CROWN CASTLE

1 Cityplace Dr, Suite 490

Creve Coeur, MO 63141

Phone: (314) 513-0147

www.crowncastle.com

April 16, 2021

Melanie A. Bachman
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: **Notice of Exempt Modification for T-Mobile**
Crown Site ID# 876372; T-Mobile Site ID# CTHA653A
71 Ashford RD Eastford, CT 06272
Latitude: 41.904591 / Longitude: -72.123776

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 177-foot mount on the existing 177-foot Monopole Tower located at 71 Ashford RD in Eastford. The property is owned by The Connecticut Forest & Park Assoc and the Tower by Crown Castle. T-Mobile now intends to replace nine (9) existing antennas and remove three (3) antennas. This modification/proposal includes hardware that is both 4G(LTE) and 5G capable through remote software configuration and either or both services may be turned on or off at various times.

Planned Modifications:
Tower:

Remove and Replace:
(3) Sprint Antennas **(REMOVE) –** (3) RFS APX16DWV-16DWV-S-E-A20 Antennas – **(REPLACE)**

(3) Commscope NNVV-65B-R4 Antennas **(REMOVE) -** (3) RFS APXVAALL24_43-U-NA20 Antennas **(REPLACE)**

(3) RFS/Celwave – APXVTM14-ALU-120 Antennas **(REMOVE) -** (3) Ericsson AIR6449 B41 Antennas **(REPLACE)**

(3) Alcatel Lucent – PCS 1900MHZ 4x45W-65MHZ Radios **(REMOVE) -** (3) Ericsson 4415 B66A Radios **(REPLACE)**

(3) Alcatel Lucent – RRH2X50-800 Radios **(REMOVE) –** (3) Ericsson 4449 B71+B85 Radios **(REPLACE)**

(3) Alcatel Lucent –TD-RRH8X20-25 Radios **(REMOVE)** – (3) Ericsson 4424 B25 Radios

(REPLACE)

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Install New:
(4) 6/24" Hybrid Cables
(1) Site Pro 1 HRK 12 Handrail Kit
(3) 8' Mount Pipes

Remove:
(3) Sprint Antennas
(3) Alcatel Lucent – RRH2X50-800 Radios
(2) Sprint Radios

Ground:

Remove and Replace:
(1) Sprint Cabinet **(REMOVE) -** (1) 6160 Site Support Cabinet (SSC) **(REPLACE)**
(1) Sprint Cabinet **(REMOVE)** – (1) B160 Cabinet **(REPLACE)**

Install New:
(1) BB 6648 in 6160 SSC
(3) BB 6630 in 6160 SSC
(1) DUG20 in 6160 SSC
(1) PSU 4813 Voltage Booster in 6160 SSC
(1) CSR IXRE V2 (Gen2) in 6160 SSC
(1) RBS 6601

Remove:
(4) Hybrid Trunks

The facility was approved by the Town of Eastford Building Official by way of Building Permit 00-13 on August 29, 2000.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, 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 Jacqueline Dubois, First Selectwoman for the Town of Eastford as well as Joseph Pajak, Building Official for the Town of Eastford. A copy will also be sent to the property owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modification 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 Communication 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, T-Mobile respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. §16-50j-72(b)(2).

Sincerely,

Colin Robinson

Colin Robinson
Project Manager
NETWORK BUILDING + CONSULTING
100 Apollo Drive Suite 303
Chelmsford, MA 01824
crobinson@nbcllc.com
(360) 561-3311

cc:

Jacqueline Dubois, First Selectwoman:*(via email only to firstselectman@townofeastford.com)*
16 Westford Road
P.O. Box 98, Eastford, CT 06242
(860) 974-0133x3

Joseph Pajak, Building Official *(via email only to buildingofficial@townofeastford.com)*
16 Westford Road
P.O. Box 98, Eastford, CT 06242
(860) 974-0133

Connecticut Forest & Park Assoc *(via FedEx)*
16 Meriden Rd
Rockfall, CT 06481

Colin Robinson

From: Colin Robinson
Sent: Friday, April 16, 2021 12:41 PM
To: firstselectman@townofeastford.com
Cc: Colin Robinson
Subject: CSC Exempt Modification Application 71 Ashford RD Eastford CT 876372
Attachments: CSC Exempt Modification Application 71 Ashford RD Eastford CT 876372 041621.pdf

Good Afternoon First Selectwoman Dubois,

Please see the attached application to the Connecticut Siting Council regarding antenna work on the existing cell tower located at 71 Ashford RD Eastford CT.

Should you have any questions/comments/concerns regarding this application, please do not hesitate to contact me.

Thank you,

Colin

Colin Robinson
Project Manager
NETWORK BUILDING + CONSULTING
100 Apollo Drive | Suite 303 | Chelmsford, MA | 01824
M 360.561.3311

Colin Robinson

From: Colin Robinson
Sent: Friday, April 16, 2021 12:41 PM
To: buildingofficial@townofeastford.com
Cc: Colin Robinson
Subject: CSC Exempt Modification Application 71 Ashford RD Eastford CT 876372
Attachments: CSC Exempt Modification Application 71 Ashford RD Eastford CT 876372 041621.pdf

Good Afternoon Mr. Pajak,

Please see the attached application to the Connecticut Siting Council regarding antenna work on the existing cell tower located at 71 Ashford RD Eastford CT.

Should you have any questions/comments/concerns regarding this application, please do not hesitate to contact me.

Thank you,

Colin

Colin Robinson
Project Manager
NETWORK BUILDING + CONSULTING
100 Apollo Drive | Suite 303 | Chelmsford, MA | 01824
M 360.561.3311

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

Exhibit A

Original Facility Approval

Building Permit

TOWN OF EASTFORD

No. 00-13

Sprint PCS/Sterling
NAME

100 Ashford Rd
STREET

Eastford Ct

Inspections Required (When checked)

- ☐ Footings or piers
- ☐ Foundation walls prior to backfill
- ☐ Rough framing
- ☐ Rough electrical
- ☐ Rough plumbing
- ☐ Rough heating
- ☐ Insulation
- ☐ Chimneys and fireplaces
- ☐ Final inspection for certificate or occupancy

This Permit Must Be Attached to or in Front of Building
To Be Removed Only By Building Inspector

Date 8-29-00

Building Inspector Alvin L Kelly

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 2016.

TOWN OF EASTFORD

Connecticut

Information on the Property Records for the Municipality of Eastford was last updated on 4/13/2021.

Parcel Information

Location:	71 ASHFORD RD	Property Use:	Vacant Land	Primary Use:	State Vacant
Unique ID:	00056820	Map Block Lot:	70 6 6 2	Acres:	13.07
490 Acres:	0.00	Zone:		Volume / Page:	0055/0766
Developers Map / Lot:		Census:	9022		

Value Information

	Appraised Value	Assessed Value
Land	64,800	45,400
Buildings	0	0
Detached Outbuildings	0	0
Total	64,800	45,400

Owner's Information

Owner's Data
CONNECTICUT FOREST & PARK ASSOC 16 MERIDEN RD ROCKFALL, CT 06481

Owner History - Sales

Owner Name	Volume	Page	Sale Date	Deed Type	Valid Sale	Sale Price
CONNECTICUT FOREST & PARK ASSOC	0055	0766	08/29/2006	Warranty Deed	No	$45,000
STERLING GROUP 1, LLC	0041	0255	01/29/2000		No	$35,000
FULLANA JAMES A + SUSAN	0036	0651	01/16/1996	Warranty Deed	Yes	$35,000
GREEN HERBERT EST	0031	0852	04/23/1991		No	$0

Building Permits

Permit Number	Permit Type	Date Opened	Date Closed	Permit Status	Reason
00-013	Miscellaneous	11/20/2000		Closed	CELL TOWER

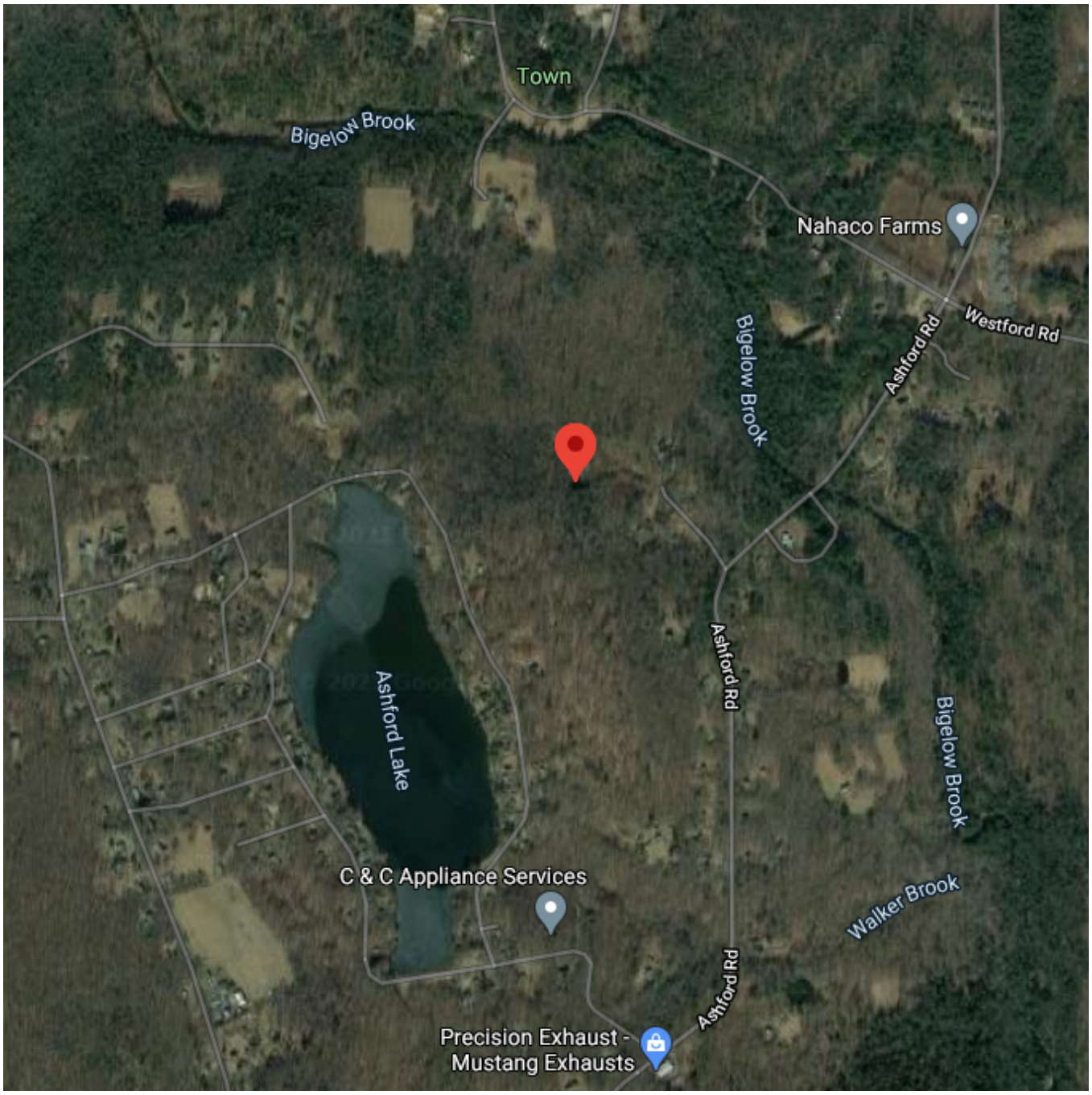

Town
Bigelow Brook
Nahaco Farms
Westford Rd
Ashford Rd
Bigelow Brook
Ashford Lake
Ashford Rd
Bigelow Brook
C & C Appliance Services
Walker Brook
Ashford Rd
Precision Exhaust -
Mustang Exhausts

Exhibit C

Construction Drawings

T-MOBILE SITE NUMBER: CTHA653A
T-MOBILE SITE NAME: CTHA653A
SITE TYPE: MONOPOLE
TOWER HEIGHT: 177'-0"

BUSINESS UNIT #: 876372
SITE ADDRESS: 71 ASHFORD RD EASTFORD, CT 06272
COUNTY: WINDHAM
JURISDICTION: TOWN OF EASTFORD

T-MOBILE SPRINT RETAIN SITE CONFIGURATION: 67D5A998C 6160 (GSM ONLY)

SITE INFORMATION

CROWN CASTLE USA INC. SITE NAME:	SMITH HILLS / STERLING GRP. (S
SITE ADDRESS:	71 ASHFORD RD EASTFORD, CT 06272
COUNTY:	WINDHAM
MAP/PARCEL #:	CT-039-70-6-6-2
AREA OF CONSTRUCTION:	EXISTING
LATITUDE:	41.904591°
LONGITUDE:	-72.123776°
LAT/LONG TYPE:	NAD83
GROUND ELEVATION:	670'
CURRENT ZONING:	UNKNOWN
JURISDICTION:	TOWN OF EASTFORD
OCCUPANCY CLASSIFICATION:	U
TYPE OF CONSTRUCTION:	IIB
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
PROPERTY OWNER:	CONNECTICUT FOREST & PARK ASSOC PMB 331 4017 WASHINGTON RD MCMURRAY, PA 15317
TOWER OWNER:	CROWN CASTLE USA INC 2000 CORPORATE DRIVE CANONSBURG, PA 15317
CARRIER/APPLICANT:	T-MOBILE 4 SYLVAN WAY PARSIPPANY, NJ 07054
ELECTRIC PROVIDER:	N/A
TELCO PROVIDER:	N/A

PROJECT TEAM

A&E FIRM:	B+T GROUP 1717 S BOULDER AVE, SUITE 300 TULSA, OK 74119 JENNY PAUL jpaul@btgrp.com
CROWN CASTLE USA INC. DISTRICT CONTACTS:	3530 TORINGDON WAY, SUITE 300 CHARLOTTE, NC 28277

DRAWING INDEX

SHEET #	SHEET DESCRIPTION
T-1	TITLE SHEET
T-2	GENERAL NOTES
C-1.1	OVERALL SITE PLAN
C-1.2	SITE PLAN & ENLARGED SITE PLAN
C-2	FINAL ELEVATION & ANTENNA PLANS
C-3	ANTENNA & CABLE SCHEDULE
C-4	PLUMBING DIAGRAM
C-5	EQUIPMENT SPECS
G-1	ANTENNA GROUNDING DIAGRAM
G-2	GROUNDING DETAILS
G-3	GROUNDING DETAILS

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR 24X36. 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.

PROJECT DESCRIPTION

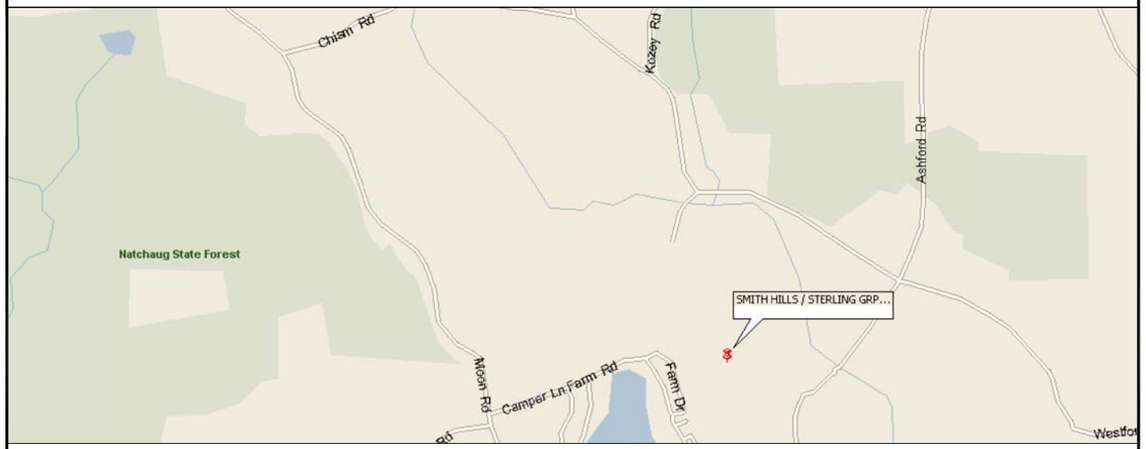
THE PURPOSE OF THIS PROJECT IS TO ENHANCE BROADBAND CONNECTIVITY AND CAPACITY TO THE EXISTING ELIGIBLE WIRELESS FACILITY.

TOWER SCOPE OF WORK:
- REMOVE (12) ANTENNAS
- REMOVE (14) RADIOS
- INSTALL (9) ANTENNAS
- INSTALL (9) RADIOS
- INSTALL (4) 6/24" HYBRID CABLES
- INSTALL (1) SITE PRO 1 HRK 12 HANDRAIL KIT
- INSTALL (3) 8' MOUNT PIPE

GROUND SCOPE OF WORK:
- REMOVE (2) SPRINT CABINETS
- REMOVE (4) HYBRID TRUNKS
- INSTALL (1) SSC 6160 CABINET
- INSTALL (1) B160 BATTERY CABINET
- INSTALL (1) BB 6648
- INSTALL (3) BB 6630s
- INSTALL (1) DUG20
- INSTALL (1) PSU 4813 VOLTAGE BOOSTER
- INSTALL (1) CSR IXRe V2 (Gen 2)
- INSTALL (1) RBS 6601

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

LOCATION MAP



NO SCALE

APPLICABLE CODES/REFERENCE DOCUMENTS

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

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

REFERENCE DOCUMENTS:

STRUCTURAL ANALYSIS:	TOWER ENGINEERING PROFESSIONALS
DATED:	2/9/21
MOUNT ANALYSIS:	INFINGY ENGINEERING, PLLC
DATED:	2/1/21
RFDS REVISION:	1
DATED:	1/12/21
ORDER ID:	538767
REVISION:	0

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

APPROVALS

APPROVAL	SIGNATURE	DATE
PROPERTY OWNER OR REP.		
LAND USE PLANNER		
T-MOBILE		
OPERATIONS		
RF		
NETWORK		
BACKHAUL		
CONSTRUCTION MANAGER		

THE PARTIES ABOVE HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL CONSTRUCTION DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND ANY CHANGES AND MODIFICATIONS THEY MAY IMPOSE.

T-Mobile
4 SYLVAN WAY
PARSIPPANY, NJ 07054

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277

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

T-MOBILE SITE NUMBER:
CTHA653A

BU #: **876372**
SMITH HILLS / STERLING GRP. (S

71 ASHFORD RD
EASTFORD, CT 06272

EXISTING
177'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	2/22/21	JTS	CONSTRUCTION	MTJ
1	3/19/21	JJD	CONSTRUCTION	GEH

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

SHEET NUMBER: T-1

REVISION: 1

147462.002.01_SMITH HILLS STERLING GRP. (S_CC_TMO_NE_CD Upgrades.dwg – Sheet:T-1 – User: ghoyes – Mar 19, 2021 – 2:02pm

CROWN CASTLE USA INC. SITE ACTIVITY REQUIREMENTS:

1. 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.
2. "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.
3. 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.
4. 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).
5. 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."
6. 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.
7. 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.
8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
10. 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.
11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.
12. 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.
13. 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.
14. 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.
15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
17. 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.
18. 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.
19. 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.
20. 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.
21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
22. 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.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   - CONTRACTOR: GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION
   - CARRIER: T–MOBILE
   - TOWER OWNER: CROWN CASTLE USA INC.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
9. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
10. 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.
11. 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.
12. 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.
13. 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.
14. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

1. 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.
2. UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.
3. 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.
4. 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.
5. 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
6. 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"
7. 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.

GREENFIELD GROUNDING NOTES:

1. 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.
2. THE CONTRACTOR SHALL PERFORM IEEE FALL–OF–POTENTAL 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.
3. 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.
4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
5. 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.
6. 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.
7. 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.
8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.
15. APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
17. MISCELLANEOUS ELECTRICAL AND NON–ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
18. BOND ALL METALLIC OBJECTS WITHIN 6 ft OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.
19. 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.
20. 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).
21. 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).

