



NSS **NORTHEAST**
SITE SOLUTIONS
Turnkey Wireless Development

Northeast Site Solutions
Denise Sabo
4 Angela's Way, Burlington CT 06013
203-435-3640
denise@northeastsitesolutions.com

December 9, 2021

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Exempt Modification Application
175 Stafford Street, Stafford, CT 06077
Latitude: 41.987055
Longitude: -72.261297
Site #: 876402_Crown_VZW

Dear Ms. Bachman:

Verizon Wireless is requesting to file an exempt modification for an existing tower located at 175 Stafford Street, Stafford, CT 06077. Verizon Wireless currently maintains six (6) antennas at the 127-foot level of the existing 150-foot tower. The property is owned by Harry & Nancy Pragl and the tower is owned by Crown Castle. Verizon now intends to add three (3) antennas. The new antennas would be installed at the 127-foot level of the tower. This modification includes B2, B5 hardware that is both 4G (LTE), and 5G capable.

Verizon Planned Modifications:

Remove: None

Remove and Replace:

- (3) Nokia B13 RRH (REMOVE) - (3) Samsung RF4440D-13A RRH (REPLACE)
- (3) Nokia B66A RRH (REMOVE) - (3) Samsung RF4439D-25A RRH (REPLACE)
- (2) OVP-6 (REMOVE) – (2) Raycap OVP-12 (REPLACE)

Install New:

- (3) MT6407-77A Antennas
- (2) Hybrid Lines

Existing to Remain:

- (6) ANDREW Antennas

The facility was approved by the Connecticut Siting Council , Docket No. 212 on June 3, 2002. Please see attached.



Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-72(b)(2), for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Sal P. Titus, First Selectman and David Perkins, Zoning Enforcement Officer for the Town of Stafford. A copy is also being sent to the tower owner and property owner.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing structure.
2. The proposed modifications will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, Verizon Wireless respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Denise Sabo
Mobile: 203-435-3640
Fax: 413-521-0558
Office: 4 Angela's Way, Burlington CT 06013
E-mail: denise@northeastsitesolutions.com



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Attachments

Cc: Sal P. Titus, First Selectman
Town of Stafford
Warren Memorial Town Hall - Second Floor
1 Main Street
Stafford Springs, CT 06076

David Perkins, Zoning Enforcement Officer
Town of Stafford
Warren Memorial Town Hall - Second Floor
1 Main Street
Stafford Springs, CT 06076

Harry & Nancy Pragl
P O Box 154 B
Staffordville, CT 06077

Crown Castle, Tower Owner

Exhibit A

Original Facility Approval

Connecticut Siting Council ^(/CSC)

[CT.gov Home](#) [./\(\)](#) [Connecticut Siting Council](#) [./CSC\)](#) Dec212

[Decisions \(/CSC/Decisions/Decisions\)](#)



[Meetings and Minutes \(/CSC/Common-Elements/v4-template/Council-Activity\)](#)



[Pending Matters \(/CSC/1_Applications-and-Other-Pending-Matters/Pending-Matters\)](#)



[About Us \(/CSC/Common-Elements/Common-Elements/Connecticut-Siting-Council---Description\)](#)



[Contact Us \(/CSC/Common-Elements/Common-Elements/Contact-Us\)](#)



Search Connecticut Siting Council



DOCKET NO. 212 - Sprint Spectrum, L.P. d/b/a Sprint PCS application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telecommunications facility adjacent to 156 Stafford Street or 159 Stafford Street, Stafford, Connecticut.

} Connecticut
} Siting
} Council
} June 3,
} 2002

Decision and Order

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a telecommunications facility at the proposed alternate D (deer stand) site located at 159 Stafford Street, in Stafford, Connecticut, including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes § 16-50k, be issued to Sprint Spectrum d/b/a Sprint PCS for the construction, maintenance, and operation of a wireless

telecommunications facility at the proposed alternate D (deer stand) site located at 159 Stafford Street Stafford, Connecticut. We deny certification of the proposed prime site and alternate A, B, and C sites located off Stafford Street, Stafford, Connecticut.

The facility shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The tower shall be constructed as a monopole, no taller than necessary to provide the proposed telecommunications services, sufficient to accommodate the antennas for Sprint PCS, and other telecommunications entities, both public and private, but such tower shall not exceed a height of 150 feet above ground level including all appurtenances.
2. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be submitted to and approved by the Council prior to the commencement of facility construction and shall include: a final site plan(s) for development of the proposed alternate site including a compound reduced in size, the location and specifications for the tower foundation, antennas, equipment and foundation for equipment, security fence, access road to be no closer than 25 feet to any inland wetlands, and utility line that shall be underground; construction plans for site clearing, tree trimming, water drainage, and erosion and sedimentation controls consistent with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended; landscaping; and provisions for the prevention and containment of spills and/or other discharge into adjacent inland wetlands.
3. The Certificate Holder shall not construct during the months of May, June, and July for the protection of a State species of special concern, the whip-poor-wills (*Caprimulgus vociferus*).
4. Upon the establishment of any new State or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.
5. The Certificate Holder shall provide electromagnetic radio frequency power density measurements within sixty days following commencement of commercial operation.
6. The Certificate Holder shall provide the Council with a recalculated report of electromagnetic radio frequency power density if and when circumstances in operation cause a change in power density above the levels originally calculated and provided in the application.
7. The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

8. Following completion of construction, if the facility does not initially provide or permanently ceases to provide wireless services this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment within sixty days, or reapply for any continued or new use to the Council before any such use is made.

9. Any antenna that becomes obsolete and ceases to function shall be removed within 60 days after such antennas become obsolete and cease to function.

10. Unless otherwise approved by the Council, this Decision and Order shall be void if the facility authorized herein is not operational within one year of the effective date of this Decision and Order or within one year after all appeals to this Decision and Order have been resolved.

Pursuant to General Statutes § 16-50p, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in The Hartford Courant, Stafford Reminder and the Journal Inquirer.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors to this proceeding are:

Applicant

Sprint Spectrum, d/b/a Sprint PCS

Thomas J. Regan, Esq.
Brown, Rudnick, Freed & Gesmer, P.C.
CityPlace 1, 38th Floor
185 Asylum Street
Hartford, CT 06103-3402

Intervenor

Citizens for Neighborhood Preservation

Glen E. Coe, Esq.
Lewis B. Rome, Esq.
Rome McGuigan Sabanosh, P.C.
Attorneys At Law
One State Street
Hartford, CT 06103-3101

Party

Town of Stafford

Gordon J. Frassinelli, Jr.
First Selectman
Town of Stafford
Warren Memorial Town
1 Main Street, P.O. Box 11
Stafford Springs, CT 06076

Exhibit B

Property Card

0 STAFFORD ST

Location 0 STAFFORD ST

Mblu 30 / / 7T / /

Acct# 00141400

Owner PRAGL HARRY J+NANCY B

Assessment \$159,460

Appraisal \$227,800

PID 1589

Building Count 1

Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2020	\$2,800	\$225,000	\$227,800

Assessment			
Valuation Year	Improvements	Land	Total
2020	\$1,960	\$157,500	\$159,460

Owner of Record

Owner PRAGL HARRY J+NANCY B
Co-Owner
Address PO BOX 154 B
STAFFORDVILLE, CT 06077

Sale Price \$0
Certificate 1
Book & Page 215/ 331
Sale Date 06/12/1985
Instrument

Ownership History

Ownership History					
Owner	Sale Price	Certificate	Book & Page	Instrument	Sale Date
PRAGL HARRY J+NANCY B	\$0	1	215/ 331		06/12/1985

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: \$0
Building Percent Good:
Replacement Cost
Less Depreciation: \$0

Building Attributes

Field	Description
Style	Vacant Ind
Model	
Grade:	
Stories	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Full Bthrms:	
Half Baths:	
Extra Fixtures	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Num Kitchens	
Fireplaces	
Extra Openings	
Prefab Fpl(s)	
Attic Type	
Bsmt Type	
Bsmt Garage(s)	
Fin Bsmnt	
Fn. Bmt. Qual.	
Unfin Area	

Building Photo



(<http://images.vgsi.com/photos2/StaffordCTPhotos/A00\00\19\68.JPG>)

Building Layout

(ParcelSketch.ashx?pid=1589&bid=1589)

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 300
Description Ind Land
Zone AA
Neighborhood 502
Alt Land Appr Category No

Land Line Valuation

Size (Acres) 0.50
Frontage
Depth
Assessed Value \$157,500
Appraised Value \$225,000

Outbuildings

Outbuildings						<u>Legend</u>
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
FN3	FENCE-6' CHAIN			200.00 L.F.	\$900	1
SHD1	Shed	MS	Masonry	240.00 S.F.	\$1,900	1

Valuation History

Appraisal			
Valuation Year	Improvements	Land	Total
2019	\$2,800	\$225,000	\$227,800
2018	\$2,800	\$225,000	\$227,800
2017	\$2,800	\$225,000	\$227,800

Assessment			
Valuation Year	Improvements	Land	Total
2019	\$1,960	\$157,500	\$159,460
2018	\$1,960	\$157,500	\$159,460
2017	\$1,960	\$157,500	\$159,460

175 Stafford St, Stafford, CT 06076

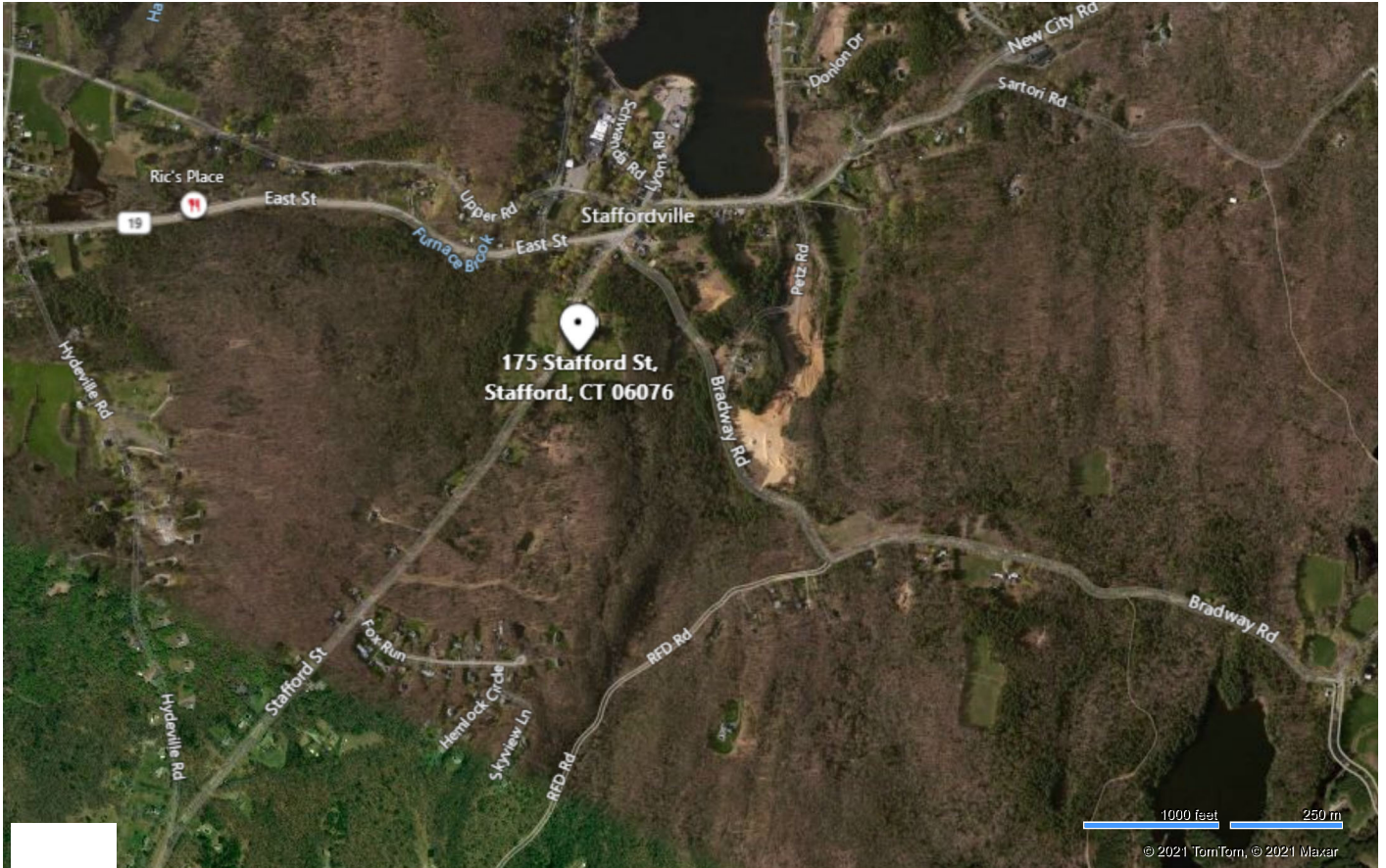


Exhibit C

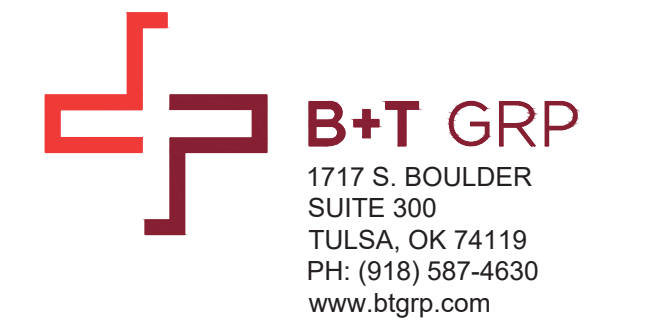
Construction Drawings



VERIZON SITE NUMBER: 468157
VERIZON SITE NAME: STAFFORDVILLE EAST CT
SITE TYPE: MONOPOLE
TOWER HEIGHT: 150'-0"

BUSINESS UNIT #: 876402
SITE ADDRESS: 165 STAFFORD ST
 STAFFORD, CT 06077
COUNTY: TOLLAND
JURISDICTION: CONNECTICUT
SITING COUNCIL

VERIZON 850 ADD



VERIZON SITE NUMBER:
468157
BU #: 876402
STAFFORD/PRAGYL/SSUSA
 165 STAFFORD ST
 STAFFORD, CT 06077
 EXISTING 150'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	10/25/21	AP	CONSTRUCTION	TDG
1	11/4/21	TDG	CONSTRUCTION	TDG

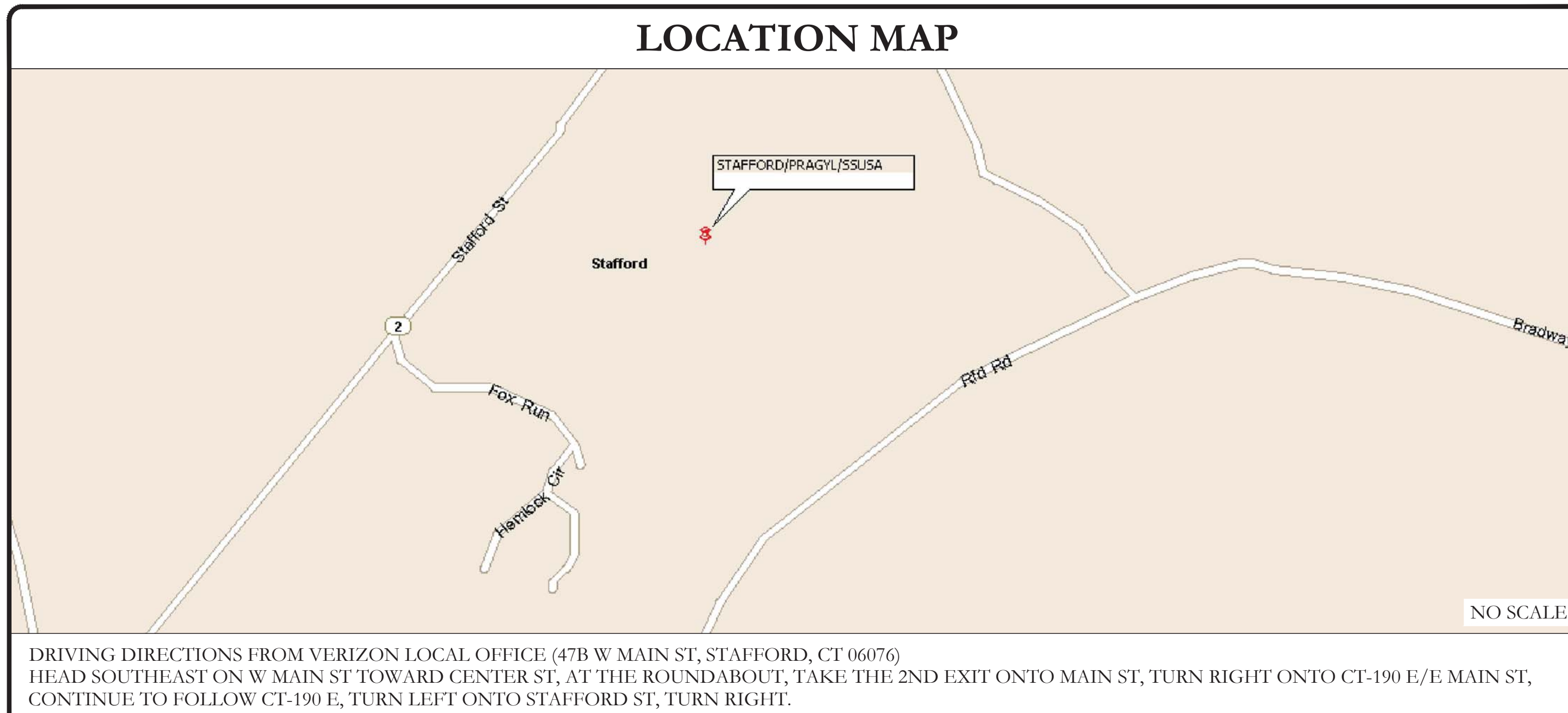
SITE INFORMATION

CROWN CASTLE USA INC. SITE NAME:	STAFFORD/PRAGYL/SSUSA
SITE ADDRESS:	165 STAFFORD ST STAFFORD, CT 06077
COUNTY:	TOLLAND
MAP/PARCEL #:	30 / 7 / 1
AREA OF CONSTRUCTION:	EXISTING
LATITUDE:	41.987050°
LONGITUDE:	-72.261328°
LAT/LONG TYPE:	NAD83
GROUND ELEVATION:	981'
CURRENT ZONING:	ST, AA
JURISDICTION:	CONNECTICUT SITING COUNCIL
OCCUPANCY CLASSIFICATION:	U
TYPE OF CONSTRUCTION:	IIB
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
PROPERTY OWNER:	PRAGL HARRY J+NANCY B PO BOX 154 B STAFFORDVILLE, CT 06077
TOWER OWNER:	CROWN CASTLE 2000 CORPORATE DRIVE CANONSBURG, PA 15317
CARRIER/APPLICANT:	VERIZON WIRELESS 20 ALEXANDER DRIVE, 2ND FLOOR WALLINGFORD, CT 06492
ELECTRIC PROVIDER:	NORTHEAST UTILITIES (800) 286-2000
TELCO PROVIDER:	AT&T (866) 620-6900

DRAWING INDEX

SHEET #	SHEET DESCRIPTION
T-1	TITLE SHEET
T-2	GENERAL NOTES
C-1	SITE PLAN
C-2	TOWER ELEVATION & ANTENNA PLANS
C-3	EQUIPMENT SCHEDULES
C-4	EQUIPMENT DETAILS
C-5	EQUIPMENT DETAILS
C-6	PLUMBING DIAGRAM
G-1	GROUNDING DETAILS
G-2	GROUNDING DETAILS

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR FULL SIZE. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.



APPROVALS

SIGNATURE	DATE
_____	_____
_____	_____
_____	_____
_____	_____

CONTRACTOR PMI REQUIREMENTS

PMI ACCESSED AT	https://pmi.vxwsmart.com
SMART TOOL VENDOR PROJECT NUMBER	10039614
VzW LOCATION CODE (PSLC)	468157

*** PMI AND REQUIREMENTS ALSO EMBEDDED IN MOUNT ANALYSIS REPORT

MOUNT MODIFICATION REQUIRED **N**

VzW APPROVED SMART KIT VENDORS

REFER TO MOUNT MODIFICATION DRAWINGS PAGE FOR VzW SMART KIT APPROVED VENDORS

APPLICABLE CODES/REFERENCE DOCUMENTS

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES:

CODE TYPE	CODE
BUILDING	2015 IBC
MECHANICAL	2015 IMC
ELECTRICAL	2017 NEC

REFERENCE DOCUMENTS:

STRUCTURAL ANALYSIS:	TOWER ENGINEERING PROFESSIONALS
DATED:	10/12/21
MOUNT ANALYSIS:	GPD ENGINEERING
DATED:	9/7/21
RFDS REVISION:	N/A
DATED:	10/27/21
ORDER ID:	589220
REVISION:	0

CALL CONNECTICUT ONE CALL (800) 922-4455 CBYD.COM CALL 2 WORKING DAYS BEFORE YOU DIG!

PROJECT DESCRIPTION

THE PURPOSE OF THIS PROJECT IS TO ENHANCE BROADBAND CONNECTIVITY AND CAPACITY TO THE EXISTING ELIGIBLE WIRELESS FACILITY.

TOWER SCOPE OF WORK:

- REMOVE (6) RADIOS
- REMOVE (2) OVP-6
- REMOVE (2) 6X12 HYBRIFLEX NON-LI
- INSTALL (3) ANTENNAS
- INSTALL (6) RADIOS
- INSTALL (2) OVPS
- INSTALL (2) 6X12 HYBRIFLEX LI

GROUND SCOPE OF WORK:

- NONE

NOTE:
PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN NOC AT (800) 788-7011 & CROWN CONSTRUCTION MANAGER

ISSUED FOR:

B&T ENGINEERING, INC.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER: T-1	REVISION: 1
------------------------------------	------------------------------

84466.008.01_STAFFORD_PRAGYL_SSUSA.dwg - Sheet: T-1 - User: itm.grove - Nov 04, 2021 - 3:32pm

CROWN CASTLE USA INC. SITE ACTIVITY REQUIREMENTS:

- NOTICE TO PROCEED-- NO WORK SHALL COMMENCE PRIOR TO CROWN CASTLE USA INC. WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN CASTLE USA INC. NOC AT 800-788-7011 & THE CROWN CASTLE USA INC. CONSTRUCTION MANAGER.
- "LOOK UP" - CROWN CASTLE USA INC. SAFETY CLIMB REQUIREMENT:
THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR CROWN CASTLE USA INC. POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.
- PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.
- ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND CROWN CASTLE USA INC. STANDARD CED--STD--10253, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA--322 (LATEST EDITION).
- ALL SITE WORK TO COMPLY WITH QAS--STD--10068 "INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON CROWN CASTLE USA INC. TOWER SITE," CED--STD--10294 "STANDARD FOR INSTALLATION OF MOUNTS AND APPURTENANCES," AND LATEST VERSION OF ANSI/TIA--1019--A--2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS." IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY CROWN CASTLE USA INC. PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
- ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
- THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
- THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
- ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.
- ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.
- CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
- ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, TOWER OWNER, CROWN CASTLE USA INC., AND/OR LOCAL UTILITIES.
- THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.
- THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
- THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
- THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.
- CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
- THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
- CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
- CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
- NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

GREENFIELD GROUNDING NOTES:

- ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
- THE CONTRACTOR SHALL PERFORM IEEE FALL--OF--POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
- THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.
- METAL CONDUIT AND TRAY SHALL BE GROUNDING AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
- METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
- EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.
- CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.
- ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
- ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
- USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
- EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
- ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
- COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
- ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.
- APPROVED ANTI-OXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
- ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
- MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
- BOND ALL METALLIC OBJECTS WITHIN 6 FT OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.
- GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
- ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON-METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD-WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).
- BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY).

GENERAL NOTES:

- FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
CONTRACTOR: GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION
CARRIER: VERIZON
TOWER OWNER: CROWN CASTLE USA INC.
- THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.
- THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.
- NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.
- SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.
- PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CROWN CASTLE.
- ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
- UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
- THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
- IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND CROWN CASTLE PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
- CONTRACTOR IS TO PERFORM A SITE INVESTIGATION AND IS TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.
- THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF CROWN CASTLE USA INC.
- CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
- CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

- ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.
- UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.
- ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°f AT TIME OF PLACEMENT.
- CONCRETE EXPOSED TO FREEZE--THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER--TO--CEMENT RATIO (W/C) OF 0.45.
- ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (Fy) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:
#4 BARS AND SMALLER.....40 ksi
#5 BARS AND LARGER.....60 ksi
THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH.....3"
CONCRETE EXPOSED TO EARTH OR WEATHER:
#6 BARS AND LARGER.....2"
#5 BARS AND SMALLER.....1-1/2"
CONCRETE NOT EXPOSED TO EARTH OR WEATHER:
SLAB AND WALLS.....3/4"
BEAMS AND COLUMNS.....1-1/2"
- A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

ELECTRICAL INSTALLATION NOTES:

- ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
- CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
- WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
- ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.
4.1. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.
4.2. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 22,000 AIG MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.
- EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR--CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
- ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).
- PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
- ALL THE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
- ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN--2, XHHW, XHHW--2, THW, THW--2, RHW, OR RHW--2 INSULATION UNLESS OTHERWISE SPECIFIED.
- SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN--2, XHHW, XHHW--2, THW, THW--2, RHW, OR RHW--2 INSULATION UNLESS OTHERWISE SPECIFIED.
- POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI--CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
- POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI--CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN--2, XHHW, XHHW--2, THW, THW--2, RHW, OR RHW--2 INSULATION UNLESS OTHERWISE SPECIFIED.
- ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP--STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).
- RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEC AND NEC.
- ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
- ELECTRICAL METALLIC TUBING (EMT) OR METAL--CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
- SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
- LIQUID--TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID--TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
- CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION--TYPE AND APPROVED FOR THE LOCATION USED. SET WORK FITTINGS ARE NOT ACCEPTABLE.
- CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEC AND THE NEC.
- WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOULD SPECMATE WIREWAY).
- SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
- CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON--PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER--ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKOUT ON OUTSIDE AND INSIDE.
- EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY--COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3R (OR BETTER) FOR EXTERIOR LOCATIONS.
- METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY--COATED OR NON--CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
- NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
- THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR CROWN CASTLE USA INC. BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
- THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
- INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "VERIZON".
- ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

CONDUCTOR COLOR CODE		
SYSTEM	CONDUCTOR	COLOR
120/240V, 1Ø	A PHASE	BLACK
	B PHASE	RED
	NEUTRAL	WHITE
	GROUND	GREEN
	120/208V, 3Ø	A PHASE
	B PHASE	RED
	C PHASE	BLUE
	NEUTRAL	WHITE
	GROUND	GREEN
277/480V, 3Ø	A PHASE	BROWN
	B PHASE	ORANGE OR PURPLE
	C PHASE	YELLOW
	NEUTRAL	GREY
	GROUND	GREEN
DC VOLTAGE	POS (+)	RED**
	NEG (-)	BLACK**

* SEE NEC 210.5(C)(1) AND (2)
** POLARITY MARKED AT TERMINATION

ABBREVIATIONS:

ANT	ANTENNA
(E)	EXISTING
FIF	FACILITY INTERFACE FRAME
GEN	GENERATOR
GPS	GLOBAL POSITIONING SYSTEM
GSM	GLOBAL SYSTEM FOR MOBILE
LTE	LONG TERM EVOLUTION
MGB	MASTER GROUND BAR
MW	MICROWAVE
(N)	NEW
NEC	NATIONAL ELECTRIC CODE
(P)	PROPOSED
PP	POWER PLANT
QTY	QUANTITY
RECT	RECTIFIER
RBS	RADIO BASE STATION
RET	REMOTE ELECTRIC TILT
RFDS	RADIO FREQUENCY DATA SHEET
RRH	REMOTE RADIO HEAD
RRU	REMOTE RADIO UNIT
SIAD	SMART INTEGRATED DEVICE
TMA	TOWER MOUNTED AMPLIFIER
TYP	TYPICAL
UMTS	UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM
W.P.	WORK POINT

APWA UNIFORM COLOR CODE:

WHITE	PROPOSED EXCAVATION
PINK	TEMPORARY SURVEY MARKINGS
RED	ELECTRIC POWER LINES, CABLES, CONDUIT, AND LIGHTING CABLES
YELLOW	GAS, OIL, STEAM, PETROLEUM, OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES, OR CONDUIT AND TRAFFIC LOOPS
BLUE	POTABLE WATER
PURPLE	RECLAIMED WATER, IRRIGATION, AND SLURRY LINES
GREEN	SEWERS AND DRAIN LINES



180 WASHINGTON VALLEY ROAD
BEDMINSTER, NJ 07921



3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065



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SUITE 300
TULSA, OK 74119
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www.btgrp.com

VERIZON SITE NUMBER:
468157


BU #: **876402**
STAFFORD/PRAGYL/SSUSA

165 STAFFORD ST
STAFFORD, CT 06077

EXISTING 150'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	10/25/21	AP	CONSTRUCTION	TDG
1	11/4/21	TDG	CONSTRUCTION	TDG



11/4/21

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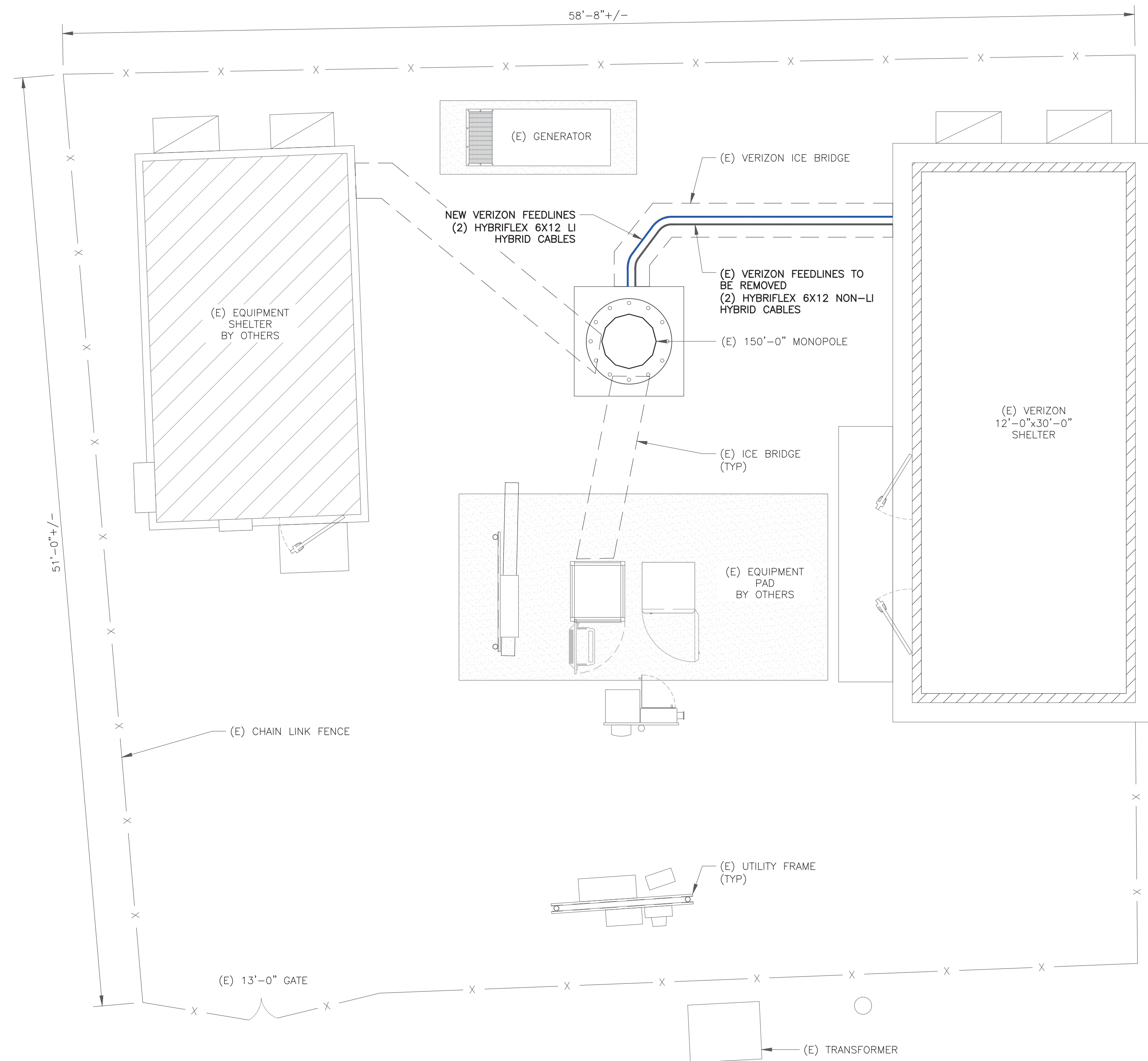
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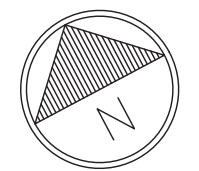
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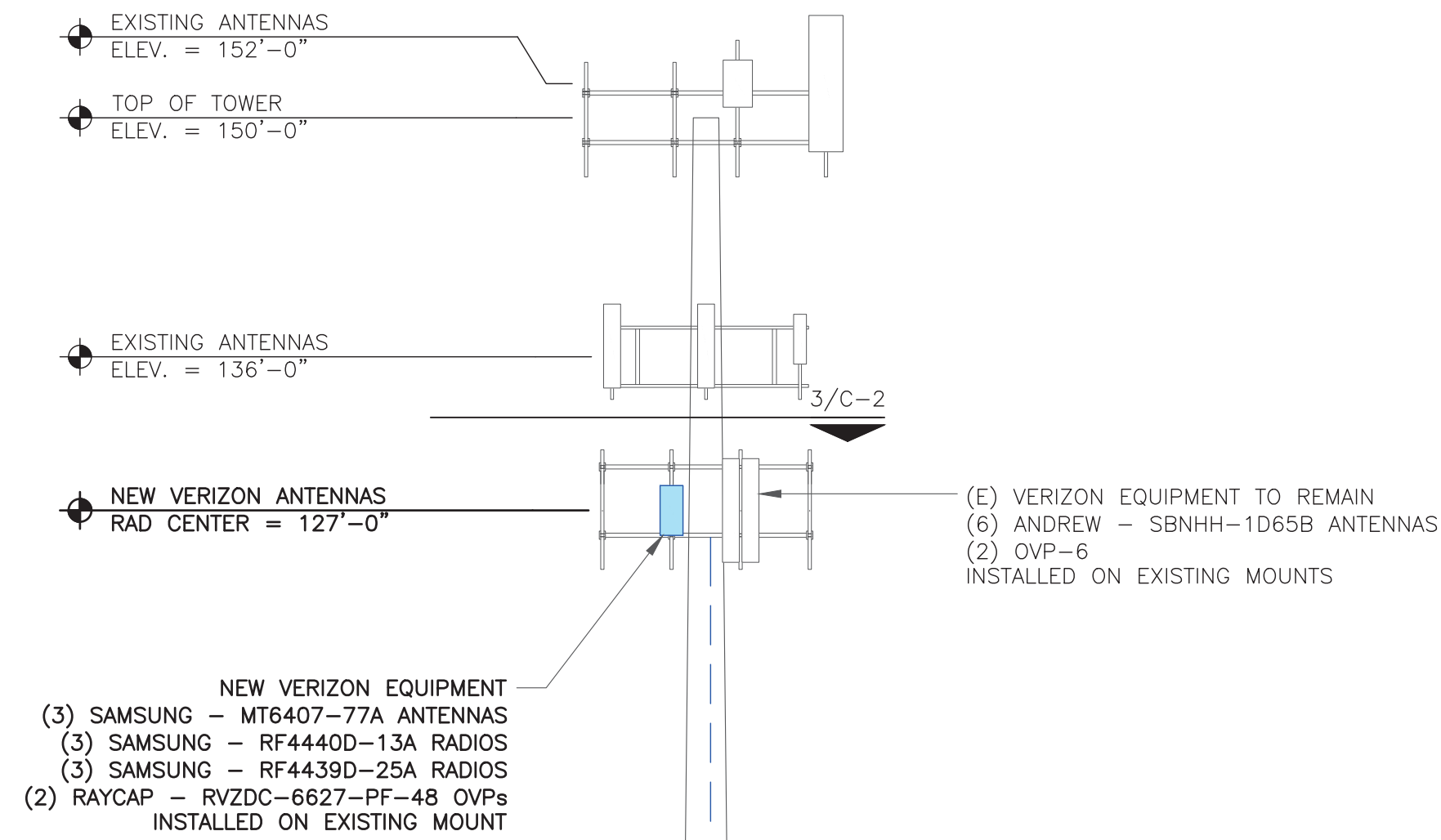
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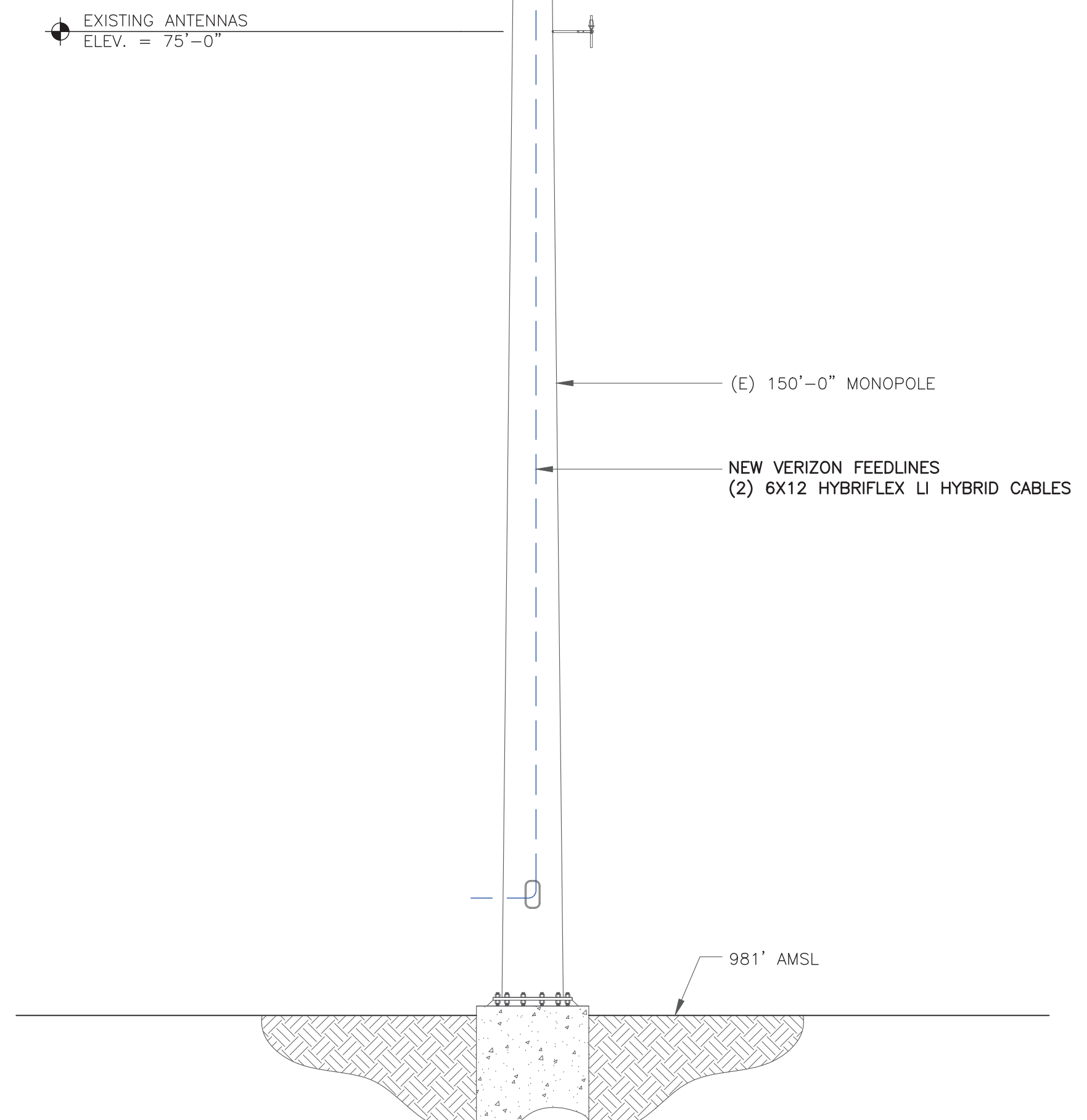
1 SITE PLAN
SCALE: 1/4"=1'-0" (FULL SIZE)
1/8"=1'-0" (11x17)



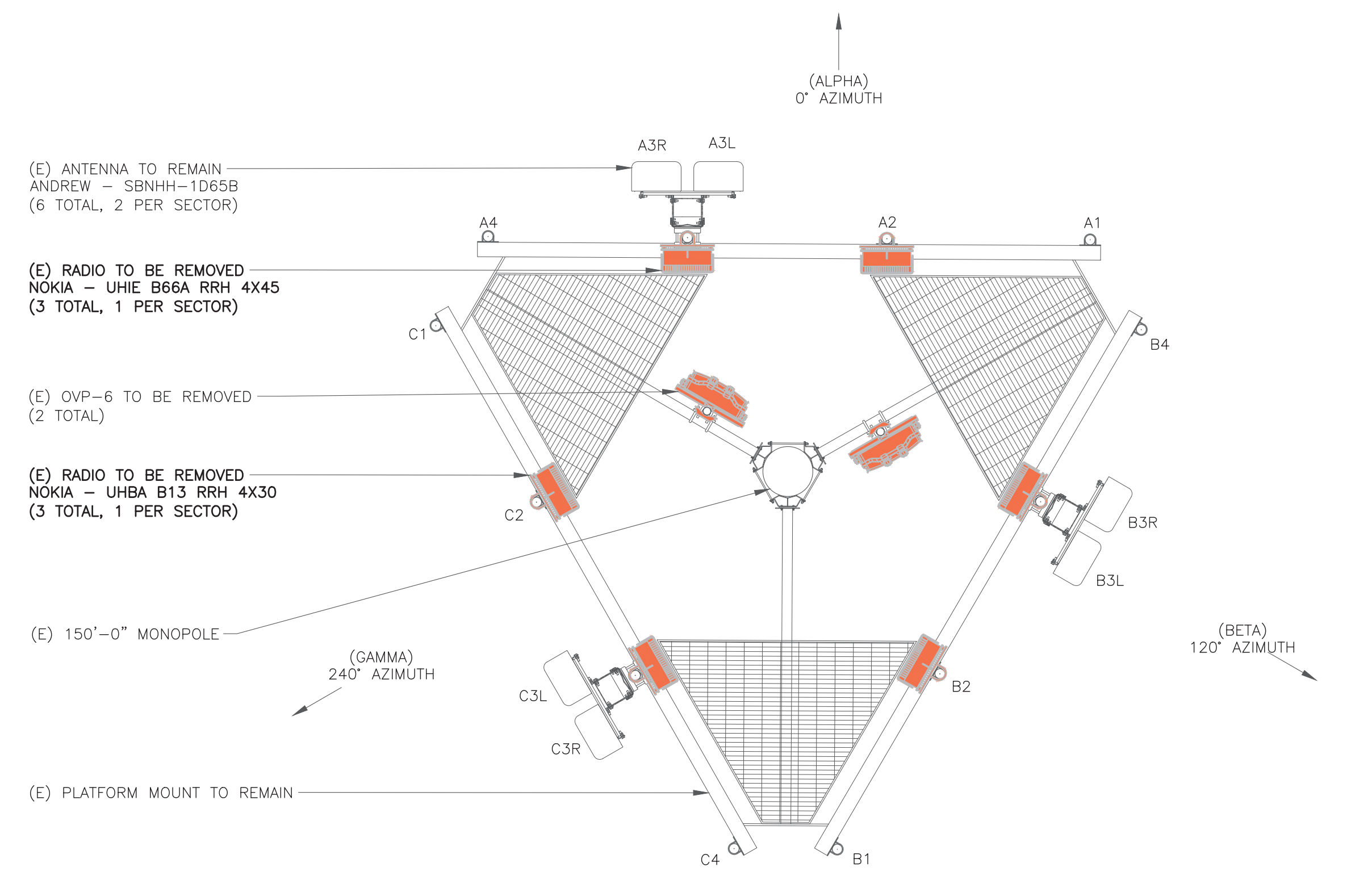
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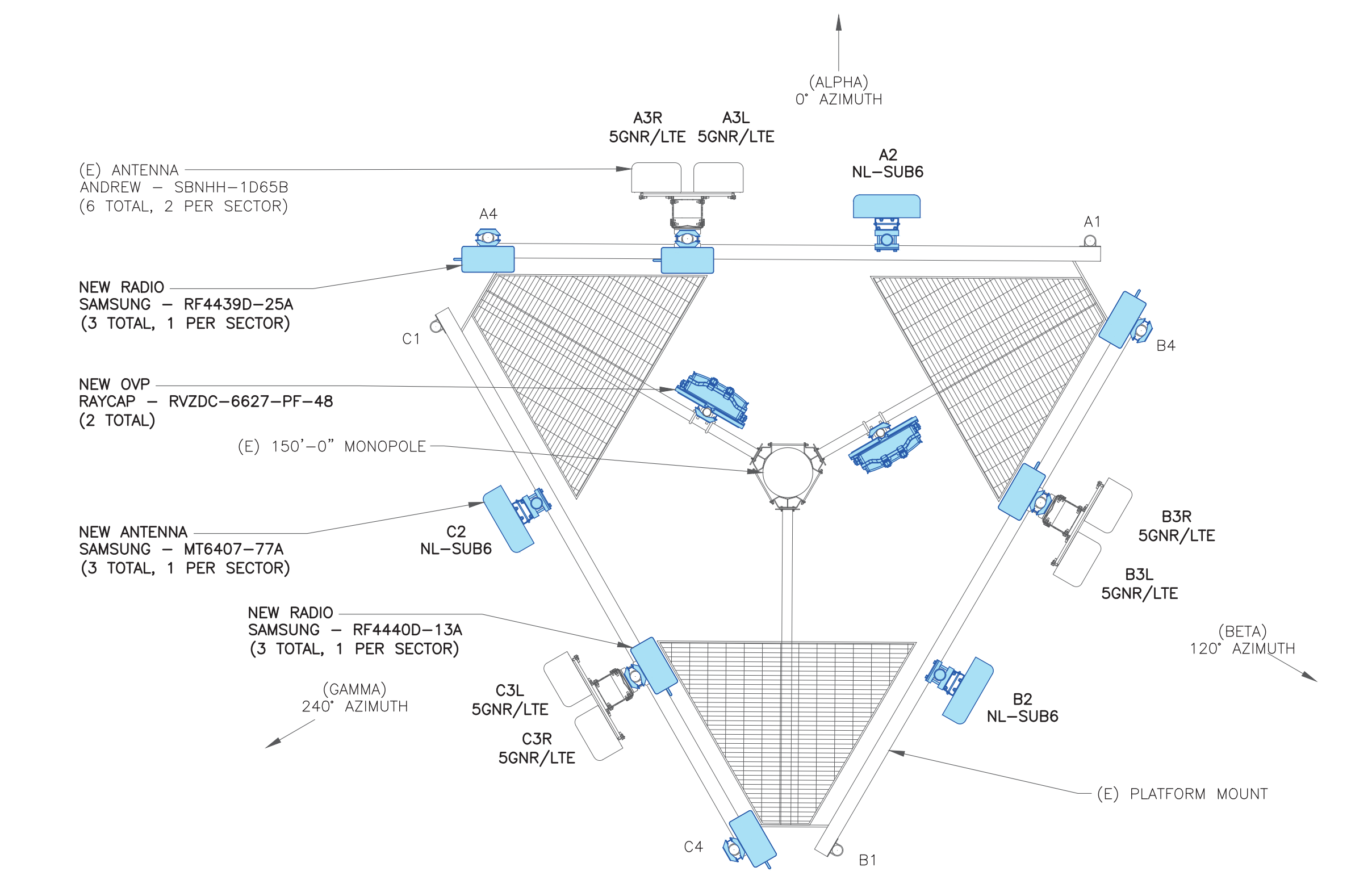
VERIZON EQUIPMENT
ANTENNA CL: 127'-0"
MOUNT CL: 127'-0"



1 TOWER ELEVATION
SCALE: NOT TO SCALE



2 EXISTING ANTENNA PLAN
SCALE: NOT TO SCALE



3 NEW ANTENNA PLAN
SCALE: NOT TO SCALE

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(Professional Engineer Seal)
11/4/21

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REVISION:

1

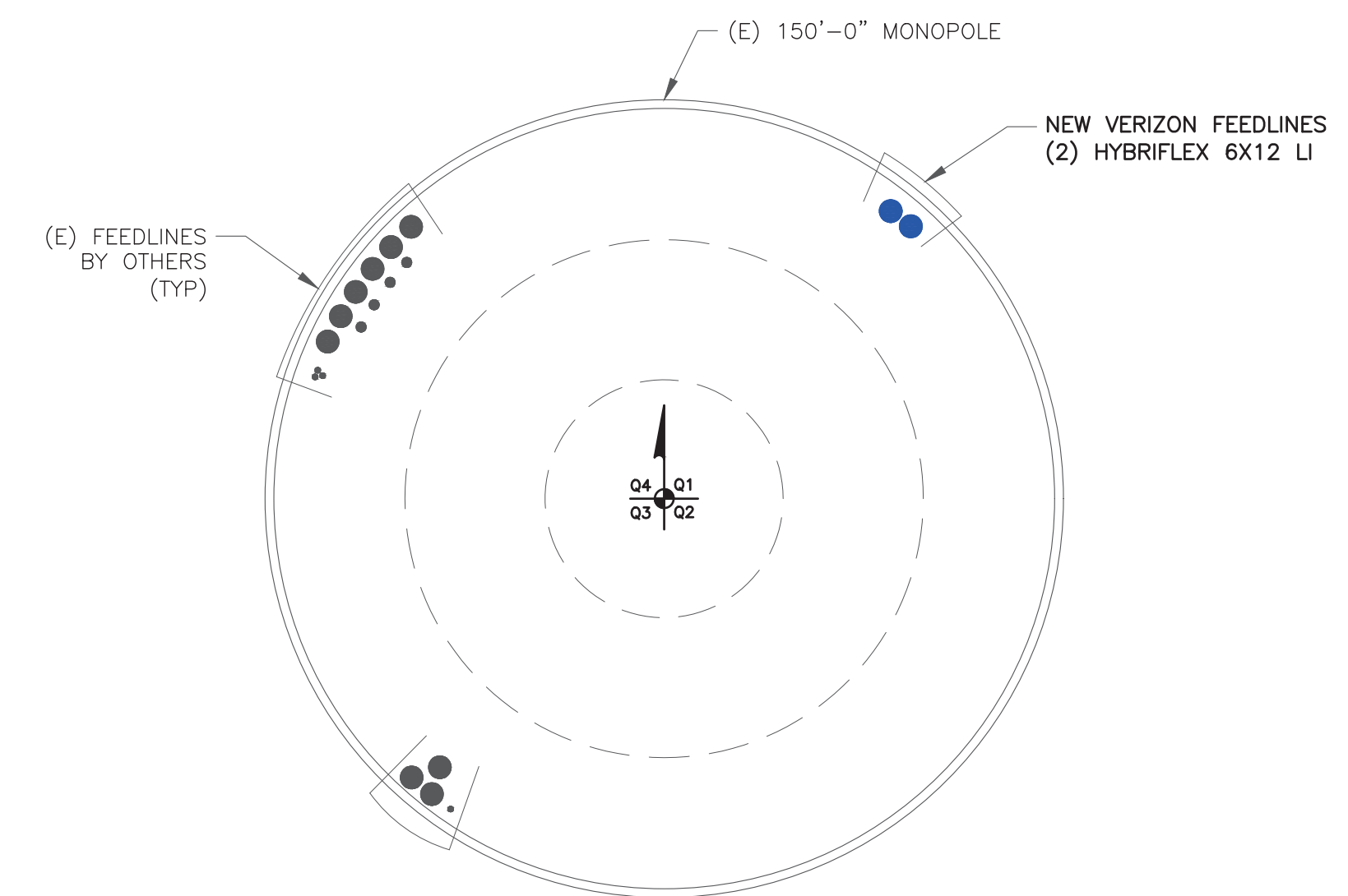
ANTENNA/RRH SCHEDULE

SECTOR	STATUS	ANTENNA MANUFACTURER	ANTENNA MODEL	ANTENNA CENTERLINE	AZIMUTH	MECHANICAL DOWNTILTS	ELECTRICAL DOWNTILTS	TOWER EQUIPMENT MANUFACTURER	TOWER EQUIPMENT QTY/MODEL
A1	-	-	EMPTY MOUNT PIPE	-	-	-	-	-	-
A2	NEW	SAMSUNG	MT6407-77A	127'-0"	0°	0°	6°	-	(1) RVZDC-6627-PF-48
A3L	EXISTING	ANDREW	SBNHH-1D65B	127'-0"	0°	0°	2' / 2' / 2' / 2' / 2'	SAMSUNG	(1) RF4440D-13A
A3R	EXISTING	ANDREW	SBNHH-1D65B	127'-0"	0°	0°	2' / 2' / 2' / 2' / 2'	SAMSUNG	(1) RF4439D-25A
A4	-	-	EMPTY MOUNT PIPE	-	-	-	-	-	-
B1	-	-	EMPTY MOUNT PIPE	-	-	-	-	-	-
B2	NEW	SAMSUNG	MT6407-77A	127'-0"	120°	0°	6°	-	(1) RVZDC-6627-PF-48
B3L	EXISTING	ANDREW	SBNHH-1D65B	127'-0"	120°	0°	2' / 2' / 2' / 2' / 2'	SAMSUNG	(1) RF4440D-13A
B3R	EXISTING	ANDREW	SBNHH-1D65B	127'-0"	120°	0°	2' / 2' / 2' / 2' / 2'	SAMSUNG	(1) RF4439D-25A
B4	-	-	EMPTY MOUNT PIPE	-	-	-	-	-	-
C1	-	-	EMPTY MOUNT PIPE	-	-	-	-	-	-
C2	NEW	SAMSUNG	MT6407-77A	127'-0"	240°	0°	6°	-	-
C3L	EXISTING	ANDREW	SBNHH-1D65B	127'-0"	240°	0°	5' / 5' / 5' / 2' / 5'	SAMSUNG	(1) RF4440D-13A
C3R	EXISTING	ANDREW	SBNHH-1D65B	127'-0"	240°	0°	5' / 5' / 5' / 2' / 5'	SAMSUNG	(1) RF4439D-25A
C4	-	-	EMPTY MOUNT PIPE	-	-	-	-	-	-

1 VERIZON TOWER EQUIPMENT SCHEDULE
SCALE: NOT TO SCALE

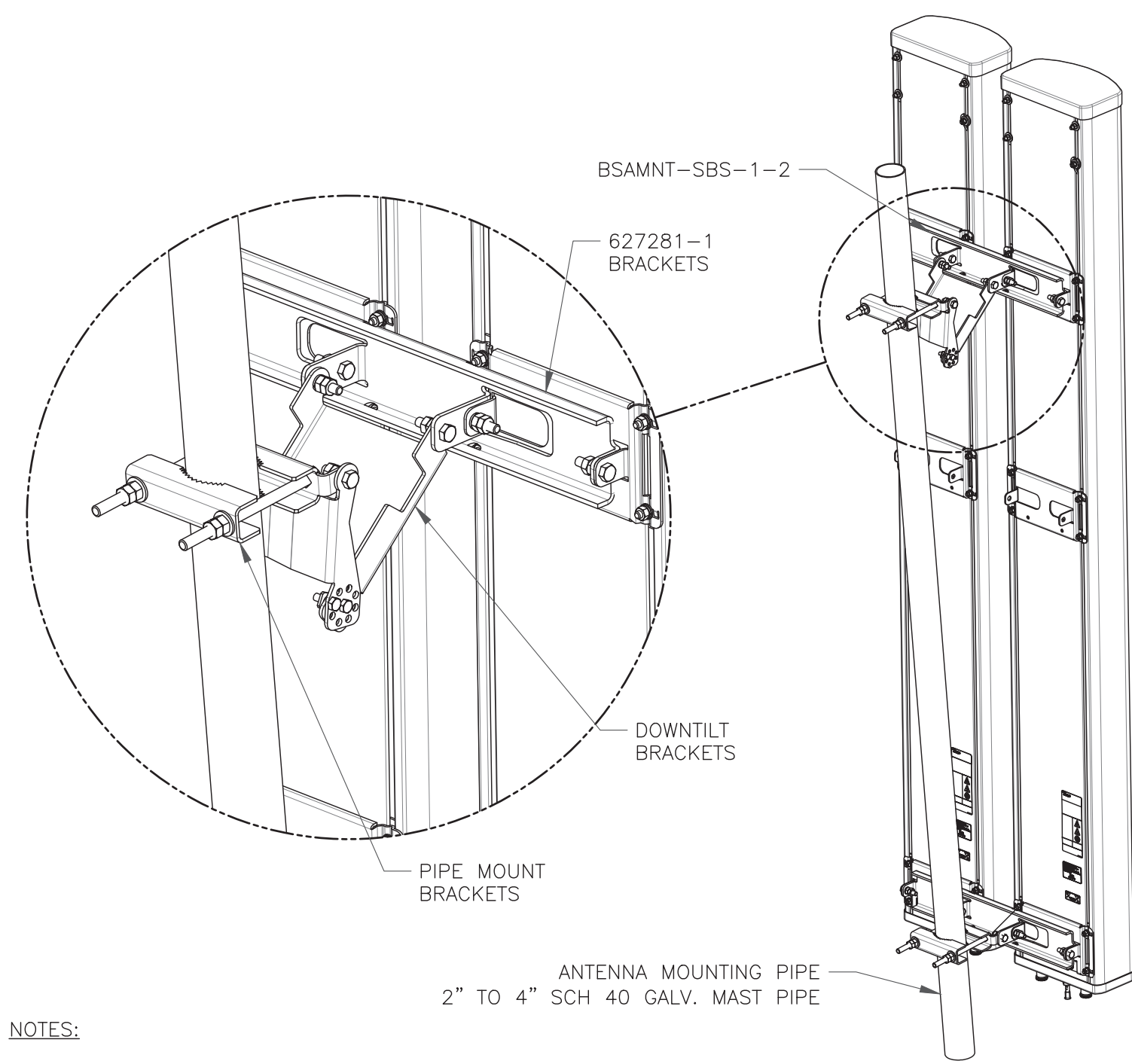
CABLE SCHEDULE

STATUS	CABLE TYPE	SIZE	LENGTH	QTY
NEW	HYBRID	6X12	177'-0"±	2
TOTAL CABLE QTY:				2



2 BASE LEVEL DETAIL
SCALE: NOT TO SCALE



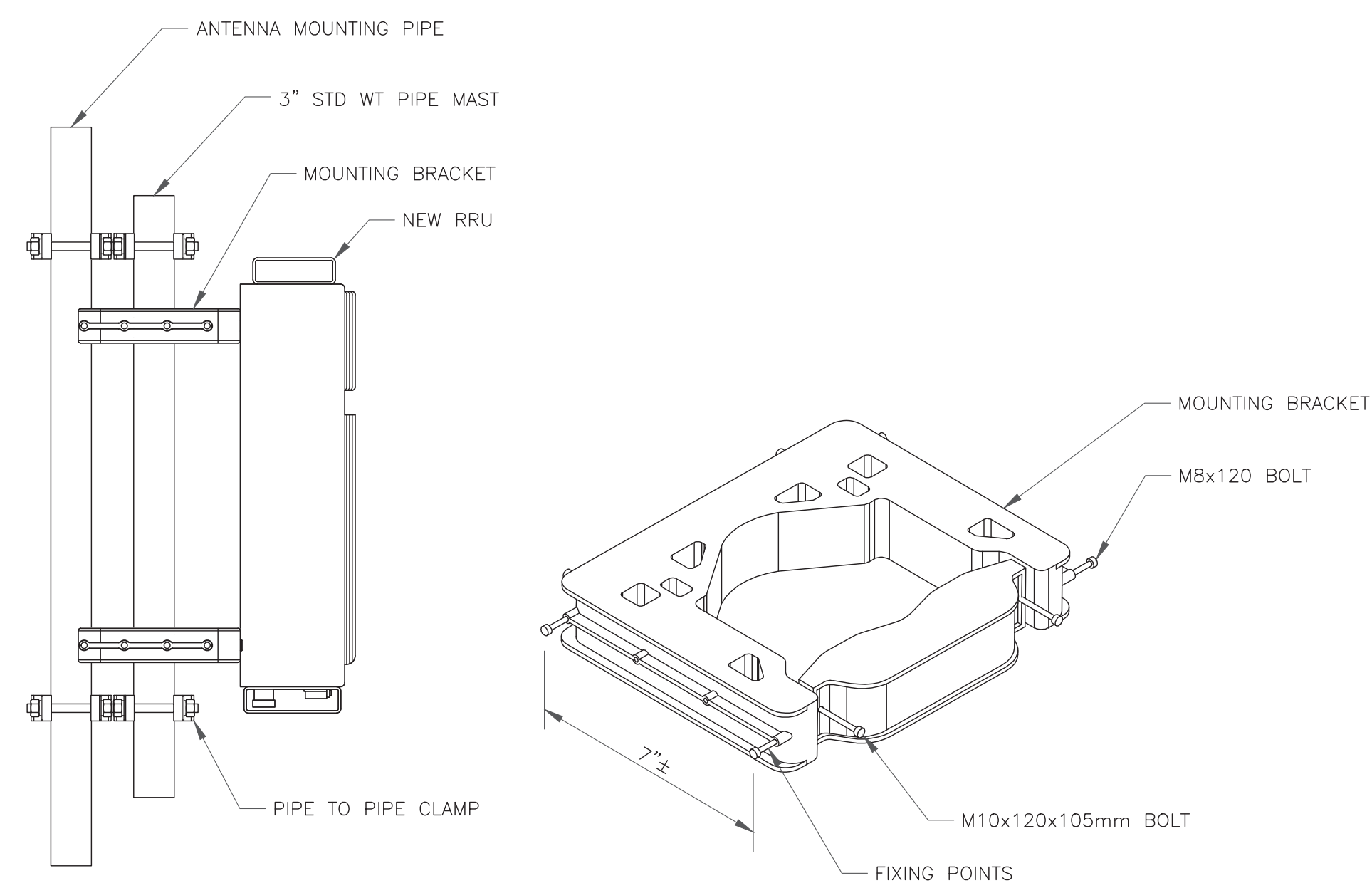


NOTES:

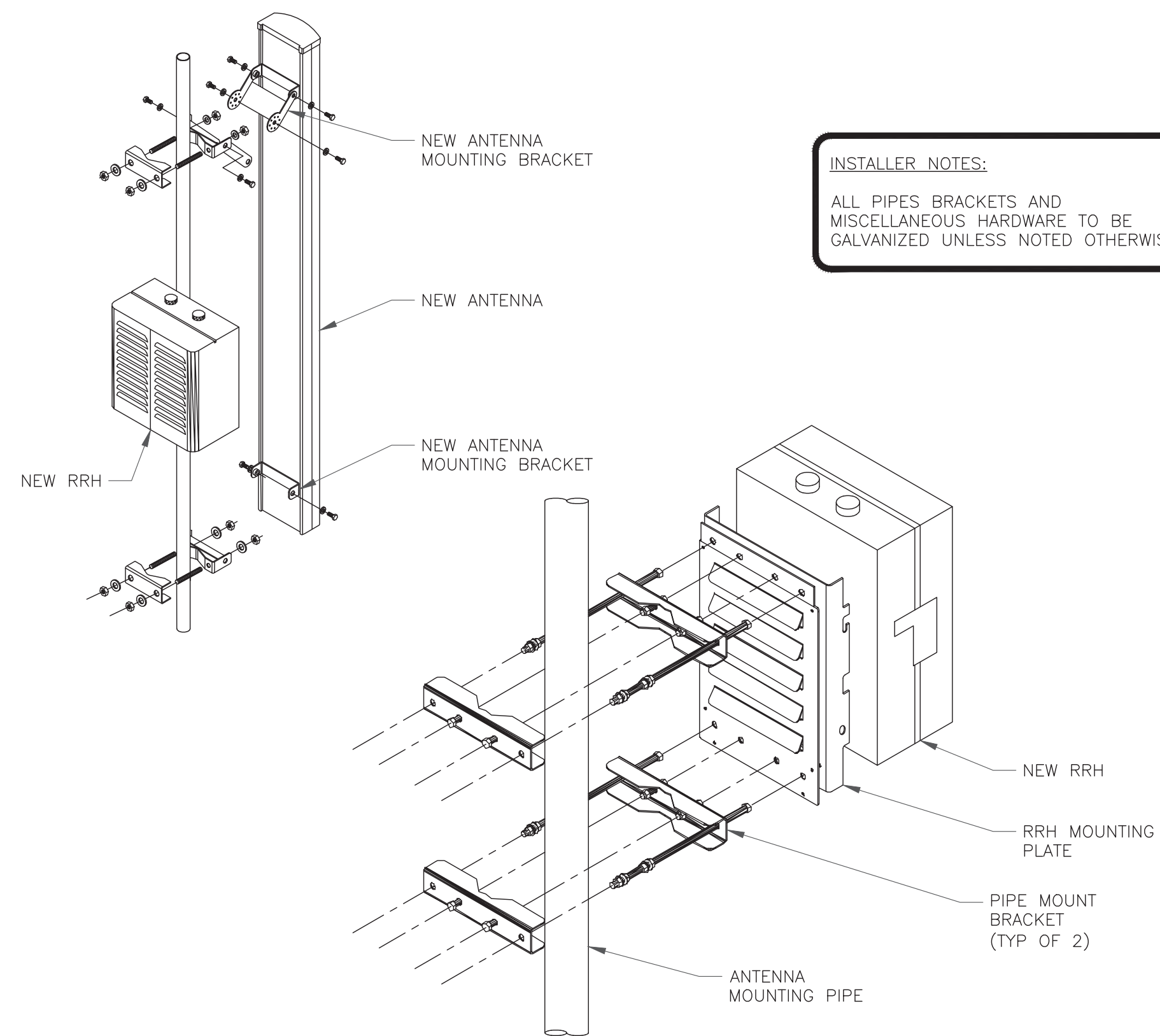
- BSAMNT-SBS-1-2 KIT CONTAINS (2) 627281 MOUNTING BRACKETS.
- TORQUE THE M10 BOLT ASSEMBLY TO 37 N.m. PER MANUFACTURE'S RECOMMENDATIONS.

1 COMMSCOPE - BSAMNT-SBS-1-2
SCALE: NOT TO SCALE

2 NOT USED
SCALE: NOT TO SCALE



3 NOKIA - FPKA BRACKET MOUNTING DETAIL
SCALE: NOT TO SCALE



INSTALLER NOTES:
ALL PIPES BRACKETS AND MISCELLANEOUS HARDWARE TO BE GALVANIZED UNLESS NOTED OTHERWISE.

4 ANTENNA & RRU MOUNTING DETAIL
SCALE: NOT TO SCALE

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SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

VERIZON SITE NUMBER:
468157

BU #: **876402**
STAFFORD/PRAGYL/SSUSA

165 STAFFORD ST
STAFFORD, CT 06077

EXISTING 150'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	10/25/21	AP	CONSTRUCTION	TDG
1	11/4/21	TDG	CONSTRUCTION	TDG

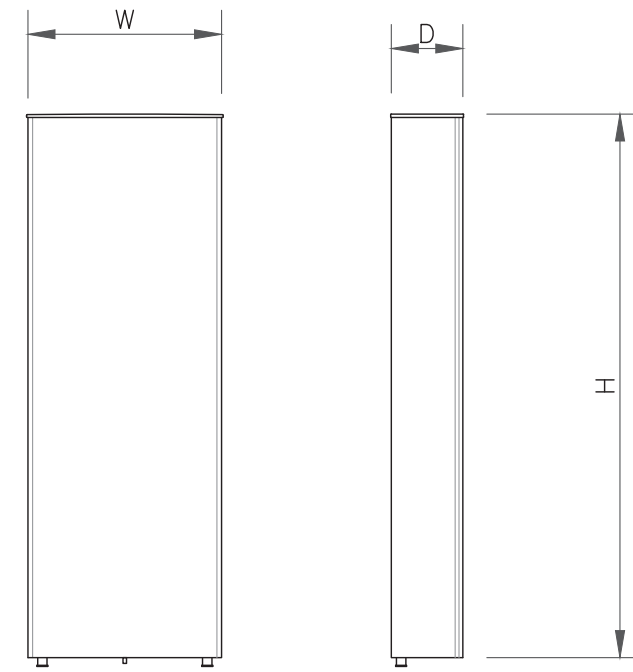


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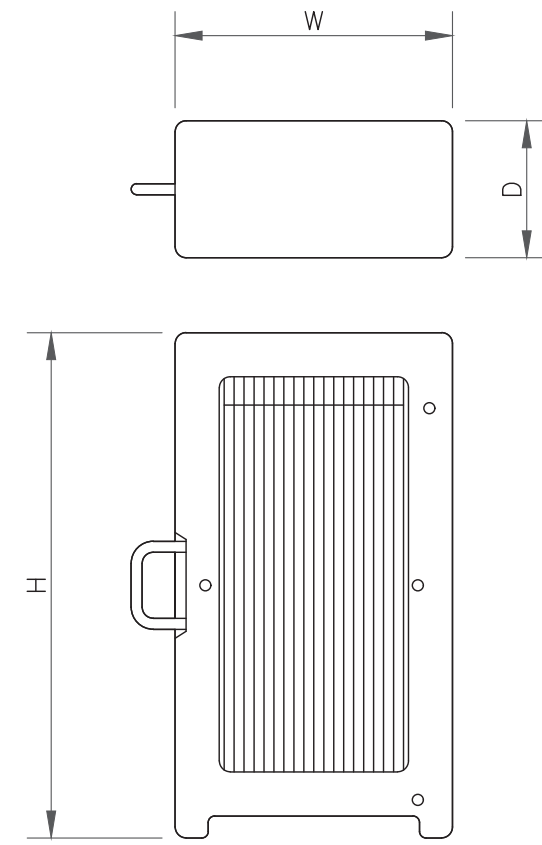
SHEET NUMBER:
C-4

REVISION:
1



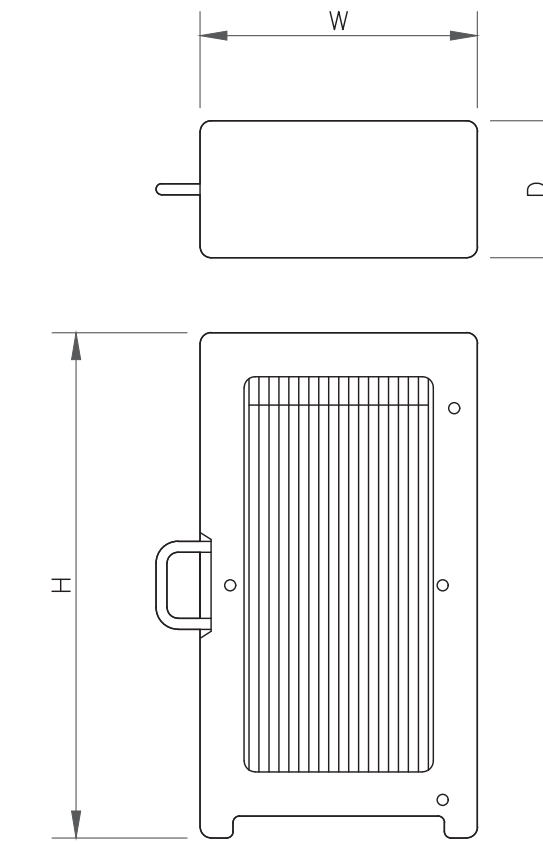
ANTENNA SPECS	
MANUFACTURER	SAMSUNG
MODEL #	MT6407-77A
WIDTH	16.06"
DEPTH	5.51"
HEIGHT	35.06"
WEIGHT	81.57 LBS

1 ANTENNA SPECS
SCALE: NOT TO SCALE



RRU SPECIFICATIONS	
MANUFACTURER	SAMSUNG
MODEL #	RF4440D-13A
WIDTH	14.96"
DEPTH	9.06"
HEIGHT	14.96"
WEIGHT	72.50 LBS

2 RRU SPECS
SCALE: NOT TO SCALE



RRU SPECIFICATIONS	
MANUFACTURER	SAMSUNG
MODEL #	RF4439D-25A
WIDTH	14.96"
DEPTH	10.04"
HEIGHT	14.96"
WEIGHT	74.70 LBS

3 RRU SPECS
SCALE: NOT TO SCALE



RRU SPECIFICATIONS	
MANUFACTURER	RAYCAP
MODEL #	RVZDC-6627-PF-48
WIDTH	16.5"
DEPTH	12.6"
HEIGHT	29.5"
WEIGHT	32 LBS

4 OVP SPECS
SCALE: NOT TO SCALE

5 NOT USED
SCALE: NOT TO SCALE

6 NOT USED
SCALE: NOT TO SCALE

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VERIZON SITE NUMBER:
468157

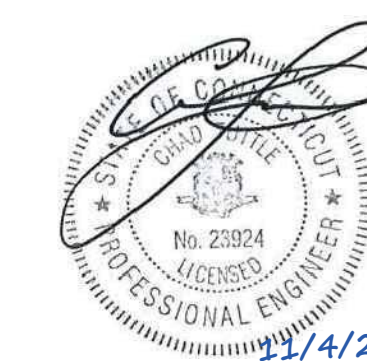
BU #: 876402
STAFFORD/PRAGYL/SSUSA

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STAFFORD, CT 06077

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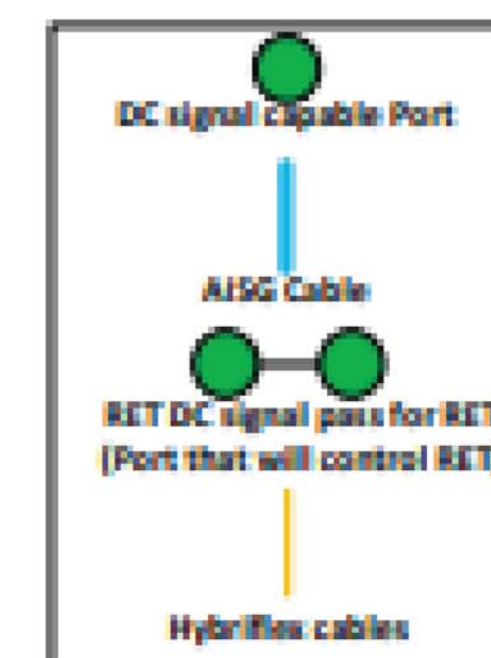
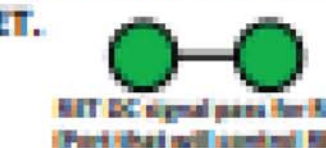
C-6

REVISION:

1



- Port 1 & 2 are for low band (890-896 MHz).
- Port 3, 4, 5, & 6 are for high band (1695-2360 MHz).
- Smart Bias Tee (SBT) is through port 1 & 3 for low band and port 1 for high band.
- AISG cable is only needed when drawn in the diagrams below, if it is not drawn then SBT is enough to control all RET motors.
- Not all SBT ports are needed to control RET, only green port connection to green port will control RET.



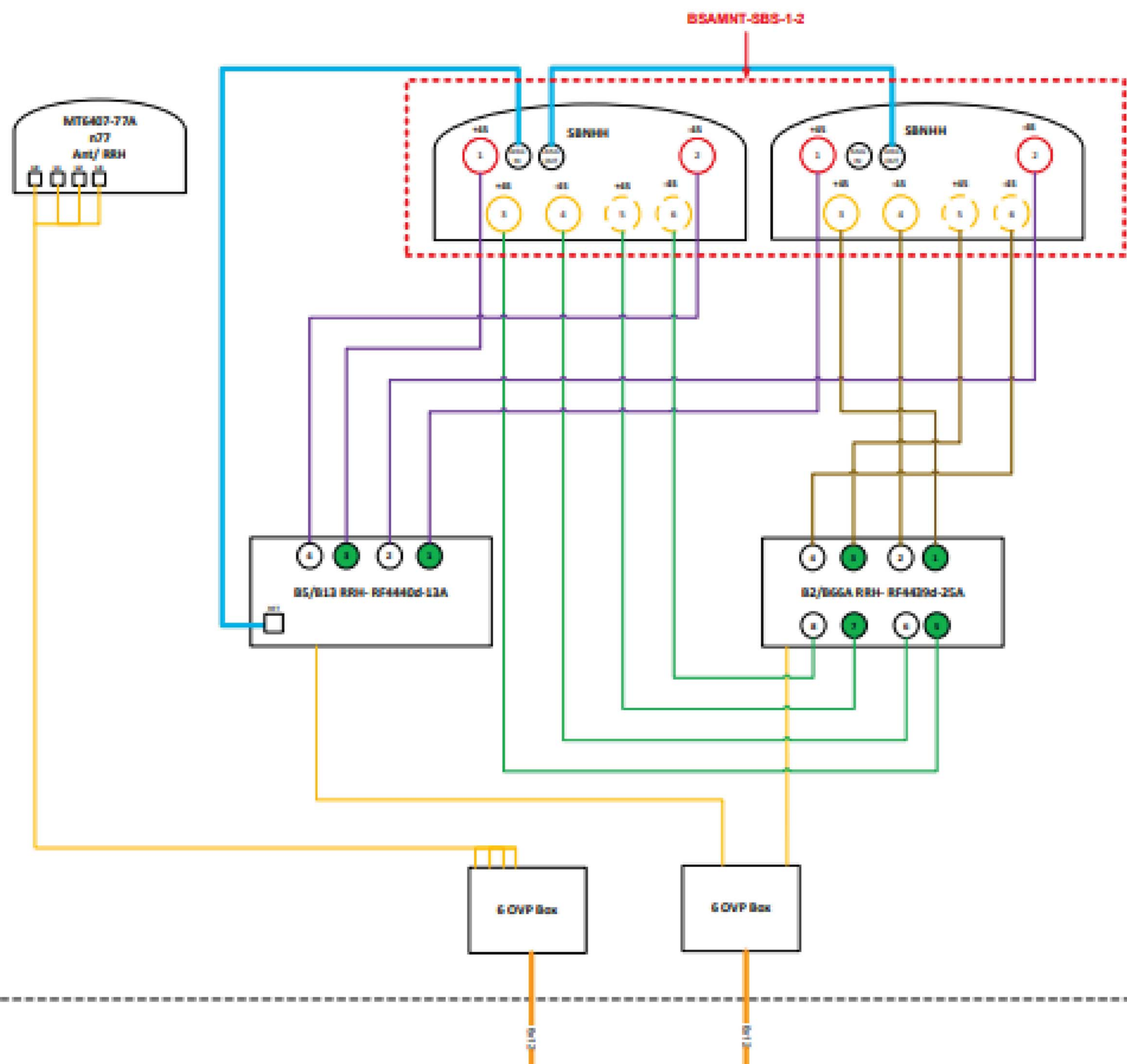
Comments:

Diagram shows antenna port configuration as viewed from below antennas.

Antenna positions are indicated as viewed from IN FRONT of antennas.

Cap and weatherproof unused antenna ports.

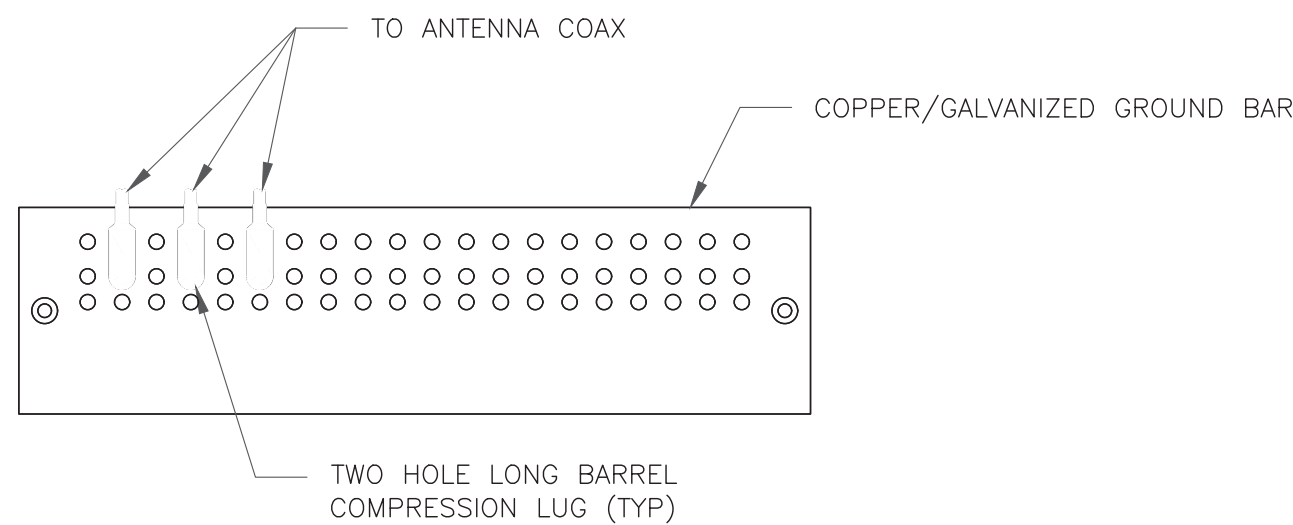
All plumbing diagram colors are irrelevant except for AISG & Hybriflex cable. (For the coax colors follow Coax Colors guide above)



1 PLUMBING DIAGRAM
SCALE: NOT TO SCALE

Tower/WaterTank/
RoofTop

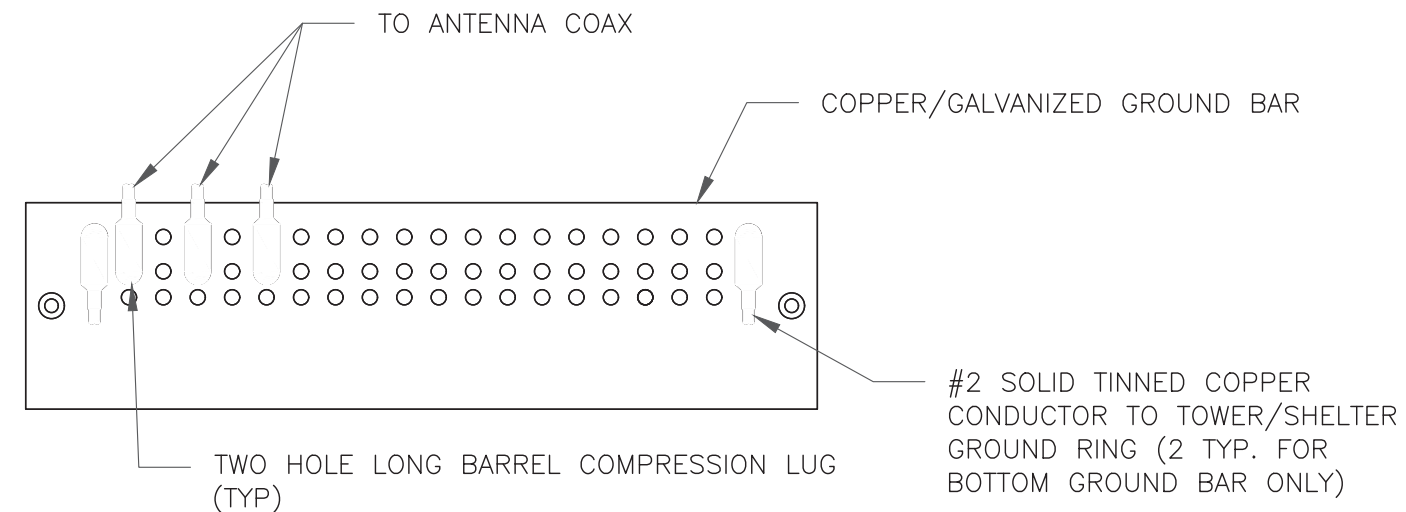
Equipment Pad



NOTES:

1. DOUBLING UP "OR STACKING" OF CONNECTIONS IS NOT PERMITTED.
2. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
3. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO ANTENNA MOUNT STEEL.

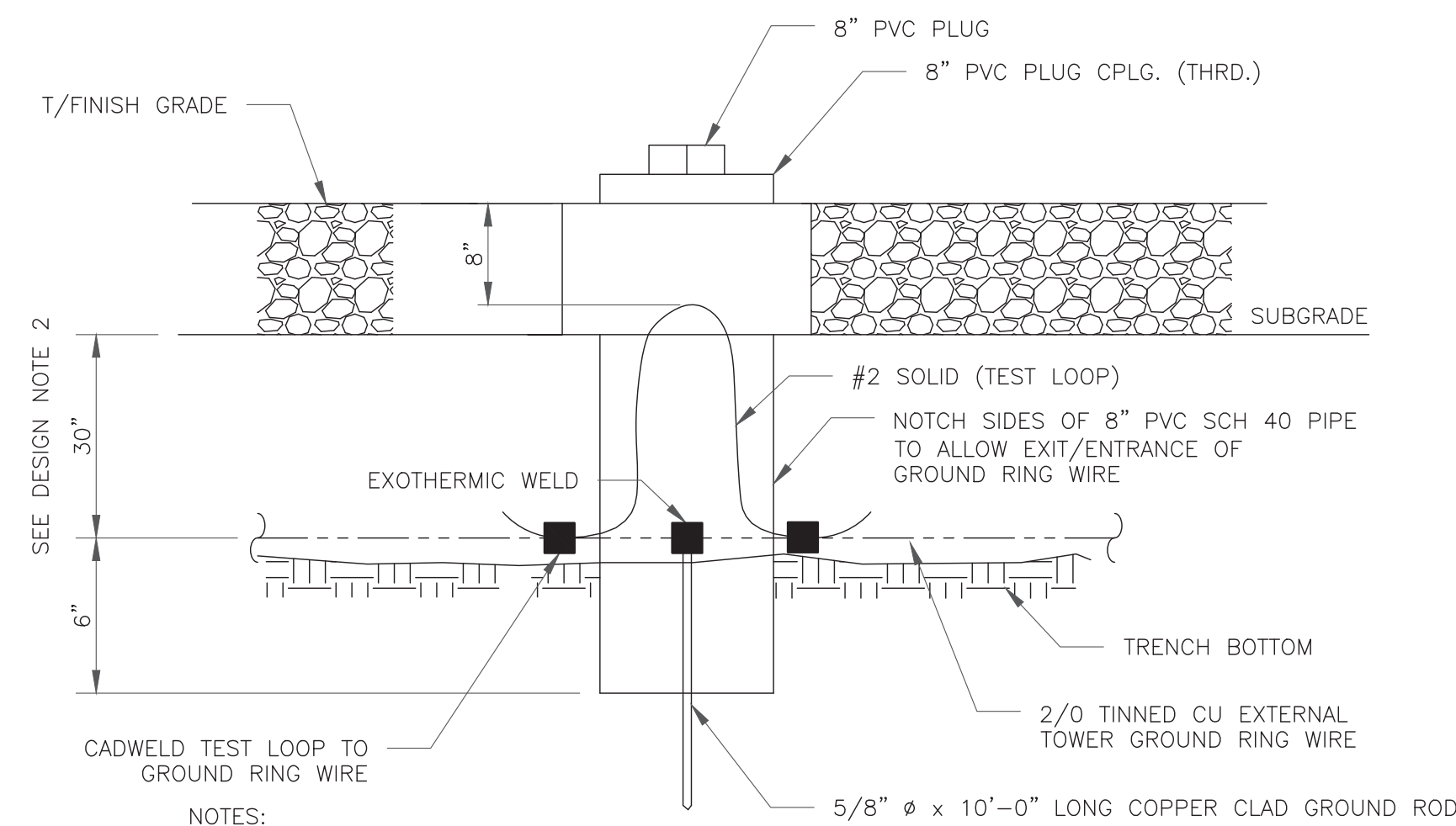
1 ANTENNA SECTOR GROUND BAR DETAIL
SCALE: NOT TO SCALE



NOTES:

1. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
2. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO TOWER STEEL (TOWER ONLY).
3. GROUND BAR SHALL BE ISOLATED FROM BUILDING OR SHELTER.

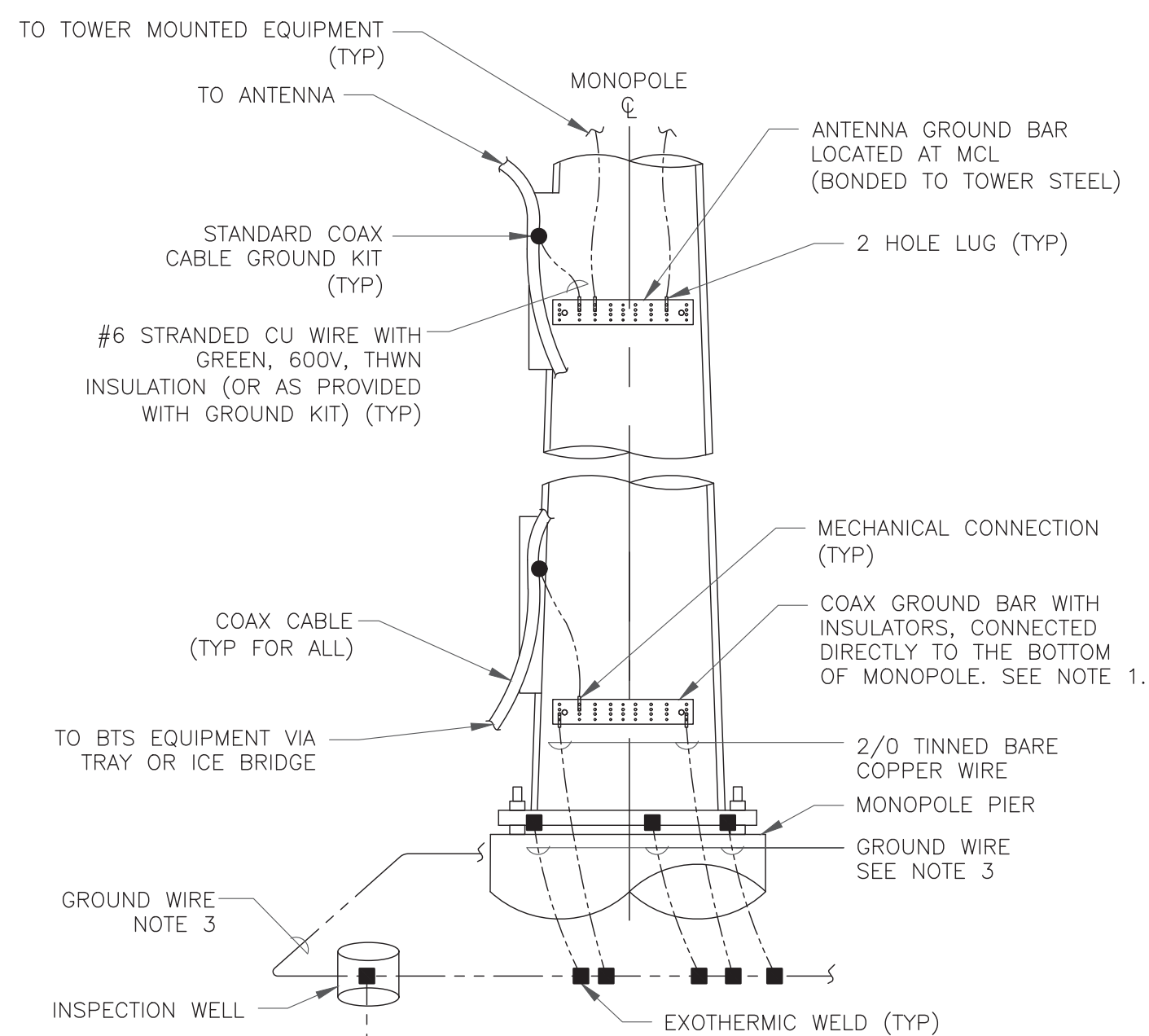
2 TOWER/SHELTER GROUND BAR DETAIL
SCALE: NOT TO SCALE



NOTES:

1. GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 45 DEGREES FROM THE VERTICAL.
2. GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D).

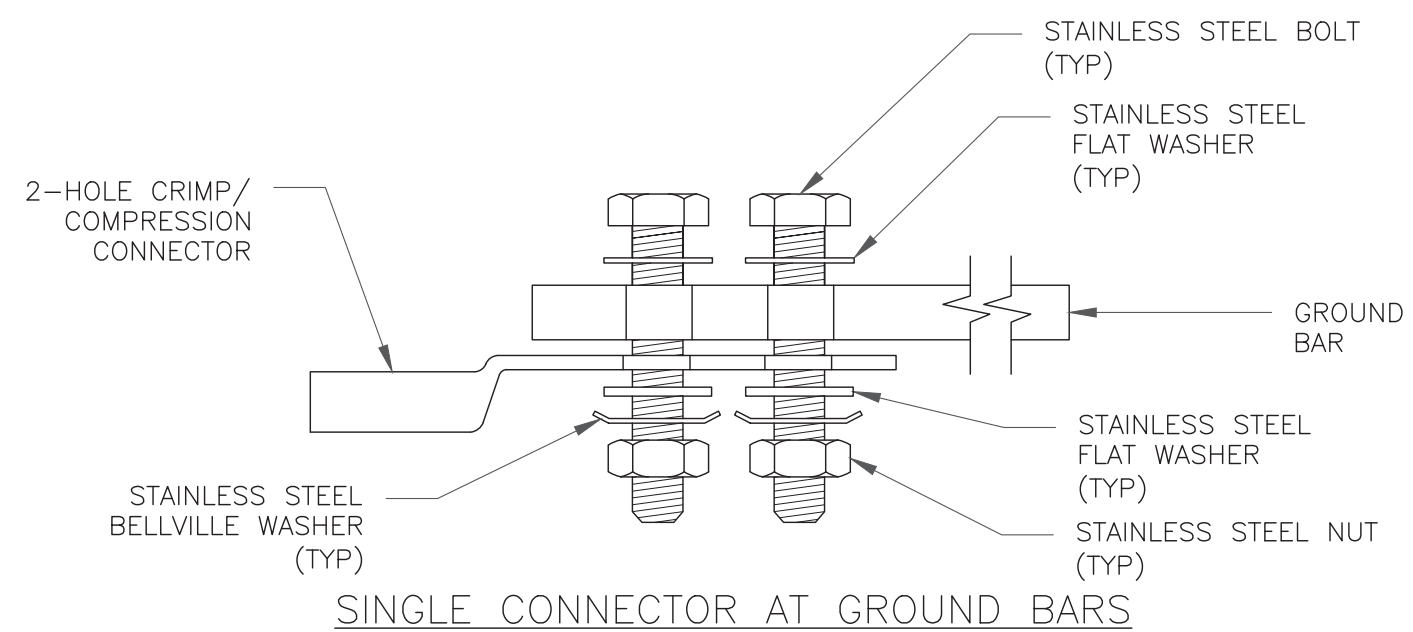
3 INSPECTION WELL DETAIL
SCALE: NOT TO SCALE



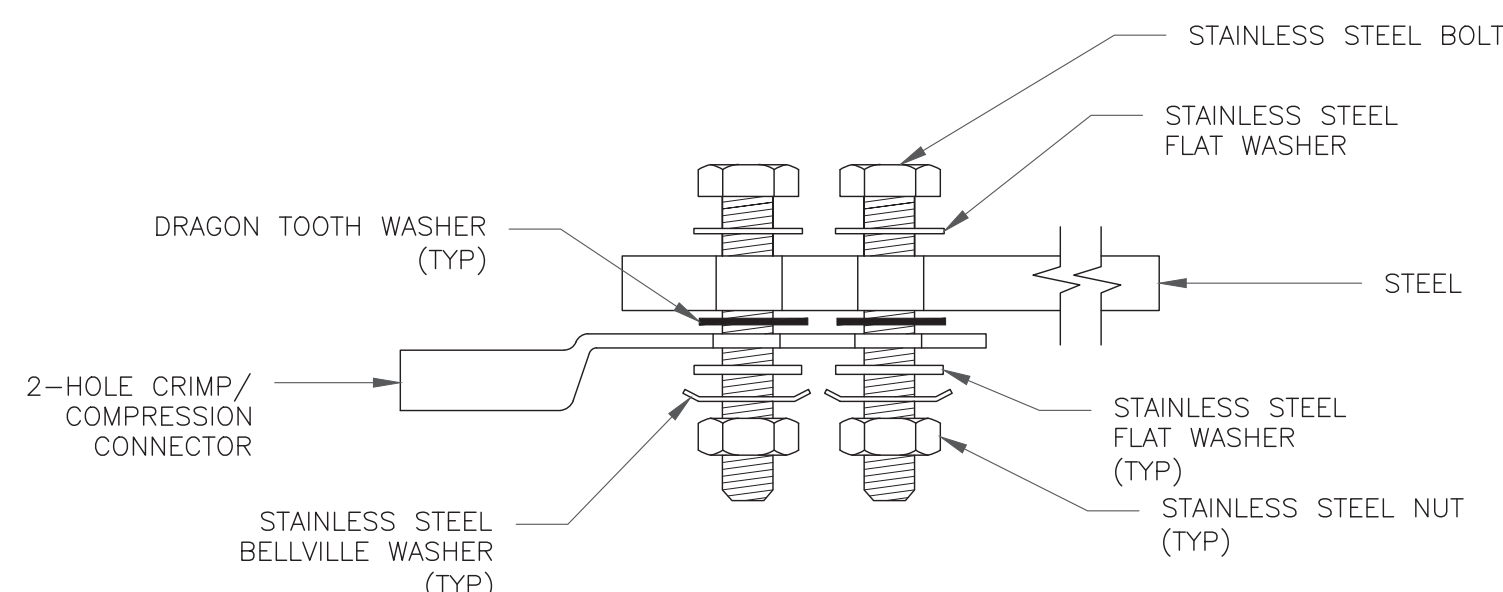
NOTES:

1. NUMBER OF GROUNDING BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, ANTENNA LOCATIONS AND CONNECTION ORIENTATION. COAXIAL CABLES EXCEEDING 200 FEET ON THE TOWER SHALL HAVE GROUND KITS AT THE MIDPOINT. PROVIDE AS REQUIRED.
2. ONLY MECHANICAL CONNECTIONS ARE ALLOWED TO BE MADE TO CROWN CASTLE USA INC. TOWERS. ALL MECHANICAL CONNECTIONS SHALL BE TREATED WITH AN ANTI-OXIDANT COATING.
3. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE RECOGNIZED EDITION OF ANSI/TIA 222 AND NFPA 780.

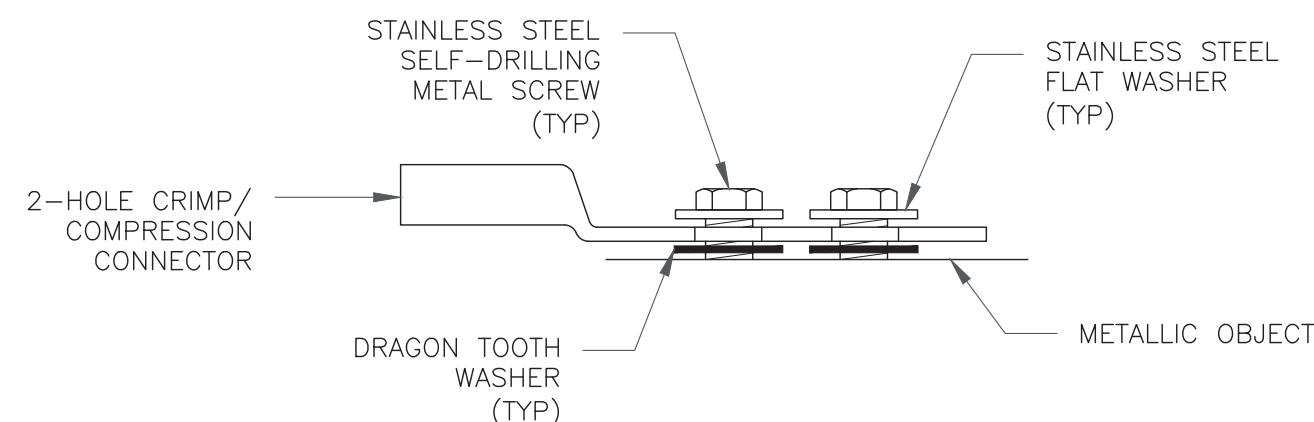
4 TYPICAL ANTENNA CABLE GROUNDING
SCALE: NOT TO SCALE



SINGLE CONNECTOR AT GROUND BARS

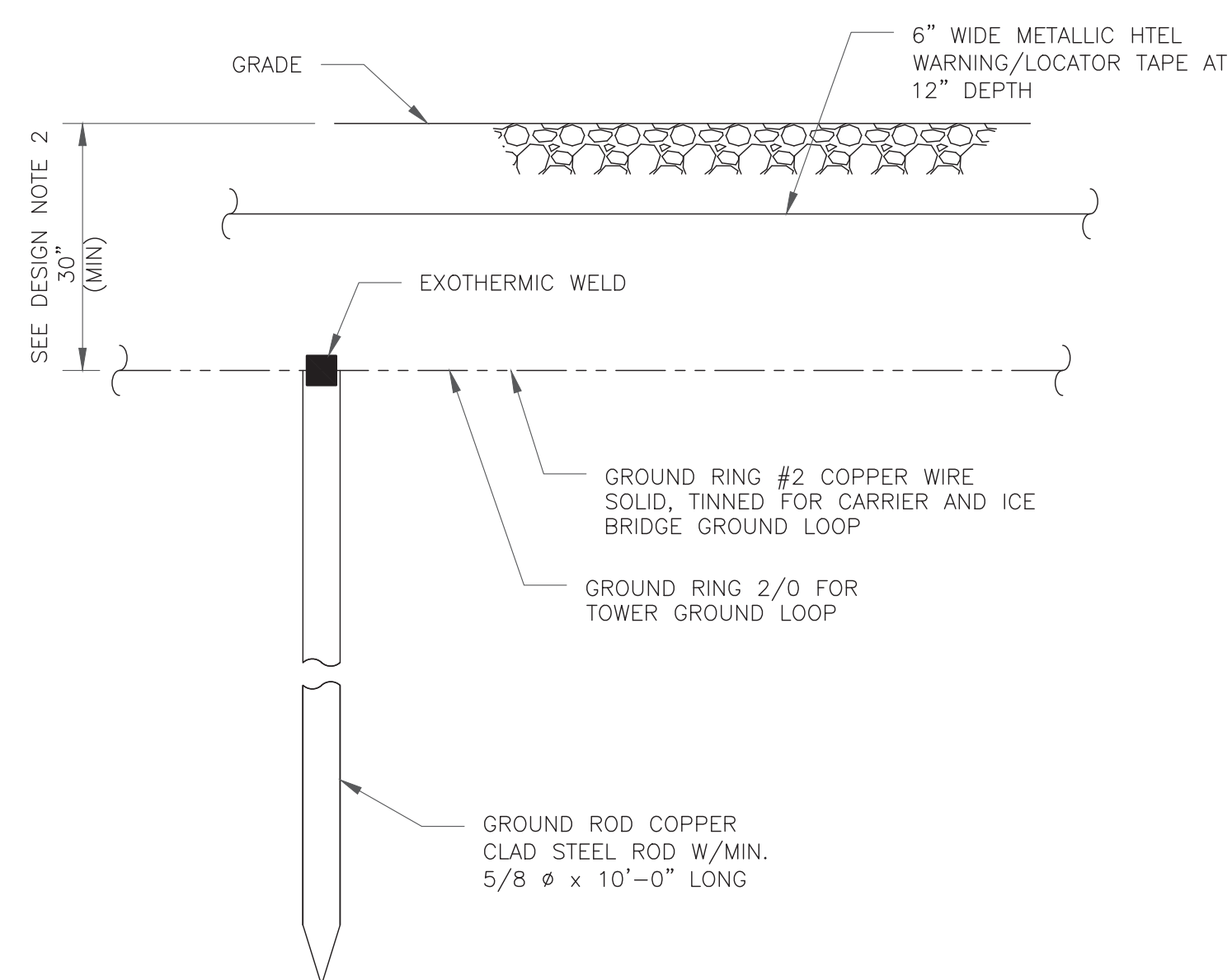


SINGLE CONNECTOR AT STEEL OBJECTS



SINGLE CONNECTOR AT METALLIC/STEEL OBJECTS

5 HARDWARE DETAIL FOR EXTERIOR CONNECTIONS
SCALE: NOT TO SCALE



NOTES:

1. GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 45 DEGREES FROM THE VERTICAL.
2. GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D).

6 GROUND ROD DETAIL
SCALE: NOT TO SCALE

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EXISTING 150'-0" MONOPOLE

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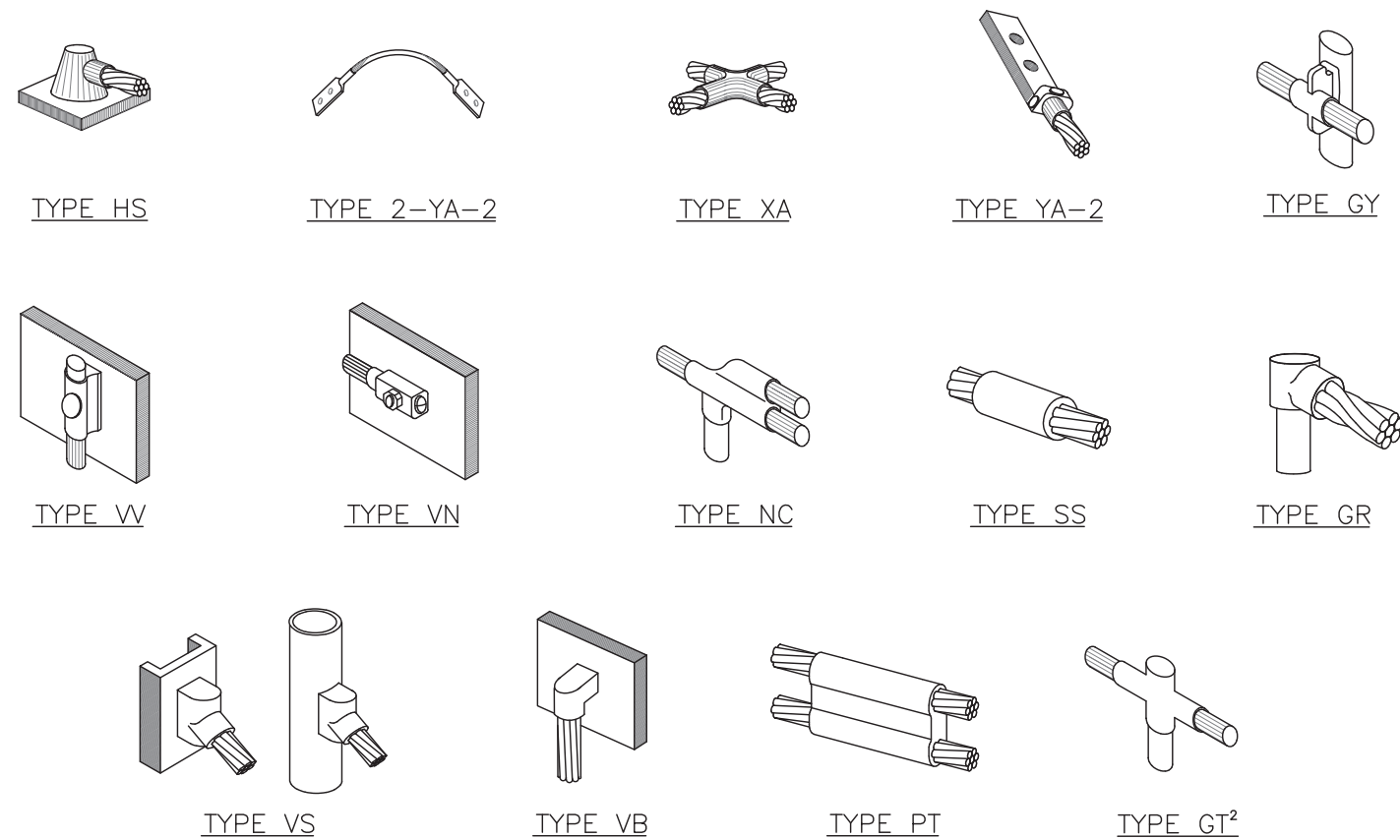
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G-1

REVISION:

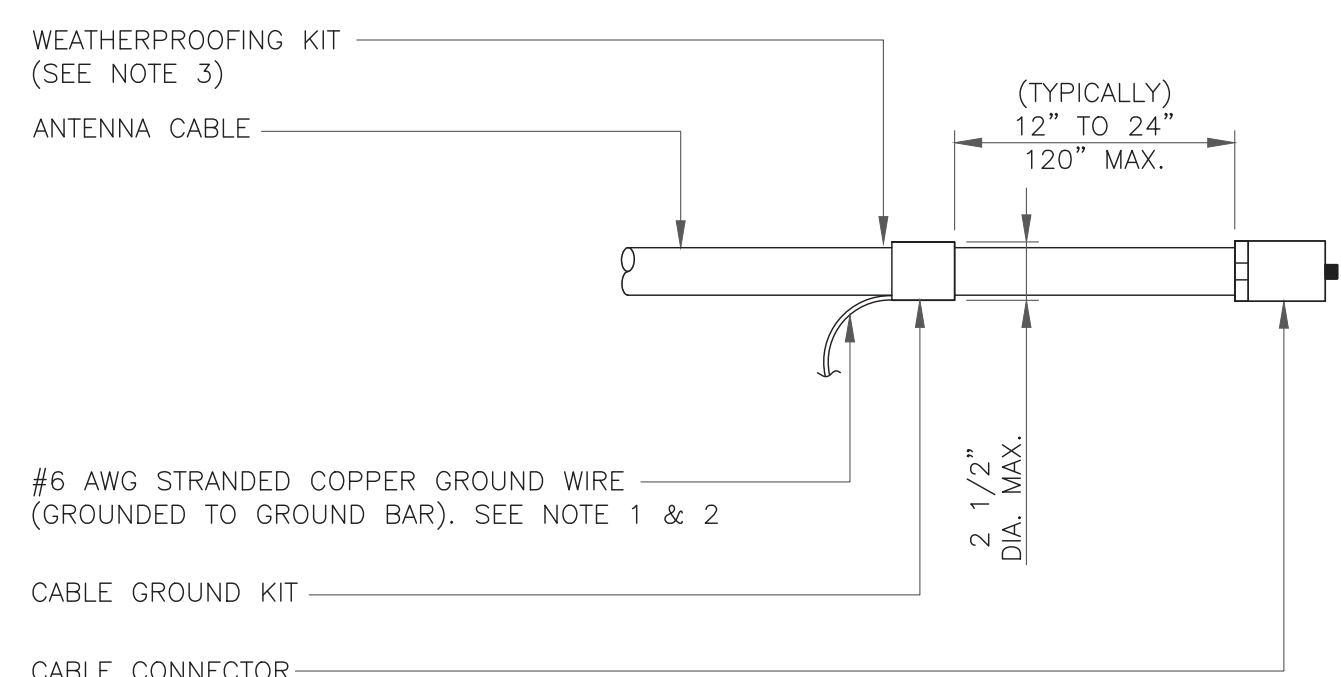
1



NOTE:

1. ERICO EXOTHERMIC "MOLD TYPES" SHOWN HERE ARE EXAMPLES. CONSULT WITH CONSTRUCTION MANAGER FOR SPECIFIC MOLDS TO BE USED FOR THIS PROJECT.
2. MOLD TYPE ONLY TO BE USED BELOW GRADE WHEN CONNECTING GROUND RING TO GROUND ROD.

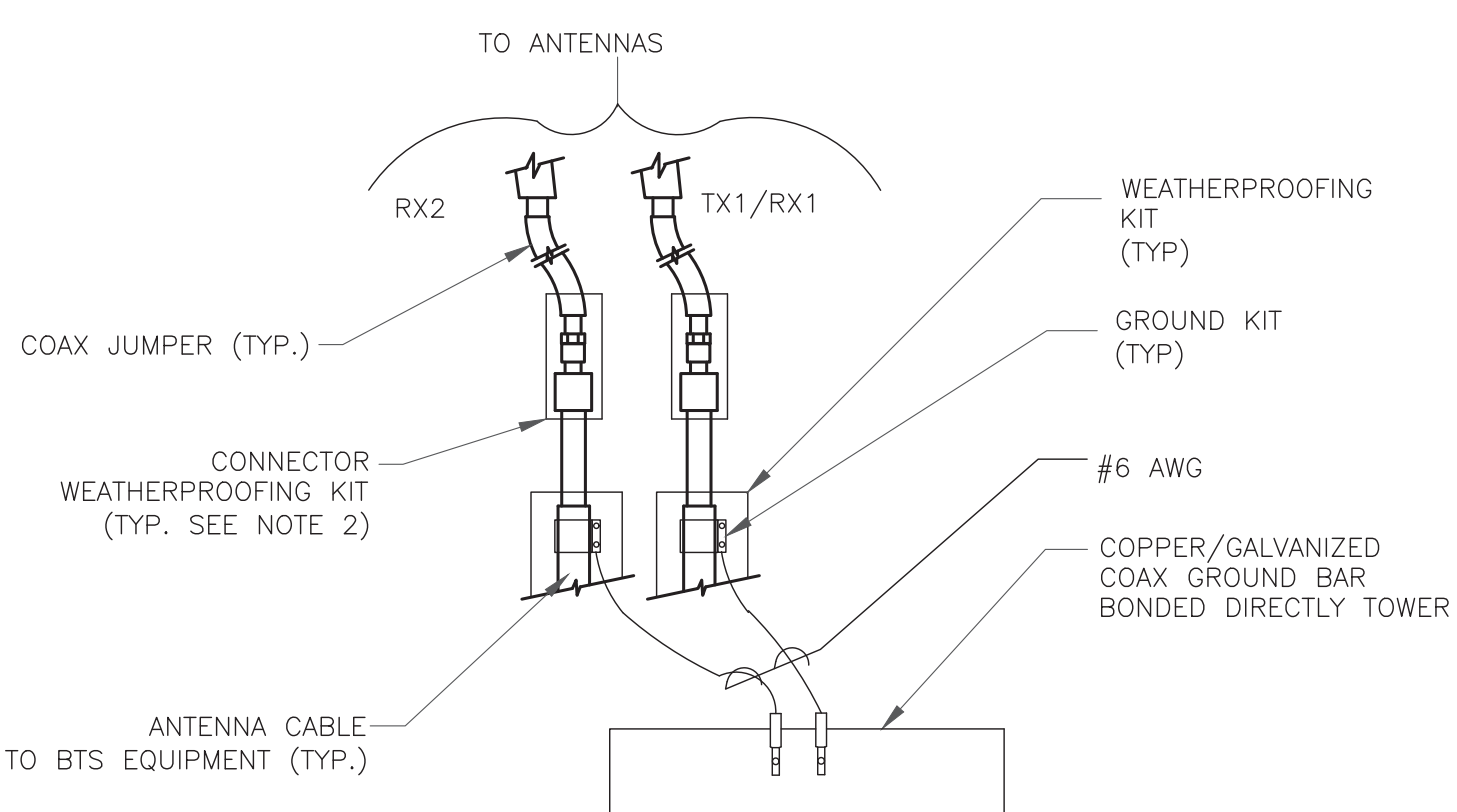
1 CADWELD GROUNDING CONNECTIONS
SCALE: NOT TO SCALE



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT. COLD SHRINK SHALL NOT BE USED.

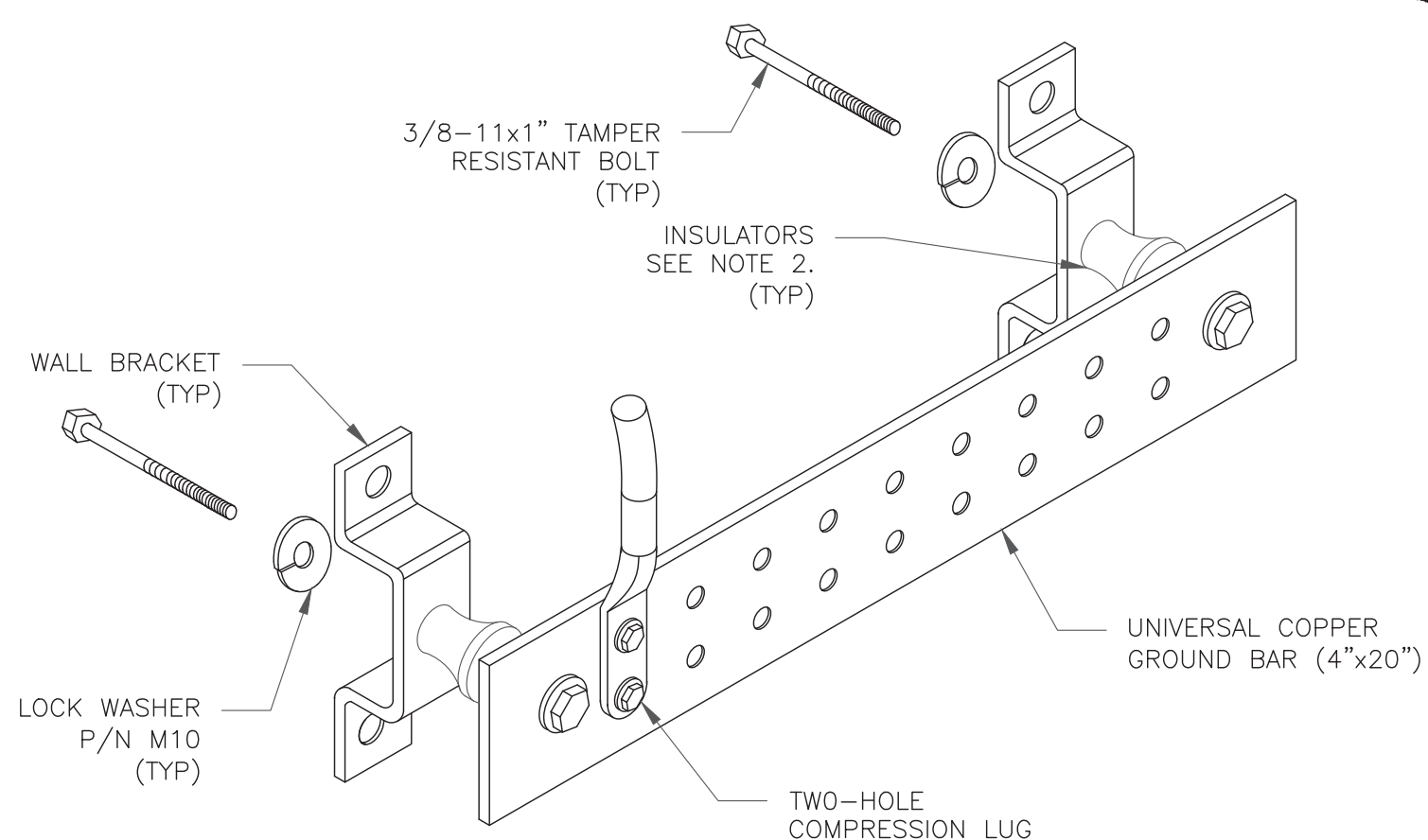
3 CABLE GROUND KIT CONNECTION
SCALE: NOT TO SCALE



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO ANTENNA GROUND BAR.
2. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT. COLD SHRINK SHALL NOT BE USED.

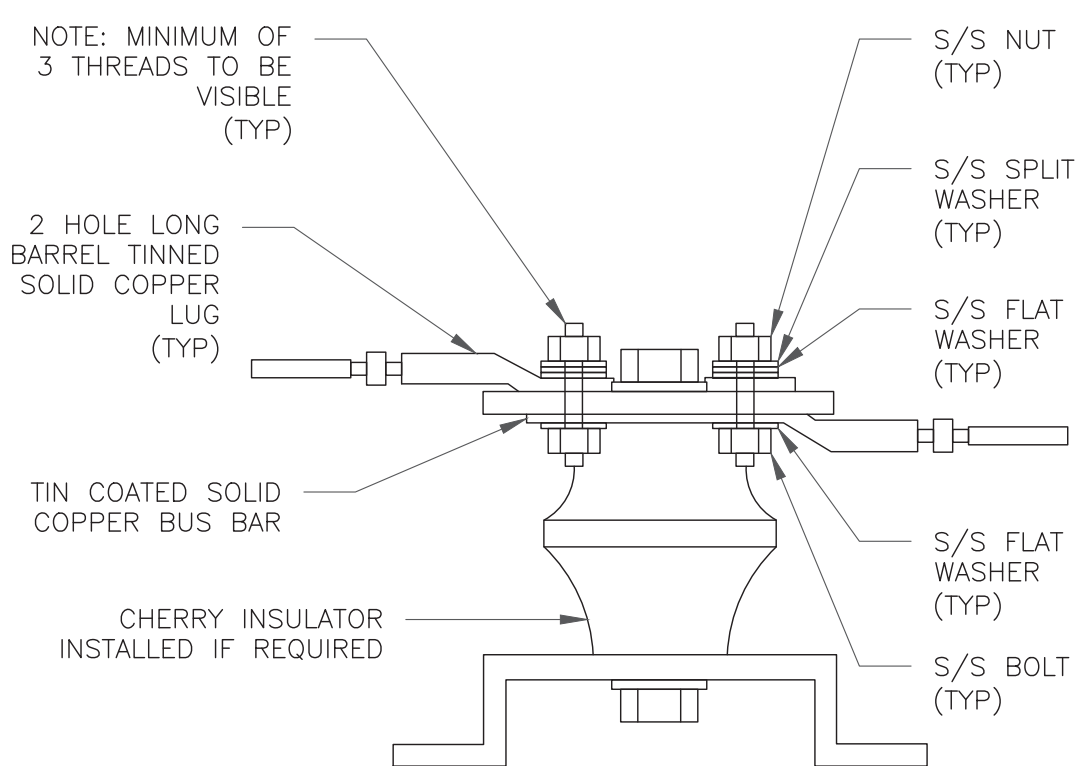
4 GROUND CABLE CONNECTION
SCALE: NOT TO SCALE



NOTES:

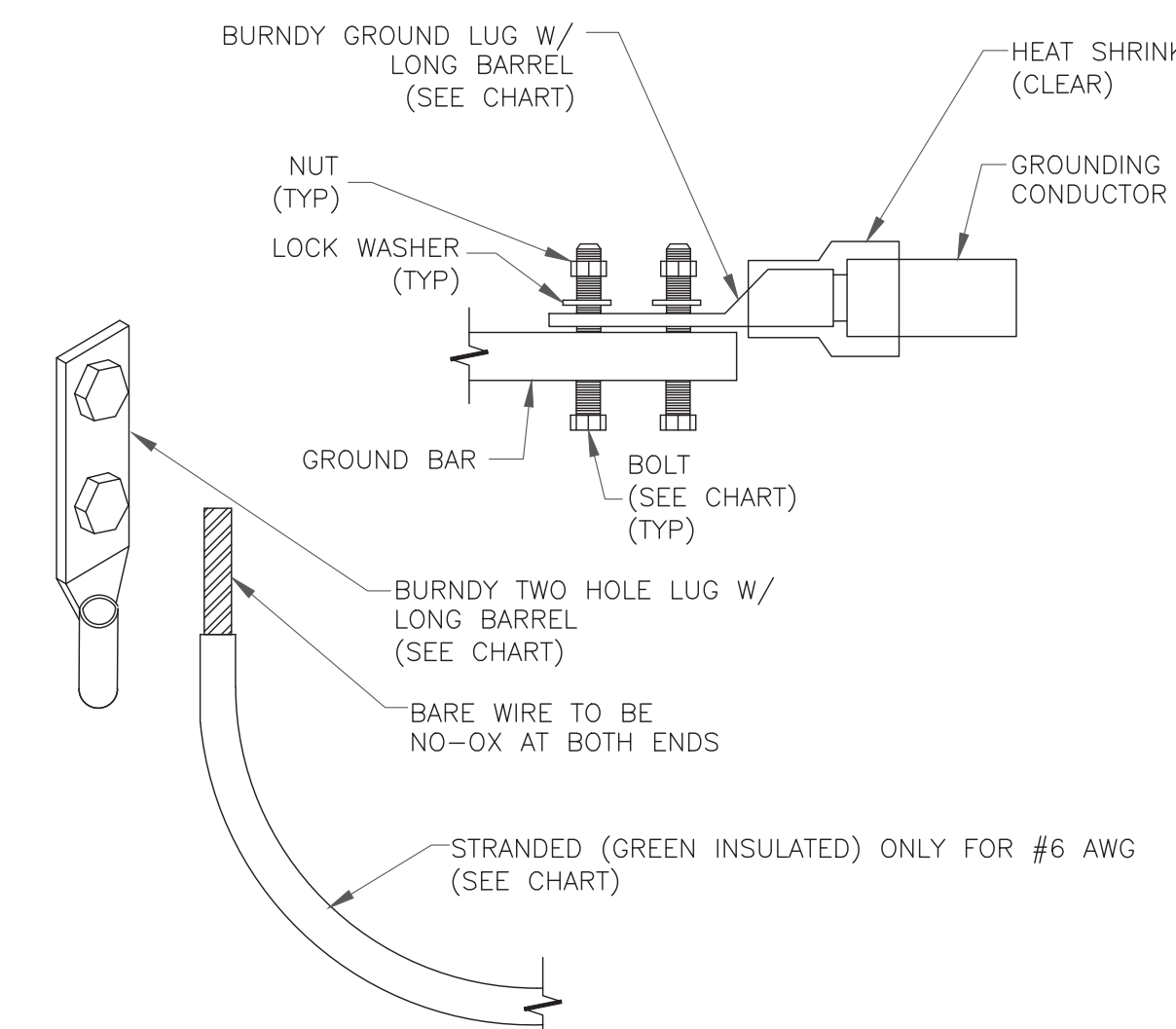
1. DOWN LEAD (HOME RUN) CONDUCTORS ARE NOT TO BE INSTALLED ON CROWN CASTLE USA INC. TOWER, PER THE GROUNDING DOWN CONDUCTOR POLICY QAS-STD-10091. NO MODIFICATION OR DRILLING TO TOWER STEEL IS ALLOWED IN ANY FORM OR FASHION, CAD-WELDING ON THE TOWER AND/OR IN THE AIR ARE NOT PERMITTED.
2. OMIT INSULATOR WHEN MOUNTING TO TOWER STEEL OR PLATFORM STEEL. USE INSULATORS WHEN ATTACHING TO BUILDING OR SHELTERS.

6 GROUND BAR DETAIL
SCALE: NOT TO SCALE



7 LUG DETAIL
SCALE: NOT TO SCALE

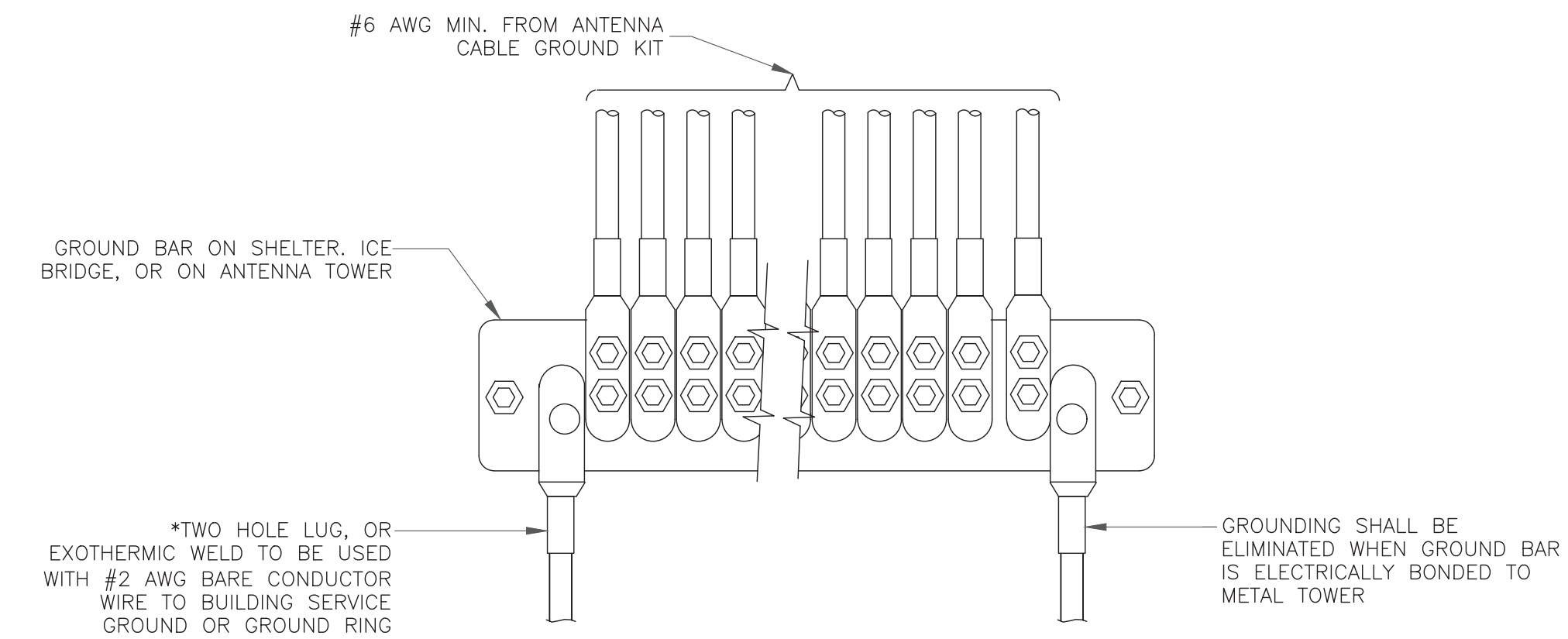
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 AWG GREEN INSULATED	YA6C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG SOLID TINNED	YA3C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG STRANDED	YA2C-2TC38	3/8" - 16 NC S 2 BOLT
#2/0 AWG STRANDED	YA26-2TC38	3/8" - 16 NC S 2 BOLT
#4/0 AWG STRANDED	YA28-2N	1/2" - 16 NC S 2 BOLT



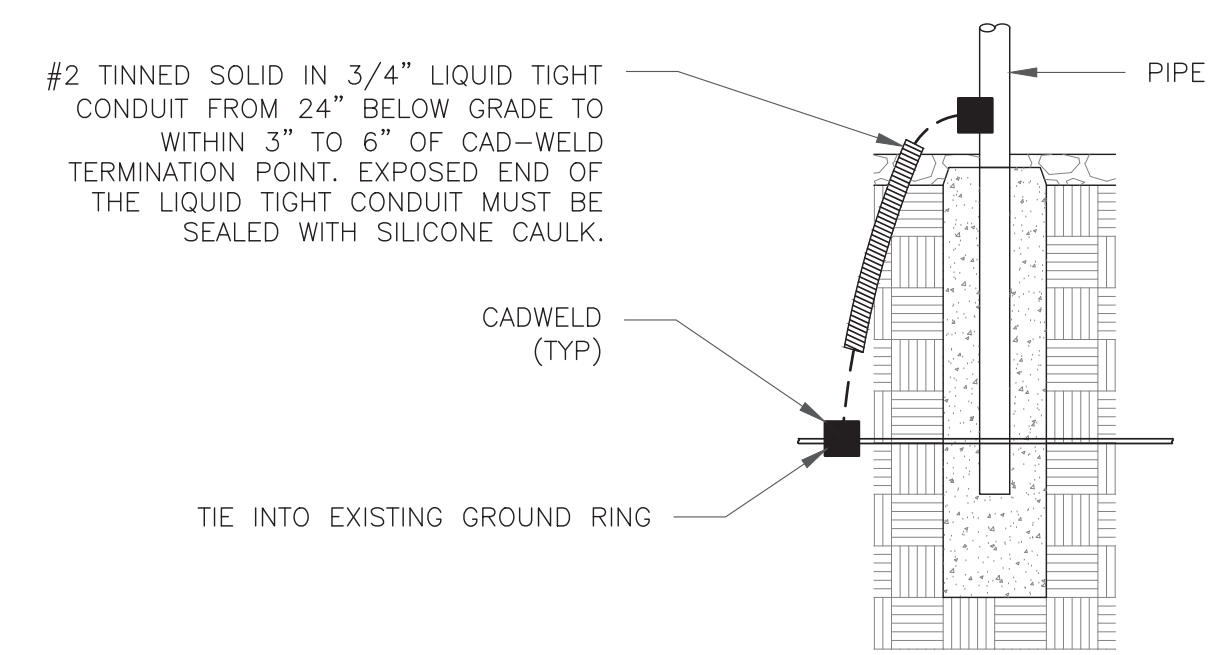
NOTES:

1. ALL GROUNDING LUGS ARE TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. ALL HARDWARE BOLTS, NUTS, LOCK WASHERS SHALL BE STAINLESS STEEL. ALL HARDWARE ARE TO BE AS FOLLOWS: BOLT, FLAT WASHER, GROUND BAR, GROUND LUG, FLAT WASHER AND NUT.

2 MECHANICAL LUG CONNECTION
SCALE: NOT TO SCALE



5 GROUNDWIRE INSTALLATION
SCALE: NOT TO SCALE



8 TRANSITIONING GROUND DETAIL
SCALE: NOT TO SCALE

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EXISTING 150'-0" MONOPOLE

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SHEET NUMBER: **G-2** REVISION: **1**

84466.008.01_STAFFORD_PRAGYL_SSUSA.dwg - Sheet:G-2 - User: tim.grove - Nov 04, 2021 3:33pm

Exhibit D

Structural Analysis Report

Date: **October 12, 2021**



Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
(919) 661-6351

Subject: Structural Analysis Report

Carrier Designation: **Verizon Wireless Co-Locate**
Site Number: 468157
Site Name: STAFFORDVILLE EAST CT

Crown Castle Designation: **BU Number:** 876402
Site Name: STAFFORD/PRAGYL/SSUSA
JDE Job Number: 688785
Work Order Number: 2027774
Order Number: 589220 Rev. 0

Engineering Firm Designation: **TEP Project Number:** 22178.609395

Site Data: **175 Stafford Street, Stafford, Tolland County, CT 06077**
Latitude 41° 59' 13.38", Longitude -72° 15' 40.78"
150 Foot - Monopole Tower

Tower Engineering Professionals is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above-mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Proposed Equipment Configuration

Sufficient Capacity - 83.3%

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Matthew E. Crispi, E.I. / DEN

Respectfully submitted by:

Aaron T. Rucker, P.E.



Electronic Copy

10/12/2021

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Equipment Configuration

Table 2 - Other Considered Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Table 5 - Tower Component Stresses vs. Capacity

4.1) Recommendations

5) APPENDIX A

tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This is a 150-ft monopole tower mapped by Tower Engineering Professionals in December of 2007. The tower has been modified per reinforcement drawings prepared by Paul J. Ford and Company in June of 2013.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	B
Topographic Factor:	1.0
Ice Thickness:	2.0 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
127.0	127.0	3	Commscope	SBNHH-1D65B w/ Mount Pipe	2	1-5/8
		3	Commscope	SBNHH-1D65B		
		3	Samsung Telecom.	MT6407-77A w/ Mount Pipe		
		3	Samsung Telecom.	RF4439D-25A		
		3	Samsung Telecom.	RF4440D-13A		
		2	Raycap	RXXDC-3315-PF-48		
		1	Tower Mounts	Platform Mount [LP 303-1_HR-1]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
150.0	152.0	3	Ericsson	AIR6449 B41_T-MOBILE w/ Mount Pipe	3	1-5/8
		3	RFS Celwave	APXVAALL24_43-U-NA20_TMO w/ Mount Pipe		
		3	Ericsson	RADIO 4460 B2/B25 B66_TMO		
		3	Ericsson	Radio 4480_TMOV2		
	150.0	1	Tower Mounts	Platform Mount [LP 1201-1_HR-1]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
136.0	138.0	2	CCI Antennas	DMP65R-BU8D w/ Mount Pipe	2 5 6	3/8 3/4 1-5/8
		1	CCI Antennas	DMP65R-BU6D w/ Mount Pipe		
		2	CCI Antennas	OPA65R-BU8D w/ Mount Pipe		
		1	CCI Antennas	OPA65R-BU6D w/ Mount Pipe		
		3	Powerwave Technologies	7770.00 w/ Mount Pipe		
		3	Ericsson	RRUS 4449 B5/B12		
		3	Ericsson	RRUS 4478 B14		
		3	Ericsson	RRUS 8843 B2/B66A		
		6	Powerwave Technologies	LGP21401		
		1	Raycap	DC6-48-60-18-8F		
	1	Raycap	DC9-48-60-24-8C-EV			
	136.0	3	Commscope	VSR-MS-B		
		3	Generic	P2.5STD - 12.5-ft		
		1	Tower Mounts	T-Arm Mount [TA 602-3]		
75.0	75.0	1	Lucent	KS24019-L112A	1	1/2
		1	Tower Mounts	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
Geotechnical Report	2194187	CCISites
Tower Foundation Drawings	2208777	CCISites
Tower Manufacturer Drawings	2175539	CCISites
Tower Reinforcement Drawings	3888429	CCISites
Post-Modification Inspection	5639214	CCISites

3.1) Analysis Method

tnxTower (version 8.1.1.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 Standard.

3.2) Assumptions

- 1) The tower and structures were maintained in accordance with the TIA-222 Standard.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2, and the referenced drawings.
- 3) The following material grades were assumed:
 - a) Pole shaft: ASTM A572-65
 - b) Base plate: ASTM A572-50
 - c) Anchor bolts: A615-75 N
 - d) Concrete compressive strength: $f'_c = 3$ ksi
 - e) Foundation flexural reinforcement: $f_y = 60$ ksi

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (k)	ϕP_{allow} (k)	% Capacity	Pass / Fail
L1	150 - 123	Pole	TP22.69x17x0.25	1	-12.07	1065.50	33.8	Pass
L2	123 - 85	Pole	TP28.36x21.6105x0.375	2	-17.83	2003.63	56.5	Pass
L3	85 - 44	Pole	TP36.86x27.0303x0.4063	3	-26.41	2808.54	59.3	Pass
L4	44 - 0	Pole	TP42.53x35.0535x0.4375	4	-39.71	3590.34	64.1	Pass
							Summary	
						Pole (L4)	64.1	Pass
						RATING =	64.1	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	-	74.3	Pass
1,2	Base Plate	-	83.3	Pass
1,2	Base Foundation Structural	-	47.5	Pass
1,2	Base Foundation Soil Interaction	-	49.1	Pass

Structure Rating (max from all components) =	83.3%
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Notes:

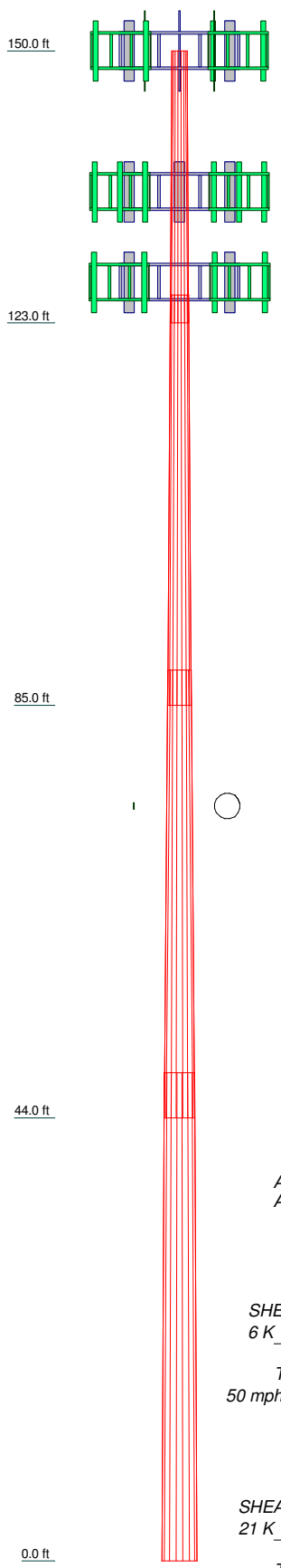
- 1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.
- 2) Rating per TIA-222-H Section 15.5

4.1) Recommendations

- 1) The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3	4	20.4
Length (ft)	27.00	40.75	44.50	48.50	
Number of Sides	18	18	18	18	
Thickness (in)	0.2500	0.3750	0.4063	0.4375	
Socket Length (ft)	2.75	3.50	4.50		
Top Dia (in)	17.0000	21.6105	27.0303	35.0535	
Bot Dia (in)	22.6900	28.3600	36.9600	42.5300	
Grade	A572-65				
Weight (K)	1.4	4.1	6.2	8.8	



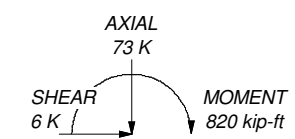
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

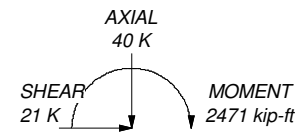
TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-H Standard.
2. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 2.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 64.1%


ALL REACTIONS ARE FACTORED



TORQUE 1 kip-ft
50 mph WIND - 2.0000 in ICE



TORQUE 1 kip-ft
REACTIONS - 125 mph WIND

 Tower Engineering Professionals	Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350		Job: Stafford/Pragyl/SSUSA (BU 876402)
	Project: TEP No. 22178.609395		
	Client: Crown Castle	Drawn by: CJB	App'd:
	Code: TIA-222-H	Date: 10/12/21	Scale: NTS
Path: C:\Users\cbowen\Desktop\22178 (BU876402)\876402_2027774_LC7.er		Dwg No. E-1	

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	Project TEP No. 22178.609395	Date 12:45:32 10/12/21
	Client Crown Castle	Designed by CJB

Tower Input Data

The tower is a monopole.

This tower is designed using the TIA-222-H standard.

The following design criteria apply:

- Tower base elevation above sea level: 962.00 ft.
- Basic wind speed of 125 mph.
- Risk Category II.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 2.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Maximum demand-capacity ratio is: 1.05.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric | <ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension √ Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination √ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs | <ul style="list-style-type: none"> Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-H Bracing Resist. Exemption Use TIA-222-H Tension Splice Exemption <li style="text-align: center;">Poles √ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets √ Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known |
|--|---|---|

Tapered Pole Section Geometry

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	Project TEP No. 22178.609395	Date 12:45:32 10/12/21
	Client Crown Castle	Designed by CJB

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	150.00-123.00	27.00	2.75	18	17.0000	22.6900	0.2500	1.0000	A572-65 (65 ksi)
L2	123.00-85.00	40.75	3.50	18	21.6105	28.3600	0.3750	1.5000	A572-65 (65 ksi)
L3	85.00-44.00	44.50	4.50	18	27.0303	36.8600	0.4063	1.6250	A572-65 (65 ksi)
L4	44.00-0.00	48.50		18	35.0535	42.5300	0.4375	1.7500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	17.2237	13.2911	471.1170	5.9463	8.6360	54.5527	942.8540	6.6468	2.5520	10.208
	23.0015	17.8061	1132.7992	7.9662	11.5265	98.2776	2267.0890	8.9048	3.5534	14.214
L2	22.3485	25.2755	1439.9945	7.5386	10.9781	131.1696	2881.8838	12.6402	3.1434	8.383
	28.7396	33.3091	3295.7296	9.9347	14.4069	228.7608	6595.7958	16.6577	4.3314	11.55
L3	28.1697	34.3300	3074.3930	9.4515	13.7314	223.8953	6152.8313	17.1683	4.0423	9.95
	37.3660	47.0048	7891.5876	12.9411	18.7249	421.4493	15793.5591	23.5069	5.7724	14.209
L4	36.2311	48.0686	7277.0016	12.2887	17.8072	408.6557	14563.5785	24.0389	5.3994	12.342
	43.1186	58.4507	13083.8812	14.9428	21.6052	605.5883	26184.9785	29.2309	6.7153	15.349

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 150.00-123.00				1	1	1			
L2 123.00-85.00				1	1	1			
L3 85.00-44.00				1	1	1			
L4 44.00-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf
-------------	-------------	--------------	---------------------------------	----------------	-----------------	--------------	--	---------------

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	Project TEP No. 22178.609395	Date 12:45:32 10/12/21
	Client Crown Castle	Designed by CJB

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight plf
150									
HB158-21U6S24-xx M_TMO(1-5/8)	C	No	No	Inside Pole	150.00 - 0.00	3	No Ice	0.00	2.50
							1/2" Ice	0.00	2.50
							1" Ice	0.00	2.50
							2" Ice	0.00	2.50
136									
FB-L98B-002-75000 (3/8)	C	No	No	Inside Pole	136.00 - 0.00	2	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	136.00 - 0.00	5	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58
FXL 1873 PE(1-5/8)	C	No	No	Inside Pole	136.00 - 0.00	6	No Ice	0.00	0.67
							1/2" Ice	0.00	0.67
							1" Ice	0.00	0.67
							2" Ice	0.00	0.67
2" Flexible Conduit	C	No	No	Inside Pole	136.00 - 0.00	1	No Ice	0.00	0.34
							1/2" Ice	0.00	0.34
							1" Ice	0.00	0.34
							2" Ice	0.00	0.34
127									
HB158-1-08U8-S8J 18(1-5/8)	C	No	No	Inside Pole	127.00 - 0.00	2	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
							2" Ice	0.00	1.30
75									
LDF4-50A(1/2)	C	No	No	Inside Pole	75.00 - 0.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
Misc									
Step Pegs (5/8" SR) 7-in. w/30" step	C	No	No	CaAa (Out Of Face)	150.00 - 0.00	1	No Ice	0.03	0.49
							1/2" Ice	0.14	1.01
							1" Ice	0.23	2.07
							2" Ice	0.43	6.09
Safety Line 3/8	C	No	No	CaAa (Out Of Face)	150.00 - 0.00	1	No Ice	0.04	0.22
							1/2" Ice	0.14	0.75
							1" Ice	0.24	1.28
							2" Ice	0.44	2.34

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	150.00-123.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.958	0.33
L2	123.00-85.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.755	0.69

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	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L3	85.00-44.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.973	0.75
L4	44.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.190	0.81

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	150.00-123.00	A	1.958	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	23.108	0.53
L2	123.00-85.00	A	1.906	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	32.523	0.98
L3	85.00-44.00	A	1.816	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	34.227	1.05
L4	44.00-0.00	A	1.629	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	35.159	1.11

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
L1	150.00-123.00	-0.5521	0.3188	-2.4046	1.3883
L2	123.00-85.00	-0.5599	0.3233	-2.6345	1.5210
L3	85.00-44.00	-0.5662	0.3269	-2.8017	1.6176
L4	44.00-0.00	-0.5700	0.3291	-2.8603	1.6514

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
-------------	-------------	-------------	---	-------------------------	-----------------	---	--	-------------

150
AIR6449 B41_T-MOBILE A From 4.00 0.0000 150.00 No Ice 5.19 2.71 0.13

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	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
w/ Mount Pipe		Centroid-Le g	0.00 2.00			1/2" Ice 5.59 1" Ice 6.02 2" Ice 6.90	3.04 3.38 4.12	0.17 0.23 0.35
AIR6449 B41_T-MOBILE w/ Mount Pipe	B	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 5.19 1/2" Ice 5.59 1" Ice 6.02 2" Ice 6.90	2.71 3.04 3.38 4.12	0.13 0.17 0.23 0.35
AIR6449 B41_T-MOBILE w/ Mount Pipe	C	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 5.19 1/2" Ice 5.59 1" Ice 6.02 2" Ice 6.90	2.71 3.04 3.38 4.12	0.13 0.17 0.23 0.35
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	A	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 14.69 1/2" Ice 15.46 1" Ice 16.23 2" Ice 17.82	6.87 7.55 8.25 9.67	0.18 0.31 0.45 0.78
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	B	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 14.69 1/2" Ice 15.46 1" Ice 16.23 2" Ice 17.82	6.87 7.55 8.25 9.67	0.18 0.31 0.45 0.78
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	C	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 14.69 1/2" Ice 15.46 1" Ice 16.23 2" Ice 17.82	6.87 7.55 8.25 9.67	0.18 0.31 0.45 0.78
RADIO 4460 B2/B25 B66_TMO	A	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 2.14 1/2" Ice 2.32 1" Ice 2.51 2" Ice 2.91	1.69 1.85 2.02 2.39	0.11 0.13 0.16 0.22
RADIO 4460 B2/B25 B66_TMO	B	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 2.14 1/2" Ice 2.32 1" Ice 2.51 2" Ice 2.91	1.69 1.85 2.02 2.39	0.11 0.13 0.16 0.22
RADIO 4460 B2/B25 B66_TMO	C	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 2.14 1/2" Ice 2.32 1" Ice 2.51 2" Ice 2.91	1.69 1.85 2.02 2.39	0.11 0.13 0.16 0.22
Radio 4480_TMOV2	A	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 2.88 1/2" Ice 3.09 1" Ice 3.31 2" Ice 3.78	1.40 1.56 1.73 2.09	0.08 0.10 0.13 0.19
Radio 4480_TMOV2	B	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 2.88 1/2" Ice 3.09 1" Ice 3.31 2" Ice 3.78	1.40 1.56 1.73 2.09	0.08 0.10 0.13 0.19
Radio 4480_TMOV2	C	From Centroid-Le g	4.00 0.00 2.00	0.0000	150.00	No Ice 2.88 1/2" Ice 3.09 1" Ice 3.31 2" Ice 3.78	1.40 1.56 1.73 2.09	0.08 0.10 0.13 0.19
Platform Mount [LP 1201-1_HR-1]	C	None		0.0000	150.00	No Ice 26.39 1/2" Ice 31.40 1" Ice 36.20 2" Ice 45.40	26.39 31.40 36.20 45.40	2.36 3.06 3.86 5.76
(2) 2 3/8" Dia. x 8'	A	From Centroid-Le g	4.00 0.00 0.00	0.0000	150.00	No Ice 1.90 1/2" Ice 2.73 1" Ice 3.40 2" Ice 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
(2) 2 3/8" Dia. x 8'	B	From Centroid-Le g	4.00 0.00	0.0000	150.00	No Ice 1.90 1/2" Ice 2.73	1.90 2.73	0.03 0.04

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	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	K
		g	0.00			1" Ice	3.40	3.40	0.06
						2" Ice	4.40	4.40	0.12
(2) 2 3/8" Dia. x 8'	C	From Centroid-Le g	4.00	0.00	150.00	No Ice	1.90	1.90	0.03
			0.00			1/2" Ice	2.73	2.73	0.04
			0.00			1" Ice	3.40	3.40	0.06
						2" Ice	4.40	4.40	0.12
136									
DMP65R-BU8D w/ Mount Pipe	A	From Leg	4.00	0.00	136.00	No Ice	15.89	7.89	0.14
			0.00			1/2" Ice	16.81	8.74	0.25
			2.00			1" Ice	17.76	9.60	0.38
						2" Ice	19.70	11.37	0.68
DMP65R-BU6D w/ Mount Pipe	B	From Leg	4.00	0.00	136.00	No Ice	11.96	5.97	0.11
			0.00			1/2" Ice	12.70	6.63	0.20
			2.00			1" Ice	13.46	7.30	0.30
						2" Ice	15.02	8.69	0.53
DMP65R-BU8D w/ Mount Pipe	C	From Leg	4.00	0.00	136.00	No Ice	15.89	7.89	0.14
			0.00			1/2" Ice	16.81	8.74	0.25
			2.00			1" Ice	17.76	9.60	0.38
						2" Ice	19.70	11.37	0.68
OPA65R-BU8D w/ Mount Pipe	A	From Leg	4.00	0.00	136.00	No Ice	17.46	8.58	0.11
			0.00			1/2" Ice	18.46	9.49	0.22
			2.00			1" Ice	19.48	10.42	0.35
						2" Ice	21.58	12.33	0.66
OPA65R-BU6D w/ Mount Pipe	B	From Leg	4.00	0.00	136.00	No Ice	12.25	6.05	0.09
			0.00			1/2" Ice	13.00	6.71	0.18
			2.00			1" Ice	13.76	7.39	0.27
						2" Ice	15.34	8.79	0.51
OPA65R-BU8D w/ Mount Pipe	C	From Leg	4.00	0.00	136.00	No Ice	17.46	8.58	0.11
			0.00			1/2" Ice	18.46	9.49	0.22
			2.00			1" Ice	19.48	10.42	0.35
						2" Ice	21.58	12.33	0.66
7770.00 w/ Mount Pipe	A	From Leg	4.00	0.00	136.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			2.00			1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
7770.00 w/ Mount Pipe	B	From Leg	4.00	0.00	136.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			2.00			1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
7770.00 w/ Mount Pipe	C	From Leg	4.00	0.00	136.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			2.00			1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
RRUS 4449 B5/B12	A	From Leg	4.00	0.00	136.00	No Ice	1.97	1.41	0.07
			0.00			1/2" Ice	2.14	1.56	0.09
			2.00			1" Ice	2.33	1.73	0.11
						2" Ice	2.72	2.07	0.16
RRUS 4449 B5/B12	B	From Leg	4.00	0.00	136.00	No Ice	1.97	1.41	0.07
			0.00			1/2" Ice	2.14	1.56	0.09
			2.00			1" Ice	2.33	1.73	0.11
						2" Ice	2.72	2.07	0.16
RRUS 4449 B5/B12	C	From Leg	4.00	0.00	136.00	No Ice	1.97	1.41	0.07
			0.00			1/2" Ice	2.14	1.56	0.09
			2.00			1" Ice	2.33	1.73	0.11
						2" Ice	2.72	2.07	0.16
RRUS 4478 B14	A	From Leg	4.00	0.00	136.00	No Ice	1.84	1.06	0.06
			0.00			1/2" Ice	2.01	1.20	0.08

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350	Job	Stafford/Pragyl/SSUSA (BU 876402)	Page	7 of 17
	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
RRUS 4478 B14	B	From Leg		2.00			1" Ice	2.19	1.34	0.09
							2" Ice	2.57	1.66	0.14
							No Ice	1.84	1.06	0.06
							1/2" Ice	2.01	1.20	0.08
RRUS 4478 B14	C	From Leg		2.00			1" Ice	2.19	1.34	0.09
							2" Ice	2.57	1.66	0.14
							No Ice	1.84	1.06	0.06
							1/2" Ice	2.01	1.20	0.08
RRUS 8843 B2/B66A	A	From Leg		2.00			1" Ice	2.19	1.34	0.09
							2" Ice	2.57	1.66	0.14
							No Ice	1.64	1.35	0.07
							1/2" Ice	1.80	1.50	0.09
RRUS 8843 B2/B66A	B	From Leg		2.00			1" Ice	1.97	1.65	0.11
							2" Ice	2.32	1.99	0.16
							No Ice	1.64	1.35	0.07
							1/2" Ice	1.80	1.50	0.09
RRUS 8843 B2/B66A	C	From Leg		2.00			1" Ice	1.97	1.65	0.11
							2" Ice	2.32	1.99	0.16
							No Ice	1.64	1.35	0.07
							1/2" Ice	1.80	1.50	0.09
(2) LGP21401	A	From Leg		2.00			1" Ice	1.97	1.65	0.11
							2" Ice	2.32	1.99	0.16
							No Ice	1.10	0.21	0.01
							1/2" Ice	1.24	0.27	0.02
(2) LGP21401	B	From Leg		2.00			1" Ice	1.38	0.35	0.03
							2" Ice	1.69	0.52	0.05
							No Ice	1.10	0.21	0.01
							1/2" Ice	1.24	0.27	0.02
(2) LGP21401	C	From Leg		2.00			1" Ice	1.38	0.35	0.03
							2" Ice	1.69	0.52	0.05
							No Ice	1.10	0.21	0.01
							1/2" Ice	1.24	0.27	0.02
DC6-48-60-18-8F	A	From Leg		2.00			1" Ice	1.38	0.35	0.03
							2" Ice	1.69	0.52	0.05
							No Ice	1.21	1.21	0.03
							1/2" Ice	1.89	1.89	0.05
DC9-48-60-24-8C-EV	C	From Leg		2.00			1" Ice	2.11	2.11	0.08
							2" Ice	2.57	2.57	0.14
							No Ice	1.14	1.14	0.03
							1/2" Ice	1.79	1.79	0.05
T-Arm Mount [TA 602-3]	C	None		2.00			1" Ice	2.00	2.00	0.07
							2" Ice	2.45	2.45	0.13
							No Ice	13.40	13.40	0.77
							1/2" Ice	16.44	16.44	1.00
Commscope VSR-MS-B	A	From Leg		2.00			1" Ice	19.70	19.70	1.29
							2" Ice	25.86	25.86	2.05
							No Ice	3.33	2.00	0.12
							1/2" Ice	4.24	2.57	0.17
Commscope VSR-MS-B	B	From Leg		2.00			1" Ice	5.15	3.14	0.21
							2" Ice	6.97	4.28	0.29
							No Ice	3.33	2.00	0.12
							1/2" Ice	4.24	2.57	0.17
Commscope VSR-MS-B	C	From Leg		2.00			1" Ice	5.15	3.14	0.21
							2" Ice	6.97	4.28	0.29
							No Ice	3.33	2.00	0.12
							1/2" Ice	4.24	2.57	0.17

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350	Job	Stafford/Pragyl/SSUSA (BU 876402)	Page	8 of 17
	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	K
2.9" x 13' Pipe	A	From Leg	4.00	0.0000	136.00	2" Ice	6.97	4.28	0.29
			0.00			No Ice	3.74	0.00	0.08
			2.00			1/2" Ice	5.07	0.00	0.12
						1" Ice	6.43	0.00	0.16
2.9" x 13' Pipe	B	From Leg	4.00	0.0000	136.00	2" Ice	8.93	0.00	0.26
			0.00			No Ice	3.74	0.00	0.08
			2.00			1/2" Ice	5.07	0.00	0.12
						1" Ice	6.43	0.00	0.16
2.9" x 13' Pipe	C	From Leg	4.00	0.0000	136.00	2" Ice	8.93	0.00	0.26
			0.00			No Ice	3.74	0.00	0.08
			2.00			1/2" Ice	5.07	0.00	0.12
						1" Ice	6.43	0.00	0.16
127 SBNHH-1D65B w/ Mount Pipe	A	From Centroid-Le g	4.00	0.0000	127.00	No Ice	4.09	3.30	0.07
			0.00			1/2" Ice	4.49	3.68	0.13
			0.00			1" Ice	4.89	4.07	0.20
						2" Ice	5.72	4.87	0.39
SBNHH-1D65B	A	From Centroid-Le g	4.00	0.0000	127.00	No Ice	4.16	2.49	0.04
			0.00			1/2" Ice	4.57	2.88	0.09
			0.00			1" Ice	4.99	3.27	0.15
						2" Ice	5.85	4.09	0.28
SBNHH-1D65B w/ Mount Pipe	B	From Centroid-Le g	4.00	0.0000	127.00	No Ice	4.09	3.30	0.07
			0.00			1/2" Ice	4.49	3.68	0.13
			0.00			1" Ice	4.89	4.07	0.20
						2" Ice	5.72	4.87	0.39
SBNHH-1D65B	B	From Centroid-Le g	4.00	0.0000	127.00	No Ice	4.16	2.49	0.04
			0.00			1/2" Ice	4.57	2.88	0.09
			0.00			1" Ice	4.99	3.27	0.15
						2" Ice	5.85	4.09	0.28
SBNHH-1D65B w/ Mount Pipe	C	From Centroid-Le g	4.00	0.0000	127.00	No Ice	4.09	3.30	0.07
			0.00			1/2" Ice	4.49	3.68	0.13
			0.00			1" Ice	4.89	4.07	0.20
						2" Ice	5.72	4.87	0.39
SBNHH-1D65B	C	From Centroid-Le g	4.00	0.0000	127.00	No Ice	4.16	2.49	0.04
			0.00			1/2" Ice	4.57	2.88	0.09
			0.00			1" Ice	4.99	3.27	0.15
						2" Ice	5.85	4.09	0.28
MT6407-77A w/ Mount Pipe	A	From Centroid-Le g	4.00	0.0000	127.00	No Ice	4.91	2.68	0.10
			0.00			1/2" Ice	5.26	3.14	0.14
			0.00			1" Ice	5.61	3.62	0.18
						2" Ice	6.36	4.63	0.29
MT6407-77A w/ Mount Pipe	B	From Centroid-Le g	4.00	0.0000	127.00	No Ice	4.91	2.68	0.10
			0.00			1/2" Ice	5.26	3.14	0.14
			0.00			1" Ice	5.61	3.62	0.18
						2" Ice	6.36	4.63	0.29
MT6407-77A w/ Mount Pipe	C	From Centroid-Le g	4.00	0.0000	127.00	No Ice	4.91	2.68	0.10
			0.00			1/2" Ice	5.26	3.14	0.14
			0.00			1" Ice	5.61	3.62	0.18
						2" Ice	6.36	4.63	0.29
RF4439D-25A	A	From Leg	4.00	0.0000	127.00	No Ice	1.87	1.25	0.07
			0.00			1/2" Ice	2.03	1.39	0.09
			0.00			1" Ice	2.21	1.54	0.11
						2" Ice	2.59	1.87	0.17
RF4439D-25A	B	From Leg	4.00	0.0000	127.00	No Ice	1.87	1.25	0.07
			0.00			1/2" Ice	2.03	1.39	0.09
			0.00			1" Ice	2.21	1.54	0.11
						2" Ice	2.59	1.87	0.17

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350	Job	Stafford/Pragyl/SSUSA (BU 876402)	Page	9 of 17
	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	K
RF4439D-25A	C	From Leg	4.00	0.0000	127.00	2" Ice	2.59	1.87	0.17
			0.00	No Ice		1.87	1.25	0.07	
			0.00	1/2" Ice		2.03	1.39	0.09	
				1" Ice		2.21	1.54	0.11	
RF4440D-13A	A	From Leg	4.00	0.0000	127.00	2" Ice	2.59	1.87	0.17
			0.00	No Ice		1.87	1.13	0.07	
			0.00	1/2" Ice		2.03	1.27	0.09	
				1" Ice		2.21	1.41	0.11	
RF4440D-13A	B	From Leg	4.00	0.0000	127.00	2" Ice	2.59	1.72	0.16
			0.00	No Ice		1.87	1.13	0.07	
			0.00	1/2" Ice		2.03	1.27	0.09	
				1" Ice		2.21	1.41	0.11	
RF4440D-13A	C	From Leg	4.00	0.0000	127.00	2" Ice	2.59	1.72	0.16
			0.00	No Ice		1.87	1.13	0.07	
			0.00	1/2" Ice		2.03	1.27	0.09	
				1" Ice		2.21	1.41	0.11	
RXXDC-3315-PF-48	B	From Centroid-Le g	4.00	0.0000	127.00	2" Ice	2.59	1.72	0.16
			0.00	No Ice		3.92	2.61	0.03	
			0.00	1/2" Ice		4.18	2.83	0.06	
				1" Ice		4.45	3.05	0.10	
RXXDC-3315-PF-48	C	From Centroid-Le g	4.00	0.0000	127.00	2" Ice	5.00	3.53	0.19
			0.00	No Ice		3.92	2.61	0.03	
			0.00	1/2" Ice		4.18	2.83	0.06	
				1" Ice		4.45	3.05	0.10	
Platform Mount [LP 303-1_HR-1]	C	None		0.0000	127.00	2" Ice	5.00	3.53	0.19
				No Ice		17.09	17.09	1.50	
				1/2" Ice		21.47	21.47	1.88	
				1" Ice		25.72	25.72	2.35	
(2) 2.375" OD x 5' Mount Pipe	A	From Centroid-Le g	4.00	0.0000	127.00	2" Ice	33.96	33.96	3.52
			0.00	No Ice		1.19	1.19	0.02	
			0.00	1/2" Ice		1.50	1.50	0.03	
				1" Ice		1.81	1.81	0.04	
(2) 2.375" OD x 5' Mount Pipe	B	From Centroid-Le g	4.00	0.0000	127.00	2" Ice	2.46	2.46	0.08
			0.00	No Ice		1.19	1.19	0.02	
			0.00	1/2" Ice		1.50	1.50	0.03	
				1" Ice		1.81	1.81	0.04	
(2) 2.375" OD x 5' Mount Pipe	C	From Centroid-Le g	4.00	0.0000	127.00	2" Ice	2.46	2.46	0.08
			0.00	No Ice		1.19	1.19	0.02	
			0.00	1/2" Ice		1.50	1.50	0.03	
				1" Ice		1.81	1.81	0.04	
Mount Reinforcement Specifications	C	None		0.0000	127.00	2" Ice	2.46	2.46	0.08
				No Ice		28.63	28.63	0.28	
				1/2" Ice		37.31	37.31	0.67	
				1" Ice		45.80	45.80	0.94	
*** KS24019-L112A	C	From Leg	4.00	0.0000	75.00	2" Ice	62.38	62.38	1.63
			0.00	No Ice		0.08	0.08	0.01	
			0.00	1/2" Ice		0.13	0.13	0.01	
				1" Ice		0.19	0.19	0.01	
Side Arm Mount [SO 701-1]	C	None		0.0000	75.00	2" Ice	0.35	0.35	0.02
				No Ice		0.85	1.67	0.07	
				1/2" Ice		1.14	2.34	0.08	
				1" Ice		1.43	3.01	0.09	
***						2" Ice	2.01	4.35	0.12

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350	Job	Stafford/Pragyl/SSUSA (BU 876402)	Page	10 of 17
	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

Load Combinations

<i>Comb. No.</i>	<i>Description</i>
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350	Job	Stafford/Pragyl/SSUSA (BU 876402)	Page	11 of 17
	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 123	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-36.04	2.18	0.30
			Max. Mx	20	-12.09	195.26	-0.88
			Max. My	2	-12.08	-0.61	195.89
			Max. Vy	20	-14.84	195.26	-0.88
			Max. Vx	2	-14.88	-0.61	195.89
			Max. Torque	4			0.97
L2	123 - 85	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-44.23	2.93	0.14
			Max. Mx	20	-17.84	786.53	-3.69
			Max. My	2	-17.83	-3.31	788.56
			Max. Vy	20	-16.85	786.53	-3.69
			Max. Vx	2	-16.88	-3.31	788.56
			Max. Torque	14			-0.96
L3	85 - 44	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-55.84	3.65	-0.13
			Max. Mx	20	-26.42	1501.41	-6.69
			Max. My	2	-26.41	-6.17	1504.88
			Max. Vy	20	-18.83	1501.41	-6.69
			Max. Vx	2	-18.87	-6.17	1504.88
			Max. Torque	14			-1.07
L4	44 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-72.96	4.16	-0.43
			Max. Mx	20	-39.71	2458.56	-10.14
			Max. My	14	-39.71	10.71	-2463.76
			Max. Vy	20	-20.49	2458.56	-10.14
			Max. Vx	14	20.52	10.71	-2463.76
			Max. Torque	14			-1.21

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	36	72.96	6.32	-0.01
	Max. H _x	20	39.73	20.45	-0.07
	Max. H _z	2	39.73	-0.07	20.48
	Max. M _x	2	2463.72	-0.07	20.48
	Max. M _z	8	2457.34	-20.45	0.07
	Max. Torsion	2	1.19	-0.07	20.48
	Min. Vert	23	29.80	17.67	10.18
	Min. H _x	8	39.73	-20.45	0.07
	Min. H _z	14	39.73	0.07	-20.48
	Min. M _x	14	-2463.76	0.07	-20.48
	Min. M _z	20	-2458.56	20.45	-0.07
	Min. Torsion	14	-1.21	0.07	-20.48

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
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	<p>Project</p> <p>TEP No. 22178.609395</p>	<p>Date</p> <p>12:45:32 10/12/21</p>
	<p>Client</p> <p>Crown Castle</p>	<p>Designed by</p> <p>CJB</p>

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	33.11	0.00	0.00	0.02	0.45	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	39.73	0.07	-20.48	-2463.72	-9.54	-1.19
0.9 Dead+1.0 Wind 0 deg - No Ice	29.80	0.07	-20.48	-2412.75	-9.47	-1.18
1.2 Dead+1.0 Wind 30 deg - No Ice	39.73	10.28	-17.77	-2138.67	-1237.11	-0.99
0.9 Dead+1.0 Wind 30 deg - No Ice	29.80	10.28	-17.77	-2094.41	-1211.65	-0.98
1.2 Dead+1.0 Wind 60 deg - No Ice	39.73	17.74	-10.30	-1240.60	-2133.06	-0.52
0.9 Dead+1.0 Wind 60 deg - No Ice	29.80	17.74	-10.30	-1214.92	-2089.07	-0.51
1.2 Dead+1.0 Wind 90 deg - No Ice	39.73	20.45	-0.07	-10.10	-2457.34	0.10
0.9 Dead+1.0 Wind 90 deg - No Ice	29.80	20.45	-0.07	-9.88	-2406.66	0.10
1.2 Dead+1.0 Wind 120 deg - No Ice	39.73	17.67	10.18	1223.17	-2123.03	0.69
0.9 Dead+1.0 Wind 120 deg - No Ice	29.80	17.67	10.18	1197.86	-2079.26	0.69
1.2 Dead+1.0 Wind 150 deg - No Ice	39.73	10.16	17.70	2128.69	-1219.63	1.10
0.9 Dead+1.0 Wind 150 deg - No Ice	29.80	10.16	17.70	2084.63	-1194.56	1.09
1.2 Dead+1.0 Wind 180 deg - No Ice	39.73	-0.07	20.48	2463.76	10.71	1.21
0.9 Dead+1.0 Wind 180 deg - No Ice	29.80	-0.07	20.48	2412.78	10.33	1.20
1.2 Dead+1.0 Wind 210 deg - No Ice	39.73	-10.28	17.77	2138.73	1238.29	0.98
0.9 Dead+1.0 Wind 210 deg - No Ice	29.80	-10.28	17.77	2094.45	1212.51	0.97
1.2 Dead+1.0 Wind 240 deg - No Ice	39.73	-17.74	10.30	1240.66	2134.26	0.50
0.9 Dead+1.0 Wind 240 deg - No Ice	29.80	-17.74	10.30	1214.97	2089.95	0.49
1.2 Dead+1.0 Wind 270 deg - No Ice	39.73	-20.45	0.07	10.14	2458.56	-0.11
0.9 Dead+1.0 Wind 270 deg - No Ice	29.80	-20.45	0.07	9.92	2407.54	-0.11
1.2 Dead+1.0 Wind 300 deg - No Ice	39.73	-17.67	-10.18	-1223.15	2124.24	-0.69
0.9 Dead+1.0 Wind 300 deg - No Ice	29.80	-17.67	-10.18	-1197.84	2080.14	-0.68
1.2 Dead+1.0 Wind 330 deg - No Ice	39.73	-10.16	-17.70	-2128.66	1220.82	-1.08
0.9 Dead+1.0 Wind 330 deg - No Ice	29.80	-10.16	-17.70	-2084.61	1195.42	-1.07
1.2 Dead+1.0 Ice+1.0 Temp	72.96	-0.00	-0.00	0.43	4.16	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	72.96	0.01	-6.33	-814.81	2.48	-0.98
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	72.96	3.17	-5.48	-706.59	-404.46	-0.67
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	72.96	5.48	-3.17	-408.83	-701.86	-0.18
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	72.96	6.32	-0.01	-1.42	-809.96	0.36
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	72.96	5.47	3.15	406.50	-700.01	0.81
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	72.96	3.15	5.47	705.62	-401.25	1.03

<p>tnxTower</p> <p>Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350</p>	Job Stafford/Pragyl/SSUSA (BU 876402)	Page 13 of 17
	Project TEP No. 22178.609395	Date 12:45:32 10/12/21
	Client Crown Castle	Designed by CJB

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 180	72.96	-0.01	6.33	815.70	6.18	0.98
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	72.96	-3.17	5.48	707.48	413.13	0.67
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	72.96	-5.48	3.17	409.72	710.54	0.17
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 270	72.96	-6.32	0.01	2.29	818.64	-0.37
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	72.96	-5.47	-3.15	-405.63	708.69	-0.81
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	72.96	-3.15	-5.47	-704.75	409.92	-1.03
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	33.11	0.01	-4.45	-529.13	-1.67	-0.27
Dead+Wind 30 deg - Service	33.11	2.23	-3.86	-459.34	-265.34	-0.22
Dead+Wind 60 deg - Service	33.11	3.85	-2.24	-266.45	-457.77	-0.12
Dead+Wind 90 deg - Service	33.11	4.44	-0.01	-2.15	-527.40	0.02
Dead+Wind 120 deg - Service	33.11	3.84	2.21	262.72	-455.60	0.15
Dead+Wind 150 deg - Service	33.11	2.21	3.84	457.21	-261.58	0.24
Dead+Wind 180 deg - Service	33.11	-0.01	4.45	529.17	2.67	0.27
Dead+Wind 210 deg - Service	33.11	-2.23	3.86	459.38	266.34	0.22
Dead+Wind 240 deg - Service	33.11	-3.85	2.24	266.48	458.78	0.12
Dead+Wind 270 deg - Service	33.11	-4.44	0.01	2.19	528.40	-0.02
Dead+Wind 300 deg - Service	33.11	-3.84	-2.21	-262.69	456.61	-0.15
Dead+Wind 330 deg - Service	33.11	-2.21	-3.84	-457.17	262.58	-0.24

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-33.11	0.00	0.00	33.11	0.00	0.000%
2	0.07	-39.73	-20.48	-0.07	39.73	20.48	0.000%
3	0.07	-29.80	-20.48	-0.07	29.80	20.48	0.000%
4	10.28	-39.73	-17.77	-10.28	39.73	17.77	0.000%
5	10.28	-29.80	-17.77	-10.28	29.80	17.77	0.000%
6	17.74	-39.73	-10.30	-17.74	39.73	10.30	0.000%
7	17.74	-29.80	-10.30	-17.74	29.80	10.30	0.000%
8	20.45	-39.73	-0.07	-20.45	39.73	0.07	0.000%
9	20.45	-29.80	-0.07	-20.45	29.80	0.07	0.000%
10	17.67	-39.73	10.18	-17.67	39.73	-10.18	0.000%
11	17.67	-29.80	10.18	-17.67	29.80	-10.18	0.000%
12	10.16	-39.73	17.70	-10.16	39.73	-17.70	0.000%
13	10.16	-29.80	17.70	-10.16	29.80	-17.70	0.000%
14	-0.07	-39.73	20.48	0.07	39.73	-20.48	0.000%
15	-0.07	-29.80	20.48	0.07	29.80	-20.48	0.000%
16	-10.28	-39.73	17.77	10.28	39.73	-17.77	0.000%
17	-10.28	-29.80	17.77	10.28	29.80	-17.77	0.000%
18	-17.74	-39.73	10.30	17.74	39.73	-10.30	0.000%
19	-17.74	-29.80	10.30	17.74	29.80	-10.30	0.000%
20	-20.45	-39.73	0.07	20.45	39.73	-0.07	0.000%
21	-20.45	-29.80	0.07	20.45	29.80	-0.07	0.000%
22	-17.67	-39.73	-10.18	17.67	39.73	10.18	0.000%
23	-17.67	-29.80	-10.18	17.67	29.80	10.18	0.000%
24	-10.16	-39.73	-17.70	10.16	39.73	17.70	0.000%
25	-10.16	-29.80	-17.70	10.16	29.80	17.70	0.000%
26	0.00	-72.96	0.00	0.00	72.96	0.00	0.000%
27	0.01	-72.96	-6.33	-0.01	72.96	6.33	0.000%

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350	Job	Stafford/Pragyl/SSUSA (BU 876402)	Page	14 of 17
	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
28	3.17	-72.96	-5.48	-3.17	72.96	5.48	0.000%
29	5.48	-72.96	-3.17	-5.48	72.96	3.17	0.000%
30	6.32	-72.96	-0.01	-6.32	72.96	0.01	0.000%
31	5.47	-72.96	3.15	-5.47	72.96	-3.15	0.000%
32	3.15	-72.96	5.47	-3.15	72.96	-5.47	0.000%
33	-0.01	-72.96	6.33	0.01	72.96	-6.33	0.000%
34	-3.17	-72.96	5.48	3.17	72.96	-5.48	0.000%
35	-5.48	-72.96	3.17	5.48	72.96	-3.17	0.000%
36	-6.32	-72.96	0.01	6.32	72.96	-0.01	0.000%
37	-5.47	-72.96	-3.15	5.47	72.96	3.15	0.000%
38	-3.15	-72.96	-5.47	3.15	72.96	5.47	0.000%
39	0.01	-33.11	-4.45	-0.01	33.11	4.45	0.000%
40	2.23	-33.11	-3.86	-2.23	33.11	3.86	0.000%
41	3.85	-33.11	-2.24	-3.85	33.11	2.24	0.000%
42	4.44	-33.11	-0.01	-4.44	33.11	0.01	0.000%
43	3.84	-33.11	2.21	-3.84	33.11	-2.21	0.000%
44	2.21	-33.11	3.84	-2.21	33.11	-3.84	0.000%
45	-0.01	-33.11	4.45	0.01	33.11	-4.45	0.000%
46	-2.23	-33.11	3.86	2.23	33.11	-3.86	0.000%
47	-3.85	-33.11	2.24	3.85	33.11	-2.24	0.000%
48	-4.44	-33.11	0.01	4.44	33.11	-0.01	0.000%
49	-3.84	-33.11	-2.21	3.84	33.11	2.21	0.000%
50	-2.21	-33.11	-3.84	2.21	33.11	3.84	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.0000001	0.0000001
2	Yes	5	0.0000001	0.00036658
3	Yes	5	0.0000001	0.00017706
4	Yes	7	0.0000001	0.00014241
5	Yes	6	0.0000001	0.00051167
6	Yes	7	0.0000001	0.00014652
7	Yes	6	0.0000001	0.00052764
8	Yes	5	0.0000001	0.00026649
9	Yes	5	0.0000001	0.00012076
10	Yes	7	0.0000001	0.00014400
11	Yes	6	0.0000001	0.00051913
12	Yes	7	0.0000001	0.00014046
13	Yes	6	0.0000001	0.00050537
14	Yes	5	0.0000001	0.00077994
15	Yes	5	0.0000001	0.00036903
16	Yes	7	0.0000001	0.00014783
17	Yes	6	0.0000001	0.00053240
18	Yes	7	0.0000001	0.00014347
19	Yes	6	0.0000001	0.00051560
20	Yes	5	0.0000001	0.00017878
21	Yes	5	0.0000001	0.00007801
22	Yes	7	0.0000001	0.00014176
23	Yes	6	0.0000001	0.00051014
24	Yes	7	0.0000001	0.00014554
25	Yes	6	0.0000001	0.00052472
26	Yes	4	0.0000001	0.00010671
27	Yes	6	0.00014312	0.00072551
28	Yes	7	0.0000001	0.00042336

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350	Job	Stafford/Pragyl/SSUSA (BU 876402)	Page	15 of 17
	Project	TEP No. 22178.609395	Date	12:45:32 10/12/21
	Client	Crown Castle	Designed by	CJB

29	Yes	7	0.00000001	0.00043922
30	Yes	6	0.00014301	0.00069450
31	Yes	7	0.00000001	0.00043823
32	Yes	7	0.00000001	0.00041524
33	Yes	6	0.00014306	0.00072952
34	Yes	7	0.00000001	0.00046015
35	Yes	7	0.00000001	0.00044244
36	Yes	6	0.00014318	0.00070741
37	Yes	7	0.00000001	0.00043352
38	Yes	7	0.00000001	0.00045855
39	Yes	4	0.00000001	0.00049556
40	Yes	5	0.00000001	0.00019643
41	Yes	5	0.00000001	0.00021539
42	Yes	4	0.00000001	0.00038984
43	Yes	5	0.00000001	0.00020724
44	Yes	5	0.00000001	0.00019149
45	Yes	4	0.00000001	0.00052716
46	Yes	5	0.00000001	0.00022243
47	Yes	5	0.00000001	0.00020157
48	Yes	4	0.00000001	0.00038865
49	Yes	5	0.00000001	0.00019796
50	Yes	5	0.00000001	0.00021560

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 123	29.1278	46	1.7270	0.0032
L2	125.75 - 85	20.6185	46	1.5820	0.0024
L3	88.5 - 44	9.9376	46	1.1042	0.0011
L4	48.5 - 0	2.9399	46	0.5620	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	AIR6449 B41_T-MOBILE w/ Mount Pipe	46	29.1278	1.7270	0.0032	26108
136.00	DMP65R-BU8D w/ Mount Pipe	46	24.1312	1.6563	0.0027	9324
127.00	SBNHH-1D65B w/ Mount Pipe	46	21.0364	1.5927	0.0024	5744
75.00	KS24019-L112A	46	7.0255	0.9126	0.0008	3933

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 123	135.4514	16	8.0597	0.0141
L2	125.75 - 85	95.9475	16	7.3818	0.0103

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350	Job Stafford/Pragyl/SSUSA (BU 876402)	Page 16 of 17
	Project TEP No. 22178.609395	Date 12:45:32 10/12/21
	Client Crown Castle	Designed by CJB

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L3	88.5 - 44	46.2860	16	5.1518	0.0049
L4	48.5 - 0	13.6950	16	2.6197	0.0020

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	AIR6449 B41_T-MOBILE w/ Mount Pipe	16	135.4514	8.0597	0.0141	5816
136.00	DMP65R-BU8D w/ Mount Pipe	16	112.2582	7.7292	0.0119	2075
127.00	SBNHH-1D65B w/ Mount Pipe	16	97.8881	7.4318	0.0106	1275
75.00	KS24019-L112A	16	32.7284	4.2571	0.0036	854

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	150 - 123 (1)	TP22.69x17x0.25	27.00	0.00	0.0	17.3463	-12.07	1014.76	0.012
L2	123 - 85 (2)	TP28.36x21.6105x0.375	40.75	0.00	0.0	32.6191	-17.83	1908.22	0.009
L3	85 - 44 (3)	TP36.86x27.0303x0.4063	44.50	0.00	0.0	45.7231	-26.41	2674.80	0.010
L4	44 - 0 (4)	TP42.53x35.0535x0.4375	48.50	0.00	0.0	58.4507	-39.71	3419.37	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{rx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	150 - 123 (1)	TP22.69x17x0.25	196.52	577.27	0.340	0.00	577.27	0.000
L2	123 - 85 (2)	TP28.36x21.6105x0.375	791.29	1357.87	0.583	0.00	1357.87	0.000
L3	85 - 44 (3)	TP36.86x27.0303x0.4063	1509.88	2468.18	0.612	0.00	2468.18	0.000
L4	44 - 0 (4)	TP42.53x35.0535x0.4375	2471.34	3738.54	0.661	0.00	3738.54	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V _u K	φV _n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T _u kip-ft	φT _n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	150 - 123 (1)	TP22.69x17x0.25	14.94	304.43	0.049	0.97	582.80	0.002

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (619) 661-6351 FAX: (619) 661-6350	Job Stafford/Pragyl/SSUSA (BU 876402)	Page 17 of 17
	Project TEP No. 22178.609395	Date 12:45:32 10/12/21
	Client Crown Castle	Designed by CJB

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L2	123 - 85 (2)	TP28.36x21.6105x0.375	16.94	572.47	0.030	0.84	1373.93	0.001
L3	85 - 44 (3)	TP36.86x27.0303x0.4063	18.92	802.44	0.024	0.91	2491.88	0.000
L4	44 - 0 (4)	TP42.53x35.0535x0.4375	20.57	1025.81	0.020	0.98	3781.39	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 123 (1)	0.012	0.340	0.000	0.049	0.002	0.355	1.050	4.8.2
L2	123 - 85 (2)	0.009	0.583	0.000	0.030	0.001	0.593	1.050	4.8.2
L3	85 - 44 (3)	0.010	0.612	0.000	0.024	0.000	0.622	1.050	4.8.2
L4	44 - 0 (4)	0.012	0.661	0.000	0.020	0.000	0.673	1.050	4.8.2

Section Capacity Table

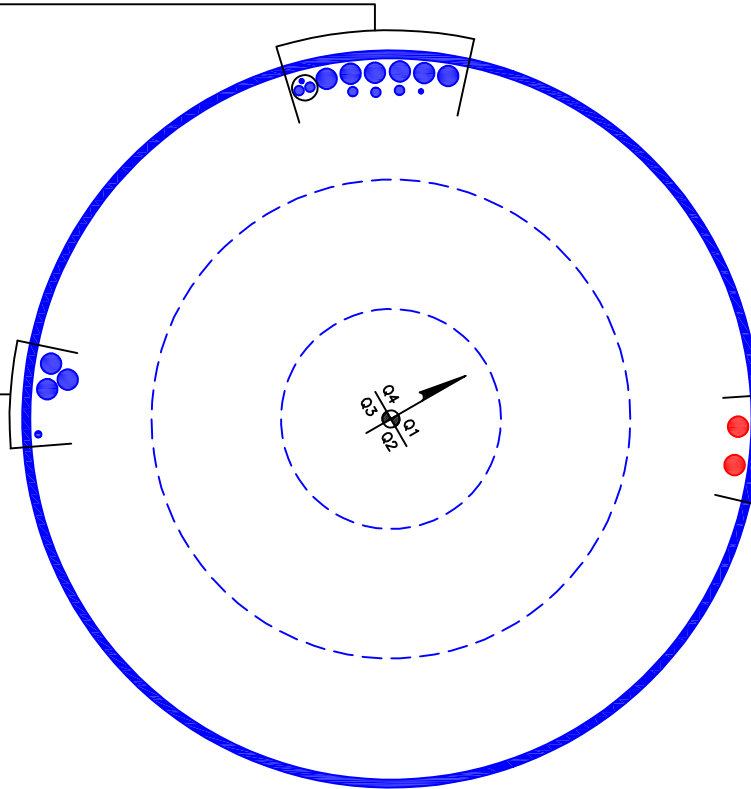
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	150 - 123	Pole	TP22.69x17x0.25	1	-12.07	1065.50	33.8	Pass
L2	123 - 85	Pole	TP28.36x21.6105x0.375	2	-17.83	2003.63	56.5	Pass
L3	85 - 44	Pole	TP36.86x27.0303x0.4063	3	-26.41	2808.54	59.3	Pass
L4	44 - 0	Pole	TP42.53x35.0535x0.4375	4	-39.71	3590.34	64.1	Pass
Summary								
Pole (L4)							64.1	Pass
RATING =							64.1	Pass

APPENDIX B
BASE LEVEL DRAWING



- (OTHER CONSIDERED EQUIPMENT—IN CONDUIT)
(1) 3/8" TO 136 FT LEVEL
(2) 3/4" TO 136 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) 3/8" TO 136 FT LEVEL
(3) 3/4" TO 136 FT LEVEL
(6) 1-5/8" TO 136 FT LEVEL

- (OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 75 FT LEVEL
(3) 1-5/8" TO 150 FT LEVEL



- (PROPOSED EQUIPMENT CONFIGURATION)
(2) 1-5/8" TO 127 FT LEVEL

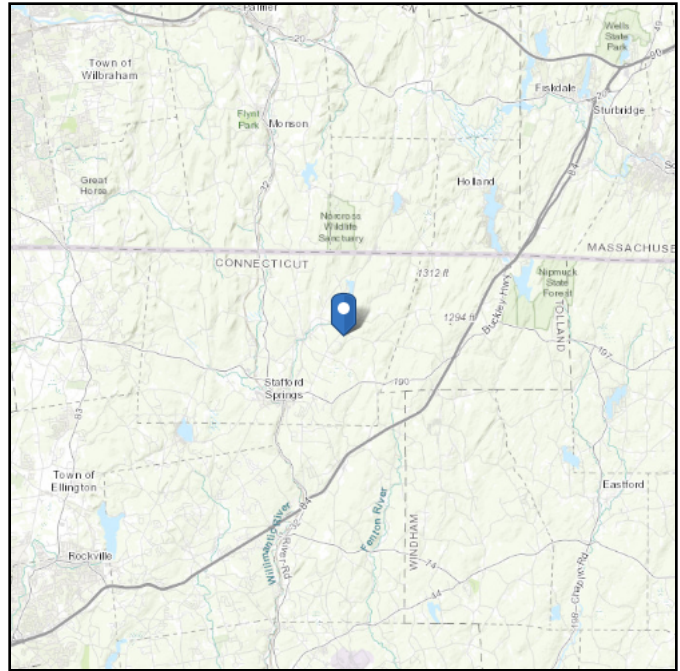
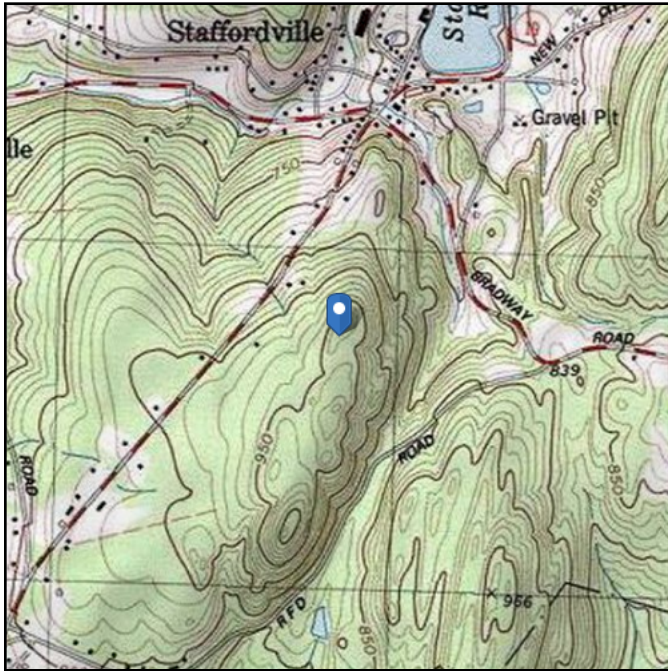
APPENDIX C
ADDITIONAL CALCULATIONS

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 962.45 ft (NAVD 88)
Latitude: 41.98705
Longitude: -72.261328



Wind

Results:

Wind Speed:	124 Vmph	125 Mph As Required By Jurisdiction
10-year MRI	77 Vmph	
25-year MRI	87 Vmph	
50-year MRI	94 Vmph	
100-year MRI	101 Vmph	

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, and Section 26.5.2, incorporating errata of March 12, 2014

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

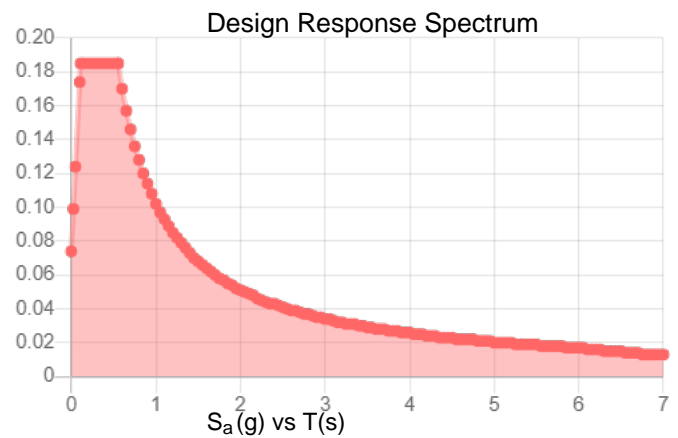
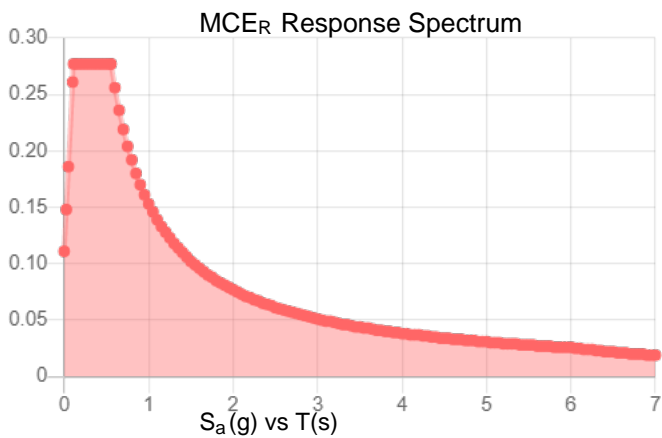
Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Site Soil Class: D - Stiff Soil

Results:

S_s :	0.173	S_{DS} :	0.185
S_1 :	0.064	S_{D1} :	0.102
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.085
S_{MS} :	0.277	PGA_M :	0.136
S_{M1} :	0.153	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B



Data Accessed:

Fri Sep 03 2021

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness: 1.00 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

Data Source: Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

Date Accessed: Fri Sep 03 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

Monopole Base Plate Connection

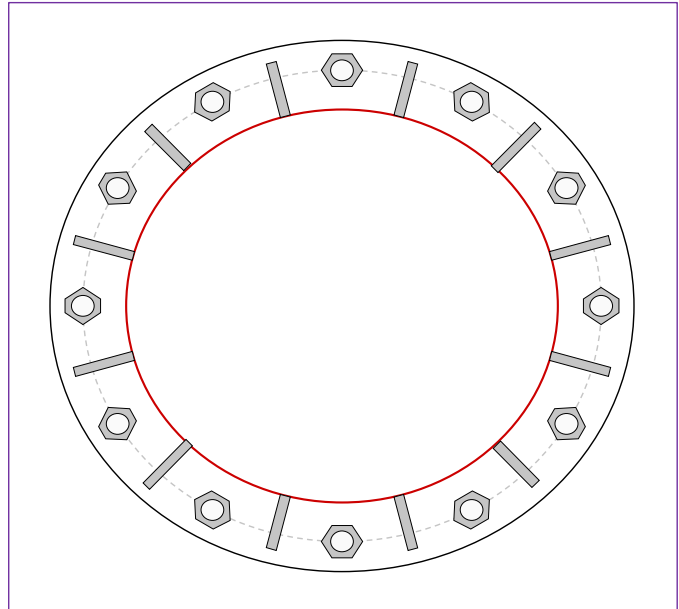


Site Info	
BU #	876402
Site Name	Stafford/Pragyl/SSUSA
Order #	589220 Rev. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
I_{ar} (in)	1.75

Applied Loads	
Moment (kip-ft)	2471.00
Axial Force (kips)	40.00
Shear Force (kips)	21.00

*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
-----------------------	------------------

Anchor Rod Data
 (12) 2-1/4" ϕ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 51.03" BC

Base Plate Data
 57.53" OD x 1.75" Plate (A572-50; $F_y=50$ ksi, $F_u=65$ ksi)

Stiffener Data
 (12) 18"H x 6"W x 1"T, Notch: 0.75"
 plate: $F_y= 50$ ksi ; weld: $F_y= 80$ ksi
 horiz. weld: 0.5" groove, 45° dbl bevel, 0.625" fillet
 vert. weld: 0.375" fillet

Pole Data
 42.53" x 0.4375" 18-sided pole (A572-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary (units of kips, kip-in)

$Pu_t = 190.2$	$\phi Pn_t = 243.75$	Stress Rating
$Vu = 1.75$	$\phi Vn = 149.1$	74.3%
$Mu = n/a$	$\phi Mn = n/a$	Pass

Base Plate Summary

Max Stress (ksi):	39.36	(Roark's Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	83.3%	Pass

Stiffener Summary

Horizontal Weld:	51.7%	Pass
Vertical Weld:	39.6%	Pass
Plate Flexure+Shear:	13.1%	Pass
Plate Tension+Shear:	53.0%	Pass
Plate Compression:	53.9%	Pass

Pole Summary

Punching Shear:	10.5%	Pass
-----------------	--------------	-------------

Pier and Pad Foundation



BU #: 876402
 Site Name: Stafford/Pragyl/SS
 App. Number: 589220 Rev. 0

TIA-222 Revision: H
 Tower Type: Monopole

Top & Bot. Pad Rein. Different?:
 Block Foundation?:
 Rectangular Pad?:

Superstructure Analysis Reactions		
Compression, P_{comp} :	40	kips
Base Shear, V_{u_comp} :	21	kips
Moment, M_u :	2471	ft-kips
Tower Height, H :	150	ft
BP Dist. Above Fdn, bp_{dist} :	4	in

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
<i>Lateral (Sliding) (kips)</i>	347.89	21.00	5.7%	Pass
<i>Bearing Pressure (ksf)</i>	45.14	2.24	5.0%	Pass
<i>Overturning (kip*ft)</i>	5364.35	2635.50	49.1%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	5170.62	2565.50	47.3%	Pass
<i>Pier Compression (kip)</i>	17184.96	69.16	0.4%	Pass
<i>Pad Flexure (kip*ft)</i>	2337.11	968.11	39.5%	Pass
<i>Pad Shear - 1-way (kips)</i>	679.06	162.47	22.8%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.164	0.031	18.2%	Pass
<i>Flexural 2-way (Comp) (kip*ft)</i>	3085.23	1539.30	47.5%	Pass

Pier Properties		
Pier Shape:	Square	
Pier Diameter, $dpier$:	6	ft
Ext. Above Grade, E :	0.5	ft
Pier Rebar Size, Sc :	11	
Pier Rebar Quantity, mc :	26	
Pier Tie/Spiral Size, St :	4	
Pier Tie/Spiral Quantity, mt :	7	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

*Rating per TIA-222-H Section 15.5

Structural Rating*:	47.5%
Soil Rating*:	49.1%

Pad Properties		
Depth, D :	7	ft
Pad Width, W_1 :	22	ft
Pad Thickness, T :	3	ft
Pad Rebar Size (Bottom dir. 2), Sp_2 :	9	
Pad Rebar Quantity (Bottom dir. 2), mp_2 :	17	
Pad Clear Cover, cc_{pad} :	3	in

Material Properties		
Rebar Grade, F_y :	60	ksi
Concrete Compressive Strength, F'_c :	3	ksi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	113	pcf
Ultimate Net Bearing, Q_{net} :	59.400	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	45	degrees
SPT Blow Count, N_{blows} :		
Base Friction, μ :	0.5	
Neglected Depth, N :	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	N/A	ft

<--Toggle between Gross and Net

Exhibit E

Mount Analysis



GPD Engineering And Architecture Professional Corporation
 520 South Main Street, Suite 2531
 Akron, OH 44311
 (317) 295-3174

Maser Consulting Contact:
 Peter.albano@colliersengineering.com
 (856) 371-9457

Antenna Mount Analysis Report with Hardware Upgrades

Mount Analysis

SMART Tool Project #: 10039614
 GPD Project #: 2021740.468157.01
 Maser Project #: 21777133

September 7, 2021

Site Information

Site ID: 468157-VZW / Staffordville East CT
 Site Name: Staffordville East CT
 Carrier Name: Verizon Wireless
 Address: 175 Stafford St.
 Stafford, Connecticut 06077
 Tolland County
 Latitude: 41.987050°
 Longitude: -72.261328°

Structure Information

Tower Type: Monopole
 Mount Type: 12.58-Ft Platform

FUZE ID # 16244671

Analysis Results

Platform: 74.4% Pass*

*Results valid after hardware upgrades noted in the PMI Requirements are installed

*****Contractor PMI Requirements:**

Included at the end of this MA report

Available & Submitted via portal at <https://pmi.vzwsmart.com>

Contractor - Please Review Specific Site PMI Requirements Upon Award

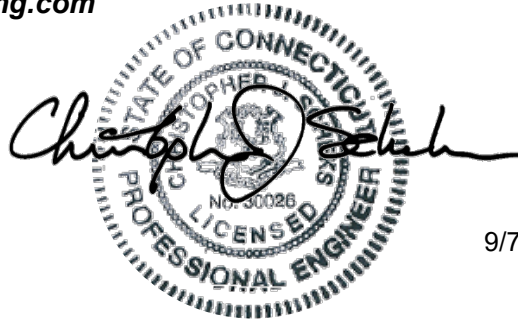
Requirements may also be Noted on A & E drawings

For additional questions and support, please reach out to:

pmisupport@colliersengineering.com

Report Prepared By: Parker Graf
 Respectfully Submitted by:

Christopher J. Scheks, P.E.
 Connecticut #: 0030026



9/7/2021

Executive Summary:

The objective of this report is to determine the capacity of the antenna support mount at the subject facility for the final wireless telecommunications configuration, per the applicable codes and standards. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

This analysis is inclusive of the mount structure only and does not address the structural capacity of the supporting structure. This mounting frame was not analyzed as an anchor attachment point for fall protection. All climbing activities are required to have a fall protection plan completed by a competent person.

Sources of Information:

Document Type	Remarks
Radio Frequency Data Sheet (RFDS)	Verizon RFDS Site ID: 1600414, dated August 28, 2021
Mount Mapping Report	Hudson Design Group, LLC. Site #: 468157, dated March 25, 2021

Analysis Criteria:

Codes and Standards:	ANSI/TIA-222-H
Wind Parameters:	Basic Wind Speed (Ultimate 3-sec. Gust), V_{ULT} : 118 mph Ice Wind Speed (3-sec. Gust): 50 mph Design Ice Thickness: 1.50 in Risk Category: II Exposure Category: B Topographic Category: 1 Topographic Feature Considered: N/A Topographic Method: N/A Ground Elevation Factor, K_e : 0.966
Seismic Parameters:	S_s : 0.176 g S_1 : 0.055 g
Maintenance Parameters:	Wind Speed (3-sec. Gust): 30 mph Maintenance Live Load, L_v : 250 lbs. Maintenance Live Load, L_m : 500 lbs.
Analysis Software:	RISA-3D (V17)

Final Loading Configuration:

The following equipment has been considered for the analysis of the mount:

Mount Elevation (ft)	Equipment Elevation (ft)	Quantity	Manufacturer	Model	Status
125.00	127.00	3	Samsung	MT6407-77A	Added
		3	Samsung	RF4439d-25A	
		3	Samsung	RF4440d-13A	
		6	Andrew	SBNHH-1D65B	Retained
		1	RFS	DB-B1-6C-12AB-OZ	
		1	RFS	DB-B1-6C-12AB-OZ	

The recent mount mapping reported existing OVP units. It is acceptable to install up to any three (3) of the OVP model numbers listed below as required at any location other than the mount face without affecting the structural capacity of the mount. If OVP units are installed on the mount face, a mount re-analysis may be required unless replacing an existing OVP.

Model Number	Ports	AKA
DB-B1-6C-12AB-OZ	6	OVP-6
RVZDC-6627-PF-48	12	OVP-12

Standard Conditions:

1. All engineering services are performed on the basis that the information provided to GPD and used in this analysis is current and correct. The existing equipment loading has been applied at locations determined from the supplied documentation. Any deviation from the loading locations specified in this report shall be communicated to GPD to verify deviation will not adversely impact the analysis.
2. Mounts are assumed to have been properly fabricated, installed and maintained in good condition, twist free and plumb in accordance with its original design and manufacturer’s specifications.

Obvious safety and structural issues/deficiencies noticed at the time of the mount mapping and reported in the Mount Mapping Report are assumed to be corrected and documented as part of the PMI process and are not considered in the mount analysis.

The mount analysis and the mount mapping are not a condition assessment of the mount. Proper maintenance and condition assessments are still required post analysis.

3. For mount analyses completed from other data sources (including new replacement mounts) and not specifically mapped in accordance with the NSTD-446 Standard, the mounts are assumed to have been properly fabricated, installed and maintained in good condition, twist free and plumb in accordance with its original design and manufacturer’s specifications.
4. All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
5. The mount was checked up to, and including, the bolts that fasten it to the mount collar/attachment and threaded rod connections in collar members if applicable. Local deformation and interaction between the mount collar/attachment and the supporting tower structure are outside the scope of this analysis.

6. All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. GPD is not responsible for the conclusion, opinions, and recommendations made by others based on the information supplied.

7. Structural Steel Grades have been assumed as follows, if applicable, unless otherwise noted in this analysis:
 - Channel, Solid Round, Angle, Plate ASTM A36 (Gr. 36)
 - HSS (Rectangular) ASTM 500 (Gr. B-46)
 - Pipe ASTM A53 (Gr. B-35)
 - Threaded Rod F1554 (Gr. 36)
 - Bolts ASTM A325

Discrepancies between in-field conditions and the assumptions listed above may render this analysis invalid unless explicitly approved by GPD.

Analysis Results:

Component	Utilization %	Pass/Fail
Toe Rail	14.6 %	Pass
Standoff Arm	39.7 %	Pass
Cross Arm	19.3 %	Pass
Connection Plate (End)	24.9 %	Pass
Connection Plate (Mid)	44.8 %	Pass
Grating Angle	20.1 %	Pass
Support Rail	28.0 %	Pass
Corner Angle	13.0 %	Pass
Pipe Mount	38.0 %	Pass
Mount Connection	74.4%	Pass

Structure Rating – (Controlling Utilization of all Components)	74.4%
---	--------------

Recommendation:

The existing mount will be **SUFFICIENT** for the final loading configuration and do not require modifications.

ANSI/ASSP rigging plan review services compliant with the requirements of ANSI/TIA 322 are available for a Construction Class IV site or other, if required. Separate review fees will apply.

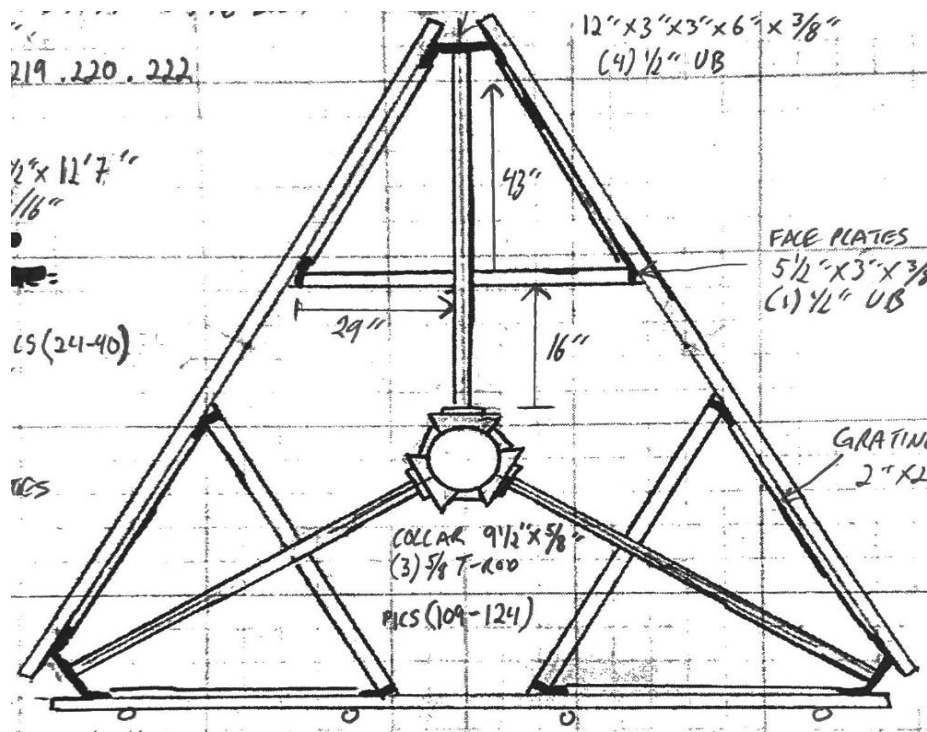
Attachments:

1. Mount Photos
2. Mount Mapping Report (for reference only)
3. Analysis Calculations
4. **Contractor Required Post Installation Inspection (PMI) Report Deliverables**
5. Antenna Placement Diagrams
6. TIA Adoption Wind Speed Letter



	Antenna Mount Mapping Form (PATENT PENDING)			FCC #
	Tower Owner:	CROWN CASTLE	Mapping Date:	3/25/2021
	Site Name:	STAFFORDVILLE EAST CT	Tower Type:	Monopole
	Site Number or ID:	468157	Tower Height (Ft.):	
Mapping Contractor:	HUDSON DESIGN GROUP, LLC.	Mount Elevation (Ft.):	126.5	

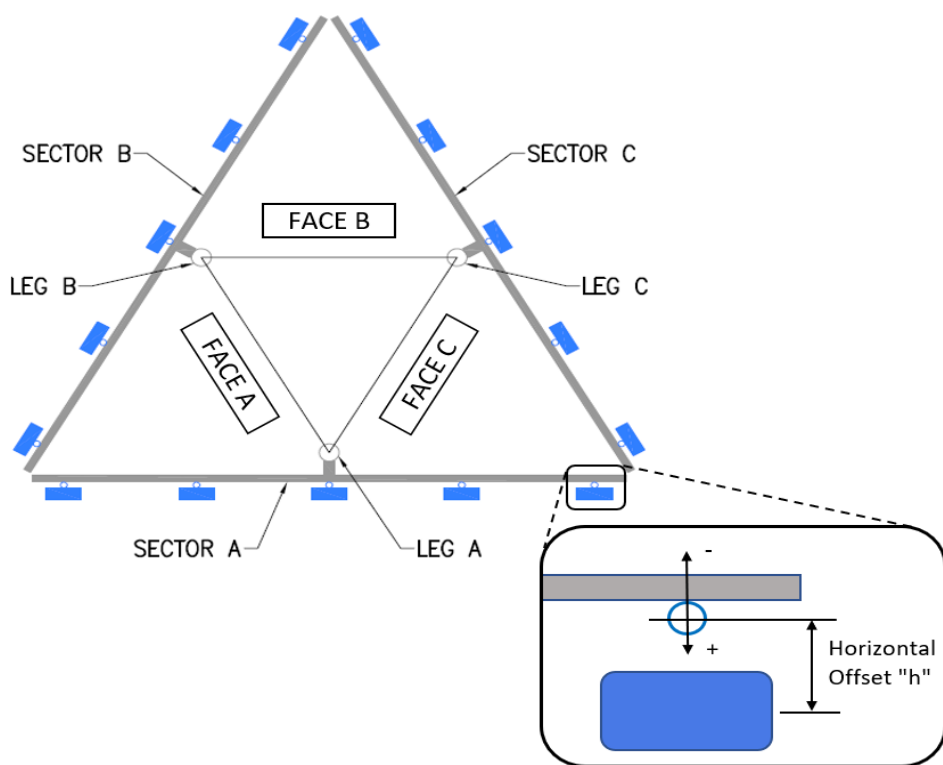
This antenna mapping form is the property of TES and under PATENT PENDING. The formation contained herein is considered confidential in nature and is to be used only for the specific customer it was intended for. Reproduction, transmission, publication, modification or disclosure by any method is prohibited except by express written permission of TES. All means and methods are the responsibility of the contractor and the work shall be compliant with ANSI/ASSE A 10.48, OSHA, FCC, FAA and other safety requirements that may apply. TES is not warranting the usability of the safety climb as it must be assessed prior to each use in compliance with OSHA requirements.



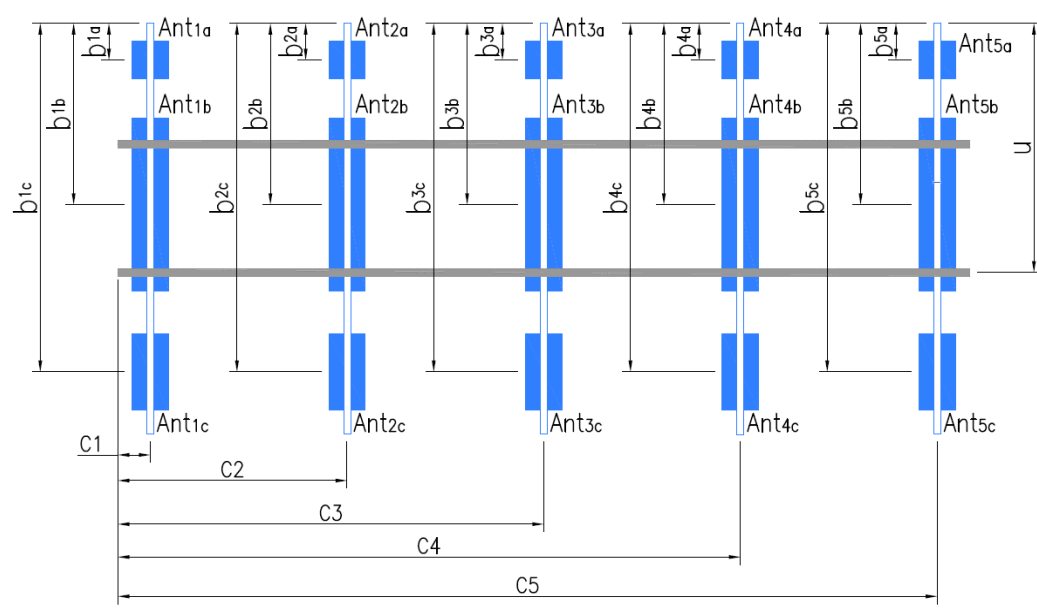
Mount Pipe Configuration and Geometries [Unit = Inches]							
Sector / Position	Mount Pipe Size & Length	Vertical Offset Dimension "u"	Horizontal Offset "C1, C2, C3, etc."	Sector / Position	Mount Pipe Size & Length	Vertical Offset Dimension "u"	Horizontal Offset "C1, C2, C3, etc."
A1	2" STD. PIPE X 72" LONG	46.00	16.00	C1	2" STD. PIPE X 72" LONG	46.00	16.00
A2	2" STD. PIPE X 72" LONG	46.00	52.00	C2	2" STD. PIPE X 72" LONG	46.00	52.00
A3	2" STD. PIPE X 72" LONG	46.00	97.00	C3	2" STD. PIPE X 72" LONG	46.00	97.00
A4	2" STD. PIPE X 72" LONG	46.00	133.00	C4	2" STD. PIPE X 72" LONG	46.00	133.00
A5				C5			
A6				C6			
B1	2" STD. PIPE X 72" LONG	46.00	16.00	D1			
B2	2" STD. PIPE X 72" LONG	46.00	52.00	D2			
B3	2" STD. PIPE X 72" LONG	46.00	97.00	D3			
B4	2" STD. PIPE X 72" LONG	46.00	133.00	D4			
B5				D5			
B6				D6			

Distance between bottom rail and mount CL elevation (dim d). Unit is inches. See 'Mount Elev Ref' tab for details. :
 Distance from top of bottom support rail to lowest tip of ant./eqpt. of Carrier above. (N/A if > 10 ft.) : 4
 Distance from top of bottom support rail to highest tip of ant./eqpt. of Carrier below. (N/A if > 10 ft.) :
 Please enter additional information or comments below.

Tower Face Width at Mount Elev. (ft.):		Tower Leg Size or Pole Shaft Diameter at Mount Elev. (in.):	21.5
--	--	---	------

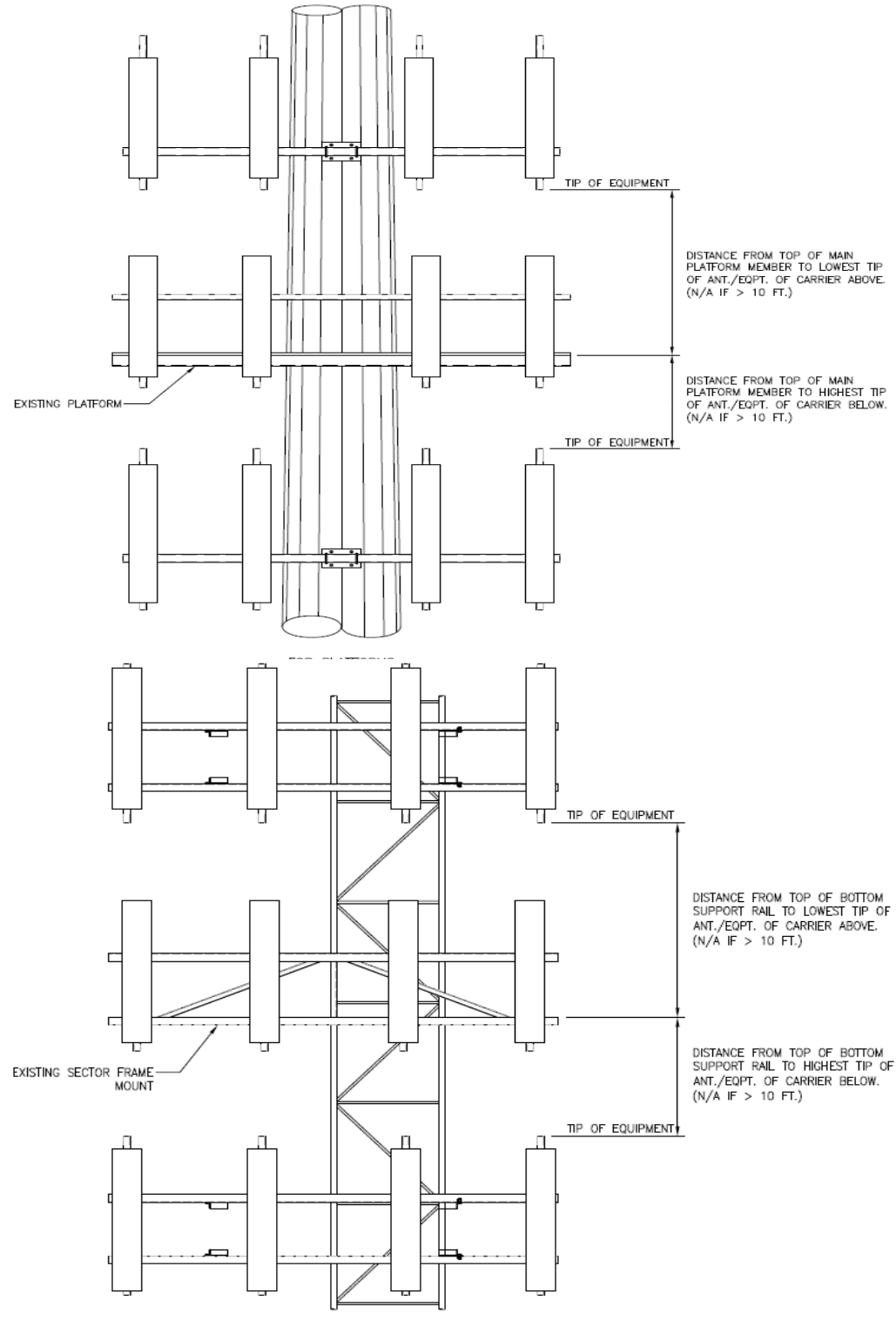


Ants. Items	Enter antenna model. If not labeled, enter "Unknown".						Mounting Locations [Units are inches and degrees]			Photos of antennas
	Antenna Models if Known	Width (in.)	Depth (in.)	Height (in.)	Coax Size and Qty	Antenna Center-line (Ft.)	Vertical Distances "b _{1a} , b _{2a} , b _{3a} , b _{1b} ..." (Inches)	Horiz. Offset "h" (Use "-" if Ant. is behind)	Antenna Azimuth (Degrees)	Photo Numbers
Sector A										
Ant _{1a}										
Ant _{1b}										
Ant _{1c}										
Ant _{2a}	B66a RRH 4X45	12.00	7.00	26.00		128.833	18.00	-9.00		59,86
Ant _{2b}	(2) SBNHH-1D65B	12.00	7.50	73.00		128.5	22.00	10.50	0.00	59,85
Ant _{2c}										
Ant _{3a}	B13 RRH 4X30	12.00	7.50	20.50		128.75	19.00	-7.00		61,88
Ant _{3b}										
Ant _{3c}										
Ant _{4a}										
Ant _{4b}										
Ant _{4c}										
Ant _{5a}										
Ant _{5b}										
Ant _{5c}										
Ant on Standoff										
Ant on Standoff										
Ant on Tower										
Ant on Tower										



Antenna Layout (Looking Out From Tower)

Mount Azimuth (Degree) for Each Sector			Tower Leg Azimuth (Degree) for Each Sector			Sector B									
Sector A:	10.00	Deg	Leg A:		Deg	Ant _{1a}									
Sector B:	130.00	Deg	Leg B:		Deg	Ant _{1b}									
Sector C:	250.00	Deg	Leg C:		Deg	Ant _{1c}									
Sector D:		Deg	Leg D:		Deg	Ant _{2a}	B66a RRH 4X45	12.00	7.00	26.00	128.833	18.00	-9.00	64,86	
Climbing Facility Information						Ant _{2b}	(2) SBNHH-1D65B	12.00	7.50	73.00	128.5	22.00	10.50	125.00	64,85
Location:	45.00	Deg	N/A			Ant _{2c}									
Climbing Facility	Corrosion Type:		Good condition.			Ant _{3a}	B13 RRH 4X30	12.00	7.50	20.50	128.75	19.00	-7.00	66,88	
	Access:		Climbing path was unobstructed.			Ant _{3b}									
	Condition:		Good condition.			Ant _{3c}									



Ant _{4a}														
Ant _{4b}														
Ant _{4c}														
Ant _{5a}														
Ant _{5b}														
Ant _{5c}														
Ant on Standoff	OVP		15.00	10.00	28.00					34.00				92-107
Ant on Standoff														
Ant on Tower														
Ant on Tower														

Sector C														
Ant _{1a}														
Ant _{1b}														
Ant _{1c}														
Ant _{2a}	B66a RRH 4X45	12.00	7.00	26.00	128.833	18.00	-9.00							67,86
Ant _{2b}	(2) SBNHH-1D65B	12.00	7.50	73.00	128.5	22.00	10.50	255.00						67,85
Ant _{2c}														
Ant _{3a}	B13 RRH 4X30	12.00	7.50	20.50	128.75	19.00	-7.00							68,88
Ant _{3b}														
Ant _{3c}														
Ant _{4a}														
Ant _{4b}														
Ant _{4c}														
Ant _{5a}														
Ant _{5b}														
Ant _{5c}														
Ant on Standoff	OVP		15.00	10.00	28.00					34.00				92-107
Ant on Standoff														
Ant on Tower														
Ant on Tower														

Sector D														
Ant _{1a}														
Ant _{1b}														
Ant _{1c}														
Ant _{2a}														
Ant _{2b}														
Ant _{2c}														
Ant _{3a}														
Ant _{3b}														
Ant _{3c}														
Ant _{4a}														
Ant _{4b}														
Ant _{4c}														
Ant _{5a}														
Ant _{5b}														
Ant _{5c}														
Ant on Standoff														
Ant on Standoff														
Ant on Tower														
Ant on Tower														

Observed Safety and Structural Issues During the Mount Mapping		
Issue #	Description of Issue	Photo #

1		
2	(2) 1-1/4"Ø HYBRID	57
3	MONOPOLE WALL THICKNESS: 0.193", 0.190", 0.199"	
4		
5		
6		
7		
8		

Mapping Notes

1. Please report any visible structural or safety issues observed on the antenna mounts (Damaged members, loose connections, tilting mounts, safety climb issues, etc.)
2. If the thickness of the existing pipes or tubing can't be obtained from a general tool (such as Caliper), please use an ultrasonic measurement tool (thickness gauge) to measure the thickness.
3. Please create all required detail sketches of the mounts and insert them into the "Sketches" tab.
4. Please measure and enter the bolt sizes and types under the Members Box in the spreadsheet of the mount type.
5. Take and label the photos of the tower, mounts, connections, antennas and all measurements. Minimum 50 photos are required.
6. Please measure and report the size and length of all existing antenna mounting pipes.
7. Please measure and report the antenna information for all sectors.
8. Don't delete or rearrange any sheet or contents of any sheet from this mapping form.

Standard Conditions

1. Obvious safety and structural issues/deficiencies noticed at the time of the mount mapping are to be reported in this mapping. However, this mount mapping is not a condition assessment of the mount.



Antenna Mount Mapping Form (PATENT PENDING)

FCC #

Tower Owner:	CROWN CASTLE	Mapping Date:	3/25/2021
Site Name:	STAFFORDVILLE EAST CT	Tower Type:	Monopole
Site Number or ID:	468157	Tower Height (Ft.):	
Mapping Contractor:	HUDSON DESIGN GROUP, LLC.	Mount Elevation (Ft.):	126.5

This antenna mapping form is the property of TES and under PATENT PENDING. The formation contained herein is considered confidential in nature and is to be used only for the specific customer it was intended for. Reproduction, transmission, publication, modification or disclosure by any method is prohibited except by express written permission of TES. All means and methods are the responsibility of the contractor and the work shall be compliant with ANSI/ASSE A 10.48, OSHA, FCC, FAA and other safety requirements that may apply. TES is not warranting the usability of the safety climb as it must be assessed prior to each use in compliance with OSHA requirements.

Please Insert Sketches of the Antenna Mount

TOT = 113
 MOUNT CL = FACE PIPE = 126.6"
 TOWER D = 21.12"
 WNL = .193

STAFFORDVILLE EAST CT
 10

COLLAR = 9.12" x 5/8"
 T ROD = (3) 5/8"
 PLATE = 8" x 8" x 3/4" (4) 5/8" BOLTS

HSS = 4" x 4"
 VALL = .219, .220, .222

T-F = 36"
 T-A = 68"

FACE PIPE = 3.12" x 12.7"
 WNL = 3/16"

~~ANTENNA~~
~~INSTALLATION~~

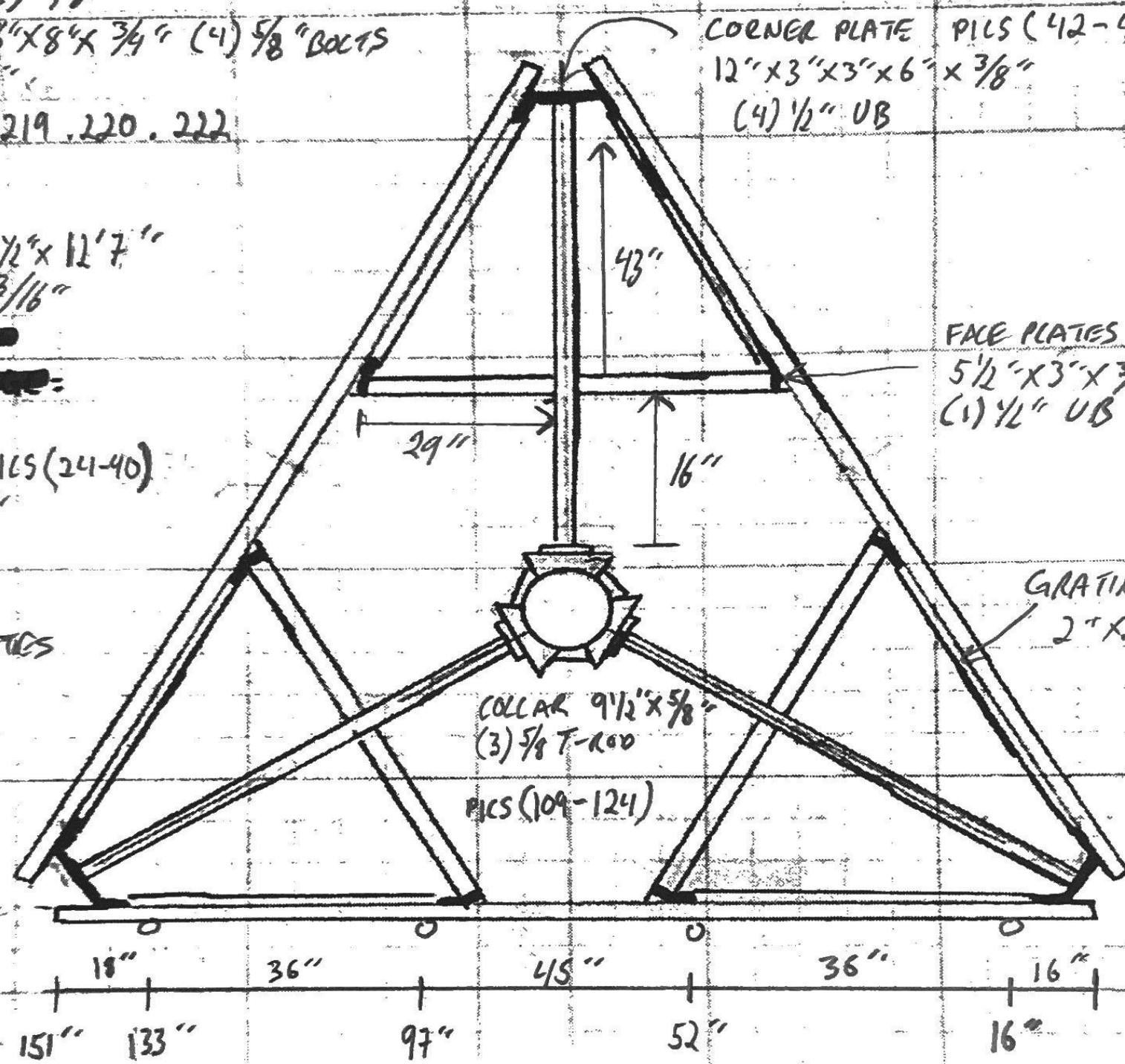
HAND RAIL PICS (24-40)
 2" x 1/8" x 12.7"
 V-SEP 48"

CROSS OVER PLATES
 PICS (46-50)
 8" x 8" x 2" x 3/8"

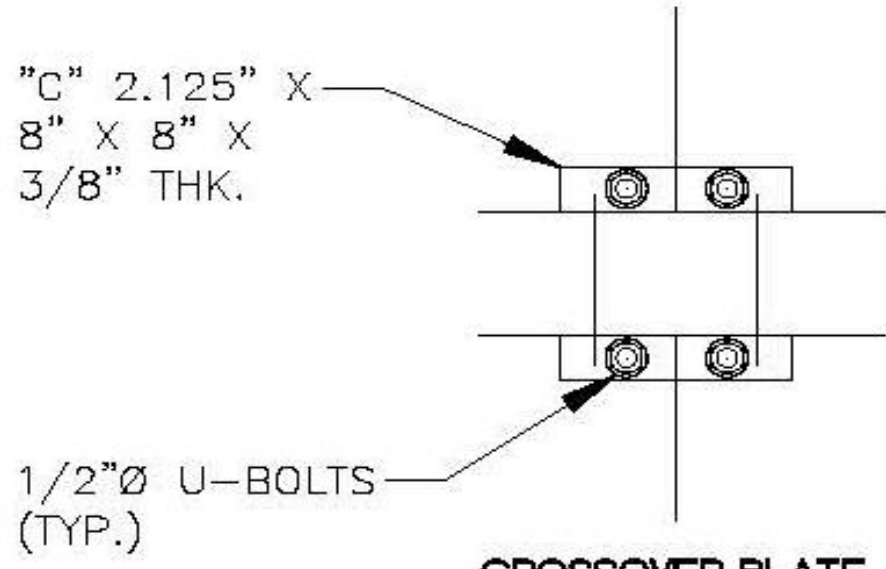
CORNER PLATE PICS (42-46)
 12" x 3" x 3" x 6" x 3/8"
 (4) 1/2" UB

FACE PLATES PICS (53-56)
 5.12" x 3" x 3/8"
 (1) 1/2" UB

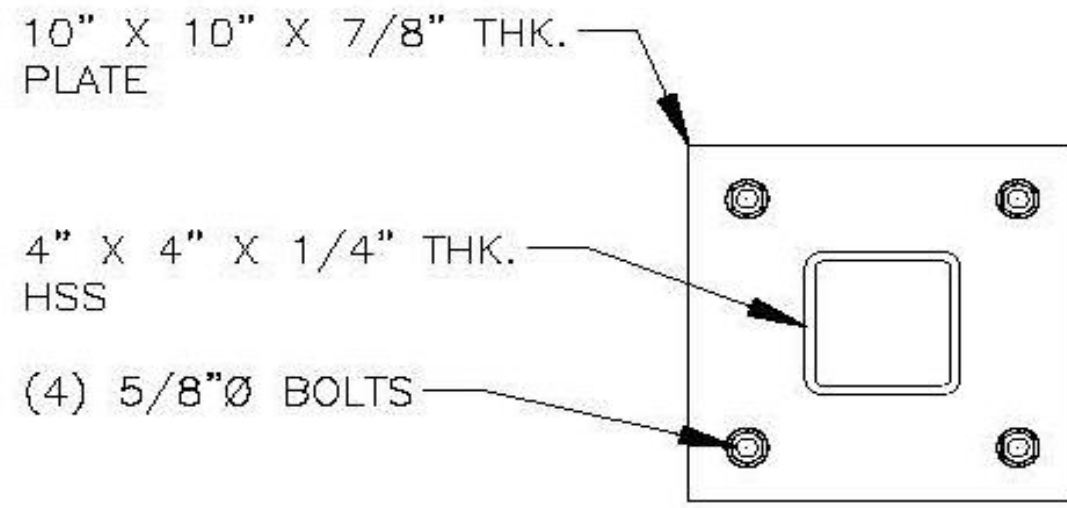
GRATING ANGLE
 2" x 2" x 3/16"



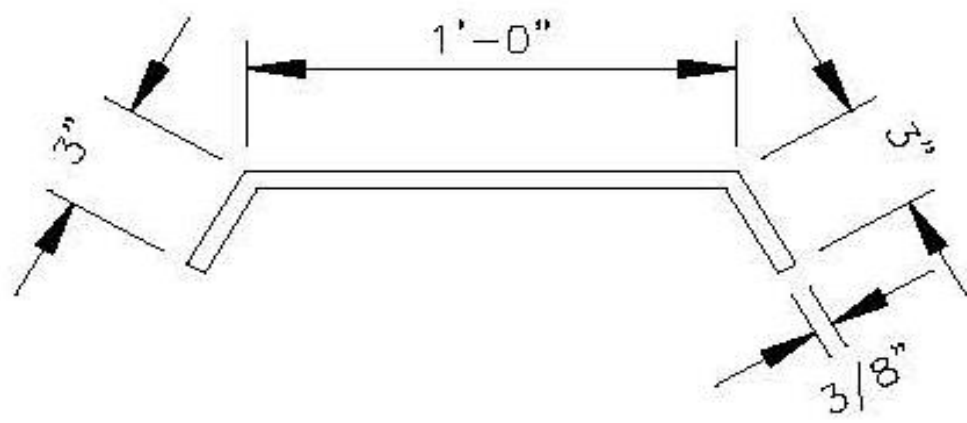
15728



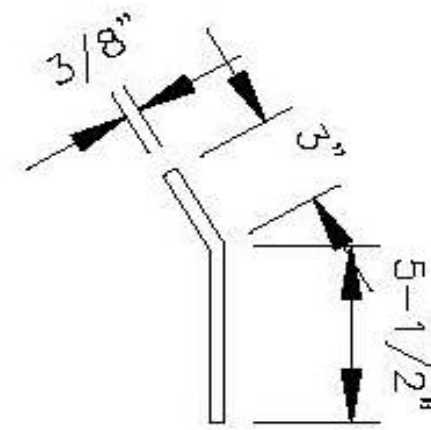
**CROSSOVER PLATE
DETAIL (PLATFORM)**



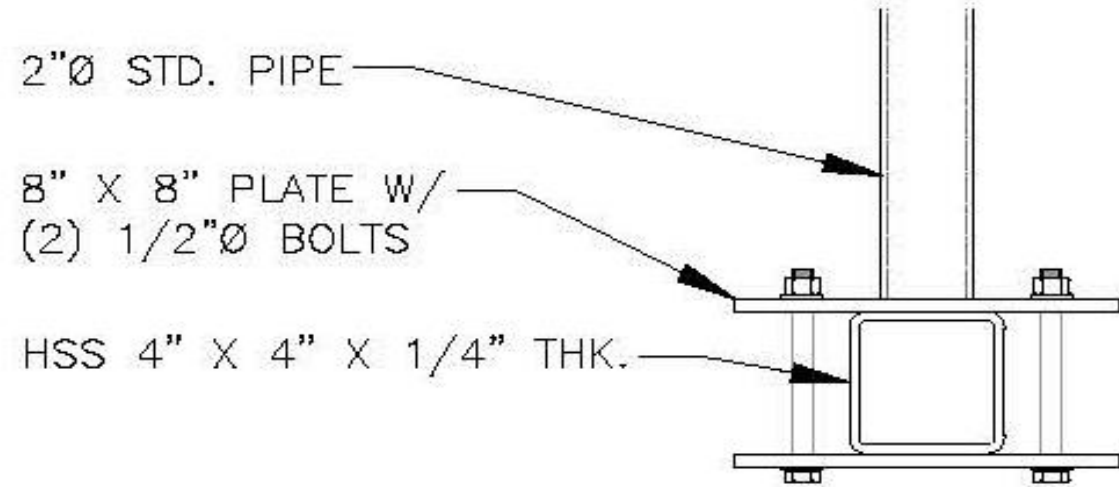
DETAIL M



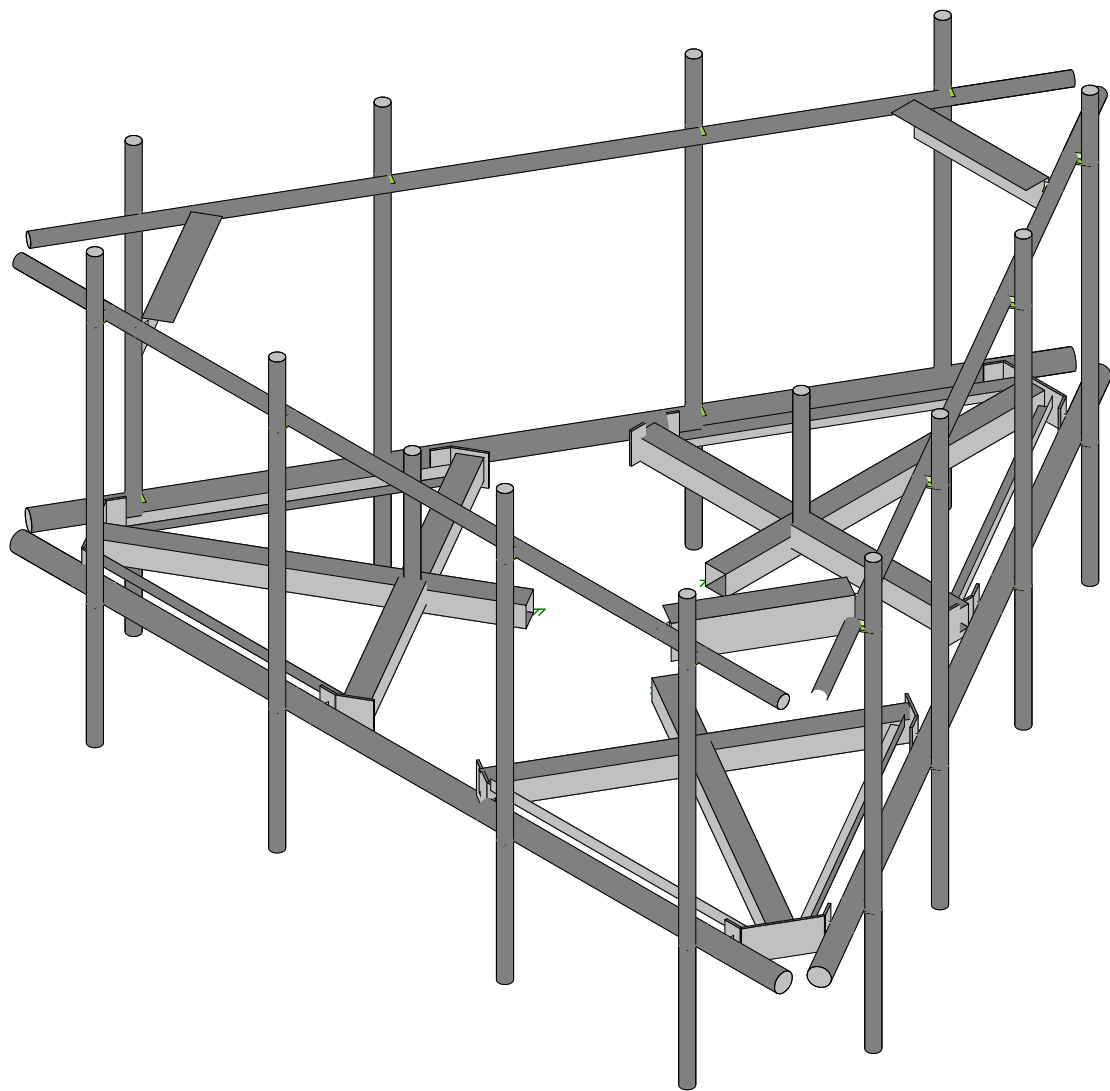
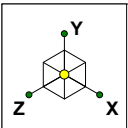
DETAIL J

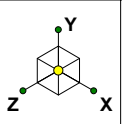


DETAIL K

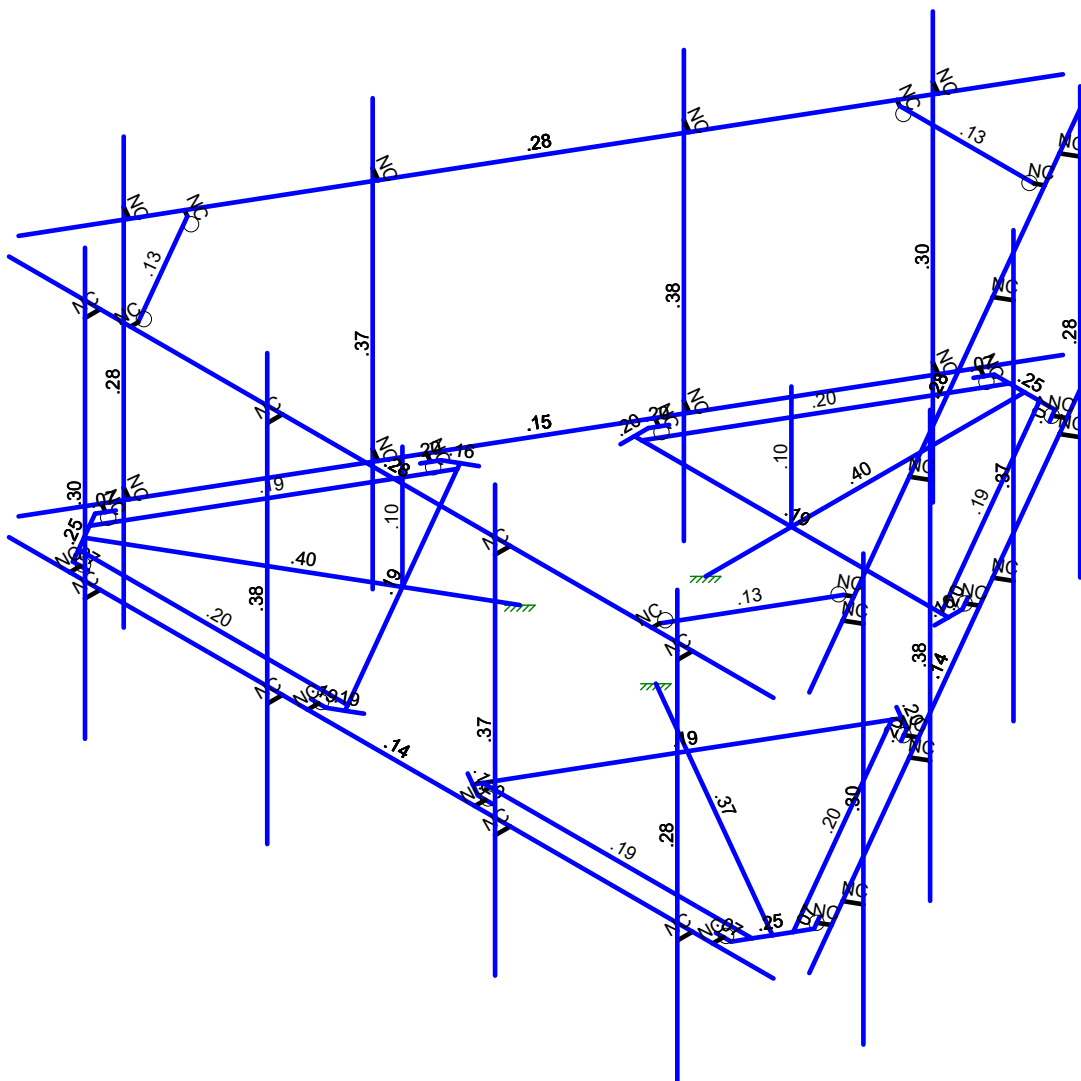


S.O. MOUNT DETAIL





Code Check (Env)	
Black	No Calc
Red	> 1.0
Pink	.90-1.0
Green	.75-.90
Cyan	.50-.75
Blue	0-.50



Member Code Checks Displayed (Enveloped)
Results for LC 1, 1.2D+1.0Wo (0 Deg)

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G	T ÚHOE	Z	FÍÉHF	FÉJ
H	T ÚHOE	Tç	ÉHG	FÉJ
I	T ÚHOE	Ý	ÉJÉG	I ÉF
Í	T ÚHOE	Z	FÍÉHF	I ÉF
Ī	T ÚHOE	Tç	ÉHG	I ÉF
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ƒ€	T ÚHÓ	Ý	É Éİ İ	I ÉF
FF	T ÚHÓ	Z	GÉĜ	I ÉF
FG	T ÚHÓ	Tç	ÉÉİ	I ÉF
FH	T ÚHÓ	Ý	É GGFİ	FÉJ
FI	T ÚHÓ	Z	HÍÉGF	FÉJ
FÍ	T ÚHÓ	Tç	ÉÉFG	FÉJ
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GF	T ÚFOE	Tç	ÉÉFH	H
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H€	T ÚFÓ	Tç	ÉÉFH	H
HF	T ÚFÓ	Ý	ÉGÉGFİ	H
HG	T ÚFÓ	Z	FİÉİJ	H
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H	T ÚFÓ	Ý	ÉGÉGFİ	H
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H	T ÚFÓ	Tç	€	H
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H	T ÚGÆ	Z	FÉG G	H
HJ	T ÚGÆ	Tç	ÉÉFG	H
I€	T ÚGÆ	Ý	ÉİÉÉJ	H
IF	T ÚGÆ	Z	FÉG G	H
IG	T ÚGÆ	Tç	ÉÉFG	H
IH	T ÚGÓ	Ý	ÉİÉÉJ	H
II	T ÚGÓ	Z	FÉG G	H
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İ	T ÚGÓ	Z	FÉG G	H
Ï	T ÚGÓ	Tç	ÉÉFG	H
IJ	T ÚGÓ	Ý	ÉGÉGFİ	H
Í€	T ÚGÓ	Z	FİÉİJ	H
ÍF	T ÚGÓ	Tç	€	H
ÍG	T ÚGÓ	Ý	ÉGÉGFİ	H

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Í	T ÚHOE	Z	ËËÈ GF	I ËF
Î	T ÚHOE	T ç	ËËG	I ËF
Ï	T ÚHÓ	Ý	ËËËG	FËÈ J
Ì	T ÚHÓ	Z	ËËËGG	FËÈ J
J	T ÚHÓ	T ç	ËËË È	FËÈ J
F€	T ÚHÓ	Ý	ËËËG	I ËF
FF	T ÚHÓ	Z	ËËËGG	I ËF
FG	T ÚHÓ	T ç	ËËË È	I ËF
FH	T ÚHÓ	Ý	ËËÈ JÍ	FËÈ J
FI	T ÚHÓ	Z	ËËÈ JI	FËÈ J
FÍ	T ÚHÓ	T ç	ËËËG	FËÈ J
FÎ	T ÚHÓ	Ý	ËËÈ JÍ	I ËF
FÌ	T ÚHÓ	Z	ËËÈ JI	I ËF
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QG	T ÚFOE	Ý	ËËËG	H
QH	T ÚFOE	Z	ËË È	H
Q	T ÚFOE	T ç	ËËË FÍ	H
Q	T ÚFÓ	Ý	ËËÈ H	H
Q	T ÚFÓ	Z	ËËI F	H
Q	T ÚFÓ	T ç	€	H
Q	T ÚFÓ	Ý	ËËÈ H	H
GJ	T ÚFÓ	Z	ËËI F	H
H€	T ÚFÓ	T ç	€	H
HF	T ÚFÓ	Ý	ËËËG	H
HG	T ÚFÓ	Z	ËË È	H
HH	T ÚFÓ	T ç	ËËË FÍ	H
H	T ÚFÓ	Ý	ËËËG	H
H	T ÚFÓ	Z	ËË È	H
H	T ÚFÓ	T ç	ËËË FÍ	H
H	T ÚGœ	Ý	ËËÈ Í F	H
H	T ÚGœ	Z	ËË Í	H
HJ	T ÚGœ	T ç	ËËË Í	H
I€	T ÚGœ	Ý	ËËÈ Í F	H
IF	T ÚGœ	Z	ËË Í	H
IG	T ÚGœ	T ç	ËËË Í	H
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II	T ÚGÓ	Z	ËËI F	H
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I€	T ÚGÓ	Z	ËË Í	H
ÍF	T ÚGÓ	T ç	ËËË Í	H
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Í	TH	Y	JËUÍ	JËUÍ	€	À FEE
Î	TH	Z	ËËËG	ËËËG	€	À FEE
ï	TFÍ	Y	ÏËÌH	ÏËÌH	€	À FEE
ì	TFÍ	Z	ËËËÌ	ËËËÌ	€	À FEE
J	TFÍ	Y	€	€	€	À FEE
F€	TFÍ	Z	€	€	€	À FEE
FF	TFÌ	Y	ÏËÌH	ÏËÌH	€	À FEE
FG	TFÌ	Z	ËËËÌ	ËËËÌ	€	À FEE
FH	TFJ	Y	JËËH	JËËH	€	À FEE
FI	TFJ	Z	ËËË€	ËËË€	€	À FEE
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Fì	TGF	Z	ËËËÍ	ËËËÍ	€	À FEE
FJ	TGG	Y	FÍËËJ	FÍËËJ	€	À FEE
G€	TGG	Z	ËËËF	ËËËF	€	À FEE
GF	TGH	Y	ÏËËG	ÏËËG	€	À FEE
GG	TGH	Z	ËËËG	ËËËG	€	À FEE
GH	TG	Y	ÏËËG	ÏËËG	€	À FEE
G	TG	Z	ËËËG	ËËËG	€	À FEE
GÍ	TG	Y	ÏËËG	ÏËËG	€	À FEE
GÌ	TG	Z	ËËËG	ËËËG	€	À FEE
Gï	TG	Y	ÏËËG	ÏËËG	€	À FEE
Gì	TG	Z	ËËËG	ËËËG	€	À FEE
GJ	TG	Y	FÍËËJ	FÍËËJ	€	À FEE
H€	TG	Z	ËËËF	ËËËF	€	À FEE
HF	TG	Y	FÍËËJ	FÍËËJ	€	À FEE
HG	TG	Z	ËËËF	ËËËF	€	À FEE
HH	TGJ	Y	ÏËËG	ÏËËG	€	À FEE
HI	TGJ	Z	ËËËG	ËËËG	€	À FEE
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HÌ	THE	Z	ËËËG	ËËËG	€	À FEE
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Hì	THF	Z	ËËËÌ	ËËËÌ	€	À FEE
HJ	THG	Y	FÍËËJ	FÍËËJ	€	À FEE
I€	THG	Z	ËËËF	ËËËF	€	À FEE
IF	THH	Y	FQËËG	FQËËG	€	À FEE
IG	THH	Z	ËËËÌ	ËËËÌ	€	À FEE
IH	THI	Y	FÍËËJ	FÍËËJ	€	À FEE
II	THI	Z	ËËËF	ËËËF	€	À FEE
IÍ	THÍ	Y	FQËËG	FQËËG	€	À FEE
IÌ	THÍ	Z	ËËËÌ	ËËËÌ	€	À FEE
Iï	THï	Y	ÏËËG	ÏËËG	€	À FEE
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IJ	THI	Y	€	€	€	À FEE
I€	THI	Z	€	€	€	À FEE
IF	THI	Y	ÏËËG	ÏËËG	€	À FEE
IG	THI	Z	ËËËG	ËËËG	€	À FEE
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íG	TIH	Z	GÈ H	GÈ H	€	€	À FEE
íH	TII	Y	€	€	€	€	À FEE
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íÍ	TIÍ	Y	€	€	€	€	À FEE
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íï	TÍF	Y	€	€	€	€	À FEE
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íJ	TJÍ	Y	€	€	€	€	À FEE
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íF	TJÌ	Y	€	€	€	€	À FEE
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íH	TJÌ	Y	€	€	€	€	À FEE
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íÍ	T ÚFœ	Y	€	€	€	€	À FEE
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íï	T ÚFó	Y	€	€	€	€	À FEE
íì	T ÚFó	Z	Ì È H	Ì È H	€	€	À FEE
íJ	T ÚFô	Y	€	€	€	€	À FEE
J€	T ÚFô	Z	Ì È H	Ì È H	€	€	À FEE
JF	T ÚGœ	Y	€	€	€	€	À FEE
JG	T ÚGœ	Z	Ì È H	Ì È H	€	€	À FEE
JH	T ÚGó	Y	€	€	€	€	À FEE
JI	T ÚGó	Z	Ì È H	Ì È H	€	€	À FEE
JÍ	T ÚGô	Y	€	€	€	€	À FEE
JÌ	T ÚGô	Z	Ì È H	Ì È H	€	€	À FEE
JÏ	T ÚHœ	Y	€	€	€	€	À FEE
Jì	T ÚHœ	Z	Ì È H	Ì È H	€	€	À FEE
JJ	T ÚHó	Y	€	€	€	€	À FEE
F€€	T ÚHó	Z	Ì È H	Ì È H	€	€	À FEE
F€F	T ÚHô	Y	€	€	€	€	À FEE
F€G	T ÚHô	Z	Ì È H	Ì È H	€	€	À FEE
F€H	T ÚI œ	Y	€	€	€	€	À FEE
F€I	T ÚI œ	Z	Ì È H	Ì È H	€	€	À FEE
F€Í	T ÚI ó	Y	€	€	€	€	À FEE
F€Ì	T ÚI ó	Z	Ì È H	Ì È H	€	€	À FEE
F€ï	T ÚI ô	Y	€	€	€	€	À FEE
F€ì	T ÚI ô	Z	Ì È H	Ì È H	€	€	À FEE
F€J	UXUó	Y	€	€	€	€	À FEE

A Ya Vyf'8]gfh]Vi hyX'@ UXg'f6 @' (, : 'Gfi Wh fy'K c'fB%\$ 8 Y] HfV' cb]hbi YXL

	T\{ à^!Àæ^	Öã^&ç	ÚçœÁ æ } æ à^!Àæ^ (D) áÁ æ } æ à^!Àæ^ (E) ÚçœÁ (S) &ç	ÚçœÁ (S) &ç	ÚçœÁ (S) &ç	ÚçœÁ (S) &ç	ÚçœÁ (S) &ç
Ji	T ÚHCE	Z	Í ÈÍ Í	Í ÈÍ Í	€	À FEE	
JJ	T ÚHÓ	Y	È È Í F	È È Í F	€	À FEE	
F€€	T ÚHÓ	Z	Í ÈÍ Í	Í ÈÍ Í	€	À FEE	
F€F	T ÚHÔ	Y	È È Í F	È È Í F	€	À FEE	
F€G	T ÚHÔ	Z	Í ÈÍ Í	Í ÈÍ Í	€	À FEE	
F€H	T ÚI CE	Y	È È Í F	È È Í F	€	À FEE	
F€I	T ÚI CE	Z	Í ÈÍ Í	Í ÈÍ Í	€	À FEE	
F€Í	T ÚI Ó	Y	È È Í F	È È Í F	€	À FEE	
F€Ì	T ÚI Ó	Z	Í ÈÍ Í	Í ÈÍ Í	€	À FEE	
F€Ï	T ÚI Ô	Y	È È Í F	È È Í F	€	À FEE	
F€Î	T ÚI Ô	Z	Í ÈÍ Í	Í ÈÍ Í	€	À FEE	
F€J	UXÚÓ	Y	È È Í Í	È È Í Í	€	À FEE	
FF€	UXÚÓ	Z	Í È Í	Í È Í	€	À FEE	
FFF	UXÚÔ	Y	È È Í Í	È È Í Í	€	À FEE	
FFG	UXÚÔ	Z	Í È Í	Í È Í	€	À FEE	

A Ya Vyf'8]gfh]Vi hyX'@ UXg'f6 @' (- : 'Gfi Wh fy'K c'fB(\$ 8 Y] H

	T\{ à^!Àæ^	Öã^&ç	ÚçœÁ æ } æ à^!Àæ^ (D) áÁ æ } æ à^!Àæ^ (E) ÚçœÁ (S) &ç	ÚçœÁ (S) &ç	ÚçœÁ (S) &ç	ÚçœÁ (S) &ç	ÚçœÁ (S) &ç
F	TF	Y	È È Í J	È È Í J	€	À FEE	
G	TF	Z	F È Í Í	F È Í Í	€	À FEE	
H	TG	Y	È È Í J	È È Í J	€	À FEE	
I	TG	Z	F È Í Í	F È Í Í	€	À FEE	
Í	TH	Y	È È Ú Í	È È Ú Í	€	À FEE	
Ì	TH	Z	Í È G	Í È G	€	À FEE	
Ï	TFÍ	Y	È È Í H	È È Í H	€	À FEE	
Î	TFÍ	Z	Í È Í	Í È Í	€	À FEE	
J	TFÍ	Y	€	€	€	À FEE	
F€	TFÍ	Z	€	€	€	À FEE	
FF	TFÍ	Y	È È Í H	È È Í H	€	À FEE	
FG	TFÍ	Z	Í È Í	Í È Í	€	À FEE	
FH	TFJ	Y	È È H	È È H	€	À FEE	
FI	TFJ	Z	Í È €	Í È €	€	À FEE	
FÍ	TGE	Y	È È Í H	È È Í H	€	À FEE	
FÌ	TGE	Z	F È Í Í	F È Í Í	€	À FEE	
FÏ	TGF	Y	È È Í H	È È Í H	€	À FEE	
FÎ	TGF	Z	F È Í Í	F È Í Í	€	À FEE	
FJ	TGG	Y	È Í È € J	È Í È € J	€	À FEE	
G€	TGG	Z	J È € F	J È € F	€	À FEE	
GF	TGH	Y	È È G	È È G	€	À FEE	
GG	TGH	Z	G È G	G È G	€	À FEE	
GH	TG	Y	È È G	È È G	€	À FEE	
G	TG	Z	G È G	G È G	€	À FEE	
G	TG	Y	È È G	È È G	€	À FEE	
G	TG	Z	G È G	G È G	€	À FEE	
G	TG	Y	È È G	È È G	€	À FEE	
G	TG	Z	G È G	G È G	€	À FEE	
GJ	TG	Y	È Í È € J	È Í È € J	€	À FEE	
H€	TG	Z	J È € F	J È € F	€	À FEE	
HF	TG	Y	È Í È € J	È Í È € J	€	À FEE	
HG	TG	Z	J È € F	J È € F	€	À FEE	
HH	TGJ	Y	È È G	È È G	€	À FEE	

A Ya Vyf'8 jgfi]Vi hYX' @ UXg'f6 @ ') \$: 'Gfi Wi fy'K c 'f6+\$ 8 Y] tL'f7 cb]hbi YXL

	T ^\ { à ^! Á æ ^\	Öã^&çj}	ÙœœÁ æ } æ à ^! Á æ œ } á Á æ } æ à ^! Á æ œ } ÛœœÁ } &œœj } ŽdĀ á	ÙœœÁ æ } æ à ^! Á æ œ } á Á æ } æ à ^! Á æ œ } ÛœœÁ } &œœj } ŽdĀ á	ÙœœÁ æ } æ à ^! Á æ œ } á Á æ } æ à ^! Á æ œ } ÛœœÁ } &œœj } ŽdĀ á	ÙœœÁ æ } æ à ^! Á æ œ } á Á æ } æ à ^! Á æ œ } ÛœœÁ } &œœj } ŽdĀ á
İI	TIJ	Z	€	€	€	Ä FEE
İİ	TÍ€	Y	€	€	€	Ä FEE
İİ	TÍ€	Z	€	€	€	Ä FEE
İİ	TÍF	Y	€	€	€	Ä FEE
İİ	TÍF	Z	€	€	€	Ä FEE
İJ	TJĪ	Y	€	€	€	Ä FEE
İ€	TJĪ	Z	€	€	€	Ä FEE
İF	TJĪ	Y	€	€	€	Ä FEE
İG	TJĪ	Z	€	€	€	Ä FEE
İH	TJĪ	Y	€	€	€	Ä FEE
İI	TJĪ	Z	€	€	€	Ä FEE
İÍ	T ÚFœ	Y	€	€	€	Ä FEE
İİ	T ÚFœ	Z	€	€	€	Ä FEE
İİ	T ÚFÓ	Y	€	€	€	Ä FEE
İİ	T ÚFÓ	Z	€	€	€	Ä FEE
İJ	T ÚFÔ	Y	€	€	€	Ä FEE
J€	T ÚFÔ	Z	€	€	€	Ä FEE
JF	T ÚGœ	Y	€	€	€	Ä FEE
JG	T ÚGœ	Z	€	€	€	Ä FEE
JH	T ÚGÓ	Y	€	€	€	Ä FEE
JI	T ÚGÓ	Z	€	€	€	Ä FEE
JÍ	T ÚGÔ	Y	€	€	€	Ä FEE
JĪ	T ÚGÔ	Z	€	€	€	Ä FEE
JĪ	T ÚHœ	Y	€	€	€	Ä FEE
Jİ	T ÚHœ	Z	€	€	€	Ä FEE
JJ	T ÚHÓ	Y	€	€	€	Ä FEE
F€€	T ÚHÓ	Z	€	€	€	Ä FEE
F€F	T ÚHÔ	Y	€	€	€	Ä FEE
F€G	T ÚHÔ	Z	€	€	€	Ä FEE
F€H	T ÚI œ	Y	€	€	€	Ä FEE
F€I	T ÚI œ	Z	€	€	€	Ä FEE
F€Í	T ÚI Ó	Y	€	€	€	Ä FEE
F€İ	T ÚI Ó	Z	€	€	€	Ä FEE
F€Ī	T ÚI Ô	Y	€	€	€	Ä FEE
F€Ī	T ÚI Ô	Z	€	€	€	Ä FEE
F€J	UXÚÓ	Y	€	€	€	Ä FEE
FF€	UXÚÓ	Z	€	€	€	Ä FEE
FFF	UXÚÔ	Y	€	€	€	Ä FEE
FFG	UXÚÔ	Z	€	€	€	Ä FEE

A Ya Vyf'8 jgfi]Vi hYX' @ UXg'f6 @ ') % : 'Gfi Wi fy'K c 'f1 \$\$ 8 Y] tL

	T ^\ { à ^! Á æ ^\	Öã^&çj}	ÙœœÁ æ } æ à ^! Á æ œ } á Á æ } æ à ^! Á æ œ } ÛœœÁ } &œœj } ŽdĀ á	ÙœœÁ æ } æ à ^! Á æ œ } á Á æ } æ à ^! Á æ œ } ÛœœÁ } &œœj } ŽdĀ á	ÙœœÁ æ } æ à ^! Á æ œ } á Á æ } æ à ^! Á æ œ } ÛœœÁ } &œœj } ŽdĀ á	ÙœœÁ æ } æ à ^! Á æ œ } á Á æ } æ à ^! Á æ œ } ÛœœÁ } &œœj } ŽdĀ á
F	TF	Y	€	€	€	Ä FEE
G	TF	Z	€	€	€	Ä FEE
H	TG	Y	€	€	€	Ä FEE
I	TG	Z	€	€	€	Ä FEE
Í	TH	Y	€	€	€	Ä FEE
Ī	TH	Z	€	€	€	Ä FEE
İ	TFĪ	Y	€	€	€	Ä FEE
İ	TFĪ	Z	€	€	€	Ä FEE
J	TFĪ	Y	€	€	€	Ä FEE

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @')&: 'Gfi Wñ fy'Kc 'fl' \$8 Y] H

	T ^ { à^! Á a^ ^	Ö á ^ & a }	Ú c a o Á a } á á ^ Z a D a () á Á a } á á ^ Z a D a () Ú c a o Á a } & a }	Z a Á á	Ö) á Á a } & a }	Z a Á á
F	TF	Y	Ĥ Ĥ J	Ĥ Ĥ J	€	Ä FEE
G	TF	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
H	TG	Y	Ĥ Ĥ J	Ĥ Ĥ J	€	Ä FEE
I	TG	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
Í	TH	Y	€	€	€	Ä FEE
Ī	TH	Z	€	€	€	Ä FEE
Ī	TĪ	Y	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
Ī	TĪ	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
J	TĪ	Y	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
F€	TĪ	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
FF	TĪ	Y	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
FG	TĪ	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
FH	TĪ	Y	€	€	€	Ä FEE
FI	TĪ	Z	€	€	€	Ä FEE
FÍ	TĪ	Y	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
FĪ	TĪ	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
FĪ	TĪ	Y	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
FĪ	TĪ	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
FJ	TĪ	Y	€	€	€	Ä FEE
Œ	TĪ	Z	€	€	€	Ä FEE
GF	TĪ	Y	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
GG	TĪ	Z	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
GH	TĪ	Y	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
G	TĪ	Z	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
G	TĪ	Y	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
G	TĪ	Z	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
G	TĪ	Y	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
G	TĪ	Z	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
G	TĪ	Y	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
G	TĪ	Z	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
GJ	TĪ	Y	€	€	€	Ä FEE
H€	TĪ	Z	€	€	€	Ä FEE
HF	TĪ	Y	€	€	€	Ä FEE
HG	TĪ	Z	€	€	€	Ä FEE
HH	TĪ	Y	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
HI	TĪ	Z	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
HÍ	TĪ	Y	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
HĪ	TĪ	Z	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
HĪ	TĪ	Y	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
HĪ	TĪ	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
HJ	TĪ	Y	€	€	€	Ä FEE
I€	TĪ	Z	€	€	€	Ä FEE
IF	TĪ	Y	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
IG	TĪ	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
IH	TĪ	Y	€	€	€	Ä FEE
II	TĪ	Z	€	€	€	Ä FEE
Í	TĪ	Y	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
Ī	TĪ	Z	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
Ī	TĪ	Y	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
Ī	TĪ	Z	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE
IJ	TĪ	Y	Ĥ Ĥ F	Ĥ Ĥ F	€	Ä FEE
Í€	TĪ	Z	Ĥ Ĥ F	Ĥ Ĥ F	€	Ä FEE
ÍF	TĪ	Y	Ĥ Ĥ I	Ĥ Ĥ I	€	Ä FEE
ÍG	TĪ	Z	Ĥ Ĥ G	Ĥ Ĥ G	€	Ä FEE

A Ya Vyf'8]qlf]Vi hYX'@ UXg'f6 @ ')' : 'Gfi Wñ fy'K]'f6'8 Y] Æf7 cb]bi YXL

	T^{ à^!Àæ^}	Öã^&ç]	ÙçéÁ æ} æ à^ZaD(III) áÁ æ} æ à^ZaD(III) ÙçéÁ &ç]	ZéÁ á	Ò) áÁ &ç]	ZéÁ á
JH	T ÚGÓ	Ý	€	€	€	À FEE
Jl	T ÚGÓ	Z	ËÈFG	ËÈFG	€	À FEE
JÍ	T ÚGÔ	Ý	€	€	€	À FEE
JÎ	T ÚGÔ	Z	ËÈFG	ËÈFG	€	À FEE
JÏ	T ÚHœ	Ý	€	€	€	À FEE
Jì	T ÚHœ	Z	ËÈFG	ËÈFG	€	À FEE
JJ	T ÚHÓ	Ý	€	€	€	À FEE
F€€	T ÚHÓ	Z	ËÈFG	ËÈFG	€	À FEE
F€F	T ÚHÔ	Ý	€	€	€	À FEE
F€G	T ÚHÔ	Z	ËÈFG	ËÈFG	€	À FEE
F€H	T ÚI œ	Ý	€	€	€	À FEE
F€l	T ÚI œ	Z	ËÈFG	ËÈFG	€	À FEE
F€Í	T ÚI Ó	Ý	€	€	€	À FEE
F€Î	T ÚI Ó	Z	ËÈFG	ËÈFG	€	À FEE
F€Ï	T ÚI Ô	Ý	€	€	€	À FEE
F€ì	T ÚI Ô	Z	ËÈFG	ËÈFG	€	À FEE
F€J	UXUÓ	Ý	€	€	€	À FEE
FF€	UXUÓ	Z	ËÈGJ	ËÈGJ	€	À FEE
FFF	UXUÔ	Ý	€	€	€	À FEE
FFG	UXUÔ	Z	ËÈGJ	ËÈGJ	€	À FEE

A Ya Vyf'8]qlf]Vi hYX'@ UXg'f6 @ ') (: 'Gfi Wñ fy'K]'f6'8 Y] Æ

	T^{ à^!Àæ^}	Öã^&ç]	ÙçéÁ æ} æ à^ZaD(III) áÁ æ} æ à^ZaD(III) ÙçéÁ &ç]	ZéÁ á	Ò) áÁ &ç]	ZéÁ á
F	TF	Ý	FÈÍÍ	FÈÍÍ	€	À FEE
G	TF	Z	ËÈÉ	ËÈÉ	€	À FEE
H	TG	Ý	€	€	€	À FEE
I	TG	Z	€	€	€	À FEE
Í	TH	Ý	FÈÍÍ	FÈÍÍ	€	À FEE
Î	TH	Z	ËÈÉ	ËÈÉ	€	À FEE
Ï	TFÍ	Ý	FÈH	FÈH	€	À FEE
ì	TFÍ	Z	ËÈÍJ	ËÈÍJ	€	À FEE
J	TFÍ	Ý	ÈÍÍ	ÈÍÍ	€	À FEE
F€	TFÍ	Z	ËÈJG	ËÈJG	€	À FEE
FF	TFÍ	Ý	ÈÍÍ	ÈÍÍ	€	À FEE
FG	TFÍ	Z	ËÈJG	ËÈJG	€	À FEE
FH	TFJ	Ý	FÈÍÍ	FÈÍÍ	€	À FEE
FI	TFJ	Z	ËÈÍÍ	ËÈÍÍ	€	À FEE
FÍ	Tœ	Ý	FÈÍÍ	FÈÍÍ	€	À FEE
FÎ	Tœ	Z	ËÈÍÍ	ËÈÍÍ	€	À FEE
FÏ	TGF	Ý	€	€	€	À FEE
Fì	TGF	Z	€	€	€	À FEE
FJ	TGG	Ý	FÈÍ	FÈÍ	€	À FEE
G€	TGG	Z	ËÈJG	ËÈJG	€	À FEE
GF	TGH	Ý	€	€	€	À FEE
GG	TGH	Z	€	€	€	À FEE
GH	TG	Ý	FÈÍH	FÈÍH	€	À FEE
G	TG	Z	ËÈFÍ	ËÈFÍ	€	À FEE
GÍ	TG	Ý	€	€	€	À FEE
GÎ	TG	Z	€	€	€	À FEE
GÏ	TG	Ý	FÈÍ	FÈÍ	€	À FEE
Gì	TG	Z	ËÈJG	ËÈJG	€	À FEE

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @') (: 'Gfi Wñ fy'K]'fl \$'8 Yl tL'f7 cb]h]bi YXL

	T^ { à^!Àæ^ ^	Öá^&çá }	ÚçæóÁ æ } á à^!ZaDæ(È) áÁ æ } á à^!ZaDæ(È) ÚçæóÁ } &æá } ZæÁ á	Ò) áÁ } &æá } ZæÁ á		
GJ	TG	Y	FÈ Ì H	FÈ Ì H	€	À FEE
H€	TG	Z	ÈÈ F	ÈÈ F	€	À FEE
HF	TG	Y	FÈ Ì	FÈ Ì	€	À FEE
HG	TG	Z	ÈÈ JG	ÈÈ JG	€	À FEE
HH	TGJ	Y	FÈ Ì	FÈ Ì	€	À FEE
H	TGJ	Z	ÈÈ JG	ÈÈ JG	€	À FEE
HÍ	THE	Y	€	€	€	À FEE
HÌ	THE	Z	€	€	€	À FEE
HÏ	THF	Y	È Ì Ì	È Ì Ì	€	À FEE
H	THF	Z	È Ì Ì	È Ì Ì	€	À FEE
HJ	THG	Y	FÈ Ì	FÈ Ì	€	À FEE
I€	THG	Z	ÈÈ JG	ÈÈ JG	€	À FEE
IF	THH	Y	GÈ G	GÈ G	€	À FEE
IG	THH	Z	ÈÈ Ì Ì	ÈÈ Ì Ì	€	À FEE
IH	TH	Y	FÈ Ì	FÈ Ì	€	À FEE
II	TH	Z	ÈÈ JG	ÈÈ JG	€	À FEE
IÍ	TH	Y	GÈ G	GÈ G	€	À FEE
IÌ	TH	Z	ÈÈ Ì Ì	ÈÈ Ì Ì	€	À FEE
IÏ	TH	Y	FÈ Ì	FÈ Ì	€	À FEE
I	TH	Z	ÈÈ JG	ÈÈ JG	€	À FEE
IJ	TH	Y	È Ì Ì	È Ì Ì	€	À FEE
I€	TH	Z	È Ì Ì	È Ì Ì	€	À FEE
IF	TH	Y	FÈ Ì	FÈ Ì	€	À FEE
IG	TH	Z	ÈÈ JG	ÈÈ JG	€	À FEE
IH	THU	Y	È Ì Ì	È Ì Ì	€	À FEE
I	THU	Z	È Ì Ì	È Ì Ì	€	À FEE
IÍ	TIE	Y	€	€	€	À FEE
IÌ	TIE	Z	€	€	€	À FEE
IÏ	TIF	Y	È Ì Ì	È Ì Ì	€	À FEE
I	TIF	Z	È Ì Ì	È Ì Ì	€	À FEE
IJ	TIG	Y	€	€	€	À FEE
I€	TIG	Z	€	€	€	À FEE
IF	TIH	Y	€	€	€	À FEE
IG	TIH	Z	€	€	€	À FEE
IH	TII	Y	FÈ Ì	FÈ Ì	€	À FEE
I	TII	Z	ÈÈ G	ÈÈ G	€	À FEE
IÍ	TII	Y	FÈ Ì	FÈ Ì	€	À FEE
IÌ	TII	Z	ÈÈ G	ÈÈ G	€	À FEE
IÏ	TII	Y	FÈ Ì	FÈ Ì	€	À FEE
I	TII	Z	ÈÈ G	ÈÈ G	€	À FEE
IJ	TII	Y	FÈ Ì	FÈ Ì	€	À FEE
I€	TII	Z	ÈÈ G	ÈÈ G	€	À FEE
IF	TII	Y	€	€	€	À FEE
IG	TII	Z	€	€	€	À FEE
IH	TIJ	Y	FÈ F	FÈ F	€	À FEE
I	TIJ	Z	ÈÈ J	ÈÈ J	€	À FEE
IÍ	TIE	Y	€	€	€	À FEE
IÌ	TIE	Z	€	€	€	À FEE
IÏ	TIF	Y	FÈ F	FÈ F	€	À FEE
I	TIF	Z	ÈÈ J	ÈÈ J	€	À FEE
IJ	TJ	Y	GÈ F	GÈ F	€	À FEE
I€	TJ	Z	ÈÈ J	ÈÈ J	€	À FEE

A Ya Vyf'8]gfh]Vi hYX'@ UXg'f6 @') (: 'Gfi Wh fY'K]'ff '\$8 Yl tL'f7 cb]bi YXL

	T\{ à^!Àæ^ ^	Öá^&çj}	ÚçæóÁ æ} æ à^!ZaDæ(È) áÁ æ} æ à^!ZaDæ(È) ÚçæóÁ &æj} ŽdÁ á	Ò) áÁ &æj} ŽdÁ á		
ì F	T JÌ	Ý	GEFI	GEFI	€	À FEE
í G	T JÌ	Z	ÈÈJÌ	ÈÈJÌ	€	À FEE
ì H	T JÌ	Ý	€	€	€	À FEE
í I	T JÌ	Z	€	€	€	À FEE
ì Í	T ÚFOE	Ý	FÈÉ	FÈÉ	€	À FEE
í Î	T ÚFOE	Z	ÈÈÌG	ÈÈÌG	€	À FEE
ì Ï	T ÚFÓ	Ý	FÈÉ	FÈÉ	€	À FEE
í Ï	T ÚFÓ	Z	ÈÈÌG	ÈÈÌG	€	À FEE
ì J	T ÚFÔ	Ý	FÈÉ	FÈÉ	€	À FEE
J€	T ÚFÔ	Z	ÈÈÌG	ÈÈÌG	€	À FEE
JF	T ÚGOE	Ý	FÈÉ	FÈÉ	€	À FEE
JG	T ÚGOE	Z	ÈÈÌG	ÈÈÌG	€	À FEE
JH	T ÚGÓ	Ý	FÈÉ	FÈÉ	€	À FEE
JÌ	T ÚGÓ	Z	ÈÈÌG	ÈÈÌG	€	À FEE
JÍ	T ÚGÔ	Ý	FÈÉ	FÈÉ	€	À FEE
JÏ	T ÚGÔ	Z	ÈÈÌG	ÈÈÌG	€	À FEE
JÏ	T ÚHOE	Ý	FÈÉ	FÈÉ	€	À FEE
JÌ	T ÚHOE	Z	ÈÈÌG	ÈÈÌG	€	À FEE
JJ	T ÚHÓ	Ý	FÈÉ	FÈÉ	€	À FEE
F€€	T ÚHÓ	Z	ÈÈÌG	ÈÈÌG	€	À FEE
F€F	T ÚHÔ	Ý	FÈÉ	FÈÉ	€	À FEE
F€G	T ÚHÔ	Z	ÈÈÌG	ÈÈÌG	€	À FEE
F€H	T ÚI OE	Ý	FÈÉ	FÈÉ	€	À FEE
F€Ì	T ÚI OE	Z	ÈÈÌG	ÈÈÌG	€	À FEE
F€Í	T ÚI Ó	Ý	FÈÉ	FÈÉ	€	À FEE
F€Ï	T ÚI Ó	Z	ÈÈÌG	ÈÈÌG	€	À FEE
F€Ï	T ÚI Ô	Ý	FÈÉ	FÈÉ	€	À FEE
F€Ì	T ÚI Ô	Z	ÈÈÌG	ÈÈÌG	€	À FEE
F€J	UXUÓ	Ý	FÈFI	FÈFI	€	À FEE
FF€	UXUÓ	Z	ÈÈHF	ÈÈHF	€	À FEE
FFF	UXUÔ	Ý	FÈFI	FÈFI	€	À FEE
FFG	UXUÔ	Z	ÈÈHF	ÈÈHF	€	À FEE

A Ya Vyf'8]gfh]Vi hYX'@ UXg'f6 @') (: 'Gfi Wh fY'K]'ff '\$8 Yl tL

	T\{ à^!Àæ^ ^	Öá^&çj}	ÚçæóÁ æ} æ à^!ZaDæ(È) áÁ æ} æ à^!ZaDæ(È) ÚçæóÁ &æj} ŽdÁ á	Ò) áÁ &æj} ŽdÁ á		
F	TF	Ý	ÈH	ÈH	€	À FEE
G	TF	Z	ÈÌG	ÈÌG	€	À FEE
H	TG	Ý	ÈH	ÈH	€	À FEE
I	TG	Z	ÈÌG	ÈÌG	€	À FEE
Í	TH	Ý	HÈHJ	HÈHJ	€	À FEE
Î	TH	Z	ÈÈG	ÈÈG	€	À FEE
Ï	TFÌ	Ý	GEHÌ	GEHÌ	€	À FEE
Ì	TFÌ	Z	ÈÈÈG	ÈÈÈG	€	À FEE
J	TFÌ	Ý	€	€	€	À FEE
F€	TFÌ	Z	€	€	€	À FEE
FF	TFÌ	Ý	GEHÌ	GEHÌ	€	À FEE
FG	TFÌ	Z	ÈÈÈG	ÈÈÈG	€	À FEE
FH	TFJ	Ý	HÈÌG	HÈÌG	€	À FEE
FI	TFJ	Z	ÈÈÈG	ÈÈÈG	€	À FEE
FÍ	TGE	Ý	ÈÌÌ	ÈÌÌ	€	À FEE
FÏ	TGE	Z	ÈÌÌ	ÈÌÌ	€	À FEE

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @') * : 'Gfi Wñ fy'K]'f' \$'8 Y] tL'f7 cb]h]bi YXL

	T ^{ à^!Àæ^ ^	Öã^&çã}	ÙçœÁ æ} æ' à^!ZaDœ(È) áÁ æ} æ' à^!ZaDœ(È) ÙçœÁ} &œã} ZœÁ á	ÙçœÁ} &œã} ZœÁ á	ÙçœÁ} &œã} ZœÁ á	ÙçœÁ} &œã} ZœÁ á
Í	TH	Ý	GË JG	GË JG	€	À FEE
Î	TH	Z	€	€	€	À FEE
Ï	TFÍ	Ý	ËFÍ	ËFÍ	€	À FEE
Ì	TFÍ	Z	€	€	€	À FEE
J	TFÍ	Ý	ËFÍ	ËFÍ	€	À FEE
F€	TFÍ	Z	€	€	€	À FEE
FF	TFÍ	Ý	HË Í J	HË Í J	€	À FEE
FG	TFÍ	Z	€	€	€	À FEE
FH	TFJ	Ý	GË H	GË H	€	À FEE
FI	TFJ	Z	€	€	€	À FEE
FÍ	TG€	Ý	€	€	€	À FEE
FÎ	TG€	Z	€	€	€	À FEE
FÏ	TGF	Ý	GË H	GË H	€	À FEE
FÌ	TGF	Z	€	€	€	À FEE
FJ	TGG	Ý	HË HJ	HË HJ	€	À FEE
G€	TGG	Z	€	€	€	À FEE
GF	TGH	Ý	HË HJ	HË HJ	€	À FEE
GG	TGH	Z	€	€	€	À FEE
GH	TG	Ý	€	€	€	À FEE
G	TG	Z	€	€	€	À FEE
GÍ	TG	Ý	HË HJ	HË HJ	€	À FEE
GÎ	TG	Z	€	€	€	À FEE
GÏ	TG	Ý	€	€	€	À FEE
GÌ	TG	Z	€	€	€	À FEE
GJ	TG	Ý	HË Í Î	HË Í Î	€	À FEE
H€	TG	Z	€	€	€	À FEE
HF	TG	Ý	HË HJ	HË HJ	€	À FEE
HG	TG	Z	€	€	€	À FEE
HH	TGJ	Ý	€	€	€	À FEE
HI	TGJ	Z	€	€	€	À FEE
HÍ	THE	Ý	HË Í Î	HË Í Î	€	À FEE
HÎ	THE	Z	€	€	€	À FEE
HÏ	THF	Ý	I Ë Í H	I Ë Í H	€	À FEE
HÌ	THF	Z	€	€	€	À FEE
HJ	THG	Ý	HË HJ	HË HJ	€	À FEE
I€	THG	Z	€	€	€	À FEE
IF	THH	Ý	FË FH	FË FH	€	À FEE
IG	THH	Z	€	€	€	À FEE
IH	TH	Ý	HË HJ	HË HJ	€	À FEE
IÍ	THÍ	Z	€	€	€	À FEE
IÎ	THÍ	Ý	FË FH	FË FH	€	À FEE
IÏ	THÍ	Z	€	€	€	À FEE
IÌ	THÍ	Ý	€	€	€	À FEE
IJ	THÍ	Z	€	€	€	À FEE
I€	THÍ	Ý	FË FH	FË FH	€	À FEE
IF	THÍ	Z	€	€	€	À FEE
IG	THÍ	Ý	€	€	€	À FEE
IH	THÍ	Z	€	€	€	À FEE
IÍ	THÍ	Ý	FË FH	FË FH	€	À FEE
IÏ	THÍ	Z	€	€	€	À FEE
IÌ	THÍ	Ý	HË HJ	HË HJ	€	À FEE
IÎ	THÍ	Z	€	€	€	À FEE

A Ya Vyf'8]gfh]Vi hYX' @ UXg'f6 @')+ : 'Gfi Wñ fy'K]''fp&\$'8 Yl tL'ff c bh]bi YXL

	T^{\ à^!Àæ^ ^}	Öã^&ç}	ÙçæÓÀ æ' } à^!ZaDæ(Ö) áÁÀ æ' } à^!ZaDæ(Ö) ÙçæÓÀ } &æç } ZæÁ á	ÙçæÓÀ æ' } à^!ZaDæ(Ö) áÁÀ æ' } à^!ZaDæ(Ö) ÙçæÓÀ } &æç } ZæÁ á	ÙçæÓÀ æ' } à^!ZaDæ(Ö) áÁÀ æ' } à^!ZaDæ(Ö) ÙçæÓÀ } &æç } ZæÁ á	ÙçæÓÀ æ' } à^!ZaDæ(Ö) áÁÀ æ' } à^!ZaDæ(Ö) ÙçæÓÀ } &æç } ZæÁ á
ÍÍ	THÍ	Ý	€	€	€	À FEE
ÎÎ	THÍ	Z	€	€	€	À FEE
ÏÏ	THÍ	Ý	ÈÍÍ	ÈÍÍ	€	À FEE
ÌÌ	THÍ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
ÍJ	THÍ	Ý	GÈJG	GÈJG	€	À FEE
Í€	THÍ	Z	FÈÍ	FÈÍ	€	À FEE
ÍF	THÍ	Ý	ÈÍÍ	ÈÍÍ	€	À FEE
ÍG	THÍ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
ÍH	THU	Ý	GÈJG	GÈJG	€	À FEE
ÍI	THU	Z	FÈÍ	FÈÍ	€	À FEE
ÍÍ	TI€	Ý	HÈÍÍ	HÈÍÍ	€	À FEE
ÎÎ	TI€	Z	GÈG	GÈG	€	À FEE
ÏÏ	TIF	Ý	GÈJG	GÈJG	€	À FEE
ÌÌ	TIF	Z	FÈÍ	FÈÍ	€	À FEE
ÍJ	TIG	Ý	HÈÍÍ	HÈÍÍ	€	À FEE
Í€	TIG	Z	GÈG	GÈG	€	À FEE
ÍF	TIH	Ý	GÈJ	GÈJ	€	À FEE
ÍG	TIH	Z	FÈF	FÈF	€	À FEE
ÍH	TII	Ý	ÈIG	ÈIG	€	À FEE
ÍI	TII	Z	ÈGJ	ÈGJ	€	À FEE
ÏÏ	TIÍ	Ý	ÈIG	ÈIG	€	À FEE
ÌÌ	TIÍ	Z	ÈGJ	ÈGJ	€	À FEE
ÍJ	TIÏ	Ý	ÈIG	ÈIG	€	À FEE
Í€	TIÏ	Z	ÈGJ	ÈGJ	€	À FEE
ÍF	TIÌ	Ý	GÈJ	GÈJ	€	À FEE
ÍG	TIÌ	Z	FÈF	FÈF	€	À FEE
ÍH	TIJ	Ý	ÈJJ	ÈJJ	€	À FEE
ÍI	TIJ	Z	È€	È€	€	À FEE
ÏÏ	TÍ€	Ý	GÈJÍ	GÈJÍ	€	À FEE
ÌÌ	TÍ€	Z	FÈFÍ	FÈFÍ	€	À FEE
ÏÏ	TÍF	Ý	ÈJJ	ÈJJ	€	À FEE
ÌÌ	TÍF	Z	È€	È€	€	À FEE
ÍJ	TJÍ	Ý	FÈÍÍ	FÈÍÍ	€	À FEE
Í€	TJÍ	Z	ÈIH	ÈIH	€	À FEE
ÍF	TJÍ	Ý	FÈÍÍ	FÈÍÍ	€	À FEE
ÍG	TJÍ	Z	ÈIH	ÈIH	€	À FEE
ÍH	TJÍ	Ý	IÈÍF	IÈÍF	€	À FEE
ÍI	TJÍ	Z	GÈJF	GÈJF	€	À FEE
ÏÏ	TÚFOE	Ý	GÈIG	GÈIG	€	À FEE
ÌÌ	TÚFOE	Z	FÈÉ	FÈÉ	€	À FEE
ÏÏ	TÚFÓ	Ý	GÈIG	GÈIG	€	À FEE
ÌÌ	TÚFÓ	Z	FÈÉ	FÈÉ	€	À FEE
ÍJ	TÚFÔ	Ý	GÈIG	GÈIG	€	À FEE
J€	TÚFÔ	Z	FÈÉ	FÈÉ	€	À FEE
JF	TÚGCE	Ý	GÈIG	GÈIG	€	À FEE
JG	TÚGCE	Z	FÈÉ	FÈÉ	€	À FEE
JH	TÚGÓ	Ý	GÈIG	GÈIG	€	À FEE
JI	TÚGÓ	Z	FÈÉ	FÈÉ	€	À FEE
JÍ	TÚGÓ	Ý	GÈIG	GÈIG	€	À FEE
JÌ	TÚGÓ	Z	FÈÉ	FÈÉ	€	À FEE

A Ya Vyf'8]gfh]Vi hYX' @ UXg'f6 @ *%. 'Gfi Wñ fy'K]''fB(\$'8 Yl'f' c bh]bi YXL

T ^ { à^!Àæ^ ^	Ôá^&çá}	ÙçœÁ æ} æ' á^ZaDœ(Ù) áÁ æ} æ' á^ZaDœ(Ù) ÙçœÁ} &œá} ZœÁ á	ÙçœÁ æ} æ' á^ZaDœ(Ù) áÁ æ} æ' á^ZaDœ(Ù) ÙçœÁ} &œá} ZœÁ á	ÙçœÁ æ} æ' á^ZaDœ(Ù) áÁ æ} æ' á^ZaDœ(Ù) ÙçœÁ} &œá} ZœÁ á	ÙçœÁ æ} æ' á^ZaDœ(Ù) áÁ æ} æ' á^ZaDœ(Ù) ÙçœÁ} &œá} ZœÁ á	ÙçœÁ æ} æ' á^ZaDœ(Ù) áÁ æ} æ' á^ZaDœ(Ù) ÙçœÁ} &œá} ZœÁ á
íH	THU	Y	€	€	€	À FEE
íI	THU	Z	€	€	€	À FEE
íÍ	TIE	Y	ÆÍI	ÆÍI	€	À FEE
íÎ	TIE	Z	ÆÍI	ÆÍI	€	À FEE
íÏ	TIF	Y	ÆÏJG	ÆÏJG	€	À FEE
íÌ	TIF	Z	FËI	FËI	€	À FEE
íJ	TIG	Y	ÆÍI	ÆÍI	€	À FEE
í€	TIG	Z	ÆÍI	ÆÍI	€	À FEE
íF	TIH	Y	ÆIG	ÆIG	€	À FEE
íG	TIH	Z	ÆGJ	ÆGJ	€	À FEE
íH	TII	Y	ÆÏJ	ÆÏJ	€	À FEE
íI	TII	Z	FËF	FËF	€	À FEE
íÍ	TIÍ	Y	ÆÏJ	ÆÏJ	€	À FEE
íÎ	TIÍ	Z	FËF	FËF	€	À FEE
íÏ	TIÏ	Y	ÆIG	ÆIG	€	À FEE
íÌ	TIÏ	Z	ÆGJ	ÆGJ	€	À FEE
íJ	TII	Y	ÆIG	ÆIG	€	À FEE
í€	TII	Z	ÆGJ	ÆGJ	€	À FEE
íF	TIÍ	Y	ÆIG	ÆIG	€	À FEE
íG	TIÍ	Z	ÆGJ	ÆGJ	€	À FEE
íH	TIJ	Y	ÆJJ	ÆJJ	€	À FEE
íI	TIJ	Z	ÆI	ÆI	€	À FEE
íÍ	TÍ€	Y	ÆJJ	ÆJJ	€	À FEE
íÎ	TÍ€	Z	ÆI	ÆI	€	À FEE
íÏ	TÍF	Y	ÆÏJ	ÆÏJ	€	À FEE
íÌ	TÍF	Z	FËF	FËF	€	À FEE
íJ	TJÍ	Y	ÆÏF	ÆÏF	€	À FEE
í€	TJÍ	Z	GËJF	GËJF	€	À FEE
íF	TJÍ	Y	ÆÏÍ	ÆÏÍ	€	À FEE
íG	TJÍ	Z	ÆIH	ÆIH	€	À FEE
íH	TJÍ	Y	ÆÏÍ	ÆÏÍ	€	À FEE
íI	TJÍ	Z	ÆIH	ÆIH	€	À FEE
íÍ	T ÚFOE	Y	ÆÏG	ÆÏG	€	À FEE
íÎ	T ÚFOE	Z	FËI	FËI	€	À FEE
íÏ	T ÚFÓ	Y	ÆÏG	ÆÏG	€	À FEE
íÌ	T ÚFÓ	Z	FËI	FËI	€	À FEE
íJ	T ÚFÔ	Y	ÆÏG	ÆÏG	€	À FEE
J€	T ÚFÔ	Z	FËI	FËI	€	À FEE
JF	T ÚGœE	Y	ÆÏG	ÆÏG	€	À FEE
JG	T ÚGœE	Z	FËI	FËI	€	À FEE
JH	T ÚGÓ	Y	ÆÏG	ÆÏG	€	À FEE
JI	T ÚGÓ	Z	FËI	FËI	€	À FEE
JÍ	T ÚGÔ	Y	ÆÏG	ÆÏG	€	À FEE
JÎ	T ÚGÔ	Z	FËI	FËI	€	À FEE
JÏ	T ÚHœE	Y	ÆÏG	ÆÏG	€	À FEE
JÌ	T ÚHœE	Z	FËI	FËI	€	À FEE
JJ	T ÚHÓ	Y	ÆÏG	ÆÏG	€	À FEE
F€€	T ÚHÓ	Z	FËI	FËI	€	À FEE
F€F	T ÚHÔ	Y	ÆÏG	ÆÏG	€	À FEE
F€G	T ÚHÔ	Z	FËI	FËI	€	À FEE
F€H	T ÚI œE	Y	ÆÏG	ÆÏG	€	À FEE
F€I	T ÚI œE	Z	FËI	FËI	€	À FEE

A Ya Vyf'8]gfi]Vi hYX' @ UXg'f6 @ '*%. 'Gfi Wi fY'K]'fB+ \$'8 Yl'f7 c bh]bi YXL

	T\{ à^!Àæ^ ^	Öã^&ç}	ÙœóÁ æ } à^ à^ZaDf(III) áÁ æ } à^ à^ZaDf(III) ÙœóÁ } &œç} ZcÁ á	Ò) áÁ } &œç} ZcÁ á		
FÉ	T ÚI Ó	Ý	ËË Ì G	ËË Ì G	€	À FEE
FÉ	T ÚI Ó	Z	FÉ É	FÉ É	€	À FEE
FÉ	T ÚI Ô	Ý	ËË Ì G	ËË Ì G	€	À FEE
FÉ	T ÚI Ô	Z	FÉ É	FÉ É	€	À FEE
FÉJ	UXÚÓ	Ý	ËË Ì H	ËË Ì H	€	À FEE
FFÉ	UXÚÓ	Z	FÉ FÍ	FÉ FÍ	€	À FEE
FFF	UXÚÔ	Ý	ËË Ì H	ËË Ì H	€	À FEE
FFG	UXÚÔ	Z	FÉ FÍ	FÉ FÍ	€	À FEE

A Ya Vyf'8]gfi]Vi hYX' @ UXg'f6 @ '*&. 'Gfi Wi fY'K]'fB+\$'8 Yl'f7

	T\{ à^!Àæ^ ^	Öã^&ç}	ÙœóÁ æ } à^ à^ZaDf(III) áÁ æ } à^ à^ZaDf(III) ÙœóÁ } &œç} ZcÁ á	Ò) áÁ } &œç} ZcÁ á		
F	TF	Ý	€	€	€	À FEE
G	TF	Z	€	€	€	À FEE
H	TG	Ý	ËË JG	ËË JG	€	À FEE
I	TG	Z	€	€	€	À FEE
Í	TH	Ý	ËË JG	ËË JG	€	À FEE
Ì	TH	Z	€	€	€	À FEE
Ï	T FÍ	Ý	ËË FÍ	ËË FÍ	€	À FEE
Î	T FÍ	Z	€	€	€	À FEE
J	T FÍ	Ý	ËË FÍ	ËË FÍ	€	À FEE
FÉ	T FÍ	Z	€	€	€	À FEE
FF	T FÍ	Ý	ËË Í J	ËË Í J	€	À FEE
FG	T FÍ	Z	€	€	€	À FEE
FH	T FJ	Ý	ËË H	ËË H	€	À FEE
FI	T FJ	Z	€	€	€	À FEE
FÍ	T GÉ	Ý	€	€	€	À FEE
FÌ	T GÉ	Z	€	€	€	À FEE
FÏ	T G FÍ	Ý	ËË H	ËË H	€	À FEE
FÎ	T G FÍ	Z	€	€	€	À FEE
FJ	T GG	Ý	ËË HJ	ËË HJ	€	À FEE
GÉ	T GG	Z	€	€	€	À FEE
GF	T GH	Ý	ËË HJ	ËË HJ	€	À FEE
GG	T GH	Z	€	€	€	À FEE
GH	T G	Ý	€	€	€	À FEE
G	T G	Z	€	€	€	À FEE
G	T G	Ý	ËË HJ	ËË HJ	€	À FEE
G	T G	Z	€	€	€	À FEE
G	T G	Ý	€	€	€	À FEE
G	T G	Z	€	€	€	À FEE
GJ	T G	Ý	ËË Í Î	ËË Í Î	€	À FEE
HÉ	T G	Z	€	€	€	À FEE
HF	T G	Ý	ËË HJ	ËË HJ	€	À FEE
HG	T G	Z	€	€	€	À FEE
HH	T GJ	Ý	€	€	€	À FEE
HI	T GJ	Z	€	€	€	À FEE
HÍ	T HÉ	Ý	ËË Í Î	ËË Í Î	€	À FEE
HÌ	T HÉ	Z	€	€	€	À FEE
HÏ	T HF	Ý	ËË Í H	ËË Í H	€	À FEE
HÎ	T HF	Z	€	€	€	À FEE
HJ	T HG	Ý	ËË HJ	ËË HJ	€	À FEE
IÉ	T HG	Z	€	€	€	À FEE

A Ya Vyf'8]g]f]Vi hYX'@ UXg'f6 @ '* & : 'Gfi Wi fy'K]''fB+\$'8 Y] LL'f7 c b]bi YXL

	T^{ à^!Àæ^}	Öá^&ç}	ÚcœÁ æ} æ à^ZaDœ(Ö) áÁ æ} æ à^ZaDœ(Ö) ÚcœÁ &œ} ZœÁ á	Ò) áÁ &œ} ZœÁ á		
JH	T ÚGÓ	Ý	ËËFG	ËËFG	€	À FEE
JI	T ÚGÓ	Z	€	€	€	À FEE
JÍ	T ÚGÔ	Ý	ËËFG	ËËFG	€	À FEE
JÎ	T ÚGÔ	Z	€	€	€	À FEE
JÏ	T ÚHœ	Ý	ËËFG	ËËFG	€	À FEE
JÌ	T ÚHœ	Z	€	€	€	À FEE
JJ	T ÚHÓ	Ý	ËËFG	ËËFG	€	À FEE
F€€	T ÚHÓ	Z	€	€	€	À FEE
F€F	T ÚHÔ	Ý	ËËFG	ËËFG	€	À FEE
F€G	T ÚHÔ	Z	€	€	€	À FEE
F€H	T ÚI œ	Ý	ËËFG	ËËFG	€	À FEE
F€I	T ÚI œ	Z	€	€	€	À FEE
F€Í	T ÚI Ó	Ý	ËËFG	ËËFG	€	À FEE
F€Î	T ÚI Ó	Z	€	€	€	À FEE
F€Ï	T ÚI Ô	Ý	ËËFG	ËËFG	€	À FEE
F€Ì	T ÚI Ô	Z	€	€	€	À FEE
F€J	UXUÓ	Ý	ËËGJ	ËËGJ	€	À FEE
FF€	UXUÓ	Z	€	€	€	À FEE
FFF	UXUÔ	Ý	ËËGJ	ËËGJ	€	À FEE
FFG	UXUÔ	Z	€	€	€	À FEE

A Ya Vyf'8]g]f]Vi hYX'@ UXg'f6 @ '* : 'Gfi Wi fy'K]''fI \$\$'8 Y] LL

	T^{ à^!Àæ^}	Öá^&ç}	ÚcœÁ æ} æ à^ZaDœ(Ö) áÁ æ} æ à^ZaDœ(Ö) ÚcœÁ &œ} ZœÁ á	Ò) áÁ &œ} ZœÁ á		
F	TF	Ý	ËËH	ËËH	€	À FEE
G	TF	Z	ËËG	ËËG	€	À FEE
H	TG	Ý	ËËHJ	ËËHJ	€	À FEE
I	TG	Z	ËËG	ËËG	€	À FEE
Í	TH	Ý	ËËH	ËËH	€	À FEE
Î	TH	Z	ËËG	ËËG	€	À FEE
Ï	TFÍ	Ý	€	€	€	À FEE
Ì	TFÍ	Z	€	€	€	À FEE
J	TFÍ	Ý	ËËHÍ	ËËHÍ	€	À FEE
F€	TFÍ	Z	ËËHG	ËËHG	€	À FEE
FF	TFÍ	Ý	ËËHÍ	ËËHÍ	€	À FEE
FG	TFÍ	Z	ËËHG	ËËHG	€	À FEE
FH	TFJ	Ý	ËËÍ	ËËÍ	€	À FEE
FI	TFJ	Z	ËËÍ	ËËÍ	€	À FEE
FÍ	Tœ	Ý	ËËÍ	ËËÍ	€	À FEE
FÎ	Tœ	Z	ËËÍ	ËËÍ	€	À FEE
FÏ	TœF	Ý	ËËÍG	ËËÍG	€	À FEE
FÌ	TœF	Z	ËËG	ËËG	€	À FEE
FJ	TGG	Ý	ËËÍ	ËËÍ	€	À FEE
G€	TGG	Z	ËËÍ	ËËÍ	€	À FEE
GF	TGH	Ý	ËËÍÍ	ËËÍÍ	€	À FEE
GG	TGH	Z	ËËG	ËËG	€	À FEE
GH	TG	Ý	ËËÍG	ËËÍG	€	À FEE
G	TG	Z	ËËÍF	ËËÍF	€	À FEE
GÍ	TG	Ý	ËËÍÍ	ËËÍÍ	€	À FEE
GÎ	TG	Z	ËËG	ËËG	€	À FEE
GÏ	TG	Ý	ËËÍ	ËËÍ	€	À FEE
GÌ	TG	Z	ËËÍ	ËËÍ	€	À FEE

A Ya Vyf'8]gfh]Vi hYX' @ UXg'f6 @ '* : 'Gfi Wh fY'K]'fl '\$\$ '8 Yl'É'f' c bh]bi YXL

	T^{ à^!Àæ^ }	Öá^&ç} }	ÙæóÁ æ} æ à^!àæ(É) áÁ æ} æ à^!àæ(É) ÙæóÁ } &ç} } ZéÁ á	Ò) áÁ } &ç} } ZéÁ á		
ì F	T JÌ	Ý	ÆÈÍ	ÆÈÍ	€	À FEE
ì G	T JÌ	Z	ÆÌH	ÆÌH	€	À FEE
ì H	T JÌ	Ý	ÆÈÍF	ÆÈÍF	€	À FEE
ì I	T JÌ	Z	ÆÈJF	ÆÈJF	€	À FEE
ì Í	T ÚFOE	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
ì Î	T ÚFOE	Z	ÆÈÉ	ÆÈÉ	€	À FEE
ì Ï	T ÚFÓ	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
ì Ì	T ÚFÓ	Z	ÆÈÉ	ÆÈÉ	€	À FEE
ì J	T ÚFÔ	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
J€	T ÚFÔ	Z	ÆÈÉ	ÆÈÉ	€	À FEE
JF	T ÚGœ	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
JG	T ÚGœ	Z	ÆÈÉ	ÆÈÉ	€	À FEE
JH	T ÚGÓ	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
JI	T ÚGÓ	Z	ÆÈÉ	ÆÈÉ	€	À FEE
JÍ	T ÚGÔ	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
JÎ	T ÚGÔ	Z	ÆÈÉ	ÆÈÉ	€	À FEE
JÏ	T ÚHœ	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
JÌ	T ÚHœ	Z	ÆÈÉ	ÆÈÉ	€	À FEE
JJ	T ÚHÓ	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
F€€	T ÚHÓ	Z	ÆÈÉ	ÆÈÉ	€	À FEE
F€F	T ÚHÔ	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
F€G	T ÚHÔ	Z	ÆÈÉ	ÆÈÉ	€	À FEE
F€H	T ÚI œ	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
F€I	T ÚI œ	Z	ÆÈÉ	ÆÈÉ	€	À FEE
F€Í	T ÚI Ó	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
F€Î	T ÚI Ó	Z	ÆÈÉ	ÆÈÉ	€	À FEE
F€Ï	T ÚI Ô	Ý	ÆÈÌG	ÆÈÌG	€	À FEE
F€Ì	T ÚI Ô	Z	ÆÈÉ	ÆÈÉ	€	À FEE
F€J	UXUÓ	Ý	ÆÈHF	ÆÈHF	€	À FEE
FF€	UXUÓ	Z	ÆÈFÍ	ÆÈFÍ	€	À FEE
FFF	UXUÔ	Ý	ÆÈHF	ÆÈHF	€	À FEE
FFG	UXUÔ	Z	ÆÈFÍ	ÆÈFÍ	€	À FEE

A Ya Vyf'8]gfh]Vi hYX' @ UXg'f6 @ '* (: 'Gfi Wh fY'K]'fl ' \$ '8 Yl'É

	T^{ à^!Àæ^ }	Öá^&ç} }	ÙæóÁ æ} æ à^!àæ(É) áÁ æ} æ à^!àæ(É) ÙæóÁ } &ç} } ZéÁ á	Ò) áÁ } &ç} } ZéÁ á		
F	TF	Ý	ÆÈÌ	ÆÈÌ	€	À FEE
G	TF	Z	ÆÈÉ	ÆÈÉ	€	À FEE
H	TG	Ý	ÆÈÌ	ÆÈÌ	€	À FEE
I	TG	Z	ÆÈÉ	ÆÈÉ	€	À FEE
Í	TH	Ý	€	€	€	À FEE
Î	TH	Z	€	€	€	À FEE
Ï	TFÌ	Ý	ÆÈÌ	ÆÈÌ	€	À FEE
Ì	TFÌ	Z	ÆÈJG	ÆÈJG	€	À FEE
J	TFÌ	Ý	ÆÈH	ÆÈH	€	À FEE
F€	TFÌ	Z	ÆÈÍJ	ÆÈÍJ	€	À FEE
FF	TFÌ	Ý	ÆÈÌ	ÆÈÌ	€	À FEE
FG	TFÌ	Z	ÆÈJG	ÆÈJG	€	À FEE
FH	TFJ	Ý	€	€	€	À FEE
FI	TFJ	Z	€	€	€	À FEE
FÍ	Tœ	Ý	ÆÈÍ	ÆÈÍ	€	À FEE
FÌ	Tœ	Z	ÆÈÌ	ÆÈÌ	€	À FEE

A Ya Vyf'8]gfi]Vi hYX'@ UXg'f6 @'*) : 'Gfi Wi fy'Ka ''f6'8 Yl'f7 cb]bi YXL

	T^ { à^!Àæ^ }	Óā^&ç	ÙœóÁ æ } à^ à^ZaDæ(Ù) áÁ æ } à^ à^ZaDæ(Ù) ÙœóÁ } &ç	ZdÁ á	Ó) áÁ } &ç } ZdÁ á
Í	TH	Ý	€	€	€
Î	TH	Z	ËÍ Í	ËÍ Í	€
Ï	TFÍ	Ý	€	€	€
Ï	TFÍ	Z	ËÍ Í	ËÍ Í	€
J	TFÍ	Ý	€	€	€
F€	TFÍ	Z	ËÍ Í	ËÍ Í	€
FF	TFÍ	Ý	€	€	€
FG	TFÍ	Z	€	€	€
FH	TFJ	Ý	€	€	€
FI	TFJ	Z	ËÍ Í	ËÍ Í	€
FÍ	Tœ	Ý	€	€	€
FÎ	Tœ	Z	ËÍ FG	ËÍ FG	€
FÏ	TGF	Ý	€	€	€
FÌ	TGF	Z	ËÍ Í	ËÍ Í	€
FJ	TGG	Ý	€	€	€
œ	TGG	Z	ËÍ œF	ËÍ œF	€
GF	TGH	Ý	€	€	€
GG	TGH	Z	ËÍ œF	ËÍ œF	€
GH	TG	Ý	€	€	€
G	TG	Z	ËÍ œG	ËÍ œG	€
G	TG	Ý	€	€	€
G	TG	Z	ËÍ œF	ËÍ œF	€
G	TG	Ý	€	€	€
G	TG	Z	ËÍ œG	ËÍ œG	€
GJ	TG	Ý	€	€	€
Hœ	TG	Z	ËÍ œF	ËÍ œF	€
HF	TG	Ý	€	€	€
HG	TG	Z	ËÍ œF	ËÍ œF	€
HH	TGJ	Ý	€	€	€
HI	TGJ	Z	ËÍ œG	ËÍ œG	€
HÍ	THE	Ý	€	€	€
HÎ	THE	Z	ËÍ œF	ËÍ œF	€
HÏ	THF	Ý	€	€	€
HÌ	THF	Z	€	€	€
HJ	THG	Ý	€	€	€
I€	THG	Z	ËÍ œF	ËÍ œF	€
IF	THH	Ý	€	€	€
IG	THH	Z	ËÍ œG	ËÍ œG	€
IH	THI	Ý	€	€	€
IÌ	THI	Z	ËÍ œF	ËÍ œF	€
IÍ	THÍ	Ý	€	€	€
IÎ	THÍ	Z	ËÍ œG	ËÍ œG	€
IÏ	THÏ	Ý	€	€	€
IÌ	THÏ	Z	ËÍ œG	ËÍ œG	€
IJ	THÏ	Ý	€	€	€
I€	THÏ	Z	ËÍ œG	ËÍ œG	€
IF	THÌ	Ý	€	€	€
IG	THÌ	Z	ËÍ œG	ËÍ œG	€
IH	THU	Ý	€	€	€
IÌ	THU	Z	ËÍ œG	ËÍ œG	€
IÍ	TIE	Ý	€	€	€
IÎ	TIE	Z	ËÍ œF	ËÍ œF	€

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @'*) : 'Gfi Wñ fy'K a ''f\$'8 Y] tL'f' cb]jbi YXL

	T^ { à^!Àæ^ }	Öã^&çj }	ÙæóÁ æ } æ à^!ZaDæ(Ö) áÁ æ } æ à^!ZaDæ(Ö) ÙæóÁ } &æj }	Zá á	Ö) áÁ } &æj }	Zá á
íí	TIF	Ý	€	€	€	À FEE
íì	TIF	Z	€	€	€	À FEE
íJ	TIG	Ý	€	€	€	À FEE
í€	TIG	Z	ÆÆF	ÆÆF	€	À FEE
íF	TIH	Ý	€	€	€	À FEE
íG	TIH	Z	Æíí	Æíí	€	À FEE
íH	TII	Ý	€	€	€	À FEE
íì	TII	Z	Æíí	Æíí	€	À FEE
íí	TIÍ	Ý	€	€	€	À FEE
íî	TIÍ	Z	Æíí	Æíí	€	À FEE
íï	TIÎ	Ý	€	€	€	À FEE
íî	TIÎ	Z	Æíí	Æíí	€	À FEE
íJ	TIÏ	Ý	€	€	€	À FEE
í€	TIÏ	Z	Æíí	Æíí	€	À FEE
íF	TII	Ý	€	€	€	À FEE
íG	TII	Z	Æíí	Æíí	€	À FEE
íH	TIJ	Ý	€	€	€	À FEE
íì	TIJ	Z	Æíí	Æíí	€	À FEE
íí	TÍ€	Ý	€	€	€	À FEE
íî	TÍ€	Z	ÆFJ	ÆFJ	€	À FEE
íï	TÍF	Ý	€	€	€	À FEE
íî	TÍF	Z	ÆFJ	ÆFJ	€	À FEE
íJ	TJÍ	Ý	€	€	€	À FEE
í€	TJÍ	Z	Æíí	Æíí	€	À FEE
íF	TJÌ	Ý	€	€	€	À FEE
íG	TJÌ	Z	ÆÈí	ÆÈí	€	À FEE
íH	TJÌ	Ý	€	€	€	À FEE
íì	TJÌ	Z	Æíí	Æíí	€	À FEE
íí	T ÚFÖE	Ý	€	€	€	À FEE
íî	T ÚFÖE	Z	Æíí	Æíí	€	À FEE
íï	T ÚFÓ	Ý	€	€	€	À FEE
íî	T ÚFÓ	Z	Æíí	Æíí	€	À FEE
íJ	T ÚFÔ	Ý	€	€	€	À FEE
J€	T ÚFÔ	Z	Æíí	Æíí	€	À FEE
JF	T ÚGÖE	Ý	€	€	€	À FEE
JG	T ÚGÖE	Z	Æíí	Æíí	€	À FEE
JH	T ÚGÓ	Ý	€	€	€	À FEE
Jì	T ÚGÓ	Z	Æíí	Æíí	€	À FEE
Jí	T ÚGÔ	Ý	€	€	€	À FEE
Jï	T ÚGÔ	Z	Æíí	Æíí	€	À FEE
JÌ	T ÚHÖE	Ý	€	€	€	À FEE
Jì	T ÚHÖE	Z	Æíí	Æíí	€	À FEE
JJ	T ÚHÓ	Ý	€	€	€	À FEE
F€€	T ÚHÓ	Z	Æíí	Æíí	€	À FEE
F€F	T ÚHÔ	Ý	€	€	€	À FEE
F€G	T ÚHÔ	Z	Æíí	Æíí	€	À FEE
F€H	T ÚI ÖE	Ý	€	€	€	À FEE
F€ì	T ÚI ÖE	Z	Æíí	Æíí	€	À FEE
F€í	T ÚI Ó	Ý	€	€	€	À FEE
F€î	T ÚI Ó	Z	Æíí	Æíí	€	À FEE
F€ï	T ÚI Ô	Ý	€	€	€	À FEE
F€î	T ÚI Ô	Z	Æíí	Æíí	€	À FEE

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @' *+ : 'Gfi Wñ fy'Ka ''ff \$'8 Yl Ë'f'f c b]i YXL

	T^ { à^!Àæ^ \}	Öã^&ç] }	ÙœœÁ æ } æ à^!ZaDœ]D) áÁ æ } æ à^!ZaDœ]D) ÙœœÁ } &œ] } ZœÁ á	ÙœœÁ } &œ] } ZœÁ á	ÙœœÁ } &œ] } ZœÁ á	ÙœœÁ } &œ] } ZœÁ á
HH	TGJ	Y	Ë	Ë	€	À FEE
H	TGJ	Z	Ë	Ë	€	À FEE
HÍ	THE	Y	Ë	Ë	€	À FEE
HÌ	THE	Z	Ë	Ë	€	À FEE
HÏ	THF	Y	Ë F	Ë F	€	À FEE
HÏ	THF	Z	Ë F	Ë F	€	À FEE
HJ	THG	Y	FË F	FË F	€	À FEE
I€	THG	Z	Ë F	Ë F	€	À FEE
IF	THH	Y	Ë F	Ë F	€	À FEE
IG	THH	Z	Ë F	Ë F	€	À FEE
IH	THI	Y	FË F	FË F	€	À FEE
IÌ	THI	Z	Ë F	Ë F	€	À FEE
IÍ	THÍ	Y	Ë F	Ë F	€	À FEE
IÏ	THÍ	Z	Ë F	Ë F	€	À FEE
IÏ	THÏ	Y	Ë	Ë	€	À FEE
IÏ	THÏ	Z	Ë	Ë	€	À FEE
IJ	THÏ	Y	€	€	€	À FEE
I€	THÏ	Z	€	€	€	À FEE
IF	THÏ	Y	Ë	Ë	€	À FEE
IG	THÏ	Z	Ë	Ë	€	À FEE
IH	THU	Y	€	€	€	À FEE
IÌ	THU	Z	€	€	€	À FEE
IÍ	TI€	Y	Ë	Ë	€	À FEE
IÏ	TI€	Z	Ë	Ë	€	À FEE
IÏ	TIF	Y	Ë F	Ë F	€	À FEE
IÏ	TIF	Z	Ë F	Ë F	€	À FEE
IJ	TIG	Y	Ë	Ë	€	À FEE
I€	TIG	Z	Ë	Ë	€	À FEE
IF	TIH	Y	Ë Í	Ë Í	€	À FEE
IG	TIH	Z	Ë H	Ë H	€	À FEE
IH	TII	Y	Ë Í	Ë Í	€	À FEE
IÌ	TII	Z	Ë H	Ë H	€	À FEE
IÍ	TII	Y	Ë Í	Ë Í	€	À FEE
IÏ	TII	Z	Ë H	Ë H	€	À FEE
IÏ	TII	Y	Ë Í	Ë Í	€	À FEE
IÏ	TII	Z	Ë H	Ë H	€	À FEE
IJ	TII	Y	Ë Í	Ë Í	€	À FEE
I€	TII	Z	Ë H	Ë H	€	À FEE
IF	TII	Y	Ë Í	Ë Í	€	À FEE
IG	TII	Z	Ë H	Ë H	€	À FEE
IH	TIJ	Y	Ë H	Ë H	€	À FEE
IÌ	TIJ	Z	Ë J	Ë J	€	À FEE
IÍ	TI€	Y	Ë H	Ë H	€	À FEE
IÏ	TI€	Z	Ë J	Ë J	€	À FEE
IÏ	TIF	Y	Ë FG	Ë FG	€	À FEE
IÏ	TIF	Z	Ë H	Ë H	€	À FEE
IJ	TJÍ	Y	FË H	FË H	€	À FEE
I€	TJÍ	Z	Ë H	Ë H	€	À FEE
IF	TJÍ	Y	Ë F	Ë F	€	À FEE
IG	TJÍ	Z	Ë Í	Ë Í	€	À FEE
IH	TJÍ	Y	Ë F	Ë F	€	À FEE
IÌ	TJÍ	Z	Ë Í	Ë Í	€	À FEE

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @' *- : 'Gfi Wñ fy'K a ''fV&\$'8 Yf Lf'f' cbl]bi YXL

	T^ { à^!Àæ^ }	Öã^&ç]	ÙçœÁ æ } æ à^!ZaDœ() áÁ æ } æ à^!ZaDœ() ÙçœÁ } &œç] ZœÁ á	Ò) áÁ } &œç] ZœÁ á		
îF	TIH	Ý	ËÏÏ	ËÏÏ	€	Ã FEE
îG	TIH	Z	ËH	ËH	€	Ã FEE
îH	TII	Ý	ËÍÍ	ËÍÍ	€	Ã FEE
îI	TII	Z	ËH	ËH	€	Ã FEE
îÍ	TIÍ	Ý	ËÍÍ	ËÍÍ	€	Ã FEE
îÏ	TIÍ	Z	ËH	ËH	€	Ã FEE
îË	TIË	Ý	ËÍÍ	ËÍÍ	€	Ã FEE
îÌ	TIË	Z	ËH	ËH	€	Ã FEE
îJ	TIÏ	Ý	ËÍÍ	ËÍÍ	€	Ã FEE
î€	TIÏ	Z	ËH	ËH	€	Ã FEE
îF	TIÌ	Ý	ËÏÏ	ËÏÏ	€	Ã FEE
îG	TIÌ	Z	ËH	ËH	€	Ã FEE
îH	TIJ	Ý	ËËJ	ËËJ	€	Ã FEE
îI	TIJ	Z	ËJ	ËJ	€	Ã FEE
îÍ	TÍ€	Ý	ËFG	ËFG	€	Ã FEE
îÏ	TÍ€	Z	ËH	ËH	€	Ã FEE
îÌ	TÍF	Ý	ËËH	ËËH	€	Ã FEE
îÌ	TÍF	Z	ËJ	ËJ	€	Ã FEE
îJ	TJÍ	Ý	ËFÍ	ËFÍ	€	Ã FEE
î€	TJÍ	Z	ËÍ	ËÍ	€	Ã FEE
îF	TJÌ	Ý	ËFÍ	ËFÍ	€	Ã FEE
îG	TJÌ	Z	ËÍ	ËÍ	€	Ã FEE
îH	TJÏ	Ý	FËH	FËH	€	Ã FEE
îI	TJÏ	Z	ËH	ËH	€	Ã FEE
îÍ	TÚFœ	Ý	ËFG	ËFG	€	Ã FEE
îÏ	TÚFœ	Z	ËH	ËH	€	Ã FEE
îÌ	TÚFÓ	Ý	ËFG	ËFG	€	Ã FEE
îÌ	TÚFÓ	Z	ËH	ËH	€	Ã FEE
îJ	TÚFÔ	Ý	ËFG	ËFG	€	Ã FEE
J€	TÚFÔ	Z	ËH	ËH	€	Ã FEE
JF	TÚGœ	Ý	ËFG	ËFG	€	Ã FEE
JG	TÚGœ	Z	ËH	ËH	€	Ã FEE
JH	TÚGÓ	Ý	ËFG	ËFG	€	Ã FEE
JI	TÚGÓ	Z	ËH	ËH	€	Ã FEE
JÍ	TÚGÔ	Ý	ËFG	ËFG	€	Ã FEE
JÏ	TÚGÔ	Z	ËH	ËH	€	Ã FEE
JÌ	TÚHœ	Ý	ËFG	ËFG	€	Ã FEE
JÌ	TÚHœ	Z	ËH	ËH	€	Ã FEE
JJ	TÚHÓ	Ý	ËFG	ËFG	€	Ã FEE
F€€	TÚHÓ	Z	ËH	ËH	€	Ã FEE
F€F	TÚHÔ	Ý	ËFG	ËFG	€	Ã FEE
F€G	TÚHÔ	Z	ËH	ËH	€	Ã FEE
F€H	TÚÍœ	Ý	ËFG	ËFG	€	Ã FEE
F€I	TÚÍœ	Z	ËH	ËH	€	Ã FEE
F€Í	TÚÍÓ	Ý	ËFG	ËFG	€	Ã FEE
F€Ï	TÚÍÓ	Z	ËH	ËH	€	Ã FEE
F€Ë	TÚÍÔ	Ý	ËFG	ËFG	€	Ã FEE
F€Ì	TÚÍÔ	Z	ËH	ËH	€	Ã FEE
F€J	UXUÓ	Ý	ËJÍ	ËJÍ	€	Ã FEE
FF€	UXUÓ	Z	ËÍG	ËÍG	€	Ã FEE
FFF	UXUÓ	Ý	ËJÍ	ËJÍ	€	Ã FEE
FFG	UXUÓ	Z	ËÍG	ËÍG	€	Ã FEE

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @ ' +%. 'Gfi Wi fY'Ka ''f% \$'8 Y] Lf'f' cbi]bi YXL

	T^{ à^!Àæ^}	Öá^&çj}	ÙœóÁ æ) æ à^ZaDœ(Ö) áÁ æ) æ à^ZaDœ(Ö) ÙœóÁ &œçj} ZœÁ á	Ö) áÁ &œçj} ZœÁ á		
JH	T ÚGÓ	Ý	€	€	€	À FEE
Jl	T ÚGÓ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
JÍ	T ÚGÔ	Ý	€	€	€	À FEE
JÎ	T ÚGÔ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
JÏ	T ÚHœ	Ý	€	€	€	À FEE
Jì	T ÚHœ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
JJ	T ÚHÓ	Ý	€	€	€	À FEE
F€€	T ÚHÓ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
F€F	T ÚHÔ	Ý	€	€	€	À FEE
F€G	T ÚHÔ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
F€H	T ÚI œ	Ý	€	€	€	À FEE
F€l	T ÚI œ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
F€Í	T ÚI Ó	Ý	€	€	€	À FEE
F€Î	T ÚI Ó	Z	ÈÍÍ	ÈÍÍ	€	À FEE
F€Ï	T ÚI Ô	Ý	€	€	€	À FEE
F€ì	T ÚI Ô	Z	ÈÍÍ	ÈÍÍ	€	À FEE
F€J	UXUÓ	Ý	€	€	€	À FEE
FF€	UXUÓ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
FFF	UXUÔ	Ý	€	€	€	À FEE
FFG	UXUÔ	Z	ÈÍÍ	ÈÍÍ	€	À FEE

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @ ' +&. 'Gfi Wi fY'Ka ''f&% \$'8 Y] Lf

	T^{ à^!Àæ^}	Öá^&çj}	ÙœóÁ æ) æ à^ZaDœ(Ö) áÁ æ) æ à^ZaDœ(Ö) ÙœóÁ &œçj} ZœÁ á	Ö) áÁ &œçj} ZœÁ á		
F	TF	Ý	ÈÍH	ÈÍH	€	À FEE
G	TF	Z	ÈÍÍ	ÈÍÍ	€	À FEE
H	TG	Ý	€	€	€	À FEE
I	TG	Z	€	€	€	À FEE
Í	TH	Ý	ÈÍH	ÈÍH	€	À FEE
Î	TH	Z	ÈÍÍ	ÈÍÍ	€	À FEE
Ï	TfÍ	Ý	ÈÍÍ	ÈÍÍ	€	À FEE
ì	TfÍ	Z	ÈÍJ	ÈÍJ	€	À FEE
J	TfÍ	Ý	ÈÍJ	ÈÍJ	€	À FEE
F€	TfÍ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
FF	TfÍ	Ý	ÈÍJ	ÈÍJ	€	À FEE
FG	TfÍ	Z	ÈÍÍ	ÈÍÍ	€	À FEE
FH	TfJ	Ý	ÈÍÍ	ÈÍÍ	€	À FEE
FI	TfJ	Z	ÈÍG	ÈÍG	€	À FEE
FÍ	Tœ	Ý	ÈÍÍ	ÈÍÍ	€	À FEE
FÎ	Tœ	Z	ÈÍG	ÈÍG	€	À FEE
FÏ	Tœ	Ý	€	€	€	À FEE
Fì	Tœ	Z	€	€	€	À FEE
FJ	TGG	Ý	ÈÍF	ÈÍF	€	À FEE
G€	TGG	Z	ÈÍF	ÈÍF	€	À FEE
GF	TGH	Ý	€	€	€	À FEE
GG	TGH	Z	€	€	€	À FEE
GH	TG	Ý	ÈÍF	ÈÍF	€	À FEE
G	TG	Z	ÈÍF	ÈÍF	€	À FEE
G	TG	Ý	€	€	€	À FEE
G	TG	Z	€	€	€	À FEE
G	TG	Ý	ÈÍF	ÈÍF	€	À FEE
G	TG	Z	ÈÍF	ÈÍF	€	À FEE

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @ ' + ' : Gfi Wi fy'Ka ''f& \$ '8 Y] Lf'f' cbl]bi YXL

	T\ { à^!Àæ^ ^	Öá^&çá}	ÙcœÁ æ } á à^!Àæ^ ^	ÙcœÁ æ } á à^!Àæ^ ^	ÙcœÁ æ } á à^!Àæ^ ^	ÙcœÁ æ } á à^!Àæ^ ^	ÙcœÁ æ } á à^!Àæ^ ^
Í J	TÍI	Y	ËI	ËI	€	À FEE	
Í €	TÍI	Z	ËH	ËH	€	À FEE	
Í F	TÍI	Y	ËI	ËI	€	À FEE	
Í G	TÍI	Z	ËH	ËH	€	À FEE	
Í H	TIJ	Y	ËEH	ËEH	€	À FEE	
Í I	TIJ	Z	ËJ	ËJ	€	À FEE	
Í Í	TÍ€	Y	ËEH	ËEH	€	À FEE	
Í Î	TÍ€	Z	ËJ	ËJ	€	À FEE	
Í Ï	TÍF	Y	ËFG	ËFG	€	À FEE	
Í Ì	TÍF	Z	ËH	ËH	€	À FEE	
Í J	TJÍ	Y	ËËH	ËËH	€	À FEE	
Í €	TJÍ	Z	ËH	ËH	€	À FEE	
Í F	TJÍ	Y	ËFI	ËFI	€	À FEE	
Í G	TJÍ	Z	ËI	ËI	€	À FEE	
Í H	TJÍ	Y	ËFI	ËFI	€	À FEE	
Í I	TJÍ	Z	ËI	ËI	€	À FEE	
Í Í	T ÚFOE	Y	ËFG	ËFG	€	À FEE	
Í Î	T ÚFOE	Z	ËH	ËH	€	À FEE	
Í Ï	T ÚFÓ	Y	ËFG	ËFG	€	À FEE	
Í Ì	T ÚFÓ	Z	ËH	ËH	€	À FEE	
Í J	T ÚFÔ	Y	ËFG	ËFG	€	À FEE	
J €	T ÚFÔ	Z	ËH	ËH	€	À FEE	
J F	T ÚGOE	Y	ËFG	ËFG	€	À FEE	
J G	T ÚGOE	Z	ËH	ËH	€	À FEE	
J H	T ÚGÓ	Y	ËFG	ËFG	€	À FEE	
J I	T ÚGÓ	Z	ËH	ËH	€	À FEE	
J Í	T ÚGÔ	Y	ËFG	ËFG	€	À FEE	
J Î	T ÚGÔ	Z	ËH	ËH	€	À FEE	
J Ï	T ÚHOE	Y	ËFG	ËFG	€	À FEE	
J Ì	T ÚHOE	Z	ËH	ËH	€	À FEE	
J J	T ÚHÓ	Y	ËFG	ËFG	€	À FEE	
F €€	T ÚHÓ	Z	ËH	ËH	€	À FEE	
F €F	T ÚHÔ	Y	ËFG	ËFG	€	À FEE	
F €G	T ÚHÔ	Z	ËH	ËH	€	À FEE	
F €H	T ÚI OE	Y	ËFG	ËFG	€	À FEE	
F €I	T ÚI OE	Z	ËH	ËH	€	À FEE	
F €Í	T ÚI Ó	Y	ËFG	ËFG	€	À FEE	
F €Î	T ÚI Ó	Z	ËH	ËH	€	À FEE	
F €Ï	T ÚI Ô	Y	ËFG	ËFG	€	À FEE	
F €Ì	T ÚI Ô	Z	ËH	ËH	€	À FEE	
F €J	UXÚÓ	Y	ËGJ	ËGJ	€	À FEE	
F F€	UXÚÓ	Z	ËI G	ËI G	€	À FEE	
F F F	UXÚÔ	Y	ËGJ	ËGJ	€	À FEE	
F F G	UXÚÔ	Z	ËI G	ËI G	€	À FEE	

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @ ' + ' : Gfi Wi fy'Ka ''f&+ \$ '8 Y] Lf

	T\ { à^!Àæ^ ^	Öá^&çá}	ÙcœÁ æ } á à^!Àæ^ ^	ÙcœÁ æ } á à^!Àæ^ ^	ÙcœÁ æ } á à^!Àæ^ ^	ÙcœÁ æ } á à^!Àæ^ ^
F	TF	Y	€	€	€	À FEE
G	TF	Z	€	€	€	À FEE
H	TG	Y	ËG	ËG	€	À FEE
I	TG	Z	€	€	€	À FEE

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @' +{ : Gfi Wñ fy'K a ''f&+\$'8 Yf Lf'f' cbl]bi YXL

	T ^{ à^!Àæ^ ^	Öã^&ç] }	ÙœóÁ æ} æ' à^!ZaDæ] } áÁ æ} æ' à^!ZaDæ] } ÛœóÁ } &œç] }	ZdÁ á	Ò) áÁ } &œç] }	ZdÁ á
Í	TH	Ý	Ë G	Ë G	€	Ä FEE
Î	TH	Z	€	€	€	Ä FEE
Ï	TFÍ	Ý	Ë J	Ë J	€	Ä FEE
Ï	TFÍ	Z	€	€	€	Ä FEE
J	TFÍ	Ý	Ë J	Ë J	€	Ä FEE
F€	TFÍ	Z	€	€	€	Ä FEE
FF	TFÍ	Ý	Ë FÍ	Ë FÍ	€	Ä FEE
FG	TFÍ	Z	€	€	€	Ä FEE
FH	TFJ	Ý	Ë H	Ë H	€	Ä FEE
FI	TFJ	Z	€	€	€	Ä FEE
FÍ	Tœ	Ý	€	€	€	Ä FEE
FÎ	Tœ	Z	€	€	€	Ä FEE
FÏ	TGF	Ý	Ë H	Ë H	€	Ä FEE
FÏ	TGF	Z	€	€	€	Ä FEE
FJ	TGG	Ý	ËœG	ËœG	€	Ä FEE
œ	TGG	Z	€	€	€	Ä FEE
GF	TGH	Ý	ËœG	ËœG	€	Ä FEE
GG	TGH	Z	€	€	€	Ä FEE
GH	TG	Ý	€	€	€	Ä FEE
G	TG	Z	€	€	€	Ä FEE
G	TG	Ý	ËœG	ËœG	€	Ä FEE
G	TG	Z	€	€	€	Ä FEE
G	TG	Ý	€	€	€	Ä FEE
G	TG	Z	€	€	€	Ä FEE
GJ	TG	Ý	ËœG	ËœG	€	Ä FEE
Hœ	TG	Z	€	€	€	Ä FEE
HF	TG	Ý	ËœG	ËœG	€	Ä FEE
HG	TG	Z	€	€	€	Ä FEE
HH	TGJ	Ý	€	€	€	Ä FEE
HI	TGJ	Z	€	€	€	Ä FEE
HÍ	THE	Ý	ËœG	ËœG	€	Ä FEE
HÎ	THE	Z	€	€	€	Ä FEE
HÏ	THF	Ý	ËœG	ËœG	€	Ä FEE
HÏ	THF	Z	€	€	€	Ä FEE
HJ	THG	Ý	ËœG	ËœG	€	Ä FEE
Iœ	THG	Z	€	€	€	Ä FEE
IF	THH	Ý	ËœF	ËœF	€	Ä FEE
IG	THH	Z	€	€	€	Ä FEE
IH	TH	Ý	ËœG	ËœG	€	Ä FEE
II	TH	Z	€	€	€	Ä FEE
IÍ	THÍ	Ý	ËœF	ËœF	€	Ä FEE
IÎ	THÍ	Z	€	€	€	Ä FEE
IÏ	THÍ	Ý	€	€	€	Ä FEE
IÏ	THÍ	Z	€	€	€	Ä FEE
IJ	THÏ	Ý	ËœF	ËœF	€	Ä FEE
Iœ	THÏ	Z	€	€	€	Ä FEE
IF	TH	Ý	€	€	€	Ä FEE
IG	TH	Z	€	€	€	Ä FEE
IH	THU	Ý	ËœF	ËœF	€	Ä FEE
II	THU	Z	€	€	€	Ä FEE
IÍ	TIœ	Ý	ËœG	ËœG	€	Ä FEE
IÎ	TIœ	Z	€	€	€	Ä FEE

A Ya Vyf'8]qlf]Vi hYX' @ UXg'f6 @ '+(: 'Gfi Wi fy'Ka ''f&+\$'8 Yl Lf'f' cbl]bi YXL

	T^\{ à^!Àæ^ ^	Öã^&çã}	ÚçœóÁ æ} æ' à^ZãDœ(Ö) áÁ æ} æ' à^ZãDœ(Ö) ÚçœóÁ &œã} ZœÄ á	Ò) áÁ &œã} ZœÄ á
F€J	UXUÓ	Y	€	€
FF€	UXUÓ	Z	€	€
FFF	UXUÖ	Y	€	€
FFG	UXUÖ	Z	€	€

A Ya Vyf'8]qlf]Vi hYX' @ UXg'f6 @ '+) : 'Gfi Wi fy'Ka ''fI \$\$'8 Yl Lf

	T^\{ à^!Àæ^ ^	Öã^&çã}	ÚçœóÁ æ} æ' à^ZãDœ(Ö) áÁ æ} æ' à^ZãDœ(Ö) ÚçœóÁ &œã} ZœÄ á	Ò) áÁ &œã} ZœÄ á
F	TF	Y	€	€
G	TF	Z	€	€
H	TG	Y	€	€
I	TG	Z	€	€
Í	TH	Y	€	€
Î	TH	Z	€	€
Ï	TFÏ	Y	€	€
Ì	TFÏ	Z	€	€
J	TFÏ	Y	€	€
F€	TFÏ	Z	€	€
FF	TFÏ	Y	€	€
FG	TFÏ	Z	€	€
FH	TFJ	Y	€	€
FI	TFJ	Z	€	€
FÍ	T€	Y	€	€
FÎ	T€	Z	€	€
FÏ	T€	Y	€	€
FÌ	T€	Z	€	€
FJ	TGG	Y	€	€
G€	TGG	Z	€	€
GF	TGH	Y	€	€
GG	TGH	Z	€	€
GH	TG	Y	€	€
G	TG	Z	€	€
GÍ	TG	Y	€	€
GÎ	TG	Z	€	€
GÏ	TG	Y	€	€
GÌ	TG	Z	€	€
GJ	TG	Y	€	€
H€	TG	Z	€	€
HF	TG	Y	€	€
HG	TG	Z	€	€
HH	TGJ	Y	€	€
H	TGJ	Z	€	€
HÍ	THE	Y	€	€
HÎ	THE	Z	€	€
HÏ	THF	Y	€	€
HÌ	THF	Z	€	€
HJ	THG	Y	€	€
I€	THG	Z	€	€
IF	THH	Y	€	€
IG	THH	Z	€	€
IH	TH	Y	€	€
II	TH	Z	€	€

A Ya Vyf'8]g]f]Vi hYX' @ UXg'f6 @' +* : 'Gfi Wñ fy'Ka "fi' \$'8 Yf' Lf'f' cbi]bi YXL

	T^ { à^!Àæ^ }	Ôã^&ç} }	ÙæçÁ æ } æ à^!ZaDæ() áÁ æ } æ à^!ZaDæ() ÙæçÁ } æçá } ZæÁ á	ÙæçÁ } æçá } ZæÁ á	ÙæçÁ } æçá } ZæÁ á	ÙæçÁ } æçá } ZæÁ á	ÙæçÁ } æçá } ZæÁ á
HH	TGJ	Y	ÆÍF	ÆÍF	€	À FEE	
H	TGJ	Z	ÆÍF	ÆÍF	€	À FEE	
HÍ	THE	Y	ÆÍF	ÆÍF	€	À FEE	
HÍ	THE	Z	ÆÍF	ÆÍF	€	À FEE	
HÌ	THF	Y	Æ	Æ	€	À FEE	
HÌ	THF	Z	Æ	Æ	€	À FEE	
HJ	THG	Y	€	€	€	À FEE	
I€	THG	Z	€	€	€	À FEE	
IF	THH	Y	Æ	Æ	€	À FEE	
IG	THH	Z	Æ	Æ	€	À FEE	
IH	THI	Y	€	€	€	À FEE	
II	THI	Z	€	€	€	À FEE	
IÍ	THÍ	Y	Æ	Æ	€	À FEE	
IÍ	THÍ	Z	Æ	Æ	€	À FEE	
IÏ	THÌ	Y	ÆÍF	ÆÍF	€	À FEE	
IÏ	THÌ	Z	ÆÍF	ÆÍF	€	À FEE	
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I€	THÌ	Z	ÆF	ÆF	€	À FEE	
IF	THÌ	Y	ÆÍF	ÆÍF	€	À FEE	
IG	THÌ	Z	ÆÍF	ÆÍF	€	À FEE	
IH	THU	Y	ÆF	ÆF	€	À FEE	
IÌ	THU	Z	ÆF	ÆF	€	À FEE	
IÍ	TI€	Y	ÆÍF	ÆÍF	€	À FEE	
IÏ	TI€	Z	ÆÍF	ÆÍF	€	À FEE	
IÏ	TIF	Y	Æ	Æ	€	À FEE	
IÏ	TIF	Z	Æ	Æ	€	À FEE	
IJ	TIG	Y	ÆÍF	ÆÍF	€	À FEE	
I€	TIG	Z	ÆÍF	ÆÍF	€	À FEE	
IF	TIH	Y	Æ	Æ	€	À FEE	
IG	TIH	Z	ÆH	ÆH	€	À FEE	
IH	TII	Y	€	€	€	À FEE	
IÌ	TII	Z	€	€	€	À FEE	
IÍ	TIÍ	Y	€	€	€	À FEE	
IÏ	TIÍ	Z	€	€	€	À FEE	
IÏ	TIÌ	Y	Æ	Æ	€	À FEE	
IÏ	TIÌ	Z	ÆH	ÆH	€	À FEE	
IJ	TIÌ	Y	Æ	Æ	€	À FEE	
I€	TIÌ	Z	ÆH	ÆH	€	À FEE	
IF	TIÌ	Y	Æ	Æ	€	À FEE	
IG	TIÌ	Z	ÆH	ÆH	€	À FEE	
IH	TIJ	Y	ÆÍ	ÆÍ	€	À FEE	
IÌ	TIJ	Z	ÆÍ	ÆÍ	€	À FEE	
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IÏ	TI€	Z	ÆÍ	ÆÍ	€	À FEE	
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IJ	TJÌ	Y	€	€	€	À FEE	
I€	TJÌ	Z	€	€	€	À FEE	
IF	TJÌ	Y	ÆÍF	ÆÍF	€	À FEE	
IG	TJÌ	Z	ÆÍ	ÆÍ	€	À FEE	
IH	TJÌ	Y	ÆÍF	ÆÍF	€	À FEE	
IÌ	TJÌ	Z	ÆÍ	ÆÍ	€	À FEE	



TIA-222-H CONNECTION CHECK
Mount to Tower Connection - Typ. All Sectors
2021740.468157.01

Bolt Information		
Bolt Diameter (d)	0.625	in
Net Tensile Area (A _n)	0.226	in ²
# of Bolts Total (n)	4	
Bolt Distance Up-Down	6	in
Bolt Distance Left-Right	6	in
Bolt Grade	A325N	
Bolt Tensile Strength (F _{ub})	120	ksi

Flange Information		
Height (h)	8	in
Width (w)	8	in
Thickness (t)	0.75	in
Steel Grade	A36	
Plate Yield Strength (F _y)	36	ksi
Support Arm Height	4	in
Support Arm Width	4	in

RISA 3D Reactions		
Moment (M)	6.38	k-ft
Axial (T)	0.35	kips
Shear (V)	3.01	kips

Bolt Capacity		
Nominal Tensile Strength (R _{nt})	27.120	kips
Nominal Shear Strength (R _{nv})	18.41	kips
Bolt Tensile Force (T _{ub})	8.93	kips
Bolt Shear Force (V _{ub})	0.753	kips
T _{ub} /φR _{nt}	0.43898	
V _{ub} /φR _{nv}	0.05453	
(V _{ub} /φR _{nv}) ² +(T _{ub} /φR _{nt}) ²	0.19567	
Bolt Capacity =	43.9%	OK

Plate Capacity		
Bolt Circle (D _{bc})	8.485	in
Effective Width (B _{eff})	5.66	in
Flexural Moment (M _u)	12.63	k-in
Flexural Strength (φM _n)	25.77	k-in
Plate Capacity=	49.0%	OK

Weld Capacity		
Fillet (leg) =	0.250	in
Throat (eff) =	0.18	in
F _{exx} =	70.00	ksi
φ =	0.75	
φR _n =	5.57	kips/in
Weld Capacity=	74.4%	OK

Mount Desktop – Post Modification Inspection (PMI) Report Requirements

Documents & Photos Required from Contractor – **Passing Mount Analysis**

Passing Mount Analysis requires a PMI due to a modification in loading.

Electronic pdf version of this can be downloaded at <https://pmi.vzwsmart.com>.

For additional questions and support, please reach out to pmisupport@colliersengineering.com

Purpose – to provide SMART Tool structural vendor the proper documentation in order to complete the required Mount Desktop review of the Post Modification Inspection Report.

- Contractor is responsible for making certain the photos provided as noted below provide confirmation that the installation was completed in accordance with this Passing Mount Analysis.
- Contractor shall relay any data that can impact the performance of the mount, this includes safety issues.

Base Requirements:

- If installation will cause damage to the structure, the climbing facility, or safety climb if present or any installed system, SMART Tool vendor to be notified prior to install. Any special photos outside of the standard requirements will be indicated on the drawings.
- Provide “as built mount drawings” showing contractor’s name, contact information, preparer’s signature, and date. Any deviations from the drawings (Proposed modification) shall be shown. NOTE: If loading is different than what is conveyed in the passing mount analysis (MA) contact the SMART Tool vendor immediately.
- Each photo should be time and date stamped
- Photos should be high resolution.
- Contractor shall ensure that the safety climb wire rope is supported and not adversely impacted by the install of the modification components. This may involve the install of wire rope guides, or other items to protect the wire rope. If there is conflict, contact the SMART Tool engineer for recommendations.
- The PMI can be accessed at the following portal: <https://pmi.vzwsmart.com>

Photo Requirements:

- Photos taken at ground level
 - Photo of Gate Signs showing the tower owner, site name, and number.
 - Overall tower structure after installation.
 - Photos of the mount after installation; if the mounts are at different rad elevations, pictures must be provided for all elevations that equipment was installed.
- Photos taken at Mount Elevation
 - Photos showing the safety climb wire rope above and below the mount prior to installation.
 - Photos showing the climbing facility and safety climb if present.

- Photos showing each individual sector after installation. Each entire sector shall be in one photo to show the interconnection of members.
 - These photos shall also certify that the placement and geometry of the equipment on the mount is as depicted in the antenna placement diagram in this form.
- Photos that show the model number of each antenna and piece of equipment installed per sector.

Antenna & equipment placement and Geometry Confirmation:

- The contractor shall certify that the antenna & equipment placement and geometry is in accordance with the sketch and table as included in the mount analysis and noted below.

Special Instructions / Validation as required from the MA or any other information the contractor deems necessary to share that was identified:

Issue:

1. Contractor shall replace all existing mount pipes with new 84" long P2.0 STD pipes. Top of pipe shall be 12" from top face horizontal. Attach new mount pipes to support rail using VZWSMART-MSK1 and toe rail using VZWSMART-MSK2 crossover plates. The support rail shall remain where existing, 48" from toe rail. Refer to placement diagrams.
2. If present, contractor shall inspect climbing facilities and ensure that the safety climb is in good condition. Contractor shall install safety climb wire rope guide (Part #: Site Pro 1-120-203/317 or EOR approved equal) in locations where the wire rope is rubbing against mount to tower attachments. Contractor shall provide photos of safety climb wire rope guide installation.

Response:

Contractor certifies that the climbing facility / safety climb was not damaged during installation:

- Yes No

Comments:

- All hardware has been properly installed, and the existing hardware was inspected.

- The material utilized was as specified on the SMART Tool engineering vendor Mount Modification Drawings and included in the material certification folder is a packing list or invoice for these materials.

Or:

The material utilized was approved by a SMART Tool as an “equivalent” and this approval is included as part of the contractor submission.

Antenna & equipment placement and Geometry Confirmation:

The contractor certifies that the photos support and the equipment on the mount is as depicted on the sketch and table included in this form and with the mount analysis provided.

OR

The contractor notes that the equipment on the mount is not in accordance with the sketch and has noted the differences below and provided photo documentation of any alterations.

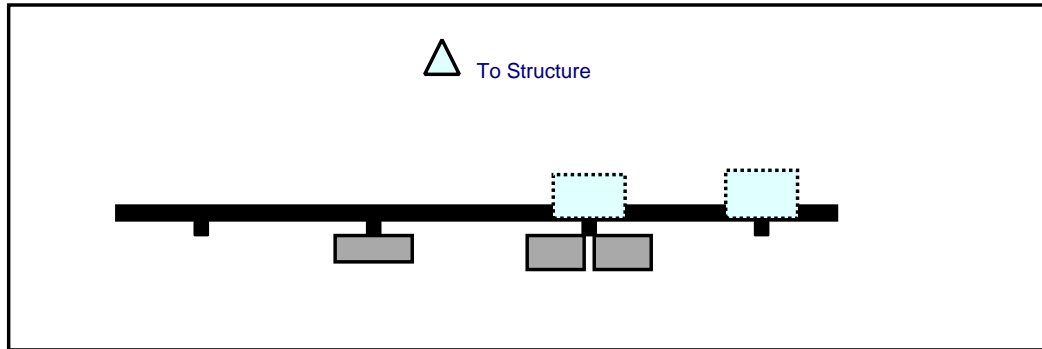
Special Instruction Confirmation:

The contractor has read and acknowledges the above special instructions.

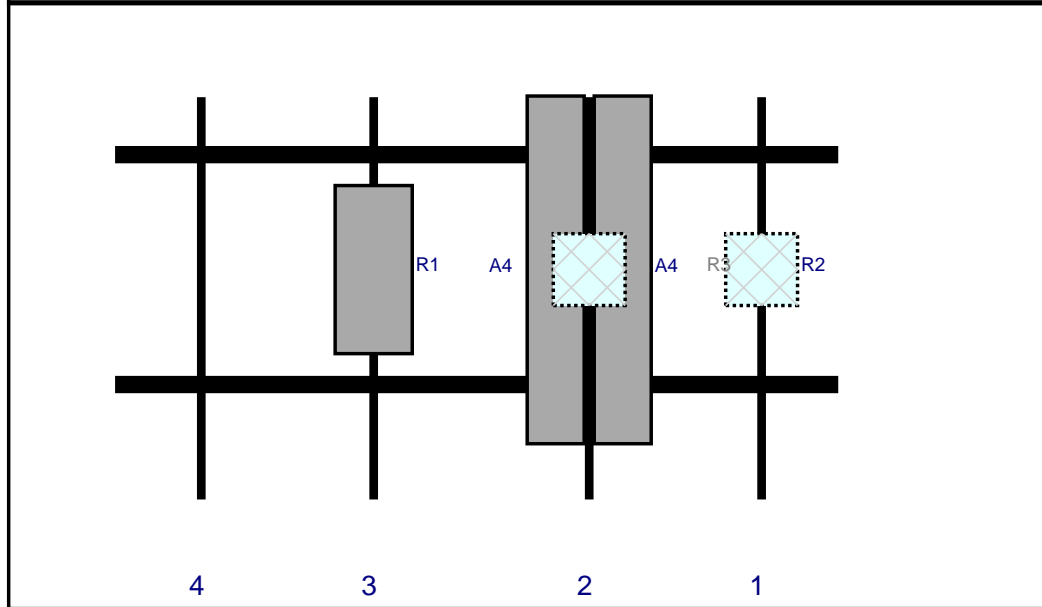
Certifying Individual:

Company:	
Employee Name:	
Contact Phone:	
Email:	
Date:	

Plan View

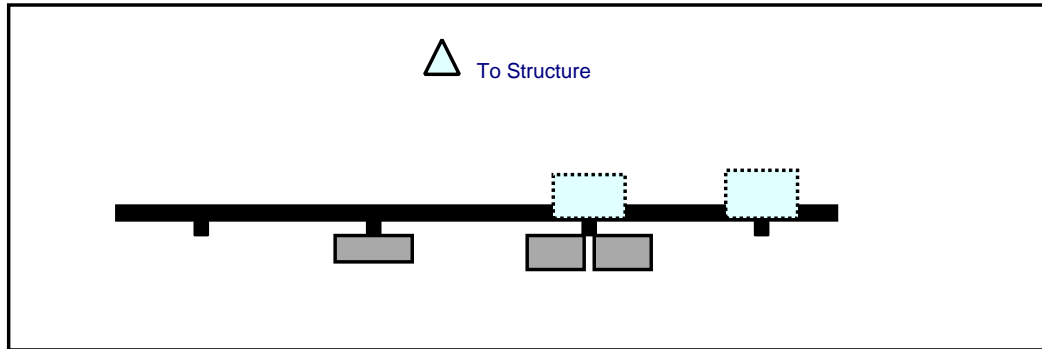


Front View
Looking at Structure

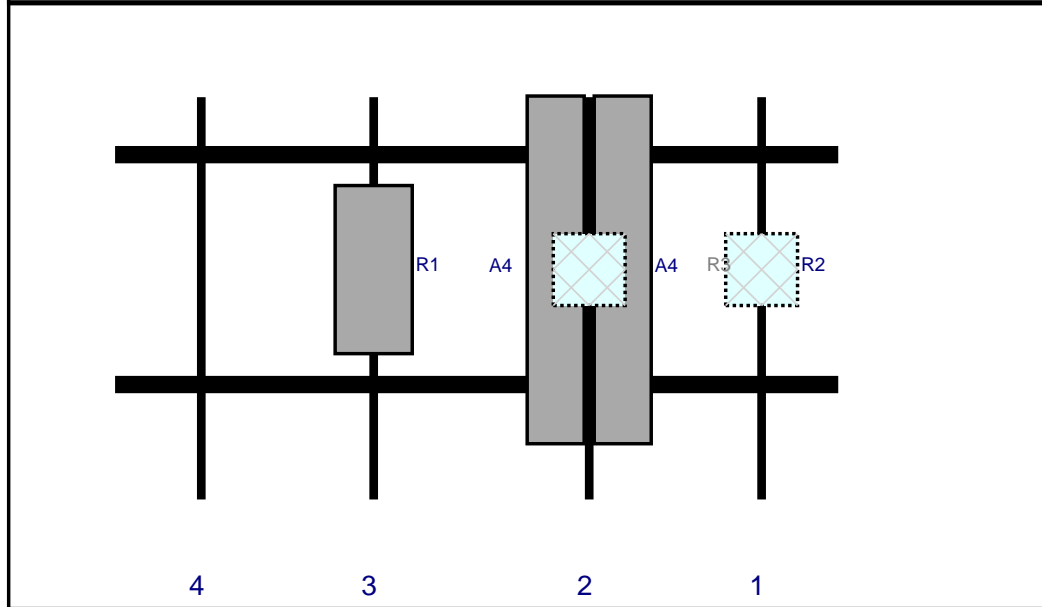


Ref#	Model	Height (in)	Width (in)	H Dist Frm L.	Pipe #	Pipe Pos V	Ant Pos	C. Ant Frm T.	Ant H Off	Status	Validation
R2	RF4439d-25A	15	15	135	1	a	Behind	36	0	Added	
A4	SBNHH-1D65B	72.6	11.9	99	2	a	Front	36.06	7	Retained	
A4	SBNHH-1D65B	72.6	11.9	99	2	b	Front	36.06	-7	Retained	
R3	RF4440d-13A	15	15	99	2	c	Behind	36	0	Added	
R1	MT6407-77A	35.1	16.1	54	3	a	Front	36	0	Added	

Plan View

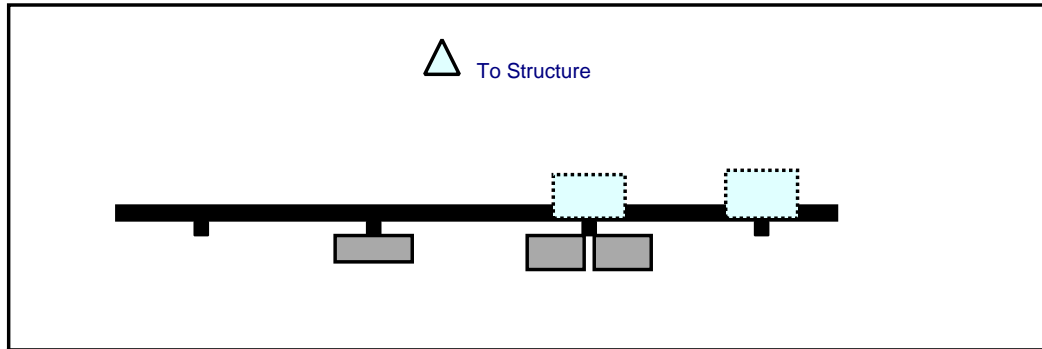


Front View
Looking at Structure

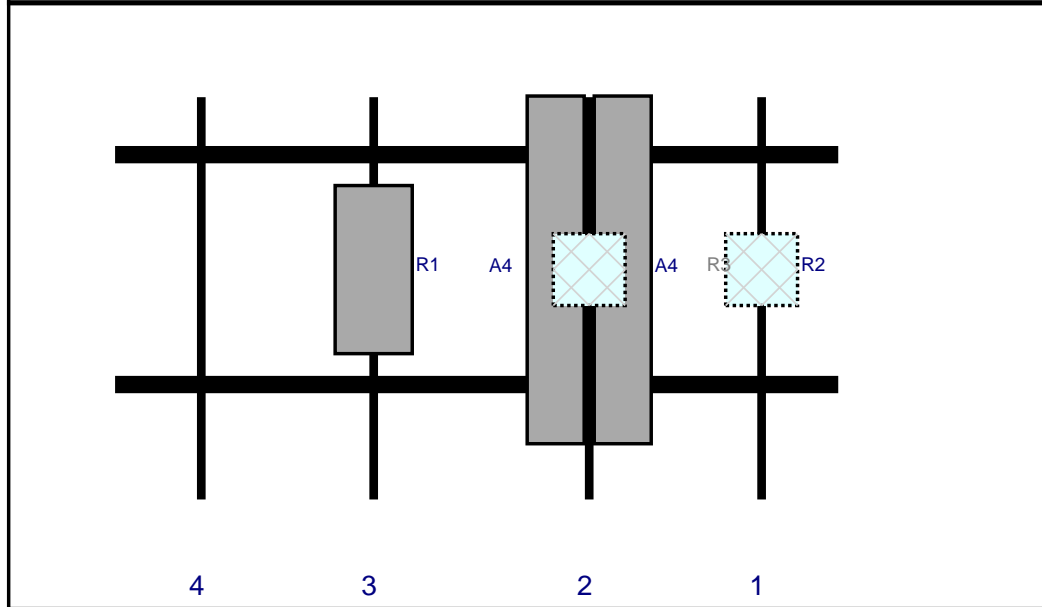


Ref#	Model	Height (in)	Width (in)	H Dist Frm L.	Pipe #	Pipe Pos V	Ant Pos	C. Ant Frm T.	Ant H Off	Status	Validation
R2	RF4439d-25A	15	15	135	1	a	Behind	36	0	Added	
A4	SBNHH-1D65B	72.6	11.9	99	2	a	Front	36.06	7	Retained	
A4	SBNHH-1D65B	72.6	11.9	99	2	b	Front	36.06	-7	Retained	
R3	RF4440d-13A	15	15	99	2	c	Behind	36	0	Added	
R1	MT6407-77A	35.1	16.1	54	3	a	Front	36	0	Added	

Plan View



Front View
Looking at Structure



Ref#	Model	Height (in)	Width (in)	H Dist Frm L.	Pipe #	Pipe Pos V	Ant Pos	C. Ant Frm T.	Ant H Off	Status	Validation
R2	RF4439d-25A	15	15	135	1	a	Behind	36	0	Added	
A4	SBNHH-1D65B	72.6	11.9	99	2	a	Front	36.06	7	Retained	
A4	SBNHH-1D65B	72.6	11.9	99	2	b	Front	36.06	-7	Retained	
R3	RF4440d-13A	15	15	99	2	c	Behind	36	0	Added	
R1	MT6407-77A	35.1	16.1	54	3	a	Front	36	0	Added	

Subject TIA-222-H Usage

Site Information Site ID: 468157-VZW / STAFFORDVILLE EAST CT
Site Name: STAFFORDVILLE EAST CT
Carrier Name: Verizon Wireless
Address: 175 Stafford St.
Stafford, Connecticut 06077
Tolland County
Latitude: 41.987050°
Longitude: -72.261328°

Structure Information Tower Type: Monopole
Mount Type: 12.58-Ft Platform

To Whom It May Concern,

We respectfully submit the above referenced Antenna Mount Structural Analysis report in conformance with ANSI/TIA-222-H, Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures.

The 2018 Connecticut State Building Code states that, in Section 3108, telecommunication towers shall be designed and constructed in accordance with the provisions of TIA-222. TIA-222-H is the latest revision of the TIA-222 Standard, effective as of January 01, 2018.

As with all ANSI standards and engineering best practice is to apply the most current revision of the standard. This ensures the engineer is applying all updates. As an example, the TIA-222-H Standard includes updates to bring it in line with the latest AISC and ACI standards and it also incorporates the latest wind speed maps by ASCE 7 based on updated studies of the wind data.

The TIA-222-H standard clarifies these specific requirements for the antenna mount analysis such as modeling methods, seismic analysis, 30-degree increment wind directions and maintenance loading. Therefore, it is our opinion that TIA-222-H is the most appropriate standard for antenna mount structural analysis and is acceptable for use at this site to ensure the engineer is taking into account the most current engineering standard available.

Sincerely,

GPD Group



Christopher J. Scheks, P.E.
Connecticut #: 0030026

Exhibit F

Power Density/RF Emissions Report

Site Name: **STAFFORDVILLE EAST CT**
 Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissible Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm ²)	(mW/cm ²)	(%)
VZW 700	751	4	698	2792	127	0.0062	0.5007	1.24%
VZW CDMA	869	2	396	792	127	0.0018	0.5793	0.30%
VZW Cellular	869	4	826	3304	127	0.0074	0.5793	1.27%
VZW PCS	1980	4	1492	5968	127	0.0133	1.0000	1.33%
VZW AWS	2125	4	1581	6324	127	0.0141	1.0000	1.41%
VZW CBAND	3730	4	6531	26124	127	0.0582	1.0000	5.82%

Total Percentage of Maximum Permissible Exposure 11.39%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

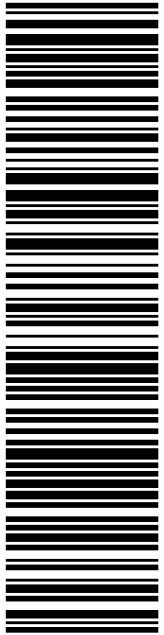
**Calculation includes a -10 dB Off Beam Antenna Pattern Adjustment pursuant to Attachments B and C of the Siting Council's November 10, 2015 Memorandum for Exempt Modification filings

MHz = Megahertz
 mW/cm² = milliwatts per square centimeter
 ERP = Effective Radiated Power

Absolute worst case maximum values used.

Exhibit G

Recipient Mailings



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Electronic Rate Approved #038555749

SHIP TO: SARAH SNELL
CROWN CASTLE
1800 W PARK DR
WESTBOROUGH MA 01581-3926

SHIP TO: DEBORAH CHASE
NORTHEAST SITE SOLUTIONS
420 MAIN ST
STE 1
STURBRIDGE MA 01566-1359

P

12/09/2021

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Trans. #: 550531589	Priority Mail® Postage: \$8.70
Print Date: 12/09/2021	Total: \$8.70
Ship Date: 12/09/2021	
Expected Delivery Date: 12/10/2021	

From: DEBORAH CHASE
NORTHEAST SITE SOLUTIONS
420 MAIN ST
STE 1
STURBRIDGE MA 01566-1359

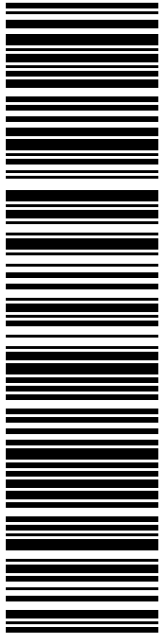
Ref#: CR-876402

To: SARAH SNELL
CROWN CASTLE
1800 W PARK DR
WESTBOROUGH MA 01581-3926

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FIRST SELECTMAN
1 MAIN ST
#2
STAFFORD SPGS CT 06076-1412

DEBORAH CHASE
NORTHEAST SITE SOLUTIONS
420 MAIN ST
STE 1
STURBRIDGE MA 01566-1359

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Trans. #: 550531589	Priority Mail® Postage: \$8.70
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Ship Date: 12/09/2021	
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From: DEBORAH CHASE
NORTHEAST SITE SOLUTIONS
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STE 1
STURBRIDGE MA 01566-1359

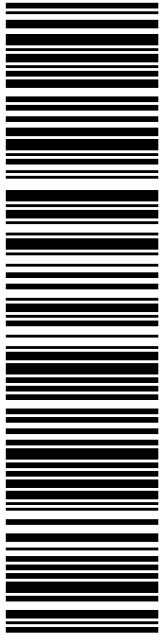
Ref#: CR-876402

To: SAL P TITUS
FIRST SELECTMAN
1 MAIN ST
#2
STAFFORD SPGS CT 06076-1412

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ZONING ENFORCEMENT OFFICER
1 MAIN ST
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420 MAIN ST
STE 1
STURBRIDGE MA 01566-1359

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STURBRIDGE MA 01566-1359


Ref#: CR876402

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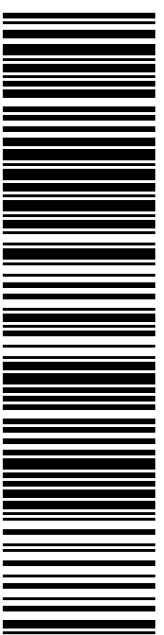
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Expected Delivery Date: 12/13/21
 Ref#: CR-876402
0006

B002

SHIP TO:
 HARRY & NANCY PRAGL
 PO BOX 154B
 STAFFORDVILLE CT 06077-0354

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Trans. #: 550531589	Priority Mail® Postage: \$8.70
Print Date: 12/09/2021	Total: \$8.70
Ship Date: 12/09/2021	
Expected Delivery Date: 12/13/2021	

From: DEBORAH CHASE
 NORTHEAST SITE SOLUTIONS
 420 MAIN ST
 STE 1
 STURBRIDGE MA 01566-1359

Ref#: CR-876402

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(800)275-8777

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12:02 PM

Product	Qty	Unit Price	Price
Prepaid Mail Westborough, MA 01581 Weight: 0 lb 2.00 oz Acceptance Date: Fri 12/10/2021 Tracking #: 9405 5036 9930 0090 5332 58	1		\$0.00
Prepaid Mail Stafford Springs, CT 06076 Weight: 0 lb 7.10 oz Acceptance Date: Fri 12/10/2021 Tracking #: 9405 5036 9930 0090 5332 96	1		\$0.00
Prepaid Mail Stafford Springs, CT 06076 Weight: 0 lb 7.10 oz Acceptance Date: Fri 12/10/2021 Tracking #: 9405 5036 9930 0090 5333 26	1		\$0.00
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Grand Total:			\$0.00