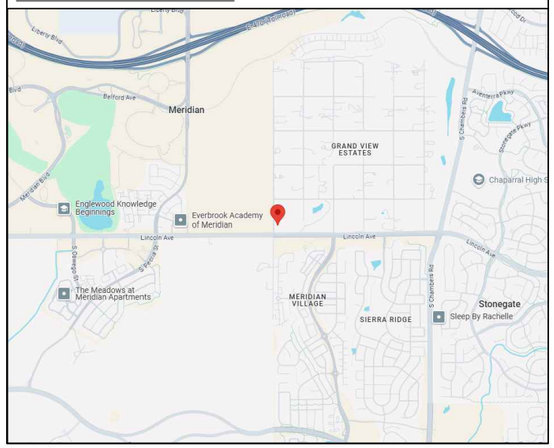
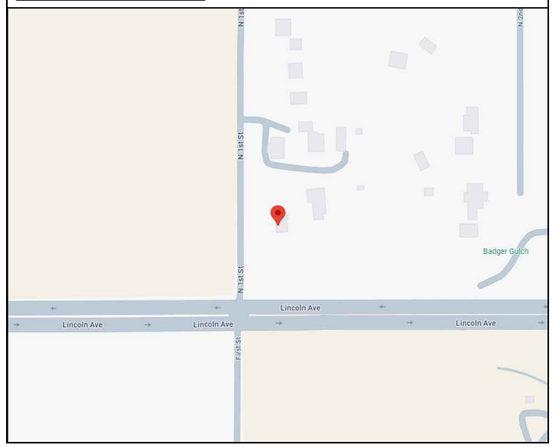
LOCATION MAP



VICINITY MAP



SCOPE OF WORK:

ROOFTOP SCOPE OF WORK:

REMOVE (5) ANTENNAS
REMOVE (10) TMA's
REMOVE (16) 7/8" COAX
REMOVE (3) 3/8" RET CABLES
INSTALL (3) COMMSCOPE KVVSS-65A-R3 ANTENNAS
INSTALL (18) 1/2" COAX FOR LTE
INSTALL (12) 1/2" COAX FOR CBAND
INSTALL (3) 3/8" RET CABLES

GROUND SCOPE OF WORK:

REMOVE (12) RRU's
REMOVE (6) DIPLEXERS
REMOVE (1) FLX21 CABINET & RELOCATE SIAD
REMOVE (2) CXDF 48-24/2KW COVERTERS
REMOVE (24) POWERSAFE SBS170F BATTERIES
INSTALL (1) GENERIC E\\\ BBU @ DRM
INSTALL (6) C48/58-2000P3 CONVERTERS (NEQ.53011)
INSTALL (16) ENERSYS SBS 190AH BATTERIES
INSTALL (1) FLX21-V2 PURCELL CABINET (CEQ.5175)
INSTALL (3) 4490 B5/B12A RRU's
INSTALL (3) 4890 B25/B66 RRU's
INSTALL (3) 4467 N77 CBAND RRU's
INSTALL (6) KAELUS DBC0051F3V51-2 DIPLEXERS
INSTALL VERTIV -48V/27V VDC BULLET CONV. (CEQ.58254) AND VERTIV 512 RETROFIT CONVERT KIT TO BE INSTALLED WITHIN PDU RACK

CONSTRUCTION CODES

ALL CONSTRUCTION SPECIFIED ON DOCUMENTS SUBMITTED FOR BUILDING PERMIT SHALL COMPLY WITH THE REQUIREMENTS OF THE FOLLOWING:

DOUGLAS COUNTY ADOPTED BUILDING CODE:

- 2021 INTERNATIONAL BUILDING CODE
- 2018 INTERNATIONAL FIRE CODE
- 2021 INTERNATIONAL PLUMBING CODE
- 2021 INTERNATIONAL MECHANICAL CODE
- 2021 INTERNATIONAL FUEL GAS CODE
- 2023 NATIONAL ELECTRICAL CODE
- 2018 INTERNATIONAL ENERGY CONSERVATION CODE

AT&T SITE ID & FA CODE:

COL01350 | 10102201

AT&T SITE NAME:

LINCOLN AVE & 3RD ST

PROJECT:

ERICSSON MODERNIZATION

PREPARED FOR:

AT&T

PROJECT MANAGER:

ANSCO & ASSOCIATES, LLC
SPECIALIZED TELECOMMUNICATIONS SERVICES

PREPARED BY:

PM&A
P. MARSHALL & ASSOCIATES

PROJECT INFORMATION

SITE ADDRESS:	12062 NORTH 1ST STREET PARKER, CO 80134
LATITUDE: LONGITUDE:	39.537194° -104.829583°
JURISDICTION:	DOUGLAS COUNTY
STRUCTURE LANDLORD:	BRIAN VELARDE AND FRANCES C. VELARDE 12062 N. 1ST STREET PARKER, CO 80134 SITE ID: N/A
APPLICANT:	AT&T 7801 FARLEY OVERLAND PARK, KS 66204
PROJECT MANAGER:	ANSCO & ASSOCIATES, LLC 1220 OLD ALPHARETTA ROAD, SUITE 380 ALPHARETTA, GA 30005
ENGINEER:	P. MARSHALL & ASSOCIATES 1000 HOLCOMB WOODS PKWY STE. 210 ROSWELL, GA 30076 CHAD T. WILHOIT, P.E. 678-280-2325

DRAWING INDEX

CALL COLORADO ONE CALL
(800) 922-1987
CALL 3 WORKING DAYS
BEFORE YOU DIG!

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ANSCO & ASSOCIATES, LLC

PM&A
P. MARSHALL & ASSOCIATES

SITE ID:
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FA LOCATION CODE:
10102201

