



DISH Wireless L.L.C. SITE ID:

**MNMSP00388A**

DISH Wireless L.L.C. SITE ADDRESS:

**4000 SW COURT  
BLOOMINGTON, MN 55425**

PL202300142

### 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:

- SECTOR SCOPE OF WORK:
- INSTALL (3) PROPOSED PANEL ANTENNAS (1 PER SECTOR)
  - INSTALL (2) PROPOSED SLED MOUNTS
  - INSTALL (1) PROPOSED STANDOFF ANTENNA MOUNT
  - INSTALL (6) PROPOSED RRUs (2 PER SECTOR)
  - INSTALL (3) PROPOSED OVER VOLTAGE PROTECTION DEVICE (OVP) (1 PER SECTOR)
  - INSTALL (3) PROPOSED HYBRID CABLE

- ROOFTOP SCOPE OF WORK:
- INSTALL (1) PROPOSED METAL PLATFORM WITH H-FRAME
  - INSTALL (1) PROPOSED CABLE LADDER TRAY OR CABLE TRAY
  - INSTALL (1) PROPOSED BBU IN CABINET
  - INSTALL (1) PROPOSED EQUIPMENT CABINET
  - INSTALL (1) PROPOSED POWER CONDUIT
  - INSTALL (1) PROPOSED TELCO CONDUIT
  - INSTALL (1) PROPOSED NEMA 3 TELCO-FIBER BOX
  - INSTALL (1) PROPOSED GPS UNIT
  - INSTALL (1) PROPOSED JUMPERS

### SITE INFORMATION

PROPERTY OWNER: MOAC MALL HOLDINGS LLC  
ADDRESS: 4000 SOUTHWEST COURT  
BLOOMINGTON, MN 55425

TOWER TYPE: ROOFTOP

TOWER CO SITE ID: MNMSP00388A

TOWER APP NUMBER: N/A

COUNTY: HENNEPIN

LATITUDE (NAD 83): 44° 51' 11.43" N  
44.853175

LONGITUDE (NAD 83): 93° 14' 39.83" W  
-93.2443972

ZONING JURISDICTION: CITY OF BLOOMINGTON

ZONING DISTRICT: ADMIN REVIEW

PARCEL NUMBER: 0102724310017

OCCUPANCY GROUP: R-1

CONSTRUCTION TYPE: III-B

POWER COMPANY: XCEL ENERGY-MN NDSD

TELEPHONE COMPANY: -

### PROJECT DIRECTORY

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

TOWER OWNER: N/A

SITE DESIGNER: TRILEAF  
1821 WALDEN OFFICE SQUARE  
SCHAUMBURG, IL 60173  
(630) 227-0202

SITE ACQUISITION: SBA NETWORKS SERVICES LLC  
(561) 579-8812

CONSTRUCTION MANAGER: MO MOHAMMED  
(720) 456-1043

RF ENGINEER: CHONG LEE  
chong.lee@dish.com

### MINNESOTA CODE OF COMPLIANCE

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

CODE TYPE	CODE
BUILDING	2020 MINNESOTA BUILDING CODE/2018 IBC
MECHANICAL	2020 MINNESOTA MECHANICAL AND FUEL GAS CODE/2018 IMC
ELECTRICAL	2020 MINNESOTA ELECTRICAL CODE/2020 NEC

### SHEET INDEX

SHEET NO.	SHEET TITLE
T-1	TITLE SHEET
A-1	OVERALL SITE PLAN
A-2	ENLARGED BUILDING PLAN
A-3	ANTENNA PLAN AND SCHEDULE
A-4	NORTH AND SOUTH ELEVATIONS
A-5	EAST AND WEST ELEVATIONS
A-6	EQUIPMENT PLATFORM AND H-FRAME DETAILS
A-7	EQUIPMENT DETAILS
A-8	EQUIPMENT DETAILS
E-1	ELECTRICAL/FIBER ROUTE PLAN AND NOTES
E-2	ELECTRICAL DETAILS
E-3	ELECTRICAL ONE-LINE, FAULT CALCS & PANEL SCHEDULE
G-1	GROUNDING PLANS AND NOTES
G-2	GROUNDING DETAILS
G-3	GROUNDING DETAILS
RF-1	RF CABLE COLOR CODE
GN-1	LEGEND AND ABBREVIATIONS
GN-2	RF SIGNAGE
GN-3	GENERAL NOTES
GN-4	GENERAL NOTES
GN-5	GENERAL NOTES
S-1	STANDOFF ANTENNA MOUNT & ROOF PENETRATION DETAIL
S-2	ASSEMBLY - LAYOUT
S-3	ASSEMBLY - ELEVATIONS

### SITE PHOTO



GOPHER STATE ONE CALL  
UTILITY NOTIFICATION CENTER OF MINNESOTA  
(800) 252-1166  
WWW.GOPHERSTATEONECALL.ORG

CALL 2 WORKING DAYS UTILITY NOTIFICATION PRIOR TO CONSTRUCTION



### GENERAL NOTES

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

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

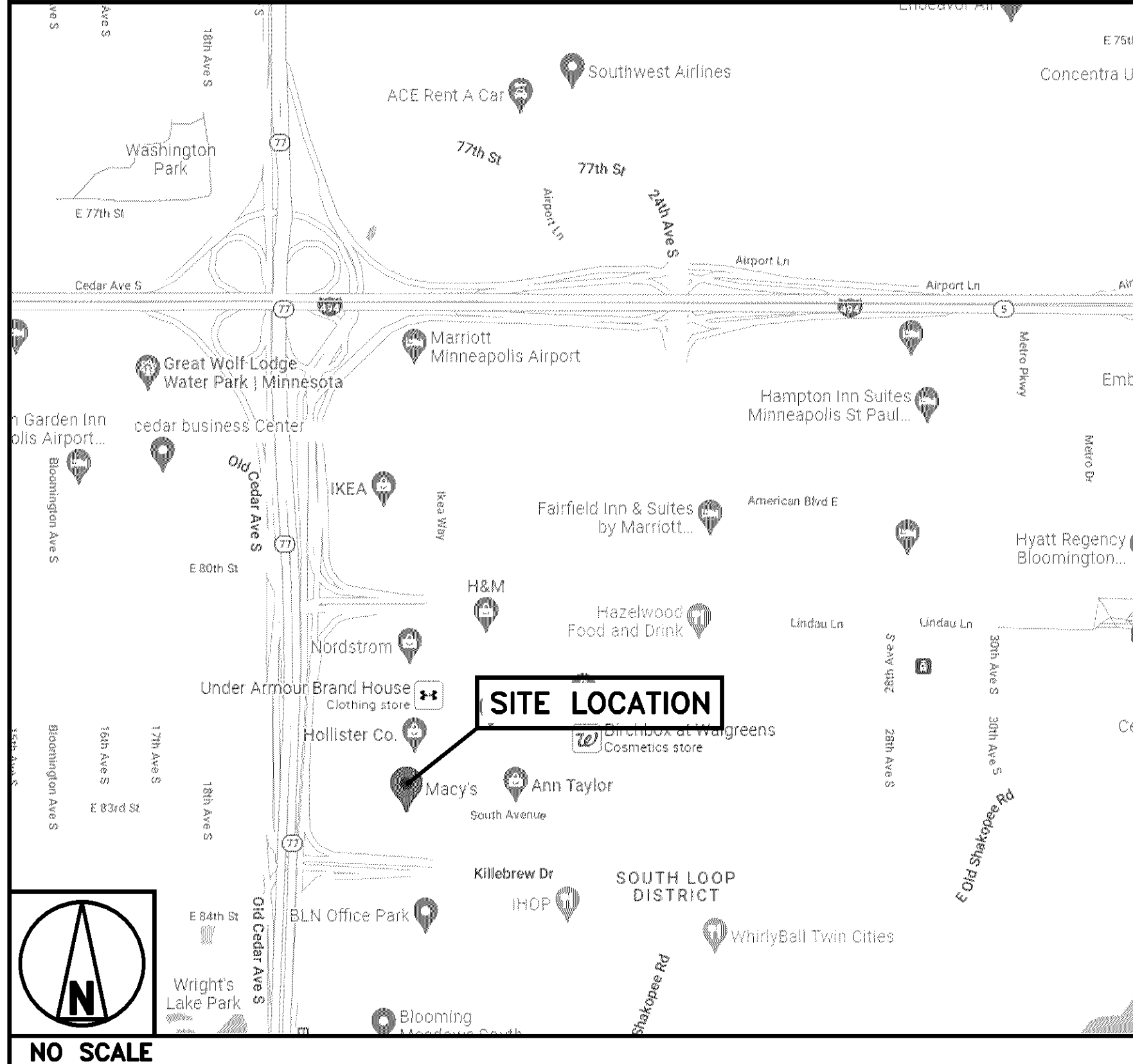
CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE, AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK.

### DIRECTIONS

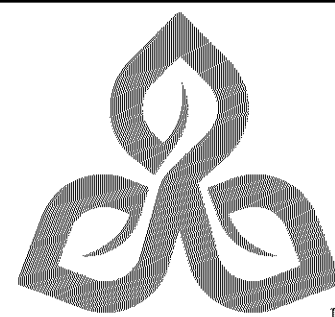
#### DIRECTIONS FROM MINNEAPOLIS-SAINT PAUL INTERNATIONAL AIRPORT:

GET ON I-494 W/MN-5 W IN BLOOMINGTON. HEAD NORTH ON 34TH AVE S TOWARD AIRPORT LN/LABELLE DR. MAKE A U-TURN AT AIRPORT LN/LABELLE DR. USE THE RIGHT LANE TO TAKE THE RAMP ONTO I-494 W/MN-5 W. CONTINUE ON I-494 W/MN-5 W TO KILLEBREW DR. TAKE EXIT 2C FROM I-494 W/MN-5 W. MERGE ONTO I-494 W/MN-5 W. TAKE EXIT 2C FOR MN-77 S. KEEP LEFT AT THE FORK, FOLLOW SIGNS FOR KILLEBREW DR. CONTINUE ON KILLEBREW DR TO YOUR DESTINATION. CONTINUE ONTO KILLEBREW DR. USE THE LEFT 2 LANES TO TURN LEFT ONTO SOUTHWEST CT. TURN LEFT AT SOUTH AVENUE. DESTINATION WILL BE ON THE RIGHT.

### VICINITY MAP



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



**TRILEAF**  
architecture | engineering

1515 DES PERES ROAD, STE 200  
SAINT LOUIS, MISSOURI 63131  
PHONE | 314-997-6111 FAX | 314-997-8066

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota

Print Name: ROGER ALLAN ZIMMER

Signature: *Roger Allan Zimmer*

Date: 8-17-23 License #: 51980

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

DRAWN BY: CHECKED BY: APPROVED BY:

CO RZ RZ

RFDS REV #: 5 03/17/2022

### CONSTRUCTION DOCUMENTS

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A&E PROJECT NUMBER

705953

DISH Wireless L.L.C.  
PROJECT INFORMATION

**MNMSP00388A**  
4000 SOUTHWEST COURT  
BLOOMINGTON, MN 55425

SHEET TITLE  
TITLE SHEET

SHEET NUMBER

**T-1**

PL202300142

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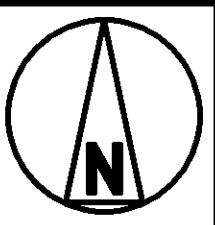
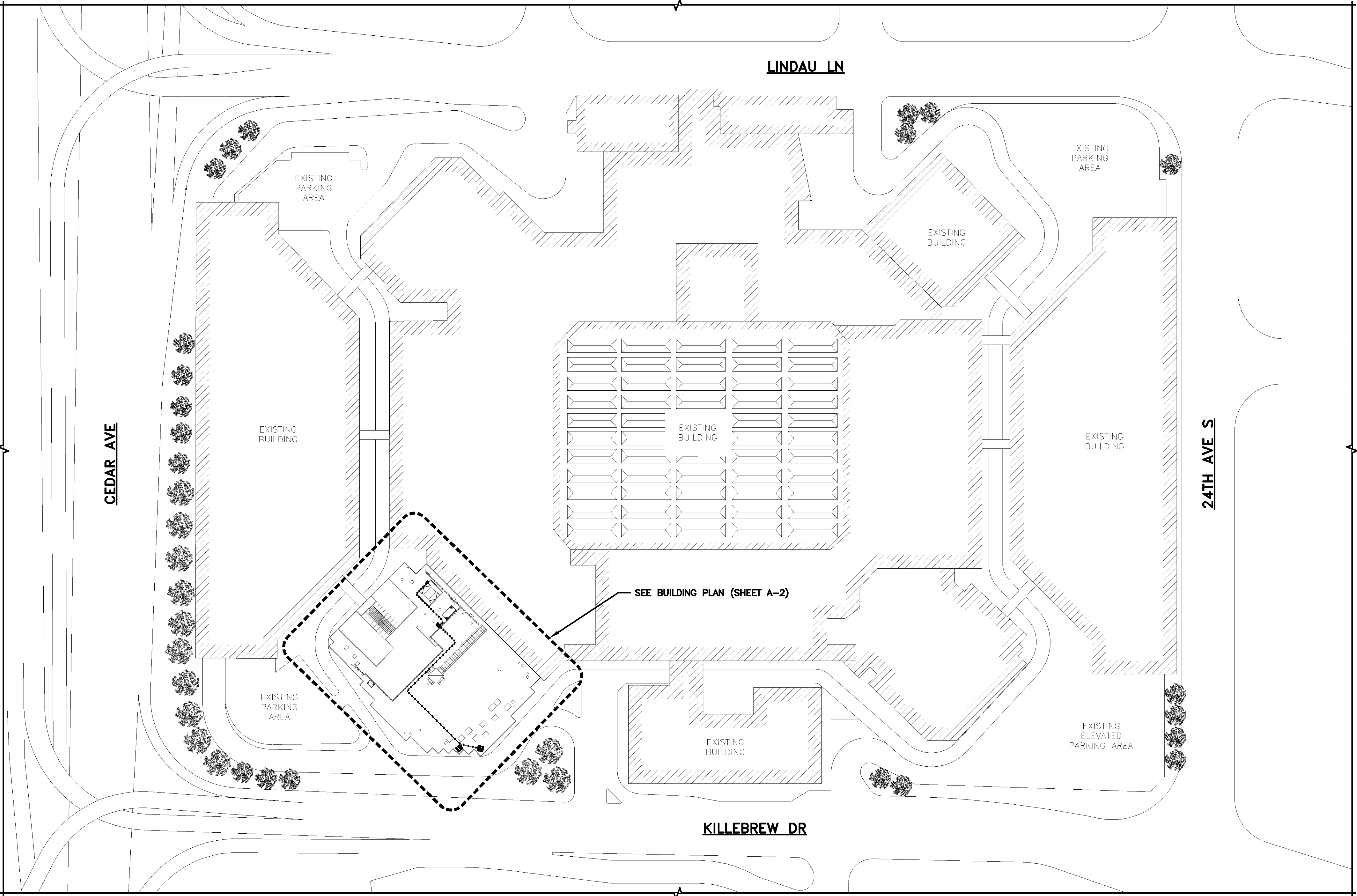
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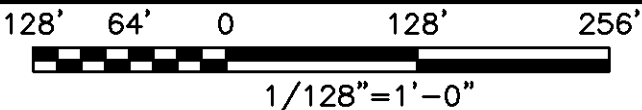
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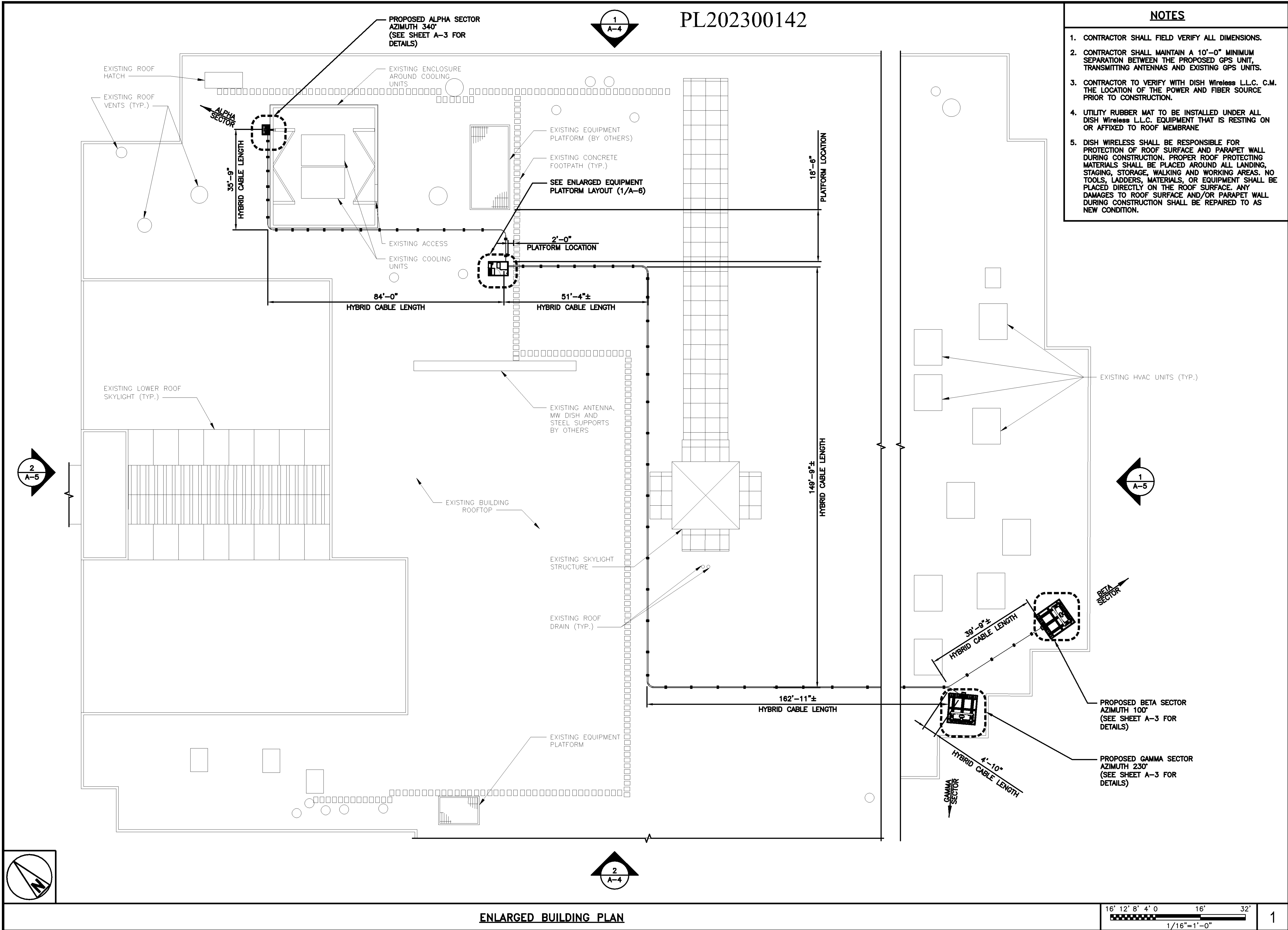
SHEET TITLE  
OVERALL  
SITE PLAN

