

REVIEWED BY:

1

PROPERTY OWNER OR REP.

RF

ZONING

NETWORK

CONSTRUCTION

CONTRACTOR

2

OPERATIONS

SITE ACQUISITION

- SCOPE OF WORK
- 3

1. INSTALLATION OF NEW ELECTRIC METER AT EXISTING BUILDING METER BANK. INSTALLATION OF POWER CONDUITS FROM NEW METER TO PPC ON EQUIPMENT PLATFORM ON ROOFTOP.

2. INSTALLATION OF NEW FIBER JUNCTION BOX PER FIBER COMPANY RECOMMENDATION. INSTALLATION OF 2"Ø FIBER CONDUITS & (2) ROPES INSIDE EACH CONDUITS FROM NEW FIBER JUNCTION BOX TO CIENA BOX ON ROOFTOP PLATFORM. INSTALLATION OF STEEL EQUIPMENT PLATFORM INSIDE ROOFTOP LEASE AREA.

3. INSTALLATION OF STEEL PLATFORM WITH STEEL BEAMS, STEEL POSTS, AND SCREEN WALL AT BETA SECTOR.

4. INSTALLATION OF STEEL REINFORCEMENTS FOR EXISTING ROOF JOISTS BELOW PROPOSED ALPHA & GAMMA SECTOR ANTENNA MOUNT LOCATIONS.

5. INSTALLATION OF BALLASTED NON-PENETRATING ROOFTOP ANGLE FRAMES AT ALPHA SECTOR.

6. INSTALLATION OF BALLASTED NON-PENETRATING ROOFTOP ANGLE FRAMES WITH SCREEN WALLS AT GAMMA SECTOR.

7. INSTALLATION OF (1) SSC-HPL3 AND (1) BBU-LB3 CABINETS ON EQUIPMENT PLATFORM. INSTALLATION OF (2) ROOFTOP JUNCTION BOXES, PPC & CIENA CABINET ON NEW PLATFORM. INSTALLATION OF (1) FYGA GPS ANTENNA ON EQUIPMENT PLATFORM.

8. INSTALLATION OF (3) OCTO ANTENNAS, (3) AEHC MASSIVE MIMO ANTENNAS, (3) AHLOAS & (3) AHFIGS ON ANTENNA SECTORS.

9. INSTALLATION OF JUMPER CABLES FROM ROOFTOP JUNCTION BOX TO ALPHA, BETA & GAMMA SECTOR RRUS. CABLES & CONDUITS TO BE MOUNTED ON CABLE TRAYS.

10. INSTALLATION OF RF JUMPERS FROM RRUS TO OCTO ANTENNAS.

11. INSTALLATION OF NEW ELECTRICAL GROUNDING WIRES.

4

5

SHEET NO.	SHEET TITLE	REV. NO.
T-1	TITLE SHEET	1
C-1	ROOF PLAN	1
C-2	EQUIPMENT PLATFORM DETAILED PLAN	1
C-3	ANTENNA SECTOR DETAILED PLANS	1
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C-9	EQUIPMENT INFORMATION	1
C-10	EQUIPMENT INFORMATION	1
C-11	MISCELLANEOUS DETAILS	0
C-12	ANTENNA MOUNT & ROOFTOP CABLE SUPPORT DETAILS	1
C-13	MISCELLANEOUS DETAILS	0
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S-1	STRUCTURAL NOTES, ROOF FRAMING PLAN	1
S-2	ALPHA & GAMMA SECTOR FRAMING DETAILS	1
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S-4	GAMMA SECTOR FRAMING DETAILS	1
S-5	GAMMA SECTOR FRAMING DETIALS	1
S-6	EQUIPMENT PLATFORM FRAMING DETAILS	1
S-7	PLATFORM LADDER AND HANDRAIL DETAILS	1
S-8	JOIST REINFORCEMENT DETAILS	1
E-1	FIRST & SECOND FLOOR UTILITY PLANS, ELECTRICAL NOTES	1
E-2	THIRD FLOOR UTILITY PLAN, UTILITY RISER DIAGRAM	0
E-3	ROOFTOP UTILITY PLAN	1
E-4	LEASE AREA UTILITY PLAN	1
E-5	LEASE AREA GROUNDING PLAN	1
E-6	GROUNDING DETAILS	0
N-1	NOTES	0
N-2	NOTES	0

T-Mobile®

SITE NAME

35 S. WASHINGTON ST. RT

SITE NUMBER

CH95063B

SITE ADDRESS

35 S. WASHINGTON ST.,  
NAPERVILLE, IL 60540

PROJECT TYPE

NSD (NEW SITE DEVELOPMENT) - NEW ANTENNAS AND  
EQUIPMENT PLATFORM MOUNTED ON ROOFTOP OF  
EXISTING BUILDING

GEOGRAPHIC COORDINATES (NAD 83)  
(OBTAINED FROM 1A CERTIFICATE DATED 10/10/2018.)

LATITUDE: 41° 46' 27.61" N

LONGITUDE: -88° 08' 53.28" W

GROUND ELEVATION: 686.40 FT (AMSL)

PROJECT SUMMARY

APPLICABLE CODES

- 2018 INTERNATIONAL BUILDING CODE
- 2017 NATIONAL ELECTRICAL CODE (NFPA 70)

APPLICANT

T-MOBILE L.L.C.  
1400 OPUS PLACE  
DOWNERS GROVE, IL 60515  
PHONE:  
FAX:

CONSTRUCTION CONTACT: CHRISTOPHER LYTLE  
PHONE NO.:

OPERATIONAL CONTACT:  
PHONE NO.:

UTILITIES

POWER: COMED

TELEPHONE: AT&T

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

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.

SITE DIRECTIONS

FROM T-MOBILE OFFICE:

- GET ON I-88 E IN LISLE TOWNSHIP FROM E OGDEN AVE
- CONTINUE ON I-88 E TO DOWNERS GROVE. TAKE EXIT 22 FROM I-355 N
- CONTINUE ON IL-56 E/BUTTERFIELD RD TO YOUR DESTINATION

SITE LOCATION

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., SCHAUMBURG, 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

SIGNATURES: \_\_\_\_\_

DATE: 7/27/20 EXPIRES: 11/30/20

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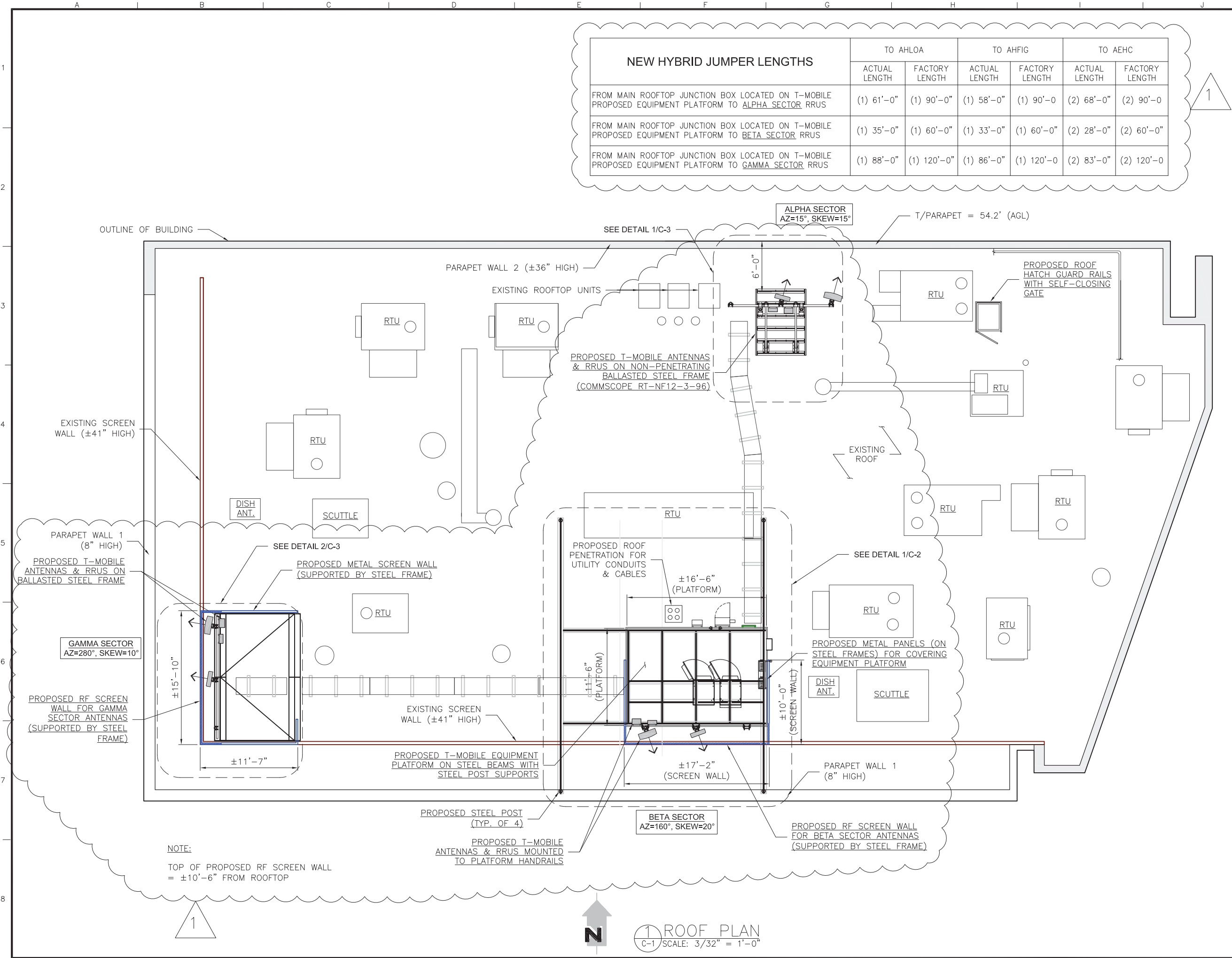
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35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:

TITLE SHEET

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
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T-1	



NEW HYBRID JUMPER LENGTHS	TO AHLOA		TO AHFIG		TO AEHC	
	ACTUAL LENGTH	FACTORY LENGTH	ACTUAL LENGTH	FACTORY LENGTH	ACTUAL LENGTH	FACTORY LENGTH
FROM MAIN ROOFTOP JUNCTION BOX LOCATED ON T-MOBILE PROPOSED EQUIPMENT PLATFORM TO ALPHA SECTOR RRUS	(1) 61'-0"	(1) 90'-0"	(1) 58'-0"	(1) 90'-0"	(2) 68'-0"	(2) 90'-0"
FROM MAIN ROOFTOP JUNCTION BOX LOCATED ON T-MOBILE PROPOSED EQUIPMENT PLATFORM TO BETA SECTOR RRUS	(1) 35'-0"	(1) 60'-0"	(1) 33'-0"	(1) 60'-0"	(2) 28'-0"	(2) 60'-0"
FROM MAIN ROOFTOP JUNCTION BOX LOCATED ON T-MOBILE PROPOSED EQUIPMENT PLATFORM TO GAMMA SECTOR RRUS	(1) 88'-0"	(1) 120'-0"	(1) 86'-0"	(1) 120'-0"	(2) 83'-0"	(2) 120'-0"

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LICENSED PROFESSIONAL ENGINEER  
SEEMESH M. SETHI  
0062-051290  
STATE OF ILLINOIS  
SIGNATURES:  
DATE: 7/24/20 EXPIRES: 11/30/21

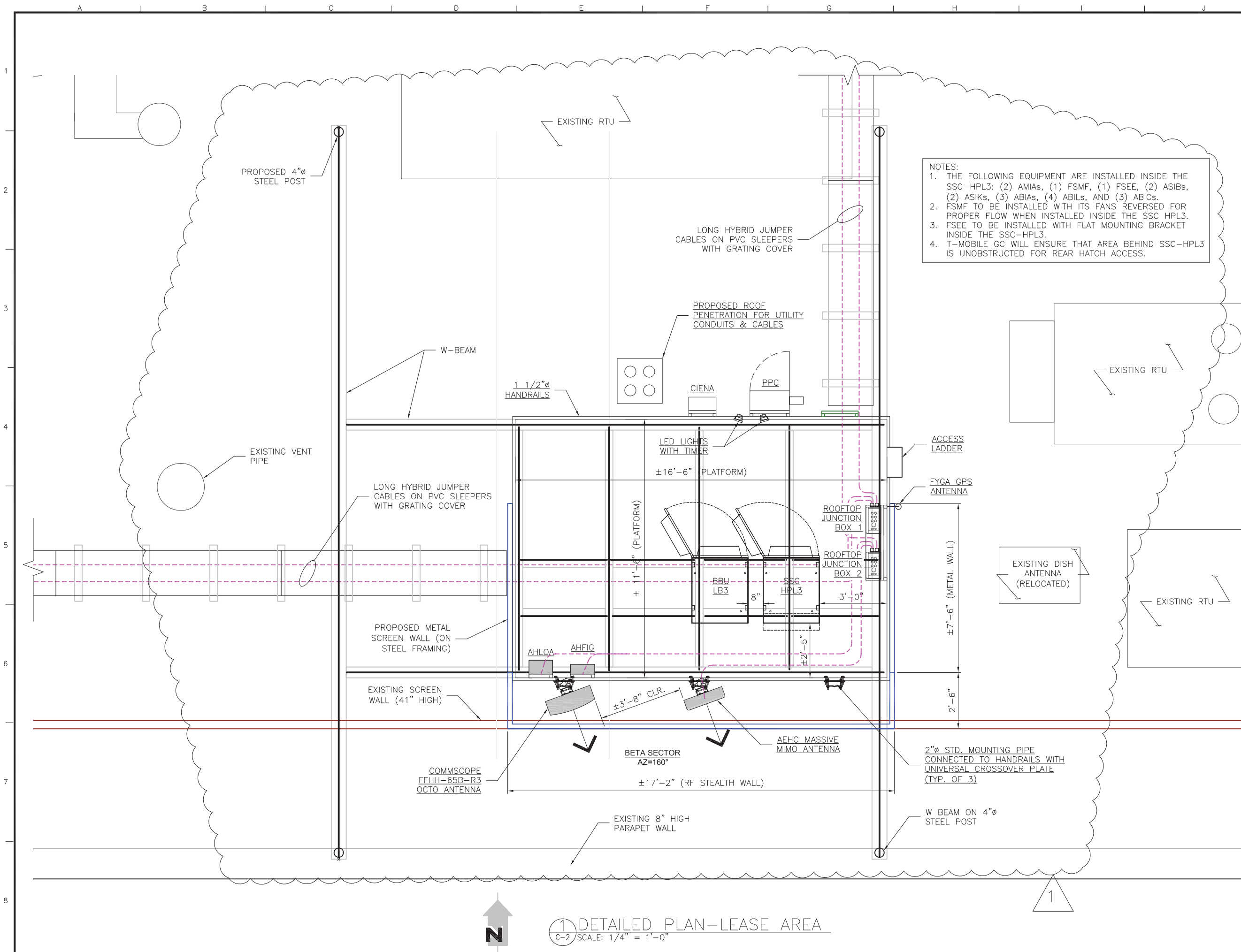
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Drawing Title:  
**ROOF PLAN**

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	Date: 8/23/18
	Approved by:
	Date:

Drawing Number:  
**C-1**



- NOTES:
1. THE FOLLOWING EQUIPMENT ARE INSTALLED INSIDE THE SSC-HPL3: (2) AMIAs, (1) FSMF, (1) FSEE, (2) ASIBs, (2) ASIks, (3) ABIAs, (4) ABILs, AND (3) ABICs.
  2. FSMF TO BE INSTALLED WITH ITS FANS REVERSED FOR PROPER FLOW WHEN INSTALLED INSIDE THE SSC HPL3.
  3. FSEE TO BE INSTALLED WITH FLAT MOUNTING BRACKET INSIDE THE SSC-HPL3.
  4. T-MOBILE GC WILL ENSURE THAT AREA BEHIND SSC-HPL3 IS UNOBSTRUCTED FOR REAR HATCH ACCESS.

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LICENSED PROFESSIONAL ENGINEER

SEE MESH M. SETHI

0062-051290

STATE OF ILLINOIS

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Drawing Title:

DETAILED LEASE AREA PLAN

Project Number:

Client Project Number:

Scale:

Drawing Number:

Drawn by: PA  
Date: 8/21/18

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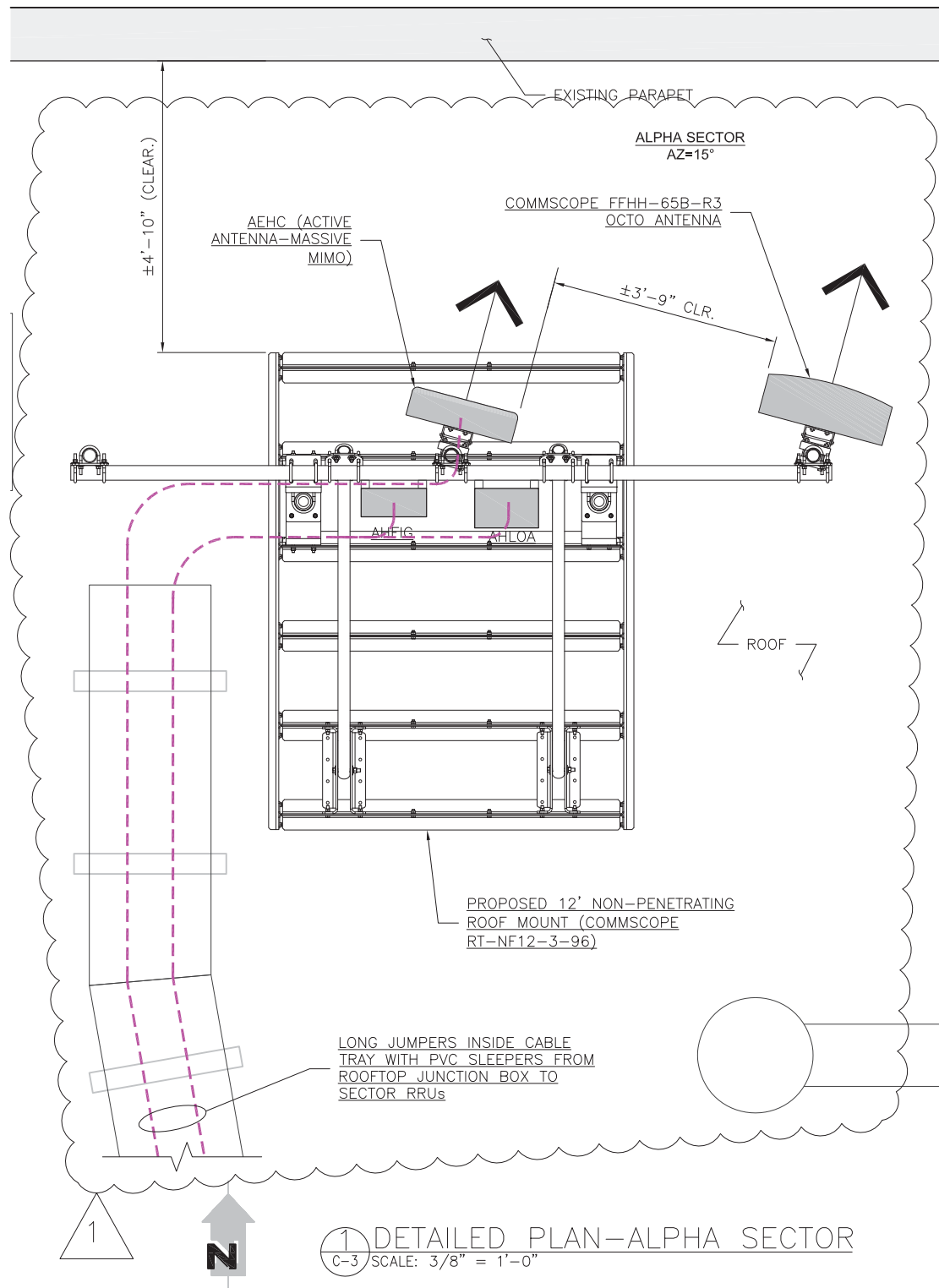
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C-2

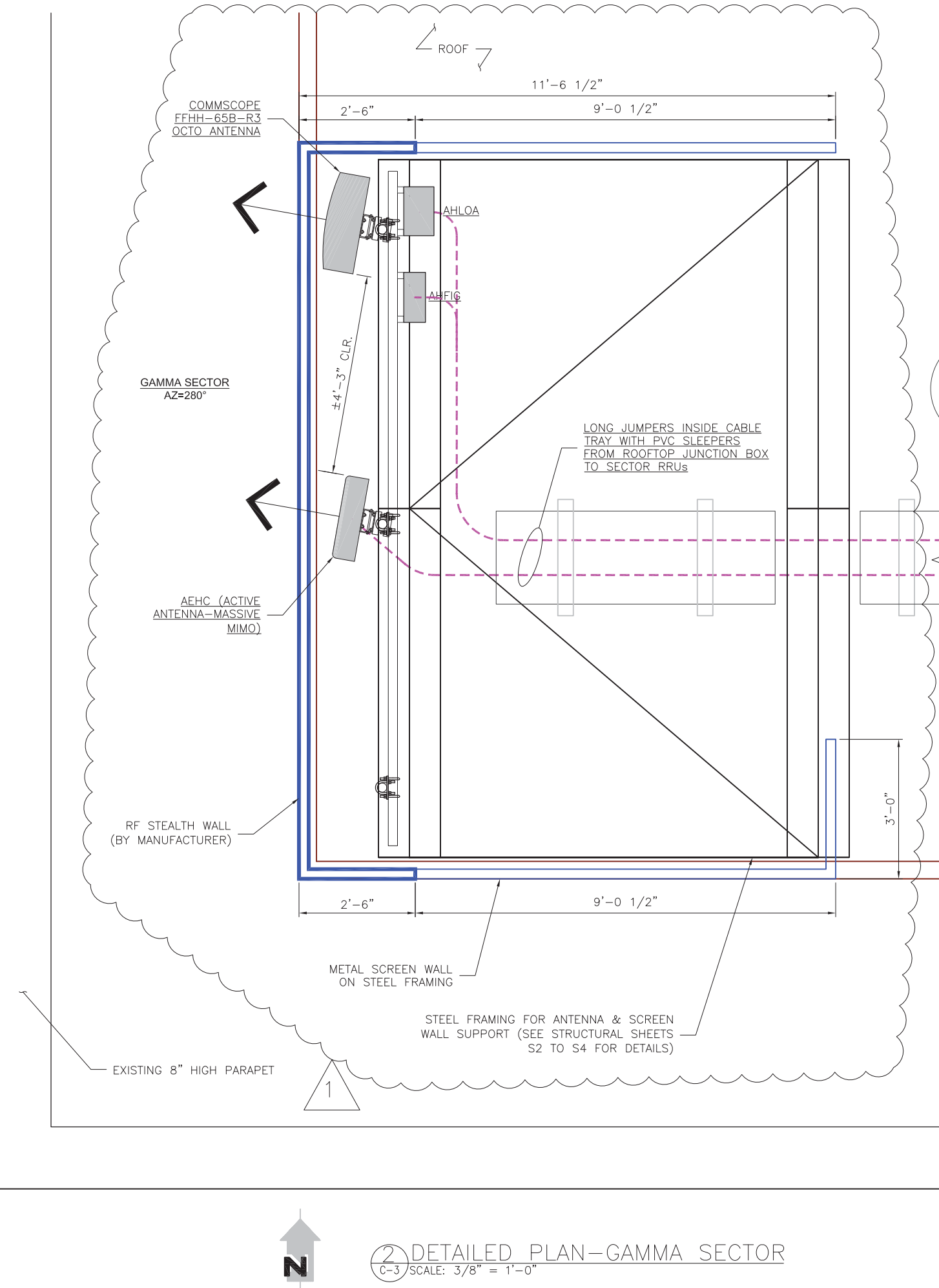


NOTE:

1. ALPHA SECTOR ANTENNAS, MOUNTING PIPES & FRAMES VISIBLE FROM GROUND LEVEL SHALL BE PAINTED TO MATCH THE UPPER WALL COLOR OF THE BUILDING.
2. GENERAL CONTRACTOR WILL COORDINATE WITH BUILDING OWNER FOR COLOR APPROVAL.



