Northeast Site Solutions
Victoria Masse
420 Main Street #2, Sturbridge, MA 01566
860-306-2326
victoria@northeastsitesolutions.com

January 15, 2021

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

RE: Notice of Exempt Modification
1669 Thomaston Avenue, Waterbury CT 06074
Latitude: 41.58981
Longitude: -73.054228
T-Mobile Site#: CT11214D_Anchor_L600

Dear Ms. Bachman:

T-Mobile is requesting to file an exempt modification for an existing smoke stack at 1669 Thomaston Avenue, Waterbury CT 06074. T-Mobile currently maintains three (3) antenna at the 130-foot level and six (6) antenna at the 132-foot level of the existing 134-foot smokestack. The smoke stack is owned by Brownstein Realty LLC. The property is owned by 1669 Thomaston Avenue LLC. T-Mobile now intends to add three (3) new 600/700/1900/2100 MHz 5G antenna and three (3) new 2500 MHz 5G antenna. The new antennas would be installed at the 130-foot and 132-Foot level of the tower. Please note, the mount analysis is located within the structural.

Planned Modifications:
Remove: (3) TMA

Remove and Replace:
(3) APX16DWVS-E-A20 (Remove) – AIR6449 B41 Antenna 2500 MHz (Replace) 5G
(3) LNX-6515DS (Remove) – APXVAALL24 Antenna 600/700/1900/2100 MHz (Replace) 5G

Install New:
(3) RRU 4449 B71+B85
(3) RRU 4415 B25
(1) Hybrid Line

Existing to Remain:
(3) AIR32 B66A_B2A Antenna 19002100 MHz
(3) Twin TMA
(18) 1-5/8” Coax

NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

(2) Hybrid Lines

This facility was approved by the City of Waterbury PZC. File No. 87500 – Approved by the City of Waterbury to install antenna to the existing smokestack. Please see attached documentation.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to Mayor Neil O'Leary, Elected Official and Robert Nerney, City Planner for the City of Waterbury, as well as the property owner and the tower owner.

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

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

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

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

Victoria Masse
Mobile: 860-306-2326
Fax: 413-521-0558
Office: 420 Main Street, Unit 2, Sturbridge MA 01566
Email: victoria@northeastsitesolutions.com

NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

Attachments
cc: Neil O'Leary- Mayor - as elected official
Robert Nerney – City Planner
LD Acquisition 8 LLC - as tower owner
1669 Thomaston Avenue LLC - as property owner

Exhibit A

BLDGAPP6

#02-128

6/25/02 .1225 PM

THE CITY OF WATERBURY

DEPARTMENT OF INSPECTIONS

235 Grand Street, Waterbury, CT 06702

(203) 574-6832

PERMIT No. 2208D

Application for Building Permit

PLEASE PRINT LEGIBLY (Shaded areas for Office use only!) Date: 6/25, 2002

Applicant:

Company Name: URS Corporation AES

Address: 795 Brook Street, Bldg 5

City: Rocky Hill State: CT Zip: 06067

License No.

Phone No. 860-529-8882

Location of Work:

Address: 1669 Thomaston Avenue

Waterbury, CT 06067

Location Owner:

Owner's Name: John Fey/Brownstein Realty

Address: 1669 Thomaston Ave.

City: Waterbury State: CT

I hereby certify that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as an authorized agent and we agree to conform to all applicable laws of this jurisdiction.

Architect:

Architect's Name: Ignacio C. Artaiz

Address: URS Corp, 795 Brook St., Bldg 5

City: Rocky Hill State: CT

Print Name: Peter H. Maxwell Signature:

(must check one) ☐ Proposed Use ☑ Existing Use Floodplain? ○ Yes ○ No If yes, attach form.

☐ Commercial ☐ Restaurant ☐ Residential ☐ Temp. Structure

☐ Industrial ☐ Hospital ☑ Other telecommunication Plan(s) on File? ○ Yes ○ No

What are you building? Sprint PCS—telecommunications facility: antennes on

(Please describe in detail) existing smokestack, equipment cabinet platform on roof

Est. Cost $ 82,000 Start Work Date: Zone: continued on back

REQUIRED?	Department		REQUIRED?	Department	
~~X~~ Yes ○ No	ZONING		○ Yes ○ No	HEALTH	
○ Yes ○ No	ENG'G		○ Yes ○ No	TRAFF	
○ Yes ○ No	CITY PL		~~X~~ Yes ○ No	DEL. TAX (allow 5 days)	
~~X~~ Yes ○ No	FIR MSH	7-11-02 DFM	○ Yes ○ No	WATER	
○ Yes ○ No	IN/ WET		○ Yes ○ No	WASTE	

FEE: $ 1240.00

CofO: $ 15.00

Ed. Fee: $ 13.12

TOTAL: $ 1268.12

Zoning Fee 15.00

$ 1283.12

ck # 9689 - 9733

Fine: $

Date Issued: 7-12-02

Issued by:

Title:

SEAL OF THE CITY OF WATERBURY CONN.

BLDGAPP6

#02-128

6/25/02 .1225 PM

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City: Waterbury State: CT

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Architect:

Architect's Name: Ignacio C. Artaiz

Address: URS Corp, 795 Brook St., Bldg 5

City: Rocky Hill State: CT

Print Name: Peter H. Maxwell Signature:

(must check one) ☐ Proposed Use ☑ Existing Use Floodplain? ○ Yes ○ No If yes, attach form.

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SEAL OF THE CITY OF WATERBURY CONN.

Exhibit B

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 2017.

Information on the Property Records for the Municipality of Waterbury was last updated on 1/9/2021.

Parcel Information

Location:	1669 THOMASTON AVE	Property Use:	Industrial	Primary Use:	Light Industrial
Unique ID:	007409730005	Map Block Lot:	0074-0973-0005	Acres:	4.00
490 Acres:	0.00	Zone:	IL	Volume / Page:	7379/ 24
Developers Map / Lot:		Census:			

Value Information

	Appraised Value	Assessed Value
Land	554,880	388,420
Buildings	387,571	271,300
Detached Outbuildings	0	0
Total	942,451	659,720

Owner's Information

Owner's Data

1669 THOMASTON AVENUE LLC
1669 THOMASTON AVE
WATERBURY, CT 06704

Building 1

Category:	Industrial	Use:	Light Industrial	GLA:	212,578
Stories:	4.00	Construction:	Average	Year Built:	1900
Heating:	Forced Air	Fuel:		Cooling Percent:	0%
Siding:	Brick, Solid	Roof Material:		Beds/Units:	0

Special Features

Passenger Elevator	1
Passenger Elevator	1
Sprinklers	212578

Attached Components

Owner History - Sales

Owner Name	Volume	Page	Sale Date	Deed Type	Valid Sale	Sale Price
1669 THOMASTON AVENUE LLC	7379	0024	08/07/2015	Additional Parcel	No	$300,000

Building Permits

Permit Number	Permit Type	Date Opened	Date Closed	Permit Status	Reason
2018.2628	Electrical	09/19/2018		Closed	INSTALL A 15KW DIESEL DC GENERATOR TO BACKUP T-MOBILE EXISTING CABINET -NEW 4'X8' CONCRETE PAD ADDED
2016.2448	Electrical	08/19/2016		Closed	INSTALL 3 NEW ANTENNAS & RRU'S
2015.1093	Electrical	05/11/2015		Closed	INSTALL METER FOR SPRINT
2015.0143	Electrical	01/15/2015		Closed	REPLACE 3 EXISTING ANTENNAS ADD 3 RRU"S ON EXISTING STEEL PLATFORM
2015.0202	Electrical	01/15/2015		Closed	INTALL GROUNDING ELECTRO CONDUCTORS FOR SERVICE MARK AND PLACARD S
2014.1915	Electrical	07/21/2014		Expired Permit	UPGRADE, REPLACE & WIRE EQUIPMENT / TELECOMMUNICATION SITE
2012.2302	Comm Renovations	08/31/2012		Closed	BATHROOM/DEMISING WALL

Information Published With Permission From The Assessor

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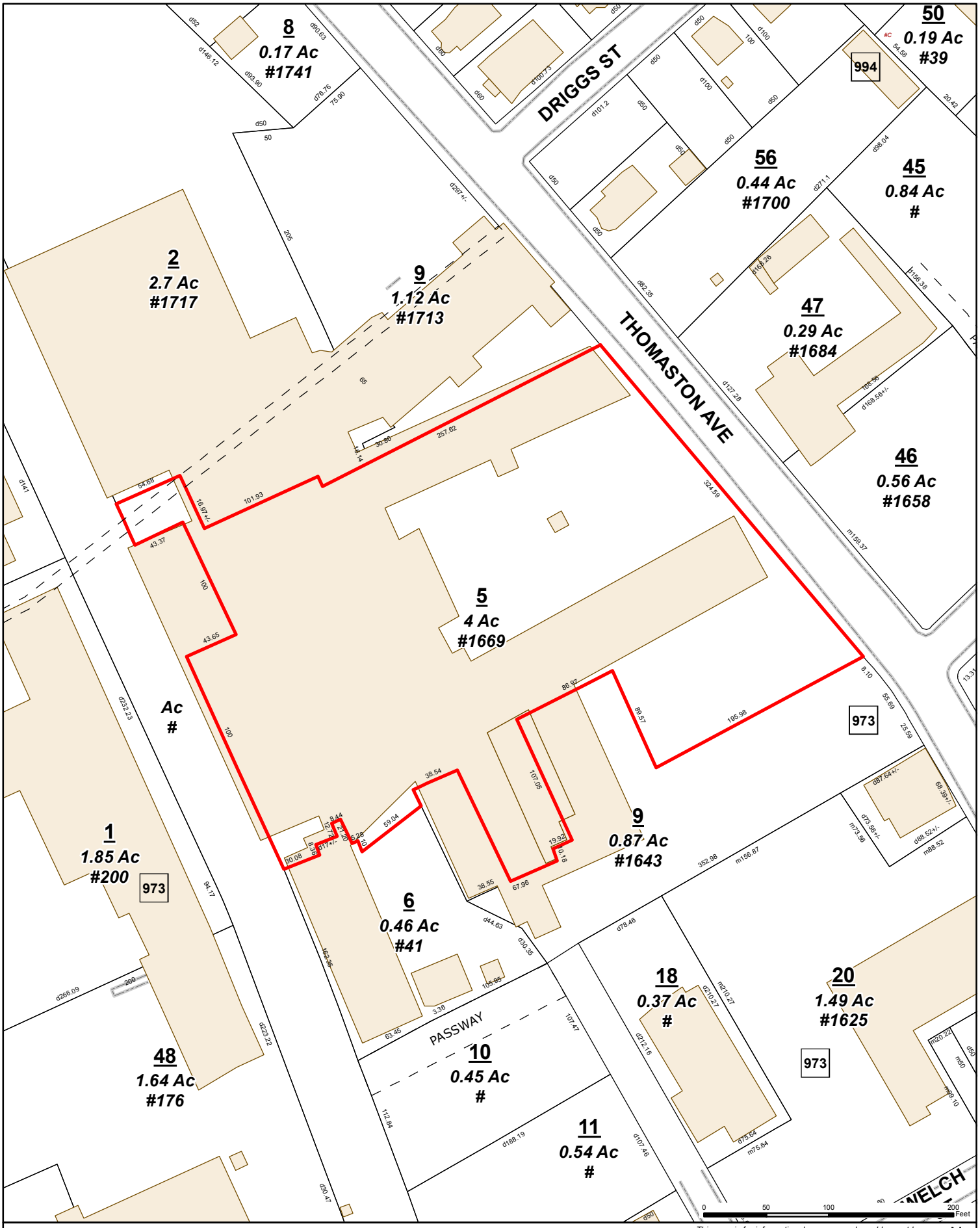


City of Waterbury
Public Works Department

MBL: **0074-0973-0005**

ADDRESS: 1669 THOMASTON AVE

Exhibit C

MODIFICATION OF EXISTING WIRELESS FACILITY BY

T-Mobile

T-MOBILE NORTHEAST LLC

PROJECT:ANCHOR

SITE NUMBER: CT11214D

SITE NAME: WATERBURY / RT 8_1

SITE ADDRESS: 1669 THOMASTON AVE

WATERBURY, CT 06704

(RF CONFIGURATION: 67D5997DB_2xAIR+1OP (U21 Market)

PROJECT NOTES:

1. THIS IS AN UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION:
   HANDICAPPED ACCESS IS NOT REQUIRED.
   POTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   NO OUTDOOR STORAGE OR ANY
   SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACES THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. DEVELOPMENT AND USE OF THE SITE WILL CONFORM TO ALL APPLICABLE CODES, ORDINANCES AND SPECIFICATIONS.

REFER TO STRUCTURAL ANALYSIS REPORT TITLED " STRUCTURAL ANALYSIS REPORT SMOKESTACK " SITE ID: CT11214D, DATED SEPTEMBER 22, 2020, PREPARED BY EFI GLOBAL, INC.

CODE COMPLIANCE:

ALL WORK SHALL COMPLY WITH THE CURRENT NATIONAL AND CONNECTICUT STATE BUILDING AND LIFE SAFETY CODES, SUPPLEMENTS AND AMENDMENTS INCLUDING BUT NOT LIMITED TO THE LATEST EDITION OF:

CONNECTICUT STATE BUILDING CODE (CSBC).

ANSI/TIA-222-G STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

NATIONAL ELECTRICAL CODE (NEC) FOR POWER AND GROUNDING REQUIREMENTS.

OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA).

NFPA - NATIONAL FIRE PROTECTION ASSOCIATION.

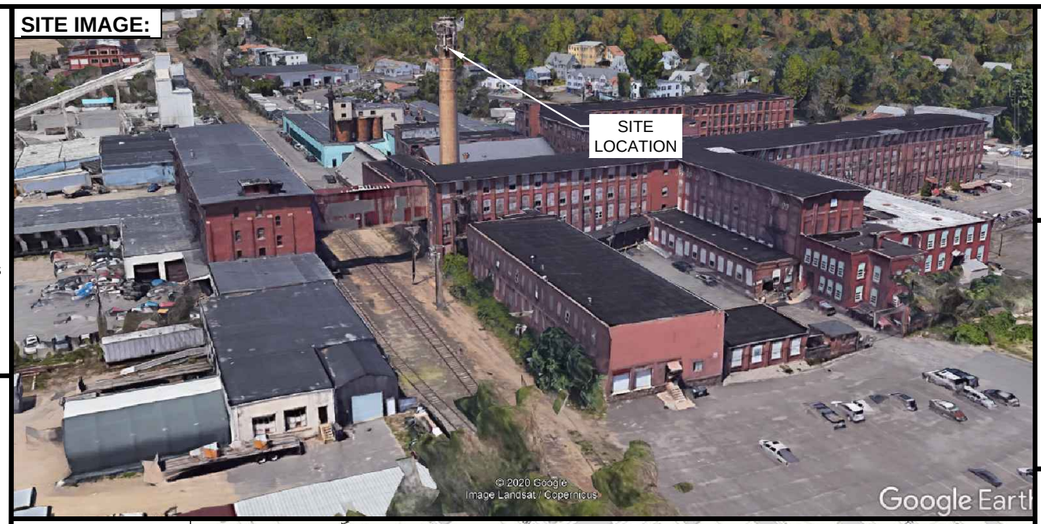
811 Connecticut - Call Before You Dig
811 or
1-800-922-4455

Advance Notice:
Minimum of 2 working days in advance, no more than 30 days in advance

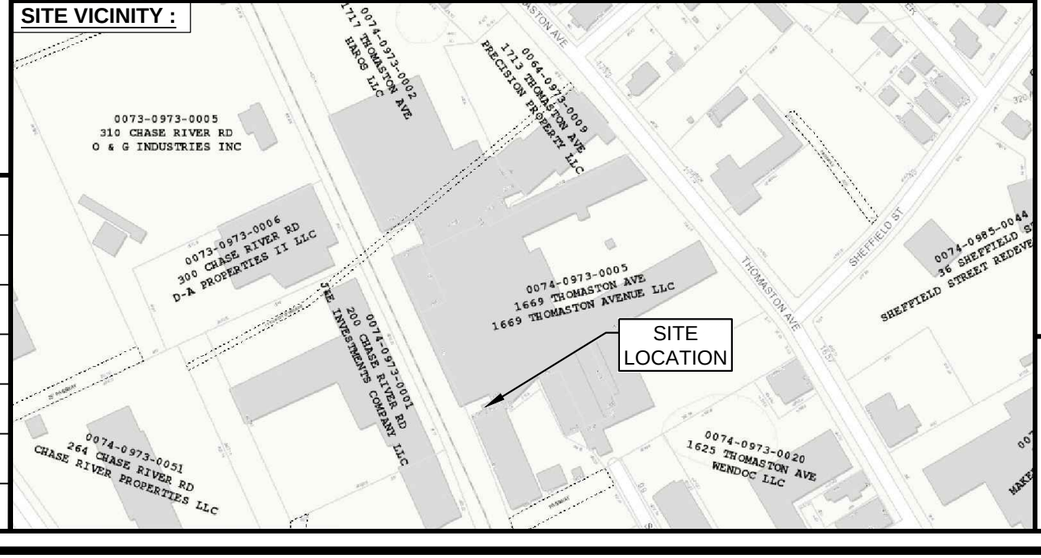
APPROVALS:

FSA CM	DATE
RF ENGINEER	DATE
FOPS	DATE
T-MOBILE ENGINEERING AND DEVELOPMENT	DATE
	DATE
	DATE

SITE IMAGE:



SITE VICINITY :



PROJECT SCOPE:

UPGRADE OF EXISTING WIRELESS FACILITY AS FOLLOWS:
UPGRADE EXISTING RBS 6102 CABINET INTERNALLY.
ADD (1) ENCLOSURE 6160.
ADD (1) BATTERY CABINET B160.
REPLACE (6) OF (9) EXISTING ANTENNAS.
REMOVE (3) OF (6) EXISTING TMA'S, ADD (6) RADIO REMOTE UNITS AND (3) DIPLEXERS AT ANTENNA.
UPGRADE AC SERVICE AND BREAKERS.
ADD (2) 6X12 HCS LINES FOR FINAL COUNT OF (18) 1-5/8" COAX CABLES AND (3) 6X12 HCS LINES.