SHEET NUMBER  
A-1



OVERALL SITE PLAN





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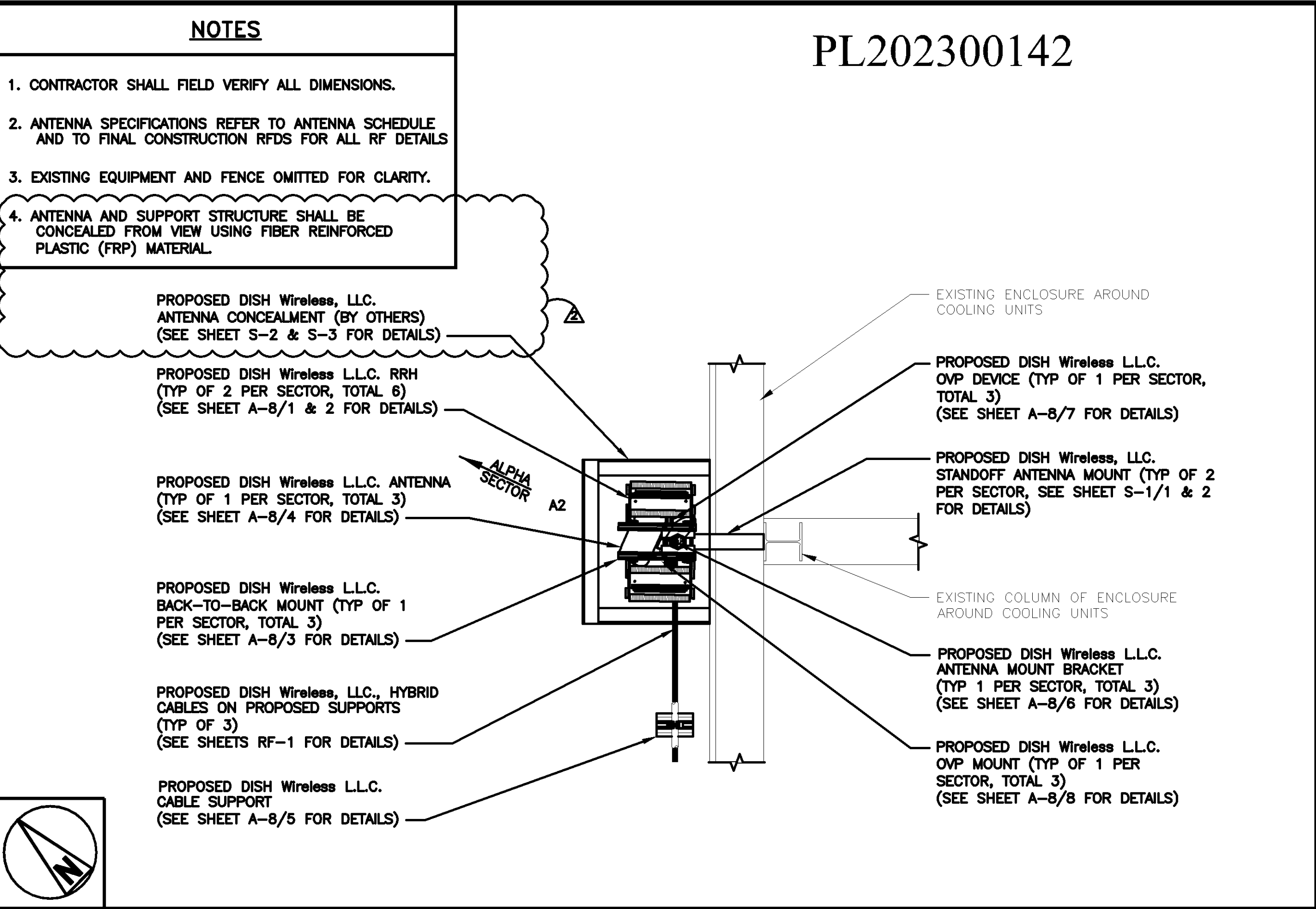
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4000 SOUTHWEST COURT  
BLOOMINGTON, MN 55425

SHEET TITLE  
ENLARGED BUILDING  
PLAN

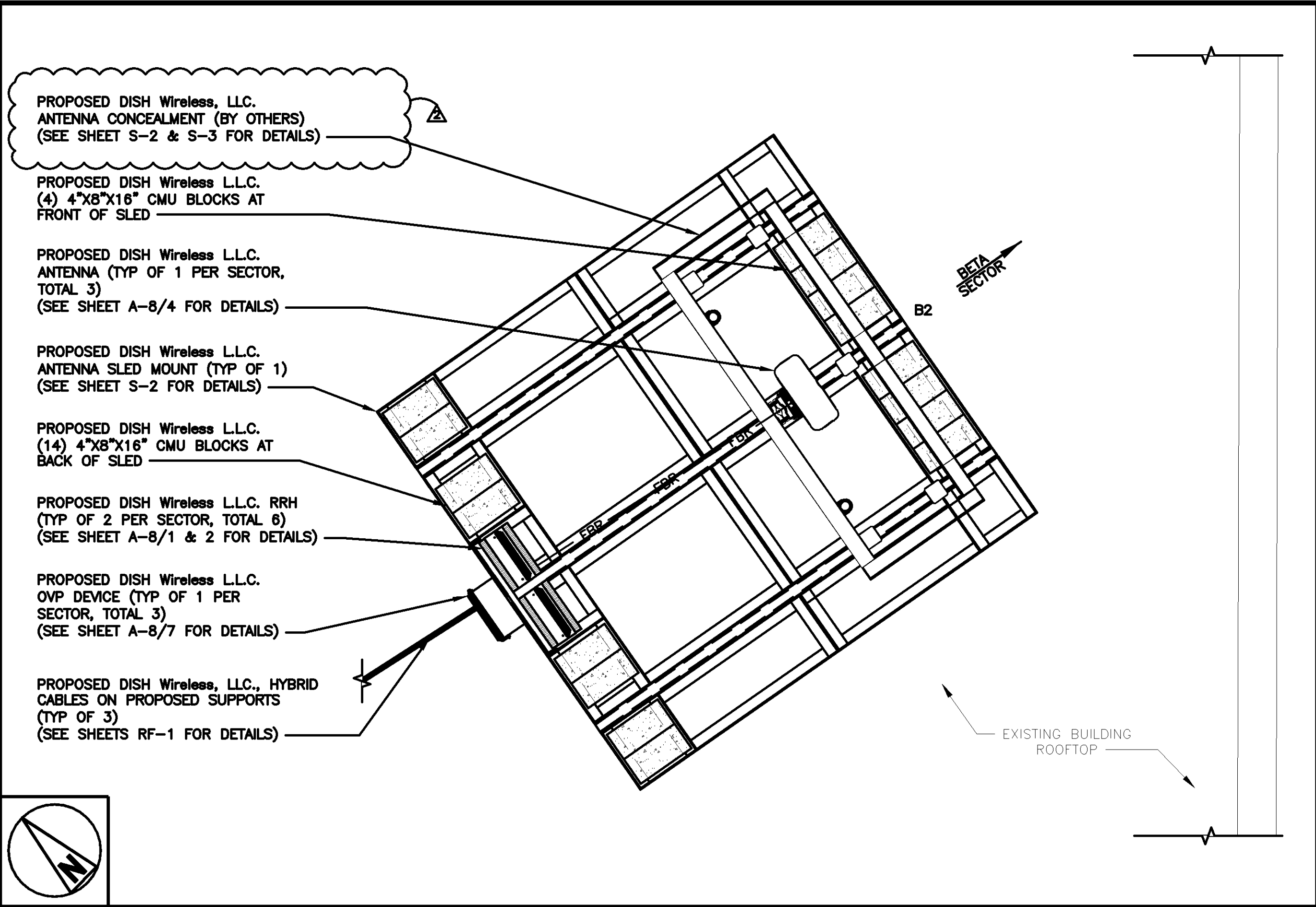
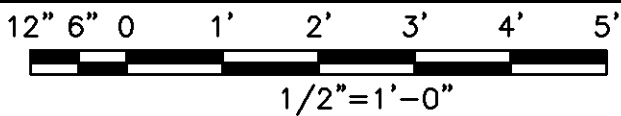
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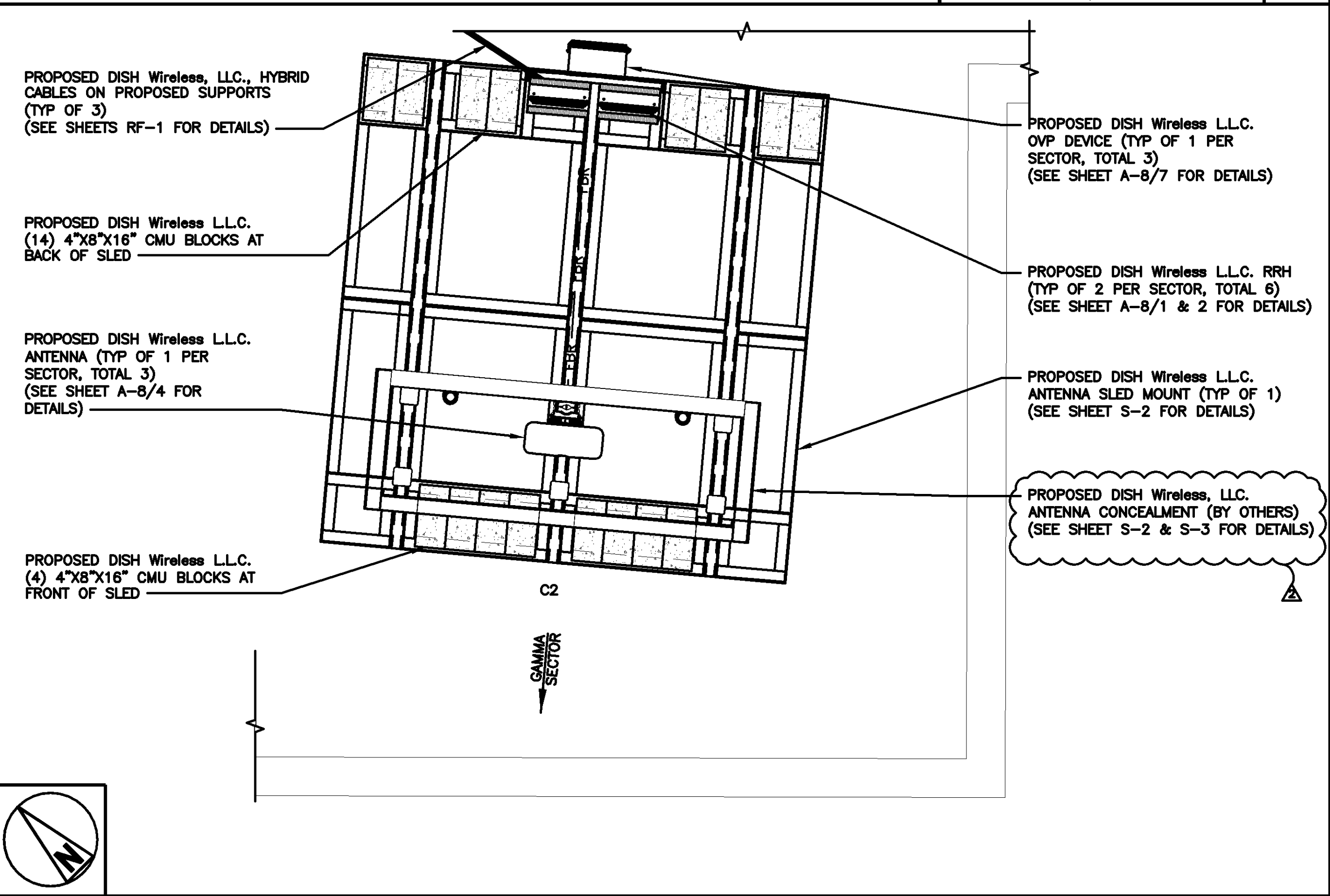
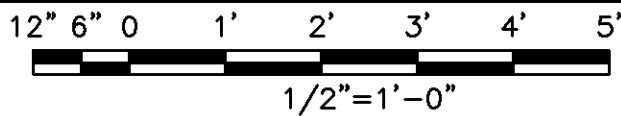




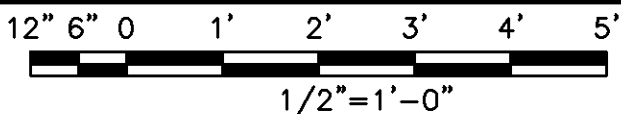
ANTENNA PLAN - ALPHA SECTOR



ANTENNA PLAN - BETA SECTOR



ANTENNA PLAN - GAMMA SECTOR



SECTOR POS.	ANTENNA					TRANSMISSION CABLE	RRH			OVP
	EXISTING OR PROPOSED	MANUFACTURER - MODEL NUMBER	TECH	AZIMUTH	RAD CENTER		MANUFACTURER - MODEL NUMBER	TECH	POS.	
A1	--	--	--	--	--	(1) HIGH-CAPACITY HYBRID CABLE (132'-0" LONG)	FUJITSU - TA08025-B605	5G	A2	RAYCAP RDIDC-3405-PF-48
A2	PROPOSED	COMMSCOPE - FFVW-65B-R2	5G	340°	74'-0"		FUJITSU - TA08025-B604	5G	A2	
A3	--	--	--	--	--		--	--	--	
B1	--	--	--	--	--	(1) HIGH-CAPACITY HYBRID CABLE (402'-0" LONG)	FUJITSU - TA08025-B605	5G	B2	RAYCAP RDIDC-3405-PF-48
B2	PROPOSED	COMMSCOPE - FFVW-65B-R2	5G	100°	74'-3"		FUJITSU - TA08025-B604	5G	B2	
B3	--	--	--	--	--		--	--	--	
C1	--	--	--	--	--	(1) HIGH-CAPACITY HYBRID CABLE (368'-0" LONG)	FUJITSU - TA08025-B605	5G	C2	RAYCAP RDIDC-3405-PF-48
C2	PROPOSED	COMMSCOPE - FFVW-65B-R2	5G	230°	74'-3"		FUJITSU - TA08025-B604	5G	C2	
C3	--	--	--	--	--		--	--	--	

**NOTES**

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.

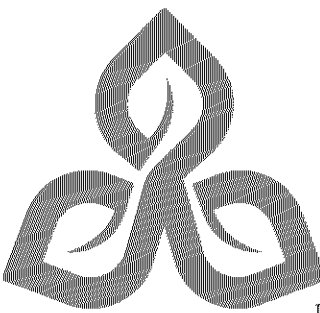
ANTENNA SCHEDULE

NO SCALE

4

**dish**  
wireless.

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LITTLETON, CO 80120



**TRILEAF**  
architecture | engineering

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A&E PROJECT NUMBER  
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DISH Wireless L.L.C.  
PROJECT INFORMATION

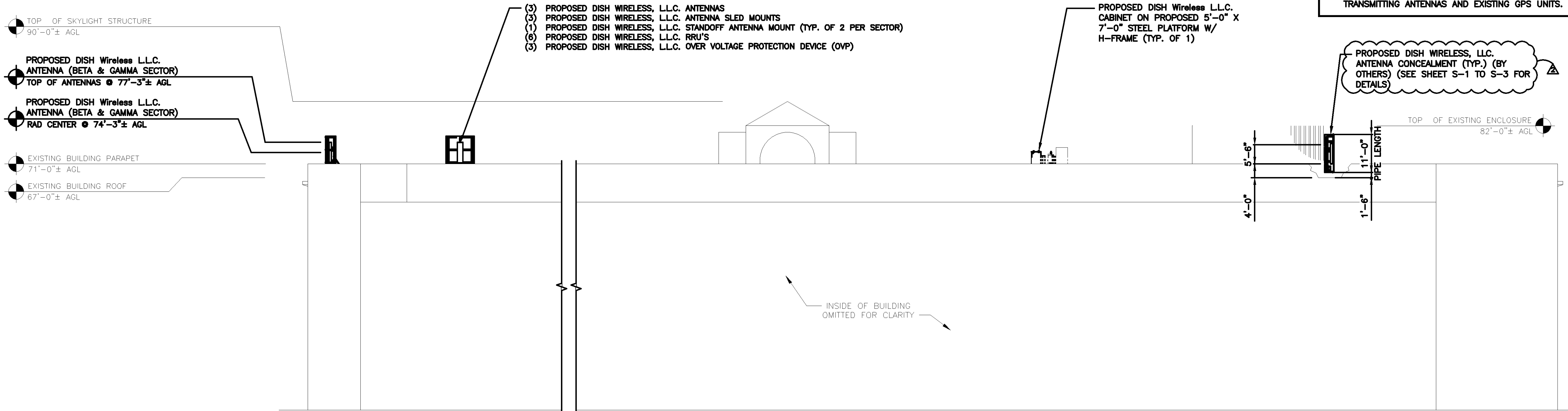
MNMP00388A  
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SHEET TITLE  
ANTENNA PLAN,  
AND SCHEDULE

