



**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

May 3, 2022

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

RE: Exempt Modification Application  
36 Prospect Street, Newington, CT 06111  
Latitude: 41.689902  
Longitude: -72.705236  
Site #: 876332\_Crown\_VZW

Dear Ms. Bachman:

Verizon Wireless is requesting to file an exempt modification for an existing tower located at 36 Prospect Street, Newington, CT 06111. Verizon Wireless currently maintains twelve (12) antennas at the 106-foot level of the existing 136-foot tower. The property is owned by John Oldham and the tower is owned by Crown Castle. Verizon now intends to replace six (6) antennas and install (3) antennas. The new antennas would be installed at the 106-foot level of the tower. This modification includes B2, B5 hardware that is both 4G (LTE), and 5G capable. Antenna mount modifications will be completed as per the attached Maser mount analysis dated May 18, 2021.

**Verizon Planned Modifications:**

**Remove:** None

**Remove and Replace:**

- (3) DECIBEL Antennas (REMOVE) – (3) Samsung MT6407-77A Antennas
- (3) DECIBEL Antennas (REMOVE) – (3) Samsung XXDWMM-12.5-65-8TCBRS Antennas

**Install New:**

- (3) ANDREW LNX-6513DS-A1M Antennas
- (1) Hybrid Line 1-1/4"

**Existing to Remain:**

- (6) ANDREW SBNHH-ID65B Antennas
- (3) Samsung B2/B66A BR049 - RFV01U-D1A RRH
- (3) Samsung B5/B13 BR04C - RFV01U-D2A RRH
- (1) Raycap OVP
- (1) Hybrid Line 1-1/4"



The facility was originally approved by the Newington Town Plan & Zoning Commission on April 9, 1997, 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 Mayor Beth DelBuono and Renata Bertotti, Town Planner for the Town of Newington. 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](mailto:denise@northeastsitesolutions.com)



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Attachments

Cc: Mayor Beth DelBuono  
Town of Newington  
200 Garfield Street  
Newington, CT 06111

Renata Bertotti, Town Planner  
Town of Newington  
200 Garfield Street  
Newington, CT 06111

John Oldham - Property Owner  
174 Fox Hill Road  
Wethersfield, CT 06109

Crown Castle – Tower Owner

# Exhibit A

## **Original Facility Approval**



*File*

# TOWN OF NEWINGTON

Town Hall • 131 Cedar Street, Newington, Connecticut 06111  
FAX 665-8507 Telephone 665-8500

Certified Mail: P 917 666 630

## CERTIFICATE OF ACTION



OFFICE OF: Town Planner

TO: Mr. Thomas F. Flynn III  
300 Research Parkway  
Meriden, CT 06450

DATE: April 11, 1997

SUBJECT: PETITION 2-97 36 Prospect Street, SBA, Inc. for Sprint PCS Limited Partnership applicant, Patricia Oldham property owner represented by Thomas F. Flynn III 300 Research Parkway Meriden, CT 06450 requests Special Exception Section 3.2.2 and Section 3.2.4 communications tower, B-BT Zone.

At a meeting held April 9, 1997 the Newington Town Plan and Zoning Commission voted to approve the above referenced PETITION subject to the following conditions:

### A. Findings

1. The applicant has been granted a variance of the required minimum setback distance equal to the height of the tower (Section 3.2.4) by the Zoning Board of Appeals; December 12, 1996. At the Zoning Board of Appeals meeting, April 3, 1997, the Board accepted the applicant's professional engineer's letter prepared by Clough, Harbour & Associates, dated April 3, 1997, certifying that the design of the monopole will be such that it will collapse upon itself and will not have any impact on adjoining properties.
2. The tower will benefit the public by enhancing wireless communication services known as, Personal Communication Services (PCS).
3. Wireless communication services can improve emergency communication for Newington public safety services, businesses and residents traveling the Route I-91/5 & 15 corridor in Central Connecticut.

### B. Conditions

1. The Sprint PCS tower and ground facilities at 36 Prospect Street shall be construction as shown on site plan entitled Lucent Technologies/Bechtel Alliance SSLP Project, sheet 1-3, Site Plan sheet 2, scale 1"=20'.
2. The Sprint PCS tower shall be a co-location site and may accommodate a maximum of two (2) additional FCC licensed carriers.

3. Provision shall be made on the tower for use by Newington emergency communication services.
4. Prior to the signing of the site plan mylar by the Chairman, Sprint PCS shall submit to the Newington Building Department written documentation from their structural engineer certifying that the design and construction of the tower at 36 Prospect Street will prevent its fall onto adjoining properties.
5. Telephone and electric utilities serving the tower compound area shall be located underground.
6. The west and north side of the tower compound area shall be screened with 6' to 8' evergreens planted seven feet on center.
7. Prior to the signing of the site plan mylar by the Chairman Sprint PCS shall submit a concise site location justification statement for 36 Prospect Street explaining the following:
  - a) why 36 Prospect Street was chosen by Sprint PCS
  - b) Sprint PCS network coverage area
  - c) need for future Sprint PCS sites in Newington
8. Sprint PCS shall be responsible for removal of the tower and ground equipment, and restoration of the site to its previous condition, if the tower is not used by Sprint PCS or its co-location FCC licensed commercial wireless services for a period of six (6) months. Removal of the tower shall occur within 90 days of the end of such six (6) month period. Sprint PCS shall notify the Commission in writing that it is terminating the use of the tower.
9. Pursuant to Section 5.2.9 of the Zoning Regulations this Special Exception approval shall be void and of no effect unless construction of the tower begins within one year from the date of this approval. The term "construction of the tower" pertains to installation of the ground facilities and tower monopole. In addition, this Special Exception is not transferable to other FCC licensed commercial wireless companies without prior approval of the Commission.

Certified by:



Edmund J. Meehan  
Town Planner

EJM:bjs

This Special Exception will not become effective until this Certificate of Action is filed by the applicant on the Land Records of the Town of Newington.

# Exhibit B

## **Property Card**

The Assessor's office is responsible for the maintenance of records on the ownership of properties. Assessments are computed at 70% of the estimated market value of real property at the time of the last revaluation which was 2015.



Information on the Property Records for the Municipality of Newington was last updated on 1/10/2019.

### Parcel Information

Location:	36 PROSPECT ST	Property Use:	Industrial	Primary Use:	Warehouse
Unique ID:	O2219600	Map Block Lot:	18/051/000	Acres:	1.29
490 Acres:	0.00	Zone:	B-BT	Volume / Page:	2157/782
Developers Map / Lot:	N/E 472	Census:			

### Value Information

	Appraised Value	Assessed Value
Land	100,000	70,000
Buildings	351,000	245,700
Detached Outbuildings	0	0
Total	451,000	315,700

### Owner's Information

Owner's Data
OLDHAM JOHN W TRUSTEE 174 FOX HILL ROAD  WETHERSFIELD CT 06109



## Building 1



Category:	Industrial	Use:	Warehouse	GLA:	15,000
Stories:	1.00	Construction:	Masonry	Year Built:	1956
Heating:	Forced Hot Air	Fuel:	Natural Gas	Cooling Percent:	0
Siding:	Brick Veneer	Roof Material:	Other	Beds/Units:	0

### Special Features

### Attached Components

## Owner History - Sales

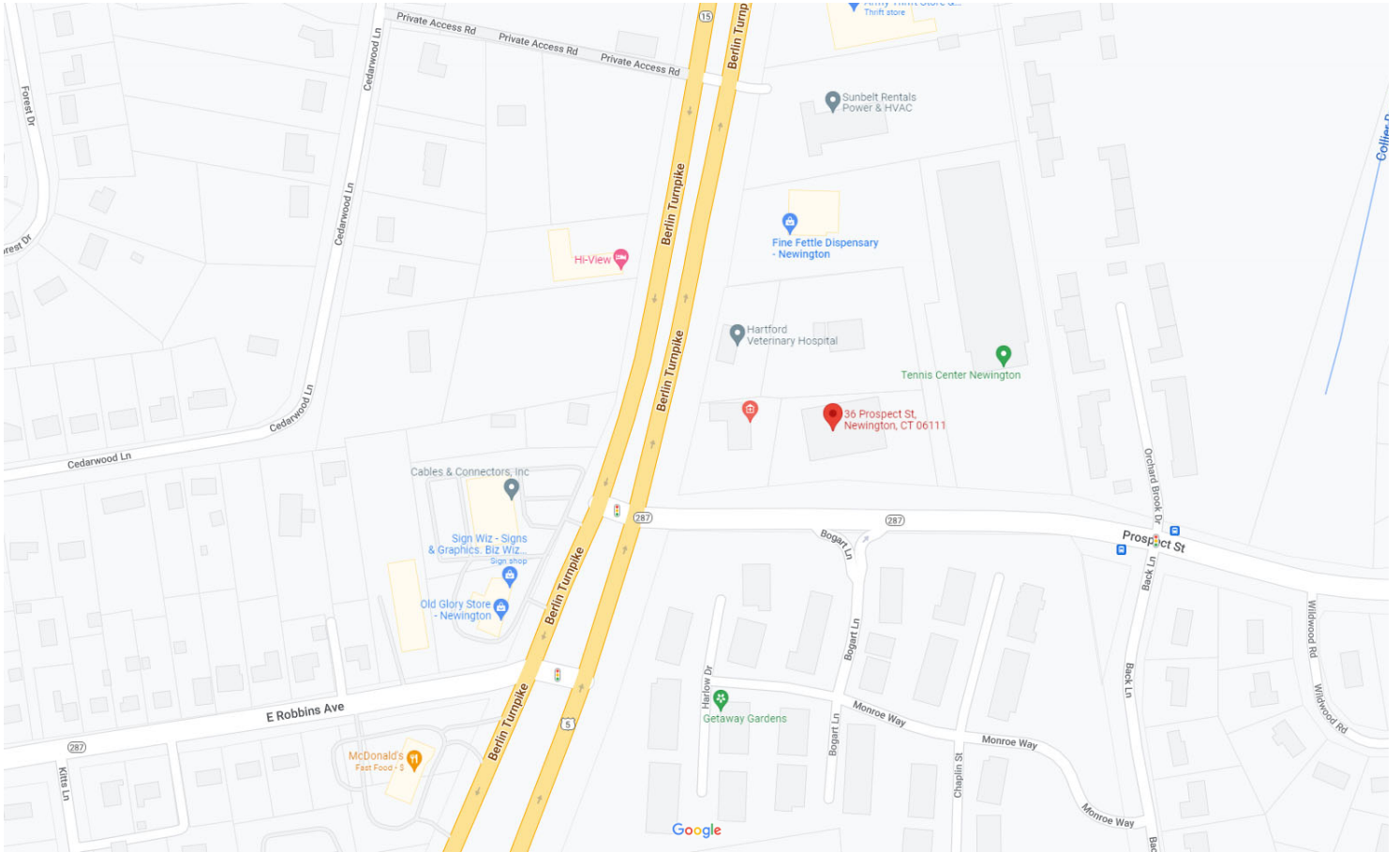
Owner Name	Volume	Page	Sale Date	Deed Type	Valid Sale	Sale Price
OLDHAM JOHN W TRUSTEE	2157	782	10/23/2014	Warranty Deed	No	\$0
OLDHAM JOHN W JR	329	282	12/12/1977		No	\$0
THE 635 CORPORATION	93	275	04/06/1955		No	\$0
HARRY E RUGAR	93	93	03/02/1955		No	\$0
GUERRERA MICHAEL & MANCINI PASQUALE	93	86	03/02/1955		No	\$0
CALLAHAN CLIFFORD J	65	385	10/09/1950		No	\$0

## Building Permits

Permit Number	Permit Type	Date Opened	Date Closed	Permit Status	Reason
E-18-300	Electrical	09/05/2018		Closed	TRENCH 12 FEET OF CONDUIT OVER TO LOCATION OF NEW EQUIPMENT INSTALL 100 AMP SERVICE
B-18-361	Comm Renovations	06/28/2018		Closed	Sigfox to install (1) Omni antenna, (1) line of coax, and (1) radio cabinet on h-frame at base of t

B-15-764	Comm Renovations	02/22/2016		Closed	9 ANTENNA PANELS
B-14-453	Remodel	07/29/2014		Closed	ADD 3 ANTENNAS, 3 REMOTE
B-13-156	Remodel	05/09/2013		Closed	3 ANTENNAS ON EXISTING MONOPOLE
62445	Building	08/16/2001		Closed	TELECOMM FACI

Information Published With Permission From The Assessor



# Exhibit C

## **Construction Drawings**





VERIZON SITE NUMBER: 468043

VERIZON SITE NAME: NEWINGTON CT

SITE TYPE: MONOPOLE

TOWER HEIGHT: 136'-0"

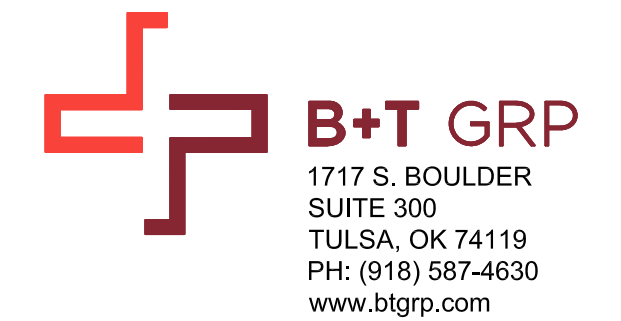
BUSINESS UNIT #: 876332

SITE ADDRESS: 36 PROSPECT STREET  
NEWINGTON, CT 06109

COUNTY: HARTFORD

JURISDICTION: CONNECTICUT SITING COUNCIL

### VERIZON 5G L-SUB6 - CARRIER ADD



VERIZON SITE NUMBER:  
468043

BU #: 876332  
36 PROSPECT STREET

36 PROSPECT STREET  
NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

#### ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	2/25/22	JHW	CONSTRUCTION	MTJ

B&T ENGINEERING, INC.  
PEC.0001564  
Expires 2/10/23

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: REVISION:

T-1 0

#### SITE INFORMATION

CROWN CASTLE USA INC. 36 PROSPECT STREET  
SITE NAME:  
SITE ADDRESS: 36 PROSPECT STREET  
NEWINGTON, CT 06109

COUNTY: HARTFORD  
MAP/PARCEL #: NEW1-221955-0000000  
AREA OF CONSTRUCTION: EXISTING  
LATITUDE: 41° 41' 23.66"  
LONGITUDE: -72° 42' 18.85"  
LAT/LONG TYPE: NAD83  
GROUND ELEVATION: 256.0 FT  
CURRENT ZONING: B-BT BUSINESS-BERLIN TURNPIKE  
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: OLDHAM, JOH W. TRUSTEE  
174 FOX HILL ROAD  
WETHERSFIELD, CT 06109

TOWER OWNER: CROWN CASTLE MU LLC  
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: VERIZON  
(800) 483-2000

#### 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	----
VzW LOCATION CODE (PSLC)	468043

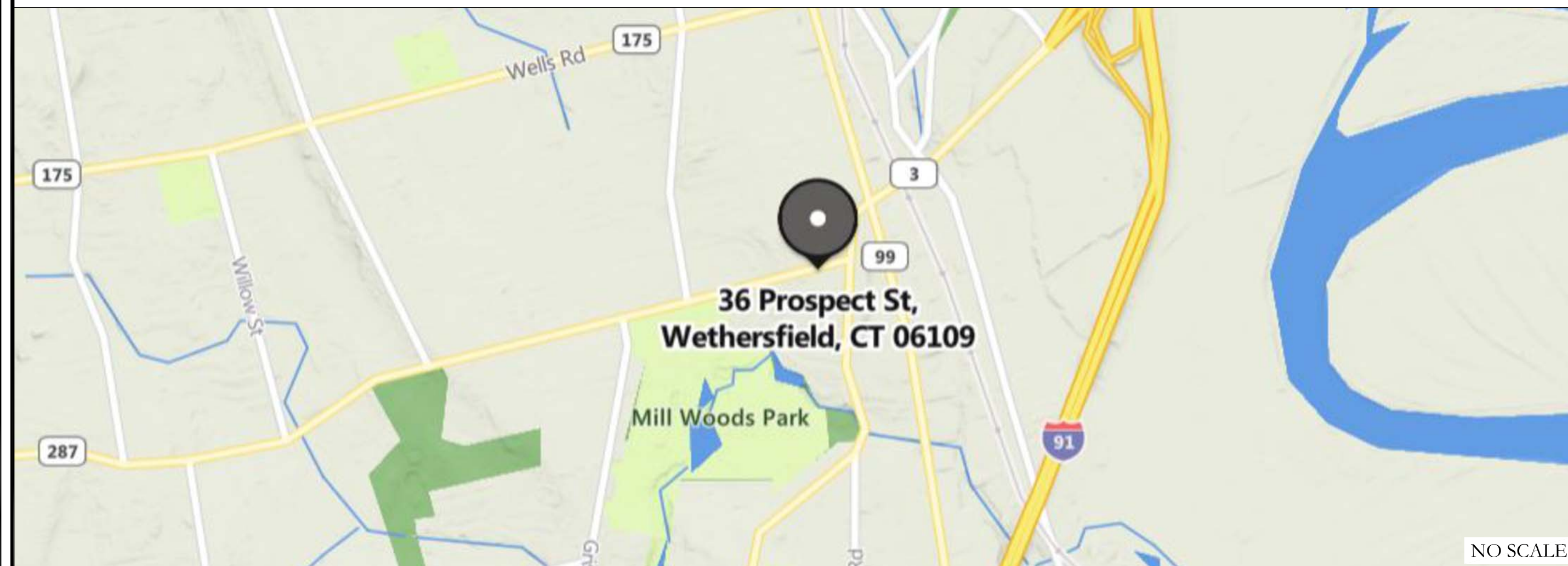
\*\*\* PMI AND REQUIREMENTS ALSO EMBEDDED IN MOUNT ANALYSIS REPORT

MOUNT MODIFICATION REQUIRED N

#### VzW APPROVED SMART KIT VENDORS

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

#### LOCATION MAP



DRIVING DIRECTIONS FROM VERIZON LOCAL OFFICE (180 WASHINGTON VALLEY RD, BEDMINSTER, NJ 07921)

HEAD NORTHWEST. SLIGHT LEFT. TURN RIGHT ONTO US-202 N/US-206 N. TURN RIGHT ONTO SCHLEY MOUNTAIN RD. MERGE WITH I-287 N. ENTERING NEW YORK. TAKE THE I-87 S/NEW YORK STATE THRUWAY/I-287 EXIT TOWARD GOV MARIO M. CUOMO BR/NEW YORK CITY. MERGE WITH I-287 E/I-87 S. KEEP LEFT AT THE Y JUNCTION TO CONTINUE ON I-287 E, FOLLOW SIGNS FOR WHITE PLAINS/RYE. MERGE WITH WESTCHESTER AVE. USE THE RIGHT LANE TO TAKE THE RAMP TO WESTCHESTER AVE/NORTH HUTCHINSON PKWY/MERRITT PKWY. KEEP RIGHT AT THE Y JUNCTION TO STAY ON HUTCHINSON RIVER PKWY N. ENTERING CONNECTICUT. CONTINUE ONTO CT-15 N. KEEP LEFT TO STAY ON CT-15 N. PASS BY SUBWAY. DESTINATION WILL BE ON THE RIGHT.

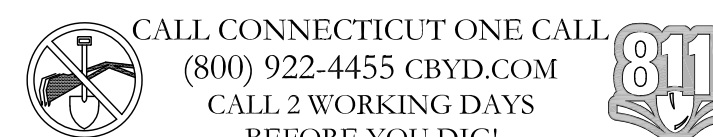
#### APPLICABLE CODES/REFERENCE DOCUMENTS

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 W/AMENDMENTS
MECHANICAL	2015 IMC W/AMENDMENTS
ELECTRICAL	2014 NEC

#### REFERENCE DOCUMENTS:

STRUCTURAL ANALYSIS:	BY OTHERS
DATED:	
MOUNT ANALYSIS:	BY OTHERS
DATED:	
RFDS REVISION:	N/A
DATED:	3/18/21
ORDER ID:	552673
REVISION:	0



#### 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) ANTENNAS
  - INSTALL (9) ANTENNAS
  - INSTALL (1) HYBRID CABLE (1-1/4")

- 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

#### PROJECT TEAM

A&E FIRM: B+T GROUP  
1717 S. BOULDER AVE.  
TULSA, OK 74119  
MARVIN PHILLIPS  
marvin.phillips@btgrp.com

CROWN CASTLE USA INC. DISTRICT CONTACTS:  
3 CORPORATE PARK DRIVE, SUITE 101  
CLIFTON PARK, NY 12065

WILLIAM GATES - PROJECT MANAGER  
WILLIAM.GATES@CROWNCastle.COM  
JASON D'AMICO - CONSTRUCTION MANAGER  
JASON.DAMICO@CROWNCastle.COM

VERIZON CONTACT: TIMOTHY PARKS  
TIMOTHY.PARKS@VERIZONWIRELESS.COM

468043\_876332\_36 PROSPECT\_CD REVISION.dwg - Sheet1-1 - User: mjonas - Feb 25, 2022 - 7:58am



**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 AIC 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 AND TIGHTEN FITTINGS AS PER MANUFACTURER'S INSTRUCTIONS.
- 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	BLACK
	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



1717 S. BOULDER  
SUITE 300  
TULSA, OK 74119  
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www.btgrp.com

**VERIZON SITE NUMBER:**  
**468043**


**BU #:** 876332  
**36 PROSPECT STREET**

36 PROSPECT STREET  
NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

**ISSUED FOR:**

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	2/25/22	JHW	CONSTRUCTION	MTJ



B&T ENGINEERING, INC.  
PEC.0001564  
Expires 2/10/23

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**SHEET NUMBER:** T-2 **REVISION:** 0



**verizon**  
 180 WASHINGTON VALLEY ROAD  
 BEDMINSTER, NJ 07921

**CROWN CASTLE**  
 3 CORPORATE PARK DRIVE, SUITE 101  
 CLIFTON PARK, NY 12065

**B+T GRP**  
 1717 S. BOULDER  
 SUITE 300  
 TULSA, OK 74119  
 PH: (918) 587-4630  
 www.btgrp.com

VERIZON SITE NUMBER:  
**468043**

BU #: **876332**  
**36 PROSPECT STREET**

36 PROSPECT STREET  
 NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

**ISSUED FOR:**

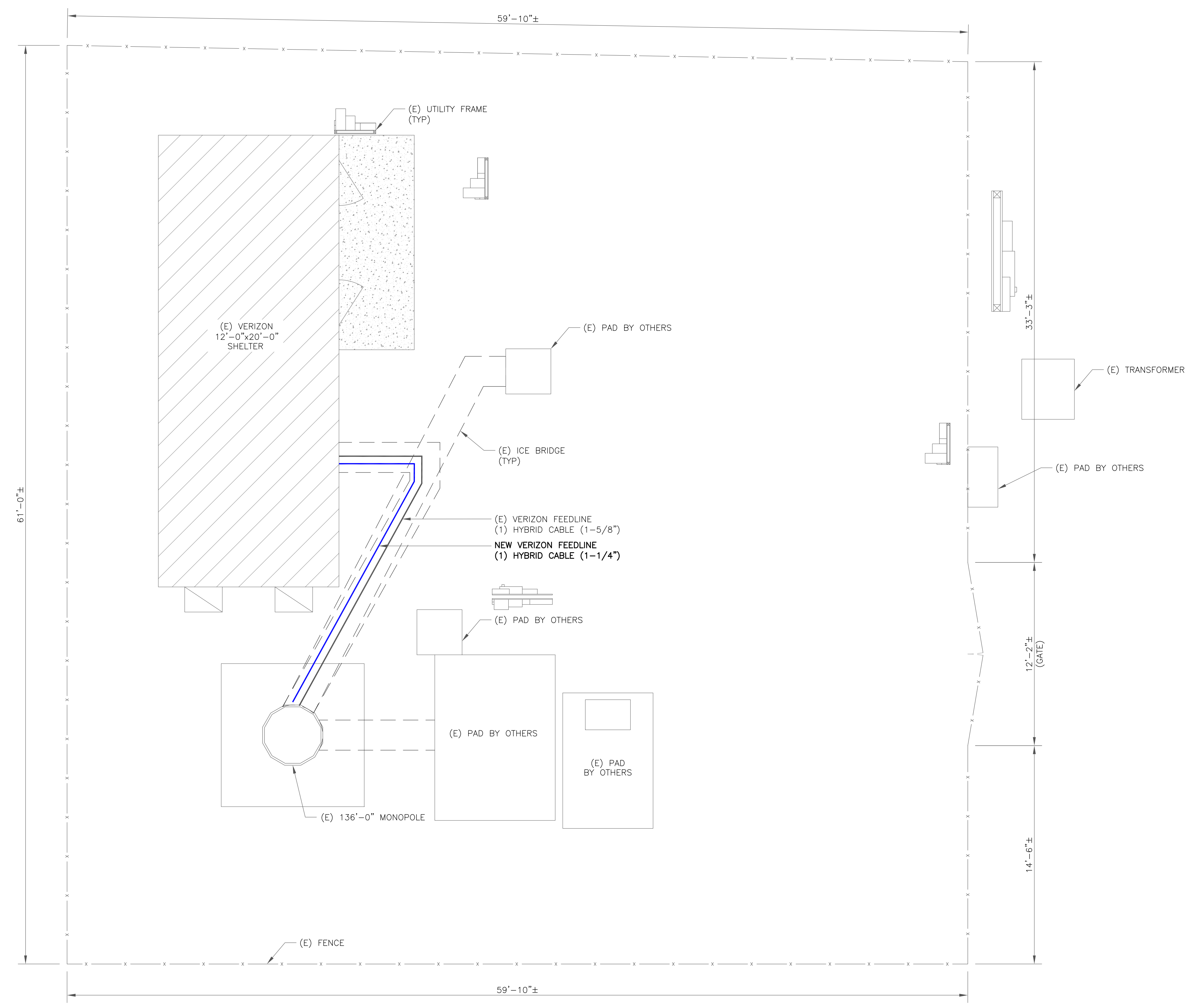
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0	2/25/22	JHW	CONSTRUCTION	MTJ



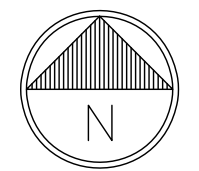
B&T ENGINEERING, INC.  
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SHEET NUMBER: **C-1** REVISION: **0**



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



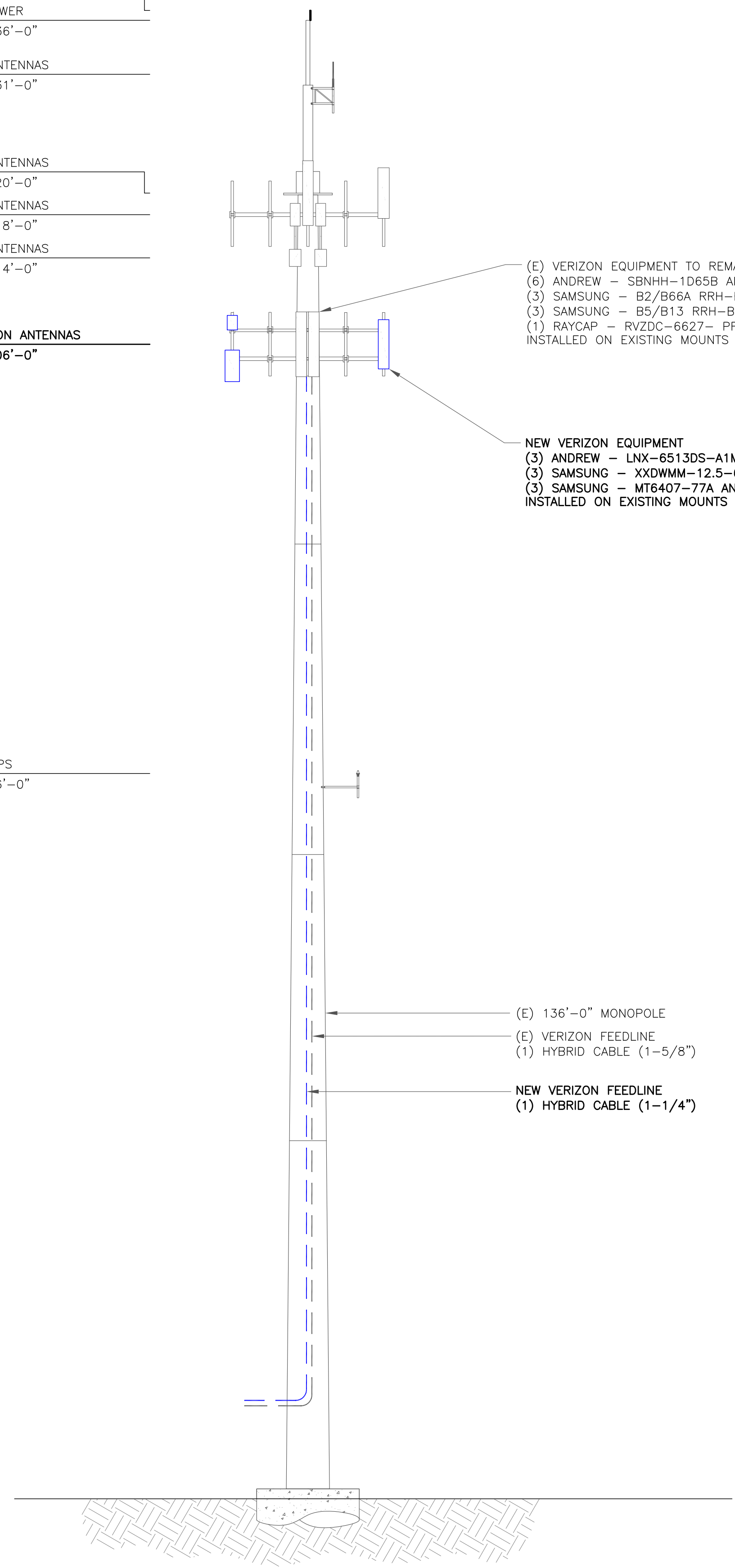
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STRUCTURE W/APPURTENANCE  
ELEV. = 136'-11"  
TOP OF TOWER  
ELEV. = 136'-0"

EXISTING ANTENNAS  
ELEV. = 120'-0"  
EXISTING ANTENNAS  
ELEV. = 118'-0"  
EXISTING ANTENNAS  
ELEV. = 114'-0"

NEW VERIZON ANTENNAS  
ELEV. = 106'-0"



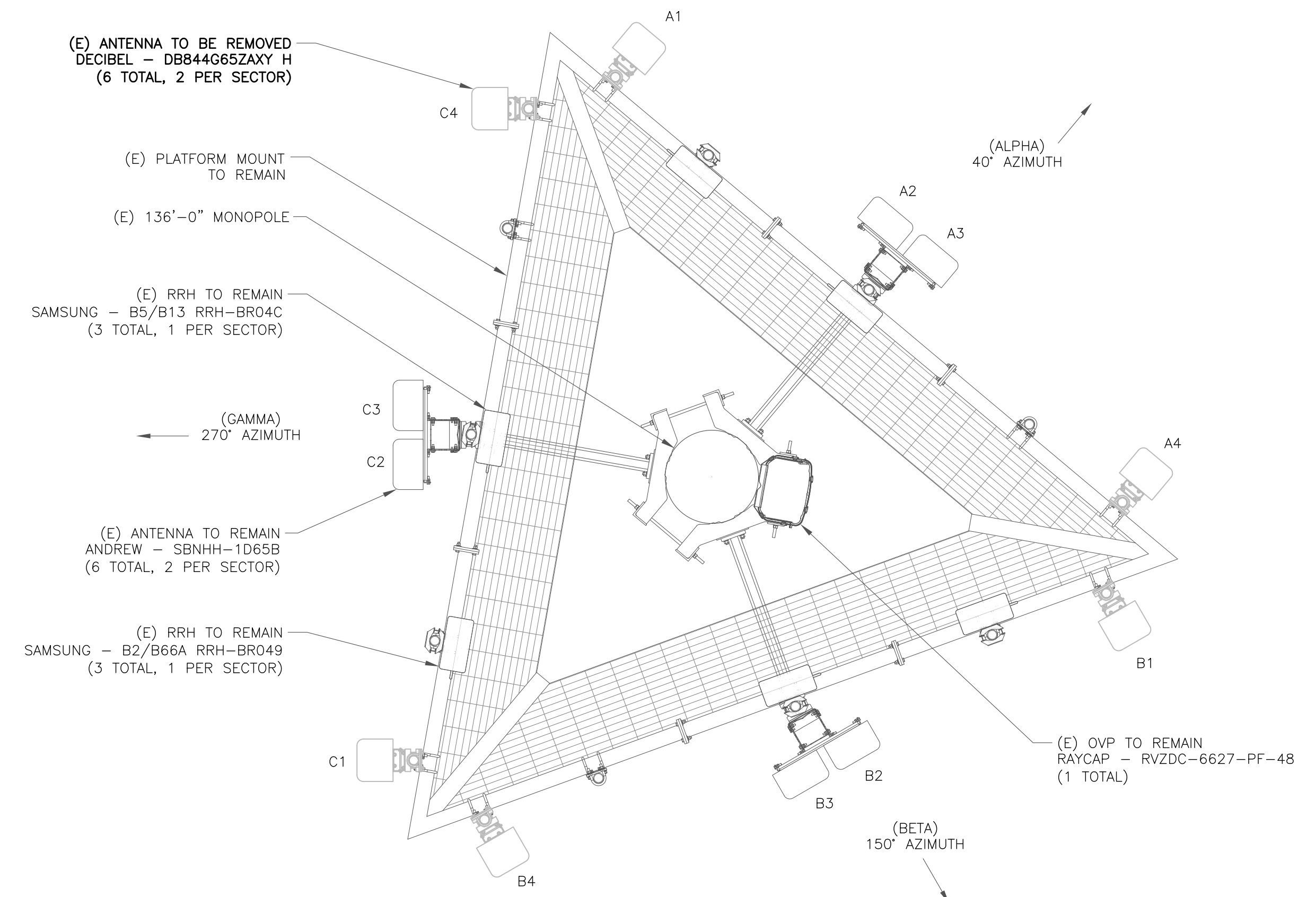
(E) VERIZON EQUIPMENT TO REMAIN  
(6) ANDREW - SBNHH-1D65B ANTENNAS  
(3) SAMSUNG - B2/B66A RRH-BR049 RRHS  
(3) SAMSUNG - B5/B13 RRH-BR04C RRHS  
(1) RAYCAP - RVZDC-6627-PF-48 OVP INSTALLED ON EXISTING MOUNTS

NEW VERIZON EQUIPMENT  
(3) ANDREW - LNX-6513DS-A1M ANTENNAS  
(3) SAMSUNG - XXDWM-12.5-65-8TCBRS ANTENNAS  
(3) SAMSUNG - MT6407-77A ANTENNAS INSTALLED ON EXISTING MOUNTS