PROJECT INFORMATION:

ADDRESS:	1669 THOMASTON AVE WATERBURY, CT 06704
STRUCTURE TYPE:	SMOKESTACK
PARCEL ID:	0074-0973-0005
ZONING DISTRICT:	IL
COORDINATES:	41°35'23.3"N 73°03'15.2"W
AVERAGE GROUND ELEV.:	286'± (AMSL)

PROJECT TEAM:

APPLICANT:	T-MOBILE NORTHEAST, LLC. 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 860-692-7100
PROPERTY OWNER:	1669 THOMASTON AVENUE LLC 1669 THOMASTON AVE WATERBURY, CT 06704
PROJECT MANAGER:	NORTHEAST SITE SOLUTIONS 420 MAIN STREET, BLDG 4 STURBRIDGE, MA 01566 SHELDON FREINCLE SHELDON@NORTHEASTSITESOLUTIONS.COM 201-776-8521
CONSULTANTS:	FORESITE LLC 462 WALNUT ST NEWTON, MA 02460 SAEED MOSSAVAT SMOSSAVAT@FORESITELLC.COM 617-212-3123

SHEET INDEX:

APPLICANT:

T-Mobile

T-MOBILE NORTHEAST LLC

35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

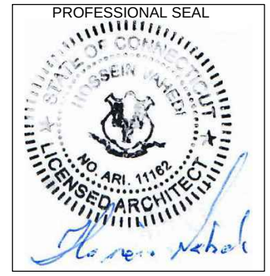
PROJECT MANAGER

NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development
420 MAIN STREET, BLDG 4
STURBRIDGE, MA 01566
203-275-6669

CONSULTANT:

FORESITE LLC
Architects . Engineers . Surveyors
462 WALNUT STREET
NEWTON, MA 02460
617-212-3123

PROFESSIONAL SEAL



REV	DESCRIPTION	DATE
A	PRELIMINARY	10/18/20
0	FINAL ISSUED	11/12/20
1	REVISED PER NEW RFDS	01/04/21

SITE NUMBER: CT11214D
SITE NAME: WATERBURY / RT 8_1
SITE ADDRESS: 1669 THOMASTON AVE
WATERBURY, CT 06704

SHEET TITLE:

T-1: TITLE SHEET

GENERAL NOTES:

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.

2. THE ARCHITECT/ENGINEER HAS MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.

3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE CLIENT'S REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK.

5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS.

6. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S / VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.

7. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS DURING CONSTRUCTION.

8. THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT SECTIONS OF THE BASIC STATE BUILDING CODE, LATEST EDITION, AND ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJEC

9. THE CONTRACTOR SHALL NOTIFY THE CLIENT'S REPRESENTATIVE IN WRITING WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE CLIENT'S REPRESENTATIVE.

10. THE WORK SHALL CONFORM TO THE CODES AND STANDARDS OF THE FOLLOWING AGENCIES AS FURTHER CITED HEREIN:

A. ASTM: AMERICAN SOCIETY FOR TESTING AND MATERIALS, AS PUBLISHED IN "COMPILATION OF ASTM STANDARDS BUILDING CODES" OR LATEST EDITION.

B. AWS: AMERICAN WELDING SOCIETY INC. AS PUBLISHED IN "STANDARD D1.1-08, STRUCTURAL WELDING CODE" OR LATEST EDITION.

C. AISC: AMERICAN INSTITUTE FOR STEEL CONSTRUCTION AS PUBLISHED IN "CODE FOR STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"; "SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" (LATEST EDITION).

11. BOLTING:

A. BOLTS SHALL BE CONFORMING TO ASTM A325 HIGH STRENGTH, HOT DIP GALVANIZED WITH ASTM A153 HEAVY HEX TYPE NUTS.

B. BOLTS SHALL BE 3/4"ø MINIMUM (UNLESS OTHERWISE NOTED)

C. ALL CONNECTIONS SHALL BE 2 BOLTS MINIMUM.

12. FABRICATION:

A. FABRICATION OF STEEL SHALL CONFORM TO THE AISC AND AWS STANDARDS AND CODES (LATEST EDITION).

B. ALL STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 (LATEST EDITION), UNLESS OTHERWISE NOTED.

13. ERECTION OF STEEL:

A. PROVIDE ALL ERECTION EQUIPMENT, BRACING, PLANKING, FIELD BOLTS, NUTS, WASHERS, DRIFT PINS, AND SIMILAR MATERIALS WHICH DO NOT FORM A PART OF THE COMPLETED CONSTRUCTION BUT ARE NECESSARY FOR ITS PROPER ERECTION.

B. ERECT AND ANCHOR ALL STRUCTURAL STEEL IN ACCORDANCE WITH AISC REFERENCE STANDARDS. ALL WORK SHALL BE ACCURATELY SET TO ESTABLISHED LINES AND ELEVATIONS AND RIGIDLY FASTENED IN PLACE WITH SUITABLE ATTACHMENTS TO THE CONSTRUCTION OF THE BUILDING.

C. TEMPORARY BRACING, GUYING AND SUPPORT SHALL BE PROVIDED TO KEEP THE STRUCTURE SAFE AND ALIGNED AT ALL TIMES DURING CONSTRUCTION, AND TO PREVENT DANGER TO PERSONS AND PROPERTY. CHECK ALL TEMPORARY LOADS AND STAY WITHIN SAFE CAPACITY OF ALL BUILDING COMPONENTS.

14. ANTENNA INSTALLATION:

A. INSTALL ANTENNAS AS INDICATED ON DRAWINGS AND CLIENT'S REPRESENTATIVE SPECIFICATIONS.

B. INSTALL GALVANIZED STEEL ANTENNA MOUNTS AS INDICATED ON DRAWINGS.

C. INSTALL COAXIAL / FIBER CABLES AND TERMINATIONS BETWEEN ANTENNAS AND EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. WEATHERPROOF ALL CONNECTORS BETWEEN THE ANTENNA AND EQUIPMENT PER MANUFACTURER'S REQUIREMENTS.

15. ANTENNA AND COAXIAL / FIBER CABLE GROUNDING:

A. ALL EXTERIOR #6 GREEN GROUND WIRE "DAISY CHAIN" CONNECTIONS ARE TO BE WEATHER SEALED WITH ANDREWS CONNECTOR/SPLICE WEATHERPROOFING KIT TYPE #221213 OR EQUAL.

B. ALL COAXIAL / FIBER CABLE GROUNDING KITS ARE TO BE INSTALLED ON STRAIGHT RUNS OF COAXIAL / FIBER CABLE (NOT WITHIN BENDS).

16. RELATED WORK, FURNISH THE FOLLOWING WORK AS SPECIFIED UNDER CONSTRUCTION DOCUMENTS, BUT COORDINATE WITH OTHER TRADES PRIOR TO BID:

A. FLASHING OF OPENING INTO OUTSIDE WALLS

B. SEALING AND CAULKING ALL OPENINGS

C. PAINTING

D. CUTTING AND PATCHING

17. REQUIREMENTS OF REGULATORY AGENCIES:

A. FURNISH U.L. LISTED EQUIPMENT WHERE SUCH LABEL IS AVAILABLE. INSTALL IN CONFORMANCE WITH U.L. STANDARDS WHERE APPLICABLE.

B. INSTALL ANTENNA, ANTENNA CABLES, GROUNDING SYSTEM IN ACCORDANCE WITH DRAWINGS AND SPECIFICATION IN EFFECT AT PROJECT LOCATION AND RECOMMENDATIONS OF STATE AND LOCAL BUILDING CODES, AND SPECIAL CODES HAVING JURISDICTION OVER SPECIFIC PORTIONS OF WORK. THIS WORK INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:

C. TIA-EIA - 222 (LATEST EDITION). STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES.

D. FAA - FEDERAL AVIATION ADMINISTRATION ADVISORY CIRCULAR AC 70/7460-lH, OBSTRUCTION MARKING AND LIGHTING.

E. FCC - FEDERAL COMMUNICATIONS COMMISSION RULES AND REGULATIONS FORM 715, OBSTRUCTION MARKING AND LIGHTING SPECIFICATION FOR ANTENNA STRUCTURES AND FORM 715A, HIGH INTENSITY OBSTRUCTION LIGHTING SPECIFICATIONS FOR ANTENNA STRUCTURES.

F. AISC - AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 BOLTS (LATEST EDITION).

G. NEC - NATIONAL ELECTRICAL CODE - ON TOWER LIGHTING KITS.

H. UL - UNDERWRITER'S LABORATORIES APPROVED ELECTRICAL PRODUCTS.

I. IN ALL CASES, PART 77 OF THE FAA RULES AND PARTS 17 AND 22 OF THE FCC RULES ARE APPLICABLE AND IN THE EVENT OF CONFLICT, SUPERSEDE ANY OTHER STANDARDS OR SPECIFICATIONS.

J. 2018 LIFE SAFETY CODE NFPA - 101.

APPLICANT:

T-MOBILE NORTHEAST LLC

35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

PROJECT MANAGER

NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

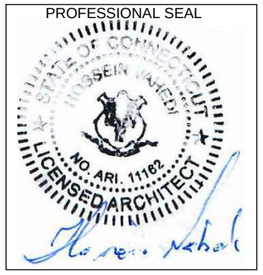
420 MAIN STREET, BLDG 4
STURBRIDGE, MA 01566
203-275-6669

CONSULTANT:

FORESITE LLC
Architects . Engineers . Surveyors

462 WALNUT STREET
NEWTON, MA 02460
617-212-3123

PROFESSIONAL SEAL

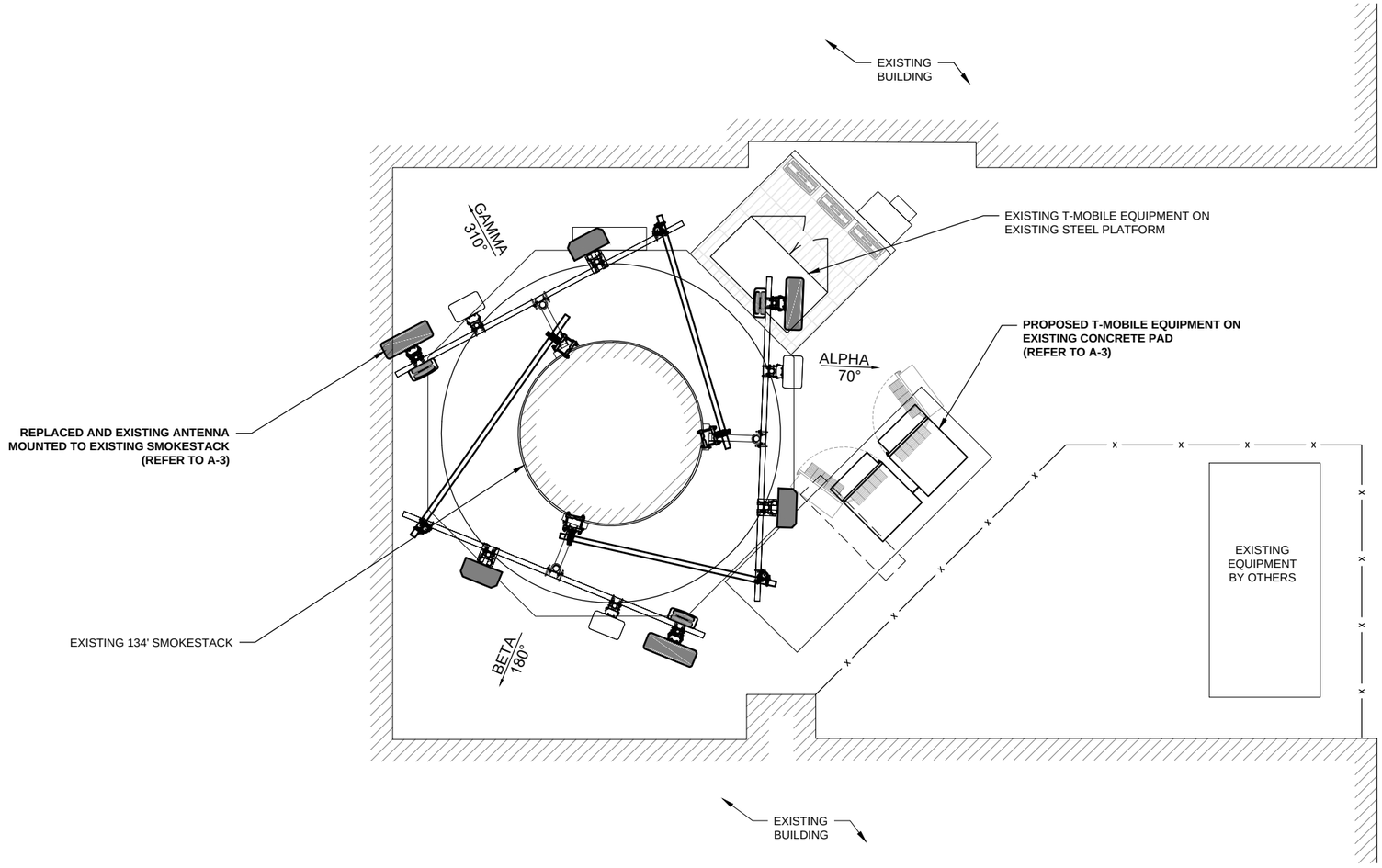


REV	DESCRIPTION	DATE
A	PRELIMINARY	10/18/20
0	FINAL ISSUED	11/12/20
1	REVISED PER NEW RFDS	01/04/21

SITE NUMBER: CT11214D
SITE NAME: WATERBURY / RT 8_1
SITE ADDRESS: 1669 THOMASTON AVE
WATERBURY, CT 06704

SHEET TITLE:

N-1: GENERAL NOTES



SITE PLAN
SCALE: 3/32" = 1'-0" (1 / A-1)

TRUE NORTH

APPLICANT:
T-Mobile
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PROFESSIONAL SEAL
STATE OF CONNECTICUT · JOSEPH M. NAHAL · NO. ARI. 11162 · LICENSED ARCHITECT

