

# T-Mobile®

## L700 4X2/ SECTOR SPLIT PROJECT

CROWN CASTLE BUN:  
**851961**  
CROWN CASTLE Site Name:  
**SER ROOFTOP/CROWN**

T-MOBILE Site #  
**ML20079A**

Site Address  
**1020 MITCHELL STREET  
MILWAUKEE, WI 53204**

T-Mobile

T-MOBILE  
1400 OPUS PLACE  
DOWNERS GROVE, IL 60515  
MAIN: (773) 444-5400



20 N. MARTINGALE  
SUITE 440  
SCHAUMBURG, IL 60173  
MAIN: (630) 855-4356

CONCORDIA, LTD  
A PROFESSIONAL DESIGN FIRM  
LICENSE # 184.004952-D.B.A.  
**CONCORDIA WIRELESS, INC.**  
361 RANDY ROAD  
UNIT 101  
CAROL STREAM, IL 60188  
MAIN: (847) 981-0801

DRAWN BY: YS      CHECKED BY: AS  
CHECKED BY: RH      APPROVED BY: GMS

No.	Revision/Issue	Date	Initial
A	90% REVIEW	09/25/18	SNJ
B	FINAL	11/20/18	HE

### SCOPE OF WORK

THE SCOPE OF WORK CONSISTS OF:

- REPLACEMENT OF (4) EXISTING ANTENNAS W/ (4) NEW ANTENNAS
- REMOVAL OF (4) EXISTING FHFB'S, (3) EXISTING FRIG'S & (1) FRIJ
- INSTALLATION OF (6) NEW AHFIB RF MODULES & NEW RF JUMPERS
- REMOVAL OF (2) EXISTING FSMF SYSTEM MODULES W/ (3) FBBC'S
- REMOVAL OF (1) EXISTING FSMF SYSTEM MODULE W/ (1) FBBA
- INSTALLATION OF (1) NEW AIRSCALE SM OUTDOOR AMOB W/ (1) NEW ASIA MODULE & (3) NEW ABIA MODULES
- REUSE OF (3) EXISTING HYBRID CABLES
- REPLACEMENT OF SAR-M/F W/ CSR-SAS
- INSTALLATION OF (1) NEW GPS ANTENNA

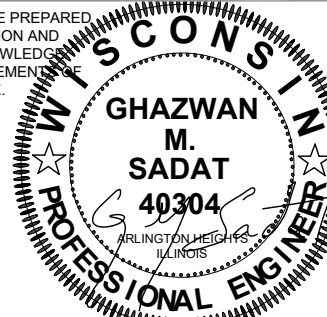
### DRIVING DIRECTIONS

DRIVING DIRECTIONS FROM T-MOBILE OFFICE  
AT: 1400 OPUS PLACE, DOWNERS GROVE, IL 60515

- GET ON I-88 E FROM DOWNERS DR & BUTTERFIELD FRONTAGE RD 1.3 MI
  - HEAD EAST 374 FT & TURN RIGHT TOWARD DOWNERS DR 62 FT
  - TURN LEFT ONTO DOWNERS DR 0.3 MI & TURN RIGHT TO FRONTAGE RD
  - CONTINUE ONTO BUTTERFIELD FRONTAGE RD 0.5 MI
  - TURN LEFT TO STAY ON BUTTERFIELD FRONTAGE RD 95 FT
  - TURN RIGHT AT THE 1ST CROSS STREET ONTO HIGHLAND AVE 0.1 MI
  - USE THE LEFT 2 LANES TO TURN LEFT ONTO THE INTERSTATE 88 E RAMP TO CHICAGO 0.3 MI
  - FOLLOW I-294 N AND I-94 W TO S 4TH ST IN MILWAUKEE. TAKE EXIT 312A-312B FROM I-94 W 88.9 MI & MERGE ONTO I-88 E 5.1 MI
  - USE THE RIGHT 2 LANES TO TAKE THE I-290 W/I-294 TRI - STATE N EXIT TOWARD MILWAUKEE/ROCKFORD 0.5 MI
  - KEEP LEFT AT THE FORK. FOLLOW SIGNS FOR INTERSTATE 294 N/O'HARE AIRPORT/MILWAUKEE AND MERGE ONTO I-294 N 8.7 MI
  - KEEP LEFT TO STAY ON I-294 N 13.6 MI & MERGE ONTO I-94 W 60.7 MI
  - TAKE EXIT 312A-312B TOWARD BECHER ST/MITCHELL ST 0.2 MI
  - CONTINUE ON S 4TH ST. DRIVE TO W MITCHELL ST 0.9 MI
  - KEEP RIGHT TO CONTINUE ON S 4TH ST 0.5 MI
  - TURN LEFT ONTO W MITCHELL ST 0.5 MI
- DESTINATION WILL BE ON THE RIGHT  
TOTAL TRAVEL ESTIMATE: 91.2 MILES, ABOUT 1 HOURS 41 MINUTES

### PROFESSIONAL LICENSURE

I CERTIFY THAT THESE DRAWINGS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND CONTROL AND TO THE BEST OF MY KNOWLEDGE AND BELIEF COMPLY WITH THE REQUIREMENTS OF THE GOVERNING LOCAL BUILDING CODE.

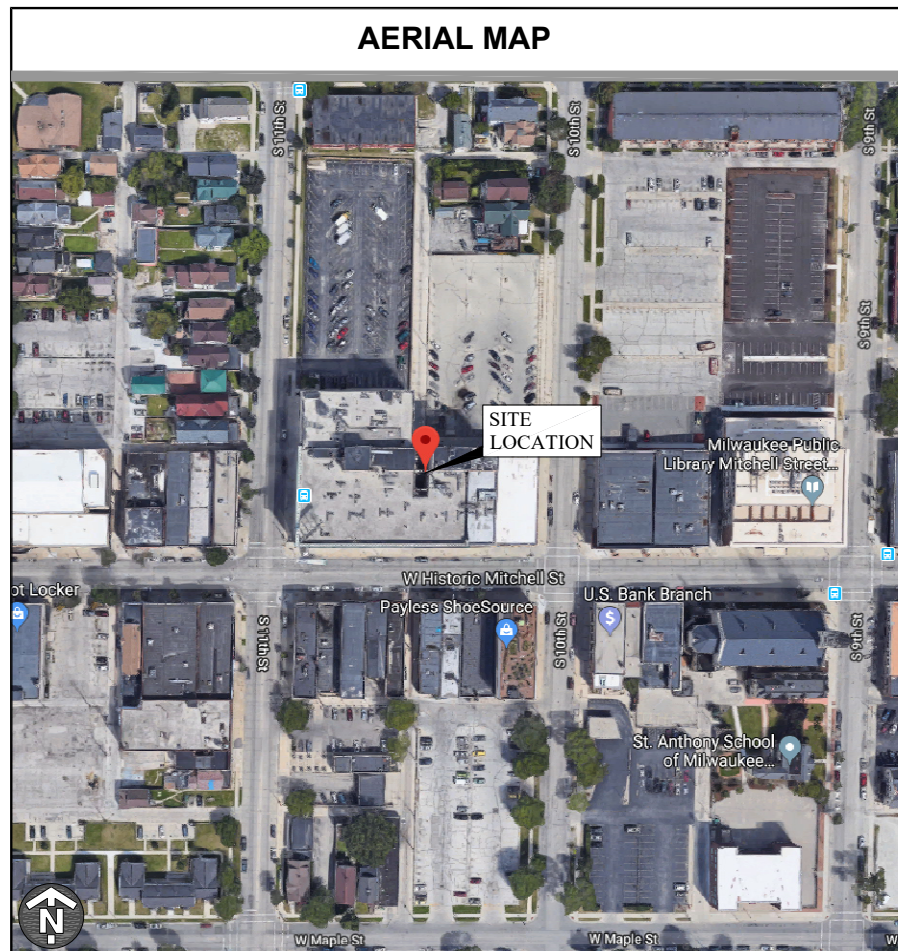


LICENSED PROFESSIONAL

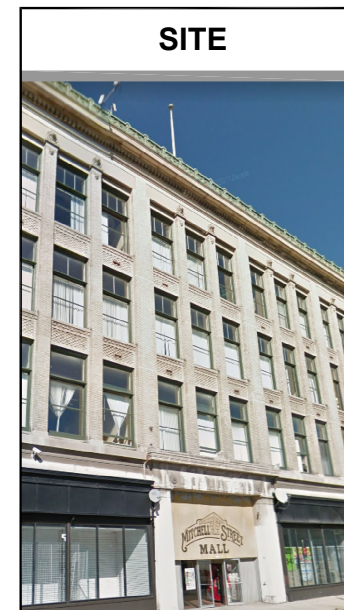
EXPIRES: 07/31/19

SIGNED: 11/20/18

### AERIAL MAP



### SITE



### SHEET INDEX

NO.	SHEET DESCRIPTION
T-1	TITLE SHEET
A-1	BUILDING PLAN
A-1A	EXISTING & PROPOSED ENLARGED EQUIPMENT LAYOUT
A-2	BUILDING ELEVATION AND DETAILS
A-2A	EXISTING & PROPOSED ANTENNA PLANS
A-3	ANTENNA & CABLE SCHEDULE
A-3A	SYSTEM CONNECTIONS DIAGRAM
A-4	NEW EQUIPMENT SPECIFICATIONS
EG-1	PROPOSED SITE GROUNDING DIAGRAM
SP-1	GENERAL NOTES AND SPECIFICATIONS

**GENERAL NOTES:**  
CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS AT THE PROJECT SITE AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

THE SEAL CERTIFIES ONLY THE CIVIL ENGINEERING DESIGN AND RELATED DETAILS SHOWN ON THESE PLANS. THIS SEAL DOES NOT CERTIFY ANY ARCHITECTURAL, ELECTRICAL, MECHANICAL, STRUCTURAL DESIGN, AND RELATED DETAILS INCLUDED IN THESE PLANS.

FOR SITES WHERE A CRANE IS NECESSARY, THE CONTRACTOR SHALL CONFIRM AN UNOBSTRUCTED ROUTE FOR THE CRANE FROM PUBLIC ROAD TO TOWER SITE PRIOR TO CONSTRUCTION. NO AERIAL OBSTRUCTIONS UNDER FIFTEEN FEET ABOVE GRADE, INCLUDING AERIAL UTILITY LINES, ARE ALLOWED ALONG SAID CRANE ROUTE.

GC SHALL CONTACT THE A&E FIRM PRIOR TO BIDWALK AND CONSTRUCTION START TO CONFIRM THAT DRAWINGS ARE THE MOST RECENT SET.

### PROJECT INFORMATION

#### SITE INFORMATION:

LATITUDE: N 43° 00' 44.27" (NAD 83)  
LONGITUDE: W 87° 55' 27.92" (NAD 83)  
SITE TYPE: ROOFTOP  
JURISDICTION: CITY OF MILWAUKEE  
COUNTY: MILWAUKEE

#### APPLICANT:

T- MOBILE  
12920 SE 38TH STREET  
BELLEVUE, WA 98006

#### T-MOBILE CONTACT:

MACKENZIE KEYS  
MACKENZIE.KEYS2@T-MOBILE.COM

#### ENGINEERING CONTACT:

CONCORDIA WIRELESS, INC.  
CONTACT: GM SADAT, PE  
PHONE: (847) 981-0801  
FAX: (847) 589-0643

#### CROWN CASTLE CONTACT:

MORGAN KLAAS  
CROWN CASTLE USA INC  
20 N. MARTINGALE  
SUITE 440  
SCHAUMBURG, IL 60173  
PHONE: (847) 273-0474

#### CODES:

- INTERNATIONAL BUILDING CODE 2015
- NATIONAL ELECTRIC CODE (NEC)
- AMERICAN CONCRETE INSTITUTE (ACI) 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
- AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION
- TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-G, STRUCTURAL STANDARDS FOR STEEL TOWER AND ANTENNA SUPPORTING STRUCTURES
- TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS



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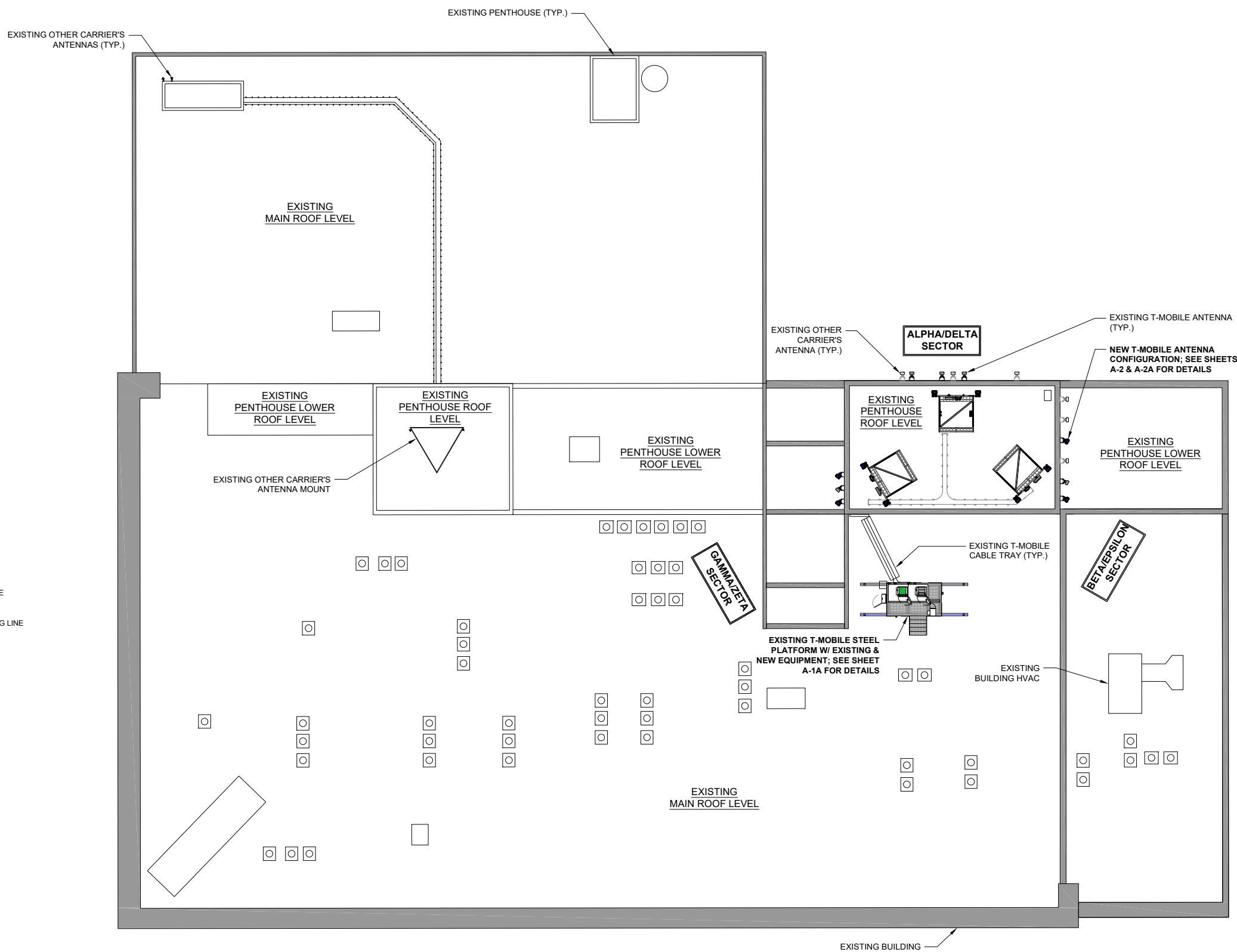
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TITLE SHEET

T-1

**LEGEND & SYMBOLS**

- UTILITY POLE
- SIGN
- TELCO PEDESTAL
- FIRE HYDRANT
- LIGHT STANDARD
- INLET
- CATCH BASIN
- MANHOLE
- TRAFFIC SIGNAL
- ROW MARKER
- IRON PIPE SET
- IRON PIPE FOUND
- BUFFALO BOX
- VALVE BOX
- HORIZONTAL CONTROL POINT
- HANDICAPPED PARKING SPACE
- DT105 DECIDUOUS TREE W/SIZE
- CT10 CONIFEROUS TREE W/SIZE
- BRUSH
- TREE LINE
- 666 CONTOUR W/ELEVATION
- EXISTING GUARDRAIL
- CHAIN LINK FENCE
- IRON FENCE
- WOOD FENCE
- OVERHEAD WIRES
- LOT LINE
- PROPERTY LINE
- LEASE AREA LINE
- UTILITY EASEMENT LINE
- CENTER LINE
- UE UNDERGROUND ELECTRIC LINE
- UG UNDERGROUND GAS LINE
- FO UNDERGROUND FIBER LINE
- UT UNDERGROUND TELCO LINE
- SS/SA UNDERGROUND STORM/SANITARY SEWER LINE
- W UNDERGROUND WATER LINE
- COM UNDERGROUND COMMUNICATION/MONITORING LINE
- CONCRETE
- ASPHALT
- GRAVEL
- CULTIVATED FIELD
- GRASS AREA
- ICE BRIDGE
- STEEL PLATFORM



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CHECKED BY: RH	APPROVED BY: GMS

**WISCONSIN**

GHAZWAN  
M.  
SADAT  
40304  
ARLINGTON HEIGHTS,  
ILLINOIS

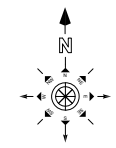
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**BUILDING PLAN**

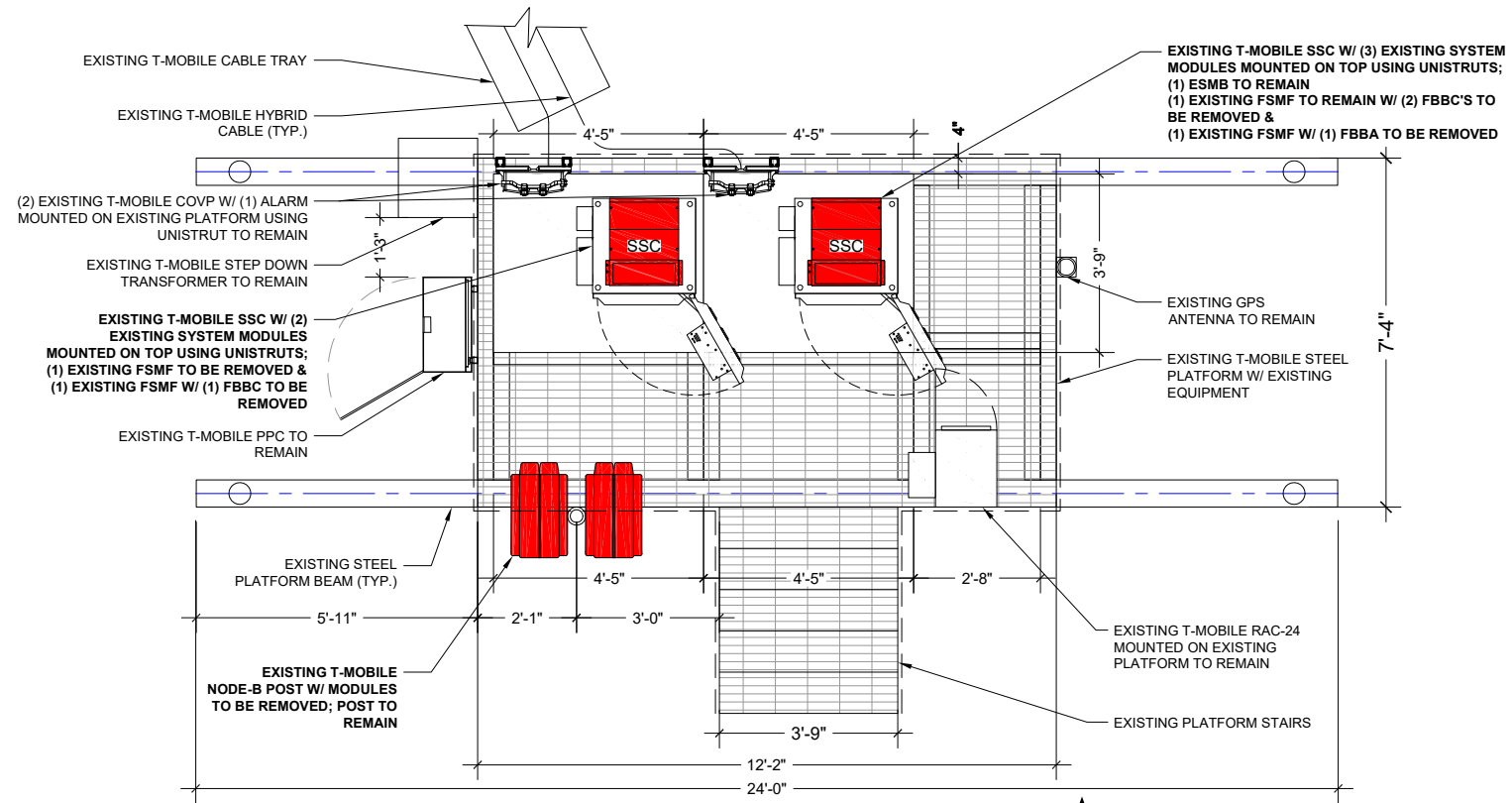
**A-1**

**1 BUILDING PLAN**  
SCALE: 5/64"=1'-0" (5/64"=2'-0" IF 11 X 17 SHEET SIZE)




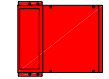
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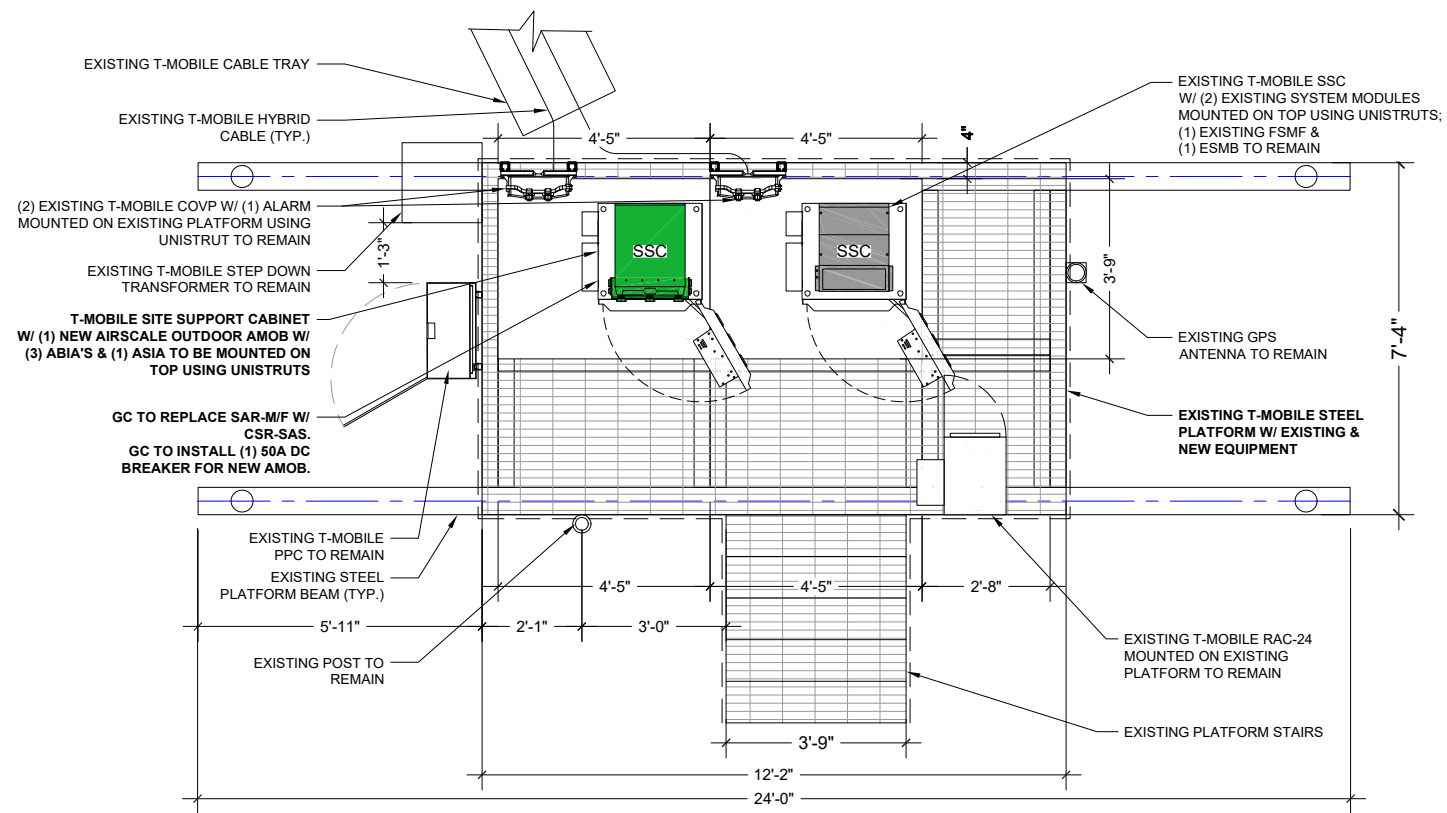


**LEGEND**


 EXISTING MODULE TO BE REMOVED

 EXISTING MODULE TO BE REMOVED/RELOCATED

**1 EXISTING EQUIPMENT LAYOUT**  
SCALE: 1/2"=1'-0" (1/2"=2'-0" IF 11 X 17 SHEET SIZE)



**LEGEND**

 NEW MODULE TO BE INSTALLED

**2 PROPOSED EQUIPMENT LAYOUT**  
SCALE: 1/2"=1'-0" (1/2"=2'-0" IF 11 X 17 SHEET SIZE)

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**WISCONSIN**

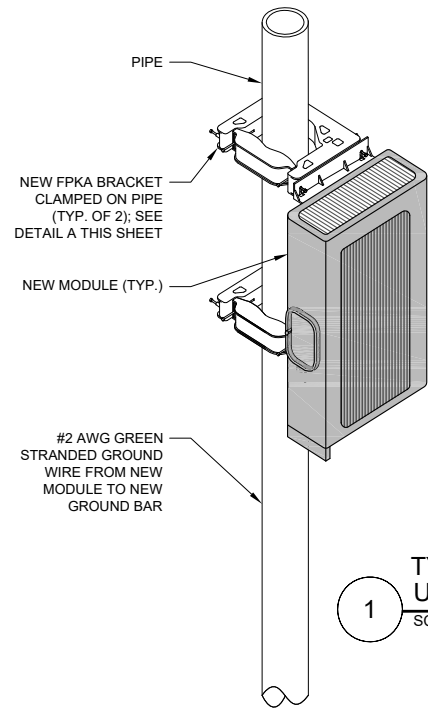
**GHAZWAN M. SADAT**  
40304  
ARLINGTON HEIGHTS, ILLINOIS