① DETAILED PLAN-ALPHA SECTOR  
C-3 SCALE: 3/8" = 1'-0"



② DETAILED PLAN-GAMMA SECTOR  
C-3 SCALE: 3/8" = 1'-0"

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0062-051290  
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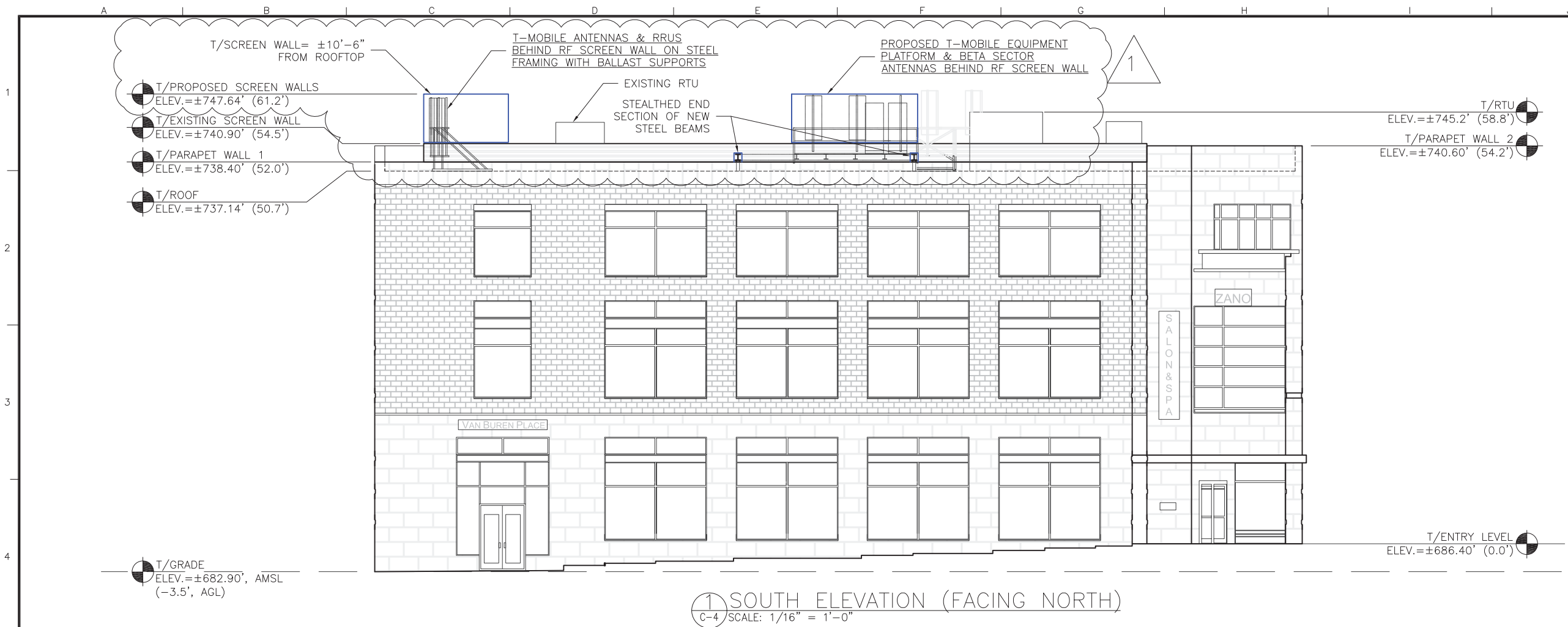
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Drawing Title:  
**SECTORS DETAILED PLANS**

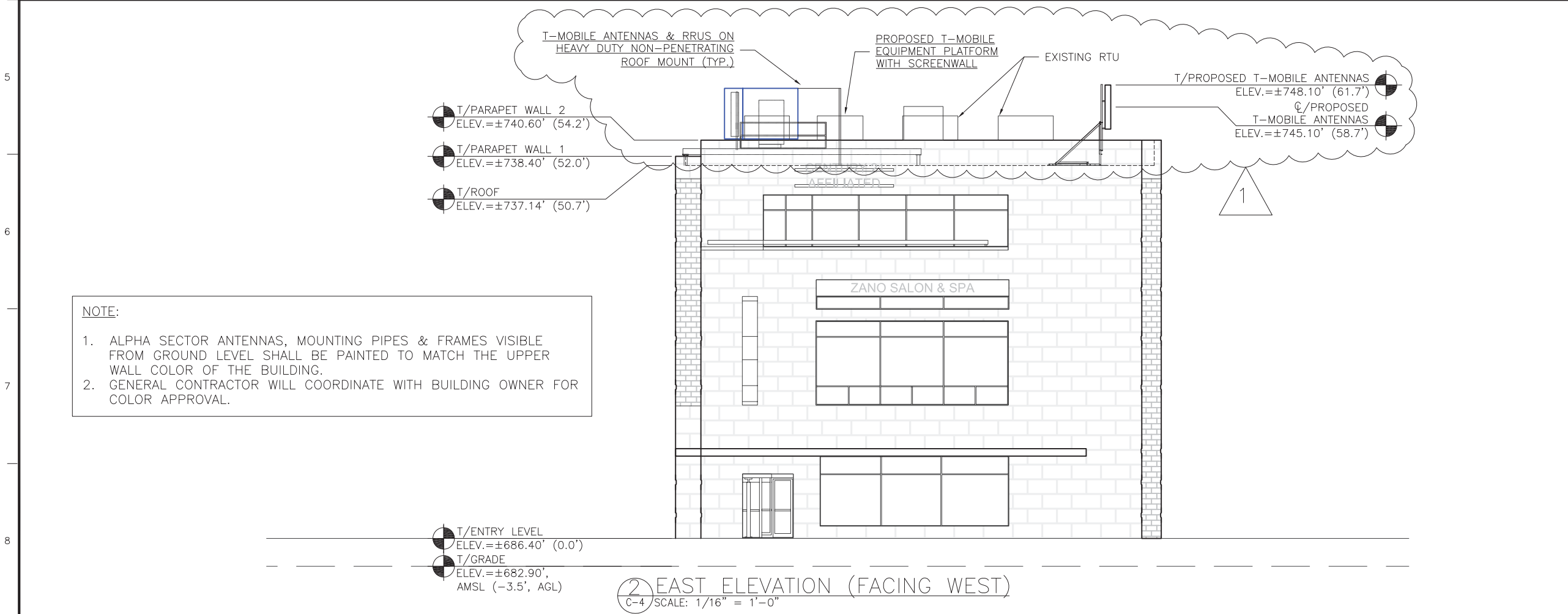
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Client Project Number:	Date: 8/21/18
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	Date: 8/23/18
	Approved by:
	Date:

Drawing Number  
**C-3**





1 SOUTH ELEVATION (FACING NORTH)  
C-4 SCALE: 1/16" = 1'-0"



2 EAST ELEVATION (FACING WEST)  
C-4 SCALE: 1/16" = 1'-0"

NOTE:

1. ALPHA SECTOR ANTENNAS, MOUNTING PIPES & FRAMES VISIBLE FROM GROUND LEVEL SHALL BE PAINTED TO MATCH THE UPPER WALL COLOR OF THE BUILDING.
2. GENERAL CONTRACTOR WILL COORDINATE WITH BUILDING OWNER FOR COLOR APPROVAL.

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**SEEMESH M. SETHI**  
0062-051290  
STATE OF ILLINOIS  
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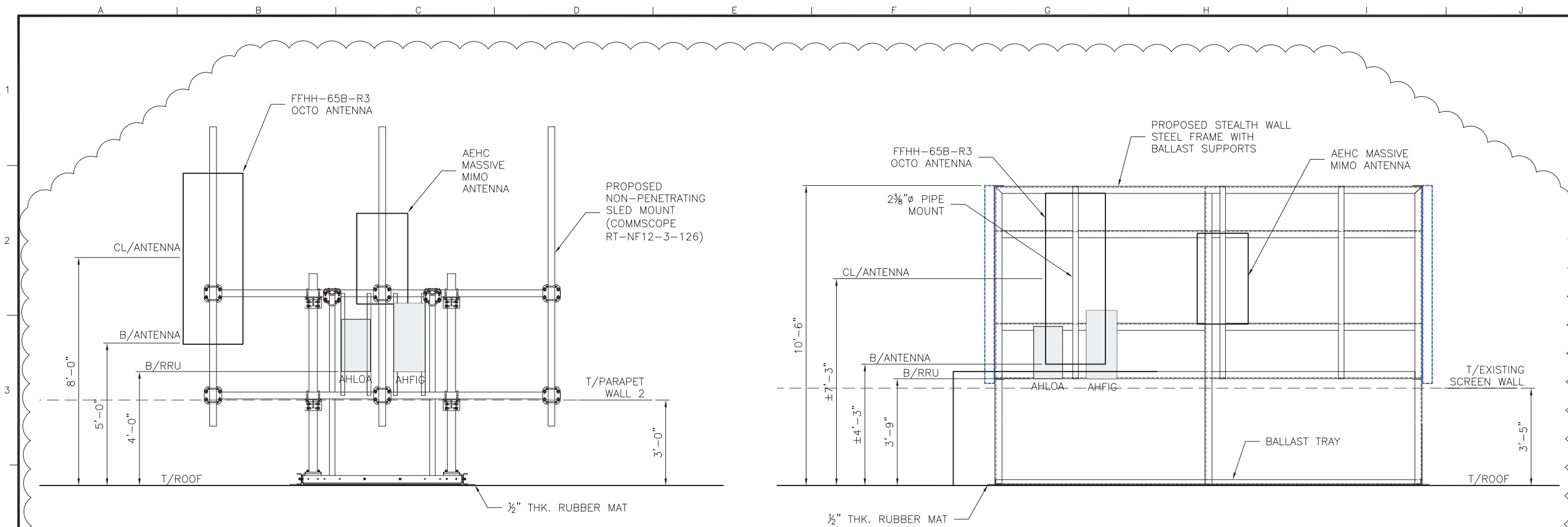
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Drawing Title:  
**BUILDING SOUTH & EAST ELEVATIONS**

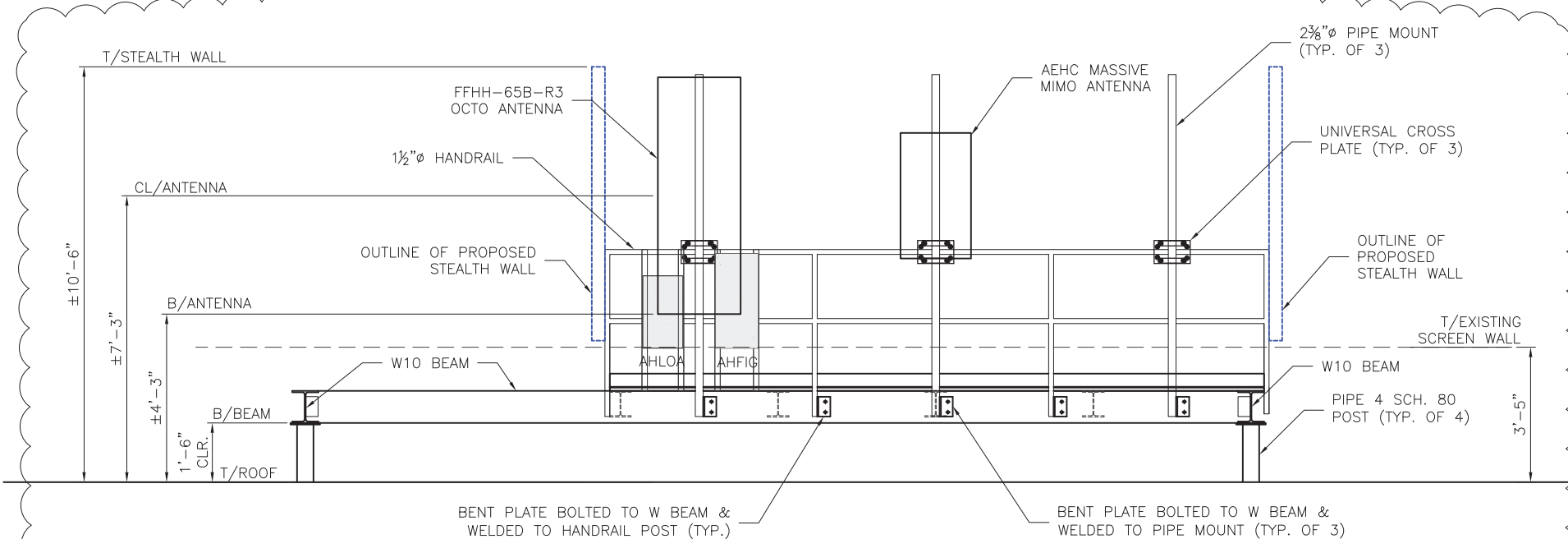
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	Date:

**C-4**



1 ALPHA SECTOR ANTENNAS & RRUS MOUNTING DETAIL  
C-5 SCALE: 1/4" = 1'-0"

2 GAMMA SECTOR ANTENNAS & RRUS MOUNTING DETAIL  
C-5 SCALE: 1/4" = 1'-0"



3 BETA SECTOR ANTENNAS & RRUS MOUNTING DETAIL  
C-5 SCALE: 1/4" = 1'-0"

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SEEEMESH M. SETHI

0062-051290

STATE OF ILLINOIS

*Seemesh M. Sethi*

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Drawing Title:

ANTENNA/RRU MOUNTING DETAIL

Project Number:	Drawn by: PA
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Drawing Title:  
ANTENNA & CABLE  
SCHEDULE, HYBRID  
JUMPER INFORMATION

Project Number:	Drawn by: PA Date: 8/21/18
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C-6

ANTENNA & CABLE SCHEDULE																
SECTOR	1					2					3					
SECTOR NAME	ALPHA					BETA					GAMMA					
ANTENNA	1				2	1				2	1				2	
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)	
AZIMUTH	15°					160°					280°					
RAD CENTER	±59.0'					±59.0'					±59.0'					
MECH. DOWNTILT	0				0	0				0	0				0	
PORTS	P1	P2	P3	P4	P5	P1	P2	P3	P4	P5	P1	P2	P3	P4	P5	
ACTIVE TECHNOLOGY	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900	L2100 L1900 G1900	L2500 N2500	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900	L2100 L1900 G1900	L2500 N2500	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900	L2100 L1900 G1900	L2500 N2500	
DARK TECHNOLOGY																
ELEC. DOWNTILT	2	2	2	2		2	2	2	2		2	2	2	2		
RRU TYPE	(1) AHLOA		(1) AHFIG		INTEGRATED TO AEHC ANTENNA	(1) AHLOA		(1) AHFIG		INTEGRATED TO AEHC ANTENNA	(1) AHLOA		(1) AHFIG		INTEGRATED TO AEHC ANTENNA	
CABLES																
CABLE TYPE FROM ROOFTOP JUNCTION BOXES/OVPS AT EQUIPMENT PLATFORM TO SECTOR RRU	LONG HYBRID JUMPER (HELIAX FIBERFEED HYBRID CABLE)					LONG HYBRID JUMPER (HELIAX FIBERFEED HYBRID CABLE)					LONG HYBRID JUMPER (HELIAX FIBERFEED HYBRID CABLE)					
ACTUAL JUMPER LENGTH	(1) 61'-0"		(1) 58'-0"		(1) 68'-0"	(1) 35'-0"		(1) 33'-0"		(1) 28'-0"	(1) 88'-0"		(1) 86'-0"		(2) 83'-0"	
FACTORY JUMPER LENGTH	(1) 90'-0"		(1) 90'-0"		(2) 90'-0"	(1) 60'-0"		(1) 60'-0"		(2) 60'-0"	(1) 120'-0"		(1) 120'-0"		(2) 120'-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		
JUMPER LENGTH	(2) 9'-0"	(2) 9'-0"	(2) 12'-0"	(2) 12'-0"		(2) 6'-0"	(2) 6'-0"	(2) 6'-0"	(2) 6'-0"		(2) 6'-0"	(2) 6'-0"	(2) 6'-0"	(2) 6'-0"		

1/



## FFHH-65B-R3

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



## Electrical Specifications

Frequency Band, MHz	617-698	698-806	1695-1880	1850-1990	1920-2200	2300-2360
Gain, dBi	14.1	14.3	17.6	18.4	19.0	19.7
Beamwidth, Horizontal, degrees	65	60	66	60	60	54
Beamwidth, Vertical, degrees	14.9	13.3	5.7	5.3	4.9	4.4
Beam Tilt, degrees	2-14	2-14	2-12	2-12	2-12	2-12
USLS (First Lobe), dB	19	17	20	19	19	20
Front-to-Back Ratio at 180°, dB	33	29	36	40	40	42
Isolation, dB	28	28	28	28	28	28
Isolation, Intersystem, dB	28	28	28	28	28	28
VSWR   Return Loss, dB	1.5   14.0	1.5   14.0	1.5   14.0	1.5   14.0	1.5   14.0	1.5   14.0
PMA, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port at 50°C, maximum, watts	250	250	200	200	200	200
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

## Electrical Specifications, BASTA\*

Frequency Band, MHz	617-698	698-806	1695-1880	1850-1990	1920-2200	2300-2360
Gain by all Beam Tilts, average, dBi	13.6	13.9	17.2	18.1	18.5	19.3
Gain by all Beam Tilts Tolerance, dB	±0.6	±0.6	±0.6	±0.5	±0.5	±0.5
Gain by Beam Tilt, average, dBi	2°   13.4 8°   13.7 14°   13.9	2°   13.8 8°   13.9 14°   13.8	2°   17.1 7°   17.3 12°   17.1	2°   18.0 7°   18.2 12°   17.9	2°   18.3 7°   18.6 12°   18.4	2°   19.0 7°   19.4 12°   19.2
Beamwidth, Horizontal Tolerance, degrees	±3	±4	±4.5	±5.6	±6.5	±7.9
Beamwidth, Vertical Tolerance, degrees	±1.1	±1.1	±0.3	±0.3	±0.4	±0.2
USLS, beampeak to 20° above beampeak, dB	19	17	15	15	16	17
Front-to-Back Total Power at 180° ± 30°, dB	24	21	29	32	32	32
CPR at Boresight, dB	22	24	18	16	18	22
CPR at Sector, dB	8	9	7	7	9	9

\* Commscope® supports NGM recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BASTA](#).

## Array Layout

page 1 of 4  
July 25, 2018

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## FFHH-65B-R3



## Port Configuration



## General Specifications

Operating Frequency Band 1695 – 2360 MHz | 617 – 806 MHz

page 2 of 4  
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## FFHH-65B-R3

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

## Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum   Low loss circuit board
Reflector Material	Fiberglass, UV resistant
RF Connector Location	Bottom
Wind Loading, frontal	765.0 N @ 150 km/h 172.0 lbf @ 150 km/h
Wind Loading, lateral	251.0 N @ 150 km/h 56.4 lbf @ 150 km/h
Wind Loading, maximum	1041.0 N @ 150 km/h 234.0 lbf @ 150 km/h
Wind Speed, maximum	241 km/h   150 mph

## Dimensions

Length	1830.0 mm   72.0 in
Width	640.0 mm   25.2 in
Depth	235.0 mm   9.3 in
Net Weight, without mounting kit	46.0 kg   101.4 lb

## Remote Electrical Tilt (RET) Information

Input Voltage	10-30 Vdc
Internal RET	High band (2)   Low band (1)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	10 W
Protocol	3GPP/4G/5G 2.0 (Single RET)
RET Interface	8-pin DIN Female   8-pin DIN Male
RET Interface, quantity	1 female   1 male

page 3 of 4  
July 25, 2018

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# 1 OCTO ANTENNA SPECIFICATIONS

SCALE: N.T.S.

## 5GC000657 Nokia AirScale MAA 64T64R 192AE B41 320W AEHC LTE4225 Nokia AirScale MAA 64T64R 192AE B41 320W AEHC 5GC002350 NR-LTE concurrent operation for AEHC eCPRI radios LTE5111 NR-LTE concurrent operation for eCPRI radios

## 1.1 64T64R Massive MIMO Adaptive Antenna AEHC (B41)

## Description

The AEHC is a new Massive MIMO Adaptive Antenna product with an integrated radio for Band 41 (2.5GHz) from Nokia. This antenna/radio unit is LTE and 5G capable and has beamforming for the Massive MIMO function, which provides coverage and capacity gains.

The deployment of Massive MIMO requires HW that supports this functionality. The AEHC has 64T64R and 5 W / TRX (320 W total, 2 W/MHz up to 160 MHz). The AEHC radio can be set up in concurrent mode with 64TRX designated for NR-LTE. Later SW versions will allow for beamforming function, and this requires the use of a TM9 UE for beamforming.

The AEHC will work with SRAN20B/5G20A SW in single mode for LTE/NR. The AEHC will be available in concurrent mode with SRAN20C/5G20B SW for LTE/NR. It deploys in a TDD configuration and is eCPRI based radio and will only work with the AirScale System Module. AEHC has 4 x SFP28 optical ports, and each AEHC requires – 1 fiber for LTE 3x20MHz 8DL4UL layers, 2 fibers required for NR when utilizing 2nd carrier example 100MHz+60MHz 8DL4UL layers or 2 fibers required for NR 100MHz+ 16DL8UL layers.

BW/Tech	TDD Layers	No of Carriers	No of Fibers	BB Requirements	Software Support
LTE 80MHz	8DL4UL	3x20MHz	1	1 ABIC per AEHC	SRAN20B
NR 100MHz	8DL4UL	1	1	1/2 ABIL per AEHC	5G20B
NR 100+80MHz	8DL4UL	2	2	1 ABIL per AEHC	Dual carrier
NR 100MHz	16DL8UL	1	2	1 ABIL per AEHC	TBD
NR 100+80MHz	16DL8UL	2	2	TBD	TBD



Diagram : AEHC 475124A

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



Since it is an antenna/radio integration it will be mounted as an antenna to ensure proper beam coverage. **DO NOT** mount the unit in a way that will have the beam blocked by parapets or so the face of the unit does not point towards the coverage area.

Additional features involved with AEHC are:

- 5GC002350 NR-LTE concurrent operation for AEHC eCPRI radios
- LTE5111 NR-LTE concurrent operation for eCPRI radios

The AEHC has the following main features:

Property	Value
Output power	5 W / TRX (320 W total, 2 W/MHz up to 160 MHz)
Modulation Support	(DL) BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM (UL) BPSK, QPSK, 16 QAM, 64 QAM
Number of TX/RX	64TX64RX
MIMO	16
Outdoor installation	Yes
SW supported technology	TD-LTE and 5G
Beamforming	Yes
RF Sharing (WCMDA/GSM/LTE)	No
Frequency Range	2496 MHz – 2690 MHz 3GPP B41
Instantaneous Bandwidth IBW	194 MHz
Occupied Bandwidth OBW	190 MHz
Number of Carriers per Pipe	Up to 3
Supported bandwidths	LTE: 60 MHz 5G: 60, 40/80/100MHz

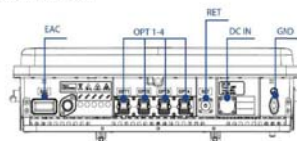
## 1.2 Antenna Properties

Macro Coverage Usage:

Property	Value
Antenna configuration	12, 8, 2 (±45°X-polarized)
Max. Antenna gain	24 dBi
Horizontal beamwidth	15°(boresight)
Vertical Beamwidth	6°(boresight)
Horizontal coverage angle	±45° (3 dB), ±60° (5 dB)
Vertical steering angle	0° to +12° (+ means down)
Vertical steering pre-tilt	+6°

## 1.2.1 AEHC Interfaces

The ports of the AEHC are shown below



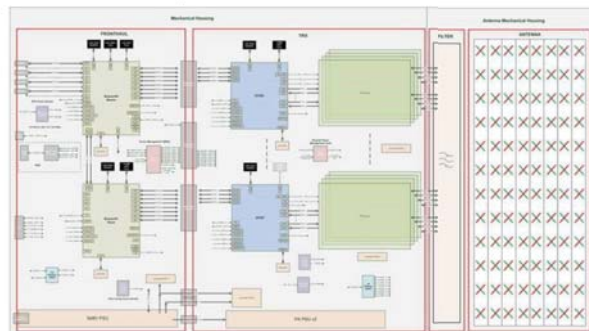
Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC IN	1	2-Pole screw terminal	-
Remote Electrical Tilt	RET	1	8-pin circular	RS-485
External Alarm Connection	EAC	1	MDR-26	-
Optical interface	OPT	4	SFP28 (OCTIS)	25 Gbps, eCPRI, OCTIS IP Seal
Local management Interface	LMI	1	HDMI	-
Grounding		1	2 x M5 screws	-

## 1.2.2 Antenna Line Devices (ALD) Support

ALD support via antenna ports	Value
AISG	RAE AISG 3.0
Voltage	10-30 V
Power per port	-

## 1.2.3 Functional Blocks

AEHC functional block diagram:



## 1.2.4 Installation/Mechanical Specifications

The installation and mechanical specifications for the AEHC are below:

Property	Value
Installation options	Pole Installation Wall Installation IP65
Related optional items	Pole Mounting Kit (AMPF) External alarm cable (ASAC EAC cable) Optical connector (AOPE) Power connector (APPG)SFP (AOSD)

## 1.2.5 Electrical Specifications

The electrical specifications for the AEHC are below

Property	Value
Nominal supply voltage	-48.0 V DC
Nominal input voltage range	-40.5 V DC to -57.0 V DC
Extended input voltage range	-36.0 V DC to -40.5 V DC -57.0 V DC to -60.0 V DC

## 1.2.6 Dimensions and Weight

Property	Value	Dimensions orientation
Height	970 mm (38.2 in.) with front covers	
Width	645 mm (21.5 in.) with front covers	
Depth	150 mm (5.9 in.) with front covers	
Weight	49 kg (108.0 lb) without mounting brackets	

## 1.2.7 Power Consumption

AEHC Power consumption is listed below:

- ≤1330 W typical (75% DL duty cycle, 30% RF load)
- ≤1827 W max (75% DL duty cycle, 100% RF load)

The detailed test results will be available upon AEHC availability for FOA.



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



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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REV.	DESCRIPTION	DATE

## CH95063B

35 S. WASHINGTON ST. RT

35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:

## ANTENNA INFORMATION

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
	Date: 8/23/18
	Approved by:
	Date:
Drawing Number	

C-7

# 2 AEHC MASSIVE MIMO ANTENNA SPECIFICATIONS

SCALE: N.T.S.

