

## FIRST AMENDMENT TO TOWER LEASE

THIS FIRST AMENDMENT TO TOWER LEASE (“Amendment”), is made and entered into by and between The Village of Orland Park, an Illinois home rule municipal corporation (“Landlord”) and T-Mobile Central LLC, a Delaware limited liability company (“Tenant”).

### RECITALS

The parties hereto recite, declare and agree as follows:

- A. Landlord and Tenant entered into a Tower Lease, dated April 18, 2016 (the “Lease”), with respect to Premises, therein described, that are a portion of property located at 17801 Wolf Road, Orland Park, Illinois.
- B. Landlord owns the real property described on Exhibit A attached hereto and by this reference made a part hereof (the “Property”).
- C. Landlord and Tenant desire to enter into this Amendment in order to modify and amend certain provisions of the Lease.

**NOW, THEREFORE**, in consideration of the mutual covenants and agreements herein contained and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Landlord and Tenant covenant and agree as follows:

1. Exhibit B to the Lease is hereby removed and replaced with the plans set forth in **Exhibit B-1** of this Amendment.
2. The terms and conditions of the Lease are incorporated herein by this reference, and capitalized terms used in this Amendment shall have the same meanings as such terms are given in the Lease. Except as specifically set forth herein, this Amendment shall in no way modify, alter or amend the remaining terms of the Lease, all of which are ratified by the parties and shall remain in full force and effect. To the extent there is any conflict between the terms and conditions of the Lease and this Amendment, the terms and conditions of this Amendment will govern and control.
3. Landlord represents and warrants that the consent or approval of no third party, including without limitation, a lender, is required with respect to the execution of this Amendment, or if any such third party consent or approval is required, Landlord has obtained any and all such consents or approvals.
4. This Amendment may be executed in any number of counterparts, each of which shall be deemed an original, but all of which together shall constitute a single instrument. Signed facsimile and electronic copies of this Amendment shall legally bind the parties to the same extent as original documents.

**IN WITNESS WHEREOF**, the parties have executed this Amendment effective as of the date of execution by the last party to sign.

**LANDLORD:**  
**The Village of Orland Park**

By:

\_\_\_\_\_

Print Name:

\_\_\_\_\_


Title:

\_\_\_\_\_

Date:

\_\_\_\_\_

**TENANT:**  
**T-Mobile Central LLC**

By:  E2530D5D0838418...  
\_\_\_\_\_

Print Name: Mike Blasutti  
\_\_\_\_\_

Title: Director, Engineering & Ops  
\_\_\_\_\_

Date: 9/17/2024  
\_\_\_\_\_

**TMO Legal** Digitally signed by TMO Legal  
Date: 2024.09.10 12:21:27 -04'00'

<sup>DS</sup>  


<sup>DS</sup>  


<sup>DS</sup>  


EXHIBIT A

LEGAL DESCRIPTION OF THE PROPERTY

THAT PART OF THE NORTHWEST 1/4 OF SECTION 32, TOWNSHIP 36 NORTH, RANGE 12 EAST OF THE THIRD PRINCIPAL MERIDIAN, DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHWEST CORNER OF THE SAID NORTHWEST 1/4 OF SECTION 32; THENCE NORTH 0 DEGREES 14 MINUTES 14 SECONDS EAST ALONG THE WEST LINE OF THE SAID NORTHWEST 1/4 OF SECTION 32 FOR A DISTANCE OF 614.88 FEET TO THE POINT OF BEGINNING; THENCE CONTINUING NORTH 0 DEGREES 14 MINUTES 14 SECONDS EAST ALONG THE SAID WEST LINE OF THE NORTHWEST 1/4 OF SECTION 32 FOR A DISTANCE OF 150.00 FEET; THENCE SOUTH 89 DEGREES 45 MINUTES 46 SECONDS EAST FOR A DISTANCE OF 210.00 FEET; THENCE SOUTH 0 DEGREES 14 MINUTES 14 SECONDS WEST FOR A DISTANCE OF 150.00 FEET; THENCE NORTH 89 DEGREES 45 MINUTES 46 SECONDS WEST FOR A DISTANCE OF 210.00 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

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**EXHIBIT B-1**

See Attached Drawings

REVIEWED BY:

PROPERTY OWNER OR REP.	RF
ZONING	NETWORK
CONSTRUCTION	CONTRACTOR
OPERATIONS	SITE ACQUISITION

SCOPE OF WORK

GROUND SCOPE OF WORK:

- REMOVAL OF T-MOBILE ANTENNAS, RRUs, HYBRID & COAX CABLES, AND LOW-PROFILE PLATFORM ON TEMPORARY TOWER. DISMANTLING OF TEMPORARY TOWER. RESTORATION OF TEMPORARY TOWER SITE TO ITS FORMER CONDITION.
- INSTALLATION OF NEW T-MOBILE UTILITY H-FRAME WITH POWER & FIBER PANEL BOXES. INSTALLATION OF POWER & FIBER CONDUITS FROM NEW H-FRAME TO EXISTING PPC AND CIENA INSIDE T-MOBILE LEASE AREA.
- REMOVAL OF DECOMMISSIONED COVP AND INSTALLATION OF (1) 3 BOTTOM OVP (I.E., SECTOR 3) ON EXISTING UNISTRUT H-FRAME AT T-MOBILE LEASE AREA INSIDE WATER TOWER BASE CONE. INSTALLATION OF CABLE LADDER AT T-MOBILE LEASE AREA.
- INSTALLATION OF (3) HCS 2.0 TRUNK CABLES FROM OVPS TO (3) WT BREAKOUT BOXES. TRUNK CABLES TO ATTACH TO NEW CABLE LADDER AND FOLLOW ROUTE OF FORMER COAX CABLES INSIDE WT BASE CONE, SHAFT AND ACCESS TUBE.

TOWER SCOPE OF WORK:

- INSTALLATION OF NEW (4) COMMSCOPE FFHH-65B-R3 OCTO ANTENNAS ON NEW RAILING ON TOP OF WATER TANK.
- RELOCATION/INSTALLATION OF EXISTING (3) AEHC MASSIVE MIMO ANTENNAS, (4) AHFIG RRUs, (4) AHLOA RRUs AND (3) HCS 2.0 CABLE BREAKOUT BOXES/PENDANTS ON NEW 30"Ø RAILING AT WT ROOF.
- INSTALLATION OF HYBRID JUMPER CABLES FROM PENDANTS TO AEHC ANTENNAS AND SECTOR RRUs.
- INSTALLATION OF RF JUMPER CABLES FROM SECTOR RRUs TO OCTO ANTENNAS.
- INSTALLATION OF NEW GROUNDING SYSTEM FOR T-MOBILE EQUIPMENT ON TOP OF WATER TANK.



**PROJECT: EQUIPMENT UPGRADE**  
**SITE ID: CH18408D**  
**SITE NAME: ORLAND PARK WATER TOWER**  
**SITE TYPE: WATER TANK**  
**PLAN: 5G AND LTE AIRSCALE**  
**SITE ADDRESS: 17801 S. WOLF ROAD, ORLAND PARK, IL 60647**

SITE COORDINATES:

GEOGRAPHIC COORDINATES (NAD 83)  
OBTAINED FROM 1A LETTER DATED 2/5/2024.

**LATITUDE: N 41° 33' 58.27"**  
**LONGITUDE: W 87° 53' 23.90"**  
**GROUND ELEVATION: 700.07' AMSL**

DRIVING DIRECTIONS

SCAN OR CODE FOR LINK TO SITE LOCATION MAP



FROM T-MOBILE OFFICE:

- GET ON I-88 E FROM BUTTERFIELD FRONTAGE RD
- CONTINUE ON I-88 E. TAKE I-294 S TO JOLIET RD/OLD RTE 66 E IN INDIAN HEAD PARK. TAKE THE I-55 N EXIT FROM I-294 S
- DRIVE TO WOLF RD

SHEET INDEX

SHEET NO:	SHEET TITLE	REV. NO:
T-1	TITLE SHEET	0
A-1	OVERALL SITE PLAN	0
A-2	SOUTH ELEVATION	0
A-3	DETAILED SITE PLAN	0
A-4	ANTENNA & RRU LAYOUT	0
A-5	ANTENNA & CABLE SCHEDULE	0
A-6	ANTENNA & EQUIPMENT INFORMATION	0
A-7	EQUIPMENT INFORMATION	0
A-8	OVP MOUNTING DETAIL, CABLE INFORMATION	0
A-9	MANDATORY SIGNAGE & POSTING	0
A-10	ANTENNA & EQUIPMENT SCHEMATIC	0
WT-1	ANTENNA & RRU MOUNTING DETAILS	0
WT-2	CABLE SUPPORT DETAILS	0
E-1	ELECTRICAL NOTES, CABLE ROUTING PLAN	0
E-2	GROUNDING NOTES, GROUNDING PLAN	0
E-3	GROUNDING DETAILS	0
N-1	NOTES	0
N-2	NOTES	0

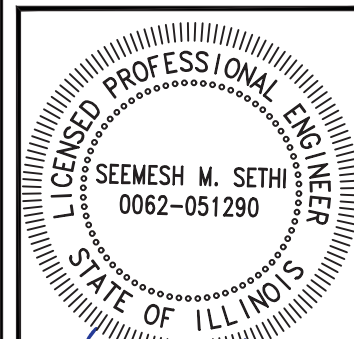


1400 OPUS PLACE, SUITE 700  
DOWNERS GROVE, IL 60515  
PHONE:  
FAX:



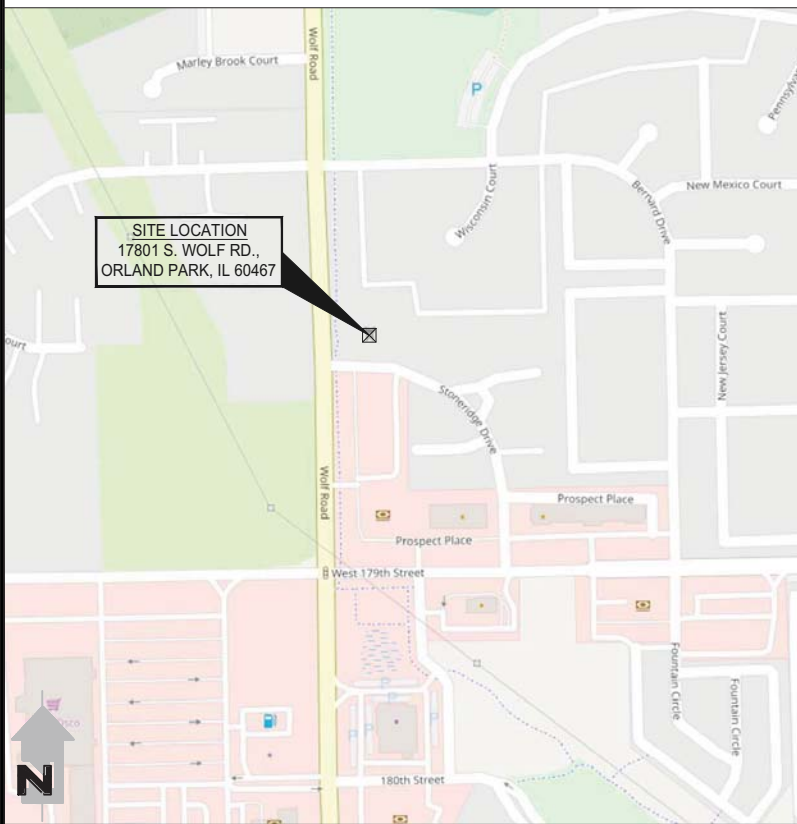
KCS CORPORATION  
CONSULTING ENGINEERS  
ILLINOIS DESIGN FIRM  
REGISTRATION NO.: 184.002139  
1125 REMINGTON RD., SCHAUMBURG, IL 60173  
PHONE: 847-490-8200; FAX: 847-490-8225  
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SIGNATURES: \_\_\_\_\_  
DATE: 7/30/24 EXPIRES: 11/30/25

VICINITY MAP



PROJECT SUMMARY

APPLICABLE CODES

- 2018 INTERNATIONAL BUILDING CODE WITH VILLAGE AMENDMENTS, VILLAGE CODE TITLE 5, CHAPTER 1
- 2017 NATIONAL ELECTRICAL CODE WITH AMENDMENTS, VILLAGE CODE TITLE 5, CHAPTER 3

APPLICANT

T-MOBILE L.L.C.  
1400 OPUS PLACE, SUITE 700  
DOWNERS GROVE, IL 60515  
PHONE: 425-302-1000  
FAX:

CONSTRUCTION CONTACT: CHRISTOPHER LYTLE  
PHONE NO.:

OPERATIONAL CONTACT:  
PHONE NO.:

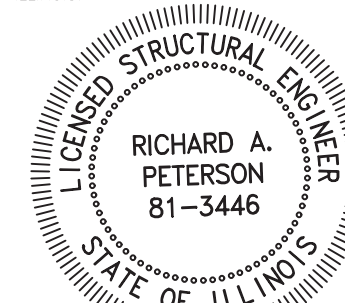


UNDERGROUND SERVICE ALERT  
CALL TOLL FREE  
1-800-892-0123  
THREE WORKING DAYS BEFORE YOU DIG

UTILITIES

PROFESSIONAL LICENSE

I HEREBY CERTIFY THAT THESE PLANS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.



SIGNATURE: \_\_\_\_\_  
SIGNED: 7/30/24 EXPIRES: 11/30/24

NOTES FOR CONTRACTOR

CONTRACTOR SHALL VERIFY ALL PLANS & EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED IN FIELD. IF SIGNIFICANT DEVIATIONS OR DETERIORATION ARE ENCOUNTERED AT THE TIME OF CONSTRUCTION, A REPAIR PERMIT WILL BE OBTAINED AND CONTRACTOR SHALL NOTIFY STRUCTURAL ENGINEER IMMEDIATELY.

HANDICAP ACCESS REQUIREMENTS

SITE IS UNOCCUPIED AND NOT FOR HUMAN HABITATION. HANDICAP ACCESS NOT REQUIRED.

NOTES

THE DRAWINGS ARE FULL ON 11"x17" SHEET SIZE AND ARE NOT REDUCED IN SIZE U.N.O.

THESE PLANS HAVE BEEN PREPARED FOR THE PURPOSE OF DESIGN AND DETAILING OF ANY AND ALL CIVIL AND ELECTRICAL ENGINEERING ASPECT OF THIS PROJECT,

CH184080D  
ORLAND PARK WT

17801 S. WOLF RD., ORLAND PARK, IL, 60647

Drawing Title:  
**TITLE SHEET**

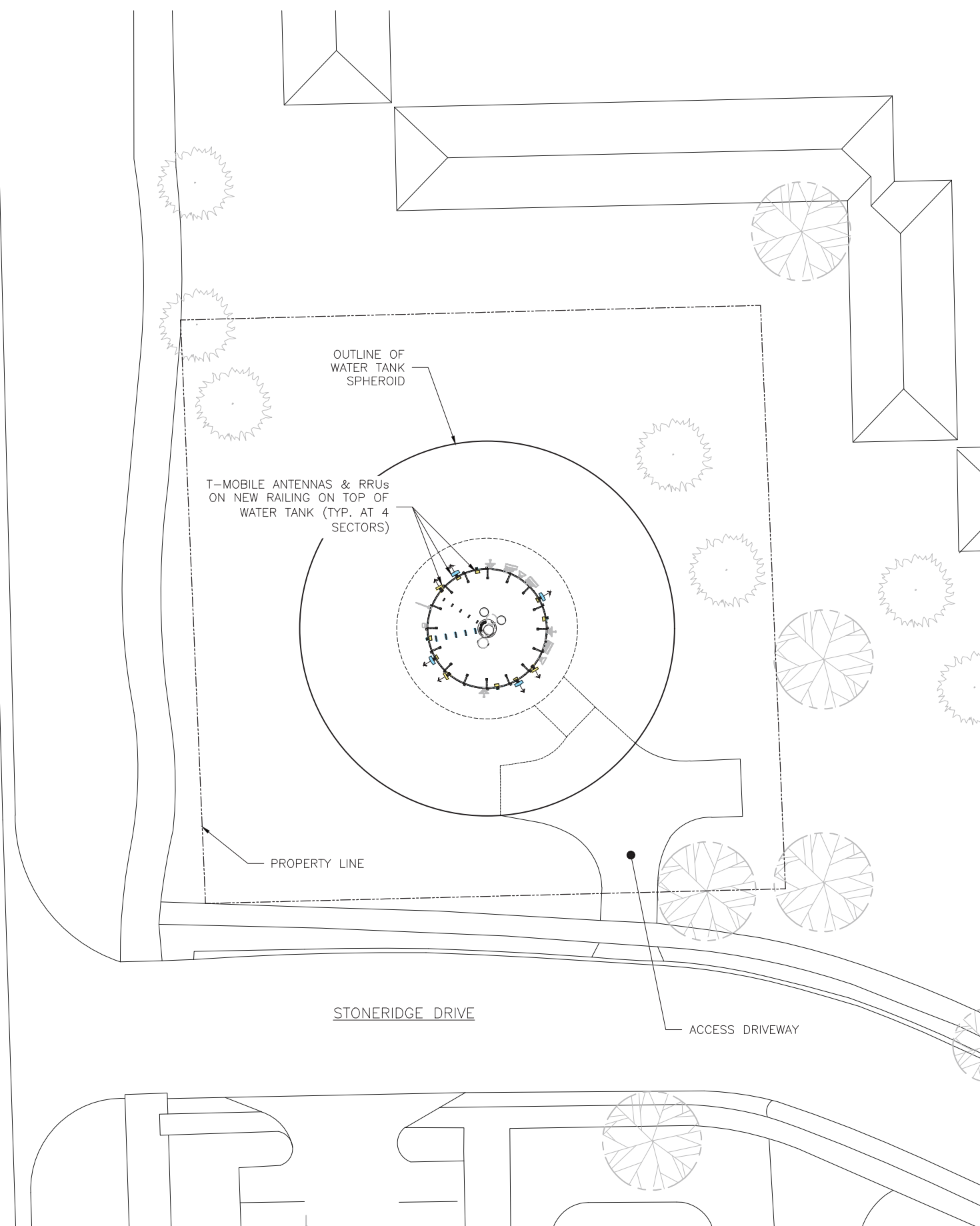
Project Number:	Drawn by: PA
Client Project Number:	Date:
Scale:	Checked by:
Drawing Number	Date:

T-1  
Signatory Level: L06  
NLG-100466

# T-MOBILE CH18408D ORLAND PARK WT 17801 S. WOLF ROAD, ORLAND PARK, IL 60467



WOLF ROAD



**LEGEND:**

<span style="display:inline-block; width:15px; height:15px; background-color:lightblue; border:1px solid black;"></span>	NEW INSTALLATION
<span style="display:inline-block; width:15px; height:15px; background-color:lightcoral; border:1px solid black;"></span>	TO BE REMOVED
<span style="display:inline-block; width:15px; height:15px; background-color:lightyellow; border:1px solid black;"></span>	TO BE RELOCATED
<span style="display:inline-block; width:15px; height:15px; background-color:white; border:1px solid black;"></span>	TO REMAIN

**NOTE:**

- SITE PLAN WAS PREPARED USING T-MOBILE CH18408D ANCHOR FCDs REV 1 DATED 12/04/2020.
- PROPOSED EQUIPMENT & ANTENNA INSTALLATION IS BASED ON PASSING STRUCTURAL ANALYSIS OF WATER TANK AND NEW HANDRAIL MOUNT PREPARED BY KCS CORPORATION DATED 7/30/2024.
- T-MOBILE GENERAL CONTRACTOR SHALL RESTORE SITE TO ITS ORIGINAL CONDITION. GC SHALL REPAIR ANY DAMAGE TO EXISTING SITE GRADING, CURB AND LANDSCAPING IF IT OCCURS.

**T-Mobile**  
 1400 OPUS PLACE, SUITE 700  
 DOWNERS GROVE, IL 60515  
 PHONE:  
 FAX:

**KCS CORPORATION**  
 CONSULTING ENGINEERS  
 ILLINOIS DESIGN FIRM  
 REGISTRATION NO.: 184.002139  
 1125 REMINGTON RD., SCHAMBURG, IL 60173  
 PHONE: 847-490-8200; FAX: 847-490-8225  
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**LICENSED PROFESSIONAL ENGINEER**  
 SEEMESH M. SETHI  
 0062-051290  
 STATE OF ILLINOIS  
*Seemesh S*  
 SIGNATURES:  
 DATE: 7/30/24 EXPIRES: 11/30/25

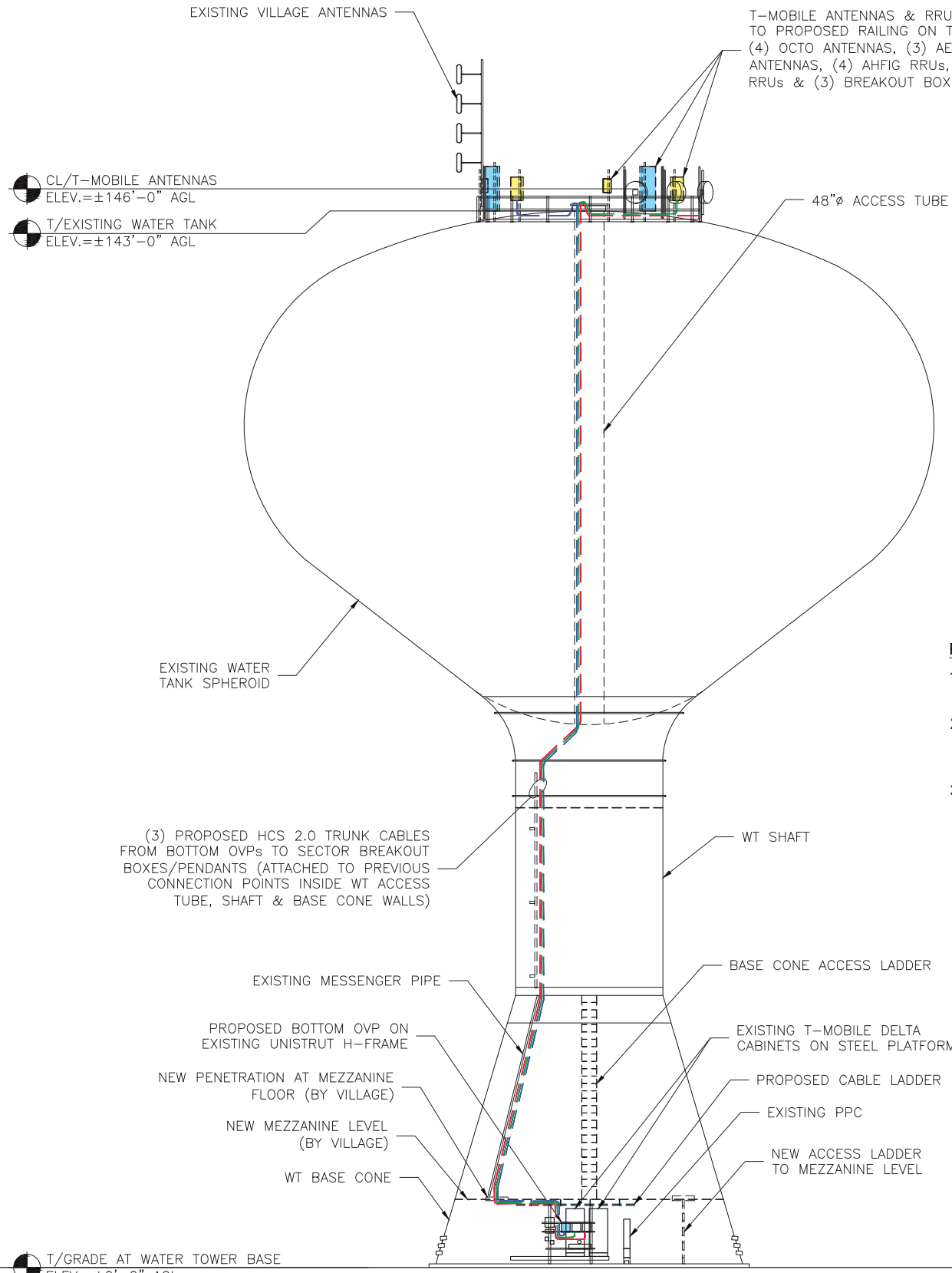
REV.	DESCRIPTION	DATE
0	ISSUED FOR PERMIT	7/30/24
B	ISSUED FOR REVIEW	5/14/24
A	ISSUED FOR REVIEW	3/11/24

**CH184080D  
ORLAND PARK WT**  
 17801 S. WOLF RD., ORLAND PARK, IL, 60467

**OVERALL SITE PLAN**

Project Number:	Drawn by: PA
Client Project Number:	Checked by:
Scale:	Approved by: MS
Drawing Number:	Date:

**1 OVERALL SITE PLAN**  
 A-1 SCALE: 1/32" = 1'-0"



CL/T-MOBILE ANTENNAS  
ELEV.=±146'-0" AGL

T/EXISTING WATER TANK  
ELEV.=±143'-0" AGL

(3) PROPOSED HCS 2.0 TRUNK CABLES FROM BOTTOM OVPs TO SECTOR BREAKOUT BOXES/PENDANTS (ATTACHED TO PREVIOUS CONNECTION POINTS INSIDE WT ACCESS TUBE, SHAFT & BASE CONE WALLS)

**PROJECT NOTES:**

1. ELEVATION DRAWING WAS PREPARED USING CHICAGO BRIDGE & IRON (CBI) PLANS DATED 9/22/1993.
2. PROPOSED EQUIPMENT & ANTENNA INSTALLATION IS BASED ON PASSING STRUCTURAL ANALYSIS OF WATER TANK AND NEW HANDRAIL MOUNT PREPARED BY KCS CORPORATION DATED 7/30/2024.
3. SITE FOR TEMPORARY TOWER LOCATION WILL BE GRADED AND CLEARED. SITE WILL BE RESTORED TO ITS ORIGINAL STATE AT THE END OF THE PROJECT.