PROFESSIONAL ENGINEER

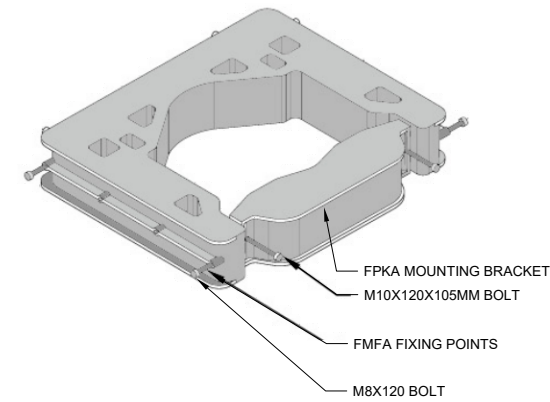
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EXISTING & PROPOSED  
ENLARGED EQUIPMENT  
LAYOUT

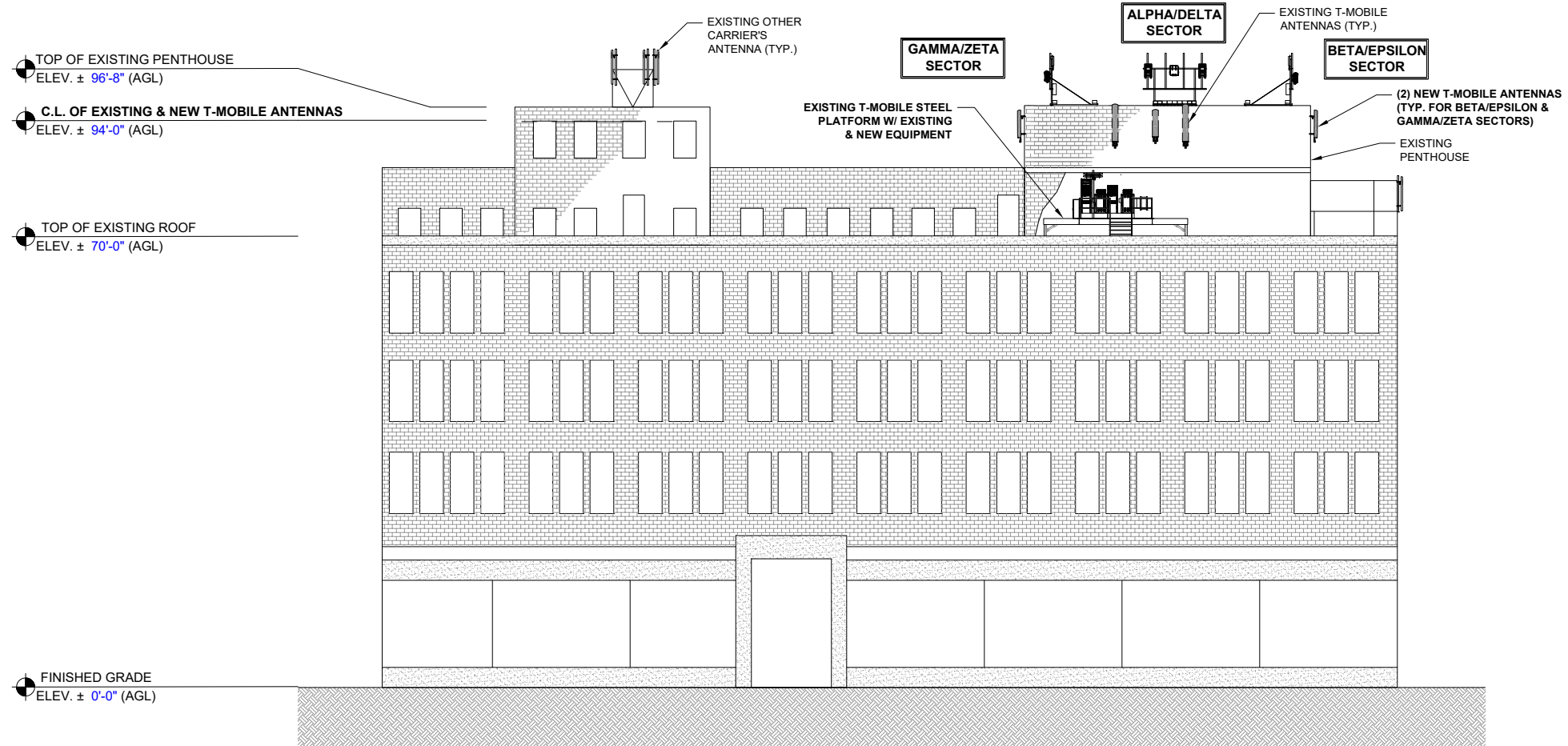
**A-1A**



1 TYPICAL RF UNIT MOUNTING DETAIL  
SCALE: N.T.S.



2 FPKA BRACKET DETAIL  
N.T.S.



3 BUILDING ELEVATION  
SCALE: 5/64"=1'-0" (5/64"=2'-0" IF 11 X 17 SHEET SIZE)

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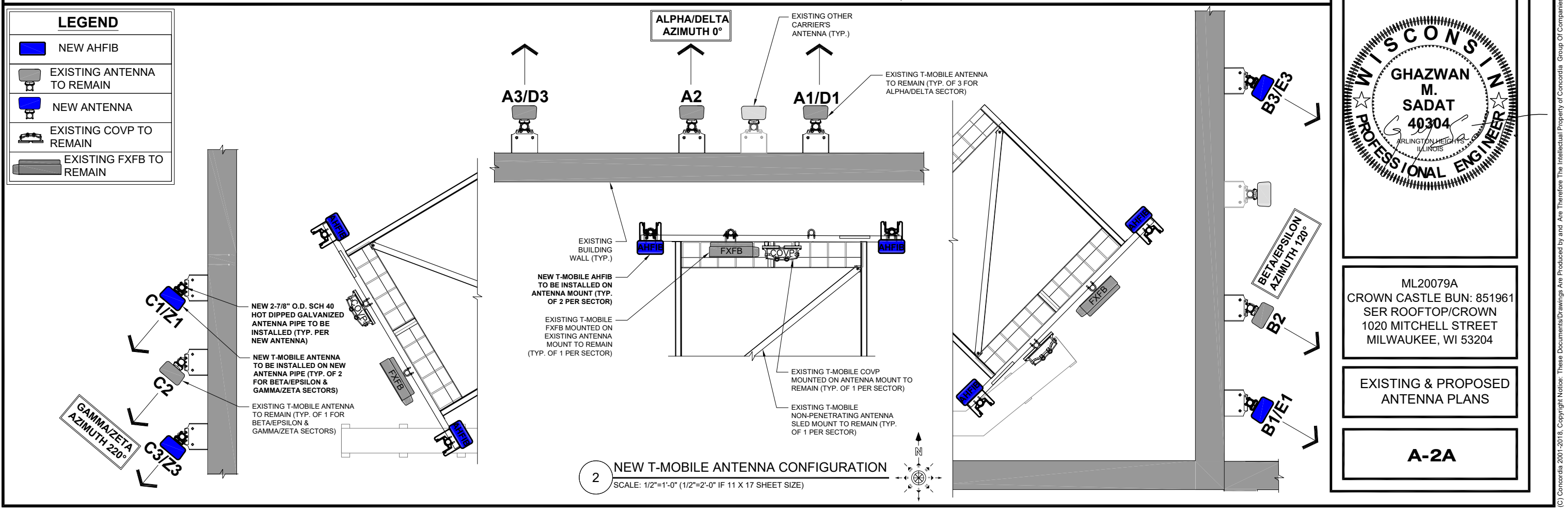
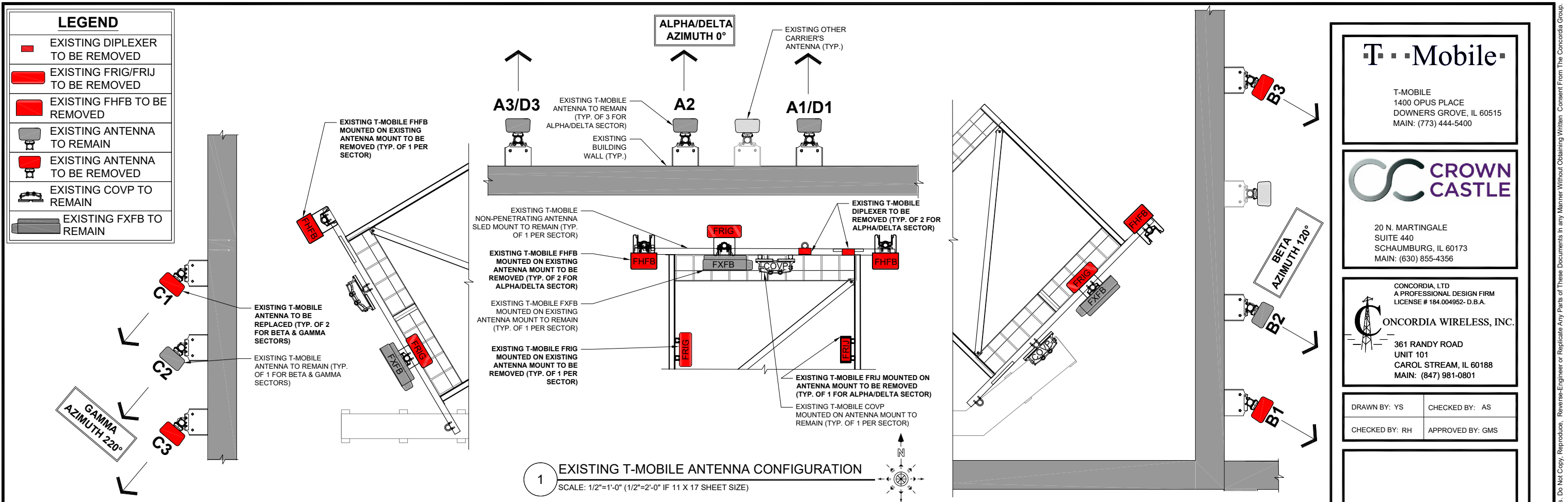
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BUILDING ELEVATION  
AND DETAILS

A-2



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EXISTING & PROPOSED  
ANTENNA PLANS

**A-2A**

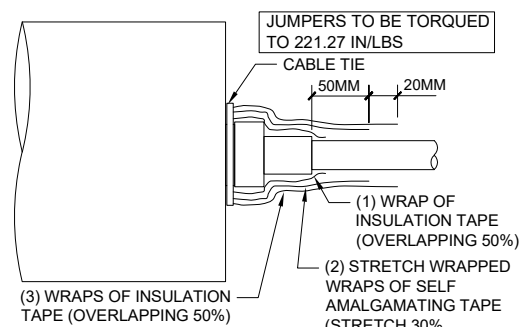


**NEW AND EXISTING ANTENNA AND CABLE SCHEDULE**

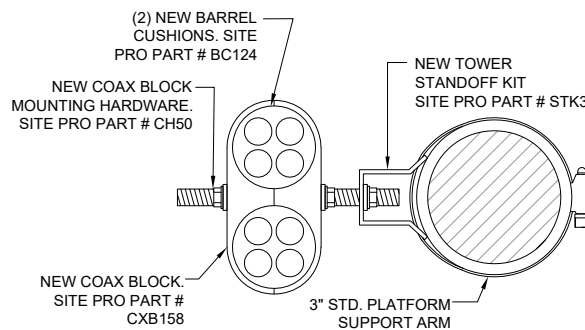
SECTOR	POS.	AZIMUTH	RAD CENTER	M. TILT	E. TILT	TECHNOLOGY	ANTENNA	STATUS	RRU TYPE	DIPLEXER	COVP	CABLE STATUS	HCS & COAX FACTORY LENGTH	JUMPER LENGTH
ALPHA/DELTA	A3/D3	0°	94'	EXISTING	4°	LTE AWS/ LTE PCS	(1) COMMSCOPE - HBXX-3817TB1-A2M	REUSE EXISTING	(2) EXISTING FHFB TO BE REPLACED WITH (1) NEW AHFIB	(1) EXISTING COMMSCOPE - CBC1923T-43-2X (AT ANTENNA) TO BE REMOVED	(3) EXISTING COVP TO REMAIN	(3) EXISTING HYBRID CABLES TO REMAIN & BE UTILIZED	EXISTING	≤ 15'-0"
	A2	0°	94'	EXISTING	4°/4°	UMTS PCS/ GSM PCS	(1) ANDREW - TMBXX-6517-A2M	REUSE EXISTING	(1) EXISTING FRIG TO BE REMOVED & (1) EXISTING FXFB TO REMAIN	-				≤ 15'-0"
	A1/D1	0°	94'	EXISTING	4°	LTE AWS/ LTE PCS	(1) COMMSCOPE - HBXX-3817TB1-A2M	REUSE EXISTING	(1) EXISTING FRIJ TO BE REPLACED W/ (1) NEW AHFIB	(1) EXISTING COMMSCOPE - CBC1923T-43-2X (AT ANTENNA) TO BE REMOVED				≤ 15'-0"
BETA/EPSILON	B3/E3	120°	94'	EXISTING	4°	LTE AWS/ LTE PCS	(1) NEW COMMSCOPE - HBXX-3817TB1-A2M	(1) ANDREW - TMBXX-6517-A2M TO BE REPLACED	(1) EXISTING FHFB TO BE REPLACED WITH (1) NEW AHFIB	-	(3) EXISTING COVP TO REMAIN	(3) EXISTING HYBRID CABLES TO REMAIN & BE UTILIZED	EXISTING	≤ 15'-0"
	B2	120°	94'	EXISTING	4°/4°	UMTS PCS/ GSM PCS	(1) ANDREW - TMBXX-6517-A2M	REUSE EXISTING	(1) EXISTING FRIG TO BE REMOVED & (1) EXISTING FXFB TO REMAIN	-				≤ 15'-0"
	B1/E1	120°	94'	EXISTING	4°	LTE AWS/ LTE PCS	(1) NEW COMMSCOPE - HBXX-3817TB1-A2M	(1) ANDREW - TMBXX-6517-A2M TO BE REPLACED	(1) NEW AHFIB	-				≤ 15'-0"
GAMMA/ZETA	C3/Z3	220°	94'	EXISTING	4°	LTE AWS/ LTE PCS	(1) NEW COMMSCOPE - HBXX-3817TB1-A2M	(1) ANDREW - TMBXX-6517-A2M TO BE REPLACED	(1) EXISTING FHFB TO BE REPLACED WITH (1) NEW AHFIB	-	(3) EXISTING COVP TO REMAIN	(3) EXISTING HYBRID CABLES TO REMAIN & BE UTILIZED	EXISTING	≤ 15'-0"
	C2	220°	94'	EXISTING	4°/4°	UMTS PCS/ GSM PCS	(1) ANDREW - TMBXX-6517-A2M	REUSE EXISTING	(1) EXISTING FRIG TO BE REMOVED & (1) EXISTING FXFB TO REMAIN	-				≤ 15'-0"
	C1/Z1	220°	94'	EXISTING	4°	LTE AWS/ LTE PCS	(1) NEW COMMSCOPE - HBXX-3817TB1-A2M	(1) ANDREW - TMBXX-6517-A2M TO BE REPLACED	(1) NEW AHFIB	-				≤ 15'-0"

IMPORTANT NOTE: PLEASE REFER TO LATEST RFDS SHEET FOR NSN CONFIGURATION. GC TO CAP ALL UNUSED PORTS.