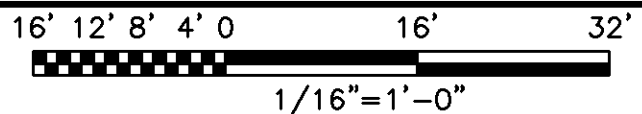
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**A-3**

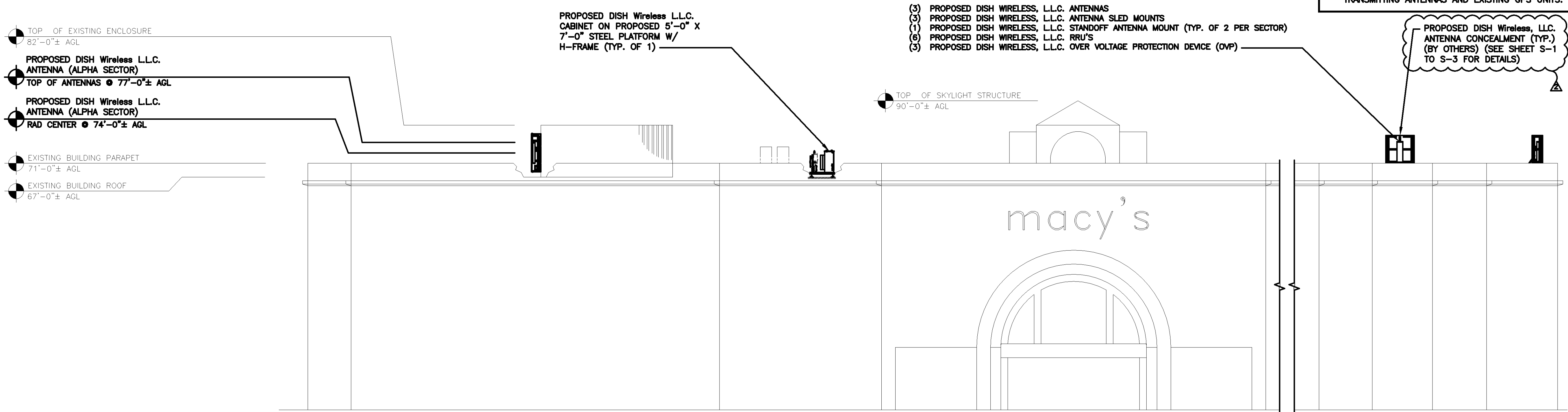
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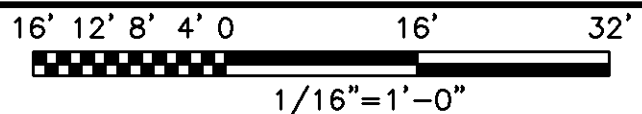
BUILDING NORTH ELEVATION



1



BUILDING SOUTH ELEVATION



2

NOTES

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2. CONTRACTOR SHALL MAINTAIN A 10'-0" MINIMUM SEPARATION BETWEEN THE PROPOSED GPS UNIT, TRANSMITTING ANTENNAS AND EXISTING GPS UNITS.

PROPOSED DISH WIRELESS, L.L.C. ANTENNA CONCEALMENT (TYP.) (BY OTHERS) (SEE SHEET S-1 TO S-3 FOR DETAILS)

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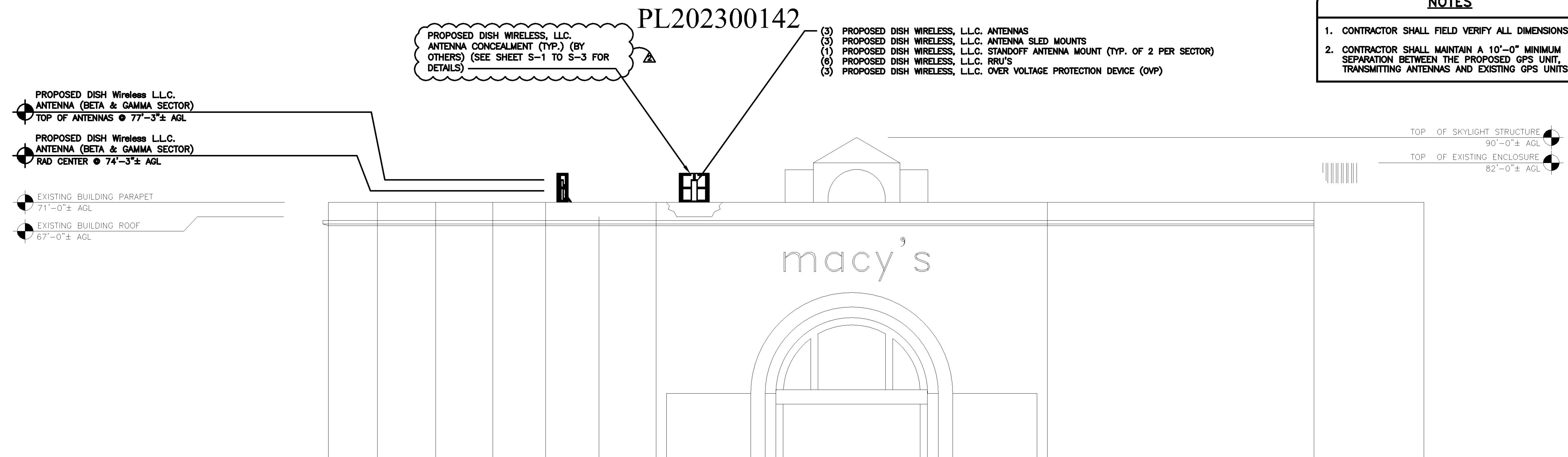
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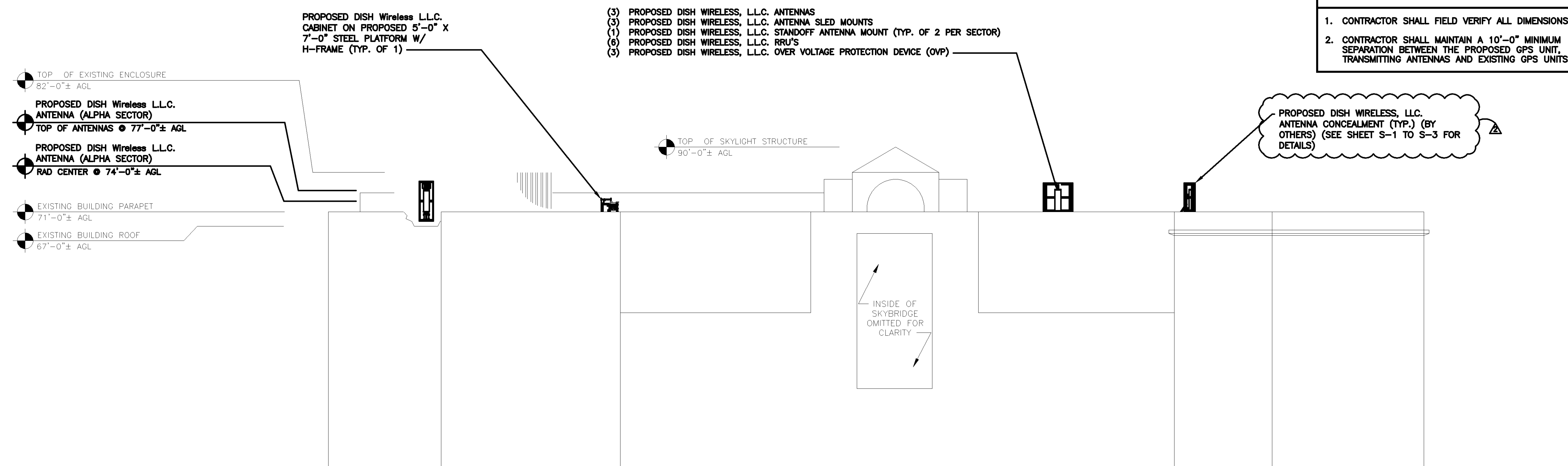
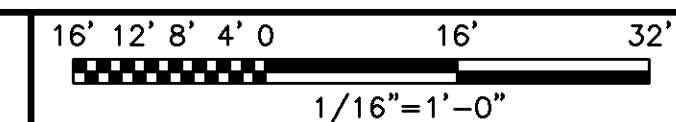
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NORTH AND SOUTH  
ELEVATIONS

SHEET NUMBER

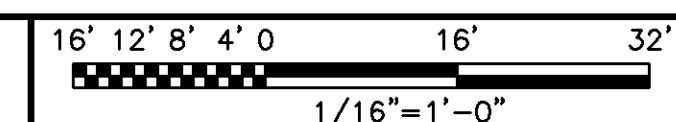
A-4



**BUILDING EAST ELEVATION**



**BUILDING WEST ELEVATION**

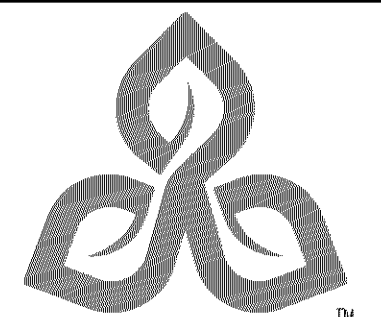


## NOTES

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The logo for Dish Wireless, featuring the word "dish" in a bold, lowercase sans-serif font, with the "i" stylized as a satellite dish. Below "dish" is the word "wireless." in a smaller, lowercase sans-serif font.

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CO

RZ

RZ

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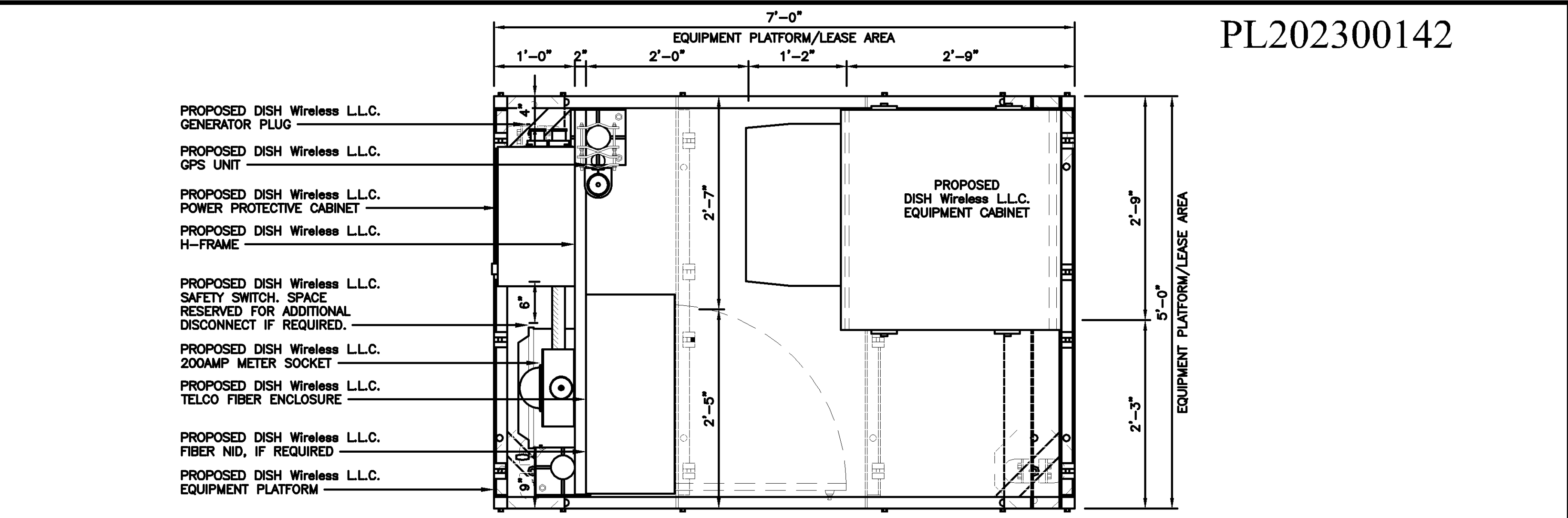
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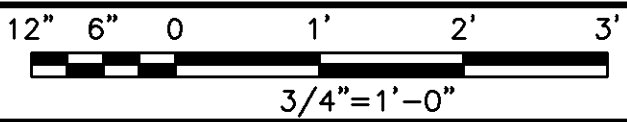
SHEET TITLE  
EAST AND WEST  
ELEVATIONS

SHEET NUMBER

**A-5**



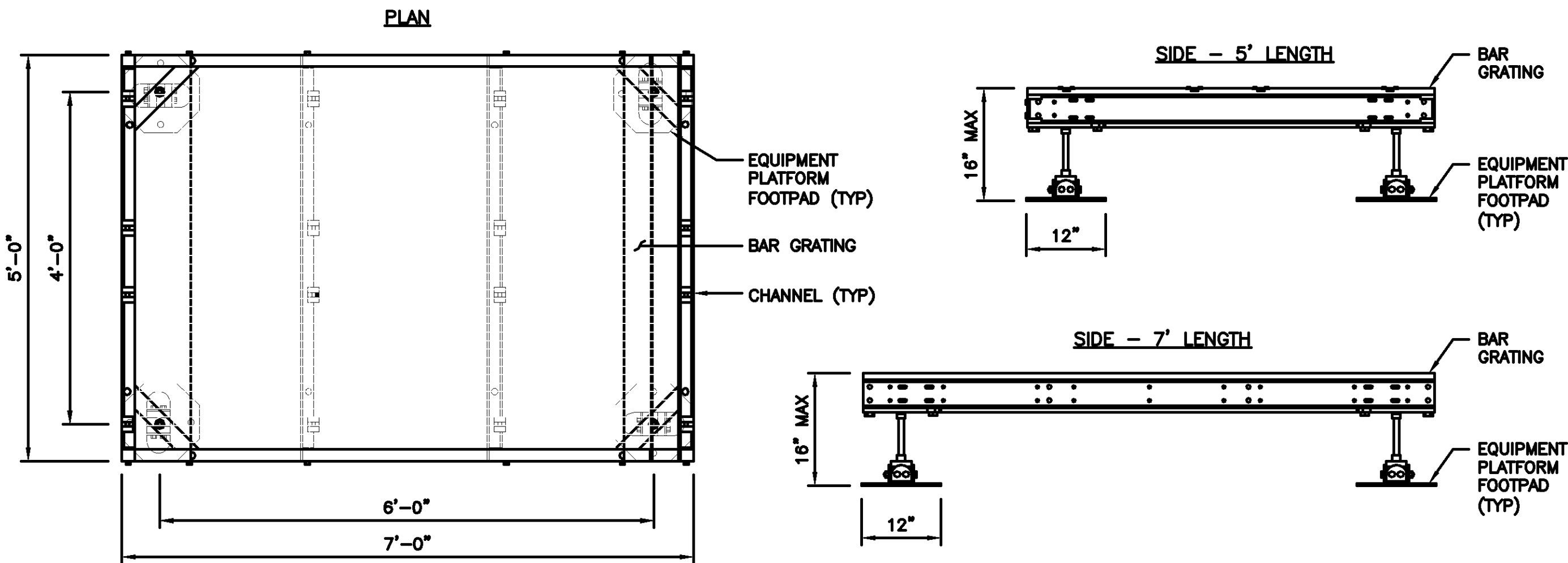
PLATFORM EQUIPMENT PLAN



1

COMMSCOPE MTC4045LP 5X7 PLATFORM	
DIMENSIONS (HxWxD)	16"x84"x60"
TOTAL WEIGHT	423 LBS

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

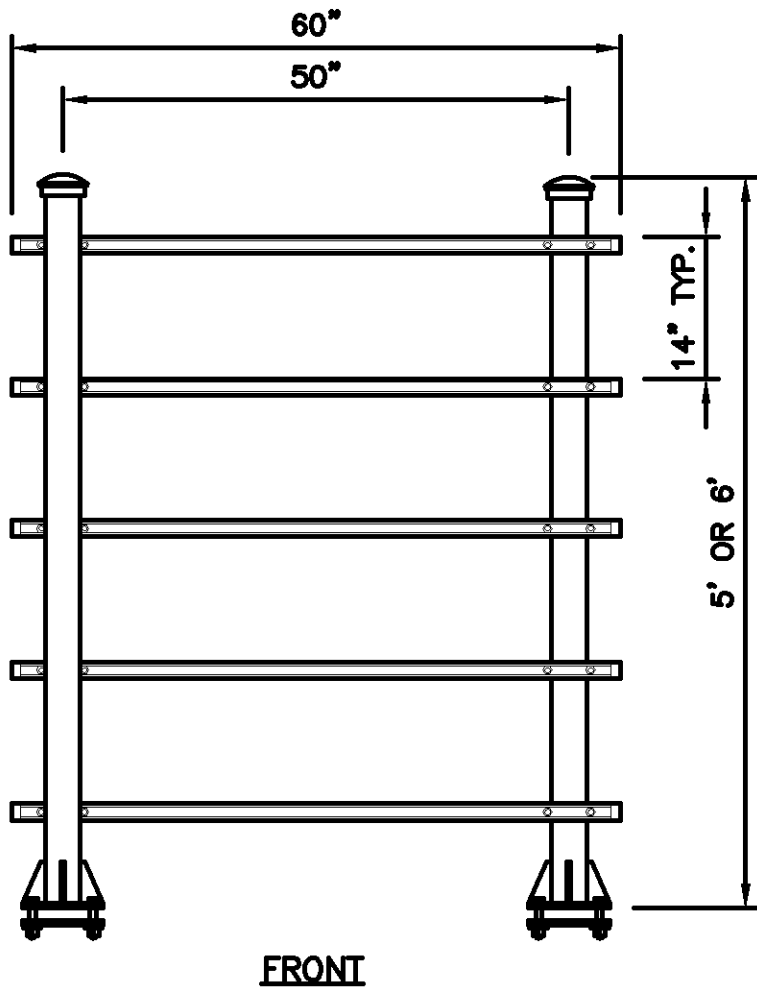
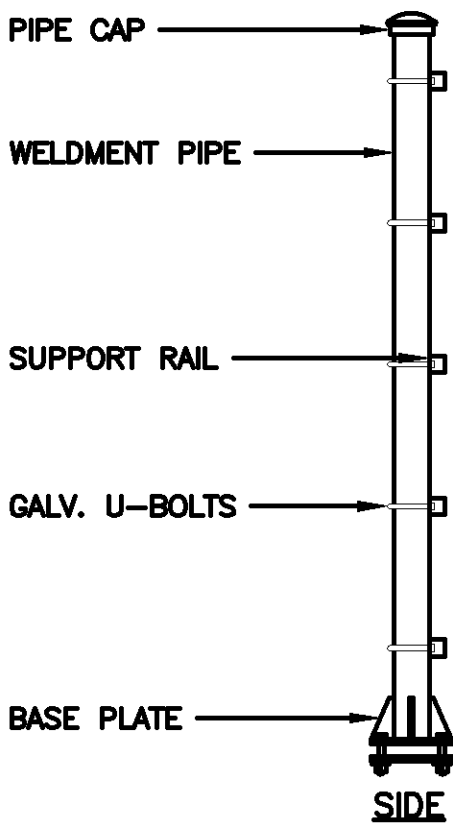