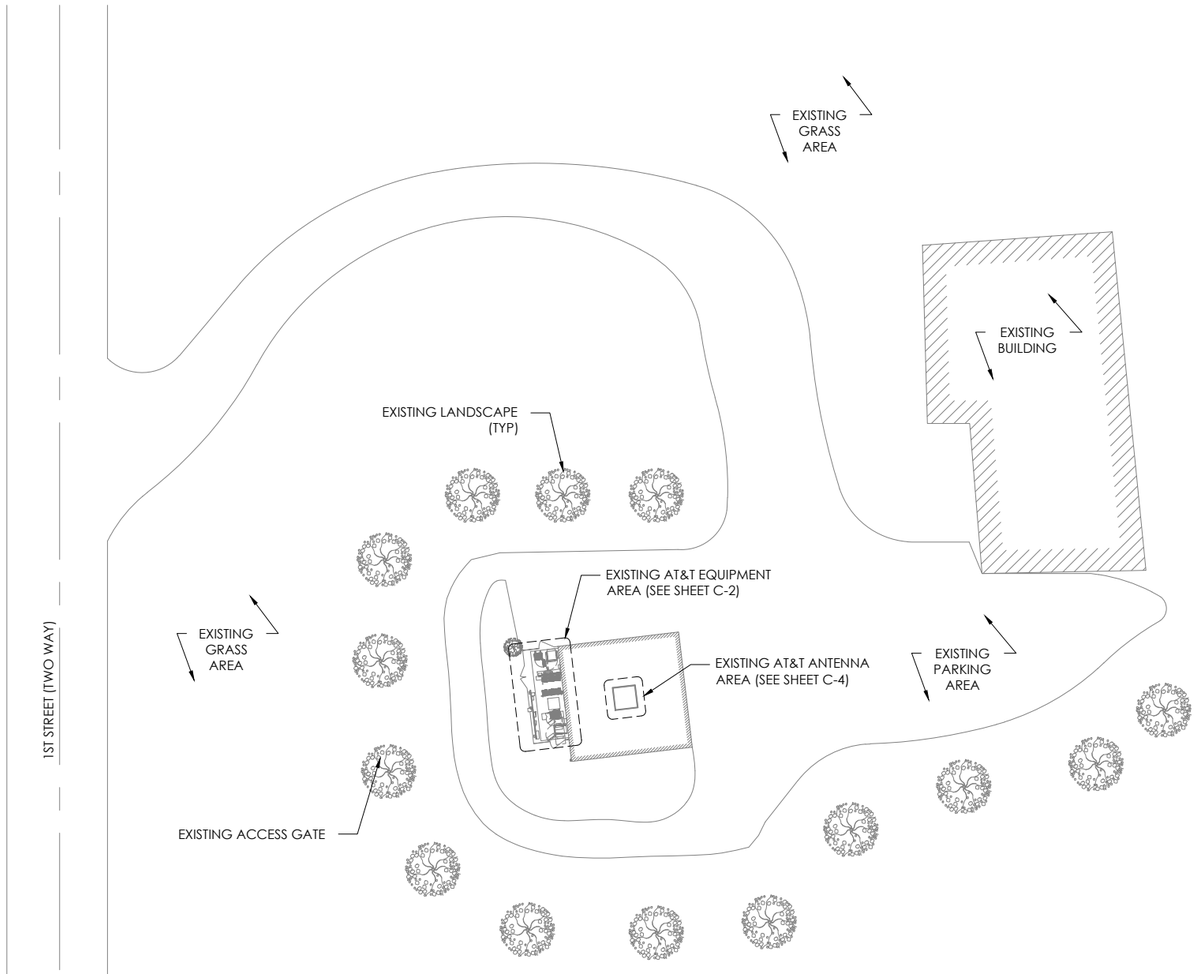
REV	DATE	DESCRIPTION
0	06/10/26	FINAL

DRAWN: DEN
CHECKED: MB
JOB#: 24ANATTRMRM-0121

COLORADO LICENSED
CHAD T. WILHOIT
65169
06/25/2026
PROFESSIONAL ENGINEER

TITLE SHEET & PROJECT INFORMATION

T-1



OVERALL SITE PLAN

20' 10' 0 20'

1"=20'-0" (FULL SIZE)
1"=40'-0" (11x17)

N W E S

AT&T

ANSCO & ASSOCIATES, LLC

PM&A P. MARSHALL & ASSOCIATES

SITE ID:
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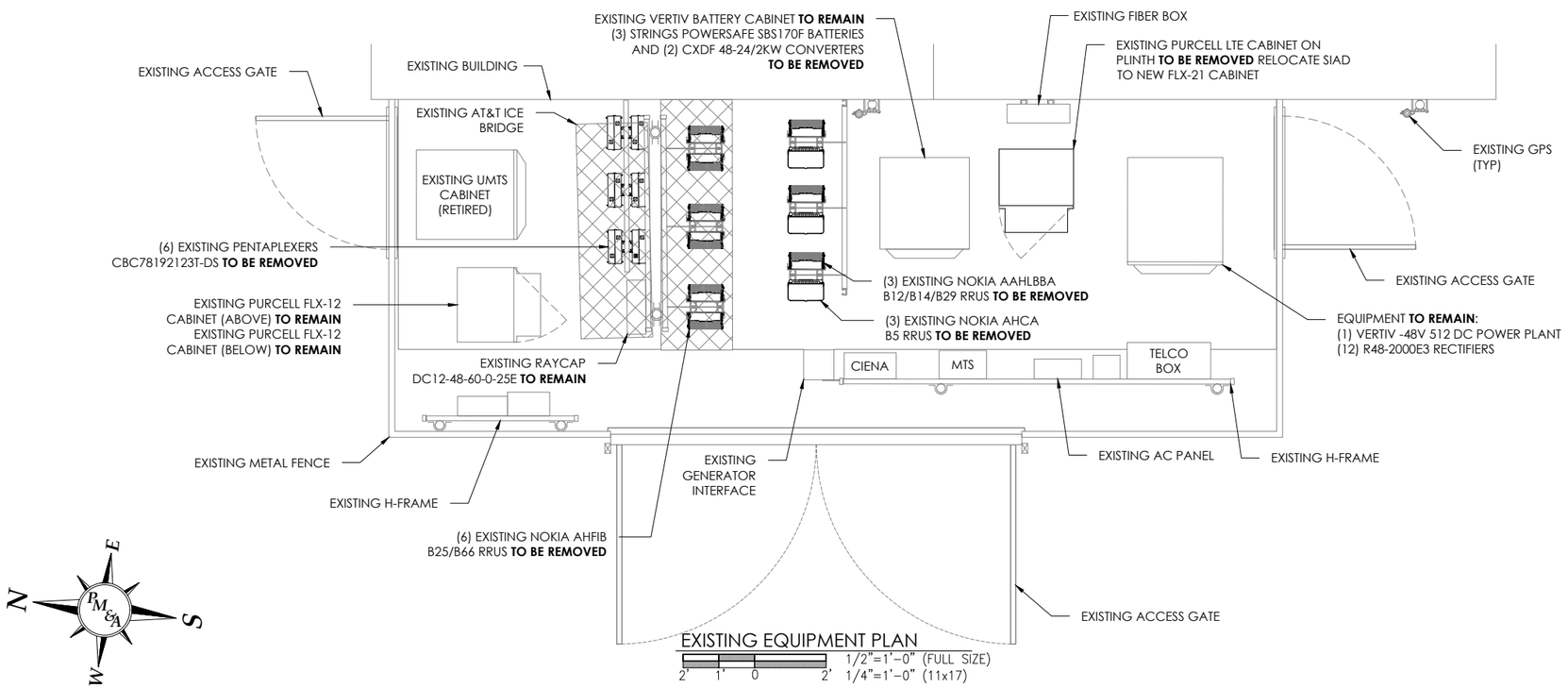
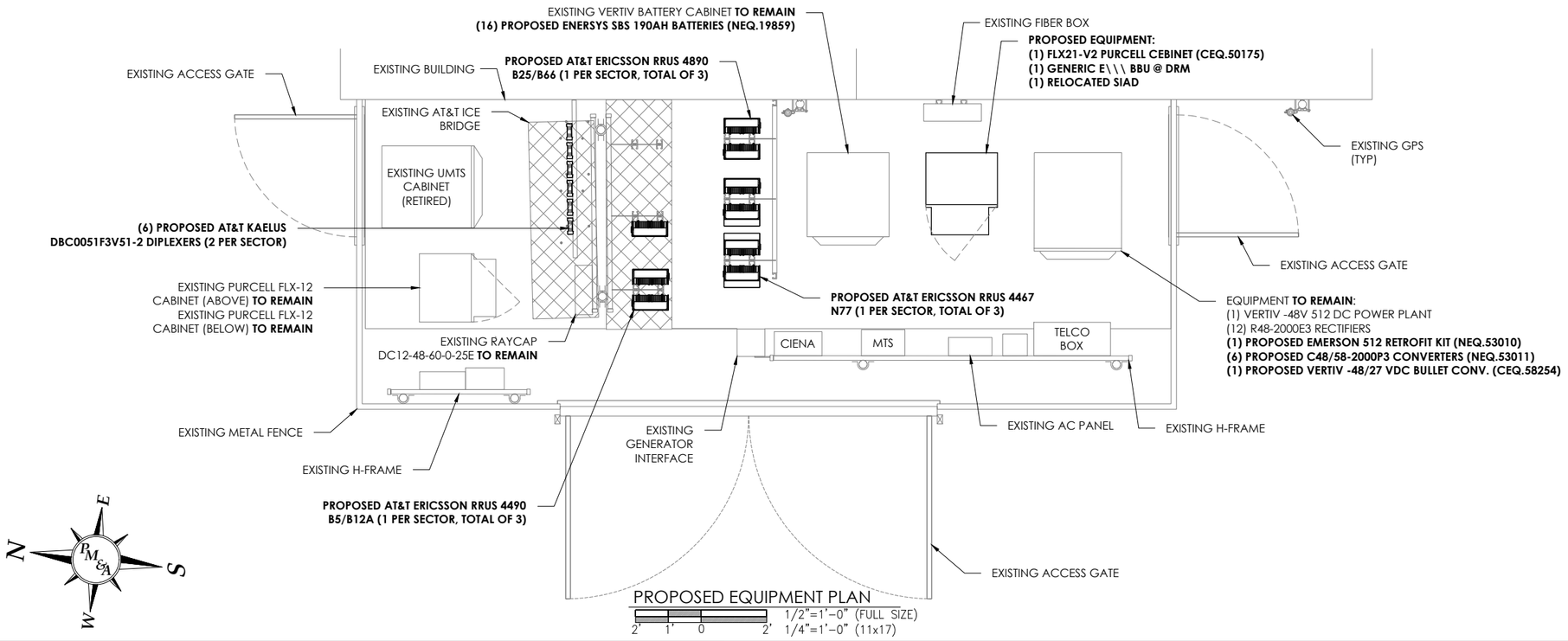
COLORADO LICENSED
BRAD T. WILHOIT
65169
06/25/2026
PROFESSIONAL ENGINEER

