



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

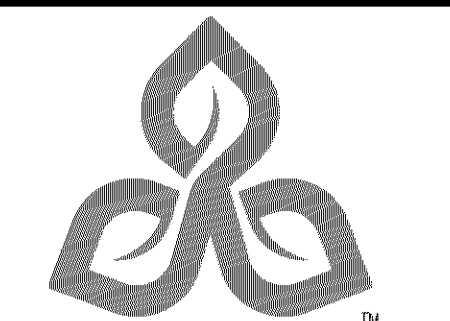
SITE ACQUISITION: SBA NETWORKS SERVICES LLC
(561) 579-8812

CONSTRUCTION MANAGER: MO MOHAMMED
(720) 456-1043

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



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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 #: 51990

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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
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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

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

SITE PHOTO

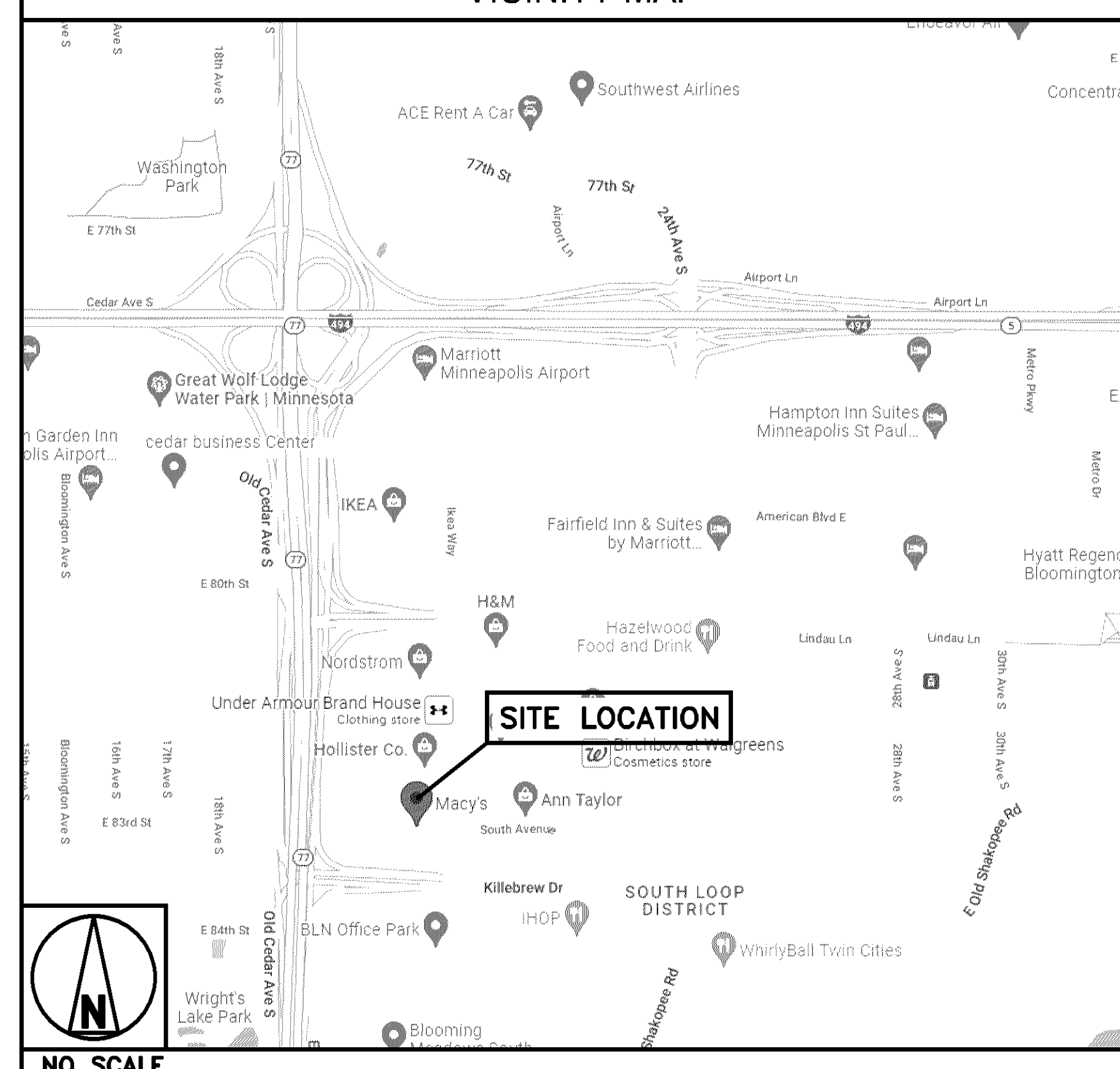


DIRECTIONS

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



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.

SHEET INDEX

SHEET NO.	SHEET TITLE
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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

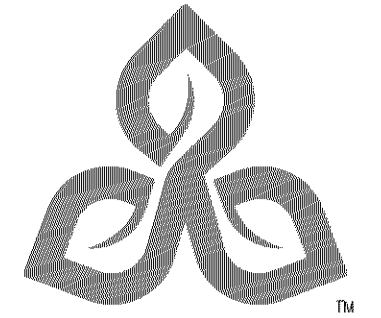
PL202300142

NOTES

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



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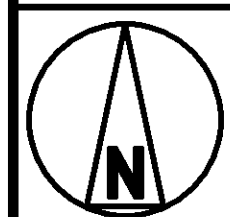
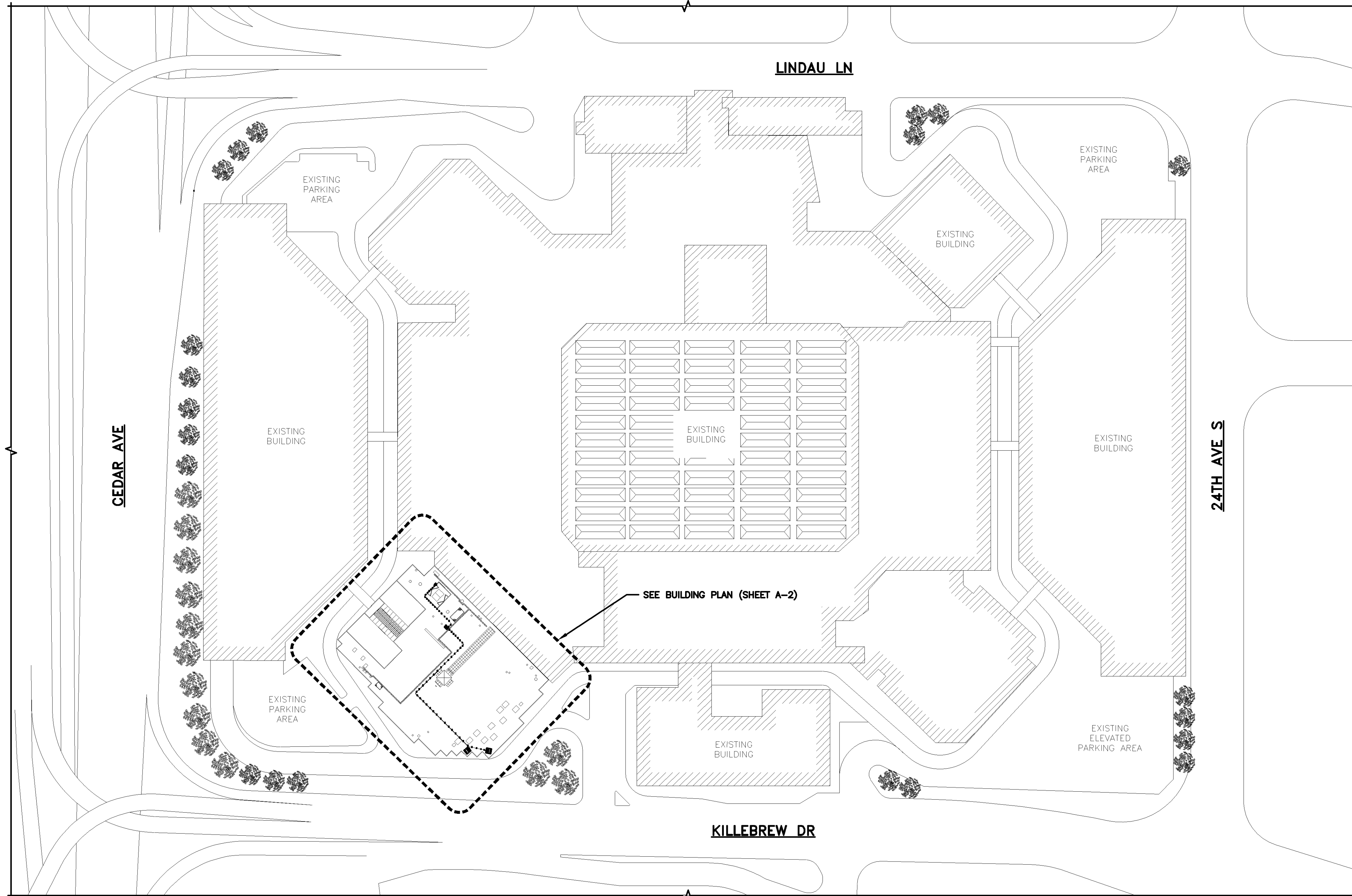
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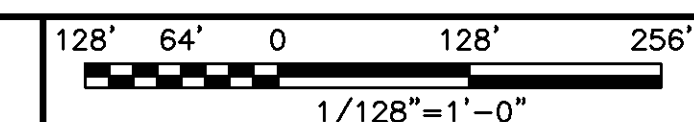
SHEET TITLE
OVERALL
SITE PLAN

SHEET NUMBER

A-1



OVERALL SITE PLAN



1

PL202300142

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3. CONTRACTOR TO VERIFY WITH DISH Wireless L.L.C. C.M. THE LOCATION OF THE POWER AND FIBER SOURCE PRIOR TO CONSTRUCTION.
4. UTILITY RUBBER MAT TO BE INSTALLED UNDER ALL DISH Wireless L.L.C. EQUIPMENT THAT IS RESTING ON OR AFFIXED TO ROOF MEMBRANE
5. DISH WIRELESS SHALL BE RESPONSIBLE FOR PROTECTION OF ROOF SURFACE AND PARAPET WALL DURING CONSTRUCTION. PROPER ROOF PROTECTING MATERIALS SHALL BE PLACED AROUND ALL LANDING, STAGING, STORAGE, WALKING AND WORKING AREAS. NO TOOLS, LADDERS, MATERIALS, OR EQUIPMENT SHALL BE PLACED DIRECTLY ON THE ROOF SURFACE. ANY DAMAGES TO ROOF SURFACE AND/OR PARAPET WALL DURING CONSTRUCTION SHALL BE REPAIRED TO AS NEW CONDITION.



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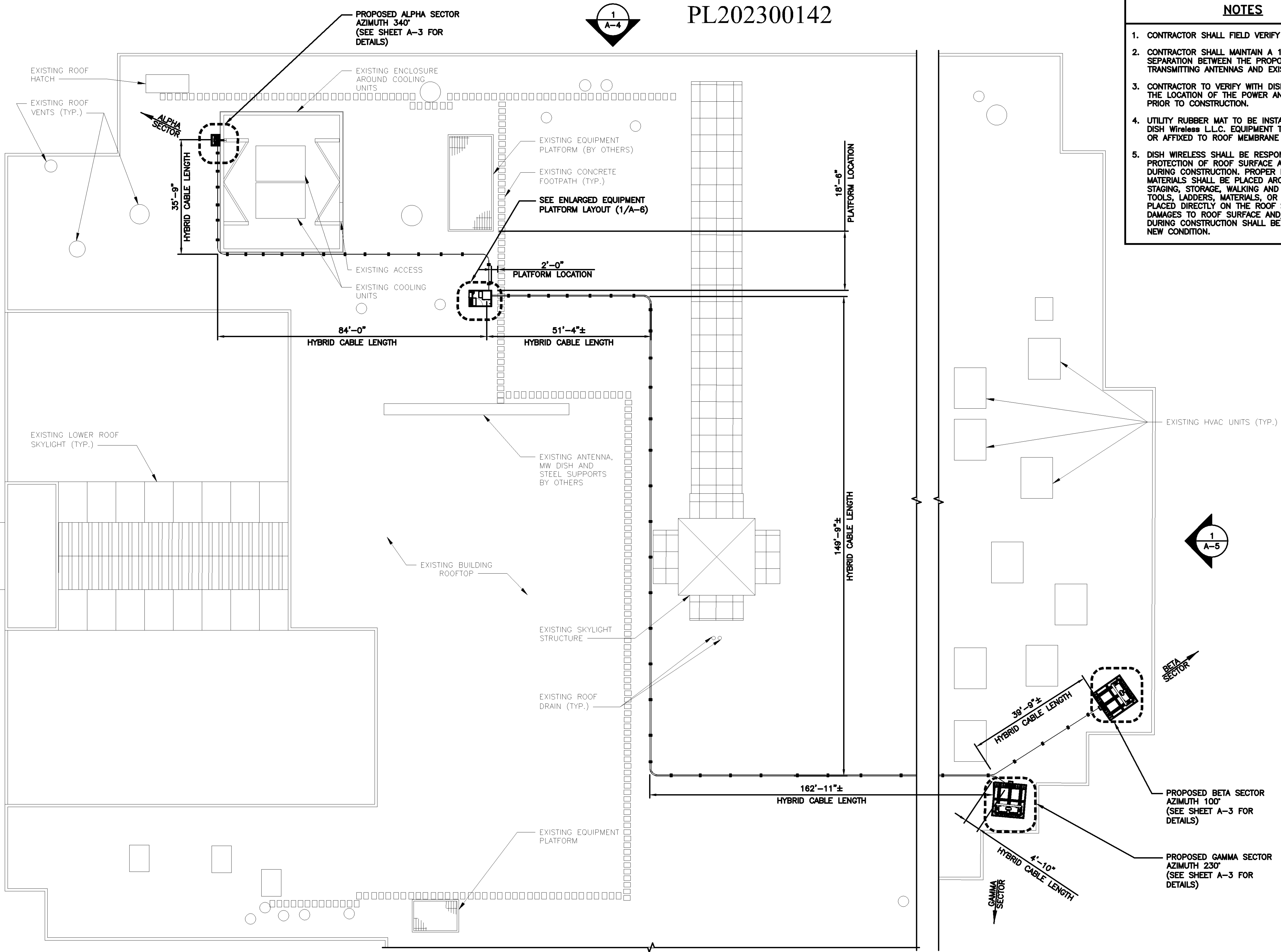
DISH Wireless L.L.C.
PROJECT INFORMATION

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4000 SOUTHWEST COURT
BLOOMINGTON, MN 55425

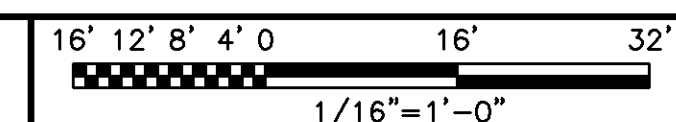
SHEET TITLE
ENLARGED BUILDING
PLAN

SHEET NUMBER

A-2



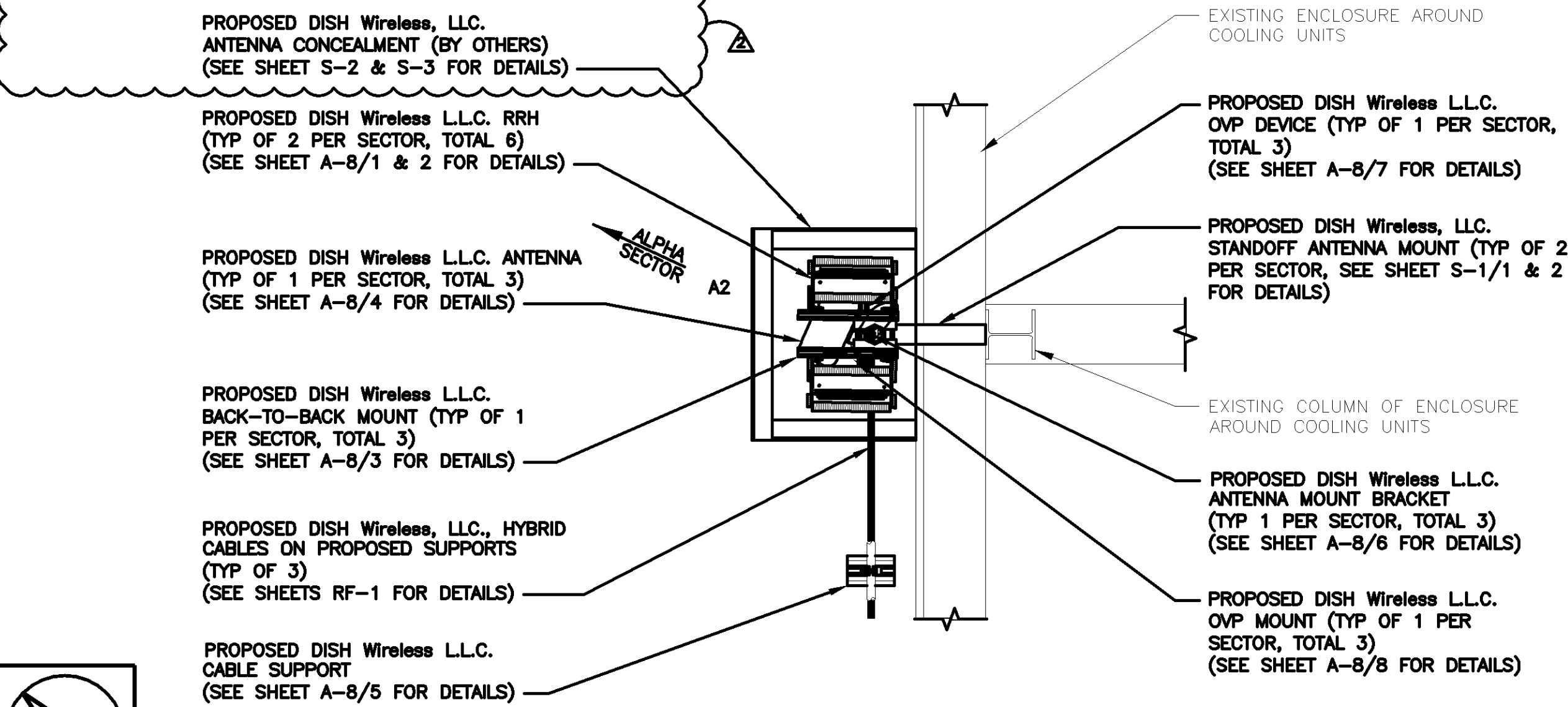
ENLARGED BUILDING PLAN



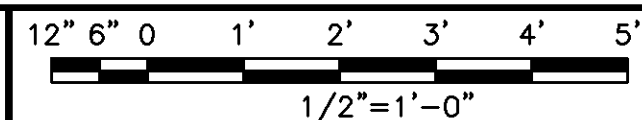
NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNA SPECIFICATIONS REFER TO ANTENNA SCHEDULE AND TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS
3. EXISTING EQUIPMENT AND FENCE OMITTED FOR CLARITY.
4. ANTENNA AND SUPPORT STRUCTURE SHALL BE CONCEALED FROM VIEW USING FIBER REINFORCED PLASTIC (FRP) MATERIAL.

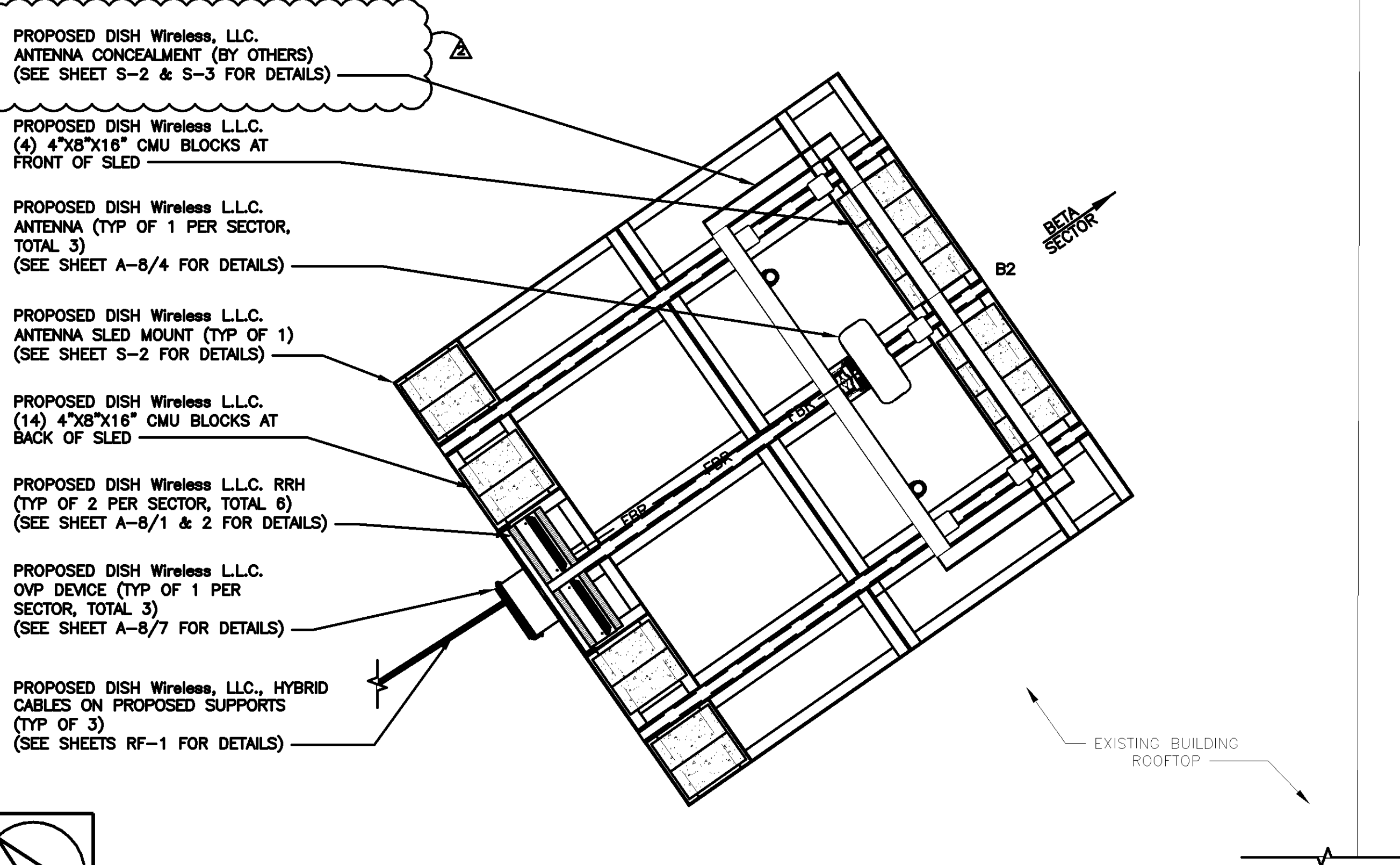
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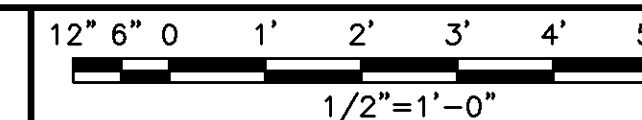
ANTENNA PLAN - ALPHA SECTOR