PLATFORM DETAIL

NO SCALE

2

COMMSCOPE MTC4045HFLD H-FRAME	
UNISTRUT/SUPPORT RAILS QTY	5
WEIGHT	59.74 lbs



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

H-FRAME DETAIL

NO SCALE

3

NOT USED

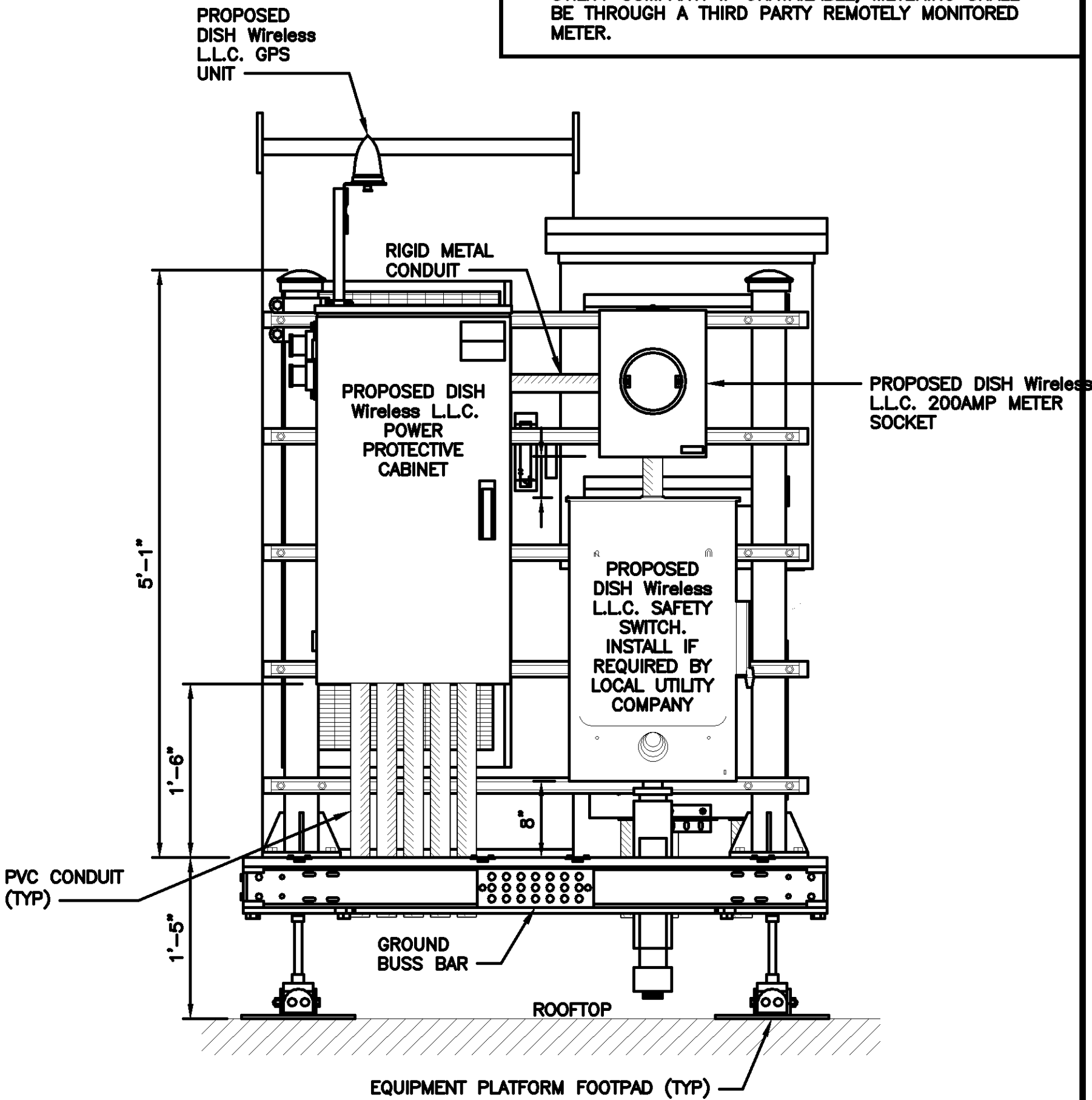
NO SCALE

4

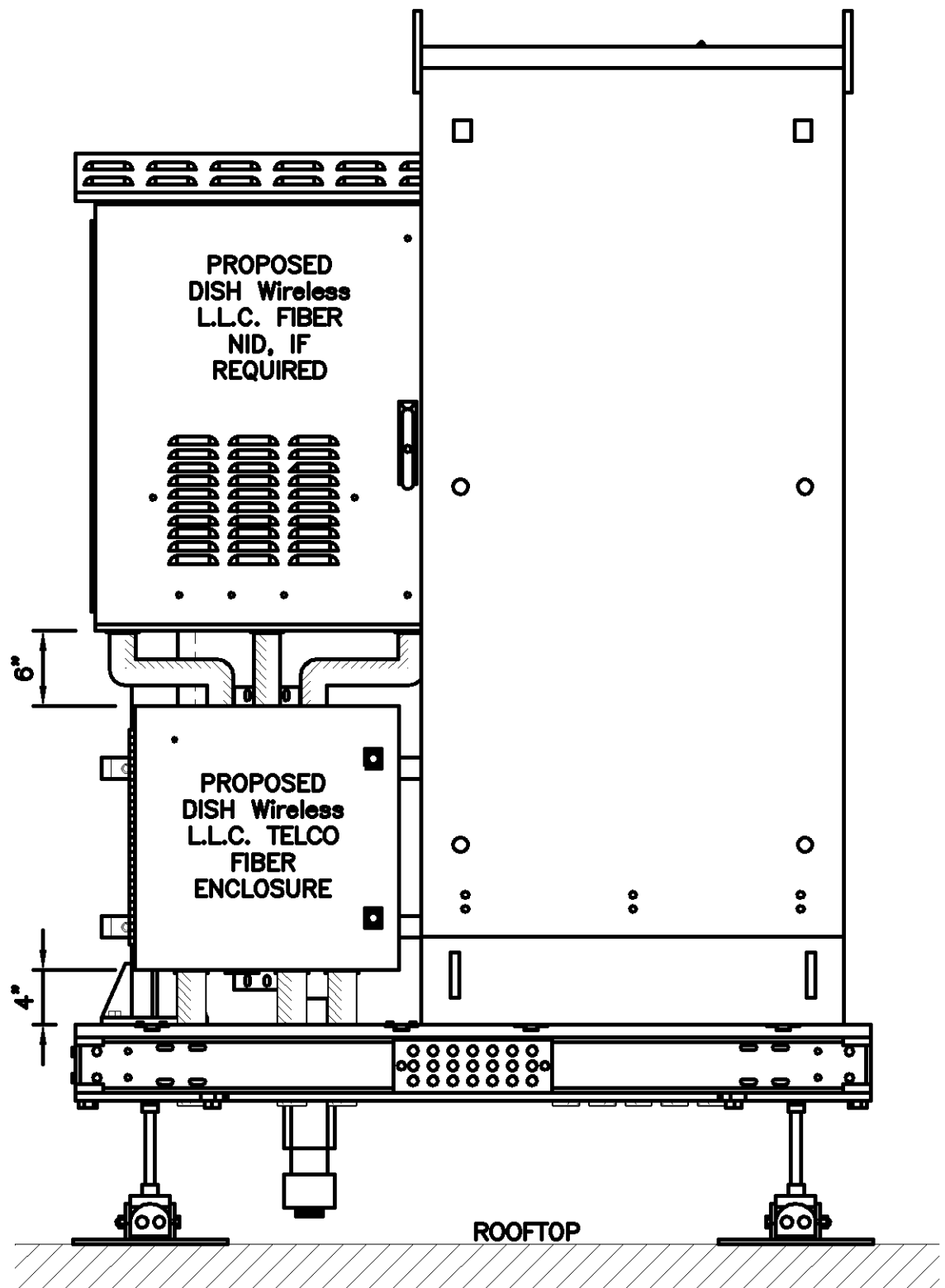
PL202300142

NOTES

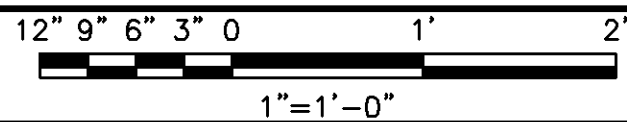
1. ELECTRIC SUPPLY SHALL BE DIRECT WITH LOCAL  
UTILITY COMPANY. IF UNAVAILABLE, METERING SHALL  
BE THROUGH A THIRD PARTY REMOTELY MONITORED  
METER.



FRONT ELEVATION



BACK ELEVATION



5

dish  
wireless.

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PHONE | 314-997-6111 FAX | 314-997-8066

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Signature: *Roger Allan Zimmer*

Date: 8-17-23 License #: 51980

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A&E PROJECT NUMBER

705953

DISH Wireless L.L.C.  
PROJECT INFORMATION

MNMP00388A  
4000 SOUTHWEST COURT  
BLOOMINGTON, MN 55425

SHEET TITLE  
EQUIPMENT PLATFORM AND  
H-FRAME DETAILS

SHEET NUMBER

A-6

CHARLES INDUSTRY HEX CUBE-PM639155N4

DIMENSIONS (HxWxD):	74"x32"x32"
POWER PLANT:	-48VDC ABB/600W
TOTAL WEIGHT (EMPTY)	408 LBS

PLAN

SIDE

BACK

SIDE

FRONT

CABINET DETAIL

NO SCALE

1

GE BREAKER PANEL TLM1220RCUP

PL202300142

ENCLOSURE DIM (HxWxD)	29"x13"x5"
TOTAL WEIGHT (EMPTY)	26 LBS
MAX VOLTAGE/MAX AMPS	240V/200A
ENCLOSURE RATING	OUTDOOR NEMA 3R

PLAN

FRONT

BACK

SIDE

BREAKER PANEL DETAIL

NO SCALE

2

SQUARE D SAFETY SWITCHES D224NRB

ENCLOSURE DIM (HxWxD)	29.25"x19.00"x8.50"
ENCLOSURE TYPE	NEMA 3R RAINPROOF
UL LISTED	FILE E-2875

SIDE

TOP

FRONT

SAFETY SWITCH DETAIL

NO SCALE

3

EATON METER SOCKET UNRRS213BEUSE

DIMENSIONS (HxWxD)	16"x12"x6"
TYPE	RING
AMPERAGE RATING	200 CONT. AMP
WEIGHT	18 lbs

TOP

BACK

SIDE

FRONT

METER BANK DETAIL

NO SCALE

4

ZAYO 5RU (LEFT SWING DOOR) FIBER NID ENCLOSURE

DIMENSIONS (HxWxD)	36.1"x29"x12.9"
WEIGHT	85 lbs

BOTTOM

BACK

SIDE

FRONT

FIBER NID ENCLOSURE DETAIL

NO SCALE

5

CHARLES CFIT-PF2020DSH1 FIBER TELCO ENCLOSURE

ENCLOSURE DIMS (HxWxD)	20"x20"x9"
ENCLOSURE WEIGHT	20 lbs
MOUNTING	WALL
COMPLIANCE	TYPE 4

SIDE

BACK

FRONT

FIBER TELCO ENCLOSURE DETAIL

NO SCALE

6

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

TOP

BACK

SIDE

GPS DETAIL

NO SCALE

7

MINIMUM OF 75° OR 270° IN ANY DIRECTION

GPS

GPS UNIT

OBSTRUCTIONS MUST BE BELOW 10'

GPS MINIMUM SKY VIEW REQUIREMENTS

NO SCALE

8

CU12PSM6P4XXX (4 AWG CONDUCTORS)

1.75"ø

27" MIN BEND RADIUS

CU12PSM9P6XXX (6 AWG CONDUCTORS)

1.60"ø

24" MIN BEND RADIUS

CU12PSM9P8XXX (8 AWG CONDUCTORS)

1.41"ø

22" MIN BEND RADIUS

CABLES UNLIMITED HYBRID CABLE MINIMUM BEND RADIUS

NO SCALE

9

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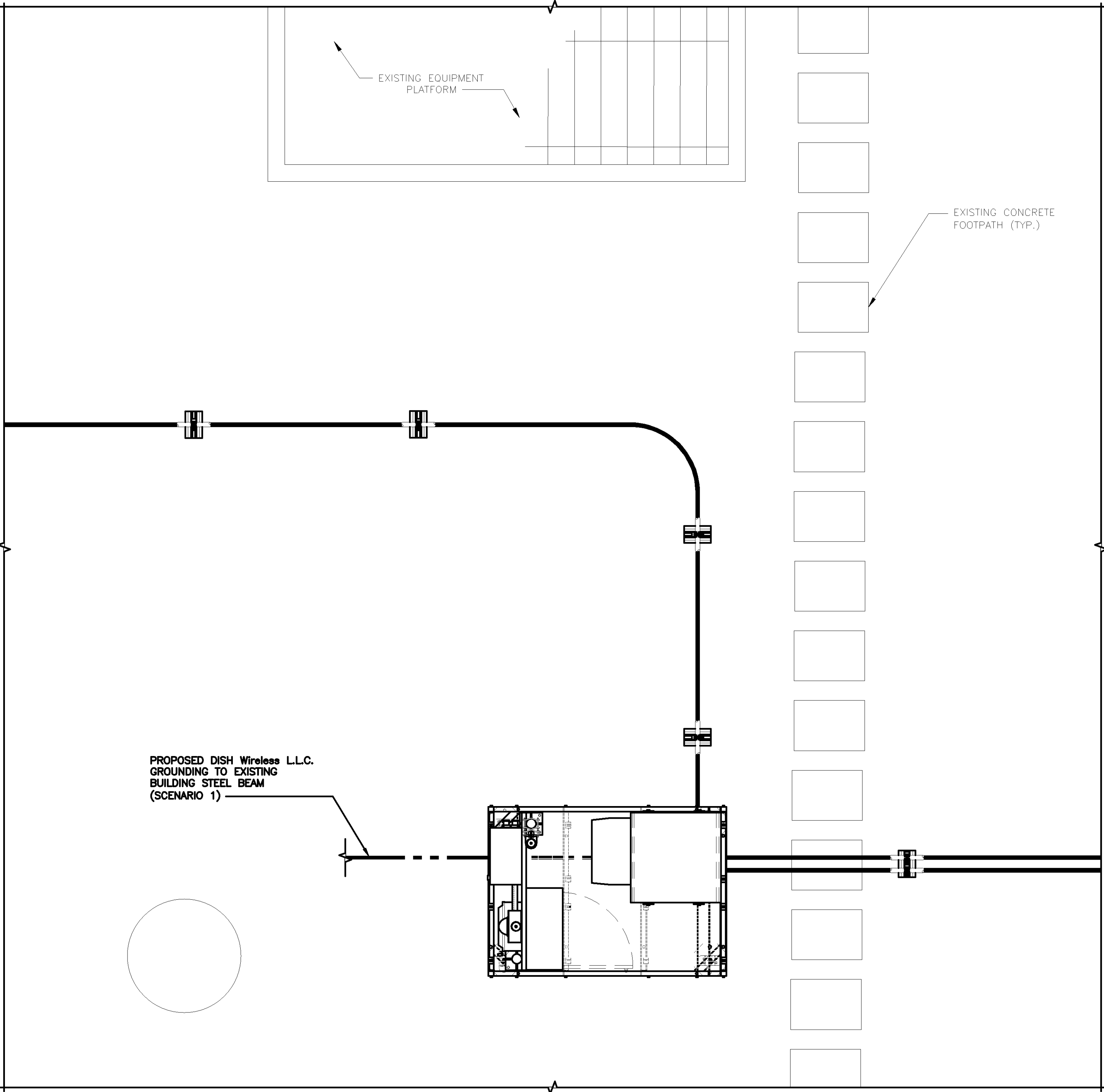
SHEET TITLE  
EQUIPMENT DETAILS

SHEET NUMBER  
A-7

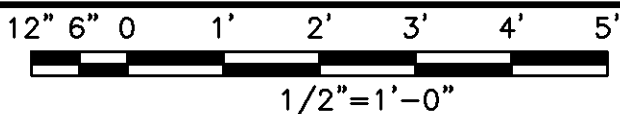




PL202300142



GROUNDING PLAN



1

GROUNDING KEY NOTES

NO SCALE

2

- EXOTHERMIC CONNECTION
- MECHANICAL CONNECTION
- GROUND BUS BAR
- GROUND ROD
- TEST GROUND ROD WITH INSPECTION SLEEVE
- #6 AWG STRANDED & INSULATED
- - - - - #2 AWG SOLID COPPER TINNED
- ▲ BUSS BAR INSULATOR

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.
- NO EXOTHERMIC WELDING ON ROOFTOP

