SITE ID: DN01549C

APPROVAL SIGNATURE BLOCK

THE FOLLOWING PARTIES HAVE REVIEWED THESE DOCUMENTS.

ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL ZONING/BUILDING DEPARTMENTS AND MAY IMPOSE CHANGES OR MODIFICATIONS.

☐ APPROVED
☐ REJECTED

PROJECT MANAGER (PRINT) | PROJECT MANAGER | DATE

☐ APPROVED
☐ REJECTED

RF ENGINEER (PRINT) | RF ENGINEER | DATE

☐ APPROVED
☐ REJECTED

SITE ACQUISITION (PRINT) | SITE ACQUISITION | DATE

☐ APPROVED
☐ REJECTED

CONSTRUCTION MANAGER (PRINT) | CONSTRUCTION MANAGER | DATE

☐ APPROVED
☐ REJECTED

OPERATIONS (PRINT) | OPERATIONS | DATE

T-Mobile

SITE ID: GATEWAY
SITE ID NUMBER: DN01549C
SITE ADDRESS: 5605 N MARKSHEFFEL RD
COLORADO SPRINGS, CO 80922

SITE COORDINATES: 38.913377, -104.682103
MOD TYPE: L600_CMP5_ANCHOR_PHASE 3

SHEET INDEX

SITE INFORMATION

SITE INFORMATION

SITE NAME:	GATEWAY
SITE ID:	DN01549C
SITE ADDRESS:	5605 N MARKSHEFFEL RD COLORADO SPRINGS, CO 80922
COUNTY:	EL PASO
JURISDICTION:	CITY OFCOLORADO SPRINGS
ASSESSOR'S PARCEL #	203196718
LATITUDE:	38.913377°
LONGITUDE:	-104.682103°
STRUCTURE TYPE:	BELL TOWER
STRUCTURE HEIGHT:	80''
POWER PROVIDER:	TBD
FIBER PROVIDER:	TBD

PROJECT DESCRIPTION

MODIFICATION OF AN EXISTING "NON-INHABITABLE" T-MOBILE TELECOMMUNICATIONS SITE CONSISTING OF:

REMOVING
- (3) EXISTING ANTENNAS
- (3) RRU'S
- (3) EXISTING SYSTEM MODULES
- (1) EXISTING EQUIPMENT CABINET

INSTALLING
- (6) NEW ANTENNAS
- (6) NEW RRU'S
- (2) NEW SYSTEM MODULE
- (2) NEW EQUIPMENT CABINETS

ON AN EXISTING BELL TOWER WITHIN THE EXISTING LEASE AREA.

INSTALLATION IS UNMANNED AND NOT FOR HUMAN HABITATION PUBLIC ACCESS IS RESTRICTED A.D.A. ACCESSIBILITY NOT REQUIRED.

PROJECT TEAM

PROPERTY OWNER:
GATEWAY CHURCH
5605 N MARKSHEFFEL RD
COLORADO SPRINGS, CO 80922

APPLICANT
T-MOBILE
18400 E. 22ND AVE.
AURORA, CO 80216

SITE ACQUISITION CONSULTANT
INSITE INC.
1S660 MIDWEST RD. SUITE 140
OAKBROOK TERRACE, IL 60181
CHARLIE AUGELLO
PH: 720.236.9199
E-MAIL: AUGELLO@INSITE-INC.COM

A&E PROJECT MANAGER
INSITE INC.
1S660 MIDWEST RD. SUITE 140
OAKBROOK TERRACE, IL 60181
GARY WATTS
PH: 303.815.8296
E-MAIL: WATTS@INSITE-INC.COM

ENGINEER ON RECORD
TELEMTN ENGINEERING
104 BROADWAY, SUITE 600
DENVER, CO 80203
KHRIS SCOTT, PE
PH: 303.596.6804
EMAIL: KSCOTT@TELEMTN.COM

DRIVING DIRECTIONS

FROM T-MOBILE OFFICE 18400 E. 22ND AVE:

START OUT GOING EAST ON E 22ND AVE TOWARD TOWER RD/CO-32., TURN RIGHT ONTO TOWER RD/CO-32., TURN RIGHT ONTO E COLFAX AVE/I-70 BUS W/US-40 W/US-287 N., MERGE ONTO I-225 S VIA THE RAMP ON THE LEFT., MERGE ONTO I-25 S/US-87 S VIA EXIT 1A ON THE LEFT TOWARD COLO SPGS., TAKE EXIT 153 TOWARD BLACK FOREST., MERGE ONTO INTERQUEST PKWY., TURN RIGHT ONTO POWERS BLVD/CO-21., TURN LEFT ONTO STETSON HILLS BLVD., TURN LEFT ONTO N MARKSHEFFEL RD., AND YOUR DESTINATION WILL BE ON THE RIGHT.

ESTIMATED DISTANCE:	72.4 MILES
ESTIMATED TIME:	1 HOUR 16 MINUTES

APPLICABLE CODES

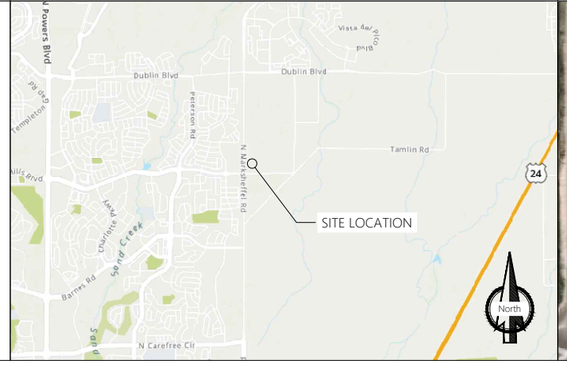
ALL CONSTRUCTION, ALTERATION, OR DEMOLITION SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES TO INCLUDE COMPLIANCE WITH THE LATEST FEDERAL STATE, AND LOCAL AMENDMENTS, REGULATIONS AND ORDINANCES.

GOVERNING CODES AS APPLICABLE:

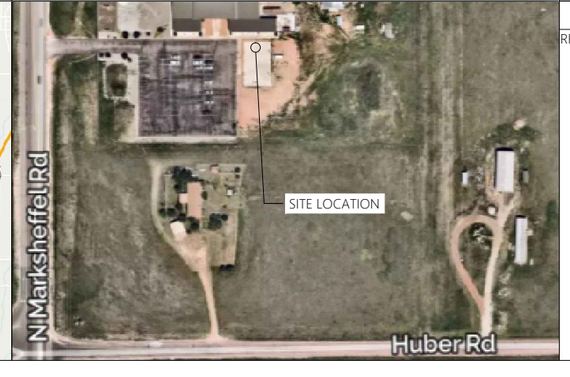
811 Know what's below. Call before you dig.

MANDATORY: CONTRACTOR TO CALL TO VERIFY UTILITIES, AT LEAST TWO WORKING DAYS PRIOR TO DIGGING.
BEFORE YOU DIG, CALL: 1-800-922-1987
HTTP://CALL811.COM/MAP-PAGE/COLORADO

VICINITY MAP



SITE PHOTO



REFERENCE DOCUMENTS

DOCUMENT NAME	DATE
RFDS	06/04/2020

PRESENTED BY:

T-Mobile

Insite inc.
Wireless Consulting Services
1S660 MIDWEST RD. SUITE 140 OAKBROOK TERRACE, IL 60181

TeleMtn ENGINEERING

SITE NAME:
GATEWAY
SITE ADDRESS:
5605 N MARKSHEFFEL RD
COLORADO SPRINGS, CO 80922
SITE COUNTY:
EL PASO

SITE ID:
DN01549C

REVISIONS

Rev:	Date:	Description:	By:
0	08.13.20	PRELIMINARY	KY
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STAMPING SIGNATURE:

THIS WORK WAS PREPARED BY MYSELF OR UNDER MY SUPERVISION. CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. ALL SCALES ARE SET FOR 11"x17"

SHEET TITLE:
COVER SHEET

SHEET NUMBER:
T1.0

DRAWN BY:	CHK BY:	APV BY:
KY	KS	KS

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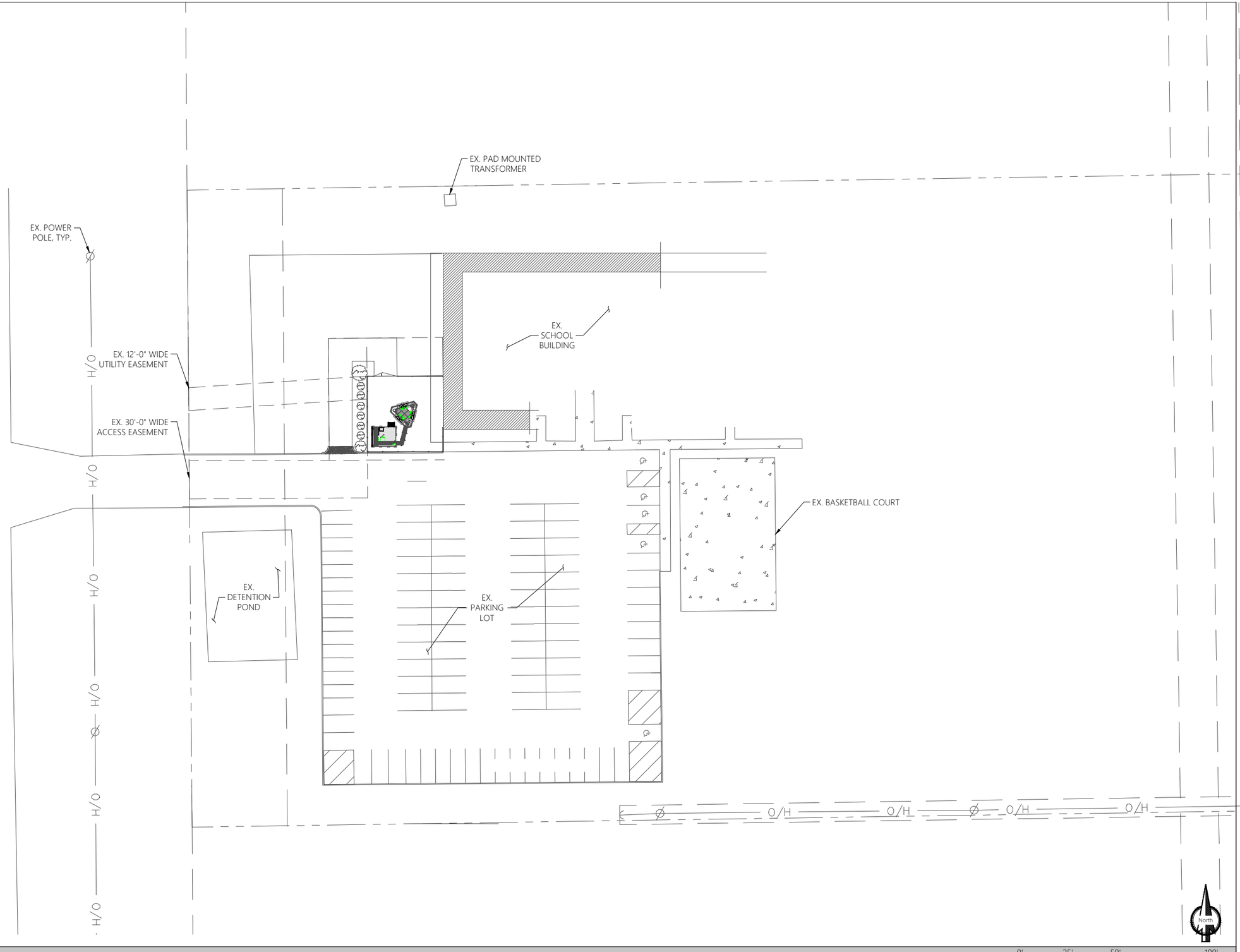

2 OVERALL SITE PLAN

0' 25' 50' 100'

SCALE: 1" = 50'-0" (11 X 17) - SCALE: 1" = 25'-0" (22 X 34)

PRESENTED BY:

T-Mobile

Insite inc.
Wireless Consulting Services
15660 MIDWEST RD. SUITE 140 OAKBROOK TERRACE, IL 60181

TeleMtn ENGINEERING

SITE NAME:

GATEWAY

SITE ADDRESS:

5605 N MARKSHEFFEL RD
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ENLARGED SITE PLAN

SHEET NUMBER:

T2.0

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KY	KS	KS

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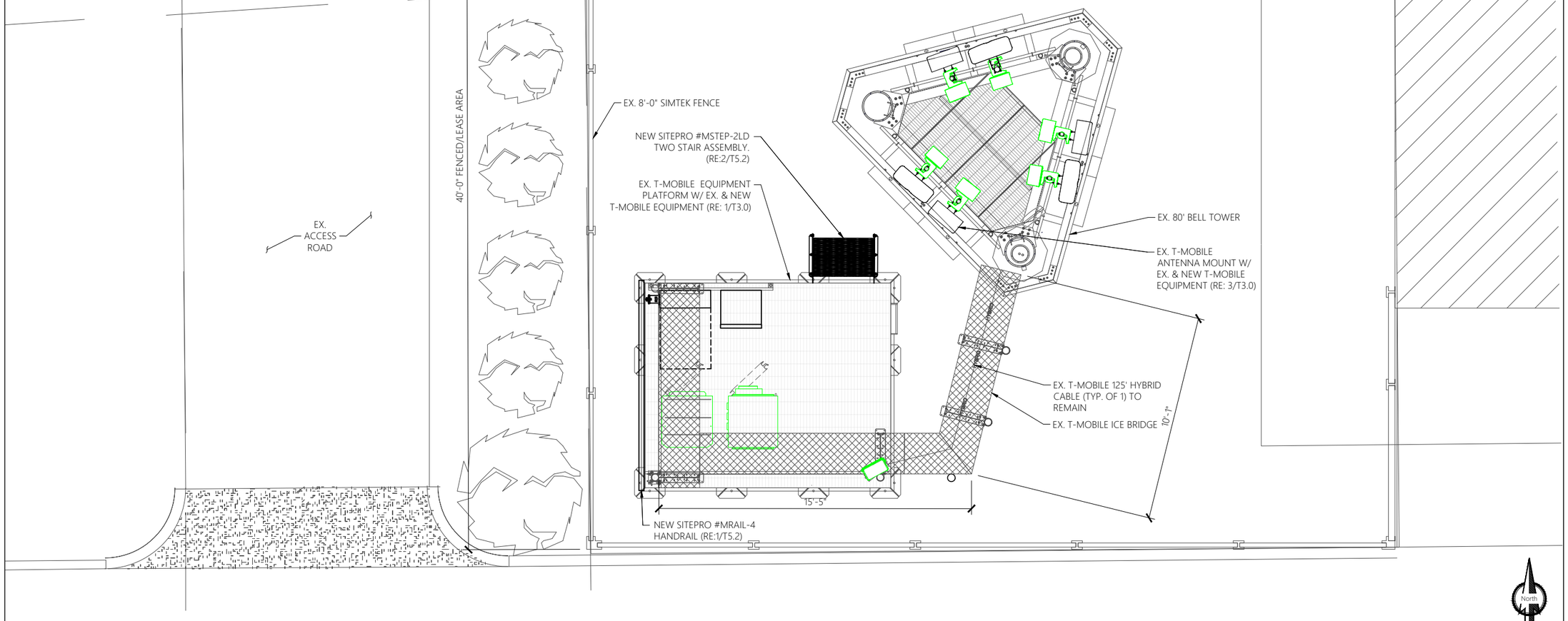
1 T-MOBILE LEASE AREA PHOTO



2 ENLARGED SITE PLAN

SCALE: 3/16" = 1'-0" (11 X 17) - SCALE: 3/8" = 1'-0" (22 X 34)

PRESENTED BY:

T-Mobile

Insite inc.
Wireless Consulting Services
1S660 MIDWEST RD. SUITE 140 OAKBROOK TERRACE, IL 60181

TeleMtn ENGINEERING

SITE NAME:

GATEWAY

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5605 N MARKSHEFFEL RD
COLORADO SPRINGS, CO 80922

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ENLARGED SITE PLAN

SHEET NUMBER:

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KY	KS	KS

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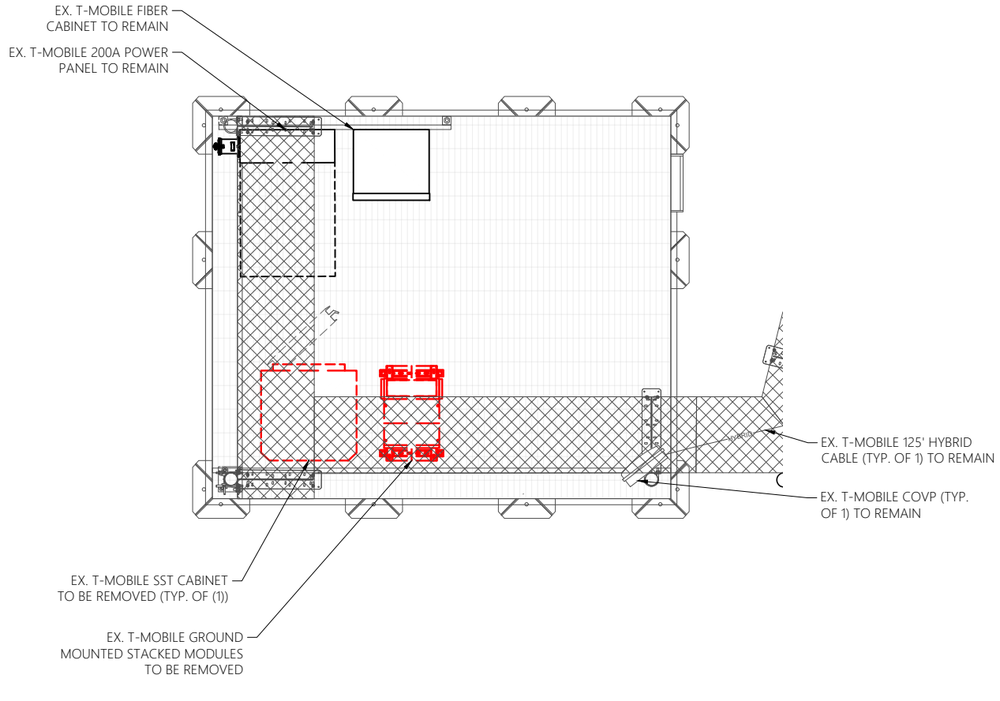
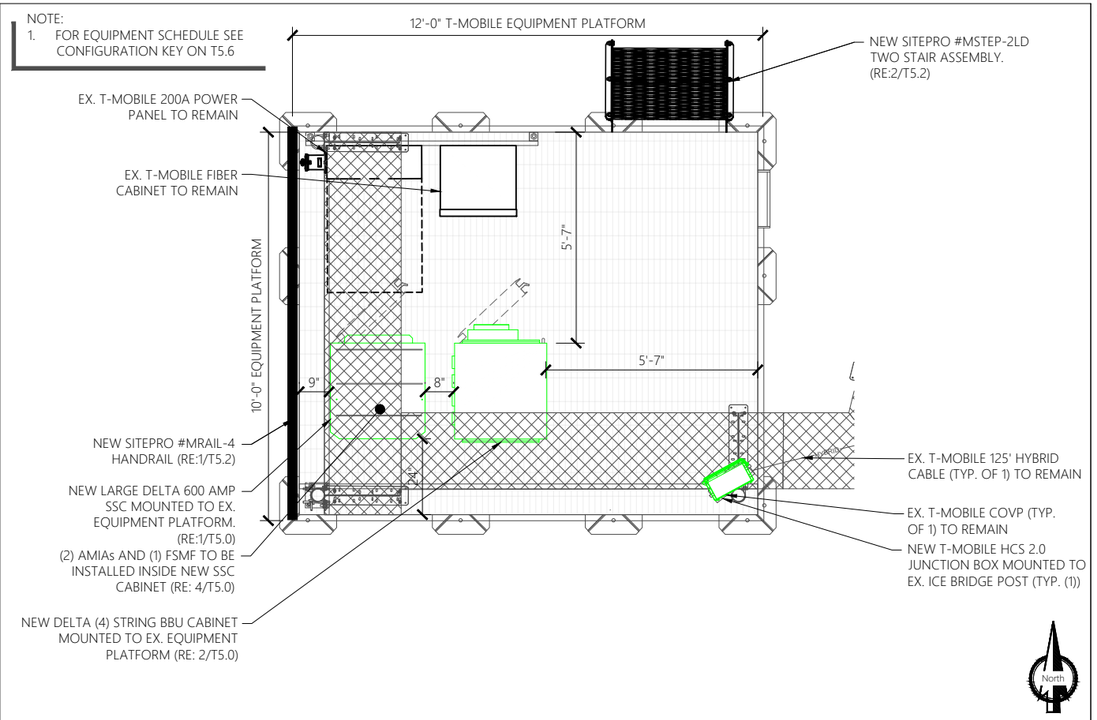


1 EX. EQUIPMENT LAYOUT

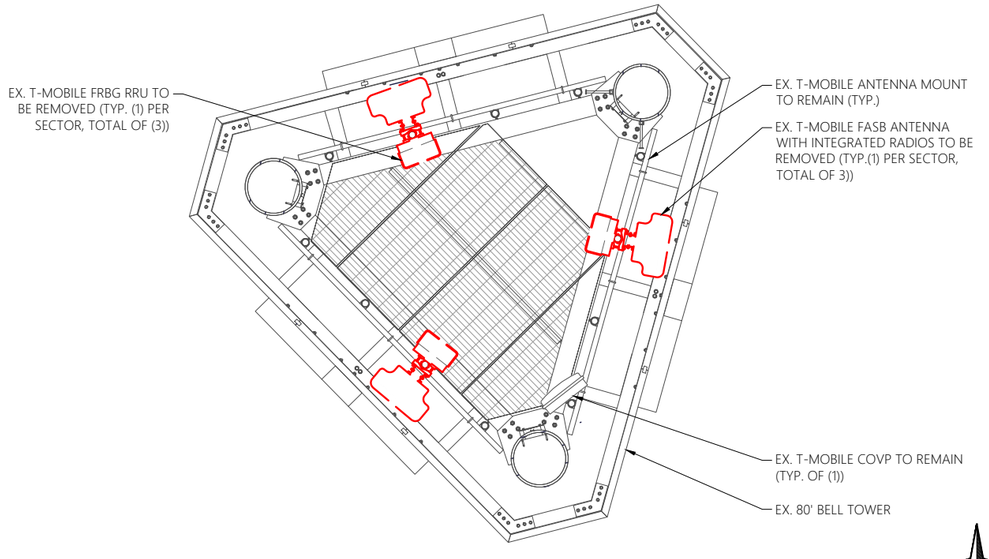
0' 2' 4' 8'
SCALE: 1/4" = 1'-0" (11 X 17) - SCALE: 1/2" = 1'-0" (22 X 34)