**LEGEND:**

- NEW INSTALLATION
- TO BE REMOVED
- TO BE RELOCATED
- TO REMAIN

T/GRADE AT WATER TOWER BASE  
ELEV.=±0'-0" AGL

1 SOUTH ELEVATION (FACING NORTH)  
A-2 SCALE: 1" = 20'

**T-Mobile**

1400 OPUS PLACE, SUITE 700  
DOWNERS GROVE, IL 60515  
PHONE:  
FAX:

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ILLINOIS DESIGN FIRM  
REGISTRATION NO.: 184.002139  
1125 REMINGTON RD., SCHAMBURG, IL 60173  
PHONE: 847-490-8200; FAX: 847-490-8225  
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LICENSED STRUCTURAL ENGINEER  
RICHARD A. PETERSON  
81-3446  
STATE OF ILLINOIS

*Richard A. Peterson*  
SIGNATURES:  
DATE: 7/30/24 EXPIRES: 11/30/24

REV.	DESCRIPTION	DATE
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A	ISSUED FOR REVIEW	3/11/24

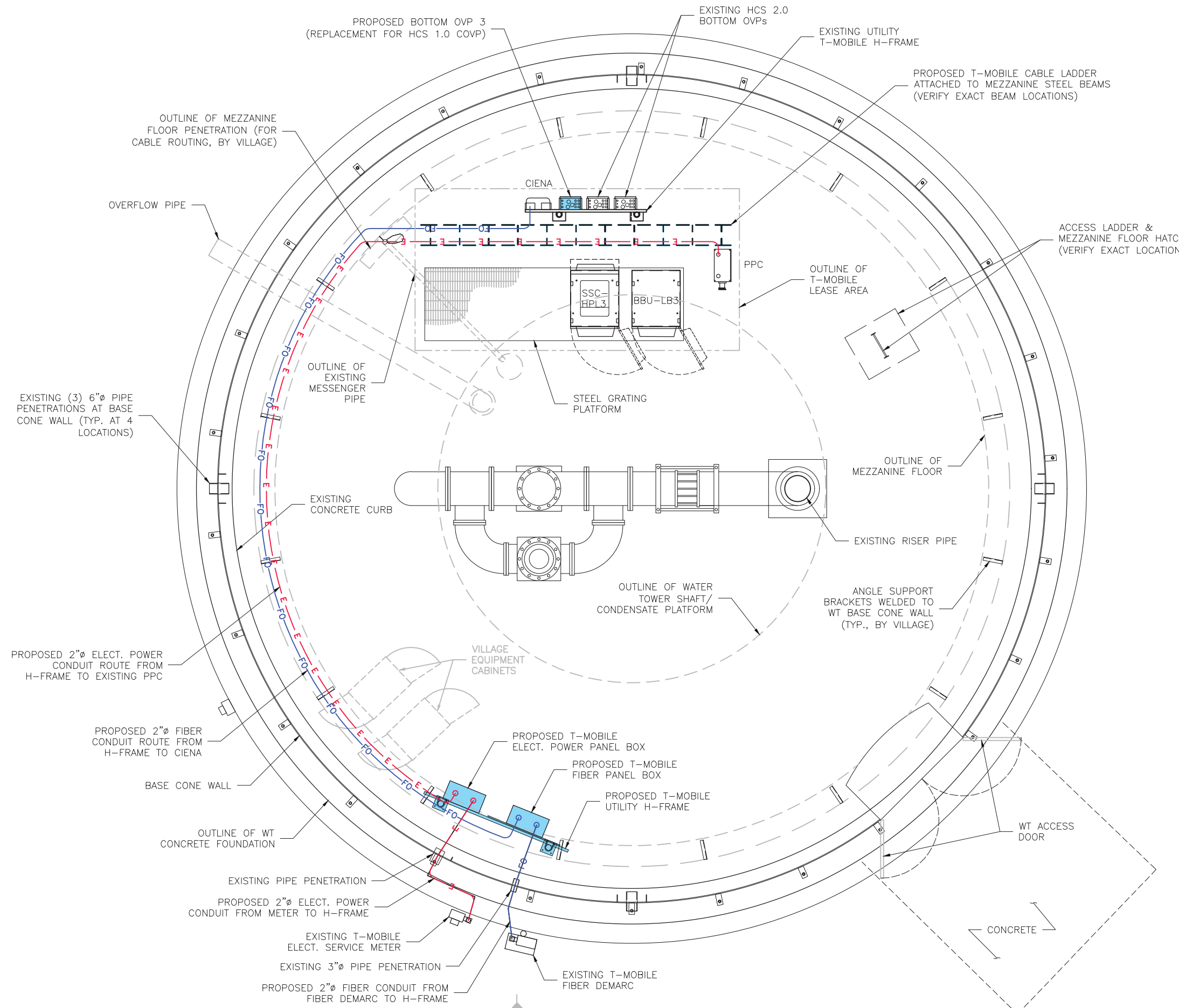
**CH184080D**  
**ORLAND PARK WT**

17801 S. WOLF RD., ORLAND PARK, IL, 60467

Drawing Title:  
**ELEVATION**

Project Number:	Drawn by: PA
Client Project Number:	Date:
Scale:	Checked by:
Drawing Number:	Date:

A-2  
TMO Signatory Level: L06  
NLG-100466



1 BASE CONE PLAN  
A-3 SCALE: 3/16" = 1'-0"

**T-Mobile**  
1400 OPUS PLACE, SUITE 700  
DOWNERS GROVE, IL 60515  
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FAX:

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LICENSED PROFESSIONAL ENGINEER  
SEEMESH M. SETHI  
0062-051290  
STATE OF ILLINOIS  
*Seemesh S*  
SIGNATURES:  
DATE: 7/30/24 EXPIRES: 11/30/25

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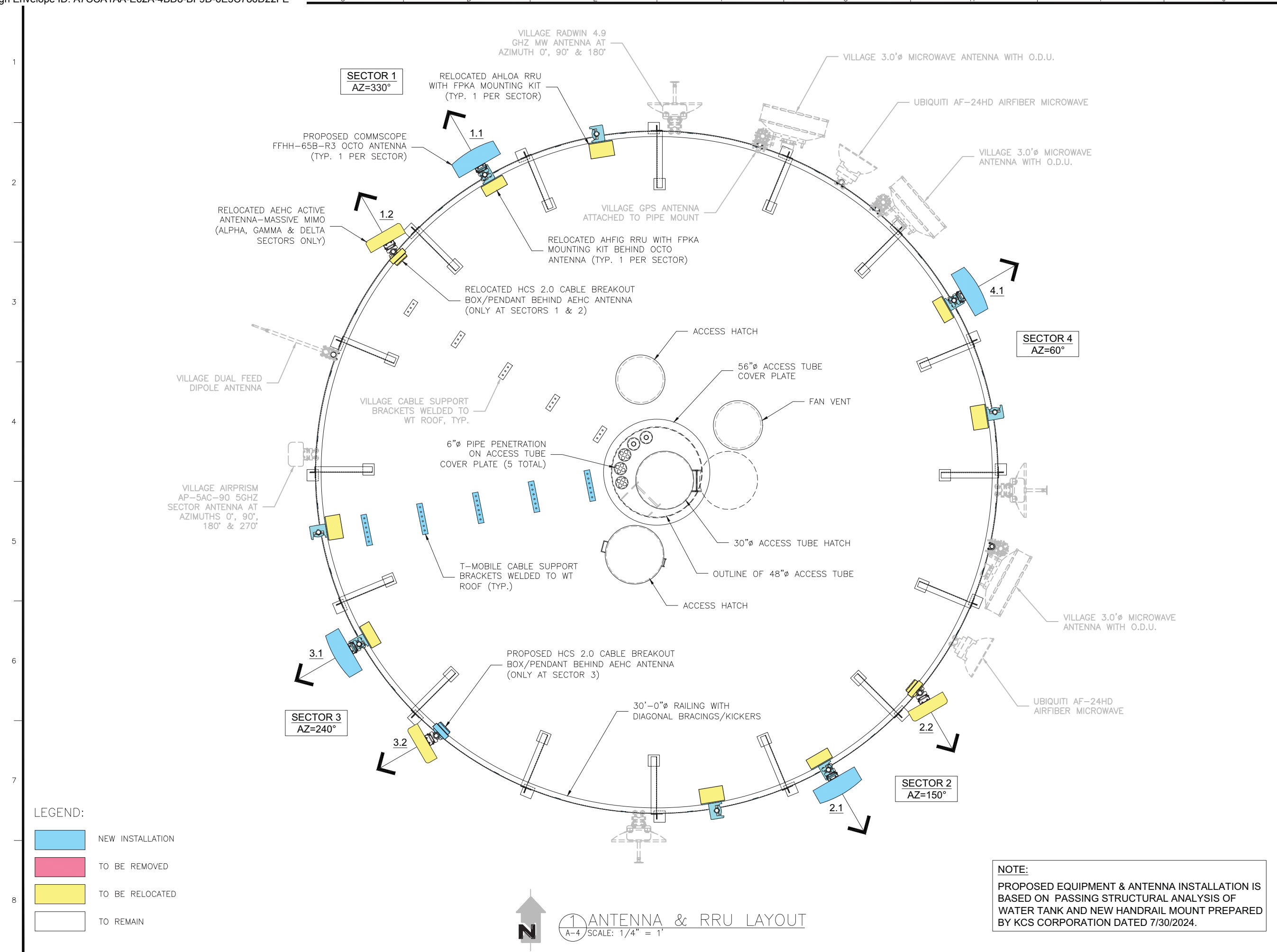
**CH184080D**  
**ORLAND PARK WT**  
17801 S. WOLF RD., ORLAND PARK, IL, 60467

Drawing Title:  
**BASE CONE PLAN**

Project Number:	Drawn by: PA
Client Project Number:	Date:
Scale:	Checked by:
Drawing Number:	Date:

A-3  
TM Signatory Level: L06  
NLG-100466





**LEGEND:**

	NEW INSTALLATION
	TO BE REMOVED
	TO BE RELOCATED
	TO REMAIN

**1 ANTENNA & RRU LAYOUT**  
 A-4 SCALE: 1/4" = 1'

**NOTE:**  
 PROPOSED EQUIPMENT & ANTENNA INSTALLATION IS BASED ON PASSING STRUCTURAL ANALYSIS OF WATER TANK AND NEW HANDRAIL MOUNT PREPARED BY KCS CORPORATION DATED 7/30/2024.

**T-Mobile**  
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**LICENSED STRUCTURAL ENGINEER**  
 RICHARD A. PETERSON  
 81-3446  
 STATE OF ILLINOIS  
*Richard A. Peterson*  
 SIGNATURES:  
 DATE: 7/30/24 EXPIRES: 11/30/24

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**CH184080D**  
**ORLAND PARK WT**  
 17801 S. WOLF RD., ORLAND PARK, IL, 60467

**ANTENNA & RRU LAYOUT**

Project Number:	Drawn by: PA
Client Project Number:	Checked by:
Scale:	Approved by: MS
Drawing Number:	Date:

# ANTENNA & CABLE SCHEDULE

SECTOR	1					2					3					4					
ANTENNA	1		2			1		2			1		2			1					
MODEL #	COMMSCOPE FFHH-65B-R3 (OCTO)		AEHC (ACTIVE ANTENNA - MASSIVE MIMO)			COMMSCOPE FFHH-65B-R3 (OCTO)		AEHC (ACTIVE ANTENNA - MASSIVE MIMO)			COMMSCOPE FFHH-65B-R3 (OCTO)		AEHC (ACTIVE ANTENNA - MASSIVE MIMO)			COMMSCOPE FFHH-65B-R3 (OCTO)					
AZIMUTH	330°					150°					240°					60°					
RAD CENTER	±146.0'					±146.0'					±146.0'					±146.0'					
MECH. DOWNTILT	0					0					0					0					
PORTS	P1	P2	P3	P4	P5	P1	P2	P3	P4	P5	P1	P2	P3	P4	P5	P1	P2	P3	P4		
ACTIVE TECHNOLOGY	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900 N1900	L2100 L1900 G1900 N1900	L2500 N2500	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900 N1900	L2100 L1900 G1900 N1900	L2500 N2500	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900 N1900	L2100 L1900 G1900 N1900	L2500 N2500	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900 N1900	L2100 L1900 G1900 N1900		
DARK TECHNOLOGY			N2100 U1900	N2100 U1900				N2100 U1900	N2100 U1900				N2100 U1900	N2100 U1900				N2100 U1900	N2100 U1900		
DECOMMISSIONED TECHNOLOGY																					
ELEC. DOWNTILT	4	4	2	2		4	4	2	2		4	4	2	2		4	4	2	2		
RRU TYPE	(1) AHLOA		(1) AHFIG			(1) AHLOA		(1) AHFIG			(1) AHLOA		(1) AHFIG			(1) AHLOA		(1) AHFIG			
CABLES																					
CABLE TYPE FROM PLATFORM BOTTOM OVP TO TOWER BREAKOUT BOX	HCS 2.0 TRUNK 1					HCS 2.0 TRUNK 2					HCS 2.0 TRUNK 3					SHARED WITH SECTOR 2					
HCS ACTUAL LENGTH	(N)(1) 200.0'					(N)(1) 219.0'					(N)(1) 196.0'										
HCS FACTORY LENGTH	(N)(1) 250.0'					(N)(1) 275.0'					(N)(1) 250.0'										
JUMPER TYPE FROM BREAKOUT BOX TO RRU/AEHC ANTENNA	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER	HYBRID JUMPER		
ACTUAL JUMPER LENGTH	(N)(1) 19'-0"	(N)(1) 14'-0"	(N)(1) 6'-0"	(N)(1) 19'-0"	(N)(1) 14'-0"	(N)(1) 6'-0"	(N)(1) 19'-0"	(N)(1) 14'-0"	(N)(1) 6'-0"	(N)(1) 19'-0"	(N)(1) 14'-0"	(N)(1) 6'-0"	(N)(1) 19'-0"	(N)(1) 14'-0"	(N)(1) 6'-0"	(N)(1) 22'-0"	(N)(1) 27'-0"	(N)(1) 22'-0"	(N)(1) 27'-0"		
FACTORY JUMPER LENGTH	(N)(1) 30'-0"	(N)(1) 15'-0"	(N)(1) 15'-0"	(N)(1) 30'-0"	(N)(1) 15'-0"	(N)(1) 15'-0"	(N)(1) 30'-0"	(N)(1) 15'-0"	(N)(1) 15'-0"	(N)(1) 30'-0"	(N)(1) 15'-0"	(N)(1) 15'-0"	(N)(1) 30'-0"	(N)(1) 15'-0"	(N)(1) 15'-0"	(N)(1) 30'-0"	(N)(1) 30'-0"	(N)(1) 30'-0"	(N)(1) 30'-0"		
JUMPER TYPE FROM RRU TO ANTENNA	RF JUMPER	RF JUMPER	RF JUMPER	RF JUMPER		RF JUMPER	RF JUMPER	RF JUMPER	RF JUMPER		RF JUMPER	RF JUMPER	RF JUMPER	RF JUMPER		RF JUMPER	RF JUMPER	RF JUMPER	RF JUMPER		
JUMPER LENGTH	(N)(2) 14'-0"	(N)(2) 14'-0"	(N)(2) 8'-0"	(N)(2) 8'-0"		(N)(2) 14'-0"	(N)(2) 14'-0"	(N)(2) 8'-0"	(N)(2) 8'-0"		(N)(2) 14'-0"	(N)(2) 14'-0"	(N)(2) 8'-0"	(N)(2) 8'-0"		(N)(2) 14'-0"	(N)(2) 14'-0"	(N)(2) 8'-0"	(N)(2) 8'-0"		

NOTE: T-MOBILE GC WILL CALL OUT HCS 2.0 LENGTHS REQUIRED TO EACH SECTOR ON SCOPE WALK; GET ON RFDS; GET MATERIALS ON ORDER THROUGH T-MOBILE BILL OF MATERIALS (BOM); AND CONFIRM PRIOR TO START OF CONSTRUCTION.

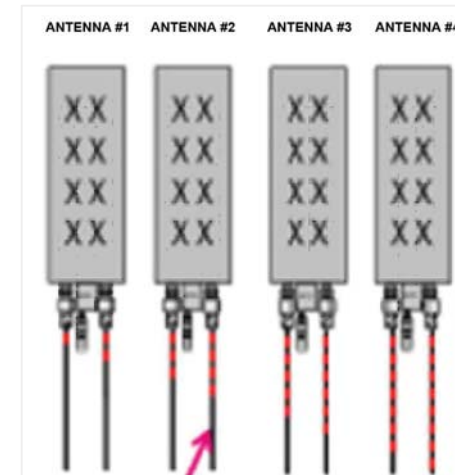
LEGEND: (N) - PROPOSED CABLE  
(E) - EXISTING CABLE

### 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	GREY
UNUSED COAX	PINK
MICROWAVE	ORANGE
DWE T-1'S+GPS DOWNLINK CABLE	ID W/ LABEL MAKER

### FRONT OF THE ANTENNA



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

### 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.
- CONTRACTOR SHALL INSTALL COLOR CODE RINGS ON EACH OF THE HYBRID CABLES AND JUMPERS CABLES WITH UV RESISTANT TAPE. ALL CABLES SHALL BE MARKED AT TOP AND BOTTOM WITH 2" COLOR TAPE OR STENCIL TAG. COLOR TAPE MAY BE OBTAINED FROM GRAYBAR ELECTRONICS.

1400 OPUS PLACE, SUITE 700  
DOWNERS GROVE, IL 60515  
PHONE:  
FAX:

**KCS CORPORATION**  
CONSULTING ENGINEERS  
ILLINOIS DESIGN FIRM  
REGISTRATION NO.: 184.002139  
1125 REMINGTON RD., SCHLAUBURG, IL 60173  
PHONE: 847-490-8200; FAX: 847-490-8225  
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SEEMESH M. SETHI  
0062-051290  
STATE OF ILLINOIS  
LICENSED PROFESSIONAL ENGINEER  
SIGNATURES: *Seemesh M. Sethi*  
DATE: 7/30/24 EXPIRES: 11/30/25

REV.	DESCRIPTION	DATE
0	ISSUED FOR PERMIT	7/30/24
B	ISSUED FOR REVIEW	5/14/24
A	ISSUED FOR REVIEW	3/11/24

**CH184080D**  
ORLAND PARK WT  
17801 S. WOLF RD., ORLAND PARK, IL, 60467

## ANTENNA & CABLE SCHEDULE

Project Number:	Drawn by: PA
Client Project Number:	Checked by:
Scale:	Approved by: MS
Drawing Number:	Date:

PROPOSED:



**FFHH-65B-R3**  
8-port sector antenna, 4x617-806 and 4x1695-2360 MHz, 65° HPBW, 3Xret, 600 MHz-Ready



Port Configuration



Dimensions and Weight

Property	Value
Height	1830.0 mm (72.0 in.)
Width	640.0 mm (25.2 in.)
Depth	235.0 mm (9.3 in.)
Net Weight	46 kg (101.41 lbs.) without mounting kit

1 OCTO ANTENNA SPECIFICATIONS  
SCALE: N.T.S.

RELOCATED:



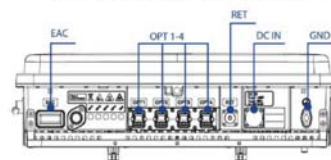
**AEHC**  
Airscale MAA 64T64R 192AE n41 240W



There are no RF ports on the AEHC since it is an integrated radio within the antenna.

AEHC Interfaces

The ports of the AEHC are shown below:



Dimensions and Weight

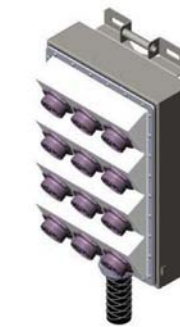
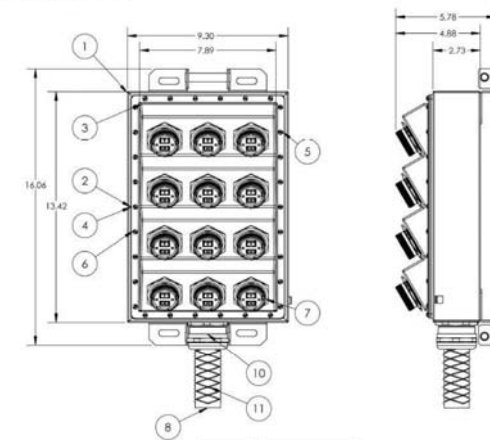
Property	Value
Height	970 mm (38.2 in.) with front covers
Width	545 mm (21.5 in.) with front covers
Depth	150 mm (5.9 in.) with front covers
Net Weight	49 kg (108.0 lbs.) without mounting brackets

2 AEHC-MASSIVE MIMO ANTENNA SPECS  
SCALE: N.T.S.

PROPOSED/RELOCATED:



**HYBRID CABLE HI-CAP BREAKOUT BOX**



ITEM NO.	PART NUMBER	DESCRIPTION	AC QUANTITY
1	AC-08TOS-2HP-DC	HP SHEETMETAL BOX	1
2	AC-08TOS-FB-HICAP	SHIELD BUSH	1
3	AC-48-FRONT-48EP-3CON	HYBRID MODULE INCLINE MOUNT THRU-HOLE SHELL	1
4	AC-08TOS-HICAP	METAL GROUNDING	1
5	Regular LW 0.125	WASHER	30
6	304#804058	TAMPERED PROOF #6-32 SCREW	36
7	100#17000	JAM NUT RECEPTACLE	12
8	AS-0328TPO2	HYBRID CABLE HI-CAP	1
9	W00008	LOCKWASHER FOR CABLE GLAND	1
10	K220342	CABLE GLAND	1
11	W00008	CABLE HOIST CLIP	1

Dimensions and Weight

Property	Value
Height	407.9 mm (16.06 in.)
Width	236.2 mm (9.3 in.)
Depth	146.8 mm (5.78 in.)
Net Weight	1.63 kg (3.59 lbs.)

3 BREAKOUT BOX SPECIFICATIONS  
SCALE: N.T.S.

RELOCATED:

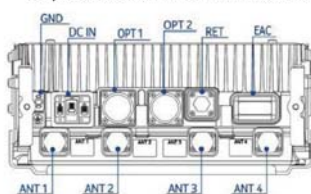


**AHFIG**  
AirScale Dual RRH 4T4R B25/B66 Module



AHFIG Interface

The ports of the AHFIG are shown below:



Dimensions and Weight

Property	Value
Height	Core RRH: 695 mm (27.4 in.) With upper and lower mounting brackets: 730 mm (28.7 in.)
Width	Core RRH: 308 mm (12.1 in.) With mounting cover: 327mm (12.9 in.)
Depth	Core RRH: 131 mm (5.2 in.) With mounting cover: 142 mm (5.6 in.)
Net Weight	Core RRH: 32 kg (70.5 lbs.)