1





## HP-Large 3 Power Cabinet

### Product Features

Compact design for equipment & power:

- 30RU supports 3 radios and transport equipment
- 600A @ -48V power system
- Slimline high efficiency rectifier
- ORION Touch screen Controller
- Rear Access Hatch

Direct air-cooling solution, 6000W capacity, 5°C delta T

Easy slide-in filter replacement

Connects with:

- SB3, 2-string battery cabinet
  - LB3, 4-string battery cabinet
  - V2, Expansion equipment and battery cabinet
- Designed to GR-487 specifications

www.deltaww.com



### Specifications

#### Model HPL3 (HP-Large 3 Power Cabinet)

1. General	Aluminum enclosure
Construction	30 x 72 x 34.6 in. (762 x 1829 x 879mm)
Dimensions (W x H x D)	Depth with Door/Hatch: 44.7 in. (1136mm)
Weight	~565 lbs (~256kg) (without customer equipment or batteries)
Internal rack dimension	Horizontal rack: 19" x 27RU Vertical rack: 19" x 3RU Power System space: 23" x 12RU
Mounting options	Pad-mount, plinth option
Finish	Polyester Power Paint (Tan)
Safety	UL Listed, IEC / EN 60950
2. Environment	
Operating temperature	-40°C to +50°C (-40°F to +122°F) with solar load, IP 55
Protection class	designed to GR-487
Acoustics	65dBA @5000W heat load, 70dBA @ 6000W
Humidity (relative)	95%, non-condensing (Max.)
3. Thermal Management	
Cooling Equipment	Direct Air Cooling, 6000W capacity, 5°C delta T
Heating Equipment	Forced air heating (2) 1000W AC heaters
4. Equipment	
Cable entry	Knock-out plate on each upper side wall / Additional knockouts on sides (1) 3" conduit hole with hole plug
Door latch	3 point latching, 5/16 nut driver tool, pad-locking capability
Primary ground	10 double-hole 1/2"-20 threaded holes on 5/8" center ground bar
Lifting Ears	4 Lifting Tabs
Plinth	Optional 6" plinth available
AC Load Center:	240V split phase, dual feed / (1) 200A + (1)100A 208V 3-phase, single feed / (1) 200A AC Surge Protection for each breaker feed GFCI Receptacle 120V Temp Probes (6 form-C) Alarm Termination block 605A/ 54V (336W) redundant Power System with DIN rail distribution: 12 rectifier positions (3x5A DPM3000 rectifiers included) 48 poles for load (2x10A, 3x50A, and 6x100A load breakers included) 18 poles for battery (2) SB350 / (2) SB175 Battery connections (3) SB350 Generator connections (6) DC powered centrifugal fans with (3) MERV-13 filters, (GORE option) Clogged Filter alarm pressure switch Door intrusion alarm (2) 1000W AC powered heaters LED interior cabinet light
Front Door:	Exhaust vent with (3) MERV-13 filters, (GORE option)
Rear Hatch:	

5. Ordering Information	
Cabinet	ESQA600-HCU01 HP-Large 3 600A Power / Equipment Cabinet
Rectifier	ESR-48/60A-A 48V / 56A 3000W, 96.4%, CAN communication
Controller (Spare)	TPS102002BAU17 Orion TOUCH Controller
Plinth, 6"	37993318816900-S Plinth for V1/V2, HPL2, HPL3, LB2 and LB3

\*All specifications are subject to change without prior notice

Delta Group Website:  
www.deltaww.com

Product Website:  
www.deltapowersolutions.com

United States of America & Canada:  
Delta Electronics (USA) Inc.  
2925 E. Plano Parkway  
Plano, TX (Texas) 75074

Sales and Order:  
DEUSTPS.Sales@deltaww.com  
DEUSTPS.Orders@deltaww.com

Field Support:  
1-877-DELTA-08 option 3  
(877-335-8208 option 3)  
DEUSTPS.Support@deltaww.com

Installation Services:  
DEUSTPS.Services@deltaww.com

RMA:  
DEUSTPS.RMA@deltaww.com



## Large Battery 3 Cabinet

LB3 Site Support Enclosure

### Product Feature

- Direct air cooling solution with optional Gore filter
- Supports four strings of -48V VRLA batteries up to 210Ah
- 600A bus bar with individual 200A breakers per string
- Bulk Input / Output with ability to daisy chain cabinets
- Connection kit includes cables with disconnects
- Rear hatch access
- Corrosion resistant aluminum construction
- Powder coated high gloss finish
- Designed to meet GR-487

www.deltaww.com



### Specifications

#### Model Large 3 Battery (LB3) Cabinet

1. General	Aluminum enclosure
Construction	30 x 72 x 35 in. (762 x 1829 x 890mm) Depth with door: 41 in. (1041mm)
Dimensions (W x H x D)	~540lbs (~245kg) (without batteries)
Weight	4 battery trays to support up to 210Ah batteries
Internal rack dimension	4 battery trays to support up to 210Ah batteries
Mounting options	Pad-mount, plinth option
Finish	Polyester Powder Paint (Tan)
Safety	UL Listed, IEC / EN 60950
2. Environment	
Operating temperature	-40°C to +50°C (-40°F to +122°F) with solar load
Protection class	IP55 designed to GR-487
Acoustics	65 dBA
Humidity (relative)	95%, non-condensing (Max.)
3. Thermal Management	
Cooling	Direct Air Cooling, (4) Axial Fans, Filters, F8 front and rear
Heating	Forced air heating (2) 1000W AC heaters
4. Equipment	
Cable Entry	Knock-out plate on each upper side wall Additional knockouts each side
Door latch	3 point latching, 5/16 Nut driver tool, pad-locking capability
Lifting Ears	4 eye bolts
Standard equipment	AC Load Center with AC Surge protection and GFCI outlet Left or Right side AC entry options (2) 1000W AC powered heater DC Load Center 600A bulk feed bus bar (4) 20050A DIN rail battery breakers (4) 2-hole lug landings (2) Anderson SB350 input connectors to daisy chain 2nd battery cabinet 24VNG battery cables from breakers to trays Configurable trays for (4) strings of up to 210Ah batteries Door intrusion switch LED interior cabinet light Fan Control Board, factory wired alarms via RJ45 output (fan & breaker alarm) Cabinet Connection kit (2) 4/0 cables with SB350 disconnects to connect to power cabinet
5. Ordering Information	
Cabinet	ESQF015-ECV04 Large Battery 3 Cabinet
Plinth, 6"	37993318816900-S Plinth for V1/V2, HPL2, LB2 cabinets only

\*All specifications are subject to change without prior notice

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Product Website:  
www.deltapowersolutions.com

United States of America & Canada:  
Delta Electronics U.S. Inc.  
2925 E. Plano Parkway  
Plano, TX (Texas) 75074

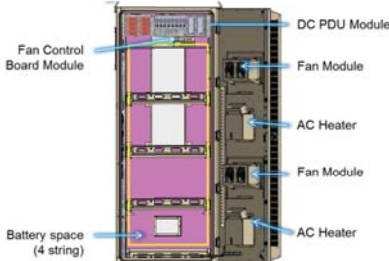
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Orders: DEUSTPS.Orders@deltaww.com

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DEUSTPS.Support@deltaww.com

Installation Services:  
DEUSTPS.Services@deltaww.com

RMA:  
DEUSTPS.RMA@deltaww.com

EN\_41320219



## Nokia AirScale SM Indoor Technical Datasheet

### AirScale SM Indoor general specification

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



Minimum configuration (1x BTS)



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



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

### AirScale SM Indoor mechanical specifications

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

### AirScale SM Indoor electrical specifications

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

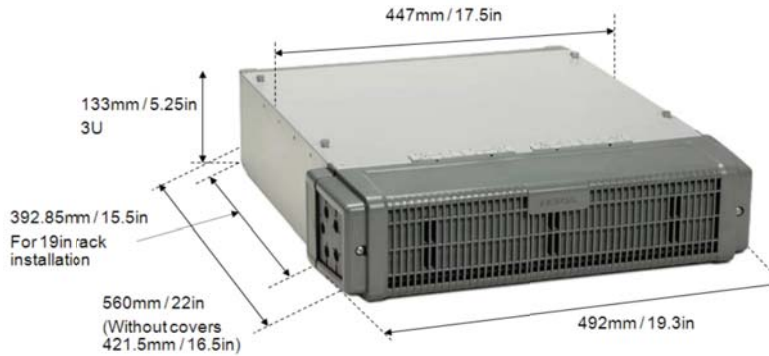
One logical BTS in full subrack  
(Future releases)

NOKIA

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

## Flexi Multiradio BTS System Module FSMF

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



NOTE:  
FSMF TO BE INSTALLED WITH ITS  
FANS REVERSED FOR PROPER  
AIR FLOW WHEN PLACED INSIDE  
THE SSC-HPL3.



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

1

T-Mobile

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

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CONSULTING ENGINEERS

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1125 REMINGTON RD., SCHAMBOURG, IL 60173  
PHONE: 847-490-8200; FAX: 847-490-8225  
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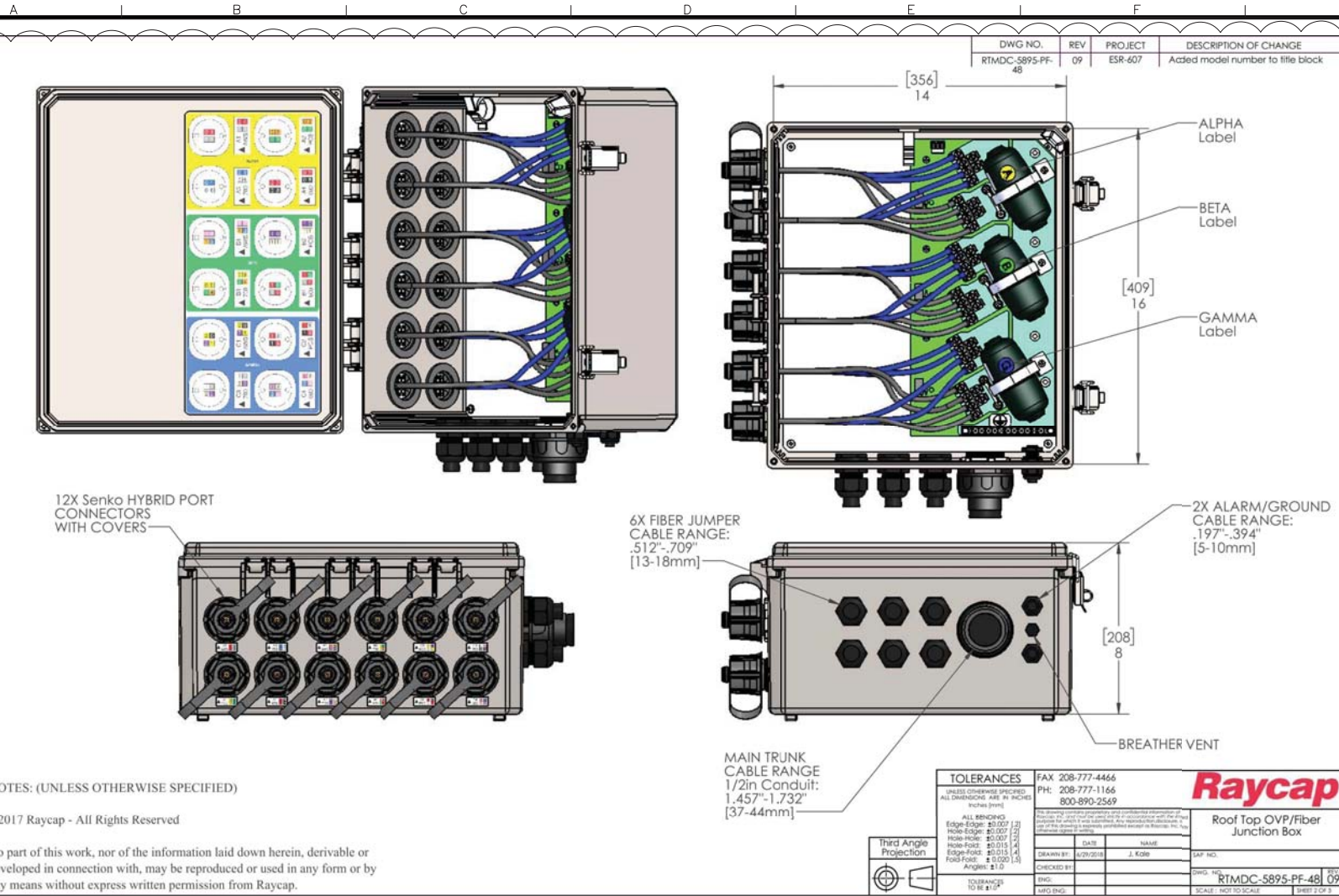
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**EQUIPMENT  
INFORMATION**

Project Number:	Drawn by: PA
Client Project Number:	Checked by: MS
Scale:	Date: 8/23/18
Drawing Number	Approved by: Date:

C-8

1 DETAIL-HP LARGE SITE SUPPORT CABINET & BBU  
SCALE: N.T.S.







AirScale Dual RRH 4T4R B12/71 240W AHLOA ( Draft)



Product Code: 474331A	
Supported Frequency bands	3GPP Band 12/71
Frequencies	Band 12 adjusted: Rx 698 – 715 MHz, TX 728 – 745 MHz Band 71: Rf 663 MHz – 698 MHz, TX 617 MHz – 652 MHz
Number of TX/RX paths/pipes	4 pipes; 2T2R, 2T4R, 4T4R for both bands
Instantaneous Bandwidth IBW	16 MHz for B12 and 35MHz for B71 1 MHz below B12 NB IoT future use
Occupied Bandwidth OBW	52 MHz total across bands
Output Power	60W per TXshared between bands
Supply Voltage / Range	DC-48 V / -36 V to -60 V
Typical Power Consumption	664W [ETSI Busy Hour Load at 4TX@60W (Both Bands Active)] 395W [ETSI Busy Hour Load at 4TX@30W (One Band Active)]
Antenna Ports	4 ports, 4.3-10+
Optical Ports	2 x CPRI 9.8 Gbps
ALD Control Interfaces	AISG3.0 from ANT1, 2, 3, 4 and RET (DC on ANT1 & ANT3)
Other Interfaces	External Alarm MDR-26 Serial connector (4 inputs, 1 Output) DC Circular Power Connector
Physical	560 mm x 308 mm x 189 mm (22.05" x 12.13" x 7.44") Approximately 38kg with no covers or brackets (83.78 lbs)
Operating Temperature Range	-40°C to 55°C (with no solar load)
Surge Protection	Class II 5A
Installation Options	Vertical & Horizontal Book Mount, Pole & Wall Mount

1  
DETAIL-AHLOA  
SCALE: N.T.S.

LTE5213/SR002411: Nokia Airscale Dual RRH 4T4R B25/B66 Module AHFIG



Description

LTE5213/SR002411: Nokia AirScale Dual RRH 4T4R B25/66 480 W AHFIG feature in release LTE19A/SRAN19A introduces the new Nokia AirScale Multiband Remote Radio Head with four transmitters and four receivers for 3GPP Band 25 and Band 66 enabling it to support one sector and two bands simultaneously with up to 4x40 W for B66 and 4x80 W for B25 at the antenna connector.

AHFIG is an updated version of the AHFIB with an improvement in the output PA power for B25 to 4x80 W as compared to 4x40 W in AHFIB. Output PA power for B66 is same as AHFIB (4x40 W).

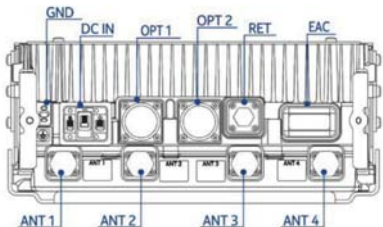
This radio can be used in LTE only or LTE/WCDMA/GSM using the SRAN functionality. Classical RF sharing with WCDMA or GSM is not supported with this radio. The AHFIG radio will work only with AirScale system module. The AHFIG is a 5G capable radio.

The AHFIG is a 4TX/4RX RRH for Band 25 and Band 66. There are four ports on the RRH. It is a one sector radio optimized for macro BTS installations.



AHFIG Interfaces

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: 327 mm (12.9 in.)
Depth	Core RRH: 131 mm (5.2 in.) With mounting cover: 142 mm (5.6 in.)
Weight	Core RRH: 32 kg (70.5 lb)

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



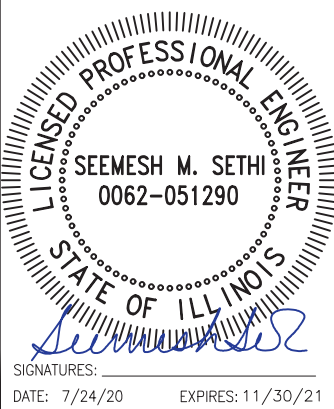
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C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

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Drawing Title:  
EQUIPMENT  
INFORMATION

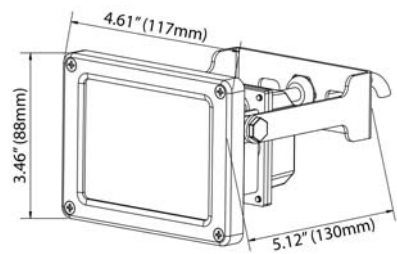
Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
	Date: 8/23/18
	Approved by:
	Date:

Drawing Number  
C-10





INPUT WATTAGE	14.0	BEAM ANGLE	14.0
INPUT VOLTAGE RANGE	120-277	BEAM TYPE	WIDE
DELIVERED LUMENS	1260.0	POWER FACTOR	0.90
EFFICACY (lm/W)	95.0	MAX THD (%)	14
COLOR RENDERING INDEX (CRI)	82	MINIMUM AMBIENT TEMP (°F)	-31
COLOR TEMPERATURE (CCT)	5000	MAXIMUM AMBIENT TEMP (°F)	115
EQUIVALENT WATTAGE	100W QH	PRODUCT WEIGHT (LBS.)	1.50

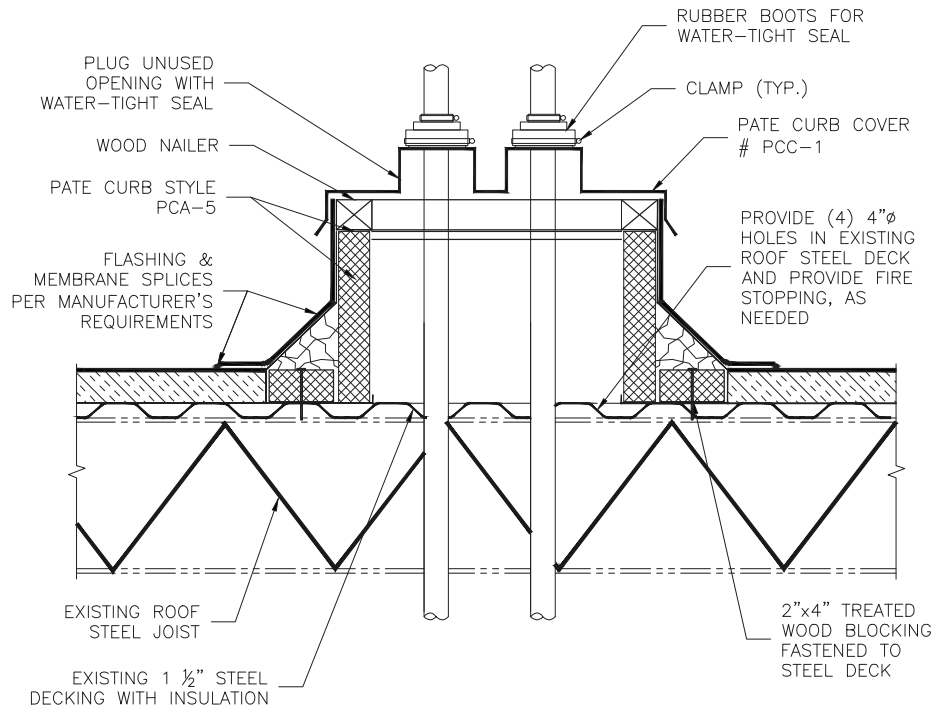


MAXLITE FLS15U50B-MAX  
ORDER # 77088

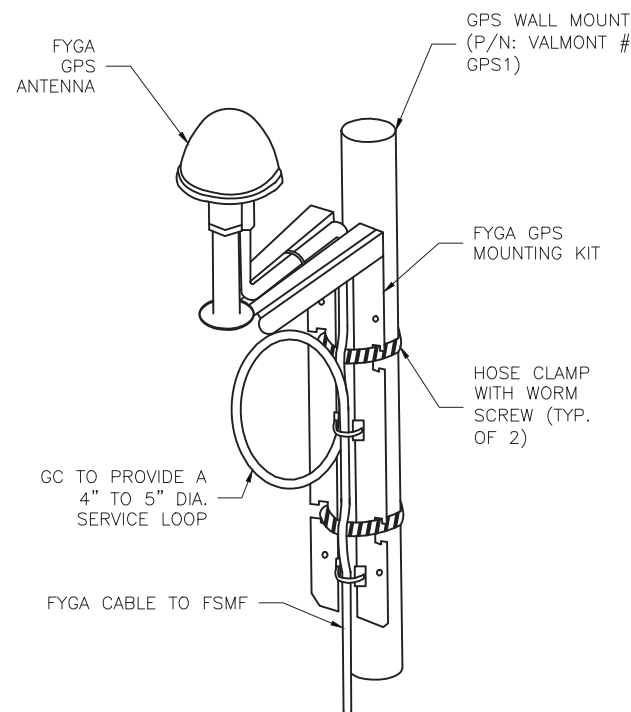
ADDITIONAL LIGHTING ACCESSORIES SPECIFICATIONS:

- TWO GANG CLEAR COVER, EXTRA DUTY WITH LOCKABLE ENCLOSURE: SIGMA # 14425 OR EQUIVALENT.
- MECHANICAL COUNTDOWN TIMER: INTERMATIC # FF60MC, OR EQUIVALENT.
- CAST ALUMINUM 2 GANG WEATHER PROOF FS BOX, NO LUGS, DEEP BOXI APPLETON, HUBBELL-KILLARK, OR EQUIVALENT. USE BACK OF GANG BOX FOR ENTRY INTO PPC, SEAL FLUSH AGAINST PPC WITH GASKETING MATERIAL, AND/OR SEAL EXTERIOR PERIMETER WITH SILICONE BEAD TO PREVENT WATER INTRUSION.
- GFCI, 15 AMP: LEVITON MT759-T OR EQUIVALENT.

1 DETAIL-LED LIGHTS  
SCALE: N.T.S.



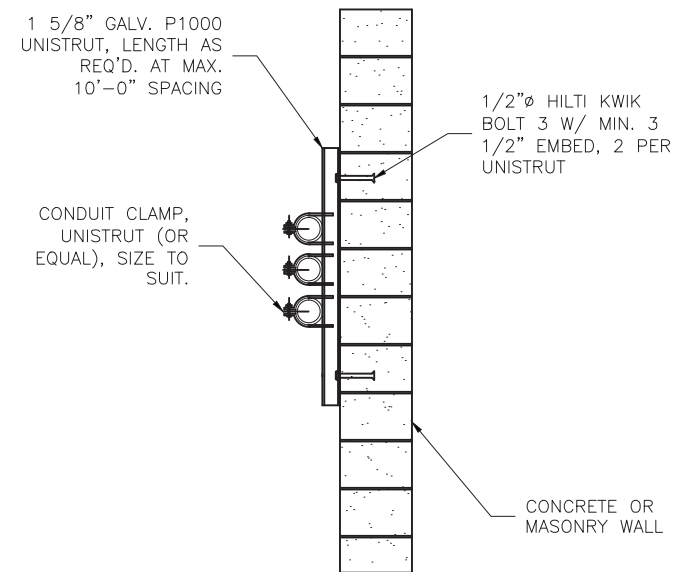
3 CONCRETE ROOFTOP PENETRATION  
SCALE: N.T.S.



2 FYGA GPS ANTENNA DETAIL  
SCALE: N.T.S.

NOTES

- THE GPS ANTENNA MOUNT IS DESIGNED TO FASTEN TO A STANDARD 1-1/4" DIA. SCH. 40 GALVANIZED OR STAINLESS STEEL PIPE. THE PIPE MUST BE THREADED AT THE ANTENNA MOUNT END. THE PIPE SHALL BE CUT TO THE REQUIRED LENGTH (MIN. OF 18") USING A WAND OR ROTARY PIPE CUTTER TO ASSURE A SMOOTH PERPENDICULAR CUT. THE CUT PIPE END SHALL BE DEBURRED AND SMOOTH IN ORDER TO SEAL AGAINST THE NEOPRENE GASKET ATTACHED TO THE ANTENNA MOUNT.
- THE MOUNTING PLATE SHALL BE FABRICATED AS SHOWN AND ATTACHED TO THE APPROPRIATE SUPPORT STRUCTURE USING U-BOLTS. THE SUPPORT PIPE FOR THE GPS SHALL BE MOUNTED USING OVERSIZED U-BOLTS TO ALLOW ADJUSTMENT. IT IS CRITICAL THAT THE GPS ANTENNA IS MOUNTED WITHIN 2" OF VERTICAL AND THE BASE OF THE ANTENNA IS WITHIN 2" LEVEL.
- INSTALL GPS ANTENNA AS SPECIFIED ON SITE PLAN. IF INSTALLING ON ICE/CABLE BRIDGE ENSURE THAT GPS IS A MINIMUM OF 10' ABOVE GRADE.
- GENERAL CONTRACTOR SHALL ENSURE THE GPS ANTENNA HAS THE REQUIRED FULL EXPOSURE TO THE SOUTHERN HEMISPHERE/HORIZON.