NOTE:
1. FOR EQUIPMENT SCHEDULE SEE CONFIGURATION KEY ON T5.6



2 NEW EQUIPMENT LAYOUT

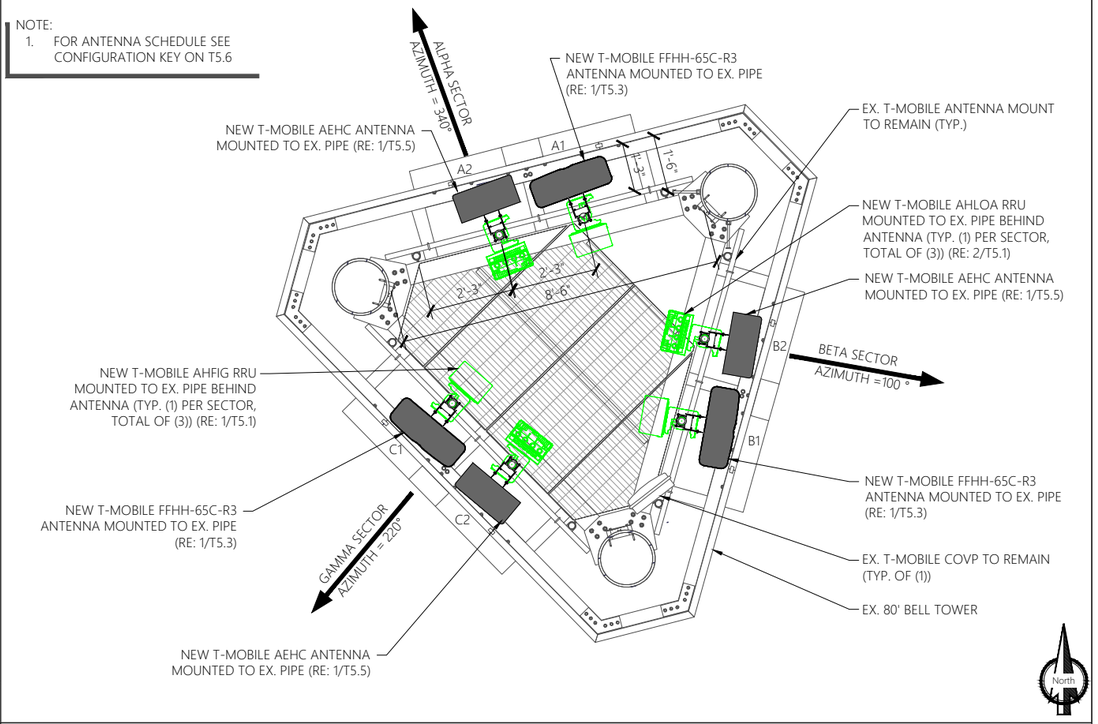
0' 2' 4' 8'
SCALE: 1/4" = 1'-0" (11 X 17) - SCALE: 1/2" = 1'-0" (22 X 34)



3 EX. ANTENNA LAYOUT

0' 2' 4' 8'
SCALE: 1/4" = 1'-0" (11 X 17) - SCALE: 1/2" = 1'-0" (22 X 34)

NOTE:
1. FOR ANTENNA SCHEDULE SEE CONFIGURATION KEY ON T5.6



4 NEW ANTENNA LAYOUT

0' 2' 4' 8'
SCALE: 1/4" = 1'-0" (11 X 17) - SCALE: 1/2" = 1'-0" (22 X 34)

PRESENTED BY:

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Insite inc.
Wireless Consulting Services
15660 MIDWEST RD. SUITE 140 OAKBROOK TERRACE, IL 60181

TeleMtn ENGINEERING

SITE NAME:

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SHEET TITLE:

NEW & EX. EQUIPMENT & ANTENNA LAYOUTS

SHEET NUMBER:

T3.0

DRAWN BY:	CHK BY:	APV BY:
KY	KS	KS

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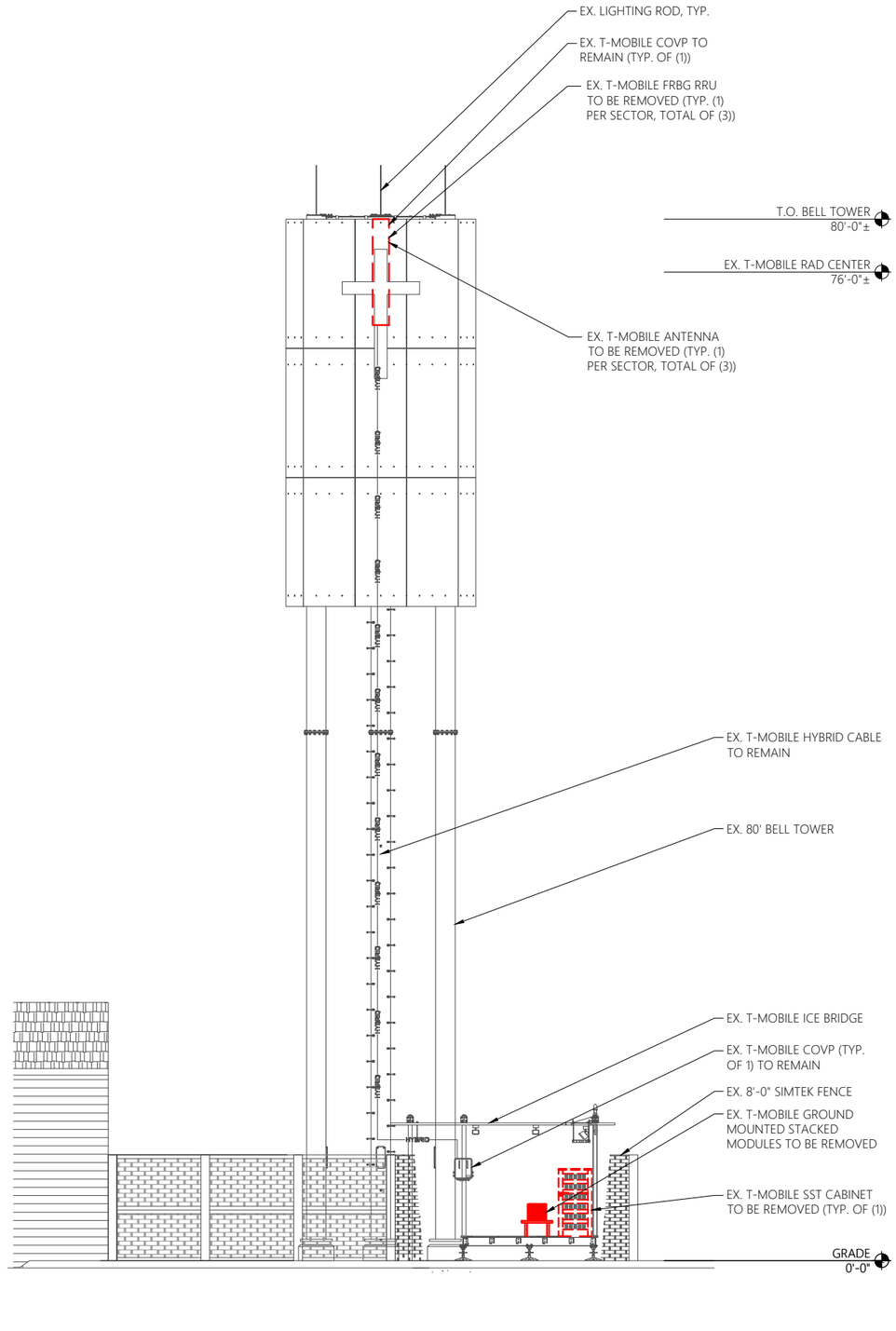
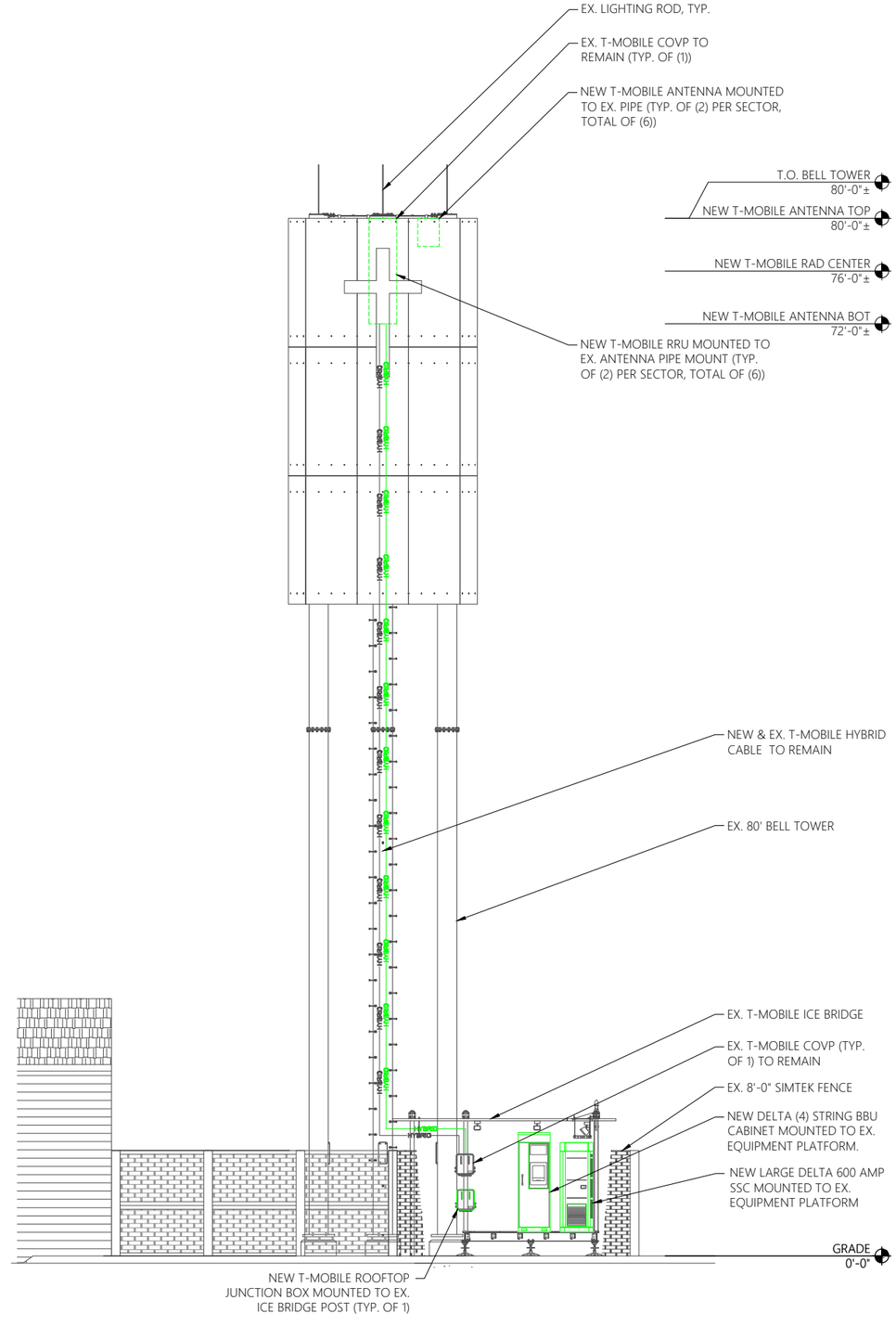


1 EXISTING NORTH ELEVATION

0' 10' 20'

SCALE: 3/32" = 1'-0" (11 X 17) - SCALE: 3/16" = 1'-0" (22 X 34)



2 NEW NORTH ELEVATION

0' 10' 20'

SCALE: 3/32" = 1'-0" (11 X 17) - SCALE: 3/16" = 1'-0" (22 X 34)

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EX. & NEW ELEVATIONS

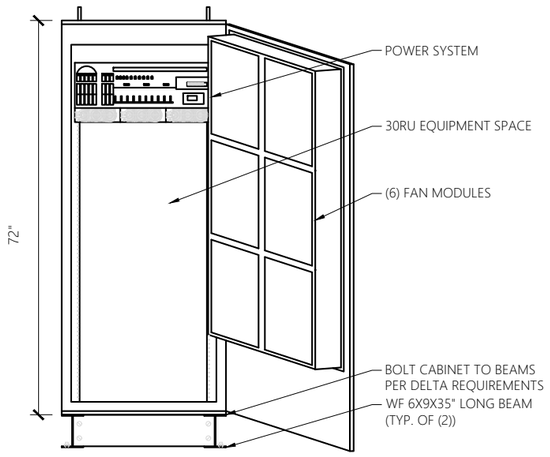
SHEET NUMBER:

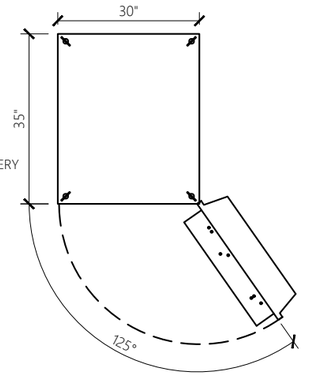
T4.0

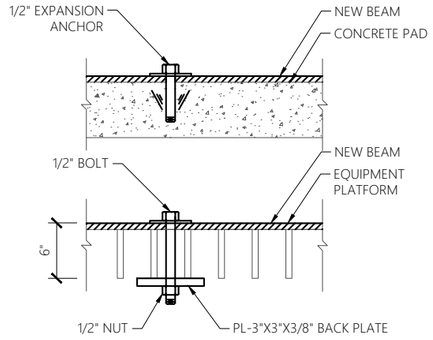
DRAWN BY:	CHK BY:	APV BY:
KY	KS	KS

DELTA LARGE OUTDOOR ENCLOSURE: ESOA600-HCU01

INTERNAL RACK DIMENSION	TOTAL EQUIPMENT SPACE, 30RU: HORIZONTAL RACK: 19" X 27RU VERTICAL RACK: 19" X 3RU POWER SYSTEM SPACE: 23" X 12RU
DC OUTPUT CURRENT:	600A
DC OUTPUT VOLTAGE:	48 VDC
CLEARANCES:	36" ON ALL SIDES
ADDITIONAL SPECS:	3 RU FOR DC DISTRIBUTION, RECTIFIER = DPR3000, 2Px3 POSITIONS FOR BATTERY BREAKER,, 10 RU FOR EQUIPMENT 19" OR 23", (3) STRINGS FOR BATTERIES
NOKIA FMFA PLINTH:	2.7" H x 30" W x 36" D - 20.5 lbs
WEIGHT:	551 lbs (WITHOUT EQUIPEMENT OR BATTERIES)



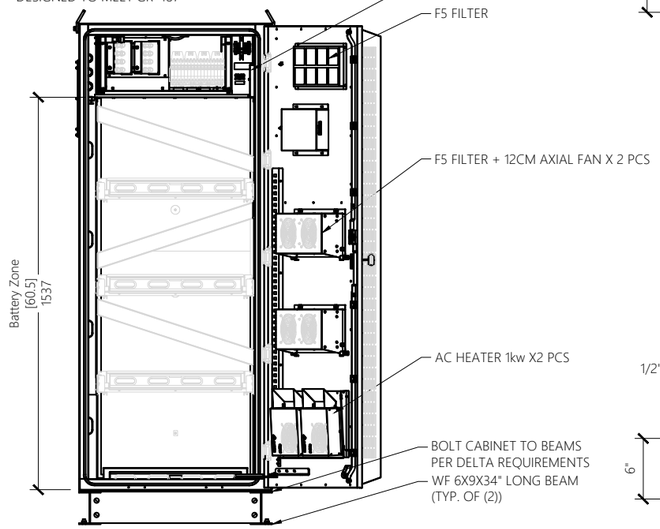


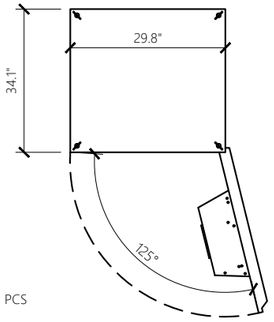


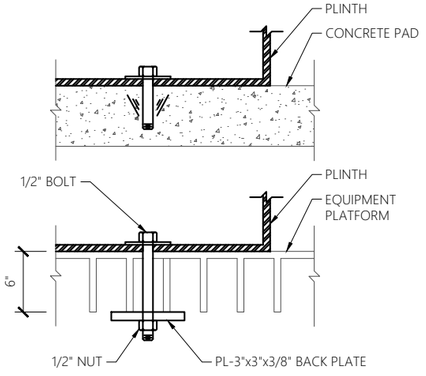
1 NEW DELTA ESOA600 HCU01 DETAIL — SCALE: NTS

DELTA LARGE BATTERY 3 CABINET ENCLOSURE: ESOF015-ECV04

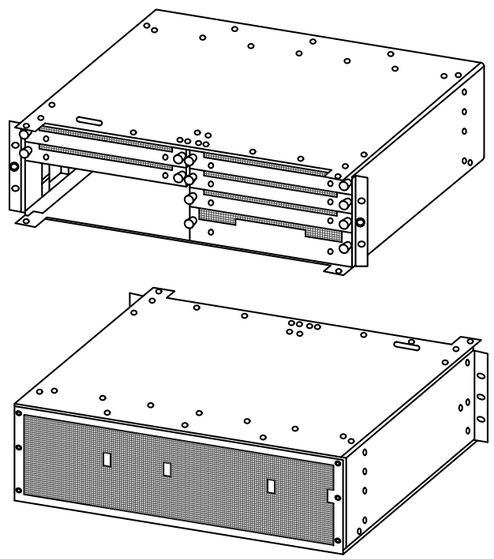
COMPACT DESIGN FOR BATTERY STRINGS:
- DIRECT AIR COOLING SOLUTION
- SUPPORTS FOUR STRINGS OF -48V VRLA BATTERIES UP TO 210AH
- 600A RATED BUS BAR WITH 200A BREAKER PER STRING
- BULK INPUT/OUTPUT WITH ABILITY TO DAISY CHAIN CABINETS
- FRONT TO FRONT AIR FLOW
- CORROSION RESISTANT ALUMINUM CONSTRUCTION
- DESIGNED TO MEET GR-487







2 NEW DELTA ESOF015-ECV04 DETAIL — SCALE: NTS

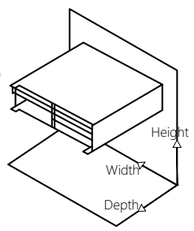


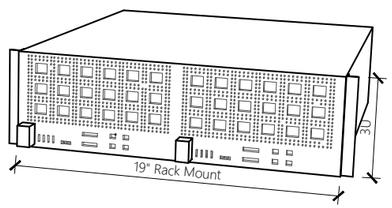
AMIA IS PRIMARY FOR INDOOR SITES (ENVIRONMENTALLY CONTROLLED) OR SITE SUPPORT CABINETS

- ONE NOKIA AIRSCALE SUBRACK (AMIA), INCLUDING BACKPLANE FOR HIGH BANDWIDTH CONNECTIVITY BETWEEN PROCESSING PLUG-IN UNITS
- ONE OR TWO NOKIA AIRSCALE COMMON (ASIA) PLUG-IN UNITS FOR TRANSPORT INTERFACING AND FOR CENTRALIZED PROCESSING
- UP TO SIX NOKIA AIRSCALE CAPACITY (ABIA) PLUG-IN UNITS FOR BASEBAND PROCESSING AND FOR OPTICAL INTERFACES WITH RADIO UNITS

PROPERTY	VALUE
HEIGHT	128.5 mm (5.1 in)
DEPTH	400 mm (15.7 in)
WIDTH	447 mm (17.6 in)
WEIGHT	EMPTY: 5.1 kg (11.2 lb) WITH DUMMY PANELS: 6.8 kg (15 LB) WITH ALL UNITS: 23.9 kg (52.7 lb)

DIMENSIONS ORIENTATION





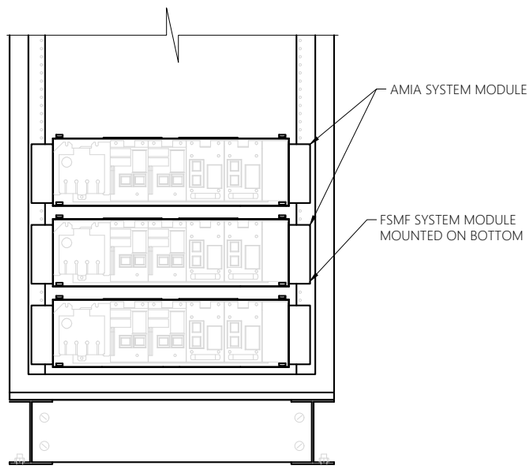
3 NEW NOKIA AMIA AIRSCALE DETAIL — SCALE: NTS

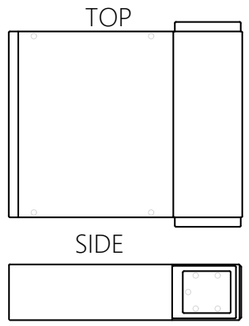
SYSTEM/RADIO MODULES MOUNTED IN SSC

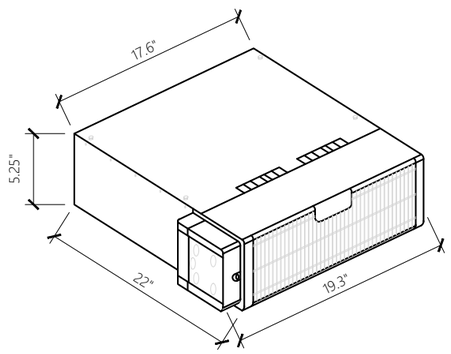
FSMF

CLEARANCES:	FRONT: 23.6" BACK: 8" TOP: 1.2" SIDES: 4"
WEIGHT:	44 lbs

ADDITIONAL NOTE: MODULE CAN BE INSTALLED VERTICALLY & HORIZONTALLY







4 SYSTEM RADIO MODULES MOUNTED IN SSC — SCALE: NTS

PRESENTED BY:

T-Mobile

Insite inc.
Wireless Consulting Services
15660 MIDWEST RD. SUITE 140 OAKBROOK TERRACE, IL 60181

TeleMtn ENGINEERING

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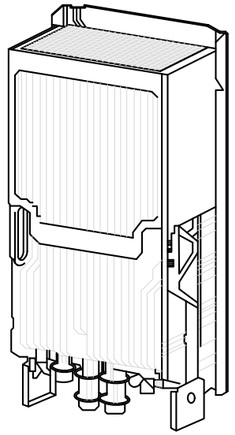
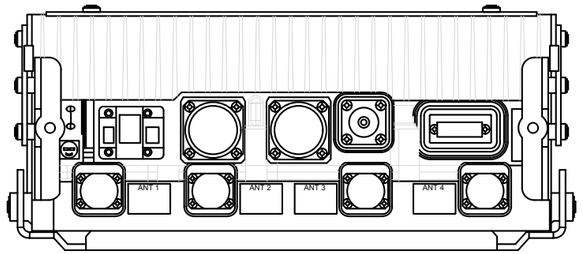
T5.0

DRAWN BY:	CHK BY:	APV BY:
KY	KS	KS

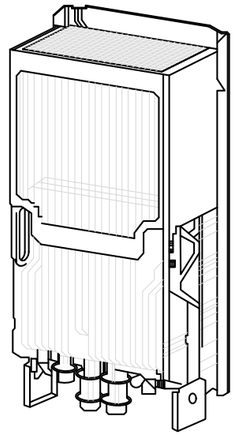


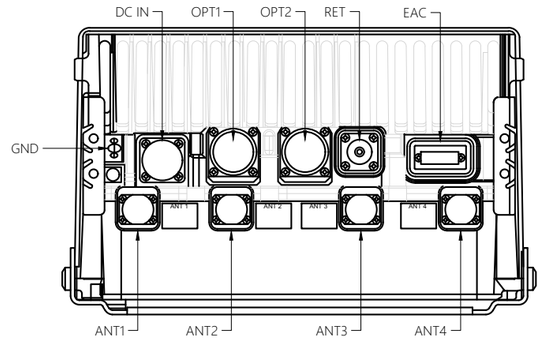


DIMENSION	VALUE
HEIGHT	27.3 INCHES
WIDTH	12 INCHES
DEPTH	5.2 INCHES
WEIGHT	70.5 LBS.