4 AHFIG SPECIFICATIONS  
SCALE: N.T.S.

RELOCATED:



**AHLOA**  
AirScale Dual RRH 4T4R B12/71 240W



AHLOA Interface



Dimensions and Weight

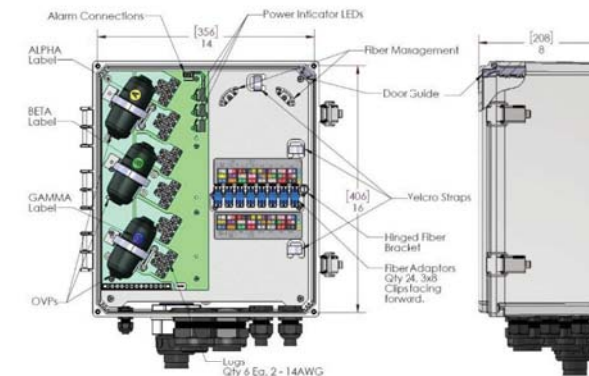
Property	Value
Height	560 mm (22.05 in.)
Width	308 mm (12.13 in.)
Depth	189 mm (7.44 in.)
Net Weight	38 kg (83.78 lbs.) without covers or brackets

5 AHLOA SPECIFICATIONS  
SCALE: N.T.S.

PROPOSED/EXISTING:



**BOTTOM OVP/ FIBER JUNCTION BOX**



Bottom Box Configuration



Dimensions and Weight

Property	Value
Height	406.0 mm (16.0 in.)
Width	356.0 mm (14.0 in.)
Depth	208.0 mm (8.0 in.)

6 BOTTOM OVP SPECIFICATIONS  
SCALE: N.T.S.

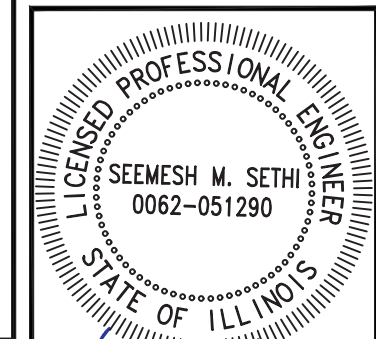


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PHONE:  
FAX:



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SIGNATURES: *Seemesh M. Sethi*  
DATE: 7/30/24 EXPIRES: 11/30/25

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0	ISSUED FOR PERMIT	7/30/24
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**CH184080D**  
ORLAND PARK WT

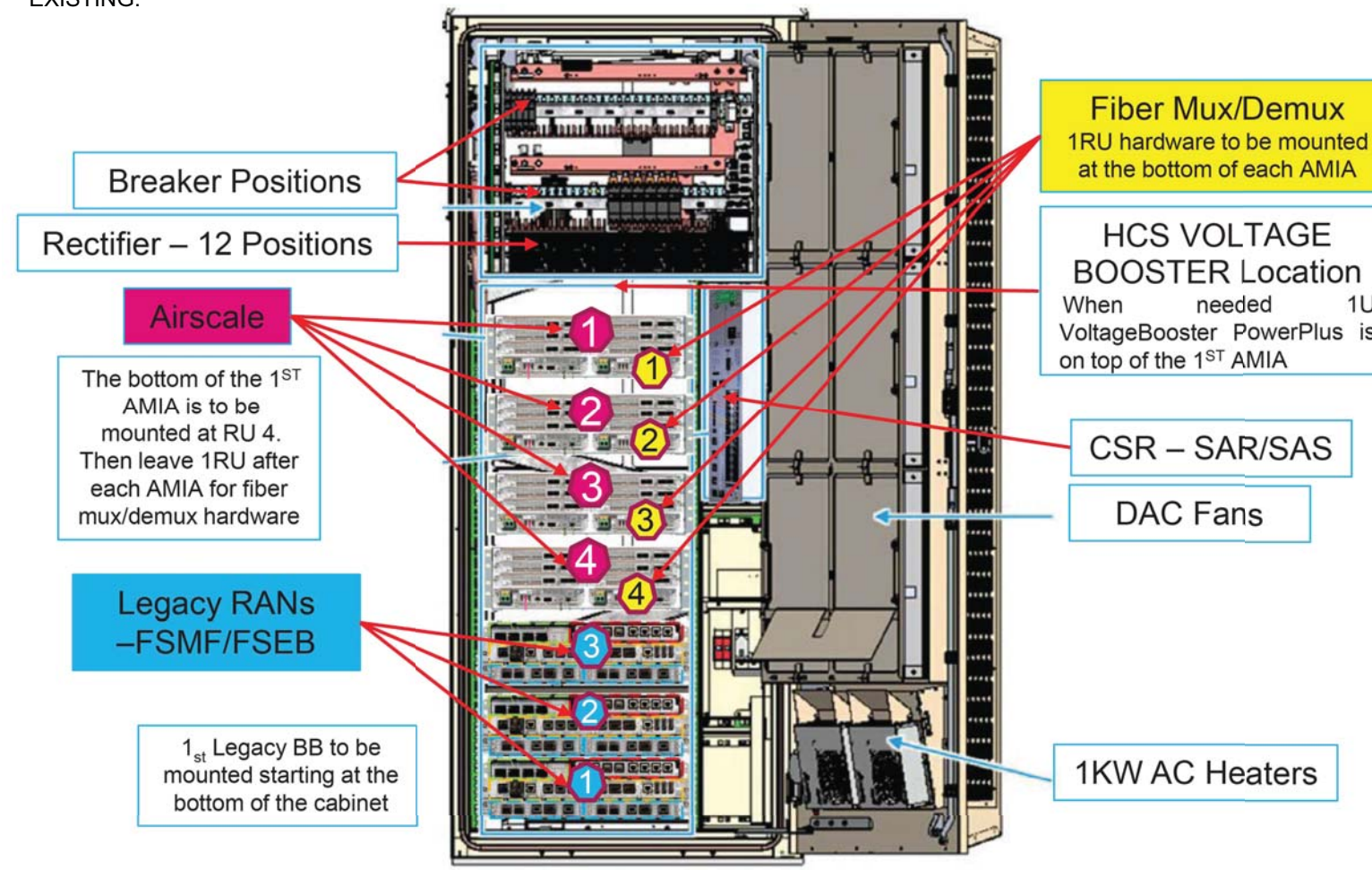
17801 S. WOLF RD., ORLAND PARK, IL, 60467

Drawing Title:  
**ANTENNA & EQUIPMENT INFORMATION**

Project Number:	Drawn by: PA
Client Project Number:	Date:
Scale:	Checked by:
Drawing Number:	Date:
	Approved by: MS
	Date:

A-6  
Signatory Level: L06  
NLG-100466

EXISTING:



1 SSC-HPL3 CABINET LAYOUT  
SCALE: N.T.S.

**T-Mobile**  
1400 OPUS PLACE, SUITE 700  
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PHONE:  
FAX:

**KCS CORPORATION**  
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LICENSED PROFESSIONAL ENGINEER  
SEEMESH M. SETHI  
0062-051290  
STATE OF ILLINOIS  
*Seemesh S*  
SIGNATURES:  
DATE: 7/30/24 EXPIRES: 11/30/25

EXISTING:

### Nokia AirScale SM Indoor Technical Datasheet

**AirScale SM Indoor general specification**

<b>Capacity</b>	Per Capacity plug-in unit in LTE16A: 8 LTE cells (FDD)
Multi-RAT capable platform	
<b>Minimum configuration</b>	1 Common PIU (transport and control), 1 Capacity PIU (baseband processing)
<b>Maximum configuration</b>	2 Common PIU, 6 Capacity PIU
<b>Installation options</b>	19 inch standard rack, pole and wall (with mounting plinth), inside Outdoor Enclosure



Minimum configuration (1x BTS)

**AirScale SM Indoor mechanical specifications**

<b>Dimensions</b>	(3U) H 128 mm x W 447 mm x D 400 mm H 5.04" x W 17.60" x D 15.75"
<b>Installation Depth</b>	400mm + cooling air space 50mm
<b>Weight</b>	Minimum (Common PIU + Capacity PIU): 10.1kg 22.27 LBS. Maximum (2 Common PIU + 6 Capacity PIU): 23.5kg 51.81 LBS.
<b>Ingress protection</b>	IP20
<b>Operational Temperature Range</b>	-5°C to 55°C



Minimum configuration (2x BTS, 1 BTS per half subrack)

**AirScale SM Indoor electrical specifications**

<b>Supply Voltage / Voltage Range</b>	Nominal: -48V DC / -40.5V to -57V
<b>Power consumption</b>	1 Common PIU & 1 Capacity PIU: typ 210W 1 Common PIU & 3 Capacity PIU: typ 420W 2 Common PIU & 6 Capacity PIU: typ 840W



Maximum AirScale SM Indoor configuration (FL16A: 1 BTS per half subrack)

One logical BTS in full subrack (Future releases)

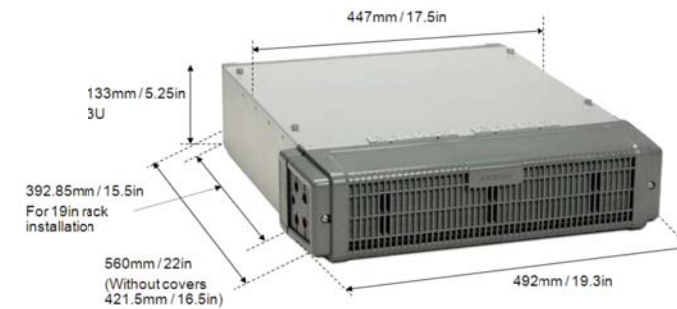


2 DETAIL-AMIA  
SCALE: N.T.S.

EXISTING:

### Flexi Multiradio BTS System Module FSMF

- < 15 liters
- < 15 kg
- 3 height units
- IP65
- 35 to +55 °C



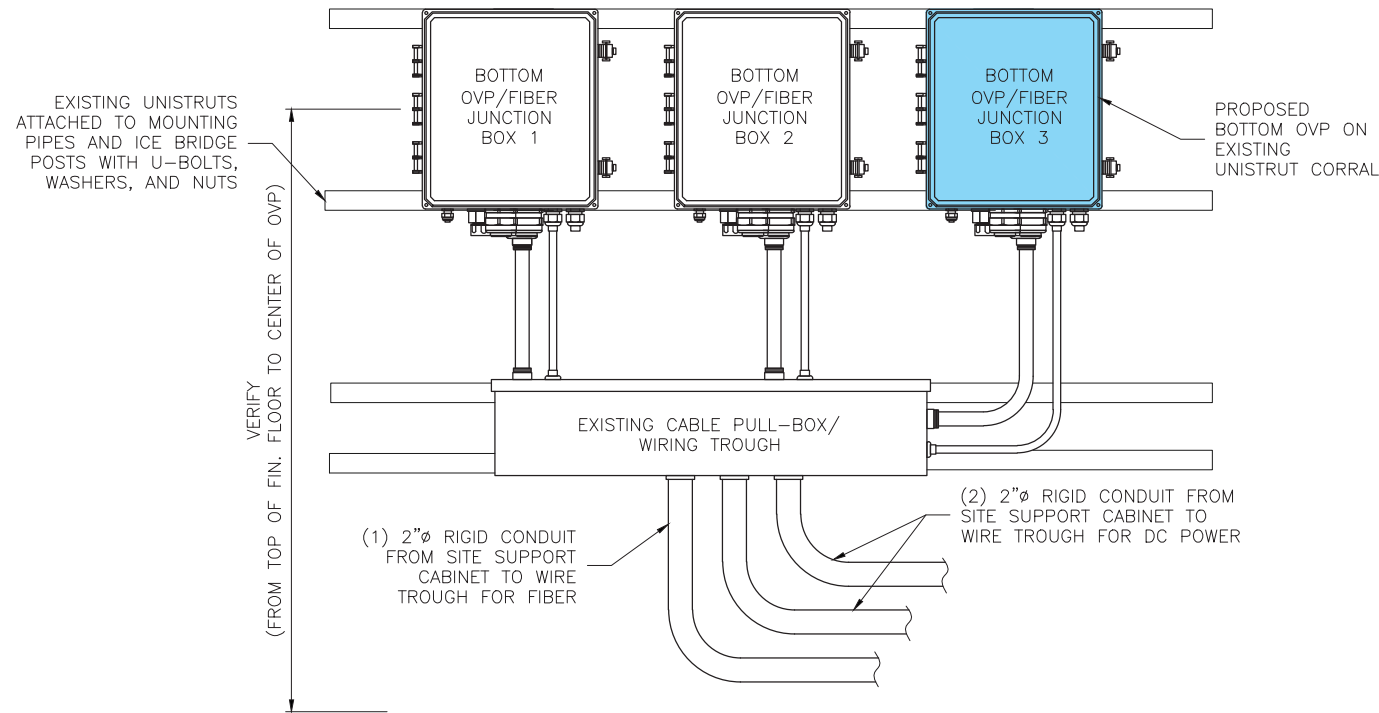
3 DETAIL-FSMF  
SCALE: N.T.S.

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A	ISSUED FOR REVIEW	3/11/24
REV.	DESCRIPTION	DATE

**CH184080D**  
**ORLAND PARK WT**  
17801 S. WOLF RD., ORLAND PARK, IL, 60467

**EQUIPMENT INFORMATION**

Project Number:	Drawn by: PA
Client Project Number:	Checked by:
Scale:	Approved by: MS
Drawing Number:	Date:

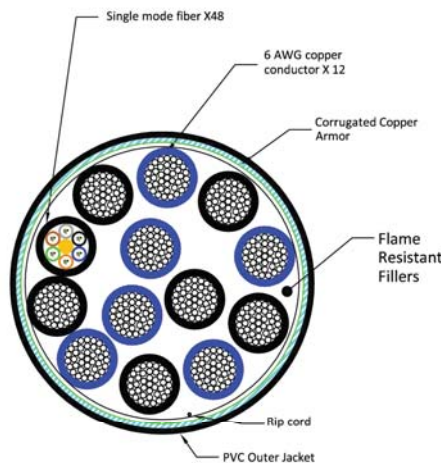
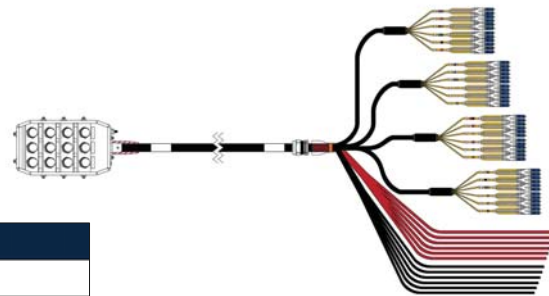


1 DETAIL-BOTTOM OVP MOUNTING  
SCALE: N.T.S.

# HybridConnect

## NWS-HCS2-HC4-XXX HCS 2.0 Trunk HiCap 12 RRU 12X4AWG

General Specifications		
Nominal OD	1.790 in (45.21 mm)	
Cable Weight	2480 lb/mft (3690 kg/km)	
Jacket Color	Black	
Minimum Bend Radius: Installed	16.25"	
DC Cable Specifications		
DC Pairs	6	
DC Conductor Size	4 AWG	
DC Resistance: Maximum	0.264 Ohms / 1000 ft.	
Breakout Length: End 1	31 in (775 mm)	
Breakout Length: End 2	Molded Enclosure	
Product Ordering		
Part Number	Description	T-Mobile SKU
NWS-HCS2-HC4-250	HCS 2.0 Trunk HiCap 12 RRU 12x4AWG 250 FT	TBD
NWS-HCS2-HC4-275	HCS 2.0 Trunk HiCap 12 RRU 12x4AWG 275 FT	TBD
NWS-HCS2-HC4-300	HCS 2.0 Trunk HiCap 12 RRU 12x4AWG 300 FT	TBD
NWS-HCS2-HC4-325	HCS 2.0 Trunk HiCap 12 RRU 12x4AWG 325 FT	TBD
NWS-HCS2-HC4-350	HCS 2.0 Trunk HiCap 12 RRU 12x4AWG 350 FT	TBD
NWS-HCS2-HC4-375	HCS 2.0 Trunk HiCap 12 RRU 12x4AWG 375 FT	TBD
NWS-HCS2-HC4-400	HCS 2.0 Trunk HiCap 12 RRU 12x4AWG 400 FT	TBD
NWS-HCS2-HC4-425	HCS 2.0 Trunk HiCap 12 RRU 12x4AWG 425 FT	TBD
NWS-HCS2-HC4-450	HCS 2.0 Trunk HiCap 12 RRU 12x4AWG 450 FT	TBD

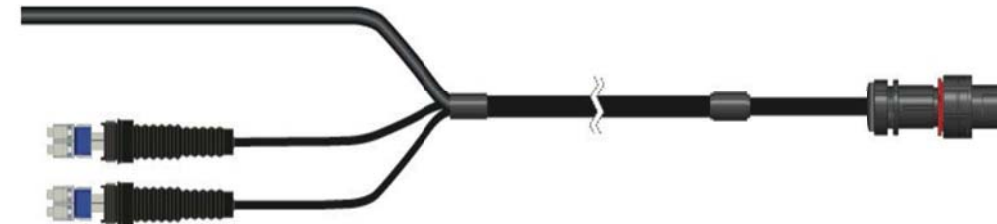


2 TRUNK CABLE INFORMATION  
SCALE: N.T.S.

# COMMSCOPE

## HFT410-ASNOK2-150 HELIAX® FiberFeed® Hybrid Cable Assembly, HQLC

End 1: 4 fibers terminated DLC for Nokia RRU with flush cut power cord (red/black conductors).  
End 2: 4 fibers terminated LC and 4X10 AWG conductors terminated at hybrid trunk connector. 15 ft

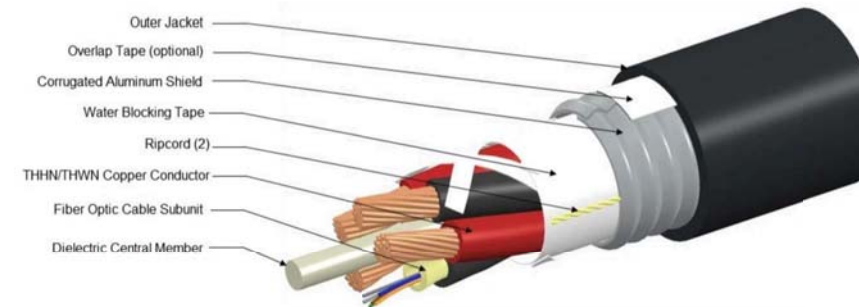


### Dimensions

Property	Value
Cord Length	4.57m (14.993 ft)
Diameter Over Jacket	18.31mm (0.721 in)
Center Conductor Gauge	10 AWG
Minimum Bend Radius	221mm (8.701 in)

# COMMSCOPE

## HTC-4SM-410-APVA HELIAX® FiberFeed® Hybrid Cable, UL Type TC-OF-ER



### Properties

Description	Value
Buffer Tube/Subunit Diameter	3.556 mm (0.14 in)
Diameter Over Jacket	18.288 mm (0.72 in)
Center Conductor Gauge	10 AWG
Minimum Bend Radius, multiple bends loaded	365.76 mm (14.4 in)
Minimum Bend Radius, multiple bends loaded	220.98 mm (8.7 in)
Minimum Bend Radius, multiple bends loaded	127 mm (5 in)
Cable weight	456.122kg/km (306.5/kft)

3 HYBRID JUMPER CABLE INFORMATION  
SCALE: N.T.S.

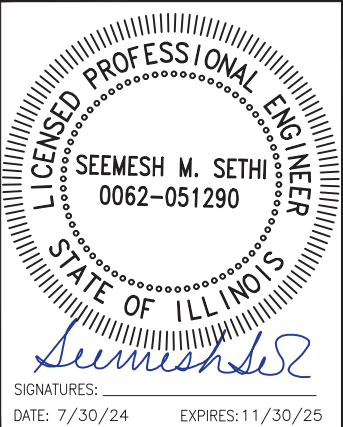


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## CH184080D ORLAND PARK WT

17801 S. WOLF RD., ORLAND PARK, IL, 60467

### OVP MOUNTING, CABLE INFORMATION

Project Number:	Drawn by: PA
Client Project Number:	Date:
Scale:	Checked by:
Drawing Number:	Date:
	Approved by: MS
	Date:

NEW MANDATORY SIGNAGE TO BE POSTED--SEE DETAIL 2 THIS SHEET

1/2"x1/2"x1/4"x7'-6" LONG STEEL ANGLE

STAPLE A COLOR COPY OF ORIGINAL PERMIT IN PLASTIC LAMINATE

NEW 3'-0"Wx3'-0"Wx0'-1/4"THK. WEATHER-TREATED PLYWOOD BACKBOARD FOR SIGNAGE TO BE FASTENED TO POST (POST MAY NOT BE NECESSARY FOR CERTAIN TYPES OF SITES, SEE NOTE "1" BELOW)

6" (OVERSIZED) ELECTRIC CONDUIT CLAMP (MAY BE GALV OR EMT)--TO BE USED FOR SECURING THE PVC CONDUIT DOWN

NEW 3"Ø PVC CONDUIT SEALED ON ONE END AND CAPPED ON THE OTHER END-- TO BE UTILIZED AS A HOLDER FOR:

1. PLANS
2. PERMITS
3. INSPECTION PAPERS
4. CLIMBING CERTIFICATIONS;
5. ANY OTHER ITEMS REQUIRED IN T-MOBILE'S MASTER SCOPE OF WORK AGREEMENT

MIN 1/2"Ø BOLTS WITH NUTS, WASHERS AND LOCK WASHERS ON BOTH SIDES TO SECURE SIGN TO POST

NOTE A:

IN CASE OF COLLOCATIONS OR ROOFTOPS, PLACEMENT OF A NEW SUPPORT POST MAY BE IGNORED IN LIEU OF PLACING THE 3'-0"Wx3'-0"W INFORMATION BOARD ON A LANDLORD-APPROVED LOCATION THAT IS VISIBLE (SUCH AS FENCE GATE OF FENCE OR APPROVED WINDOWS)

T/ FINISHED GRADE

2'-0" (MIN.)

1 SITE INFORMATION POST & BOARD ELEVATION  
SCALE: N.T.S.

**T-Mobile**  
THIS IS A T-MOBILE USA FACILITY THAT IS CURRENTLY **UNDER CONSTRUCTION!!!**  
THE FOLLOWING INFORMATION IS TO BE POSTED BY THE GENERAL CONTRACTING FIRM THAT HAS BEEN AWARDED THE CONSTRUCTION OF THIS SITE FAILURE TO POST THIS INFORMATION CONSTITUTES A VIOLATION OF THE MASTER SCOPE OF WORK AGREEMENT BETWEEN THE CONTRACTOR & T-MOBILE

<b>SITE NUMBER:</b> _____		<b>SITE NAME:</b> _____	
<b>GENERAL CONTRACTOR:</b> _____		<b>EMERGENCY CONTACTS</b>	
<b>CONTRACTOR LICENSE #</b> _____		FIRE _____	
<b>POINT OF CONTACT NAME</b> _____		POLICE/FIRE PHONE # _____	
<b>CONTACT PHONE #</b> _____		T-MOBILE CONSTRUCTION _____	
<b>NAMES OF ON-SITE STAFF</b> _____		CONSTRUCTION MANAGER _____	
_____		CONTACT PHONE # _____	
_____		PROJECT MANAGER _____	
_____		CONTACT PHONE # _____	
<b>ELECTRICAL CONTRACTOR:</b> _____		<b>T-MOBILE NETWORK OPERATIONS (1-800- - )</b>	
<b>CONTRACTOR LICENSE #</b> _____		<b>LOCAL TELCO</b>	
<b>POINT OF CONTACT NAME</b> _____		ENGINEER: _____	
<b>CONTACT PHONE #</b> _____		<b>LOCAL ELECTRIC COMPANY</b>	
<b>CREW LEADER PHONE #</b> _____		ENGINEER: _____	
_____		PHONE # _____	
<b>ANTENNA &amp; LINE CREW CO:</b> _____		<b>ON-SITE CHECKLIST</b>	
<b>CLIMBING CERTIFICATION#</b> _____		AVAILABLE: YES NO N/A DATE	
<b>POINT OF CONTACT NAME</b> _____		PERMITTED DRAWINGS _____	
<b>CONTACT PHONE #</b> _____		CONSTRUCTION PERMIT _____	
<b>CREW LEADER PHONE #</b> _____		ELECTRICAL PERMIT _____	
_____		CLIMBING CERTIFICATIONS _____	
<b>NAMES OF ON-SITE STAFF</b> _____		CITY INSPECTION STICKERS _____	
_____		_____	

**•Get more from life•••**

2 ON-SITE MANDATORY INFORMATION SIGN/BOARD  
SCALE: N.T.S.

**ATTENTION GC!**  
THIS IS A TEMPORARY INSTALLATION THAT MAY REQUIRE USE OF A HOLE AUGER--AT NO CIRCUMSTANCE WHATSOEVER WILL THE GC BE ALLOWED TO POUR/PLACE CONCRETE AROUND THE POST--THIS IS A TEMPORARY INSTALLATION AND WILL BE REMOVED AT THE END OF THE PROJECT LIFE AT THE CONCLUSION OF THE QA WALK.