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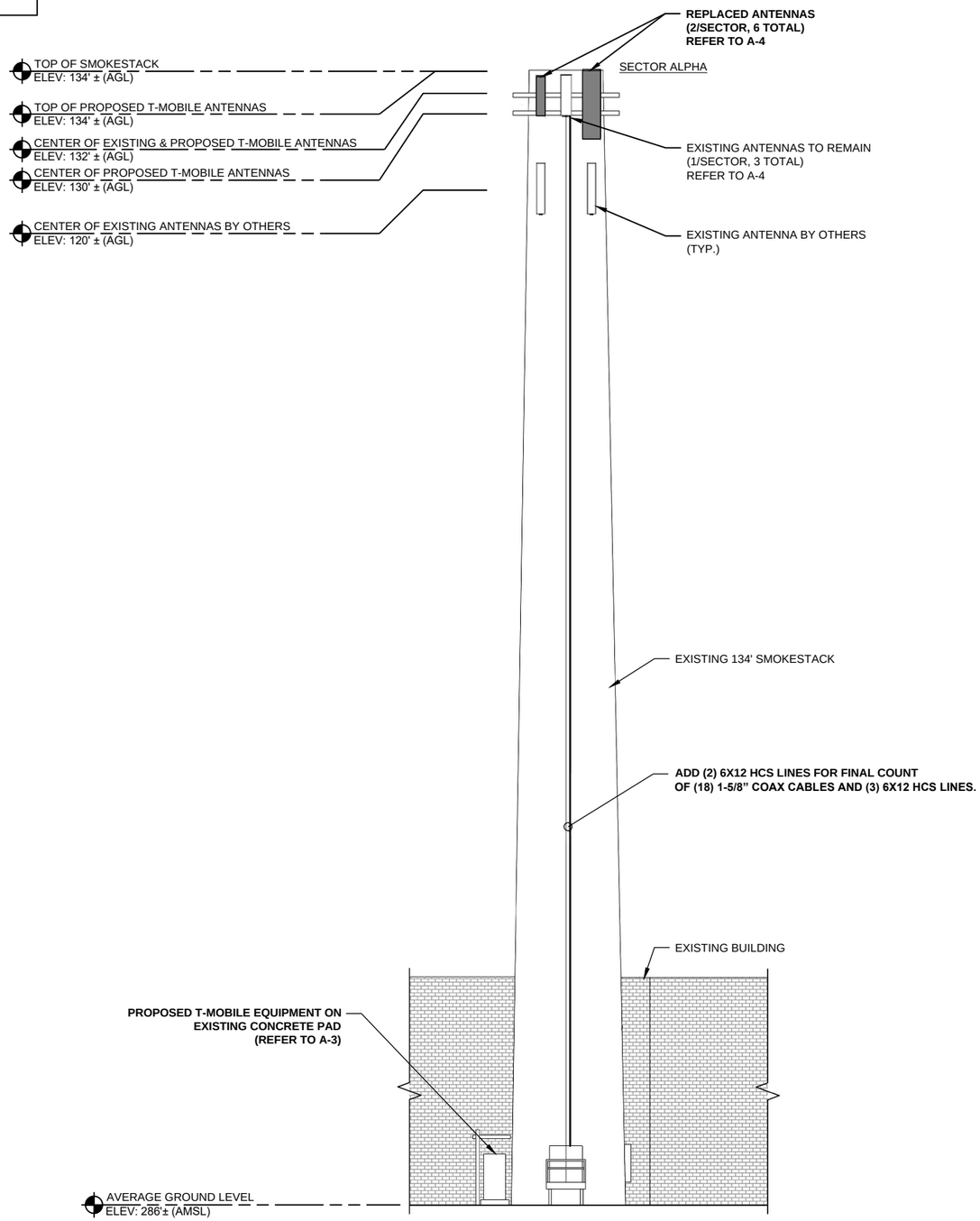
WATERBURY, CT 06704

SHEET TITLE:
A-1: SITE PLAN

ELEVATION NOTES:

ABOVE MEAN SEE LEVEL ELEVATIONS (AMSL) SHOWN ARE APPROXIMATIONS ONLY AND OBTAINED FROM GOOGLE EARTH APPLICATION AND NOT THE RESULT OF A SURVEY.



ELEVATION
N.T.S.

1
A-2

APPLICANT:

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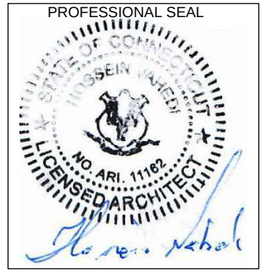

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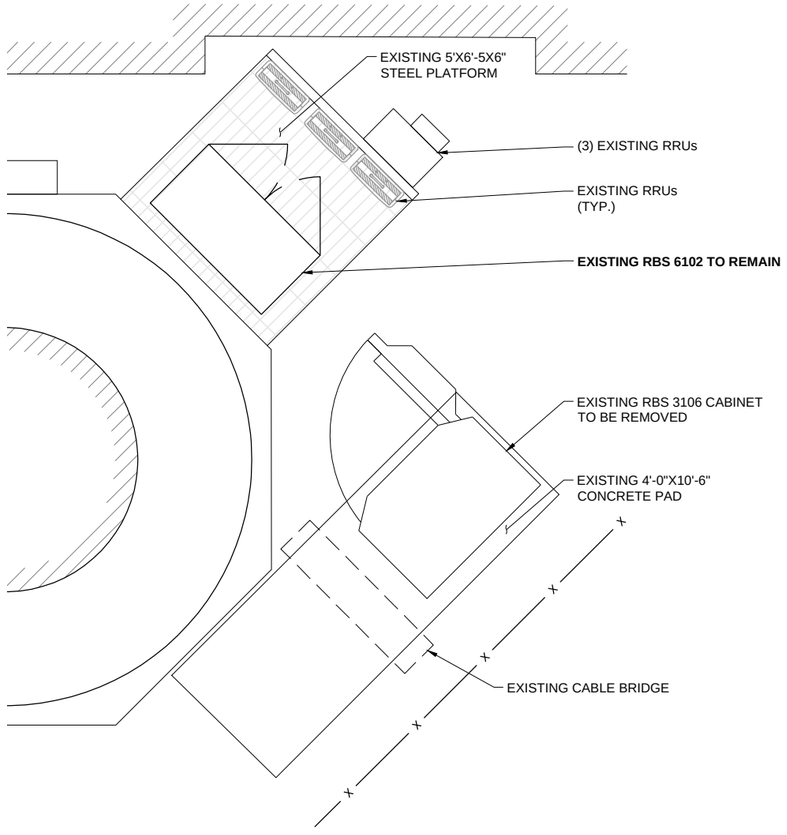
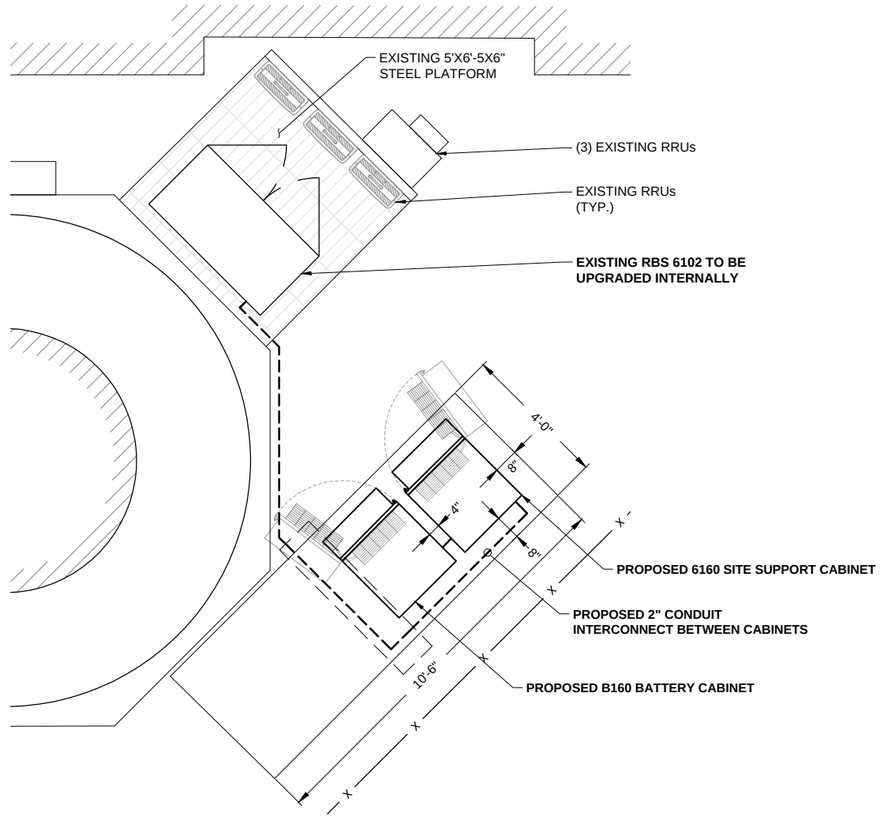
SHEET TITLE:
A-2: ELEVATION



EXISTING EQUIPMENT LAYOUT
SCALE: 1/4" = 1'-0"

1 / A-3



PROPOSED EQUIPMENT LAYOUT
SCALE: 1/4" = 1'-0"

2 / A-3

APPLICANT:

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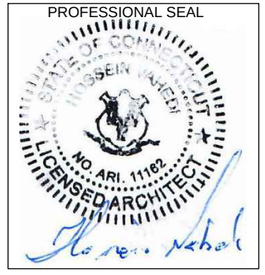

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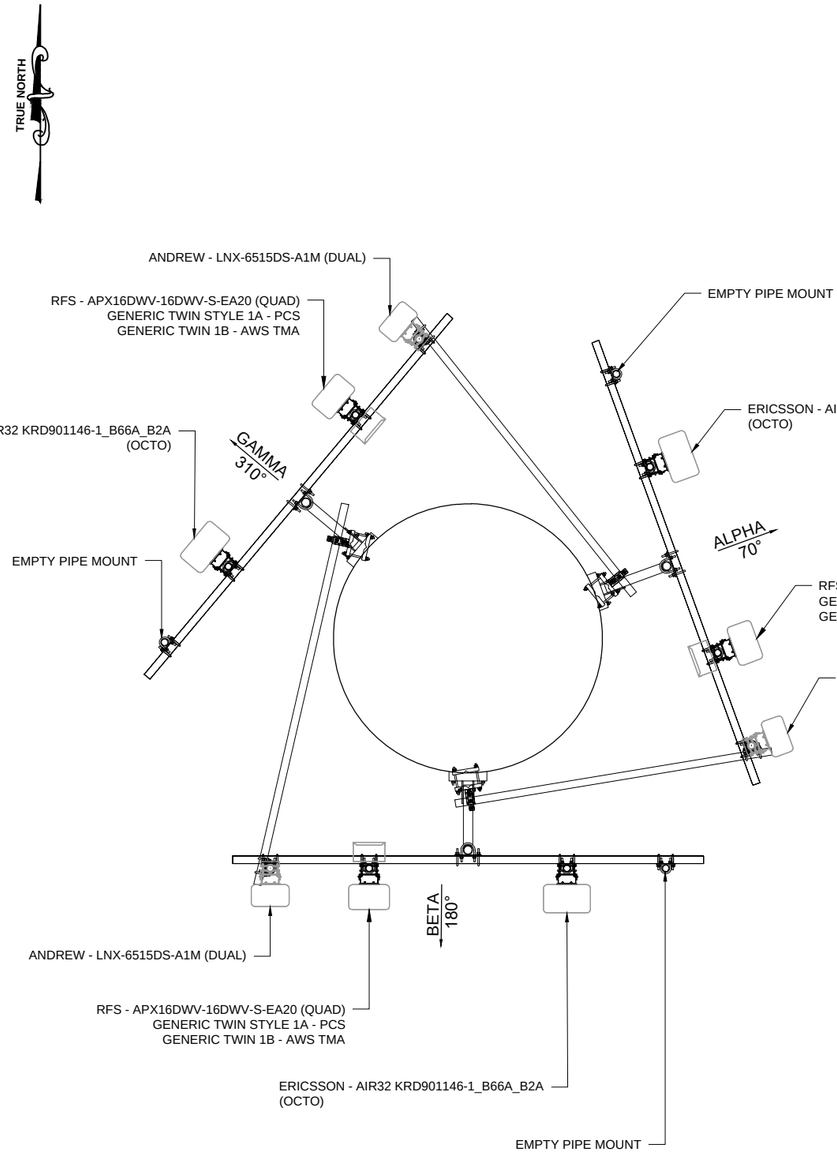
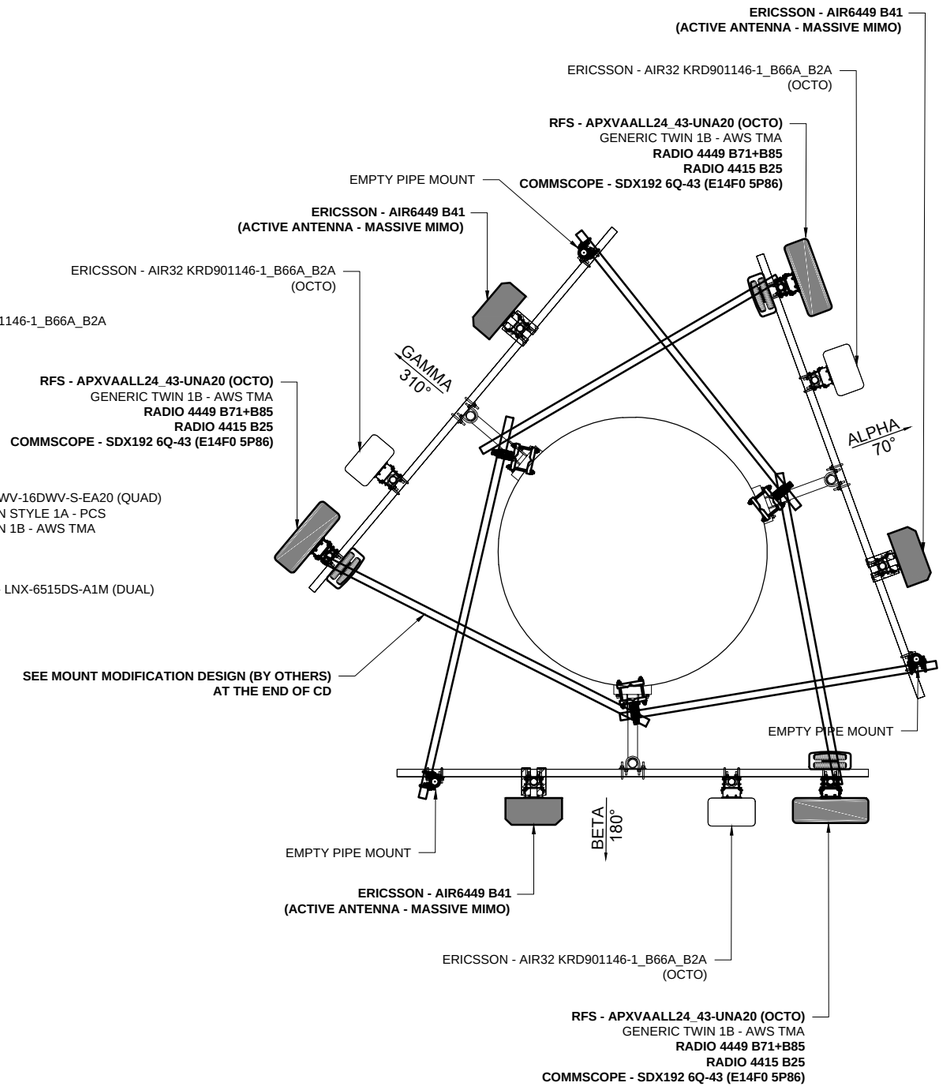
SHEET TITLE:
A-3: EQUIPMENT LAYOUT



EXISTING ANTENNA PLAN
N.T.S.

1
A-4



PROPOSED ANTENNA PLAN
N.T.S.

2
A-4

APPLICANT:
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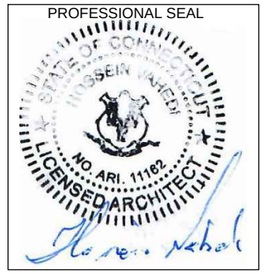

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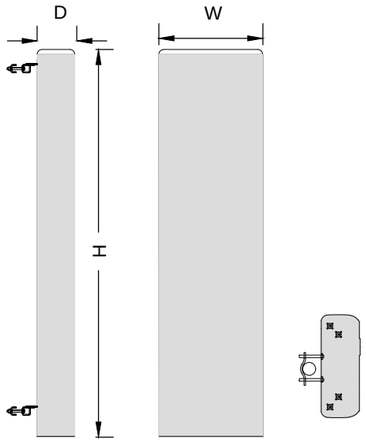
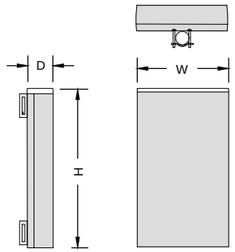
SHEET TITLE:
A-4: ANTENNA PLANS



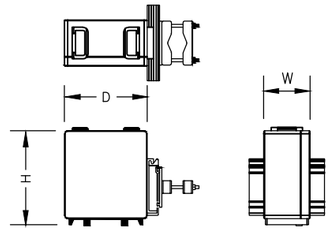
L600 ANTENNA DIMENSIONS	
MODEL #	APXVAALL24_43-UNA20
MANUF.	RFS
HEIGHT	95.9"
WIDTH	24.0"
DEPTH	8.5"
WEIGHT	128 LB

ERICSSON ANTENNA 1 A-5
N.T.S



ERICSON ANTENNA SPECIFICATIONS	
MODEL #	AIR6449 B41
MANUF.	ERICSSON
HEIGHT	33.1"
WIDTH	20.5"
DEPTH	8.3"
WEIGHT	103 LB

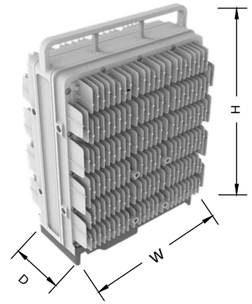
ERICSSON ANTENNA 2 A-5
N.T.S



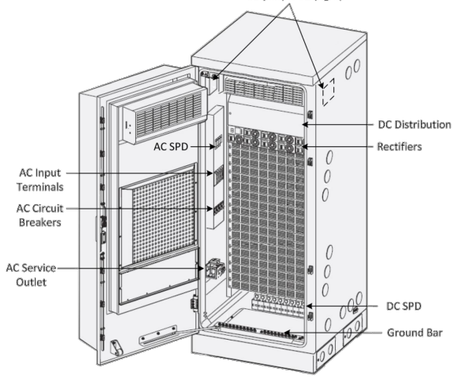
REMOTE RADIO UNIT SPECIFICATIONS	
MODEL #	RADIO 4415 B25
MANUF.	ERICSSON
HEIGHT	14.9"
WIDTH	13.2"
DEPTH	5.4"
WEIGHT	46.3 LB

REMOTE RADIO UNIT 3 A-5
N.T.S

REMOTE RADIO UNIT SPECIFICATIONS	
MODEL #	RADIO 4449 B71+B85
MANUF.	ERICSSON
HEIGHT	14.9"
WIDTH	13.2"
DEPTH	10.4"
WEIGHT	74 LB



REMOTE RADIO UNIT 4 A-5
N.T.S



SITE SUPPORT CABINET SPECIFICATIONS	
MODEL #	6160
MANUF.	ERICSSON
HEIGHT	63"
WIDTH	25.6"
DEPTH	33.5"
WEIGHT	605 lbs

SITE SUPPORT CABINET 5 A-5
N.T.S.