OVERALL SITE PLAN

C-1





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PM&A P. MARSHALL & ASSOCIATES

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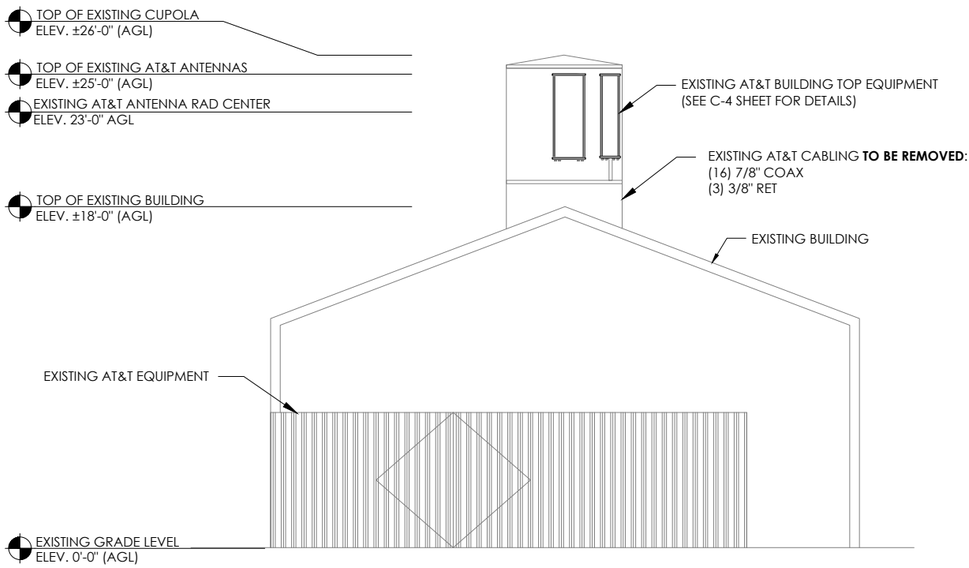
COLORADO LICENSED
DAVID T. WILHOIT
65169
06/25/2026
PROFESSIONAL ENGINEER

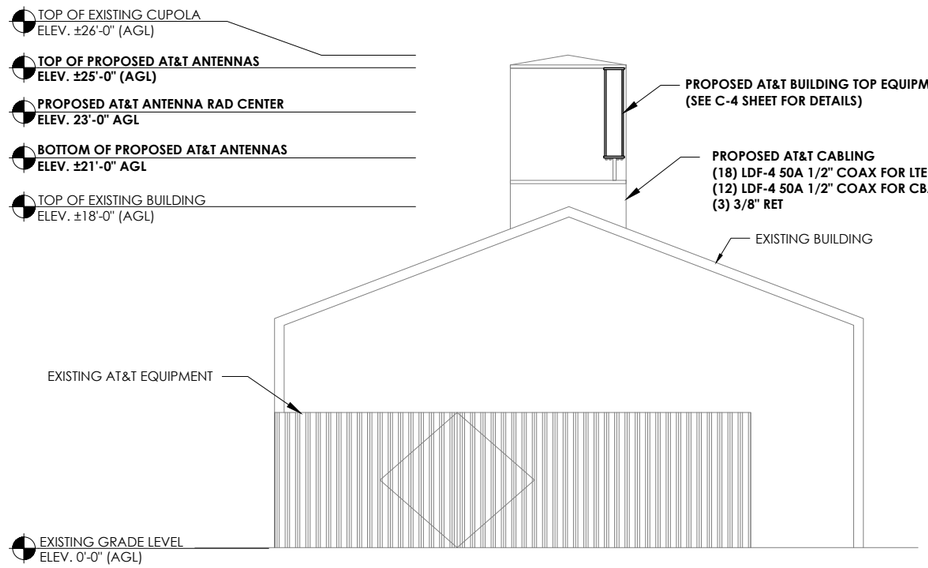
EXISTING AND PROPOSED EQUIPMENT PLANS

C-2



EXISTING BUILDING ELEVATION

4' 2' 0 4' 1/4"=1'-0" (FULL SIZE)
1/8"=1'-0" (11x17)



NEW BUILDING ELEVATION

4' 2' 0 4' 1/4"=1'-0" (FULL SIZE)
1/8"=1'-0" (11x17)

GC SHALL REVIEW AND COMPLY WITH EFI GLOBAL, INC STRUCTURAL AND MOUNT ANALYSIS DATED 06/04/26. JOB # 049.05629-2501095

CURRENT RAD CENTER: 23'-0"
PROPOSED RAD CENTER: 23'-0"
**PROPOSED RAD CENTER IS NOT MOVING FROM CURRENT RAD CENTER AND WILL REMAIN WITHIN BUILDING CUPOLA.

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PM&A
P. MARSHALL & ASSOCIATES

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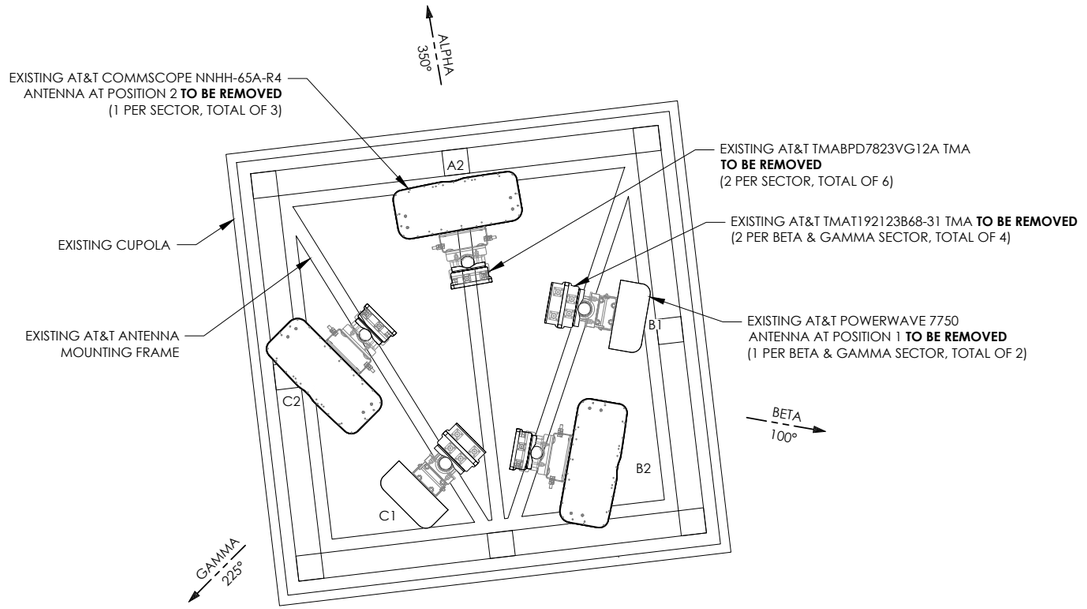
COLORADO LICENSED
CHAD T. WILHOIT
65169
06/25/2026
PROFESSIONAL ENGINEER

