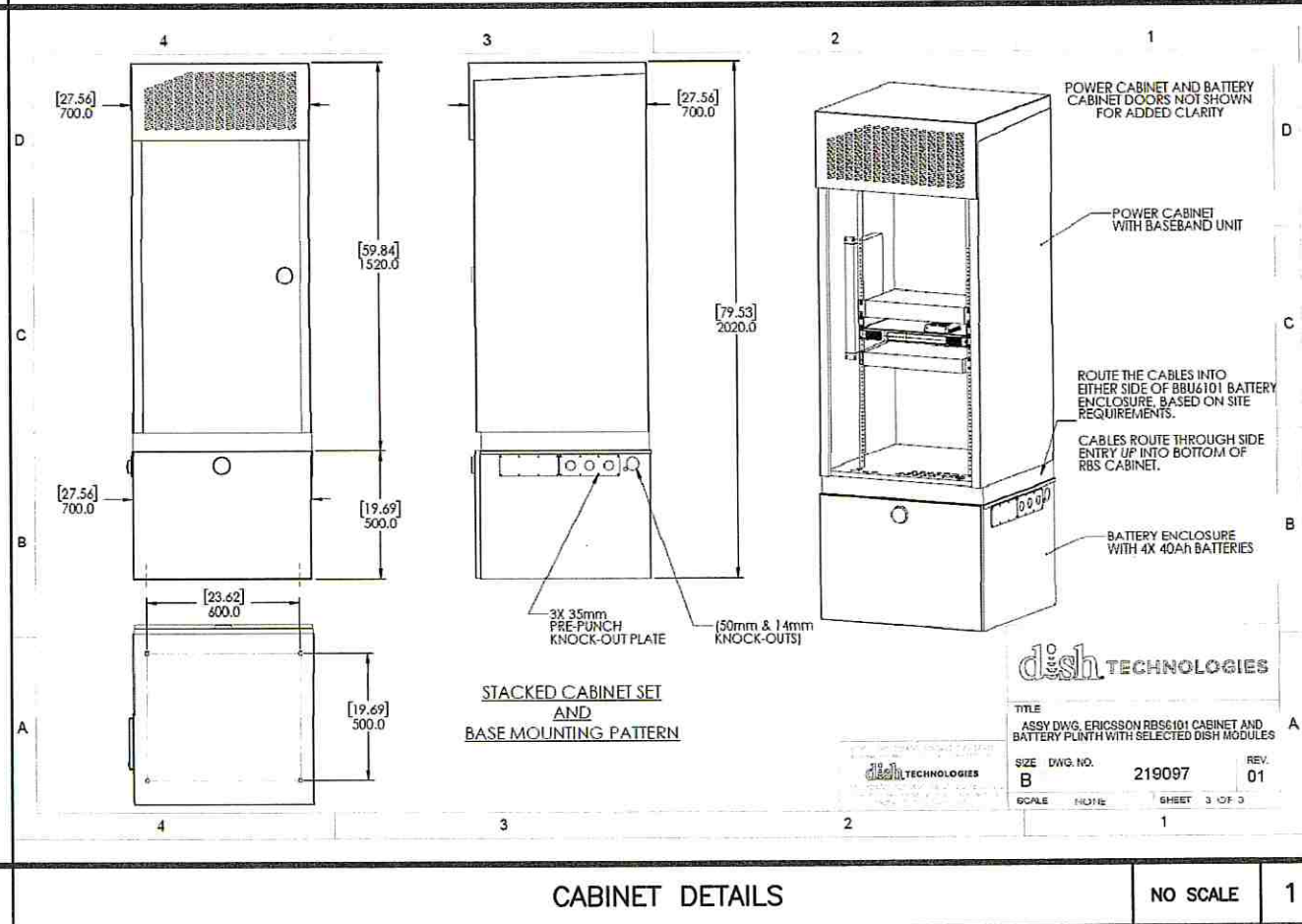


DETAIL NOT USED



CABINET DETAILS

NO SCALE 1



CABINET DETAILS

NO SCALE 1

PREPARED FOR:

dish
WIRELESS

7171 West 95th Street, Suite 600
Overland Park, Kansas 66212
Phone: 913-438-7700
Fax: 913-438-7777

SSC

ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
KEVIN M. VANMAELE 53946 CIVIL CC
REJ. ROBERT E. JENSEN 54720 CIVIL mm
TMS TERRANCE M. SUPER 36490 ELECTRICAL
SDK SHELTON D. KEISLING 49643 ELECTRICAL

COLORADO LICENSE
Kevin M. VanMaale
PE.0053946
7/10/19
PROFESSIONAL ENGINEER

DRAWN BY: MGH
CHECKED BY: TW
APP'D:

SUBMITTALS

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CO1410011A

TOWER OWNER SITE ID:
302459

SITE ADDRESS:
2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:
CABINET DETAILS

SHEET NUMBER:
C-5 (TWR19-001)



ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
KMY KEVIN M. VANMAELE 53845 CIVIL C
REJ ROBERT E. JENSEN 54735 CIVIL E
TMS TERRANCE M. SUPER 35490 ELECTRICAL
SDK SHELTON D. KEISLING 68943 ELECTRICAL

7-10-19

DRAWN BY: MGH
CHECKED BY: TW
APP'D:

SUBMITTALS				
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04/11/19	ISSUED FOR REVIEW	A	MGH	
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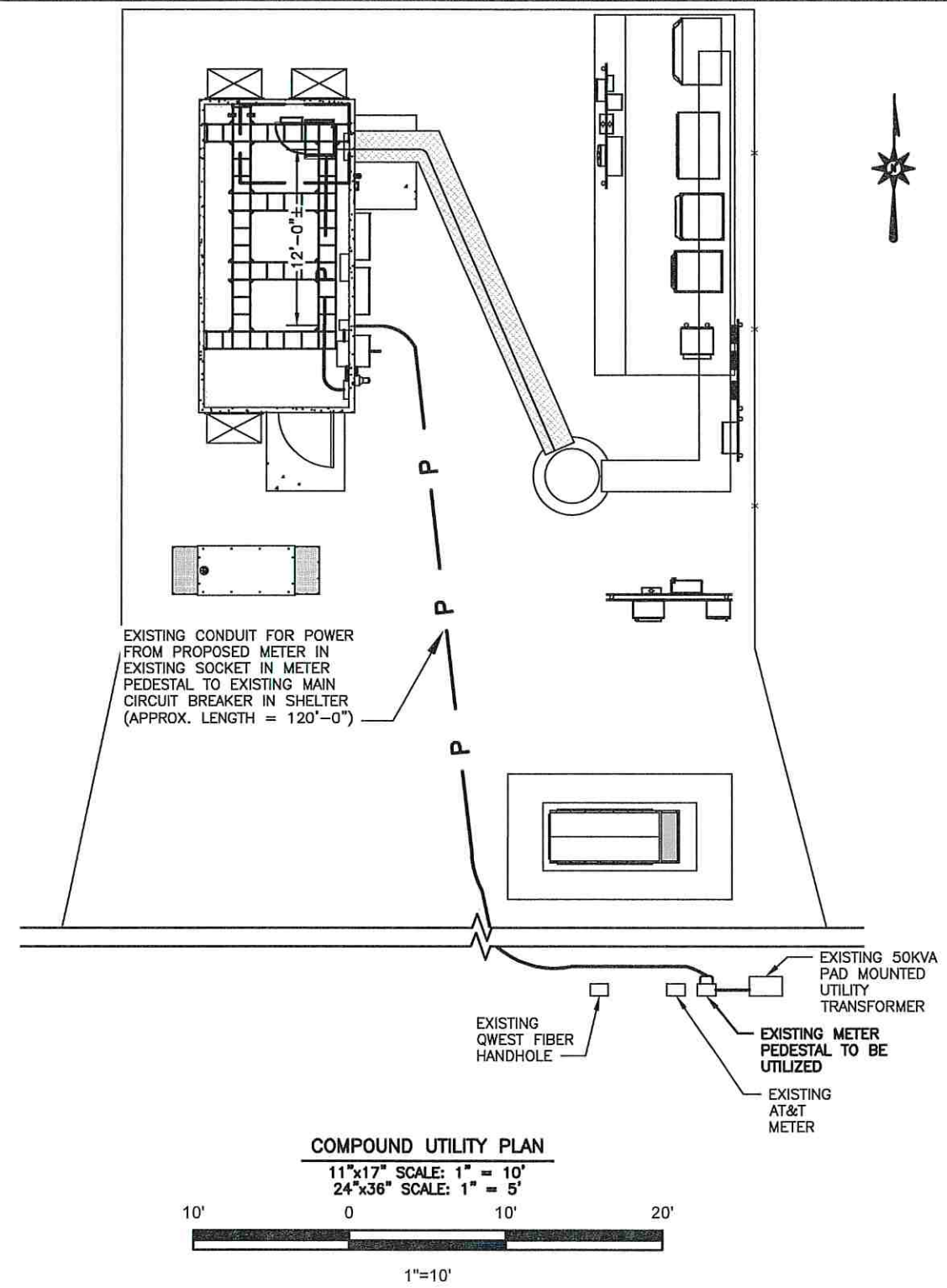
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CO1410011A