**VERIZON EQUIPMENT**  
ANTENNA CL: 106'-0"  
MOUNT CL: 106'-0"

EXISTING GPS  
ELEV. = 66'-0"

1 TOWER ELEVATION  
SCALE: NOT TO SCALE



(E) ANTENNA TO BE REMOVED  
DECIBEL - DBB44G65ZAXY H  
(6 TOTAL, 2 PER SECTOR)

(E) PLATFORM MOUNT TO REMAIN

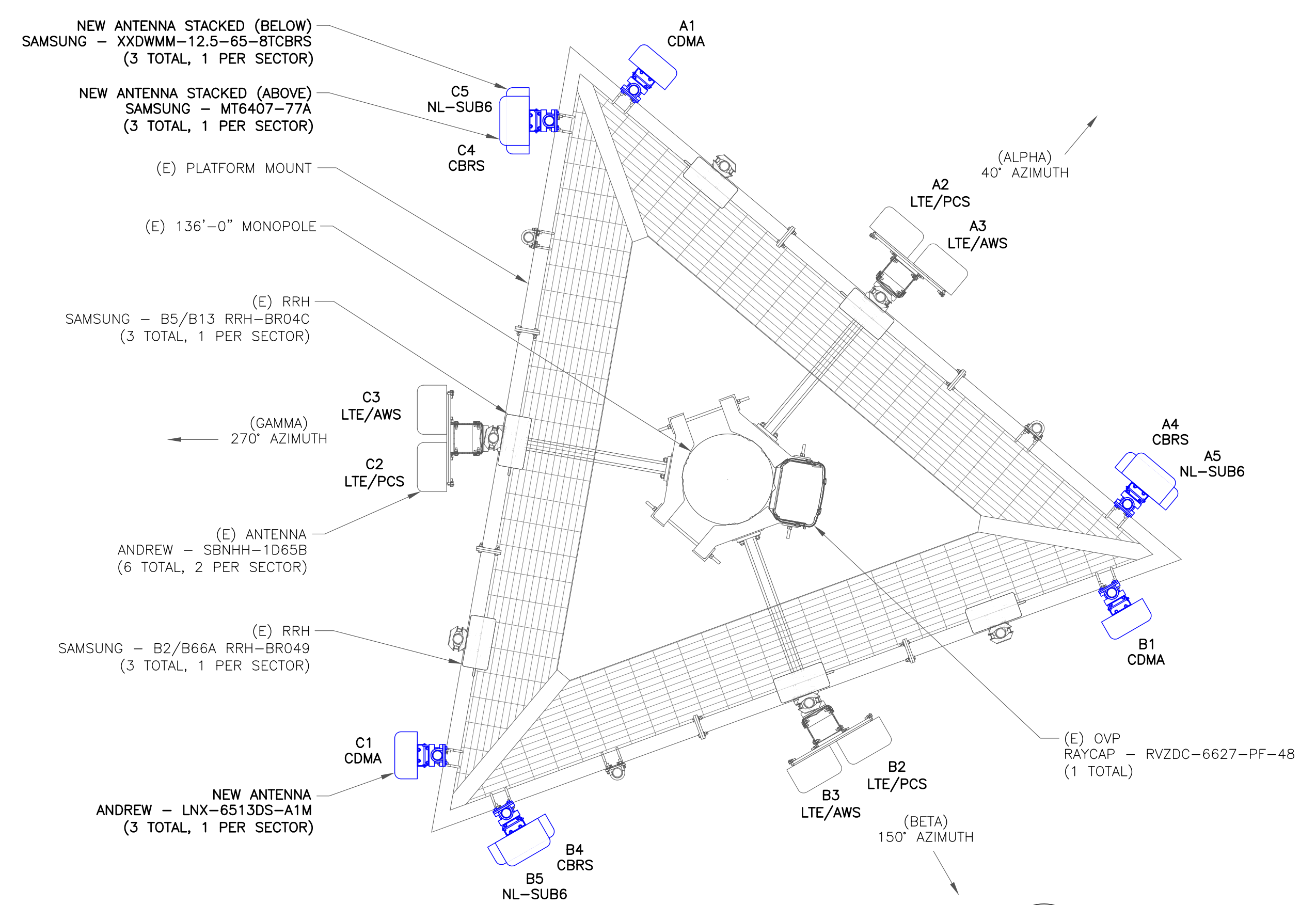
(E) 136'-0" MONOPOLE

(E) RRH TO REMAIN  
SAMSUNG - B5/B13 RRH-BR04C  
(3 TOTAL, 1 PER SECTOR)

(E) ANTENNA TO REMAIN  
ANDREW - SBNHH-1D65B  
(6 TOTAL, 2 PER SECTOR)

(E) RRH TO REMAIN  
SAMSUNG - B2/B66A RRH-BR049  
(3 TOTAL, 1 PER SECTOR)

2 EXISTING ANTENNA PLAN  
SCALE: NOT TO SCALE



NEW ANTENNA STACKED (BELOW)  
SAMSUNG - XXDWM-12.5-65-8TCBRS  
(3 TOTAL, 1 PER SECTOR)

NEW ANTENNA STACKED (ABOVE)  
SAMSUNG - MT6407-77A  
(3 TOTAL, 1 PER SECTOR)

(E) PLATFORM MOUNT

(E) 136'-0" MONOPOLE

(E) RRH  
SAMSUNG - B5/B13 RRH-BR04C  
(3 TOTAL, 1 PER SECTOR)

(E) ANTENNA  
ANDREW - SBNHH-1D65B  
(6 TOTAL, 2 PER SECTOR)

(E) RRH  
SAMSUNG - B2/B66A RRH-BR049  
(3 TOTAL, 1 PER SECTOR)

NEW ANTENNA  
ANDREW - LNX-6513DS-A1M  
(3 TOTAL, 1 PER SECTOR)

3 NEW ANTENNA PLAN  
SCALE: NOT TO SCALE

**verizon**  
180 WASHINGTON VALLEY ROAD  
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**CROWN CASTLE**  
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PH: (918) 587-4630  
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VERIZON SITE NUMBER:  
**468043**

BU #: 876332  
**36 PROSPECT STREET**

36 PROSPECT STREET  
NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

**ISSUED FOR:**

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	2/25/22	JHW	CONSTRUCTION	MTJ

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VERIZON SITE NUMBER:  
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BU #: **876332**  
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36 PROSPECT STREET  
 NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

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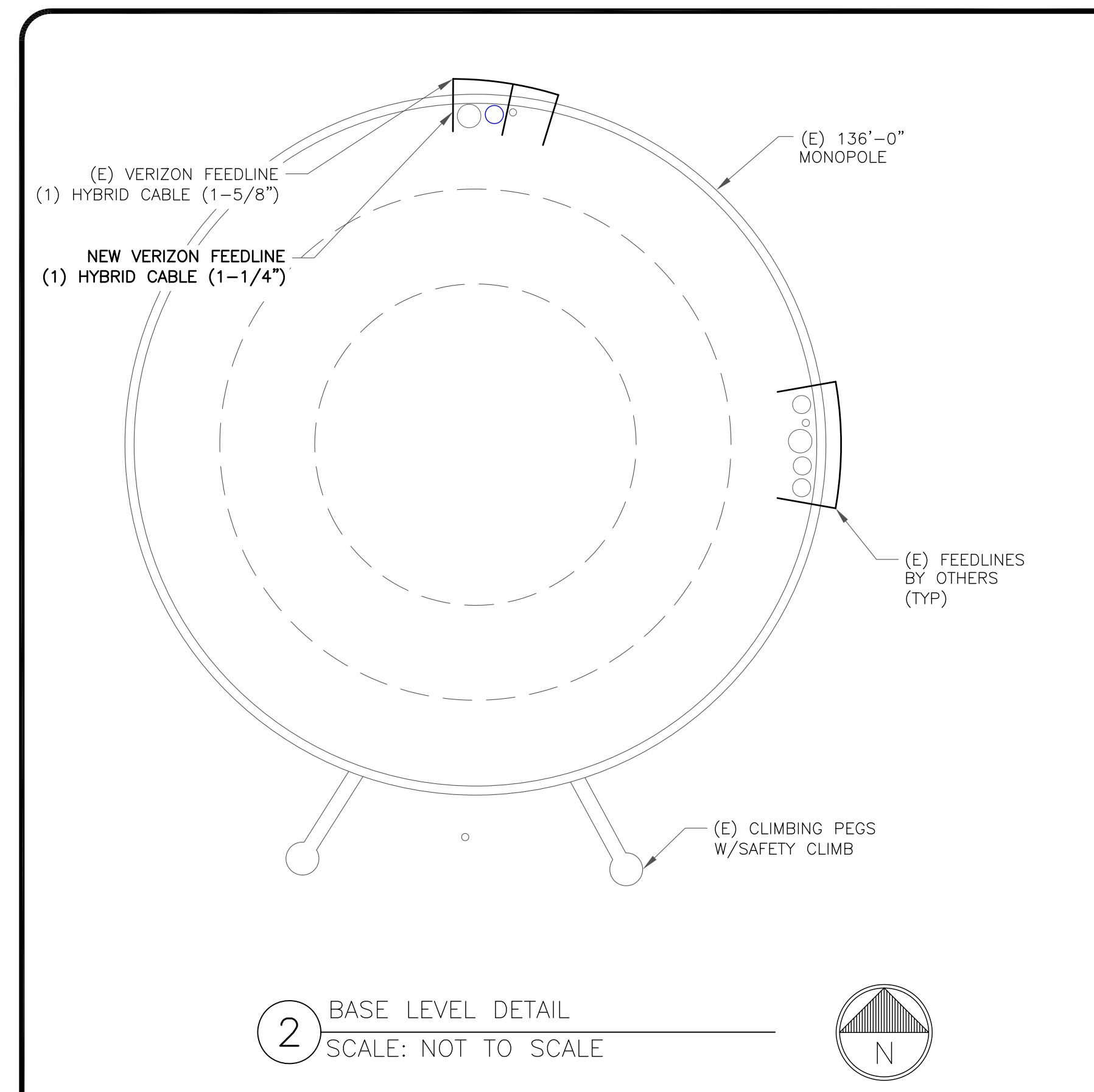
ANTENNA/RRH SCHEDULE

SECTOR	STATUS	ANTENNA MANUFACTURER	ANTENNA MODEL	ANTENNA CENTERLINE	AZIMUTH	MECHANICAL DOWNTILTS	ELECTRICAL DOWNTILTS	TOWER EQUIPMENT MANUFACTURER	TOWER EQUIPMENT QTY/MODEL
A1	NEW	ANDREW	LNX-6513DS-A1M	106'-0"	40°	0'	9'	-	-
A2	EXISTING	ANDREW	SBNHH-1D65B	106'-0"	40°	0'	7'/4"	SAMSUNG	(1) B2/B66A RRH-BR049
A3	EXISTING	ANDREW	SBNHH-1D65B	106'-0"	40°	0'	7'/4"	SAMSUNG	(1) B5/B13 RRH-BR04C
A4	NEW	SAMSUNG	MT6407-77A	106'-0"	40°	0'	8'/3"	RAYCAP	(1) RVZDC-3315-PF-48
A5	NEW	SAMSUNG	XXDWMM-12.5-65-8TCBRS	106'-0"	40°	0'	8'	SAMSUNG	(1) CBRS RRH - RT4401-48A (INTEGRATED)
B1	NEW	ANDREW	LNX-6513DS-A1M	106'-0"	150°	0'	9'	-	-
B2	EXISTING	ANDREW	SBNHH-1D65B	106'-0"	150°	0'	7'/5"	SAMSUNG	(1) B2/B66A RRH-BR049
B3	EXISTING	ANDREW	SBNHH-1D65B	106'-0"	150°	0'	7'/5"	SAMSUNG	(1) B5/B13 RRH-BR04C
B4	NEW	SAMSUNG	MT6407-77A	106'-0"	150°	0'	8'/3"	-	-
B5	NEW	SAMSUNG	XXDWMM-12.5-65-8TCBRS	106'-0"	150°	0'	8'	SAMSUNG	(1) CBRS RRH - RT4401-48A (INTEGRATED)
C1	NEW	ANDREW	LNX-6513DS-A1M	106'-0"	270°	0'	7'	-	-
C2	EXISTING	ANDREW	SBNHH-1D65B	106'-0"	270°	0'	9'/5"	SAMSUNG	(1) B2/B66A RRH-BR049
C3	EXISTING	ANDREW	SBNHH-1D65B	106'-0"	270°	0'	9'/5"	SAMSUNG	(1) B5/B13 RRH-BR04C
C4	NEW	SAMSUNG	MT6407-77A	106'-0"	270°	0'	8'/3"	-	-
C5	NEW	SAMSUNG	XXDWMM-12.5-65-8TCBRS	106'-0"	270°	0'	8'	SAMSUNG	(1) CBRS RRH - RT4401-48A (INTEGRATED)

1 VERIZON TOWER EQUIPMENT SCHEDULE  
 SCALE: NOT TO SCALE

CABLE SCHEDULE

STATUS	CABLE TYPE	SIZE	LENGTH	QTY
EXISTING	HYBRID	1-5/8"	156'-0"±	1
NEW	HYBRID	1-1/4"	156'-0"±	1
TOTAL CABLE QTY:				2



2 BASE LEVEL DETAIL  
 SCALE: NOT TO SCALE

468043\_876332\_36 PROSPECT\_CD REVISION.dwg - Sheet-C-3 - User: mjonas - Feb 25, 2022 - 8:00am

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VERIZON SITE NUMBER:  
**468043**

BU #: **876332**  
**36 PROSPECT STREET**

36 PROSPECT STREET  
 NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

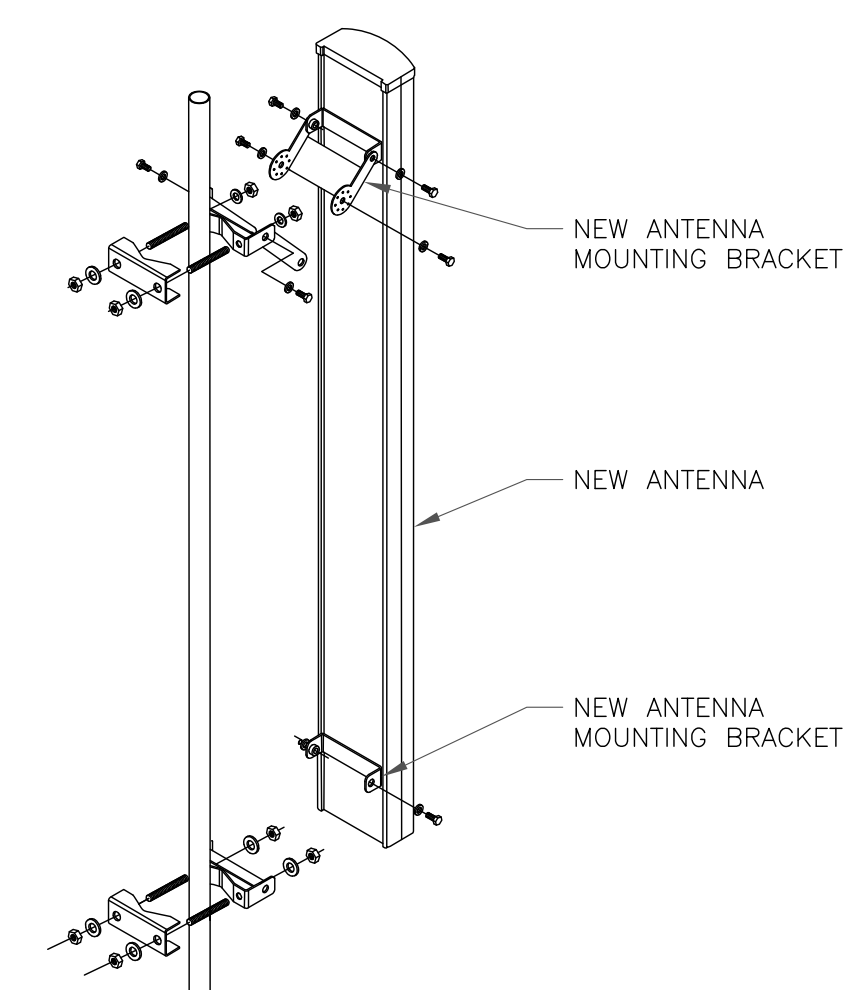
1 NOT USED  
 SCALE: NOT TO SCALE

2 NOT USED  
 SCALE: NOT TO SCALE

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0	2/25/22	JHW	CONSTRUCTION	MTJ

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



4 ANTENNA MOUNTING DETAIL  
 SCALE: NOT TO SCALE

3 NOT USED  
 SCALE: NOT TO SCALE

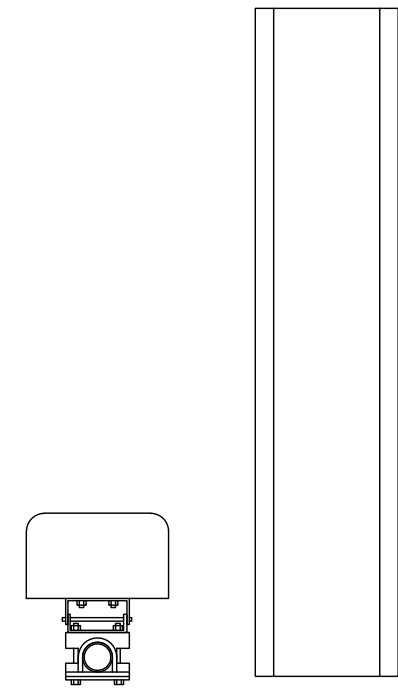


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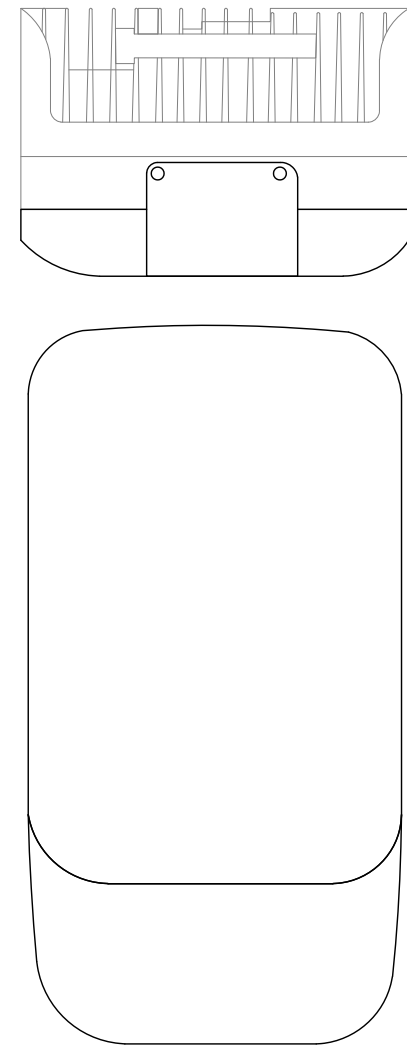
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**C-4**

REVISION:  
**0**



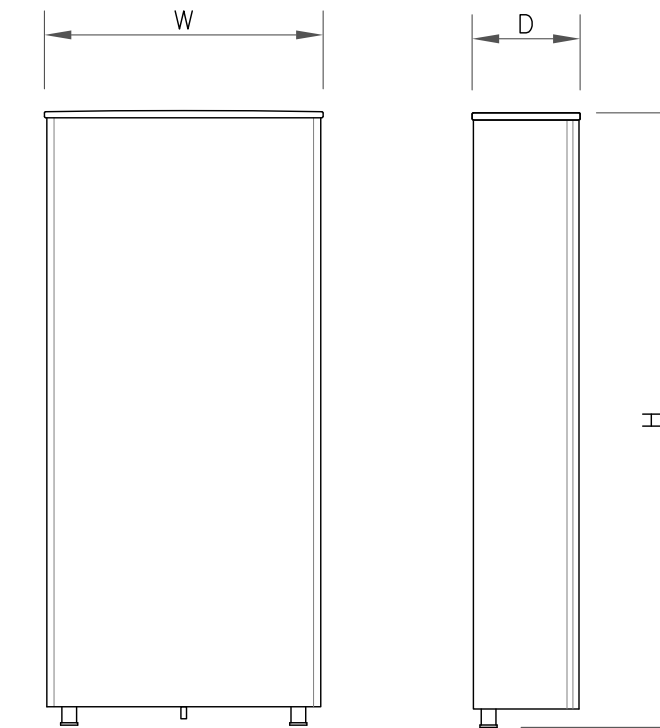
ANDREW - LNX-6513DS-A1M  
 WEIGHT (WITHOUT MOUNTING HARDWARE): 30.4 LBS  
 SIZE (HxWxD): 54.7x11.90x7.10 IN.  
 MOUNTING HARDWARE P/N: DB380-3 & DB5083D  
 RATED WIND VELOCITY: 149.8 MPH

1 ANDREW - LNX-6513DS-A1M  
 SCALE: NOT TO SCALE



SAMSUNG - XXDWMM-12.5-65-8T-CBRS  
 WEIGHT (FULLY EQUIPPED): 23.14 LBS  
 SIZE (HxWxD): 16.16x11.39x5.45 IN.

2 SAMSUNG - XXDWMM-12.5-65-8T-CBRS  
 SCALE: NOT TO SCALE



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

3 ANTENNA DETAIL  
 SCALE: NOT TO SCALE

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VERIZON SITE NUMBER:  
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BU #: **876332**  
**36 PROSPECT STREET**

36 PROSPECT STREET  
 NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

**ISSUED FOR:**

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	2/25/22	JHW	CONSTRUCTION	MTJ



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SHEET NUMBER: **C-5** REVISION: **0**

4 NOT USED  
 SCALE: NOT TO SCALE

5 NOT USED  
 SCALE: NOT TO SCALE

6 NOT USED  
 SCALE: NOT TO SCALE



VERIZON SITE NUMBER:  
**468043**

BU #: **876332**  
**36 PROSPECT STREET**

36 PROSPECT STREET  
 NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

**ISSUED FOR:**

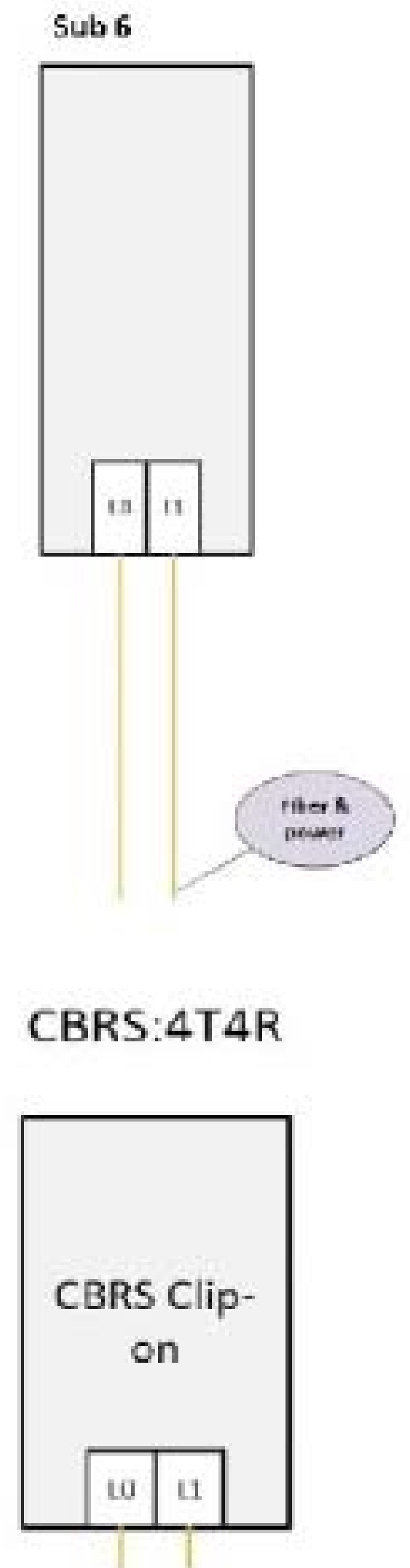
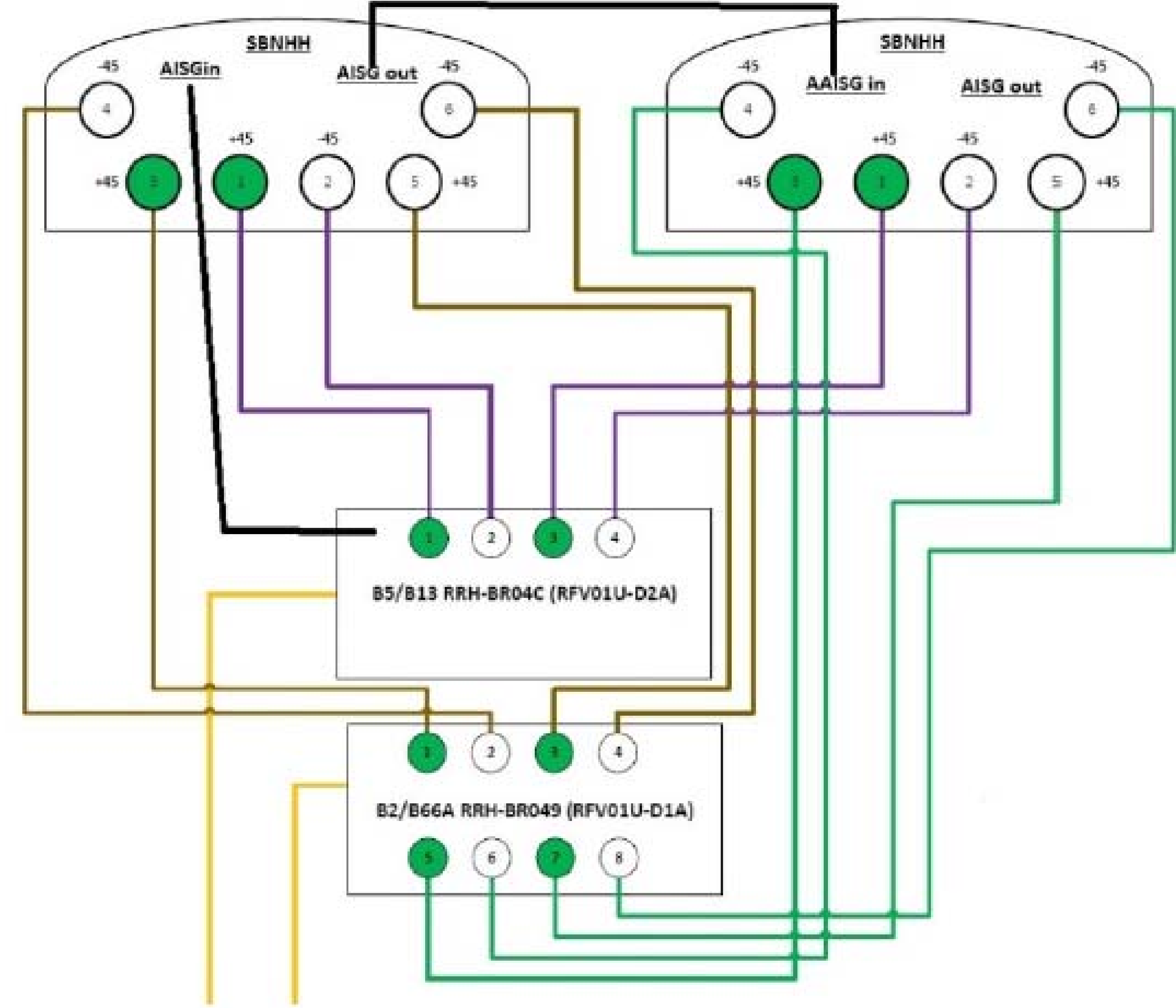
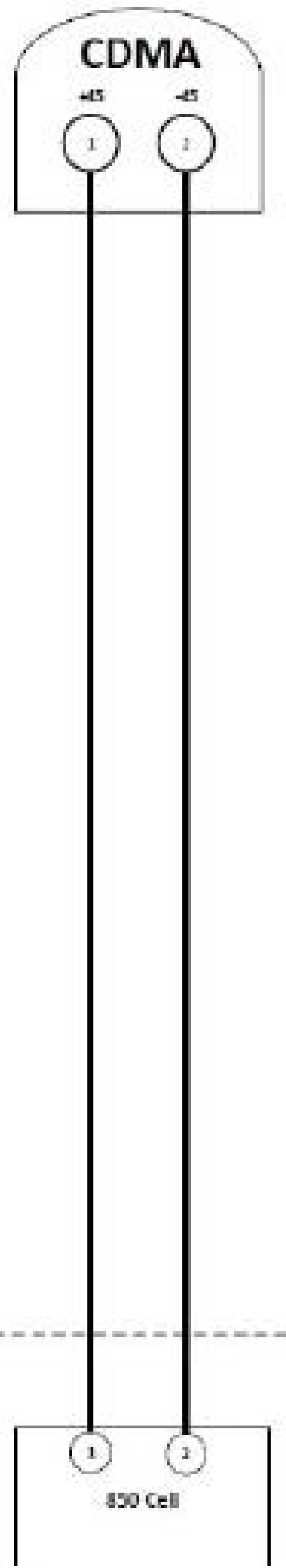
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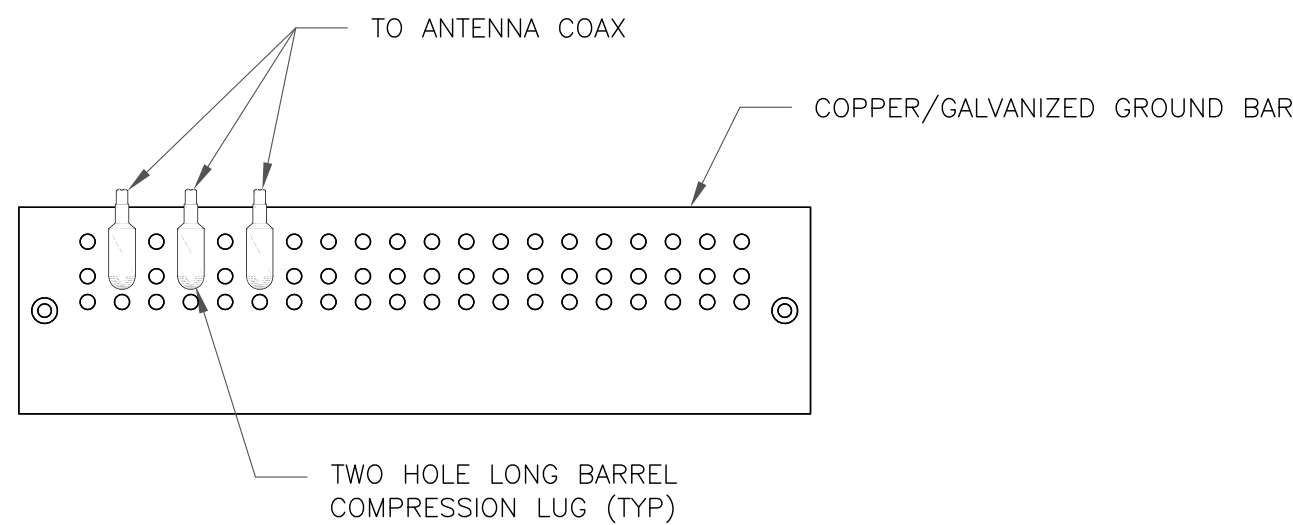
SHEET NUMBER: **C-6** REVISION: **0**



1 PLUMBING DIAGRAM  
 SCALE: NOT TO SCALE

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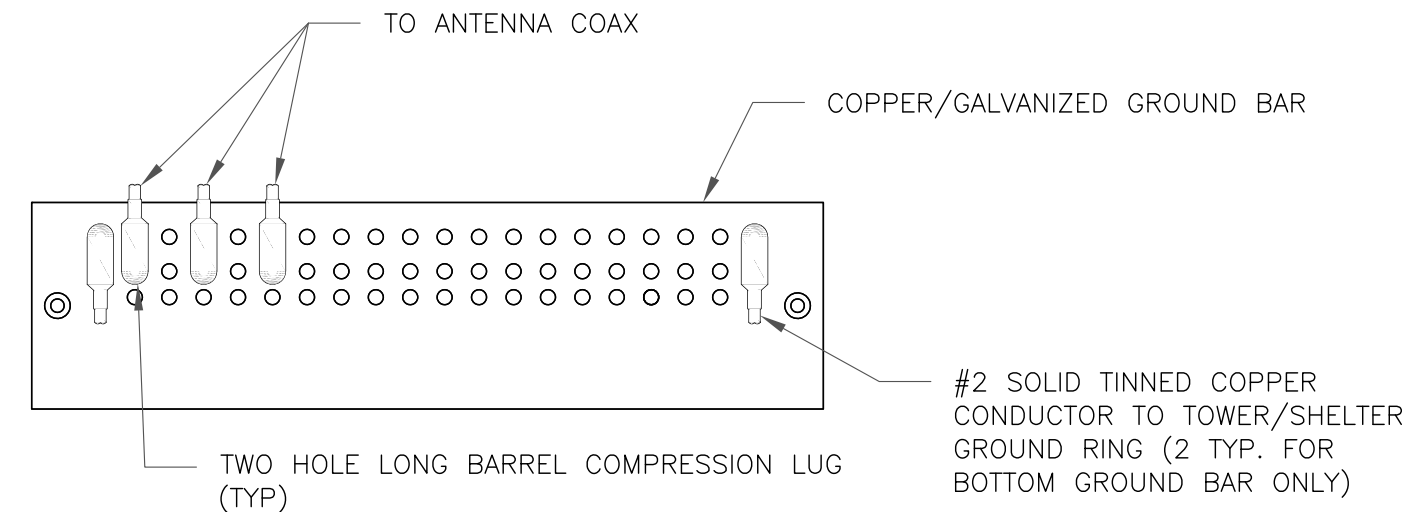




NOTES:

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.