4 CONDUIT SUPPORT AT WALL/CEILING  
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Drawing Number	Date:

C-11

RT-NF/RT-DNF

COMMScope®

Document: RT-NF Rev 110419



RT-NF

GENERAL SPECIFICATIONS

Single Ballast Roof Top Sector Frame  
Modular frame with various configurations  
Includes: Frame | Pipe Mounts | Brackets  
Material Type: Hot Dip Galvanized Steel

MECHANICAL SPECIFICATIONS

Pipe Diameter - Horizontal 73 mm | 2.875 in.  
Antenna Pipe Diameter 73 mm | 2.875 in



RT-DNF

GENERAL SPECIFICATIONS

Double Ballast Roof Top Sector frame  
Modular frame with various configurations  
Includes: Frame | Pipe Mounts | Brackets  
Material Type: Hot Dip Galvanized Steel

MECHANICAL SPECIFICATIONS

Pipe Diameter - Horizontal 73 mm | 2.875 in.  
Antenna Pipe Diameter 73 mm | 2.875 in

1 | Page

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RT-NF/RT-DNF

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MOUNT CLASSIFICATION CRITERIA

MOUNT MODEL	TIA-5053 MOUNT CLASSIFICATION	AT&T Mount Classification
RT-NF7-2-126	M1500R(1000)-2[12]	Heavy-WLL (2 Mount Pipes)
RT-NF10-3-126	M1500R(1000)-3[6]	Heavy-WLL (3 Mount Pipes)
RT-NF12-4-126	M1000R(1000)-4[6]	Heavy-5 (4 Mount Pipes)
RT-DF12-4-126	M1500R(1000)-4[18]	Heavy-WLL (4 Mount Pipes)
RT-DF14-4-126	M1500R(1000)-4[15]	Heavy-WLL (4 Mount Pipes)

Notes:

1. For more details please refer mount classification letter, RT-NF, RT-DF Mount Classification 60400-01-STR-LET document

RT-NF CONFIGURATION

PART NO.	DESCRIPTION	WEIGHT (LBS.)
RT-NF-BAL	BALLAST TRAY	420
RT-NF7-B	MOUNT, 7" BALLAST W/O PIPES	811
RT-NF7-2-96	MOUNT, 7" BALLAST W/2 96" PIPES	936
RT-NF7-2-126	MOUNT, 7" BALLAST W/2 126" PIPES	966
RT-NF7-3-96	MOUNT, 7" BALLAST W/3 96" PIPES	998
RT-NF7-3-126	MOUNT, 7" BALLAST W/3 126" PIPES	1043
RT-NF10-B	MOUNT, 10" BALLAST W/O PIPES	853
RT-NF10-3-96	MOUNT, 10" BALLAST W/3 96" PIPES	1039
RT-NF10-3-126	MOUNT, 10" BALLAST W/3 126" PIPES	1084
RT-NF10-4-96	MOUNT, 10" BALLAST W/4, 96" PIPES	1102
RT-NF10-4-126	MOUNT, 10" BALLAST W/4, 126" PIPES	1161
RT-NF12-B	MOUNT, 12" BALLAST W/O PIPES	877
RT-NF12-3-96	MOUNT, 12" BALLAST W/3 96" PIPES	1064
RT-NF12-3-126	MOUNT, 12" BALLAST W/4 126" PIPES	1109
RT-NF12-4-96	MOUNT, 12" BALLAST W/4 96" PIPES	1126
RT-NF12-4-126	MOUNT, 12" BALLAST W/4 126" PIPES	1186

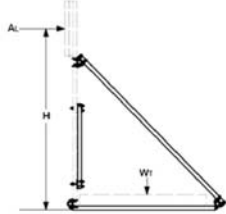
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RT-NF/RT-DNF

COMMScope®

Document: RT-NF Rev 110419



BALLAST EQUATION WITH 1.5 SAFETY FACTOR:

$$WT = \frac{[(AL \cdot H \cdot N) + (FL \cdot HF)] \cdot (1.5)}{3.375}$$

FOR 4 TRAYS,  $W = \frac{WT}{4}$

BALLAST EQUATION WITH REV. G LOADING

$$WT = \frac{[(AL \cdot H \cdot N) + (FL \cdot HF)] \cdot (1.6)}{3.375 \cdot (0.9)}$$

FOR 4 TRAYS,  $W = \frac{WT}{4}$

BALLAST EQUATION WITH REV. H LOADING

$$WT = \frac{[(AL \cdot H \cdot N) + (FL \cdot HF)] \cdot (1.0)}{3.375 \cdot (0.9)}$$

FOR 4 TRAYS,  $W = \frac{WT}{4}$

AL=Antenna Wind Load (Non-Factored), lbs.  
FL=Mount Frame Wind Load (Non-Factored), lbs.  
H=Height from rooftop, ft  
HF= Centerline of Mount frame from rooftop, ft  
N=Number of Antennas  
WT= Total Ballast Weight, lbs.  
W= Ballast Weight per Tray, lbs.

Note:

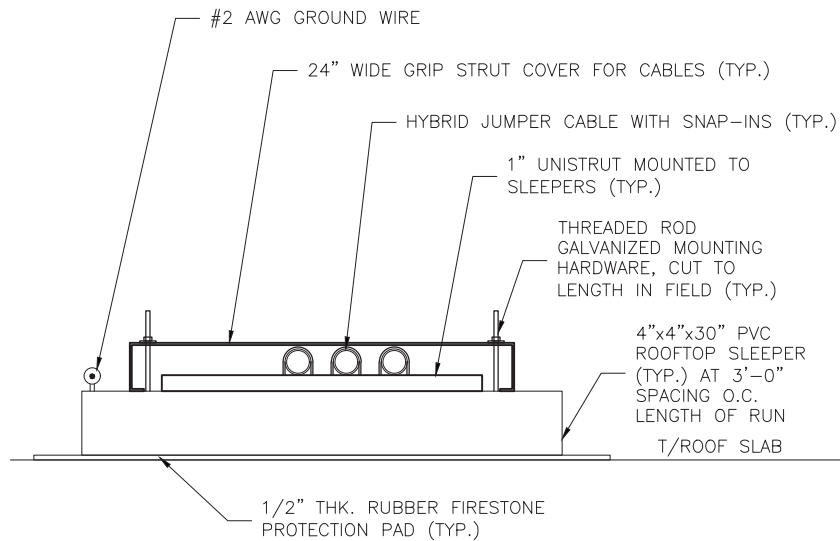
Formula includes wind load seen by mount frame which will vary based on individual engineering judgement as well as shielding factor

4 | Page

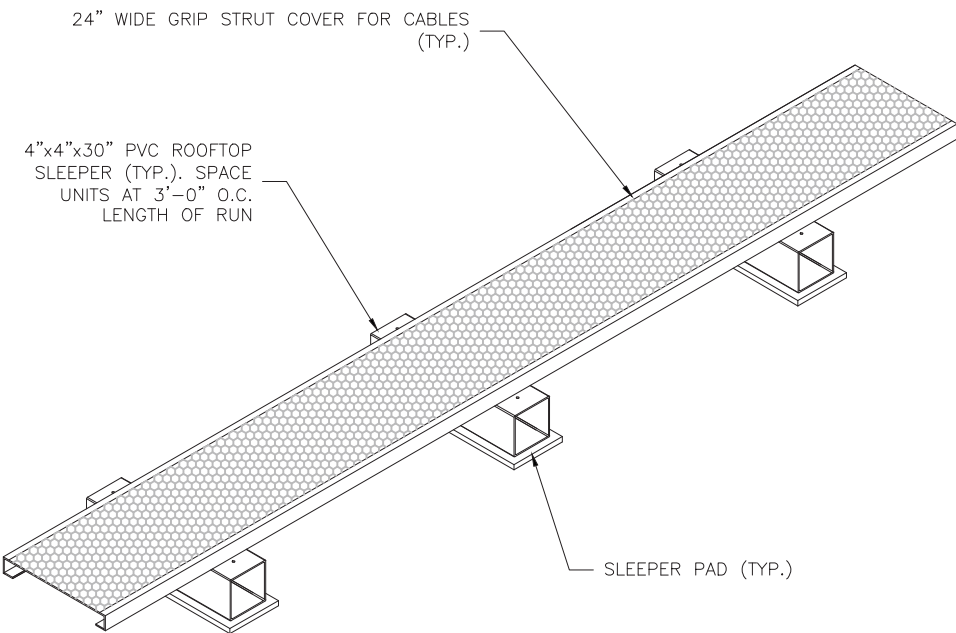
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1 ANTENNA & RRU MOUNTING FRAME DETAILS  
SCALE: N.T.S.

1



2 ROOFTOP CABLE SUPPORT DETAIL  
SCALE: N.T.S.



3 ROOFTOP CABLE SUPPORT DETAIL  
SCALE: N.T.S.

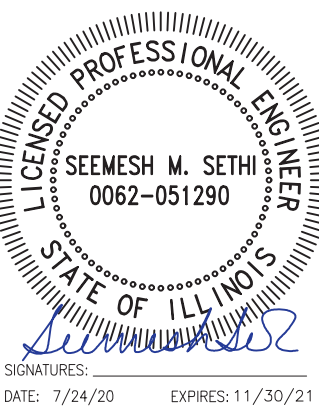
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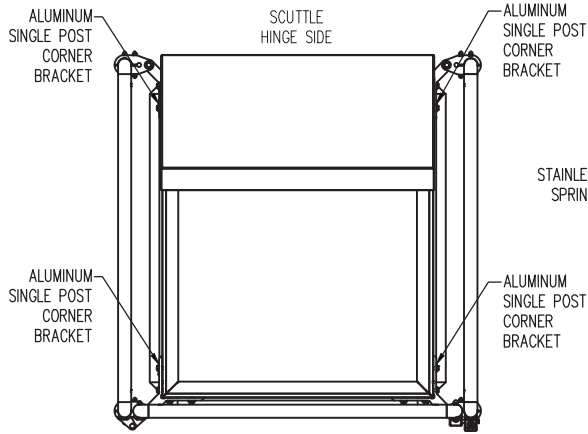
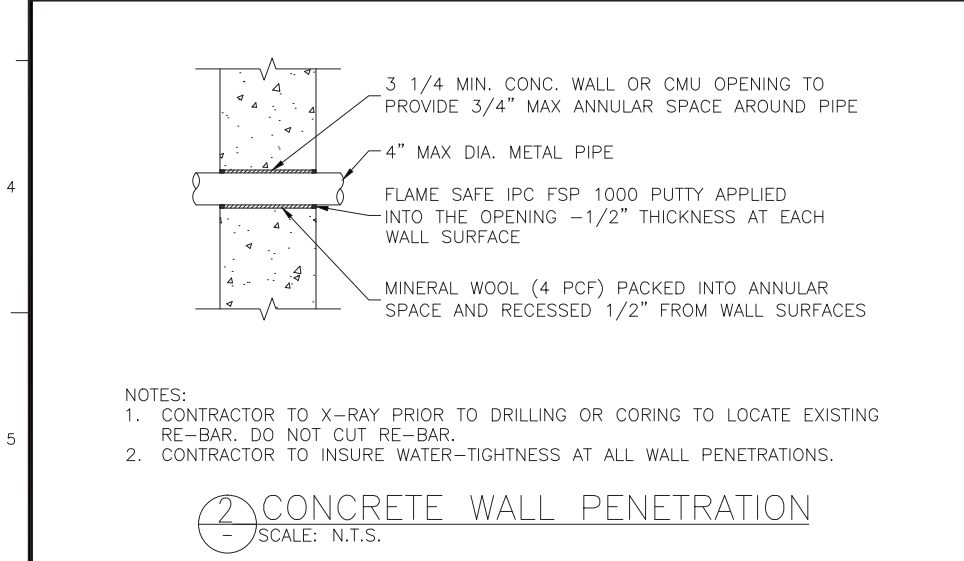
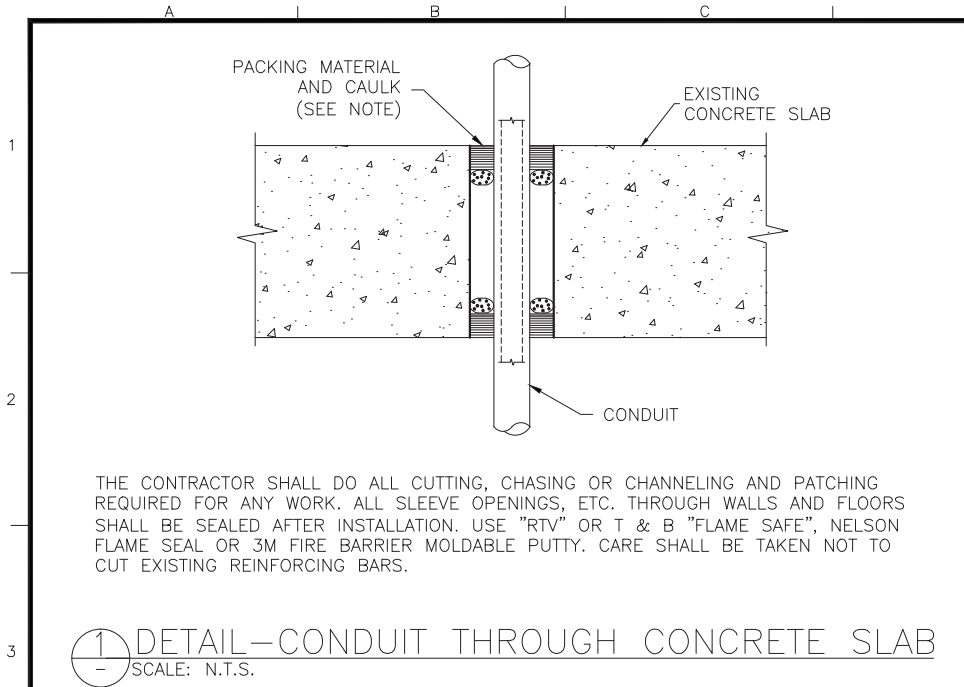
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Drawing Title:  
**ANTENNA MOUNT & ROOFTOP CABLE MOUNTING DETAILS**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
	Date: 8/23/18
	Approved by:
	Date:

Drawing Number  
**C-12**





PLAN

NOTE:

INSIDE OPENING OF EXISTING ROOF HATCH IS 30"x36".

④DETAIL-ACCESS HATCH RAILING WITH GATE

SCALE: 3/4" = 1'-0"



DB Series

Base with Galv. Channel - 1" (25mm) high

Dimensions - 5" (127mm) High x 6" (152mm) Wide x Length (overall length)

Ultimate Load Capacity - (uniform load) \*

DB5 = 200 lbs. (0.89kN) DB30 = 1,500 lbs. (6.67kN)

DB10 = 500 lbs. (2.22kN) DB40 = 2,000 lbs. (8.89kN)

DB20 = 1,000 lbs. (4.45kN) DB48 = 2,500 lbs. (11.12kN)

UPC/Part #	Cat. #	Height	Width	Overall Length	Weight Each
782051 50035	DB5	5" (127mm)	6" (152mm)	4.8" (122mm)	2.75 (1.25kg)
782051 49972	DB10	5" (127mm)	6" (152mm)	9.6" (244mm)	5.28 (2.39kg)
782051 49974	DB20	5" (127mm)	6" (152mm)	20.2" (513mm)	10.63 (4.82kg)
782051 50021	DB30	5" (127mm)	6" (152mm)	30.8" (782mm)	15.99 (7.25kg)
782051 50022	DB40	5" (127mm)	6" (152mm)	41.4" (1052mm)	21.34 (9.68kg)
782051 50023	DB48	5" (127mm)	6" (152mm)	52.0" (1321mm)	26.70 (12.4kg)

Specifications

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required for the correct installation of recycled rubber pipe [conduit] supports for mechanical piping [electrical conduit] systems.

1.02 REFERENCES

- A. ASTM A653 G90 Gr. 33 - Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot Dipped Process
- B. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- C. ASTM C531 - Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts, Monolithic Surfaces, and Polymer Concretes
- D. ASTM D242 - Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete
- E. ASTM C672 - Test Methods for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals
- F. ASTM D412 - Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
- G. ASTM D295 - Standard Test Methods for Rubber Property - Compression Set
- H. ASTM D573 - Test Method for Rubber - Deterioration in an Air Oven
- I. ASTM D746 - Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
- J. ASTM D2240 - Test Method for Rubber Property - Durometer Hardness
- K. NFPA 70 - National Electrical Code

1.03 QUALITY ASSURANCE

- A. Rubber / steel pipe supports shall be manufactured under a strict quality control program assuring quality product delivered to the jobsite. Pipe supports that are damaged shall not be installed.
- B. Workmanship: All pipe [conduit] supports to be installed by a qualified piping [electrical] contractor and installed in accordance with manufacturer's recommendations.
1. All work shall comply with all applicable federal, state, and local codes and laws having jurisdiction.
2. All work shall conform to accepted industry and trade standards for pipe support [conduit] installations.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with these specifications, pipe support systems shall be DURA-BLOK® design as supplied by Eaton (or engineer approved equal).

2.02 MATERIALS

- A. Curb base must be made of 100% recycled rubber and polyurethane prepolymer with a uniform load capacity of 500 pounds per linear foot of support.\* In addition, each base to have a reflective red stripe. (\*See 3.01(C))
- B. Dimensions: 6-inches wide by 14 (15.0) (6.75) inches tall by 19.6 (20.2) (30.8) (41.4) (52.0) inches long
- C. Steel frame: Steel, strut galvanized per ASTM A653 or strut galvanized per ASTM A653 for bridge series.
- D. Attaching hardware: Zinc-plated threaded rod, nuts and attaching hardware per ASTM B633.

E. Any products claiming to be a similar, like, or equal must demonstrate (meet or exceed) the same physical and performance characteristics as specified below:

1. Density: 0.52 oz/cu in ASTM D575
2. Durometer Hardness: 67.2A ± 1 ASTM D575
3. Tensile Strength: 231 psi minimum ASTM D575
4. Compression Deformation: 5% at 70psi and 72°F ASTM D575
5. Brittleness at Low Temp: -50°F ASTM D746
6. Weathering: 70 hours at 120°F ASTM D573
- a. Hardness retained: 100% (±5%)
- b. Compressive strength: 100% (±5%)
- c. Tensile strength: 100% (±5%)
- d. Elongation retained: 100% (±5%)

2.03 TYPE OF ROOFTOP SUPPORTS

- A. Rubber block supports - DURA-BLOK® model # [DBP] [DMB] base dimensions: 6-inch wide by 4-inch tall by 19.6 (4.8)-inch length. Accessories are fastened directly into rubber material with weather resistant type 12 lag screws.
- B. Continuous block channel supports - DURA-BLOK DB Series or DBE Series: Dimensions 6-inch wide by 15.0 (6.5)-inch tall by 19.6 (20.2) (30.8) (41.4) (52.0)-inch length. Assembly has 1" gaps between blocks for free flow of water. Standard strut accessories can be used for attachment.
- C. Bridge channel supports - DURA-BLOK DB10 Series: Dimensions 6-inch wide by 5 1/2-inch tall by 28.0 (36.0) (42.0) (50.0) (60.0)-inch length. Standard strut accessories can be used for attachment.
- D. Extendible height support - DURA-BLOK model DBE 10-18 (12-16), height to suit application: 8-inch, 12-inch or 16-inch (800 pound maximum load). Base to be 9.6 inches in length or otherwise specified sizes available. Heavier loads, may require CLDP load distribution plate.
- E. Roller supports - DURA-BLOK DBR10 Series & DBR Series: DBR10 Series is sized for pipe up to 3 inches, with vertical adjustment up to 12 inches. DBR Series is sized for (2-3/4) (4-6) (8-10) (18-14) (16-20)-inch pipe sizes.
- F. Elevated single pipe supports - DURA-BLOK DBM Series: (Copper) or (Steel) pipe sizes 1/4 (1/4) (1/4) (1/4) (1/4) (2)-inch.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.
- B. If gravel top roof, gravel must be removed around and under pipe support.
- C. Always consult roofing manufacturer for roof membrane compression capacities. If necessary, a compatible sheet of roofing material (rubber pad) may be installed under rooftop support to disperse concentrated loads and add further membrane protection.
- D. Gas pipe spacing subject to local gas authorities.
- E. Use properly sized clamps to suit pipe [conduit] sizes.

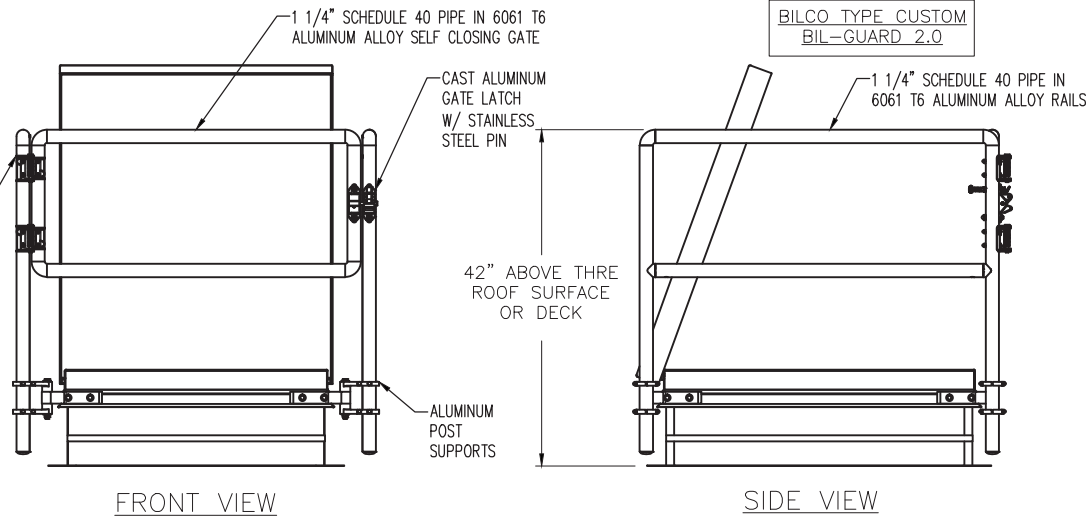


NOTE:

USE BUTTERFLY CLAMPS FOR MOUNTING ELECTRICAL POWER, FIBER AND GROUNDING CONDUITS TO PRE-INSTALLED 1" UNISTRUT.

③DURA-BLOK ROOFTOP CONDUIT SUPPORTS

SCALE: N.T.S.



FRONT VIEW

SIDE VIEW

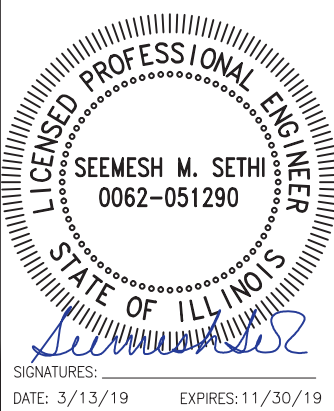
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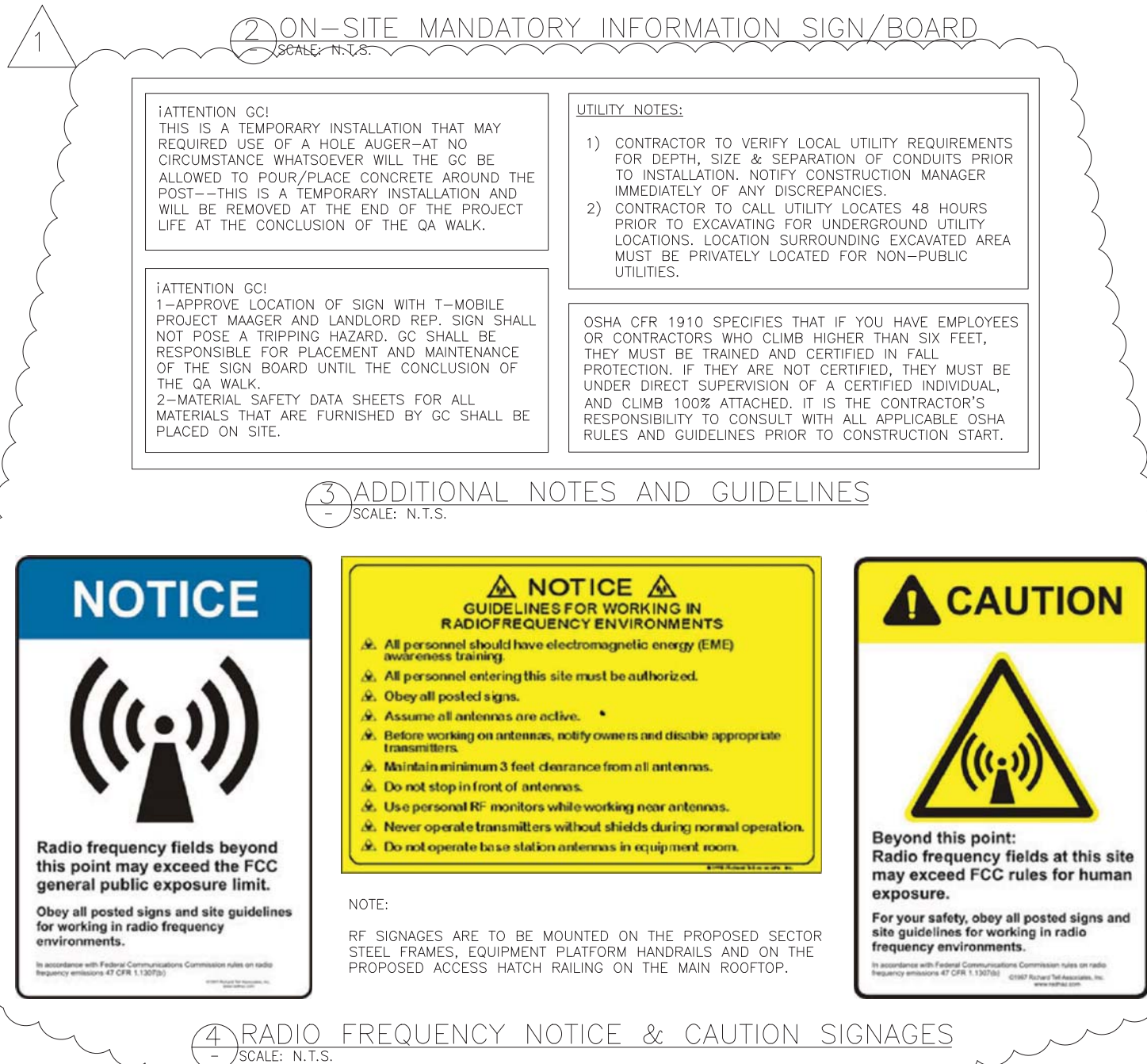
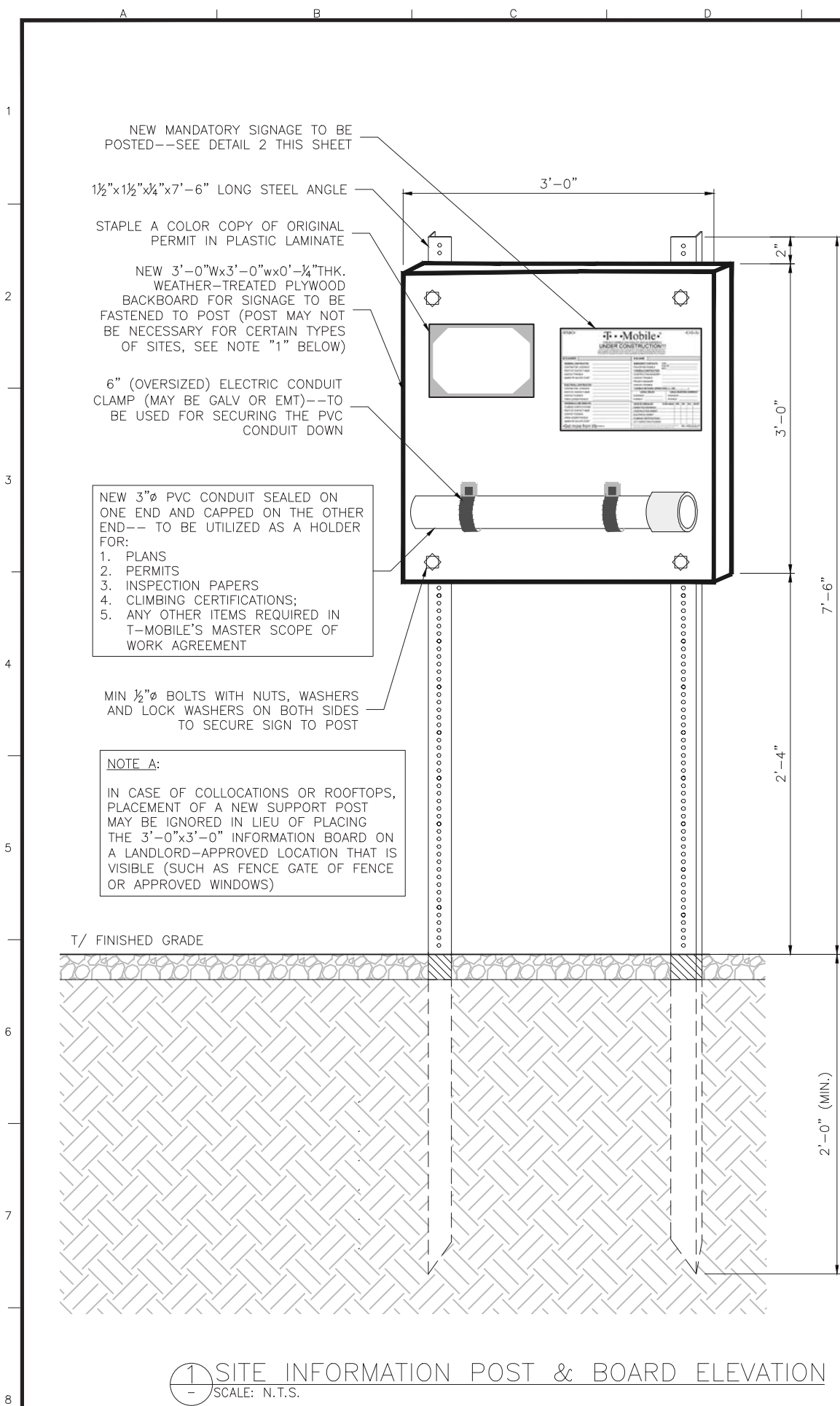
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**LICENSED PROFESSIONAL ENGINEER**  
**SEEMESH M. SETHI**  
0062-051290  
**STATE OF ILLINOIS**  
SIGNATURES:  
DATE: 5/24/28 EXPIRES: 11/30/21

REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	6/2/18
A	ISSUED FOR REVIEW	10/19/18

**CH95063B**  
35 S. WASHINGTON ST. RT  
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:  
**MANDATORY SIGNAGES & POSTINGS**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
	Date: 8/23/18
Drawing Number:	Approved by:
	Date:

**C-14**



RAN Template: 56792EZ\_SR  
A&L Template: 56792EZ\_SR

CH95063B\_Anchor\_1\_draft

Print Name: Standard (1)  
PORs: Cell Split\_CMP4

### Section 1 - Site Information

Site ID: CH95063B  
Status: Draft  
Version: 1  
Project Type: Anchor  
Approved: Not Approved  
Approved By: Not Approved  
Last Modified: 5/29/2020 8:49:36 AM  
Last Modified By: Ahmaad.Brunson@T-Mobile.com

Site Name: 35 S. Washington  
Site Class: Roof Top Mount  
Site Type: Building  
Plan Year: 2020  
Market: CHICAGO IL  
Vendor: Nokia  
Landlord: K2 development LLC

Latitude: 41.77433600  
Longitude: -88.14813300  
Address: 35 S. Washington St.  
City, State: Naperville, IL  
Region: CENTRAL

RAN Template: 56792EZ\_SR

AL Template: 56792EZ\_SR

Sector Count: 3 Antenna Count: 6 Coax Line Count: 0 TMA Count: 0 RRU Count: 6

### Section 2 - Existing Template Images

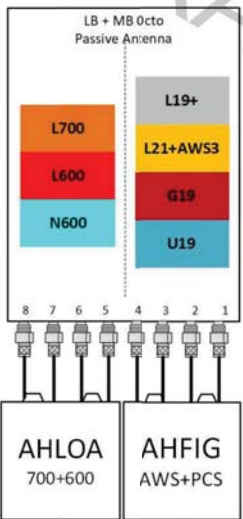
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### Section 3 - Proposed Template Images

56792EZ\_SR.jpg

#### Configuration 56792EZ\_SR

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



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

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

**TDD - Band 41**  
L2.5(2.5GHz)– 60 MHz  
N41(2.5GHz) – 100MHz  
+2nd carrier (<=80MHz)

### Section 4 - Siteplan Images

----- This section is intentionally blank -----

### Section 5 - RAN Equipment

#### Existing RAN Equipment

----- This section is intentionally blank -----

#### Proposed RAN Equipment

Template: 56792EZ\_SR

Enclosure	1	2	3	4
Enclosure Type	Generic 600A Site Support Cabinet	Tower Top Mount (Nokia)	Ancillary Equipment (Nokia)	Generic Battery Cabinet for 600A SSC
Baseband	ASIB (L2100) ASIK (N2500) ASIB (L1900) FSMF (L700) G1900 (L600)			
Baseband Submodule	ABIA (x 2) L2100 L1900 ABIA (x 3) L700 L600 ABIC (x 3) L2500			
Baseband Subrack	ABIA (x 2)			
Junction Box			Nokia KCS 2.0 Roof-Top Junction Box (x 2)	
Power subsystem	Rectifier Shelf "Select size" Breakers "Select size"			Batteries "Select size"
Radio		AHLOA (x 3) L700 L600 N600	AHFIG (x 3) L2100 L1900 G1900	
Transport System	CSR IXR6			

#### RAN Scope of Work:

Ashutosh 09012018 Rad updated to 58.5 feet.  
11/7/2018: HCS length computation based on the PCD REV B actual length.  
Alpha = 105+10 = 115 with Close multiple of 30 = 120  
Beta = 78+10 = 88 with close multiple of 30 = 90  
Gamma = 95+10 = 105 with close multiple of 30 = 120  
12/4/2018: The azimuth is changed from 0/120/240 to 40/160/280 to accommodate the new proposed antenna location on roof which will be less visible from the adjacent streets.  
This is a request from the City of Naperville.  
01/02/2019: The AZ of Alpha sector has been changed to 15 degrees other all remain the same this is done to avoid blocking of existing RTU.  
03/06/2019 HCS length updated per Cons, the RFDS was already final.

### Section 6 - A&L Equipment

Existing Template: Custom  
Proposed Template: 56792EZ\_SR

Coverage Type	A - Outdoor Macro
Antenna	1
Antenna Model	Commscope - FFHH-65B-R3 (Octo)
Azimuth	15
M. Tilt	0
Height	59
Ports	P1 P2 P3 P4 P5
Active Tech.	L700 L600 N600 L700 L600 L2100 L1900 L2100 L1900 L2500 N2500
Dark Tech.	
Restricted Tech.	
Decomm. Tech.	
E. Tilt	2 2 2 2 2
Cables	
TMA's	
Diplexers / Combiners	
Radio	
Sector Equipment	

#### Unconnected Equipment:

#### Scope of Work:

----- This section is intentionally blank -----

### Sector 2 (Proposed) view from front (Note: the images show view from behind)

Coverage Type	A - Outdoor Macro
Antenna	1
Antenna Model	Commscope - FFHH-65B-R3 (Octo)
Azimuth	160
M. Tilt	0
Height	59
Ports	P1 P2 P3 P4 P5
Active Tech.	L700 L600 N600 L700 L600 L2100 L1900 L2100 L1900 L2500 N2500
Dark Tech.	
Restricted Tech.	
Decomm. Tech.	
E. Tilt	2 2 2 2 2
Cables	
TMA's	
Diplexers / Combiners	
Radio	
Sector Equipment	

#### Unconnected Equipment:

#### Scope of Work:

----- This section is intentionally blank -----

### Sector 3 (Proposed) view from front (Note: the images show view from behind)

Coverage Type	A - Outdoor Macro
Antenna	1
Antenna Model	Commscope - FFHH-65B-R3 (Octo)
Azimuth	280
M. Tilt	0
Height	59
Ports	P1 P2 P3 P4 P5
Active Tech.	L700 L600 N600 L700 L600 L2100 L1900 L2100 L1900 L2500 N2500
Dark Tech.	
Restricted Tech.	
Decomm. Tech.	
E. Tilt	2 2 2 2 2
Cables	
TMA's	
Diplexers / Combiners	
Radio	
Sector Equipment	

#### Unconnected Equipment:

#### Scope of Work:

----- This section is intentionally blank -----

### Section 7 - Power Systems Equipment

#### Existing Power Systems Equipment

----- This section is intentionally blank -----

#### Proposed Power Systems Equipment

----- This section is intentionally blank -----

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SIGNATURES:

DATE: 7/24/20 EXPIRES: 11/30/21

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A	ISSUED FOR REVIEW	10/19/18

**CH95063B**

35 S. WASHINGTON ST. RT

35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:

**RF DATA  
CONFIGURATION SHEET**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
	Date: 8/23/18
	Approved by:
	Date:

Drawing Number

C-15



STRUCTURAL NOTES

CODES & STANDARDS:

- 1. INTERNATIONAL BUILDING CODE, LATEST EDITION
- 2. AMERICAN WELDING SOCIETY WELDING CODE, LATEST EDITION
- 3. AISC MANUAL OF STEEL CONSTRUCTION, FOURTEENTH EDITION

GENERAL:

- 1. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND DIMENSIONS PRIOR TO BEGINNING WORK, AND NOTIFY THE ENGINEER OF ANY CONDITIONS DIFFERENT THAN THOSE SHOWN IN THE CONTRACT DOCUMENTS.
- 2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE VERIFICATION AND COORDINATION OF DIMENSIONS AND FOR THE PROPER FIT-UP OF THE ANTENNA SUPPORT STRUCTURE AND EQUIPMENT.

STRUCTURAL STEEL:

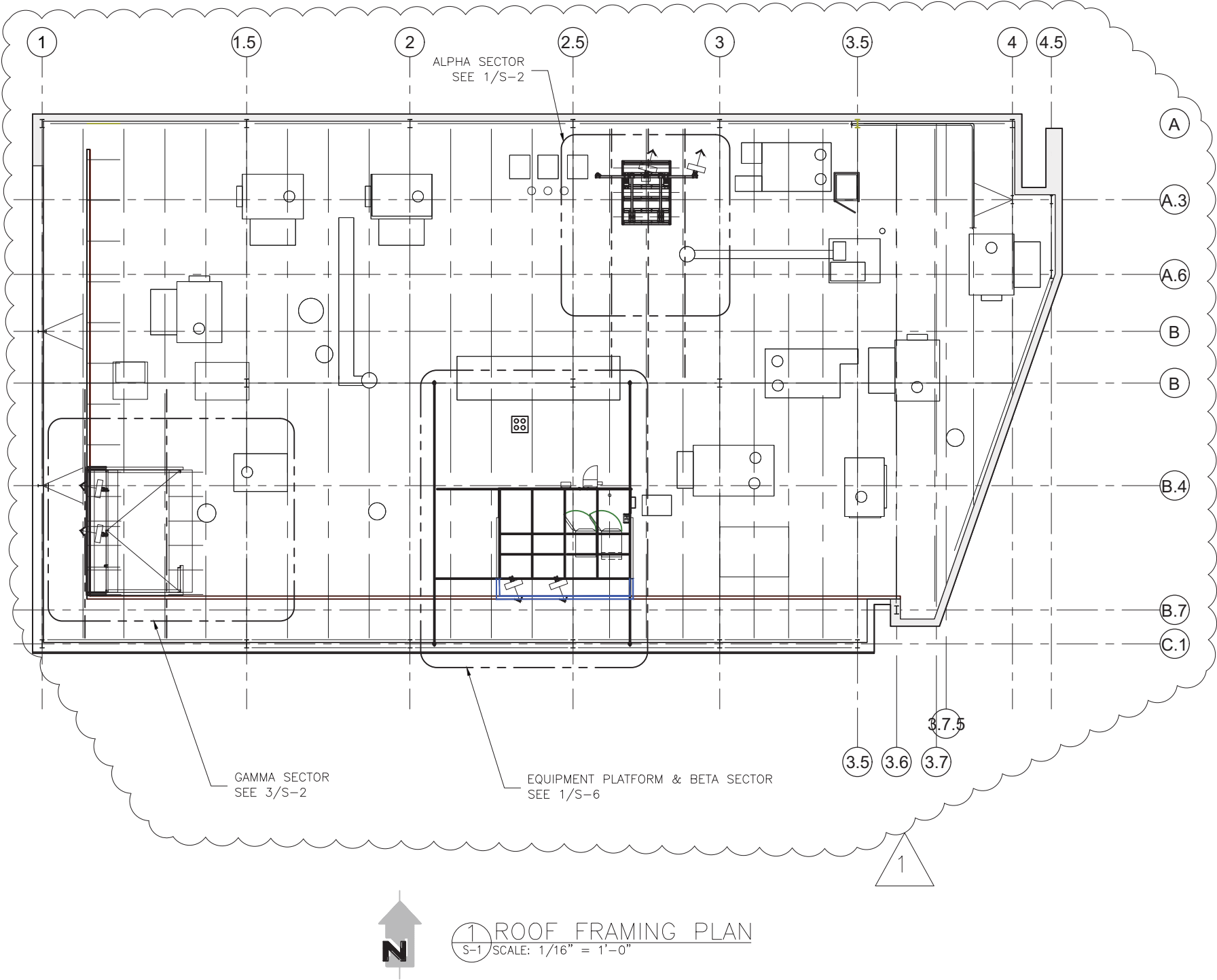
- 1. PLATFORM DESIGN IS BASED ON OWNER-SUPPLIED EQUIPMENT LOADS AND DESIGN LOADS SHOWN ON THIS DRAWING AND EIA/TIA 222.-E-91 REQUIREMENTS. IN CASE OF CONFLICT BETWEEN ABOVE CODES AND LOCAL BUILDING CODE, THE CONSTRUCTION MANAGER SHALL BRING THIS TO THE ENGINEER'S ATTENTION FOR SOLUTION.
- 2. STRUCTURAL STEEL DESIGN AND FABRICATION SHALL CONFORM TO THE LATEST EDITION OF AISC MANUAL FOR STEEL CONSTRUCTION, ALLOWABLE STRESS DESIGN. CONTRACTOR SHALL FURNISH SHOP DRAWINGS FOR ENGINEER'S REVIEW. UNLESS NOTED OR DETAILED HEREIN, FIELD CONNECTIONS SHALL BE WELDED. FIELD BOLTING ON EXISTING MEMBERS SHALL BE PRE-APPROVED BY E.O.R. PRIOR TO USE. USE MIN. 2 BOLTS PER CONN., MIN. ANGLE LEG THICKNESS OF 5/16" AND MIN. GUSSET PL. THICKNESS OF 3/8.
- 3. EXCEPTION IS TAKEN TO AISC CODE OF STANDARD PRACTICE PARAGRAPH 4.2.1 REGARDING OWNER'S AND FABRICATOR'S RESPONSIBILITY FOR CONNECTION DESIGN AND ADEQUACY OF SHOP DRAWINGS. COMPLIANCE WITH THE REQUIREMENTS SHOWN ON DRAWINGS AND/OR SPECIFICATIONS, CONNECTION DESIGN AND DETAILING IS THE CONTRACTOR'S RESPONSIBILITY. ENGINEER'S REVIEW OF SHOP DRAWINGS IS FOR GENERAL CONSIDERATIONS ONLY AND DOES NOT CONSTITUTE AN ACCEPTANCE OF THESE RESPONSIBILITIES BY THE OWNER AND/OR ENGINEER.
- 4. STRUCTURAL STEEL PLATES AND SHAPES SHALL CONFORM TO ASTM A36. ALL STRUCTURAL TUBING SHALL CONFORM TO ASTM A53, GRADE B. ALL STRUCTURAL BOLTS SHALL BE WITH 3/4"Ø ASTM A325. HIGH STRENGTH, BEARING TYPE, WITH THREADS EXCLUDED FROM SHEAR PLANE AND HARDENED WASHER PER ASTM F436.
- 5. ALL MATERIALS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION, PER ASTM A123 AND A153. TOUCH UP DAMAGED GALVANIZING DURING CONSTRUCTION WITH ZINC RICH PAINT.
- 6. WELDING SHALL BE IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY (AWS) D1.1. STRUCTURAL WELDING CODE, LATEST EDITION. WELDING ELECTRODE SHALL BE E70XX.
- 7. USE 3/4"Ø A325N H.S. BOLTS FOR ALL CONNECTIONS.
- 8. GRATING SHALL BE MIN. 1"x3/16" WELDED STEEL, GALVANIZED. PROVIDE BANDING AT CUT EDGE OF BEARING BARS. GRATING SHALL BE SECURED TO STRUCTURAL STEEL WITH TYPE C SADDLE CLIPS, MIN. 14 GA. AND SELF TAPPING SCREWS. PROVIDE MIN. 4 SADDLE CLIPS PER GRATING PANEL.
- 9. DESIGN LOADS:  
SNOW ROOF LOAD: 25 PSF  
DEAD LOAD (EQUIPMENT CABINETS): 8,000 LBS.  
WIND LOAD: 20 PSF  
LIVE LOAD: 60 PSF

BUILT-UP ROOFING:

- 1. CONTRACTOR SHALL USE ACCREDITED ROOFING CONTRACTOR TO FURNISH AND INSTALL ALL NECESSARY MEMBRANE AND FLASHING MATERIALS FOR ALL PENETRATIONS TO THE EXISTING ROOFING SYSTEM. ALL WARRANTIES SHALL BE MAINTAINED BY ACCREDITED ROOFING CONTRACTOR.
- 2. CONTRACTOR TO MEET OR EXCEED SYSTEM REQUIREMENTS FOR ROOF PENETRATION.

REPAIR & RESTORATION WORKS:

THE CONTRACTOR SHALL REPAIR, RESTORE AND RE-Paint ALL WALLS DAMAGED DURING CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE ALL REPAIR WORKS WITH THE BUILDING OWNER.



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DOWNERS GROVE, IL 60515  
PHONE:  
FAX:

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CONSULTING ENGINEERS

ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139  
1125 REMINGTON RD., SCHAUMBURG, IL 60173  
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SIGNATURES:

DATE: 7/27/20

EXPIRES: 11/30/20

REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
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B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