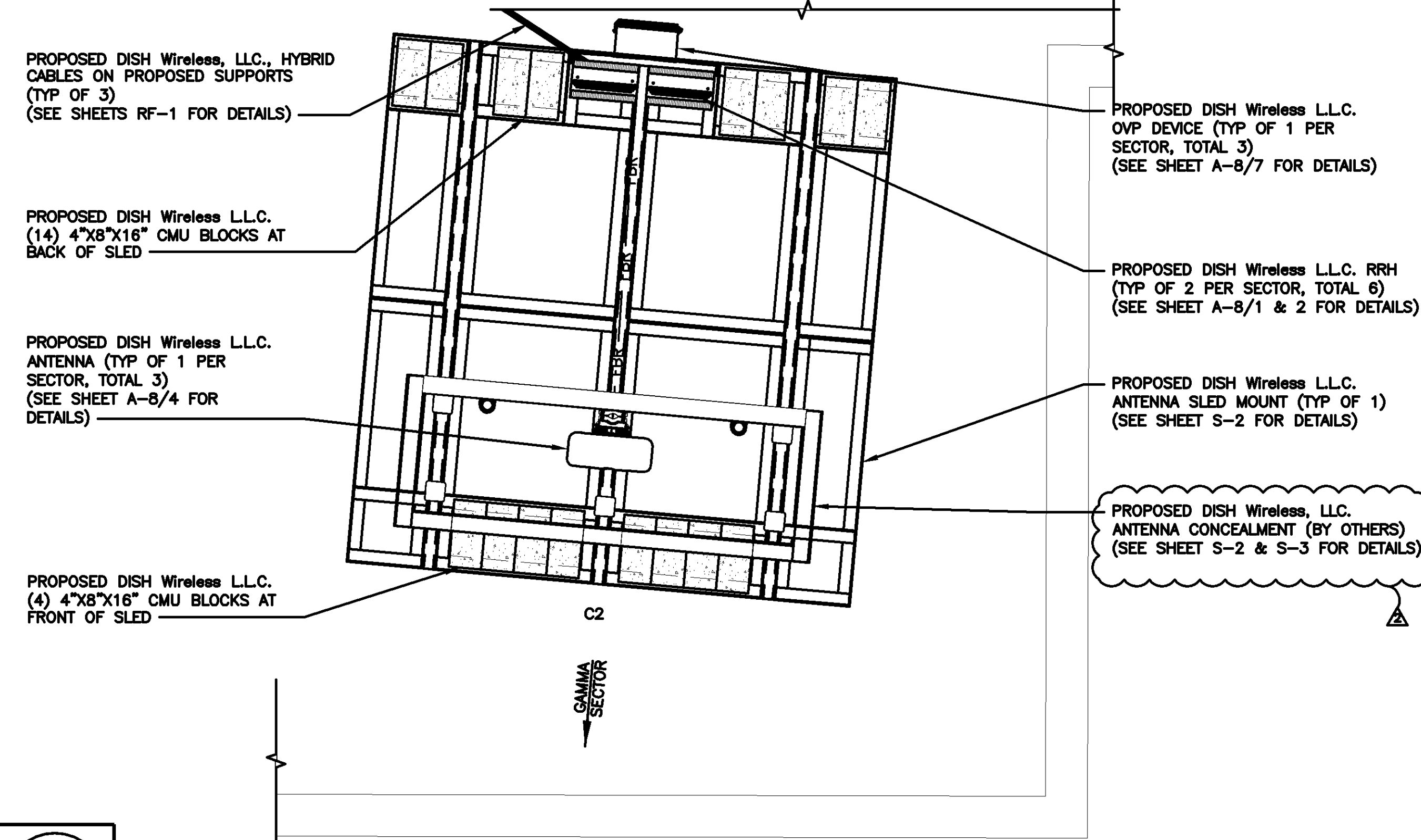
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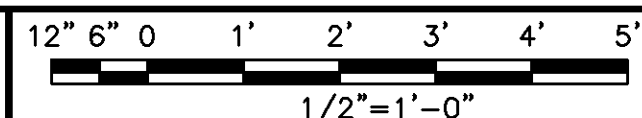
ANTENNA PLAN - BETA SECTOR



2



ANTENNA PLAN - GAMMA SECTOR



3

SECTOR POS.	ANTENNA					TRANSMISSION CABLE FEED LINE TYPE AND LENGTH	RRH			OVP MANUFACTURER MODEL
	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 RDIC-3405-PF-48
A2	PROPOSED	COMMSCOPE - FFV-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 RDIC-3405-PF-48
B2	PROPOSED	COMMSCOPE - FFV-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 RDIC-3405-PF-48
C2	PROPOSED	COMMSCOPE - FFV-65B-R2	5G	230°	74'-3"		FUJITSU - TA08025-B604	5G	C2	
C3	---	---	---	---	---		---	---	---	

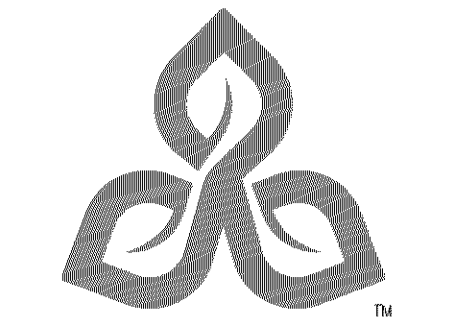
- NOTES**
1. CONTRACTOR TO REFER TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS.
 2. ANTENNA AND RRH MODELS MAY CHANGE DUE TO EQUIPMENT AVAILABILITY. ALL EQUIPMENT CHANGES MUST BE APPROVED AND REMAIN IN COMPLIANCE WITH THE PROPOSED DESIGN AND STRUCTURAL ANALYSES.

ANTENNA SCHEDULE

NO SCALE 4



5701 SOUTH SANTA FE DRIVE
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SAINT LOUIS, MISSOURI 63131
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DRAWN BY: CO CHECKED BY: RZ APPROVED BY: RZ

RFDS REV #: 5 03/17/2022

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4000 SOUTHWEST COURT
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SHEET TITLE
ANTENNA PLAN,
AND SCHEDULE

SHEET NUMBER
A-3

PL202300142

NOTES

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

TOP OF SKYLIGHT STRUCTURE
90'-0"± AGL

PROPOSED DISH Wireless L.L.C.
ANTENNA (BETA & GAMMA SECTOR)
TOP OF ANTENNAS @ 77'-3"± AGL

PROPOSED DISH Wireless L.L.C.
ANTENNA (BETA & GAMMA SECTOR)
RAD CENTER @ 74'-3"± AGL

EXISTING BUILDING PARAPET
71'-0"± AGL

EXISTING BUILDING ROOF
67'-0"± AGL

- (3) PROPOSED DISH WIRELESS, L.L.C. ANTENNAS
- (3) PROPOSED DISH WIRELESS, L.L.C. ANTENNA SLED MOUNTS
- (1) PROPOSED DISH WIRELESS, L.L.C. STANDOFF ANTENNA MOUNT (TYP. OF 2 PER SECTOR)
- (6) PROPOSED DISH WIRELESS, L.L.C. RRU'S
- (3) PROPOSED DISH WIRELESS, L.L.C. OVER VOLTAGE PROTECTION DEVICE (OVP)

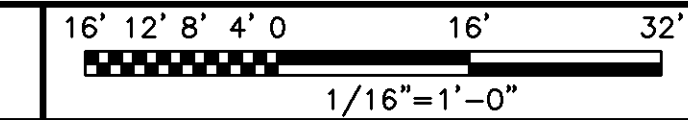
PROPOSED DISH Wireless L.L.C.
CABINET ON PROPOSED 5'-0" X
7'-0" STEEL PLATFORM W/
H-FRAME (TYP. OF 1)

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

TOP OF EXISTING ENCLOSURE
82'-0"± AGL

INSIDE OF BUILDING
OMITTED FOR CLARITY

BUILDING NORTH ELEVATION



NOTES

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TOP OF EXISTING ENCLOSURE
82'-0"± AGL

PROPOSED DISH Wireless L.L.C.
ANTENNA (ALPHA SECTOR)
TOP OF ANTENNAS @ 77'-0"± AGL

PROPOSED DISH Wireless L.L.C.
ANTENNA (ALPHA SECTOR)
RAD CENTER @ 74'-0"± AGL

EXISTING BUILDING PARAPET
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PROPOSED DISH Wireless L.L.C.
CABINET ON PROPOSED 5'-0" X
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- (3) PROPOSED DISH WIRELESS, L.L.C. ANTENNA SLED MOUNTS
- (1) PROPOSED DISH WIRELESS, L.L.C. STANDOFF ANTENNA MOUNT (TYP. OF 2 PER SECTOR)
- (6) PROPOSED DISH WIRELESS, L.L.C. RRU'S
- (3) PROPOSED DISH WIRELESS, L.L.C. OVER VOLTAGE PROTECTION DEVICE (OVP)

TOP OF SKYLIGHT STRUCTURE
90'-0"± AGL

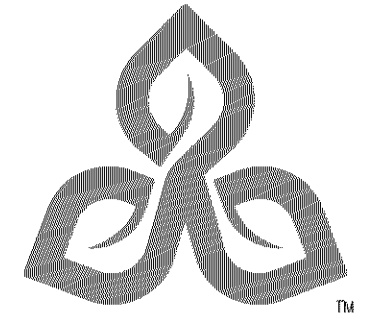
PROPOSED DISH Wireless, L.L.C.
ANTENNA CONCEALMENT (TYP.) (BY
OTHERS) (SEE SHEET S-1
TO S-3 FOR DETAILS)

macy's

BUILDING SOUTH ELEVATION



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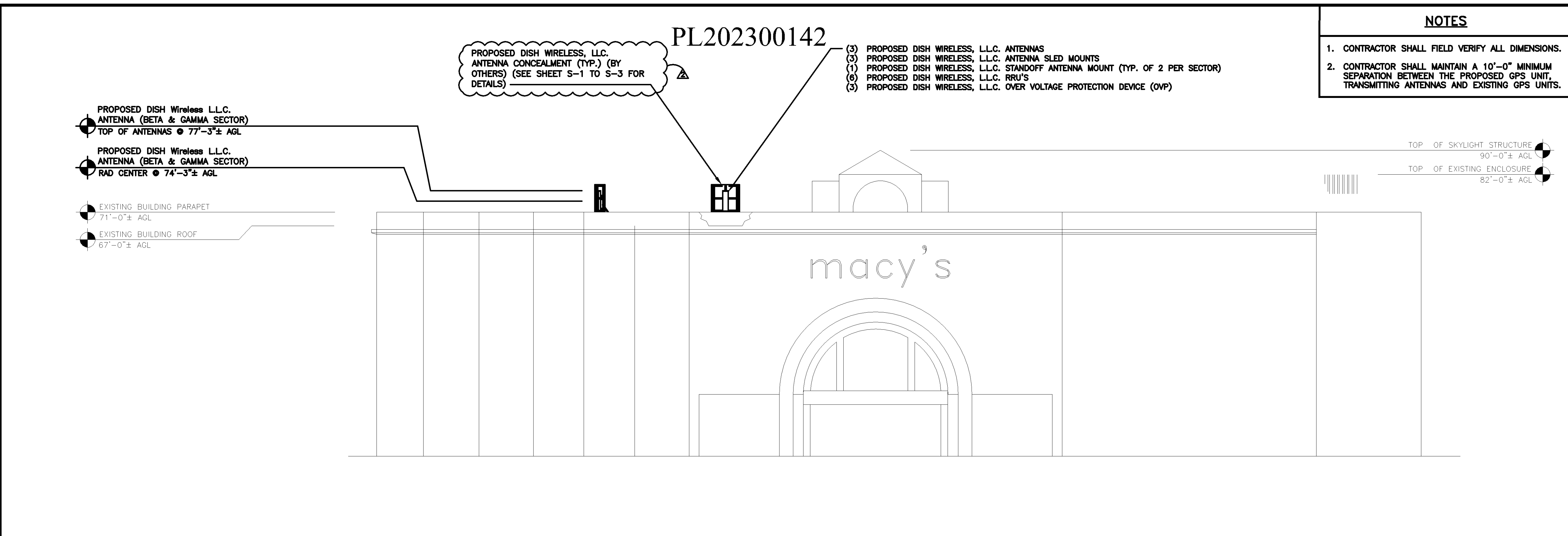
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NORTH AND SOUTH
ELEVATIONS

SHEET NUMBER

A-4



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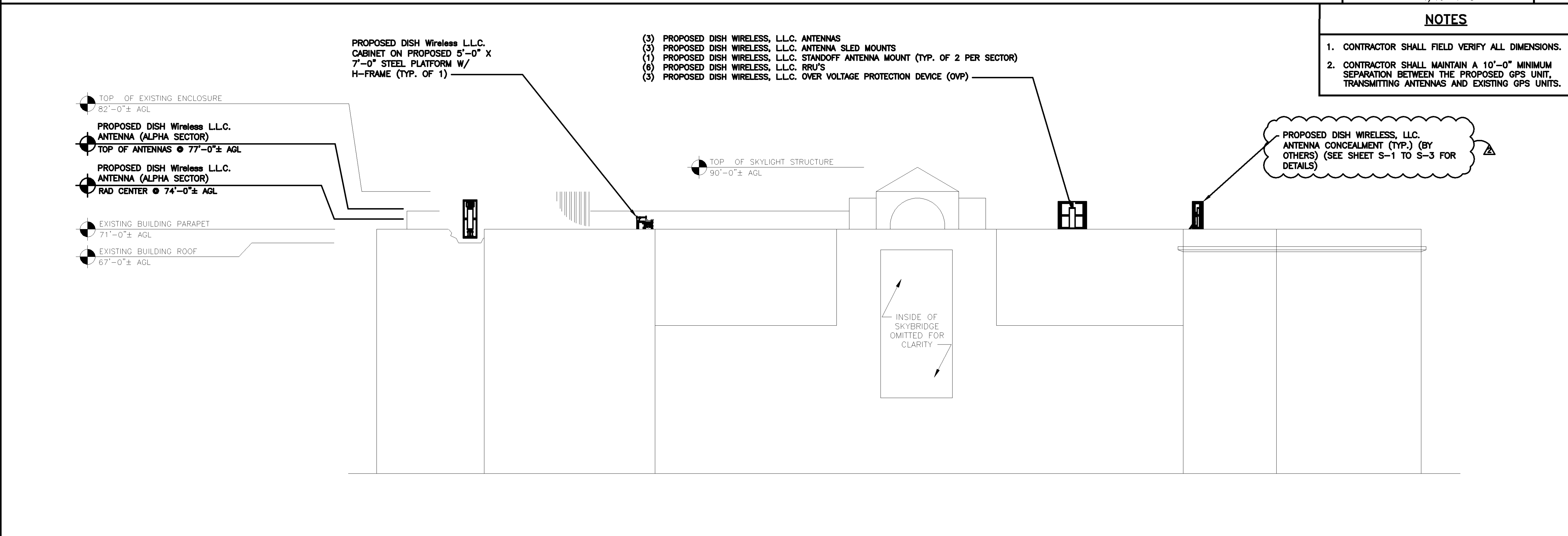
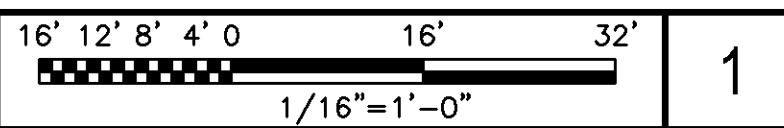
5701 SOUTH SANTA FE DRIVE
 LITTLETON, CO 80120

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 #: 51990

BUILDING EAST ELEVATION



NOTES

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

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DRAWN BY:	CHECKED BY:	APPROVED BY:
CO	RZ	RZ

RFDS REV #: 5 03/17/2022

CONSTRUCTION DOCUMENTS

SUBMITTALS		
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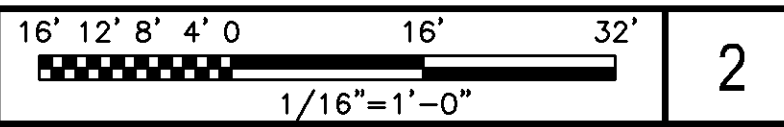
A&E PROJECT NUMBER
 705953

DISH Wireless L.L.C.
 PROJECT INFORMATION
 MNMSP00388A
 4000 SOUTHWEST COURT
 BLOOMINGTON, MN 55425

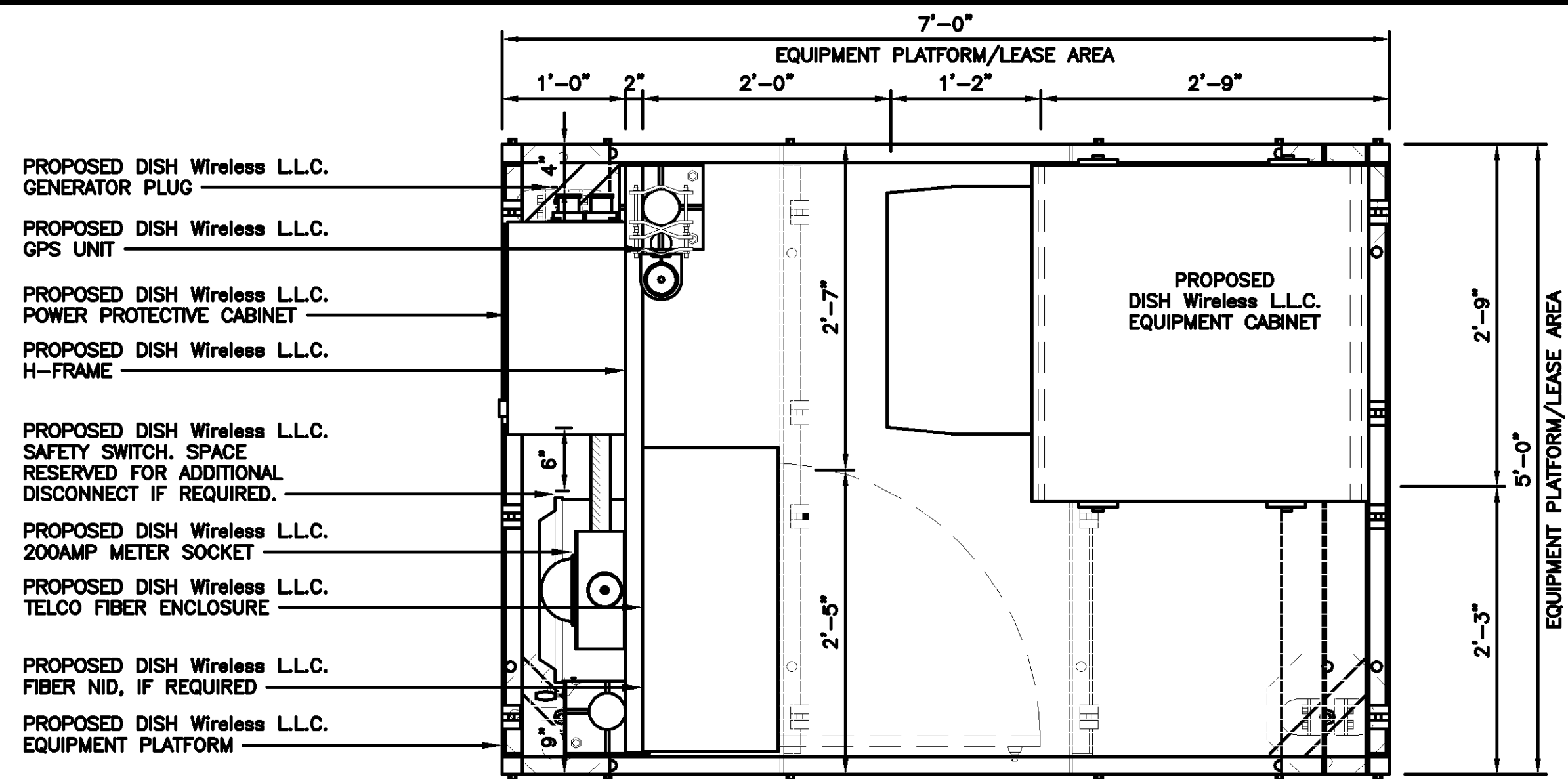
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 EAST AND WEST
 ELEVATIONS

SHEET NUMBER
A-5

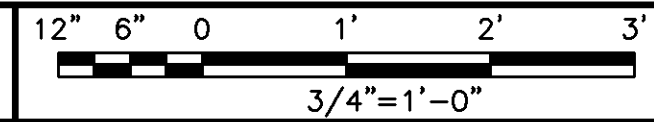
BUILDING WEST ELEVATION



PL202300142



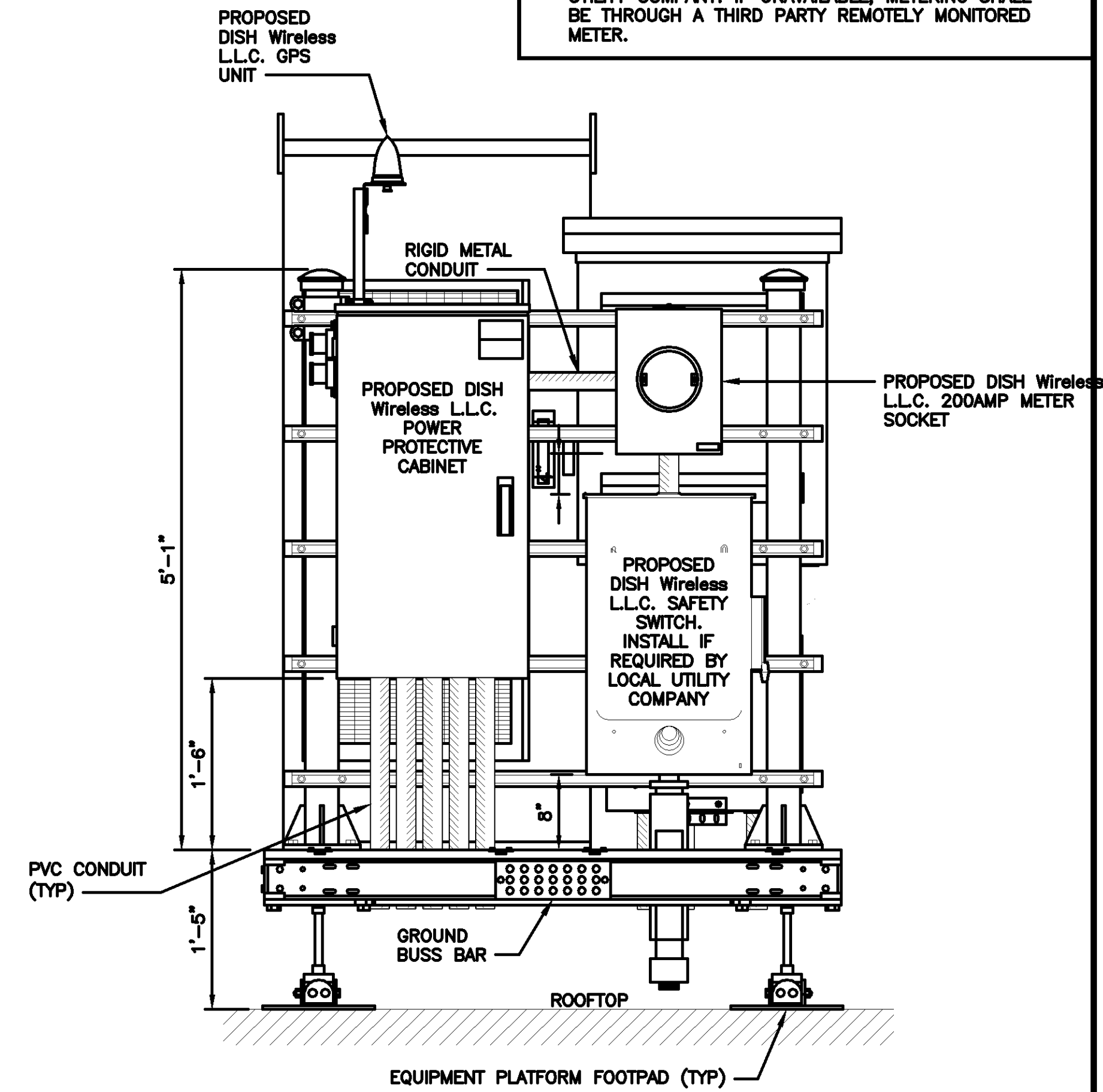
PLATFORM EQUIPMENT PLAN



1

NOTES

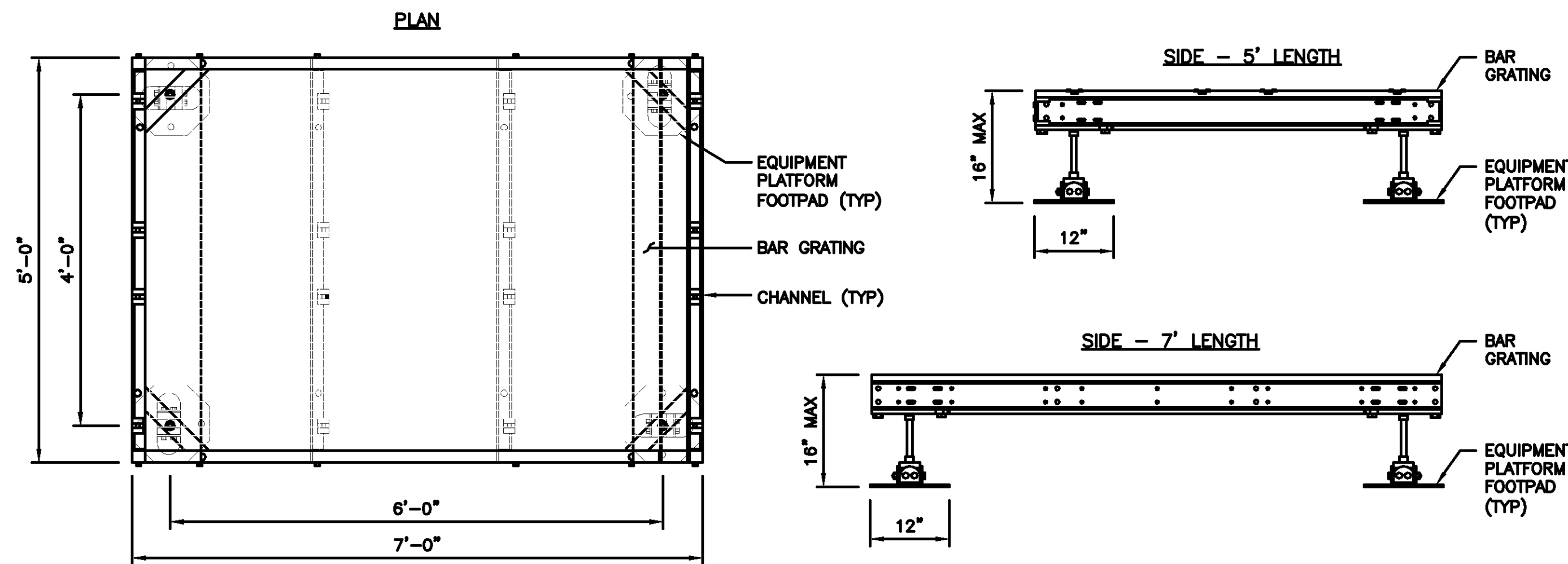
1. ELECTRIC SUPPLY SHALL BE DIRECT WITH LOCAL UTILITY COMPANY. IF UNAVAILABLE, METERING SHALL BE THROUGH A THIRD PARTY REMOTELY MONITORED METER.