TOWER OWNER SITE ID:
302459

SITE ADDRESS:
2867 AKERS DR
COLORADO SPRINGS, CO 80922

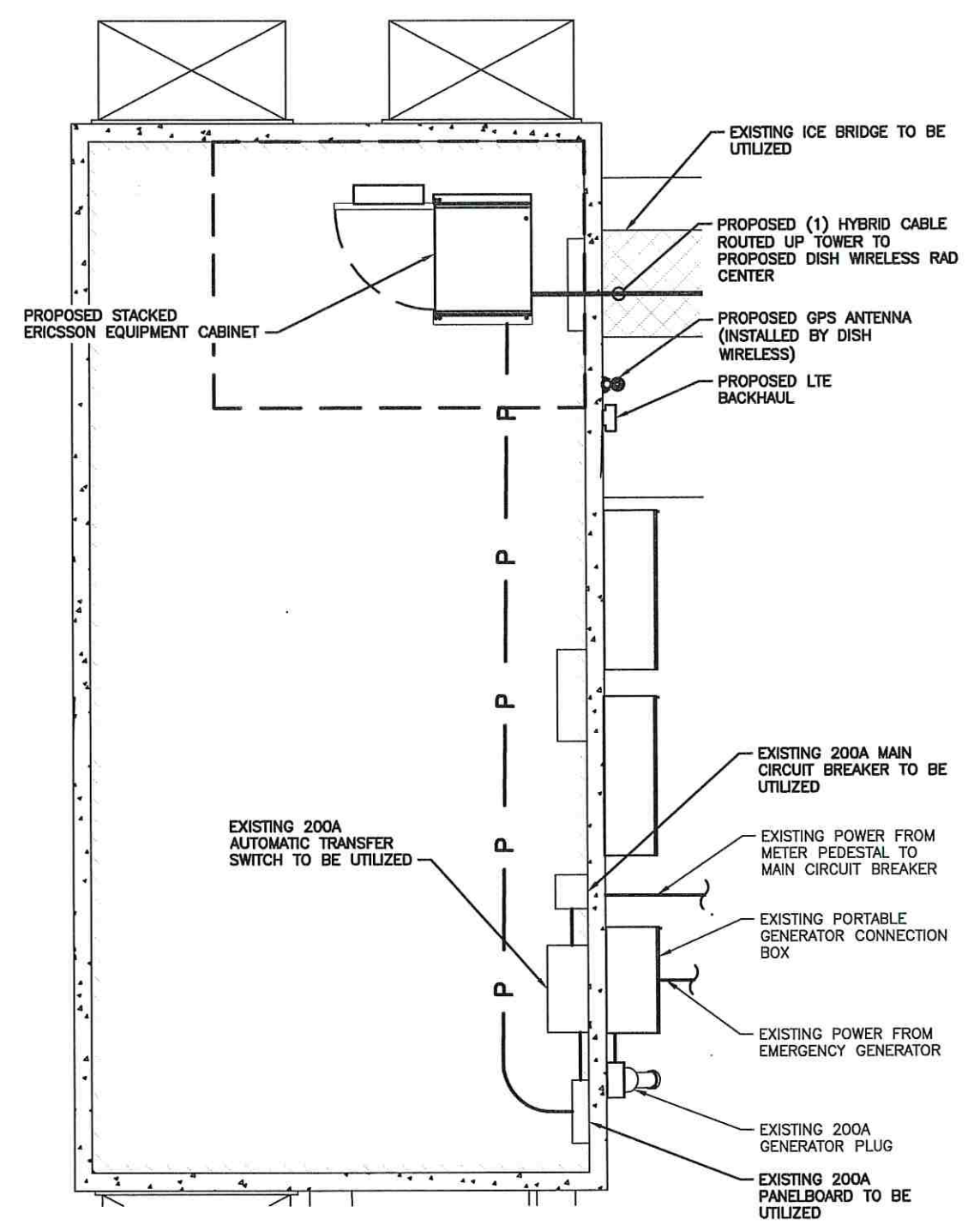
SHEET TITLE:
UTILITY PLANS

SHEET NUMBER:
E-1 (TWR19-001)



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

- UTILITY NOTES:**
- CONTRACTOR TO COORDINATE SERVICE ROUTING & CONNECTION WITH LOCAL TELEPHONE AND POWER COMPANIES.
 - CONTRACTOR SHALL FOLLOW LOCAL UTILITY COMPANY STANDARDS WHEN CONNECTING TO UTILITIES, PROVIDING REQUIRED CLEARANCES AND ACCESS PER NEC. LOCAL AND STATE BUILDING CODES SHALL GOVERN IN CASES WHERE UTILITY CO. STANDARDS DIFFER.



- NOTES:**
- ELECTRICAL ROUTING IS A SCHEMATIC. THE CONTRACTOR SHALL VERIFY EQUIPMENT LOCATION AND ELECTRICAL ROUTING PRIOR TO INSTALLATION.

EQUIPMENT PLATFORM UTILITY PLAN
N.T.S.

INSTALLER NOTE:
SCHEMATIC LAYOUT ONLY. REFER TO SHEET C-2 FOR EXACT EQUIPMENT LAYOUT.