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
4. 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. VERYIFY 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.
5. 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.
6. 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).
7. PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
8. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
9. 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.
10. 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.
11. POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI–CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
12. 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.
13. 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).
14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.
15. ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
16. ELECTRICAL METALLIC TUBING (EMT) OR METAL–CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
18. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.
20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND THE NEC.
21. WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).
22. SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
23. 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 LOCKNUT ON OUTSIDE AND INSIDE.
24. 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.
25. 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.
26. 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.
27. 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.
28. 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.
29. INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "T–MOBILE".
30. 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

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

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

4 SYLVAN WAY
PARSIPPANY, NJ 07054

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277

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

T-MOBILE SITE NUMBER:
CTHA653A

BU #: **876372**
SMITH HILLS / STERLING GRP. (S

71 ASHFORD RD
EASTFORD, CT 06272

EXISTING
177'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	2/22/21	JTS	CONSTRUCTION	MTJ
1	3/19/21	JJD	CONSTRUCTION	GEH

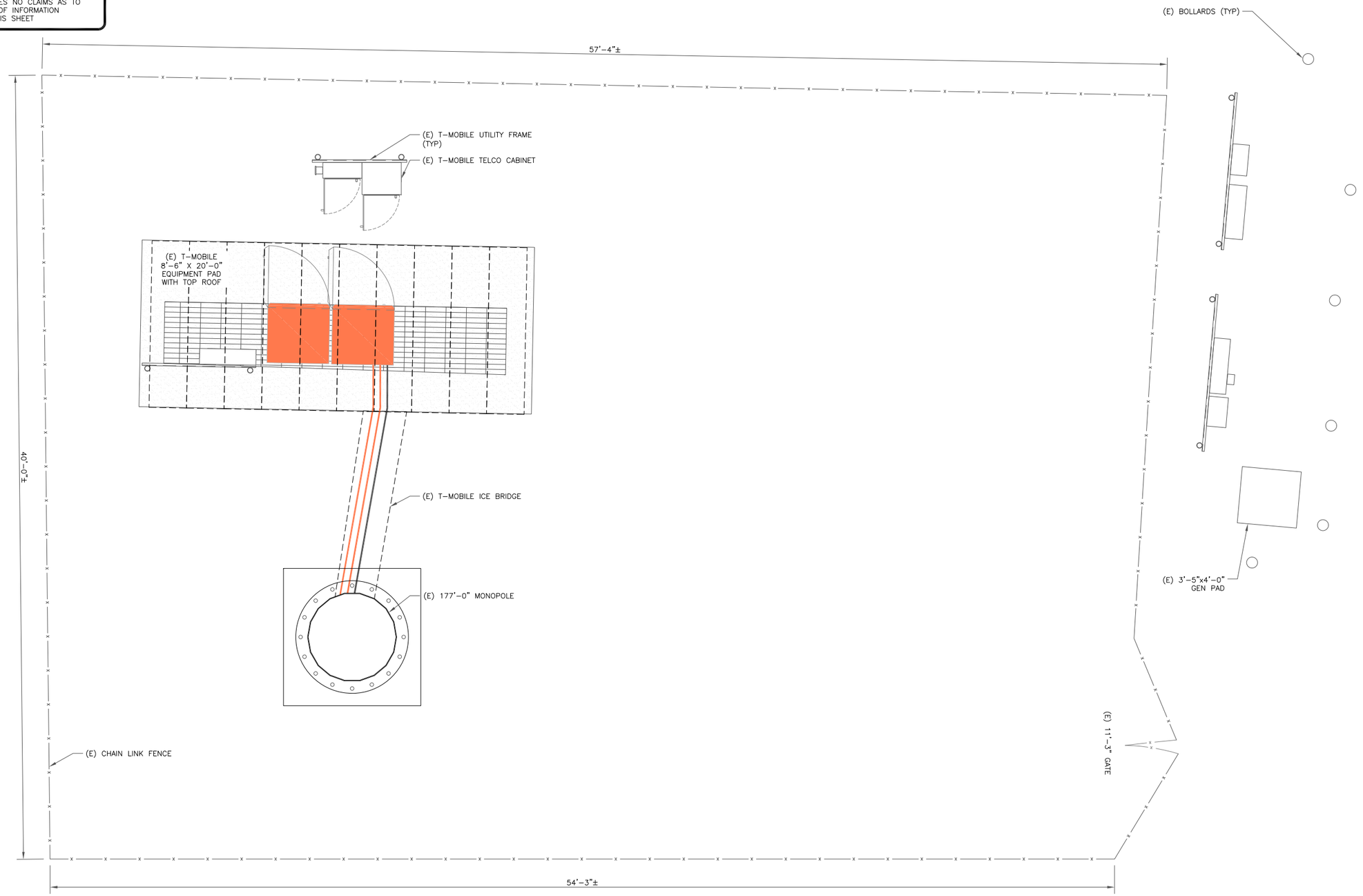
B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

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

147462.002.01_SMITH HILLS STERLING GRP. (S_CC_TMO_NE_CD Upgrades.dwg – Sheet:T–2 – User: ghayes – Mar 19, 2021 – 2:02pm

SITE PLAN DISCLAIMER:

PROPERTY LINES AND STRUCTURES HAVE BEEN DIGITIZED FROM PREVIOUS PLAN SETS OR FROM ASSESSORS MAPS. CROWN CASTLE USA INC. HAS NOT COMPLETED A SITE SURVEY AND THEREFORE MAKES NO CLAIMS AS TO THE ACCURACY OF INFORMATION DEPICTED ON THIS SHEET



1 OVERALL SITE PLAN

SCALE: 2' 1' 0 2' 3/8"=1'-0" (FULL SIZE) 3/16"=1'-0" (11x17)

N

T-Mobile
4 SYLVAN WAY
PARSIPPANY, NJ 07054

CROWN CASTLE
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71 ASHFORD RD
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EXISTING
177'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	2/22/21	JTS	CONSTRUCTION	MTJ
1	3/19/21	JJD	CONSTRUCTION	GEH

CT PE No. 23824 LICENSED PROFESSIONAL ENGINEER
3/19/21

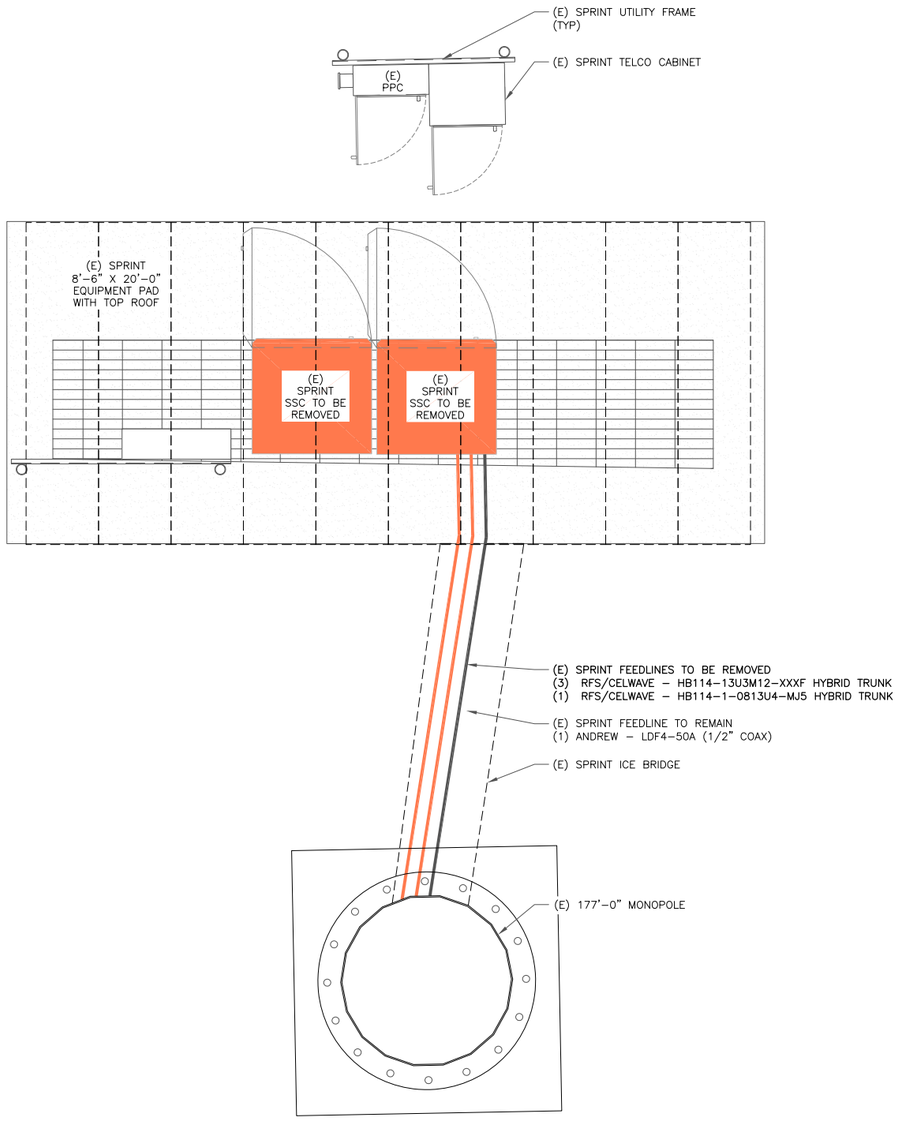
B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

SHEET NUMBER: C-1.1

REVISION: 1

EQUIPMENT LEGEND:

- EXISTING
- TO BE RELOCATED/REMOVED
- NEW



1 EXISTING EQUIPMENT PLAN

SCALE: 2' 1' 0 2' 1/2"=1'-0" (FULL SIZE) 1/4"=1'-0" (11x17)

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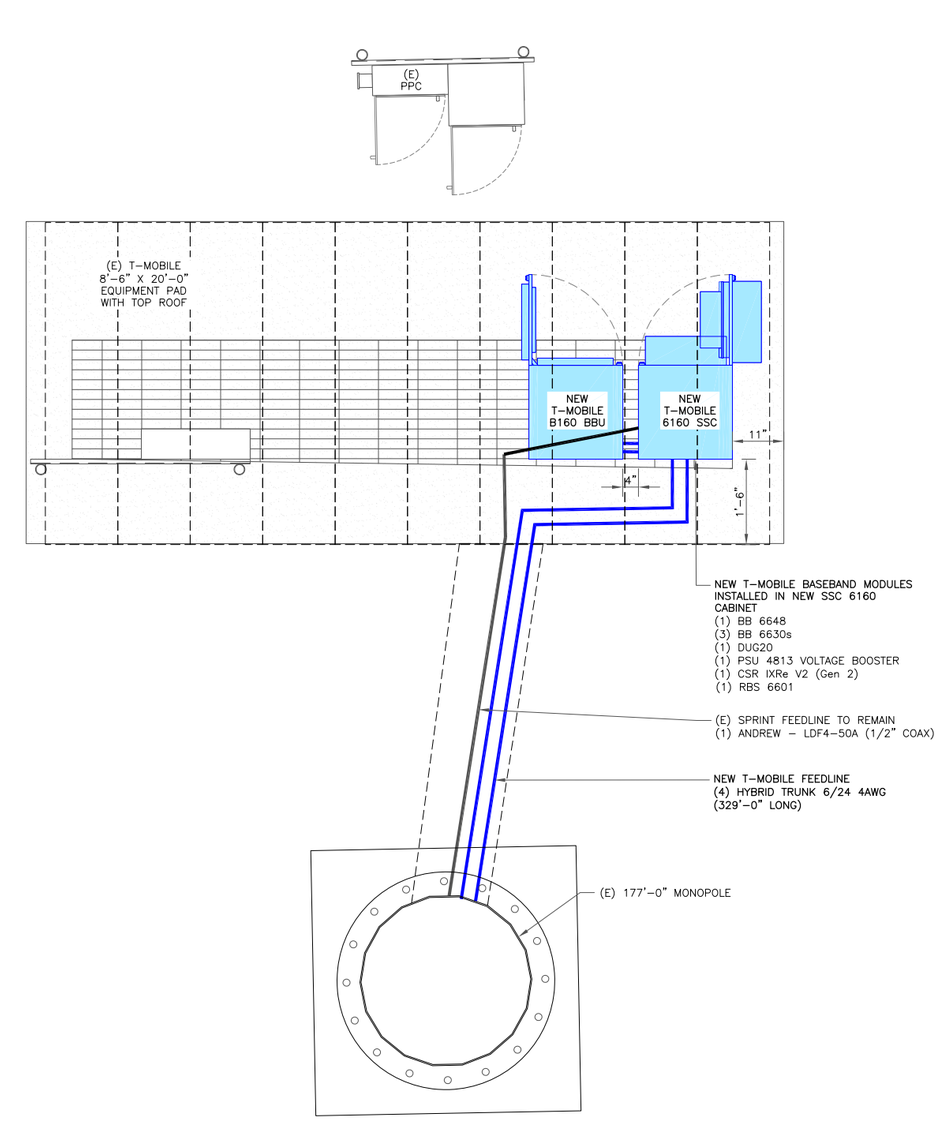

2 FINAL EQUIPMENT PLAN

SCALE: 2' 1' 0 2' 1/2"=1'-0" (FULL SIZE) 1/4"=1'-0" (11x17)

N

T-Mobile
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71 ASHFORD RD
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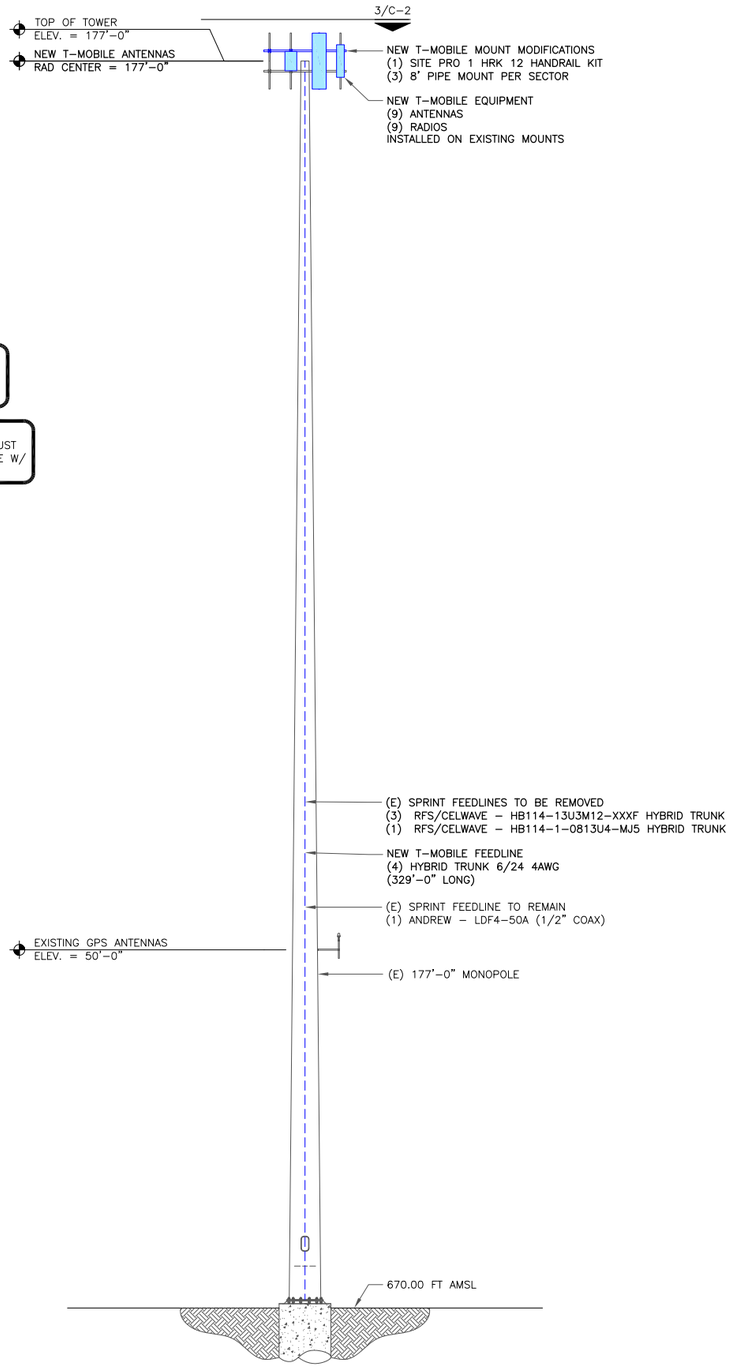
1	3/19/21	JJD	CONSTRUCTION	GEH

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

SHEET NUMBER: C-1.2

REVISION: 1

147462.002.01_SMITH HILLS STERLING GRP. (S_CC_TMO_NE_CD Upgrades.dwg — Sheet:C-1.2 — User: ghoyes — Mar 19, 2021 — 2:02pm

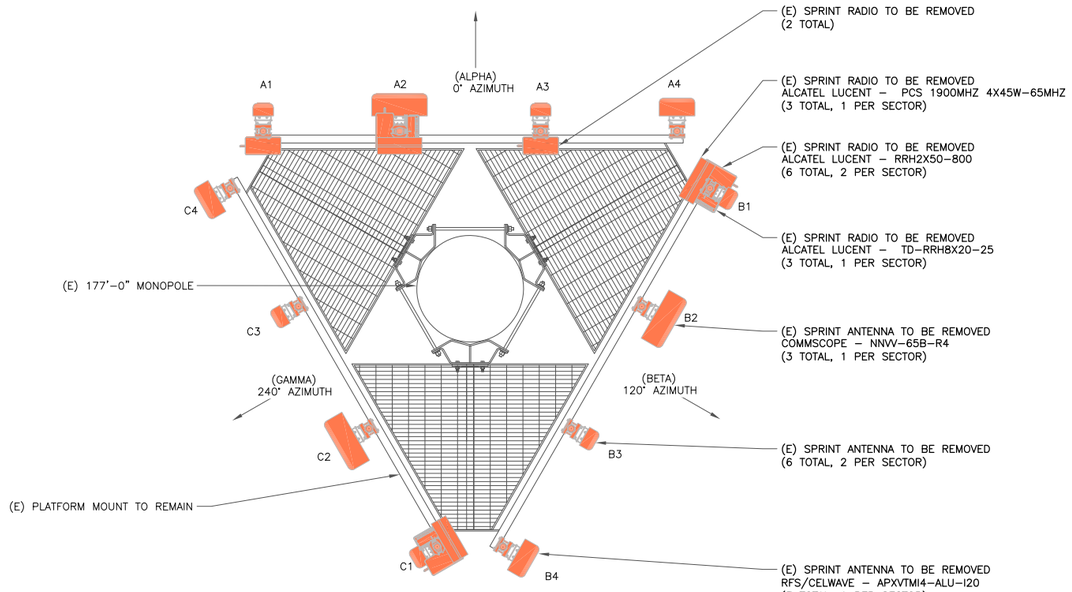


T-MOBILE EQUIPMENT

ANTENNA CL: 177'-0"
MOUNT CL: 177'-0"

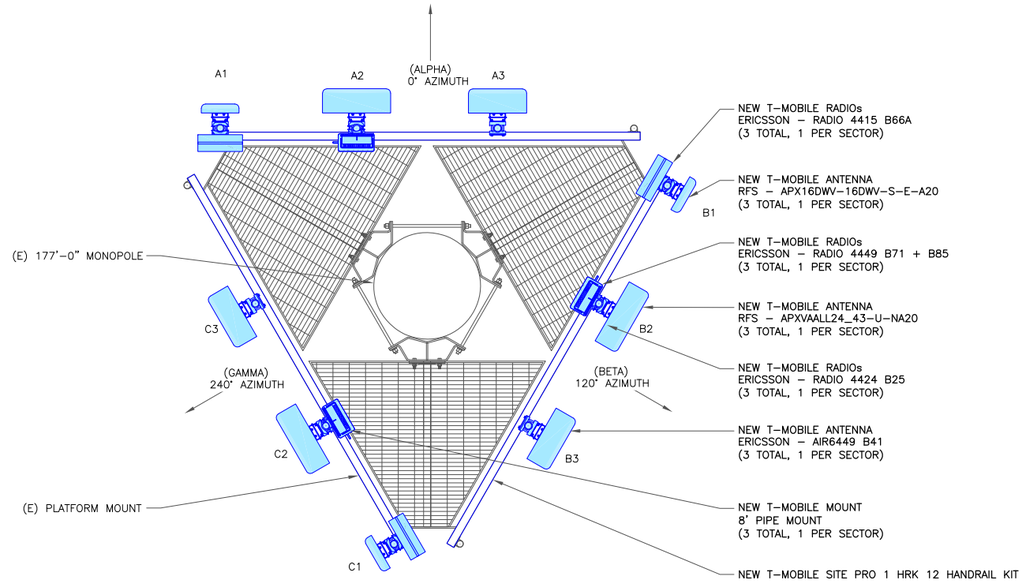
ANY AND ALL TOWER MOUNTED EQUIPMENT MUST NOT TRAP OR INTERFERE W/ EXISTING SAFETY CLIMB

1 FINAL ELEVATION
SCALE: NOT TO SCALE



2 EXISTING ANTENNA PLAN
SCALE: NOT TO SCALE

N



3 FINAL ANTENNA PLAN
SCALE: NOT TO SCALE

N

T-Mobile
4 SYLVAN WAY
PARSIPPANY, NJ 07054

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277

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

T-MOBILE SITE NUMBER:
CTHA653A

BU #: **876372**
SMITH HILLS / STERLING GRP. (S

71 ASHFORD RD
EASTFORD, CT 06272

EXISTING
177'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	2/22/21	JTS	CONSTRUCTION	MTJ
1	3/19/21	JJD	CONSTRUCTION	GEH

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

SHEET NUMBER: C-2

REVISION: 1

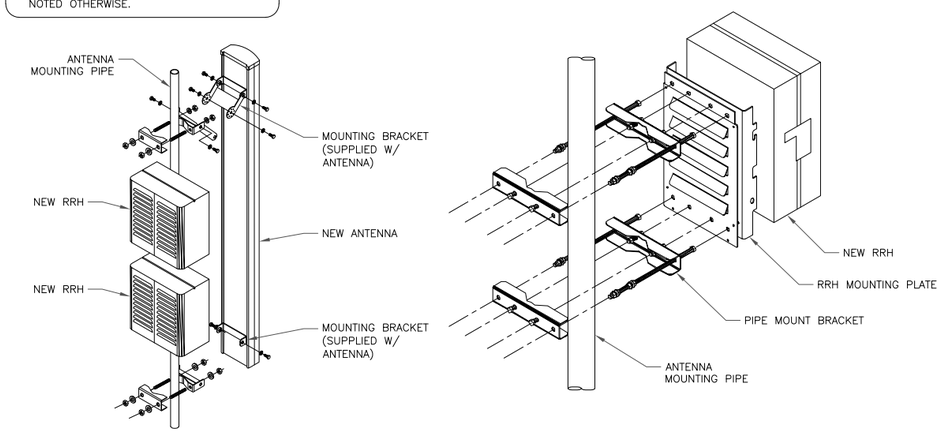
RF SYSTEM SCHEDULE

SECTOR	ANTENNA	TECH	MANUFACTURER	ANTENNA MODEL	AZIMUTH	M-TILT	E-TILT	RAD CENTER	TMA/RRU	CABLE TYPE	CABLE DIAMETER	CABLE LENGTH
ALPHA	A-1	L2100	RFS	APX16DWV-16DWV-S-E-A20	0°	0°	-	177'-0"	(1) RADIO 4415 B66A	(2) HYBRID TRUNK 6/24 4AWG (1) COAX	1 5/8" 1/2"	329'-0" 329'-0"
	A-2	L700/L600/N600 /L1900/G1900	RFS	APXVAALL24_43-U-NA20	0°	0°	-	177'-0"	(1) RADIO 4449 B71 +B85 (1) RADIO 4424 B25			
	A-3	L2500/N2500	ERICSSON	AIR6449 B41	0°	0°	-	177'-0"	-			
BETA	B-1	L2100	RFS	APX16DWV-16DWV-S-E-A20	120°	0°	-	177'-0"	(1) RADIO 4415 B66A	(1) HYBRID TRUNK 6/24 4AWG	1 5/8"	329'-0"
	B-2	L700/L600/N600 /L1900/G1900	RFS	APXVAALL24_43-U-NA20	120°	0°	-	177'-0"	(1) RADIO 4449 B71 +B85 (1) RADIO 4424 B25			
	B-3	L2500/N2500	ERICSSON	AIR6449 B41	120°	0°	-	177'-0"	-			
GAMMA	C-1	L2100	RFS	APX16DWV-16DWV-S-E-A20	240°	0°	-	177'-0"	(1) RADIO 4415 B66A	(1) HYBRID TRUNK 6/24 4AWG	1 5/8"	329'-0"
	C-2	L700/L600/N600 /L1900/G1900	RFS	APXVAALL24_43-U-NA20	240°	0°	-	177'-0"	(1) RADIO 4449 B71 +B85 (1) RADIO 4424 B25			
	C-3	L2500/N2500	ERICSSON	AIR6449 B41	240°	0°	-	177'-0"	-			

1 ANTENNA & FEEDLINE SCHEDULE
SCALE: NOT TO SCALE

INSTALLER NOTES:

1. COMPLY WITH MANUFACTURERS INSTRUCTIONS TO ENSURE THAT ALL RRHs RECEIVE ELECTRICAL POWER WITHIN 24 HOURS OF BEING REMOVED FROM THE MANUFACTURER'S PACKAGING.
2. DO NOT OPEN RRH PACKAGES IN THE RAIN.
3. ALL PIPES, BRACKETS, AND MISCELLANEOUS HARDWARE TO BE GALVANIZED UNLESS NOTED OTHERWISE.