FRONT ELEVATION

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"

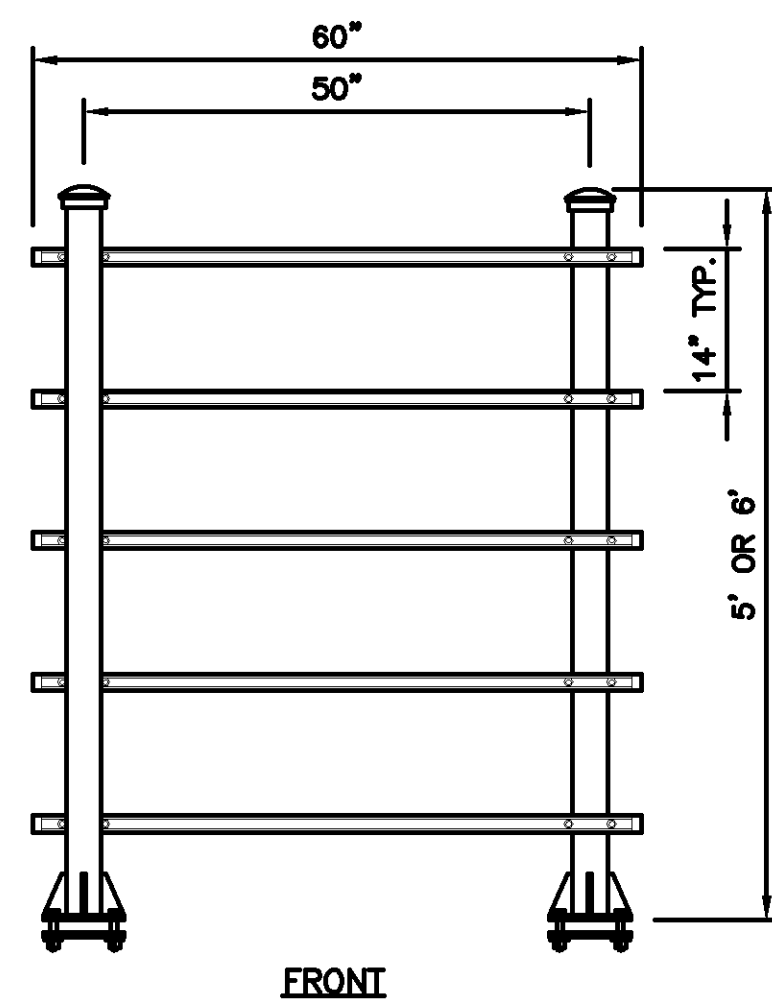
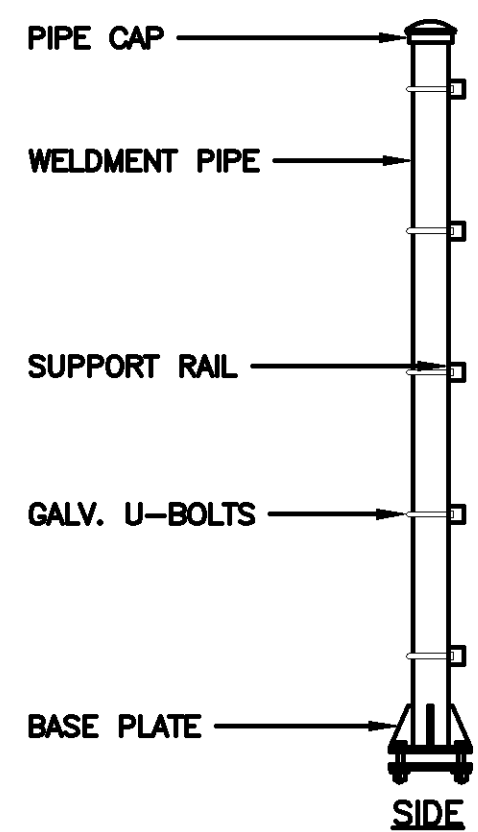


PLATFORM DETAIL

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

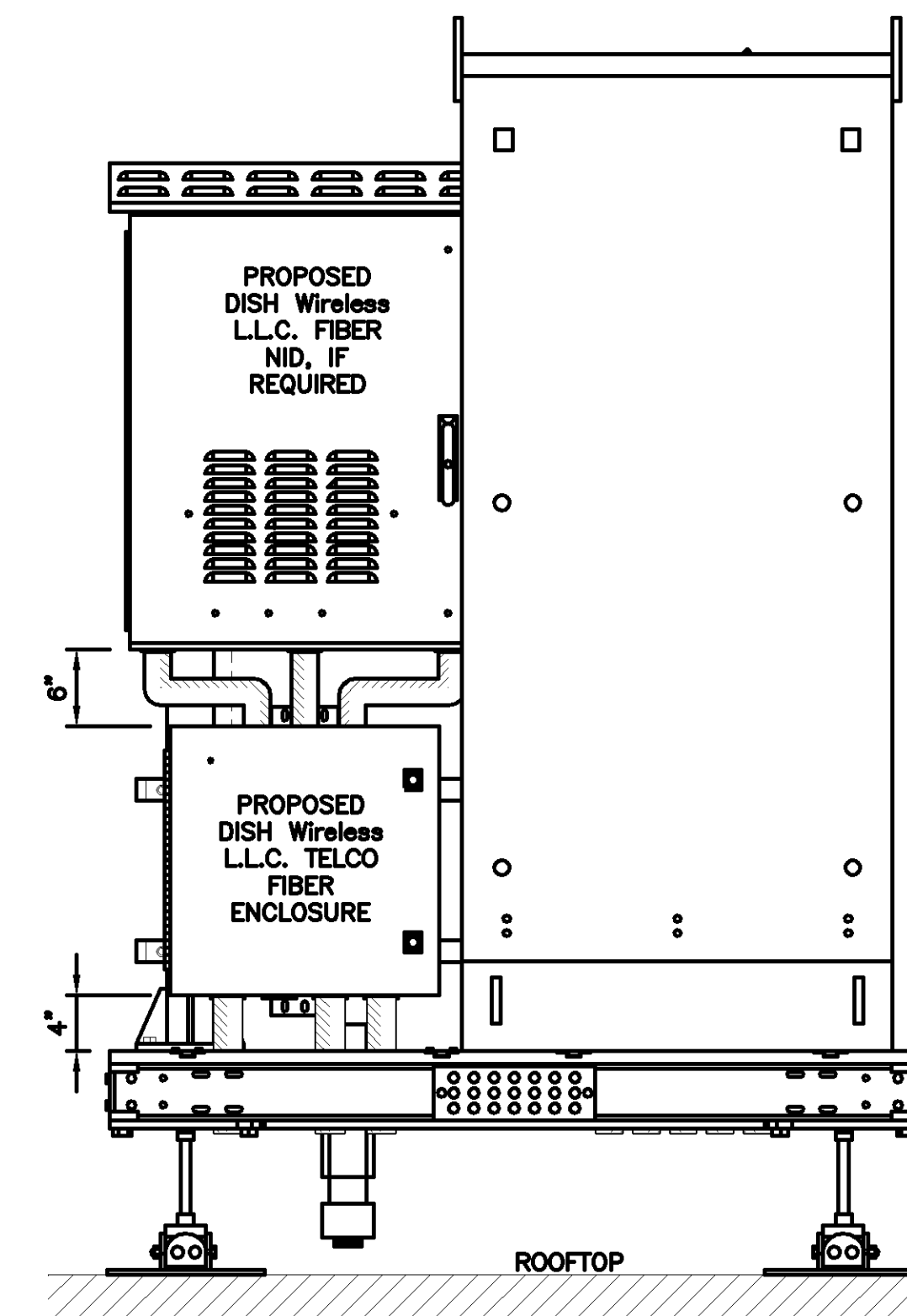


H-FRAME DETAIL

NO SCALE 3

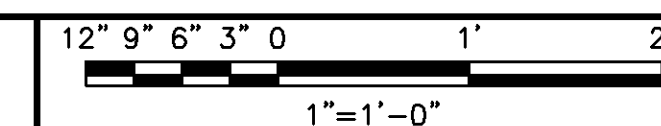
NOT USED

NO SCALE 4



BACK ELEVATION

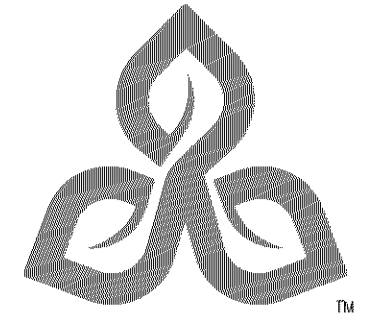
H-FRAME EQUIPMENT ELEVATION



5



5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120



1515 DES PERES ROAD, STE 200
SAINT LOUIS, MISSOURI 63131

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

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A&E PROJECT NUMBER

705953

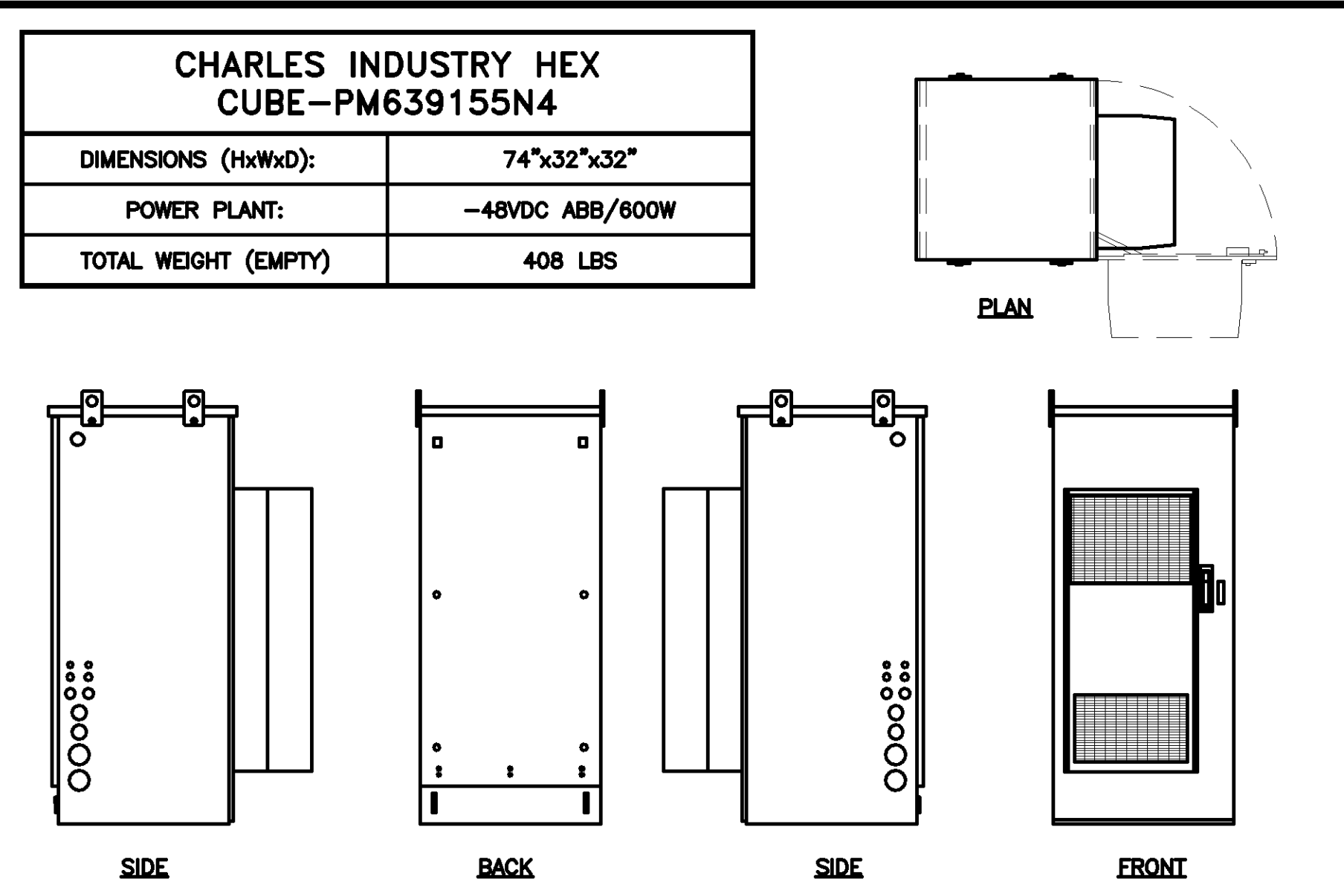
DISH Wireless L.L.C.
PROJECT INFORMATION

MNMSPO0388A
4000 SOUTHWEST COURT
BLOOMINGTON, MN 55425

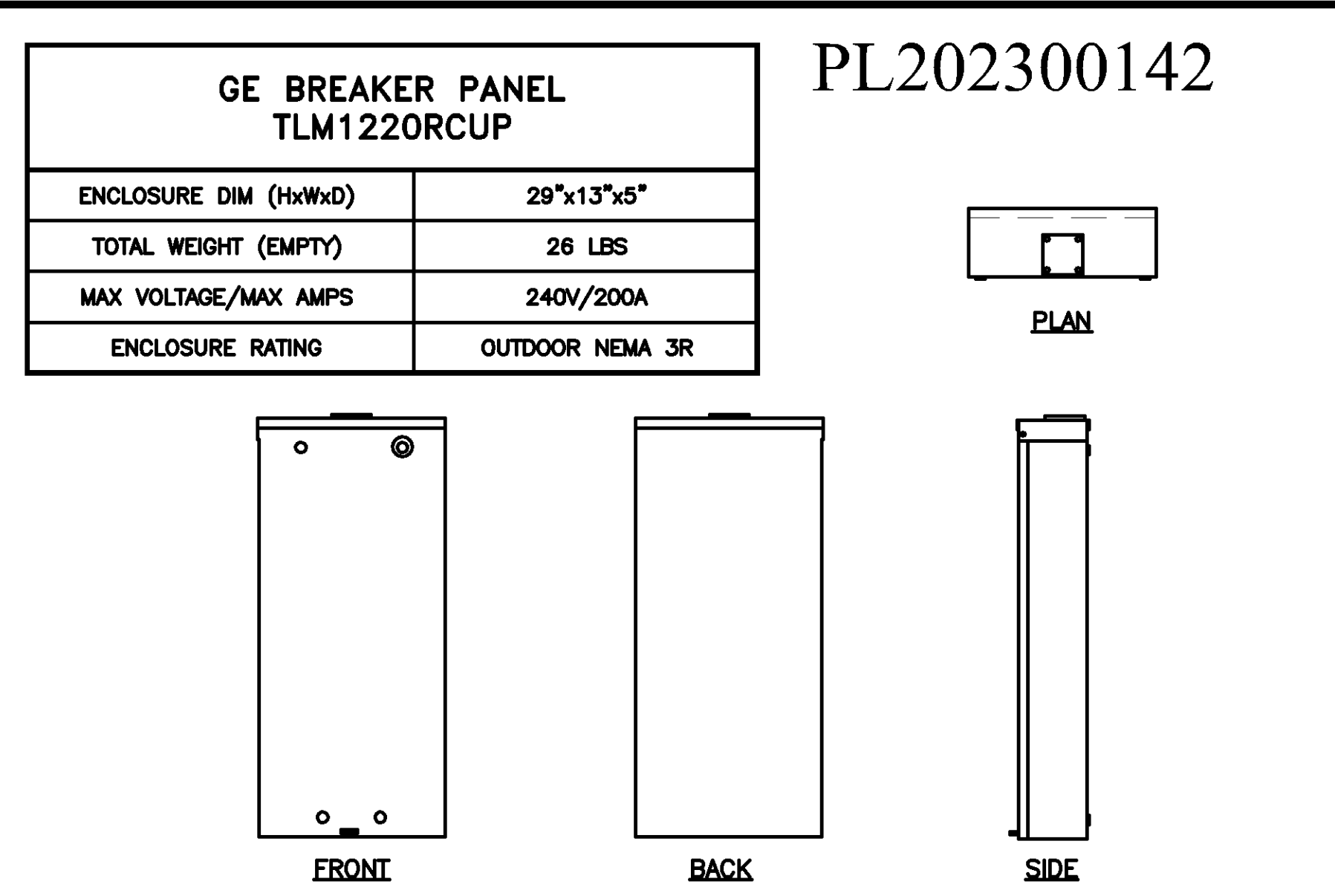
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EQUIPMENT PLATFORM AND
H-FRAME DETAILS

SHEET NUMBER

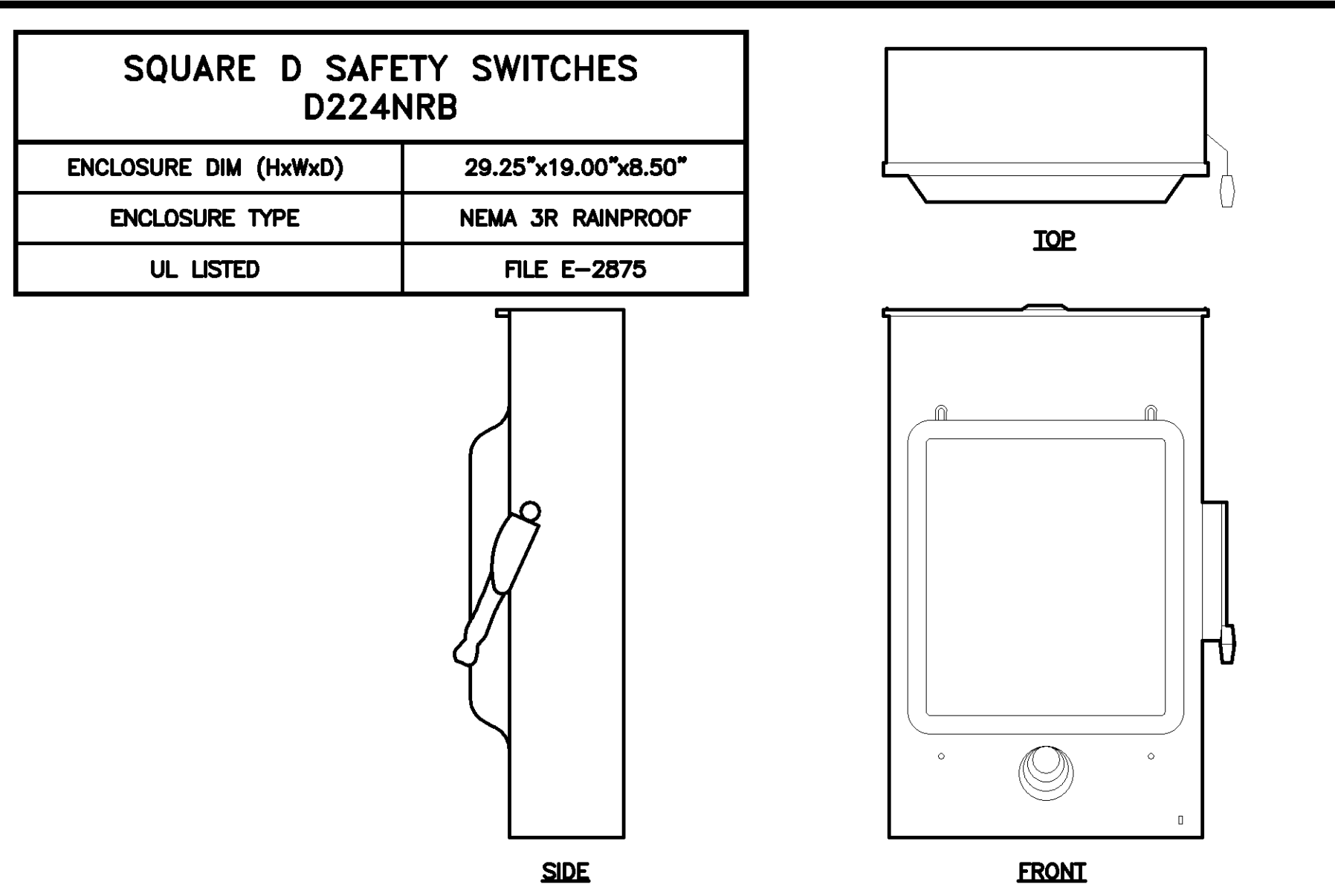
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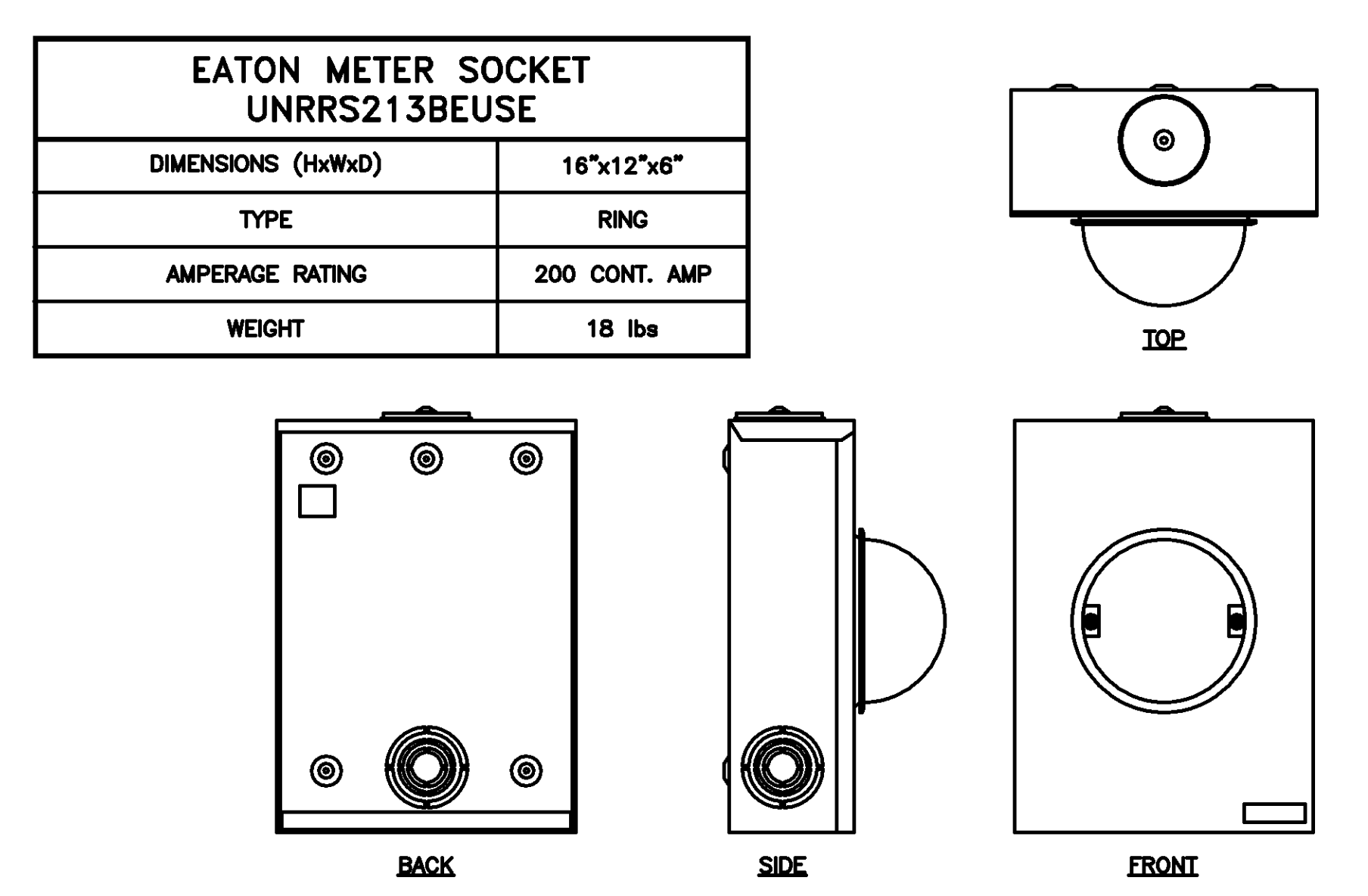
CABINET DETAIL NO SCALE 1