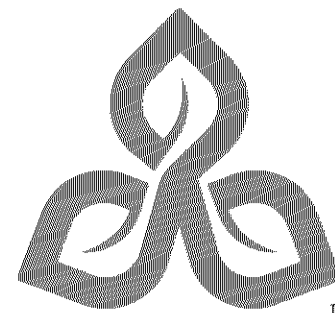
GROUNDING ROOFTOP KEY NOTES

- (A) **EXTERIOR GROUND RING:** #2 AWG SOLID COPPER, BURIED AT A DEPTH OF AT LEAST 30 INCHES BELOW GRADE, OR 8 INCHES BELOW THE FROST LINE AND APPROXIMATELY 24 INCHES FROM THE EXTERIOR WALL OR FOOTING.
- (B) **ROOFTOP GROUND SYSTEM:** THE 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 OR ROOM.
- (E) **GROUND ROD:** UL LISTED COPPER CLAD STEEL. MINIMUM 1/2" DIAMETER BY EIGHT FEET LONG. GROUND RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES. GROUND RODS SHALL BE DRIVEN TO THE DEPTH OF GROUND RING CONDUCTOR.
- (F) **CELL REFERENCE GROUND BAR (CRGB):** 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 COMMON BUILDING GROUND SYSTEM WITH (2) #2 SOLID TINNED COPPER CONDUCTORS.
- (G) **HATCH PLATE GROUND BAR:** BOND TO THE COMMON BUILDING GROUND SYSTEM 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 ROOM. BOND TO GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTORS WITH MECHANICAL CONNECTIONS.
- (I) **TELCO GROUND BAR:** BOND TO BOTH CELL REFERENCE GROUND BAR OR EXTERIOR GROUND RING.
- (J) **FRAME BONDING:** THE BONDING POINT FOR TELECOM EQUIPMENT FRAMES SHALL BE THE GROUND BUS THAT IS NOT ISOLATED FROM THE EQUIPMENTS METAL FRAMEWORK.
- (K) **INTERIOR UNIT BONDS:** METAL FRAMES, CABINETS AND INDIVIDUAL METALLIC UNITS LOCATED WITH THE AREA OF THE INTERIOR GROUND RING REQUIRE A #6 AWG STRANDED GREEN INSULATED COPPER BOND TO THE INTERIOR GROUND RING.
- (L) **FENCE AND GATE GROUNDING:** METAL FENCES SHALL BE BONDED TO THE COMMON BUILDING GROUND SYSTEM WITH A #2 AWG SOLID TINNED COPPER CONDUCTOR AT AN INTERVAL NOT EXCEEDING 25 FEET. BONDS SHALL BE MADE AT EACH GATE POST AND ACROSS GATE OPENINGS.
- (M) **EXTERIOR UNIT BONDS:** METALLIC OBJECTS, EXTERNAL TO OR MOUNTED TO THE BUILDING, SHALL BE BONDED TO THE COMMON BUILDING GROUND SYSTEM. USING #2 TINNED SOLID COPPER WIRE
- (N) **ICE BRIDGE SUPPORTS:** EACH ICE BRIDGE LEG SHALL BE BONDED TO THE GROUND RING WITH #2 AWG BARE TINNED COPPER CONDUCTOR. PROVIDE EXOTHERMIC WELDS AT BOTH THE ICE BRIDGE LEG AND BURIED GROUND RING.
- (O) **DURING ALL DC POWER SYSTEM CHANGES** INCLUDING DC SYSTEM CHANGE OUTS, RECTIFIER REPLACEMENTS OR ADDITIONS, BREAKER DISTRIBUTION CHANGES, BATTERY ADDITIONS, BATTERY REPLACEMENTS AND INSTALLATIONS OR CHANGES TO DC CONVERTER SYSTEMS IT SHALL BE REQUIRED THAT SERVICE CONTRACTORS VERIFY ALL DC POWER SYSTEMS ARE EQUIPPED WITH A MASTER DC SYSTEM RETURN GROUND CONDUCTOR FROM THE DC POWER SYSTEM COMMON RETURN BUS DIRECTLY CONNECTED TO THE CELL SITE REFERENCE GROUND BAR
- (P) **ROOFTOP COLLECTOR BUSS BAR** IS TO BE MECHANICALLY BONDED TO COMMON BUILDING GROUND SYSTEM.

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



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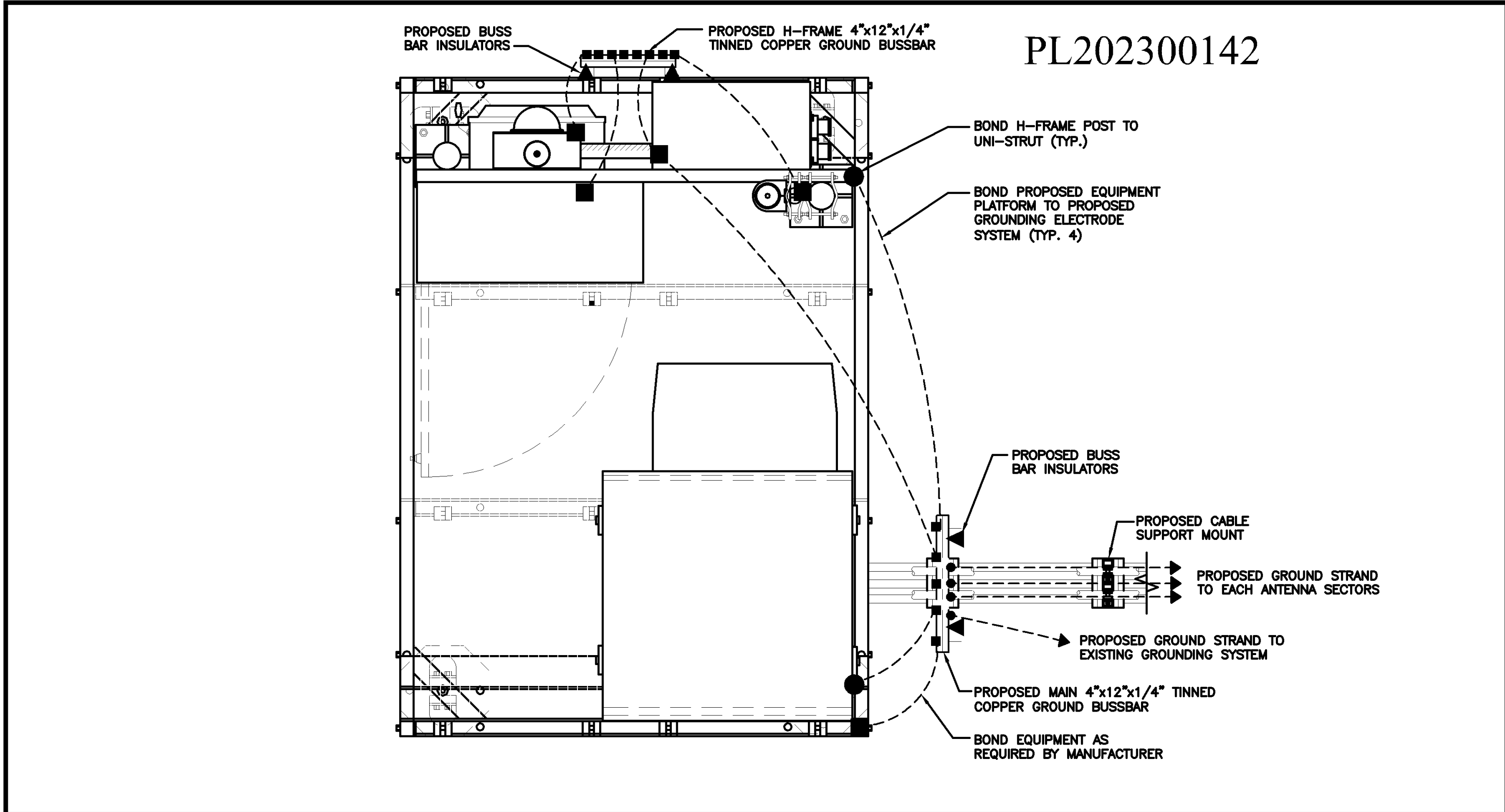
DISH Wireless L.L.C.  
PROJECT INFORMATION

MNMSP00388A  
4000 SOUTHWEST COURT  
BLOOMINGTON, MN 55425

SHEET TITLE  
GROUNDING PLANS  
AND NOTES

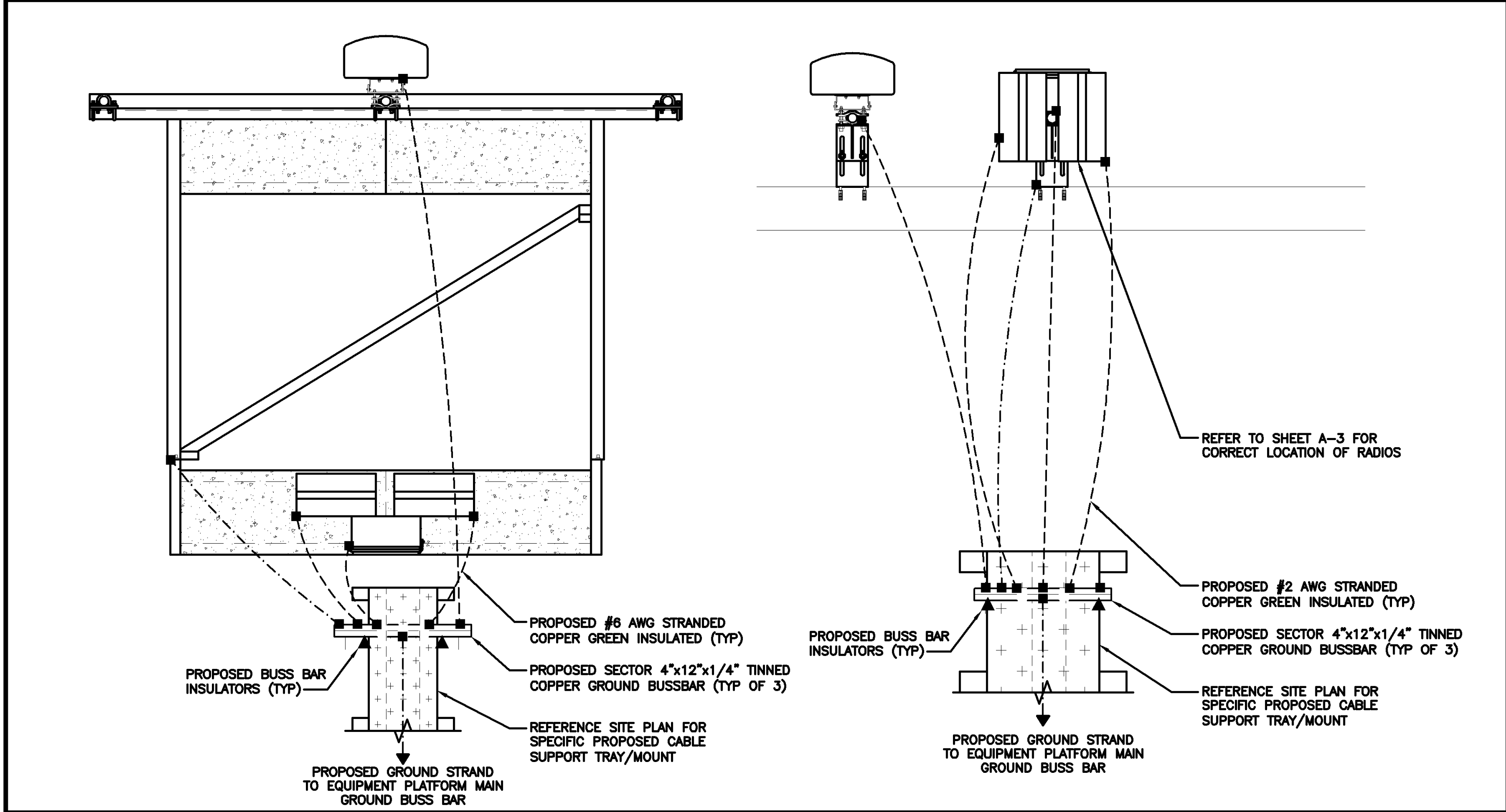
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G-1



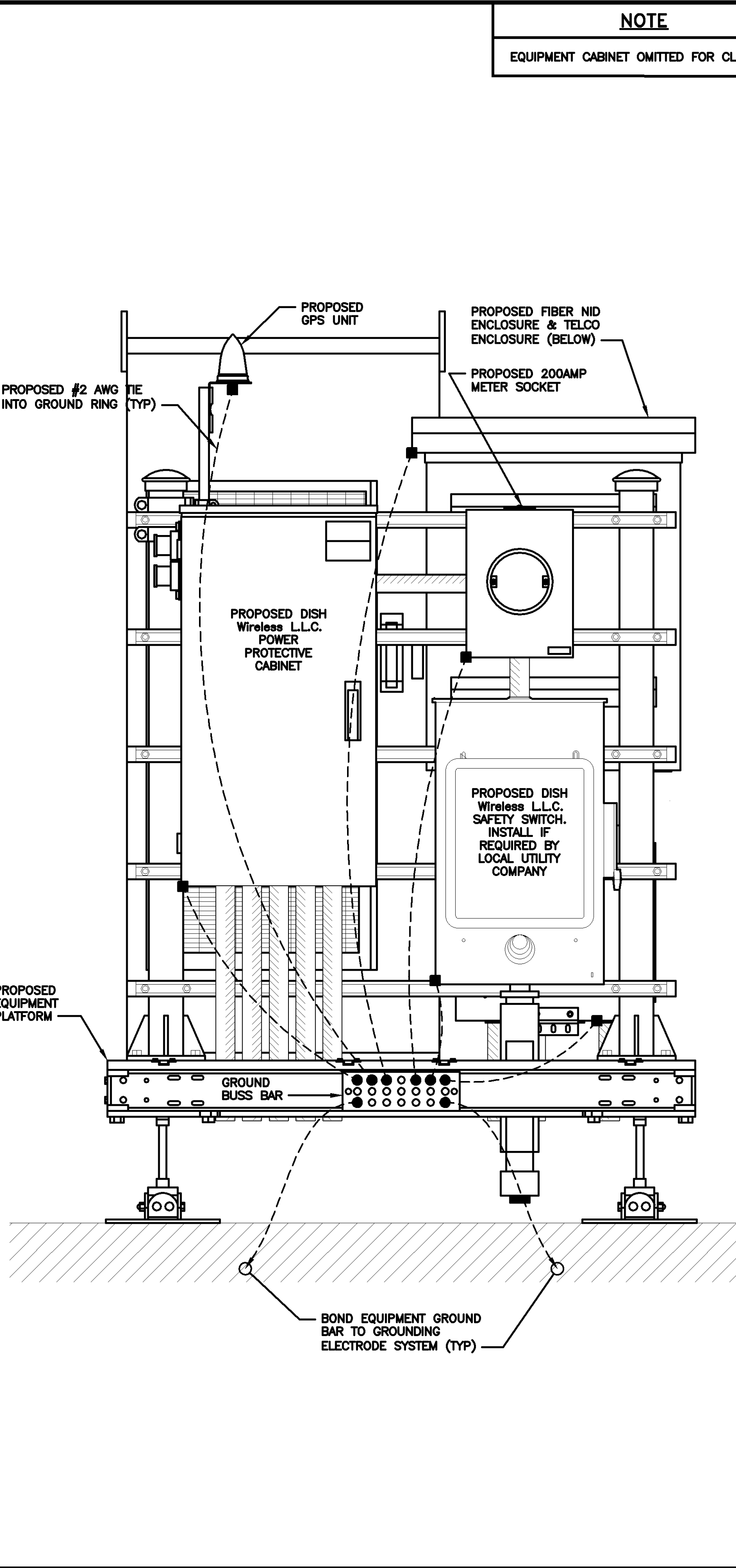
TYPICAL ROOFTOP EQUIPMENT GROUNDING PLAN

NO SCALE 1



TYPICAL ROOFTOP ANTENNA GROUNDING PLAN

NO SCALE 2



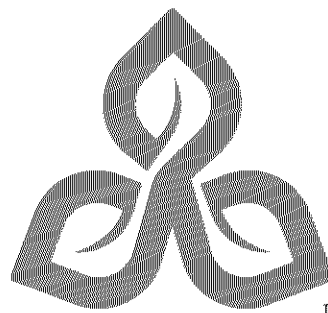
H-FRAME GROUNDING DETAIL

NO SCALE 3

NOTE  
EQUIPMENT CABINET OMITTED FOR CLARITY



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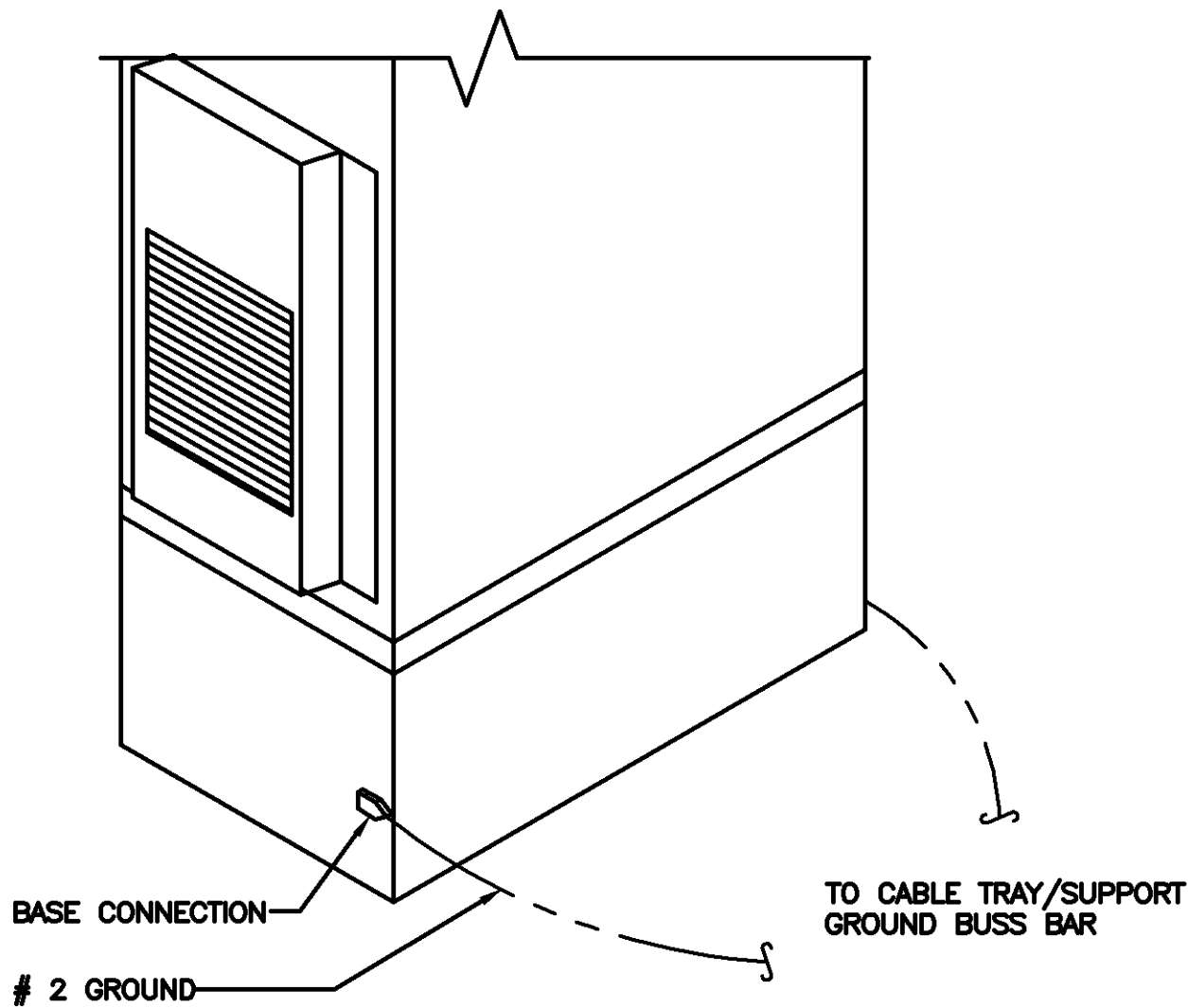
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GROUNDING DETAILS