Y

INFINITE PRIMARY SOURCE

TRANSFORMER - T1

KVA 50
Voltage secondary 240
%Z 1.40
%Z TOL No Change

FAULT - X1

$I_{total\ s.c.\ (L-L)}$ 14,879 AMPS
 $I_{total\ s.c.\ (L-N)}$ 22,319 AMPS
Voltage (L-L) 240 V

14,880A

CONDUCTOR RUN - C1

LENGTH 8 FT
SIZE 3/0
QTY 1
(per phase)
TYPE Three Single Conductors
CONDUIT Nonmagnetic
WIRE Cu, 600 V

FAULT - X2

$I_{total\ s.c.\ (L-L)}$ 13,890 AMPS
 $I_{total\ s.c.\ (L-N)}$ 18,389 AMPS
Voltage (L-L) 240 V

13,890A

CONDUCTOR RUN - C2

LENGTH 120 FT
SIZE 3/0
QTY 1
(per phase)
TYPE Three Single Conductors
CONDUIT Nonmagnetic
WIRE Cu, 600 V

FAULT - X3

$I_{total\ s.c.\ (L-L)}$ 6,953 AMPS
 $I_{total\ s.c.\ (L-N)}$ 5,050 AMPS
Voltage (L-L) 240 V

6,955A

CONDUCTOR RUN - C3

LENGTH 3 FT
SIZE 3/0
QTY 1
(per phase)
TYPE Three Single Conductors
CONDUIT Steel
WIRE Cu, 600 V

FAULT - X4

$I_{total\ s.c.\ (L-L)}$ 6,861 AMPS
 $I_{total\ s.c.\ (L-N)}$ 4,953 AMPS
Voltage (L-L) 240 V

6,860A

CONDUCTOR RUN - C4

LENGTH 3 FT
SIZE 3/0
QTY 1
(per phase)
TYPE Three Single Conductors
CONDUIT Steel
WIRE Cu, 600 V

FAULT - X5

$I_{total\ s.c.\ (L-L)}$ 6,770 AMPS
 $I_{total\ s.c.\ (L-N)}$ 4,859 AMPS
Voltage (L-L) 240 V

6,770A

PREPARED FOR:

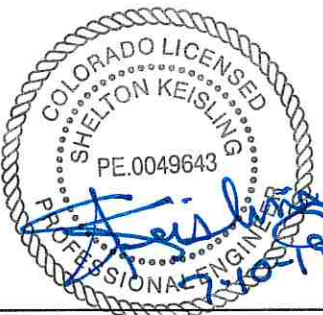
dish
WIRELESS



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Phone: 913-438-7700
Fax: 913-438-7777

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TMS TERRANCE M. SUPER 36490 ELECTRICAL E
SDK SHELTON D. KEISLING 49643 ELECTRICAL E



DRAWN BY: MGH

CHECKED BY: TW

APP'D:

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CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

FAULT CURRENT
CALCULATIONS

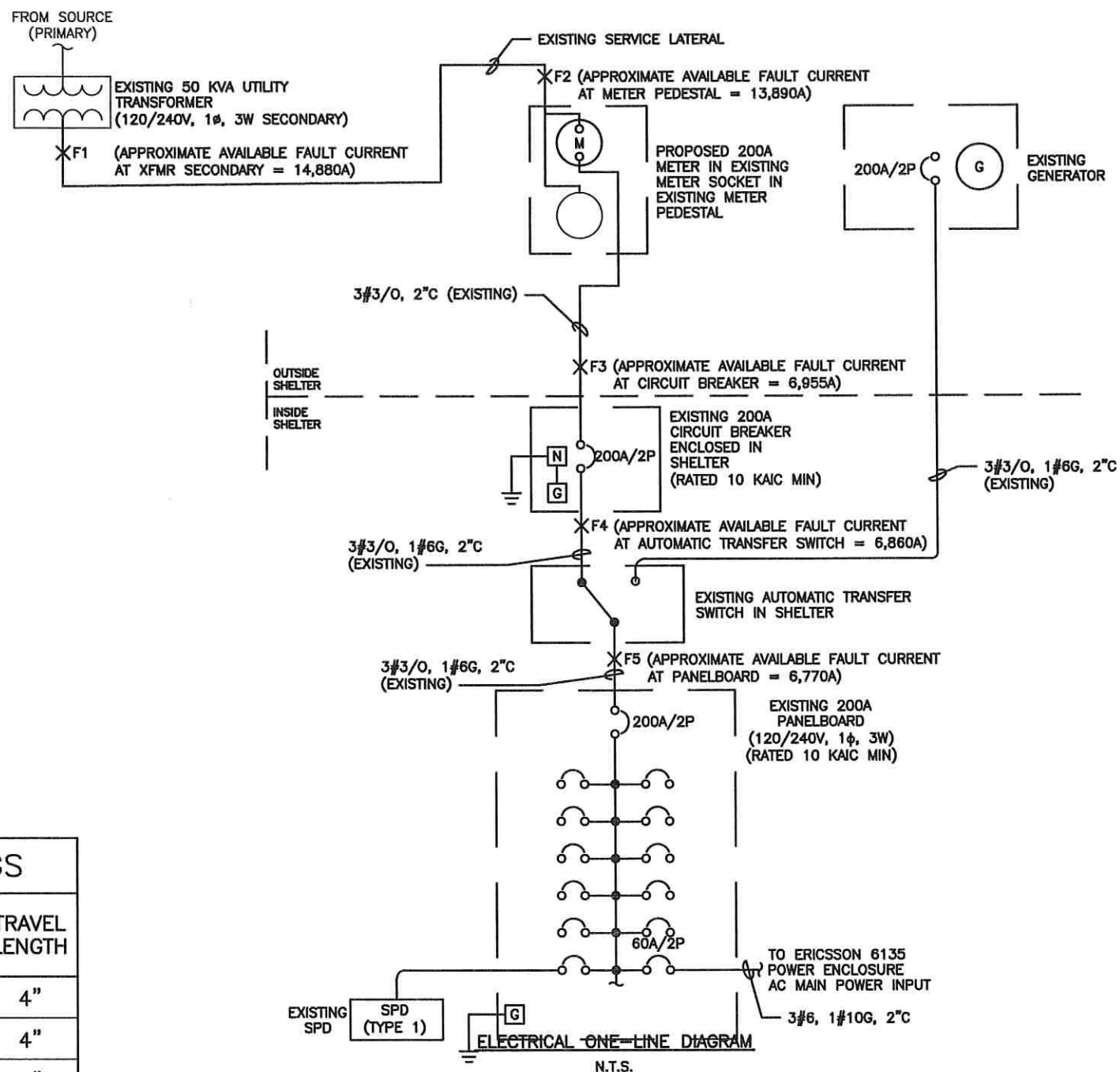
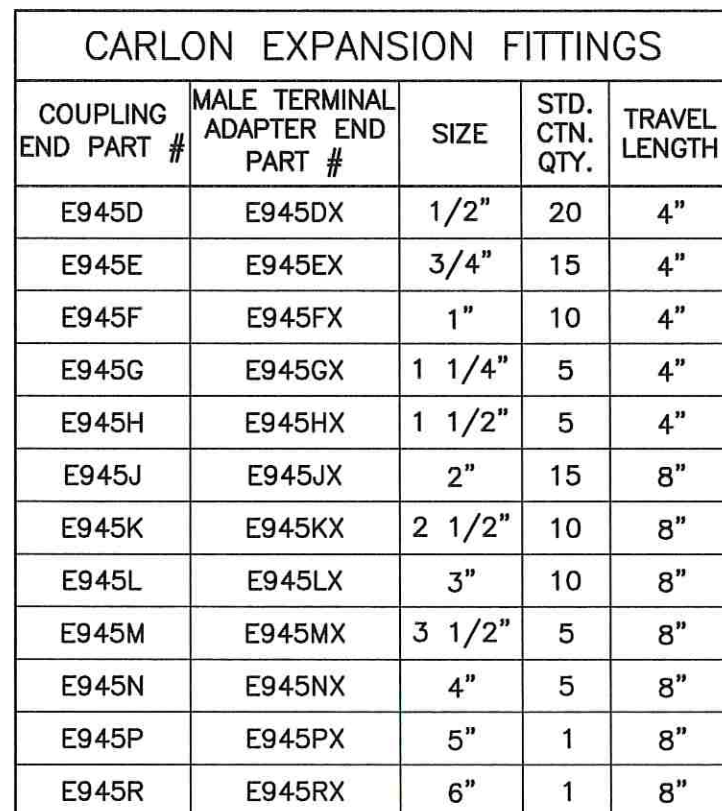
SHEET NUMBER:

E-1.1

1. WIDTH OF TRENCH AS REQUIRED BY UTILITY COMPANY OR PER QUANTITY OF CONDUITS AND LOCAL CODE REQUIREMENTS.
2. VERIFY DISTANCE PER LOCAL CODE, UTILITY COMPANY, AND CLIENT REQUIREMENTS.