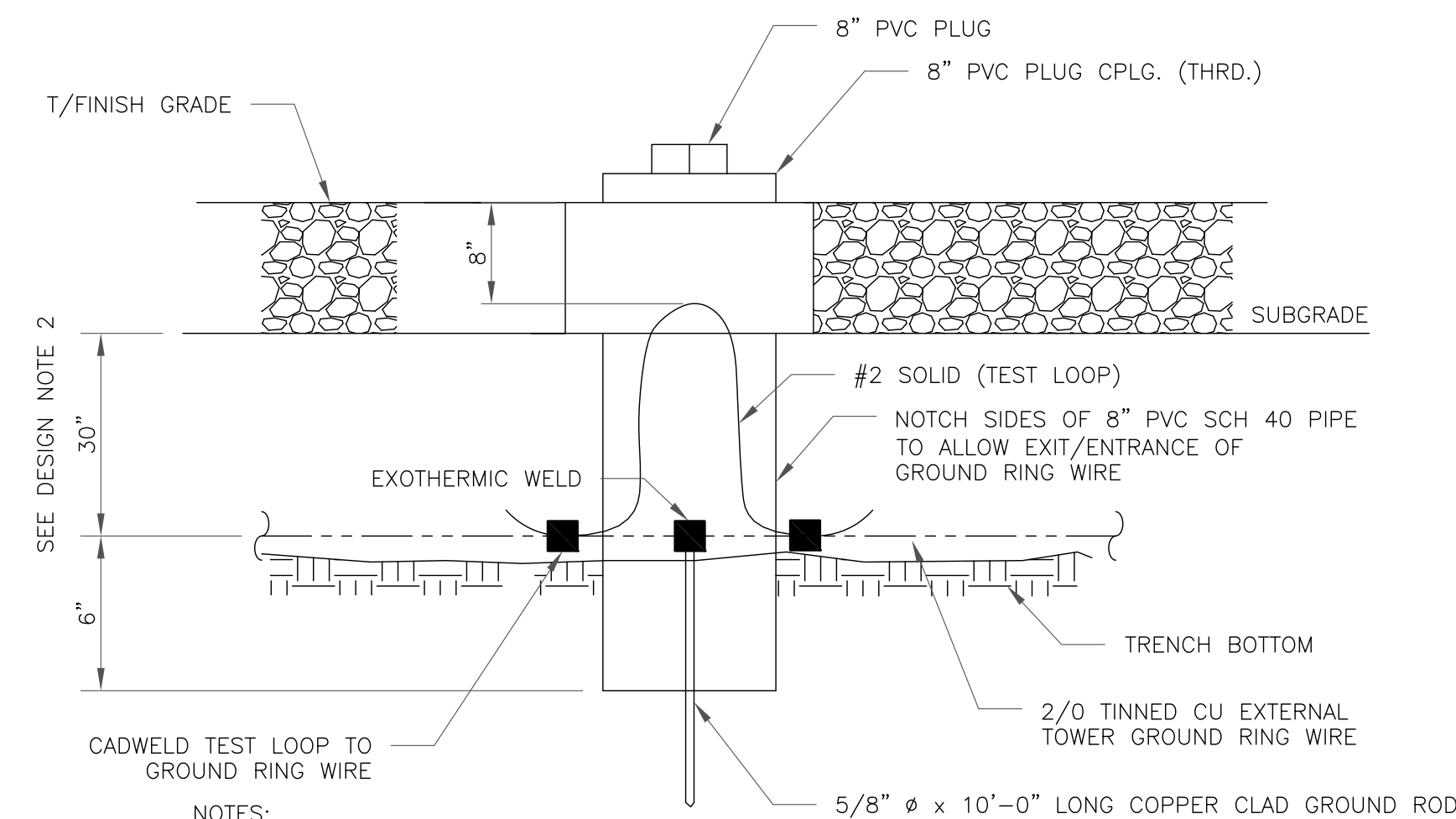
1 ANTENNA SECTOR GROUND BAR DETAIL  
SCALE: NOT TO SCALE



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.

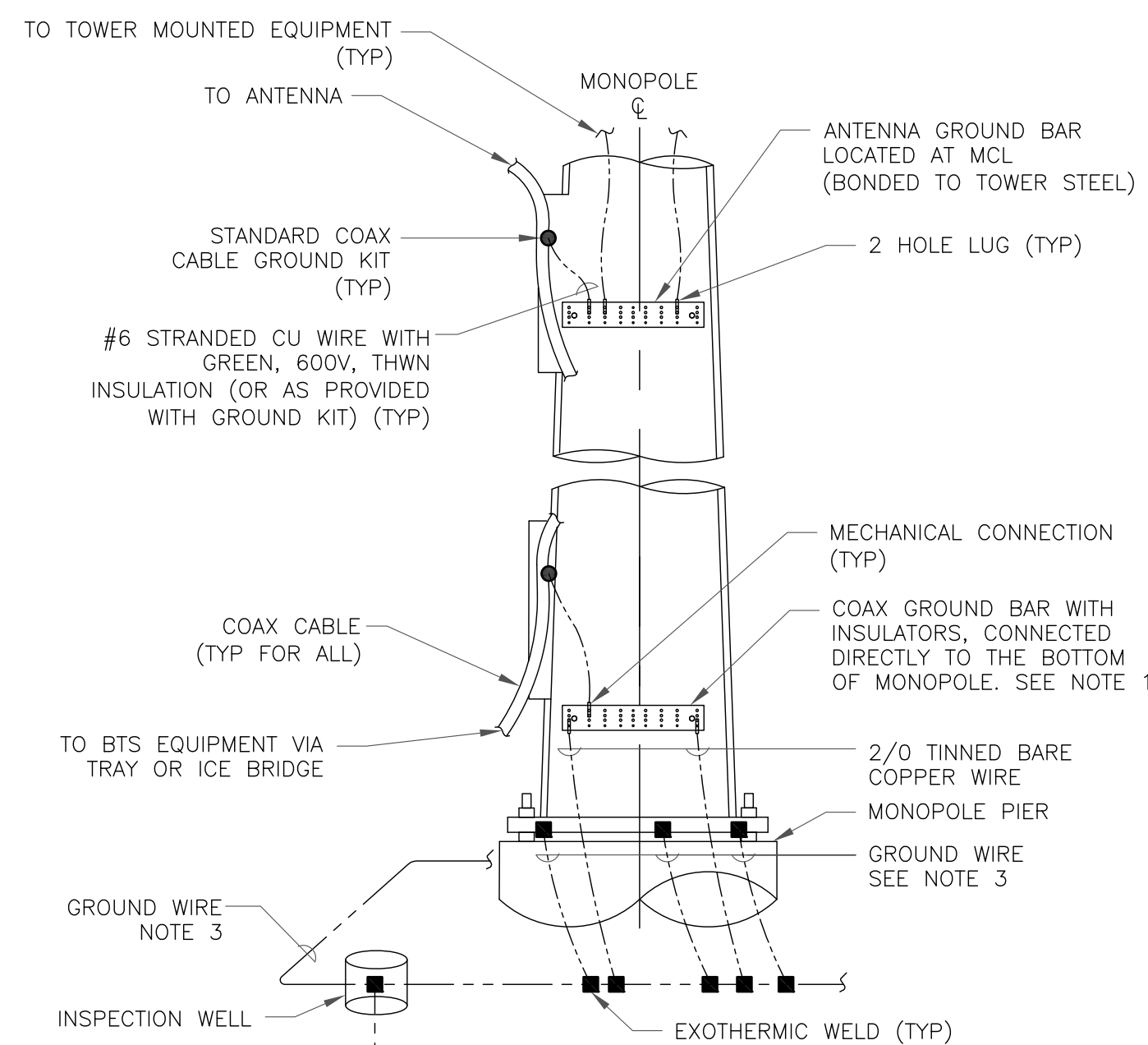
2 TOWER/SHELTER GROUND BAR DETAIL  
SCALE: NOT TO SCALE



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).

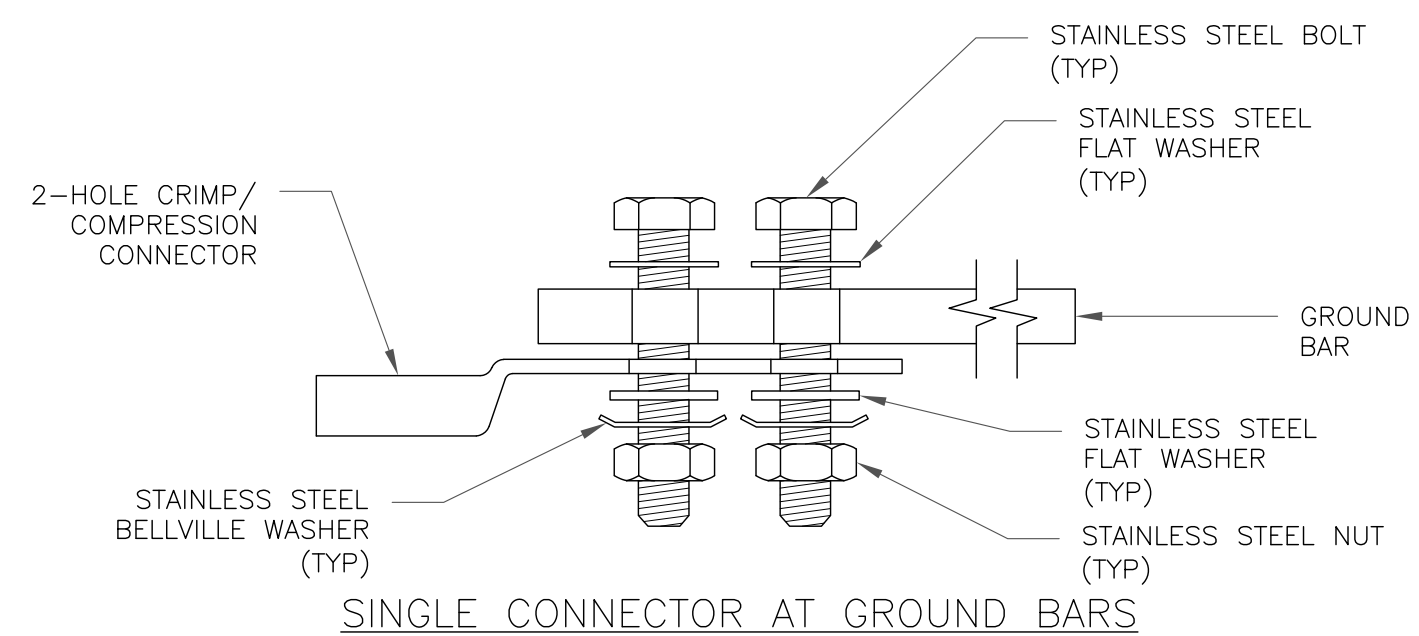
3 INSPECTION WELL DETAIL  
SCALE: NOT TO SCALE



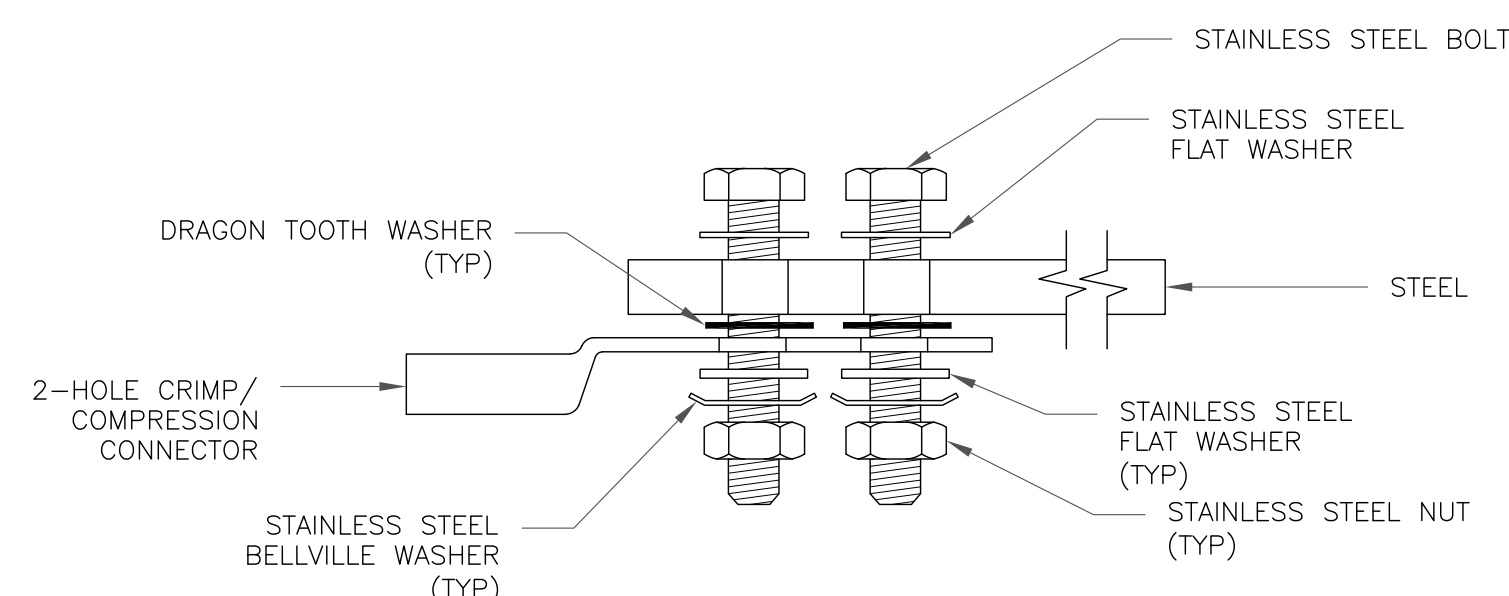
NOTES:

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.

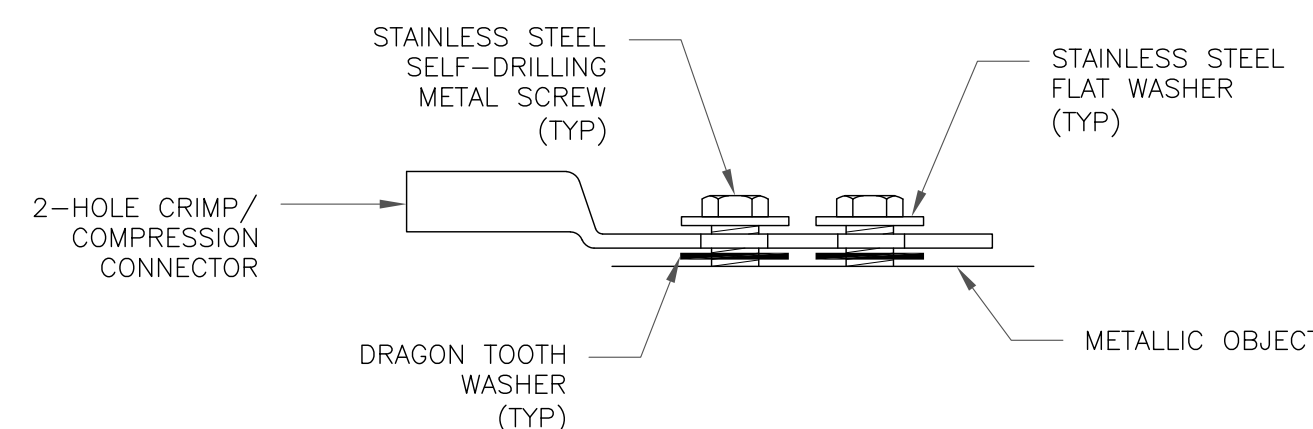
4 TYPICAL ANTENNA CABLE GROUNDING  
SCALE: NOT TO SCALE



SINGLE CONNECTOR AT GROUND BARS

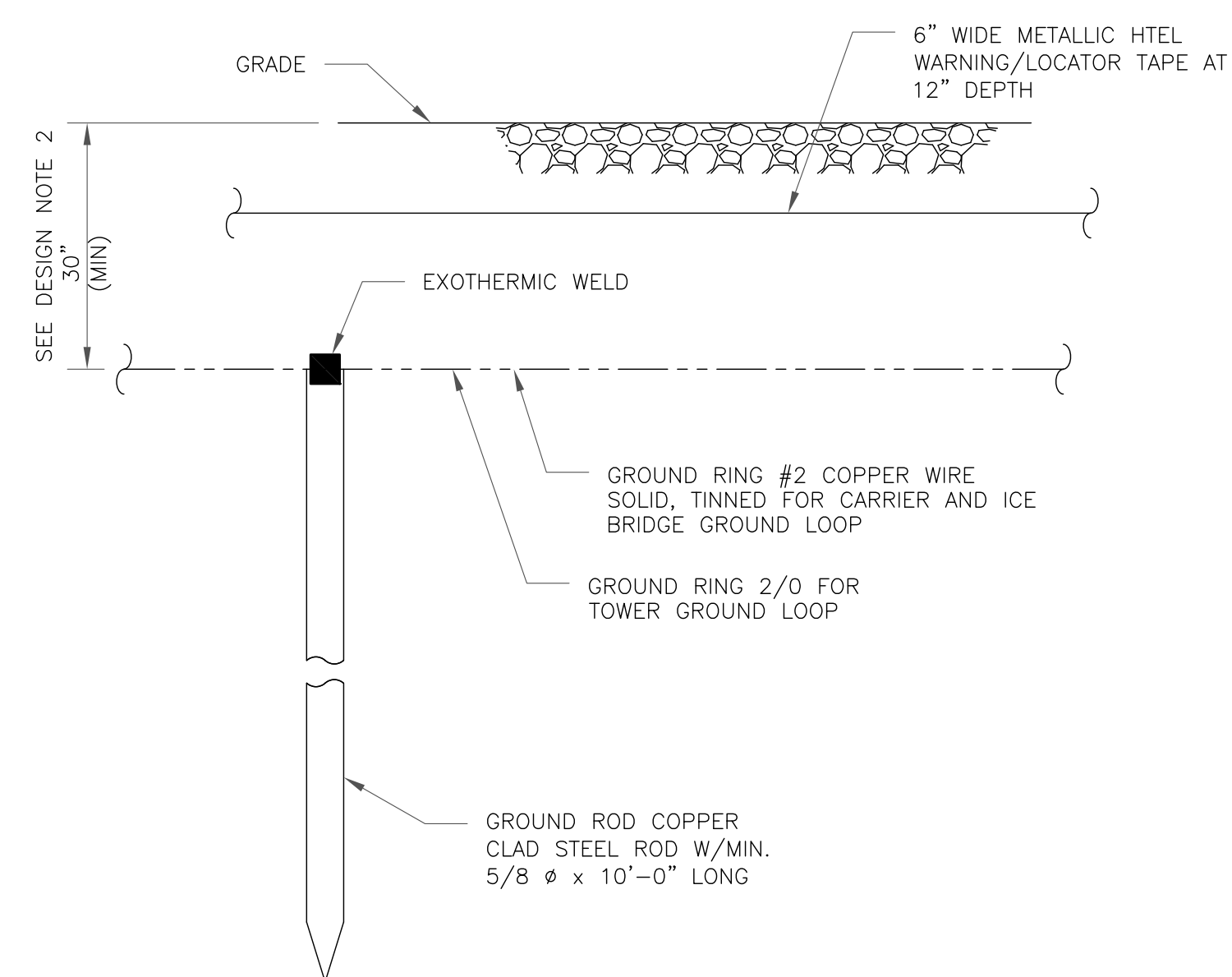


SINGLE CONNECTOR AT STEEL OBJECTS



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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**36 PROSPECT STREET**

36 PROSPECT STREET  
NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

ISSUED FOR:

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0	2/25/22	JHW	CONSTRUCTION	MTJ

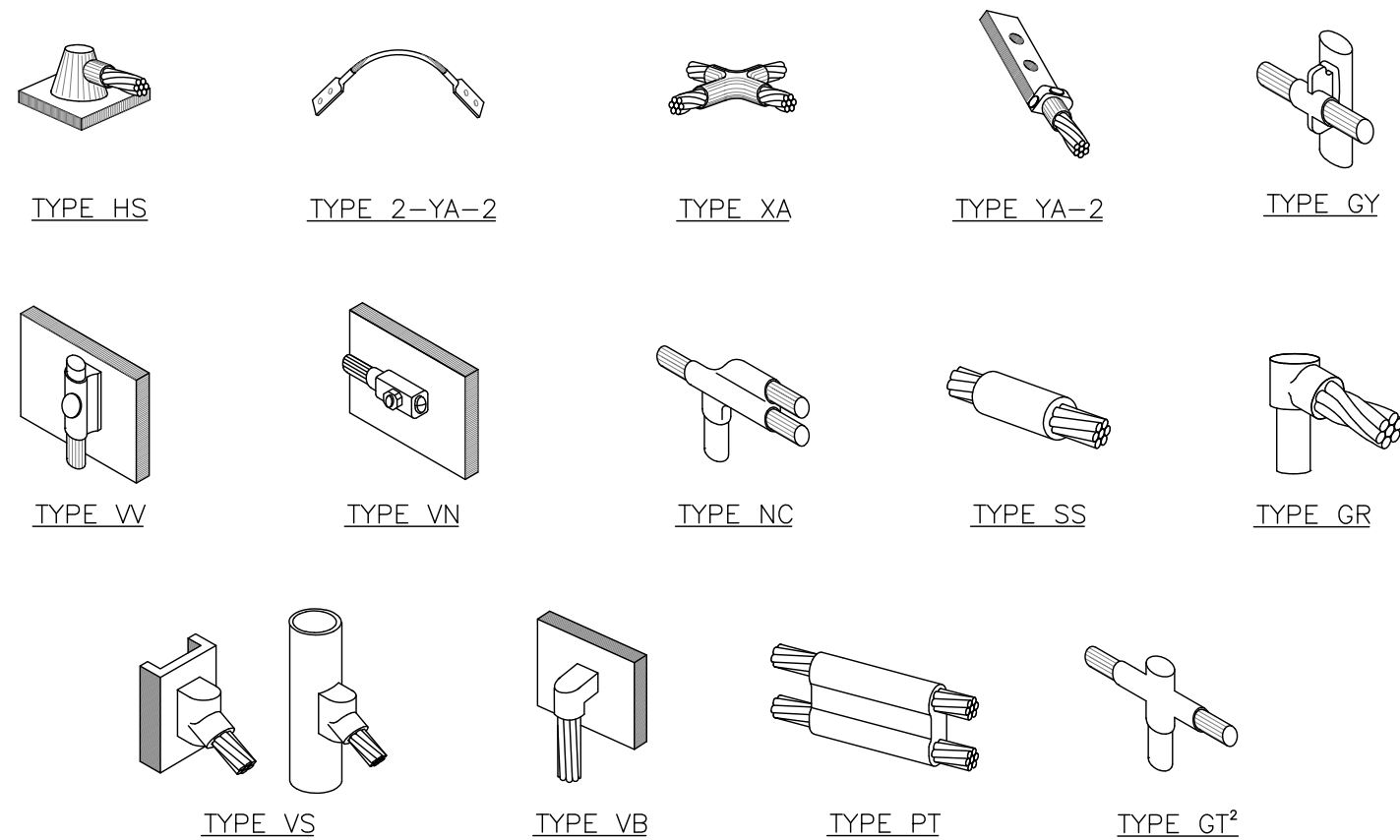


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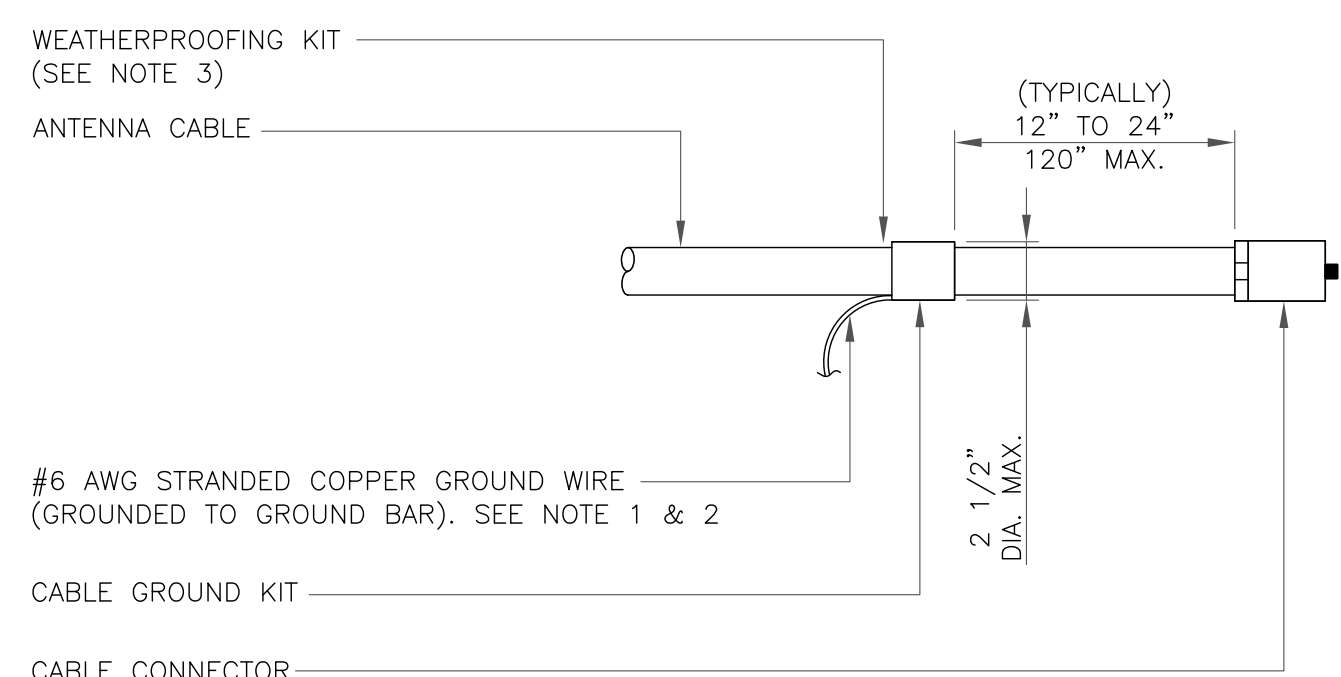




**NOTE:**

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.

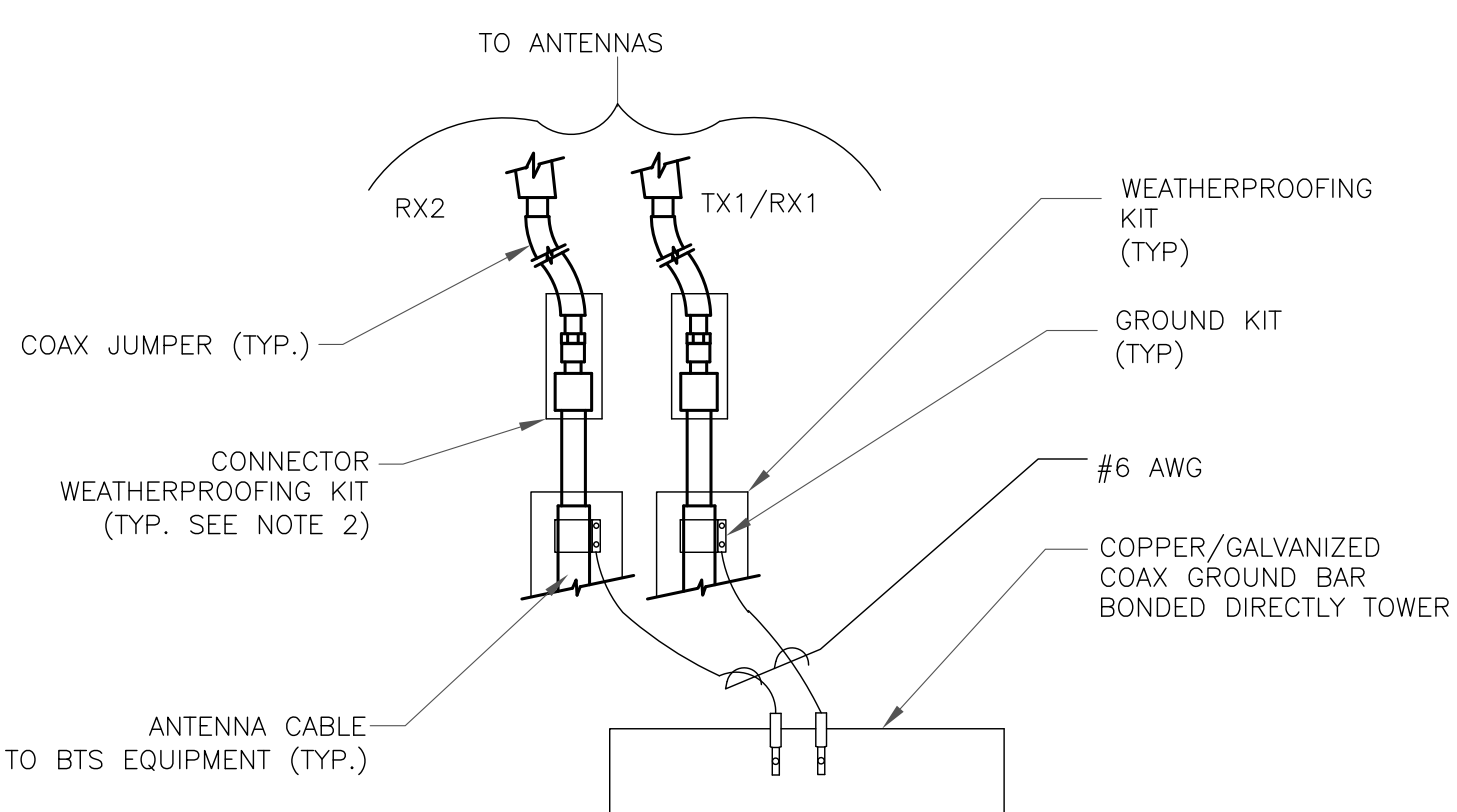
**1 CADWELD GROUNDING CONNECTIONS**  
SCALE: NOT TO SCALE



**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.

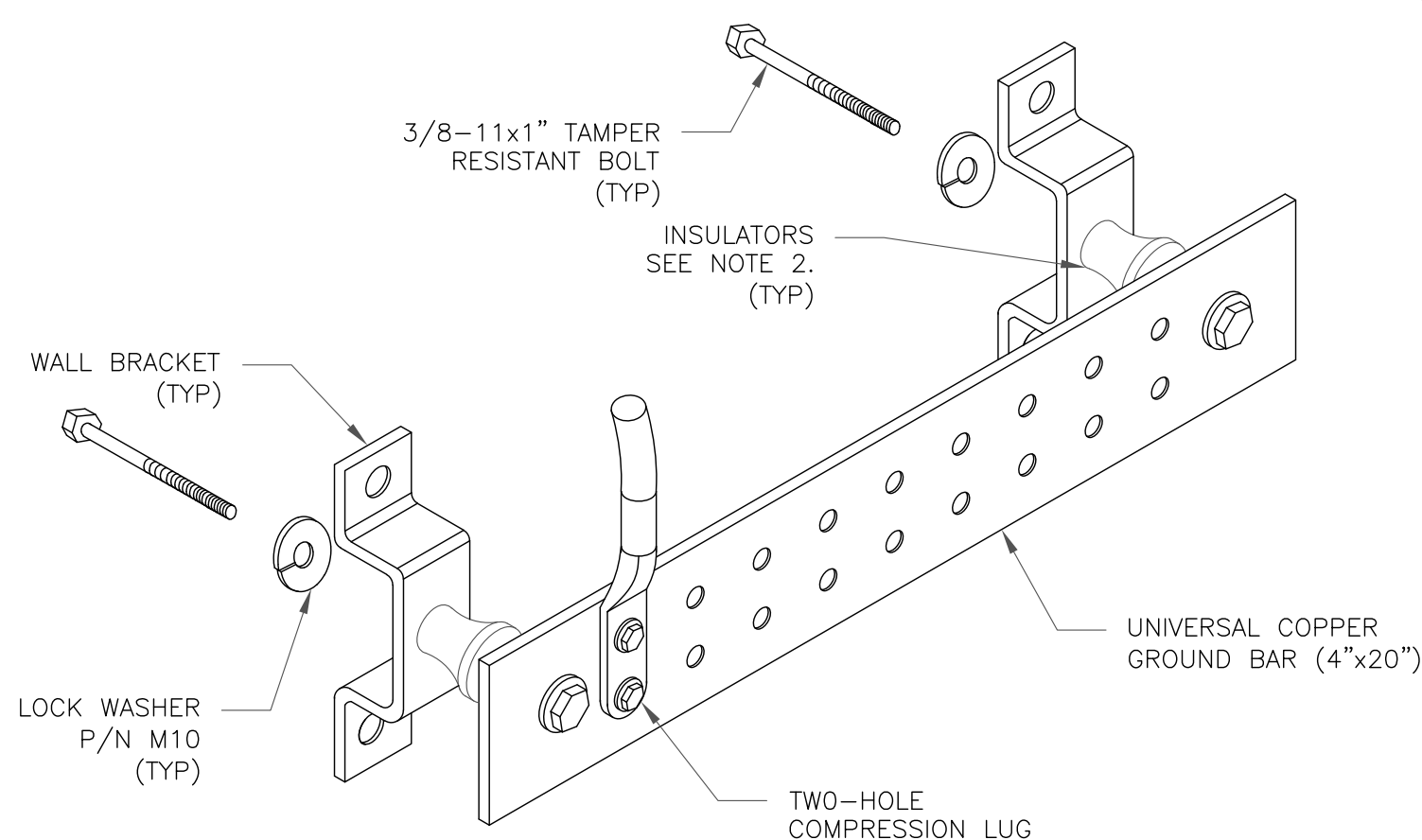
**3 CABLE GROUND KIT CONNECTION**  
SCALE: NOT TO SCALE



**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.

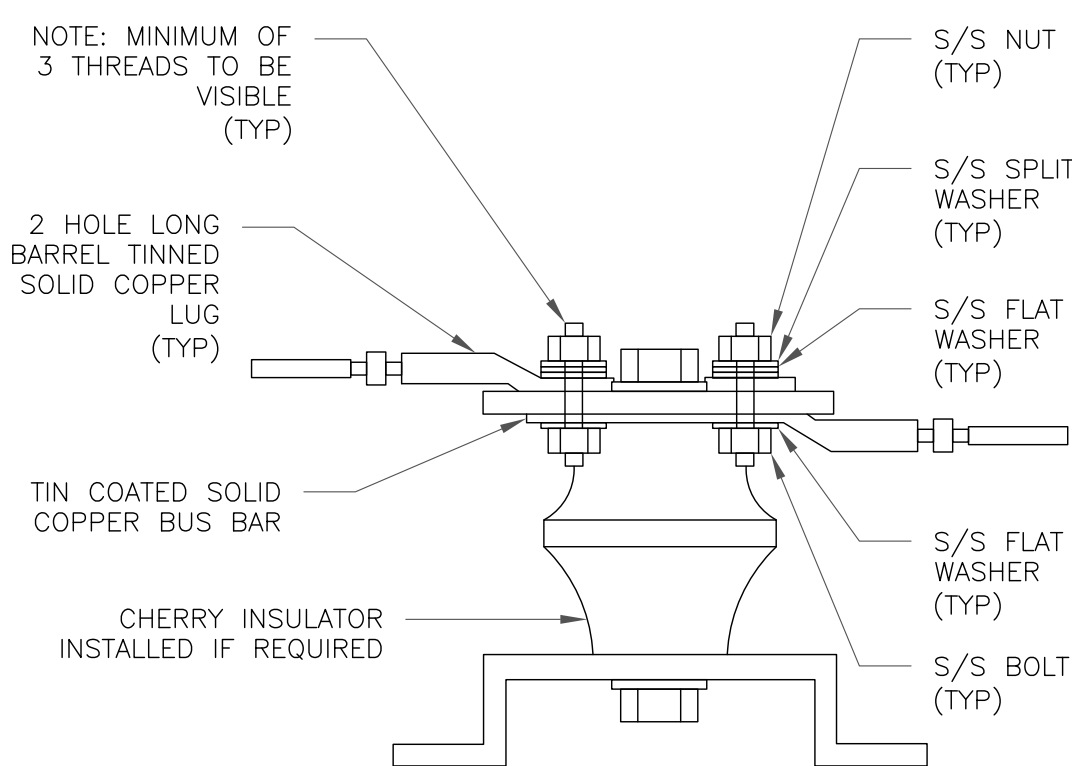
**4 GROUND CABLE CONNECTION**  
SCALE: NOT TO SCALE