PRODUCT	AHFIG (AIRSCALE 4T4R DUAL MID-BAND RADIO)
TYPE	4T4R RRH (1 PER SECTOR), 2X9.8 CPRI FIBER
MAX OUTPUT POWER	4X40W AWS + 3X80W PCS (MAX 4 CARRIERS PER BAND)
SPECTRUM BAND	B25 + B66 (SRAN CAPABLE)
IBW (DL/UL)	B66: 80MHZ B25: 65 MHZ
FORM FACTOR (HXWXD) WEIGHT (LBS)	695 MM (27.3") X 308MM (12") X 131MM (5.2") 70.5 LBS (32 KG)

1 NEW NOKIA AHFIG RRU DETAIL — SCALE: NTS
SCALE: NTS



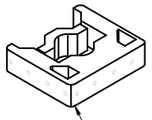


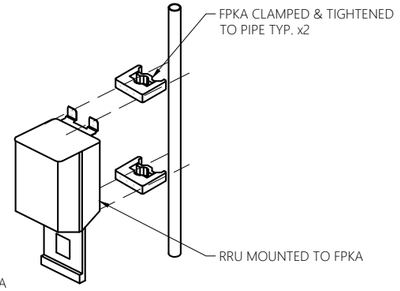
DIMENSION	VALUE
HEIGHT	22 INCHES (W/ BRACKET 26.6 INCHES)
WIDTH	12.1 INCHES (W/ BRACKET 12.9 INCHES)
DEPTH	7.4 INCHES (W/ BRACKET 8.1 INCHES)
WEIGHT	83.8 LBS

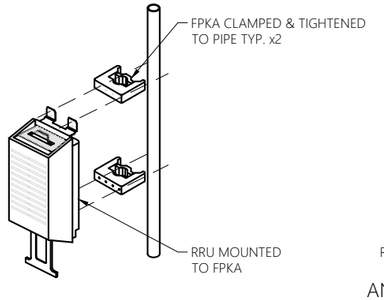
CHARACTERSTIC	AHLOA CAPABILITY
NOMINAL SUPPLY VOLTAGE	-48.0 VDC
NOMINAL INPUT VOLT RANGE	-40.5 TO -57.0 VDC
EXTENDED INPUT VOLT RAGE	-36.0 TO -40.5 VDC -57.0 TO -60.0 VDC
VOLTAGE	14.5 V
POWER SUPPLY	T.B.D.

2 NEW NOKIA AHLOA RRU DETAIL — SCALE: NTS
SCALE: NTS

3 NOT USED — SCALE: NTS
SCALE: NTS

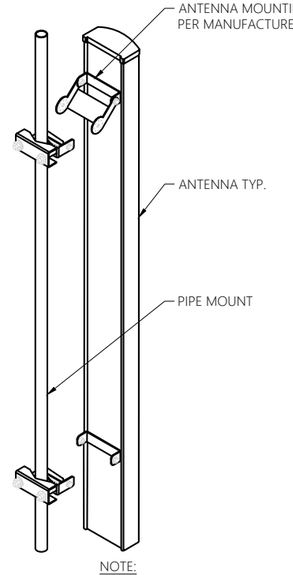






UP TO (3) RADIO HEADS
AROUND (1) PAIR OF FPKA
POLE MOUNTING BRACKETS

NOKIA FPKA BRACKET



NOTE:
REFER TO S-SHEETS FOR MOUNT DETAILS
(IF APPLICABLE)

ANTENNA TO PIPE MOUNTED

4 RRU AND ANTENNA MOUNTING DETAIL — SCALE: NTS
SCALE: NTS

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Wireless Consulting Services
15660 MIDWEST RD. SUITE 140 OAKBROOK TERRACE, IL 60181

TeleMtn ENGINEERING

SITE NAME:

GATEWAY

SITE ADDRESS:

5605 N MARKSHEFFEL RD
COLORADO SPRINGS, CO 80922

SITE COUNTY:

EL PASO

SITE ID:

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SHEET NUMBER:

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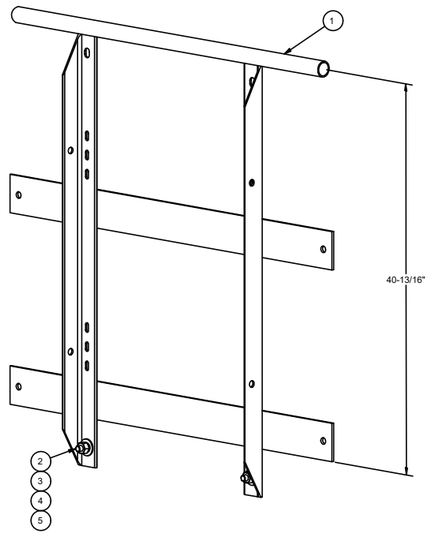
KY	KS	KS

PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	X-MRAIL4	4' HANDRAIL WELDMENT FOR MODULAR EQUIPMENT PLATFORM		60.49	60.49
2	2	G58134	5/8" x 1-3/4" HDG BOLT	1 3/4 in	0.27	0.54
3	2	G58FW	5/8" HDG USS FLATWASHER	1/8 in	0.07	0.14
4	2	G58LW	5/8" HDG LOCKWASHER		0.03	0.05
5	2	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	0.26
				TOTAL WT. #		64.44



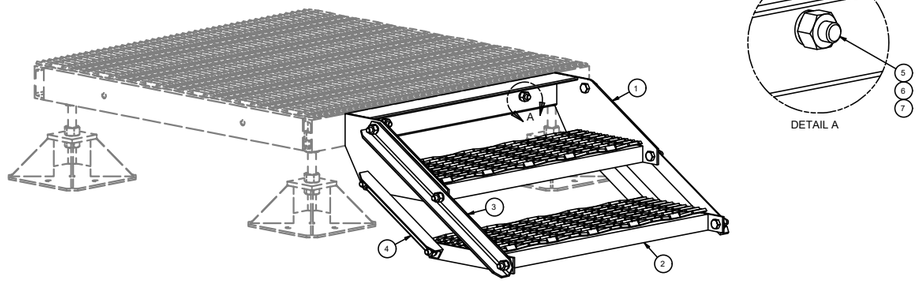
1 SITEPRO MRAIL-4 HANDRAIL FOR EQUIPMENT PLATFORM

SCALE: NTS
SCALE: NTS

NOTE:
PLATFORM AND FOOTPADS ARE NOT INCLUDED

MOUNTS DIRECTLY TO THE PLATFORM. WILL NOT WORK WITH THE MOPEN-4, OR HANDRAILS.

PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	X-MSNH	MODULAR STEP NO HANDRAIL		81.15	81.15
2	1	X-MSTEP	STAIR WELDMENT FOR MODULAR EQUIPMENT PLATFORM		37.92	37.92
3	2	X-MS3A	SIDE ANGLE FOR THREE STAIR ASSEMBLY	28 1/2 in	6.06	12.12
4	2	X-MS2A	SIDE ANGLE FOR TWO STAIR ASSEMBLY	15 1/4 in	3.20	6.40
5	12	G58134	5/8" x 1-3/4" HDG BOLT	1 3/4 in	0.27	3.23
6	12	G58LW	5/8" HDG LOCKWASHER		0.03	0.31
7	12	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	1.56
				TOTAL WT. #		42.69



2 SITEPRO MSTEP-2LD DETAIL

SCALE: NTS
SCALE: NTS

3 NOT USED

SCALE: NTS
SCALE: NTS

4 NOT USED

SCALE: NTS
SCALE: NTS

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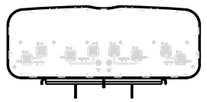
FFHH-65C-R3



8-port sector antenna, 4x 617-806 and 4x 1695–2360 MHz, 65° HPBW,
3x RET, 600 MHz-Ready Antenna Technology

Electrical Specifications

Frequency Band, MHz	617-698	698–806	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	15.4	15.8	17.9	18.4	18.8	19.6
Beamwidth, Horizontal, degrees	66	61	64	65	64	56
Beamwidth, Vertical, degrees	10.2	9.2	5.7	5.3	4.9	4.4
Beam Tilt, degrees	2–13	2–13	2–12	2–12	2–12	2–12
USLS (First Lobe), dB	18	17	19	19	19	22
Front-to-Back Ratio at 180°, dB	33	31	38	41	40	38
Isolation, dB	28	28	28	28	28	28
Isolation, Intersystem, dB	28	28	28	28	28	28
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-150	-153	-153	-153	-153	-153
Input Power per Port at 50°C, maximum, watts	250	250	250	250	250	200
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	617-698	698–806	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	15.2	15.5	17.5	18.0	18.4	19.2
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.4	±0.4	±0.5	±0.5	±0.6
Gain by Beam Tilt, average, dBi	2 ° | 15.0 8 ° | 15.3 13 ° | 15.1	2 ° | 15.3 8 ° | 15.6 13 ° | 15.3	2 ° | 17.3 7 ° | 17.6 12 ° | 17.5	2 ° | 17.8 7 ° | 18.1 12 ° | 17.9	2 ° | 18.1 7 ° | 18.5 12 ° | 18.4	2 ° | 18.7 7 ° | 19.3 12 ° | 19.2
Beamwidth, Horizontal Tolerance, degrees	±3	±5.1	±5.9	±5.6	±5.9	±7.2
Beamwidth, Vertical Tolerance, degrees	±0.6	±0.6	±0.4	±0.3	±0.4	±0.2
USLS, beampeak to 20° above beampeak, dB	17	14	15	15	16	17
Front-to-Back Total Power at 180° ± 30°, dB	23	21	30	31	31	30
CPR at Boresight, dB	21	20	18	18	19	19
CPR at Sector, dB	7	10	8	7	8	7

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

COMMSCOPE

FFHH-65C-R3

Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage
Total Input Power, maximum	900 W @ 50 °C

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	1055.0 N @ 150 km/h 237.2 lbf @ 150 km/h
Wind Loading, lateral	355.0 N @ 150 km/h 79.8 lbf @ 150 km/h
Wind Loading, maximum	1433.0 N @ 150 km/h 322.2 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	2437.0 mm | 95.9 in
Width	640.0 mm | 25.2 in
Depth	235.0 mm | 9.3 in
Net Weight, without mounting kit	57.9 kg | 127.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (2) | Low band (1)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum 10 W	
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

COMMSCOPE

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Wireless Consulting Services
15660 MIDWEST RD. SUITE 140 OAKBROOK TERRACE, IL 60181

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4 Description of the equipment under test (EUT)

The main technical characteristics of AAHF and AAHJ products are reproduced in Table 2 and Table 3 respectively.

Table 2 – AAHF product general technical characteristics

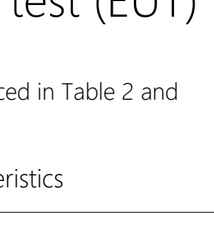
Product name	AirScale MAA 64T64R 128AE B41 120 W AAHF Radio Unit
FCC ID.	VBNAAHF-01
Model number	474715A
Rated max Tx power	120 W
Number of TXRX	64TX64RX
Beamforming	Yes
SW supported techno.	TD-LTE
Frequency range	2496 – 2690 MHz (3GPP Band 41)
Nb of antenna elements	8 (horizontal) x 8 (vertical)
Distance between AE	57.5 mm (horizontal) x 80 mm (vertical)
Gain	24 dBi
EIRP	74.8 dBm
Beam steering range	± 60° (horizontal) and ± 20° (vertical)
Dimensions	Height: 651 mm (25.6 in.) Depth: 245 mm (9.6 in.) Width: 501 mm (19.7 in.) Note: includes front covers. 
Technology duty cycle factor 75 %	
Transmitted power tolerance 1.5 dB	

Table 3 – AAHJ product general technical characteristics

Product name	AirScale MAA 64T64R 128AE B41 120 W AAHJ Radio Unit
FCC ID:	VBNAAHJ-01
Model number	474795A
Frequency range	2590 – 2690 MHz
The other characteristics are the same as AAHF (see Table 2).	

Antenna pattern characteristics provided in Table 4 have been derived from the antenna test report [12].