2 ANTENNA WITH RRHs MOUNTING DETAIL
SCALE: NOT TO SCALE

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1	3/19/21	JJD	CONSTRUCTION	GEH

STATE OF CONNECTICUT
No. 23824
LICENSED
PROFESSIONAL ENGINEER
3/19/21

B&T ENGINEERING, INC.
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Expires 2/10/21

SHEET NUMBER: C-3

REVISION: 1

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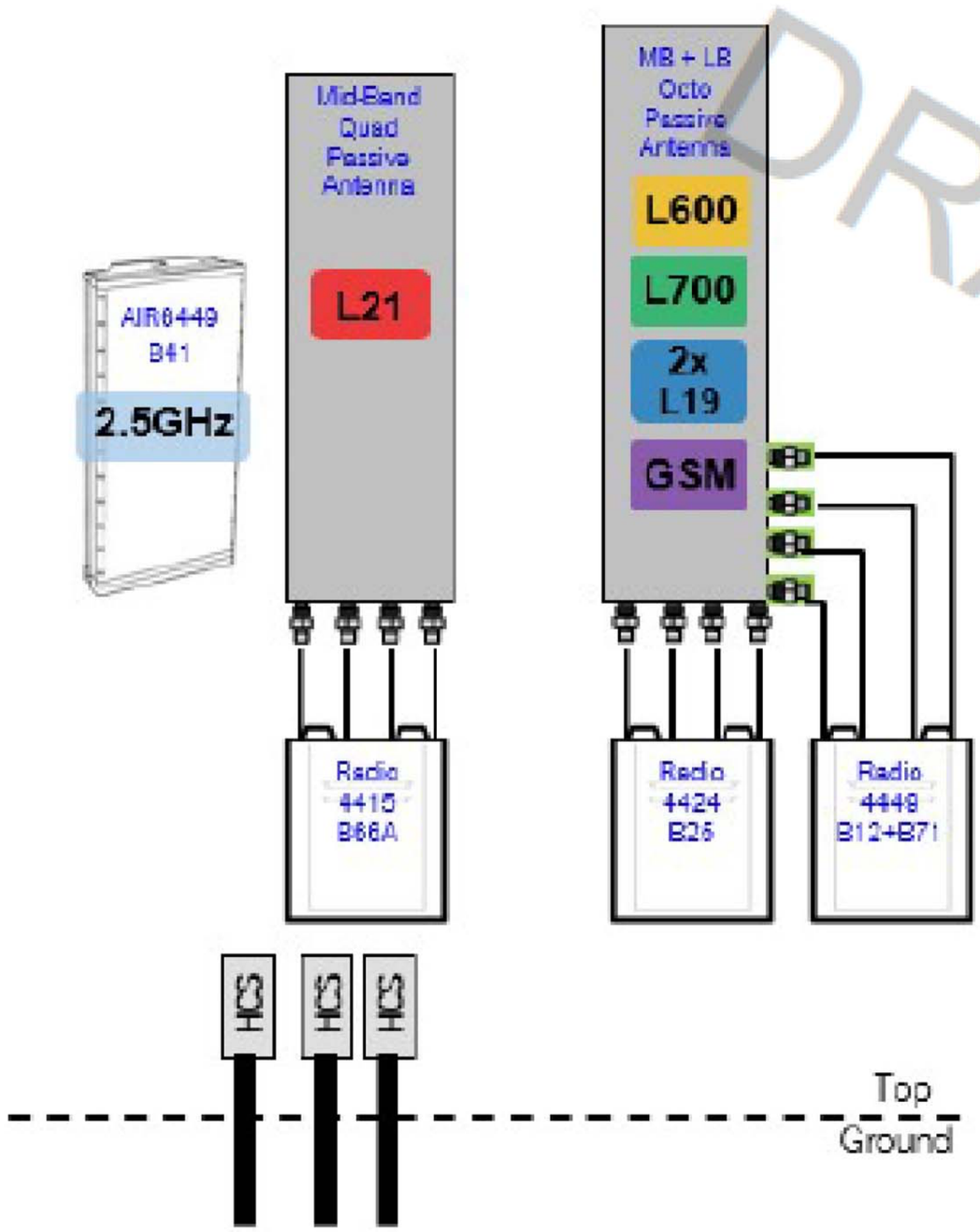

1 PLUMBING DIAGRAM
SCALE: NOT TO SCALE

T-Mobile
4 SYLVAN WAY
PARSIPPANY, NJ 07054

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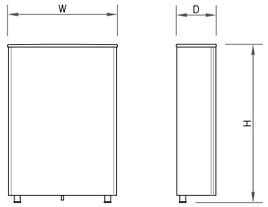
1	3/19/21	JJD	CONSTRUCTION	GEH

STATE OF CONNECTICUT
GREG E. HOYES
No. 23824
LICENSED
PROFESSIONAL ENGINEER
3/19/21

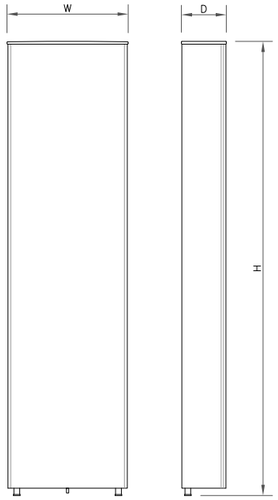
B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

SHEET NUMBER: C-4
REVISION: 1



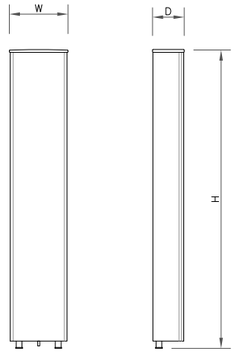
ANTENNA SPECS	
MANUFACTURER	ERICSSON
MODEL #	AIR6449 B41
WIDTH	20.51"
DEPTH	8.54"
HEIGHT	33.11"
WEIGHT	114.63 LBS

1 ANTENNA SPECS
SCALE: NOT TO SCALE



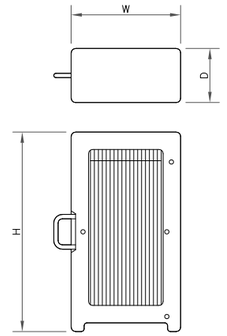
ANTENNA SPECS	
MANUFACTURER	RFS/CELWAVE
MODEL #	APXVAALL24_43-U-NA20
WIDTH	24.00"
DEPTH	8.50"
HEIGHT	95.90"
WEIGHT	149.90 LBS

2 ANTENNA SPECS
SCALE: NOT TO SCALE



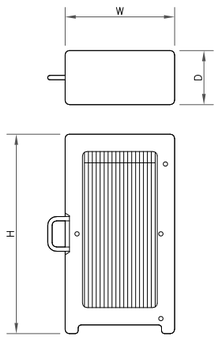
ANTENNA SPECS	
MANUFACTURER	RFS/CELWAVE
MODEL #	APX16DWV-16DWVS-E-A20
WIDTH	13.30"
DEPTH	3.15"
HEIGHT	55.90"
WEIGHT	40.70 LBS

3 ANTENNA SPECS
SCALE: NOT TO SCALE



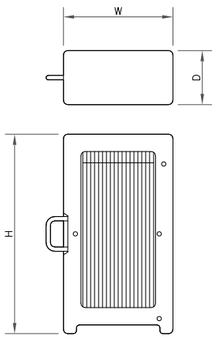
RRU SPECIFICATIONS	
MANUFACTURER	ERICSSON
MODEL #	RADIO 4415 B66A
WIDTH	13.50"
DEPTH	6.30"
HEIGHT	16.50"
WEIGHT	49.60 LBS

4 RRU SPECS
SCALE: NOT TO SCALE



RRU SPECIFICATIONS	
MANUFACTURER	ERICSSON
MODEL #	RADIO 4424 B25
WIDTH	14.40"
DEPTH	11.30"
HEIGHT	17.10"
WEIGHT	86.00 LBS

5 RRU SPECS
SCALE: NOT TO SCALE



RRU SPECIFICATIONS	
MANUFACTURER	ERICSSON
MODEL #	RADIO 4449 B70 + B85
WIDTH	13.20"
DEPTH	10.63"
HEIGHT	17.91"
WEIGHT	73.21 LBS

6 RRU SPECS
SCALE: NOT TO SCALE

ERICSSON 6160 SSC
WEIGHT: 60.0 LBS
SIZE (HxWxD): 63"x25.6"x33.5" IN.

7 ERICSSON 6160 SSC
SCALE: NOT TO SCALE

BATTERY CABINET SPECIFICATIONS	
MODEL #	B160
MANUF.	ERICSSON
HEIGHT	63"
WIDTH	26"
DEPTH	26"
WEIGHT	

8 ERICSSON B160 BATTERY CABINET
SCALE: NOT TO SCALE

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STATE OF CONNECTICUT
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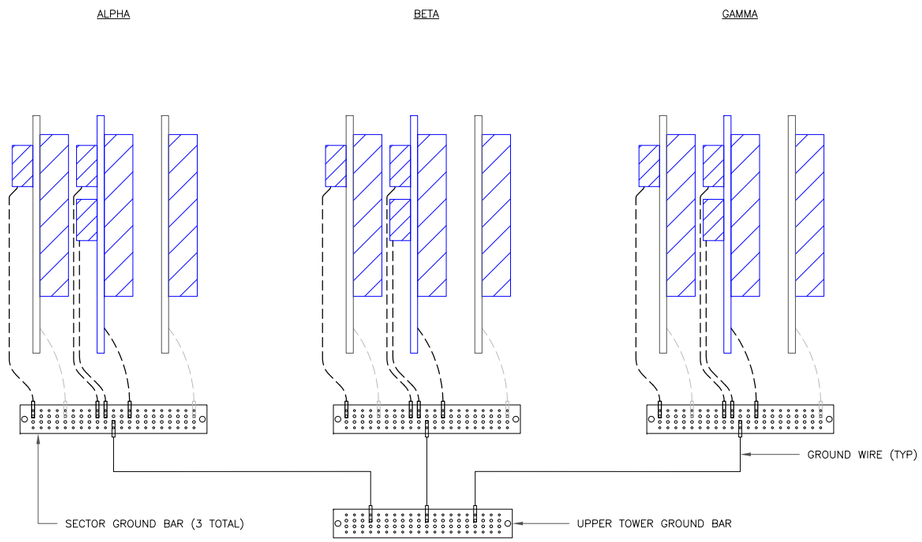
3/19/21

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

SHEET NUMBER: C-5
REVISION: 1



NOTE:

ALL NEW GROUNDS TO BE #6 STRANDED COPPER WITH GREEN INSULATION UNLESS NOTED OTHERWISE.

1 ANTENNA GROUNDING DIAGRAM
SCALE: NOT TO SCALE

T-Mobile
4 SYLVAN WAY
PARSIPPANY, NJ 07054

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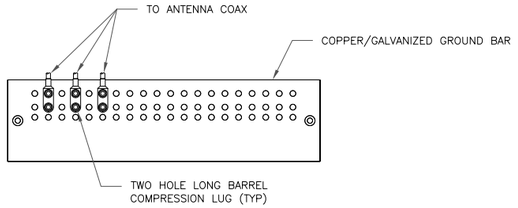
SHEET NUMBER: G-1

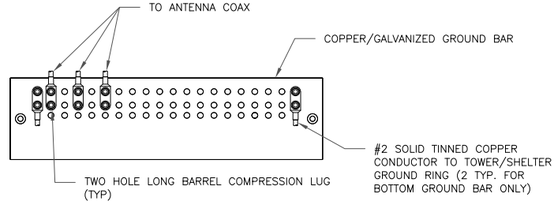
REVISION: 1



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.

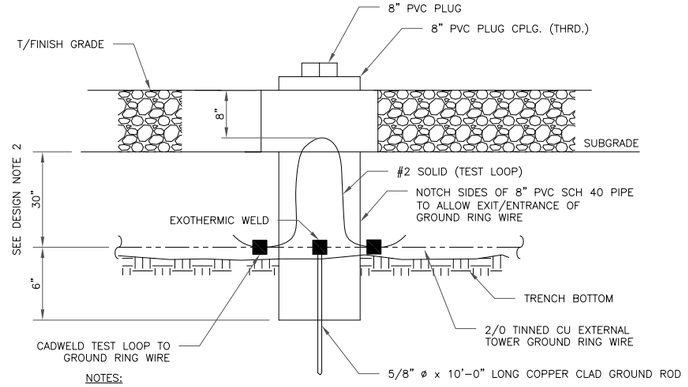
1 ANTENNA SECTOR GROUND BAR DETAIL
SCALE: NOT TO SCALE



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.

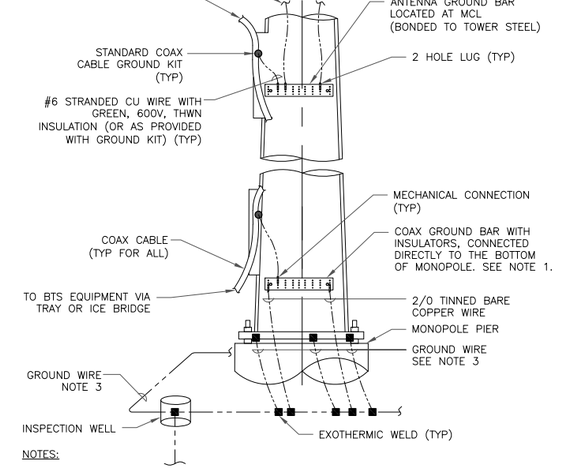
2 TOWER/SHELTER GROUND BAR DETAIL
SCALE: NOT TO SCALE



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)

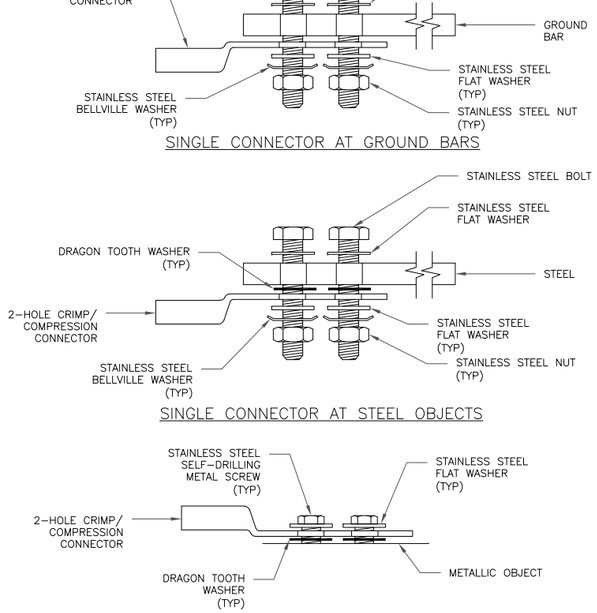
3 INSPECTION WELL DETAIL
SCALE: NOT TO SCALE



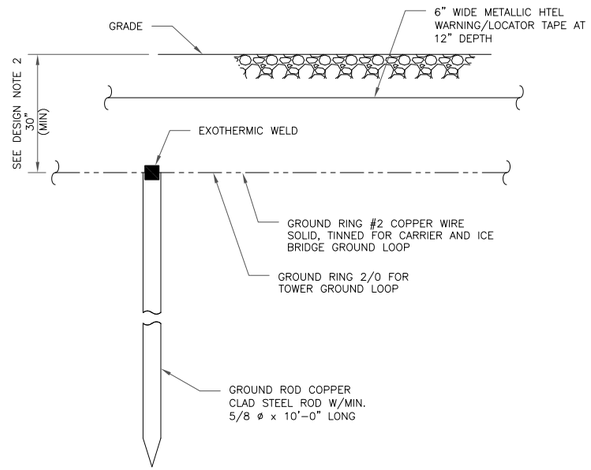
NOTES:

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



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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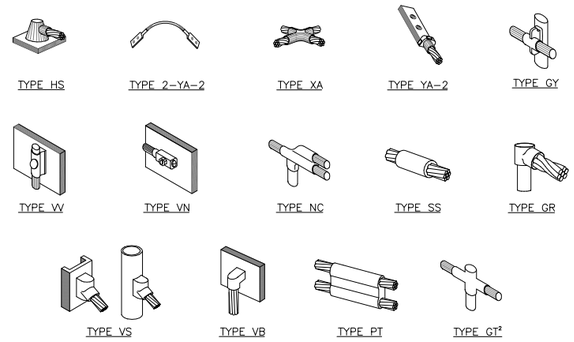
SHEET NUMBER: G-2
REVISION: 1

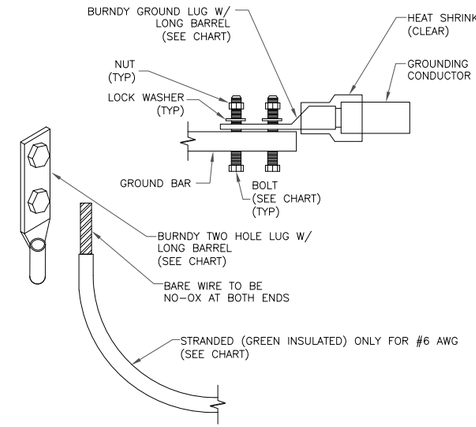


NOTE:

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

1 CADWELD GROUNDING CONNECTIONS
SCALE: NOT TO SCALE

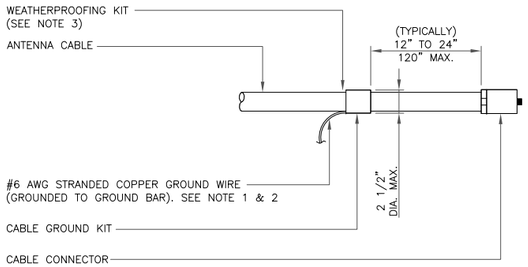
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 AWG GREEN INSULATED	YA6C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG SOLID TINNED	YA3C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG STRANDED	YA2C-2TC38	3/8" - 16 NC S 2 BOLT
#2/0 AWG STRANDED	YA26-2TC38	3/8" - 16 NC S 2 BOLT
#4/0 AWG STRANDED	YA28-2N	1/2" - 16 NC S 2 BOLT



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.

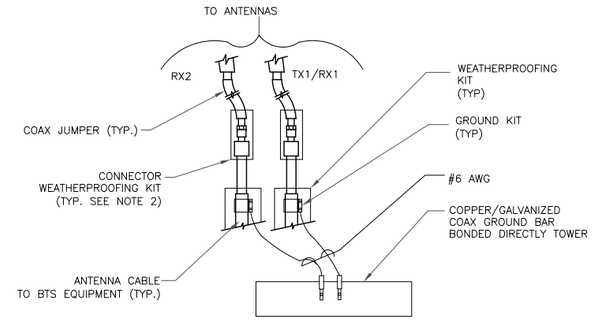
2 MECHANICAL LUG CONNECTION
SCALE: NOT TO SCALE



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.