CONTRACTOR SHALL INSTALL
SLIP JOINTS AS REQUIRED BY
UTILITY COMPANY
(SEE SHEET E-2.2, DETAIL 3)



7171 West 95th Street, Suite 600
Overland Park, Kansas 66212
Phone: 913-438-7700
Fax: 913-438-7777

STATE OF <u>COLORADO</u>		
STATE CERTIFICATE OF AUTHORIZATION # 20041302439		
ENGINEER:	PE#:	DISCIPLINE:
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REJ ROBERT E. JENSEN	54720	CIVIL
TMS TERRANCE M. SUPER	36490	ELECTRICAL
SDK SHELTON D. KEISLING	49643	ELECTRICAL



DRAWN BY: MGH
CHECKED BY: TW
APPV'D:

SUBMITTALS			
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04/22/19	ISSUED FOR CONST.	2	MGH
08/24/19	REVISED PER COMMENTS	3	MGH
07/08/19	REVISED PER COMMENTS	4	MGH
07/10/19	REVISED PER COMMENTS	5	MGH

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DISH WIRELESS SITE ID:

CO1410011A

TOWER OWNER SITE ID:

302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

ELECTRICAL DETAILS

SHEET NUMBER:

E 2

E-2

(TWR19-001)

PANEL: MAIN PANELBOARD				LOCATION: EQUIPMENT SHELTER				MTG.					
MAIN: 200A MCB				BUS: 200A		VOLTS: 120/240V		PHASE: 1		3		WIRE	
FEEDER:				TYPE									
	VA		WIRE	BRKR	CIRC			CIRC	BRKR	WIRE	VA		
	A	B									B	A	
HVAC UNIT	2100		-	30	1			2	20	-			SPARE
		2100			3			4	20	12	960		EXISTING EXT. LIGHTS
SMOKE DETECTOR	150		12	20	5			6	20	12		1080	EXISTING RECEPTACLES
SPARE		-	-	20	7			8	20	12	1080		EXISTING RECEPTACLES
	-				9			10	20	-		-	SPARE
SPARE		-	-	20	11			12	20	-	-		SPARE
	-				13			14				-	
POWER FAIL RELAY		-	-	15	15			16	20	-	-		SPARE
	-				17			18				-	
GFCI RECEPTACLE		-	-	20	19			20	20	-	-		SPARE
SUB-PANEL FEED	-		8	40	21			22	60	6		2000	DC POWER PLANT
		-			23			24				2000	
GEN. GFCI RECEPTACLE	-		-	-	25			26	40	-		2800	HVAC UNIT
SPD		-	-	SW	27			28				2800	
	-				29			30	20	12		180	BATTERY CABINET RECEPTACLE
TOTAL A	2250											6060	
TOTAL B		2100									6840		
TOTAL CONNECTED LOAD: VA 17250 AVERAGE AMPS PER PHASE 72A													

PANEL SCHEDULE
N.T.S.

PREPARED FOR:

dish
WIRELESS



7171 West 95th Street, Suite 600
Overland Park, Kansas 66212
Phone: 913-438-7700
Fax: 913-438-7777

ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
KMY KEVIN M. VANMAELE 53946 CIVIL C
REJ ROBERT E. JENSEN 54720 CIVIL C
TMS TERRANCE M. SUPER 36490 ELECTRICAL E
SDK SHELTON D. KEISLING 49643 ELECTRICAL E



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302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

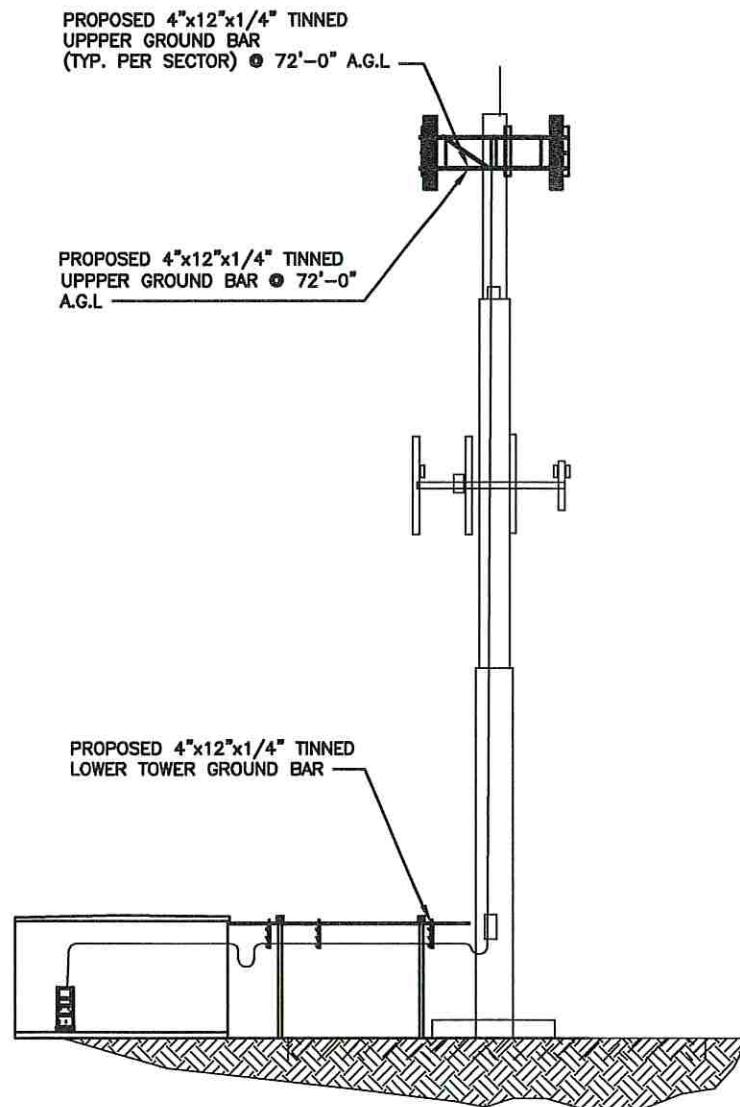
SHEET TITLE:

PANEL SCHEDULE

SHEET NUMBER:

E-2.1

(TWR19-001)