EXISTING AND NEW BUILDING ELEVATIONS

C-3



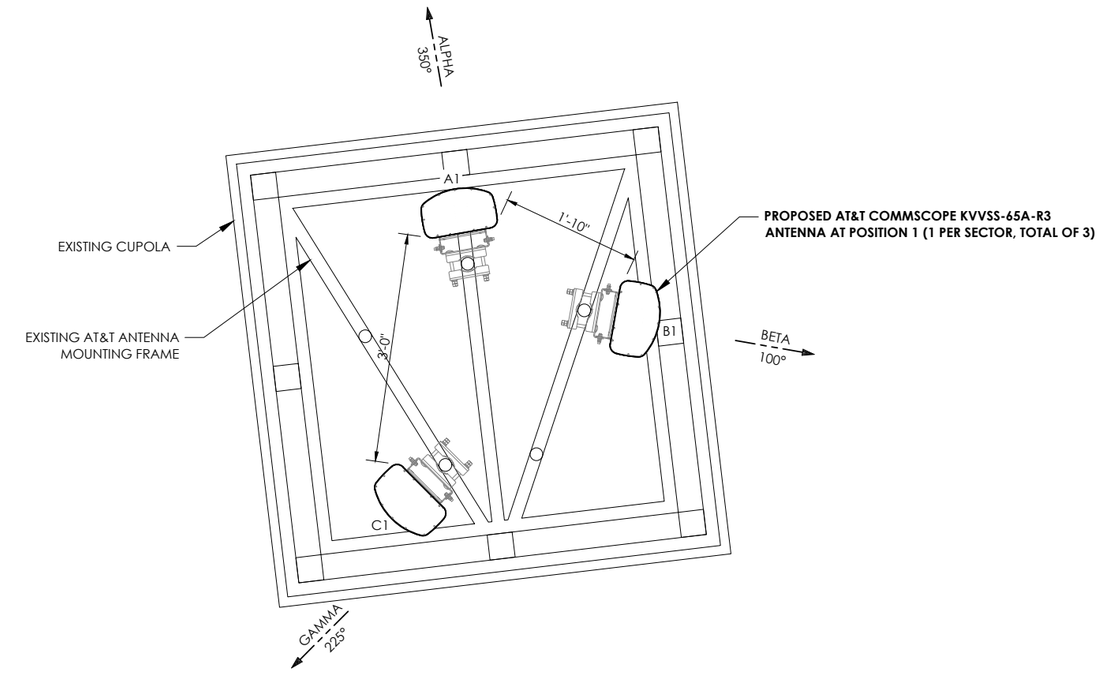
N

EXISTING ANTENNA PLAN

1' 6" 0 1'

1"=1'-0" (FULL SIZE)
1/2"=1'-0" (11x17)

CONTRACTOR SHALL SLIDE ANTENNA MOUNT PIPES AS NEEDED FOR ANTENNA CLEARANCES FROM EXISTING BUILDING FRAMING.



N

FINAL ANTENNA PLAN

1' 6" 0 1'

1"=1'-0" (FULL SIZE)
1/2"=1'-0" (11x17)

NOTES:

- DO NOT INSTALL RAYCAPS OR RRUS IN A MANNER THAT INFRINGES UPON THE TOWER SAFETY CLIMB.
- THE CONTRACTOR SHALL OBTAIN THE FINAL RFDS PRIOR TO CONSTRUCTION.
- REQUIRED MINIMUM OF 24" SEPARATION BETWEEN ANTENNAS (EDGE-TO-EDGE) HORIZONTALLY AS WELL AS CORNER SPACING.
- REQUIRED MINIMUM OF 12" SEPARATION BETWEEN ANTENNA HORIZONTAL MOUNTING PIPE AND ANCILLARY EQUIPMENT.
- ALL ANTENNA FACE SURFACES MUST ALIGN IN THE SAME PLANE WITHIN 2".
- ANTENNA AZIMUTH (AIMING) ACCURACY TO BE WITHIN 3 DEGREES OF RFDS.
- ANTENNA SKEW TO MOUNT ALIGNMENT ACCURACY TO BE WITHIN 3 DEGREES.

CONTRACTOR TO REFER TO THE MOUNT ANALYSIS FOR THIS PROJECT.

AT&T

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ANTENNA ORIENTATION

C-4

RF Information (Leased = LMPS, As-Built = Drone, As-Designed = RFDS | SKU# = Item Number - NEQ.XXXXX/CEQ.XXXXX/ANT.XXXXX)

Leased Antennas

Azimuths:			350/100/225	
Type	SKU#	Qty	RAD	Sector/Position
NNHH-65A-R4		3	23	A-2, B-2, C-2
7750		1	23	B-1
P65-15-XLH-RR		1	23	C-1

As-Built Antennas

Azimuths:			350/100/225	
Type	SKU#	Qty	RAD	Sector/Position
				A-1
REMOVE: NNHH-65A-R4	ANT.16569	1	23	A-2
REMOVE: POWERWAVE 7750	?	1	23	B-1
REMOVE: NNHH-65A-R4	ANT.16569	1	23	B-2
REMOVE: POWERWAVE 7750	?	1	23	C-1
REMOVE: NNHH-65A-R4	ANT.16569	1	23	C-2

Note: Any existing AT&T RF antenna physically present or on a lease that is not listed in the As-Designed Section is a removal from the site. The As-Built Antennas section is produced by the AT&T National BOT from the AT&T RFDS for the site.

As-Designed Antennas

Azimuths:			350/100/225	
Type	SKU#	Qty	RAD	Sector/Position
PROPOSED: KVVSS-65A-R3	ANT.54517	1	23	A-1
PROPOSED: KVVSS-65A-R3	ANT.54517	1	23	B-1
PROPOSED: KVVSS-65A-R3	ANT.54517	1	23	C-1
NOTE: 1 POSTION SECTOR MOUNTS				

Leased Radios

Type	SKU#	Qty	RAD	Sector/Position
AHFIB B25/B66		6		
AHLBBA B12/B14/B29		3		
AHCA B5		3		

As-Built Radios

Type	SKU#	Qty	RAD	Sector/Position
REMOVE: AHFIB B25/B66		6	GROUND	RACK
REMOVE: AHLBBA B12/B14/B29		3	GROUND	RACK
REMOVE: AHCA B5		3	GROUND	RACK
REMOVE ALL EXISTING NOKIA RRHs				

As-Designed Radios

Type	SKU#	Qty	RAD	Sector/Position
PROPOSED: 4490 B5/B12A	CEQ.56841	3	GROUND	A-1, B-1, C-1
PROPOSED: 4890 B25/B66	CEQ.57137	3	GROUND	A-1, B-1, C-1
PROPOSED: 4467 N77 CBAND	CEQ.56901	3	GROUND	A-1, B-1, C-1
NOTE: ALL ERICSSON RRHs PROPOSED				

Leased TMAs

Type	SKU#	Qty	RAD	Sector/Position
TMAT192123B68-31		4		
TMABPD7823VG12A		6		

As-Built TMAs

Type	SKU#	Qty	RAD	Sector/Position
REMOVE: TMAT192123B68-31		4	23	A-B-C
REMOVE: TMABPD7823VG12A		6	23	A-B-C
REMOVE ALL EXISTING TMAs				