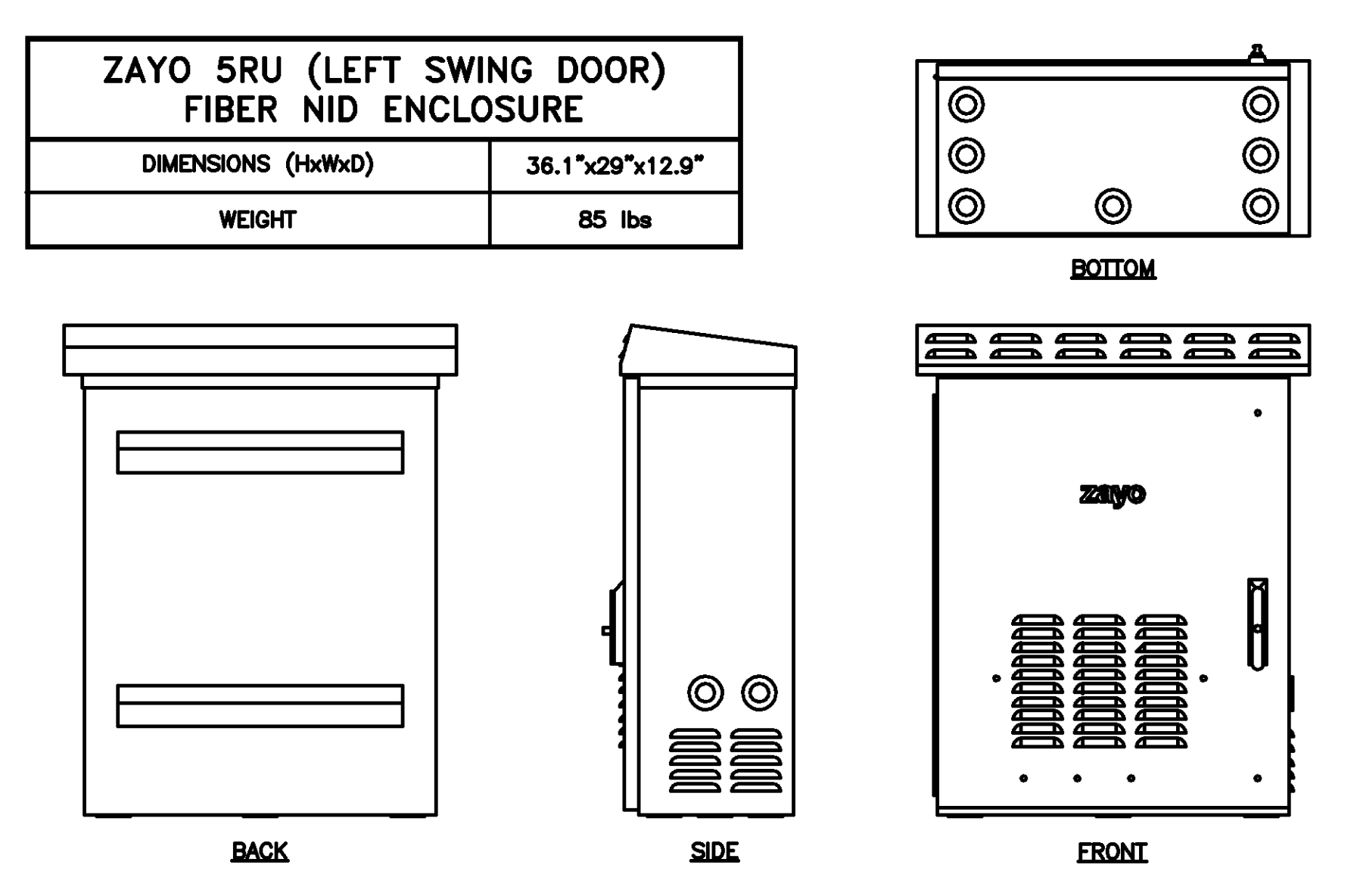
BREAKER PANEL DETAIL NO SCALE 2



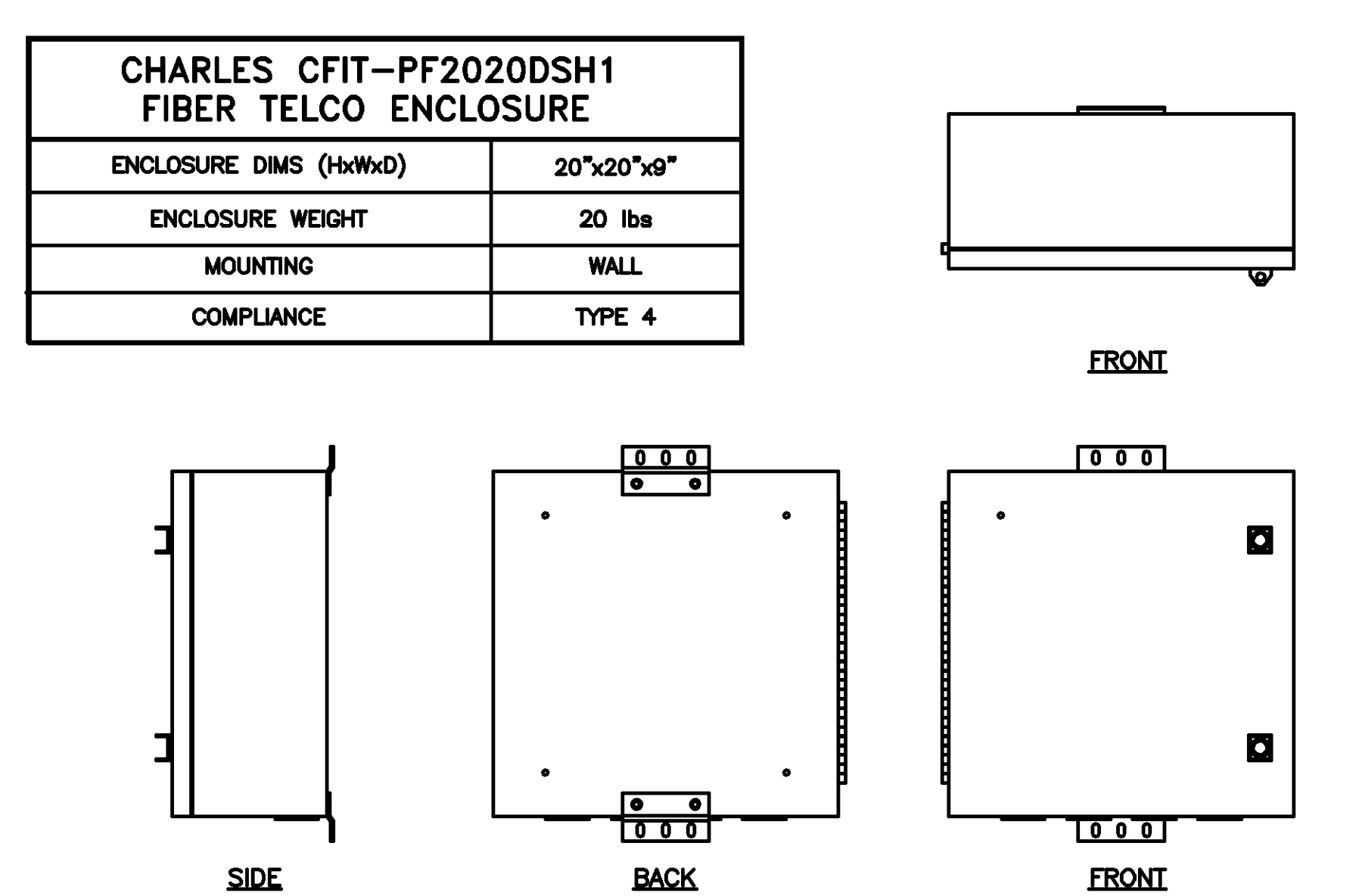
SAFETY SWITCH DETAIL NO SCALE 3



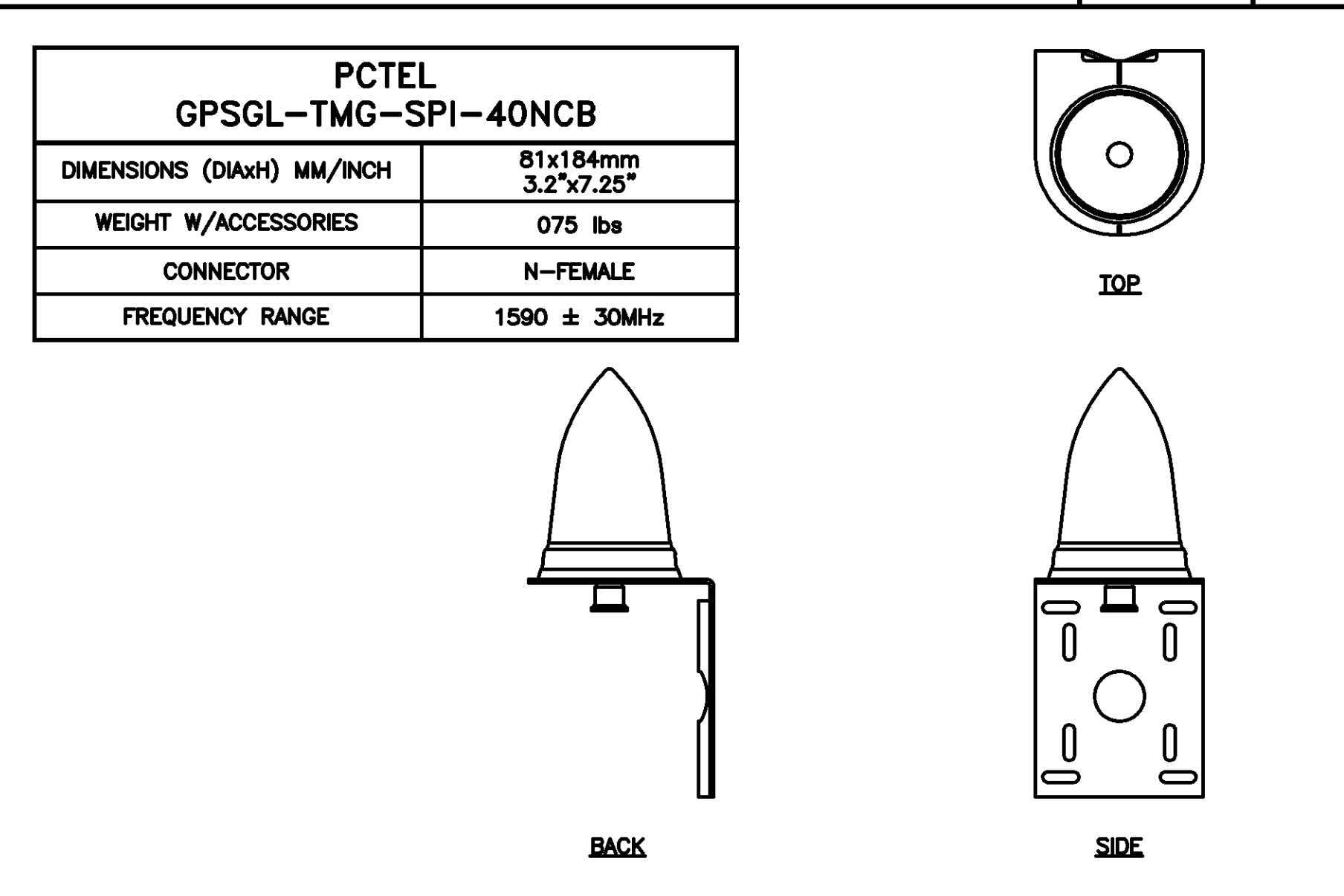
METER BANK DETAIL NO SCALE 4



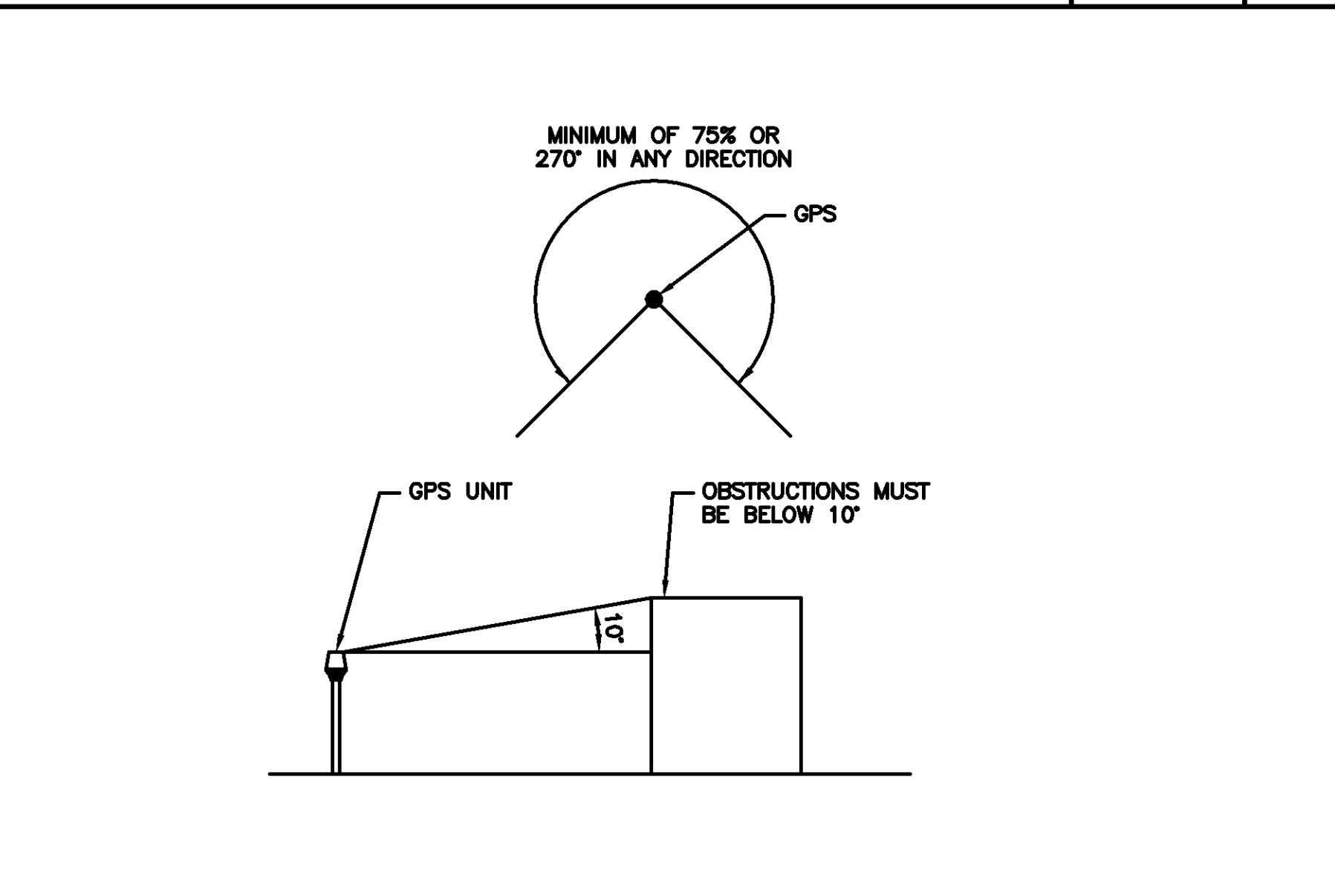
FIBER NID ENCLOSURE DETAIL NO SCALE 5



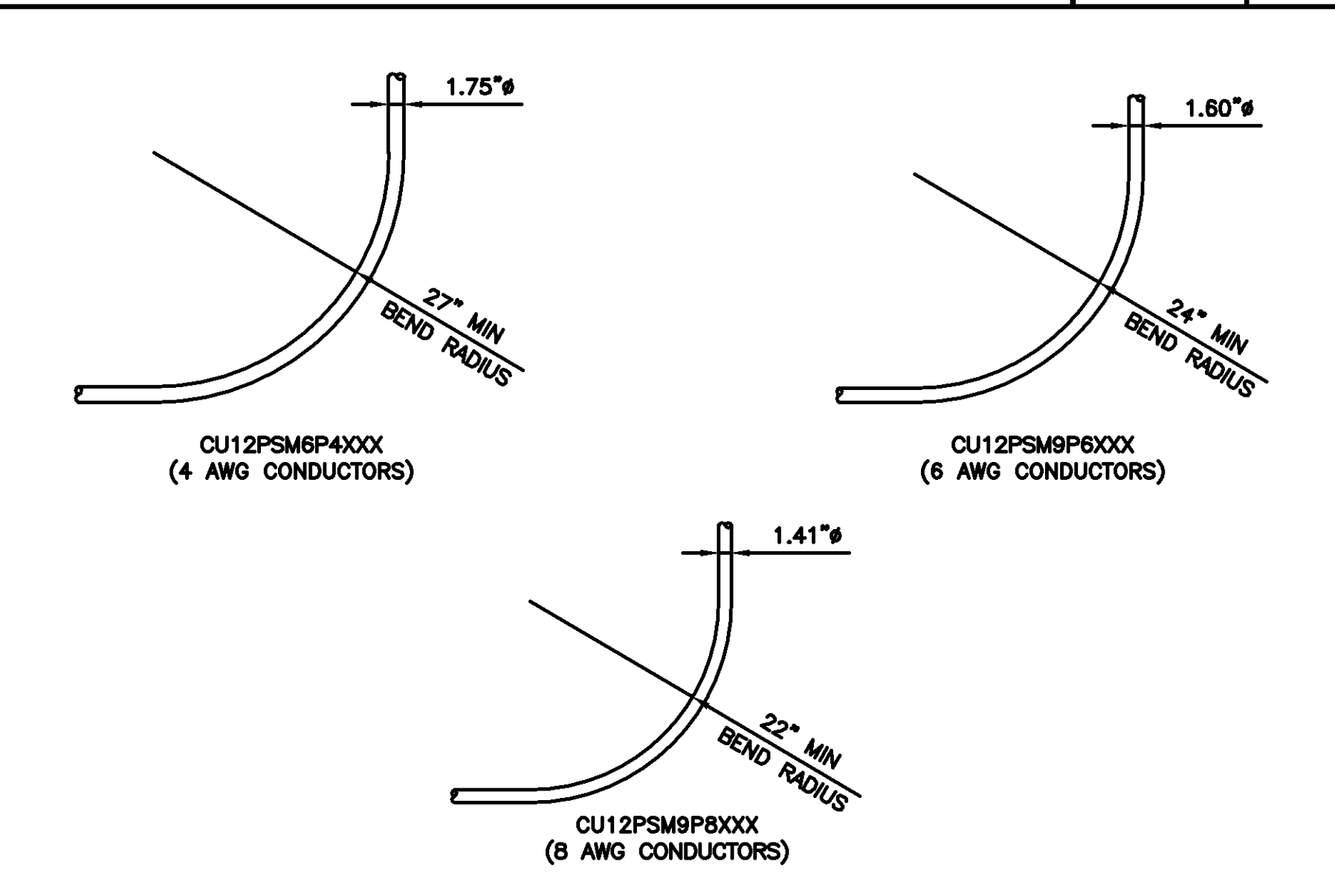
FIBER TELCO ENCLOSURE DETAIL NO SCALE 6



GPS DETAIL NO SCALE 7



GPS MINIMUM SKY VIEW REQUIREMENTS NO SCALE 8



CABLES UNLIMITED HYBRID CABLE MINIMUM BEND RADIUSSES NO SCALE 9

5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120

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SAINT LOUIS, MISSOURI 63131
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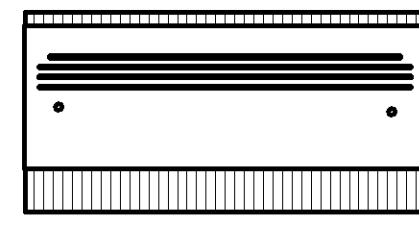
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DISH Wireless L.L.C.
PROJECT INFORMATION
MNMSP00388A
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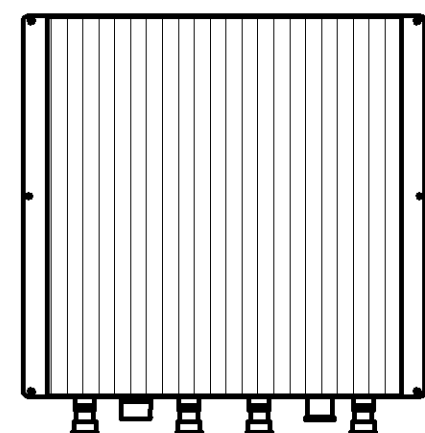
SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-7

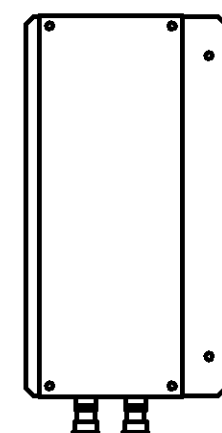
FUJITSU DUAL BAND TA08025-B604	
DIMENSIONS (HxWxD)	14.9"x15.7"x7.8"
WEIGHT	63.9 lbs
CONNECTOR TYPE	4.3-10 RF CONNECTOR
POWER SUPPLY	DC -58~-36V



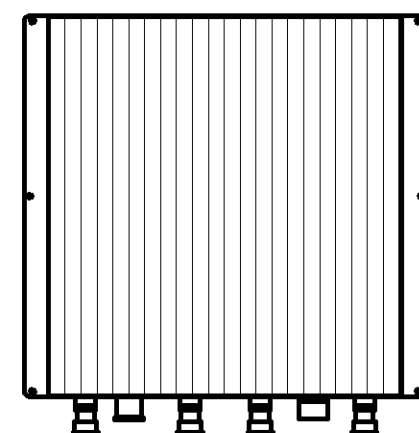
PLAN



BACK



SIDE



FRONT

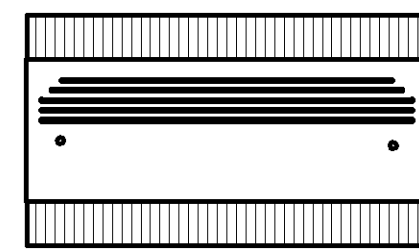
RRH DETAIL

NO SCALE

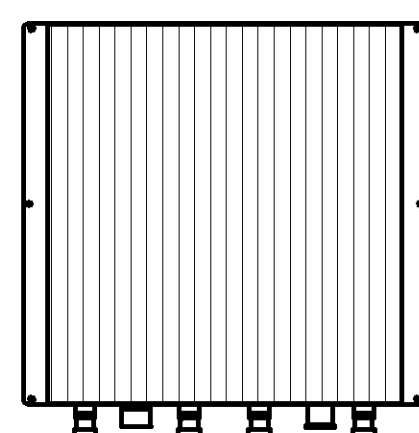
1

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

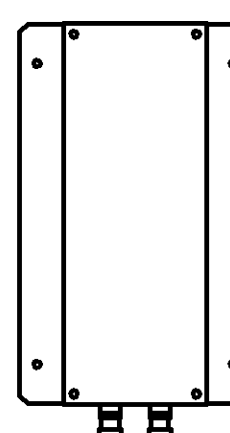
PL202300142



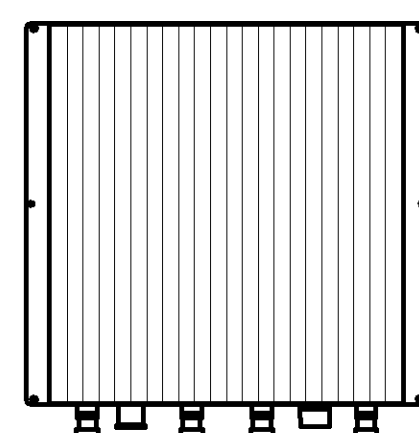
PLAN



BACK



SIDE



FRONT

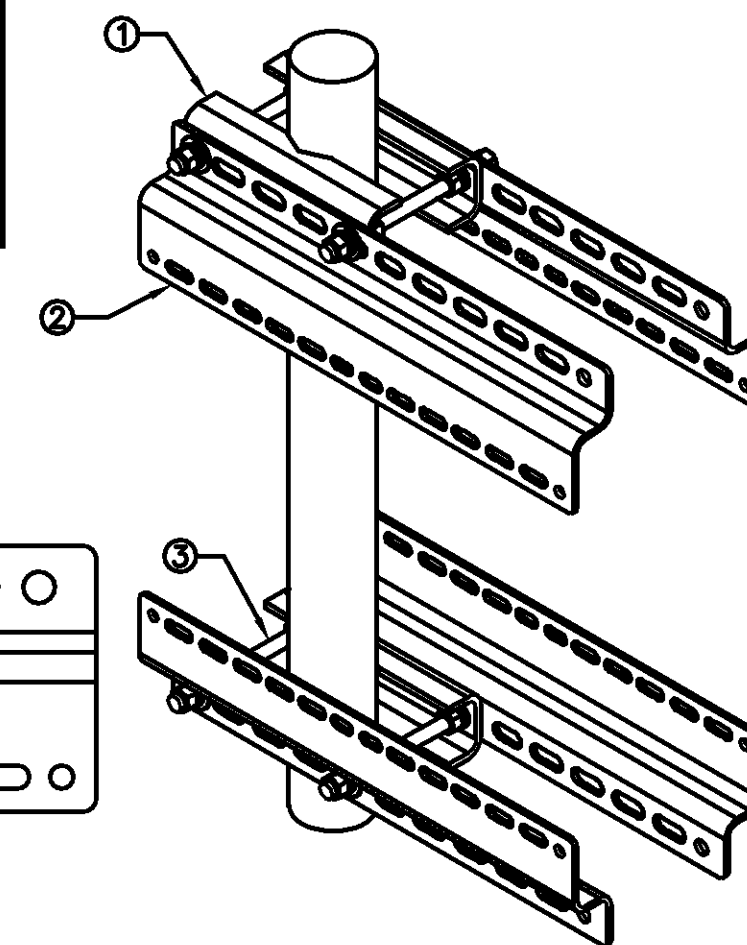
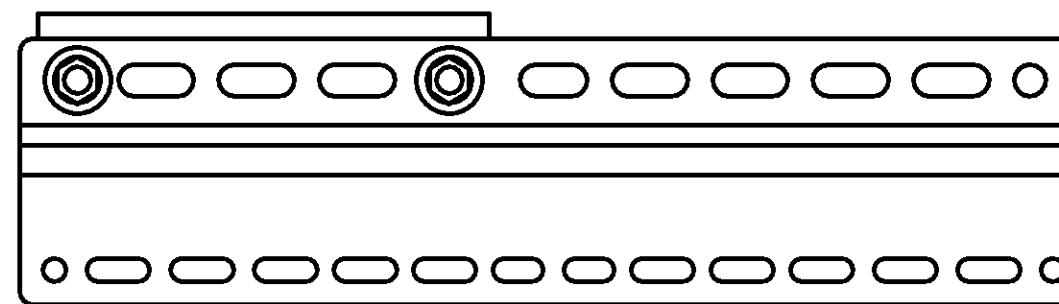
RRH DETAIL