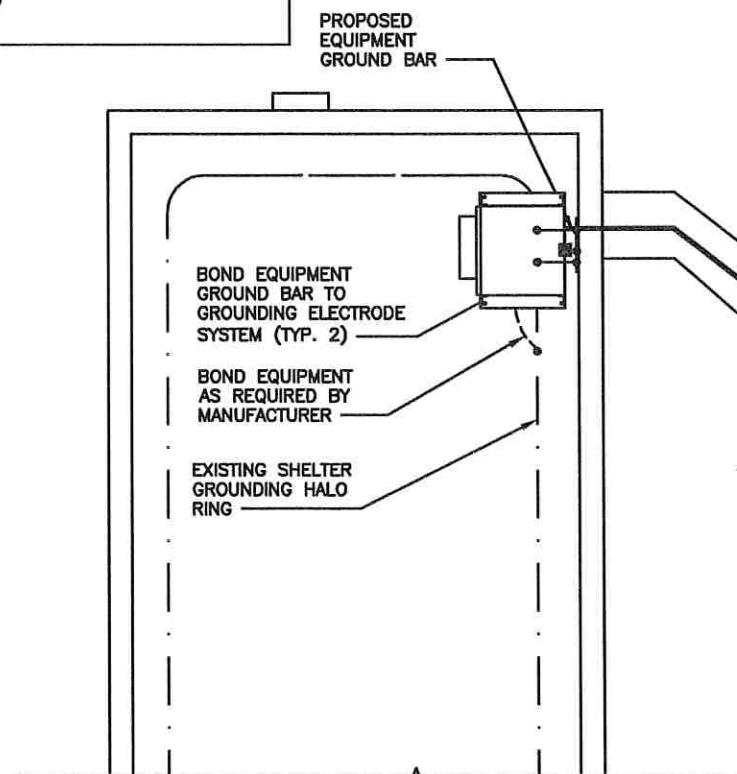


TOWER ELEVATION GROUNDING
N.T.S.

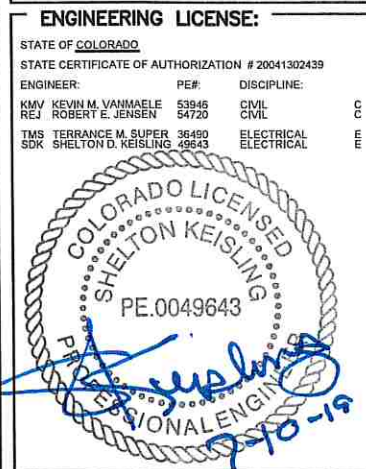
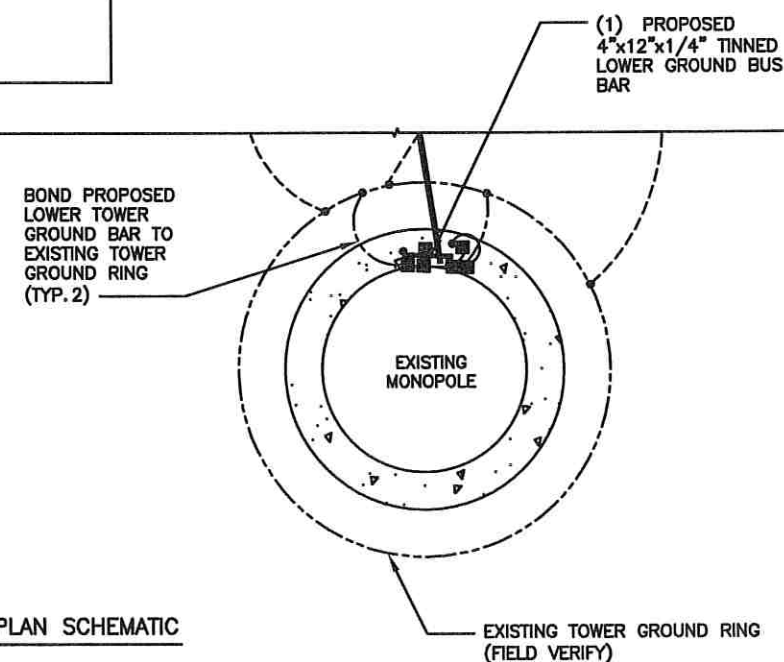
LEGEND	
—	GROUNDING CONDUCTOR — ABOVE GRADE
----	GROUNDING CONDUCTOR — BELOW GRADE
---	GROUNDING ELECTRODE SYSTEM
•	EXOTHERMIC CONNECTION
■	MECHANICAL CONNECTION
□	GROUND INSPECTION/TEST WELL
⊙	GROUND ROD

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

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



TYPICAL GROUNDING PLAN SCHEMATIC
N.T.S.



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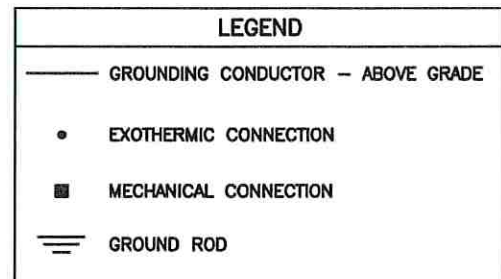
DISH WIRELESS SITE ID:
CO1410011A