As-Designed TMAs

Type	SKU#	Qty	RAD	Sector/Position

Leased Diplexers

Type	SKU#	Qty	RAD	Sector/Position
CQX6192123T-DS-430		6		

As-Built Diplexers

Type	SKU#	Qty	RAD	Sector/Position
REMOVE: CQX6192123T-DS-43		6	GROUND	RACK
REMOVE ALL AT&T PLEXERS				

As-Designed Diplexers

Type	SKU#	Qty	RAD	Sector/Position
PROPOSED: DBC0051F3V51-2	ANT.15271	6	GROUND	A1,B1,C1 (for 4890 RRHs)

Surge Protection Information

As-Built Ground Surge

Type	SKU#	Qty
REMAIN: DC12-48-60-0-25E	CEQ.12659	1

Proposed Ground Surge

Type	SKU#	Qty

Final Ground Surge

Type	SKU#	Qty
REMAIN: DC12-48-60-0-25E	CEQ.12659	1

Leased Tower Surge

Type	SKU#	Qty	RAD	Sector/Position

As-Built Tower Surge

Type	SKU#	Qty	RAD	Sector/Position
N/A GROUND MOUNTED RRH'S				

As-Designed Tower Surge

Type	SKU#	Qty	RAD	Sector/Position
N/A GROUND MOUNTED RRH'S				

Cable/Feedline Information

Leased Fiber Trunks

Type	SKU#	Qty

As-Built Fiber Trunks

Type	SKU#	Qty
N/A GROUND MOUNTED RRH'S		

As-Designed Fiber Trunks

Type	SKU#	Qty
N/A GROUND MOUNTED RRH'S		

Leased DC Power Trunks

Type	SKU#	Qty	Gauge

As-Built DC Power Trunks

Type	SKU#	Qty	Gauge
N/A GROUND MOUNTED RRH'S			

As-Designed DC Power Trunks

Type	SKU#	Qty	Gauge
N/A GROUND MOUNTED RRH'S			

Leased Coax

Type	SKU#	Qty

As-Built Coax

Type	SKU#	Qty
REMOVE: 7/8" COAX BASED ON PAST CDS	A= 4, B=6, C=6	16
REMOVE: 3/8" RET		3

As-Designed Coax

Type	SKU#	Qty
PROPOSED: LDF4-50A - 1/2in coax	ANT.13042	18 (4490 is 2T2R)
PROPOSED: LDF4P-50A-136 - 1/2in cband rated coax	CEQ.54809	12 (These 12 are for the 4467 RRHs.)
Proposed: 3/8in RET cable		3

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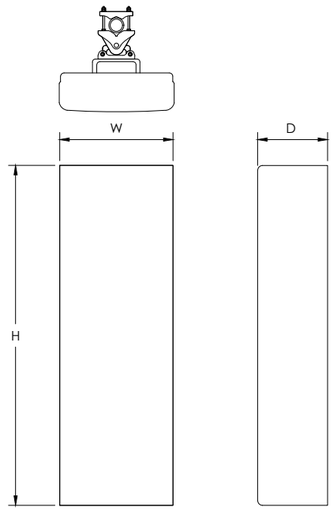
65169
06/25/2026
PROFESSIONAL ENGINEER

RF INFORMATION

C-5

SPECIFICATIONS

MFG / MODEL:	KVVSS-65A-R3
DIMENSIONS:	47.992" H X 11.85" W X 7.126" D
WEIGHT:	87.1 LBS (W/O MOUNTING KIT)