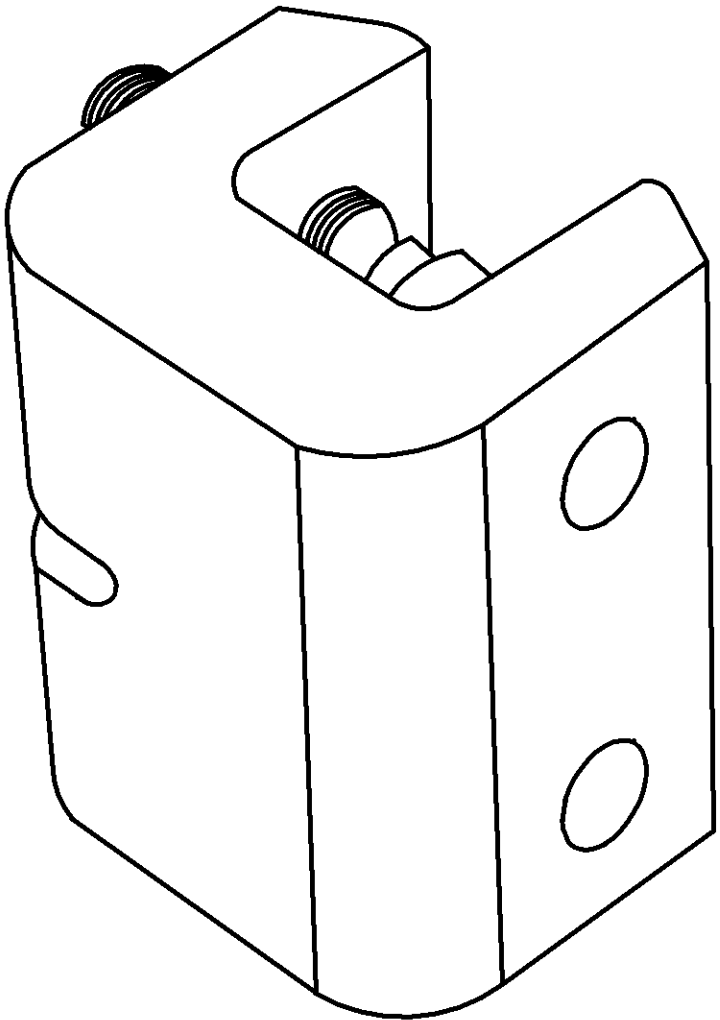
SHEET NUMBER

G-2

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



PANDUIT GUBC500-6 UNIVERSAL BEAM GROUNDING, CLAMP	
COPPER CONDUCTOR SIZE RANGE AWG	#6-500
FLANGE THICKNESS INCHES	0.250-0.675
STUD SIZE INCHES	1/2"
THREAD SIZE	1/2"-13
DIMENSIONS (LxWxH)	3.15"x 2.13"x 2.50"
NOTE: 1. UNIVERSAL, FITS ON A WIDE RANGE OF STANDARD (ANGLED) AND WIDE FLANGE (PARALLEL) STRUCTURAL STEEL BEAMS. 2. UL 467 LISTED FOR GROUNDING AND BONDING ONLY	



TYPICAL GROUNDING NOTES

NO SCALE

1

OUTDOOR CABINET GROUNDING

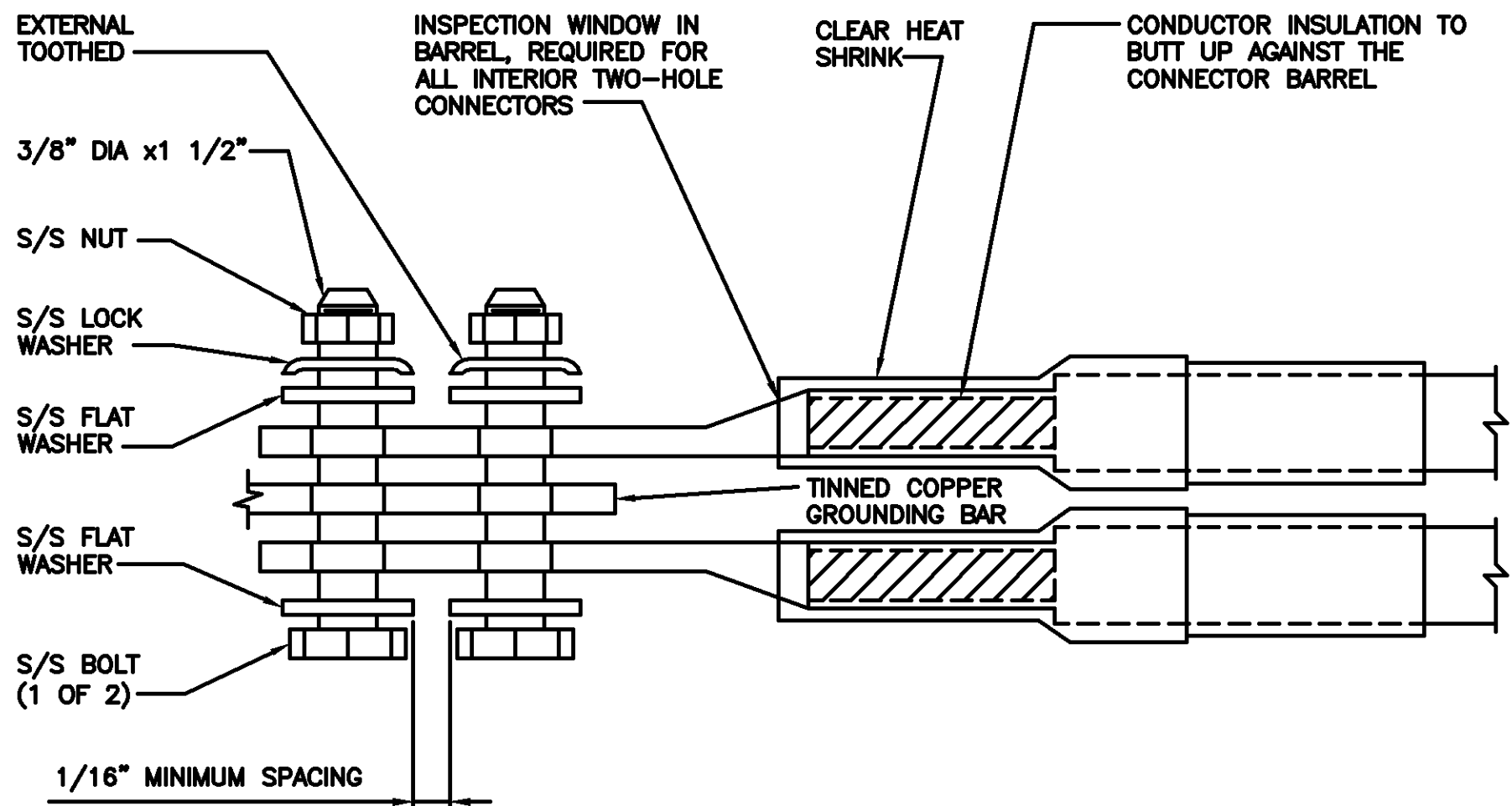
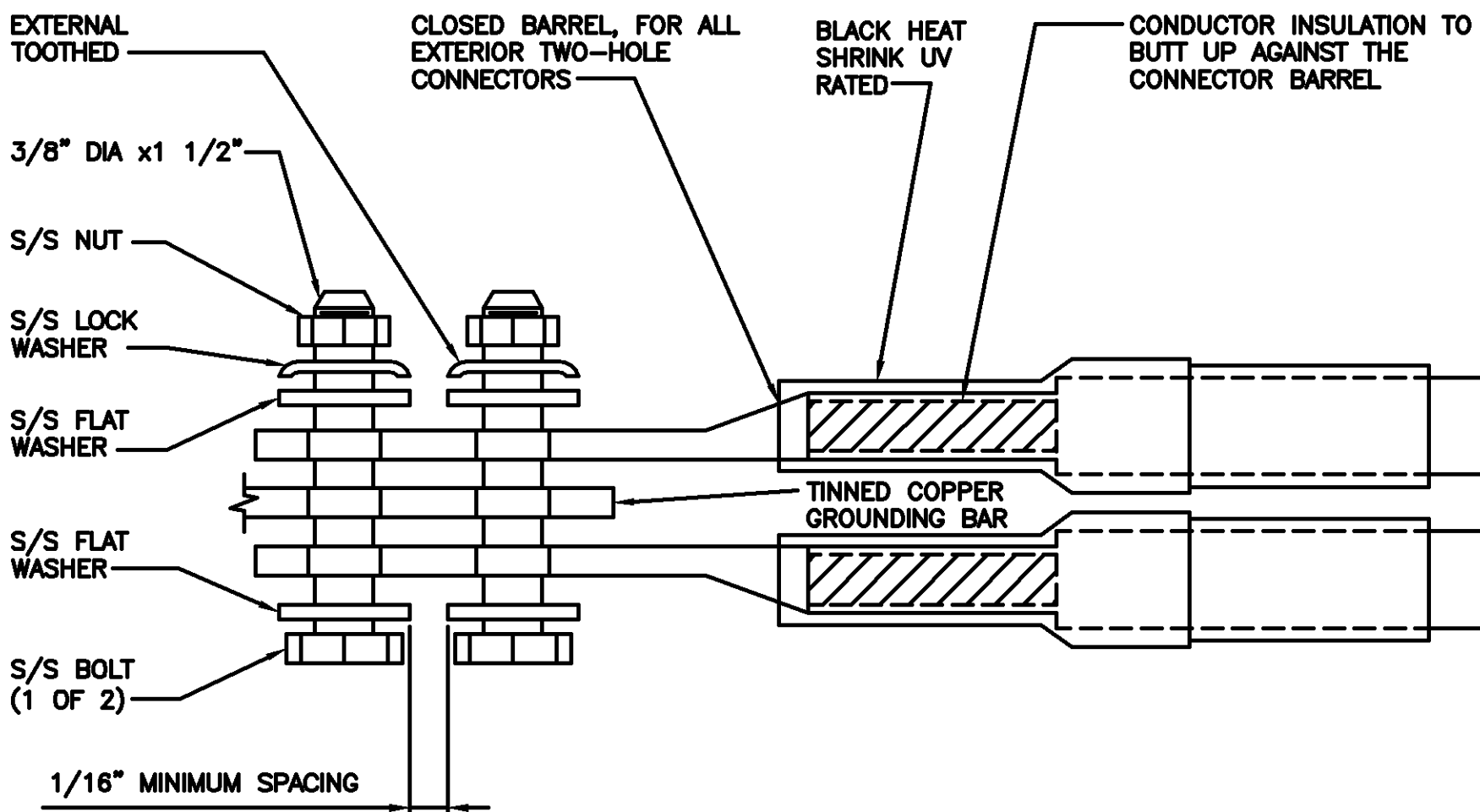
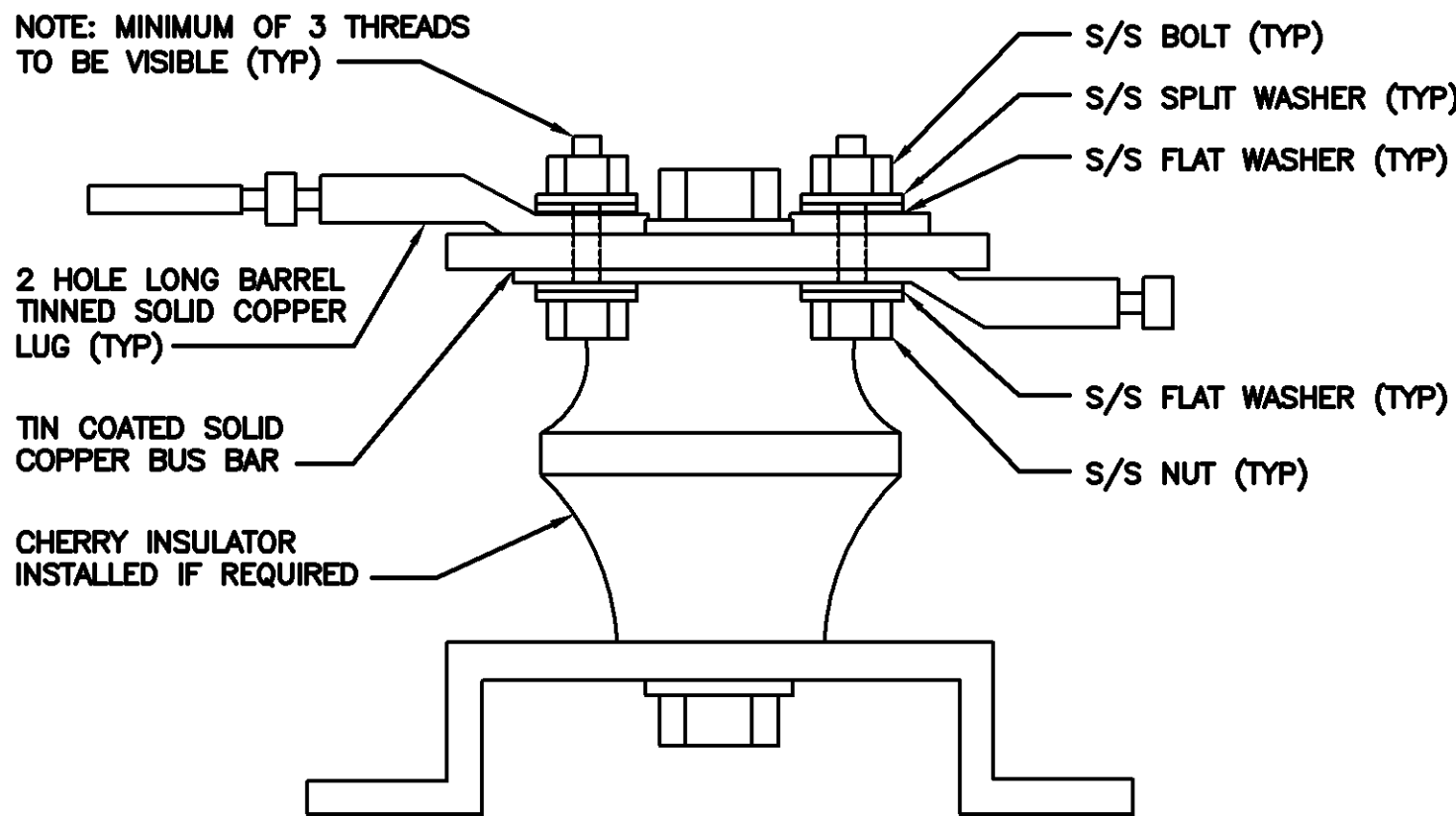
NO SCALE