BATTERY CABINET SPECIFICATIONS	
MODEL #	B160
MANUF.	ERICSSON
HEIGHT	63"
WIDTH	26"
DEPTH	26"
WEIGHT	1883 lbs

BATTERY CABINET 6 A-5
N.T.S.

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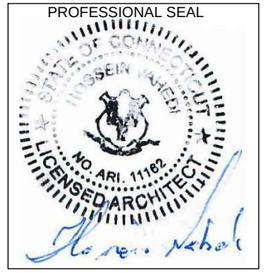
PROFESSIONAL SEAL



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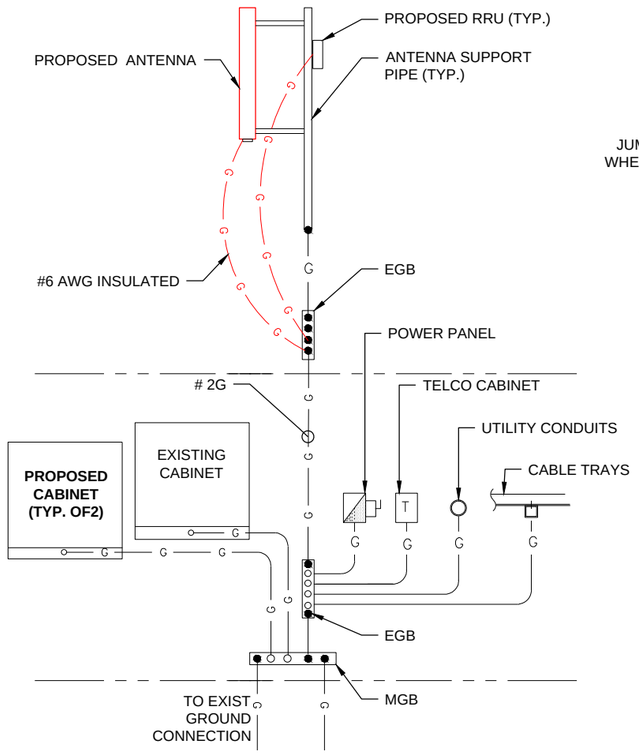
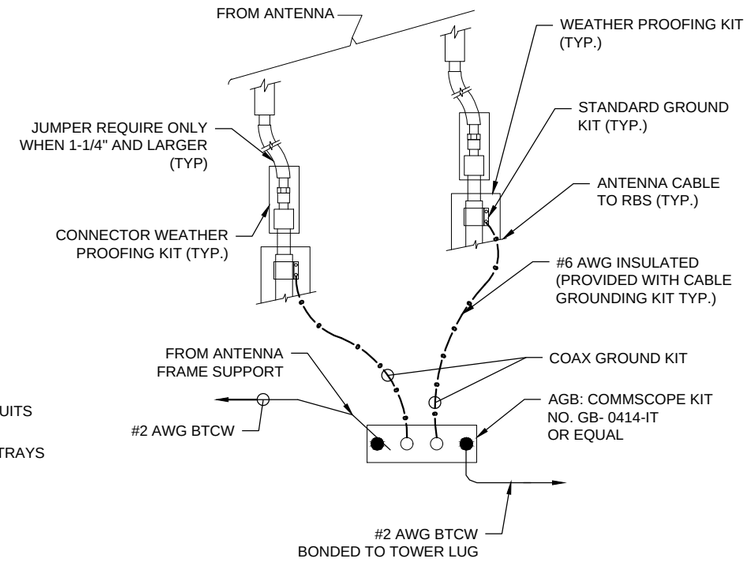
SHEET TITLE:
A-5: EQUIPMENT AND ANTENNA SPECIFICATIONS

ELECTRICAL & GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PRODUCED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) ND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLING BETWEEN ELECTRICAL ROOM AND PROPOSED CELL SITE ARE PEDESTAL AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROPOSED CELL SITE TELECOM CABINET AND RBS CABINET AS INDICATED ON DRAWING A -1. PROVIDE FULL LENGTH PULL ROPE INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NAME 3R ENCLOSURE.
11. GROUNDING SHALL COMPLY WITH NEC ART. 250.
12. GROUNDING COAX CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURES COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
13. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSTALLATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE GROUND.
14. ALL GROUND CONNECTION TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
15. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AS RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY BOND ANY METER OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
16. CONNECTIONS TO MGB SHALL BE ARRANGED IN THREE MAIN GROUPS: SURGE PROCEDURES (COAXIAL CABLE GROUND KITS, TELCO AND POWER PANEL GROUND); (GROUNDING ELECTRODE RING OR BUILDING STEEL); NON-SURGING OBJECTS (EGB GROUND IN RBS UNIT).
17. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
18. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTION.
19. BOND ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND ALNA TO EGB PLACED NEAR THE ANTENNA LOCATION.
20 BOND ANTENNA EGB'S AND MGB TO WATER MAIN.
21. TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION.
22. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
23. VERIFY PROPOSED SERVICE UPGRADE WITH LOCAL UTILITY COMPANY PRIOR TO CONSTRUCTION.



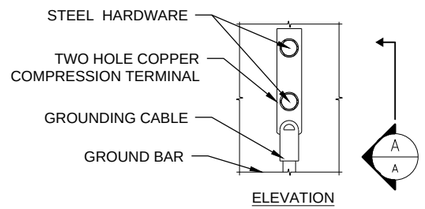
GROUNDING RISER DIAGRAM 1/E-1
SCALE: N.T.S



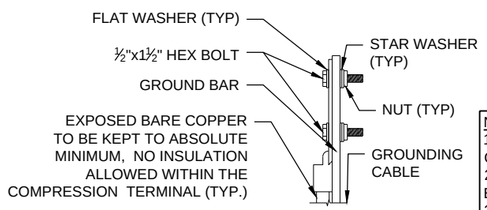
NOTES:
INSTALL CABLE GROUND KIT ABOVE HORIZONTAL BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO AGB/EGB

TOWER TOP CABLE GROUNDING DETAIL 2/E-1
SCALE: N.T.S

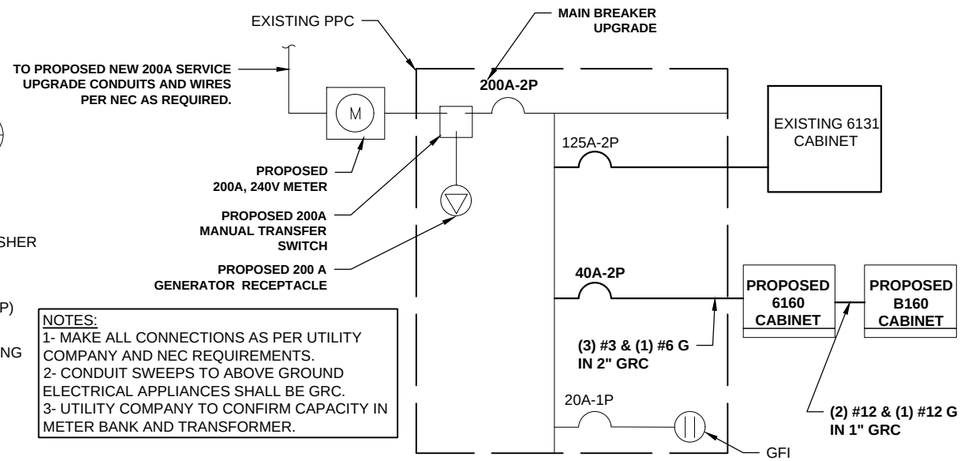
SPECIAL CONTRACTOR NOTES:
CONTRACTOR TO VERIFY THE POWER FEED & PHASE OF METER BANK AND THAT THE EXISTING AND PROPOSED CONDUITS AND WIRE SIZES ARE ADEQUATE FOR THE PROPOSED LOADING IN ACCORDANCE WITH NEC AND INCLUDE ELECTRICAL UPGRADES IN THE SCOPE OF WORK AS REQUIRED.



ELEVATION



SECTION A-A



NOTES:
1- MAKE ALL CONNECTIONS AS PER UTILITY COMPANY AND NEC REQUIREMENTS.
2- CONDUIT SWEEPS TO ABOVE GROUND ELECTRICAL APPLIANCES SHALL BE GRC.
3- UTILITY COMPANY TO CONFIRM CAPACITY IN METER BANK AND TRANSFORMER.

NOTES:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

TYPICAL GROUND BAR CONNECTIONS DETAIL 3/E-1
SCALE: N.T.S

TYPICAL ONE LINE DIAGRAM 4/E-1
SCALE: N.T.S

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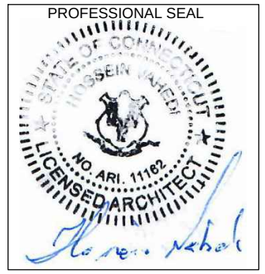

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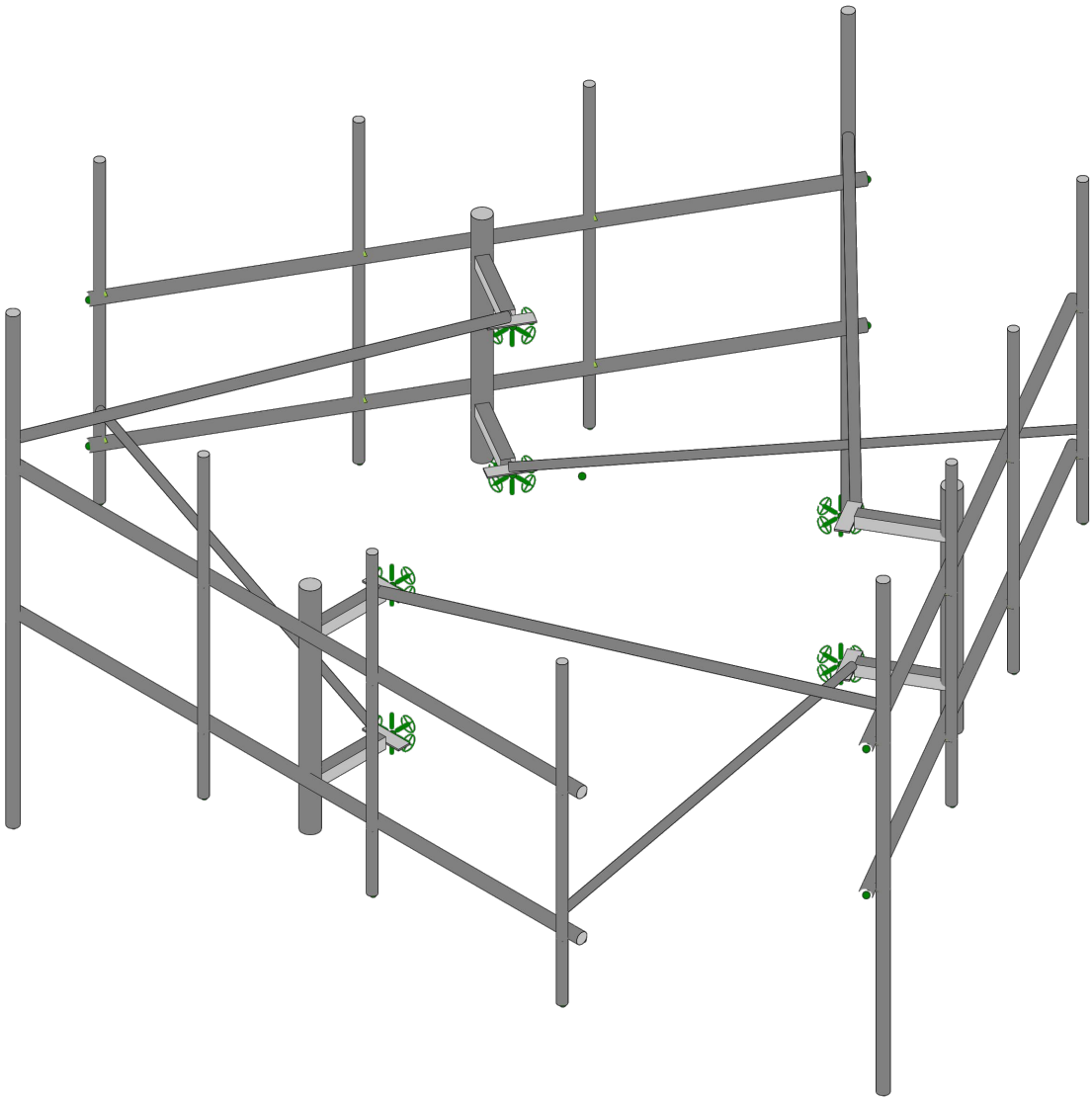
SHEET TITLE:
E-1: GROUNDING AND ELECTRICAL DETAILS



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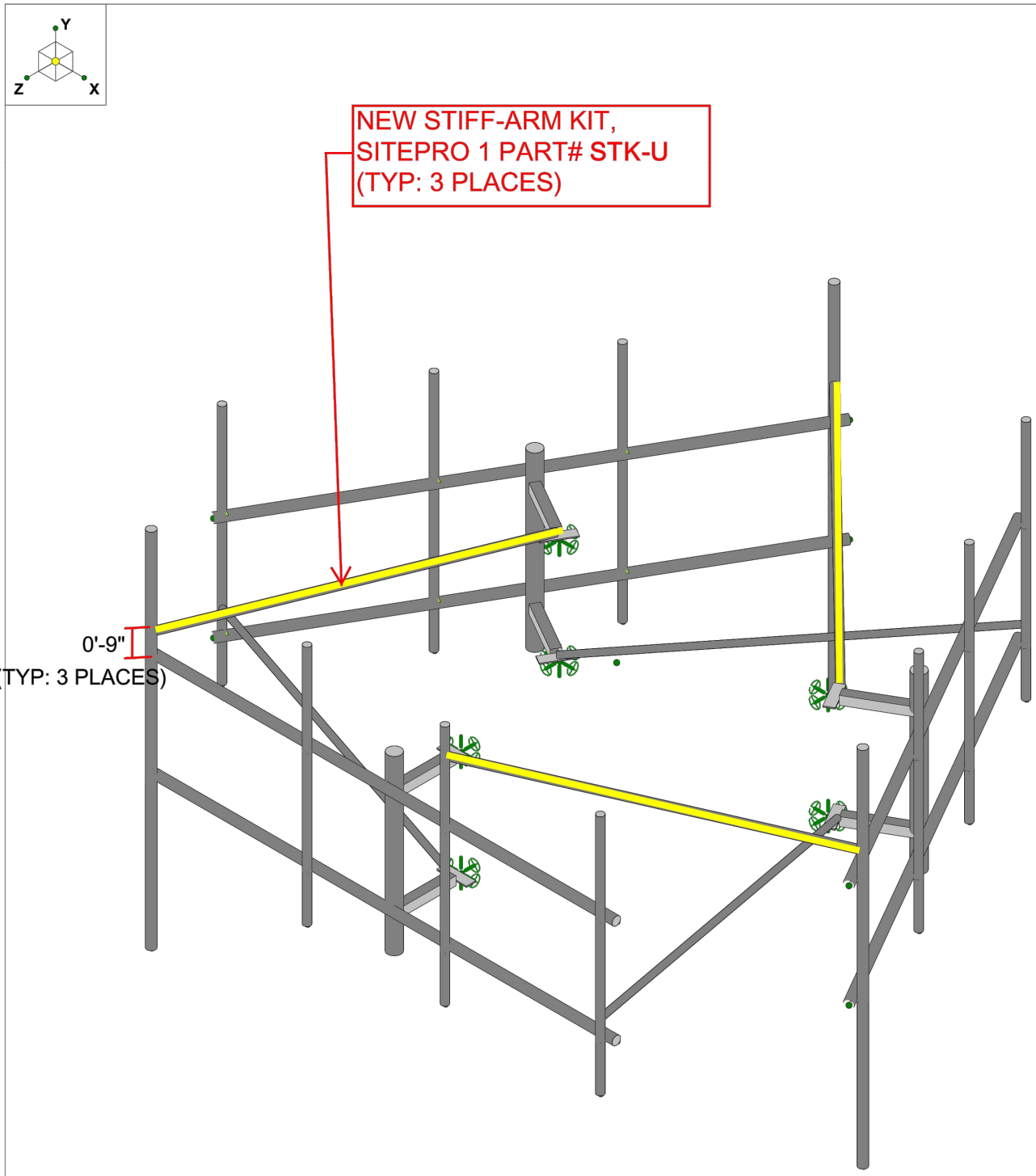