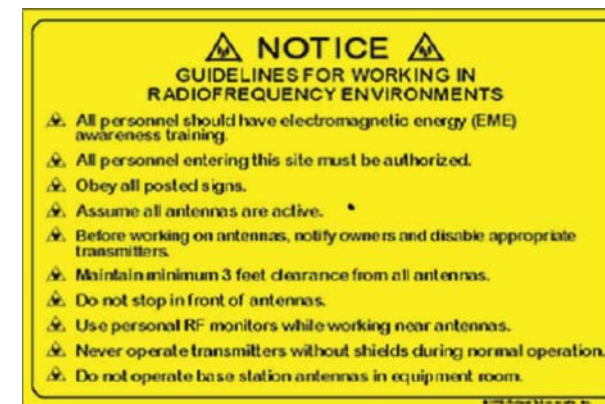
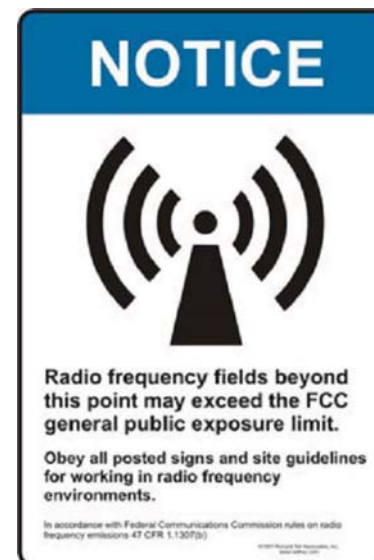
**UTILITY NOTES:**

- 1) CONTRACTOR TO VERIFY LOCAL UTILITY REQUIREMENTS FOR DEPTH, SIZE & SEPARATION OF CONDUITS PRIOR TO INSTALLATION. NOTIFY CONSTRUCTION MANAGER IMMEDIATELY OF ANY DISCREPANCIES.
- 2) CONTRACTOR TO CALL UTILITY LOCATES 48 HOURS PRIOR TO EXCAVATING FOR UNDERGROUND UTILITY LOCATIONS. LOCATION SURROUNDING EXCAVATED AREA MUST BE PRIVATELY LOCATED FOR NON-PUBLIC UTILITIES.

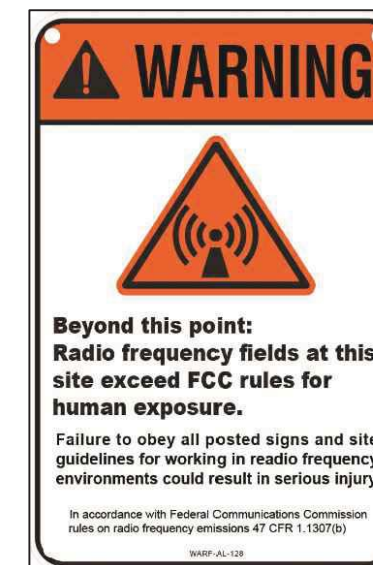
**ATTENTION GC!**  
1--APPROVE LOCATION OF SIGN WITH T-MOBILE PROJECT MAAGER AND LANDLORD REP. SIGN SHALL NOT POSE A TRIPPING HAZARD. GC SHALL BE RESPONSIBLE FOR PLACEMENT AND MAINTENANCE OF THE SIGN BOARD UNTIL THE CONCLUSION OF THE QA WALK.  
2--MATERIAL SAFETY DATA SHEETS FOR ALL MATERIALS THAT ARE FURNISHED BY GC SHALL BE PLACED ON SITE.

OSHA CFR 1910 SPECIFIES THAT IF YOU HAVE EMPLOYEES OR CONTRACTORS WHO CLIMB HIGHER THAN SIX FEET, THEY MUST BE TRAINED AND CERTIFIED IN FALL PROTECTION. IF THEY ARE NOT CERTIFIED, THEY MUST BE UNDER DIRECT SUPERVISION OF A CERTIFIED INDIVIDUAL, AND CLIMB 100% ATTACHED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONSULT WITH ALL APPLICABLE OSHA RULES AND GUIDELINES PRIOR TO CONSTRUCTION START.

3 ADDITIONAL NOTES AND GUIDELINES  
SCALE: N.T.S.



NOTE:  
RF EME SIGNS ARE TO BE INSTALLED ON CONTROLLED AREAS, LOCKED DOORS & HATCHES. INSTALL YELLOW (10 STEPS) & BLUE NOTICE SIGNS AT EACH LAST POINT OF PUBLIC ACCESS. INSTALL RED WARNING SIGN ON THE BACK OF EACH OF THE ANTENNA SECTORS (I.E., ALPHA, BETA & GAMMA).



4 RADIO FREQUENCY NOTICE & CAUTION SIGNAGES  
SCALE: N.T.S.

1400 OPUS PLACE, SUITE 700  
DOWNERS GROVE, IL 60515  
PHONE: \_\_\_\_\_  
FAX: \_\_\_\_\_

CONSULTING ENGINEERS  
ILLINOIS DESIGN FIRM  
REGISTRATION NO.: 184.002139  
1125 REMINGTON RD., SCHLAUMBURG, IL 60173  
PHONE: 847-490-8200; FAX: 847-490-8225  
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SEEMESH M. SETHI  
0062-051290  
STATE OF ILLINOIS  
Seemesh M. Sethi  
SIGNATURES: \_\_\_\_\_  
DATE: 7/30/24 EXPIRES: 11/30/25

0	ISSUED FOR PERMIT	7/30/24
B	ISSUED FOR REVIEW	5/14/24
A	ISSUED FOR REVIEW	3/11/24
REV.	DESCRIPTION	DATE

**CH184080D**  
**ORLAND PARK WT**

17801 S. WOLF RD., ORLAND PARK, IL, 60467

Drawing Title:  
**MANDATORY SIGNAGE & POSTING**

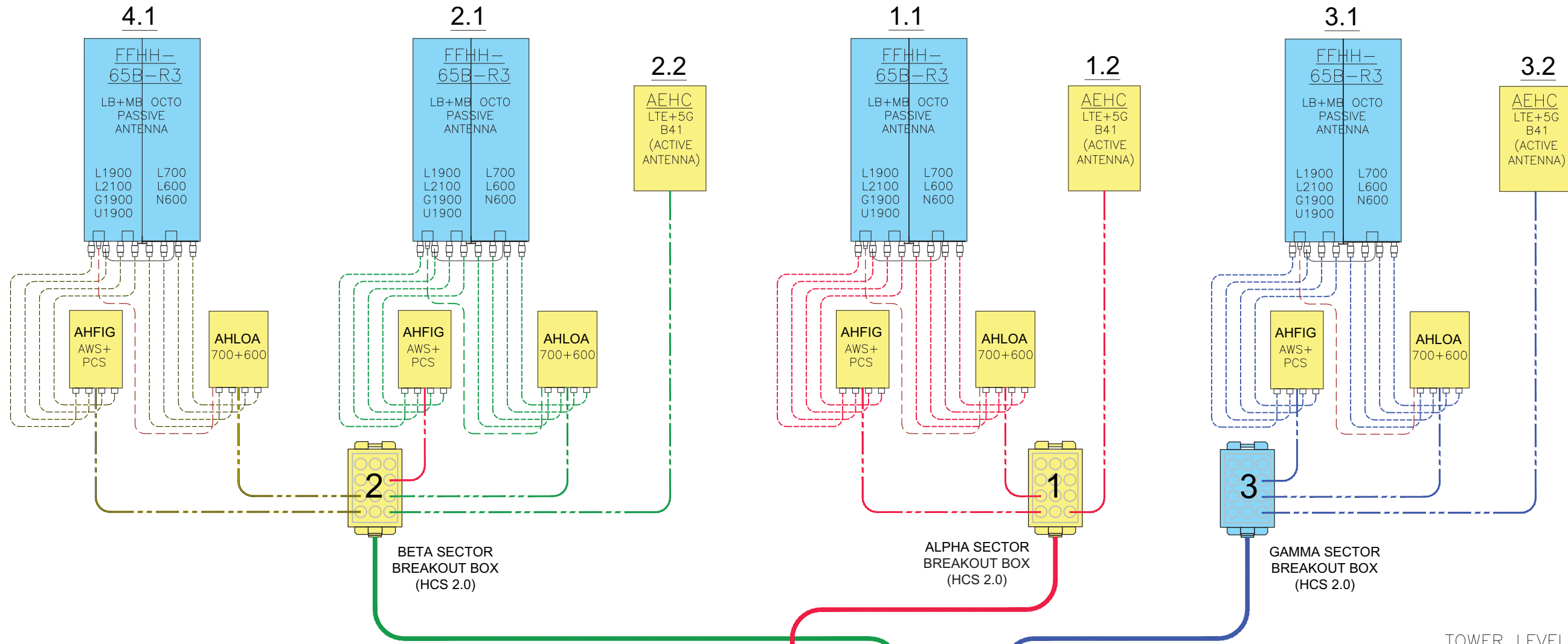
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Client Project Number:	Date:
Scale:	Checked by:
Drawing Number:	Date:
	Approved by: MS
	Date:

### SECTOR 4

### SECTOR 2

### SECTOR 1

### SECTOR 3



LEGEND	
	HCS 2.0 TRUNK CABLE (BY SECTOR)
	RET CABLE
	HYBRID JUMPER CABLE (BY SECTOR)
	POWER CONDUIT
	FIBER CONDUIT
	RF CABLING (BY SECTOR)

EQUIPMENT DESIGNATION:	
	PROPOSED EQUIPMENT
	EXISTING EQUIPMENT
	RELOCATED EQUIPMENT

SECTOR	COLOR
SECTOR 4 (DELTA)	YELLOW
SECTOR 3 (GAMMA)	BLUE
SECTOR 2 (BETA)	GREEN
SECTOR 1 (ALPHA)	RED

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 1400 OPUS PLACE, SUITE 700  
 DOWNERS GROVE, IL 60515  
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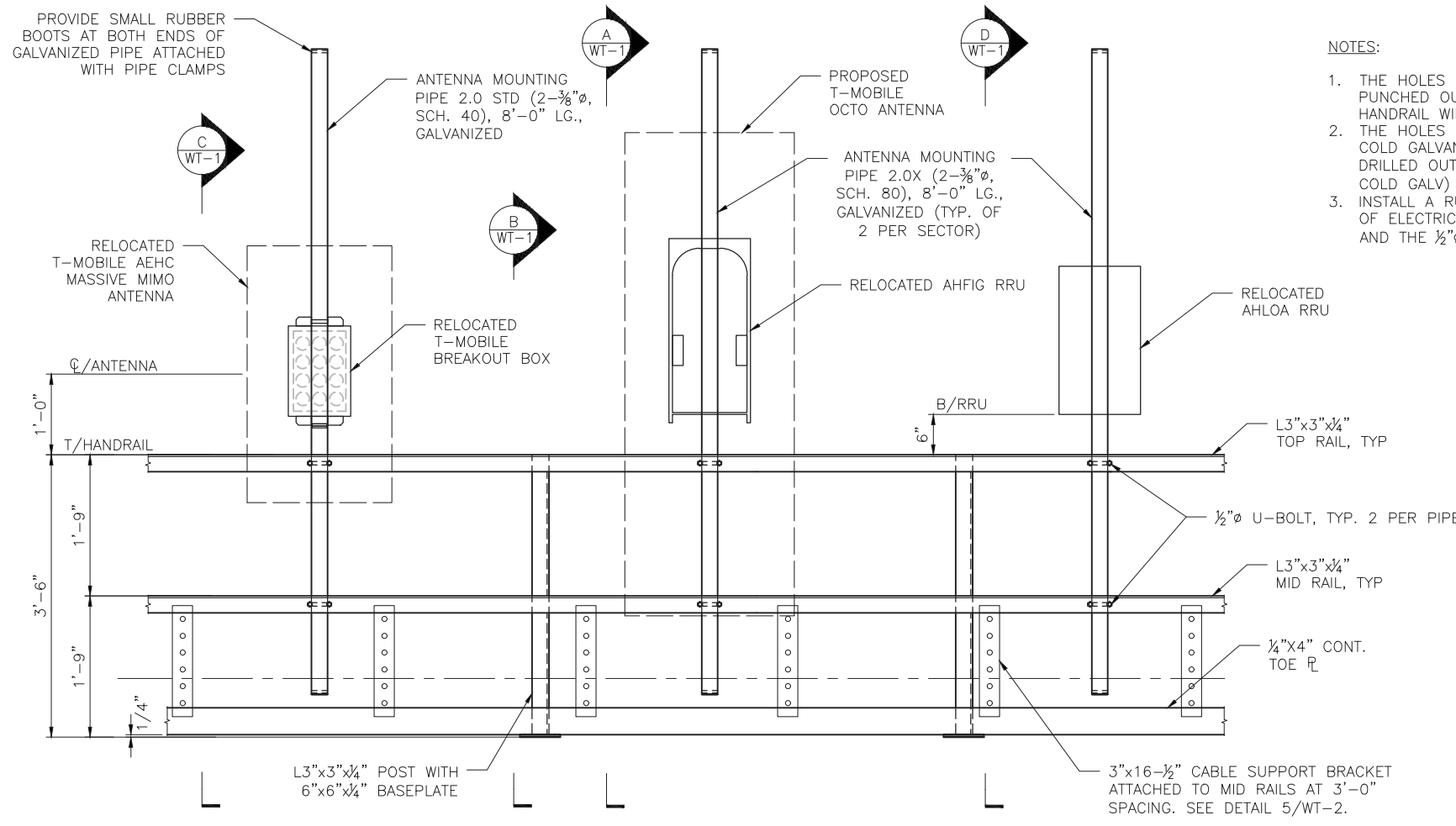
**LICENSED PROFESSIONAL ENGINEER**  
 SEEMESH M. SETHI  
 0062-051290  
 STATE OF ILLINOIS  
 SIGNATURES: *Seemesh S*  
 DATE: 7/30/24 EXPIRES: 11/30/25

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**ANTENNA & EQUIPMENT SCHEMATIC**

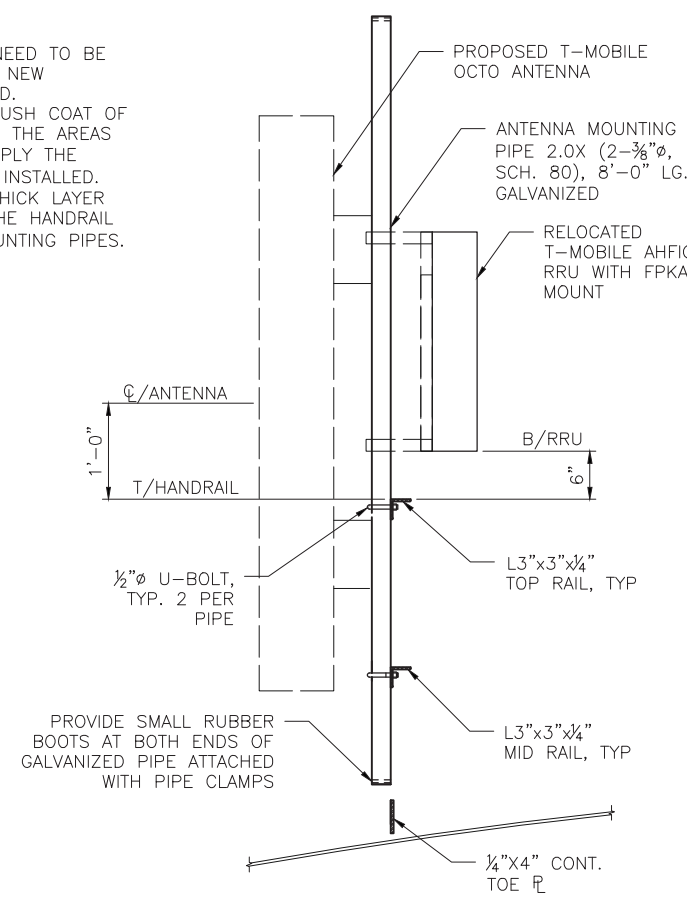
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Client Project Number:	Checked by:
Scale:	Approved by: MS
Drawing Number:	Date:



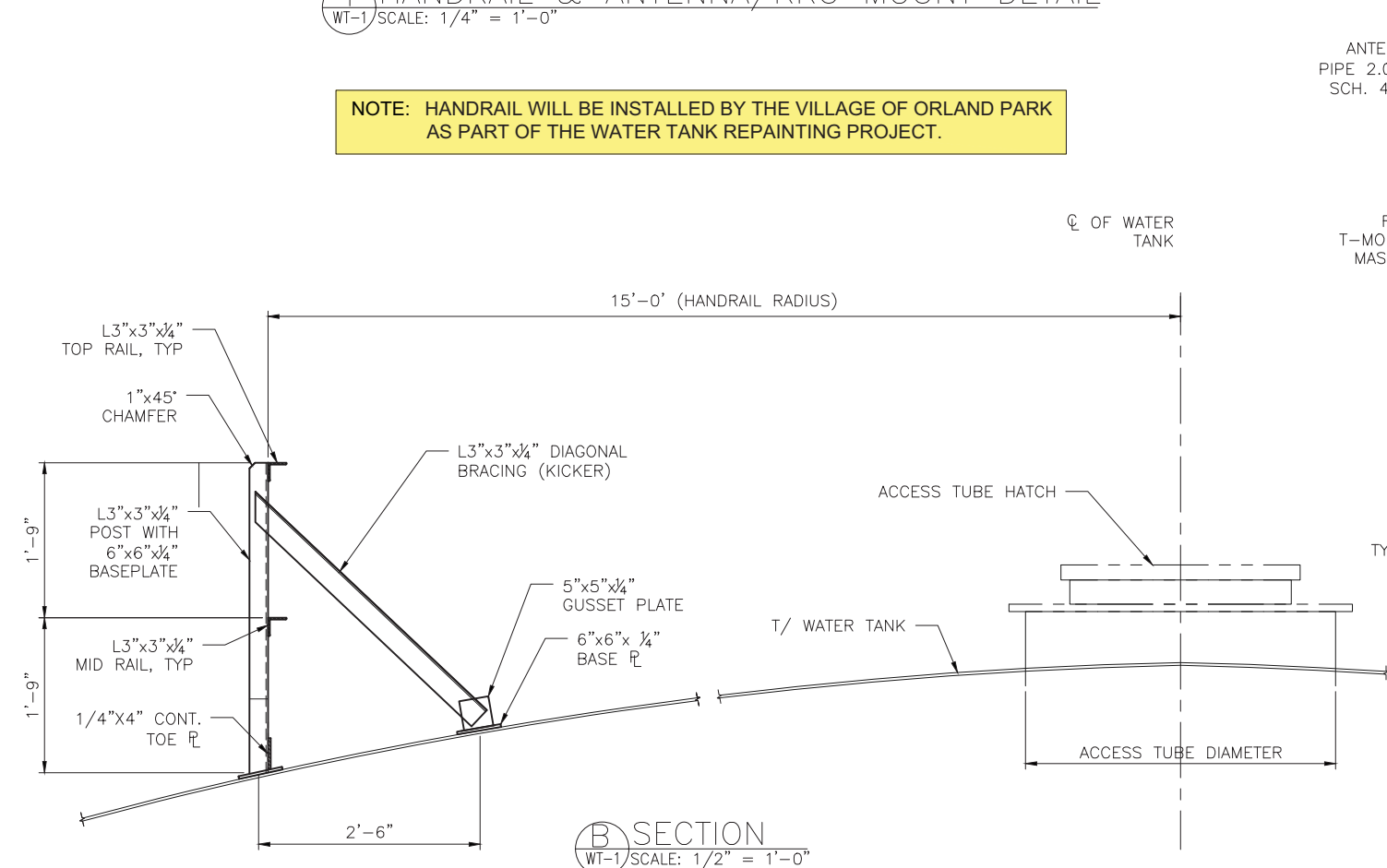
1 HANDRAIL & ANTENNA/RRU MOUNT DETAIL  
WT-1 SCALE: 1/4" = 1'-0"

**NOTE: HANDRAIL WILL BE INSTALLED BY THE VILLAGE OF ORLAND PARK AS PART OF THE WATER TANK REPAINTING PROJECT.**

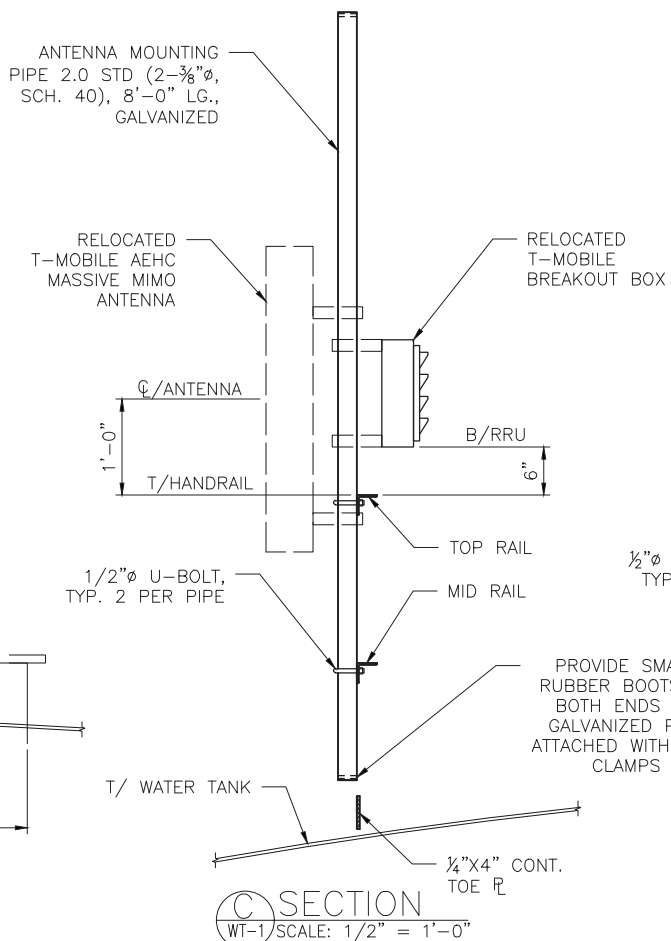
- NOTES:**
1. THE HOLES FOR THE U-BOLTS NEED TO BE PUNCHED OUT. DRILLING OF THE NEW HANDRAIL WILL NOT BE PERMITTED.
  2. THE HOLES NEED TO HAVE A BRUSH COAT OF COLD GALVANIZING COMPOUND IN THE AREAS DRILLED OUT (DO NOT SPRAY APPLY THE COLD GALV) BEFORE BOLTS ARE INSTALLED.
  3. INSTALL A RUBBER GASKET OR THICK LAYER OF ELECTRICAL TAPE BETWEEN THE HANDRAIL AND THE 1/2" U-BOLTS AND MOUNTING PIPES.