NO SCALE

2

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

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



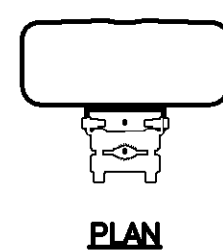
NOTE:
OR DISH Wireless L.L.C.
APPROVED EQUIVALENT

RRH MOUNT DETAIL

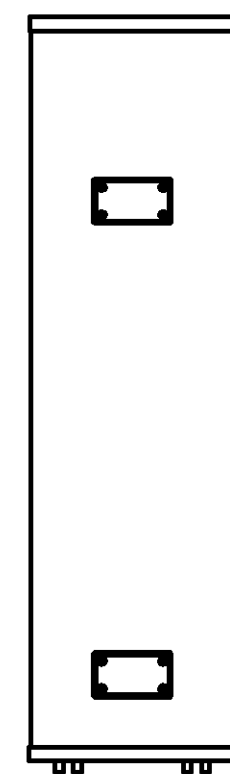
NO SCALE

3

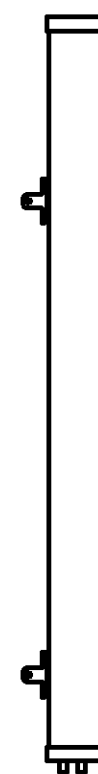
COMMSCOPE FFVV-65B-R2	
DIMENSIONS (HxWxD)(MM/IN)	1826x498x197 72"x19.6"x7.8"
RF CONNECTOR INTERFACE	4.3-10 FEMALE
WEIGHT	70.8 lbs
WEIGHT WITH BRACKETS	98.1 lbs



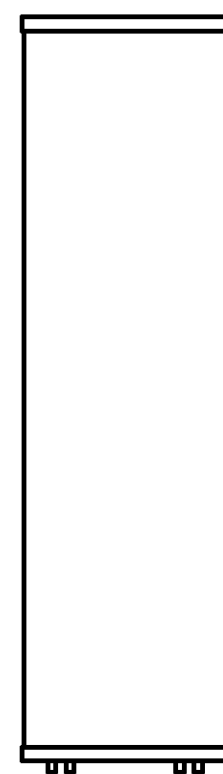
PLAN



BACK



SIDE



FRONT

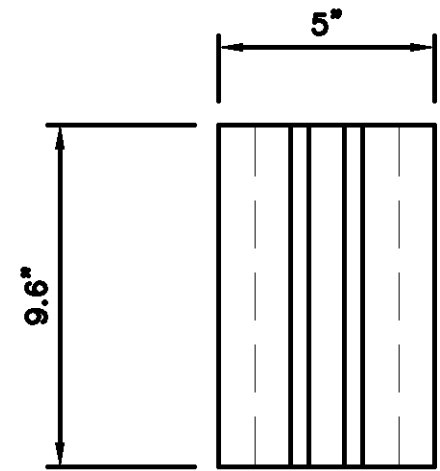
ANTENNA DETAIL

NO SCALE

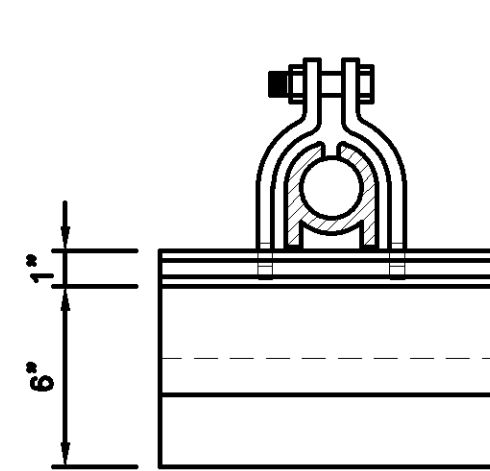
4

DURA-BLOK DB10 ROOFTOP CABLE SUPPORT	
DIMENSIONS (HxWxD)	5"x6"x9.6"
WEIGHT/ VOLUME	5.28 LBS
ULTIMATE LOAD CAPACITY	500 LBS

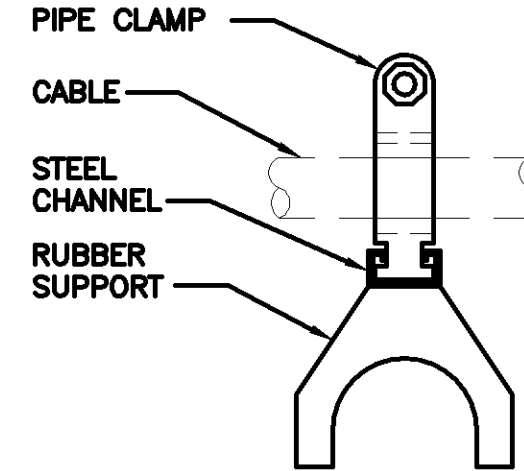
NOTE: NON-PENETRATING



PLAN



FRONT



SIDE

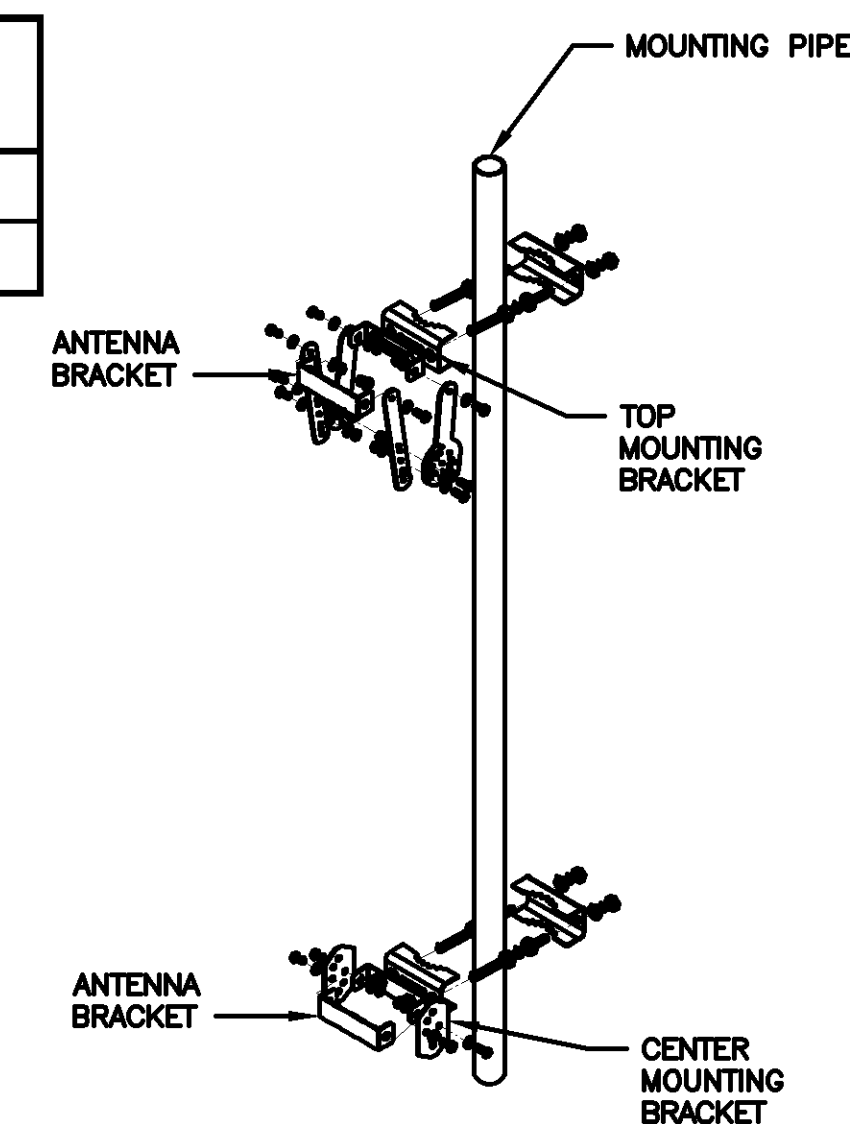
ROOFTOP CABLE SUPPORT DETAIL

NO SCALE

5

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

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



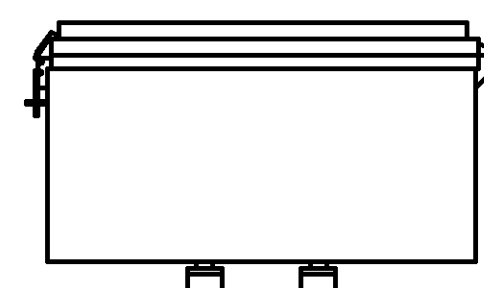
NOTE:
OR DISH Wireless L.L.C.
APPROVED EQUIVALENT

ANTENNA BRACKET DETAIL

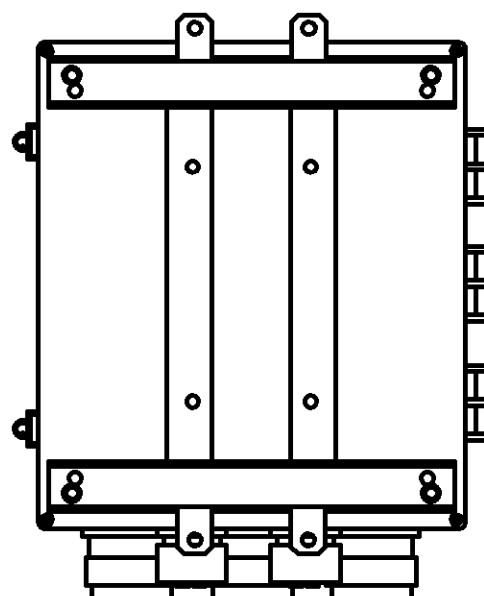
NO SCALE

6

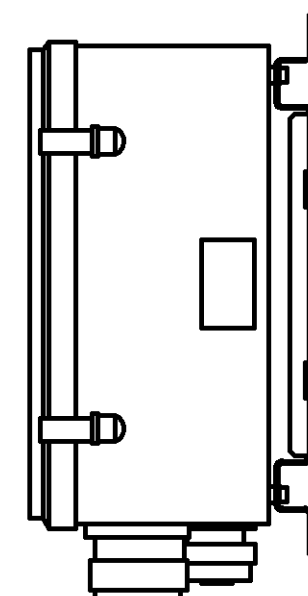
RAYCAP RDIDC-3045-PF-48 SURGE PROTECTION DEVICE (OVP)	
DIMENSIONS (HxWxD)	19"x16.21"x9.64"
WEIGHT	21 lbs



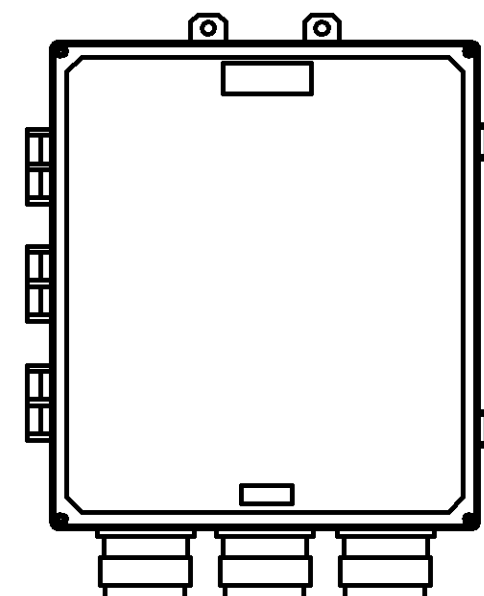
PLAN



BACK



SIDE



FRONT

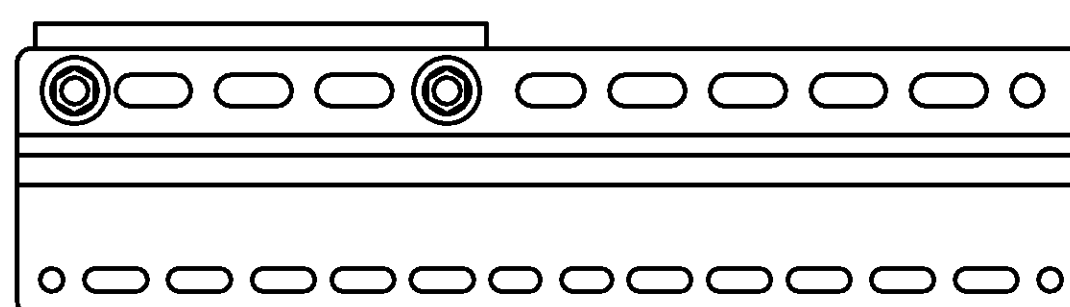
SURGE PROTECTION DEVICE (OVP) DETAIL

NO SCALE

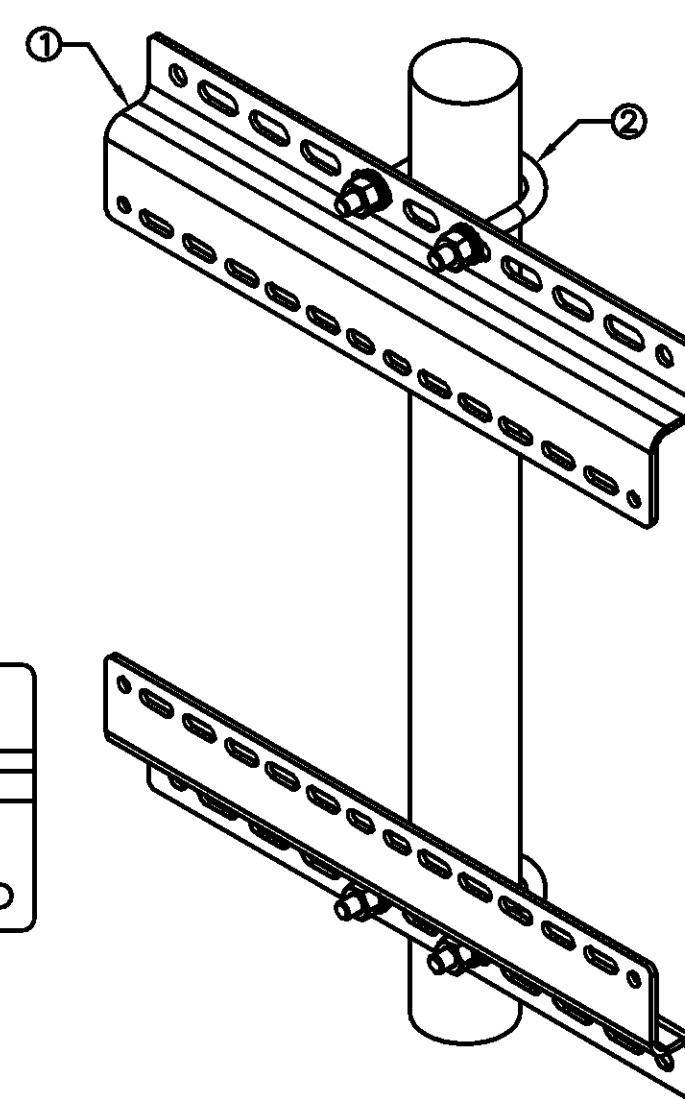
7

SABRE SINGLE Z-BRACKET C10123151	
DIMENSIONS (HxWxD) (1 BRACKET)	5"x20"x1-13/16"
WEIGHT (FULL ASSEMBLY)	13.41 lbs
PACKAGE QUANTITY	2

#	DESCRIPTION
1	RRH Z BRACKET, 3/16"
2	U-BOLT ASSEMBLY, 1/2" FOR 2-7/8" PIPE



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

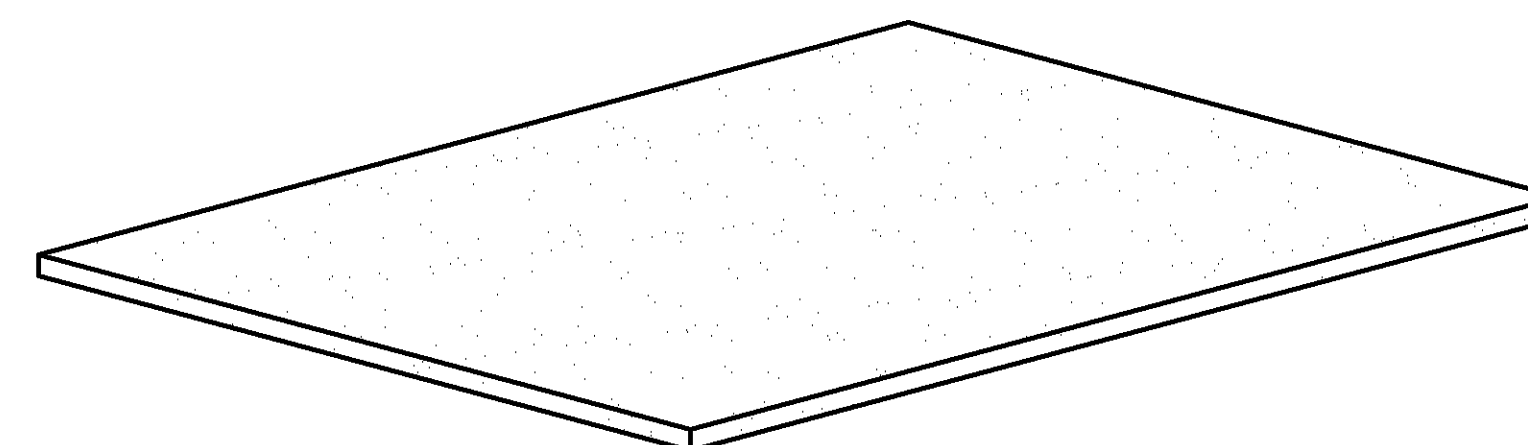


RRH MOUNT DETAIL

NO SCALE

8

UTILITY RUBBER MAT, BLACK	
DIMENSIONS	4'x 3'x 1/2"
WEIGHT/ VOLUME	36.5 LB AVERAGE
MATERIAL	100% RECYCLE RUBBER



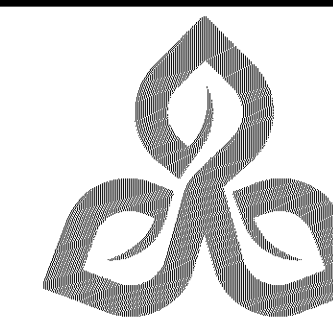
UTILITY RUBBER MAT DETAIL

NO SCALE

9

dish
wireless.