2

BUILDING STEEL GROUNDING DETAIL

NO SCALE

3



LUG DETAIL

NO SCALE

4

TYPICAL EXTERIOR TWO HOLE LUG

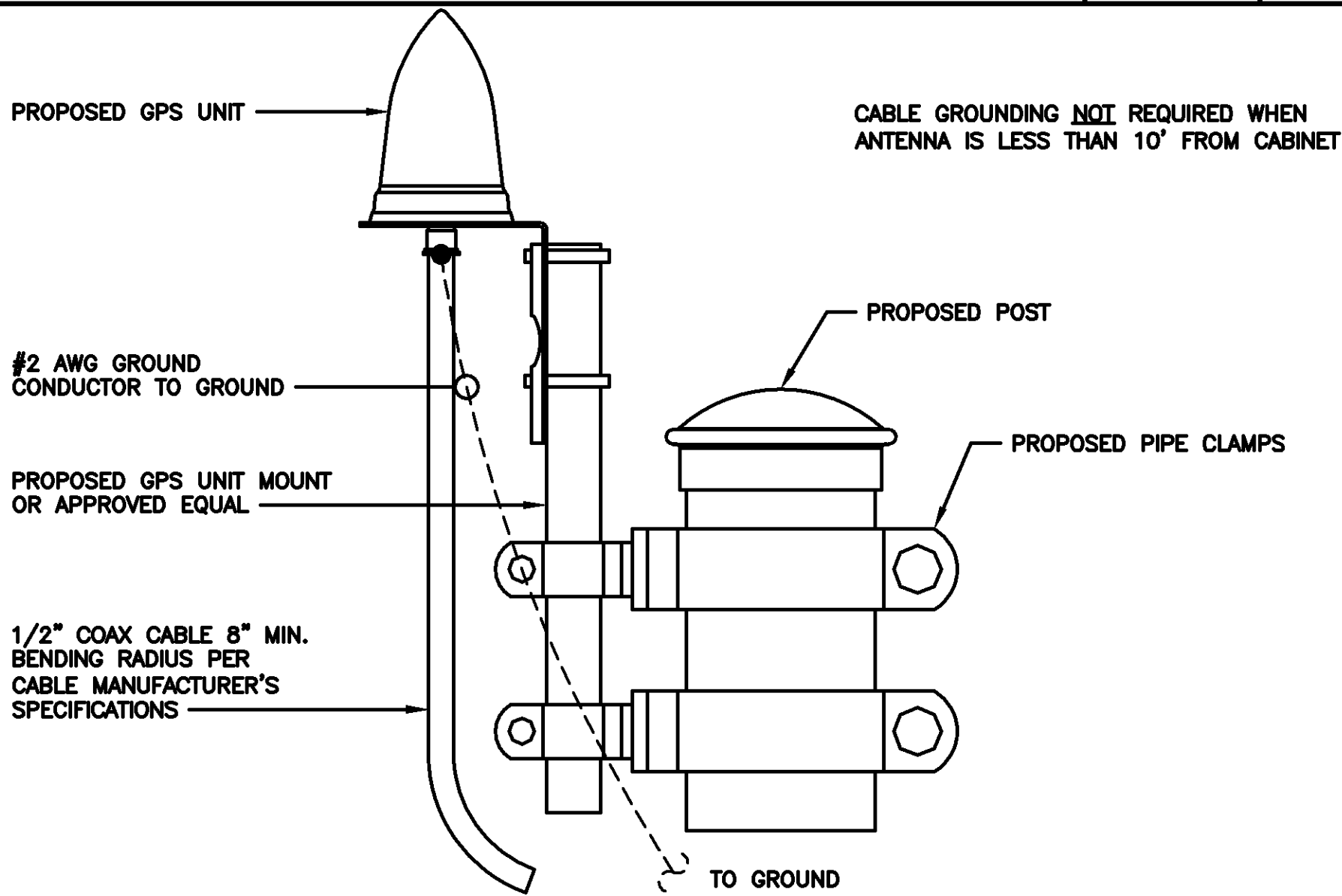
NO SCALE

5

TYPICAL INTERIOR TWO HOLE LUG

NO SCALE

6



TYPICAL GPS UNIT GROUNDING

NO SCALE

7

NOT USED

NO SCALE

8

NOT USED

NO SCALE

9

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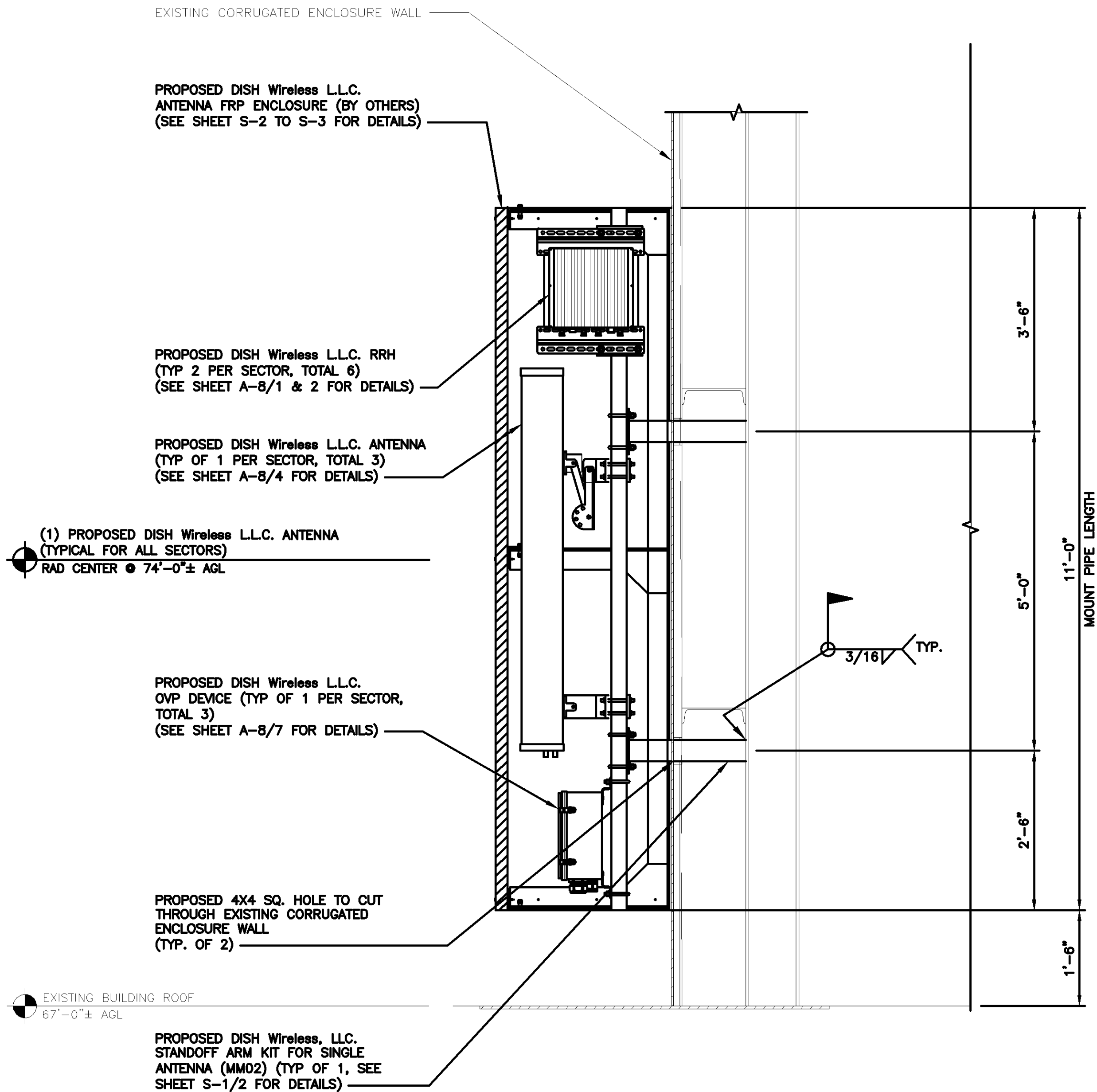
SHEET TITLE  
GROUNDING DETAILS

SHEET NUMBER

G-3



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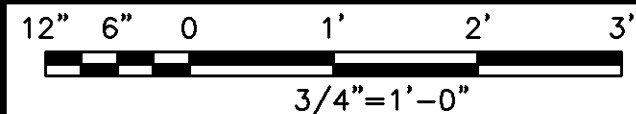
NOTES

- ADJACENT SURFACES MUST BE PROTECTED FROM THE EFFECTS OF THE INSTALLATION AND MODIFICATIONS INCLUDING ANY DRILLING AND METAL SHAVINGS PRODUCED, NOT LIMITED TO THE USE OF WELD BLANKETS. ALL METAL SHAVINGS AND DEBRIS ARE TO BE CLEANED UP AND PROPERLY DISPOSED OF.
- PAINTING AND REPAIRS DUE TO THE INSTALLATION OF STANDOFF MOUNT WILL NEED TO BE DONE PER SE COATING SYSTEMS FOR TELECOMMUNICATIONS EQUIPMENT (VERIFY COLOR).
- DISH WIRELESS L.L.C. MUST NOT ALTER ANY CABLING OR MOUNTS FOR THE EXISTING OMNI, MICROWAVE OR WIRELESS ANTENNAS DURING THE INSTALLATION OF THE PROPOSED EQUIPMENT AND ANTENNA MOUNTS.
- FOR COLD WEATHER PAINT REPAIRS AS DEFINED BY AWS 5.12.2, TOUCH UP WITH COLD GALVANIZE PAINT. PERMANENT REPAIRS MUST BE COMPLETED WHEN WARMER WEATHER PERMITS AND BE DONE PER SEH COATING SPECIFICATIONS.

STEEL NOTES:

- CONTRACTOR SHALL TOUCH UP ALL DAMAGED GALVANIZED COATING WITH ZINC-RICH PAINT PER DISH WIRELESS L.L.C. PROJECT SPECIFICATIONS.
- ALL WELDS TO HAVE ELECTRODE STRENGTH OF 70 KSI AND WELD THICKNESS OF 0.25" UNLESS OTHERWISE NOTED.
- ALL WELDS TO BE DONE BY CERTIFIED WELDERS.

STANDOFF ANTENNA MOUNT PLAN AND ELEVATION

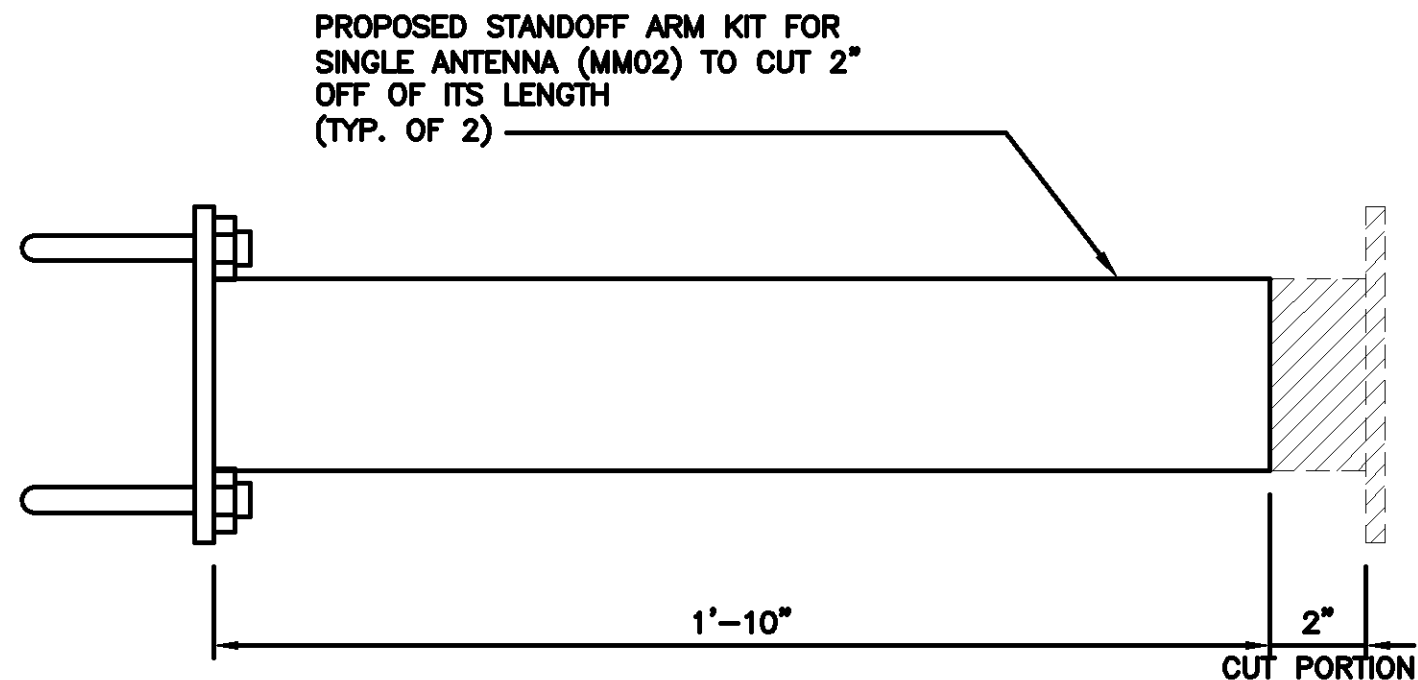
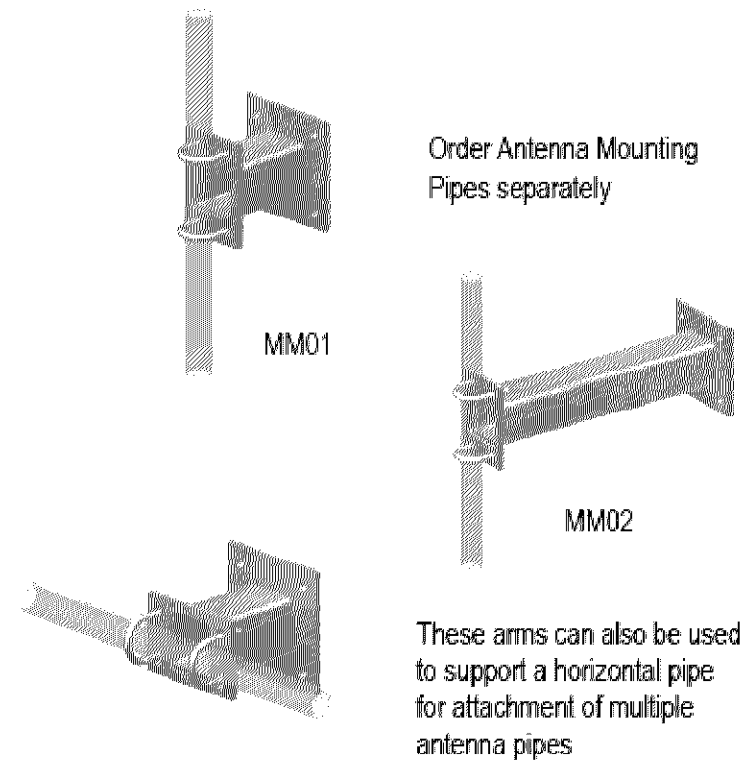


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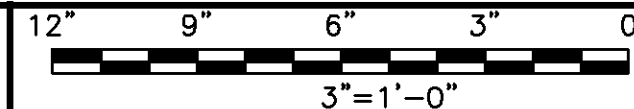
Standoff Arm Kits for Single Antenna

- Versatile 8", 2', or 3' Standoff Arms
- Accept 2-3/8", 2-7/8", or 3-1/2" Pipes vertically or horizontally
- Fit our standard or lightweight Ring Mounts
- Include attachment hardware
- Mounting plate is 1/2" thick by 8-1/2" square with four 11/16" holes on 6" centers
- Standoff is 4" x 3/16" square tube

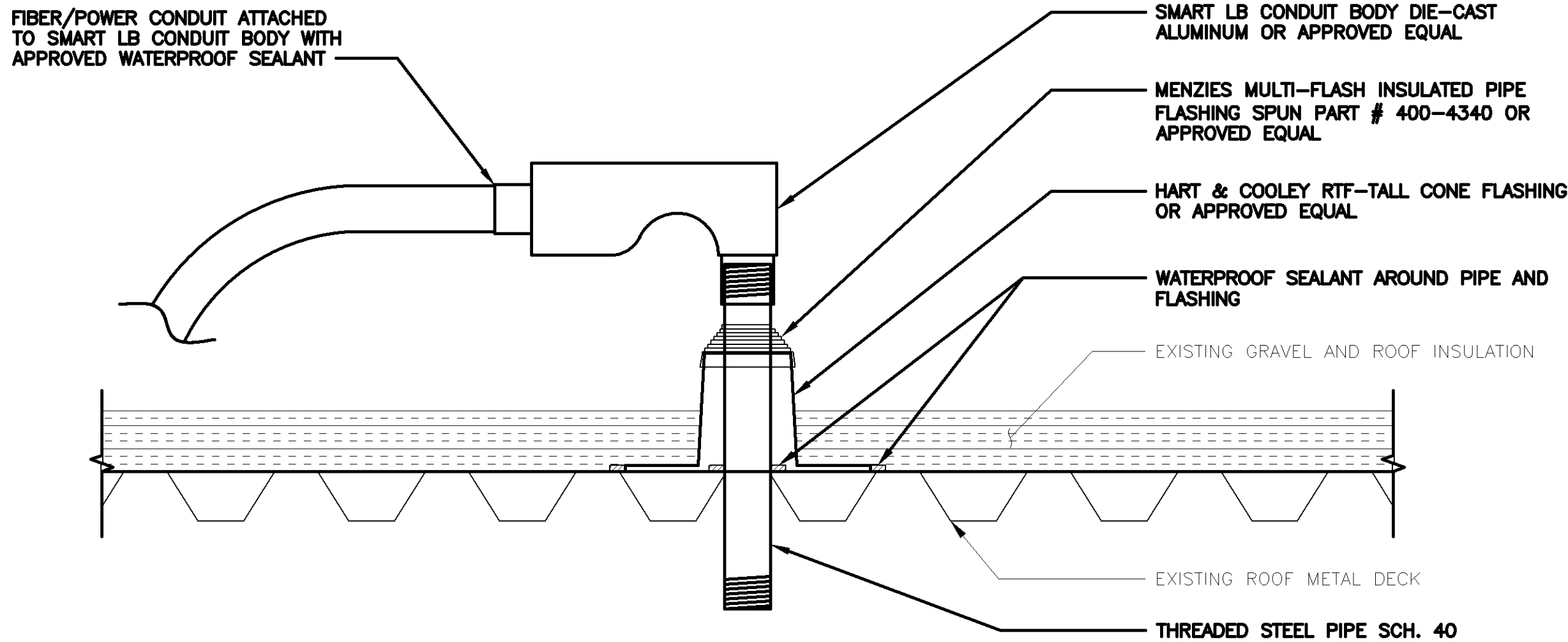
Part #	Description	Weight	Price
MM01	8" Support Arm	37 lb	\$209.00
MM02	24" Support Arm	51 lb	\$253.00
MM03	36" Support Arm	62 lb	\$280.00



STANDOFF ARM KIT FOR SINGLE ANTENNA (MM02) DETAIL



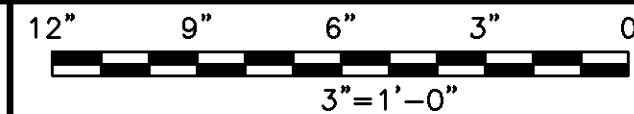
2



NOTES

- ADJACENT SURFACES MUST BE PROTECTED FROM THE EFFECTS OF THE INSTALLATION AND MODIFICATIONS INCLUDING ANY DRILLING AND METAL SHAVINGS PRODUCED, NOT LIMITED TO THE USE OF WELD BLANKETS. ALL METAL SHAVINGS AND DEBRIS ARE TO BE CLEANED UP AND PROPERLY DISPOSED OF.
- PAINTING AND REPAIRS DUE TO THE PROPOSED PENETRATION WILL NEED TO BE DONE PER SEH COATING SYSTEMS FOR TELECOMMUNICATIONS EQUIPMENT (VERIFY COLOR).
- DISH WIRELESS L.L.C. MUST NOT ALTER ANY EXISTING BUILDING CABLES.
- FOR COLD WEATHER PAINT REPAIRS AS DEFINED BY AWS 5.12.2, TOUCH UP WITH COLD GALVANIZE PAINT. PERMANENT REPAIRS MUST BE COMPLETED WHEN WARMER WEATHER PERMITS AND BE DONE PER CLIENT COATING SPECIFICATIONS.
- CONCEALING OF PENETRATION MUST UTILIZE BUILDING MATERIALS, COLORS AND TEXTURES THAT ARE COMPATIBLE WITH THE EXISTING PRINCIPAL STRUCTURE AND THAT EFFECTIVELY BLEND THE TOWER FACILITIES INTO THE SURROUNDING SETTING AND ENVIRONMENT TO THE GREATEST EXTENT POSSIBLE.
- ALL SIZES AND DIMENSIONS OF PROPOSED PRODUCTS AND STEEL PIPE SHALL BE VERIFIED IN FIELD.
- THE ANNULAR SPACE BETWEEN THE METAL DECK OPENING/PENETRATION AND THE PIPE SHALL BE MINIMUM 0" (POINT CONTACT) TO MAXIMUM 1-3/8". APPROVED WATERPROOF SEALANT SHALL BE APPLIED AROUND THE METAL DECK OPENING AND AROUND THE CONE FLASHING OR APPROVED EQUAL.