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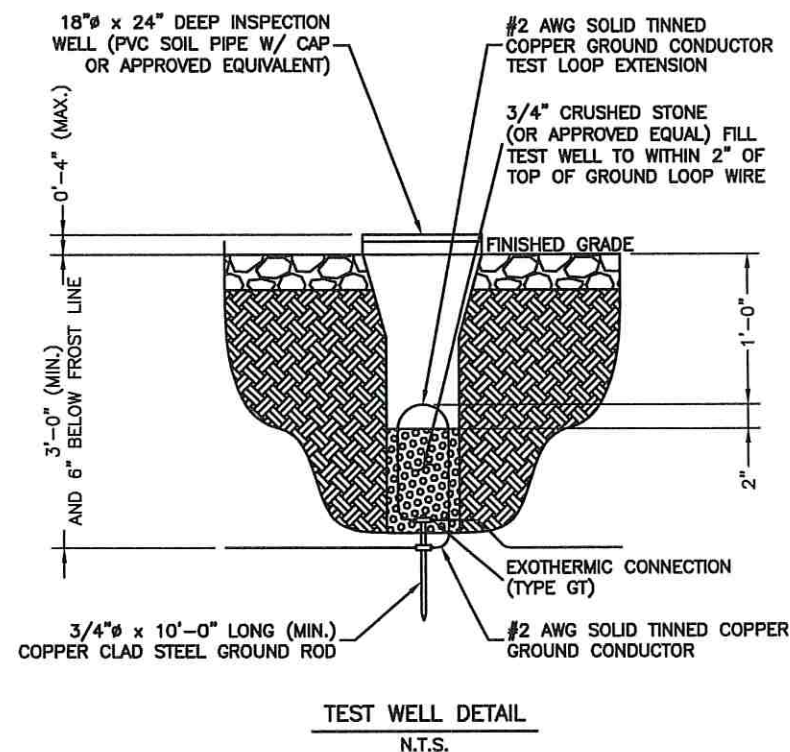
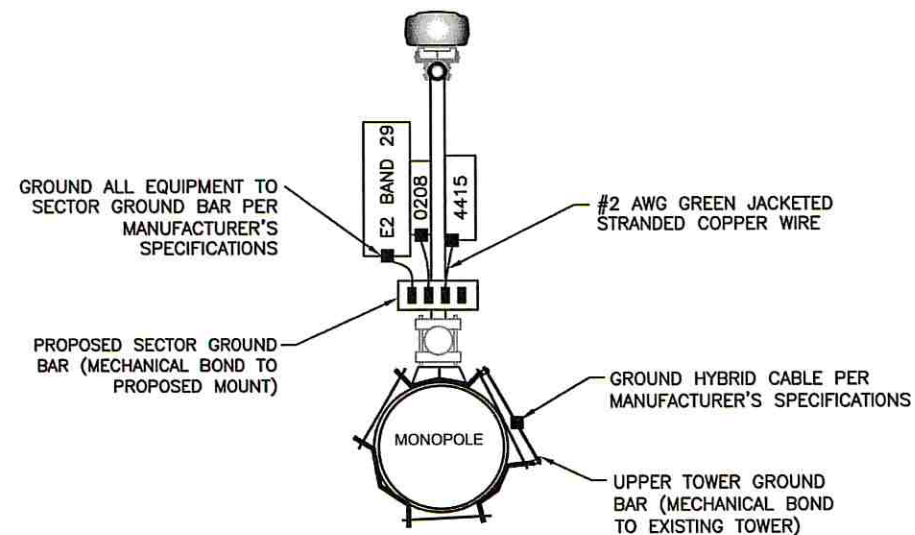
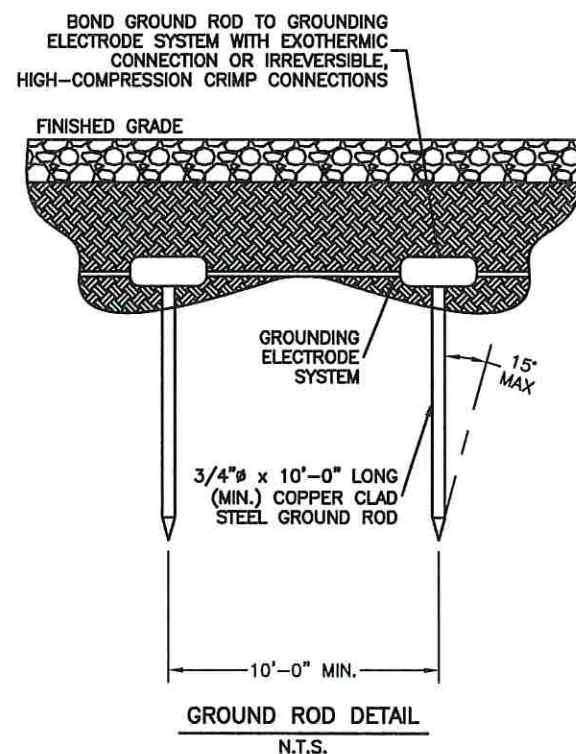
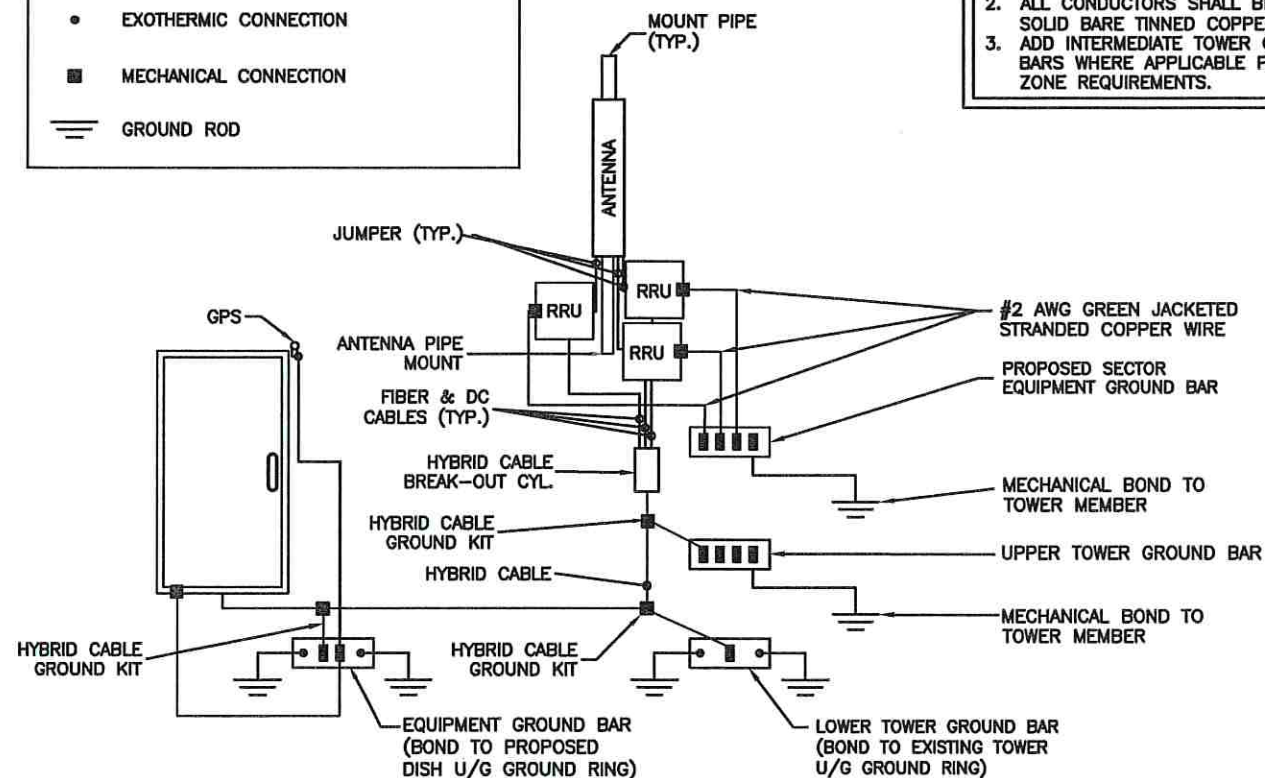
SITE ADDRESS:
2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:
GROUNDING NOTES
& DETAILS

SHEET NUMBER:
G-1
(TWR19-001)



- NOTE:**
1. SEE SHEET G-3 FOR GROUND BAR DETAILS.
 2. ALL CONDUCTORS SHALL BE #2 AWG SOLID BARE TINNED COPPER, UNO.
 3. ADD INTERMEDIATE TOWER GROUND BUS BARS WHERE APPLICABLE PER LIGHTNING ZONE REQUIREMENTS.



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ENGINEERING LICENSE:

STATE OF COLORADO
STATE CERTIFICATE OF AUTHORIZATION # 20041302439
ENGINEER: PE# DISCIPLINE:
KMY KEVIN M. VANMAELE 53845 CIVIL C
REJ ROBERT E. JENSEN 54720 CIVIL C
TMS TERRANCE M. SUPER 36490 ELECTRICAL E
SDK SHELTON D. KEISLING 49643 ELECTRICAL E



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COLORADO SPRINGS, CO 80922

SHEET TITLE:
GROUNDING NOTES
& DETAILS

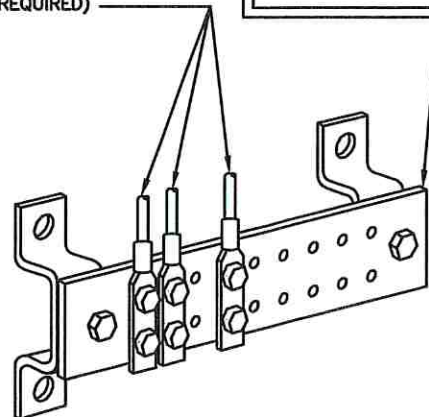
SHEET NUMBER:
G-2
(TWR19-001)

#2 AWG GREEN JACKETED STRANDED COPPER WIRE OR AS PER MANUFACTURER SPECS GROUND WIRE TO SECTOR EQUIPMENT & ANTENNA MOUNTING PIPES W/ TIN PLATED LONG BARREL COMPRESSION TWO-HOLE LUGS (AS REQUIRED)

NOTES:

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

2"x12"x1/4" COPPER GROUND BAR (VALMONT CAT# MG21218-K) WITH TIN PLATING (TIN21218) WITHOUT MOUNTING INSULATORS AND SECURE DIRECTLY TO STEEL.