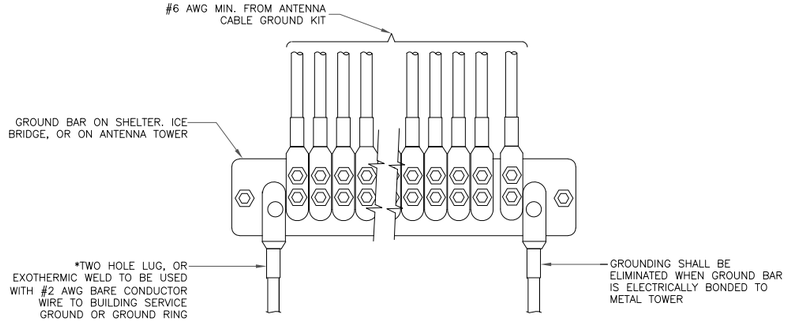
3 CABLE GROUND KIT CONNECTION
SCALE: NOT TO SCALE



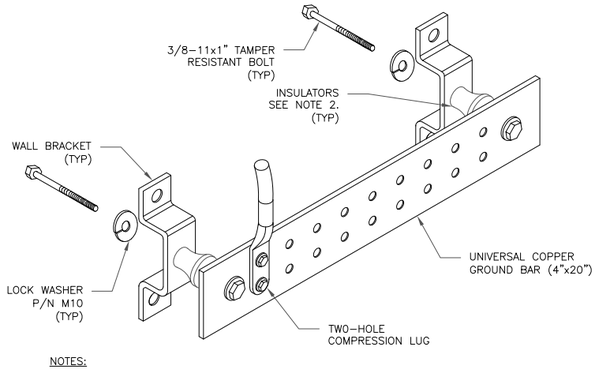
NOTES:

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



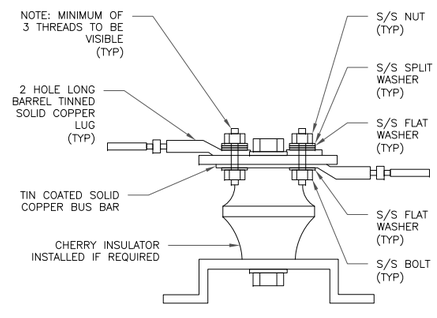
5 GROUNDWIRE INSTALLATION
SCALE: NOT TO SCALE



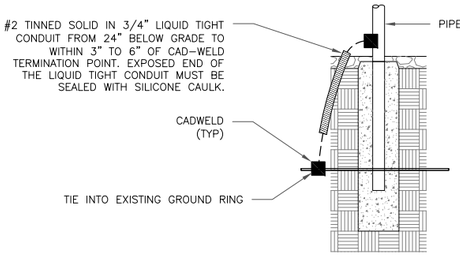
NOTES:

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



8 TRANSITIONING GROUND DETAIL
SCALE: NOT TO SCALE

T-Mobile
4 SYLVAN WAY
PARSIPPANY, NJ 07054

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277

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

T-MOBILE SITE NUMBER:
CTHA653A

BU #: **876372**
SMITH HILLS / STERLING GRP. (S

71 ASHFORD RD
EASTFORD, CT 06272

EXISTING
177'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	2/22/21	JTS	CONSTRUCTION	MTJ
1	3/19/21	JJD	CONSTRUCTION	GEH

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

SHEET NUMBER: G-3
REVISION: 1

Exhibit D

Structural Analysis Report

Date: **February 9, 2021**

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

Subject: Structural Analysis Report

Carrier Designation:	***Sprint PCS* Co-Locate**	
	Site Number:	CTHA653A
	Site Name:	N/A
Crown Castle Designation:	**BU Number:**	876372
	Site Name:	Smith Hills / Sterling GRP. (S
	JDE Job Number:	628851
	Work Order Number:	1919200
	Order Number:	538767 Rev. 0
Engineering Firm Designation:	**TEP Project Number:**	218032.495772
Site Data:	**71 Ashford Rd., Eastford, Windham County, CT 06272** **Latitude *41° 54' 16.22"*, Longitude *-72° 7' 25.92"*** **177 Foot - Monopole Tower**	

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

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

LC5: Proposed Equipment Configuration **Sufficient Capacity - 70.0%**

This analysis utilizes an ultimate 3-second gust wind speed of 130 mph as required by the 2018 Connecticut State Building Code and Appendix N. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Matthew Fry, E.I.T. / TLI

Respectfully submitted by:

Aaron T. Rucker, P.E.

02/09/2021

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 177-ft monopole tower designed by Engineered Endeavors.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	130 mph
Exposure Category:	C
Topographic Factor:	1.0
Ice Thickness:	2.0 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
177.0	180.0	3	RFS Celwave	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	3	1-5/8
		3	RFS Celwave	APXVAALL24_43-U-NA20_TMO w/ Mount Pipe		
		3	Ericsson	AIR6449 B41_T-MOBILE w/ Mount Pipe		
		3	Ericsson	RADIO 4415 B66A		
		3	Ericsson	RADIO 4449 B71 B85A_T-MOBILE		
		3	Ericsson	RADIO 4424 B25_TMO		
	177.0	1	Tower Mounts	Platform Mount [LP 604-1]		
		1	Site Pro 1	HRK12		
50.0	50.0	1	Lucent	KS24019-L112A	1	1/2
		1	Tower Mounts	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Reference	Source
Geotechnical Report	1531936	CCISites
Tower Foundation Drawings	1615434	CCISites
Tower Manufacturer Drawings	1615375	CCISites

3.1) Analysis Method

tnxTower (version 8.0.7.5), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 Standard.

3.2) Assumptions

1) The tower and structures were maintained in accordance with the TIA-222 Standard.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Table 1, and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 3 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	ϕP_{allow} (K)	% Capacity	Pass / Fail
L1	177 - 133.71	Pole	TP24.46x14x0.25	1	-5.52	1137.85	51.0	Pass
L2	133.71 - 88.04	Pole	TP34.86x23.095x0.3125	2	-11.48	2033.23	51.2	Pass
L3	88.04 - 43.42	Pole	TP44.89x33.0597x0.375	3	-20.93	3147.00	47.2	Pass
L4	43.42 - 0	Pole	TP54.5x42.669x0.375	4	-34.85	3957.13	53.6	Pass
							Summary	
						Pole (L4)	53.6	Pass
						RATING =	**53.6**	**Pass**

Table 4 - Tower Component Stresses vs. Capacity - LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	-	44.4	Pass
1,2	Base Plate	-	70.0	Pass
1,2	Base Foundation Soil Interaction	-	28.3	Pass
1,2	Base Foundation Structural	-	50.9	Pass

Structure Rating (max from all components) =	**70.0%**

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

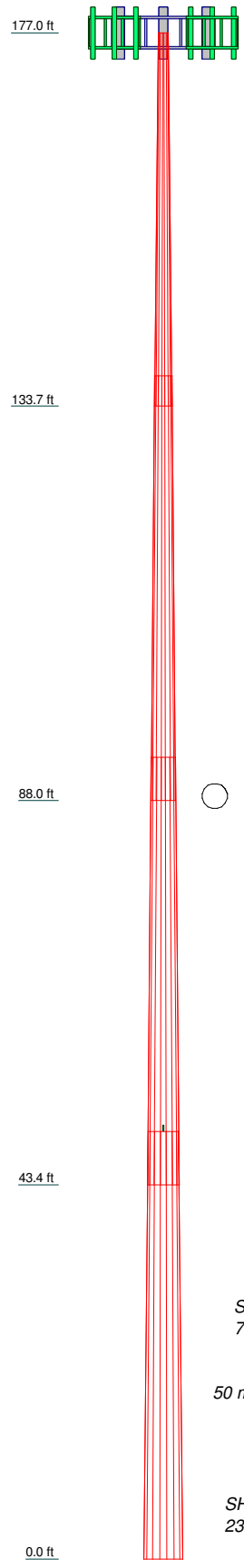
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4
Length (ft)	43.2900	49.2500	49.5400	49.5800
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.3750
Socket Length (ft)	3.5800	4.9200	6.1600	
Top Dia (in)	14.0000	23.0950	33.0597	42.6690
Bot Dia (in)	24.4600	34.8600	44.8900	54.5000
Grade	A572-65			
Weight (K) 24.4	2.2	4.8	7.7	9.7



MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Windham County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 130 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 0.0000 ft
8. TOWER RATING: 53.6%

Tower Engineering Professionals

Tower Engineering Professionals
326 Tryon Rd.
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job:	***Smith Hills / Sterling GRP. (S (BU 876372)***		
Project:	***TEP No. 218032.495772***		
Client: Crown Castle	Drawn by: mfry	App'd:	
Code: TIA-222-H	Date: 02/09/21	Scale: NTS	
Path: C:\Users\mfry\Documents\Projects\SA\218032\tnx\876372_1919200_LC5.eri		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 Windham County, Connecticut.
Tower base elevation above sea level: 672.0000 ft.
Basic wind speed of 130 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.0000 ft.
Nominal ice thickness of 2.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56.00 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs	√	Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

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	177.0000-133.7100	43.2900	3.58	18	14.0000	24.4600	0.2500	1.0000	A572-65 (65 ksi)
L2	133.7100-88.0400	49.2500	4.92	18	23.0950	34.8600	0.3125	1.2500	A572-65 (65 ksi)
L3	88.0400-43.4200	49.5400	6.16	18	33.0597	44.8900	0.3750	1.5000	A572-65 (65 ksi)
L4	43.4200-0.0000	49.5800		18	42.6690	54.5000	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	14.1774	10.9106	260.6108	4.8812	7.1120	36.6438	521.5646	5.4563	2.0240	8.096
	24.7988	19.2106	1422.5540	8.5945	12.4257	114.4850	2846.9798	9.6071	3.8650	15.46
L2	24.2714	22.5974	1481.8262	8.0878	11.7322	126.3037	2965.6023	11.3008	3.5147	11.247
	35.3496	34.2668	5167.0691	12.2644	17.7089	291.7784	10340.9372	17.1367	5.5854	17.873
L3	34.7049	38.9030	5250.5987	11.6031	16.7943	312.6413	10508.1064	19.4552	5.1585	13.756
	45.5247	52.9840	13264.6188	15.8028	22.8041	581.6764	26546.6915	26.4970	7.2406	19.308
L4	44.7620	50.3404	11376.5634	15.0144	21.6758	524.8500	22768.0964	25.1750	6.8497	18.266
	55.2829	64.4223	23843.4650	19.2144	27.6860	861.2102	47718.3038	32.2173	8.9320	23.819

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 177.0000-133.7100				1	1	1			
L2 133.7100-88.0400				1	1	1			
L3 88.0400-43.4200				1	1	1			
L4 43.4200-0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Miscl									
Safety Line 3/8	A	No	No	CaAa (Out Of Face)	177.0000 - 0.0000	1	No Ice	0.0375	0.22
							1/2" Ice	0.1375	0.75
							1" Ice	0.2375	1.28
							2" Ice	0.4375	2.34
Step Pegs (5/8" SR) 7-in. w/30" step	A	No	No	CaAa (Out Of Face)	177.0000 - 0.0000	1	No Ice	0.0350	0.49
							1/2" Ice	0.1350	1.01
							1" Ice	0.2350	2.07
							2" Ice	0.4350	6.09
177									
HB158-21U6S24-xx M_TMO(1-5/8)	B	No	No	Inside Pole	177.0000 - 0.0000	3	No Ice	0.0000	2.50
							1/2" Ice	0.0000	2.50
							1" Ice	0.0000	2.50
							2" Ice	0.0000	2.50
50									
LDF4-50A(1/2")	B	No	No	Inside Pole	50.0000 - 0.0000	1	No Ice	0.0000	0.15
							1/2" Ice	0.0000	0.15
							1" Ice	0.0000	0.15
							2" Ice	0.0000	0.15
***									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	177.0000-133.7100	A	0.000	0.000	0.000	3.139	0.03
		B	0.000	0.000	0.000	0.000	0.32
		C	0.000	0.000	0.000	0.000	0.00
L2	133.7100-88.0400	A	0.000	0.000	0.000	3.311	0.03
		B	0.000	0.000	0.000	0.000	0.34
		C	0.000	0.000	0.000	0.000	0.00
L3	88.0400-43.4200	A	0.000	0.000	0.000	3.235	0.03
		B	0.000	0.000	0.000	0.000	0.34
		C	0.000	0.000	0.000	0.000	0.00
L4	43.4200-0.0000	A	0.000	0.000	0.000	3.148	0.03
		B	0.000	0.000	0.000	0.000	0.33
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	177.0000-133.7100	A	1.983	0.000	0.000	0.000	37.468	0.36
		B		0.000	0.000	0.000	0.000	0.32
		C		0.000	0.000	0.000	0.000	0.00
L2	133.7100-88.0400	A	1.917	0.000	0.000	0.000	39.528	0.38

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	0.000	0.000	0.34
		C		0.000	0.000	0.000	0.000	0.00
L3	88.0400-43.4200	A	1.820	0.000	0.000	0.000	37.449	0.36
		B		0.000	0.000	0.000	0.000	0.34
		C		0.000	0.000	0.000	0.000	0.00
L4	43.4200-0.0000	A	1.631	0.000	0.000	0.000	34.751	0.33
		B		0.000	0.000	0.000	0.000	0.33
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	177.0000-133.7100	0.0000	-0.6362	0.0000	-2.7598
L2	133.7100-88.0400	0.0000	-0.6509	0.0000	-3.2219
L3	88.0400-43.4200	0.0000	-0.6583	0.0000	-3.4231
L4	43.4200-0.0000	0.0000	-0.6625	0.0000	-3.4718

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 ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
177									
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	A	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.2900 6.8600 7.4500 8.6800	2.7600 3.2700 3.7900 4.9000	0.06 0.11 0.16 0.29
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	B	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.2900 6.8600 7.4500 8.6800	2.7600 3.2700 3.7900 4.9000	0.06 0.11 0.16 0.29
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	C	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.2900 6.8600 7.4500 8.6800	2.7600 3.2700 3.7900 4.9000	0.06 0.11 0.16 0.29
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	A	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	14.6900 15.4600 16.2300 17.8200	6.8700 7.5500 8.2500 9.6700	0.18 0.31 0.45 0.78
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	B	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	14.6900 15.4600 16.2300 17.8200	6.8700 7.5500 8.2500 9.6700	0.18 0.31 0.45 0.78

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXVAALL24_43-U-NA20 _TMO w/ Mount Pipe	C	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	14.6900 15.4600 16.2300 17.8200	6.8700 7.5500 8.2500 9.6700	0.18 0.31 0.45 0.78
AIR6449 B41_T-MOBILE w/ Mount Pipe	A	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	5.8701 6.2332 6.6061 7.3816	3.2700 3.7282 4.2026 5.2001	0.13 0.18 0.23 0.36
AIR6449 B41_T-MOBILE w/ Mount Pipe	B	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	5.8701 6.2332 6.6061 7.3816	3.2700 3.7282 4.2026 5.2001	0.13 0.18 0.23 0.36
AIR6449 B41_T-MOBILE w/ Mount Pipe	C	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	5.8701 6.2332 6.6061 7.3816	3.2700 3.7282 4.2026 5.2001	0.13 0.18 0.23 0.36
RADIO 4415 B66A	A	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.8563 2.0266 2.2044 2.5822	0.8701 0.9966 1.1344 1.4322	0.05 0.06 0.08 0.12
RADIO 4415 B66A	B	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.8563 2.0266 2.2044 2.5822	0.8701 0.9966 1.1344 1.4322	0.05 0.06 0.08 0.12
RADIO 4415 B66A	C	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.8563 2.0266 2.2044 2.5822	0.8701 0.9966 1.1344 1.4322	0.05 0.06 0.08 0.12
RADIO 4449 B71 B85A_T-MOBILE	A	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.9701 2.1466 2.3306 2.7207	1.5865 1.7488 1.9185 2.2800	0.07 0.09 0.12 0.17
RADIO 4449 B71 B85A_T-MOBILE	B	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.9701 2.1466 2.3306 2.7207	1.5865 1.7488 1.9185 2.2800	0.07 0.09 0.12 0.17
RADIO 4449 B71 B85A_T-MOBILE	C	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.9701 2.1466 2.3306 2.7207	1.5865 1.7488 1.9185 2.2800	0.07 0.09 0.12 0.17
RADIO 4424 B25_TMO	A	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	2.0520 2.2307 2.4168 2.8113	1.6103 1.7717 1.9406 2.3006	0.09 0.11 0.13 0.19
RADIO 4424 B25_TMO	B	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	2.0520 2.2307 2.4168 2.8113	1.6103 1.7717 1.9406 2.3006	0.09 0.11 0.13 0.19
RADIO 4424 B25_TMO	C	From Centroid-Leg	4.0000 0.00 3.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	2.0520 2.2307 2.4168 2.8113	1.6103 1.7717 1.9406 2.3006	0.09 0.11 0.13 0.19
8' Ladder	C	From Centroid-Leg	3.0000 0.00 -2.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.5296 4.3619 7.1941 12.8586	5.3333 8.0833 10.8333 16.3333	0.10 0.11 0.13 0.16
2.4" x 8' Pipe	A	From	4.0000	0.0000	177.0000	No Ice	1.8998	1.9000	0.03

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
		Centroid-Leg	0.00 0.00			1/2" Ice 1" Ice 2" Ice	2.7317 3.4156 4.4555	2.7319 3.4159 4.4559	0.05 0.07 0.13
2.4" x 8' Pipe	B	From Centroid-Leg	4.0000 0.00 0.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.8998 2.7317 3.4156 4.4555	1.9000 2.7319 3.4159 4.4559	0.03 0.05 0.07 0.13
2.4" x 8' Pipe	C	From Centroid-Leg	4.0000 0.00 0.00	0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.8998 2.7317 3.4156 4.4555	1.9000 2.7319 3.4159 4.4559	0.03 0.05 0.07 0.13
Platform Mount [LP 604-1]	C	None		0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	23.0300 26.4400 29.8000 36.3400	23.0300 26.4400 29.8000 36.3400	0.93 1.32 1.77 2.80
Miscellaneous [NA 507-1]	C	None		0.0000	177.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.5600 6.3900 8.1800 11.6600	4.5600 6.3900 8.1800 11.6600	0.25 0.31 0.40 0.66
50									
KS24019-L112A	C	From Face	3.0000 0.00 0.00	0.0000	50.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0815 0.1333 0.1944 0.3500	0.0815 0.1333 0.1944 0.3500	0.01 0.01 0.01 0.02
Side Arm Mount [SO 701-1]	C	From Face	2.0000 0.00 0.00	0.0000	50.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.8500 1.1400 1.4300 2.0100	1.6700 2.3400 3.0100 4.3500	0.07 0.08 0.09 0.12
***									

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

Comb. No.	Description
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	177 - 133.71	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-15.59	0.53	0.00
			Max. Mx	20	-5.55	343.04	3.40
			Max. My	14	-5.53	-3.26	-346.89
			Max. Vy	20	-9.69	343.04	3.40
			Max. Vx	14	9.80	-3.26	-346.89
			Max. Torque	12			-0.90
L2	133.71 - 88.04	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-25.15	0.53	0.45
			Max. Mx	20	-11.50	856.26	7.59
			Max. My	14	-11.49	-7.39	-864.84
			Max. Vy	20	-13.59	856.26	7.59
			Max. Vx	14	13.69	-7.39	-864.84
			Max. Torque	12			-0.82
L3	88.04 - 43.42	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-39.10	0.53	0.46
			Max. Mx	20	-20.94	1540.77	11.37
			Max. My	14	-20.93	-11.43	-1554.26
			Max. Vy	20	-18.07	1540.77	11.37
			Max. Vx	14	18.14	-11.43	-1554.26

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	29			0.86
L4	43.42 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-58.52	0.53	1.23
			Max. Mx	20	-34.85	2556.31	15.96
			Max. My	14	-34.85	-15.93	-2573.05
			Max. Vy	20	-22.71	2556.31	15.96
			Max. Vx	14	22.77	-15.93	-2573.05
			Max. Torque	29			1.19

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	38	58.52	3.56	6.16
	Max. H_x	20	34.86	22.69	0.09
	Max. H_z	3	26.15	0.09	22.75
	Max. M_x	2	2572.46	0.09	22.75
	Max. M_z	8	2555.65	-22.69	-0.09
	Max. Torsion	29	1.19	-6.15	3.54
	Min. Vert	23	26.15	19.69	11.45
	Min. H_x	8	34.86	-22.69	-0.09
	Min. H_z	14	34.86	-0.09	-22.75
	Min. M_x	14	-2573.05	-0.09	-22.75
	Min. M_z	20	-2556.31	22.69	0.09
	Min. Torsion	35	-1.19	6.15	-3.54