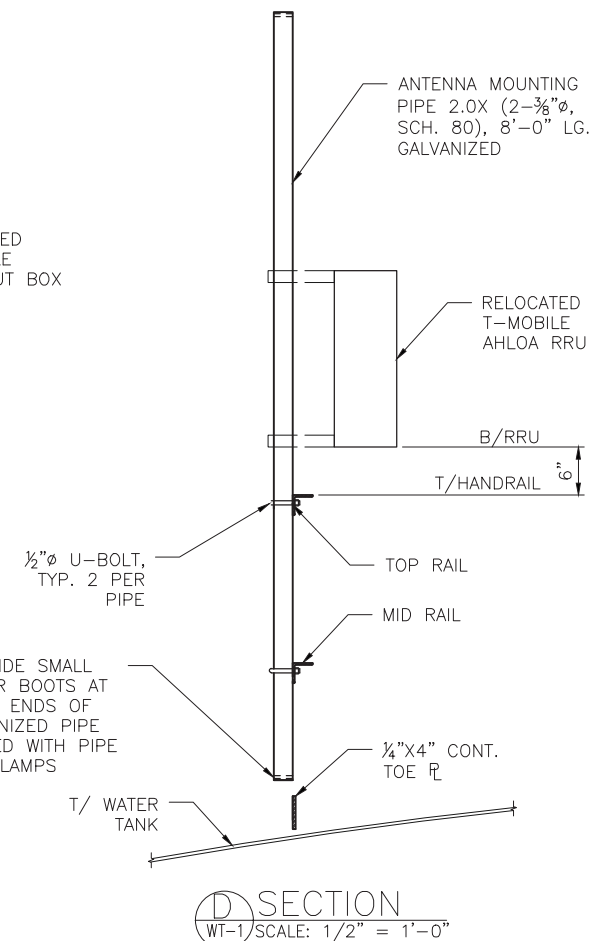
A SECTION  
WT-1 SCALE: 1/2" = 1'-0"



B SECTION  
WT-1 SCALE: 1/2" = 1'-0"



C SECTION  
WT-1 SCALE: 1/2" = 1'-0"



D SECTION  
WT-1 SCALE: 1/2" = 1'-0"

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**LICENSED STRUCTURAL ENGINEER**  
RICHARD A. PETERSON  
81-3446  
STATE OF ILLINOIS  
*Richard A. Peterson*  
SIGNATURES:  
DATE: 7/30/24 EXPIRES: 11/30/24

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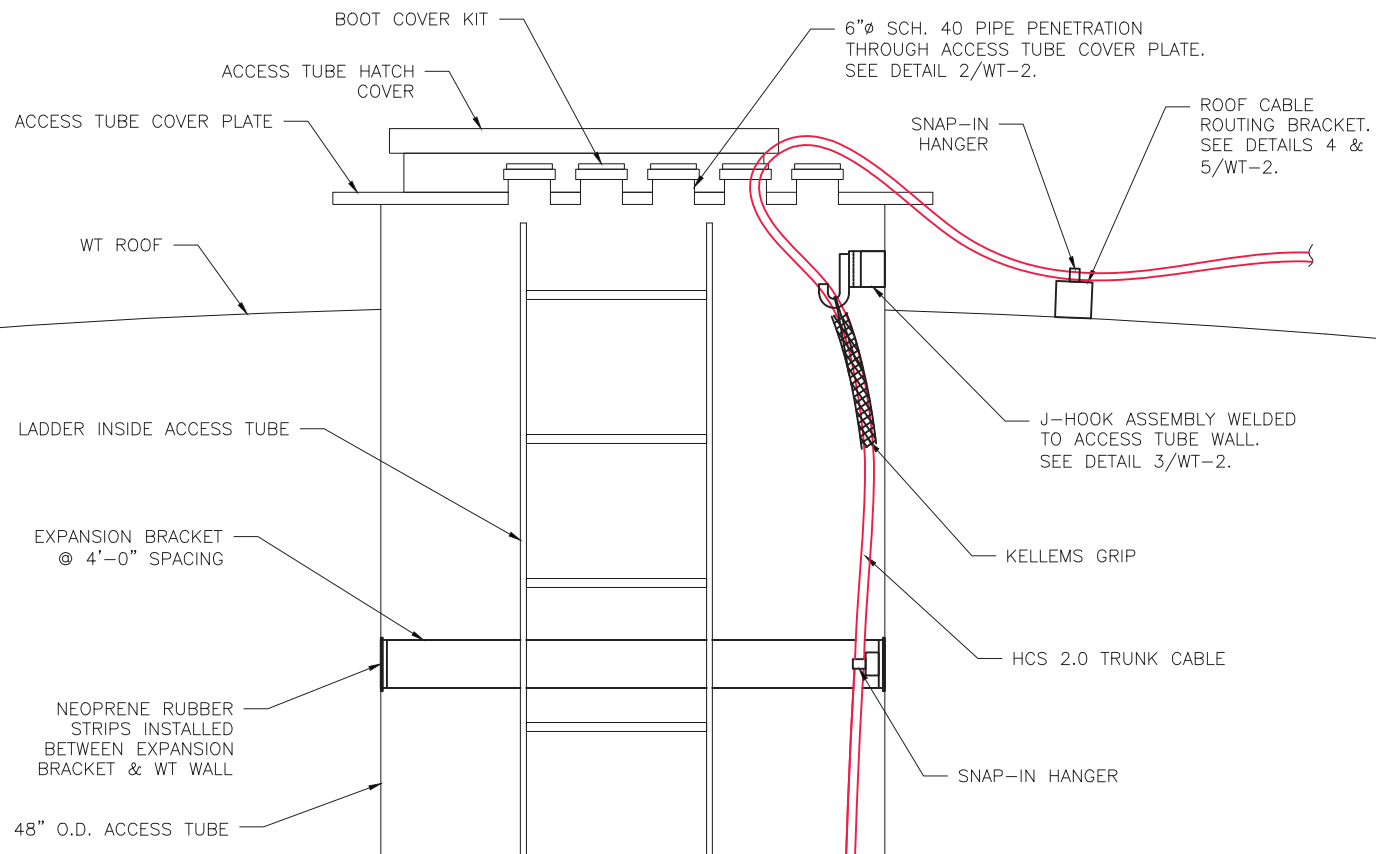
**CH184080D**  
**ORLAND PARK WT**  
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Drawing Title:  
**ANTENNA & RRU MOUNTING DETAILS**

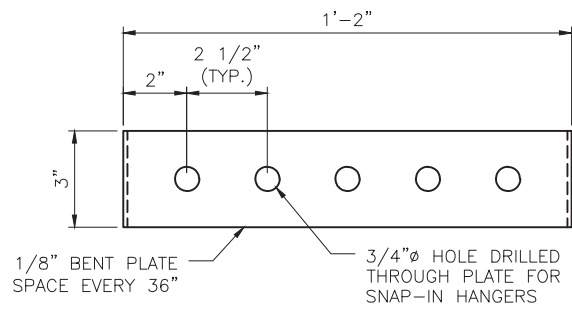
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Scale:	Approved by: MS
Drawing Number:	Date:

**WT-1**  
TMO Signatory Level: L06  
NLG-100466

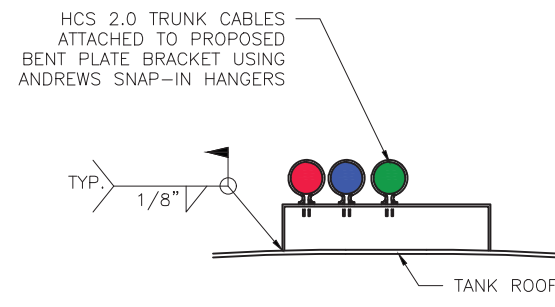




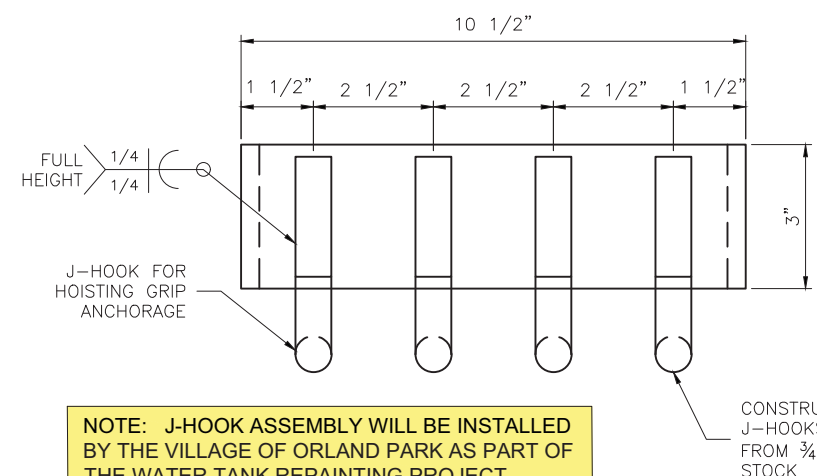
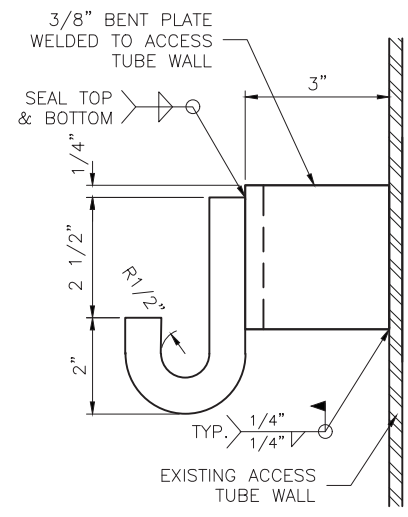
1 CABLE MOUNTING AT ACCESS TUBE  
WT-2 SCALE: N.T.S.



3 COAX SUPPORT PLAN  
WT-2 SCALE: 2" = 1'-0"



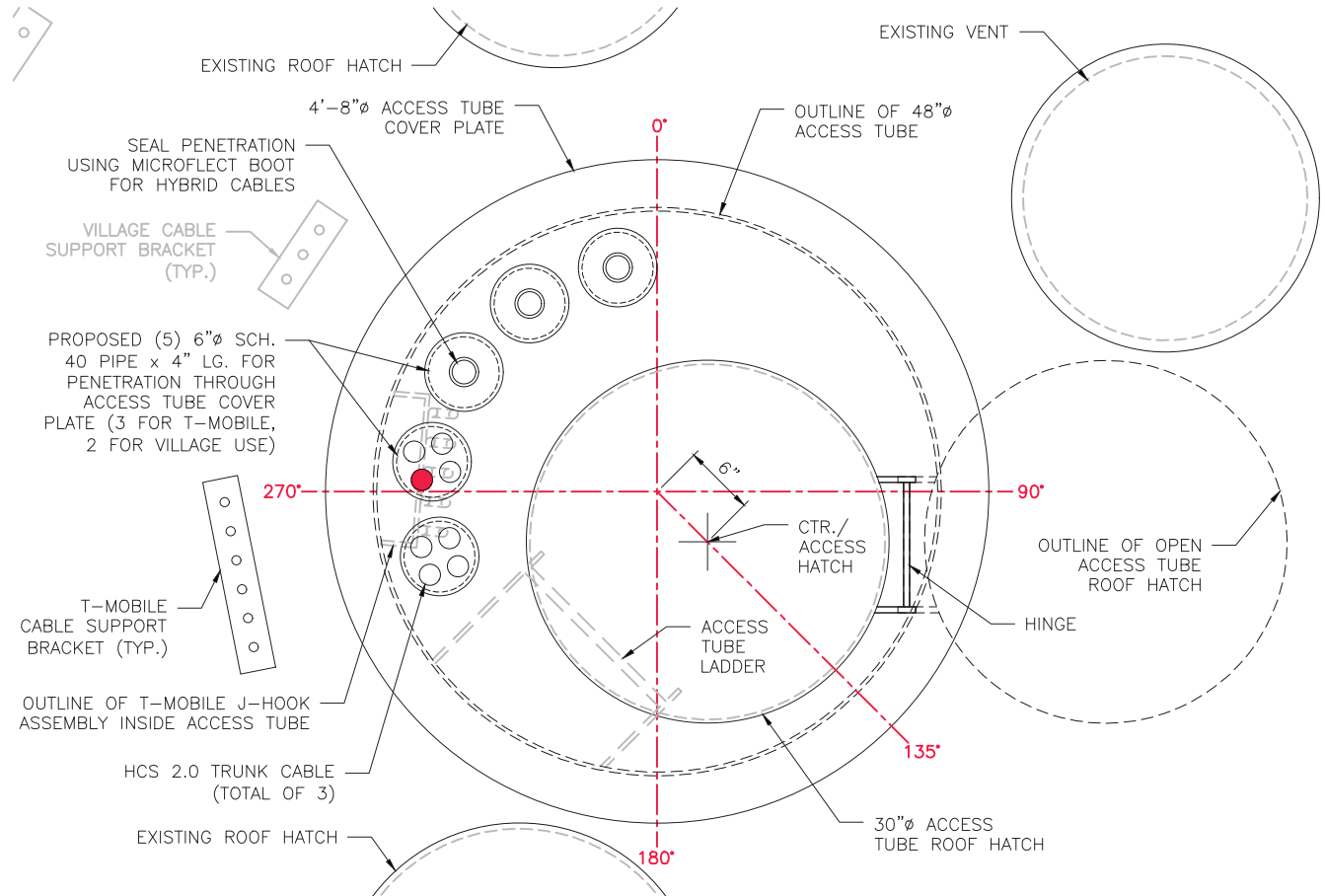
4 COAX SUPPORT SECTION  
WT-2 SCALE: N.T.S.



NOTE: J-HOOK ASSEMBLY WILL BE INSTALLED BY THE VILLAGE OF ORLAND PARK AS PART OF THE WATER TANK REPAINTING PROJECT.

- NOTE:
1. THE WELDING OF J-HOOKS TO THE ANGLE IRON COMPONENTS NEEDS TO BE COMPLETED ON THE GROUND OR IN A SHOP AND NOT IN THE ACCESS TUBE OF THE TANK.
  2. COLLECT AND DISPOSE OF ALL DEBRIS AND METAL FILINGS FROM THE DRILLING OF THE HOLES IN THE TOP OF THE PLATE FOR THE BOLTED CONNECTION OF THE J-HOOKS. IF NOT COLLECTED IN A TIMELY MANNER, THESE DEBRIS AND FILINGS CAN QUICKLY TURN IN A RUST STAINING ISSUE.
  3. THE HOLES NEED TO HAVE A BRUSH COAT OF COLD GALVANIZING COMPOUND IN THE AREAS DRILLED OUT (DO NOT SPRAY APPLY THE COLD GALV) BEFORE BOLTS ARE INSTALLED.
  4. INSTALL A RUBBER GASKET BETWEEN THE ANGLE IRON COMPONENT AND THE ACCESS TUBE PLATE.

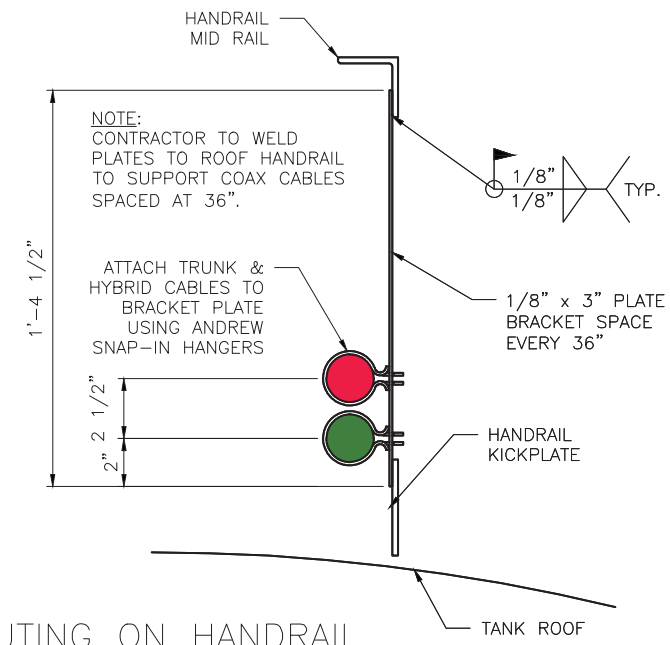
5 J-HOOK ASSEMBLY DETAIL  
WT-2 SCALE: 3" = 1'-0"



2 PENETRATION AT ACCESS TUBE COVER PLATE  
WT-2 SCALE: 3/4" = 1'-0"

6 COAX ROUTING ON HANDRAIL  
WT-2 SCALE: 1 1/2" = 1'-0"

- NOTES:
1. THE HOLES FOR THE UNISTRUT BOLTS NEED TO BE PUNCHED OUT. DRILLING OF THE NEW HANDRAIL WILL NOT BE PERMITTED.
  2. THE HOLES NEED TO HAVE A BRUSH COAT OF COLD GALVANIZING COMPOUND IN THE AREAS DRILLED OUT (DO NOT SPRAY APPLY THE COLD GALV) BEFORE BOLTS ARE INSTALLED.
  3. INSTALL A RUBBER GASKET OR THICK LAYER OF ELECTRICAL TAPE BETWEEN THE HANDRAIL AND THE 1/2" U-BOLTS AND MOUNTING PIPES.



**T-Mobile**  
1400 OPUS PLACE, SUITE 700  
DOWNERS GROVE, IL 60515  
PHONE:  
FAX:

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**LICENSED STRUCTURAL ENGINEER**  
RICHARD A. PETERSON  
81-3446  
STATE OF ILLINOIS  
*Richard A. Peterson*  
SIGNATURES:  
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**CH184080D**  
**ORLAND PARK WT**  
17801 S. WOLF RD., ORLAND PARK, IL, 60467

Drawing Title:  
**CABLE SUPPORT DETAILS**

Project Number:	Drawn by: PA
Client Project Number:	Date:
Scale:	Checked by:
Drawing Number:	Date:
	Approved by: MS
	Date:

WT-2  
TMO Signatory Level: L06  
NLG-100466

# ELECTRICAL NOTES:

THE GENERAL NOTES AND ACCOMPANYING DRAWINGS ARE TO INDICATE THE PROVISIONS AND REQUIREMENTS IN BY THE ELECTRICAL CONTRACTOR OF ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO INSTALL THE ELECTRICAL WORK COMPLETE IN CONNECTION WITH THIS SITE AND SHALL INCLUDE, BUT NOT LIMITED TO, THE FOLLOWING:

1. THE INSTALLATION, PROVISION, AND CONNECTION OF A GROUND ROD (ELECTRODE) SYSTEM AS INDICATED IN THE DRAWINGS.
2. THE INSTALLATION AND PROVISION OF AN ELECTRICAL SERVICE (OVERHEAD OR UNDERGROUND) AND ALL CONDUIT AND WIRE ASSOCIATED WITH IT AS INDICATED AND/OR REQUIRED ON PLANS.
3. THE INSTALLATION, PROVISION OF CONDUIT AND CONNECTIONS FOR LOCAL TELEPHONE SERVICE.
4. CONDUITS SHALL BE PVC SCHED. 40 UNLESS OTHERWISE NOTED.
5. ALL FISH LINE SHALL BE LEFT IN CONDUITS (PVC) FOR FUTURE USE.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL ELECTRICAL SERVICE ENTRANCE CONDUCTORS, CONDUIT AND METER SOCKET AND MAKE THE NECESSARY CONNECTION TO THE SERVICE EQUIPMENT WITHIN THE BUILDING.

PRIOR TO THE SUBMISSION OF BIDS, THE ELECTRICAL CONTRACTOR SHALL VERIFY ALL DETAILS AND SCHEDULES ON THE DRAWINGS AND SPECIFICATIONS PROVIDED BY THE OWNER. FOR MEANING OF ABBREVIATIONS AND ADDITIONAL REQUIREMENTS AND INFORMATION, CHECK STRUCTURAL AND OTHER MECHANICAL AND ELECTRICAL DRAWINGS FOR SCALE, SPACE LIMITATIONS, BEAMS, DOOR SWINGS, WINDOWS, COORDINATION, AND ADDITIONAL INFORMATION, ETC. REPORT ANY DISCREPANCIES, CONFLICTS, ETC. TO THE OWNER BEFORE SUBMITTING BID.

UNLESS OTHERWISE NOTED, THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE NECESSARY MOTOR STARTERS, DISCONNECTS, CONTROLS, ETC. FOR ALL EQUIPMENT FURNISHED BY OTHER (FBO). ALL ASSOCIATED EQUIPMENT SHALL BE INSTALLED AND COMPLETELY WIRED BY THE ELECTRICAL CONTRACTOR IN ACCORDANCE WITH MANUFACTURER'S WIRE DIAGRAMS AND AS REQUIRED FOR A COMPLETE OPERATING INSTALLATION. ELECTRICAL CONTRACTOR SHALL VERIFY AND COORDINATE CHARACTERISTICS AND REQUIREMENTS OF (FBO) EQUIPMENT PRIOR TO ROUGH-IN OF CONDUIT AND WIRINGS TO AVOID CONFLICT.

### CONTRACTOR RESPONSIBILITIES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND SECURING ALL REQUIRED PERMITS, LICENSES, INSPECTIONS, APPROVALS, AND PAYMENT OF ALL FEES.
2. THE INSTALLATION SHALL BE IN ACCORDANCE WITH ALL APPLICABLE: STATE, LOCAL, AND NATIONAL CODES AS WELL AS THE LATEST ISSUE OF THE VARIOUS APPLICABLE STANDARD SPECIFICATIONS OF THE FOLLOWING RECOGNIZED AUTHORITIES:

NEC - NATIONAL ELECTRIC CODE  
 ANSI - AMERICAN NATIONAL STANDARD INSTITUTE  
 IEEE - INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS  
 ASTM - AMERICAN SOCIETY FOR TESTING MATERIALS  
 NEMA - NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION  
 UL - UNDERWRITERS LABORATORY, INC.

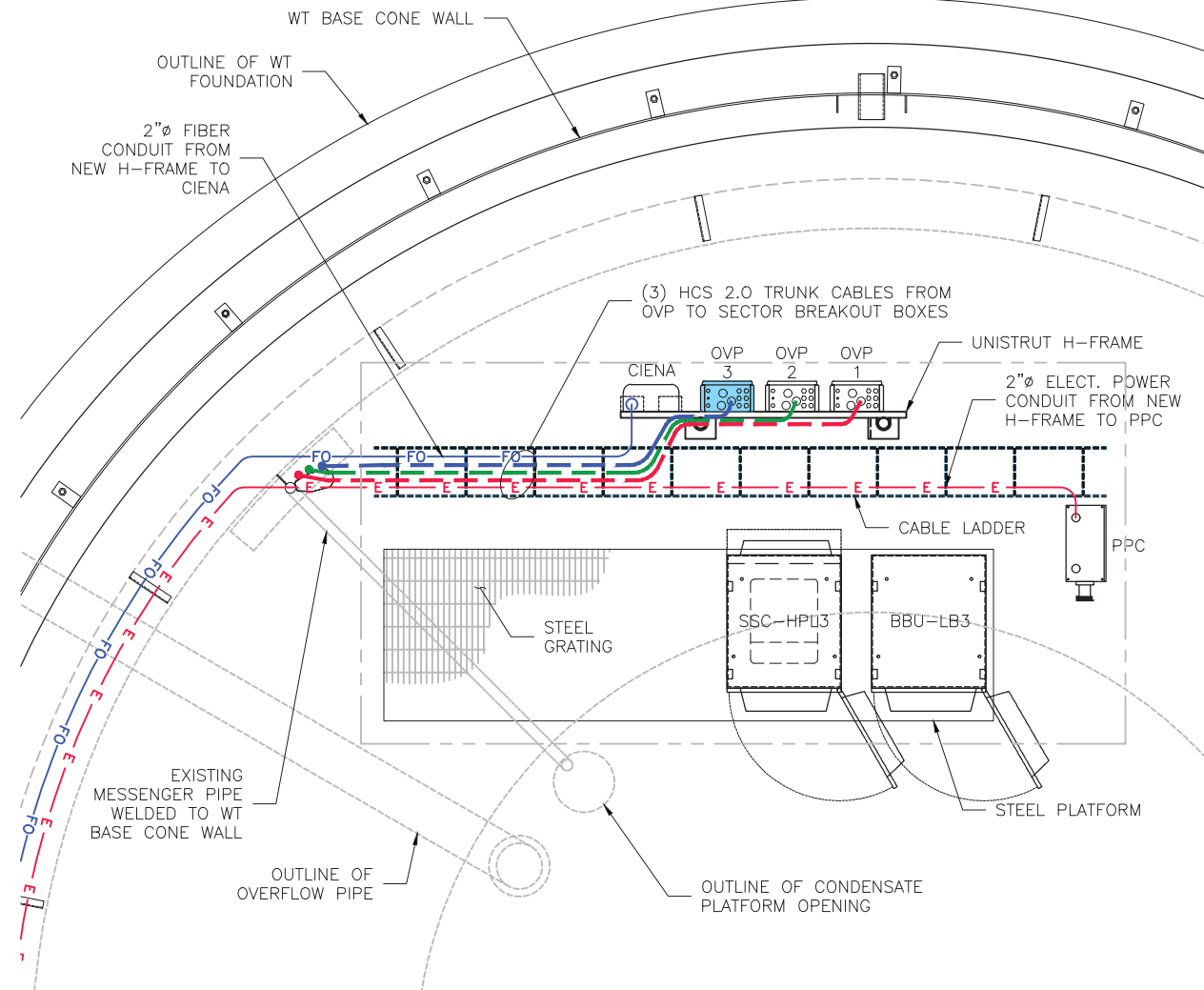
3. PRIOR TO COMMENCING WORK, THE ELECTRICAL CONTRACTOR SHALL CONFORM TO THE LOCAL UTILITY COMPANY'S REGULATIONS AND SHALL GET THE APPROVAL FROM THE SAME, BEFORE SUBMITTING HIS BID, TO DETERMINE FROM EACH UTILITY ADDITIONAL COSTS THEY MAY REQUIRE, AND SHALL BE INCLUDED IN HIS BID FOR CONTRACT.