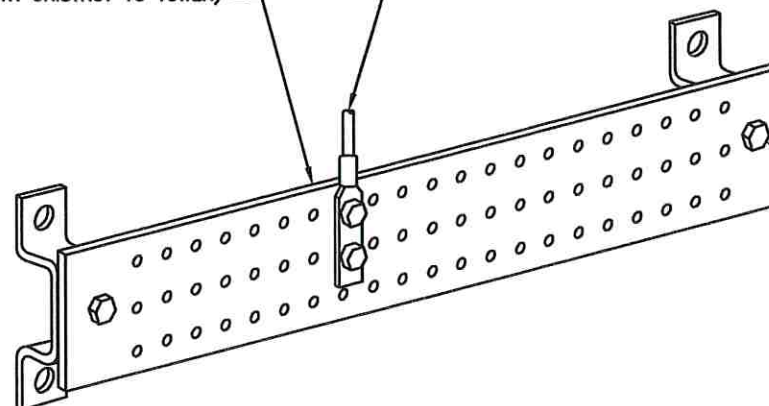
(MECHANICALLY BOND TO PROPOSED ANTENNA MOUNTS)

SECTOR GROUND BAR DETAIL

N.T.S.

4"x12"x1/4" TINNED GROUND BAR (VALMONT CAT# HDG42483-K) WITH TIN PLATING (TIN21218) (MOUNT WITH UNISTRUT TO TOWER)

GROUND LEAD FROM HYBRID CABLE TO UPPER GROUND BUS BAR USING HYBRID CABLE GROUNDING KIT PER CABLE MANUFACTURER'S REQUIREMENTS



SECURE DIRECTLY TO STEEL WITHOUT INSULATORS

(MECHANICALLY BOND TO EXISTING TOWER)

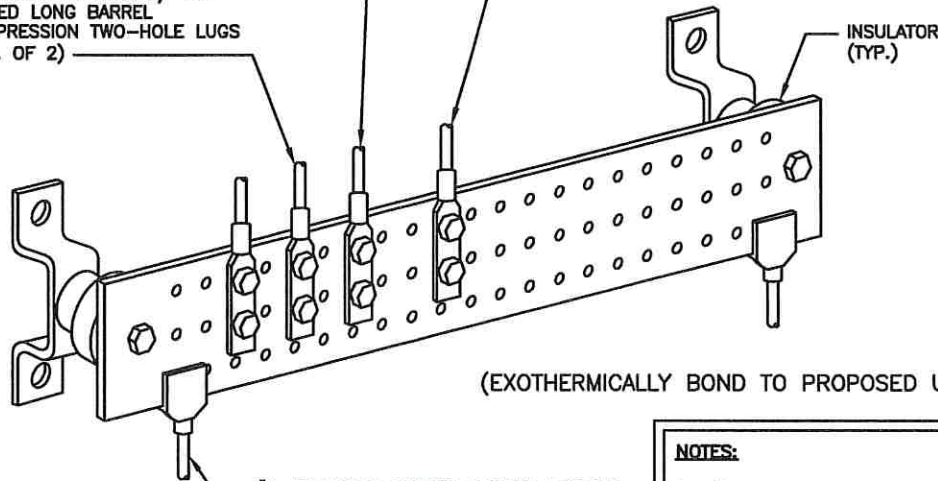
UPPER TOWER GROUND BAR DETAIL

N.T.S.

#2 AWG SOLID TINNED COPPER OR AS PER MANUFACTURER SPECS GROUND WIRE TO EQUIPMENT CABINET W/ TIN PLATED LONG BARREL COMPRESSION TWO-HOLE LUGS (TYP. OF 2)

GROUND LEAD FROM HYBRID CABLE GROUNDING KIT PER CABLE MANUFACTURER REQUIREMENTS

#2 AWG SOLID TINNED COPPER OR AS PER MANUFACTURER SPECS GROUND WIRE TO GPS ANTENNA W/ TIN PLATED LONG BARREL COMPRESSION TWO-HOLE LUGS (TYP.)



(EXOTHERMICALLY BOND TO PROPOSED U/G GROUNDING RING)

EQUIPMENT GROUND BAR DETAIL

N.T.S.

NOTES:

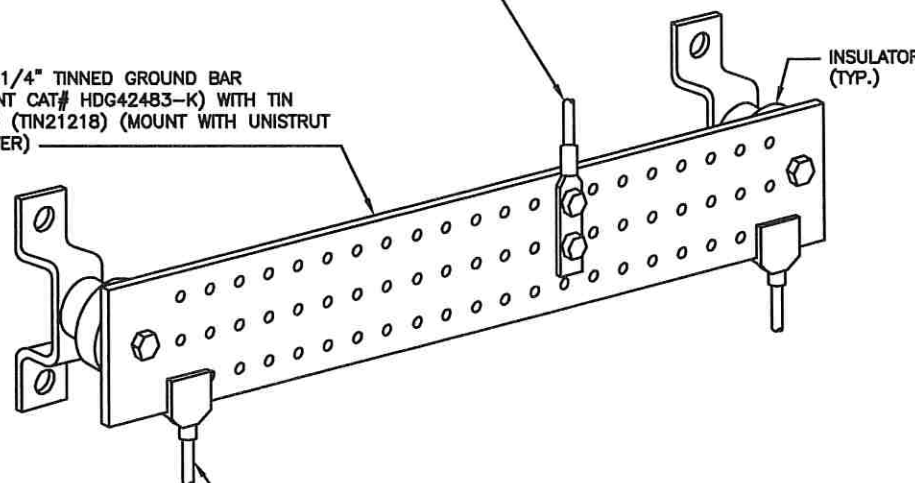
1. #2 AWG SOLID BARE TINNED COPPER CONDUCTOR FROM EACH ICE BRIDGE POST TO EXTERNAL GROUNDING SYSTEM USING EXOTHERMIC WELDS.
2. IN CASES OF SHEATHED STRANDED WIRES, CONNECTOR SHALL HAVE INSPECTION WINDOW AND NO MORE THAN 1/8" GAP BETWEEN CONNECTOR BODY AND SHEATH.

NOTE:

GROUND FROM SATELLITE DISH TO EQUIPMENT GROUND RING WHEN APPLICABLE

GROUND LEAD FROM HYBRID CABLE TO LOWER TOWER GROUND BAR USING HYBRID CABLE GROUNDING KIT PER CABLE MANUFACTURER REQUIREMENTS

4"x12"x1/4" TINNED GROUND BAR (VALMONT CAT# HDG42483-K) WITH TIN PLATING (TIN21218) (MOUNT WITH UNISTRUT TO TOWER)



#2 AWG SOLID TINNED COPPER GROUND WIRE TO EXISTING TOWER GROUND RING W/ EXOTHERMIC WELDS (TYP. OF 2)

LOWER TOWER GROUND BAR DETAIL

N.T.S.