**NOTES:**

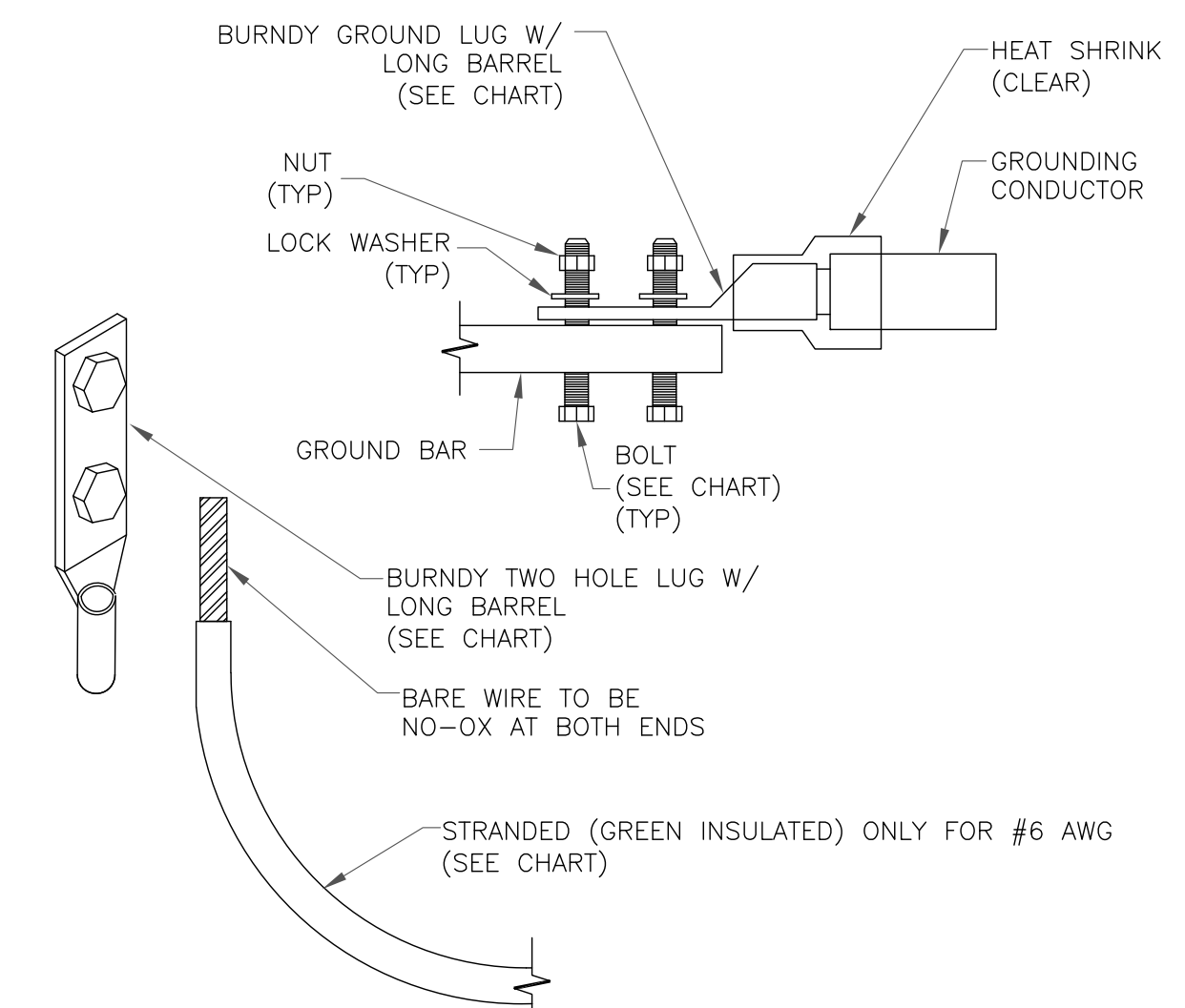
1. DOWN LEAD (HOME RUN) CONDUCTORS ARE NOT TO BE INSTALLED ON CROWN CASTLE USA INC. TOWER, PER THE GROUNDING DOWN CONDUCTOR POLICY QAS-STD-10091. NO MODIFICATION OR DRILLING TO TOWER STEEL IS ALLOWED IN ANY FORM OR FASHION, CAD-WELDING ON THE TOWER AND/OR IN THE AIR ARE NOT PERMITTED.
2. OMIT INSULATOR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

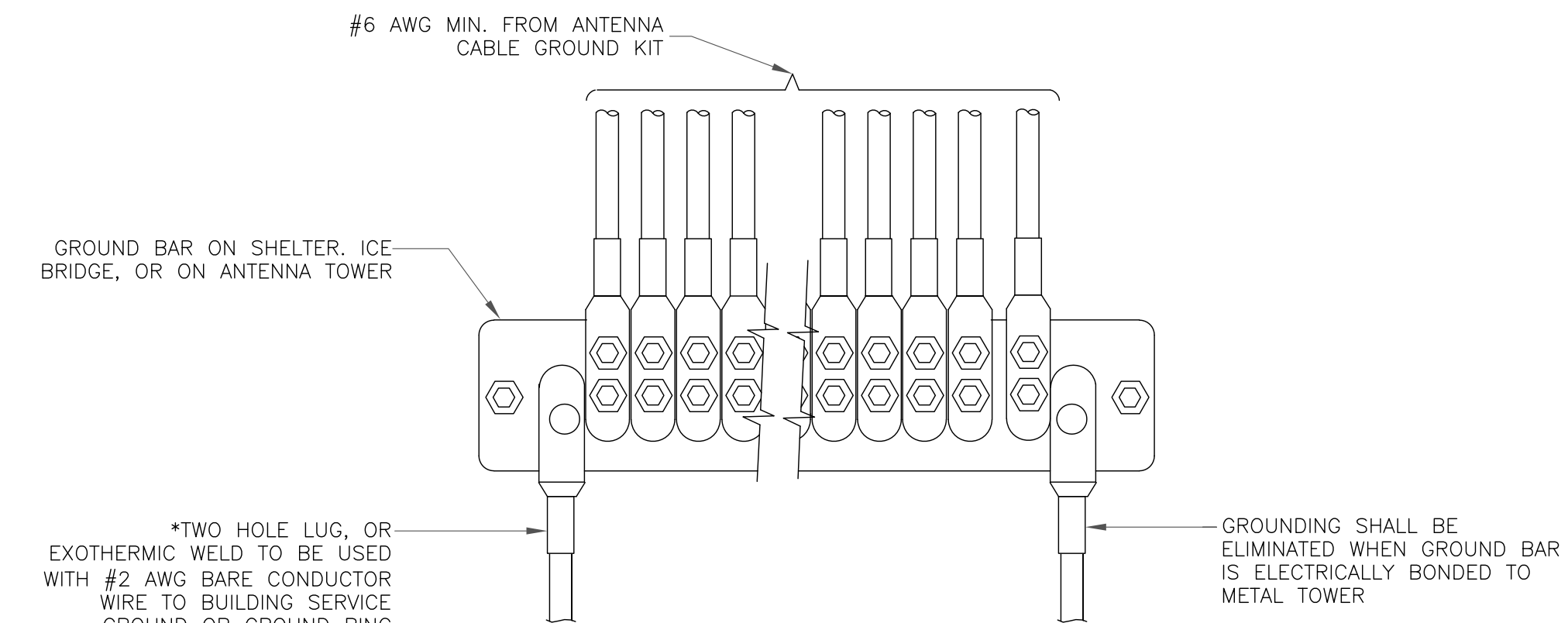
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 AWG GREEN INSULATED	YA6C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG SOLID TINNED	YA3C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG STRANDED	YA2C-2TC38	3/8" - 16 NC S 2 BOLT
#2/0 AWG STRANDED	YA26-2TC38	3/8" - 16 NC S 2 BOLT
#4/0 AWG STRANDED	YA28-2N	1/2" - 16 NC S 2 BOLT



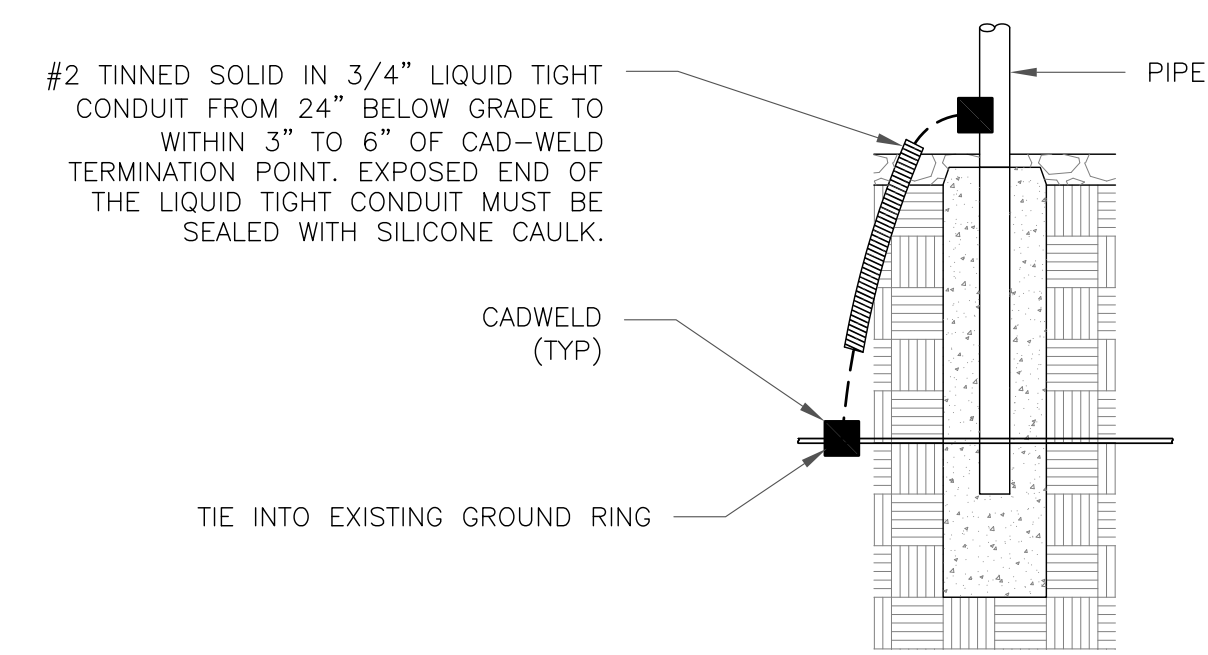
**NOTES:**

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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BU #: **876332**  
**36 PROSPECT STREET**

36 PROSPECT STREET  
NEWINGTON, CT 06109

EXISTING 136'-0" MONOPOLE

**ISSUED FOR:**

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# Exhibit D

## **Structural Analysis Report**

Date: **March 28, 2022**



Crown Castle  
2000 Corporate Drive  
Canonsburg, PA 15317  
(724) 416-2000

**Subject:** **Structural Analysis Report**

**Carrier Designation:** **Verizon Wireless Co-Locate**  
**Site Number:** 468043  
**Site Name:** NEWINGTON CT

**Crown Castle Designation:** **BU Number:** 876332  
**Site Name:** 36 PROSPECT STREET  
**JDE Job Number:** 711444  
**Work Order Number:** 2096452  
**Order Number:** 610891 Rev. 0

**Engineering Firm Designation:** **Crown Castle Project Number:** 2096452

**Site Data:** **36 Prospect Street, NEWINGTON, HARTFORD County, CT**  
**Latitude 41° 41' 23.66", Longitude -72° 42' 18.85"**  
**136 Foot - Monopole Tower**

Crown Castle 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

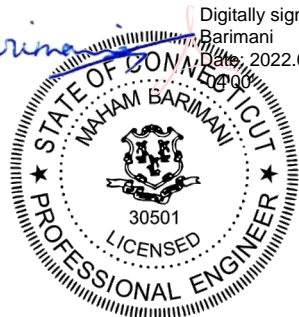
**Sufficient Capacity-45.6%**

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 Schmitt

Respectfully submitted by: *Barimani* Digitally signed by Maham Barimani  
Date: 2022.04.01 09:20:13

Maham Barimani, P.E.  
Senior Project Engineer



## 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 - LC7

4.1) Recommendations

### 5) APPENDIX A

tnxTower Output

### 6) APPENDIX B

Base Level Drawing

### 7) APPENDIX C

Additional Calculations

## 1) INTRODUCTION

This tower is a 136 ft Monopole tower designed by SUMMIT.

## 2) ANALYSIS CRITERIA

<b>TIA-222 Revision:</b>	TIA-222-H
<b>Risk Category:</b>	II
<b>Wind Speed:</b>	125 mph
<b>Exposure Category:</b>	B
<b>Topographic Factor:</b>	1
<b>Ice Thickness:</b>	2 in
<b>Wind Speed with Ice:</b>	50 mph
<b>Service Wind Speed:</b>	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)
106.0	108.0	3	samsung telecommunications	MT6407-77A w/ Mount Pipe	2	1-1/4
	106.0	3	andrew	LNx-6513DS-A1M w/ Mount Pipe		
		6	andrew	SBNHH-1D65B w/ Mount Pipe		
		3	miscl	Dual Antenna Mounting Bracket		
		1	raycap	RVZDC-6627-PF-48		
		3	samsung telecommunications	RFV01U-D1A		
		3	samsung telecommunications	RFV01U-D2A		
		1	tower mounts	Platform Mount [LP 713-1]		
	104.0	3	samsung telecommunications	XXDWMM-12.5-65-8T-CBRS w/ Mount Pipe		

**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)
129.0	131.0	1	sigfox	CAVITY FILTER	1	1/2
		1	sigfox	CXL 900-3LW		
		1	sigfox	LNA		
	129.0	1	tower mounts	Side Arm Mount [SO 306-1]		
118.0	120.0	3	alcatel lucent	TD-RRH8X20-25	3	1-5/8 1-1/4
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe		
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe		
	118.0	1	tower mounts	Platform Mount [LP 1201-1]		
116.0	118.0	3	alcatel lucent	PCS 1900MHZ 4X45W 65MHZ	-	-
	116.0	1	tower mounts	Side Arm Mount [SO 102-3]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
	114.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER		
78.0	78.0	3	fujitsu	TA08025-B604	1	1-3/8
		3	fujitsu	TA08025-B605		
		3	jma wireless	MX08FRO665-21 w/ Mount Pipe		
		1	raycap	RDIDC-9181-PF-48		
		1	tower mounts	Commscope MC-PK8-DSH		
65.0	66.0	1	lucent	KS24019-L112A	1	1/2
	65.0	1	tower mounts	Side Arm Mount [SO 701-1]		

### 3) ANALYSIS PROCEDURE

**Table 3 - Documents Provided**

Document	Reference	Source
4-GEOTECHNICAL REPORTS	1529724	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	1615432	CCISITES
4-TOWER MANUFACTURER DRAWINGS	1440581	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) 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.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle 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)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	136 - 130	Pole	TP4.5x4.5x0.216	1	-0.067	96.151	2.3	Pass
L2	130 - 129.5	Pole	TP10.75x4.5x0.216	2	-0.073	96.151	2.3	Pass
L3	129.5 - 120.5	Pole	TP10.75x10.75x0.322	3	-0.511	348.904	3.0	Pass
L4	120.5 - 120	Pole	TP22x10.75x0.322	4	-0.511	348.904	3.0	Pass
L5	120 - 87.5	Pole	TP29.476x22x0.188	5	-10.440	947.092	34.2	Pass
L6	87.5 - 58.75	Pole	TP35.715x28.238x0.25	6	-17.212	1571.493	45.6	Pass
L7	58.75 - 32.25	Pole	TP41.311x34.18x0.375	7	-22.834	2946.678	33.3	Pass
L8	32.25 - 0	Pole	TP47.98x39.353x0.438	8	-33.903	4113.973	35.0	Pass
							Summary	
						Pole (L6)	45.6	Pass
						Rating =	45.6	Pass

**Table 5 - Tower Component Stresses vs. Capacity - LC7**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flange Bolts	130	0.8	Pass
1	Flange Plate	130	4.3	Pass
1	Flange Bolts	120	7.8	Pass
1	Flange Plate	120	13.4	Pass
1	Anchor Rods	0	31.6	Pass
1	Base Plate	0	32.2	Pass
1,2	Base Foundation (Compared w/ Design Loads)	0	33.7	Pass

<b>Structure Rating (max from all components) =</b>	<b>45.6%</b>
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Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Foundation capacity determined by comparing analysis reactions to original design reactions.

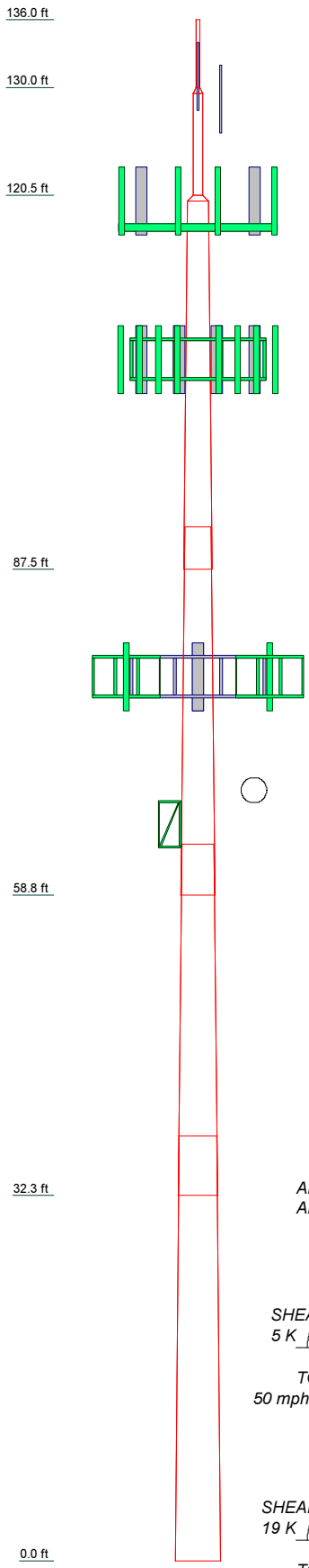
#### 4.1) Recommendations

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	5	6	7	8	A53-B-35	17.5
Length (ft)	0.500	0.500	9.000	0.500	32.500	32.500	31.000	37.500	A572-65	7.8
Number of Sides	1	1	1	1	12	12	12	12	A572-60	4.8
Thickness (in)	0.322	0.216	0.322	0.322	0.188	0.250	0.375	0.438	A572-60	2.8
Socket Length (ft)					3.750	4.500	5.250	39.353	A572-65	7.8
Top Dia (in)			10.750	10.750	22.000	28.238	34.180	47.980	A572-65	7.8
Bot Dia (in)			10.750	10.750	29.476	35.715	41.311	47.980	A572-65	7.8
Grade										
Weight (K)	0.0	0.0	0.3	0.0	1.7	2.8	4.8	7.8		



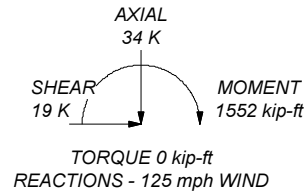
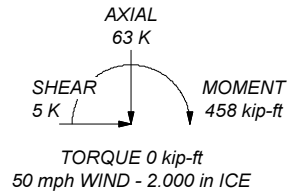
**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	60 ksi	A572-65	65 ksi	80 ksi
A572-60	60 ksi	75 ksi			

**TOWER DESIGN NOTES**

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 2.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 45.6%

ALL REACTIONS ARE FACTORED



**CROWN CASTLE**  
The Foundation for a Wireless World

**Crown Castle**  
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Canonsburg, PA 15317  
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Job: <b>BU# 876332</b>			
Project:			
Client: Crown Castle	Drawn by: Matthew Schmitt	App'd:	
Code: TIA-222-H	Date: 03/28/22	Scale: NTS	
Path: C:\Work Area\876332\WO 2096452 - SAIProd\876332.dwg		Dwg No. E-1	

## Tower Input Data

The tower is a monopole.  
 This tower is designed using the TIA-222-H standard.  
 The following design criteria apply:

- Tower is located in Hartford County, Connecticut.
- Tower base elevation above sea level: 260.000 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: 0.000 ft.
- Nominal ice thickness of 2.000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56.000 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50.000 °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

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	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	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  <div style="text-align: center; background-color: #e0e0e0; padding: 2px;"><b>Poles</b></div> ✓ 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
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## Tapered Pole Section Geometry

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	136.000-130.000	6.000	0.000	Round	4.500	4.500	0.216		A53-B-35 (35 ksi)
L2	130.000-129.500	0.500	0.000	Round	4.500	10.750	0.216		A53-B-35 (35 ksi)
L3	129.500-120.500	9.000	0.000	Round	10.750	10.750	0.322		A53-B-35 (35 ksi)
L4	120.500-120.000	0.500	0.000	Round	10.750	22.000	0.322		A53-B-35 (35 ksi)
L5	120.000-87.500	32.500	3.750	12	22.000	29.476	0.188	0.750	A572-60 (60 ksi)
L6	87.500-58.750	32.500	4.500	12	28.238	35.715	0.250	1.000	A572-60 (60 ksi)
L7	58.750-32.250	31.000	5.250	12	34.180	41.311	0.375	1.500	A572-65 (65 ksi)
L8	32.250-0.000	37.500		12	39.353	47.980	0.438	1.750	A572-65 (65 ksi)

### Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	It/Q in <sup>2</sup>	w in	w/t
L1	4.500	2.907	6.686	1.517	2.250	2.972	13.372	1.453	0.000	0
	4.500	2.907	6.686	1.517	2.250	2.972	13.372	1.453	0.000	0
L2	4.500	2.907	6.686	1.517	2.250	2.972	13.372	1.453	0.000	0
	10.750	7.148	99.192	3.725	5.375	18.454	198.384	3.572	0.000	0
L3	10.750	10.549	143.527	3.689	5.375	26.703	287.053	5.271	0.000	0
	10.750	10.549	143.527	3.689	5.375	26.703	287.053	5.271	0.000	0
L4	10.750	10.549	143.527	3.689	5.375	26.703	287.053	5.271	0.000	0
	22.000	21.929	1288.455	7.665	11.000	117.132	2576.910	10.958	0.000	0
L5	22.710	13.169	799.760	7.809	11.396	70.179	1620.530	6.482	5.394	28.765
	30.450	17.683	1936.130	10.485	15.269	126.805	3923.124	8.703	7.397	39.451
L6	30.039	22.531	2252.762	10.020	14.627	154.009	4564.707	11.089	6.898	27.592
	36.887	28.549	4583.336	12.696	18.500	247.743	9287.082	14.051	8.902	35.606
L7	36.325	40.819	5953.979	12.102	17.705	336.286	12064.375	20.090	8.155	21.747
	42.636	49.430	10572.783	14.655	21.399	494.076	21423.324	24.328	10.066	26.844
L8	41.838	54.823	10597.356	13.932	20.385	519.860	21473.116	26.982	9.374	21.427
	49.518	66.975	19322.616	17.020	24.854	777.456	39152.859	32.963	11.686	26.711

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>r</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
L1 136.000-130.000				1	1	1			
L2 130.000-129.500				1	1	1			
L3 129.500-120.500				1	1	1			
L4 120.500-120.000				1	1	1			
L5 120.000-87.500				1	1	1			
L6 87.500-58.750				1	1	1			
L7 58.750-32.250				1	1	1			
L8 32.250-0.000				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 r in	Weight klf
***											

**Feed Line/Linear Appurtenances - Entered As Area**

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C <sub>AA</sub> ft <sup>2</sup> /ft	Weight klf		
EC4-50(1/2)	A	No	No	Inside Pole	129.000 - 0.000	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000		
*											
HB114-1-08U4-M5J(1-1/4)	B	No	No	Inside Pole	118.000 - 0.000	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.001 0.001 0.001 0.001		
HB158-1-13U6-S6F18(1-5/8)	B	No	No	Inside Pole	118.000 - 0.000	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.002 0.002 0.002 0.002		
*											
HB114-U6S12-XXX-LI(1-1/4)	C	No	No	Inside Pole	106.000 - 0.000	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.002 0.002 0.002 0.002		
*											
LDF4-50A(1/2)	A	No	No	Inside Pole	65.000 - 0.000	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000		
*											
CU12PSM9P8XXX(1-3/8)	C	No	No	Inside Pole	78.000 - 0.000	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.002 0.002 0.002 0.002		
***											

**Feed Line/Linear Appurtenances Section Areas**

Tower Section n	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
L1	136.000-130.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L2	130.000-129.500	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L3	129.500-120.500	A	0.000	0.000	0.000	0.000	0.001
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L4	120.500-120.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L5	120.000-87.500	A	0.000	0.000	0.000	0.000	0.005
		B	0.000	0.000	0.000	0.000	0.157

Tower Section	Tower Elevation ft	Face	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
L6	87.500-58.750	C	0.000	0.000	0.000	0.000	0.063
		A	0.000	0.000	0.000	0.000	0.006
		B	0.000	0.000	0.000	0.000	0.148
L7	58.750-32.250	C	0.000	0.000	0.000	0.000	0.130
		A	0.000	0.000	0.000	0.000	0.008
		B	0.000	0.000	0.000	0.000	0.136
L8	32.250-0.000	C	0.000	0.000	0.000	0.000	0.134
		A	0.000	0.000	0.000	0.000	0.010
		B	0.000	0.000	0.000	0.000	0.166
		C	0.000	0.000	0.000	0.000	0.163

**Feed Line/Linear Appurtenances Section Areas - With Ice**

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
L1	136.000-130.000	A	1.954	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L2	130.000-129.500	A	1.949	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L3	129.500-120.500	A	1.942	0.000	0.000	0.000	0.000	0.001
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L4	120.500-120.000	A	1.935	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L5	120.000-87.500	A	1.905	0.000	0.000	0.000	0.000	0.005
		B		0.000	0.000	0.000	0.000	0.157
		C		0.000	0.000	0.000	0.000	0.063
L6	87.500-58.750	A	1.840	0.000	0.000	0.000	0.000	0.006
		B		0.000	0.000	0.000	0.000	0.148
		C		0.000	0.000	0.000	0.000	0.130
L7	58.750-32.250	A	1.754	0.000	0.000	0.000	0.000	0.008
		B		0.000	0.000	0.000	0.000	0.136
		C		0.000	0.000	0.000	0.000	0.134
L8	32.250-0.000	A	1.578	0.000	0.000	0.000	0.000	0.010
		B		0.000	0.000	0.000	0.000	0.166
		C		0.000	0.000	0.000	0.000	0.163

**Feed Line Center of Pressure**

Section	Elevation ft	$CP_x$ in	$CP_z$ in	$CP_x$ Ice in	$CP_z$ Ice in
L1	136.000-130.000	0.000	0.000	0.000	0.000
L2	130.000-129.500	0.000	0.000	0.000	0.000
L3	129.500-120.500	0.000	0.000	0.000	0.000
L4	120.500-120.000	0.000	0.000	0.000	0.000
L5	120.000-87.500	0.000	0.000	0.000	0.000
L6	87.500-58.750	0.000	0.000	0.000	0.000
L7	58.750-32.250	0.000	0.000	0.000	0.000
L8	32.250-0.000	0.000	0.000	0.000	0.000

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
CXL 900-3LW	A	From Leg	4.000 0.000 2.000	0.000	129.000
LNA	A	From Leg	4.000 0.000 2.000	0.000	129.000
CAVITY FILTER	A	From Leg	4.000 0.000 2.000	0.000	129.000
Side Arm Mount [SO 306-1]	A	From Leg	2.000 0.000 0.000	0.000	129.000
*					
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	118.000
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	118.000
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	118.000
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	118.000
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	118.000
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	118.000
TD-RRH8X20-25	A	From Leg	4.000 0.000 2.000	0.000	118.000
TD-RRH8X20-25	B	From Leg	4.000 0.000 2.000	0.000	118.000
TD-RRH8X20-25	C	From Leg	4.000 0.000 2.000	0.000	118.000
Platform Mount [LP 1201-1]	C	None		0.000	118.000
(3) 6' x 2" Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	118.000
(3) 6' x 2" Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	118.000
(3) 6' x 2" Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	118.000
*					
PCS 1900MHZ 4X45W 65MHZ	A	From Leg	1.000 0.000 2.000	0.000	116.000
PCS 1900MHZ 4X45W 65MHZ	B	From Leg	1.000 0.000 2.000	0.000	116.000
PCS 1900MHZ 4X45W 65MHZ	C	From Leg	1.000 0.000 2.000	0.000	116.000
800MHz 2X50W RRH W/FILTER	A	From Leg	1.000 0.000	0.000	116.000

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement
			Horz Lateral ft	Vert ft		
800MHz 2X50W RRH W/FILTER	B	From Leg	-2.000	1.000	0.000	116.000
			0.000			
800MHz 2X50W RRH W/FILTER	C	From Leg	-2.000	1.000	0.000	116.000
			0.000			
Side Arm Mount [SO 102-3] 6' x 2" Mount Pipe	C	None	-2.000		0.000	116.000
	A	From Leg	1.000		0.000	116.000
			0.000			
6' x 2" Mount Pipe	B	From Leg	1.000		0.000	116.000
			0.000			
6' x 2" Mount Pipe	C	From Leg	1.000		0.000	116.000
			0.000			
			1.000			
*						
LNX-6513DS-A1M w/ Mount Pipe	A	From Leg	4.000		0.000	106.000
			0.000			
LNX-6513DS-A1M w/ Mount Pipe	B	From Leg	4.000		0.000	106.000
			0.000			
LNX-6513DS-A1M w/ Mount Pipe	C	From Leg	4.000		0.000	106.000
			0.000			
MT6407-77A w/ Mount Pipe	A	From Leg	4.000		0.000	106.000
			0.000			
MT6407-77A w/ Mount Pipe	B	From Leg	4.000		0.000	106.000
			0.000			
MT6407-77A w/ Mount Pipe	C	From Leg	4.000		0.000	106.000
			0.000			
XXDWMM-12.5-65-8T-CBRS w/ Mount Pipe	A	From Leg	2.000		0.000	106.000
			4.000			
XXDWMM-12.5-65-8T-CBRS w/ Mount Pipe	B	From Leg	4.000		0.000	106.000
			0.000			
XXDWMM-12.5-65-8T-CBRS w/ Mount Pipe	C	From Leg	-2.000		0.000	106.000
			4.000			
			0.000			
			-2.000			
RVZDC-6627-PF-48	B	From Leg	4.000		0.000	106.000
			0.000			
			0.000			
RFV01U-D1A	A	From Leg	4.000		0.000	106.000
			0.000			
RFV01U-D1A	B	From Leg	4.000		0.000	106.000
			0.000			
RFV01U-D1A	C	From Leg	4.000		0.000	106.000
			0.000			
			0.000			
RFV01U-D2A	A	From Leg	4.000		0.000	106.000
			0.000			
			0.000			
RFV01U-D2A	B	From Leg	4.000		0.000	106.000
			0.000			
			0.000			
RFV01U-D2A	C	From Leg	4.000		0.000	106.000
			0.000			



Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement
			Horz	Lateral		
			ft	ft	°	ft
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	0.000	4.000	0.000	106.000
			0.000	0.000		
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	0.000	4.000	0.000	106.000
			0.000	0.000		
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	0.000	4.000	0.000	106.000
			0.000	0.000		
Platform Mount [LP 713-1]	C	None			0.000	106.000
Dual Antenna Mounting Bracket	A	From Leg	4.000	0.000	0.000	106.000
			0.000	0.000		
Dual Antenna Mounting Bracket	B	From Leg	4.000	0.000	0.000	106.000
			0.000	0.000		
Dual Antenna Mounting Bracket	C	From Leg	4.000	0.000	0.000	106.000
			0.000	0.000		
(2) 6' x 2" Mount Pipe	A	From Leg	0.000	4.000	0.000	106.000
			0.000	0.000		
(2) 6' x 2" Mount Pipe	B	From Leg	0.000	4.000	0.000	106.000
			0.000	0.000		
(2) 6' x 2" Mount Pipe	C	From Leg	0.000	4.000	0.000	106.000
			0.000	0.000		
			0.000	0.000		
*						
MX08FRO665-21 w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
MX08FRO665-21 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
MX08FRO665-21 w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
TA08025-B604	A	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
TA08025-B604	B	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
TA08025-B604	C	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
TA08025-B605	A	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
TA08025-B605	B	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
TA08025-B605	C	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
RDIDC-9181-PF-48	C	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
Commscope MC-PK8-DSH	C	None			0.000	78.000
(2) 8' x 2" Mount Pipe	A	From Leg	4.000	0.000	0.000	78.000
			0.000	0.000		
(2) 8' x 2" Mount Pipe	B	From Leg	4.000	0.000	0.000	78.000

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
			0.000		
(2) 8' x 2" Mount Pipe	C	From Leg	0.000 4.000	0.000	78.000
*			0.000 0.000		
KS24019-L112A	C	From Leg	3.000	0.000	65.000
			0.000 1.000		
Side Arm Mount [SO 701-1]	C	From Leg	1.500	0.000	65.000
			0.000 0.000		
2' x 2" Pipe Mount	C	From Leg	3.000	0.000	65.000
			0.000 1.000		
***					

## Load Combinations

Comb. No.	Description
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

Comb. No.	Description
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**

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	136 - 130	Pole	Max Tension	8	0.000	0.000	-0.000
			Max. Compression	26	-0.164	-0.000	0.000
			Max. Mx	8	-0.067	-0.247	0.000
			Max. My	2	-0.068	0.000	0.247
			Max. Vy	8	0.082	-0.247	0.000
			Max. Vx	2	-0.082	0.000	0.247
L2	130 - 129.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-0.185	-0.000	0.000
			Max. Mx	8	-0.077	-0.290	0.000
			Max. My	2	-0.078	-0.000	0.289
			Max. Vy	8	0.089	-0.290	0.000
			Max. Vx	2	-0.089	-0.000	0.289
L3	129.5 - 120.5	Pole	Max. Torque	10			-0.000
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-1.083	-0.000	0.676
			Max. Mx	8	-0.511	-2.794	0.137
			Max. My	2	-0.514	0.000	2.373
			Max. Vy	8	0.366	-2.794	0.137
L4	120.5 - 120	Pole	Max. Vx	2	-0.296	0.000	2.373
			Max. Torque	21			-0.281
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-1.138	-0.000	0.676
			Max. Mx	8	-0.544	-2.980	0.137
			Max. My	2	-0.547	-0.000	2.524
L5	120 - 87.5	Pole	Max. Vy	8	0.380	-2.980	0.137
			Max. Vx	2	-0.311	-0.000	2.524
			Max. Torque	21			-0.281
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-27.053	-0.789	0.220
			Max. Mx	8	-10.440	-181.276	-0.221
L6	87.5 - 58.75	Pole	Max. My	2	-10.447	0.112	178.173
			Max. Vy	20	-9.146	180.939	0.319
			Max. Vx	14	9.053	-0.427	-178.067
			Max. Torque	3			-0.347
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-39.837	0.157	-0.326
L7	58.75 - 32.25	Pole	Max. Mx	20	-17.212	505.813	0.444
			Max. My	14	-17.217	-0.400	-499.973
			Max. Vy	20	-13.951	505.813	0.444
			Max. Vx	14	13.857	-0.400	-499.973
			Max. Torque	3			-0.347
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-47.961	0.157	-0.326
			Max. Mx	20	-22.834	892.527	0.889
			Max. My	14	-22.838	-0.846	-884.283
			Max. Vy	20	-16.067	892.527	0.889
			Max. Vx	14	15.974	-0.846	-884.283