### UTILITIES GENERAL NOTES

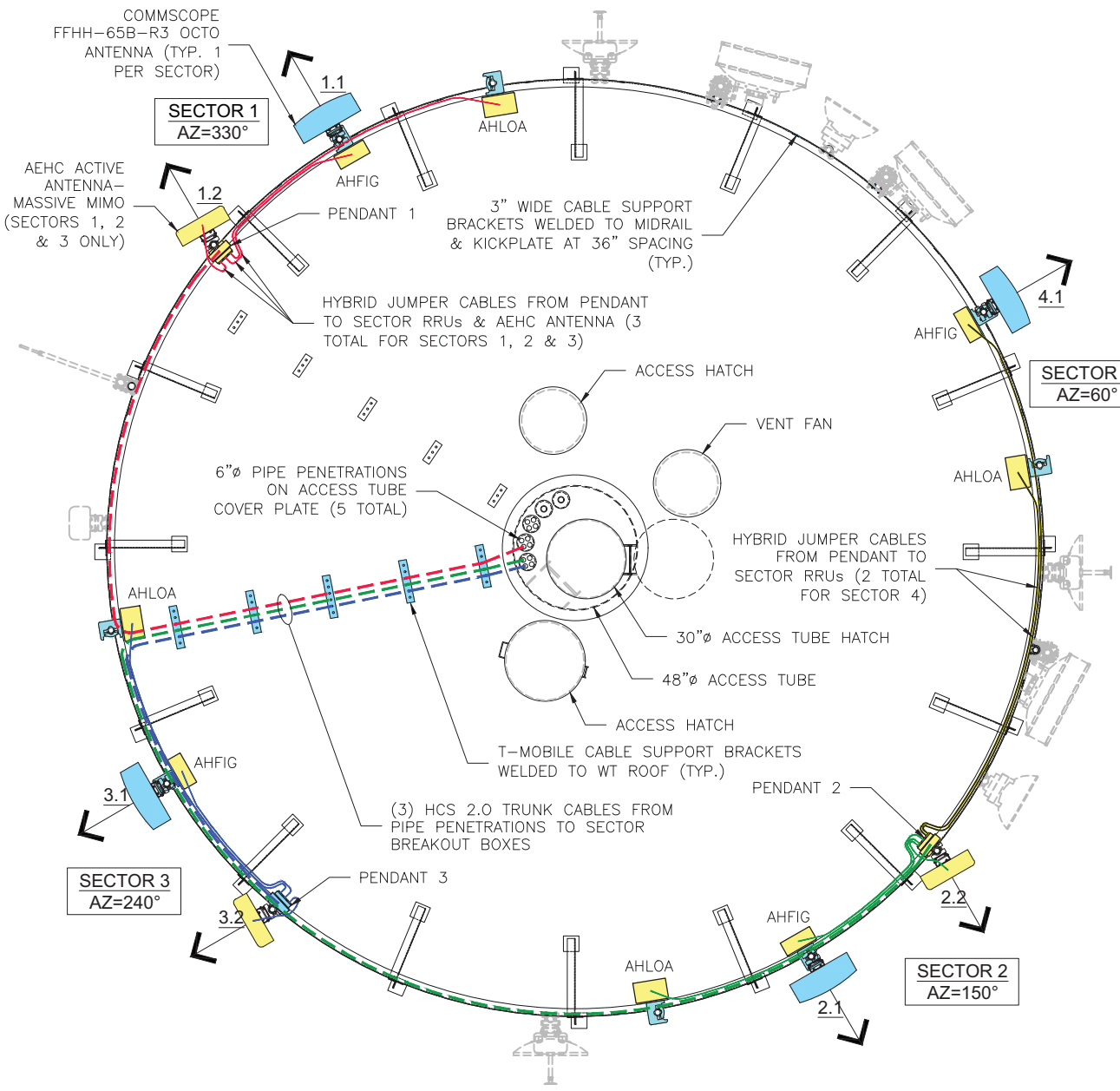
1. UTILITY POINTS OF SERVICE AND WORK/MATERIALS SHOWN ARE BASED ON PRELIMINARY INFORMATION ONLY, PROVIDED BY THE UTILITY COMPANIES AND ARE FOR BID PURPOSES ONLY.
2. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR FINAL AND EXACT WORK/MATERIALS REQUIREMENTS AND CONSTRUCT TO UTILITY COMPANY PLANS AND SPECIFICATIONS ONLY. CONTRACTOR SHALL FURNISH AND INSTALL ALL CONDUIT, PULL WIRES, CABLES, PULL BOXES, CONCRETE ENCASUREMENT OF CONDUIT (IF REQUIRED), TRANSFORMER PAD, BARRIERS, POLE RISERS, TRENCHING, BACKFILL.
3. PAY ALL UTILITY COMPANY FEES AND INCLUDE ALL REQUIREMENTS IN SCOPE OF WORK.

**LEGEND**

- FO — FIBER CONDUIT
- E — POWER CONDUIT
- G — ELECTRICAL GROUNDING CONDUIT
- - - ALPHA HCS 2.0 TRUNK CABLE
- - - BETA HCS 2.0 TRUNK CABLE
- - - GAMMA HCS 2.0 TRUNK CABLE
- ALPHA HYBRID JUMPER CABLES
- BETA HYBRID JUMPER CABLES
- GAMMA HYBRID JUMPER CABLES



① LEASE AREA UTILITY PLAN  
 E-1 SCALE: 1/4" = 1'-0"



② CABLE ROUTING AT WT ROOF  
 E-1 SCALE: 3/16" = 1'-0"

**T-Mobile**  
 1400 OPUS PLACE, SUITE 700  
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 FAX:

**KCS CORPORATION**  
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*Seemesh S*  
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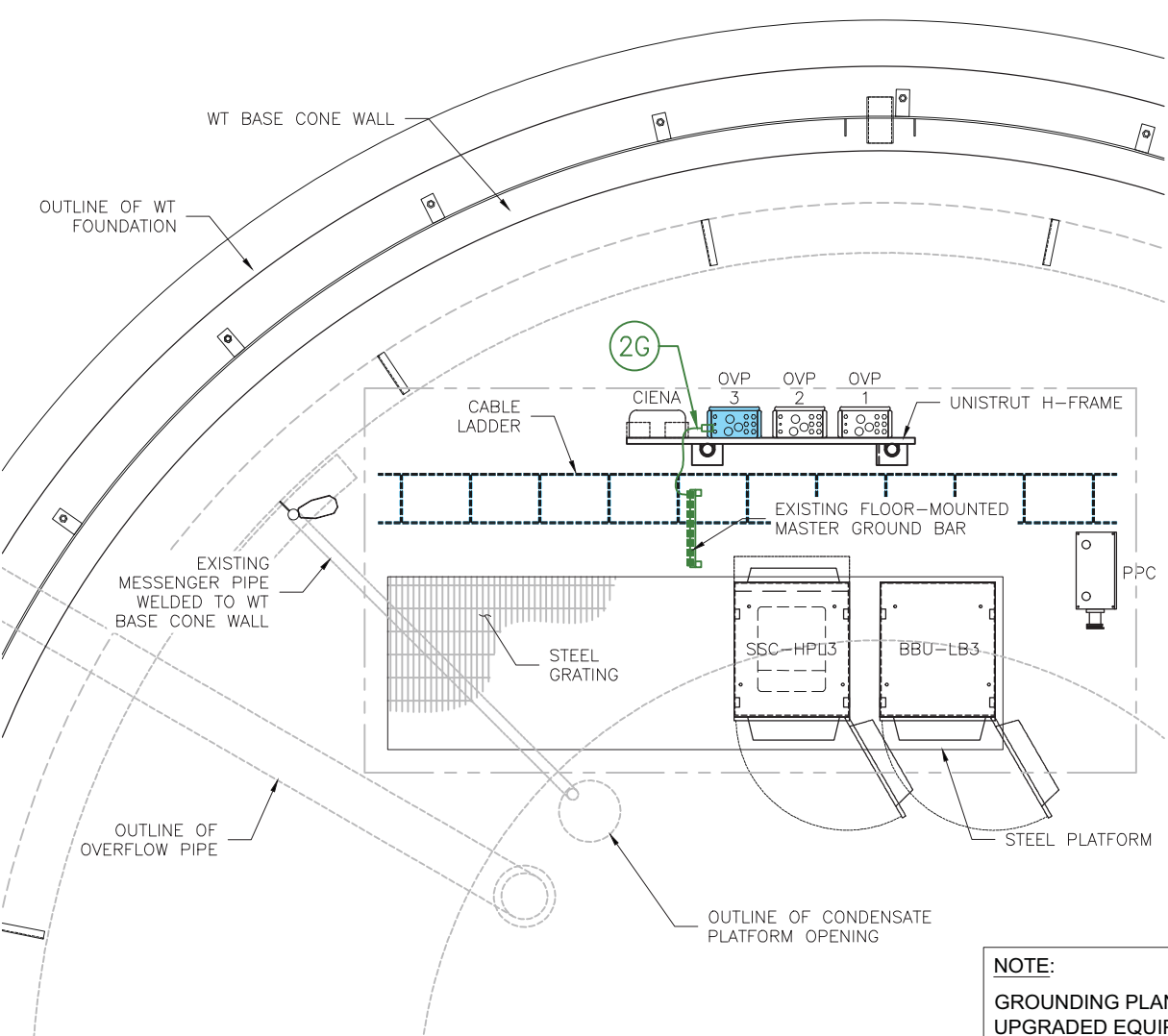
**CH184080D**  
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**ELECTRICAL NOTES,  
 UTILITY & CABLE  
 ROUTING PLANS**

Project Number:	Drawn by: PA
Client Project Number:	Checked by:
Scale:	Approved by: MS
Drawing Number:	Date:

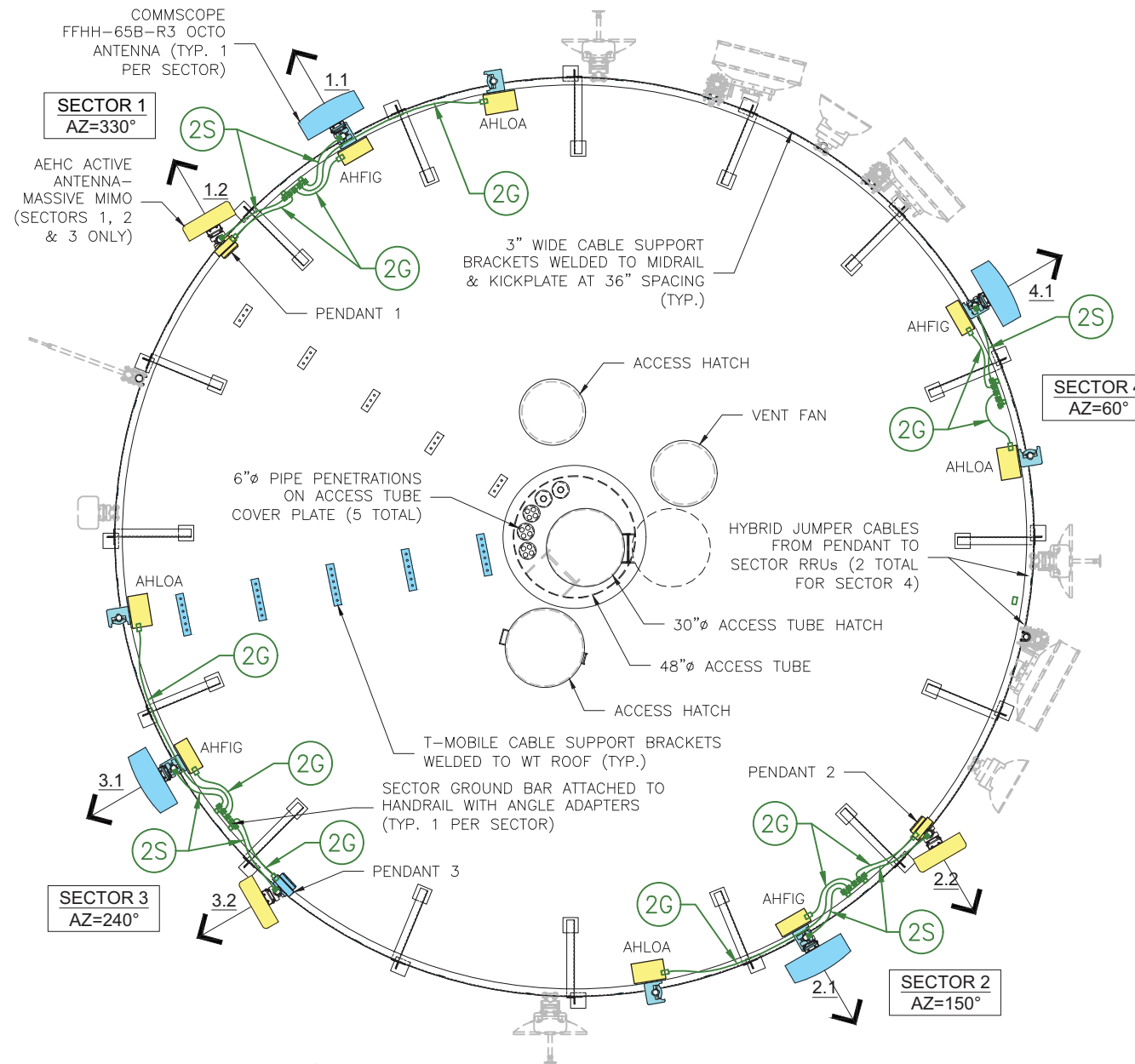
**GROUNDING NOTES:**

- GROUNDING CONNECTIONS SHALL BE EXOTHERMIC TYPE ("CADWELD") TO ANTENNA MASTS, FENCE POSTS, MONOPOLE, AND THE GROUND RODS, REMAINING GROUNDING CONNECTIONS SHALL BE COMPRESSION FITTINGS.
- GROUND CABLE SHIELDS AT BOTH ENDS WITH CABLE GROUNDING KITS.
- ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE, ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY.
- CONTRACTOR TO PROVIDE GROUND WIRES, BARS AND CONNECTIONS AS SHOWN ON GROUNDING RISER DIAGRAM. CONTRACTOR SHALL TEST AND VERIFY THAT THE IMPEDANCE DOES NOT EXCEED 5 OHMS TO GROUND BY MEANS OF A 4 POINT BIDDLE-MEGGER TESTER. GROUNDING AND OTHER OPERATIONAL TESTING SHALL BE WITNESSED BY THE OWNER'S REPRESENTATIVE.
- GROUNDING CONDUCTORS SHALL BE COPPER ONLY. ABOVE GROUND EITHER SOLID OR STRANDED CONDUCTORS ARE PERMITTED. IGR AND ALL EXTERNAL CONDUCTORS (W/ THE EXCEPTION FOR GROUND WIRE BETWEEN THE TOP AND THE BOTTOM OF THE ANTENNA TOWER) MUST BE BARE. EQUIPMENT GROUND LEADS IN CABLE TRAYS MUST BE GREEN INSULATED. BELOW GROUND BARE SOLID TINNED WIRE SHALL BE USED. ALL WIRES MUST BE #2 AWG MIN. WITH THE EXCEPTION OF GROUND WIRES FOR MISCELLANEOUS METALLIC OBJECTS IN THE EQUIPMENT SHELTER, WHERE #6 WIRES CAN BE USED.
- THE GROUND ELECTRODE SYSTEM SHALL CONSIST OF DRIVEN GROUND RODS UNIFORMLY SPACED AROUND CELL SITE. THE GROUND RODS SHALL BE 3/4"x10'-0" COPPER CLAD STEEL. THE RODS SHALL BE INTERCONNECTED WITH #2 AWG BARE SOLID TINNED COPPER GROUND WIRE BURIED 42" BELOW THE SURFACE OF THE SOIL. MINIMUM DISTANCE BETWEEN GROUND RODS - 8', MAXIMUM - 16'.
- METALS WITHIN 6' OF THE GROUND RING SHALL BE BONDED TO THE GROUND RING.
- THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER WHEN THE GROUNDING IS COMPLETE. THE CONSTRUCTION MANAGER SHALL INSPECT THE GROUNDING SYSTEM PRIOR TO BACKFILLING.
- VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO ANY DIGGING.
- GROUND CONDUCTOR BENDS SHALL NOT BE LESS THAN 8" RADIUS.
- GROUND CONDUCTORS TO THE GROUND RING SHALL BE IN 3/4" "LIQUID-TITE" FLEX DUCT AND SEALED AT EXIT W/ SILICONE CAULK.
- ANTENNA INSTALLATION CONTRACTOR TO PROVIDE & INSTALL TOP, RF BUSBARS & BUSBAR BELOW CENTERLINE.



① LEASE AREA GROUNDING PLAN  
E-2 SCALE: 1/4" = 1'-0"

**NOTE:**  
GROUNDING PLAN IS FOR NEW/UPGRADED EQUIPMENT. EXISTING EQUIPMENT TO RETAIN ORIGINAL GROUNDING CONNECTIONS.



② GROUNDING PLAN AT WT ROOF  
E-2 SCALE: 3/16" = 1'-0"

LEGEND	
	GROUND BAR
	CADWELD OR APPROVED CONNECTION
	SPARE GROUND LEAD
	MECHANICAL CONNECTION

KEY NOTES	
	#2 AWG GREEN STRANDED GROUND COPPER WIRE
	#2 AWG SOLID, TINNED BARE COPPER GROUND WIRE
	#6 AWG GREEN STRANDED GROUND COPPER WIRE

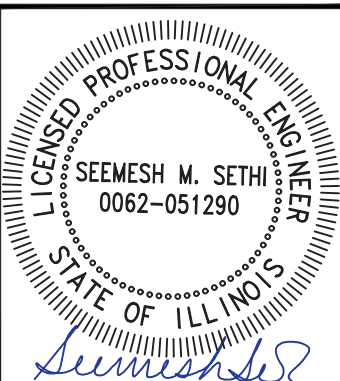


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PHONE: 847-490-8200; FAX: 847-490-8225  
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SIGNATURES:  
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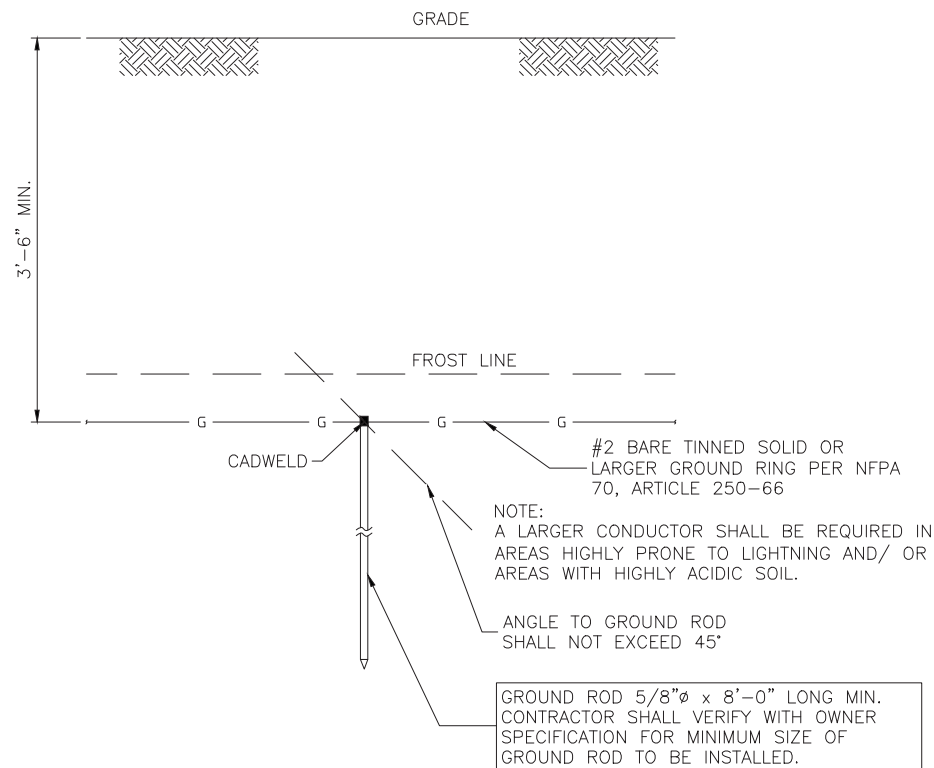
REV.	DESCRIPTION	DATE
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B	ISSUED FOR REVIEW	5/14/24
A	ISSUED FOR REVIEW	3/11/24