5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120



TRILEAF
architecture | engineering

1515 DES PERES ROAD, STE 200
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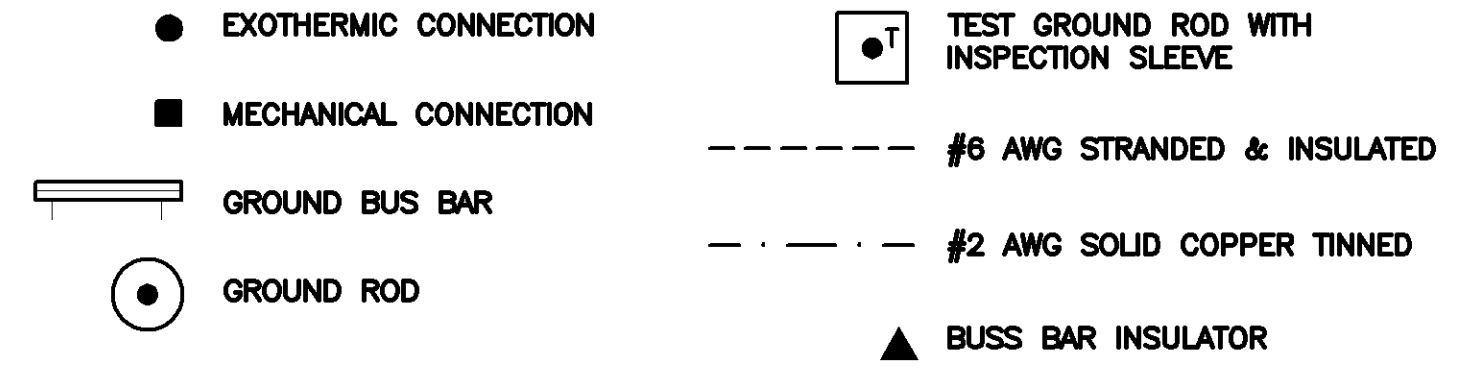
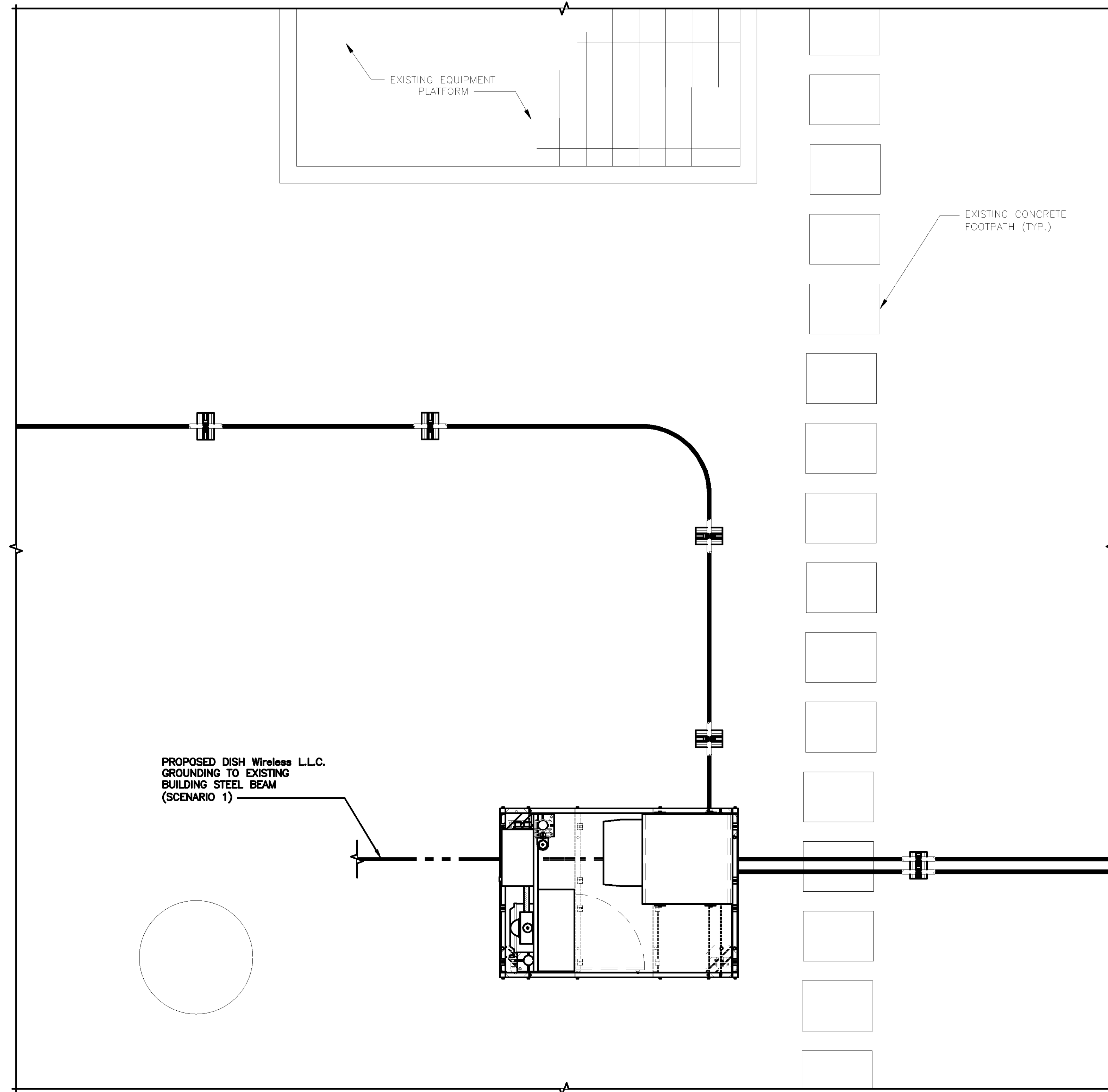
MNMP00388A
4000 SOUTHWEST COURT
BLOOMINGTON, MN 55425

SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER

A-8

PL202300142



GROUNDING LEGEND

1. GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
2. CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND DISH Wireless L.L.C. GROUNDING AND BONDING REQUIREMENTS AND MANUFACTURER'S SPECIFICATIONS.
3. ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.
4. 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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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 #: 51990

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CO	RZ	RZ

RFDS REV #: 5 03/17/2022

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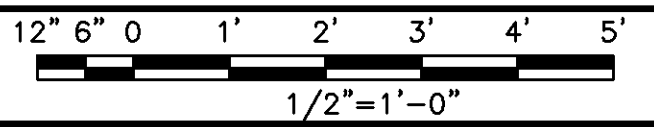
A&E PROJECT NUMBER
705953

DISH Wireless L.L.C.
PROJECT INFORMATION
MNMSPO0388A
4000 SOUTHWEST COURT
BLOOMINGTON, MN 55425

SHEET TITLE
GROUNDING PLANS
AND NOTES

SHEET NUMBER
G-1

GROUNDING PLAN

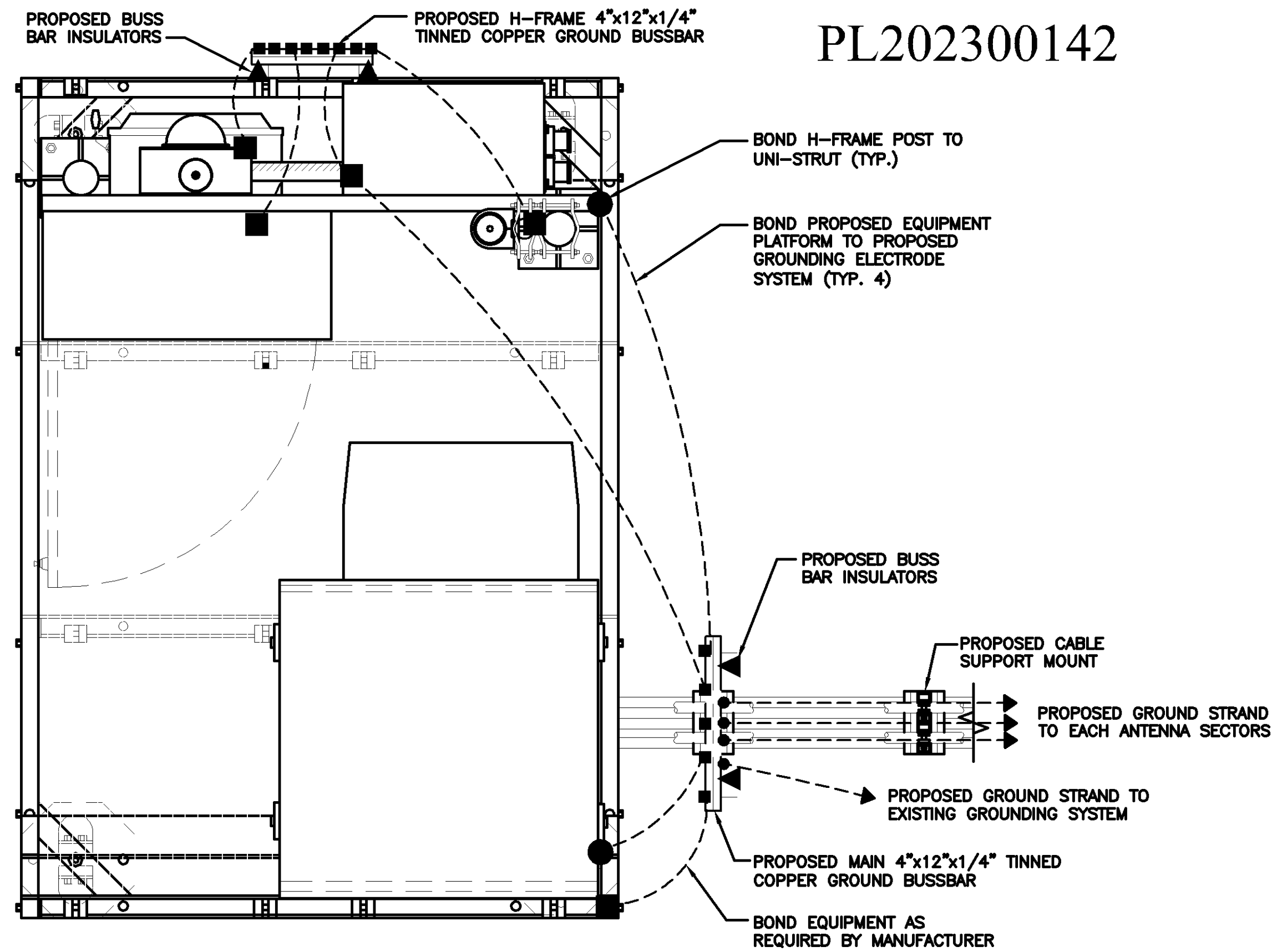


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GROUNDING KEY NOTES

NO SCALE

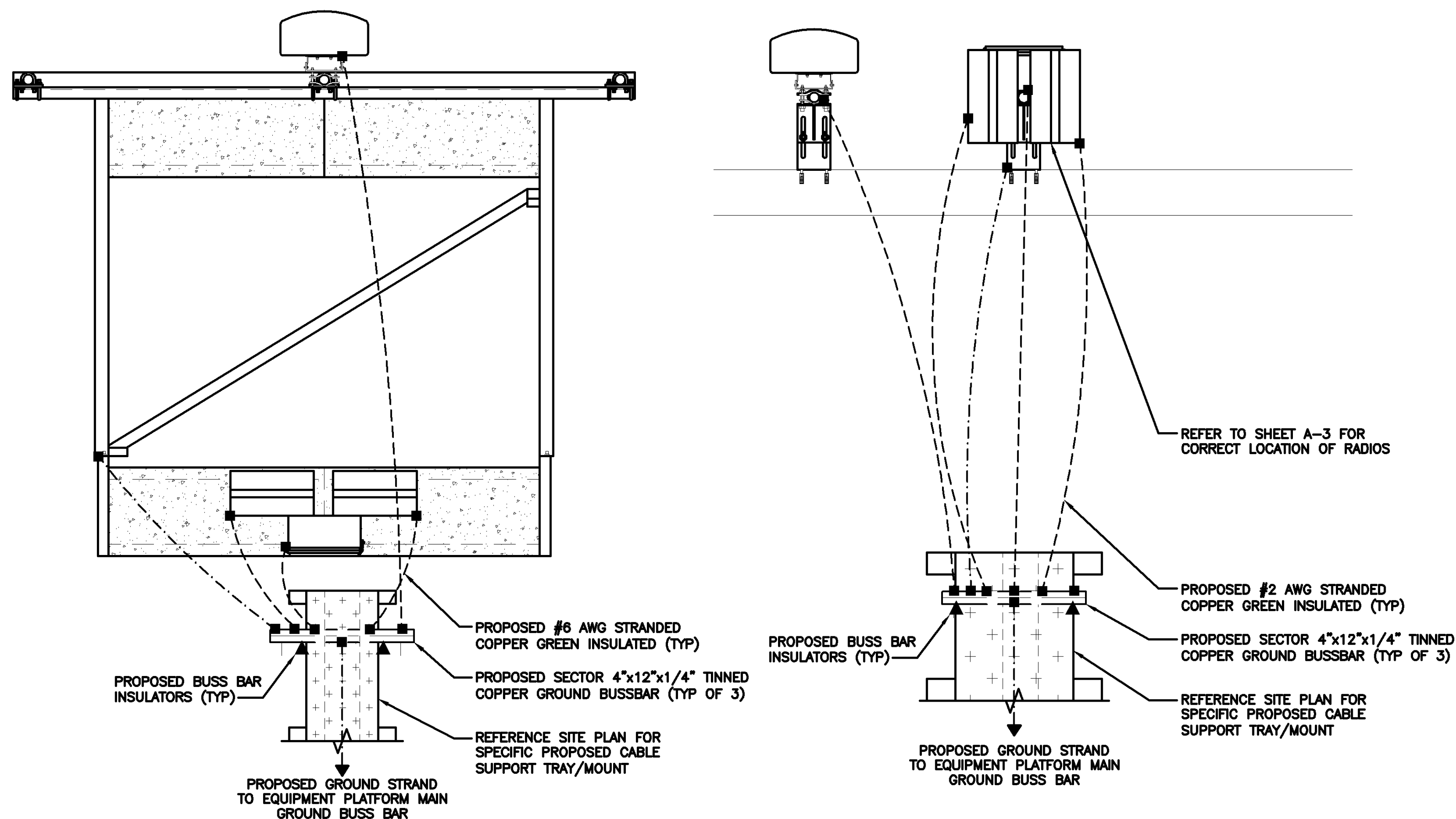
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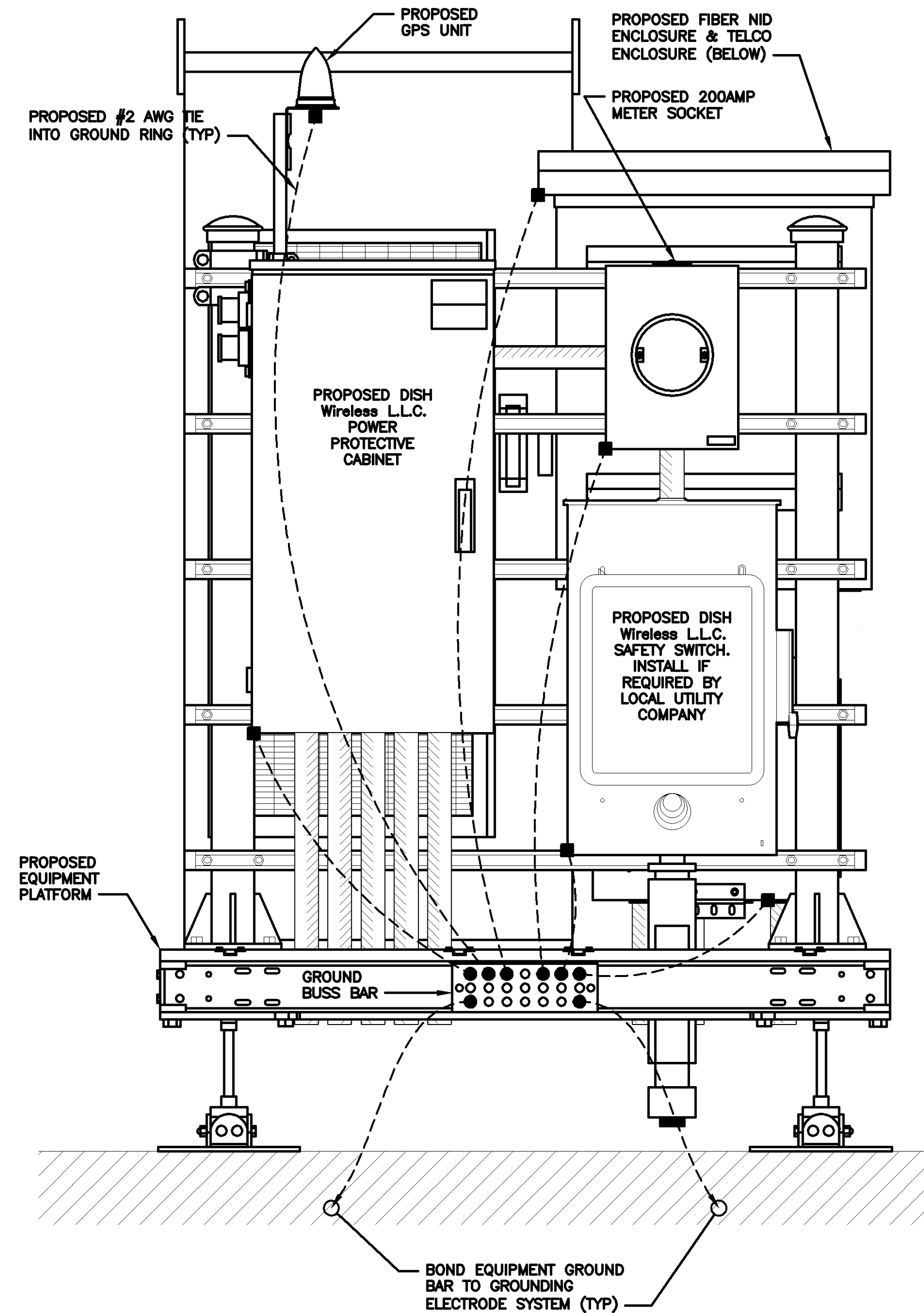
TYPICAL ROOFTOP EQUIPMENT GROUNDING PLAN

NO SCALE 1



TYPICAL ROOFTOP ANTENNA GROUNDING PLAN

NO SCALE 2



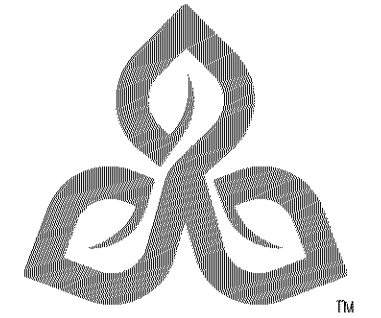
H-FRAME GROUNDING DETAIL

NOTE

EQUIPMENT CABINET OMITTED FOR CLARITY



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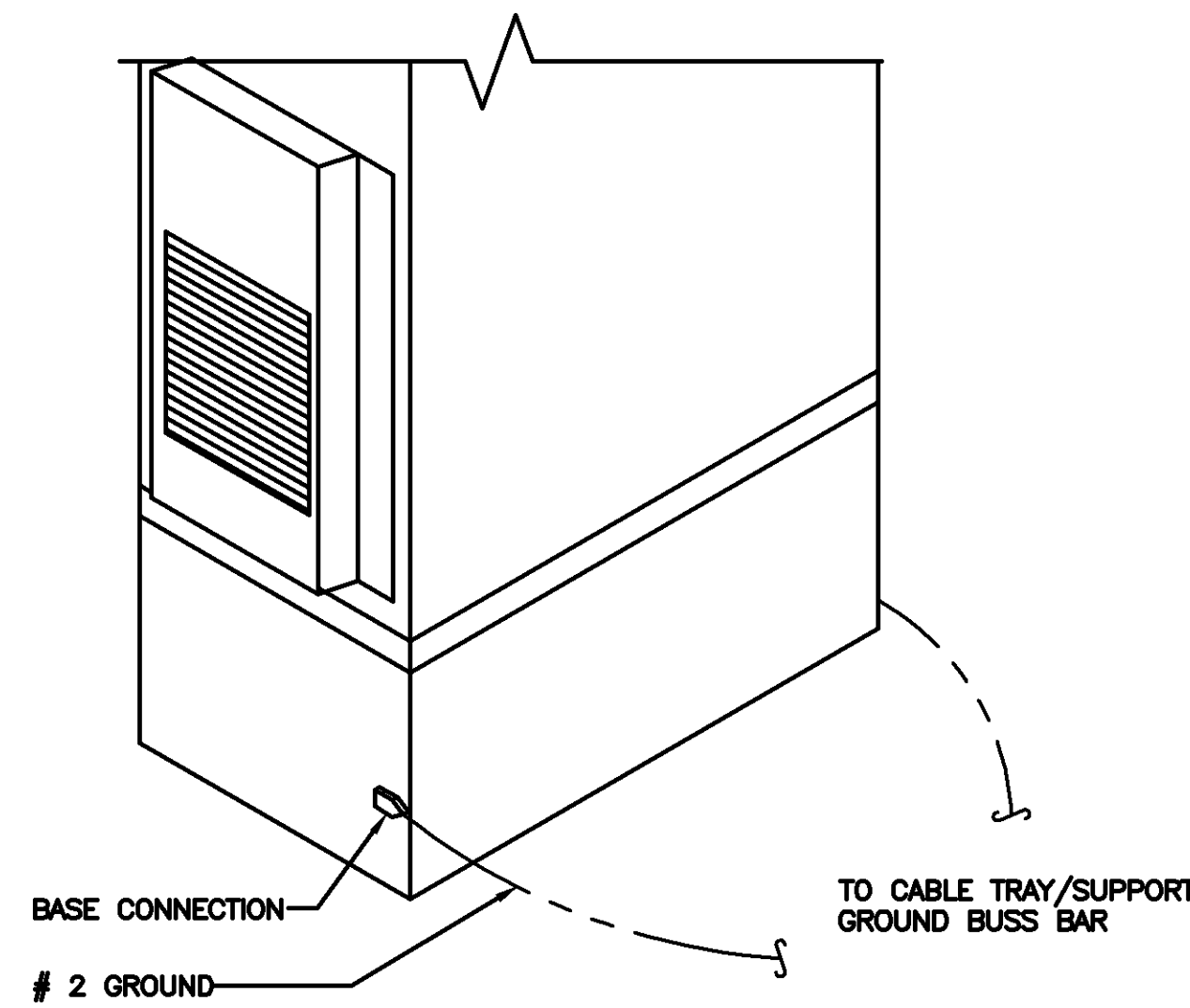
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GROUNDING DETAILS

SHEET NUMBER

G-2

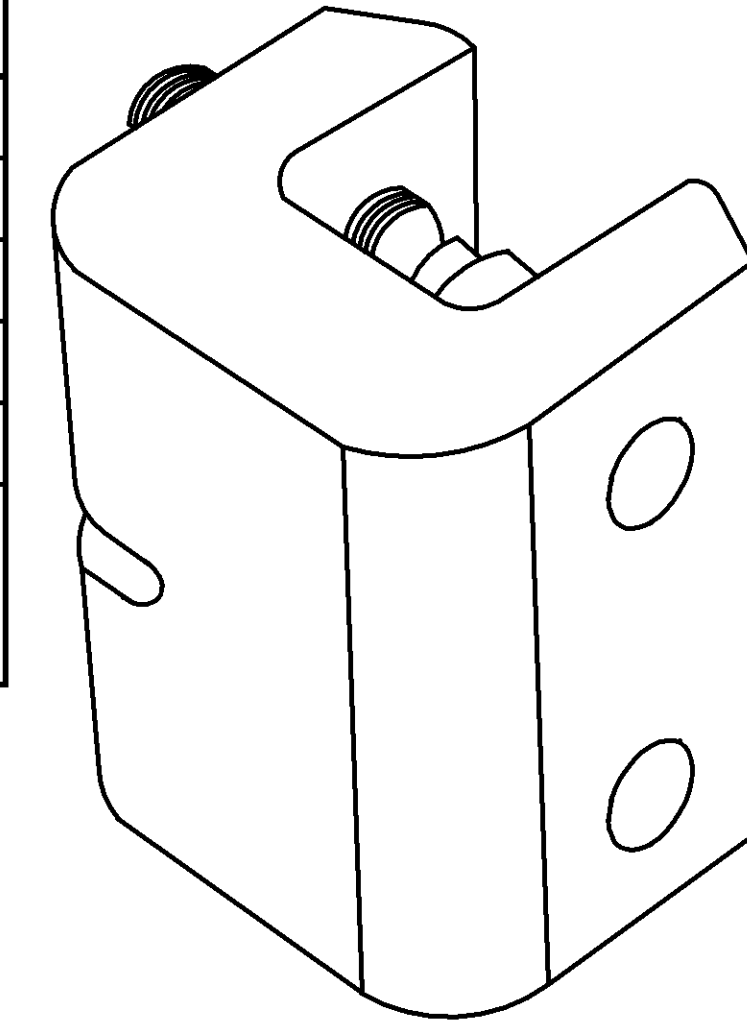
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1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUND BAR. ROUTE CONDUCTORS TO BURIED GROUND RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. ALL EXTERIOR GROUNDING HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. 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).