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B+T Group	CT11214D - Waterbury/Rt 8_1	SK - 3
PG		July 8, 2019 at 2:53 PM
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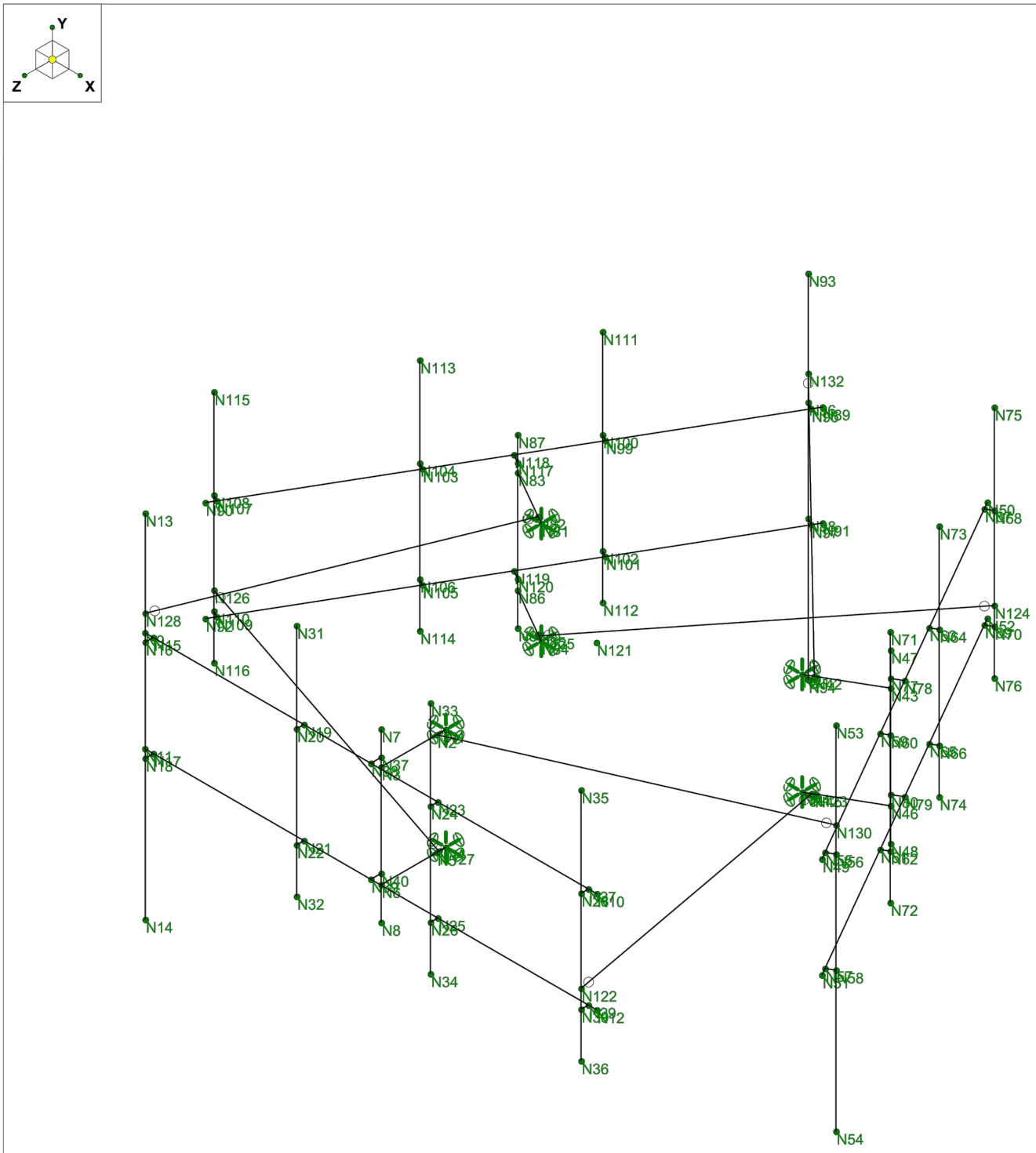

Envelope Only Solution

B+T Group	CT11214D - Waterbury/Rt 8_1	SK - 4
PG		July 8, 2019 at 2:53 PM
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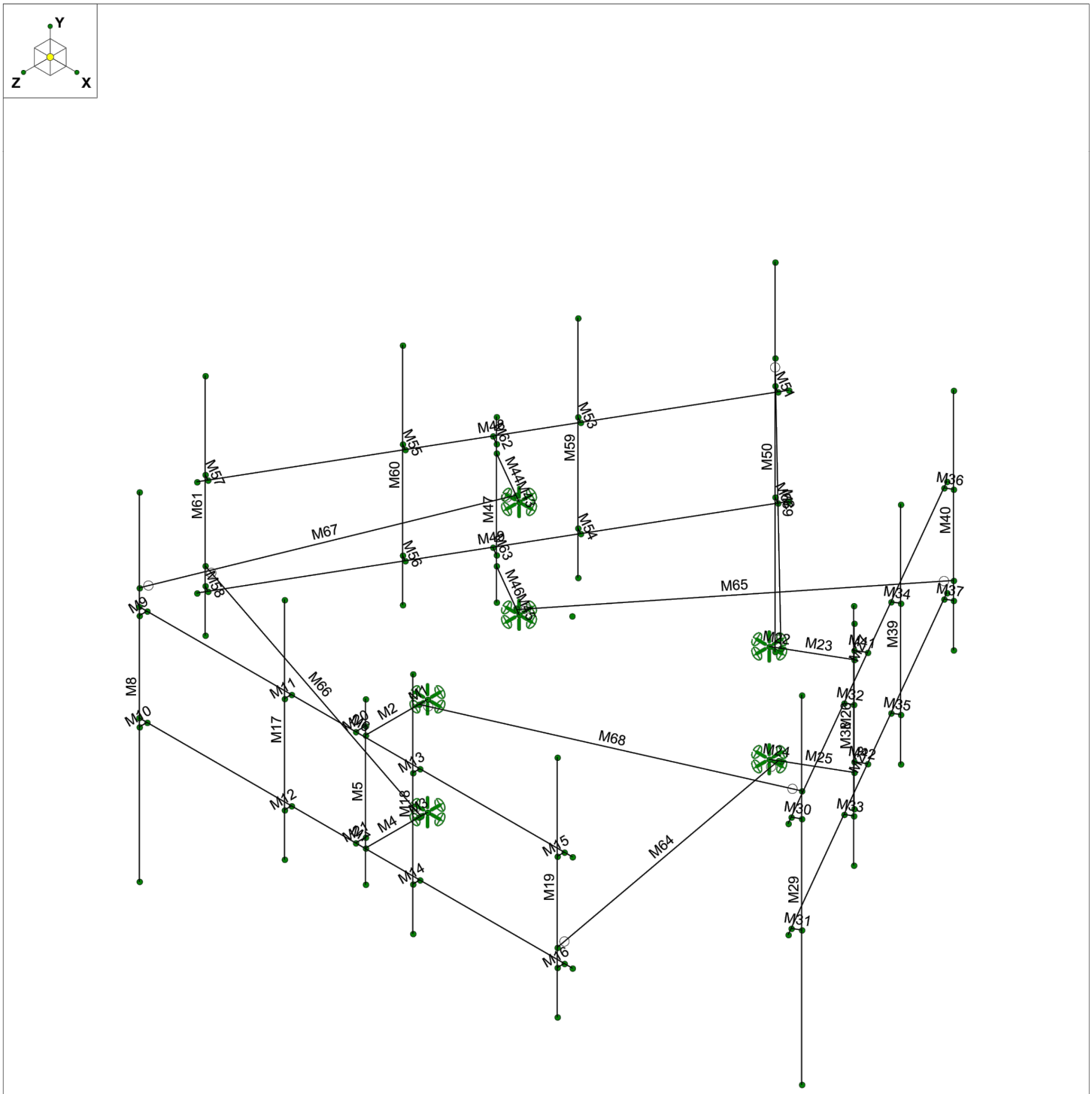

Envelope Only Solution

B+T Group	CT11214D - Waterbury/Rt 8_1	SK - 5
PG		July 8, 2019 at 2:53 PM
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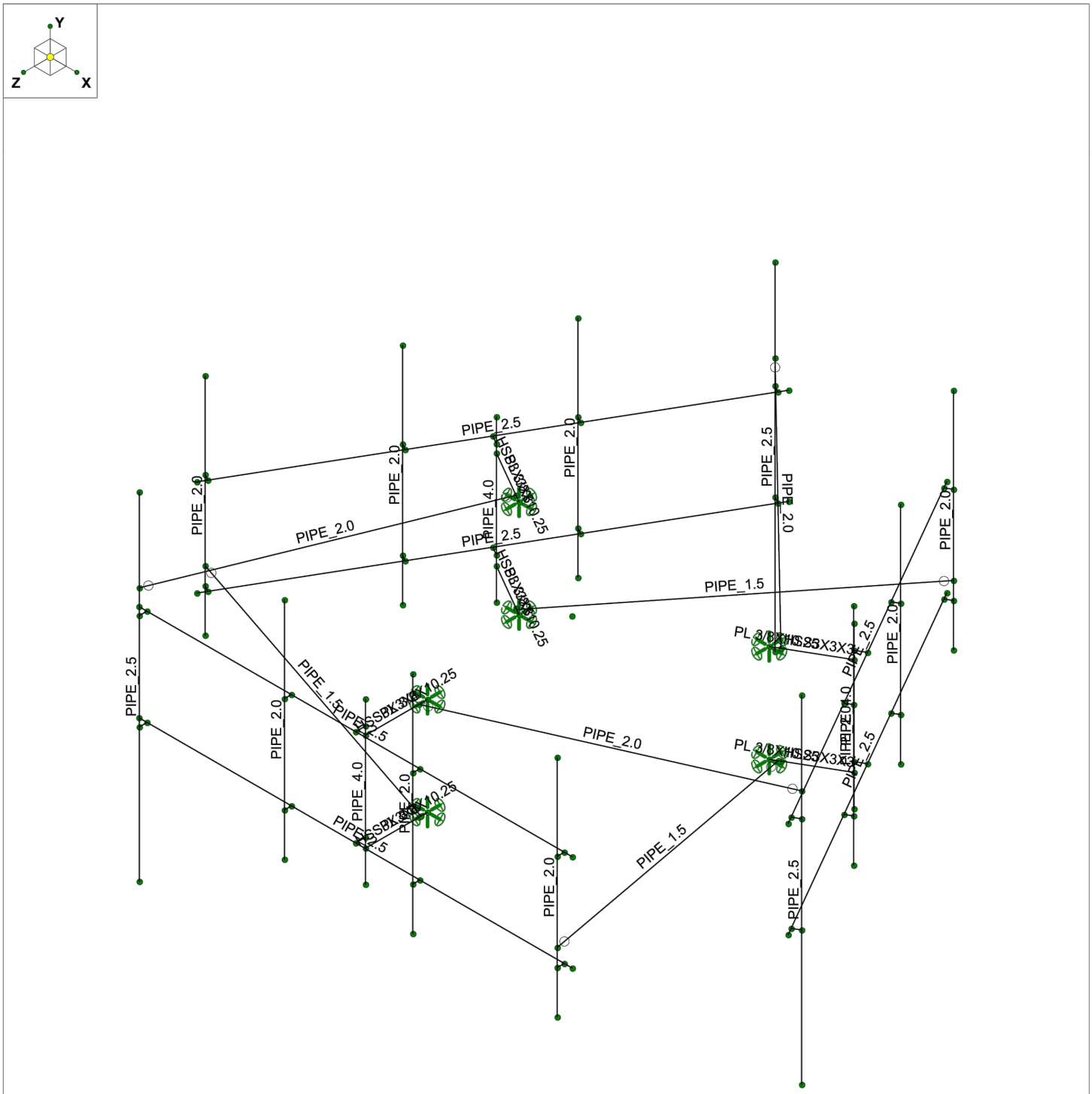

Envelope Only Solution

B+T Group	CT11214D - Waterbury/Rt 8_1	SK - 6
PG		July 8, 2019 at 2:53 PM
135648.002.01		135648_002_01_WaterburyRt 8_1...

Exhibit D

STRUCTURAL ANALYSIS REPORT
SMOKESTACK

Prepared For:

T-Mobile Northeast, LLC
35 Griffin Road South
Bloomfield, CT 06002

Structure Rating	
Smokestack:	**Pass**
Sector Mounts	**Pass**

Sincerely,
EFI Global, Inc.
License No: PEC0001245

09/22/2020

STATE OF CONNECTICUT
AHMET COLAKOGLU
PEN. 27057
LICENSED
PROFESSIONAL ENGINEER

Ahmet Colakoglu, PE
Connecticut Professional Engineer
License No: 27057

Site ID: CT11214D
Site Name: Waterbury/Rt8_1
1669 Thomaston Ave
Waterbury, CT 06074

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CONTENTS

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1.0 SUBJECT AND REFERENCES

The purpose of this analysis is to evaluate the structural capacity of the wireless telecommunication installation on the existing smoke stack located at 1669 Thomaston Avenue, Waterbury, CT 06074 for additions and alterations proposed by T-Mobile.

The structural analysis is based on the following information provided to EFI Global, Inc. (EFI):

- RFDS provided by T-Mobile, dated 08/24/2020.
- Structural Analysis Report prepared by Destek Engineering dated 06/27/2016.
- Appurtenance Mount Conditional Pass Report prepared by B+T Group, dated 07/08/2019.
- Structural Letter prepared by B+T Group, dated 07/15/2019.

1.1 STRUCTURE

The subject structure is a 134 feet tall, round, tapered brick smokestack. The stack has a diameter range of approximately 14'-3" feet at the base to 9'-9" at the top. The thickness of the smoke stack varies from 28 inches at the base to 8 inches at the top. T-Mobile has currently nine (9) panel antennas, (3) per sector, mounted on sector mounts which are attached to smokestack brick wall.

2.0 PROPOSED APPURTENANCES

Existing Configuration of T-Mobile Appurtenances:

Sector	RAD Center (ft.)	Antennas and Equipment	Mount	Coax
Alpha, Beta & Gamma	132	(3) Ericsson AIR32 B66A_B2A (3) RFS APX16DWV-16DWV-S-EA20 (3) Generic Twin Style 1A – PCS TMAs (3) Generic Twin Style 1B – AWS TMAs	(3) Sector Mounts	(18) 1-5/8" Coax (1) 6x12 HCS
	130	(3) Andrew LNX-6515DS-A1M		

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Proposed and Final Configuration of T-Mobile Appurtenances:

Sector	RAD Center (ft.)	Antennas and Equipment	Mount	Coax
Alpha, Beta & Gamma	132	(3) Ericsson AIR32 B66A_B2A (3) Ericsson AIR6449 B41 (3) Radio 4449 B71+B85 (3) Radio 4415 B25 (3) Generic Twin Style 1B – AWS TMAs (3) Commscope SDX1926Q-43	(3) Sector Mounts	(18) 1-5/8" Coax (3) 6x12 HCS
	130	(3) RFS APXVAALL24_43-UNA20		

Existing Configuration of Appurtenances by Others:

Sector	RAD Center (ft.)	Antennas and Equipment	Mount	Coax
Alpha, Beta & Gamma	120	(3) RFS APPXVERR18-C (3) Generic Antennas (6) RRUS-11	(6) Pipe Mounts	(3) 7/8" (1) 1/4" In Cable Tray

3.0 CODES AND LOADING

The analysis is in accordance with the following codes and loading as adopted in Connecticut:

- *2018 Connecticut State Building Code*.
- *Minimum Design Loads for Buildings and Other Structures SEI/ASCE 7-10*, American Society of Civil Engineers
- *Specifications for Structural Steel Buildings – Allowable Stress ANSI/AISC 360-10*, American National Standards Institute/American Institute for Steel Construction.
- *Building Requirements for Masonry Structures ACI-530-11*, American Concrete Institute.