CH95063B

35 S. WASHINGTON ST. RT

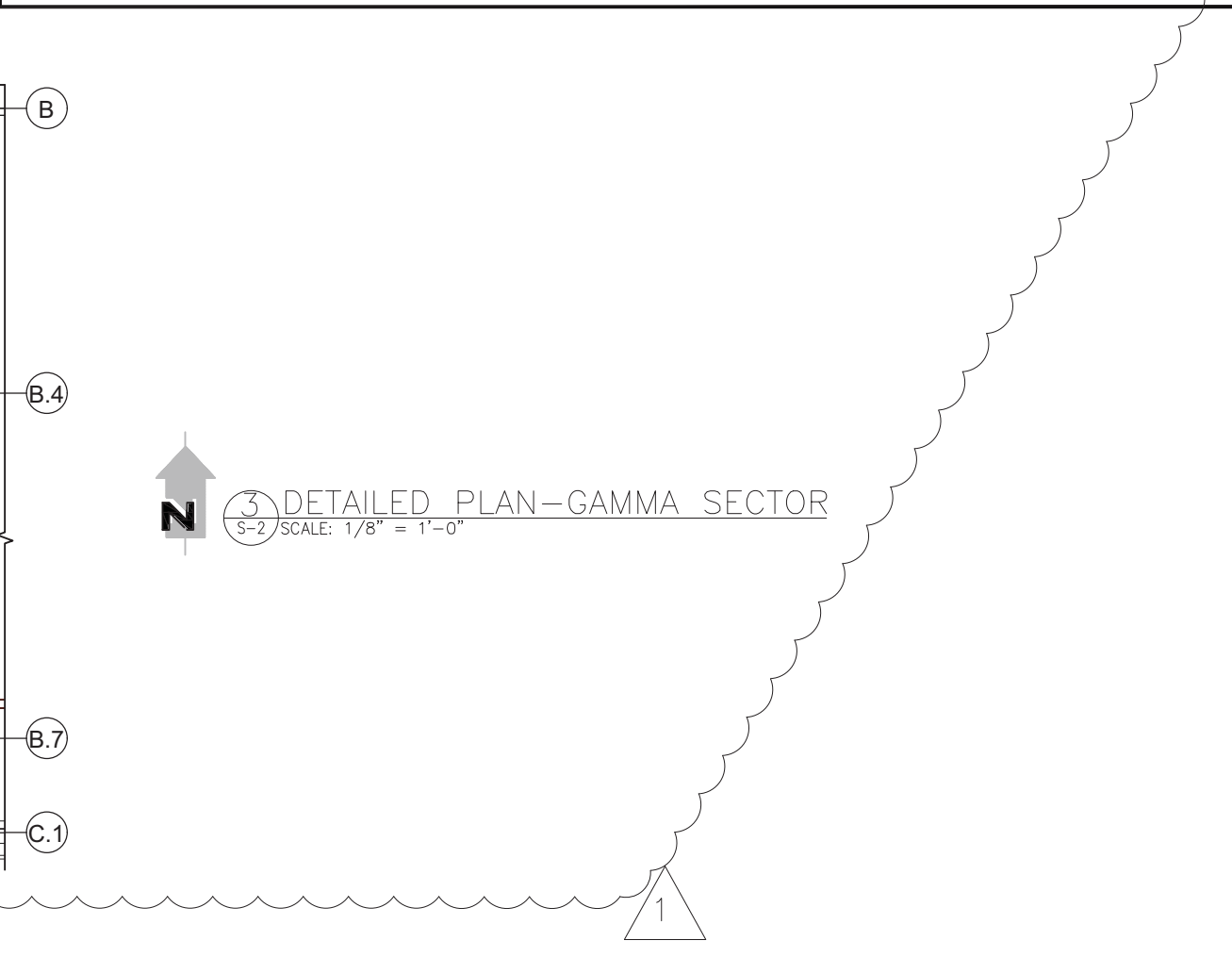
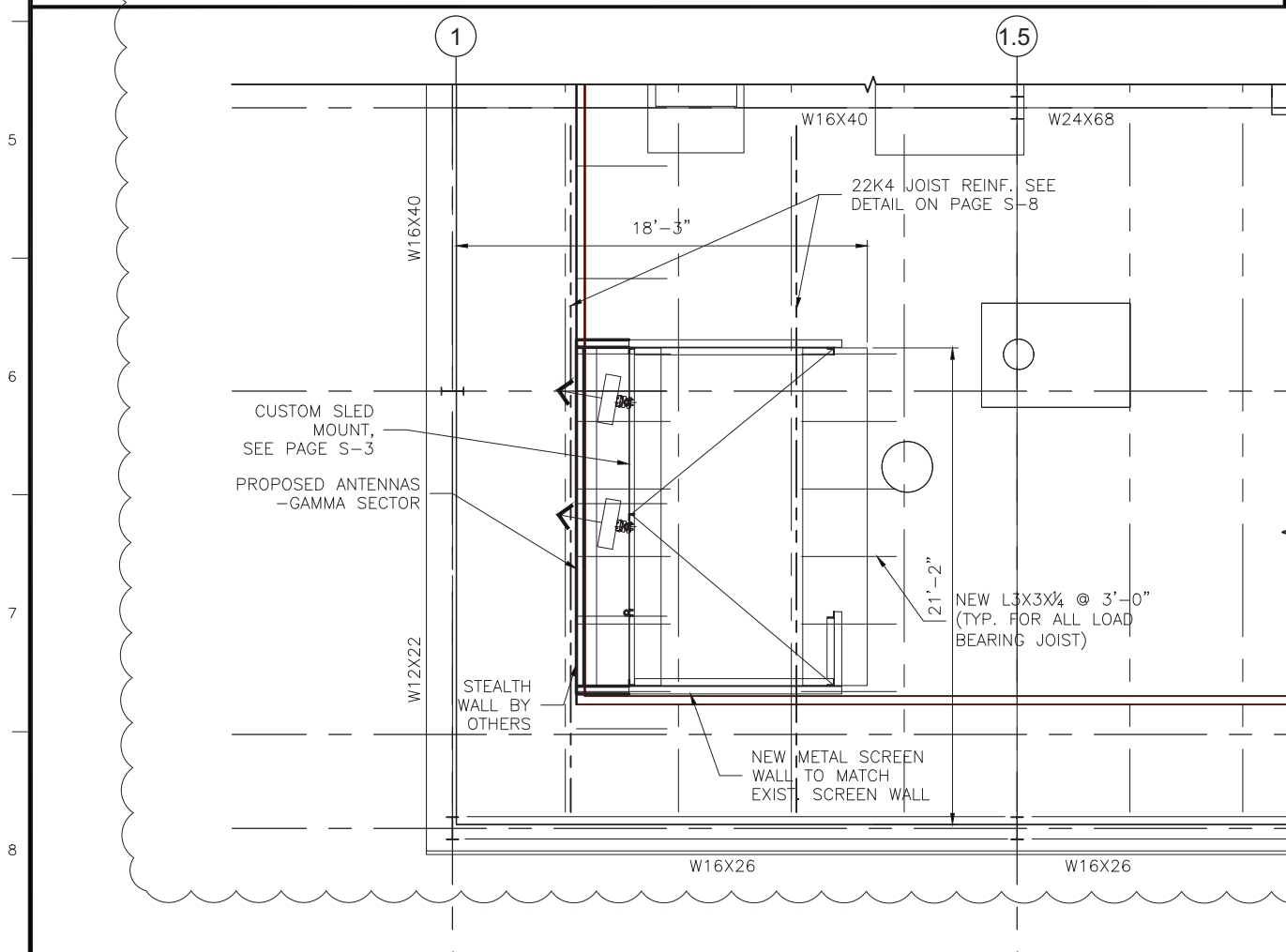
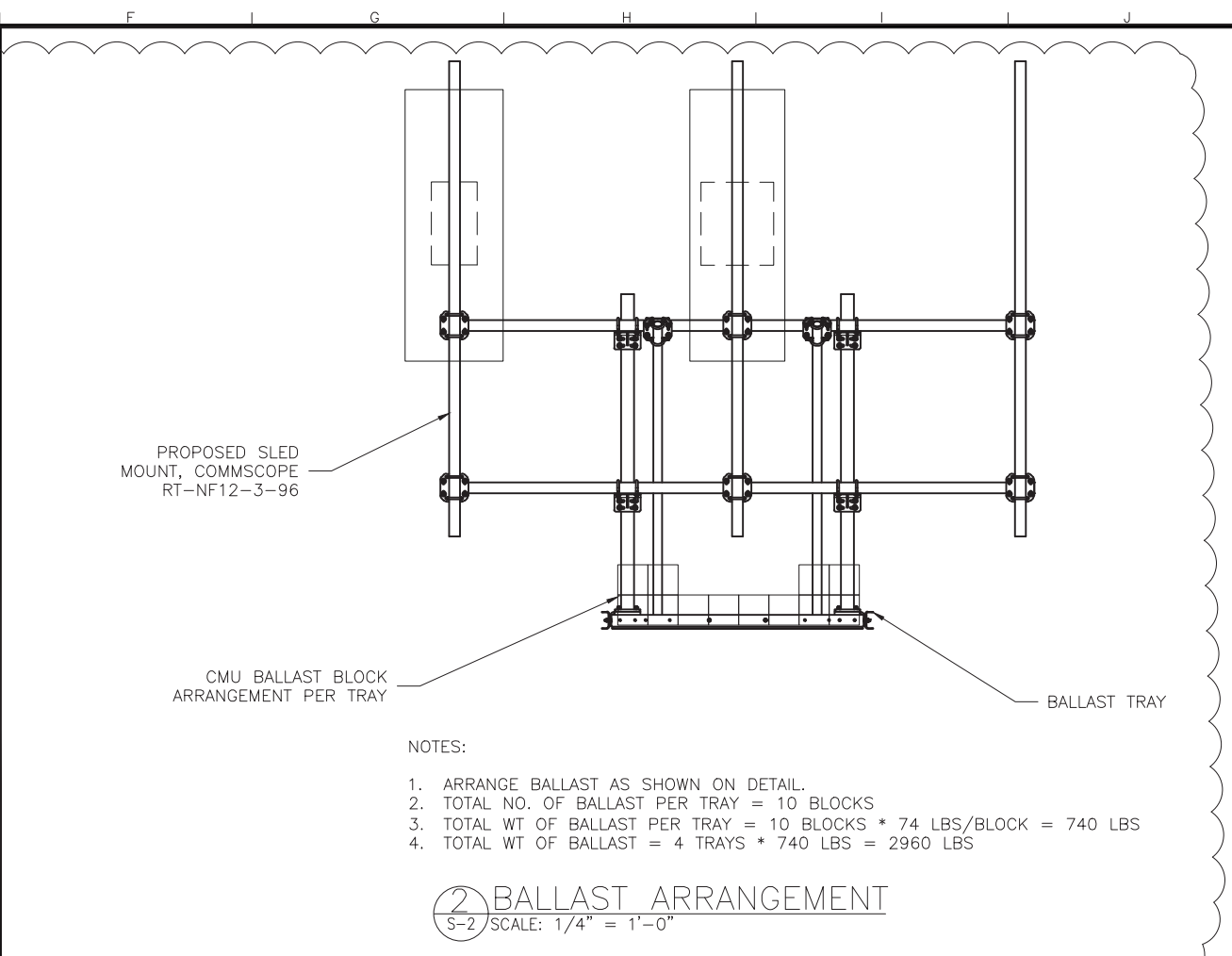
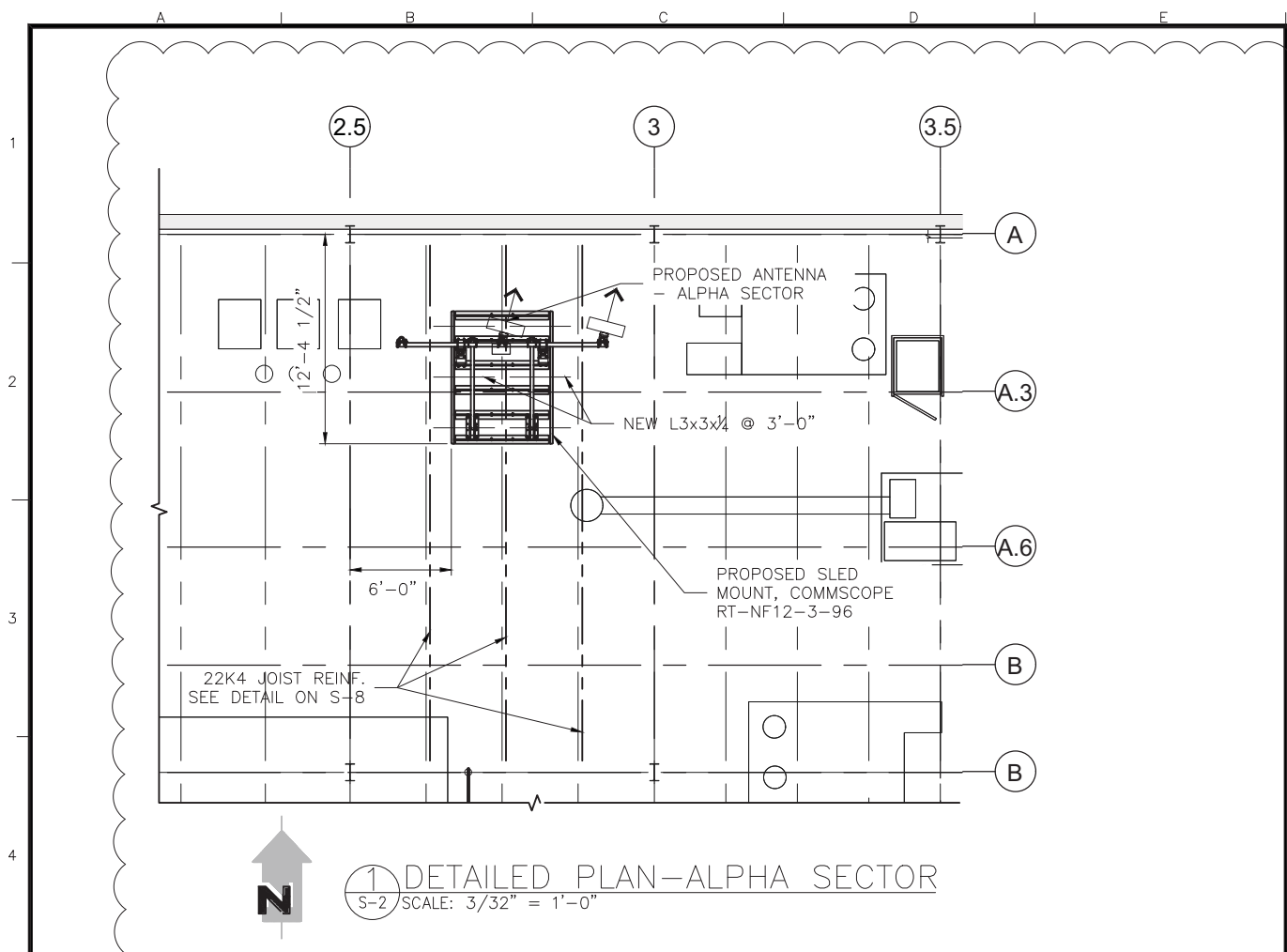
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

STRUCTURAL NOTES  
AND OVERALL PLAN

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
	Date: 8/23/18
	Approved by:
	Date:

Drawing Number

S-1



1400 OPUS PLACE, SUITE 700  
DOWNERS GROVE, IL 60515  
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ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139  
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**RICHARD A. PETERSON**  
81-3446  
STATE OF ILLINOIS  
LICENSED STRUCTURAL ENGINEER

SIGNATURES: \_\_\_\_\_  
DATE: 7/27/20 EXPIRES: 11/30/20

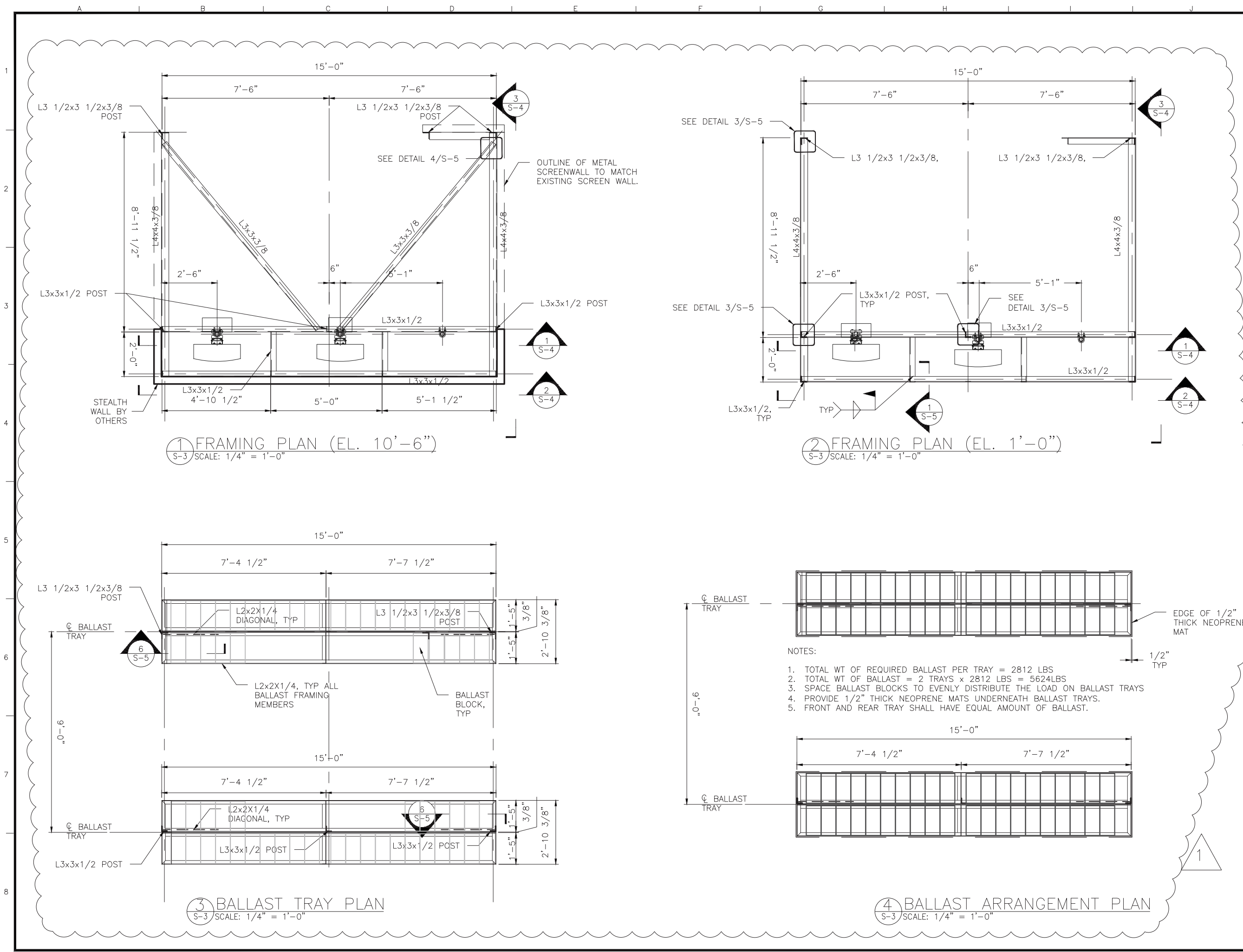
REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

**CH95063B**  
35 S. WASHINGTON ST. RT  
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:  
**ALPHA & GAMMA SECTORS FRAMING DETAILS**

Project Number:	Drawn by: PA
Client Project Number:	Checked by: MS
Scale:	Date: 8/23/18
Drawing Number	Date:

**S-2**



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

CONSULTING ENGINEERS  
ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139  
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SIGNATURES: \_\_\_\_\_  
DATE: 7/27/20 EXPIRES: 11/30/20

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A	ISSUED FOR REVIEW	10/19/18
REV.	DESCRIPTION	DATE

**CH95063B**  
35 S. WASHINGTON ST. RT  
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

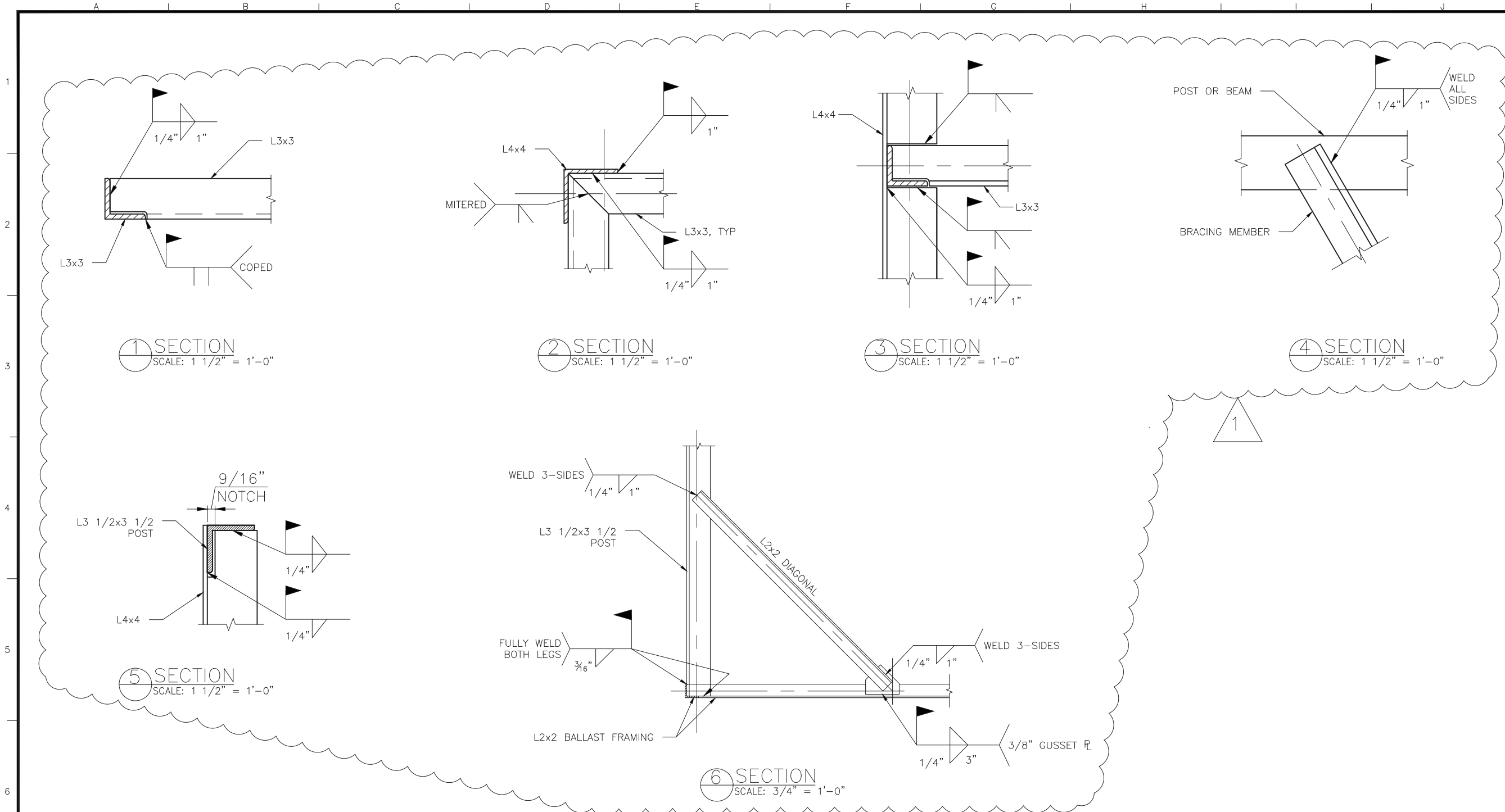
Drawing Title:  
**GAMMA SECTOR  
FRAMING DETAILS**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
	Date: 8/23/18
	Approved by:
	Date:
Drawing Number	

**S-3**







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LICENSED STRUCTURAL ENGINEER

RICHARD A. PETERSON  
81-3446

STATE OF ILLINOIS

SIGNATURES: \_\_\_\_\_  
DATE: 7/24/20 EXPIRES: 11/30/20

REV.	DESCRIPTION	DATE
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B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

CH95063B

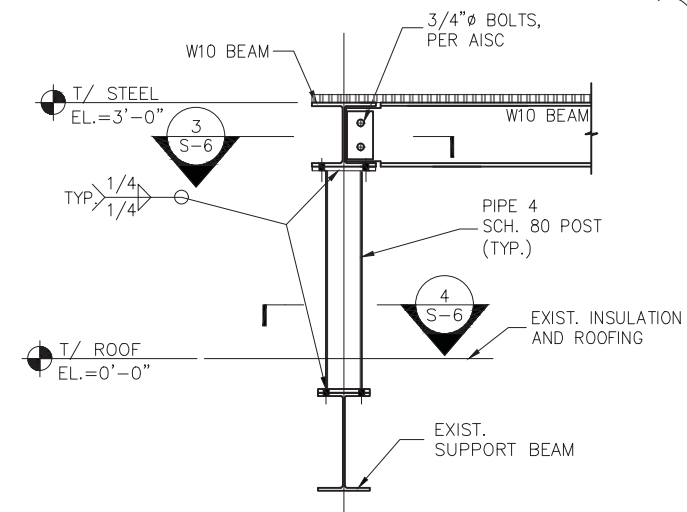
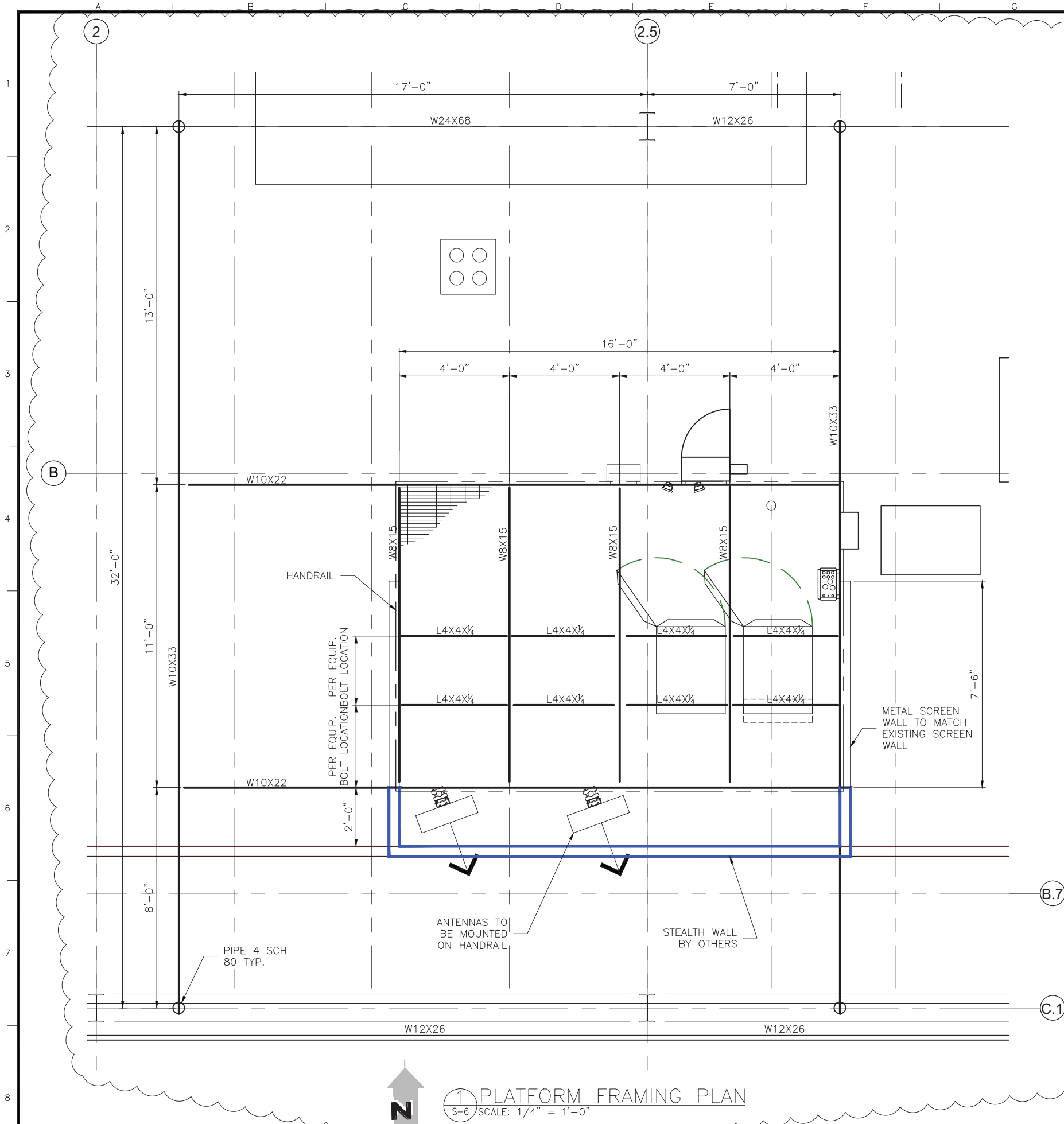
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35 S. WASHINGTON ST, NAPERVILLE, IL 60540

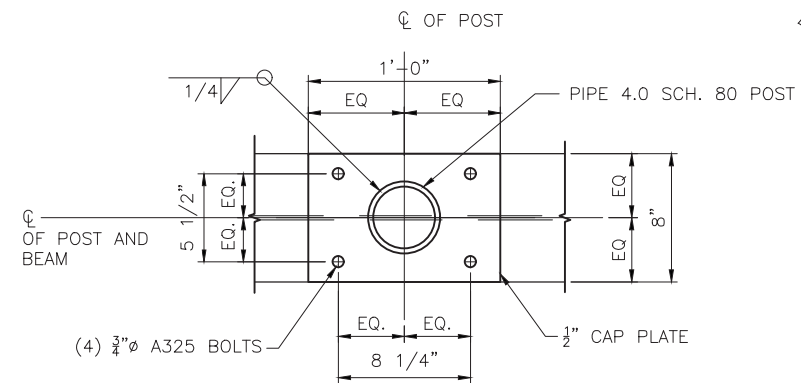
Drawing Title:  
GAMMA SECTOR  
FRAMING DETAILS

Project Number:	Drawn by: PA Date: 8/21/18
Client Project Number:	Checked by: MS Date: 8/23/18
Scale:	Approved by: Date:

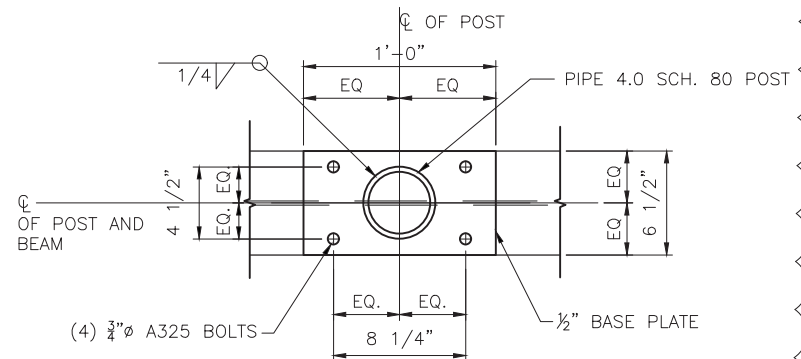
Drawing Number  
S-5



2 SECTION  
S-6 SCALE: 1/2" = 1'-0"



3 SECTION  
S-6 SCALE: 1" = 1'-0"



4 SECTION  
S-6 SCALE: 1" = 1'-0"

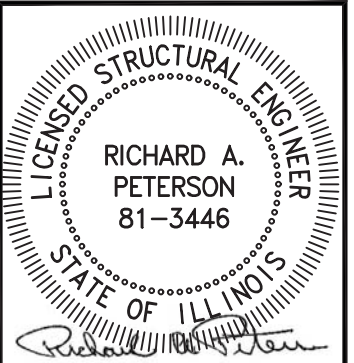
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DOWNERS GROVE, IL 60515  
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**CH95063B**  
35 S. WASHINGTON ST. RT

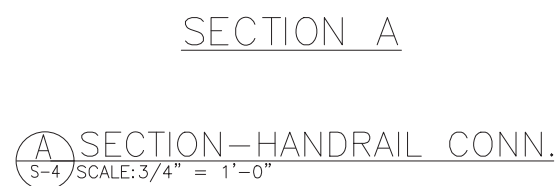
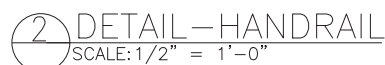
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:  
**PLATFORM FRAMING  
PLAN & CONNECTION  
DETAILS**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
Drawing Number:	Date: 8/23/18