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L8	32.25 - 0	Pole	Max. Torque	8			-0.113
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-62.663	0.157	-0.326
			Max. Mx	20	-33.903	1551.990	1.532
			Max. My	14	-33.903	-1.488	-1540.315
			Max. Vy	20	-19.099	1551.990	1.532
			Max. Vx	14	19.009	-1.488	-1540.315
		Max. Torque	8			-0.113	

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	30	62.663	-5.359	-0.006
	Max. H <sub>x</sub>	20	33.910	19.087	0.017
	Max. H <sub>z</sub>	2	33.910	0.017	18.997
	Max. M <sub>x</sub>	2	1539.980	0.017	18.997
	Max. M <sub>z</sub>	8	1551.569	-19.087	-0.017
	Max. Torsion	20	0.113	19.087	0.017
	Min. Vert	5	25.432	-9.529	16.444
	Min. H <sub>x</sub>	8	33.910	-19.087	-0.017
	Min. H <sub>z</sub>	14	33.910	-0.017	-18.997
	Min. M <sub>x</sub>	14	-1540.315	-0.017	-18.997
	Min. M <sub>z</sub>	20	-1551.990	19.087	0.017
	Min. Torsion	8	-0.113	-19.087	-0.017

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturing Moment, M <sub>x</sub> kip-ft	Overturing Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	28.258	0.000	0.000	0.136	0.172	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	33.910	-0.017	-18.997	-1539.980	1.911	0.011
0.9 Dead+1.0 Wind 0 deg - No Ice	25.432	-0.017	-18.997	-1529.779	1.845	0.012
1.2 Dead+1.0 Wind 30 deg - No Ice	33.910	9.529	-16.444	-1332.790	-774.211	0.067
0.9 Dead+1.0 Wind 30 deg - No Ice	25.432	9.529	-16.444	-1323.967	-769.104	0.067
1.2 Dead+1.0 Wind 60 deg - No Ice	33.910	16.522	-9.484	-768.432	-1342.824	0.104
0.9 Dead+1.0 Wind 60 deg - No Ice	25.432	16.522	-9.484	-763.363	-1333.926	0.104
1.2 Dead+1.0 Wind 90 deg - No Ice	33.910	19.087	0.017	1.868	-1551.569	0.113
0.9 Dead+1.0 Wind 90 deg - No Ice	25.432	19.087	0.017	1.812	-1541.280	0.112
1.2 Dead+1.0 Wind 120 deg - No Ice	33.910	16.539	9.513	771.711	-1344.522	0.092
0.9 Dead+1.0 Wind 120 deg - No Ice	25.432	16.539	9.513	766.535	-1335.612	0.091
1.2 Dead+1.0 Wind 150 deg - No Ice	33.910	9.558	16.461	1334.824	-777.154	0.046
0.9 Dead+1.0 Wind 150 deg - No Ice	25.432	9.558	16.461	1325.902	-772.026	0.045
1.2 Dead+1.0 Wind 180 deg - No Ice	33.910	0.017	18.997	1540.315	-1.488	-0.011
0.9 Dead+1.0 Wind 180 deg - No Ice	25.432	0.017	18.997	1530.029	-1.530	-0.012

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
1.2 Dead+1.0 Wind 210 deg - No Ice	33.910	-9.529	16.444	1333.125	774.634	-0.066
0.9 Dead+1.0 Wind 210 deg - No Ice	25.432	-9.529	16.444	1324.216	769.419	-0.066
1.2 Dead+1.0 Wind 240 deg - No Ice	33.910	-16.522	9.484	768.767	1343.246	-0.103
0.9 Dead+1.0 Wind 240 deg - No Ice	25.432	-16.522	9.484	763.613	1334.241	-0.102
1.2 Dead+1.0 Wind 270 deg - No Ice	33.910	-19.087	-0.017	-1.532	1551.990	-0.113
0.9 Dead+1.0 Wind 270 deg - No Ice	25.432	-19.087	-0.017	-1.563	1541.595	-0.112
1.2 Dead+1.0 Wind 300 deg - No Ice	33.910	-16.539	-9.513	-771.375	1344.944	-0.093
0.9 Dead+1.0 Wind 300 deg - No Ice	25.432	-16.539	-9.513	-766.285	1335.927	-0.092
1.2 Dead+1.0 Wind 330 deg - No Ice	33.910	-9.558	-16.461	-1334.488	777.577	-0.047
0.9 Dead+1.0 Wind 330 deg - No Ice	25.432	-9.558	-16.461	-1325.652	772.341	-0.046
1.2 Dead+1.0 Ice+1.0 Temp	62.663	0.000	0.000	0.326	0.157	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	62.663	-0.006	-5.313	-451.333	0.654	-0.039
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	62.663	2.674	-4.598	-390.560	-228.547	-0.072
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	62.663	4.638	-2.651	-225.045	-396.473	-0.086
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	62.663	5.359	0.006	0.863	-458.139	-0.077
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	62.663	4.644	2.662	226.637	-397.002	-0.047
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	62.663	2.685	4.605	391.767	-229.447	-0.005
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	62.663	0.006	5.313	452.020	-0.385	0.039
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	62.663	-2.674	4.598	391.248	228.816	0.073
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	62.663	-4.638	2.651	225.737	396.752	0.087
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	62.663	-5.359	-0.006	-0.176	458.408	0.077
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	62.663	-4.644	-2.662	-225.950	397.271	0.047
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	62.663	-2.685	-4.605	-391.080	229.716	0.005
Dead+Wind 0 deg - Service	28.258	-0.004	-4.148	-336.059	0.542	0.003
Dead+Wind 30 deg - Service	28.258	2.081	-3.591	-290.833	-168.862	0.014
Dead+Wind 60 deg - Service	28.258	3.608	-2.071	-167.642	-292.973	0.022
Dead+Wind 90 deg - Service	28.258	4.168	0.004	0.506	-338.536	0.024
Dead+Wind 120 deg - Service	28.258	3.611	2.077	168.556	-293.341	0.020
Dead+Wind 150 deg - Service	28.258	2.087	3.594	291.479	-169.498	0.010
Dead+Wind 180 deg - Service	28.258	0.004	4.148	336.337	-0.192	-0.003
Dead+Wind 210 deg - Service	28.258	-2.081	3.591	291.112	169.212	-0.014
Dead+Wind 240 deg - Service	28.258	-3.608	2.071	167.920	293.324	-0.022
Dead+Wind 270 deg - Service	28.258	-4.168	-0.004	-0.228	338.886	-0.024
Dead+Wind 300 deg - Service	28.258	-3.611	-2.077	-168.278	293.691	-0.020
Dead+Wind 330 deg - Service	28.258	-2.087	-3.594	-291.200	169.848	-0.010

## 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	0.000	-28.258	0.000	0.000	28.258	0.000	0.000%
2	-0.017	-33.910	-18.997	0.017	33.910	18.997	0.000%
3	-0.017	-25.432	-18.997	0.017	25.432	18.997	0.000%
4	9.529	-33.910	-16.444	-9.529	33.910	16.444	0.000%
5	9.529	-25.432	-16.444	-9.529	25.432	16.444	0.000%
6	16.522	-33.910	-9.484	-16.522	33.910	9.484	0.000%
7	16.522	-25.432	-9.484	-16.522	25.432	9.484	0.000%
8	19.087	-33.910	0.017	-19.087	33.910	-0.017	0.000%
9	19.087	-25.432	0.017	-19.087	25.432	-0.017	0.000%
10	16.539	-33.910	9.513	-16.539	33.910	-9.513	0.000%
11	16.539	-25.432	9.513	-16.539	25.432	-9.513	0.000%
12	9.558	-33.910	16.461	-9.558	33.910	-16.461	0.000%
13	9.558	-25.432	16.461	-9.558	25.432	-16.461	0.000%
14	0.017	-33.910	18.997	-0.017	33.910	-18.997	0.000%
15	0.017	-25.432	18.997	-0.017	25.432	-18.997	0.000%
16	-9.529	-33.910	16.444	9.529	33.910	-16.444	0.000%
17	-9.529	-25.432	16.444	9.529	25.432	-16.444	0.000%
18	-16.522	-33.910	9.484	16.522	33.910	-9.484	0.000%
19	-16.522	-25.432	9.484	16.522	25.432	-9.484	0.000%
20	-19.087	-33.910	-0.017	19.087	33.910	0.017	0.000%
21	-19.087	-25.432	-0.017	19.087	25.432	0.017	0.000%
22	-16.539	-33.910	-9.513	16.539	33.910	9.513	0.000%
23	-16.539	-25.432	-9.513	16.539	25.432	9.513	0.000%
24	-9.558	-33.910	-16.461	9.558	33.910	16.461	0.000%
25	-9.558	-25.432	-16.461	9.558	25.432	16.461	0.000%
26	0.000	-62.663	0.000	0.000	62.663	0.000	0.000%
27	-0.006	-62.663	-5.313	0.006	62.663	5.313	0.000%
28	2.674	-62.663	-4.598	-2.674	62.663	4.598	0.000%
29	4.638	-62.663	-2.651	-4.638	62.663	2.651	0.000%
30	5.359	-62.663	0.006	-5.359	62.663	-0.006	0.000%
31	4.644	-62.663	2.662	-4.644	62.663	-2.662	0.000%
32	2.685	-62.663	4.605	-2.685	62.663	-4.605	0.000%
33	0.006	-62.663	5.313	-0.006	62.663	-5.313	0.000%
34	-2.674	-62.663	4.598	2.674	62.663	-4.598	0.000%
35	-4.638	-62.663	2.651	4.638	62.663	-2.651	0.000%
36	-5.359	-62.663	-0.006	5.359	62.663	0.006	0.000%
37	-4.644	-62.663	-2.662	4.644	62.663	2.662	0.000%
38	-2.685	-62.663	-4.605	2.685	62.663	4.605	0.000%
39	-0.004	-28.258	-4.148	0.004	28.258	4.148	0.000%
40	2.081	-28.258	-3.591	-2.081	28.258	3.591	0.000%
41	3.608	-28.258	-2.071	-3.608	28.258	2.071	0.000%
42	4.168	-28.258	0.004	-4.168	28.258	-0.004	0.000%
43	3.611	-28.258	2.077	-3.611	28.258	-2.077	0.000%
44	2.087	-28.258	3.594	-2.087	28.258	-3.594	0.000%
45	0.004	-28.258	4.148	-0.004	28.258	-4.148	0.000%
46	-2.081	-28.258	3.591	2.081	28.258	-3.591	0.000%
47	-3.608	-28.258	2.071	3.608	28.258	-2.071	0.000%
48	-4.168	-28.258	-0.004	4.168	28.258	0.004	0.000%
49	-3.611	-28.258	-2.077	3.611	28.258	2.077	0.000%
50	-2.087	-28.258	-3.594	2.087	28.258	3.594	0.000%

## Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00017537
3	Yes	4	0.00000001	0.00010886
4	Yes	5	0.00000001	0.00015279
5	Yes	5	0.00000001	0.00007402
6	Yes	5	0.00000001	0.00015245
7	Yes	5	0.00000001	0.00007380

8	Yes	4	0.00000001	0.00015757
9	Yes	4	0.00000001	0.00009553
10	Yes	5	0.00000001	0.00015050
11	Yes	5	0.00000001	0.00007274
12	Yes	5	0.00000001	0.00015555
13	Yes	5	0.00000001	0.00007539
14	Yes	4	0.00000001	0.00019334
15	Yes	4	0.00000001	0.00012172
16	Yes	5	0.00000001	0.00014988
17	Yes	5	0.00000001	0.00007255
18	Yes	5	0.00000001	0.00015211
19	Yes	5	0.00000001	0.00007362
20	Yes	4	0.00000001	0.00017100
21	Yes	4	0.00000001	0.00010542
22	Yes	5	0.00000001	0.00015629
23	Yes	5	0.00000001	0.00007571
24	Yes	5	0.00000001	0.00014934
25	Yes	5	0.00000001	0.00007221
26	Yes	4	0.00000001	0.00000001
27	Yes	5	0.00000001	0.00021856
28	Yes	5	0.00000001	0.00024073
29	Yes	5	0.00000001	0.00024396
30	Yes	5	0.00000001	0.00022404
31	Yes	5	0.00000001	0.00024340
32	Yes	5	0.00000001	0.00024204
33	Yes	5	0.00000001	0.00021871
34	Yes	5	0.00000001	0.00024058
35	Yes	5	0.00000001	0.00024212
36	Yes	5	0.00000001	0.00022322
37	Yes	5	0.00000001	0.00024404
38	Yes	5	0.00000001	0.00024053
39	Yes	4	0.00000001	0.00002087
40	Yes	4	0.00000001	0.00005753
41	Yes	4	0.00000001	0.00005645
42	Yes	4	0.00000001	0.00002066
43	Yes	4	0.00000001	0.00005414
44	Yes	4	0.00000001	0.00006014
45	Yes	4	0.00000001	0.00002097
46	Yes	4	0.00000001	0.00005452
47	Yes	4	0.00000001	0.00005610
48	Yes	4	0.00000001	0.00002073
49	Yes	4	0.00000001	0.00006018
50	Yes	4	0.00000001	0.00005369

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	136 - 130	9.748	48	0.591	0.002
L2	130 - 129.5	9.008	48	0.585	0.002
L3	129.5 - 120.5	8.947	48	0.585	0.002
L4	120.5 - 120	7.850	48	0.578	0.001
L5	120 - 87.5	7.789	48	0.578	0.001
L6	91.25 - 58.75	4.501	48	0.484	0.000
L7	63.25 - 32.25	2.105	48	0.314	0.000
L8	37.5 - 0	0.745	48	0.180	0.000

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
129.000	CXL 900-3LW	48	8.886	0.585	0.002	62980

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
118.000	APXVTM14-C-120 w/ Mount Pipe	48	7.548	0.577	0.001	62421
116.000	PCS 1900MHZ 4X45W 65MHZ	48	7.307	0.575	0.001	50963
106.000	LNx-6513DS-A1M w/ Mount Pipe	48	6.122	0.551	0.000	19017
78.000	MX08FRO665-21 w/ Mount Pipe	48	3.249	0.405	0.000	9931
65.000	KS24019-L112A	48	2.227	0.324	0.000	9996

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	136 - 130	44.488	20	2.678	0.008
L2	130 - 129.5	41.131	20	2.657	0.008
L3	129.5 - 120.5	40.853	20	2.656	0.008
L4	120.5 - 120	35.866	20	2.631	0.003
L5	120 - 87.5	35.591	20	2.631	0.003
L6	91.25 - 58.75	20.587	20	2.212	0.001
L7	63.25 - 32.25	9.634	20	1.437	0.000
L8	37.5 - 0	3.412	20	0.824	0.000

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
129.000	CXL 900-3LW	20	40.576	2.656	0.008	19629
118.000	APXVTM14-C-120 w/ Mount Pipe	20	34.490	2.627	0.003	15894
116.000	PCS 1900MHZ 4X45W 65MHZ	20	33.392	2.619	0.003	12157
106.000	LNx-6513DS-A1M w/ Mount Pipe	20	27.991	2.514	0.002	4284
78.000	MX08FRO665-21 w/ Mount Pipe	20	14.868	1.852	0.001	2190
65.000	KS24019-L112A	20	10.193	1.484	0.000	2193

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KI/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio P <sub>u</sub> / φP <sub>n</sub>
L1	136 - 130 (1)	TP4.5x4.5x0.216	6.000	0.000	0.0	2.907	-0.067	91.572	0.001
L2	130 - 129.5 (2)	TP10.75x4.5x0.216	0.500	0.000	0.0	2.907	-0.073	91.572	0.001
L3	129.5 - 120.5 (3)	TP10.75x10.75x0.322	9.000	0.000	0.0	10.549	-0.511	332.290	0.002
L4	120.5 - 120 (4)	TP22x10.75x0.322	0.500	0.000	0.0	10.549	-0.511	332.290	0.002
L5	120 - 87.5 (5)	TP29.476x22x0.188	32.500	0.000	0.0	17.162	-10.440	901.992	0.012
L6	87.5 - 58.75 (6)	TP35.715x28.238x0.25	32.500	0.000	0.0	27.716	-17.212	1496.660	0.011
L7	58.75 - 32.25	TP41.311x34.18x0.375	31.000	0.000	0.0	47.972	-22.834	2806.360	0.008



Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KI/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio P <sub>u</sub> / φP <sub>n</sub>
L8	(7) 32.25 - 0 (8)	TP47.98x39.353x0.438	37.500	0.000	0.0	66.976	-33.903	3918.070	0.009

### Pole Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>nx</sub> kip-ft	Ratio M <sub>ux</sub> / φM <sub>nx</sub>	M <sub>uy</sub> kip-ft	φM <sub>ny</sub> kip-ft	Ratio M <sub>uy</sub> / φM <sub>ny</sub>
L1	136 - 130 (1)	TP4.5x4.5x0.216	0.247	10.415	0.024	0.000	10.415	0.000
L2	130 - 129.5 (2)	TP10.75x4.5x0.216	0.247	10.415	0.024	0.000	10.415	0.000
L3	129.5 - 120.5 (3)	TP10.75x10.75x0.322	2.797	91.944	0.030	0.000	91.944	0.000
L4	120.5 - 120 (4)	TP22x10.75x0.322	2.797	91.944	0.030	0.000	91.944	0.000
L5	120 - 87.5 (5)	TP29.476x22x0.188	181.276	523.042	0.347	0.000	523.042	0.000
L6	87.5 - 58.75 (6)	TP35.715x28.238x0.25	505.813	1085.442	0.466	0.000	1085.442	0.000
L7	58.75 - 32.25 (7)	TP41.311x34.18x0.375	892.525	2614.017	0.341	0.000	2614.017	0.000
L8	32.25 - 0 (8)	TP47.98x39.353x0.438	1551.992	4321.917	0.359	0.000	4321.917	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V <sub>u</sub> K	φV <sub>n</sub> K	Ratio V <sub>u</sub> / φV <sub>n</sub>	Actual T <sub>u</sub> kip-ft	φT <sub>n</sub> kip-ft	Ratio T <sub>u</sub> / φT <sub>n</sub>
L1	136 - 130 (1)	TP4.5x4.5x0.216	0.082	27.472	0.003	0.000	10.347	0.000
L2	130 - 129.5 (2)	TP10.75x4.5x0.216	0.089	27.472	0.003	0.000	10.347	0.000
L3	129.5 - 120.5 (3)	TP10.75x10.75x0.322	0.366	99.687	0.004	0.280	91.394	0.003
L4	120.5 - 120 (4)	TP22x10.75x0.322	0.380	207.232	0.002	0.280	91.394	0.003
L5	120 - 87.5 (5)	TP29.476x22x0.188	9.146	278.026	0.033	0.080	695.184	0.000
L6	87.5 - 58.75 (6)	TP35.715x28.238x0.25	13.951	448.999	0.031	0.113	1359.817	0.000
L7	58.75 - 32.25 (7)	TP41.311x34.18x0.375	16.067	841.907	0.019	0.113	2942.142	0.000
L8	32.25 - 0 (8)	TP47.98x39.353x0.438	19.099	1175.420	0.016	0.113	4915.583	0.000

### Pole Interaction Design Data

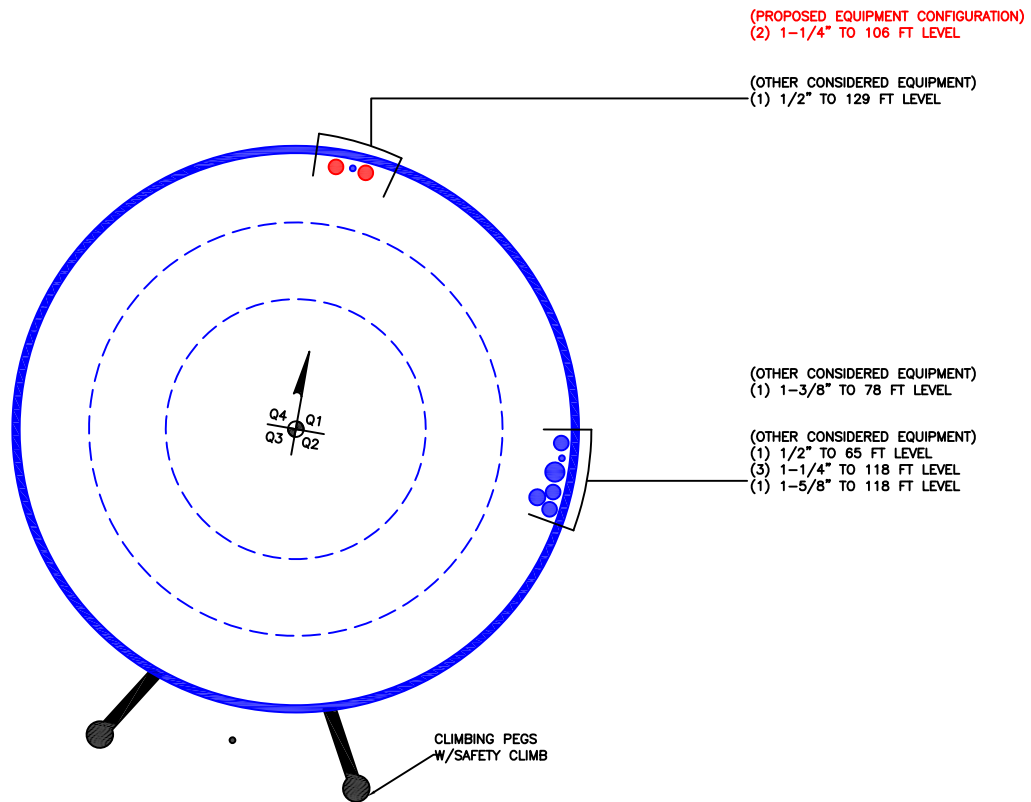
Section No.	Elevation ft	Ratio P <sub>u</sub> / φP <sub>n</sub>	Ratio M <sub>ux</sub> / φM <sub>nx</sub>	Ratio M <sub>uy</sub> / φM <sub>ny</sub>	Ratio V <sub>u</sub> / φV <sub>n</sub>	Ratio T <sub>u</sub> / φT <sub>n</sub>	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	136 - 130 (1)	0.001	0.024	0.000	0.003	0.000	0.024	1.050	4.8.2
L2	130 - 129.5 (2)	0.001	0.024	0.000	0.003	0.000	0.025	1.050	4.8.2
L3	129.5 - 120.5 (3)	0.002	0.030	0.000	0.004	0.003	0.032	1.050	4.8.2
L4	120.5 - 120 (4)	0.002	0.030	0.000	0.002	0.003	0.032	1.050	4.8.2
L5	120 - 87.5 (5)	0.012	0.347	0.000	0.033	0.000	0.359	1.050	4.8.2
L6	87.5 - 58.75	0.011	0.466	0.000	0.031	0.000	0.478	1.050	4.8.2

Section No.	Elevation ft	Ratio $P_u$	Ratio $M_{ux}$	Ratio $M_{uy}$	Ratio $V_u$	Ratio $T_u$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$\phi P_n$	$\phi M_{nx}$	$\phi M_{ny}$	$\phi V_n$	$\phi T_n$			
L7	(6) 58.75 - 32.25	0.008	0.341	0.000	0.019	0.000	0.350	1.050	4.8.2
L8	(7) 32.25 - 0 (8)	0.009	0.359	0.000	0.016	0.000	0.368	1.050	4.8.2

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail	
L1	136 - 130	Pole	TP4.5x4.5x0.216	1	-0.067	96.151	2.3	Pass	
L2	130 - 129.5	Pole	TP10.75x4.5x0.216	2	-0.073	96.151	2.3	Pass	
L3	129.5 - 120.5	Pole	TP10.75x10.75x0.322	3	-0.511	348.904	3.0	Pass	
L4	120.5 - 120	Pole	TP22x10.75x0.322	4	-0.511	348.904	3.0	Pass	
L5	120 - 87.5	Pole	TP29.476x22x0.188	5	-10.440	947.092	34.2	Pass	
L6	87.5 - 58.75	Pole	TP35.715x28.238x0.25	6	-17.212	1571.493	45.6	Pass	
L7	58.75 - 32.25	Pole	TP41.311x34.18x0.375	7	-22.834	2946.678	33.3	Pass	
L8	32.25 - 0	Pole	TP47.98x39.353x0.438	8	-33.903	4113.973	35.0	Pass	
							Summary		
							Pole (L6)	45.6	Pass
							<b>RATING =</b>	<b>45.6</b>	<b>Pass</b>

**APPENDIX B**  
**BASE LEVEL DRAWING**



**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

# Monopole Flange Plate Connection

Elevation = 130 ft.



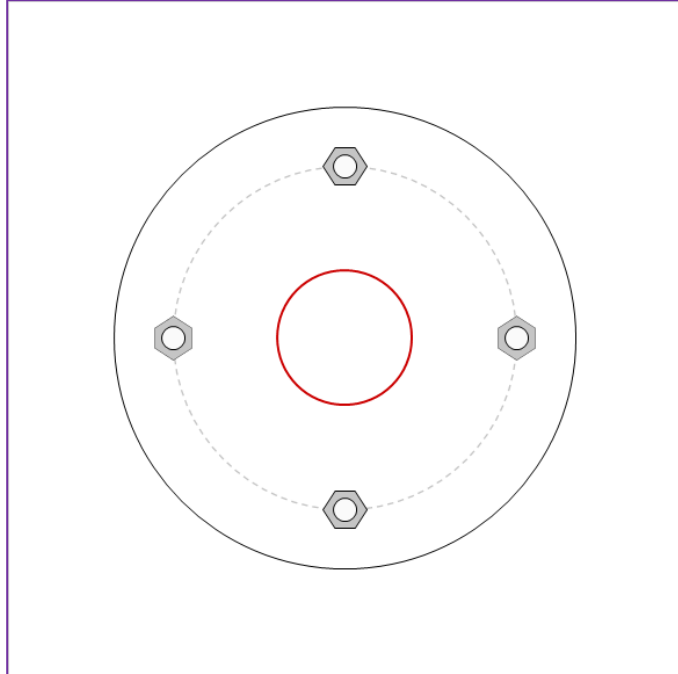
BU #	876332
Site Name	36 PROSPECT STREET
Order #	610891 Rev 0

Applied Loads	
Moment (kip-ft)	0.25
Axial Force (kips)	0.07
Shear Force (kips)	0.08

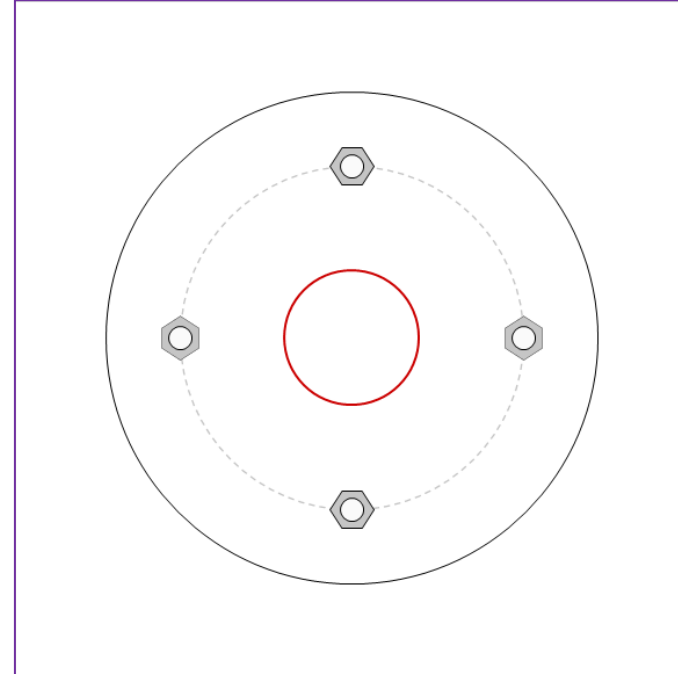
TIA-222 Revision	H
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\*TIA-222-H Section 15.5 Applied

Top Plate - External



Bottom Plate - External



### Connection Properties

#### Bolt Data

(4) 3/4"  $\phi$  bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 11.5" BC

#### Top Plate Data

15.5" OD x 0.5" Plate (A36; Fy=36 ksi, Fu=58 ksi)

#### Top Stiffener Data

N/A

#### Top Pole Data

4.5" x 0.216" round pole (A53-B-35; Fy=35 ksi, Fu=60 ksi)

#### Bottom Plate Data

16.5" OD x 0.75" Plate (A36; Fy=36 ksi, Fu=58 ksi)

#### Bottom Stiffener Data

N/A

#### Bottom Pole Data

4.5" x 0.216" round pole (A53-B-35; Fy=35 ksi, Fu=60 ksi)

### Analysis Results

#### Bolt Capacity

Max Load (kips)	0.24
Allowable (kips)	30.06
Stress Rating:	<b>0.8%</b> Pass

#### Top Plate Capacity

Max Stress (ksi):	1.45	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	<b>4.3%</b>	Pass
Tension Side Stress Rating:	<b>3.5%</b>	Pass

#### Bottom Plate Capacity

Max Stress (ksi):	0.64	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	<b>1.9%</b>	Pass
Tension Side Stress Rating:	<b>1.6%</b>	Pass

# Monopole Flange Plate Connection

Elevation = 120 ft.



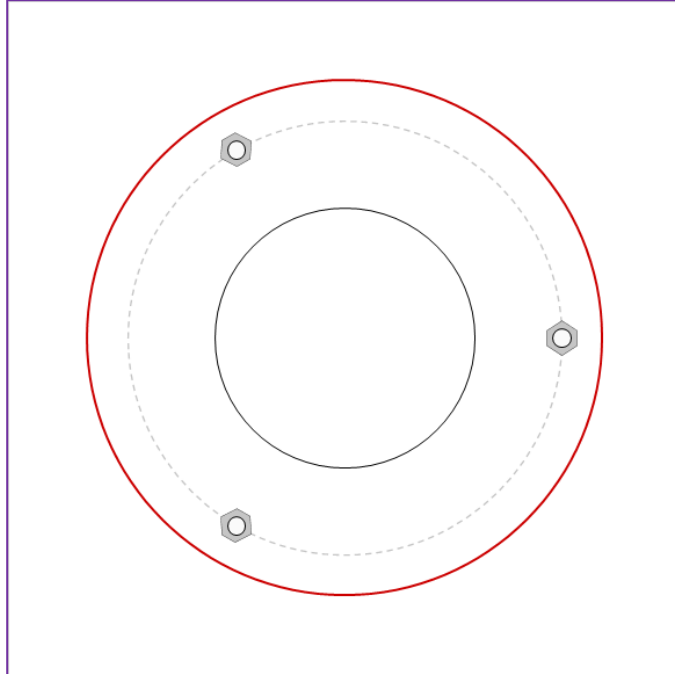
BU #	876332
Site Name	36 PROSPECT STREET
Order #	610891 Rev 0

Applied Loads	
Moment (kip-ft)	2.98
Axial Force (kips)	0.54
Shear Force (kips)	0.38

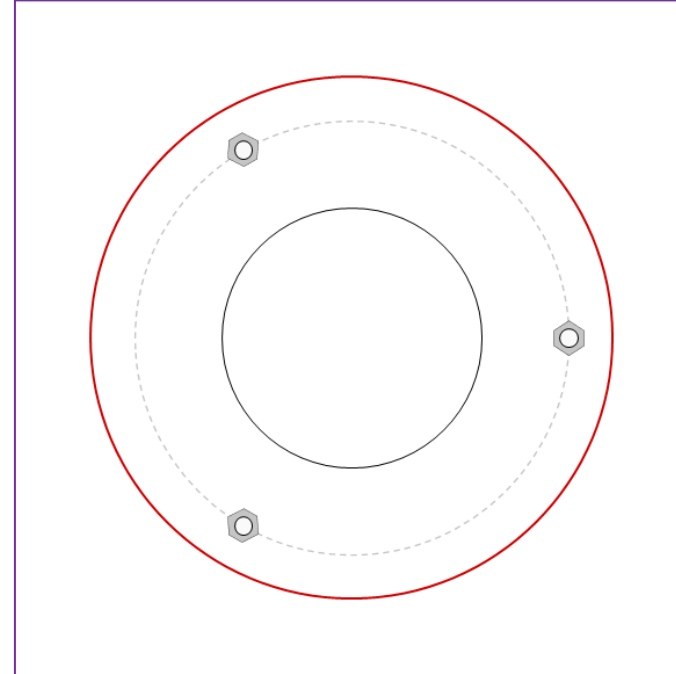
TIA-222 Revision	H
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\*TIA-222-H Section 15.5 Applied

Top Plate - Internal



Bottom Plate - Internal



### Connection Properties

#### Bolt Data

(3) 3/4"  $\phi$  bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 18" BC

#### Top Plate Data

10.75" ID x 0.75" Plate (A36; Fy=36 ksi, Fu=58 ksi)

#### Top Stiffener Data

N/A

#### Top Pole Data

22" x 0.322" round pole (A53-B-35; Fy=35 ksi, Fu=60 ksi)

#### Bottom Plate Data

10.75" ID x 0.75" Plate (A36; Fy=36 ksi, Fu=58 ksi)

#### Bottom Stiffener Data

N/A

#### Bottom Pole Data

22" x 0.1875" 12-sided pole (A572-60; Fy=60 ksi, Fu=75 ksi)

### Analysis Results

#### Bolt Capacity

Max Load (kips)	2.47
Allowable (kips)	30.06
Stress Rating:	<b>7.8% Pass</b>

#### Top Plate Capacity

Max Stress (ksi):	4.53	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	<b>13.3%</b>	<b>Pass</b>
Tension Side Stress Rating:	<b>3.0%</b>	<b>Pass</b>

#### Bottom Plate Capacity

Max Stress (ksi):	4.56	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	<b>13.4%</b>	<b>Pass</b>
Tension Side Stress Rating:	<b>3.0%</b>	<b>Pass</b>

# Monopole Base Plate Connection

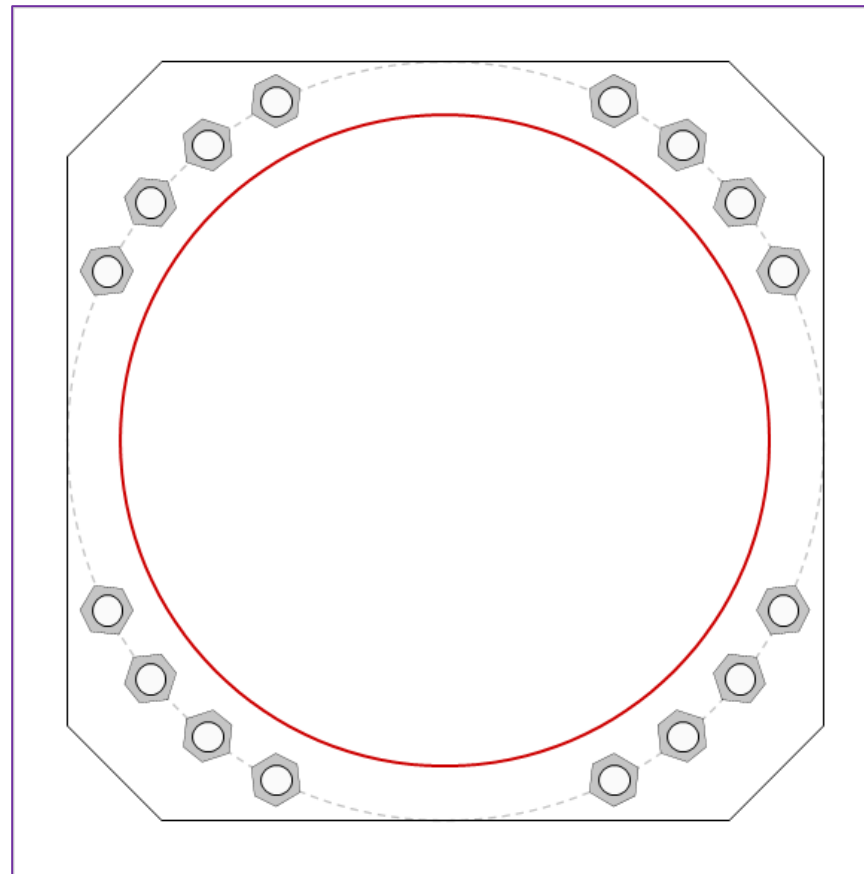


Site Info	
BU #	876332
Site Name	36 PROSPECT STREET
Order #	610891 Rev 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
$l_{ar}$ (in)	1

Applied Loads	
Moment (kip-ft)	1551.99
Axial Force (kips)	33.90
Shear Force (kips)	19.10

\*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
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Anchor Rod Data
(16) 2-1/4" $\phi$ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 56" BC <i>Anchor Spacing: 6 in</i>
Base Plate Data
56" W x 3" Plate (A572-50; $F_y=50$ ksi, $F_u=65$ ksi); Clip: 7 in
Stiffener Data
N/A
Pole Data
47.98" x 0.4375" 12-sided pole (A572-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary			<i>(units of kips, kip-in)</i>
$P_{u,t} = 80.97$	$\phi P_{n,t} = 243.75$	<b>Stress Rating</b>	
$V_u = 1.19$	$\phi V_n = 149.1$	<b>31.6%</b>	
$M_u = n/a$	$\phi M_n = n/a$	<b>Pass</b>	
Base Plate Summary			
Max Stress (ksi):	15.21	(Flexural)	
Allowable Stress (ksi):	45		
Stress Rating:	<b>32.2%</b>	<b>Pass</b>	



## Monopole Base Reaction Comparison Test



BU # :	876332
Site Name:	36 PROSPECT STREET
Order Number:	610891 Rev 0
Design TIA:	TIA-222-F
Current TIA:	TIA-222-H
Component:	Monopole Base
Reference Doc ID:	1615432

### TIA-222-F Compared To TIA-222-H

#### MONOPOLE BASE FOUNDATION REACTION COMPARISON

REACTIONS	DESIGN REACTIONS	*MODIFIED DESIGN REACTIONS	CURRENT REACTIONS	% CAPACITY
MOMENT (kip-ft)	3250.0	4387.5	1552.0	33.7%
SHEAR (kips)	31.0	41.9	19.1	43.5%

Design loads from: CClites Doc #1615432

Although the shear capacity is at 43.5%, the moment reaction is the governing criteria for a monopole drilled pier foundation. Therefore, the overall capacity for this foundation is 33.7%.