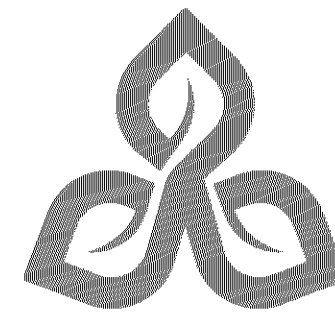
ROOF PENETRATION DETAIL FOR POWER/FIBER CONDUIT



3

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TRILEAF  
architecture | engineering

1515 DES PERES ROAD, STE 200  
SAINT LOUIS, MISSOURI 63131  
PHONE | 314-997-6111 FAX | 314-997-8066

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota

Print Name: ROGER ALLAN ZIMMER

Signature: *Roger Allan Zimmer*

Date: 8-17-23 License #: 51980

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DRAWN BY: CHECKED BY: APPROVED BY:

CO RZ RZ

RFDS REV #: 5 03/17/2022

CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
A	11/03/2022	ISSUED FOR REVIEW
B	12/01/2022	ISSUED FOR REVIEW
C	03/21/2023	ISSUED FOR REVIEW
D	04/11/2023	ISSUED FOR CONSTRUCTION
1	06/26/2023	ISSUED FOR CONSTRUCTION
2	08/17/2023	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER

705953

DISH Wireless L.L.C.  
PROJECT INFORMATION

MNMSP00388A  
4000 SOUTHWEST COURT  
BLOOMINGTON, MN 55425

SHEET TITLE  
STANDOFF ANTENNA MOUNT  
& ROOF PENETRATION DETAIL

SHEET NUMBER

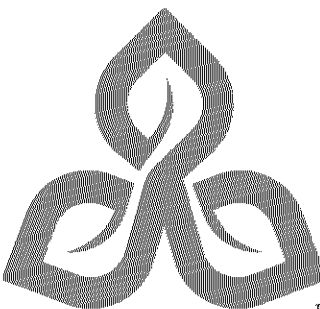
S-1

NOTES

1. ANTENNA AND SUPPORT STRUCTURE SHALL BE CONCEALED FROM VIEW USING SHROUD.
2. TELECOM ANTENNA SHROUD SHALL BE MADE OF FIBER REINFORCED PLASTIC (FRP). CONCEALMENT SHALL BE PAINTED TO MATCH BUILDING COLOR.

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DISH Wireless L.L.C.  
PROJECT INFORMATION

MNMSP00388A  
4000 SOUTHWEST COURT  
BLOOMINGTON, MN 55425

SHEET TITLE  
ASSEMBLY - LAYOUT

SHEET NUMBER

**S-2**

**DIMENSION CRITICAL  
DESIGN**

THE DIMENSIONS OF EXISTING CONDITIONS  
REFERENCED IN THESE DRAWINGS ARE CRITICAL  
TO THE SUCCESS OF THE PROJECT.  
PLEASE VERIFY THAT THE DIMENSIONS  
LISTED ARE ACCURATE BEFORE APPROVING.

I hereby certify that this plan, specification,  
or report was prepared by me or under my  
direct supervision and that I am a duly  
Licensed Professional Engineer under the  
laws of the State of Minnesota.

Print Name: **BRADLEY R. NEWMAN**

Signature: \_\_\_\_\_

Date: 09/21/2023 License # 50753

DRAWN	DSP	<b>Raycap</b> 7555-A PALMETTO COMMERCE PARKWAY NORTH CHARLESTON, SC 29420 USA
DESIGNED	ARS	
REVISED	NB+C	
DRAWING NOT TO SCALE. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.		TRILEAF CORPORATION MNMSP00388A 4000 SW COURT BLOOMINGTON, MN 55425
TOLERANCES: DECIMAL: FRACTIONAL: .X ± 0.1 XX ± 1/16 .XX ± 0.03 .XXX ± 0.01 ANGLES ± 5°		
ALL BENDING TOLERANCES: ± 1.0°		ASSEMBLY - LAYOUT
THIRD ANGLE PROJECTION		
RAYCAP #DW23-00846H-35R0		SHEET # <b>S1</b>
DATE: 06-21-2023		REVISION <b>C</b>
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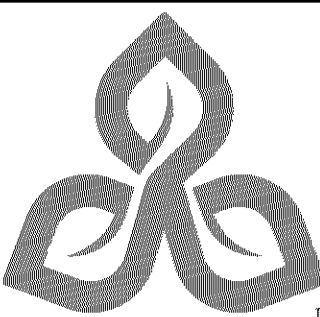


NOTES

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2. TELECOM ANTENNA SHROUD SHALL BE MADE OF FIBER REINFORCED PLASTIC (FRP). CONCEALMENT SHALL BE PAINTED TO MATCH BUILDING COLOR.

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DRAWN BY: CHECKED BY: APPROVED BY:

CO RZ RZ

RFDS REV #: 5 03/17/2022

**CONSTRUCTION  
DOCUMENTS**

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A&E PROJECT NUMBER

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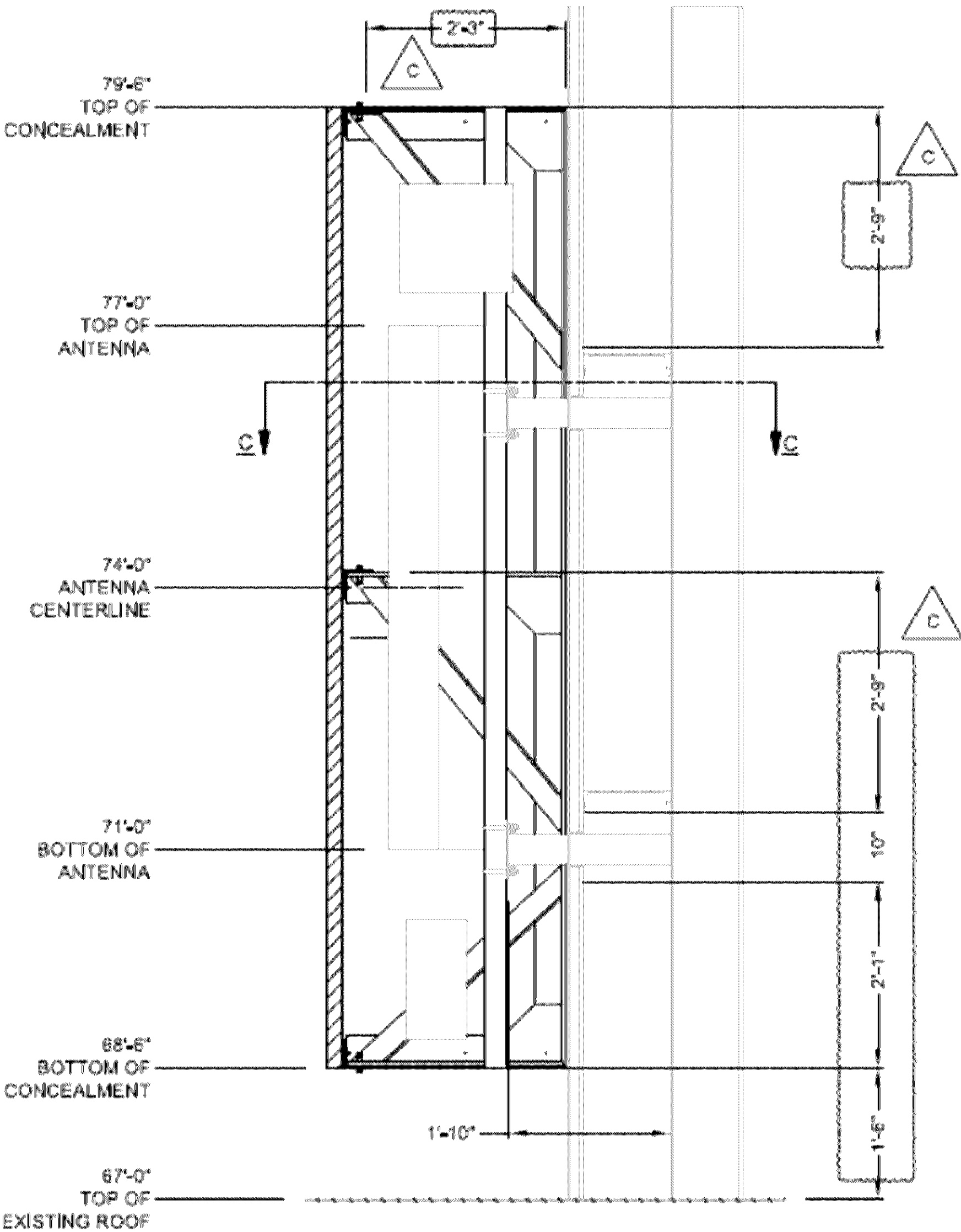
DISH Wireless L.L.C.  
PROJECT INFORMATION

MNMSP00388A  
4000 SOUTHWEST COURT  
BLOOMINGTON, MN 55425

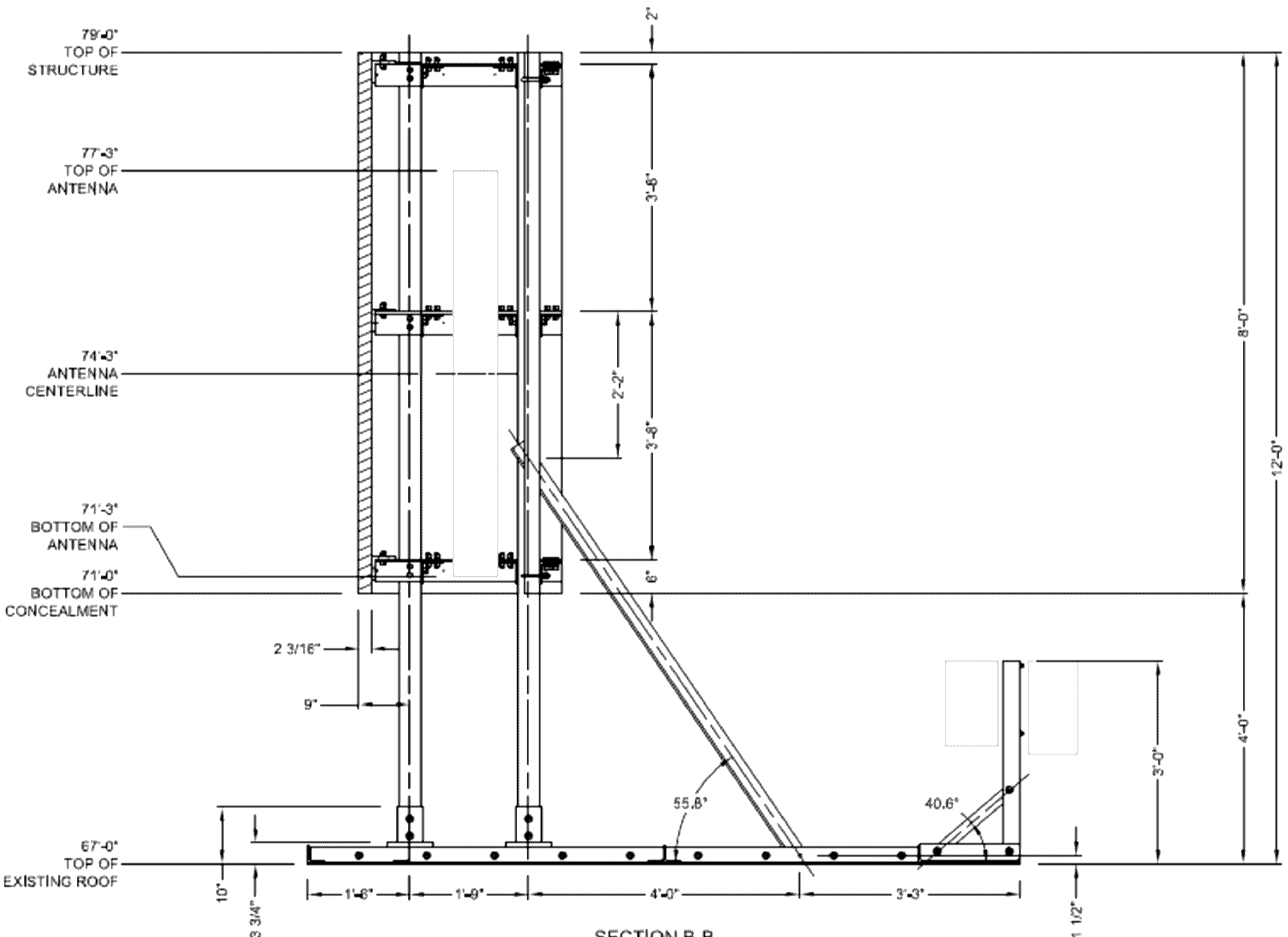
SHEET TITLE  
ASSEMBLY - ELEVATIONS

SHEET NUMBER

**S-3**



SECTION A-A



SECTION B-B

NOTES:

1. THE INTEGRITY OF THE EXISTING STRUCTURE MUST BE VERIFIED BY OTHERS.
2. DIMENSIONS OF THE EXISTING STRUCTURE ARE BASED UPON DRAWINGS BY TRILEAF CORPORATION DATED 04-11-2023 AND HAVE NOT BEEN PHYSICALLY VERIFIED BY RAYCAP. VERIFICATION OF THESE DIMENSIONS IS THE RESPONSIBILITY OF THE CUSTOMER.
3. THE ATTACHMENT TO EXISTING (DESIGN AND FASTENERS) MUST BE PROVIDED BY OTHERS. RAYCAP WILL ONLY SUPPLY FASTENER SIZE AND QUANTITY REQUIRED, FOR ATTACHMENT TO EXISTING.
4. THE PANELS ARE TO BE PAINTED / TEXTURED ACCORDING TO THE CUSTOMER APPROVED SAMPLE(S).
5. THIS CONCEALMENT WAS DESIGNED TO ACCEPT THE FOLLOWING ANTENNA COMMSCOPE FFVY-85B-R2. IT IS THE CUSTOMERS RESPONSIBILITY TO ENSURE THE FIT OF THE ANTENNA AND COAX WITH THEIR SPECIFIC MOUNTING EQUIPMENT.
6. IT IS STRONGLY RECOMMENDED THAT THE CUSTOMER REVIEWS THE RF CONSIDERATIONS IN THIS DESIGN.
7. DUE TO THE USE OF NON-CONVENTIONAL MATERIALS FOR RF PERFORMANCE, THIS CONCEALMENT WAS NOT DESIGNED TO BE WATERPROOF. A WATERPROOF MEMBRANE OR CONNECTION METHOD MUST BE INSTALLED BELOW CONCEALMENT BY CONTRACTOR TO PREVENT WATER INTRUSION TO THE EXISTING STRUCTURE IS REQUIRED.

I hereby certify that this plan, specification,  
or report was prepared by me or under my  
direct supervision and that I am a duly  
Licensed Professional Engineer under the  
laws of the State of Minnesota.

Print Name: **BRADLEY R. NEWMAN**

Signature: \_\_\_\_\_

Date: 06-21-2023 License # 50753

**NB+C**  
TOTALLY COMMITTED

NB+C ENGINEERING SERVICES, LLC.  
5000 S. HANCOCK BLVD. SUITE 200  
MINNEAPOLIS, MN 55412  
(612) 338-0000

DRAWN	DSP
DESIGNED	ARS
REVISED	NB+C

**Raycap**

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NORTH CHARLESTON, SC 29420 USA

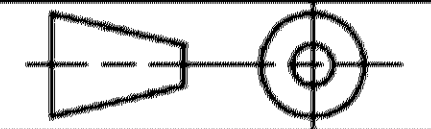
TRILEAF CORPORATION  
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TOLERANCES:  
DECIMAL: FRACTIONAL:  
.X ± 0.1 X/X ± 1/16  
.XX ± 0.03  
.XXX ± 0.01  
ANGLES ± .5°

ALL BENDING TOLERANCES:  
± 1.0°

THIRD ANGLE PROJECTION



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ASSEMBLY - ELEVATIONS

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SHEET #  
**S2**

REVISION  
**C**

DATE: 06-21-2023