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	29.05	0.00	0.00	0.24	0.26	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	34.86	-0.09	-22.75	-2572.46	16.58	-0.73
0.9 Dead+1.0 Wind 0 deg - No Ice	26.15	-0.09	-22.75	-2545.06	16.28	-0.72
1.2 Dead+1.0 Wind 30 deg - No Ice	34.86	11.27	-19.66	-2219.73	-1263.59	-0.68
0.9 Dead+1.0 Wind 30 deg - No Ice	26.15	11.27	-19.66	-2196.12	-1250.24	-0.68
1.2 Dead+1.0 Wind 60 deg - No Ice	34.86	19.60	-11.30	-1272.07	-2205.14	-0.48
0.9 Dead+1.0 Wind 60 deg - No Ice	26.15	19.60	-11.30	-1258.59	-2181.74	-0.48
1.2 Dead+1.0 Wind 90 deg - No Ice	34.86	22.69	0.09	16.56	-2555.65	-0.15
0.9 Dead+1.0 Wind 90 deg - No Ice	26.15	22.69	0.09	16.27	-2528.51	-0.16
1.2 Dead+1.0 Wind 120 deg - No Ice	34.86	19.69	11.45	1300.76	-2221.27	0.24
0.9 Dead+1.0 Wind 120 deg - No Ice	26.15	19.69	11.45	1286.76	-2197.67	0.23

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.0 Wind 150 deg - No Ice	34.86	11.42	19.75	2236.46	-1291.68	0.61
0.9 Dead+1.0 Wind 150 deg - No Ice	26.15	11.42	19.75	2212.49	-1277.97	0.60
1.2 Dead+1.0 Wind 180 deg - No Ice	34.86	0.09	22.75	2573.05	-15.93	0.81
0.9 Dead+1.0 Wind 180 deg - No Ice	26.15	0.09	22.75	2545.51	-15.81	0.80
1.2 Dead+1.0 Wind 210 deg - No Ice	34.86	-11.27	19.66	2220.34	1264.24	0.76
0.9 Dead+1.0 Wind 210 deg - No Ice	26.15	-11.27	19.66	2196.57	1250.72	0.76
1.2 Dead+1.0 Wind 240 deg - No Ice	34.86	-19.60	11.30	1272.68	2205.80	0.48
0.9 Dead+1.0 Wind 240 deg - No Ice	26.15	-19.60	11.30	1259.04	2182.23	0.48
1.2 Dead+1.0 Wind 270 deg - No Ice	34.86	-22.69	-0.09	-15.96	2556.31	0.07
0.9 Dead+1.0 Wind 270 deg - No Ice	26.15	-22.69	-0.09	-15.82	2528.99	0.08
1.2 Dead+1.0 Wind 300 deg - No Ice	34.86	-19.69	-11.45	-1300.16	2221.93	-0.33
0.9 Dead+1.0 Wind 300 deg - No Ice	26.15	-19.69	-11.45	-1286.32	2198.15	-0.32
1.2 Dead+1.0 Wind 330 deg - No Ice	34.86	-11.42	-19.75	-2235.86	1292.33	-0.61
0.9 Dead+1.0 Wind 330 deg - No Ice	26.15	-11.42	-19.75	-2212.05	1278.44	-0.60
1.2 Dead+1.0 Ice+1.0 Temp	58.52	-0.00	-0.00	-1.23	0.53	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	58.52	-0.01	-7.10	-814.99	2.96	-0.36
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	58.52	3.54	-6.15	-704.80	-403.21	-0.89
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	58.52	6.15	-3.54	-406.11	-701.17	-1.19
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	58.52	7.10	0.01	1.04	-811.10	-1.17
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	58.52	6.16	3.56	407.55	-703.52	-0.84
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	58.52	3.56	6.16	704.51	-407.28	-0.28
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	58.52	0.01	7.10	812.35	-1.74	0.36
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	58.52	-3.54	6.15	702.16	404.42	0.90
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	58.52	-6.15	3.54	403.48	702.39	1.19
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	58.52	-7.10	-0.01	-3.67	812.32	1.17
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	58.52	-6.16	-3.56	-410.19	704.75	0.83
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	58.52	-3.56	-6.16	-707.15	408.50	0.27
Dead+Wind 0 deg - Service	29.05	-0.02	-4.56	-513.20	3.52	-0.15
Dead+Wind 30 deg - Service	29.05	2.26	-3.94	-442.79	-251.96	-0.14
Dead+Wind 60 deg - Service	29.05	3.93	-2.27	-253.66	-439.85	-0.10
Dead+Wind 90 deg - Service	29.05	4.55	0.02	3.49	-509.81	-0.02
Dead+Wind 120 deg - Service	29.05	3.95	2.30	259.78	-443.09	0.06
Dead+Wind 150 deg - Service	29.05	2.29	3.96	446.53	-257.58	0.12
Dead+Wind 180 deg - Service	29.05	0.02	4.56	513.70	-2.97	0.16
Dead+Wind 210 deg - Service	29.05	-2.26	3.94	443.29	252.51	0.15

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 240 deg - Service	29.05	-3.93	2.27	254.17	440.40	0.10
Dead+Wind 270 deg - Service	29.05	-4.55	-0.02	-2.99	510.36	0.02
Dead+Wind 300 deg - Service	29.05	-3.95	-2.30	-259.28	443.64	-0.06
Dead+Wind 330 deg - Service	29.05	-2.29	-3.96	-446.03	258.13	-0.12

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-29.05	0.00	0.00	29.05	0.00	0.000%
2	-0.09	-34.86	-22.75	0.09	34.86	22.75	0.000%
3	-0.09	-26.15	-22.75	0.09	26.15	22.75	0.000%
4	11.27	-34.86	-19.66	-11.27	34.86	19.66	0.000%
5	11.27	-26.15	-19.66	-11.27	26.15	19.66	0.000%
6	19.60	-34.86	-11.30	-19.60	34.86	11.30	0.000%
7	19.60	-26.15	-11.30	-19.60	26.15	11.30	0.000%
8	22.69	-34.86	0.09	-22.69	34.86	-0.09	0.000%
9	22.69	-26.15	0.09	-22.69	26.15	-0.09	0.000%
10	19.69	-34.86	11.45	-19.69	34.86	-11.45	0.000%
11	19.69	-26.15	11.45	-19.69	26.15	-11.45	0.000%
12	11.42	-34.86	19.75	-11.42	34.86	-19.75	0.000%
13	11.42	-26.15	19.75	-11.42	26.15	-19.75	0.000%
14	0.09	-34.86	22.75	-0.09	34.86	-22.75	0.000%
15	0.09	-26.15	22.75	-0.09	26.15	-22.75	0.000%
16	-11.27	-34.86	19.66	11.27	34.86	-19.66	0.000%
17	-11.27	-26.15	19.66	11.27	26.15	-19.66	0.000%
18	-19.60	-34.86	11.30	19.60	34.86	-11.30	0.000%
19	-19.60	-26.15	11.30	19.60	26.15	-11.30	0.000%
20	-22.69	-34.86	-0.09	22.69	34.86	0.09	0.000%
21	-22.69	-26.15	-0.09	22.69	26.15	0.09	0.000%
22	-19.69	-34.86	-11.45	19.69	34.86	11.45	0.000%
23	-19.69	-26.15	-11.45	19.69	26.15	11.45	0.000%
24	-11.42	-34.86	-19.75	11.42	34.86	19.75	0.000%
25	-11.42	-26.15	-19.75	11.42	26.15	19.75	0.000%
26	0.00	-58.52	0.00	0.00	58.52	0.00	0.000%
27	-0.01	-58.52	-7.10	0.01	58.52	7.10	0.000%
28	3.54	-58.52	-6.15	-3.54	58.52	6.15	0.000%
29	6.15	-58.52	-3.54	-6.15	58.52	3.54	0.000%
30	7.10	-58.52	0.01	-7.10	58.52	-0.01	0.000%
31	6.16	-58.52	3.56	-6.16	58.52	-3.56	0.000%
32	3.56	-58.52	6.16	-3.56	58.52	-6.16	0.000%
33	0.01	-58.52	7.10	-0.01	58.52	-7.10	0.000%
34	-3.54	-58.52	6.15	3.54	58.52	-6.15	0.000%
35	-6.15	-58.52	3.54	6.15	58.52	-3.54	0.000%
36	-7.10	-58.52	-0.01	7.10	58.52	0.01	0.000%
37	-6.16	-58.52	-3.56	6.16	58.52	3.56	0.000%
38	-3.56	-58.52	-6.16	3.56	58.52	6.16	0.000%
39	-0.02	-29.05	-4.56	0.02	29.05	4.56	0.000%
40	2.26	-29.05	-3.94	-2.26	29.05	3.94	0.000%
41	3.93	-29.05	-2.27	-3.93	29.05	2.27	0.000%
42	4.55	-29.05	0.02	-4.55	29.05	-0.02	0.000%
43	3.95	-29.05	2.30	-3.95	29.05	-2.30	0.000%
44	2.29	-29.05	3.96	-2.29	29.05	-3.96	0.000%
45	0.02	-29.05	4.56	-0.02	29.05	-4.56	0.000%
46	-2.26	-29.05	3.94	2.26	29.05	-3.94	0.000%
47	-3.93	-29.05	2.27	3.93	29.05	-2.27	0.000%
48	-4.55	-29.05	-0.02	4.55	29.05	0.02	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
49	-3.95	-29.05	-2.30	3.95	29.05	2.30	0.000%
50	-2.29	-29.05	-3.96	2.29	29.05	3.96	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	5	0.00000001	0.00006163
3	Yes	4	0.00000001	0.00076991
4	Yes	6	0.00000001	0.00005218
5	Yes	5	0.00000001	0.00044528
6	Yes	6	0.00000001	0.00005335
7	Yes	5	0.00000001	0.00045560
8	Yes	4	0.00000001	0.00096657
9	Yes	4	0.00000001	0.00043345
10	Yes	6	0.00000001	0.00005487
11	Yes	5	0.00000001	0.00046836
12	Yes	6	0.00000001	0.00005290
13	Yes	5	0.00000001	0.00045136
14	Yes	4	0.00000001	0.00084728
15	Yes	4	0.00000001	0.00033005
16	Yes	6	0.00000001	0.00005427
17	Yes	5	0.00000001	0.00046319
18	Yes	6	0.00000001	0.00005268
19	Yes	5	0.00000001	0.00044956
20	Yes	4	0.00000001	0.00078685
21	Yes	4	0.00000001	0.00027063
22	Yes	6	0.00000001	0.00005311
23	Yes	5	0.00000001	0.00045329
24	Yes	6	0.00000001	0.00005550
25	Yes	5	0.00000001	0.00047355
26	Yes	4	0.00000001	0.00000530
27	Yes	5	0.00000001	0.00060671
28	Yes	5	0.00000001	0.00087456
29	Yes	5	0.00000001	0.00090684
30	Yes	5	0.00000001	0.00060098
31	Yes	5	0.00000001	0.00089471
32	Yes	5	0.00000001	0.00089325
33	Yes	5	0.00000001	0.00060454
34	Yes	5	0.00000001	0.00091200
35	Yes	5	0.00000001	0.00087682
36	Yes	5	0.00000001	0.00060462
37	Yes	5	0.00000001	0.00090955
38	Yes	5	0.00000001	0.00091385
39	Yes	4	0.00000001	0.00005747
40	Yes	4	0.00000001	0.00023586
41	Yes	4	0.00000001	0.00025317
42	Yes	4	0.00000001	0.00003911
43	Yes	4	0.00000001	0.00027529
44	Yes	4	0.00000001	0.00024631
45	Yes	4	0.00000001	0.00005159
46	Yes	4	0.00000001	0.00026762
47	Yes	4	0.00000001	0.00024521
48	Yes	4	0.00000001	0.00003726
49	Yes	4	0.00000001	0.00025046

50	Yes	4	0.00000001	0.00028459

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	177 - 133.71 (1)	TP24.46x14x0.25	43.2900	0.0000	0.0	18.5242	-5.52	1083.67	0.005
L2	133.71 - 88.04 (2)	TP34.86x23.095x0.3125	49.2500	0.0000	0.0	33.1010	-11.48	1936.41	0.006
L3	88.04 - 43.42 (3)	TP44.89x33.0597x0.375	49.5400	0.0000	0.0	51.2331	-20.93	2997.14	0.007
L4	43.42 - 0 (4)	TP54.5x42.669x0.375	49.5800	0.0000	0.0	64.4223	-34.85	3768.70	0.009

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	177 - 133.71 (1)	TP24.46x14x0.25	348.78	658.81	0.529	0.00	658.81	0.000
L2	133.71 - 88.04 (2)	TP34.86x23.095x0.3125	869.20	1635.56	0.531	0.00	1635.56	0.000
L3	88.04 - 43.42 (3)	TP44.89x33.0597x0.375	1560.80	3199.78	0.488	0.00	3199.78	0.000
L4	43.42 - 0 (4)	TP54.5x42.669x0.375	2582.67	4673.19	0.553	0.00	4673.19	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	177 - 133.71 (1)	TP24.46x14x0.25	9.85	325.10	0.030	0.83	664.65	0.001
L2	133.71 - 88.04 (2)	TP34.86x23.095x0.3125	13.75	580.92	0.024	0.73	1697.79	0.000
L3	88.04 - 43.42 (3)	TP44.89x33.0597x0.375	18.20	899.14	0.020	0.75	3389.38	0.000
L4	43.42 - 0 (4)	TP54.5x42.669x0.375	22.83	1130.61	0.020	0.61	5359.09	0.000

Pole Interaction Design Data

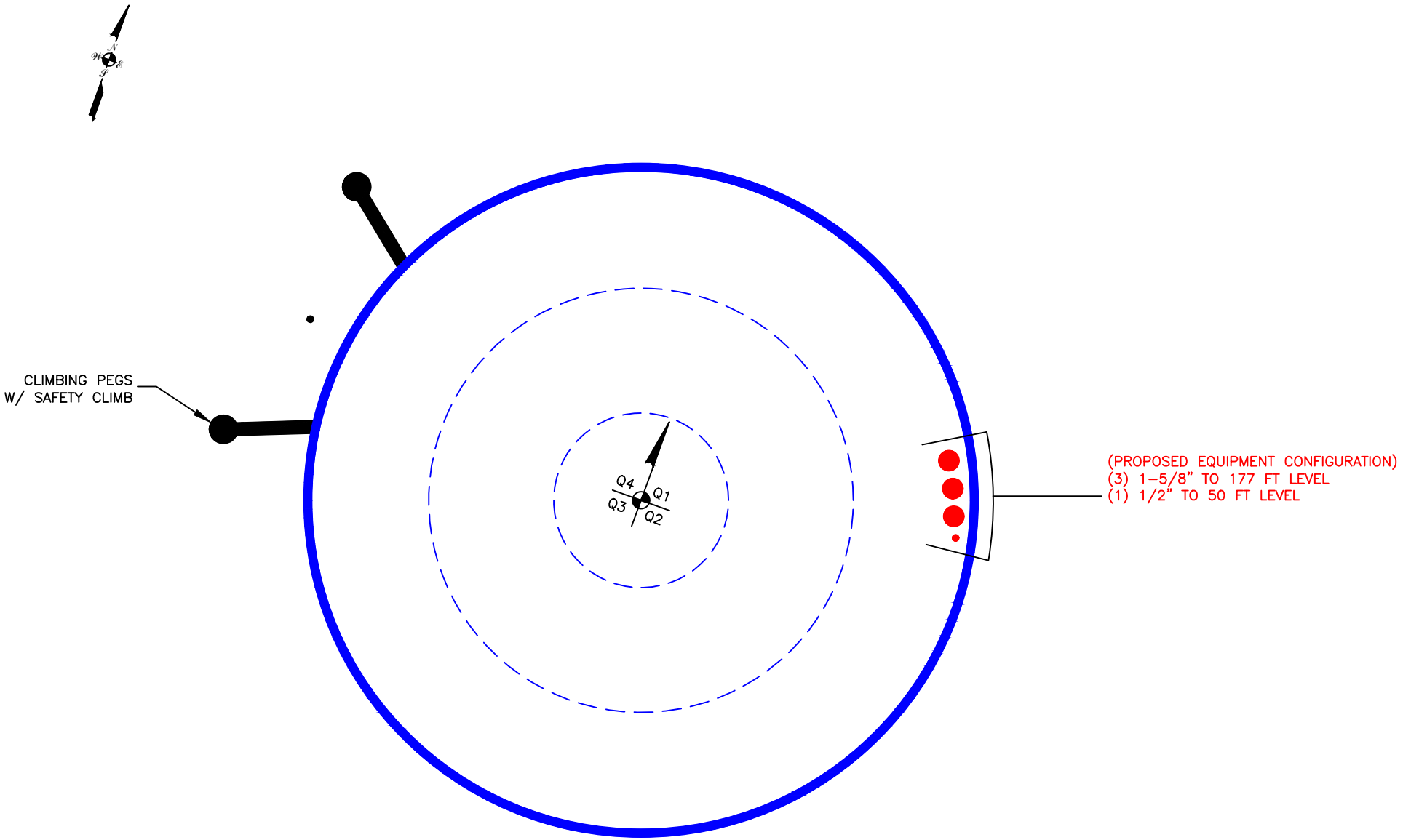
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	177 - 133.71 (1)	0.005	0.529	0.000	0.030	0.001	0.535	1.050	4.8.2
L2	133.71 - 88.04 (2)	0.006	0.531	0.000	0.024	0.000	0.538	1.050	4.8.2
L3	88.04 - 43.42 (3)	0.007	0.488	0.000	0.020	0.000	0.495	1.050	4.8.2
L4	43.42 - 0 (4)	0.009	0.553	0.000	0.020	0.000	0.562	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	177 - 133.71	Pole	TP24.46x14x0.25	1	-5.52	1137.85	51.0	Pass
L2	133.71 - 88.04	Pole	TP34.86x23.095x0.3125	2	-11.48	2033.23	51.2	Pass
L3	88.04 - 43.42	Pole	TP44.89x33.0597x0.375	3	-20.93	3147.00	47.2	Pass
L4	43.42 - 0	Pole	TP54.5x42.669x0.375	4	-34.85	3957.13	53.6	Pass
							Summary	
						Pole (L4)	53.6	Pass
						RATING =	**53.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


CLIMBING PEGS
W/ SAFETY CLIMB
Q4
Q1
Q3
Q2
(PROPOSED EQUIPMENT CONFIGURATION)
(3) 1-5/8" TO 177 FT LEVEL
(1) 1/2" TO 50 FT LEVEL

APPENDIX C

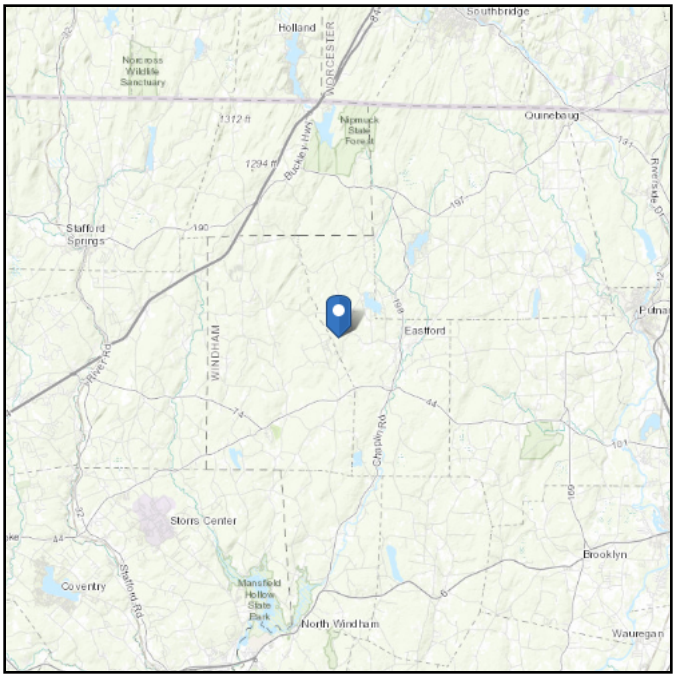
ADDITIONAL CALCULATIONS

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 672.24 ft (NAVD 88)
Latitude: 41.904506
Longitude: -72.123867



Wind

Results:

Wind Speed:	126 Vmph	130 Vmph per Jurisdictional requirement.
10-year MRI	78 Vmph	
25-year MRI	88 Vmph	
50-year MRI	95 Vmph	
100-year MRI	102 Vmph	

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

Date Accessed: Mon Feb 08 2021

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.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

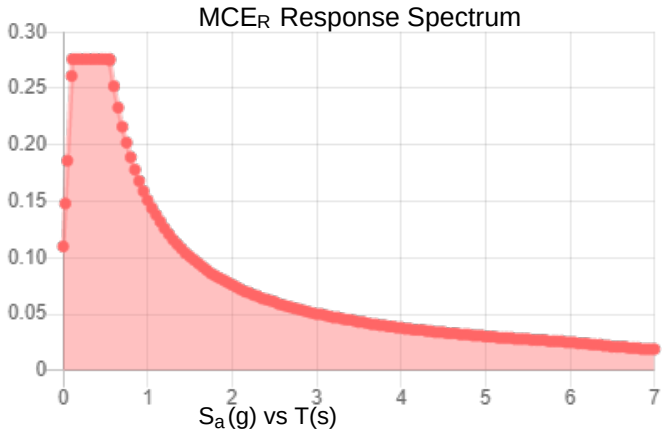
Seismic

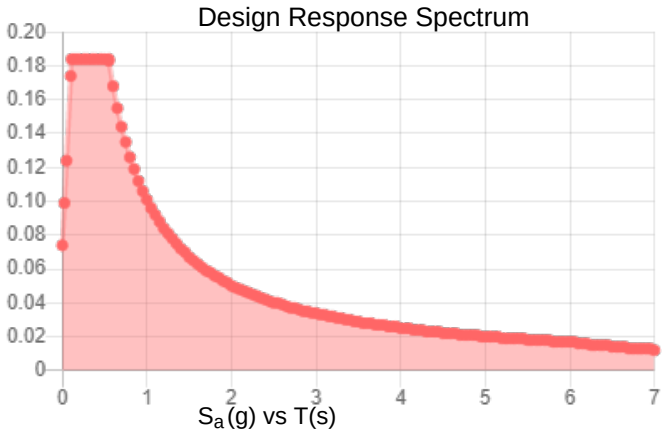
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.172	S_{DS} :	0.184
S_1 :	0.063	S_{D1} :	0.101
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.085
S_{MS} :	0.276	PGA_M :	0.136
S_{M1} :	0.151	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Mon Feb 08 2021

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

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Mon Feb 08 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.