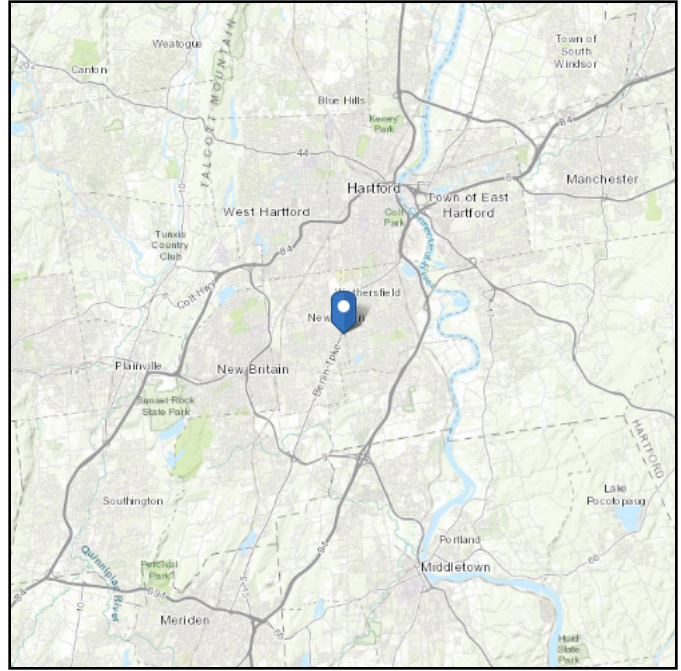
\*Design loads were multiplied by 1.35 for comparison as allowed by TIA-222-H, Section 15.6.

# ASCE 7 Hazards Report

**Address:**  
No Address at This Location

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

**Elevation:** 259.63 ft (NAVD 88)  
**Latitude:** 41.689906  
**Longitude:** -72.705236



## Wind

### Results:

Wind Speed:	123 Vmph
10-year MRI	77 Vmph
25-year MRI	86 Vmph
50-year MRI	93 Vmph
100-year MRI	100 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).

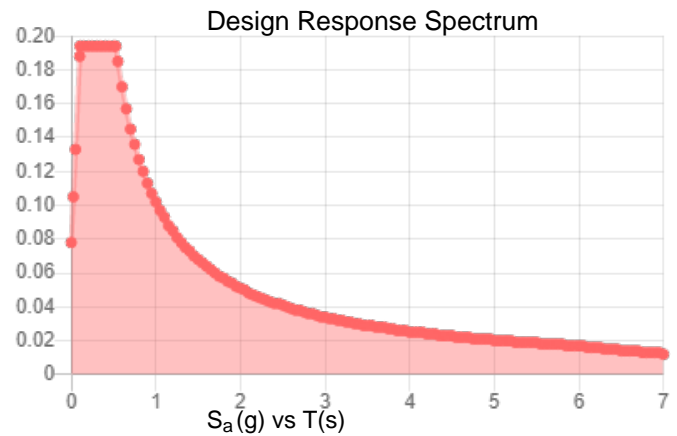
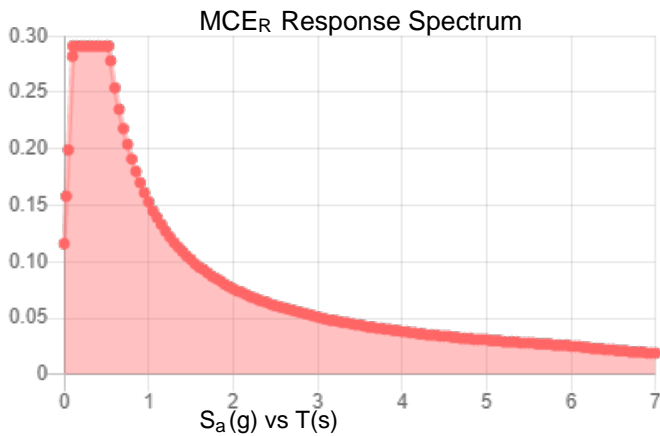
Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

**Site Soil Class:** D - Stiff Soil

**Results:**

$S_s$ :	0.182	$S_{DS}$ :	0.194
$S_1$ :	0.064	$S_{D1}$ :	0.102
$F_a$ :	1.6	$T_L$ :	6
$F_v$ :	2.4	PGA :	0.092
$S_{MS}$ :	0.291	PGA <sub>M</sub> :	0.147
$S_{M1}$ :	0.153	F <sub>PGA</sub> :	1.6
		$I_e$ :	1

**Seismic Design Category** B



**Data Accessed:**

Tue Apr 13 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

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### 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:** Tue Apr 13 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.

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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.

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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.

# Exhibit E

## **Mount Analysis**



Maser Consulting Connecticut  
2000 Midlantic Drive, Suite 100  
Mt. Laurel, NJ 08054  
856.797.0412  
peter.albano@colliersengineering.com

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## Post-Mod Antenna Mount Analysis Report and PMI Requirements

Mount Fix

SMART Tool Project #: 10063097  
Maser Consulting Connecticut Project #: 21777015A

May 26, 2021

### Site Information

Site ID: 468043-VZW / Newington CT  
Site Name: Newington CT  
Carrier Name: Verizon Wireless  
Address: 36 Prospect Street  
Newington, Connecticut 06111  
Hartford County  
Latitude: 41.689819°  
Longitude: -72.705369°

### Structure Information

Tower Type: 139.00-Ft Monopole  
Mount Type: 14.17-Ft Platform

FUZE ID # 16232003

### Analysis Results

Platform: 82.5% Pass

### \*\*\*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 also Noted on Mount Modification Drawings*

*Requirements may also be Noted on A & E drawings*

Report Prepared By: Selene Chen



**Executive Summary:**

The objective of this report is to summarize the analysis results of the antenna support mount including the proposed modifications at the subject facility for the final wireless telecommunications configuration, per the applicable codes and standards.

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: 324495, dated September 2, 2020
Mount Mapping Report	Structural Components, Site ID: 16232003, dated February 23, 2021
Loading Configuration Email	Email Correspondence with John Gavaletz dated March 31, 2021
Mount Analysis Report	Maser Consulting Connecticut, Project #: 21777015A, dated April 9, 2021
Mount Modification Drawings	Maser Consulting Connecticut, Project #: 21777015A, dated May 18, 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, $K_e$ : 0.991
Seismic Parameters:	$S_s$ : 0.196 $S_1$ : 0.055
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
104.50	107.50	3	Samsung	MT6407-77A	Added
	106.00	6	Andrew	SBNHH-1D65B	Retained
		3	Samsung	B2/B66A RRH-BR049	
		3	Samsung	B5/B13 RRH-BR04C	
		1	Raycap	RRFDC-3315-PF-48*	
	3	Andrew	LNx-6513DS-A1M	Added	
	104.00	3	Samsung		XXDWMM-12.5-65-8T-CBRS

\* Equipment to be flush mounted directly to the Monopole. They are not mounted on platform mounts and are not included in this mount analysis.

**Standard Conditions:**

1. All engineering services are performed on the basis that the information provided to Maser Consulting Connecticut 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 Maser Consulting Connecticut 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 by Maser Consulting Connecticut, 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. Maser Consulting Connecticut 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:
- o Channel, Solid Round, Angle, Plate      ASTM A36 (Gr. 36)
  - o HSS (Rectangular)                              ASTM 500 (Gr. B-46)
  - o Pipe    ASTM A53 (Gr. B-35)
  - o Threaded Rod                                        F1554 (Gr. 36)
  - o Bolts    ASTM A325
8. Any mount modifications listed under Sources of Information are assumed to have been installed per the design specifications.

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

**Analysis Results:**

Component	Utilization %	Pass/Fail
Mount Pipe	30.6%	Pass
Dual Mount Pipe	22.7%	Pass
Support Rail Corner	26.7%	Pass
Support Rail	25.4%	Pass
Standoffs	49.3%	Pass
Face Horizontal	82.5%	Pass
Cross Members	39.9%	Pass
Grating Angle	19.4%	Pass
Support Rail Bracing	8.1%	Pass
Connection Check	77.6%	Pass

<b>Structure Rating – (Controlling Utilization of all Components)</b>	<b>82.5%</b>
---	--------------

**Recommendation:**


The existing mount will be **SUFFICIENT** for the final loading after the proposed modifications are successfully completed.

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.

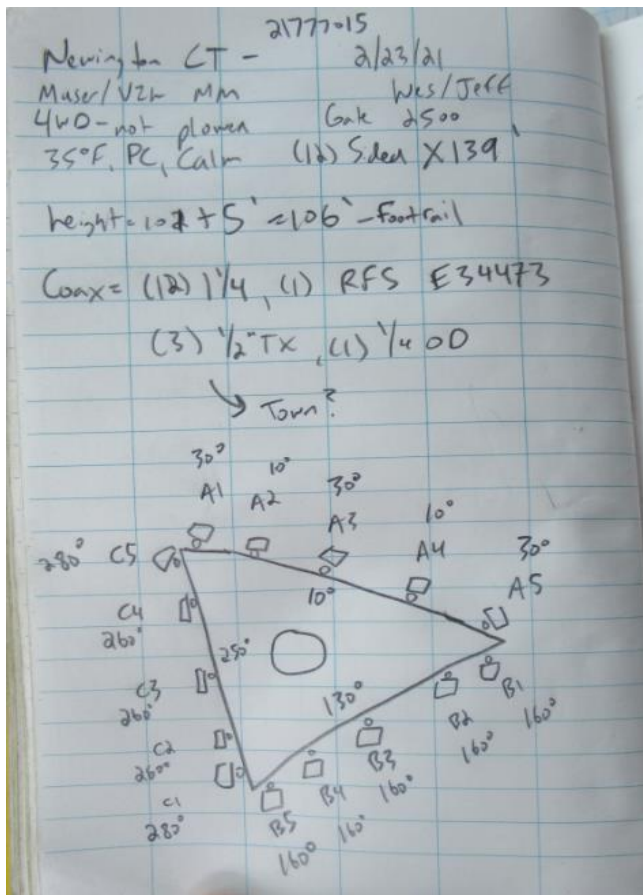
**Attachments:**

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

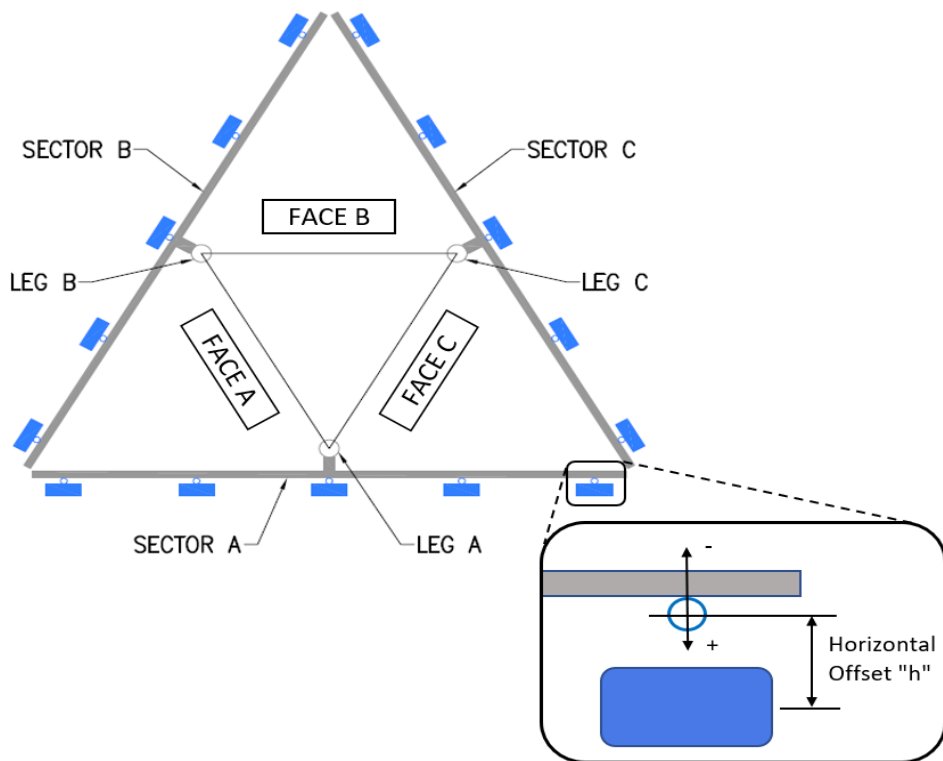


	<b>Antenna Mount Mapping Form (PATENT PENDING)</b>		<b>FCC #</b>
			1273740
<b>Tower Owner:</b>	Crown Castle	<b>Mapping Date:</b>	2/23/2021
<b>Site Name:</b>	Newington	<b>Tower Type:</b>	Monopole
<b>Site Number or ID:</b>	16232003	<b>Tower Height (Ft.):</b>	139
<b>Mapping Contractor:</b>	Structural Components	<b>Mount Elevation (Ft.):</b>	106

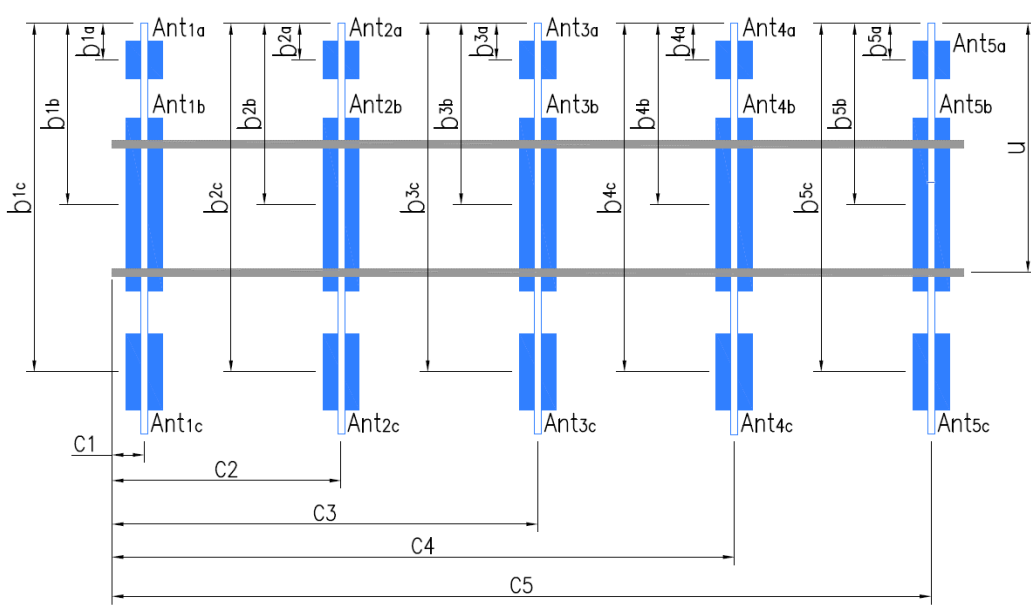
This antenna mapping form is the property of TES and under **PATENT PENDING**. The formation contained herein is considered confidential in nature and is to be used only for the specific customer it was intended for. Reproduction, transmission, publication, modification or disclosure by any method is 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	Horizontal Offset "C1, C2, C3, etc."
A1	2-3/8 x 0.154 x 72	61.00	14.00	C1	2-3/8 x 0.154 x 72	12.00
A2	2-3/8 x 0.154 x 72	67.00	44.00	C2	2-3/8 x 0.154 x 72	49.50
A3	2-3/8 x 0.154 x 72	61.00	79.00	C3	2-3/8 x 0.154 x 72	79.50
A4	2-3/8 x 0.154 x 72	61.00	135.00	C4	2-3/8 x 0.218 x 72	133.50
A5	2-3/8 x 0.154 x 72	61.00	159.00	C5	2-3/8 x 0.154 x 72	156.50
A6				C6		
B1	2-3/8 x 0.154 x 72	58.00	12.50	D1		
B2	2-3/8 x 0.154 x 72	67.00	41.00	D2		
B3	2-3/8 x 0.154 x 72	62.00	81.00	D3		
B4	2-3/8 x 0.154 x 72	64.00	135.00	D4		
B5	2-3/8 x 0.154 x 72	58.00	158.00	D5		
B6				D6		
Distance between bottom rail and mount CL elevation (dim d). Unit is inches. See 'Mount Elev Ref' tab for details.						0.00
Distance from top of bottom support rail to lowest tip of ant./eqpt. of Carrier above. (N/A if > 10 ft.)						6.4
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.):			25	



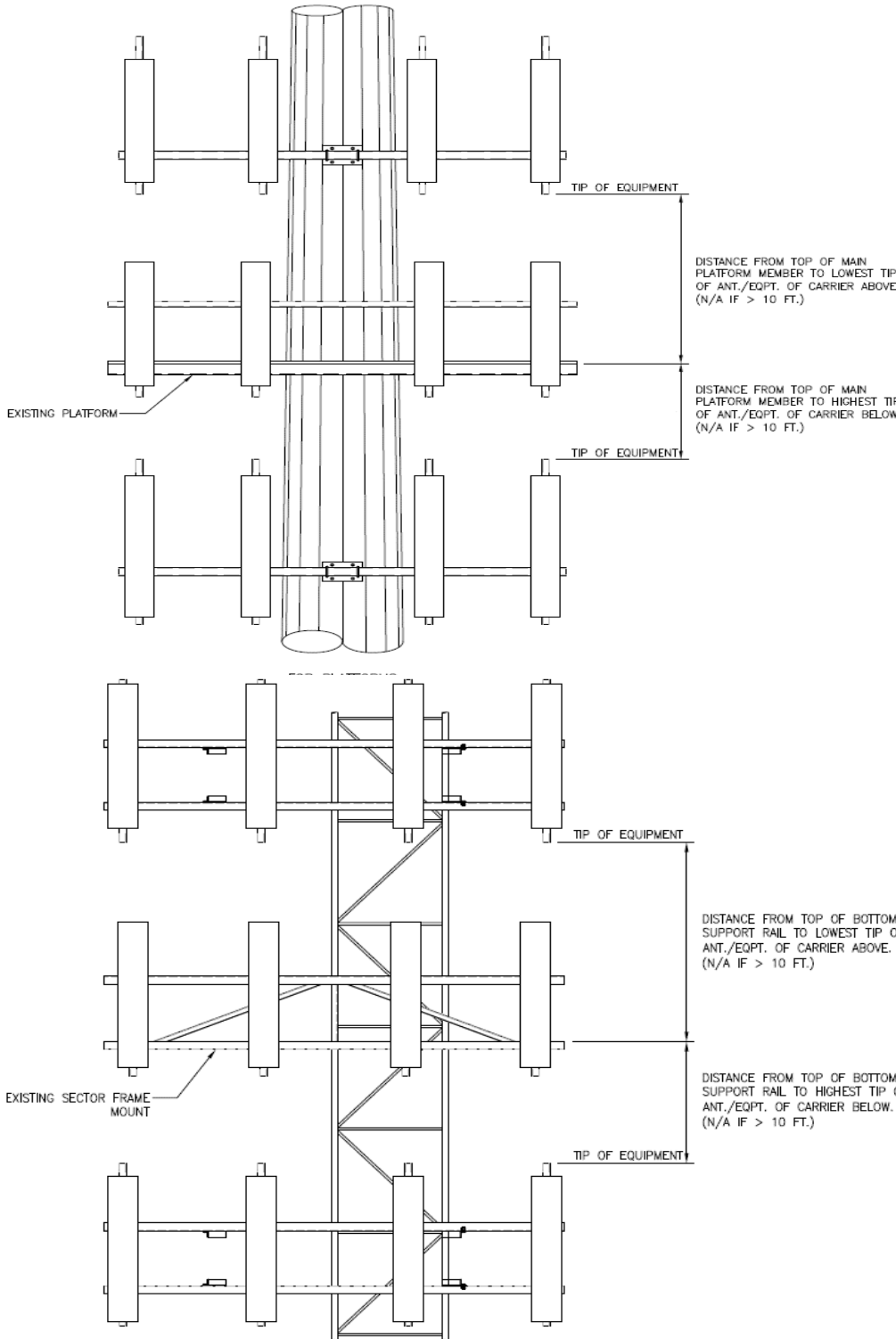
Ants. Items	Enter antenna model. If not labeled, enter "Unknown".						Mounting Locations [Units are inches and degrees]			Photos of antennas
	Antenna Models if Known	Width (in.)	Depth (in.)	Height (in.)	Coax Size and Qty	Antenna Center-line (Ft.)	Vertical Distances "b <sub>1a</sub> , b <sub>2a</sub> , b <sub>3a</sub> , b <sub>1b</sub> ..." (Inches)	Horiz. Offset "h" (Use "-" if Ant. is behind)	Antenna Azimuth (Degrees)	
<b>Sector A</b>										
Ant <sub>1a</sub>										
Ant <sub>1b</sub>	Andrews db846 f65za	10.00	8.00	72.00	(1) 1.25 tx	108.333	33.00	9.00	30.00	6
Ant <sub>1c</sub>										
Ant <sub>2a</sub>	Alcatel B4 RRH2x60-4	10.50	6.00	36.00	jumpers	110.333	15.00	-6.00	10.00	157
Ant <sub>2b</sub>	Comm SBNHH-1D65B	12.00	7.00	73.00	jumpers	108.125	41.50	9.00	10.00	6
Ant <sub>2c</sub>										
Ant <sub>3a</sub>	Alcatel B13 RRH4x30	12.00	7.50	20.00	jumpers	108.333	33.00	-4.50	10.00	178
Ant <sub>3b</sub>	Andrews LNX-6514DS	12.00	7.00	73.00	(2) 1.25 tx	108.083	36.00	11.00	30.00	165
Ant <sub>3c</sub>										
Ant <sub>4a</sub>										
Ant <sub>4b</sub>	Comm SBNHH-1D65B	12.00	7.00	73.00	jumpers	107.625	41.50	11.00	10.00	186
Ant <sub>4c</sub>										
Ant <sub>5a</sub>										
Ant <sub>5b</sub>	Andrews db846 f65za	10.00	8.00	72.00	(1) 1.25 tx	108.333	33.00	9.00	30.00	188
Ant <sub>5c</sub>										
Ant on Standoff										
Ant on Standoff										
Ant on Tower	RRFDC-3315-pf-48	14.50	10.00	19.00	1.5 Hybrid		64.00	5.00	40.00	202
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 <sub>1a</sub>														
Sector B:	130.00	Deg	Leg B:		Deg	Ant <sub>1b</sub>	Andrews db846 f652a	10.00	8.00	72.00	(1) 1.25 tx	108.083	33.00	9.00	160.00	209				
Sector C:	250.00	Deg	Leg C:		Deg	Ant <sub>1c</sub>														
Sector D:		Deg	Leg D:		Deg	Ant <sub>2a</sub>	Alactel B4 RRH2x60-4	10.50	6.00	36.00	jumpers	110.5	13.00	-6.00	130.00	227				
<b>Climbing Facility Information</b>						Ant <sub>2b</sub>	Comm SBNHH-1D65B	12.00	7.00	73.00	jumpers	108.5	37.00	10.00	160.00	10				
Location:	200.00	Deg				Ant <sub>2c</sub>														
Climbing Facility	Corrosion Type:		Good condition.			Ant <sub>3a</sub>	Alcatel B13 RRH4x30	12.00	7.50	20.00	jumpers	108.417	33.00	-4.50	130.00	234				
	Access:		Climbing path was unobstructed.			Ant <sub>3b</sub>	Andrews LNX-6514DS	12.00	7.00	73.00	(2) 1.25 tx	108.083	37.00	11.00	160.00	10				
	Condition:		Good condition.			Ant <sub>3c</sub>														
						Ant <sub>4a</sub>														
						Ant <sub>4b</sub>	Comm SBNHH-1D65B	12.00	7.00	73.00	jumpers	107.833	42.00	11.00	160.00	10				
						Ant <sub>4c</sub>														
						Ant <sub>5a</sub>														
						Ant <sub>5b</sub>	Andrews db846 f652a	10.00	8.00	72.00	(1) 1.25 tx	107.958	34.50	9.00	160.00	243				
						Ant <sub>5c</sub>														
						Ant on Standoff														
						Ant on Standoff														
						Ant on Tower														
						Ant on Tower														
														Sector C						
						Ant <sub>1a</sub>														
						Ant <sub>1b</sub>	Andrews db846 f652a	10.00	8.00	72.00	(1) 1.25 tx	107.917	35.00	9.00	280.00	249				
						Ant <sub>1c</sub>														
						Ant <sub>2a</sub>	Alactel B4 RRH2x60-4	10.50	6.00	36.00	jumpers	110.417	14.00	-6.00	250.00	267				
						Ant <sub>2b</sub>	Comm SBNHH-1D65B	12.00	7.00	73.00	jumpers	108.167	41.00	10.00	260.00	267				
						Ant <sub>2c</sub>														
						Ant <sub>3a</sub>	Alcatel B13 RRH4x30	12.00	7.50	20.00	jumpers	108.5	32.00	-4.50	250.00	274				
						Ant <sub>3b</sub>	Kathrein 80010735V0	12.00	4.00	76.00	(2) 1.25 tx	108.667	30.00	10.00	260.00	273				
						Ant <sub>3c</sub>														
						Ant <sub>4a</sub>														
						Ant <sub>4b</sub>	Comm SBNHH-1D65B	12.00	7.00	73.00	jumpers	107.583	38.00	11.00	260.00	287				
						Ant <sub>4c</sub>														
						Ant <sub>5a</sub>														
						Ant <sub>5b</sub>	Andrews db846 f652a	10.00	8.00	72.00	(1) 1.25 tx	108.25	34.00	9.00	280.00	288				
						Ant <sub>5c</sub>														
						Ant on Standoff														
						Ant on Standoff														
						Ant on Tower														
						Ant on Tower														
														Sector D						
						Ant <sub>1a</sub>														
						Ant <sub>1b</sub>														
						Ant <sub>1c</sub>														
						Ant <sub>2a</sub>														
						Ant <sub>2b</sub>														
						Ant <sub>2c</sub>														
						Ant <sub>3a</sub>														
						Ant <sub>3b</sub>														
						Ant <sub>3c</sub>														
						Ant <sub>4a</sub>														
						Ant <sub>4b</sub>														
						Ant <sub>4c</sub>														
						Ant <sub>5a</sub>														
						Ant <sub>5b</sub>														
						Ant <sub>5c</sub>														
						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		
3		
4		
5		
6		
7		
8		

<b>Mapping Notes</b>
----------------------

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.

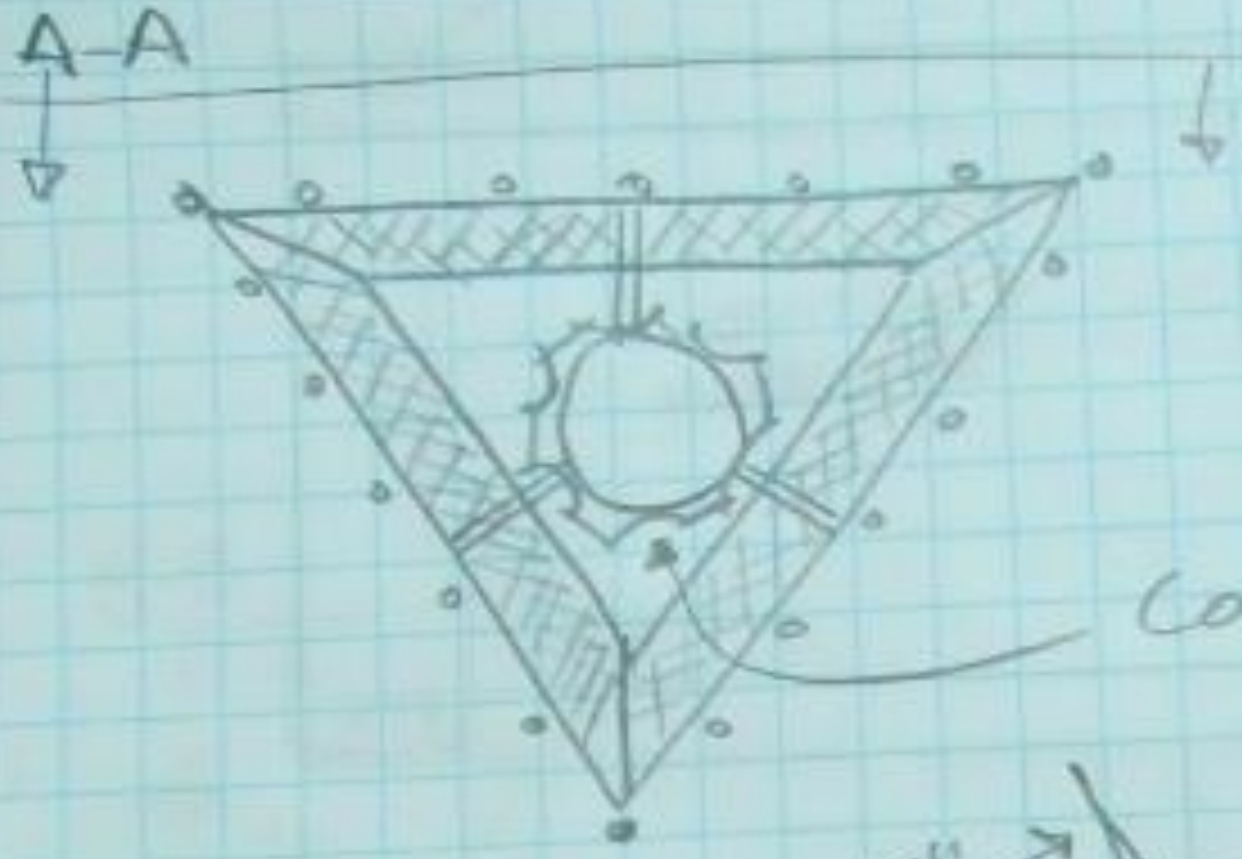
<b>Standard Conditions</b>
----------------------------

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.