NOTE:

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

PREPARED FOR:

dish
WIRELESS

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DISH WIRELESS SITE ID:

CO1410011A

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302459

SITE ADDRESS:

2867 AKERS DR
COLORADO SPRINGS, CO 80922

SHEET TITLE:

GROUNDING NOTES
& DETAILS

SHEET NUMBER:

G-3

(TWR19-001)



RF Design Data Sheet

Site Information

State	CO	Site ID	CO1410011A
Site Name	302459	Tower Type	Monopole
Address	2875 Akers Dr	City	COLORADO SPRINGS
Latitude (degrees)	38.87495556	Zip	80922
Longitude (degrees)	-104.6862306	Tower Owner	ATC
RFDS Revision	1.0	Issue Date	4/17/2019
RF Engineer	Ajit Prashar		ajit.p.prashar@ericsson.com

Design Information

Technology	NB-IoT		
Vendor	Ericsson		
Site Configuration	4415-2		
Site Type - Equipment - Band	700 MHz/AWS-4		
Sector Information (Expected Configuration)	Sector-1 (Alpha)	Sector-2 (Beta)	Sector-3 (Gamma)
LTE Sector Number	CO1410011A_1	CO1410011A_2	CO1410011A_3
Antenna Center Line (ft)	72	72	72
Antenna Model Number	ODI-065R16M18JJ-GQ V2	ODI-065R16M18JJ-GQ V2	ODI-065R16M18JJ-GQ V2
Number of Antennas / Sector	1	1	1
Antenna Dimensions (LxWxD) (in)	78.7 x 14.0 x 7.6	78.7 x 14.0 x 7.6	78.7 x 14.0 x 7.6
Antenna Weight (lbs.)	57	57	57
Antenna Manufacturer	Comba	Comba	Comba
Horizontal Beamwidth	62	62	62
Gain (dBd)	15.3	15.3	15.3
Azimuth (deg) (Relative to True North)	30	205	310
Antenna Downtilt (Mechanical)	0	0	0
Antenna Downtilt 2100 (Electrical)	2	2	2
Antenna Downtilt 700 (Electrical)	4	4	4
Radio Model (Band 70)	Radio 4415	Radio 4415	-
Radio Quantity (Band 70)	1	1	-
Radio Model (H-Block)	Radio 0208	Radio 0208	Radio 0208
Radio Quantity (H-Block)	1	1	1
Radio Model (700 band)	RRUS E2 B29	RRUS E2 B29	RRUS E2 B29
Radio Quantity (700 band)	1	1	1
Number of Feeders / Sector	6	6	6
Feeder Diameter (Nominal) (in)	1/2	1/2	1/2
Feeder Length (m)	3	3	3
700 MHz Radio location	Tower_Top	Tower_Top	Tower_Top
700 MHz Coax Cable Type (in)	-	-	-
TX/RX Diplexer Model			
TX/RX Diplexer Qty			
TX/RX Diplexer Dim (inch) / Wt (lbs)			

Description of Cabling Configuration Changes / Additions

Mandatory : Append Sketches indicating Locations of all new Antennas, Cabling, Duplexor, Diplexors (if applicable), TMA's etc....

Sector Alpha	
Sector Beta	
Sector Gamma	
General Comments	4/17-Azimuth Changed from 0/120/240 to 30/205/310

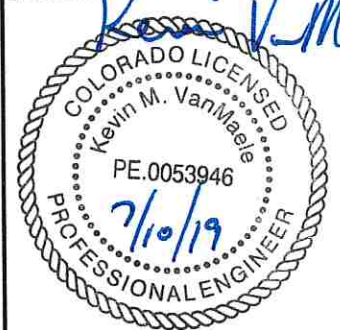
NOTE:

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

SUPPLEMENTAL
INFORMATION

NOTES:

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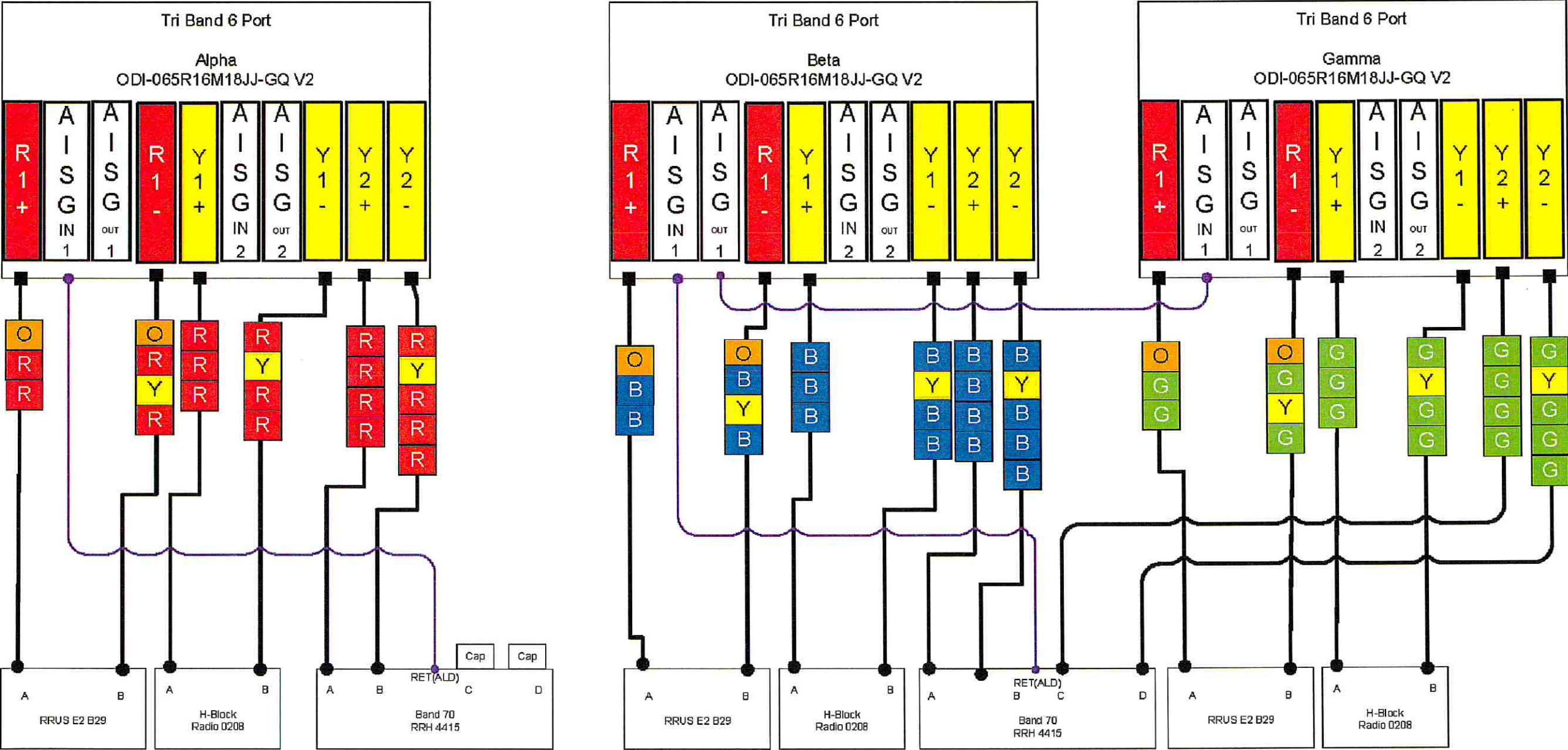
RF DATA SHEET

SHEET NUMBER:

RF-1

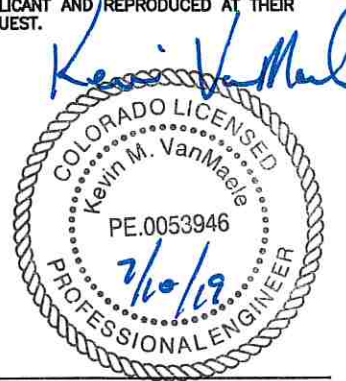
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Ericsson Antenna to RRU Diagram



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SHEET TITLE:
PLUMBING DIAGRAM

SHEET NUMBER:
RF-2.1 (TWR19-001)