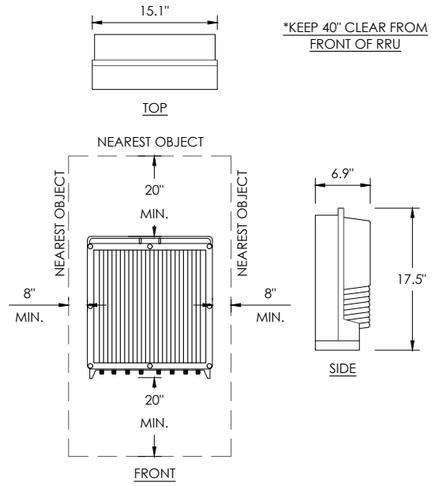


KVVSS-65A-R3 ANTENNA DETAIL

NOT TO SCALE

SPECIFICATIONS

MFG:	ERICSSON
MODEL:	4467 N77
HEIGHT:	16.1 IN
WIDTH:	14.4 IN
DEPTH:	5.9 IN
WEIGHT:	55.1 LBS

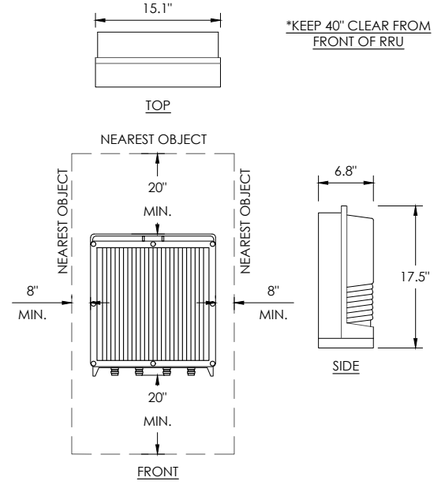


4467 N77 RRU DETAIL

NOT TO SCALE

SPECIFICATIONS

MFG:	ERICSSON
MODEL:	4490 B5/B12
HEIGHT:	17.5 IN
WIDTH:	15.1 IN
DEPTH:	6.8 IN
WEIGHT:	68 LBS

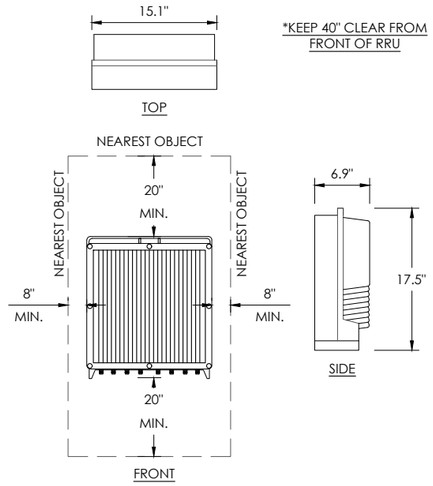


4490 B5/B12 RRU DETAIL

NOT TO SCALE

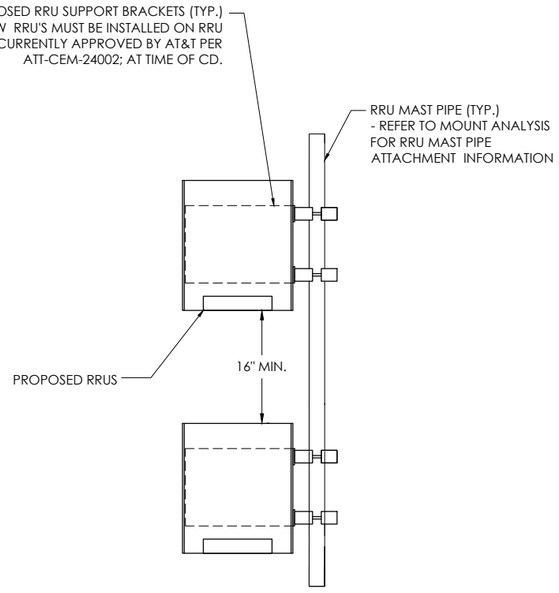
SPECIFICATIONS

MFG:	ERICSSON
MODEL:	4890 B25/B66
HEIGHT:	17.5 IN
WIDTH:	15.1 IN
DEPTH:	6.9 IN
WEIGHT:	68 LBS



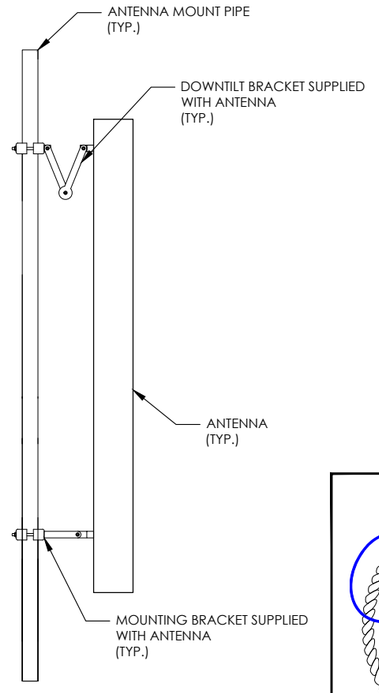
4890 B25/B66A RRU DETAIL

NOT TO SCALE



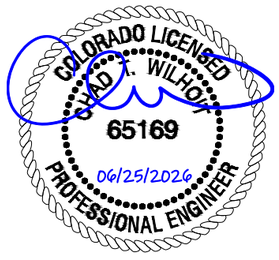
RRU MOUNTING DETAIL

NOT TO SCALE



ANTENNA MOUNTING DETAIL

NOT TO SCALE



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P. MARSHALL & ASSOCIATES

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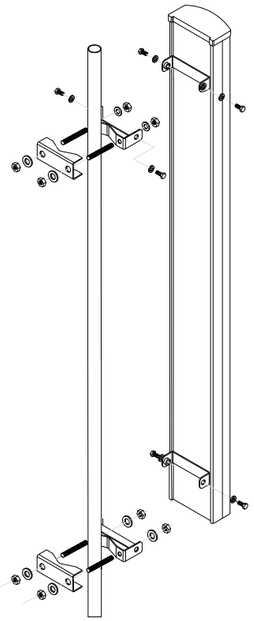
EQUIPMENT DETAILS

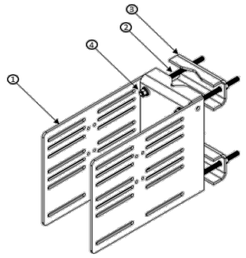
C-6



ANTENNA MOUNTING DETAIL

NOT TO SCALE

Technical Data Sheet	Rosenberger
LOW PIM 7 SLOTTED RRU MOUNT, UNIVERSAL	D200RRU



* Drawings not to scale

Description

LOW PIM 7 SLOTTED RRU MOUNT, UNIVERSAL

Parts

ITEM	QTY.	DESCRIPTION	WEIGHT [lb.]
1	1	RRU MOUNT WELDMENT,7 SLOTTED,LOW PIM	37.98
2	4	THREADED ROD ASSEMBLY 1/2" X 0'-10" (A36)	2.40
3	2	RRU MOUNT CLAMP (FORMED)	6.16
4	8	FLAT WASHER, LOCK 1/2" A153 GALV	0.08
		TOTAL WEIGHT	46.62

RF_3509_20R3

Rosenberger Hochfrequenztechnik GmbH & Co. KG
P.O.Box 1260 D-84526 Tittmoning Germany
www.rosenberger.de

Rosenberger Site Solutions, LLC
102 Dupont Dr. Lake Charles, LA 70607
Phone : (337) 598-5250
Web: www.rosenbergeronline.us

ROSENBERGER RRU B2B BRACKET

NOT TO SCALE

kaelus

DBC0051F3V51-2

DIPLEXER 1900/AWS3-4

Designed to combine 1900 and AWS technologies the Kaelus DBC0051 provides a low loss combiner with excellent insertion loss and passive inter-modulation performance. The DBC0051 is AWS 3 / AWS 3U and AWS 4 ready.

FEATURES

- AWS 3 / AWS 3U and AWS4 ready
- Enables the sharing of antennas by 1900 and AWS networks
- Multiple DC bypass/AISG configurations field seittable
- Offers low insertion loss and high isolation
- Low passive IM performance
- Wall or mast mounting

TECHNICAL SPECIFICATIONS

PORT NAME	B1	B2
Passband	1850-1990MHz	1695-1780MHz / 2110-2200MHz
Insertion loss	0.2dB typical	
Group delay variation	10ns maximum (In any 3.84MHz band)	
Maximum input power	250W (average) / 3kW (PEP)	250W (average) / 3kW (PEP)
Attenuation	50dB minimum, 70dB typical @ AWS	50dB minimum, 57 dB typical @ 1900
ELECTRICAL		
Impedance	50Ohms	
Return loss	22dB minimum, 24dB typical	
Intermodulation products	-161dBc typical / -153dBc maximum all ports with 2 x 20W carriers	
Isolation	50dB	
DC / AISG		
A field selectable DC/AISG path is achieved via mechanical links on a IEC60130-9, 8-pin ferrule connector (see electrical block diagram).		
Passband	0 - 3MHz	
Insertion loss, single DC/AISG pass	1dB maximum	
Return loss, single DC/AISG pass	12dB minimum	
Insertion loss, two DC/AISG pass	4.5dB typical	
Return loss, two DC/AISG pass	9dB typical	
Input voltage range	± 31V	
DC current rating	2A continuous, 4A peak	
ENVIRONMENTAL		
For further details of environmental compliance, please contact Kaelus.		
Temperature range	-40°C to +65°C | -40°F to +149°F	
Ingress protection	IP67	
Lightning protection	RF: ±6kA maximum (8/20us), IEC61000-4-5	
MTBF	>1,000,000 hours	
Compliance	ETSI EN 300 019 class 4.1, RoHS	

DBC0051F3V51-2 DIPLEXER DETAIL

NOT TO SCALE

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VERTIV.

DC Power Accessories & Spare Parts

-58V NetSure™ Converter Retrofit Kit Ordering Instructions

Retrofit kits for NetSure DC power systems to accept -58V converters in place of +24V converters. When a system is equipped with the retrofit kit, the rectifier/converter shelf positions originally provided to accommodate the 1C24481500 +24V output converters will accommodate the 1C48582000P3 -58V output converters. All DC load breaker positions originally used for +24V converter output will provide -58V converter output. Additionally there are ordering steps below for expanding the number of -58 VDC distribution breaker positions.

Ordering Information

NetSure 5100 | NetSure 7100 | Vertiv XTE 603P

Step 1 - Order quantity of 1C48582000P3 converters modules as needed and a retrofit kit for the power system you are retrofitting.

AT&T Number	Vertiv Number	Description
NEQ.53011	1C48582000P3	High efficiency converter, -48 V to -58 VDC, 2000W peak, 1600W average, 2.5 lbs.
NEQ.53008	60028017	Retrofit Kit, -58VDC Converter, NetSure 7100 For use with NEQ.20068 (582127000203), NEQ.19736 (582127000100), NEQ.19864 (582127000101), NEQ.19863 (582127000102) or NEQ.19735 (582127000103)*
NEQ.53021	60027905	Retrofit Kit, -58VDC Converter, NetSure 721 previous models For use with NEQ.19475 (582127000ZZ041) or NEQ.19476 (582127000ZZ042)
NEQ.53012	60029556	Retrofit Kit, -58VDC Converter, NetSure 721 original models For use with NEQ.15920 (582127000ZZ003), NEQ.17139 (582127000ZZ011) or NEQ.19235 (582127000ZZ033) **If retrofitting NEQ.15920 (582127000ZZ003) or NEQ.17139 (582127000ZZ011) see Step 2 for the required NCU controller.**
NEQ.53034	60028039	Retrofit Kit, -58VDC Converter, NetSure 5100 For use with NEQ.20193 (582137100ZZ028)