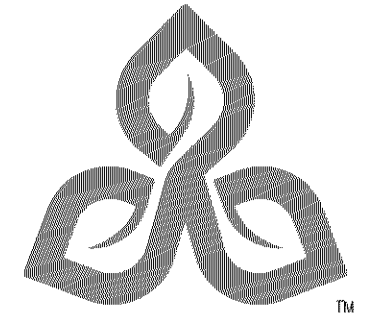
PANDUIT GUBC500-6 UNIVERSAL BEAM GROUNDING, CLAMP	
COPPER CONDUCTOR SIZE RANGE AWG	#6-500
FLANGE THICKNESS INCHES	0.250-0.675
STUD SIZE INCHES	1/2"
THREAD SIZE	1/2"-13
DIMENSIONS (LxWxH)	3.15"x 2.13"x 2.50"

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



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SHEET TITLE
GROUNDING DETAILS

SHEET NUMBER

G-3

TYPICAL GROUNDING NOTES

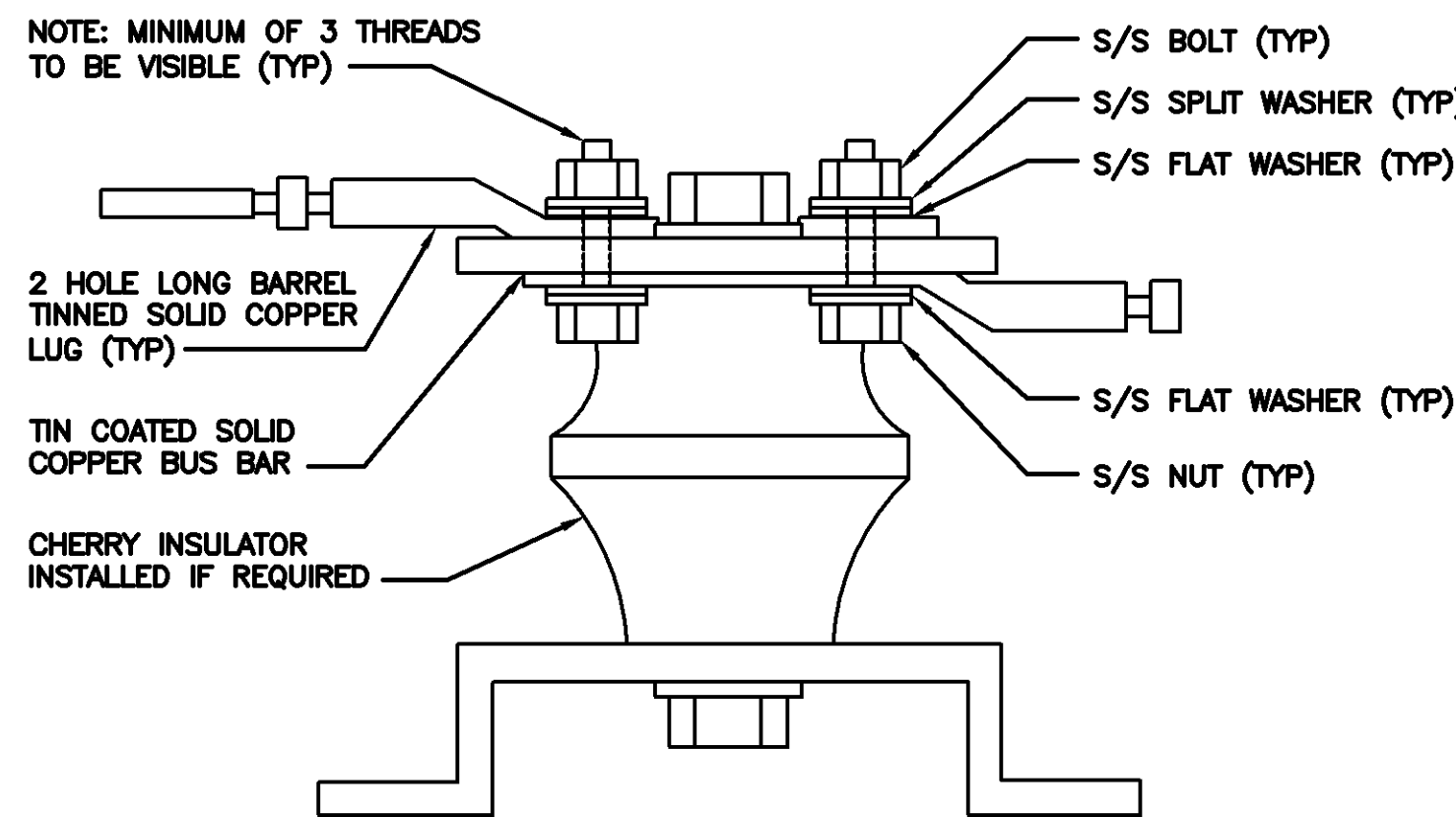
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OUTDOOR CABINET GROUNDING

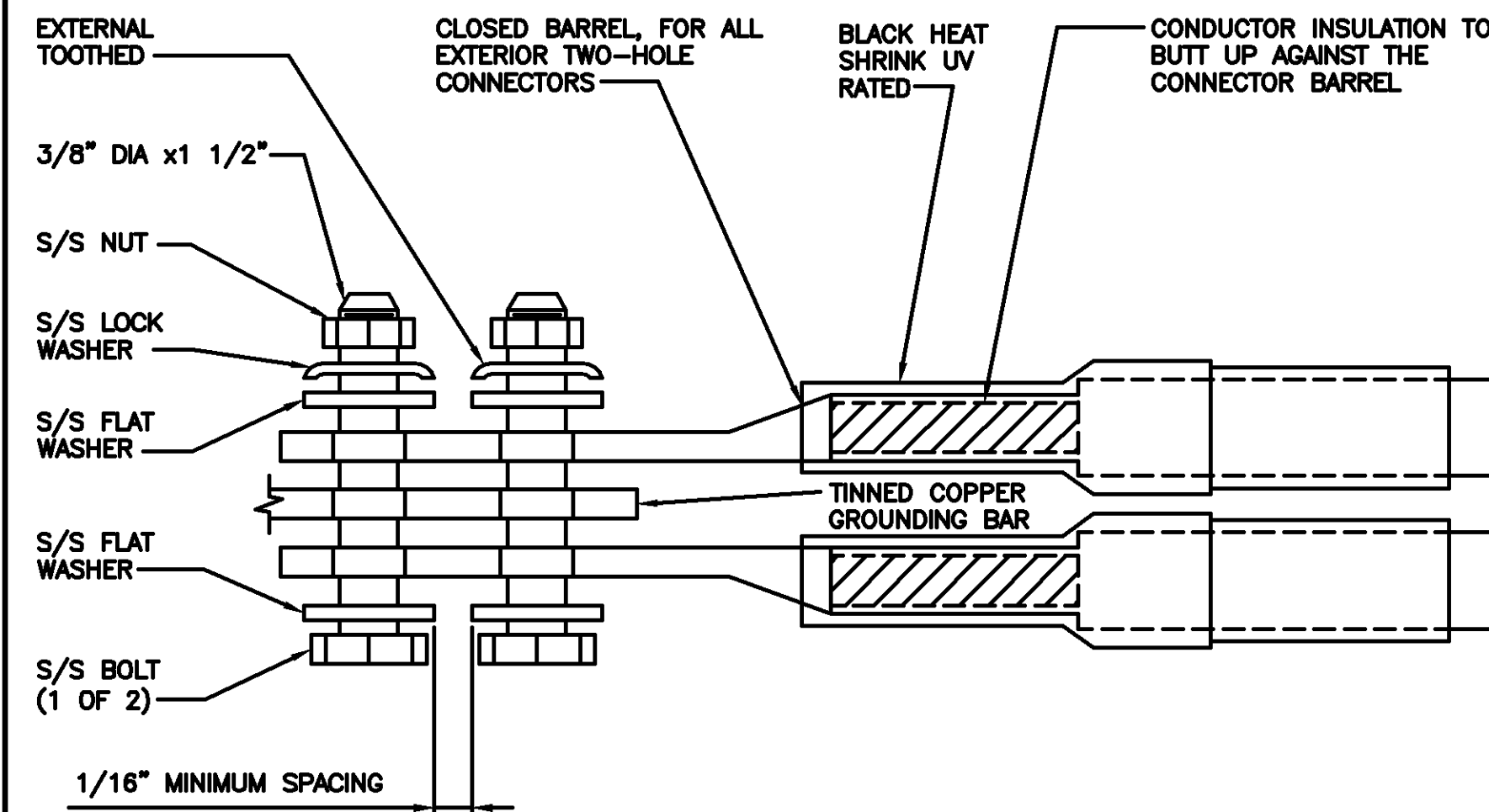
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BUILDING STEEL GROUNDING DETAIL

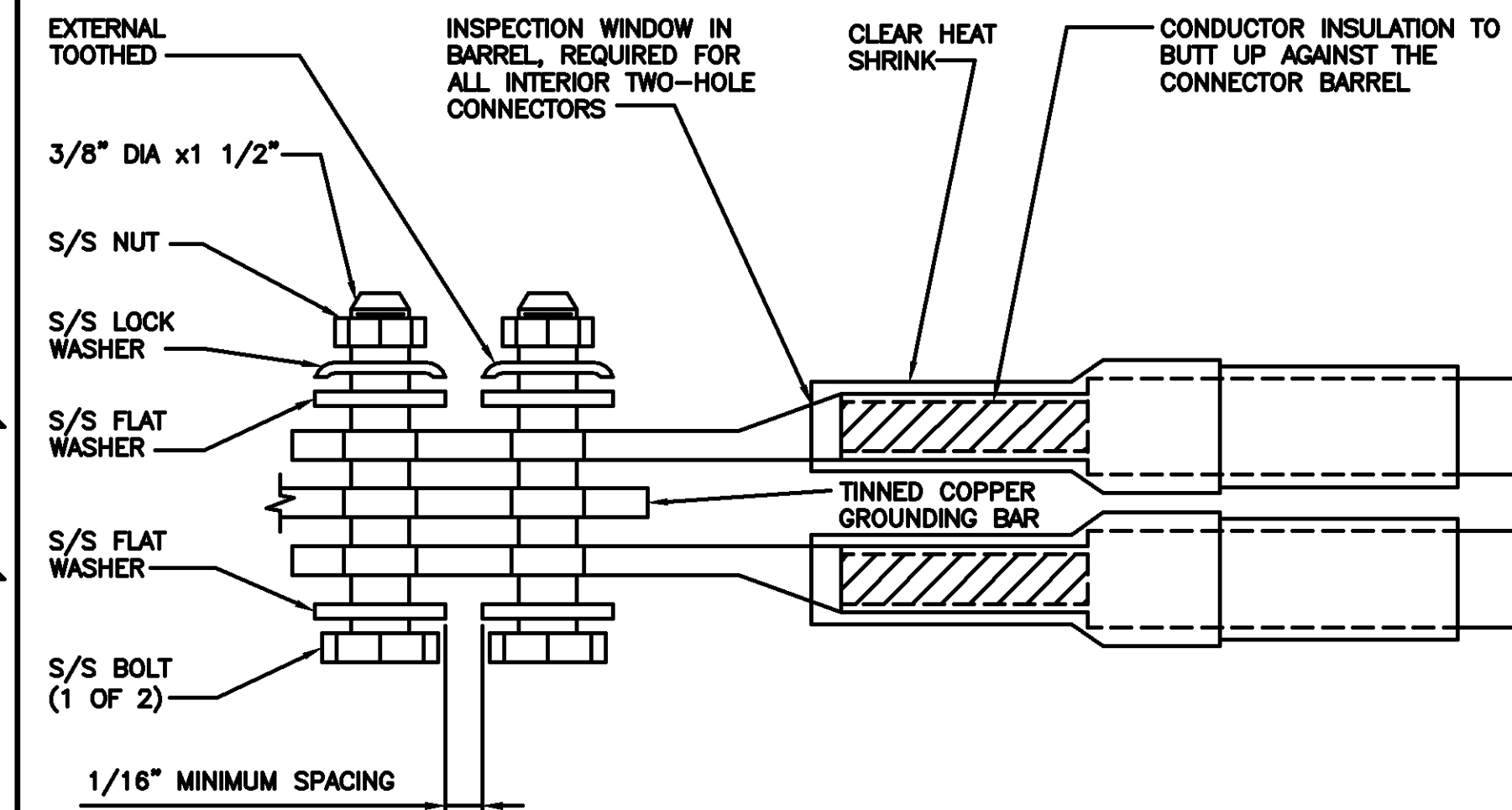
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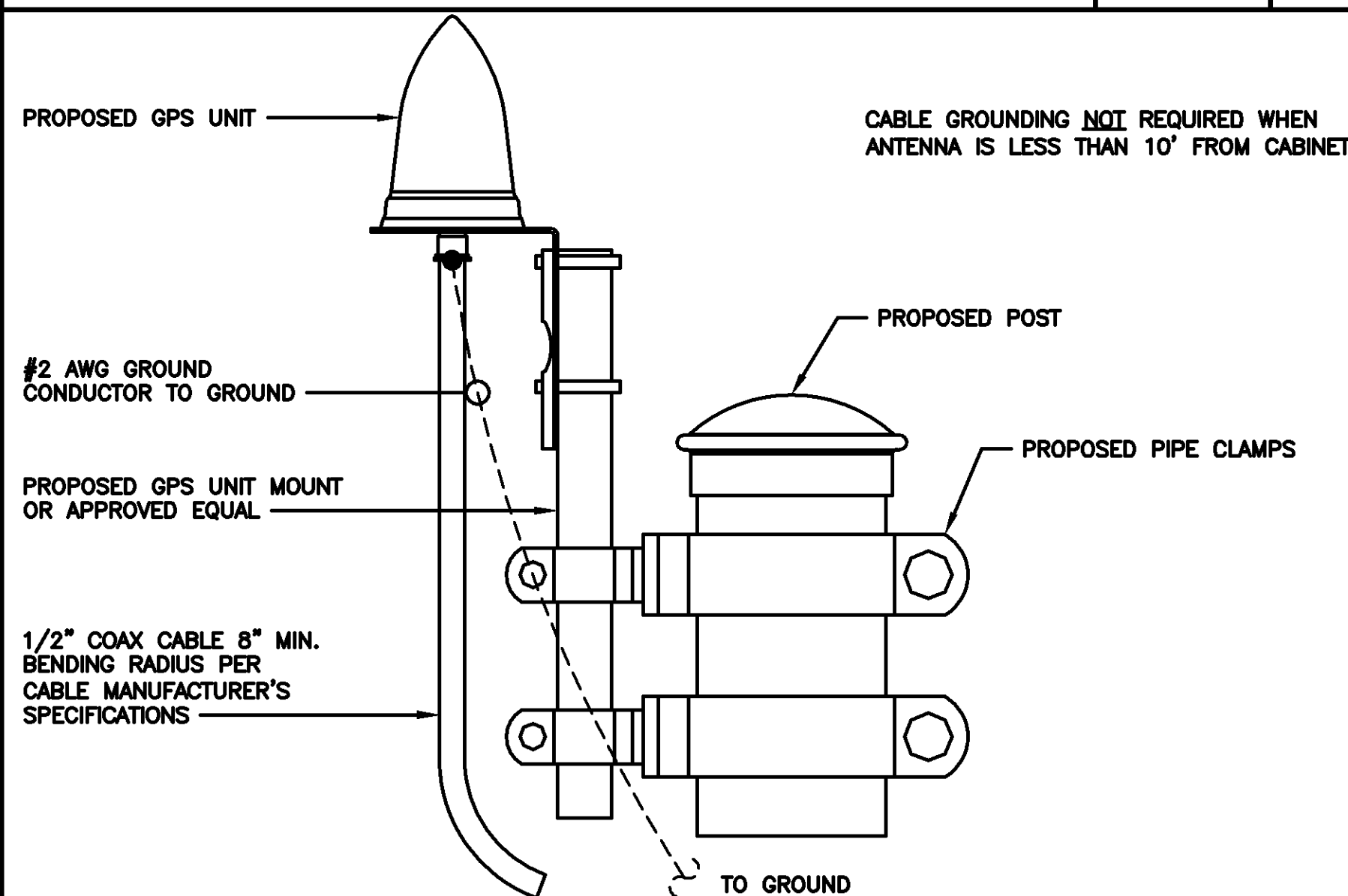


NO SCALE 5



TYPICAL INTERIOR TWO HOLE LUG

NO SCALE 6



TYPICAL GPS UNIT GROUNDING

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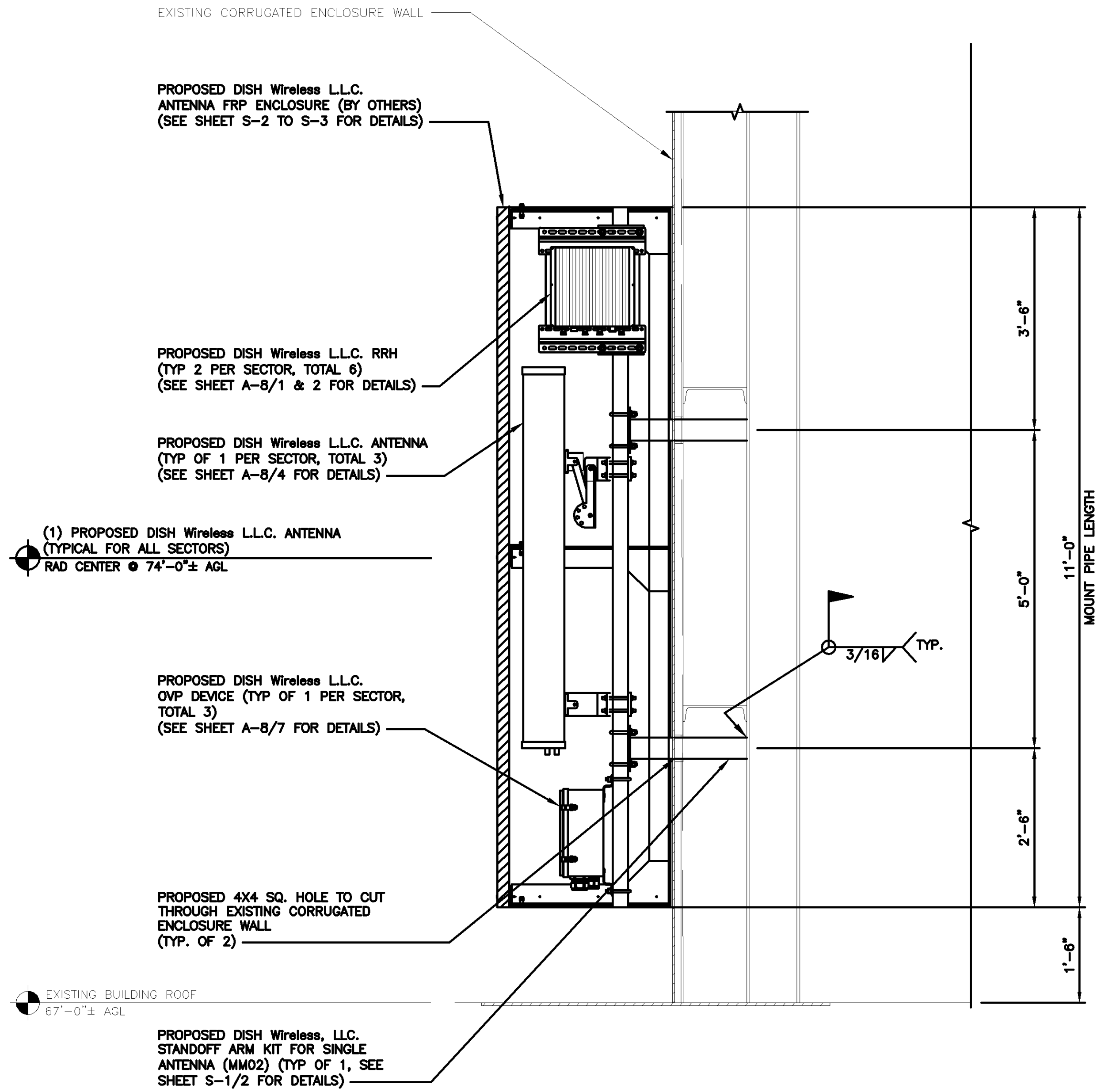
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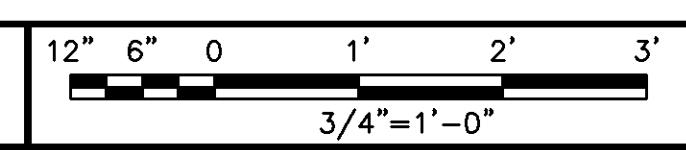


NOTES

- 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

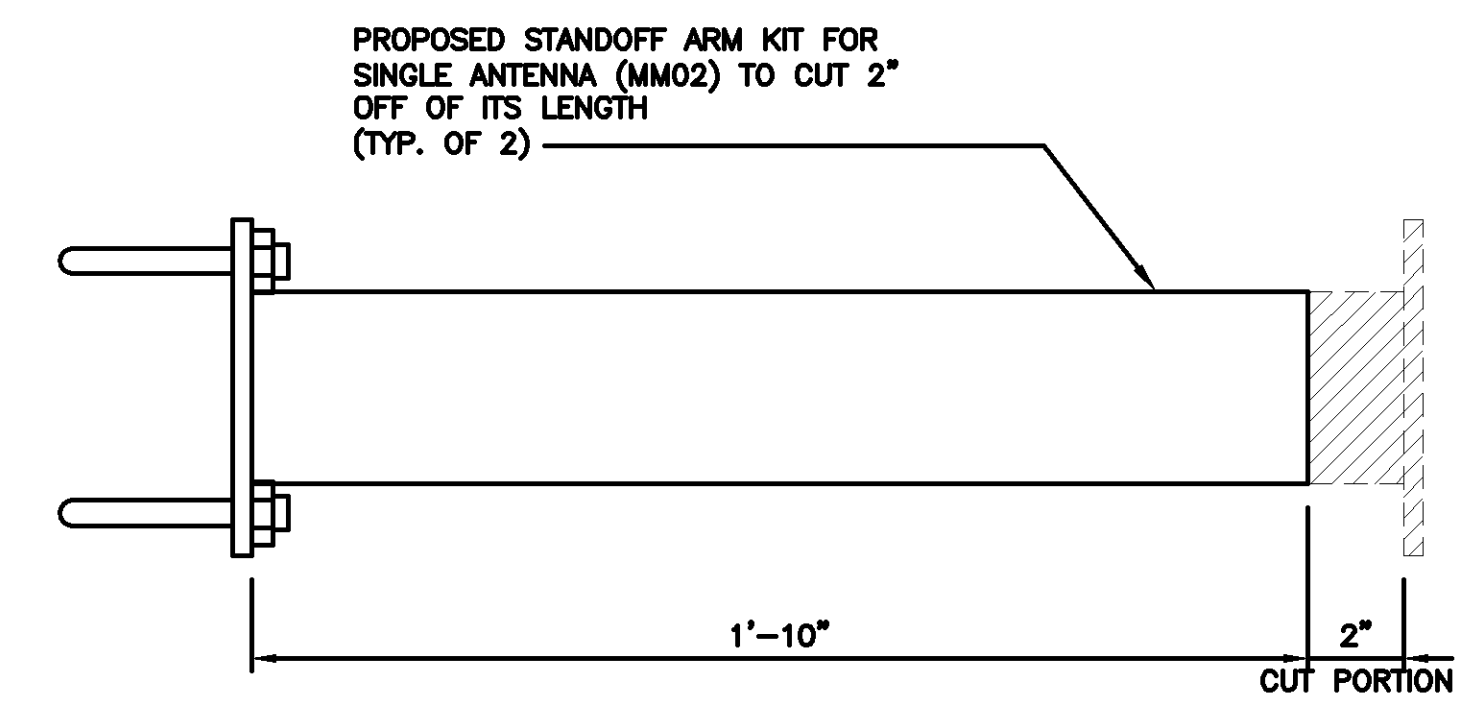
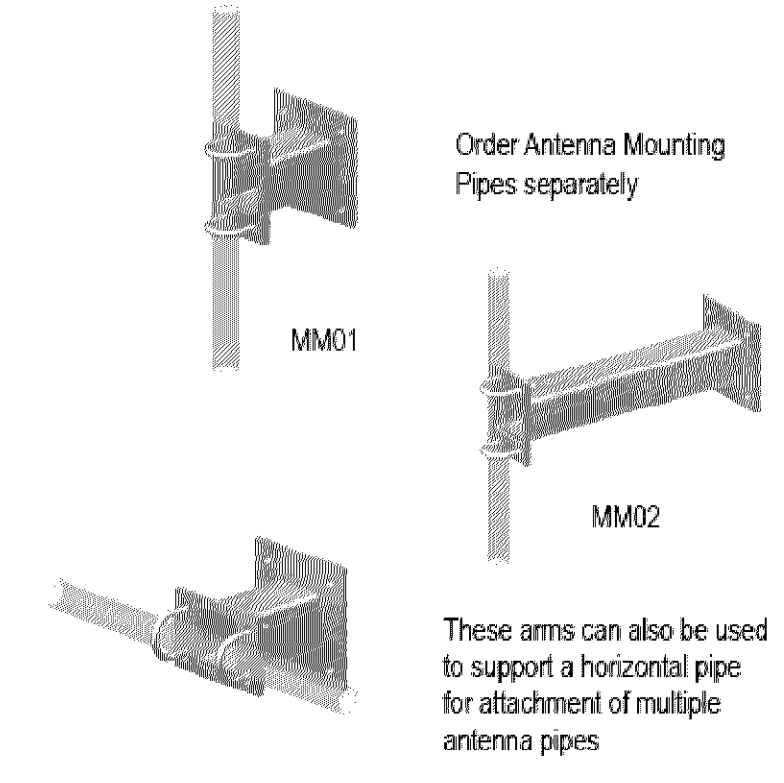


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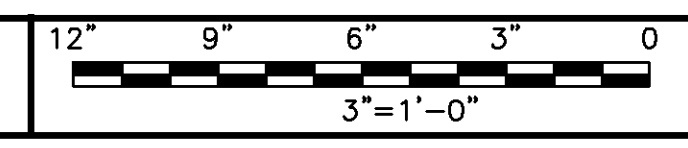
Standoff Arm Kits for Single Antenna