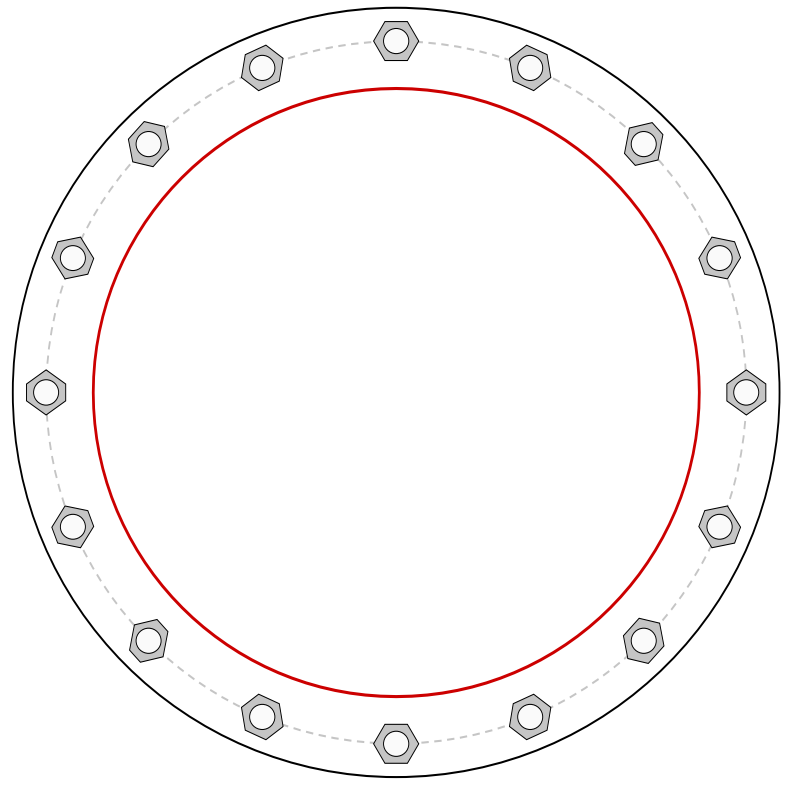
Monopole Base Plate Connection

Site Info	
BU #	876372
Site Name	ith Hills / Sterling GRP
Order #	538767 Rev. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	1.5

Applied Loads	
Moment (kip-ft)	2582.67
Axial Force (kips)	34.85
Shear Force (kips)	22.83

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(16) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 63" BC

Base Plate Data

69" OD x 1.75" Plate (A871-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

54.5" x 0.375" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

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

Pu_c = 125.1	ϕPn_c = 268.39	**Stress Rating**
Vu = 1.43	ϕVn = 120.77	**44.4%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	39.69	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**70.0%**	**Pass**

Pier and Pad Foundation

BU # :	876372
Site Name:	Smith Hills / Sterlin
App. Number:	538767 Rev. 0

TIA-222 Revision:	H
Tower Type:	Monopole

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

Superstructure Analysis Reactions

Compression, P_{comp}:	35	kips
Base Shear, Vu_comp:	23	kips
Moment, M_u:	2583	ft-kips
Tower Height, **H**:	177	ft
BP Dist. Above Fdn, bp_{dist}:	3.75	in

Pier Properties

Pier Shape:	Square	
Pier Diameter, **dpier**:	7	ft
Ext. Above Grade, **E**:	1	ft
Pier Rebar Size, **Sc**:	8	
Pier Rebar Quantity, **mc**:	39	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	6	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties

Depth, **D**:	7	ft
Pad Width, W_1:	28.5	ft
Pad Thickness, **T**:	3	ft
Pad Rebar Size (Top dir.2), Sp_{top2}:	8	
Pad Rebar Quantity (Top dir. 2), mp_{top2}:	25	
Pad Rebar Size (Bottom dir. 2), Sp_2:	8	
Pad Rebar Quantity (Bottom dir. 2), mp_2:	32	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties

Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	4	ksi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties

Total Soil Unit Weight, γ:	125	pcf
Ultimate Net Bearing, Qnet:	18.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	35	degrees
SPT Blow Count, N_{blows}:	31	
Base Friction, μ:	0.4	
Neglected Depth, **N**:	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	N/A	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	386.75	23.00	**5.7%**	**Pass**
Bearing Pressure (ksf)	14.16	1.70	**11.5%**	**Pass**
*Overturning (kip*ft)*	9795.89	2774.19	**28.3%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	5047.75	2698.00	**50.9%**	**Pass**
Pier Compression (kip)	31187.52	79.10	**0.2%**	**Pass**
*Pad Flexure (kip*ft)*	3509.24	987.10	**26.8%**	**Pass**
Pad Shear - 1-way (kips)	1022.02	133.20	**12.4%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.190	0.027	**13.8%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	3464.79	1618.80	**44.5%**	**Pass**

**Rating per TIA-222-H Section 15.5*

Soil Rating*:	**28.3%**
Structural Rating*:	**50.9%**

Version 4.0.1

Exhibit F

Power Density/RF Emissions Report

EBI Consulting

environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CTHA653A

71 Ashford Road
Eastford, Connecticut 06272

March 30, 2021

EBI Project Number: 6221001455

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**6.08%**

21 B Street, Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

March 30, 2021

T-Mobile
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, Connecticut 06002

Emissions Analysis for Site: CTHA653A

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **71 Ashford Road** in **Eastford, Connecticut** for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu W/cm^2$). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits; therefore, it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 71 Ashford Road in Eastford, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower. For power density calculations, the broadcast footprint of the AIR6449 antenna has been considered. Due to the beamforming nature of this antenna, the actual beam locations vary depending on demand and are narrow in nature. Using the broadcast footprint accounts for the potential location of beams at any given time.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.

3) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

5) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

7) 1 LTE channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.

8) 1 NR channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.

9) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

10) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

11) The antennas used in this modeling are the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector A, the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector B, the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

12) The antenna mounting height centerline of the proposed antennas is 180 feet above ground level (AGL).

13) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

14) All calculations were done with respect to uncontrolled / general population threshold limits.

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20
Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	180 feet	Height (AGL):	180 feet	Height (AGL):	180 feet
Channel Count:	2	Channel Count:	2	Channel Count:	2
Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE %:	**0.55%**	Antenna B1 MPE %:	**0.55%**	Antenna C1 MPE %:	**0.55%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20
Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz
Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd
Height (AGL):	180 feet	Height (AGL):	180 feet	Height (AGL):	180 feet
Channel Count:	11	Channel Count:	11	Channel Count:	11
Total TX Power (W):	440 Watts	Total TX Power (W):	440 Watts	Total TX Power (W):	440 Watts
ERP (W):	12,569.87	ERP (W):	12,569.87	ERP (W):	12,569.87
Antenna A2 MPE %:	**2.17%**	Antenna B2 MPE %:	**2.17%**	Antenna C2 MPE %:	**2.17%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449
Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz
Gain:	17.3 dBd / 17.3 dBd	Gain:	17.3 dBd / 17.3 dBd	Gain:	17.3 dBd / 17.3 dBd
Height (AGL):	180 feet	Height (AGL):	180 feet	Height (AGL):	180 feet
Channel Count:	2	Channel Count:	2	Channel Count:	2
Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts
ERP (W):	12,888.76	ERP (W):	12,888.76	ERP (W):	12,888.76
Antenna A3 MPE %:	**1.53%**	Antenna B3 MPE %:	**1.53%**	Antenna C3 MPE %:	**1.53%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	4.26%
Sprint	1.82%
Site Total MPE % :	6.08%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	4.26%
T-Mobile Sector B Total:	4.26%
T-Mobile Sector C Total:	4.26%
Site Total MPE % :	6.08%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 2100 MHz LTE	2	2334.27	180.0	5.54	2100 MHz LTE	1000	0.55%
T-Mobile 600 MHz LTE	2	591.73	180.0	1.41	600 MHz LTE	400	0.35%
T-Mobile 600 MHz NR	1	1577.94	180.0	1.87	600 MHz NR	400	0.47%
T-Mobile 700 MHz LTE	2	695.22	180.0	1.65	700 MHz LTE	467	0.35%
T-Mobile 1900 MHz GSM	4	1052.26	180.0	5.00	1900 MHz GSM	1000	0.50%
T-Mobile 1900 MHz LTE	2	2104.51	180.0	5.00	1900 MHz LTE	1000	0.50%
T-Mobile 2500 MHz LTE	1	6444.38	180.0	7.65	2500 MHz LTE	1000	0.77%
T-Mobile 2500 MHz NR	1	6444.38	180.0	7.65	2500 MHz NR	1000	0.77%
						Total:	**4.26%**

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	4.26%
Sector B:	4.26%
Sector C:	4.26%
T-Mobile Maximum MPE % (Sector A):	4.26%
Site Total:	6.08%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **6.08%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Exhibit E

Mount Analysis

Date: **February 1, 2021**

Darcy Tarr
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6589

Infinigy Engineering, PLLC
1033 Watervliet Shaker Road
Albany, NY 12205
518-690-0790
structural@infinigy.com

Subject:	**Mount Analysis Report**	
Carrier Designation:	**Sprint PCS Retain**	
	Carrier Site Number:	CTHA653A
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	876372
	Crown Castle Site Name:	SMITH HILLS / STERLING GRP. (S
	Crown Castle JDE Job Number:	628851
	Crown Castle Order Number:	538767 Rev. 0
Engineering Firm Designation:	**Infinigy Engineering, PLLC Report Designation:** 1039-Z0001-B	
Site Data:	**71 Ashford Road, Eastford, Windham County, CT, 06272** **Latitude 41°54'16.22", Longitude -72°7'25.92"**	
Structure Information:	**Tower Height & Type:**	**177.0 ft Monopole**
	Mount Elevation:	**177.0 ft**
	Mount Type:	**10.5 ft Platform**

Dear Darcy Tarr,

Infinigy Engineering, PLLC is pleased to submit this **"Mount Analysis Report"** to determine the structural integrity of Sprint PCS's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

Platform **Sufficient - 75.0%**
***Sufficient upon completion of the changes listed in the 'Recommendations' section of this report.**

This analysis has been performed in accordance with the 2018 Connecticut State Building Code and Appendix N based upon an ultimate 3-second gust wind speed of 130 mph. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Mount analysis prepared by: Jacques S. Grimaldi, M.S., P.E.

Respectfully Submitted by:
Emmanuel Poulin, P.E.
518-690-0790
structural@infinigy.com
CT PE License No. 22947

2/2/21

TABLE OF CONTENTS

1) INTRODUCTION

This is an existing 3 sector 10.5 ft Platform, designed by Engineered Endeavors Incorporated.

2) ANALYSIS CRITERIA

Building Code:	2015 IBC / 2018 Connecticut State Building Code and Appendix N
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	130 mph
Exposure Category:	C
Topographic Factor at Base:	1.0
Topographic Factor at Mount:	1.0
Ice Thickness:	2.0 in
Wind Speed with Ice:	50 mph
Seismic S_s:	0.172
Seismic S_1:	0.063
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
177.0	180.0	3	Ericsson	AIR6449 B41_T-MOBILE	10.5 ft Platform
		3	RFS/Celwave	APX16DWV-16DWV-S-E-A20	
		3	RFS/Celwave	APXVAALL24_43-U-NA20_TMO	
		3	Ericsson	RADIO 4415 B66A	
		3	Ericsson	RADIO 4424 B25_TMO	
		3	Ericsson	RADIO 4449 B71 B85A_ T-MOBILE	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Crown Application	Sprint PCS Application	538767 Rev. 0	CCI Sites
Loading Document	Sprint PCS	RFDS Version: 1	TSA
Tower Manufacturer Drawings	Engineered Endeavors Incorporated	1615375	CCI Sites

3.1) Analysis Method

RISA-3D (Version 19.0.1), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

Infinigy Mount Analysis Tool V2.1.4, a tool internally developed by Infinigy, was used to calculate wind loading on all appurtenances, dishes and mount members for various loading cases. Selected output from the analysis is included in Appendix B “Software Input Calculations”.

This analysis was performed in accordance with Crown Castle’s ENG-SOW-10208 *Tower Mount Analysis* (Revision B).

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
3) 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.
4) The analysis will be required to be revised if the existing conditions in the field differ from those shown in the above-referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.
5) Prior structural modifications to the tower mounting system are assumed to be installed as shown per available data.
6) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM A500 (GR B-46)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Infinigy Engineering, PLLC should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (Platform, All Sectors)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1, 2	Mount Pipe(s)	MP7	177.0	62.7	Pass
	Horizontal(s)	M2		46.1	Pass
	Handrail(s)	M36		75.0	Pass
	Support Channel(s)	M6		48.3	Pass
	Mount Connection(s)	-		5.7	Pass

Structure Rating (max from all components) =	75.0%

Notes:
1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
2) See additional documentation in “Appendix D - Additional Calculations” for detailed mount connection calculations.

4.1) Recommendations

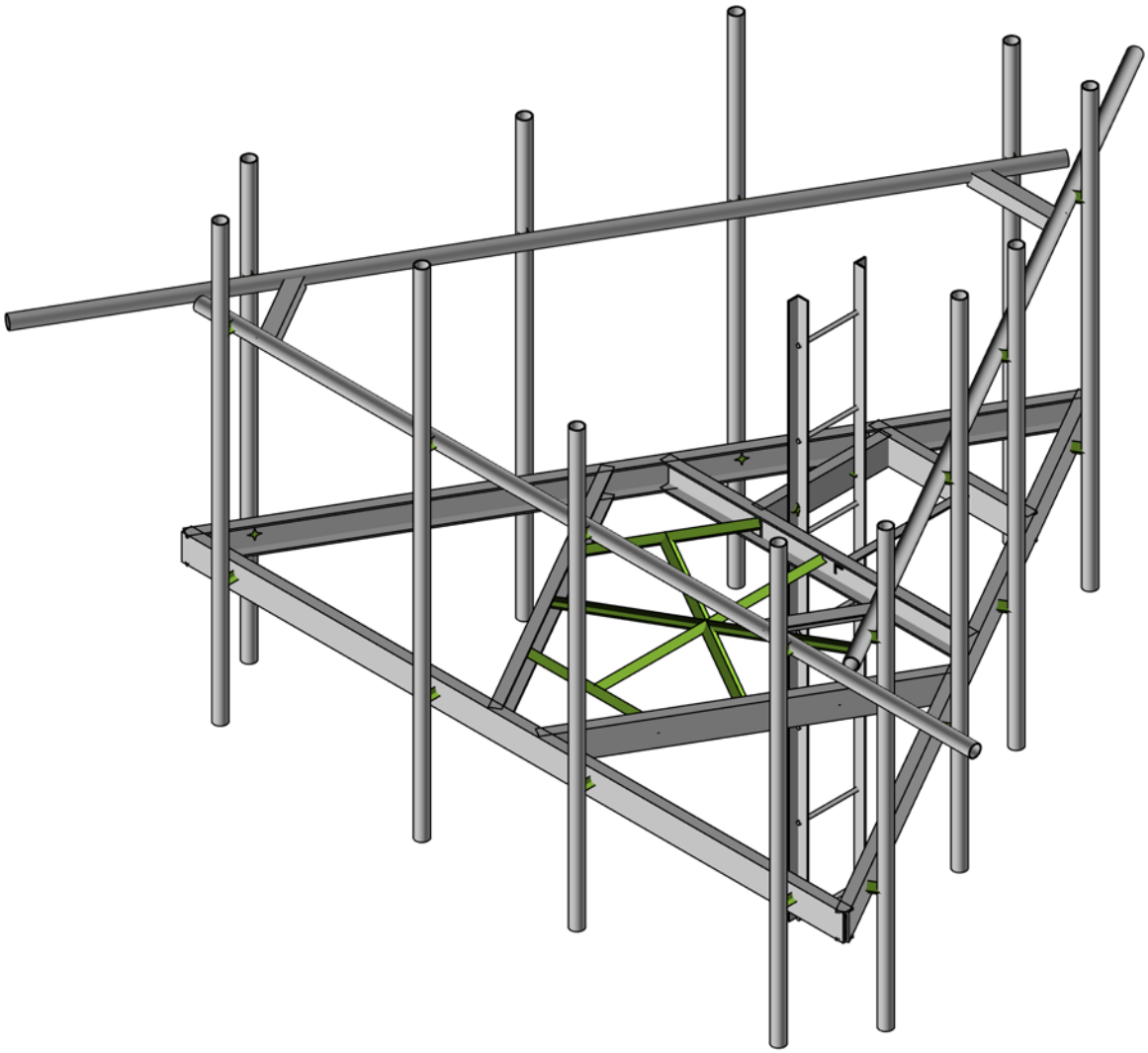
The mount has sufficient capacity to carry the proposed loading configuration. In order for the results of the analysis to be considered valid, the structural modifications listed below must be completed.

1. Installation of proposed Site Pro 1 HRK12 handrail kit.
2. Addition of (1) 8’ pipe mount per sector.

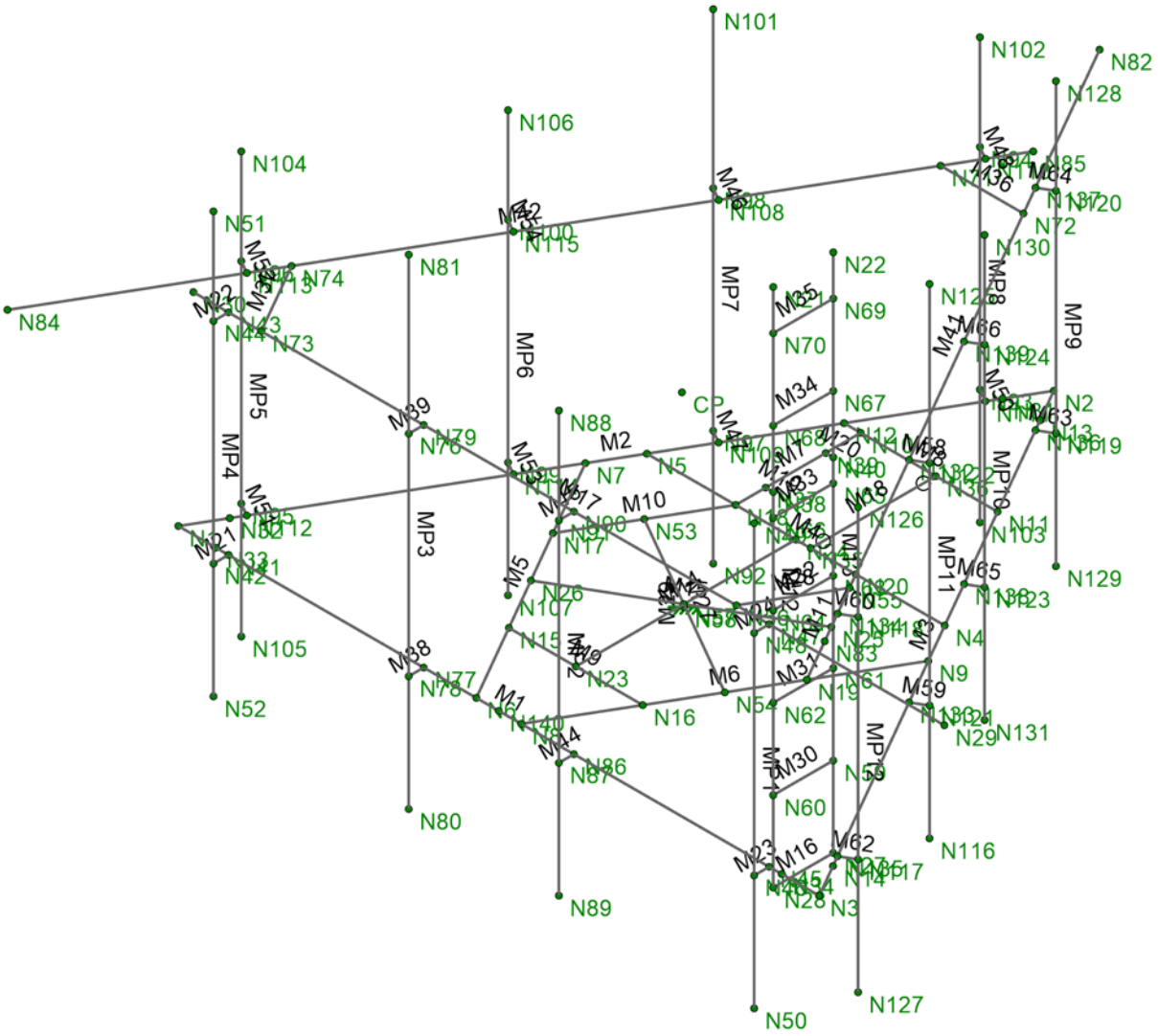
No structural modifications are required at this time, provided that the above-listed changes are implemented.