VERTIV 512 RETROFIT KIT

NOT TO SCALE

Construction

- Utilizes TPPL technology. Thin positive grids are produced from high purity lead using a unique manufacturing process to maximize corrosion resistance and service life while increasing energy density
- Separators are AGM made from high purity, superior quality fibers. The electrolyte is absorbed within the AGM, preventing acid spills in case of accidental damage
- Electrolyte is produced from extremely high purity acid to reduce self-discharge rates and float currents
- Container and cover made from flame retardant UL94-V0 material, highly-resistant to shock and vibration
- Front terminal batteries use tin-plated copper terminals
- Self-regulating one-way pressure relief valves prevent ingress of atmospheric oxygen

Installation and Operation

- Space efficient footprint
- VRLA design, reduces maintenance requirements
- Lifting handles for easy handling
- Greater than 10 year life expectancy in float service at 77°F (25°C)
- TPPL technology provides increased active material surface area which yields increased energy density
- Operating temperature: -40°F (-40°C) to 122°F (50°C)
- Recommended temperature: 68°F (20°C) to 89°F (30°C)

Standards

- Approved as non-hazardous cargo for ground, sea, and air transportation in accordance with US DOT Regulation 49 and ICAO & IATA Packing Instruction 806. Please see our SDS for complete details at www.enersys.com
- Complies with Telcordia® SR-4228, Network Equipment Building System (NEBS™) Criteria Levels
- The management systems governing the manufacture of this product are ISO 9001 and ISO 14001 certified

General Specifications

Battery Type	# of Cells	Nominal Voltage (V)	Nominal Capacity (Ah) 8hr Rate to 1.75Vpc @ 77°F (25°C)	Nominal Capacity (Ah) 10hr Rate to 1.80Vpc @ 68°F (20°C)	Nominal Dimensions Length in	Length mm	Width in	Width mm	Height in	Height mm	Typical Weight lbs	Typical Weight kg	Short Circuit Current (Amps)	Internal Resistance Milli-Ohms	Terminals	Electrolyte (1.280 S.G.) Volume (per block) gal	Electrolyte (1.280 S.G.) Weight (per block) L	Electrolyte (1.280 S.G.) Weight (per block) lbs	Electrolyte (1.280 S.G.) Weight (per block) kg	Pure Acid (1.0 S.G.) Volume (per block) gal	Pure Acid (1.0 S.G.) Weight (per block) L	Pure Acid (1.0 S.G.) Weight (per block) lbs	Pure Acid (1.0 S.G.) Weight (per block) kg	Lead Weight (per block) lbs	Lead Weight (per block) kg
SBS 88F	6	12	31	31	11.9	303	3.8	97	6.26	159	22.7	10.3	1270	10.0	M6 M	0.37	1.42	4.05	1.84	0.11	0.40	1.61	0.73	15.6	7.08
SBS 810F	6	12	38	38	11.9	303	3.8	97	7.24	184	28.2	12.8	1390	9.0	M6 M	0.46	1.80	5.10	2.33	0.13	0.51	2.04	0.93	17.7	8.03
SBS 814F	6	12	62	62	11.9	303	3.8	97	10.4	266	42.0	19.1	1800	7.0	M6 M	0.79	2.95	8.40	3.83	0.22	0.85	3.35	1.52	29.8	13.4
SBS C11F	6	12	92	91	16.4	417	4.1	105	10.1	256	61.6	27.9	2300	5.5	M8 M	1.28	4.85	13.9	6.30	0.36	1.36	5.20	2.49	43.4	19.7
SBS 100F	6	12	100	100	15.6	395	4.3	109	11.3	287	71.9	32.6	2210	5.8	M8 M	1.34	5.09	14.6	6.60	0.38	1.43	5.77	2.62	49.7	22.5
SBS 112F	6	12	112	112	22.1	561	4.9	135	8.98	228	90.4	41.0	2600	5.0	M8 M	1.71	6.48	18.5	8.41	0.49	1.82	7.35	3.34	56.8	25.8
SBS 140F	6	12	145	145	17.8	452	6.8	172	9.37	238	105	47.6	4100	3.0	M8 M	2.25	8.51	24.3	11.0	0.65	2.39	9.66	4.38	72.4	32.8
SBS 160F	6	12	165	165	17.8	452	6.8	172	10.8	274	117	52.8	3700	2.3	M8 M	2.49	9.37	26.5	12.0	0.64	2.42	9.72	4.41	79.7	34.9
SBS 170F	6	12	170	170	22.1	561	4.9	126	11.1	283	116	52.5	3500	3.5	M8 M	3.09	7.92	25.4	11.5	0.59	2.23	8.99	4.08	82.0	37.2
SBS 190F	6	12	190	190	22.1	561	4.9	126	12.4	316	132	60.0	3990	3.2	M8 M	2.34	8.86	29.9	13.1	0.66	2.49	10.1	4.56	96.8	43.4

AMER-EN-DS-PS-SBS-FT-0422

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POWERSAFE SBS190F BATTERIES

NOT TO SCALE

Vertiv™ NetSure™ Converter System

-48V DC to -58V DC

VERTIV.

Technical Specifications

Input	
Voltage	-48.0 volts DC nominal, with range of -41.0 to -58.5 volts DC
Current	41.9 amps maximum (at full load for one module, -41VDC input)
Circuit Protection	Fuse is located in the negative input lead of each converter module
Filtering	Noise reflected back to the battery is less than 28dBrnC and is within the parameters set forth in Telcordia technical reference TR-TSY-000019, using test measurements in PUB43802, pages 5 and 6
Efficiency	95.8% peak
Output	
Voltage	-56.0 VDC to -58.0 VDC adjustment range
Current	26-position Bullet Panel = 400 amps 4-position GJ/ZR Breaker Panel = 600 amps
Regulation	Steady state output voltage remains within ±1% of the pre-adjusted voltage for any load current from no load to full load and over the specified input voltage range
Dynamic Response	For a step load change of 25%, the maximum voltage transient will not exceed 5% of the initial steady state voltage
Filtering	Wide band noise does not exceed 250 mV peak to peak over the frequency range of 1 Hz to 100 MHz. Wide band noise does not exceed 20 mV rms over the frequency range of 25 Hz to 20 kHz.
Protection	
Overvoltage	Two independent over-voltage shutdown circuits are included in each converter module. 1) Settable via NCU controller from -56V to -59V. 2) Backup (hardware employed) at -58.5VDC When the output current of a DC-DC converter module increases to a value set via the NCU
Overcurrent	controller between 10% to 100% of rated full load, the output voltage of the module will automatically decrease to limit current to this value. The output will recover to within specified limits when the overload condition is removed.
Over Temperature	Each DC-DC converter module will automatically shut down if the internal temperature of the module exceeds a predetermined value. Operation will automatically resume after the over-temperature condition is removed.
Environmental	
Operating Temperature	-40°C to +65°C (-40°F to +149°F)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Humidity	0% to 95% relative humidity, non-condensing
Altitude	Maximum operating ambient temperature should be derated linearly (3°C per 1000 ft.) at elevation above 6562000 ft.
Audible Noise	The audible noise at 1 meter shall not exceed 56DB-A per ANSI S14.
EMI/RFI Suppression	This unit conforms to the requirements of FCC Part 15, Subpart B, Class B, EN55022, Class B for radiated and GR-1089 CORE for conducted noise.