The following load parameters were used:

- Risk Category: II
- Ultimate Wind Speed of 125 mph, converted to a nominal wind speed of 97 mph
- Exposure: B
- Ss: 0.189g
- S1: 0.064g
- Seismic Site Class D

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4.0 STANDARD CONDITIONS FOR ENGINEERING SERVICES ON EXISTING STRUCTURES

The analysis is based on the information provided to EFI and is assumed to be current and correct. Unless otherwise noted, the structure and the foundation system are assumed to be in good condition, free of defects and can achieve theoretical strength.

It is assumed that the structure has been maintained and shall be maintained during its service. The superstructure and the foundation system are assumed to be designed with proper engineering practice and fabricated, constructed and erected in accordance with the design documents. EFI will accept no liability which may arise due to any existing deficiency in design, material, fabrication, erection, construction, etc. or lack of maintenance.

The analysis does not include a qualification of the antenna mounts attached on the structure or their connections. The analysis is performed to verify the capacity of the main structural members, which is the current practice in the tower industry.

The analysis results presented in this report are only applicable for the previously mentioned existing and proposed additions and alterations. Any deviation of the proposed equipment and placement, etc., will require EFI to generate an additional structural analysis.

5.0 ANALYSIS AND ASSUMPTIONS

This structural analysis and qualification of the subject structure is based on either a load comparison or a strength check as follows:

Pursuant to 2015 International Existing Building Code Sections 707 and 807, any existing gravity load-carrying structural element for which additions and/or alterations cause an increase in design gravity load of no more than 5 percent, shall be permitted to remain unaltered, and thus considered to be Code-compliant and adequate. Any existing gravity load-carrying structural element for which additions and/or alterations cause an increase in design gravity loads exceeding 5 percent is checked against the applicable Code criteria for new structures.

Pursuant to 2015 International Existing Building Code Sections 707 and 807, any existing lateral load-carrying structural element whose demand-capacity ratio with the addition and/or alteration considered is no more than 10 percent greater than its demand-capacity ratio with the addition and/or alteration ignored shall be permitted to remain unaltered, and thus considered to be Code-compliant and adequate. If the demand-capacity ratio increase is more than 10 percent, the subject structural element is checked against the applicable Code criteria for new structures.

The analysis was performed by utilizing Risa 3-D, a commercially available structural engineering software package developed by Risa Technologies, as applicable.

This analysis assumes that new stiff-arm kits have been or will be installed according to the referenced Appurtenance Mount Conditional Pass Report prepared by B+T Group, dated 7/8/2019. If this assumption is found to be incorrect, EFI should be contacted immediately.

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6.0 RESULTS AND CONCLUSION

Smokestack: The existing smokestack is found to have **adequate** structural capacity for the proposed additions by T-Mobile. Utilizing a conservative approach, seismic shear and moment are calculated to be 3.2 and 2.4 times higher than the wind shear and moment, respectively, thus smokestack structural design is governed by seismic loads. The additional lateral loads on the smokestack due to T-Mobile and other carrier additions is approximately 1.7%, less than the 5% given by the 2015 IEBC. Therefore, further analysis of the tank is not required and the structure is considered to have adequate capacity.

Sector Mounts: The existing sector mounts have **adequate** capacity for the proposed installation by T-Mobile. For the code specified load combinations and as a maximum, the sector mounts are stressed to **72.4%** of their structural capacity.

These results are only valid if the stiff-arm kits have been or will be installed according to the referenced Appurtenance Mount Conditional Pass Report prepared by B+T Group, dated 7/8/2019. If this assumption is found to be incorrect, EFI should be contacted immediately.

Therefore, the proposed additions by T-Mobile **can** be implemented as intended with the conditions outlined in this report.

Should you need any clarifications or have any questions about this report, please contact EFI at telecom@efiglobal.com.

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APPENDIX A
PICTURES AND CALCULATIONS

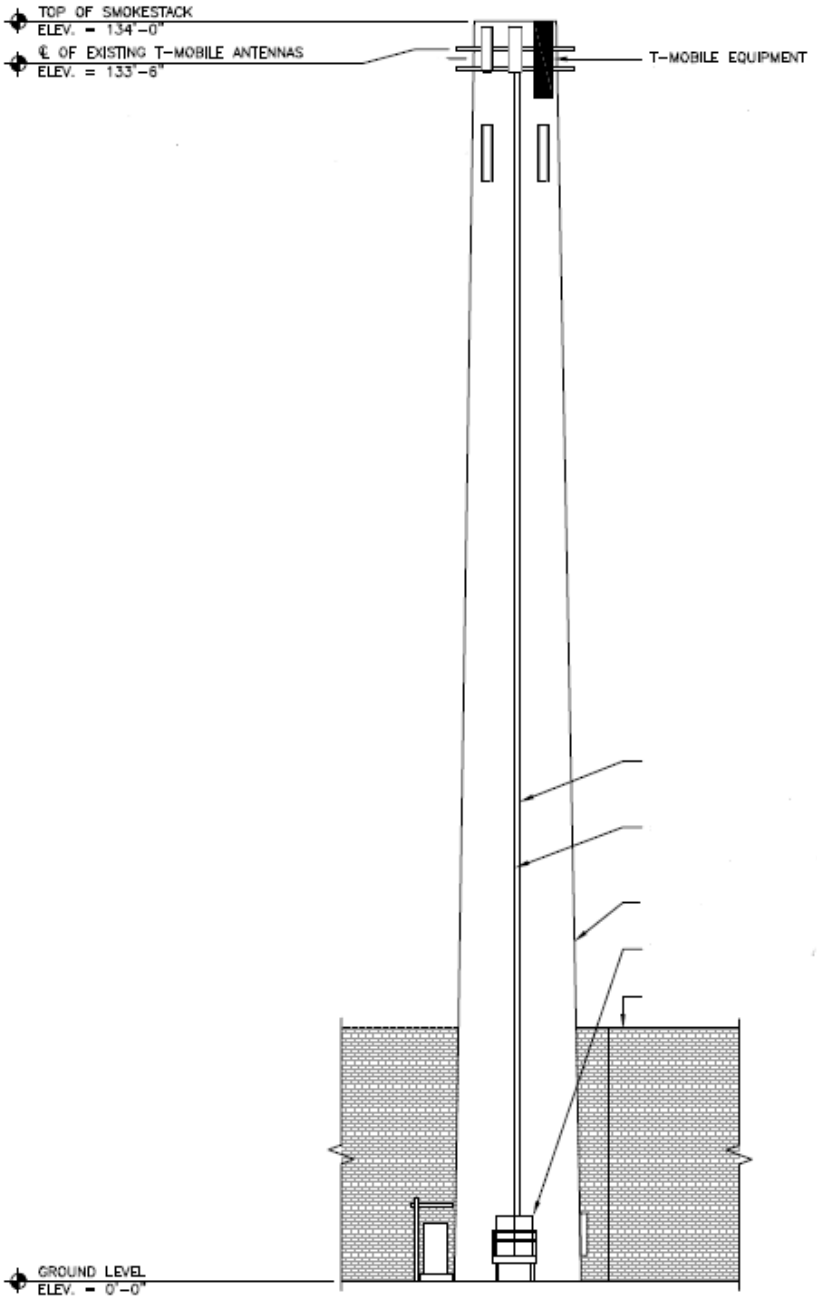
Existing smokestack and sector mounts

CALCULATION SHEET

PURPOSE

The purpose of these calculations is to determine whether the wireless telecommunication installation on the smoke stack located at 1669 Thomaston Avenue, Waterbury, CT 06074, has adequate structural capacity for the proposed additions and alterations by T-Mobile.
All calculations in accordance with 2018 Connecticut State Building Code.

1. Smoke Stack Check



Wind Loads

(reference ASCE 7-10)

ASCE 7 Reference

Input:

Location:	Waterbury, CT - New Haven County	
Classification:	II	Table 1.5-1, pg. 2
Antenna RAD Center:	$z := 134ft$	
Exposure category:	$Exp := "B"$	Section 26.7.3, pg. 251

$$z_g := \begin{cases} 1200ft & \text{if } Exp = "B" \\ 900ft & \text{if } Exp = "C" \\ 700ft & \text{if } Exp = "D" \end{cases} = 365.76 \qquad \alpha := \begin{cases} 7.0 & \text{if } Exp = "B" \\ 9.5 & \text{if } Exp = "C" \\ 11.5 & \text{if } Exp = "D" \end{cases} = 7$$

Velocity pressure exposure coefficient:	$K_z := 2.01 \cdot \left(\frac{z}{z_g}\right)^{\frac{2}{\alpha}} = 1.07$	Table 29.3-1, pg. 310
Topographic factor:	$K_{zt} := 1.0$	Section 26.8.2, pg. 254
Wind directionality factor:	$K_d := 0.85$	Table 26.6-1, pg. 250
Basic wind speed:	$V := 125 \cdot \sqrt{0.6} = 97$ mph	Appendix N of 2018 CT-BC
Gust response factor:	$G := 0.85$	Section 26.9, pg. 254
Velocity pressure:	$q_z := 0.00256 \cdot K_{zt} \cdot V^2 \cdot psf$	Equation 29.3-1, pg. 307
	$q_z = 24 \cdot psf$	
Force Coefficients:		Figure 29.5-1, pg. 312

for Flat surface | for D*sqrt(qz) >2.5 | for D*sqrt(qz) < 2.5

$$C_{F\_flat} := \begin{pmatrix} 1 & 1.3 \\ 7 & 1.4 \\ 25 & 2 \end{pmatrix} \qquad C_{F\_round\_1} := \begin{pmatrix} 1 & 0.5 \\ 7 & 0.6 \\ 25 & 0.7 \end{pmatrix} \qquad C_{F\_round\_2} := \begin{pmatrix} 1 & 0.7 \\ 7 & 0.8 \\ 25 & 1.2 \end{pmatrix}$$

CALCULATION SHEET

CALCULATE WIND LOAD ON SMOKE STACK:

Height of Stack: $H_{stack} := 134ft$

Diameter at Top and Bottom: $D_{Top} := 9ft + 9in$ $D_{Bot} := 14ft + 3in$

Wall thickness at Top and Bottom: $t_{Top} := 8in$ $t_{Bot} := 28in$

Wind directionality factor: $K_d := 0.95$

Height to top section: $z_{Top} := \frac{2}{3} H_{stack} = 89.33\,ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{Top}}{z_g} \right)^{\frac{2}{\alpha}} = 0.96$

Area exposed to wind pressure: $Area_1 := H_{stack} \cdot 0.5 \left(D_{Top} + D_{Bot} \right) = 1608\,ft^2$

Force Coefficient: $C_f := linterp\left(C_{F\_round\_1}^{\langle 0 \rangle}, C_{F\_round\_1}^{\langle 1 \rangle}, \frac{H_{stack}}{D_{Top}} \right) = 0.64$

Wind Load on Stack: $F_{wind\_stack} := q_z \cdot G \cdot C_f \cdot Area_1 \cdot K_d \cdot K_z = 19009\,lbf$ Equation (29.5-1)

Smoke Stack Wind Base Shear and Moment:

Total Wind Base Shear: $F_{wind\_stack} = 19.01 \cdot kip$

Total Wind Base Moment: $M_{wind\_stack} := F_{wind\_stack} \cdot \left(\frac{2}{3} \cdot H_{stack} \right) = 1698.1 \cdot kip \cdot ft$

Seismic Loads per ASCE 7-10

The following variables will remain constant throughout the analysis of the smoke stack and the antennas/appurtenances:

			ASCE 7-10 Reference
Occupancy category:	II		Table 1.5-1, pg. 2
Importance factor:	$I_s := 1.0$		Table 1.5-2, pg. 5
Spectral Parameters:	$S_s := 0.189$		Appendix N of 2018 CT-BC
	$S_1 := 0.064$		
	$F_a := 1.6$ } Site Class D assumed per code		Table 11.4-1, pg. 66
	$F_v := 2.4$		Table 11.4-2, pg. 66
	$S_{MS} := F_a \cdot S_s$	$S_{MS} = 0.3$	Eq. 11.4-1, pg. 65
	$S_{M1} := F_v \cdot S_1$	$S_{M1} = 0.15$	Eq. 11.4.2, pg. 65
	$S_{DS} := \frac{2}{3} \cdot S_{MS}$	$S_{DS} = 0.202$	Eq. 11.4-3, pg. 65
	$S_{D1} := \frac{2}{3} \cdot S_{M1}$	$S_{D1} = 0.102$	Eq. 11.4-4, pg. 65
Response Modification Factor:	$R := 1.25$		Table 15.4-2, pg. 142

Seismic Reponse Coefficient:

$$C_{s1} := \frac{S_{DS}}{\frac{R}{I_s}} \qquad C_{s1} = 0.1613$$

Computed from Equation 12.8-2, pg. 129.
Must be compared to max. and min. values.

Maximum Value of Cs:

Maximum value of Cs need not be greater than the value given by Equation 12.8-3: $C_s = S_{D1}/T(R/I_s)$

Period Determination, T:
per Section 12.8.2, pg. 90

Structure Height: $h_n := 134$ ft

Coefficients: $C_t := 0.02$ Table 12.8-2, pg. 90

$x := 0.75$ Table 12.8-2, pg. 90

Approx. Fundamental Period: $T_a := C_t \cdot h_n^{\,x} = 0.79$ sec Eq. 12.8-7, pg. 90

The fundamental period should not exceed:

$C_u := 1.7$ Table 12.8-1, pg. 90

$T_{max} := C_u \cdot T_a = 1.34$ sec Section 12.8.2, pg. 90

Therefore,

$T := T_a \quad T = 0.79$ sec

Maximum Seismic Response Coefficient:

$$C_{s\_max} := \frac{S_{D1}}{T \cdot \left(\frac{R}{I_s}\right)} = 0.104$$ Eq. 12.8-3, pg. 89

Minimum value for Cs:

Minimum value of Cs should not be taken less than:

$C_{s\_min} := 0.03$ Eq. 15.4-1, pg. 140

Therefore, use:

$C_s := \min(C_{s1}, C_{s\_max}) = 0.104$

$C_s := \max(C_s, C_{s\_min}) = 0.104$

CALCULATE WEIGHT OF SMOKE STACK:

Assume 125 pcf for the weight of the brick

$\gamma_{brick} := 125pcf$

Radius of Cylinder: $r_{Bot} := \frac{D_{Bot}}{2} = 7.12\ ft$ $r_{Top} := \frac{D_{Top}}{2} = 4.88\ ft$

Volume of Tapered Cylinder: $V_{Ext} := \frac{\pi \cdot H_{stack}}{3} \cdot \left(r_{Bot}^{2} + r_{Top}^{2} + r_{Bot} \cdot r_{Top} \right) = 15332.64 \cdot ft^3$

$r_{Top.I} := \frac{D_{Top}}{2} - t_{Top} = 4.21\ ft$

$r_{Bot.I} := \frac{D_{Bot}}{2} - t_{Bot} = 4.79\ ft$

Volume of Chimney Flue: $V_{flue} := \frac{\pi \cdot H_{stack}}{3} \cdot \left(r_{Bot.I}^{2} + r_{Top.I}^{2} + r_{Bot.I} \cdot r_{Top.I} \right) = 8536.65 \cdot ft^3$

Top Stack Volume: $V_1 := V_{Ext} - V_{flue} = 6796 \cdot ft^3$

Top Stack Weight: $Weight_{stack} := V_1 \cdot \gamma_{brick} = 849.5 \cdot kip$

Smoke Stack Seismic Base Shear and Moment:

Seismic Load Factor: $LF_{Seismic} := 0.7$ IBC 2015 Section 1605.3

Total Seismic Base Shear: $F_{seismic\_stack} := LF_{Seismic} \cdot C_s \cdot Weight_{stack} = 62 \cdot kip$ Eq. 12.8-1, pg. 89

Total Seismic Base Moment: $M_{seismic\_stack} := F_{seismic\_stack} \cdot \left(0.5 H_{stack} \right) = 4143 \cdot kip \cdot ft$

Determine Governing Load

$\frac{F_{wind\_stack}}{F_{seismic\_stack}} = 0.31$

$\frac{M_{wind\_stack}}{M_{seismic\_stack}} = 0.41$

==> Seismic Load Governs

Compute Antenna Loads

T-MOBILE LOADING:

Antenna RAD Center: $z_{tmobile} := 134ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{tmobile}}{z_g}\right)^{\frac{2}{\alpha}} = 1.07$ — Table 29.3-1, pg. 310