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Infinigy Engineering, PLLC	876372	Render
JG		Feb 01, 2021
1039-Z0001-B		876372_loaded.r3d



Infinigy Engineering, PLLC	876372	Wireframe
JG		Feb 01, 2021
1039-Z0001-B		876372_loaded.r3d

APPENDIX B

SOFTWARE INPUT CALCULATIONS

Program Inputs

PROJECT INFORMATION	
Client:	Crown Castle
Carrier:	Sprint PCS
Engineer:	Jacques Grimaldi

SITE INFORMATION		
Risk Category:	II	
Exposure Category:	C	
Topo Factor Procedure:	Method 1, Category 1	
Site Class:	D - Stiff Soil	
Ground Elevation:	672.24	ft *Rev H

MOUNT INFORMATION		
Mount Type:	Platform	
Num Sectors:	3	
Centerline AGL:	177.0	ft
Tower Height AGL:	177.0	ft

TOPOGRAPHIC DATA		
Topo Feature:	N/A	
Slope Distance:	N/A	ft
Crest Distance:	N/A	ft
Crest Height:	N/A	ft

FACTORS		
Directionality Fact. (K_d):	0.95	
Ground Ele. Factor (K_e):	0.98	*Rev H Only
Rooftop Speed-Up (K_s):	1.00	*Rev H Only
Topographic Factor (K_{zt}):	1.00	
Gust Effect Factor (G_h):	1.0	

CODE STANDARDS		
Building Code:	2015 IBC	
TIA Standard:	TIA-222-H	
ASCE Standard:	ASCE 7-10	

WIND AND ICE DATA		
Ultimate Wind (V_{ult}):	130	mph
Design Wind (V):	N/A	mph
Ice Wind (V_{ice}):	50	mph
Base Ice Thickness (t_i):	2.0	in
Flat Pressure:	114.50	psf
Round Pressure:	68.70	psf
Ice Wind Pressure:	10.16	psf

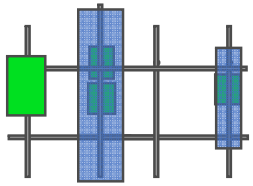
SEISMIC DATA		
Short-Period Accel. (S_s):	0.172	g
1-Second Accel. (S_1):	0.063	g
Short-Period Design (S_{DS}):	0.18	
1-Second Design (S_{D1}):	0.10	
Short-Period Coeff. (F_a):	1.60	
1-Second Coeff. (F_v):	2.40	
Amplification Factor (a_p):	1.00	
Response Mod. (R_p):	2.50	
Overstrength (Ω_o):	1.00	

INFINIGY
FROM ZERO TO INFINIGY
the solutions are endless

Infinigy Load Calculator V2.1.4

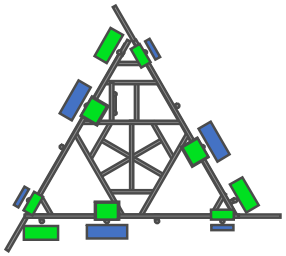
Program Inputs

ELEVATION VIEW



MP4 MP3 MP2 MP1

PLAN VIEW



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Infinigy Load Calculator V2.1.4

APPURTENANCE INFORMATION

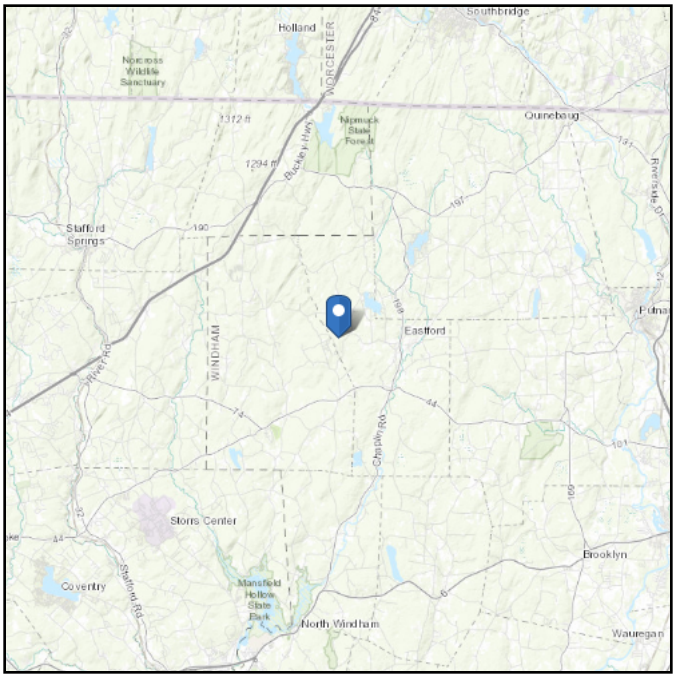
Appurtenance Name	Elevation	Qty.	K_a	q_z (psf)	EPA_N (ft^2)	EPA_T (ft^2)	Wind F_z (lbs)	Wind F_x (lbs)	Weight (lbs)	Seismic F (lbs)	Member (α sector)
ERICSSON AIR6449 B41_T-MOBILE	180.0	3	0.90	57.45	5.66	2.48	292.63	128.06	114.63	10.52	MP4
RFS/CELWAVE APX16DWV-16DWV-S-E-A20	180.0	3	0.90	57.45	6.26	1.50	323.70	77.56	40.70	3.73	MP1
RFS/CELWAVE APXVAALL24_43-U-NA20_TMO	180.0	3	0.90	57.45	14.67	5.32	758.58	275.09	149.90	13.75	MP3
ERICSSON RADIO 4415 B66A	180.0	3	0.90	57.45	1.86	0.87	95.99	44.99	49.60	4.55	MP1
ERICSSON RADIO 4424 B25_TMO	180.0	3	0.90	57.45	2.05	1.61	106.11	83.26	86.00	7.89	MP3
ERICSSON RADIO 4449 B71 B85A_T-MOBILE	180.0	3	0.90	57.45	1.97	1.59	101.87	82.04	73.21	6.72	MP3

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 672.24 ft (NAVD 88)
Latitude: 41.904506
Longitude: -72.123867



Wind

Results:

Wind Speed:	130 Vmph per 2018 Connecticut State Building Code and Appendix N
10-year MRI	78 Vmph
25-year MRI	88 Vmph
50-year MRI	95 Vmph
100-year MRI	102 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Sun Jan 31 2021

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.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

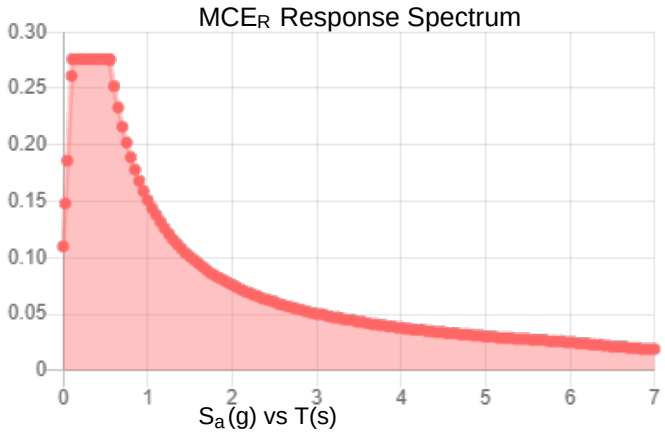
Seismic

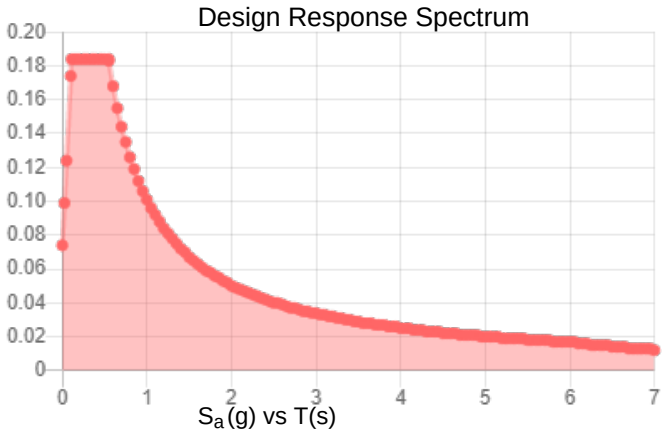
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.172	S_{DS} :	0.184
S_1 :	0.063	S_{D1} :	0.101
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.085
S_{MS} :	0.276	PGA_M :	0.136
S_{M1} :	0.151	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Sun Jan 31 2021

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

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Sun Jan 31 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.

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Member Primary Data

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N3	N1		Horizontal	Beam	Channel	A36 Gr.36	Typical
2	M2	N2	N1	180	Horizontal	Beam	Channel	A36 Gr.36	Typical
3	M3	N2	N3		Horizontal	Beam	Channel	A36 Gr.36	Typical
4	M4	N4	N5	180	Support Channel	Beam	Channel	A36 Gr.36	Typical
5	M5	N6	N7		Support Channel	Beam	Channel	A36 Gr.36	Typical
6	M6	N8	N9	180	Support Channel	Beam	Channel	A36 Gr.36	Typical
7	M7	N18	N10	180	Support Channel	Beam	Channel	A36 Gr.36	Typical
8	M8	N11	N12		Support Channel	Beam	Channel	A36 Gr.36	Typical
9	M9	N15	N16		RIGID	None	None	RIGID	Typical
10	M10	N17	N18		RIGID	None	None	RIGID	Typical
11	M11	N19	N20		RIGID	None	None	RIGID	Typical
12	M12	N21	N28	180	Ladder Rail	Column	Single Angle	A36 Gr.36	Typical
13	M13	N22	N27	90	Ladder Rail	Column	Single Angle	A36 Gr.36	Typical
14	M14	N23	N24		RIGID	None	None	RIGID	Typical
15	M15	N25	N26		RIGID	None	None	RIGID	Typical
16	M16	N27	N28		Ladder Step	Beam	BAR	A36 Gr.36	Typical
17	M17	N29	N30	90	Handrails	Beam	Pipe	A53 Gr.B	Typical
18	M18	N35	N36	90	Grating Angle	Beam	Single Angle	A36 Gr.36	Typical
19	M19	N37	N38		RIGID	None	None	RIGID	Typical
20	M20	N39	N40		RIGID	None	None	RIGID	Typical
21	M21	N41	N42		RIGID	None	None	RIGID	Typical
22	M22	N43	N44		RIGID	None	None	RIGID	Typical
23	M23	N45	N46		RIGID	None	None	RIGID	Typical
24	M24	N47	N48		RIGID	None	None	RIGID	Typical
25	MP1	N49	N50		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
26	MP4	N51	N52		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
27	M27	N53	N54		RIGID	None	None	RIGID	Typical
28	M28	N55	N56	180	Handrail Corner Angle	Beam	Single Angle	A36 Gr.36	Typical
29	M29	N58	N57		RIGID	None	None	RIGID	Typical
30	M30	N59	N60		Ladder Step	Beam	BAR	A36 Gr.36	Typical
31	M31	N61	N62		Ladder Step	Beam	BAR	A36 Gr.36	Typical
32	M32	N63	N64		Ladder Step	Beam	BAR	A36 Gr.36	Typical
33	M33	N65	N66		Ladder Step	Beam	BAR	A36 Gr.36	Typical
34	M34	N67	N68		Ladder Step	Beam	BAR	A36 Gr.36	Typical
35	M35	N69	N70		Ladder Step	Beam	BAR	A36 Gr.36	Typical
36	M36	N71	N72	180	Handrail Corner Angle	Beam	Single Angle	A36 Gr.36	Typical
37	M37	N73	N74	180	Handrail Corner Angle	Beam	Single Angle	A36 Gr.36	Typical
38	M38	N77	N78		RIGID	None	None	RIGID	Typical
39	M39	N79	N76		RIGID	None	None	RIGID	Typical
40	MP3	N81	N80		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
41	M41	N82	N83	90	Handrails	Beam	Pipe	A53 Gr.B	Typical
42	M42	N84	N85	90	Handrails	Beam	Pipe	A53 Gr.B	Typical
43	MP2	N88	N89		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
44	M44	N86	N87		RIGID	None	None	RIGID	Typical
45	M45	N90	N91		RIGID	None	None	RIGID	Typical
46	M46	N108	N98		RIGID	None	None	RIGID	Typical
47	M47	N109	N97		RIGID	None	None	RIGID	Typical
48	M48	N110	N94		RIGID	None	None	RIGID	Typical
49	MP7	N101	N92		Mount Pipe	Column	Pipe	A53 Gr.B	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
50	M50	N111	N93		RIGID	None	None	RIGID	Typical
51	M51	N112	N95		RIGID	None	None	RIGID	Typical
52	M52	N113	N96		RIGID	None	None	RIGID	Typical
53	M53	N114	N99		RIGID	None	None	RIGID	Typical
54	M54	N115	N100		RIGID	None	None	RIGID	Typical
55	MP8	N102	N103		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
56	MP5	N104	N105		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
57	MP6	N106	N107		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
58	M58	N132	N122		RIGID	None	None	RIGID	Typical
59	M59	N133	N121		RIGID	None	None	RIGID	Typical
60	M60	N134	N118		RIGID	None	None	RIGID	Typical
61	MP11	N125	N116		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
62	M62	N135	N117		RIGID	None	None	RIGID	Typical
63	M63	N136	N119		RIGID	None	None	RIGID	Typical
64	M64	N137	N120		RIGID	None	None	RIGID	Typical
65	M65	N138	N123		RIGID	None	None	RIGID	Typical
66	M66	N139	N124		RIGID	None	None	RIGID	Typical
67	MP12	N126	N127		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
68	MP9	N128	N129		Mount Pipe	Column	Pipe	A53 Gr.B	Typical
69	MP10	N130	N131		Mount Pipe	Column	Pipe	A53 Gr.B	Typical

Material Take-Off

	Material	Size	Pieces	Length[in]	Weight[LB]
1	General Members				
2	RIGID		33	287.5	0
3	Total General		33	287.5	0
4					
5	Hot Rolled Steel				
6	A36 Gr.36	0.625 SR	7	84	7.308
7	A36 Gr.36	C5X9	8	618.2	462.779
8	A36 Gr.36	L1.5x1.5x4	1	25	4.87
9	A36 Gr.36	L2.5x2.5x3	3	49.6	12.683
10	A36 Gr.36	L2x2x4	2	208	55.679
11	A53 Gr.B	PIPE_2.0	15	1494	432.119
12	Total HR Steel		36	2478.8	975.437

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Point	Distributed	Area(Member)
1	Self Weight	DL		-1			36		8
2	Wind Load AZI 0	WLZ					72		
3	Wind Load AZI 30	None					72		
4	Wind Load AZI 60	None					72		
5	Wind Load AZI 90	WLX					72		
6	Wind Load AZI 120	None					72		
7	Wind Load AZI 150	None					72		
8	Wind Load AZI 180	None					72		
9	Wind Load AZI 210	None					72		
10	Wind Load AZI 240	None					72		

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Point	Distributed	Area(Member)
11	Wind Load AZI 270	None					72		
12	Wind Load AZI 300	None					72		
13	Wind Load AZI 330	None					72		
14	Distr. Wind Load Z	WLZ						69	
15	Distr. Wind Load X	WLX						69	
16	Ice Weight	OL1					36	69	8
17	Ice Wind Load AZI 0	OL2					72		
18	Ice Wind Load AZI 30	None					72		
19	Ice Wind Load AZI 60	None					72		
20	Ice Wind Load AZI 90	OL3					72		
21	Ice Wind Load AZI 120	None					72		
22	Ice Wind Load AZI 150	None					72		
23	Ice Wind Load AZI 180	None					72		
24	Ice Wind Load AZI 210	None					72		
25	Ice Wind Load AZI 240	None					72		
26	Ice Wind Load AZI 270	None					72		
27	Ice Wind Load AZI 300	None					72		
28	Ice Wind Load AZI 330	None					72		
29	Distr. Ice Wind Load Z	OL2						69	
30	Distr. Ice Wind Load X	OL3						69	
31	Seismic Load Z	ELZ			-0.092		36		
32	Seismic Load X	ELX	-0.092				36		
33	Service Live Loads	LL				1			
34	Maintenance Load 1	LL				1			
35	Maintenance Load 2	LL				1			
36	Maintenance Load 3	LL				1			
37	Maintenance Load 4	LL				1			
38	Maintenance Load 5	LL				1			
39	Maintenance Load 6	LL				1			
40	Maintenance Load 7	LL				1			
41	Maintenance Load 8	LL				1			
42	Maintenance Load 9	LL				1			
43	Maintenance Load 10	LL				1			
44	Maintenance Load 11	LL				1			
45	Maintenance Load 12	LL				1			
46	BLC 1 Transient Area Loads	None						94	
47	BLC 16 Transient Area Loads	None						94	

Load Combinations

	Description	Solve	PDelta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.4DL	Yes	Y	1	1.4								
2	1.2DL + 1WL AZI 0	Yes	Y	1	1.2	2	1	14	1	15			
3	1.2DL + 1WL AZI 30	Yes	Y	1	1.2	3	1	14	0.866	15	0.5		
4	1.2DL + 1WL AZI 60	Yes	Y	1	1.2	4	1	14	0.5	15	0.866		
5	1.2DL + 1WL AZI 90	Yes	Y	1	1.2	5	1	14		15	1		
6	1.2DL + 1WL AZI 120	Yes	Y	1	1.2	6	1	14	-0.5	15	0.866		
7	1.2DL + 1WL AZI 150	Yes	Y	1	1.2	7	1	14	-0.866	15	0.5		
8	1.2DL + 1WL AZI 180	Yes	Y	1	1.2	8	1	14	-1	15			

Load Combinations (Continued)

	Description	Solve	PDelta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
9	1.2DL + 1WL AZI 210	Yes	Y	1	1.2	9	1	14	-0.866	15	-0.5		
10	1.2DL + 1WL AZI 240	Yes	Y	1	1.2	10	1	14	-0.5	15	-0.866		
11	1.2DL + 1WL AZI 270	Yes	Y	1	1.2	11	1	14		15	-1		
12	1.2DL + 1WL AZI 300	Yes	Y	1	1.2	12	1	14	0.5	15	-0.866		
13	1.2DL + 1WL AZI 330	Yes	Y	1	1.2	13	1	14	0.866	15	-0.5		
14	0.9DL + 1WL AZI 0	Yes	Y	1	0.9	2	1	14	1	15			
15	0.9DL + 1WL AZI 30	Yes	Y	1	0.9	3	1	14	0.866	15	0.5		
16	0.9DL + 1WL AZI 60	Yes	Y	1	0.9	4	1	14	0.5	15	0.866		
17	0.9DL + 1WL AZI 90	Yes	Y	1	0.9	5	1	14		15	1		
18	0.9DL + 1WL AZI 120	Yes	Y	1	0.9	6	1	14	-0.5	15	0.866		
19	0.9DL + 1WL AZI 150	Yes	Y	1	0.9	7	1	14	-0.866	15	0.5		
20	0.9DL + 1WL AZI 180	Yes	Y	1	0.9	8	1	14	-1	15			
21	0.9DL + 1WL AZI 210	Yes	Y	1	0.9	9	1	14	-0.866	15	-0.5		
22	0.9DL + 1WL AZI 240	Yes	Y	1	0.9	10	1	14	-0.5	15	-0.866		
23	0.9DL + 1WL AZI 270	Yes	Y	1	0.9	11	1	14		15	-1		
24	0.9DL + 1WL AZI 300	Yes	Y	1	0.9	12	1	14	0.5	15	-0.866		
25	0.9DL + 1WL AZI 330	Yes	Y	1	0.9	13	1	14	0.866	15	-0.5		
26	1.2D + 1.0Di	Yes	Y	1	1.2	16	1						
27	1.2D + 1.0Di +1.0Wi AZI 0	Yes	Y	1	1.2	16	1	17	1	29	1	30	
28	1.2D + 1.0Di +1.0Wi AZI 30	Yes	Y	1	1.2	16	1	18	1	29	0.866	30	0.5
29	1.2D + 1.0Di +1.0Wi AZI 60	Yes	Y	1	1.2	16	1	19	1	29	0.5	30	0.866
30	1.2D + 1.0Di +1.0Wi AZI 90	Yes	Y	1	1.2	16	1	20	1	29		30	1
31	1.2D + 1.0Di +1.0Wi AZI 120	Yes	Y	1	1.2	16	1	21	1	29	-0.5	30	0.866
32	1.2D + 1.0Di +1.0Wi AZI 150	Yes	Y	1	1.2	16	1	22	1	29	-0.866	30	0.5
33	1.2D + 1.0Di +1.0Wi AZI 180	Yes	Y	1	1.2	16	1	23	1	29	-1	30	
34	1.2D + 1.0Di +1.0Wi AZI 210	Yes	Y	1	1.2	16	1	24	1	29	-0.866	30	-0.5
35	1.2D + 1.0Di +1.0Wi AZI 240	Yes	Y	1	1.2	16	1	25	1	29	-0.5	30	-0.866
36	1.2D + 1.0Di +1.0Wi AZI 270	Yes	Y	1	1.2	16	1	26	1	29		30	-1
37	1.2D + 1.0Di +1.0Wi AZI 300	Yes	Y	1	1.2	16	1	27	1	29	0.5	30	-0.866
38	1.2D + 1.0Di +1.0Wi AZI 330	Yes	Y	1	1.2	16	1	28	1	29	0.866	30	-0.5
39	(1.2 + 0.2Sds)DL + 1.0E AZI 0	Yes	Y	1	1.237	31	1	32					
40	(1.2 + 0.2Sds)DL + 1.0E AZI 30	Yes	Y	1	1.237	31	0.866	32	0.5				
41	(1.2 + 0.2Sds)DL + 1.0E AZI 60	Yes	Y	1	1.237	31	0.5	32	0.866				
42	(1.2 + 0.2Sds)DL + 1.0E AZI 90	Yes	Y	1	1.237	31		32	1				
43	(1.2 + 0.2Sds)DL + 1.0E AZI 120	Yes	Y	1	1.237	31	-0.5	32	0.866				
44	(1.2 + 0.2Sds)DL + 1.0E AZI 150	Yes	Y	1	1.237	31	-0.866	32	0.5				
45	(1.2 + 0.2Sds)DL + 1.0E AZI 180	Yes	Y	1	1.237	31	-1	32					
46	(1.2 + 0.2Sds)DL + 1.0E AZI 210	Yes	Y	1	1.237	31	-0.866	32	-0.5				
47	(1.2 + 0.2Sds)DL + 1.0E AZI 240	Yes	Y	1	1.237	31	-0.5	32	-0.866				
48	(1.2 + 0.2Sds)DL + 1.0E AZI 270	Yes	Y	1	1.237	31		32	-1				
49	(1.2 + 0.2Sds)DL + 1.0E AZI 300	Yes	Y	1	1.237	31	0.5	32	-0.866				
50	(1.2 + 0.2Sds)DL + 1.0E AZI 330	Yes	Y	1	1.237	31	0.866	32	-0.5				
51	(0.9 - 0.2Sds)DL + 1.0E AZI 0	Yes	Y	1	0.863	31	1	32					
52	(0.9 - 0.2Sds)DL + 1.0E AZI 30	Yes	Y	1	0.863	31	0.866	32	0.5				
53	(0.9 - 0.2Sds)DL + 1.0E AZI 60	Yes	Y	1	0.863	31	0.5	32	0.866				
54	(0.9 - 0.2Sds)DL + 1.0E AZI 90	Yes	Y	1	0.863	31		32	1				
55	(0.9 - 0.2Sds)DL + 1.0E AZI 120	Yes	Y	1	0.863	31	-0.5	32	0.866				
56	(0.9 - 0.2Sds)DL + 1.0E AZI 150	Yes	Y	1	0.863	31	-0.866	32	0.5				
57	(0.9 - 0.2Sds)DL + 1.0E AZI 180	Yes	Y	1	0.863	31	-1	32					