- 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

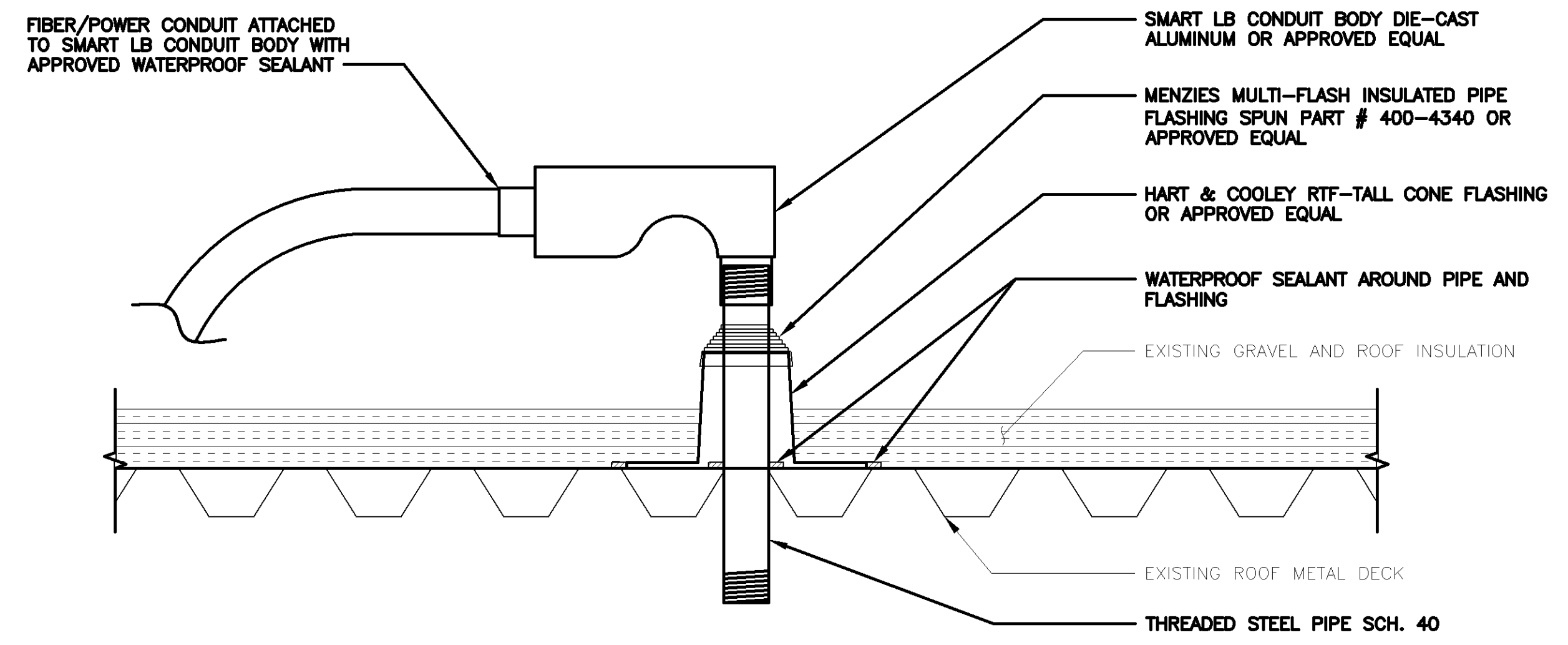
Part #	Description	Weight	Price
MM01	8" Support Arm	37 lb	\$209.00
MM02	24" Support Arm	51 lb	\$253.00
MM03	36" Support Arm	62 lb	\$280.00



STANDOFF ARM KIT FOR SINGLE ANTENNA (MM02) DETAIL



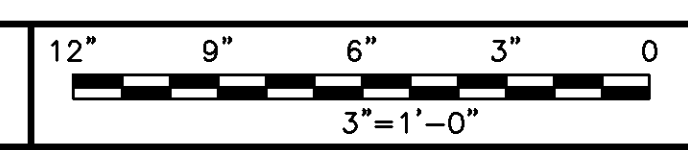
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NOTES

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- 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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Print Name: ROGER ALLAN ZIMMER
Signature: *Roger Allan Zimmer*
Date: 8-17-23 License #: 51990

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DRAWN BY: CHECKED BY: APPROVED BY:
CO RZ RZ

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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
STANDOFF ANTENNA MOUNT
& ROOF PENETRATION DETAIL

SHEET NUMBER
S-1

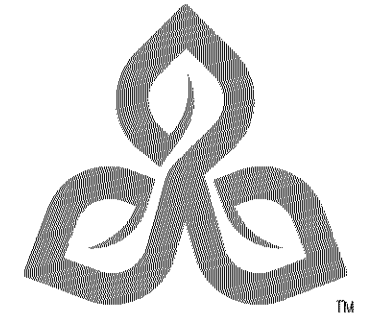
PL202300142

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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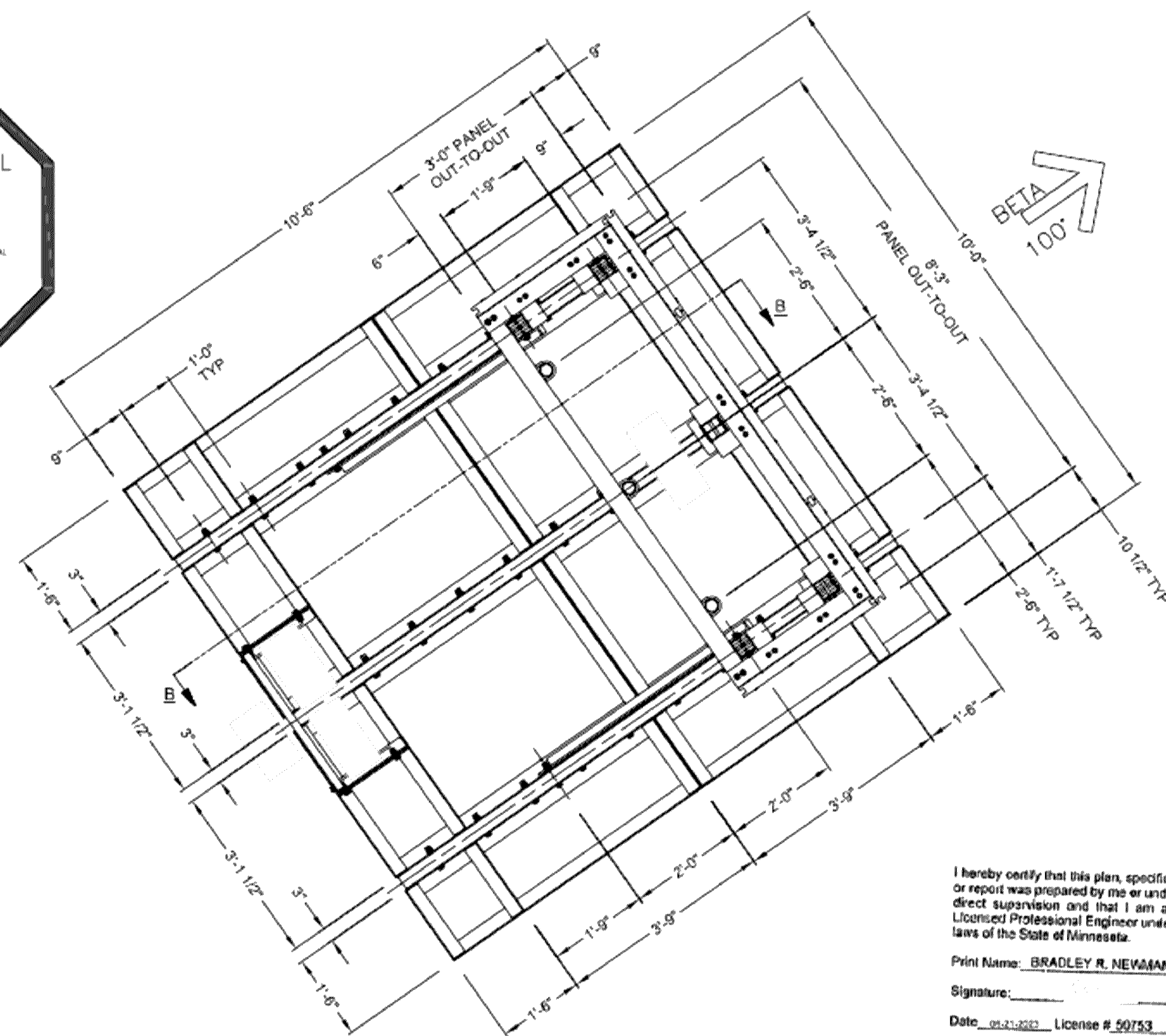
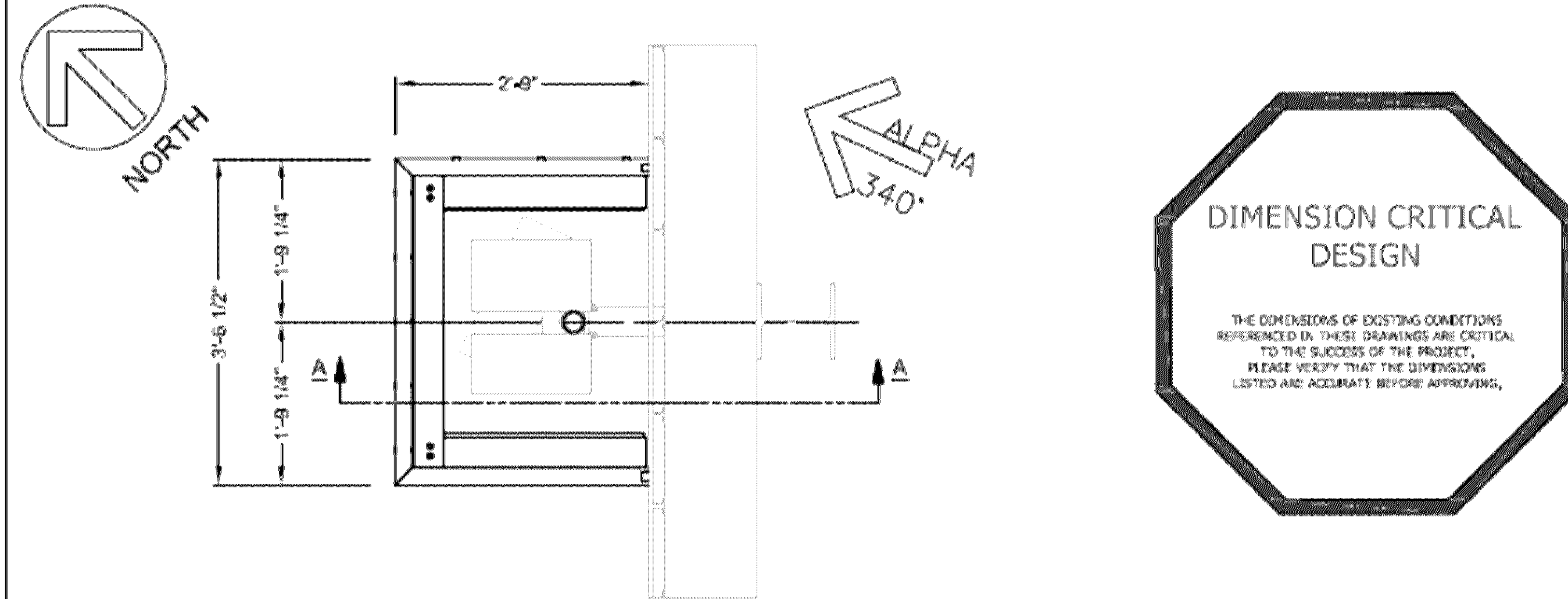
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SHEET TITLE
ASSEMBLY - LAYOUT

SHEET NUMBER

S-2

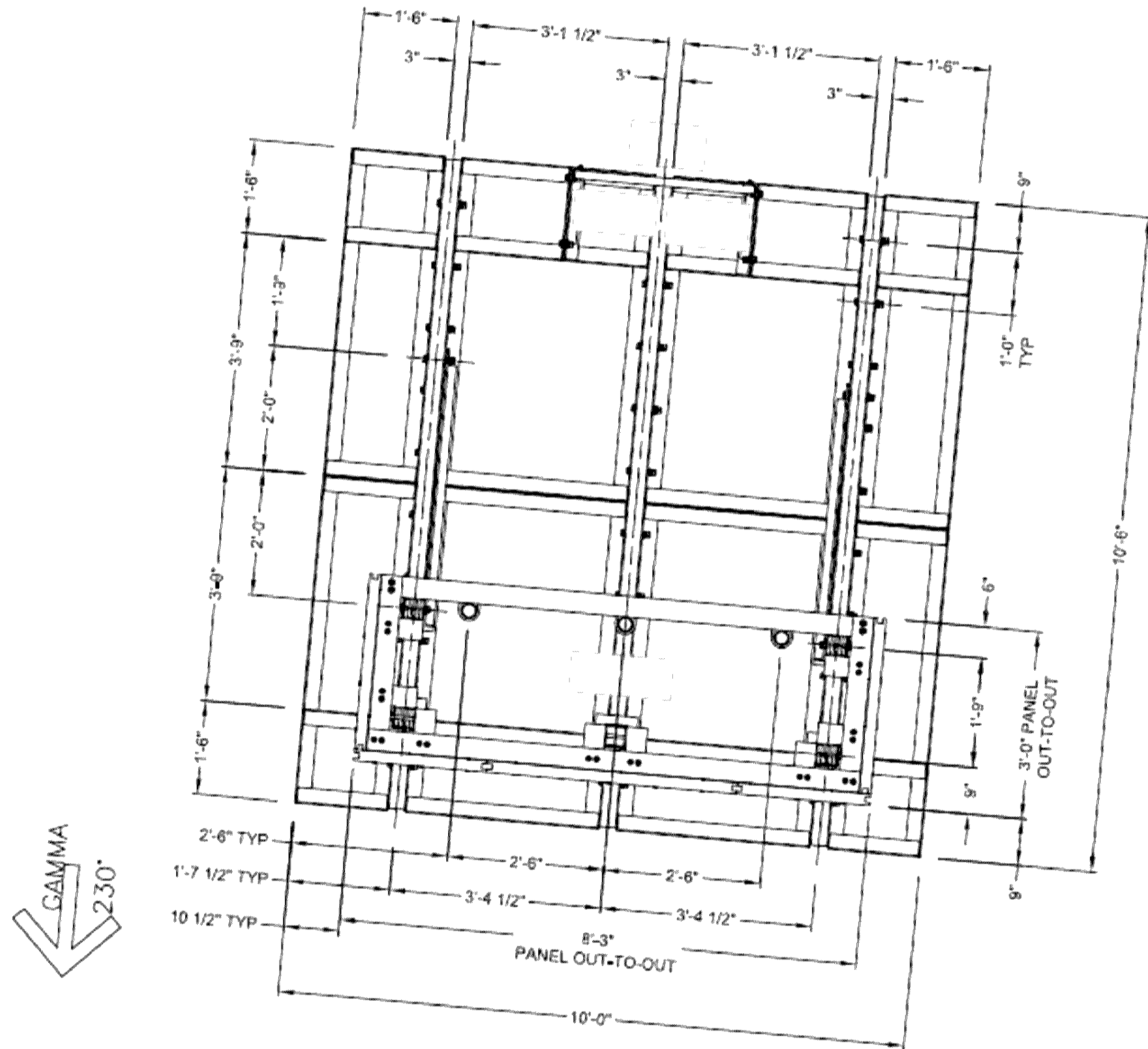


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Print Name: BRADLEY R. NEWMAN

Signature: _____

Date: 06-21-2023 License # 50753



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REVISED	NB+C

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

ALL BENDING TOLERANCES: ± 1.0°
THIRD ANGLE PROJECTION

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RAYCAP #DW23-00846H-35R0	S1	C
	DATE: 06-21-2023	

ASSEMBLY - LAYOUT

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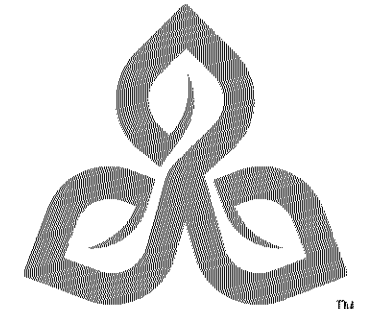
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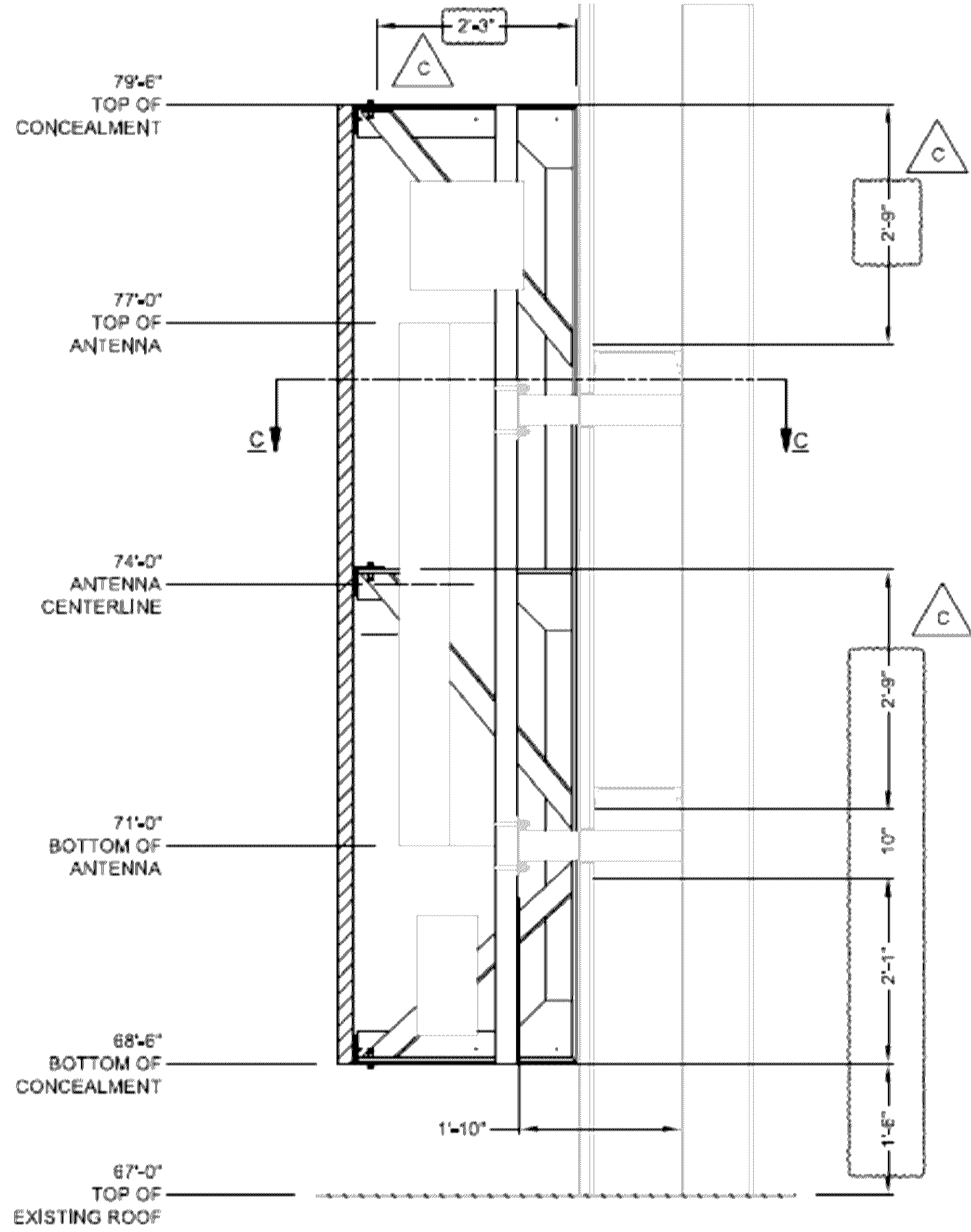
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PROJECT INFORMATION

MNMSP00388A
4000 SOUTHWEST COURT
BLOOMINGTON, MN 55425

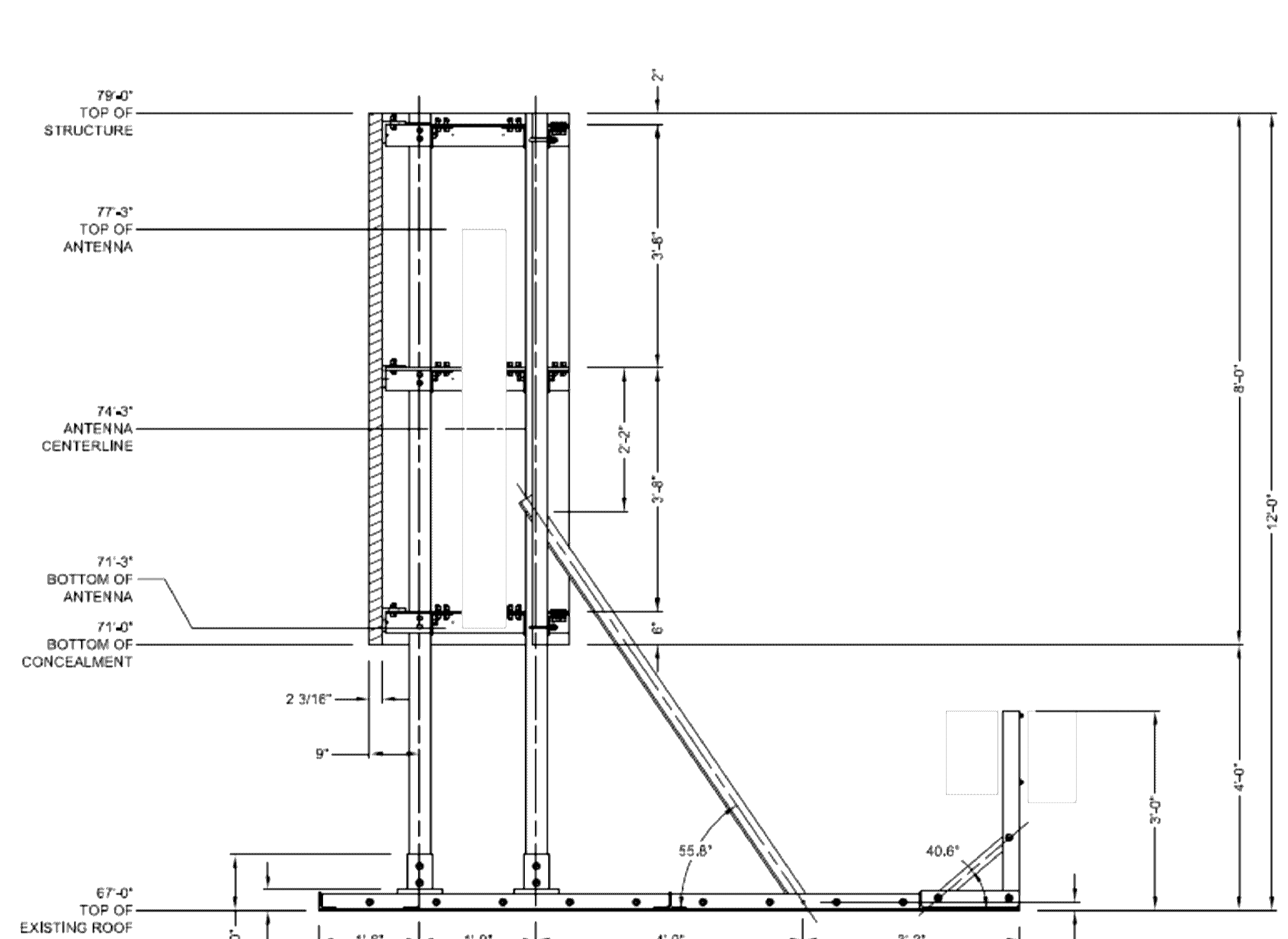
SHEET TITLE
ASSEMBLY - ELEVATIONS

SHEET NUMBER

S-3



SECTION A-A



SECTION B-B

NOTES:

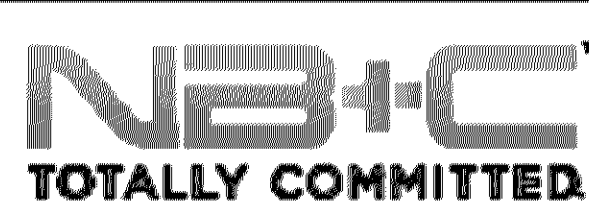
1. THE INTEGRITY OF THE EXISTING STRUCTURE MUST BE VERIFIED BY OTHERS.
2. DIMENSIONS OF THE EXISTING STRUCTURE ARE BASED UPON DRAWINGS BY TRILEAF CORPORATION DATED 04-11-2023 AND HAVE NOT BEEN PHYSICALLY VERIFIED BY RAYCAP. VERIFICATION OF THESE DIMENSIONS IS THE RESPONSIBILITY OF THE CUSTOMER.
3. THE 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 ENGINEERING SERVICES, LLC.
609 MARSHALL DR. #100
BLOOMINGTON, MN 55425
612-895-7200

DRAWN	DSP	Raycap 7555-A PALMETTO COMMERCE PARKWAY NORTH CHARLESTON, SC 29420 USA		
DESIGNED	ARS			
REVISED	NB+C		TRILEAF CORPORATION MNMSP00388A 4000 SW COURT BLOOMINGTON, MN 55425	
DRAWING NOT TO SCALE, ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED			ASSEMBLY - ELEVATIONS	
TOLERANCES: DECIMAL: .X ± 0.1 FRACTIONAL: .XX ± 0.03 .XXX ± 0.01 ANGLES ± 5°				
ALL BENDING TOLERANCES: ± 1.0°				
THIRD ANGLE PROJECTION				
PROPRIETARY INFORMATION: THE INFORMATION CONTAINED WITHIN THIS DRAWING SET IS PROPRIETARY & CONFIDENTIAL BY NATURE. ANY USE OR DISCLOSURE OTHER THAN THAT WHICH RELATES TO RAYCAP, INC. IS STRICTLY PROHIBITED. COPYRIGHT 2023 RAYCAP INC. ALL RIGHTS RESERVED.				