**CH184080D  
ORLAND PARK WT**

17801 S. WOLF RD., ORLAND PARK, IL, 60467

**GROUNDING NOTES,  
GROUNDING PLANS**

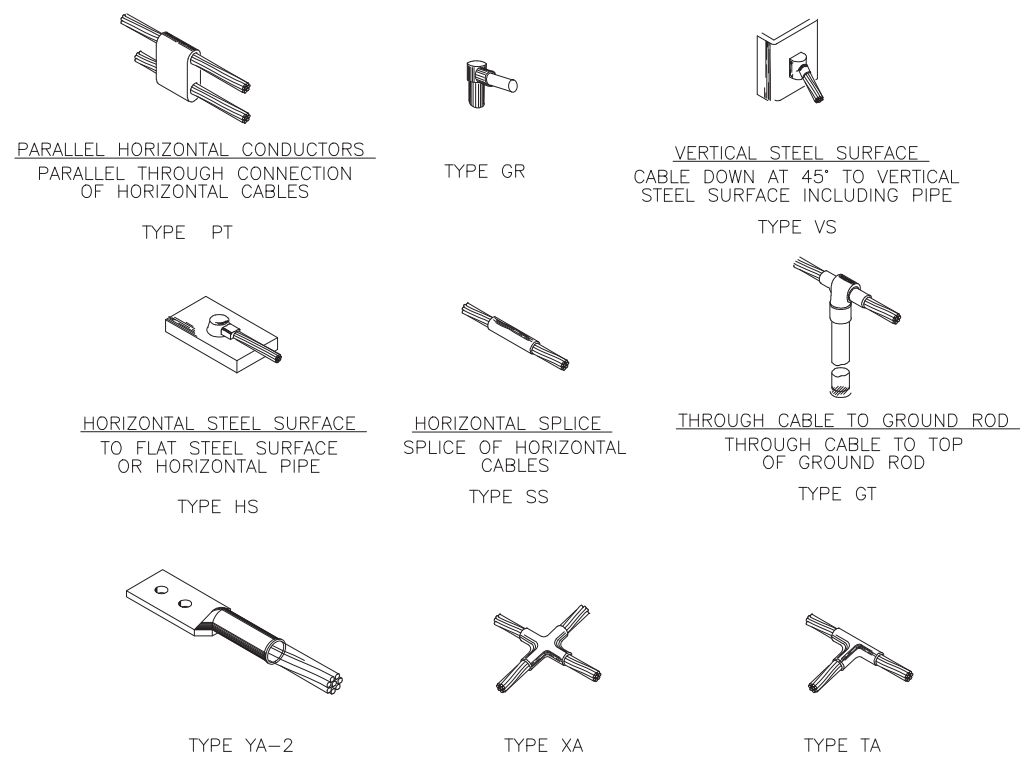
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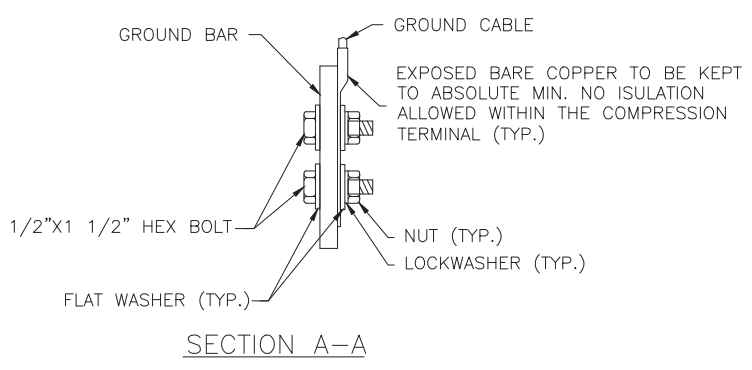
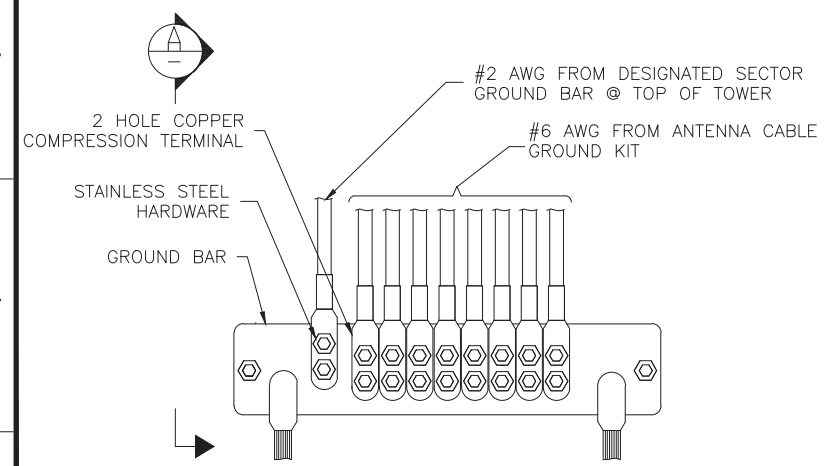
1. GROUND RODS MAY BE:  
- COPPER CLAD STEEL  
- SOLID COPPER
2. GROUND RODS SHALL HAVE A MAX. SPACING TWICE THE LENGTH OF ROD
3. SEE RESISTIVITY REPORT FOR VERIFICATION AS AVAILABLE
4. GROUND RODS INSTALLED WITHIN CLOSE PROXIMITY TO TOWER OR WHEN SOIL IS AT OR BELOW 2,000 OHM-CM, SHALL BE GALVANIZED TO PREVENT GALVANIC CORROSION OF TOWER (SEE ANSI/TIA-EIA-222-G)

1 GROUNDING ROD (IF REQUIRED)  
E-5 SCALE: N.T.S.

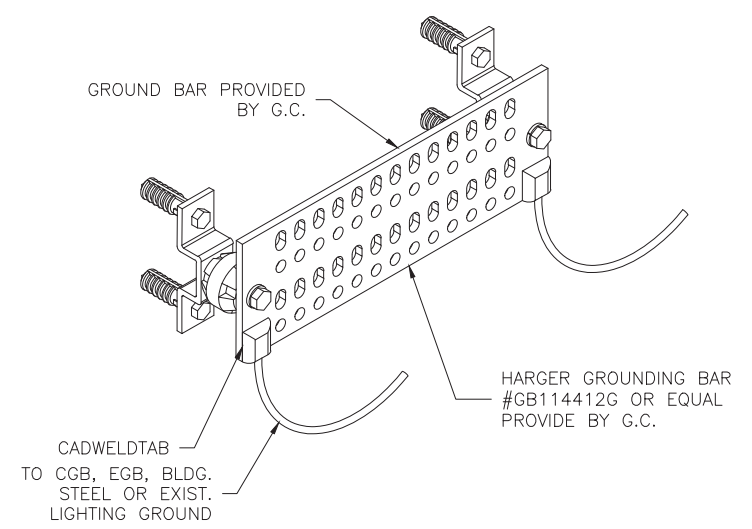


NOTE: CADWELD "TYPES" SHOWN ABOVE ARE EXAMPLES. CONSULT WITH PROJECT MANAGER FOR SPECIFIC TYPES OF CADWELDS TO BE USED FOR THIS PROJECT.

3 CADWELD TYPES  
E-5 SCALE: N.T.S.



2 GROUNDING BAR CONNECTION  
E-5 SCALE: N.T.S.



4 COLLECTOR GROUND BAR (CGB)  
E-5 SCALE: N.T.S.

**T-Mobile**

1400 OPUS PLACE, SUITE 700  
DOWNERS GROVE, IL 60515  
PHONE:  
FAX:

**KCS CORPORATION**  
CONSULTING ENGINEERS  
ILLINOIS DESIGN FIRM  
REGISTRATION NO.: 184.002139  
1125 REMINGTON RD., SCHLAUMBURG, IL 60173  
PHONE: 847-490-8200; FAX: 847-490-8225  
www.kcscorp.com

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LICENSED PROFESSIONAL ENGINEER  
STATE OF ILLINOIS  
SEEMESH M. SETHI  
0062-051290  
SIGNATURES:  
DATE: 7/30/24 EXPIRES: 11/30/25

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Drawing Title:  
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DIVISION 1 – GENERAL REQUIREMENTS

PART 1 – GENERAL

1.1 INTENT

THESE SPECIFICATIONS AND CONSTRUCTION DRAWINGS ACCOMPANYING THEM DESCRIBE THE WORK TO BE DONE AND THE MATERIALS TO BE FURNISHED FOR CONSTRUCTION.

THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO BE FULLY EXPLANATORY AND SUPPLEMENTARY. HOWEVER, SHOULD ANYTHING BE SHOWN, INDICATED OR SPECIFIED ON ONE AND NOT THE OTHER, IT SHALL BE DONE THE SAME AS IF SHOWN, INDICATED OR SPECIFIED IN BOTH.

THE INTENTION OF THE DOCUMENTS IS TO INCLUDE ALL LABOR AND MATERIALS REASONABLY NECESSARY FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK AS STIPULATED IN THE CONTRACT.

THE PURPOSE OF THE SPECIFICATIONS IS TO INTERPRET THE INTENT OF THE DRAWINGS AND TO DESIGNATE THE METHOD OF THE PROCEDURE, TYPE AND QUALITY OF MATERIALS REQUIRED TO COMPLETE THE WORK.

MINOR DEVIATIONS FROM THE DESIGN LAYOUT ARE ANTICIPATED AND SHALL BE CONSIDERED AS PART OF THE WORK. NO CHANGES THAT ALTER THE CHARACTER OF THE WORK WILL BE MADE OR PERMITTED BY THE OWNER WITHOUT ISSUING A CHANGE ORDER.

1.2 CONFLICTS

THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL MEASUREMENTS AT THE SITE BEFORE ORDERING ANY MATERIALS OR DOING ANY WORK. NO EXTRA CHARGE OR COMPENSATION SHALL BE ALLOWED DUE TO DIFFERENCE BETWEEN ACTUAL DIMENSIONS AND DIMENSIONS INDICATED ON THE CONSTRUCTION DRAWINGS. ANY SUCH DISCREPANCY IN DIMENSION WHICH MAY BE FOUND SHALL BE SUBMITTED TO THE OWNER FOR CONSIDERATION BEFORE THE CONTRACTOR PROCEEDS WITH THE WORK IN THE AFFECTED AREAS.

THE BIDDER, IF AWARDED THE CONTRACT, WILL NOT BE ALLOWED ANY EXTRA COMPENSATION BY REASON OF ANY MATTER OR THING CONCERNING WHICH SUCH BIDDER MIGHT HAVE FULLY INFORMED THEMSELVES PRIOR TO THE BIDDING.

NO PLEA OF IGNORANCE OF CONDITIONS THAT EXIST, OR OF DIFFICULTIES OR CONDITIONS THAT MAY BE ENCOUNTERED OR OF ANY OTHER RELEVANT MATTER CONCERNING THE WORK TO BE PERFORMED IN THE EXECUTION OF THE WORK WILL BE ACCEPTED AS AN EXCUSE FOR ANY FAILURE OR OMISSION ON THE PART OF THE CONTRACTOR TO FULFILL EVERY DETAIL OF ALL THE REQUIREMENTS OF THE CONTRACT DOCUMENTS GOVERNING THE WORK.

1.3 CONTRACTS AND WARRANTIES

CONTRACTOR IS RESPONSIBLE FOR APPLICATION AND PAYMENT OF CONTRACTOR LICENSES AND BONDS.

SEE MASTER CONSTRUCTION SERVICES AGREEMENT FOR ADD'L DETAILS.

1.4 STORAGE

ALL MATERIALS MUST BE STORED IN A LEVEL AND DRY FASHION AND IN A MANNER THAT DOES NOT NECESSARILY OBSTRUCT THE FLOW OF OTHER WORK. ANY STORAGE METHOD MUST MEET ALL RECOMMENDATIONS OF THE ASSOCIATED MANUFACTURER.

1.5 CLEAN UP

THE CONTRACTORS SHALL AT ALL TIMES KEEP THE SITE FREE FROM ACCUMULATION OF WASTE MATERIALS OR RUBBISH CAUSED BY THEIR EMPLOYEES AT WORK AND AT THE COMPLETION OF THE WORK, THEY SHALL REMOVE ALL RUBBISH FROM AND ABOUT THE BUILDING AREA, INCLUDING ALL THEIR TOOLS, SCAFFOLDING AND SURPLUS MATERIALS AND SHALL LEAVE THEIR WORK CLEAN AND READY FOR USE.

EXTERIOR: VISUALLY INSPECT EXTERIOR SURFACES AND REMOVE ALL TRACES OF SOIL, WASTE MATERIALS, SMUDGES AND OTHER FOREIGN MATTER.

1. REMOVE ALL TRACES OF SPLASHED MATERIALS FROM ADJACENT SURFACES.

2. IF NECESSARY TO ACHIEVE A UNIFORM DEGREE OF CLEANLINESS, HOSE DOWN THE EXTERIOR OF THE STRUCTURE.

INTERIOR:

VISUALLY INSPECT INTERIOR SURFACE AND REMOVE ALL TRACES OF SOIL, WASTE MATERIALS, SMUDGES AND OTHER FOREIGN MATTER FROM WALLS/FLOOR/CEILING.

- 1. REMOVE ALL TRACES OF SPLASHED MATERIAL FROM ADJACENT SURFACES.
2. REMOVE PAINT DROPPINGS, SPOTS, STAINS AND DIRT FROM FINISHED SURFACES.

1.6 CHANGE ORDER PROCEDURE

CHANGE ORDERS MAY BE INITIATED BY THE OWNER AND/OR THE CONTRACTOR INVOLVED. THE CONTRACTOR, UPON VERBAL REQUEST FROM THE OWNER SHALL PREPARE A WRITTEN PROPOSAL DESCRIBING THE CHANGE IN WORK OR MATERIALS AND ANY CHANGES IN THE CONTRACT AMOUNT AND PRESENT TO THE OWNER WITHIN 72 HRS FOR APPROVAL. SUBMIT REQUESTS FOR SUBSTITUTIONS IN THE FORM AND IN ACCORDANCE WITH PROCEDURES REQUIRED FOR CHANGE ORDER PROPOSALS. ANY CHANGES IN SCOPE OF WORK OR MATERIALS WHICH ARE PERFORMED BY THE CONTRACTOR WITHOUT A WRITTEN CHANGE ORDER AS DESCRIBED AND APPROVED BY THE OWNER SHALL PLACE FULL RESPONSIBILITY OF THESE ACTIONS ON THE CONTRACTOR.

1.7 RELATED DOCUMENTS AND COORDINATION
GENERAL NOTES, CIVIL, STRUCTURAL, ELECTRICAL AND ANTENNA DRAWINGS ARE INTERRELATED. IN PERFORMANCE OF THE WORK; THE CONTRACTOR MUST REFER TO ALL DRAWINGS. ALL COORDINATION TO BE THE RESPONSIBILITY OF THE CONTRACTOR.

1.8 SHOP DRAWINGS

- A. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AS REQUIRED AND LISTED IN THESE SPECIFICATIONS TO THE OWNER FOR APPROVAL.
B. ALL SHOP DRAWINGS SHALL BE REVIEWED, CHECKED AND CORRECTED BY CONTRACTOR PRIOR TO SUBMITTAL TO THE OWNER.

1.9 PRODUCTS AND SUBSTITUTIONS

- A. SUBMIT 3 COPIES OF EACH REQUEST FOR SUBSTITUTION. IN EACH REQUEST IDENTIFY THE PRODUCT OR FABRICATION OR INSTALLATION METHOD TO BE REPLACED BY THE SUBSTITUTION. INCLUDE RELATED SPECIFICATION SECTION AND DRAWING NUMBERS AND COMPLETE DOCUMENTATION SHOWING COMPLIANCE WITH THE REQUIREMENTS FOR SUBSTITUTIONS.
B. SUBMIT ALL NECESSARY PRODUCT DATA AND CUT SHEETS WHICH PROPERLY INDICATE AND DESCRIBE THE ITEMS, PRODUCTS AND MATERIALS BEING INSTALLED. THE CONTRACTOR SHALL, IF DEEMED NECESSARY BY THE OWNER SUBMIT ACTUAL SAMPLES TO THE OWNER FOR APPROVAL IN LIEU OF CUT SHEETS.

1.10 QUALITY ASSURANCE

ALL WORK SHALL BE IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS. THESE SHALL INCLUDE BUT NOT BE LIMITED TO THE LATEST VERSION OF THE FOLLOWING:

- TIA-222-H
2018 INTERNATIONAL BUILDING CODE
2017 NATIONAL ELECTRICAL CODE
UNDERWRITER LABORATORIES APPROVED ELECTRICAL PRODUCTS
AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATIONS (AISC)
LIFE SAFETY CODE NFPA – 101-2018

1.11 ADMINISTRATION

- A. BEFORE THE COMMENCEMENT OF ANY WORK, THE CONTRACTOR WILL ASSIGN A PROJECT MANAGER WHO WILL ACT AS A SINGLE POINT OF CONTACT FOR ALL PERSONNEL INVOLVED IN THIS PROJECT. THIS PROJECT MANAGER WILL DEVELOP A MASTER SCHEDULE FOR THE PROJECT WHICH WILL BE SUBMITTED TO THE OWNER PRIOR TO THE COMMENCEMENT OF ANY WORK.
B. SUBMIT A BAR TYPE PROGRESS CHART NOT MORE THAN 3 DAYS AFTER THE DATE ESTABLISHED FOR COMMENCEMENT OF THE WORK ON THE SCHEDULE, INDICATING A TIME BAR FOR EACH MAJOR CATEGORY OR UNIT OF WORK TO BE PERFORMED AT SITE, PROPERLY SEQUENCED AND COORDINATED WITH OTHER ELEMENTS OF WORK AND SHOWING COMPLETION OF THE WORK SUFFICIENTLY IN ADVANCE OF THE DATE ESTABLISHED FOR SUBSTANTIAL COMPLETION OF THE WORK.

C. PRIOR TO COMMENCING CONSTRUCTION, THE OWNER

SHALL SCHEDULE AN ON-SITE MEETING WITH ALL MAJOR PARTIES. THIS WOULD INCLUDE (THOUGH NOT LIMITED TO) THE OWNER, PROJECT MANAGER, CONTRACTOR, LAND OWNER REPRESENTATIVE, LOCAL TELEPHONE COMPANY, TOWER ERECTION FOREMAN (IF SUBCONTRACTED).

- D. CONTRACTOR SHALL BE EQUIPPED WITH SOME MEANS OF CONSTANT COMMUNICATIONS, SUCH AS A MOBILE PHONE OR A BEEPER. THIS EQUIPMENT WILL NOT BE SUPPLIED BY THE OWNER, NOR WILL WIRELESS SERVICE BE ARRANGED.
E. DURING CONSTRUCTION, CONTRACTOR MUST ENSURE THAT EMPLOYEES AND SUBCONTRACTORS WEAR HARD HATS AT ALL TIMES. CONTRACTOR WILL COMPLY WITH ALL SAFETY REQUIREMENTS IN THEIR AGREEMENT.
F. PROVIDE WRITTEN DAILY UPDATES ON SITE PROGRESS TO THE OWNER.
G. COMPLETE INVENTORY OF CONSTRUCTION MATERIALS AND EQUIPMENT IS REQUIRED PRIOR TO START OF CONSTRUCTION.
H. NOTIFY THE OWNER / PROJECT MANAGER IN WRITING NO LESS THAN 48 HOURS IN ADVANCE OF CONCRETE POURS, TOWER ERECTIONS, AND EQUIPMENT CABINET PLACEMENTS.

1.12 INSURANCE AND BONDS

- A. CONTRACTOR SHALL AT THEIR OWN EXPENSE CARRY AND MAINTAIN FOR THE DURATION OF THE PROJECT ALL INSURANCE AS REQUIRED AND LISTED AND SHALL NOT COMMENCE WITH THEIR WORK UNTIL THEY HAVE PRESENTED AN ORIGINAL CERTIFICATE OF INSURANCE STATING ALL COVERAGES TO THE OWNER. REFER TO THE MASTER AGREEMENT FOR REQUIRED INSURANCE LIMITS.
B. THE OWNER SHALL BE NAMED AS AN ADDITIONAL INSURED ON ALL POLICIES.
C. CONTRACTOR MUST PROVIDE PROOF OF INSURANCE.

DIVISION 13 – SPECIAL CONSTRUCTION

13100 TOWER & ANTENNA INSTALLATION

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. INSTALL ANTENNAE AS INDICATED ON DRAWINGS AND OWNER SPECIFICATIONS.
B. INSTALL GALVANIZED STEEL ANTENNA MOUNTS AS INDICATED ON DRAWINGS.
C. SUPPLY AND INSTALL ONE ISOLATED GROUND BAR AT EQUIPMENT CABINET.
D. SUPPLY AND INSTALL GROUNDING STRAP KITS WITH LONG BARREL COMPRESSION LUGS (SIM. TO ANDREW-223700TBD OR APPROVED EQUAL) ATOP TOWER BASE BEFORE ENTERING THE EQUIPMENT. GROUNDING STRAPS TO BE CONNECTED TO INSULATED GROUND BAR.
E. ASSIST OWNER TECHNICIANS IN PERFORMING SWEEP TEST OF INSTALLED COAX.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

- A. FURNISH U.L. LISTED EQUIPMENT WHERE SUCH LABEL IS AVAILABLE, INSTALL IN CONFORMANCE WITH U.L. STANDARDS WHERE APPLICABLE.
B. INSTALL ANTENNA, ANTENNA CABLES, GROUNDING SYSTEM IN ACCORDANCE WITH DRAWINGS AND SPECIFICATION IN EFFECT AT PROJECT LOCATION AND RECOMMENDATIONS OF STATE AND LOCAL BUILDING CODES, SPECIAL CODES HAVING JURISDICTION OVER SPECIFIC PORTIONS OF WORK. THIS INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:

1.3 APPLICABLE STANDARDS

- A. EIA – ELECTRONIC INDUSTRIES ASSOCIATION EIA/ TIA-222-H STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES.
B. FAA – FEDERAL AVIATION ADMINISTRATION ADVISORY

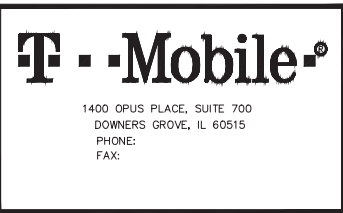
CIRCULAR AC 70/7460-IH, OBSTRUCTION MARKING AND LIGHTING.

- C. FCC – FEDERAL COMMUNICATIONS COMMISSION RULES AND REGULATIONS FORM 715, OBSTRUCTION MARKING AND LIGHTING SPECIFICATIONS FOR ANTENNA STRUCTURES AND FORM 715A, HIGH INTENSITY OBSTRUCTION LIGHTING SPECIFICATIONS FOR ANTENNA STRUCTURES.
D. AISC – AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS.
E. NATIONAL ELECTRICAL CODE, 2017– ON TOWER LIGHTING KITS.
F. UL – UNDERWRITER’S LABORATORIES APPROVED ELECTRICAL PRODUCTS.
G. IN ALL CASES, PART 77 OR THE FAA RULES AND PARTS 17 AND 22 OF THE FCC RULES ARE APPLICABLE AND IN THE EVENT OF CONFLICT, SUPERSEDE ANY OTHER STANDARDS OR SPECIFICATIONS.
H. LIFE SAFETY CODE NFPA – 101-2018.

DIVISION 16 – GENERAL ELECTRIC

GENERAL ELECTRICAL PROVISION

- 1. SUBMITTAL OF BID INDICATES CONTRACTOR IS COGNIZANT OF ALL JOB SITE CONDITIONS AND WORK TO BE PERFORMED UNDER THIS CONTRACT.
2. CONTRACTOR SHALL PERFORM ALL VERIFICATION OBSERVATION TEST, AND EXAMINATION WORK PRIOR TO THE ORDERING OF THE ELECTRICAL EQUIPMENT AND THE ACTUAL CONSTRUCTION. CONTRACTOR SHALL ISSUE A WRITTEN NOTICE OF ALL FINDINGS TO THE ARCHITECT LISTING ALL MALFUNCTIONS, FAULTY EQUIPMENT AND DISCREPANCIES.
3. HEIGHTS SHALL BE VERIFIED WITH OWNER PRIOR TO INSTALLATION.
4. THESE PLANS ARE DIAGRAMMATIC ONLY, FOLLOW AS CLOSELY AS POSSIBLE.
5. ELECTRICAL SERVICE SHALL BE 120/240 VAC SINGLE PHASE 3 WIRE 200 AMP SERVICE
6. EACH CONDUCTOR OF EVERY SYSTEM SHALL BE PERMANENTLY TAGGED IN EACH PANEL BOARD, PULL BOX, J-BOX, SWITCH BOX, ETC., IN COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH ACT (O.S.H.A.).
7. 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.
8. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND IN PERFECT CONDITION WHEN INSTALLED AND SHALL BE OF THE BEST GRADE AND OF THE SAME MANUFACTURER THROUGHOUT FOR EACH CLASS OR GROUP OF EQUIPMENT. MATERIALS SHALL BE LISTED "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.
9. ALL CONDUIT INSTALLED SHALL BE SURFACE MOUNTED OR DIRECT BURIAL UNLESS OTHERWISE NOTED.
10. CONTRACTOR SHALL CARRY OUT THEIR WORK IN ACCORDANCE WITH ALL GOVERNING STATE,COUNTY AND LOCAL CODES AND O.S.H.A.
11. CONTRACTOR SHALL SECURE ALL NECESSARY BUILDING PERMITS AND PAY ALL REQUIRED FEES.
12. COMPLETE JOB SHALL BE GUARANTEED FOR A PERIOD OF ONE (1) YEAR AFTER THE DATE OF JOB ACCEPTANCE BY OWNER. 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 CONTRACTOR.
13. ALL CONDUIT ONLY SHALL HAVE A PULL WIRE OR ROPE.
14. PROVIDE PROJECT MANAGER WITH ONE SET OF COMPLETE ELECTRICAL "AS INSTALLED" DRAWINGS AT THE COMPLETION OF THE JOB, SHOWING ACTUAL DIMENSIONS, ROUTINGS AND CIRCUITS.