Load Combinations (Continued)

	Description	Solve	PDelta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
58	(0.9 - 0.2Sds)DL + 1.0E AZI 210	Yes	Y	1	0.863	31	-0.866	32	-0.5				
59	(0.9 - 0.2Sds)DL + 1.0E AZI 240	Yes	Y	1	0.863	31	-0.5	32	-0.866				
60	(0.9 - 0.2Sds)DL + 1.0E AZI 270	Yes	Y	1	0.863	31		32	-1				
61	(0.9 - 0.2Sds)DL + 1.0E AZI 300	Yes	Y	1	0.863	31	0.5	32	-0.866				
62	(0.9 - 0.2Sds)DL + 1.0E AZI 330	Yes	Y	1	0.863	31	0.866	32	-0.5				
63	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 0	Yes	Y	1	1	2	0.213	14	0.213	15		33	1.5
64	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 30	Yes	Y	1	1	3	0.213	14	0.184	15	0.107	33	1.5
65	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 60	Yes	Y	1	1	4	0.213	14	0.107	15	0.184	33	1.5
66	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 90	Yes	Y	1	1	5	0.213	14		15	0.213	33	1.5
67	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 120	Yes	Y	1	1	6	0.213	14	-0.107	15	0.184	33	1.5
68	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 150	Yes	Y	1	1	7	0.213	14	-0.184	15	0.107	33	1.5
69	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 180	Yes	Y	1	1	8	0.213	14	-0.213	15		33	1.5
70	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 210	Yes	Y	1	1	9	0.213	14	-0.184	15	-0.107	33	1.5
71	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 240	Yes	Y	1	1	10	0.213	14	-0.107	15	-0.184	33	1.5
72	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 270	Yes	Y	1	1	11	0.213	14		15	-0.213	33	1.5
73	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 300	Yes	Y	1	1	12	0.213	14	0.107	15	-0.184	33	1.5
74	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 330	Yes	Y	1	1	13	0.213	14	0.184	15	-0.107	33	1.5
75	1.2DL + 1.5LL	Yes	Y	1	1.2	33	1.5						
76	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	34	1.5	2	0.053	14	0.053	15	
77	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	34	1.5	3	0.053	14	0.046	15	0.027
78	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	34	1.5	4	0.053	14	0.027	15	0.046
79	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	34	1.5	5	0.053	14		15	0.053
80	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	34	1.5	6	0.053	14	-0.027	15	0.046
81	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	34	1.5	7	0.053	14	-0.046	15	0.027
82	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	34	1.5	8	0.053	14	-0.053	15	
83	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	34	1.5	9	0.053	14	-0.046	15	-0.027
84	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	34	1.5	10	0.053	14	-0.027	15	-0.046
85	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	34	1.5	11	0.053	14		15	-0.053
86	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	34	1.5	12	0.053	14	0.027	15	-0.046
87	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	34	1.5	13	0.053	14	0.046	15	-0.027
88	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	35	1.5	2	0.053	14	0.053	15	
89	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	35	1.5	3	0.053	14	0.046	15	0.027
90	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	35	1.5	4	0.053	14	0.027	15	0.046
91	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	35	1.5	5	0.053	14		15	0.053
92	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	35	1.5	6	0.053	14	-0.027	15	0.046
93	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	35	1.5	7	0.053	14	-0.046	15	0.027
94	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	35	1.5	8	0.053	14	-0.053	15	
95	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	35	1.5	9	0.053	14	-0.046	15	-0.027
96	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	35	1.5	10	0.053	14	-0.027	15	-0.046
97	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	35	1.5	11	0.053	14		15	-0.053
98	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	35	1.5	12	0.053	14	0.027	15	-0.046
99	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	35	1.5	13	0.053	14	0.046	15	-0.027
100	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	36	1.5	2	0.053	14	0.053	15	
101	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	36	1.5	3	0.053	14	0.046	15	0.027
102	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	36	1.5	4	0.053	14	0.027	15	0.046
103	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	36	1.5	5	0.053	14		15	0.053
104	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	36	1.5	6	0.053	14	-0.027	15	0.046
105	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	36	1.5	7	0.053	14	-0.046	15	0.027
106	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	36	1.5	8	0.053	14	-0.053	15	

Load Combinations (Continued)

	Description	Solve	PDelta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
107	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	36	1.5	9	0.053	14	-0.046	15	-0.027
108	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	36	1.5	10	0.053	14	-0.027	15	-0.046
109	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	36	1.5	11	0.053	14		15	-0.053
110	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	36	1.5	12	0.053	14	0.027	15	-0.046
111	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	36	1.5	13	0.053	14	0.046	15	-0.027
112	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	37	1.5	2	0.053	14	0.053	15	
113	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	37	1.5	3	0.053	14	0.046	15	0.027
114	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	37	1.5	4	0.053	14	0.027	15	0.046
115	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	37	1.5	5	0.053	14		15	0.053
116	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	37	1.5	6	0.053	14	-0.027	15	0.046
117	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	37	1.5	7	0.053	14	-0.046	15	0.027
118	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	37	1.5	8	0.053	14	-0.053	15	
119	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	37	1.5	9	0.053	14	-0.046	15	-0.027
120	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	37	1.5	10	0.053	14	-0.027	15	-0.046
121	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	37	1.5	11	0.053	14		15	-0.053
122	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	37	1.5	12	0.053	14	0.027	15	-0.046
123	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	37	1.5	13	0.053	14	0.046	15	-0.027
124	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	38	1.5	2	0.053	14	0.053	15	
125	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	38	1.5	3	0.053	14	0.046	15	0.027
126	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	38	1.5	4	0.053	14	0.027	15	0.046
127	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	38	1.5	5	0.053	14		15	0.053
128	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	38	1.5	6	0.053	14	-0.027	15	0.046
129	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	38	1.5	7	0.053	14	-0.046	15	0.027
130	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	38	1.5	8	0.053	14	-0.053	15	
131	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	38	1.5	9	0.053	14	-0.046	15	-0.027
132	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	38	1.5	10	0.053	14	-0.027	15	-0.046
133	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	38	1.5	11	0.053	14		15	-0.053
134	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	38	1.5	12	0.053	14	0.027	15	-0.046
135	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	38	1.5	13	0.053	14	0.046	15	-0.027
136	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	39	1.5	2	0.053	14	0.053	15	
137	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	39	1.5	3	0.053	14	0.046	15	0.027
138	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	39	1.5	4	0.053	14	0.027	15	0.046
139	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	39	1.5	5	0.053	14		15	0.053
140	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	39	1.5	6	0.053	14	-0.027	15	0.046
141	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	39	1.5	7	0.053	14	-0.046	15	0.027
142	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	39	1.5	8	0.053	14	-0.053	15	
143	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	39	1.5	9	0.053	14	-0.046	15	-0.027
144	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	39	1.5	10	0.053	14	-0.027	15	-0.046
145	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	39	1.5	11	0.053	14		15	-0.053
146	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	39	1.5	12	0.053	14	0.027	15	-0.046
147	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	39	1.5	13	0.053	14	0.046	15	-0.027
148	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	40	1.5	2	0.053	14	0.053	15	
149	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	40	1.5	3	0.053	14	0.046	15	0.027
150	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	40	1.5	4	0.053	14	0.027	15	0.046
151	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	40	1.5	5	0.053	14		15	0.053
152	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	40	1.5	6	0.053	14	-0.027	15	0.046
153	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	40	1.5	7	0.053	14	-0.046	15	0.027
154	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	40	1.5	8	0.053	14	-0.053	15	
155	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	40	1.5	9	0.053	14	-0.046	15	-0.027

Load Combinations (Continued)

	Description	Solve	PDelta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
156	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	40	1.5	10	0.053	14	-0.027	15	-0.046
157	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	40	1.5	11	0.053	14		15	-0.053
158	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	40	1.5	12	0.053	14	0.027	15	-0.046
159	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	40	1.5	13	0.053	14	0.046	15	-0.027
160	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	41	1.5	2	0.053	14	0.053	15	
161	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	41	1.5	3	0.053	14	0.046	15	0.027
162	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	41	1.5	4	0.053	14	0.027	15	0.046
163	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	41	1.5	5	0.053	14		15	0.053
164	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	41	1.5	6	0.053	14	-0.027	15	0.046
165	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	41	1.5	7	0.053	14	-0.046	15	0.027
166	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	41	1.5	8	0.053	14	-0.053	15	
167	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	41	1.5	9	0.053	14	-0.046	15	-0.027
168	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	41	1.5	10	0.053	14	-0.027	15	-0.046
169	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	41	1.5	11	0.053	14		15	-0.053
170	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	41	1.5	12	0.053	14	0.027	15	-0.046
171	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	41	1.5	13	0.053	14	0.046	15	-0.027
172	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	42	1.5	2	0.053	14	0.053	15	
173	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	42	1.5	3	0.053	14	0.046	15	0.027
174	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	42	1.5	4	0.053	14	0.027	15	0.046
175	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	42	1.5	5	0.053	14		15	0.053
176	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	42	1.5	6	0.053	14	-0.027	15	0.046
177	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	42	1.5	7	0.053	14	-0.046	15	0.027
178	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	42	1.5	8	0.053	14	-0.053	15	
179	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	42	1.5	9	0.053	14	-0.046	15	-0.027
180	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	42	1.5	10	0.053	14	-0.027	15	-0.046
181	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	42	1.5	11	0.053	14		15	-0.053
182	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	42	1.5	12	0.053	14	0.027	15	-0.046
183	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	42	1.5	13	0.053	14	0.046	15	-0.027
184	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	43	1.5	2	0.053	14	0.053	15	
185	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	43	1.5	3	0.053	14	0.046	15	0.027
186	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	43	1.5	4	0.053	14	0.027	15	0.046
187	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	43	1.5	5	0.053	14		15	0.053
188	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	43	1.5	6	0.053	14	-0.027	15	0.046
189	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	43	1.5	7	0.053	14	-0.046	15	0.027
190	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	43	1.5	8	0.053	14	-0.053	15	
191	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	43	1.5	9	0.053	14	-0.046	15	-0.027
192	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	43	1.5	10	0.053	14	-0.027	15	-0.046
193	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	43	1.5	11	0.053	14		15	-0.053
194	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	43	1.5	12	0.053	14	0.027	15	-0.046
195	1.2DL + 1.5LM-MP10 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	43	1.5	13	0.053	14	0.046	15	-0.027
196	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	44	1.5	2	0.053	14	0.053	15	
197	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	44	1.5	3	0.053	14	0.046	15	0.027
198	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	44	1.5	4	0.053	14	0.027	15	0.046
199	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	44	1.5	5	0.053	14		15	0.053
200	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	44	1.5	6	0.053	14	-0.027	15	0.046
201	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	44	1.5	7	0.053	14	-0.046	15	0.027
202	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	44	1.5	8	0.053	14	-0.053	15	
203	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	44	1.5	9	0.053	14	-0.046	15	-0.027
204	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	44	1.5	10	0.053	14	-0.027	15	-0.046

Load Combinations (Continued)

	Description	Solve	PDelta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
205	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	44	1.5	11	0.053	14		15	-0.053
206	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	44	1.5	12	0.053	14	0.027	15	-0.046
207	1.2DL + 1.5LM-MP11 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	44	1.5	13	0.053	14	0.046	15	-0.027
208	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	45	1.5	2	0.053	14	0.053	15	
209	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	45	1.5	3	0.053	14	0.046	15	0.027
210	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	45	1.5	4	0.053	14	0.027	15	0.046
211	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	45	1.5	5	0.053	14		15	0.053
212	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	45	1.5	6	0.053	14	-0.027	15	0.046
213	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	45	1.5	7	0.053	14	-0.046	15	0.027
214	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	45	1.5	8	0.053	14	-0.053	15	
215	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	45	1.5	9	0.053	14	-0.046	15	-0.027
216	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	45	1.5	10	0.053	14	-0.027	15	-0.046
217	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	45	1.5	11	0.053	14		15	-0.053
218	1.2DL + 1.5LM-MP12 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	45	1.5	12	0.053	14	0.027	15	-0.046

Envelope Node Reactions

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N58	max	6447.719	17	11427.021	30	6690.638	2	12524.127	2	4249.551	23	11886.074	23
2		min	-6447.72	11	2355.066	60	-6690.634	20	-11885.185	20	-4259.146	17	-12051.485	5
3	Totals:	max	6447.719	17	11427.021	30	6690.638	2						
4		min	-6447.72	11	2355.066	60	-6690.634	20						

Envelope AISC 15TH (360-16): LRFD Member Steel Code Checks

	Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [lb-ft]	phi*Mn z-z [lb-ft]	Cb	Eqn
1	M36	L2.5x2.5x3	0.75	0	10	0.15	16.547	y	11	27229.407	29192.4	872.574	1971.83	1.5	H2-1
2	M28	L2.5x2.5x3	0.646	0	6	0.137	16.547	y	7	27229.407	29192.4	872.574	1971.83	1.5	H2-1
3	MP7	PIPE_2.0	0.627	73	7	0.125	31		3	14916.096	32130	1871.625	1871.625	1.826	H1-1b
4	M17	PIPE_2.0	0.598	104.687	9	0.351	135.937		2	6295.422	32130	1871.625	1871.625	1.972	H3-6
5	M42	PIPE_2.0	0.597	104.687	5	0.36	135.937		10	6295.422	32130	1871.625	1871.625	1.957	H3-6
6	M37	L2.5x2.5x3	0.596	16.547	10	0.134	0	y	9	27229.407	29192.4	872.574	1971.83	1.5	H2-1
7	M41	PIPE_2.0	0.586	104.687	13	0.352	135.937		6	6295.422	32130	1871.625	1871.625	2.04	H3-6
8	MP10	PIPE_2.0	0.585	60.375	10	0.138	60.375		13	17855.085	32130	1871.625	1871.625	2.218	H1-1b
9	MP3	PIPE_2.0	0.542	73	10	0.15	31		8	14916.096	32130	1871.625	1871.625	1.868	H1-1b
10	MP6	PIPE_2.0	0.528	60.375	2	0.136	60.375		4	17855.085	32130	1871.625	1871.625	2.293	H1-1b
11	MP2	PIPE_2.0	0.521	60.375	6	0.144	60.375		8	17855.085	32130	1871.625	1871.625	2.237	H1-1b
12	MP11	PIPE_2.0	0.511	73	2	0.14	31		12	14916.096	32130	1871.625	1871.625	2.163	H1-1b
13	MP9	PIPE_2.0	0.506	60.375	10	0.143	60.375		11	17855.085	32130	1871.625	1871.625	2.274	H1-1b
14	MP8	PIPE_2.0	0.495	60.375	6	0.17	60.375		5	17855.085	32130	1871.625	1871.625	2.231	H1-1b
15	M6	C5X9	0.483	42.154	10	0.142	17.358	y	10	38865.728	85536	1909.122	11853	1.663	H1-1b
16	M5	C5X9	0.475	17.358	6	0.149	17.358	y	5	38865.728	85536	1909.122	11853	1.664	H1-1b
17	M2	C5X9	0.461	68	6	0.344	69.333	y	4	84014.745	85536	1909.122	11853	1.167	H1-1b
18	MP4	PIPE_2.0	0.448	60.375	10	0.15	60.375		9	17855.085	32130	1871.625	1871.625	2.483	H1-1b
19	M3	C5X9	0.439	69.333	12	0.366	58.667	y	11	83458.08	85536	1909.122	11853	1.184	H1-1b
20	MP1	PIPE_2.0	0.438	60.375	6	0.13	60.375		7	17855.085	32130	1871.625	1871.625	2.41	H1-1b
21	M1	C5X9	0.432	69.333	8	0.366	58.667	y	7	83458.08	85536	1909.122	11853	1.192	H1-1b
22	M7	C5X9	0.43	0	2	0.078	5.985	y	3	74436.578	85536	1909.122	11853	1.771	H1-1b
23	MP5	PIPE_2.0	0.395	60.375	2	0.126	60.375		3	17855.085	32130	1871.625	1871.625	2.628	H1-1b
24	MP12	PIPE_2.0	0.391	60.375	2	0.147	60.375		13	17855.085	32130	1871.625	1871.625	2.612	H1-1b

Envelope AISC 15TH (360-16): LRFD Member Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [lb-ft]	phi*Mn z-z [lb-ft]	Cb	Eqn
25	M4	C5X9	0.296	17.358	2	0.068	17.358	y	3	38865.728	85536	1909.122	11853	2.009	H1-1b
26	M12	L2x2x4	0.217	35.75	2	0.043	39	z	2	30368.666	30585.6	690.934	1576.849	1.248	H2-1
27	M13	L2x2x4	0.205	35.75	2	0.044	39	y	2	30368.666	30585.6	690.934	1576.849	1.283	H2-1
28	M8	C5X9	0.168	0	7	0.06	27.472	z	10	69371.456	85536	1909.122	11853	1.258	H1-1b
29	M33	0.625 SR	0.057	12	2	0.004	12		3	7286.892	9940.196	103.544	103.544	2.125	H1-1b*
30	M18	L1.5x1.5x4	0.049	12.49	32	0.006	24.981	z	9	15152.943	22275	360.338	834.027	1.136	H2-1
31	M34	0.625 SR	0.025	0	2	0.004	12		3	7286.892	9940.196	103.544	103.544	2.077	H1-1b
32	M35	0.625 SR	0.017	12	27	0.004	12		3	7286.892	9940.196	103.544	103.544	2.76	H1-1b
33	M32	0.625 SR	0.015	12	28	0.003	12		3	7286.892	9940.196	103.544	103.544	2.49	H1-1b
34	M31	0.625 SR	0.013	12	28	0.002	12		3	7286.892	9940.196	103.544	103.544	2.543	H1-1b
35	M30	0.625 SR	0.012	12	28	0.002	12		29	7286.892	9940.196	103.544	103.544	2.576	H1-1b
36	M16	0.625 SR	0.011	12	28	0.002	12		29	7286.892	9940.196	103.544	103.544	2.558	H1-1b

APPENDIX D

ADDITIONAL CALCUATIONS

INFINIGY

FROM ZERO TO INFINIGY

the solutions are endless

Bolt Calculation Tool, V1.4

PROJECT DATA	
Site Name:	SMITH HILLS / STERLING GRP. (S
Site Number:	876372
Job Code:	1039-Z0001-B
Connection Description:	Platform to Pole

APPLIED LOADS		
Bolt Tension:	1724.73	lbs
Bolt Shear:	562.42	lbs

BOLT PROPERTIES		
Bolt Type:	Bolt	-
Bolt Diameter:	0.75	in
Bolt Grade:	A325	-
# of Bolts:	12	-
Threads Excluded?	No	-

BOLT CHECK		
Tensile Strength	30101.39	
Shear Strength	17892.35	
Tensile Usage	5.7%	
Shear Usage	3.1%	
Interaction Check	0.00	***≤1.05***
Result	Pass