C48/58-2000P3 Converter Module

VERTIV C48/58-2000 CONVERTER SYSTEM

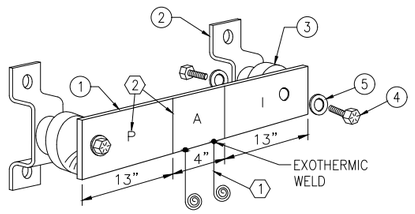
NOT TO SCALE

COLORADO LICENSED
CHAD T. WILHOIT
65169
06/25/2026
PROFESSIONAL ENGINEER

EQUIPMENT DETAILS

C-7

NEWTON INSTRUMENT COMPANY, INC. BUTNER, N.C.			
NO.	REQ.	PART NO.	DESCRIPTION
(1)	1	1/4"x4"x30"	SOLID GND. BAR
(2)	2	A-6056	WALL MTG. BRKT.
(3)	2	3061-4	INSULATORS
(4)	4	3012-1	5/8"-11x1" H.H.C.S.
(5)	4	3015-8	5/8 LOCKWASHER



EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION.

SECTION "P" – SURGE PRODUCERS

CABLE ENTRY PORTS (HATCH PLATES) (#2)
TELCO GROUND BAR (#2)
COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2)
CELL SITE +24V POWER SUPPLY RETURN BAR (#2)
CELL SITE -48V POWER SUPPLY RETURN BAR (#2)
GENERATOR FRAMEWORK (IF AVAILABLE) (#2)
RECTIFIER FRAMES
ANTENNA SUPPRESSION

SECTION "A" – SURGE ABSORBERS

INTERIOR GROUND RING (#2)
EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
BUILDING STEEL (IF AVAILABLE) (#2)

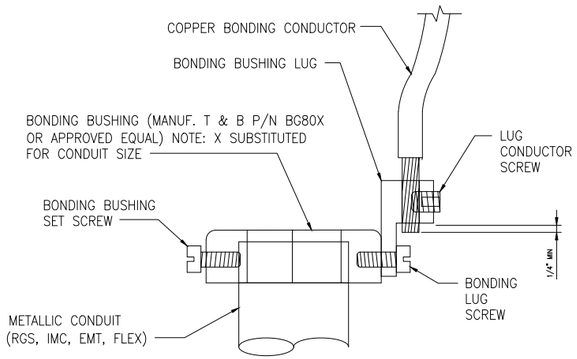
SECTION "I" – ISOLATED GROUND ZONE

ALL CELL SITE COMMUNICATIONS EQUIPMENT FRAMES

DETAIL NOTES:

1. EXOTHERMICALLY WELD #2 AWG BARE TINNED SOLID COPPER CONDUCTOR TO GROUND BAR. ROUTE CONDUCTOR TO BURIED GROUND RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. THE INSTALLER SHALL USE PERMANENT MARKER TO DRAW THE LINES BETWEEN EACH SECTION ("P", "A", "I") WITH 1" HIGH LETTERS.

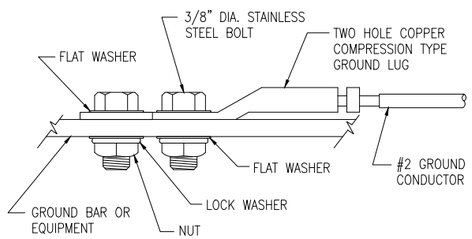
MASTER GROUND BAR DETAILS
NOT TO SCALE



DIRECTIONS:
1. MOUNT BONDING BUSHING ONTO CONDUIT
2. TIGHTEN BOND BUSHING SET SCREW
3. INSERT COPPER CONDUCTOR INTO LUG
4. TIGHTEN LUG CONDUCTOR SCREW
5. TIGHTEN BONDING LUG SCREW

NOTE: BONDING BUSHING, SET SCREW, LUG, LUG SCREW, COND. LUG SCREW, SHOWN AS COMPLETE UNIT.

CONDUIT BOND/GROUND BUSHING
NOT TO SCALE



MECHANICAL GROUND CONNECTION
NOT TO SCALE

GROUNDING NOTES:

1. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC AND AT&T ATT-TP-76416.

2. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. TESTING SHALL BE IN ACCORDANCE WITH SPECIFICATION 24782-000-3PS-EG00-00001. USE OF OTHER METHODS MUST BE PRE-APPROVED BY CONTRACTOR IN WRITING.

3. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS. WHEN ADDING ELECTRODES, CONTRACTOR SHALL MAINTAIN A MINIMUM DISTANCE BETWEEN THE ADDED ELECTRODE AND ANY OTHER EXISTING ELECTRODE EQUAL TO THE BURIED LENGTH OF THE ROD. IDEALLY, CONTRACTOR SHALL STRIVE TO KEEP THE SEPARATION DISTANCE EQUAL TO TWICE THE BURIED LENGTH OF THE RODS.

4. THE SUBCONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT.

5. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 AWG COPPER WIRE AND UL APPROVED GROUNDING TYPE CONDUIT CLAMPS PER NEC AND AT&T ND-00071.

6. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED. BACK-TO-BACK CONNECTIONS ON OPPOSITE SIDES OF THE GROUND BUS ARE PERMITTED.

8. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

9. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED. IN ALL CASES, BENDS SHALL BE MADE WITH A MINIMUM BEND RADIUS OF 8 INCHES.

10. EACH INTERIOR BTS CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH #2 AWG STRANDED, GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES. EACH OUTDOOR CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE BURIED GROUND RING WITH # 2 AWG SOLID TIN-PLATED COPPER WIRE.

11. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING, SHALL BE #2 AWG SOLID TIN-PLATED COPPER UNLESS OTHERWISE INDICATED.

12. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE. CONNECTIONS TO ABOVE GRADE EXTERIOR UNITS SHALL BE MADE WITH EXOTHERMIC WELDS WHERE PRACTICAL OR WITH 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS. HIGH PRESSURE CRIMP CONNECTORS MAY ONLY BE USED WITH WRITTEN PERMISSION FROM AT&T MARKET REPRESENTATIVE.

13. EXOTHERMIC WELDS SHALL BE PERMITTED ON TOWERS ONLY WITH THE EXPRESS APPROVAL OF THE TOWER MANUFACTURER OR THE CONTRACTORS STRUCTURAL ENGINEER.

14. ALL WIRE TO WIRE GROUND CONNECTIONS TO THE INTERIOR GROUND RING SHALL BE FORMED USING HIGH PRESS CRIMPS OR SPLIT BOLT CONNECTORS WHERE INDICATED IN THE DETAILS.

15. ON ROOFTOP SITES WHERE EXOTHERMIC WELDS ARE A FIRE HAZARD COPPER COMPRESSION CAP CONNECTORS MAY BE USED FOR WIRE TO WIRE CONNECTORS. 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS SHALL BE USED FOR CONNECTION TO ALL ROOFTOP BTS EQUIPMENT AND STRUCTURAL STEEL.

16. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR USING TWO HOLED MECHANICAL TYPE BRASS CONNECTORS AND STAINLESS STEEL HARDWARE.

17. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

18. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.

19. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

20. BOND ALL METALLIC OBJECTS WITHIN 6 FT OF THE BURIED GROUND RING WITH # 2 SOLID AWG TIN-PLATED COPPER GROUND CONDUCTOR.

21. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT WITH LISTED BONDING FITTINGS.

22. GROUND ALL RF EQUIPMENT INCLUDING BUT NOT LIMITED TO COAX, DIPLEXERS, SURGE ARRESTORS, TMA's, ANTENNAS, & ANTENNA MASTS PER NEC AND AT&T ATT-TP-76416.

AT&T

ANSCO & ASSOCIATES, LLC

PM&A
P. MARSHALL & ASSOCIATES

SITE ID:
COL01350

FA LOCATION CODE:
10102201

REV	DATE	DESCRIPTION
0	06/10/26	FINAL

DRAWN: DEN
CHECKED: MB
JOB#: 24ANATTRMRM-0121

COLORADO LICENSED
CHAD T. WILHOIT
65169
06/25/2026
PROFESSIONAL ENGINEER

GROUNDING DETAILS

G-1

CONTRACTOR TO OBTAIN FINAL RFDS FOR PLUMBING DIAGRAM