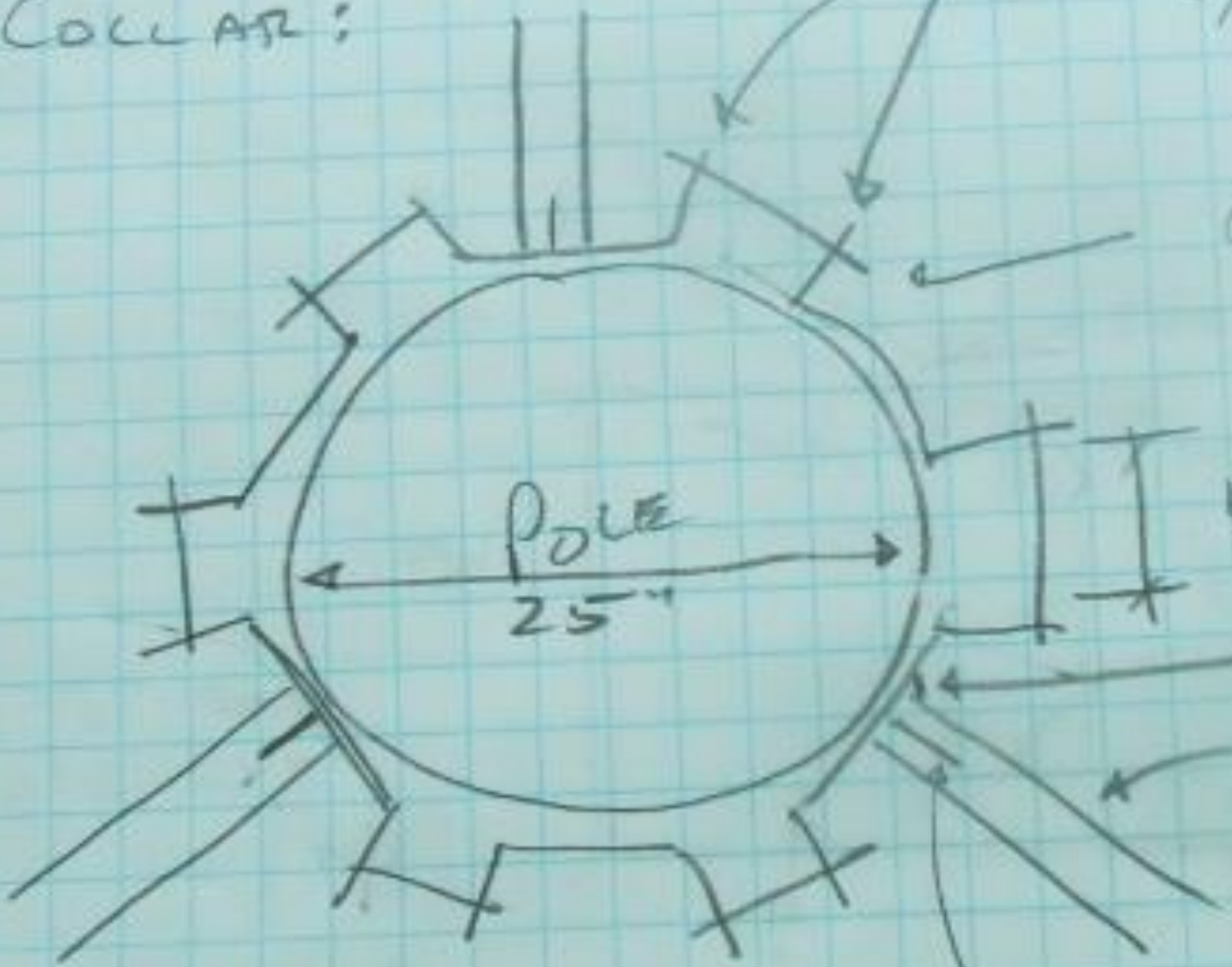


21777015 - NEWINGTON CT



COLLAR  
1/2" THK  
5"  
5"  
5"  
3"  
1/2" BENT PLATE  
5", 8", 5" X 12" TALL  
(6) TOTAL

COLLAR:

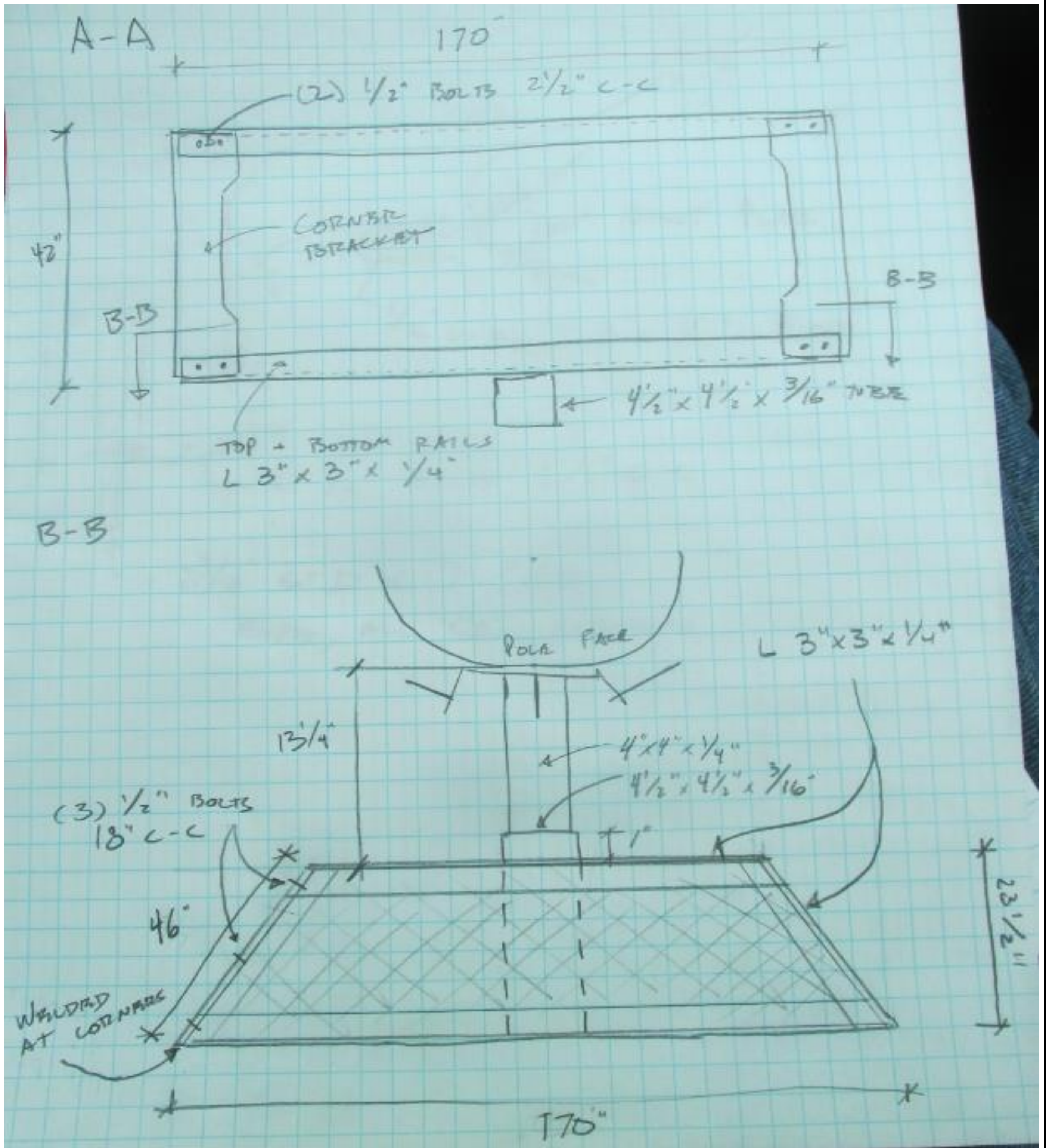


(3) 3/4" ALL THREAD  
4 1/2" C-C

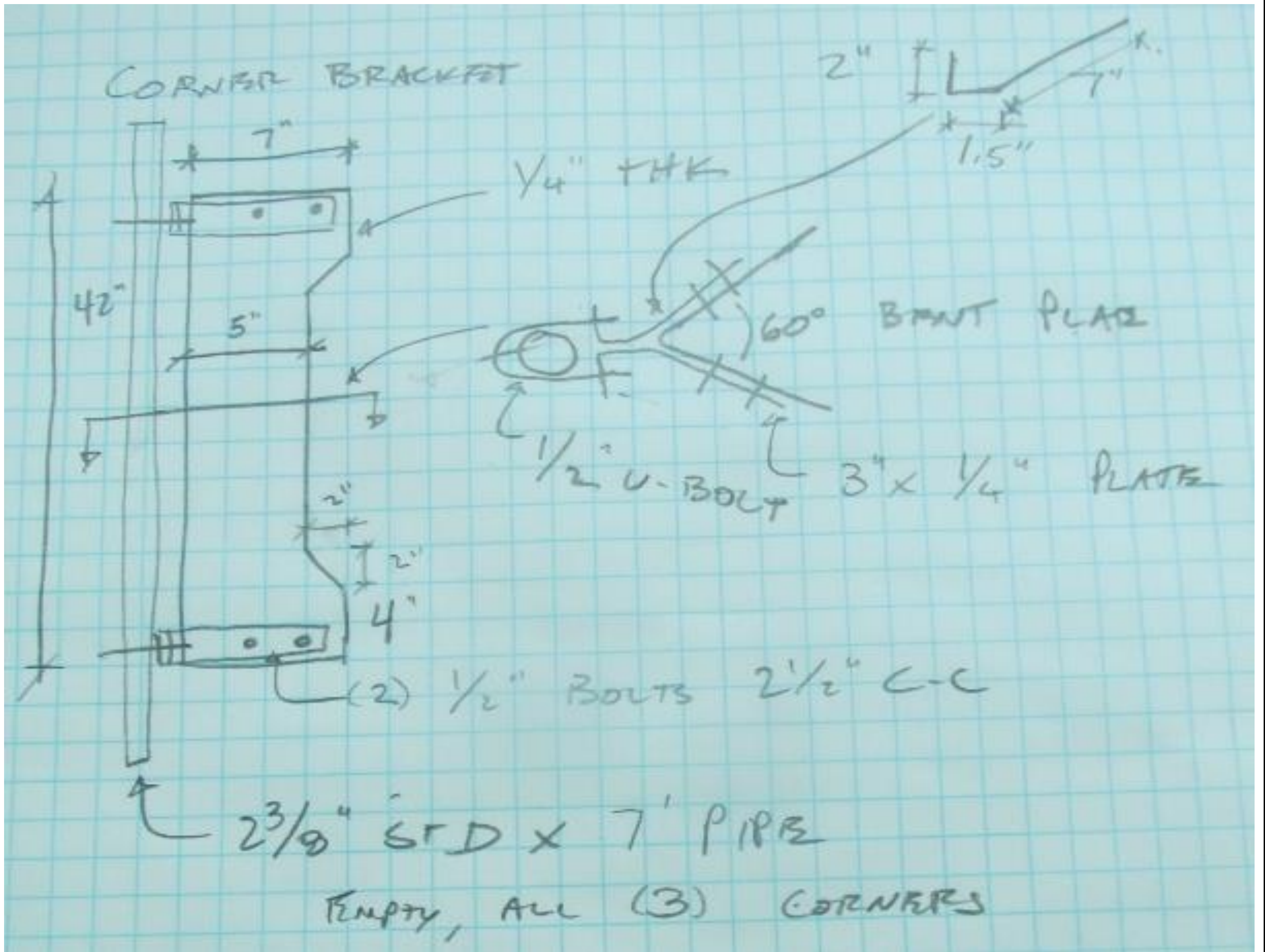
4 1/2" GAP +/-  
1/4" WELD  
4" x 4" x 1/4" TUBE

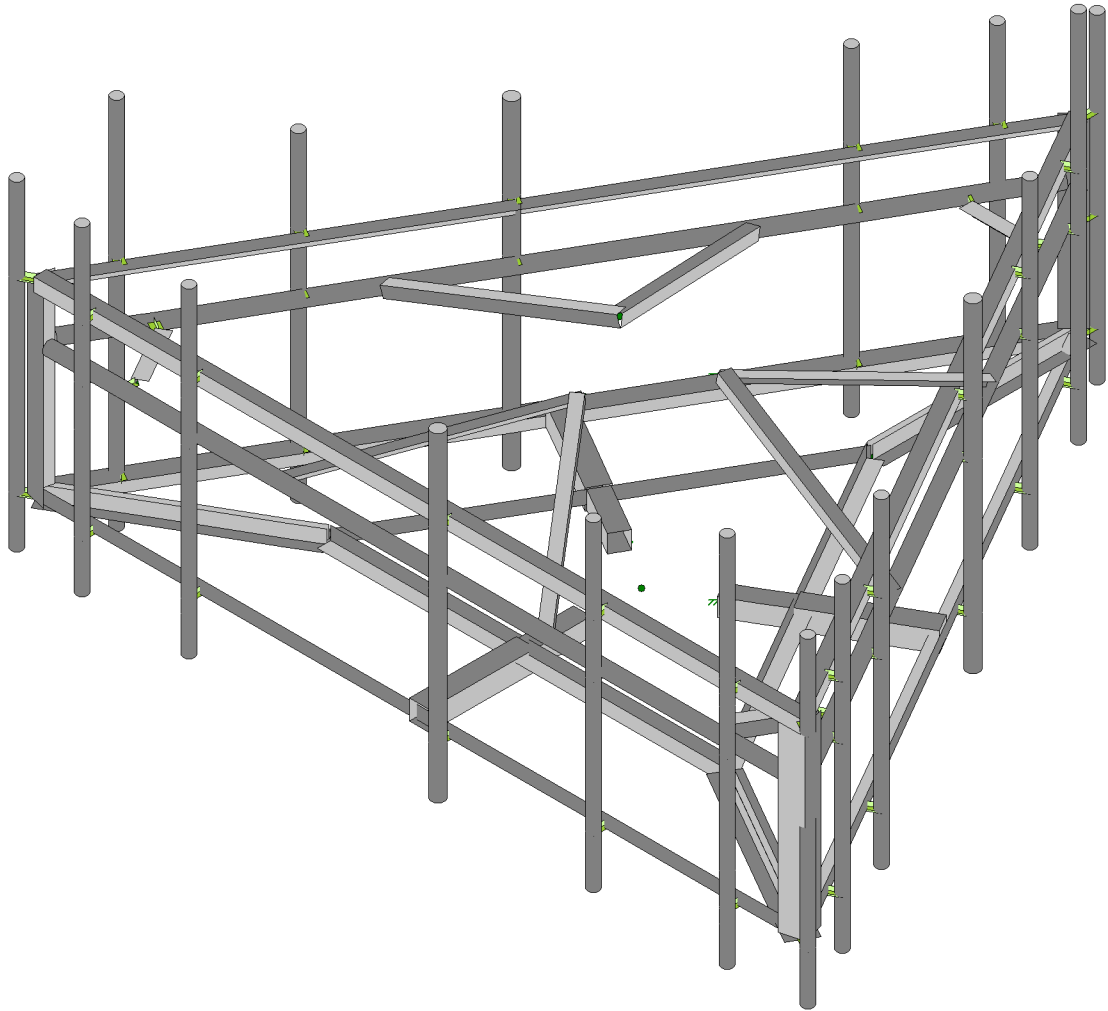
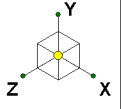
STIFFENERS TOP + BOTTOM  
4 1/2" x 4" x 3/8"











Envelope Only Solution

Maser Consulting

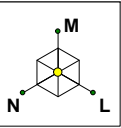
Project No. 10063097

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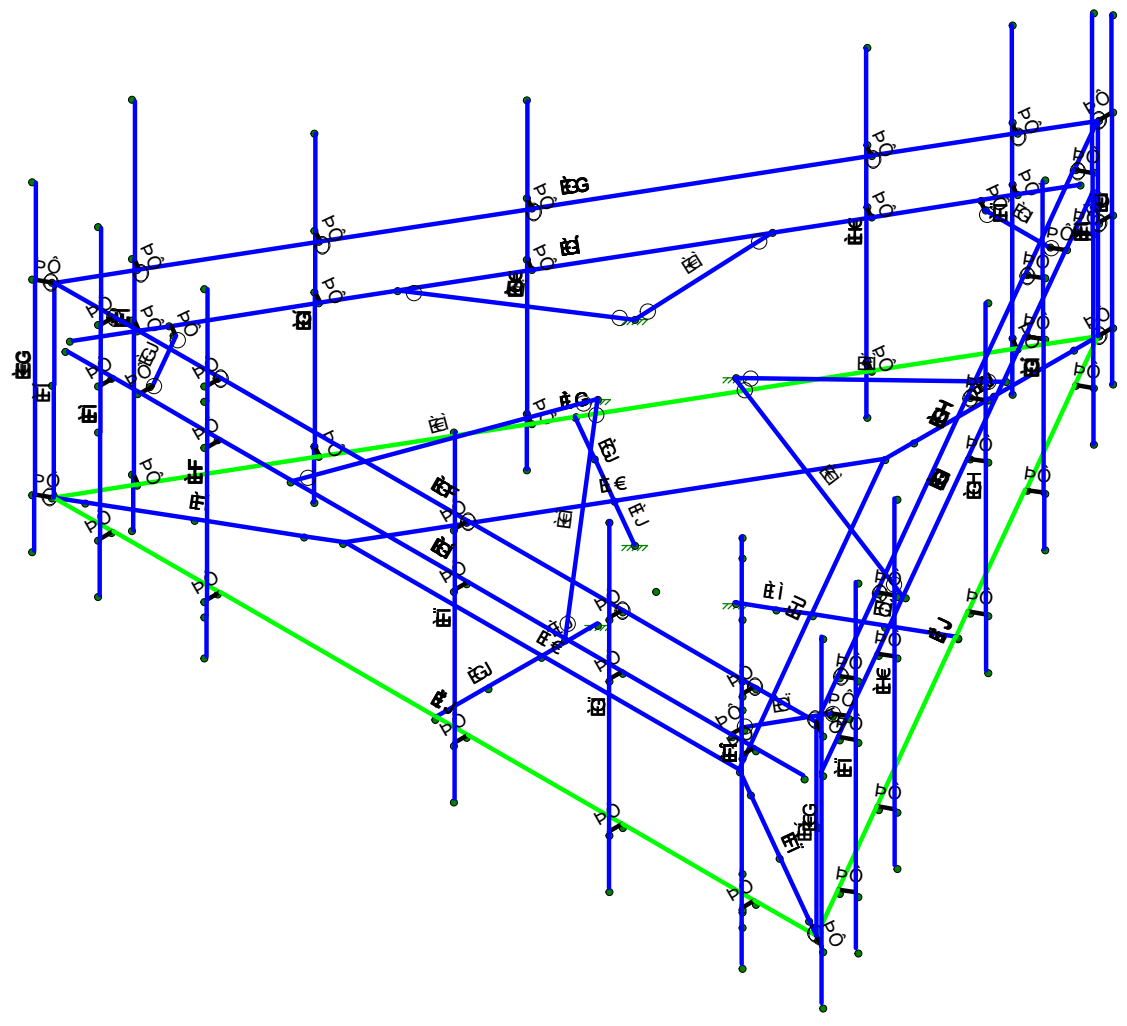
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 0[ E^E  
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T^ { a^:A[ a^A@&•Aa] | a^A(A) q^ [ ] ^aD  
 0, q^ [ ] ^A^ ) [ ^A [ ] q^ }

T a^ / A [ ] • ~ | a^ \*

I I I E H X Z Y ' T V ' S U ' P

U S A G

T a^ A G E G F a^ A K A U T

U [ ] b & a [ ] E E E H E J I

I I I E H X Z Y ' T V ' S U ' P ' S U O C O O E E E





















































































































































**A Ya Vyf'Dc]bh@UXg'f6 @ '&'. '5 bhMbUK ]fi ' \$'8 Yl k'f7 cb]bi YXL**

	T^(\ à^/Á{ }•  ã^)	Öá^&á)	Tæ) æ^ á^ ŽaÉ Eeá	Š &á) ŽáÁ á
İ J	T ÚHÓ	Ý	Ë È Í	Í ÈH
İ €	T ÚHÓ	Z	Ë Í È Fİ	Í ÈH
İ F	T ÚHÓ	T ç	Ë È Fİ	Í ÈH
İ G	T ÚGÖ	Ý	Ë È Í	H ÈH
İ H	T ÚGÖ	Z	Ë È Í I	H ÈH
İ I	T ÚGÖ	T ç	Ë È H	H ÈH
İ İ	T ÚGÓ	Ý	Ë È Í	H ÈH
İ İ	T ÚGÓ	Z	Ë È È G	H ÈH
İ İ	T ÚGÓ	T ç	Ë È	H ÈH
İ İ	T ÚGÖ	Ý	Ë È È	H ÈH
İ J	T ÚGÖ	Z	Ë È Í H	H ÈH
J €	T ÚGÖ	T ç	Ë È	H ÈH
J F	T ÚHÖ	Ý	Ë È È	H ÈH
J G	T ÚHÖ	Z	Ë È È G	H ÈH
J H	T ÚHÖ	T ç	Ë È H	H ÈH
J I	T ÚHÓ	Ý	Ë È Í	H ÈH
J İ	T ÚHÓ	Z	Ë È Í	H ÈH
J İ	T ÚHÓ	T ç	Ë È	H ÈH
J İ	T ÚHÓ	Ý	Ë È È	H ÈH
J İ	T ÚHÓ	Z	Ë È H	H ÈH
J J	T ÚHÓ	T ç	Ë È	H ÈH

**A Ya Vyf'Dc]bh@UXg'f6 @ '&'. '5 bhMbUK a 'f6'8 Yl k'**

	T^(\ à^/Á{ }•  ã^)	Öá^&á)	Tæ) æ^ á^ ŽaÉ Eeá	Š &á) ŽáÁ á
F	T ÚI Ö	Ý	€	G ÈH
G	T ÚI Ö	Z	Ë È JH	G ÈH
H	T ÚI Ö	T ç	€	G ÈH
I	T ÚI Ö	Ý	€	I ÈH
İ	T ÚI Ö	Z	Ë È JH	I ÈH
Î	T ÚI Ö	T ç	€	I ÈH
İ	T ÚI Ó	Ý	€	G ÈH
İ	T ÚI Ó	Z	Ë È İ İ	G ÈH
J	T ÚI Ó	T ç	Ë È H	G ÈH
F €	T ÚI Ó	Ý	€	I ÈH
FF	T ÚI Ó	Z	Ë È İ İ	I ÈH
FG	T ÚI Ó	T ç	Ë È H	I ÈH
FH	T ÚI Ö	Ý	€	G ÈH
FI	T ÚI Ö	Z	Ë È Í G	G ÈH
Fİ	T ÚI Ö	T ç	Ë È H	G ÈH
Fİ	T ÚI Ö	Ý	€	I ÈH
Fİ	T ÚI Ö	Z	Ë È Í G	I ÈH
Fİ	T ÚI Ö	T ç	Ë È H	I ÈH
FJ	T ÚFÖ	Ý	€	İ ÈH
G €	T ÚFÖ	Z	Ë È Í H	İ ÈH
GF	T ÚFÖ	T ç	€	İ ÈH
GG	T ÚFÓ	Ý	€	İ ÈH
GH	T ÚFÓ	Z	Ë È È G	İ ÈH
G	T ÚFÓ	T ç	Ë È È G	İ ÈH
G	T ÚFÓ	Ý	€	İ ÈH
G	T ÚFÓ	Z	Ë È H	İ ÈH
G	T ÚFÓ	T ç	Ë È È JF	İ ÈH























**A Ya Vyf'Dc]bhi@UXg'f6 @ ' % '5 bhYbbUK a 'fp&\$'8 YJ H'f' c]b]bi YXL**

	T^ { à^/Á[ Éeá^	Öá^&á}	Tæ^ } æ^ à^ ŽaÉ Eeá	Š } &eá } ŽeÁ á
ï	T ÚGÖ	T ç	ËEF	HÉH
í	T ÚGÓ	Ý	HÉHF	HÉH
î	T ÚGÓ	Z	FÈ É	HÉH
ï	T ÚGÓ	T ç	ËEÇFI	HÉH
ì	T ÚGÓ	Ý	GÉH	HÉH
ìJ	T ÚGÓ	Z	FÉJF	HÉH
J€	T ÚGÓ	T ç	ËEÇF	HÉH
JF	T ÚHÖ	Ý	GÉH	HÉH
JG	T ÚHÖ	Z	FÉJH	HÉH
JH	T ÚHÖ	T ç	ËEÇF	HÉH
JI	T ÚHÓ	Ý	HÉFJ	HÉH
JÍ	T ÚHÓ	Z	FÈ É	HÉH
JÎ	T ÚHÓ	T ç	ËEÇFH	HÉH
JÏ	T ÚHÓ	Ý	FÈ   G	HÉH
JÌ	T ÚHÓ	Z	FÈ	HÉH
JJ	T ÚHÓ	T ç	ËEÇF	HÉH

**A Ya Vyf'Dc]bhi@UXg'f6 @ ' & '5 bhYbbUK a 'fp\$'8 YJ H**

	T^ { à^/Á[ Éeá^	Öá^&á}	Tæ^ } æ^ à^ ŽaÉ Eeá	Š } &eá } ŽeÁ á
F	T ÚI Ö	Ý	GÉH	GÉH
G	T ÚI Ö	Z	I È É	GÉH
H	T ÚI Ö	T ç	ËEÇG	GÉH
I	T ÚI Ö	Ý	GÉH	I ÈH
Í	T ÚI Ö	Z	I È É	I ÈH
Î	T ÚI Ö	T ç	ËEÇG	I ÈH
Ï	T ÚI Ó	Ý	GÉH	GÉH
Ì	T ÚI Ó	Z	I ÈH	GÉH
J	T ÚI Ó	T ç	ËEÇH	GÉH
F€	T ÚI Ó	Ý	GÉH	I ÈH
FF	T ÚI Ó	Z	I ÈH	I ÈH
FG	T ÚI Ó	T ç	ËEÇH	I ÈH
FH	T ÚI Ö	Ý	FÈ É	GÉH
FI	T ÚI Ö	Z	HÉJH	GÉH
FÍ	T ÚI Ö	T ç	ËEÇH	GÉH
FÎ	T ÚI Ö	Ý	FÈ É	I ÈH
FÏ	T ÚI Ö	Z	HÉJH	I ÈH
FÌ	T ÚI Ö	T ç	ËEÇH	I ÈH
FJ	T ÚFÖ	Ý	È	Í ÈH
G€	T ÚFÖ	Z	FÈ H	Í ÈH
GF	T ÚFÖ	T ç	ËEÇH	Í ÈH
GG	T ÚFÓ	Ý	È H	Í ÈH
GH	T ÚFÓ	Z	FÈ H	Í ÈH
G	T ÚFÓ	T ç	ËEÇH	Í ÈH
Ĝ	T ÚFÔ	Ý	È HH	Í ÈH
Ĝ	T ÚFÔ	Z	FÉJH	Í ÈH
Ĝ	T ÚFÔ	T ç	ËEÇG	Í ÈH
Ĝ	T ÚFÖ	Ý	FÈ	ÈH
GJ	T ÚFÖ	Z	HÉH	ÈH
H€	T ÚFÖ	T ç	ËEÇJH	ÈH
HF	T ÚFÖ	Ý	FÈ	GÉH
HG	T ÚFÖ	Z	HÉH	GÉH





















































**A Ya Vyf'8 ]g]f]Vi hYX' @ UXg'f6 @' ( ) : Gfi Wñ fy'Kc 'fv&\$8 Y] Hf'f' cb]hbi YXL**

	T ^{ à^/Áæ^ ^	Öá^&ç	ÚæóÁ æ' æ' á^ZaDfE) áÁ æ' æ' á^ZaDfE ÚæóÁ &æ} ZéÁ á	Ö) áÁ &æ} ZéÁ á
F€	TÍ	Z	€	€
FF	TÍœ	Y	HG F	€
FG	TÍœ	Z	FÉ	€
FH	TÍœ	Y	HG F	€
FI	TÍœ	Z	FÉ	€
FÍ	T ÚFœ	Y	Í ÈF	€
FÌ	T ÚFœ	Z	HÉ	€
FĪ	T Gœ	Y	HG F	€
FÌ	T Gœ	Z	FÉ	€
FJ	T G	Y	HG F	€
G€	T G	Z	FÉ	€
GF	T H	Y	Í ÈÉ	€
GG	T H	Z	HGH	€
GH	T Hœ	Y	FH H	€
G	T Hœ	Z	Í ÈH	€
G	T I€	Y	FH H	€
G	T I€	Z	Í ÈH	€
G	T II	Y	€	€
G	T II	Z	€	€
GJ	T II	Y	Í ÈH	€
H€	T II	Z	I ÈF	€
HF	T II	Y	€	€
HG	T II	Z	€	€
HH	T I G	Y	HG F	€
HI	T I G	Z	FÉ	€
HÍ	T I Hœ	Y	HG F	€
HÌ	T I Hœ	Z	FÉ	€
HĪ	T II	Y	FH H	€
HÌ	T II	Z	Í ÈH	€
HJ	T ÚGœ	Y	Í ÈF	€
I€	T ÚGœ	Z	HÉ	€
IF	T ÚHœ	Y	Í ÈG	€
IG	T ÚHœ	Z	I ÈH	€
IH	T ÚI œ	Y	Í ÈF	€
II	T ÚI œ	Z	HÉ	€
IÍ	T ÚI œ	Y	Í ÈF	€
IÌ	T ÚI œ	Z	HÉ	€
IĪ	T H	Y	FÍ ÈG	€
IÌ	T H	Z	JÉ É	€
IJ	T H	Y	Í ÈF	€
I€	T H	Z	HÉ	€
ÍF	T H œ	Y	FÍ ÈG	€
ÍG	T H œ	Z	JÉ É	€
ÍH	T I F	Y	Í ÈF	€
ÍI	T I F	Z	HÉ	€
ÍÍ	T I Gœ	Y	FÍ ÈG	€
ÍÌ	T I Gœ	Z	JÉ É	€
ÍĪ	T II	Y	Í ÈF	€
ÍÌ	T II	Z	HÉ	€
ÍJ	T ÚFô	Y	Í ÈF	€
Í€	T ÚFô	Z	HÉ	€
ÍF	T ÚGô	Y	Í ÈF	€







































Ô({ ]æ^ KTæ^/ÁO{)•^ |q̃\*  
 Ô•ă}^! K  
 R{á}^ { à^! K Ú! | b&áP [ ĚĚĚĚĚĚĚ  
 T [ á^/áPæ ^ K I I I I I HĚZY 'TV' ŠU' P

T æ^/ĀĪ ĚĚĚĚ  
 ĀĪ HĚZY  
 Ô@&^/áĀ'K''''

**A Ya Vyf'8 ]gfh]Vi hYX'@ UXg'f6 @ )' : 'Gfi Wñ fy'K]'f6'8 YI Ě**

	T ^ { à^/áPæ ^}	Öă^&ă}	ÚčeoÁ æ ) ě á^ZaDfĚĚ) áÁ æ ) ě á^ZaDfĚĚ	ÚčeoĀĪ ĚĚĚ ) ŽdĚ á	Ů) áĀĪ ĚĚĚ ) ŽdĚ á	
F	TF	Y	€	€	€	ĀĪĚĚĚ
G	TF	Z	€	€	€	ĀĪĚĚĚ
H	TG	Y	€	€	€	ĀĪĚĚĚ
I	TG	Z	€	€	€	ĀĪĚĚĚ
Í	TÍ	Y	€	€	€	ĀĪĚĚĚ
Ī	TÍ	Z	€	€	€	ĀĪĚĚĚ
Ī	TĪ	Y	€	€	€	ĀĪĚĚĚ
Ī	TĪ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
J	TĪ	Y	€	€	€	ĀĪĚĚĚ
FĚ	TĪ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
FF	TĪĚ	Y	€	€	€	ĀĪĚĚĚ
FG	TĪĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
FH	TĪĚ	Y	€	€	€	ĀĪĚĚĚ
FI	TĪĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
FÍ	T ÚĚĚ	Y	€	€	€	ĀĪĚĚĚ
FĪ	T ÚĚĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
FĪ	TĜĚ	Y	€	€	€	ĀĪĚĚĚ
FĪ	TĜĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
FJ	TĜ	Y	€	€	€	ĀĪĚĚĚ
ĚĚ	TĜ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
ĜF	THĪ	Y	€	€	€	ĀĪĚĚĚ
ĚĚ	THĪ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
ĜH	THĚ	Y	€	€	€	ĀĪĚĚĚ
Ĝ	THĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
Ĝ	TĪĚ	Y	€	€	€	ĀĪĚĚĚ
Ĝ	TĪĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
Ĝ	TĪĪ	Y	€	€	€	ĀĪĚĚĚ
Ĝ	TĪĪ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
ĜJ	TĪĪ	Y	€	€	€	ĀĪĚĚĚ
HĚ	TĪĪ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
HF	TĪĪ	Y	€	€	€	ĀĪĚĚĚ
HĜ	TĪĪ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
HH	TĪĜ	Y	€	€	€	ĀĪĚĚĚ
H	TĪĜ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
HÍ	THĚ	Y	€	€	€	ĀĪĚĚĚ
HĪ	THĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
HĪ	TĪĪ	Y	€	€	€	ĀĪĚĚĚ
HĪ	TĪĪ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
HJ	T ÚĚĚ	Y	€	€	€	ĀĪĚĚĚ
IĚ	T ÚĚĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
IF	T ÚĚĚ	Y	€	€	€	ĀĪĚĚĚ
IG	T ÚĚĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
IH	T ÚĪĚ	Y	€	€	€	ĀĪĚĚĚ
II	T ÚĪĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
IĪ	T ÚĪĚ	Y	€	€	€	ĀĪĚĚĚ
IĪ	T ÚĪĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
IĪ	THĪ	Y	€	€	€	ĀĪĚĚĚ
IĪ	THĪ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
IJ	THĪ	Y	€	€	€	ĀĪĚĚĚ
IĚ	THĪ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ
IĪ	THĚ	Y	€	€	€	ĀĪĚĚĚ
IĜ	THĚ	Z	ĚĚĚĚĚĚĚ	ĚĚĚĚĚĚĚĚ	€	ĀĪĚĚĚ

















































Ó{ }æ^ K T æ^/Á{ }•~ |ç\*  
 Ô•ã}^! K  
 R àÁ~{ à^! K Ú!{ b&Á[ ÆÆÍ HÉJ  
 T[ à^/Áæ ^ K I Í!ÉI HÉZY 'TV' SÚ' P

T æ^ÁÍ ÈGEF  
 GK HÁUT  
 Ô@&^áÁ'K''''