Wind directionality factor: $K_d := 0.85$ — Table 26.6-1, pg. 250

Velocity pressure: $q_z := 0.00256 \cdot K_{zt} \cdot K_z \cdot K_d V^2 \cdot psf = 21.9 \cdot psf$ — Equation 29.3-1, pg. 307

Loads on Antennas (APXVAALL24_43-U-NA20):

Dimensions : $H := 95.9in$ $W := 24in$ $D := 8.5in$ $W_{ant1} := 122.8lbf$ $n_{ant1\_front} := 1$ $n_{ant1\_side} := 2$

Front: $Area := H \cdot W = 15.98\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.35$ — Figure 29.5-1, pg. 312

$F_{ant1\_front} := q_z \cdot G \cdot C_f \cdot Area = 401.98\,lbf$ — Equation (29.5-1)

Side: $Area := H \cdot D = 5.66\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.54$ — Figure 29.5-1, pg. 312

$F_{ant1\_side} := q_z \cdot G \cdot C_f \cdot Area = 162.7\,lbf$ — Equation (29.5-1)

Loads on Antennas (AIR32 B66A/B2A):

Dimensions : $H := 56in$ $W := 12.1in$ $D := 7.9in$ $W_{ant2} := 91.5lbf$ $n_{ant2\_front} := 1$ $n_{ant2\_side} := 2$

Front: $Area := H \cdot W = 4.71\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.36$ — Figure 29.5-1, pg. 312

$F_{ant2\_front} := q_z \cdot G \cdot C_f \cdot Area = 119.27\,lbf$ — Equation (29.5-1)

Side: $Area := H \cdot D = 3.07\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.4$ — Figure 29.5-1, pg. 312

$F_{ant2\_side} := q_z \cdot G \cdot C_f \cdot Area = 80.3\,lbf$ — Equation (29.5-1)

Loads on Antennas (AIR6449 B41):

Dimensions : $H := 33.1in$ $W := 20.6in$ $D := 8.6in$ $W_{ant3} := 104lbf$ $n_{ant3\_front} := 1$ $n_{ant3\_side} := 2$

Front: $Area := H \cdot W = 4.74\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.31$ Figure 29.5-1, pg. 312

$F_{ant3\_front} := q_z \cdot G \cdot C_f \cdot Area = 115.58\,lbf$ Equation (29.5-1)

Side: $Area := H \cdot D = 1.98\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.35$ Figure 29.5-1, pg. 312

$F_{ant3\_side} := q_z \cdot G \cdot C_f \cdot Area = 49.63\,lbf$ Equation (29.5-1)

Loads on RRU (Radio 4449 B71 + B85):

Dimensions : $H := 17.9in$ $W := 13.2in$ $D := 10.6in$ $W_{rru1} := 73.2lbf$ $n_{rru1\_front} := 1$ $n_{rru1\_side} := 2$

Front: $Area := H \cdot W = 1.64\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.31$ Figure 29.5-1, pg. 312

$F_{rru1\_front} := q_z \cdot G \cdot C_f \cdot Area = 39.92\,lbf$ Equation (29.5-1)

Side: $Area := H \cdot D = 1.32\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.31$ Figure 29.5-1, pg. 312

$F_{rru1\_side} := q_z \cdot G \cdot C_f \cdot Area = 32.19\,lbf$ Equation (29.5-1)

Loads on RRU (Radio 4415 B25):

Dimensions : $H := 15in$ $W := 13.2in$ $D := 5.4in$ $W_{rru2} := 44lbf$ $n_{rru2\_front} := 1$ $n_{rru2\_side} := 2$

Front: $Area := H \cdot W = 1.37\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.3$ Figure 29.5-1, pg. 312

$F_{rru2\_front} := q_z \cdot G \cdot C_f \cdot Area = 33.36\,lbf$ Equation (29.5-1)

Side: $Area := H \cdot D = 0.56\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.33$ Figure 29.5-1, pg. 312

$F_{rru2\_side} := q_z \cdot G \cdot C_f \cdot Area = 13.93\,lbf$ Equation (29.5-1)

Loads on Generic Twin Style AWS TMA:

Dimensions : $H := 10.1in$ $W := 8.7in$ $D := 2.8in$ $W_{tma1} := 8.4lbf$ $n_{tma1\_front} := 1$ $n_{tma1\_side} := 2$

Front: $Area := H \cdot W = 0.61\ ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.3$ Figure 29.5-1, pg. 312

$F_{tma1\_front} := q_z \cdot G \cdot C_f \cdot Area = 14.81\ lbf$ Equation (29.5-1)

Side: $Area := H \cdot D = 0.2\ ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.34$ Figure 29.5-1, pg. 312

$F_{tma1\_side} := q_z \cdot G \cdot C_f \cdot Area = 4.92\ lbf$ Equation (29.5-1)

Loads on Commscope SDX1926Q-43:

Dimensions : $H := 4.173in$ $W := 6.929in$ $D := 2.913in$ $W_{tma2} := 6.17lbf$ $n_{tma2\_front} := 1$ $n_{tma2\_side} := 2$

Front: $Area := H \cdot W = 0.2\ ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.29$ Figure 29.5-1, pg. 312

$F_{tma2\_front} := q_z \cdot G \cdot C_f \cdot Area = 4.84\ lbf$ Equation (29.5-1)

Side: $Area := H \cdot D = 0.08\ ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.31$ Figure 29.5-1, pg. 312

$F_{tma2\_side} := q_z \cdot G \cdot C_f \cdot Area = 2.06\ lbf$ Equation (29.5-1)

Loads on Mounts:

Weight: $W_{mounts1} := 804lbf$ $n_{mounts1} := 1$

Number of antenna pipes: $n_{antpipes} := 4$

OD of antenna pipes: $OD_{antpipes} := 2.375in$

Length of antenna pipes $L_{antpipes1} := 126.in$ $L_{antpipes2} := 96.in$

Area of antenna pipes $A_{antpipes} := 2.OD_{antpipes}\left(L_{antpipes1} + L_{antpipes2}\right) = 7.32\ ft^2$

Number of horizontal mount pipes: $n_{mpipes} := 2$

OD of antenna pipes: $OD_{mpipes} := 2.375\,in$

Length of antenna pipes: $L_{mpipes} := 162.in$

Area of antenna pipes: $A_{mpipes} := 2.OD_{mpipes}(L_{mpipes}) = 5.34\,ft^2$

Total area of exposed mount $Area_{mount} := A_{antpipes} + A_{mpipes} = 12.67\,ft^2$

$C_f := 2.0$

Figure 29.5-1, pg. 312

Total load: $F_{mounts1} := q_z \cdot G \cdot C_f \cdot Area_{mount} = 472\,lbf$ Equation (29.5-1)

Loads on Coax:

Weight: $W_{coax1} := 1.35plf \cdot z_{tmobile} = 180.9\,lbf$ $n_{coax1} := 21$

Exposed width: $d_{coax\_tmobile} := 1.625\,in$

Number of exposed cables: $n_{exposedc\_tmobile} := 3$

Exposed Area: $Area_{coax} := n_{exposedc\_tmobile} \cdot d_{coax\_tmobile} \cdot z_{tmobile} = 54.44\,ft^2$

$C_f := 2.0$

Figure 29.5-1, pg. 312

Total load: $F_{coax1} := q_z \cdot G \cdot C_f \cdot Area_{coax} = 2028.4\,lbf$ Equation (29.5-1)

CALCULATION SHEET

Total Loading for T-Mobile:

Total Weight:

$$W_{tmobile} := W_{ant1}\cdot\left(n_{ant1\_front} + n_{ant1\_side}\right) + W_{ant2}\cdot\left(n_{ant2\_front} + n_{ant2\_side}\right) \cdots + W_{ant3}\cdot\left(n_{ant3\_front} + n_{ant3\_side}\right) + W_{rru1}\cdot\left(n_{rru1\_front} + n_{rru1\_side}\right) \cdots + W_{rru2}\cdot\left(n_{rru2\_front} + n_{rru2\_side}\right) + W_{tma1}\cdot\left(n_{tma1\_front} + n_{tma1\_side}\right) \cdots + W_{tma2}\cdot\left(n_{tma2\_front} + n_{tma2\_side}\right) + W_{mounts1}\cdot n_{mounts1} + W_{coax1}\cdot n_{coax1}$$

$$W_{tmobile} = 5.95\cdot kip$$

Total Wind Shear:

$$F_{tmobile} := F_{ant1\_front}\cdot n_{ant1\_front} + F_{ant1\_side}\cdot n_{ant1\_side} + F_{ant2\_front}\cdot n_{ant2\_front} \cdots + F_{ant2\_side}\cdot n_{ant2\_side} + F_{ant3\_front}\cdot n_{ant3\_front} + F_{ant3\_side}\cdot n_{ant3\_side} \cdots + F_{rru1\_front}\cdot n_{rru1\_front} + F_{rru1\_side}\cdot n_{rru1\_side} + F_{rru2\_front}\cdot n_{rru2\_front} \cdots + F_{rru2\_side}\cdot n_{rru2\_side} + F_{tma1\_front}\cdot n_{tma1\_front} + F_{tma1\_side}\cdot n_{tma1\_side} \cdots + F_{tma2\_front}\cdot n_{tma2\_front} + F_{tma2\_side}\cdot n_{tma2\_side} + F_{coax1} + F_{mounts1}$$

$$F_{tmobile} = 3.92\cdot kip$$

Total Wind Moment:

$$M_{tmobile} := \left(F_{tmobile} - F_{coax1}\right)\cdot z_{tmobile} + F_{coax1}\cdot\frac{2z_{tmobile}}{3} = 434.9\cdot kip\cdot ft$$

OTHER CARRIER LOADING:

Antenna RAD Center:

$$z_{oc1} := 120ft$$

Velocity pressure exposure coefficient:

$$K_z := 2.01\cdot\left(\frac{z_{oc1}}{z_g}\right)^{\frac{2}{\alpha}} = 1.04$$

Table 29.3-1, pg. 310

Wind directionality factor:

$$K_d := 0.85$$

Table 26.6-1, pg. 250

Velocity pressure:

$$q_z := 0.00256\cdot K_{zt}\cdot K_z\cdot K_d V^2\cdot psf = 21.2\cdot psf$$

Equation 29.3-1, pg. 307

Loads on Antennas (APXVRR18-C):

Dimensions : $H := 72in$ $W := 12in$ $D := 7in$ $W_{ant4} := 41.6lbf$

$n_{ant4\_front} := 1$

$n_{ant4\_side} := 2$

Front: $Area := H\cdot W = 6\,ft^2$

$$C_f := linterp\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{W}\right) = 1.38$$

Figure 29.5-1, pg. 312

$$F_{ant4\_front} := q_z\cdot G\cdot C_f\cdot Area = 149.83\,lbf$$

Equation (29.5-1)

Side: $Area := H\cdot D = 3.5\,ft^2$

$$C_f := linterp\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{D}\right) = 1.51$$

Figure 29.5-1, pg. 312

$$F_{ant4\_side} := q_z\cdot G\cdot C_f\cdot Area = 95.38\,lbf$$

Equation (29.5-1)

Loads on RRU (RRUS-11):

Dimensions : $H := 19.7in$ $W := 17in$ $D := 7.2in$ $W_{rru3} := 50.7lbf$ $n_{rru3\_front} := 4$ $n_{rru3\_side} := 2$

Front: $Area := H \cdot W = 2.33\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{W}{H}\right) = 1.3$ Figure 29.5-1, pg. 312

$F_{rru3\_front} := q_z \cdot G \cdot C_f \cdot Area = 54.48\,lbf$ Equation (29.5-1)

Side: $Area := H \cdot D = 0.98\,ft^2$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.33$ Figure 29.5-1, pg. 312

$F_{rru3\_side} := q_z \cdot G \cdot C_f \cdot Area = 23.63\,lbf$ Equation (29.5-1)

Loads on Coax:

Weight: $W_{coax2} := 0.82plf \cdot z_{oc1} = 98.4\,lbf$ $n_{coax2} := 9$

Exposed width: $d_{coax\_oc} := 0in$ Coax are inside Stack

Exposed Area: $Area_{coax} := d_{coax\_oc} \cdot z_{oc1} = 0$

$C_f := 2.0$ Figure 29.5-1, pg. 312

Total load: $F_{coax2} := q_z \cdot G \cdot C_f \cdot Area_{coax} = 0$ Equation (29.5-1)

Total Loading for Other Carrier:

Total Weight: $W_{oc1} := W_{ant4} \cdot \left(n_{ant4\_front} + n_{ant4\_side}\right) + W_{rru3} \cdot \left(n_{rru3\_front} + n_{rru3\_side}\right) \cdots + W_{coax2} \cdot n_{coax2}$

$W_{oc1} = 1.31 \cdot kip$

Total Wind Shear: $F_{oc1} := F_{ant4\_front} \cdot n_{ant4\_front} + F_{ant4\_side} \cdot n_{ant4\_side} + F_{rru3\_front} \cdot n_{rru3\_front} \cdots + F_{rru3\_side} \cdot n_{rru3\_side} + F_{coax2}$

$F_{oc1} = 0.61 \cdot kip$

Total Wind Moment: $M_{oc1} := \left(F_{oc1} - F_{coax2}\right) \cdot z_{oc1} + F_{coax2} \cdot \frac{2z_{oc1}}{3} = 72.7 \cdot kip \cdot ft$

Compare Smoke Stack Loading with Antenna Loads

Seismic:

Weight of All Additions: $W_{add} := W_{oc1} + W_{tmobile} = 7.27 \cdot kip$

Base Seismic Shear of Additions: $F_{seismic\_add} := LF_{Seismic} \cdot C_s \cdot W_{add}$

$F_{seismic\_add} = 529.1\ lbf$

Seismic Moment of Additions: $M_{seismic\_add} := LF_{Seismic} \cdot C_s \cdot \left(W_{oc1} \cdot z_{oc1} + W_{tmobile} \cdot z_{tmobile}\right)$

$M_{seismic\_add} = 69.6 \cdot kip \cdot ft$

Comparison:

$\frac{F_{seismic\_add}}{F_{seismic\_stack}} = 0.856 \cdot \%$ < 5% ==> OK

$\frac{M_{seismic\_add}}{M_{seismic\_stack}} = 1.68 \cdot \%$ < 5% ==> OK

No further analysis is required

Check Antenna Mounts

Loads on Pipes 4.0 STD:

$Dia := 4.5in$ $H := 60in$

$$C_f := \min\left[\left(\text{linterp}\left(C_{F\_round\_2}^{\langle 0\rangle}, C_{F\_round\_2}^{\langle 1\rangle}, \frac{H}{Dia}\right)\right), 1.2\right] = 0.94$$ Figure 29.5-1, pg. 312

$$F_{4.0pipe} := q_z \cdot G \cdot C_f \cdot Dia = 6.37 \cdot plf$$ Equation (29.5-1) Pg 308

Loads on Pipe Mounts 2.5 STD:

$Dia := 2.875in$ $H := 162in$

$$C_f := \min\left[\left(\text{linterp}\left(C_{F\_round\_2}^{\langle 0\rangle}, C_{F\_round\_2}^{\langle 1\rangle}, \frac{H}{Dia}\right)\right), 1.2\right] = 1.2$$ Figure 29.5-1, pg. 312

$$F_{2.0pipe} := q_z \cdot G \cdot C_f \cdot Dia = 5.19 \cdot plf$$ Equation (29.5-1) Pg 308

Loads on Pipes 2.0 STD:

$Dia := 2.375in$ $H := 126in$

$$C_f := \min\left[\left(\text{linterp}\left(C_{F\_round\_2}^{\langle 0\rangle}, C_{F\_round\_2}^{\langle 1\rangle}, \frac{H}{Dia}\right)\right), 1.2\right] = 1.2$$ Figure 29.5-1, pg. 312

$$F_{2.5pipe} := q_z \cdot G \cdot C_f \cdot Dia = 4.29 \cdot plf$$ Equation (29.5-1) Pg 308

Loads on Pipes 1.5 STD:

$Dia := 1.9in$ $H := 115in$

$$C_f := \min\left[\left(\text{linterp}\left(C_{F\_round\_2}^{\langle 0\rangle}, C_{F\_round\_2}^{\langle 1\rangle}, \frac{H}{Dia}\right)\right), 1.2\right] = 1.2$$ Figure 29.5-1, pg. 312

$$F_{4.0pipe} := q_z \cdot G \cdot C_f \cdot Dia = 3.43 \cdot plf$$ Equation (29.5-1) Pg 308

Loads on HSS 3x3x3:

$Width := 3in$ $H := 20in$

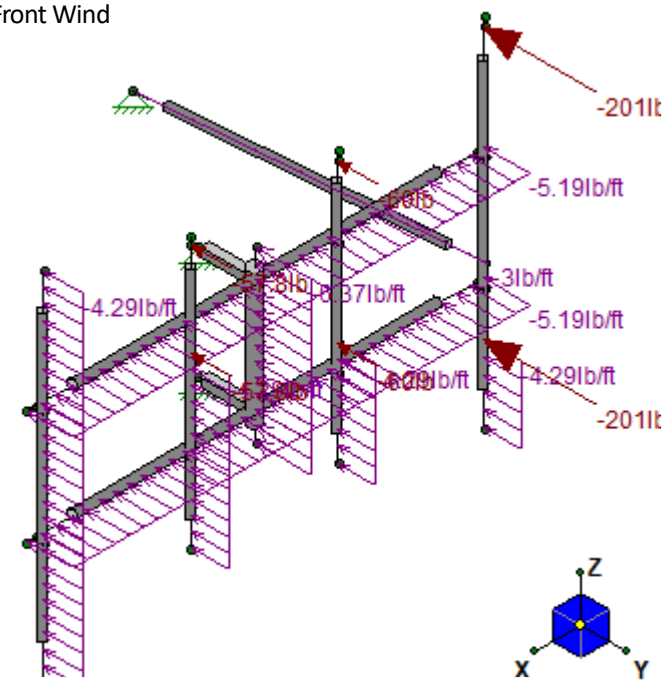
$$C_f := \min\left[\left(\text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{Width}\right)\right), 2.0\right] = 1.39$$ Figure 29.5-1, pg. 312

$$F_{L3} := q_z \cdot G \cdot C_f \cdot Width = 6.29 \cdot plf$$ Equation (29.5-1) Pg 308

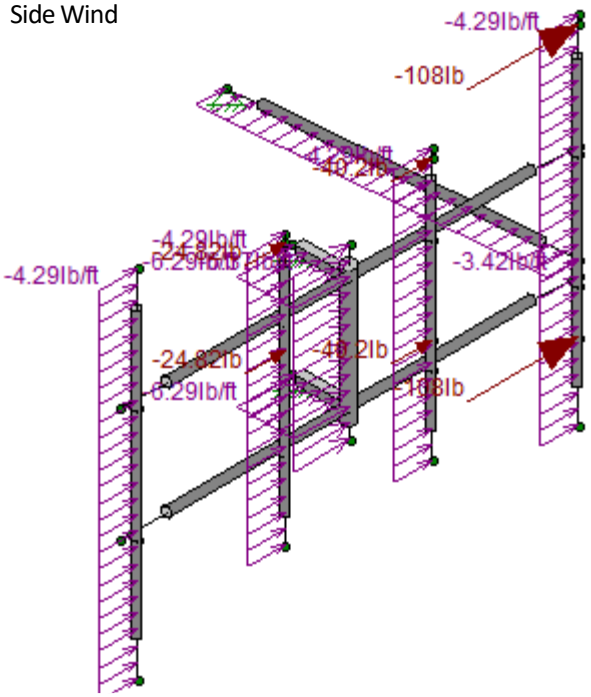
Sector Mount Analysis

Load Configuration:

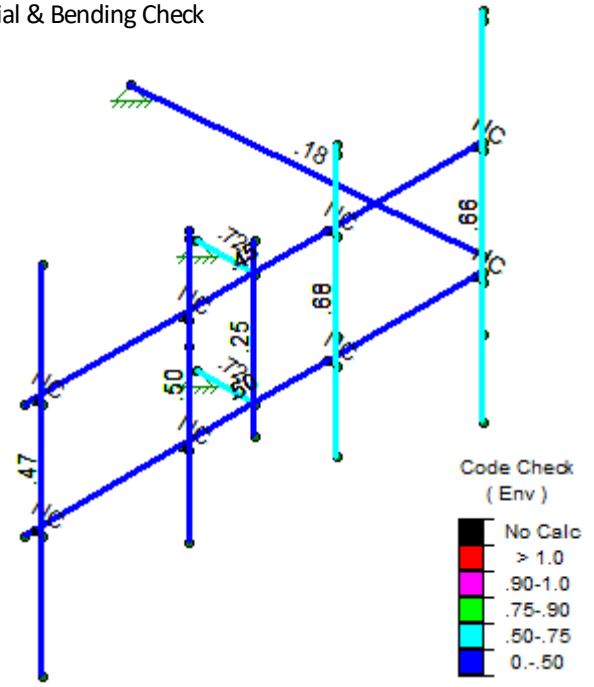
Front Wind



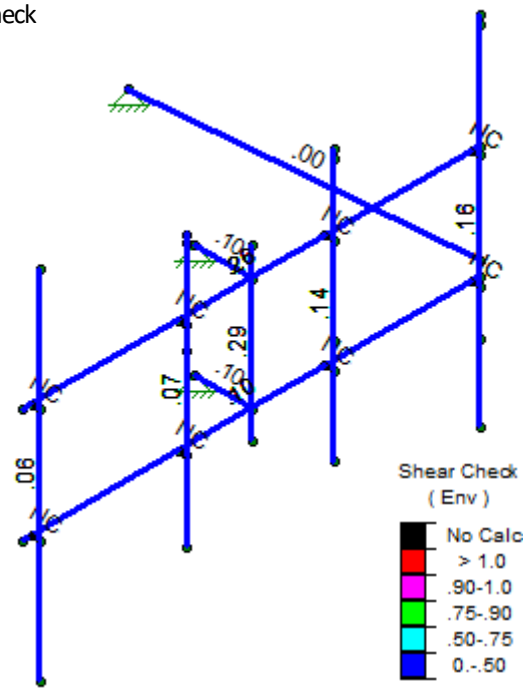
Side Wind



Axial & Bending Check



Shear Check



At a maximum, the mount members are stressed to **72.4%** of capacity.

Exhibit E

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: CT11214D

Waterbury / RT 8_1
1669 Thomaston Avenue
Waterbury, Connecticut 06704

December 16, 2020

EBI Project Number: 6220005613

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**15.80%**

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

December 16, 2020

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

Emissions Analysis for Site: CT11214D - Waterbury / RT 8_1

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **1669 Thomaston Avenue** in **Waterbury, 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 1669 Thomaston Avenue in Waterbury, 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 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 UMTS 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.

6) 4 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.

7) 2 UMTS channels (AWS Band - 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

8) 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.

9) 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.

10) 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.

11) 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.

12) 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.

13) The antennas used in this modeling are the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector A, the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector B, the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 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.

14) The antenna mounting height centerlines of the proposed antennas are 130 and 132 feet above ground level (AGL).

15) 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.

16) 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 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 / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz
Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd / 16.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd / 16.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd / 16.45 dBd
Height (AGL):	130 feet	Height (AGL):	130 feet	Height (AGL):	130 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):	13,114.79	ERP (W):	13,114.79	ERP (W):	13,114.79
Antenna A1 MPE %:	**4.01%**	Antenna B1 MPE %:	**4.01%**	Antenna C1 MPE %:	**4.01%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32
Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz
Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd
Height (AGL):	132 feet	Height (AGL):	132 feet	Height (AGL):	132 feet
Channel Count:	8	Channel Count:	8	Channel Count:	8
Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts
ERP (W):	12,841.53	ERP (W):	12,841.53	ERP (W):	12,841.53
Antenna A2 MPE %:	**2.65%**	Antenna B2 MPE %:	**2.65%**	Antenna C2 MPE %:	**2.65%**
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:	22.05 dBd / 22.05 dBd	Gain:	22.05 dBd / 22.05 dBd	Gain:	22.05 dBd / 22.05 dBd
Height (AGL):	132 feet	Height (AGL):	132 feet	Height (AGL):	132 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):	38,477.89	ERP (W):	38,477.89	ERP (W):	38,477.89
Antenna A3 MPE %:	**7.94%**	Antenna B3 MPE %:	**7.94%**	Antenna C3 MPE %:	**7.94%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	14.60%
Sprint	1.2%
Site Total MPE % :	15.80%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	14.60%
T-Mobile Sector B Total:	14.60%
T-Mobile Sector C Total:	14.60%
Site Total MPE % :	15.80%

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 600 MHz LTE	2	591.73	130.0	2.52	600 MHz LTE	400	0.63%
T-Mobile 600 MHz NR	1	1577.94	130.0	3.36	600 MHz NR	400	0.84%
T-Mobile 700 MHz LTE	2	695.22	130.0	2.96	700 MHz LTE	467	0.63%
T-Mobile 1900 MHz UMTS	2	1052.26	130.0	4.48	1900 MHz UMTS	1000	0.45%
T-Mobile 1900 MHz LTE	2	2104.51	130.0	8.95	1900 MHz LTE	1000	0.90%
T-Mobile 2100 MHz UMTS	2	1324.71	130.0	5.64	2100 MHz UMTS	1000	0.56%
T-Mobile 1900 MHz GSM	4	1028.30	132.0	8.49	1900 MHz GSM	1000	0.85%
T-Mobile 1900 MHz LTE	2	2056.61	132.0	8.49	1900 MHz LTE	1000	0.85%
T-Mobile 2100 MHz LTE	2	2307.55	132.0	9.52	2100 MHz LTE	1000	0.95%
T-Mobile 2500 MHz LTE	1	19238.94	132.0	39.70	2500 MHz LTE	1000	3.97%
T-Mobile 2500 MHz NR	1	19238.94	132.0	39.70	2500 MHz NR	1000	3.97%
						Total:	**14.60%**

• 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:	14.60%
Sector B:	14.60%
Sector C:	14.60%
T-Mobile Maximum MPE % (Sector A):	14.60%
Site Total:	15.80%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **15.80%** 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 F

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US POSTAGE
Flat Rate Env

01/15/2021 Mailed from 01566 062S0000001311

P

PRIORITY MAIL 2-DAY™

DEBORAH CHASE
NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST STE 2
STURBRIDGE MA 01566-1359

Expected Delivery Date: 01/19/21
Ref#: 214D-ANCH

0006

C035

SHIP TO: NEIL M O'LEARY
MAYOR-CITY OF WATERBURY
235 GRAND ST
WATERBURY CT 06702-1915

USPS TRACKING #

9405 5036 9930 0234 1045 73

Electronic Rate Approved #038555749

Cut on dotted line.

Instructions

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

Click-N-Ship® Label Record

USPS TRACKING # :
9405 5036 9930 0234 1045 73

Trans. #:	521506350
Print Date:	01/13/2021
Ship Date:	01/15/2021
Expected Delivery Date:	01/19/2021

Priority Mail® Postage:	**$7.75**
Total:	**$7.75**

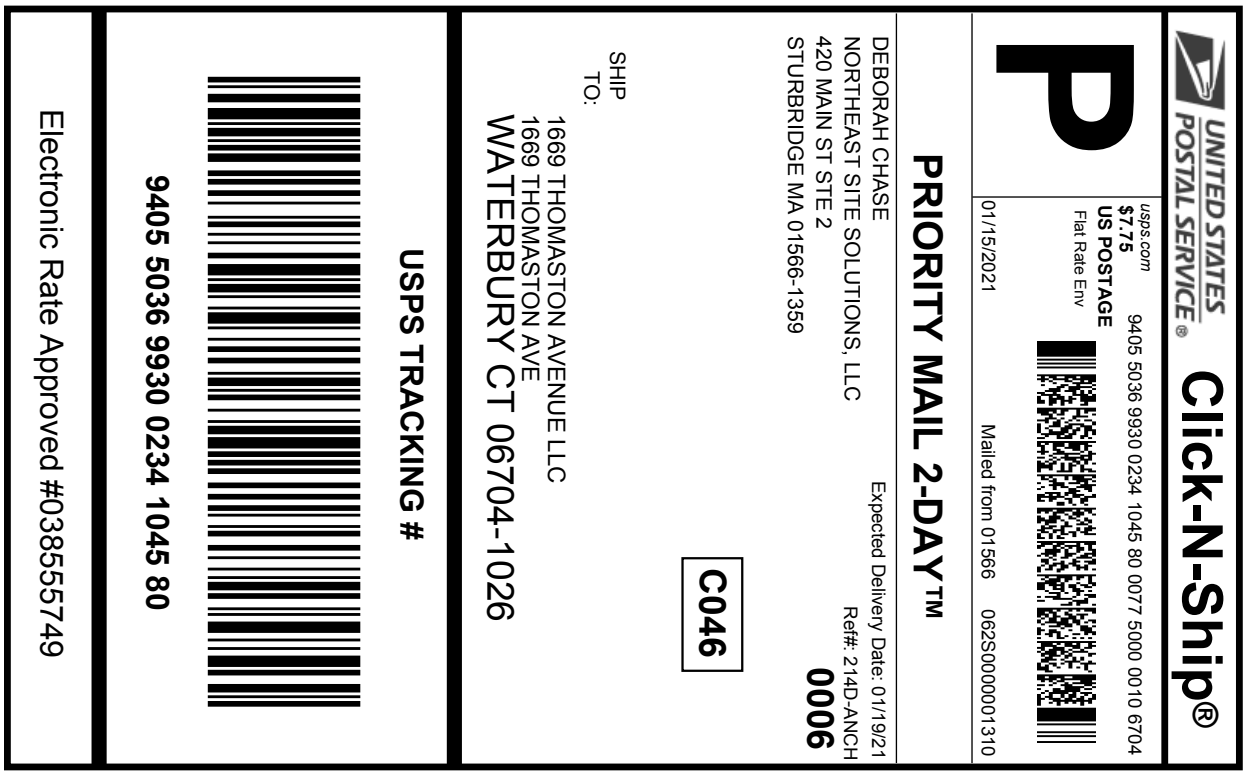
From: DEBORAH CHASE Ref#: 214D-ANCH
NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST STE 2
STURBRIDGE MA 01566-1359

To: NEIL M O'LEARY
MAYOR-CITY OF WATERBURY
235 GRAND ST
WATERBURY CT 06702-1915

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

UNITED STATES POSTAL SERVICE®

Thank you for shipping with the United States Postal Service!
Check the status of your shipment on the USPS Tracking® page at usps.com



Cut on dotted line.

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Click-N-Ship® Label Record

USPS TRACKING # :
9405 5036 9930 0234 1045 80

Trans. #:	521506350
Print Date:	01/13/2021
Ship Date:	01/15/2021
Expected Delivery Date:	01/19/2021

Priority Mail® Postage:	**$7.75**
Total:	**$7.75**

From: DEBORAH CHASE Ref#: 214D-ANCH
NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST STE 2
STURBRIDGE MA 01566-1359

To: 1669 THOMASTON AVENUE LLC
1669 THOMASTON AVE
WATERBURY CT 06704-1026

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

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UNITED STATES POSTAL SERVICE®

Click-N-Ship®

9405 5036 9930 0234 1045 97 0077 5000 0089 0245

usps.com
$7.75
US POSTAGE
Flat Rate Env

01/15/2021 Mailed from 01566 062S0000001307

P

PRIORITY MAIL 2-DAY™

DEBORAH CHASE
NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST STE 2
STURBRIDGE MA 01566-1359

Expected Delivery Date: 01/19/21
Ref#: 214D-ANCH

0006

C012

SHIP TO: LD AQUISITION COMPANY 8 LLC
400 CONTINENTAL BLVD
STE 500
EL SEGUNDO CA 90245-5078

USPS TRACKING #

9405 5036 9930 0234 1045 97

Electronic Rate Approved #038555749

Cut on dotted line.

Instructions

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Click-N-Ship® Label Record

USPS TRACKING # :
9405 5036 9930 0234 1045 97

Trans. #:	521506350
Print Date:	01/13/2021
Ship Date:	01/15/2021
Expected Delivery Date:	01/19/2021

Priority Mail® Postage:	**$7.75**
Total:	**$7.75**

From: DEBORAH CHASE Ref#: 214D-ANCH
NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST STE 2
STURBRIDGE MA 01566-1359

To: LD AQUISITION COMPANY 8 LLC
400 CONTINENTAL BLVD
STE 500
EL SEGUNDO CA 90245-5078

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

UNITED STATES POSTAL SERVICE®

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Check the status of your shipment on the USPS Tracking® page at usps.com

Exhibit G

Deborah Chase

From: Deborah Chase
Sent: Friday, January 15, 2021 9:33 AM
To: 'noleary@waterburyct.org'; 'rnerney@waterburyct.org'
Cc: 'gbrown@landmarkdividend.com'
Subject: 1669 THOMASTON AVENUE, WATERBURY, CT 06710 T-MOBILE EM APPLICATION (CT11214D-ANCHOR)
Attachments: 1669 THOMASTON AVENUE, WATERBURY, CT 06710 T-MOBILE EM APPLICATION (CT11214D Anchor).pdf

Good morning
This is to inform you that you will be receiving a copy of T-Mobile's Exempt Modification (Zoning) Application to the CT Siting Council for the site listed above.
It will be delivered via Priority Mail.
Please let me know if you have any questions.
Thank you very much

Deborah Chase
Senior Project Coordinator & Analyst
Mobile: 860-490-8839

Save a tree. Refuse.Reduce. Reuse. Recycle.