Table 4 – Measured antenna gain characteristics for various beam steering directions (from [12])

Azimuth	Elevation	Gain (dBi)			
		2496 MHz	2605 MHz	2690 MHz	Conservative value used
0°	3°	22.8	23.3	23.0	23.3
0°	-17°	20.4	21.3	20.6	21.3
0°	23°	20.1	20.4	19.8	21.3
10°	-17°	20.2	20.8	20.3	21.3
10°	23°	20.5	20.7	19.8	21.3
60°	3°	19.3	18.9	19.0	19.9
60°	13°	19.1	19.9	19.7	19.9

In order to provide a conservative assessment over the frequency range, we performed the calculation at the central frequency (i.e. 2605 MHz) scaled to the maximum gain over the whole frequency band (indicated in the right column in Table 4). The compliance boundary is defined by the box shape perimeter shown in Figure 1 of IEC 62232:2017 [4] and displayed in Figure 1. The distances Df, Ds, Da,u and Da,d are taken from the nearest point of the antenna. For convenience, the distances Dsc, Duc and Ddc (respectively) taken from antenna center are also provided.

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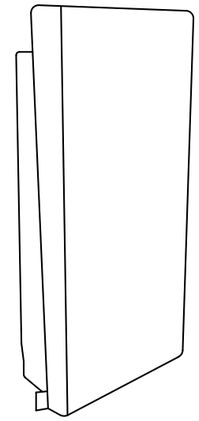
AEHC AirScale MAA 64T64R 192AE B41 320W

Preliminary technical data

Specificatin	Details
Standard	3GPP NR and LTE compliant, TDD, FCC compliant
Band/Frequency range	2496-2690 Mhz 3 GPP 841
Max. supported modulation	256 QAM
Number of TX/RX paths	64T/64R
MIMO streams	16
Instantaneous bandwidth IBW	194 Mhz
Occupied bandwidth OBW	190 Mhz
Total average EIRP	79 dBm
Max. output power per TRX	5 W / TRX (320 W total)
Dimensions	970 mm (H) x 540 mm (W) x 205 mm (D)
Volume	941
Weight	47 kg (without mounting brackets)
Supply voltage / Connector type	DC -36 V - 60 V / 2 pole connector
Power consumption	1280 W typical (75% DL duty cycle, 30% RF load) 1690 W max (75% DL duty cycle, 100% RF load)
Optical ports	4 x SFP28, 10/25GE eCPRI (Octis)
Other interfaces / Connector type	RF monitor port / SMA, Control AISG, External Alarms / MDR26, status LED
Operational temperature range	-40 °C +55 °C
Cooling	Nateral convection cooling
Installation optinos	Pole / Wall, ± 15° vertical
Ingress / Surge protection	IP65, Class II 20 kA
Supported RAT	5G, TD-LTE

AirScale High Power Wide Band MAA benefits

- 5G Adaptive Antenna System for optimized capacity and coverage
- Beamforming capable 64T64R with total 320W output power
- Full band operation for B41



AEHC 475124A

NOKIA

1 ANTENNA SPECIFICATION SHEETS

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SCALE: NTS

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ANTENNA NOTES:

1. ANTENNA CONTRACTOR SHALL INSURE THAT ALL ANTENNA MOUNTING PIPES ARE PLUMB.
2. FEEDLINE LENGTHS INDICATED ARE APPROXIMATE.
3. ANTENNA COAXIAL FEEDERS & ANTENNA JUMPERS SHALL BE COLOR CODED PER T-MOBILE REQUIREMENTS.
4. IN ADDITION TO THE COLOR CODE THE FOLLOWING ANTENNA SECTOR COLOR STRIPE SHALL BE ADDED TO EACH ANTENNA SECTOR FEEDLINE & JUMPER.
ALPHA - RED STRIPE
BETA - BLUE STRIPE
GAMMA - WHITE STRIPE
DELTA - GREEN STRIPE
EPSILON - GRAY STRIPE
ZETA - BROWN STRIPE
HYBRID - GRAY STRIPE
5. MULTI PORT ANTENNAS: TERMINATE UNUSED ANTENNA PORTS WITH CONNECTOR CAP &
WEATHERPROOF THOROUGHLY. JUMPERS FROM TMA'S MUST TERMINATE TO OPPOSITE POLARIZATIONS IN EACH SECTOR.
6. CONTRACTOR MUST FOLLOW ALL MANUFACTURERS' RECOMMENDATIONS REGARDING THE INSTALLATION OF FEEDLINES, CONNECTORS, AND ANTENNAS.
7. MINIMUM BEND RADIUS:
LDF4-50A (1/2" HARD LINE) = 5"
FSJ4-50B (1/2" SUPER FLEX) = 1 1/4"
AVA5-50A (7/8" HARD LINE) = 10"
AVA7-50A (1-5/8" HARD LINE) = 15"
LDF7-50A (1-5/8" HARD LINE) = 20"
8. CONTRACTOR SHALL RECORD THE SERIAL #, SECTOR, AND POSITION OF EACH ACTUATOR INSTALLED AT THE ANTENNAS AND PROVIDE THE INFORMATION TO T-MOBILE.
9. WEATHERPROOF ALL ANTENNA CONNECTORS WITH SELF AMALGAMATING TAPE.
10. ANTENNA CONTRACTOR SHALL PERFORM A "TAPE DROP" MEASUREMENT TO CONFIRM/ VALIDATE ANTENNA CENTERLINE (ACL) HEIGHT. CONTRACTOR SHALL SUBMIT A COMPLETED
HEIGHT VERIFICATION FORM TO THE CONSTRUCTION MANAGER.
11. ALL FIBER RUNS CONTAINED IN ONE COMMSCOPE HYBRID DC-FIBER CABLE (MODEL# HCS 2.0 TRUNK CABLE 12#6AWG24 SM FIBER PR) FROM LOWER COVP TO UPPER COVP, HYBRID CABLE SHALL BE COLOR CODED PER T-MOBILE REQUIREMENTS.

ANTENNA KEY

STATUS	ANTENNA NUMBER / SERVICED TECH	COLOR CODE (SEE SNOTE 3) SECTOR COLOR/#	ANTENNA VENDER	MODEL #	AZIMUTH	ELECT. DOWN TILT	MECH DOWNTILT	ANTENNA CENTERLINE	TECH.	COAXIAL FEEDER (QTY) SIZE	COAXIAL FEEDER COLOR CODE	HYBRID FEEDER QUANTITY	HYBRID FEEDER COLOR CODE
PROPOSED	A-1 LTE 700, LTE 600, N600, LTE 2100, LTE 1900, GSM 1900, UMTS 2100	RED 4	COMMSCOPE	FFHH-65C-R3	340°	-	-	76'-0"	L700, L600, N600, L2100, L1900, G1900, U2100	-	-	(3) NEW JUMPER	GREY 1
		RED 3											
		RED 2											
		RED 1											
PROPOSED	A-2 LTE 2500, N2500	RED 1	NOKIA	AAHF (OR AEHC)	340°	-	-	76'-0"	L2500, N2500	-	-		
PROPOSED	B-1 LTE 700, LTE 600, N600, LTE 2100, LTE 1900, GSM 1900, UMTS 2100	BLUE 4	COMMSCOPE	FFHH-65C-R3	100°	-	-	76'-0"	L700, L600, N600, L2100, L1900, G1900, U2100	-	-		
		BLUE 3											
		BLUE 2											
		BLUE 1											
PROPOSED	B-2 LTE 2500, N2500	BLUE 1	NOKIA	AAHF (OR AEHC)	100°	-	-	76'-0"	L2500, N2500	-	-		
PROPOSED	C-1 LTE 700, LTE 600, N600, LTE 2100, LTE 1900, GSM 1900, UMTS 2100	WHITE 4	COMMSCOPE	FFHH-65C-R3	220°	-	-	76'-0"	L700, L600, N600, L2100, L1900, G1900, U2100	-	-		
		WHITE 3											
		WHITE 2											
		WHITE 1											
PROPOSED	C-2 LTE 2500, N2500	WHITE 1	NOKIA	AAHF (OR AEHC)	220°	-	-	76'-0"	L2500, N2500	-	-		

GROUND LEVEL EQUIPMENT KEY

LOCATION	VENDOR	EQUIPMENT	MODEL NUMBER	TECH.	QTY.	STATUS
ICE BRIDGE POST	NOKIA	JUNCTION BOX	HCS 2.0	-	1	PROPOSED
MULTI SECTOR	NOKIA	COVP	-	-	1	EXISTING
SSC	NOKIA	SYSTEM MODULE	ASIK	N2500	1	PROPOSED
SSC	NOKIA	SYSTEM MODULE	ASIK	N600	1	PROPOSED
SSC	NOKIA	SYSTEM MODULE	ASIB	L700, L600 L2100 L1900	1	PROPOSED
SSC	NOKIA	SYSTEM MODULE	ASIB	L2500	1	PROPOSED
SSC	NOKIA	SYSTEM MODULE	FSMF	G1900, U2100	1	EXISTING
SSC	NOKIA	SYSTEM MODULE	ABIA	L2100 L1900	1	PROPOSED
SSC	NOKIA	SYSTEM MODULE	ABIA	L1900	1	PROPOSED
SSC	NOKIA	SYSTEM MODULE	ABIA	L700, L600	1	PROPOSED
SSC	NOKIA	SYSTEM MODULE	ABIL	N2500	3	PROPOSED
SSC	NOKIA	SYSTEM MODULE	ABIL	N600	1	PROPOSED
SSC	NOKIA	SYSTEM MODULE	ABIC	L2500	3	PROPOSED
SSC	NOKIA	SYSTEM MODULE	AMIA	-	2	PROPOSED
CABINET	NOKIA	TRANSPORT SYSTEM	CSR IXRe	-	1	EXISTING

ANTENNA LEVEL EQUIPMENT KEY

LOCATION	VENDOR	EQUIPMENT	MODEL NUMBER	TECHNOLOGY	QTY.	STATUS
MULTI SECTOR	NOKIA	COVP	-	-	1	EXISTING
1 PER SECTOR	NOKIA	RRU	AHFIG	G1900, U2100, L2100, L1900	3	PROPOSED
1 PER SECTOR	NOKIA	RRU	AHLOA	L700, L600, N600	3	PROPOSED

EQUIPMENT FEEDLINE KEY

LOCATION	VENDOR	EQUIPMENT	MODEL NUMBER	TECHNOLOGY	QTY.	STATUS
PER SECTOR	NSN	HYBRID CABLE	125' ± NSN HIGH CAP HCS 1.0	-	1	EXISTING
PER SECTOR	NSN	HYBRID CABLE	125' ± HCS 2.O TRUNK	-	1	PROPOSED

1 EQUIPMENT KEY CONFIGURATION

PRESENTED BY:

T-Mobile

Insite inc.
Wireless Consulting Services
1S660 MIDWEST RD. SUITE 140 OAKBROOK TERRACE, IL 60181

TeleMtn ENGINEERING

SITE NAME:

GATEWAY

SITE ADDRESS:

5605 N MARKSHEFFEL RD
COLORADO SPRINGS, CO 80922

SITE COUNTY:

EL PASO

SITE ID:

DN01549C

REVISIONS

Rev:	Date:	Description:	By:
0	08.13.20	PRELIMINARY	KY
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STAMPING SIGNATURE:

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CONFIGURATION KEYS

SHEET NUMBER:

T5.6

DRAWN BY:	CHK BY:	APV BY:
KY	KS	KS

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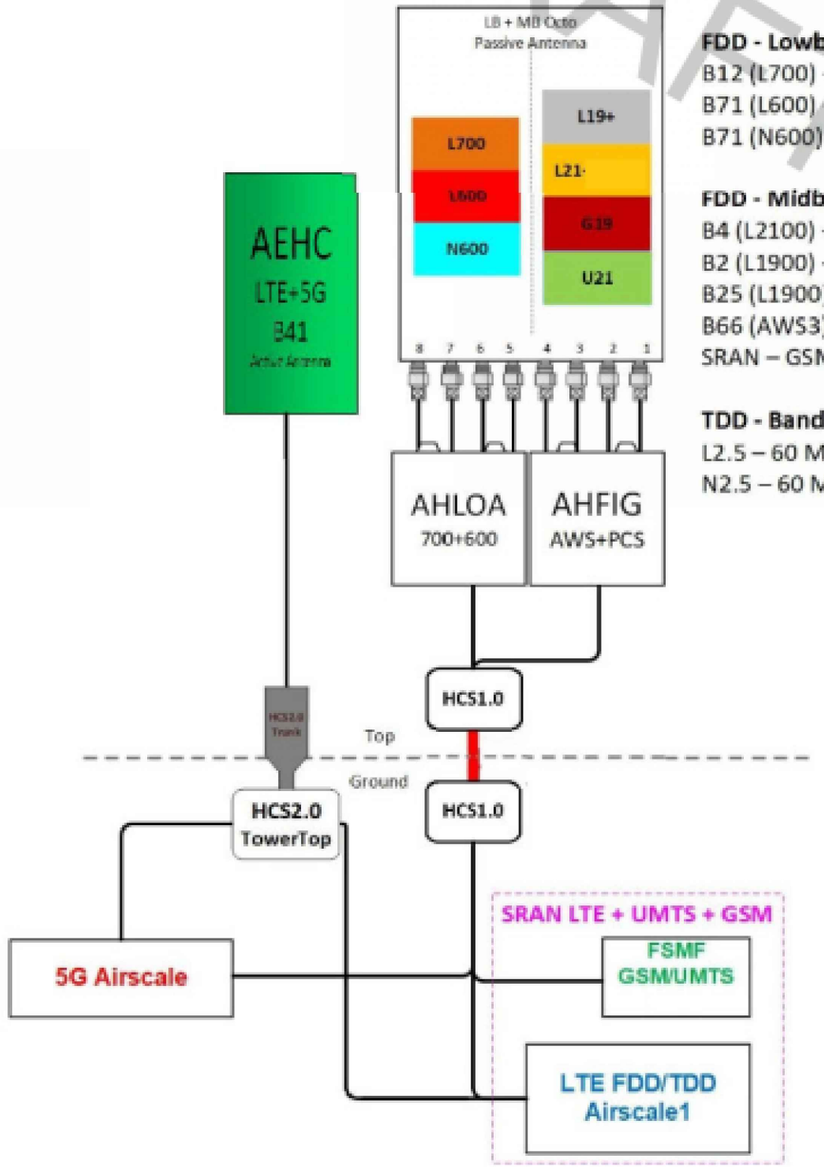
Configuration 56791EZ_SR_U21

* For 5G and LTE Airscale BB dimensioning refer to Fiber Port matrices.
(Alpha, Beta & Gamma)



FDD - Lowband
B12 (L700) – 5 MHz
B71 (L600) –10 MHz
B71 (N600) – 10 MHz

FDD - Midband
B4 (L2100) – 20 MHz
B2 (L1900) – 20 MHz
B25 (L1900) – 20 MHz
B66 (AWS3) – 5MHz
SRAN – GSM/UMTS

TDD - Band 41
L2.5 – 60 MHz
N2.5 – 60 MHz

1 NSN CONFIGURATION DIAGRAM

PRESENTED BY:

T-Mobile

Insite inc.
Wireless Consulting Services
15660 MIDWEST RD. SUITE 140 OAKBROOK TERRACE, IL 60181

TeleMtn
ENGINEERING

SITE NAME:
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SHEET TITLE:
RFDS CONFIGURATION DIAGRAM

SHEET NUMBER:
T5.7

DRAWN BY:	CHK BY:	APV BY:
KY	KS	KS

GENERAL CONSTRUCTION NOTES

1. THE FACILITY IS AN UNOCCUPIED WIRELESS FACILITY.
2. PLANS ARE NOT TO BE SCALED AND ARE INTENDED TO BE A DIAGRAMMATIC OUTLINE ONLY, UNLESS NOTED OTHERWISE. THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
3. PRIOR TO THE SUBMISSION OF BIDS, THE CONTRACTORS SHALL VISIT THE JOB SITE AND BE RESPONSIBLE FOR ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS, AND CONFIRMING THAT THE WORK MAY BE ACCOMPLISHED AS SHOWN PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE IMPLEMENTATION ENGINEER AND ARCHITECT/ENGINEER PRIOR TO PROCEEDING WITH THE WORK.
4. THE CONTRACTOR SHALL RECEIVE, IN WRITING, AUTHORIZATION TO PROCEED BEFORE STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED OR IDENTIFIED BY THE CONTRACT DOCUMENTS.
5. CONTRACTOR SHALL CONTACT LOCAL DIGGERS HOTLINE 48 HOURS PRIOR TO PROCEEDING WITH ANY EXCAVATION, SITE WORK OR CONSTRUCTION.
6. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY INDICATED OTHERWISE OR WHERE LOCAL CODES OR REGULATIONS TAKE PRECEDENCE.
7. ALL WORK PERFORMED AND MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. MECHANICAL AND ELECTRICAL SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. THE GENERAL CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK, USING THE BEST SKILLS AND ATTENTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT INCLUDING CONTACT AND COORDINATION WITH THE CONSTRUCTION FIELD ENGINEER AND WITH THE LANDLORD'S AUTHORIZED REPRESENTATIVE.
9. DETAILS ARE INTENDED TO SHOW END RESULT OF DESIGN. MINOR MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK.
10. REPRESENTATIONS OF TRUE NORTH, OTHER THAN THOSE FOUND ON THE PLOT OF SURVEY DRAWING, SHALL NOT BE USED TO IDENTIFY OR ESTABLISH THE BEARING OF TRUE NORTH AT THE SITE. THE CONTRACTOR SHALL RELY SOLELY ON THE PLOT OF SURVEY DRAWING AND ANY SURVEYOR'S MARKINGS AT THE SITE FOR THE ESTABLISHMENT OF TRUE NORTH, AND SHALL NOTIFY THE ARCHITECT/ENGINEER PRIOR TO PROCEEDING WITH THE WORK IF ANY DISCREPANCY IS FOUND BETWEEN THE VARIOUS ELEMENTS OF THE WORKING DRAWINGS AND THE TRUE NORTH ORIENTATION AS DEPICTED ON THE PLAT OF SURVEY. THE CONTRACTOR SHALL ASSUME SOLE LIABILITY FOR ANY FAILURE TO NOTIFY THE ARCHITECT/ENGINEER.

STRUCTURAL NOTES

GENERAL CONDITIONS

1. DESIGN AND CONSTRUCTION OF ALL WORK SHALL CONFORM TO THE APPROVED EDITION OF THE IBC EDITION AND ALL OTHER APPLICABLE STATE CODES, ORDINANCES, AND REGULATIONS. IN CASE OF CONFLICT BETWEEN THE CODES, STANDARDS, AND REGULATIONS. SPECIFICATIONS, GENERAL NOTES AND/OR MANUFACTURER'S REQUIREMENTS. USE THE MOST STRINGENT PROVISION.
2. IT IS THE EXPRESS INTENT OF THE PARTIES INVOLVED IN THIS PROJECT THAT THE CONTRACTOR OR SUBCONTRACTOR OR INDEPENDENT CONTRACTOR OR THEIR RESPECTIVE EMPLOYEES SHALL EXCULPATE THE ARCHITECT, THE ENGINEER, THE CONSTRUCTION MANAGER, THE OWNER, AND THEIR AGENTS, FROM ANY LIABILITY WHATSOEVER AND HOLD THEM HARMLESS AGAINST LOSS, DAMAGES, LIABILITY OR ANY EXPENSE ARISING IN ANY MATTER FROM THE WRONGFUL OR NEGLIGENT ACT, OR FAILURE TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, OR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FAILURE TO CONFORM TO THE STATE SCAFFOLDING ACT IN CONNECTION WITH THE WORK.
3. DO NOT SCALE DRAWINGS.
4. VERIFY ALL EQUIPMENT MOUNTING DIMENSIONS PER MANUFACTURER DRAWINGS.
5. SUBMIT ONE SEPIA AND TWO PRINTS OF ALL STRUCTURAL SHOP DRAWINGS. MARKED UP SEPIA SHALL BE RETURNED.

STRUCTURAL STEEL NOTES:

1. CHANNELS, ANGLES AND PLATES SHALL BE ASTM A36 MATERIAL, UNLESS NOTED OTHERWISE.
2. SQUARE AND RECTANGULAR TUBE STEEL HSS SECTIONS SHALL BE ASTM A500, GRADE B (Fy = 46 ksi) MATERIAL.
3. ROUND PIPE SECTIONS SHALL BE ASTM A53, GRADE B (Fy =35 ksi) MATERIAL.
4. DESIGN, FABRICATION, AND ERECTION SHALL BE IN ACCORDANCE WITH THE "AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" , WITH COMMENTARY AND THE "CODE OF STANDARD PRACTICE" .
5. ALL STEEL SHALL HAVE ONE COAT OF SHOP PRIMER. DO NOT PAINT AREAS WITHIN 3" OF BOLTS, WELDS OR HEADED STUDS.
6. BOLTS SHALL BE HIGH STRENGTH BOLTS, A325, CONFORMING TO ASTM SPECIFICATIONS. ALL CONNECTIONS SHALL HAVE A MINIMUM OF 2 BOLTS.
7. WELDING SHALL BE CONDUCTED BY CERTIFIED WELDERS AND SHALL CONFORM TO THE AWS CODES FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION.
8. WELDS SHALL BE MADE USING E70XX ELECTRODES AND SHALL BE 3/16" MINIMUM UNLESS OTHERWISE NOTED.
9. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH A WELDED PROCEDURE SPECIFICATION (WPS) AS PER AWS D1.1 , D1.3 AND D1.4.
10. ONLY PRE-QUALIFIED WELDING PROCEDURES SHALL BE USED.
11. UNLESS SPECIFICALLY ADDRESSED IN THE SPECIFICATIONS OR THE DETAILS, ALL STEEL ITEMS PERMANENTLY EXPOSED TO EARTH OR WEATHER SHALL BE CORROSION-RESISTANT BY GALVANIZING OR BY THE USE OF STAINLESS STEEL.
12. ALL FIELD WELDS ON GALVANIZED MATERIAL SHALL BE BRUSH-COATED WITH A ZINC-RICH PAINT.

FRP NOTES:

1. ALL FRP MATERIAL SHALL BE EXTREN SERIES 500 OR EQUIVALENT, PRODUCED BY THE PULTRUSION METHOD.
2. ALL ADHESIVE RESIN SHALL BE PLEXUS METHACRYLATE OR AN EQUIVALENT ADHESIVE RESIN THAT IS COMPATIBLE WITH THE RESIN MATRIX USED IN THE STRUCTURAL SHAPES.
3. ALL FRP CONNECTIONS SHALL BE FULLY-BONDED AT EACH SIDE WITH A 1/4" PLATE AND A MINIMUM OF (2) 3/8" DIAMETER FLATHEAD FRP SCREWS PER MEMBER.
4. ISOPLAST NUTS AND BOLTS SHALL BE TIGHTENED TO A SNUG-TIGHT FIT PLUS AN ADDITIONAL 1/2 TURN, PRIOR TO BEING LOCKED WITH EPOXY.
5. ALL PANELS / SHEATHING SHALL BE FULLY BONDED WITH 3/8" FLATHEAD FRP SCREWS AT 12" O.C.
6. ALL FIELD CUT AND DRILLED EDGES, HOLES AND ABRASIONS SHALL BE SEALED WITH A CATALYZED EPOXY RESIN COMPATIBLE WITH THE MANUFACTURER'S ORIGINAL RESIN.

STANDARDS FOR ALL CONCRETE WORK

1. ALL CONCRETE WORK SHALL CONFORM WITH ACI. 318 OR LATEST. DETAIL REINFORCING IN CONFORMANCE WITH ACI. SP66 LATEST.
2. NO SPLICES OF REINFORCEMENT SHALL BE MADE EXCEPT AS DETAILED OR AUTHORIZED BY THE STRUCTURAL ENGINEER. LAP SPLICES WHERE PERMITTED SHALL BE A MINIMUM OF 30 BAR DIAMETERS.
3. PROVIDE ALL ACCESSORIES NECESSARY TO SUPPORT REINFORCING AT POSITIONS SHOW ON DRAWINGS.
4. WIRE FABRIC REINFORCEMENT MUST LAP ONE FULL MESH AT SIDE AND END LAPS SHALL BE TIED TOGETHER.
5. CURE AFTER FINISHING CONCRETE. KEEP MOIST FOR 7 DAYS AFTER POURING.
6. COMPACT STRUCTURAL FILL 95% PROCTOR DENSITY PRIOR TO PLACING CONCRETE UNDER SLABS.
7. 1/4" CHAMFER ON ALL CORNERS AND EDGES.
8. ALL CONCRETE SHALL BE PORTLAND, TYPE 1 CEMENT WITH A MINIMUM OF 28 DAY STRENGTH OF 3000 PSI., 4" SLUMP AND A MINIMUM AIR ENTRAPMENT OF 4%.
9. ALL REINFORCING STEEL SHALL BE GRADE 60. ALL REINFORCING MESH SHALL CONFORM TO ASTM A 185.

ELECTRICAL NOTES

1. SUBMITTAL OF BID INDICATES CONTRACTOR IS COGNIZANT OF ALL JOB SITE CONDITIONS AND WORK TO BE PREFORMED UNDER THIS CONTRACT. CONTRACTOR IS RESPONSIBLE FOR ALL FIELD VERIFICATION.
2. THESE PLANS ARE DIAGRAMMATIC ONLY, AND NOT TO BE SCALED.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, INSURANCE, EQUIPMENT, INSTALLATION, CONSTRUCTION TOOLS, TRANSPORTATION, ETC. FOR A COMPLETE AND PROPERLY OPERATIVE SYSTEM ENERGIZED THROUGHOUT AND AS INDICATED ON DRAWINGS, AS SPECIFIED HEREIN AND/OR AS OTHERWISE REQUIRED.
4. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND IN PERFECT CONDITION WHEN INSTALLED AND SHALL BE OF THE BEST GRADE OR GROUP OF EQUIPMENT. MATERIALS SHALL BE LISTED AND APPROVED BY UNDER-WRITER'S LABORATORY AND SHALL BEAR THE INSPECTION LABEL "J" WHERE SUBJECT TO SUCH APPROVAL MATERIALS SHALL MEET WITH APPROVAL OF THE DIVISION OF INDUSTRIAL SAFETY AND ALL GOVERNING BODIES HAVING JURISDICTION. MATERIALS SHALL BE MANUFACTURED IN ACCORDANCE WITH APPLICABLE STANDARDS ESTABLISHED BY ANSI, NEMA AND NBFU.
5. ALL CONDUIT INSTALLED SHALL BE SURFACE MOUNTED UNLESS OTHERWISE NOTED.
6. ELECTRICAL CONTRACTOR SHALL CARRY OUT HIS WORK WITH ACCORDANCE WITH ALL GOVERNING STATE, COUNTY, LOCAL CODES AND O.S.H.A.
7. ELECTRICAL CONTRACTOR SHALL SECURE ALL NECESSARY ELECTRICAL PERMITS, AND PAY ALL REQUIRED FEES.
8. COMPLETE JOB SHALL BE GUARANTEED FOR A PERIOD OF NO LESS THAN ONE YEAR AFTER THE DATE OF JOB COMPLETION. ANY WORK, MATERIAL, OR EQUIPMENT FOUND TO BE FAULTY DURING THAT PERIOD SHALL BE CORRECTED AT ONCE, UPON WRITTEN NOTIFICATION, AT THE EXPENSE OF THE ELECTRICAL CONTRACTOR.
9. ALL CONDUIT ONLY (C.O.) SHALL HAVE A PULL WIRE OR ROPE, AND TRUE TAPE.
10. PROVIDE THE OWNER WITH ONE SET OF COMPLETE DIMENSIONS AND CIRCUITS, WITHIN 10 WORKING DAYS OF PROJECT COMPLETION. ELECTRICAL "AS BUILT" DRAWINGS, SHOWING ACTUAL LOCATION OF CONDUITS.
11. ALL BROCHURES, OPERATING MANUALS, CATALOGS, SHOP DRAWINGS, ETC. SHALL BE TURNED OVER TO PROJECT MANAGER AT JOB COMPLETION.
12. USE T-TAP CONNECTIONS ON ALL MULTI-CIRCUITS WITH COMMON NEUTRAL CONDUCTOR FOR LIGHTING FIXTURE. ALL CONDUCTORS SHALL BE COPPER.
13. THE EXTERIOR GROUND RING SHALL BE TESTED PER CCI SPECIFICATIONS AND SHALL HAVE A RESISTANCE TO EARTH OF 5 OHMS OR LESS. IF NOT NOTIFY ENGINEER.
14. ALL CIRCUIT BREAKERS, FUSES AND ELECTRICAL EQUIPMENT SHALL HAVE AN INTERRUPTING RATING NOT LESS THAN THE MAXIMUM SHORT =CIRCUIT CURRENT TO WHICH THEY MAY BE SUBJECTED, AND A MINIMUM OF 10,000 A.I.C.
15. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE GROUNDED AS REQUIRED BY ALL APPLICABLE CODES.
16. PATCH, REPAIR, AND PAINT ANY AREA THAT HAS BEEN DAMAGED IN THE COURSE OF THE ELECTRICAL WORK.
17. IN DRILLING HOLES INTO CONCRETE (WHETHER FOR FASTENING OR ANCHORING PURPOSES OR PENETRATIONS THROUGH THE FLOOR FOR CONDUIT RUNS, PIPE RUNS, ETC.) IT MUST BE CLEARLY UNDERSTOOD THAT TENDONS AND RE-BARS WILL NOT BE DRILLED INTO, CUT, OR DAMAGED UNDER ANY CIRCUMSTANCES.
18. LOCATION OF TENDONS AN RE-BARS ARE NOT DEFINITELY KNOWN AND THEREFORE MUST BE SEARCHED FOR BY APPROPRIATE METHODS AND EQUIPMENT VIA X-RAY, OR OTHER DEVICES THAT CAN ACCURATELY LOCATE THE REINFORCING STEEL TENDONS.
19. PENETRATIONS IN FIRE RATED WALLS SHALL BE FIRE STOPPED IN ACCORDANCE WITH APPLICABLE LOCAL BUILDING CODES. USING U.L. RATED MATERIALS.
20. ELECTRICAL CONTRACTOR IS TO COORDINATE WITH UTILITY COMPANY FOR CONNECTION OF TEMPORARY AND PERMANENT POWER TO THE SITE. THE TEMPORARY POWER AND ALL HOOK-UP COSTS SHALL BE PAID BY THE CONTRACTOR.
21. ELECTRICAL CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND/OR CATALOG CUT-SHEETS ON ALL NON-SPECIFIED ORIGINAL MATERIALS AND EQUIPMENT, TO PROJECT MANAGER PRIOR TO COMMENCEMENT OF THE WORK.
22. UPON COMPLETION OF WORK, CONDUCT CONTINUITY AND SHORT CIRCUIT, AS WELL AS, GROUNDING TEST, GROUNDING TEST SHALL BE PREFORMED BY INDEPENDENT TESTING AGENCY, WITH WRITTEN REPORT SUBMITTED TO THE PROJECT MANAGER FOR REVIEW AND APPROVAL.
23. CLEAN PREMISES DAILY OF ALL DEBRIS RESULTING FROM WORK AND LEAVE WORK PREMISES IN A COMPLETE AND UNDAMAGED CONDITION.
24. ALL EXTERIOR WALL PENETRATIONS SHALL BE SEALED WITH POLYSEAM SEALANT.
25. ALL #2 TINNED BARE COPPER DOWNLEADS TO BE PROTECTED BY 1/2" P.V.C. PIPE AND SECURED.
26. COMPRESSION FITTINGS TO BE USED ON ALL CONDUITS (NO SET SCREWS).
27. ALL #6 STRANDED COPPER WITH GREEN INSULATION TO BE ATTACHED WITH CRIMPED DOUBLE LUG, ATTACHED WITH NUTS, BOLTS AND STAR WASHERS TYPICAL AND NO-OX GREASE BETWEEN LUG AND BUS BAR.
28. ALL ABOVE GROUND CONDUIT SHALL BE RIGID GALVANIZED CONDUIT WITH WEATHERPROOF FITTINGS.

GROUNDING

1. ALL METALLIC PARTS OF ELECTRICAL EQUIPMENT WHICH DO NOT CARRY CURRENT SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING MANUFACTURER, T-MOBILE GROUNDING AND BONDING STANDARDS, AND THE NATIONAL ELECTRICAL CODE.
2. PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEM INDICATED WITH ASSEMBLY OF MATERIALS, INCLUDING GROUNDING ELECTRODES, BONDING JUMPERS AND ADDITIONAL ACCESSORIES AS REQUIRED FOR A COMPLETE INSTALLATION.
3. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUNDING CONDUCTORS SHALL NOT BE LOOPED OR SHARPLY BENT. ROUTE GROUNDING CONNECTIONS AND CONDUCTORS TO GROUND IN THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE TO MINIMIZE TRANSIENT VOLTAGE RISES. BUILDINGS AND/OR NEW TOWERS GREATER THAN 75 FEET IN HEIGHT AND WHERE THE MAIN
4. GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUND RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN #2 AWG COPPER. ROOFTOP GROUND RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY).
5. TIGHTEN GROUNDING AND BONDING CONNECTORS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES FOR CONNECTORS AND BOLTS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT AVAILABLE, TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUE VALUES SPECIFIED IN UL TO ASSURE PERMANENT AND EFFECTIVE GROUNDING. CONTRACTOR SHALL VERIFY THE LOCATIONS OF GROUNDING TIE-IN-POINTS TO THE EXISTING
6. ALL UNDERGROUND GROUNDING CONNECTIONS SHALL BE MADE BY THE GROUNDING SYSTEM. EXOTHERMIC WELD PROCESS AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. ALL GROUNDING CONNECTIONS SHALL BE INSPECTED FOR TIGHTNESS. EXOTHERMIC WELDED CONNECTIONS SHALL BE APPROVED BY THE INSPECTOR HAVING JURISDICTION BEFORE BEING PERMANENTLY CONCEALED.
8. APPLY CORROSION-RESISTANCE FINISH TO FIELD CONNECTIONS AND PLACES WHERE FACTORY APPLIED PROTECTIVE COATINGS HAVE BEEN DESTROYED.
9. A SEPARATE, CONTINUOUS, INSULATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED IN ALL FEEDER AND BRANCH CIRCUITS.
10. BOND ALL INSULATED GROUNDING BUSHINGS WITH A BARE 6 AWG GROUNDING CONDUCTOR TO A GROUND BUS.
11. DIRECT BURIED GROUNDING CONDUCTORS SHALL BE INSTALLED AT A NOMINAL DEPTH OF 36" MINIMUM BELOW GRADE, OR 6" BELOW THE FROST LINE, USE THE GREATER OF THE TWO DISTANCES.
12. ALL GROUNDING CONDUCTORS EMBEDDED IN OR PENETRATING CONCRETE SHALL BE INSTALLED IN SCHEDULE 40 PVC CONDUIT.
13. THE INSTALLATION OF CHEMICAL ELECTROLYTIC GROUNDING SYSTEM IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. REMOVE SEALING TAPE FROM LEACHING AND BREATHER HOLES. INSTALL PROTECTIVE BOX FLUSH WITH GRADE.
14. DRIVE GROUND RODS UNTIL TOPS ARE A MINIMUM DISTANCE OF 36" DEPTH OR 6" BELOW FROST LINE, USING THE GREATER OF THE TWO DISTANCES.
15. IF COAX ON THE ICE BRIDGE IS MORE THAN 6 FT. FROM THE GROUND BAR AT THE BASE OF THE TOWER, A SECOND GROUND BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE, TO GROUND THE COAX CABLE GROUNDING KITS AND IN-LINE ARRESTORS
16. CONTRACTOR SHALL REPAIR, AND/OR REPLACE, EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.

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GENERAL NOTES

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GN1.0

DRAWN BY:	CHK BY:	APV BY:
KY	KS	KS

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