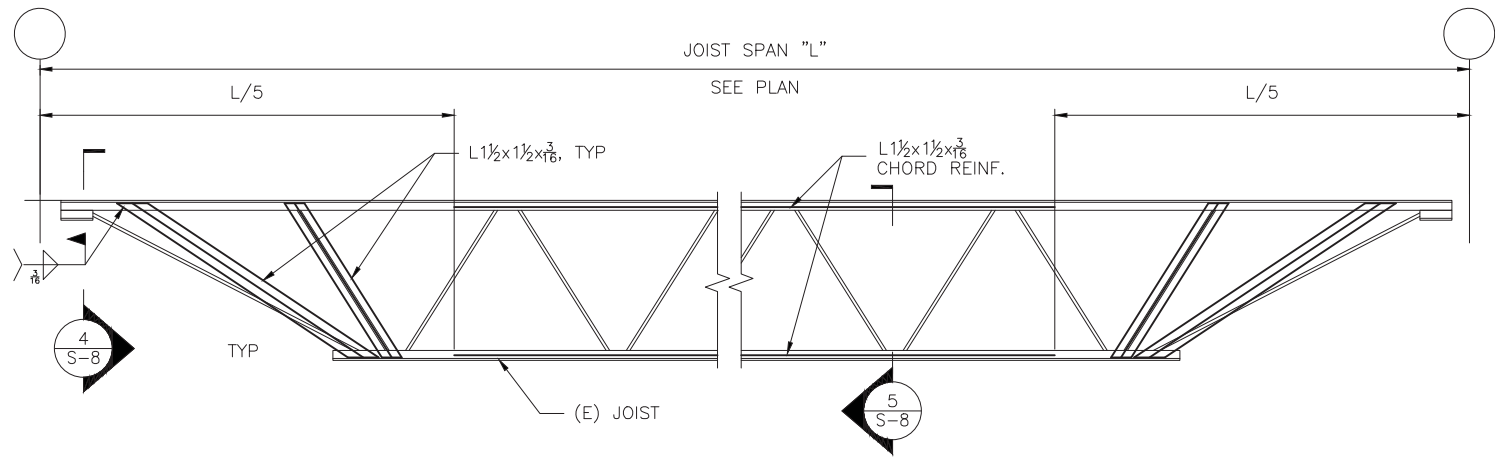
S-6



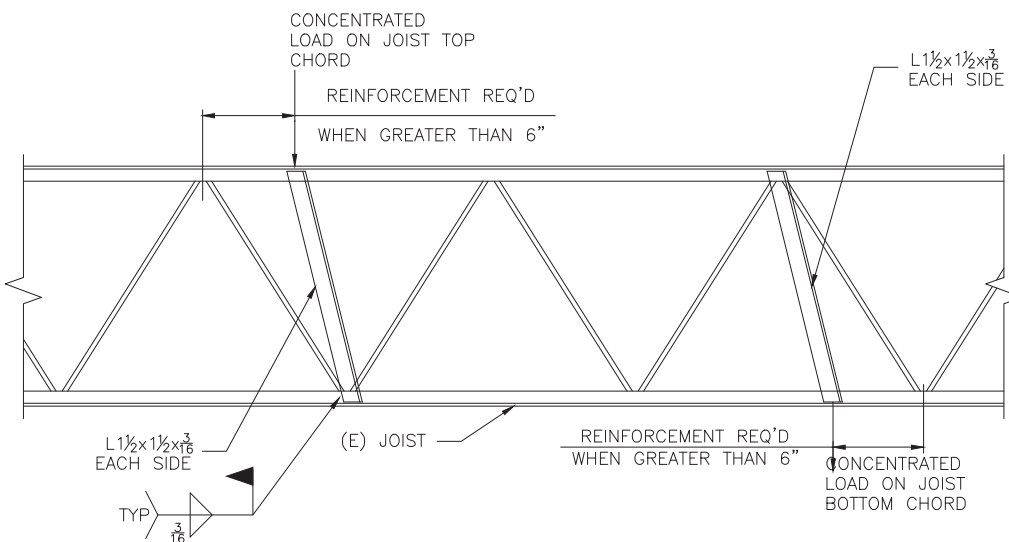


Drawing Number

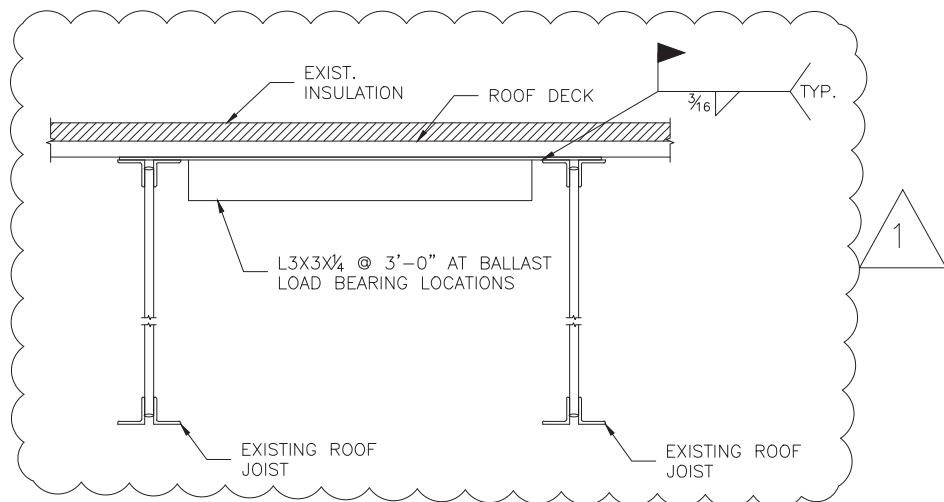
S-7



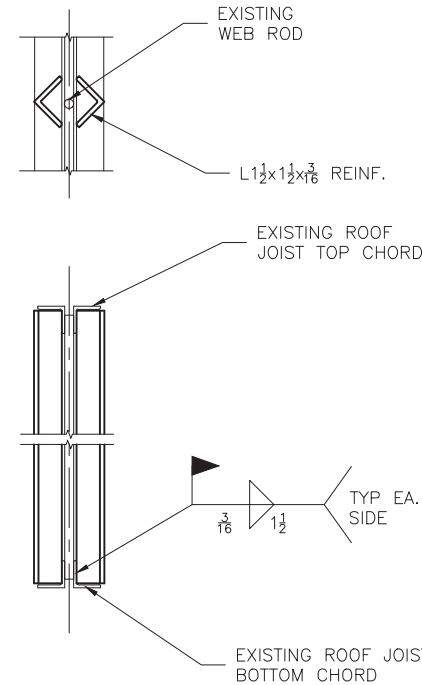
1 JOIST REINFORCEMENT DETAIL  
SCALE: 1/2" = 1'-0"



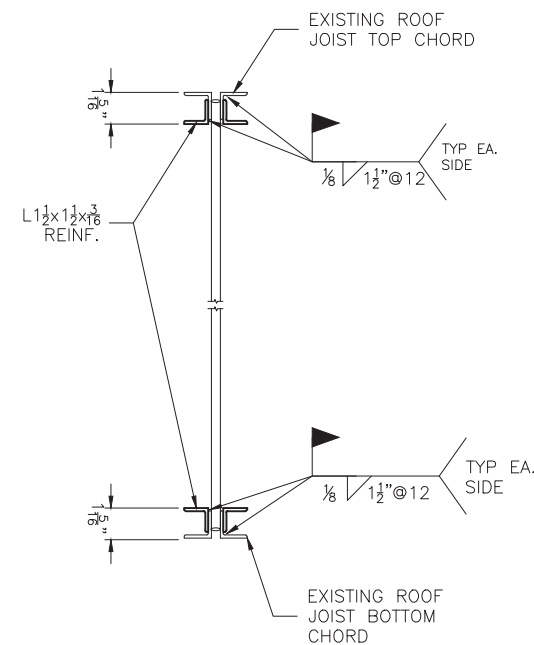
2 JOIST REINFORCEMENT @ PLATFORM SUPPORT  
SCALE: 3/4" = 1'-0"



3 SECTION  
S-8 SCALE: 1 1/2" = 1'-0"



4 SECTION  
S-8 SCALE: 1 1/2" = 1'-0"



5 SECTION  
S-8 SCALE: 1 1/2" = 1'-0"

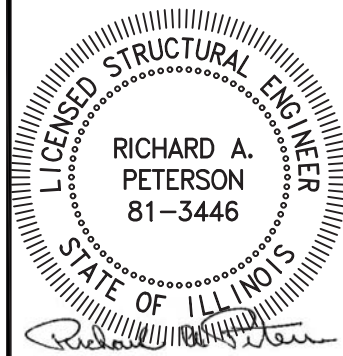
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C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

**CH95063B**  
**35 S. WASHINGTON ST. RT**  
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:  
**JOIST REINFORCEMENT**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
	Date: 8/23/18
	Approved by:
	Date:

Drawing Number  
**S-8**



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.

ELECTRICAL WIRING AND RACEWAYS

1. ALL WIRINGS OF ALL KINDS MUST BE INSTALLED IN CONDUIT, UNLESS OTHERWISE NOTED OR APPROVED BY THE ENGINEER.
2. ALL WIRING SHALL BE COPPER TYPE THWN AND IN ACCORDANCE WITH THE (NEC) NATIONAL ELECTRICAL CODE OR AS INDICATED ON PLANS.
3. RACEWAYS SHALL BE STEEL, GALVANIZED, WITH SIZE AS SPECIFIED AND IN ACCORDANCE WITH THE (NEC) NATIONAL ELECTRICAL CODE UNLESS OTHERWISE NOTED ON PLANS. ALL RACEWAYS SHALL BE APPROVED PRIOR TO INSTALLATION.
4. JUNCTION BOXES OR PULL BOXES SHALL MEET (NEC) NATIONAL ELECTRICAL CODE STANDARDS AND AS APPROVED FOR INSTALLATION OF RACEWAYS AND WIRING.
5. THE RACEWAY AND WIRING INSTALLATION SHALL BE GROUNDED PERMANENTLY AND EFFECTIVELY IN ACCORDANCE WITH ARTICLE 250 OF THE (NEC) NATIONAL ELECTRICAL CODE.
6. THE CONTRACTOR SHALL BE AWARE THAT ALL STATE AND LOCAL CODES SHALL APPLY TO THIS INSTALLATION AND MUST BE ADHERED TO.

CONDUIT INFORMATION			
FIBER – FROM FIBER VAULT ON W. BENTON AVE. TO NEW FIBER JUNCTION BOX AT TRASH AREA	380 FT.	NOTE: THE CONDUIT LENGTH GIVEN IS BASED ON THE DRAWING +15%. THE EXACT LENGTH TO BE VERIFIED IN FIELD. GENERAL CONTRACTOR TO VERIFY LENGTHS AFTER COORDINATING WITH SERVICE UTILITY COMPANIES. 	
FIBER – FROM NEW FIBER JUNCTION BOX (ASSUMED LOCATION AT TRASH AREA WALL) TO CIENA BOX	215 FT.		
POWER – FROM NEW ELECTRICAL METER TO PPC	215 FT.		
GROUNDING – FROM MASTER GROUND BAR TO EXISTING GROUND BOX INSIDE 1ST FLOOR ELECT. ROOM	200 FT.		
VOLTAGE DROP (FROM NEW ELECTRICAL SERVICE METER TO PPC)			
LENGTH OF RUN	WIRE SIZE	VOLTAGE DROP (VOLTS)	PERCENTAGE OF VOLTAGE
215 FT.	(3) 3/0 AWG (168 KCMIL)	5.32	2.21%
NOTE: FIBER CONDUIT LENGTH MAY VARY UPON FINAL JUNCTION BOX LOCATION DETERMINED BY UTILITY COMPANY.			

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.

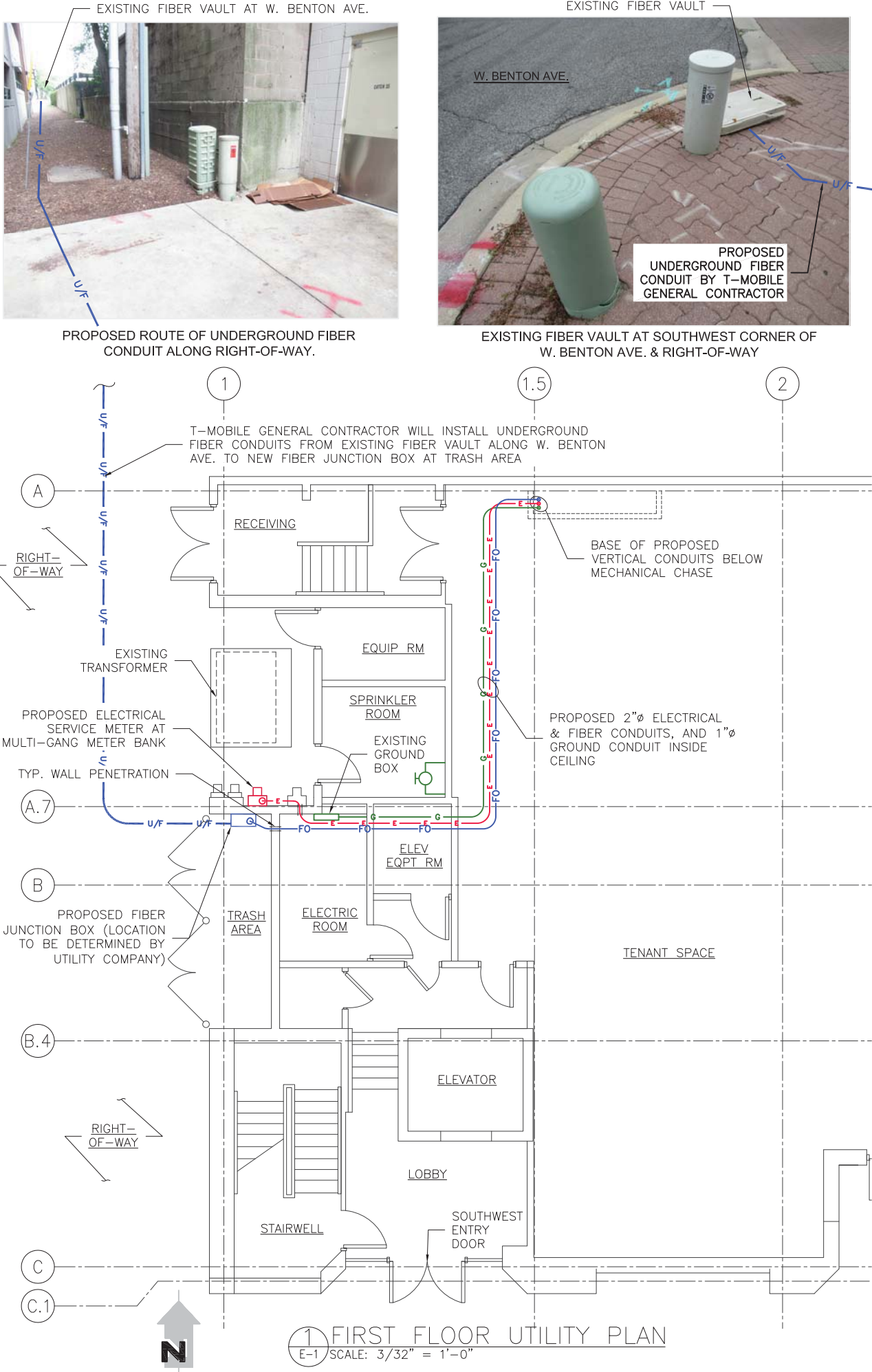
UTILITIES GENERAL NOTES

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 ENCASEMENT 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.



PROPOSED ELECTRICAL SERVICE METER TO BE INSTALLED AT EXISTING MULTI-GANG METER BANK NEAR EXISTING TRANSFORMER

LEGEND	
	FIBER CONDUIT
	UNDERGROUND FIBER
	POWER CONDUIT
	ELECTRICAL GROUNDING CONDUIT
	NATURAL GAS CONDUIT



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**LICENSED PROFESSIONAL ENGINEER**  
SEEMESH M. SETHI  
0062-051290  
STATE OF ILLINOIS  
SIGNATURES:  
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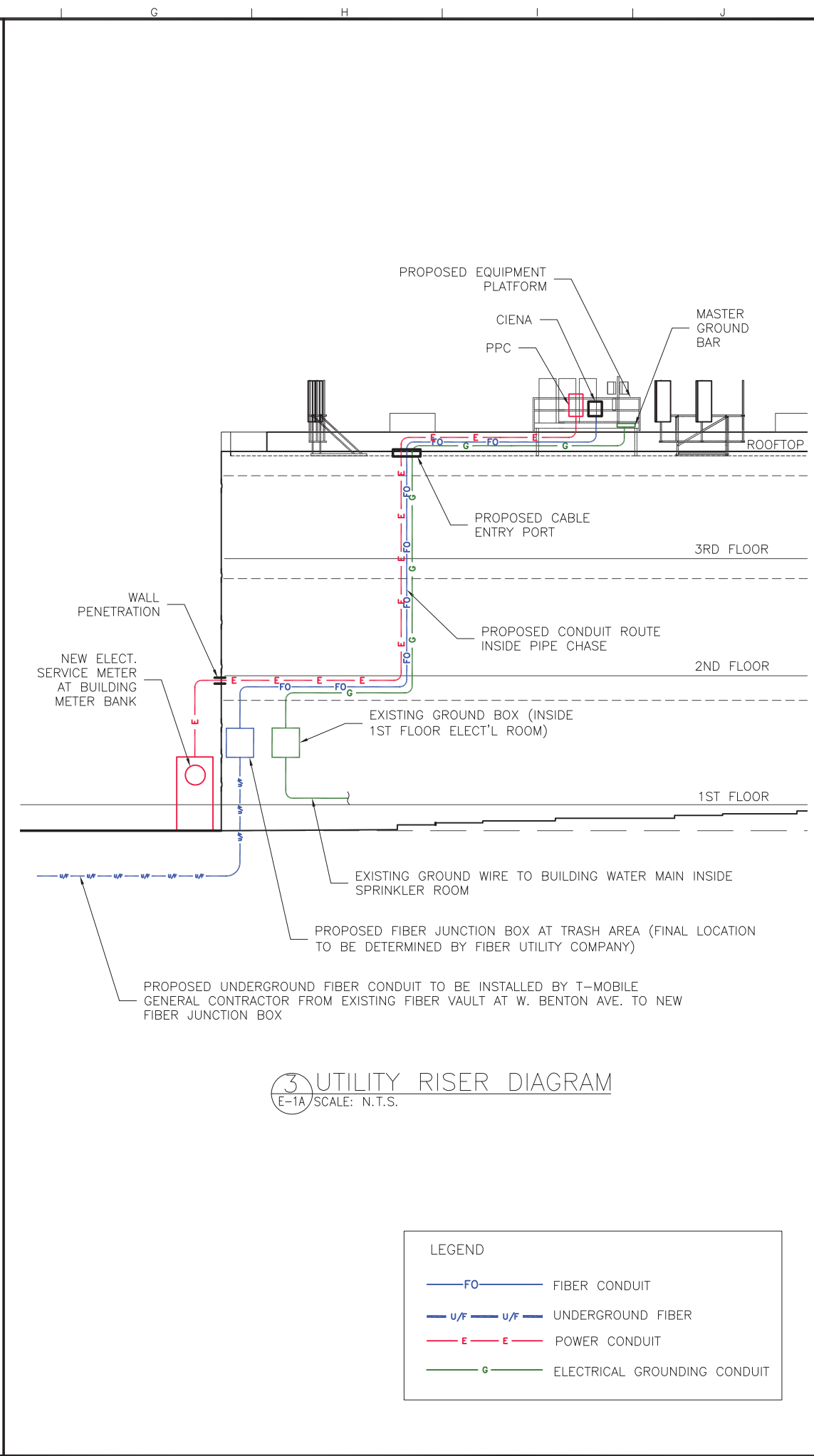
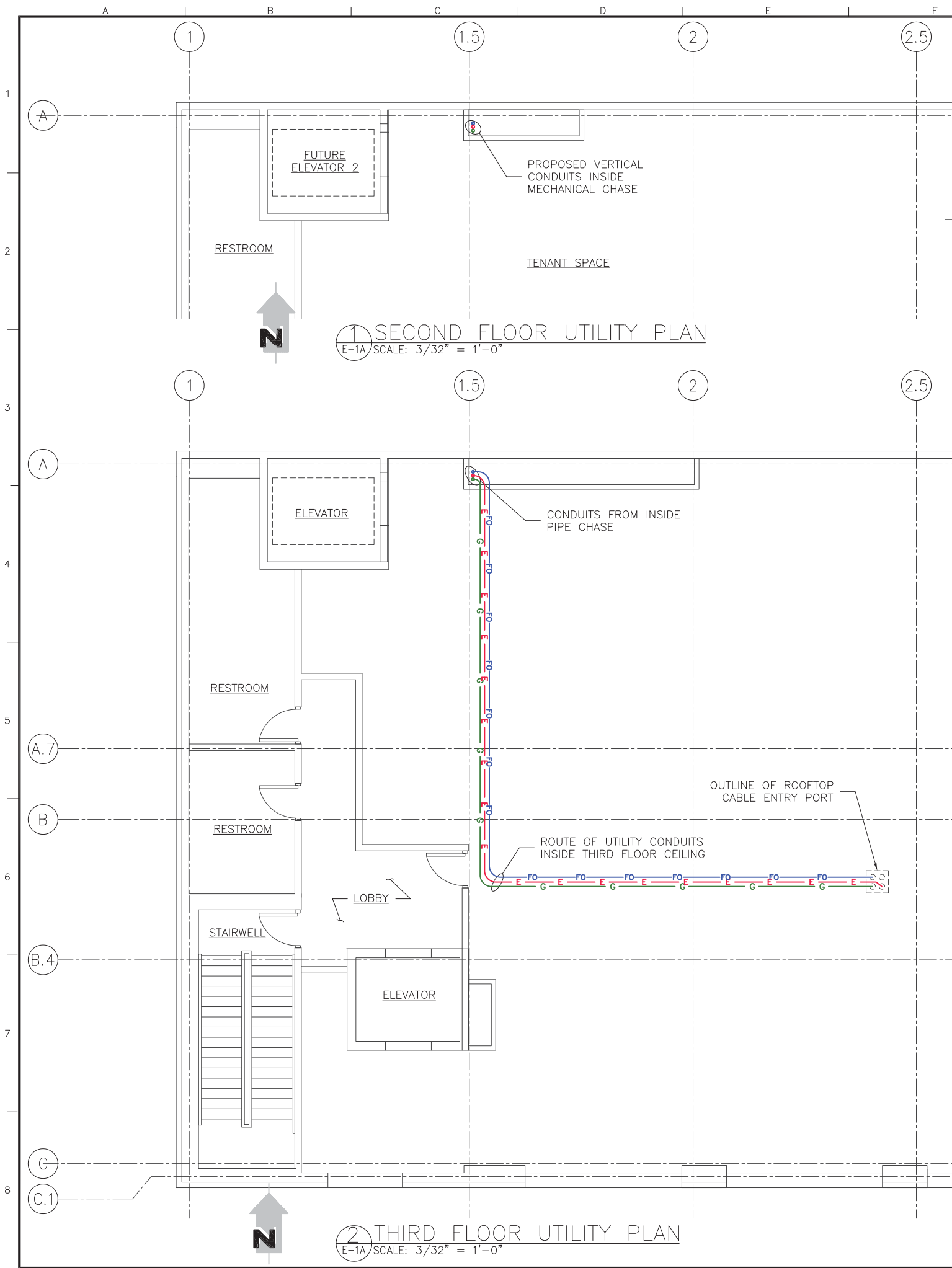
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Drawing Title:  
**UTILITY PLANS & ELECTRICAL NOTES**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
	Date: 8/23/18
Drawing Number	Approved by:
	Date:

**E-1**



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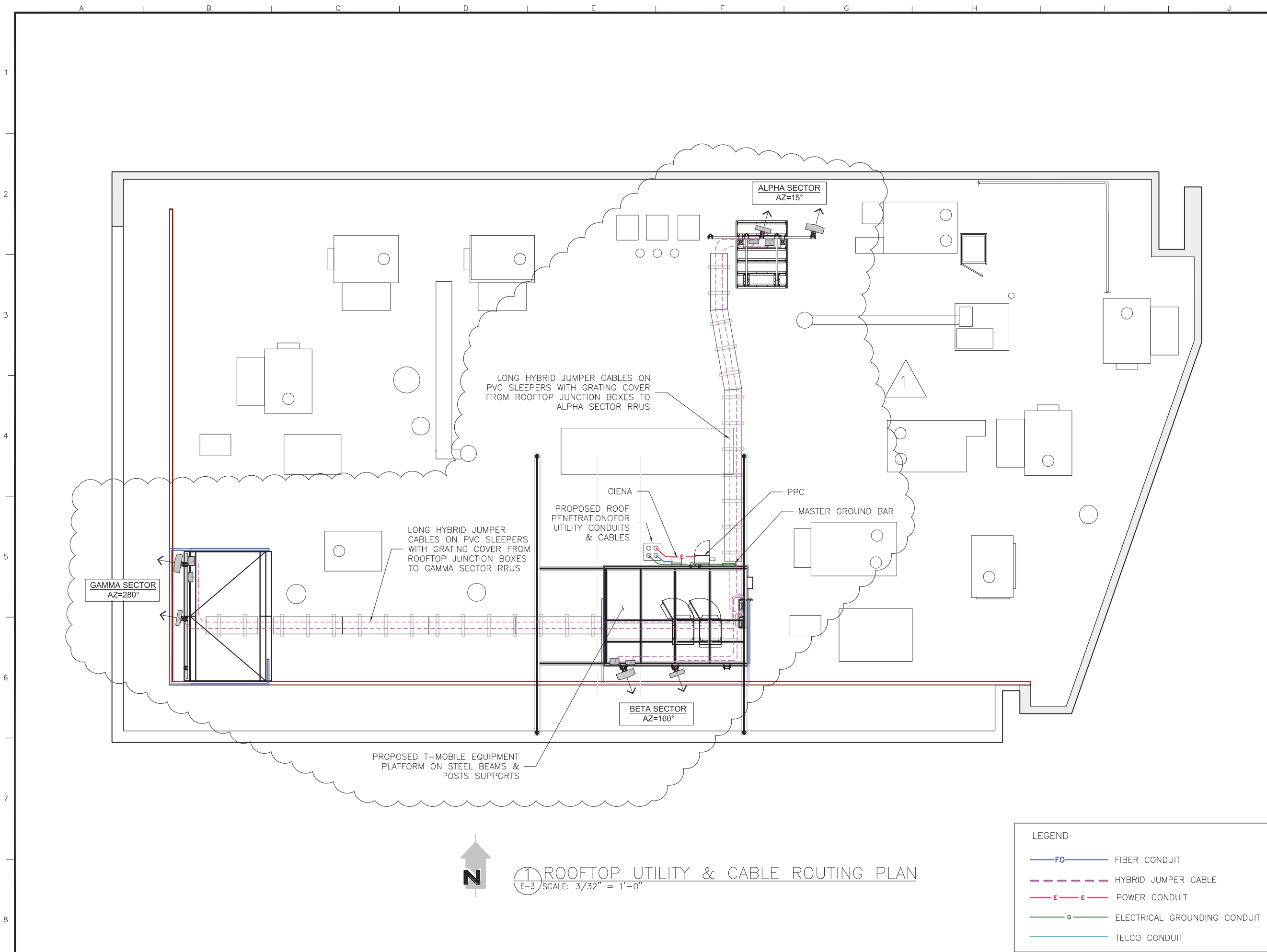
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**UTILITY PLAN**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
Drawing Number	Date: 8/23/18