**A Ya Vyf'8 jgfv]vi hyx' @ Uxg'f6 @ '\* : Gfi Wñ fy'K]''fl \$\$'8 Yl'f7 c bñbi YXL**

	T { à^/Áæ^}	Öã^&ç}	ÚçæÁ æ } æ à^ ŽaDæ(É) áÁ æ } æ à^ ŽaDæ(É) ÚçæÁ &æá } ŽdÁ á	Ò) áÁ &æá } ŽdÁ á		
íH	T I F	Ý	ÈÈ JF	ÈÈ JF	€	À FEE
íI	T I F	Z	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
íÍ	T I GE	Ý	È ÈÍ	È ÈÍ	€	À FEE
íÎ	T I GE	Z	ÈÈ Í	ÈÈ Í	€	À FEE
íÏ	T I Í	Ý	ÈÈ JF	ÈÈ JF	€	À FEE
íÌ	T I Í	Z	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
íJ	T ÚFÔ	Ý	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
í€	T ÚFÔ	Z	ÈÈ ÍÍ	ÈÈ ÍÍ	€	À FEE
íF	T ÚGÔ	Ý	ÈÈ JF	ÈÈ JF	€	À FEE
íG	T ÚGÔ	Z	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
íH	T ÚHÔ	Ý	ÈÈ G	ÈÈ G	€	À FEE
íI	T ÚHÔ	Z	ÈÈ HG	ÈÈ HG	€	À FEE
íÍ	T ÚÍ Ô	Ý	ÈÈ JF	ÈÈ JF	€	À FEE
íÎ	T ÚÍ Ô	Z	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
íÏ	T ÚÍ Ô	Ý	ÈÈ JF	ÈÈ JF	€	À FEE
íÌ	T ÚÍ Ô	Z	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
íJ	T ÚFÓ	Ý	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
í€	T ÚFÓ	Z	ÈÈ ÍÍ	ÈÈ ÍÍ	€	À FEE
íF	T ÚGÓ	Ý	ÈÈ JF	ÈÈ JF	€	À FEE
íG	T ÚGÓ	Z	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
íH	T ÚHÓ	Ý	ÈÈ G	ÈÈ G	€	À FEE
íI	T ÚHÓ	Z	ÈÈ HG	ÈÈ HG	€	À FEE
íÍ	T ÚÍ Ó	Ý	ÈÈ JF	ÈÈ JF	€	À FEE
íÎ	T ÚÍ Ó	Z	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
íÏ	T ÚÍ Ó	Ý	ÈÈ JF	ÈÈ JF	€	À FEE
íÌ	T ÚÍ Ó	Z	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
ìJ	T Î Î	Ý	ÈÈ HH	ÈÈ HH	€	À FEE
ì€	T Î Î	Z	ÈÈ GH	ÈÈ GH	€	À FEE
ìF	T Î Î	Ý	ÈÈ HH	ÈÈ HH	€	À FEE
ìG	T Î Î	Z	ÈÈ GH	ÈÈ GH	€	À FEE
ìH	T Î Î	Ý	ÈÈ HG	ÈÈ HG	€	À FEE
ìI	T Î Î	Z	ÈÈ JH	ÈÈ JH	€	À FEE
ìÍ	T J Í	Ý	ÈÈ Í H	ÈÈ Í H	€	À FEE
ìÎ	T J Í	Z	ÈÈ GG	ÈÈ GG	€	À FEE
ìÏ	T J Í	Ý	ÈÈ GH	ÈÈ GH	€	À FEE
ìÌ	T J Í	Z	ÈÈ Í	ÈÈ Í	€	À FEE
ìJ	T J Í	Ý	ÈÈ GF	ÈÈ GF	€	À FEE
J€	T J Í	Z	ÈÈ KF	ÈÈ KF	€	À FEE
JF	T J Í	Ý	ÈÈ JG	ÈÈ JG	€	À FEE
JG	T J Í	Z	ÈÈ G	ÈÈ G	€	À FEE
JH	T J J	Ý	ÈÈ JÍ	ÈÈ JÍ	€	À FEE
JI	T J J	Z	ÈÈ Í H	ÈÈ Í H	€	À FEE
JÍ	T F È	Ý	ÈÈ Í G	ÈÈ Í G	€	À FEE
JÎ	T F È	Z	ÈÈ Í Í	ÈÈ Í Í	€	À FEE
JÏ	T F È	Ý	ÈÈ G	ÈÈ G	€	À FEE
JÌ	T F È	Z	ÈÈ Í F	ÈÈ Í F	€	À FEE
JJ	T F È	Ý	ÈÈ È	ÈÈ È	€	À FEE
FÈ	T F È	Z	ÈÈ Í Í	ÈÈ Í Í	€	À FEE
FÈ	T F È	Ý	ÈÈ G	ÈÈ G	€	À FEE
FÈ	T F È	Z	ÈÈ Í H	ÈÈ Í H	€	À FEE

























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J€	TJÍ	Z	ÈÍH	ÈÍH	€	À FEE
JF	TJÍ	Ý	ÈG	ÈG	€	À FEE
JG	TJÍ	Z	ÈÍG	ÈÍG	€	À FEE
JH	TJJ	Ý	ÈFI	ÈFI	€	À FEE
JI	TJJ	Z	ÈÍF	ÈÍF	€	À FEE
JÍ	TFEE	Ý	ÈG	ÈG	€	À FEE
JÎ	TFEE	Z	ÈÍH	ÈÍH	€	À FEE
JÏ	TFÈ	Ý	ÈH	ÈH	€	À FEE
JÌ	TFÈ	Z	ÈÍJ	ÈÍJ	€	À FEE
JJ	TFÈ	Ý	ÈÍG	ÈÍG	€	À FEE
FEE	TFÈ	Z	ÈFJ	ÈFJ	€	À FEE
FÈF	TFEJ	Ý	ÈH	ÈH	€	À FEE
FEG	TFEJ	Z	ÈÍ	ÈÍ	€	À FEE











**A Ya Vyf'8 ]g]f]Vi hYX' @ UXg'f6 @' +&: Gfi Wí fY'K a ''f&\$'8 Y' L**

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H	TG	Y	ÈÈF	ÈÈF	€	À FEE
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F€	TĪ	Z	ÈÈFJ	ÈÈFJ	€	À FEE
FF	TĪOE	Y	ÈÈĪ	ÈÈĪ	€	À FEE
FG	TĪOE	Z	ÈÈH	ÈÈH	€	À FEE
FH	TĪOE	Y	ÈÈĪ	ÈÈĪ	€	À FEE
FI	TĪOE	Z	ÈÈH	ÈÈH	€	À FEE
FÍ	TÚFOE	Y	ÈÈHG	ÈÈHG	€	À FEE
FÌ	TÚFOE	Z	ÈÈEG	ÈÈEG	€	À FEE
FĪ	TGHOE	Y	ÈÈĪ	ÈÈĪ	€	À FEE
Fİ	TGHOE	Z	ÈÈH	ÈÈH	€	À FEE
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GF	TH	Y	ÈÈÈ	ÈÈÈ	€	À FEE
GG	TH	Z	ÈÈGF	ÈÈGF	€	À FEE
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G	THOE	Z	€	€	€	À FEE
G	TIE	Y	€	€	€	À FEE
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GJ	TĪ	Y	ÈÈF	ÈÈF	€	À FEE
H€	TĪ	Z	ÈÈÍ	ÈÈÍ	€	À FEE
HF	TĪ	Y	ÈÈH	ÈÈH	€	À FEE
HG	TĪ	Z	ÈÈH	ÈÈH	€	À FEE
HH	TIG	Y	ÈÈĪ	ÈÈĪ	€	À FEE
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H	TIHOE	Z	ÈÈH	ÈÈH	€	À FEE
H	TII	Y	€	€	€	À FEE
H	TII	Z	€	€	€	À FEE
HJ	TÚGOE	Y	ÈÈHG	ÈÈHG	€	À FEE
I€	TÚGOE	Z	ÈÈEG	ÈÈEG	€	À FEE
IF	TÚHOE	Y	ÈÈF	ÈÈF	€	À FEE
IG	TÚHOE	Z	ÈÈĪ	ÈÈĪ	€	À FEE
IH	TÚIOE	Y	ÈÈHG	ÈÈHG	€	À FEE
II	TÚIOE	Z	ÈÈEG	ÈÈEG	€	À FEE
IÍ	TÚIOE	Y	ÈÈHG	ÈÈHG	€	À FEE
IÌ	TÚIOE	Z	ÈÈEG	ÈÈEG	€	À FEE
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IJ	TH	Y	ÈÈHG	ÈÈHG	€	À FEE
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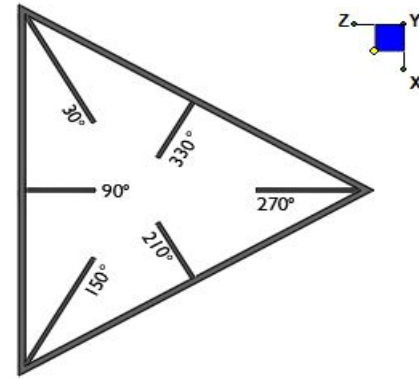




## I. Mount-to-Tower Connection Check

### RISA Model Data

Nodes (labeled per RISA)	Orientation (per graphic of typical platform)
n2	90
n77	210
n109	330



TYPICAL PLATFORM

### Tower Connection Plate and Weld Check

Connecting Standoff Member Shape:

W1 (in):

W2 (in):

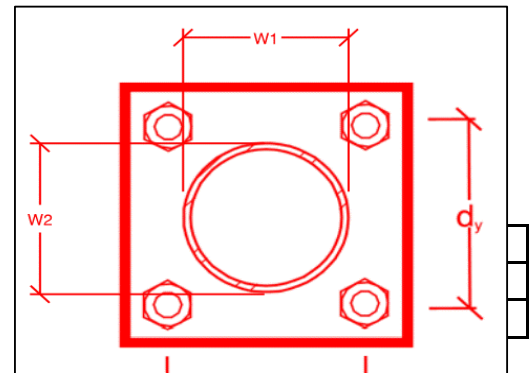
Weld Size (1/16 in):

Phi\*Rn (kip/in):

Required Weld Strength (kip/in):

Weld Capacity:

Rect
4
4
4
5.57
4.32
<b>77.6%</b>



# Mount Desktop – Post Modification Inspection (PMI) Report Requirements

## Documents & Photos Required from Contractor – Mount Modification

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**Purpose** – to provide Maser Consulting Connecticut 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 modification was completed in accordance with the modification drawings.
- Contractor shall relay any data that can impact the performance of the mount or the mount modification, this includes safety issues.

### **Base Requirements:**

- Any special photos outside of the standard requirements will be indicated on the drawings
- Provide “as built drawings” showing contractor’s name, preparer’s signature, and date. Any deviations from the drawings (proposed modification) must be shown.
- Notation that all hardware was properly installed, and the existing hardware was inspected for any issues.
- Verification that loading is as communicated in the modification drawings. NOTE If loading is different than what is conveyed in the modification drawing contact Maser Consulting Connecticut immediately.
- Each photo should be time and date stamped
- Photos should be high resolution and submitted in a Zip File and should be organized in the file structure as depicted in Schedule A attached.
- 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.
- The photos in the file structure should be uploaded to <https://pmi.vzwsmart.com> as depicted on the drawings

### **Photo Requirements:**

- Base and “During Installation Photos”
  - Base pictures include
    - Photo of Gate Signs showing the tower owner, site name, and number
    - Photo of carrier shelter showing the carrier site name and number if available
    - Photos of the galvanizing compound and/or paint used (if applicable), clearly showing the label and name
  - “During Installation Photos if provided - must be placed only in this folder
- Photos taken at ground level
  - Overall tower structure before and after installation of the modifications
  - Photos of the appropriate mount before and after installation of the modifications; if the mounts are at different rad elevations, pictures must be provided for all elevations that the modifications were installed

- Photos taken at Mount Elevation

- Photos showing each individual sector before and also after installation of modifications. Each entire sector must be in one photo to show in the inter-connection of members.
  - These photos should also certify that the placement and geometry of the equipment on the mount is as depicted on the sketch and table in the mount analysis
- Close-up photos of each installed modification per the modification drawings; pictures should also include connection hardware (U-bolts, bolts, nuts, all-threaded rods, etc.)
- Photos showing the measurements of the installed modification member sizes (i.e. lengths, widths, depths, diameters, thicknesses)
- Photos showing the elevation or distances of the installed modifications from the appropriate reference locations shown in the modification drawings
- Photos showing the installed modifications onto the tower with tape drop measurements (if applicable) (i.e. ring/collar mounts, tie-backs, V-bracing kits, etc.); if the existing mount elevation needs to be changed according to the modification drawings, a tape drop measurement shall be provided before the elevation change
- Photos showing the safety climb wire rope above and below the mount prior to modification.
- Photos showing the climbing facility and safety climb if present.

**Material Certification:**

- Materials utilized must be as per specification on the drawings or the equivalent as validated by Maser Consulting Connecticut.
  - If the drawings are as specified on the drawings
    - The contractor should provide the packing list or the materials utilized to perform the mount modification
  - If an equivalent is utilized
    - It is required that the Maser Consulting Connecticut certification of such is included in the contractor submission package. There may be an additional charge for this certification if the equivalent submission doesn't meet specifications as prescribed in the drawings.
- The contractor must certify that the materials meet these specifications by one of these methods.

The Material utilized was as specified on the Maser Consulting Connecticut Mount Modification Drawings and included in the Material certification folder is a packing list or invoice for these materials

The material utilized was an "equivalent" and included as part of the contractor submission is the Maser Consulting Connecticut certification, invoices, or specifications validating accepted status


















Certifying Individual: Company \_\_\_\_\_

Name \_\_\_\_\_

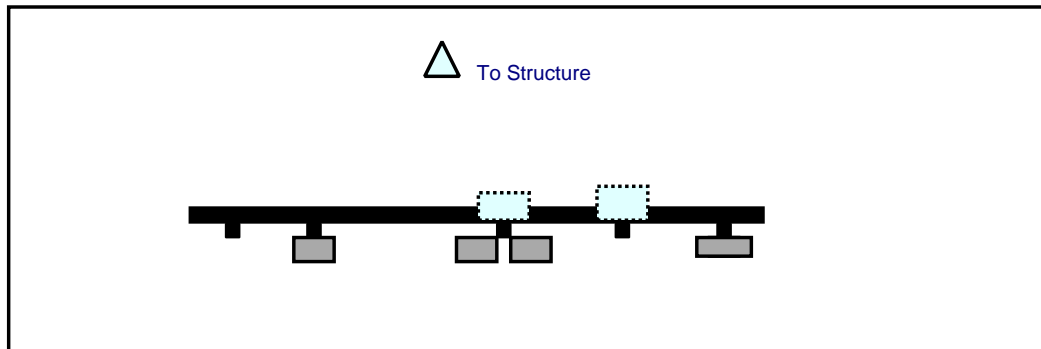




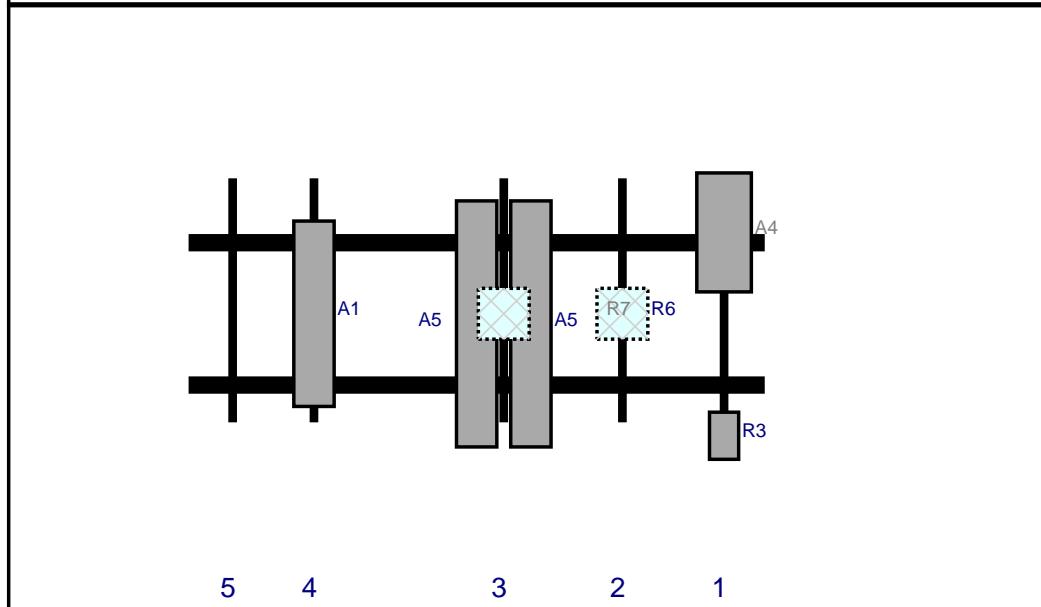
## **Schedule A – Photo & Document File Structure**

-  VzW Site Number / Name
  -  Base & “During Installation” Photos
  -  Pre-Installation Photos
    -  Alpha
    -  Beta
    -  Gamma
    -  Ground Level
    -  Tape Drop
  -  Post-Installation Photos
    -  Alpha
    -  Beta
    -  Gamma
    -  Ground Level
    -  Tape Drop
    -  Photos of climbing facility and safety climb – If Present
-  Certifications – Submission of this document including certifications
-  Specific Required Additional Photos

Plan View

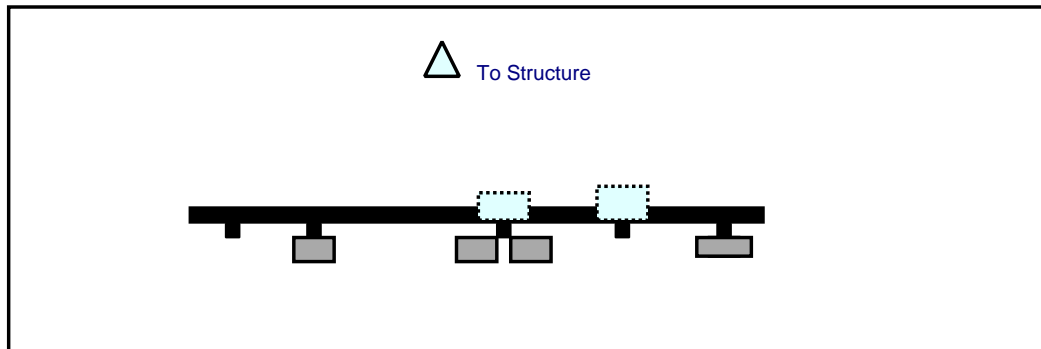


Front View  
Looking at Structure

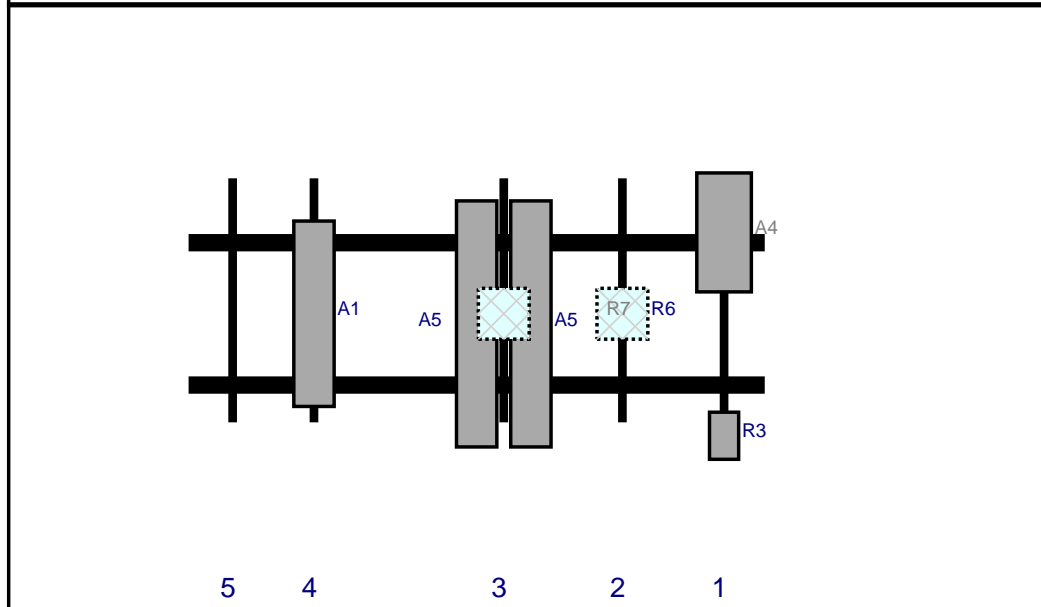


Ref#	Model	Height (in)	Width (in)	H Dist Frm L.	Pipe #	Pipe Pos V	Ant Pos	C. Ant Frm T.	Ant H Off	Status	Validation
A4	VZS01	35.1	16.1	158	1	a	Front	15.96	0	Added	
R3	XXDWMM-12.5-65-8T	13.9	8.6	158	1	a	Front	75.96	0	Added	
R6	B2/B66A RRH-BR049	15	15	128	2	a	Behind	39.96	0	Retained	
A5	SBNHH-1D65B	72.6	11.9	93	3	a	Front	42.96	8	Retained	02/23/2021
A5	SBNHH-1D65B	72.6	11.9	93	3	b	Front	42.96	-8	Retained	02/23/2021
R7	B5/B13 RRH-BR04C	15	15	93	3	a	Behind	39.96	0	Retained	
A1	LNx-6513DS-A1M	54.7	11.9	37	4	a	Front	39.96	0	Added	

Plan View

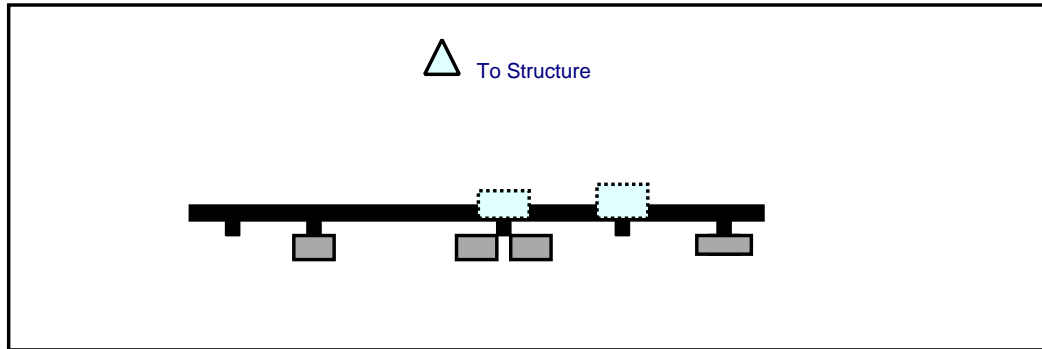


Front View  
Looking at Structure

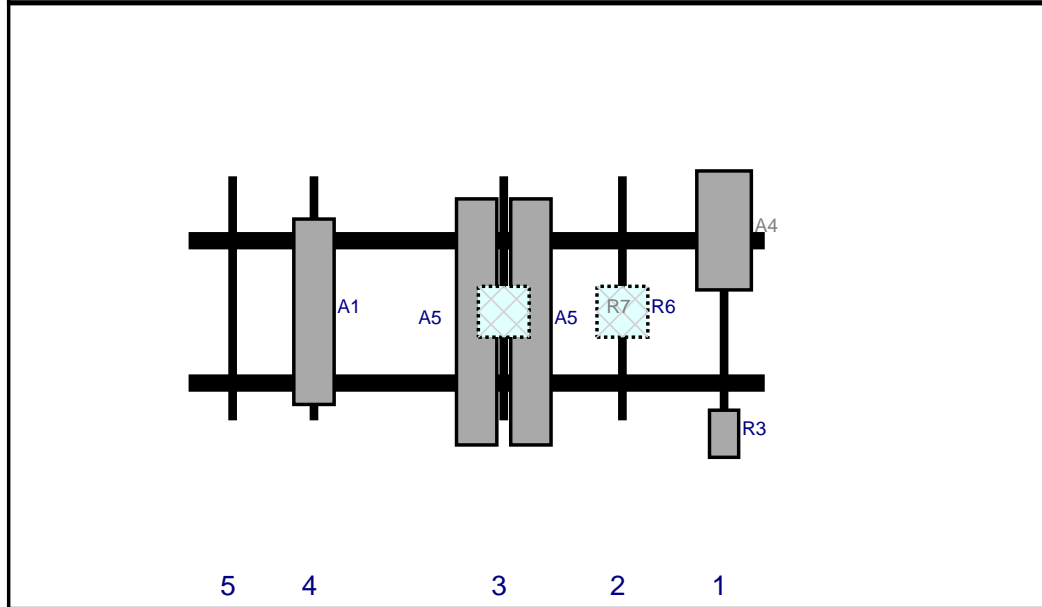


Ref#	Model	Height (in)	Width (in)	H Dist Frm L.	Pipe #	Pipe Pos V	Ant Pos	C. Ant Frm T.	Ant H Off	Status	Validation
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R6	B2/B66A RRH-BR049	15	15	128	2	a	Behind	39.96	0	Retained	
A5	SBNHH-1D65B	72.6	11.9	93	3	a	Front	42.96	8	Retained	02/23/2021
A5	SBNHH-1D65B	72.6	11.9	93	3	b	Front	42.96	-8	Retained	02/23/2021
R7	B5/B13 RRH-BR04C	15	15	93	3	a	Behind	39.96	0	Retained	
A1	LNx-6513DS-A1M	54.7	11.9	37	4	a	Front	39.96	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
A4	VZS01	35.1	16.1	158	1	a	Front	15.96	0	Added	
R3	XXDWMM-12.5-65-8T	13.9	8.6	158	1	a	Front	75.96	0	Added	
R6	B2/B66A RRH-BR049	15	15	128	2	a	Behind	39.96	0	Retained	
A5	SBNHH-1D65B	72.6	11.9	93	3	a	Front	42.96	8	Retained	02/23/2021
A5	SBNHH-1D65B	72.6	11.9	93	3	b	Front	42.96	-8	Retained	02/23/2021
R7	B5/B13 RRH-BR04C	15	15	93	3	a	Behind	39.96	0	Retained	
A1	LNx-6513DS-A1M	54.7	11.9	37	4	a	Front	39.96	0	Added	

<b><u>Subject</u></b>	TIA-222-H Usage
<b><u>Site Information</u></b>	Site ID: 468043-VZW / Newington CT
	Site Name: Newington CT
	Carrier Name: Verizon Wireless
	Address: 36 Prospect Street
	Newington, Connecticut 06111
	Hartford County
	Latitude: 41.689819°
	Longitude: -72.705369°
<b><u>Structure Information</u></b>	Tower Type: 139.00-Ft Monopole
	Mount Type: 14.17-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 2015 International Building Code states that, in Section 3108, telecommunication towers shall be designed and constructed in accordance with the provisions of TIA-222. The 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 map 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 method, seismic analysis, 30-degree increment wind direction 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,



Petros Tsoukalas, PE

# Exhibit F

## **Power Density/RF Emissions Report**

Site Name: **NEWINGTON 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 <sup>2</sup> )	(mW/cm <sup>2</sup> )	(%)
VZW 700	751	4	698	2792	106	0.0089	0.5007	1.78%
VZW CDMA	869	2	413	826	106	0.0026	0.5793	0.46%
VZW Cellular	869	4	826	3304	106	0.0106	0.5793	1.83%
VZW PCS	1980	4	1593	6372	106	0.0204	1.0000	2.04%
VZW AWS	2125	4	1581	6324	106	0.0202	1.0000	2.02%
VZW CBAND	3730	4	6531	26124	107.5	0.0813	1.0000	8.13%
VZW CBRS	3625	4	12	48	104	0.0002	1.0000	0.02%

**Total Percentage of Maximum Permissible Exposure** 16.28%

\*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/cm<sup>2</sup> = milliwatts per square centimeter  
 ERP = Effective Radiated Power

Absolute worst case maximum values used.



# Exhibit G

## Recipient Mailings



**UNITED STATES POSTAL SERVICE®**

**Click-N-Ship®**

**P**

usps.com 9405 5036 9930 0244 7668 60 0089 5000 0010 6111  
**US POSTAGE**  
Flat Rate Env  
**U.S. POSTAGE PAID**  
click-n-ship®

05/09/2022 Mailed from 01566

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**PRIORITY MAIL 2-DAY™**

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


Expected Delivery Date: 05/12/22  
Ref#: CR-876332  
**0006**

C022

SHIP TO: BETH DEL BUONO  
MAYOR- TOWN OF NEWINGTON  
131 CEDAR ST  
NEWINGTON CT 06111-2644

**USPS TRACKING #**

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**9405 5036 9930 0244 7668 60**

Electronic Rate Approved #038555749



Cut on dotted line.

### Instructions

1. Each Click-N-Ship® label is unique. Labels are to be used as printed and used only once. DO NOT PHOTO COPY OR ALTER LABEL.
2. Place your label so it does not wrap around the edge of the package.
3. Adhere your label to the package. A self-adhesive label is recommended. If tape or glue is used, DO NOT TAPE OVER BARCODE. Be sure all edges are secure.
4. To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.
5. Mail your package on the "Ship Date" you selected when creating this label.

### Click-N-Ship® Label Record

**USPS TRACKING # :**  
**9405 5036 9930 0244 7668 60**

Trans. #: 563150015	Priority Mail® Postage: <b>\$8.95</b>
Print Date: 05/09/2022	Total: <b>\$8.95</b>
Ship Date: 05/09/2022	
Expected Delivery Date: 05/12/2022	

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


Ref#: CR-876332

**To:** BETH DEL BUONO  
MAYOR- TOWN OF NEWINGTON  
131 CEDAR ST  
NEWINGTON CT 06111-2644

\* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.



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**P**

usps.com 9405 5036 9930 0244 7668 77 0089 5000 0010 6111

**US POSTAGE**  
Flat Rate Env

U.S. POSTAGE PAID  
click-n-ship®

05/09/2022 Mailed from 01566

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**PRIORITY MAIL 2-DAY™**


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

Expected Delivery Date: 05/12/22  
Ref#: CR-876332  
**0006**

**C022**

SHIP TO: RENATA BERTOTTI  
TOWN PLANNER- TOWN OF NEWINGTON  
131 CEDAR ST  
NEWINGTON CT 06111-2644

**USPS TRACKING #**



**9405 5036 9930 0244 7668 77**

---

Electronic Rate Approved #038555749



Cut on dotted line.

## Instructions


1. Each Click-N-Ship® label is unique. Labels are to be used as printed and used only once. DO NOT PHOTO COPY OR ALTER LABEL.
2. Place your label so it does not wrap around the edge of the package.
3. Adhere your label to the package. A self-adhesive label is recommended. If tape or glue is used, DO NOT TAPE OVER BARCODE. Be sure all edges are secure.
4. To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.
5. Mail your package on the "Ship Date" you selected when creating this label.

## Click-N-Ship® Label Record

<b>USPS TRACKING # :</b>	
<b>9405 5036 9930 0244 7668 77</b>	
Trans. #: 563150015	Priority Mail® Postage: <b>\$8.95</b>
Print Date: 05/09/2022	Total: <b>\$8.95</b>
Ship Date: 05/09/2022	
Expected Delivery Date: 05/12/2022	
<hr/>	
<b>From:</b> DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	Ref#: CR-876332
<hr/>	
<b>To:</b> RENATA BERTOTTI TOWN PLANNER- TOWN OF NEWINGTON 131 CEDAR ST NEWINGTON CT 06111-2644	
<p>* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.</p>	



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**Click-N-Ship®**

**P**

usps.com 9405 5036 9930 0244 7668 91 0089 5000 0010 6109  
**US POSTAGE**  
 Flat Rate Env  
 U.S. POSTAGE PAID  
click-n-ship®

05/09/2022 Mailed from 01566

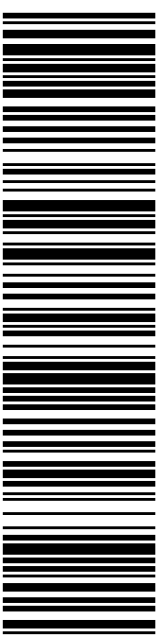
**PRIORITY MAIL 2-DAY™**

Expected Delivery Date: 05/12/22  
 Ref#: CR-876332  
**0006**

**C035**

SHIP TO:  
 JOHN OLDMAN  
 174 FOX HILL RD  
 WETHERSFIELD CT 06109-4132

**USPS TRACKING #**



**9405 5036 9930 0244 7668 91**

Electronic Rate Approved #038555749



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5. Mail your package on the "Ship Date" you selected when creating this label.

### Click-N-Ship® Label Record

**USPS TRACKING # :**  
**9405 5036 9930 0244 7668 91**

Trans. #: 563150015	Priority Mail® Postage: <b>\$8.95</b>
Print Date: 05/09/2022	Total: <b>\$8.95</b>
Ship Date: 05/09/2022	
Expected Delivery Date: 05/12/2022	

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


Ref#: CR-876332

**To:** JOHN OLDMAN  
 174 FOX HILL RD  
 WETHERSFIELD CT 06109-4132

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POSTAL SERVICE®**

**Click-N-Ship®**

**P**

usps.com 9405 5036 9930 0244 7669 14 0089 5000 0010 1581  
**US POSTAGE**  
 Flat Rate Env  
 U.S. POSTAGE PAID  
 Click-N-Ship®

05/09/2022 Mailed from 01566

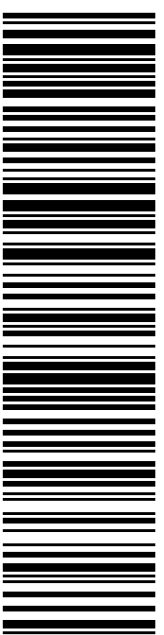
**PRIORITY MAIL 1-DAY™**

Expected Delivery Date: 05/10/22  
 Ref#: CR-876332  
**0006**

**C006**

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

**USPS TRACKING #**



**9405 5036 9930 0244 7669 14**

Electronic Rate Approved #038555749



Cut on dotted line.

### Instructions

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### Click-N-Ship® Label Record

**USPS TRACKING # :**  
**9405 5036 9930 0244 7669 14**

Trans. #: 563150015	Priority Mail® Postage: <b>\$8.95</b>
Print Date: 05/09/2022	Total: <b>\$8.95</b>
Ship Date: 05/09/2022	
Expected Delivery Date: 05/10/2022	

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

Ref#: CR-876332

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

\* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.



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876332 Crown  
V2W



FARMINGTON  
210 MAIN ST  
FARMINGTON, CT 06032-9998  
(800)275-8777

05/10/2022 12:22 PM

Product	Qty	Unit Price	Price
Prepaid Mail Westborough, MA 01581 Weight: 0 lb 2.00 oz Acceptance Date: Tue 05/10/2022 Tracking #: 9405 5036 9930 0244 7669 14	1		\$0.00
Prepaid Mail Newington, CT 06111 Weight: 0 lb 8.40 oz Acceptance Date: Tue 05/10/2022 Tracking #: 9405 5036 9930 0244 7668 60	1		\$0.00
Prepaid Mail Newington, CT 06111 Weight: 1 lb 0.80 oz Acceptance Date: Tue 05/10/2022 Tracking #: 9405 5036 9930 0244 7668 77	1		\$0.00
Prepaid Mail Wethersfield, CT 06109 Weight: 0 lb 8.40 oz Acceptance Date: Tue 05/10/2022 Tracking #: 9405 5036 9930 0244 7668 91	1		\$0.00

Grand Total: \$0.00

\*\*\*\*\*  
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