(\*) SHARED WITH ALL SECTORS



**1 RF JUMPER CONNECTION DETAIL**  
SCALE: N.T.S.



**2 RF JUMPER MOUNTING DETAIL**  
SCALE: N.T.S.

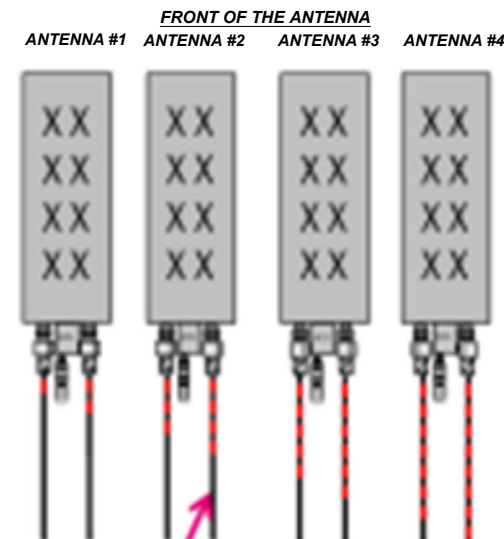
**COAX COLOR CODING**

- ANTENNAS WILL BE LABELED (BACK OF ANTENNA VIEW) RIGHT TO LEFT 1-X PORTS
- COAX/JUMPER LINES WILL BE IDENTIFIED BY SECTOR COLOR AND BY NUMBER OF BANDS AROUND THE COAX/JUMPER

SECTOR A	RED
SECTOR B	GREEN
SECTOR C	BLUE
SECTOR D	YELLOW
SECTOR E	WHITE
SECTOR F	PURPLE
LMU	BROWN + SECTOR COLOR BANDS (1 & 2)
FIBER ID	GRAY
UNUSED COAX	PINK
MICROWAVE	ORANGE
DWE T-1'S + GPS DOWNLINK CABLE	ID W/LABEL MAKER

**ANTENNA AND COAXIAL CABLE SCHEDULE**

- ALL ANTENNAS SHALL BE FURNISHED WITH DOWNTILT BRACKETS. CONTRACTOR SHALL COORDINATE REQUIRED MECHANICAL DOWNTILT FOR EACH ANTENNA WITH RF ENGINEER. ANTENNA DOWNTILT SHALL BE SET AND VERIFIED BY A SMART LEVEL.
- CONTRACTOR SHALL INSTALL COLOR CODE RINGS ON EACH OF THE HYBRID CABLES AND JUMPER CABLES WITH UV RESISTANT TAPE. ALL CABLE SHALL BE MARKED AT TOP AND BOTTOM WITH 2" COLOR TAPE OR STENCIL TAG. COLOR TAPE MAY BE OBTAINED FROM GRAYBAR ELECTRONICS.



**EXAMPLE: COAX WITH FOUR BANDS OF RED TAPE WILL REPRESENT ALPHA SECTOR AND THE 4TH PORT OF ANTENNA**

**3 TAGGING COLOR AND NOTES**  
SCALE: N.T.S.

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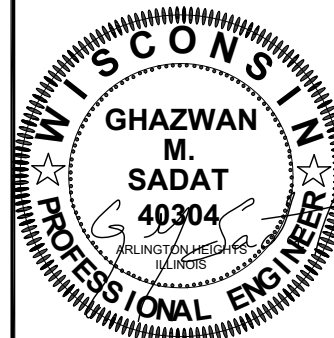
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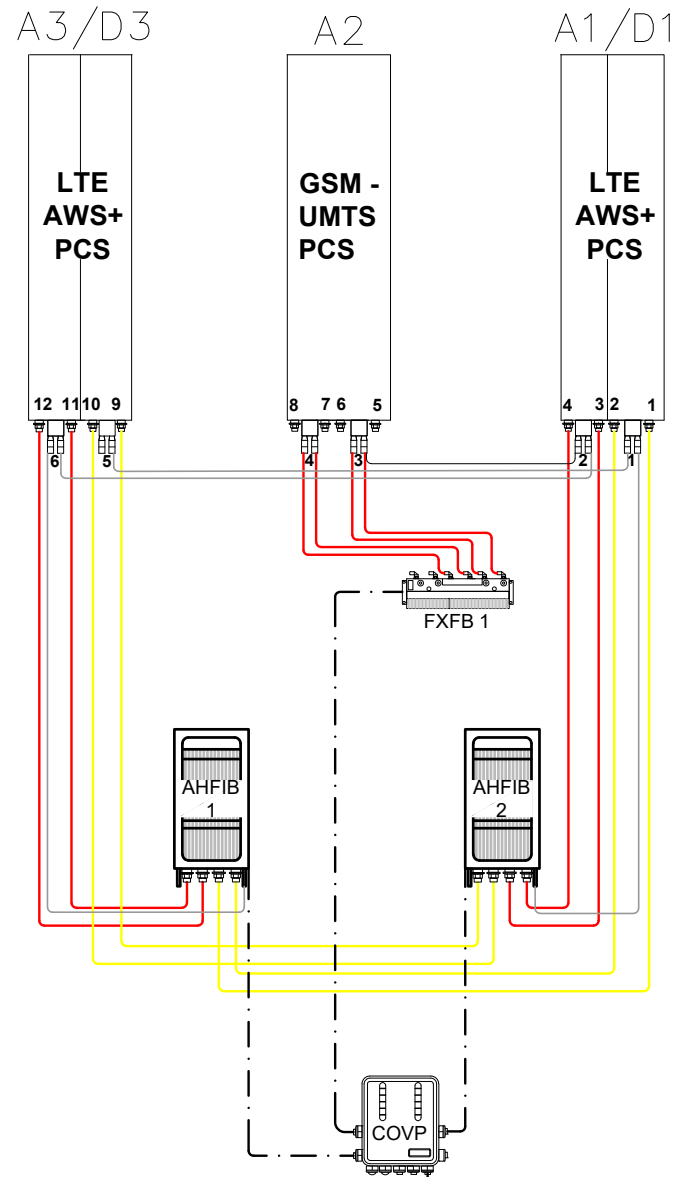


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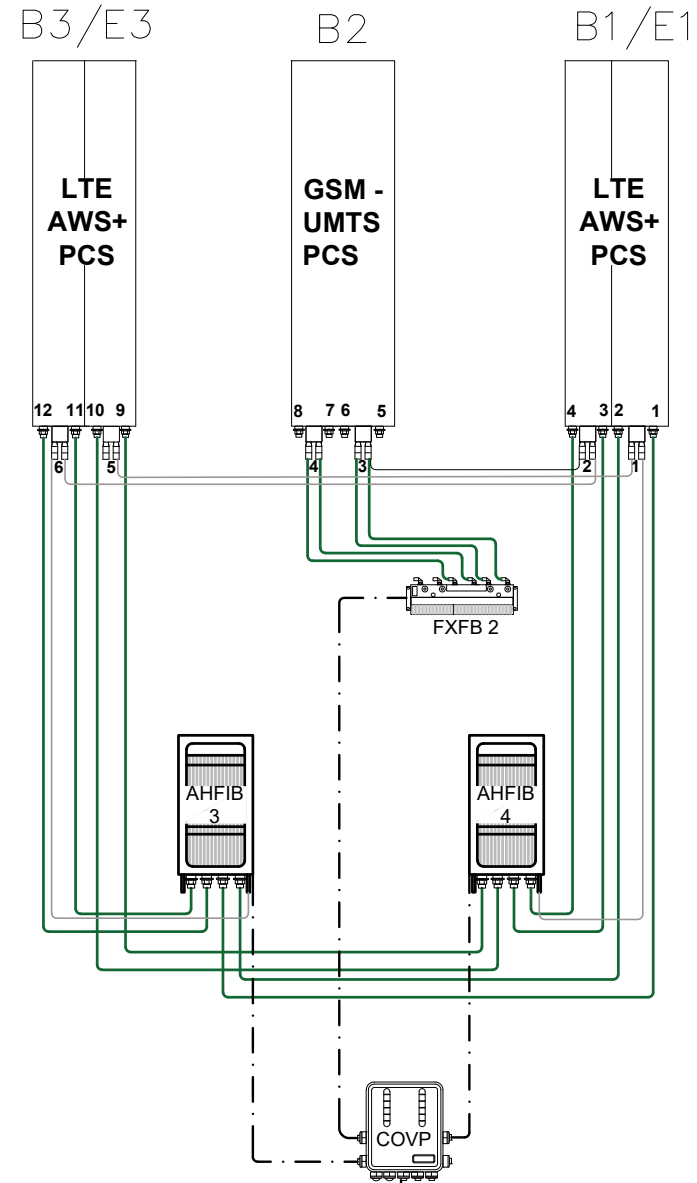
**ANTENNA & CABLE SCHEDULE**

**A-3**

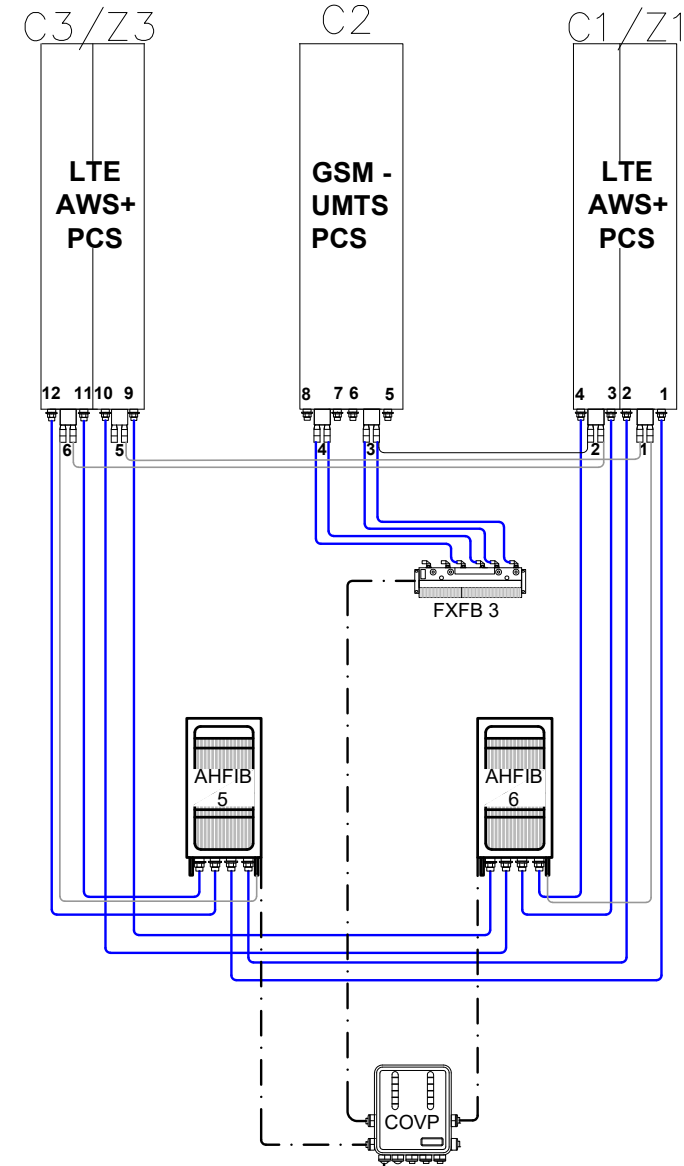
# ALPHA/DELTA SECTOR



# BETA/EPSILON SECTOR



# GAMMA/ZETA SECTOR



ANTENNA LOCATION

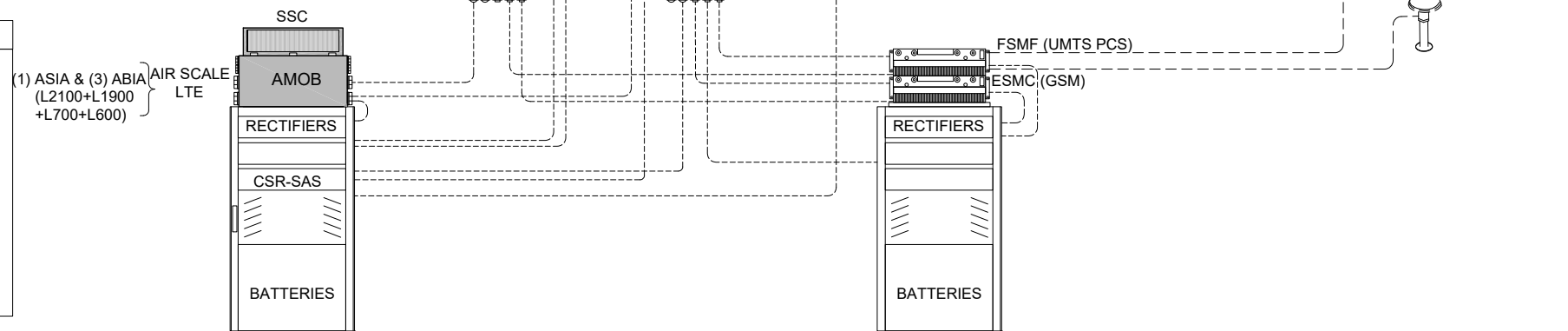
EQUIPMENT LOCATION

LEGEND	
COAX CABLE	—
RET CABLING	—
RF CABLING ALPHA	—
RF CABLING BETA	—
RF CABLING GAMMA	—
RF CABLING DELTA	—
RF CABLING EPSILON	—
RF CABLING ZETA	—
HYBRID CABLE (POWER AND FIBER)	—
MAIN POWER AND FIBER	---
FIBER AND POWER JUMPER	- - -

**REFER TO CURRENT RFDS**

**NOTE TO GC:**

- REFER TO UPDATED RFDS W/ LATEST CONFIGURATION DRAWING FOR RF CABLING. CAP OFF UNUSED RF/RET PORTS
- GC TO REQUIRE THE LATEST PORT MATRIX DIAGRAM FROM RF FOR THIS SITE. GC TO REFER TO ANTENNA PLAN FOR ANTENNA LOCATIONS
- GC TO CAP ALL UNUSED PORTS
- ALL EXISTING TMA'S TO BE REMOVED AND ANY UNUSED RF/RET PORTS ARE TO BE CAPPED



SYSTEM CONNECTION DIAGRAM

**T-Mobile**

T-MOBILE  
1400 OPUS PLACE  
DOWNERS GROVE, IL 60515  
MAIN: (773) 444-5400

**CROWN CASTLE**

20 N. MARTINGALE  
SUITE 440  
SCHAUMBURG, IL 60173  
MAIN: (630) 855-4356

CONCORDIA, LTD  
A PROFESSIONAL DESIGN FIRM  
LICENSE # 184.004952- D.B.A.  
**CONCORDIA WIRELESS, INC.**  
361 RANDY ROAD  
UNIT 101  
CAROL STREAM, IL 60188  
MAIN: (847) 981-0801

DRAWN BY: YS      CHECKED BY: AS  
CHECKED BY: RH      APPROVED BY: GMS



ML20079A  
CROWN CASTLE BUN: 851961  
SER ROOFTOP/CROWN  
1020 MITCHELL STREET  
MILWAUKEE, WI 53204

SYSTEM CONNECTION  
DIAGRAM

**A-3A**

HEIGHT	8U (354 MM/ 13.94 INCH)
WIDTH (FRONT COVER)	487MM/ 19.17 INCH
WIDTH (CABINET)	448MM/ 17.64 INCH (FITS INTO 19 INCH RACK) 487MM/ 19.17 INCH (WITHOUT CONDUIT PLUGS OR FITTINGS)
DEPTH	TOTAL 605MM / 23.81 INCH (472MM/ 18.58 INCH FROM RACK MOUNTING SURFACE)
WEIGHTS	23 KG/ 50.71 LBS AMOB ENCLOSURE 3 KG/ 6.61 LBS ASIA (CORE MODULE) 2 KG/ 4.41 LBS ABIA (EXPANSION MODULE) 32 KG/ 70.55 LBS 1/2 CAPACITY (1 CORE + 3 EXPANSION) 41 KG/ 90.39 LBS FULL CAPACITY (2 CORE + 6 EXPANSION)
INGRESS PROTECTION	IP55
OPERATING TEMPERATURE	-40°C UP TO +55°C (WITHOUT SOLAR RADIATION)
INSTALLATION TEMPERATURE	-20°C - +55°C
AIRFLOW DIRECTION	BACK TO FRONT AIRFLOW DIRECTION SUPPORTED FOR HORIZONTAL (FCOA, 19" RACK, FLEXI STACK) FRONT TO BACK AIRFLOW DIRECTION SUPPORTED FOR VERTICAL (WALL AND POLE MOUNTING CASE)
CLEARANCES FOR COOLING	40 MM MINIMUM ON THE BACK AND FRONT SIDE
COLD START	~2H FROM -40°C TO -5°C *OPTIONAL 2ND HEATER CAN BE ADDED TO MEET NAM REQUIREMENT, COLD START FROM -40°C TO -5°C IN 1 HOUR INSTEAD OF 2 HOURS
NOMINAL SUPPLY VOLTAGE	-40.5 ... -57 V DC
INPUT VOLTAGE RANGE	EXTENDED SERVICE VOLTAGE RANGE SUPPORTED -36VDC ... -60VDC FLOATING
VOLUME	104.5L
MASS CAPACITY	SUPPORT MAX 18KG INSIDE
POWER CONSUMPTION	TYPICAL MAX ~285W (ALL FANS AT HIGHEST SPEED) COLD START ~600W (HEATER ON 55W + FANS AT LOW SPEED)
CONDUIT CABLE ENTRY	2X1.5" + 1" ON EACH LEFT AND RIGHT SIDE



### HBXX-3817TB1-VTM | HBXX-3817TB1-A2M 4-port multibeam antenna, 4x 1710–2180 MHz, 2x 38° HPBW, RET compatible

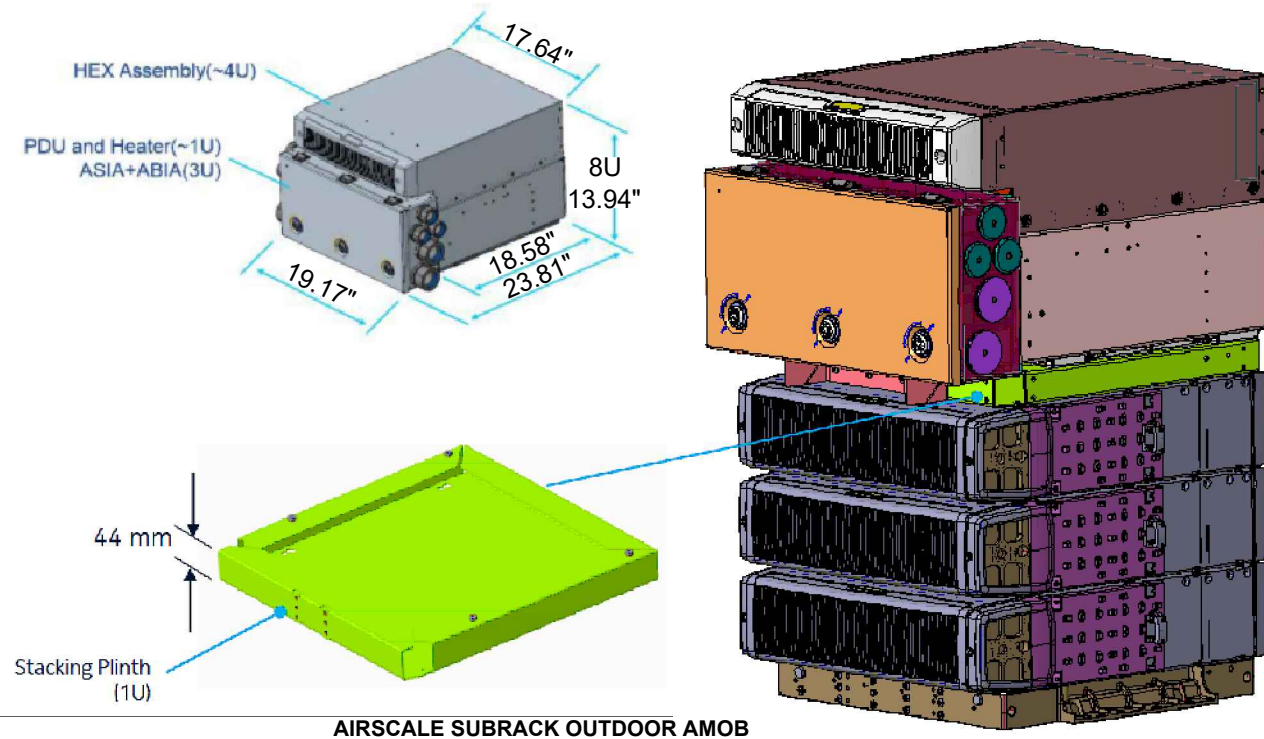
#### General Specifications

Operating Frequency Band	1710 – 2180 MHz
Antenna Type	Multibeam
Band	Single band
Performance Note	Outdoor usage

#### Dimensions

Length	1390.0 mm   54.7 in
Width	301.0 mm   11.9 in
Depth	181.0 mm   7.1 in
Net Weight, without mounting kit	13.6 kg   30.0 lb

**NEW ANTENNA (COMMSCOPE- HBXX-3817TB1-VTM | HBXX-3817TB1-A2M)**



### AHFIB-DUAL BAND

- 4T4R B25+B66 RADIO
- OUTPUT POWER 4X40W PER BAND
- IBW
- B66 90MHz (OBW 40 MHz)
- B25 65MHz (OBW 40 MHz)
- 26 X 6 X 12 IN (H X W X D)
- 66 LBS
- 2 X 9.8 GBPS CPRI FIBER
- IP65

**NOKIA 5G NR2100/1900 5G MID-BAND RADIOS (AHFIB)**

**T-Mobile**

T-MOBILE  
1400 OPUS PLACE  
DOWNERS GROVE, IL 60515  
MAIN: (773) 444-5400

**CROWN CASTLE**

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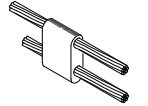
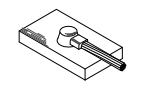
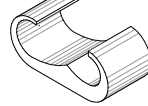
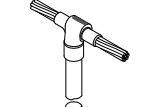
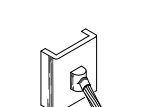
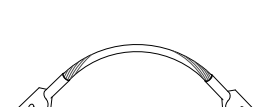

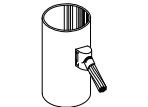
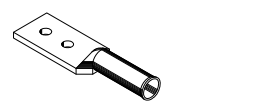


ML20079A  
CROWN CASTLE BUN: 851961  
SER ROOFTOP/CROWN  
1020 MITCHELL STREET  
MILWAUKEE, WI 53204

NEW EQUIPMENT  
SPECIFICATIONS

**A-4**



CADWELD CONNECTIONS OR APPROVED EQUAL		BURNDY CONNECTIONS OR APPROVED EQUAL
 <p>PARALLEL HORIZONTAL CONDUCTORS PARALLEL THROUGH CONNECTION OF HORIZONTAL CABLES TYPE PT</p>	 <p>HORIZONTAL STEEL SURFACE TO FLAT STEEL SURFACE OR HORIZONTAL PIPE TYPE HS</p>	 <p>"C" CONNECTOR HYPRESS TYPE YGHC</p>
 <p>THROUGH CABLE TO GROUND ROD THROUGH CABLE TO TOP OF GROUND ROD TYPE GT</p>	 <p>VERTICAL STEEL SURFACE CABLE DOWN AT 45° TO VERTICAL STEEL SURFACE INCLUDING PIPE TYPE VS</p>	 <p>BOND JUMPER FIELD FABRICATED GREEN STRANDED INSULATED TYPE 2-YA-2</p>
 <p>HORIZONTAL SPLICE SPLICE OF HORIZONTAL CABLES</p>	 <p>VERTICAL PIPE CABLE DOWN AT 45° TO RANGE OF VERTICAL PIPES TYPE VS</p>	 <p>COPPER LUGS TWO HOLE - LONG BARREL LENGTH TYPE YA-2</p>

**CADWELD DETAILS**





**GROUNDING NOTES:**

- 1.) UNDERGROUND AND OVERHEAD UTILITY LENGTHS TO BE DETERMINED FROM SITE PLAN.
- 2.) SEE ELECTRICAL SPECIFICATIONS SECTION 16000 FOR ALL ELECTRICAL AND GROUNDING INSTALLATION REQUIREMENTS.
- 3.) FOR ORIENTATION OF SITE LAYOUT SEE SITE PLAN, DRAWING.
- 4.) UDA CABINET FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR.
- 5.) GROUND KITS PROVIDED BY OWNER SHALL BE RETROFITTED TO ACCOMMODATE 2 HOLE LUG CONNECTION AND APPROPRIATE LENGTH.
- 6.) CONTRACTOR RESPONSIBLE TO PROVIDE OWNER CERTIFICATION OF RESISTIVITY TESTING.
- 7.) GROUND RODS TO BE INSTALLED AT 10' CENTERS.
- 8.) ALL GROUND LEADS TO BE SLEEVED IN 3/4" Ø SCHEDULE 40 PVC CONDUIT AND SEALED W/ SILICON.
- 9.) GROUND BARS SUPPLIED BY OWNER AND INSTALLED BY CONTRACTOR.
- 10.) ALL BENDS IN GROUNDING SYSTEM MUST BE SMOOTH AND WELL ROUNDED AND MAINTAIN BENDING RADIUS.
- 11.) SEE SITE PLAN FOR COAXIAL ROUTING THIS SHEET IS INTENDED FOR GROUNDING CLARITY ONLY AND IS SCHEMATIC IN DETAIL.
- 12.) GROUND KITS SHALL BE INSTALLED BETWEEN 8"-18" OF ALL CONNECTORS.
- 13.) TOWER FOUNDATION DESIGN BY OWNER, INSTALLED BY CONTRACTOR.
- 14.) ADDITIONAL GROUND KITS TO BE PLACED AT 100' WHEN ANTENNA CENTERLINE IS 200' OR ABOVE.
- 15.) ALL CONDUITS TO BE SEALED W/ SILICONE TO PROVIDE A WATER TIGHT SEAL.
- 16.) GROUND TEST RESULTS SHOULD BE 5 OHMS OR LESS.

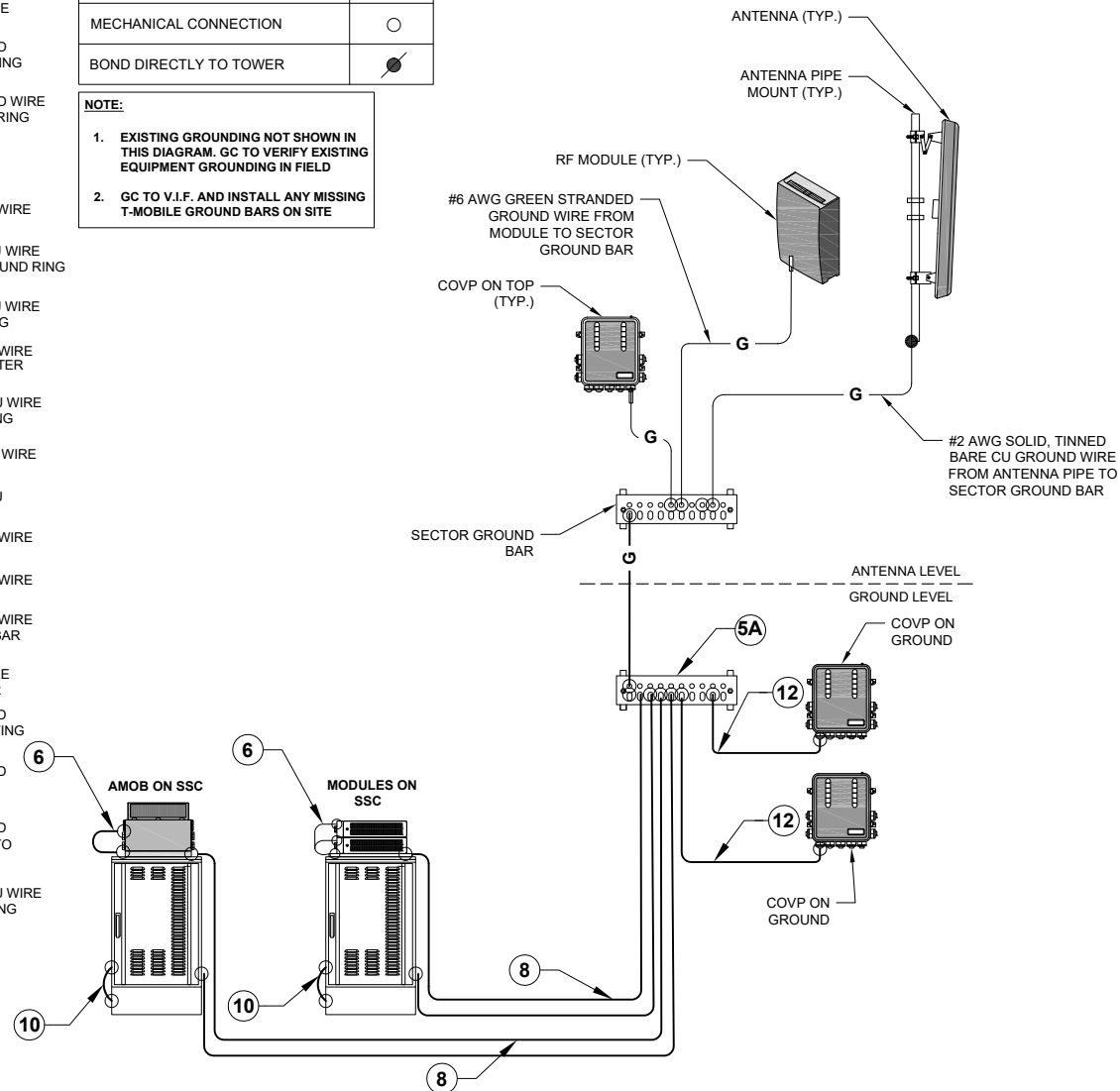
**KEY NOTES:**

- 1) #2 SOLID, TINNED BARE COPPER GROUND WIRE FROM ICE BRIDGE TO ICE BRIDGE POST.
- 2) #2 SOLID, TINNED BARE COPPER GROUND WIRE, BOND ICE BRIDGE POST W/ VS TYPE CADWELD. (1 PER POST REQUIRED).
- 3) #2 SOLID, TINNED BARE COPPER GROUND WIRE FROM GROUND BAR TO GROUND RING (2 REQUIRED).
- 4) #2 SOLID, TINNED BARE COPPER GROUND WIRE FROM NEW POST TO EXISTING GROUND RING
- 5) NEW GROUND BAR
- 5A) EXISTING GROUND BAR
- 6) #6 AWG GREEN STRANDED GROUND CU WIRE FROM NEW MODULES TO PLINTH
- 7) #2 AWG SOLID TINNED BARE GROUND CU WIRE FROM STEEL CUBE W/ MODULES TO GROUND RING
- 7A) #2 AWG SOLID TINNED BARE GROUND CU WIRE FROM MODULES PLINTH TO GROUND RING
- 8) #2 AWG GREEN STRANDED CU GROUND WIRE FROM SYSTEM MODULE PLINTH TO MASTER GROUND BAR
- 9) #2 AWG SOLID TINNED BARE GROUND CU WIRE FROM MODULE'S PLINTH TO GROUND RING
- 10) #6 AWG GREEN STRANDED GROUND CU WIRE FROM SSC TO SSC PLINTH
- 11) #2 AWG SOLID TINNED BARE GROUND CU WIRE FROM SSC TO GROUND RING
- 12) #2 AWG GREEN STRANDED CU GROUND WIRE FROM NEW COVP TO GROUND BAR
- 13) #2 AWG GREEN STRANDED CU GROUND WIRE FROM NEW ALARM BOX TO GROUND BAR
- 14) #6 AWG GREEN STRANDED CU GROUND WIRE FROM NEW HYBRID CABLE TO GROUND BAR
- 15) #2 AWG GREEN STRANDED GROUND WIRE FROM NEW RF MODULE TO GROUND BAR
- 16) #2 AWG SOLID, TINNED BARE CU GROUND WIRE FROM NEW GROUND BAR TO EXISTING GROUND RING/ROD
- 17) #2 AWG SOLID, TINNED BARE CU GROUND WIRE FROM FCOA CABINET TO EXISTING GROUND RING/BAR
- 18) #6 AWG SOLID, TINNED BARE CU GROUND WIRE FROM NEW DIPLEXER/TRIPLEXER TO EXISTING GROUND BAR
- 19) #2 AWG SOLID TINNED BARE GROUND CU WIRE FROM BATTERY CABINET TO GROUND RING

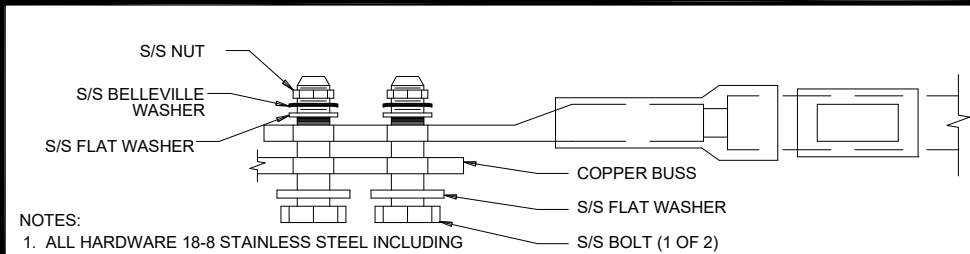
**SYMBOLS LEGEND:**

GROUND BAR	
EXOTHERMIC WELD CONNECTION	
MECHANICAL CONNECTION	
BOND DIRECTLY TO TOWER	

**NOTE:**  
1. EXISTING GROUNDING NOT SHOWN IN THIS DIAGRAM. GC TO VERIFY EXISTING EQUIPMENT GROUNDING IN FIELD  
2. GC TO V.I.F. AND INSTALL ANY MISSING T-MOBILE GROUND BARS ON SITE

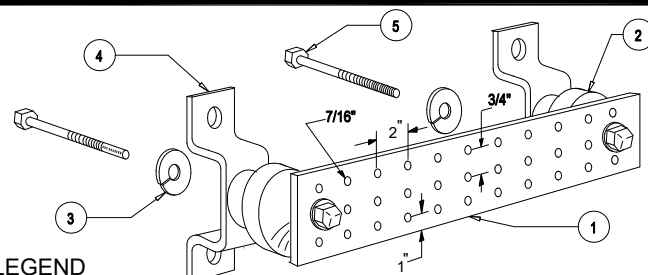


**1 TYPICAL GROUNDING DIAGRAM**  
SCALE: N.T.S.



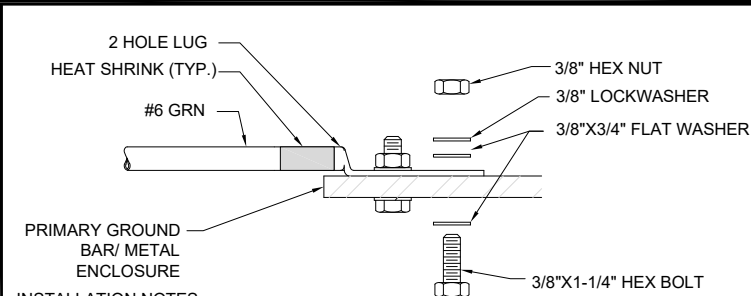
- NOTES:**
1. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING BELLEVILLES. COAT ALL SURFACES WITH KOPR-SHIELD BEFORE MATING.
  2. FOR GROUND BOND TO STEEL ONLY: INSERT A DRAGON TOOTH WASHER BETWEEN LUG AND STEEL. COAT ALL SURFACES WITH KOPR-SHIELD.

**2 STANDARD LUG CONNECTION OF GROUND LEADS TO GROUND BAR DETAIL**  
SCALE: N.T.S.



- LEGEND**
- 1- GROUND BAR, 4"X 20"X1/4", CONFIRM W/T-MOBILE PROJECT MANAGER THE APPROVED BUSS MFR. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION
  - 2- INSULATORS, CONFIRM THE APPROVED BUSS MFR. W/T-MOBILE
  - 3- 5/8" LOCKWASHERS, CONFIRM W/T-MOBILE THE APPROVED BUSS MFR. (NEWTON INSTRUMENT CO. CAT. NO. 3015-8 OR EQUIVALENT)
  - 4- WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-6056 OR APPROVED EQUIVALENT (CONFIRM W/T-MOBILE THE APPROVED BUSS MFR.)
  - 5- 5/8-11 X 1" H.H.C.S. BOLTS, NEWTON INSTRUMENT CO. CAT NO. 3012-1 OR APPROVED EQUIVALENT (CONFIRM W/T-MOBILE THE APPROVED BUSS MFR.)

**3 GROUNDING - STANDARD GROUND BAR DETAIL**  
SCALE: N.T.S.



- INSTALLATION NOTES:**
1. SELECT BOLT LENGTH TO PROVIDE A MINIMUM OF TWO EXPOSED THREADS.
  2. BURNISH MOUNTING SURFACE TO REMOVE PAINT IN THE AREA OF LUG CONTACT AND REMOVE OXIDATION FROM OUTDOOR WEATHERED BARS.
  3. APPLY ANTI-OXIDANT COMPOUND TO MATING SURFACE OF LUG AND WIPE CLEAN EXCESS COMPOUND.
  4. USE SOLID COPPER WIRE AND MECHANICAL 2-HOLE LUG FOR ALL EXTERIOR GROUNDING.

**4 MECHANICAL GROUND CONNECTION**  
SCALE: N.T.S.

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**WISCONSIN**  
GHAZWAN  
M.  
SADAT  
40304  
ARLINGTON HEIGHTS,  
ILLINOIS  
**PROFESSIONAL ENGINEER**

ML20079A  
CROWN CASTLE BUN: 851961  
SER ROOFTOP/CROWN  
1020 MITCHELL STREET  
MILWAUKEE, WI 53204

**PROPOSED SITE  
GROUNDING DIAGRAM**

**EG-1**

## GENERAL NOTES:

- OWNER FURNISHED MATERIALS, T-MOBILE "THE COMPANY" WILL PROVIDE AND THE CONTRACTOR WILL INSTALL:
  - BTS EQUIPMENT FRAME (PLATFORM) AND ICEBRIDGE SHELTER (GROUND BUILD/CO-LOCATE ONLY)
  - AC/TELCO INTERFACE BOX(PPC)
  - ICE BRIDGE (CABLE TRAY WITH COVER) (GROUND BUILD/CO-LOCATE ONLY, GC TO FURNISH AND INSTALL FOR ROOFTOP INSTALLATION)
  - TOWERS, MONOPOLE
  - TOWER LIGHTING
  - GENERATORS & LIQUID PROPANE TANK
  - ANTENNA STANDARD BRACKETS, FRAMES, AND PIPES FOR MOUNTING.
  - ANTENNAS (INSTALLED BY OTHERS)
  - TRANSMISSION LINE
  - TRANSMISSION LINE JUMPERS
  - TRANSMISSION LINE CONNECTORS WITH WEATHERPROOFING KITS
  - TRANSMISSION LINE GROUND KITS
  - HANGERS
  - HOISTING GRIPS
  - BTS EQUIPMENT

- CONTRACTOR TO FURNISH AND INSTALL THE FOLLOWING:

THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL OTHER MATERIALS FOR THE COMPLETE INSTALLATION OF THE SITE INCLUDING, BUT NOT LIMITED TO, SUCH MATERIALS AS FENCING, STRUCTURAL STEEL SUPPORTING SUB-FRAME FOR PLATFORM, ROOFING LABOR AND MATERIALS, GROUNDING RINGS, GROUNDING WIRES, COPPER-CLAD OR XIT CHEMICAL GROUND ROD(S), BUSS BARS, TRANSFORMERS AND DISCONNECT SWITCHES WHERE APPLICABLE, TEMPORARY ELECTRICAL POWER, CONDUIT, LANDSCAPING COMPOUND STONE, CRANES, CORE DRILLING, SLEEPERS AND RUBBER MATTING, REBAR, CONCRETE CAISSONS, PADS AND/OR AUGER MOUNTS, MISCELLANEOUS FASTENERS, CABLE TRAYS, NON-STANDARD ANTENNA FRAMES AND ALL OTHER MATERIAL AND LABOR REQUIRED TO COMPLETE THE JOB ACCORDING TO THE DRAWINGS AND SPECIFICATIONS.

IT IS THE POSITION OF T-MOBILE TO APPLY FOR PERMITTING AND CONTRACTOR RESPONSIBLE FOR PICKUP AND PAYMENT OF REQUIRED PERMITS.

- T-MOBILE FURNISHED EQUIPMENT SHALL BE PICKED-UP AT THE T-MOBILE WAREHOUSE, NO LATER THAN 48HR AFTER BEING NOTIFIED INSURED, STORED, UNCRATED, PROTECTED AND INSTALLED BY THE

CONTRACTOR WITH ALL APPURTENANCES REQUIRED TO PLACE THE EQUIPMENT IN OPERATION, READY FOR USE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE EQUIPMENT AFTER PICKING UP.

- ALL EQUIPMENT FURNISHED AND WORK PERFORMED UNDER THE CONTRACT DOCUMENTS SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIALS OR WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE, UNLESS NOTED OTHERWISE. ANY FAILURE OF EQUIPMENT OR WORK DUE TO DEFECTS IN MATERIALS OR WORKMANSHIP SHALL BE CORRECTED BY THE CONTRACTOR AT NO COST TO THE OWNER.

- ALL WORK, MATERIAL, AND EQUIPMENT SHALL COMPLY WITH ALL REQUIREMENTS OF THE LATEST EDITIONS AND INTERIM AMENDMENTS OF THE NATIONAL ELECTRICAL CODE (NEC), NATIONAL ELECTRICAL SAFETY CODE, OSHA, AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND ORDINANCES. ALL ELECTRICAL EQUIPMENT PROVIDED UNDER THIS CONTRACT SHALL BE NEW (EXCEPT WHERE OTHERWISE NOTED) AND SHALL COMPLY WITH THE REQUIREMENTS OF THE UNDERWRITERS' LABORATORIES (U.L.) AND BEAR THE U.L. LABEL.

- T-MOBILE OR HIS ARCHITECT/ENGINEER RESERVES THE RIGHT TO REJECT ANY EQUIPMENT OR MATERIALS WHICH, IN HIS OPINION ARE NOT IN COMPLIANCE WITH THE CONTRACT DOCUMENTS, EITHER BEFORE OR AFTER INSTALLATION AND THE EQUIPMENT SHALL BE REPLACED WITH EQUIPMENT CONFORMING TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS BY THE CONTRACTOR AT NO COST TO THE OWNER OR HIS ARCHITECT/ENGINEER.

- THE CONTRACTOR SHALL SUPPORT, BRACE AND SECURE EXISTING STRUCTURE AS REQUIRED. CONTRACTOR IS SOLELY RESPONSIBLE FOR THE PROTECTION OF ANY EXISTING STRUCTURES DURING CONSTRUCTION. FIELD VERIFY ALL EXISTING DIMENSIONS WHICH AFFECT THE NEW CONSTRUCTION.

- THE CONTRACTOR SHALL NOT ALLOW OR CAUSE ANY OF THE WORK TO BE COVERED UP OR ENCLOSED UNTIL IT HAS BEEN INSPECTED BY THE GOVERNING AUTHORITIES. ANY WORK THAT IS ENCLOSED OR COVERED UP BEFORE SUCH INSPECTION AND TEST SHALL BE UNCOVERED AT THE CONTRACTOR'S EXPENSE; AFTER IT HAS BEEN INSPECTED, THE CONTRACTOR SHALL RESTORE THE WORK TO ITS ORIGINAL CONDITION AT HIS OWN EXPENSE.

- ALL EXISTING UTILITIES, FACILITIES, CONDITIONS, AND THEIR DIMENSIONS SHOWN ON PLANS HAVE BEEN PLOTTED FROM AVAILABLE RECORDS. THE ARCHITECT/ENGINEER AND OWNER (T-MOBILE) ASSUME NO RESPONSIBILITY WHATEVER AS TO THE SUFFICIENCY OR ACCURACY OF THE INFORMATION SHOWN ON THE PLANS OR THE MANNER OF THEIR REMOVAL OR ADJUSTMENT. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING EXACT LOCATION OF ALL SAID UTILITIES AND FACILITIES PRIOR TO START OF CONSTRUCTION. CONTRACTOR SHALL ALSO OBTAIN FROM EACH UTILITY COMPANY DETAILED INFORMATION RELATIVE TO WORKING SCHEDULES AND METHODS OF REMOVING OR ADJUSTING AFFECTED UTILITIES.

## GENERAL NOTES (CONTD):

- CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITIES BOTH HORIZONTALLY AND VERTICALLY PRIOR TO START OF CONSTRUCTION. ANY DISCREPANCIES OR DOUBTS AS TO THE INTERPRETATION OF PLANS SHOULD BE IMMEDIATELY REPORTED TO THE PROJECT MANAGER FOR RESOLUTION AND INSTRUCTION, AND NO FURTHER WORK SHALL BE PERFORMED UNTIL DISCREPANCY IS CHECKED AND CORRECTED BY THE ARCHITECT/ENGINEER. FAILURE TO SECURE SUCH INSTRUCTION MEANS CONTRACTOR WILL HAVE WORKED AT HIS OWN RISK AND EXPENSE.
- CONTRACTORS SHALL CLEAN ENTIRE SITE AFTER CONSTRUCTION SUCH THAT NO PAPERS, TRASH, DEBRIS, WEEDS, BRUSH, OR ANY OTHER DEPOSITS REMAIN. ALL MATERIALS COLLECTED DURING CLEANING OPERATIONS SHALL BE PROPERLY DISPOSED OF OFF-SITE BY THE CONTRACTOR.
- ALL SITE WORK SHALL BE CAREFULLY COORDINATED BY THE CONTRACTOR WITH LOCAL GAS, ELECTRIC, TELEPHONE, AND ANY OTHER UTILITY COMPANIES HAVING JURISDICTION OVER THIS LOCATION.
- DURING CONSTRUCTION, THE CONTRACTOR SHALL AT ALL TIMES MAINTAIN THE UTILITIES OF THE BUILDING/SITE WITHOUT INTERRUPTION. SHOULD IT BE NECESSARY TO INTERRUPT ANY SERVICE OR UTILITY, THE CONTRACTOR SHALL SECURE PERMISSION IN WRITING FROM THE BUILDING/PROPERTY OWNER FOR SUCH INTERRUPTION, AT LEAST 72 HOURS IN ADVANCE. ANY INTERRUPTION SHALL BE MADE WITH A MINIMUM AMOUNT OF INCONVENIENCE TO THE BUILDING/PROPERTY OWNER AND ANY SUCH SHUTDOWN TIME SHALL BE COORDINATED WITH THE BUILDING/PROPERTY OWNER.
- CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION.
- CONTRACTOR SHALL SUBMIT AT THE END OF THE PROJECT A COMPLETE SET OF AS BUILT DRAWINGS TO T-MOBILE'S PROJECT ENGINEER.
- GC WILL NOT START THE CONSTRUCTION UNTIL AFTER THEY RECEIVE THE PRE CON PACKAGE AND HAVE A PRE CON WALK WITH THE PROJECT MANAGER.

## DIVISION 2 - SITE WORK:

- THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY THE PROJECT MANAGER. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT LIMITED TO:
  - FALL PROTECTION
  - CONFINED SPACE
  - ELECTRICAL SAFETY
  - TRENCHING AND EXCAVATION
- REMOVE FROM SITE/OWNER'S PROPERTY ALL WASTE MATERIALS, UNUSED EXCAVATED MATERIAL INCLUDING MATERIAL CLASSIFIED UNSATISFACTORY, CONTAMINATED OR DANGEROUS TRASH AND DEBRIS, AND DISPOSE OF IN A LEGAL MANNER.
- ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF ENGINEERING.
- THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE BUILDING OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, FERTILIZED, SEEDDED, AND COVERED WITH MULCH
- CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, AS REQUIRED DURING CONSTRUCTION.

CONTRACTOR IS RESPONSIBLE FOR LAYOUT AND CONSTRUCTION STAKING. CONTRACTOR SHALL ESTABLISH GRADE AND LINE STAKES PRIOR TO CONSTRUCTION.

CONCORDIA DOES NOT GUARANTEE OR WARRANT THAT THE AFOREMENTIONED EASEMENTS ARE SUFFICIENT FOR CONSTRUCTION TRAFFIC. GC SHALL CONSULT WITH A T-MOBILE REPRESENTATIVE AND LANDLORD WITH EXACT LOGISTICS TO FACILITATE CONTRACTIBILITY OF THE SITE AND DELIVERY OF CRITICAL MATERIALS SUCH AS THE TOWER, STEEL, CONCRETE AND CRANES TO THE PROPOSED LEASE AREA. GC SHALL RESTORE SITE TO ORIGINAL CONDITIONS AND REPLACE ANY AND ALL DISTURBED TREES OR LANDSCAPING.

CONCORDIA IS NOT RESPONSIBLE FOR THE MAINTENANCE AND/OR OPERATIONAL FEASIBILITY.

SCOPE OF WORK FOR THESE PLANS DOES NOT INVOLVE VALUE ENGINEERING AS WELL AS MAINTAINABILITY OPERATIONS OF THE SITE, ACCESS OR UTILITIES.

## DIVISION 3 - CONCRETE:

- MINIMUM ALLOWABLE CONCRETE COMPRESSIVE STRENGTH SHALL BE 4000 PSI AT 28 DAYS WHEN TESTED IN ACCORDANCE WITH THE AMERICAN SOCIETY FOR TESTING AND MATERIALS METHODS STANDARDS ASTM C172, ASTM C31 AND ASTM C39 UNLESS OTHERWISE NOTED.
- CONCRETE FOR ALL FOUNDATIONS: 540 LBS PER CUBIC YARD OF CONCRETE MINIMUM CEMENT CONTENT FOR 1-INCH MAXIMUM SIZE AGGREGATE, SLUMP RANGE 3 INCHES TO 5 INCHES, TOTAL AIR CONTENT 4 PERCENT TO 7 PERCENT BY VOLUME. AIR ENTRAINING ADMIXTURE REQUIRED TO CONTROL TOTAL AIR CONTENT, WATER REDUCING ADMIXTURE PERMITTED TO OBTAIN SLUMP OVER 3-INCHES.
- ALL CONCRETE CONSTRUCTION SHALL MEET THE REQUIREMENTS OF THE LATEST EDITION OF THE AMERICAN CONCRETE INSTITUTE (ACI 318) BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE AND (ACI 301) STANDARD SPECIFICATION FOR STRUCTURAL CONCRETE.
- REBARS SHALL BE ASTM A-615 DEFORMED TYPE WITH MINIMUM YIELD STRENGTH OF 60,000 PSI (40,000 PSI GRADE MAY BE USED FOR TIES & STIRRUPS).

WELDED WIRE FABRIC SHALL CONFORM TO ASTM A-185.
- DETAILING SHALL BE IN ACCORDANCE WITH MANUAL OF STANDARD PRACTICE OF DETAILING REINFORCED CONCRETE STRUCTURES (ACI STD-315 LATEST EDITION).
- CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" UNLESS OTHERWISE NOTED.
- REINFORCING STEEL SHALL BE ACCURATELY PLACED AND ADEQUATELY SECURED IN POSITION. LOCATION OF REINFORCEMENT SHALL BE INDICATED ON THE DRAWINGS. THE FOLLOWING MINIMUM COVER (INCHES) FOR REINFORCEMENT SHALL BE PROVIDED, EXCEPT AS NOTED ON DRAWINGS.

MINIMUM COVER (INCHES)  
CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH ... 3"  
EXPOSED TO EARTH OR WEATHER:  
#6 THROUGH #18 ... 2"  
#5 BAR AND SMALLER ... 1-1/2"

- TESTS  
CONCRETE MATERIALS AND OPERATIONS SHALL BE TESTED AND INSPECTED BY THE ENGINEER AS THE WORK PROGRESSES. FAILURE TO DETECT ANY DEFECTIVE WORK OR MATERIAL SHALL NOT IN ANY WAY PREVENT LATER REJECTION WHEN SUCH DEFECT IS DISCOVERED NOR SHALL IT OBLIGATE THE ENGINEER FOR FINAL ACCEPTANCE.
  - FIVE CONCRETE TEST CYLINDERS SHALL BE TAKEN OF THE TOWER PIER FOUNDATION. TWO SHALL BE TESTED @ THREE DAYS, TWO @ TWENTY-EIGHT DAYS. THE FIFTH CYLINDER SHALL BE KEPT SEPARATELY, IF REQUIRED TO BE USED IN THE FUTURE.
  - ONE ADDITIONAL TEST CYLINDER SHALL BE TAKEN DURING COLD WEATHER AND CURED ON SITE UNDER SAME CONDITIONS AS CONCRETE IT REPRESENTS.
  - ONE SLUMP TEST SHALL BE TAKEN FOR EACH SET OF TEST CYLINDERS TAKEN.
- PLACING CONCRETE
  - THE ENGINEER SHALL BE NOTIFIED NOT LESS THAN 24 HOURS IN ADVANCE OF CONCRETE PLACEMENT, UNLESS INSPECTION IS WAIVED IN EACH CASE. PLACING OF CONCRETE SHALL BE PERFORMED ONLY IN THE PRESENCE OF THE ENGINEER. CONCRETE SHALL NOT BE PLACED UNTIL ALL FORMWORK, EMBEDDED PARTS, STEEL REINFORCEMENT, FOUNDATION SURFACES AND JOINTS INVOLVED IN THE PLACING HAVE BEEN APPROVED, AND UNTIL FACILITIES ACCEPTABLE TO THE T-MOBILE REPRESENTATIVE HAVE BEEN PROVIDED AND MADE READY FOR ACCOMPLISHMENT OF THE WORK AS SPECIFIED. CONCRETE MAY NOT BE ORDERED FOR PLACEMENT UNTIL ALL ITEMS HAVE BEEN APPROVED AND T-MOBILE HAS PERFORMED A FINAL INSPECTION AND GIVEN APPROVAL TO START PLACEMENT IN WRITING.
  - PLACEMENT OF CONCRETE SHALL BE IN ACCORDANCE WITH ACI 301.
- PROTECTION
  - IMMEDIATELY AFTER PLACEMENT, THE CONTRACTOR SHALL PROTECT THE CONCRETE FROM PREMATURE DRYING, EXCESSIVELY HOT OR COLD TEMPERATURES, AND MECHANICAL INJURY. FINISHED WORK SHALL BE PROTECTED.
  - CONCRETE SHALL BE MAINTAINED WITH MINIMAL MOISTURE LOSS AT RELATIVELY CONSTANT TEMPERATURE FOR A PERIOD NECESSARY FOR HYDRATION OF CEMENT AND HARDENING OF CONCRETE.
  - ALL CONCRETE SHALL BE WATER CURED BY CONTINUOUS (NOT PERIODIC) FINE MIST SPRAYING OR SPRINKLING ALL EXPOSED SURFACES. WATER SHALL BE CLEAN AND FREE FROM ACID, ALKALI, SALTS, OIL SEDIMENT, AND ORGANIC MATTER. SUCCESSFUL CURING SHALL BE OBTAINED BY USE OF AN AMPLE WATER SUPPLY UNDER PRESSURE IN PIPES, WITH ALL NECESSARY APPLIANCES OF SPRINKLERS, AND SPRAYING DEVICES.

## ELECTRICAL NOTES:

- ELECTRICAL DESIGN SHALL BE PERFORMED BY ELECTRICAL CONTRACTOR. STRUCTURAL DESIGN SHALL BE PERFORMED BY GENERAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL ENSURE THAT ALL WORK COMPLIES WITH ALL APPLICABLE LOCAL AND STATE CODES AND NATIONAL ELECTRICAL CODE.
- ALL SUGGESTED ELECTRICAL ELEMENTS (SUCH AS BREAKER SIZES, WIRE SIZES, CONDUITS SIZES ARE FOR ZONING PURPOSES ONLY. IT IS THE RESPONSIBILITY TO OF THE ELECTRICAL CONTRACTOR TO CONFIRM COMPLIANCE WITH LOCAL ELECTRICAL CODES AND PASS ALL APPLICABLE AND NECESSARY INSPECTIONS. IN SOME EVENTS, IT MAY BE NECESSARY TO PERFORM AN ELECTRICAL LOAD STUDY TO VERIFY THE CAPACITY OF THE EXISTING SERVICE. THIS IS NOT THE RESPONSIBILITY OF CONCORDIA. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
- CONTRACTOR SHALL FIELD LOCATE ALL BELOW GRADE GROUND LINES AND UTILITY LINES PRIOR TO CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR RELOCATION OF ALL UTILITIES AND GROUND LINES THAT MAY BECOME DISTURBED OR CONFLICTING IN THE COURSE OF CONSTRUCTION.

## DIVISION 5 - STRUCTURAL STEEL:

- DETAIL, FABRICATE AND ERECT STRUCTURAL STEEL IN ACCORDANCE WITH THE LATEST AISC MANUAL OF STEEL CONSTRUCTION (ASD), AWS D1.1, AND THE BASIC BUILDING CODE. STRUCTURAL STEEL SHALL BE AS FOLLOWS:
  - ASTM A36, GRADE 36; ROLLED STEEL, RODS, PLATES, U-BOLTS AND ANCHOR BOLTS.
  - ASTM A325 BOLTS, BEARING TYPE
  - ALL STEEL SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A123.
- THE CONTRACTOR SHALL PROVIDE ADEQUATE SHORING AND/OR BRACING WHERE REQUIRED DURING CONSTRUCTION UNTIL ALL CONNECTIONS ARE COMPLETE.
- ANY FIELD CHANGES OR SUBSTITUTIONS SHALL HAVE PRIOR APPROVAL FROM THE ENGINEER, AND T-MOBILE PROJECT MANAGER IN WRITING
- TIGHTEN HIGH STRENGTH BOLTS TO A SNUG TIGHT CONDITION WHERE ALL PLIES IN A JOINT ARE IN FIRM CONTACT BY EITHER
  - A FEW IMPACTS OF AN IMPACT WRENCH
  - THE FULL EFFORT OF A PERSON USING A SPUD WRENCH.
- WELDING
  - ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS. CERTIFICATION DOCUMENTS SHALL BE MADE AVAILABLE FOR ENGINEER'S AND/OR OWNER'S REVIEW IF REQUESTED.
  - WELDING ELECTRODES FOR MANUAL SHIELDED METAL ARC WELDING SHALL CONFORM TO ASTM A-233, E70 SERIES. BARE ELECTRODES AND GRANULAR FLUX USED IN THE SUBMERGED ARC PROCESS SHALL CONFORM TO AISC SPECIFICATIONS.
  - FIELD WELDING SHALL BE DONE AS PER AWS D1.1 REQUIREMENTS VISUAL INSPECTION IS ACCEPTABLE.
- PROTECTION
  - UPON COMPLETION OF ERECTION INSPECT ALL GALVANIZED STEEL AND PAINT ANY FIELD CUTS, WELDS, OR GALVANIZED BREAKS WITH ZINC BASED PAINT. COLOR TO MATCH THE GALVANIZING PROCESS.

## DIVISION 13 - SPECIAL CONSTRUCTION ANTENNA INSTALLATION

- WORK INCLUDED:
  - ANTENNAS AND COAXIAL CABLES ARE FURNISHED BY T-MOBILE UNDER A SEPARATE CONTRACT. THE CONTRACTOR SHALL ASSIST ANTENNA INSTALLATION CONTRACTOR IN TERMS OF COORDINATION AND SITE ACCESS. ERECTION SUB-CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF PERSONNEL AND PROPERTY.
  - INSTALL ANTENNAS AS INDICATED ON DRAWINGS AND T-MOBILE SPECIFICATIONS.
  - INSTALL GALVANIZED STEEL ANTENNA MOUNTS AS INDICATED ON DRAWINGS.
  - INSTALL FURNISHED GALVANIZED STEEL OR ALUMINUM WAVEGUIDE AND PROVIDE PRINTOUT OF THAT TEST.
  - CONTRACTOR SHALL PROVIDE FOUR (4) SETS OF SWEEP TESTS USING ANRITZU-PACKARD 8713B RF SCALAR NETWORK ANALYZER. SUBMIT FREQUENCY DOMAIN REFLECTOMETER(FDR) TESTS RESULTS TO THE PROJECT MANAGER. SWEEP TESTS SHALL BE AS PER ATTACHED RFS "MINIMUM FIELD TESTING RECOMMENDED FOR ANTENNA AND HELIAX COAXIAL CABLE SYSTEMS" DATED 10/5/93. TESTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING SERVICE AND BE BOUND AND SUBMITTED WITHIN ONE WEEK OF WORK COMPLETION.
  - INSTALL COAXIAL CABLES AND TERMINATING BETWEEN ANTENNAS AND EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. WEATHERPROOF ALL CONNECTORS BETWEEN THE ANTENNA AND EQUIPMENT PER MANUFACTURER'S REQUIREMENTS. TERMINATE ALL COAXIAL CABLE THREE (3) FEET IN EXCESS OF ENTRY PORT LOCATION UNLESS OTHERWISE STATED.
  - ANTENNA AND COAXIAL CABLE GROUNDING:
    - ALL EXTERIOR #6 GREEN GROUND WIRE "DAISY CHAIN" CONNECTIONS ARE TO BE WEATHER SEALED WITH RFS CONNECTOR/SPICE WEATHERPROOFING KIT #221213 OR EQUAL.
    - ALL COAXIAL CABLE GROUNDING KITS ARE TO BE INSTALLED ON STRAIGHT RUNS OF COAXIAL CABLE (NOT WITHIN BENDS).

## ROOF PROTECTION NOTES:

- THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE A MINIMUM OF SEVEN (7) DAYS PRIOR TO THE BEGINNING OF WORK THAT INVOLVES ACTIVITY ON THE ROOF.
- THE CONTRACTOR AND THE OWNER'S REPRESENTATIVE SHALL INSPECT THE EXPOSED ROOFING MEMBRANE SYSTEM PRIOR TO THE START OF CONSTRUCTION. ANY PREVIOUS DAMAGE OR DEFECTS OF THE ROOFING SYSTEM SHALL BE DOCUMENTED BY WRITING AND/OR PHOTOGRAPHS.
- THE CONTRACTOR SHALL PLACE MINIMUM OF 48" WIDE, 1/2" THICK APPROVED PROTECTION BOARDS (1 LAYER) MADE OF CONSTRUCTION GRADE PLYWOOD (ORIENTED STRAND BOARD WILL BE ACCEPTABLE) OVER ALL MEMBRANE ROOFING THAT WILL HAVE CONSTRUCTION TRAFFIC. THIS ROOF PROTECTION SHALL BE PROVIDED FOR THE ENTIRE AREA WITHIN LIMITS OF THE WORK. SUCH PROTECTION SHALL ALSO BE PROVIDED IN THE FORM OF A WALKWAY FROM THE ROOF ACCESS DOOR TO THE PROTECTED CONSTRUCTION AREA.
- STORAGE OF MATERIALS ON EXISTING ROOF WILL NOT BE ALLOWED.
- THE CONTRACTOR SHALL REMOVE DAILY ALL PROJECT DEBRIS FROM ALL ROOFING SURFACES.
- THE CONTRACTOR SHALL ADVISE THE OWNER'S REPRESENTATIVE WHEN WORK ON THE ROOF IS COMPLETE AND THE PROTECTION BOARDS HAVE BEEN REMOVED. THE CONTRACTOR AND THE OWNER'S REPRESENTATIVE SHALL EXAMINE ALL ROOF SURFACES WHERE WORK HAS OCCURRED AND WILL REPAIR ALL DEFECTS NOT PREVIOUSLY DOCUMENTED.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE BUILDING, ROOF, STRUCTURAL FRAMING, ETC. INCURRED DURING CONSTRUCTION.
- CONTRACTOR SHALL UTILIZE A LICENSED APPLICATOR OF THE EXISTING ROOFING SYSTEM TO REPAIR ANY AND ALL DAMAGE INCURRED THE COURSE OF CONSTRUCTION
- THE CONTRACTOR TO VERIFY WARRANTY ON THE EXISTING MEMBRANE ROOFING SYSTEM. THE CONTRACTOR SHALL UTILIZE A LICENSED APPLICATOR OF THE EXISTING ROOFING SYSTEM TO PERFORM ALL ROOFING WORK AND TO THE REPAIR ANY AND ALL DAMAGE. UPON COMPLETION, THE CONTRACTOR SHALL OBTAIN A LETTER FROM THE ROOFING MFR. STATING THAT ANY EXISTING WARRANTY REMAINS IN FULL FORCE AND EFFECT.

**T-Mobile**

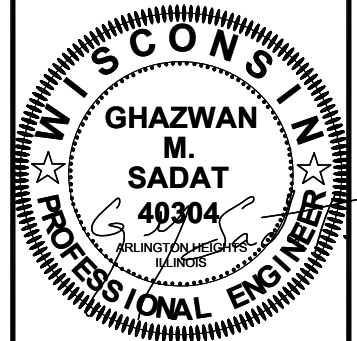
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GENERAL NOTES  
& SPECIFICATIONS

SP-1