**E-2**





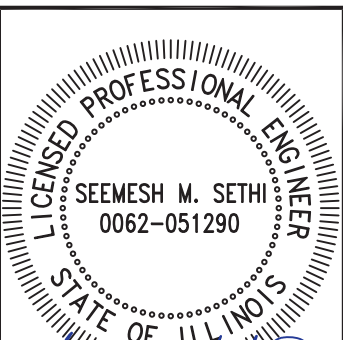


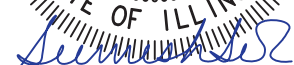
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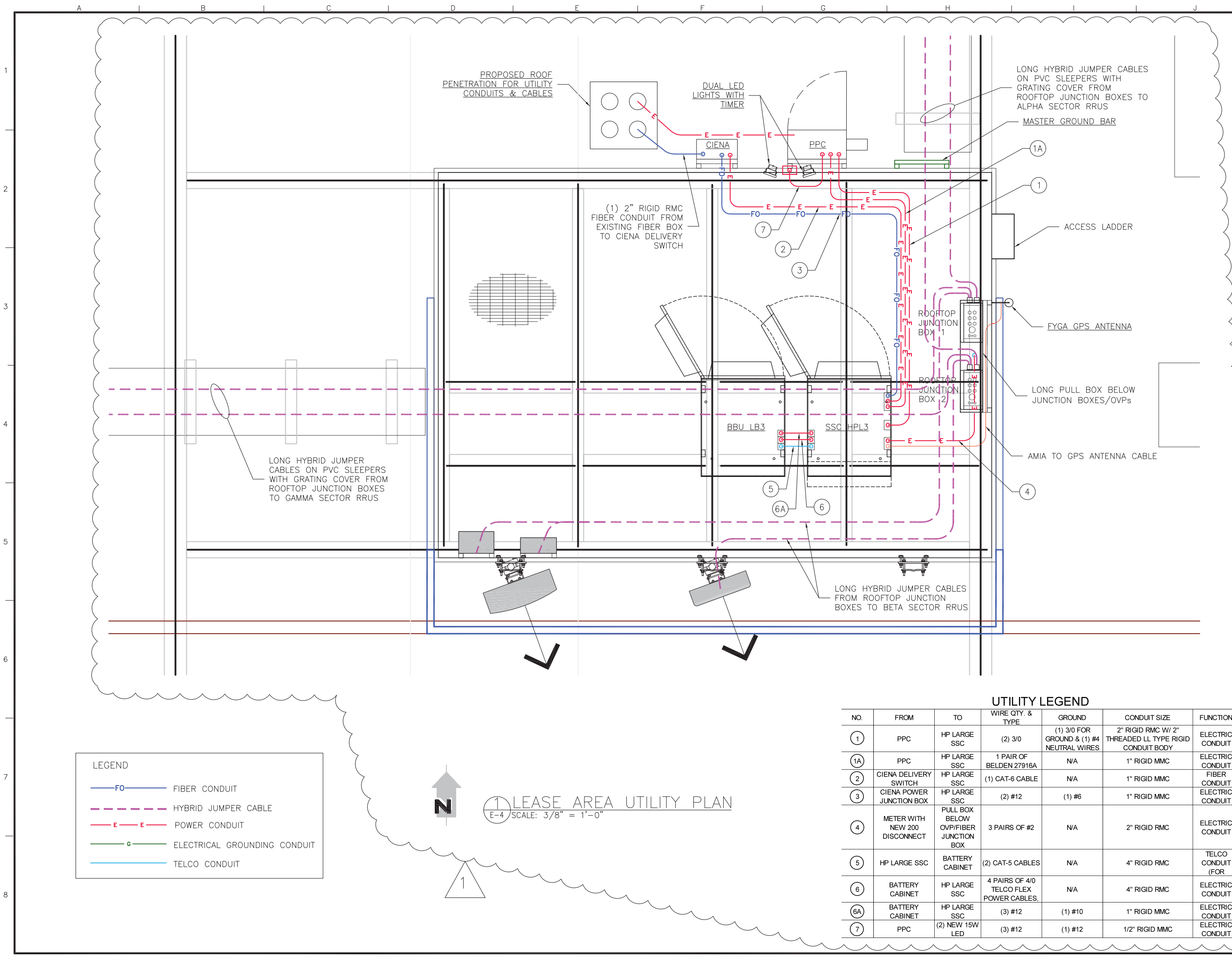
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Drawing Title:  
**ROOFTOP UTILITY AND CABLE ROUTING PLAN**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
Drawing Number	Date: 8/23/18
Approved by:	
Date:	
<b>E-3</b>	



LEGEND

FO

FIBER CONDUIT

HYBRID JUMPER CABLE

E E

POWER CONDUIT

G

ELECTRICAL GROUNDING CONDUIT

TELCO CONDUIT

UTILITY LEGEND						
NO.	FROM	TO	WIRE QTY. & TYPE	GROUND	CONDUIT SIZE	FUNCTION
1	PPC	HP LARGE SSC	(2) 3/0	(1) 3/0 FOR GROUND & (1) #4 NEUTRAL WIRES	2" RIGID RMC W/ 2" THREADED LL TYPE RIGID CONDUIT BODY	ELECTRIC CONDUIT
1A	PPC	HP LARGE SSC	1 PAIR OF BELDEN 27916A	N/A	1" RIGID MMC	ELECTRIC CONDUIT
2	CIENA DELIVERY SWITCH	HP LARGE SSC	(1) CAT-6 CABLE	N/A	1" RIGID MMC	FIBER CONDUIT
3	CIENA POWER JUNCTION BOX	HP LARGE SSC	(2) #12	(1) #6	1" RIGID MMC	ELECTRIC CONDUIT
4	METER WITH NEW 200 DISCONNECT	PULL BOX BELOW OVP/FIBER JUNCTION BOX	3 PAIRS OF #2	N/A	2" RIGID RMC	ELECTRIC CONDUIT
5	HP LARGE SSC	BATTERY CABINET	(2) CAT-5 CABLES	N/A	4" RIGID RMC	TELCO CONDUIT (FOR
6	BATTERY CABINET	HP LARGE SSC	4 PAIRS OF 4/0 TELCO FLEX POWER CABLES,	N/A	4" RIGID RMC	ELECTRIC CONDUIT
6A	BATTERY CABINET	HP LARGE SSC	(3) #12	(1) #10	1" RIGID MMC	ELECTRIC CONDUIT
7	PPC	(2) NEW 15W LED	(3) #12	(1) #12	1/2" RIGID MMC	ELECTRIC CONDUIT

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LICENSED PROFESSIONAL ENGINEER

SEEEMESH M. SETHI

0062-051290

STATE OF ILLINOIS

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Drawing Title:

LEASE AREA UTILITY PLAN

Project Number:

Client Project Number:

Scale:

Drawing Number

Drawn by: PA

Date: 8/21/18

Checked by: MS

Date: 8/23/18

Approved by:

Date:

E-4



GROUNDING NOTES:

- 1

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6

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1.

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12.
- 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 5/8"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.

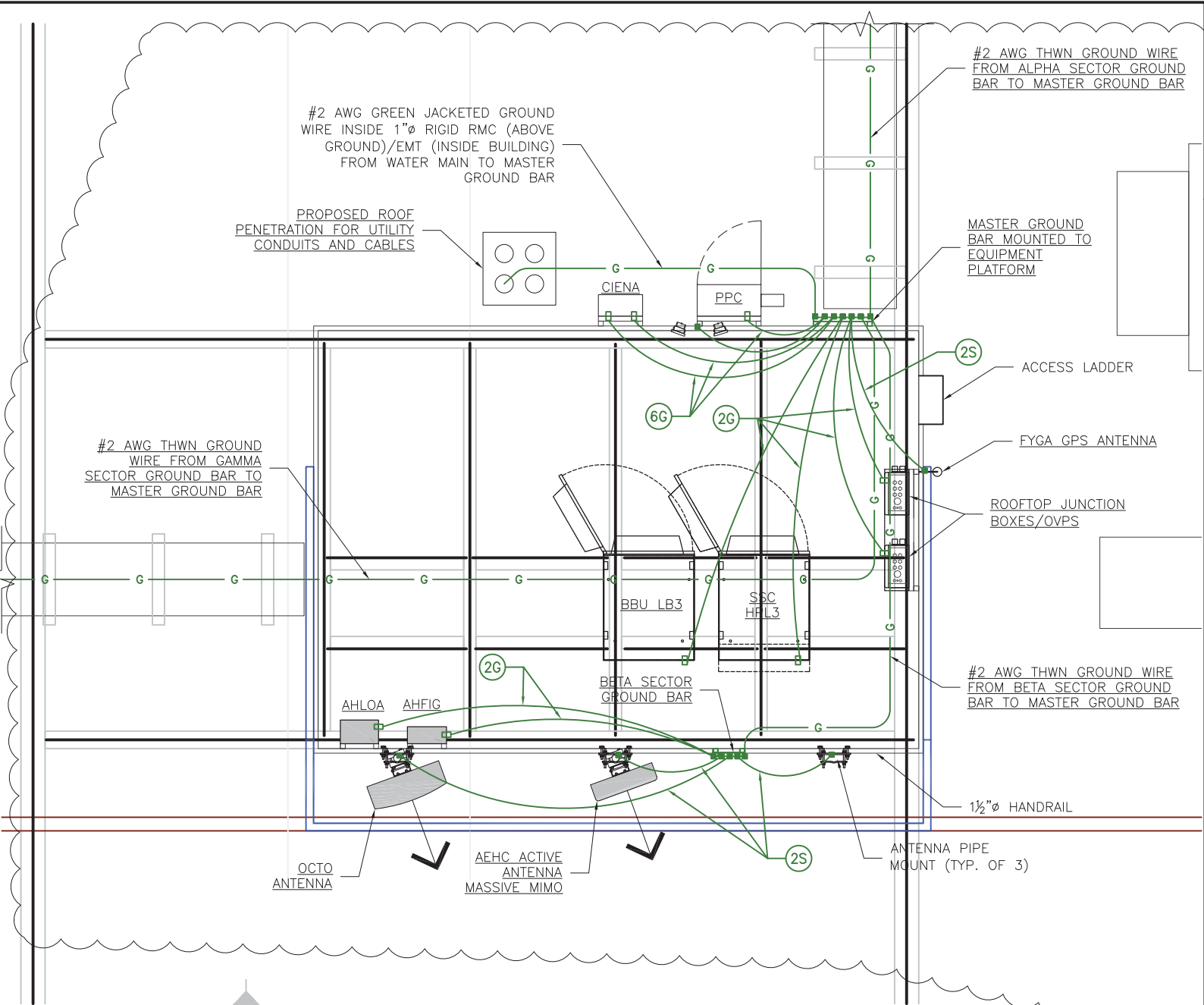
GROUND CONDUCTOR BENDS SHALL NOT BE LESS THAN 8" RADIUS.

GROUND CONDUCTORS TO THE GROUND RING SHALL BE IN 3/4" "LIQUID-TITE" FLEX DUCT AND SEALED AT EXIT W/ SILICONE CAULK.

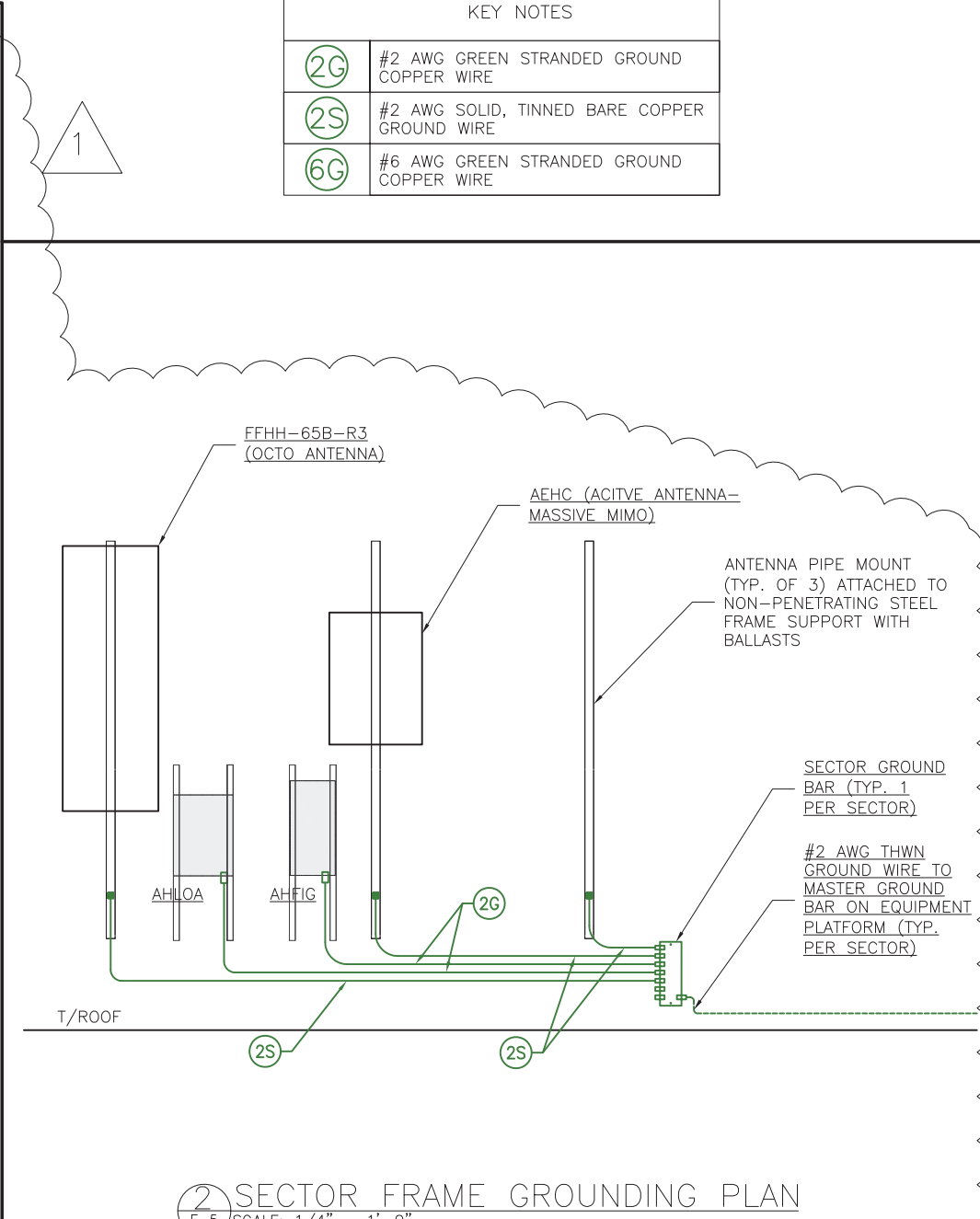
ANTENNA INSTALLATION CONTRACTOR TO PROVIDE & INSTALL TOP, RF BUSBARS & BUSBAR BELOW CENTERLINE.

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

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



1 EQUIPMENT PLATFORM GROUNDING PLAN  
E-5 SCALE: 1/4" = 1'-0"



2 SECTOR FRAME GROUNDING PLAN  
E-5 SCALE: 1/4" = 1'-0"

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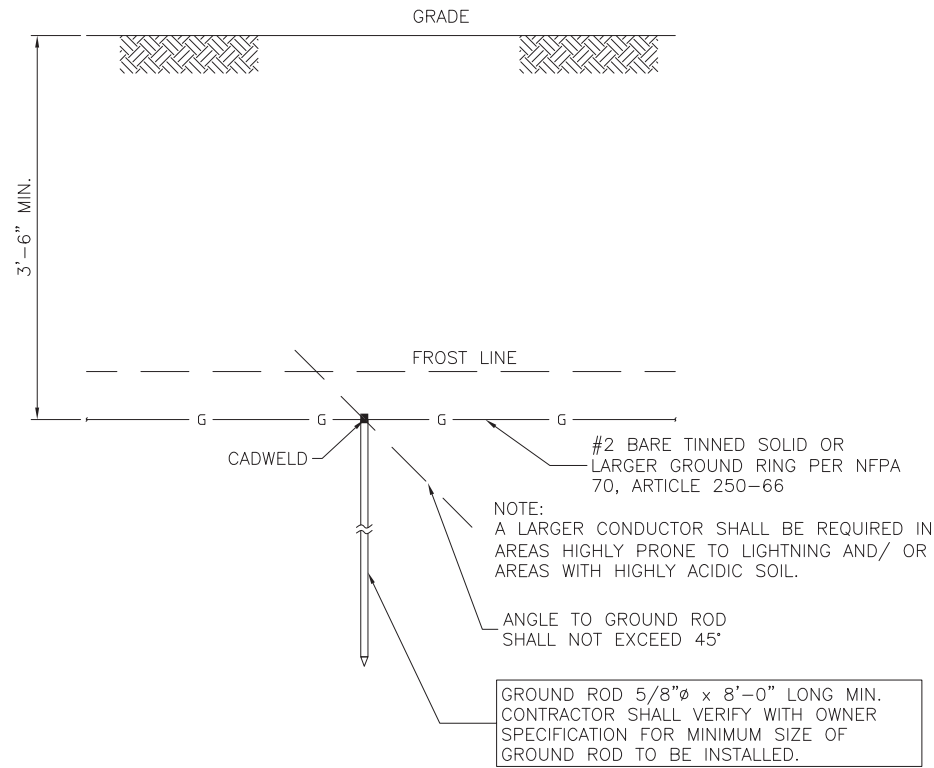
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35 S. WASHINGTON ST. RT

35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:  
GROUNDING PLAN &  
NOTES

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
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	Date:

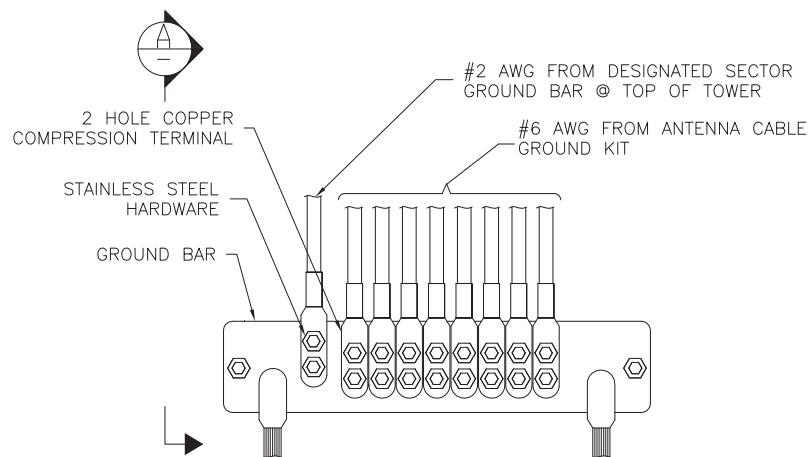
Drawing Number  
E-5



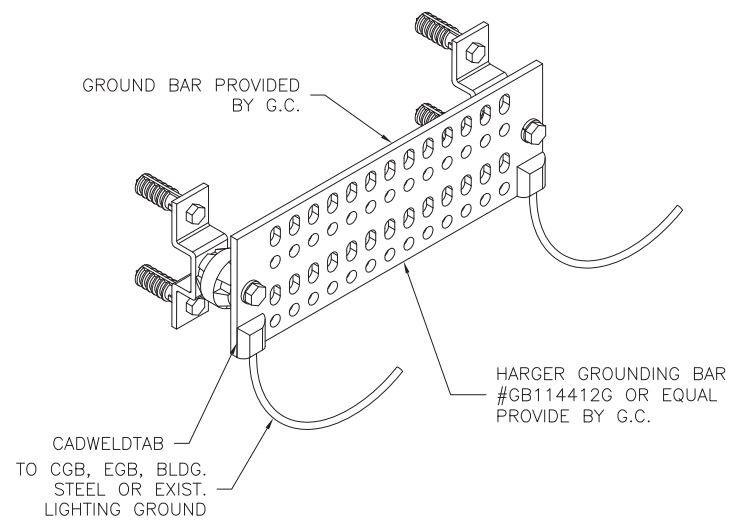
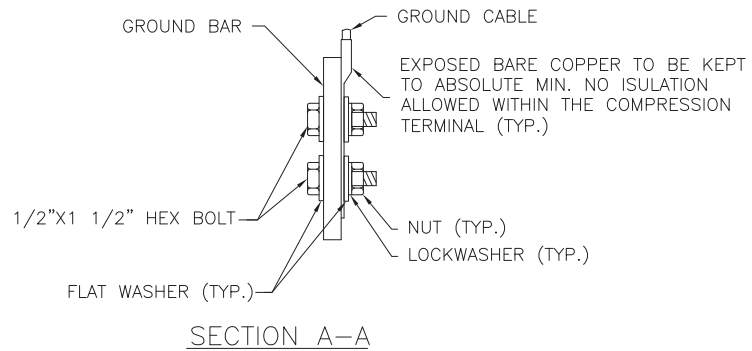
NOTES:

- GROUND RODS MAY BE:  
- COPPER CLAD STEEL  
- SOLID COPPER
- GROUND RODS SHALL HAVE A MAX. SPACING TWICE THE LENGTH OF ROD
- SEE RESISTIVITY REPORT FOR VERIFICATION AS AVAILABLE
- 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)

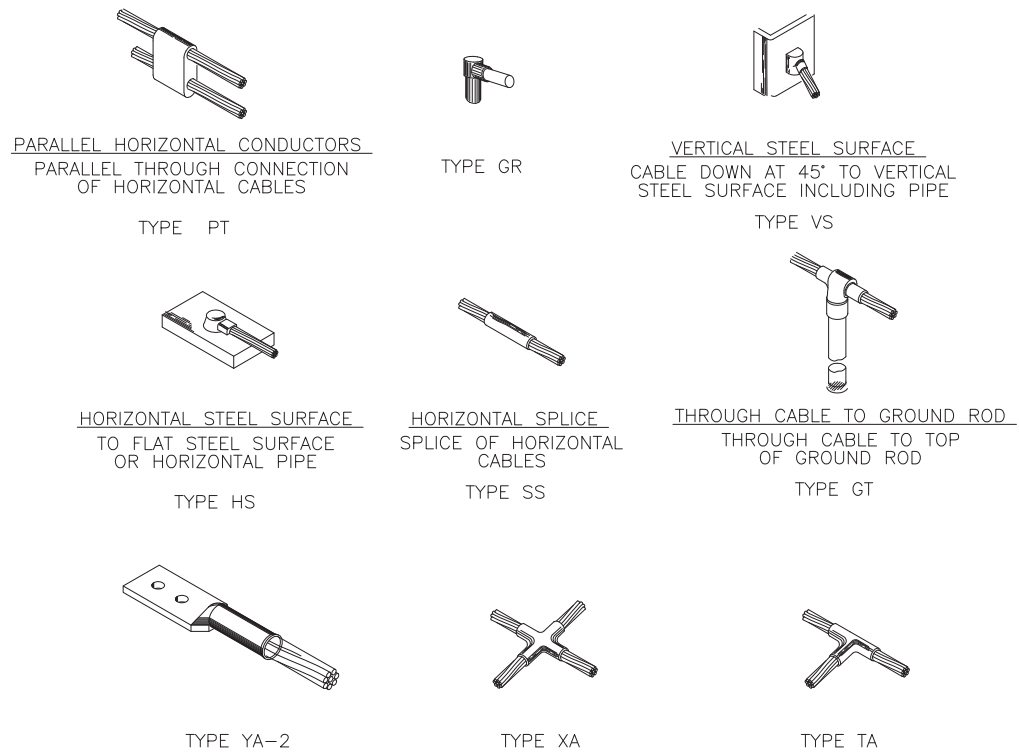
1 GROUNDING ROD (IF REQUIRED)  
E-6 SCALE: N.T.S.



2 GROUNDING BAR CONNECTION  
E-6 SCALE: N.T.S.



3 COLLECTOR GROUND BAR (CGB)  
E-6 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.

4 CADWELD TYPES  
E-6 SCALE: N.T.S.

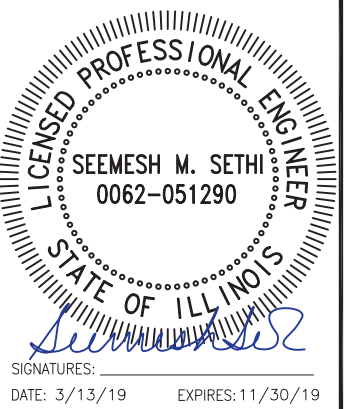
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CONSULTING ENGINEERS

ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139  
1125 REMINGTON RD., SCHAUMBURG, IL 60173  
PHONE: 847-490-8200; FAX: 847-490-8225  
www.kscorp.com

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REV.	DESCRIPTION	DATE
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

**CH95063B**  
**35 S. WASHINGTON ST. RT**  
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:  
**GROUNDING DETAILS**

Project Number:	Drawn by: PA
Client Project Number:	Date: 8/21/18
Scale:	Checked by: MS
Drawing Number	Date: 8/23/18

E-6