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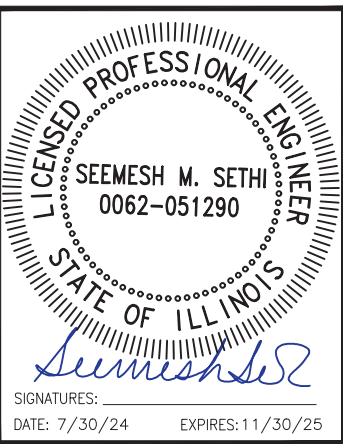


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N-1
Signatory Level: L06
NLG-100466

15. ALL BROCHURES, OPERATING MANUALS, CATALOGS, SHOP DRAWINGS, ETC., SHALL BE TURNED OVER TO THE OWNER AT JOB COMPLETION.
16. USE T-TAP CONNECTIONS ON ALL MULTI-CIRCUITS WITH COMMON NEUTRAL CONDUCTOR FOR LIGHTING FIXTURES.
17. ALL CONDUCTORS SHALL BE COPPER.
18. ALL CIRCUIT BREAKERS, FUSES AND ELECTRICAL EQUIPMENT SHALL HAVE AN INTERRUPTING SHORT CIRCUIT CURRENT TO WHICH THEY MAY BE SUBJECTED, AND A MINIMUM OF 10,000 A.I.C.
19. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE GROUNDED AS REQUIRED BY ALL APPLICABLE CODES.
20. PATCH, REPAIR AND PAINT ANY AREA THAT HAS BEEN DAMAGED IN THE COURSE OF THE ELECTRICAL WORK.
21. WIRE AND CABLE CONDUCTORS SHALL BE COPPER #12 AWG MINIMUM UNLESS SPECIFICALLY NOTED OTHERWISE ON DRAWINGS.
22. GROUNDED CONDUCTORS SHALL BE SOLID TINNED COPPER UNLESS OTHERWISE NOTED.
23. METER SOCKET AMPERES, VOLTAGE, NUMBER OF PHASES SHALL BE AS NOTED ON THE DRAWINGS, MANUFACTURED BY "SQUARE D COMPANY", OR APPROVED EQUAL.
24. ALL MATERIALS SHALL BE U.L. LISTED.
25. CONDUIT
  - A. RIGID CONDUIT SHALL BE U.L. LABEL GALVANIZED ZINC COATED WITH ZINC INTERIOR AND SHALL BE USED WHEN INSTALLED IN OR UNDER CONCRETE SLABS IN CONTACT WITH THE EARTH, UNDER PUBLIC ROADWAYS, IN MASONRY WALLS OR EXPOSED ON BUILDING EXTERIOR. RIGID CONDUIT IN CONTACT WITH EARTH SHALL BE 1/2 LAPPED WRAPPED WITH HUNTS WRAP PROCESS NO. 3
  - B. ELECTRICAL METALLIC TUBING SHALL HAVE U.L. LABEL, FITTING SHALL BE GLAND RING COMPRESSION TYPE. EMT SHALL BE USED ONLY FOR INTERIOR RUNS.
  - C. FLEXIBLE METALLIC CONDUIT SHALL HAVE U.L. LISTED LABEL AND MAY BE USED WHERE PERMITTED BY CODE. FITTINGS SHALL BE "JAKE" OR "SQUEEZE" TYPE, SEAL TIGHT FLEXIBLE CONDUIT. ALL CONDUIT SHALL HAVE FULL SIZE EQUIPMENT GROUND WIRE.
  - D. N/A
  - E. PARALLEL UNDERGROUND CONDUIT SHALL BE PVC SCHEDULE 40 (UNLESS NOTED OTHERWISE) AT A MINIMUM DEPTH OF 30" BELOW GRADE- STACKED UNDERGROUND CONDUIT SHALL BE PVC SCHEDULE 40 (UNLESS NOTED OTHERWISE) AT A MINIMUM DEPTH OF 24" BELOW GRADE.
  - F. ABOVE GROUND CONDUIT SHALL BE P.V.C. SCHEDULE 80 (UNLESS NOTED OTHERWISE).
27. ALL ELECTRICAL EQUIPMENT SHALL BE LABELED WITH PERMANENT ENGRAVED PLASTIC LABELS.
28. COORDINATE THE ELECTRICAL SERVICE WITH THE UTILITY COMPANY, AND PROVIDE DAILY UPDATES TO PM UNTIL FINAL ELECTRICAL SERVICE IS EFFECTED.
29. UPON COMPLETION OF WORK, CONDUCT CONTINUITY, SHORT CIRCUIT, AND FALL OF POTENTIAL GROUND TESTS FOR APPROVAL. SUBMIT TEST REPORTS TO PROJECT MANAGER. CLEAN PREMISES OF ALL DEBRIS RESULTING FROM WORK AND LEAVE WORK IN A COMPLETE AND UNDAMAGED CONDITION.
30. CONTRACTOR TO COORDINATE WITH UTILITY COMPANY FOR CONNECTION OF TEMPORARY AND PERMANENT POWER TO THE SITE. THE TEMPORARY POWER AND ALL HOOKUP COSTS TO BE PAID BY CONTRACTOR.

GROUNDED STANDARDS

1. DEFINITIONS
  - AGB ANTENNA GROUND BAR
  - AWG AMERICAN WIRE GAUGE.
  - CAD WELDING: AN EXOTHERMIC WELDING PROCESS WHICH CREATES POSITIVE CONTACT OF POSITIVE CONTACT OF GROUNDED CONDUCTORS
  - EMT ELECTRICAL METAL TUBING (LIGHT GAUGE METAL CONDUIT)
  - RGC RIGID GALVANIZED CONDUIT, SCH 40 OR HIGHER
  - PVC POLY VINYL CHLORIDE CONDUIT
  - MGB MASTER GROUND BAR
  - RFI RADIO FREQUENCY INTERFERENCE
  - THW LETTER TYPE DESIGNATION FOR CONDUCTOR INSULATION THAT IS A MOISTURE AND HEAT RESISTANT THERMOPLASTIC WITH A MAXIMUM OPERATING TEMPERATURE OF 75 DEGREES CELSIUS OR 167 DEGREES FAHRENHEIT.
  - T/I TENANT IMPROVEMENT

2. BACKGROUND

- 2.1. AREAS OF CONCERN: WHEN DESIGNING A GROUNDED SYSTEM FOR A MOBILE RADIO FACILITY THERE ARE FOUR INTERRELATED AREAS OF CONCERN. THE BASIC OBJECTIVE FOR EACH IS:
  - A. LIGHTNING PROTECTION - TO MAINTAIN ALL EQUIPMENT AT THE SAME POTENTIAL DURING A LIGHTNING IMPULSE.
  - B. RFI FOR NOISE INDUCTION CONTROL - TO ESTABLISH THE LOWEST POSSIBLE IMPEDANCE AMONG ALL EQUIPMENT.
  - C. ELECTROSTATIC CONTROL - TO REDUCE ELECTROSTATIC DISCHARGE PROBLEMS.
  - D. PERSONNEL SAFETY - TO MAINTAIN A MINIMUM VOLTAGE DIFFERENCE BETWEEN ANY TWO METALLIC OBJECTS WHICH PERSONNEL MIGHT CONTACT SIMULTANEOUSLY.

2.1. A/C GROUNDED:  
 IN THIS GROUNDED SYSTEM THE A/C SERVICE GROUND SHALL BE KEPT ISOLATED FROM THE EQUIPMENT FRAME WORK AND LIGHTNING PROTECTION GROUND SYSTEMS EXCEPT FOR ONE THIS WOULD TYPICALLY BE CONNECTING THE A/C SERVICE GROUND AT THE COMMERCIAL POWER RISER POLE DISCONNECT/METER BASE TO THE EXTERNAL GROUND RING. ALL GROUNDED CONNECTIONS INSIDE OF CABINETS SHALL BE SCRAPPED TO BARE METAL AND COATED WITH NOALOX.

2.2. LIGHTNING CONSIDERATIONS:  
 LIGHTNING DAMAGE OCCURS FROM EITHER INDUCTION OR FROM AN ACTUAL DIRECT STRIKE TO THE BUILDING, USUALLY TAKEN THROUGH THE TOWER AND/OR ANTENNAS. STRIKES TO OTHER NEARBY OBJECTS INDUCE HIGH ENERGY INTO POWER OR TELEPHONE CABLES ENTERING THE BUILDING. THIS TYPE OF EFFECT HISTORICALLY CAUSES MOST OF THE DAMAGE TO THE BUILDING AND ITS CONTENTS.

3. STATION GROUNDED SYSTEM

- 3.1. MATERIALS:
  - A. #2 AWG, BARE SOLID TINNED COPPER WIRE, FOR ALL EXTERIOR CONDUCTORS AND TOWER GROUND BAR CONDUCTORS OR AS OTHERWISE SPECIFIED. GROUNDS TO THE LNAS SHALL BE NO. 6 STANDARD GREEN INSULATED JUMPERS. THE GROUND WIRE TO THE MGB SHALL BE GREEN JACKETED STRANDED #2 TINNED WIRE BURNDY CONNECTED TO THE BUSS BAR AND CONNECTED TO THE GROUND RING ON A GROUND ROD.
  - B. #2 AWG, INSULATED STRANDED COPPER CABLE IS ACCEPTABLE FOR INTERIOR GROUND BAR CONDUCTORS ON TENANT IMPROVEMENT SITES.
  - C. 5/8" ØX 10' GROUND RODS OF SOLID COPPER, STAINLESS STEEL OR COPPER CLAD HIGH STRENGTH STEEL.
  - D. ABOVE GRADE CONNECTIONS SHALL BE BURNDY HYGROUND COMPRESSION. BELOW GRADE CONNECTIONS SHALL BE CAD WELD OR OTHER APPROVED EXOTHERMIC WELDING SYSTEM FOR BONDING AS SPECIFIED.
  - E. XIT OR ADVANCED GROUNDED ELECTRODE (AGE), ALL CHEMICAL GROUND RODS SHALL BE UL APPROVED.
  - F. SOLID COPPER PLATES OF MINIMUM 3'X3'X1/4" SIZE AS SPECIFIED.
  - G. NOALOX OR APPROVED EQUAL CONDUCTIVE MEDIUM MATERIAL SHALL BE USED IN ALL MECHANICAL CONNECTIONS.
  - H. #6 AWG STRANDED INSULATED (GREEN) FOR ALL INTERNAL EQUIPMENT GROUNDED.
  - I. MECHANICAL FASTENERS (I.E., DOUBLE LUGS, SPLIT BOLTS PARALLEL CONNECTORS) SHALL BE BRONZE, BRASS, COPPER OR STAINLESS STEEL AND HAVE NOALOX BETWEEN CONDUCTOR AND CONNECTION.
  - J. BOLTS, NUTS AND SCREWS USED TO FASTEN MECHANICAL CONNECTORS SHALL BE STAINLESS STEEL WITH STAR TYPE STAINLESS STEEL LOCK WASHERS.
  - K. ALL LUG TUBE FASTENERS SHALL PROVIDE TWO HOLES TO ALLOW A DOUBLE BOLT CONNECTION.

3.2 MASTER GROUND BAR (MGB):  
 THE PURPOSE OF THE MASTER GROUND BAR IS TO GROUND THE BTS AND ANY OTHER METALLIC OBJECTS AROUND THE BTS. IF AN MGB IS NOT PROVIDED WITH THE BTS, THE MGB SHALL BE AS FOLLOWS:  
 THE MGB IS A COPPER BAR MEASURING 4"W X 24"L X 1/4" LOCATED AS CLOSE TO THE BTS AS POSSIBLE. THE MGB SHALL HAVE A MINIMUM NUMBER OF 28 EACH 3/8" HOLES. GROUND BAR SHALL BE SUPPORTED BY MOUNTING BRACKETS WITH INSULATOR STANDOFFS. (2) #2 TINNED SHALL BE MECHANICALLY ATTACHED ((2) HOLE COMPRESSION LUG 3/8" HOLES, 1" CENTER TO CENTER SPACING) TO THE MGB AND DOWN LEADS THEN TAKEN THROUGH CONDUIT TO THE GROUND RING. THIS CONDUCTOR SHALL BE KEPT

SEPARATE AND ISOLATED UNTIL TERMINATING AT THE MAIN GROUNDED POINT, (I.E. EXTERIOR GROUND RING OR BUILDING STEEL).

3.3 ANTENNA GROUND BAR (AGB):  
 THE PURPOSE OF THE ANTENNA GROUND BAR IS PRIMARILY FOR LIGHTNING PROTECTION. COAXIAL CABLE IS USUALLY THE ONLY ITEM GROUNDED TO THIS BAR. HOWEVER IT IS ACCEPTABLE TO BOND EXTERIOR; CABLE TRAY, WAVE GUIDE PORTS AND CANTILEVERED WAVE GUIDE BRIDGES TO THE AGB.

THE AGB IS A COPPER BAR MEASURING 4"W X 24"L X 1/4" ON WHICH THE COAXIAL CABLE FROM THE ANTENNAS ARE PRIMARILY GROUNDED. THERE SHALL BE TWO AGBS, ONE LOCATED AT THE TOP OF THE TOWER AT THE START OF THE VERTICAL RUN OF COAX, THE OTHER AT THE BOTTOM OF THE VERTICAL RUN OF COAX BEFORE IT MAKES ITS BEND. (IF THE TOWER IS OVER 200 THERE SHALL BE A THIRD AGB LOCATED AT THE MIDDLE OF THE TOWER). THE AGB SHALL HAVE A MINIMUM OF 28 EACH 3/8" HOLES. GROUND BARS SHALL BE SUPPORTED BY MOUNTING BRACKETS WITH INSULATOR STANDOFFS. USE #2 AWG SOLID TINNED WIRE W/ 2-HOLE SHORT BARREL COMPRESSION LUGS 3/8" HOLES, 1" CENTER TO CENTER SPACING). THIS CONDUCTOR SHALL BE KEPT SEPARATE AND ISOLATED UNTIL TERMINATING AT THE MAIN GROUNDED POINT (I.E., EXTERIOR GROUND RING, OR BUILDING STEEL.)

3.4 SURGE ARRESTOR GROUND BAR: N/A  
 3.5 GROUND ROD AND GROUND RING PLACEMENT:

THE OUTSIDE GROUND RING SHALL BE PLACED AROUND THE BTS AT A DISTANCE OF TWO (2) FEET FROM THE BTS AT A DEPTH OF 3'-6" OR 6" BELOW THE FROST LINE, WHICHEVER IS DEEPER. RODS SHALL BE DRIVEN TO A DEPTH SUCH THAT THE TOP OF THE RODS IS AT THE LEVEL OF THE GROUND RING CONDUCTOR. THE RODS SHALL BE PLACED ALONG THE RING AT THE FOLLOWING LOCATIONS:

- A. BELOW THE AREA OF THE INTERNAL MASTER GROUND BAR (MGB) FOR CONNECTION TO THE MGB.
- B. NEAR THE CORNERS OF THE BTS.
- C. AS REQUIRED TO ACHIEVE A MAXIMUM SPACING OF EIGHT (8) FEET BETWEEN GROUND RODS ALONG THE RING PERIMETER.
- D. AS REQUIRED ALONG THE RING PERIMETER TO ACHIEVE 5 OHMS OR LESS RESISTANCE WHEN TESTED.
- E. TWO RODS LOCATED ON OPPOSITE SIDES AT EACH TOWER LEG OR MONOPOLE.
- F. ONE ROD LOCATED BENEATH EACH END OF THE WAVE GUIDE BRIDGE OR CABLE TRAY.
- G. ONE ROD LOCATED ADJACENT TO THE STANDBY GENERATOR, AND IF SEPARATED BY MORE THAN EIGHT (8) FEET, ONE LOCATED ADJACENT TO THE FUEL TANK.
- H. ONE ROD LOCATED AT THE BASE OF THE TOWER FOR THE AGB.

3.6 TOWER GROUNDED (IF REQUIRED):  
 ALL MONOPOLES SHALL HAVE TWO GROUND RODS (MINIMUM). ALL OTHER TOWERS SHALL HAVE TWO GROUND RODS PLACED AT THE BASE OF EACH TOWER LEG. EACH MONOPOLE OR TOWER LEG SHALL BE BONDED TO THE SYSTEM VIA TWO #2 BARE TINNED SOLID COPPER CONDUCTORS. BURNDY CONNECT THE CONDUCTORS TO ONLY STRUCTURAL BASE PLATES OR LUGS OR EARS AS MAY BE PROVIDED. NO BURNDY CONNECTIONS SHALL BE MADE TO THE VERTICAL WALLS OF THE STRUCTURE. NEVER GROUND TO HOLLOW LEG MEMBERS.

3.7 ANTENNA GROUNDED:  
 EACH ANTENNA COAXIAL CABLE SHALL TYPICALLY BE GROUNDED AT THREE POINTS USING A HARD-SHELL COAXIAL CABLE KIT FROM THE MANUFACTURER OF THE ANTENNA CABLE. A TYPICAL INSTALLATION SHALL BE AS FOLLOWS:

- A. THE FIRST GROUND CONNECTION SHALL OCCUR AS CLOSE TO THE ANTENNA AS POSSIBLE, BELOW THE FIRST POINT THE COAX CABLE BEGINS TO RUN VERTICAL DOWN THE TOWER. THIS GROUND SHALL TERMINATE DIRECT TO THE TOP AGB. ON A T/I, GROUND TO THE AGB AT THE ANTENNA MOUNTS.
- B. THE SECOND GROUND SHALL BE MADE AT THE BOTTOM OF THE VERTICAL RUN OF THE COAXIAL CABLE AS IT TURNS OUT AWAY FROM THE TOWER TOWARDS THE BTS. THIS GROUND SHALL BE TERMINATED AT THE GROUND BAR AT BASE OF TOWER. THE GROUND BAR SHALL HAVE TWO (2) LEADS OF #2 AWG BARE TINNED SOLID COPPER WIRE, AND SHALL TERMINATE AT THE TOWER GROUND RING. THESE SHALL BE ENCASED IN PVC PIPE.
- C. THE THIRD GROUND SHALL BE MADE PRIOR TO COAX ENTRY INTO BTS. THE GROUND WIRE SHALL BE TERMINATED AT THE MASTER GROUND BAR SHALL MASTER GROUND BAR. HAVE TWO (2) LEADS OF #2 AWG BARE TINNED SOLID COPPER WIRE, AND SHALL TERMINATE AT THE TOWER GROUND RING. THESE SHALL BE ENCASED IN PVC PIPE.

3.13 GENERATOR RECEPTACLE GROUNDED:  
 THE GENERATOR RECEPTACLE (HUBBLE PLUG) SHALL BE GROUNDED TO THE EGR.

3.14 COAX BRIDGE / CABLE TRAY GROUNDED :  
 BOND THE COAX BRIDGE OR CABLE TRAY TO THE AGB WITH #2 SOLID TINNED GROUND WIRE. THESE CONNECTIONS SHALL BE DOUBLE LUG BOLTED / SCREWED MECHANICAL CONNECTIONS WITH STAR LOCK WASHERS AND NOALOX. ALL BRIDGE SPLICES SHALL HAVE JUMPERS OF #2 SOLID WITH COMPRESSION LUGS.

3.15 CAD WELD & BURNDY CONNECTION:  
 CAD WELDS (EXOTHERMIC WELDS) AND BURNDY CONNECTIONS SHALL BOND ALL UNDERGROUND AND DAMP LOCATION CONNECTIONS, SHELTER SKID GROUNDS, TOWER OR MONOPOLE GROUNDS, FENCING CORNER AND AND GATE POSTS, ANTENNA GROUND BARS, (AGB) SURGE ARRESTER GROUND BAR, AND THE MASTER GROUND BAR (MGB). MECHANICAL CONNECTIONS SHALL BE TYPICALLY USED TO BOND ALL INTERIOR EQUIPMENT, COAX CABLE BRIDGES AND COAXIAL CABLE GROUND KITS. ALL LUG TYPE MECHANICAL CONNECTORS TO THE MGB OR AGB SHALL BE TWO HOLE TYPE CONNECTED WITH STAINLESS STEEL BOLTS AND NUTS WITH STAINLESS STEEL LOCK WASHERS AND NOALOX ON EITHER SIDE OF THE BUSS BAR.

3.16 CHEMICAL GROUND RODS (IF REQUIRED):  
 CHEMICAL GROUND RODS SHALL NOT BE INSTALLED ON GROUND RING INSTALLATIONS WITH NORMAL SOIL. CHEMICAL GROUND RODS SHALL BE INSTALLED ONLY FOR SPECIAL DESIGN APPLICATIONS THAT REQUIRE SINGLE POINT GROUNDED DUE TO SPECIFIC SITE CONDITIONS.

3.17 TENANT IMPROVEMENT SITE GROUNDED:  
 N/A

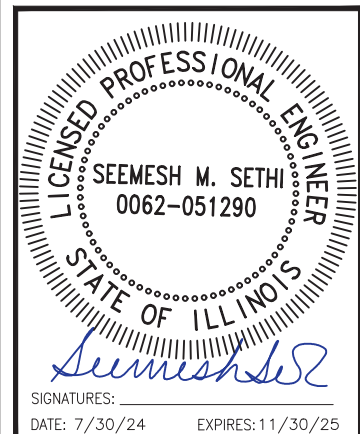
3.18 LIMITS OF BEND RADIUS:  
 IT IS IMPORTANT THAT THE GROUNDED CONDUCTOR CONNECTING THE INSIDE AND OUTSIDE GROUND SYSTEMS BE AS STRAIGHT AS POSSIBLE, WITH NO TURN OR BEND SHORTER THAN ONE FOOT RADIUS WITH A THREE FOOT RADIUS PREFERRED. NO RIGHT ANGLE OR SHARP BENDS SHALL BE ALLOWED.

3.19 BONDING PREPARATION & FINISH:  
 ALL SURFACES REQUIRE PREPARATION PRIOR TO BONDING OF EITHER CAD WELD OR BURNDY FASTENERS. GALVANIZED SURFACES SHALL BE GROUND OR SANDED TO THE POINT OF EXPOSING THE STEEL SURFACE BELOW, PRIOR TO BONDING THE GROUND CONDUCTOR. FOR OTHER SURFACES INCLUDING COPPER BUSS BARS ALL PAINT, RUST TARNISH AND GREASE SHALL BE REMOVED PRIOR TO BONDING THE GROUND CONDUCTOR. CAD WELD TYPE BONDS SHALL BE FINISHED WITH THE APPLICATION OF COLD GALVANIZATION AND WHEN APPLICABLE, FINISH PAINTED WITH AN APPROPRIATE COLOR AS REQUIRED. MECHANICAL TYPE BONDS ON BUSS BARS SHALL BE FINISHED WITH THE APPLICATION OF NOALOX OR OTHER APPROVED CONDUCTIVE MEDIUM MATERIAL BETWEEN CONNECTOR AND BUSS BAR. MECHANICAL TYPE BONDS ON ALL OTHER SURFACES SHALL BE FINISHED WITH THE APPLICATION OF COLD GALVANIZATION AND OR THE APPROPRIATE PAINT TO MATCH AS REQUIRED.

3.20 TESTING:  
 THE OUTSIDE GROUND RING SHALL BE TESTED AFTER INSTALLATION BUT PRIOR TO BACKFILLING THE GROUND RING TRENCH. THE GROUND FIELD RESISTANCE SHALL MEASURE 5 OHMS OR LESS TO GROUND. ANY DIFFICULTY IN ACHIEVING THIS LEVEL OF RESISTANCE MUST BE BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER. THE RESISTANCE TO GROUND SHALL BE MEASURED USING THE FALL OF POTENTIAL METHOD. TESTING SHALL BE PERFORMED BY AN OWNER PROVIDED INDEPENDENT TESTING LABORATORY FROM WHICH A WRITTEN REPORT SHALL BE PRODUCED FOR REVIEW BY THE PROJECT MANAGER.



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REV.	DESCRIPTION	DATE
0	ISSUED FOR PERMIT	7/30/24
B	ISSUED FOR REVIEW	5/14/24
A	ISSUED FOR REVIEW	3/11/24

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**ORLAND PARK WT**  
 17801 S. WOLF RD., ORLAND PARK, IL, 60467

Drawing Title:  
**NOTES**

Project Number:	Drawn by: PA
Client Project Number:	Checked by:
Scale:	Approved by: MS
Drawing Number	Date: